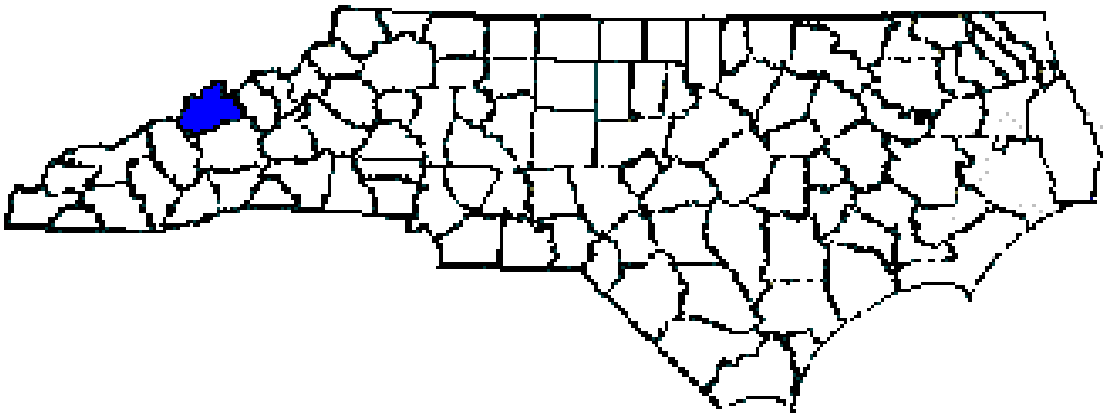
ANNUAL REPORT FOR 2014



UT to Middle Fork Creek Site C Mitigation Site
Madison County
TIP No. R-2518A
COE Action ID: SAW-2007-2197-357/300
DWR #: 20071134

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November 2014

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SUMMARY

The following report summarizes the stream monitoring activities that have occurred during the Year 2014 at the UT to Middle Fork Creek Site C Mitigation Site in Madison County. The North Carolina Department of Transportation (NCDOT) completed this project in December 2008 and water was turned in May 2009. This report provides the monitoring results for the fifth formal year of monitoring (Year 2014). The Year 2014 monitoring period was the fifth of five scheduled years of monitoring on the UT to Middle Fork Creek Site C Mitigation Site (See Success Criteria Section 2.1).

Based on the overall conclusions of monitoring at the UT to Middle Fork Creek Site C, it has met the required monitoring protocols for the fifth formal year of monitoring on the stream and third formal year of monitoring on the planted vegetation. The ACOE and NCDWR agreed with NCDOT on emails sent on April 2, 2012 to not complete the longitudinal profile survey for the remainder of the five year monitoring period due to heavy vegetation within the channel. In lieu of doing the longitudinal profile, visual inspection of the channel stability throughout the reach and photo documentation at the permanent photo point locations would be completed. All other monitoring activities will continue to be completed throughout the five year monitoring period. The channel throughout the stream restoration site is stable at this time. The streambank and buffer area were planted in March 2012 with live stakes and bareroot seedlings. The planted vegetation is surviving at this time.

NCDOT proposes to discontinue stream monitoring but will continue vegetation monitoring at the UT to Middle Fork Creek Site C Mitigation Site until 2016.

1.0 INTRODUCTION

1.1 Project Description

The following report summarizes the stream monitoring activities that have occurred during the Year 2014 at the UT to Middle Fork Creek Site C Mitigation Site. Site C is located on US 19 in Madison County at Sta. 27+40 Rt. –L- (Figure 1). The UT to Middle Fork Creek Site C was constructed to provide mitigation for stream impacts associated with Transportation Improvement Program (TIP) number R-2518A in Madison County.

The mitigation site provided approximately 259 linear feet of stream restoration. Construction was completed during December 2008 and water was turned in May 2009 by the NCDOT. Stream restoration involved back-filling the existing channel, excavation of a new floodplain and channel, installing several in-stream cross vane structures and planting the riparian buffer zone.

1.2 Purpose

In order for a mitigation site to be considered successful, the site must meet the success criteria. This report details the monitoring in 2014 at the UT to Middle Fork Creek Site C Mitigation Site. Hydrologic monitoring was not required for this site.

1.3 Project History

December 2008	Construction Completed
May 2009	Water Turned Into Stream
March 2009	Site Planted (Type I only)
October 2009	As-Built Survey Completed
November 2010	Stream Channel Monitoring (Year 1)
November 2011	Stream Channel Monitoring (Year 2)
March 2012	Site Planted (Type I and II)
September 2012	Vegetation Monitoring (Year 1)
November 2012	Stream Channel Monitoring (Year 3)
March 2013	Bankfull Monitoring Gauge Installed
August 2013	Vegetation Monitoring (Year 2)
November 2013	Stream Channel Monitoring (Year 4)
July 2014	Vegetation Monitoring (Year 3)
November 2014	Stream Channel Monitoring (Year 5)

1.4 Debit Ledger

The entire UT to Middle Fork Creek Site C stream mitigation site was used for the R-2518A project to compensate for unavoidable stream impacts.

Figure 1. Vicinity Map

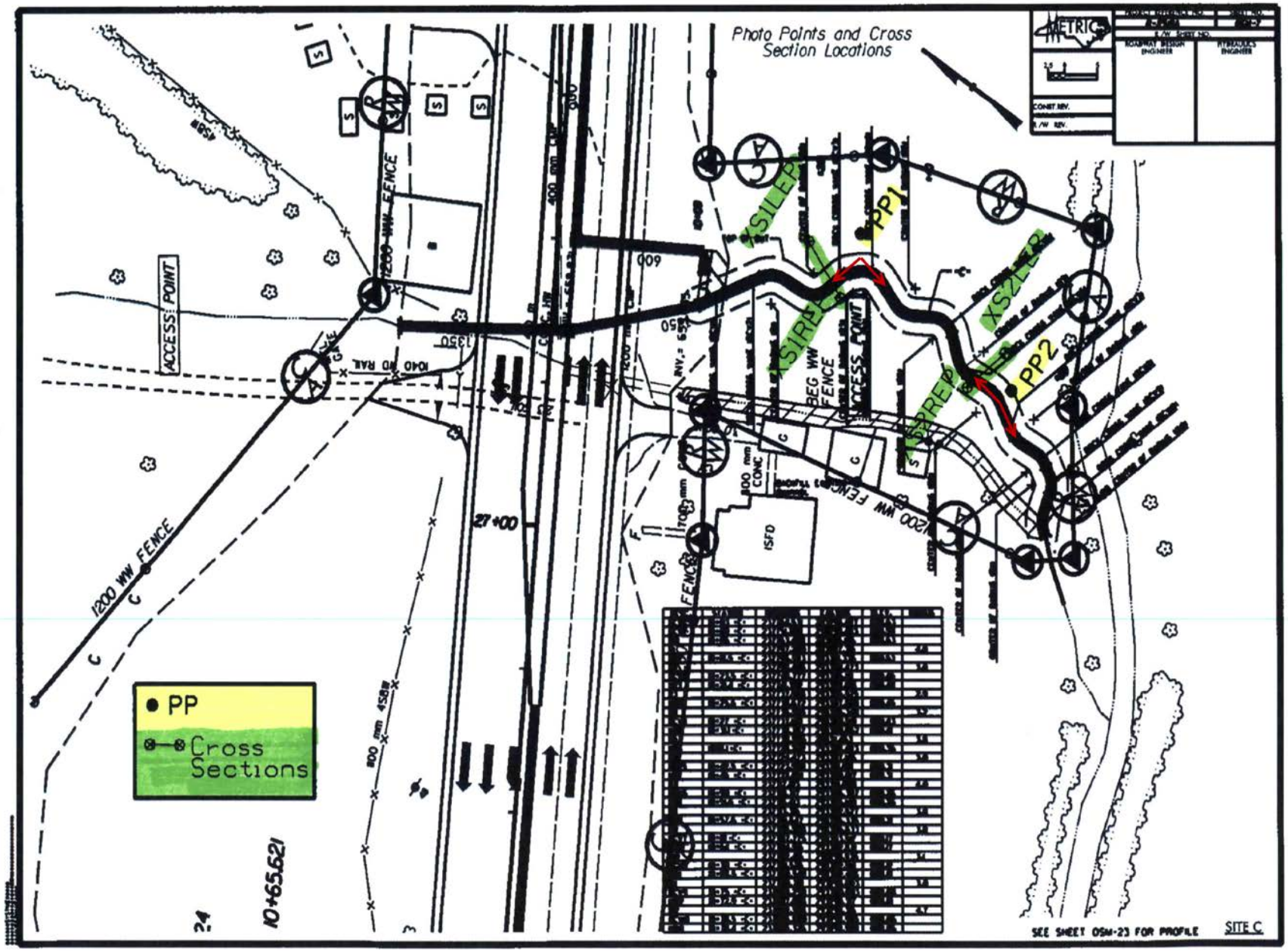


Figure 2. Site C Map

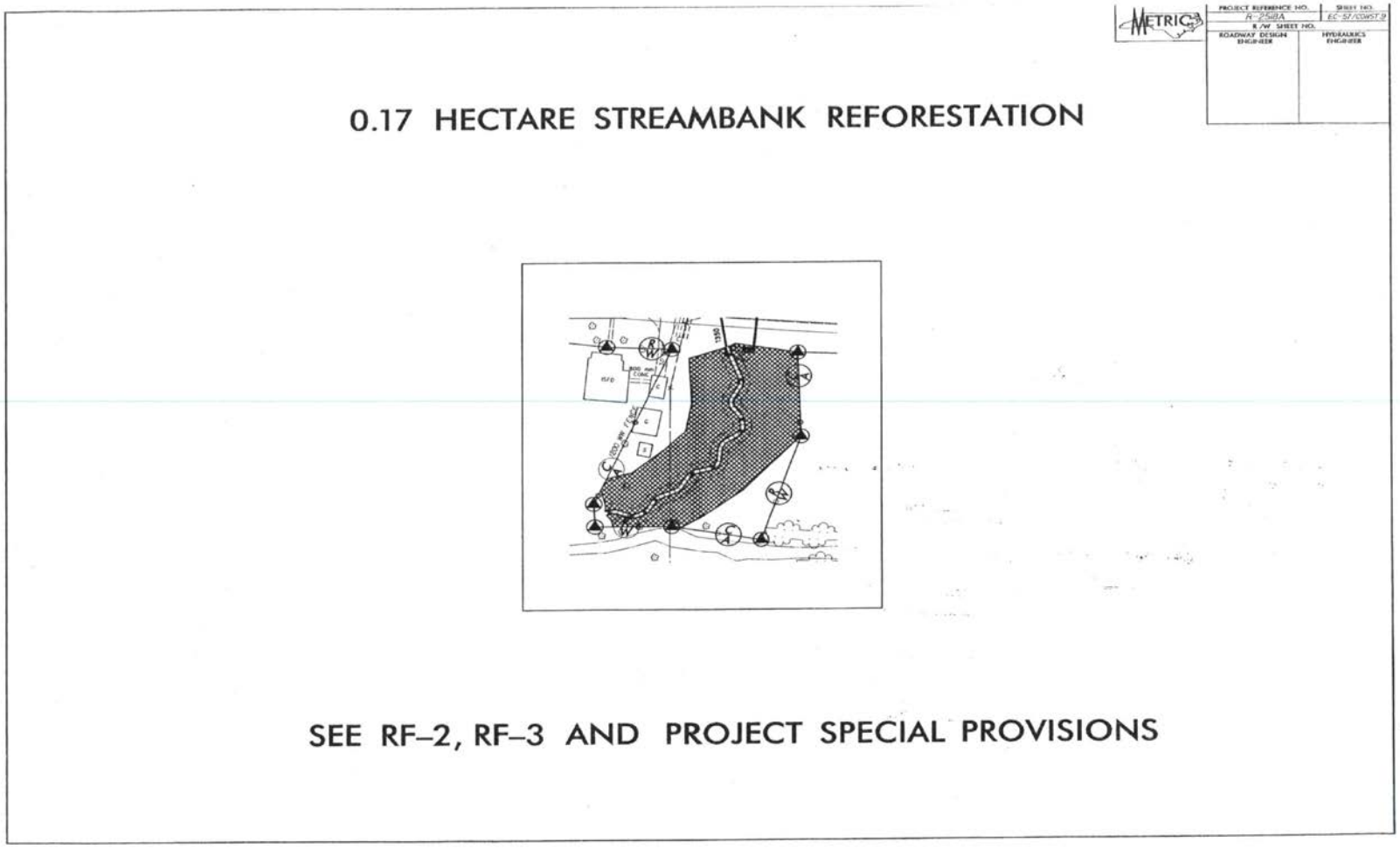


Figure 3. Site C Reforestation Map

2.0 STREAM ASSESSMENT

2.1 Success Criteria

The permittee shall monitor the restoration and enhancement mitigation sites following the Level 1 protocols outlined in the "Stream Mitigation Guidelines," dated April 2003 with the following exceptions:

1. Pebble counts shall not be conducted.

2. Two cross sections shall be conducted for streams less than 500 linear feet and five (5) cross sections shall be conducted for streams greater than 500 linear feet.

3. Riparian success shall be by visual inspection of plant survival. Photos will be taken and comments noted on plant survival.

The permittee shall monitor the preservation sites by visual inspection. Photos will be taken and comments noted on plant survival. The monitoring shall be conducted annually for a minimum of five (5) years after final planting. The monitoring results shall be submitted to DWR in a final report within sixty (60) days after completing monitoring. After 5 years the NCDOT shall contact the DWR to schedule a site visit to "close out" the mitigation site.

2.2 Stream Description

2.2.1 Post-Construction Conditions

The restoration of the UT to Middle Fork Creek Site C Mitigation Site involved back-filling the existing channel, excavation of a new floodplain and channel, installing several in-stream cross vane structures and planting the riparian buffer zone.

2.2.2 Monitoring Conditions

The objective of the UT to Middle Fork Creek Site C stream restoration was to restore a B4c stream as identified in Rosgen's Applied River Morphology. A total of two cross sections (one in a riffle and one in a pool) were surveyed. For this report, only cross sections containing riffles were used in the comparison of channel morphology presented below in Table 1 (Site C).

Table 1. Abbreviated Morphological Summary (UT to Middle Fork Creek Site C)

Variable	Proposed	Cross-Section #1 (Riffle)	Cross-Section #1 (Riffle)	Cross-Section #1 (Riffle)	Cross-Section #1 (Riffle)	Cross-Section #1 (Riffle)
		2010	**2011**	**2012**	**2013**	**2014**
Drainage Area (mi^2)	**0.08**	0.08	0.08	0.08	0.08	0.08
Bankfull Cross Sectional Area (ft^2)	**1.86**	2.07	1.96	1.97	2.3	1.9
Maximum Bankfull Depth (ft.)	**0.47 – 0.59**	0.52	0.63	0.55	0.74	0.64
Width of the Floodprone Area (ft.)	**8**	10.01	11.05	11.62	12.2	11.26
Bankfull Mean Depth (ft.)	**0.39**	0.3	0.28	0.29	0.35	0.27
Width/Depth Ratio	**12**	22.87	24.93	23.17	18.57	25.89
Entrenchment Ratio	**1.7**	1.46	1.58	1.73	1.88	1.61
Bankfull Width (ft.)	**4.7**	6.86	6.98	6.72	6.5	6.99

* Riffle values are used for classification purposes, pool values are shown in Appendix A.

2.3 Results of the Stream Assessment

2.3.1 Site Data

The assessment included the survey of two cross sections of the UT to Middle Fork Creek Site C established by NCDOT after construction. Two cross sections were established during the as-built monitoring year. Cross section locations were subsequently based on the stationing of the longitudinal profile and are presented below. The location of the cross sections are shown in Appendix A.

UT to Middle Fork Creek Site C Cross-Sections:

- Cross-Section #1: UT to Middle Fork Creek Site C, Station 70+00, midpoint of riffle

- Cross-Section #2: UT to Middle Fork Creek Site C, Station 183+00, midpoint of pool

Based on comparisons of the As-Built to the monitoring data, all of the cross sections appear stable with little or no active bank erosion. Graphs of the cross sections are presented in Appendix A. Future survey data will vary depending on actual location of rod placement and alignment; however, this information should remain similar in appearance. The ACOE and NCDWR agreed with NCDOT on emails sent on April 2, 2012 to not complete the longitudinal profile survey for the remainder of the five year monitoring period due to heavy vegetation within the channel. In lieu of doing the longitudinal profile, visual inspection of the channel stability throughout the reach and photo documentation at the permanent photo point locations would be completed. All other monitoring activities will continue to be completed throughout the five year monitoring period. Photo points 1 and 2 showed an extensive growth of herbaceous and woody vegetation. The channel bed is stable throughout the stream site at this time. Pebble counts were not required per the permit conditions and therefore were not completed. Two bankfull events were documented by a surface water gauge at Site C during the 2014 monitoring period.

3.0 VEGETATION: UT to MIDDLE FORK CREEK SITE C

3.1 Description of Species

The following tree species were planted on the streambank:

Salix nigra, Black Willow

Cornus amomum, Silky Dogwood

The following tree species were planted in the buffer area:

Liriodendron tulipifera, Yellow Poplar

Platanus occidentalis, Sycamore

Fraxinus pennsylvanica, Green Ash

Quercus alba, White Oak

3.2 Results of Vegetation Monitoring

Streambank & Buffer Vegetation: The streambank reforestation was completed in March 2012. The Year 2 vegetation monitoring evaluation noted: Type I: Black Willow, Silky Dogwood and Type II: Sycamore, Green Ash, Tulip Poplar and White Oak were surviving at the time of the monitoring evaluation. It was noted during the 2014 monitoring evaluation that the power line easement within Site C had been sprayed.

3.3 Conclusions

NCDOT will continue to monitor the planted vegetation in 2015.

4.0 OVERALL CONCLUSIONS/RECOMMENDATIONS

The UT to Middle Fork Creek Site C Mitigation Site has met the required monitoring protocols for the fifth formal year of monitoring on the stream and the third formal year of monitoring on the planted vegetation. The channel throughout the stream restoration site is stable at this time and the planted vegetation is surviving. NCDOT proposes to discontinue stream monitoring but will continue vegetation monitoring at the UT to Middle Fork Creek Site C Mitigation Site until 2016.

5.0 REFERENCES

Stream Mitigation Plan, US Highway 19, R-2518A On-Site Mitigation Madison County, North Carolina, August 2006.

Design Plans for R-2518A, US 19 from I-26 to 0.8 KM east of the Yancey Co. Line, Stream Mitigation (Preservation, Enhancement, and Restoration), HSMM.

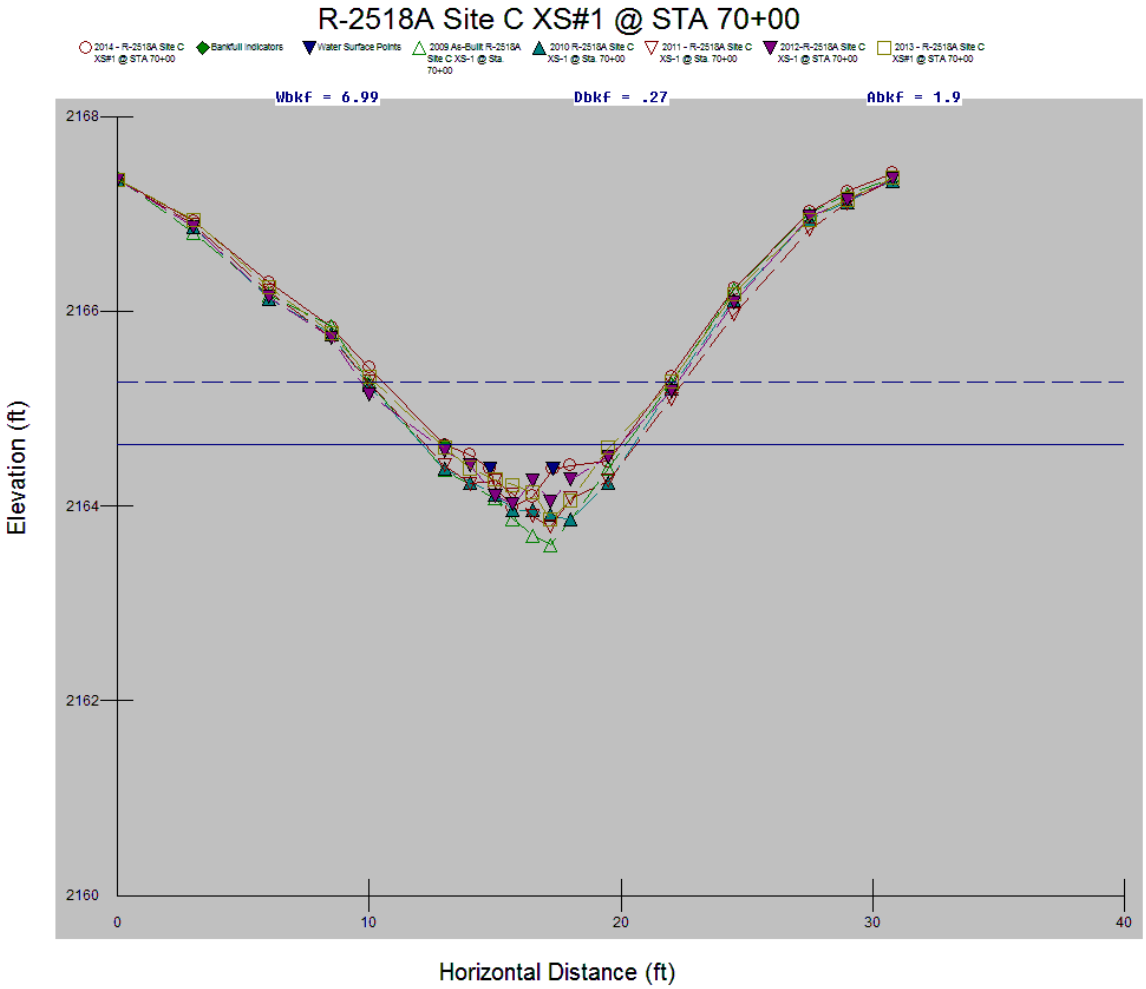
North Carolina Department of Transportation (NCDOT), April 29, 2008. 404 and 401 Individual Permits for R-2518A and R-2518B (ACOE Permit No. 2007-2197-357/300 and DWR Project No. 20071134, Individual Certification No. 3706).

Rosgen, D.L, 1996. Applied River Morphology. Wildland Hydrology, Pagosa Springs, Colorado.

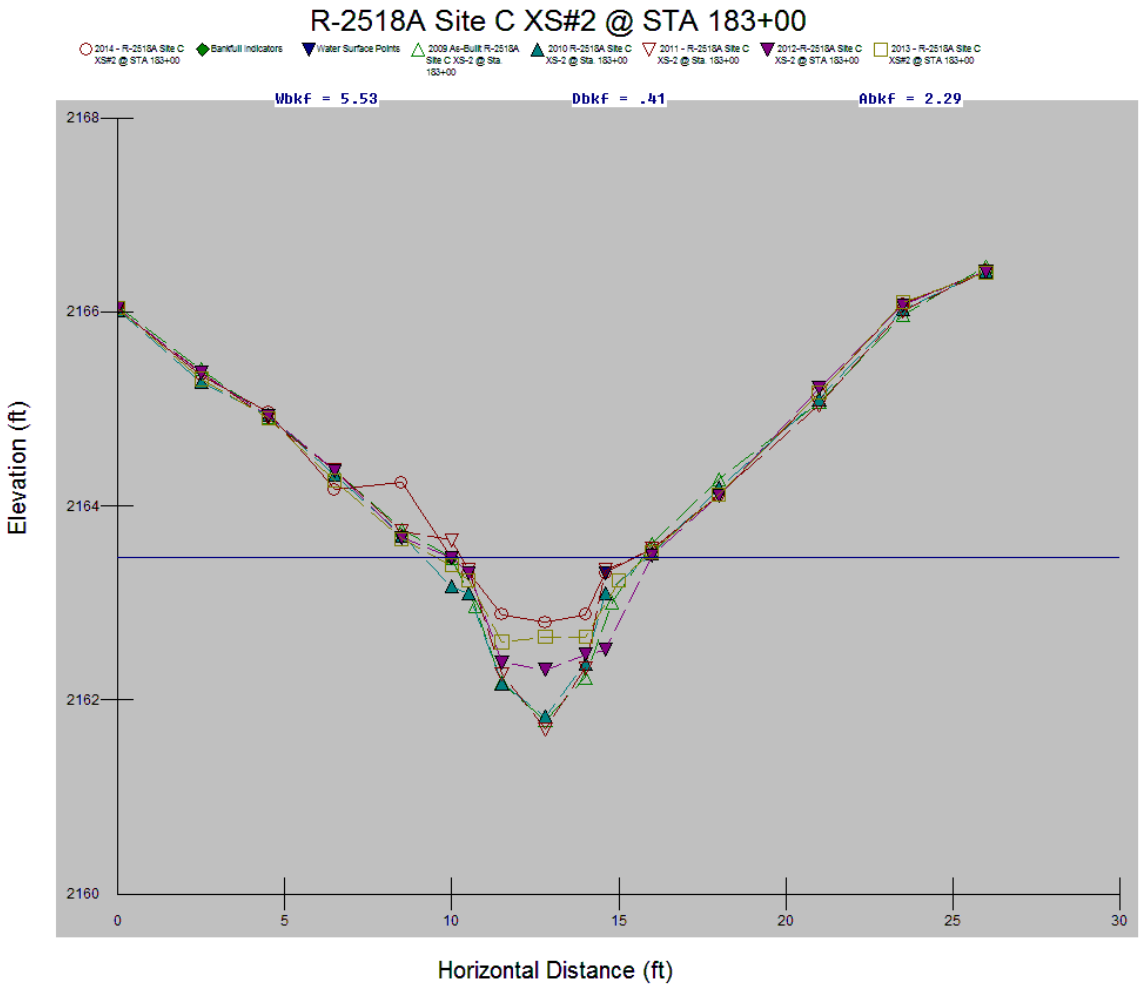
US Army Corps of Engineers (USACE), 2003. Stream Mitigation Guidelines. Prepared with cooperation from the US Environmental Protection Agency, NC Wildlife Resources Commission, and the NC Division of Water Resources.

APPENDIX A

CROSS SECTIONS



Site C: Cross-Section #1 (Riffle) Abbreviated Morphological Summary					
	2010	2011	2012	2013	2014
Bankfull Cross Sectional Area (ft^2)	2.07	1.96	1.97	2.3	1.9
Maximum Bankfull Depth (ft.)	0.52	0.63	0.55	0.74	0.64
Width of the Floodprone Area (ft.)	10.01	11.05	11.62	12.2	11.26
Bankfull Mean Depth (ft.)	0.3	0.28	0.29	0.35	0.27
Width/Depth Ratio	22.87	24.93	23.17	18.57	25.89
Entrenchment Ratio	1.46	1.58	1.73	1.88	1.61
Bankfull Width (ft.)	6.86	6.98	6.72	6.5	6.99



Site C: Cross-Section #2 (Pool) Abbreviated Morphological Summary					
	2010	2011	2012	2013	2014
Bankfull Cross Sectional Area (ft^2)	3.62	5.83	4.65	2.89	2.29
Maximum Bankfull Depth (ft.)	1.34	1.95	1.16	0.79	0.67
Bankfull Mean Depth (ft.)	0.75	0.92	0.78	0.52	0.41
Bankfull Width (ft.)	4.84	6.32	5.97	5.53	5.53

*According to the Rosgen Classification of Natural Rivers floodprone width, entrenchment ratio, and width depth ratio are not measured in pool, glide, or run features.

APPENDIX B

SITE PHOTOGRAPHS

UT to Middle Fork Creek Site C

Photo Point #1 (Upstream)

Photo Point #1 (Downstream)

Photo Point #2 (Upstream)

Photo Point #2 (Downstream)

November 2014

UT to Middle Fork Creek Site C

Vegetation Overview Photo

Power Line Easement

July 2014