MONITORING YEAR 5 ANNUAL REPORT
Final

FOUST CREEK MITIGATION SITE
Alamance County, NC
NCDEQ Contract 004954
DMS Project Number 95715
USACE Action ID Number 2012-01908
NCDWR Project Number 13-1295

Data Collection Period: March 2019 - October 2019
Draft Submission Date: December 2, 2019
Final Submission Date: January 8, 2020

PREPARED FOR:

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

Mitigation Project Name	**Foust Creek Mitigation Site**	**County**	**Alamance**	**USACE Action ID**	2012-01908
DMS ID	**95715**	**Date Project Instituted**	**12/4/2012**	**NCDWR Permit No**	2013-1295
River Basin	**Cape Fear**	**Date Prepared**	**7/19/2019**		
Cataloging Unit	**03030002**				

Credit Release Milestone	Stream Credits						Wetland Credits							
	Scheduled Releases (Stream)	Warm	Cool	Cold	Anticipated Release Year (Stream)	Actual Release Date (Stream)	Scheduled Releases (Forested)	Riparian Riverine	Riparian Non-riverine	Non-riparian	Scheduled Releases (Coastal)	Coastal	Anticipated Release Year (Wetland)	Actual Release Year (Wetland)
Potential Credits (Mitigation Plan)		**4,818.020**						**4.007**						
Potential Credits (As-Built Survey)		**4,769.600**						**4.007**						
1 (Site Establishment)	**N/A**				N/A	N/A	**N/A**				**N/A**		N/A	
2 (Year 0 / As-Built)	**30%**	1,430.880			2015	5/14/2015	**30%**	1.202			**30%**		2015	5/14/2015
3 (Year 1 Monitoring)	**10%**	476.960			2016	4/25/2016	**10%**	0.401			**10%**		2016	4/25/2016
4 (Year 2 Monitoring)	**10%**	476.960			2017	4/3/2017	**10%**	0.401			**15%**		2017	4/3/2017
5 (Year 3 Monitoring)	**10%**	476.960			2018	4/25/2018	**15%**	0.601			**20%**		2018	4/25/2018
Permanent Credit Reduction - 5 (Year 3 Monitoring)								(0.100)					2018	
6 (Year 4 Monitoring)	**5%**	238.480			2019	4/26/2019	**5%**	0.200			**10%**		2019	4/26/2019
7 (Year 5 Monitoring)	**10%**				2020		**15%**				**15%**		2020	
8 (Year 6 Monitoring)	**5%**				2021		**5%**				**N/A**		2021	
9 (Year 7 Monitoring)	**10%**				2022		**10%**				**N/A**		2022	
Stream Bankfull Standard	**10%**	476.960			2017	4/3/2017	**N/A**				**N/A**			
Total Credits Released to Date		**3,577.200**						**2.705**						
Total Credits Unrealized (Permanent Reduction)		**0.000**						**0.100**						

NOTES:

CONTINGENCIES:

Signature of Wilmington District Official Approving Credit Release

27 Sept 2019

Date

1 - For DMS, no credits are released during the first milestone

2 - For DMS projects, the second credit release milestone occurs automatically when the as-built report (baseline monitoring report) has been made available to the NCIRT by posting it to the NCEEP Portal, provided the following criteria have been met:

1) Approval of the final Mitigation Plan
2) Recordation of the preservation mechanism, as well as a title opinion acceptable to the USACE covering the property
3) Completion of all physical and biological improvements to the mitigation site pursuant to the mitigation plan
4) Reciept of necessary DA permit authorization or written DA approval for porjects where DA permit issuance is not required

3 - A 10% reserve of credits is to be held back until the bankfull event performance standard has been met

Mitigation Project Name	**Foust Creek Mitigation Site**	**County**	**Alamance**	**USACE Action ID**	2012-01908
DMS ID	**95715**	**Date Project Instituted**	**12/4/2012**	**NCDWR Permit No**	2013-1295
River Basin	**Cape Fear**	**Date Prepared**	**7/19/2019**		
Cataloging Unit	**03030002**				

DEBITS (released credits only)

			Ratios	1.0016092	1.5	2.72402	5	1.2629	3	2	5	1	3	2	5	1	3	2	5
				Stream Restoration	Stream Enhancment I	Stream Enhancement II	Stream Preservation	Riparian Restoration	Riparian Creation	Riparian Enhancement	Riparian Preservation	Nonriparian Restoration	Nonriparian Creation	Nonriparian Enhancement	Nonriparian Preservation	Coastal Marsh Restoration	Coastal Marsh Creation	Coastal Marsh Enhancement	Coastal Marsh Preservation
As-Built Amounts (feet and acres)				**4,357.000**		**1,143.000**		**5.060**											
As-Built Amounts (mitigation credits)				**4,350.000**		**419.600**		**4.007**											
Percentage Released				**75.00%**		**75.00%**		**70.00%**											
Released Amounts (feet / acres)				**3,267.750**		**857.250**		**3.416**											
Released Amounts (credits)				**3,262.500**		**314.700**		**2.705**											
Credits Unrealized (Permanent Reduction)								**0.100**											
NCDWR Permit	USACE Action ID	Project Name																	
2013-0223	2001-21125	NCDOT TIP U-2524C / D - Greensboro - Western Loop, Guilford County		749.480															
2013-0517	2013-00557	NCDOT TIP R-2413 A/B - NC 68 Connector, Guilford County		557.620		342.900													
2013-0517	2013-00557	NCDOT TIP R-2413 A/B - NC 68 Connector, Guilford County		435.700		114.300													
2013-0918	2005-21386	NCDOT TIP U-2525 B/C - Greensboro Eastern Loop, Guilford County						2.024											
2013-0912	2013-01990	NCDOT TIP R-2612B - US 421 Improvements, Guilford County		459.770															
	2015-00943	SR 2178 - Bridge 253 - Division 7		70.113															
	2014-01930	SR 2354 - Bridge 248 - Division 7		64.103															
	2014-01180	SR 2356 - Bridge 135 - Division 7		162.260															
2014-1226	2011-00317	NCDOT TIP I-5110 - I-73 Construction, Guilford County		115.160		228.600													
2013-0918	2005-21386	NCDOT TIP U-2525 B/C - Greensboro Eastern Loop, Guilford County						0.506											
2013-0517	2013-00557	NCDOT TIP R-2413 A/B - NC 68 Connector, Guilford County		0.200															
2013-0918	2005-21386	NCDOT TIP U-2525 B/C - Greensboro Eastern Loop, Guilford County		435.495		114.300													
	2017-02605	NCDOT - SR 1945 - Bridge 310093 - Division 5						0.025											
2017-1466	2009-02019	NCDOT TIP U-4734 - Division 9						0.602											
2013-0918	2005-21386	NCDOT TIP U-2525 B/C - Greensboro Eastern Loop, Guilford County		217.850		57.150		0.259											

Mitigation Project Name	**Foust Creek Mitigation Site**	**County**	**Alamance**	**USACE Action ID**	2012-01908
DMS ID	**95715**	**Date Project Instituted**	**12/4/2012**	**NCDWR Permit No**	2013-1295
River Basin	**Cape Fear**	**Date Prepared**	**7/19/2019**		
Cataloging Unit	**03030002**				

Remaining Amounts (feet / acres)	**0.000**		**0.000**		**0.000**												
Remaining Amounts (credits)	**0.000**		**0.000**		**0.000**												

January 8, 2020

Jeremiah Dow
N.C. Division of Mitigation Services
1652 Mail Service Center
Raleigh, NC 27699-1652

RE: Draft Monitoring Year 5 Annual Report Comments - Foust Creek Mitigation Site (DMS #95715)
Cape Fear River Basin 03030002, Alamance County
Contract No. 004954

Dear Mr. Dow,

We have reviewed the comments on the Monitoring Year 5 Report for the above referenced project dated December 31, 2019 and have revised the report based on these comments. The revised documents are submitted with this letter. Below are responses to each of your comments. For your convenience, the comments are reprinted with our response in italics.

1. Appendix 4
    a. For any morphological tables, please change the Bank Height Ratio and Entrenchment Ratio footnotes to state that they are calculated using the methods specified in the Industry Technical Workgroup Memorandum.

       Footnotes on morphological tables have been updated.

    b. Table 12a – Please verify the Max values entered for Foust Creek – Reach 2 for MY5.

       Values for Foust Creek – Reach 2 in Table 12a contained errors and have been updated.

    c. Table 12b – See comment (b) above since Reach 3A appears to be based on Reach 2 data.

       Values for Foust Creek – Reach 3A in Table 12b were updated.

    d. Reachwide and Cross Section Pebble Count Plots – Please change the pebble count sheet titled “Foust Creek R2, Reachwide” to “Foust Creek R2 & R3a, Reachwide” or otherwise indicate that this pebble count includes Reach 3a in order to reduce confusion. Please change “Foust Creek R3, Reachwide” to “Foust Creek R3b, Reachwide.”

The pebble count plot previously titled "Foust Creek R2, Reachwide" was updated to "Foust Creek R2 and R3A, Reachwide." The pebble count plot previously title "Foust Creek R3, Reachwide" was updated to "Foust Creek R3B, Reachwide."

2. Appendix 5
    a. Table 13 – The verification of bankfull events table should be cumulative for prior years.

    Table 13 was updated to include bankfull events during previous monitoring years.

3. Digital data and drawings
    a. Geospatial features for Foust Creek and associated wetlands do not match reported assets. Please provide features that characterize the creditable assets that have been reported, ensuring that features are segmented and attributed as they are in the asset table and that feature lengths/areas match the linear feet/acreage reported.

    This has been resolved.

    b. CVS entry tool is missing many plant vigors, please include these and resubmit. Also, please enter in the observation/sampling dates for MY5 plots.

    Our records indicate that the CVS entry tool is populated entirely for MY5. Please note that in the Foust Creek CVS entry tool, plot sampling year labels correspond to monitoring years as follows:
    95715-WEI-0001= MY0 sampling
    95715-WEI-0001-year:1 = MY1
    95715-WEI-0001-year:2 = MY2
    95715-WEI-0001-year:3 = MY3
    95715-WEI-0001-year:4 = MY5
    95715-WEI-0001-year:5 = MY7
    Plot sampling year 95715-WEI-0001-year:5 was removed from the CVS database and the updated database is included in this submittal.

If you have any questions, please contact me by phone (919) 851-9986, or by email (jlorch@wildlandseng.com).

Sincerely,

Jason Lorch, *Monitoring Coordinator*

PREPARED BY:

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

Jason Lorch
jlorch@wildlandseng.com
Phone: 919.851.9986

EXECUTIVE SUMMARY

Wildlands Engineering (Wildlands) completed a full delivery project for the North Carolina Department of Environmental Quality, Division of Mitigation Services (DMS) to restore and enhance a total of 5,500 linear feet (LF) of stream and rehabilitate and re-establish 4.96 acres of wetlands in Alamance County, NC. The Foust Creek Mitigation Site (Site) proposes to provide 4,770 Stream Mitigation Units (SMUs) and 3.91 Wetland Mitigation Units (WMUs). The project consists of Foust Creek, a second order perennial stream, and an unnamed, intermittent first order tributary to Foust Creek (UT1). At the downstream limits of the project the drainage area is 1,259 acres (1.97 square miles).

The Site is located in the southern portion of Alamance County, east of Snow Camp and approximately 15 miles southeast of the City of Burlington (Figure 1). It is located in the Carolina Slate Belt of the Piedmont Physiographic Province (USGS, 1998). The Site is in the Jordan Lake Water Supply Watershed within the North Carolina Division of Water Resources (NCDWR) subbasin 03-06-04 of the Cape Fear River Basin and United States Geological Survey (USGS) Hydrologic Unit 03030002050050.

Prior to construction activities, both streams had been degraded by livestock access and agricultural practices. The primary objectives of the project were to promote wetland hydrology, restore a stream and wetland complex to the condition of a naturally occurring community, restore a stream system to promote hydrologic connectivity with the floodplains and wetlands, stabilize stream banks, promote instream habitat and aeration, restore riparian buffers, and further improve water quality through removing agricultural practices. Figure 2 and Table 1 present the restoration and enhancement components of the Site.

The following project goals were established to address the effects listed above from watershed and project site stressors:

- Reduce sediment inputs by removing cattle from streams and restoring degraded and eroding stream channels;
- Return a network of streams to a stable form that is capable of supporting biological functions;
- Reduce fecal coliform, nitrogen, and phosphorus inputs through removing cattle from streams and establishing and augmenting a forested riparian corridor; and
- Protect existing high-quality streams and forested buffers.

Stream and wetland restoration and enhancement construction efforts were completed in February 2015. Baseline as-built monitoring activities (MY0) were completed in February 2015. A conservation easement is in place on 22.11 acres of the stream and wetland riparian corridors to protect them in perpetuity.

Monitoring Year 5 (MY5) assessment and site visits were completed between the months of March and October 2019 to assess the conditions of the project. Overall, the Site has met the required vegetation, stream, and hydrology success criteria for MY5. The overall MY5 average planted stem density for the Site is 417 stems per acre which is greater than the year five interim density requirement of 260 stems per acre. Supplemental planting was performed during January 2019 within areas that appeared to have lower stem density than surrounding areas. Invasive vegetation has been removed and removal will continue as necessary. All restored and enhanced streams are stable and functioning as designed and have recorded multiple bankfull events. The flow gage on UT1 met the hydrologic success criteria for MY5. All groundwater gages met the success criterion (water table within 12 inches of the ground surface for 8.5% of the growing season consecutively).

TABLE OF CONTENTS

APPENDICES

Section 1: PROJECT OVERVIEW

The Foust Creek Mitigation Site; hereafter referred to as the Site, is located in southern Alamance County within the Cape Fear River Basin (USGS Hydrologic Unit 03030002) approximately 15 miles southeast of the City of Burlington. The Site is located upstream and downstream of the Snow Camp Road stream crossing immediately east of the town of Snow Camp. The Site is located in the Carolina Slate Belt of the Piedmont Physiographic Province (USGS, 1998). The project watershed consists primarily of agricultural lands and forest. The drainage area for the project site is 1,259 acres (1.97 square miles) at the lower end of Foust Creek.

The project stream reaches include Foust Creek and UT1 and were improved through stream restoration and enhancement level II approaches. Mitigation work within the Site included restoration and enhancement of 5,500 linear feet (LF) of perennial and intermittent stream channel and rehabilitation and re-establishment of 4.96 acres (ac) of riparian wetland. The stream and wetland areas were also planted with native vegetation to improve habitat and protect water quality. The Site proposes to provide 4,770 Stream Mitigation Units (SMUs) and 3.91 Wetland Mitigation Units (WMUs). The final mitigation plan was submitted and accepted by the North Carolina Department of Environmental Quality, Division of Mitigation Services (DMS) in February of 2014. Construction activities were completed by Fluvial Solutions in February 2015. The planting was completed by Bruton Natural Systems, Inc. in February 2015 and baseline monitoring (MY0) was conducted in January and February 2015. Annual monitoring will be conducted for seven years with the close-out anticipated to commence in 2022 given the success criteria are met. Appendix 1 provides more detailed project activity, history, contact information, and watershed/site background information for this project.

A conservation easement has been recorded and is in place along the stream and wetland riparian corridors to protect them in perpetuity; 22.11 ac (Deed Book 3278, Pages 935-944) within four parcels. Directions and a map of the Site are provided in Figure 1 and project components are illustrated in Figure 2.

1.1 Project Goals and Objectives

Prior to construction activities, both streams had been degraded by livestock access and agricultural practices. Impacts to the stream included direct access by livestock, trampling of the riparian vegetation and stream banks, channelization, eroding banks, floodplain ditching, and a lack of stabilizing riparian vegetation. The adjacent floodplain had been cleared for pasture and was grazed by livestock. The riparian vegetation was either absent, limited to the streambanks, or periodically disturbed. Table 4 in Appendix 1 and Tables 10a and 10b in Appendix 4 present the pre-restoration conditions in detail.

The Site was designed to meet the over-arching goals as described in the Mitigation Plan (Wildlands, 2014). The project is intended to provide numerous ecological benefits within the Cape Fear River Basin. While many of these benefits are limited to the Foust Creek Mitigation Site project area, others, such as pollutant removal and improved aquatic and terrestrial habitat, have more far-reaching effects. The following project specific goals established in the Mitigation Plan (Wildlands, 2014) include:

- Reduce sediment inputs by removing cattle from streams and restoring degraded and eroding stream channels;
- Return a network of streams to a stable form that is capable of supporting biological functions;

- Reduce fecal coliform, nitrogen, and phosphorus inputs through removing cattle from streams and establishing and augmenting a forested riparian corridor; and
- Protect existing high-quality streams and forested buffers.

The project goals were addressed through the following project objectives:

- On-site nutrient inputs were decreased by removing cattle from streams, re-establishing floodplain connectivity, and filtering on-site runoff through buffer zones and wetlands. Off-site nutrient input is absorbed on-site by filtering flood flows through restored floodplain areas and riparian wetlands, where flood flow spreads through native vegetation. Vegetation uptakes excess nutrients.
- Stream bank erosion which contributes sediment load to the creeks was greatly reduced in the project area. Eroding stream banks were stabilized using bioengineering, natural channel design techniques, and grading to reduce bank angles and bank height. Storm flow containing grit and fine sediment is filtered through restored floodplain areas, where flow spreads through native vegetation. Spreading flood flows also reduce velocity and allow sediment to settle out. Sediment transport capacity of restored reaches was improved so that capacity balances more closely to load. Sediment load reduction will be monitored through assessing bank stability with cross section surveys and visual assessment through photo documentation which serves as an accepted surrogate for direct turbidity measurements.
- Restored riffle/pool sequences promote aeration of water and create deep water zones, helping to lower water temperature. Establishment and maintenance of riparian buffers creates long-term shading of the channel flow to minimize thermal heating. Lower water temperatures help maintain dissolved oxygen concentrations.
- In-stream structures were constructed to improve habitat diversity and trap detritus. Wood habitat structures were included in the stream as part of the restoration design. Such structures included log drops and rock structures that incorporate woody debris.
- Adjacent buffer and riparian habitats were restored with native vegetation as part of the project. Native vegetation provides cover and food for terrestrial creatures. Native plant species were planted and invasive species were treated. Eroding and unstable areas were also stabilized with vegetation as part of this project.
- The restored land is protected in perpetuity through a conservation easement.

The design streams and wetlands were restored to the appropriate type based on the surrounding landscape, climate, and natural vegetation communities but also with strong consideration to existing watershed conditions and trajectory. Specifically, the Site design was developed to restore a stream and wetland complex to the condition of a naturally occurring ecosystem creating riparian habitat and improving water quality.

1.2 Monitoring Year 5 Data Assessment

Annual monitoring and quarterly site visits were conducted during monitoring year 5 (MY5) to assess the condition of the project. The stream and wetland mitigation success criteria for the Site follow the approved success criteria presented in the Foust Creek Mitigation Plan (Wildlands, 2014).

1.2.1 Vegetation Assessment

A total of 17 10 meter by 10 meter vegetation plots were established during baseline monitoring within the project easement areas. The final vegetative success criteria will be the survival of 210 planted stems per acre averaging 10 feet in height within the conservation easement at the end of the seven-year monitoring period (MY7). The interim measure of vegetative success for the Site will be the survival of 260 planted stems per acre at the end of the fifth year of monitoring (MY5).

The MY5 vegetation survey was completed in August 2019. The 2019 vegetation monitoring indicated an average planted stem density of 417 planted stems per acre, which is greater than the interim requirement of 260 planted stems per acre required at MY5, but approximately 36% less than the baseline density of 647 planted stems per acre. Fifteen of the 17 vegetation plots individually met success criterion for MY5 and are on track to meet the success criteria required for MY7 (Table 9, Appendix 3). Planted stem densities in plots six and seven are below the MY5 interim and final stem density requirements. When including volunteer stems, plots six and seven exceed the MY5 interim success criterion. Refer to Appendix 2 for vegetation plot photographs and the vegetation condition assessment table and Appendix 3 for vegetation data tables.

1.2.2 Vegetation Areas of Concern

During MY5, defined populations of Japanese honeysuckle (*Lonicera japonica*) and Chinese privet (*Ligustrum sinense*) were identified within the project area (Figures 3.1-3.3). The populations of Chinese privet were treated during May and October of 2019. During the October invasive vegetation treatment, the entire site was also spot treated for invading invasive individuals to prevent spreading. Japanese honeysuckle was not treated because treatment for this species can be conducted with greater effectiveness during winter and without adverse impact to non-target species. The autumn olive (*Elaeagnus umbellata*) stem inventoried in plot 3 and the Chinese privet stems inventoried in plot 14 were not located within the defined population treatment zones identified on Figures 3.1-3.3 but were removed during the spot treatment.

During January of 2019, supplemental tree planting was performed within areas that appeared to have lower planted stem survival than the surrounding areas. Despite vegetation plots 6 and 7 having fewer than 210 planted stems per acre, no supplemental planting was performed in the area surrounding these. This is because natural recruitment of woody stems has occurred, and woody stems that were cultivated in a nursery environment are not as likely to survive in this area due to excess moisture stress and competition with dense tearthumb (*Polygonum sagittatum*). During an IRT site visit on November 18, 2019, the supplemental planting area near station 122+00 on stream left was discussed. This area has smaller trees and less dense herbaceous vegetation than surrounding areas. Most of the less than one-year old trees are surviving, but have not yet experienced height growth.

1.2.3 Stream Assessment

Morphological surveys for MY5 were conducted in March 2019. All streams within the Site are stable and met success criteria for MY5. In general, cross sections for all streams showed little to no change in bankfull area, maximum depth ratio, or width-to-depth ratio. Cross section surveys show that the bank height ratios remain at or very near 1.0. Entrenchment ratios vary slightly from year to year due to minor changes in bankfull widths. Small adjustments in width occur due to vegetation, sediment deposition, and other factors. These minor changes do not indicate channel instability. Surveyed riffle cross sections fell within the parameters defined for channels of the appropriate Rosgen stream type. Table 11 indicates a large increase in cross sectional area relative to previous years in cross section 5.

This is because dimensions were calculated using a fixed bankfull elevation in previous monitoring years. Dimensions presented for MY5 are based on true low bank elevation and do not represent a sudden change. Based on the plot, it appears the right floodplain aggraded between MY0 and MY1 and has remained at approximately the same elevation since MY1. The inside of the meander bend surveyed in cross section 2 has experienced sediment deposition associated with point bar development. This section of Foust Creek was designed with a low slope. Mean depth and cross-sectional area have decreased, but the channel has maintained width and maximum depth dimensions relative to as-built dimensions. Point bar development is not an indicator of channel instability.

Visual assessment indicated streams are laterally and vertically stable throughout the project. Refer to Appendix 2 for the visual stability assessment table, the CCPV, and reference photographs. Refer to Appendix 4 for the morphological data and plots.

1.2.4 Stream Areas of Concern

There are no stream areas of concern for MY5.

1.2.5 Hydrology Assessment

At the end of the seven-year monitoring period, two or more bankfull events must have occurred during separate years within the restoration reaches. Multiple bankfull events were recorded on both Foust Creek and UT1 with crest gages and pressure transducers during MY5 (Table 13). Both Foust Creek and UT1 recorded bankfull events during previous monitoring years; therefore, the Site has met the required bankfull stream hydrology criterion for the duration of the monitoring period.

A flow gage was installed on UT1 to document jurisdictional status. Baseflow must be present for at least some portion of the year (most likely in the winter/early spring) during years with normal rainfall conditions. A gage malfunction occurred from November 23, 2018 until February 15, 2019. Persistent flow was recorded from February 15, 2019 until June 4, 2019 (109 consecutive days). Discrete observation of baseflow on January 30, 2019, previously recorded data during the winter, and the occurrence of above normal precipitation suggest UT1 flowed persistently throughout the duration of the gage malfunction. Refer to Appendix 5 for hydrologic data.

1.2.6 Wetland Assessment

Nine groundwater gages were monitored within the wetland rehabilitation and re-establishment zones. All gages were installed at appropriate locations so that the data collected provides an indication of groundwater levels throughout the Site. A soil temperature probe and barometric pressure gage was also installed to support wetland hydrology measurements. All monitoring gages were downloaded and maintained quarterly. The success criteria for wetland hydrology is a free groundwater surface must be within 12 inches of the soil surface for a consecutive 8.5 percent of the growing season. During MY1 NRCS WETS Data was used to determine the growing season for the Site. After discussions with the United States Army Corps of Engineers (USACE), it was agreed to use on-site soil temperature data to determine the beginning of the growing season and use NRCS WETS data to determine the end of the growing season. The growing season begins when soil temperature remains above 41 degrees Fahrenheit 12 inches below the soil surface but is not to begin prior to March 1. Refer to Appendix 2 for the groundwater gage locations and Appendix 5 for groundwater hydrology data and plots.

All groundwater wells attainted the hydrology criterion during MY5. The measured hydroperiod ranged from 24.0% to 73.6% of the growing season consecutively. During an IRT site visit on November 18, 2019, limited hydric soil development was observed in a wetland re-establishment area near cross

section seven. Concern was expressed over whether this area would attain the wetland hydroperiod criterion for the Site. An additional groundwater gage will be installed within this area and data will be discussed in future reports (Figure 3.2).

1.2.7 Maintenance Plan

Japanese honeysuckle will be treated during the winter of 2019. Tree growth will be visually monitored in the supplemental planting zones to determine if amendment is necessary to enhance tree growth rates. The supplemental planting area on stream left near station 122+00 will be visually assessed during 2020 to determine if management action is necessary to improve tree growth and herbaceous cover.

1.3 Monitoring Year 5 Summary

All streams within the Site are stable and functioning as designed. The average stem density for the Site is on track to meeting the MY7 success criteria. Fifteen of 17 vegetation plots exceeded the planted stem density requirement for MY5. The other two plots exceeded the success criterion when volunteer trees were included. Multiple bankfull events were recorded on both streams, and persistent flow was recorded on UT1 for 109 consecutive days. All groundwater gages exceeded the required hydroperiod.

Section 2: METHODOLOGY

Geomorphic data was 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 data collected for the Integrated Current Condition Mapping was recorded using a Trimble handheld GPS with sub-meter accuracy and processed using Pathfinder and ArcGIS software. Crest gages and pressure transducers were installed in surveyed riffle cross sections and monitored quarterly. Hydrology attainment installation and monitoring methods are in accordance with the USACE (2003) standards. Vegetation monitoring protocols followed the Carolina Vegetation Survey-NCDMS Level 2 Protocol (Lee et al., 2008). Summary information and data related to the success 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 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 3: REFERENCES

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

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

Lee, M.T., Peet, R.K., S.D., Wentworth, T.R. 2008. CVS-DMS Protocol for Recording Vegetation Version 4.2. Retrieved from http://cvs.bio.unc.edu/protocol/cvs-eep-protocol-v4.2-lev1-5.pdf.

Rosgen, D. L. 1994. A classification of natural rivers. *Catena* 22:169-199.

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

Rosgen, D.L. 1997. A Geomorphological Approach to Restoration of Incised Rivers. Proceedings of the Conference on Management of Landscapes Disturbed by Channel Incision. Center For Computational Hydroscience and Bioengineering, Oxford Campus, University of Mississippi, Pages 12-22.

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

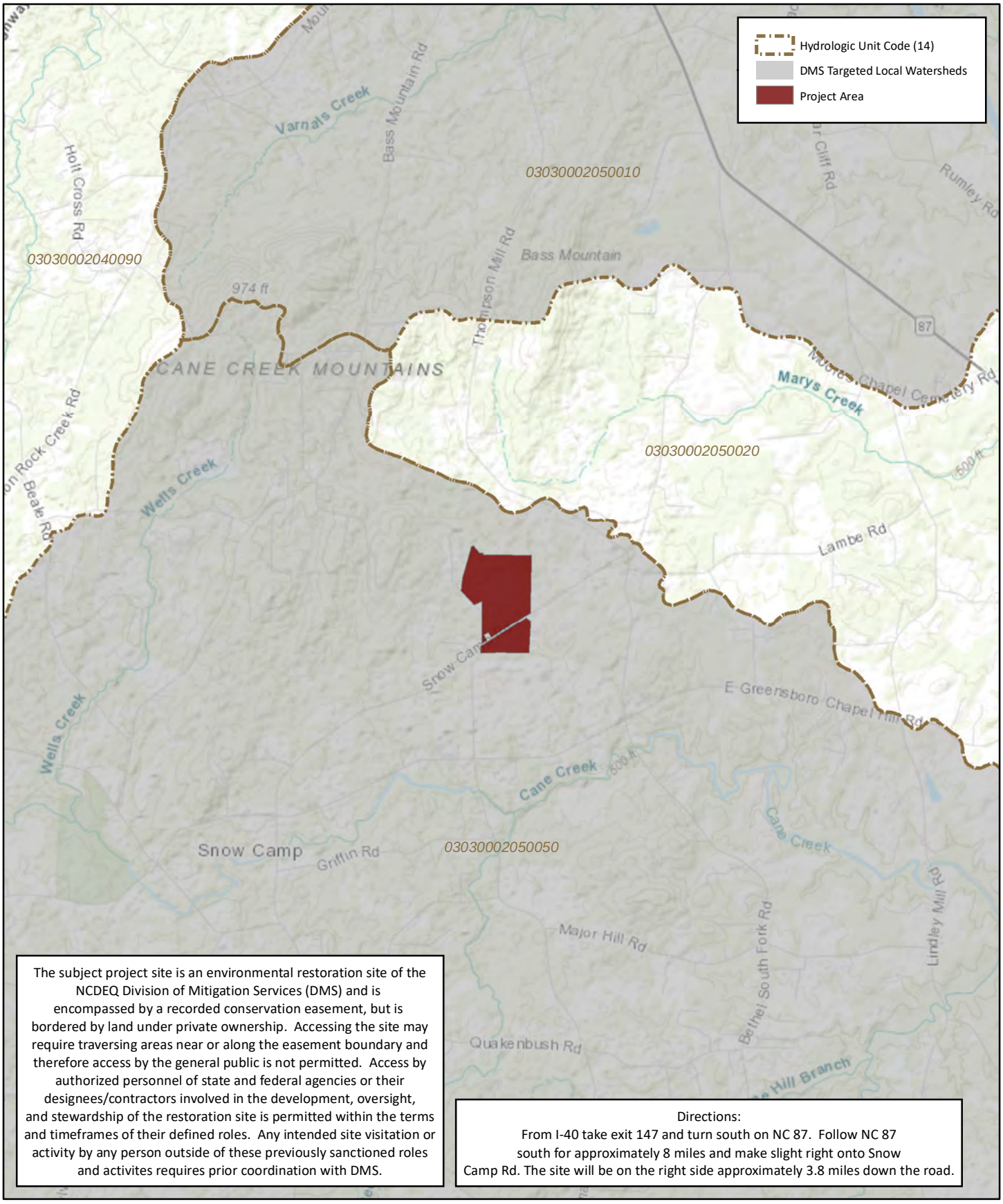
United States Department of Agriculture (USDA). 2002. Natural Resources Conservation Service, Climate Information for Alamance County, NC (1971-2000). WETS Station: Graham 2 ENE, NC3555.

United States Geological Survey (USGS). 1998. North Carolina Geology. http://www.geology.enr.state.nc.us/usgs/carolina.htm

Wildlands Engineering, Inc. 2014. Foust Creek Mitigation Plan. DMS, Raleigh, NC.

Wildlands Engineering, Inc. 2015. Foust Creek Mitigation Site Baseline Monitoring Document and As-Built Baseline Report. DMS, Raleigh, NC.

APPENDIX 1. General Tables and Figures

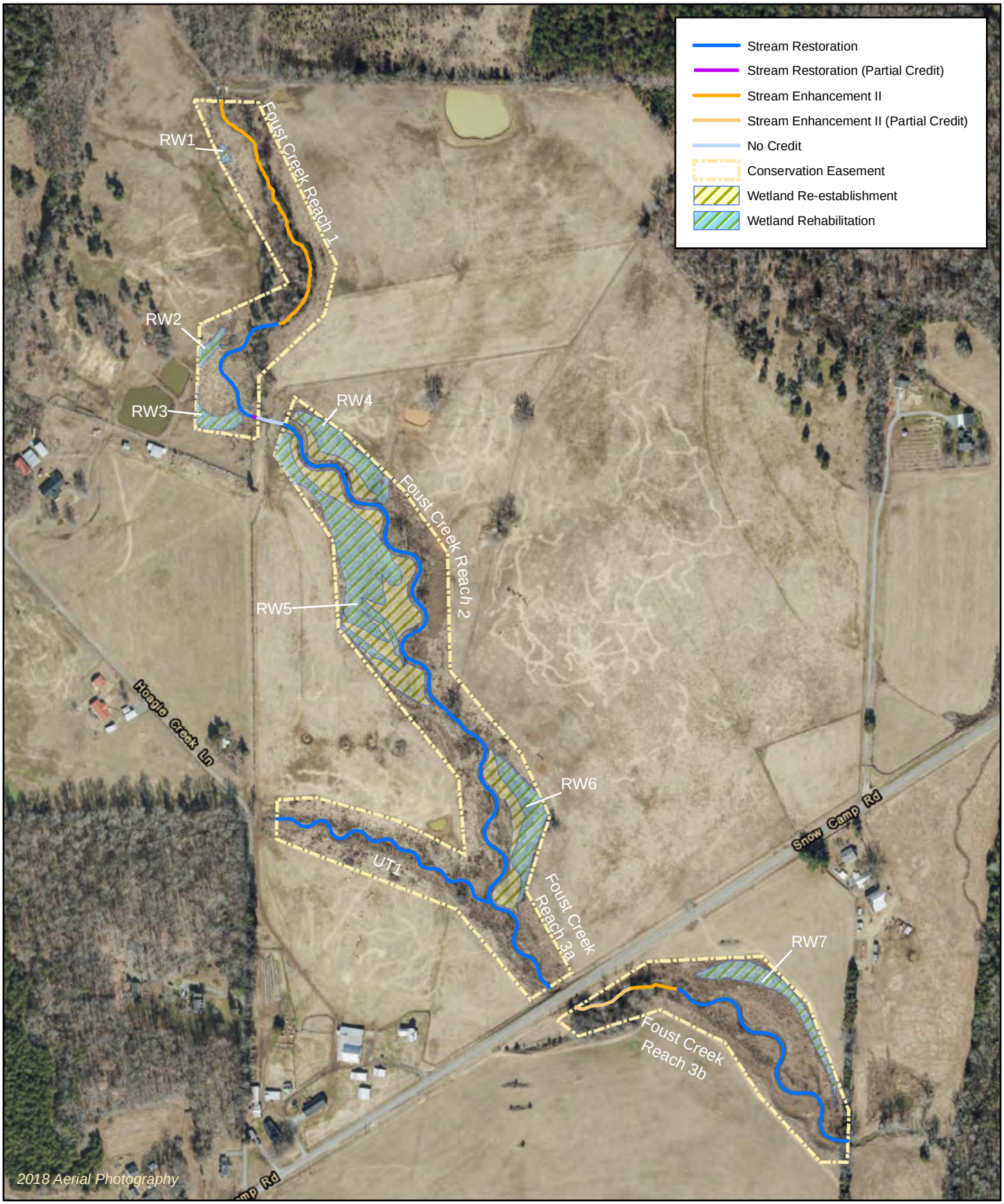


The subject project site is an environmental restoration site of the NCDEQ Division of Mitigation Services (DMS) and is encompassed by a recorded conservation easement, but is bordered by land under private ownership. Accessing the site may require traversing areas near or along the easement boundary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

Directions:
From I-40 take exit 147 and turn south on NC 87. Follow NC 87 south for approximately 8 miles and make slight right onto Snow Camp Rd. The site will be on the right side approximately 3.8 miles down the road.

WILDLANDS ENGINEERING

Figure 1. Project Vicinity Map
Foust Creek Mitigation Site
DMS Project No. 95715
Monitoring Year 5 - 2019
Alamance County, NC



WILDLANDS ENGINEERING

0 200 400 Feet

Figure 2. Project Component/Asset Map
Foust Creek Mitigation Site
DMS Project No. 95715
Monitoring Year 5 - 2019
Alamance County, NC

Table 1. Project Components and Mitigation Credits
Foust Creek Mitigation Site (DMS Project No. 95715)
Monitoring Year 5 - 2019

Mitigation Credits

	Stream		Riparian Wetland		Non-Riparian Wetland		Buffer	Nitrogen Nutrient Offset	Phosphorous Nutrient Offset
Type	R	RE	R-E[1]	RE[1]	R-E[1]	RE[1]			
Totals	4,770	N/A	1.80*	2.11	N/A	N/A			

Project Components

Reach ID	As-Built Stationing/ Location	Existing Footage/ Acreage	Approach	Restoration or Restoration Equivalent	Restoration Footage/ Acreage	Mitigation Ratio	Credits (SMU/ WMU)
Streams							
Foust Creek – Reach 1	101+83 to 109+96	814	EII	Enhancement	813	2.5	325
Foust Creek – Reach 2	109+96 to 114+21 & 115+19 to 134+84	2,356	P1	Restoration	2,390	1	2,390
Foust Creek – Reach 2	114+21 to 114+35	31	P1	Restoration (Partial Credit)	14	2[2]	7
Foust Creek – Reach 2 (Easement Break)	114+35 to 115+19	91	P1	Restoration (No Credit)	84	---	---
Foust Creek – Reach 3A	134+84 to 138+01	307	P1/2	Restoration	317	1	317
Foust Creek – Reach 3B	139+01 to 140+89	187	EII	Enhancement (Partial Credit)	188	5[2]	38
Foust Creek – Reach 3B	140+89 to 142+31	142	EII	Enhancement	142	2.5	57
Foust Creek – Reach 3B	142+31 to 150+74	684	P1/2	Restoration	843	1	843
UT1 to Foust Creek	200+94 to 208+87	713	P1	Restoration	793	1	793
Wetlands							
Riparian Wetland RW1	---	0.03	---	Rehabilitation	0.03	1.5	0.02
Riparian Wetland RW2	---	0.08	---	Rehabilitation	0.08	1.5	0.05
Riparian Wetland RW3	---	0.16	---	Rehabilitation	0.16	1.5	0.11
Riparian Wetland RW4	---	0.45	---	Rehabilitation	0.45	1.5	0.30
Riparian Wetland RW4	---	0.21	---	Re-Establishment	0.21	1.0	0.21
Riparian Wetland RW5	---	1.46	---	Rehabilitation	1.46	1.5	0.97
Riparian Wetland RW5	---	1.18	---	Re-Establishment	1.18	1.0	1.18
Riparian Wetland RW6	---	0.52	---	Rehabilitation	0.52	1.5	0.35
Riparian Wetland RW6	---	0.51	---	Re-Establishment	0.41*	1.0	0.41*
Riparian Wetland RW7	---	0.46	---	Rehabilitation	0.46	1.5	0.31

Component Summation

Restoration Level	Stream (LF)	Riparian Wetland (acres)		Non-Riparian Wetland (acres)	Buffer (acres)	Upland (acres)
		Riverine	Non-Riverine			
Restoration	4,357	-	-	-	-	-
Enhancement		-	-	-	-	-
Enhancement I	-					
Enhancement II	1,143					
Creation		-	-	-		
Preservation	-	-	-	-		-
High Quality Preservation	-	-	-	-		-
Re-Establishment		1.80	-	-		
Rehabilitation		3.16	-	-		

N/A: not applicable

1. R-E = Wetland Re-Establishment and RE = Wetland Rehabilitation per NCDENR July 30, 2013 Memorandum titled:Consistency between Federal and State Wetland Mitigation Requirements

2. A portion of Foust Creek Reach 2 and Reach 3B does not have a full 50' buffer from top of bank to the conservation easement boundary on the river left side. Therefore, mitigation credit is only included at a rate of half the normal crediting giving the restoration or restoration equivalent type.

* Wetland RW6 Re-Establishment credit calculations were updated for Monitoring Year 3 based on the performance of groundwater well 9.

Table 2. Project Activity and Reporting History
Foust Creek Mitigation Site (DMS Project No. 95715)
Monitoring Year 5 - 2019

Activity or Report		Date Collection Complete	Completion or Scheduled Delivery
Mitigation Plan		October 2013-February 2014	February 2014
Final Design - Construction Plans		April 2014-August 2014	August 2014
Construction		October 2014-February 2015	February 2015
Temporary S&E mix applied to entire project area [1]		February 2015	February 2015
Permanent seed mix applied to reach/segments		February 2015	February 2015
Bare root and live stake plantings for reach/segments		February 2015	February 2015
Baseline Monitoring Document (Year 0)	Stream Survey	February 2015	May 2015
	Vegetation Survey	February 2015	
Year 1 Monitoring	Stream Survey	September 2015	December 2015
	Vegetation Survey	September 2015	
Year 2 Monitoring	Stream Survey	March 2016	December 2016
	Vegetation Survey	June 2016	
Supplemental Planting			March 2017
Year 3 Monitoring	Stream Survey	March 2017	December 2017
	Vegetation Survey	August 2017	
Invasive Vegetation Treatment			September 2018
Year 4 Monitoring	Stream Survey	N/A	December 2018
	Vegetation Survey	N/A	
Supplemental Planting			January 2019
Invasive Vegetation Treatment			May 2019
Invasive Vegetation Treatment			October 2019
Year 5 Monitoring	Stream Survey	March 2019	December 2019
	Vegetation Survey	August 2019	
Year 6 Monitoring	Stream Survey	2020	December 2020
	Vegetation Survey	2020	
Year 7 Monitoring	Stream Survey	2021	December 2021
	Vegetation Survey	2021	

[1]Seed and mulch is added as each section of construction is completed.

Table 3. Project Contacts Table
Foust Creek Mitigation Site (DMS Project No. 95715)
Monitoring Year 5 - 2019

Designer Angela Allen, PE	**Wildlands Engineering, Inc.** 312 West Millbrook Road, Suite 225 Raleigh, NC 27609 919.851.9986
Construction Contractor	**Fluvial Solutions** P.O. Box 28749 Raleigh, NC 27611
Planting Contractor	**Bruton Natural Systems, Inc** P.O. Box 1197 Fremont, NC 27830
Seeding Contractor	**Fluvial Solutions** P.O. Box 28749 Raleigh, NC 27611
Seed Mix Sources	**Green Resource, LLC**
Nursery Stock Suppliers	
Bare Roots	**Dykes and Son Nursery**
Live Stakes	**Bruton Natural Systems, Inc**
Monitoring Performers Monitoring, POC	**Wildlands Engineering, Inc.** Jason Lorch 919.851.9986, ext. 107

Table 4. Project Information and Attributes
Foust Creek Mitigation Site (DMS Project No. 95715)
Monitoring Year 5 - 2019

Project Information	
Project Name	Foust Creek Mitigation Site
County	Alamance County
Project Area (acres)	22.11 acres
Project Coordinates (latitude and longitude)	35° 55' 0.12" N, 79° 24' 6.84" W
Project Watershed Summary Information	
Physiographic Province	Carolina Slate Belt of the Piedmont Physiographic Province
River Basin	Cape Fear River
USGS Hydrologic Unit 8-digit	03030002
USGS Hydrologic Unit 14-digit	03030002050050
DWR Sub-basin	03-06-04
Project Drainiage Area (acres)	1,259 acres
Project Drainage Area Percentage of Impervious Area	<1%
CGIA Land Use Classification	78% Forested/ Scrubland, 21% Agriculture/ Managed Herbaceous, <1% Open Water, <1% Watershed Impervious Cover, <1% Developed

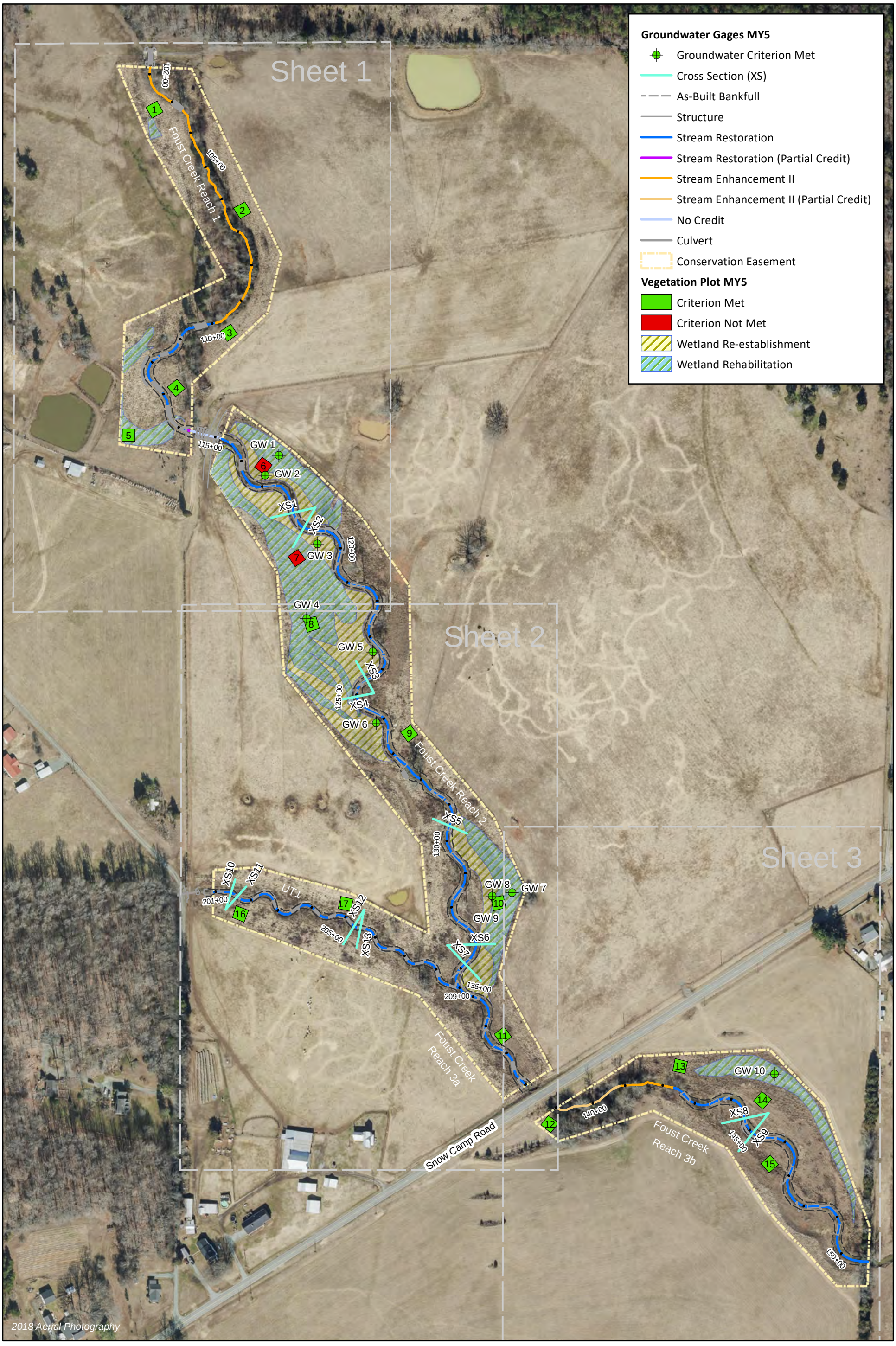
Reach Summary Informtation

Parameters	Foust Creek Reach 1	Foust Creek Reach 2	Foust Creek Reach 3	UT1
Length of reach (linear feet) - Post-Restoration	813	2,404	1,490	793
Drainage area (acres)	954	1,047	1,259	173
NCDWR stream identification score	41.5	41.5	44	28
NCDWR Water Quality Classification	WS-V	WS-V	WS-V	---
Morphological Desription (stream type)	P	P	P	I
Evolutionary trend (Simon's Model) - Pre- Restoration	III/IV	N/A	III/IV	III
Underlying mapped soils	Georgeville silty clay loam, Local alluvial land, Orange silt loam			
Drainage class	---	---	---	---
Soil Hydric status	---	---	---	---
Slope	---	---	---	---
FEMA classification	AE	AE	AE	---
Native vegetation community	Piedmont bottomland forest			
Percent composition exotic invasive vegetation - Post - Restoration	0%			

Regulatory Considerations

Regulation	Applicable?	Resolved?	Supporting Documentation
Waters of the United States - Section 404	Yes	Yes	USACE Nationwide Permit No.27 and DWQ 401 Water Quality Certification No. 3885.
Waters of the United States - Section 401	Yes	Yes	
Division of Land Quality (Dam Safety)	No	N/A	N/A
Endangered Species Act	Yes	Yes	Foust Creek Mitigation Plan(2013); Wildlands determined "no effect" on Alamance County listed endangered species.
Historic Preservation Act	Yes	Yes	No historic resources were found to be impacted (letter from SHPO dated 1/9/13).
Coastal Zone Management Act (CZMA)/Coastal Area Management Act (CAMA)	No	N/A	N/A
FEMA Floodplain Compliance	Yes	Yes	Foust Creek is located within the floodway and flood fringe (FEMA Zone AE, FIRM panels 8788 and 8879).
Essential Fisheries Habitat	No	N/A	N/A

APPENDIX 2. Visual Assessment Data



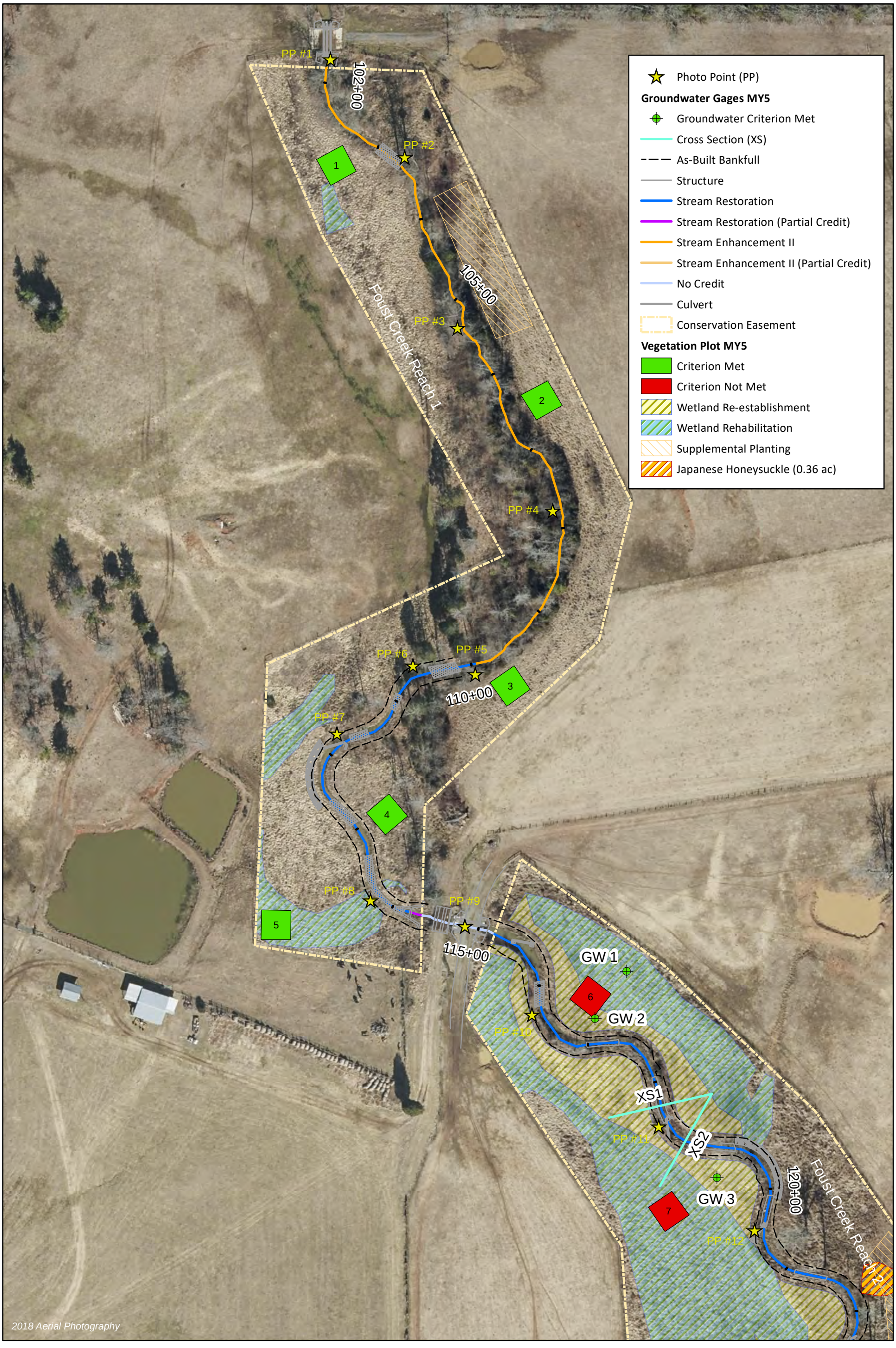
WILDLANDS ENGINEERING

0 125 250 375 500 Feet

N

Figure 3.0 Integrated Current Condition Plan View (Key)
Foust Creek Mitigation Site
DMS Project No. 95715
Monitoring Year 5 - 2019

Alamance County, NC



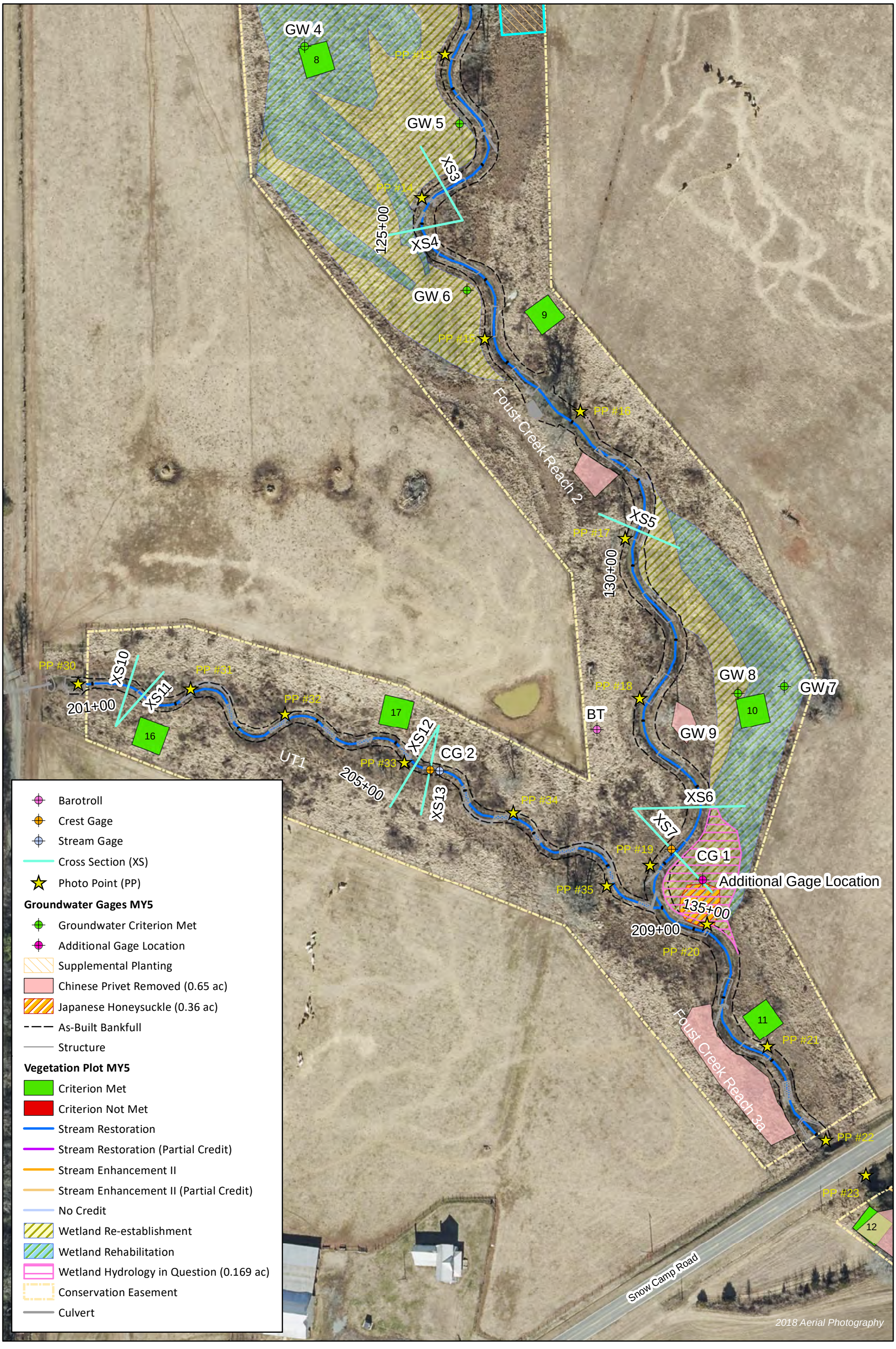
WILDLANDS ENGINEERING

0 50 100 150 200 Feet

N

Figure 3.1 Integrated Current Condition Plan View
(Sheet 1 of 3)
Foust Creek Mitigation Site
DMS Project No. 95715
Monitoring Year 5 - 2019

Alamance County, NC



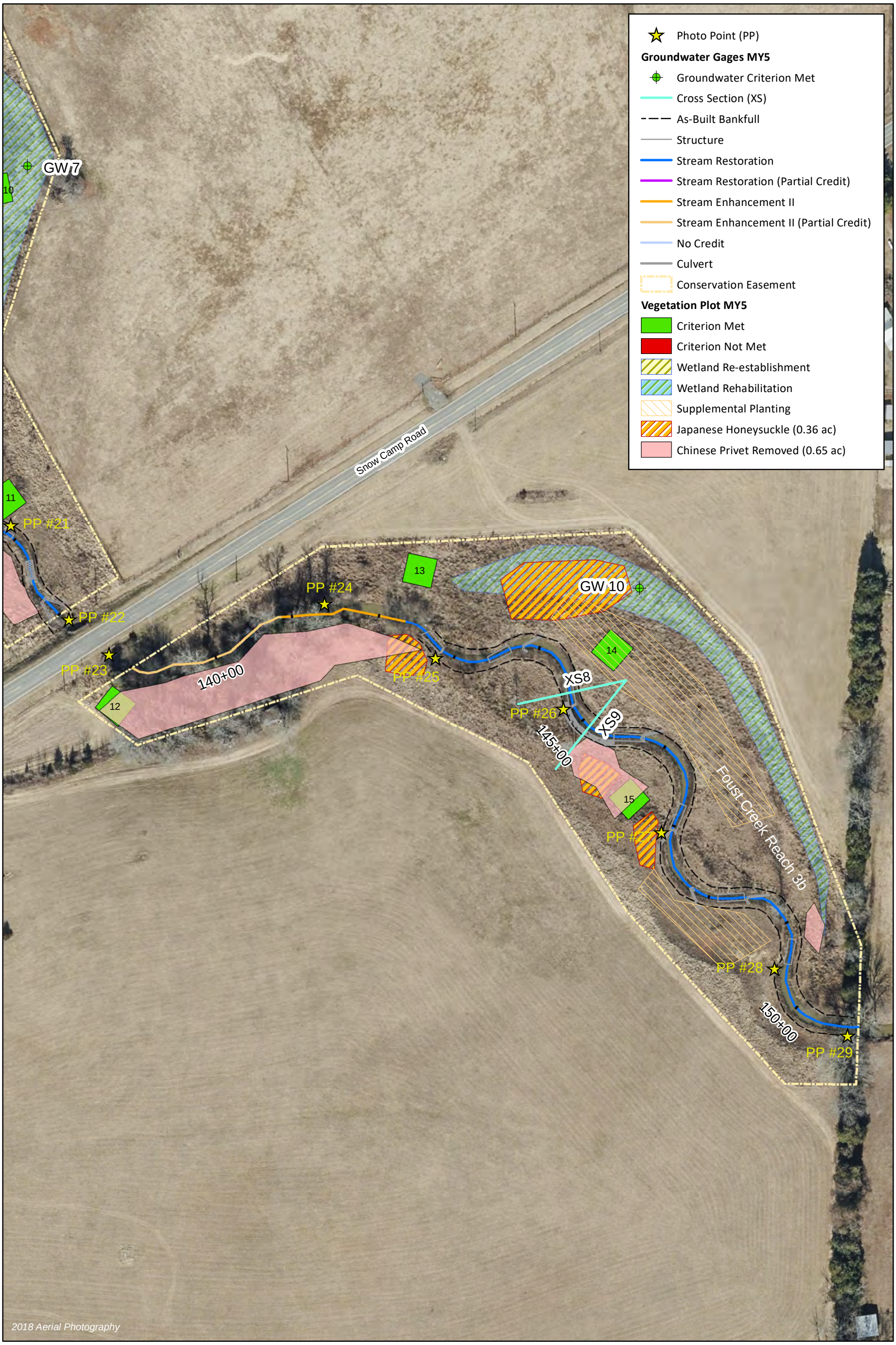
WILDLANDS ENGINEERING

0 50 100 150 200 Feet

N

Figure 3.2 Integrated Current Condition Plan View
(Sheet 2 of 3)
Foust Creek Mitigation Site
DMS Project No. 95715
Monitoring Year 5 - 2019

Alamance County, NC



WILDLANDS ENGINEERING

0 50 100 150 200 Feet

N

Figure 3.3 Integrated Current Condition Plan View
(Sheet 3 of 3)
Foust Creek Mitigation Site
DMS Project No. 95715
Monitoring Year 5 - 2019

Alamance County, NC

Table 5a. Visual Stream Morphology Stability Assessment Table

Foust Creek Mitigation Site (DMS Project No. 95715)

Monitoring Year 5 - 2019

Foust Creek Reach 1 (813 LF)

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	Adjust % for Stabilizing Woody Vegetation
1. Bed	1. Vertical Stability (Riffle and Run units)	Aggradation			0	0	100%			
		Degradation			0	0	100%			
	2. Riffle Condition	Texture/Substrate	n/a	n/a			n/a			
	3. Meander Pool Condition	Depth Sufficient	n/a	n/a			n/a			
		Length Appropriate	n/a	n/a			n/a			
	4. Thalweg Position	Thalweg centering at upstream of meander bend (Run)	n/a	n/a			n/a			
		Thalweg centering at downstream of meander bend (Glide)	n/a	n/a			n/a			
2. Bank	1. Scoured/Eroded	Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion			0	0	100%	n/a	n/a	n/a
	2. Undercut	Banks undercut/overhanging to the extent that mass wasting appears likely. Does NOT include undercuts that are modest, appear sustainable and are providing habitat			0	0	100%	n/a	n/a	n/a
	3. Mass Wasting	Bank slumping, caving, or collapse			0	0	100%	n/a	n/a	n/a
				TOTALS	0	0	100%	n/a	n/a	n/a
3. Engineered Structures	1. Overall Integrity	Structures physically intact with no dislodged boulders or logs	n/a	n/a			n/a			
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill	n/a	n/a			n/a			
	2a. Piping	Structures lacking any substantial flow underneath sills or arms	n/a	n/a			n/a			
	3. Bank Protection	Bank erosion within the structures extent of influence does not exceed 15%	n/a	n/a			n/a			
	4. Habitat	Pool forming structures maintaining ~Max Pool Depth : Bankfull Depth ≥ 1.6 Rootwads/logs providing some cover at baseflow	n/a	n/a			n/a			

Table 5b. Visual Stream Morphology Stability Assessment Table

Foust Creek Mitigation Site (DMS Project No. 95715)

Monitoring Year 5 - 2019

Foust Creek Reach 2 (2,404 LF)

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	Adjust % for Stabilizing Woody Vegetation
1. Bed	1. Vertical Stability (Riffle and Run units)	Aggradation			0	0	100%			
		Degradation			0	0	100%			
	2. Riffle Condition	Texture/Substrate	10	10			100%			
	3. Meander Pool Condition	Depth Sufficient	9	9			100%			
		Length Appropriate	9	9			100%			
	4. Thalweg Position	Thalweg centering at upstream of meander bend (Run)	9	9			100%			
		Thalweg centering at downstream of meander bend (Glide)	9	9			100%			
2. Bank	1. Scoured/Eroded	Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion			0	0	100%	n/a	n/a	n/a
	2. Undercut	Banks undercut/overhanging to the extent that mass wasting appears likely. Does NOT include undercuts that are modest, appear sustainable and are providing habitat			0	0	100%	n/a	n/a	n/a
	3. Mass Wasting	Bank slumping, caving, or collapse			0	0	100%	n/a	n/a	n/a
				TOTALS	0	0	100%	n/a	n/a	n/a
3. Engineered Structures	1. Overall Integrity	Structures physically intact with no dislodged boulders or logs	2	2			100%			
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill	1	1			100%			
	2a. Piping	Structures lacking any substantial flow underneath sills or arms	1	1			100%			
	3. Bank Protection	Bank erosion within the structures extent of influence does not exceed 15%	2	2			100%			
	4. Habitat	Pool forming structures maintaining ~Max Pool Depth : Bankfull Depth ≥ 1.6 Rootwads/logs providing some cover at baseflow	1	1			100%			

Table 5c. Visual Stream Morphology Stability Assessment Table

Foust Creek Mitigation Site (DMS Project No. 95715)

Monitoring Year 5 - 2019

Foust Creek Reach 3 (1,490 LF)

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	Adjust % for Stabilizing Woody Vegetation
1. Bed	1. Vertical Stability (Riffle and Run units)	Aggradation			0	0	100%			
		Degradation			0	0	100%			
	2. Riffle Condition	Texture/Substrate	11	11			100%			
	3. Meander Pool Condition	Depth Sufficient	11	11			100%			
		Length Appropriate	11	11			100%			
	4. Thalweg Position	Thalweg centering at upstream of meander bend (Run)	11	11			100%			
		Thalweg centering at downstream of meander bend (Glide)	11	11			100%			
2. Bank	1. Scoured/Eroded	Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion			0	0	100%	n/a	n/a	n/a
	2. Undercut	Banks undercut/overhanging to the extent that mass wasting appears likely. Does NOT include undercuts that are modest, appear sustainable and are providing habitat			0	0	100%	n/a	n/a	n/a
	3. Mass Wasting	Bank slumping, caving, or collapse			0	0	100%	n/a	n/a	n/a
				TOTALS	0	0	100%	n/a	n/a	n/a
3. Engineered Structures	1. Overall Integrity	Structures physically intact with no dislodged boulders or logs	5	5			100%			
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill	3	3			100%			
	2a. Piping	Structures lacking any substantial flow underneath sills or arms	3	3			100%			
	3. Bank Protection	Bank erosion within the structures extent of influence does not exceed 15%	3	3			100%			
	4. Habitat	Pool forming structures maintaining ~Max Pool Depth : Bankfull Depth ≥ 1.6 Rootwads/logs providing some cover at baseflow	1	1			100%			

Table 5d. Visual Stream Morphology Stability Assessment Table

Foust Creek Mitigation Site (DMS Project No. 95715)

Monitoring Year 5 - 2019

UT1 (793 LF)

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	Adjust % for Stabilizing Woody Vegetation
1. Bed	1. Vertical Stability (Riffle and Run units)	Aggradation			0	0	100%			
		Degradation			0	0	100%			
	2. Riffle Condition	Texture/Substrate	15	15			100%			
	3. Meander Pool Condition	Depth Sufficient	14	14			100%			
		Length Appropriate	14	14			100%			
	4. Thalweg Position	Thalweg centering at upstream of meander bend (Run)	15	15			100%			
		Thalweg centering at downstream of meander bend (Glide)	14	14			100%			
2. Bank	1. Scoured/Eroded	Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion			0	0	100%	n/a	n/a	n/a
	2. Undercut	Banks undercut/overhanging to the extent that mass wasting appears likely. Does NOT include undercuts that are modest, appear sustainable and are providing habitat			0	0	100%	n/a	n/a	n/a
	3. Mass Wasting	Bank slumping, caving, or collapse			0	0	100%	n/a	n/a	n/a
				TOTALS	0	0	100%	n/a	n/a	n/a
3. Engineered Structures	1. Overall Integrity	Structures physically intact with no dislodged boulders or logs	13	13			100%			
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill	13	13			100%			
	2a. Piping	Structures lacking any substantial flow underneath sills or arms	13	13			100%			
	3. Bank Protection	Bank erosion within the structures extent of influence does not exceed 15%	13	13			100%			
	4. Habitat	Pool forming structures maintaining ~Max Pool Depth : Bankfull Depth ≥ 1.6 Rootwads/logs providing some cover at baseflow	3	3			100%			

Table 6. Vegetation Condition Assessment Table
Foust Creek Mitigation Site (DMS Project No. 95715)
Monitoring Year 5 - 2019

Planted Acreage **22**

Vegetation Category	Definitions	Mapping Threshold (Ac)	Number of Polygons	Combined Acreage	% of Planted Acreage
Bare Areas	Very limited cover of both woody and herbaceous material	0.1	0	0	0.0%
Low Stem Density Areas	Woody stem densities clearly below target levels based on MY3, 4, or 5 stem count criteria.	0.1	0	0.0	0.0%
		Total	**0**	**0.0**	**0.0%**
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 Ac	0	0	0%
		Cumulative Total	**0**	**0.0**	**0.0%**

Easement Acreage **22**

Vegetation Category	Definitions	Mapping Threshold (SF)	Number of Polygons	Combined Acreage	% of Planted Acreage
Invasive Areas of Concern	Areas or points (if too small to render as polygons at map scale).	1,000	6	0.36	1.6%
Easement Encroachment Areas	Areas or points (if too small to render as polygons at map scale).	none	0	0	0%

STREAM PHOTOGRAPHS
Monitoring Year 5

PHOTO POINT 1 Foust Creek R1 – looking downstream (3/20/2019)

PHOTO POINT 2 Foust Creek R1 – looking upstream (3/20/2019)

PHOTO POINT 2 Foust Creek R1 – looking downstream (3/20/2019)

PHOTO POINT 3 Foust Creek R1 – looking upstream (3/20/2019)

PHOTO POINT 3 Foust Creek R1 – looking downstream (3/20/2019)

	
PHOTO POINT 4 Foust Creek R1 – looking upstream (3/20/2019)	**PHOTO POINT 4 Foust Creek R1** – looking downstream (3/20/2019)
	
PHOTO POINT 5 Foust Creek R1 – looking upstream (3/20/2019)	**PHOTO POINT 5 Foust Creek R1** – looking downstream (3/20/2019)
	
PHOTO POINT 6 Foust Creek R2 – looking upstream (3/20/2019)	**PHOTO POINT 6 Foust Creek R2 –** looking downstream (3/20/2019)

	
PHOTO POINT 7 Foust Creek R2 – looking upstream (3/20/2019)	**PHOTO POINT 7 Foust Creek R2 –** looking downstream (3/20/2019)
	
PHOTO POINT 8 Foust Creek R2 – looking upstream (3/20/2019)	**PHOTO POINT 8 Foust Creek R2 –** looking downstream (3/20/2019)
	
PHOTO POINT 9 Foust Creek R2 – looking upstream (3/20/2019)	**PHOTO POINT 9 Foust Creek R2 –** looking downstream (3/20/2019)

	
PHOTO POINT 10 Foust Creek R2 – looking upstream (3/20/2019)	**PHOTO POINT 10 Foust Creek R2 –** looking downstream (3/20/2019)
	
PHOTO POINT 11 Foust Creek R2 – looking upstream (3/20/2019)	**PHOTO POINT 11 Foust Creek R2 –** looking downstream (3/20/2019)
	
PHOTO POINT 12 Foust Creek R2 – looking upstream (3/20/2019)	**PHOTO POINT 12 Foust Creek R2 –** looking downstream (3/20/2019)

	
PHOTO POINT 13 Foust Creek R2 – looking upstream (3/20/2019)	**PHOTO POINT 13 Foust Creek R2 –** looking downstream (3/20/2019)
	
PHOTO POINT 14 Foust Creek R2 – looking upstream (3/20/2019)	**PHOTO POINT 14 Foust Creek R2 –** looking downstream (3/20/2019)
	
PHOTO POINT 15 Foust Creek R2 – looking upstream (3/20/2019)	**PHOTO POINT 15 Foust Creek R2 –** looking downstream (3/20/2019)

PHOTO POINT 16 Foust Creek R2 – looking upstream (3/20/2019)

PHOTO POINT 16 Foust Creek R2 – looking downstream (3/20/2019)

PHOTO POINT 17 Foust Creek R2 – looking upstream (3/13/2019)

PHOTO POINT 17 Foust Creek R2 – looking downstream (3/13/2019)

PHOTO POINT 18 Foust Creek R2 – looking upstream (3/13/2019)

PHOTO POINT 18 Foust Creek R2 – looking downstream (3/13/2019)

PHOTO POINT 19 Foust Creek R2 – looking upstream (3/13/2019)

PHOTO POINT 19 Foust Creek R2 – looking downstream (3/13/2019)

PHOTO POINT 20 Foust Creek R3a – looking upstream (3/13/2019)

PHOTO POINT 20 Foust Creek R3a – looking downstream (3/13/2019)

PHOTO POINT 21 Foust Creek R3a – looking upstream (3/13/2019)

PHOTO POINT 21 Foust Creek R3a – looking downstream (3/13/2019)

PHOTO POINT 22 Foust Creek R3a – looking upstream (3/13/2019)

PHOTO POINT 23 Foust Creek R3b – looking downstream (3/13/2019)

PHOTO POINT 24 Foust Creek R3b – looking upstream (3/13/2019)

PHOTO POINT 24 Foust Creek R3b – looking downstream (3/13/2019)

PHOTO POINT 25 Foust Creek R3b – looking upstream (3/13/2019)

PHOTO POINT 25 Foust Creek R3b – looking downstream (3/13/2019)

PHOTO POINT 26 Foust Creek R3b – looking upstream (3/13/2019)

PHOTO POINT 26 Foust Creek R3b – looking downstream (3/13/2019)

PHOTO POINT 27 Foust Creek R3b – looking upstream (3/13/2019)

PHOTO POINT 27 Foust Creek R3b – looking downstream (3/13/2019)

PHOTO POINT 28 Foust Creek R3b – looking upstream (3/13/2019)

PHOTO POINT 28 Foust Creek R3b – looking downstream (3/13/2019)

PHOTO POINT 29 Foust Creek R3b – looking upstream (3/13/2019)

PHOTO POINT 29 Foust Creek R3b – looking downstream (3/13/2019)

PHOTO POINT 30 UT1 – looking downstream (3/13/2019)

PHOTO POINT 31 UT1– looking upstream (3/13/2019)

PHOTO POINT 31 UT1 – looking downstream (3/13/2019)

	
PHOTO POINT 32 UT1 – looking upstream (3/13/2019)	**PHOTO POINT 32 UT1 –** looking downstream (3/13/2019)
	
PHOTO POINT 33 UT1 – looking upstream (3/13/2019)	**PHOTO POINT 33 UT1 –** looking downstream (3/13/2019)
	
PHOTO POINT 34 UT1 – looking upstream (3/13/2019)	**PHOTO POINT 34 UT1 –** looking downstream (3/13/2019)

	
PHOTO POINT 35 UT1 – looking upstream (3/13/2019)	**PHOTO POINT 35 UT1 –** looking downstream (3/13/2019)

VEGETATION PHOTOGRAPHS
Monitoring Year 5

VEG PLOT 1 *(8/15/2019)*

VEG PLOT 2 *(8/15/2019)*

VEG PLOT 3 *(8/15/2019)*

VEG PLOT 4 *(8/15/2019)*

VEG PLOT 5 *(8/15/2019)*

VEG PLOT 6 *(8/15/2019)*

VEG PLOT 7 *(8/15/2019)*

VEG PLOT 8 *(8/15/2019)*

VEG PLOT 9 *(8/15/2019)*

VEG PLOT 10 *(8/15/2019)*

VEG PLOT 11 *(8/15/2019)*

VEG PLOT 12 *(8/22/2019)*

VEG PLOT 13 *(8/22/2019)*

VEG PLOT 14 *(8/22/2019)*

VEG PLOT 15 *(8/22/2019)*

VEG PLOT 16 *(8/22/2019)*

VEG PLOT 17 (*8/22/2019)*

APPENDIX 3. Vegetation Plot Data

Table 7. Vegetation Plot Criteria Attainment

Foust Creek Mitigation Site (DMS Project No. 95715)

Monitoring Year 5 - 2019

Plot	Success Criteria Met (Y/N)	Tract Mean
1	Y	88%
2	Y	
3	Y	
4	Y	
5	Y	
6	N	
7	N	
8	Y	
9	Y	
10	Y	
11	Y	
12	Y	
13	Y	
14	Y	
15	Y	
16	Y	
17	Y	

Table 8. CVS Vegetation Plot Metadata

Foust Creek Mitigation Site (DMS Project No. 95715)

Monitoring Year 5 - 2019

Database name	Foust- Creek MY5- v2.3.1.mdb
Database location	F:\Projects\005-02135 Foust Creek\Monitoring\Monitoring Year 5\Vegetation Assessment
Computer name	JASON-PC
File size	71004160
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	95715
project Name	Foust Creek Mitigation Site
Description	Stream and Wetland Mitigation
River Basin	Cape Fear
Sampled Plots	17

Table 9. Planted and Total Stem Counts

Foust Creek Mitigation Site (DMS Project No. 95715)

Monitoring Year 5 - 2019

			Current Plot Data (MY5 2019)																	
			VP 1			VP 2			VP 3			VP 4			VP 5			VP 6		
Scientific Name	**Common Name**	**Species Type**	**PnoLS**	**P-all**	**T**	**PnoLS**	**P-all**	**T**	**PnoLS**	**P-all**	**T**	**PnoLS**	**P-all**	**T**	**PnoLS**	**P-all**	**T**	**PnoLS**	**P-all**	**T**
Acer negundo	boxelder	Tree																		
Acer rubrum	red maple	Tree																		
Alnus serrulata	hazel alder	Shrub																		
Baccharis	baccharis	Shrub																		
Betula nigra	river birch	Tree				1	1	1	1	1	1	2	2	2						
Cephalanthus occidentalis	common buttonbush	Shrub															1			5
Cornus amomum	silky dogwood	Shrub																		
Elaeagnus umbellata	autumn olive	Exotic									1									
Fraxinus pennsylvanica	green ash	Tree				1	1	1			1	1	1	1	7	7	7	5	5	6
Juniperus virginiana	eastern redcedar	Tree						1			1									
Ligustrum sinense	Chinese privet	Exotic																		
Liquidambar styraciflua	sweetgum	Tree						6			9			1						
Liriodendron tulipifera	tuliptree	Tree										1	1	1						
Nyssa sylvatica	blackgum	Tree																		
Pinus taeda	loblolly pine	Tree						1												
Platanus occidentalis	American sycamore	Tree							2	2	2									
Quercus michauxii	swamp chestnut oak	Tree	8	8	8	3	3	3	1	1	1	4	4	4	2	2	2			
Quercus phellos	willow oak	Tree	2	2	2	1	1	1	2	2	2									
Quercus rubra	northern red oak	Tree				6	6	6	1	1	1	1	1	1						
Sambucus nigra	elderberry	Shrub																		
Ulmus	elm	Tree																		
		Stem count	10	10	10	12	12	19	7	7	18	9	9	10	9	9	10	5	5	11
		size (ares)		1			1			1			1			1			1	
		size (ACRES)		0.02			0.02			0.02			0.02			0.02			0.02	
		Species count	2	2	2	5	5	8	5	5	9	5	5	6	2	2	3	1	1	2
		Stems per ACRE	405	405	405	486	486	769	283	283	728	364	364	405	364	364	405	202	202	445

Color Coding for Table

Exceeds requirements by 10%

Exceeds requirements, but by less than 10%

Fails to meet requirements, by less than 10%

Fails to meet requirements by more than 10%

Volunteer species included in total

PnoLS: Number of Planted stems excluding live stakes

P-all: Number of planted stems including live stakes,

T: Total Stems

Table 9. Planted and Total Stem Counts

Foust Creek Mitigation Site (DMS Project No. 95715)

Monitoring Year 5 - 2019

			Current Plot Data (MY5 2019)																	
			VP 7			VP 8			VP 9			VP 10			VP 11			VP 12		
Scientific Name	**Common Name**	**Species Type**	**PnoLS**	**P-all**	**T**	**PnoLS**	**P-all**	**T**	**PnoLS**	**P-all**	**T**	**PnoLS**	**P-all**	**T**	**PnoLS**	**P-all**	**T**	**PnoLS**	**P-all**	**T**
Acer negundo	boxelder	Tree																		
Acer rubrum	red maple	Tree																		
Alnus serrulata	hazel alder	Shrub															4			
Baccharis	baccharis	Shrub																		
Betula nigra	river birch	Tree							4	4	4				2	2	2	1	1	1
Cephalanthus occidentalis	common buttonbush	Shrub																		
Cornus amomum	silky dogwood	Shrub	3	3	4	3	3	3				5	5	5						
Elaeagnus umbellata	autumn olive	Exotic																		
Fraxinus pennsylvanica	green ash	Tree	1	1	2	1	1	18			4			90	4	4	4	2	2	3
Juniperus virginiana	eastern redcedar	Tree																		1
Ligustrum sinense	Chinese privet	Exotic																		4
Liquidambar styraciflua	sweetgum	Tree									5						6			9
Liriodendron tulipifera	tuliptree	Tree													1	1	1	3	3	3
Nyssa sylvatica	blackgum	Tree				1	1	1				1	1	1						1
Pinus taeda	loblolly pine	Tree																		
Platanus occidentalis	American sycamore	Tree													5	5	5	7	7	7
Quercus michauxii	swamp chestnut oak	Tree	1	1	1	2	2	2	2	2	2									
Quercus phellos	willow oak	Tree							1	1	1	1	1	1						
Quercus rubra	northern red oak	Tree							4	4	4				1	1	1	1	1	1
Sambucus nigra	elderberry	Shrub																		
Ulmus	elm	Tree																		
		Stem count	5	5	7	7	7	24	11	11	20	7	7	97	13	13	23	14	14	26
		size (ares)		1			1			1			1			1			1	
		size (ACRES)		0.02			0.02			0.02			0.02			0.02			0.02	
		Species count	3	3	3	4	4	4	4	4	6	3	3	4	5	5	7	5	5	9
		Stems per ACRE	202	202	283	283	283	971	445	445	809	283	283	3,925	526	526	931	567	567	1,052

Color Coding for Table

Exceeds requirements by 10%

Exceeds requirements, but by less than 10%

Fails to meet requirements, by less than 10%

Fails to meet requirements by more than 10%

Volunteer species included in total

PnoLS: Number of Planted stems excluding live stakes

P-all: Number of planted stems including live stakes,

T: Total Stems

Table 9. Planted and Total Stem Counts

Foust Creek Mitigation Site (DMS Project No. 95715)

Monitoring Year 5 - 2019

			Current Plot Data (MY5 2019)														
			VP 13			VP 14			VP 15			VP 16			VP 17		
Scientific Name	Common Name	Species Type	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T
Acer negundo	boxelder	Tree															
Acer rubrum	red maple	Tree															
Alnus serrulata	hazel alder	Shrub						1									
Baccharis	baccharis	Shrub						2									
Betula nigra	river birch	Tree				1	1	1				2	2	2	2	2	2
Cephalanthus occidentalis	common buttonbush	Shrub															
Cornus amomum	silky dogwood	Shrub															
Elaeagnus umbellata	autumn olive	Exotic															
Fraxinus pennsylvanica	green ash	Tree	8	8	8	8	8	17	6	6	6	2	2	6	3	3	3
Juniperus virginiana	eastern redcedar	Tree															
Ligustrum sinense	Chinese privet	Exotic						4			3			1			
Liquidambar styraciflua	sweetgum	Tree			10			8			15			4			
Liriodendron tulipifera	tuliptree	Tree				2	2	2				1	1	1	1	1	1
Nyssa sylvatica	blackgum	Tree													1	1	1
Pinus taeda	loblolly pine	Tree															
Platanus occidentalis	American sycamore	Tree	7	7	7	4	4	4	5	5	5	3	3	3	3	3	3
Quercus michauxii	swamp chestnut oak	Tree													1	1	1
Quercus phellos	willow oak	Tree										2	2	2	1	1	1
Quercus rubra	northern red oak	Tree							1	1	1	2	2	2			
Sambucus nigra	elderberry	Shrub									1						
Ulmus	elm	Tree															
		Stem count	15	15	25	15	15	35	12	12	28	12	12	20	12	12	12
		size (ares)	1			1			1			1			1		
		size (ACRES)	0.02			0.02			0.02			0.02			0.02		
		Species count	2	2	3	4	4	8	3	3	6	6	6	8	7	7	7
		Stems per ACRE	607	607	1,012	607	607	1,416	486	486	1,133	486	486	809	486	486	486

Color Coding for Table

Exceeds requirements by 10%

Exceeds requirements, but by less than 10%

Fails to meet requirements, by less than 10%

Fails to meet requirements by more than 10%

Volunteer species included in total

PnoLS: Number of Planted stems excluding live stakes

P-all: Number of planted stems including live stakes,

T: Total Stems

Table 9. Planted and Total Stem Counts

Foust Creek Mitigation Site (DMS Project No. 95715)

Monitoring Year 5 - 2019

			Annual Means														
			MY5 (2019)			MY3 (2017)			MY2 (2016)			MY1 (2015)			MY0 (2015)		
Scientific Name	**Common Name**	**Species Type**	**PnoLS**	**P-all**	**T**	**PnoLS**	**P-all**	**T**	**PnoLS**	**P-all**	**T**	**PnoLS**	**P-all**	**T**	**PnoLS**	**P-all**	**T**
Acer negundo	boxelder	Tree						2									
Acer rubrum	red maple	Tree						2			1			1			
Alnus serrulata	hazel alder	Shrub			5	1	1	17	2	2	3	3	3	3	6	6	6
Baccharis	baccharis	Shrub			2												
Betula nigra	river birch	Tree	16	16	16	16	16	16	20	20	20	28	28	31	35	35	35
Cephalanthus occidentalis	common buttonbush	Shrub			6			8									
Cornus amomum	silky dogwood	Shrub	11	11	12	12	12	12	13	13	13	12	12	16	15	15	15
Elaeagnus umbellata	autumn olive	Exotic			1												
Fraxinus pennsylvanica	green ash	Tree	49	49	177	51	51	131	51	51	51	53	53	90	53	53	53
Juniperus virginiana	eastern redcedar	Tree			3			2									
Ligustrum sinense	Chinese privet	Exotic			12												
Liquidambar styraciflua	sweetgum	Tree			73			72			20			8			
Liriodendron tulipifera	tuliptree	Tree	9	9	9	9	9	9	9	9	9	10	10	10	24	24	24
Nyssa sylvatica	blackgum	Tree	3	3	4	4	4	4	6	6	7	10	10	10	10	10	10
Pinus taeda	loblolly pine	Tree			1			1									
Platanus occidentalis	American sycamore	Tree	36	36	36	36	36	41	36	36	36	36	36	36	36	36	36
Quercus michauxii	swamp chestnut oak	Tree	24	24	24	28	28	28	35	35	35	36	36	36	37	37	37
Quercus phellos	willow oak	Tree	10	10	10	14	14	17	21	21	21	33	33	33	35	35	35
Quercus rubra	northern red oak	Tree	17	17	17	18	18	18	21	21	21	21	21	21	21	21	21
Sambucus nigra	elderberry	Shrub			1												
Ulmus	elm	Tree						1									
		Stem count	175	175	395	189	189	381	214	214	237	242	242	295	272	272	272
		size (ares)		17			17			17			17			17	
		size (ACRES)		0.42			0.42			0.42			0.42			0.42	
		Species count	9	9	18	10	10	17	10	10	12	10	10	12	10	10	10
		Stems per ACRE	417	417	940	450	450	907	509	509	564	576	576	702	647	647	647

Color Coding for Table

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 4. Morphological Summary Data and Plots

Table 10a. Baseline Stream Data Summary
Foust Creek Mitigation Site (DMS Project No. 95715)
Monitoring Year 5 - 2019

Foust Creek

		PRE-RESTORATION CONDITION						REFERENCE REACH DATA												DESIGN						AS-BUILT/BASELINE					
Parameter	**Gage**	**Foust Creek-Reach 2**		**Foust Creek-Reach 3A**		**Foust Creek-Reach 3B**		**Onsite Reference Reach - Foust Creek**		**Spencer Creek 1**		**Spencer Creek 2**		**UT to Richland Creek- Reach 1**		**UT to Richland Creek- Reach 2**		**Dutchman's Creek**		**UT to Cane Creek**		**Foust Creek-Reach 2**		**Foust Creek-Reach 3A**		**Foust Creek-Reach 3B**		**Foust Creek-Reach 2**		**Foust Creek-Reach 3A**		**Foust Creek-Reach 3B**	
		Min	**Max**	**Min**	**Max**	**Min**	**Max**	**Min**	**Max**	**Min**	**Max**	**Min**	**Max**	**Min**	**Max**	**Min**	**Max**	**Min**	**Max**	**Min**	**Max**	**Min**	**Max**	**Min**	**Max**	**Min**	**Max**	**Min**	**Max**	**Min**	**Max**	**Min**	**Max**
Dimension and Substrate - Riffle																															
Bankfull Width (ft)		24.7		17.5		22.4		18.5	19.4	10.7	11.2	6.3	9.3	8.8	10.4	13.3	15.2	24.8	26.6	11.5	12.3	20.0		20.0		20.0		18.5	22.5	18.5	22.5	23.6	
Floodprone Width (ft)		180		114.2		276.1		49	62.5	60	>114	14	125	27.6	31.4	>50		4.4	49.7	311		50	400	50	400	50	400	150		150		150	
Bankfull Mean Depth		1.2		1.4		1.5		1.3	1.4	1.6	1.8	0.8	1.0	0.8	0.9	1.1	1.3	1.3	1.5	0.8	1.0	1.3		1.3		1.5		1.1	1.3	1.1	1.3	1.5	
Bankfull Max Depth		1.8		2.5		3		1.8	2.1	2.1	2.6	1	1.2	1.1	1.3	1.8	2.1	1.8	2.0	1.2	1.6	2.1		2.1		2.3		1.9	2.3	1.9	2.3	2.7	
Bankfull Cross Sectional Area (ft^2)	N/A	30		25.3		34.6		23.9	24.1	17.8	19.7	6.6	8.7	7.8	8.5	16.5	17.5	34.2	36.9	8.9	12.2	26.4		25.8		29.2		21.5	30.2	21.5	30.2	36.5	
Width/Depth Ratio		20.3		12.2		14.6		13.9	14.2	5.8	7.1	7.9	9.3	10	12.8	10.1	13.9	17.9	19.4	12.3	14.4	15.2		15.5		13.3		15.5	18.8	15.5	18.8	15.2	
Entrenchment Ratio[1]		7.3		6.5		12.3		2.6	3.4	5.5	>10.2	1.7	4.3	2.4	4.0	>2.5		1.9	1.9	>2.5		2.5	20.0	2.5	20.0	2.5	20.0	6.7	8.1	6.7	8.1	6.4	
Bank Height Ratio[2]		1.4		1.1		1.4		1.0		1.0		1.0	1.0	1.4	2.1	1.0		1.0	1.2	---		1.0		1.0		1.0		1.0		1.0		1.0	
D50 (mm)		1.20		7.60		11.00																						7.3	51.8	7.3	51.8	52.3	
Profile																																	
Riffle Length (ft)								---		---		---		---		---		---		---		---		---		---		19.0	``	19.0	52.2	24.2	34.4
Riffle Slope (ft/ft)		0.01		0.023		0.0151		0.015	0.035	0.013		0.0184	0.0343	0.0183	0.0355	0.0183	0.0355	---		0.0188	0.0704	0.0039	0.0329	0.0117	0.0423	0.0065	0.0752	0.0028	0.0530	0.0028	0.0530	0.0096	0.0300
Pool Length (ft)								---		---		---		---		---		---		---		---		---		---		42.5	96.1	42.5	96.1	56.3	101.2
Pool Max Depth (ft)	N/A	4.4		2.9		4		2.5	2.9	3.3		1.2	1.8	14.7	16	1.8	1.8	---		2.6		2.6	5.3	2.6	5.3	3.0	6.0	2.0	4.3	2.0	4.3	2.3	4.0
Pool Spacing (ft)		212.55		2.8	2.96	3.0	4.9	48.8	91.3	71		9	46	2.5	6.1	2.5	6.1	---		2.3	6.1	50	140	50	140	50	140	70	164	70	164	34	137
Pool Volume (ft^3)																																	
Pattern																																	
Channel Beltwidth (ft)		N/A		N/A		N/A		N/A		38	41	10	50	N/A		N/A		N/A		102		32	178	32	178	32	178	38	110	38	110	72	128
Radius of Curvature (ft)		N/A		N/A		N/A		N/A		11	15	12	85	N/A		N/A		N/A		23	38	41	58	41	58	43	57	51	69	51	69	55	67
Rc:Bankfull Width (ft/ft)	N/A	N/A		N/A		N/A		N/A		1.3	1.4	1.9	9.1	N/A		N/A		N/A		2.0	3.1	2.1	2.9	2.1	2.9	2.2	2.9	2.8	3.1	2.8	3.1	2.3	2.8
Meander Length (ft)		N/A		N/A		N/A		N/A		--	--	53	178	N/A		N/A		N/A		45.0	81.0	100	280	100	280	100	280	135	216	135	216	166	234
Meander Width Ratio		N/A		N/A		N/A		N/A		3.4	3.6	1.6	5.4	N/A		N/A		N/A		8.3	8.9	1.6	8.9	1.6	8.9	1.6	8.9	2.1	4.9	2.1	4.9	3.1	5.4
Substrate, Bed and Transport Parameters																																	
Ri%/Ru%/P%/G%/S%																																	
SC%/Sa%/G%/C%/B%/Be%																																	
d16/d35/d50/d84/d95/d100	N/A	0.2/0.5/1.2/11/65		0.3/3.2/7.6/110/160		0.1/4.4/11/19/47		---		---		---		---		---		---		---								SC/ 0.14/0.2/ 45.0/90.0/128.0		SC/ 0.14/0.2/ 45.0/90.0/128.0		SC/0.10/0.3 66.2/101.2/180.0	
Reach Shear Stress (Competency) lb/ft^2		0.53		0.83		0.26																0.4		0.71		0.86		0.39	0.47	0.39	0.47	0.70	
Max part size (mm) mobilized at bankfull																																	
Stream Power (Capacity) W/m^2																																	
Additional Reach Parameters																																	
Drainage Area (SM)		1.60		1.90		2.00		1.38		0.96		0.37		0.28		0.97		2.90		0.29		1.60		1.90		2.00		1.60		1.90		2.00	
Watershed Impervious Cover Estimate (%)		<1%		<1%		<1%		---		---		---		---		---		---		---		<1%		<1%		<1%		<1%		<1%		<1%	
Rosgen Classification		C5		C/E4		C/E4		C4		E4		E4		C/E4		C/E4		B4c		C/E4		C4		C4		C/E4		C5		C4		C/E4	
Bankfull Velocity (fps)		3.4		4.5		3.3		2.9	3.7	4.9	5.4	5.0	5.6	4.1	5.2	4.2	4.5	4.2	4.5	3.8		3.6		4.6		4.5		3.0	3.4	4.0		4.0	
Bankfull Discharge (cfs)		101		112		115		69.4	88.0	97		35		29.1	32.0	68.9	78.6	140.0	165.0	40		100.0		110.0		110.0		66.0	102.1	90.5		90.5	
Q-NFF regression		---		---		---																											
Q-USGS extrapolation	N/A	---		---		---																											
Q-Mannings		---		---		---																											
Valley Length (ft)		---		---		---		---		---		---		---		---		---		---		2,133		300		1,030							
Channel Thalweg Length (ft)		2,478		307		1,013		---		---		---		---		---		---		---		2,523		321		1,186		2,404		317		1,173	
Sinuosity		1.09		1.11		1.05		1.05		2.3		1.0	1.3	1.1		2.3		1.0		1.3		1.18		1.07		1.15		1.1		1.1		1.1	
Water Surface Slope ($ft/ft)^2$		---		---		---		---		---		---		---		---		---		---		---		---		---		---		0.0058		0.0105		0.0056	
Bankfull Slope (ft/ft)		---		---		---		---		0.0047		0.019	0.022	0.013		0.018		0.009		0.015		0.007		0.008		0.005		0.0053		0.0085		0.0071	

(---): Data was not provided
N/A: Not Applicable
[1]Entrenchment Ratio was calculated by the method specified in the Industry Technical Workgroup Memorandum.
[2]Bank Height Ratio was calculated by the method specified in the Industry Technical Workgroup Memorandum.

Table 10b. Baseline Stream Data Summary
Foust Creek Mitigation Site (DMS Project No. 95715)
Monitoring Year 5 - 2019

UT1

		PRE-RESTORATION		REFERENCE REACH DATA														DESIGN		AS-BUILT/ BASELINE	
Parameter	**Gage**	**UT1**		**Onsite Reference Reach - Foust Creek**		**Spencer Creek 1**		**Spencer Creek 2**		**UT to Richland Creek- Reach 1**		**UT to Richland Creek- Reach 2**		**Dutchman's Creek**		**UT to Cane Creek**		**UT1**		**UT1**	
		Min	**Max**	**Min**	**Max**	**Min**	**Max**	**Min**	**Max**	**Min**	**Max**	**Min**	**Max**	**Min**	**Max**	**Min**	**Max**	**Min**	**Max**	**Min**	**Max**
Dimension and Substrate - Riffle																					
Bankfull Width (ft)		8.6		18.5	19.4	10.7	11.2	6.3	9.3	8.8	10.4	13.3	15.2	24.8	26.6	11.5	12.3	11.0		10.8	12.6
Floodprone Width (ft)		104.3		49	62.5	60	>114	14	125	27.6	31.4	>50		4.4	49.7	311		27.5	220	150	150
Bankfull Mean Depth		1.0		1.3	1.4	1.6	1.8	0.8	1.0	0.8	0.9	1.1	1.3	1.3	1.5	0.8	1.0	0.8		0.6	0.8
Bankfull Max Depth		1.8		1.8	2.1	2.1	2.6	1.0	1.2	1.1	1.3	1.8	2.1	1.8	2.0	1.2	1.6	1.3		1.3	1.5
Bankfull Cross Sectional Area (ft^2)	N/A	8.7		23.9	24.1	17.8	19.7	6.6	8.7	7.8	8.5	16.5	17.5	34.2	36.9	8.9	12.2	8.8		7.7	8.1
Width/Depth Ratio		8.5		13.9	14.2	5.8	7.1	7.9	9.3	10.0	12.8	10.1	13.9	17.9	19.4	12.3	14.4	13.8		14.2	20.4
Entrenchment Ratio[1]		12.2		2.6	3.4	5.5	>10.2	1.7	4.3	2.4	4.0	>2.5		1.9	1.9	>2.5		2.5	20.0	11.9	13.9
Bank Height Ratio[2]		1.4		1.0		1.0		1.0	1.0	1.4	2.1	1.0		1.0	1.2	---		1.0		1.0	1.0
D50 (mm)		0.40																		18.2	35.7
Profile																					
Riffle Length (ft)				---		---		---		---		---		---		---		---		11.5	21.6
Riffle Slope (ft/ft)		---		0.015	0.035	0.013		0.0184	0.0343	0.0183	0.0355	0.0183	0.0355	---		0.0188	0.0704	0.0065	0.0799	0.0088	0.0583
Pool Length (ft)	N/A			---		---		---		---		---		---		---		---		18.5	51.0
Pool Max Depth (ft)		2.6		2.5	2.9	3.3		1.2	1.8	14.7	16.0	1.8	1.8	---		2.6		1.6	3.2	1.9	2.0
Pool Spacing (ft)		---		48.8	91.3	71		9	46	2.5	6.1	2.5	6.1	---		2.3	6.1	28	77	33	82
Pool Volume (ft^3)																					
Pattern																					
Channel Beltwidth (ft)		N/A		N/A		38	41	10	50	N/A		N/A		N/A		102		17.6	97.9	21	44
Radius of Curvature (ft)		N/A		N/A		11	15	12	85	N/A		N/A		N/A		23	38	21	34	30	36
Rc:Bankfull Width (ft/ft)	N/A	N/A		N/A		1.3	1.4	1.9	9.1	N/A		N/A		N/A		2.0	3.1	1.9	3.1	2.7	2.8
Meander Length (ft)		N/A		N/A		--	--	53	178	N/A		N/A		N/A		45.0	81.0	55	154	79	120
Meander Width Ratio		N/A		N/A		3.4	3.6	1.6	5.4	N/A		N/A		N/A		8.3	8.9	1.6	8.9	1.9	3.5
Substrate, Bed and Transport Parameters																					
Ri%/Ru%/P%/G%/S%																					
SC%/Sa%/G%/C%/B%/Be%																					
d16/d35/d50/d84/d95/d100	N/A	0.1/0.1/0.4/14/24		---		---		---		---		---		---		---				0.07/0.39/11.4/ 55.6/90.0/256.0	
Reach Shear Stress (Competency) lb/ft^2		0.42																0.58		0.29	0.36
Max part size (mm) mobilized at bankfull																					
Stream Power (Capacity) W/m^2																					
Additional Reach Parameters																					
Drainage Area (SM)		0.30		1.38		0.96		0.37		0.28		0.97		2.90		0.29		0.30		0.30	
Watershed Impervious Cover Estimate (%)		<1%		---		---		---		---		---		---		---		<1%		<1%	
Rosgen Classification		E5		C4		E4		E4		C/E4		C/E4		B4c		C/E4		C/E4		C/E4	
Bankfull Velocity (fps)		3.6		2.9	3.7	4.9	5.4	5.0	5.6	4.1	5.2	4.2	4.5	4.2	4.5	3.8		3.5		2.3	2.7
Bankfull Discharge (cfs)		31		69.4	88.0	97		35		29.1	32.0	68.9	78.6	140.0	165.0	40		30.0		18.1	21.8
Q-NFF regression		---																			
Q-USGS extrapolation	N/A	---																			
Q-Mannings		---																			
Valley Length (ft)		---		---		---		---		---		---		---		---		702			
Channel Thalweg Length (ft)		713		---		---		---		---		---		---		---		788		793	
Sinuosity		1.11		1.05		2.3		1.0	1.3	1.1		2.3		1.0		1.3		1.15		1.13	
Water Surface Slope (ft/ft)[2]		---		---		---		---		---		---		---		---		---		0.0079	
Bankfull Slope (ft/ft)		---		---		0.0047		0.019		0.013		0.018		0.009		0.015		0.005	0.011	0.006	0.0125

(---): Data was not provided
N/A: Not Applicable
1Entrenchment Ratio was calculated by the method specified in the Industry Technical Workgroup Memorandum.
[2]Bank Height Ratio was calculated by the method specified in the Industry Technical Workgroup Memorandum.

Table 11. Morphology and Hydraulic Summary (Dimensional Parameters - Cross Section)
Foust Creek Mitigation Site (DMS Project No. 95715)
Monitoring Year 5 - 2019

	Foust Creek - Reach 2																							
	Cross Section 1 (Riffle)						Cross Section 2 (Pool)						Cross Section 3 (Riffle)						Cross Section 4 (Pool)					
Dimension and Substrate	**Base**	**MY1**	**MY2**	**MY3**	**MY5**	**MY7**	**Base**	**MY1**	**MY2**	**MY3**	**MY5**	**MY7**	**Base**	**MY1**	**MY2**	**MY3**	**MY5**	**MY7**	**Base**	**MY1**	**MY2**	**MY3**	**MY5**	**MY7**
Bankfull Elevation (ft)	561.7	561.7	561.7	561.7	561.9		561.6	561.6	561.6	561.6	561.7		558.4	558.4	558.4	558.4	558.8		558.2	558.2	558.2	558.2	558.5	
Low Bank Elevation (ft)	561.7	561.7	561.7	561.7	561.9		561.6	561.6	561.6	561.6	561.7		558.4	558.4	558.4	558.4	558.8		558.2	558.2	558.2	558.2	558.5	
Bankfull Width (ft)	20.6	19.7	20.0	19.1	17.0		21.5	20.8	20.8	20.5	21.2		18.5	17.7	17.6	16.7	19.8		24.9	23.6	23.5	21.5	21.8	
Floodprone Width (ft)	150	150	150	150	150		N/A	N/A	N/A	N/A	N/A		150	150	150	150	150		N/A	N/A	N/A	N/A	N/A	
Bankfull Mean Depth (ft)	1.1	1.0	1.0	0.9	1.0		1.2	0.9	0.9	0.9	0.8		1.2	1.0	1.0	0.9	1.0		1.0	0.9	0.9	0.9	1.0	
Bankfull Max Depth (ft)	1.9	1.8	1.8	1.7	2.0		2.5	1.9	2.4	2.4	2.4		1.9	1.9	1.9	1.8	2.1		2.1	2.0	2.0	2.0	2.3	
Bankfull Cross Sectional Area (ft^2)	22.7	20.5	20.5	17.5	17.6		26.7	18.5	19.0	18.0	17.3		21.5	17.7	16.8	15.1	20.4		24.4	20.7	20.2	18.7	21.8	
Width/Depth Ratio	18.8	19.0	19.4	20.8	16.5		17.4	23.4	22.7	23.2	26.0		16.0	17.7	18.5	18.4	19.2		25.4	26.8	27.2	24.9	21.8	
Entrenchment Ratio[1]	7.3	7.6	7.5	7.9	8.8		N/A	N/A	N/A	N/A	N/A		8.1	8.5	8.5	9.0	7.6		N/A	N/A	N/A	N/A	N/A	
Bankfull Bank Height Ratio[2]	1.0	1.0	1.0	1.0	<1.0		N/A	N/A	N/A	N/A	N/A		1.0	1.0	1.0	1.0	<1.0		N/A	N/A	N/A	N/A	N/A	

	Foust Creek - Reach 2																		Foust Creek - Reach 3					
	Cross Section 5 (Riffle)						Cross Section 6 (Pool)						Cross Section 7 (Riffle)						Cross Section 8 (Riffle)					
Dimension and Substrate	**Base**	**MY1**	**MY2**	**MY3**	**MY5**	**MY7**	**Base**	**MY1**	**MY2**	**MY3**	**MY5**	**MY7**	**Base**	**MY1**	**MY2**	**MY3**	**MY5**	**MY7**	**Base**	**MY1**	**MY2**	**MY3**	**MY5**	**MY7**
Bankfull Elevation (ft)	555.7	555.7	555.7	555.7	556.1		553.5	553.5	553.5	553.5	553.4		552.9	552.9	552.9	552.9	553.0		547.9	547.9	547.9	547.9	547.7	
Low Bank Elevation (ft)	555.7	555.7	555.7	555.7	556.1		553.5	553.5	553.5	553.5	553.4		552.9	552.9	552.9	552.9	553.0		547.9	547.9	547.9	547.9	547.7	
Bankfull Width (ft)	20.7	22.0	22.0	22.0	26.1		25.8	25.7	26.5	26.0	25.0		22.5	22.2	22.1	22.1	22.9		23.6	22.7	23.2	22.3	20.9	
Floodprone Width (ft)	150	150	150	150	150		N/A	N/A	N/A	N/A	N/A		150	150	150	150	150		150	150	150	150	150	
Bankfull Mean Depth (ft)	1.3	1.2	1.2	1.2	1.5		1.6	1.5	1.4	1.4	1.5		1.3	1.3	1.3	1.2	1.1		1.5	1.4	1.4	1.4	1.4	
Bankfull Max Depth (ft)	2.1	2.3	2.2	2.2	2.6		3.0	3.0	3.4	3.4	3.5		2.3	2.1	2.2	2.1	2.2		2.7	2.5	2.5	2.4	2.4	
Bankfull Cross Sectional Area (ft^2)	27.6	27.0	26.6	26.2	38.4		41.7	37.4	37.6	37.6	38.3		30.2	28.8	28.2	26.4	26.1		36.5	32.1	31.9	30.5	29.3	
Width/Depth Ratio	15.5	17.9	18.2	18.4	17.8		15.9	17.7	18.7	18.0	16.3		16.8	17.0	17.3	18.5	20.0		15.2	16.0	16.9	16.3	14.9	
Entrenchment Ratio[1]	7.2	6.8	6.8	6.8	5.7		N/A	N/A	N/A	N/A	N/A		6.7	6.8	6.8	6.8	6.6		6.4	6.6	6.5	6.7	7.2	
Bankfull Bank Height Ratio[2]	1.0	1.0	1.0	1.0	1.2		N/A	N/A	N/A	N/A	N/A		1.0	1.0	1.0	1.0	<1.0		1.0	1.0	1.0	1.0	<1.0	

	Foust Creek - Reach 3						UT1																	
	Cross Section 9 (Pool)						Cross Section 10 (Pool)						Cross Section 11 (Riffle)						Cross Section 12 (Pool)					
Dimension and Substrate	**Base**	**MY1**	**MY2**	**MY3**	**MY5**	**MY7**	**Base**	**MY1**	**MY2**	**MY3**	**MY5**	**MY7**	**Base**	**MY1**	**MY2**	**MY3**	**MY5**	**MY7**	**Base**	**MY1**	**MY2**	**MY3**	**MY5**	**MY7**
Bankfull Elevation (ft)	547.4	547.4	547.4	547.4	547.5		562.4	562.4	562.4	562.4	562.4		562.1	562.1	562.1	562.1	562.3		557.5	557.5	557.5	557.5	557.5	
Low Bank Elevation (ft)	547.4	547.4	547.4	547.4	547.5		562.4	562.4	562.4	562.4	562.4		562.1	562.1	562.1	562.1	562.3		557.5	557.5	557.5	557.5	557.5	
Bankfull Width (ft)	25.6	25.0	24.9	24.4	23.4		18.0	15.9	15.7	15.6	14.8		10.8	10.2	10.2	10.2	11.6		14.5	14.6	14.1	14.0	14.4	
Floodprone Width (ft)	N/A	N/A	N/A	N/A	N/A		N/A	N/A	N/A	N/A	N/A		150	150	150	150	150		N/A	N/A	N/A	N/A	N/A	
Bankfull Mean Depth (ft)	2.1	1.8	2.1	2.1	2.2		1.1	1.1	1.1	1.1	1.1		0.8	0.7	0.7	0.7	0.7		0.8	0.7	0.8	0.7	0.8	
Bankfull Max Depth (ft)	3.6	3.7	3.9	3.9	4.1		2.3	2.1	2.1	2.2	2.2		1.3	1.3	1.4	1.4	1.5		1.6	1.5	1.7	1.7	1.8	
Bankfull Cross Sectional Area (ft^2)	53.5	46.1	51.9	50.5	50.9		20.0	17.0	17.2	16.9	15.8		8.1	7.4	7.6	7.5	8.4		11.5	10.6	10.7	10.5	11.1	
Width/Depth Ratio	12.3	13.5	11.9	11.8	10.8		16.2	14.8	14.4	14.5	13.9		14.2	14.1	13.6	13.8	16.0		18.4	19.9	18.6	18.7	18.8	
Entrenchment Ratio[1]	N/A	N/A	N/A	N/A	N/A		N/A	N/A	N/A	N/A	N/A		13.9	14.6	14.8	14.8	12.9		N/A	N/A	N/A	N/A	N/A	
Bankfull Bank Height Ratio[2]	N/A	N/A	N/A	N/A	N/A		N/A	N/A	N/A	N/A	N/A		1.0	1.0	1.0	1.0	1.0		N/A	N/A	N/A	N/A	N/A	

	UT1					
	Cross Section 13 (Riffle)					
Dimension and Substrate	**Base**	**MY1**	**MY2**	**MY3**	**MY5**	**MY7**
Bankfull Elevation (ft)	557.4	557.4	557.4	557.4	557.4	
Low Bank Elevation (ft)	557.4	557.4	557.4	557.4	557.4	
Bankfull Width (ft)	12.6	12.0	11.7	11.6	11.0	
Floodprone Width (ft)	150	150	150	150	150	
Bankfull Mean Depth (ft)	0.6	0.6	0.6	0.6	0.6	
Bankfull Max Depth (ft)	1.5	1.1	1.2	1.1	1.2	
Bankfull Cross Sectional Area (ft^2)	7.7	7.0	6.8	6.4	6.6	
Width/Depth Ratio	20.4	20.6	20.2	20.8	18.2	
Entrenchment Ratio[1]	11.9	12.5	12.8	12.9	13.7	
Bankfull Bank Height Ratio[2]	1.0	1.0	1.0	1.0	<1.0	

[1]Entrenchment Ratio was calculated by the method specified in the Industry Technical Workgroup Memorandum.
[2]Bank Height Ratio was calculated by the method specified in the Industry Technical Workgroup Memorandum.

Table 12a. Monitoring Data - Stream Reach Data Summary

Foust Creek Mitigation Site (DMS Project No. 95715)

Monitoring Year 5 - 2019

Foust Creek - Reach 2

Parameter	As-Built/Baseline		MY1		MY2		MY3		MY5		MY7	
	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
Dimension and Substrate - Riffle												
Bankfull Width (ft)	18.5	22.5	17.7	22.2	17.6	22.1	16.7	22.1	17.0	26.1		
Floodprone Width (ft)	150		150		150		150		150			
Bankfull Mean Depth	1.1	1.3	1.0	1.3	1.0	1.3	0.9	1.2	1.0	1.5		
Bankfull Max Depth	1.9	2.3	1.8	2.3	1.8	2.2	1.7	2.2	2.0	2.6		
Bankfull Cross Sectional Area (ft^2)	21.5	30.2	17.7	28.8	16.8	28.2	15.1	26.4	17.6	38.4		
Width/Depth Ratio	15.5	18.8	17.0	19.0	17.3	19.4	18.4	20.8	16.5	20.0		
Entrenchment Ratio[1]	6.7	8.1	6.8	8.5	6.8	8.5	6.8	9.0	7.6	8.8		
Bank Height Ratio [2]	1.0		1.0		1.0		1.0		<1.0			
D50 (mm)	7.3	51.8	7.7	41.3	13.5	49.9	27.6	73.4	11	22.6		
Profile												
Riffle Length (ft)	19.0	52.2										
Riffle Slope (ft/ft)	0.0028	0.0530										
Pool Length (ft)	42.5	96.1										
Pool Max Depth (ft)	2.0	4.3										
Pool Spacing (ft)	70	164										
Pool Volume (ft^3)												
Pattern												
Channel Beltwidth (ft)	38	110										
Radius of Curvature (ft)	51	69										
Rc:Bankfull Width (ft/ft)	2.8	3.1										
Meander Wave Length (ft)	135	216										
Meander Width Ratio	2.1	4.9										
Additional Reach Parameters												
Rosgen Classification	C5											
Channel Thalweg Length (ft)	2,404											
Sinuosity (ft)	1.1											
Water Surface Slope (ft/ft)	0.0058											
Bankfull Slope (ft/ft)	0.0053											
Ri%/Ru%/P%/G%/S%												
SC%/Sa%/G%/C%/B%/Be%												
d16/d35/d50/d84/d95/d100	SC/0.14/0.2/45.0/90.0/128.0		SC/0.71/5.6/101.2/362/>2048		SC/1.47/11.0/75.9/146.7/512.0		0.13/0.71/13.3/109.1/160.7/256		0.30/0.57/1.0/53.7/113.8/362.0			
% of Reach with Eroding Banks	0%		0%		0%		0%		0%			

[1]Entrenchment Ratio was calculated by the method specified in the Industry Technical Workgroup Memorandum.

[2]Bank Height Ratio was calculated by the method specified in the Industry Technical Workgroup Memorandum.

Table 12b. Monitoring Data - Stream Reach Data Summary

Foust Creek Mitigation Site (DMS Project No. 95715)

Monitoring Year 5 - 2019

Foust Creek - Reach 3A

Parameter	As-Built/Baseline		MY1		MY2		MY3		MY5		MY7	
	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
Dimension and Substrate - Riffle												
Bankfull Width (ft)	18.5	22.5	17.7	22.2	17.6	22.1	16.7	22.1	17.0	26.1		
Floodprone Width (ft)	150		150		150		150		150			
Bankfull Mean Depth	1.1	1.3	1.0	1.3	1.0	1.3	0.9	1.2	1.0	1.5		
Bankfull Max Depth	1.9	2.3	1.8	2.3	1.8	2.2	1.7	2.2	2.0	2.6		
Bankfull Cross Sectional Area (ft^2)	21.5	30.2	17.7	28.8	16.8	28.2	15.1	26.4	17.6	38.4		
Width/Depth Ratio	15.5	18.8	17.0	19.0	17.3	19.4	18.4	20.8	16.5	20.0		
Entrenchment Ratio[1]	6.7	8.1	6.8	8.5	6.8	8.5	6.8	9.0	7.6	8.8		
Bank Height Ratio [2]	1.0		1.0		1.0		1.0		<1.0			
D50 (mm)	7.3	51.8	7.7	41.3	13.5	49.9	27.6	73.4	11	22.6		
Profile												
Riffle Length (ft)	19.0	52.2										
Riffle Slope (ft/ft)	0.0028	0.0530										
Pool Length (ft)	42.5	96.1										
Pool Max Depth (ft)	2.0	4.3										
Pool Spacing (ft)	70	164										
Pool Volume (ft^3)												
Pattern												
Channel Beltwidth (ft)	38	110										
Radius of Curvature (ft)	51	69										
Rc:Bankfull Width (ft/ft)	2.8	3.1										
Meander Wave Length (ft)	135	216										
Meander Width Ratio	2.1	4.9										
Additional Reach Parameters												
Rosgen Classification	C4											
Channel Thalweg Length (ft)	317											
Sinuosity (ft)	1.1											
Water Surface Slope (ft/ft)	0.0105											
Bankfull Slope (ft/ft)	0.0085											
Ri%/Ru%/P%/G%/S%												
SC%/Sa%/G%/C%/B%/Be%												
d16/d35/d50/d84/d95/d100	SC/0.14/0.2/45.0/90.0/128.0		SC/0.71/5.6/101.2/362/>2048		SC/1.47/11.0/75.9/146.7/512.0		0.13/0.71/13.3/109.1/160.7/256		0.30/0.57/1.0/53.7/113.8/362.0			
% of Reach with Eroding Banks	0%		0%		0%		0%		0%			

[1]Entrenchment Ratio was calculated by the method specified in the Industry Technical Workgroup Memorandum.

[2]Bank Height Ratio was calculated by the method specified in the Industry Technical Workgroup Memorandum.

Table 12c. Monitoring Data - Stream Reach Data Summary

Foust Creek Mitigation Site (DMS Project No. 95715)

Monitoring Year 5 - 2019

Foust Creek - Reach 3B

Parameter	As-Built/Baseline		MY1		MY2		MY3		MY5		MY7	
	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
Dimension and Substrate - Riffle												
Bankfull Width (ft)	23.6		22.7		23.2		22.3		20.9			
Floodprone Width (ft)	150		150		150		150		150			
Bankfull Mean Depth	1.5		1.4		1.4		1.4		1.4			
Bankfull Max Depth	2.7		2.5		2.5		2.4		2.4			
Bankfull Cross Sectional Area (ft^2)	36.5		32.1		31.9		30.5		29.3			
Width/Depth Ratio	15.2		16.0		16.9		16.3		14.9			
Entrenchment Ratio[1]	6.4		6.6		6.5		6.7		7.2			
Bank Height Ratio [2]	1.0		1.0		1.0		1.0		<1.0			
D50 (mm)	52.3		28.1		32.0		48.3		22.6			
Profile												
Riffle Length (ft)	24.24	34.42										
Riffle Slope (ft/ft)	0.0096	0.0300										
Pool Length (ft)	56.3	101.2										
Pool Max Depth (ft)	2.3	4.0										
Pool Spacing (ft)	34	137										
Pool Volume (ft^3)												
Pattern												
Channel Beltwidth (ft)	72	128										
Radius of Curvature (ft)	55	67										
Rc:Bankfull Width (ft/ft)	2.3	2.8										
Meander Wave Length (ft)	166	234										
Meander Width Ratio	3.1	5.4										
Additional Reach Parameters												
Rosgen Classification	C/E4											
Channel Thalweg Length (ft)	1,173											
Sinuosity (ft)	1.1											
Water Surface Slope (ft/ft)	0.0056											
Bankfull Slope (ft/ft)	0.0071											
Ri%/Ru%/P%/G%/S%												
SC%/Sa%/G%/C%/B%/Be%												
d16/d35/d50/d84/d95/d100	SC/0.10/0.3/66.2/101.2/180.0		SC/SC/5.6/69.7/120.7/256.0		0.63/2.50/7.4/55.6/90.0/512.0		.17/1.41/15.3/120.1/180/>2048		SC/4.47/25.4/124.0/214.7/362.0			
% of Reach with Eroding Banks	0%		0%		0%		0%		0%			

[1]Entrenchment Ratio was calculated by the method specified in the Industry Technical Workgroup Memorandum.

[2]Bank Height Ratio was calculated by the method specified in the Industry Technical Workgroup Memorandum.

Table 12d. Monitoring Data - Stream Reach Data Summary

Foust Creek Mitigation Site (DMS Project No. 95715)

Monitoring Year 5 - 2019

UT1

Parameter	As-Built/Baseline		MY1		MY2		MY3		MY5		MY7	
	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
Dimension and Substrate - Riffle												
Bankfull Width (ft)	10.8	12.6	10.2	12.0	10.2	11.7	10.2	11.6	11.0	11.6		
Floodprone Width (ft)	150		150		150		150		150			
Bankfull Mean Depth	0.6	0.8	0.6	0.7	0.6	0.7	0.6	0.7	0.6	0.7		
Bankfull Max Depth	1.3	1.5	1.1	1.3	1.2	1.4	1.1	1.4	1.2	1.5		
Bankfull Cross Sectional Area (ft^2)	7.7	8.1	7.0	7.4	6.8	7.6	6.4	7.5	6.6	8.4		
Width/Depth Ratio	14.2	20.4	14.1	20.6	13.6	20.2	13.8	20.8	16.0	18.2		
Entrenchment Ratio[1]	11.9	13.9	12.5	14.6	12.8	14.8	12.9	14.8	12.9	13.7		
Bank Height Ratio [2]	1.0		1.0		1.0		1.0		1.0			
D50 (mm)	18.2	35.7	17.6	21.3	15.0	30.9	32.0	37.9	19	29.3		
Profile												
Riffle Length (ft)	11.5	21.6										
Riffle Slope (ft/ft)	0.0088	0.0583										
Pool Length (ft)	18.5	51.0										
Pool Max Depth (ft)	1.9	2.0										
Pool Spacing (ft)	33	82										
Pool Volume (ft^3)												
Pattern												
Channel Beltwidth (ft)	21	44										
Radius of Curvature (ft)	30	36										
Rc:Bankfull Width (ft/ft)	2.7	2.8										
Meander Wave Length (ft)	79	120										
Meander Width Ratio	1.9	3.5										
Additional Reach Parameters												
Rosgen Classification	C/E4											
Channel Thalweg Length (ft)	793											
Sinuosity (ft)	1.1											
Water Surface Slope (ft/ft)	0.0079											
Bankfull Slope (ft/ft)	0.006											
Ri%/Ru%/P%/G%/S%												
SC%/Sa%/G%/C%/B%/Be%												
d16/d35/d50/d84/d95/d100	0.07/0.39/11.4/55.6/90.0/256.0		0.16/3.26/6.7/45.0/143.4/512.0		SC\SC\12.2\66.5\107.3\180.0		SC\SC\0.4\59.2\104.7\180.0		SC/0.81/12.5/80.3/151.8/362.0			
% of Reach with Eroding Banks	0%		0%		0%		0%		0%			

[1]Entrenchment Ratio was calculated by the method specified in the Industry Technical Workgroup Memorandum.

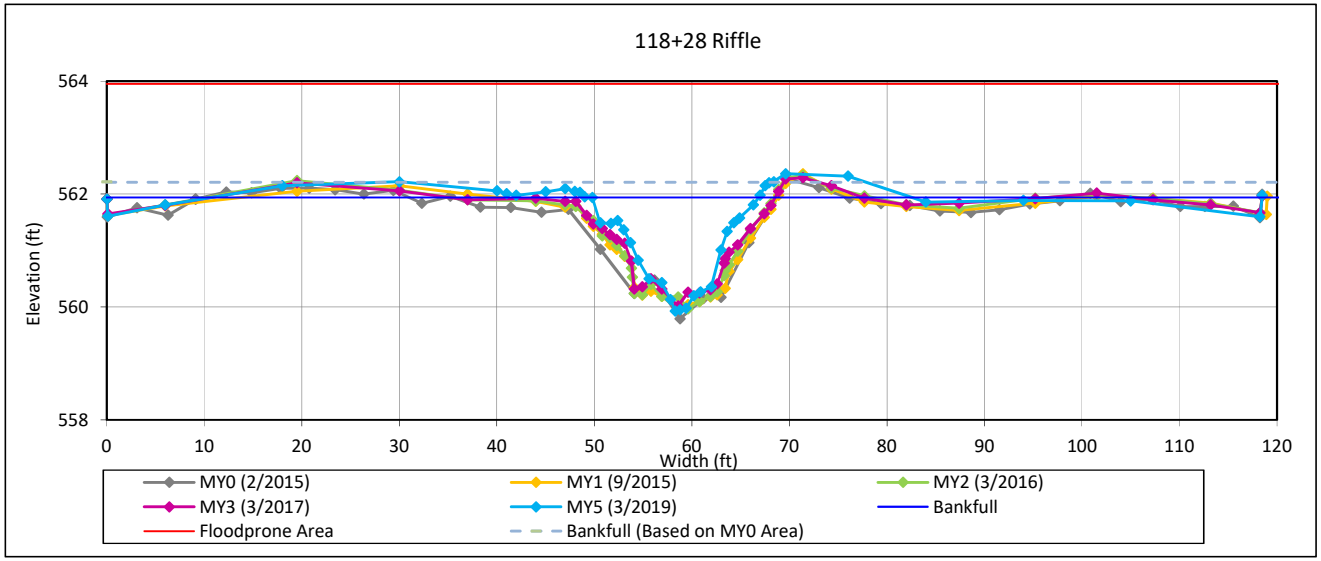
[2]Bank Height Ratio was calculated by the method specified in the Industry Technical Workgroup Memorandum.

Cross Section Plots

Foust Creek Mitigation Site (DMS Project No. 95715)

Monitoring Year 5 - 2019

Cross Section 1- Foust Creek Reach 2



Bankfull Dimensions	
17.6	x-section area (ft.sq.)
17.0	width (ft)
1.0	mean depth (ft)
2.0	max depth (ft)
17.8	wetted parimeter (ft)
1.0	hyd radi (ft)
16.5	width-depth ratio
150.0	W flood prone area (ft)
8.8	entrenchment ratio
< 1.0	low bank height ratio

Survey Date: 3/2019

Field Crew: Wildlands Engineering

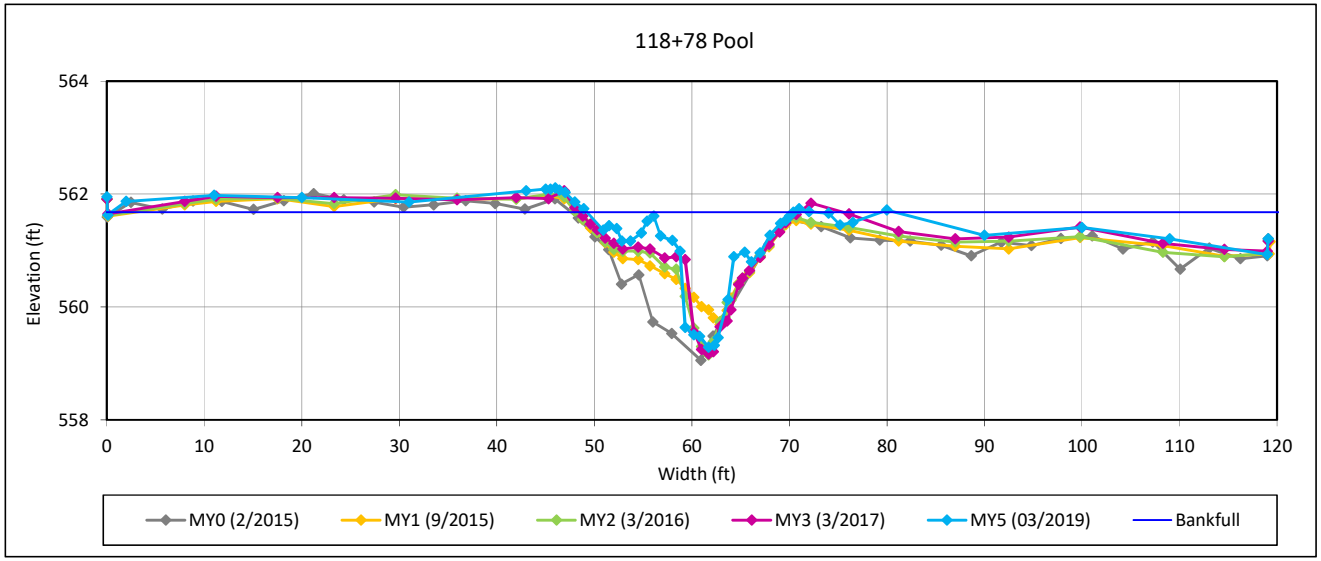
View Downstream

Cross Section Plots

Foust Creek Mitigation Site (DMS Project No. 95715)

Monitoring Year 5 - 2019

Cross Section 2- Foust Creek Reach 2



Bankfull Dimensions	
17.3	x-section area (ft.sq.)
21.2	width (ft)
0.8	mean depth (ft)
2.4	max depth (ft)
23.1	wetted parimeter (ft)
0.7	hyd radi (ft)
26.0	width-depth ratio

Survey Date: 03/2019

Field Crew: Wildlands Engineering

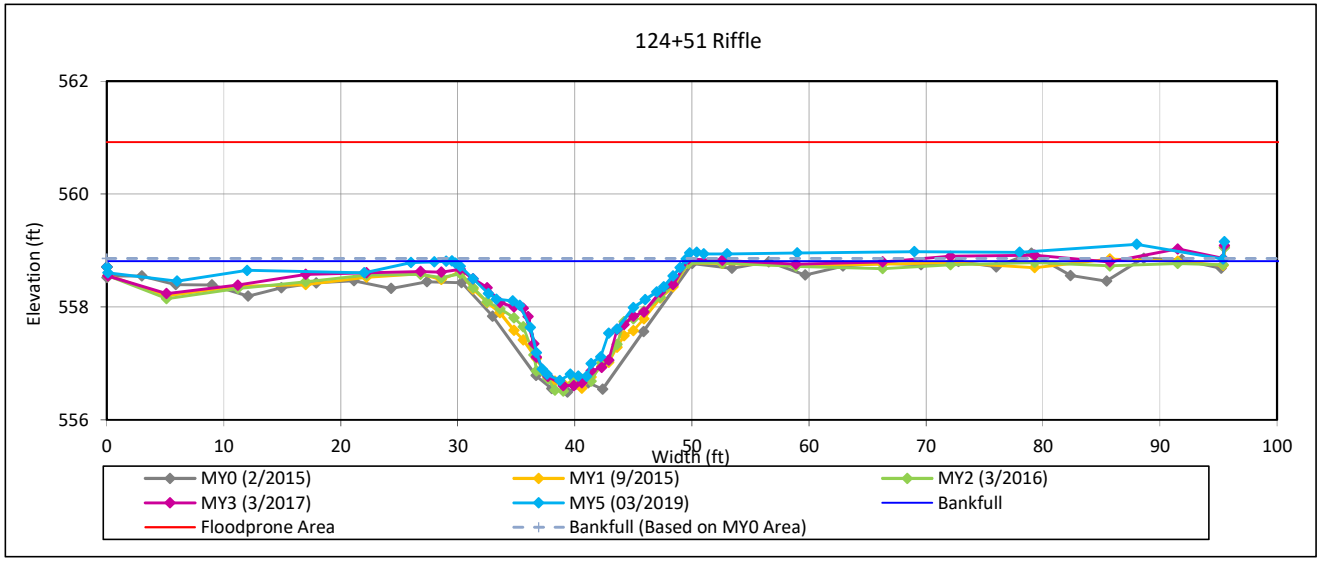
View Downstream

Cross Section Plots

Foust Creek Mitigation Site (DMS Project No. 95715)

Monitoring Year 5 - 2019

Cross Section 3- Foust Creek Reach 2



Bankfull Dimensions	
20.4	x-section area (ft.sq.)
19.8	width (ft)
1.0	mean depth (ft)
2.1	max depth (ft)
20.5	wetted parimeter (ft)
1.0	hyd radi (ft)
19.2	width-depth ratio
150.0	W flood prone area (ft)
7.6	entrenchment ratio
< 1.0	low bank height ratio

Survey Date: 03/2019

Field Crew: Wildlands Engineering

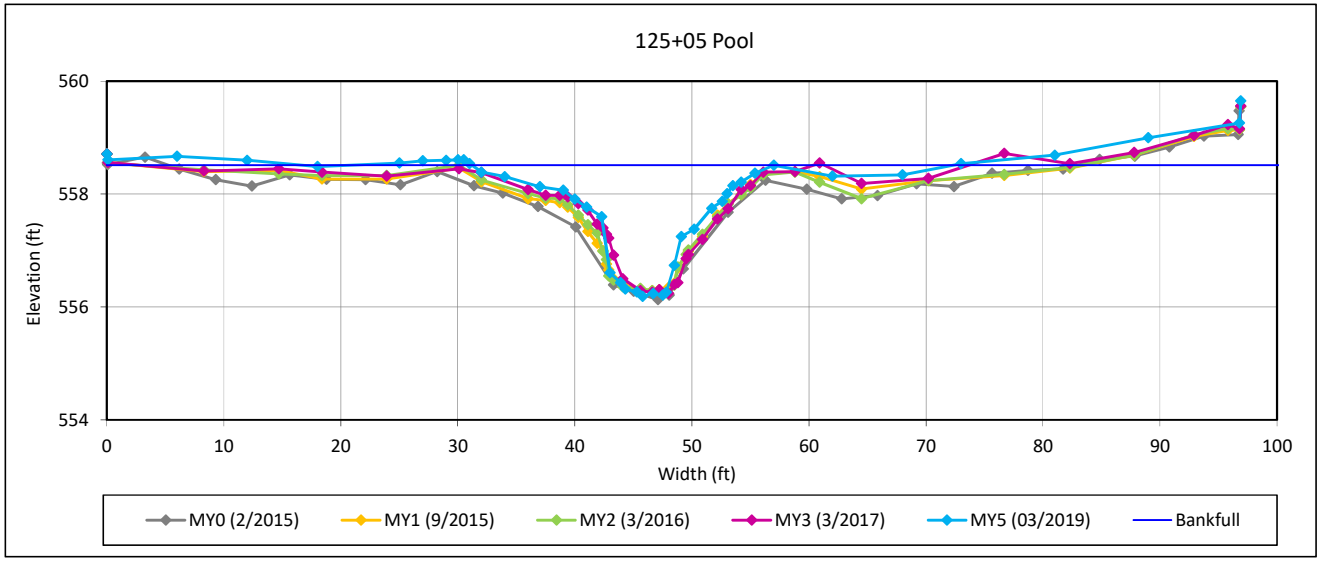
View Downstream

Cross Section Plots

Foust Creek Mitigation Site (DMS Project No. 95715)

Monitoring Year 5 - 2019

Cross Section 4- Foust Creek Reach 2



Bankfull Dimensions	
21.8	x-section area (ft.sq.)
21.8	width (ft)
1.0	mean depth (ft)
2.3	max depth (ft)
22.8	wetted parimeter (ft)
1.0	hyd radi (ft)
21.8	width-depth ratio

Survey Date: 03/2019

Field Crew: Wildlands Engineering

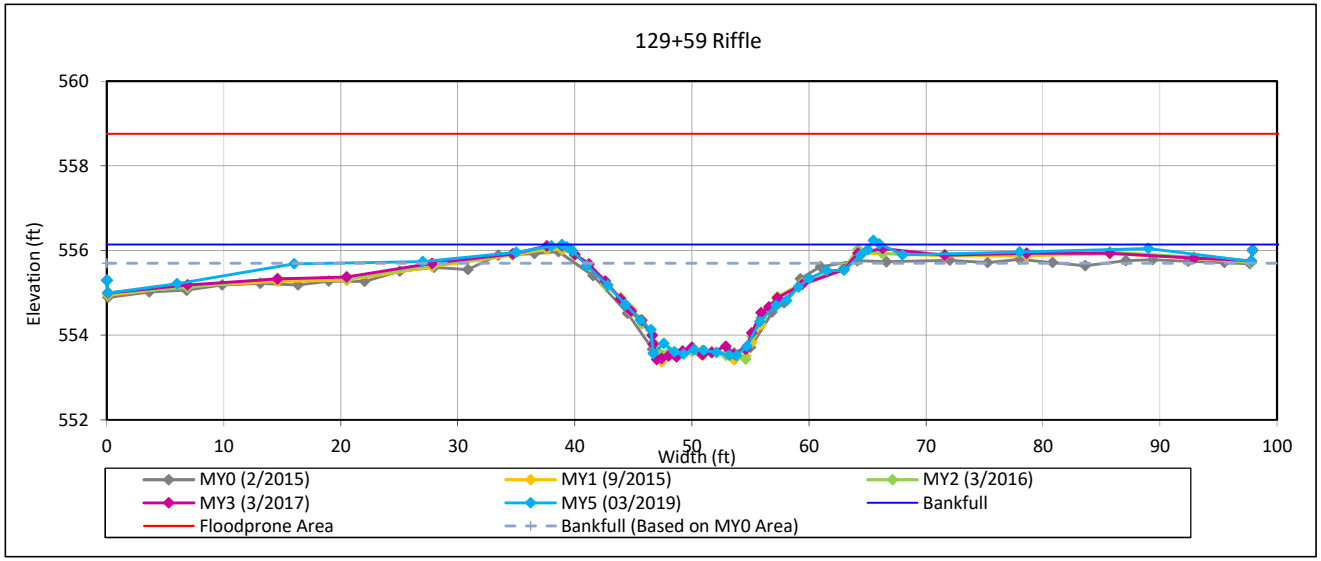
View Downstream

Cross Section Plots

Foust Creek Mitigation Site (DMS Project No. 95715)

Monitoring Year 5 - 2019

Cross Section 5- Foust Creek Reach 2



Bankfull Dimensions	
38.4	x-section area (ft.sq.)
26.1	width (ft)
1.5	mean depth (ft)
2.6	max depth (ft)
27.2	wetted parimeter (ft)
1.4	hyd radi (ft)
17.8	width-depth ratio
150.0	W flood prone area (ft)
5.7	entrenchment ratio
1.2	low bank height ratio

Survey Date: 03/2019

Field Crew: Wildlands Engineering

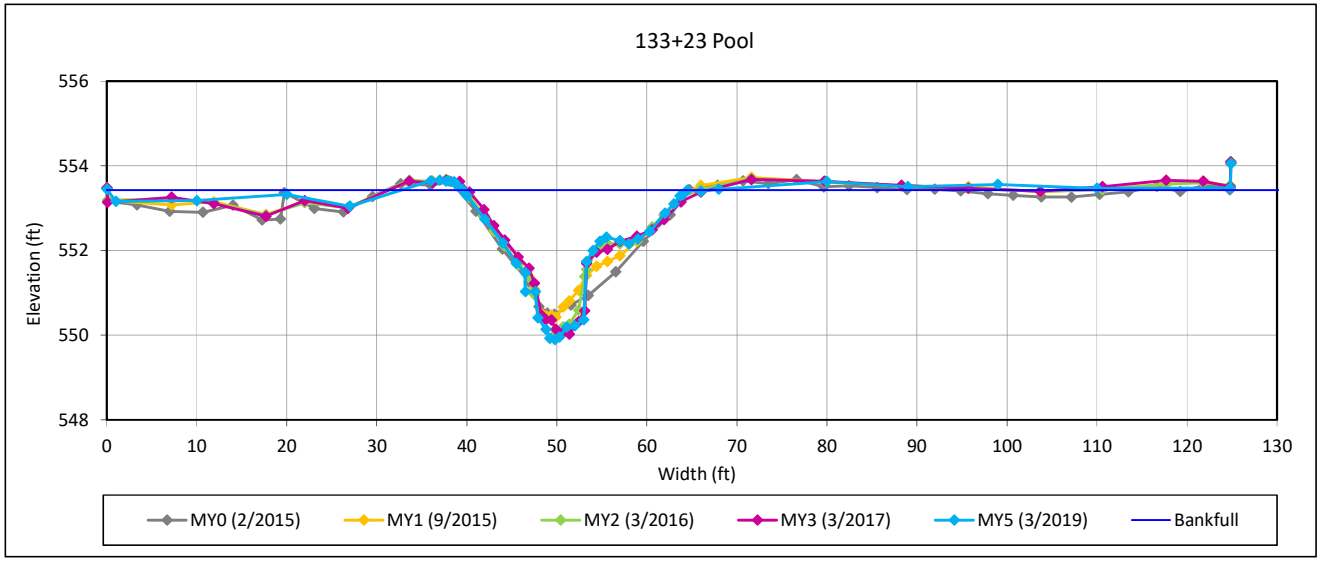
View Downstream

Cross Section Plots

Foust Creek Mitigation Site (DMS Project No. 95715)

Monitoring Year 5 - 2019

Cross Section 6- Foust Creek Reach 2



Bankfull Dimensions	
38.3	x-section area (ft.sq.)
25.0	width (ft)
1.5	mean depth (ft)
3.5	max depth (ft)
27.5	wetted parimeter (ft)
1.4	hyd radi (ft)
16.3	width-depth ratio

Survey Date: 3/2019

Field Crew: Wildlands Engineering

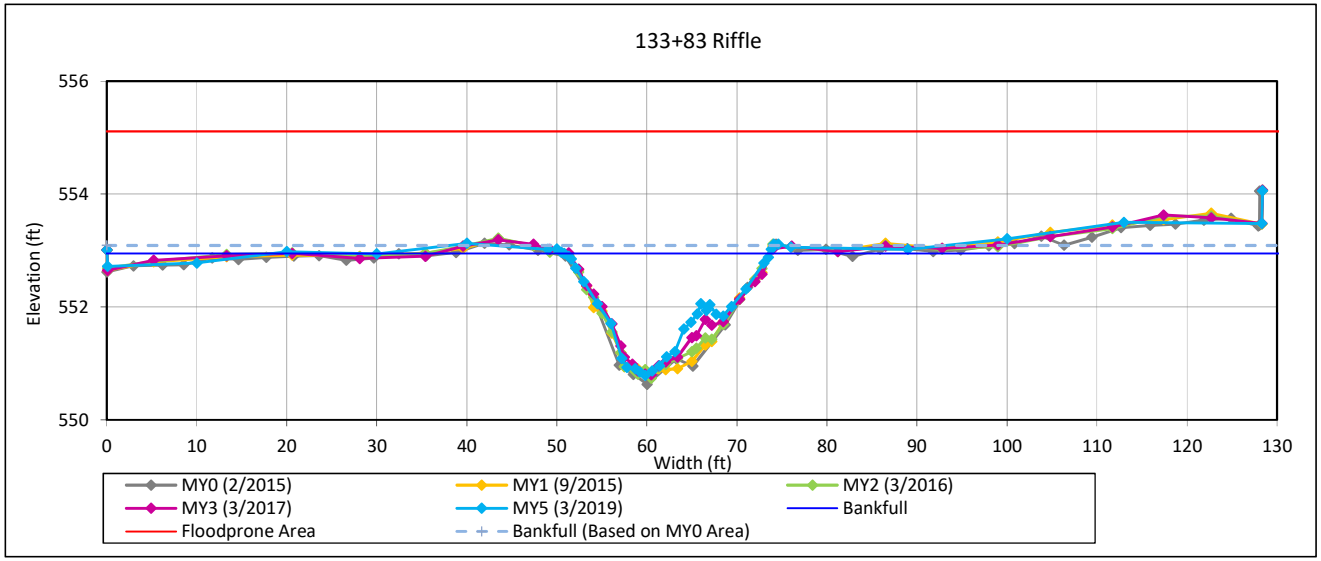
View Downstream

Cross Section Plots

Foust Creek Mitigation Site (DMS Project No. 95715)

Monitoring Year 5 - 2019

Cross Section 7- Foust Creek Reach 2



Bankfull Dimensions	
26.1	x-section area (ft.sq.)
22.9	width (ft)
1.1	mean depth (ft)
2.2	max depth (ft)
23.5	wetted parimeter (ft)
1.1	hyd radi (ft)
20.0	width-depth ratio
150.0	W flood prone area (ft)
6.6	entrenchment ratio
< 1.0	low bank height ratio

Survey Date: 3/2019

Field Crew: Wildlands Engineering

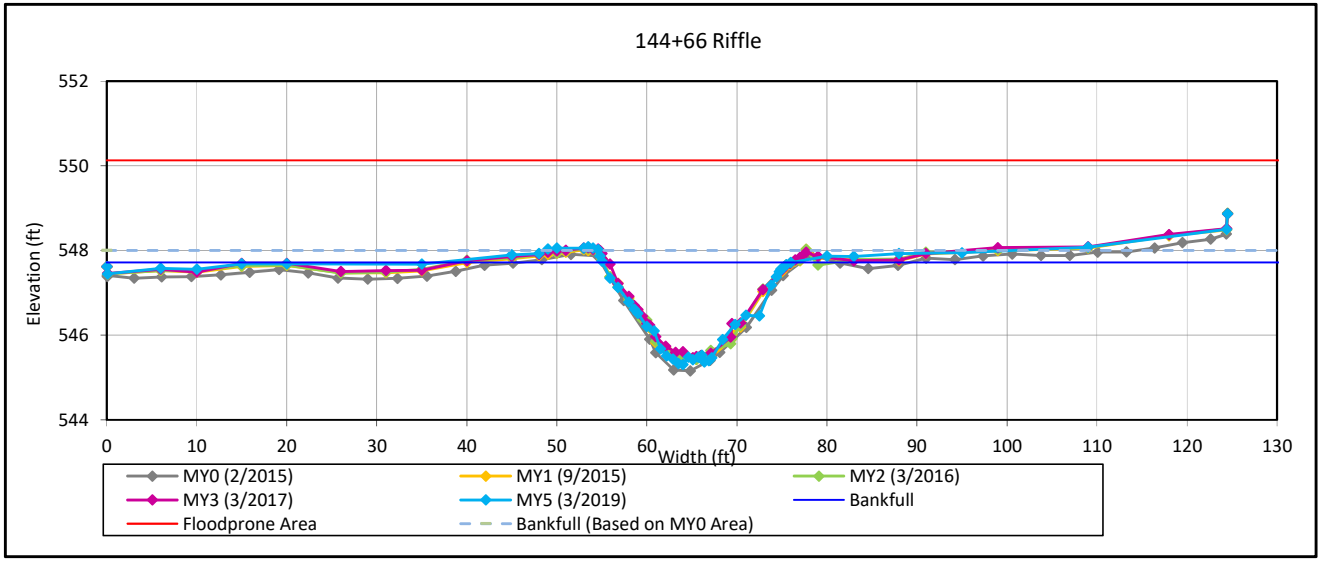
View Downstream

Cross Section Plots

Foust Creek Mitigation Site (DMS Project No. 95715)

Monitoring Year 5 - 2019

Cross Section 8- Foust Creek Reach 3B



Bankfull Dimensions	
29.3	x-section area (ft.sq.)
20.9	width (ft)
1.4	mean depth (ft)
2.4	max depth (ft)
21.8	wetted parimeter (ft)
1.3	hyd radi (ft)
14.9	width-depth ratio
150.0	W flood prone area (ft)
7.2	entrenchment ratio
< 1.0	low bank height ratio

Survey Date: 3/2019
Field Crew: Wildlands Engineering

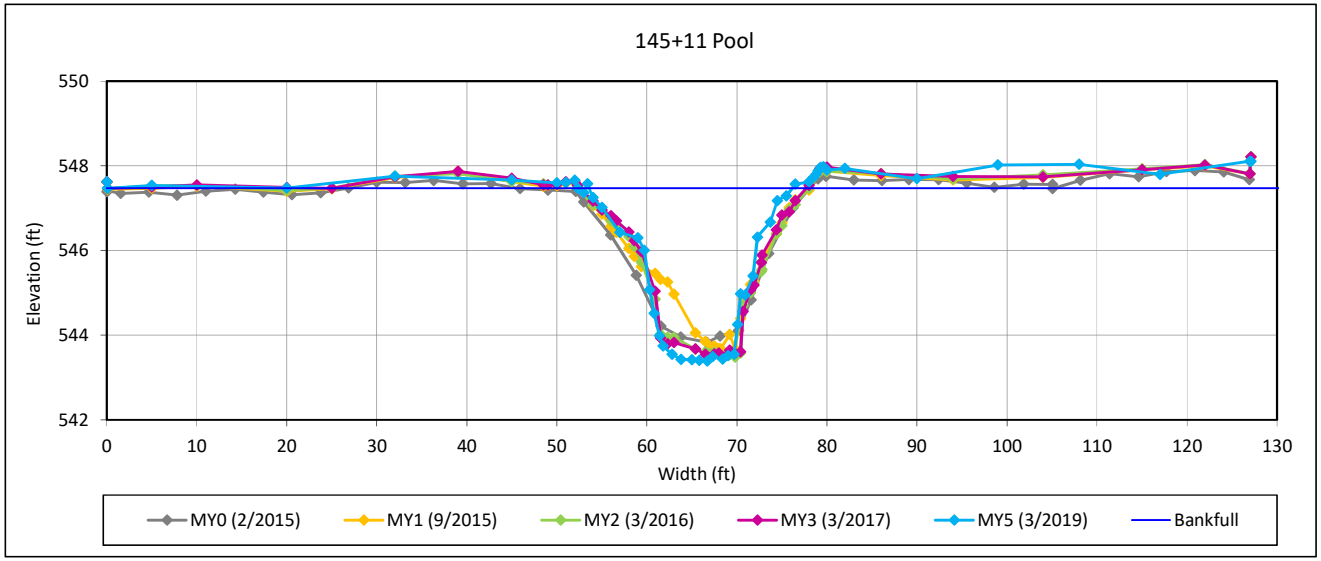
View Downstream

Cross Section Plots

Foust Creek Mitigation Site (DMS Project No. 95715)

Monitoring Year 5 - 2019

Cross Section 9- Foust Creek Reach 3B



Bankfull Dimensions	
50.9	x-section area (ft.sq.)
23.4	width (ft)
2.2	mean depth (ft)
4.1	max depth (ft)
26.5	wetted parimeter (ft)
1.9	hyd radi (ft)
10.8	width-depth ratio

Survey Date: 3/2019
Field Crew: Wildlands Engineering

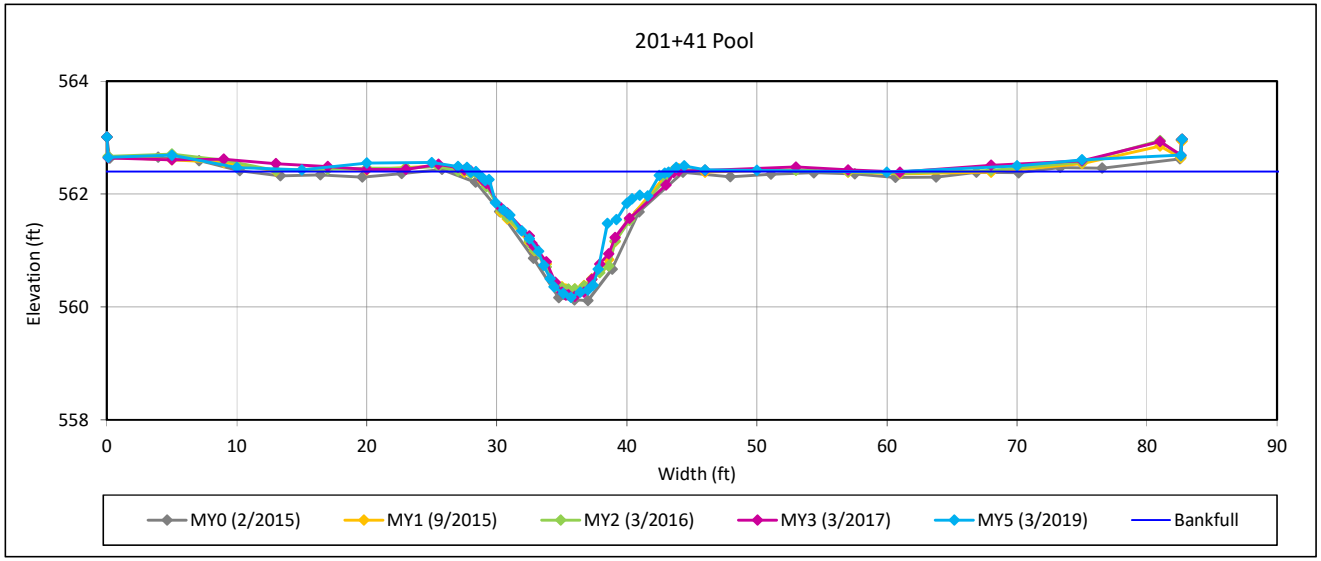
View Downstream

Cross Section Plots

Foust Creek Mitigation Site (DMS Project No. 95715)

Monitoring Year 5 - 2019

Cross Section 10-UT1



Bankfull Dimensions	
15.8	x-section area (ft.sq.)
14.8	width (ft)
1.1	mean depth (ft)
2.2	max depth (ft)
15.9	wetted parimeter (ft)
1.0	hyd radi (ft)
13.9	width-depth ratio

Survey Date: 3/2019

Field Crew: Wildlands Engineering

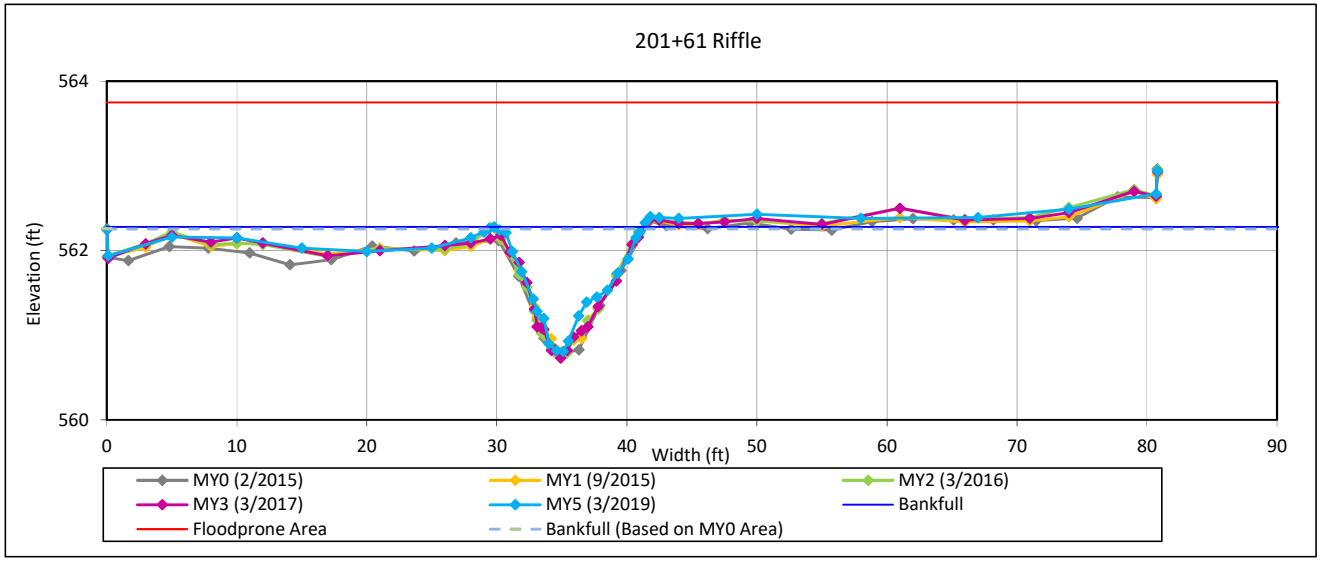
View Downstream

Cross Section Plots

Foust Creek Mitigation Site (DMS Project No. 95715)

Monitoring Year 5 - 2019

Cross Section 11-UT1



Bankfull Dimensions	
8.4	x-section area (ft.sq.)
11.6	width (ft)
0.7	mean depth (ft)
1.5	max depth (ft)
12.1	wetted parimeter (ft)
0.7	hyd radi (ft)
16.0	width-depth ratio
150.0	W flood prone area (ft)
12.9	entrenchment ratio
1.0	low bank height ratio

Survey Date: 03/2019

Field Crew: Wildlands Engineering

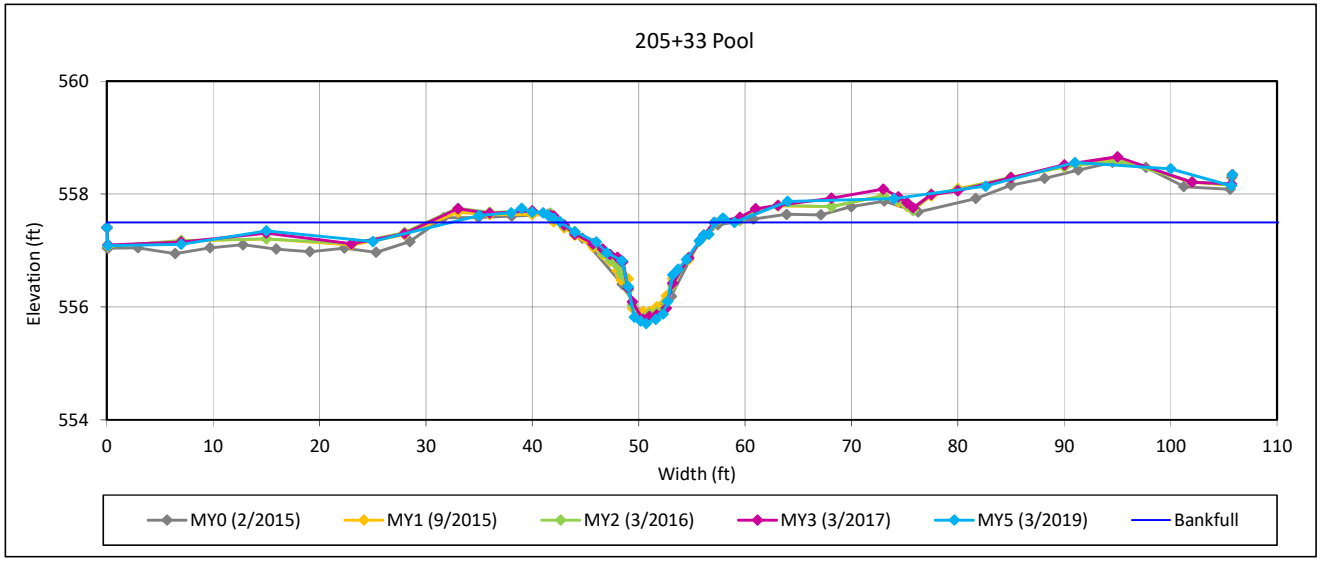
View Downstream

Cross Section Plots

Foust Creek Mitigation Site (DMS Project No. 95715)

Monitoring Year 5 - 2019

Cross Section 12-UT1



Bankfull Dimensions	
11.1	x-section area (ft.sq.)
14.4	width (ft)
0.8	mean depth (ft)
1.8	max depth (ft)
15.2	wetted parimeter (ft)
0.7	hyd radi (ft)
18.8	width-depth ratio

Survey Date: 3/2019

Field Crew: Wildlands Engineering

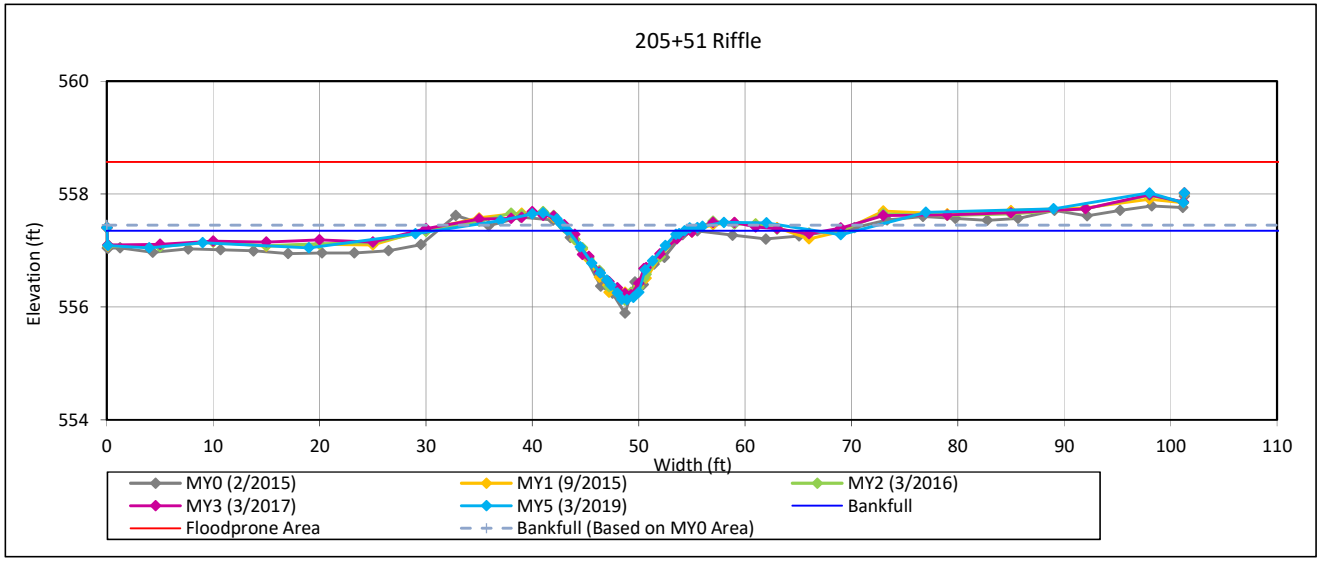
View Downstream

Cross Section Plots

Foust Creek Mitigation Site (DMS Project No. 95715)

Monitoring Year 5 - 2019

Cross Section 13-UT1



Bankfull Dimensions	
6.6	x-section area (ft.sq.)
11.0	width (ft)
0.6	mean depth (ft)
1.2	max depth (ft)
11.3	wetted parimeter (ft)
0.6	hyd radi (ft)
18.2	width-depth ratio
150.0	W flood prone area (ft)
13.7	entrenchment ratio
< 1.0	low bank height ratio

Survey Date: 3/2019

Field Crew: Wildlands Engineering

View Downstream

Reachwide and Cross Section Pebble Count Plots

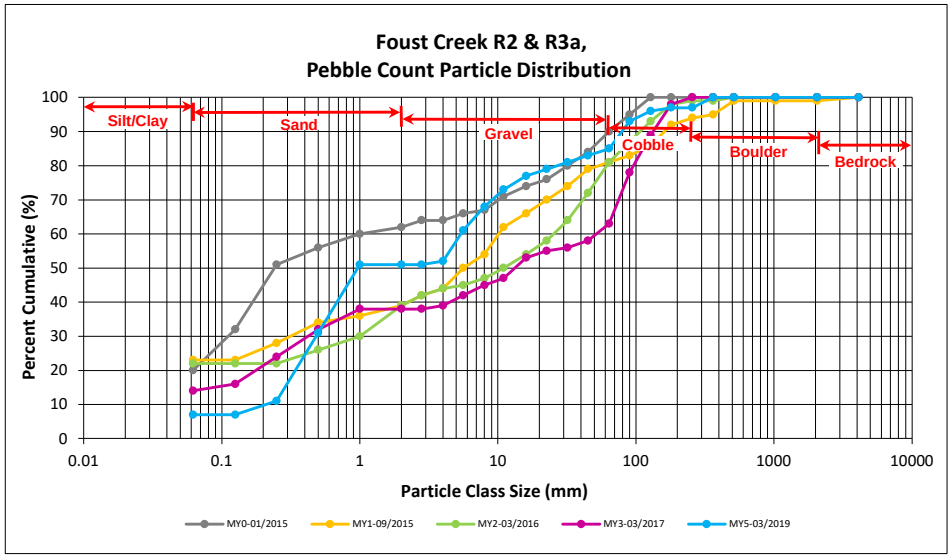
Foust Creek Mitigation Site (DMS Project No. 95715)

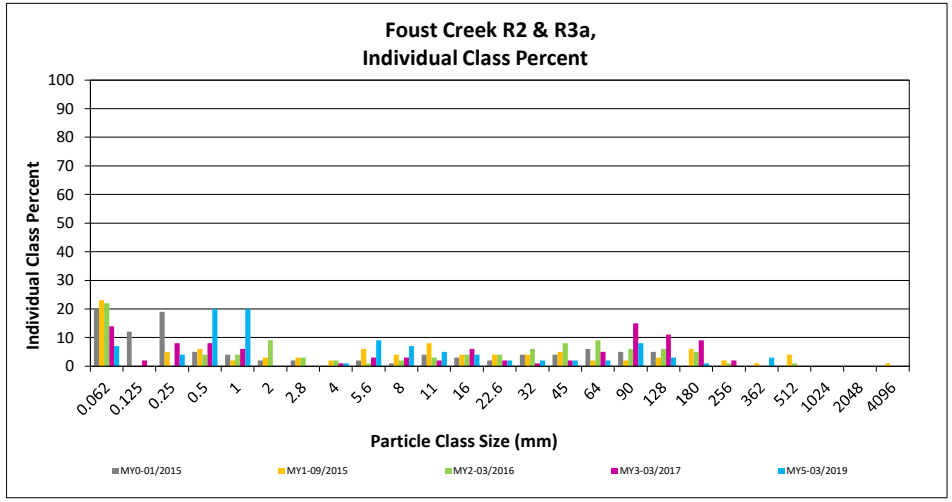
Monitoring Year 5 - 2019

Foust Creek R2 & R3a, Reachwide

Particle Class		Diameter (mm)		Particle Count			Reach Summary	
		min	max	Riffle	Pool	Total	Class Percentage	Percent Cumulative
SILT/CLAY	Silt/Clay	0.000	0.062	1	6	7	7	7
SAND	Very fine	0.062	0.125					7
	Fine	0.125	0.250	1	3	4	4	11
	Medium	0.25	0.50	2	18	20	20	31
	Coarse	0.5	1.0	6	14	20	20	51
	Very Coarse	1.0	2.0					51
GRAVEL	Very Fine	2.0	2.8					51
	Very Fine	2.8	4.0		1	1	1	52
	Fine	4.0	5.6	5	4	9	9	61
	Fine	5.6	8.0	4	3	7	7	68
	Medium	8.0	11.0	3	2	5	5	73
	Medium	11.0	16.0	1	3	4	4	77
	Coarse	16.0	22.6	2		2	2	79
	Coarse	22.6	32	2		2	2	81
	Very Coarse	32	45	2		2	2	83
	Very Coarse	45	64	2		2	2	85
COBBLE	Small	64	90	6	2	8	8	93
	Small	90	128	1	2	3	3	96
	Large	128	180		1	1	1	97
	Large	180	256					97
BOULDER	Small	256	362	2	1	3	3	100
	Small	362	512					100
	Medium	512	1024					100
	Large/Very Large	1024	2048					100
BEDROCK	Bedrock	2048	>2048					100
			Total	**40**	**60**	**100**	**100**	**100**

Reachwide	
Channel materials (mm)	
D_{16} =	0.30
D_{35} =	0.57
D_{50} =	1.0
D_{84} =	53.7
D_{95} =	113.8
D_{100} =	362.0





Reachwide and Cross Section Pebble Count Plots

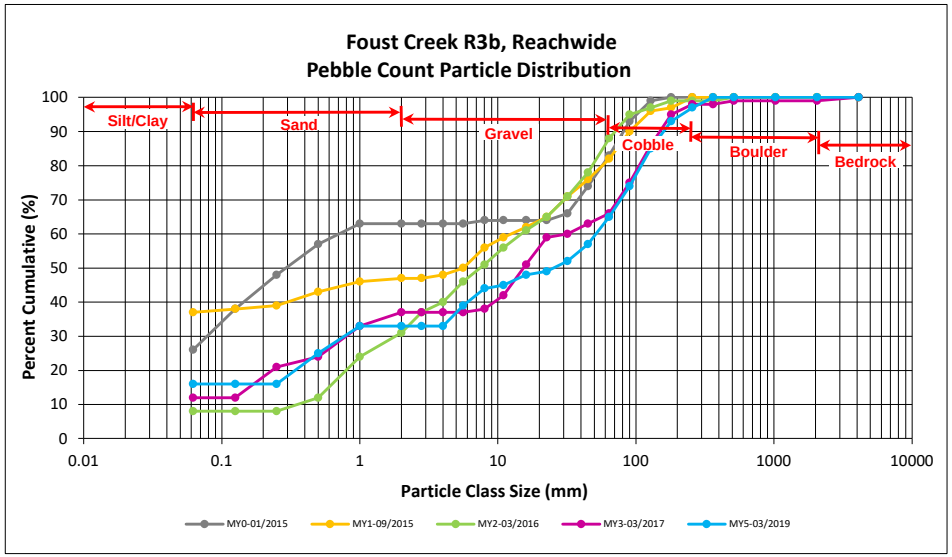
Foust Creek Mitigation Site (DMS Project No. 95715)

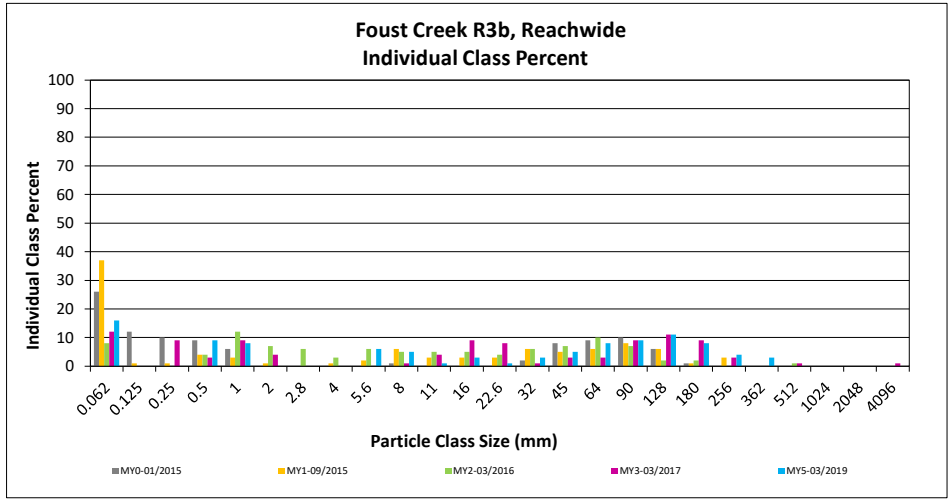
Monitoring Year 5 - 2019

Foust Creek R3b, Reachwide

Particle Class		Diameter (mm)		Particle Count			Reach Summary	
		min	max	Riffle	Pool	Total	Class Percentage	Percent Cumulative
SILT/CLAY	Silt/Clay	0.000	0.062		16	16	16	16
SAND	Very fine	0.062	0.125					16
	Fine	0.125	0.250					16
	Medium	0.25	0.50	1	8	9	9	25
	Coarse	0.5	1.0	1	7	8	8	33
	Very Coarse	1.0	2.0					33
GRAVEL	Very Fine	2.0	2.8					33
	Very Fine	2.8	4.0					33
	Fine	4.0	5.6	1	5	6	6	39
	Fine	5.6	8.0	1	4	5	5	44
	Medium	8.0	11.0		1	1	1	45
	Medium	11.0	16.0	1	2	3	3	48
	Coarse	16.0	22.6	1		1	1	49
	Coarse	22.6	32	3		3	3	52
	Very Coarse	32	45	3	2	5	5	57
	Very Coarse	45	64	6	2	8	8	65
COBBLE	Small	64	90	8	1	9	9	74
	Small	90	128	8	3	11	11	85
	Large	128	180	5	3	8	8	93
	Large	180	256		4	4	4	97
BOULDER	Small	256	362	1	2	3	3	100
	Small	362	512					100
	Medium	512	1024					100
	Large/Very Large	1024	2048					100
BEDROCK	Bedrock	2048	>2048					100
			Total	**40**	**60**	**100**	**100**	**100**

Reachwide	
Channel materials (mm)	
D_{16} =	Silt/Clay
D_{35} =	4.47
D_{50} =	25.4
D_{84} =	124.0
D_{95} =	214.7
D_{100} =	362.0





Reachwide and Cross Section Pebble Count Plots

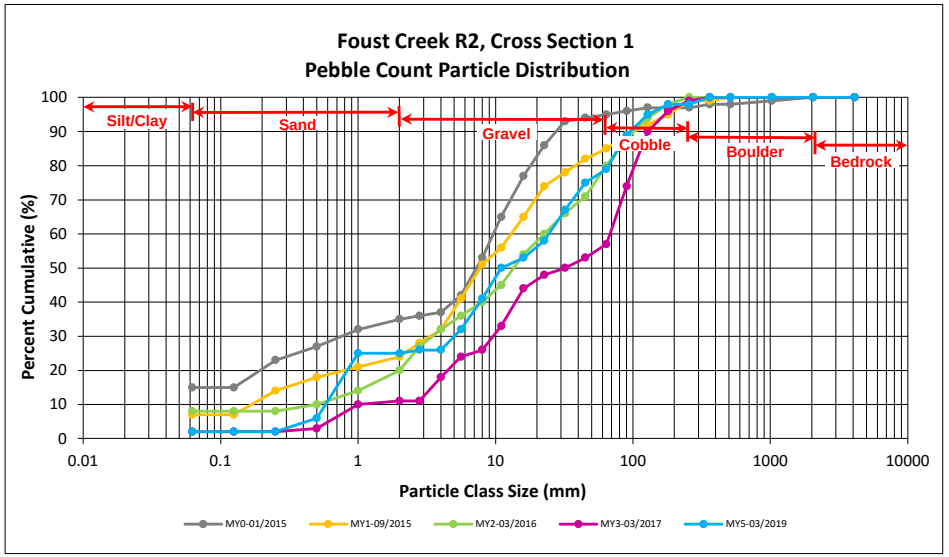
Foust Creek Mitigation Site (DMS Project No. 95715)

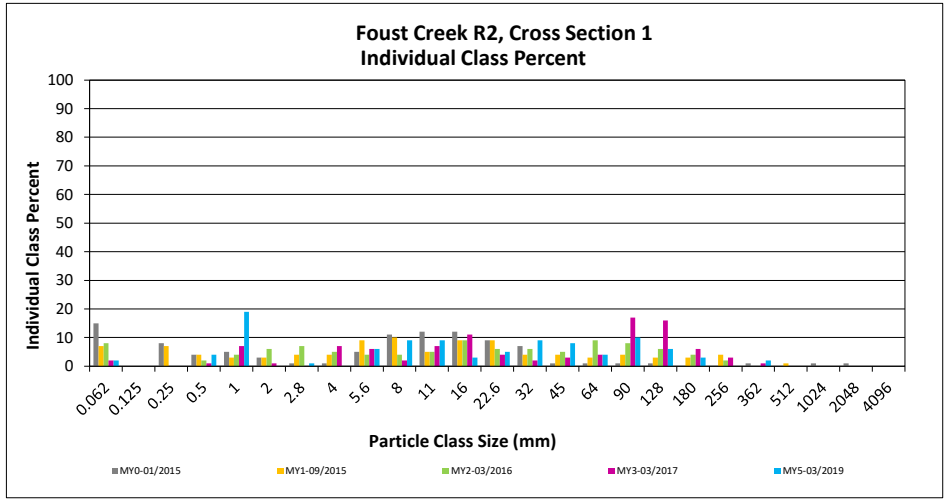
Monitoring Year 5 - 2019

Foust Creek R2, Cross Section 1

Particle Class		Diameter (mm) min	Diameter (mm) max	Riffle 100-Count	Summary: Class Percentage	Summary: Percent Cumulative
SILT/CLAY	Silt/Clay	0.000	0.062	2	2	2
SAND	Very fine	0.062	0.125			2
	Fine	0.125	0.250			2
	Medium	0.25	0.50	4	4	6
	Coarse	0.5	1.0	19	19	25
	Very Coarse	1.0	2.0			25
GRAVEL	Very Fine	2.0	2.8	1	1	26
	Very Fine	2.8	4.0			26
	Fine	4.0	5.6	6	6	32
	Fine	5.6	8.0	9	9	41
	Medium	8.0	11.0	9	9	50
	Medium	11.0	16.0	3	3	53
	Coarse	16.0	22.6	5	5	58
	Coarse	22.6	32	9	9	67
	Very Coarse	32	45	8	8	75
	Very Coarse	45	64	4	4	79
COBBLE	Small	64	90	10	10	89
	Small	90	128	6	6	95
	Large	128	180	3	3	98
	Large	180	256			98
BOULDER	Small	256	362	2	2	100
	Small	362	512			100
	Medium	512	1024			100
	Large/Very Large	1024	2048			100
BEDROCK	Bedrock	2048	>2048			100
			Total	**100**	**100**	**100**

Cross Section 1	
Channel materials (mm)	
D_{16} =	0.72
D_{35} =	6.31
D_{50} =	11.0
D_{84} =	75.9
D_{95} =	128.0
D_{100} =	362.0





Reachwide and Cross Section Pebble Count Plots

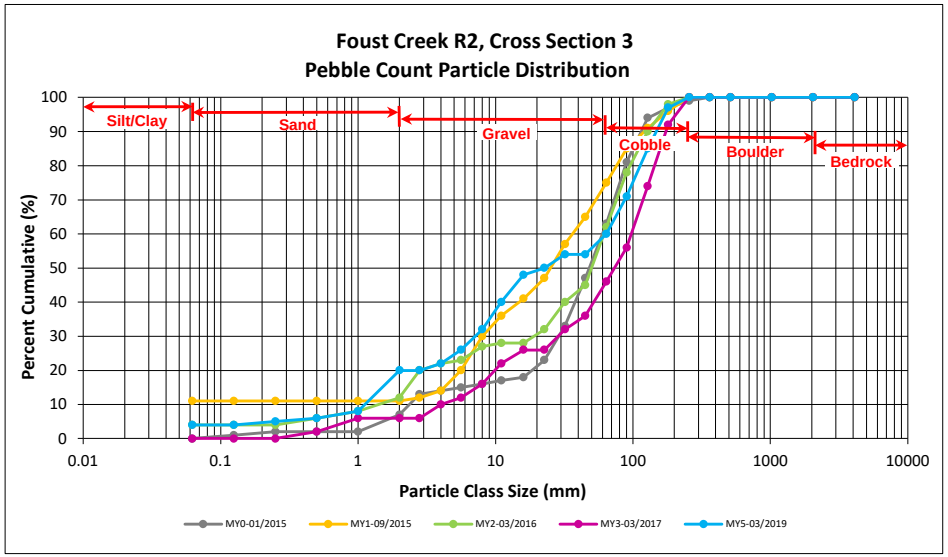
Foust Creek Mitigation Site (DMS Project No. 95715)

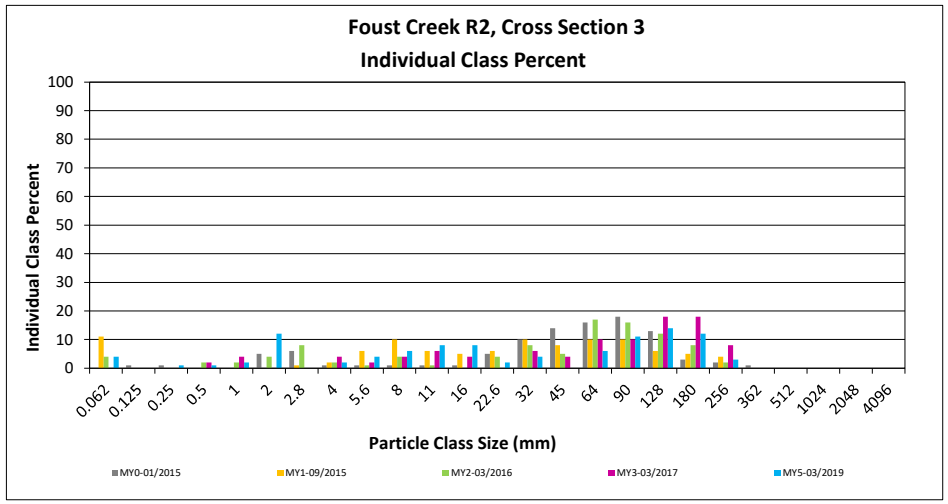
Monitoring Year 5 - 2019

Foust Creek R2, Cross Section 3

Particle Class		Diameter (mm) min	Diameter (mm) max	Riffle 100-Count	Summary: Class Percentage	Summary: Percent Cumulative
SILT/CLAY	Silt/Clay	0.000	0.062	4	4	4
SAND	Very fine	0.062	0.125			4
	Fine	0.125	0.250	1	1	5
	Medium	0.25	0.50	1	1	6
	Coarse	0.5	1.0	2	2	8
	Very Coarse	1.0	2.0	12	12	20
GRAVEL	Very Fine	2.0	2.8			20
	Very Fine	2.8	4.0	2	2	22
	Fine	4.0	5.6	4	4	26
	Fine	5.6	8.0	6	6	32
	Medium	8.0	11.0	8	8	40
	Medium	11.0	16.0	8	8	48
	Coarse	16.0	22.6	2	2	50
	Coarse	22.6	32	4	4	54
	Very Coarse	32	45			54
	Very Coarse	45	64	6	6	60
COBBLE	Small	64	90	11	11	71
	Small	90	128	14	14	85
	Large	128	180	12	12	97
	Large	180	256	3	3	100
BOULDER	Small	256	362			100
	Small	362	512			100
	Medium	512	1024			100
	Large/Very Large	1024	2048			100
BEDROCK	Bedrock	2048	>2048			100
			Total	**100**	**100**	**100**

Cross Section 3	
Channel materials (mm)	
D_{16} =	1.59
D_{35} =	9.01
D_{50} =	22.6
D_{84} =	124.8
D_{95} =	170.1
D_{100} =	256.0





Reachwide and Cross Section Pebble Count Plots

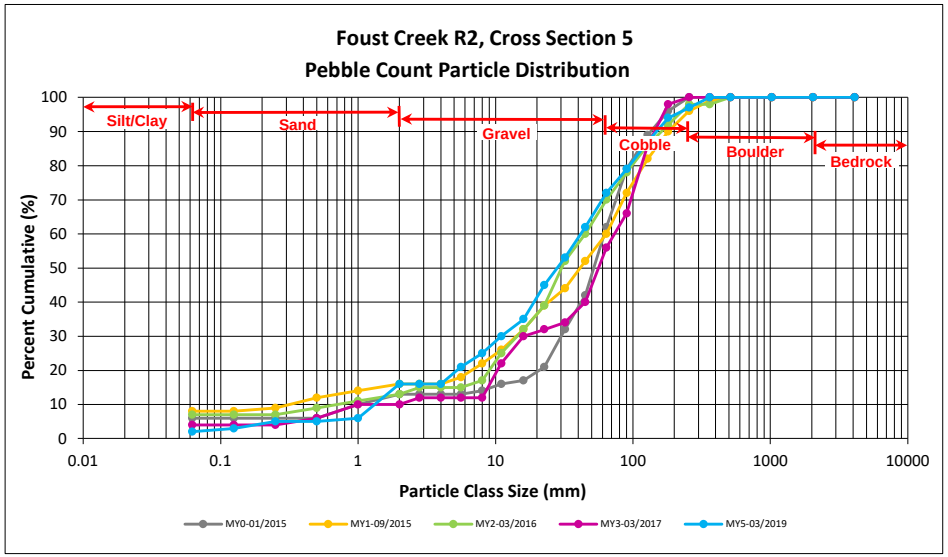
Foust Creek Mitigation Site (DMS Project No. 95715)

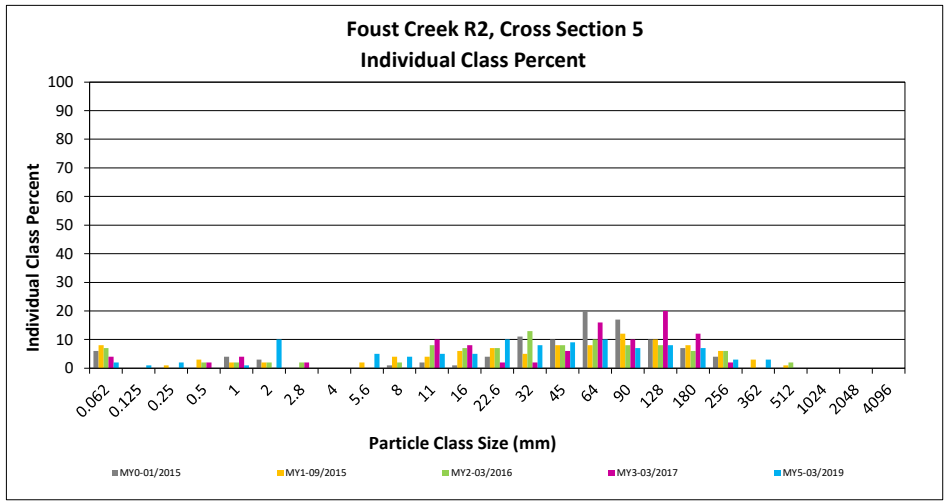
Monitoring Year 5 - 2019

Foust Creek R2, Cross Section 5

Particle Class		Diameter (mm) min	Diameter (mm) max	Riffle 100-Count	Summary: Class Percentage	Summary: Percent Cumulative
SILT/CLAY	Silt/Clay	0.000	0.062	2	2	2
SAND	Very fine	0.062	0.125	1	1	3
	Fine	0.125	0.250	2	2	5
	Medium	0.25	0.50			5
	Coarse	0.5	1.0	1	1	6
	Very Coarse	1.0	2.0	10	10	16
GRAVEL	Very Fine	2.0	2.8			16
	Very Fine	2.8	4.0			16
	Fine	4.0	5.6	5	5	21
	Fine	5.6	8.0	4	4	25
	Medium	8.0	11.0	5	5	30
	Medium	11.0	16.0	5	5	35
	Coarse	16.0	22.6	10	10	45
	Coarse	22.6	32	8	8	53
	Very Coarse	32	45	9	9	62
	Very Coarse	45	64	10	10	72
COBBLE	Small	64	90	7	7	79
	Small	90	128	8	8	87
	Large	128	180	7	7	94
	Large	180	256	3	3	97
BOULDER	Small	256	362	3	3	100
	Small	362	512			100
	Medium	512	1024			100
	Large/Very Large	1024	2048			100
BEDROCK	Bedrock	2048	>2048			100
			Total	**100**	**100**	**100**

Cross Section 5	
Channel materials (mm)	
D_{16} =	2.00
D_{35} =	16.00
D_{50} =	28.1
D_{84} =	112.2
D_{95} =	202.4
D_{100} =	362.0





Reachwide and Cross Section Pebble Count Plots

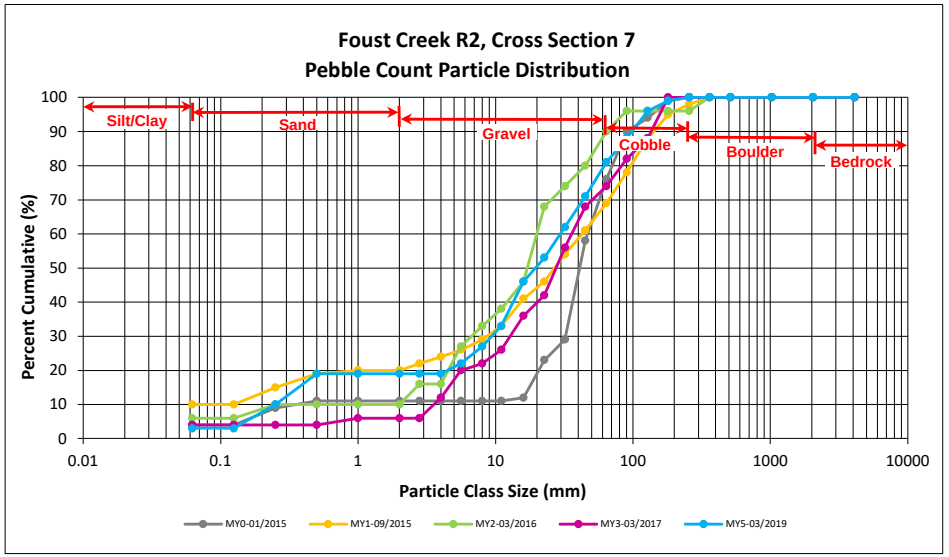
Foust Creek Mitigation Site (DMS Project No. 95715)

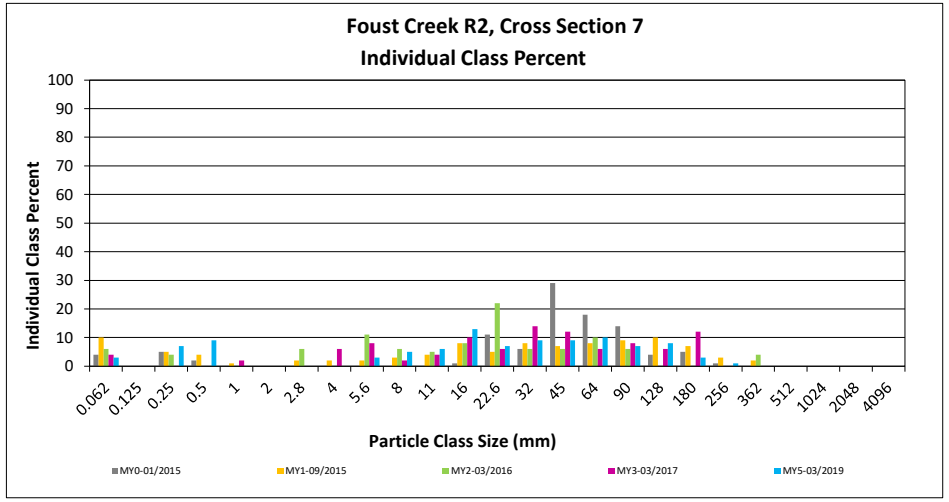
Monitoring Year 5 - 2019

Foust Creek R2, Cross Section 7

Particle Class		Diameter (mm) min	Diameter (mm) max	Riffle 100-Count	Summary: Class Percentage	Summary: Percent Cumulative
SILT/CLAY	Silt/Clay	0.000	0.062	3	3	3
SAND	Very fine	0.062	0.125			3
	Fine	0.125	0.250	7	7	10
	Medium	0.25	0.50	9	9	19
	Coarse	0.5	1.0			19
	Very Coarse	1.0	2.0			19
GRAVEL	Very Fine	2.0	2.8			19
	Very Fine	2.8	4.0			19
	Fine	4.0	5.6	3	3	22
	Fine	5.6	8.0	5	5	27
	Medium	8.0	11.0	6	6	33
	Medium	11.0	16.0	13	13	46
	Coarse	16.0	22.6	7	7	53
	Coarse	22.6	32	9	9	62
	Very Coarse	32	45	9	9	71
	Very Coarse	45	64	10	10	81
COBBLE	Small	64	90	7	7	88
	Small	90	128	8	8	96
	Large	128	180	3	3	99
	Large	180	256	1	1	100
BOULDER	Small	256	362			100
	Small	362	512			100
	Medium	512	1024			100
	Large/Very Large	1024	2048			100
BEDROCK	Bedrock	2048	>2048			100
			Total	**100**	**100**	**100**

Cross Section 7	
Channel materials (mm)	
D_{16} =	0.40
D_{35} =	11.65
D_{50} =	19.5
D_{84} =	74.1
D_{95} =	122.5
D_{100} =	256.0





Reachwide and Cross Section Pebble Count Plots

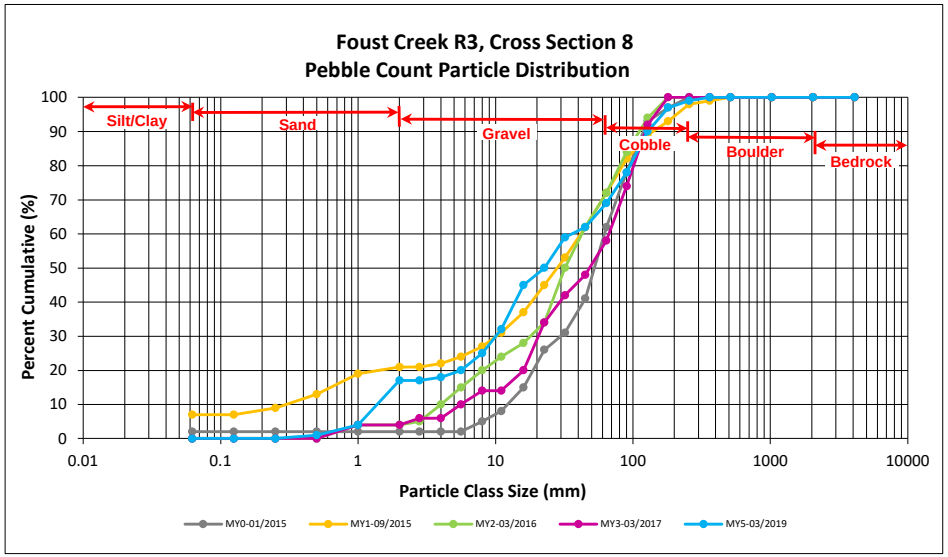
Foust Creek Mitigation Site (DMS Project No. 95715)

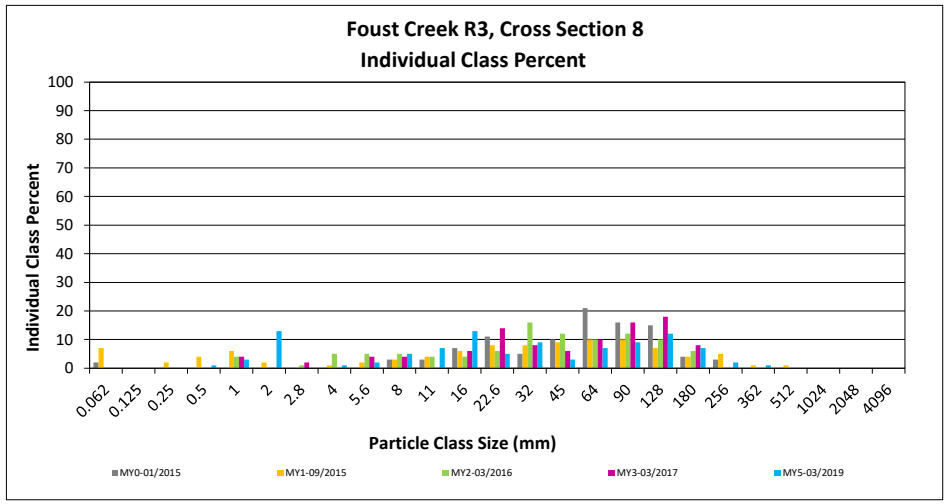
Monitoring Year 5 - 2019

Foust Creek R3, Cross Section 8

Particle Class		Diameter (mm) min	Diameter (mm) max	Riffle 100-Count	Summary: Class Percentage	Summary: Percent Cumulative
SILT/CLAY	Silt/Clay	0.000	0.062			0
SAND	Very fine	0.062	0.125			0
	Fine	0.125	0.250			0
	Medium	0.25	0.50	1	1	1
	Coarse	0.5	1.0	3	3	4
	Very Coarse	1.0	2.0	13	13	17
GRAVEL	Very Fine	2.0	2.8			17
	Very Fine	2.8	4.0	1	1	18
	Fine	4.0	5.6	2	2	20
	Fine	5.6	8.0	5	5	25
	Medium	8.0	11.0	7	7	32
	Medium	11.0	16.0	13	13	45
	Coarse	16.0	22.6	5	5	50
	Coarse	22.6	32	9	9	59
	Very Coarse	32	45	3	3	62
	Very Coarse	45	64	7	7	69
COBBLE	Small	64	90	9	9	78
	Small	90	128	12	12	90
	Large	128	180	7	7	97
	Large	180	256	2	2	99
BOULDER	Small	256	362	1	1	100
	Small	362	512			100
	Medium	512	1024			100
	Large/Very Large	1024	2048			100
BEDROCK	Bedrock	2048	>2048			100
			Total	**100**	**100**	**100**

Cross Section 8	
Channel materials (mm)	
D_{16} =	1.90
D_{35} =	11.99
D_{50} =	22.6
D_{84} =	107.3
D_{95} =	163.3
D_{100} =	362.0





Reachwide and Cross Section Pebble Count Plots

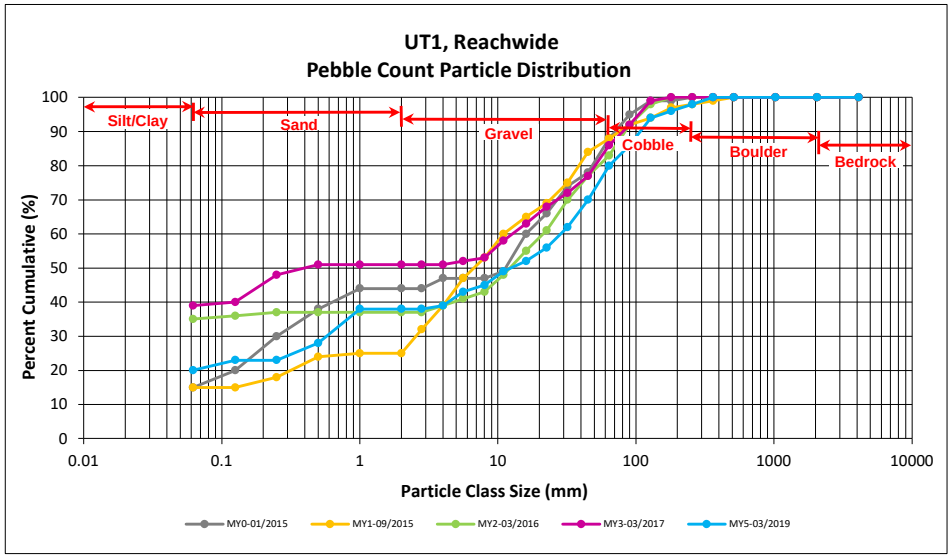
Foust Creek Mitigation Site (DMS Project No. 95715)

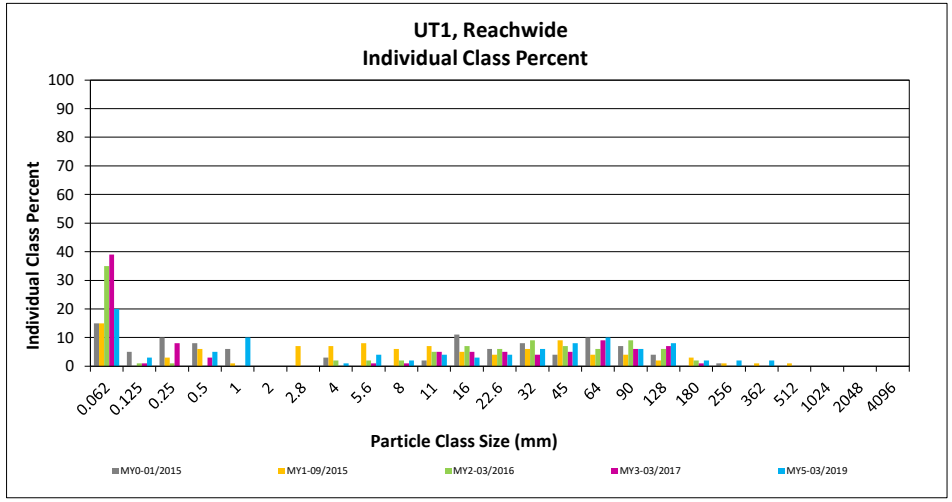
Monitoring Year 5 - 2019

UT1, Reachwide

Particle Class		Diameter (mm)		Particle Count			Reach Summary	
		min	max	Riffle	Pool	Total	Class Percentage	Percent Cumulative
SILT/CLAY	Silt/Clay	0.000	0.062		20	20	20	20
SAND	Very fine	0.062	0.125	3		3	3	23
	Fine	0.125	0.250					23
	Medium	0.25	0.50	1	4	5	5	28
	Coarse	0.5	1.0	7	3	10	10	38
	Very Coarse	1.0	2.0					38
GRAVEL	Very Fine	2.0	2.8					38
	Very Fine	2.8	4.0		1	1	1	39
	Fine	4.0	5.6	1	3	4	4	43
	Fine	5.6	8.0	1	1	2	2	45
	Medium	8.0	11.0	1	3	4	4	49
	Medium	11.0	16.0	1	2	3	3	52
	Coarse	16.0	22.6	1	3	4	4	56
	Coarse	22.6	32	3	3	6	6	62
	Very Coarse	32	45	6	2	8	8	70
	Very Coarse	45	64	7	3	10	10	80
COBBLE	Small	64	90	6		6	6	86
	Small	90	128	8		8	8	94
	Large	128	180	1	1	2	2	96
	Large	180	256	1	1	2	2	98
BOULDER	Small	256	362	2		2	2	100
	Small	362	512					100
	Medium	512	1024					100
	Large/Very Large	1024	2048					100
BEDROCK	Bedrock	2048	>2048					100
			Total	**50**	**50**	**100**	**100**	**100**

Reachwide	
Channel materials (mm)	
D_{16} =	Silt/Clay
D_{35} =	0.81
D_{50} =	12.5
D_{84} =	80.3
D_{95} =	151.8
D_{100} =	362.0





Reachwide and Cross Section Pebble Count Plots

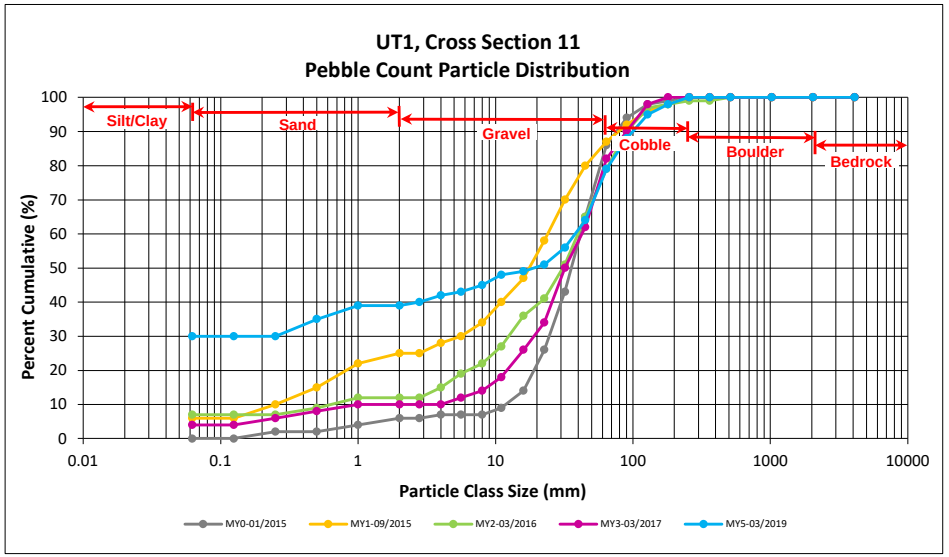
Foust Creek Mitigation Site (DMS Project No. 95715)

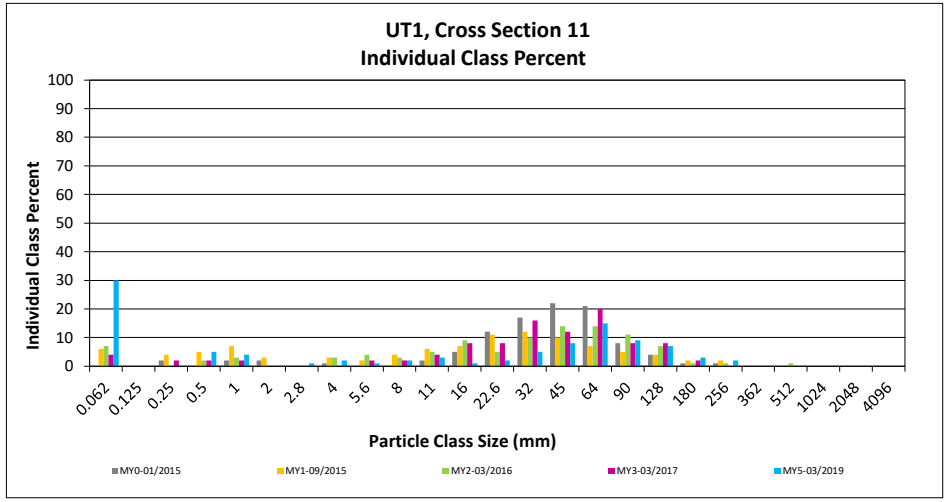
Monitoring Year 5 - 2019

UT1, Cross Section 11

Particle Class		Diameter (mm) min	Diameter (mm) max	Riffle 100-Count	Summary: Class Percentage	Summary: Percent Cumulative
SILT/CLAY	Silt/Clay	0.000	0.062	30	30	30
SAND	Very fine	0.062	0.125			30
	Fine	0.125	0.250			30
	Medium	0.25	0.50	5	5	35
	Coarse	0.5	1.0	4	4	39
	Very Coarse	1.0	2.0			39
GRAVEL	Very Fine	2.0	2.8	1	1	40
	Very Fine	2.8	4.0	2	2	42
	Fine	4.0	5.6	1	1	43
	Fine	5.6	8.0	2	2	45
	Medium	8.0	11.0	3	3	48
	Medium	11.0	16.0	1	1	49
	Coarse	16.0	22.6	2	2	51
	Coarse	22.6	32	5	5	56
	Very Coarse	32	45	8	8	64
	Very Coarse	45	64	15	15	79
COBBLE	Small	64	90	9	9	88
	Small	90	128	7	7	95
	Large	128	180	3	3	98
	Large	180	256	2	2	100
BOULDER	Small	256	362			100
	Small	362	512			100
	Medium	512	1024			100
	Large/Very Large	1024	2048			100
BEDROCK	Bedrock	2048	>2048			100
			Total	**100**	**100**	**100**

Cross Section 11	
Channel materials (mm)	
D_{16} =	Silt/Clay
D_{35} =	0.50
D_{50} =	19.0
D_{84} =	77.3
D_{95} =	128.0
D_{100} =	256.0





Reachwide and Cross Section Pebble Count Plots

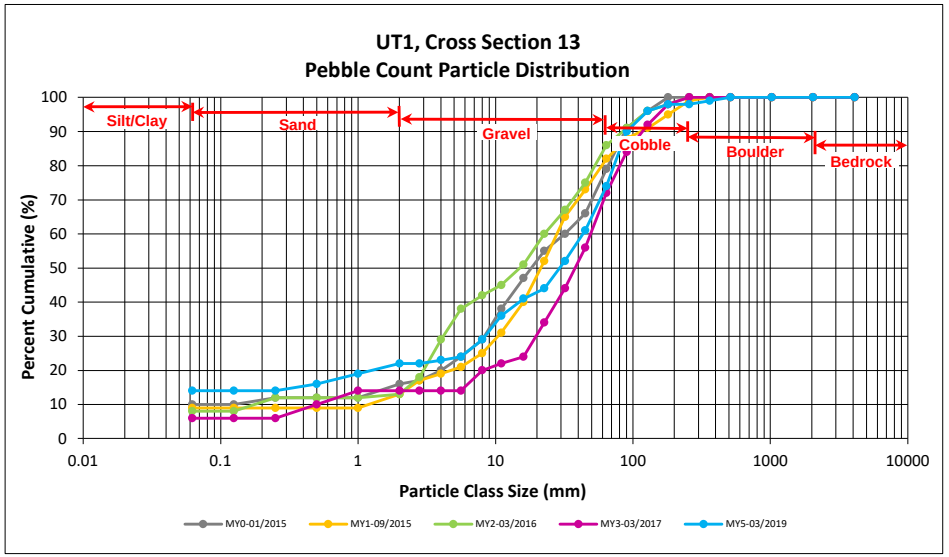
Foust Creek Mitigation Site (DMS Project No. 95715)

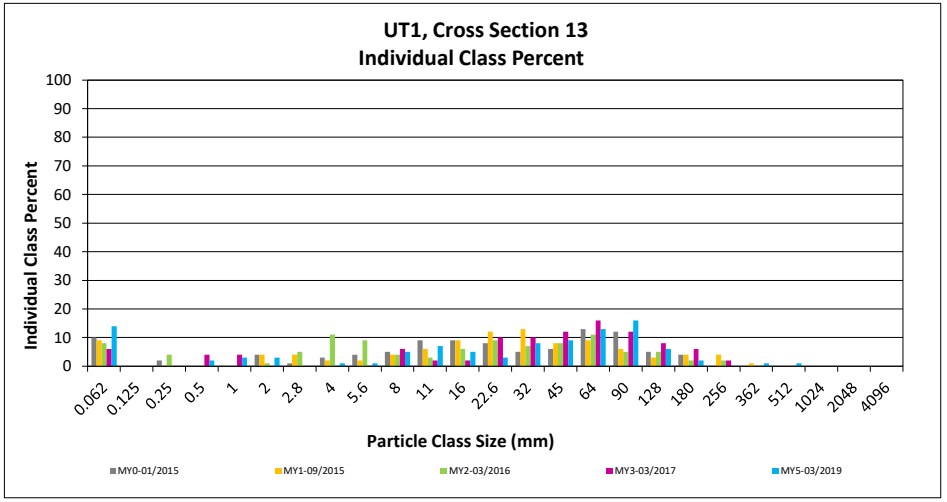
Monitoring Year 5 - 2019

UT1, Cross Section 13

Particle Class		Diameter (mm) min	Diameter (mm) max	Riffle 100-Count	Summary: Class Percentage	Summary: Percent Cumulative
SILT/CLAY	Silt/Clay	0.000	0.062	14	14	14
SAND	Very fine	0.062	0.125			14
	Fine	0.125	0.250			14
	Medium	0.25	0.50	2	2	16
	Coarse	0.5	1.0	3	3	19
	Very Coarse	1.0	2.0	3	3	22
GRAVEL	Very Fine	2.0	2.8			22
	Very Fine	2.8	4.0	1	1	23
	Fine	4.0	5.6	1	1	24
	Fine	5.6	8.0	5	5	29
	Medium	8.0	11.0	7	7	36
	Medium	11.0	16.0	5	5	41
	Coarse	16.0	22.6	3	3	44
	Coarse	22.6	32	8	8	52
	Very Coarse	32	45	9	9	61
	Very Coarse	45	64	13	13	74
COBBLE	Small	64	90	16	16	90
	Small	90	128	6	6	96
	Large	128	180	2	2	98
	Large	180	256			98
BOULDER	Small	256	362	1	1	99
	Small	362	512	1	1	100
	Medium	512	1024			100
	Large/Very Large	1024	2048			100
BEDROCK	Bedrock	2048	>2048			100
			Total	**100**	**100**	**100**

Cross Section 13	
Channel materials (mm)	
D_{16} =	0.50
D_{35} =	10.51
D_{50} =	29.3
D_{84} =	79.2
D_{95} =	120.7
D_{100} =	512.0





APPENDIX 5. Hydrology Summary Data and Plots

Table 13. Verification of Bankfull Events

Foust Creek Mitigation Site (DMS Project No. 95715)

Monitoring Year 5 - 2019

Reach	Monitoring Year	Date of Data Collection	Date of Occurrence	Method
Foust Creek	MY1	10/6/2015	7/2015-10/2015	Crest Gage/ Pressure Transducer
	MY2	3/8/2016	1/2016-3/2016	
		8/2/2016	6/7/2016	
		10/6/2016	10/8/2016	
	MY3	6/27/2017	4/24/2017	
		6/27/2017	6/20/2017	
	MY4	7/6/2018	4/25/2018	
		10/23/2018	8/20/2018	
		10/24/2018	9/18/2018	
	MY5	5/2/2019	2/23/2019	
		5/2/2019	4/12/2019	
		5/2/2019	4/19/2019	
UT1	MY1	10/6/2015	7/2015-10/2015	
		12/4/2015	10/2015-12/2015	
	MY2	3/8/2016	1/2016-3/2016	
	MY3	6/27/2017	4/24/2017	
		6/27/2019	6/20/2017	
	MY4	3/20/2018	4/25/2018	
		10/23/2018	9/17/2018	
	MY5	1/30/2019	1/16/2019	
		5/2/2019	4/13/2019	

Table 14. Wetland Gage Attainment Summary

Foust Creek Mitigation Site (DMS Project No. 95715)

Monitoring Year 5 - 2019

Summary of Groundwater Gage Results for Monitoring Years 1 through 7							
Gage	Success Criteria Achieved/Max Consecutive Days During Growing Season (Percentage)						
	Year 1 (2015)	Year 2 (2016)	Year 3 (2017)	Year 4 (2018)	Year 5 (2019)	Year 6 (2020)	Year 7 (2021)
1	Yes/93 Days (40.2%)	Yes/143 Days (57.0%)	Yes/134 Days (53.0%)	Yes/132 Days (52.0%)	Yes/121 Days (47.6%)		
2	Yes/46 Days (20.0%)	Yes/49 Days (19.5%)	Yes/44 Days (17.4%)	Yes/35 Days (12.8%)	Yes/61 Days (24.0%)		
3	Yes/57 Days (24.6%)	Yes/91 Days (36.3%)	Yes/23 Days (9.1%)	Yes/94 Days (37.0%)	Yes/62 Days (24.4%)		
4	Yes/63 Days (27.2%)	Yes/86 Days (34.3%)	Yes/132 Days (52.2%)	Yes/74 Days (29.1%)	Yes/78 Days (30.7%)		
5	Yes/124 Days (53.7%)	Yes/196 Days (78.1%)	Yes/153 Days (60.5%)	Yes/39 Days (15.4%)	Yes/97 Days (38.2%)		
6	Yes/47 Days (20.2%)	Yes/49 Days (19.5%)	Yes/45 Days (17.8%)	Yes/84 Days (33.1%)	Yes/64 Days (25.2%)		
7	Yes/152 Days (66.1%)	Yes/218 Days (86.9%)	Yes/202 Days (79.8%)	Yes/237 Days (93.3%)	Yes/187 Days (73.6%)		
8	Yes/51 Days (22.0%)	Yes/74 Days (29.5%)	Yes/23 Days (9.1%)	Yes/37 Days (14.6%)	Yes/63 Days (24.8%)		
10	Yes/ 119 Days (51.7%)	Yes/179 Days (71.3%)	Yes/144 Days (56.9%)	Yes/124 Days (48.8%)	Yes/123 Days (48.4%)		

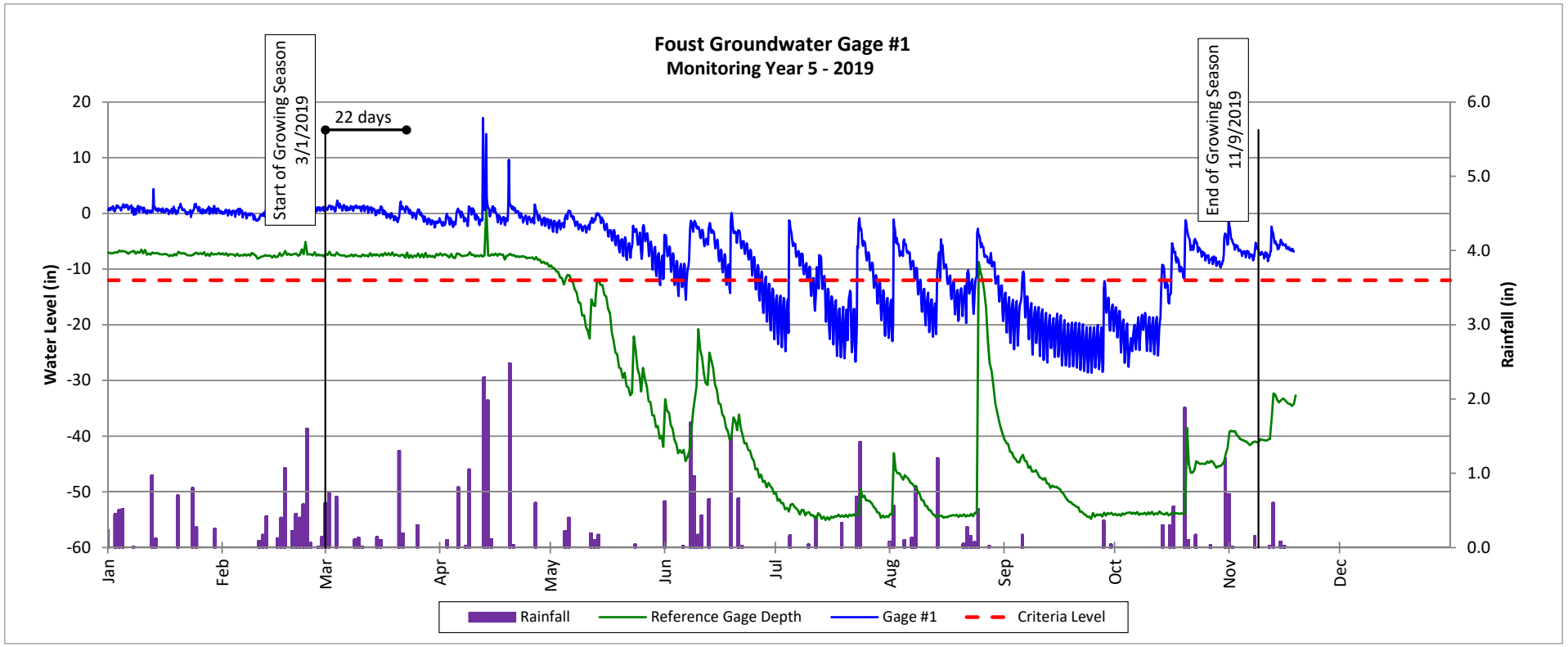
*Wetland Re-establishment area surrounding groundwater well 9 eliminated during MY3

Criterion is that a free groundwater must be present within 12 inches of the soil surface for a consecutive 8.5% of the growing season.

Groundwater Gage Plots

Foust Creek Mitigation Site (DMS Project No. 95715)

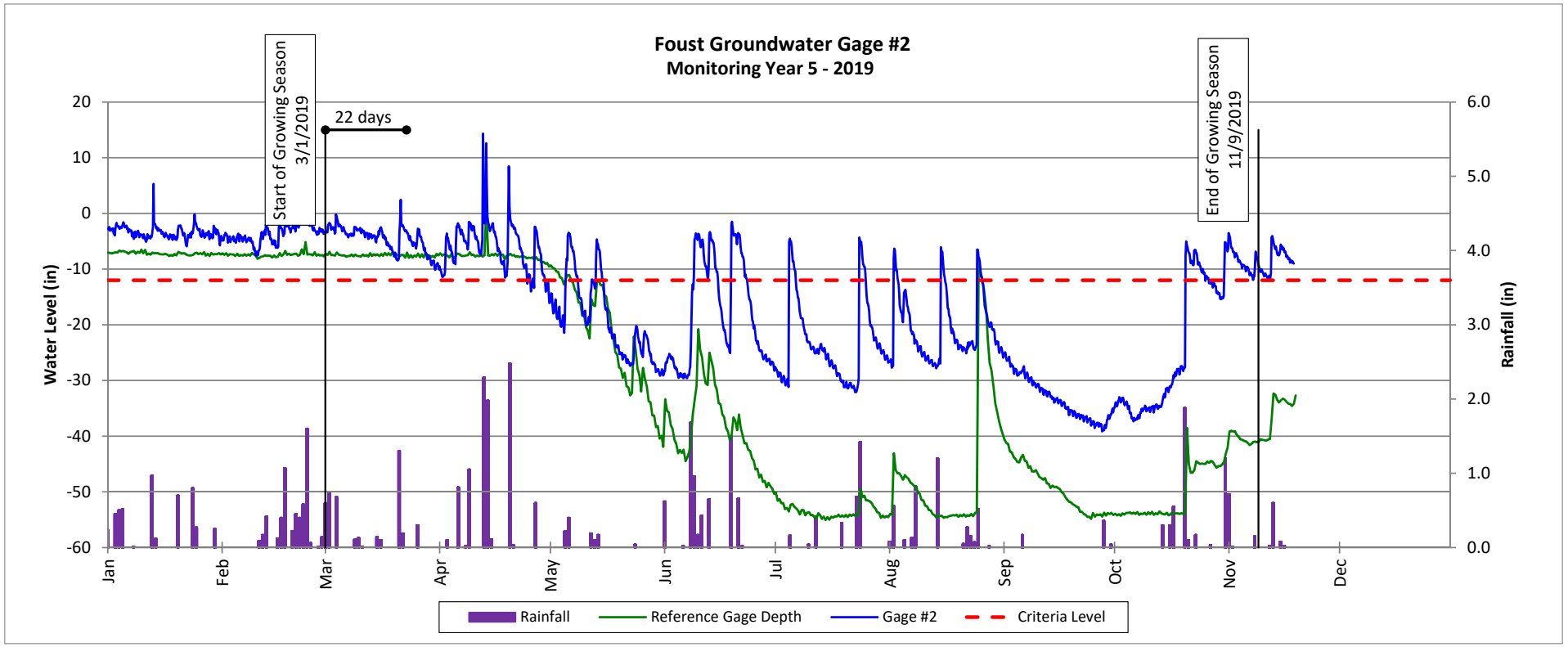
Monitoring Year 5 - 2019



Groundwater Gage Plots

Foust Creek Mitigation Site (DMS Project No. 95715)

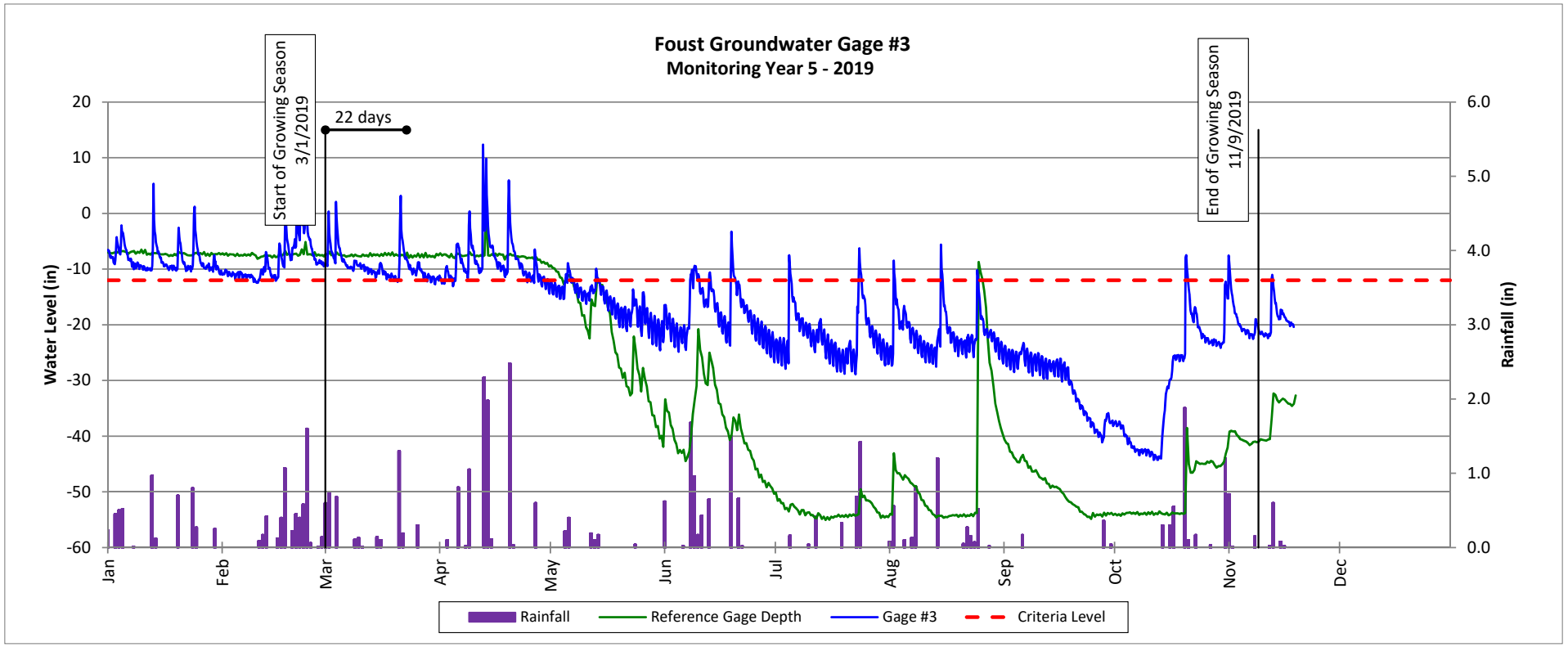
Monitoring Year 5 - 2019



Groundwater Gage Plots

Foust Creek Mitigation Site (DMS Project No. 95715)

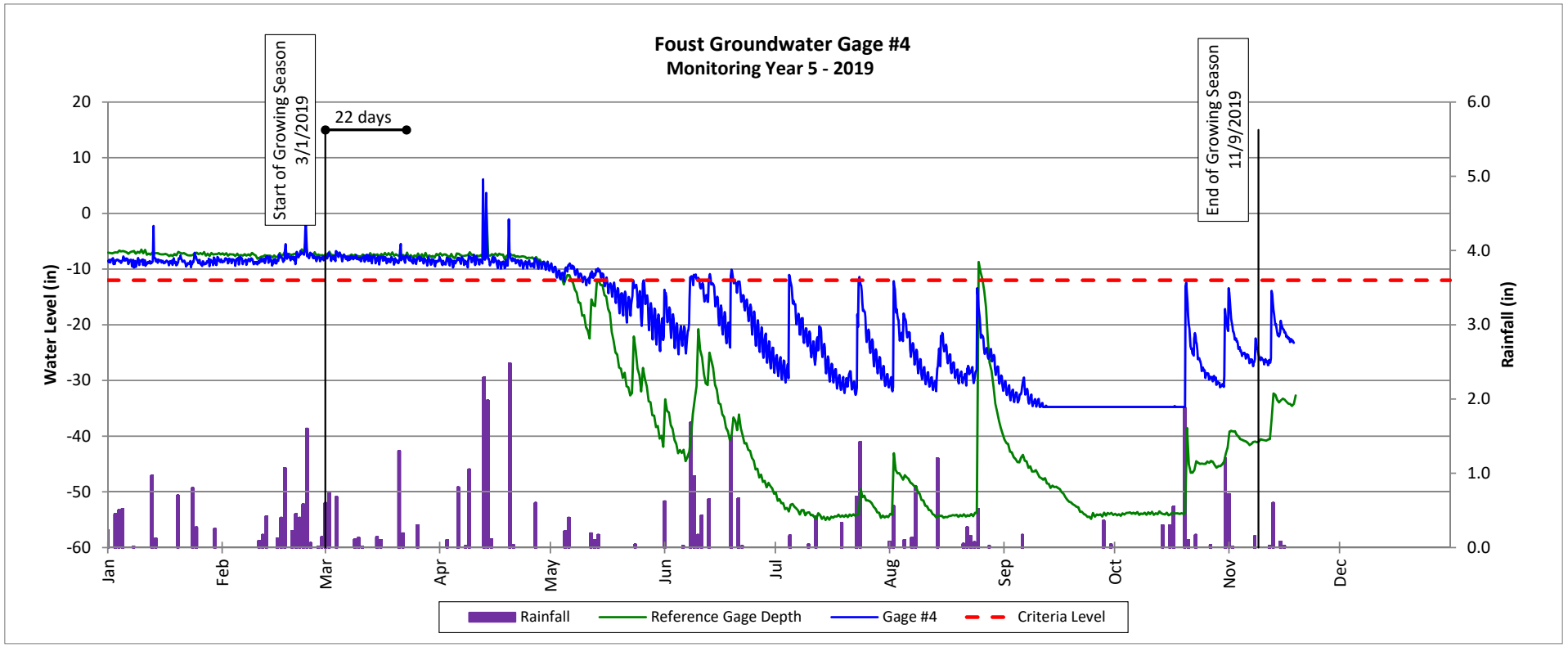
Monitoring Year 5 - 2019



Groundwater Gage Plots

Foust Creek Mitigation Site (DMS Project No. 95715)

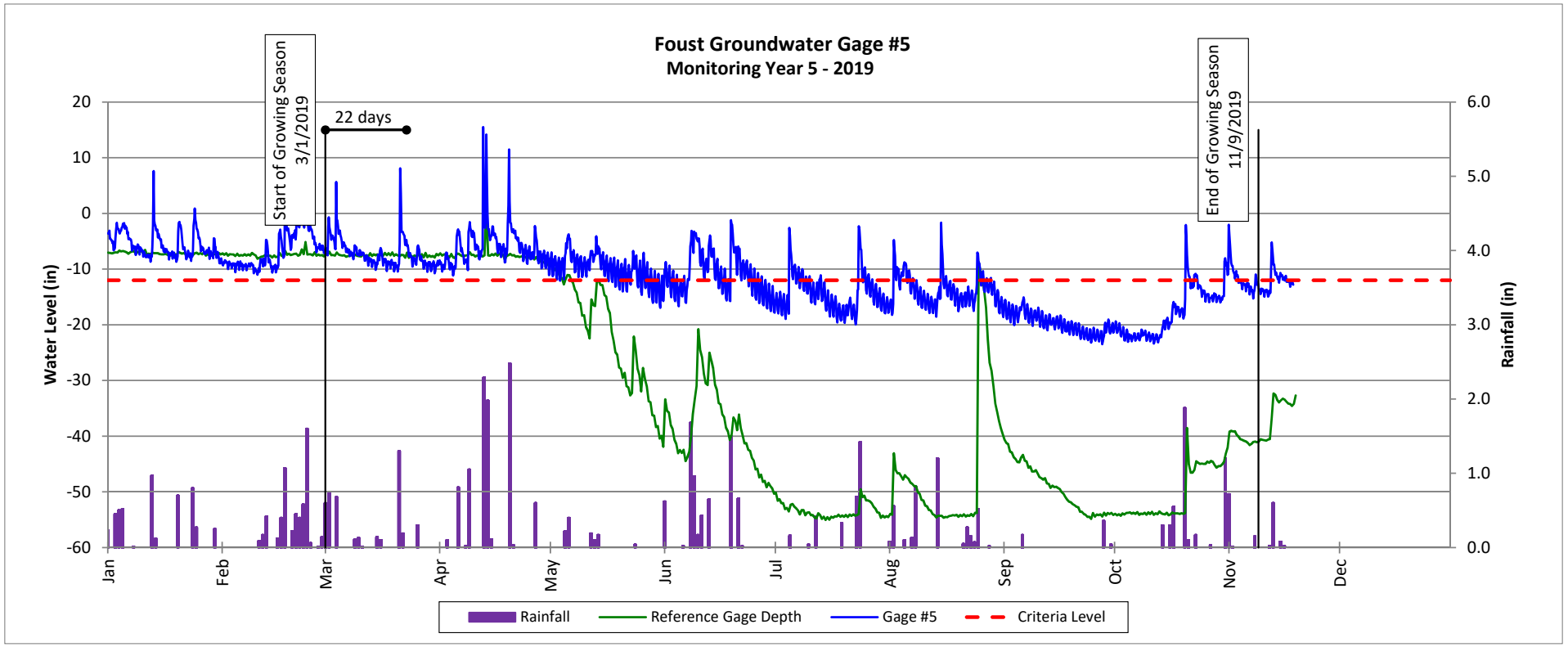
Monitoring Year 5 - 2019



Groundwater Gage Plots

Foust Creek Mitigation Site (DMS Project No. 95715)

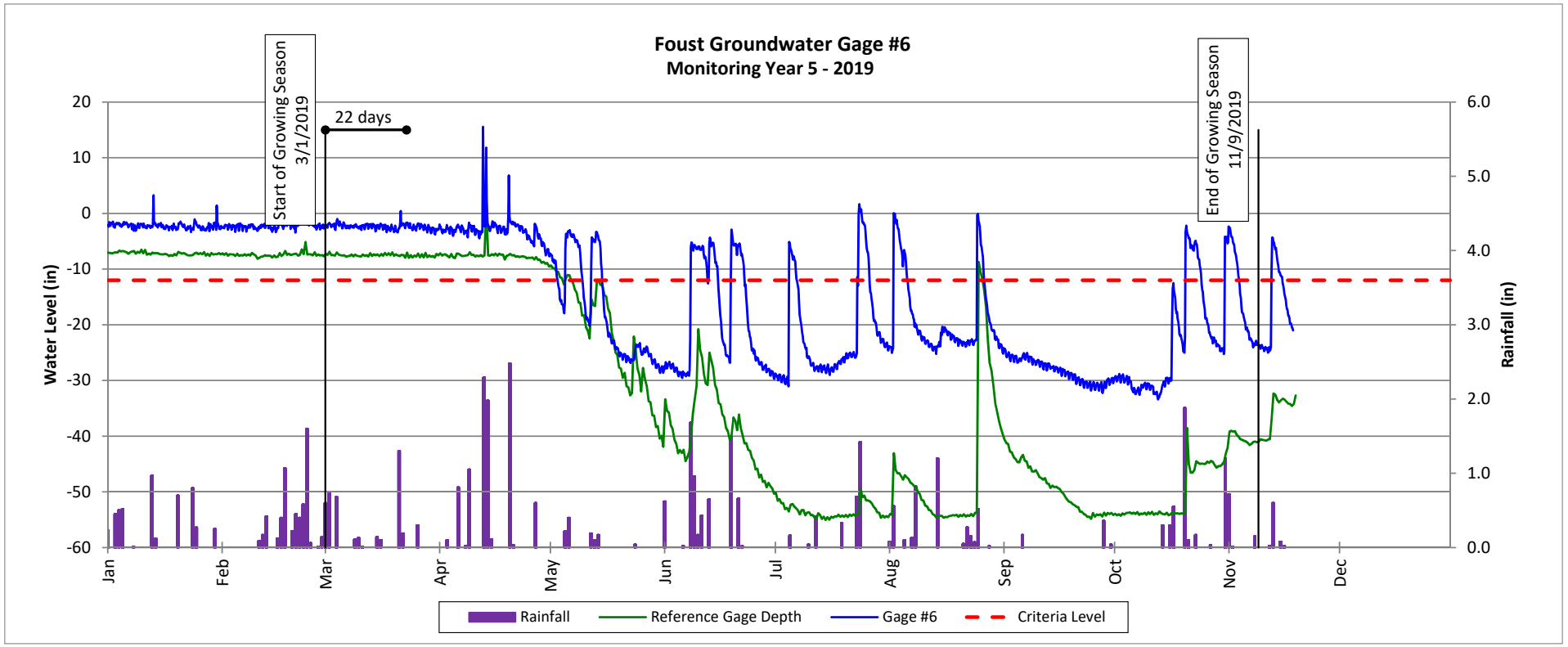
Monitoring Year 5 - 2019



Groundwater Gage Plots

Foust Creek Mitigation Site (DMS Project No. 95715)

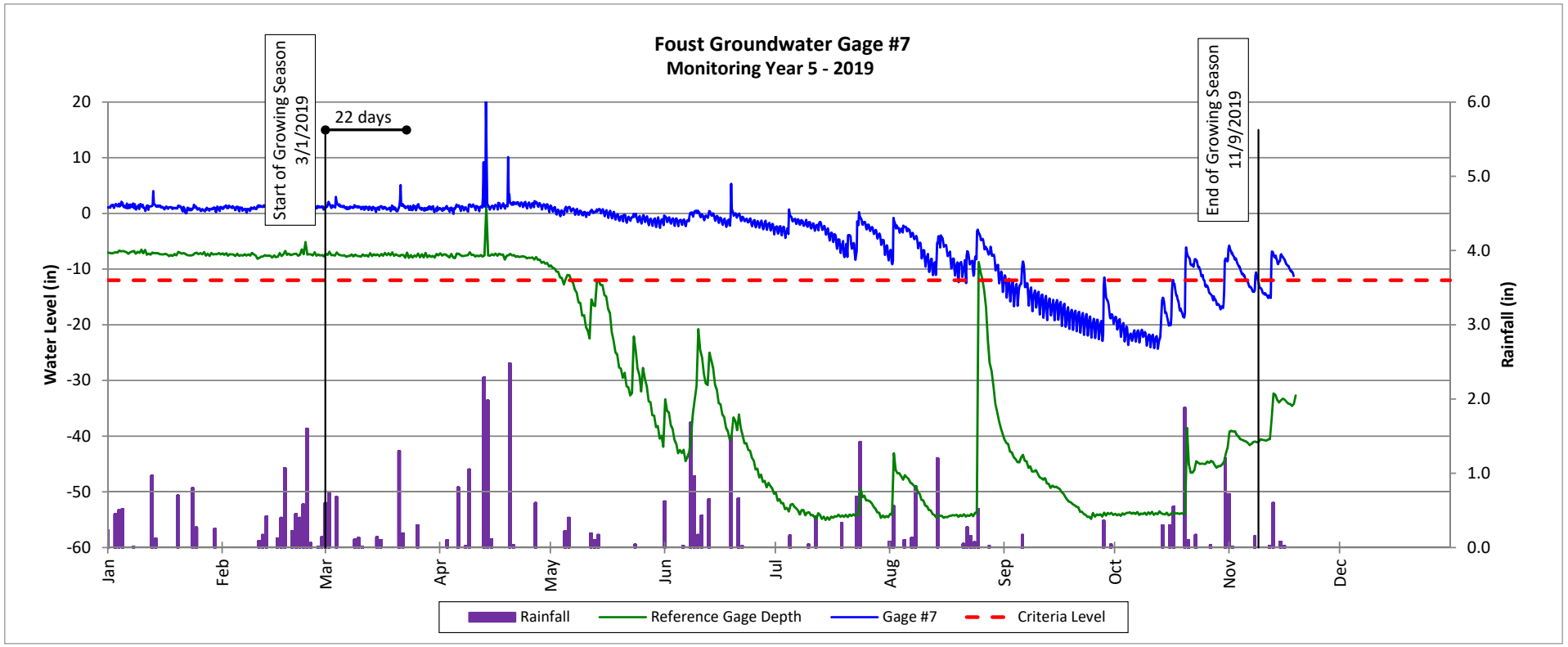
Monitoring Year 5 - 2019



Groundwater Gage Plots

Foust Creek Mitigation Site (DMS Project No. 95715)

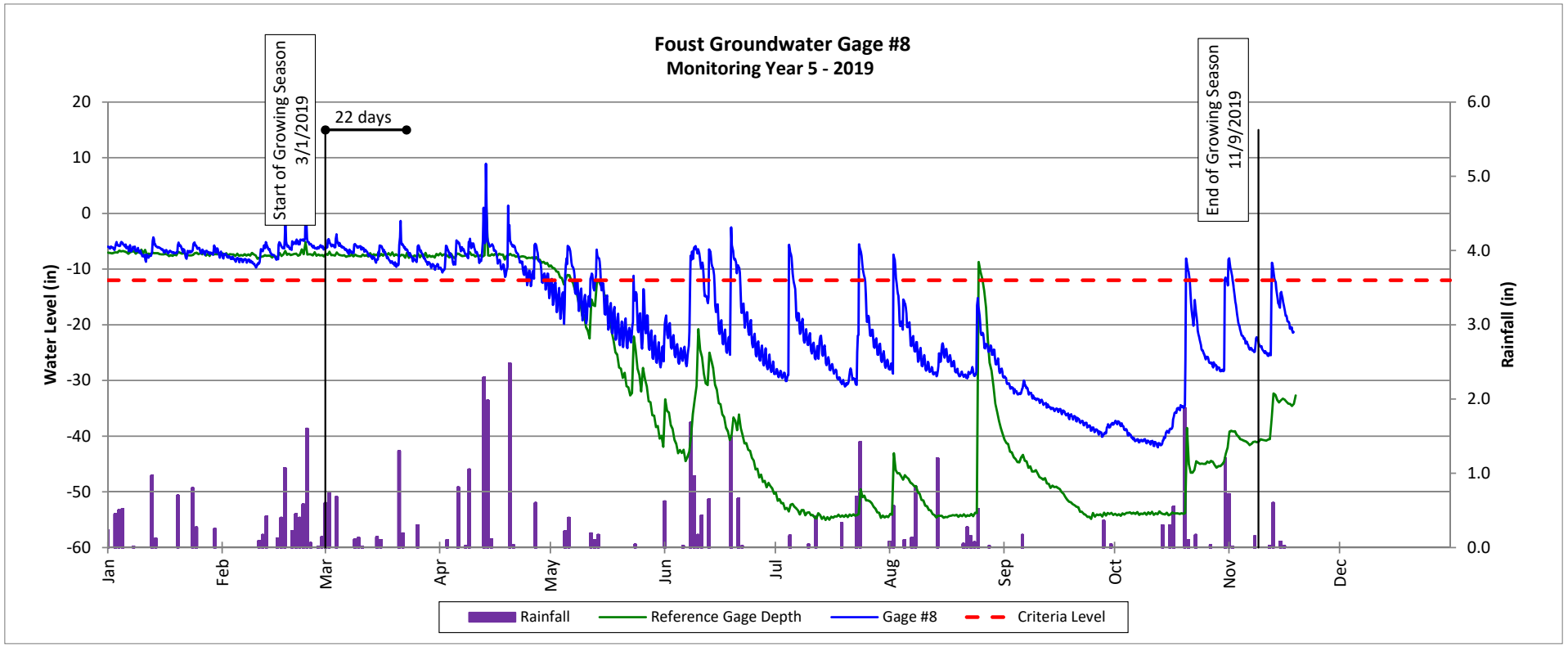
Monitoring Year 5 - 2019



Groundwater Gage Plots

Foust Creek Mitigation Site (DMS Project No. 95715)

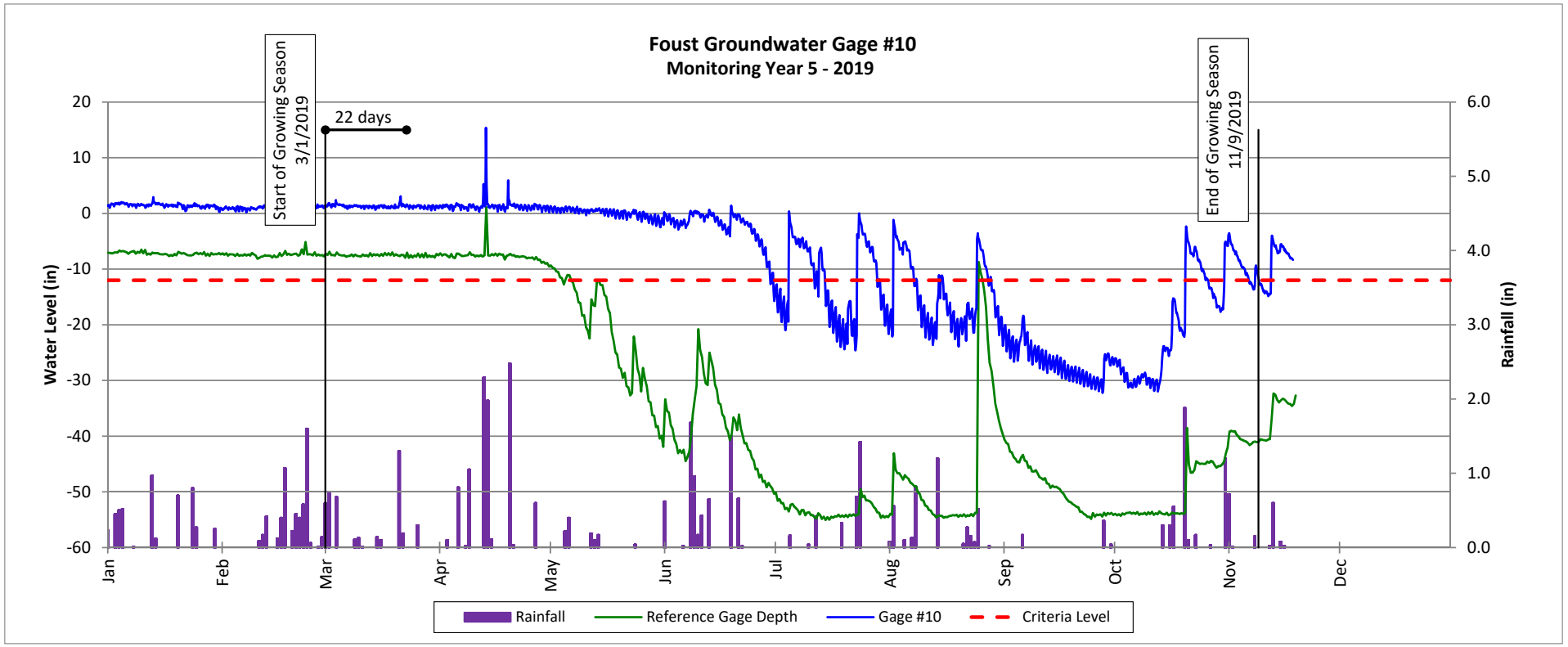
Monitoring Year 5 - 2019



Groundwater Gage Plots

Foust Creek Mitigation Site (DMS Project No. 95715)

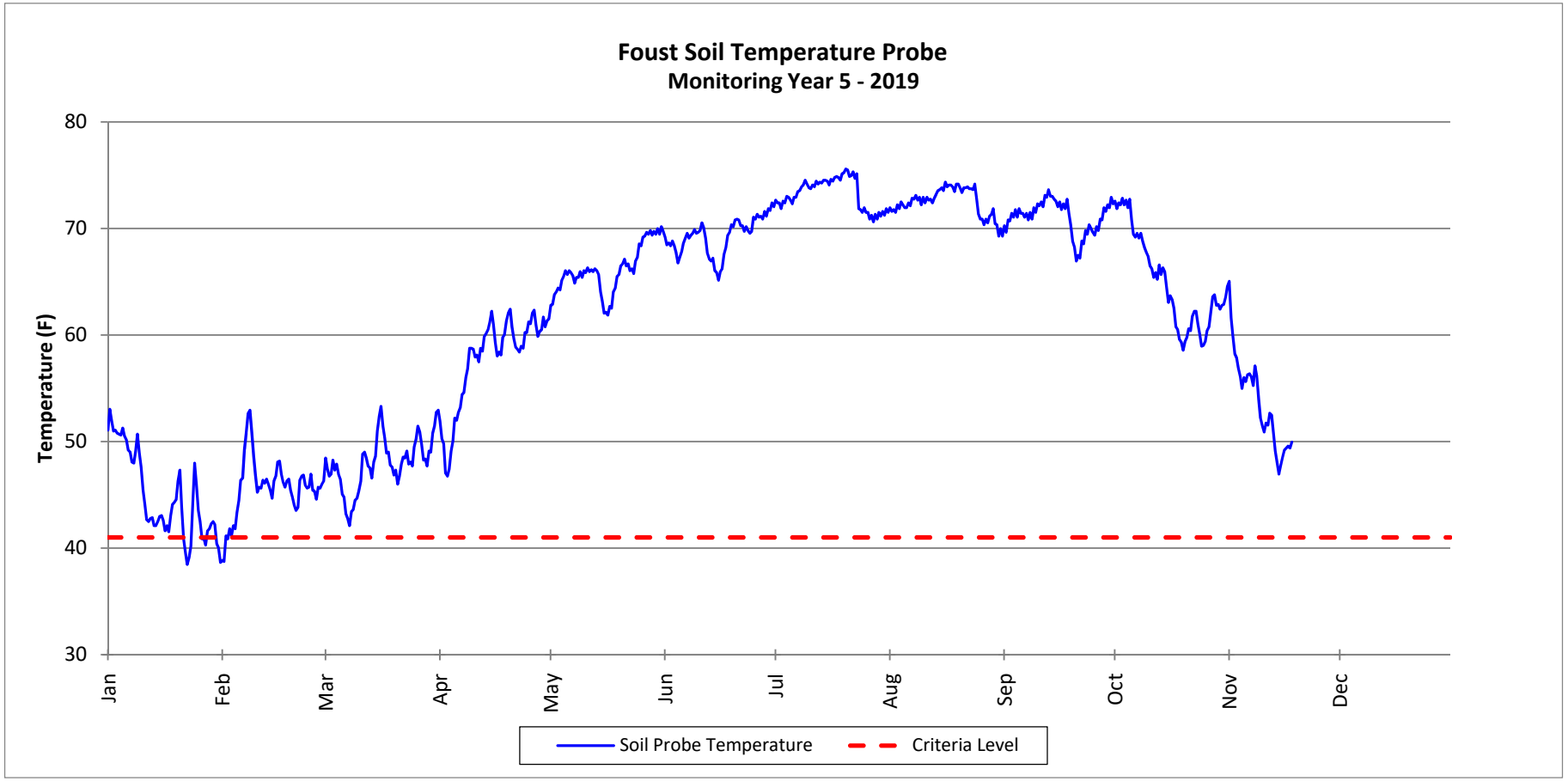
Monitoring Year 5 - 2019



Soil Temperature Probe Plot

Foust Creek Mitigation Site (DMS Project No. 95715)

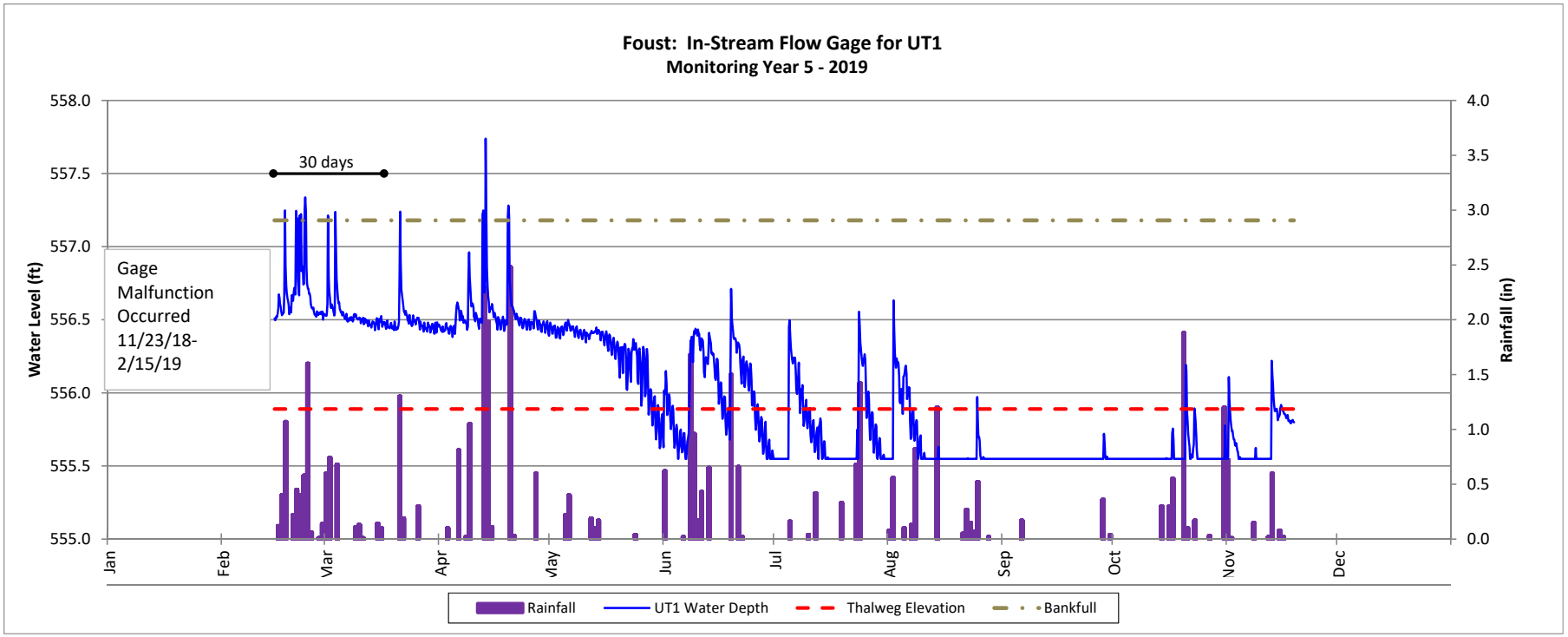
Monitoring Year 5 - 2019



Recorded In-Stream Flow Events

Foust Creek Mitigaiton Site (DMS Project No. 95715)

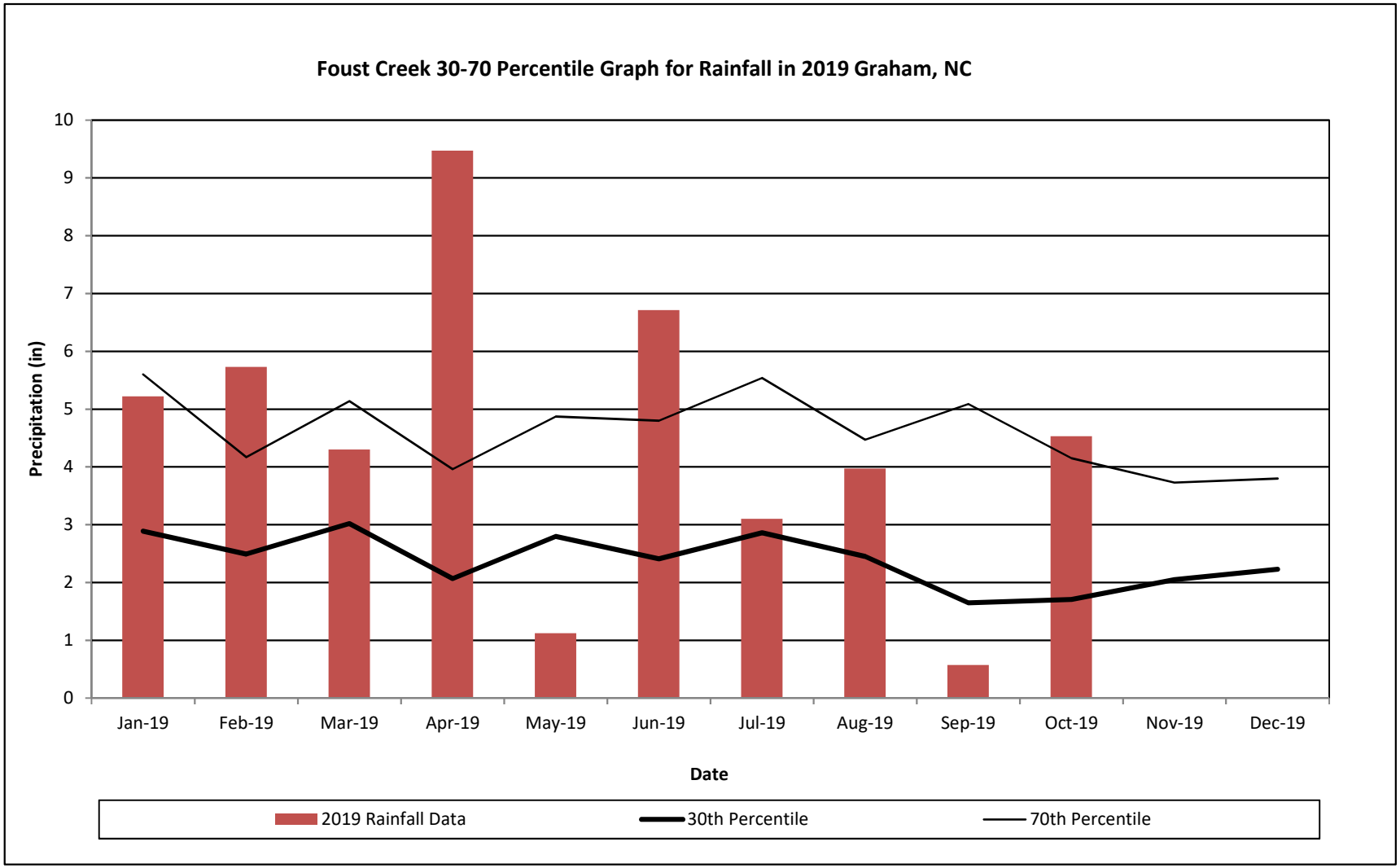
Monitoring Year 5 - 2019



Monthly Rainfall Data

Foust Creek Mitigation Site (DMS Project No. 95715)

Monitoring Year 5 - 2019



[1] 2019 monthly rainfall collected from weather station Graham 2 ENE, in Graham, NC (USDA, 2000).

[2] 30th and 70th percentile rainfall data collected from weather station Graham 2 ENE, in Graham, NC (USDA, 2000).