ANNUAL REPORT FOR 2015

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

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

The following report summarizes the wetland monitoring activities conducted during 2015 at the Aberdeen Creek mitigation site. This site, situated adjacent to Bridge No. 2 over the CSX railroad on US 15/501in 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 first formal year of monitoring (Year 2015). 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 2015.

Two vegetation plots were established to monitor the vegetation planted in the 1.67 acre restoration site. The 2015 vegetation monitoring revealed an average density of 612 trees per acre, which is above the minimum success criteria of 320 trees per acre for year one.

NCDOT will continue hydrologic and vegetation monitoring at the Aberdeen Creek mitigation site in 2016.

1.0 INTRODUCTION

1.1 Project Description

The following report summarizes the wetland monitoring activities that have occurred during 2015 at the Aberdeen Creek mitigation site. The site is located adjacent to Bridge No. 2 over the CSX railroad on US 15/501in 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 2015 growing season at the Aberdeen Creek mitigation site.

1.3 Project History

September 2014	Herbicide application for privet
October-December 2014	Site Constructed
March 2015	Gauges Installed
April 2015	Wetland Restoration Area Planted
March-November 2015	Hydrologic Monitoring (Year 1)
June 2015	Vegetation Monitoring (Year 1)
October 2015	Herbicide application for privet

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.

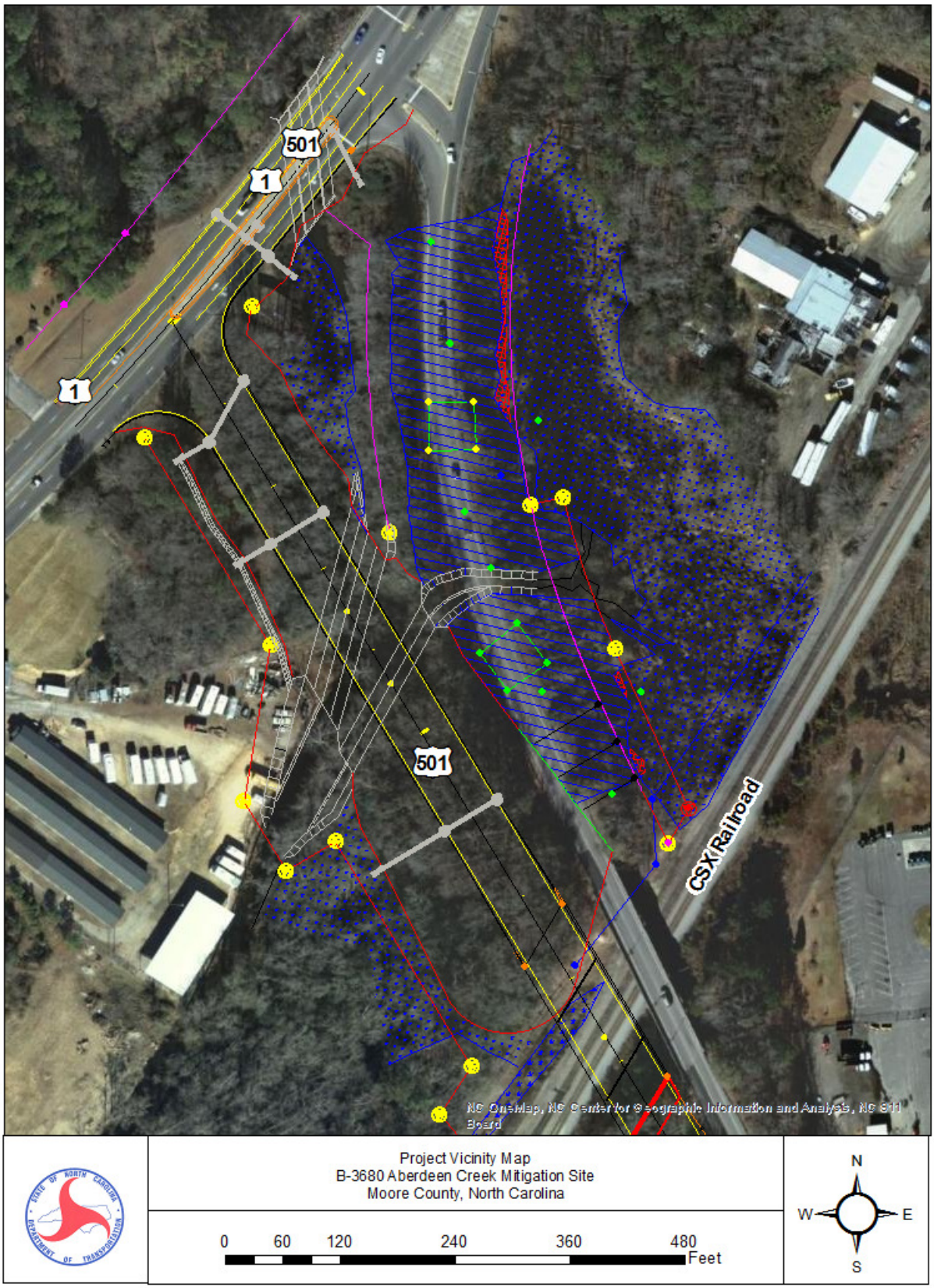

Figure 1. Site Location Map

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^{o} F or higher after March 23 and before November 7. The growing season is 228 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 2015. 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 2015. 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 2015.

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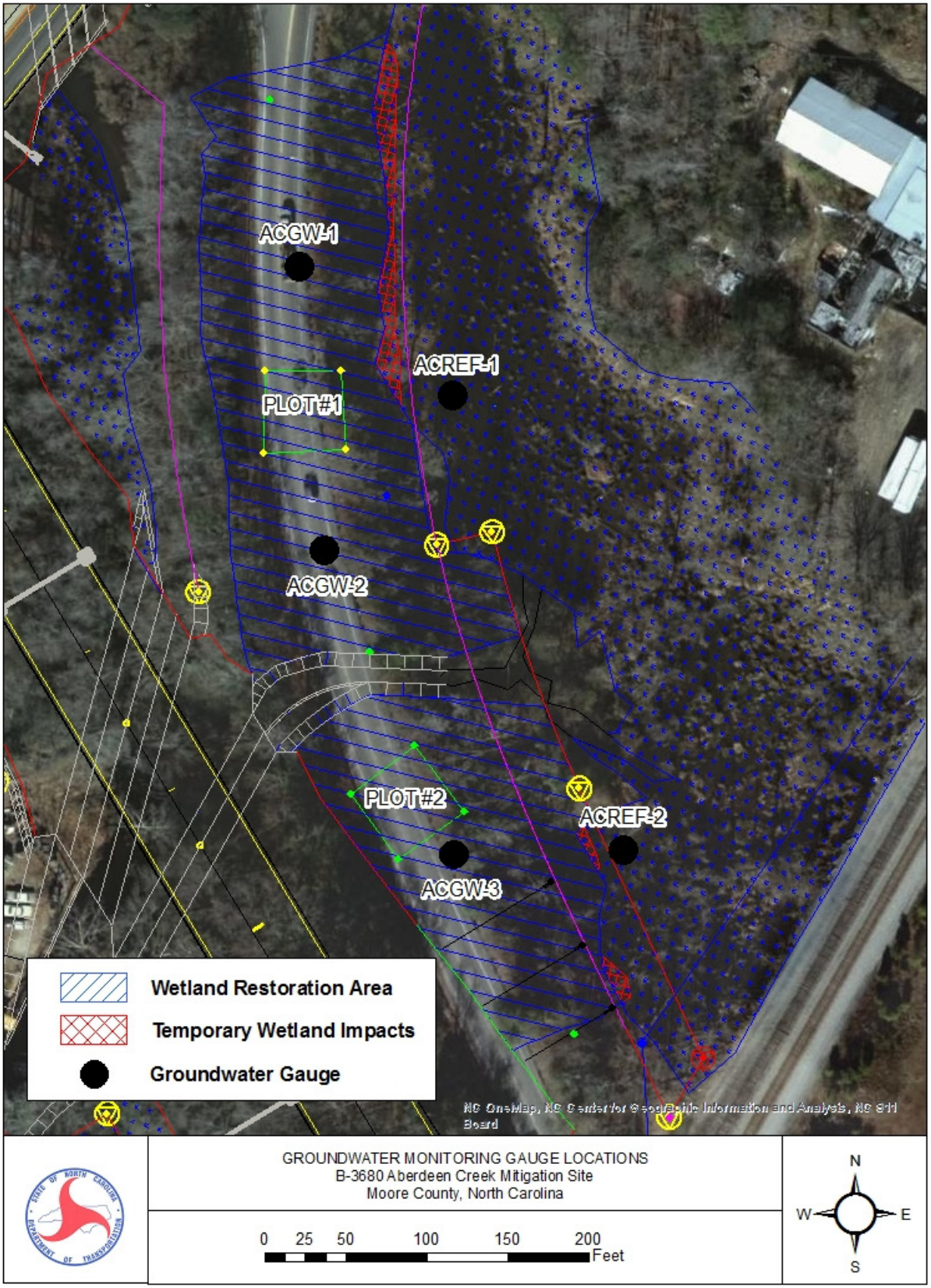


Figure 2. Monitoring Gauge Location Map

Table 1. 2015 Hydrologic Monitoring Results

Monitoring Gauge	< 5%	5 – 12.5%	> 12.5%	Actual %	Dates of Success
ACGW-1			**X**	**36.0**	June 27 – Aug. 2, Aug, 18 – Nov. 7
ACGW-2			**X**	**18.9**	June 27 – July 31, Sept. 26 – Nov. 7
ACGW-3			**X**	**18.9**	June 27 – July 30, Aug. 18 – Sept. 15, Sept. 26 – Nov. 7
*ACREF-1			**X**	**36.0**	March 17 – May 17, June 27 – July 31, Aug. 18 – Nov. 7
*ACREF-2			**X**	**36.0**	March 17 – May 16, June 27 – Aug. 1, Aug. 18 – Nov. 7

*ACREF-1 & ACREF-2 are located in the adjacent existing wetland area.
*Appendix A contains plots of groundwater data during 2015.

Table 2. 2015-2019 Hydrologic Monitoring Results

Monitoring Gauge	2015 Results	2016 Results	2017 Results	2018 Results	2019 Results
ACGW-1	36.0				
ACGW-2	18.9				
ACGW-3	18.9				
ACREF-1	36.0				
ACREF-2	36.0				
Climate Conditions	Average Rainfall				

2.3.2 Climatic Data

Figure 4 is a comparison of monthly rainfall for the period of January 2015 through November 2015 to historical precipitation (collected between 1985 and 2014) for Drowning Creek in Moore County. This comparison gives an indication of how 2015 relates to historical data in terms of climate conditions. The NC State Climate Office provided all local rainfall information.

For the 2015-year, January, February, April, June and September experienced average rainfall. March, May, July, and August recorded below average rainfall while October and November recorded above average rainfall. Overall 2015 experienced an average rainfall year.

2.4 Conclusions

The 2015 year represents the first 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 2015 monitoring year.

NCDOT will continue to monitor the hydrology at the Aberdeen Creek mitigation site in 2016.

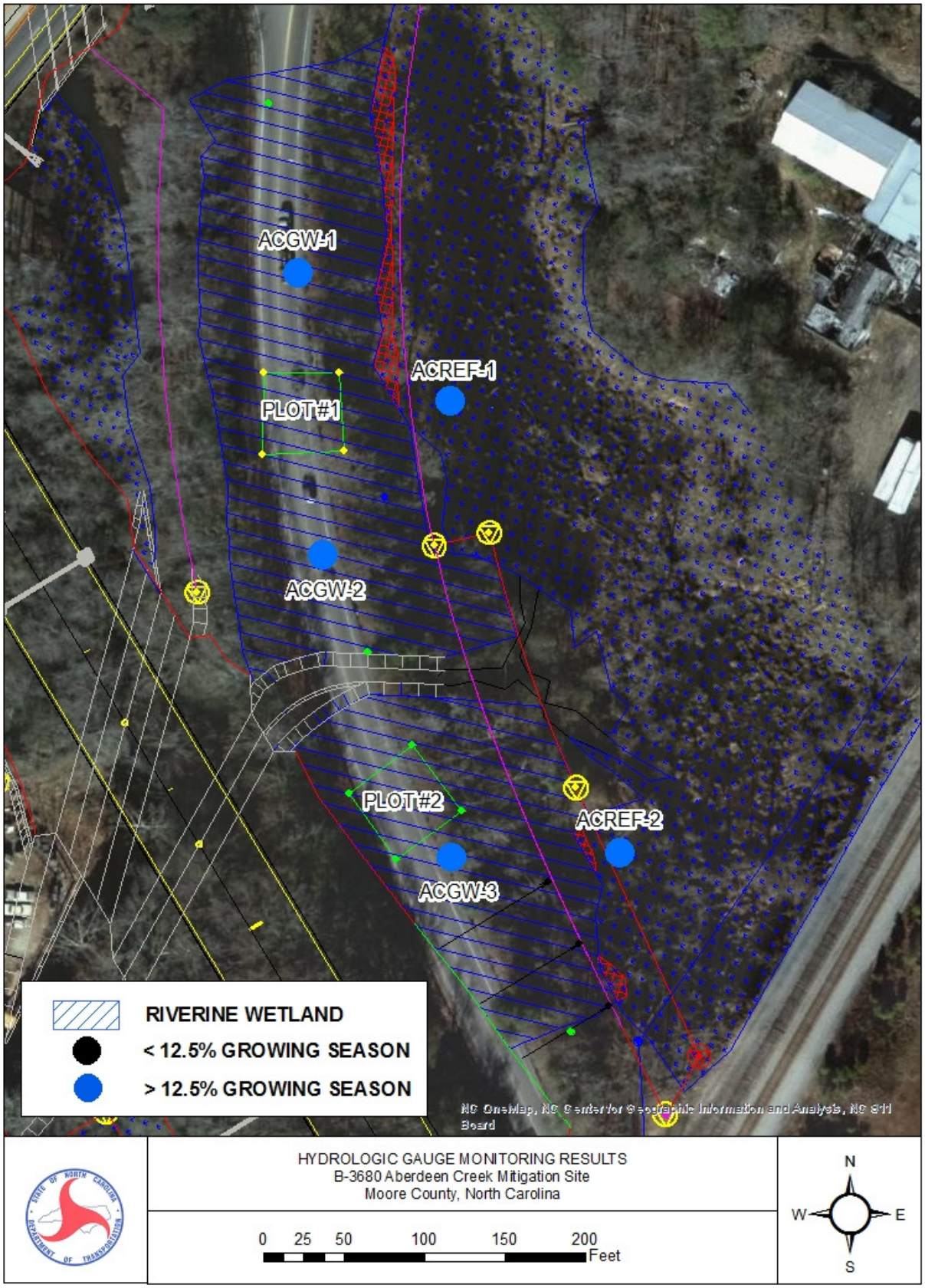


Figure 3. 2015 Hydrologic Monitoring Results

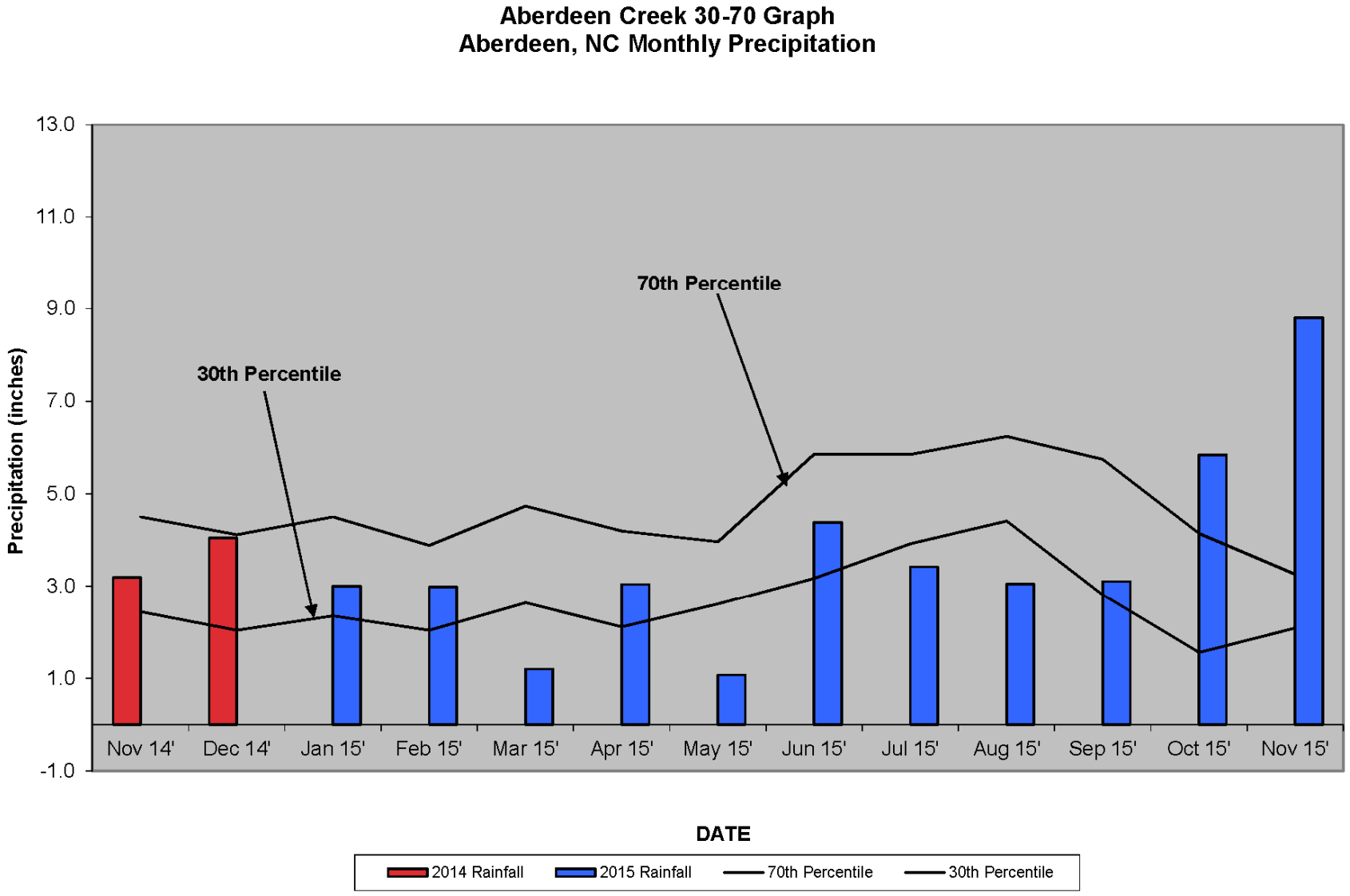


Figure 4. 30-70 Percentile Graph 2015

3.0 VEGETATION: ABERDEEN CREEK MITIGATION SITE (YEAR 1 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 stakes were planted along Streambank:

Salix nigra, Black Willow

Cornus amomum, Silky Dogwood

The following tree species were planted in the Wetland Restoration and Buffer Areas:

Quercus nigra, Water Oak

Platanus occidentalis, American Sycamore

Fraxinus pennsylvanica, Green Ash

Betula nigra, River Birch

3.3 Results of Vegetation Monitoring

Table 3. Vegetation Monitoring Statistics

Plot #	Water Oak	Sycamore	Green Ash	River Birch	Total (Year 1)	Total (at planting)	Density (Trees/Acre)
1			18	29	47	47	680
2	5	5	5	13	28	35	544
Year 1 Average Density (Trees/Acre)							**612**

Site Notes: Other species noted onsite included *Juncus* sp., alder, cattail, woolgrass, fennel, and various grasses. Live staking of the streambank was not completed during the April 2015 planting date so this will be completed during the 2015/2016 planting window. Privet that was noted along the perimeter of the mitigation site was treated with an herbicide application in September 2014 and October 2015. The silt fence noted during the June 2015 monitoring evaluation photos has since been removed from the project. Seedlings that were disturbed during the silt fence removal or noted dead seedlings will be replanted during the 2015/2016 planting window as well.

3.4 Conclusions

There are a total of two vegetation monitoring plots established throughout the wetland restoration area. The 2015 vegetation monitoring of the site revealed an average tree density of 612 trees per acre. This average is well above the minimum success criteria of 320 trees per acre for Year 1. NCDOT will live stake the streambank and replant any dead or missing seedlings from the silt fence removal during the 2015/2016 planting window.

NCDOT proposes to continue monitoring vegetation at the Aberdeen Creek Wetland Mitigation Site for 2016.

4.0 OVERALL CONCLUSIONS/ RECOMMENDATIONS

The 2015 year represents the first 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 2015 growing season.

There were two vegetation monitoring plots established throughout the wetland restoration area. The 2015 vegetation monitoring revealed an average density of 612 trees per acre, which is well above the minimum success criteria of 320 trees per acre.

NCDOT will continue hydrologic and vegetation monitoring at the Aberdeen Creek mitigation site in 2016.

APPENDIX A

GROUNDWATER GAUGE DATA

APPENDIX B

SITE PHOTOS, PHOTO LOCATIONS, AS-BUILT PLAN SHEETS

AND PLOT LOCATIONS MAP

Aberdeen Creek Wetland Mitigation Site

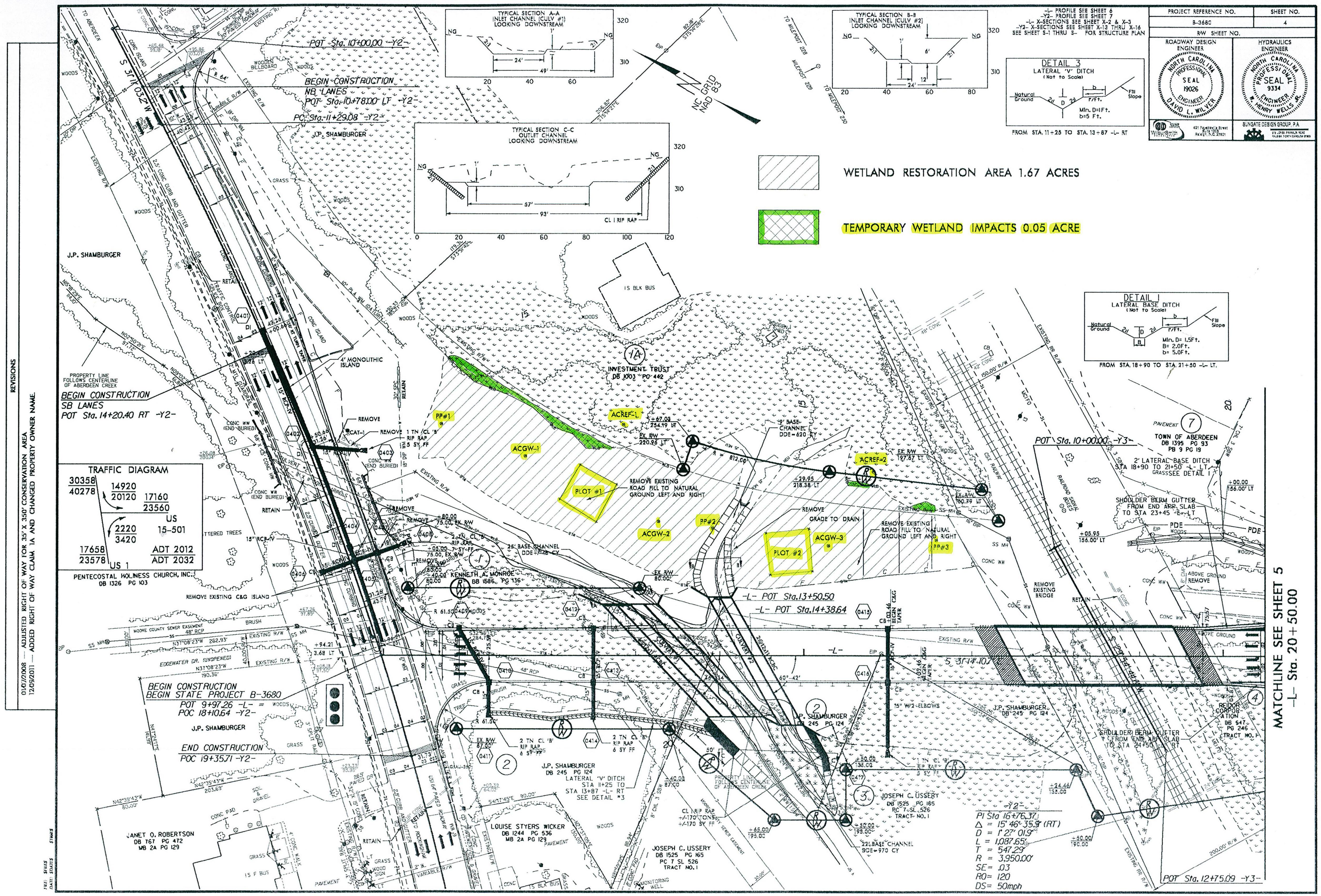
Photo Point #1 Looking at Vegetation Plot 1

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

June 2015



PROJECT REFERENCE NO. B-3680
SHEET NO. 4
R/W SHEET NO.
ROADWAY DESIGN ENGINEER
HYDRAULICS ENGINEER
-L- PROFILE SEE SHEET 6
-Y2- PROFILE SEE SHEET 7
-L- X-SECTIONS SEE SHEET X-2 & X-3
-Y2- X-SECTIONS SEE SHEET X-13 THRU X-16
SEE SHEET S-1 THRU S- FOR STRUCTURE PLAN
TYPICAL SECTION A-A
INLET CHANNEL (CULV #1)
LOOKING DOWNSTREAM
TYPICAL SECTION B-B
INLET CHANNEL (CULV #2)
LOOKING DOWNSTREAM
TYPICAL SECTION C-C
OUTLET CHANNEL
LOOKING DOWNSTREAM
DETAIL 3
LATERAL 'V' DITCH
(Not to Scale)
FROM STA. 11+25 TO STA. 13+87 -L- RT
DETAIL 1
LATERAL BASE DITCH
(Not to Scale)
FROM STA. 18+90 TO STA. 21+50 -L- LT.
WETLAND RESTORATION AREA 1.67 ACRES
TEMPORARY WETLAND IMPACTS 0.05 ACRE
NC GRID NAD 83
TRAFFIC DIAGRAM
ADT 2012
ADT 2032
BEGIN CONSTRUCTION
NB LANES
POT Sta. 10+78.00 LT -Y2-
BEGIN CONSTRUCTION
SB LANES
POT Sta. 14+20.40 RT -Y2-
BEGIN CONSTRUCTION
BEGIN STATE PROJECT B-3680
POT 9+97.26 -L- =
POC 18+10.64 -Y2-
END CONSTRUCTION
POC 19+35.71 -Y2-
INVESTMENT TRUST
PLOT #1
PLOT #2
ACGW-1
ACGW-2
ACGW-3
ACREF-1
ACREF-2
PP#1
PP#2
PP#3
J.P. SHAMBURGER
PENTECOSTAL HOLINESS CHURCH, INC.
KENNETH A. MONROE
TOWN OF ABERDEEN
JOSEPH C. USSERY
LOUISE STYERS WICKER
JANET O. ROBERTSON
MATCHLINE SEE SHEET 5
-L- Sta. 20+50.00
REVISIONS
01/03/2008 — ADJUSTED RIGHT OF WAY FOR 35' X 350' CONSERVATION AREA
12/09/2011 — ADDED RIGHT OF WAY CLAIM 1A AND CHANGED PROPERTY OWNER NAME.

PROJECT REFERENCE NO.
B-3680
SHEET NO.
4
R/W SHEET NO.
ROADWAY DESIGN ENGINEER
HYDRAULICS ENGINEER
SUNGATE DESIGN GROUP, P.A.
*AS-BUILT PLANS
WETLAND RESTORATION AREA 1.67 ACRES
TEMPORARY WETLAND IMPACTS 0.05 ACRE
TYPICAL SECTION A-A INLET CHANNEL (CULV #1) LOOKING DOWNSTREAM
TYPICAL SECTION B-B INLET CHANNEL (CULV #2) LOOKING DOWNSTREAM
TYPICAL SECTION C-C OUTLET CHANNEL LOOKING DOWNSTREAM
DETAIL 3 LATERAL "V" DITCH (Not to Scale)
FROM STA. 11+25 TO STA. 13+87 -L- RT
DETAIL 1 LATERAL BASE DITCH (Not to Scale)
FROM STA. 18+90 TO STA. 21+50 -L- LT.
POT Sta. 10+00.00 -Y2-
BEGIN CONSTRUCTION NB LANES POT Sta. 10+78.00 LT -Y2-
PC Sta. 11+29.08 -Y2-
BEGIN CONSTRUCTION SB LANES POT Sta. 14+20.40 RT -Y2-
TRAFFIC DIAGRAM
30358
40278
14920
20120
17160
23560
US 15-501
2220
3420
17658
23578
US 1
ADT 2012
ADT 2032
PENTECOSTAL HOLINESS CHURCH, INC.
BEGIN CONSTRUCTION BEGIN STATE PROJECT B-3680
POT 9+97.26 -L-
POC 18+10.64 -Y2-
END CONSTRUCTION
POC 19+35.71 -Y2-
-L- POT Sta. 13+50.50
-L- POT Sta. 14+38.64
S 31°14'10.7" E
POT Sta. 10+00.00 -Y3-
POT Sta. 12+76.09 -Y3-
MATCHLINE SEE SHEET 5 -L- Sta. 20+50.00
-Y2-
PI Sta 16+76.37
Δ = 15°46' 35.9" (RT)
D = 1°27' 01.9"
L = 1,087.65'
T = 547.29'
R = 3,950.00'
SE = .03
RO = 120
DS = 50mph