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

EEP Project No. 172

2010 Monitoring Report: Year 2 of 5

Construction Completed: April 2009
Submission Date: February 2011

Prepared for:

NCDENR-EEP
1652 Mail Service Center
Raleigh, NC 27699

Prepared by:

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Ecosystem Enhancement PROGRAM

NCDENR

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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 1.1). 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 two 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 2 provides detailed project activity, history, contact information, and watershed/site background information for this project.

1.2 Vegetative Assessment

JJG conducted the 2010 (year 2 of 5) vegetative assessment and vegetative plot analysis in October 2010. 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.

Vegetative monitoring success criteria for the Site requires that the planted woody vegetation must meet a minimum survival success rate of 320 stems/acre after three years, 288 stems/acre after four years, and 260 stems/acre after five years.

The 2010 vegetation monitoring indicated an average survivability of 385 planted stems per acre with an average of 10 planted stems per plot recorded for the Site, which is greater than the required vegetation survival criteria of 320 stems per acre after the second growing season. Three out of the four plots met the success criteria for the 2010 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 2010 monitoring year. In conclusion, the riparian restoration project meets the requirements per the success criterion for the 2010 monitoring year. Please refer to Appendix 3 for detailed vegetation plot photos and data tables.

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 2010 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, but it does not appear to have affected channel flow at this time. Low flow and drought conditions are the most likely explanations for the vegetative growth in the channel. The growth will be monitored for any additional development in the 2011 monitoring year.

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. One bankfull event was recorded by the crest gauge for the 2010 monitoring year. Also during the 2010 assessment, other indicators such as wrack lines and water staining were observed at the bankfull and greater elevations. Furthermore, the landowner visually observed a bankfull event or greater occurring in the 2010 monitoring year.

Overall, the Site appears to be maintaining vertical and horizontal stability with minimal bank erosion. Please refer to Appendix 1.2 for the current condition map and Appendix 4 for detailed stream data tables.

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 2010 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 has been replaced to avoid this situation from reoccurring in future monitoring years. Within the wetland restoration area, hydrophytic vegetation and hydrology indicators have developed. 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 2010 is not expected to cause any delay in the monitoring schedule for this project, barring any other issues.

Groundwater data and plots will be provided in the 2011 monitoring report. Please refer to Appendix 5 for the 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 met the stream and vegetation mitigation goals for monitoring year 2. The 2010 vegetation plot monitoring results indicate that the planted and naturally recruited vegetation is doing well at the Site. 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 2010 monitoring year; however, visual observations indicated the presence of typical wetland vegetation and hydrology. Complete groundwater gauge results will be reported in the 2011 monitoring year.

The background information provided in this report is referenced from previous reports prepared by EcoScience (2003). Summary information/data related to the occurrence of items such as beaver or encroachment 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 an off-site resource at a Concord, NC weather station (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

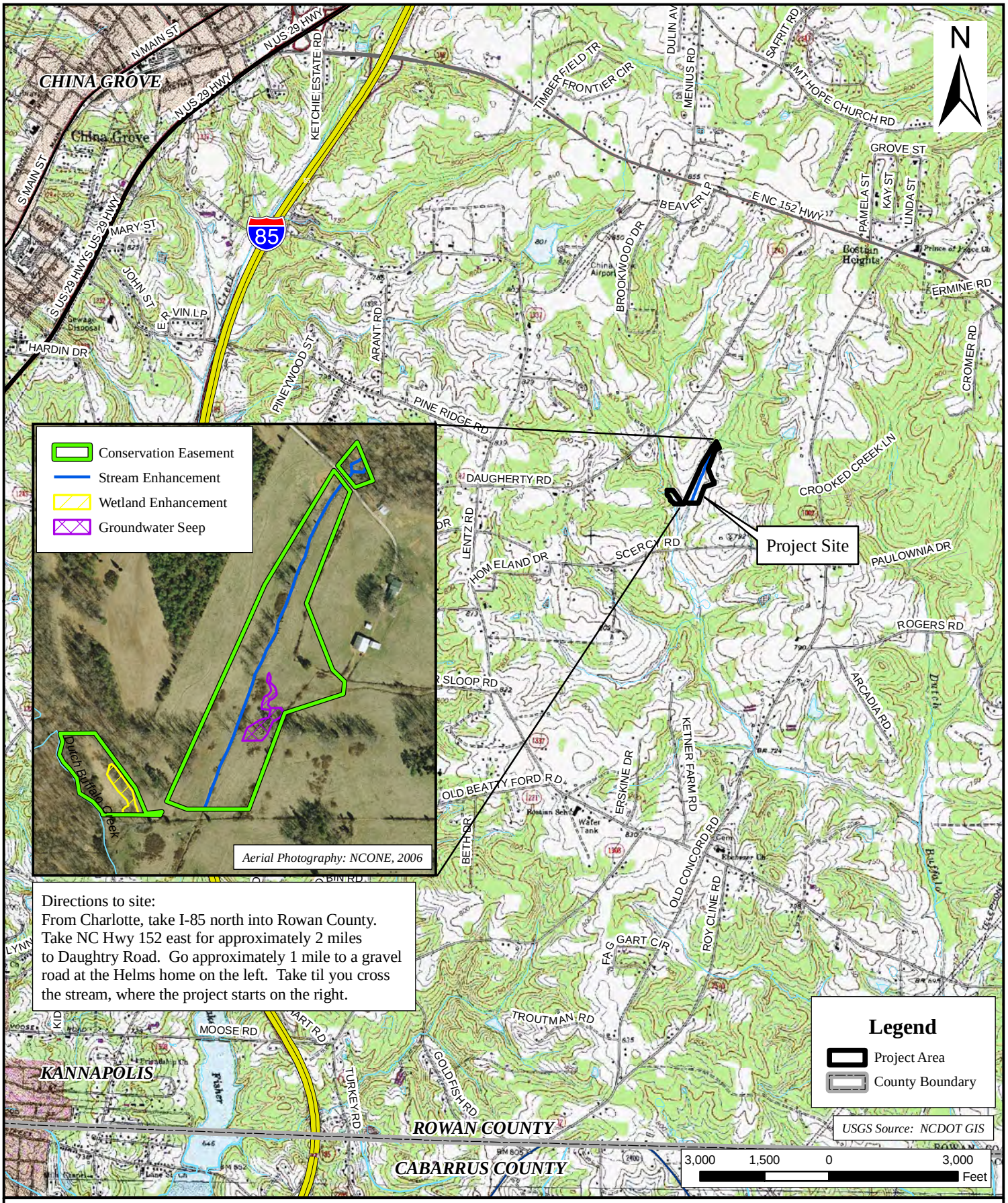
Appendix 1 - General Figures and Plan Views

Appendix 2 - General Project Tables

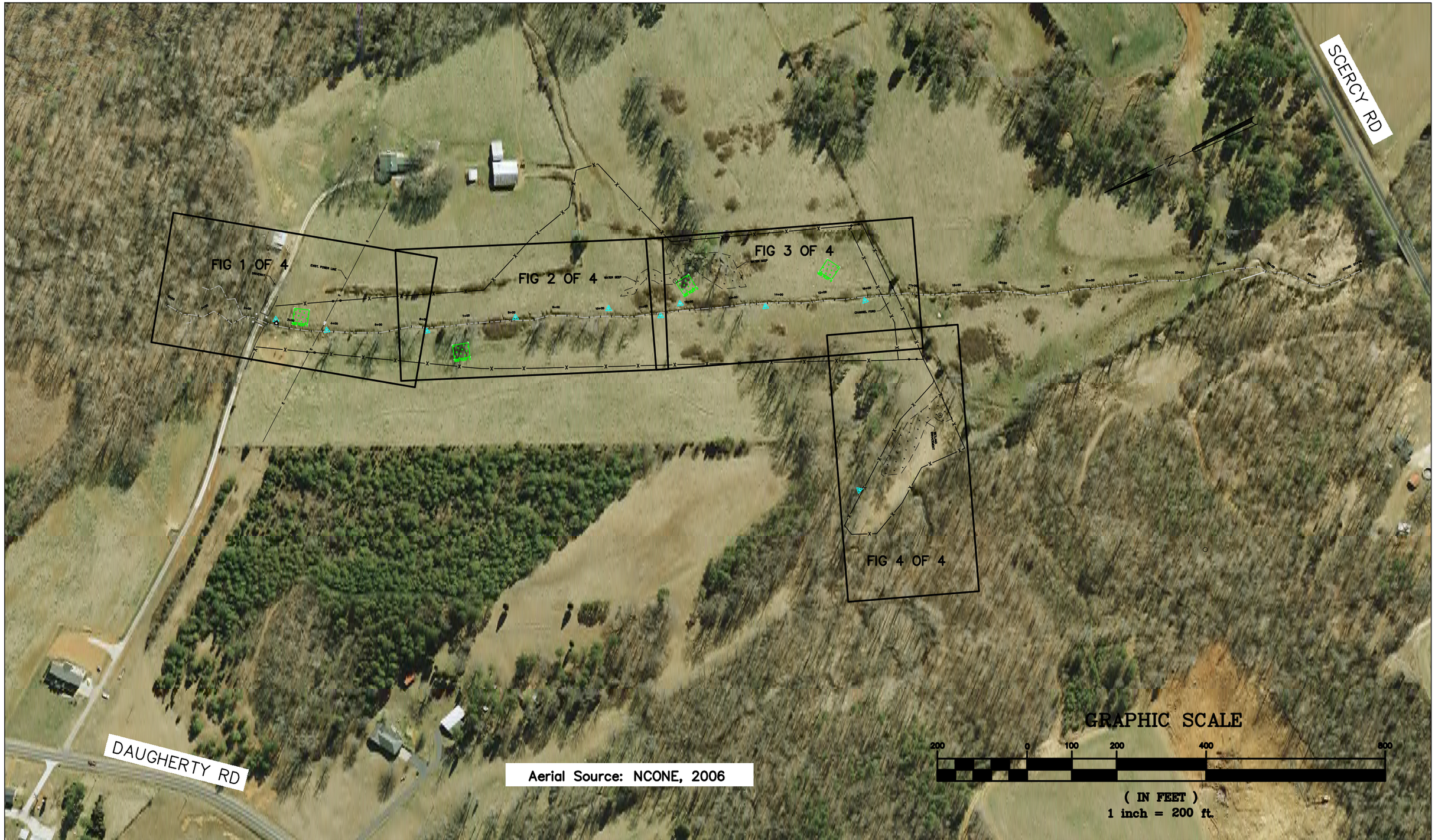
Appendix 3 - Vegetation Assessment Data

Appendix 4 – Stream Assessment Data

Appendix 5 – Wetland Assessment Data



Appendix 1.1 Project Vicinity Map
Helms Site (UT to Dutch Buffalo Creek)/EEP Project No. 172
Rowan County, North Carolina
Monitoring Year 1 of 5
Submittal Date: February 2011



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

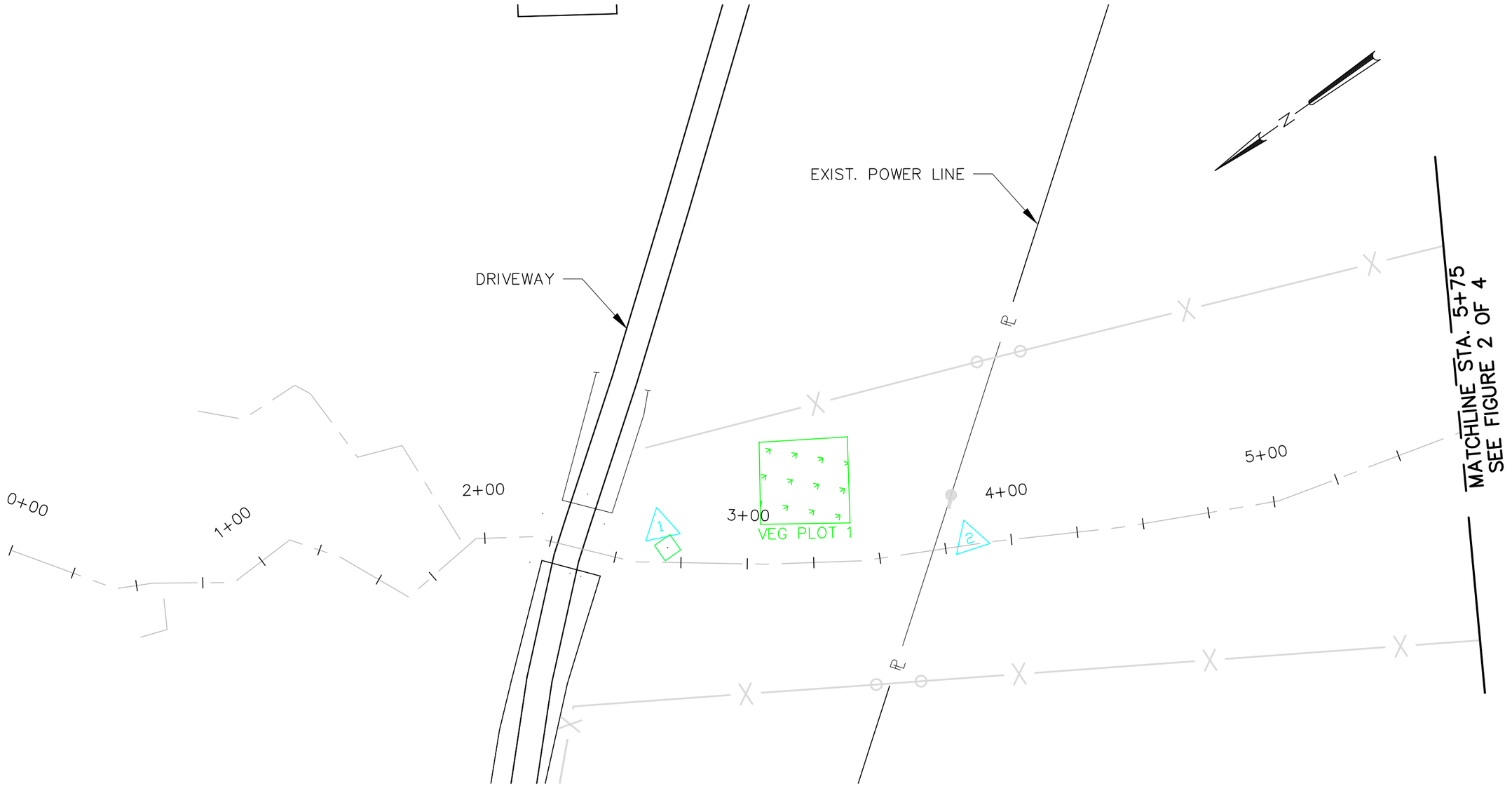
EEP PROJECT NO. 172
ROWAN COUNTY,
NORTH CAROLINA
MONITORING YEAR 2 of 5

NC ECOSYSTEM ENHANCEMENT PROGRAM
UT TO DUTCH BUFFALO CREEK

APPENDIX 1.2
CURRENT CONDITION PLAN VIEW

DATE : JANUARY 2011
SCALE : 1"=200'
JOB NO.: JJX31100

FIGURE KEY



LEGEND

- PHOTO POINT
- CREST GAUGE
- GROUNDWATER GAUGE
- STREAM CENTERLINE
- CONSERVATION EASEMENT
- VEGETATION PLOT

2010 CURRENT CONDITION

- VEGETATION PLOT– MET SUCCESS CRITERIA
- GROUNDWATER GAUGE– FAILED

GRAPHIC SCALE

40 0 20 40 80 160

(IN FEET)
1 inch = 40 ft.

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NC ECOSYSTEM ENHANCEMENT PROGRAM
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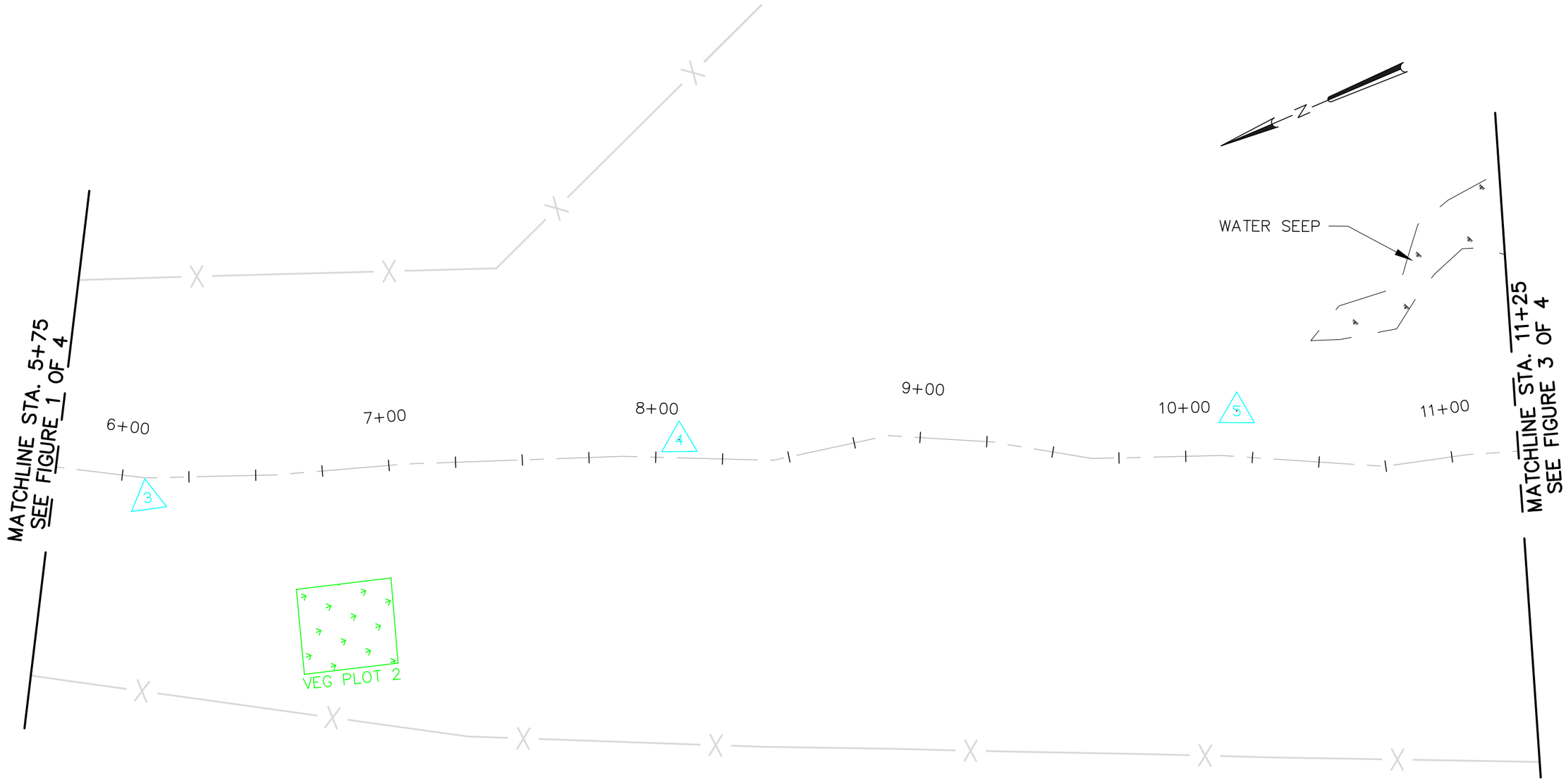
APPENDIX 1.2
CURRENT CONDITION PLAN VIEW

DATE : JANUARY 2011
SCALE : 1"=40'
JOB NO.: JJX31100

FIGURE 1 OF 4



LEGEND

- PHOTO POINT
- CREST GAUGE
- GROUNDWATER GAUGE
- STREAM CENTERLINE
- CONSERVATION EASEMENT
- VEGETATION PLOT

2010 CURRENT CONDITION

- VEGETATION PLOT– CRITERIA MET
- GROUNDWATER GAUGE– CRITERIA UNMET

GRAPHIC SCALE

40 0 20 40 80 160

(IN FEET)
1 inch = 40 ft.

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EEP PROJECT NO. 172
ROWAN COUNTY,
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NC ECOSYSTEM ENHANCEMENT PROGRAM
UT TO DUTCH BUFFALO CREEK

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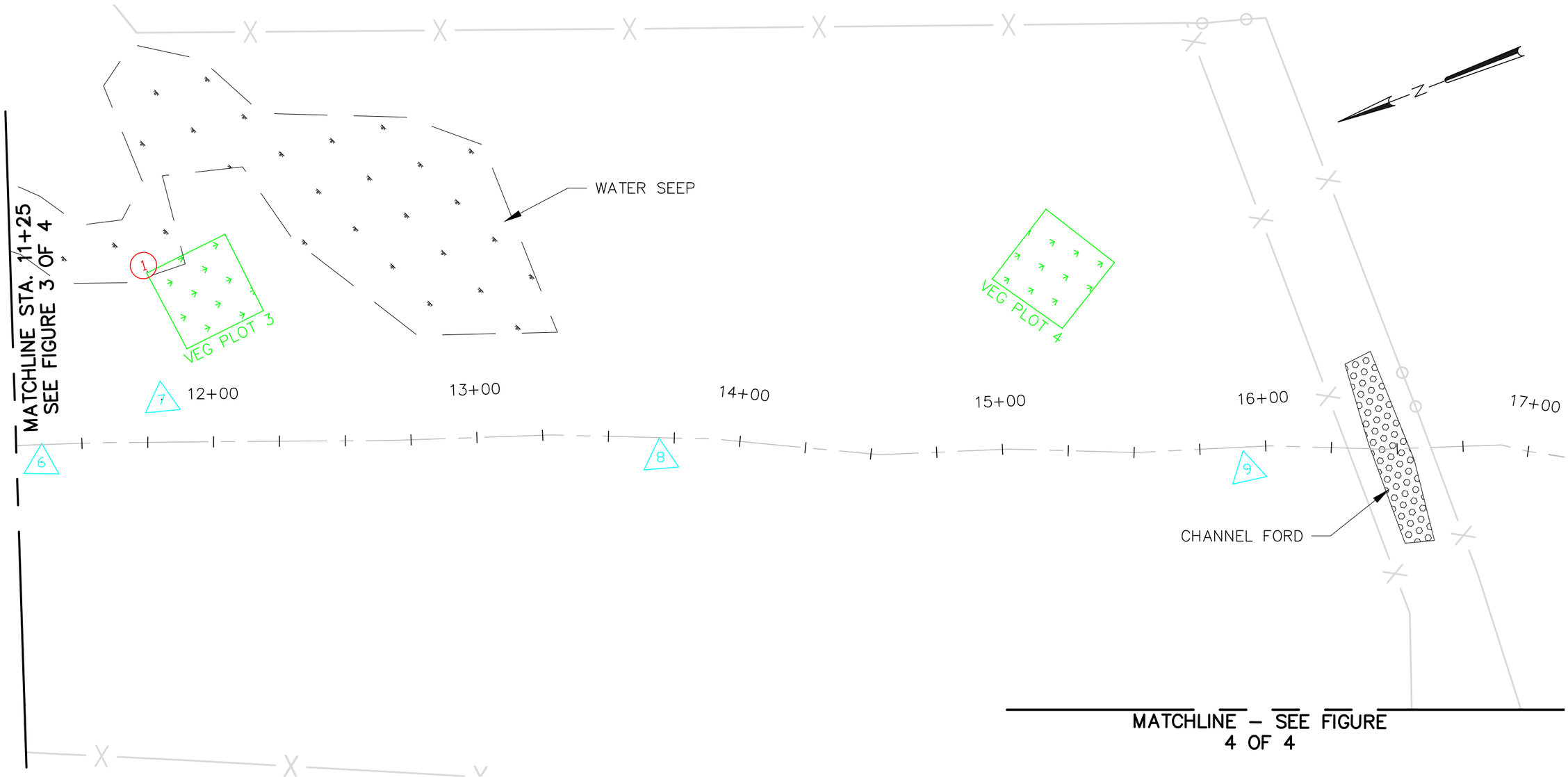
CURRENT CONDITION PLAN VIEW

DATE : JANUARY 2011
SCALE : 1"=40'
JOB NO.: JJX31100

FIGURE 2 OF 4



LEGEND

- PHOTO POINT
- CREST GAUGE
- GROUNDWATER GAUGE
- STREAM CENTERLINE
- CONSERVATION EASEMENT
- VEGETATION PLOT

2010 CURRENT CONDITION

- VEGETATION PLOT– CRITERIA MET
- GROUNDWATER GAUGE– CRITERIA UNMET

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(IN FEET)
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EEP PROJECT NO. 172
ROWAN COUNTY,
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NC ECOSYSTEM ENHANCEMENT PROGRAM
UT TO DUTCH BUFFALO CREEK

APPENDIX 1.2
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DATE : JANUARY 2011
SCALE : 1"=40'
JOB NO.: JJX31100

FIGURE 3 OF 4

LEGEND

- PHOTO POINT
- CREST GAUGE
- GROUNDWATER GAUGE
- STREAM CENTERLINE
- CONSERVATION EASEMENT
- VEGETATION PLOT

2010 CURRENT CONDITION

- VEGETATION PLOT– CRITERIA MET
- GROUNDWATER GAUGE– CRITERIA UNMET

GRAPHIC SCALE

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EEP PROJECT NO. 172
ROWAN COUNTY,
NORTH CAROLINA
MONITORING YEAR 2 of 5

NC ECOSYSTEM ENHANCEMENT PROGRAM
UT TO DUTCH BUFFALO CREEK

APPENDIX 1.2
CURRENT CONDITION PLAN VIEW

DATE : JANUARY 2011
SCALE : 1"=40'
JOB NO.: JJX31100

FIGURE 4 OF 4

Appendix 2.1 Project Mitigation Structure and Objectives
Helms Site (UT to Dutch Buffalo Creek)/EEP Project No. 172
Monitoring Year 2 of 5

Segment/Reach	Mitigation Type	Approach	Linear Footage or Acres	Stationing (ft)	Comments
Main Channel	E2	P4	1,393.81 lf	0+00-13+93.81	Stream Enhancement using native vegetative plants.
Wetland Area	E	-	0.4 ac	-	Wetland Enhancement using native plants in areas with existing hydric soils.

Component Summations						
		Wetland (ac)				
Restoration Level	Stream (lf)	Riparian	Non-Riparian	Upland (ac)	Buffer (ac)	BMP
Restoration (R)	N/A	N/A	N/A	N/A	N/A	N/A
Enhancement (E)	N/A	N/A	N/A	N/A	N/A	N/A
Enahncement I (E)	N/A	N/A	N/A	N/A	N/A	N/A
Enhancement II (E)	1,400	0.4	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	**1,400**	**0.4**	**N/A**	**N/A**	**N/A**	**N/A**

Appendix 2.2 Project Activity and Reporting History
Helms Site (UT to Dutch Buffalo Creek)/EEP Project No. 172
Monitoring Year 2 of 5

Elapsed Time Since Grading Complete: 4 Years 8 Months
Elapsed Time Since Planting Complete: 4 Years 8 Months
Number of Reporting Years: 2

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	2011	2011
Year 4 Monitoring	2012	2012
Year 5 Monitoring	2013	2013

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

Appendix 2.3 Project Contacts
Helms Site (UT to Dutch Buffalo Creek)/EEP Project No. 172
Monitoring Year 2 of 5

Designer	EcoScience Corporation 1101 Haynes Street, Suite 101 Raleigh, NC 27604 919- 828-3433
Construction	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	Jordan, Jones and Goulding 309 E. Morehead Street, Suite 110 Charlotte, NC 28202
Stream Monitoring, POC	Alison Nichols, 704-527-4106 ext.227
Vegetation Monitoring, POC	
Wetland Monitoring, POC	

Appendix 2.4 Project Attribute Table
Helms Site (UT to Dutch Buffalo Creek)/EEP Project No. 172
Monitoring Year 2 of 5

Project County	Rowan County, North Carolina
Physiographic Region	Piedmont
Ecoregion	Southern Outer Piedmont
Project River Basin	Yadkin PeeDee
USGS HUC for Project (14 digit)	03040105020050
NCDWQ Sub-basin for Project and Reference	03-07-12
Within extent of EEP Watershed Plan?	U
WRC Class (Warm, Cool, Cold)	Warm
% of project easement fenced or demarcated?	100%
Beaver activity observed during design phase?	U

Restoration Component Attribute Table

	Main Channel		
Drainage Area (sq.mi.)	0.6 sq. mi		
Stream Order	2nd		
Restored Length (ft)	1,393.81		
Perennial or Intermittent	Perennial		
Watershed type (Rural, Urban, Developing)	Rural		
Watershed LULC Distribution			
Agriculture	-		
Commercial	-		
Public/Institutional	-		
Residential	-		
Transportation	-		
Watershed Impervious Cover (%)	<10%		
NCDWQ AU/Index number	13-17-11-(1)		
NCDWQ classification	WS-II, HQW		
303d listed?	No		
Upstream of a 303d listed sedment?	No		
Reasons for 303d listing or stressor	N/A		
Total acreage of easement	9.60		
Total vegetated acreage within the easement	9.6		
Total planted acreage as part of the restoration	U		
Rosgen classification of the pre-existing	G5/4		
Rosgen classification of the As-Built	E5/4		
Valley Type	-		
Valley slope	-		
Valley side slope range	-		
Valley toe slope range	-		
Cowardin classification	-		
Trout waters designation	No		
Species of concern, endangered, etc? (Y/N)	N/A		
Dominant soil series and characteristics			
Series	Chewalca	Cecil	Enon/Meckle
Depth	-		
Clay %	-		
K	-		
T	-		

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

Appendix 3.1 Vegetation Plot Mitigation Success
Helms Site (UT to Dutch Buffalo Creek)/EEP Project No.172
Monitoring Year 2 of 5

Vegetation Plot ID	Vegetation Survival Threshold Met (Y/N)
Plot 1	Y
Plot 2	Y
Plot 3	Y
Plot 4	N
Total Mean Density (stems/acre)	547
Total Planted Density (stems/acre)	385

Vegetation Plot 1
(10/2010)

Vegetation Plot 2
(10/2010)

Vegetation Plot 3
(10/2010)

Vegetation Plot 4
(10/2010)

Prepared For:

Ecosystem Enhancement Program

Appendix 3.2 Vegetation Monitoring Plot Photos
Helms Site (UT to Dutch Buffalo Creek)/EEP Project No. 172
Monitoring Year 2 of 5
Submittal Date: February 2011

Prepared By:

JJG

Table 3.3 Vegetation Metadata Table
Helms Site (UT to Dutch Buffalo Creek)/EEP Project No.172
Monitoring Year 2 of 5

Report Prepared By	Kirsten Young
Date Prepared	
database name	
database location	
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)	1,393.81
stream-to-edge width (ft)	
area (sq m)	20436.6
Required Plots (calculated)	4
Sampled Plots	4

Appendix 3.4 Vegetation Plot Summary Data Table
Helms Site (UT to Dutch Buffalo Creek)/EEP Project No.172
Monitoring Year 2 of 5

			Current Data (MY2-2010)								Annual Means			
			Plot 1		Plot 2		Plot 3		Plot 4		Current Mean		MY1 - 2009	
Species	**Common Name**	**Type**	P	T	P	T	P	T	P	T	P	T	**P**	**T**
Alnus serrulata	tag alder	T/S	0	1	0	0	0	0	0	0	**0**	**0**	**N/A**	**N/A**
Betula nigra	river birch	T	0	0	1	1	0	0	0	0	**0**	**0**	**2**	**2**
Carya sp.	hickory	T	0	0	0	0	0	0	0	0	**N/A**	**0**	**N/A**	**1**
Diospyros virginiana	common persimmon	T	3	3	0	0	0	0	0	0	**1**	**1**	**3**	**3**
Fraxinus pennsylvanica	green ash	T	4	5	1	1	3	3	0	1	**2**	**3**	**3**	**3**
Liquidambar stryaciflua	sweet gum	T	0	0	0	9	0	0	0	4	**N/A**	**3**	**N/A**	**1**
Nyssa sylvatica	blackgum	T	1	1	0	0	0	0	0	0	**0**	**0**	**1**	**1**
Platanus occidentalis	American sycamore	T	3	3	2	2	2	2	3	3	**3**	**3**	**3**	**3**
Quercus sp.	Oak	T	0	0	1	2	0	0	0	0	**0**	**1**	**N/A**	**N/A**
Quercus lyrata	overcup oak	T	1	1	0	0	0	0	0	0	**0**	**0**	**1**	**1**
Quercus michauxii	swamp chestnut oak	T	1	1	1	1	5	5	0	0	**2**	**2**	**2**	**2**
Quercus nigra	water oak	T	0	0	0	0	0	0	1	1	**0**	**0**	**1**	**1**
Quercus pagoda	cherrybark oak	T	1	1	0	0	0	0	1	1	**1**	**1**	**1**	**1**
Quercus phellos	willow oak	T	1	1	0	0	0	0	0	0	**0**	**0**	**1**	**1**
Viburnum dentatum	southern arrowwood	T/S	0	0	2	2	0	0	0	0	**1**	**1**	**2**	**2**
Unknown sp.	unknown species	T	0	0	0	0	0	0	0	0	**0**	**0**	**1**	**1**
Plot Area (acres)			**0.0247**											
Species Count			**15**	**15**	**15**	**15**	**15**	**15**	**15**	**15**	**13**	**15**	**12**	**14**
Stem Count			**15**	**16**	**8**	**18**	**10**	**10**	**5**	**10**	**10**	**14**	**21**	**23**
Stems per Acre			**607**	**648**	**324**	**729**	**405**	**405**	**202**	**405**	**385**	**547**	**425**	**445**

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

Appendix 3.5 Vegetation Condition Assessment
Helms Site (UT to Dutch Buffalo Creek)/EEP Project No.172
Monitoring Year 2 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 tart levels based on MY3, 4, or 5 stem count criteria.	0.1	0	0	0%
		Total	**0**	**0**	**0%**
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).	1000	0	0	0%
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
(11/2010)

Photo Point 1-View Downstream
(11/2010)

Photo Point 2-View Upstream
(11/2010)

Photo Point 2-View Downstream
(11/2010)

Prepared For:

Ecosystem Enhancement Program

Appendix 4.1 Stream Station Photos
Helms Site (UT to Dutch Buffalo Creek)/EEP Project No. 172
Monitoring Year 2 of 5
Submittal Date: February 2011

Prepared For:

JJG

Photo Point 3-View Upstream
(11/2010)

Photo Point 3-View Downstream
(11/2010)

Photo Point 4-View Upstream
(11/2010)

Photo Point 4-View Downstream
(11/2010)

Photo Point 5-View Upstream
(11/2010)

Photo Point 5-View Downstream
(11/2010)

Photo Point 6-View Upstream
(11/2010)

Photo Point 6-View Downstream
(11/2010)

Prepared For:

Ecosystem Enhancement Program

Appendix 4.1 Stream Station Photos
Helms Site (UT to Dutch Buffalo Creek)/EEP Project No. 172
Monitoring Year 2 of 5
Submittal Date: February 2011

Prepared For:

JJG

Photo Point 7-View Upstream
(11/2010)

Photo Point 7-View Downstream
(11/2010)

Photo Point 8-View Upstream
(11/2010)

Photo Point 8-View Downstream
(11/2010)

Photo Point 9-View Upstream
(11/2010)

Photo Point 9-View Downstream
(11/2010)

Photo Point 10-View Away From Wetland
(11/2010)

Photo Point 10-Viewing Wetland Enhancement
(11/2010)

Appendix 4.2 Qualitative Visual Stability Assessment
Main Channel (1,393.81 lf)
Helms Site (UT to Dutch Buffalo Creek)/EEP Project No. 172
Monitoring Year 2 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			N/A		95%			
		Degradation			N/A		100%			
	2. Riffle Condition	Texture/Substrate	N/A				N/A			
	3. Meander Pool Condition	Depth Sufficient	N/A				N/A			
		Length Appropriate	N/A				N/A			
	4. Thalweg Position	Thalweg centering at upstream of meander bend (Run)	N/A				100%			
		Thalweg centering at downstream of meander bend (Glide)	N/A				100%			
2. Bank	**1. Scoured/Eroded**	Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion			0	0	91%	0	0	100%
	2. Undercut	Banks undercut/overhanging to the extent that mass wasting appears likely. Does NOT include undercuts that are modest, appear sustainable and are providing habitat			0	0	100%	0	0	100%
	3. Mass Wasting	Bank slumping, calving, or collapse			0	0	100%	0	0	100%
				Totals	0	0	100%	0	0	100%
3. Engineered Structures	**1. Overall Integrity**	Structures physically intact with no dislodged boulders or logs.	N/A				N/A			
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill	N/A				N/A			
	2a. Piping	Structures lacking any substantial flow underneath sills or arms.	N/A				N/A			
	3. Bank Protection	Bank erosion within the structures extent of influence does not exceed 15%.	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			

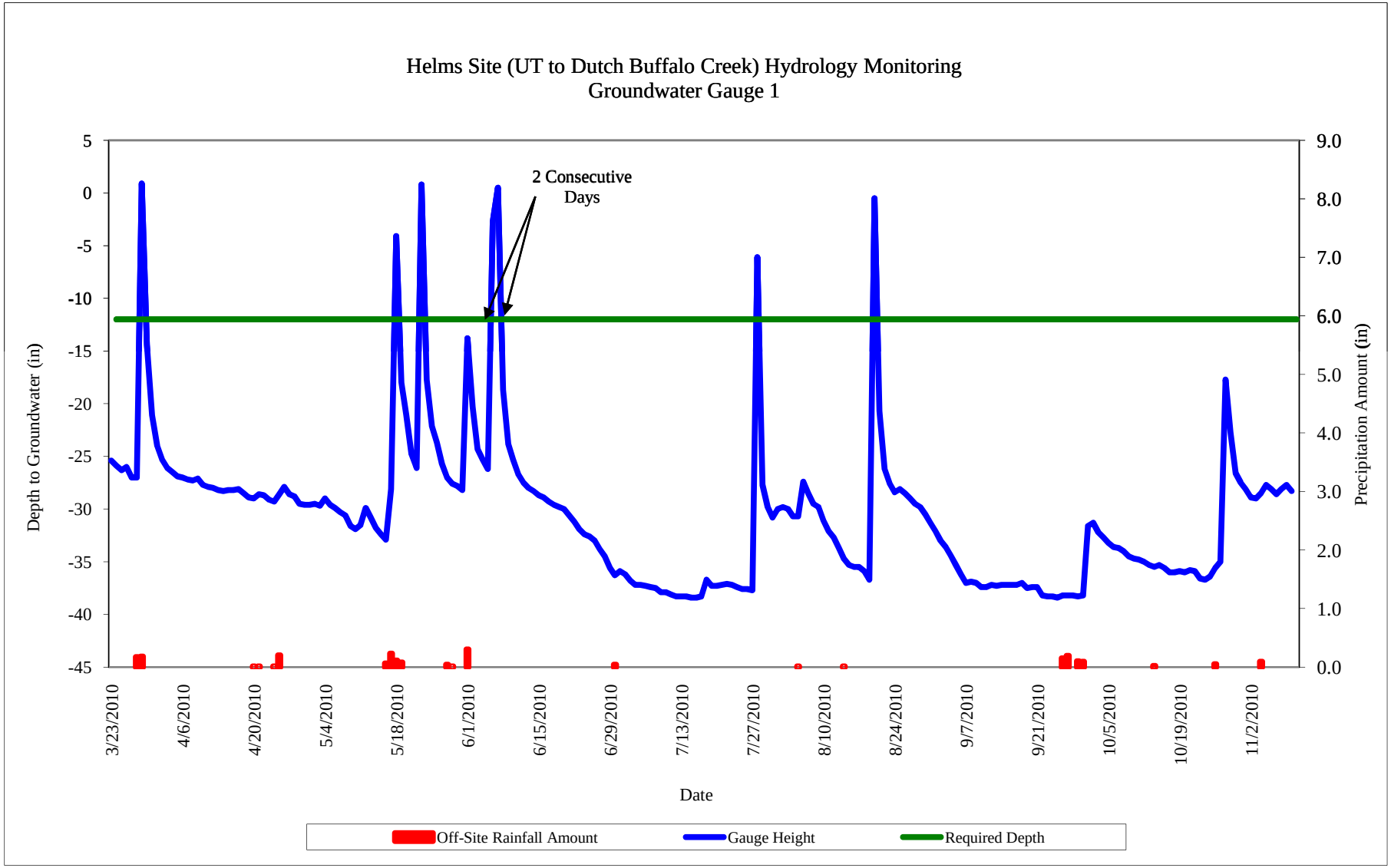
Appendix 4.3 Verification of Bankfull Events
Helms Site (UT to Dutch Buffalo Creek)/EEP Project No. 172
Monitoring Year 2 of 5

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

U: Unknown

Appendix 5.1 Precipitation - Water Level Plots for Gauges
Helms Site (UT to Dutch Buffalo Creek)/EEP Project No. 172
Monitoring Year 2 of 5

Growing Season: March 23-November 10



Appendix 5.2 Wetland Criteria Attainment
Helms Site (UT to Dutch Buffalo Creek)/EEP Project No. 172
Monitoring Year 2 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 (2008)**	**Year 4 (2009)**	**Year 5 (2010)**
GW1	*	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.