

ANNUAL REPORT FOR 2016



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



Prepared By:
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 2016 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 second formal year of monitoring (Year 2016). 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 2016.

Two vegetation plots were established to monitor the vegetation planted in the 1.67 acre restoration site. The 2016 vegetation monitoring revealed an average density of 680 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 2017.

1.0 INTRODUCTION

1.1 Project Description

The following report summarizes the wetland monitoring activities that have occurred during 2016 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 2016 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
January 2016	Live staking and supplemental planting completed
March-November 2016	Hydrologic Monitoring (Year 2)
June 2016	Vegetation Monitoring (Year 2)

1.4 Debit Ledger

The entire Aberdeen Creek mitigation site was used at a 1:1 ratio for the B-3680 project to compensate for unavoidable wetland and stream impacts.

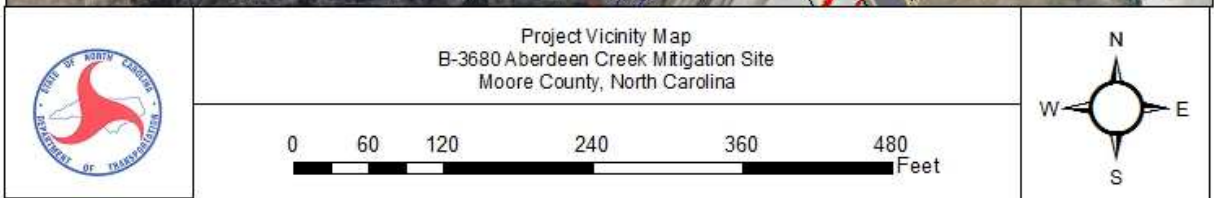
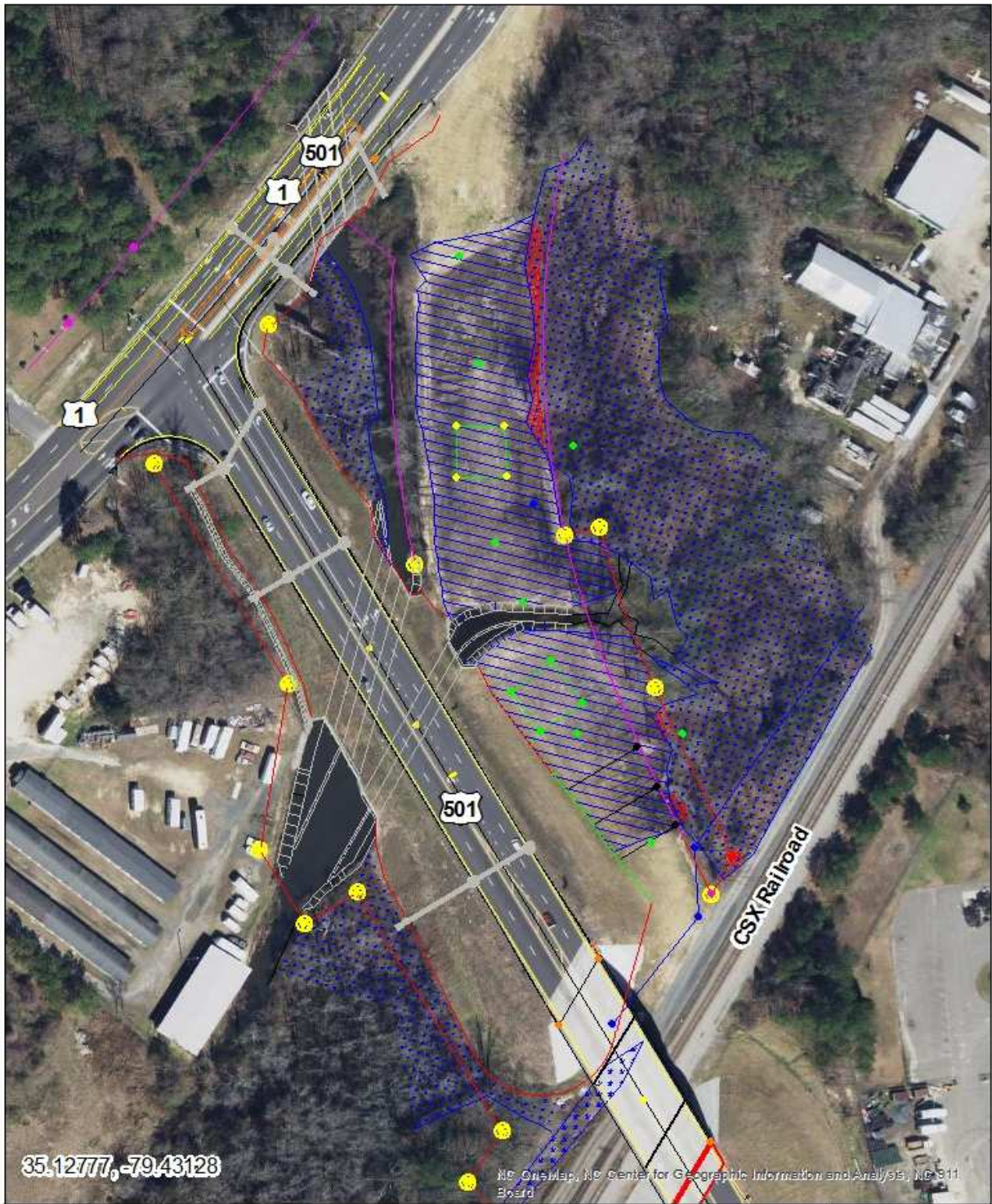


Figure 1. Site Location Map

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 2016. 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 2016. 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 2016.

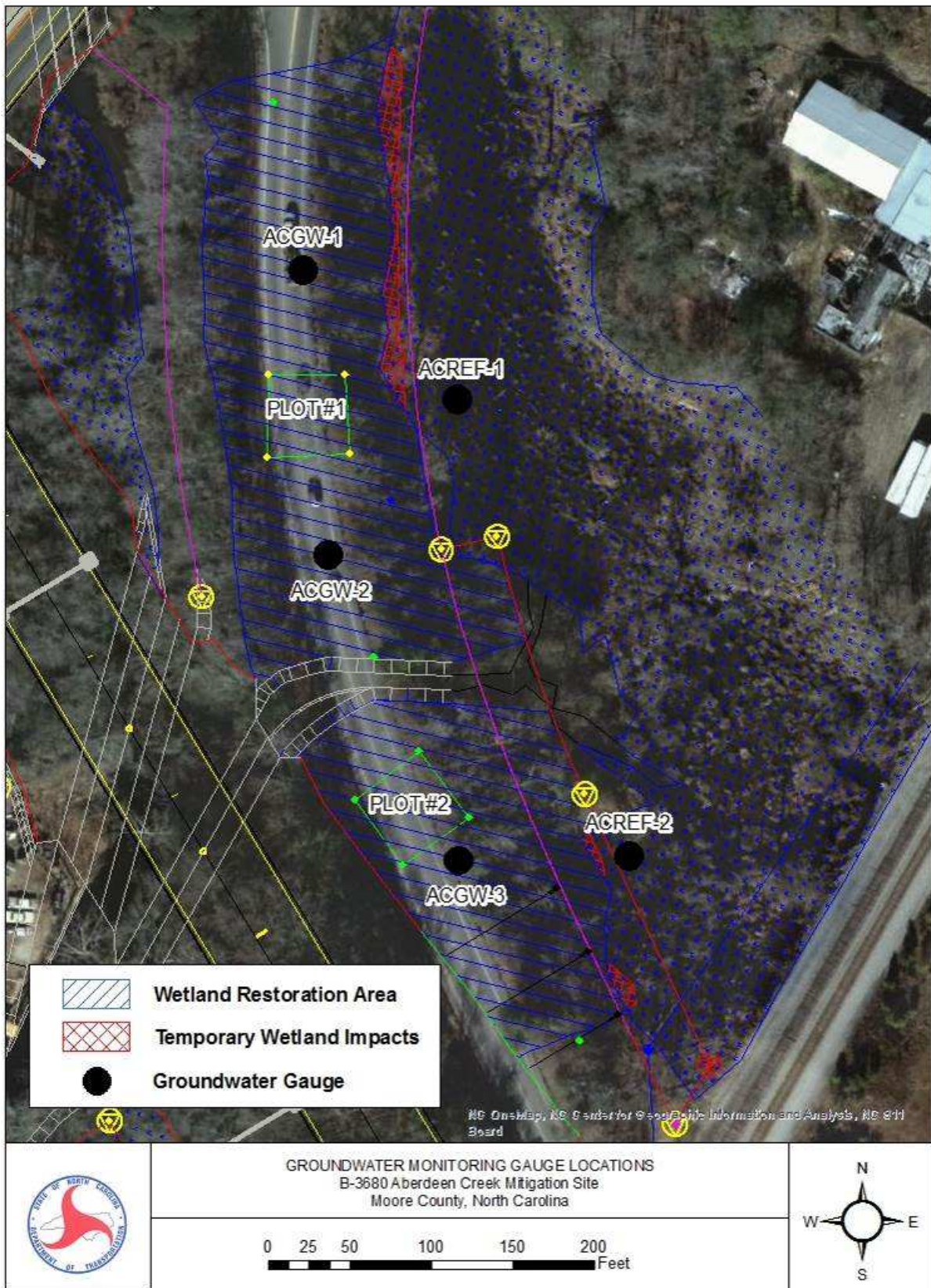


Figure 2. Monitoring Gauge Location Map

Table 1. 2016 Hydrologic Monitoring Results

Monitoring Gauge	< 5%	5 – 12.5%	> 12.5%	Actual %	Dates of Success
ACGW-1			X	100.0	March 23 – Nov. 7
ACGW-2			X	100.0	March 23 – Nov. 7
ACGW-3			X	100.0	March 23 – Nov. 7
*ACREF-1			X	100.0	March 23 – Nov. 7
*ACREF-2			X	23.7	March 23 – May 15, June 25 – Aug. 12, Sept. 3 – Nov. 7

*ACREF-1 & ACREF-2 are located in the adjacent existing wetland area.

*Appendix A contains plots of groundwater data during 2016.

Table 2. 2015-2019 Hydrologic Monitoring Results

Monitoring Gauge	2015 Results	2016 Results	2017 Results	2018 Results	2019 Results
ACGW-1	36.0	100.0			
ACGW-2	18.9	100.0			
ACGW-3	18.9	100.0			
ACREF-1	36.0	100.0			
ACREF-2	36.0	23.7			
Climate Conditions	Average Rainfall	Average Rainfall			

2.3.2 Climatic Data

Figure 4 is a comparison of monthly rainfall for the period of January 2016 through November 2016 to historical precipitation (collected between 1985 and 2014) for Drowning Creek in Moore County. This comparison gives an indication of how 2016 relates to historical data in terms of climate conditions. The NC State Climate Office provided all local rainfall information.

For the 2016-year, July, and August experienced average rainfall. January, March, April, and November recorded below average rainfall while February, May, June, September, and October recorded above average rainfall. Overall 2016 experienced an average rainfall year.

2.4 Conclusions

The 2016 year represents the second 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 2016 monitoring year.

NCDOT will continue to monitor the hydrology at the Aberdeen Creek mitigation site in 2017.

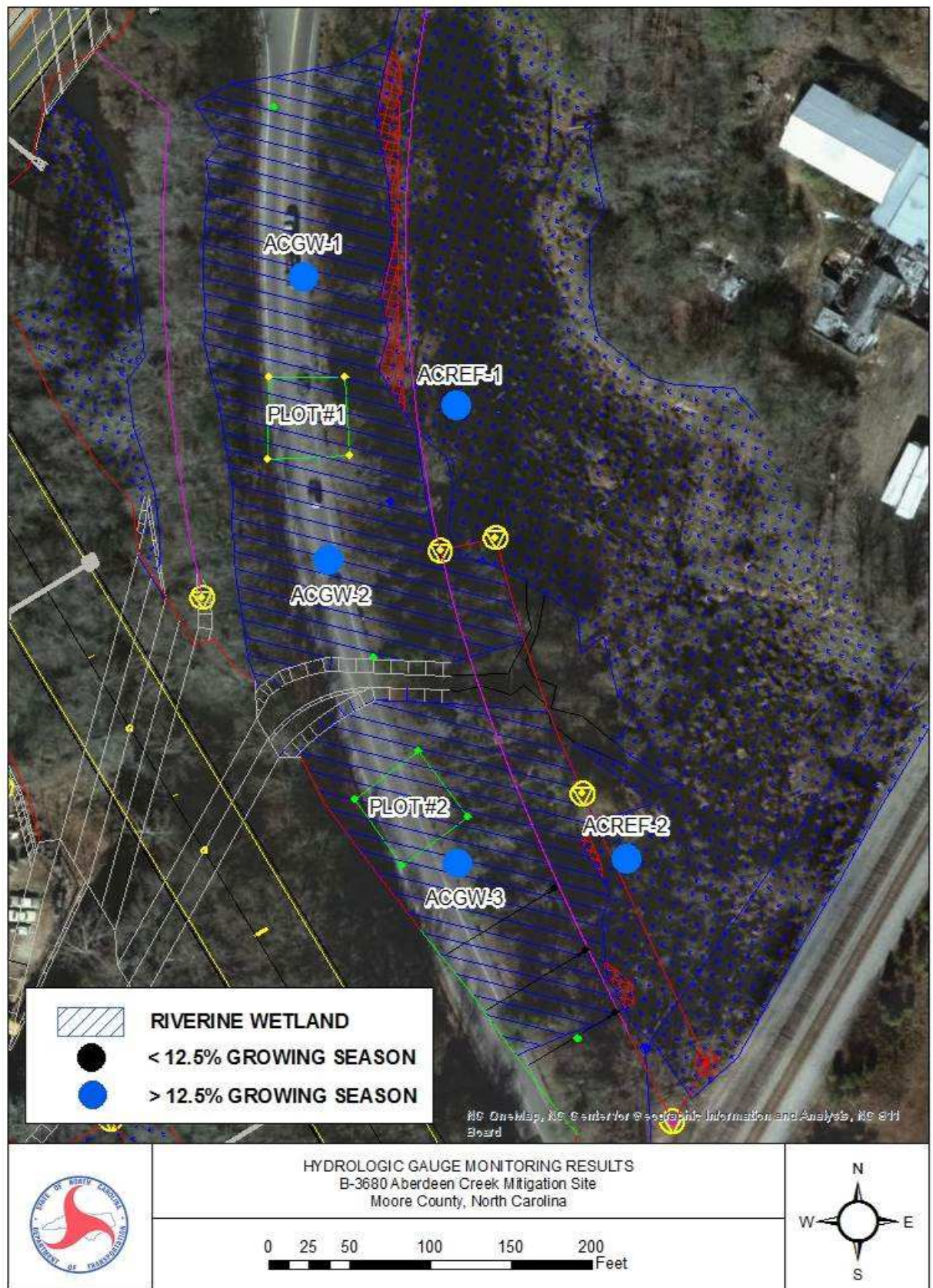


Figure 3. 2016 Hydrologic Monitoring Results

**Aberdeen Creek 30-70 Graph
Aberdeen, NC Monthly Precipitation**

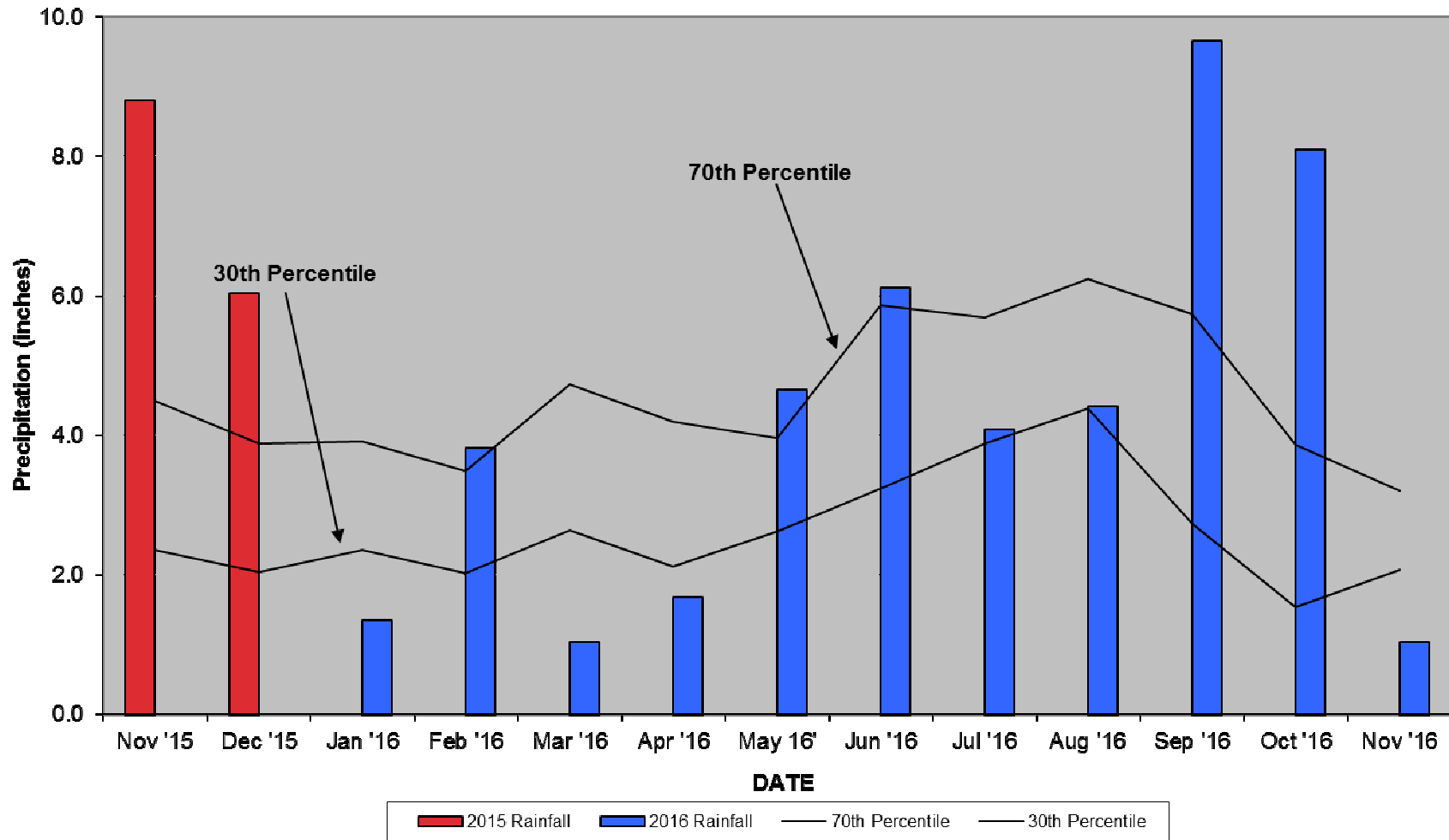


Figure 4. 30-70 Percentile Graph 2016

3.0 VEGETATION: ABERDEEN CREEK MITIGATION SITE (YEAR 2 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 the 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 2)	Total (at planting)	Density (Trees/Acre)
1		3	17	29	49	49	680
2	4	12	6	13	35	35	680
Year 2 Average Density (Trees/Acre)							680
Year 1 Average Density							612

Site Notes: Other species noted onsite included *Juncus* sp., alder, cattail, woolgrass, fennel, sweetgum, *Scirpus* sp., kudzu, and various grasses. Privet that was noted along the perimeter of the mitigation site was treated with an herbicide application in September 2014 and October 2015. No additional privet was noted within the site in 2016. Some kudzu was encroaching into the site from the west side. NCDOT will treat the kudzu in 2016. In January 2016, the live staking was completed along the streambank and a supplemental planting of bare root seedlings was completed where the silt fence was removed and where dead seedlings were noted.

3.4 Conclusions

There are a total of two vegetation monitoring plots established throughout the wetland restoration area. The 2016 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 320 trees per acre for Year 2.

NCDOT proposes to continue monitoring vegetation at the Aberdeen Creek Wetland Mitigation Site for 2017.

4.0 OVERALL CONCLUSIONS/ RECOMMENDATIONS

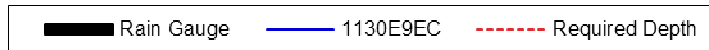
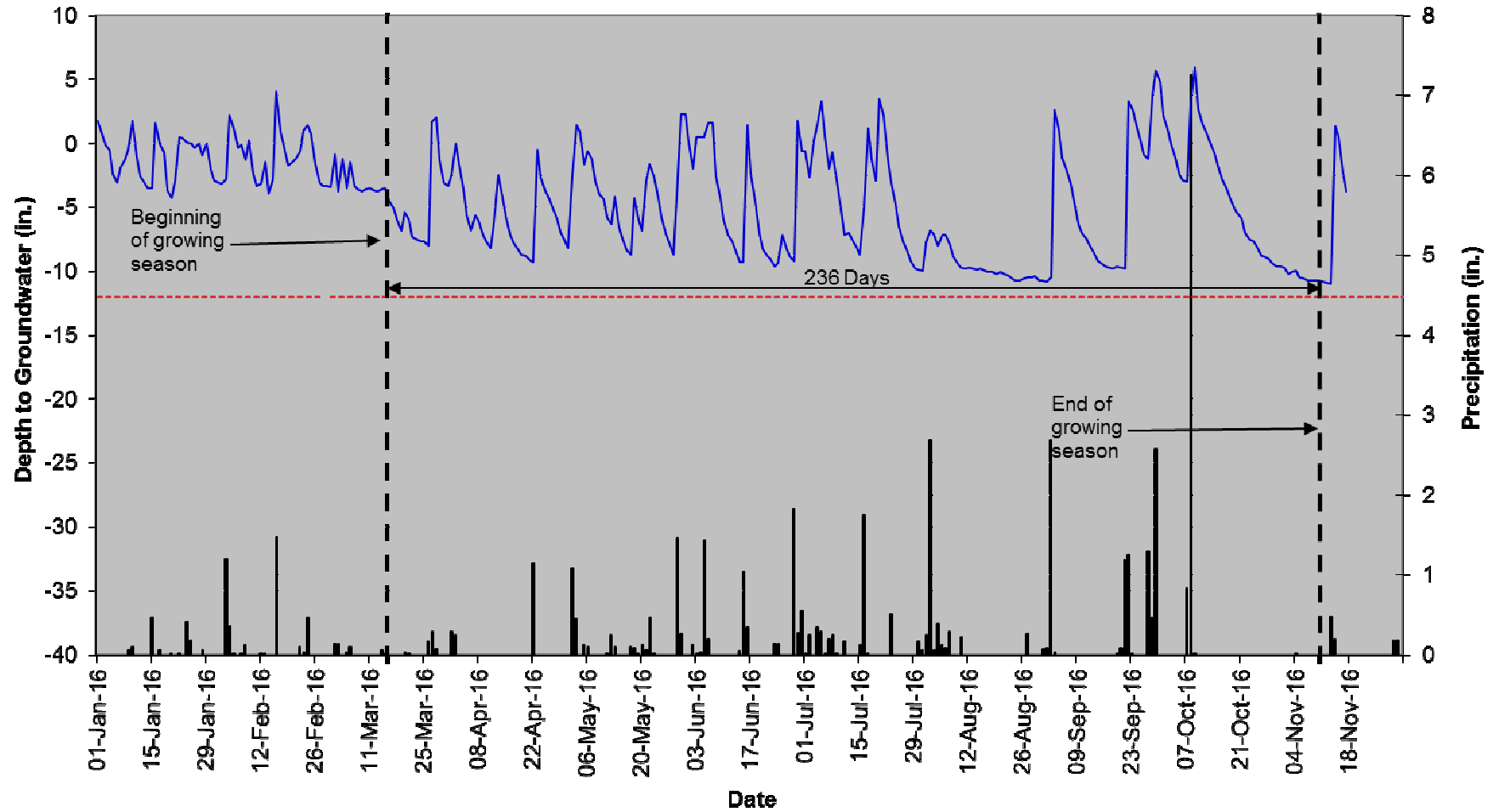
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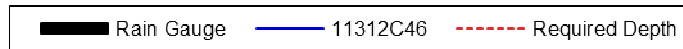
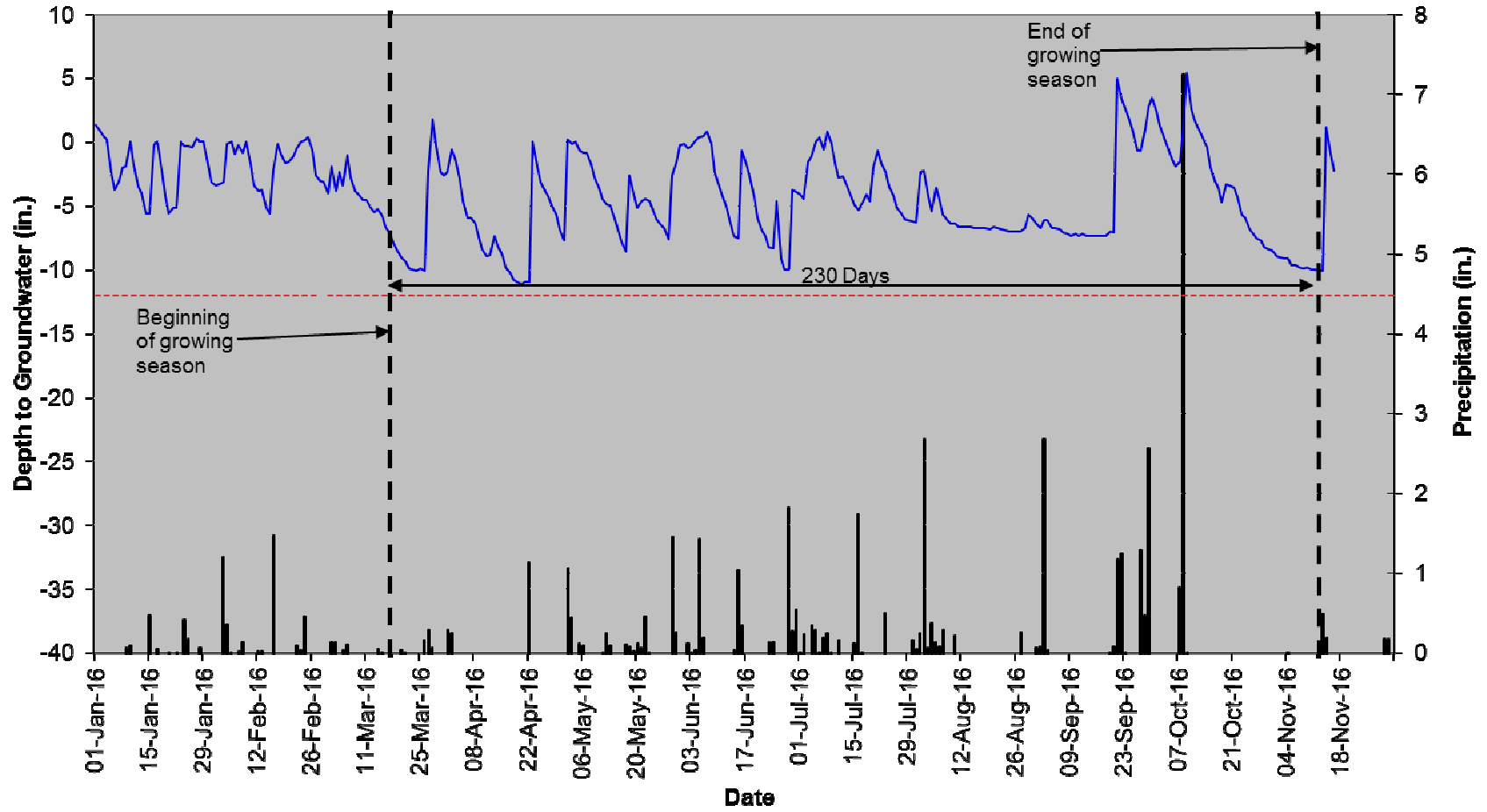
APPENDIX A
GROUNDWATER GAUGE DATA

Aberdeen Creek ACGW-1

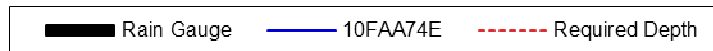
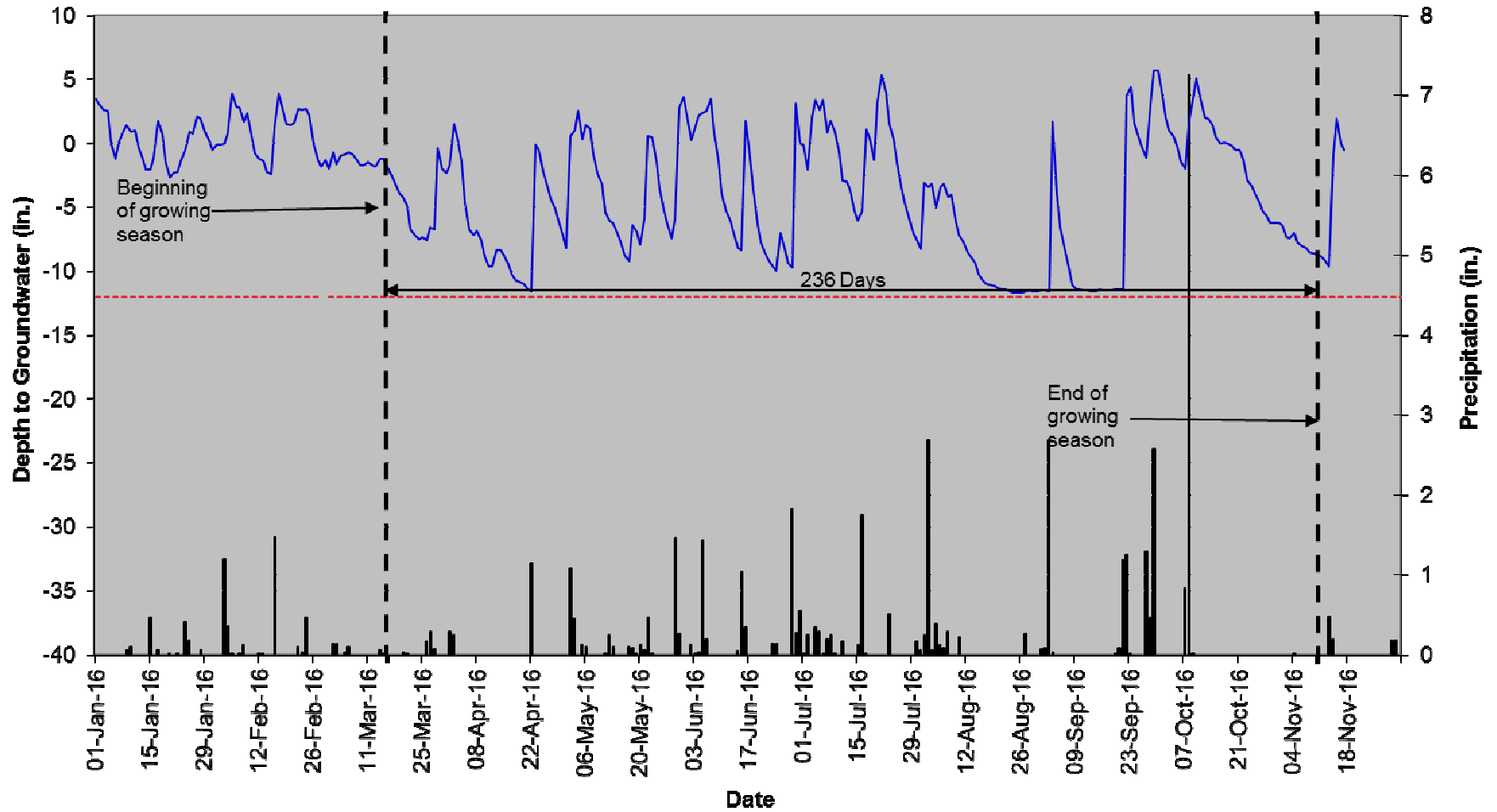


Aberdeen Creek

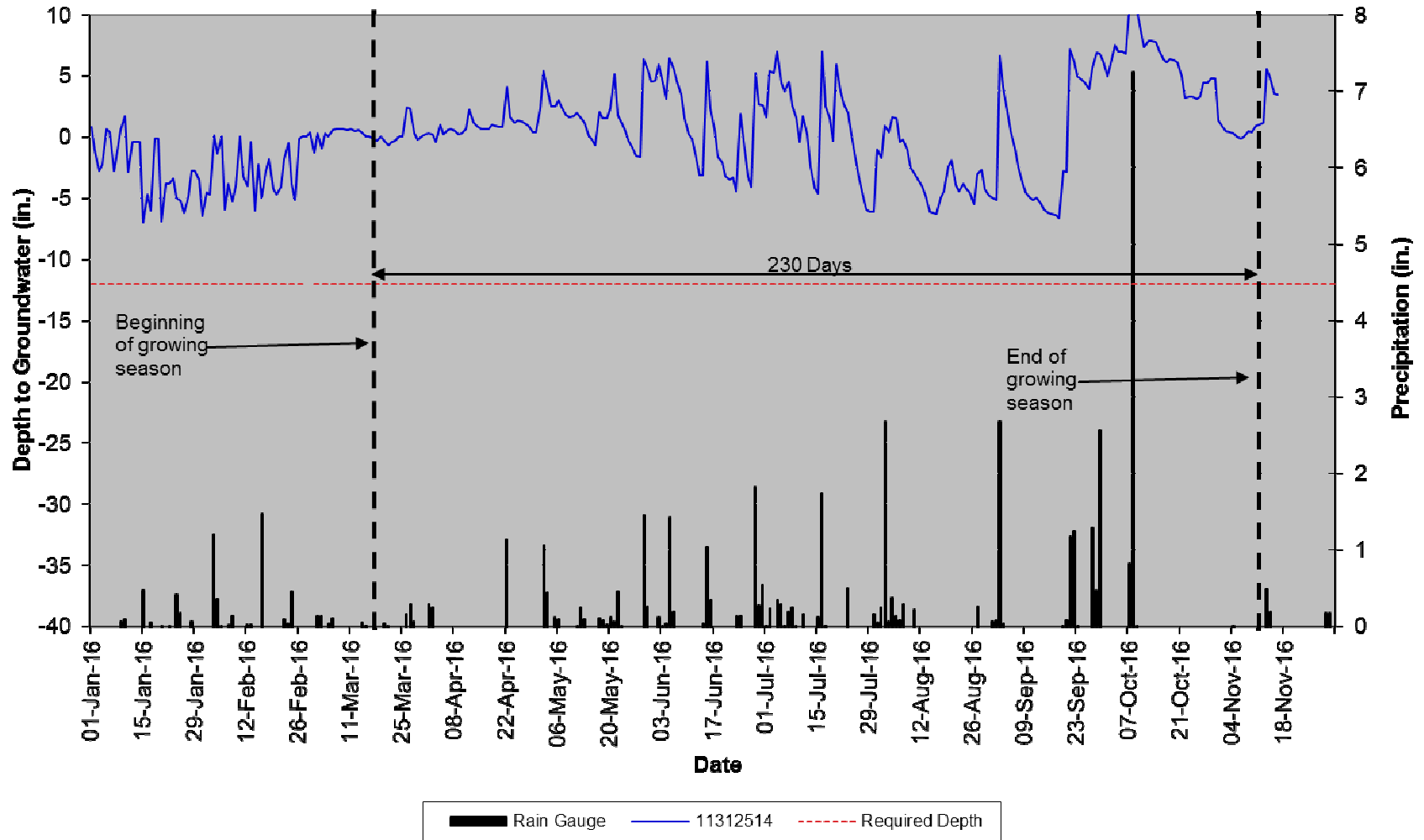
ACGW-2



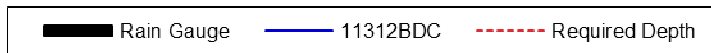
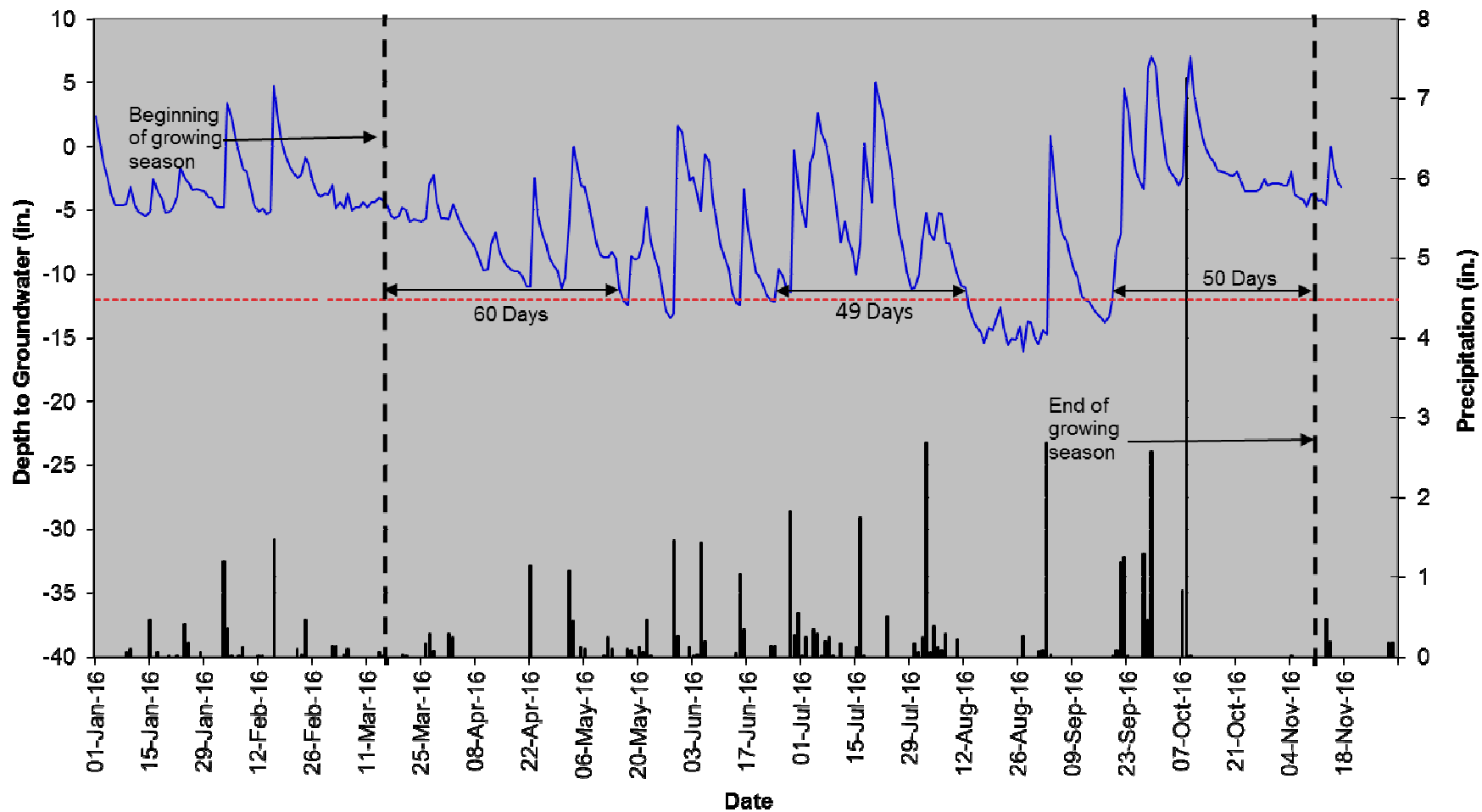
Aberdeen Creek ACGW-3



Aberdeen Creek ACREF-1



Aberdeen Creek ACREF-2



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



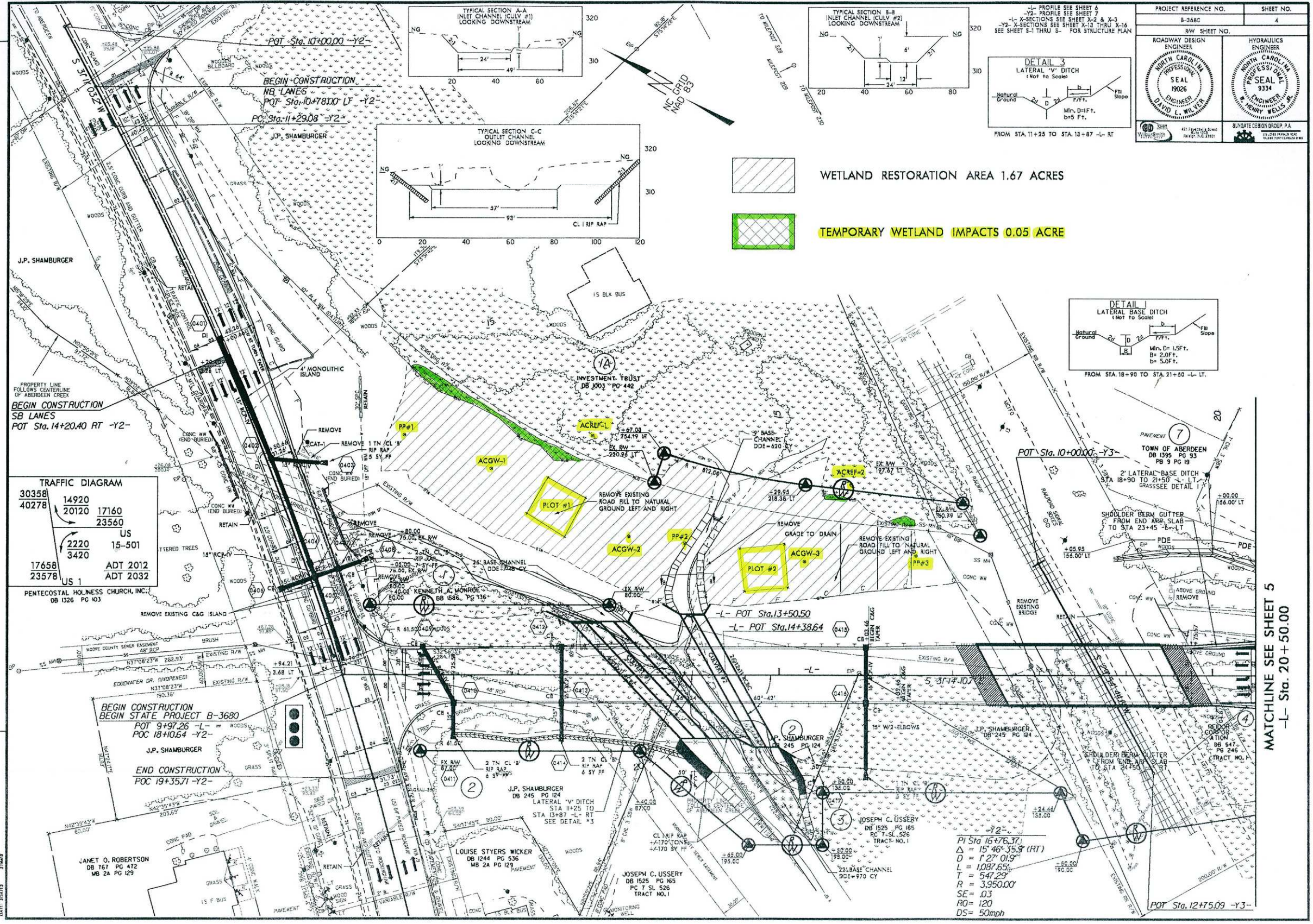
Photo Point #2 looking downstream at Devil Gut Branch



Photo Point #3 looking at Vegetation Plot #2

June 2016

REVISIONS
 01/07/2008 - ADJUSTED RIGHT OF WAY FOR 35'-X-350' CONSERVATION AREA
 12/29/2011 - ADDED RIGHT OF WAY CLANK 'A' AND CHANGED PROPERTY OWNER NAME



PROJECT REFERENCE NO. B-3680	SHEET NO. 4
RW SHEET NO.	
ROADWAY DESIGN ENGINEER NORTH CAROLINA PROFESSIONAL SEAL 19026 D. L. WILSON	HYDRAULICS ENGINEER NORTH CAROLINA PROFESSIONAL SEAL 9334 HENRY WELLS
SUNGATE DESIGN GROUP P.A.	

TRAFFIC DIAGRAM

30358	14920	17160
40278	20120	23560
2220	15	US
3420		ADT 2012
17658		ADT 2032
23578		US 1

-Y2-
 PI Sta 16+76.37
 Δ = 15° 46' 35.3" (RT)
 D = 1' 27" 01.5"
 L = 1087.65'
 T = 547.23'
 R = 3.95000'
 SE = .03
 RO = 120
 DS = 50mph

MATCHLINE SEE SHEET 5
 -L- Sta. 20 + 50.00



PROJECT REFERENCE NO.	SHEET NO.
B-3680	4
RW SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
SARGATE DESIGN GROUP, P.A.	

WETLAND RESTORATION AREA 1.67 ACRES
 TEMPORARY WETLAND IMPACTS 0.05 ACRE

*AS-BUILT PLANS

30358	14920	17160
40278	20120	23560
	2220	15-501
	3420	ADT 2012
17658		ADT 2032
23578		US 1

-Y2-
PI Sta 16+76.37
Δ = 15° 46' 35.9" (RT)
D = 127' 01.9"
L = 1087.65'
T = 547.29'
R = 3,950.00'
SE = .03
RO = 120
DS = 50mph

MATCHLINE SEE SHEET 3
 -L- Sta. 20+50.00