Ivy Gap Branch Site N Mitigation Site
Madison County
TIP No. R-2518A
COE Action ID: SAW-2007-2197-357/300
DWR #: 20071134

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

The following report summarizes the stream monitoring activities that have occurred during the Year 2016 at the Ivy Gap Branch Site N Mitigation Site in Madison County. The North Carolina Department of Transportation (NCDOT) completed this project in January 2009 (Sta. 10+00 to 10+90) and May 2011 (Sta. 10+90 to 12+25). This report provides the monitoring results for the seventh formal year of monitoring (Year 2016). The Year 2016 monitoring period was the seventh of five scheduled years of monitoring on the Ivy Gap Branch Site N Mitigation Site (See Success Criteria Section 2.1).

Based on the overall conclusions of monitoring at the Ivy Gap Branch Site N, it has met the required monitoring protocols for the seventh formal year of monitoring on the stream and fifth formal year of monitoring on the planted vegetation. The channel throughout the stream relocation site is stable at this time. Bank pins set in July 2015 showed little to no further bank erosion with Bank Pin #4 showing the most bank pin exposed. The streambank and buffer area were planted in March 2012 with live stakes and bareroot seedlings. The planted vegetation is surviving at this time.

It was agreed by the Regulatory Agencies and NCDOT during the March 25, 2014 Annual Monitoring Meeting that the longitudinal profile could be discontinued for the remainder of the five year monitoring period due to heavy vegetation within the channel. Also, it was agreed by the Regulatory Agencies and NCDOT during the March 18, 2015 Annual Monitoring Meeting that all stream surveying could be discontinued. In lieu of doing the stream survey, bank pins will be installed in the eroded banks and measured along with the 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 monitoring period.

NCDOT proposes to discontinue visual stream and vegetation monitoring.
1.0 INTRODUCTION

1.1 Project Description

The following report summarizes the stream monitoring activities that have occurred during the Year 2016 at the Ivy Gap Branch Site N Mitigation Site. Site N is located on US 19 in Madison County at Sta. 82+20 to 82+50 -L- Rt. and Sta. 82+80 to 84+20 -L- Lt. (Figure 1). The Ivy Gap Branch Site N 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 148 linear feet of stream preservation and 581 linear feet of stream relocation. Construction was completed in January 2009 (Sta. 10+00 to 10+90) and May 2011 (Sta. 10+90 to 12+25). The stream relocation involved 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 2016 at the Ivy Gap Branch Site N Mitigation Site. Hydrologic monitoring was not required for this site.

1.3 Project History

<table>
<thead>
<tr>
<th>Date</th>
<th>Event Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>January 2009</td>
<td>Construction Completed (Sta. 10+00 to 10+90)</td>
</tr>
<tr>
<td>March 2009</td>
<td>Site Planted (Type I only)</td>
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<tr>
<td>October 2009</td>
<td>As-Built Survey Completed (Sta. 10+00 to 10+90)</td>
</tr>
<tr>
<td>November 2010</td>
<td>Stream Channel Monitoring (Year 1)</td>
</tr>
<tr>
<td>May 2011</td>
<td>Construction Completed (Sta. 10+90 to 12+25)</td>
</tr>
<tr>
<td>November 2011</td>
<td>As-Built Survey Completed (Sta. 10+90 to 12+25)</td>
</tr>
<tr>
<td>November 2011</td>
<td>Stream Channel Monitoring (Year 2)</td>
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<tr>
<td>March 2012</td>
<td>Stream Repairs (Sta. 11+15 to 11+20 Rt.)</td>
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<tr>
<td>March 2012</td>
<td>Site Planted (Type I and II)</td>
</tr>
<tr>
<td>September 2012</td>
<td>Vegetation Monitoring (Year 1)</td>
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<tr>
<td>November 2012</td>
<td>Stream Channel Monitoring (Year 3)</td>
</tr>
<tr>
<td>February 2013</td>
<td>Live Staked Upper Reach</td>
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<tr>
<td>March 2013</td>
<td>Bankfull Monitoring Gauge Installed</td>
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<tr>
<td>August 2013</td>
<td>Vegetation Monitoring (Year 2)</td>
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<tr>
<td>November 2013</td>
<td>Stream Channel Monitoring (Year 3)</td>
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<tr>
<td>July 2014</td>
<td>Vegetation Monitoring (Year 3)</td>
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<tr>
<td>November 2014</td>
<td>Stream Channel Monitoring (Year 5)</td>
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<td>July 2015</td>
<td>Installed Bank Pins</td>
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<td>July 2015</td>
<td>Vegetation Monitoring (Year 4)</td>
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<td>November 2015</td>
<td>Visual Stream Channel Monitoring (Year 6)</td>
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<tr>
<td>July 2016</td>
<td>Vegetation Monitoring (Year 5)</td>
</tr>
<tr>
<td>November 2016</td>
<td>Visual Stream Channel Monitoring (Year 7)</td>
</tr>
</tbody>
</table>
1.4 Debit Ledger

The entire Ivy Gap Branch Site N stream mitigation site was used at a 4:1 ratio for the 148 linear feet of preservation and at a 1:1 ratio for the 581 linear feet of relocation for the R-2518A project to compensate for unavoidable stream impacts.
Figure 1. Vicinity Map
Due to culvert construction, portion from Sta. 10+90 to 12+25 was completed in 2011. XS# 4, XS# 5, PP# 3, PP# 4 and profile of this portion were set in 2011. All other PP, XS and profile were set in 2009.
Due to culvert construction, portion from Sta. 10+90 to 12+25 was completed in 2011. X5$4, X5$5, P$4, P$4 and profile of this portion were set in 2011. All other PP, XS and profile were set in 2009.

Figure 3. Site N Map
Figure 4. Site N 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 DWQ in a final report within sixty (60) days after completing monitoring. After 5 years the NCDOT shall contact the DWQ to schedule a site visit to “close out” the mitigation site.

2.2 Stream Description

2.2.1 Post-Construction Conditions

The stream relocation of the Ivy Gap Branch Site N Mitigation Site involved 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 Ivy Gap Branch Site N stream restoration/relocation was to restore a B4c stream as identified in Rosgen’s Applied River Morphology. A total of five cross sections (three in a riffle and two in a pool) were surveyed. For this report, only cross sections containing riffles were used in the comparison of channel morphology. Morphology table comparison can be found in the 2010 to 2014 monitoring reports.
2.3 Results of the Stream Assessment

2.3.1 Site Data

The assessment included the survey of five cross sections and the longitudinal profile of the Ivy Gap Branch Site N established by NCDOT after construction. The length of the profile along the Ivy Gap Branch Site N was approximately 593 linear feet. Five 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 and longitudinal profile are shown in the 2010 to 2014 monitoring reports Appendix A.

Ivy Gap Branch Site N Cross-Sections:

- Cross-Section #1: Ivy Gap Branch Site N, Station 133+00, midpoint of pool
- Cross-Section #2: Ivy Gap Branch Site N, Station 214+50, midpoint of riffle
- Cross-Section #3: Ivy Gap Branch Site N, Station 236+00, midpoint of pool
- Cross-Section #4: Ivy Gap Branch Site N, Station 356+50, midpoint of riffle
- Cross-Section #5: Ivy Gap Branch Site N, Station 704+00, midpoint of riffle
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 the 2010 to 2014 monitoring reports Appendix A.

It was agreed by the Regulatory Agencies and NCDOT during the March 25, 2014 Annual Monitoring Meeting that the longitudinal profile could be discontinued for the remainder of the five year monitoring period due to heavy vegetation within the channel. Also, it was agreed by the Regulatory Agencies and NCDOT during the March 18, 2015 Annual Monitoring Meeting that stream surveying could be discontinued. In lieu of doing the stream survey, bank pins will be installed in the eroded banks and measured along with the 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 monitoring period.

The channel throughout the stream relocation site is stable at this time. Bank pins 1s, 2 and 3 set within the eroded banks showed little to no further bank erosion has occurred from July to November 2016. Pin #4 had the most bank pin exposed. Noted in 2015, a rock off of a crossvane arm on the left bank that fell into the channel at PP#2 showed little to no further change and remains stable at this time. (see Appendix A: Site Photographs). Pebble counts were not required per the permit conditions and therefore were not completed. Thirteen bankfull events were documented by a surface water gauge at Site N during the 2013 and 2014 monitoring years.
3.0 VEGETATION: IVY GAP BRANCH SITE N

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 5 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.

3.3 Conclusions
NCDOT proposes to discontinue monitoring the planted vegetation.

4.0 OVERALL CONCLUSIONS/RECOMMENDATIONS

The Ivy Gap Branch Site N Mitigation Site has met the required monitoring protocols for the seventh formal year of monitoring on the stream and the fifth formal year of monitoring on the planted vegetation. The channel throughout the stream relocation site is stable at this time with the bank pins showing little to no further erosion has occurred with Bank Pin #4 showing the most bank pin exposed. The planted vegetation is surviving at this time.

NCDOT proposes to discontinue visual stream and vegetation monitoring.
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 DWQ Project No. 20071134, Individual Certification No.
3706).

Springs, Colorado.

Prepared with cooperation from the US Environmental Protection Agency,
NC Wildlife Resources Commission, and the NC Division of Water Quality.
APPENDIX A

SITE PHOTOGRAPHS
Rock on left arm at crossvane at PP#2 fell into channel noted in 2015 has no change.

November 2016