ANNUAL REPORT FOR 2019

Aberdeen Creek Wetland Mitigation Site
Moore County
TIP No.  B-3680
COE Action ID:  SAW 2001-01373
NCDWR Project #:  12-0040

Prepared By:
Environmental Analysis Unit & Roadside Environmental Unit
North Carolina Department of Transportation
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SUMMARY

The following report summarizes the wetland monitoring activities conducted during 2019 at the Aberdeen Creek Mitigation Site. This site, situated adjacent to Bridge No. 2 over the CSX railroad on US 15/501 in Aberdeen, was designed and constructed during 2014 by the North Carolina Department of Transportation (NCDOT) in order to provide mitigation for wetland impacts associated with the construction of Transportation Improvement Program (TIP) number B-3680. This report provides the monitoring results for the fifth formal year of monitoring (Year 2019). The site must demonstrate hydrologic and vegetative monitoring success for a minimum of five years or until the site is deemed successful.

The site hydrology is monitored with five groundwater gauges including three gauges in the restoration area and two reference gauges in the adjacent wetland area. All five of the groundwater gauges met the jurisdictional criteria for wetland hydrology (>12.5% of the growing season) in 2019.

Two vegetation plots were established to monitor the vegetation planted in the 1.67 acre restoration site. The 2019 vegetation monitoring revealed an average density of 680 trees per acre, which is above the minimum success criteria of 260 trees per acre for year five.

NCDOT proposes to discontinue hydrologic and vegetation monitoring at the Aberdeen Creek Mitigation Site.
1.0 INTRODUCTION

1.1 Project Description

The following report summarizes the wetland monitoring activities that have occurred during 2019 at the Aberdeen Creek mitigation site. The site is located adjacent to Bridge No. 2 over the CSX railroad on US 15/501 in Aberdeen (Figure 1). The site was constructed to provide 1.67 acres of wetland restoration and 118 linear feet of stream restoration to offset impacts associated with the B-3680 project.

1.2 Purpose

In order to demonstrate successful mitigation, hydrologic and vegetative monitoring must be conducted for a minimum of five years or until success criteria are satisfied. Success criteria are based on federal guidelines for wetland mitigation. Criteria for hydrologic conditions and vegetation survival are included in these documents. The following report details the results of hydrologic and vegetation monitoring during the 2019 growing season at the Aberdeen Creek Mitigation Site.

1.3 Project History

<table>
<thead>
<tr>
<th>Date Range</th>
<th>Event Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>September 2014</td>
<td>Herbicide application for privet</td>
</tr>
<tr>
<td>October-December 2014</td>
<td>Site Constructed</td>
</tr>
<tr>
<td>March 2015</td>
<td>Gauges Installed</td>
</tr>
<tr>
<td>April 2015</td>
<td>Wetland Restoration Area Planted</td>
</tr>
<tr>
<td>March-November 2015</td>
<td>Hydrologic Monitoring (Year 1)</td>
</tr>
<tr>
<td>June 2015</td>
<td>Vegetation Monitoring (Year 1)</td>
</tr>
<tr>
<td>October 2015</td>
<td>Herbicide application for privet</td>
</tr>
<tr>
<td>January 2016</td>
<td>Live staking and supplemental planting completed</td>
</tr>
<tr>
<td>March-November 2016</td>
<td>Hydrologic Monitoring (Year 2)</td>
</tr>
<tr>
<td>June 2016</td>
<td>Vegetation Monitoring (Year 2)</td>
</tr>
<tr>
<td>October 2016</td>
<td>Herbicide application on kudzu</td>
</tr>
<tr>
<td>June 2017</td>
<td>Vegetation Monitoring (Year 3)</td>
</tr>
<tr>
<td>March-November 2017</td>
<td>Hydrologic Monitoring (Year 3)</td>
</tr>
<tr>
<td>August 2018</td>
<td>Vegetation Monitoring (Year 4)</td>
</tr>
<tr>
<td>August 2018</td>
<td>Herbicide application on kudzu</td>
</tr>
<tr>
<td>August 2018</td>
<td>Onsite Agency Review</td>
</tr>
<tr>
<td>March-November 2018</td>
<td>Hydrologic Monitoring (Year 4)</td>
</tr>
<tr>
<td>May 2019</td>
<td>Herbicide application on kudzu along fill slope</td>
</tr>
<tr>
<td>June 2019</td>
<td>Vegetation Monitoring (Year 5)</td>
</tr>
<tr>
<td>March-November 2019</td>
<td>Hydrologic Monitoring (Year 5)</td>
</tr>
</tbody>
</table>
1.4 Debit Ledger

The entire Aberdeen Creek mitigation site was used for the B-3680 project to compensate for unavoidable wetland and stream impacts.
Figure 1. Site Location Map
2.0 HYDROLOGY

2.1 Success Criteria
In accordance with the mitigation plan and permit for wetland mitigation, the success criteria for hydrology states that the area must be inundated or saturated (within 12” of the surface) by surface or ground water for at least a consecutive 12.5% of the growing season. The hydrologic monitoring shall persist for a total of five years with monitoring reports submitted annually.

The growing season in Moore County begins March 23 and ends November 7. These dates correspond to a 50% probability that temperatures will remain above 28° F or higher after March 23 and before November 7. The growing season is 230 days; therefore hydrology for 12.5% of the growing season is at least 29 consecutive days. Local climate must represent average conditions for the area in order for the hydrologic data to be valid.

2.2 Hydrologic Description
Five groundwater monitoring gauges are used to record site hydrologic data including three in the restoration area and two reference gauges in the existing adjacent wetland area. The groundwater gauges are set to record daily water levels. The hydrologic response (groundwater) to rainfall events is evaluated using data provided by the North Carolina State Climate Office.

Appendix A contains a plot of the water depth for each of the groundwater monitoring gauges for 2019. Precipitation events, provided by the State Climate Office, are included on each groundwater graph as bars.

2.3 Results of Hydrologic Monitoring
2.3.1 Site Data
The total number of consecutive days that the groundwater was within twelve inches of the surface was determined for each groundwater monitoring gauge. This number was converted into a percentage of the growing season. Table 1 presents the hydrologic results for 2019. Table 2 presents the hydrologic results at the site since construction was completed. Figure 3 is a graphical representation of the hydrologic monitoring results for 2019.
Figure 2. Monitoring Gauge Location Map
Table 1. 2019 Hydrologic Monitoring Results

<table>
<thead>
<tr>
<th>Monitoring Gauge</th>
<th>&lt; 5%</th>
<th>5 – 12.5%</th>
<th>&gt; 12.5%</th>
<th>Actual %</th>
<th>Dates of Success</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACGW-1</td>
<td>X</td>
<td>100.0</td>
<td></td>
<td></td>
<td>March 23 – Nov. 7</td>
</tr>
<tr>
<td>ACGW-2</td>
<td>X</td>
<td>100.0</td>
<td></td>
<td></td>
<td>March 23 – Nov. 7</td>
</tr>
<tr>
<td>ACGW-3</td>
<td>X</td>
<td>42.6</td>
<td></td>
<td></td>
<td>March 23 – June 28, July 11 – Sept. 18</td>
</tr>
<tr>
<td>*ACREF-1</td>
<td>X</td>
<td>54.8</td>
<td></td>
<td></td>
<td>April 12 – Aug. 15</td>
</tr>
<tr>
<td>*ACREF-2</td>
<td>X</td>
<td>54.8</td>
<td></td>
<td></td>
<td>March 23 – July 7, July 5 – Nov. 7</td>
</tr>
</tbody>
</table>

*ACREF-1 & ACREF-2 are located in the adjacent existing wetland area.
*Appendix A contains plots of groundwater data during 2019.

Table 2. 2015-2019 Hydrologic Monitoring Results

<table>
<thead>
<tr>
<th>Monitoring Gauge</th>
<th>2015 Results</th>
<th>2016 Results</th>
<th>2017 Results</th>
<th>2018 Results</th>
<th>2019 Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACGW-1</td>
<td>36.0</td>
<td>100.0</td>
<td>100.0</td>
<td>100.0</td>
<td>100.0</td>
</tr>
<tr>
<td>ACGW-2</td>
<td>18.9</td>
<td>100.0</td>
<td>100.0</td>
<td>100.0</td>
<td>100.0</td>
</tr>
<tr>
<td>ACGW-3</td>
<td>18.9</td>
<td>100.0</td>
<td>83.5</td>
<td>27.2</td>
<td>42.6</td>
</tr>
<tr>
<td>ACREF-1</td>
<td>36.0</td>
<td>100.0</td>
<td>45.7</td>
<td>51.3</td>
<td>54.8</td>
</tr>
<tr>
<td>ACREF-2</td>
<td>36.0</td>
<td>23.7</td>
<td>36.5</td>
<td>25.7</td>
<td>54.8</td>
</tr>
<tr>
<td>Climate Conditions</td>
<td>Average Rainfall</td>
<td>Average Rainfall</td>
<td>Average Rainfall</td>
<td>Above Average Rainfall</td>
<td>Average Rainfall</td>
</tr>
</tbody>
</table>

2.3.2 Climatic Data

Figure 4 is a comparison of monthly rainfall for the period of November 2018 through November 2019 to historical precipitation (collected between 1985 and 2014) for Sandhills Research Station in Moore County. This comparison gives an indication of how 2019 relates to historical data in terms of climate conditions. The NC State Climate Office provided all local rainfall information.

For the 2019-year, March, June, and October experienced average rainfall. May, July, August, and September recorded below average rainfall while January, February, April, and November recorded above average rainfall. Overall 2019 experienced an average rainfall year.
2.4 Conclusions

The 2019 year represents the fifth year that hydrologic data has been collected on the Aberdeen Creek mitigation site. All five of the groundwater monitoring gauges met the jurisdictional criteria for wetland hydrology (>12.5% of the growing season) in the 2019 monitoring year.

NCDOT proposes discontinuing hydrology monitoring at the Aberdeen Creek mitigation site.
Figure 3. 2019 Hydrologic Monitoring Results
Figure 4. 30-70 Percentile Graph 2019
3.0 VEGETATION: ABERDEEN CREEK WETLAND MITIGATION SITE (YEAR 5 Monitoring)

3.1 Success Criteria

**Mitigation Plan:** Success for vegetation monitoring within the riparian buffer and wetland areas are based on survival of at least 260 stems per acre of five year old trees at year five. Assessment of channel stability will be based on the survival of riparian vegetation and lack of significant bank erosion, channel widening or down-cutting.

**ACOE Permit:** All stream and wetland restoration areas shall be monitored for a minimum of 5 years or until deemed successful by the Corps. The success of wetland vegetation planting in the re-established wetland and stream buffer areas will be gauged by stem counts of planted species within the mitigation areas. Survival of planted species must meet or exceed 320 three year old trees after three years and 260 five year old trees after five years.

**DWR Permit:** The permittee shall visually monitor the vegetative plantings to assess and ensure complete stabilization of the mitigation stream segments. The monitoring shall be conducted annually for a minimum of 3 years after final planting. Photo documentation shall be utilized to document the success of the riparian vegetation and submitted to NCDWR in a final report within sixty days after completing monitoring.

3.2 Description of Species

The following live stake species were planted in the Streambank Restoration Area:

- *Salix nigra*, Black Willow
- *Cornus amomum*, Silky Dogwood

The following tree species were planted in the Wetland Restoration Area:

- *Quercus nigra*, Water Oak
- *Platanus occidentalis*, American Sycamore
- *Fraxinus pennsylvanica*, Green Ash
- *Betula nigra*, River Birch
3.3 Results of Vegetation Monitoring

Site Notes: The stream is stable at this time. Beaver dams were noted at the time of monitoring. USDA is currently working to remove the beavers and dams from the site. The planted silky dogwood and black willow were noted surviving along the streambank and tag alder has volunteered along the streambank as well. Pockets of standing water were noted throughout the site. Other species noted onsite included *Juncus* sp., tag alder, woolgrass, fennel, sweetgum, red maple, black willow, pine, lespedeza, baccharis, wax myrtle, tulip poplar, cattail, and various grasses. Kudzu was noted along the fill slope adjacent to the site. NCDOT treated the kudzu in May 2019 and on previous dates throughout the monitoring period.

3.4 Conclusions

There is a total of two vegetation monitoring plots established throughout the wetland restoration area. The 2019 vegetation monitoring of the site revealed an average tree density of 680 trees per acre. This average is well above the minimum success criteria of 260 trees per acre for Year 5. NCDOT proposes to discontinue monitoring vegetation at the Aberdeen Creek Wetland Mitigation Site.
4.0 OVERALL CONCLUSIONS / RECOMMENDATIONS

The 2019 year represents the fifth year that hydrologic data has been collected on the Aberdeen Creek mitigation site. All five of the groundwater monitoring gauges met the jurisdictional criteria for wetland hydrology (>12.5% of the growing season) during the 2019 growing season.

There were two vegetation monitoring plots established throughout the wetland restoration area. The 2019 vegetation monitoring revealed an average density of 680 trees per acre, which is well above the minimum success criteria of 260 trees per acre.

NCDOT proposes to discontinue hydrologic and vegetation monitoring at the Aberdeen Creek mitigation site.
APPENDIX A

GROUNDWATER GAUGE DATA
Aberdeen Creek

ACGW-2

Depth to Groundwater (ft.)

Precipitation (in.)

Beginning of growing season

End of growing season

230 Days

Date


Rain Gauge  11312C46  Required Depth
APPENDIX B

SITE PHOTOS, PHOTO LOCATIONS, AS-BUILT PLAN SHEETS AND PLOT LOCATIONS MAP
Aberdeen Creek Wetland Mitigation Site

Photo Point #1 looking at Vegetation Plot #1

Photo Point #2 looking upstream at Devil Gut Branch

Photo Point #2 looking downstream at Devil Gut Branch

Photo Point #3 looking at Vegetation Plot #2

Devil Gut Branch Overview Photo Looking Upstream

June 2019