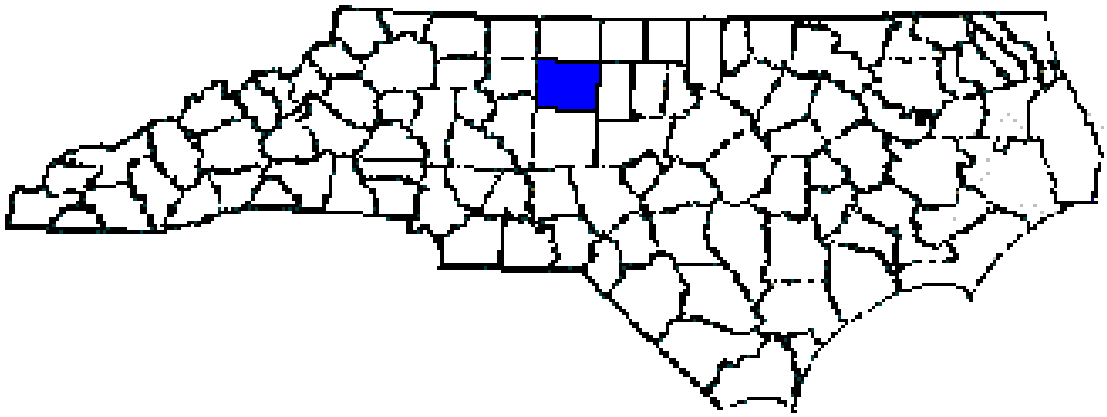
ANNUAL REPORT FOR 2015



Mile Branch
Guilford County
TIP No. R-0609IA
COE Action ID: 2004-00340
DWR #: 2006-0331

Prepared By:
Natural Environment Section & Roadside Environmental Unit
North Carolina Department of Transportation
September 2015

TABLE OF CONTENTS

SUMMARY 1

1.0 INTRODUCTION: 3
1.1 Project Description 3
1.2 Purpose 3
1.3 Project History 3
1.4 Debit Ledger 4

2.0 STREAM ASSESSMENT: 6
2.1 Success Criteria 6
2.2 Stream Description 6
2.2.1 Post-Construction Conditions 6
2.2.2 Monitoring Conditions 6
2.3 Results of Stream Assessment 7
2.3.1 Site Data 7
2.4 Results of Stream and Buffer Vegetation 8
2.4.1 Description of Species 8
2.4.2 Results of Vegetation Monitoring 8
2.4.3 Conclusions 9

3.0 OVERALL CONCLUSIONS AND RECOMMENDATIONS 9

4.0 REFERENCES 10

LIST OF FIGURES

Figure 1 – Vicinity Map 5

APPENDICES

Appendix A – Site Photographs, Cross Section & Photo Point Locations and Streambank Reforestation Plan

SUMMARY

The following report summarizes the stream monitoring activities that have occurred during 2015 at the Mile Branch Mitigation Site in Guilford County. The site was constructed during 2008 by the North Carolina Department of Transportation (NCDOT). This report provides the monitoring results for the seventh formal year of monitoring (Year 2015). The Year 2015 monitoring period is the seventh of five scheduled years for monitoring on Mile Branch (See Success Criteria Section 2.1).

Based on the overall conclusions of monitoring along Mile Branch, the site has met the required monitoring protocols for the seventh formal year of monitoring. Based on the monitoring data, the channel is stable throughout the stream at this time. At least two bankfull events have been visually documented by wrack lines over the 7-year monitoring period.

On April 30, 2010, NCDOT repaired an area of the stream at Sta. 11+64 due to a wash out behind the cross vane arm. NCDOT repaired this area by placing boulders behind the right arm of the vane and installed a sill at the end of the arm. Also the cross vane at Sta. 11+42 had a boulder placed behind the left arm of the vane where washing had occurred. N.C. Division of Water Resources and U.S. Army Corps of Engineers personnel requested that this information be included in the monitoring report in lieu of completing a permit modification.

In late March 2011, NCDOT repaired the scour on the right bank from approximately 11+70 to 11+83 by installing boulder toe protection. All disturbed areas were seeded and matted. Live stakes and bare root seedlings were planted on March 29, 2011.

During the 2012 monitoring evaluation, there were two beaver dams noted onsite at Photo Point #3 (large dam) and at Cross Section #3 (small dam) that have been breached and beavers have been trapped by USDA. DOT Maintenance removed the debris from the large dam so water could access the floodplain. On February 13, 2013, NCDOT replanted bare root seedlings and live stakes along the area where beaver activity had occurred.

On March 2, 2014, a site visit was conducted with the regulatory agencies and NCDOT personnel present. It was agreed that the channel was stable and no further cross section or longitudinal profile survey would be required. The regulatory agencies requested that more trees were needed along the northern buffer and along the streambank where the beaver dams were removed. NCDOT will continue to take photos at the permanent photo point locations to check for stream stability and will continue to monitor the planted vegetation.

On May 21-22, 2014, NCDOT mowed approximately 0.3 acres of the north buffer where there was a dense area of lespedeza with little planted vegetation surviving and spot sprayed other areas of the site that has lesser amounts of lespedeza. On July 7, 2014, NCDOT mowed the 0.3 acres of the north buffer again and completed an herbicide application on this area.

On November 7, 2014, NCDOT replanted the 0.3 acres of the north buffer with 1 gallon green ash, willow oak, river birch, and sycamore.

Based on the September 14, 2015 site visit with NCDWR, NCDOT will replant the 1 gallon trees that did not survive in the north buffer to increase plant survival within this area.

NCDOT proposes to continue stream and vegetation monitoring at the Mile Branch Mitigation Site for 2016.

1.0 INTRODUCTION

1.1 Project Description

The following report summarizes the stream monitoring activities that have occurred during 2015 at the Mile Branch Mitigation Site. The site is located adjacent to the US 311 southbound lanes just east of SR 1158 Jackson Lake Road (Figure 1). The Mile Branch Mitigation Site was constructed to provide mitigation for stream impacts associated with Transportation Improvement Program (TIP) number R-0609IA in Guilford County.

The mitigation project covers approximately 659 linear feet of stream relocation. Construction was completed in August 2008 by the North Carolina Department of Transportation (NCDOT). Stream restoration involved the installation of rock cross vanes, rock sills, construction of a new stream channel and construction of the floodplain to allow for overbank flooding. It also included the installation of coir fiber matting and live stakes along the streambank and bareroot seedlings in the buffer area.

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 2015 at the Mile Branch Mitigation Site. Hydrologic monitoring was not required for the site.

1.3 Project History

August 2008	Construction Completed
January 2009	Planted Live Stakes and Bareroot Seedlings
September 2009	Stream Channel and Vegetation Monitoring (1 yr.)
January 2010	Replanted Buffer
April 2010	Streambank Repairs
October 2010	Stream Channel and Vegetation Monitoring (2 yr.)
March 2011	Streambank Repairs
March 2011	Replanted Streambank and Buffer
October 2011	Stream Channel and Vegetation Monitoring (3 yr.)
September 2012	Vegetation Monitoring (4 yr.)
November 2012	Stream Channel Monitoring (4 yr.)
February 2013	Replanted Beaver Disturbed Area
August 2013	Vegetation Monitoring (5 yr.)
November 2013	Stream Channel Monitoring (5 yr.)
March 2014	Agency Onsite Meeting
May 2014	Mowed North Buffer and Spot Sprayed Lespedeza
July 2014	Mowed and Sprayed Lespedeza in North Buffer
August 2014	Stream and Vegetation Monitoring (6 yr.)
November 2014	Replanted North Buffer
June 2015	Stream and Vegetation Monitoring (7 yr.)
September 2015	NCDOT & NCDWR Onsite Meeting

1.4 Debit Ledger

The entire Mile Branch stream mitigation site was used for the R-0609IA project to compensate for unavoidable stream impacts.

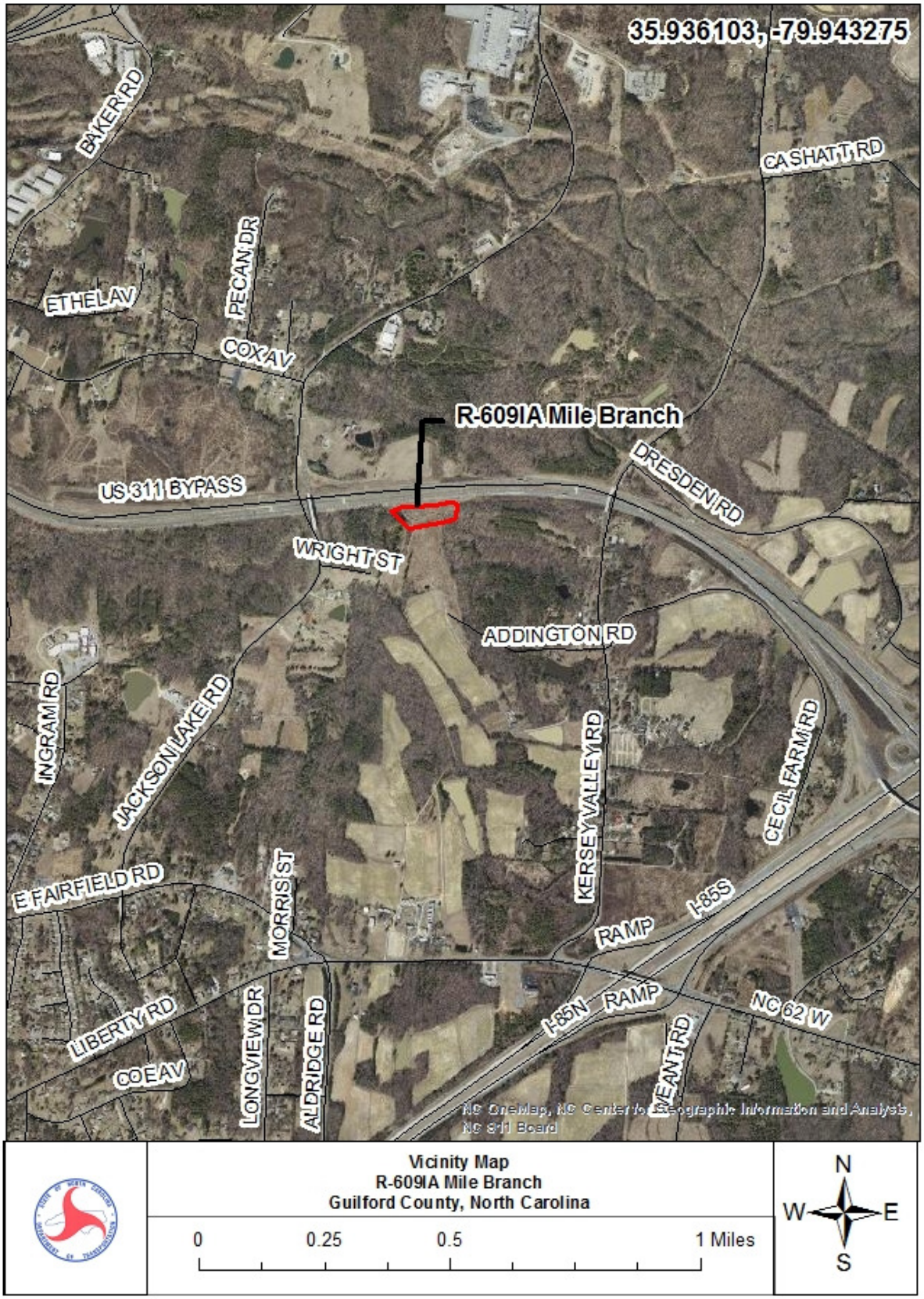


Figure 1. Vicinity Map

2.0 STREAM ASSESSMENT

2.1 Success Criteria

In accordance with the approved mitigation plan, NCDOT will evaluate the success of the stream relocation project based on guidance provided by the Stream Mitigation Guidelines disseminated by the United States Army Corps of Engineers-Wilmington District. The survey of channel dimension will consist of permanent cross sections placed at approximately four cross sections (two riffles and two pools). Annual photographs showing both banks and upstream and downstream views will be taken from permanent, mapped photo points. The survey of the longitudinal profile will represent distinct areas of the stream and will cover a cumulative total of 632 linear feet of channel. The entire restored length of stream will be investigated for channel stability and in-stream structure functionality. Any evidence of channel instability will be identified, mapped and photographed.

Vegetation Success

The success of vegetation plantings will be measured through stem counts. Permanent quadrants will be used to sample the riparian buffer. Survival of the live stakes will be determined by visual observation throughout the 5 year monitoring period.

Bareroot vegetation will be evaluated using 2 staked survival plots. Plots will be 50 ft. by 50 ft. and all flagged stems will be counted in those plots. Success will be defined as 320 stems per acre after 5 years. All vegetation monitoring will be conducted during the growing season.

2.2 Stream Description

2.2.1 Post-Construction Conditions

The mitigation project covers approximately 659 linear feet of stream relocation. Construction was completed in August 2008 by the North Carolina Department of Transportation (NCDOT). Stream restoration involved the installation of rock cross vanes, rock sills, construction of a new stream channel and construction of the floodplain to allow for overbank flooding. It also included the installation of coir fiber matting and live stakes along the streambank and bareroot seedlings in the buffer area.

2.2.2 Monitoring Conditions

The objective of the Mile Branch Mitigation Site relocation was to build a C4 stream type as identified in the Rosgen's Applied River Morphology. A total of four cross sections (two in a riffle, two in a pool) were surveyed.

2.3 Results of the Stream Assessment

2.3.1 Site Data

The assessment included the survey of four cross sections and the longitudinal profile of Mile Branch established by the NCDOT after construction. The length of the profile along Mile Branch was approximately 632 linear feet. Four cross sections were established during the 2009 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 is shown in Appendix A.

- Cross Section #1. Mile Branch, Station 83+00 linear feet, midpoint of riffle
- Cross Section #2. Mile Branch, Station 340+00 linear feet, midpoint of pool
- Cross Section #3. Mile Branch, Station 412+00 linear feet, midpoint of riffle
- Cross Section #4. Mile Branch, Station 520+00 linear feet, midpoint of pool

Based on comparisons of the monitoring data, all four cross sections appear stable with little or no active bank erosion. The floodplain on the right bank at Cross Section #4 had to be repaired after the as-built was completed. The right endpin at this cross section had to be reset again due to the latest streambank repairs in March 2011. Graphs of the cross sections can be found in the 2009 to 2013 monitoring reports.

A site visit was conducted on March 2, 2014 with the regulatory agencies and NCDOT personnel present. It was agreed that the channel was stable and no further cross section or longitudinal profile survey would be required. A visual inspection of the channel stability throughout the reach and photo documentation a the permanent photo point locations would be completed. All other monitoring activities will continue to be completed throughout the monitoring period.

A visual inspection of the channel and photos taken from photo points 1 through 6 showed that the channel bed is stable throughout the stream relocation at this time.

2.4 Results of Stream and Buffer Vegetation

2.4.1 Description of Species

The following live stake 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, Tulip Poplar

Platanus occidentalis, American Sycamore

Fraxinus pennsylvanica, Green Ash

Quercus phellos, Willow Oak

Nyssa sylvatica, Blackgum

Quercus lyrata, Overcup Oak

Betula nigra, River Birch

2.4.2 Results of Vegetation Monitoring

Buffer Vegetation: Three 50 ft. x 50 ft. vegetation plots were set to determine the trees per acre in the buffer area.

Plot #	Tulip Poplar	American Sycamore	Green Ash	Willow Oak	Overcup Oak	River Birch	Blackgum	Total (Year 7)	Total (at planting)	Density (Trees/Acre)
1	5	6	19	2				32	40	544
2	3	12	8	2	8	4	1	38	55	470
3		6	8	7		7		28	32	595
Year 7 Average Density (Trees/Acre)										**536**
Year 6 Average Density										515
Year 5 Average Density										628
Year 4 Average Density										486
Year 3 Average Density										527
Year 2 Average Density										327
Year 1 Average Density										485

Site Notes: The black willow and silky dogwood live stakes were surviving along the streambank. Other vegetation noted included lespedeza, fennel, goldenrod, alder, pine, briars, soft rush, jewelweed, goldenrod, sweetgum, and various grasses.

The streambanks where the beaver dams were removed have re-vegetated with alder, silky dogwood, black willow, sycamore, and various grasses. Additional planting should not be needed along the streambanks where the beaver dams were removed.

On May 21-22, 2014, NCDOT mowed approximately 0.3 acres of the north buffer where there was a dense area of lespedeza with little planted vegetation surviving. Spot spraying was completed in other areas of the site that had lesser amounts of lespedeza noted during the monitoring period. On July 7, 2014, NCDOT mowed the 0.3 acres of the north buffer again and completed an herbicide application in this area.

On Nov. 7, 2014, NCDOT replanted the north buffer with 1 gallon trees. An additional vegetation plot (Plot #3) was set within the replanted area to determine the survival of the replanted trees.

2.4.3 Conclusions

There were three vegetation monitoring plots established throughout the buffer area. The 2015 vegetation monitoring of the site revealed an average tree density of 536 trees per acre. This average is above the minimum success criteria of 320 trees per acre after the seventh year of monitoring.

3.0 OVERALL CONCLUSIONS/RECOMMENDATIONS

The Mile Branch Mitigation Site has met the required monitoring protocols for the seventh formal year of monitoring. The channel and structures throughout the stream are stable at this time. At least two bankfull events have been visually documented by wrack lines over the 7-year monitoring period. The 536 trees per acre surviving onsite is above the minimum success criteria of 320 trees per acre after the seventh year of monitoring. Based on the September 14, 2015 site visit with NCDWR, NCDOT will replant the 1 gallon trees that did not survive within in the north buffer in increase plant survival within this area.

NCDOT proposes to continue stream and vegetation monitoring at the Mile Branch Mitigation Site for 2016.

4.0 REFERENCES

Stream Mitigation Plan for Mile Branch (Permit Site 6); Guilford County, NC, September 11, 2006.

As-Built Report for Stream Restoration on R-609IA Permit Site 6, Guilford County, NC, March 20, 2009.

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

SITE PHOTOGRAPHS, CROSS SECTION &

PHOTO POINT LOCATIONS, AND

STREAMBANK REFORESTATION PLAN

Mile Branch

Photo Point #1 (Upstream)

Photo Point #1 (Downstream)

Photo Point #2 (Upstream on Trib. 1)

Photo Point #2 (Downstream on Trib. 1)

Photo Point #3 (Upstream)
(large beaver dam removal area re-vegetated)
June 2015

Photo Point #3 (Downstream)

Mile Branch

Photo Point #4 (Upstream)

Photo Point #4 (Downstream)
(small beaver dam removal area re-vegetated)

Photo Point #5 (Upstream on Main Channel)

Photo Point #5 (Upstream on Trib. 2)

Photo Point #5 (Downstream on Main Channel)
June 2015

Mile Branch

Photo Point #6 (Upstream)

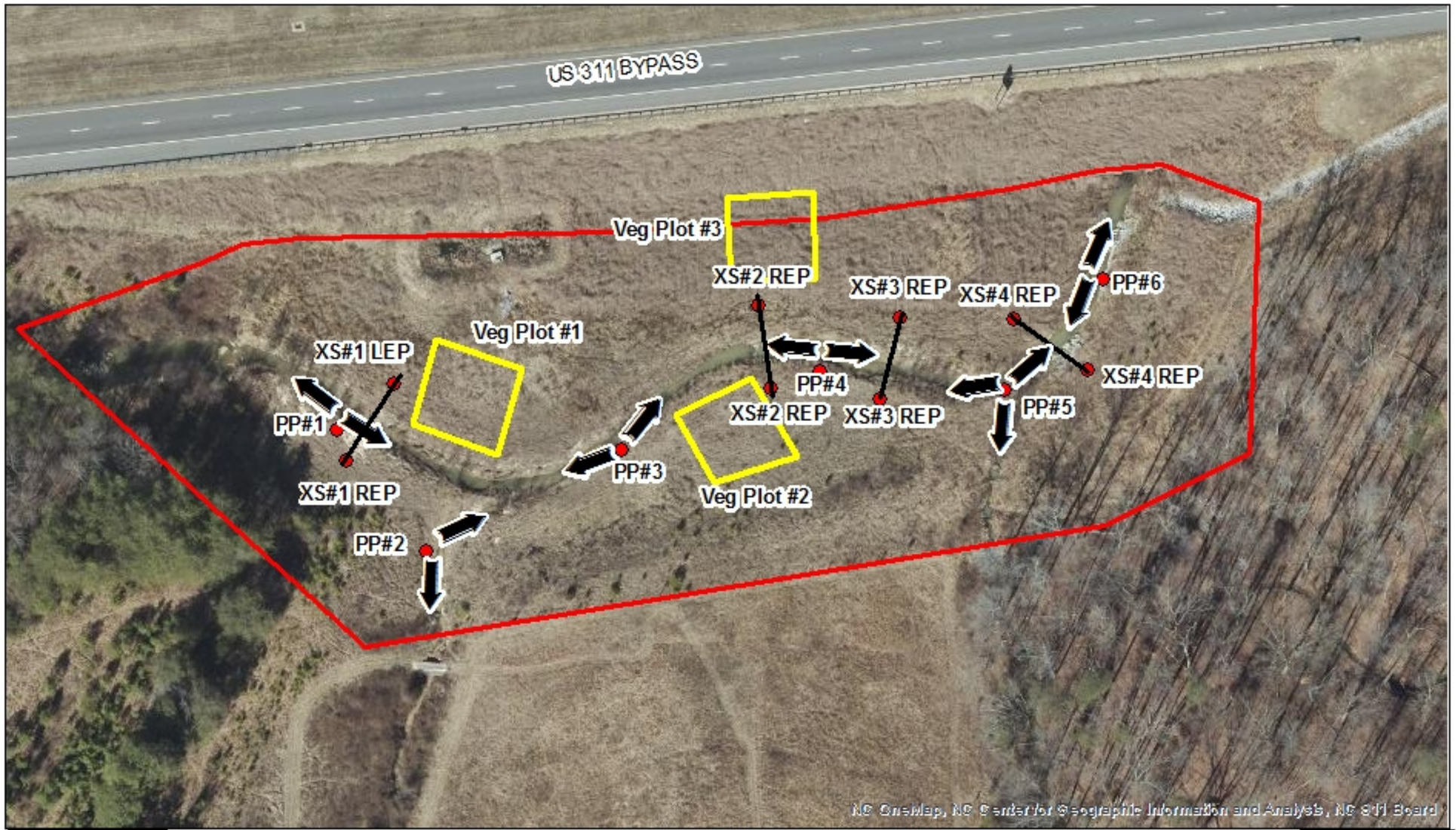
Photo Point #6 (Downstream)

Vegetation Plot #1

Vegetation Plot #2

Vegetation Plot #3
June 2015

Northern buffer area re-seeded and replanted

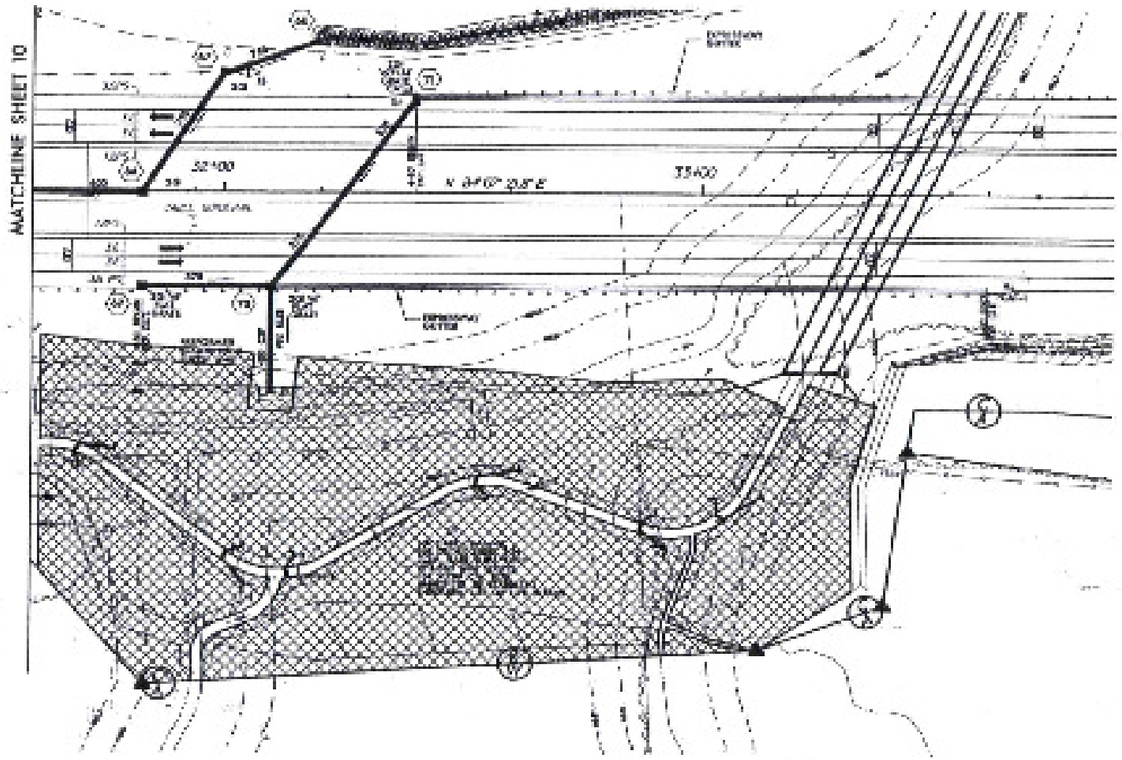


SITE MAP (Photo Point Locations, Cross Sections, & Veg. Plots)
R-6091A MILE BRANCH MITIGATION SITE
GUILFORD COUNTY, NORTH CAROLINA

0 125 250 500 Feet

N
W E
S

1.0 HECTARE STREAMBANK REFORESTATION



SEE RF–2 AND PROJECT SPECIAL PROVISIONS

Streambank Reforestation Plan
Mile Branch
Guilford County, North Carolina