Helms Site (UT to Dutch Buffalo Creek) Stream and Wetland Enhancement Project

EEP Project No. 172
2011 Final Monitoring Report: Year 3 of 5

Construction Completed: April 2009
Submission Date: May 2012

Submitted to: NCDENR-EEP
1652 Mail Service Center
Raleigh, NC 27699

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SECTION 1
EXECUTIVE SUMMARY

SECTION 1
EXECUTIVE SUMMARY

The Helms Site (unnamed tributary (UT) to Dutch Buffalo Creek), hereafter referred to as the Site, is located approximately 1.5 miles southwest of the Town of Bostian Heights in Rowan County, North Carolina (Appendix A). The UT to Dutch Buffalo Creek is a second order stream located within the Southern Outer Piedmont Ecoregion of the Piedmont physiographic region in the Yadkin River Basin (USGS HUC 03040105). The Site consisted of stream enhancement and wetland restoration along an UT to Dutch Buffalo Creek. The stream and wetland restoration plan was designed by EcoScience. Construction and seeding activities were completed in April 2009.

This report serves as year three of the five year monitoring plan for the Site.

1.1 Goals and Objectives

Prior to construction activities, wetland, stream, and buffer functions on the Site were impaired as a result of being dredged and straightened. Natural vegetation within the floodplain, including stream buffer zones, was maintained through regular mowing and active cattle grazing. According to the as-built plan sheets, the activities completed on the Site consist of enhancing 1393.81 linear feet (lf) of stream (Level 2) and 0.4 acres (ac) of wetlands. The Site's riparian areas were planted to stabilize streambanks, improve habitat, and protect water quality.

The following restoration goals were established for the Site:

1. Enhance (Level 2) 1393.81 lf of UT to Dutch Buffalo Creek by establishing native vegetation along streambanks and floodplain areas;
2. Enhance 0.4 ac of wetlands by planting native wetland vegetation in areas with existing hydric soils; and
3. Installation of livestock exclusion fencing.

Streambanks, riparian areas, and wetland areas were stabilized using bare-root plantings as well as temporary and permanent seeding mixes. The Site was planted with native riparian vegetation, and a fence was installed around the permanent conservation easement to exclude cattle. Enhancement of the stream and wetland areas will help to improve water quality via nutrient removal, increase local vegetative biodiversity, provide wildlife habitat, and serve as a forested corridor linking the Site with adjacent forested areas. Appendix A provides detailed project activity, history, contact information, and watershed/site background information for this project.

1.2 Vegetative Assessment

JJG conducted the 2011 (year 3 of 5) vegetative assessment and vegetative plot analysis in June 2011. Vegetation assessments were conducted following the Carolina Vegetation Survey-NCEEP Level 2 Protocol (Lee et al., 2006). The four vegetation monitoring plots 100 m^2 (10m x 10m) in size were previously established on site within the enhancement areas. The success criteria for vegetation establishment requires that the planted woody stem count must meet a minimum density of 320 stems/acre after three years, 288 stems/acre after four years, and 260 stems/acre after five years.

The 2011 vegetation monitoring indicated an average survivability of 405 planted stems per acre with an average of 10 planted stems per plot recorded for the Site, which is greater than the required third year vegetation survival criteria of 320 stems per acre. Three out of the four plots met the success criteria for the 2011 monitoring year (Plot 1, 2 and 3); however, with the inclusion of native recruit woody species, all four Plots meet the success criteria for the 2011 monitoring year. In conclusion, the riparian restoration project meets the requirements per the success criterion for the 2011 monitoring year. However, visual inspection of the site suggests the vegetative assessment results are not indicative of overall planted specimen survivability. Much of the site appears to be lacking sufficient density of planted and recruit stems/acre, as mentioned in the CCPV. Additional randomly placed vegetative plots may be necessary to further characterize the site conditions. Please refer to Appendix B and C for detailed vegetation plot photos and data tables, respectively.

Approximately 13 percent of the planted area contains invasive patches of blackberry. Future monitoring will assess these areas to determine if they are expanding and causing any detrimental issues. Removal activities may be required to control further spread of these areas.

1.3 Stream Assessment

Stream dimension, pattern, profile, and substrate were visually evaluated along 1393.81 linear feet of the UT to Dutch Buffalo Creek. Results from the 2011 stream monitoring effort indicate that stream pattern, profile, and dimension of UT to Dutch Buffalo Creek is maintaining vertical and lateral stability with minimal problem areas. A few areas were noted with in-stream vegetation growth (in association with aggradation) and bank scour. In-stream vegetation does not appear to have affected channel flow but has been associated with mid and transverse channel bars. The channel bars are located near the northernmost portion of the project (near the driveway bridge crossing) and within the vicinity of station 06+00. Low flow conditions have also exacerbated the complications with in-stream vegetation growth. Bank scour is likely a pre-existing condition as a result of previous land use. Currently, sections of the reach exhibiting scour appear to be limited to historically eroded areas and have maintained or slightly decreased in size and prevalence throughout. These problem areas will continue to be monitored during subsequent assessments.

One crest gauge was installed along the UT to Dutch Buffalo Creek by JJG in November 2009 to verify bankfull or greater events occurring over the five year monitoring period. For the Site to meet mitigation success criteria, at least two bankfull or greater events should occur over the five year monitoring period. During the 2011 assessment, indicators such as wrack lines and water staining were observed at bankfull or greater elevations. Recorded events from the crest gauge indicated a minimum of two bankfull events occurring in April and May (4/19/2011, 2.5"; 5/19/2011, 44"). Additionally, the landowner visually observed a bankfull event or greater occurring in July of the 2011 monitoring year. Please refer to Appendix B for the current condition map and Appendix E for the verification of bankfull events.

1.4 Wetland Assessment

Two groundwater gauges are located on Site. The original groundwater gauge (Gauge 1) installed by EcoScience malfunctioned and was replaced by JJG after the first (2009) monitoring season. Groundwater gauge 2 was installed late in the 2010 monitoring season and experienced multiple malfunctions throughout the growing season. The gauges are programmed to download groundwater levels daily in order to capture hydrological data during the growing season. The target wetland hydrological success criterion is saturation or inundation for at least 12.5 percent of the growing season in the lower landscape (floodplain) positions. To achieve the stated hydrologic success criterion, groundwater levels must be within 12 inches of the ground surface for 29 consecutive days of the March 23 to November 7 (229 days) growing season.

Neither groundwater gauge achieved the wetland success criterion of soil saturation within the upper 12 inches for 29 consecutive days during the growing season. Groundwater gauge 1 is not located in a wetland restoration area but has been installed to monitor groundwater elevations in a potential wetland area. Therefore, this area is not a high concern and is not needed for the Site to meet the wetland success criteria. However, groundwater gauge 2 is located within the wetland restoration area and is needed for determining wetland success. Due to unforeseen circumstances, data from groundwater gauge 2 was not available during the 2010 growing season. The groundwater gauge was replaced after the 2010 growing season to prevent this situation from reoccurring in future monitoring years, but, the gauge continually malfunctioned throughout the 2011 monitoring year. Therefore, hydrologic data was not collected from groundwater gauge 2 during the growing season. However, within the wetland restoration area, hydrophytic vegetation and hydrology indicators have continued to develop in 2011. Surface inundation to ground saturation was observed throughout the wetland area; therefore, appropriate hydrological conditions for the wetland zones appeared to be present. Since the wetland restoration area appears to be functioning as anticipated, the lack of data from groundwater gauge 2 in MY 2011 is not expected to cause any delay in the monitoring schedule for this project, barring any other issues.

Please refer to Appendix E for the groundwater gauge 1 wetland plot and a summary of the wetland criteria attainment.

1.5 Annual Monitoring Summary

In summary, the Site appears to be stable and has generally met the stream and vegetation mitigation goals for monitoring year 3. The 2011 vegetation plot monitoring results indicate that the planted and naturally recruited vegetation are generally doing well, with the exception of Plot 4, which did not meet the criterion for planted species. However, with the inclusion of native recruit woody species, all four Plots meet the success criteria for the 2011 monitoring year. Also, overall visual inspection of the site indicates proper stem density may not be adequate, and a significant portion of the site consists of invasive species.

The pattern, profile, and dimension of the enhanced channel appear to be maintaining vertical and lateral stability with minimal bank erosion. JJG is unable to determine whether the wetland restoration area is meeting success criteria due to the malfunctioning gauge in the 2011 monitoring year; however, visual observations indicated the presence of typical wetland vegetation and hydrology. Groundwater gauge 2 will be replaced at the beginning of the 2012 growing season, and complete groundwater gauge results will be reported in the 2012 monitoring year.

No easement integrity issues were observed during the 2011 monitoring year. There was no evidence of livestock or other easement violations.

The background information provided in this report is referenced from previous reports prepared by EcoScience (2003). Summary information/data and statistics related to performance of various project and monitoring elements can be found in the tables and figures in the report appendices. Narrative background and supporting information formerly found in these reports can be found in the mitigation and restoration plan documents available on EEP's website. All raw data supporting the tables and figures in the appendices is available from EEP upon request.

SECTION 2
METHODOLOGY

SECTION 2
METHODOLOGY

2.1 Methodology

Methods employed for the Site were a combination of those established by standard regulatory guidance and procedure documents as well as the Mitigation Plan completed by EcoScience. Vegetation assessments were performed following the Carolina Vegetation Survey-NCEEP Level 2 Protocol (Lee et al., 2006). JJG used the *Flora of the Carolinas, Virginia, Georgia, and surrounding areas* by Alan S. Weakley as the taxonomic standard for vegetation nomenclature for this report.

Precipitation data for the hydrographs was obtained from the NC CRONOS Database Divisional Data for the Southern Piedmont of North Carolina and at a Concord, NC weather station (an off-site resource which is the nearest station offering daily precipitation data) through Weather Underground URL (http://www.wunderground.com/history/airport/KJQF/2010/12/16/CustomHistory.html).

SECTION 3
REFERENCES

SECTION 3
REFERENCES

EcoScience. 2003. Unnamed Tributary to Dutch Buffalo Creek Detailed Stream Mitigation Plan. Raleigh, NC.

Lee, Michael T., Peet, Robert K., Steven D., Wentworth, Thomas R. (2006). CVS-EEP Protocol for Recording Vegetation Version 4.0. Retrieved from http://www.nceep.net/business/monitoring/veg/datasheets.htm.

Rosgen, D L. 1996. Applied River Morphology. Wildland Hydrology Books, Pagosa Springs,
CO.

Weakley, A.S. 2008. *Flora of the Carolinas, Virginia, Georgia, Northern Florida, and Surrounding Areas* (Draft April 2008). University of North Carolina at Chapel Hill: Chapel Hill, NC.

SECTION 4
APPENDICES

Appendix A – Project Vicinity Map and Background Tables

Appendix B – Visual Assessment Data

Appendix C – Vegetation Plot Data

Appendix D – Stream Monitoring not required

Appendix E – Hydrologic Data

APPENDIX A
PROJECT VICINITY MAP AND BACKGROUND TABLES

Figure 1 **Project Vicinity Map and Directions**

Table 1 **Project Restoration Components**

Table 2 **Project Activity and Reporting History**

Table 3 **Project Contacts Table**

Table 4 **Project Attribute Table**

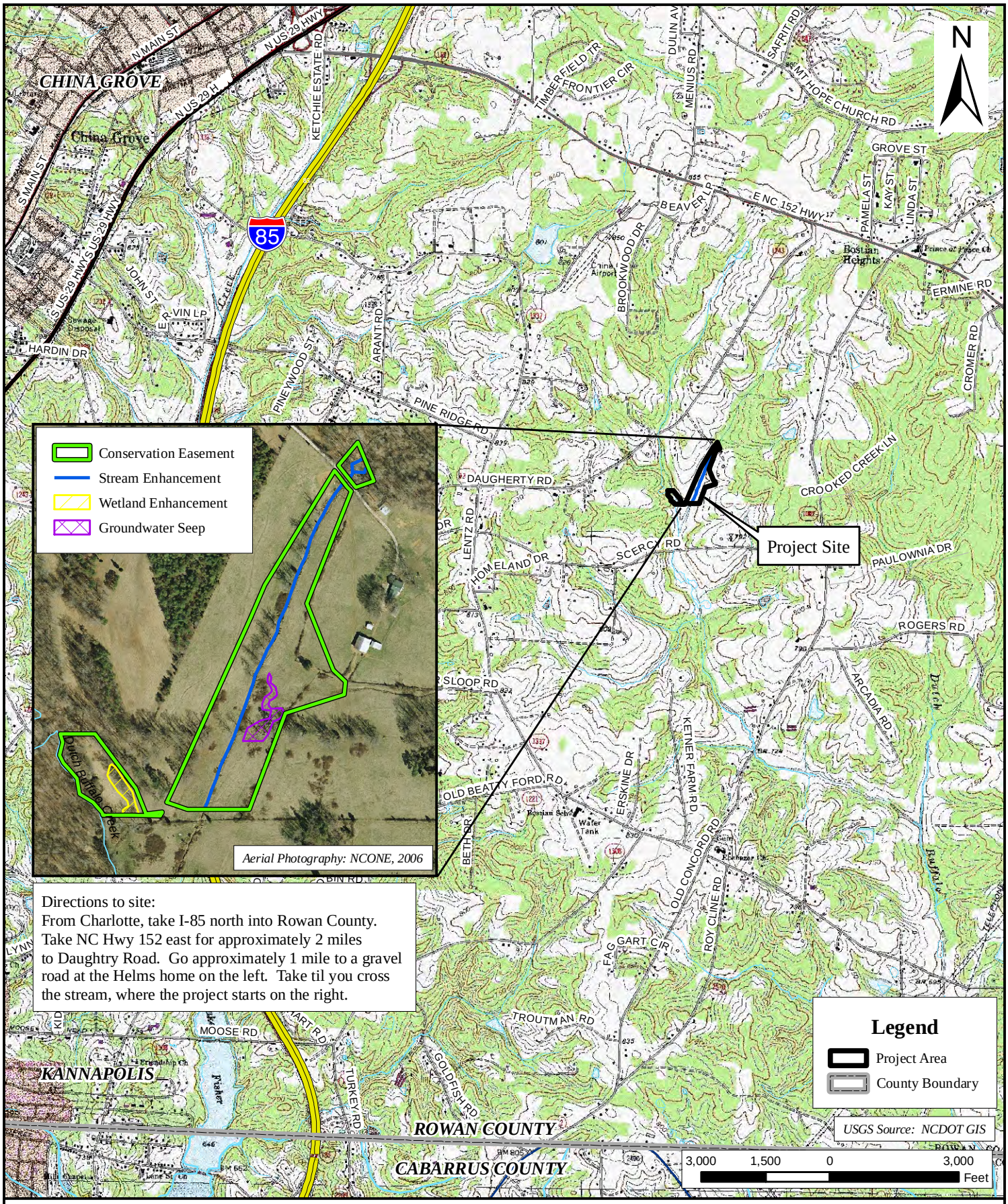


Figure 1. Project Vicinity Map
Helms Site (UT to Dutch Buffalo Creek)/EEP Project No. 172
Rowan County, North Carolina
Monitoring Year 3 of 5
Submittal Date: May 2012

Appendix A. Project Vicinity Map and Background Tables
Table 1: Project Components and Mitigation Credits
Helms Site (UT to Dutch Buffalo Creek)/EEP Project No. 172
Monitoring Year 3 of 5

Mitigation Credits						
	Stream	**Riparian Wetland**	**Non-riparian Wetland**	**Buffer**	**Nitrogen Nutrient Offset**	**Phosphorous Nutrient Offset**
Type	E2	E	N/A	N/A	N/A	N/A
Totals	557.6	0.2	N/A	N/A	N/A	N/A

Project Components						
Project Component/Reach ID	**Stationing (ft)**	**Existing Footage/ Acreage**	**Approach**	**Restoration or Restoration Equivalent**	**Restoration Footage or Acres**	**Mitigation Ratio**
Main Channel	0+00-13+94	1,394 lf	E2	RE	1,394 lf	2.5:1
Oxbow Depression	N/A	0.4 acres	E	RE	0.4 ac	2:1

Component Summations						
Restoration Level	**Stream (linear feet)**	**Riparian Wetland (acres)**		**Non-riparian Wetland (acres)**	**Buffer (square feet)**	**Upland (acres)**
		Riverine	**Non-Riverine**			
Restoration (R)	N/A	N/A	N/A	N/A	N/A	N/A
Enhancement (E)	N/A	N/A	0.4	N/A	N/A	N/A
Enahncement I (E)	N/A	N/A	N/A	N/A	N/A	N/A
Enhancement II (E)	1,394	N/A	N/A	N/A	N/A	N/A
Creation (C)	N/A	N/A	N/A	N/A	N/A	N/A
Preservation (P)	N/A	N/A	N/A	N/A	N/A	N/A
HQ Preservation (P)	N/A	N/A	N/A	N/A	N/A	N/A
Totals	**1,394**	**N/A**	**0.4**	**N/A**	**N/A**	**N/A**

BMP Elements			
Element	**Location**	**Purpose/Function**	**Notes**
N/A	N/A	N/A	N/A

BMP Elements

BR = Bioretention Cell; SF = Sand Filter; SW = Stormwater Wetland; WDP = Wet Detention Pond; DDP - Dry Detention Pond; FS = Filter Strip; S = Grassed Swale; LS = Level Spreader; NI = Natural Infiltration Area; FB = Forested Buffer

*Enhancement and Preservation reaches were not stationed.

Appendix A. Project Vicinity Map and Background Tables
Table 2: Project Activity and Reporting History
Helms Site (UT to Dutch Buffalo Creek)/EEP Project No. 172
Monitoring Year 3 of 5

Elapsed Time Since Grading Complete: N/A
Elapsed Time Since Planting Complete: 2 Years 10 Months
Number of Reporting Years: 3

Activity or Report	Data Collection Completed	Actual Completion or Delivery
Restoration Plan	Jul-03	Jul-03
Final Design-90%	N/A	Nov-07
Construction	N/A	Apr-09
Temporary S&E mix applied to entire project area*	N/A	Apr-09
Permanent seed mix applied to reach	N/A	Apr-09
Containerized and B&B plantings for reach	N/A	Apr-09
Mitigation Plan/ As-Built (Year 0 Monitoring)	Oct-09	Nov-09
Year 1 Monitoring	Nov-09	Nov-09
Year 2 Monitoring	Oct-10	Jan-11
Year 3 Monitoring	Nov-11	Feb-12
Year 4 Monitoring	2012	2012
Year 5 Monitoring	2013	2013

*Seed and mulch is added as each section of construction is completed.

Appendix A. Project Vicinity Map and Background Tables
Table 3: Project Contacts
Helms Site (UT to Dutch Buffalo Creek)/EEP Project No. 172
Monitoring Year 3 of 5

Designer	EcoScience Corporation 1101 Haynes Street, Suite 101 Raleigh, NC 27604 919- 828-3433
Contractor's Name	Husky Construction 617 Westbury Rd. Charlotte, NC 28211
Planting Contractor	Husky Construction 617 Westbury Rd. Charlotte, NC 28211
Seeding Contractor	Husky Construction 617 Westbury Rd. Charlotte, NC 28211
Monitoring Performers	Jacobs Engineering Group 6801 Governors Lake Parkway Norcross, GA 30071
Stream Monitoring, POC	Alison Nichols, 770-455-8555
Vegetation Monitoring, POC	
Wetland Monitoring, POC	

Appendix A. Project Vicinity Map and Background Tables
Table 4 Project Attribute Table
Helms Site (UT to Dutch Buffalo Creek)/EEP Project No. 172
Monitoring Year 3 of 5

Project Information	
Project Name	Helms Site (UT to Dutch Buffalo Creek)
Project County	Rowan County, North Carolina
Project Area (acres)	9.6 acres
Project Coordinates	35º 32' 44.38" N 80º 31' 58.04" W
Project Watershed Summary Information	
Physiographic Region	Piedmont
River Basin	Yadkin/Pee Dee
USGS HUC for Project (8 digit)	03040105
USGS HUC for Project (14 digit)	03040105020050
DWQ Sub-basin	03-07-12
Project Drainage Area (acres)	384
Project Drainage Area Percentage of Impervious Area*	< 10%
CGIA Land Use Classification	-
Reach Summary Information	
Parameters	**Main Channel**
Length of reach (linear feet)	1,394
Valley classification	VIII
Drainage area (acres)	384
NCDWQ stream identification score	-
NCDWQ Water Quality Classification	WS-II, HQW
Morphological Description (stream type)	Perennial
Evolutionaly trend	G5/4 to E5/4
Underlying mapped soils	Chewacla
Drainage Class	U
Soil Hydric status	None
Slope	0.0076
FEMA classification	100 year floodplain
Native vegetation community	Agriculture, Hay Production
Percent composition of exotic invasive vegetation	U
Wetland Summary Information	
Parameters	**Oxbow Depression**
Size of Wetland (acres)	0.4
Wetland Type (non-riparian, riparian riverine or riparian non-riverine)	Riparian non-riverine
Mapped Soil Series	Chewacla loam
Drainage class	U
Soil Hydric Status	hydric inclusions
Source of Hydrology	U
Hydrologic impairment	U
Native vegetation community	Hydrophytic assemblage
Percent composition of exotic invasive vegetation	U

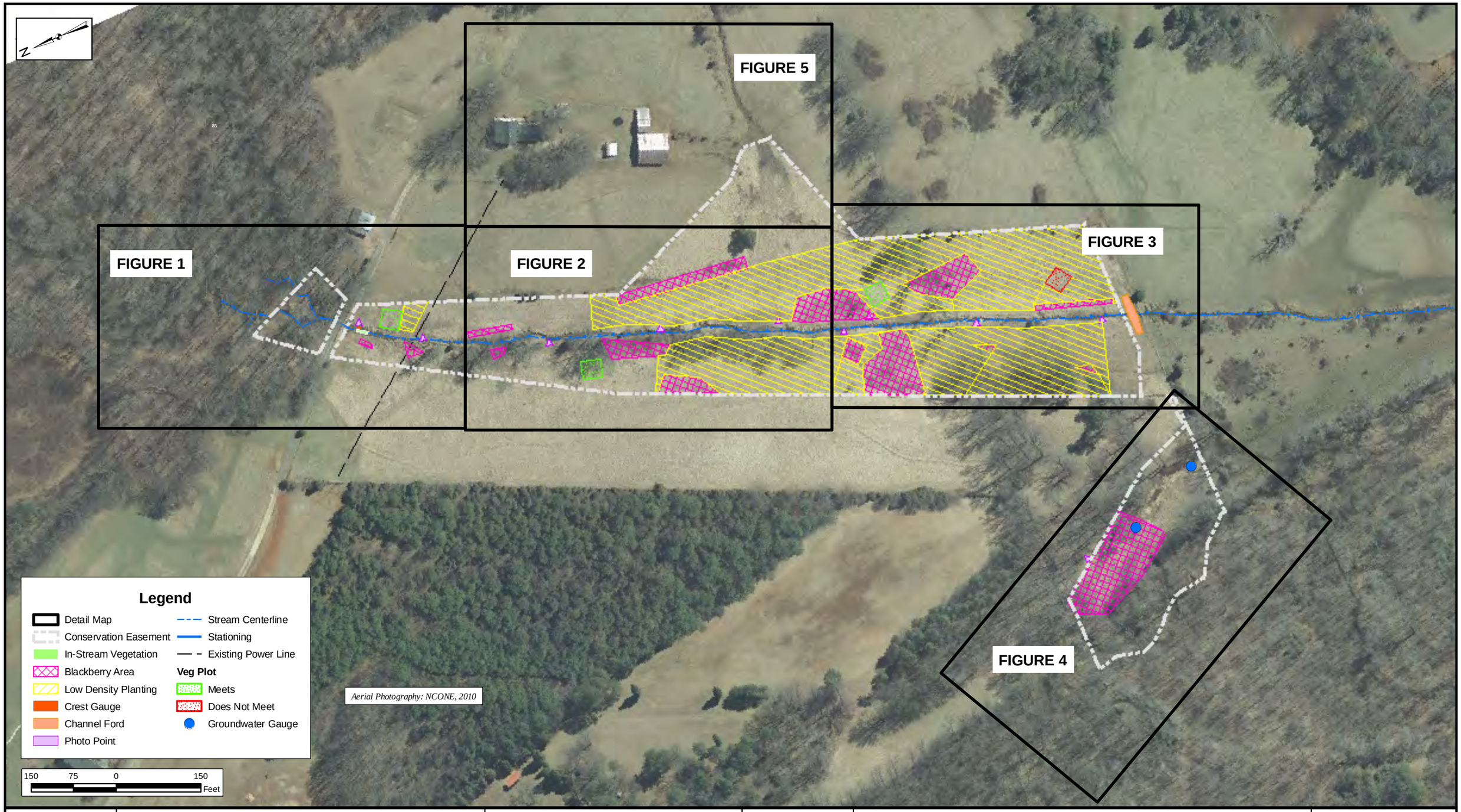
Regulatory Considerations			
Regulation	**Applicable?**	**Resolved?**	**Supporting Documentation**
Waters of the United States - Section 404	No	N/A	N/A
Waters of the United States - Section 401	No	N/A	N/A
Endangered Species Act	No	N/A	N/A
Historic Preservation Act	No	N/A	N/A
Costal Zone Managemetn Act (CZMA)/Costal Area	No	N/A	N/A
FEMA Floodplain Compliance	No	N/A	N/A
Essential Fisheries Habitat	No	N/A	N/A

*****At the time of project completion.

"N/A": items do not apply / "-": items are unavailable / "U": items are unknown

APPENDIX B
VISUAL ASSESSMENT DATA

Figure 2	**Current Condition Plan View (CCPV)**
Table 5	**Visual Stream Morphology Stability Assessment Table**
Table 6	**Vegetation Condition Assessment Table**
Photos	**Stream Station Photos**
Photos	**Vegetation Plot Photos**



NOTES:
1. GENERAL SITE DATA ARE PROVIDED BY NCEEP.
2. ALL LOCATIONS ARE APPROXIMATE

PROJECT NO. 172
ROWAN COUNTY
NORTH CAROLINA
MONITORING YEAR 3 OF 5

NC ECOSYSTEM ENHANCEMENT PROGRAM
HELMS SITE (UT DUTCH BUFFALO CREEK)

CURRENT CONDITION PLAN VIEW

DATE: MAY 2012
SCALE: Not To Scale
JOB NO.: JJX31100

FIGURE 2 INDEX

NOTES:
1. GENERAL SITE DATA ARE PROVIDED BY NCEEP.
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PROJECT NO. 172
ROWAN COUNTY
NORTH CAROLINA
MONITORING YEAR 3 OF 5

NC ECOSYSTEM ENHANCEMENT PROGRAM
HELMS SITE (UT DUTCH BUFFALO CREEK)

CURRENT CONDITION PLAN VIEW

DATE: MAY 2012
SCALE: 1" = 40'
JOB NO.: JJX31100

FIGURE 1 OF 5

MATCH FIGURE 5

MATCH FIGURE 1

MATCH FIGURE 3

WATER SEEP

VEG PLOT 2

5+00 6+00 7+00 8+00 9+00 10+00 11+00

1 2 3 4 5

Legend

- In-Stream Vegetation
- Blackberry Area
- Low Density Planting
- Photo Point
- Crest Gauge
- Channel Ford
- Conservation Easement
- Stream Centerline
- Stationing
- Existing Power Line
- **Veg Plot**
- Meets
- Does Not Meet
- Groundwater Gauge

Aerial Photography: NCONE, 2010

40 20 0 40 Feet

NOTES:
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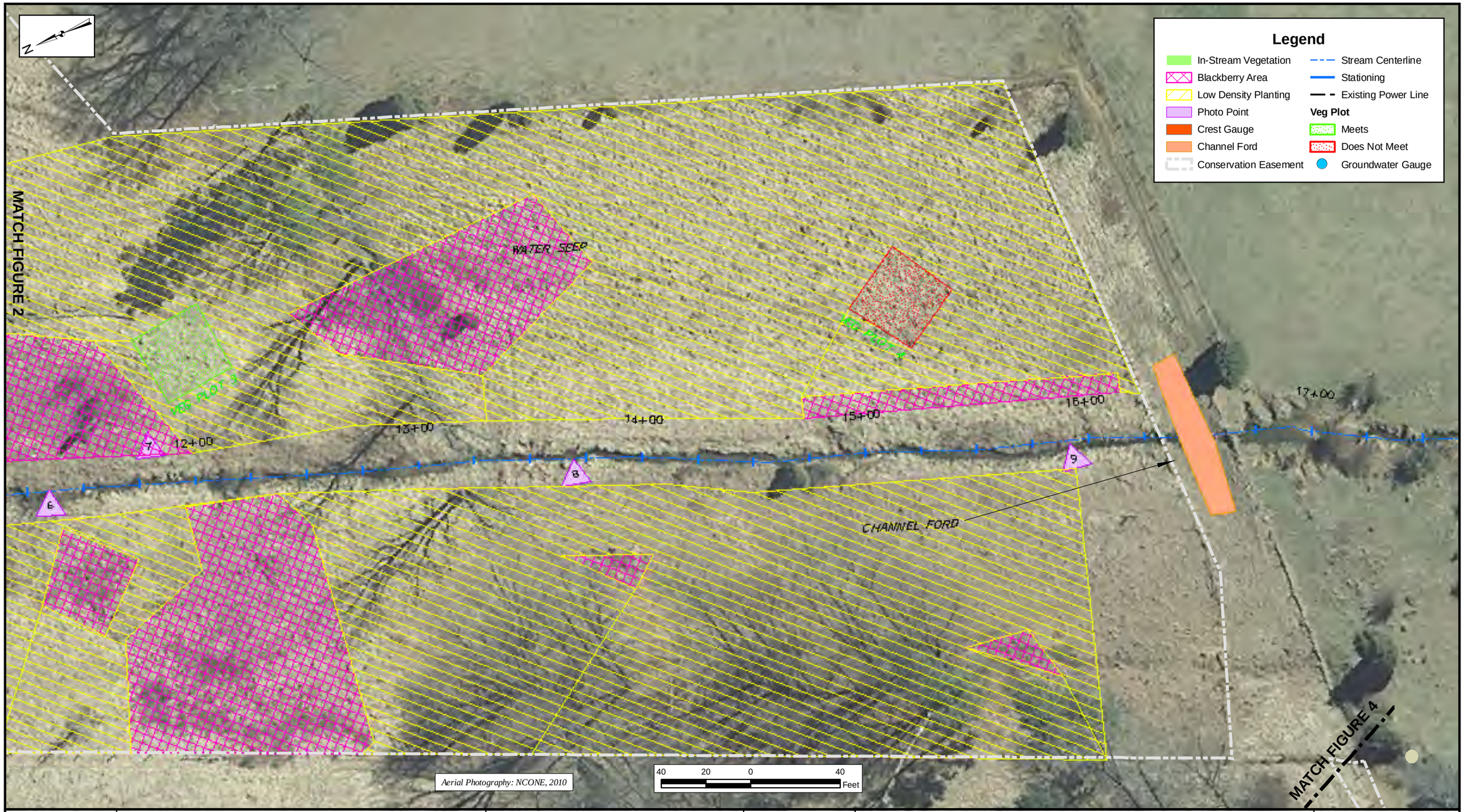
PROJECT NO. 172
ROWAN COUNTY
NORTH CAROLINA
MONITORING YEAR 3 OF 5

NC ECOSYSTEM ENHANCEMENT PROGRAM
HELMS SITE (UT DUTCH BUFFALO CREEK)

CURRENT CONDITION PLAN VIEW

DATE: MAY 2012
SCALE: 1" = 40'
JOB NO.: JJX31100

FIGURE 2 OF 5



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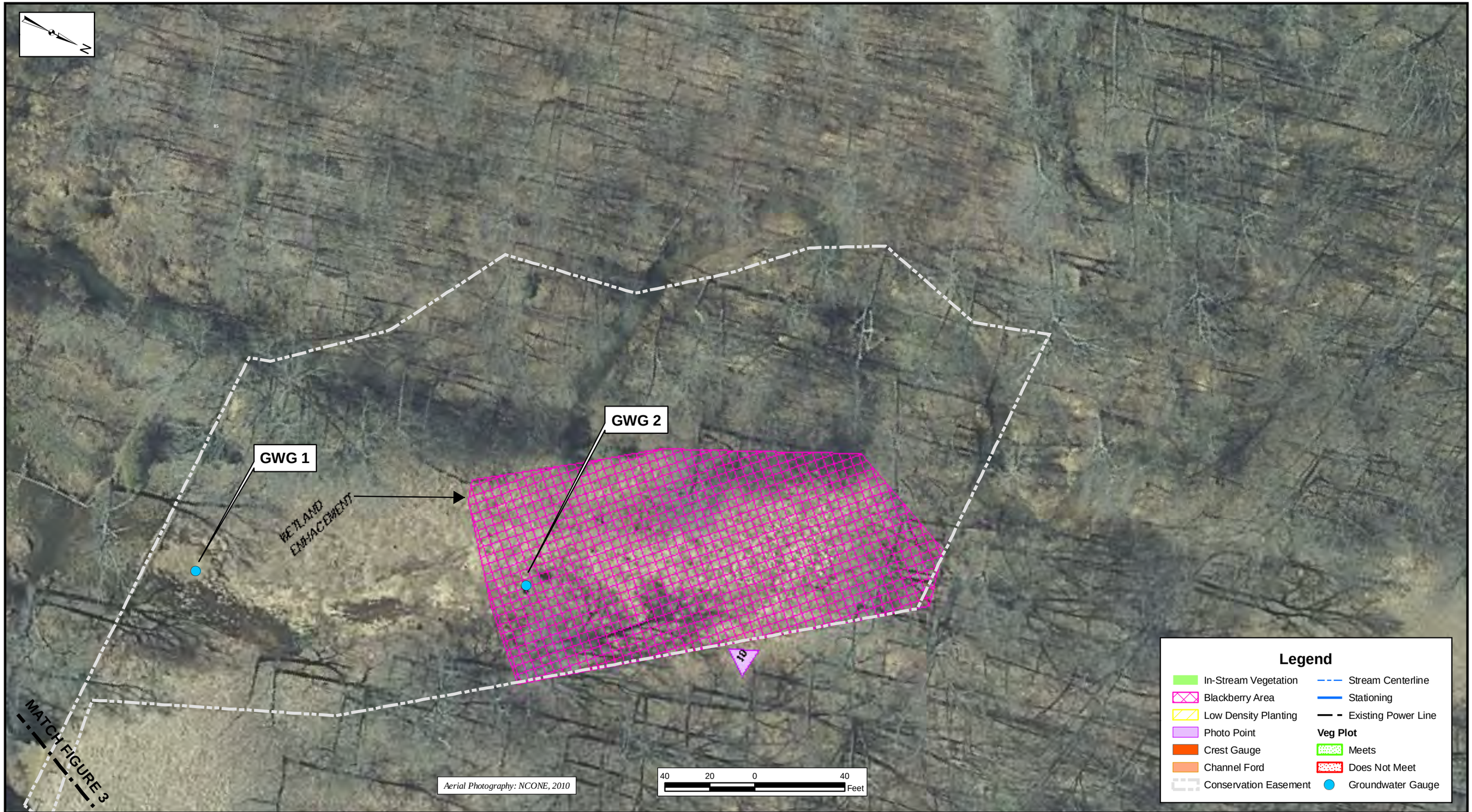
PROJECT NO. 172
ROWAN COUNTY
NORTH CAROLINA
MONITORING YEAR 3 OF 5

NC ECOSYSTEM ENHANCEMENT PROGRAM
HELMS SITE (UT DUTCH BUFFALO CREEK)

CURRENT CONDITION PLAN VIEW

DATE: MAY 2012
SCALE: 1" = 40'
JOB NO.: JJX31100

FIGURE 3 OF 5



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2. ALL LOCATIONS ARE APPROXIMATE

PROJECT NO. 172
ROWAN COUNTY
NORTH CAROLINA
MONITORING YEAR 3 OF 5

NC ECOSYSTEM ENHANCEMENT PROGRAM
HELMS SITE (UT DUTCH BUFFALO CREEK)

CURRENT CONDITION PLAN VIEW

DATE: MAY 2012
SCALE: 1" = 40'
JOB NO.: JJX31100

FIGURE 4 OF 5

NOTES:
1. GENERAL SITE DATA ARE PROVIDED BY NCEEP.
2. ALL LOCATIONS ARE APPROXIMATE

PROJECT NO. 172
ROWAN COUNTY
NORTH CAROLINA
MONITORING YEAR 3 OF 5

NC ECOSYSTEM ENHANCEMENT PROGRAM
HELMS SITE (UT DUTCH BUFFALO CREEK)

CURRENT CONDITION PLAN VIEW

DATE: MAY 2012
SCALE: 1" = 40'
JOB NO.: JJX31100

FIGURE 5 OF 5

Appendix B
Table 5. Visual Stream Morphology Stability Assessment Table*
Helms Site (UT to Dutch Buffalo Creek)/EEP Project No.172
Monitoring Year 3 of 5

Major Channel Category	Channel Sub-Category	Metric	Number Stable, Performing as Intended	**Total Number in As-Built	Number of Unstable Segments	Amount of Unstable Footage	% Stable, Performing as Intended	Number with Stabilizing Woody Vegetation	Footage with Stabilizing Woody Vegetation	Adjust % for Stabilizing Woody Vegetation
1. Bed	**1. Vertical Stability (Riffle and Run units)**	Aggradation			4	123	91%			
		Degradation			1	15	99%			
	2. Riffle Condition	Texture/Substrate	11	18			61%			
	3. Meander Pool Condition	Depth Sufficient	19	20			95%			
		Length Appropriate	16	20			80%			
	4. Thalweg Position	Thalweg centering at upstream of meander bend (Run)	18	18			100%			
		Thalweg centering at downstream of meander bend (Glide)	16	18			89%			
2. Bank	**1. Scoured/Eroded**	Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion			4	134	90%	3	31	93%
	2. Undercut	Banks undercut/overhanging to the extent that mass wasting			0	0	100%	0	0	100%
	3. Mass Wasting	Bank slumping, calving, or collapse			3	158	89%	1	3.5	89%
				Totals	7	292	79%	4	34.5	82%
3. Engineered Structures* **	**1. Overall Integrity**	Structures physically intact with no dislodged boulders or logs.	N/A	N/A			N/A			
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill	N/A	N/A			N/A			
	2a. Piping	Structures lacking any substantial flow underneath sills or arms.	N/A	N/A			N/A			
	3. Bank Protection	Bank erosion within the structures extent of influence does not exceed 15%.	N/A	N/A			N/A			
	4. Habitat	Pool forming structures maintaining ~Max Pool Depth : Bankfull Depth ≥ 1.6 Rootwads/logs providing some cover at baseflow.	N/A	N/A			N/A			

*Data was collected on May 23, 2012
**No stream restoration contruction was conducted; therefore, as-built information is not available. Number of existing features was used in lieu of as-built data.
***No restoratiion was conducted within the stream; no structures were installed.
Total project length: 1,393.81

Appendix B
Table 6: Vegetation Condition Assessment Table
Helms Site (UT to Dutch Buffalo Creek)/EEP Project No.172
Monitoring Year 3 of 5

Planted Acreage **9.6**

Vegetation Category	Definitions	Mapping Threshold (acres)	Number of Polygons	Combined Acreage	% of Planted Acreage
Bare Areas	Very limited cover of both woody and herbaceous material	0.1	0	0	0%
Low Stem Density Areas	Woody stem densities clearly below target levels based on MY3, 4, or 5 stem count criteria.	0.1	4	5.3	55%
		Total	**0**	**0**	**55%**
Areas of Poor Growth Rates or Vigor	Areas with woody stems of a size class that are obviously small given the monitoring year.				

Easement Acreage **9.6**

Vegetation Category	Definitions	Mapping Threshold (SF)	Number of Polygons	Combined Acreage	% of Planted Acreage
Invasive Areas of Concern	Areas of points (if too small to render as polygons at map scale).	100	15	1.22	13%
Easement Encroachment Areas	Areas of points (if too small to render as polygons at map scale).	none	0	0	0%

Photo Point 1-View Upstream
(MY 0/1 – 10/2009)

Photo Point 1-View Upstream
(MY 3 – 6/2011)

Photo Point 1-View Downstream
(MY 0/1 – 10/2009)

Photo Point 1-View Downstream
(MY 3 - 6/2011)

Photo Point 2-View Upstream
(MY 0/1 – 10/2009)

Photo Point 2-View Upstream
(MY 3 – 6/2011)

Photo Point 2-View Downstream
(MY 0/1 – 10/2009)

Photo Point 2-View Downstream
(MY 3 – 6/2011)

Prepared For:

Ecosystem Enhancement Program

Appendix B – Visual Assessment Data
Stream Station Photos
Helms Site (UT to Dutch Buffalo Creek)/EEP Project No. 172
Monitoring Year 3 of 5
Submittal Date: May 2012

Prepared By:

JJG

Photo Point 3-View Upstream
(MY 0/1 – 10/2009)

Photo Point 3-View Upstream
(MY 3 – 6/2011)

Photo Point 3-View Downstream
(MY 0/1 – 10/2009)

Photo Point 3-View Downstream
(MY 3 – 6/2011)

Photo Point 4-View Upstream
(MY 0/1 – 10/2009)

Photo Point 4-View Upstream
(MY 3 – 6/2011)

Photo Point 4-View Downstream
(MY 0/1 – 10/2009)

Photo Point 4-View Downstream
(MY 3 – 6/2011)

Photo Point 5-View Upstream
(MY 0/1 – 10/2009)

Photo Point 5-View Upstream
(MY 3 – 6/2011)

Photo Point 5-View Downstream
(MY 0/1 – 10/2009)

Photo Point 5-View Downstream
(MY 3 – 6/2011)

Photo Point 6-View Upstream
(MY 0/1 – 10/2009)

Photo Point 6-View Upstream
(MY 3 – 6/2011)

Photo Point 6-View Downstream
(MY 0/1 – 10/2009)

Photo Point 6-View Downstream
(MY 3 – 6/2011)

Prepared For:

Ecosystem Enhancement Program

Appendix B – Visual Assessment Data
Stream Station Photos
Helms Site (UT to Dutch Buffalo Creek)/EEP Project No. 172
Monitoring Year 3 of 5
Submittal Date: May 2012

Prepared By:

JJG

Photo Point 7-View Upstream
(MY 0/1 – 10/2009)

Photo Point 7-View Upstream
(MY 3 – 6/2011)

Photo Point 7-View Downstream
(MY 0/1 – 10/2009)

Photo Point 7-View Downstream
(MY 3 – 6/2011)

Photo Point 8-View Upstream
(MY 0/1 – 10/2009)

Photo Point 8-View Upstream
(MY 3 – 6/2011)

Photo Point 8-View Downstream
(MY 0/1 – 10/2009)

Photo Point 8-View Downstream
(MY 3 – 6/2011)

Photo Point 9-View Upstream
(MY 0/1 – 10/2009)

Photo Point 9-View Upstream
(MY 3 – 6/2011)

Photo Point 9-View Downstream
(MY 0/1 – 10/2009)

Photo Point 9-View Downstream
(MY 3 – 6/2011)

Photo Point 10 –View Towards Stream Channel
(MY 0/1 – 10/2009)

Photo Point 10 –View Towards Stream Channel
(MY 3 – 6/2011)

Photo Point 10 –View Towards Top of Easement
(MY 0/1 – 10/2009)

Photo Point 10 -View Towards Top of Easement
(MY 3 – 6/2011)

Prepared For:	Appendix B – Visual Assessment Data Stream Station Photos Helms Site (UT to Dutch Buffalo Creek)/EEP Project No. 172 Monitoring Year 3 of 5 Submittal Date: May 2012	Prepared By:

Vegetation Plot 1
(MY 0/1 - 10/2009)

Vegetation Plot 1
(MY 3 - 6/2011)

Vegetation Plot 2
(MY 0/1 - 10/2009)

Vegetation Plot 2
(MY 3 - 6/2011)

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Appendix B – Visual Assessment Data
Vegetation Plot Photos
Helms Site (UT to Dutch Buffalo Creek)/EEP Project No. 172
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Submittal Date: May 2012

Prepared By:

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Vegetation Plot 3
(MY 0/1 – 10/2009)

Vegetation Plot 3
(MY 3 - 6/2011)

Vegetation Plot 4
(MY 0/1 – 10/2009)

Vegetation Plot 4
(MY 3 - 6/2011)

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Appendix B – Visual Assessment Data
Vegetation Plot Photos
Helms Site (UT to Dutch Buffalo Creek)/EEP Project No. 172
Monitoring Year 3 of 5
Submittal Date: May 2012

Prepared By:

JJG

APPENDIX C
VEGETATION PLOT DATA

Table 7 **Vegetation Plot Mitigation Success Summary Table**

Table 8 **CVS Vegetation Metadata Table**

Table 9 **CVS Stem Count Total and Planted by Plat and Species**

Appendix C
Table 7 Vegetation Plot Mitigation Success
Helms Site (UT to Dutch Buffalo Creek)/EEP Project No.172
Monitoring Year 3 of 5

Vegetation Plot ID	Vegetation Survival Threshold Met (Y/N)
Plot 1	Y
Plot 2	Y
Plot 3	Y
Plot 4	N

Appendix C
Table 8: CVS Vegetation Metadata Table
Helms Site (UT to Dutch Buffalo Creek)/EEP Project No.172
Monitoring Year 3 of 5

Report Prepared By	Heath Caldwell
Date Prepared	7/8/2011 0:00
database name	JJG-2010-A.mdb
database location	J:\JJX31100\M5-Field Monitoring Data\MY 2011\VEGETATION\Helms
DESCRIPTION OF WORKSHEETS IN THIS DOCUMENT----------	
Metadata	Description of database file, the report worksheets, and a summary of project(s) and project data.
Plots	List of plots surveyed with location and summary data (live stems, dead stems, missing, etc.).
Vigor	Frequency distribution of vigor classes for stems for all plots.
Vigor by Spp	Frequency distribution of vigor classes listed by species.
Damage	List of most frequent damage classes with number of occurrences and percent of total stems impacted
Damage by Spp	Damage values tallied by type for each species.
Damage by Plot	Damage values tallied by type for each plot.
Stem Count by Plot and Spp	A matrix of the count of total living stems of each species (planted and natural volunteers combined) for each plot; dead and missing stems are excluded.
PROJECT SUMMARY----------	
Project Code	172
project Name	Helms Property (UT Dutch Buffalo)
Description	Stream and Wetland Enhancement Rowan County, North Carolina
length(ft)	1400
stream-to-edge width (ft)	
area (sq m)	20436.6
Required Plots (calculated)	4
Sampled Plots	4

Appendix C
Table 9: CVS Stem Count Total and Planted by Plot and Species
Helms Site (UT to Dutch Buffalo Creek)/EEP Project No.172
Monitoring Year 3 of 5

			Current Data (MY3-2011)								Annual Means					
			Plot 1		Plot 2		Plot 3		Plot 4		Current Mean		MY1 - 2009		MY2-2010	
Species	**Common Name**	**Type**	P	T	P	T	P	T	P	T	P	T	**P**	**T**	**P**	**T**
Betula nigra	river birch	T	0	0	1	1	0	0	0	0	**0**	**0**	**2**	**2**	**0**	**0**
Carya sp.	hickory	T	0	0	1	1	0	0	0	0	**0**	**0**	**N/A**	**1**	**N/A**	**0**
Diospyros virginiana	common persimmon	T	4	4	0	0	0	0	0	0	**1**	**1**	**3**	**3**	**1**	**1**
Fraxinus pennsylvanica	green ash	T	4	6	1	1	3	3	0	0	**2**	**3**	**3**	**3**	**2**	**3**
Liquidambar stryaciflua	sweet gum	T	0	0	0	10	0	0	0	3	**N/A**	**3**	**N/A**	**1**	**N/A**	**3**
Nyssa sylvatica	blackgum	T	0	0	0	0	0	0	0	0	**N/A**	**N/A**	**1**	**1**	**0**	**0**
Platanus occidentalis	American sycamore	T	3	4	2	2	2	2	3	4	**3**	**3**	**3**	**3**	**3**	**3**
Quercus sp.	Oak	T	0	0	0	0	0	0	0	0	**N/A**	**N/A**	**N/A**	**N/A**	**0**	**1**
Quercus lyrata	overcup oak	T	1	1	0	0	0	0	0	0	**0**	**0**	**1**	**1**	**0**	**0**
Quercus michauxii	swamp chestnut oak	T	1	1	1	1	5	5	1	1	**2**	**2**	**2**	**2**	**2**	**2**
Quercus nigra	water oak	T	0	0	1	1	0	0	1	1	**1**	**1**	**1**	**1**	**0**	**0**
Quercus pagoda	cherrybark oak	T	1	1	0	0	0	0	1	1	**1**	**1**	**1**	**1**	**1**	**1**
Quercus phellos	willow oak	T	1	1	0	0	0	0	0	0	**0**	**0**	**1**	**1**	**0**	**0**
Viburnum cassinoides	southern arrowwood	T/S	0	0	2	2	0	0	0	0	**1**	**1**	**2**	**2**	**1**	**1**
Unknown sp.	unknown species	T	0	0	0	0	0	0	0	0	**N/A**	**N/A**	**1**	**1**	**0**	**0**
Plot Area (acres)			**0.0247**													
Species Count			**7**	**7**	**7**	**8**	**3**	**3**	**4**	**5**	**11**	**12**	**12**	**14**	**13**	**15**
Stem Count			**15**	**18**	**9**	**19**	**10**	**10**	**6**	**10**	**10**	**14**	**21**	**23**	**10**	**14**
Stems per Acre			**607**	**729**	**364**	**769**	**405**	**405**	**243**	**405**	**405**	**577**	**425**	**445**	**385**	**547**

Type=**S**hrub or **T**ree
P = Planted
T = Total

APPENDIX D
STREAM MONITORING DATA

Stream Monitoring not required

APPENDIX E
HYDROLOGIC DATA

Table 12 **Verification of Bankfull Events**

Figure 6 **Monthly Rainfall Data**

Figure 7 **Precipitation and Water Level Plots**

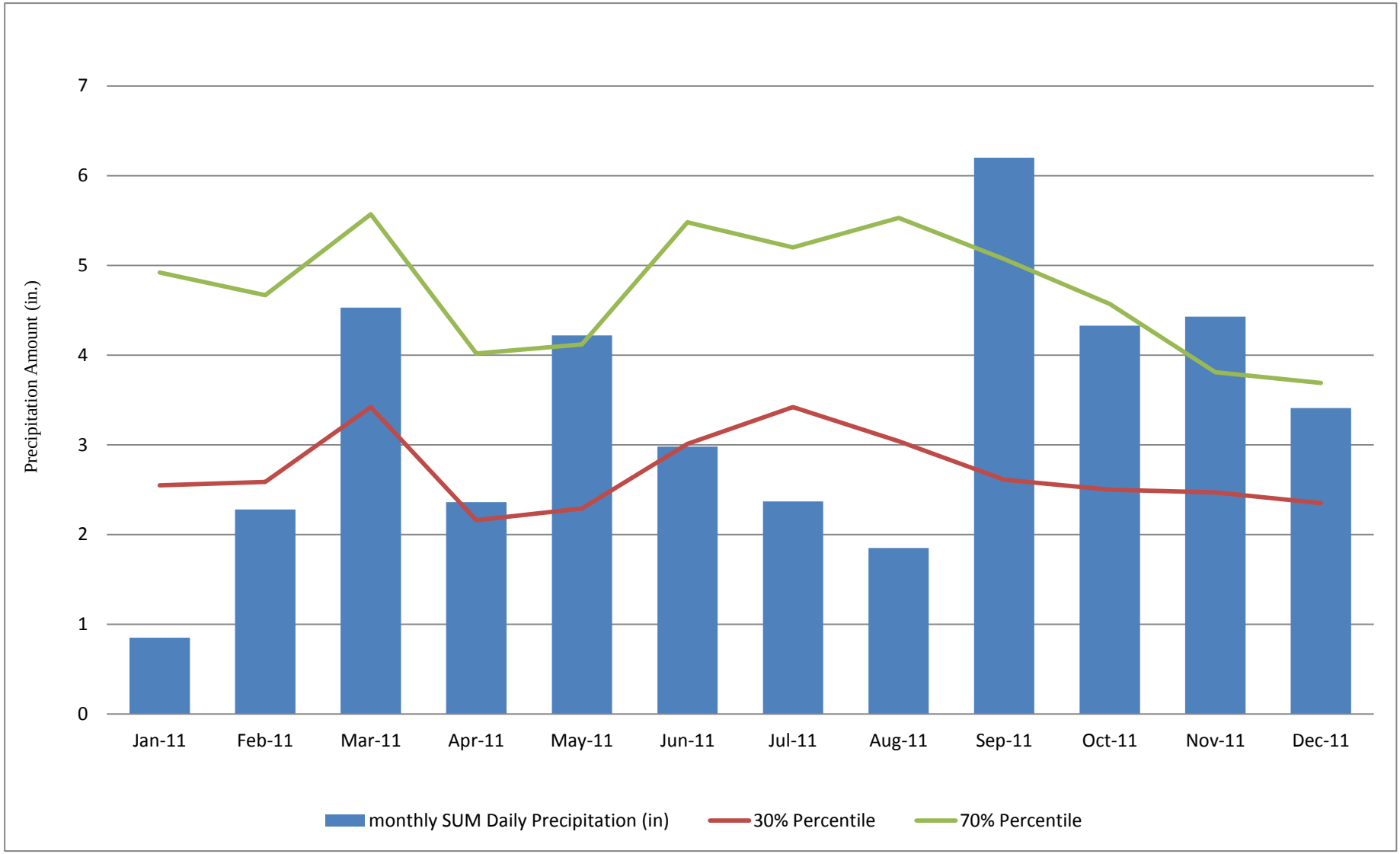
Table 13 **Wetland Hydrology Criteria Attainment**

Appendix E. Hydrologic Data
Table 12: Verification of Bankfull Events
Helms Site (UT to Dutch Buffalo Creek)/EEP Project No. 172
Monitoring Year 3 of 5

Date of Collection	Date of Occurrence	Method	Photo # (if available)
11/18/09	11/11/2009-11/12/2009	Visual	N/A
10/1/10	U	Visual/Crest Gauge	N/A
Apr., May, July 2011	4/19/11, 5/19/11, 07/11	Crest Gauge, Crest Gauge, Landowner	N/A

U: Unknown

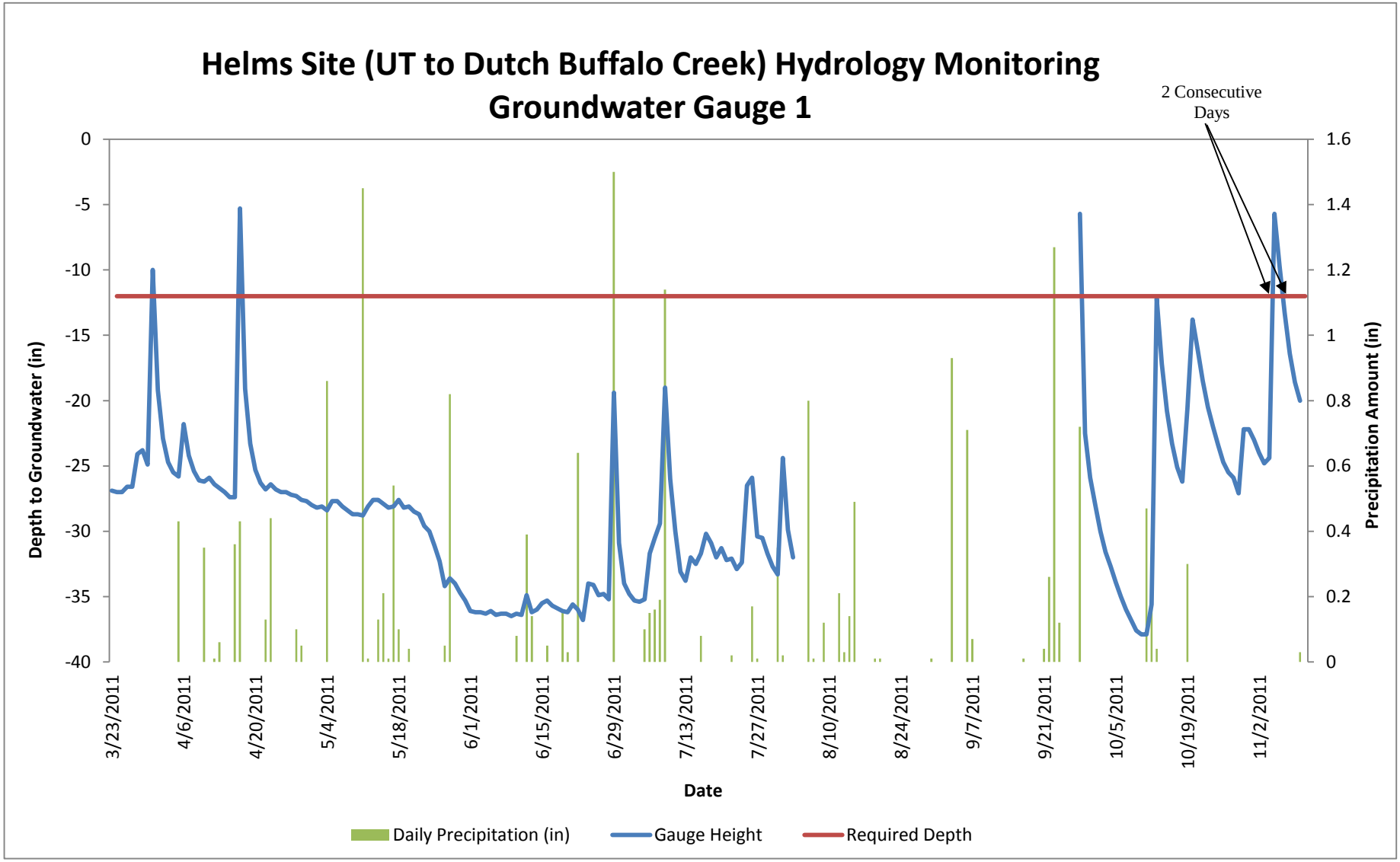
Appendix E. Hydrologic Data
Figure 6: Helms Site 30-70 Percentile Graph for Rainfall in 2011, Concord NC
Helms Site (UT to Dutch Buffalo Creek)/EEP Project No. 172
Monitoring Year 3 of 5



*Historical rainfall data referenced from NC Cronos Database Divisonal Data for the Southern Piedmont of North Carloina - Data Period January 2011 through December 2011

Figure 7a: Precipitation and Water Level Plots for Gauges
Helms Site (UT to Dutch Buffalo Creek)/EEP Project No. 172
Monitoring Year 3 of 5

Growing Season: March 23-November 10



Appendix E. Hydrologic Data
Table 13: Wetland Hydrology Criteria Attainment
Helms Site (UT to Dutch Buffalo Creek)/EEP Project No. 172
Monitoring Year 3 of 5

Summary of Groundwater Gauge Results for Years 1 through 5					
Gauge	**Success Criteria Achieved/Max Consecutive Days During Growing Season (Percentage)**				
	Year 1 (2009)	**Year 2 (2010)**	**Year 3 (2011)**	**Year 4 (2012)**	**Year 5 (2013)**
GW1	*	No/2 Days (1%)	No/2 Days (1%)		
GW2	**	**	***		

*GW1 was replaced in late 2009 when initial monitoring commenced.

**GW2 was installed in 7/2010, however no data was retrieved for the 2010 monitoring due to an incorrect calibration that occurred in 7/2010 and 8/2010 and a gauge malfunction in 9/2010.

***GWG malfunctioned throughout 2011. No data was collected from GWG 2 during the growing season.