

FINAL

Thomas Creek Restoration Project

Year 1 Monitoring Report

Wake County, North Carolina

DMS Project ID Number – 96074, DEQ Contract No. 5549

Permits: SAW-2013-02009, DWR# 14-1328

Cape Fear River Basin: 03030004-020010

Report Prepared and Submitted by Michael Baker Engineering, Inc.

NC Professional Engineering License # F-1084



TABLE OF CONTENTS

1.0 EXECUTIVE SUMMARY	1
2.0 METHODOLOGY	3
2.1 Stream Assessment	3
2.1.1 Morphological Parameters and Channel Stability	3
2.1.2 Hydrology.....	4
2.1.3 Photographic Documentation	4
2.1.4 Visual Stream Morphological Stability Assessment.....	4
2.2 Vegetation Assessment	5
3.0 REFERENCES	5

APPENDICES

Appendix A	<i>Project Vicinity Map and Background Tables</i>
Figure 1	Project Vicinity Map and Directions
Figure 2	Restoration Summary Map
Figure 3	Reference Stream Locations Map
Table 1	Project Components and Mitigation Credits
Table 2	Project Activity and Reporting History
Table 3	Project Contacts
Table 4	Project Attributes (Pre-Construction Conditions)
Appendix B	<i>Visual Assessment Data</i>
Figure 4	Current Condition Plan View (CCPV)
Table 5	Visual Stream Morphology Stability Assessment
Table 6	Vegetation Conditions Assessment
	Stream Station Photos / SPA Photos
	Vegetation Plot Photos
Appendix C	<i>Vegetation Plot Data</i>
Table 7	CVS Density Per Plot
Table 8	CVS Vegetation Summary and Totals
Table 9	Stem Count for Each Species Arranged by Plot
Appendix D	<i>Stream Survey Data</i>
Figure 5	Year 1 Cross-sections
Figure 6	Pebble Count Plot Data
Table 10	Baseline Stream Summary
Table 11a	Cross-section Morphology Summary
Table 11b	Stream Reach Morphology Summary

Appendix E *Hydrologic Data*

Table 12 Verification of Bankfull Events

Table 13 Flow Gauge Success (2016)

Figure 7 Flow Gauge Graphs (2016)

1.0 EXECUTIVE SUMMARY

Michael Baker Engineering, Inc. (Baker) restored 4,721 linear feet (LF) of perennial and intermittent stream and enhanced 3,948 LF of intermittent stream. Baker also planted approximately 14 acres (AC) of native riparian vegetation within the 22.7 acre recorded conservation easement areas along all or portions of the restored and enhanced reaches (Reaches R1, R2, R3, R4, R5, R6, R7, T1, and T2). The Thomas Creek Restoration Project (Site) is located in Wake County, North Carolina (Figure 1), approximately 1.5 miles southwest of the Community of New Hill. (Figure 1). The Site is located within the NC Division of Mitigation Services' (NCDMS) Targeted Local Watershed (TLW) 03030004-020010 (the Harris Lake HU) of the Cape Fear River Basin, and is located in what was formerly known as the NC Division of Water Resources (NCDWR) subbasin 03-06-07. The project involved the restoration and enhancement of a Rural Piedmont Stream (Schafale and Weakley, 1990) which had been impaired due to past agricultural conversion and cattle grazing.

Based on the NCDMS 2009 Cape Fear River Basin Restoration Priority (RBRP) Plan, the Thomas Creek Restoration Project area is located in an existing targeted local watershed within the Cape Fear River Basin and is located within the Middle Cape Fear / Kenneth and Parker Creeks, Local Watershed Planning (LWP) area. The restoration strategy for the Cape Fear River Basin is to promote low impact development, stormwater management, restoration and buffer protection in urbanizing areas, and buffer preservation elsewhere.

The primary goal of the project was to improve ecologic functions through the restoration and enhancement of streams and buffers in a degraded, urbanizing area as described in the NCDMS 2009 Cape Fear RBRP. Detailed project goals are identified below:

- Create geomorphically stable conditions along the unnamed tributaries throughout the Site,
- Protect and improve water quality by reducing streambank erosion, and nutrient/sediment inputs,
- Restore stream and floodplain interaction by connecting historic flow paths and promoting natural flood processes,
- Restore and protect riparian buffer functions and corridor habitat in perpetuity by establishing a permanent conservation easement, and
- Improve aquatic and terrestrial habitat through improved substrate and in-stream cover, addition of woody debris, and reduction of water temperature.

To accomplish these goals, the following objectives were identified:

- Restore existing incised, eroding, and channelized streams by providing them access to their relic floodplains,
- Implement agricultural BMPs, including cattle watering stations, to reduce nonpoint source (NPS) inputs to receiving waters,
- Prevent cattle from accessing the conservation easement by installing permanent fencing and thus reduce excessive streambank erosion and undesired nutrient inputs,
- Enhance aquatic habitat value by providing more bedform diversity, creating natural scour pools and reducing sediment from accelerated streambank erosion,

- Plant native species riparian buffer vegetation along streambank and floodplain areas, protected by a permanent conservation easement, to increase stormwater runoff filtering capacity, improve streambank stability and riparian habitat connectivity, and shade the stream to decrease water temperature, and
- Control invasive species vegetation within much of the project area and, if necessary, continue treatments during the monitoring period.

The Year 1 monitoring survey data of sixteen cross-sections indicates that the Site is geomorphically stable and performing at 100 percent for all the parameters evaluated. Certain cross-sections (located in Appendix D) have shown minor fluctuations in their geometry as compared to their as-built conditions. These fluctuations do not represent a trend towards instability based off visual field evaluations. All reaches are stable and performing as designed. The data collected are within the lateral/vertical stability and in-stream structure performance categories. The only exception is a short, 10-foot section along the left bank of a log step-pool structure on Reach 2 that has recently shown scour damage from Hurricane Matthew, and which will be repaired in 2017. The location and photographs of this lone problem area can be found in Appendix B.

Additionally, damage from Hurricane Joaquin in October 2015 caused damage to the rock step pool located at the confluence of Reach 2 and Reach 5, and also to two riffles and their adjacent banks along Reach 1 immediately downstream. The high flows scoured around the rock step pool, scoured out pools, pushed riffle rock to one side, and began undermining channel banks. Once started, the damage slowly got worse over the winter with each storm event. In July 2016, a River Works crew mobilized on site and replaced the rock step pool with a larger boulder cross vane at the confluence and repaired the channel banks and two rock riffles downstream with slightly larger cobble. This section has been stable since its repair and remained stable after Hurricane Matthew in October 2016, a larger storm event than Hurricane Joaquin in 2015. The location and photographs of this repaired stream section can be found in Appendix B.

During Year 1 monitoring, the planted acreage performance categories were functioning at 100 percent with no bare areas to report (Appendix B). The average density of total planted stems, based on data collected from the sixteen monitoring plots following Year 1 monitoring in September 2016, was 728 stems per acre. Thus, the Year 1 vegetation data demonstrate that the Site has met the minimum success interim criteria of 320 trees per acre by the end of Year 3. Additionally, there were no areas of invasive species vegetation observed during the Year 1 monitoring.

Year 1 flow monitoring demonstrated that both flow gauges (TMCK-FL1 and TMCK-FL2) met the stated success criteria of 30 days or more of consecutive flow through Reaches 2 and 5 respectively. Flow gauge TMCK-FL1 documented 229 days of consecutive flow in Reach 2, while flow gauge TMCK-FL2 documented 126 days of consecutive flow in Reach 5. The gauges demonstrated similar patterns relative to rainfall events observed in the vicinity of the Site as shown in the flow gauge graphs in Appendix E.

During Year 1 monitoring, the Reach R2 crest gauge (crest gauge #1) documented at least one post-construction bankfull event from early October 2016.

Summary information/data related to the Site and statistics related to performance of various project and monitoring elements can be found in the tables and figures in the report Appendices. Narrative background and supporting information formerly found in these reports can be found in the Baseline Monitoring Report and in the Mitigation Plan available on the DMS website. Any raw data supporting the tables and figures in the Appendices is available from DMS upon request.

This report documents the successful completion of the Year 1 monitoring activities for the post-construction monitoring period.

2.0 METHODOLOGY

The seven-year monitoring plan for the Site includes criteria to evaluate the success of the stream and vegetation components of the Site. The methodology and report template used to evaluate these components adheres to the DMS monitoring report template document Version 1.5 (June 8, 2012), which will continue to serve as the template for subsequent monitoring years. The vegetation-monitoring quadrants follow CVS-DMS monitoring levels 1 and 2 in accordance with CVS-DMS Protocol for Recording Vegetation, Version 4.1 (2007).

Stream survey data was collected to a minimum of Class C Vertical and Class A Horizontal Accuracy using Leica TS06 Total Station and was georeferenced to the NAD83 State Plane Coordinate System, FIPS3200 in US Survey Feet, which was derived from the As-built Survey. This survey system collects point data with an accuracy of less than one tenth of a foot.

The specific locations of monitoring features, such as vegetation plots, permanent cross-sections, reference photograph stations, crest gauges and flow gauges, are shown on the CCPV map found in Appendix B.

All earthwork for project construction was completed in October of 2015, with subsequent as-built survey work completed in November of 2015. All site planting (bareroot stems and live-stakes) was completed in January of 2016.

The Monitoring Year 1 vegetation plot data was collected in September 2016, the visual site assessment data contained in Appendix B was collected in October 2016, and the cross-section data was collected in November 2016.

2.1 Stream Assessment

The Project involved the restoration and enhancement of a Rural Piedmont Stream System (NC WAM 2010, Schafale and Weakley, 1990) that had been impaired due to past agricultural conversion and cattle grazing. Restoration practices involved raising the existing streambed and reconnecting the stream to the relic floodplain to restore natural flow regimes to the system. The existing channels abandoned within the restoration areas were partially to completely filled to decrease surface and subsurface drainage and to raise the local water table. Permanent cattle exclusion fencing was provided around all proposed reaches and riparian buffers, except along reaches where no cattle are located or lack stream access.

2.1.1 Morphological Parameters and Channel Stability

Cross-sections were classified using the Rosgen Stream Classification System, and all monitored cross-sections fall within the quantitative parameters defined for channels of the design stream type. Morphological survey data are presented in Appendix D.

A longitudinal profile was surveyed for the entire length of channel immediately after construction to document as-built baseline conditions for the Monitoring Year 0 only. Annual longitudinal profiles will not be conducted during subsequent monitoring years unless channel instability has been documented or remedial actions/repairs are required by the U.S. Army Corps of Engineers (USACE) or DMS.

The Year 1 monitoring survey data of sixteen cross-sections indicates that the Site is geomorphically stable and performing at 100 percent for all the parameters evaluated. Certain cross-sections (located in Appendix D) have shown minor fluctuations in their geometry as compared to their as-built conditions. These fluctuations do not represent and trend towards instability based off visual field evaluations. All reaches are stable and performing as designed. The data collected are within the

lateral/vertical stability and in-stream structure performance categories. The only exception is a 10-foot section along the left bank of a log step-pool structure on Reach 2 that has recently shown scour damage from Hurricane Matthew. It is not believed this small area will stabilize on its own without future repair, which will be conducted in 2017. The location and photographs of this lone problem area can be found in Appendix B.

Additionally, damage from Hurricane Joaquin in October 2015 caused damage to the rock step pool located at the confluence of Reach 2 and Reach 5, and also to two riffles and their adjacent banks along Reach 1 immediately downstream. The high flows scoured around the rock step pool, scoured out pools, pushed riffle rock to one side, and began undermining channel banks. Once started, the damage slowly got worse over the winter with each storm event. In July 2016, a River Works crew mobilized on site and replaced the rock step pool with a larger boulder cross vane at the confluence, and repaired the channel banks and two rock riffles downstream with slightly larger cobble. This section has been stable since construction and remained stable after Hurricane Matthew in October 2016, a larger storm event than Hurricane Joaquin in 2015. The location and photographs of this repaired stream section can be found in Appendix B.

2.1.2 Hydrology

To monitor on-site bankfull events, one crest gauge (crest gauge #1) was installed along the downstream portion of Reach 2. This crest gauge is located on the floodplain at bankfull elevation along the left top of bank on Reach R2, at approximately Station 38+90.

During Year 1 monitoring, one above bankfull stage event was documented in October 2016 by the crest gauge. The crest gauge reading is presented in Appendix E.

Year 1 flow monitoring demonstrated that both flow gauges (TMCK-FL1 and TMCK-FL2) met the stated success criteria of 30 days or more of consecutive flow through Reaches 2 and 5 respectively. Flow gauge TMCK-FL1 documented 229 days of consecutive flow in Reach 2, while flow gauge TMCK-FL2 documented 126 days of consecutive flow in Reach 5. The gauges demonstrated similar patterns relative to rainfall events observed in the vicinity of the Site as shown in the flow gauge graphs in Appendix E.

2.1.3 Photographic Documentation

Reference photograph transects were taken at each permanent cross-section. The survey tape was centered in the photographs of the bank. The water line was located in the lower edge of the frame, and as much of the bank as possible is included in each photograph.

Representative photographs for Monitoring Year 1 were taken along each Reach in October 2016 and are provided in Appendix B. Photographs of both the single Stream Problem Area and the repaired stream section on Reach 1 can also be found in Appendix B.

Photographs of each Vegetation Plot taken in September 2016 can be found in Appendix B.

2.1.4 Visual Stream Morphological Stability Assessment

The visual stream morphological stability assessment involves the qualitative evaluation of lateral and vertical channel stability, and the integrity and overall performance of in-stream structures throughout the Project reaches as a whole. Habitat parameters and pool depth maintenance are also measured and scored. During Year 1 monitoring, Baker staff walked the entire length of each of the Project reaches several times throughout the year, noting geomorphic conditions of the stream bed profile (riffle/pool facets), both stream banks, and engineered in-stream structures. Representative photographs were taken per the Site's Mitigation Plan, and the locations of any Stream Problem Areas (SPAs) were

documented in the field for subsequent mapping on the CCPV figures. Only one SPA was discovered during Year 1 monitoring. A more detailed summary of the results for the visual stream stability assessment can be found in Appendix B, which includes supporting data tables, as well as general stream and SPA photos.

2.2 Vegetation Assessment

In order to determine if the success criteria were achieved, vegetation-monitoring quadrants were installed and are monitored across the site in accordance with the CVS-DMS Protocol for Recording Vegetation, Version 4.1 (2007). The vegetation monitoring plots are a minimum of 2 percent of the planted portion of the Site with sixteen plots established randomly within the planted riparian buffer areas per Monitoring Levels 1 and 2. The sizes of individual quadrants are 100 square meters for woody tree species.

Based on the recent Year 1 data collected from the vegetation monitoring plots, the planted stem density is 728 stems per acre. Therefore, the vegetation data demonstrate that the Site is on track for meeting the minimum success criteria of 320 trees per acre by the end of Year 3.

Additionally, there were no areas of invasive species vegetation observed during the Year 1 monitoring.

Year 1 vegetation assessment information is provided in Appendix B and C.

3.0 REFERENCES

Carolina Vegetation Survey (CVS) and NC Division of Mitigation Services (DMS). CVS-DMS Data Entry Tool v. 2.3.1. University of North Carolina, Raleigh, NC.

Lee, M., Peet R., Roberts, S., Wentworth, T. 2007. CVS-DMS Protocol for Recording Vegetation, Version 4.1.

North Carolina Division of Mitigation Services (DMS). 2011. Monitoring Requirements and Performance Standards for Stream and/or Wetland Mitigation. Version 1.4, November 7, 2011.

North Carolina Division of Mitigation Services (DMS). 2010. Baseline Monitoring Template and Guidance. Version 2.0, October 14, 2010.

North Carolina Division of Mitigation Services (DMS). 2009. Cape Fear River Basin Restoration Priorities.

Rosgen, D. L. 1994. A Classification of Natural Rivers. *Catena* 22:169-199.

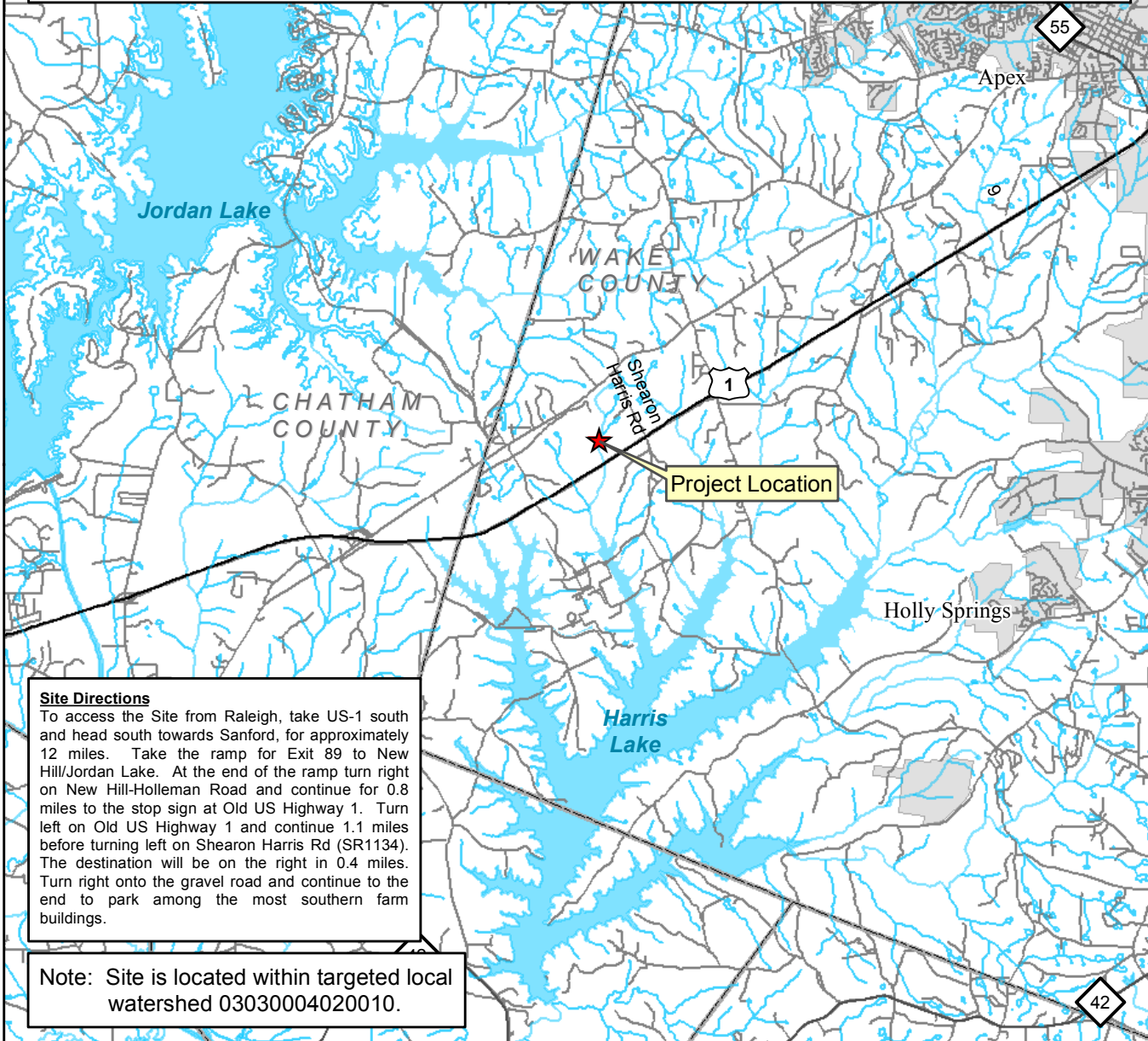
Schafale, M. P., and A. S. Weakley. 1990. Classification of the natural communities of North Carolina, third Approximation. North Carolina Natural Heritage Program. Division of Parks and Recreation, NCDEQ. Raleigh, NC.

U.S. Army Corps of Engineers. 2003. Stream Mitigation Guidelines, April 2003, U.S. Army Corps of Engineers (USACE). Wilmington District.

Appendix A

Project Vicinity Map and Background Tables

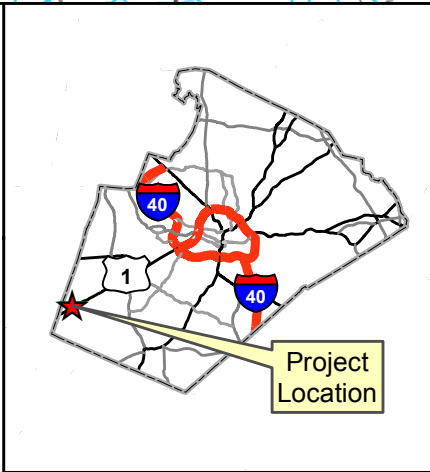
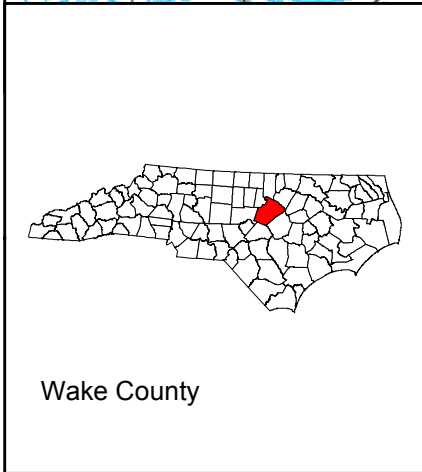
The subject project site is an environmental restoration site of the NCDEQ Division of Mitigation Services (DMS) and is encompassed by a recorded conservation easement, but is bordered by land under private ownership. Accessing the site may require traversing areas near or along the easement boundary 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 activities requires prior coordination with DMS.



Site Directions

To access the Site from Raleigh, take US-1 south and head south towards Sanford, for approximately 12 miles. Take the ramp for Exit 89 to New Hill/Jordan Lake. At the end of the ramp turn right on New Hill-Holleman Road and continue for 0.8 miles to the stop sign at Old US Highway 1. Turn left on Old US Highway 1 and continue 1.1 miles before turning left on Shearon Harris Rd (SR1134). The destination will be on the right in 0.4 miles. Turn right onto the gravel road and continue to the end to park among the most southern farm buildings.

Note: Site is located within targeted local watershed 03030004020010.



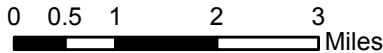
**Figure 1 - Project Vicinity Map
Thomas Creek Site
DMS Project ID No. 96074**

**NCDEQ -
Division of
Mitigation Services**



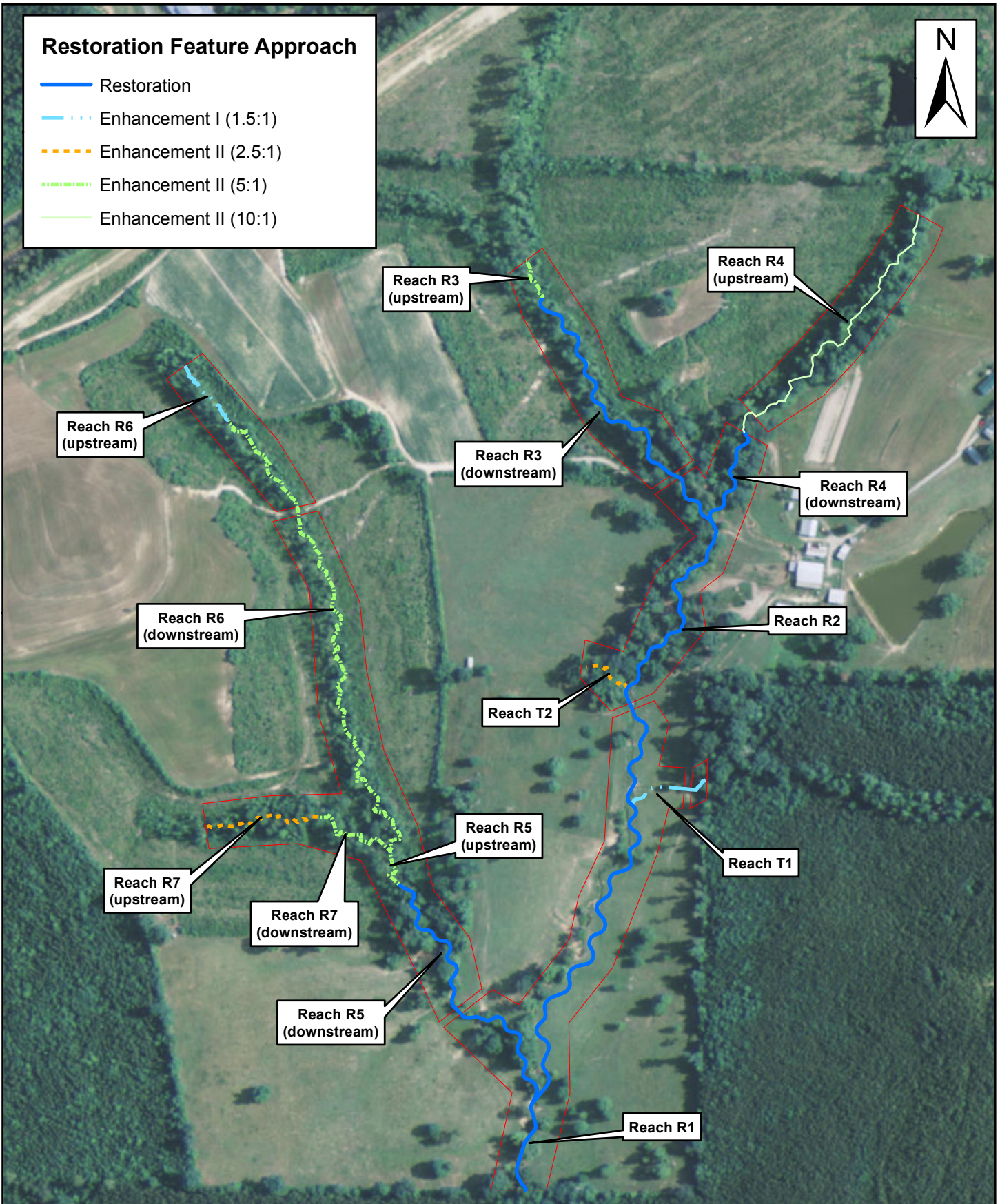
Michael Baker

INTERNATIONAL



Restoration Feature Approach

- Restoration
- - - Enhancement I (1.5:1)
- - - Enhancement II (2.5:1)
- - - Enhancement II (5:1)
- - - Enhancement II (10:1)



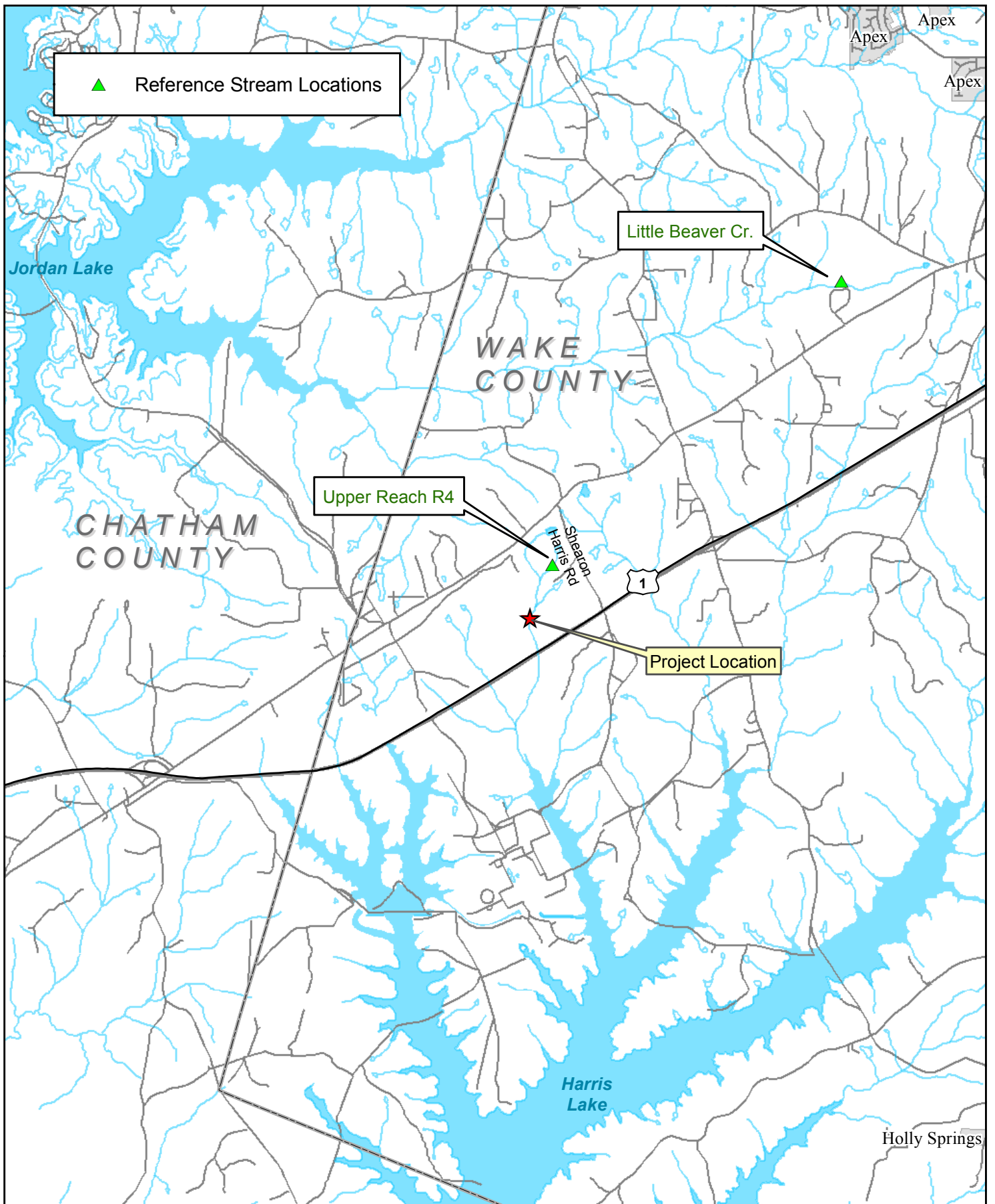


Table 1. Project Components and Mitigation Credits						
Thomas Creek Restoration Project: DMS Project ID No. 96074						
Mitigation Credits						
	Stream	Riparian Wetland	Non-riparian Wetland	Buffer	Nitrogen Nutrient Offset	Phosphorus Nutrient
Type	R, E1, EII					
Totals	5,728 SMU					
Project Components						
Project Component or Reach ID	Stationing/ Location	Existing Footage/ Acreage (LF)	Approach	Restoration/ Restoration Equivalent (SMU)	Restoration Footage or Acreage (LF)	Mitigation Ratio
Reach 1	42+01 to 44+99	397	Restoration	298	298	1:1
Reach 2	20+55 to 27+58 / CE Break / 27+78 to 42+01	1,995	Restoration	2,126	2,126	1:1
Reach 3 (downstream)	11+17 to 18+70 / CE Break / 18+94 to 20+55	937	Restoration	914	914	1:1
Reach 3 (upstream)	10+00 to 11+17	130	Enhancement II	23	117	5:1
Reach 4 (downstream)	10+41 to 13+83	327	Restoration	342	342	1:1
Reach 4 (upstream)	0+99 to 9+95	870	Enhancement II	90	896	10:1
Reach 5 (downstream)	29+30 to 34+97 / CE Break / 35+17 to 39+91	883	Restoration	1,041	1,041	1:1
Reach 5 (upstream)	28+02 to 29+30	137	Enhancement II	26	128	5:1
Reach 6 (downstream)	12+10 to 15+55 / CE Break / 15+81 to 28+02	1,592	Enhancement II	313	1,566	5:1
Reach 6 (upstream)	10+00 to 12+10	210	Enhancement I	140	210	1.5:1
Reach 7 (downstream)	13+60 to 16+47	287	Enhancement II	57	287	5:1
Reach 7 (upstream)	10+00 to 13+60	360	Enhancement II	144	360	2.5:1
Reach T1	10+00 to 10+55 / CE Break / 10+75 to 12+47	242	Enhancement I	151	227	1.5:1
Reach T2	10+00 to 11+57	171	Enhancement II	63	157	2.5:1
Component Summation						
Restoration Level	Stream (LF)	Riparian Wetland (AC)	Non-riparian Wetland (AC)	Buffer (SF)	Upland (AC)	
Restoration	4,721					
Enhancement I	437					
Enhancement II	3,511					
BMP Elements						
Element	Location	Purpose/Function	Notes			
BMP Elements: BR= Bioretention Cell; SF= Sand Filter; SW= Stormwater Wetland; WDP= Wet Detention Pond; DDP= Dry Detention Pond; FS= Filter Strip; S= Grassed Swale; LS= Level Spreader; NI=Natural Infiltration Area						

Table 2. Project Activity and Reporting History		
Thomas Creek Restoration Project: DMS Project ID No. 96074		
Elapsed Time Since Grading Completed in Oct. 2015	1 Year 3 Months	
Elapsed Time Since Planting Completed in Jan. 2016	1 Years 0 Months	
Number of Reporting Years ¹	1	
Activity or Deliverable		
	Data Collection Complete	Actual Completion or Delivery
Mitigation Plan Prepared	N/A	Oct-14
Mitigation Plan Amended	N/A	Mar-15
Mitigation Plan Approved	N/A	Mar-15
Final Design – (at least 90% complete)	N/A	Mar-15
Construction Begins	N/A	Apr-15
Temporary S&E mix applied to entire project area	N/A	Oct-15
Permanent seed mix applied to entire project area	N/A	Oct-15
Planting of live stakes	N/A	Jan-16
Planting of bare root trees	N/A	Jan-16
End of Construction	N/A	Oct-15
Survey of As-built conditions (Year 0 Monitoring-baseline)	Nov-15	Nov-15
Baseline Monitoring Report	Mar-16	Oct-16
Year 1 Monitoring	Nov-16	Jan-17
Year 2 Monitoring	Nov-17	N/A
Year 3 Monitoring	Nov-18	N/A
Year 4 Monitoring	Nov-19	N/A
Year 5 Monitoring	Nov-20	N/A
Year 6 Monitoring	Nov-21	N/A
Year 7 Monitoring	Nov-22	N/A
¹ The number of reports or data points produced excluding the baseline		

Table 3. Project Contacts	
Thomas Creek Restoration Project: DMS Project ID No. 95729	
Designer	
Michael Baker Engineering, Inc.	797 Haywood Rd, Suite 201 Asheville, NC 28806 <u>Contact:</u> Jake Byers, Telephone: 828-412-6101
Construction Contractor	
River Works, Inc.	6105 Chapel Hill Road Raleigh, NC 27607 <u>Contact:</u> Phillip Todd, Telephone: 919-582-3575
Planting Contractor	
River Works, Inc.	6105 Chapel Hill Road Raleigh, NC 27607 <u>Contact:</u> Phillip Todd, Telephone: 919-582-3575
Seeding Contractor	
River Works, Inc.	6105 Chapel Hill Road Raleigh, NC 27607 <u>Contact:</u> Phillip Todd, Telephone: 919-582-3575
Seed Mix Source	Green Resources, Telephone: 336-855-6363
Nursery Stock Suppliers	Mellow Marsh Farm, Telephone: 919-742-1200 ArborGen, Telephone: 843-528-3204
Monitoring Performers	
Michael Baker Engineering, Inc.	8000 Regency Parkway, Suite 600 Cary, NC 27518 <u>Contact:</u>
Stream Monitoring Point of Contact	Scott King, Tel. 919-481-5731
Vegetation Monitoring Point of Contact	Scott King, Tel. 919-481-5732

Table 4. Project Attributes (Pre-Construction Conditions)					
Thomas Creek Restoration Project: DMS Project No. ID 96074					
Project Information					
Project Name	Thomas Creek Restoration Project				
County	Wake				
Project Area (acres)	22.7				
Project Coordinates (latitude and longitude)	35.6636 N, -79.9547 W				
Project Watershed Summary Information					
Physiographic Province	Piedmont				
River Basin	Cape Fear				
USGS Hydrologic Unit 8-digit and 14-digit	03030004 / 03030004020010				
NCDWR Sub-basin	03-06-07				
Project Drainage Area (acres)	246 (Reach R1 main stem at downstream extent)				
Project Drainage Area Percent Impervious	<1%				
CGIA / NCEEP Land Use Classification	2.01.01.01, 2.03.01, 2.99.01, 3.02 / Forest (66%) Agriculture (19%) Impervious Cover (1%)				
Reach Summary Information					
Parameters	Reach R1	Reach R2	Reach R3	Reach R4	Reach R5
Length of Reach (linear feet)	397	1,995	1,067	342	1,020
Valley Classification (Rosgen)	VII	VII	VII	VII	VII
Drainage Area (acres)	246	176	62	36	62
NCDWR Stream Identification Score	37.5	38	25 / 37	31	31 / 34
NCDWR Water Quality Classification	C				
Morphological Description (Rosgen stream type)	Bc	F (upstream)/ Gc (downstream)	Gc (upstream)/ Bc (downstream)	Bc	Bc
Evolutionary Trend	Bc→Gc→F	Bc→Gc→F	Bc→Gc→F	Bc→Gc→F	Bc→Gc→F
Underlying Mapped Soils	WoA	WoA	WoA	WoA	WoA
Drainage Class	Poorly drained	Poorly drained	Poorly drained	Poorly drained	Poorly drained
Soil Hydric Status	Hydric	Hydric	Hydric	Hydric	Hydric
Average Channel Slope (ft/ft)	0.0165	0.0083	0.014	0.0102	0.0172
FEMA Classification	N/A	N/A	N/A	N/A	N/A
Native Vegetation Community	Piedmont Small Stream				
Percent Composition of Exotic/Invasive Vegetation	<5%	25%	<5%	<5%	<5%
Parameters	Reach R6	Reach R7	Reach T1	Reach T2	
Length of Reach (linear feet)	1,828	646	242	171	
Valley Classification (Rosgen)	VII	VII	VII	VII	
Drainage Area (acres)	32	14	49	5	
NCDWR Stream Identification Score	25 / 30	23 / 35	23.75	20.75	
NCDWR Water Quality Classification	C				
Morphological Description (Rosgen stream type)	G5c (upstream)/ B5c (downstream)	G5 (upstream)/ B5c (downstream)	B5c	B5c	
Evolutionary Trend	Bc→Gc→F	Bc→Gc→F	Bc→Gc→F	Bc→Gc→F	
Underlying Mapped Soils	WoA	WoA	WoA	WoA	
Drainage Class	Poorly drained	Poorly drained	Poorly drained	Poorly drained	
Soil Hydric Status	Hydric	Hydric	Hydric	Hydric	
Average Channel Slope (ft/ft)	0.015/0.025	0.025	0.02	0.041	
FEMA Classification	N/A	N/A	N/A	N/A	
Native Vegetation Community	Piedmont Small Stream				
Percent Composition of Exotic/Invasive Vegetation	<5%	<5%	<5%	<5%	
Regulatory Considerations					
Regulation	Applicable	Resolved	Supporting Documentation		
Waters of the United States – Section 404	Yes	Yes	Categorical Exclusion (Appendix B)		
Waters of the United States – Section 401	Yes	Yes	Categorical Exclusion (Appendix B)		
Endangered Species Act	No	N/A	Categorical Exclusion (Appendix B)		
Historic Preservation Act	No	N/A	Categorical Exclusion (Appendix B)		
Coastal Area Management Act (CAMA)	No	N/A	Categorical Exclusion (Appendix B)		
FEMA Floodplain Compliance	No	Yes	Categorical Exclusion (Appendix B)		
Essential Fisheries Habitat	No	N/A	Categorical Exclusion (Appendix B)		

Appendix B

Visual Assessment Data



Fig. 2A

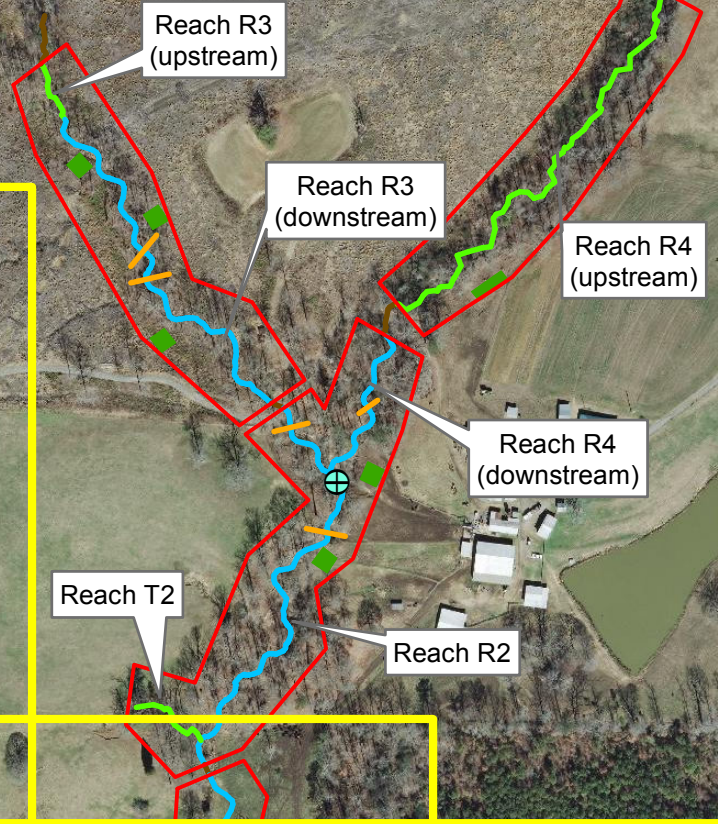


Fig. 2C

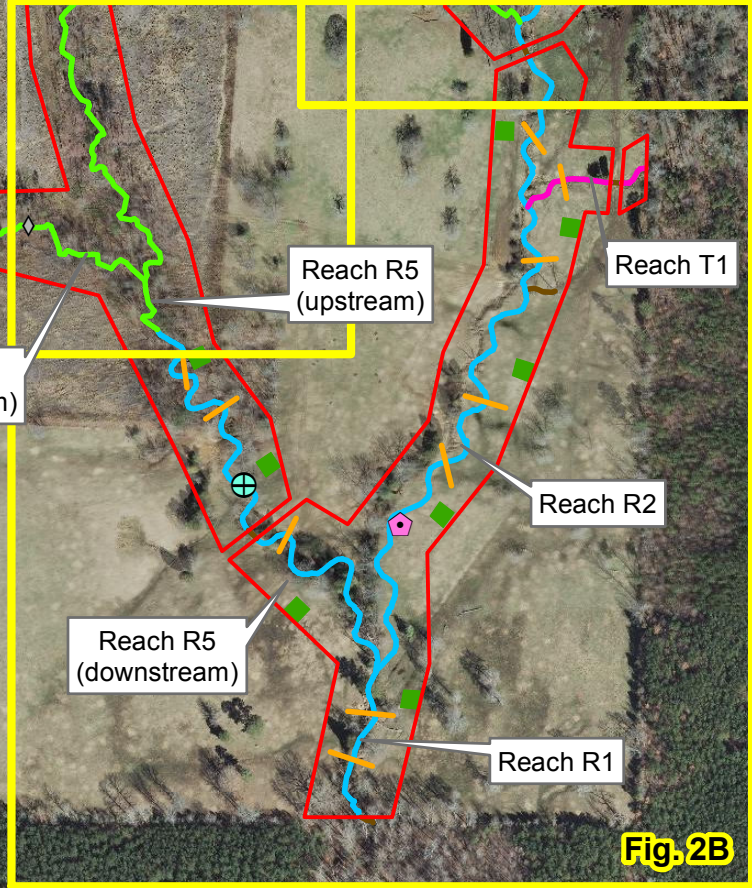
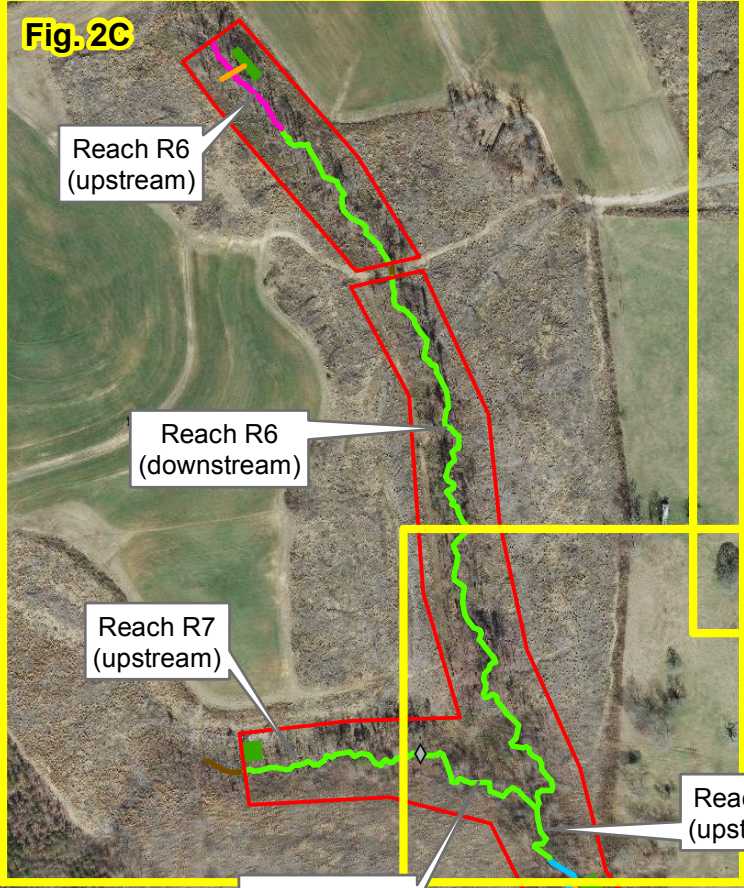
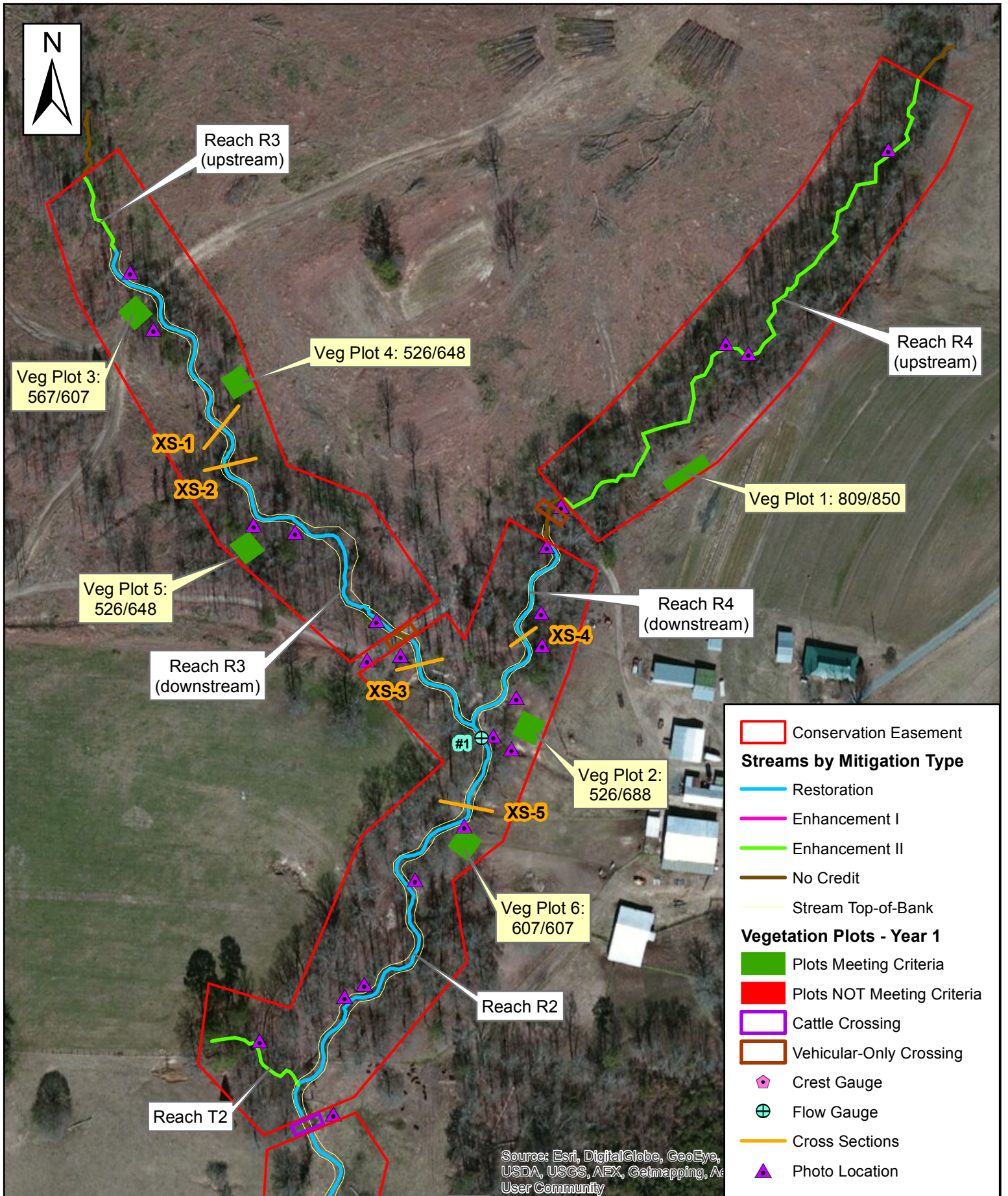
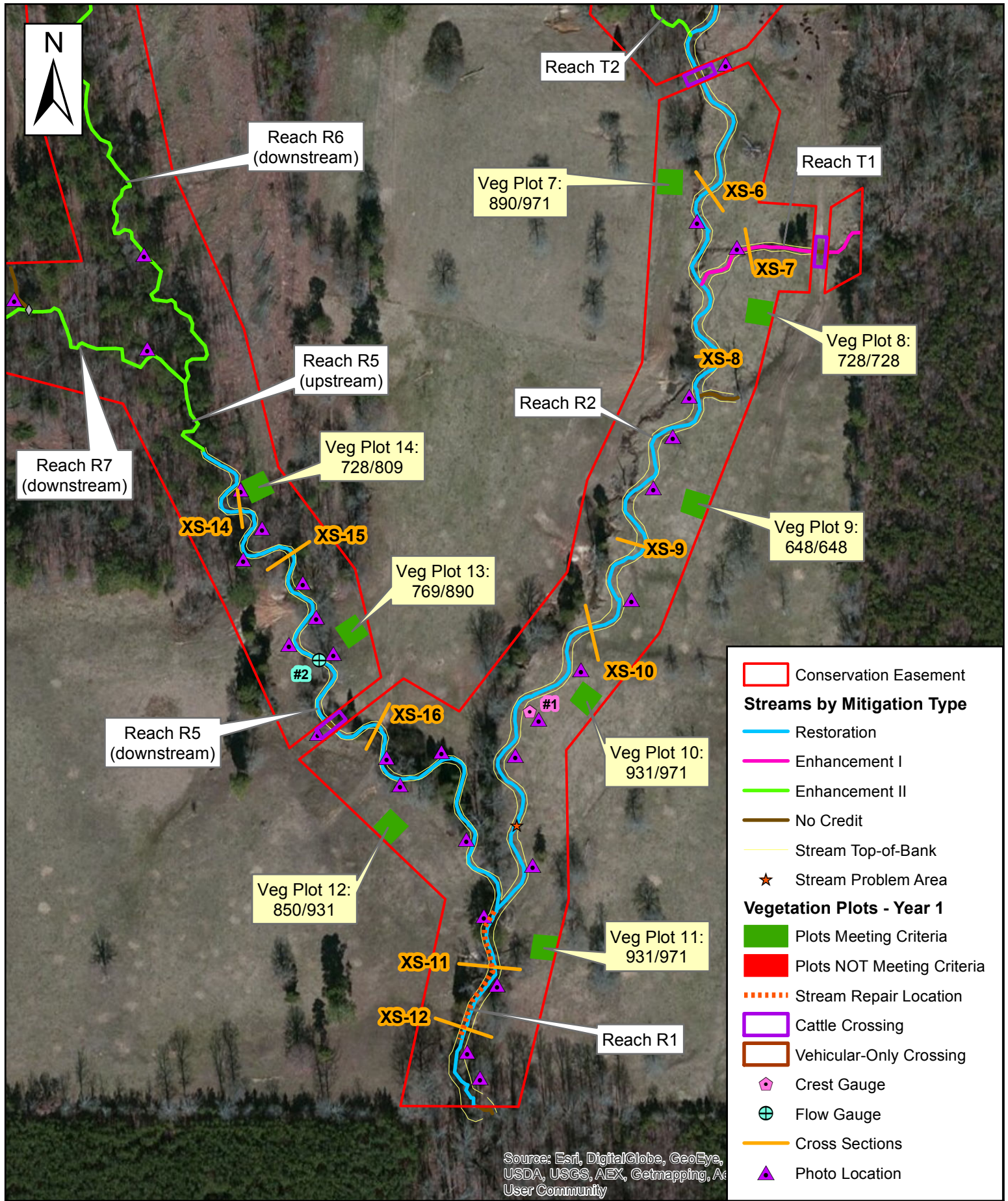


Fig. 2B

NC OneMap, NC Center for Geographic Information and Analysis, NC 911 Board





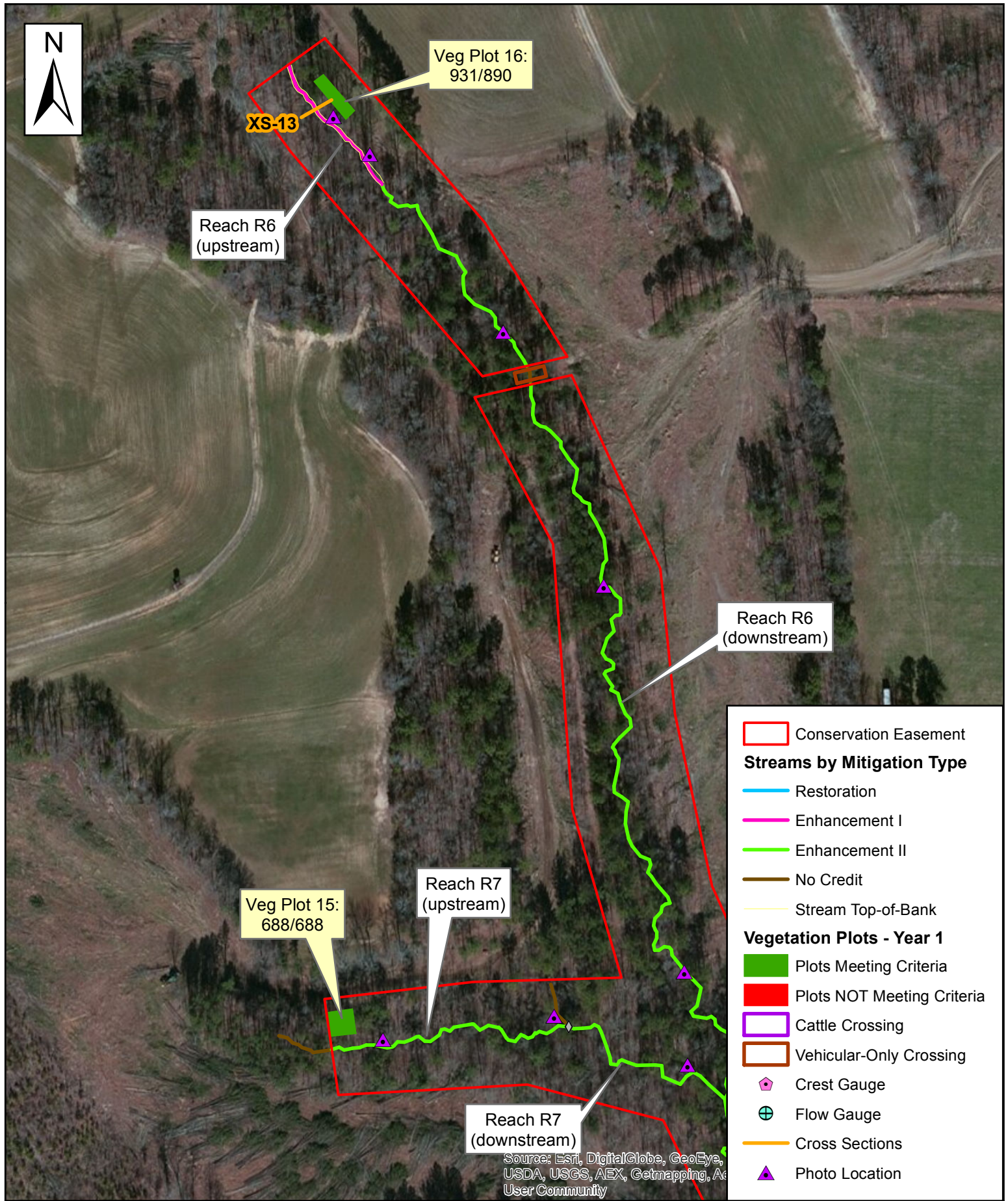


Table 5. Visual Stream Morphology Stability Assessment										
Thomas Creek Restoration Project: DMS Project ID No. 96074										
Reach ID: Reach 1										
Assessed Length (LF): 298										
Major Channel Category	Channel Sub-Category	Metric	Number Stable, Performing as Intended	Total Number per As-built	Number of Unstable Segments	Amount of Unstable Footage	% Stable, Performing as Intended	Number with Stabilizing Woody Veg.	Footage with Stabilizing Woody Veg.	Adjusted % for Stabilizing Woody Veg.
1. Bed	1. Vertical Stability	1. Aggradation - Bar formation/growth sufficient to significantly deflect flow laterally (not to include point bars)			0	0	100%			
		2. Degradation - Evidence of downcutting			0	0	100%			
	2. Riffle Condition	1. Texture Substrate - Riffle maintains coarser substrate	3	3			100%			
	3. Meander Pool Condition	1. Depth - Sufficient (Max Pool Depth/Mean Bkf Depth \geq 1.5)	3	3			100%			
		2. Length - Sufficient (>30% of centerline distance between tail of upstream riffle and head of downstream riffle)	3	3			100%			
	4. Thalweg Position	1. Thalweg centering at upstream of meander bend (Run)	3	3			100%			
		2. Thalweg centering at downstream of meander bend (Glide)	3	3			100%			
2. Bank	1. Scoured/Eroding	Bank lacking vegetative cover due to active scour and erosion			0	0	100%	0	0	100%
	2. Undercut	Banks undercut/overhanging to the extent that mass wasting is expected			0	0	100%	0	0	100%
	3. Mass Wasting	Banks slumping, caving or collapse			0	0	100%	0	0	100%
						Totals	0	0	100%	0
3. Engineering Structures	1. Overall Integrity	Structures physically intact with no dislodged boulders or logs	3	3			100%			
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill	2	2			100%			
	2a. Piping	Structures lacking any substantial flow underneath or around sills or arms	3	3			100%			
	3. Bank Position	Bank erosion within the structures extent of influence does not exceed 15%	3	3			100%			
	4. Habitat	Pool forming structures maintaining - Max Pool Depth/Mean Bankfull Depth ratio \geq 1.5. Rootwads/logs providing some cover at low flow	3	3			100%			

Table 5. Visual Stream Morphology Stability Assessment										
Thomas Creek Restoration Project: DMS Project ID No. 96074										
Reach ID: Reach 2										
Assessed Length (LF): 2,126										
Major Channel Category	Channel Sub-Category	Metric	Number Stable, Performing as Intended	Total Number per As-built	Number of Unstable Segments	Amount of Unstable Footage	% Stable, Performing as Intended	Number with Stabilizing Woody Veg.	Footage with Stabilizing Woody Veg.	Adjusted % for Stabilizing Woody Veg.
1. Bed	1. Vertical Stability	1. Aggradation - Bar formation/growth sufficient to significantly deflect flow laterally (not to include point bars)			0	0	100%			
		2. Degradation - Evidence of downcutting			0	0	100%			
	2. Riffle Condition	1. Texture Substrate - Riffle maintains coarser substrate	26	26			100%			
	3. Meander Pool Condition	1. Depth - Sufficient (Max Pool Depth/Mean Bkf Depth \geq 1.5)	28	28			100%			
		2. Length - Sufficient (>30% of centerline distance between tail of upstream riffle and head of downstream riffle)	28	28			100%			
	4. Thalweg Position	1. Thalweg centering at upstream of meander bend (Run)	28	28			100%			
		2. Thalweg centering at downstream of meander bend (Glide)	28	28			100%			
2. Bank	1. Scoured/Eroding	Bank lacking vegetative cover due to active scour and erosion			1	10'	99%	0	0	99%
	2. Undercut	Banks undercut/overhanging to the extent that mass wasting is expected			0	0	100%	0	0	100%
	3. Mass Wasting	Banks slumping, caving or collapse			0	0	100%	0	0	100%
						Totals	1	10'	99%	0
3. Engineering Structures	1. Overall Integrity	Structures physically intact with no dislodged boulders or logs	23	23			100%			
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill	10	10			100%			
	2a. Piping	Structures lacking any substantial flow underneath or around sills or arms	23	23			100%			
	3. Bank Position	Bank erosion within the structures extent of influence does not exceed 15%	23	23			100%			
	4. Habitat	Pool forming structures maintaining - Max Pool Depth/Mean Bankfull Depth ratio \geq 1.5. Rootwads/logs providing some cover at low flow	13	14			93%			

Table 5. Continued Visual Stream Morphology Stability Assessment										
Thomas Creek Restoration Project: DMS Project ID No. 96074										
Reach ID: Reach 3										
Assessed Length (LF): 1,031										
Major Channel Category	Channel Sub-Category	Metric	Number Stable, Performing as Intended	Total Number per As-built	Number of Unstable Segments	Amount of Unstable Footage	% Stable, Performing as Intended	Number with Stabilizing Woody Veg.	Footage with Stabilizing Woody Veg.	Adjusted % for Stabilizing Woody Veg.
1. Bed	1. Vertical Stability	1. Aggradation - Bar formation/growth sufficient to significantly deflect flow laterally (not to include point bars)			0	0	100%			
		2. Degradation - Evidence of downcutting			0	0	100%			
	2. Riffle Condition	1. Texture Substrate - Riffle maintains coarser substrate	14	14			100%			
	3. Meander Pool Condition	1. Depth - Sufficient (Max Pool Depth/Mean Bkf Depth \geq 1.5)	15	15			100%			
		2. Length - Sufficient (>30% of centerline distance between tail of upstream riffle and head of downstream riffle)	15	15			100%			
4. Thalweg Position	1. Thalweg centering at upstream of meander bend (Run)	15	15			100%				
	2. Thalweg centering at downstream of meander bend (Glide)	15	15			100%				
2. Bank	1. Scoured/Eroding	Bank lacking vegetative cover due to active scour and erosion			0	0	100%	0	0	100%
		2. Undercut	Banks undercut/overhanging to the extent that mass wasting is expected		0	0	100%	0	0	100%
		3. Mass Wasting	Banks slumping, caving or collapse		0	0	100%	0	0	100%
	Totals					0	0	100%	0	0
3. Engineering Structures	1. Overall Integrity	Structures physically intact with no dislodged boulders or logs	10	10			100%			
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill	2	2			100%			
	2a. Piping	Structures lacking any substantial flow underneath or around sills or arms	10	10			100%			
	3. Bank Position	Bank erosion within the structures extent of influence does not exceed 15%	10	10			100%			
	4. Habitat	Pool forming structures maintaining - Max Pool Depth/Mean Bankfull Depth ratio \geq 1.5. Rootwads/logs providing some cover at low flow	7	7			100%			

Table 5. Continued Visual Stream Morphology Stability Assessment										
Thomas Creek Restoration Project: DMS Project ID No. 96074										
Reach ID: Reach 4										
Assessed Length (LF): 1,238										
Major Channel Category	Channel Sub-Category	Metric	Number Stable, Performing as Intended	Total Number per As-built	Number of Unstable Segments	Amount of Unstable Footage	% Stable, Performing as Intended	Number with Stabilizing Woody Veg.	Footage with Stabilizing Woody Veg.	Adjusted % for Stabilizing Woody Veg.
1. Bed	1. Vertical Stability	1. Aggradation - Bar formation/growth sufficient to significantly deflect flow laterally (not to include point bars)			0	0	100%			
		2. Degradation - Evidence of downcutting			0	0	100%			
	2. Riffle Condition	1. Texture Substrate - Riffle maintains coarser substrate	8	8			100%			
	3. Meander Pool Condition	1. Depth - Sufficient (Max Pool Depth/Mean Bkf Depth \geq 1.5)	8	8			100%			
		2. Length - Sufficient (>30% of centerline distance between tail of upstream riffle and head of downstream riffle)	8	8			100%			
4. Thalweg Position	1. Thalweg centering at upstream of meander bend (Run)	8	8			100%				
	2. Thalweg centering at downstream of meander bend (Glide)	8	8			100%				
2. Bank	1. Scoured/Eroding	Bank lacking vegetative cover due to active scour and erosion			0	0	100%	0	0	100%
		2. Undercut	Banks undercut/overhanging to the extent that mass wasting is expected		0	0	100%	0	0	100%
		3. Mass Wasting	Banks slumping, caving or collapse		0	0	100%	0	0	100%
	Totals					0	0	100%	0	0
3. Engineering Structures	1. Overall Integrity	Structures physically intact with no dislodged boulders or logs	4	4			100%			
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill	1	1			100%			
	2a. Piping	Structures lacking any substantial flow underneath or around sills or arms	4	4			100%			
	3. Bank Position	Bank erosion within the structures extent of influence does not exceed 15%	4	4			100%			
	4. Habitat	Pool forming structures maintaining - Max Pool Depth/Mean Bankfull Depth ratio \geq 1.5. Rootwads/logs providing some cover at low flow	3	3			100%			

Table 5. Continued Visual Stream Morphology Stability Assessment											
Thomas Creek Restoration Project: DMS Project ID No. 96074											
Reach ID: Reach 5											
Assessed Length (LF): 1,169											
Major Channel Category	Channel Sub-Category	Metric	Number Stable, Performing as Intended	Total Number per As-built	Number of Unstable Segments	Amount of Unstable Footage	% Stable, Performing as Intended	Number with Stabilizing Woody Veg.	Footage with Stabilizing Woody Veg.	Adjusted % for Stabilizing Woody Veg.	
1. Bed	1. Vertical Stability	1. Aggradation - Bar formation/growth sufficient to significantly deflect flow laterally (not to include point bars)			0	0	100%				
		2. Degradation - Evidence of downcutting			0	0	100%				
	2. Riffle Condition	1. Texture Substrate - Riffle maintains coarser substrate	17	17			100%				
	3. Meander Pool Condition	1. Depth - Sufficient (Max Pool Depth/Mean Bkf Depth \geq 1.5)	18	18			100%				
		2. Length - Sufficient (>30% of centerline distance between tail of upstream riffle and head of downstream riffle)	18	18			100%				
	4. Thalweg Position	1. Thalweg centering at upstream of meander bend (Run)	18	18			100%				
2. Thalweg centering at downstream of meander bend (Glide)		18	18			100%					
2. Bank	1. Scoured/Eroding	Bank lacking vegetative cover due to active scour and erosion			0	0	100%	0	0	100%	
		2. Undercut	Banks undercut/overhanging to the extent that mass wasting is expected			0	0	100%	0	0	100%
		3. Mass Wasting	Banks slumping, caving or collapse			0	0	100%	0	0	100%
				Totals		0	0	100%	0	0	100%
3. Engineering Structures	1. Overall Integrity	Structures physically intact with no dislodged boulders or logs	16	16			100%				
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill	1	1			100%				
	2a. Piping	Structures lacking any substantial flow underneath or around sills or arms	16	16			100%				
		Bank erosion within the structures extent of influence does not exceed 15%	16	16			100%				
	4. Habitat	Pool forming structures maintaining - Max Pool Depth/Mean Bankfull Depth ratio \geq 1.5. Rootwads/logs providing some cover at low flow	15	15			100%				

Table 5. Continued Visual Stream Morphology Stability Assessment											
Thomas Creek Restoration Project: DMS Project ID No. 96074											
Reach ID: Reach 6											
Assessed Length (LF): 1,776											
Major Channel Category	Channel Sub-Category	Metric	Number Stable, Performing as Intended	Total Number per As-built	Number of Unstable Segments	Amount of Unstable Footage	% Stable, Performing as Intended	Number with Stabilizing Woody Veg.	Footage with Stabilizing Woody Veg.	Adjusted % for Stabilizing Woody Veg.	
1. Bed	1. Vertical Stability	1. Aggradation - Bar formation/growth sufficient to significantly deflect flow laterally (not to include point bars)			0	0	100%				
		2. Degradation - Evidence of downcutting			0	0	100%				
	2. Riffle Condition	1. Texture Substrate - Riffle maintains coarser substrate	6	6			100%				
	3. Meander Pool Condition	1. Depth - Sufficient (Max Pool Depth/Mean Bkf Depth \geq 1.5)	5	5			100%				
		2. Length - Sufficient (>30% of centerline distance between tail of upstream riffle and head of downstream riffle)	5	5			100%				
	4. Thalweg Position	1. Thalweg centering at upstream of meander bend (Run)	5	5			100%				
2. Thalweg centering at downstream of meander bend (Glide)		5	5			100%					
2. Bank	1. Scoured/Eroding	Bank lacking vegetative cover due to active scour and erosion			0	0	100%	0	0	100%	
		2. Undercut	Banks undercut/overhanging to the extent that mass wasting is expected			0	0	100%	0	0	100%
		3. Mass Wasting	Banks slumping, caving or collapse			0	0	100%	0	0	100%
				Totals		0	0	100%	0	0	100%
3. Engineering Structures	1. Overall Integrity	Structures physically intact with no dislodged boulders or logs	0	0			-				
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill	0	0			-				
	2a. Piping	Structures lacking any substantial flow underneath or around sills or arms	0	0			-				
		Bank erosion within the structures extent of influence does not exceed 15%	0	0			-				
	4. Habitat	Pool forming structures maintaining - Max Pool Depth/Mean Bankfull Depth ratio \geq 1.5. Rootwads/logs providing some cover at low flow	0	0			-				

Table 5. Continued Visual Stream Morphology Stability Assessment											
Thomas Creek Restoration Project: DMS Project ID No. 96074											
Reach ID: Reach 7											
Assessed Length (LF): 647											
Major Channel Category	Channel Sub-Category	Metric	Number Stable, Performing as Intended	Total Number per As-built	Number of Unstable Segments	Amount of Unstable Footage	% Stable, Performing as Intended	Number with Stabilizing Woody Veg.	Footage with Stabilizing Woody Veg.	Adjusted % for Stabilizing Woody Veg.	
1. Bed	1. Vertical Stability	1. Aggradation - Bar formation/growth sufficient to significantly deflect flow laterally (not to include point bars)			0	0	100%				
		2. Degradation - Evidence of downcutting			0	0	100%				
	2. Riffle Condition	1. Texture Substrate - Riffle maintains coarser substrate	5	5			100%				
		1. Depth - Sufficient (Max Pool Depth/Mean Bkf Depth \geq 1.5)	6	6			100%				
	3. Meander Pool Condition	2. Length - Sufficient (>30% of centerline distance between tail of upstream riffle and head of downstream riffle)	6	6			100%				
4. Thalweg Position	1. Thalweg centering at upstream of meander bend (Run)	6	6			100%					
	2. Thalweg centering at downstream of meander bend (Glide)	6	6			100%					
2. Bank	1. Scoured/Eroding	Bank lacking vegetative cover due to active scour and erosion			0	0	100%	0	0	100%	
		2. Undercut	Banks undercut/overhanging to the extent that mass wasting is expected			0	0	100%	0	0	100%
		3. Mass Wasting	Banks slumping, caving or collapse			0	0	100%	0	0	100%
	Totals					0	0	100%	0	0	100%
3. Engineering 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	2	2			100%				
	2a. Piping	Structures lacking any substantial flow underneath or around sills or arms	2	2			100%				
	3. Bank Position	Bank erosion within the structures extent of influence does not exceed 15%	2	2			100%				
	4. Habitat	Pool forming structures maintaining - Max Pool Depth/Mean Bankfull Depth ratio \geq 1.5. Rootwads/logs providing some cover at low flow	2	2			100%				

Table 5. Continued Visual Stream Morphology Stability Assessment											
Thomas Creek Restoration Project: DMS Project ID No. 96074											
Reach ID: Reach T1											
Assessed Length (LF): 227											
Major Channel Category	Channel Sub-Category	Metric	Number Stable, Performing as Intended	Total Number per As-built	Number of Unstable Segments	Amount of Unstable Footage	% Stable, Performing as Intended	Number with Stabilizing Woody Veg.	Footage with Stabilizing Woody Veg.	Adjusted % for Stabilizing Woody Veg.	
1. Bed	1. Vertical Stability	1. Aggradation - Bar formation/growth sufficient to significantly deflect flow laterally (not to include point bars)			0	0	100%				
		2. Degradation - Evidence of downcutting			0	0	100%				
	2. Riffle Condition	1. Texture Substrate - Riffle maintains coarser substrate	3	3			100%				
		1. Depth - Sufficient (Max Pool Depth/Mean Bkf Depth \geq 1.5)	4	4			100%				
	3. Meander Pool Condition	2. Length - Sufficient (>30% of centerline distance between tail of upstream riffle and head of downstream riffle)	4	4			100%				
4. Thalweg Position	1. Thalweg centering at upstream of meander bend (Run)	4	4			100%					
	2. Thalweg centering at downstream of meander bend (Glide)	4	4			100%					
2. Bank	1. Scoured/Eroding	Bank lacking vegetative cover due to active scour and erosion			0	0	100%	0	0	100%	
		2. Undercut	Banks undercut/overhanging to the extent that mass wasting is expected			0	0	100%	0	0	100%
		3. Mass Wasting	Banks slumping, caving or collapse			0	0	100%	0	0	100%
	Totals					0	0	100%	0	0	100%
3. Engineering Structures	1. Overall Integrity	Structures physically intact with no dislodged boulders or logs	1	1			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 or around sills or arms	1	1			100%				
	3. Bank Position	Bank erosion within the structures extent of influence does not exceed 15%	1	1			100%				
	4. Habitat	Pool forming structures maintaining - Max Pool Depth/Mean Bankfull Depth ratio \geq 1.5. Rootwads/logs providing some cover at low flow	1	1			100%				

Table 5. Continued Visual Stream Morphology Stability Assessment										
Thomas Creek Restoration Project: DMS Project ID No. 96074										
Reach ID: Reach T2										
Assessed Length (LF): 157										
Major Channel Category	Channel Sub-Category	Metric	Number Stable, Performing as Intended	Total Number per As-built	Number of Unstable Segments	Amount of Unstable Footage	% Stable, Performing as Intended	Number with Stabilizing Woody Veg.	Footage with Stabilizing Woody Veg.	Adjusted % for Stabilizing Woody Veg.
1. Bed	1. Vertical Stability	1. Aggradation - Bar formation/growth sufficient to significantly deflect flow laterally (not to include point bars)			0	0	100%			
		2. Degradation - Evidence of downcutting			0	0	100%			
	2. Riffle Condition	1. Texture Substrate - Riffle maintains coarser substrate	2	2			100%			
		3. Meander Pool Condition	1. Depth - Sufficient (Max Pool Depth/Mean Bkf Depth \geq 1.5)	2	2			100%		
	4. Thalweg Position	2. Length - Sufficient (>30% of centerline distance between tail of upstream riffle and head of downstream riffle)	2	2			100%			
		1. Thalweg centering at upstream of meander bend (Run)	2	2			100%			
2. Bank	2. Thalweg centering at downstream of meander bend (Glide)	2. Thalweg centering at downstream of meander bend (Glide)	2	2			100%			
				Totals	0	0	100%	0	0	100%
3. Engineering Structures	1. Overall Integrity	Structures physically intact with no dislodged boulders or logs	1	1			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 or around sills or arms	1	1			100%			
	3. Bank Position	Bank erosion within the structures extent of influence does not exceed 15%	1	1			100%			
	4. Habitat	Pool forming structures maintaining - Max Pool Depth/Mean Bankfull Depth ratio \geq 1.5. Rootwads/logs providing some cover at low flow	1	1			100%			

Table 6. Vegetation Conditions Assessment						
Thomas Creek Restoration Project: DMS Project ID No. 96074						
Reach ID: Reach 1						
Planted Acreage: 3.1						
Vegetation Category	Defintions	Mapping Threshold (acres)	CCPV Depiction	Number of Polygons	Combined Acreage	% of Planted Acreage
1. Bare Areas	Very limited cover both woody and herbaceous material.	0.1	NA	0	0.00	0.0%
2. Low Stem Density Areas	Woody stem densities clearly below target levels based on MY3, 4 or 5 stem count criteria.	0.1	NA	0	0.00	0.0%
Total				0	0.00	0.0%
3. Areas of Poor Growth Rates or Vigor	Areas with woody stems or a size class that are obviously small given the monitoring year.	0.25	NA	0	0.00	0.0%
Cumulative Total				0	0.00	0.0%
Easement Acreage: 3.1						
Vegetation Category	Defintions	Mapping Threshold	CCPV Depiction	Number of Polygons	Combined Acreage	% of Planted Acreage
5. Invasive Areas of Concern	Areas of points (if too small to render as polygons at map scale)	1000 ft ²	NA	0	0.00	0.0%
6. Easement Encroachment Areas	Easement area shown was encroached into by use of farm equipment and will need to be replanted.	none	NA	0	0.00	0.0%
Reach ID: Reach 2						
Planted Acreage: 8.4						
Vegetation Category	Defintions	Mapping Threshold (acres)	CCPV Depiction	Number of Polygons	Combined Acreage	% of Planted Acreage
1. Bare Areas	Very limited cover both woody and herbaceous material.	0.1	NA	0	0.00	0.0%
2. Low Stem Density Areas	Woody stem densities clearly below target levels based on MY3, 4 or 5 stem count criteria.	0.1	NA	0	0.00	0.0%
Total				0	0.00	0.0%
3. Areas of Poor Growth Rates or Vigor	Areas with woody stems or a size class that are obviously small given the monitoring year.	0.25	NA	0	0.00	0.0%
Cumulative Total				0	0.00	0.0%
Easement Acreage: 8.4						
Vegetation Category	Defintions	Mapping Threshold	CCPV Depiction	Number of Polygons	Combined Acreage	% of Planted Acreage
5. Invasive Areas of Concern	Areas of points (if too small to render as polygons at map scale)	1000 ft ²	NA	0	0.00	0.0%
6. Easement Encroachment Areas	Areas of points (if too small to render as polygons at map scale)	none	NA	0	0.00	0.0%

Table 6 continued. Vegetation Conditions Assessment						
Thomas Creek Restoration Project: DMS Project ID No. 96074						
Reach ID: Reach 3						
Planted Acreage: 3.1						
Vegetation Category	Defintions	Mapping Threshold (acres)	CCPV Depiction	Number of Polygons	Combined Acreage	% of Planted Acreage
1. Bare Areas	Very limited cover both woody and herbaceous material.	0.1	NA	0	0.00	0.0%
2. Low Stem Density Areas	Woody stem densities clearly below target levels based on MY3, 4 or 5 stem count criteria.	0.1	NA	0	0.00	0.0%
Total				0	0.00	0.0%
3. Areas of Poor Growth Rates or Vigor	Areas with woody stems or a size class that are obviously small given the monitoring year.	0.25	NA	0	0.00	0.0%
Cumulative Total				0	0.00	0.0%
Easement Acreage: 3.1						
Vegetation Category	Defintions	Mapping Threshold	CCPV Depiction	Number of Polygons	Combined Acreage	% of Planted Acreage
5. Invasive Areas of Concern	Areas of points (if too small to render as polygons at map scale)	1000 ft ²	NA	0	0.00	0.0%
6. Easement Encroachment Areas	Easement area shown was encroached into by use of farm equipment and will need to be replanted.	none	NA	0	0.00	0.0%
Reach ID: Reach 4						
Planted Acreage: 8.4						
Vegetation Category	Defintions	Mapping Threshold (acres)	CCPV Depiction	Number of Polygons	Combined Acreage	% of Planted Acreage
1. Bare Areas	Very limited cover both woody and herbaceous material.	0.1	NA	0	0.00	0.0%
2. Low Stem Density Areas	Woody stem densities clearly below target levels based on MY3, 4 or 5 stem count criteria.	0.1	NA	0	0.00	0.0%
Total				0	0.00	0.0%
3. Areas of Poor Growth Rates or Vigor	Areas with woody stems or a size class that are obviously small given the monitoring year.	0.25	NA	0	0.00	0.0%
Cumulative Total				0	0.00	0.0%
Easement Acreage: 8.4						
Vegetation Category	Defintions	Mapping Threshold	CCPV Depiction	Number of Polygons	Combined Acreage	% of Planted Acreage
5. Invasive Areas of Concern	Areas of points (if too small to render as polygons at map scale)	1000 ft ²	NA	0	0.00	0.0%
6. Easement Encroachment Areas	Areas of points (if too small to render as polygons at map scale)	none	NA	0	0.00	0.0%
6. Easement Encroachment Areas	Areas of points (if too small to render as polygons at map scale)	none	NA	0	0.00	0.0%

Table 6 continued. Vegetation Conditions Assessment						
Thomas Creek Restoration Project: DMS Project ID No. 96074						
Reach ID: Reach 5						
Planted Acreage: 3.1						
Vegetation Category	Defintions	Mapping Threshold (acres)	CCPV Depiction	Number of Polygons	Combined Acreage	% of Planted Acreage
1. Bare Areas	Very limited cover both woody and herbaceous material.	0.1	NA	0	0.00	0.0%
2. Low Stem Density Areas	Woody stem densities clearly below target levels based on MY3, 4 or 5 stem count criteria.	0.1	NA	0	0.00	0.0%
Total				0	0.00	0.0%
3. Areas of Poor Growth Rates or Vigor	Areas with woody stems or a size class that are obviously small given the monitoring year.	0.25	NA	0	0.00	0.0%
Cumulative Total				0	0.00	0.0%
Easement Acreage: 3.1						
Vegetation Category	Defintions	Mapping Threshold	CCPV Depiction	Number of Polygons	Combined Acreage	% of Planted Acreage
5. Invasive Areas of Concern	Areas of points (if too small to render as polygons at map scale)	1000 ft ²	NA	0	0.00	0.0%
6. Easement Encroachment Areas	Easement area shown was encroached into by use of farm equipment and will need to be replanted.	none	NA	0	0.00	0.0%
Reach ID: Reach 6						
Planted Acreage: 8.4						
Vegetation Category	Defintions	Mapping Threshold (acres)	CCPV Depiction	Number of Polygons	Combined Acreage	% of Planted Acreage
1. Bare Areas	Very limited cover both woody and herbaceous material.	0.1	NA	0	0.00	0.0%
2. Low Stem Density Areas	Woody stem densities clearly below target levels based on MY3, 4 or 5 stem count criteria.	0.1	NA	0	0.00	0.0%
Total				0	0.00	0.0%
3. Areas of Poor Growth Rates or Vigor	Areas with woody stems or a size class that are obviously small given the monitoring year.	0.25	NA	0	0.00	0.0%
Cumulative Total				0	0.00	0.0%
Easement Acreage: 8.4						
Vegetation Category	Defintions	Mapping Threshold	CCPV Depiction	Number of Polygons	Combined Acreage	% of Planted Acreage
5. Invasive Areas of Concern	Areas of points (if too small to render as polygons at map scale)	1000 ft ²	NA	0	0.00	0.0%
6. Easement Encroachment Areas	Areas of points (if too small to render as polygons at map scale)	none	NA	0	0.00	0.0%

Table 6 continued. Vegetation Conditions Assessment						
Thomas Creek Restoration Project: DMS Project ID No. 96074						
Reach ID: Reach 7						
Planted Acreage: 3.1						
Vegetation Category	Defintions	Mapping Threshold (acres)	CCPV Depiction	Number of Polygons	Combined Acreage	% of Planted Acreage
1. Bare Areas	Very limited cover both woody and herbaceous material.	0.1	NA	0	0.00	0.0%
2. Low Stem Density Areas	Woody stem densities clearly below target levels based on MY3, 4 or 5 stem count criteria.	0.1	NA	0	0.00	0.0%
Total				0	0.00	0.0%
3. Areas of Poor Growth Rates or Vigor	Areas with woody stems or a size class that are obviously small given the monitoring year.	0.25	NA	0	0.00	0.0%
Cumulative Total				0	0.00	0.0%
Easement Acreage: 3.1						
Vegetation Category	Defintions	Mapping Threshold	CCPV Depiction	Number of Polygons	Combined Acreage	% of Planted Acreage
5. Invasive Areas of Concern	Areas of points (if too small to render as polygons at map scale)	1000 ft ²	NA	0	0.00	0.0%
6. Easement Encroachment Areas	Easement area shown was encroached into by use of farm equipment and will need to be replanted.	none	NA	0	0.00	0.0%
Reach ID: Reach T1						
Planted Acreage: 8.4						
Vegetation Category	Defintions	Mapping Threshold (acres)	CCPV Depiction	Number of Polygons	Combined Acreage	% of Planted Acreage
1. Bare Areas	Very limited cover both woody and herbaceous material.	0.1	NA	0	0.00	0.0%
2. Low Stem Density Areas	Woody stem densities clearly below target levels based on MY3, 4 or 5 stem count criteria.	0.1	NA	0	0.00	0.0%
Total				0	0.00	0.0%
3. Areas of Poor Growth Rates or Vigor	Areas with woody stems or a size class that are obviously small given the monitoring year.	0.25	NA	0	0.00	0.0%
Cumulative Total				0	0.00	0.0%
Easement Acreage: 8.4						
Vegetation Category	Defintions	Mapping Threshold	CCPV Depiction	Number of Polygons	Combined Acreage	% of Planted Acreage
5. Invasive Areas of Concern	Areas of points (if too small to render as polygons at map scale)	1000 ft ²	NA	0	0.00	0.0%
6. Easement Encroachment Areas	Areas of points (if too small to render as polygons at map scale)	none	NA	0	0.00	0.0%

Stream Station Photos (taken October 2016)



Reach 3, view upstream, Station 11+75



Reach 3, view downstream, Station 11+75



Reach 3, view upstream, Station 15+75



Reach 3, view downstream, Station 16+25



Reach 3, view downstream at pipe crossing, Station 18+50



Reach 3, stream crossing, Station 18+80



Reach 3, Station 19+00



Reach 4, view downstream at Station 1+90



Reach 4, view downstream at Station 5+75



Reach 4, view downstream at Station 6+10



Reach 4, view upstream at Station 10+10



Reach 4, view upstream at Station 10+50



Reach 4, view upstream at Station 11+75



Reach 4, view downstream at Station 12+25



Reach 4, view upstream at Station 13+00



Reach 2, view upstream at Station 20+60



Reach 2, Flow Gauge #1 at Station 20+75



Reach 2, view of stabilized drainage on left bank at Station 20+80



Reach 2, view upstream at Station 22+00



Reach 2, view upstream at Station 23+00



Reach 2, view upstream at Station 25+25



Reach 2, view downstream at Station 25+50



Reach 2, view of crossing at Station 27+75



Reach 2, view downstream at Station 30+20



Reach T1, view upstream at Station 11+75



Reach 2, view of drainage on left bank at Station 32+90



Reach 2, view downstream at Station 33+25



Reach 2, view downstream at Station 34+30



Reach 2, view downstream at Station 36+90



Reach 2, view upstream at Station 38+25



Reach 2, Crest Gauge at Station 38+75



Reach 2, view downstream at Station 39+40



Reach 2, view upstream at Station 41+50



Reach 1, view upstream at Station 42+75



Reach 1, view downstream at Station 43+25



Reach 1, view of drainage on left bank at Station 44+00



Reach 6, view upstream at Station 10+75



Reach 6, view upstream at Station 11+50



Reach 6, view upstream at Station 15+25



Reach 6, view upstream at Station 18+90



Reach 6, view upstream at Station 25+50



Reach 7, view upstream at Station 10+40



Reach 7, view of stabilized drainage at Station 13+50



Reach 7, view upstream at Station 15+00



Reach 5, view upstream at Station 30+25



Reach 5, view downstream at Station 30+75



Reach 5, view downstream at Station 31+40



Reach 5, view downstream at Station 32+50



Reach 5, view upstream at Station 33+10



Reach 5, view downstream at Station 33+75



Reach 5, Flow Gauge #2 at Station 33+90



Reach 5, Rock Crossing at Station 35+00



Reach 5, view upstream at Station 36+40



Reach 5, view upstream at Station 36+75



Reach 5, view downstream at Station 37+30



Reach 5, view upstream at Station 38+50



Reach 5, view upstream at Station 39+90
(the confluence of R5 and R2)



Reach T2, view upstream at Station 10+60



Conservation Easement Post and Sign



Reach 2: Crest Gauge, 1.17 feet, Oct. 27, 2016

Stream Problem Area Photos



Stream Problem Area (upstream), Oct. 2016, Station 40+60



Stream Problem Area (downstream), Oct. 2016, Station 40+60



Repaired Stream Area (before), May 2016, Station 42+00



Repaired Stream Area (after), Oct. 2016, Station 42+00



Repaired Stream Area (before), May 2016, Station 42+50



Repaired Stream Area (after), Oct. 2016, Station 42+50

Vegetation Plot Photos



Vegetation Plot 1 – September 2016



Vegetation Plot 2 – September 2016



Vegetation Plot 3 – September 2016



Vegetation Plot 4 – September 2016



Vegetation Plot 5 – September 2016



Vegetation Plot 6 – September 2016



Vegetation Plot 7 – September 2016



Vegetation Plot 8 – September 2016



Vegetation Plot 9 – September 2016



Vegetation Plot 10 – September 2016



Vegetation Plot 11 – September 2016



Vegetation Plot 12 – September 2016



Vegetation Plot 13 – September 2016



Vegetation Plot 14 – September 2016



Vegetation Plot 15 – October 2016



Vegetation Plot 16 – October 2016

Appendix C

Vegetation Plot Data

Table 7. CVS Density Per Plot
Thomas Creek Restoration Project: DMS Project ID No. 96074

Scientific Name	Common Name	Species Type	Current Plot Data (MY1 2016)																								Annual Means MY1 (2016)									
			96074-01-0001			96074-01-0002			96074-01-0003			96074-01-0004			96074-01-0005			96074-01-0006			96074-01-0007			96074-01-0008												
			PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T										
<i>Asimina triloba</i>	pawpaw	Tree																																		
<i>Betula nigra</i>	river birch	Tree	2	2	2	1	1	1	3	3	3				1	1	1	2	2	2	2	2	2	7	7	7										
<i>Carpinus caroliniana</i>	American hornbeam	Tree	4	4	4										1	1	1				6	6	6													
<i>Diospyros virginiana</i>	common persimmon	Tree	6	6	6	1	1	1	3	3	3	5	5	5	1	1	1	1	1	1	2	2	2	1	1	1										
<i>Fraxinus pennsylvanica</i>	green ash	Tree	1	1	1							1	1	1	1	1	1				3	3	3	3	3	3	1	1	1							
<i>Liriodendron tulipifera</i>	tuliptree	Tree	3	3	3	1	1	1				1	1	1	2	2	2	3	3	3				3	3	3										
<i>Platanus occidentalis</i>	American sycamore	Tree	2	2	2	1	1	1				2	2	2	2	2	2	4	4	4	1	1	1	2	2	2	4	4	4							
<i>Quercus michauxii</i>	swamp chestnut oak	Tree	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	4	4	4	1	1	1	2	2	2	2	2	2							
<i>Quercus pagoda</i>	cherrybark oak	Tree				1	1	1	2	2	2	2	2	2	1	1	1	2	2	2	3	3	3	5	5	5										
<i>Viburnum dentatum</i>	southern arrowwood	Shrub	1	1	1	6	6	6	4	4	4	4	4	4	1	1	1	2	2	2	3	3	3	5	5	5										
Stem count			20	20	20	13	13	13	14	14	14	13	13	13	13	13	13	15	15	15	22	22	22	18	18	18										
size (ares)			1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1										
size (ACRES)			0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02										
Species count			8	8	8	7	7	7	5	5	5	6	6	6	8	8	8	6	6	6	7	7	7	6	6	6										
Stems per ACRE			809.4	809.4	809.4	526.1	526.1	526.1	566.6	566.6	566.6	526.1	526.1	526.1	526.1	526.1	526.1	607.0	607.0	607.0	890.3	890.3	890.3	728.4	728.4	728.4										
Scientific Name	Common Name	Species Type	Current Plot Data (MY1 2016) continued																								Annual Means MY1 (2016)									
			96074-01-0009			96074-01-0010			96074-01-0011			96074-01-0012			96074-01-0013			96074-01-0014			96074-01-0015			96074-01-0016												
			PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T				PnoLS	P-all	T				
<i>Asimina triloba</i>	pawpaw	Tree																																		
<i>Betula nigra</i>	river birch	Tree	2	2	2	4	4	4	2	2	2	3	3	3	4	4	4	1	1	1	2	2	2	2	2	2	5	5	5	38	38	38				
<i>Carpinus caroliniana</i>	American hornbeam	Tree				5	5	5	1	1	1	2	2	2				5	5	5	5	5	5	5	5	5	34	34	34							
<i>Diospyros virginiana</i>	common persimmon	Tree	1	1	1	2	2	2	3	3	3	1	1	1				2	2	2	2	2	2	2	2	2	31	31	31							
<i>Fraxinus pennsylvanica</i>	green ash	Tree	2	2	2				3	3	3							1	1	1	2	2	2	1	1	1	16	16	16							
<i>Liriodendron tulipifera</i>	tuliptree	Tree							1	1	1	4	4	4	4	4	4	4	4	4	1	1	1	5	5	5	28	28	28							
<i>Platanus occidentalis</i>	American sycamore	Tree	1	1	1	2	2	2	2	2	2	5	5	5	5	5	5	6	6	6	1	1	1	4	4	4	40	40	40							
<i>Quercus michauxii</i>	swamp chestnut oak	Tree	4	4	4	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2				4	4	4	23	23	23							
<i>Quercus pagoda</i>	cherrybark oak	Tree	2	2	2	4	4	4	3	3	3	4	4	4	3	3	3							1	1	1	27	27	27							
<i>Viburnum dentatum</i>	southern arrowwood	Shrub	4	4	4	4	4	4	8	8	8							1	1	1	4	4	4	3	3	3	46	46	46							
Stem count			16	16	16	23	23	23	23	23	23	21	21	21	19	19	19	18	18	18	17	17	17	23	23	23	288	288	288							
size (ares)			1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1							
size (ACRES)			0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.40	0.40	0.40							
Species count			7	7	7	7	7	7	8	8	8	7	7	7	5	5	5	7	7	7	7	7	7	8	8	8	10	10	10							
Stems per ACRE			647.5	647.5	647.5	930.8	930.8	930.8	930.8	930.8	930.8	849.8	849.8	849.8	768.9	768.9	768.9	728.4	728.4	728.4	688.0	688.0	688.0	930.8	930.8	930.8	728.4	728.4	728.4							
Color for Density																																				
Exceeds requirements by 10%																																				
Exceeds requirements, but by less than 10%																																				
Fails to meet requirements, by less than 10%																																				
Fails to meet requirements by more than 10%																																				

Table 8. CVS Vegetation Summary and Totals

Thomas Creek Restoration Project: DMS Project ID No. 96074

Thomas Creek Restoration Project: DMS Project ID No. 96074 Year 1 (September 2016)							
Vegetation Plot Summary Information							
Plot #	Riparian Buffer Stems ¹	Stream/ Wetland Stems ²	Live Stakes	Invasives	Volunteers ³	Total ⁴	Unknown Growth Form
1	n/a	20	0	0	0	20	0
2	n/a	13	0	0	0	13	0
3	n/a	14	0	0	0	14	0
4	n/a	13	0	0	0	13	0
5	n/a	13	0	0	0	13	0
6	n/a	15	0	0	0	15	0
7	n/a	22	0	0	0	22	0
8	n/a	18	0	0	0	18	0
9	n/a	16	0	0	0	16	0
10	n/a	23	0	0	0	23	0
11	n/a	23	0	0	0	23	0
12	n/a	21	0	0	0	21	0
13	n/a	19	0	0	0	19	0
14	n/a	18	0	0	0	18	0
15	n/a	17	0	0	0	17	0
16	n/a	23	0	0	0	23	0
Wetland/Stream Vegetation Totals (per acre)					Riparian Buffer Vegetation Totals (per acre)		
Plot #	Stream/ Wetland Stems ²	Volunteers ³	Total ⁴	Success Criteria Met?	Plot #	Riparian Buffer Stems ¹	Success Criteria Met?
1	809	0	809	Yes	1	n/a	n/a
2	526	0	526	Yes	2	n/a	n/a
3	567	0	567	Yes	3	n/a	n/a
4	526	0	526	Yes	4	n/a	n/a
5	526	0	526	Yes	5	n/a	n/a
6	607	0	607	Yes	6	n/a	n/a
7	890	0	890	Yes	7	n/a	n/a
8	728	0	728	Yes	8	n/a	n/a
9	647	0	647	Yes	9	n/a	n/a
10	931	0	931	Yes	10	n/a	n/a
11	931	0	931	Yes	11	n/a	n/a
12	850	0	850	Yes	12	n/a	n/a
13	769	0	769	Yes	13	n/a	n/a
14	728	0	728	Yes	14	n/a	n/a
15	688	0	688	Yes	15	n/a	n/a
16	931	0	931	Yes	16	n/a	n/a
Project Average	728	0	728	Yes	Project Average	n/a	n/a
Stem Class	Characteristics						
¹ Buffer Stems	Native planted hardwood trees. Does NOT include shrubs. No pines. No vines.						
² Stream/ Wetland Stems	Native planted woody stems. Includes shrubs, does NOT include live stakes. No vines						
³ Volunteers	Native woody stems. Not planted. No vines.						
⁴ Total	Planted + volunteer native woody stems. Includes live stakes. Excl. exotics. Excl. vines.						
Color for Density							
Exceeds requirements by 10%							
Exceeds requirements, but by less than 10%							
Fails to meet requirements, by less than 10%							
Fails to meet requirements by more than 10%							

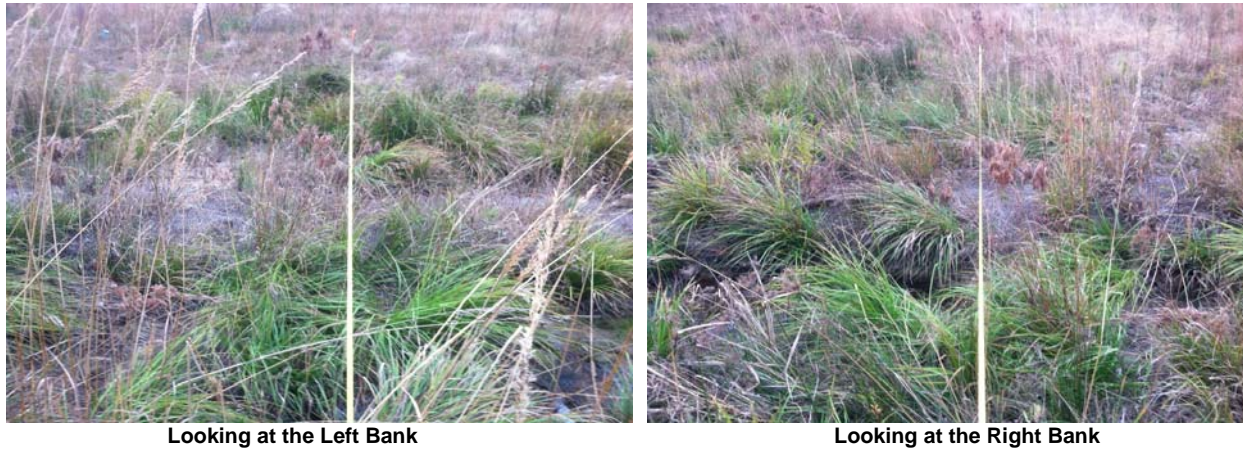
Table 9. Stem Count for Each Species Arranged by Plot																		
Thomas Creek Restoration Project: DMS Project ID No. 96074																		
Botanical Name	Common Name	Plots																Average Stems Per Acre
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	
Tree Species																		
<i>Betula nigra</i>	river birch	2	1	3		1	2	2	7	2	4	2	3	4	1	2	2	
<i>Fraxinus pennsylvanica</i>	green ash	1			1	1		3	1	2		3			1	2	1	
<i>Liriodendron tulipifera</i>	tulip poplar	3	1		1	2	3		3			1	4	4		1	5	
<i>Platanus occidentalis</i>	American sycamore	2	1		3	1	5	2	4	1	2	2	5	5	6	1		
<i>Quercus michauxii</i>	swamp chestnut oak	1	2	2				2	2	4	2				2		4	
<i>Quercus pagoda</i>	cherryback oak		1	2	2	4	1			2	4	3	4	3			1	
Shrub Species																		
<i>Asimina triloba</i>	paw paw													3		2		
<i>Carpinus caroliniana</i>	ironwood	4				1		6			5	1	2		5	5	5	
<i>Diospyros virginiana</i>	persimmon	6	1	3	5	1	1	2	1	1	2	3	1		2		2	
<i>Viburnum dentatum</i>	arrowwood viburnum	1	6	4	1	2	3	5		4	4	8			1	4	3	
Stems Per Plot for Year 1		20	13	14	13	13	15	22	18	16	23	23	21	19	18	17	23	
Stems/Acre for Year 1		809	526	567	526	526	607	890	728	648	931	931	850	769	728	688	931	
Total Stems/ Acre for Year 0 As-Built (Baseline Data)		850	688	607	648	648	607	971	728	648	971	971	931	890	809	688	890	

Appendix D

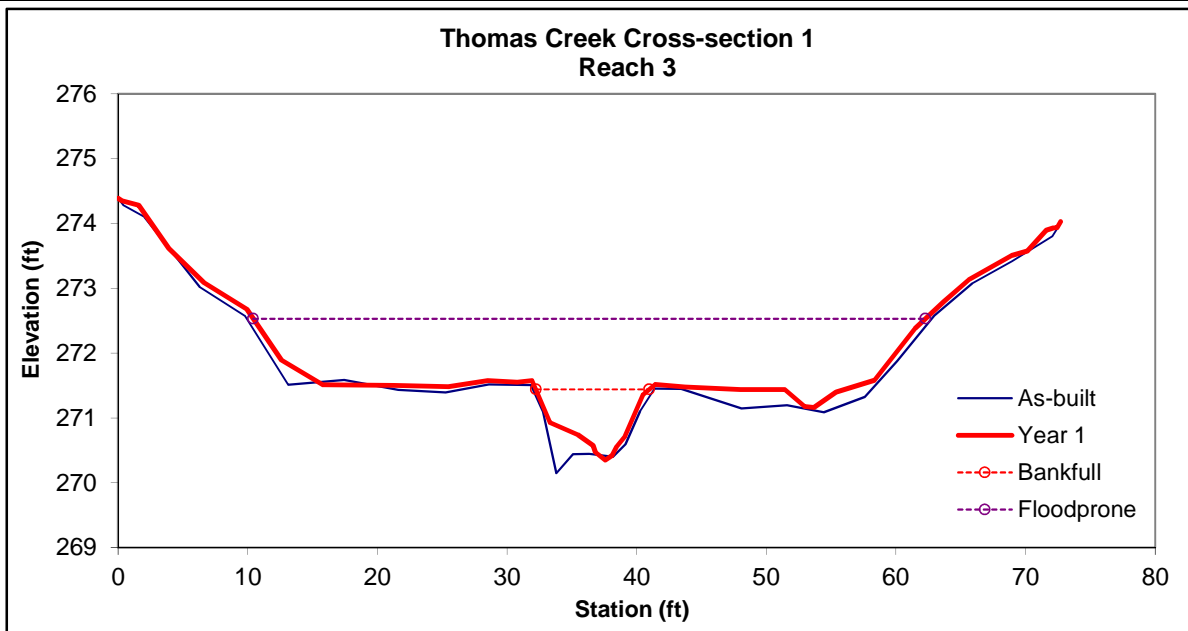
Stream Survey Data

Figure 5.

Permanent Cross-section 1
(Year 1 Data - Collected November 2016)



Feature	Stream Type	BKF Area	BKF Width	BKF Depth	Max BKF Depth	W/D	BH Ratio	ER	BKF Elev	TOB Elev
Riffle	C	5.4	8.76	0.62	1.09	14.1	1.1	5.9	271.44	271.52



Permanent Cross-section 2
(Year 1 Data - Collected November 2016)

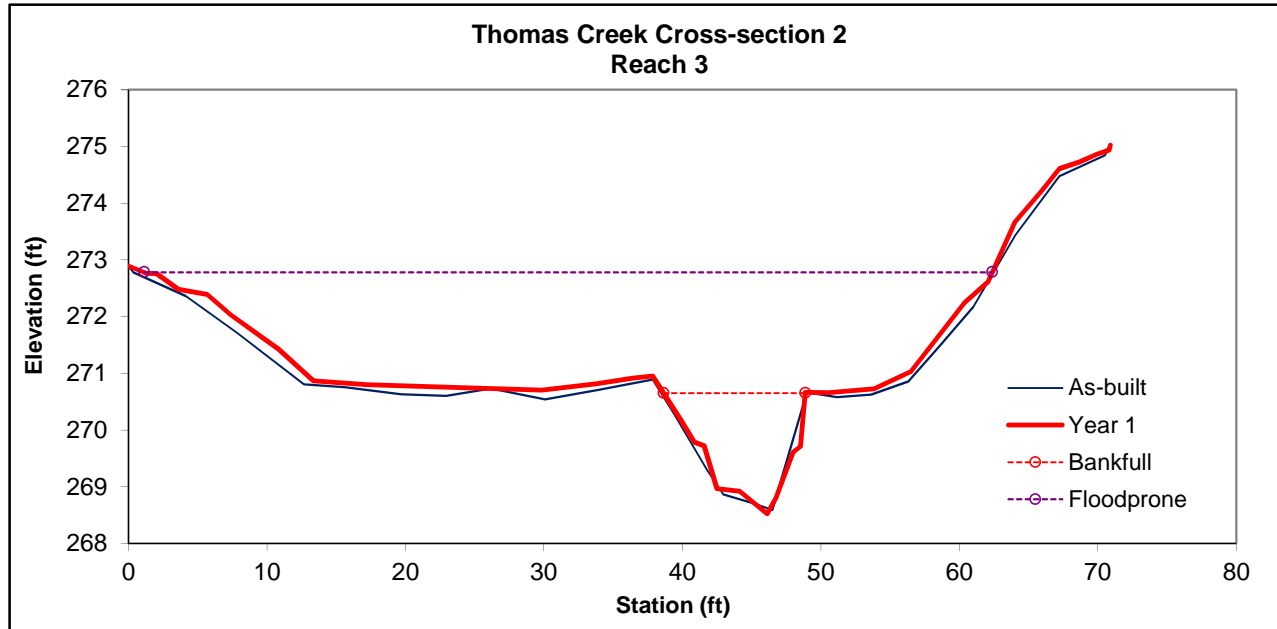


Looking at the Left Bank



Looking at the Right Bank

Feature	Stream Type	BKF Area	BKF Width	BKF Depth	Max BKF Depth	W/D	BH Ratio	ER	BKF Elev	TOB Elev
Pool		13.2	10.24	1.29	2.13	7.96	1	6	270.65	270.67



Permanent Cross-section 3
(Year 1 Data - Collected November 2016)

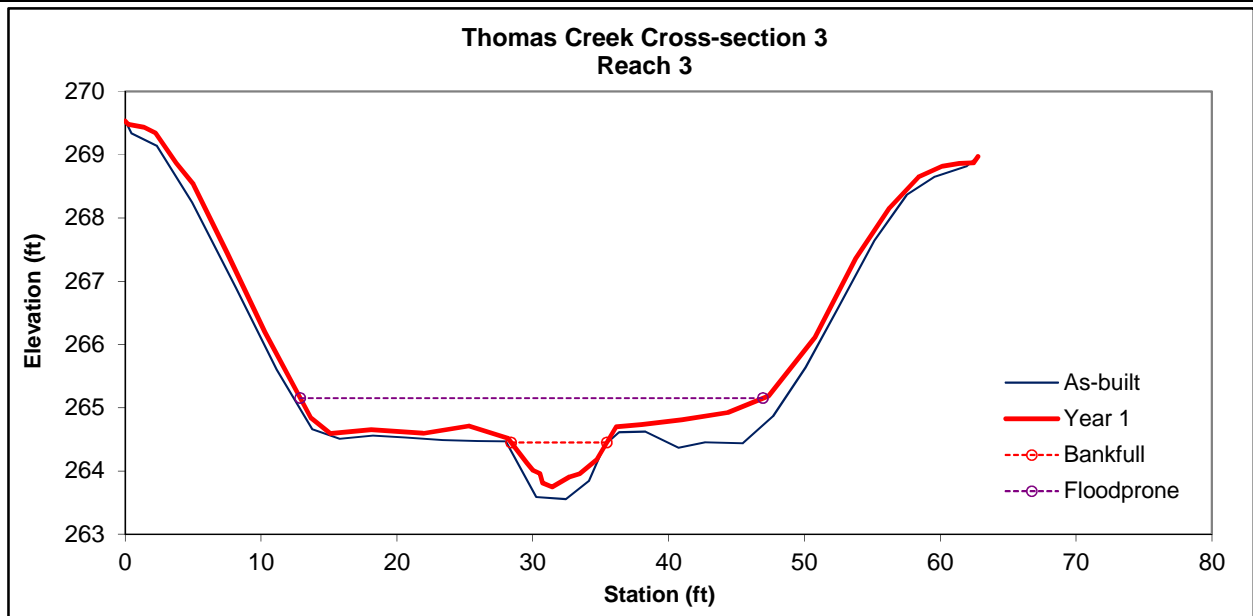


Looking at the Left Bank



Looking at the Right Bank

Feature	Stream Type	BKF Area	BKF Width	BKF Depth	Max BKF Depth	W/D	BH Ratio	ER	BKF Elev	TOB Elev
Riffle	C	3	7.05	0.42	0.7	16.85	1.1	4.8	264.45	264.52



Permanent Cross-section 4
(Year 1 Data - Collected November 2016)

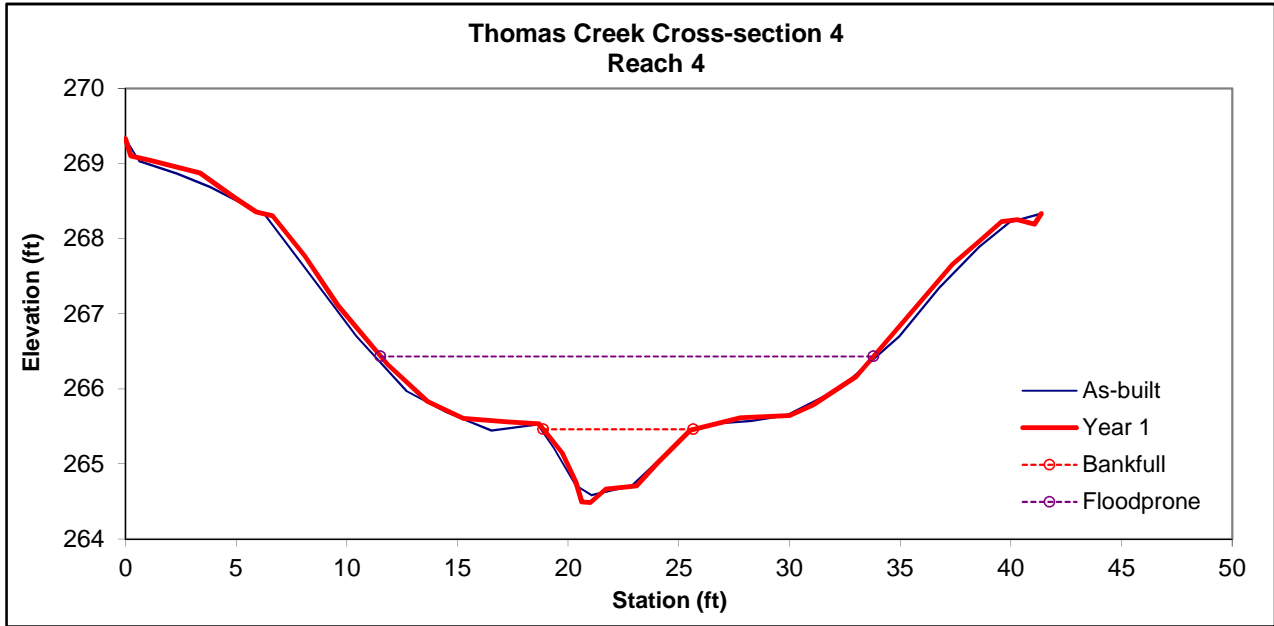


Looking at the Left Bank



Looking at the Right Bank

Feature	Stream Type	BKF Area	BKF Width	BKF Depth	Max BKF Depth	W/D	BH Ratio	ER	BKF Elev	TOB Elev
Riffle	C	3.6	6.77	0.54	0.97	12.58	1	3.3	265.46	265.45



Permanent Cross-section 5
(Year 1 Data - Collected November 2016)

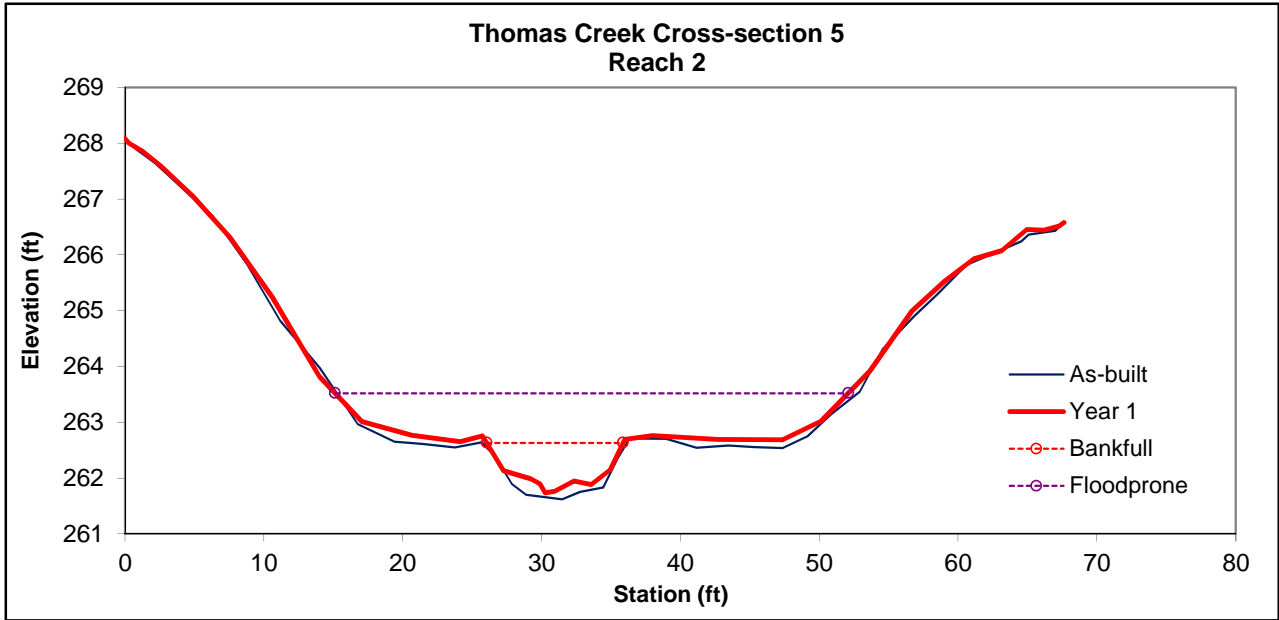


Looking at the Left Bank



Looking at the Right Bank

Feature	Stream Type	BKF Area	BKF Width	BKF Depth	Max BKF Depth	W/D	BH Ratio	ER	BKF Elev	TOB Elev
Riffle	C	5.8	9.82	0.59	0.89	16.61	1.1	3.8	262.63	262.69



Permanent Cross-section 6
(Year 1 Data - Collected November 2016)

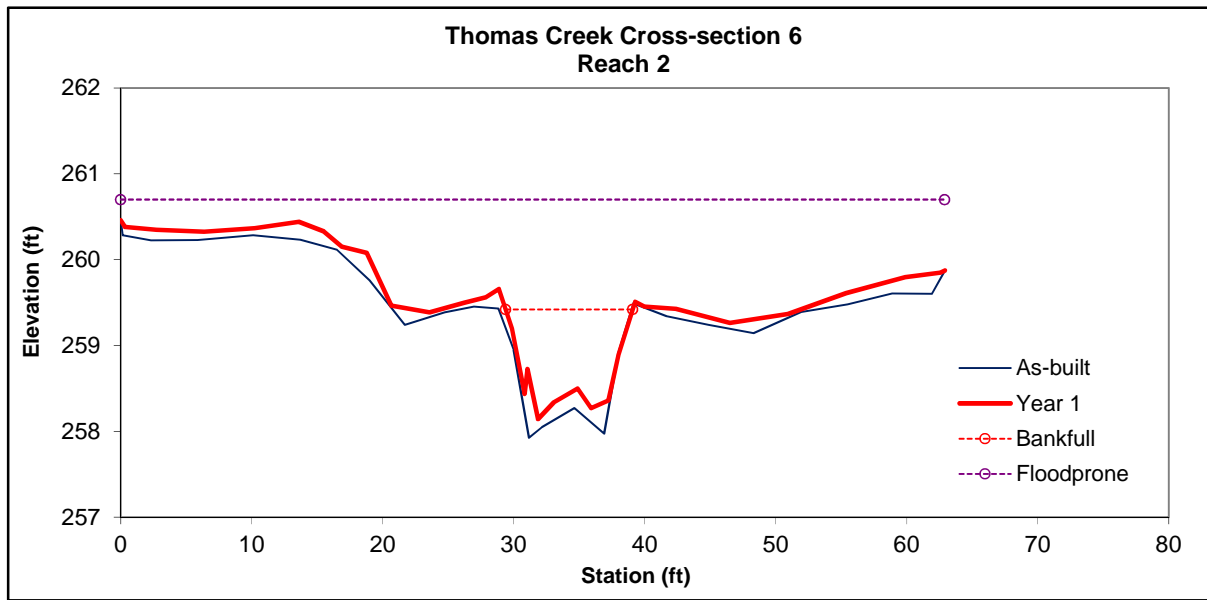


Looking at the Left Bank



Looking at the Right Bank

Feature	Stream Type	BKF Area	BKF Width	BKF Depth	Max BKF Depth	W/D	BH Ratio	ER	BKF Elev	TOB Elev
Riffle	C	8.3	9.7	0.85	1.28	11.36	1.1	6.5	259.42	259.51



Permanent Cross-section 7
(Year 1 Data - Collected November 2016)

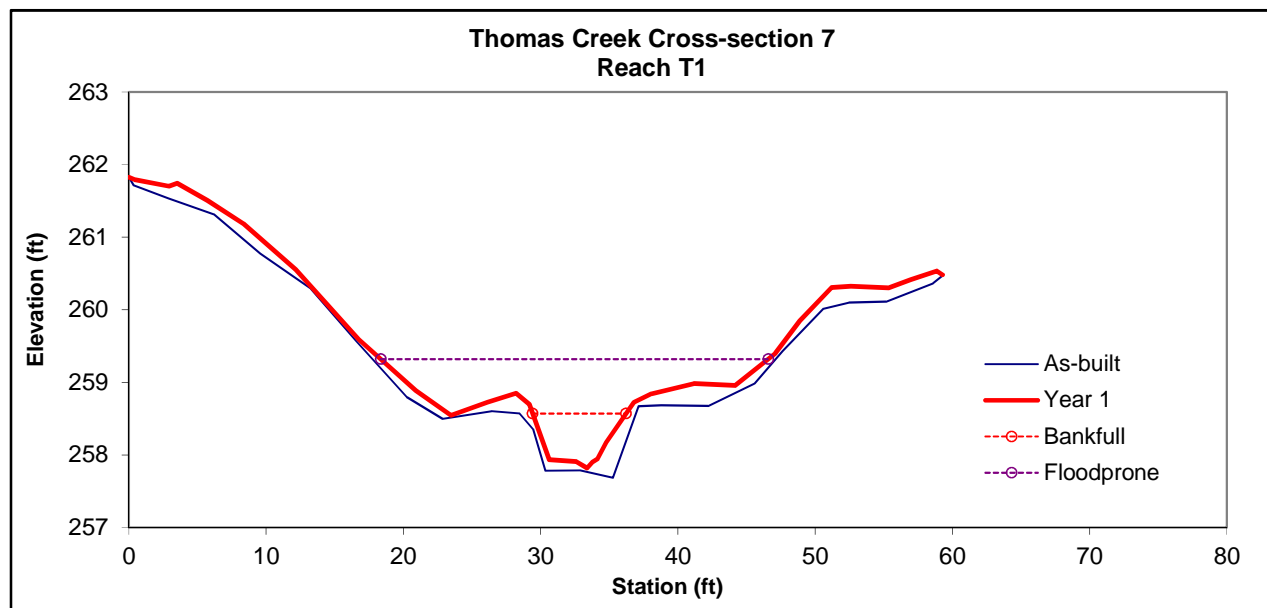


Looking at the Left Bank



Looking at the Right Bank

Feature	Stream Type	BKF Area	BKF Width	BKF Depth	Max BKF Depth	W/D	BH Ratio	ER	BKF Elev	TOB Elev
Riffle	C	3.4	6.81	0.49	0.75	13.83	1.2	4.1	258.57	258.7



Permanent Cross-section 8
(Year 1 Data - Collected November 2016)

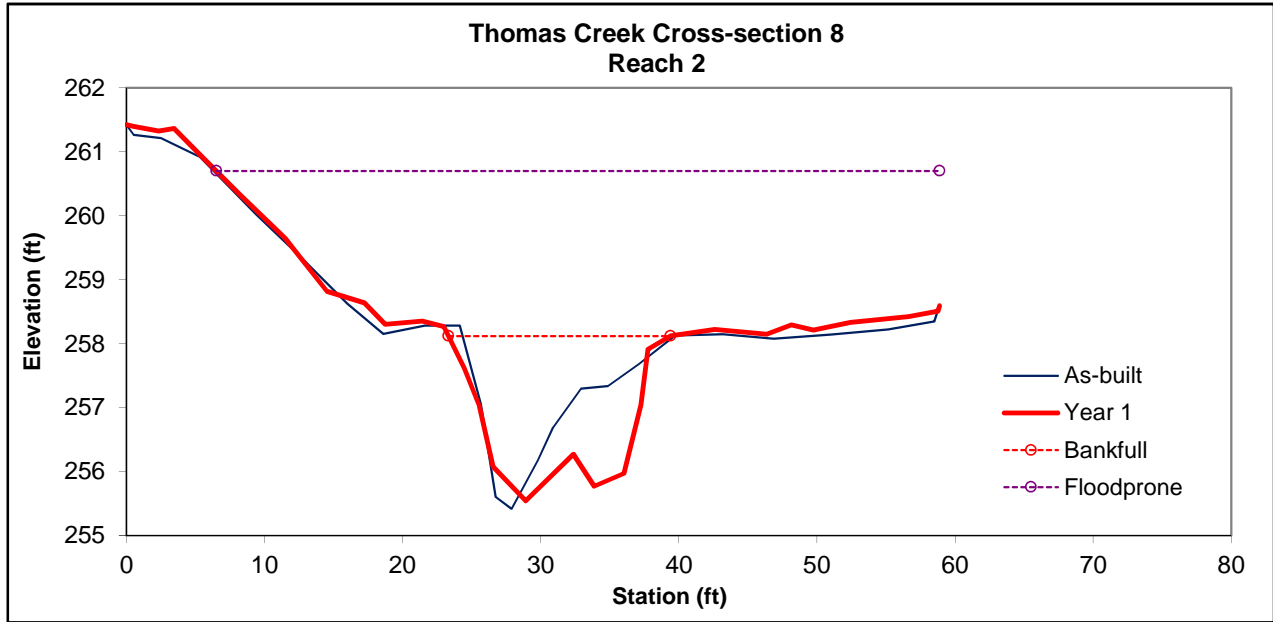


Looking at the Left Bank



Looking at the Right Bank

Feature	Stream Type	BKF Area	BKF Width	BKF Depth	Max BKF Depth	W/D	BH Ratio	ER	BKF Elev	TOB Elev
Pool		26.3	16.06	1.64	2.58	9.8	1	3.3	258.12	258.12



Permanent Cross-section 9
(Year 1 Data - Collected November 2016)

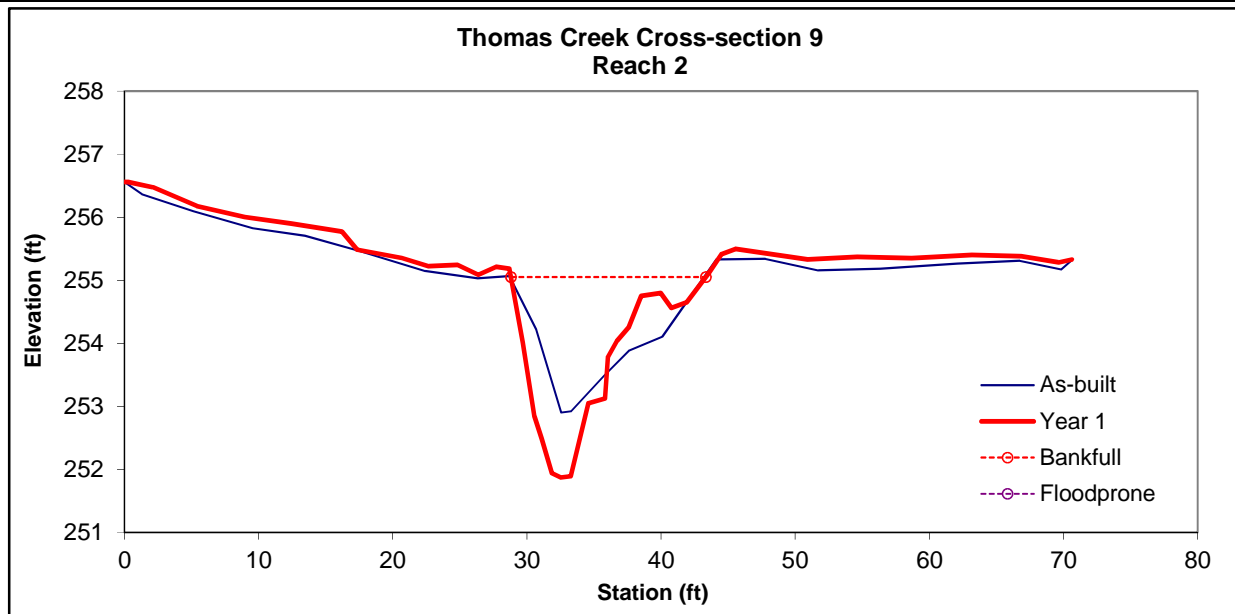


Looking at the Left Bank



Looking at the Right Bank

Feature	Stream Type	BKF Area	BKF Width	BKF Depth	Max BKF Depth	W/D	BH Ratio	ER	BKF Elev	TOB Elev
Pool		19.5	14.53	1.34	3.18	10.82	1	4.9	255.05	255.18



Permanent Cross-section 10
(Year 1 Data - Collected November 2016)

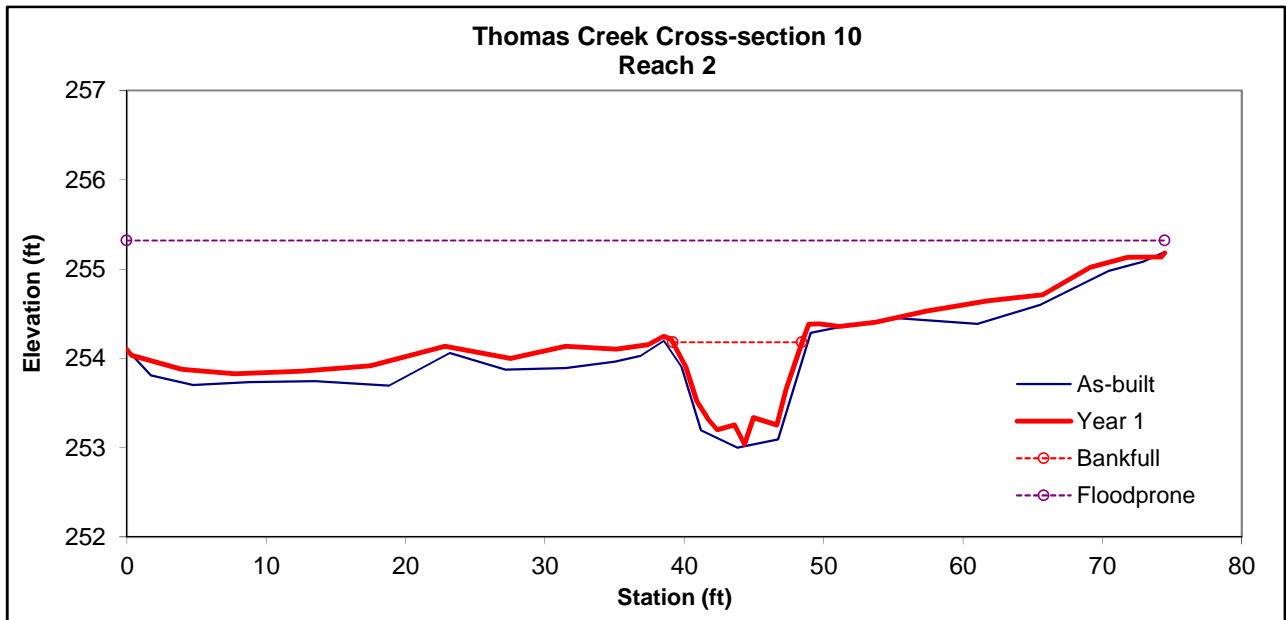


Looking at the Left Bank



Looking at the Right Bank

Feature	Stream Type	BKF Area	BKF Width	BKF Depth	Max BKF Depth	W/D	BH Ratio	ER	BKF Elev	TOB Elev
Rifle	C	6.5	9.28	0.71	1.14	13.15	1.1	8	254.18	254.25



Permanent Cross-section 11
(Year 1 Data - Collected November 2016)

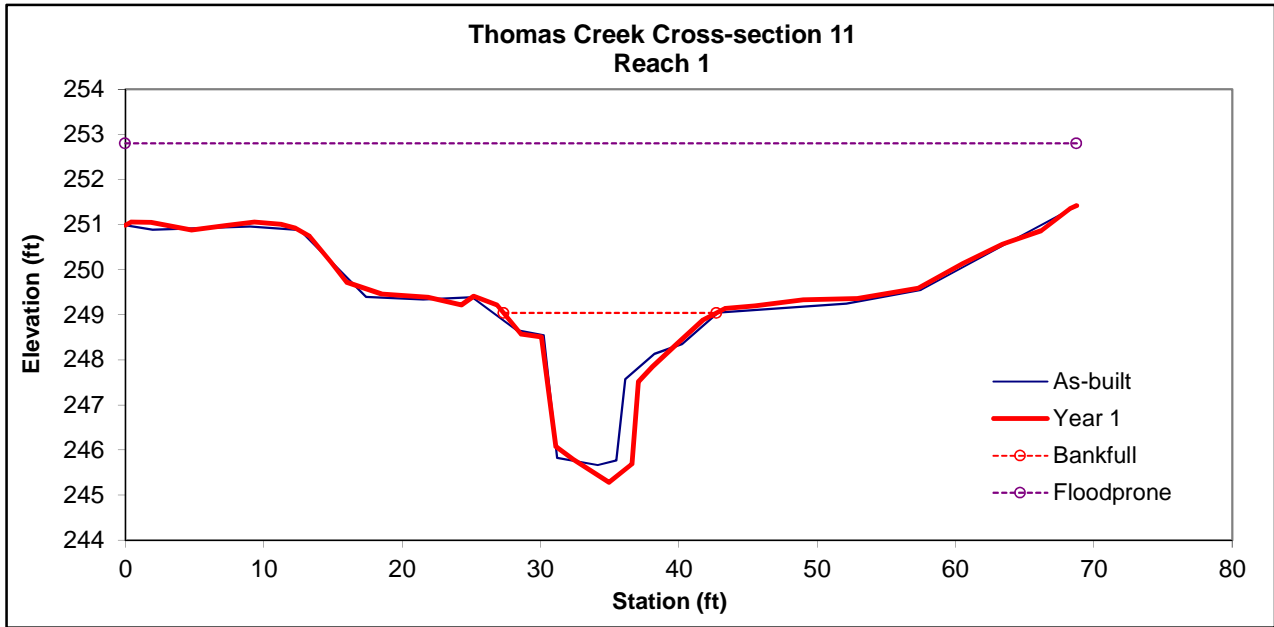


Looking at the Left Bank



Looking at the Right Bank

Feature	Stream Type	BKF Area	BKF Width	BKF Depth	Max BKF Depth	W/D	BH Ratio	ER	BKF Elev	TOB Elev
Pool		26.8	15.38	1.74	3.76	8.83	1	4.5	249.04	249.14



Permanent Cross-section 12
(Year 1 Data - Collected November 2016)

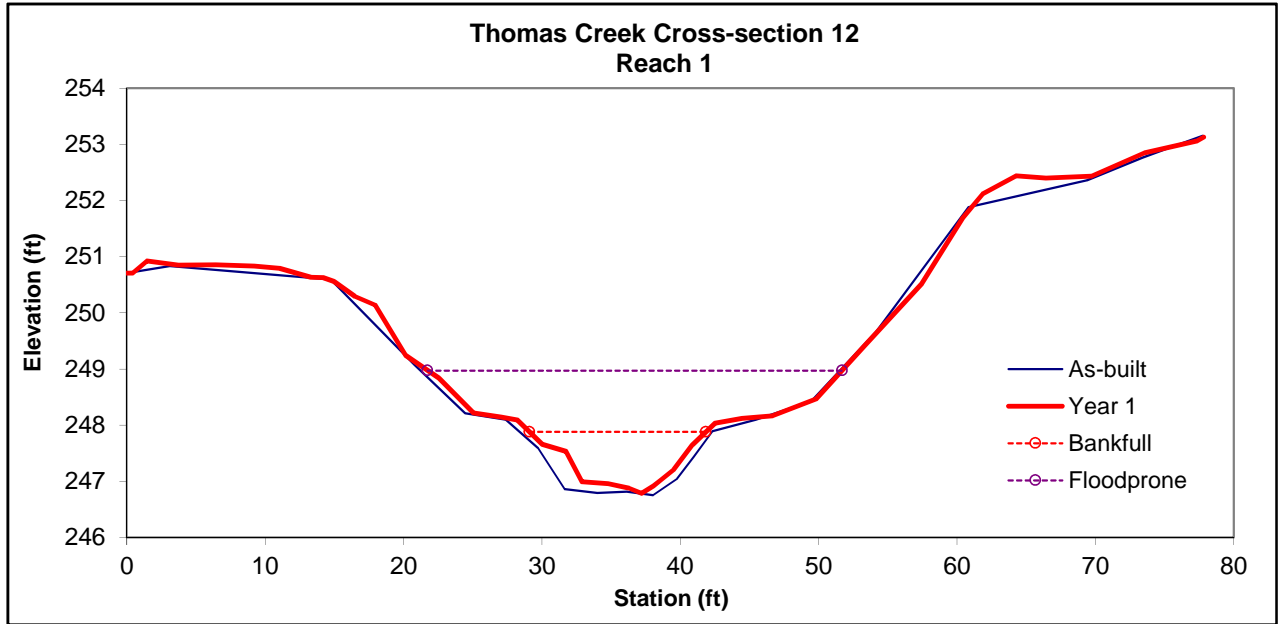


Looking at the Left Bank



Looking at the Right Bank

Feature	Stream Type	BKF Area	BKF Width	BKF Depth	Max BKF Depth	W/D	BH Ratio	ER	BKF Elev	TOB Elev
Riffle	C	8.2	12.74	0.65	1.09	19.75	1.1	2.4	247.88	248.03



Permanent Cross-section 13
 (Year 1 Data - Collected November 2016)

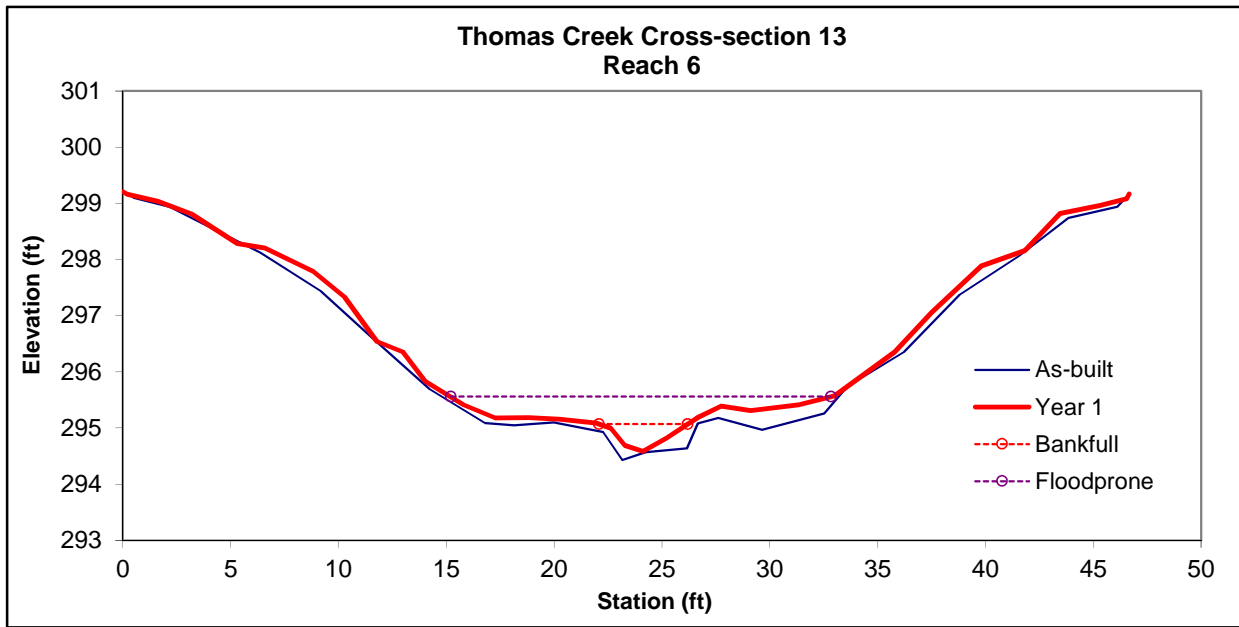


Looking at the Left Bank



Looking at the Right Bank

Feature	Stream Type	BKF Area	BKF Width	BKF Depth	Max BKF Depth	W/D	BH Ratio	ER	BKF Elev	TOB Elev
Riffle	C	1.1	4.12	0.26	0.49	16.06	1	4.3	295.07	295.09



Permanent Cross-section 14
(Year 1 Data - Collected November 2016)

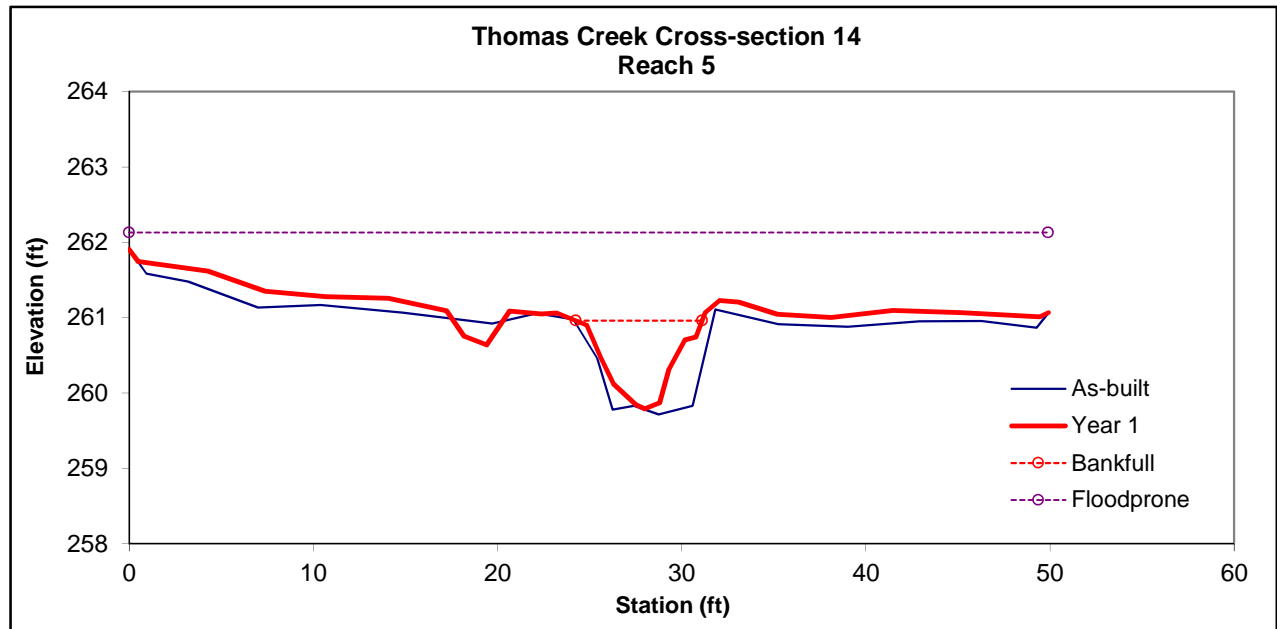


Looking at the Left Bank



Looking at the Right Bank

Feature	Stream Type	BKF Area	BKF Width	BKF Depth	Max BKF Depth	W/D	BH Ratio	ER	BKF Elev	TOB Elev
Riffle	E	4.4	6.85	0.64	1.17	10.78	1.1	7.3	260.96	261.06



Permanent Cross-section 15
(Year 1 Data - Collected November 2016)

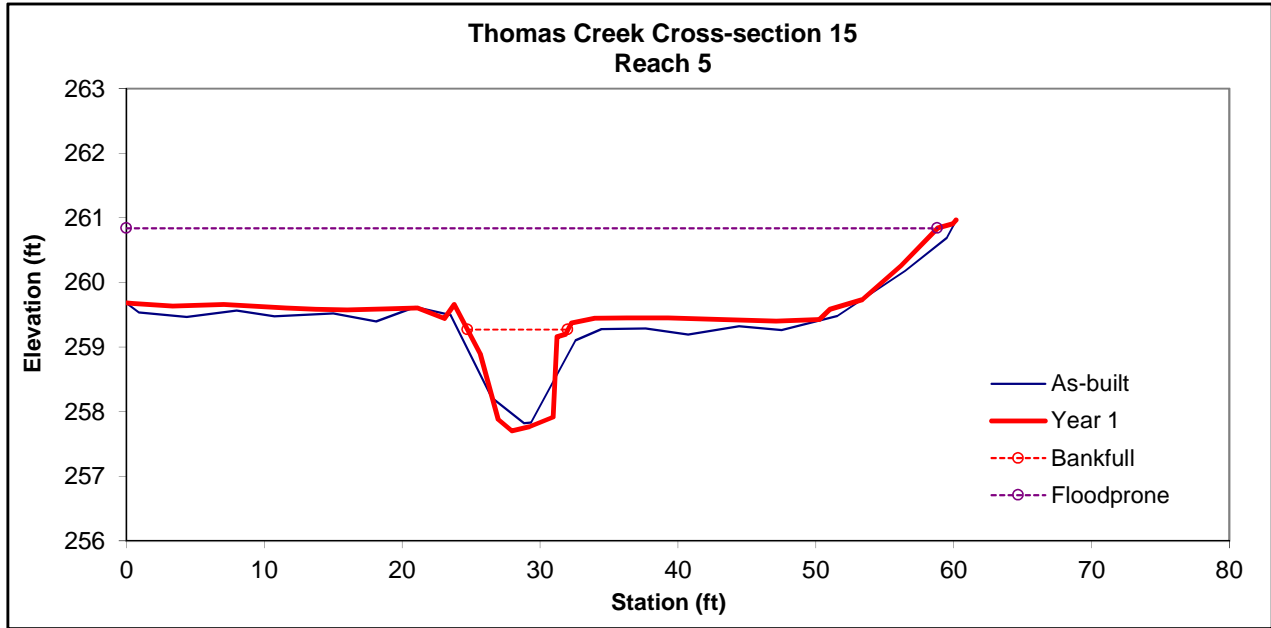


Looking at the Left Bank



Looking at the Right Bank

Feature	Stream Type	BKF Area	BKF Width	BKF Depth	Max BKF Depth	W/D	BH Ratio	ER	BKF Elev	TOB Elev
Pool		7.5	7.28	1.03	1.57	7.08	1.1	8.1	259.27	259.45



Permanent Cross-section 16
(Year 1 Data - Collected November 2016)



Looking at the Left Bank



Looking at the Right Bank

Feature	Stream Type	BKF Area	BKF Width	BKF Depth	Max BKF Depth	W/D	BH Ratio	ER	BKF Elev	TOB Elev
Pool		10.4	8.74	1.19	2.68	7.32	1	7.7	255.05	255.1

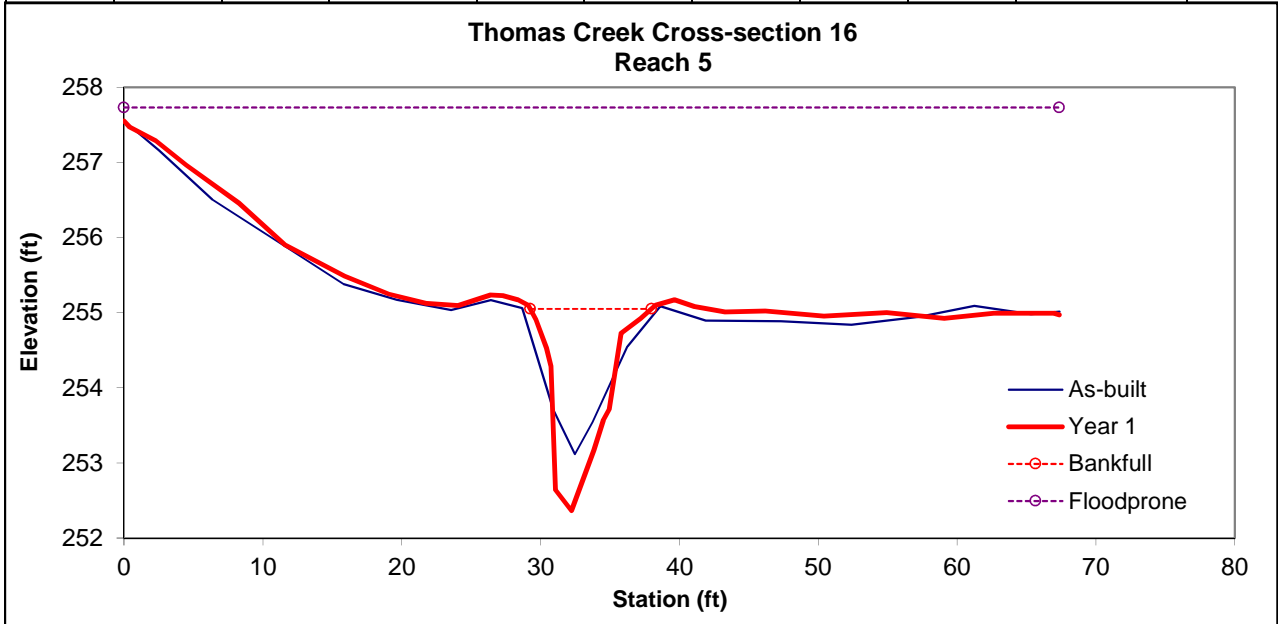


Figure 6.

Pebble Count; Monitoring Year 1
 Thomas Creek Mitigation Project, DMS# 96074

SITE OR PROJECT:	Thomas Creek
REACH/LOCATION:	Reach R2 (Station 37+00)
FEATURE:	Rock Riffle
DATE:	7-Nov-16

MATERIAL	PARTICLE	SIZE (mm)	MY1 2016			Distribution Plot Size (mm)
			Total	Class %	% Cum	
Silt/Clay	Silt / Clay	< .063			0%	0.063
	Very Fine	.063 - .125			0%	0.125
Sand	Fine	.125 - .25	3	3%	3%	0.25
	Medium	.25 - .50	8	7%	9%	0.50
	Coarse	.50 - 1.0	11	9%	19%	1.0
	Very Coarse	1.0 - 2.0	2	2%	21%	2.0
Gravel	Very Fine	2.0 - 2.8	4	3%	24%	2.8
	Very Fine	2.8 - 4.0	6	5%	29%	4.0
	Fine	4.0 - 5.6	1	1%	30%	5.6
	Fine	5.6 - 8.0	1	1%	31%	8.0
	Medium	8.0 - 11.0			31%	11.0
	Medium	11.0 - 16.0			31%	16.0
	Coarse	16 - 22.6			31%	22.6
	Coarse	22.6 - 32	2	2%	33%	32
	Very Coarse	32 - 45	3	3%	35%	45
	Very Coarse	45 - 64	11	9%	45%	64
Cobble	Small	64 - 90	24	21%	66%	90
	Small	90 - 128	15	13%	78%	128
	Large	128 - 180	20	17%	96%	180
	Large	180 - 256	4	3%	99%	256
Boulder	Small	256 - 362	1	1%	100%	362
	Small	362 - 512			100%	512
	Medium	512 - 1024			100%	1024
	Large-Very Large	1024 - 2048			100%	2048
Bedrock	Bedrock	> 2048			100%	5000
Total % of whole count			116	100%		

Largest particle= 256

Summary Data			
Channel materials			
D16 =	0.8	D84 =	142.9
D35 =	43.0	D95 =	177.6
D50 =	69.7	D100 =	256 - 362

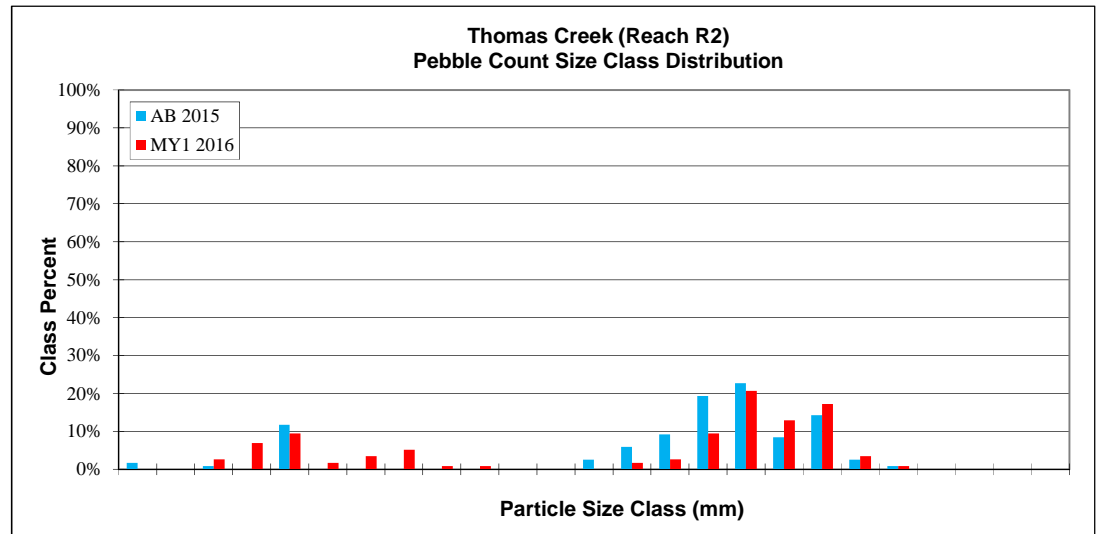
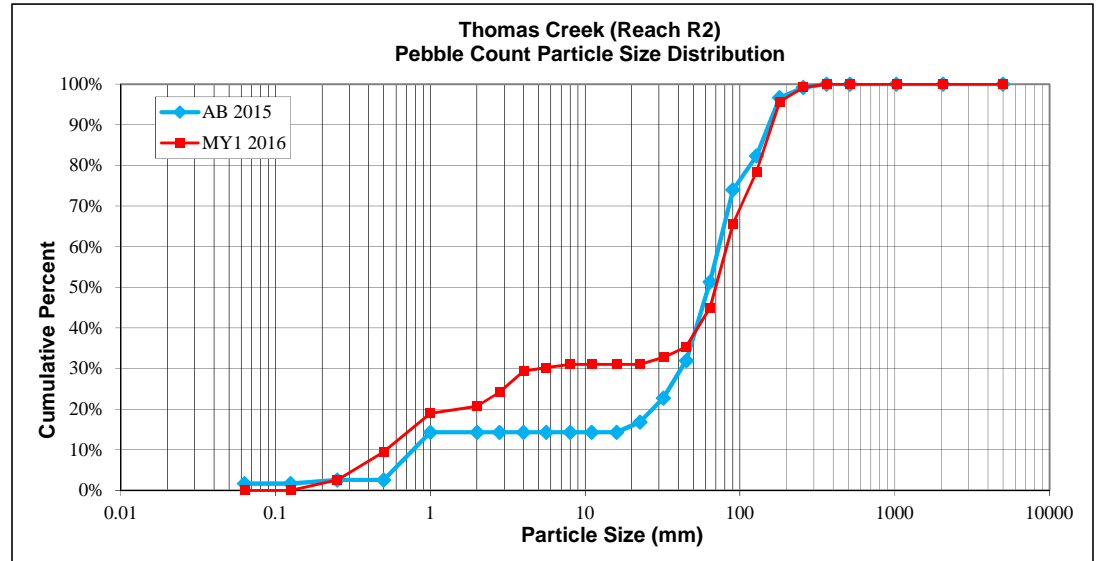


Figure 6. (cont.)

Pebble Count; Monitoring Year 1
 Thomas Creek Mitigation Project, DMS# 96074

SITE OR PROJECT:	Thomas Creek
REACH/LOCATION:	Reach R5 (Station 37+00)
FEATURE:	Rock Riffle
DATE:	7-Nov-16

MATERIAL	PARTICLE	SIZE (mm)	MY1 2016			Distribution Plot Size (mm)
			Total	Class %	% Cum	
Silt/Clay	Silt / Clay	< .063			0%	0.063
Sand	Very Fine	.063 - .125			0%	0.125
	Fine	.125 - .25	2	1%	1%	0.25
	Medium	.25 - .50	3	2%	3%	0.50
	Coarse	.50 - 1.0	9	5%	8%	1.0
	Very Coarse	1.0 - 2.0	1	1%	9%	2.0
Gravel	Very Fine	2.0 - 2.8	2	1%	10%	2.8
	Very Fine	2.8 - 4.0			10%	4.0
	Fine	4.0 - 5.6			10%	5.6
	Fine	5.6 - 8.0	1	1%	10%	8.0
	Medium	8.0 - 11.0	3	2%	12%	11.0
	Medium	11.0 - 16.0	10	6%	18%	16.0
	Coarse	16 - 22.6	19	11%	29%	22.6
	Coarse	22.6 - 32	6	3%	32%	32
	Very Coarse	32 - 45	11	6%	39%	45
	Very Coarse	45 - 64	28	16%	55%	64
Cobble	Small	64 - 90	34	20%	75%	90
	Small	90 - 128	24	14%	88%	128
	Large	128 - 180	14	8%	97%	180
	Large	180 - 256	3	2%	98%	256
Boulder	Small	256 - 362	2	1%	99%	362
	Small	362 - 512	1	1%	100%	512
	Medium	512 - 1024			100%	1024
	Large-Very Large	1024 - 2048			100%	2048
Bedrock	Bedrock	> 2048			100%	5000
Total % of whole count			173	100%		

Largest particle= 256

Summary Data			
Channel materials			
D16 =	14.1	D84 =	114.4
D35 =	36.8	D95 =	168.8
D50 =	57.5	D100 =	362 - 512

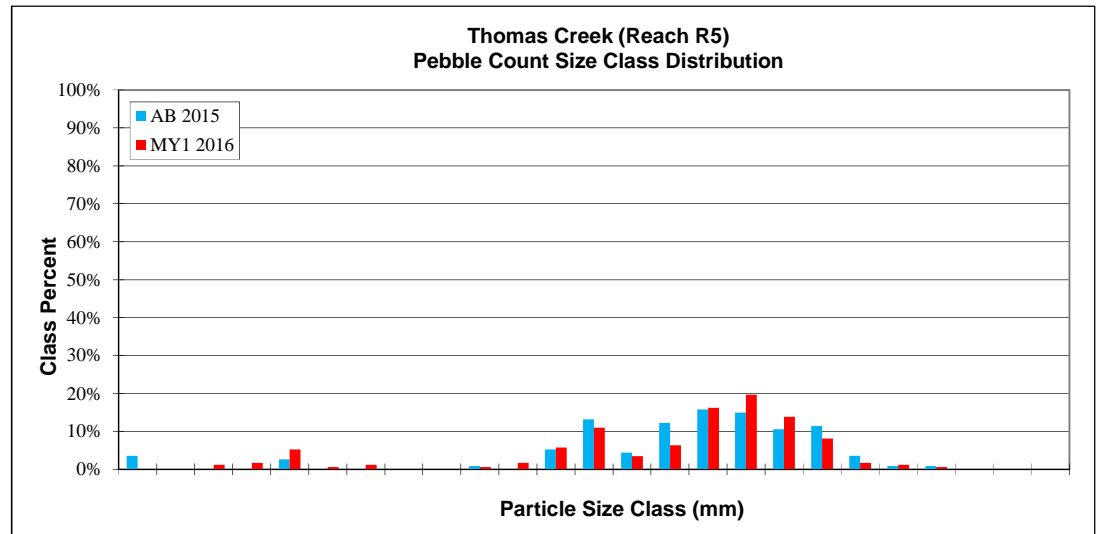
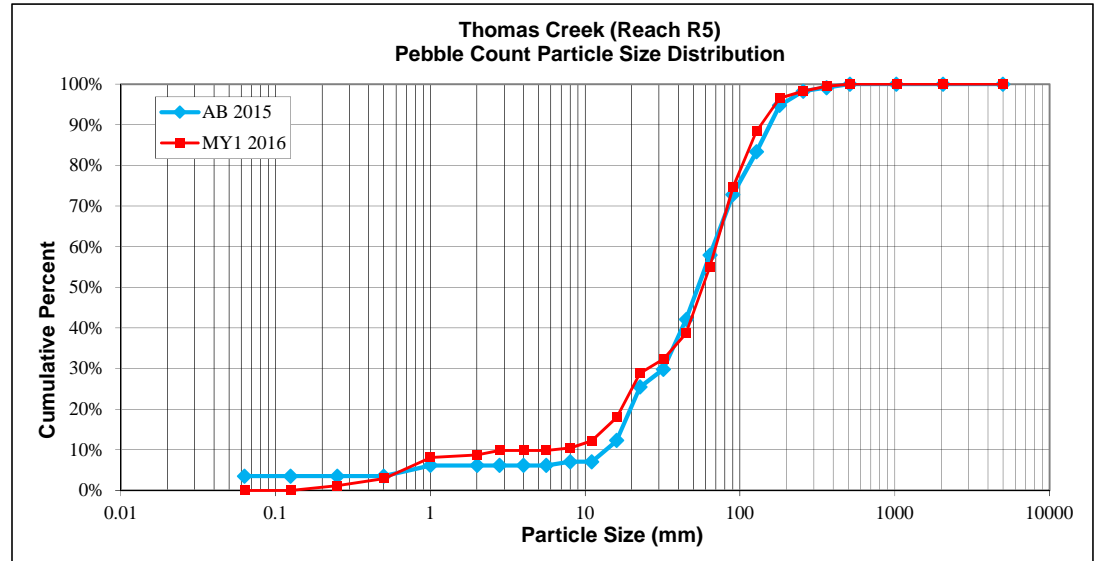


Table 10. Baseline Stream Summary																													
Thomas Creek Restoration Project: DMS Project ID No. 96074																													
Reach 1 - Length 298 ft																													
Parameter	USGS Gauge	Regional Curve			Pre-Existing Condition						Reference Reach(es) Data						Design						As-built						
											Little Beaver Creek (Wake County)																		
		LL	UL	Eq.	Min	Mean	Med	Max	SD	n	Min	Mean	Med	Max	SD	n	Min	Mean	Med	Max	SD	n	Min	Mean	Med	Max	SD	n	
Dimension and Substrate - Riffle																													
BF Width (ft)	----	11.6	11.9	----	----	----	----	9.0	----	----	----	----	----	----	----	----	----	12.5	----	----	----	----	----	----	13.9	----	----	----	
Floodprone Width (ft)	----	----	----	----	----	----	----	9.0	----	----	----	----	----	----	----	----	----	>25	----	----	----	----	----	----	30.6	----	----	----	
BF Mean Depth (ft)	----	1.2	1.5	----	----	----	----	1.2	----	----	----	----	----	----	----	----	----	0.9	----	----	----	----	----	----	0.8	----	----	----	
BF Max Depth (ft)	----	----	----	----	----	----	----	1.9	----	----	----	----	----	----	----	----	----	1.1	----	----	----	----	----	----	1.1	----	----	----	
BF Cross-sectional Area (ft ²)	----	----	11.2	----	----	----	----	11.2	----	----	----	----	----	----	----	----	----	11.2	----	----	----	----	----	----	11.1	----	----	----	
Width/Depth Ratio	----	----	----	----	----	----	----	7.2	----	----	12.0	----	----	18.0	----	----	----	14.0	----	----	----	----	----	----	17.4	----	----	----	
Entrenchment Ratio	----	----	----	----	----	----	----	1.8	----	----	1.4	----	----	2.2	----	----	----	>2.2	----	----	----	----	----	----	2.2	----	----	----	
Bank Height Ratio	----	----	----	----	----	----	----	2.5	----	----	1.0	----	----	1.1	----	----	----	1.0	----	----	----	----	----	----	1.0	----	----	----	
d50 (mm)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	
Pattern																													
Channel Beltwidth (ft)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	30.0	----	----	----	----	----	----	34.4	----	----	----	
Radius of Curvature (ft)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	25.0	----	----	35.0	----	----	----	----	33.1	----	----	----	
Rc:Bankfull width (ft/ft)	----	----	----	----	----	----	----	----	----	----	2.0	----	----	3.0	----	----	2.0	----	----	2.8	----	----	----	----	2.4	----	----	----	
Meander Wavelength (ft)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	105.0	----	----	----	----	103.4	----	----	----	
Meander Width Ratio	----	----	----	----	----	----	----	----	----	----	3.5	----	----	8.0	----	----	----	2.4	----	----	----	----	----	----	2.5	----	----	----	
Profile																													
Riffle Length (ft)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	0.028	----	----	----	24.0	----	----	----	
Riffle Slope (ft/ft)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	0.028	----	----	----	----	0.025	----	----	----	
Pool Length (ft)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	
Pool to Pool Spacing (ft)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	24	----	----	60	----	----	----	----	64.0	----	----	----	
Pool Max Depth (ft)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	2.4	----	----	----	----	2.5	----	----	----	
Pool Volume (ft ³)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	
Substrate and Transport Parameters																													
Ri% / Ru% / P% / G% / S%	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
SC% / Sa% / G% / B% / Be%	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
d16 / d35 / d50 / d84 / d95	----	----	----	----	----	----	----	0.15 / 0.27 / 0.34 / 0.75 / 1.39	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Reach Shear Stress (competency) lb/ft ²	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	
Max part size (mm) mobilized at bankfull (Rosgen Curve)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	
Stream Power (transport capacity) W/m ²	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	
Additional Reach Parameters																													
Drainage Area (SM)	----	----	----	----	----	----	0.38	----	----	----	----	----	----	----	----	----	----	0.38	----	----	----	----	----	----	0.38	----	----	----	
Impervious cover estimate (%)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	
Rosgen Classification	----	----	----	----	----	----	E	----	----	----	----	----	C5	----	----	----	----	4	----	----	----	----	----	----	----	----	----	----	
BF Velocity (fps)	----	3.4	4.0	----	----	----	3.9	----	----	----	3.5	----	----	5	----	----	----	4	----	----	----	----	----	----	----	----	----	----	
BF Discharge (cfs)	----	27.6	44.6	----	----	----	44.6	----	----	----	----	----	----	----	----	----	----	44.6	----	----	----	----	----	----	----	----	----	----	
Valley Length	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	
Channel length (ft)	----	----	----	----	----	----	397	----	----	----	----	----	----	----	----	----	----	266	----	----	----	----	----	----	324.3	----	----	----	
Sinuosity	----	----	----	----	----	----	1.18	----	----	----	1.1	----	----	1.3	----	----	----	1.22	----	----	----	----	----	----	1.2	----	----	----	
Water Surface Slope (Channel) (ft/ft)	----	----	----	----	----	----	0.0028	----	----	----	----	----	----	----	----	----	----	0.022	----	----	----	----	----	----	0.0168	----	----	----	
BF slope (ft/ft)	----	----	----	----	----	----	0.0050	----	----	----	0.002	----	----	0.015	----	----	----	0.0165	----	----	----	----	----	----	0.0201	----	----	----	
Bankfull Floodplain Area (acres)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	
BEHI VL% / L% / M% / H% / VH% / E%	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	
Channel Stability or Habitat Metric	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	
Biological or Other	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	

1 - Pre-Existing Condition measurement taken on existing sandbed riffle

Table 10 continued. Baseline Stream Summary																												
Thomas Creek Restoration Project: DMS Project ID No. 96074																												
Reach 2 - Length 2,126 ft																												
Parameter	USGS Gauge	Regional Curve			Pre-Existing Condition						Reference Reach(es) Data						Design						As-built					
											Little Beaver Creek (Wake County)																	
		LL	UL	Eq.	Min	Mean	Med	Max	SD	n	Min	Mean	Med	Max	SD	n	Min	Mean	Med	Max	SD	n	Min	Mean	Med	Max	SD	n
Dimension and Substrate - Riffle																												
BF Width (ft)	----	11.6	11.9	----	6.5	----	----	9.4	----	----	----	----	----	----	----	----	9.2	----	----	10.4	----	----	10.2	10.3	----	10.4	----	----
Floodprone Width (ft)	----	----	----	----	9.0	----	----	13.2	----	----	----	----	----	----	----	----	----	>18	----	----	----	----	38.2	58.5	----	74.5	----	----
BF Mean Depth (ft)	----	1.2	1.5	----	0.6	----	----	1.2	----	----	----	----	----	----	----	----	0.7	----	----	0.7	----	----	0.7	0.8	----	1.0	----	----
BF Max Depth (ft)	----	----	----	----	1.6	----	----	2.6	----	----	----	----	----	----	----	----	0.8	----	----	1.0	----	----	1.0	1.2	----	1.5	----	----
BF Cross-sectional Area (ft²)	----	6.0	7.7	----	7.7	----	----	15.7	----	----	----	----	----	----	----	----	6.0	----	----	7.7	----	----	7.4	8.6	----	10.2	----	----
Width/Depth Ratio	----	----	----	----	3.4	----	----	5.4	----	----	10.0	----	----	15.0	----	----	14.0	----	----	14.0	----	----	10.1	12.5	----	14.8	----	----
Entrenchment Ratio	----	----	----	----	1.4	----	----	1.4	----	----	----	----	----	>2.2	----	----	----	>2.2	----	----	----	3.7	5.7	----	6.2	----	----	
Bank Height Ratio	----	----	----	----	2.2	----	----	3.3	----	----	1.0	----	----	1.1	----	----	----	1.0	----	----	----	1.0	1.0	----	1.0	----	----	
d50 (mm)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Pattern																												
Channel Beltwidth (ft)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	32.0	----	----	45.0	----	----	----	56.6	----	----	----	----
Radius of Curvature (ft)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	17.0	----	----	30.0	----	----	----	22.0	----	----	----	----
Rc:Bankfull width (ft/ft)	----	----	----	----	----	----	----	----	----	----	2.0	----	----	3.0	----	----	2.0	----	----	3.0	----	----	----	2.1	----	----	----	----
Meander Wavelength (ft)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	75.0	----	----	107.0	----	----	----	83.2	----	----	----	----
Meander Width Ratio	----	----	----	----	----	----	----	----	----	----	7.0	----	----	14.0	----	----	3.3	----	----	4.7	----	----	----	5.5	----	----	----	----
Profile																												
Riffle Length (ft)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	17.7	----	----	----	----
Riffle Slope (ft/ft)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	0.0094	----	----	0.02	----	----	----	0.012	----	----	----	----
Pool Length (ft)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Pool to Pool Spacing (ft)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	25	----	----	75	----	----	----	50.8	----	----	----	----
Pool Max Depth (ft)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	1.7	----	----	1.9	----	----	----	1.7	----	----	----	----
Pool Volume (ft³)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Substrate and Transport Parameters																												
Ri% / Ru% / P% / G% / S%	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
SC% / Sa% / G% / B% / Be%	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
d16 / d35 / d50 / d84 / d95	----	----	----	----	----	----	0.11 / 0.22 / 0.32 / 0.85 / 1.89	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	20.2 / 47.6 / 62.5 / 133.1 / 173.1	----	----	----	----
Reach Shear Stress (competency) lb/ft²	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Max part size (mm) mobilized at bankfull (Rosgen Curve)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Stream Power (transport capacity) W/m²	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Additional Reach Parameters																												
Drainage Area (SM)	----	----	----	----	0.153	----	----	0.275	----	----	----	----	----	----	----	----	----	----	----	0.275	----	----	----	0.275	----	----	----	
Impervious cover estimate (%)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	
Rosgen Classification	----	----	----	----	G5c	----	----	F5	----	----	----	----	C5	----	----	----	----	----	----	C5	----	----	----	----	C5	----	----	
BF Velocity (fps)	----	3.2	3.9	----	3.8	----	----	3.9	----	----	3.5	----	----	5	----	----	3.8	----	----	3.9	----	----	----	----	----	----	----	
BF Discharge (cfs)	----	17.8	29.7	----	22.9	----	----	35.0	----	----	----	----	----	----	----	----	23.0	----	----	29.7	----	----	----	----	----	----	----	
Valley Length	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	2549.3	----	----	----	
Channel length (ft)	----	----	----	----	----	----	----	1,995	----	----	----	----	----	----	----	----	----	----	----	1,089	----	----	----	3413.7	----	----	----	
Sinuosity	----	----	----	----	----	1.17	----	----	----	----	1.2	----	----	1.5	----	----	----	----	----	1.20	----	----	----	1.3	----	----	----	
Water Surface Slope (Channel) (ft/ft)	----	----	----	----	0.0082	----	----	----	----	----	0.0047	----	----	0.0083	----	----	0.0047	----	----	0.0083	----	----	----	0.0092	----	----	----	
BF slope (ft/ft)	----	----	----	----	0.0098	----	----	----	----	----	0.002	----	----	0.01	----	----	----	----	----	0.01	----	----	----	0.0123	----	----	----	
Bankfull Floodplain Area (acres)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	
BEHI VL% / L% / M% / H% / VH% / E%	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	
Channel Stability or Habitat Metric	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	
Biological or Other	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	

1 - Pre-Existing Condition measurement taken on existing sandbed riffle, As-Built measurement taken on constructed rock riffle

Table 10 continued. Baseline Stream Summary																													
Thomas Creek Restoration Project: DMS Project ID No. 96074																													
Reach 3 - Length 1,031 ft																													
Parameter	USGS Gauge	Regional Curve			Pre-Existing Condition						Reference Reach(es) Data						Design						As-built						
											Thomas Creek Site Upper Reach 4 (On-site)																		
		LL	UL	Eq.	Min	Mean	Med	Max	SD	n	Min	Mean	Med	Max	SD	n	Min	Mean	Med	Max	SD	n	Min	Mean	Med	Max	SD	n	
Dimension and Substrate - Riffle																													
BF Width (ft)	----	11.6	11.9	----	4.5	----	----	5.3	----	----	----	----	----	----	----	----	----	7.0	----	----	----	----	7.5	8.4	----	9.3	----	----	
Floodprone Width (ft)	----	----	----	----	6.7	----	----	9.5	----	----	----	----	----	----	----	----	----	>16	----	----	----	----	37.3	46.3	----	55.3	----	----	
BF Mean Depth (ft)	----	1.2	1.5	----	0.7	----	----	0.8	----	----	----	----	----	----	----	----	----	0.7	----	----	----	----	0.6	0.7	----	0.8	----	----	
BF Max Depth (ft)	----	----	----	----	1.0	----	----	1.5	----	----	----	----	----	----	----	----	----	0.7	----	----	----	----	0.9	0.9	----	1.29	----	----	
BF Cross-sectional Area (ft²)	----	26.8	36.2	----	3.0	----	----	4.3	----	----	----	----	----	----	----	----	----	4.1	----	----	----	----	4.5	5.9	----	7.3	----	----	
Width/Depth Ratio	----	----	----	----	6.5	----	----	6.7	----	----	10	----	----	14.0	----	----	11.0	12.0	----	13.0	----	----	11.9	12.1	----	12.3	----	----	
Entrenchment Ratio	----	----	----	----	1.5	----	----	1.8	----	----	----	----	----	>2.2	----	----	----	>2.2	----	----	----	----	5.0	5.5	----	5.9	----	----	
Bank Height Ratio	----	----	----	----	2.3	----	----	3.2	----	----	1.0	----	----	1.1	----	----	----	1.0	----	----	----	----	1.0	1.0	----	1.0	----	----	
d50 (mm)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Pattern																													
Channel Beltwidth (ft)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	18	----	----	28	----	----	----	32.2	----	----	----	----	
Radius of Curvature (ft)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	15	----	----	21	----	----	----	19.1	----	----	----	----	
Rc:Bankfull width (ft/ft)	----	----	----	----	----	----	----	----	----	----	2	----	----	3	----	----	2.0	----	----	2.7	----	----	----	2.3	----	----	----	----	
Meander Wavelength (ft)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	70	----	----	80	----	----	----	77.5	----	----	----	----	
Meander Width Ratio	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	2.6	----	----	4.0	----	----	----	3.8	----	----	----	----	
Profile																													
Riffle Length (ft)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	12.5	----	----	----	----	
Riffle Slope (ft/ft)	----	----	----	----	----	----	----	----	----	----	1.1	----	----	2.0	----	----	----	0.031	----	----	----	----	----	0.013	----	----	----	----	
Pool Length (ft)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	
Pool to Pool Spacing (ft)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	28.0	----	----	48.0	----	----	----	47.2	----	----	----	----	
Pool Max Depth (ft)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	1.5	----	----	----	----	----	1.3	----	----	----	----	
Pool Volume (ft³)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Substrate and Transport Parameters																													
R% / Ru% / P% / G% / S%	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
SC% / Sa% / G% / B% / Be%	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
d16 / d35 / d50 / d84 / d95	----	----	----	----	----	----	----	.014 / .029 / 0.41 / 1.16 / 3.05	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Reach Shear Stress (competency) lb/ft²	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Max part size (mm) mobilized at bankfull (Rosgen Curve)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Stream Power (transport capacity) W/m²	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Additional Reach Parameters																													
Drainage Area (SM)	----	----	----	----	----	----	0.083	----	----	----	----	----	----	----	----	----	----	----	0.083	----	----	----	----	0.083	----	----	----	----	
Impervious cover estimate (%)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	
Rosgen Classification	----	----	----	----	----	----	B5c	----	----	----	----	----	E/C5	----	----	----	----	----	E/C5	----	----	----	----	----	----	C5	----	----	
BF Velocity (fps)	----	3.0	3.6	----	3.8	----	2.3	----	----	----	3.5	----	----	5	----	----	----	----	----	3.8	----	----	----	----	----	----	----	----	
BF Discharge (cfs)	----	9.4	16.5	----	12.2	----	16.5	----	----	----	----	----	----	----	----	----	----	----	----	16.5	----	----	----	----	----	----	----	----	
Valley Length	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	873	----	----	----	
Channel length (ft)	----	----	----	----	----	----	1,067	----	----	----	----	----	----	----	----	----	----	----	----	1,231	----	----	----	1,031	----	----	----	----	
Sinuosity	----	----	----	----	----	----	1.22	----	----	----	1.20	----	----	1.50	----	----	----	----	----	1.20	----	----	----	1.2	----	----	----	----	
Water Surface Slope (Channel) (ft/ft)	----	----	----	----	----	----	0.0150	----	----	----	----	----	----	----	----	----	----	----	----	0.0150	----	----	----	0.0092	----	----	----	----	
BF slope (ft/ft)	----	----	----	----	----	----	0.0182	----	----	----	0.005	----	----	0.015	----	----	----	----	----	0.0182	----	----	----	0.0123	----	----	----	----	
Bankfull Floodplain Area (acres)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	
BEHI VL% / L% / M% / H% / VH% / E%	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	
Channel Stability or Habitat Metric	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	
Biological or Other	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	

1 - Pre-Existing Condition measurement taken on existing sandbed riffle

Table 10 continued. Baseline Stream Summary																													
Thomas Creek Restoration Project: DMS Project ID No. 96074																													
Reach 4 - Length 1,238 ft																													
Parameter	USGS Gauge	Regional Curve			Pre-Existing Condition						Reference Reach(es) Data						Design						As-built						
											Thomas Creek Site Upper Reach 4 (On-site)																		
		LL	UL	Eq.	Min	Mean	Med	Max	SD	n	Min	Mean	Med	Max	SD	n	Min	Mean	Med	Max	SD	n	Min	Mean	Med	Max	SD	n	
Dimension and Substrate - Riffle																													
BF Width (ft)	----	11.6	11.9	----	----	----	----	4.5	----	----	----	----	----	----	----	----	----	6.3	----	----	----	----	----	6.8	----	----	----	----	
Floodprone Width (ft)	----	----	----	----	----	----	----	9.9	----	----	----	----	----	----	----	----	----	>13	----	----	----	----	----	21.9	----	----	----	----	
BF Mean Depth (ft)	----	1.2	1.5	----	----	----	----	0.7	----	----	----	----	----	----	----	----	----	0.5	----	----	----	----	----	0.5	----	----	----	----	
BF Max Depth (ft)	----	----	----	----	----	----	----	1.4	----	----	----	----	----	----	----	----	----	0.6	----	----	----	----	----	0.9	----	----	----	----	
BF Cross-sectional Area (ft²)	----	----	3.1	----	----	----	----	3.1	----	----	----	----	----	----	----	----	----	3.1	----	----	----	----	----	3.6	----	----	----	----	
Width/Depth Ratio	----	----	----	----	----	----	----	6.4	----	----	10.0	----	----	14.0	----	----	12.0	----	----	14.0	----	----	----	12.7	----	----	----	----	
Entrenchment Ratio	----	----	----	----	----	----	----	2.2	----	----	----	----	>2.2	----	----	----	----	>2.1	----	----	----	----	----	3.2	----	----	----	----	
Bank Height Ratio	----	----	----	----	----	----	----	3.0	----	----	1.0	----	----	1.1	----	----	----	1.0	----	----	----	----	----	1.0	----	----	----	----	
d50 (mm)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	
Pattern																													
Channel Beltwidth (ft)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	20.0	----	----	29.0	----	----	----	34.0	----	----	----	----	
Radius of Curvature (ft)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	12.0	----	----	18.0	----	----	----	16.9	----	----	----	----	
Rc:Bankfull width (ft/ft)	----	----	----	----	----	----	----	----	----	----	2.0	----	----	3.0	----	----	2.0	----	----	3.0	----	----	----	2.5	----	----	----	----	
Meander Wavelength (ft)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	60.0	----	----	75.0	----	----	----	66.2	----	----	----	----	
Meander Width Ratio	----	----	----	----	----	----	----	----	----	----	3.5	----	----	8.0	----	----	3.2	----	----	4.6	----	----	----	5.0	----	----	----	----	
Profile																													
Riffle Length (ft)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	0.029	----	----	----	15.4	----	----	----	----	
Riffle Slope (ft/ft)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	0.035	----	----	----	0.035	----	----	----	----	
Pool Length (ft)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	
Pool to Pool Spacing (ft)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	28-	----	----	43	----	----	----	42.8	----	----	----	----	
Pool Max Depth (ft)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	1.5	----	----	----	1.3	----	----	----	----	
Pool Volume (ft³)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	
Substrate and Transport Parameters																													
R% / Ru% / P% / G% / S%	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
SC% / Sa% / G% / B% / Be%	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
d16 / d35 / d50 / d84 / d95	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Reach Shear Stress (competency) lb/ft²	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Max part size (mm) mobilized at bankfull (Rosgen Curve)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Stream Power (transport capacity) W/m²	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Additional Reach Parameters																													
Drainage Area (SM)	----	----	----	----	----	----	0.056	----	----	----	----	----	----	----	----	----	----	0.056	----	----	----	----	----	0.056	----	----	----	----	
Impervious cover estimate (%)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	
Rosgen Classification	----	----	----	----	----	----	B5c	----	----	----	----	----	C5	----	----	----	----	C5	----	----	----	----	----	----	C5	----	----	----	
BF Velocity (fps)	----	3.2	3.9	----	----	----	3.6	----	----	----	3.5	----	----	5	----	----	----	3.6	----	----	----	----	----	----	----	----	----	----	
BF Discharge (cfs)	----	17.8	29.7	----	----	----	11.1	----	----	----	----	----	----	----	----	----	----	11.1	----	----	----	----	----	----	----	----	----	----	
Valley Length	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	285.55	----	----	----	----	
Channel length (ft)	----	----	----	----	----	----	1,197	----	----	----	----	----	----	----	----	----	----	1,201	----	----	----	----	----	342.91	----	----	----	----	
Sinuosity	----	----	----	----	----	----	1.16	----	----	1.20	----	----	1.50	----	----	----	----	1.13	----	----	----	----	----	1.20	----	----	----	----	
Water Surface Slope (Channel) (ft/ft)	----	----	----	----	----	----	0.0121	----	----	----	----	----	----	----	----	----	----	0.015	----	----	----	----	----	0.0156	----	----	----	----	
BF slope (ft/ft)	----	----	----	----	----	----	0.0105	----	----	0.005	----	----	0.015	----	----	----	----	0.024	----	----	----	----	----	0.0188	----	----	----	----	
Bankfull Floodplain Area (acres)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	
BEHI VL% / L% / M% / H% / VH% / E%	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	
Channel Stability or Habitat Metric	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	
Biological or Other	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	

1 - Pre-Existing Condition measurement taken on existing sandbed riffle

Table 10 continued. Baseline Stream Summary																												
Thomas Creek Restoration Project: DMS Project ID No. 96074																												
Reach 5 - Length 1,169 ft																												
Parameter	USGS Gauge	Regional Curve			Pre-Existing Condition						Reference Reach(es) Data						Design						As-built					
											Little Beaver Creek (Wake County)																	
		LL	UL	Eq.	Min	Mean	Med	Max	SD	n	Min	Mean	Med	Max	SD	n	Min	Mean	Med	Max	SD	n	Min	Mean	Med	Max	SD	n
Dimension and Substrate - Riffle																												
BF Width (ft)	----	11.6	11.9	----	4.4	----	----	8.9	----	----	----	----	----	----	----	----	----	6.8	----	----	----	----	8.6	----	----	----	----	----
Floodprone Width (ft)	----	----	----	----	7.8	----	----	>30	----	----	----	----	----	----	----	----	----	>16	----	----	----	----	49.9	----	----	----	----	----
BF Mean Depth (ft)	----	1.2	1.5	----	0.4	----	----	1.0	----	----	----	----	----	----	----	----	----	0.5	----	----	----	----	0.9	----	----	----	----	----
BF Max Depth (ft)	----	----	----	----	0.8	----	----	1.6	----	----	----	----	----	----	----	----	----	0.7	----	----	----	----	1.2	----	----	----	----	----
BF Cross-sectional Area (ft²)	----	----	4.0	----	3.4	----	----	4.5	----	----	----	----	----	----	----	----	----	3.6	----	----	----	----	6.8	----	----	----	----	----
Width/Depth Ratio	----	----	----	----	4.2	----	----	3.4	----	----	10.0	----	----	14.0	----	----	----	13.0	----	----	----	----	8.4	----	----	----	----	----
Entrenchment Ratio	----	----	----	----	1.8	----	----	5.4	----	----	----	----	----	>2.2	----	----	----	>2.3	----	----	----	----	6.6	----	----	----	----	----
Bank Height Ratio	----	----	----	----	2.4	----	----	1.0	----	----	1.0	----	----	1.1	----	----	----	1.0	----	----	----	----	1.0	----	----	----	----	----
d50 (mm)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Pattern																												
Channel Beltwidth (ft)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	28	----	----	45	----	----	58.6	----	----	----	----	----
Radius of Curvature (ft)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	14	----	----	20	----	----	17.5	----	----	----	----	----
Rc:Bankfull width (ft/ft)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	2	----	----	3	----	----	2.0	----	----	----	----	----
Meander Wavelength (ft)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	60	----	----	90	----	----	81.5	----	----	----	----	----
Meander Width Ratio	----	----	----	----	----	----	----	----	----	----	3.5	----	----	8	----	----	4.1	----	----	6.6	----	----	6.8	----	----	----	----	----
Profile																												
Riffle Length (ft)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	15.2	----	----	----	----	----
Riffle Slope (ft/ft)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	0.0265	----	----	----	----	0.0196	----	----	----	----	----
Pool Length (ft)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Pool to Pool Spacing (ft)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	25	----	----	55	----	----	57.8	----	----	----	----	----
Pool Max Depth (ft)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	1.3	----	----	----	----	1.7	----	----	----	----	----
Pool Volume (ft³)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Substrate and Transport Parameters																												
R% / Ru% / P% / G% / S%	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
SC% / Sa% / G% / B% / Be%	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
d16 / d35 / d50 / d84 / d95	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	17.6 / 36.9 / 53.7 / 130.6 / 184.8				----	
Reach Shear Stress (competency) lb/ft²	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Max part size (mm) mobilized at bankfull (Rosgen Curve)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Stream Power (transport capacity) W/m²	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Additional Reach Parameters																												
Drainage Area (SM)	----	----	----	----	0.097	----	----	0.083	----	----	----	----	----	----	----	----	----	----	0.097	----	----	----	0.097	----	----	----	----	----
Impervious cover estimate (%)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Rosgen Classification	----	----	----	----	B5c	----	----	C	----	----	----	----	C5	----	----	----	----	----	----	C5	----	----	----	----	----	----	----	----
BF Velocity (fps)	----	3.4	3.7	----	3.7	----	----	4.2	----	----	3.5	----	----	5	----	----	----	----	----	3.3	----	----	----	----	----	----	----	----
BF Discharge (cfs)	----	9.4	14.7	----	14.4	----	----	16.5	----	----	----	----	----	----	----	----	----	----	----	12.0	----	----	----	----	----	----	----	----
Valley Length	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	726.02	----	----	----	----	----
Channel length (ft)	----	----	----	----	----	----	----	1,022	----	----	----	----	----	----	----	----	----	----	----	1,828	----	----	1069.32	----	----	----	----	----
Sinuosity	----	----	----	----	1.31	----	----	1.42	----	----	1.20	----	----	1.50	----	----	----	----	----	1.42	----	----	1.47	----	----	----	----	
Water Surface Slope (Channel) (ft/ft)	----	----	----	----	----	----	----	0.0177	----	----	----	----	----	----	----	----	----	----	0.0124	----	----	----	0.0123	----	----	----	----	
BF slope (ft/ft)	----	----	----	----	----	----	----	0.0133	----	----	0.005	----	----	0.015	----	----	----	----	0.0134	----	----	----	0.0185	----	----	----	----	
Bankfull Floodplain Area (acres)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
BEHI VL% / L% / M% / H% / VH% / E%	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Channel Stability or Habitat Metric	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Biological or Other	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----

1 - Pre-Existing Condition measurement taken on existing sandbed riffle

Table 10 continued. Baseline Stream Summary																													
Thomas Creek Restoration Project: DMS Project ID No. 96074																													
Reach 6 - Length 1,776 ft																													
Parameter	USGS Gauge	Regional Curve			Pre-Existing Condition						Reference Reach(es) Data						Design						As-built						
											Thomas Creek Site Upper Reach 4 (On-site)																		
		LL	UL	Eq.	Min	Mean	Med	Max	SD	n	Min	Mean	Med	Max	SD	n	Min	Mean	Med	Max	SD	n	Min	Mean	Med	Max	SD	n	
Dimension and Substrate - Riffle																													
BF Width (ft)	----	----	----	----	3.2	----	----	4.3	----	----	----	----	----	----	----	----	----	4.6	----	----	----	----	----	6.3	----	----	----	----	
Floodprone Width (ft)	----	----	----	----	4.5	----	----	6.5	----	----	----	----	----	----	----	----	----	>9	----	----	----	----	----	19.4	----	----	----	----	
BF Mean Depth (ft)	----	----	----	----	----	----	----	0.60	----	----	----	----	----	----	----	----	----	0.3	----	----	----	----	----	0.3	----	----	----	----	
BF Max Depth (ft)	----	----	----	----	----	----	----	0.9	----	----	----	----	----	----	----	----	----	0.4	----	----	----	----	----	0.6	----	----	----	----	
BF Cross-sectional Area (ft²)	----	----	----	----	1.8	----	----	2.5	----	----	----	----	----	----	----	----	----	1.5	----	----	----	----	----	2.1	----	----	----	----	
Width/Depth Ratio	----	----	----	----	0.9	----	----	5.8	----	----	12.0	----	----	18.0	----	----	----	14.0	----	----	----	----	----	18.7	----	----	----	----	
Entrenchment Ratio	----	----	----	----	1.4	----	----	1.5	----	----	1.4	----	----	2.2	----	----	----	>2.0	----	----	----	----	----	3.1	----	----	----	----	
Bank Height Ratio	----	----	----	----	2.9	----	----	4.4	----	----	1.0	----	----	1.1	----	----	----	1.0	----	----	----	----	----	1.0	----	----	----	----	
d50 (mm)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	
Pattern																													
Channel Beltwidth (ft)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Radius of Curvature (ft)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Rc:Bankfull width (ft/ft)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Meander Wavelength (ft)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Meander Width Ratio	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Profile																													
Riffle Length (ft)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	12.5	----	----	----	----	----
Riffle Slope (ft/ft)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	0.04	----	----	----	----	----	0.027	----	----	----	----	----
Pool Length (ft)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Pool to Pool Spacing (ft)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	34.6	----	----	----	----	----
Pool Max Depth (ft)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	1.0	----	----	----	----	----	1.2	----	----	----	----	----
Pool Volume (ft³)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Substrate and Transport Parameters																													
R% / Ru% / P% / G% / S%	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
SC% / Sa% / G% / B% / Be%	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
d16 / d35 / d50 / d84 / d95	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Reach Shear Stress (competency) lb/ft²	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Max part size (mm) mobilized at bankfull (Rosgen Curve)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Stream Power (transport capacity) W/m²	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Additional Reach Parameters																													
Drainage Area (SM)	----	----	----	----	0.019	----	----	0.050	----	----	----	----	----	----	----	----	----	----	0.05	----	----	----	----	0.05	----	----	----	----	
Impervious cover estimate (%)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	
Rosgen Classification	----	----	----	----	B5c	----	----	G5c	----	----	----	----	B5c	----	----	----	----	B5c	----	----	----	----	----	----	----	----	----	----	----
BF Velocity (fps)	----	----	----	----	2.8	----	----	4.1	----	----	4	----	----	6	----	----	----	3.3	----	----	----	----	----	----	----	----	----	----	
BF Discharge (cfs)	----	----	----	----	5.1	----	----	10.2	----	----	----	----	----	----	----	----	----	12	----	----	----	----	----	----	----	----	----	----	
Valley Length	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	201	----	----	----	----
Channel length (ft)	----	----	----	----	----	----	----	1,828	----	----	----	----	----	----	----	----	----	1,808	----	----	----	----	----	210	----	----	----	----	
Sinuosity	----	----	----	----	----	----	----	1.13	----	----	1.10	----	----	1.30	----	----	----	1.05	----	----	----	----	----	1.04	----	----	----	----	
Water Surface Slope (Channel) (ft/ft)	----	----	----	----	0.0148	----	----	0.0250	----	----	----	----	----	----	----	----	----	0.030	----	----	----	----	----	----	----	----	----	----	
BF slope (ft/ft)	----	----	----	----	0.0250	----	----	0.0361	----	----	0.005	----	----	0.015	----	----	----	0.033	----	----	----	----	----	----	----	----	----	----	
Bankfull Floodplain Area (acres)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	
BEHI VL% / L% / M% / H% / VH% / E%	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Channel Stability or Habitat Metric	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Biological or Other	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	

1 - Pre-Existing Condition measurement taken on existing sandbed riffle

Table 10 continued. Baseline Stream Summary																													
Thomas Creek Restoration Project: DMS Project ID No. 96074																													
Reach 7 - Length 647 ft																													
Parameter	USGS Gauge	Regional Curve			Pre-Existing Condition						Reference Reach(es) Data						Design						As-built						
											Thomas Creek Site Upper Reach 4 (On-site)																		
		LL	UL	Eq.	Min	Mean	Med	Max	SD	n	Min	Mean	Med	Max	SD	n	Min	Mean	Med	Max	SD	n	Min	Mean	Med	Max	SD	n	
Dimension and Substrate - Riffle																													
BF Width (ft)	----	----	----	----	----	----	----	3.6	----	----	----	----	----	----	----	----	----	4.6	----	----	----	----	----	----	----	----	----	----	
Floodprone Width (ft)	----	----	----	----	----	----	----	5.4	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	
BF Mean Depth (ft)	----	----	----	----	----	----	----	0.4	----	----	----	----	----	----	----	----	----	0.3	----	----	----	----	----	----	----	----	----	----	
BF Max Depth (ft)	----	----	----	----	----	----	----	0.6	----	----	----	----	----	----	----	----	----	0.4	----	----	----	----	----	----	----	----	----	----	
BF Cross-sectional Area (ft²)	----	----	----	----	----	----	----	1.6	----	----	----	----	----	----	----	----	----	1.5	----	----	----	----	----	----	----	----	----	----	
Width/Depth Ratio	----	----	----	----	----	----	----	8.4	----	----	12.0	----	----	18.0	----	----	----	14.0	----	----	----	----	----	----	----	----	----	----	
Entrenchment Ratio	----	----	----	----	----	----	----	1.5	----	----	1.4	----	----	2.2	----	----	----	----	----	----	----	----	----	----	----	----	----	----	
Bank Height Ratio	----	----	----	----	----	----	----	4.2	----	----	1.0	----	----	1.1	----	----	----	1.0	----	----	----	----	----	----	----	----	----	----	
d50 (mm)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	
Pattern																													
Channel Beltwidth (ft)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Radius of Curvature (ft)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Rc:Bankfull width (ft/ft)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Meander Wavelength (ft)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Meander Width Ratio	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Profile																													
Riffle Length (ft)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Riffle Slope (ft/ft)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Pool Length (ft)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Pool to Pool Spacing (ft)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Pool Max Depth (ft)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	1.0	----	----	----	----	----	----	----	----	----	----	----
Pool Volume (ft³)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Substrate and Transport Parameters																													
R% / Ru% / P% / G% / S%	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
SC% / Sa% / G% / B% / Be%	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
d16 / d35 / d50 / d84 / d95	----	----	----	----	----	----	0.12 / 0.29 / 0.43 / 0.87 / 1.39	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Reach Shear Stress (competency) lb/ft²	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Max part size (mm) mobilized at bankfull (Rosgen Curve)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Stream Power (transport capacity) W/m²	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Additional Reach Parameters																													
Drainage Area (SM)	----	----	----	----	----	----	0.022	----	----	----	----	----	----	----	----	----	----	0.022	----	----	----	----	----	----	----	0.022	----	----	
Impervious cover estimate (%)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	
Rosgen Classification	----	----	----	----	----	----	B5	----	----	----	----	----	B5c	----	----	----	----	B5c	----	----	----	----	----	----	----	----	----	----	
BF Velocity (fps)	----	----	----	----	----	3.6	----	----	----	----	4	----	----	6	----	----	----	3.33	----	----	----	----	----	----	----	----	----	----	
BF Discharge (cfs)	----	----	----	----	----	----	5.7	----	----	----	----	----	----	----	----	----	----	5	----	----	----	----	----	----	----	----	----	----	
Valley Length	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	
Channel length (ft)	----	----	----	----	----	----	646	----	----	----	----	----	----	----	----	----	----	646	----	----	----	----	----	----	----	----	----	----	
Sinuosity	----	----	----	----	----	----	1.11	----	----	1.10	----	----	1.30	----	----	----	----	1.11	----	----	----	----	----	----	----	----	----	----	
Water Surface Slope (Channel) (ft/ft)	----	----	----	----	----	----	0.025	----	----	----	----	----	----	----	----	----	----	0.032	----	----	----	----	----	----	----	----	----	----	
BF slope (ft/ft)	----	----	----	----	----	----	0.036	----	----	0.005	----	----	0.015	----	----	----	----	0.036	----	----	----	----	----	----	----	----	----	----	
Bankfull Floodplain Area (acres)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	
BEHI VL% / L% / M% / H% / VH% / E%	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Channel Stability or Habitat Metric	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Biological or Other	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----

1 - Pre-Existing Condition measurement taken on existing sandbed riffle

Table 10 continued. Baseline Stream Summary																												
Thomas Creek Restoration Project: DMS Project ID No. 96074																												
Reach T1 - Length 227 ft																												
Parameter	USGS Gauge	Regional Curve			Pre-Existing Condition						Reference Reach(es) Data						Design						As-built					
											Thomas Creek Site Upper Reach 4 (On-site)																	
		LL	UL	Eq.	Min	Mean	Med	Max	SD	n	Min	Mean	Med	Max	SD	n	Min	Mean	Med	Max	SD	n	Min	Mean	Med	Max	SD	n
Dimension and Substrate - Riffle																												
BF Width (ft)	----	----	----	----	----	----	----	7.2	----	----	----	----	----	----	----	----	----	7.0	----	----	----	----	----	8.5	----	----	----	----
Floodprone Width (ft)	----	----	----	----	----	----	----	10.8	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	30.6	----	----	----	----
BF Mean Depth (ft)	----	----	----	----	----	----	----	0.4	----	----	----	----	----	----	----	----	----	0.6	----	----	----	----	----	0.6	----	----	----	----
BF Max Depth (ft)	----	----	----	----	----	----	----	0.7	----	----	----	----	----	----	----	----	----	0.7	----	----	----	----	----	0.9	----	----	----	----
BF Cross-sectional Area (ft ²)	----	----	----	----	----	----	----	2.8	----	----	----	----	----	----	----	----	----	3.8	----	----	----	----	----	5.3	----	----	----	----
Width/Depth Ratio	----	----	----	----	----	----	----	18.6	----	----	12.0	----	----	18.0	----	----	----	13.0	----	----	----	----	----	13.6	----	----	----	----
Entrenchment Ratio	----	----	----	----	----	----	----	1.5	----	----	1.4	----	----	2.2	----	----	----	----	----	----	----	----	----	3.6	----	----	----	----
Bank Height Ratio	----	----	----	----	----	----	----	2.6	----	----	1.0	----	----	1.1	----	----	----	1.0	----	----	----	----	----	1.0	----	----	----	----
d50 (mm)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Pattern																												
Channel Beltwidth (ft)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	32.5	----	----	----	----
Radius of Curvature (ft)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	13.5	----	----	18.0	----	----	----	14.0	----	----	----	----
Rc:Bankfull width (ft/ft)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	2.0	----	----	2.6	----	----	----	1.7	----	----	----	----
Meander Wavelength (ft)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	48.0	----	----	----	----
Meander Width Ratio	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	3.8	----	----	----	----
Profile																												
Riffle Length (ft)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	14.7	----	----	----	----
Riffle Slope (ft/ft)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	0.0135	----	----	----	----	----	0.0113	----	----	----	----
Pool Length (ft)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Pool to Pool Spacing (ft)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	25	----	----	42	----	----	----	41.2	----	----	----	----
Pool Max Depth (ft)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	1.4	----	----	----	----	----	1.4	----	----	----	----
Pool Volume (ft ³)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Substrate and Transport Parameters																												
R% / Ru% / P% / G% / S%	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
SC% / Sa% / G% / B% / Be%	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
d16 / d35 / d50 / d84 / d95	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Reach Shear Stress (competency) lb/ft ²	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Max part size (mm) mobilized at bankfull (Rosgen Curve)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Stream Power (transport capacity) W/m ²	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Additional Reach Parameters																												
Drainage Area (SM)	----	----	----	----	----	----	0.077	----	----	----	----	----	----	----	----	----	----	0.077	----	----	----	----	----	0.077	----	----	----	----
Impervious cover estimate (%)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Rosgen Classification	----	----	----	----	----	----	B5c	----	----	----	----	----	B5c	----	----	----	----	B5c	----	----	----	----	----	C5	----	----	----	----
BF Velocity (fps)	----	----	----	----	----	----	5.0	----	----	----	----	----	----	----	----	----	----	3.66	----	----	----	----	----	----	----	----	----	----
BF Discharge (cfs)	----	----	----	----	----	----	14.0	----	----	----	----	----	----	----	----	----	----	13.9	----	----	----	----	----	----	----	----	----	----
Valley Length	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	218	----	----	----	----
Channel length (ft)	----	----	----	----	----	----	242	----	----	----	----	----	----	----	----	----	----	253	----	----	----	----	----	227	----	----	----	----
Sinuosity	----	----	----	----	----	----	1.09	----	----	1.10	----	----	1.30	----	----	----	----	1.16	----	----	----	----	----	1.04	----	----	----	----
Water Surface Slope (Channel) (ft/ft)	----	----	----	----	----	----	0.0203	----	----	----	----	----	----	----	----	----	----	0.004	----	----	----	----	----	----	----	----	----	----
BF slope (ft/ft)	----	----	----	----	----	----	0.0120	----	----	0.005	----	----	0.015	----	----	----	----	0.005	----	----	----	----	----	----	----	----	----	----
Bankfull Floodplain Area (acres)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
BEHI VL% / L% / M% / H% / VH% / E%	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Channel Stability or Habitat Metric	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Biological or Other	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----

1 - Pre-Existing Condition measurement taken on existing sandbed riffle

Table 10 continued. Baseline Stream Summary																													
Thomas Creek Restoration Project: DMS Project ID No. 96074																													
Reach T2 - Length 157 ft																													
Parameter	USGS Gauge	Regional Curve			Pre-Existing Condition						Reference Reach(es) Data						Design						As-built						
											Thomas Creek Site Upper Reach 4 (On-site)																		
		LL	UL	Eq.	Min	Mean	Med	Max	SD	n	Min	Mean	Med	Max	SD	n	Min	Mean	Med	Max	SD	n	Min	Mean	Med	Max	SD	n	
Dimension and Substrate - Riffle																													
BF Width (ft)	----	----	----	----	----	----	----	2.1	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Floodprone Width (ft)	----	----	----	----	----	----	----	3.4	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
BF Mean Depth (ft)	----	----	----	----	----	----	----	0.4	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
BF Max Depth (ft)	----	----	----	----	----	----	----	0.6	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
BF Cross-sectional Area (ft ²)	----	----	----	----	----	----	----	0.8	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Width/Depth Ratio	----	----	----	----	----	----	----	5.6	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Entrenchment Ratio	----	----	----	----	----	----	----	1.6	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Bank Height Ratio	----	----	----	----	----	----	----	2.3	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
d50 (mm)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Pattern																													
Channel Beltwidth (ft)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Radius of Curvature (ft)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Rc:Bankfull width (ft/ft)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Meander Wavelength (ft)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Meander Width Ratio	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Profile																													
Riffle Length (ft)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Riffle Slope (ft/ft)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Pool Length (ft)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Pool to Pool Spacing (ft)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Pool Max Depth (ft)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Pool Volume (ft ³)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Substrate and Transport Parameters																													
R% / Ru% / P% / G% / S%	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
SC% / Sa% / G% / B% / Be%	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
d16 / d35 / d50 / d84 / d95	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Reach Shear Stress (competency) lb/ft ²	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Max part size (mm) mobilized at bankfull (Rosgen Curve)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Stream Power (transport capacity) W/m ²	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Additional Reach Parameters																													
Drainage Area (SM)	----	----	----	----	----	----	----	0.008	----	----	----	----	----	----	----	----	----	----	0.008	----	----	----	----	----	----	----	0.008	----	
Impervious cover estimate (%)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	
Rosgen Classification	----	----	----	----	----	----	----	B5c	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	
BF Velocity (fps)	----	----	----	----	----	----	----	3.4	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	
BF Discharge (cfs)	----	----	----	----	----	----	----	2.7	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	
Valley Length	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	
Channel length (ft)	----	----	----	----	----	----	----	171	----	----	----	----	----	----	----	----	----	----	157	----	----	----	----	----	----	157	----		
Sinuosity	----	----	----	----	----	----	----	1.17	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	
Water Surface Slope (Channel) (ft/ft)	----	----	----	----	----	----	----	0.0414	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	
BF slope (ft/ft)	----	----	----	----	----	----	----	0.0417	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	
Bankfull Floodplain Area (acres)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	
BEHI VL% / L% / M% / H% / VH% / E%	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	
Channel Stability or Habitat Metric	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	
Biological or Other	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	

1 - Pre-Existing Condition measurement taken on existing sandbed riffle

Table 11a. Cross-Section Morphology and Hydraulic Monitoring Summary
Thomas Creek Restoration Project: DMS Project ID No. 96074

Stream Reach	Cross-section X-1 (Riffle)							Cross-section X-2 (Pool)							Cross-section X-3 (Riffle)													
Based on fixed baseline bankfull elevation	Base	MY1	MY2	MY3	MY4	MY5	MY+	Base	MY1	MY2	MY3	MY4	MY5	MY+	Base	MY1	MY2	MY3	MY4	MY5	MY+							
BF Width (ft)	9.34	8.8						10.51	10.24						7.47	7.05												
BF Mean Depth (ft)	0.78	0.6						1.27	1.29						0.61	0.42												
Width/Depth Ratio	11.9	14.1						8.25	7.96						12.34	16.9												
BF Cross-sectional Area (ft²)	7.3	5.4						13.4	13.2						4.5	3												
BF Max Depth (ft)	1.29	1.1						2.06	2.13						0.89	0.7												
Width of Floodprone Area (ft)	55.3	51.84						61.3	62.24						37.3	34.07												
Entrenchment Ratio	5.9	5.9						5.8	6						5.0	4.8												
Bank Height Ratio	1	1.1						1.0	1.0						1.0	1.1												
Wetted Perimeter (ft)	10.9	10.0						13.1	12.8						8.7	7.9												
Hydraulic Radius (ft)	0.7	0.5						1.0	1.0						0.52	0.38												
Cross Sectional Area between end pins (ft³)	-	-						-	-						-	-												
d50 (mm)	-	-						-	-						-	-												
Stream Reach	Cross-section X-4 (Riffle)							Cross-section X-5 (Riffle)							Cross-section X-6 (Riffle)							Cross-section X-7 (Riffle)						
Based on fixed baseline bankfull elevation	Base	MY1	MY2	MY3	MY4	MY5	MY+	Base	MY1	MY2	MY3	MY4	MY5	MY+	Base	MY1	MY2	MY3	MY4	MY5	MY+	Base	MY1	MY2	MY3	MY4	MY5	MY+
BF Width (ft)	6.78	6.77						10.42	9.82						10.15	9.7						8.46	6.8					
BF Mean Depth (ft)	0.53	0.54						0.71	0.59						1.01	0.85						0.62	0.5					
Width/Depth Ratio	12.7	12.58						14.77	16.61						10.08	11.36						13.64	13.8					
BF Cross-sectional Area (ft²)	3.6	3.6						7.4	5.8						10.2	8.3						5.3	3.4					
BF Max Depth (ft)	0.87	0.97						1.01	0.89						1.5	1.28						0.88	0.8					
Width of Floodprone Area (ft)	21.9	22.27						38.17	36.97						62.93	62.9						30.61	28.2					
Entrenchment Ratio	3.2	3.3						3.7	3.8						6.2	6.5						3.6	4.1					
Bank Height Ratio	1.0	1.0						1.0	1.1						1.0	1.1						1.0	1.2					
Wetted Perimeter (ft)	7.8	7.9						11.8	11.0						12.2	11.4						9.7	7.8					
Hydraulic Radius (ft)	0.5	0.5						0.6	0.5						0.8	0.7						0.5	0.4					
Cross Sectional Area between end pins (ft³)	-	-						-	-						-	-						-	-					
d50 (mm)	-	-						-	-						-	-						-	-					
Stream Reach	Cross-section X-8 (Pool)							Cross-section X-9 (Pool)							Cross-section X-10 (Riffle)													
Based on fixed baseline bankfull elevation	Base	MY1	MY2	MY3	MY4	MY5	MY+	Base	MY1	MY2	MY3	MY4	MY5	MY+	Base	MY1	MY2	MY3	MY4	MY5	MY+	Base	MY1	MY2	MY3	MY4	MY5	MY+
BF Width (ft)	15.33	16.06						14.50	14.53						10.27	9.28												
BF Mean Depth (ft)	1.15	1.64						1.13	1.34						0.81	0.71												
Width/Depth Ratio	13.3	9.8						12.9	10.82						12.6	13.15												
BF Cross-sectional Area (ft²)	17.6	26.3						16.3	19.5						8.4	6.5												
BF Max Depth (ft)	2.70	2.58						2.15	3.18						1.18	1.14												
Width of Floodprone Area (ft)	53.1	52.35						70.6	70.61						74.5	74.48												
Entrenchment Ratio	3.5	3.3						4.9	4.9						7.2	8												
Bank Height Ratio	1.0	1.0						1.0	1.0						1.0	1.1												
Wetted Perimeter (ft)	17.6	19.3						16.8	17.2						11.9	10.7												
Hydraulic Radius (ft)	1.0	1.4						1.0	1.1						0.7	0.6												
Cross Sectional Area between end pins (ft³)	-	-						-	-						-	-												
d50 (mm)	-	-						-	-						-	-												

**Table 11a. (Continued) Cross Section Morphology and Hydraulic Monitoring Summary
Thomas Creek Restoration Project: DMS Project ID No. 96074**

Stream Reach	Reach 1 (208 LF)														Reach 6 (1,776 LF)							
	Cross-section X-11 (Pool)							Cross-section X-12 (Riffle)							Cross-section X-13 (Riffle)							
Based on fixed baseline bankfull elevation	Base	MY1	MY2	MY3	MY4	MY5	MY+	Base	MY1	MY2	MY3	MY4	MY5	MY+	Base	MY1	MY2	MY3	MY4	MY5	MY+	
BF Width (ft)	16.24	15.38						13.91	12.74						6.26	4.12						
BF Mean Depth (ft)	1.46	1.74						0.80	0.65						0.33	0.26						
Width/Depth Ratio	11.1	8.83						17.4	19.75						18.7	16.06						
BF Cross-sectional Area (ft ²)	23.7	26.8						11.1	8.2						2.1	1.1						
BF Max Depth (ft)	3.38	3.76						1.13	1.09						0.64	0.49						
Width of Floodprone Area (ft)	68.8	68.76						30.6	29.95						19.4	17.63						
Entrenchment Ratio	4.2	4.5						2.2	2.4						3.1	4.3						
Bank Height Ratio	1.0	1.0						1.0	1.1						1.0	1.0						
Wetted Perimeter (ft)	19.2	18.9						15.5	14.0						6.9	4.6						
Hydraulic Radius (ft)	1.2	1.4						0.7	0.6						0.3	0.2						
Cross Sectional Area between end pins (ft ²)	-	-						-	-						-	-						
d50 (mm)	-	-						-	-						-	-						
Stream Reach	Reach 5 (1,168 LF)														Reach 6 (1,776 LF)							
Based on fixed baseline bankfull elevation	Cross-section X-14 (Riffle)							Cross-section X-15 (Pool)							Cross-section X-16 (Pool)							
BF Width (ft)	7.52	6.85						10.30	7.28						9.34	8.74						
BF Mean Depth (ft)	0.90	0.64						0.75	1.03						0.78	1.19						
Width/Depth Ratio	8.4	10.78						13.8	7.08						11.9	7.32						
BF Cross-sectional Area (ft ²)	6.8	4.4						7.7	7.5						7.3	10.4						
BF Max Depth (ft)	1.24	1.17						1.45	1.57						1.29	2.68						
Width of Floodprone Area (ft)	49.9	49.91						59.6	58.81						63.8	67.37						
Entrenchment Ratio	6.6	7.3						5.8	8.1						5.9	7.7						
Bank Height Ratio	1.0	1.1						1.0	1.1						1.0	1.0						
Wetted Perimeter (ft)	9.3	8.1						11.8	9.3						10.9	11.1						
Hydraulic Radius (ft)	0.7	0.5						0.7	0.8						0.7	0.9						
Cross Sectional Area between end pins (ft ²)	-	-						-	-						-	-						
d50 (mm)	-	-						-	-						-	-						

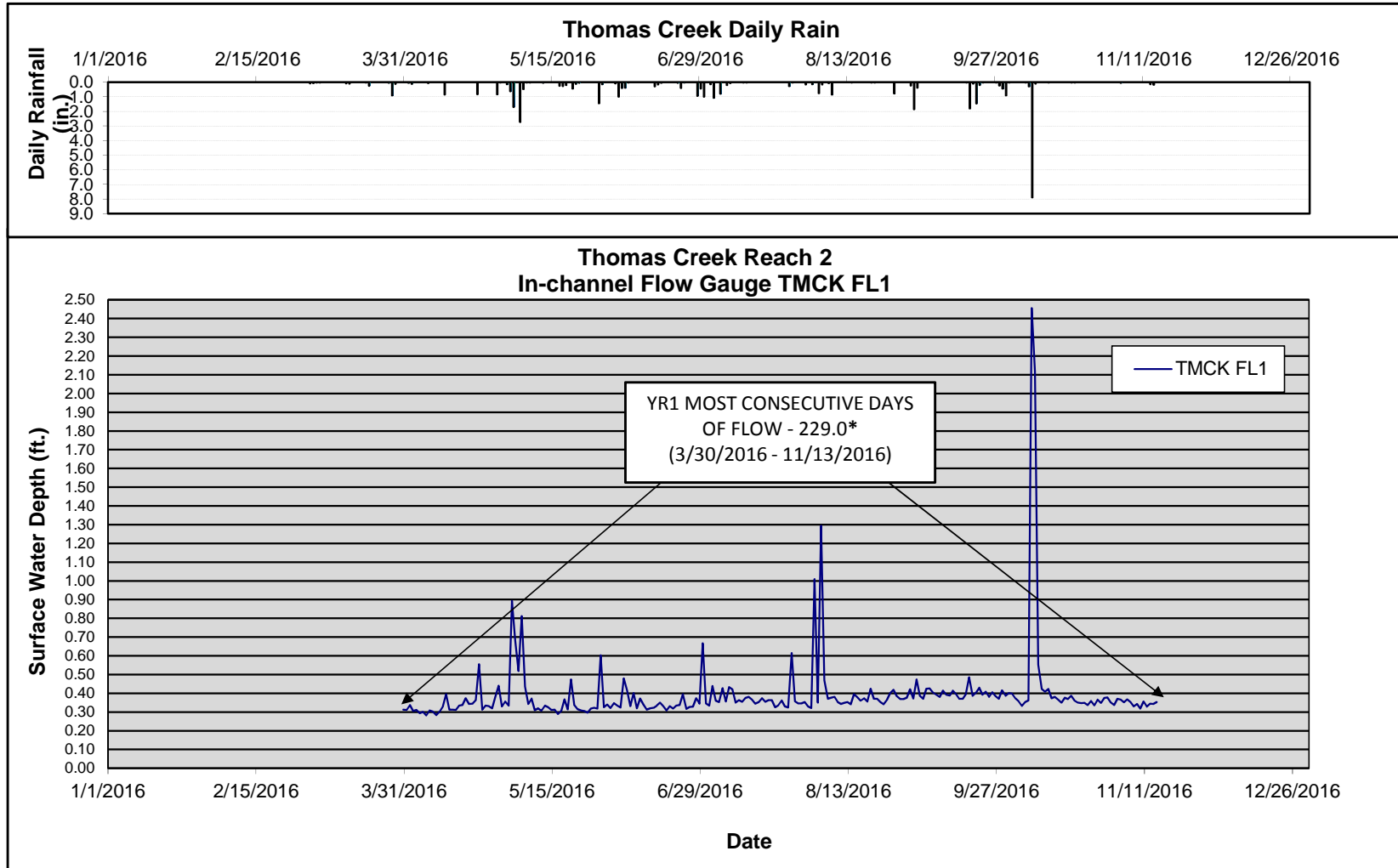
Appendix E

Hydrologic Data

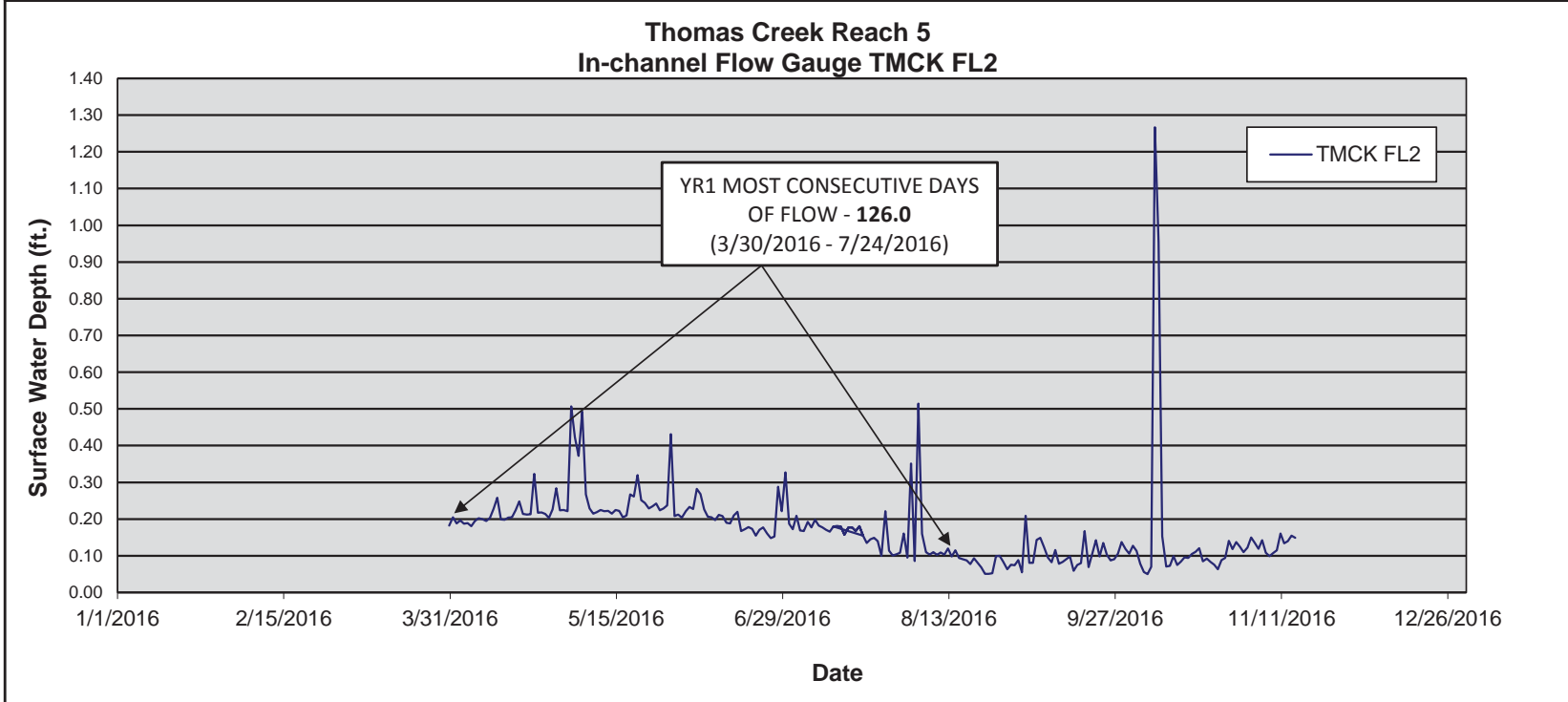
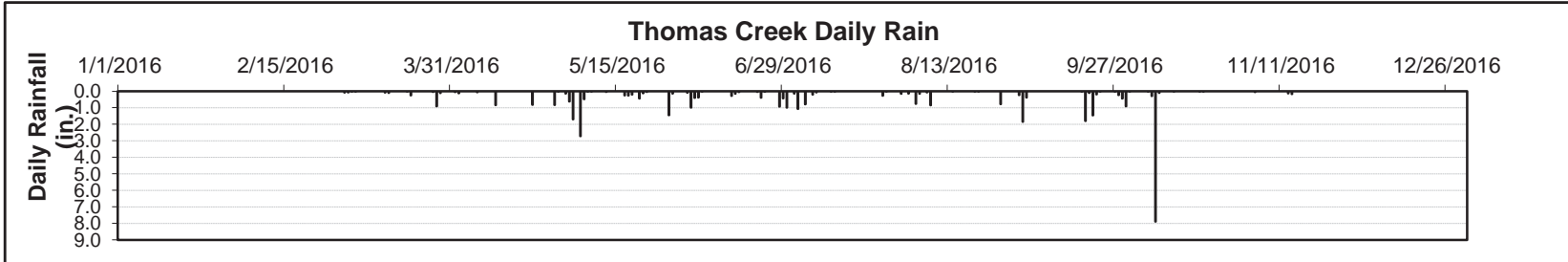
Table 12. Verification of Bankfull Events			
Thomas Creek Restoration Project: DMS Project ID No. 96074			
Date of Data Collection	Reach 2 Crest Gauge (feet)	Estimated Occurrence of Bankfull Event	Method of Data Collection
Year 1 Monitoring (2016)			
10/27/2016	1.1	10/8/2016	Crest Gauge

Table 13. Flow Gauge Success (2016)		
Thomas Creek Restoration Project: DMS Project ID No. 96074		
Flow Gauge ID	Consecutive Days of Flow¹	Cumulative Days of Flow²
Reach 2 Flow Gauge		
TMCK FL1	229	229
Reach 5 Flow Gauge		
TMCK FL2	126	182
Notes:		
¹ Indicates the number of consecutive days within the monitoring year where flow was measured.		
² Indicates the number of cumulative days within the monitoring year where flow was measured.		
* Surface water flow is estimated to have occurred when the pressure transducer reading is equal to or above 0.1 feet in depth.		
Flow success criteria for the Site: A restored stream reach will be considered intermittent when the flow duration occurs for a minimum of 30 consecutive days.		

Figure 7.



* Surface water flow is estimated to have occurred when the pressure transducer reading is equal to or above 0.1 feet in depth.



* Surface water flow is estimated to have occurred when the pressure transducer reading is equal to or above 0.1 feet in depth.