UT to Cane Creek Restoration Project
Year 1 Monitoring Report

Alamance County, North Carolina
NCDENR DMS Project ID Number - 95729

Project Info:	Monitoring Year: 1 of 7 Year of Data Collection: 2014/2015 Year of Completed Construction: 2014 Submission Date: April 2015
Submitted To:	NCDENR - Division of Mitigation Services 1625 Mail Service Center Raleigh, NC 27699 NCDENR Contract ID No. 003992

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Report Prepared and Submitted by Michael Baker Engineering, Inc.

NC Professional Engineering License # F-1084

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APPENDICES

1.0 EXECUTIVE SUMMARY

Michael Baker Engineering, Inc. (Baker) restored 3,314 linear feet (LF) of perennial and intermittent streams and enhanced 2,911 LF of channel for the UT to Cane Creek Restoration Project (Site or Project). Baker also planted approximately 14.0 acres (AC) of native riparian species vegetation within the recorded conservation easement areas along the restored and enhanced reaches (Reaches R1, R3, R4, R5 and R5a) for the Site. Table 1 summarizes project components and mitigation credits (Appendix A). The Site is located in Alamance County, approximately three miles south of the Town of Saxapahaw (Figure 1). The Site is located in the NC Division of Water Resources (NCDWR) Sub-basin 03-06-04 and the NCDENR Division of Mitigation Services (DMS, formerly Ecosystem Enhancement Program) Targeted Local Watershed (TLW) 03030002-050050 of the Cape Fear River Basin. The Project involved the restoration and enhancement of a Rural Piedmont Streams (NC WAM 2010, 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 UT to Cane Creek Restoration Project area is located in an existing targeted local watershed (TLW) within the Cape Fear River Basin, although it is not located in a Local Watershed Planning (LWP) area. The restoration strategy for the Cape Fear River Basin targets specific projects which focus on developing creative strategies for improving water quality flowing to the Haw River in order to reduce non-point source (NPS) pollution to Jordan Lake.

The primary goals of the Project were to improve ecologic functions and to manage NPS inputs to the impaired areas as described in the NCDMS 2009 Cape Fear RBRP and as identified below:

- Create geomorphically stable conditions along the unnamed tributaries across the Site,
- Implement agricultural BMPs to reduce NPS inputs to receiving waters,
- Protect and improve water quality by reducing stream bank erosion, and nutrient and sediment inputs,
- Restore stream and floodplain interaction by connecting historic flow paths and promoting natural flood processes, and
- Restore and protect riparian buffer functions and corridor habitat in perpetuity by establishing a permanent conservation easement.

To accomplish these goals, the following objectives were identified:

- Restore existing incised, eroding, and channelized streams by providing flood water access to the relic floodplains,
- Prevent cattle from accessing the conservation easement boundary by installing permanent fencing and thus reduce excessive stream bank erosion and undesired nutrient inputs,
- Increase aquatic habitat value by providing more bedform diversity, creating natural scour pools and reducing sediment from accelerated stream bank erosion,
- Plant native species riparian buffer vegetation along stream bank and floodplain areas, protected by a permanent conservation easement, to increase stormwater runoff filtering capacity, improve stream bank stability and riparian habitat connectivity, and shade the stream to decrease water temperature,
- Improve aquatic and terrestrial habitat through improved substrate and in-stream cover, addition of woody debris, and reduction of water temperature, and

- Control invasive species vegetation within the Project area and, if necessary, continue treatments during the monitoring period.

During Year 1 monitoring, the planted acreage performance categories were functioning at 97.7 percent with no bare areas to report (Appendix B). The average density of total planted stems, based on data collected from the six monitoring plots following Year 1 monitoring in December 2014, was 398 stems per acre. As stated in Baker's letter dated November 7, 2014 to Mr. Jeff Schaffer of NCDMS, buffer areas with low stem densities were to be "replanted during the 2014 dormant season". In March 2015, the supplemental replanting of Reaches R3, R4 and R5 was completed with bare-root stems in accordance with this letter. Both the riparian buffer areas, as well as vegetation monitoring plots 2 through 6 were replanted during this effort. The planting areas were mostly un-forested within the respective reach buffers. Based on recent data collected from the five vegetation monitoring plots following replanting, the new Site planted stem density as of March 2015 is 796 stems per acre. Therefore, the replanting data demonstrate that the Site is on back on track for meeting the minimum success interim criteria of 320 trees per acre by the end of Year 3. Tree species will be identified during spring 2015 leaf out and will be reported in the Year 2 annual monitoring report.

No significant areas of invasive species vegetation were observed during Year 1 monitoring.

Additionally, an easement issue regarding buffer encroachment was documented along the downstream portion of Reach 1 as shown on the Current Condition Plan View (CCPV) in Appendix B. This problem area is approximately 0.06 acre in size and encompasses 3.8% of the planted riparian buffer area of Reach R1. Encroachment occurred due to confusion relating to the prior use of this area as an active agricultural field. Following construction, buffer signage was in place at the concerned easement corner; however signage was removed by an equipment operator. This encroachment was noted by Baker monitoring staff and the signage has been re-established. To further demarcate the easement boundary, 1-inch horse tape has been installed and no remedial action is proposed at the time of this report.

The Year 1 monitoring survey data of twelve (12) cross-sections indicates that the Site is geomorphically stable and performing at 100 percent for the all parameters evaluated. The data collected are within the lateral/vertical stability and in-stream structure performance categories.

During Year 1 monitoring, the Reach R3 crest gauge documented at least one post-construction bankfull event. However, the Reach R5 crest gauge did not record any above-bankfull events during Year 1 monitoring.

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 NCDMS website. All raw data supporting the tables and figures in the Appendices is available from NCDMS 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 Project. The methodology and report template used to evaluate these components adheres to the NCDMS monitoring report template document Version 1.4 (November 7, 2011), which will continue to serve as the template for subsequent monitoring years. The specific locations of

monitoring features, such as vegetation plots, permanent cross-sections, reference photograph stations and crest gauges, are shown on the CCPV sheets found in Appendix B.

The Year 1 cross-sectional data and vegetation plot were collected in December 2014/January 2015. All visual site assessment data contained in Appendix B were collected in November/December 2014 as well as March 2015. Immediately following the March 2015 replanting effort, additional vegetation plot data were collected.

2.2 Stream Assessment

The Project involved the restoration and enhancement of a Rural Piedmont Stream System (NC WAM 2010, Schafale and Weakley 1990) which 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, and restoring natural flows to areas previously drained by ditching activities. The existing channels abandoned within the restoration areas were partially to completely filled to decrease surface and subsurface drainage and raise the local water table. Permanent cattle exclusion fencing was provided around all proposed reaches and riparian buffers, with the exception of Reach R1, where cattle lack access.

Stream survey data were collected conventionally using a Nikon DM-522 total station unit and is georeferenced used NAD83-State Plane Feet-FIPS3200. This survey system is designed to be accurate within one-tenth of a foot.

2.2.1 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 (i.e. BHR no more than 1.2 and ER no less than 2.2) defined for channels of the design stream type. Morphological survey data is 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 first year of monitoring only. The survey was tied to a permanent benchmark and measurements included thalweg, water surface, bankfull, and top of low bank. Each of these measurements was taken at the head of each feature (e.g., riffle, pool) and at the maximum pool depth. 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 USACE or NCDMS.

2.2.2 Hydrology

To monitor on-site bankfull events, crest gauges were installed along two of the restored reaches. One crest gauge was installed on the floodplain at the bankfull elevation along the left top of bank on Reach R5, approximately at Station 22+00. The second crest gauge was installed on the floodplain along the right top of bank along Reach R3, approximately at Station 13+50.

During Year 1 monitoring, no flow events above bankfull stage were documented by the Reach R5 crest gauge. However, an above bankfull reading of 0.18 feet (2.16 inches) was measured on Reach R3 during a flow event on or about July 16, 2014. Crest gauge readings are presented in Appendix E.

2.2.3 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 also were taken of grade control structures and buffer areas along the restored stream. Selected stream photographs from Year 1 monitoring are shown in Appendix B.

2.2.4 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, the entire length of each of the Project reaches was walked, noting geomorphic conditions of the stream bed profile (riffle/pool facets); both stream banks, and engineered in-stream structures. Representative photos were taken per the Site's Mitigation Plan. Locations of potential Stream Problem Areas (SPAs) are documented in the field for subsequent mapping on the CCPV figures. A detailed summary of the methodology and results for the visual stream stability assessment can be found in Appendix B which includes supporting data tables, and SPA photos if applicable.

2.3 Vegetation Assessment

In order to determine if the success criteria are achieved, vegetation-monitoring quadrants were installed and are monitored across the restoration site in accordance with the CVS-NCDMS 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 six plots established randomly within the planted riparian buffer areas per Monitoring Levels 1 and 2. No monitoring quadrants were established within the undisturbed wooded areas of Reach R4. The sizes of individual quadrants are 100 square meters for woody tree species.

During Year 1 monitoring, the planted acreage performance categories were functioning at 97.7 percent with no bare areas to report (Appendix B). The average density of total planted stems, based on data collected from the six monitoring plots following Year 1 monitoring in December 2014, was 398 stems per acre. As stated in Baker's letter dated November 7, 2014 to Mr. Jeff Schaffer of NCDMS, buffer areas with low stem densities were to be "replanted during the 2014 dormant season". In March 2015, the supplemental replanting of Reaches R3, R4 and R5 was completed with bare-root stems in accordance with this letter. These areas, as well as vegetation monitoring plots 2 through 6, were replanted during this effort. The planting areas were mostly unforested within the respective reach buffers. Based on recent data collected from the five vegetation monitoring plots following replanting, the new Site planted stem density as of March 2015 is 796 stems per acre. Therefore, the replanting data demonstrate that the Site is on back on track for meeting the minimum success interim criteria of 320 trees per acre by the end of Year 3. Tree species will be identified during spring 2015 leaf out and will be reported in the Year 2 annual monitoring report.

Following the replanting effort completed in March 2015, it is now reported that no vegetation areas of concern, with the exception of the 0.06 acre encroachment area along Reach R1, are present along Reaches R1, R3, R4 or R5.

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 (NCDMS). CVS-NCDMS Data Entry Tool v. 2.3.1. University of North Carolina, Raleigh, NC.

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

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

____. 2010. Baseline Monitoring Template and Guidance. Version 2.0, October 14, 2010.

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

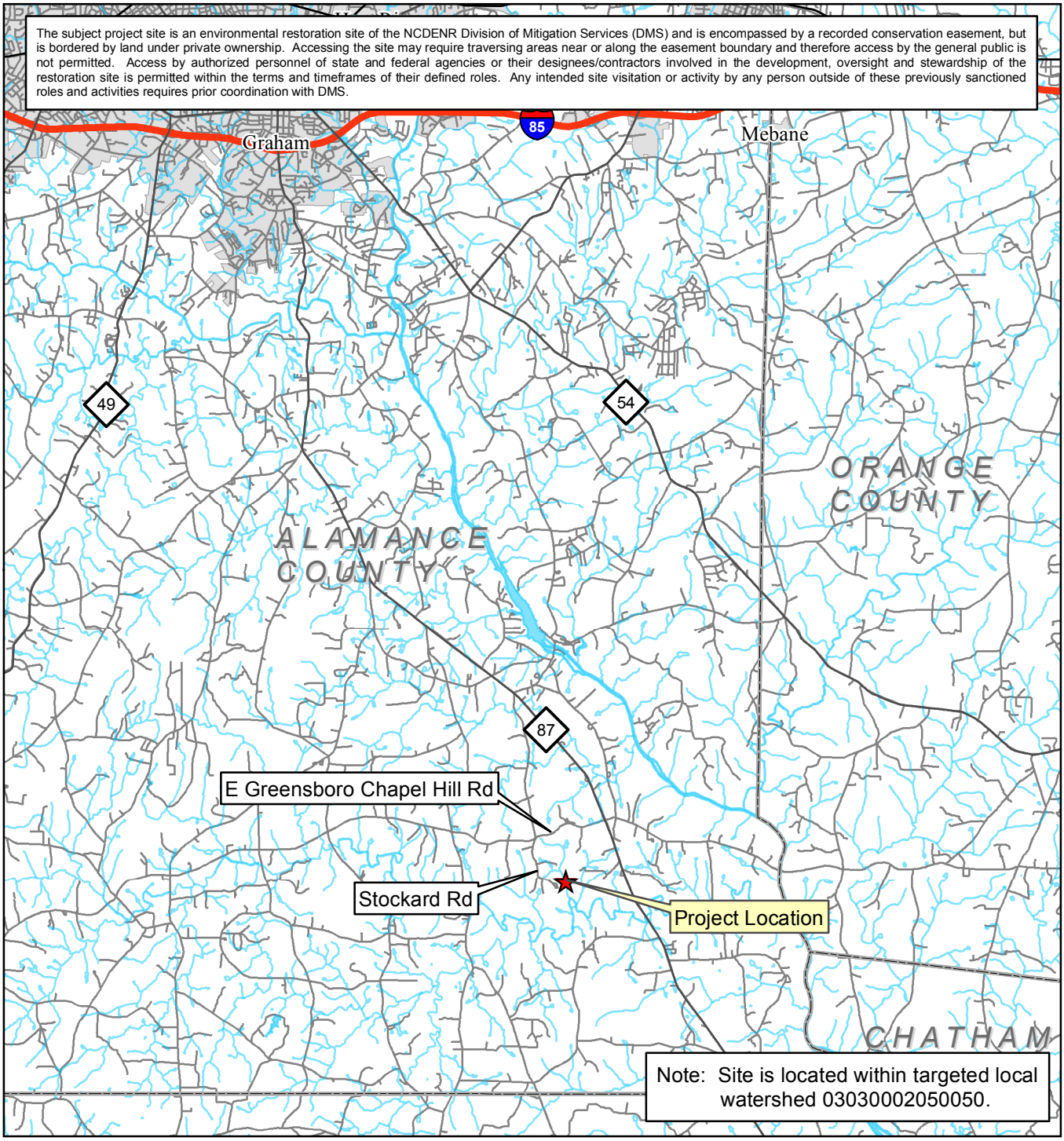
Schafale, M. P., and A. S. Weakley. 1990. Classification of the natural communities of North Carolina, third approximation. North Carolina Natural Heritage Program. Division of Parks and Recreation, NCDENR. Raleigh, NC.

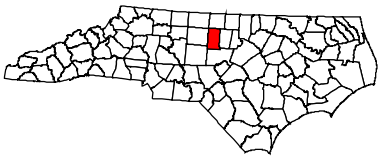
____. 2003. Stream Mitigation Guidelines, April 2003, U.S. Army Corps of Engineers. Wilmington District.

Appendix A

Project Vicinity Map and Background Tables

The subject project site is an environmental restoration site of the NCDENR 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.





Alamance County

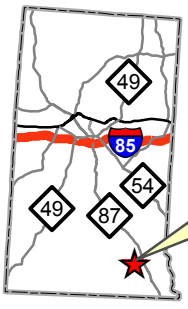


Figure 1
Project Vicinity Map
UT to Cane Creek Site

DENR - Division of Mitigation Services

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0 0.5 1 2 3 Miles

Table 1. Project Components and Mitigation Credits

UT to Cane Creek Restoration Project: DMS Project ID No. 95729

Mitigation Credits

	Stream	Riparian Wetland		Non-riparian Wetland		Buffer	Nitrogen Nutrient Offset	Phosphorus Nutrient Offset
Type	R, E1, EII	R	E					
Totals	4,594 SMU	0	0					

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	10+00 – 20+45	944	Restoration	1,045	1,045	1:1
Reach 3	10+00 – 13+98	425	Restoration	398	398	1:1
Reach 4 (Upstream section)	29+32 – 52+86	2,346	Enhancement Level II	933	2,333	2.5:1
Reach 4 (Downstream section)	53+20 – 57+30	411	Restoration	410	410	1:1
Reach 5 (Upstream section)	10+03 – 24+64	1,386	Restoration	1,461	1,461	1:1
Reach 5 (Downstream section)	25+00 – 29+32	426	Enhancement Level I	289	433	1.5:1
Reach 5a	10+02 – 11+47	144	Enhancement Level II	58	145	2.5:1

Component Summation

Restoration Level	Stream (LF)	Riparian Wetland (AC)		Non-riparian Wetland (AC)	Buffer (SF)	Upland (AC)
		Riverine	Non-Riverine			
Restoration	3,314					
Enhancement I	433					
Enhancement II	2,478					
Creation	0					
Preservation	0					
High Quality Preservation	0					

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 UT to Cane Creek Restoration Project: DMS Project ID No. 95729			
Activity or Report	**Scheduled Completion**	**Data Collection Complete**	**Actual Completion or Delivery**
Mitigation Plan Prepared	N/A	N/A	Aug-13
Mitigation Plan Amended	N/A	N/A	Oct-13
MItigation Plan Approved	May-13	N/A	Dec-13
Final Design – (at least 90% complete)	N/A	N/A	Feb-14
Construction Begins	Nov-13	N/A	Mar-14
Temporary S&E mix applied to entire project area	Feb-14	N/A	Jun-14
Permanent seed mix applied to entire project area	Feb-14	N/A	Jun-14
Planting of live stakes	Feb-14	N/A	Jun-14
Planting of bare root trees	Feb-14	N/A	Jun-14
End of Construction	Feb-14	N/A	Jun-14
Survey of As-built conditions (Year 0 Monitoring-baseline)	Apr-14	Jul-14	Aug-14
Year 1 Monitoring	Dec-14	Jan-15	Apr-15
Year 2 Monitoring	Dec-15	N/A	N/A
Year 3 Monitoring	Dec-16	N/A	N/A
Year 4 Monitoring	Dec-17	N/A	N/A
Year 5 Monitoring	Dec-18	N/A	N/A
Year 6 Monitoring	Dec-19	N/A	N/A
Year 7 Monitoring	Dec-20	N/A	N/A

Table 3. Project Contacts **UT to Cane Creek Restoration Project: DMS Project ID No. 95729**	
Designer	
Michael Baker Engineering, Inc.	8000 Regency Parkway, Suite 600 Cary, NC 27518 Contact: Kayne Van Stell, Tel. 919-481-5730
Construction Contractor	
River Works, Inc.	6105 Chapel Hill Road Raleigh, NC 27607 Contact: Phillip Todd, Tel. 919-582-3575
Planting Contractor	
River Works, Inc.	6105 Chapel Hill Road Raleigh, NC 27607 Contact: Phillip Todd, Tel. 919-582-3575
Seeding Contractor	
River Works, Inc.	6105 Chapel Hill Road Raleigh, NC 27607 Contact: Phillip Todd, Tel. 919-582-3575
Seed Mix Sources	Green Resources, Tel. 336-855-6363
Nursery Stock Suppliers	Mellow Marsh Farm, 919-742-1200 ArborGen, 843-528-3204
Monitoring Performers	
Michael Baker Engineering, Inc.	8000 Regency Parkway, Suite 600 Cary, NC 27518 Contact:
Stream Monitoring Point of Contact	Dwayne Huneycutt, Tel. 919-481-5745
Vegetation Monitoring Point of Contact	Dwayne Huneycutt, Tel. 919-481-5745

Table 4. Project Attributes
UT to Cane Creek Restoration Project: DMS Project ID No. 95729

Project Information	
Project Name	UT to Cane Creek Restoration Project
County	Alamance
Project Area (acres)	19.9
Project Coordinates (latitude and longitude)	35.8934 N, -79.3187 W

Project Watershed Summary Information	
Physiographic Province	Piedmont
River Basin	Cape Fear
USGS Hydrologic Unit 8-digit and 14-digit	03030002 / 03030002050050
NCDWR Sub-basin	3-06-04
Project Drainage Area (acres)	452 (Reach R4 main stem at downstream confluence w/ Cane Creek)
Project Drainage Area Percent Impervious	<1%
CGIA / NCEEP Land Use Classification	2.01.01.01, 2.03.01, 2.99.01, 3.02 / Forest (49%) Agriculture (46%) Impervious Cover (1%)

Reach Summary Information

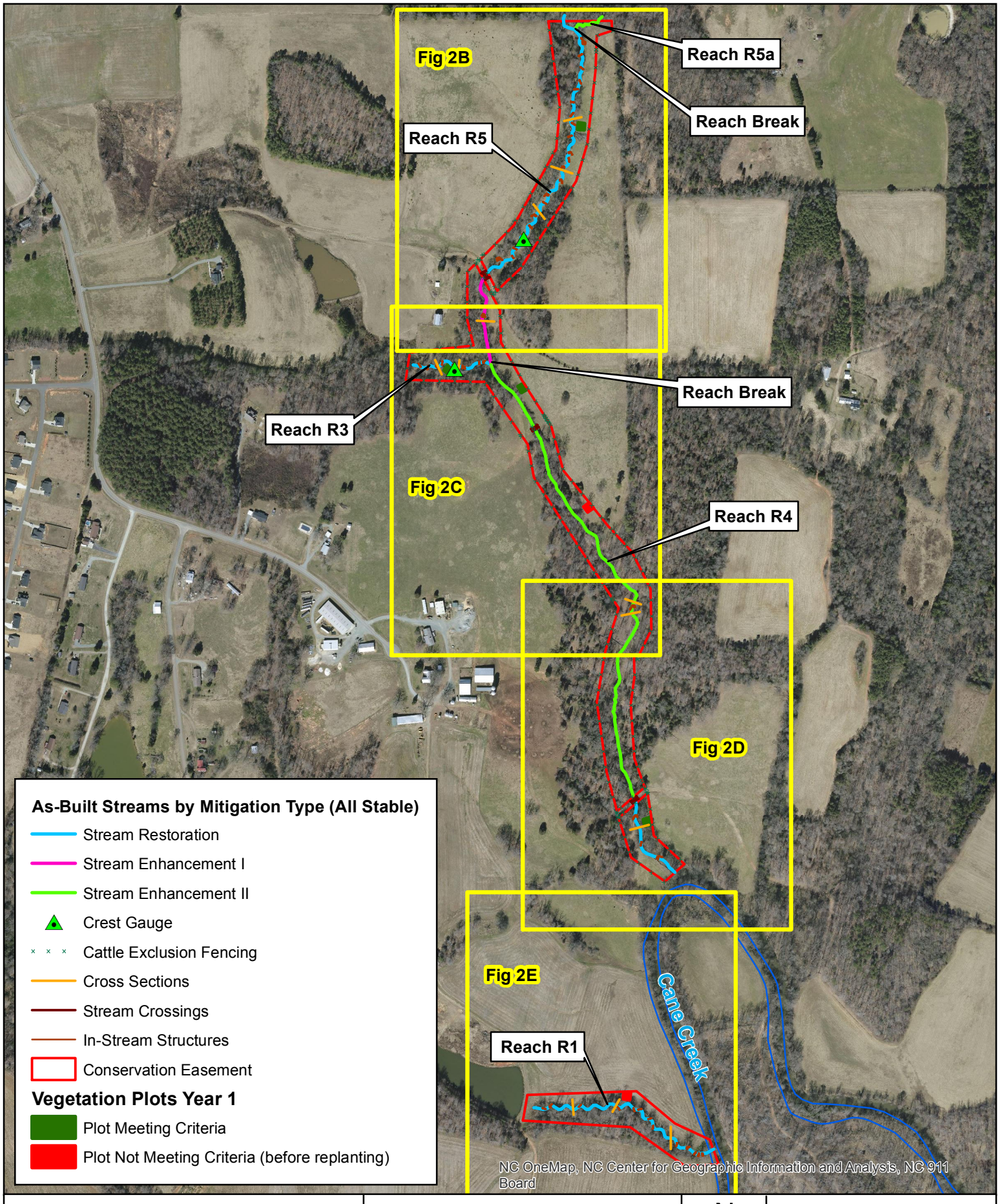
Parameters	Reach R1	Reach R3	Reach R4	Reach R5	Reach R5a
Length of Reach (linear feet)	1,052	400	2,731	1,925	145
Valley Classification (Rosgen)	VII	VII	VII	VII	VII
Drainage Area (acres)	80	91	452	290	14
NCDWR Stream Identification Score	30.5	36	42.5	38.5	33.5
NCDWR Water Quality Classification	WS V; NSW				
Morphological Description (Rosgen stream type)	Incised E	G	Bc (upstream)/ F (downstream)	G	B
Evolutionary Trend	Incised E→Gc→F	Bc→G→Fb	Bc→G→Fb	Bc→G→Fb	B→G
Underlying Mapped Soils	We, GaE, Cg, DbB	We	We, GbD3, Mc, Cg, TaD	We	We
Drainage Class	Poorly drained	Poorly drained	Poorly	Poorly drained	Poorly
Soil Hydric Status	Hydric	Hydric	Hydric	Hydric	Hydric
Average Channel Slope (ft/ft)	0.0127	0.0168	0.0169	0.0126	0.0223
FEMA Classification	N/A	Zone AE	Zone AE	N/A	N/A
Native Vegetation Community	Piedmont Small Stream				
Percent Composition of Exotic/Invasive Vegetatic	<5%	<5%	<5%	<5%	<5%

Regulatory Considerations

Regulation	Applicable	Resolved	Supporting Documentation
Waters of the United States – Section 404	Yes	Yes	Categorical Exclusion
Waters of the United States – Section 401	Yes	Yes	Categorical Exclusion
Endangered Species Act	No	N/A	Categorical Exclusion
Historic Preservation Act	No	N/A	Categorical Exclusion
Coastal Area Management Act (CAMA)	No	N/A	Categorical Exclusion
FEMA Floodplain Compliance	Yes	Yes	Categorical Exclusion
Essential Fisheries Habitat	No	N/A	Categorical Exclusion

Appendix B

Visual Assessment Data



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0 250 500 Feet

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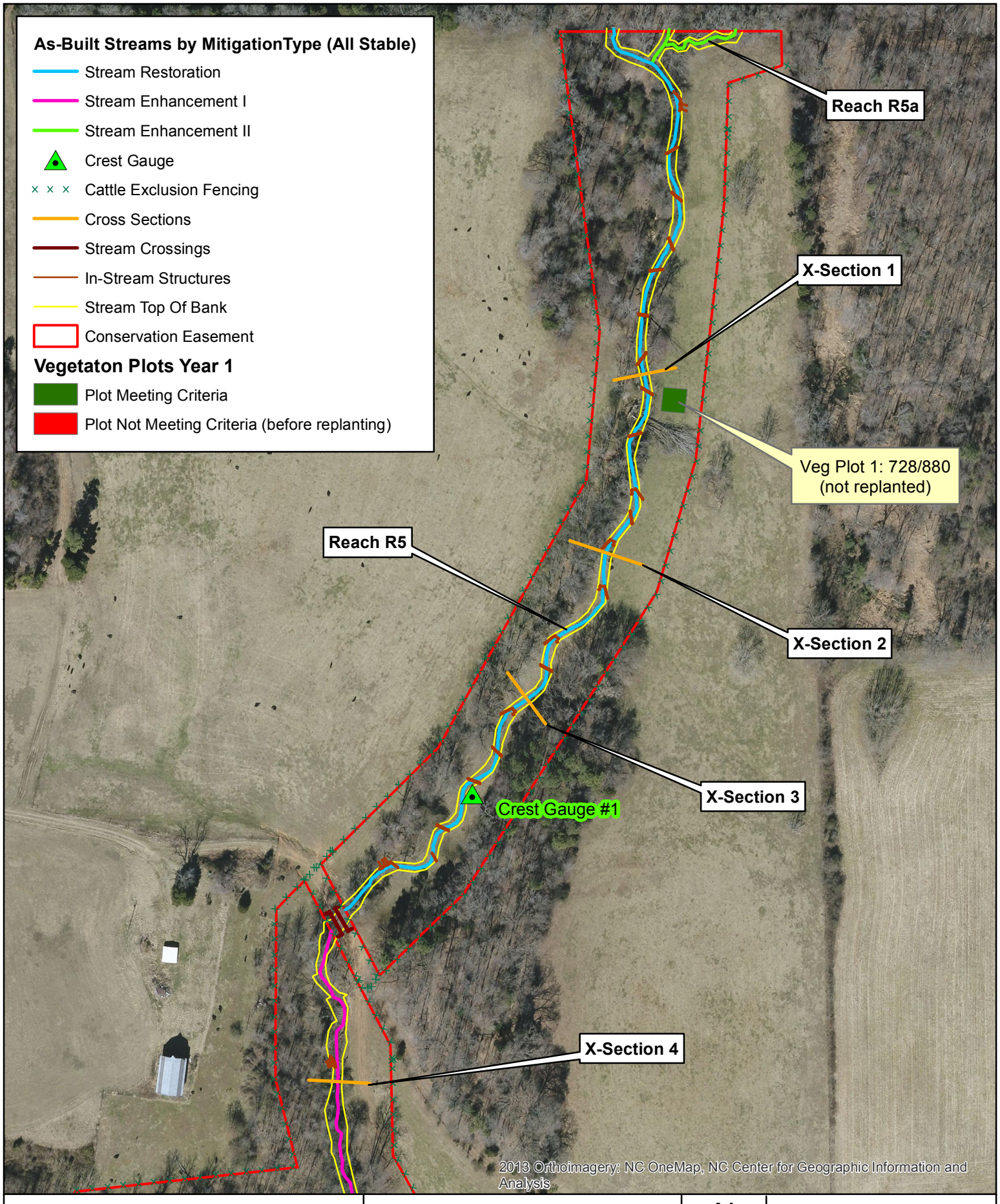
DENR DMS Project # 95729

Current Condition Plan View - Figure 2A
UT to Cane Creek Site
Alamance County, NC



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0 100 200 Feet

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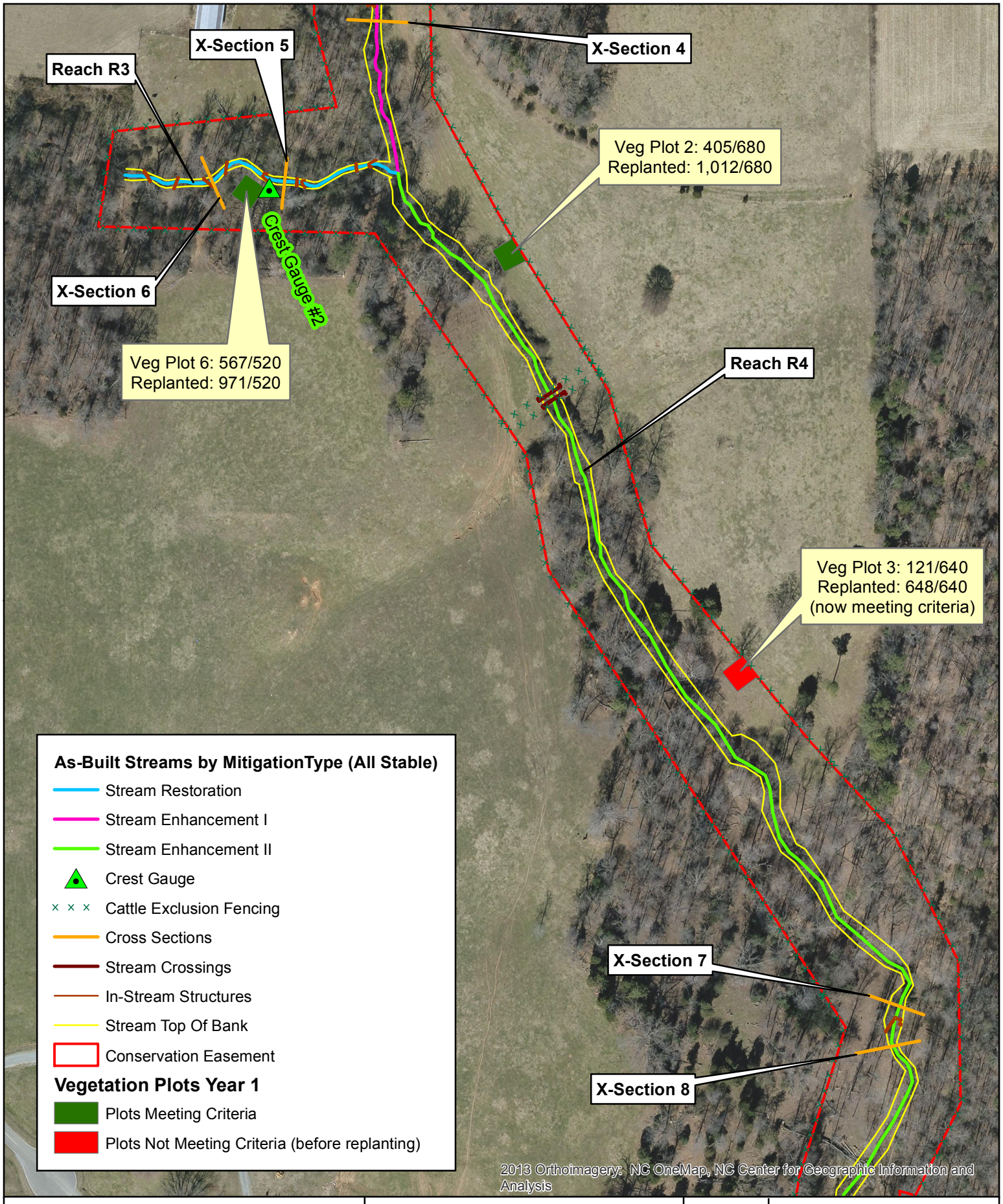
DENR DMS Project # 95729

Current Condition Plan View - Figure 2B
UT to Cane Creek Site
Alamance County, NC



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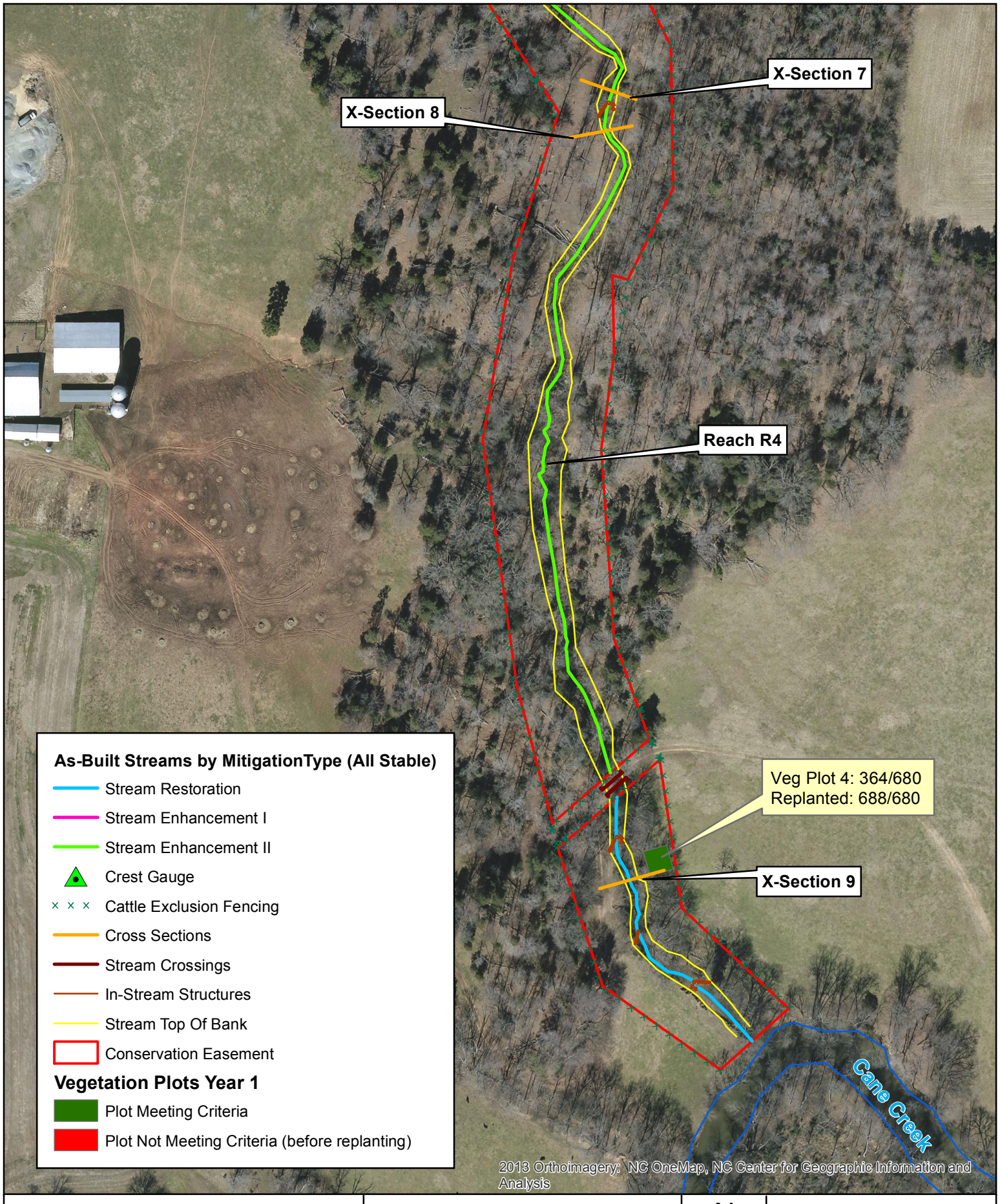
DENR DMS Project # 95729

Current Condition Plan View - Figure 2C
UT to Cane Creek Site
Alamance County, NC



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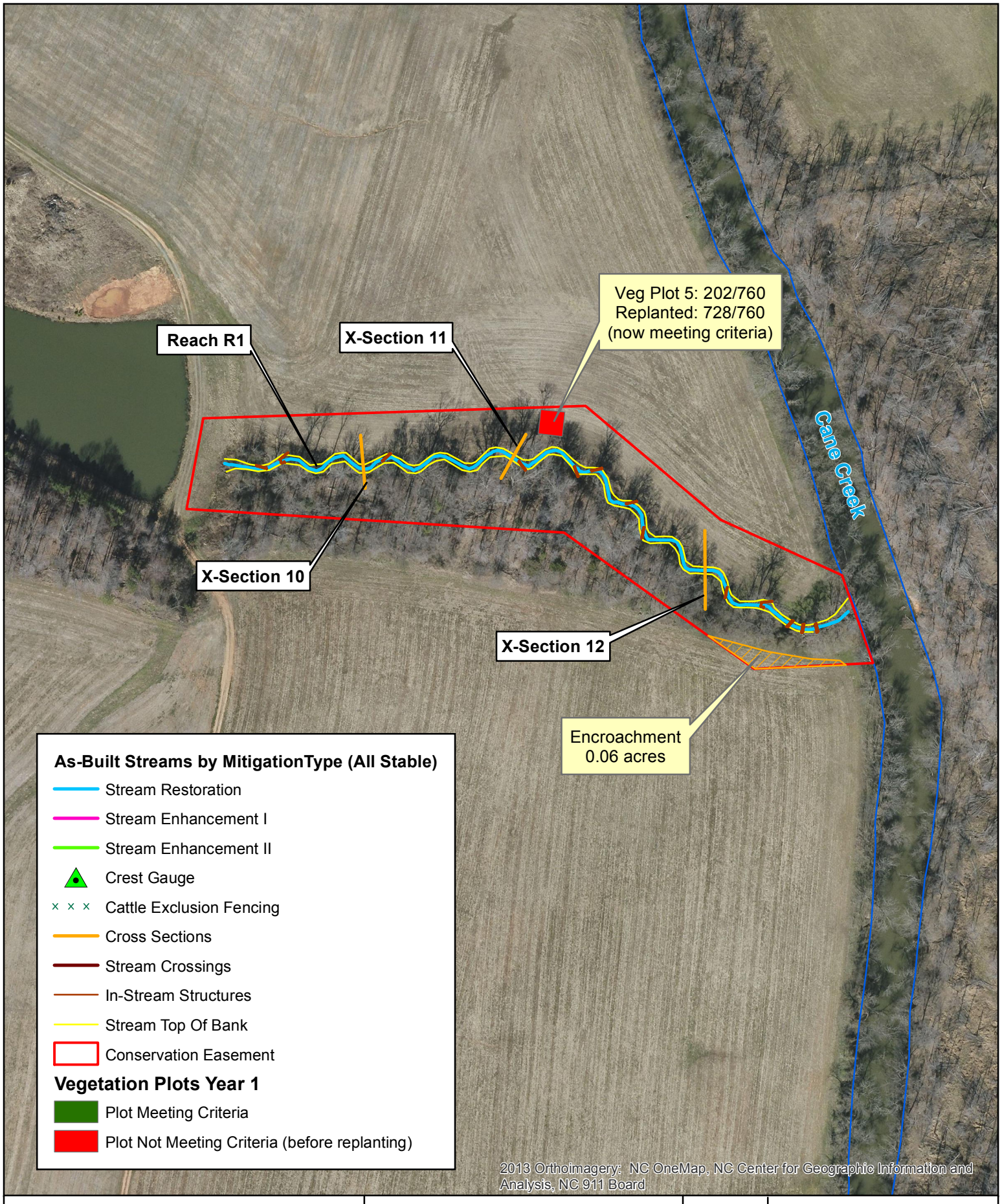
DENR DMS Project # 95729

Current Condition Plan View - Figure 2D
UT to Cane Creek Site
Alamance County, NC



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0 100 200 Feet

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DENR DMS Project # 95729

Current Condition Plan View - Figure 2E
UT to Cane Creek Site
Alamance County, NC

Table 5a. Visual Steam Morphology Stability Assessment
UT to Cane Creek Restoration Project: DMS Project ID No. 95729
Reach ID: Reach 1
Assessed Length (LF): 1,045

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			0	0	100%			
		2. Degradation			0	0%	100%			
	2. Riffle Condition	1. Texture Substrate	9	9			100%			
	3. Meander Pool Condition	1. Depth	21	21			100%			
		2. Length	21	21			100%			
	4. Thalweg Position	1. Thalweg centering at upstream of meander bend (Run)	21	21			100%			
		2. Thalweg centering at downstream of meander bend (Glide)	20	20			100%			
2. Bank	1. Scoured/Eroding	Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion			0	0	100%	0	0	100%
	2. Undercut	Banks undercut/overhanging to the extent that mass wasting appears likely			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	4	4			100%			
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill	4	4			100%			
	2a. Piping	Structures lacking any substantial flow underneath sill 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	4	4			100%			

Table 5a. Visual Steam Morphology Stability Assessment
UT to Cane Creek Restoration Project: DMS Project ID No. 95729
Reach ID: Reach 3
Assessed Length (LF): 398

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			0	0	100%			
		2. Degradation			0	0%	100%			
	2. Riffle Condition	1. Texture Substrate	6	6			100%			
	3. Meander Pool Condition	1. Depth	3	3			100%			
		2. Length	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 resulting simply from poor growth and/or scour and erosion			0	0	100%	0	0	100%
	2. Undercut	Banks undercut/overhanging to the extent that mass wasting appears likely			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	4	4			100%			
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill	4	4			100%			
	2a. Piping	Structures lacking any substantial flow underneath sill 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	4	4			100%			

Table 5a. Visual Steam Morphology Stability Assessment
UT to Cane Creek Restoration Project: DMS Project ID No. 95729
Reach ID: Reach 4
Assessed Length (LF): 2,743

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			0	0	100%			
		2. Degradation			0	0%	100%			
	2. Riffle Condition	1. Texture Substrate	7	7			100%			
	3. Meander Pool Condition	1. Depth	2	2			100%			
		2. Length	2	2			100%			
	4. Thalweg Position	1. Thalweg centering at upstream of meander bend (Run)	2	2			100%			
		2. Thalweg centering at downstream of meander bend (Glide)	2	2			100%			
2. Bank	1. Scoured/Eroding	Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion			0	0	100%	0	0	100%
	2. Undercut	Banks undercut/overhanging to the extent that mass wasting appears likely			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	3	3			100%			
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill	3	3			100%			
	2a. Piping	Structures lacking any substantial flow underneath sill 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	3	3			100%			

Table 5a. Visual Steam Morphology Stability Assessment
UT to Cane Creek Restoration Project: DMS Project ID No. 95729
Reach ID: Reach 5
Assessed Length (LF): 2,039

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			0	0	100%			
		2. Degradation			0	0%	100%			
	2. Riffle Condition	1. Texture Substrate	15	15			100%			
	3. Meander Pool Condition	1. Depth	19	19			100%			
		2. Length	19	19			100%			
	4. Thalweg Position	1. Thalweg centering at upstream of meander bend (Run)	19	19			100%			
		2. Thalweg centering at downstream of meander bend (Glide)	18	18			100%			
2. Bank	1. Scoured/Eroding	Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion			0	0	100%	0	0	100%
	2. Undercut	Banks undercut/overhanging to the extent that mass wasting appears likely			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	17	17			100%			
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill	17	17			100%			
	2a. Piping	Structures lacking any substantial flow underneath sill or arms	17	17			100%			
	3. Bank Position	Bank erosion within the structures extent of influence does not exceed 15%	17	17			100%			
	4. Habitat	Pool forming structures maintaining - Max Pool Depth	17	17			100%			

Table 5b. Stream Problem Areas (SPAs)
UT to Cane Creek Restoration Project: DMS Project ID No. 95729

Feature Issue	Station Number	Suspected Cause	Photo Number
None Observed	N/A	N/A	N/A

Table 6a. Vegetation Conditions Assessment
UT to Cane Creek Restoration Project: DMS Project ID No. 95729

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	**Yes**	0	0.04	0.3%
			Total	**0**	**0.00**	**0.3%**
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 ft²	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**	**Yes**	**1**	**0.06**	**3.8%**

Reach ID: Reach 3 and 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 ft²	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%

Reach ID: Reach 5

Planted Acreage: 5.0

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: 5.0

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 ft²	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%

Indicates a vegetation category issue which includes a descripiton and is quantified

Table 6b. Vegetation Problem Areas (VPAs) UT to Cane Creek Restoration Project: DMS Project ID No. 95729			
Feature Issue	**Station Number**	**Suspected Cause**	**Photo Number**
None Observed	N/A	N/A	N/A

Reach R5 – View upstream of culvert, Station 24+75

Reach R5 – View upstream towards crest gauge, Station 22+00

Reach R5 – View upstream, Station 20+00

Reach R5 – View upstream, Station 18+50

Reach R5 – View upstream, Station 17+00

Reach R5 – View upstream, Station 13+75

Reach R5 – View upstream, Station 12+00

Reach R5 – View upstream, Station 11+50

Reach R4 – View upstream, Station 26+00

Reach R4 – View downstream, Station 31+75

Reach R4 – View upstream, Station 32+50

Reach R4 – View downstream, stream crossing, Station 33+00

Reach R4 – View upstream, enhancement area, Station 37+50

Reach R4 – View upstream, enhancement area (Log J-Hook), Station 43+50

Reach R4 – View upstream, enhancement area, Station 48+50

Reach R4 – View upstream, stream crossing, Station 53+50

Reach R4 – View upstream, Station 55+50

Reach R4 – View upstream, Station 56+75

Reach R1 – View downstream, Station 20+00

Reach R1 – View downstream, Station 13+75

Reach R1 – View upstream, Station 12+25

Reach R1 – View downstream, Station 10+50

Reach R3 – Crest gauge location

Reach R3 – Crest gauge reading, 0.18 inches, on October 1, 2014 (bankfull event ~July 16, 2014)

Vegetation Plot 1 – December 2014

Vegetation Plot 2 – December 2014

Vegetation Plot 3 – December 2014

Vegetation Plot 4 – December 2014

Vegetation Plot 5 – March 2015

Vegetation Plot 6 – December 2014

Appendix C

Vegetation Plot Data

Table 7a. Vegetation Plot Criteria Attainment (December 2014)
UT to Cane Creek Restoration Project: DMS Project ID No. 95729

Plot ID	Vegetation Survival Threshold Met?	Total/As-built Planted Stem Count*	Tract Mean
1	Y	728/880	398
2	Y	405/680	
3	**N**	**121/640**	
4	Y	364/680	
5	**N**	**202/760**	
6	Y	567/520	

Notes:

***** Total/Planted Stem Count reflects the change in stem density based on the density of stems at the time of the As-Built Survey (Planted) and the current total density of planted stems (Total)

Bold - Indicates Survival Threshold was NOT met during the Year 1 growing season

Table 7b. Vegetation Plot Criteria Attainment (March 2015)
UT to Cane Creek Restoration Project: DMS Project ID No. 95729

Plot ID	Vegetation Survival Threshold Met?	Total/As-built Planted Stem Count*	Tract Mean
1	Y	728/880 (not-replanted)	796
2	Y	1012/680	
3	Y	648/640	
4	Y	688/680	
5	Y	728/760	
6	Y	971/520	

Notes:

***** Total/Planted Stem Count reflects the change in stem density based on the density of stems at the time of the As-Built Survey (Planted) and the current total density of planted stems (Total)

Table 8. CVS Vegetation Plot Metadata
UT to Cane Creek Restoration Project: DMS Project ID No. 95729

Report Prepared By	Dwayne Huneycutt
Date Prepared	1/20/2015 9:43
database name	cvs-DMS-entrytool-v2.3.1.mdb
database location	L:\Monitoring\Veg Plot Info\CVS Data Tool\St Clair_UTtoCaneCrk
computer name	CARYLDHUNEYCUTT
file size	36474880
DESCRIPTION OF WORKSHEETS IN THIS DOCUMENT----------	
Metadata	Description of database file, the report worksheets, and a summary of project(s) and project data.
Proj, planted	Each project is listed with its PLANTED stems per acre, for each year. This excludes live stakes.
Proj, total stems	Each project is listed with its TOTAL stems per acre, for each year. This includes live stakes, all planted stems, and all natural/volunteer stems.
Plots	List of plots surveyed with location and summary data (live stems, dead stems, missing, etc.).
Vigor	Frequency distribution of vigor classes for stems for all plots.
Vigor by Spp	Frequency distribution of vigor classes listed by species.
Damage	List of most frequent damage classes with number of occurrences and percent of total stems impacted by each.
Damage by Spp	Damage values tallied by type for each species.
Damage by Plot	Damage values tallied by type for each plot.
Planted Stems by Plot and Spp	A matrix of the count of PLANTED living stems of each species for each plot; dead and missing stems are excluded.
PROJECT SUMMARY----------	
Project Code	95729
project Name	UT to Cane Creek
Description	
River Basin	Cape Fear
length(ft)	
stream-to-edge width (ft)	
area (sq m)	
Required Plots (calculated)	
Sampled Plots	6

Table 9a. CVS Stem Count of Planted Stems by Plot and Species														
UT to Cane Creek Restoration Project: DMS Project ID No. 95729														
	Comment	Species	Species Type	Common Name	Total Planted Stems	# plots	Avg# stems	Plot 95729-01-0001	Plot 95729-01-0002	Plot 95729-01-0003	Plot 95729-01-0004	Plot 95729-01-0005	Plot 95729-01-0006	
		Betula nigra	Tree	river birch	13	3	4.33	7		1			5	
		Carpinus caroliniana	Shrub Tree	American hornbeam	5	4	1.25		1		1	1	2	
		Diospyros virginiana	Tree	common persimmon	1	1	1	1						
		Fraxinus pennsylvanica	Tree	green ash	15	4	3.75		8	2	1		4	
		Nyssa sylvatica	Tree	blackgum	4	2	2				3	1		
		Platanus occidentalis	Tree	American sycamore	7	1	7	7						
		Quercus laurifolia	Tree	laurel oak	3	2	1.5	1				2		
		Quercus michauxii	Tree	swamp chestnut oak	9	4	2.25	1			4	1	3	
		Quercus nigra	Tree	water oak	1	1	1	1						
		Unknown	n/a	n/a	1	1	1		1					
TOT:	**0**	**10**	**10**	**9**	**59**	**10**		**18**	**10**	**3**	**9**	**5**	**14**	

Table 9b. Stem Count for Each Species Arranged by Plot
UT to Cane Creek Restoration Project: DMS Project ID No. 95729

Botanical Name	Common Name	Plots						
		1	2	3	4	5	6	
Tree Species								
Betula nigra	river birch	7		1			5	
Fraxinus pennsylvanica	green ash		8	2	1	1	4	
Liriodendron tulipfera	tulip poplar							
Nyssa sylvatica	black gum				3	1		
Platanus occidentalis	American sycamore	7						
Quercus alba	white oak							
Quercus laurifolia	laurel oak	1				2		
Quercus michauxii	swamp chestnut oak	1			4	1	3	
Quercus nigra	water oak	1						Average Stems Per Acre
Quercus spp.	unknown oak							
Shrub Species								
Asimina triloba	paw paw							
Carpinus caroliniana	ironwood		1		1		2	
Diospyros virginiana	persimmon	1						
Hamamelis virginiana	witch hazel							
Itea virginica	Virginia sweetspire							
Lindera benzoin	spicebush							
Viburnum dentatum	arrowwood Viburnum							
Unknown	unknown		16	13	8	13	10	
Total Stems Per Plot for Year 1 (After re-planting Mar. 2015)		18	25	16	17	18	24	
Density Per Plot for Year 1 (After re-planting Mar. 2015)		**728**	**1012**	**648**	**688**	**728**	**971**	**796**
Total Stems/ Acre for Year 1 (Before re-planting Dec. 2014)		728	405	121	364	202	567	398
Total Stems/ Acre for Year 0 As-Built (Baseline Data)		880	680	640	680	760	520	693

Table 9c. CVS Density Per Plot

UT to Cane Creek Restoration Project: DMS Project ID No. 95729

			Current Plot Data (MY1 2014)																		Annual Means		
			95729-01-0001			95729-01-0002			95729-01-0003			95729-01-0004			95729-01-0005			95729-01-0006			MY1 (2014)		
Scientific Name	**Common Name**	**Species Type**	**PnoLS**	**P-all**	**T**	**PnoLS**	**P-all**	**T**	**PnoLS**	**P-all**	**T**	**PnoLS**	**P-all**	**T**	**PnoLS**	**P-all**	**T**	**PnoLS**	**P-all**	**T**	**PnoLS**	**P-all**	**T**
Betula nigra	river birch	Tree	7	7	7				1	1	1							5	5	5	13	13	13
Carpinus caroliniana	American hornbeam	Tree				1	1	1				1	1	1	1	1	1	2	2	2	5	5	5
Diospyros virginiana	common persimmon	Tree	1	1	1																1	1	1
Fraxinus pennsylvanica	green ash	Tree				8	8	8	2	2	2	1	1	1				4	4	4	15	15	15
Nyssa sylvatica	blackgum	Tree										3	3	3	1	1	1				4	4	4
Platanus occidentalis	American sycamore	Tree	7	7	7																7	7	7
Quercus laurifolia	laurel oak	Tree	1	1	1										2	2	2				3	3	3
Quercus michauxii	swamp chestnut oak	Tree	1	1	1							4	4	4	1	1	1	3	3	3	9	9	9
Quercus nigra	water oak	Tree	1	1	1																1	1	1
Unknown		Shrub or Tree				1	1	1													1	1	1
		Stem count	18	18	18	10	10	10	3	3	3	9	9	9	5	5	5	14	14	14	59	59	59
		size (ares)	1			1			1			1			1			1			6		
		size (ACRES)	0.02			0.02			0.02			0.02			0.02			0.02			0.15		
		Species count	6	6	6	3	3	3	2	2	2	4	4	4	4	4	4	4	4	4	10	10	10
		Stems per ACRE	728.434	728.434	728.434	404.686	404.686	404.686	121.406	121.406	121.406	364.217	364.217	364.217	202.343	202.343	202.343	566.56	566.56	566.56	397.941	397.941	397.941

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 9d. Vegetation Summary and Totals
UT to Cane Creek Restoration Project: DMS Project ID No. 95729

UT to Cane Creek Restoration Project: DMS Project ID No. 95729
Year 1 (Dec-2015)

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	18	0	0	0	**18**	0
2	n/a	9	0	0	0	**10**	0
3	n/a	3	0	0	0	**3**	0
4	n/a	9	0	0	0	**9**	0
5	n/a	5	0	0	0	**5**	0
6	n/a	14	0	0	0	**14**	0

Wetland/Stream Vegetation Totals
(per acre)

Plot #	Stream/ Wetland Stems[2]	Volunteers[3]	Total[4]	Success Criteria Met?
1	728	0	728	Yes
2	364	0	405	Yes
3	121	0	121	No
4	364	0	364	No
5	202	0	202	No
6	567	0	567	Yes
Project Average	**553**	**0**	**398**	**Yes**

Riparian Buffer Vegetation Totals
(per acre)

Plot #	Riparian Buffer Stems[1]	Success Criteria Met?
1	n/a	
2	n/a	
3	n/a	
4	n/a	
5	n/a	
6	n/a	
Project Average	**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.

Appendix D

Stream Survey Data

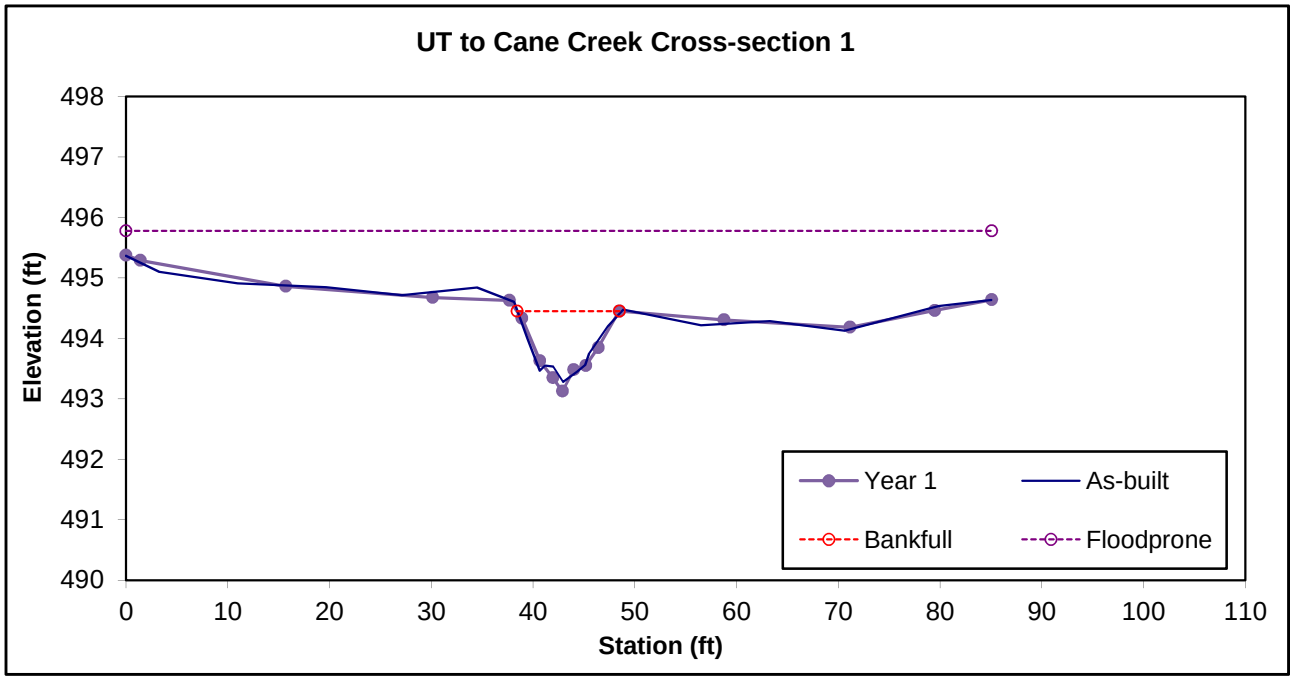
Permanent Cross-section 1

(Year 1 Data - Collected December 2014/January 2015)

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	Cc	7.2	10.06	0.71	1.33	14.15	1	8.5	494.45	494.45



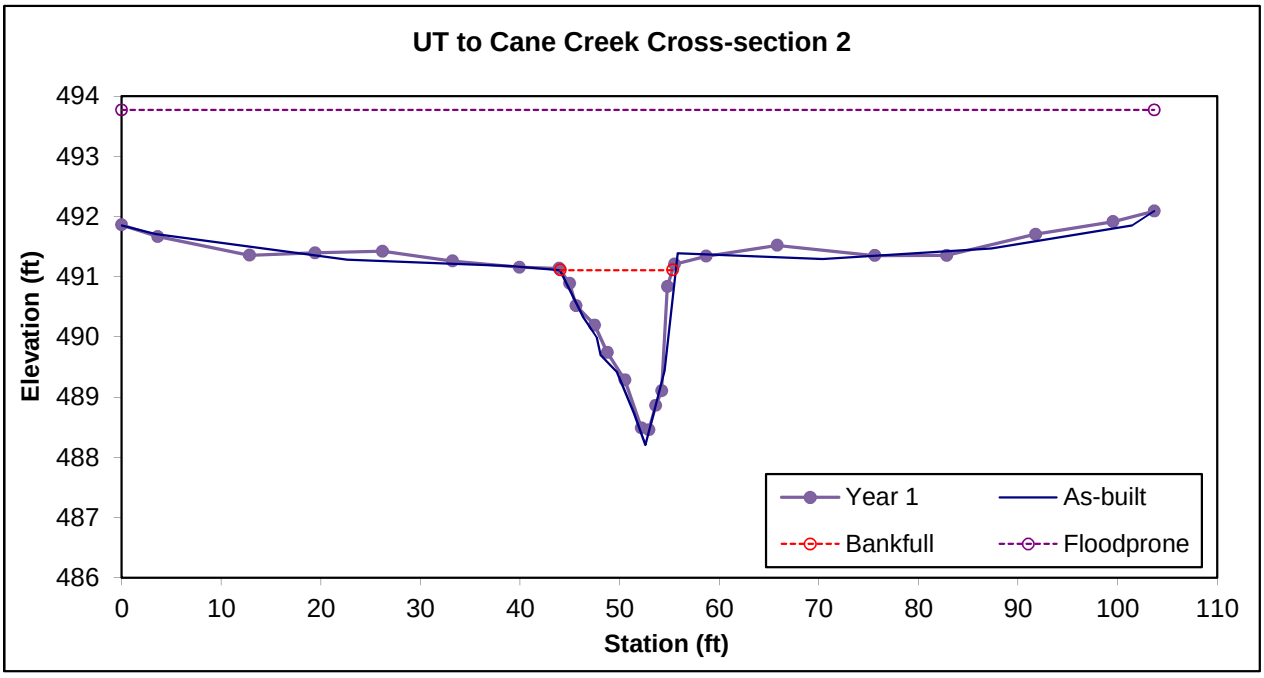
Permanent Cross-section 2

(Year 1 Data - Collected December 2014/January 2015)

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		15.4	11.28	1.37	2.66	8.26	1	9.2	491.11	491.14



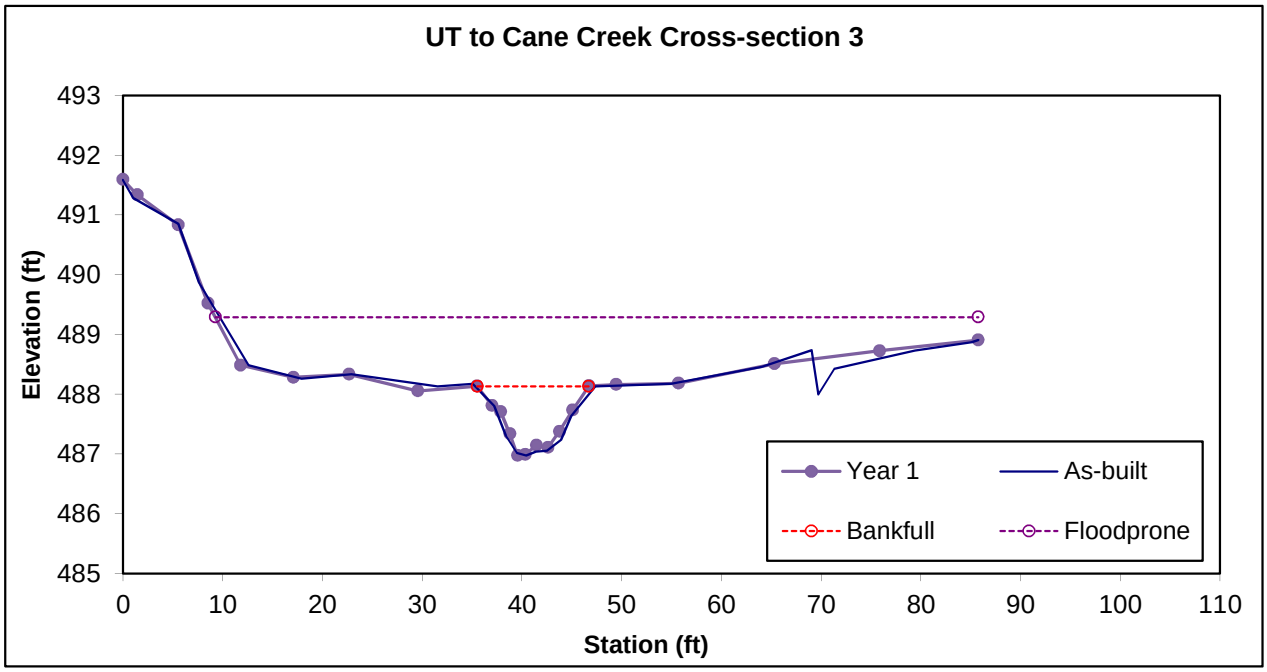
Permanent Cross-section 3

(Year 1 Data - Collected December 2014/January 2015)

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	Cc	7.2	11.16	0.65	1.16	17.28	1	6.9	488.13	488.14



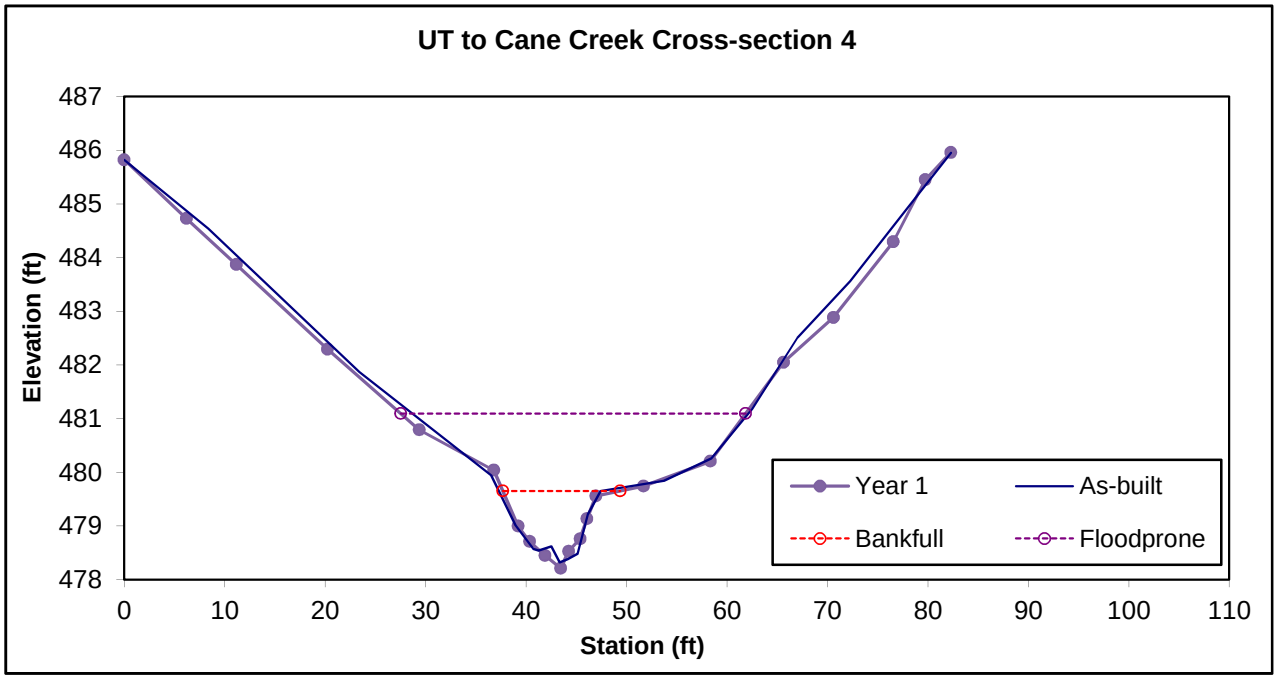
Permanent Cross-section 4

(Year 1 Data - Collected December 2014/January 2015)

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	Cc	8.1	11.66	0.7	1.44	16.71	0.9	2.9	479.65	479.56



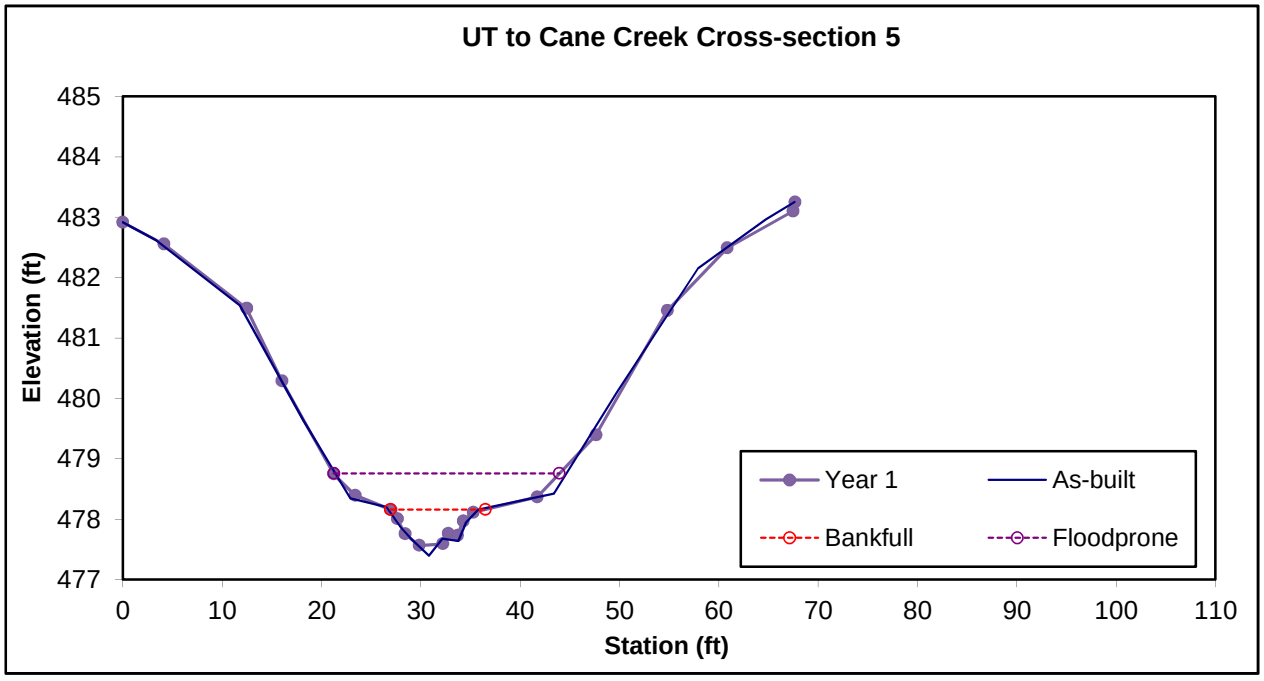
Permanent Cross-section 5

(Year 1 Data - Collected December 2014/January 2015)

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	Cc	3.3	9.55	0.35	0.6	27.31	0.9	2.4	478.16	478.11



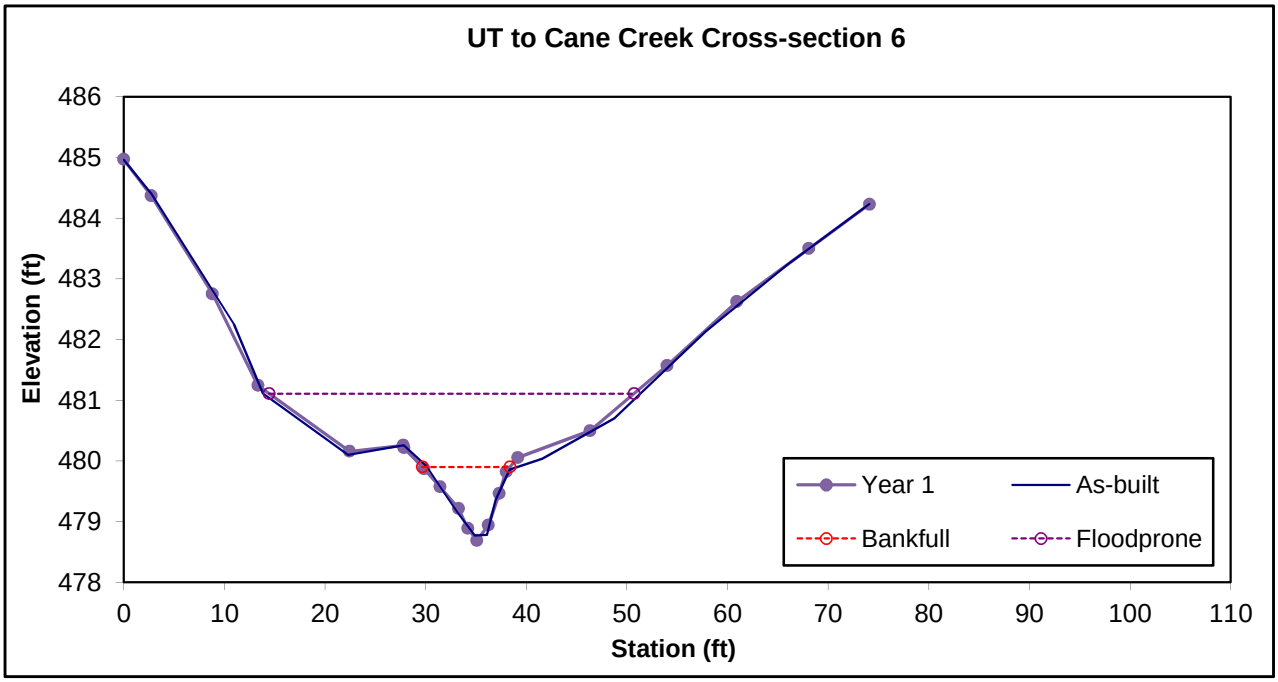
Permanent Cross-section 6

(Year 1 Data - Collected December 2014/January 2015)

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		5.2	8.71	0.59	1.21	14.68	1.1	4.2	479.9	480.06



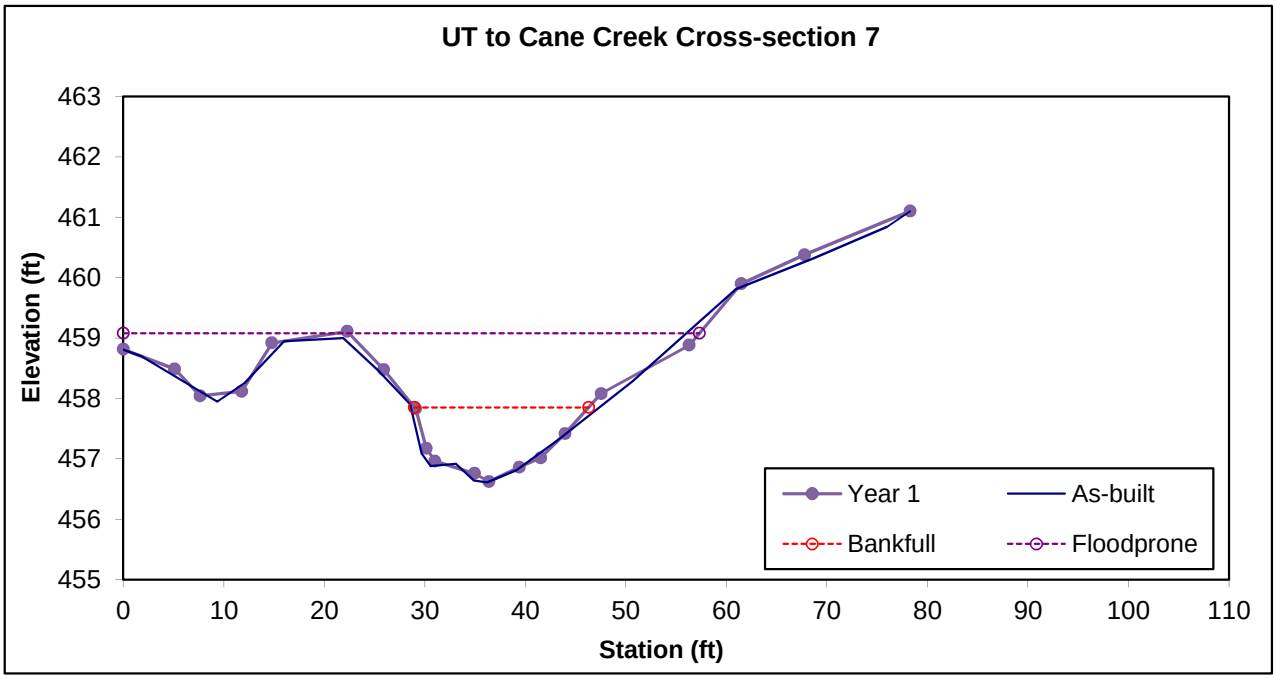
Permanent Cross-section 7

(Year 1 Data - Collected December 2014/January 2015)

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	Bc	14	17.33	0.81	1.23	21.52	2	2	457.85	459.11



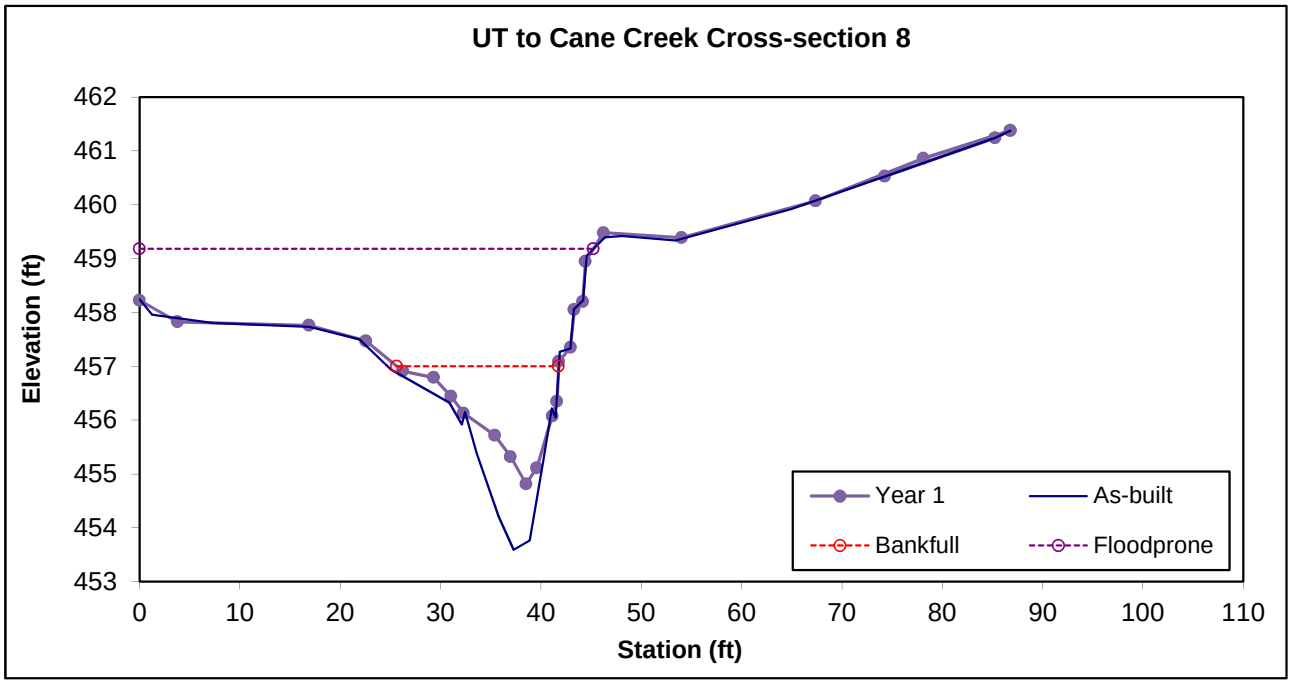
Permanent Cross-section 8

(Year 1 Data - Collected December 2014/January 2015)

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		15.5	16.13	0.96	2.18	16.8	1.2	2.8	457	457.47



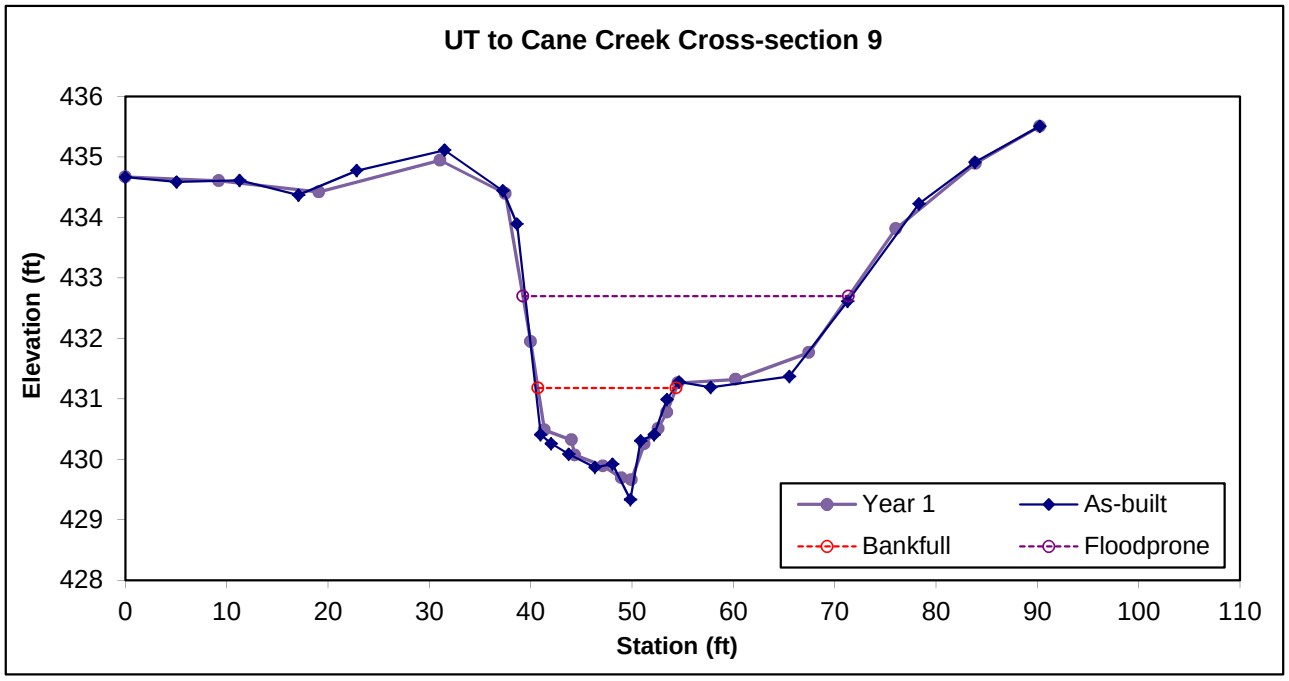
Permanent Cross-section 9

(Year 1 Data - Collected December 2014/January 2015)

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	Cc	13.3	13.66	0.97	1.52	14.07	1.1	2.4	431.18	431.27



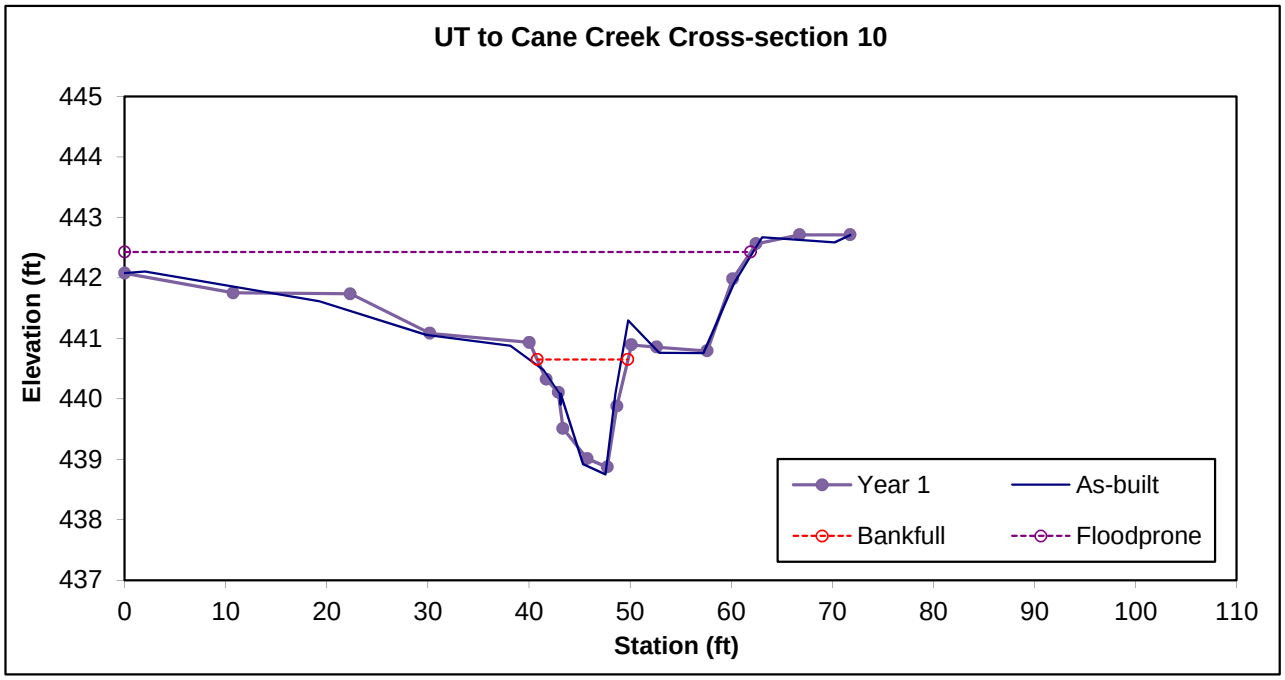
Permanent Cross-section 10

(Year 1 Data - Collected December 2014/January 2015)

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		9.4	8.98	1.05	1.78	8.57	1.1	6.9	440.65	440.89



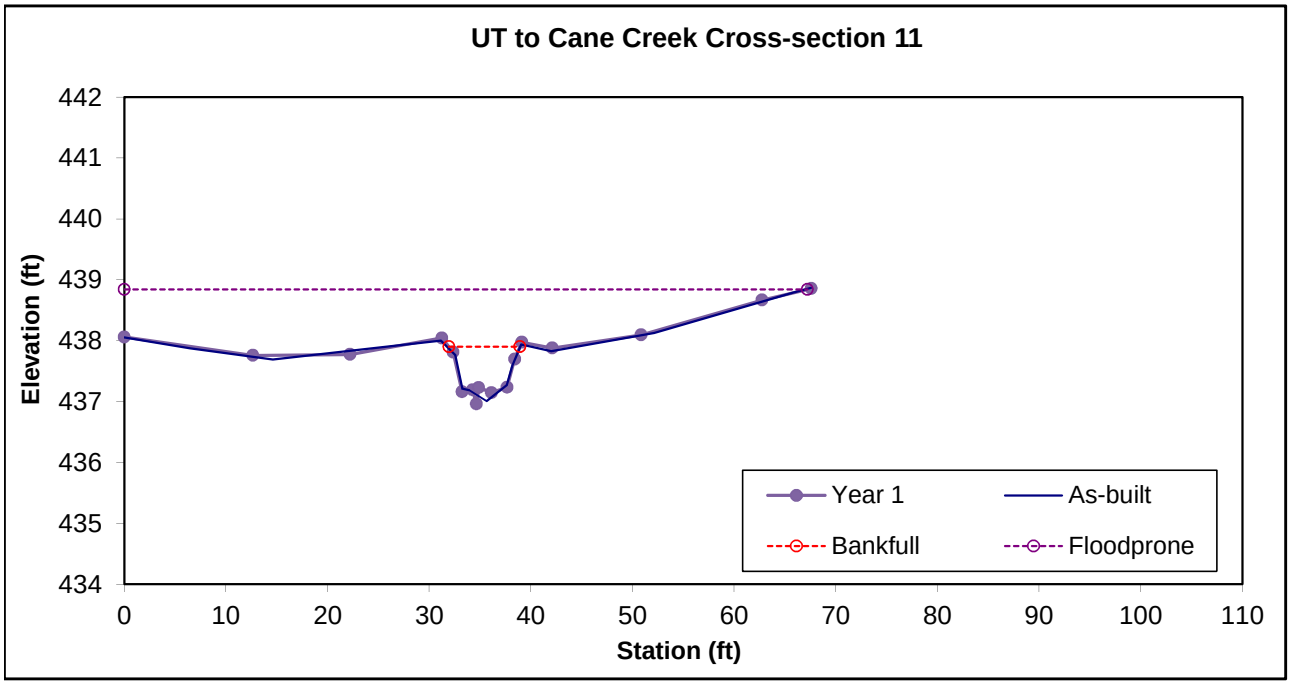
Permanent Cross-section 11

(Year 1 Data - Collected December 2014/January 2015)

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	Cc	4	6.98	0.57	0.94	12.26	1.1	9.6	437.9	437.98



Permanent Cross-section 12

(Year 1 Data - Collected December 2014/January 2015)

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	Cc	4	7.08	0.56	0.82	12.62	1.1	12.1	434.5	434.55

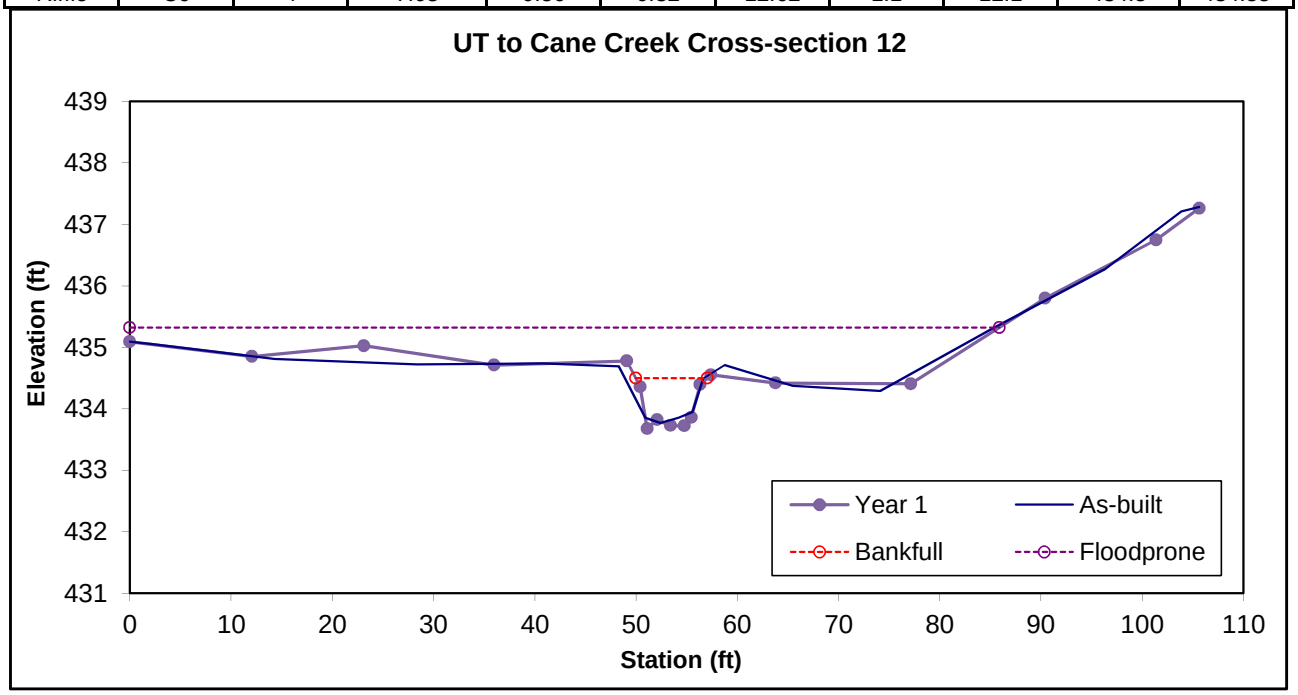


Table 10. Baseline Stream Summary
UT to Cane Creek Restoration Project: DMS Project ID No. 95729
Reach 1 (1,045 LF)

Parameter	USGS Gauge	Regional Curve Interval (Harman et al, 1999)*			Pre-Existing Condition[1]						Reference Reach(es) Data												Design						As-built					
											UT to Wells Creek						UT to Varnals Creek																	
		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	Min	Mean	Med	Max	SD	n
Dimension and Substrate - Riffle																																		
BF Width (ft)	-----	23.0	80.0	4.9	5.6	-----	-----	7.3	-----	-----	-----	8	-----	-----	-----	-----	-----	9.7	-----	-----	-----	-----	-----	6.9	-----	-----	-----	-----	7.2	-----	-----	9.1	-----	-----
Floodprone Width (ft)	-----	-----	-----	-----	6.8	-----	-----	>30	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	>20	-----	-----	-----	-----	65.6	-----	-----	84.4	-----	-----
BF Mean Depth (ft)	-----	2.3	5.8	0.8	0.7	-----	-----	0.9	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	0.5	-----	-----	-----	-----	0.5	-----	-----	1.0	-----	-----
BF Max Depth (ft)	-----	-----	-----	-----	1.1	-----	-----	1.2	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	0.7	-----	-----	-----	-----	0.7	-----	-----	1.9	-----	-----
BF Cross-sectional Area (ft²)	-----	80.0	300.0	5.2	5.1	-----	-----	5.2	-----	-----	-----	5.3	-----	-----	-----	-----	-----	7.9	-----	-----	-----	-----	-----	3.7	-----	-----	-----	-----	4.0	-----	-----	8.7	-----	-----
Width/Depth Ratio	-----	-----	-----	-----	6.1	-----	-----	10.5	-----	-----	7	-----	-----	26	-----	-----	8	-----	-----	18	-----	-----	-----	13.0	-----	-----	-----	-----	9.6	-----	-----	15.2	-----	-----
Entrenchment Ratio	-----	-----	-----	-----	1.2	-----	-----	9.5	-----	-----	2.0	-----	-----	3.4	-----	-----	1.9	-----	-----	3.9	-----	-----	-----	>2.2	-----	-----	-----	-----	6.9	-----	-----	10.8	-----	-----
Bank Height Ratio	-----	-----	-----	-----	1.6	-----	-----	4.3	-----	-----	1.4	-----	-----	2.5	-----	-----	1.1	-----	-----	1.5	-----	-----	-----	1.0	-----	-----	-----	-----	1.0	-----	-----	1.3	-----	-----
d50 (mm)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Pattern																																		
Channel Beltwidth (ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	25.0	-----	-----	45.0	-----	-----	-----	-----	-----	-----	-----	-----
Radius of Curvature (ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	14.0	-----	-----	21.0	-----	-----	-----	-----	-----	-----	-----	-----
Rc:Bankfull width (ft/ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	0.3	-----	-----	4.0	-----	-----	0.8	-----	-----	2.3	-----	-----	2.0	-----	-----	3.0	-----	-----	-----	-----	-----	-----	-----	-----
Meander Wavelength (ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	4.4	-----	-----	8.8	-----	-----	4.9	-----	-----	6.9	-----	-----	50.0	-----	-----	80.0	-----	-----	-----	-----	-----	-----	-----	-----
Meander Width Ratio	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	1.3	-----	-----	4.4	-----	-----	1.2	-----	-----	1.8	-----	-----	3.6	-----	-----	6.5	-----	-----	-----	-----	-----	-----	-----	-----
Profile																																		
Riffle Length (ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Riffle Slope (ft/ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Pool Length (ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Pool Spacing (ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	2.1	-----	-----	7.9	-----	-----	2.9	-----	-----	5.0	-----	-----	28.0	-----	-----	42.0	-----	-----	-----	-----	-----	-----	-----	-----
Pool Max Depth (ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	2.3	-----	-----	2.7	-----	-----	1.6	-----	-----	2.3	-----	-----	-----	1.5	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Pool Volume (ft^3)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Substrate and Transport Parameters																																		
Ri% / Ru% / P% / G% / S%	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	----
SC% / Sa% / G% / B% / Be%	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	----
d16 / d35 / d50 / d84 / d95	-----	-----	-----	-----										0.1 / 0.6/ 4.5 / 53 / 96										0.2 / 2.5/ 8 / 92 / 1,536												
Reach Shear Stress (competency) lb/f²	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Max part size (mm) mobilized at bankfull (Rosgen Curve	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Stream Power (transport capacity) W/m²	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Additional Reach Parameters																																		
Drainage Area (SM)	-----	-----	-----	-----	-----	-----	-----	0.125	-----	-----	-----	-----	-----	0.13	-----	-----	-----	-----	-----	0.24	-----	-----	-----	-----	-----	0.125	-----	-----	-----	-----	-----	0.125	-----	-----
Impervious cover estimate (%)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Rosgen Classification	-----	-----	-----	-----	G5c		-----	E5	-----	-----	-----	-----	-----	C4/1	-----	-----	-----	-----	-----	B4/1a	-----	-----	-----	E4/C4	-----	-----	-----	-----	-----	E4/C4	-----	-----	-----	-----
BF Velocity (fps)	-----	-----	-----	-----	0.8	-----	-----	1.2	-----	-----	-----	-----	-----	5.3	-----	-----	-----	-----	-----	-----	-----	-----	-----	3.5	-----	-----	-----	-----	-----	3.5	-----	-----	-----	-----
BF Discharge (cfs)	-----	290.0	2000.0	19.8	-----	-----	-----	19.8	-----	-----	-----	-----	-----	25.2	-----	-----	-----	-----	-----	46.6	-----	-----	-----	13	-----	-----	-----	-----	-----	13	-----	-----	-----	-----
Valley Length	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	859.4	-----	-----	-----	-----
Channel length (ft)	-----	-----	-----	-----	-----	-----	-----	943	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	1044.9	-----	-----	-----	-----
Sinuosity	-----	-----	-----	-----	-----	-----	-----	1.09	-----	-----	-----	-----	-----	1.40	-----	-----	-----	-----	-----	1.20	-----	-----	-----	1.20	-----	-----	-----	-----	-----	1.2	-----	-----	-----	-----
Water Surface Slope (Channel) (ft/ft)	-----	-----	-----	-----	-----	-----	-----	0.0127	-----	-----	-----	-----	-----	0.0197	-----	-----	-----	-----	-----	0.0405	-----	-----	-----	0.012	-----	-----	-----	-----	-----	0.0123	-----	-----	-----	-----
BF slope (ft/ft)	-----	-----	-----	-----	-----	-----	-----	0.0135	-----	-----	-----	-----	-----	0.028	-----	-----	-----	-----	-----	0.0458	-----	-----	-----	0.015	-----	-----	-----	-----	-----	0.0150	-----	-----	-----	-----
Bankfull Floodplain Area (acres)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
BEHI VL% / L% / M% / H% / VH% / E%	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Channel Stability or Habitat Metric	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Biological or Other	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

* Harman, W.A., G.D. Jennings, J.M. Patterson, D.R. Clinton, L.O. Slate, A.G. Jessup, J.R. Everhart, and R.E. Smith. 1999. Bankfull hydraulic geometry relationships for North Carolina streams. Wildland Hydrology. AWRA Symposium Proceedings. D.S. Olsen and J.P. Potyondy, eds. American Water Resources Association. June 30-July 2, 1999. Bozeman, MT.

Table 10. Baseline Stream Summary (continued)
UT to Cane Creek Restoration Project: DMS Project ID No. 95729
Reach 3 (398 LF)

Parameter	USGS Gauge	Regional Curve Interval (Harman et al, 1999)*			Pre-Existing Condition[1]						Reference Reach(es) Data												Design						As-built					
											UT to Wells Creek						UT to Varnals Creek																	
		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	Min	Mean	Med	Max	SD	n
Dimension and Substrate - Riffle																																		
BF Width (ft)	-----	23.0	80.0	5.1	-----	-----	-----	7.6	-----	-----	-----	8	-----	-----	-----	-----	-----	9.7	-----	-----	-----	-----	-----	7.2	-----	-----	-----	-----	8.9	-----	-----	9.0	-----	-----
Floodprone Width (ft)	-----	-----	-----	-----	-----	-----	-----	>16.3	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	12	-----	-----	20.0	-----	-----	24.4	-----	-----	36.3	-----	-----
BF Mean Depth (ft)	-----	2.3	5.8	0.8	-----	-----	-----	0.8	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	0.6	-----	-----	-----	-----	0.4	-----	-----	0.6	-----	-----
BF Max Depth (ft)	-----	-----	-----	-----	-----	-----	-----	1.2	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	0.7	-----	-----	-----	-----	0.8	-----	-----	1.1	-----	-----
BF Cross-sectional Area (ft²)	-----	80.0	300.0	5.7	-----	-----	-----	5.6	-----	-----	-----	5.3	-----	-----	-----	-----	-----	7.9	-----	-----	-----	-----	-----	4.0	-----	-----	-----	-----	3.7	-----	-----	5.3	-----	-----
Width/Depth Ratio	-----	-----	-----	-----	-----	-----	-----	9.9	-----	-----	7	-----	-----	26	-----	-----	8	-----	-----	18	-----	-----	-----	13.0	-----	-----	-----	-----	15.3	-----	-----	21.7	-----	-----
Entrenchment Ratio	-----	-----	-----	-----	-----	-----	-----	2.2	-----	-----	2.0	-----	-----	3.4	-----	-----	1.9	-----	-----	3.9	-----	-----	1.8	-----	-----	2.2	-----	-----	2.7	-----	-----	4.0	-----	-----
Bank Height Ratio	-----	-----	-----	-----	-----	-----	-----	1.5	-----	-----	1.4	-----	-----	2.5	-----	-----	1.1	-----	-----	1.5	-----	-----	-----	1.0	-----	-----	-----	-----	1.0	-----	-----	1.0	-----	-----
d50 (mm)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Pattern																																		
Channel Beltwidth (ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Radius of Curvature (ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Rc:Bankfull width (ft/ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	0.3	-----	-----	4.0	-----	-----	0.8	-----	-----	2.3	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Meander Wavelength (ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	4.4	-----	-----	8.8	-----	-----	4.9	-----	-----	6.9	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Meander Width Ratio	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	1.3	-----	-----	4.4	-----	-----	1.2	-----	-----	1.8	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Profile																																		
Riffle Length (ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Riffle Slope (ft/ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Pool Length (ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Pool Spacing (ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	2.1	-----	-----	7.9	-----	-----	2.9	-----	-----	5.0	-----	-----	11	-----	-----	36	-----	-----	-----	-----	-----	-----	-----	-----
Pool Max Depth (ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	2.3	-----	-----	2.7	-----	-----	1.6	-----	-----	2.3	-----	-----	1.5	-----	-----	1.5	-----	-----	-----	-----	-----	-----	-----	-----
Pool Volume (ft^3)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Substrate and Transport Parameters																																		
Ri% / Ru% / P% / G% / S%	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	----
SC% / Sa% / G% / B% / Be%	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	----
d16 / d35 / d50 / d84 / d95	-----	-----	-----	-----										0.1 / 0.6/ 4.5 / 53 / 96										0.2 / 2.5/ 8 / 92 / 1,536			-----	-----	-----	-----	-----	-----	-----	-----	-----	----
Reach Shear Stress (competency) lb/f²	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Max part size (mm) mobilized at bankfull (Rosgen Curve)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Stream Power (transport capacity) W/m²	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Additional Reach Parameters																																		
Drainage Area (SM)	-----	-----	-----	-----	-----	-----	-----	0.1	-----	-----	-----	-----	-----	0.13	-----	-----	-----	-----	-----	0.24	-----	-----	-----	0.1	-----	-----	-----	-----	-----	0.1	-----	-----	-----	-----
Impervious cover estimate (%)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Rosgen Classification	-----	-----	-----	-----	-----	-----	-----	B4c	-----	-----	-----	-----	-----	C4/1	-----	-----	-----	-----	-----	B4/1a	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
BF Velocity (fps)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	5.3	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
BF Discharge (cfs)	-----	290.0	2000.0	21.7	-----	-----	-----	21.7	-----	-----	-----	-----	-----	25.2	-----	-----	-----	-----	-----	46.6	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Valley Length	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	356.8	-----	-----	-----	-----
Channel length (ft)	-----	-----	-----	-----	-----	-----	-----	425	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	389.1	-----	-----	-----	-----
Sinuosity	-----	-----	-----	-----	-----	-----	-----	1.16	-----	-----	-----	-----	-----	1.40	-----	-----	-----	-----	-----	1.20	-----	-----	-----	1.18	-----	-----	-----	-----	-----	1.1	-----	-----	-----	-----
Water Surface Slope (Channel) (ft/ft)	-----	-----	-----	-----	-----	-----	-----	0.0195	-----	-----	-----	-----	-----	0.0197	-----	-----	-----	-----	-----	0.0405	-----	-----	-----	0.016	-----	-----	-----	-----	-----	0.0172	-----	-----	-----	-----
BF slope (ft/ft)	-----	-----	-----	-----	-----	-----	-----	0.0168	-----	-----	-----	-----	-----	0.028	-----	-----	-----	-----	-----	0.0458	-----	-----	-----	0.018	-----	-----	-----	-----	-----	0.0187	-----	-----	-----	-----
Bankfull Floodplain Area (acres)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
BEHI VL% / L% / M% / H% / VH% / E%	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Channel Stability or Habitat Metric	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Biological or Other	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

* Harman, W.A., G.D. Jennings, J.M. Patterson, D.R. Clinton, L.O. Slate, A.G. Jessup, J.R. Everhart, and R.E. Smith. 1999. Bankfull hydraulic geometry relationships for North Carolina streams. Wildland Hydrology. AWRA Symposium Proceedings. D.S. Olsen and J.P. Potyondy, eds. American Water Resources Association. June 30-July 2, 1999. Bozeman, MT.

Table 10. Baseline Stream Summary (continued)
UT to Cane Creek Restoration Project: DMS Project ID No. 95729
Reach 4 (2,333 LF)

Parameter	USGS Gauge	Regional Curve Interval (Harman et al, 1999)*			Pre-Existing Condition[1]						Reference Reach(es) Data												Design						As-built					
											UT to Wells Creek						UT to Varnals Creek																	
		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	Min	Mean	Med	Max	SD	n
Dimension and Substrate - Riffle																																		
BF Width (ft)	-----	23.0	80.0	10.2	15.4	-----	-----	16.7	-----	-----	-----	8	-----	-----	-----	-----	-----	9.7	-----	-----	-----	-----	-----	14.0	-----	-----	-----	-----	10.1	-----	-----	13.8	-----	-----
Floodprone Width (ft)	-----	-----	-----	-----	18.4	-----	-----	26.2	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	>30	-----	-----	-----	-----	80.1	-----	-----	105.0	-----	-----
BF Mean Depth (ft)	-----	2.3	5.8	1.3	0.9	-----	-----	1.0	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	1.0	-----	-----	-----	-----	0.6	-----	-----	1.2	-----	-----
BF Max Depth (ft)	-----	-----	-----	-----	1.3	-----	-----	1.6	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	1.2	-----	-----	-----	-----	1.1	-----	-----	2.0	-----	-----
BF Cross-sectional Area (ft^2)	-----	80.0	300.0	16.9	14.8	-----	-----	15.5	-----	-----	-----	5.3	-----	-----	-----	-----	-----	7.9	-----	-----	-----	-----	-----	14.0	-----	-----	-----	-----	7.5	-----	-----	12.3	-----	-----
Width/Depth Ratio	-----	-----	-----	-----	15.4	-----	-----	19.0	-----	-----	7	-----	-----	26	-----	-----	8	-----	-----	18	-----	-----	-----	14.0	-----	-----	-----	-----	8.3	-----	-----	19.4	-----	-----
Entrenchment Ratio	-----	-----	-----	-----	1.2	-----	-----	1.6	-----	-----	2.0	-----	-----	3.4	-----	-----	1.9	-----	-----	3.9	-----	-----	-----	>2.2	-----	-----	-----	-----	7.9	-----	-----	9.4	-----	-----
Bank Height Ratio	-----	-----	-----	-----	1.3	-----	-----	2.8	-----	-----	1.4	-----	-----	2.5	-----	-----	1.1	-----	-----	1.5	-----	-----	-----	1.0	-----	-----	-----	-----	1.0	-----	-----	1.1	-----	-----
d50 (mm)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Pattern																																		
Channel Beltwidth (ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	38.0	79.0	-----	120.0	-----	-----
Radius of Curvature (ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	21.0	26.0	-----	31.0	-----	-----
Rc:Bankfull width (ft/ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	0.3	-----	-----	4.0	-----	-----	0.8	-----	-----	2.3	-----	-----	-----	-----	-----	-----	-----	-----	38.0	79.0	-----	120.0	-----	-----
Meander Wavelength (ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	4.4	-----	-----	8.8	-----	-----	4.9	-----	-----	6.9	-----	-----	-----	-----	-----	-----	-----	-----	72.0	104.0	-----	124.0	-----	-----
Meander Width Ratio	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	1.3	-----	-----	4.4	-----	-----	1.2	-----	-----	1.8	-----	-----	-----	-----	-----	-----	-----	-----	3.5	6.0	-----	8.0	-----	-----
Profile																																		
Riffle Length (ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Riffle Slope (ft/ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	0.0046	0.0043	-----	0.0039	-----	-----
Pool Length (ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Pool Spacing (ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	2.1	-----	-----	7.9	-----	-----	2.9	-----	-----	5.0	-----	-----	42	-----	-----	84	-----	-----	41	-----	72	57	-----	-----
Pool Max Depth (ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	2.3	-----	-----	2.7	-----	-----	1.6	-----	-----	2.3	-----	-----	-----	2.2	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Pool Volume (ft^3)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Substrate and Transport Parameters																																		
Ri% / Ru% / P% / G% / S%	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	----
SC% / Sa% / G% / B% / Be%	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	----
d16 / d35 / d50 / d84 / d95	-----	-----	-----	-----				24.2 / 50.6 / 69.4 / 50.6 / 24.2						0.1 / 0.6 / 4.5 / 53 / 96						0.2 / 2.5 / 8 / 92 / 1,536					-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	----
Reach Shear Stress (competency) lb/f	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Max part size (mm) mobilized at bankfull (Rosgen Curve	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Stream Power (transport capacity) W/m^2	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Additional Reach Parameters																																		
Drainage Area (SM)	-----	-----	-----	-----	-----	-----	-----	0.7	-----	-----	-----	-----	-----	0.13	-----	-----	-----	-----	-----	0.24	-----	-----	-----	-----	-----	0.7	-----	-----	-----	-----	-----	0.7	-----	-----
Impervious cover estimate (%	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Rosgen Classification	-----	-----	-----	-----	B3c	-----	-----	F5	-----	-----	-----	-----	-----	C4/1	-----	-----	-----	-----	-----	B4/1a	-----	-----	-----	B3c	-----	-----	-----	-----	-----	B3c	-----	-----	-----	-----
BF Velocity (fps)	-----	-----	-----	-----	4.4	-----	-----	4.6	-----	-----	-----	-----	-----	5.3	-----	-----	-----	-----	-----	-----	-----	-----	-----	4.0	-----	-----	-----	-----	-----	3.0	-----	-----	-----	-----
BF Discharge (cfs)	-----	290.0	2000.0	69.2	-----	-----	-----	69.2	-----	-----	-----	-----	-----	25.2	-----	-----	-----	-----	-----	46.6	-----	-----	-----	56.0	-----	-----	-----	-----	-----	56.0	-----	-----	-----	-----
Valley Length	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	349	-----	-----	-----	-----
Channel length (ft)	-----	-----	-----	-----	-----	-----	-----	2,783	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	386	-----	-----	-----	-----
Sinuosity	-----	-----	-----	-----	-----	-----	-----	1.04	-----	-----	-----	-----	-----	1.40	-----	-----	-----	-----	-----	1.20	-----	-----	-----	-----	-----	-----	-----	-----	-----	1.10	-----	-----	-----	-----
Water Surface Slope (Channel) (ft/ft)	-----	-----	-----	-----	-----	-----	-----	0.0169	-----	-----	-----	-----	-----	0.0197	-----	-----	-----	-----	-----	0.0405	-----	-----	-----	0.015	-----	-----	-----	-----	-----	0.0074	-----	-----	-----	-----
BF slope (ft/ft)	-----	-----	-----	-----	-----	-----	-----	0.0148	-----	-----	-----	-----	-----	0.028	-----	-----	-----	-----	-----	0.0458	-----	-----	-----	0.017	-----	-----	-----	-----	-----	0.0082	-----	-----	-----	-----
Bankfull Floodplain Area (acres)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
BEHI VL% / L% / M% / H% / VH% / E%	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Channel Stability or Habitat Metric	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Biological or Other	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

* Harman, W.A., G.D. Jennings, J.M. Patterson, D.R. Clinton, L.O. Slate, A.G. Jessup, J.R. Everhart, and R.E. Smith. 1999. Bankfull hydraulic geometry relationships for North Carolina streams. Wildland Hydrology. AWRA Symposium Proceedings. D.S. Olsen and J.P. Potyondy, eds. American Water Resources Association. June 30-July 2, 1999. Bozeman, MT.

Table 10. Baseline Stream Summary (continued)
UT to Cane Creek Restoration Project: DMS Project ID No. 95729
Reach 5 (1,461 LF)

Parameter	USGS Gauge	Regional Curve Interval (Harman et al, 1999)*			Pre-Existing Condition[1]						Reference Reach(es) Data												Design						As-built					
											UT to Wells Creek						UT to Varnals Creek																	
		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	Min	Mean	Med	Max	SD	n
Dimension and Substrate - Riffle																																		
BF Width (ft)	-----	23.0	80.0	8.4	-----	-----	-----	8.9	-----	-----	-----	8	-----	-----	-----	-----	-----	9.7	-----	-----	-----	-----	-----	10.8	-----	-----	-----	-----	10.2	-----	-----	12.0	-----	-----
Floodprone Width (ft)	-----	-----	-----	-----	-----	-----	-----	11.8	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	>25	-----	-----	-----	-----	76.0	-----	-----	103.7	-----	-----
BF Mean Depth (ft)	-----	2.3	5.8	1.2	-----	-----	-----	1.2	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	0.8	-----	-----	-----	-----	0.7	-----	-----	1.4	-----	-----
BF Max Depth (ft)	-----	-----	-----	-----	-----	-----	-----	1.5	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	1.1	-----	-----	-----	-----	1.2	-----	-----	2.8	-----	-----
BF Cross-sectional Area (ft²)	-----	80.0	300.0	12.5	-----	-----	-----	10.9	-----	-----	-----	5.3	-----	-----	-----	-----	-----	7.9	-----	-----	-----	-----	-----	9.0	-----	-----	-----	-----	7.1	-----	-----	15.8	-----	-----
Width/Depth Ratio	-----	-----	-----	-----	-----	-----	-----	7.2	-----	-----	7	-----	-----	26	-----	-----	8	-----	-----	18	-----	-----	-----	13.0	-----	-----	-----	-----	8.0	-----	-----	17.8	-----	-----
Entrenchment Ratio	-----	-----	-----	-----	-----	-----	-----	1.3	-----	-----	2.0	-----	-----	3.4	-----	-----	1.9	-----	-----	3.9	-----	-----	-----	>2.2	-----	-----	-----	-----	3.2	-----	-----	9.2	-----	-----
Bank Height Ratio	-----	-----	-----	-----	-----	-----	-----	2.6	-----	-----	1.4	-----	-----	2.5	-----	-----	1.1	-----	-----	1.5	-----	-----	-----	1.0	-----	-----	-----	-----	1.0	-----	-----	1.0	-----	-----
d50 (mm)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Pattern																																		
Channel Beltwidth (ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Radius of Curvature (ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Rc:Bankfull width (ft/ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	0.3	-----	-----	4.0	-----	-----	0.8	-----	-----	2.3	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Meander Wavelength (ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	4.4	-----	-----	8.8	-----	-----	4.9	-----	-----	6.9	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Meander Width Ratio	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	1.3	-----	-----	4.4	-----	-----	1.2	-----	-----	1.8	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Profile																																		
Riffle Length (ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Riffle Slope (ft/ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Pool Length (ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Pool Spacing (ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	2.1	-----	-----	7.9	-----	-----	2.9	-----	-----	5.0	-----	-----	32.0	-----	65.0	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Pool Max Depth (ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	2.3	-----	-----	2.7	-----	-----	1.6	-----	-----	2.3	-----	-----	-----	2.0	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Pool Volume (ft^3)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Substrate and Transport Parameters																																		
Ri% / Ru% / P% / G% / S%	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	----
SC% / Sa% / G% / B% / Be%	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	----
d16 / d35 / d50 / d84 / d95	-----	-----	-----	-----				16.6/31.2/47.0/85.3/116.1						0.1 / 0.6/ 4.5 / 53 / 96						0.2 / 2.5/ 8 / 92 / 1,536					-----	-----	-----	-----	-----	-----				6.74 / 20.49 / 29.79 / 63.73 / 118.25		
Reach Shear Stress (competency) lb/f²	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Max part size (mm) mobilized at bankfull (Rosgen Curve)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Stream Power (transport capacity) W/m²	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Additional Reach Parameters																																		
Drainage Area (SM)	-----	-----	-----	-----	-----	-----	-----	0.5	-----	-----	-----	-----	-----	0.13	-----	-----	-----	-----	-----	0.24	-----	-----	-----	-----	-----	0.5	-----	-----	-----	-----	-----	0.5	-----	-----
Impervious cover estimate (%)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Rosgen Classification	-----	-----	-----	-----	-----	-----	-----	G4	-----	-----	-----	-----	-----	C4/1	-----	-----	-----	-----	-----	B4/1a	-----	-----	-----	B4c	-----	-----	-----	-----	-----	B4c	-----	-----	-----	-----
BF Velocity (fps)	-----	-----	-----	-----	-----	-----	-----	4.5	-----	-----	-----	-----	-----	5.3	-----	-----	-----	-----	-----	-----	-----	-----	-----	4.4	-----	-----	-----	-----	4.4	-----	-----	4.4	-----	-----
BF Discharge (cfs)	-----	290.0	2000.0	50.0	-----	-----	-----	50	-----	-----	-----	-----	-----	25.2	-----	-----	-----	-----	-----	46.6	-----	-----	-----	40	-----	-----	-----	-----	-----	40	-----	-----	-----	-----
Valley Length	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Channel length (ft)	-----	-----	-----	-----	-----	-----	-----	1848	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Sinuosity	-----	-----	-----	-----	-----	-----	-----	1.07	-----	-----	-----	-----	-----	1.40	-----	-----	-----	-----	-----	1.20	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Water Surface Slope (Channel) (ft/ft)	-----	-----	-----	-----	-----	-----	-----	0.0144	-----	-----	-----	-----	-----	0.0197	-----	-----	-----	-----	-----	0.0405	-----	-----	-----	0.014	-----	-----	-----	-----	-----	0.014	-----	-----	-----	-----
BF slope (ft/ft)	-----	-----	-----	-----	-----	-----	-----	0.0128	-----	-----	-----	-----	-----	0.028	-----	-----	-----	-----	-----	0.0458	-----	-----	-----	0.017	-----	-----	-----	-----	-----	0.017	-----	-----	-----	-----
Bankfull Floodplain Area (acres)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
BEHI VL% / L% / M% / H% / VH% / E%	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Channel Stability or Habitat Metric	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Biological or Other	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

* Harman, W.A., G.D. Jennings, J.M. Patterson, D.R. Clinton, L.O. Slate, A.G. Jessup, J.R. Everhart, and R.E. Smith. 1999. Bankfull hydraulic geometry relationships for North Carolina streams. Wildland Hydrology. AWRA Symposium Proceedings. D.S. Olsen and J.P. Potyondy, eds. American Water Resources Association. June 30-July 2, 1999. Bozeman, MT.

Table 10. Baseline Stream Summary (continued)
UT to Cane Creek Restoration Project: DMS Project ID No. 95729
Reach 5a (145 LF)

Parameter	USGS Gauge	Regional Curve Interval (Harman et al, 1999)*			Pre-Existing Condition[1]						Reference Reach(es) Data												Design						As-built					
											UT to Wells Creek						UT to Varnals Creek																	
		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	Min	Mean	Med	Max	SD	n
Dimension and Substrate - Riffle																																		
BF Width (ft)	-----	23.0	80.0	2.4	-----	-----	-----	13.6	-----	-----	-----	8	-----	-----	-----	-----	-----	9.7	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Floodprone Width (ft)	-----	-----	-----	-----	-----	-----	-----	16.9	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
BF Mean Depth (ft)	-----	2.3	5.8	0.5	-----	-----	-----	0.3	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
BF Max Depth (ft)	-----	-----	-----	-----	-----	-----	-----	0.5	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
BF Cross-sectional Area (ft^2)	-----	80.0	300.0	1.7	-----	-----	-----	4.2	-----	-----	-----	5.3	-----	-----	-----	-----	-----	7.9	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Width/Depth Ratio	-----	-----	-----	-----	-----	-----	-----	45.0	-----	-----	7	-----	-----	26	-----	-----	8	-----	-----	18	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Entrenchment Ratio	-----	-----	-----	-----	-----	-----	-----	1.3	-----	-----	2.0	-----	-----	3.4	-----	-----	1.9	-----	-----	3.9	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Bank Height Ratio	-----	-----	-----	-----	-----	-----	-----	2.3	-----	-----	1.4	-----	-----	2.5	-----	-----	1.1	-----	-----	1.5	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
d50 (mm)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Pattern																																		
Channel Beltwidth (ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Radius of Curvature (ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Rc:Bankfull width (ft/ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	0.3	-----	-----	4.0	-----	-----	0.8	-----	-----	2.3	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Meander Wavelength (ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	4.4	-----	-----	8.8	-----	-----	4.9	-----	-----	6.9	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Meander Width Ratio	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	1.3	-----	-----	4.4	-----	-----	1.2	-----	-----	1.8	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Profile																																		
Riffle Length (ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Riffle Slope (ft/ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Pool Length (ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Pool Spacing (ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	2.1	-----	-----	7.9	-----	-----	2.9	-----	-----	5.0	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Pool Max Depth (ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	2.3	-----	-----	2.7	-----	-----	1.6	-----	-----	2.3	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Pool Volume (ft^3)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Substrate and Transport Parameters																																		
Ri% / Ru% / P% / G% / S%	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
SC% / Sa% / G% / B% / Be%	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
d16 / d35 / d50 / d84 / d95	-----	-----	-----	-----										0.1 / 0.6/ 4.5 / 53 / 96										0.2 / 2.5/ 8 / 92 / 1,536			-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Reach Shear Stress (competency) lb/f²	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Max part size (mm) mobilized at bankfull (Rosgen Curve	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Stream Power (transport capacity) W/m²	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Additional Reach Parameters																																		
Drainage Area (SM)	-----	-----	-----	-----	-----	-----	-----	0.025	-----	-----	-----	-----	-----	0.13	-----	-----	-----	-----	-----	0.24	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Impervious cover estimate (%	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Rosgen Classification	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	C4/1	-----	-----	-----	-----	-----	B4/1a	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
BF Velocity (fps)	-----	-----	-----	-----	-----	-----	-----	1.7	-----	-----	-----	-----	-----	5.3	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
BF Discharge (cfs)	-----	290.0	2000.0	6.2	-----	-----	-----	7.1	-----	-----	-----	-----	-----	25.2	-----	-----	-----	-----	-----	46.6	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Valley Length	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Channel length (ft^2)	-----	-----	-----	-----	-----	-----	-----	144	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Sinuosity	-----	-----	-----	-----	-----	-----	-----	1.19	-----	-----	-----	-----	-----	1.40	-----	-----	-----	-----	-----	1.20	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Water Surface Slope (Channel) (ft/ft)	-----	-----	-----	-----	-----	-----	-----	0.0236	-----	-----	-----	-----	-----	0.0197	-----	-----	-----	-----	-----	0.0405	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
BF slope (ft/ft)	-----	-----	-----	-----	-----	-----	-----	0.0224	-----	-----	-----	-----	-----	0.028	-----	-----	-----	-----	-----	0.0458	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Bankfull Floodplain Area (acres)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
BEHI VL% / L% / M% / H% / VH% / E%	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Channel Stability or Habitat Metric	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Biological or Other	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

* Harman, W.A., G.D. Jennings, J.M. Patterson, D.R. Clinton, L.O. Slate, A.G. Jessup, J.R. Everhart, and R.E. Smith. 1999. Bankfull hydraulic geometry relationships for North Carolina streams. Wildland Hydrology. AWRA Symposium Proceedings. D.S. Olsen and J.P. Potyondy, eds. American Water Resources Association. June 30-July 2, 1999. Bozeman, MT.

Table 11. Morphology and Hydraulic Monitoring Summary
UT to Cane Creek Restoration Project: DMS Project ID No. 95729

Reach 1 (1,045 LF)

	Cross-section X-10 (Pool)							Cross-section X-11 (Riffle)							Cross-section X-12 (Riffle)													
Dimension and substrate	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+
Based on fixed baseline bankfull elevation																												
BF Width (ft)	9.11	8.98						7.21	6.98						7.83	7.08												
BF Mean Depth (ft)	0.95	1.05						0.57	0.57						0.51	0.56												
Width/Depth Ratio	9.6	8.6						12.8	12.3						15.2	12.6												
BF Cross-sectional Area (ft²)	8.7	9.4						4.1	4.0						4.0	4.0												
BF Max Depth (ft)	1.90	1.78						0.89	0.94						0.73	0.82												
Width of Floodprone Area (ft)	65.6	61.9						65.9	67.2						84.4	85.9												
Entrenchment Ratio	6.9	6.9						9.1	9.6						10.8	12.1												
Bank Height Ratio	1.1	1.1						1.0	1.1						1.3	1.1												
Wetted Perimeter (ft)	11.0	11.1						8.4	8.1						8.9	8.2												
Hydraulic Radius (ft)	0.8	0.8						0.5	0.5						0.5	0.5												
Based on current/developing bankfull feature																												
BF Width (ft)																												
BF Mean Depth (ft)																												
Width/Depth Ratio																												
BF Cross-sectional Area (ft²)																												
BF Max Depth (ft)																												
Width of Floodprone Area (ft)																												
Entrenchment Ratio																												
Bank Height Ratio																												
Wetted Perimeter (ft)																												
Hydraulic Radius (ft)																												
Cross Sectional Area between end pins (ft²)																												
d50 (mm)																												

Reach 3 (398 LF)

	Cross-section X-5 (Riffle)							Cross-section X-6 (Pool)																				
Dimension and substrate	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+
Based on fixed baseline bankfull elevation																												
BF Width (ft)	8.94	9.55						8.98	8.70																			
BF Mean Depth (ft)	0.41	0.35						0.59	0.59																			
Width/Depth Ratio	21.7	27.3						15.3	14.7																			
BF Cross-sectional Area (ft²)	3.7	3.3						5.3	5.2																			
BF Max Depth (ft)	0.76	0.6						1.13	1.21																			
Width of Floodprone Area (ft)	24.4	22.7						36.3	36.3																			
Entrenchment Ratio	2.7	2.4						4.0	4.2																			
Bank Height Ratio	1.0	0.9						1.0	1.1																			
Wetted Perimeter (ft)	9.8	10.3						10.2	9.9																			
Hydraulic Radius (ft)	0.4	0.3						0.5	0.5																			
Based on current/developing bankfull feature																												
BF Width (ft)																												
BF Mean Depth (ft)																												
Width/Depth Ratio																												
BF Cross-sectional Area (ft²)																												
BF Max Depth (ft)																												
Width of Floodprone Area (ft)																												
Entrenchment Ratio																												
Bank Height Ratio																												
Wetted Perimeter (ft)																												
Hydraulic Radius (ft)																												
Cross Sectional Area between end pins (ft²)																												
d50 (mm)																												

Reach 4 (2,333 LF)																										
	Cross-section X-7 (Riffle)							Cross-section X-8 (Pool)							Cross-section X-9 (Riffle)											
Dimension and substrate	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+
Based on fixed baseline bankfull elevation																										
BF Width (ft)	18.74	17.33						17.08	16.13						13.77	13.66										
BF Mean Depth (ft)	0.79	0.81						1.45	0.96						1.02	0.97										
Width/Depth Ratio	23.7	21.5						11.8	16.8						13.5	14.1										
BF Cross-sectional Area (ft²)	14.8	14.0						24.7	15.5						14.1	13.3										
BF Max Depth (ft)	1.24	1.23						3.41	2.18						1.85	1.52										
Width of Floodprone Area (ft)	56.1	57.3						72.5	45.2						33.9	32.1										
Entrenchment Ratio	3.0	2.0						4.2	2.8						2.5	2.4										
Bank Height Ratio	1.9	2.0						1.1	1.2						1.1	1.1										
Wetted Perimeter (ft)	20.3	19.0						20.0	18.1						15.8	15.6										
Hydraulic Radius (ft)	0.7	0.7						1.2	0.9						0.9	0.9										
Based on current/developing bankfull feature																										
BF Width (ft)																										
BF Mean Depth (ft)																										
Width/Depth Ratio																										
BF Cross-sectional Area (ft²)																										
BF Max Depth (ft)																										
Width of Floodprone Area (ft)																										
Entrenchment Ratio																										
Bank Height Ratio																										
Wetted Perimeter (ft)																										
Hydraulic Radius (ft)																										
Cross Sectional Area between end pins (ft²)								-																		
d50 (mm)								-																		

Reach 5 (1,461 LF)																										
	Cross-section X-1 (Riffle)							Cross-section X-2 (Pool)							Cross-section X-3 (Riffle)							Cross-section X-4 (Riffle)						
Dimension and substrate	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+
Based on fixed baseline bankfull elevation																										
BF Width (ft)	10.41	10.06						11.24	11.28						12.00	11.16						10.16	11.66					
BF Mean Depth (ft)	0.68	0.71						1.41	1.37						0.68	0.65						0.81	0.70					
Width/Depth Ratio	15.2	14.2						8.0	8.3						17.8	17.3						12.5	16.7					
BF Cross-sectional Area (ft²)	7.1	7.2						15.8	15.4						8.1	7.2						8.3	8.1					
BF Max Depth (ft)	1.19	1.33						2.79	2.66						1.16	1.16						1.33	1.44					
Width of Floodprone Area (ft)	85.1	85.0						103.7	103.7						76.0	76.5						32.2	34.3					
Entrenchment Ratio	8.2	8.5						9.2	9.2						6.3	6.9						3.2	2.9					
Bank Height Ratio	1.0	1						1.0	1.0						1.0	1.0						1.0	0.9					
Wetted Perimeter (ft)	11.8	11.5						14.1	14.0						13.4	12.5						11.8	13.1					
Hydraulic Radius (ft)	0.6	0.6						1.1	1.1						0.6	0.6						0.7	0.6					
Based on current/developing bankfull feature																										
BF Width (ft)																										
BF Mean Depth (ft)																										
Width/Depth Ratio																										
BF Cross-sectional Area (ft²)																										
BF Max Depth (ft)																										
Width of Floodprone Area (ft)																										
Entrenchment Ratio																										
Bank Height Ratio																										
Wetted Perimeter (ft)																										
Hydraulic Radius (ft)																										
Cross Sectional Area between end pins (ft²)																										
d50 (mm)																										

Appendix E

Hydrologic Data

Table 12. Verification of Bankfull Events
UT to Cane Creek Restoration Project: DMS Project ID No. 95729

Date of Data Collection	Reach 3 Gauge	Reach 5 Gauge	Estimated Occurrence of Bankfull Event	Method of Data Collection
10/1/2014	0.18	0	7/16/2014	Crest Gauge

Mitigation Project Name	**UT to Cane Creek Restoration Project**	**County**	**Alamance**	**USACE Action ID**	2012-01907
DMS IMS ID	**95729**	**Date Project Instituted**	**10/29/2012**	**NCDWR Permit No**	2013-1177
River Basin	**Cape Fear**	**Date Prepared**	**4/13/2015**		
Cataloging Unit	**03030002**				

Credit Release Milestone	Stream Credits						Wetland Credits							
	Scheduled Releases (Stream)	Warm	Cool	Cold	Anticipated Release Year (Stream)	Actual Release Date (Stream)	Scheduled Releases (Forested)	Riparian Riverine	Riparian Non-riverine	Non-riparian	Scheduled Releases (Coastal)	Coastal	Anticipated Release Year (Wetland)	Actual Release Year (Wetland)
Potential Credits (Mitigation Plan)		4,603.0												
Potential Credits (As-Built Survey)		4,593.9												
1 (Site Establishment)	N/A				N/A	N/A	N/A				N/A		N/A	N/A
2 (Year 0 / As-Built)	30%	1,378.2			2014	12/1/2014	30%				30%		N/A	N/A
3 (Year 1 Monitoring)	10%	459.4			2015	4/23/2015	10%				10%		N/A	N/A
4 (Year 2 Monitoring)	10%				2016		10%				15%		N/A	N/A
5 (Year 3 Monitoring)	10%				2017		15%				20%		N/A	N/A
6 (Year 4 Monitoring)	5%				2018		5%				10%		N/A	N/A
7 (Year 5 Monitoring)	10%				2019		15%				15%		N/A	N/A
8 (Year 6 Monitoring)	5%				2020		5%				N/A		N/A	N/A
9 (Year 7 Monitoring)	10%				2021		10%				N/A		N/A	N/A
Stream Bankfull Standard	10%						N/A				N/A			
Total Credits Released to Date		1,837.5												

DEBITS (released credits only)

Ratios	1	1.5	2.5	5	1	3	2	5	1	3	2	5	1	3	2	5
	Stream Restoration	Stream Enhancement I	Stream Enhancement II	Stream Preservation	Riparian Restoration	Riparian Creation	Riparian Enhancement	Riparian Preservation	Nonriparian Restoration	Nonriparian Creation	Nonriparian Enhancement	Nonriparian Preservation	Coastal Marsh Restoration	Coastal Marsh Creation	Coastal Marsh Enhancement	Coastal Marsh Preservation
As-Built Amounts (feet and acres)	3,314.0	433.0	2,478.0													
As-Built Amounts (mitigation credits)	3,314.0	288.7	991.2													
Percentage Released	40%	40%	40%													
Released Amounts (feet / acres)	1,325.6	173.2	991.2													
Released Amounts (credits)	1,325.6	115.5	396.5													
NCDWR Permit / USACE Action ID / Project Name																
Remaining Amounts (feet / acres)	1,325.6	173.2	991.2													
Remaining Amounts (credits)	1,325.6	115.5	396.5													

Contingencies (if any): None

TUGWELL.TODD.JASON.1048429293
2015.07.20 17:20:18 -04'00'

Signature of Wilmington District Official Approving Credit Release **Date**

1 - For DMS, no credits are released during the first milestone
2 - For DMS projects, the second credit release milestone occurs automatically when the as-built report (baseline monitoring report) has been made available to the NCIRT by posting it to the NCEEP Portal, provided the following criteria have been met:
1) Approval of the final Mitigation Plan
2) Recordation of the preservation mechanism, as well as a title opinion acceptable to the USACE covering the property
3) Completion of all physical and biological improvements to the mitigation site pursuant to the mitigation plan
4) Reciept of necessary DA permit authorization or written DA approval for porjects where DA permit issuance is not required

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