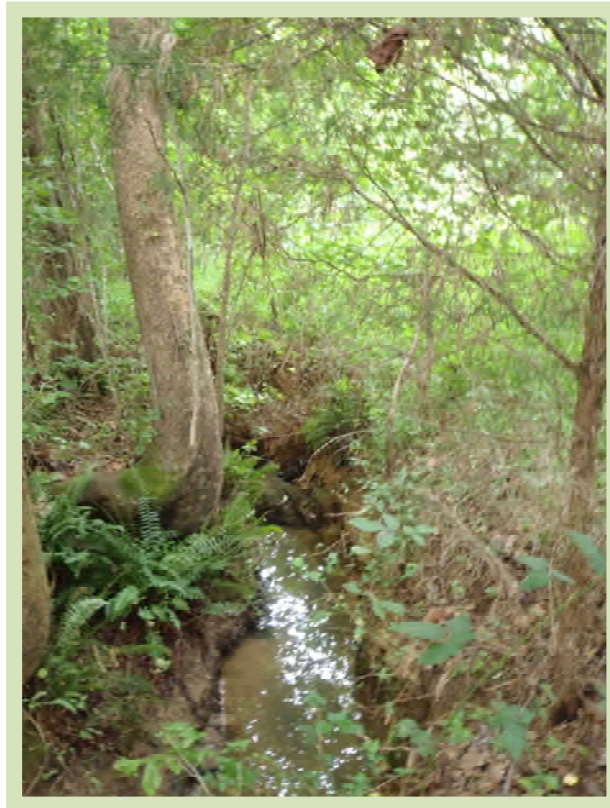


**FINAL
ANNUAL MONITORING REPORT
UT TO HAW (GWYNN) SITE
ALAMANCE COUNTY, NORTH CAROLINA
(EEP Project No. 92753, Contract No. 004543)**

Monitoring Year 5 of 5 (2014)



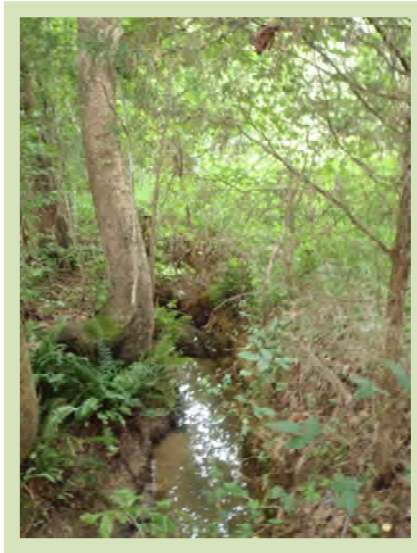
Submitted to:
North Carolina Department of Environment and Natural Resources
Ecosystem Enhancement Program
Raleigh, North Carolina



December 2014

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Monitoring Year 5 of 5 (2014)



Submitted to:
North Carolina Department of Environment and Natural Resources
Ecosystem Enhancement Program
Raleigh, North Carolina

Prepared by:
Axiom Environmental, Inc.
218 Snow Avenue
Raleigh, North Carolina 27603

Design Firm:
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Raleigh, North Carolina 27603



December 2014

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1.0 EXECUTIVE SUMMARY

The North Carolina Ecosystem Enhancement Program (NCEEP) has completed enhancement and preservation of streams and wetlands at the UT to Haw (Gwynn) Site (hereafter referred to as the “Site”) to assist in fulfilling stream and wetland mitigation goals in the area. The Site is located approximately 9 miles north of Burlington, in Alamance County within United States Geological Survey (USGS) Hydrologic Unit 03030002030010 (North Carolina Division of Water Quality Subbasin 03-06-02) of the Cape Fear River Basin and will service USGS 8-digit Cataloging Unit (CU) 03030002 (Figure 1, Appendix A). The Site is located within a NCEEP Targeted Local Watershed; in addition, this Site was identified for preservation and enhancement as Site 26 (Travis & Tickle 15.4) in the 2008 NCEEP *Little Alamance, Travis, and Tickle Creek Local Watershed Plan* (PTCG 2008).

The removal of invasive species, fencing out livestock, and subsequent planting with native riparian vegetation at the Site resulted in 2428 linear feet of stream enhancement, 2.0 acres of riparian riverine wetland enhancement, and 0.3 acres of riparian riverine wetland preservation. Site activities provided 971 Stream Mitigation Units and 1.1 riparian riverine Wetland Mitigation Units. Tables summarizing project objectives and activities are included in Appendix A. This report (compiled based on EEP’s *Procedural Guidance and Content Requirements for EEP Monitoring Reports* Version 1.3 dated 1/15/10) summarizes data for year 5 (2014) monitoring.

Prior to construction the Site was characterized by pasture land utilized for livestock grazing, a drained pond, and disturbed forest. Land use practices including the maintenance and removal of riparian vegetation and hoof shear from livestock had resulted in degraded water quality, unstable channel characteristics (stream entrenchment, erosion, and bank collapse), and reduced storage capacity and floodwater attenuation. In addition, hydric soils were disturbed due to regular plowing, vegetation maintenance, and hoof shear from livestock.

The goals and objectives of this project focused on improving local water quality, enhancing flood attenuation, and restoring aquatic and riparian habitat. These goals were accomplished by the following.

1. Reducing nonpoint sources of pollution by 1) fencing livestock from stream channels, buffers, and wetlands; 2) ceasing the application of agricultural herbicides, pesticides, and fertilizers; and 3) providing a vegetative buffer adjacent to streams and wetlands to treat surface runoff prior to entering Site streams and ultimately the Haw River.
2. Reducing sedimentation/siltation within on-Site and downstream receiving waters by a) eliminating bank erosion associated with livestock hoof shear on Site streams, b) filtering surface runoff and reducing particulate matter deposition into tributaries, and c) providing a forested vegetative buffer adjacent to Site streams and wetlands.
3. Promoting floodwater attenuation and improving stream stability by revegetating Site floodplains to reduce floodwater velocities through increased frictional resistance on floodwaters crossing Site floodplains.
4. Providing increased habitat for aquatic wildlife by 1) increasing organic matter, carbon export, and woody debris in the stream corridor and 2) restoring shade to Site open waters.
5. Providing wildlife habitat including a forested riparian corridor within a region of the state increasingly dissected by residential/agricultural land use.
6. Protecting a Site identified in the 2008 Piedmont Triad Council of Government’s *Little Alamance, Travis, and Tickle Creek Watersheds Restoration Plan* (PTCG 2008) for preservation due to its location within a remote, rural area along the heavily used Boone Road (SR 1602) resulting in increasing development pressure and appeal to developers.

Success criteria for stream enhancement will include 1) success of riparian vegetation and 2) documentation of two bankfull channel events. One bankfull event was documented to date during year 5 monitoring (2014) for a total of eight documented bankfull events with at least one event documented to occur in each monitoring year.

Success criteria dictate that an average density of 320 stems per acre of Characteristic Tree Species must be surviving in the first three monitoring years. Subsequently, 260 Characteristic Tree Species per acre must be surviving in year 5. Based on the number of stems counted, average densities were measured at 1036 planted stems per acre (excluding livestakes) surviving in year 5 (2014). The dominant planted stems identified at the Site were swamp chestnut oak (*Quercus michauxii*), cherrybark oak (*Quercus pagoda*), persimmon (*Diospyros virginiana*), silky dogwood (*Cornus amomum*), and green ash (*Fraxinus pennsylvanica*). All individual plots met success criteria when counting planted stems alone.

There are some minor areas of multiflora rose (*Rosa multiflora*) and Chinese privet (*Ligustrum sinense*) scattered throughout the site. Invasive species are minimal and pose no threat to planted stems at this time.

Growth rates and vigor of planted stems had slightly decreased within the wetland enhancement area during the year 4 (2013) monitoring season as the result of competition from herbaceous species such as soft rush (*Juncus effusus*) and tear thumb (*Polygonum sp.*). This can be attributed to flooding from a beaver dam observed on August 8, 2013. Even so, all individual plots continue to meet success criteria and there is an abundant seed source adjacent to the Site. The remaining planted vegetation appears viable, and there were no signs of beaver activity observed during the October 2014 field visit.

In summary, the Site achieved success criteria for vegetation and stream attributes in the Fifth Monitoring Year (2014). Summary information and 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 tables and figures within this report's appendices. Narrative background and supporting information formerly found in these reports can be found in the mitigation and restoration plan documents available on EEPs website. All raw data supporting the tables and figures in the appendices is available from EEP upon request.

2.0 METHODOLOGY

2.1 Stream Assessment

Annual stream monitoring will include vegetation survival (Section 2.2 Vegetation Assessment) and a photographic record of preconstruction and postconstruction conditions. Photographs of the enhancement (level II) reach will be taken for each year of the monitoring period (Appendix D). In addition, visual assessments of the stream will be conducted by walking the length of stream and bankfull flow events will be documented (Appendix E).

2.2 Vegetation Assessment

After planting was completed, an initial evaluation was performed to verify that planting methods were successful and to determine initial species composition and density. Five vegetation plots were established and marked after construction with four foot metal U-bar post demarking the corners with a ten foot, three-quarter inch PVC at the origin. The plots are 10 meters square and are located randomly within the Site. These plots were surveyed in October 2014 for the year 5 (2014) monitoring season using the *CVS-EEP Protocol for Recording Vegetation, Version 4.2* (Lee et al. 2008) (<http://cvs.bio.unc.edu/methods.htm>); results are included in Appendix C. The taxonomic standard for vegetation used for this document was *Flora of the Carolinas, Virginia, Georgia, and Surrounding Areas* (Weakley 2008).

3.0 REFERENCES

- Lee, M.T., R.K. Peet, S.D. Roberts, and T.R. Wentworth. 2008. CVS-EEP Protocol for Recording Vegetation. Version 4.2. North Carolina Department of Environment and Natural Resources, Ecosystem Enhancement Program. Raleigh, North Carolina.
- Piedmont Triad Council of Government (PTCG). 2008. Little Alamance, Travis, & Tickle Creek Watersheds Restoration Plan. Available: <http://www.ptcog.org/eep/LATTPhaseIII.pdf> [November 2008]. Piedmont Triad Council of Government, Greensboro, North Carolina.
- Schafale, M.P. and A.S. Weakley. 1990. Classification of the Natural Communities of North Carolina: Third Approximation. North Carolina Natural Heritage Program, Division of Parks and Recreation, North Carolina Department of Environment, Health, and Natural Resources. Raleigh, North Carolina.
- United States Army Corps of Engineers, United States Environmental Protection Agency, North Carolina Wildlife Resources Commission, North Carolina Division of Water Quality (USACE et al.). 2003. Stream Mitigation Guidelines.
- United States Geological Survey (USGS). 1974. Hydrologic Unit Map - 1974. State of North Carolina.
- Weather Underground. 2014. Station in Burlington (KBUY), North Carolina. (online). Available: http://www.wunderground.com/history/airport/KBUY/2014/3/1/CustomHistory.html?dayend=6&monthend=10&yearend=2014&req_city=NA&req_state=NA&req_statename=NA [October 6, 2014]. Weather Underground.

APPENDIX A

PROJECT VICINITY MAP AND BACKGROUND TABLES

Figure 1. Vicinity Map

Figure 1A. Site Soils

Table 1. Project Components and Mitigation Credits

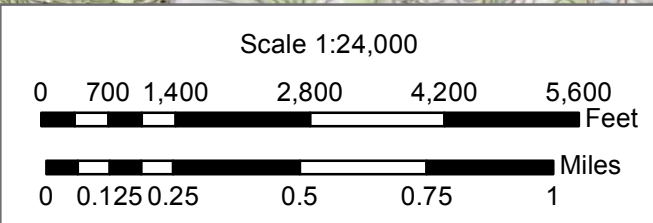
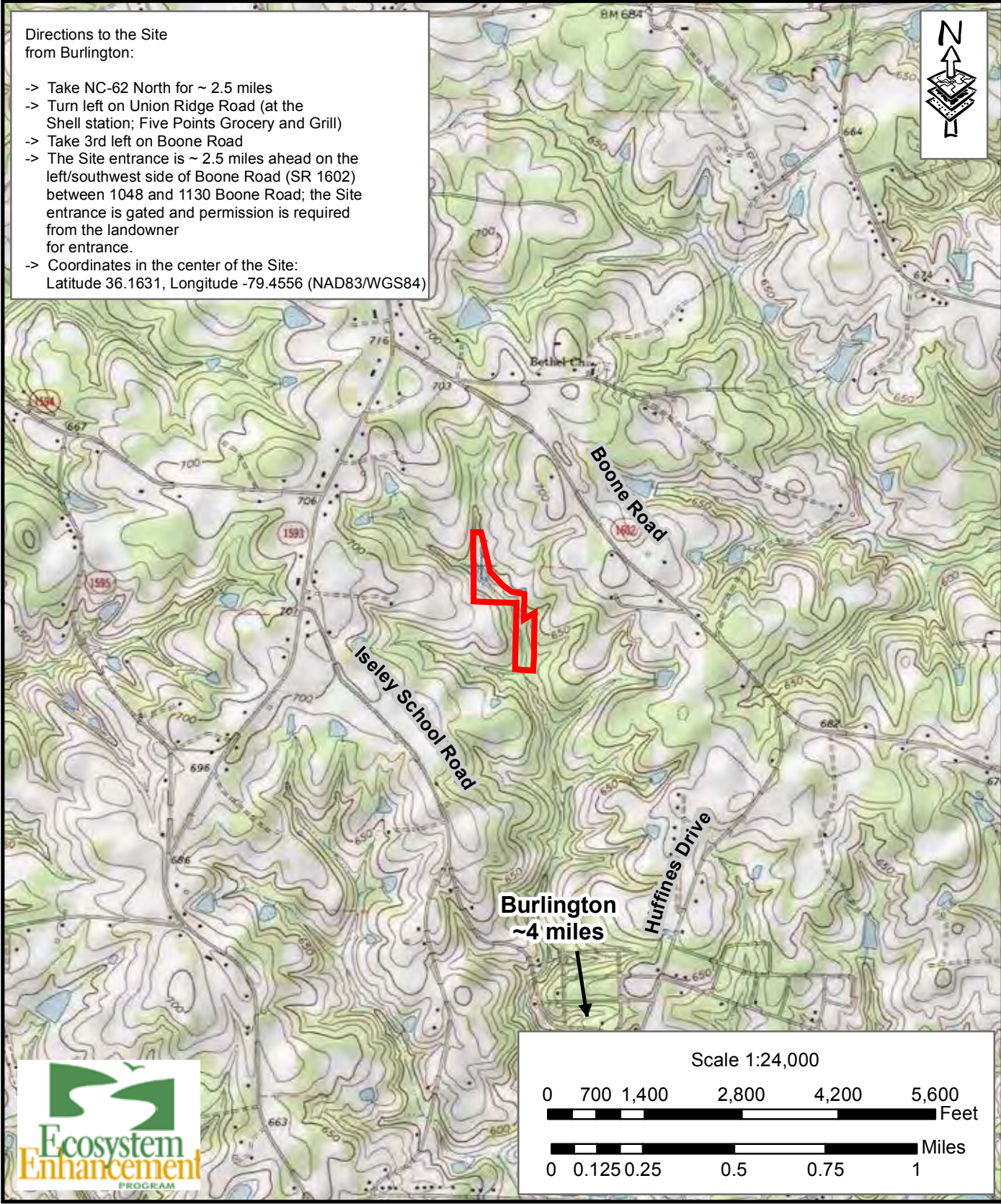
Table 2. Project Activity and Reporting History

Table 3. Project Contacts Table

Table 4. Project Baseline Information and Attributes

Directions to the Site
from Burlington:

- > Take NC-62 North for ~ 2.5 miles
- > Turn left on Union Ridge Road (at the Shell station; Five Points Grocery and Grill)
- > Take 3rd left on Boone Road
- > The Site entrance is ~ 2.5 miles ahead on the left/southwest side of Boone Road (SR 1602) between 1048 and 1130 Boone Road; the Site entrance is gated and permission is required from the landowner for entrance.
- > Coordinates in the center of the Site:
Latitude 36.1631, Longitude -79.4556 (NAD83/WGS84)

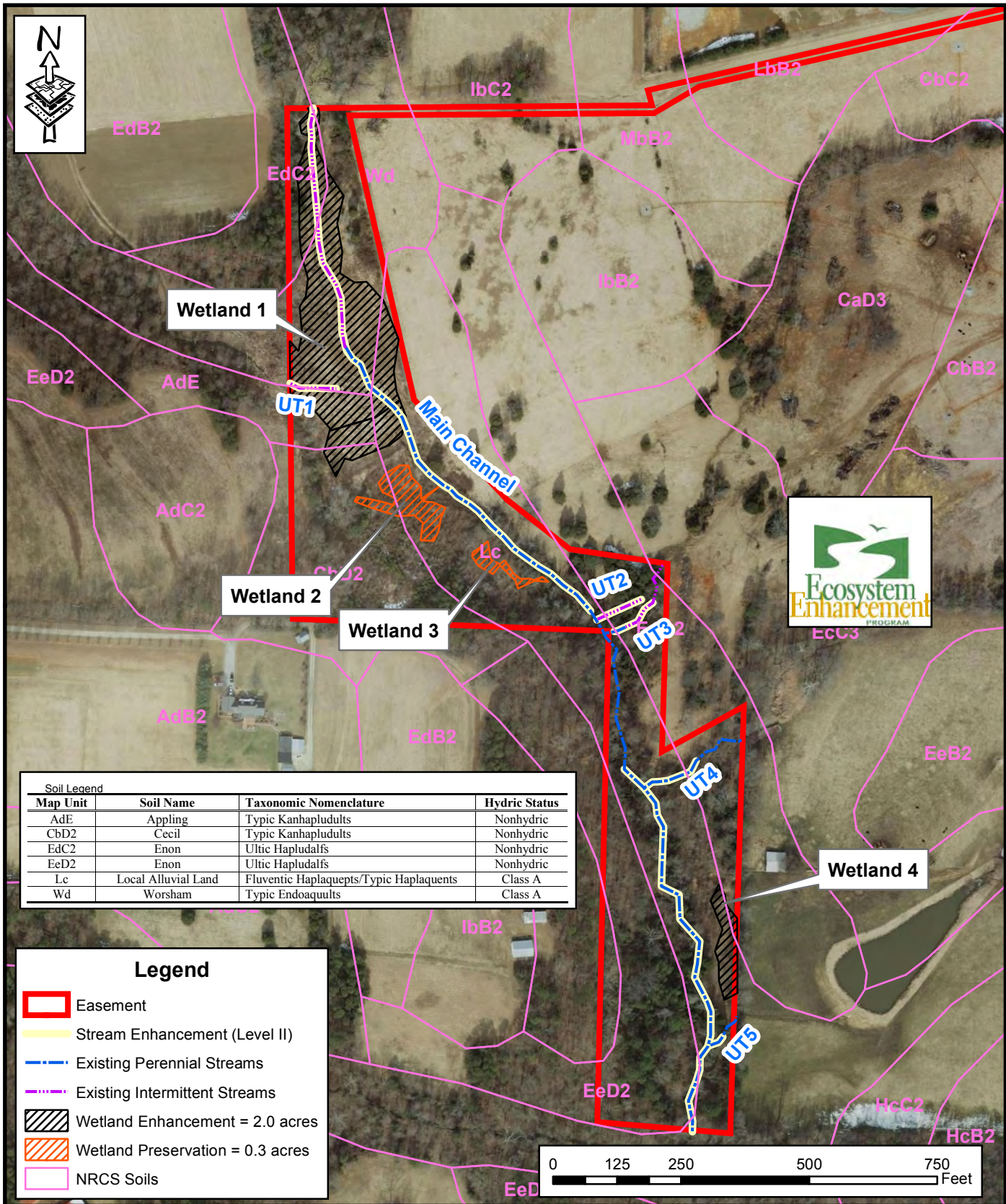



218 Snow Avenue
Raleigh, NC 27603
(919) 215-1693

SITE LOCATION
UT TO HAW (GWYNN) SITE
Alamance County, North Carolina

Dwn. by:	CLF
Date:	June 2011
Project:	12-004.04

FIGURE
1



Soil Legend			
Map Unit	Soil Name	Taxonomic Nomenclature	Hydric Status
AdE	Appling	Typic Kanhapludults	Nonhydric
CbD2	Cecil	Typic Kanhapludults	Nonhydric
EdC2	Enon	Ultic Hapludalfs	Nonhydric
EeD2	Enon	Ultic Hapludalfs	Nonhydric
Lc	Local Alluvial Land	Fluentic Haplaquepts/Typic Haplaquepts	Class A
Wd	Worsham	Typic Endoaquults	Class A

Legend

- Easement
- Stream Enhancement (Level II)
- Existing Perennial Streams
- Existing Intermittent Streams
- Wetland Enhancement = 2.0 acres
- Wetland Preservation = 0.3 acres
- NRCS Soils

218 Snow Avenue
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SITE SOILS
UT TO HAW (GWYNN) SITE
Alamance County, North Carolina

Dwn. by: CLF
Date: Dec. 2014
Project: 12-004.04

FIGURE
1A

Table 1. Project Components and Mitigation Credits

Mitigation Credits								
	Stream		Riparian Wetland		Non-Riparian Wetland	Buffer	Nitrogen Offset	Phosphorus Nutrient Offset
Type	R	RE	R	RE	--	--	--	--
Totals	--	971 SMUs	--	1.1 WMUs	--	--	--	--
Restoration Segment/ Reach ID	Station Range	Mitigation Type		Priority Approach	Linear Footage/ Acreage	Comment		
Main Channel	--	Enhancement (Level II)		--	1987	Invasive species removal, planting with native forest vegetation, and exclusion of livestock.		
UT1	--	Enhancement (Level II)		--	93			
UT2	--	Enhancement (Level II)		--	96			
UT3	--	Enhancement (Level II)		--	98			
UT4	--	Enhancement (Level II)		--	121			
UT5	--	Enhancement (Level II)		--	33			
Wetland 1	--	Enhancement		--	1.8	Invasive species removal, planting with native forest vegetation, and exclusion of livestock.		
Wetland 2	--	Preservation		--	0.2	Exclusion of livestock.		
Wetland 3	--	Preservation		--	0.1			
Wetland 4	--	Enhancement		--	0.2	Invasive species removal, planting with native forest vegetation, and exclusion of livestock.		
Component Summation								
Restoration Level	Stream (linear footage)		Riverine Riparian Wetland (acreage)		Planted Riparian Area (acreage)			
Enhancement (Level II)	2428		--		--			
Enhancement	--		2.0		--			
Preservation	--		0.3		--			
Totals	2428		2.3		8.3			
Mitigation Units	971 SMUs		1.1 WMUs		--			

Table 2. Project Activity and Reporting History

Activity or Report	Data Collection Complete	Completion or Delivery
Restoration Plan	--	June 2009
Invasive Species Control	--	February 2010
Fencing Out Livestock	--	February 2010
Soil Amendments	--	February 2010
Site Planting	--	January 2010
Mitigation Plan	February 2010	February 2010
Monitoring Year 1 (2010)	October 2010	November 2010
Monitoring Year 2 (2011)	June 2011	June 2011
Monitoring Year 3 (2012)	June 2012	August 2012
Beaver Removal	--	September 2013
Monitoring Year 4 (2013)	July 2013	September 2013
Beaver Dam Removal	--	May 2014
Beaver Removal	--	August 2014
Monitoring Year 5 (2014)	October 2014	November 2014

Table 3. Project Contacts Table

Designer and Monitoring Performer	Axiom Environmental, Inc. 218 Snow Avenue Raleigh, North Carolina 27603 Grant Lewis (919) 215-1693
Planting, Soil Amendment, and Invasive Species Removal Contractor	Carolina Silvics 908 Indian Trail Road Edenton, North Carolina 27932 Dwight McKinney (252) 482-8491

Table 4. Project Baseline Information and Attributes Table

Project Information						
Project name	UT to Haw Gwynn					
County	Alamance					
Project Area	12.5 acres					
Project Coordinates	36.1631°N, -79.4556°W					
Project Watershed Summary Information						
Physiographic Province	Southern Outer Piedmont					
River Basin	Cape Fear					
USGS Hydrologic Unit 8-digit	03030002	USGS Hydrologic Unit 14-digit	03030002030010			
DWQ Sub-Basin	03-06-02					
Project Drainage Area	250 acres					
Project Drainage Area Percentage Impervious Surface	<5					
CGIA Land Use Classification	Managed Herbaceous Cover, Hardwood Swamps					
Reach Summary Information						
Parameters	Main Channel	UT 1	UT 2	UT 3	UT 4	UT 5
Length of reach (linear feet)	2299	93	95	197	234	84
Valley classification	VIII	VIII	VIII	VIII	VIII	VIII
Drainage area (acres)	250	80	<5	20	20	20
NCDWQ stream identification score	28.5	20.75	19	32.5	30.5	36.5
NCDWQ Water Quality Classification	C-NSW					
Morphological Description (stream type)	-		-		-	-
Evolutionary trend	-		-		-	-
Underlying mapped soils	Appling, Enon, Cecil, Local Alluvial Land					
Drainage class	Well-drained, Somewhat poorly drained, Poorly drained					
Soil Hydric status	Nonhydric and Hydric					
FEMA classification	--					
Percent composition of exotic invasive vegetation	<1					
Wetland Summary Information						
Parameters	Wetland 1	Wetland 2	Wetland 3	Wetland 4		
Size of Wetland (acres)	1.8 acres	0.2 acres	0.1 acres	0.2 acres		
Wetland Type	Riparian					
Drainage class	Poorly Drained					
Soil Hydric Status	Hydric					
Source of Hydrology	Overbank and over-land flow					
Native Vegetation Community	Piedmont/Mountain Swamp Forest	Bottomland Hardwood Forest	Bottomland Hardwood Forest	Bottomland Hardwood Forest		
Percent composition of exotic invasive vegetation	<1					

Table 4. Project Baseline Information and Attributes Table (continued)

Regulatory Considerations			
Regulation	Applicable	Resolved?	Supporting Document
Waters of the United States – Section 404	No		
Waters of the United States – Section 401	No		
Endangered Species Act	No		
Historic Preservation Act	No		
Coastal Management Zone Act (CZMA)/ Coastal Area Management Act (CAMA)	No		
FEMA Floodplain Compliance	No		
Essential Fisheries Habitat	No		

APPENDIX B

VISUAL ASSESSMENT DATA

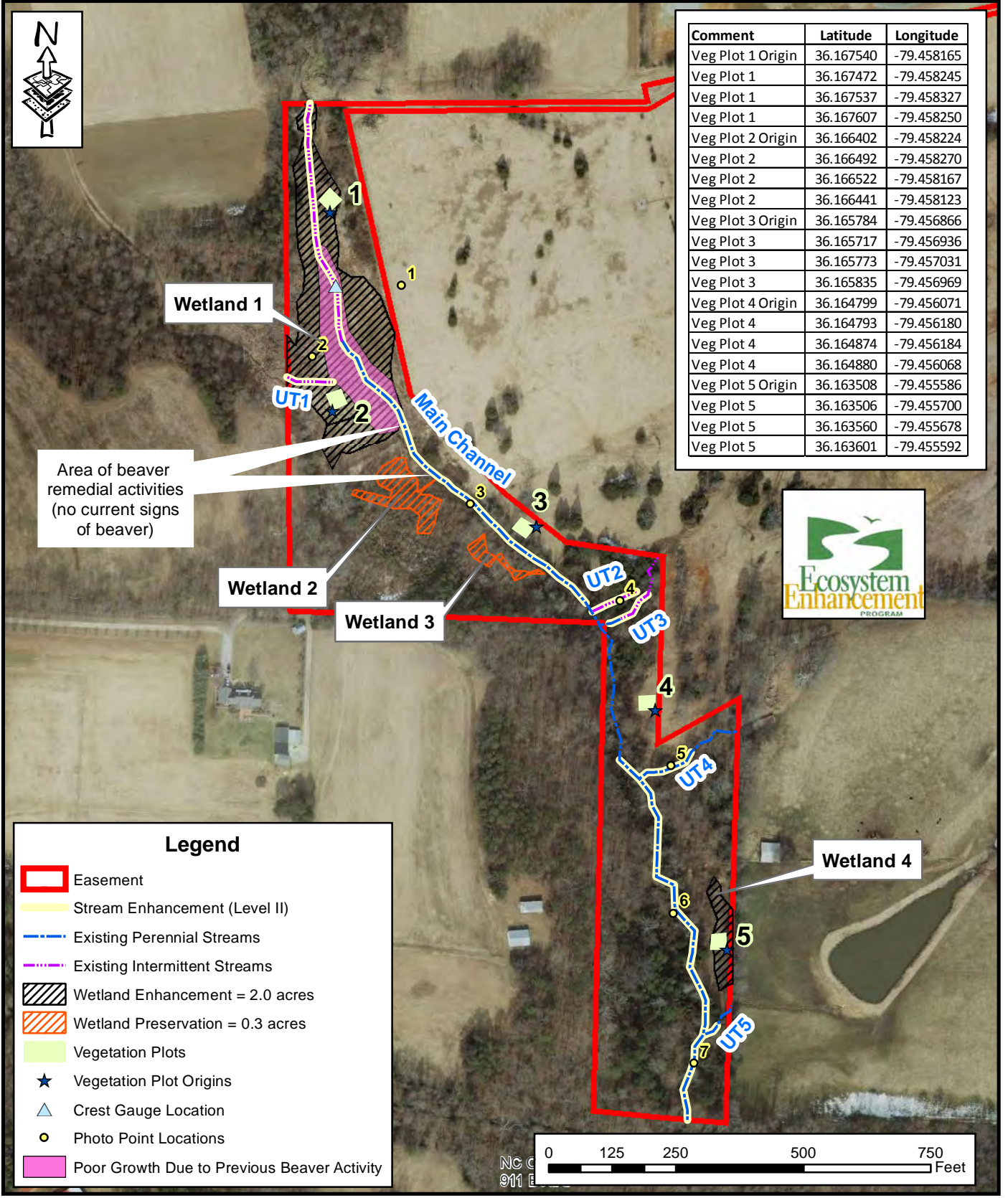
Figure 2. Current Conditions Plan View

Table 5. Vegetation Condition Assessment Table

Vegetation Monitoring Plot Photos



Comment	Latitude	Longitude
Veg Plot 1 Origin	36.167540	-79.458165
Veg Plot 1	36.167472	-79.458245
Veg Plot 1	36.167537	-79.458327
Veg Plot 1	36.167607	-79.458250
Veg Plot 2 Origin	36.166402	-79.458224
Veg Plot 2	36.166492	-79.458270
Veg Plot 2	36.166522	-79.458167
Veg Plot 2	36.166441	-79.458123
Veg Plot 3 Origin	36.165784	-79.456866
Veg Plot 3	36.165717	-79.456936
Veg Plot 3	36.165773	-79.457031
Veg Plot 3	36.165835	-79.456969
Veg Plot 4 Origin	36.164799	-79.456071
Veg Plot 4	36.164793	-79.456180
Veg Plot 4	36.164874	-79.456184
Veg Plot 4	36.164880	-79.456068
Veg Plot 5 Origin	36.163508	-79.455586
Veg Plot 5	36.163506	-79.455700
Veg Plot 5	36.163560	-79.455678
Veg Plot 5	36.163601	-79.455592



Legend

- Easement
- Stream Enhancement (Level II)
- Existing Perennial Streams
- Existing Intermittent Streams
- Wetland Enhancement = 2.0 acres
- Wetland Preservation = 0.3 acres
- Vegetation Plots
- ★ Vegetation Plot Origins
- ▲ Crest Gauge Location
- Photo Point Locations
- Poor Growth Due to Previous Beaver Activity

218 Snow Avenue
Raleigh, NC 27603
(919) 215-1693

CURRENT CONDITIONS PLAN VIEW
UT TO HAW (GWYNN) SITE
 Alamance County, North Carolina

Dwn. by:	CLF
Date:	Nov. 2014
Project:	12-004.04

FIGURE
2

Table 5 **Vegetation Condition Assessment**
UT Haw Gwynn/EEP Project Number 92753

Planted Acreage¹ **8.3**

Vegetation Category	Definitions	Mapping Threshold	CCPV Depiction	Number of Polygons	Combined Acreage	% of Planted Acreage
1. Bare Areas	NA	NA	NA	NA	NA	NA
2. Low Stem Density Areas	NA	NA	NA	NA	NA	NA
				Total	0	0.00
3. Areas of Poor Growth Rates or Vigor	Poor growth rates and vigor in the wetland enhancement area due to flooding from past beaver activity.	NA	Solid Purple	1	0.34	4.1%
				Cumulative Total	1	0.34

Easement Acreage² **13.11**

Vegetation Category	Definitions	Mapping Threshold	CCPV Depiction	Number of Polygons	Combined Acreage	% of Easement Acreage
4. Invasive Areas of Concern ⁴	There are some minor areas of multiflora rose (<i>Rosa multiflora</i>) and Chinese privet (<i>Ligustrum sinense</i>) scattered throughout the site. Invasive species are minimal and pose no threat to planted stems at this time. These areas are too small and scattered to depict on Figure 2.	NA	NA	NA	NA	0.1%
5. Easement Encroachment Areas ³	NA	NA	NA	NA	NA	NA

¹ = Enter the planted acreage within the easement. This number is calculated as the easement acreage minus any existing mature tree stands that were not subject to supplemental planting of the understory, the channel acreage, crossings or any other elements not directly planted as part of the project effort.

² = The acreage within the easement boundaries.

³ = Encroachment may occur within or outside of planted areas and will therefore be calculated against the overall easement acreage. In the event a polygon is cataloged into items 1, 2 or 3 in the table and is the result of encroachment, the associated acreage should be tallied in the relevant item (i.e., item 1, 2 or 3) as well as a parallel tally in item 5.

⁴ = Invasives may occur in or out of planted areas, but still within the easement and will therefore be calculated against the overall easement acreage. Invasives of concern/interest are listed below. The list of high concern species are those with the potential to directly outcompete native, young, woody stems in the short-term (e.g. monitoring period or shortly thereafter) or affect the community structure for existing, more established tree/shrub stands over timeframes that are slightly longer (e.g. 1-2 decades). The low/moderate concern group are those species that generally do not have this capacity over the timeframes discussed and therefore are not expected to be mapped with regularity, but can be mapped, if in the judgment of the observer their coverage, density or distribution is suppressing the viability, density, or growth of planted woody stems. Decisions as to whether remediation will be needed are based on the integration of risk factors by EEP such as species present, their coverage, distribution relative to native biomass, and the practicality of treatment. For example, even modest amounts of Kudzu or Japanese Knotweed early in the projects history will warrant control, but potentially large coverages of *Microstegium* in the herb layer will not likely trigger control because of the limited capacities to impact tree/shrub layers within the timeframes discussed and the potential impacts of treating extensive amounts of ground cover. Those species with the "watch list" designator in gray shade are of interest as well, but have yet to be observed across the state with any frequency. Those in *red italics* are of particular interest given their extreme risk/threat level for mapping as points where isolated specimens are found, particularly early in a projects monitoring history. However, areas of discreet, dense patches will of course be mapped as polygons. The symbology scheme below was one that was found to be helpful for symbolizing invasives polygons, particularly for situations where the condition for an area is somewhere between isolated specimens and dense, discreet patches. In any case, the point or polygon/area feature can be symbolized to describe things like high or low concern and species can be listed as a map inset, in legend items if the number of species are limited or in the narrative section of the executive summary.

**UT to Haw (Gwynn) Restoration Site
Year 5 (2014) Annual Monitoring
Vegetation Plot Photos (taken October 2014)**



APPENDIX C

VEGETATION PLOT DATA

Table 6. Vegetation Plot Criteria Attainment

Table 7. CVS Vegetation Plot Metadata

Table 8. Total Planted and Natural Recruit Stems by Plot and Species

Table 6. Vegetation Plot Criteria Attainment

Vegetation Plot ID	Vegetation Survival Threshold Met?	Tract Mean
1	Yes	100%
2	Yes	
3	Yes	
4	Yes	
5	Yes	

Table 7. CVS Vegetation Plot Metadata

Report Prepared By	Corri Faquin
Date Prepared	10/22/2014 15:12
database name	Axiom-EEP-2014-A-v2.3.1.mdb
database location	S:\CVS database\2014
computer name	PHILLIP-PC
file size	72613888
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.
ALL 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.
PROJECT SUMMARY-----	
Project Code	92753
project Name	UT to Haw (Gwynn)
Description	Stream/wetland enhancement site
River Basin	Cape Fear
length(ft)	
stream-to-edge width	
area (sq m)	
Required Plots	
Sampled Plots	5

Table 8. Total and Planted Stems by Plot and Species
 EEP Project Code 92753. Project Name: UT to Haw (Gwynn)

Scientific Name	Common Name	Species Type	Current Plot Data (MY5 2014)															Annual Means																		
			E92753-AXE-0001			E92753-AXE-0002			E92753-AXE-0003			E92753-AXE-0004			E92753-AXE-0005			MY5 (2014)			MY4 (2013)			MY3 (2012)			MY2 (2011)			MY1 (2010)			MY0 (2009)			
			PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	
Acer rubrum	red maple	Tree			2													2			5			12							6			8		
Betula nigra	river birch	Tree																							1							2				
Carpinus caroliniana	American hornbeam	Tree																							1	1	1									
Carya	hickory	Tree																						1												
Carya glabra	pignut hickory	Tree												1		1																				
Cephalanthus occidentalis	common buttonbush	Shrub	2	2	3											2	2	3	3	3	5	3	3	6				1			2					
Cercis canadensis	eastern redbud	Tree																					1													
Cornus amomum	silky dogwood	Shrub	1	1	1	9	9	9								10	10	10	11	11	11	13	13	14	17	17	17	13	13	13	31	31	31			
Diospyros virginiana	common persimmon	Tree	1	1	1				22	22	22				1	23	23	24	23	23	30	23	23	41	18	18	35	18	18	18	35	35	35			
Fraxinus pennsylvanica	green ash	Tree	9	9	9				3	3	14	1	1	1	2	13	13	26	14	14	37	15	15	68	14	14	23	18	18	26	13	13	14			
Gleditsia triacanthos	honeylocust	Tree																					3													
Juglans nigra	black walnut	Tree																					1													
Juniperus virginiana	eastern redcedar	Tree									2							2			4		5				1									
Liquidambar styraciflua	sweetgum	Tree									1			44				45			90			154			110			47			71			
Liriodendron tulipifera	tuliptree	Tree																6			8		14			5			4							
Platanus occidentalis	American sycamore	Tree													2			2			2	1	1	3	1	1	1	1	1	1	2	2	4			
Populus deltoides	eastern cottonwood	Tree																												1						
Prunus serotina	black cherry	Tree									1	1	1			1	1	1	2	2	2	2	2	2	2	2	2	2	4	4	4	10	10	10		
Quercus	oak	Tree																																		
Quercus alba	white oak	Tree									3	3	3	5	5	5	8	8	8	8	8	8	8	8	8	8	9	9	9	4	4	4	5	5	5	
Quercus lyrata	overcup oak	Tree				1	1	1	1	1	1	1	1	1	1	3	3	3	4	4	4	5	5	5	4	4	4	1	1	1	8	8	8			
Quercus michauxii	swamp chestnut oak	Tree							11	11	11	19	19	19	16	16	16	46	46	46	45	45	45	47	47	47	46	46	46	44	44	44	15	15	15	
Quercus pagoda	cherrybark oak	Tree							4	4	4				12	12	12	16	16	16	15	15	15	16	16	16	16	16	16	24	24	24	8	8	8	
Quercus phellos	willow oak	Tree							2	2	2	1	1	1				3	3	3	3	3	3	4	4	4	5	5	5	5	5	5	5	5	5	
Quercus rubra	northern red oak	Tree																											1	1	1	4	4	4		
Robinia pseudoacacia	black locust	Tree																																		
Salix nigra	black willow	Tree						2																												
Sambucus canadensis	Common Elderberry	Shrub																						1												
Ulmus	elm	Tree																								10			16			1			9	
Ulmus alata	winged elm	Tree							3	3	3						3	3	3	3	3	4	3	3	34						4					
Ulmus americana	American elm	Tree			3																							1	1	1						
Unknown		Shrub or Tree																													2	2	2	1	1	1
Stem count			13	13	19	10	10	12	46	46	64	26	26	84	33	33	43	128	128	222	132	132	277	142	142	451	135	135	305	145	145	222	199	199	293	
size (ares)			1			1			1			1			1			5			5			5			5			5			5			
size (ACRES)			0.02			0.02			0.02			0.02			0.02			0.12			0.12			0.12			0.12			0.12			0.12			
Species count			4	4	6	2	2	3	7	7	11	6	6	9	3	3	8	11	11	20	12	12	20	13	13	22	13	13	20	13	13	22	13	13	18	
Stems per ACRE			526.1	526.1	768.9	404.7	404.7	485.6	1862	1862	2590	1052	1052	3399	1335	1335	1740	1036	1036	1797	1068	1068	2242	1149	1149	3650	1093	1093	2469	1174	1174	1797	1611	1611	2371	

Color for Density
 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%

PnoLS = Planted excluding livestakes
 P-all = Planting including livestakes
 T = All planted and natural recruits including livestakes
 T includes natural recruits

APPENDIX D
STREAM DATA
Fixed-Station Photos

**UT to Haw (Gwynn) Site
Fixed Station Photo Points
Taken October 22, 2014, 2014**



Photo Point 1



Photo Point 2

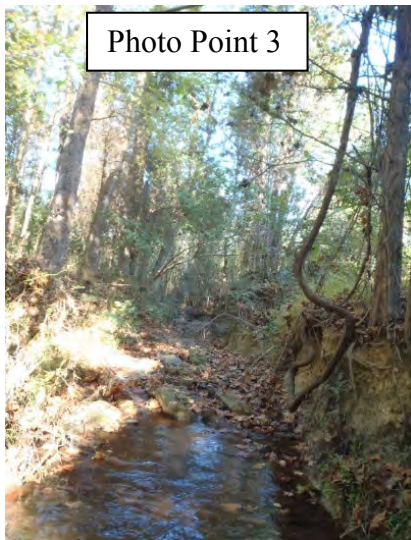


Photo Point 3



Photo Point 4



Photo Point 5



Photo Point 6



Photo Point 7

APPENDIX E
HYDROLOGY DATA

Table 9. Verification of Bankfull Events

Table 9. Verification of Bankfull Events

Date of Data Collection	Date of Occurrence	Method	Photo (if available)
February 17, 2010	February 5, 2010	Visual observations of overbank event including wrack lines and sediment deposition resulting from a 1.36 inch* rainfall event on February 5, 2010 that occurred after numerous rainfall events, within the 3 weeks prior, that totaled 3.52 inches.	1
June 16, 2010	May 17, 2010	Visual observations of overbank event including wrack lines and sediment deposition resulting from a 4.1 inch* rainfall event on May 16-17, 2010.	--
October 5, 2010	September 30, 2010	A 4.43-inch* rainfall event occurring between September 26-October 2, 2010.	--
September 30, 2011	June 28, 2011	Total of 2.83 inches* of rain reported to fall over 2 days (June 27-28, 2011)	--
September 30, 2011	September 24, 2011	Total of 3.61 inches* of rain reported to fall over 4 days (September 21-24, 2011) with an additional 0.85 inches* of rain the following 3 days (Sept 25-27, 2011)	--
July 18, 2012	July 11, 2012	Total of 4.84 inches* of rain reported to fall over 3 days (July 9-11, 2012)	--
July 26, 2013	June 31, 2013	Visual observations of overbank event including wrack lines and sediment deposition resulting from 14 days (June 25-July 8) of heavy rainfall totaling 6.27 inches.	2
October 6, 2014	May 15, 2014	2.74 inches of rain was documented* on May 15, 2014	--

* Reported at KBUY Weather Station in Burlington.



Photo 1

Bankfull Event Photos 1 and 2 showing wrack lines resulting from overbank events



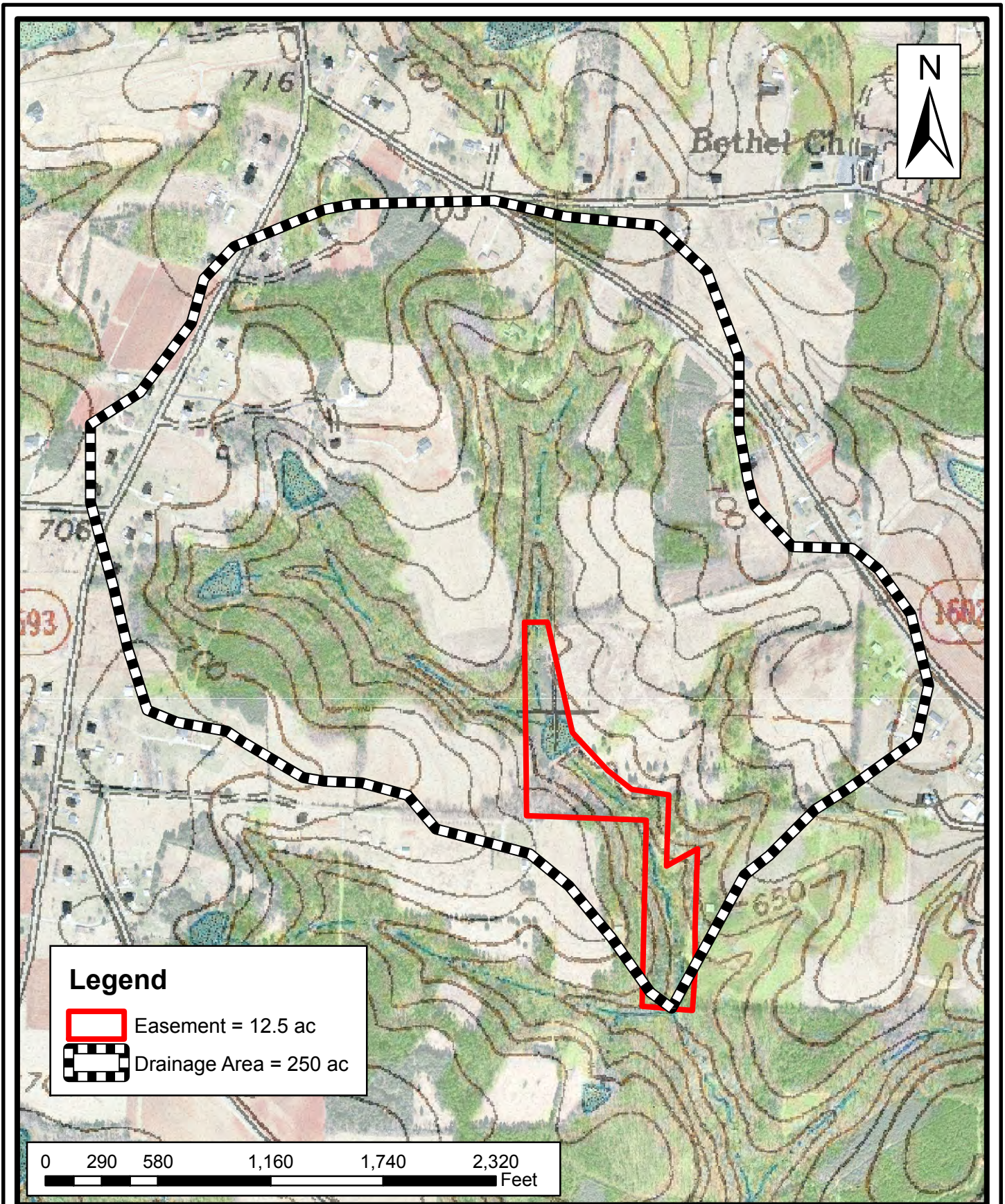
Photo 2

APPENDIX F
ADDITIONAL SITE DATA


Restoration Plan Figure 3. USGS Topographic Map (with drainage area)


Restoration Plan Figure 4. Existing Conditions (with soils)

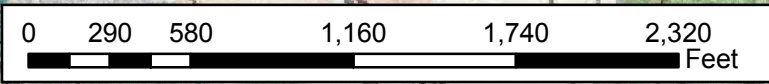
Preconstruction Photographs



Legend

 Easement = 12.5 ac

 Drainage Area = 250 ac



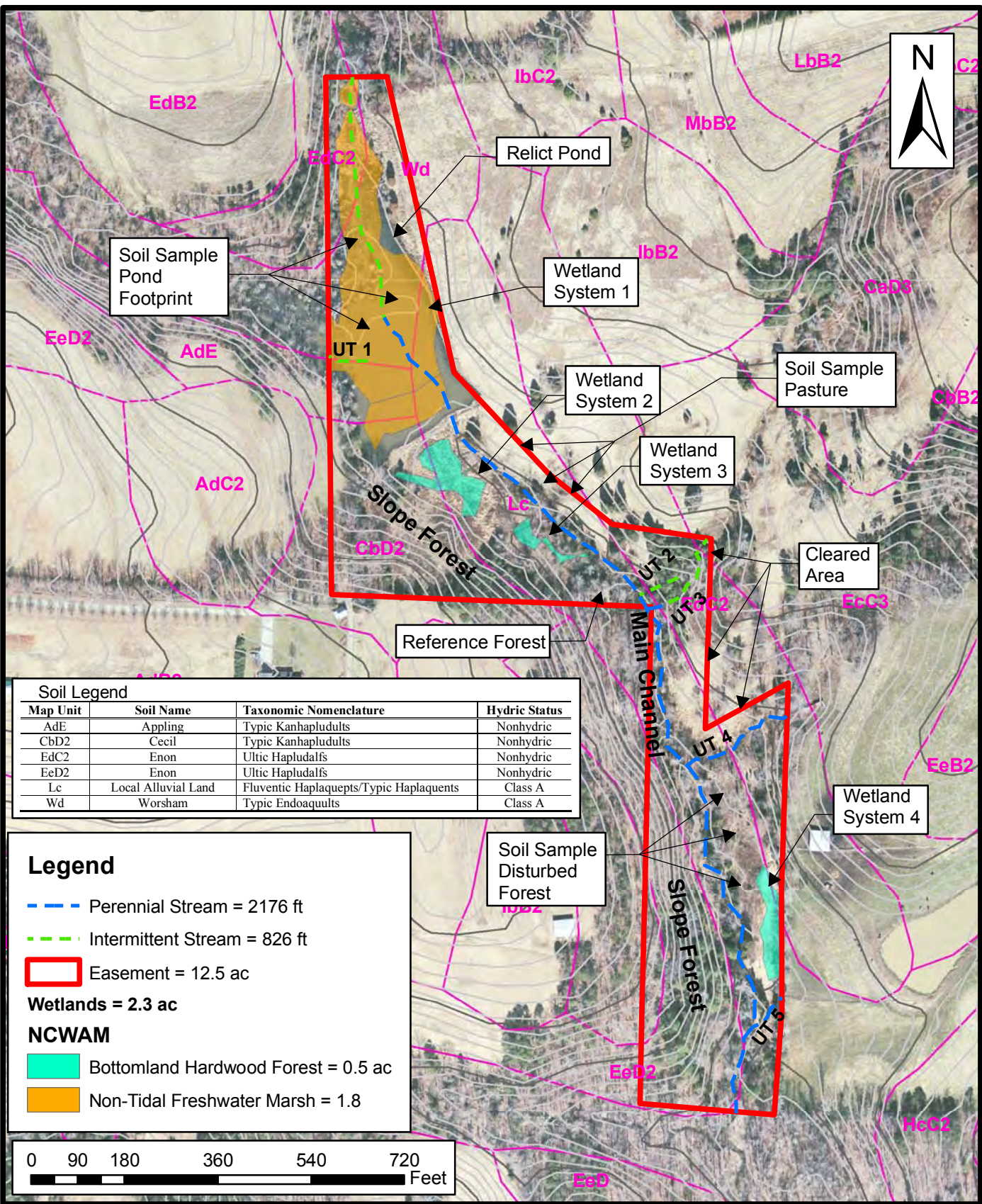

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Asion Environmental

USGS TOPOGRAPHIC MAP
 UT TO HAW (GWYNN) SITE
 Alamance County, North Carolina

Dwn. By: WGL
 Date: Feb 2009
 Project: 08-027

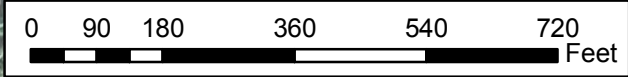
FIGURE
 3



Map Unit	Soil Name	Taxonomic Nomenclature	Hydric Status
AdE	Appling	Typic Kanhapludults	Nonhydric
CbD2	Cecil	Typic Kanhapludults	Nonhydric
EdC2	Enon	Ultic Hapludalfs	Nonhydric
EeD2	Enon	Ultic Hapludalfs	Nonhydric
Lc	Local Alluvial Land	Fluentic Haplaquepts/Typic Haplaquepts	Class A
Wd	Worsham	Typic Endoaquults	Class A

Legend

- Perennial Stream = 2176 ft
- Intermittent Stream = 826 ft
- Easement = 12.5 ac
- Wetlands = 2.3 ac**
- NCWAM**
- Bottomland Hardwood Forest = 0.5 ac
- Non-Tidal Freshwater Marsh = 1.8



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**EXISTING CONDITIONS
UT TO HAW (GWYNN) SITE
Alamance County, North Carolina**

Dwn. By: WGL
Date: Feb 2009
Project: 08-027

FIGURE
4

**UT to Haw (Gwynn) Site
Preconstruction Pictures
Taken February 2009**

