



MONITORING YEAR 4

ANNUAL 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: April-September 2019

Final Submission Date: October 21, 2019

PREPARED FOR:



NC Department of Environmental Quality

Division of Mitigation Services

1652 Mail Service Center

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PREPARED BY:



Wildlands Engineering, Inc.
1430 South Mint Street, Suite 104
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October 21, 2019

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

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

Dear Mr. Reid:

Wildlands Engineering, Inc. (Wildlands) has reviewed the Division of Mitigation Services (DMS) comments from the Draft Monitoring Year 4 report for the Moores Fork Stream Mitigation Project. The following Wildlands responses to DMS's report comments are noted in italics lettering.

DMS comment; 1.2.2 Vegetation Areas of Concern: The invasive species contractor continued to treat invasives at the site throughout the monitoring year. Treatments occurred in February, July and September during 2019. DMS will continue to treat invasives at the site through closeout.

Wildlands response; Text was added to Section 1.2.2 to specify the invasive treatments dates in 2019 and indicate that treatments will continue through closeout.

DMS comment; 1.2.2 Vegetation Areas of Concern: The supplemental planting that was completed in March 2019 consisted of 400 bare roots spread across four areas of the site determined to have low stem density based on the MY3 plant warranty inspection report. A pdf of the areas has been included. Please add these areas to the CCPV.

Wildlands response; Text was added to Section 1.2.2 to indicate that 400 bare roots were planted in March 2019. The four areas where supplemental planting took place were added to the CCPV.

DMS comment; 1.2.4 Stream Areas of Concern: DMS had an on-site meeting with the IRT on June 10, 2019 to discuss repair opportunities for Moores Fork. Following that meeting, DMS contracted with a design firm to develop a repair plan for approximately nine areas of instability throughout the site. The assessment and design will occur fall/winter 2019 followed by construction in fall 2020.

Wildlands response; Text was added to Section 1.2.4 to detail the repair plan timeline for the Site.

DMS comment; 1.2.4 Stream Areas of Concern: DMS contracted with APHIS to control beaver and dams at the site in 2019. APHIS removed multiple beaver and five dams in July 2019. APHIS will



continue to monitor the site for beaver activity through closeout. A map is included with approximate locations of the dams. Please add this to the CCPV.

Wildlands response; Text was added to Section 1.2.4 to detail the management of beaver activity for the Site in 2019. The approximate locations of the dams were added to the CCPV.

DMS comment; Table 2: Please add the following activities:

- **September 2019 to Invasive Species Treatment dates.**
- **Beaver/Dam Removal July 2019**

Wildlands response; The adaptive management activities and dates were updated in Table 2.

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

Wildlands response; Wildlands will continue to update the CCPV figures as treatment of invasive species occurs and populations are reduced.

Enclosed please find three (3) hard copies and one (1) electronic copy on CD of the Final Monitoring Report. Please contact me at 704-941-9093 if you have any questions.

Sincerely,

A handwritten signature in black ink that reads "Kirsten Y. Gimbert".

Kirsten Y. Gimbert
Project Manager
kgimbert@wildlandseng.com

EXECUTIVE SUMMARY

The North Carolina Department of Environmental Quality (NCDEQ) Division of Mitigation Services (DMS) restored, enhanced, and preserved approximately 19,587 linear feet (LF) of Moores Fork and 13 unnamed tributaries (UTs), provided livestock fencing and alternative water sources to 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 (Cataloging Unit 03040101). The Moores Fork Stream Mitigation Project (Site) will net 11,587.543 stream mitigation units 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 (MY) 4 activities were completed in September 2019.

The Site is on track to meet monitoring success criteria for MY7 vegetation, geomorphology, and hydrology performance standards. The MY4 vegetation survey resulted in an average stem density of 459 planted stems per acre. The Site is on track to meet the MY5 density requirement of 260 planted stems per acre, with 10 of the 12 plots (83%) individually meeting this requirement. In addition, the Site is on track to meet the average planted stem height requirement of 8 feet by the end of MY7, with an average stem height for all plots in MY4 of approximately 9.3 feet. The MY4 vegetation monitoring and visual assessment revealed invasive plant populations have been reduced due to ongoing treatment. Supplemental planting was completed in March 2019 in areas with low stem density based on the MY3 plant warranty inspection report. A few instances of localized bank erosion and structure instability are present on the Site. During MY4, at least two bankfull events occurred on Moores Fork and one bankfull event occurred on Silage Tributary. The performance standard of two recorded bankfull events in separate monitoring years has been met for both Moores Fork and Silage Tributary.



MOORES FORK STREAM MITIGATION PROJECT
Year 4 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 Hydrologic Unit Code (HUC) 03040101 and the 14-digit HUC 03040101100010 (Figure 1). Located in the Piedmont physiographic province (NCGS 2004), the project watershed primarily includes agricultural land cover. The drainage area for the lower end of Moores Fork is 1,527 acres, and the drainage area for Silage Tributary is 156 acres. The Site is located approximately 0.25 mile north of NC 89 on Horton Road. The project site is located on both sides of Horton Road. Latitude and longitude for the site are 36.506671 N and -80.704115 W, respectively (Figure 1).

The NCDEQ DMS restored, enhanced, and preserved approximately 19,587 LF of Moores Fork and 13 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 11,587.543 stream mitigation units (SMUs) through a combination of restoration, enhancement I and II, and preservation. Due to overhead utility easements that cross project streams, 7.8 SMUs were removed on Silage Tributary Reach 2 (starting at STA 30+10.49 and ending at STA 30+33.95), 10.4 SMUs were removed on Moores Fork (starting at STA 37+22.01 and ending at STA 37+42.79), and 4.1 SMUs were removed on Corn Trib (starting at STA 19+38.58 and ending at STA 19+59.15) as shown in Table 1 of Appendix A.

The final design was completed in June 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. The Monitoring Year 4 monitoring activities were completed in September 2019. 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 MY4 monitoring efforts.

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, and 10) in a permanent conservation easement.

1.2 Monitoring Year 4 Data Assessment

Annual monitoring was conducted during MY4 (April to September 2019) to assess the condition of the project. The stream restoration success criteria for the Site follows the approved performance standards presented in the Moores Fork Stream Mitigation Project Final Mitigation Plan (Confluence, 2012). Annual monitoring will be conducted for seven years to provide a project data chronology that will facilitate an understanding of project status and trends.

1.2.1 Vegetation Assessment

A total of 12 vegetation monitoring plots were established during the baseline monitoring within the project easement areas using a standard 10 by 10 meter plot. Please refer to Figures 3.0-3.6 in Appendix B for the vegetation monitoring locations. 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 MY4 vegetation survey was completed in August 2019, resulting in an average stem density of 459 planted stems per acre. The Site is on track to meet the MY5 density requirement of 260 planted stems per acre, with 10 of the 12 plots (83%) individually meeting this requirement. Vegetation plots 2 and 3 have densities of 243 and 202 planted stems per acre respectively and did not meet the MY5 interim success criteria. However, vegetation plot 2 is still on track to meet the MY7 density requirement of 210 planted stems per acre. Overall, there was no net change in the planted stem density from MY3 to MY4. There is an average of 11 stems per plot. The average stem height for all plots in MY4 is about 9.3 feet. Approximately 10% of the planted stems scored a vigor of 2, indicating that they have fair plant health with some damage present. This low vigor rating is due to damage from storm events, suffocation from dense herbaceous cover, insects, 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 and Management Activity

Some vegetation problem areas of invasive plant populations were identified MY4 throughout the Site. Species included: kudzu (*Pueraria montana*), Chinese privet (*Ligustrum sinense*), Japanese honeysuckle (*Lonicera japonica*), Multiflora rose (*Rosa multiflora*), Winter Creeper (*Euonymus fortunei*), oriental bittersweet (*Celastrus orbiculatus*), and Japanese stilt grass (*Microstegium vimineum*). The invasive treatments that occurred in 2018 and continued in February, July, and September 2019 have significantly reduced these vegetation areas of concern. Invasive treatments at the Site will continue through closeout. Many planted stems continue to be damaged from vine strangulation along Barn Tributary Reach 1. Areas of invasive species that persist throughout the conservation easement are indicated on Figures 3.0-3.6 in Appendix B.

The site has a strong herbaceous cover consisting of various species of clover, rye grass, fescue, and sedge. Supplemental planting consisting of 400 bare roots was completed in March 2019 in areas with low stem density based on the MY3 plant warranty inspection report. Isolated bare/poorly vegetated areas that were observed in MY3 have herbaceous cover that is becoming established in MY4. These vegetation areas of concern and management activities are shown in Figures 3.0-3.6 in Appendix B.

1.2.3 Stream Assessment

MY4 is a reduced monitoring year that does not require morphological surveys; therefore no cross-sectional survey was performed this year. In general, MY4 riffle pebble counts in Moores Fork indicate coarser sediment size distribution as compared to MY0. Along Silage Tributary, MY4 riffle pebble counts indicate similar or coarser sediment size distribution as compared to MY0. Please refer to Appendix D for pebble count plots.

1.2.4 Stream Areas of Concern and Management Activity

Stream areas of concern include localized instances of bank instability and sediment deposition. Along Moores Fork, new or expanded areas of bank erosion was noted in MY4 (STA 21+60, 23+80, 35+40, 45+10, 64+10). The most significant erosion along Moores Fork is located just upstream of the bridge (STA 35+40) where a point bar is re-directing flow into the left bank. Additionally, at the end of Moores Fork Reach 3 (STA 64+10) bank erosion has continued to scour the left bank behind a log vane structure. At both wetland outlets to Moores Fork below UT8 and UT10, the headcuts have worsened and migrated further into the wetlands. These headcuts are likely to worsen without maintenance. Along Silage Tributary, several new or expanded areas of bank instability were noted in MY4 (STA 23+00, 24+50, 25+60, 28+70, 31+10). Areas with rill formations (gully) were noted, especially on the left bank of Silage Reach 1 near STA 14+30. Several structures along Silage Tributary Reach 1 and 2 have been undermined including log structures at STA 15+80, 18+20, 26+90, 31+90, 33+10 and a boulder step footer at STA 35+20. The Pond Tributary continues to experience sedimentation that is accumulating within the upstream section of the tributary, resulting in channel braiding. At the project start of Corn Tributary, a significant headcut and erosion around the culvert was observed. These areas will continue to be monitored in future years for signs of accelerated instability.

DMS has contracted with a design firm to develop a repair plan for approximately nine areas of instability throughout the Site. The assessment and design will occur fall/winter 2019 followed by construction in fall 2020. DMS has also contracted with APHIS to control beaver and dams at the Site in 2019. APHIS removed multiple beaver and five dams in July 2019 and will continue to monitor the Site for beaver activity through closeout. Stream areas of concern and management activities are shown in Figures 3.0-3.6 in Appendix B.

1.2.5 Hydrology Assessment

Bankfull data collected on March 13 and June 19, 2019 indicate that bankfull events occurred in MY4. At least two bankfull events on Moores Fork and one bankfull event on Silage Tributary were documented with crest gage measurements and debris wracklines in MY4. Monthly rainfall data indicate higher than the normal rainfall amounts occurred during the months of February and June 2019 (NCCRONOS, 2019). Hydrologic success criteria for the Site states that two bankfull flow events must be documented on restoration reaches within the seven-year monitoring period and must occur in separate years. Four bankfull events have been documented for Moores Fork and three bankfull events have been documented for Silage Tributary in separate years. Therefore, the performance standard for the Site has been met. Refer to Appendix E for hydrologic data and graphs.

1.3 Monitoring Year 4 Summary

The Site is on track to meet monitoring success criteria for MY7 vegetation, geomorphology, and hydrology performance standards. The MY4 vegetation survey resulted in an average stem density of 459 planted stems per acre. The Site is on track to meet the MY5 density requirement of 260 planted stems per acre, with 10 of the 12 plots (83%) individually meeting this requirement. The MY4 vegetation monitoring and visual assessment revealed invasive plant populations have been reduced due to ongoing treatment. Supplemental planting was completed in March 2019 in areas with low stem density based on the MY3 plant warranty inspection report. A few instances of localized bank erosion and structure instability are present on the Site and are likely to require the implementation of maintenance measures to deter further degradation. During MY4, at least two bankfull events occurred on Moores Fork and one bankfull event occurred on Silage Tributary. The performance standard of two recorded bankfull events in separate monitoring years has been met for both Moores Fork and 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

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



Section 3: REFERENCES

- Confluence Engineering, PC. 2012. Moores Fork Stream Mitigation Plan. NCEEP, Raleigh, NC.
- Doll, B.A., Grabow, G.L., Hall, K.A., Halley, J., Harman, W.A., Jennings, G.D., and Wise, D.E. 2003. Stream Restoration A Natural Channel Design Handbook.
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- 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>
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- North Carolina Geological Survey (NCGS). 2004. Physiography of North Carolina. Map compiled by the Division of Land Resources. Raleigh.
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- United States Geological Survey (USGS), 1998. North Carolina Geology. <https://deq.nc.gov/about/divisions/energy-mineral-land-resources/north-carolina-geological-survey/>



APPENDIX A. General Tables and Figures

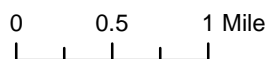
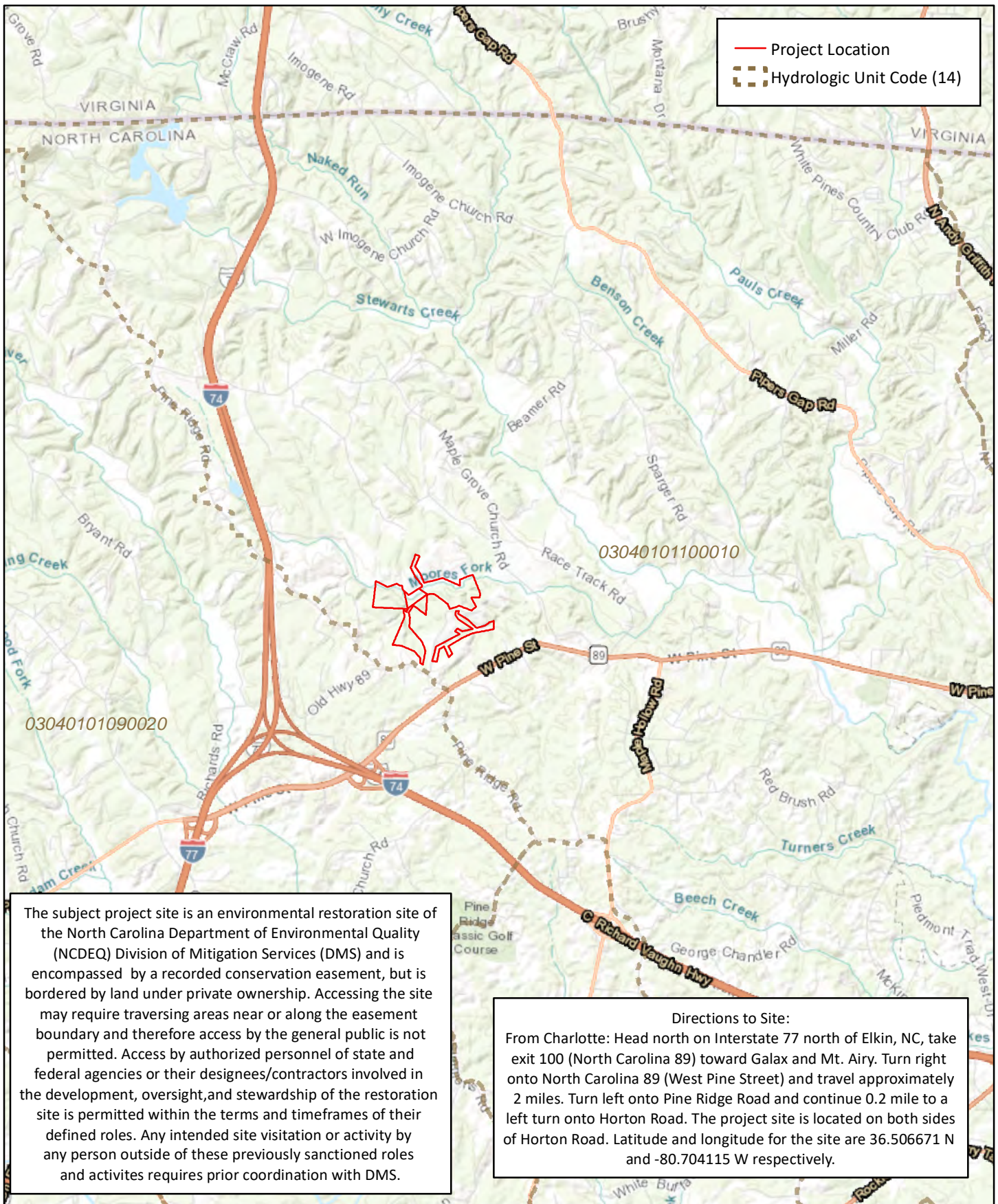


Figure 1 Project Vicinity Map
 Moores Fork Stream Mitigation Site
 DMS Project No. 94709
 Monitoring Year 4 - 2019

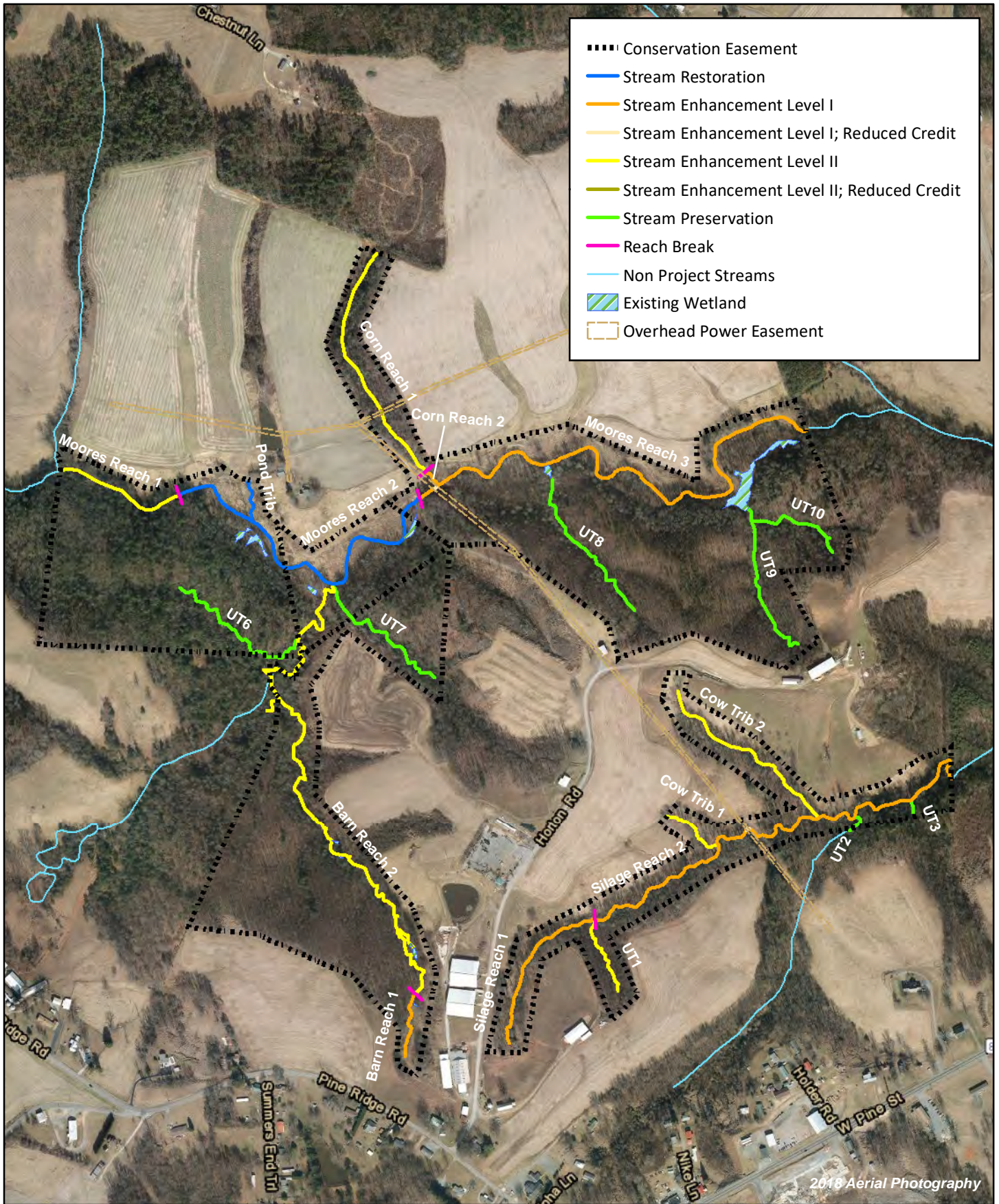


Figure 2 Project Component/Asset Map
 Moores Fork Stream Mitigation Site
 DMS Project No. 94709
 Monitoring Year 4 - 2019

Table 1. Project Components and Mitigation Credits

Moore's Fork Stream Mitigation Project

DMS Project No. 94709

Monitoring Year 4 - 2019

Mitigation Credit Summaries ¹								
Type	Restoration	Enhancement I	Enhancement II	Preservation				
Total	2071.000	5757.790	2902.953	855.800				
Project Components ¹								
Project Component or Reach ID	Stationing	Pre-project Footage or Acreage	Restoration Footage or Acreage	Restoration Level	Restoration or Rest Equiv.	Mitigation Ratio	Mitigation Credits	Notes
Moore's Reach 1	STA 989-1750	761	761	N/A	EII	2.5:1	304.400	-
Moore's Reach 2	STA 1750-3578	1,636	1,828	P2	R	1:1	1,828.000	-
Moore's Reach 3	STA 3578-6410	2,856	2,832	P2/3	EI	1:1	2,821.610	Reduction in 10.39 SMU because of 20' overhead powerline easement
Silage Reach 1	STA 1000-1900	900	900	P1	EI	1:1	900.000	-
Silage Reach 2	STA 1900-4348	2,448	2,448	P3	EI	1.5:1	1,624.180	Reduction in 7.82 SMU because of 20' overhead powerline easement.
Cow Trib 1	STA 1219-1386	167	167	P4	EII	1.5:1	111.333	-
Cow Trib 2	STA 1331-2098	767	767	P4	EII	1.5:1	511.333	-
Pond Trib	STA 1000-1243	194	243	P2	R	1:1	243.000	-
Barn Reach 1	STA 1000-1300	300	300	P3	EI	1:1	300.000	-
Barn Reach 2	STA 1350-3746; STA 4069-4757	3,134	3,134	N/A	EII	2.5:1	1,253.600	-
Corn Reach 1	STA 1000-2350	1,350	1,350	N/A	EII	2.5:1	535.886	Reduction in 4.114 SMU because of 20' overhead powerline
Corn Reach 2	STA 2350-2462	112	112	P3	EI	1:1	112.000	-
UT1	STA 1000-1466	466	466	N/A	EII	2.5:1	186.400	-
Preservation Reaches	UTs 2,3,6,7,8,9,10	4,279	4,279	N/A	P	5:1	855.800	-
Length and Area Summations ¹								
Restoration Level	Stream (Linear Feet)	Riparian Wetland (acres)		Non-riparian Wetland (acres)	Buffer (Square feet)	Upland (acres)		
		Riverine	Non-Riverine					
		-						
Restoration	2,071	-	-	-	-	-	-	-
Enhancement		-	-	-	-	-	-	-
Enhancement I	6,592							
Enhancement II	6,645							
Creation		-	-	-			-	-
Preservation	4,279	-	-	-			-	-
High Quality Preservation		-	-	-			-	-
		-	-	-			-	-

N/A - Not Applicable

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

Table 2. Project Activity and Reporting History

Moore's Fork Stream Mitigation Project
 DMS Project No. 94709
Monitoring Year 4 - 2019

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

N/A - Not Applicable

Table 3. Project Contacts Table

Moore's Fork Stream Mitigation Project
 DMS Project No. 94709
Monitoring Year 4 - 2019

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

Table 4a. Project Baseline Information and Attributes

Moores Fork Stream Mitigation Project

DMS Project No. 94709

Monitoring Year 4 - 2019

Project Information					
Project Name	Moores Fork Stream Mitigation Project				
County	Surry				
Project Area (acres)	~140				
Project Coordinates (latitude and longitude)	36.506671 N, 80.704115 W				
Project Watershed Summary Information					
Physiographic Province	Piedmont				
River Basin	Yadkin				
USGS Hydrologic Unit 8-digit	03040101				
USGS Hydrologic Unit 14-digit	03040101100010				
DWR Sub-basin	Pee Dee River Subbasin 03-07-02				
Project Drainage Area (acres)	1,527 ac (2.39 mi ²)				
Project Drainage Area Percentage of Impervious Area	<5%				
CGIA Land Use Classification	Cropland and Pasture, Confined Animal Operations				
Reach Summary Information					
Parameters	Moores Fork Reach 1 & 2	Moores Fork Reach 3	Silage	Cow Trib 1	Cow Trib 2
Length of Reach Post Construction (LF)	2,636	2,885	3,348	167	767
Valley classification (Rosgen)	VIII	VIII	II/IV	II	II
Drainage area (acres)	1,193	1,527	156	4	16
NCDWQ stream identification score	35	34.5	23.5	20	23.5
NCDWQ Water Quality Classification	WS-IV	WS-IV	WS-IV	WS-IV	WS-IV
Morphological Description (Rosgen stream type)	C4	C4	G4/C4	G5	G5
Evolutionary trend	C-F	C-F	G-F	G	G
Underlying mapped soils	CsA, FsE	CsA, FsE	FeD2	FeD2	FeD2
Drainage class	well drained	well drained	well drained	well drained	well drained
Soil Hydric status	not hydric	not hydric	not hydric	not hydric	not hydric
Slope	0.008	0.006	0.030	0.056	0.038
FEMA classification	Not in SFHA	Not in SFHA	Not in SFHA	Not in SFHA	Not in SFHA
Native vegetation community	Felsic Mesic Forest	Felsic Mesic Forest	Felsic Mesic Forest	Felsic Mesic Forest	Felsic Mesic Forest
Percent composition of exotic invasive vegetation	0	0	0	0	0
Wetland Summary Information					
Parameters	Wetland 1	Wetland 2	Wetland 3	Wetland 4	
Size of Wetland (acres)	0.49	0.04	0.08	0.15	
Wetland Type	riparian non-riverine	riparian non-riverine	riparian non-riverine	riparian non-riverine	
Mapped Soil Series	FsE	FsE	CsA	FsE & CsA	
Drainage class	well drained	well drained	well drained	well drained	
Soil Hydric Status	not hydric	not hydric	not hydric	not hydric	
Source of Hydrology	UT9 & UT10	UT8	Toe seep	Toe seep	
Hydrologic Impairment	none	none	none	none	
Native vegetation community	Dist. Small Stream/ Narrow FP Forest	Dist. Small Stream/ Narrow FP Forest	Dist. Small Stream/ Narrow FP Forest	Dist. Small Stream/ Narrow FP Forest	
Percent composition of exotic invasive vegetation	0	0	0	0	
Regulatory Considerations					
Regulation	Applicable?	Resolved?	Supporting Documentation		
Waters of the United States – Section 404	Y	Y	USACE ID No. SAW-2011-02257		
Waters of the United States – Section 401	Y	Y	NCDWR # 12-0396		
Endangered Species Act	Y	Y	CE Approved 12/21/11		
Historic Preservation Act	N	N/A	-		
Coastal Zone Management Act (CZMA)/ Coastal Area Management Act (CAMA)	N	N/A	-		
FEMA Floodplain Compliance	N	N/A	-		
Essential Fisheries Habitat	N	N/A	-		

N/A Not-applicable

Table 4b. Project Baseline Information and Attributes

Moores Fork Stream Mitigation Project
 DMS Project No. 94709
 Monitoring Year 4 - 2019

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 4 - 2019

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	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
Visual Assessment	Project Site	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

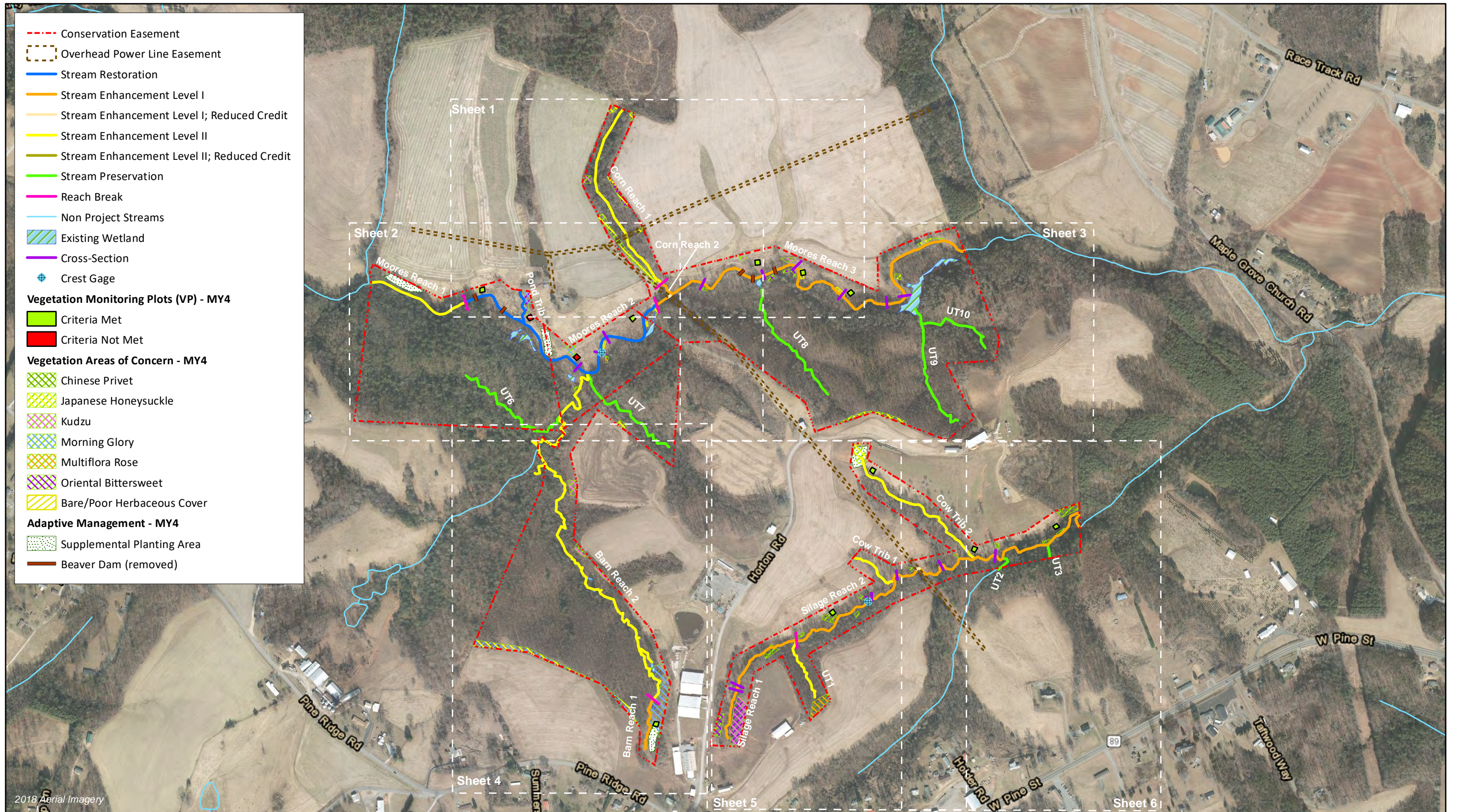
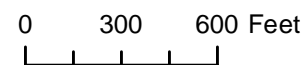
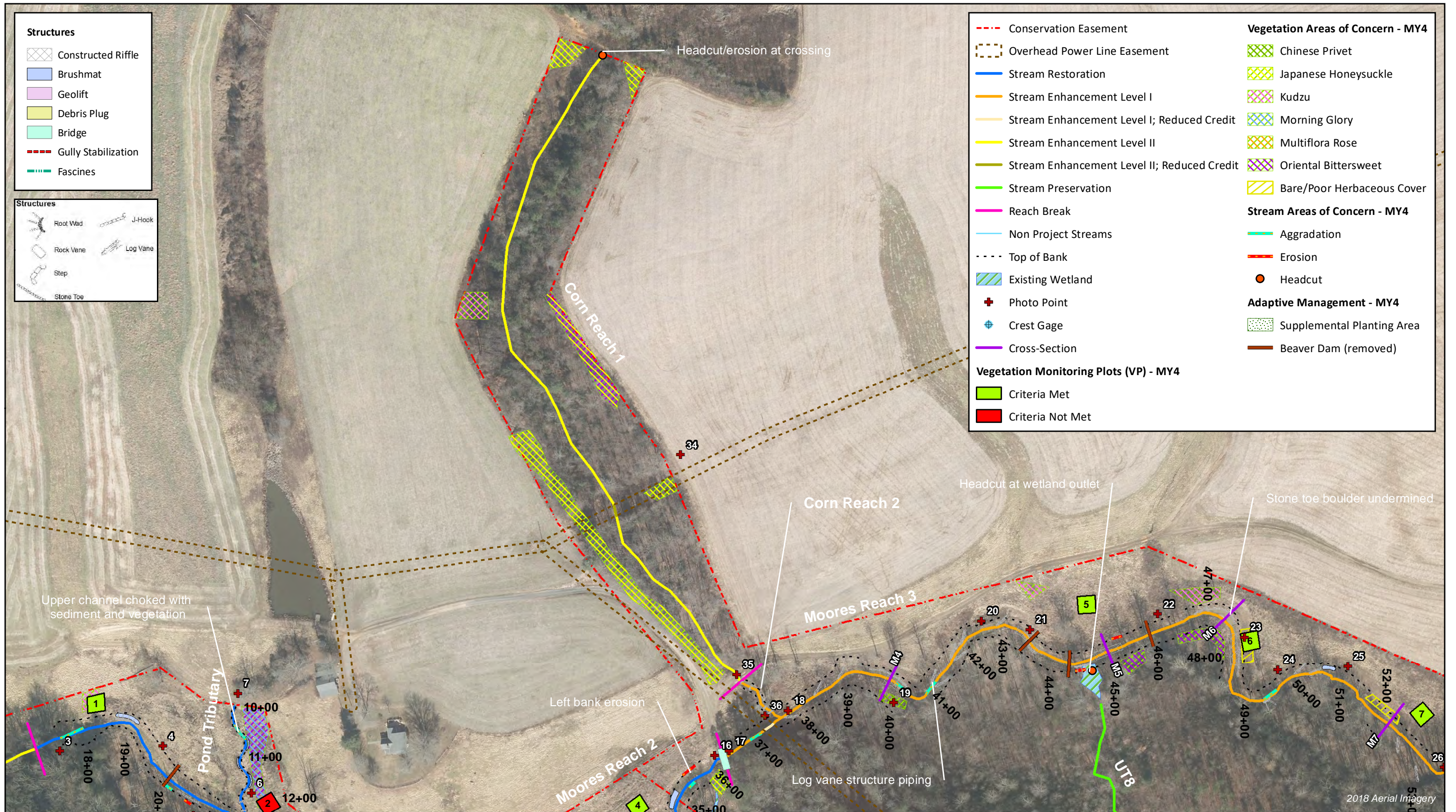


Figure 3.0 Integrated Current Condition Plan View (Key)
 Moores Fork Stream Mitigation Project
 DMS Project No. 94709
 Monitoring Year 4 - 2019





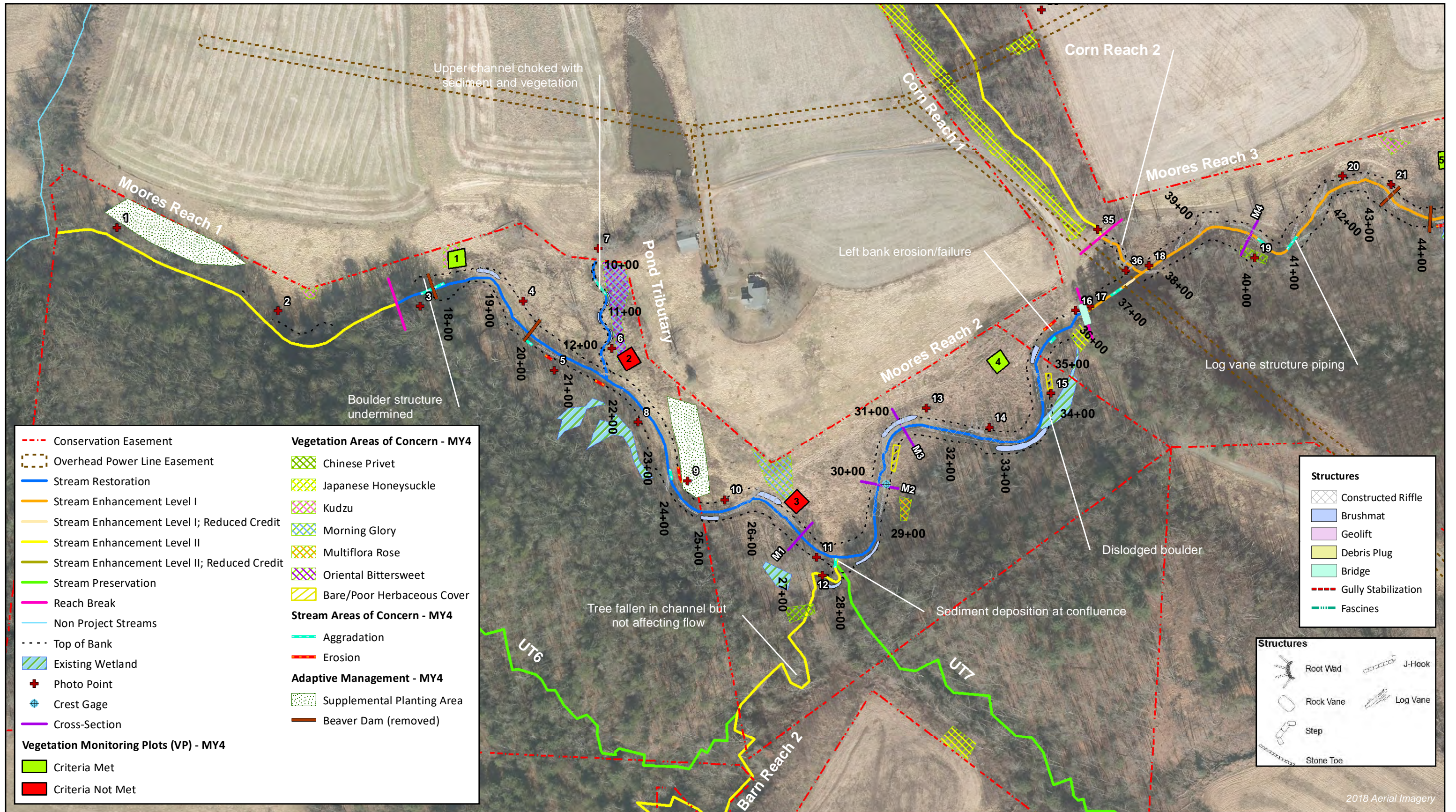
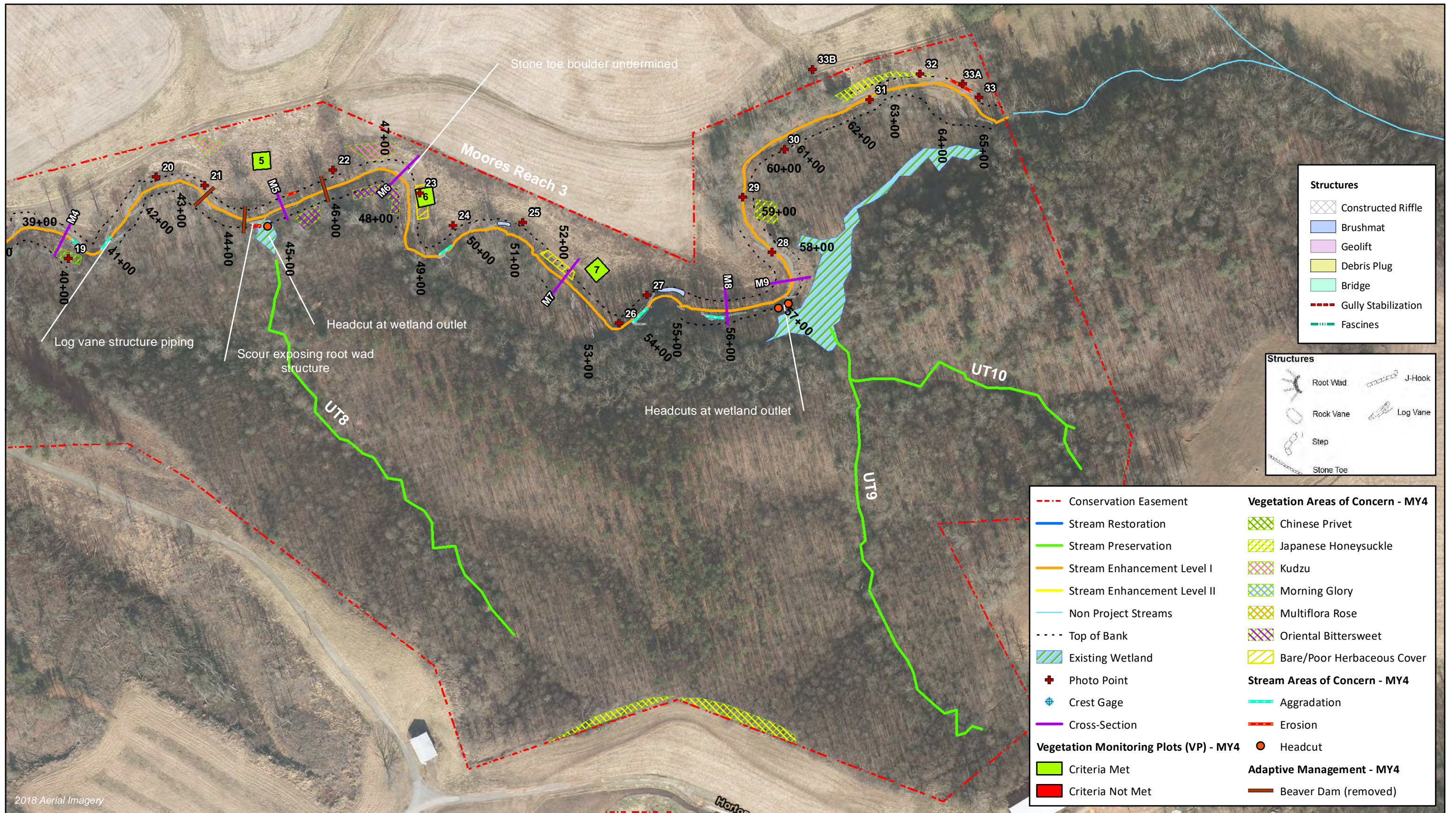


Figure 3.2 Integrated Current Condition Plan View (Sheet 2 of 6)
 Moores Fork Stream Mitigation Project
 DMS Project No. 94709
 Monitoring Year 4 - 2019



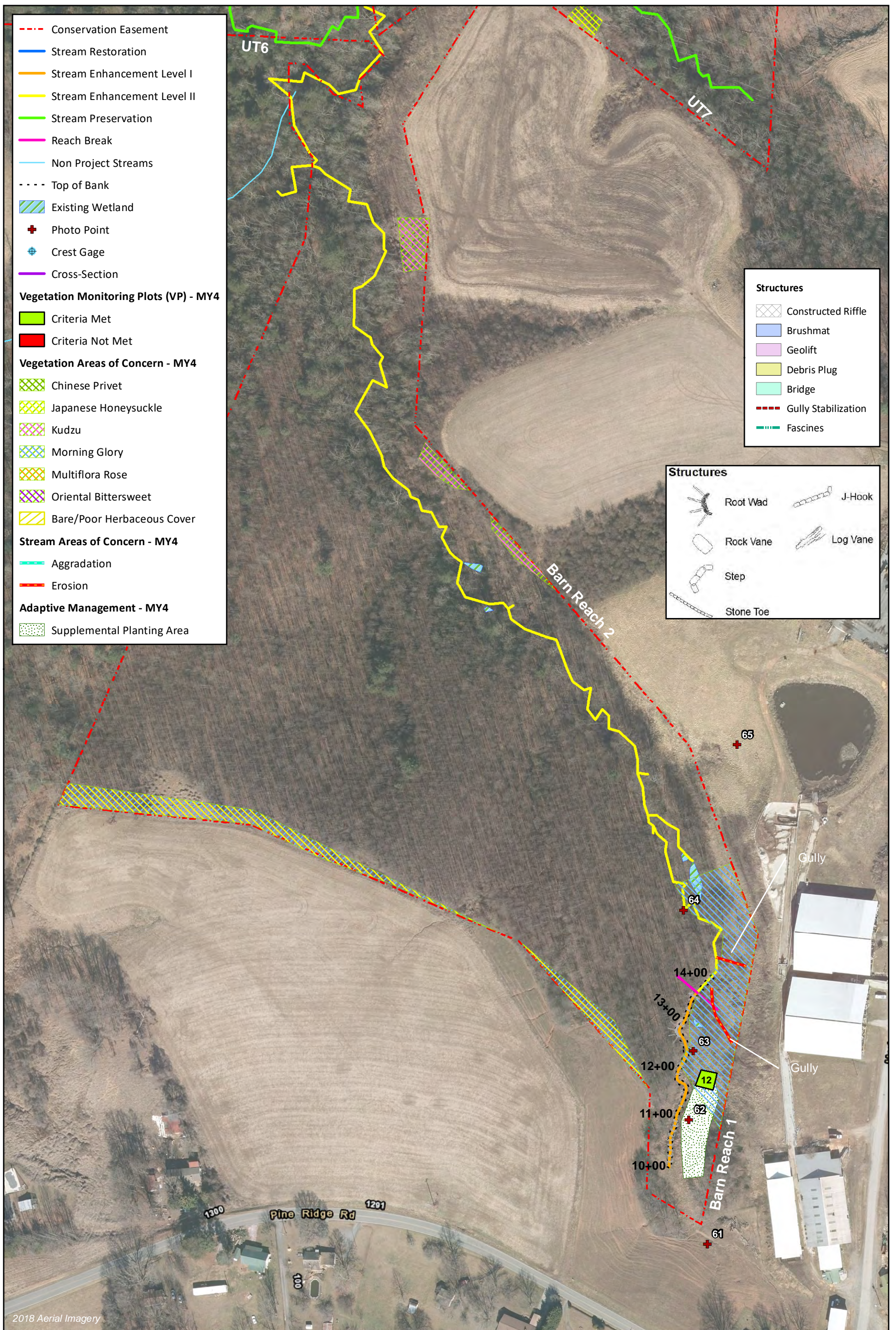


Figure 3.4 Integrated Current Condition Plan View (Sheet 4 of 6)
 Moores Fork Stream Mitigation Project
 DMS Project No. 94709
 Monitoring Year 4 - 2019

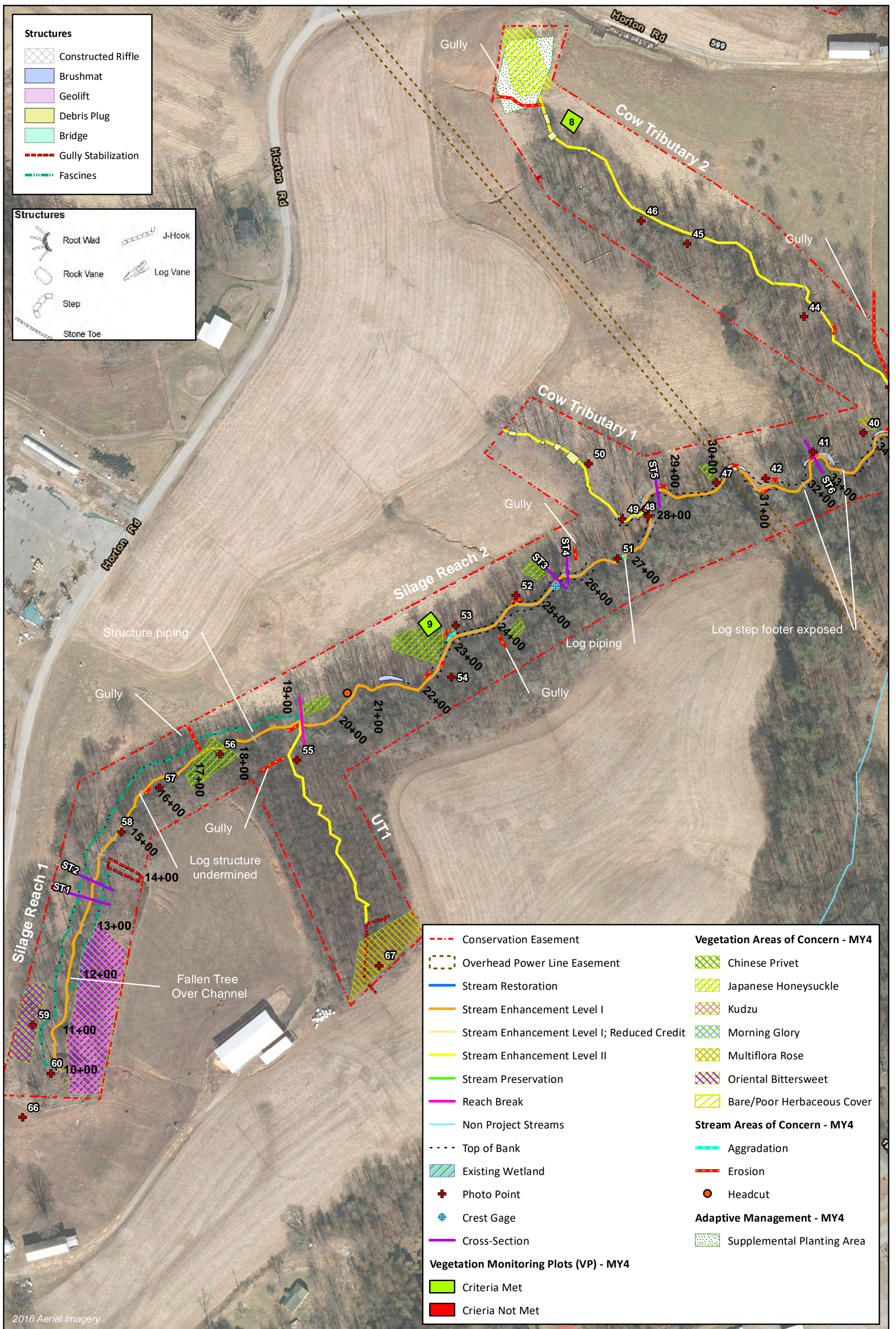
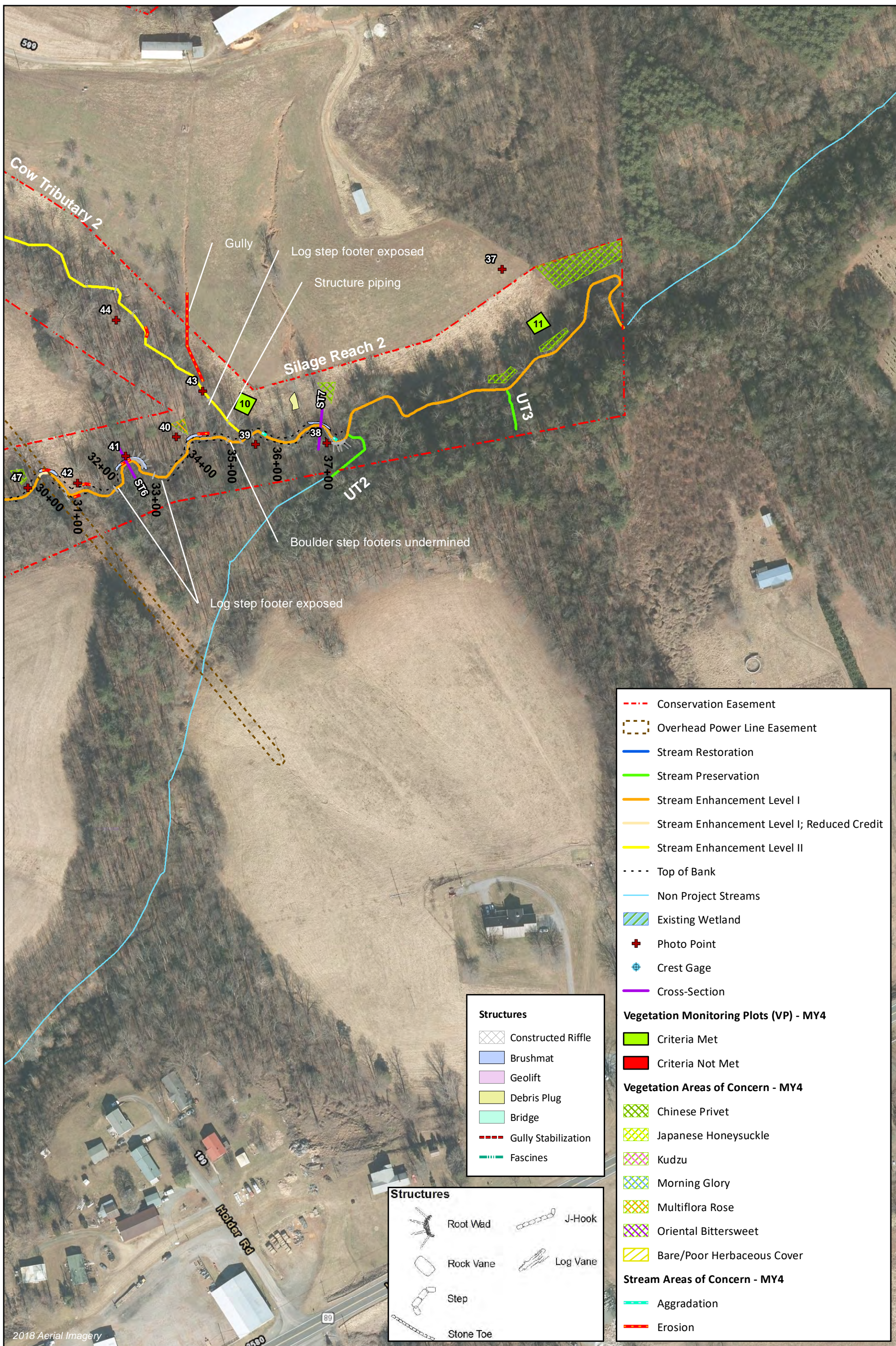


Figure 3.5 Integrated Current Condition Plan View (Sheet 5 of 6)
 Moores Fork Stream Mitigation Project
 DMS Project No. 94709
 Monitoring Year 4 - 2019



- - - Conservation Easement
 - Overhead Power Line Easement
 - Stream Restoration
 - Stream Preservation
 - Stream Enhancement Level I
 - Stream Enhancement Level I; Reduced Credit
 - Stream Enhancement Level II
 - - - Top of Bank
 - Non Project Streams
 - Existing Wetland
 - + Photo Point
 - + Crest Gage
 - Cross-Section
- Vegetation Monitoring Plots (VP) - MY4**
- Criteria Met
 - Criteria Not Met
- Vegetation Areas of Concern - MY4**
- Chinese Privet
 - Japanese Honeysuckle
 - Kudzu
 - Morning Glory
 - Multiflora Rose
 - Oriental Bittersweet
 - Bare/Poor Herbaceous Cover
- Stream Areas of Concern - MY4**
- Aggradation
 - Erosion

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

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

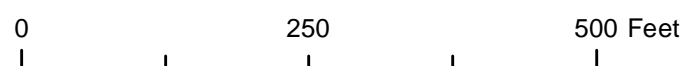


Figure 3.6 Integrated Current Condition Plan View (Sheet 6 of 6)
 Moores Fork Stream Mitigation Project
 DMS Project No. 94709
 Monitoring Year 4 - 2019

Table 6a. Visual Stream Morphology Stability Assessment Table

Moores Fork Stream Mitigation Project

DMS Project No. 94709

Monitoring Year 4 - 2019

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. <u>Aggradation</u> - Bar formation/growth sufficient to significantly deflect flow laterally (not to include point bars)			0	0	100%			
		2. <u>Degradation</u> - Evidence of downcutting			0	0	100%			
	2. Riffle Condition	1. <u>Texture/Substrate</u> - Riffle maintains coarser substrate	4	4			100%			
	3. Meander Pool Condition	1. <u>Depth Sufficient</u> (Max Pool Depth : Mean Bankfull Depth \geq 1.6)	5	5			100%			
		2. <u>Length</u> appropriate (>30% of centerline distance between tail of upstream riffle and head of downstream 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%				
Totals					0	0	100%	0	0	100%
2. Bank	1. <u>Scoured/Eroding</u>	Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion			0	0	100%	0	0	100%
	2. <u>Undercut</u>	Banks undercut/overhanging to the extent that mass wasting appears likely. Does <u>NOT</u> include undercuts that are modest, appear sustainable and are providing habitat.			0	0	100%	0	0	100%
	3. <u>Mass Wasting</u>	Bank slumping, calving, or collapse			0	0	100%	0	0	100%
Totals					0	0	100%	0	0	100%
3. Engineered Structures	1. <u>Overall Integrity</u>	Structures physically intact with no dislodged boulders or logs.	N/A	N/A			N/A			
	2. <u>Grade Control</u>	Grade control structures exhibiting maintenance of grade across the sill.	N/A	N/A			N/A			
	2a. <u>Piping</u>	Structures lacking any substantial flow underneath sills or arms.	N/A	N/A			N/A			
	3. <u>Bank Protection</u>	Bank erosion within the structures extent of influence does <u>not</u> exceed 15%. (See guidance for this table in EEP monitoring guidance document)	N/A	N/A			N/A			
	4. <u>Habitat</u>	Pool forming structures maintaining ~ Max Pool Depth : Mean Bankfull Depth ratio \geq 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 4 - 2019

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. <u>Aggradation</u> - Bar formation/growth sufficient to significantly deflect flow laterally (not to include point bars)			3	100	95%					
		2. <u>Degradation</u> - Evidence of downcutting			0	0	100%					
	2. Riffle Condition	1. <u>Texture/Substrate</u> - Riffle maintains coarser substrate	8	8			100%					
	3. Meander Pool Condition	1. <u>Depth Sufficient</u> (Max Pool Depth : Mean Bankfull Depth \geq 1.6)	6	7			86%					
		2. <u>Length</u> appropriate (>30% of centerline distance between tail of upstream riffle and head of downstream 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. <u>Scoured/Eroding</u>	Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion			3	65	98%	1	10	99%		
	2. <u>Undercut</u>	Banks undercut/overhanging to the extent that mass wasting appears likely. Does <u>NOT</u> include undercuts that are modest, appear sustainable and are providing habitat.			0	0	100%	0	0	100%		
	3. <u>Mass Wasting</u>	Bank slumping, calving, or collapse			1	30	99%	0	0	99%		
					Totals		4	95	97%	1	10	98%
3. Engineered Structures	1. <u>Overall Integrity</u>	Structures physically intact with no dislodged boulders or logs.	15	16			94%					
	2. <u>Grade Control</u>	Grade control structures exhibiting maintenance of grade across the sill.	5	5			100%					
	2a. <u>Piping</u>	Structures lacking any substantial flow underneath sills or arms.	16	16			100%					
	3. <u>Bank Protection</u>	Bank erosion within the structures extent of influence does <u>not</u> exceed 15%. (See guidance for this table in EEP monitoring guidance document)	8	9			89%					
	4. <u>Habitat</u>	Pool forming structures maintaining ~ Max Pool Depth : Mean Bankfull Depth ratio \geq 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 4 - 2019

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. <u>Aggradation</u> - Bar formation/growth sufficient to significantly deflect flow laterally (not to include point bars)			6	175	94%			
		2. <u>Degradation</u> - Evidence of downcutting			0	0	100%			
	2. Riffle Condition	1. <u>Texture/Substrate</u> - Riffle maintains coarser substrate	13	13			100%			
	3. Meander Pool Condition	1. <u>Depth Sufficient</u> (Max Pool Depth : Mean Bankfull Depth \geq 1.6)	16	16			100%			
		2. <u>Length</u> appropriate (>30% of centerline distance between tail of upstream riffle and head of downstream 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%				
Totals					3	85	99%	0	0	99%
2. Bank	1. <u>Scoured/Eroding</u>	Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion			3	85	99%	0	0	99%
	2. <u>Undercut</u>	Banks undercut/overhanging to the extent that mass wasting appears likely. Does <u>NOT</u> include undercuts that are modest, appear sustainable and are providing habitat.			0	0	100%	0	0	100%
	3. <u>Mass Wasting</u>	Bank slumping, calving, or collapse			0	0	100%	0	0	100%
Totals					3	85	99%	0	0	99%
3. Engineered Structures	1. <u>Overall Integrity</u>	Structures physically intact with no dislodged boulders or logs.	24	27			89%			
	2. <u>Grade Control</u>	Grade control structures exhibiting maintenance of grade across the sill.	6	6			100%			
	2a. <u>Piping</u>	Structures lacking any substantial flow underneath sills or arms.	24	27			89%			
	3. <u>Bank Protection</u>	Bank erosion within the structures extent of influence does <u>not</u> exceed 15%. (See guidance for this table in EEP monitoring guidance document)	17	18			94%			
	4. <u>Habitat</u>	Pool forming structures maintaining ~ Max Pool Depth : Mean Bankfull Depth ratio \geq 1.6 Rootwads/logs providing some cover at base-flow.	3	3			100%			

Table 6d. Visual Stream Morphology Stability Assessment Table

Moore's Fork Stream Mitigation Project

DMS Project No. 94709

Monitoring Year 4 - 2019

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. <u>Aggradation</u> - Bar formation/growth sufficient to significantly deflect flow laterally (not to include point bars)			0	0	100%			
		2. <u>Degradation</u> - Evidence of downcutting			0	0	100%			
	2. Riffle Condition	1. <u>Texture/Substrate</u> - Riffle maintains coarser substrate	N/A	N/A			N/A			
	3. Meander Pool Condition	1. <u>Depth Sufficient</u> (Max Pool Depth : Mean Bankfull Depth \geq 1.6)	12	12			100%			
		2. <u>Length</u> appropriate (>30% of centerline distance between tail of upstream riffle and head of downstream 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%				
Totals					2	35	98%	0	0	98%
2. Bank	1. <u>Scoured/Eroding</u>	Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion			2	35	98%	0	0	98%
	2. <u>Undercut</u>	Banks undercut/overhanging to the extent that mass wasting appears likely. Does <u>NOT</u> include undercuts that are modest, appear sustainable and are providing habitat.			0	0	100%	0	0	100%
	3. <u>Mass Wasting</u>	Bank slumping, calving, or collapse			0	0	100%	0	0	100%
Totals					2	35	98%	0	0	98%
3. Engineered Structures	1. <u>Overall Integrity</u>	Structures physically intact with no dislodged boulders or logs.	6	8			75%			
	2. <u>Grade Control</u>	Grade control structures exhibiting maintenance of grade across the sill.	8	8			100%			
	2a. <u>Piping</u>	Structures lacking any substantial flow underneath sills or arms.	6	8			75%			
	3. <u>Bank Protection</u>	Bank erosion within the structures extent of influence does <u>not</u> exceed 15%. (See guidance for this table in EEP monitoring guidance document)	1	1			100%			
	4. <u>Habitat</u>	Pool forming structures maintaining ~ Max Pool Depth : Mean Bankfull Depth ratio \geq 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 4 - 2019

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. <u>Aggradation</u> - Bar formation/growth sufficient to significantly deflect flow laterally (not to include point bars)			4	60	98%				
		2. <u>Degradation</u> - Evidence of downcutting			0	0	100%				
	2. Riffle Condition	1. <u>Texture/Substrate</u> - Riffle maintains coarser substrate	15	15			100%				
	3. Meander Pool Condition	1. <u>Depth Sufficient</u> (Max Pool Depth : Mean Bankfull Depth \geq 1.6)	13	16			81%				
		2. <u>Length</u> appropriate (>30% of centerline distance between tail of upstream riffle and head of downstream 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%					
					Totals	10	175	96%	0	0	96%
2. Bank	1. <u>Scoured/Eroding</u>	Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion			10	175	96%	0	0	96%	
	2. <u>Undercut</u>	Banks undercut/overhanging to the extent that mass wasting appears likely. Does <u>NOT</u> include undercuts that are modest, appear sustainable and are providing habitat.			0	0	100%	0	0	100%	
	3. <u>Mass Wasting</u>	Bank slumping, calving, or collapse			0	0	100%	0	0	100%	
					Totals	10	175	96%	0	0	96%
3. Engineered Structures	1. <u>Overall Integrity</u>	Structures physically intact with no dislodged boulders or logs.	12	16			75%				
	2. <u>Grade Control</u>	Grade control structures exhibiting maintenance of grade across the sill.	12	16			75%				
	2a. <u>Piping</u>	Structures lacking any substantial flow underneath sills or arms.	12	16			75%				
	3. <u>Bank Protection</u>	Bank erosion within the structures extent of influence does <u>not</u> exceed 15%. (See guidance for this table in EEP monitoring guidance document)	N/A	N/A			N/A				
	4. <u>Habitat</u>	Pool forming structures maintaining ~ Max Pool Depth : Mean Bankfull Depth ratio \geq 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 4 - 2019

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. <u>Aggradation</u> - Bar formation/growth sufficient to significantly deflect flow laterally (not to include point bars)			0	0	100%			
		2. <u>Degradation</u> - Evidence of downcutting			0	0	100%			
	2. Riffle Condition	1. <u>Texture/Substrate</u> - Riffle maintains coarser substrate	N/A	N/A			N/A			
	3. Meander Pool Condition	1. <u>Depth Sufficient</u> (Max Pool Depth : Mean Bankfull Depth \geq 1.6)	2	2			100%			
		2. <u>Length</u> appropriate (>30% of centerline distance between tail of upstream riffle and head of downstream 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				
Totals					0	0	N/A	0	0	N/A
2. Bank	1. <u>Scoured/Eroding</u>	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. <u>Undercut</u>	Banks undercut/overhanging to the extent that mass wasting appears likely. Does <u>NOT</u> include undercuts that are modest, appear sustainable and are providing habitat.			N/A	N/A	N/A	0	0	N/A
	3. <u>Mass Wasting</u>	Bank slumping, calving, or collapse			N/A	N/A	N/A	0	0	N/A
3. Engineered Structures	1. <u>Overall Integrity</u>	Structures physically intact with no dislodged boulders or logs.	13	13			100%			
	2. <u>Grade Control</u>	Grade control structures exhibiting maintenance of grade across the sill.	13	13			100%			
	2a. <u>Piping</u>	Structures lacking any substantial flow underneath sills or arms.	13	13			100%			
	3. <u>Bank Protection</u>	Bank erosion within the structures extent of influence does <u>not</u> exceed 15%. (See guidance for this table in EEP monitoring guidance document)	N/A	N/A			N/A			
	4. <u>Habitat</u>	Pool forming structures maintaining ~ Max Pool Depth : Mean Bankfull Depth ratio \geq 1.6 Rootwads/logs providing some cover at base-flow.	N/A	N/A			N/A			

Table 6g. Visual Stream Morphology Stability Assessment Table

Moore's Fork Stream Mitigation Project

DMS Project No. 94709

Monitoring Year 4 - 2019

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. <u>Aggradation</u> - Bar formation/growth sufficient to significantly deflect flow laterally (not to include point bars)			0	0	100%			
		2. <u>Degradation</u> - Evidence of downcutting			0	0	100%			
	2. Riffle Condition	1. <u>Texture/Substrate</u> - Riffle maintains coarser substrate	N/A	N/A		N/A				
	3. Meander Pool Condition	1. <u>Depth Sufficient</u> (Max Pool Depth : Mean Bankfull Depth \geq 1.6)	N/A	N/A		N/A				
		2. <u>Length</u> appropriate (>30% of centerline distance between tail of upstream riffle and head of downstream 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						
Totals					1	20	99%	0	0	99%
2. Bank	1. <u>Scoured/Eroding</u>	Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion			1	20	99%	0	0	100%
	2. <u>Undercut</u>	Banks undercut/overhanging to the extent that mass wasting appears likely. Does <u>NOT</u> include undercuts that are modest, appear sustainable and are providing habitat.			0	0	100%	0	0	100%
	3. <u>Mass Wasting</u>	Bank slumping, calving, or collapse			0	0	100%	0	0	99%
Totals					1	20	99%	0	0	99%
3. Engineered Structures	1. <u>Overall Integrity</u>	Structures physically intact with no dislodged boulders or logs.	22	24			92%			
	2. <u>Grade Control</u>	Grade control structures exhibiting maintenance of grade across the sill.	22	24			92%			
	2a. <u>Piping</u>	Structures lacking any substantial flow underneath sills or arms.	22	24			92%			
	3. <u>Bank Protection</u>	Bank erosion within the structures extent of influence does <u>not</u> exceed 15%. (See guidance for this table in EEP monitoring guidance document)	N/A	N/A			N/A			
	4. <u>Habitat</u>	Pool forming structures maintaining ~ Max Pool Depth : Mean Bankfull Depth ratio \geq 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 4 - 2019

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. <u>Aggradation</u> - Bar formation/growth sufficient to significantly deflect flow laterally (not to include point bars)			1	40	84%	Channel largely overgrown with vegetation. No discernible facets in some segments of channel.		
		2. <u>Degradation</u> - Evidence of downcutting			0	0	100%			
	2. Riffle Condition	1. <u>Texture/Substrate</u> - Riffle maintains coarser substrate	N/A	N/A			N/A			
	3. Meander Pool Condition	1. <u>Depth Sufficient</u> (Max Pool Depth : Mean Bankfull Depth \geq 1.6)	N/A	N/A			N/A			
		2. <u>Length</u> appropriate (>30% of centerline distance between tail of upstream riffle and head of downstream 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				
Totals										
2. Bank	1. <u>Scoured/Eroding</u>	Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion			0	0	100%	0	0	100%
	2. <u>Undercut</u>	Banks undercut/overhanging to the extent that mass wasting appears likely. Does <u>NOT</u> include undercuts that are modest, appear sustainable and are providing habitat.			0	0	100%	0	0	100%
	3. <u>Mass Wasting</u>	Bank slumping, calving, or collapse			0	0	100%	0	0	100%
Totals										
3. Engineered Structures	1. <u>Overall Integrity</u>	Structures physically intact with no dislodged boulders or logs.	7	7			100%			
	2. <u>Grade Control</u>	Grade control structures exhibiting maintenance of grade across the sill.	7	7			100%			
	2a. <u>Piping</u>	Structures lacking any substantial flow underneath sills or arms.	N/A	N/A			N/A			
	3. <u>Bank Protection</u>	Bank erosion within the structures extent of influence does <u>not</u> exceed 15%. (See guidance for this table in EEP monitoring guidance document)	N/A	N/A			N/A			
	4. <u>Habitat</u>	Pool forming structures maintaining ~ Max Pool Depth : Mean Bankfull Depth ratio \geq 1.6 Rootwads/logs providing some cover at base-flow.	N/A	N/A			N/A			

Table 6i. Visual Stream Morphology Stability Assessment Table

Moore's Fork Stream Mitigation Project

DMS Project No. 94709

Monitoring Year 4 - 2019

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. <u>Aggradation</u> - Bar formation/growth sufficient to significantly deflect flow laterally (not to include point bars)			0	0	100%			
		2. <u>Degradation</u> - Evidence of downcutting			0	0	100%			
	2. Riffle Condition	1. <u>Texture/Substrate</u> - Riffle maintains coarser substrate	N/A	N/A			N/A			
	3. Meander Pool Condition	1. <u>Depth Sufficient</u> (Max Pool Depth : Mean Bankfull Depth \geq 1.6)	N/A	N/A			N/A			
		2. <u>Length</u> appropriate (>30% of centerline distance between tail of upstream riffle and head of downstream 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				
Totals										
2. Bank	1. <u>Scoured/Eroding</u>	Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion			0	0	100%	0	0	100%
	2. <u>Undercut</u>	Banks undercut/overhanging to the extent that mass wasting appears likely. Does <u>NOT</u> include undercuts that are modest, appear sustainable and are providing habitat.			0	0	100%	0	0	100%
	3. <u>Mass Wasting</u>	Bank slumping, calving, or collapse			0	0	100%	0	0	100%
Totals										
3. Engineered Structures	1. <u>Overall Integrity</u>	Structures physically intact with no dislodged boulders or logs.	15	15			100%			
	2. <u>Grade Control</u>	Grade control structures exhibiting maintenance of grade across the sill.	15	15			100%			
	2a. <u>Piping</u>	Structures lacking any substantial flow underneath sills or arms.	15	15			100%			
	3. <u>Bank Protection</u>	Bank erosion within the structures extent of influence does <u>not</u> exceed 15%. (See guidance for this table in EEP monitoring guidance document)	N/A	N/A			N/A			
	4. <u>Habitat</u>	Pool forming structures maintaining ~ Max Pool Depth : Mean Bankfull Depth ratio \geq 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 4 - 2019

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

Table 7. Visual Stream Morphology Stability Assessment Table

Moore's Fork Stream Mitigation Project

DMS Project No. 94709

Monitoring Year 4 - 2019

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	4	0.06	0.4%
2. Low Stem Density Areas	Woody stem densities clearly below target levels based on MY3, 4, or 5 stem count criteria.	0.1 acres	N/A	0	0.00	0.0%
Total				4	0.06	0.4%
3. Areas of Poor Growth Rates or Vigor	Areas with woody stems of a size class that are obviously small given the monitoring year.	0.25 acres	N/A	0	0.00	0.0%
Cumulative Total				4	0.06	0.4%

Easement Acreage 140

Vegetation Category	Definitions	Mapping Threshold	CCPV Depiction	Number of Polygons	Combined Acreage	% of Easement Acreage
4. Invasive Areas of Concern	Areas or points (if too small to render as polygons at map scale).	1000 SF	Cross Hatch (Color varies by species)	44	4.7	3.3%
5. Easement Encroachment Areas	Areas or points (if too small to render as polygons at map scale).	None	N/A	0	0.00	0.0%

Stream Photographs



PP1 – Moores Reach 1, looking upstream (06/19/2019)



PP2 – Moores Reach 1, looking downstream (06/19/2019)



PP3 – Moores Reach 2, looking downstream (06/19/2019)



PP4 – Moores Reach 2, looking downstream (06/19/2019)



PP5 – Moores Reach 2, looking upstream (06/19/2019)



PP6 – Pond Tributary, looking downstream (06/19/2019)



PP7 – Pond Tributary, looking downstream (06/19/2019)



PP8 – Moores Reach 2, looking downstream (06/19/2019)



PP9 – Moores Reach 2, looking downstream (06/19/2019)



PP10 – Moores Reach 2, looking downstream (06/19/2019)



PP11 – Moores Reach 2, looking downstream (06/19/2019)



PP12 – Barn Reach 2, looking upstream (06/19/2019)



PP13 – Moores Reach 2, looking downstream (06/19/2019)



PP14 – Moores Reach 2, looking downstream (06/19/2019)



PP15 – Moores Reach 2, looking downstream (06/19/2019)



PP16 – Moores Reach 2, looking upstream (06/19/2019)



PP17 – Moores Reach 3, looking downstream (06/19/2019)



PP18 – Moores Reach 3, looking downstream (06/19/2019)



PP19 – Moores Reach 3, looking downstream (06/19/2019)



PP20 – Moores Reach 3, looking downstream (06/19/2019)



PP21 – Moores Reach 3, looking downstream (06/19/2019)



PP22 – Moores Reach 3, looking downstream (06/19/2019)



PP23 – Moores Reach 3, looking downstream (06/19/2019)



PP24 – Moores Reach 3, looking downstream (06/19/2019)



PP25 – Moores Reach 3, looking downstream (06/19/2019)



PP26 – Moores Reach 3, looking downstream (06/19/2019)



PP27 – Moores Reach 3, looking downstream (06/19/2019)



PP28 – Moores Reach 3, looking downstream (06/19/2019)



PP29 – Moores Reach 3, looking downstream (06/19/2019)



PP30 – Moores Reach 3, looking downstream (06/19/2019)



PP31 – Moores Reach 3, looking downstream (06/19/2019)



PP32 – Moores Reach 3, looking downstream (06/19/2019)



PP33 – Moores Reach 3, looking downstream (06/19/2019)



PP33a – Moores Reach 3, looking upstream (06/19/2019)



PP33b – Moores Reach 3, looking downstream (06/19/2019)



PP34 – Corn Reach 1, looking downslope (06/19/2019)



PP35 – Corn Reach 2, looking downstream (06/19/2019)



PP36 – Corn Reach 2, looking upstream (08/19/2019)



PP37 – Silage Reach 2, looking downslope (06/19/2019)



PP38 – Silage Reach 2, looking downstream (06/19/2019)



PP39 – Silage Reach 2, looking upstream (06/19/2019)



PP40 – Silage Reach 2, looking downstream (06/19/2019)



PP41 – Silage Reach 2, looking downstream (06/19/2019)



PP42 – Silage Reach 2, looking downstream (06/19/2019)



PP43 – Cow Tributary 2, looking downstream (06/19/2019)



PP44 – Cow Tributary 2, looking downstream (06/19/2019)



PP45 – Cow Tributary 2, looking downstream (06/19/2019)



PP46 – Cow Tributary 2, looking upstream (06/19/2019)



PP47 – Silage Reach 2, looking downstream (06/19/2019)



PP48 – Silage Reach 2, looking upstream (06/19/2019)



PP49 – Cow Tributary 1, looking upstream (06/19/2019)



PP50 – Cow Tributary 1, looking upstream (06/19/2019)



PP51 – Silage Reach 2, looking downstream (06/19/2019)



PP52 – Silage Reach 2, looking upstream (06/19/2019)



PP53 – Silage Reach 2, looking downstream (06/19/2019)



PP54 – Silage Reach 2, looking upstream (06/19/2019)



PP55 – UT1, looking upstream (06/19/2019)



PP56 – Silage Reach 1, looking downstream (06/19/2019)



PP57 – Silage Reach 1, looking upstream (06/19/2019)



PP58 – Silage Reach 1, looking upstream (06/19/2019)



PP59 – Silage Reach 1, looking downstream (06/19/2019)



PP60 – Silage Reach 1, looking downstream (06/19/2019)



PP61 – Barn Reach 1, looking downslope (08/19/2019)



PP62 – Barn Reach 1, looking downstream (08/19/2019)



PP63 – Barn Reach 1, looking downstream (08/19/2019)



PP64 – Barn Reach 2, looking downstream (08/19/2019)



PP65 – Barn Reach 2, looking downslope (08/19/2019)



PP66 – Silage Reach 1, looking upslope (06/19/2019)



PP67 – UT1, looking downstream (06/19/2019)

Vegetation Photographs



Vegetation Plot 1 – (8/20/2019)



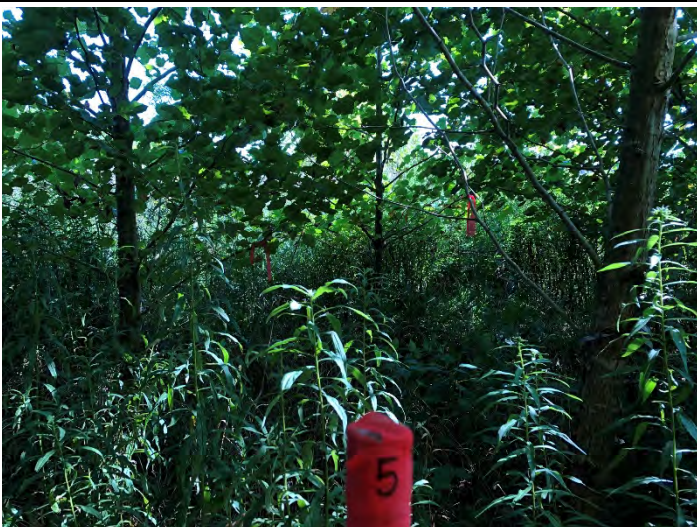
Vegetation Plot 2 – (8/20/2019)



Vegetation Plot 3 – (8/20/2019)



Vegetation Plot 4 – (8/20/2019)



Vegetation Plot 5 – (8/20/2019)



Vegetation Plot 6 – (8/20/2019)



Vegetation Plot 7 – (8/20/2019)



Vegetation Plot 8 – (8/20/2019)



Vegetation Plot 9 – (8/20/2019)



Vegetation Plot 10 – (8/20/2019)



Vegetation Plot 11 – (8/20/2019)



Vegetation Plot 12 – (8/20/2019)

APPENDIX C. Vegetation Plot Data

Table 8. Vegetation Plot Criteria Attainment

Moore's Fork Stream Mitigation Project
 DMS Project No. 94709
 Monitoring Year 4 - 2019

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

Moore's Fork Stream Mitigation Project
 DMS Project No. 94709
 Monitoring Year 4 - 2019

Database Name	cvs-eep-entrytool-v2.5.0 Moores MY4.mdb
Database Location	L:\Active Projects\005-02153 Moores Monitoring\Monitoring\Monitoring Year 4 (2019)\Vegetation Assessment
Computer Name	MIMI-PC
File Size	48807936
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	Moore's 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

Moore's Fork Stream Mitigation Project
 DMS Project No. 94709
 Monitoring Year 4 - 2019

Scientific Name	Common Name	Species Type	Current Plot Data (MY4 2019)																											
			94709-01-0001			94709-01-0002			94709-01-0003			94709-01-0004			94709-01-0005			94709-01-0006			94709-01-0007			94709-01-0008			94709-01-0009			
			PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	
<i>Acer rubrum</i>	Red Maple	Tree																												
<i>Betula nigra</i>	River Birch, Red Birch	Tree										1	1	1																
<i>Cercis canadensis</i>	Redbud	Shrub Tree																									1			
<i>Diospyros virginiana</i>	American Persimmon	Tree	3	3	3	1	1	2																						
<i>Fraxinus pennsylvanica</i>	Green Ash, Red Ash	Tree										8	8	8	2	2														
<i>Liriodendron tulipifera</i>	Tulip Poplar	Tree										3	3	3																
<i>Nyssa sylvatica</i>	Black Gum	Tree																												
<i>Platanus occidentalis</i>	Sycamore	Tree										1	1	1	4	4	4	9	9	9	2	2	2	7	7	7				
<i>Pyrus calleryana</i>	Bradford Pear	Tree																												
<i>Quercus lyrata</i>	Overcup Oak	Tree	6	6	6	4	4	4																						
<i>Quercus montana</i>	Rock Chestnut Oak	Tree																												
<i>Quercus nigra</i>	Water Oak	Tree	3	3	3	1	1	1																						
<i>Quercus phellos</i>	Willow Oak	Tree																												
<i>Rhus glabra</i>	Smooth Sumac	Shrub Tree																												
Stem count			12	12	12	6	6	7	5	5	5	17	17	17	14	14	18	13	13	13	12	12	12	7	7	7	12	16	16	16
size (ares)			1			1			1			1			1			1			1			1			1			
size (ACRES)			0.02			0.02			0.02			0.02			0.02			0.02			0.02			0.02			0.02			
Species count			3	3	3	3	3	3	3	3	3	6	6	6	4	4	6	7	7	7	4	4	4	3	3	3	6	6	6	6
Stems per ACRE			486	486	486	243	243	283	202	202	202	688	688	688	567	567	728	526	526	526	486	486	486	283	283	486	647	647	647	

Scientific Name	Common Name	Species Type	Current Plot Data (MY4 2019)									Annual Means																
			94709-01-0010			94709-01-0011			94709-01-0012			MY4 (2019)			MY3 (2018)			MY2 (2017)			MY1 (2016)			MY0 (2016)				
			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		
<i>Acer rubrum</i>	Red Maple	Tree			8			2																				
<i>Betula nigra</i>	River Birch, Red Birch	Tree											1	1	3													
<i>Cercis canadensis</i>	Redbud	Shrub Tree																										
<i>Diospyros virginiana</i>	American Persimmon	Tree	4	4	4	1	1	1	6	6	6	17	17	18	17	17	21	16	16	17	14	14	14	14	14	14	14	14
<i>Fraxinus pennsylvanica</i>	Green Ash, Red Ash	Tree																										
<i>Liriodendron tulipifera</i>	Tulip Poplar	Tree																										
<i>Nyssa sylvatica</i>	Black Gum	Tree	4	4	4	5	5	5																				
<i>Platanus occidentalis</i>	Sycamore	Tree																										
<i>Pyrus calleryana</i>	Bradford Pear	Tree																										
<i>Quercus lyrata</i>	Overcup Oak	Tree				3	3	3	1	1	1	29	29	29	28	28	28	30	30	30	28	28	28	29	29	29	29	29
<i>Quercus montana</i>	Rock Chestnut Oak	Tree				5	5	5																				
<i>Quercus nigra</i>	Water Oak	Tree	2	2	2																							
<i>Quercus phellos</i>	Willow Oak	Tree																										
<i>Rhus glabra</i>	Smooth Sumac	Shrub Tree																										
Stem count			10	10	53	14	14	16	10	10	10	136	136	191	136	136	213	140	140	221	146	146	154	149	149	149	149	149
size (ares)			1			1			1			12			12			12			12			12				
size (ACRES)			0.02			0.02			0.02			0.30			0.30			0.30			0.30			0.30				
Species count			3	3	5	4	4	5	4	4	4	10	10	14	9	9	13	10	10	12	9	9	11	9	9	9	9	
Stems per ACRE			405	405	2145	567	567	647	405	405	405	459	459	644	459	459	718	472	472	745	492	492	519	502	502	502	502	

Color for Density

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

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

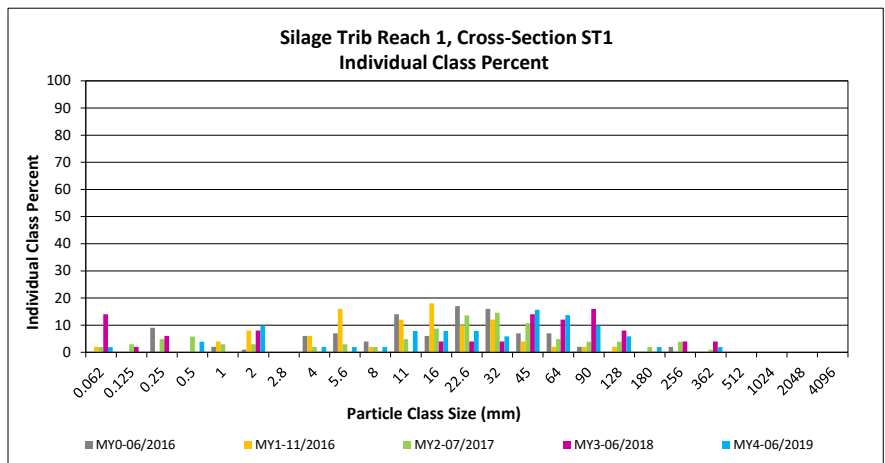
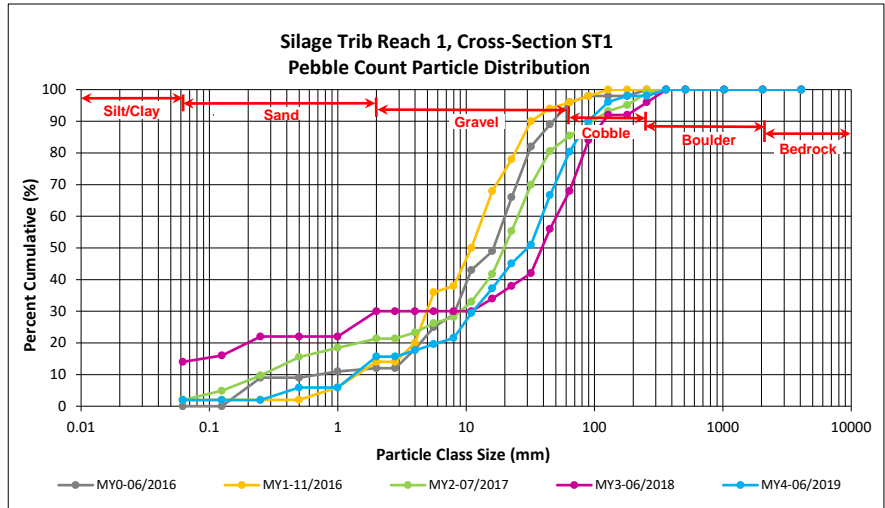
APPENDIX D. Morphological Summary Data and Plots

Cross-Section Pebble Count Plots
 Moores Fork Stream Mitigation Project
 DMS Project No. 94709
Monitoring Year 4 - 2019

Silage Trib Reach 1, Cross-Section ST1

Particle Class		Diameter (mm)		Riffle 100-Count	Summary	
		min	max		Class Percentage	Percent Cumulative
SILT/CLAY		Silt/Clay	0.000 0.062	2	2	2
SAND	Very fine	0.062	0.125			2
	Fine	0.125	0.250			2
	Medium	0.25	0.50	4	4	6
	Coarse	0.5	1.0			6
	Very Coarse	1.0	2.0	10	10	16
GRAVEL	Very Fine	2.0	2.8			16
	Very Fine	2.8	4.0	2	2	18
	Fine	4.0	5.6	2	2	20
	Fine	5.6	8.0	2	2	22
	Medium	8.0	11.0	8	8	29
	Medium	11.0	16.0	8	8	37
	Coarse	16.0	22.6	8	8	45
	Coarse	22.6	32	6	6	51
	Very Coarse	32	45	16	16	67
	Very Coarse	45	64	14	14	80
COBBLE	Small	64	90	10	10	90
	Small	90	128	6	6	96
	Large	128	180	2	2	98
BEDROCK	Large	180	256			98
	Small	256	362	2	2	100
	Small	362	512			100
BEDROCK	Medium	512	1024			100
	Large/Very Large	1024	2048			100
	Bedrock	2048	>2048			100
		Total		102	100	100

Cross-Section ST1 Channel materials (mm)	
D ₁₆ =	3.0
D ₃₅ =	14.4
D ₅₀ =	30.2
D ₈₄ =	72.6
D ₉₅ =	120.0
D ₁₀₀ =	362.0

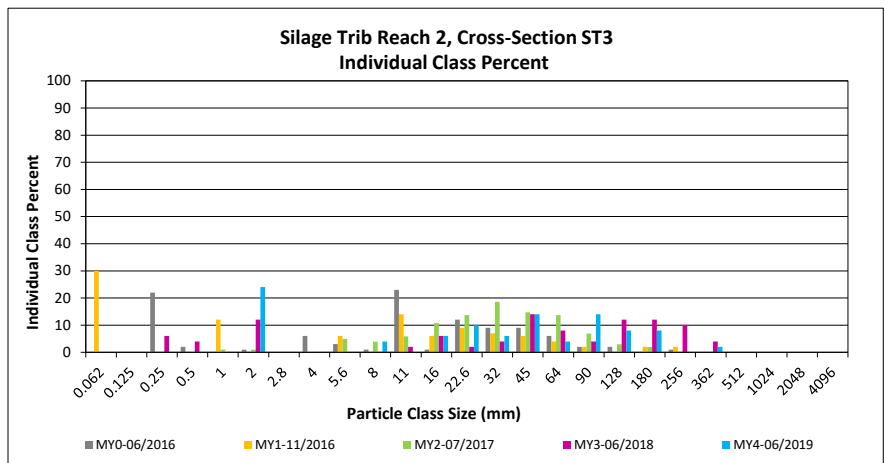
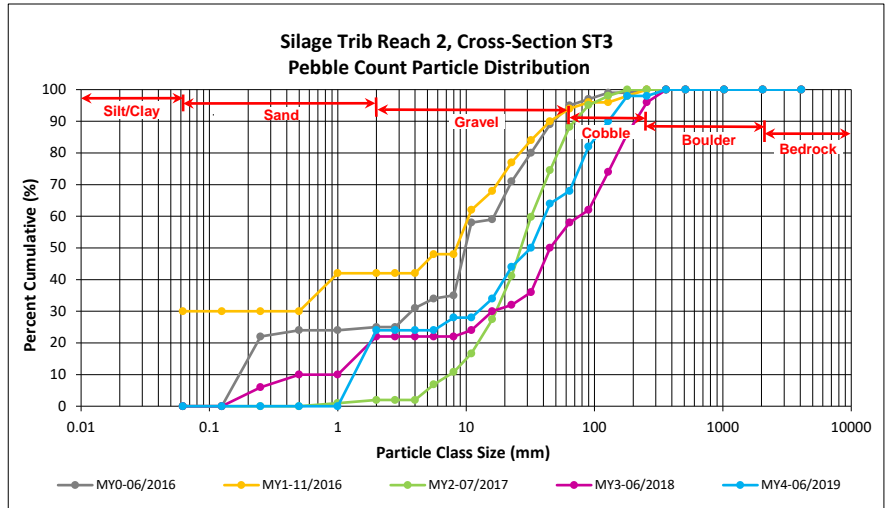


Cross-Section Pebble Count Plots
 Moores Fork Stream Mitigation Project
 DMS Project No. 94709
Monitoring Year 4 - 2019

Silage Trib Reach 2, Cross-Section ST3

Particle Class		Diameter (mm)		Riffle 100-Count	Summary	
		min	max		Class Percentage	Percent Cumulative
SILT/CLAY		Silt/Clay	0.000	0.062		0
SAND	Very fine	0.062	0.125			0
	Fine	0.125	0.250			0
	Medium	0.25	0.50			0
	Coarse	0.5	1.0			0
	Very Coarse	1.0	2.0	24	24	24
GRAVEL	Very Fine	2.0	2.8			24
	Very Fine	2.8	4.0			24
	Fine	4.0	5.6			24
	Fine	5.6	8.0	4	4	28
	Medium	8.0	11.0			28
	Medium	11.0	16.0	6	6	34
	Coarse	16.0	22.6	10	10	44
	Coarse	22.6	32	6	6	50
	Very Coarse	32	45	14	14	64
	Very Coarse	45	64	4	4	68
COBBLE	Small	64	90	14	14	82
	Small	90	128	8	8	90
	Large	128	180	8	8	98
BEDROCK	Large	180	256			98
	Small	256	362	2	2	100
	Small	362	512			100
BEDROCK	Medium	512	1024			100
	Large/Very Large	1024	2048			100
	Bedrock	2048	>2048			100
		Total			100	100

Cross-Section ST3	
Channel materials (mm)	
D ₁₆ =	1.6
D ₃₅ =	16.6
D ₅₀ =	32.0
D ₈₄ =	98.3
D ₉₅ =	158.4
D ₁₀₀ =	362.0

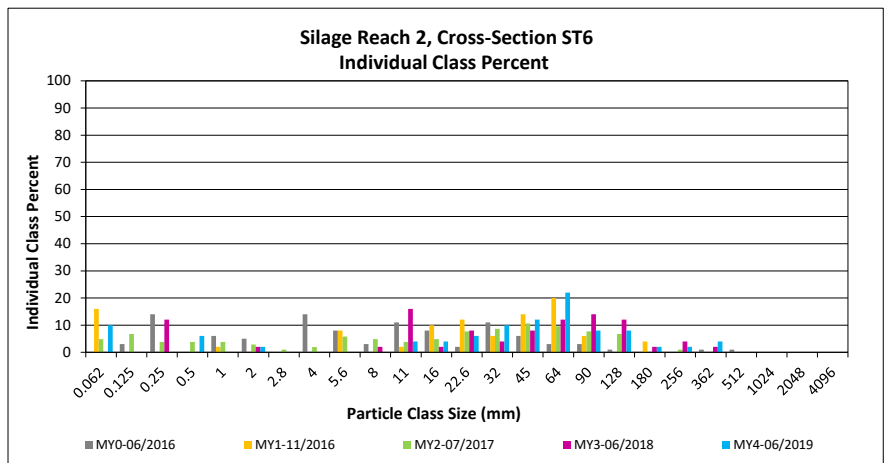
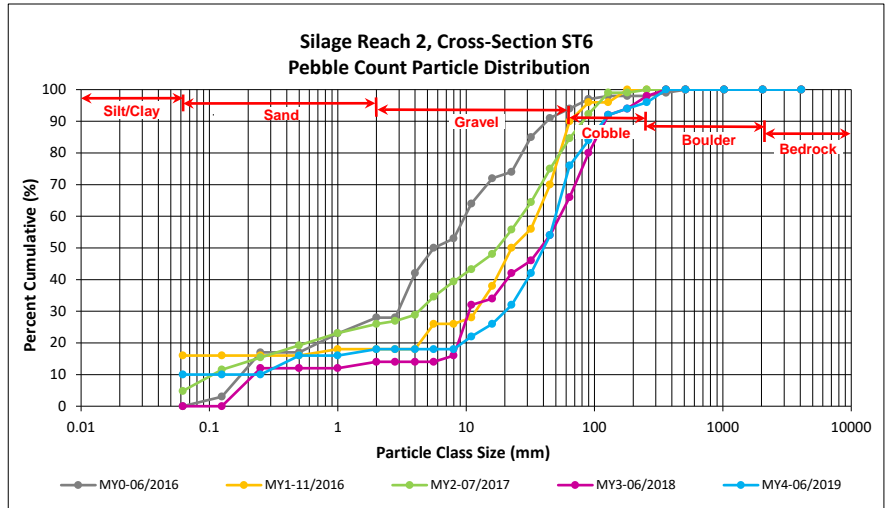


Cross-Section Pebble Count Plots
 Moores Fork Stream Mitigation Project
 DMS Project No. 94709
Monitoring Year 4 - 2019

Silage Reach 2, Cross-Section ST6

Particle Class		Diameter (mm)		Riffle 100-Count	Summary	
		min	max		Class Percentage	Percent Cumulative
SILT/CLAY		Silt/Clay	0.000 0.062	10	10	10
SAND	Very fine	0.062	0.125			10
	Fine	0.125	0.250			10
	Medium	0.25	0.50	6	6	16
	Coarse	0.5	1.0			16
	Very Coarse	1.0	2.0	2	2	18
GRAVEL	Very Fine	2.0	2.8			18
	Very Fine	2.8	4.0			18
	Fine	4.0	5.6			18
	Fine	5.6	8.0			18
	Medium	8.0	11.0	4	4	22
	Medium	11.0	16.0	4	4	26
	Coarse	16.0	22.6	6	6	32
	Coarse	22.6	32	10	10	42
	Very Coarse	32	45	12	12	54
	Very Coarse	45	64	22	22	76
COBBLE	Small	64	90	8	8	84
	Small	90	128	8	8	92
	Large	128	180	2	2	94
	Large	180	256	2	2	96
BEDROCK	Small	256	362	4	4	100
	Small	362	512			100
	Medium	512	1024			100
BEDROCK		Bedrock	1024 2048			100
		Bedrock	2048 >2048			100
		Total		100	100	100

Cross-Section ST6 Channel materials (mm)	
D ₁₆ =	0.5
D ₃₅ =	25.1
D ₅₀ =	40.2
D ₈₄ =	90.0
D ₉₅ =	214.7
D ₁₀₀ =	362.0

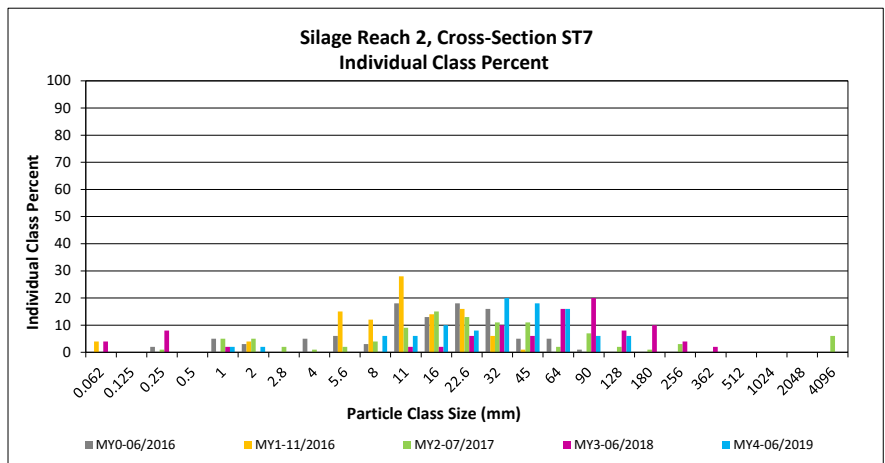
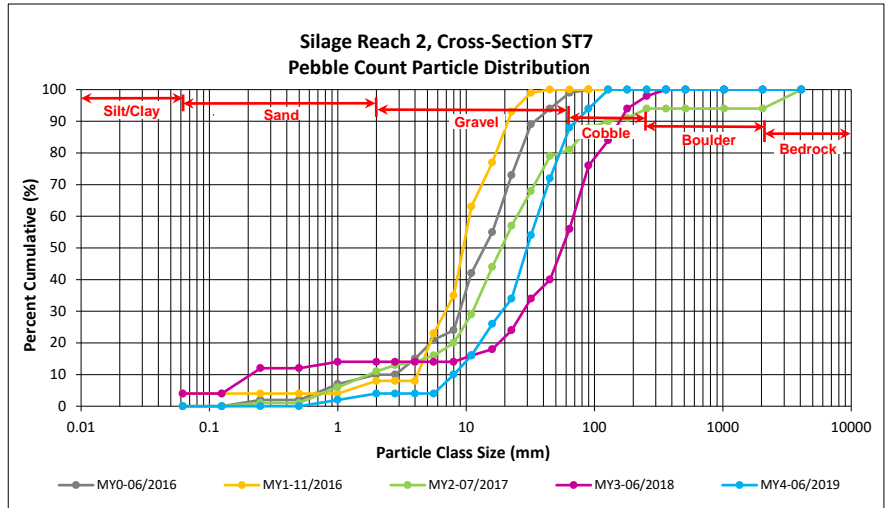


Cross-Section Pebble Count Plots
 Moores Fork Stream Mitigation Project
 DMS Project No. 94709
Monitoring Year 4 - 2019

Silage Reach 2, Cross-Section ST7

Particle Class		Diameter (mm)		Riffle 100-Count	Summary	
		min	max		Class Percentage	Percent Cumulative
SILT/CLAY		Silt/Clay	0.000 0.062			0
SAND	Very fine	0.062	0.125			0
	Fine	0.125	0.250			0
	Medium	0.25	0.50			0
	Coarse	0.5	1.0	2	2	2
	Very Coarse	1.0	2.0	2	2	4
GRAVEL	Very Fine	2.0	2.8			4
	Very Fine	2.8	4.0			4
	Fine	4.0	5.6			4
	Fine	5.6	8.0	6	6	10
	Medium	8.0	11.0	6	6	16
	Medium	11.0	16.0	10	10	26
	Coarse	16.0	22.6	8	8	34
	Coarse	22.6	32	20	20	54
	Very Coarse	32	45	18	18	72
	Very Coarse	45	64	16	16	88
COBBLE	Small	64	90	6	6	94
	Small	90	128	6	6	100
	Large	128	180			100
BEDROCK	Large	180	256			100
	Small	256	362			100
	Small	362	512			100
BEDROCK	Medium	512	1024			100
	Large/Very Large	1024	2048			100
	Bedrock	2048	>2048			100
		Total		100	100	100

Cross-Section ST7 Channel materials (mm)	
D ₁₆ =	11.0
D ₃₅ =	23.0
D ₅₀ =	29.8
D ₈₄ =	58.6
D ₉₅ =	95.4
D ₁₀₀ =	128.0

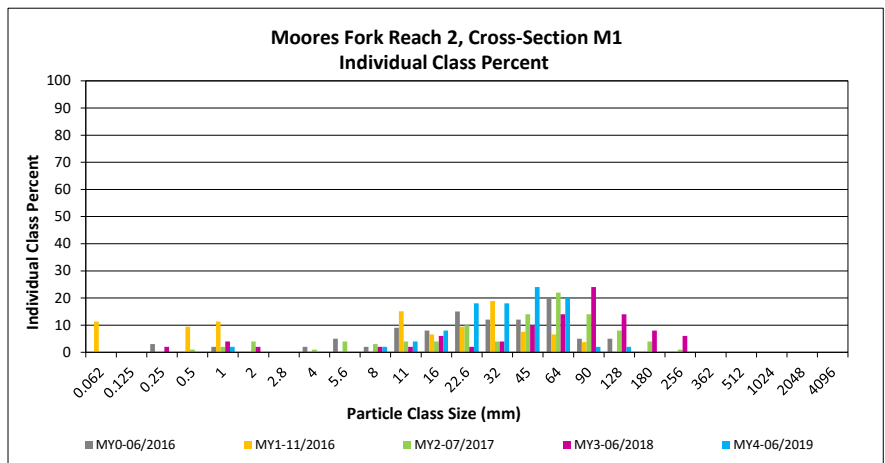
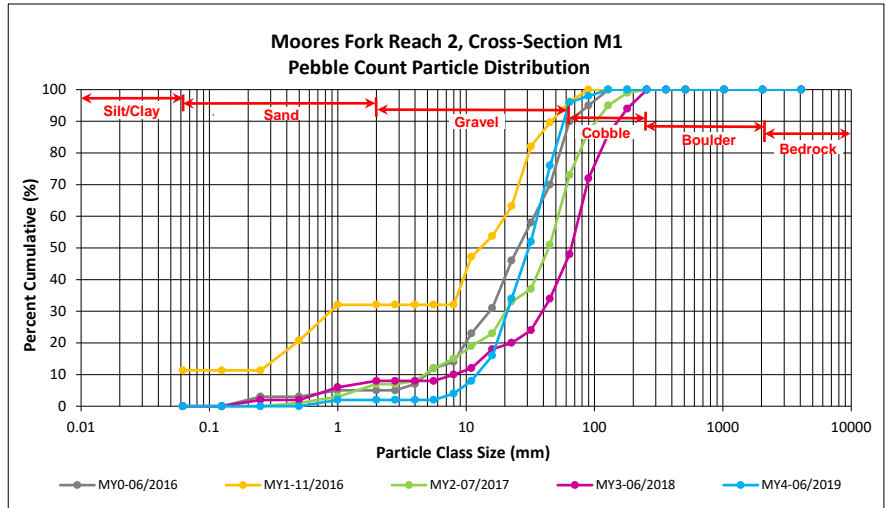


Cross-Section Pebble Count Plots
 Moores Fork Stream Mitigation Project
 DMS Project No. 94709
Monitoring Year 4 - 2019

Moores Fork Reach 2, Cross-Section M1

Particle Class		Diameter (mm)		Riffle 100-Count	Summary	
		min	max		Class Percentage	Percent Cumulative
SILT/CLAY		Silt/Clay	0.000	0.062		0
SAND	Very fine	0.062	0.125			0
	Fine	0.125	0.250			0
	Medium	0.25	0.50			0
	Coarse	0.5	1.0	2	2	2
	Very Coarse	1.0	2.0			2
GRAVEL	Very Fine	2.0	2.8			2
	Very Fine	2.8	4.0			2
	Fine	4.0	5.6			2
	Fine	5.6	8.0	2	2	4
	Medium	8.0	11.0	4	4	8
	Medium	11.0	16.0	8	8	16
	Coarse	16.0	22.6	18	18	34
	Coarse	22.6	32	18	18	52
	Very Coarse	32	45	24	24	76
Very Coarse	45	64	20	20	96	
COBBLE	Small	64	90	2	2	98
	Small	90	128	2	2	100
	Large	128	180			100
BEDROCK	Large	180	256			100
	Small	256	362			100
	Small	362	512			100
BEDROCK	Medium	512	1024			100
	Large/Very Large	1024	2048			100
	Bedrock	2048	>2048			100
		Total			100	100

Cross-Section M1	
Channel materials (mm)	
D ₁₆ =	16.0
D ₃₅ =	23.0
D ₅₀ =	30.8
D ₈₄ =	51.8
D ₉₅ =	62.9
D ₁₀₀ =	128.0

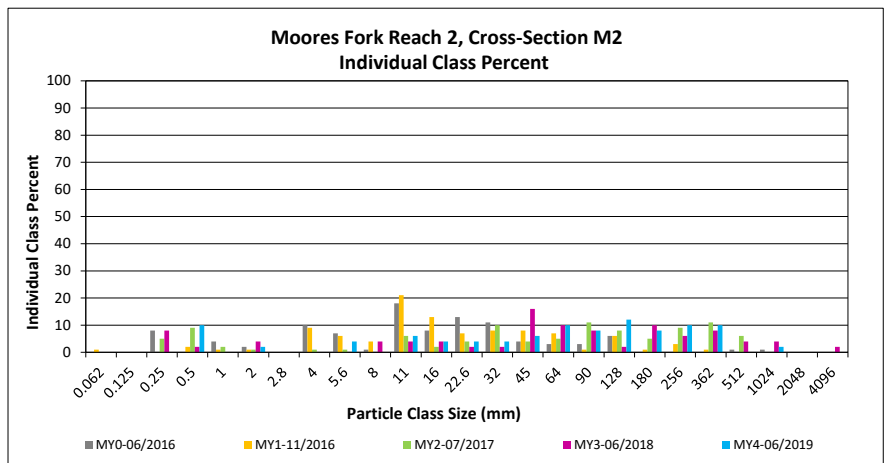
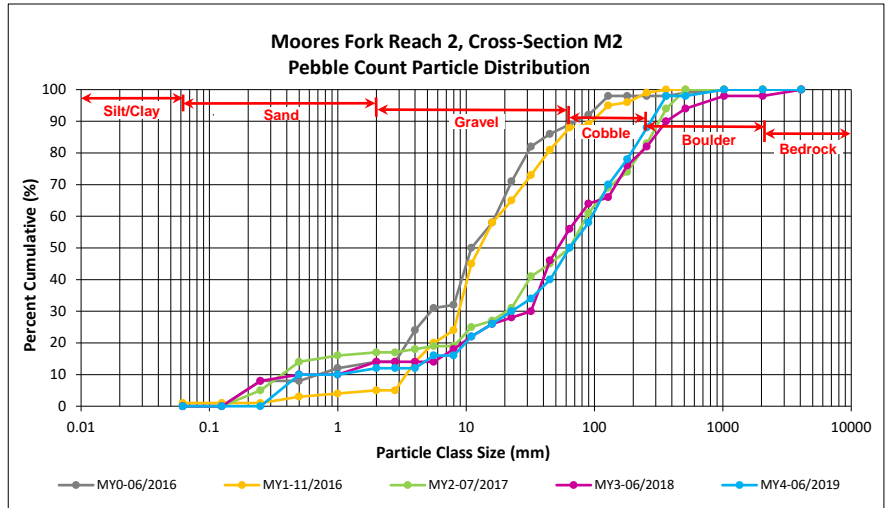


Cross-Section Pebble Count Plots
 Moores Fork Stream Mitigation Project
 DMS Project No. 94709
Monitoring Year 4 - 2019

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			0
	Medium	0.25	0.50	10	10	10
	Coarse	0.5	1.0			10
	Very Coarse	1.0	2.0	2	2	12
GRAVEL	Very Fine	2.0	2.8			12
	Very Fine	2.8	4.0			12
	Fine	4.0	5.6	4	4	16
	Fine	5.6	8.0			16
	Medium	8.0	11.0	6	6	22
	Medium	11.0	16.0	4	4	26
	Coarse	16.0	22.6	4	4	30
	Coarse	22.6	32	4	4	34
	Very Coarse	32	45	6	6	40
	Very Coarse	45	64	10	10	50
COBBLE	Small	64	90	8	8	58
	Small	90	128	12	12	70
	Large	128	180	8	8	78
BEDROCK	Large	180	256	10	10	88
	Small	256	362	10	10	98
	Small	362	512			98
BEDROCK	Medium	512	1024	2	2	100
	Large/Very Large	1024	2048			100
	Bedrock	2048	>2048			100
		Total		100	100	100

Cross-Section M2	
Channel materials (mm)	
D ₁₆ =	5.6
D ₃₅ =	33.9
D ₅₀ =	64.0
D ₈₄ =	222.4
D ₉₅ =	326.3
D ₁₀₀ =	1024.0

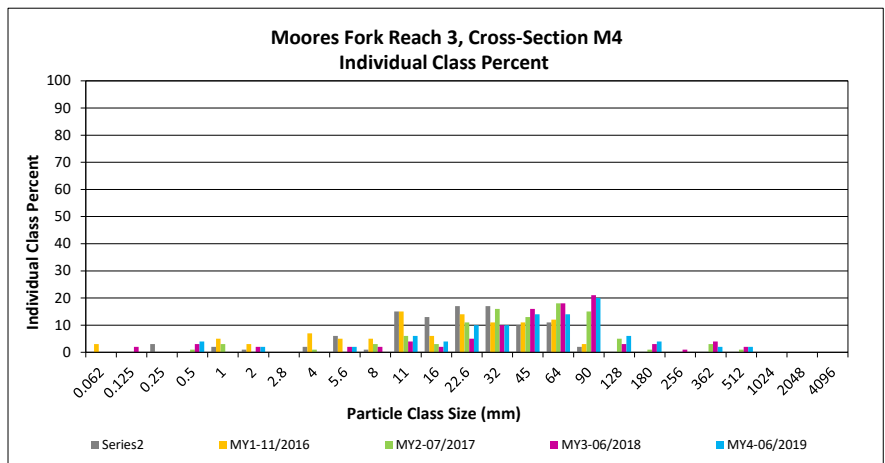
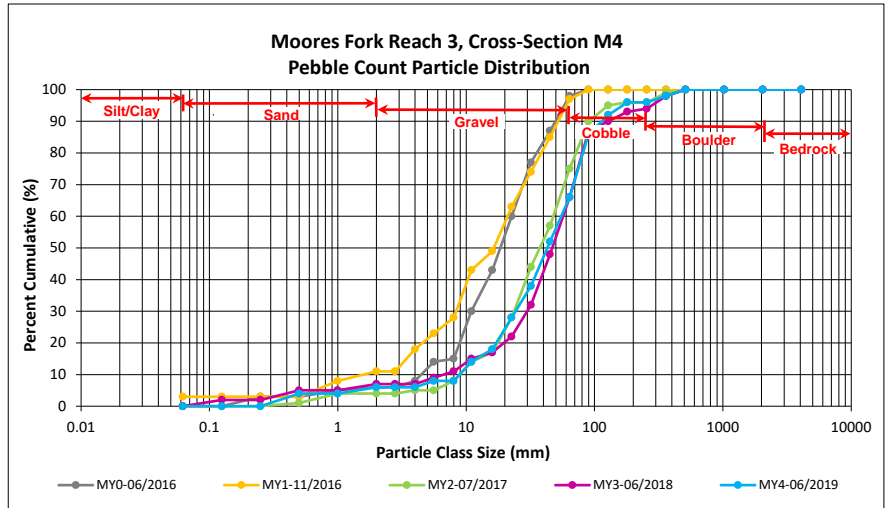


Cross-Section Pebble Count Plots
 Moores Fork Stream Mitigation Project
 DMS Project No. 94709
Monitoring Year 4 - 2019

Moores Fork Reach 3, Cross-Section M4

Particle Class		Diameter (mm)		Riffle 100-Count	Summary	
		min	max		Class Percentage	Percent Cumulative
SILT/CLAY		Silt/Clay	0.000 0.062			0
SAND	Very fine	0.062	0.125			0
	Fine	0.125	0.250			0
	Medium	0.25	0.50	4	4	4
	Coarse	0.5	1.0			4
	Very Coarse	1.0	2.0	2	2	6
GRAVEL	Very Fine	2.0	2.8			6
	Very Fine	2.8	4.0			6
	Fine	4.0	5.6	2	2	8
	Fine	5.6	8.0			8
	Medium	8.0	11.0	6	6	14
	Medium	11.0	16.0	4	4	18
	Coarse	16.0	22.6	10	10	28
	Coarse	22.6	32	10	10	38
	Very Coarse	32	45	14	14	52
Very Coarse	45	64	14	14	66	
COBBLE	Small	64	90	20	20	86
	Small	90	128	6	6	92
	Large	128	180	4	4	96
BEDROCK	Large	180	256			96
	Small	256	362	2	2	98
	Small	362	512	2	2	100
BEDROCK	Medium	512	1024			100
	Large/Very Large	1024	2048			100
	Bedrock	2048	>2048			100
		Total		100	100	100

Cross-Section M4	
Channel materials (mm)	
D ₁₆ =	13.3
D ₃₅ =	28.8
D ₅₀ =	42.9
D ₈₄ =	87.0
D ₉₅ =	165.3
D ₁₀₀ =	512.0

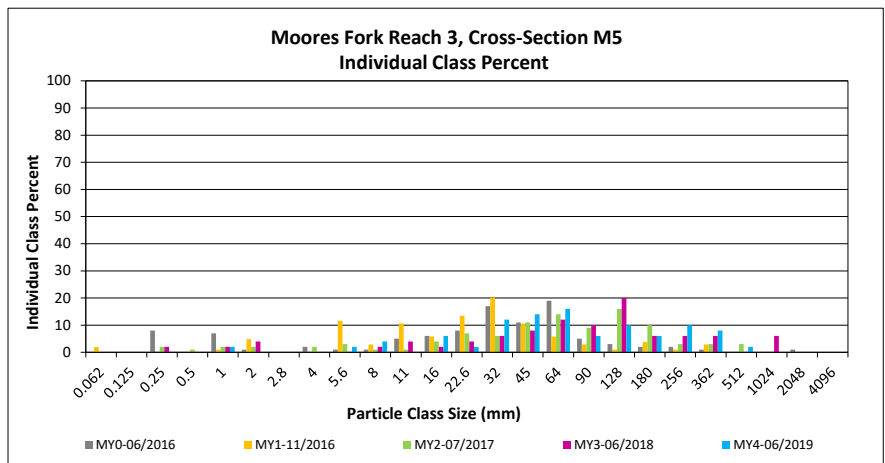
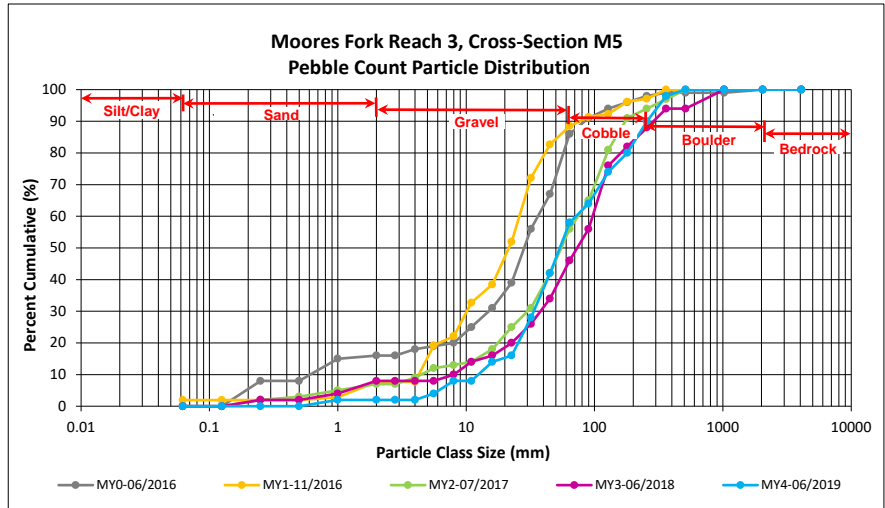


Cross-Section Pebble Count Plots
 Moores Fork Stream Mitigation Project
 DMS Project No. 94709
Monitoring Year 4 - 2019

Moores Fork Reach 3, Cross-Section M5

Particle Class		Diameter (mm)		Riffle 100-Count	Summary	
		min	max		Class Percentage	Percent Cumulative
SILT/CLAY		Silt/Clay	0.000	0.062		0
SAND	Very fine	0.062	0.125			0
	Fine	0.125	0.250			0
	Medium	0.25	0.50			0
	Coarse	0.5	1.0	2	2	2
	Very Coarse	1.0	2.0			2
GRAVEL	Very Fine	2.0	2.8			2
	Very Fine	2.8	4.0			2
	Fine	4.0	5.6	2	2	4
	Fine	5.6	8.0	4	4	8
	Medium	8.0	11.0			8
	Medium	11.0	16.0	6	6	14
	Coarse	16.0	22.6	2	2	16
	Coarse	22.6	32	12	12	28
	Very Coarse	32	45	14	14	42
	Very Coarse	45	64	16	16	58
COBBLE	Small	64	90	6	6	64
	Small	90	128	10	10	74
	Large	128	180	6	6	80
	Large	180	256	10	10	90
BEDROCK	Small	256	362	8	8	98
	Small	362	512	2	2	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 =	22.6
D ₃₅ =	37.9
D ₅₀ =	53.7
D ₈₄ =	207.2
D ₉₅ =	317.9
D ₁₀₀ =	512.0

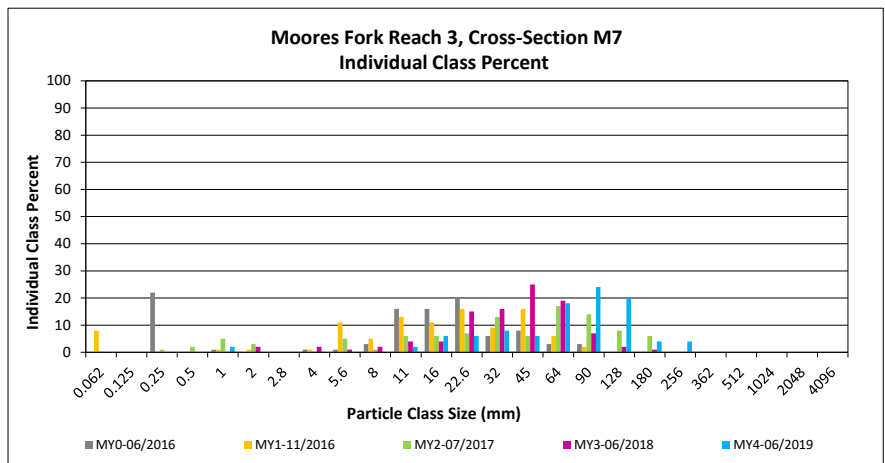
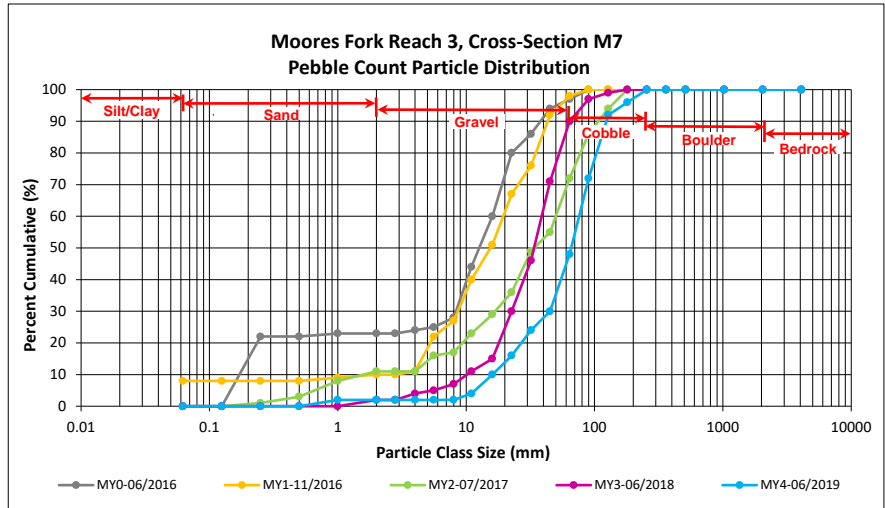


Cross-Section Pebble Count Plots
 Moores Fork Stream Mitigation Project
 DMS Project No. 94709
Monitoring Year 4 - 2019

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			0
	Medium	0.25	0.50			0
	Coarse	0.5	1.0	2	2	2
	Very Coarse	1.0	2.0			2
GRAVEL	Very Fine	2.0	2.8			2
	Very Fine	2.8	4.0			2
	Fine	4.0	5.6			2
	Fine	5.6	8.0			2
	Medium	8.0	11.0	2	2	4
	Medium	11.0	16.0	6	6	10
	Coarse	16.0	22.6	6	6	16
	Coarse	22.6	32	8	8	24
COBBLE	Very Coarse	32	45	6	6	30
	Very Coarse	45	64	18	18	48
	Small	64	90	24	24	72
	Small	90	128	20	20	92
	Large	128	180	4	4	96
BEDROCK	Large	180	256	4	4	100
	Small	256	362			100
	Small	362	512			100
BEDROCK	Medium	512	1024			100
	Large/Very Large	1024	2048			100
	Bedrock	2048	>2048			100
		Total			100	100

Cross-Section M7	
Channel materials (mm)	
D ₁₆ =	22.6
D ₃₅ =	49.6
D ₅₀ =	65.8
D ₈₄ =	111.2
D ₉₅ =	165.3
D ₁₀₀ =	256.0

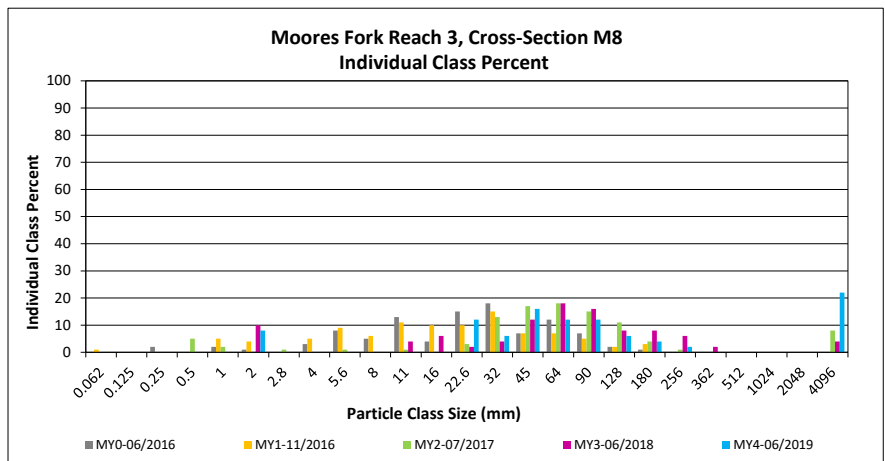
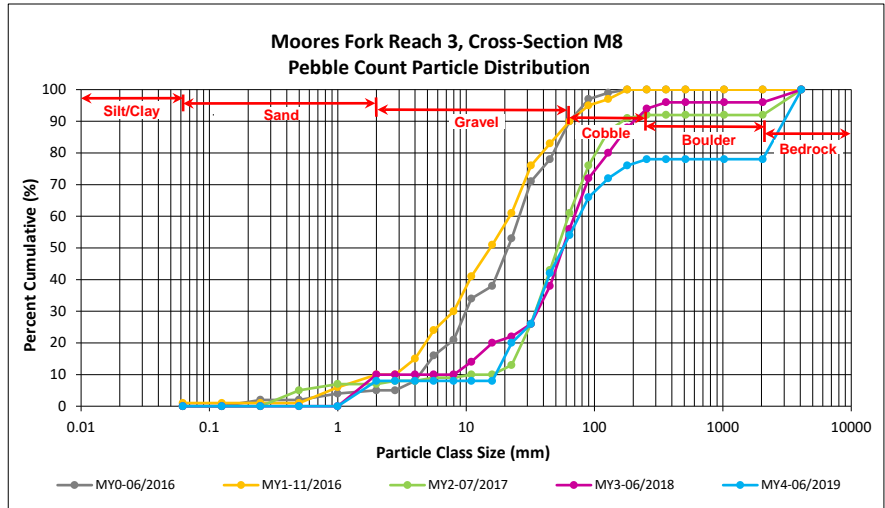


Cross-Section Pebble Count Plots
 Moores Fork Stream Mitigation Project
 DMS Project No. 94709
Monitoring Year 4 - 2019

Moores Fork Reach 3, Cross-Section M8

Particle Class		Diameter (mm)		Riffle 100-Count	Summary	
		min	max		Class Percentage	Percent Cumulative
SILT/CLAY		Silt/Clay	0.000 0.062			0
SAND	Very fine	0.062	0.125			0
	Fine	0.125	0.250			0
	Medium	0.25	0.50			0
	Coarse	0.5	1.0			0
	Very Coarse	1.0	2.0	8	8	8
GRAVEL	Very Fine	2.0	2.8			8
	Very Fine	2.8	4.0			8
	Fine	4.0	5.6			8
	Fine	5.6	8.0			8
	Medium	8.0	11.0			8
	Medium	11.0	16.0			8
	Coarse	16.0	22.6	12	12	20
	Coarse	22.6	32	6	6	26
	Very Coarse	32	45	16	16	42
	Very Coarse	45	64	12	12	54
COBBLE	Small	64	90	12	12	66
	Small	90	128	6	6	72
	Large	128	180	4	4	76
	Large	180	256	2	2	78
	Small	256	362			78
BEDROCK	Small	362	512			78
	Medium	512	1024			78
	Large/Very Large	1024	2048			78
BEDROCK	Bedrock	2048	>2048	22	22	100
		Total		100	100	100

Cross-Section M8	
Channel materials (mm)	
D ₁₆ =	20.1
D ₃₅ =	38.8
D ₅₀ =	56.9
D ₈₄ =	2474.2
D ₉₅ =	3499.0
D ₁₀₀ =	>2048



APPENDIX E. Hydrology Summary Data and Plots

Table 11. Verification of Bankfull Events

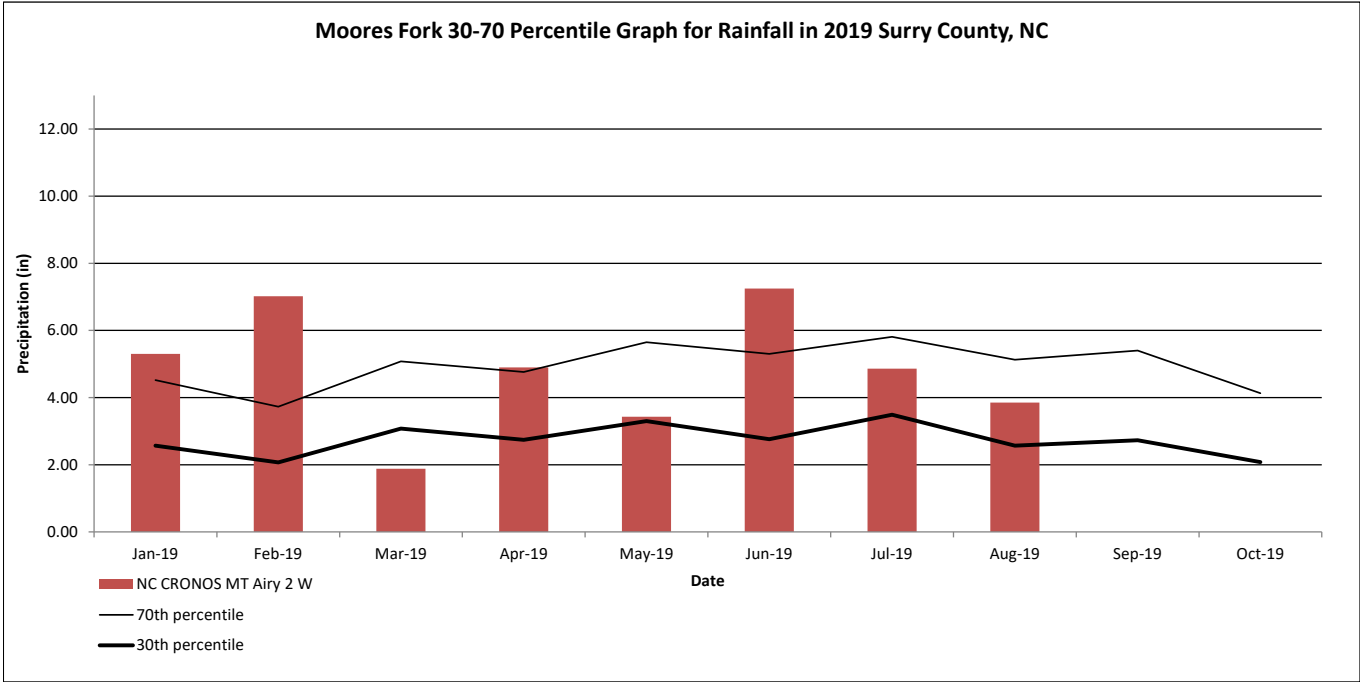
Moore's Fork Stream Mitigation Project

DMS Project No.94709

Monitoring Year 4 - 2019

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

Monthly Rainfall Data
 Moores Fork Stream Mitigation Project
 DMS Project No.94709
 Monitoring Year 4 - 2019



¹ 2019 rainfall collected from NC CRONOS Station Name: MT AIRY 2 W (NCCRONOS, 2019)

² 30th and 70th percentile rainfall data collected from weather station MT AIRY 2 W, NC (NCCRONOS, 2019)

APPENDIX F. Invasive Species Treatment Logs

MEMO

To: Matthew Reid, NCDEQ
From: Joe Secoges
Date: October 2019
Subject: Moore's Fork Mitigation Site Maintenance Report

For reporting purposes, Eastern Forest Consultants produced a map delineating five management units. The units are labeled A through E on a map attached to the memo to help describe tasks performed in various areas of the property.

Tasks Performed:

- **Management Area A-** July 5th, 6th, and 11th was spent spraying in Management Area A. Invasive species found in the management area include Japanese honeysuckle, kudzu, Chinese privet, multi-flora rose and oriental bittersweet. There were large amounts of honeysuckle sprayed in the cove area on the south side, along with a small area of kudzu. Chinese privet was scattered throughout all of the area, some spots being denser with the species than others. The herbicide used to spray all species, except kudzu, was Rodeo. Rodeo was used at a rate of 5oz per gallon. The kudzu was controlled with Transline at an approximate rate of 10 oz per acre (half the amount allowed on a site in one year).

On August 24th, Area A was treated again. The honeysuckle, privet, rose, and bittersweet were treated using a mix of 4 oz Rodeo and 2 oz Vastlan per gallon of water. Kudzu was treated again using Transline at an approximate rate of 10 oz per acre.

On November 12th, privet stems from the ground to about 12-15" above ground were treated using 25% Garlon 4 Ultra in penetrating basal oil.

On February 26th, 2019, privet stems from the ground to about 12-15" above ground were treated using 25% Garlon 4 Ultra in penetrating basal oil.

On September 27th, 2019, the management area received a final herbicide application to address the few remaining invasive plants that could be located. A mix of Vastlan (2 oz / gallon water) + Rodeo (4 oz / gallon water) + surfactant + spray pattern indicator was used to treat all species. Applicators concentrated on treating kudzu and privet that were close to the water and difficult to treat on previous applications with herbicides not approved for aquatic use (Transline and Garlon 4 Ultra).

- **Management Area B-** July 10th and 11th was spent treating Management Area B. Invasive species found in the area include Japanese honeysuckle, kudzu, Chinese privet, multi-flora rose and oriental bittersweet. Honeysuckle and bittersweet had a well-established presence in the area. There was also a small patch of kudzu that was starting to work its way back into the forested area. Rodeo was used at a rate of 5oz per gallon. The kudzu was controlled with Transline at an approximate rate of 10 oz per acre. Several ailanthus and paulownia trees were treated via hack and squirt.

On August 24th, and 27th and September 3rd and 5th, Area B was treated again. The honeysuckle, privet, rose, and bittersweet were treated using a mix of 4 oz Rodeo and 2 oz Vastlan per gallon of water. Kudzu was treated again using Transline at an approximate rate of 10 oz per acre.

On November 28th, privet stems from the ground to about 12-15” above ground were treated using 25% Garlon 4 Ultra in penetrating basal oil.

On February 26th, 2019, privet stems from the ground to about 12-15” above ground were treated using 25% Garlon 4 Ultra in penetrating basal oil.

On September 27th, 2019, the management area received a final herbicide application to address the few remaining invasive plants that could be located. A mix of Vastlan (2 oz / gallon water) + Rodeo (4 oz / gallon water) + surfactant + spray pattern indicator was used to treat all species. Applicators concentrated on treating kudzu and privet that were close to the water and difficult to treat on previous applications with herbicides not approved for aquatic use (Transline and Garlon 4 Ultra). Some kudzu in this unit also received a small treatment with Transline. The Transline was utilized on areas away from the water that were difficult to access earlier in the summer before kudzu received the first treatment of 2019.

- **Management Area C-** Management Area C was treated on July 11th and 12th. Invasive species found in the management area include Japanese honeysuckle, kudzu, Chinese privet, multi-flora rose and oriental bittersweet. The area was not heavily populated with invasive species. The south side of the stream was more heavily populated, but was still sporadic. Rodeo was used at a rate of 5oz per gallon. The kudzu was controlled with Transline at an approximate rate of 10 oz per acre.

On August 27th and September 5th, Area C was treated again. The honeysuckle, privet, rose, and bittersweet were treated using a mix of 4 oz Rodeo and 2 oz Vastlan per gallon of water. Kudzu was treated again using Transline at an approximate rate of 10 oz per acre.

On November 29th, privet stems from the ground to about 12-15” above ground were treated using 25% Garlon 4 Ultra in penetrating basal oil.

On February 26th, 2019, privet stems from the ground to about 12-15” above ground were treated using 25% Garlon 4 Ultra in penetrating basal oil.

On September 27th, 2019, the management area received a final herbicide application to address the few remaining invasive plants that could be located. A mix of Vastlan (2 oz / gallon water) + Rodeo (4 oz / gallon water) + surfactant + spray pattern indicator was used to treat all species. Applicators concentrated on treating kudzu and privet that were close to the water and difficult to treat on previous applications with herbicides not approved for aquatic use (Transline and Garlon 4 Ultra).

- **Management Area D-** Management Area D was treated on July 11th and 12th. Invasive species found in the management area include Japanese honeysuckle, kudzu, Chinese privet, multi-flora rose and oriental bittersweet. Invasive species populations in this area were sporadic but dense when found. Rodeo was used at a rate of 5oz per gallon. The kudzu was controlled with Transline at an approximate rate of 10 oz per acre. Some ailanthus trees were flagged to be hacked and squirted on the next application.

On August 24th and 27th, Area D was treated again. The honeysuckle, privet, rose, and bittersweet were treated using a mix of 4 oz Rodeo and 2 oz Vastlan per gallon of water. Kudzu was treated again using Transline at an approximate rate of 10 oz per acre.

On November 29th, privet stems from the ground to about 12-15” above ground were treated using 25% Garlon 4 Ultra in penetrating basal oil.

On February 26th, 2019, privet stems from the ground to about 12-15” above ground were treated using 25% Garlon 4 Ultra in penetrating basal oil.

- **Management Area E-** Management Area E was treated on the afternoon of July 10th and 12th. Invasive species found in the management area include Japanese honeysuckle, kudzu, Chinese privet, multi-flora rose and Oriental bittersweet. The area was dense in honeysuckle, and bittersweet and had some dense areas of kudzu on the outer edges. Rodeo was used at a rate of 5oz per gallon. The kudzu was controlled with Transline at an approximate rate of 10 oz per acre.

On August 27th and September 5th, Area E was treated again. The honeysuckle, privet, rose, and bittersweet were treated using a mix of 4 oz Rodeo and 2 oz Vastlan per gallon of water. Kudzu was treated again using Transline at an approximate rate of 10 oz per acre.

On November 29th, privet stems from the ground to about 12-15” above ground were treated using 25% Garlon 4 Ultra in penetrating basal oil.

On February 26th, 2019, privet stems from the ground to about 12-15” above ground were treated using 25% Garlon 4 Ultra in penetrating basal oil.

On September 27th, 2019, the management area received a final herbicide application to address the few remaining invasive plants that could be located. A mix of Vastlan (2 oz / gallon water) + Rodeo (4 oz / gallon water) + surfactant + spray pattern indicator was used to treat all species. Applicators concentrated on treating kudzu and privet that were close to the water and difficult to treat on previous applications with herbicides not approved for aquatic use (Transline and Garlon 4 Ultra).

Other Notable Information:

- Kudzu was found to be more abundant than originally noted on the site assessment report. A map is attached to this memo noting the kudzu that was located and treated in the field.
- On the second round of control (late August – early September) extra care was taken when treating kudzu along the field edges, especially in Blocks B and E, because corn and/or sorghum was planted nearby.
- When spraying privet in November, stems that were next to surface water were not treated.
- When spraying privet in February 2019, stems that were next to surface water were not treated.
- All kudzu locations identified in 2018 were treated with Transline on 7/24/2019. Each position was given a ranking with “3” noting a heavy infestation, “2” noting a moderate infestation, and “1” or “0” noting a light infestation/none found. A follow-up treatment will be conducted later in 2019 on areas ranked with a “3” or “2”.
- Eastern Forest Consultants believes that a 95% kill/control rate was achieved prior to the application on September 27, 2019. However, the final application was beneficial for treating new seedlings and some areas that were difficult to reach with herbicides not approved for aquatic use. Applicators visited all kudzu areas designated with a “3” or “2” after the 7/24/2019 application (see above). Unfortunately, applicators still had to refrain from treating kudzu that was climbing out of the mitigation area and into the neighboring corn fields out of fear of damaging crops.

PESTICIDE/HERBICIDE APPLICATION RECORD

PROPERTY OWNER/MANAGER:

Name: Matthew Reid
NC DEQ DMS

Address: 5 Ravenscroft Drive, Suite 102
Asheville, NC 28801

Telephone #: 828-231-7912

ADDRESS/LOCATION OF APPLICATION SITE (if different than above):

Address/Location: Moore's Fork Mitigation Site – Surry County

CERTIFIED APPLICATOR:

Joseph M. Secoges (Applicator Cert. # 026-34911 / Consultant Cert. # 030-1312)
Eastern Forest Consultants LLC
P.O. Box 1577
Clemmons, NC 27012
240-446-1583

DATE + START/END TIME OF APPLICATION: 9/27/2019; 0900-1630

RESTRICTED ENTRY INTERVAL (REI):

DURATION (# OF HOURS): 24 Hours

EXPIRATION (DATE/TIME): 9/28/2019 @ 1630

PLANTS/SITES TREATED: Upland Area around Stream

PRINCIPLE PESTS TO BE CONTROLLED: Kudzu, Privet, Morning Glory, Rose,
Honeysuckle, Bittersweet

ACREAGE, AREA, OR NUMBER OF PLANTS TREATED:

Spot Spray As Needed

IDENTIFICATION/AMOUNT OF PESTICIDES USED:

- 1) Brand/Common Name: Vastlan
EPA Reg. Number: 62719-687
Amount Applied to Site: 72 oz
Application Rate: 2 oz/Gallon
- 2) Brand/Common Name: Rodeo
EPA Reg. Number: 62719-324
Amount Applied to Site: 144 oz
Application Rate: 4 oz/Gallon
- 3) Brand/Common Name: Spreader 90 Surfactant
EPA Reg. Number: N/A
Amount Applied to Site: 39 oz
Application Rate: 1 oz /gallon
- 4) Brand/Common Name: Bullseye Dye
EPA Reg. Number: N/A
Amount Applied to Site: 39 oz
Application Rate: 1 oz/gallon
- 5) Brand/Common Name: Transline
EPA Reg. Number: 62719-259
Amount Applied to Site: 5 oz
Application Rate: 21 oz /ac (12 gallons water / ac)

DILUENTS USED (Water, Oil, Fuel, etc.):

- 1) Diluent: Water
Amount Applied to Site: 39 gallons
Application Rate: As Needed
- 2) Diluent:
Amount Applied to Site:
Application Rate:

TYPE OF APPLICATION EQUIPMENT USED: Back-pack Sprayers

WEATHER:

Temp: 75-90 deg F

Wind Speed: 0-10 mph

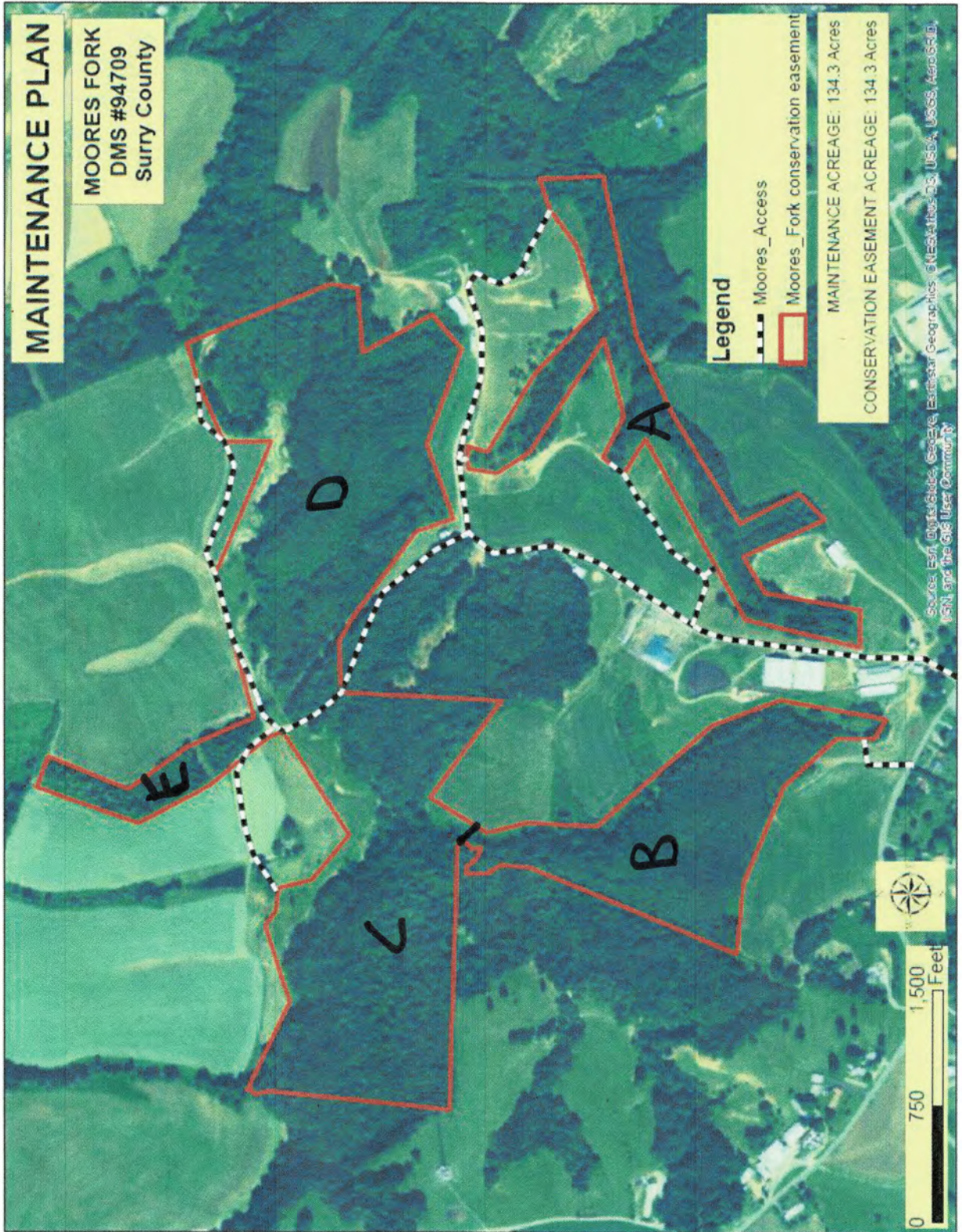
Wind Direction: variable

NOTES: Treated some kudzu away from creek on northeast side of Management Unit B using Transline (3 gallons of mix). Conducted follow-up treatment in all management units using vastlan and rodeo mix so that we could treat up to water's edge.

MEASUREMENT AND PAYMENT

The invasive vegetation treatment will be paid per the Payments and Milestones Schedule listed in Section 4.6 of this RFQ. VENDOR must follow the PAYMENT & INVOICING PROCEDURES listed in Section 4.7 to avoid delays in payments.

EFL Management Units



2018 Kudzu Locations - July 2019 Status



0-1 - Little/No Kudzu Found
 2 - Moderate Infestation
 3 - Heavy Infestation

