MONITORING YEAR 2 ANNUAL REPORT
Final

FOUST CREEK MITIGATION SITE
Alamance County, NC
NCDEQ Contract 004954
DMS Project Number 95715

Data Collection Period: March 2016 - October 2016
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PREPARED FOR:

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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 5.06 acres of wetlands in Alamance County, NC. The Foust Creek Mitigation Site (Site) proposes to provide 4,770 Stream Mitigation Units (SMUs) and 4.0 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 directly to 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 existing agricultural practices. Figure 2 and Table 1 present the restoration and enhancement design for 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 March 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 2 (MY2) assessment and site visits were completed between the months of March and October 2016 to assess the conditions of the project. Overall, the Site has met the required vegetation, hydrology, and stream success criteria for MY2. The overall MY2 average planted stem density for the Site is 509 stems/ acre which is greater than the year three interim density requirement of 320 stems/ acre. All restored and enhanced streams are stable and functioning as designed. UT1 had a pressure transducer installed to monitor stream flow. The UT1 stream gage met the hydrologic success criteria for MY2. Of the 10 groundwater monitoring wells on the Site, nine met the success criteria (water table within 12 inches of the ground surface for 8.5% of the growing season consecutively) and one did not. The one well that did not meet the success criteria showed a water table within 12 inches of the ground surface for 5% of the growing season consecutively. It is anticipated that this wetland area is taking longer to recharge and will meet hydrologic success criteria in the upcoming monitoring years.

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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 5.06 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 4.0 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 March 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 Figures 2a and 2b.

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 2 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 directly to a naturally occurring community to create riparian habitat and improve water quality. Other key factors addressed in the design were to create stable habitats, improve riparian buffers, and restore the natural migration patterns for fish spawning.

1.2 Monitoring Year 2 Data Assessment

Annual monitoring and quarterly site visits were conducted during monitoring year 2 (MY2) 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 Vegetative Assessment

A total of 17 vegetation plots were established during the baseline monitoring within the project easement areas. All of the plots were installed using a standard 10 meter by 10 meter plot. The final vegetative success criteria will be the survival of 210 planted stems per acre in the riparian corridor along restored and enhanced reaches and within the wetland restoration areas at the end of the seven year monitoring period (MY7). The interim measure of vegetative success for the Site will be the survival of at least 320 planted stems per acre at the end of year three of the monitoring period (MY3) and at least 260 stems per acre at the end of the fifth year of monitoring (MY5).

The MY2 vegetative survey was completed in June 2016. The 2016 vegetation monitoring resulted in an average planted stem density of 509 planted stems per acre, which is greater than the interim requirement of 320 planted stems/acre required at MY3, but approximately 21% less than the baseline density recorded at MY0, 647 planted stems/acre, in February 2015. When including volunteer stems, the average stems/acre is 564. This is well above the MY3 interim requirement of 320 stems/ acre. There was an average of 13 planted stems per plot which is a slight decrease from 16 stems per plot in MY0. Fifteen of the 17 vegetation plots individually met success criteria for MY2, and are on track to meet the success criteria required for MY7 (Table 9, Appendix 3). Vegetation plots six and seven did not meet the interim success criteria of 320 planted stems/acre. However, when counting volunteer trees both of these vegetation plots meet the interim success criteria. 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

Low planted stem density was observed around vegetation plots six and seven. These areas stay wet for most of the year and trees have not become well established in the wet conditions. Supplemental planting will be performed in these areas with native tree species that are more tolerant of the wetter conditions. See Current Condition Plan View (CCPV) map in Appendix 2 for areas of low stem density that will have supplemental planting completed in the winter of 2016/2017.

1.2.3 Stream Assessment

Morphological surveys for MY2 were conducted in March 2016. All streams within the Site are stable and met success criteria for MY2. In general, cross sections for all streams showed little to no change in bankfull area, maximum depth ratio, or width-to-depth ratio. Surveyed riffle cross sections fell within the parameters defined for channels of the appropriate Rosgen stream type.

During MY1 cross section 2 on Foust Creek had experienced sediment deposition from high flow events. The cross section has maintained a consistent bankfull width, but had decreased in depth and area due to the sediment deposition during high flows. During MY2 cross section 2 did not experience any deposition and returned to its original depth. There is still deposition on the point bar, but this is expected even though this area is showing more deposition than expected. This section of Foust Creek was designed with a very low slope and some deposition is expected. Most of this sediment is expected to flush out during future high flow events. This area will be monitored for further signs of deposition in subsequent monitoring years.

Longitudinal profile surveys are not required on the project unless visual inspection indicates reach wide vertical stability concerns. 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

Foust Creek has shown some deposition around cross section 2. Deposition is normal, however there was more sediment deposition than expected. This area will be monitored in the future for any more signs of deposition. If sediment deposition continues to be a problem in this area, remedial actions will be taken.

1.2.5 Hydrology Assessment

At the end of the seven year monitoring period, two or more bankfull events must have occurred in separate years within the restoration reaches. Bankfull events were recorded on both Foust Creek and UT1 with crest gages, pressure transducers, and visual wrack lines during MY2 data collection. Both Foust Creek and UT1 had banfull events during MY1, therefore the Site has met the required stream hydrology success criteria for the seven year monitoring period.

A pressure transducer was also installed on UT1 to measure stream flow. The pressure transducer was installed to show UT1 has adequate flow to be determined jurisdictional, and is not an ephemeral ditch. 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. UT1 showed consistent flow from the beginning of the year until late April and showed intermittent flow from late April until the last pressure transducer download in October. Therefore, UT1 has met the flow success criteria for MY2. Refer to Appendix 5 for hydrologic data.

1.2.6 Wetland Assessment

Ten groundwater monitoring gages were established during the baseline monitoring within the wetland rehabilitation and re-establishment zones. All gages were installed at appropriate locations so that the data collected will provide an indication of groundwater levels throughout the Site. To provide data for the determination of the growing season, one soil temperature probe was installed. A barotroll logger (to measure barometric pressure used in the calculations of groundwater levels with well transducer data) and a rain gage were also installed on the Site. All monitoring gages were downloaded on a quarterly basis and maintained on an as needed basis. The success criteria for wetland hydrology is to have a free groundwater surface within 12 inches of the ground surface for 8.5 percent of the growing season, which is measured in consecutive days under typical precipitation conditions. 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 soil temperature probe will be used to determine the beginning of the growing season based on soil temperatures staying above 41 degrees Fahrenheit at 12 inches below the ground surface.

Of the ten groundwater monitoring wells on the Site, nine met the success criteria and one did not for MY2. The nine wells that met the success criteria generally exceeded the standard significantly. The measured hydroperiod ranged from 19.5% to 86.9% of the growing season consecutively.

The one well that did not meet the success criteria, (Gage 9) showed the water table within 12 inches of the ground surface for 5% of the growing season consecutively. It is also worth noting that this well is near wells 7 and 8, which both easily met wetland success criteria, with well 7 being the wettest on the Site. The area around Well 9 appears to be taking longer for groundwater to recharge. Refer to Appendix 2 for the groundwater gage locations and Appendix 5 for groundwater hydrology data and plots.

1.2.7 Maintenance Plan

Supplemental planting will be performed during the winter of 2016/2017 as described in section 1.2.2 above. No other maintenance plan is necessary at this time. Wildlands will continue to monitor the upper portion of Foust Creek for deposition. A maintenance plan will be developed if it becomes apparent that deposition is an ongoing problem.

1.3 Monitoring Year 2 Summary

All streams within the Site are stable and functioning as designed. The deposition that was on Foust Creek at cross section 2 during MY1 has begun to flush out. This area will be monitored for any future issues and a maintenance plan will be prepared if necessary. The average stem density for the Site is on track to meeting the MY7 success criteria; 15 of 17 vegetation plots meet the MY2 success criteria as noted in the CCPV map. The other two plots meet success criteria when volunteer trees were counted. Supplemental tree planting will be completed during the winter of 2016/2017. Both streams on site have recorded at least one bankfull event. A total of 9 out of 10 groundwater gages met the wetland hydrology success criteria.

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.

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

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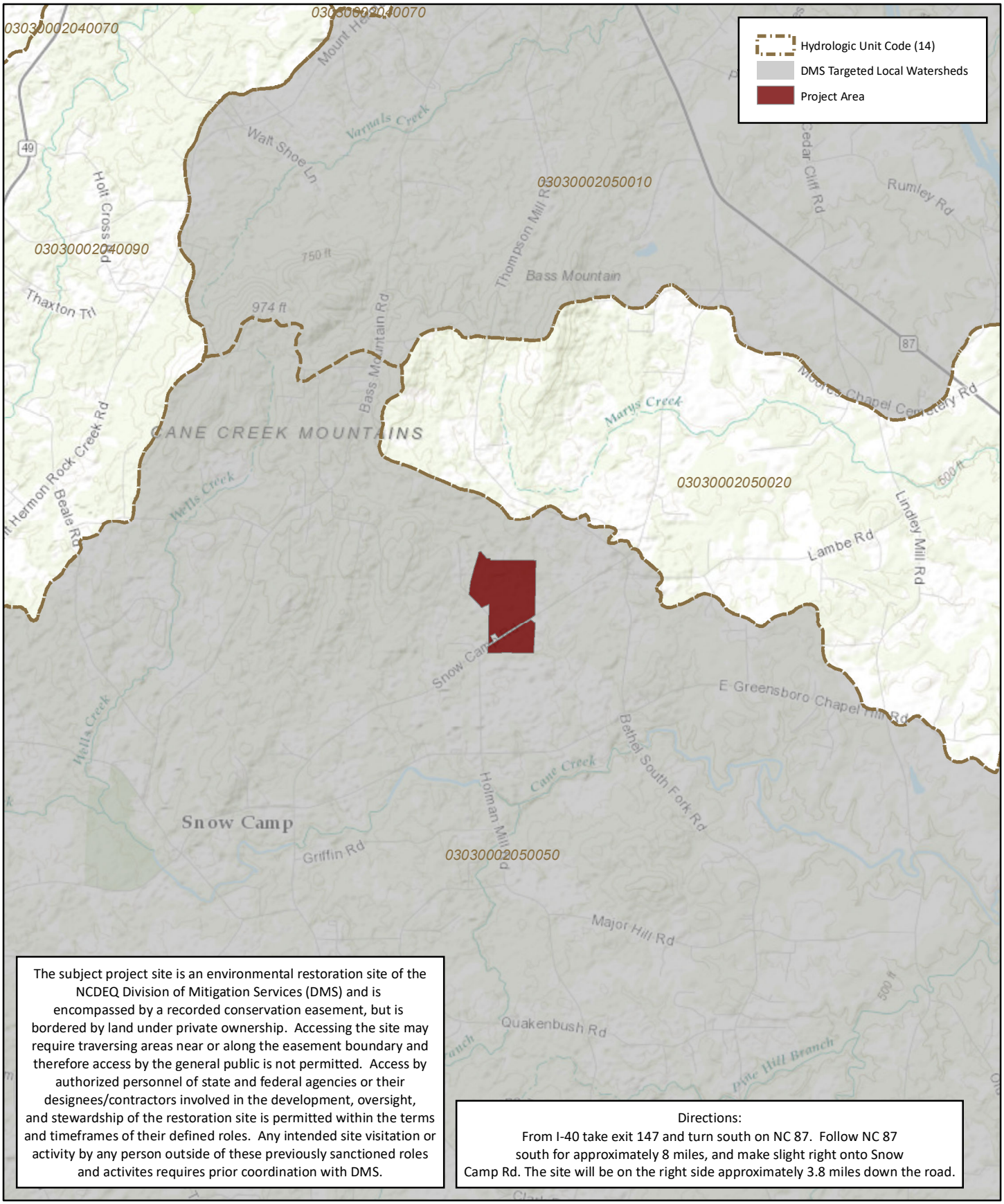
Wildlands Engineering, Inc. 2014. Foust Creek Mitigation Plan. DMS, Raleigh, NC.

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

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Figure 1 Project Vicinity Map
Foust Creek Mitigation Site
DMS Project No. 95715
Monitoring Year 2 - 2016
Alamance County, NC

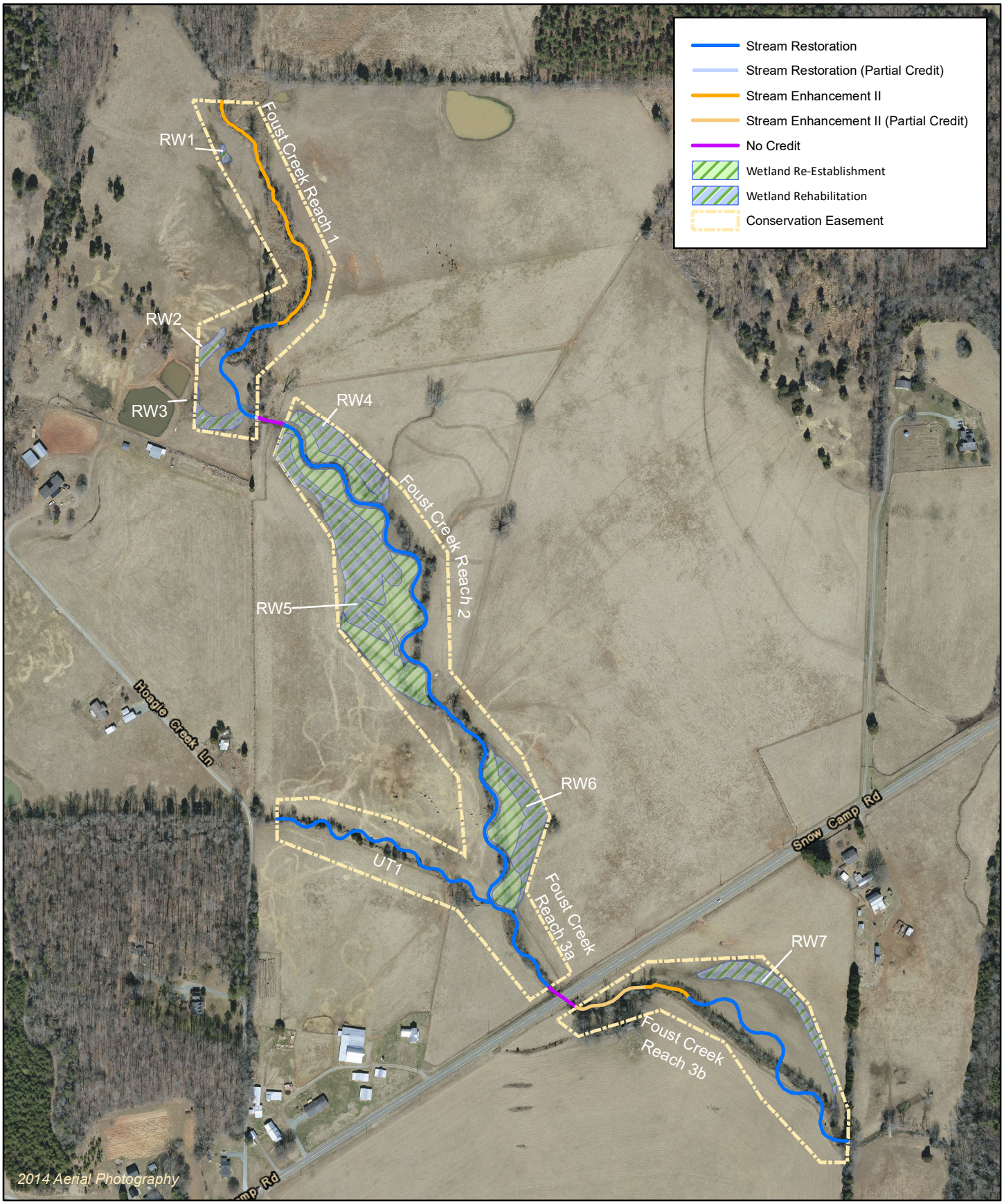

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Figure 2 Project Component/ Asset Map
Foust Creek Mitigation Site
DMS Project No. 95715
Monitoring Year 2 - 2016
Alamance County, NC

Table 1. Project Components and Mitigation Credits
Foust Creek Mitigation Site (DMS Project No.95715)
Monitoring Year 2 - 2016

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	1.9	2.1	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	0.21
Riparian Wetland RW5	---	1.46	---	Rehabilitation	1.46	1.5	0.97
Riparian Wetland RW5	---	1.18	---	Re-Establishment	1.18	1	1.18
Riparian Wetland RW6	---	0.52	---	Rehabilitation	0.52	1.5	0.35
Riparian Wetland RW6	---	0.51	---	Re-Establishment	0.51	1	0.51
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		1.90	-	-		
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.

Table 2. Project Activity and Reporting History
Foust Creek Mitigation Site (DMS Project No.95715)
Monitoring Year 2 -2016

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)	January 2015-March 2015	May 2015
Year 1 Monitoring	December 2015	December 2015
Year 2 Monitoring	October 2016	December 2016
Year 3 Monitoring	2017	December 2017
Year 4 Monitoring	2018	December 2018
Year 5 Monitoring	2019	December 2019
Year 6 Monitoring	2020	December 2020
Year 7 Monitoring	2021	December 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 2 - 2016

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 2 -2016

Project Information	
Project Name	Foust Creek Mitigation Site
County	Alamance County
Project Area (acres)	22.1 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

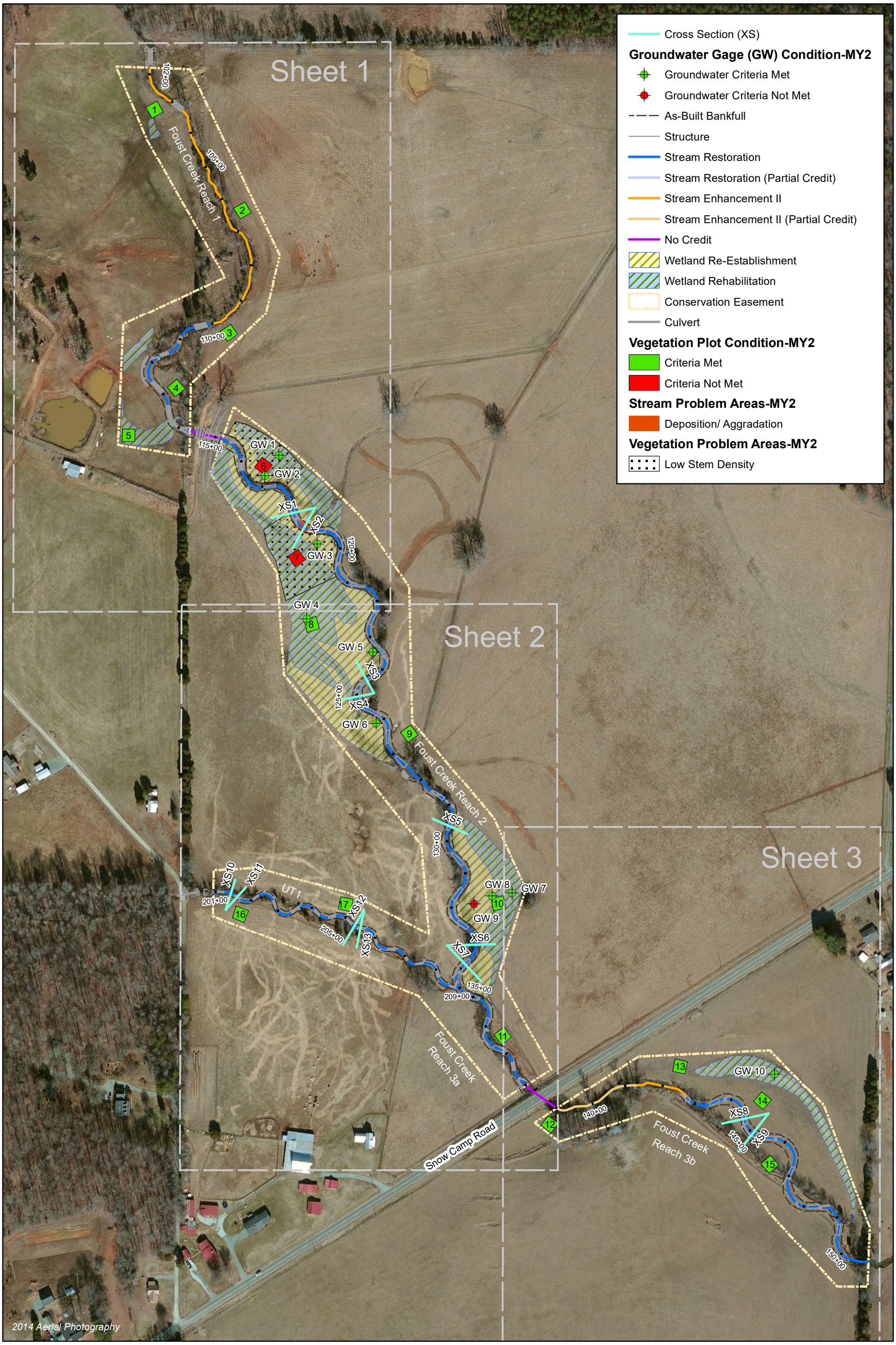
Reach Summary Informtation

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	NA	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

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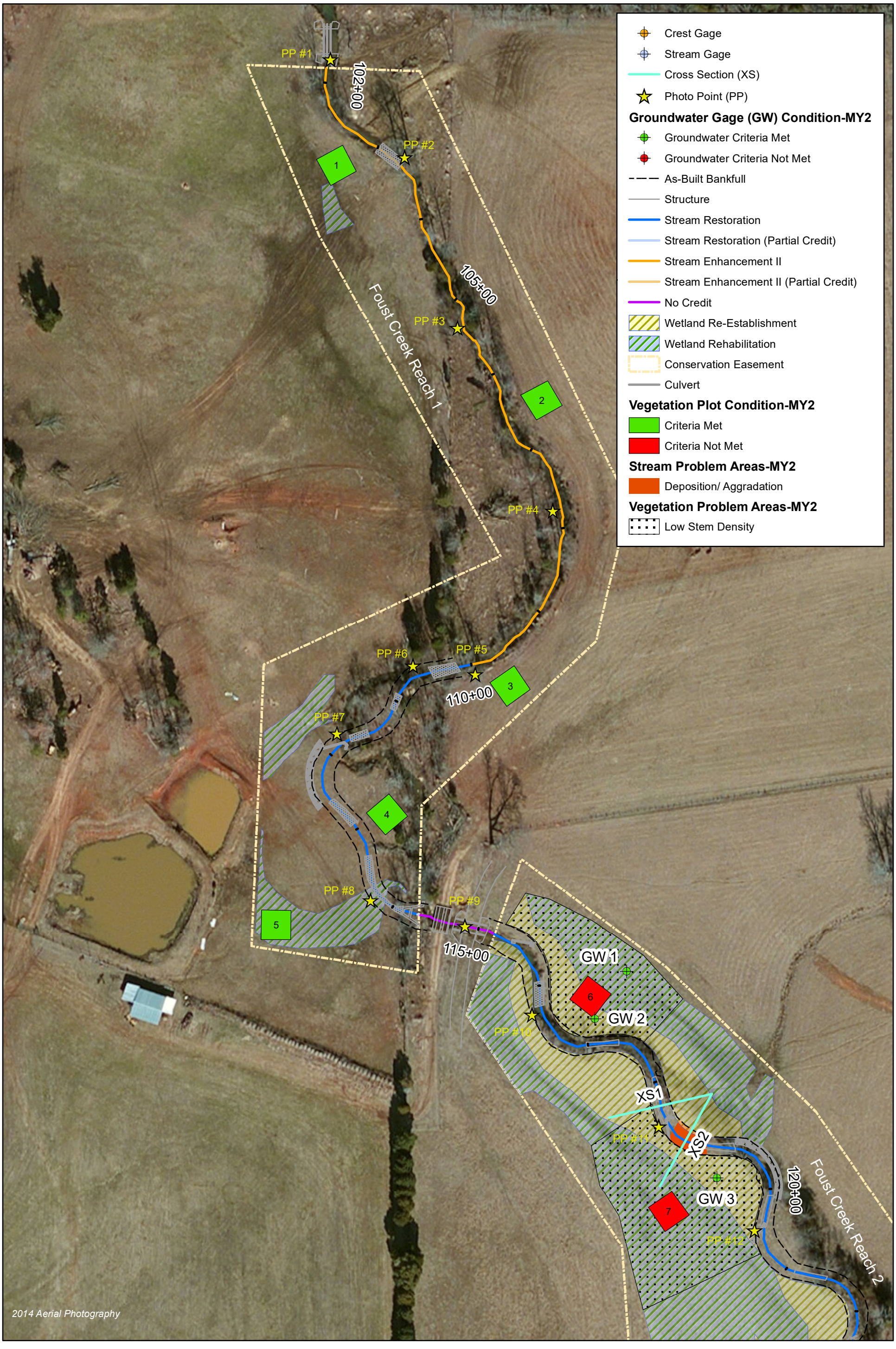
Figure 3.0 Integrated Current Condition Plan View (Key)
Foust Creek Stream Restoration Site
DMS Project No. 95715
Monitoring Year 2 - 2016

Alamance County, NC



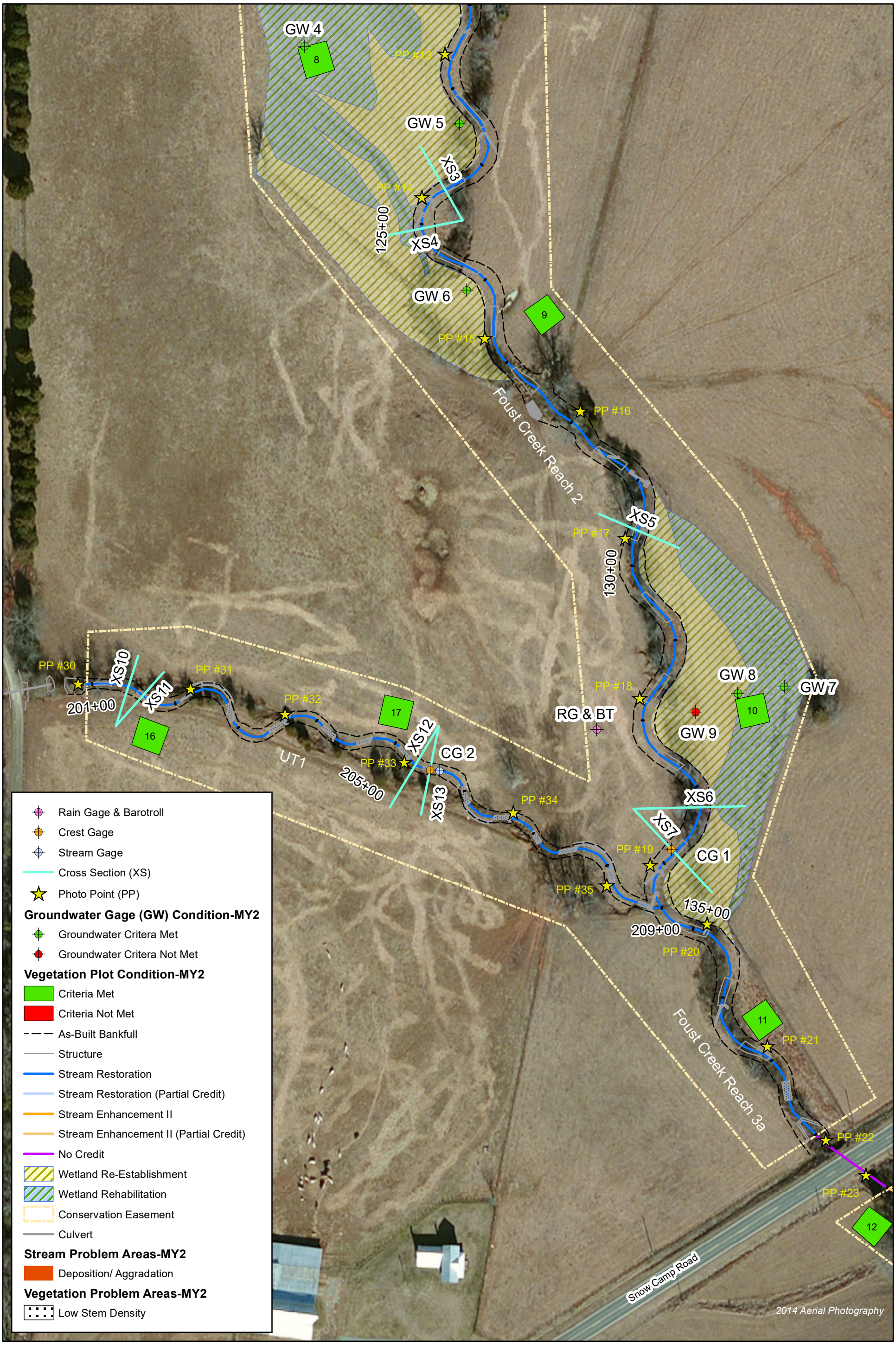
WILDLANDS ENGINEERING

0 50 100 150 200 Feet

N

Figure 3.1 Integrated Current Condition Plan View
(Sheet 1 of 3)
Foust Creek Stream Restoration Site
DMS Project No. 95715
Monitoring Year 2 - 2016

Alamance County, NC



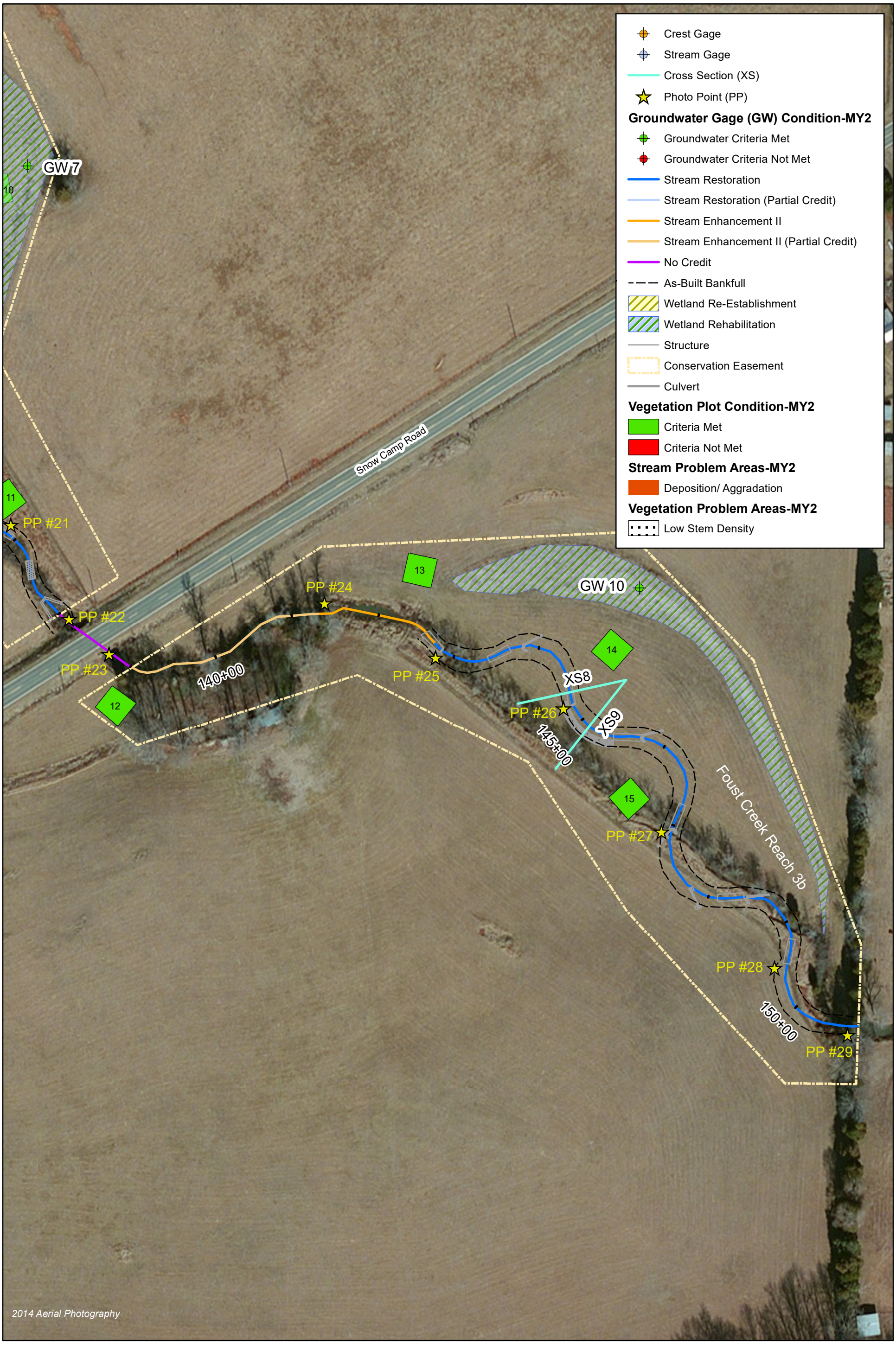
WILDLANDS ENGINEERING

0 50 100 150 200 Feet

N

Figure 3.2 Integrated Current Condition Plan View
(Sheet 2 of 3)
Foust Creek Stream Restoration Site
DMS Project No. 95715
Monitoring Year 2 - 2016

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 Stream Restoration Site
DMS Project No. 95715
Monitoring Year 2 - 2016

Alamance County, NC

Table 5a. Visual Stream Morphology Stability Assessment Table

Foust Creek Mitigation Site (DMS Project No. 95715)

Monitoring Year 2 - 2016

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 2 - 2016

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 2 - 2016

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 2 - 2016

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	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 6. Vegetation Condition Assessment Table
Foust Creek Mitigation Site (DMS Project No. 95715)
Monitoring Year 2 - 2016

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	2	1.0	4.5%
		Total	**2**	**1.0**	**4.5%**
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	**2**	**1.0**	**4.5%**

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	0	0	0.0%
Easement Encroachment Areas	Areas or points (if too small to render as polygons at map scale).	none	0	0	0%

STREAM PHOTOGRAPHS
Foust Creek
Monitoring Year 2

PHOTO POINT 1 – looking downstream (3*/9/2016*)

PHOTO POINT 2 – looking upstream (3*/9/2016*)

PHOTO POINT 2 – looking downstream (3*/9/2016*)

PHOTO POINT 3 – looking upstream (3*/9/2016*)

PHOTO POINT 3 – looking downstream (3*/9/2016*)

PHOTO POINT 4 – looking upstream (3*/9/2016*)

PHOTO POINT 4 – looking downstream (3*/9/2016*)

PHOTO POINT 5 – looking upstream (3*/9/2016*)

PHOTO POINT 5 – looking downstream (3*/9/2016*)

PHOTO POINT 6 – looking upstream *(3/9/2016)*

PHOTO POINT 6 – looking downstream (3*/9/2016*)

	
PHOTO POINT 7 – looking upstream (3*/9/2016*)	**PHOTO POINT 7 –** looking downstream (3*/9/2016*)
	
PHOTO POINT 8 – looking upstream (3*/9/2016*)	**PHOTO POINT 8 –** looking downstream (3*/9/2016*)
	
PHOTO POINT 9 – looking upstream (3*/9/2016*)	**PHOTO POINT 9 –** looking downstream (3*/9/2016*)

	
PHOTO POINT 10 – looking upstream (3*/9/2016*)	**PHOTO POINT 10 –** looking downstream (3*/9/2016*)
	
PHOTO POINT 11 – looking upstream (3*/9/2016*)	**PHOTO POINT 11 –** looking downstream (3*/9/2016*)
	
PHOTO POINT 12 – looking upstream (3*/9/2016*)	**PHOTO POINT 12 –** looking downstream (3*/9/2016*)

PHOTO POINT 13 – looking upstream (3*/9/2016*)

PHOTO POINT 13 – looking downstream (3*/9/2016*)

PHOTO POINT 14 – looking upstream (3*/9/2016*)

PHOTO POINT 14 – looking downstream (3*/9/2016*)

PHOTO POINT 15 – looking upstream (3*/9/2016*)

PHOTO POINT 15 – looking downstream (3*/9/2016*)

	
PHOTO POINT 16 – looking upstream (3*/9/2016*)	**PHOTO POINT 16 –** looking downstream (3*/9/2016*)
	
PHOTO POINT17 – looking upstream (3*/9/2016*)	**PHOTO POINT 17 –** looking downstream (3*/9/2016*)
	
PHOTO POINT 18 – looking upstream (3*/9/2016*)	**PHOTO POINT 18 –** looking downstream (3*/9/2016*)

PHOTO POINT 19 – looking upstream (3*/9/2016*)

PHOTO POINT 19 – looking downstream (3*/9/2016*)

PHOTO POINT 20 – looking upstream (3*/9/2016*)

PHOTO POINT 20 – looking downstream (3*/9/2016*)

PHOTO POINT 21 – looking upstream (3*/9/2016*)

PHOTO POINT 21 – looking downstream (3*/9/2016*)

PHOTO POINT 22 – looking upstream (3*/9/2016*)

PHOTO POINT 23 – looking downstream (3*/9/2016*)

PHOTO POINT 24 – looking upstream (3*/9/2016*)

PHOTO POINT 24 – looking downstream (3*/9/2016*)

PHOTO POINT 25 – looking upstream (3*/9/2016*)

PHOTO POINT 25 – looking downstream (3*/9/2016*)

PHOTO POINT 26 – looking upstream (3*/9/2016*)

PHOTO POINT 26 – looking downstream (3*/9/2016*)

PHOTO POINT 27 – looking upstream (3*/9/2016*)

PHOTO POINT 27 – looking downstream (3*/9/2016*)

PHOTO POINT 28 – looking upstream (3*/9/2016*)

PHOTO POINT 28 – looking downstream (3*/9/2016*)

PHOTO POINT 29 – looking upstream (3*/9/2016*)

PHOTO POINT 29 – looking downstream (3*/9/2016*)

PHOTO POINT 30 – looking downstream (3*/9/2016*)

PHOTO POINT 31 – looking upstream (3*/9/2016*)

PHOTO POINT 31 – looking downstream (3*/9/2016*)

PHOTO POINT 32 – looking upstream (3*/9/2016*)

PHOTO POINT 32 – looking downstream (3*/9/2016*)

PHOTO POINT 33 – looking upstream (3*/9/2016*)

PHOTO POINT 33 – looking downstream (3*/9/2016*)

PHOTO POINT 34 – looking upstream (3*/9/2016*)

PHOTO POINT 34 – looking downstream (3*/9/2016*)

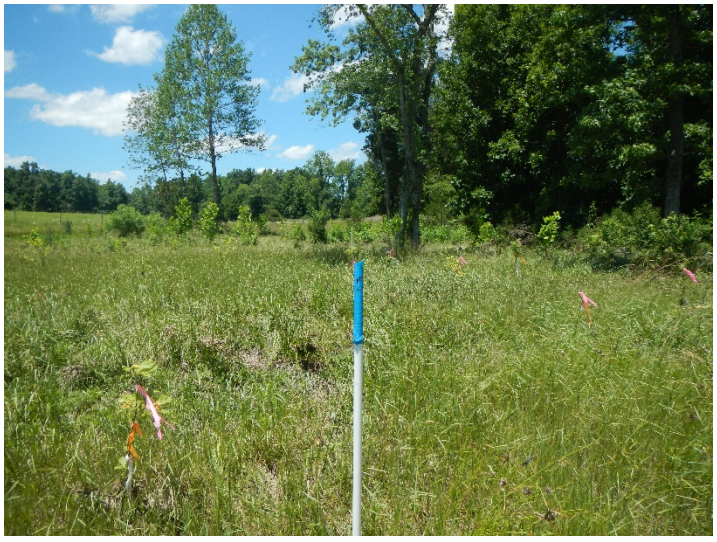
	
PHOTO POINT 35 – looking upstream (3*/9/2016*)	**PHOTO POINT 35 –** looking downstream (3*/9/2016*)

VEGETATION PHOTOGRAPHS
Foust Creek
Monitoring Year 2

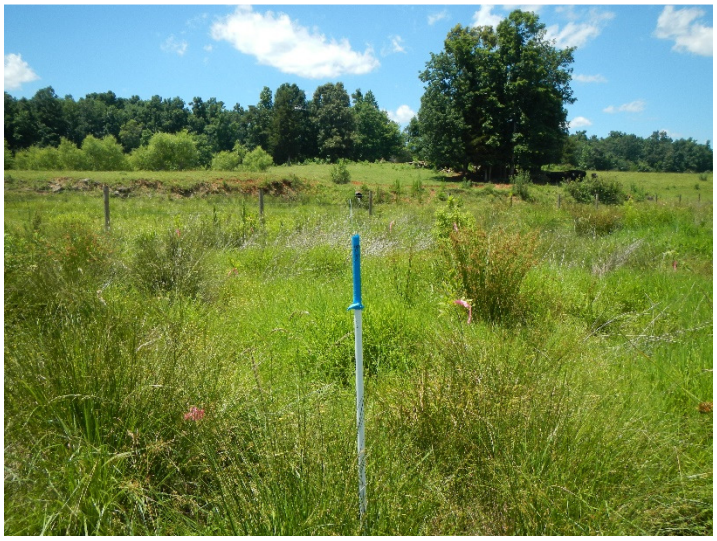
VEG PLOT 1 *(6/8/2016)*

VEG PLOT 2 *(6/8/2016)*

VEG PLOT 3 *(6/8/2016)*

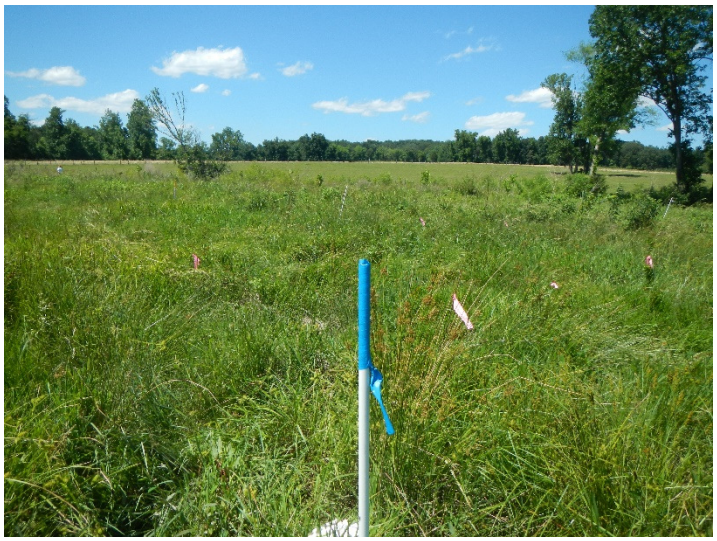


VEG PLOT 4 *(6/8/2016)*



VEG PLOT 5 *(6/8/2016)*

VEG PLOT 6 *(6/8/2016)*



VEG PLOT 7 *(6/8/2016)*

VEG PLOT 8 *(6/8/2016)*

VEG PLOT 9 *(6/8/2016)*

VEG PLOT 10 *(6/8/2016)*

VEG PLOT 11 *(6/8/2016)*

VEG PLOT 12 *(6/8/2016)*

VEG PLOT 13 *(6/8/2016)*

VEG PLOT 14 *(6/8/2016)*

VEG PLOT 15 *(6/8/2016)*

VEG PLOT 16 *(6/8/2016)*

VEG PLOT 17 (*6/8/2016)*

APPENDIX 3. Vegetation Plot Data

Table 7. Vegetation Plot Criteria Attainment

Foust Creek Mitigation Site (DMS Project No. 95715)

Monitoring Year 2 - 2016

Plot	MY2 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 2 - 2016

Database name	Foust- Creek MY2- v2.3.1.mdb
Database location	F:\Projects\005-02135 Foust Creek\Monitoring\Monitoring Year 2\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 2 -2016

			Current Plot Data (MY2 2016)														
			95715-WEI-0001			95715-WEI-0002			95715-WEI-0003			95715-WEI-0004			95715-WEI-0005		
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 rubrum	red maple	Tree															
Alnus serrulata	hazel alder	Shrub															
Betula nigra	river birch	Tree				1	1	1	1	1	1	2	2	2			
Cornus amomum	silky dogwood	Shrub													1	1	1
Fraxinus pennsylvanica	green ash	Tree				1	1	1				2	2	2	7	7	7
Liquidambar styraciflua	sweetgum	Tree									5						
Liriodendron tulipifera	tuliptree	Tree										1	1	1			
Nyssa sylvatica	blackgum	Tree															1
Platanus occidentalis	American sycamore	Tree							2	2	2						
Quercus michauxii	swamp chestnut oak	Tree	9	9	9	3	3	3	2	2	2	5	5	5	3	3	3
Quercus phellos	willow oak	Tree	1	1	1	2	2	2	2	2	2				2	2	2
Quercus rubra	northern red oak	Tree				6	6	6	4	4	4	2	2	2			
		Stem count	10	10	10	13	13	13	11	11	16	12	12	12	13	13	14
		size (ares)	1			1			1			1			1		
		size (ACRES)	0.02			0.02			0.02			0.02			0.02		
		Species count	2	2	2	5	5	5	5	5	6	5	5	5	4	4	5
		Stems per ACRE	404.7	404.7	404.7	526.1	526.1	526.1	445.2	445.2	647.5	485.6	485.6	485.6	526.1	526.1	566.6

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 2 -2016

			Current Plot Data (MY2 2016)														
			95715-WEI-0006			95715-WEI-0007			95715-WEI-0008			95715-WEI-0009			95715-WEI-0010		
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 rubrum	red maple	Tree						1									
Alnus serrulata	hazel alder	Shrub						1	1	1	1				1	1	1
Betula nigra	river birch	Tree							2	2	2	4	4	4	1	1	1
Cornus amomum	silky dogwood	Shrub				3	3	3	3	3	3				6	6	6
Fraxinus pennsylvanica	green ash	Tree	6	6	6	2	2	2	1	1	1						
Liquidambar styraciflua	sweetgum	Tree			5												
Liriodendron tulipifera	tuliptree	Tree															
Nyssa sylvatica	blackgum	Tree	1	1	1				2	2	2				2	2	2
Platanus occidentalis	American sycamore	Tree															
Quercus michauxii	swamp chestnut oak	Tree				1	1	1	5	5	5	3	3	3	2	2	2
Quercus phellos	willow oak	Tree				1	1	1	2	2	2	2	2	2	4	4	4
Quercus rubra	northern red oak	Tree										4	4	4			
		Stem count	7	7	12	7	7	9	16	16	16	13	13	13	16	16	16
		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	6	7	7	7	4	4	4	6	6	6
		Stems per ACRE	283.3	283.3	485.6	283.3	283.3	364.2	647.5	647.5	647.5	526.1	526.1	526.1	647.5	647.5	647.5

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 2 -2016

			Current Plot Data (MY2 2016)														
			95715-WEI-0011			95715-WEI-0012			95715-WEI-0013			95715-WEI-0014			95715-WEI-0015		
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 rubrum	red maple	Tree															
Alnus serrulata	hazel alder	Shrub															
Betula nigra	river birch	Tree	2	2	2	2	2	2				1	1	1			
Cornus amomum	silky dogwood	Shrub															
Fraxinus pennsylvanica	green ash	Tree	4	4	4	2	2	2	8	8	8	8	8	8	6	6	6
Liquidambar styraciflua	sweetgum	Tree															10
Liriodendron tulipifera	tuliptree	Tree	1	1	1	3	3	3				2	2	2			
Nyssa sylvatica	blackgum	Tree															
Platanus occidentalis	American sycamore	Tree	5	5	5	7	7	7	7	7	7	4	4	4	5	5	5
Quercus michauxii	swamp chestnut oak	Tree															
Quercus phellos	willow oak	Tree													1	1	1
Quercus rubra	northern red oak	Tree	1	1	1	1	1	1							1	1	1
		Stem count	13	13	13	15	15	15	15	15	15	15	15	15	13	13	23
		size (ares)	1			1			1			1			1		
		size (ACRES)	0.02			0.02			0.02			0.02			0.02		
		Species count	5	5	5	5	5	5	2	2	2	4	4	4	4	4	5
		Stems per ACRE	526.1	526.1	526.1	607	607	607	607	607	607	607	607	607	526.1	526.1	930.8

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 2 -2016

			Current Plot Data (MY2 2016)						Annual Means								
			95715-WEI-0016			95715-WEI-0017			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 rubrum	red maple	Tree									1			1			
Alnus serrulata	hazel alder	Shrub							2	2	3	3	3	3	6	6	6
Betula nigra	river birch	Tree	2	2	2	2	2	2	20	20	20	28	28	31	35	35	35
Cornus amomum	silky dogwood	Shrub							13	13	13	12	12	16	15	15	15
Fraxinus pennsylvanica	green ash	Tree	2	2	2	2	2	2	51	51	51	53	53	90	53	53	53
Liquidambar styraciflua	sweetgum	Tree									20			8			
Liriodendron tulipifera	tuliptree	Tree	1	1	1	1	1	1	9	9	9	10	10	10	24	24	24
Nyssa sylvatica	blackgum	Tree				1	1	1	6	6	7	10	10	10	10	10	10
Platanus occidentalis	American sycamore	Tree	3	3	3	3	3	3	36	36	36	36	36	36	36	36	36
Quercus michauxii	swamp chestnut oak	Tree	1	1	1	1	1	1	35	35	35	36	36	36	37	37	37
Quercus phellos	willow oak	Tree	2	2	2	2	2	2	21	21	21	33	33	33	35	35	35
Quercus rubra	northern red oak	Tree	2	2	2				21	21	21	21	21	21	21	21	21
		Stem count	13	13	13	12	12	12	214	214	237	242	242	295	272	272	272
		size (ares)	1			1			17			17			17		
		size (ACRES)	0.02			0.02			0.42			0.42			0.42		
		Species count	7	7	7	7	7	7	10	10	12	10	10	12	10	10	10
		Stems per ACRE	526.1	526.1	526.1	485.6	485.6	485.6	509.4	509.4	564.2	576.1	576.1	702.2	647.5	647.5	647.5

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 2 - 2016

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	150.0		150.0		150.0	
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	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	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		7.3		6.5		12.3		2.6	3.4	5.5	>10.2	1.7	4.3	2.4	4	>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		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	52.2	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

Table 10b. Baseline Stream Data Summary
Foust Creek Mitigation Site (DMS Project No. 95715)
Monitoring Year 2 - 2016

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	150.0	150.0
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	1.2	1.1	1.3	1.8	2.1	1.8	2	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	12.8	10.1	13.9	17.9	19.4	12.3	14.4	13.8		14.2	20.4
Entrenchment Ratio		12.2		2.6	3.4	5.5	>10.2	1.7	4.3	2.4	4	>2.5		1.9	1.9	>2.5		2.5	20.0	11.9	13.9
Bank Height Ratio		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	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	0.022	0.013		0.018		0.009		0.015		0.005	0.011	0.006	0.0125

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

Table 11. Morphology and Hydraulic Summary (Dimensional Parameters - Cross Section)

Foust Creek Mitigation Site (DMS Project No. 95715)

Monitoring Year 2 - 2016

	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**	**MY4**	**MY5**	**MY6**	**MY7**	**Base**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**	**MY6**	**MY7**	**Base**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**	**MY6**	**MY7**	**Base**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**	**MY6**	**MY7**
based on fixed bankfull elevation	561.7	561.7	561.7						561.6	561.6	561.6						558.4	558.4	558.4						558.2	558.2	558.2					
Bankfull Width (ft)	20.6	19.7	20.0						21.5	20.8	20.8						18.5	17.7	17.6						24.9	23.6	23.5					
Floodprone Width (ft)	150.0	150.0	150.0						N/A	N/A	N/A						150.0	150.0	150.0						N/A	N/A	N/A					
Bankfull Mean Depth (ft)	1.1	1.0	1.0						1.2	0.9	0.9						1.2	1.0	1.0						1.0	0.9	0.9					
Bankfull Max Depth (ft)	1.9	1.8	1.8						2.5	1.9	2.4						1.9	1.9	1.9						2.1	2.0	2.0					
Bankfull Cross Sectional Area (ft^2)	22.7	20.5	20.5						26.7	18.5	19.0						21.5	17.7	16.8						24.4	20.7	20.2					
Bankfull Width/Depth Ratio	18.8	19.0	19.4						17.4	23.4	22.7						16.0	17.7	18.5						25.4	26.8	27.2					
Bankfull Entrenchment Ratio	7.3	7.6	7.5						N/A	N/A	N/A						8.1	8.5	8.5						N/A	N/A	N/A					
Bankfull Bank Height Ratio	1.0	1.0	1.0						N/A	N/A	N/A						1.0	1.0	1.0						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**	**MY4**	**MY5**	**MY6**	**MY7**	**Base**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**	**MY6**	**MY7**	**Base**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**	**MY6**	**MY7**	**Base**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**	**MY6**	**MY7**
based on fixed bankfull elevation	555.7	555.7	555.7						553.5	553.5	553.5						552.9	552.9	552.9						547.9	547.9	547.9					
Bankfull Width (ft)	20.7	22.0	22.0						25.8	25.7	26.5						22.5	22.2	22.1						23.6	22.7	23.2					
Floodprone Width (ft)	150.0	150.0	150.0						N/A	N/A	N/A						150.0	150.0	150.0						150.0	150.0	150.0					
Bankfull Mean Depth (ft)	1.3	1.2	1.2						1.6	1.5	1.4						1.3	1.3	1.3						1.5	1.4	1.4					
Bankfull Max Depth (ft)	2.1	2.3	2.2						3.0	3.0	3.4						2.3	2.1	2.2						2.7	2.5	2.5					
Bankfull Cross Sectional Area (ft^2)	27.6	27.0	26.6						41.7	37.4	37.6						30.2	28.8	28.2						36.5	32.1	31.9					
Bankfull Width/Depth Ratio	15.5	17.9	18.2						15.9	17.7	18.7						16.8	17.0	17.3						15.2	16.0	16.9					
Bankfull Entrenchment Ratio	7.2	6.8	6.8						N/A	N/A	N/A						6.7	6.8	6.8						6.4	6.6	6.5					
Bankfull Bank Height Ratio	1.0	1.0	1.0						N/A	N/A	N/A						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**	**MY4**	**MY5**	**MY6**	**MY7**	**Base**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**	**MY6**	**MY7**	**Base**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**	**MY6**	**MY7**	**Base**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**	**MY6**	**MY7**
based on fixed bankfull elevation	547.4	547.4	547.4						562.4	562.4	562.4						562.1	562.1	562.1						557.5	557.5	557.5					
Bankfull Width (ft)	25.6	25.0	24.9						18.0	15.9	15.7						10.8	10.2	10.2						14.5	14.6	14.1					
Floodprone Width (ft)	N/A	N/A	N/A						N/A	N/A	N/A						150.0	150.0	150.0						N/A	N/A	N/A					
Bankfull Mean Depth (ft)	2.1	1.8	2.1						1.1	1.1	1.1						0.8	0.7	0.7						0.8	0.7	0.8					
Bankfull Max Depth (ft)	3.6	3.7	3.9						2.3	2.1	2.1						1.3	1.3	1.4						1.6	1.5	1.7					
Bankfull Cross Sectional Area (ft^2)	53.5	46.1	51.9						20.0	17.0	17.2						8.1	7.4	7.6						11.5	10.6	10.7					
Bankfull Width/Depth Ratio	12.3	13.5	11.9						16.2	14.8	14.4						14.2	14.1	13.6						18.4	19.9	18.6					
Bankfull Entrenchment Ratio	N/A	N/A	N/A						N/A	N/A	N/A						13.9	14.6	14.8						N/A	N/A	N/A					
Bankfull Bank Height Ratio	N/A	N/A	N/A						N/A	N/A	N/A						1.0	1.0	1.0						N/A	N/A	N/A					

	UT1							
	Cross Section 13 (Riffle)							
Dimension and Substrate	**Base**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**	**MY6**	**MY7**
based on fixed bankfull elevation	557.4	557.4	557.4					
Bankfull Width (ft)	12.6	12.0	11.7					
Floodprone Width (ft)	150.0	150.0	150.0					
Bankfull Mean Depth (ft)	0.6	0.6	0.6					
Bankfull Max Depth (ft)	1.5	1.1	1.2					
Bankfull Cross Sectional Area (ft^2)	7.7	7.0	6.8					
Bankfull Width/Depth Ratio	20.4	20.6	20.2					
Bankfull Entrenchment Ratio	11.9	12.5	12.8					
Bankfull Bank Height Ratio	1.0	1.0	1.0					

Table 12a. Monitoring Data - Stream Reach Data Summary
Foust Creek Mitigation Site (DMS Project No. 95715)
Monitoring Year 2 - 2016

Foust Creek- Reach 2

Parameter	As-Built/Baseline		MY1		MY2		MY3		MY4		MY5		MY6		MY7	
	Min	Max	Min	Max	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										
Floodprone Width (ft)	150		150		150											
Bankfull Mean Depth	1.1	1.3	1.0	1.3	1.0	1.3										
Bankfull Max Depth	1.9	2.3	1.8	2.3	1.8	2.2										
Bankfull Cross Sectional Area (ft^2)	21.5	30.2	17.7	28.8	16.8	28.2										
Width/Depth Ratio	15.5	18.8	17.0	19.0	17.3	19.4										
Entrenchment Ratio	6.7	8.1	6.8	8.5	6.8	8.5										
Bank Height Ratio	1.0		1.0		1.0											
D50 (mm)	7.3	51.8	7.7	41.3	13.5	49.9										
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											
% of Reach with Eroding Banks	0%		0%		0%											

Table 12b. Monitoring Data - Stream Reach Data Summary
Foust Creek Mitigation Site (DMS Project No. 95715)
Monitoring Year 2 - 2016

Foust Creek- Reach 3A

Parameter	As-Built/Baseline		MY1		MY2		MY3		MY4		MY5		MY6		MY7	
	Min	Max	Min	Max	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										
Floodprone Width (ft)	150		150		150											
Bankfull Mean Depth	1.1	1.3	1.0	1.3	1.0	1.3										
Bankfull Max Depth	1.9	2.3	1.8	2.3	1.8	2.2										
Bankfull Cross Sectional Area (ft^2)	21.5	30.2	17.7	28.8	16.8	28.2										
Width/Depth Ratio	15.5	18.8	17.0	19.0	17.3	19.4										
Entrenchment Ratio	6.7	8.1	6.8	8.5	6.8	8.5										
Bank Height Ratio	1.0		1.0		1.0											
D50 (mm)	7.3	51.8	7.7	41.3	13.5	49.9										
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											
% of Reach with Eroding Banks	0%		0%		0%											

Table 12c. Monitoring Data - Stream Reach Data Summary
Foust Creek Mitigation Site (DMS Project No. 95715)
Monitoring Year 2 - 2016

Foust Creek- Reach 3B

Parameter	As-Built/Baseline		MY1		MY2		MY3		MY4		MY5		MY6		MY7	
	Min	Max	Min	Max	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											
Floodprone Width (ft)	150		150		150											
Bankfull Mean Depth	1.5		1.4		1.4											
Bankfull Max Depth	2.7		2.5		2.5											
Bankfull Cross Sectional Area (ft^2)	36.5		32.1		31.9											
Width/Depth Ratio	15.2		16.0		16.9											
Entrenchment Ratio	6.4		6.6		6.5											
Bank Height Ratio	1.0		1.0		1.0											
D50 (mm)	52.3		28.1		32											
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											
% of Reach with Eroding Banks	0%		0%		0%											

Table 12d. Monitoring Data - Stream Reach Data Summary
Foust Creek Mitigation Site (DMS Project No. 95715)
Monitoring Year 2 - 2016

UT1

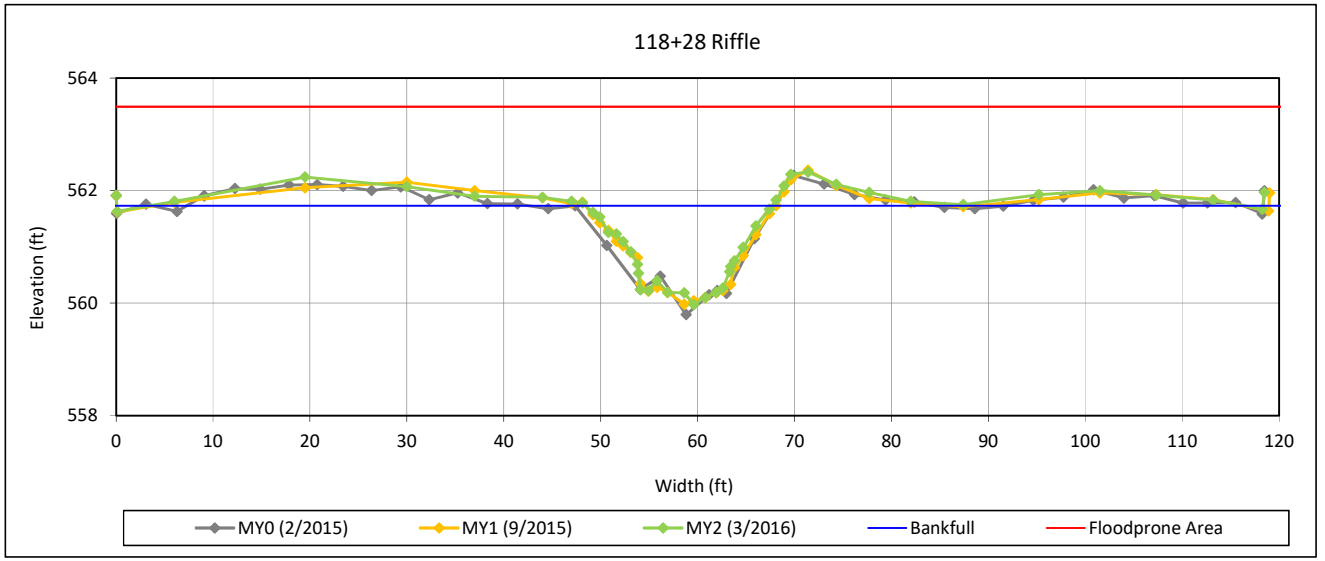
Parameter	As-Built/Baseline		MY1		MY2		MY3		MY4		MY5		MY6		MY7	
	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
Dimension and Substrate - Riffle																
Bankfull Width (ft)	10.8	12.6	10.2	12.0	10.2	11.7										
Floodprone Width (ft)	150		150		150											
Bankfull Mean Depth	0.6	0.8	0.6	0.7	0.6	0.7										
Bankfull Max Depth	1.3	1.5	1.1	1.3	1.2	1.4										
Bankfull Cross Sectional Area (ft^2)	7.7	8.1	7.0	7.4	6.8	7.6										
Width/Depth Ratio	14.2	20.4	14.1	20.6	13.6	20.2										
Entrenchment Ratio	11.9	13.9	12.5	14.6	12.8	14.8										
Bank Height Ratio	1.0		1.0		1.0											
D50 (mm)	18.2	35.7	17.6	21.3	15	30.9										
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											
% of Reach with Eroding Banks	0%		0%		0%											

Cross Section Plots

Foust Creek Mitigation Site (DMS Project No. 95715)

Monitoring Year 2 - 2016

Cross Section 1- Foust Creek Reach 2



Bankfull Dimensions	
20.5	x-section area (ft.sq.)
20.0	width (ft)
1.0	mean depth (ft)
1.8	max depth (ft)
20.8	wetted parimeter (ft)
1.0	hyd radi (ft)
19.4	width-depth ratio
150.0	W flood prone area (ft)
7.5	entrenchment ratio
1.0	low bank height ratio

Survey Date: 3/2016

Field Crew: Wildlands Engineering

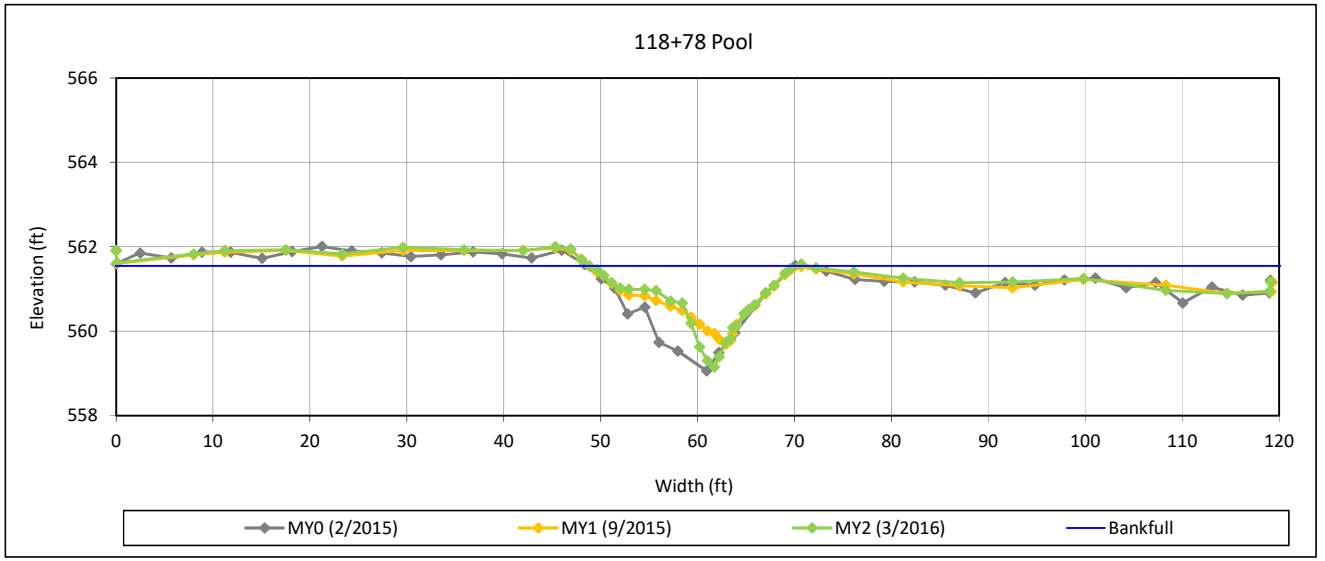
View Downstream

Cross Section Plots

Foust Creek Mitigation Site (DMS Project No. 95715)

Monitoring Year 2 - 2016

Cross Section 2- Foust Creek Reach 2



Bankfull Dimensions	
19.0	x-section area (ft.sq.)
20.8	width (ft)
0.9	mean depth (ft)
2.4	max depth (ft)
21.7	wetted parimeter (ft)
0.9	hyd radi (ft)
22.7	width-depth ratio

Survey Date: 3/2016

Field Crew: Wildlands Engineering

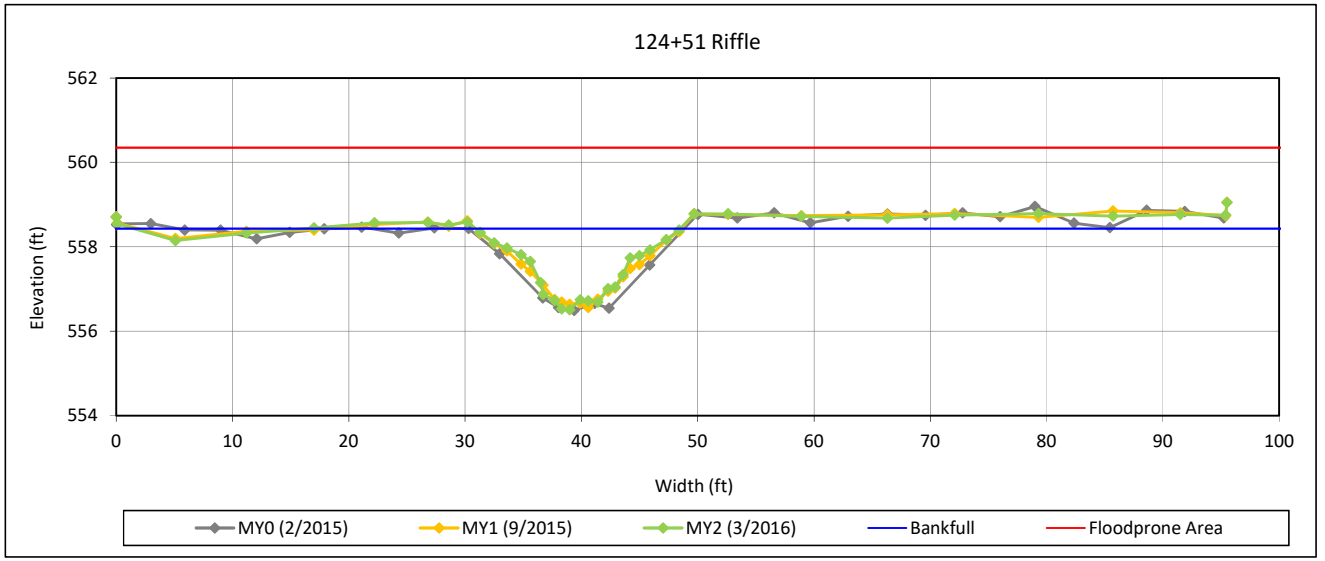
View Downstream

Cross Section Plots

Foust Creek Mitigation Site (DMS Project No. 95715)

Monitoring Year 2 - 2016

Cross Section 3- Foust Creek Reach 2



Bankfull Dimensions	
16.8	x-section area (ft.sq.)
17.6	width (ft)
1.0	mean depth (ft)
1.9	max depth (ft)
18.3	wetted parimeter (ft)
0.9	hyd radi (ft)
18.5	width-depth ratio
150.0	W flood prone area (ft)
8.5	entrenchment ratio
1.0	low bank height ratio

Survey Date: 3/2016
Field Crew: Wildlands Engineering

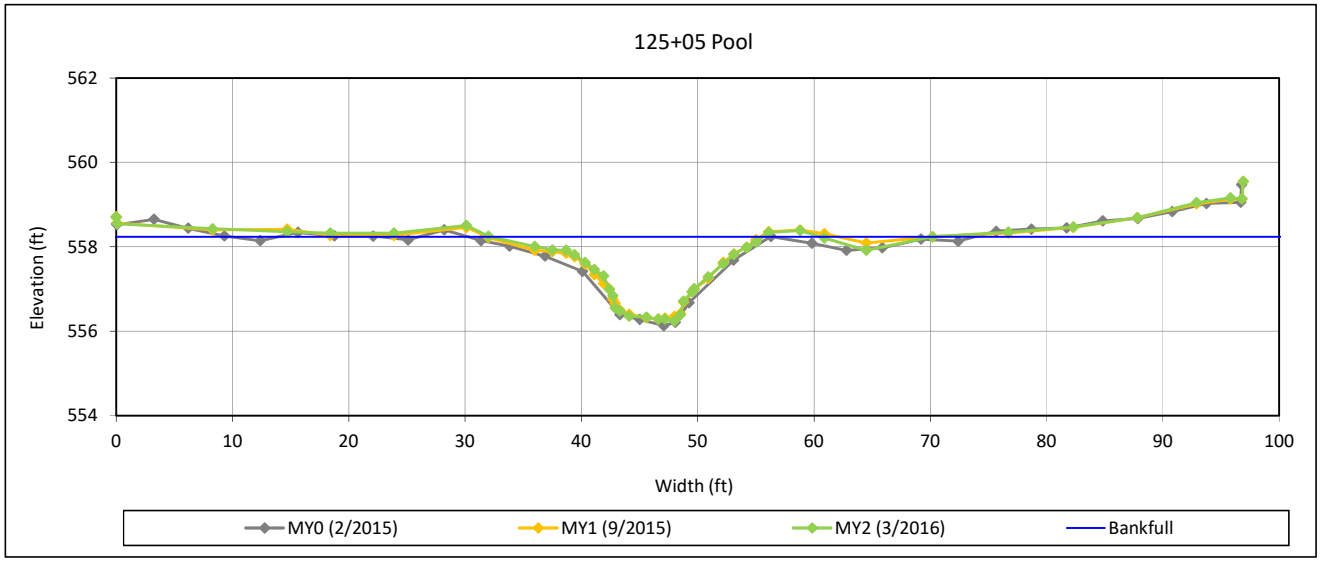
View Downstream

Cross Section Plots

Foust Creek Mitigation Site (DMS Project No. 95715)

Monitoring Year 2 - 2016

Cross Section 4- Foust Creek Reach 2



Bankfull Dimensions	
20.2	x-section area (ft.sq.)
23.5	width (ft)
0.9	mean depth (ft)
2.0	max depth (ft)
24.2	wetted parimeter (ft)
0.8	hyd radi (ft)
27.2	width-depth ratio

Survey Date: 3/2016

Field Crew: Wildlands Engineering

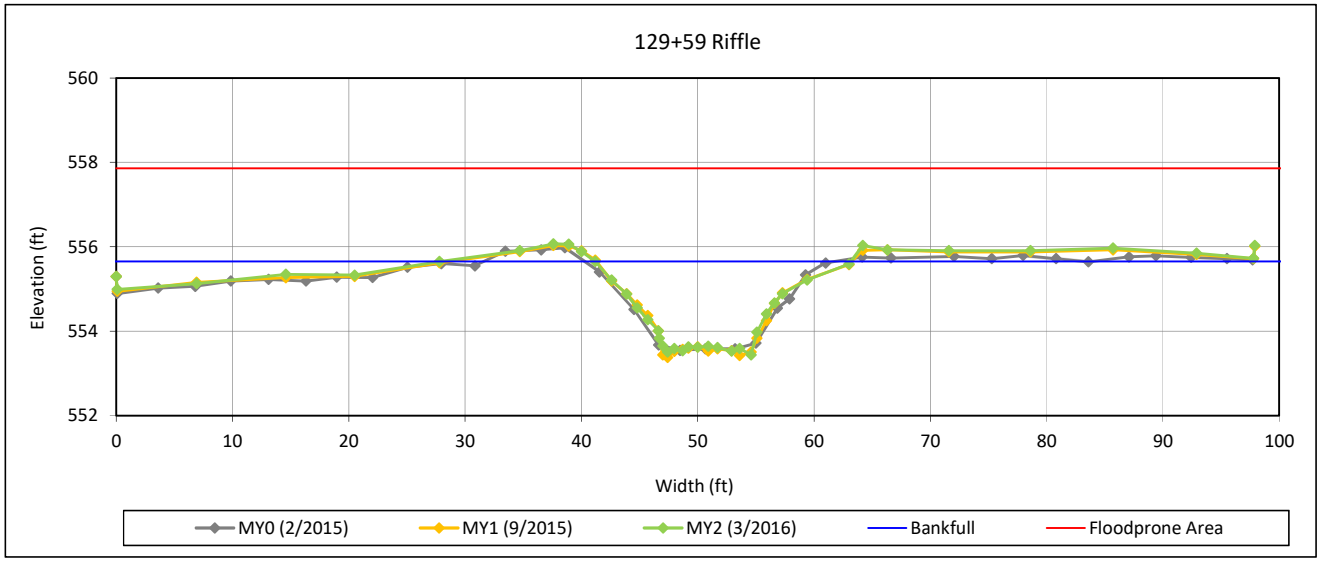
View Downstream

Cross Section Plots

Foust Creek Mitigation Site (DMS Project No. 95715)

Monitoring Year 2 - 2016

Cross Section 5- Foust Creek Reach 2



Bankfull Dimensions	
26.6	x-section area (ft.sq.)
22.0	width (ft)
1.2	mean depth (ft)
2.2	max depth (ft)
22.9	wetted parimeter (ft)
1.2	hyd radi (ft)
18.2	width-depth ratio
150.0	W flood prone area (ft)
6.8	entrenchment ratio
1.0	low bank height ratio

Survey Date: 3/2016

Field Crew: Wildlands Engineering

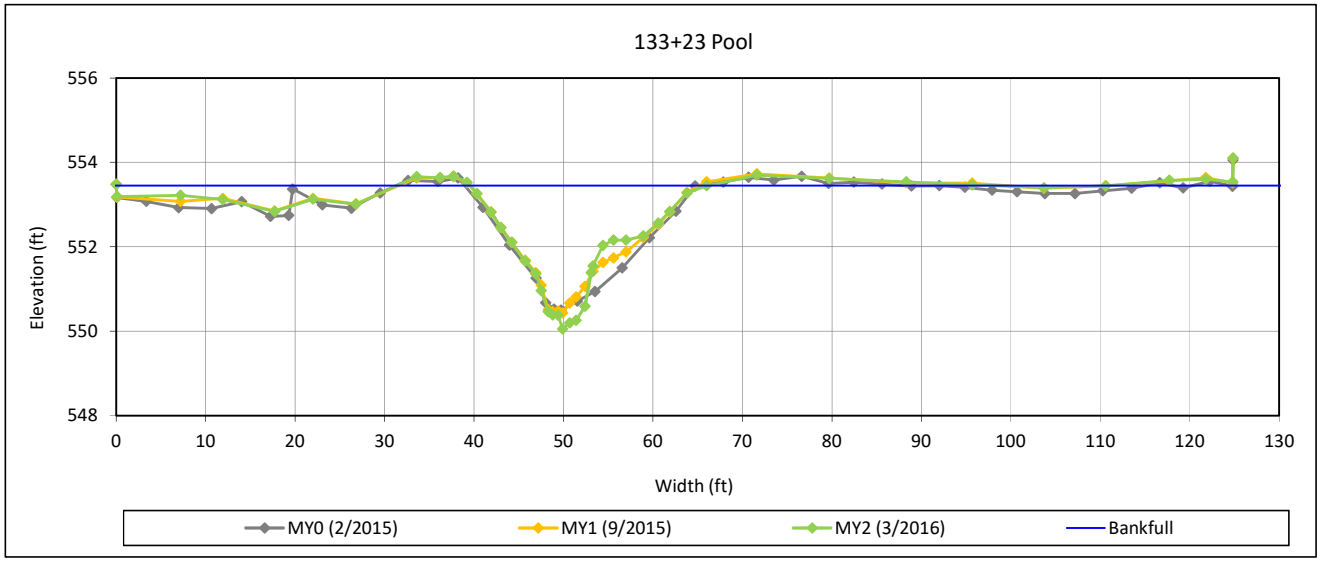
View Downstream

Cross Section Plots

Foust Creek Mitigation Site (DMS Project No. 95715)

Monitoring Year 2 - 2016

Cross Section 6- Foust Creek Reach 2



Bankfull Dimensions	
37.6	x-section area (ft.sq.)
26.5	width (ft)
1.4	mean depth (ft)
3.4	max depth (ft)
27.8	wetted parimeter (ft)
1.3	hyd radi (ft)
18.7	width-depth ratio

Survey Date: 3/2016

Field Crew: Wildlands Engineering

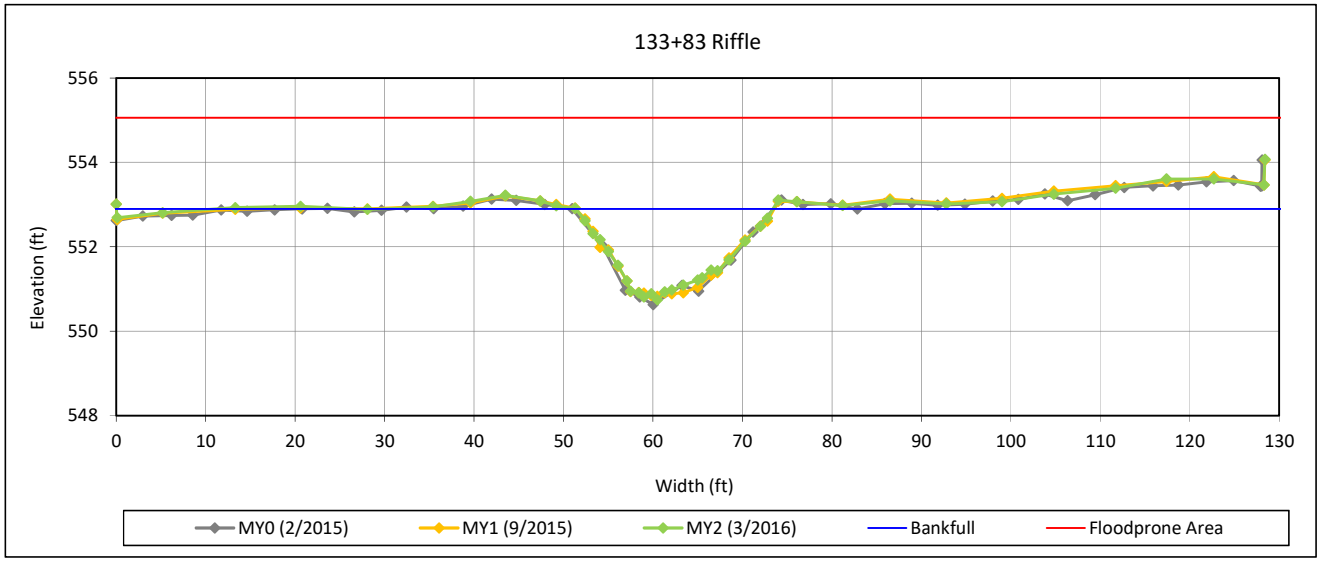
View Downstream

Cross Section Plots

Foust Creek Mitigation Site (DMS Project No. 95715)

Monitoring Year 2 - 2016

Cross Section 7- Foust Creek Reach 2



Bankfull Dimensions	
28.2	x-section area (ft.sq.)
22.1	width (ft)
1.3	mean depth (ft)
2.2	max depth (ft)
22.7	wetted parimeter (ft)
1.2	hyd radi (ft)
17.3	width-depth ratio
150.0	W flood prone area (ft)
6.8	entrenchment ratio
1.0	low bank height ratio

Survey Date: 3/2016

Field Crew: Wildlands Engineering

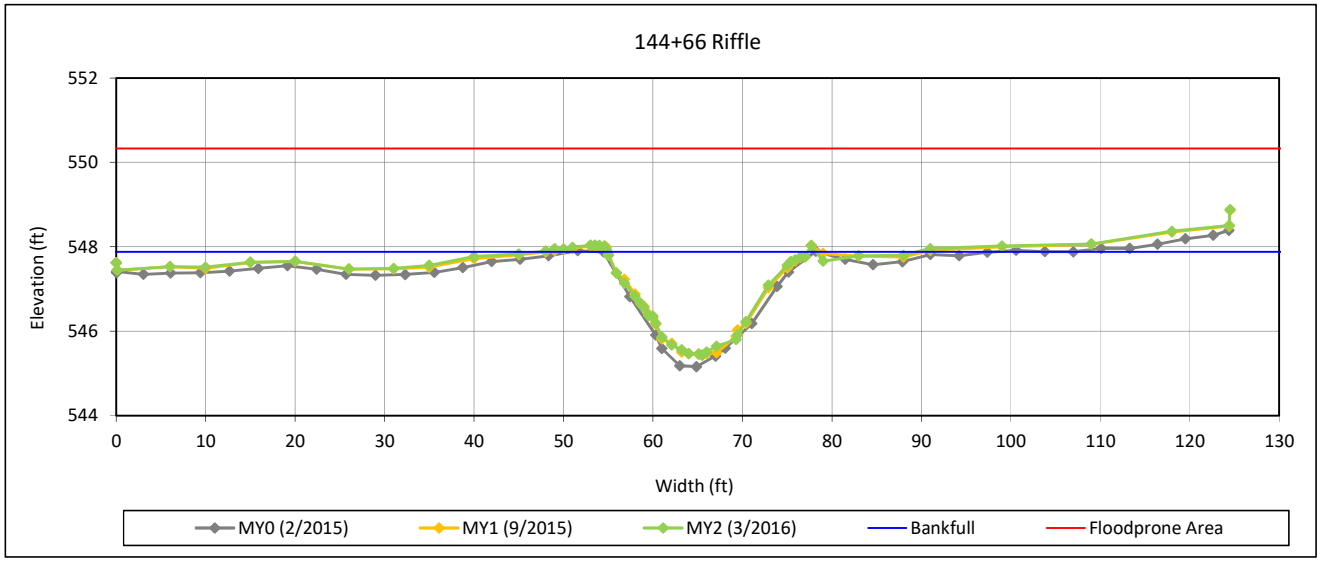
View Downstream

Cross Section Plots

Foust Creek Mitigation Site (DMS Project No. 95715)

Monitoring Year 2 - 2016

Cross Section 8- Foust Creek Reach 3B



Bankfull Dimensions	
31.9	x-section area (ft.sq.)
23.2	width (ft)
1.4	mean depth (ft)
2.5	max depth (ft)
24.0	wetted parimeter (ft)
1.3	hyd radi (ft)
16.9	width-depth ratio
150.0	W flood prone area (ft)
6.5	entrenchment ratio
1.0	low bank height ratio

Survey Date: 3/2016

Field Crew: Wildlands Engineering

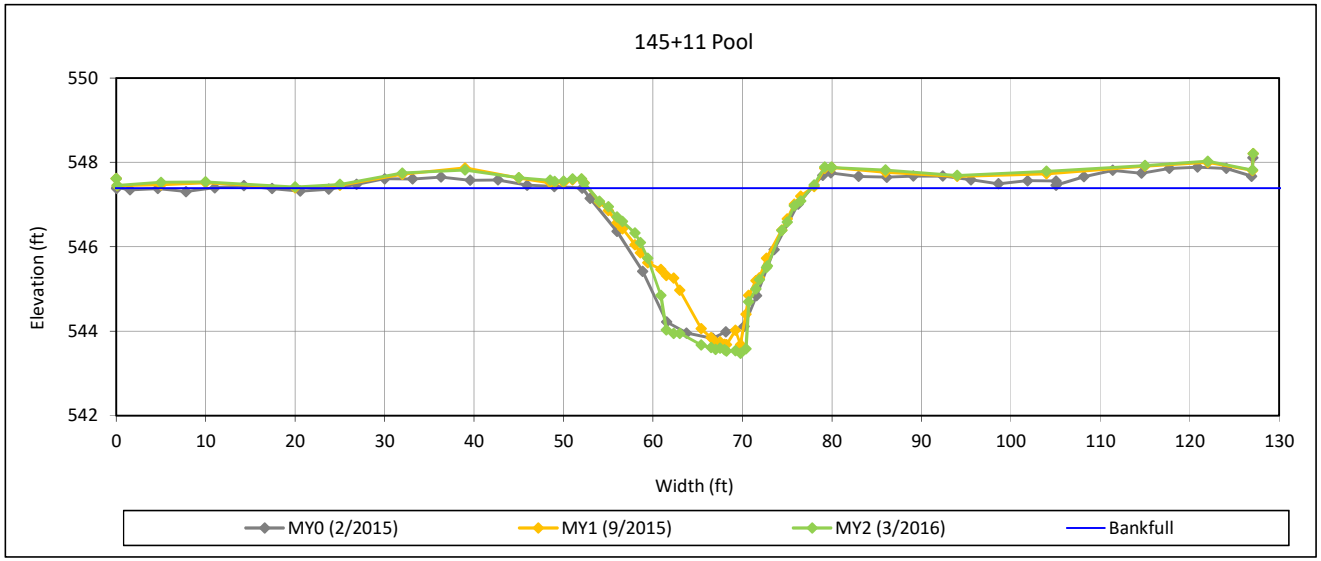
View Downstream

Cross Section Plots

Foust Creek Mitigation Site (DMS Project No. 95715)

Monitoring Year 2 - 2016

Cross Section 9- Foust Creek Reach 3B



Bankfull Dimensions	
51.9	x-section area (ft.sq.)
24.9	width (ft)
2.1	mean depth (ft)
3.9	max depth (ft)
27.2	wetted parimeter (ft)
1.9	hyd radi (ft)
11.9	width-depth ratio

Survey Date: 3/2016

Field Crew: Wildlands Engineering

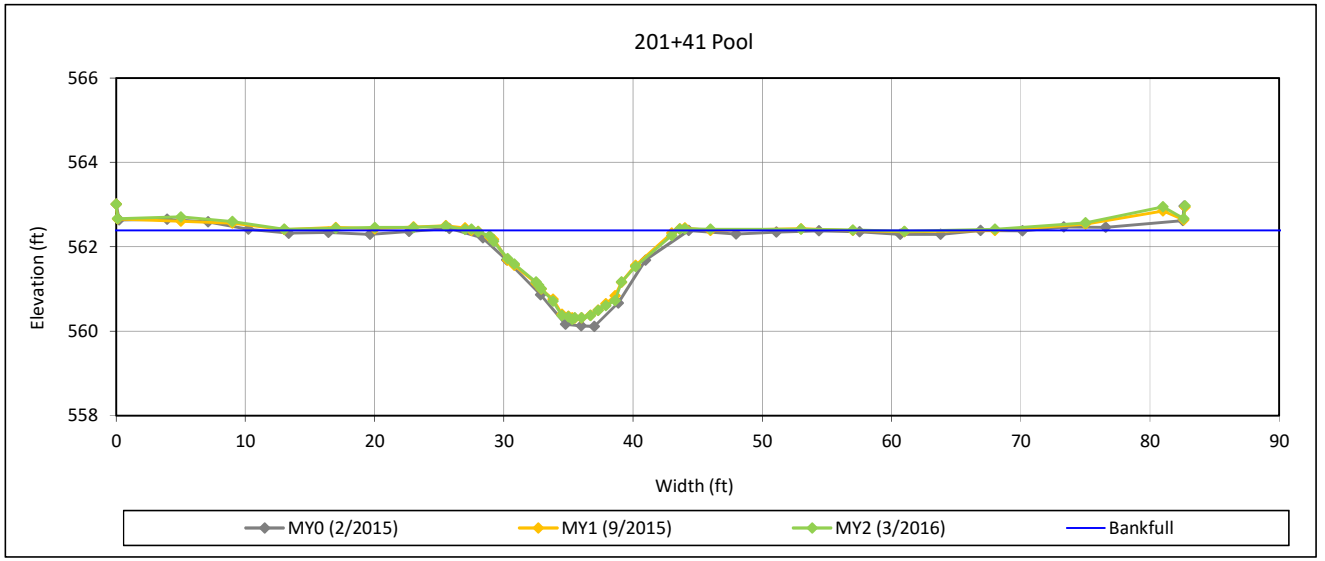
View Downstream

Cross Section Plots

Foust Creek Mitigation Site (DMS Project No. 95715)

Monitoring Year 2 - 2016

Cross Section 10-UT1



Bankfull Dimensions	
17.2	x-section area (ft.sq.)
15.7	width (ft)
1.1	mean depth (ft)
2.1	max depth (ft)
16.4	wetted parimeter (ft)
1.0	hyd radi (ft)
14.4	width-depth ratio

Survey Date: 3/2016

Field Crew: Wildlands Engineering

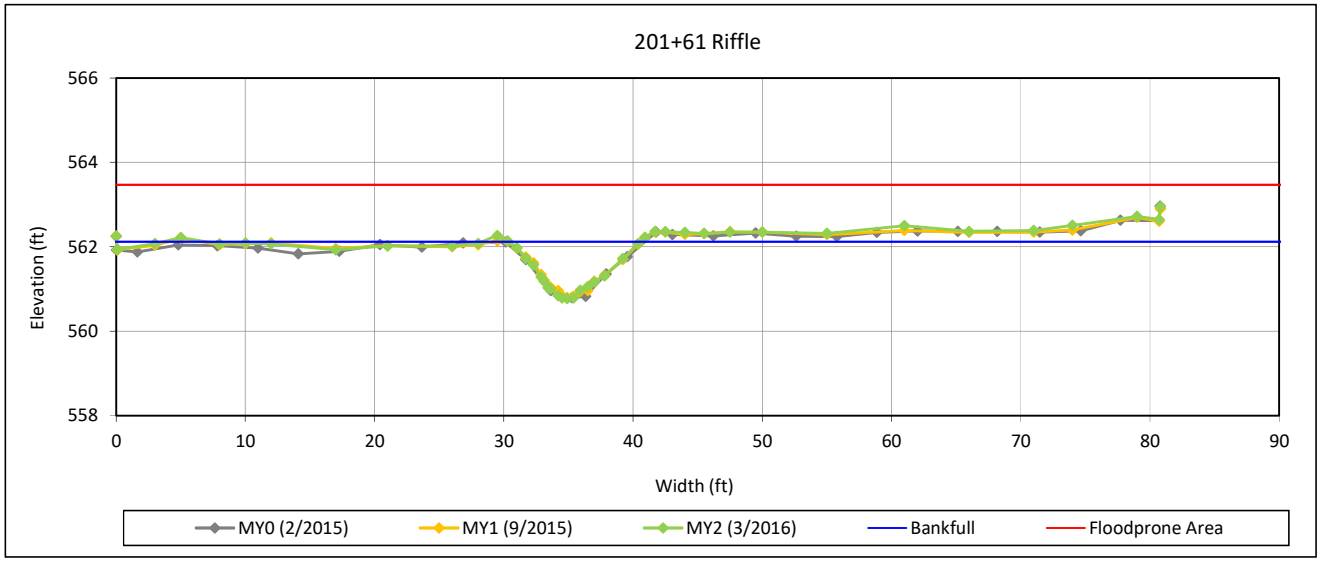
View Downstream

Cross Section Plots

Foust Creek Mitigation Site (DMS Project No. 95715)

Monitoring Year 2 - 2016

Cross Section 11-UT1



Bankfull Dimensions	
7.6	x-section area (ft.sq.)
10.2	width (ft)
0.7	mean depth (ft)
1.4	max depth (ft)
10.6	wetted parimeter (ft)
0.7	hyd radi (ft)
13.6	width-depth ratio
150.0	W flood prone area (ft)
14.8	entrenchment ratio
1.0	low bank height ratio

Survey Date: 3/2016

Field Crew: Wildlands Engineering

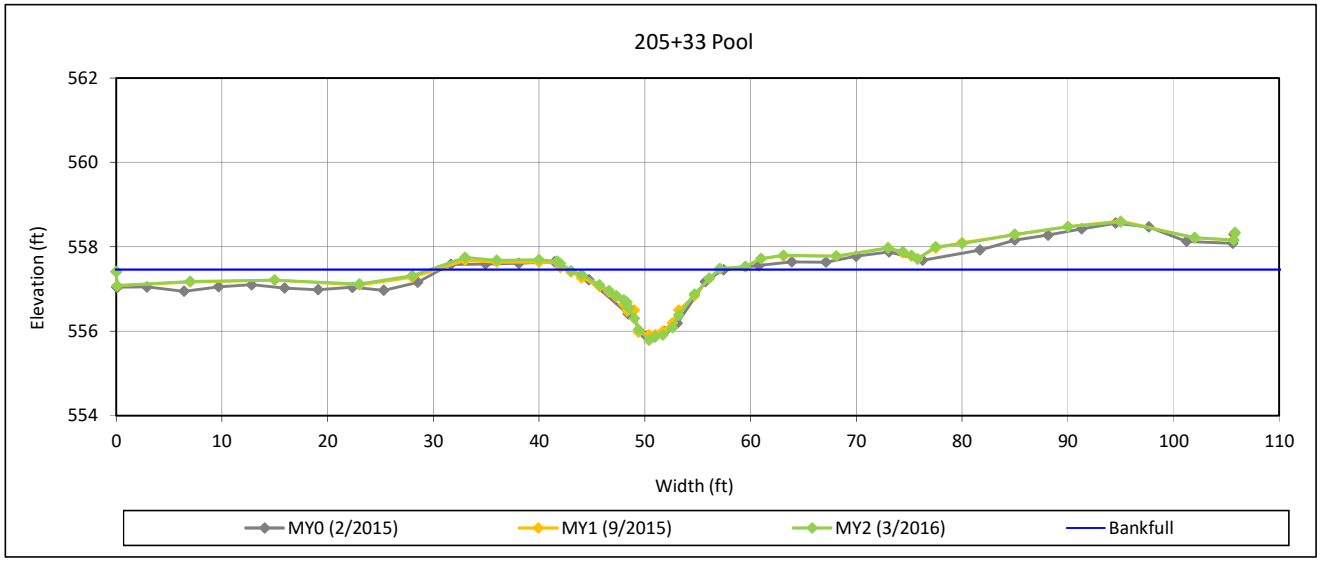
View Downstream

Cross Section Plots

Foust Creek Mitigation Site (DMS Project No. 95715)

Monitoring Year 2 - 2016

Cross Section 12-UT1



Bankfull Dimensions	
10.7	x-section area (ft.sq.)
14.1	width (ft)
0.8	mean depth (ft)
1.7	max depth (ft)
14.7	wetted parimeter (ft)
0.7	hyd radi (ft)
18.6	width-depth ratio

Survey Date: 3/2016

Field Crew: Wildlands Engineering

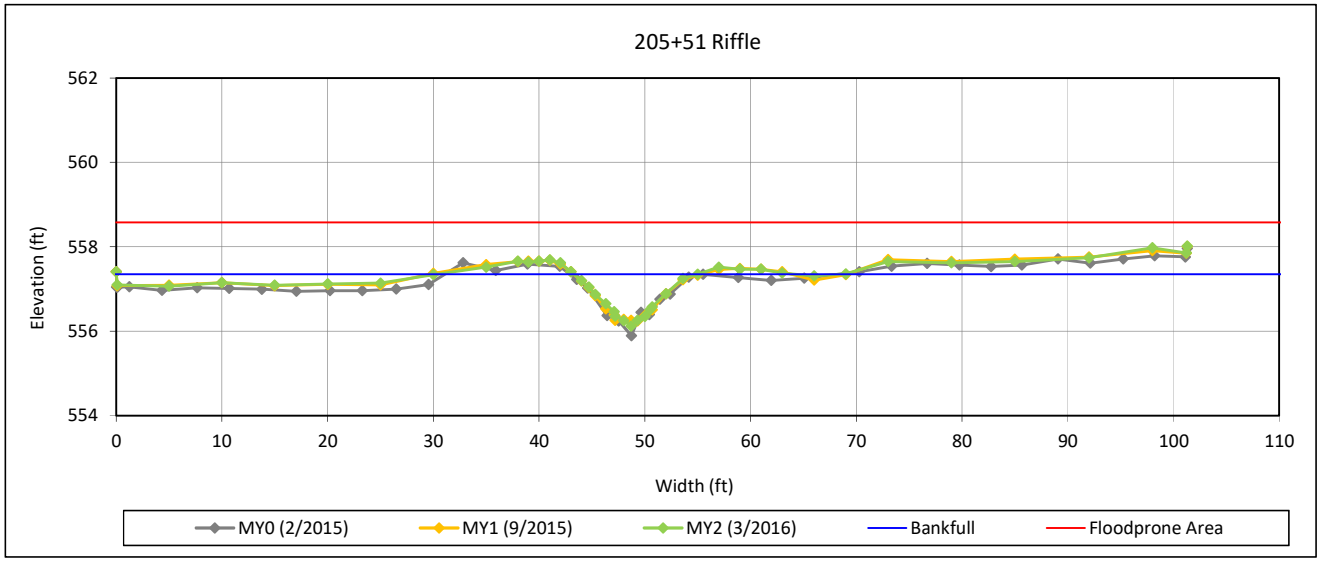
View Downstream

Cross Section Plots

Foust Creek Mitigation Site (DMS Project No. 95715)

Monitoring Year 2 - 2016

Cross Section 13-UT1



Bankfull Dimensions	
6.8	x-section area (ft.sq.)
11.7	width (ft)
0.6	mean depth (ft)
1.2	max depth (ft)
12.0	wetted parimeter (ft)
0.6	hyd radi (ft)
20.2	width-depth ratio
150.0	W flood prone area (ft)
12.8	entrenchment ratio
1.0	low bank height ratio

Survey Date: 3/2016

Field Crew: Wildlands Engineering

View Downstream

Reachwide and Cross Section Pebble Count Plots

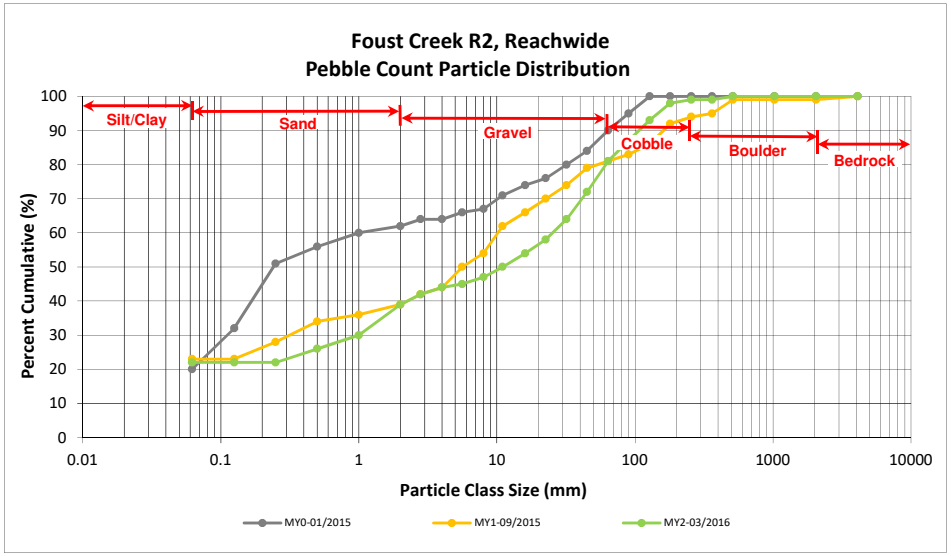
Foust Creek Mitigation Site (DMS Project No. 95715)

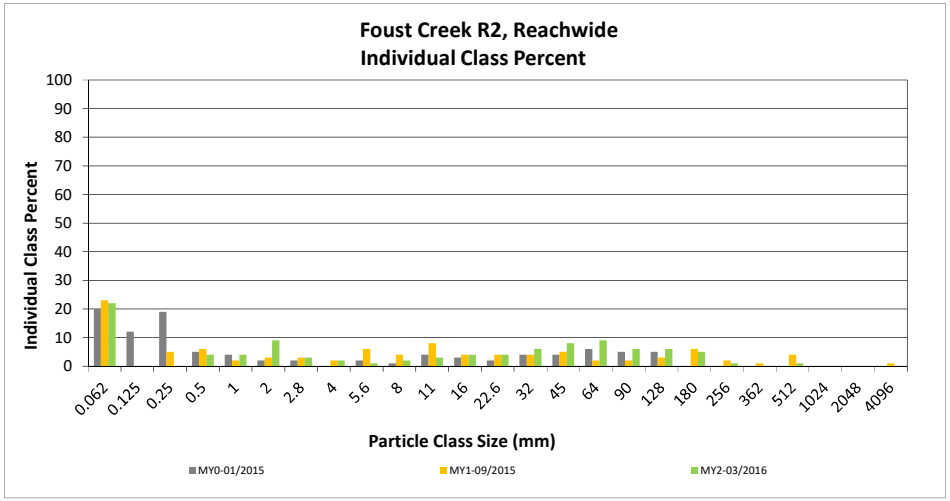
Monitoring Year 2 - 2016

Foust Creek R2, 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	5	17	22	22	22
SAND	Very fine	0.062	0.125					22
	Fine	0.125	0.250					22
	Medium	0.25	0.50		4	4	4	26
	Coarse	0.5	1.0		4	4	4	30
	Very Coarse	1.0	2.0		9	9	9	39
GRAVEL	Very Fine	2.0	2.8		3	3	3	42
	Very Fine	2.8	4.0		2	2	2	44
	Fine	4.0	5.6		1	1	1	45
	Fine	5.6	8.0		2	2	2	47
	Medium	8.0	11.0	1	2	3	3	50
	Medium	11.0	16.0		4	4	4	54
	Coarse	16.0	22.6	3	1	4	4	58
	Coarse	22.6	32	5	1	6	6	64
	Very Coarse	32	45	6	2	8	8	72
	Very Coarse	45	64	8	1	9	9	81
COBBLE	Small	64	90	5	1	6	6	87
	Small	90	128	3	3	6	6	93
	Large	128	180	3	2	5	5	98
	Large	180	256	1		1	1	99
BOULDER	Small	256	362					99
	Small	362	512		1	1	1	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} =	1.47
D_{50} =	11.0
D_{84} =	75.9
D_{95} =	146.7
D_{100} =	512.0





Reachwide and Cross Section Pebble Count Plots

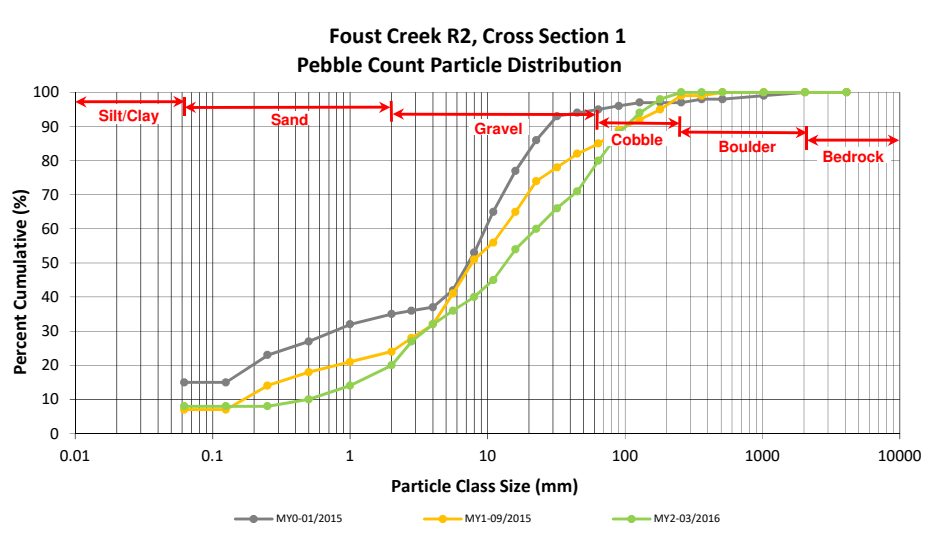
Foust Creek Mitigation Site (DMS Project No. 95715)

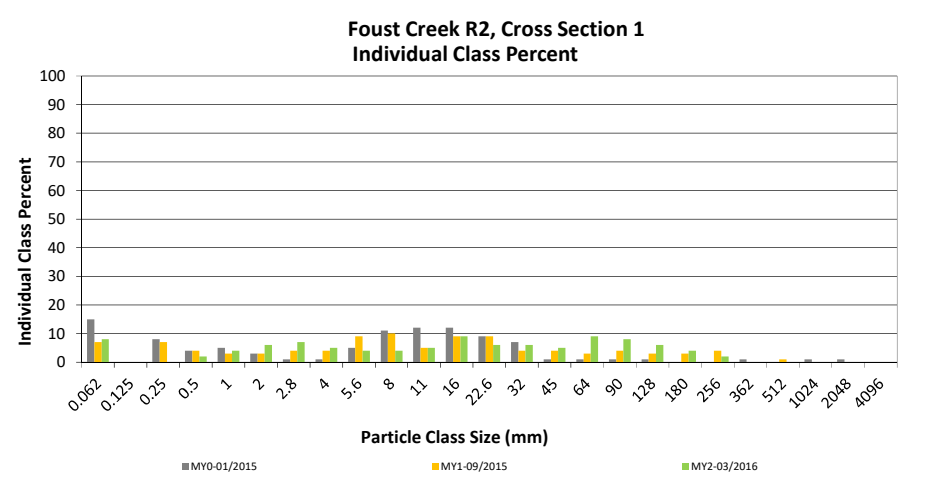
Monitoring Year 2 - 2016

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	8	8	8
SAND	Very fine	0.062	0.125			8
	Fine	0.125	0.250			8
	Medium	0.25	0.50	2	2	10
	Coarse	0.5	1.0	4	4	14
	Very Coarse	1.0	2.0	6	6	20
GRAVEL	Very Fine	2.0	2.8	7	7	27
	Very Fine	2.8	4.0	5	5	32
	Fine	4.0	5.6	4	4	36
	Fine	5.6	8.0	4	4	40
	Medium	8.0	11.0	5	5	45
	Medium	11.0	16.0	9	9	54
	Coarse	16.0	22.6	6	6	60
	Coarse	22.6	32	6	6	66
	Very Coarse	32	45	5	5	71
	Very Coarse	45	64	9	9	80
COBBLE	Small	64	90	8	8	88
	Small	90	128	6	6	94
	Large	128	180	4	4	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 1	
Channel materials (mm)	
D_{16} =	1.26
D_{35} =	5.15
D_{50} =	13.5
D_{84} =	75.9
D_{95} =	139.4
D_{100} =	256.0





Reachwide and Cross Section Pebble Count Plots

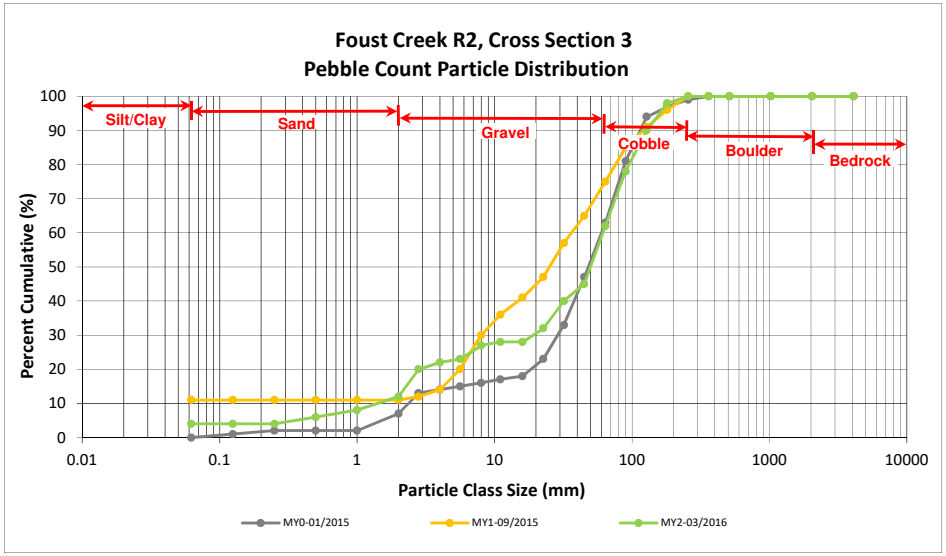
Foust Creek Mitigation Site (DMS Project No. 95715)

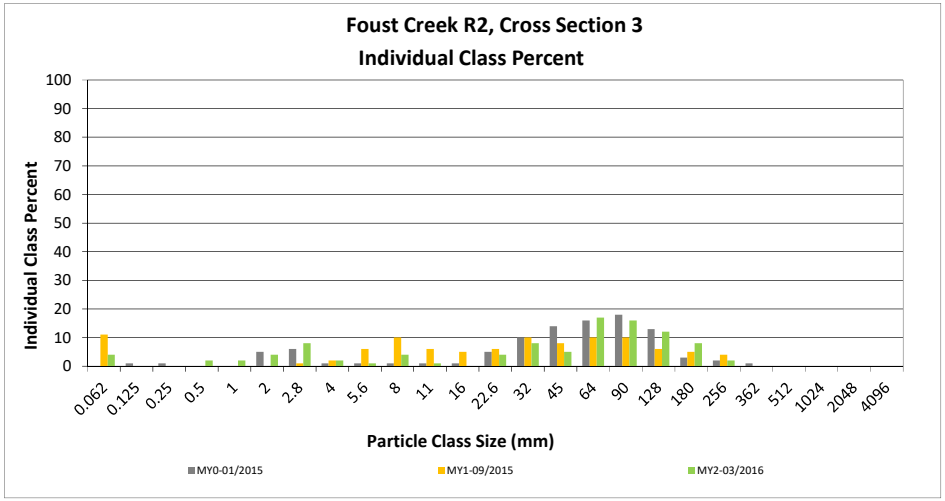
Monitoring Year 2 - 2016

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			4
	Medium	0.25	0.50	2	2	6
	Coarse	0.5	1.0	2	2	8
	Very Coarse	1.0	2.0	4	4	12
GRAVEL	Very Fine	2.0	2.8	8	8	20
	Very Fine	2.8	4.0	2	2	22
	Fine	4.0	5.6	1	1	23
	Fine	5.6	8.0	4	4	27
	Medium	8.0	11.0	1	1	28
	Medium	11.0	16.0			28
	Coarse	16.0	22.6	4	4	32
	Coarse	22.6	32	8	8	40
	Very Coarse	32	45	5	5	45
	Very Coarse	45	64	17	17	62
COBBLE	Small	64	90	16	16	78
	Small	90	128	12	12	90
	Large	128	180	8	8	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 3	
Channel materials (mm)	
D_{16} =	2.37
D_{35} =	25.75
D_{50} =	49.9
D_{84} =	107.3
D_{95} =	158.4
D_{100} =	256.0





Reachwide and Cross Section Pebble Count Plots

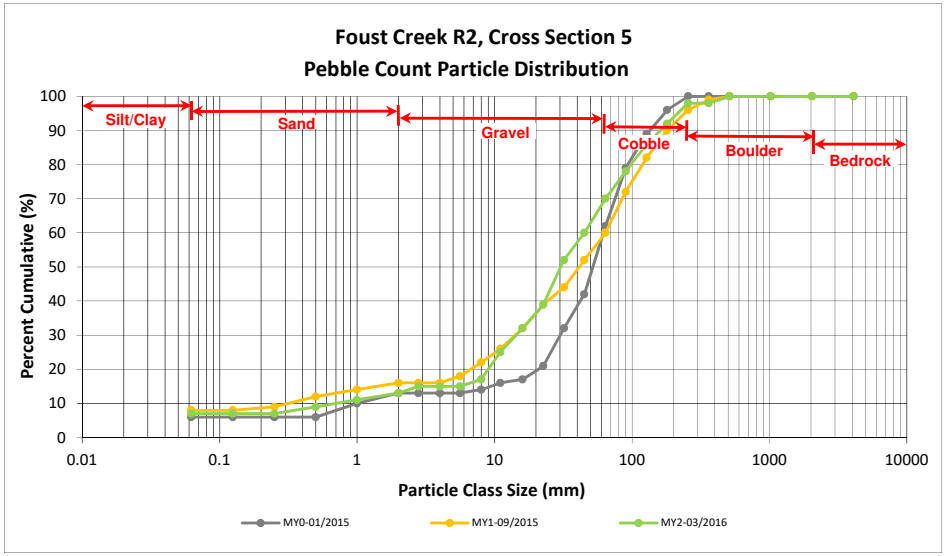
Foust Creek Mitigation Site (DMS Project No. 95715)

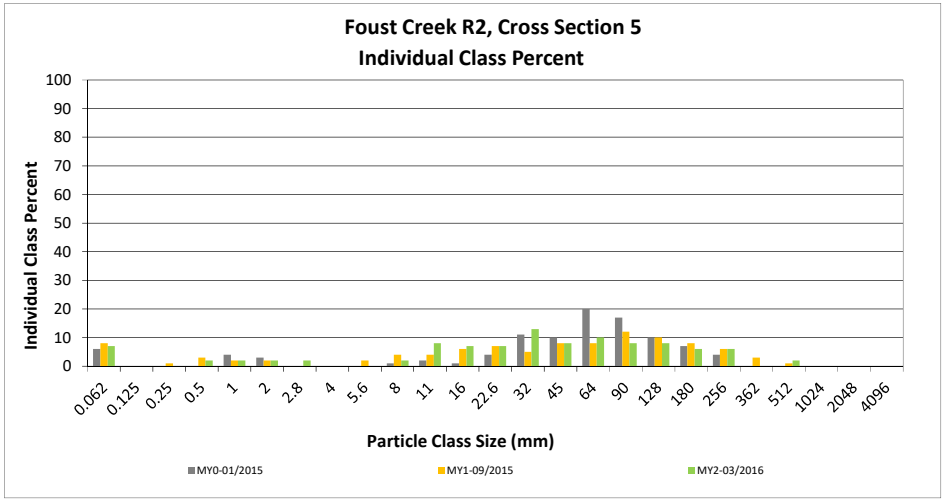
Monitoring Year 2 - 2016

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	7	7	7
SAND	Very fine	0.062	0.125			7
	Fine	0.125	0.250			7
	Medium	0.25	0.50	2	2	9
	Coarse	0.5	1.0	2	2	11
	Very Coarse	1.0	2.0	2	2	13
GRAVEL	Very Fine	2.0	2.8	2	2	15
	Very Fine	2.8	4.0			15
	Fine	4.0	5.6			15
	Fine	5.6	8.0	2	2	17
	Medium	8.0	11.0	8	8	25
	Medium	11.0	16.0	7	7	32
	Coarse	16.0	22.6	7	7	39
	Coarse	22.6	32	13	13	52
	Very Coarse	32	45	8	8	60
	Very Coarse	45	64	10	10	70
COBBLE	Small	64	90	8	8	78
	Small	90	128	8	8	86
	Large	128	180	6	6	92
	Large	180	256	6	6	98
BOULDER	Small	256	362			98
	Small	362	512	2	2	100
	Medium	512	1024			100
	Large/Very Large	1024	2048			100
BEDROCK	Bedrock	2048	>2048			100
			Total	**100**	**100**	**100**

Cross Section 5	
Channel materials (mm)	
D_{16} =	6.69
D_{35} =	18.55
D_{50} =	30.3
D_{84} =	117.2
D_{95} =	214.7
D_{100} =	512.0





Reachwide and Cross Section Pebble Count Plots

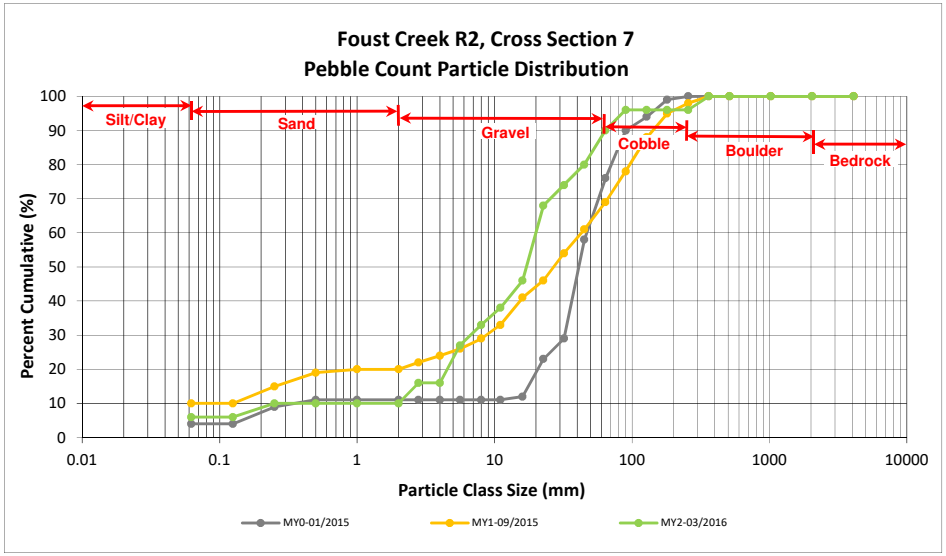
Foust Creek Mitigation Site (DMS Project No. 95715)

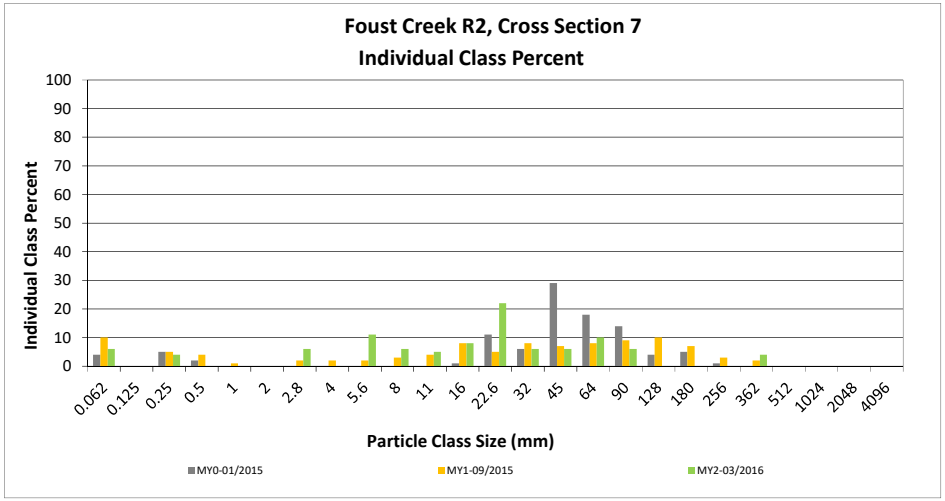
Monitoring Year 2 - 2016

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	6	6	6
SAND	Very fine	0.062	0.125			6
	Fine	0.125	0.250	4	4	10
	Medium	0.25	0.50			10
	Coarse	0.5	1.0			10
	Very Coarse	1.0	2.0			10
GRAVEL	Very Fine	2.0	2.8	6	6	16
	Very Fine	2.8	4.0			16
	Fine	4.0	5.6	11	11	27
	Fine	5.6	8.0	6	6	33
	Medium	8.0	11.0	5	5	38
	Medium	11.0	16.0	8	8	46
	Coarse	16.0	22.6	22	22	68
	Coarse	22.6	32	6	6	74
	Very Coarse	32	45	6	6	80
	Very Coarse	45	64	10	10	90
COBBLE	Small	64	90	6	6	96
	Small	90	128			96
	Large	128	180			96
	Large	180	256			96
BOULDER	Small	256	362	4	4	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} =	2.80
D_{35} =	9.09
D_{50} =	17.0
D_{84} =	51.8
D_{95} =	85.0
D_{100} =	362.0





Reachwide and Cross Section Pebble Count Plots

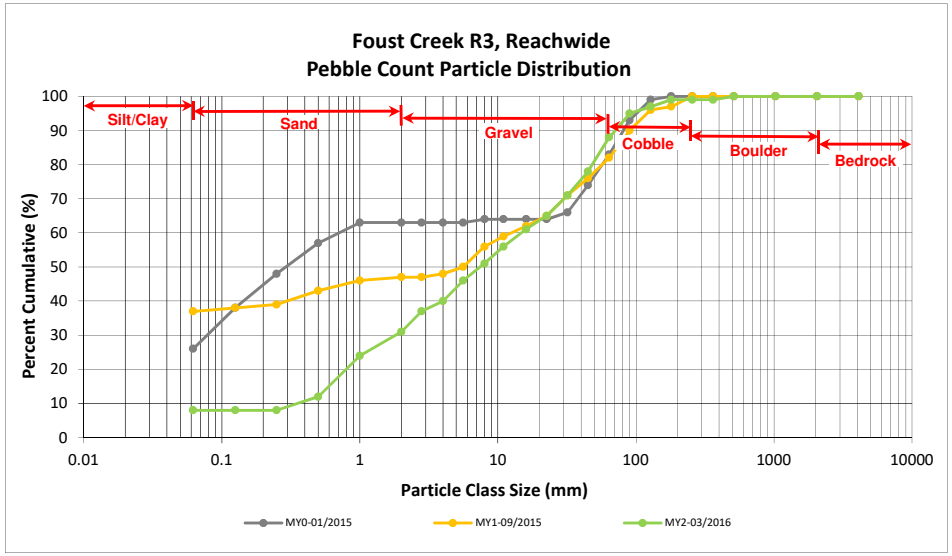
Foust Creek Mitigation Site (DMS Project No. 95715)

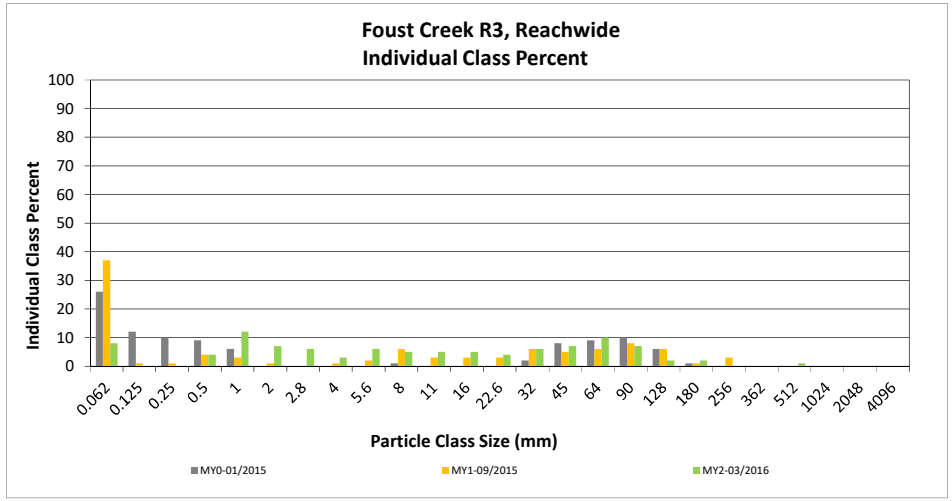
Monitoring Year 2 - 2016

Foust Creek R3, 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		8	8	8	8
SAND	Very fine	0.062	0.125					8
	Fine	0.125	0.250					8
	Medium	0.25	0.50		4	4	4	12
	Coarse	0.5	1.0	1	11	12	12	24
	Very Coarse	1.0	2.0		7	7	7	31
GRAVEL	Very Fine	2.0	2.8		6	6	6	37
	Very Fine	2.8	4.0		3	3	3	40
	Fine	4.0	5.6	1	5	6	6	46
	Fine	5.6	8.0	1	4	5	5	51
	Medium	8.0	11.0	1	4	5	5	56
	Medium	11.0	16.0	2	3	5	5	61
	Coarse	16.0	22.6	4		4	4	65
	Coarse	22.6	32	6		6	6	71
	Very Coarse	32	45	4	3	7	7	78
	Very Coarse	45	64	8	2	10	10	88
COBBLE	Small	64	90	7		7	7	95
	Small	90	128	2		2	2	97
	Large	128	180	2		2	2	99
	Large	180	256					99
BOULDER	Small	256	362					99
	Small	362	512	1		1	1	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} =	0.63
D_{35} =	2.50
D_{50} =	7.4
D_{84} =	55.6
D_{95} =	90.0
D_{100} =	512.0





Reachwide and Cross Section Pebble Count Plots

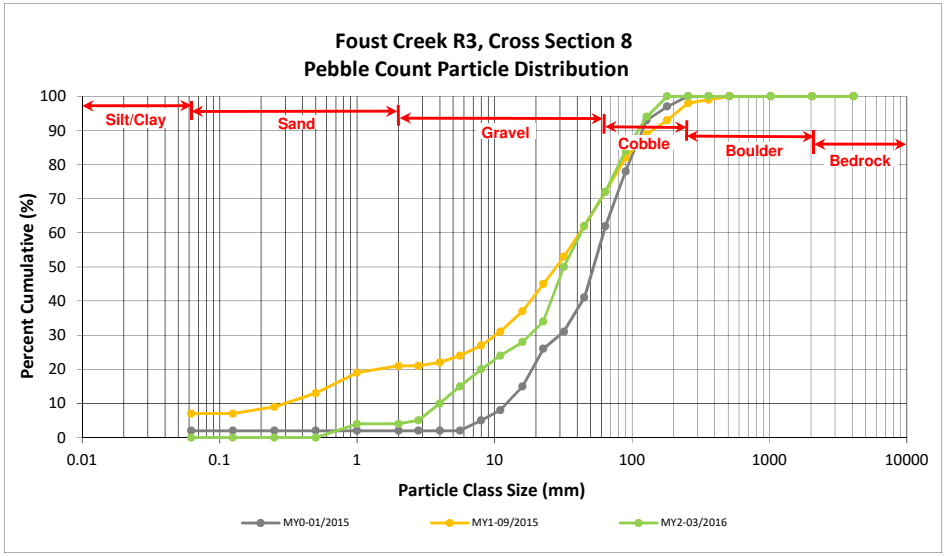
Foust Creek Mitigation Site (DMS Project No. 95715)

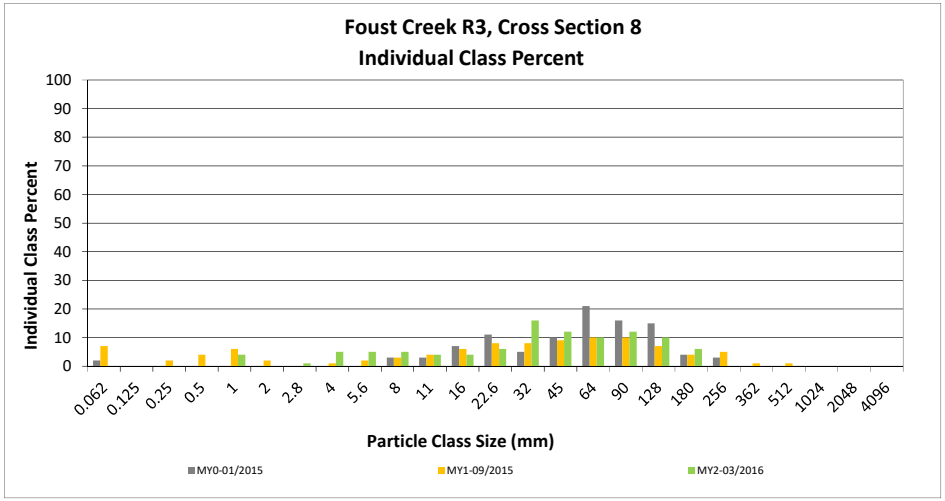
Monitoring Year 2 - 2016

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			0
	Coarse	0.5	1.0	4	4	4
	Very Coarse	1.0	2.0			4
GRAVEL	Very Fine	2.0	2.8	1	1	5
	Very Fine	2.8	4.0	5	5	10
	Fine	4.0	5.6	5	5	15
	Fine	5.6	8.0	5	5	20
	Medium	8.0	11.0	4	4	24
	Medium	11.0	16.0	4	4	28
	Coarse	16.0	22.6	6	6	34
	Coarse	22.6	32	16	16	50
	Very Coarse	32	45	12	12	62
	Very Coarse	45	64	10	10	72
COBBLE	Small	64	90	12	12	84
	Small	90	128	10	10	94
	Large	128	180	6	6	100
	Large	180	256			100
BOULDER	Small	256	362			100
	Small	362	512			100
	Medium	512	1024			100
	Large/Very Large	1024	2048			100
BEDROCK	Bedrock	2048	>2048			100
			Total	**100**	**100**	**100**

Cross Section 8	
Channel materials (mm)	
D_{16} =	6.01
D_{35} =	23.10
D_{50} =	32.0
D_{84} =	90.0
D_{95} =	135.5
D_{100} =	180.0





Reachwide and Cross Section Pebble Count Plots

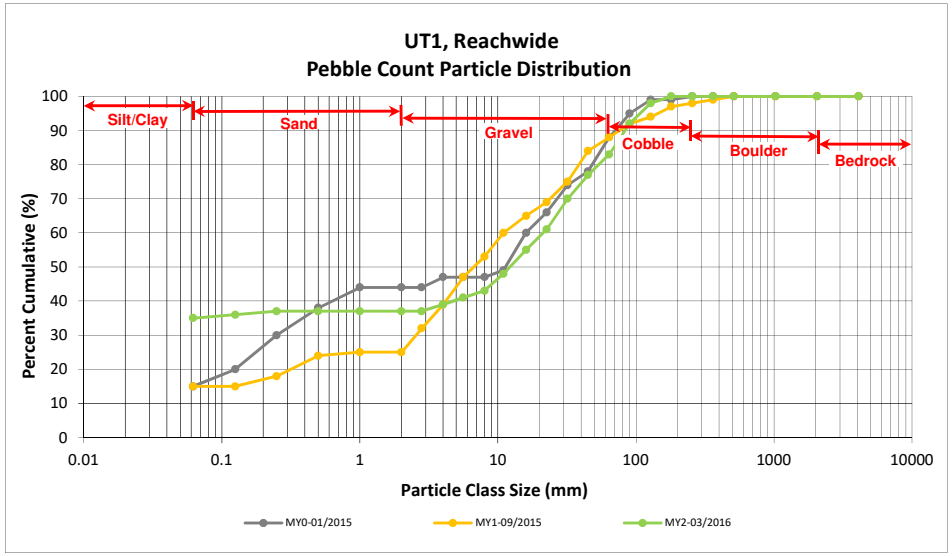
Foust Creek Mitigation Site (DMS Project No. 95715)

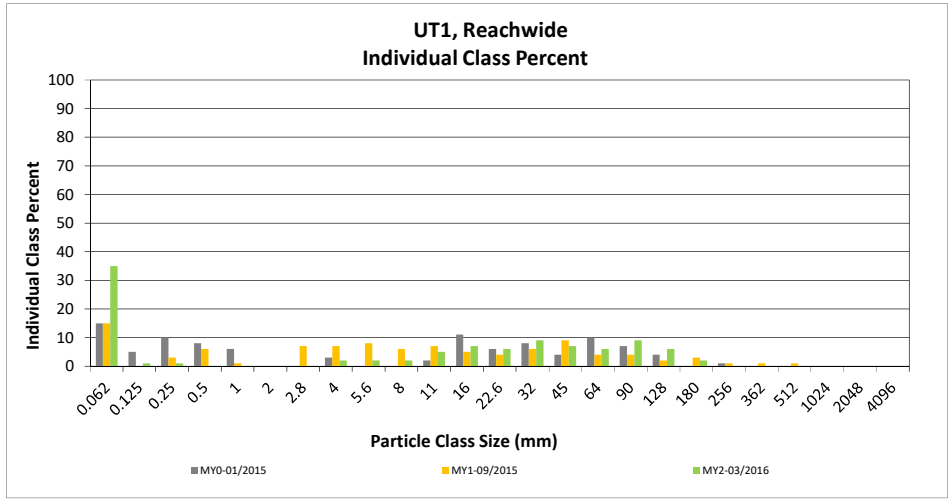
Monitoring Year 2 - 2016

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	3	32	35	35	35
SAND	Very fine	0.062	0.125		1	1	1	36
	Fine	0.125	0.250		1	1	1	37
	Medium	0.25	0.50					37
	Coarse	0.5	1.0					37
	Very Coarse	1.0	2.0					37
GRAVEL	Very Fine	2.0	2.8					37
	Very Fine	2.8	4.0	1	1	2	2	39
	Fine	4.0	5.6		2	2	2	41
	Fine	5.6	8.0		2	2	2	43
	Medium	8.0	11.0	3	2	5	5	48
	Medium	11.0	16.0	5	2	7	7	55
	Coarse	16.0	22.6	4	2	6	6	61
	Coarse	22.6	32	5	4	9	9	70
	Very Coarse	32	45	6	1	7	7	77
	Very Coarse	45	64	6		6	6	83
COBBLE	Small	64	90	9		9	9	92
	Small	90	128	6		6	6	98
	Large	128	180	2		2	2	100
	Large	180	256					100
BOULDER	Small	256	362					100
	Small	362	512					100
	Medium	512	1024					100
	Large/Very Large	1024	2048					100
BEDROCK	Bedrock	2048	>2048					100
			Total	**50**	**50**	**100**	**100**	**100**

Reachwide	
Channel materials (mm)	
D_{16} =	Silt/Clay
D_{35} =	Silt/Clay
D_{50} =	12.2
D_{84} =	66.5
D_{95} =	107.3
D_{100} =	180.0





Reachwide and Cross Section Pebble Count Plots

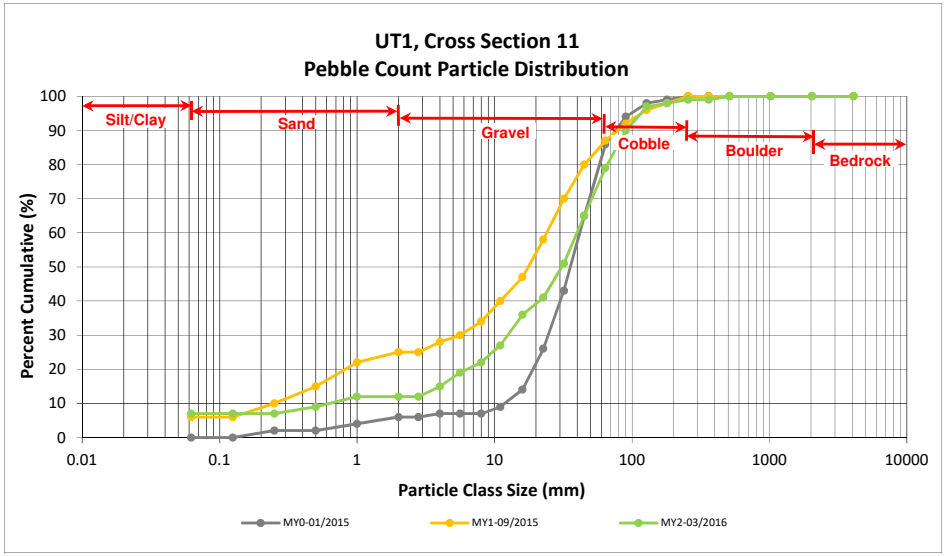
Foust Creek Mitigation Site (DMS Project No. 95715)

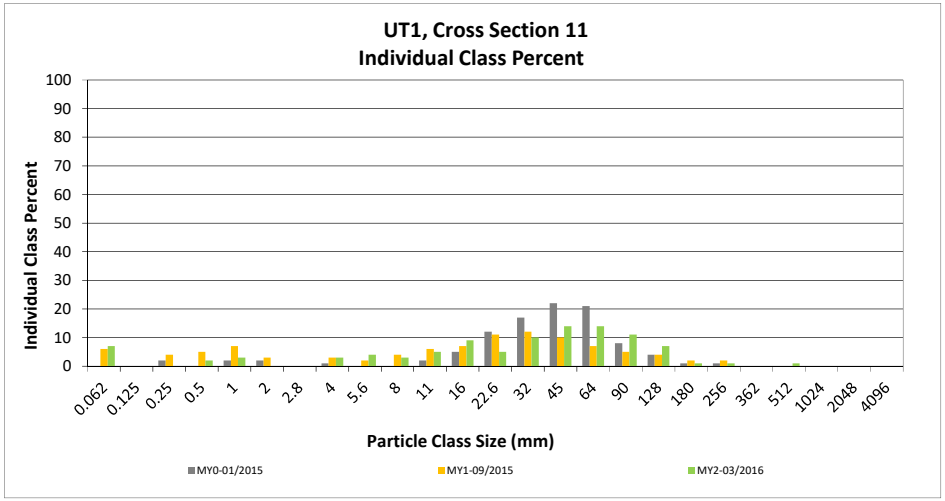
Monitoring Year 2 - 2016

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	7	7	7
SAND	Very fine	0.062	0.125			7
	Fine	0.125	0.250			7
	Medium	0.25	0.50	2	2	9
	Coarse	0.5	1.0	3	3	12
	Very Coarse	1.0	2.0			12
GRAVEL	Very Fine	2.0	2.8			12
	Very Fine	2.8	4.0	3	3	15
	Fine	4.0	5.6	4	4	19
	Fine	5.6	8.0	3	3	22
	Medium	8.0	11.0	5	5	27
	Medium	11.0	16.0	9	9	36
	Coarse	16.0	22.6	5	5	41
	Coarse	22.6	32	10	10	51
	Very Coarse	32	45	14	14	65
	Very Coarse	45	64	14	14	79
COBBLE	Small	64	90	11	11	90
	Small	90	128	7	7	97
	Large	128	180	1	1	98
	Large	180	256	1	1	99
BOULDER	Small	256	362			99
	Small	362	512	1	1	100
	Medium	512	1024			100
	Large/Very Large	1024	2048			100
BEDROCK	Bedrock	2048	>2048			100
			Total	**100**	**100**	**100**

Cross Section 11	
Channel materials (mm)	
D_{16} =	4.35
D_{35} =	15.35
D_{50} =	30.9
D_{84} =	74.7
D_{95} =	115.7
D_{100} =	512.0





Reachwide and Cross Section Pebble Count Plots

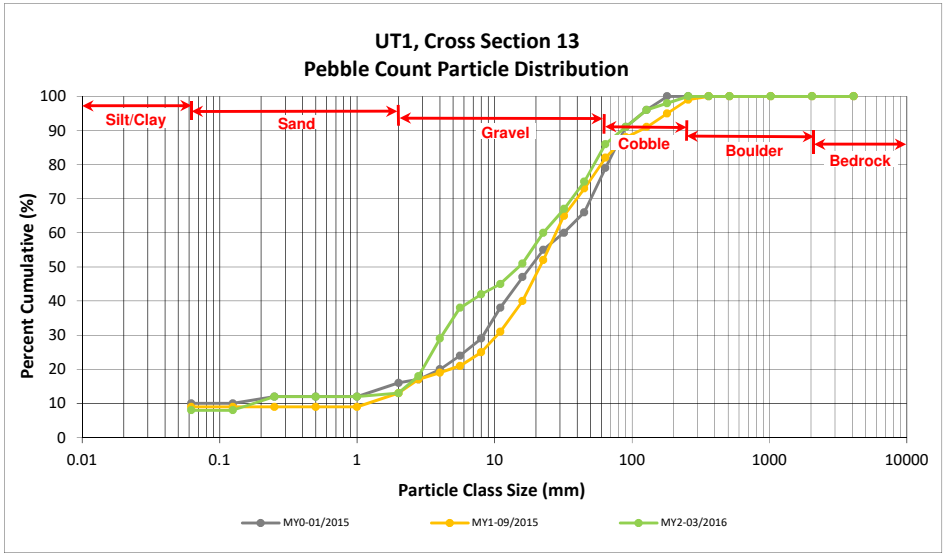
Foust Creek Mitigation Site (DMS Project No. 95715)

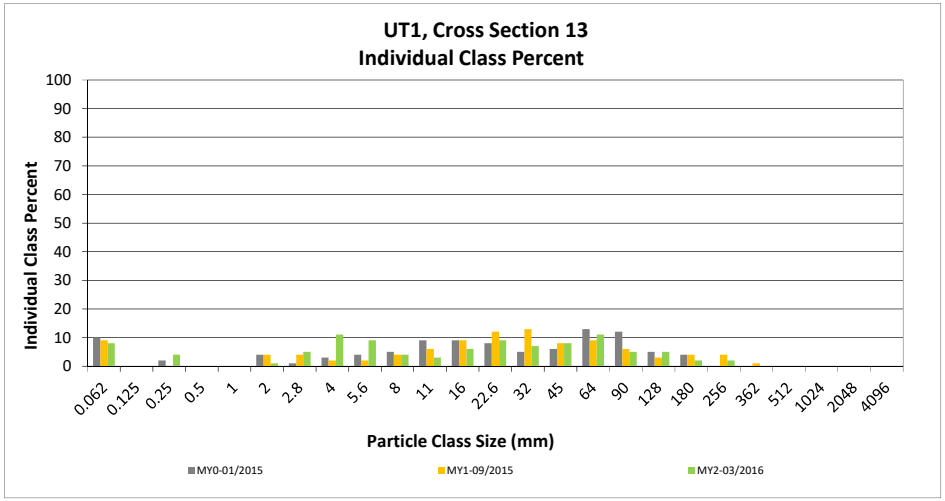
Monitoring Year 2 - 2016

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	8	8	8
SAND	Very fine	0.062	0.125			8
	Fine	0.125	0.250	4	4	12
	Medium	0.25	0.50			12
	Coarse	0.5	1.0			12
	Very Coarse	1.0	2.0	1	1	13
GRAVEL	Very Fine	2.0	2.8	5	5	18
	Very Fine	2.8	4.0	11	11	29
	Fine	4.0	5.6	9	9	38
	Fine	5.6	8.0	4	4	42
	Medium	8.0	11.0	3	3	45
	Medium	11.0	16.0	6	6	51
	Coarse	16.0	22.6	9	9	60
	Coarse	22.6	32	7	7	67
	Very Coarse	32	45	8	8	75
	Very Coarse	45	64	11	11	86
COBBLE	Small	64	90	5	5	91
	Small	90	128	5	5	96
	Large	128	180	2	2	98
	Large	180	256	2	2	100
BOULDER	Small	256	362			100
	Small	362	512			100
	Medium	512	1024			100
	Large/Very Large	1024	2048			100
BEDROCK	Bedrock	2048	>2048			100
			Total	**100**	**100**	**100**

Cross Section 13	
Channel materials (mm)	
D_{16} =	2.45
D_{35} =	5.01
D_{50} =	15.0
D_{84} =	60.0
D_{95} =	119.3
D_{100} =	256.0





APPENDIX 5. Hydrology Summary Data and Plots

Table 13. Verification of Bankfull Events

Foust Creek Mitigation Site (DMS Project No. 95715)

Monitoring Year 2 - 2016

Reach	Date of Data Collection	Date of Occurrence	Method
Foust Creek	3/8/2016	1/2016- 3/2016	Crest Gage/ Pressure Transducer
	8/2/2016	6/7/2016	
	10/6/2016	10/8/2016	
UT1	3/8/2016	1/2016- 3/2016	

Table 14. Wetland Gage Attainment Summary

Foust Creek Mitigation Site (DMS Project No. 95715)

Monitoring Year 2 - 2016

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%)					
2	Yes/46 Days (20.0%)	Yes/49 Days (19.5%)					
3	Yes/57 Days (24.6%)	Yes/91 Days (36.3%)					
4	Yes/63 Days (27.2%)	Yes/86 Days (34.3%)					
5	Yes/124 Days (53.7%)	Yes/196 Days (78.1%)					
6	Yes/47 Days (20.2%)	Yes/49 Days (19.5%)					
7	Yes/152 Days (66.1%)	Yes/218 Days (86.9%)					
8	Yes/51 Days (22.0%)	Yes/74 Days (29.5%)					
9	No/ 16 Days (7.0%)	No/ 12 Days (4.8%)					
10	Yes/ 119 Days (51.7%)	Yes/179 Days (71.3%)					

BANKFULL VERIFICATION PHOTOGRAPHS
Monitoring Year 2

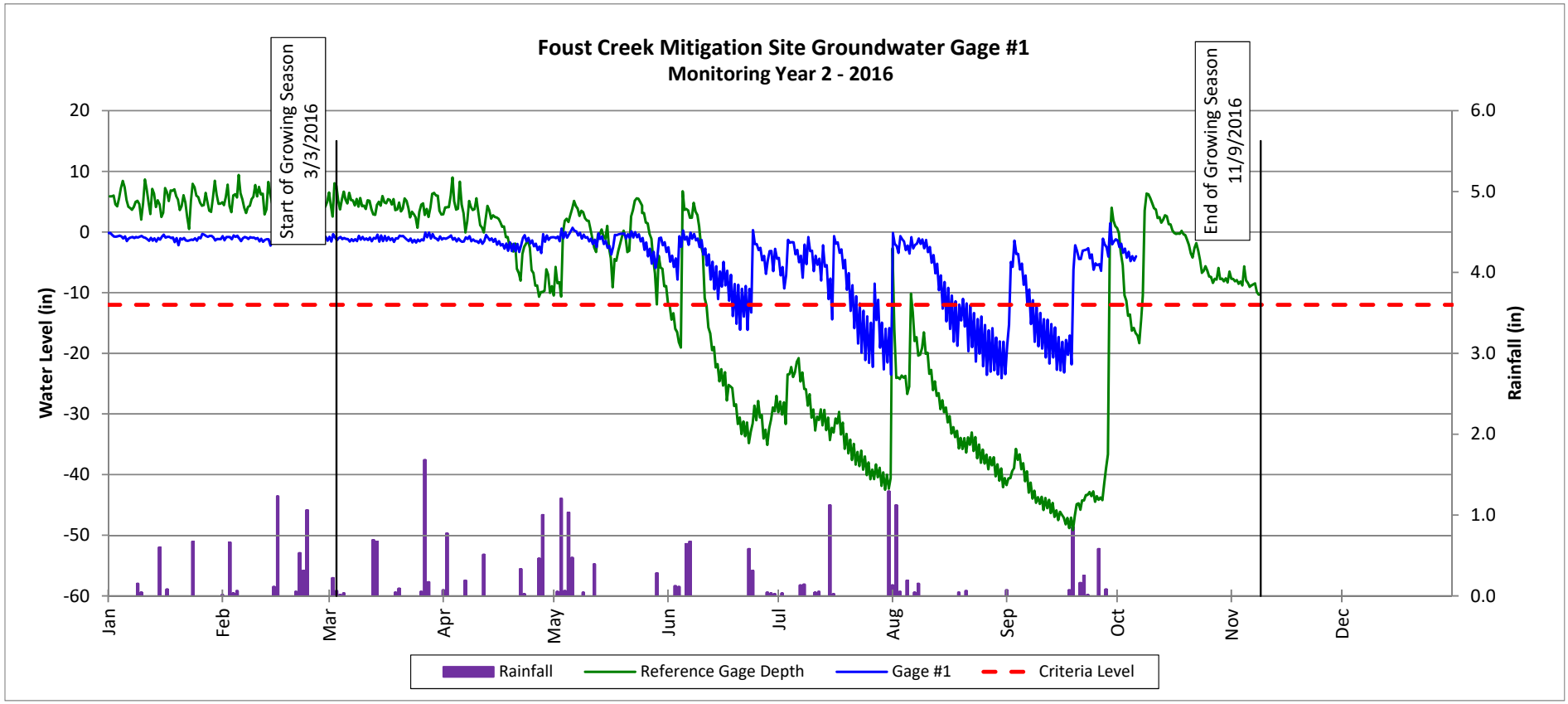
	
Foust Creek – *(3/9/2016)*	**Foust Creek** – *(3/9/2016)*
	
Foust Creek – *(3/9/2016)*	**Foust Creek** – *(3/9/2016)*

	
UT1 – *(3/9/2016)*	**UT1** – *(3/9/2016)*

Groundwater Gage Plots

Foust Creek Mitigation Site (DMS Project No. 95715)

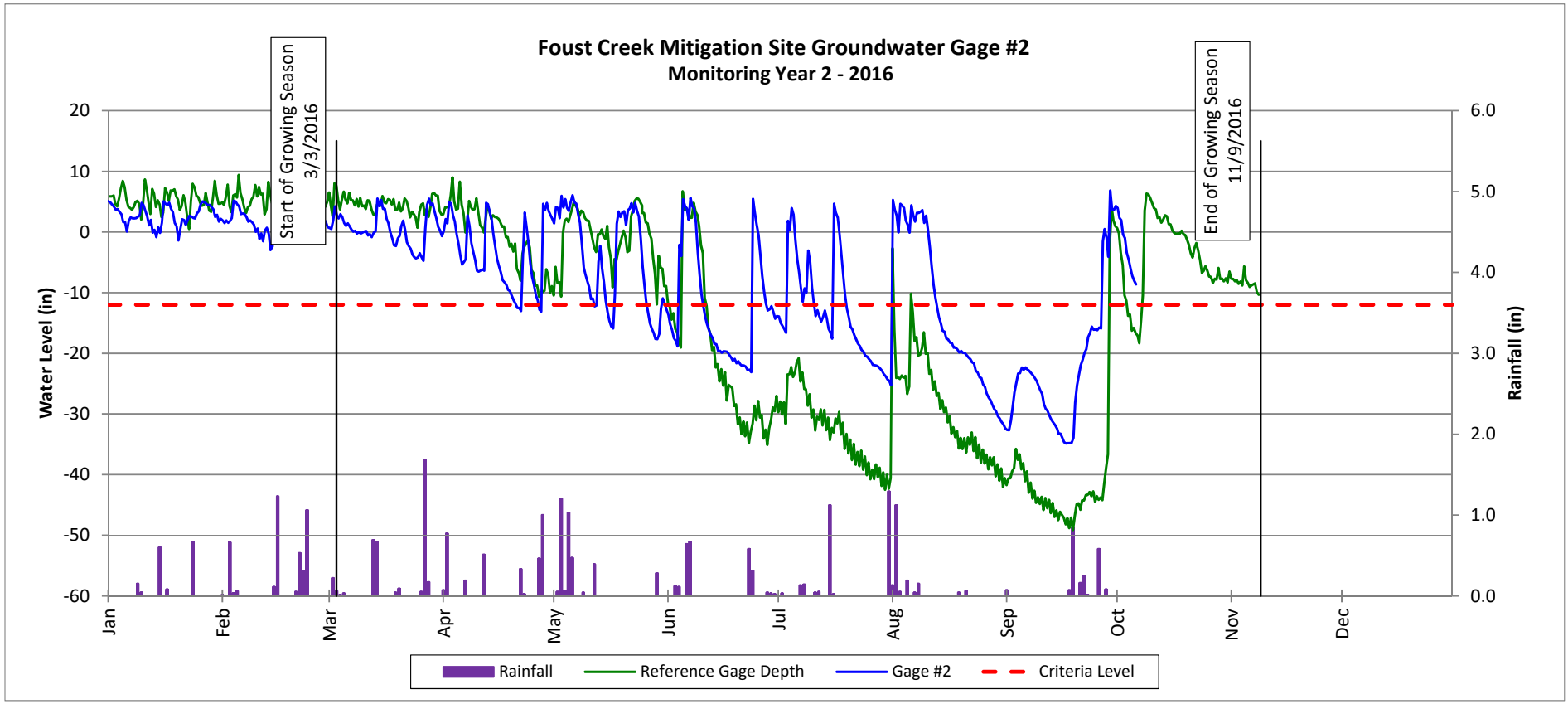
Monitoring Year 2 - 2016



Groundwater Gage Plots

Foust Creek Mitigation Site (DMS Project No. 95715)

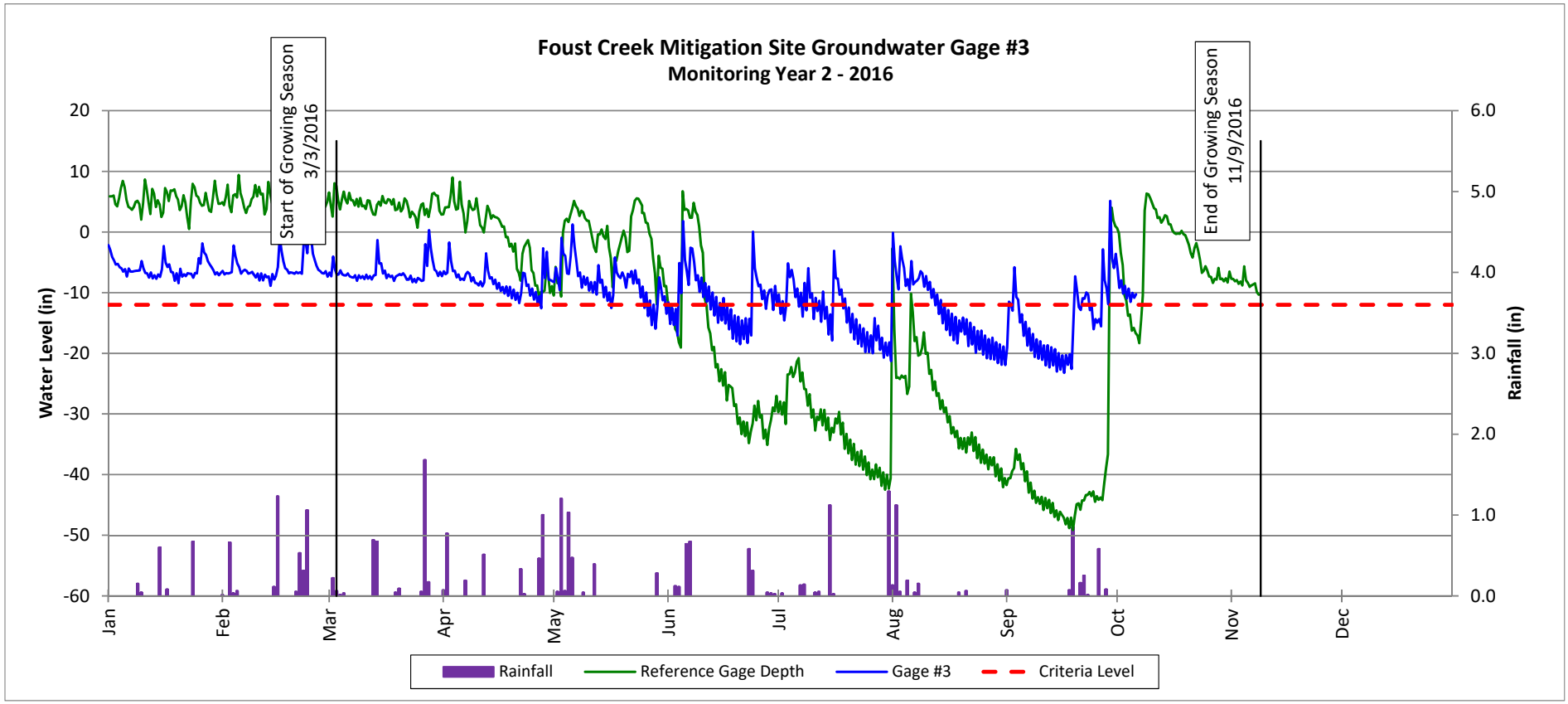
Monitoring Year 2 - 2016



Groundwater Gage Plots

Foust Creek Mitigation Site (DMS Project No. 95715)

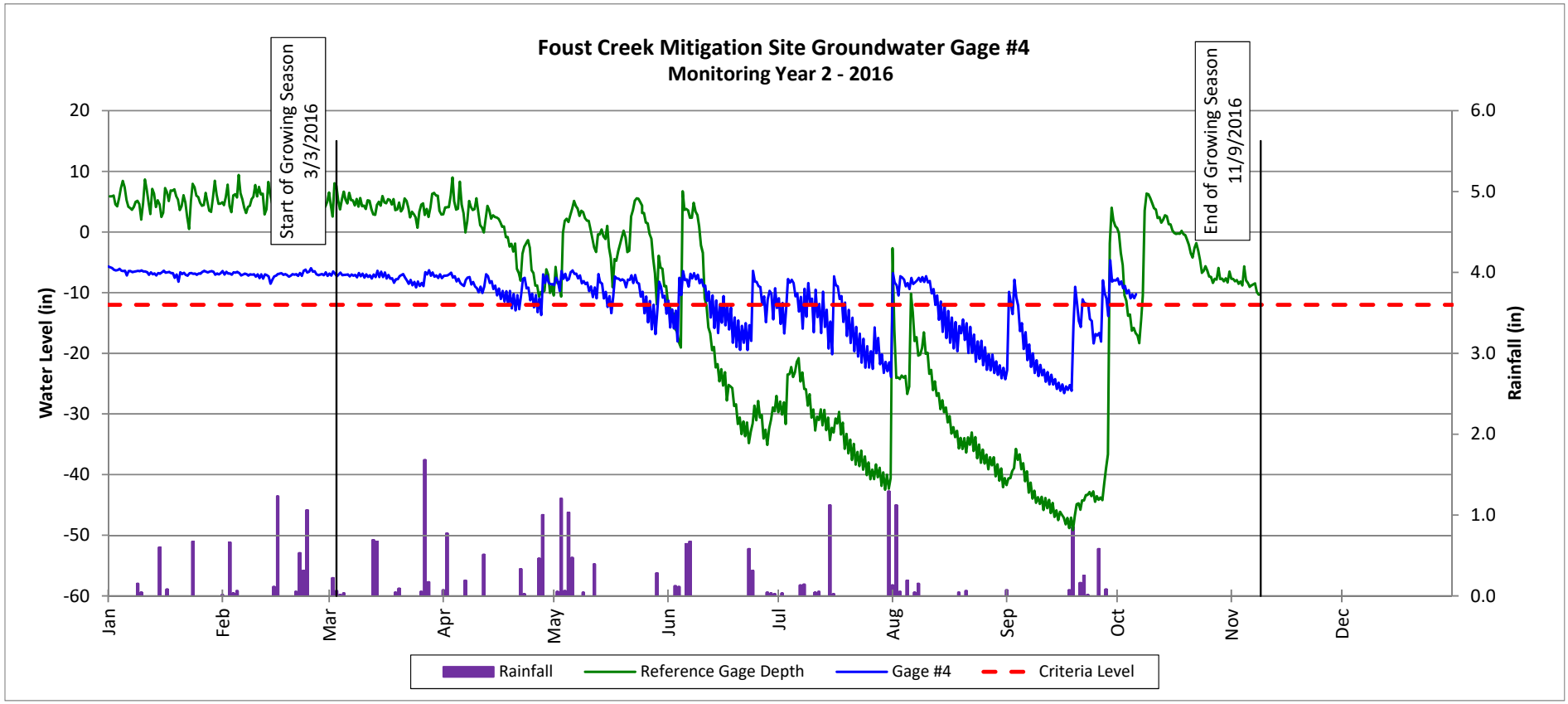
Monitoring Year 2 - 2016



Groundwater Gage Plots

Foust Creek Mitigation Site (DMS Project No. 95715)

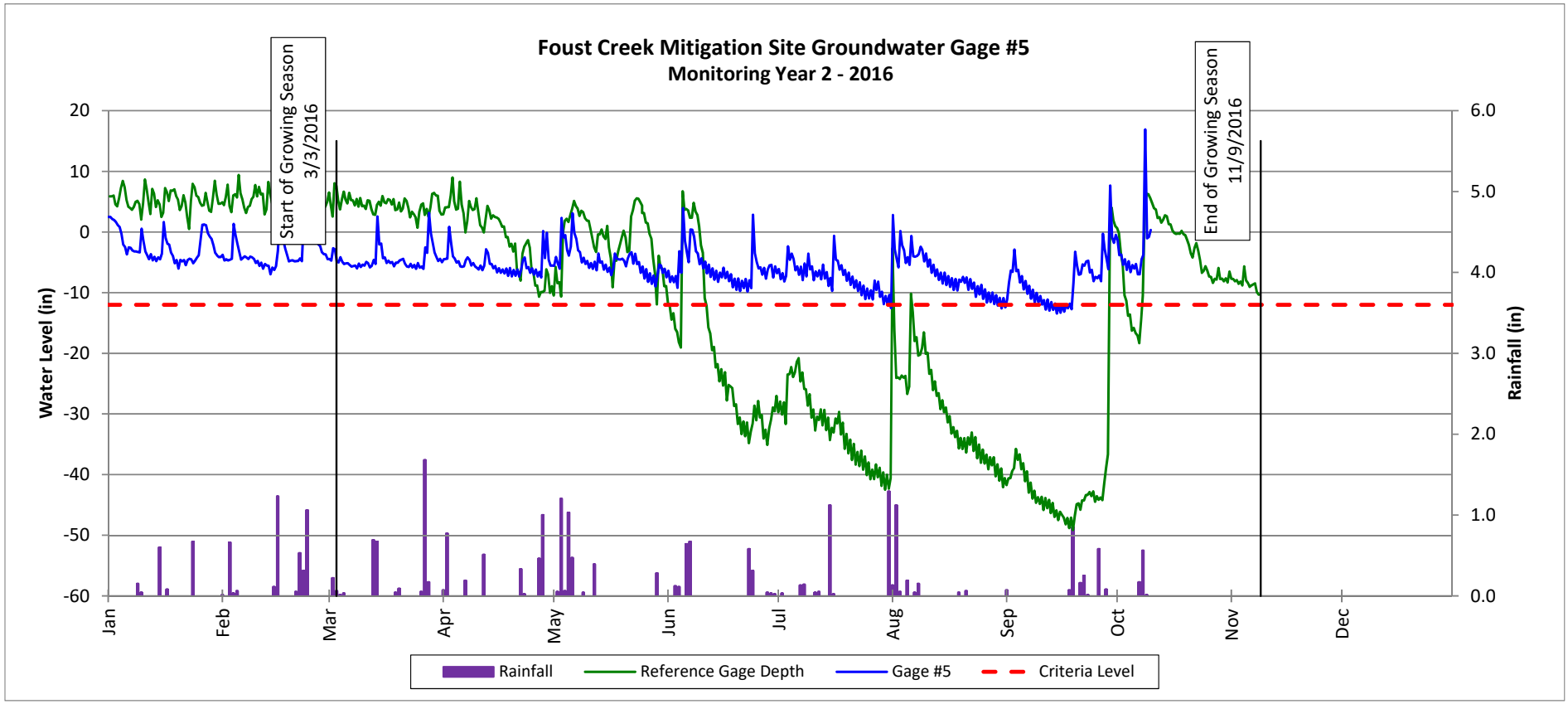
Monitoring Year 2 - 2016



Groundwater Gage Plots

Foust Creek Mitigation Site (DMS Project No. 95715)

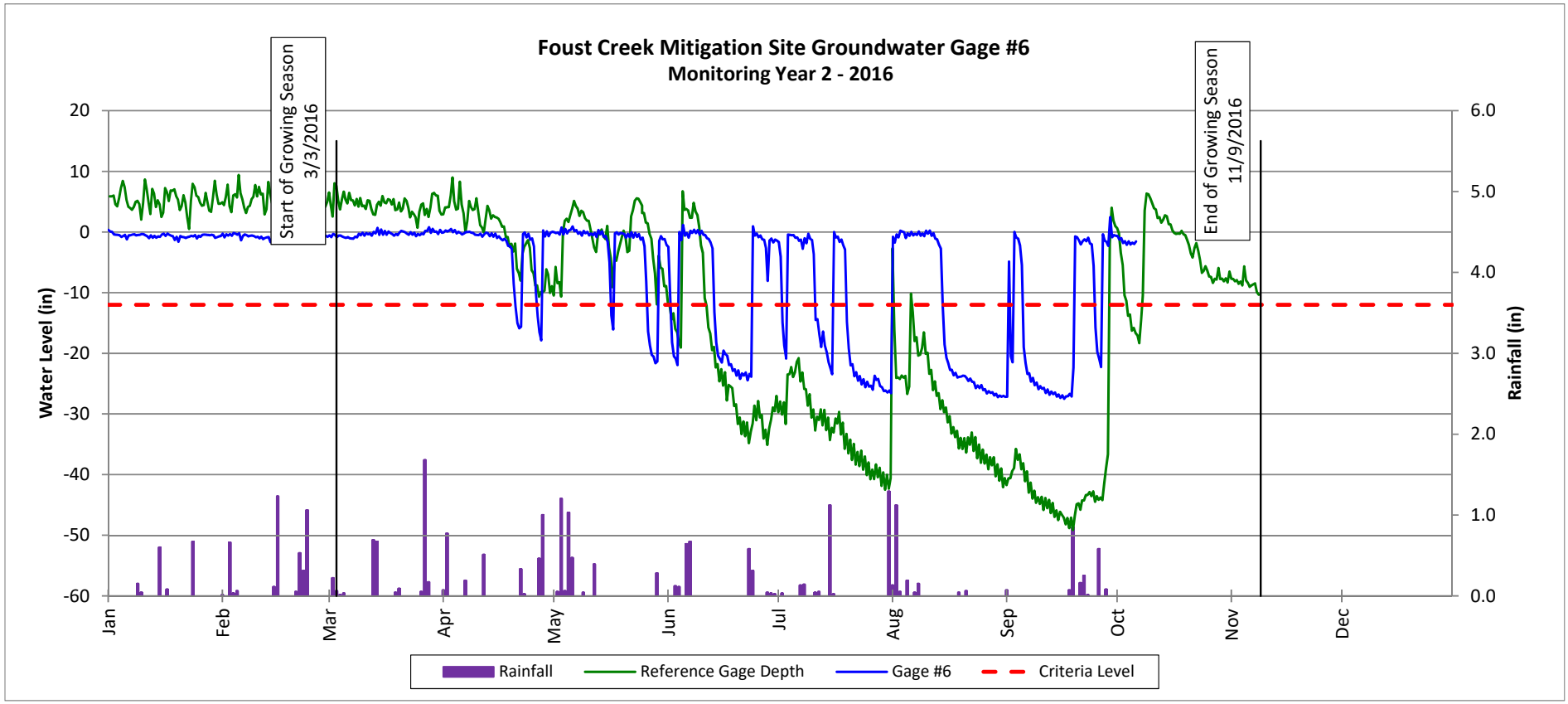
Monitoring Year 2 - 2016



Groundwater Gage Plots

Foust Creek Mitigation Site (DMS Project No. 95715)

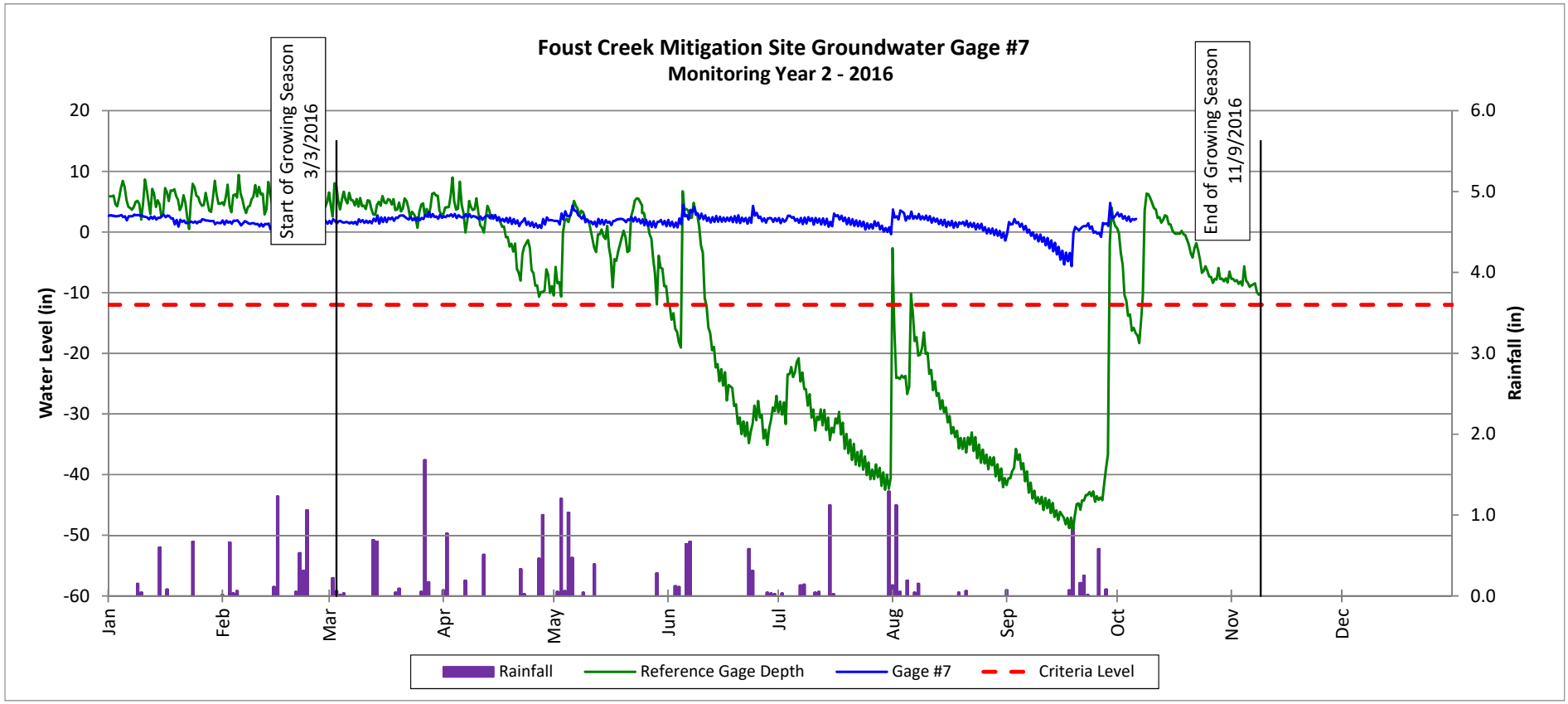
Monitoring Year 2 - 2016



Groundwater Gage Plots

Foust Creek Mitigation Site (DMS Project No. 95715)

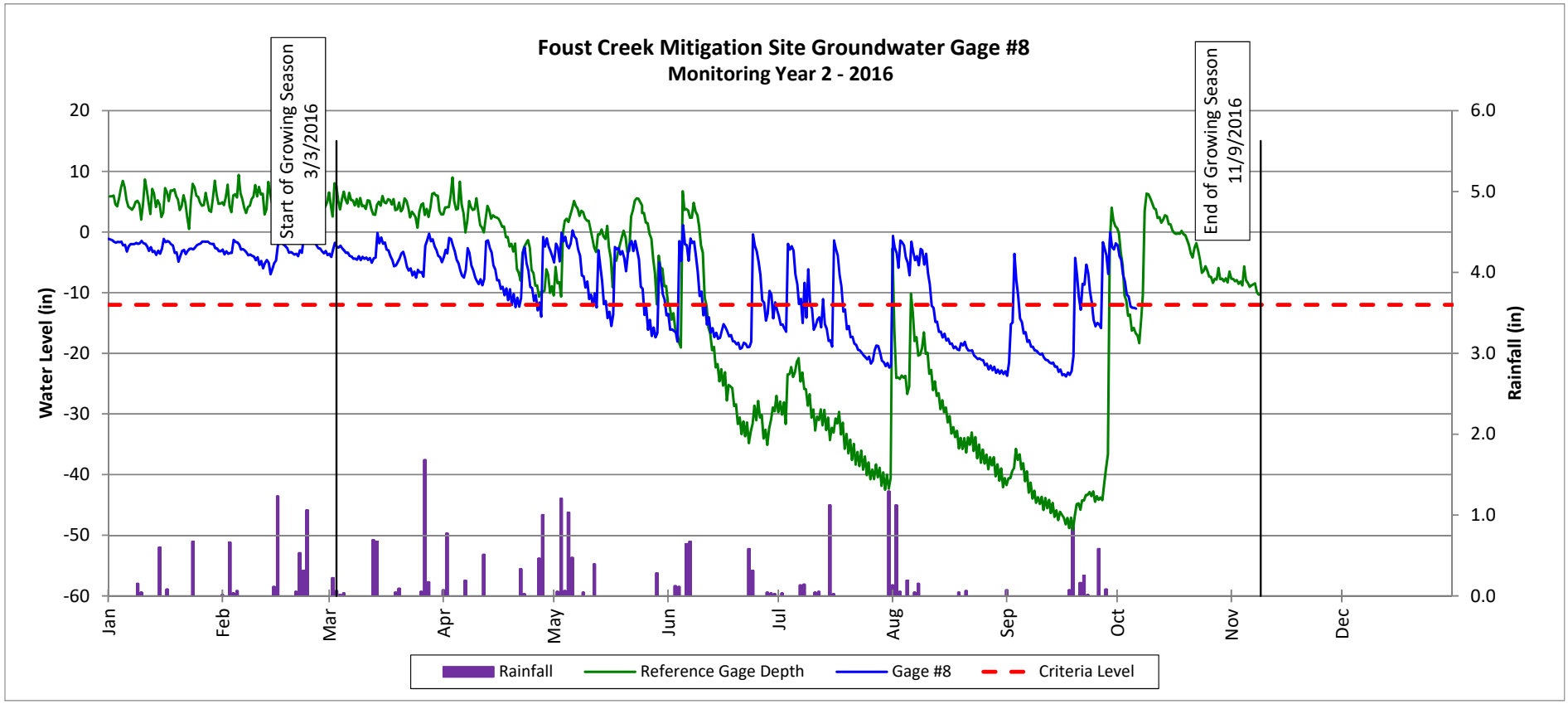
Monitoring Year 2 - 2016



Groundwater Gage Plots

Foust Creek Mitigation Site (DMS Project No. 95715)

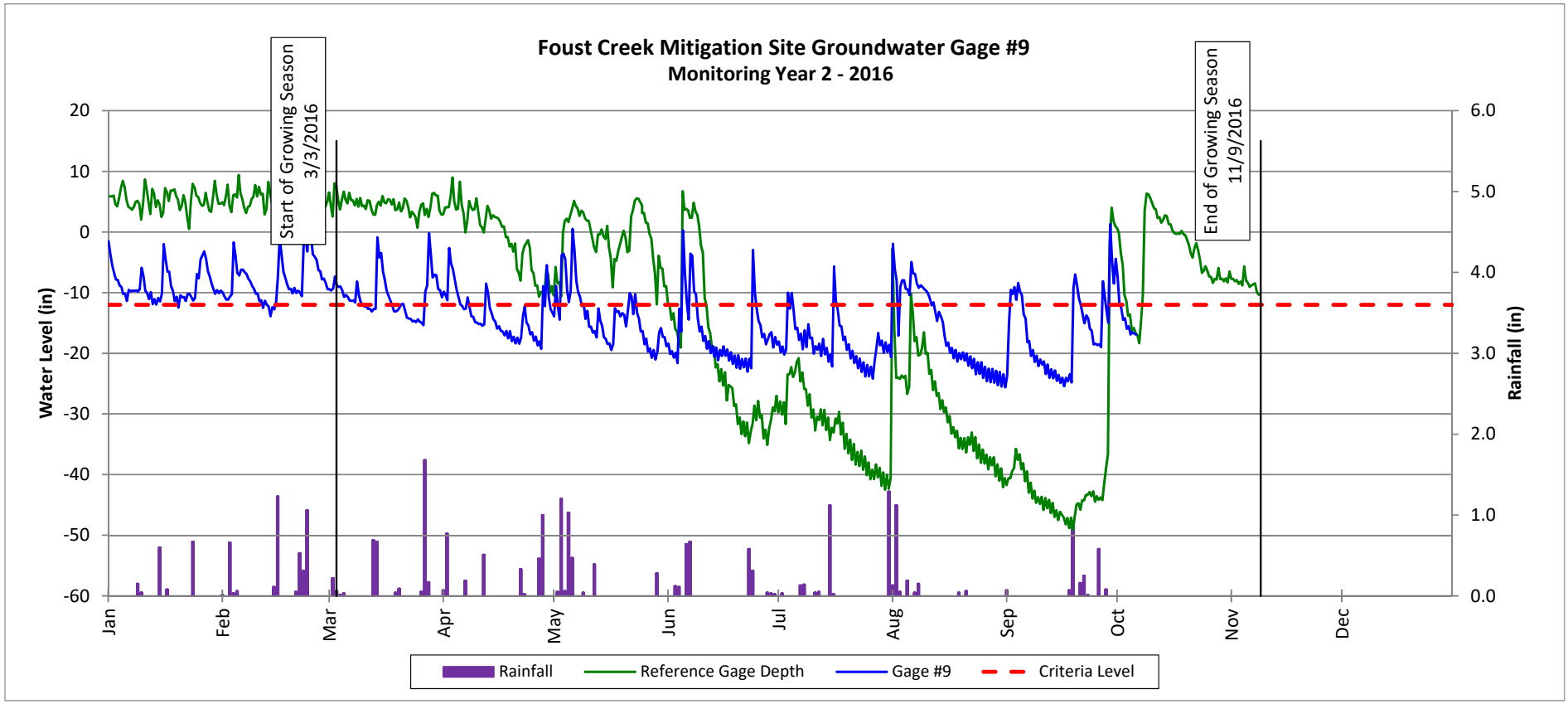
Monitoring Year 2 - 2016



Groundwater Gage Plots

Foust Creek Mitigation Site (DMS Project No. 95715)

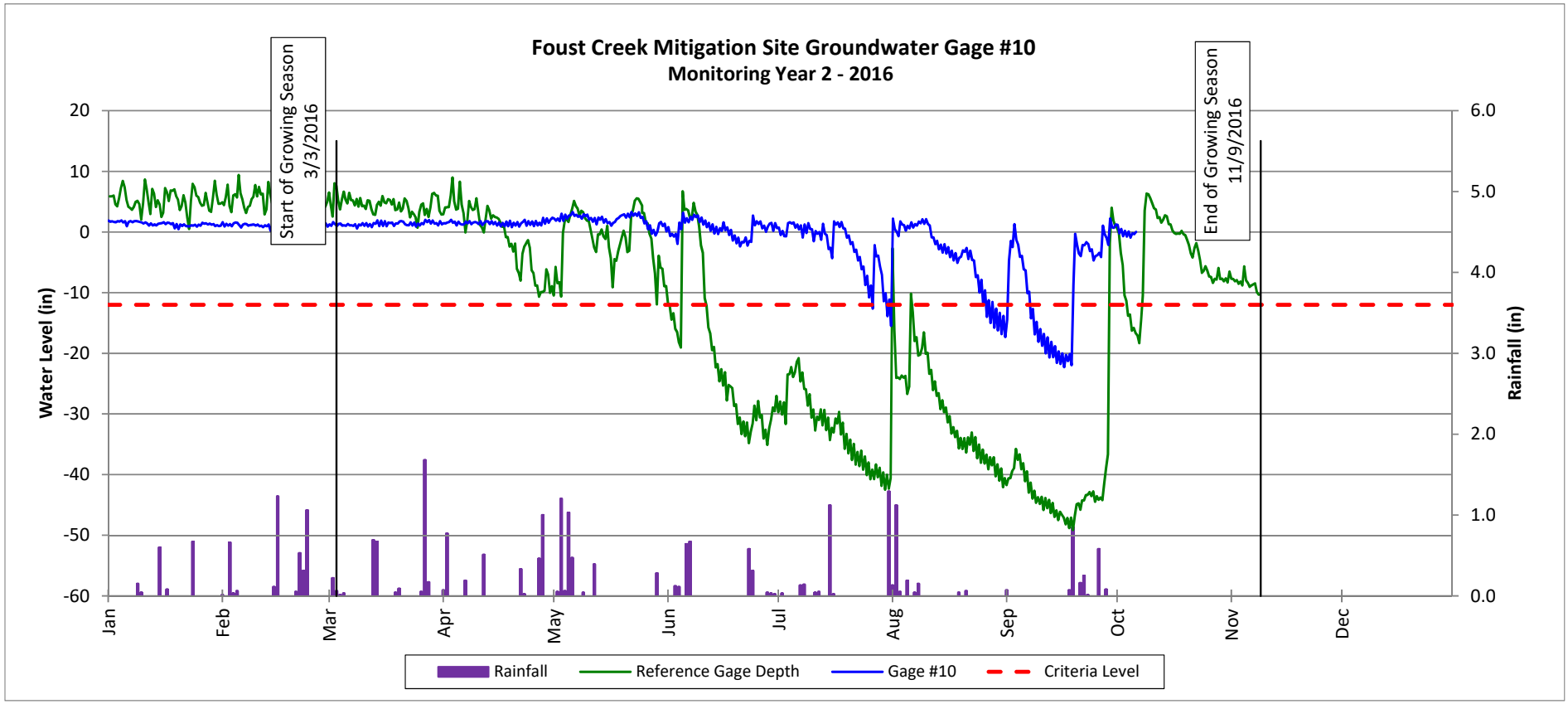
Monitoring Year 2 - 2016



Groundwater Gage Plots

Foust Creek Mitigation Site (DMS Project No. 95715)

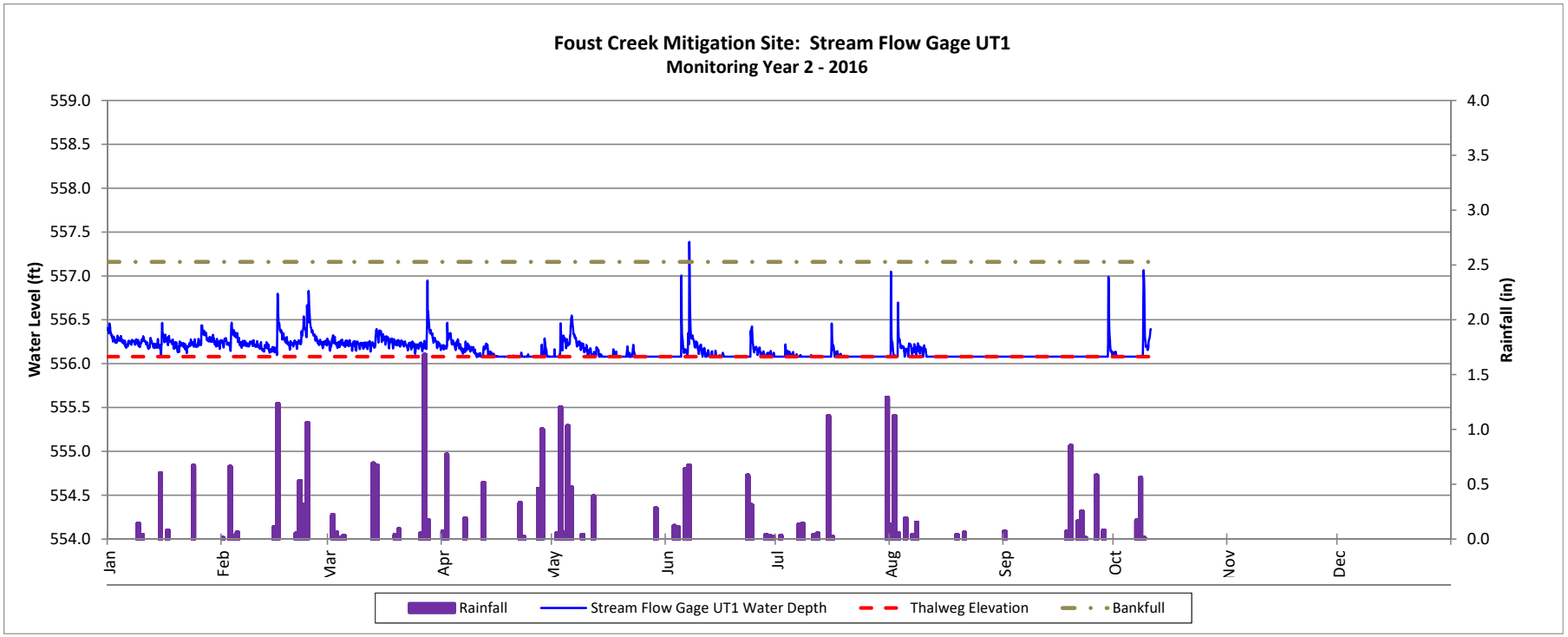
Monitoring Year 2 - 2016



Stream Flow Gage Plot

Foust Creek Mitigation Site (DMS Project No. 95715)

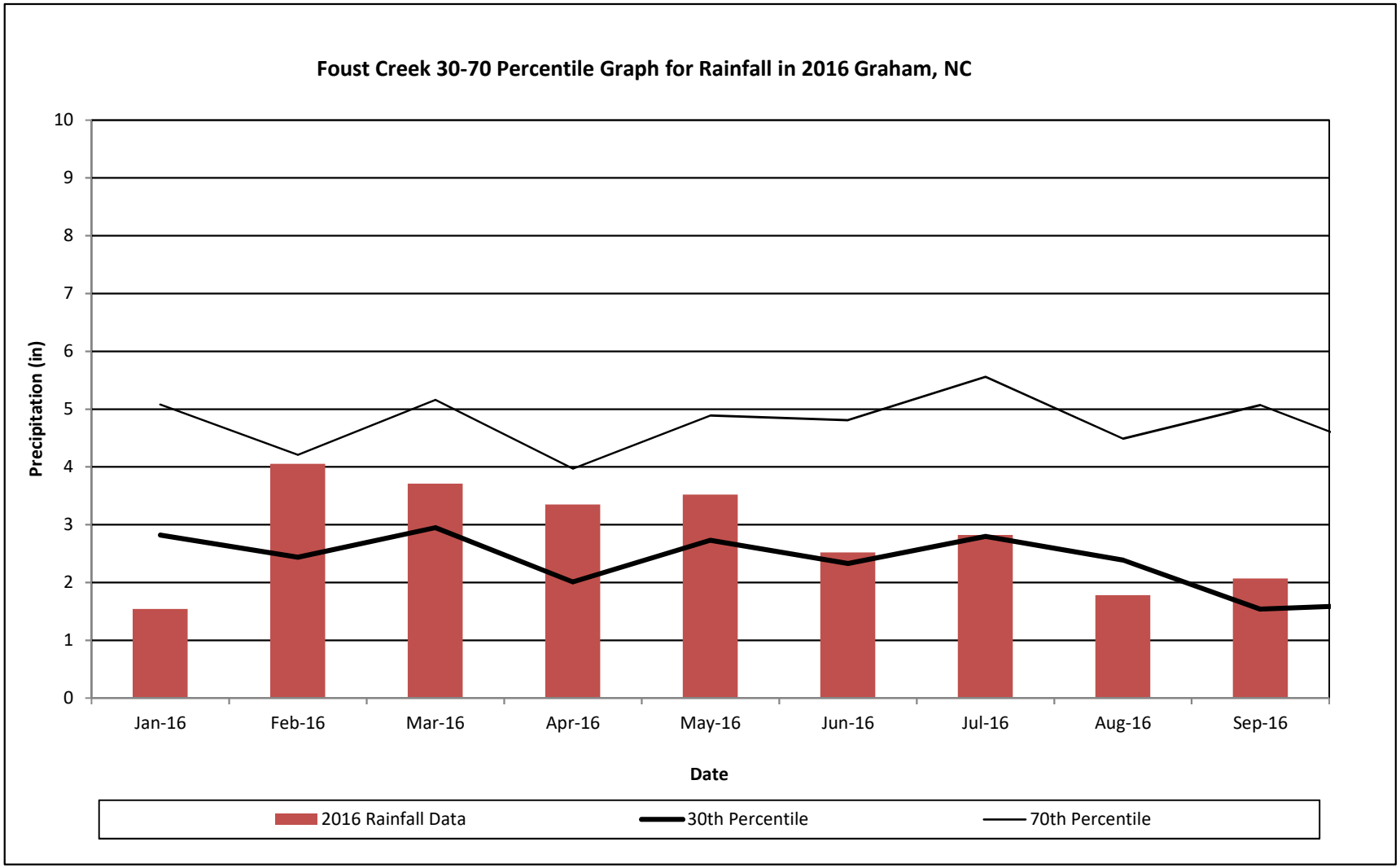
Monitoring Year 2 - 2016



Monthly Rainfall Data

Foust Creek Mitigation Site (DMS Project No. 95715)

Monitoring Year 2 - 2016



[1] 2016 monthly rainfall collected by on-site rain gage and Weather Underground Station KNCSNOWC2 (Snow Camp, NC).

[2] 30th and 70th percentile rainfall data collected from weather station NC355, in Graham, NC (USDA, 2000).