UT ALTAMAHAW SITE

EEP Project No. 92837

MONITORING YEAR 1 (2012) FINAL SUBMITTAL

Construction Completed February 2011

Alamance County, NC
State Construction Project No. 09-0762301

Prepared for the
NC Department of Environment and Natural Resources
Ecosystem Enhancement Program

1652 Mail Service Center
Raleigh, NC 27699-1652

December 2012

Prepared by:

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G. Lane Sauls, Jr., Principal

This assessment and report are consistent with NCDENR Ecosystem Enhancement Program Template Version 1.3 (1/15/10) for EEP Monitoring Reports.

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Note: Tables 5, 10 and 11 are not included as part of this monitoring assessment and report due to the required protocols associated with the monitoring of this project.

1.0 EXECUTIVE SUMMARY/ PROJECT ABSTRACT

The UT Altamahaw Site is located within HUC 03030002 and sub-basin 03-06-02 of the Cape Fear River Basin in Alamance County, North Carolina (Figure 1). It includes portions of two unnamed tributaries (UTs) to Altamahaw Creek. The enhancement lengths of the main and secondary channels are 1,347 and 130 linear feet, respectively. In addition, 0.026 acres of wetlands were enhanced as part of the overall project. The UT Altamahaw Site is protected for perpetuity under a conservation easement purchased from Mr. Charles Hursey Sr., Charles Hursey II, Christopher Hursey and Carey Hursey in 2008. Project restoration components, activity and reporting history, contacts and attribute data are all provided in Appendix A.

1.1 Goals and Objectives

The Project's goals were to:

- reduce nutrient and sediment water quality stressors,
- provide for uplift in water quality functions,
- improve instream and wetland aquatic habitats, including riparian terrestrial habitats, and
- provide for greater overall instream and wetland habitat complexity and quality.

Stream enhancement, the primary project component, served as the dominant input for achieving this goal.

These goals were consistent with the Travis and Tickle Creek Local Watershed Plan (LWP). The LWP, completed in 2008, identified six goals; two of which are met by the Project. These are (1) to improve water quality through stormwater management and (2) identify and rank parcels for retrofits, stream repair, preservation and/or conservation. The Project improved the emergency spillway associated with the existing pond immediately upstream of the Project Site and the existing stream crossing to further prevent erosion into the main stream channel. It also included the design and installation of a modified level spreader to diffuse surface flows from the nearby pasture through a vegetated buffer. In addition, the Site was also one of the specific areas identified through the stakeholder process associated with the LWP.

The LWP process identified nine key watershed stressors and their corresponding management strategies. These stressors were identified via the local stakeholder groups including EEP, Piedmont Land Conservancy, Haw River Assembly, Piedmont Triad Council of Governments, Alamance and Guilford Counties, Natural Resources Conservation Service, Cities of Burlington and Graham, Towns of Elon and Gibsonville, NC Division of Water Quality, NC Wildlife Resources Commission and Resource Conservation & Development. The UT to Altamahaw Stream Enhancement Project combats six of those stressors with the following strategies:

Key Watershed Stressors	Management Strategies
Stream bank erosion	Riparian buffers & livestock exclusion
Lack of adequate buffer	Riparian buffers & livestock exclusion
Stormwater runoff	Stormwater BMPs
Livestock access to streams	Livestock exclusion
Nutrients	Agricultural BMPs, riparian buffers & stormwater BMPs
Fecal coliform	Agricultural BMPs & stormwater BMPs

The objectives were to exclude livestock in their entirety from the easement area and install plantings designed to maintain vertical stability, lateral stability and habitat, as well as re-vegetate and supplement

those areas lacking suitable vegetation along the easement area. An alternative water supply was provided and the existing crossing was improved to prevent further erosion. In addition, enhancement of the auxiliary spillway associated with the pond immediately upstream of the Site and construction of a modified level spreader to combat surface flows from the pasture were also completed as part of implementation activities. Ultimately, this supplemental planting will provide increased opportunities for the filtration of pollutants and nutrients prior to entering the stream channel as well as, the stabilization of sediment along the associated stream banks.

1.2 Vegetation Condition and Comparison to Success Criteria

Vegetation success criteria at the Site is consistent with the USACE Wilmington Regulatory District's guidance for wetland mitigation which documents the survival of a minimum of 320 planted woody stems/acre after Monitoring Year 3 (MY3). The mortality rate of 10% will be allowed after MY4 assessments (288 stems/acre) and correspondingly, MY5 assessments (260 stems/acre). Invasive, exotic species were present prior to implementation and criteria will also include the removal of all such species prior to project closeout.

Vegetation is currently being assessed using plot layouts consistent with the EEP/Carolina Vegetation Survey (CVS) Level II Vegetation Protocol. Stem count data is ascertained from five permanently placed 10-meter^2 vegetation plots (Figure 2). Assessments included counts of both planted and natural stems. Based on this year's monitoring effort, only one of the five vegetation plots met the minimum success criteria. Stem counts ranged from approximately 100 to 350 planted stems per acre and approximately 350 to 1,350 total stems per acre across the site. Prior to baseline assessments, it was discovered that cattle had accessed the easement area between the completion of implementation activities and baseline assessments. Damages were unrealized at the time; however, based on recent vegetation counts, it appears that overall seedling mortality can be attributed to this occurrence in addition to common mortality rationales such as drought, inferior specimens, etc.

Appendices B and C depict more detailed information regarding the vegetation condition, including annual photograph comparisons.

1.3 Stream Stability/Condition and Comparison to Success Criteria

No in-channel enhancement activities were conducted as part of this project. Assessments include only annual photograph comparisons and monitoring of hydrology associated with the channel. A minimum of two bankfull events must be documented within the standard five-year monitoring period. In order for the hydrology-based monitoring to be considered complete, the two events must occur in separate monitoring years.

During November 2011, at least one bankfull event occurred. This was prior to installation of the crest gage though construction was complete. No bankfull events were reported during 2012. Annual photograph comparisons of the stream channels are depicted in Appendix B and hydrologic data associated with this year's monitoring assessment is provided in Appendix D.

1.4 Other Information

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 Baseline Monitoring Report (formerly Mitigation Plan) and in the Mitigation Plan (formerly the

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.

2.0 METHODOLOGY

This monitoring report follows methodology consistent with EEP's Procedural Guidance and Content Requirements for EEP Monitoring Reports (Version 1.3, dated 1/15/10), available at EEP's website (http://www.nceep.net).

Vegetation assessments were conducted using the CVS-EEP protocol (Version 4.2). As part of this protocol, vegetation is assessed using 100-meter^2 plots, or modules. The scientific method requires that measurements be as unbiased as possible, and that they be repeatable. Plots are designed to achieve both of these objectives; in particular, different people should be able to inventory the same plot and produce similar data (Lee et. al., 2006).

According to Lee et. al. (2006), there are many different goals in recording vegetation, and both time and resources for collecting plot data are extremely variable. To provide appropriate flexibility in project design, the CVS-EEP protocol supports five distinct types of vegetation plot records, which are referred to as levels in recognition of the increasing level of detail and complexity across the sequence. The lower levels require less detail and fewer types of information about both vegetation and environment, and thus are generally sampled with less time and effort (Lee et. al., 2006). Level 1 (Planted Stem Inventory Plots) and Level 2 (Total Woody Stem Inventory Plots) inventories were completed on all five of the vegetation plots at the Project Site.

Level 1 plots are applicable only for restoration areas with planted woody stems. The primary purpose is to determine the pattern of installation of plant material with respect to species, spacing, and density, and to monitor the survival and growth of those installed plants. Level 1 plots are one module in size (Lee et. al., 2006).

Level 2 plots also are designed specifically for restoration areas and represent a superset of information collected for Level 1 plots. In these plots planted woody stems are recorded exactly as for Level 1, but in addition all woody stems resulting from natural regeneration are recorded by size class using separate datasheets. These plots allow an accurate and rapid assessment of the overall trajectory of woody-plant restoration and regeneration on a site. Level 2 plots are one module in size (Lee et. al., 2006).

A crest gage was installed near the downstream end of the Site along the main UT. This gage will verify the on-site occurrences of bankfull events. In addition to the crest gage, observations of wrack and deposition will also serve to validate gage observations, as necessary. Documentation of the highest stage during the monitoring interval will be assessed during each Site visit and the gage will be reset. The data related to bankfull verification will be summarized in each year's report. Based on the elevation of the crest gage, any readings observed higher than 12 inches on the gage will reflect a bankfull or above bankfull event.

3.0 REFERENCES

Lee, Michael T., R.K. Peet, S.D. Roberts and T.R. Wentworth, 2006. CVS-EEP Protocol for Recording Vegetation, Version 4.0 (http://cvs.bio.unc.edu/methods.htm).

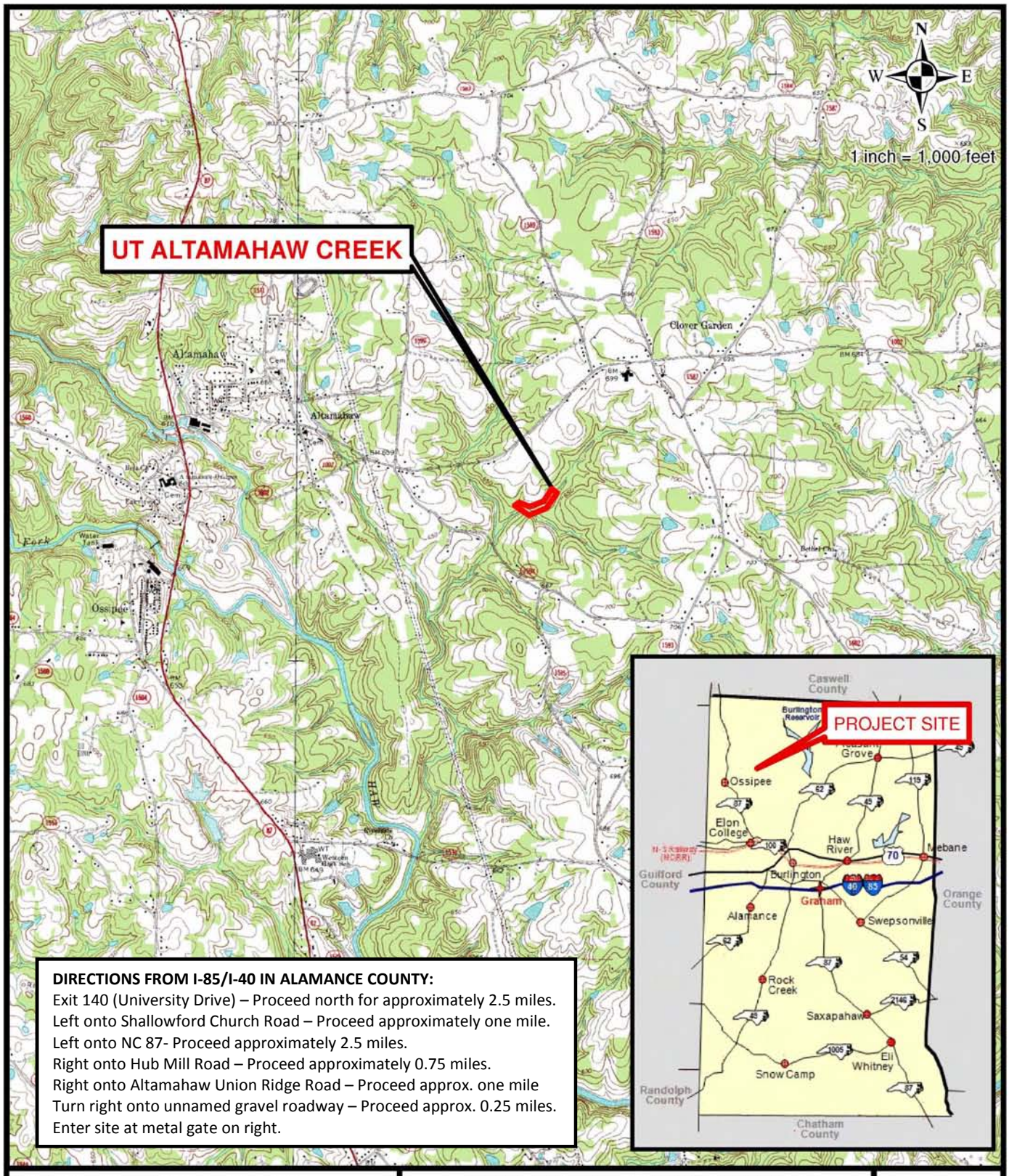
NCDENR Ecosystem Enhancement Program, 2012. UT Altamahaw Creek Baseline Monitoring Document and As-built Baseline Report. Prepared by Ecological Engineering, LLP.

NC State Climate Office, 2012. Daily Precipitation Data from Burlington/Alamance Airport (KBUY), Alamance County (www.nc-climate.ncsu.edu).

US Army Corps of Engineers, US Environmental Protection Agency, NC Wildlife Resources Commission and NC Department of Environment Division of Water Quality, 2003. Stream Mitigation Guidelines.

APPENDIX A.

Project Vicinity Map and Background Tables



DIRECTIONS FROM I-85/I-40 IN ALAMANCE COUNTY:
Exit 140 (University Drive) – Proceed north for approximately 2.5 miles.
Left onto Shallowford Church Road – Proceed approximately one mile.
Left onto NC 87- Proceed approximately 2.5 miles.
Right onto Hub Mill Road – Proceed approximately 0.75 miles.
Right onto Altamahaw Union Ridge Road – Proceed approx. one mile
Turn right onto unnamed gravel roadway – Proceed approx. 0.25 miles.
Enter site at metal gate on right.

Ecosystem Enhancement PROGRAM

PROJECT SITE VICINITY MAP

UT Altamahaw Creek Site
Alamance County, NC

EEP Project No. 92837 SCO Project No.09-0762301
December 3, 2012
Sources: NCDOT and NC Atlas & Gazetteer. USGS Maps Ossipee and Lake Burlington

FIGURE 1

Table 1. Project Components and Mitigation Credits
UT Altamahaw/ 92837

Mitigation Credits

	Stream		Riparian Wetland		Non-riparian wetland		Buffer	Nitrogen Nutrient Offset	Phosphorus Nutrient Offset
Type	R	RE	R	RE	R	RE			
Totals	738.5			0.013					

Project Components

Project Component	Stationing/Location	Existing Footage/ Acreage	Approach	Restoration or Restoration Equivalent	Restoration Footage or Acreage	Mitigation Ratio
Rip. Non-riverine	Northwest boundary	0.026 acres	E	0.013	0.013 acres	2 to 1
UT Altamahaw Creek	Center of Project Area	1,347 linear feet	EII	673.5	673.5 lf	2 to 1
UT to UT Altamahaw Creek	Southwest boundary	130 linear feet	EII	65	65 lf	2 to 1

Component Summation

Restoration Level	Stream (linear feet)	Riparian Wetland (acres)		Non-riparian Wetland (acres)	Buffer (square feet)	Upland (acres)
		Riverine	Non-riverine			
Restoration						
Enhancement			0.026 acres			
Enhancement I						
Enhancement II	1,477 linear feet					
Creation						
Preservation						
HQ Preservation						

BMP Elements

Element	Location	Purpose/Function	Notes

BMP Elements

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

Table 2. Project Activity and Reporting History UT Altamahaw/ 92837		
Elapsed Time Since Grading Complete: 1 year 9 months Elapsed Time Since Planting Complete: 1 year 9 months Number of Reporting Years: 1		
Activity or Report	**Data Collection Complete**	**Completion or Delivery**
Mitigation Plan	May-10	May-10
Final Design - Construction Plans	June-10	June-10
Construction		February-11
Temporary S&E Mix Applied to Entire Project Area		February-11
Permanent Seed Mix Applied to Entire Project Area		February-11
Bare Root, Live Stake and Tubling Plantings Applied		February-11
Baseline Monitoring Document	January-12	February-12
Year 1 Monitoring	August-12	December-12
Year 2 Monitoring		
Year 3 Monitoring		
Year 4 Monitoring		
Year 5 Monitoring		

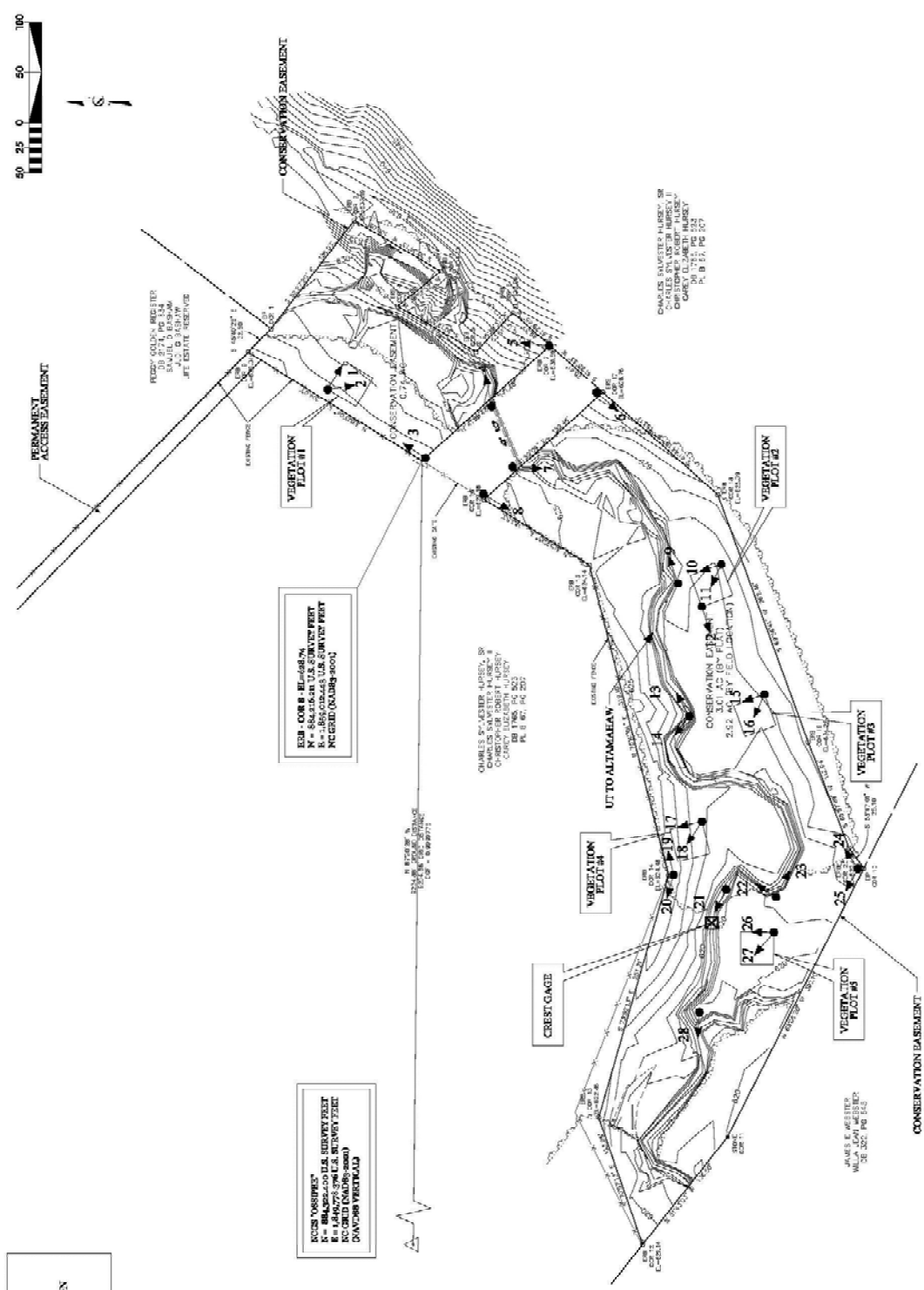
Table 3. Project Contact Table UT Altamahaw/ 92837	
Designer Ecological Engineering, LLP Jenny S. Fleming, PE	**Firm Information/ Address** 1151 SE Cary Parkway, Suite 101, Cary, NC 27518 (919) 557-0929
Construction Contractor Riverworks, Inc. Bill Wright	**Firm Information/ Address** 8000 Regency Parkway, Suite 800, Cary, NC 27518 (919) 459-9001
Planting Contractor Riverworks, Inc. George Morris	**Firm Information/ Address** 8000 Regency Parkway, Suite 800, Cary, NC 27518 (919) 459-9001
Seeding Contractor Riverworks, Inc. George Morris	**Firm Information/ Address** 8000 Regency Parkway, Suite 800, Cary, NC 27518 (919) 459-9001
Seed Mix Sources	Green Resource (336) 855-6363
Nursery Stock Suppliers	ArborGen (843) 851-4129 Cure Nursery (919) 542-6186 Foggy Mountain Nursery (336) 384-5323 Mellow Marsh Farm (919) 742-1200 Superior Tree (850) 971-5159
Monitoring Performer Ecological Engineering, LLP G. Lane Sauls Jr. (stream, vegetation & wetland)	**Firm Information/ Address** 1151 SE Cary Parkway, Suite 101, Cary, NC 27518 (919) 557-0929

Table 4. Project Baseline Information and Attributes
UT Altamahaw/ 92837

Project Information			
Project Name	UT Altamahaw		
County	Alamance		
Project Area	3.6 acres		
Project Coordinates (latitude and longitude)	36°10'43.56'' North/ 79°28'37.91" West		
Project Watershed Summary Information			
Physiographic Province	Piedmont		
River Basin	Cape Fear		
USGS Hydrologic Unit 8-digit	3030002	**USGS Hydrologic Unit 14-digit**	3030002030010
DWQ Subbasin	03.06.02		
Project Drainage Area	0.51 sq. mi. (334 acres)		
Project Drainage Area Percentage of Impervious Area	Less than 1%		
CGIA Land Use Classification	Agricultural Land		
Reach Summary Information			
Parameters	**Reach 1**	**Reach 2**	
Length of Reach	1,347 linear feet	130 linear feet	
Valley Classification	Valley Type VIII	Valley Type VIII	
Drainage Area	0.51 sq. mi. (334 acres)	0.39 sq. mi. (251 acres)	
NCDWQ Stream ID Score	46.75	39.25	
NCDWQ Water Quality Classification	C NSW	C NSW	
Morphological Description (stream type)	C/E 5	C/E 5	
Evolutionary Trend	E-C-G-F-E-C	E-C-G-F-E-C	
Underlying Mapped Soils	Worsham sandy loam	Worsham sandy loam	
Drainage Classification	Poorly drained	Poorly drained	
Soil Hydric Status	Hydric A	Hydric A	
Slope	0 to 3%	0 to 3%	
FEMA Classification	Zone AE - lower end	Zone AE - lower end	
Native Vegetation Community	Piedmont Alluvial Forest	Piedmont Alluvial Forest	
Percent Composition of Exotic Invasive Species	Less than 5%	Less than 5%	
Wetland Summary Information			
Size of Wetland	0.026 acres		
Wetland Type	Seepage		
Mapped Soil Series	Worsham sandy loam		
Drainage Classification	Poorly drained		
Soil Hydric Status	Hydric A		
Source of Hydrology	Groundwater		
Hydrologic Impairment	None		
Native Vegetation Community	Piedmont Alluvial Forest		
Percent Composition of Exotic Invasive Species	Less than 5%		
Regulatory Considerations			
Waters of the United States - Section 404	Resolved		
Waters of the United States - Section 401	Resolved		
Endangered Species Act	Resolved		
Historic Preservation Act	Resolved		
Coastal Zone/Area Management Acts (CZMA/CAMA)	Not Applicable		
FEMA Floodplain Compliance	Resolved		
Essential Fisheries Habitat	Not Applicable		

APPENDIX B.

Visual Assessment Data

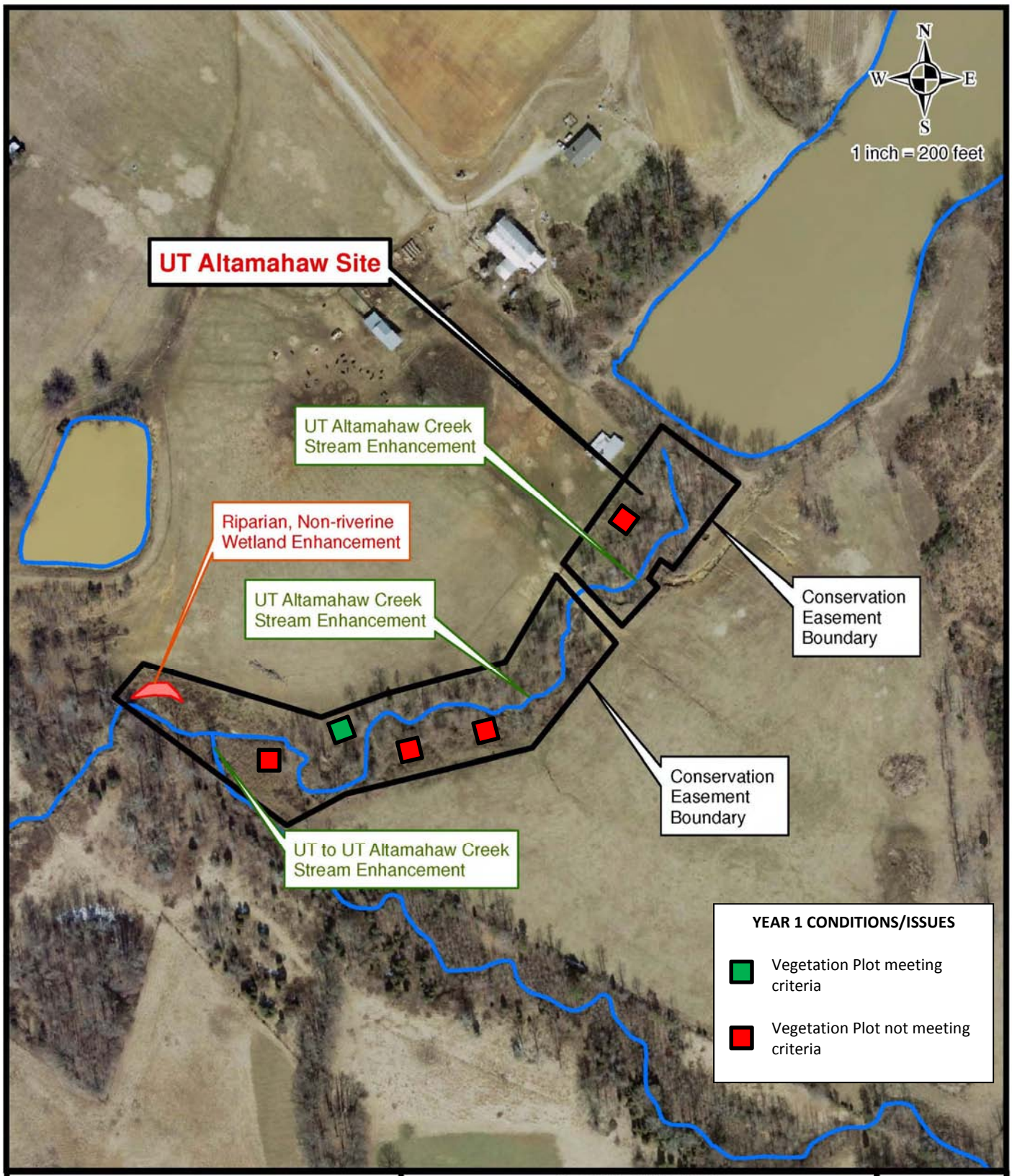


Ecosystem Enhancement PROGRAM

MONITORING PLAN VIEW

UT to Altamahaw Site
EEP Project No. 92837
Alamance County, NC
December 3, 2012

FIGURE 2



Prepared for:

Ecosystem Enhancement Program

CURRENT CONDITIONS PLAN VIEW

UT to Altamahaw Site
EEP Project No. 92837
Alamance County, NC
December 3, 2012

Source: NCEEP Orthoimagery server and Alamance County

FIGURE 3

Table 6. Vegetation Condition Assessment UT Altamahaw/ 92837

Planted Acreage 4.6

Vegetation Category	Definitions	Mapping Threshold	CCPV Depiction	Number of Polygons	Combined Acreage	% Planted Acreage
1. Bare Areas	Very limited cover of both woody and herbaceous material	0.1 ac	n/a	0	0	0
2. Low Stem Density Areas	Woody stem densities clearly below target levels based on MY 3, 4, or 5 stem count criteria	0.1 ac	n/a	4	3.7	80
			Total	**4**	**3.7**	**0**
3. Areas of Poor Growth Rates or Vigor	Areas with woody stems of a size class that area obviously small given the monitoring year	0.25 ac	n/a	0	0	0
			Cumulative Total	**0**	**0**	**0**

Easement Acreage 4.6

Vegetation Category	Definitions	Mapping Threshold	CCPV Depiction	Number of Polygons	Combined Acreage	% Planted Acreage
4. Invasive Areas	Areas or points (if too small to render as polygons at map scale)	none	n/a	0	0	0
5. Easement Encroachment Areas	Areas or points (if too small to render as polygons at map scale)	none	n/a	0	0	0

Photostation Comparison

UT Altamahaw Site - Monitoring Year 1 (2012)

Photo # and Location	Baseline Condition 2012	MY 1 2012
Photostation 1. Facing south east along y-axis of Vegetation Plot 1.		
Photostation 2. Facing south across Vegetation Plot 1.		
Photostation 3. Facing northeast towards Vegetation Plot 1.		
Photostation 4. Facing east (upstream) along UT Altamahaw Creek.		
Photostation 5. Facing north from east corner of existing crossing.		

Photostation Comparison - Page 2

	Baseline Condition 2012	MY 1 2012
Photostation 6. Facing southwest from south corner of existing crossing.		
Photostation 7. Facing south along UT Altamhaw Creek from existing crossing.		
Photostation 8. Facing southwest from corner at existing west corner of crossing.		
Photostation 9. Facing upstream along UT Altamahaw Creek north of Vegetation Plot 2.		
Photostation 10. Facing north along x-axis of Vegetation Plot 2.		

Photostation Comparison - Page 3

	Baseline Condition 2012	MY 1 2012
Photostation 11. Facing northwest across Vegetation Plot 2.		
Photostation 12. Facing west at riparian area from Vegetation Plot 2.		
Photostation 13. Facing upstream along UT Altamahaw Creek.		
Photostation 14. Facing downstream along UT Altamahaw Creek.		
Photostation 15. Facing north along x-axis of Vegetation Plot 3.		

Photostation Comparison - Page 4

	Baseline Condition 2012	MY 1 2012
Photostation 16. Facing northwest across Vegetation Plot 3.		
Photostation 17. Facing north along x-axis of Vegetation Plot 4.		
Photostation 18. Facing northwest across Vegetation Plot 4.		
Photostation 19. Facing northwest along easement boundary.		
Photostation 20. Facing northeast along easement boundary.		

Photostation Comparison - Page 5

	Baseline Condition 2012	MY 1 2012
Photostation 21. Facing downstream along UT Altamahaw Creek at the crest gage.		
Photostation 22. Facing downstream along UT Altamahaw Creek.		
Photostation 23. Facing upstream along UT Altamahaw Creek.		
Photostation 24. Facing northwest along southern easement boundary.		
Photostation 25. Facing northwest along southern easement boundary.		

Photostation Comparison - Page 6

	Baseline Condition 2012	MY 1 2012
Photostation 26. Facing north along x-axis of Vegetation Plot 5.		
Photostation 27. Facing northwest across Vegetation Plot 5.		
Photostation 28. Facing downstream from confluence of two unnamed tributaries.		

APPENDIX C.

Vegetation Plot Data

Table 7. Vegetation Plot Criteria Attainment UT Altamahaw/ 92837		
Vegetation Plot ID	**Vegetation Survival Threshold Met?**	**Tract Mean**
1	No	100%
2	No	100%
3	No	100%
4	Yes	100%
5	No	100%

Table 8. CVS Vegetation Metadata Table UT Altamahaw Creek (EEP Project No. 92837)	
Report Prepared By	Lane Sauls
Date Prepared	10/30/2012 10:43
database name	EcologicalEngineering-2012-UTAltamahawYear1-A.mdb
database location	S:\Projects\50000 State\EEP 50512\50512-001 EEP Altamahaw Creek\MONITORING\Year 1 2012
computer name	LANE
file size	36397056
DESCRIPTION OF WORKSHEETS IN THIS DOCUMENT----------	
Metadata	Description of database file, the report worksheets, and a summary of project(s) and project data.
Proj, planted	Each project is listed with its PLANTED stems per acre, for each year. This excludes live stakes.
Proj, total stems	Each project is listed with its TOTAL stems per acre, for each year. This includes live stakes, all planted stems, and all natural/volunteer stems.
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 by each.
Damage by Spp	Damage values tallied by type for each species.
Damage by Plot	Damage values tallied by type for each plot.
Planted Stems by Plot and Spp	A matrix of the count of PLANTED living stems of each species for each plot; dead and missing stems are excluded.
ALL Stems 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	92837
project Name	UT ALTAMAHAW
Description	Stream enhancement
River Basin	Cape Fear
length(ft)	1347
stream-to-edge width (ft)	50
area (sq m)	12512.77
Required Plots (calculated)	5
Sampled Plots	0

Table 9. Planted and Total Stem Counts (Species by Plot with Annual Means)
UT Altamahaw Site (EEP Project No. 92837)

SCIENTIFIC NAME	COMMON NAME	TYPE	CURRENT DATA (MY 1 2012)										ANNUAL MEANS			
			PLOT 1		PLOT 2		PLOT 3		PLOT 4		PLOT 5		CURRENT MEAN		AS BUILT	
			P	T	P	T	P	T	P	T	P	T	P	T	P	T
Acer negundo	boxelder	Tree		1										1		
Acer rubrum	red maple	Tree				2						1		3		
Betula nigra	river birch	Tree		2		1		3	1	1	1	12	2	19	1	1
Cornus florida	flowering dogwood	Tree								1				1	2	2
Fraxinus pennsylvanica	green ash	Tree	2	2			1	1	3	3	1	1	7	7	7	7
Ligustrum sinense	Chinese privet	Tree		1										1		
Liquidambar styraciflua	sweetgum	Tree										8		8		
Liriodendron tulipifera	tuliptree	Tree										1		1		
Oxydendrum arboreum	Sourwood	Tree													1	1
Platanus occidentalis	American sycamore	Tree			2	2					1	1	3	3	3	3
Quercus sp.	Oak species	Tree													1	1
Quercus michauxii	swamp chestnut oak	Tree			1	1	2	2					3	3	4	4
Quercus pagoda	cherrybark oak	Tree			2	2	2	2	3	3	1	1	8	8	11	11
Rhus sp.	sumac	Shrub								1		1		2		
Salix nigra	black willow	Shrub		1										1		2
Ulmus americana	American elm	Tree						1						1	2	2
Unknown		Tree			1	1					1	1	2	2	3	3
PLOT AREA (ACRES)			0.02		0.02		0.02		0.02		0.02		0.1		0.1	
SPECIES COUNT			2	7	6	9	5	9	7	9	5	27	25	61	35	37
STEM COUNT			1	5	4	6	3	5	3	5	5	9	6	15	10	11
STEMS PER ACRE			100	350	300	450	250	450	350	450	250	1350	250	610	350	370

Color for Density (Based on Year 3 Success Criteria)
Exceeds requirements by 10%
Exceeds requirements but by less than 10%
Fails to meet requirements by less than 10%
Fails to meet requirements by more than 10%

Other Colors
Indicates that volunteer species exist within plot

APPENDIX D.

Hydrology Data

Table 12. Verification of Bankfull Events UT Altamahaw/ 92837			
Date of Data Collection	**Date of Occurrence**	**Method**	**Photo # (if available)**
n/a*	November 3 & 4, 2012	NC State Climate Office	None

* Based on daily rainfall data prior to installation of Crest Gage. Approximately 2.4 inches of rain was recorded over a span of two days.