

**“Manning Farm Property”  
Buffer Restoration Project**

**Edgecombe County, NC  
Tar-Pamlico River Basin  
(Cataloging Unit #03020103)**

**2010 Annual Monitoring Report (Year 5 of 5)  
(Task 11)**

**NC EEP Contract #D05026**



*Prepared For:*

**North Carolina Department of Environment and Natural Resources  
Ecosystem Enhancement Program  
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## EXECUTIVE SUMMARY

Prior to project implementation, the Manning Farm Property was farmed for soybean and cotton production. The site consisted entirely of open agricultural fields with no existing riparian buffer (i.e. trees and shrubs are absent within 200 ft of existing surface waters). Under contract with the North Carolina Ecosystem Enhancement Program (EEP), Land Management Group, Inc. (LMG) implemented the restoration of 9.70 acres of riparian buffer habitat along Knight Canal (a tributary of Conetoe Creek) and contiguous surface-waters (i.e. field ditches) in Edgecombe County, NC.

The 9.70-ac project area was planted with characteristic tree and shrub species on an average density of 900 stems/acre. The planting plan was developed utilizing the EEP's *Guidelines for Riparian Buffer Restoration (October 2004)* and LMG's knowledge of coastal plain vegetative communities. Planting was completed in February 2006. Five (5) permanent 0.10-ac monitoring plots (equivalent to 5% of the restoration area) were established subsequent to planting. Annual monitoring was initiated in October 2006 and has been conducted over a 5-year period. The following report summarizes the findings of the fifth year of monitoring. Per the approved restoration plan, vegetative planting will be deemed successful if survivorship of plantings and volunteers of desirable species meets or exceeds a target stem density of 320 stems/acre. Based upon Year 5 monitoring, the success criterion has been met for the five years of monitoring. The mean stem density of planted stems alone is 710 stems per acre.

The following monitoring report summarizes the restoration project and includes specific plot data from the September 2010 (Year 5) monitoring event. As indicated above, the success criterion has been met through five years of monitoring.

# **I. PROJECT BACKGROUND**

## **1. Location and Setting**

Under contract with the North Carolina Ecosystem Enhancement Program (EEP), Land Management Group, Inc. (LMG) implemented the restoration of 9.70 acres of farmland located adjacent to Knight Canal (a tributary of the Tar River) and a series of contiguous surface waters (i.e. field ditches). The project area is part of the “Manning Farm”, located approximately 4.0 miles southeast of Tarboro in Edgecombe County, NC (refer to Figure 1). The site is bordered to the north by US 64 Alternate and to the west by Knight Canal (refer to Figure 2). The property is situated within TAR-3 of the lower Tar-Pamlico River Basin (USGS Cataloging Unit 03020103).

## **2. Mitigation Structure and Objectives**

The restoration project is intended to provide suitable, high-quality riparian buffer restoration as compensatory mitigation for riparian buffer impacts authorized through the North Carolina Division of Water Quality (NC DWQ). The objective of the project is to restore riparian buffer vegetation and diffuse flow conditions to help reduce non-point source discharge of contaminants into adjacent water bodies. The restoration project has resulted in the removal of agricultural fields adjacent to Knight Creek and surface-water ditches contiguous with the creek. In doing so, the restoration project helps to reduce non-point source loading of nitrogen (N) into surface waters while increasing the nutrient removal capacity of the adjacent land. The following monitoring report summarizes conditions related to restoration site development.

## **3. Project History and Background**

Table 1 provides the reporting and milestone history of the Manning Farm restoration project.

## **II. PROJECT CONDITIONS**

### **1. Pre-Construction Conditions**

The 9.70-acre riparian buffer restoration area represents a portion of a larger 250-acre tract (“Manning Farm”) formerly farmed for the production of soybean and cotton. Land use practices, including herbicide, pesticide, and fertilizer application, served as potential contributors to decreased water quality of adjacent surface waters (i.e. ditches and ‘blue-line’ streams). Application of nitrogen-rich fertilizer represented the most significant non-point source of nitrogen within the immediate project area. Woody vegetation along ditches was either absent or sparse (less than 100 stems per acre that are > 5 inches diameter at breast height). As a result, nutrient-laden runoff was discharged from agricultural fields directly into surface waters with little or no nutrient filtration/transformation.

### **2. Soils**

The site consists predominantly of Cape Fear loam, a very poorly drained soil occurring along stream terraces and depressional drainageways. Infiltration is slow and surface runoff is slow in these areas. The seasonal high water table occurs at or near the soil surface, assuming no ditching in the vicinity. The remaining portion of the buffer area consists of Roanoke loam – a poorly drained soil characteristic of broader flats of stream terraces. Roanoke soils exhibit slow infiltration with a seasonal high water table occurring at or near the soil surface (Figure 3).

### **3. Restoration Activities**

The restoration project included the planting of characteristic tree and shrub seedlings adjacent to open ditches and blue-line streams on the 9.70-ac restoration site (refer to Figure 4). No federal or state permits were necessary to conduct the restoration activities.

The riparian buffer was planted with characteristic tree species including river birch (*Betula nigra*), sycamore (*Platanus occidentalis*), water oak (*Quercus nigra*), overcup oak (*Quercus lyrata*), tulip poplar (*Liriodendron tulipifera*), and red bay (*Persea borbonia*). Bare-root seedlings were planted at a density of 600 trees per acre. The outer 50 feet of the proposed buffer areas were planted with characteristic shrub species including wax myrtle (*Myrica cerifera*), American beautyberry (*Callicarpa americana*), and elderberry (*Sambucus canadensis*). Shrubs were planted at a density of 1,200 plants per acre. These species are considered to be well suited for site-specific conditions, including soil characteristics and moisture regimes. In addition, each of these species is listed within EEP's *Guidelines for Riparian Buffer Restoration (October 2004)* as appropriate species for use in riparian buffer restoration projects. Approximately 7,500 trees and shrubs were planted throughout the project footprint. On-site planting was completed in February 2006. Refer to Table 2 for a list of species planted (with corresponding quantities) within the buffer restoration area.

LMG arranged for the execution of the conservation easement deed to ensure the protection of the riparian buffer restoration area in perpetuity. The easement prohibits any activities (e.g. timbering, farming, building, etc.) that would alter the environmental state of the restoration project. Post-restoration management will be consistent with allowable activities as identified in the Tar-Pamlico Buffer Rule (15A NCAC 02B.0233). The conservation easement has been transferred to the North Carolina State Property Office for long-term protection and management of the site.

### **III. METHODOLOGY & SUCCESS CRITERIA**

Based upon standard mitigation site monitoring requirements, annual monitoring has been conducted at the end of each growing season over a period of five years. Five (5) 0.10-acre permanent plots corresponding to a total of 0.5 acres (equivalent to 5% of the restoration area) were established subsequent to site planting. The locations of the

monitoring plots are depicted in Appendix C. Monitoring includes the identification and enumeration of individuals (including shrubs and trees, planted or volunteer) occurring within each plot. All tree and shrub species within the plots are identified, flagged, and recorded on field data sheets during each monitoring event. Site planting is to be deemed successful if survivorship of plantings and volunteers of desirable species<sup>1</sup> meets or exceeds a target stem density of 320 stems/acre. Non-preferred and invasive species are not counted toward success criteria. Thus species such as red maple (*Acer rubrum*), sweet gum (*Liquidambar styraciflua*), and privet (*Ligustrum sinense*) are excluded from the recorded plot density data. Note that the site planting included a mix of both tree species and shrub species as specified within the approved restoration plan and recommended within EEP's *Guidelines for Riparian Buffer Restoration (October 2004)*.

Monitoring reports have been submitted annually to the EEP (by January 1 of each year). These reports include results of vegetative monitoring and photographic documentation of site conditions. Monitoring reports also identify any contingency measures that may need to be employed to remedy any site deficiencies. Examples of contingency (i.e. adaptive management) measures may include deer browse tubes (if evidence of significant herbivory or deer browse is observed) or supplemental planting (if significant mortality among one or more planted species indicates that the site will not meet the 320 stems/acre criterion). Note that based upon the findings of each monitoring report (Year 1 through Year 5), no contingency measures have been necessary to implement at the Manning Farm Buffer Restoration site.

#### **IV. MONITORING RESULTS**

A total of 1,064 stems (planted and volunteer shrubs/trees) were observed within the five 0.10-acre plots. Of the planted species, water oak was the most abundant tree species observed (77 stems) and American beautyberry was the most abundant shrub observed

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<sup>1</sup> Desirable species are considered as noninvasive species characteristic of riparian habitats.  
Manning Farm Riparian Buffer Restoration  
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December 2010  
Contract No. D05026



(45 stems). The observed mean stem density of planted species during Year 5 monitoring was 7708 stems/acre. Densities within monitoring plots ranged between 420 stems/acre (Plot 4) to 1,110 stems/acre (Plot 5). Commonly occurring volunteer species of restored sites were observed within the five plots monitored. These species included loblolly pine (*Pinus taeda*), sweet gum (*Liquidambar styraciflua*), and eastern false willow (*Baccharis halimifolia*). Given the dispersal mechanism and growth strategy of these species, it is relatively common for these volunteers to be abundant within forested restoration sites during the early years of plant re-establishment (particularly when the restoration site is situated adjacent to wooded areas as is the case with the Manning project area). The presence and abundance of volunteers in the case of the Manning site provides a net benefit in that they do not appear to have any significant adverse effect on the survivorship of planted species while at the same time providing for increase nutrient removal capacity of the buffer area.

Refer to Table 3 for a comprehensive list of monitoring plot totals. Site photographs from the 2010 monitoring event are included in Appendix A and individual plot data sheets are included in Appendix B.

## **V. CONCLUSION**

Restoration activities have demonstrated to be successful at the 9.70-acre project site through the fifth year of annual monitoring. The observed planted density (710 stems/acre) well exceeds the stated success criterion and is an indication that the vegetative community has been successfully re-established. Based on the existing conditions observed during the Year 5 monitoring event, it is expected that the site will continue to mature and provide the intended functions of a vegetated buffer ecosystem.

Reversion of agricultural land to wooded riparian buffer is likely to decrease source nutrient loading and concurrently increase nutrient removal capacity. In addition, the

project will provide ancillary benefits to aquatic and wildlife habitat via enhanced niche habitat, microclimate modification and shade, and increased food-web support. By doing so, the proposed project will help to effectively mitigate for authorized loss of riparian buffers within the Tar-Pamlico River Basin.

## **TABLES**

Table 1. Reporting and Milestone History

<b>Task</b>	<b>Project Milestone</b>	<b>Completion Date</b>	<b>COMMENTS</b>
1	Feasibility Study, CE Document, and Public Meeting	July 1, 2005	
2	Record a Conservation Easement on the Site	January 25, 2006	Recorded in Edgecombe County Register of Deeds
3	Restoration Plan Approved by EEP	January 2006	Restoration Plan complete
4	Mitigation Site Earthwork Completed	January 15, 2006	Minimal earthwork required (only disking)
5	Mitigation Site Planting and Installation of Monitoring Devices	February 15, 2006	Approved by EEP
6	Submittal of Mitigation Plan (including as-built drawings)	June, 2006	Approved by EEP
7	Submittal of Monitoring Report #1 to EEP	December 31, 2006	Approved by EEP
8	Submittal of Monitoring Report #2 to EEP	December 31, 2007	Approved by EEP
9	Submittal of Monitoring Report #3 to EEP	December 31, 2008	Approved by EEP
10	Submittal of Monitoring Report #4 to EEP	December 31, 2009	Approved by EEP <sup>1</sup>
11	Submittal of Monitoring Report #5 to EEP	December 31, 2010	

<sup>1</sup>Based on identification of existing wooded area, 0.30 buffer mitigation units deducted from project during Year 4.

Table 2. Manning Farm Plant List.

<b>Buffer Zone</b>	<b>Zone 1 (Trees)</b>	<b>Zone 2 (Shrubs)</b>		
<b>Stem Target:</b>	<b>600/ac.</b>	<b>4,500</b>	<b>1,200/ac.</b>	<b>3,000</b>
<b>Species</b>	<b># planted</b>	<b>(% of total)</b>	<b># planted</b>	<b>(% of total)</b>
River Birch ( <i>Betula nigra</i> )	1,200	26.67%		
Sycamore ( <i>Platanus occidentalis</i> )	800	17.78%		
Green Ash ( <i>Fraxinus pennsylvanica</i> )	500	11.11%		
Overcup Oak ( <i>Quercus lyrata</i> )	200	4.44%		
Water Oak ( <i>Quercus nigra</i> )	500	11.11%		
Red Bay ( <i>Persea borbonia</i> )	500	11.11%		
Tulip Poplar ( <i>Liriodendron tulipifera</i> )	1,000	22.22%		
Sweet pepperbush ( <i>Clethra alnifolia</i> )			500	16.67%
Elderberry ( <i>Sambucus canadensis</i> )			1,000	33.33%
American Beautyberry ( <i>Callicarpa americana</i> )			1,000	33.33%
Wax Myrtle ( <i>Myrica cerifera</i> )			500	16.67%
			<b>TOTAL</b>	<b>7,700</b>

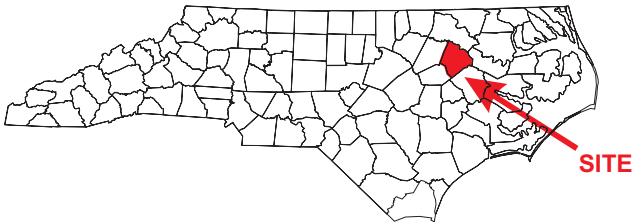
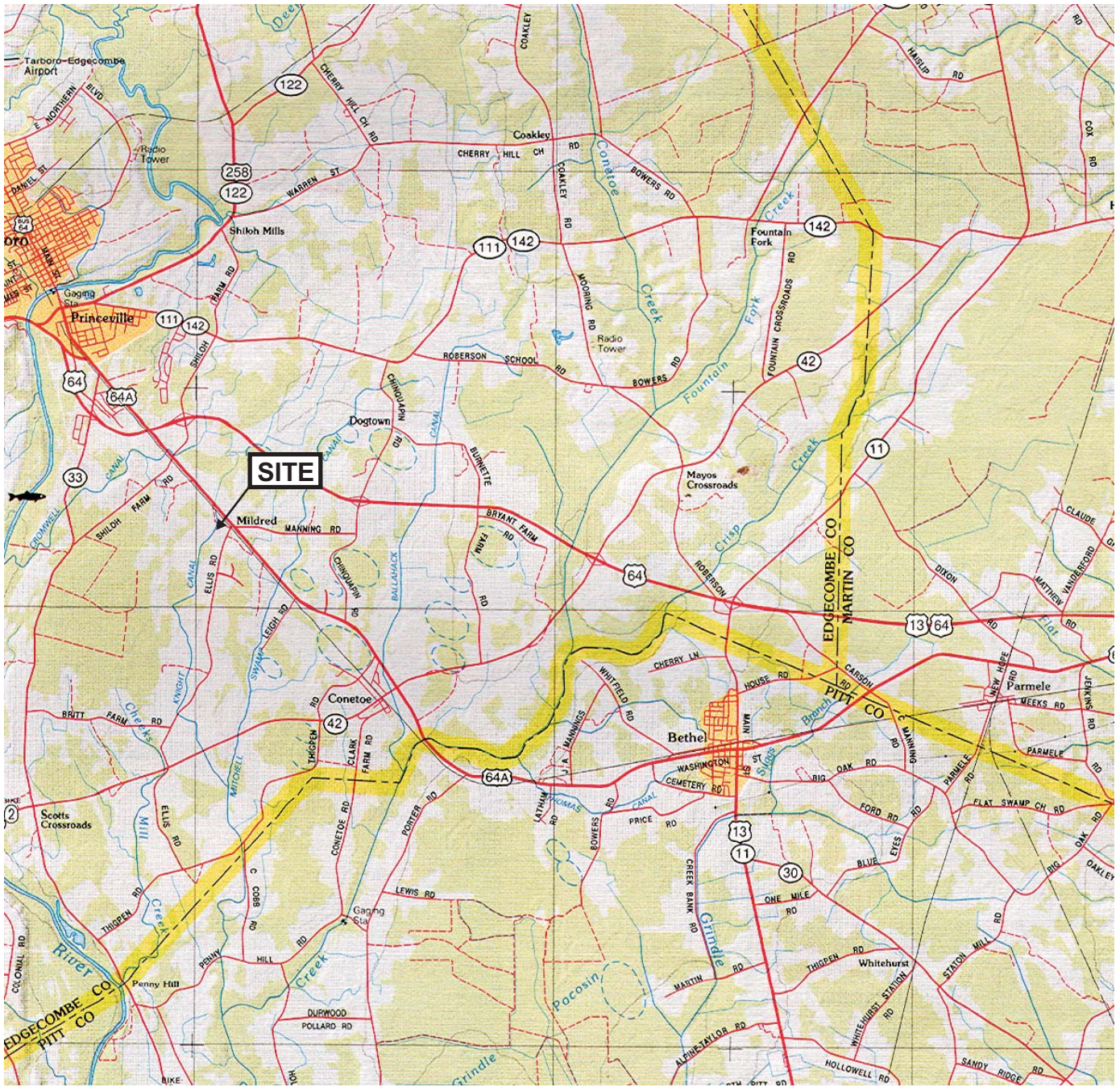
**TABLE 3. ANNUAL MONITORING DATA SHEET (YEAR 5) - VEGETATION PLOTS**  
**MANNING FARM RIPARIAN BUFFER SITE**

SPECIES	PLOT 1	PLOT 2	PLOT 3	PLOT 4	PLOT 5	TOTAL
American Beautyberry				12	33	45
Elderberry		16	1		7	24
Green Ash	0			5	21	26
Overcup Oak						0
Persimmon	6	9	5	4	1	25
River Birch	37	5	23			65
Sweet Pepperbush						0
Sycamore	19	14	23			56
Tulip Poplar	13	2	20			35
Water Oak	6		2	20	49	77
Willow Oak				1		1
Wax Myrtle						0
Baccharis	32	33	5	9	22	101
Loblolly Pine	46	27	3	2	21	99
Sweet Gum	112	60	65	140	120	497
Winged Sumac			4	8	1	13
<b>TOTAL STEMS</b>	<b>271</b>	<b>166</b>	<b>151</b>	<b>201</b>	<b>275</b>	<b>1064</b>
<b>PLANTED STEMS</b>	<b>81</b>	<b>46</b>	<b>74</b>	<b>42</b>	<b>111</b>	<b>354</b>
<b>Stem Density of Planted Only (per acre)</b>	<b>810</b>	<b>460</b>	<b>740</b>	<b>420</b>	<b>1,110</b>	
<b>Stem Density of Planted &amp; Acceptable Volunteers</b>	<b>1,270</b>	<b>730</b>	<b>770</b>	<b>440</b>	<b>1,320</b>	

Mean Stem Density (Planted Only) = 708

 Planted  
 Volunteer

## **FIGURES**



Map Source: DeLorme: North Carolina Atlas and Gazetteer., 1997 p. 46.

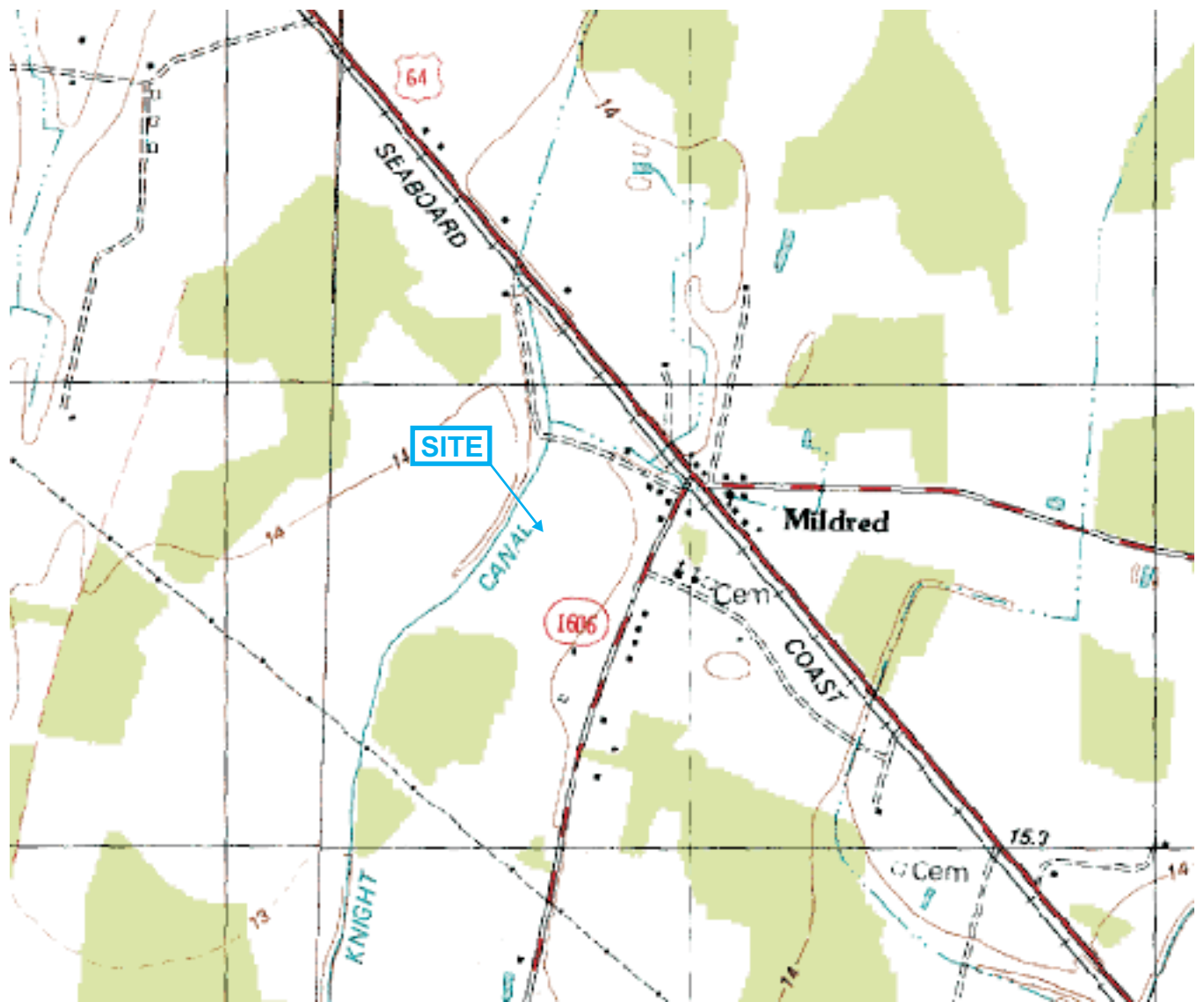
SCALE 1" = 2.0 miles

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Edgemcombe County

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Wilmington, N.C.  
September 2010

**Figure 1.**  
Site Location Map





Boundaries are approximate  
and not meant to be absolute.

Map Source: 1990, USGS 7.5' Topographic Quadrangle. Conetoe Quadrangle



SCALE 1" = 2000'

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**Figure 2.**  
1990 Topographic Quad



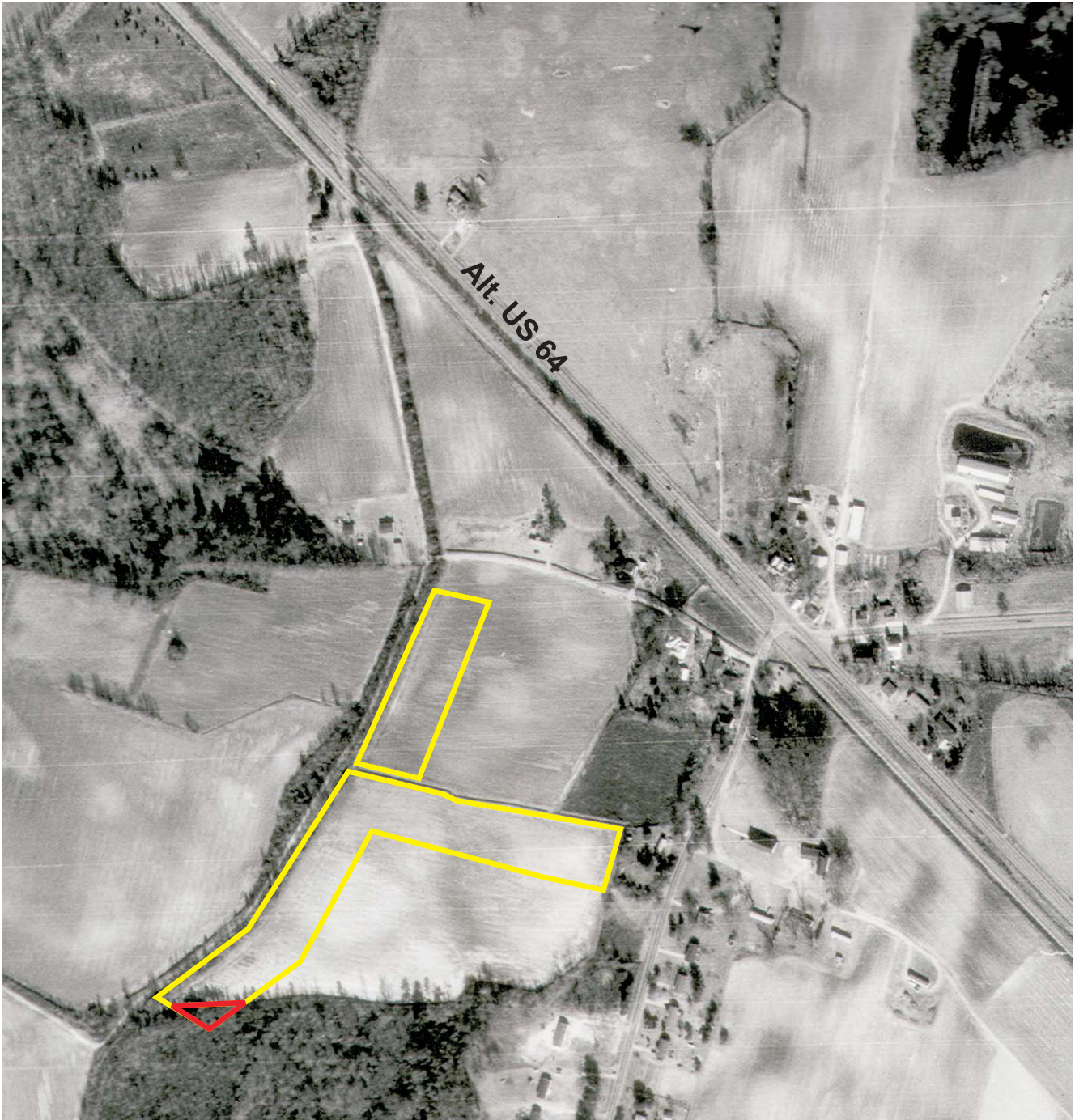
SCALE 1" = 1000'

Map Source: Soil Survey of Edgecombe County , 1977.


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**Figure 3.**  
Generalized Soil Map  
Edgecombe County, NC



 200-ft Buffer Planting Area (9.70 acres)

 Non-Restored Area -Existing Woods in Preservation (0.30 acres)



SCALE 1" = 500'

Boundaries are approximate  
and not meant to be absolute.

**Map Source:** 1993 Aerial Photography NCGIA

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**Figure 4.**  
Buffer Planting Overview  
(updated December 2009)

**APPENDIX A.**

**SITE PHOTOGRAPHS (SEPTEMBER 2010: YEAR 5 OF 5)**

(1) Typical view of Plot #1 looking south.



(2) Typical view of 5th year Sycamores in Plot #1



**(3) View of maturing trees in Plot #2**



**(4) American Beautyberry in Plot #4**



(5) View of River Birch trees in Plot #3 (facing south).



(6) View of Green Ash in Plot #5



**APPENDIX B.**

**VEGETATION SURVEY DATA BY PLOT**



**MANNING FARM RIPARIAN BUFFER SITE  
ANNUAL MONITORING DATA SHEET - VEGETATION PLOTS**

**PLOT NUMBER 1**

SPECIES	STRATUM	Number of Individuals	HEIGHT	Planted vs. Volunteer Species	Number of Individuals Counted toward Success Criteria
	(T, SA, or SH)				
River Birch	SA	1	2 ft	Planted	1
River Birch	SA	2	7 ft	Planted	2
River Birch	SA	14	8 ft	Planted	14
River Birch	SA	2	9 ft	Planted	2
River Birch	SA	8	10 ft	Planted	8
River Birch	SA	8	12 ft	Planted	8
River Birch	SA	2	16 ft	Planted	2
Tulip Poplar	SA	4	2 ft	Planted	4
Tulip Poplar	SA	3	3 ft	Planted	3
Tulip Poplar	SA	5	4 ft	Planted	5
Tulip Poplar	SA	1	5 ft	Planted	1
American Sycamore	SA	1	5 ft	Planted	1
American Sycamore	SA	1	6 ft	Planted	1
American Sycamore	SA	1	7 ft	Planted	1
American Sycamore	SA	2	8 ft	Planted	2
American Sycamore	SA	1	10 ft	Planted	1
American Sycamore	SA	4	11 ft	Planted	4
American Sycamore	SA	1	12 ft	Planted	1
American Sycamore	SA	6	15 ft	Planted	6
American Sycamore	SA	2	16 ft	Planted	2
Water Oak	SA	3	4 ft	Planted	3
Water Oak	SA	1	5 ft	Planted	1
Water Oak	SA	1	7 ft	Planted	1
Water Oak	SA	1	15 ft	Planted	1
Baccharis	SH	1	4 ft	Volunteer	0
Baccharis	SH	1	5 ft	Volunteer	0
Baccharis	SH	5	6 ft	Volunteer	0

Baccharis	SH	9	7 ft	Volunteer	0
Baccharis	SH	10	8 ft	Volunteer	0
Baccharis	SH	5	9 ft	Volunteer	0
Baccharis	SH	1	10 ft	Volunteer	0
Persimmon	SA	1	1 ft	Planted	1
Persimmon	SA	2	2 ft	Planted	2
Persimmon	SA	1	3 ft	Planted	1
Persimmon	SA	2	4 ft	Planted	2
Loblolly Pine	SA	1	1 ft	Volunteer	1
Loblolly Pine	SA	11	2 ft	Volunteer	11
Loblolly Pine	SA	27	3 ft	Volunteer	27
Loblolly Pine	SA	7	4 ft	Volunteer	7
Sweet Gum	SA	112	2 ft - 12 ft	Volunteer	0
	<b>TOTAL STEMS (planted and all volunteers)</b>	<b>271</b>			
	<b>TOTAL SHRUBS OF PLANTED SPECIES</b>	<b>0</b>			
	<b>TOTAL TREES OF PLANTED SPECIES</b>	<b>81</b>			
	<b>TOTAL STEMS OF PLANTED SPECIES</b>	<b>81</b>		<b>PLANTED DENSITY (PER ACRE)</b>	<b>810</b>
	<b>TOTAL STEMS OF ACCEPTABLE VOLUNTEERS</b>	<b>46</b>		<b>PLANTED + ACCEPTABLE VOLUNTEERS DENSITY (PER ACRE)</b>	<b>1270</b>

**MANNING FARM RIPARIAN BUFFER SITE  
ANNUAL MONITORING DATA SHEET - VEGETATION PLOTS**

PLOT NUMBER 2

SPECIES	STRATUM	Number of Individuals	HEIGHT	Planted vs. Volunteer Species	Number of Individuals Counted toward Success Criteria
	(T, SA, or SH)				
Elderberry	SH	8	3 ft	Planted	8
Elderberry	SH	4	4 ft	Planted	4
Elderberry	SH	4	5 ft	Planted	4
River Birch	SA	1	6 ft	Planted	1
River Birch	SA	1	7 ft	Planted	1
River Birch	SA	2	10 ft	Planted	2
River Birch	SA	1	12 ft	Planted	1
Tulip Poplar	SA	2	2 ft	Planted	2
American Sycamore	SA	2	5 ft	Planted	2
American Sycamore	SA	1	6 ft	Planted	1
American Sycamore	SA	1	7 ft	Planted	1
American Sycamore	SA	3	8 ft	Planted	3
American Sycamore	SA	4	10 ft	Planted	4
American Sycamore	SA	3	12 ft	Planted	3
Baccharis	SH	1	4 ft	Volunteer	0
Baccharis	SH	6	5 ft	Volunteer	0
Baccharis	SH	12	6 ft	Volunteer	0
Baccharis	SH	7	7 ft	Volunteer	0
Baccharis	SH	6	8 ft	Volunteer	0
Baccharis	SH	1	10 ft	Volunteer	0
Persimmon	SA	2	2 ft	Planted	2
Persimmon	SA	1	3 ft	Planted	1
Persimmon	SA	5	4 ft	Planted	5
Persimmon	SA	1	5 ft	Planted	1
Pine	SA	1	1 ft	Volunteer	1
Pine	SA	2	2 ft	Volunteer	2
Pine	SA	17	3 ft	Volunteer	17

Pine	SA	7	4 ft	Volunteer	7
Sweet Gum	SA	60	2 ft - 6 ft	Volunteer	0
	<b>TOTAL STEMS (planted and all volunteers)</b>	<b>166</b>			
	<b>TOTAL SHRUBS OF PLANTED SPECIES</b>	<b>16</b>			
	<b>TOTAL TREES OF PLANTED SPECIES</b>	<b>30</b>			
	<b>TOTAL STEMS OF PLANTED SPECIES</b>	<b>46</b>		<b>PLANTED DENSITY (PER ACRE)</b>	<b>460</b>
	<b>TOTAL STEMS OF ACCEPTABLE VOLUNTEERS</b>	<b>27</b>		<b>PLANTED + ACCEPTABLE VOLUNTEERS DENSITY (PER ACRE)</b>	<b>730</b>

**MANNING FARM RIPARIAN BUFFER SITE  
ANNUAL MONITORING DATA SHEET - VEGETATION PLOTS**

PLOT NUMBER

3

SPECIES	STRATUM	Number of Individuals	HEIGHT	Planted vs. Volunteer Species	Number of Individuals Counted toward Success Criteria
	(T, SA, or SH)				
River Birch	SA	1	10 ft	Planted	1
River Birch	SA	8	12 ft	Planted	8
River Birch	SA	4	14 ft	Planted	4
River Birch	SA	10	15 ft	Planted	10
Sycamore	SA	1	8 ft	Planted	1
Sycamore	SA	2	10 ft	Planted	2
Sycamore	SA	1	11 ft	Planted	1
Sycamore	SA	5	12 ft	Planted	5
Sycamore	SA	1	14 ft	Planted	1
Sycamore	SA	7	15 ft	Planted	7
Sycamore	SA	6	16 ft	Planted	6
Tulip Poplar	SA	1	4 ft	Planted	1
Tulip Poplar	SA	3	7 ft	Planted	3
Tulip Poplar	SA	2	8 ft	Planted	2
Tulip Poplar	SA	7	10 ft	Planted	7
Tulip Poplar	SA	1	11 ft	Planted	1
Tulip Poplar	SA	2	12 ft	Planted	2
Tulip Poplar	SA	4	14 ft	Planted	4
Water Oak	SA	1	4 ft	Planted	1
Water Oak	SA	1	8 ft	Planted	1
Elderberry	SH	1	5 ft	Planted	1
Baccharis	SH	1	5 ft	Volunteer	0
Baccharis	SH	1	6 ft	Volunteer	0
Baccharis	SH	1	7 ft	Volunteer	0

Baccharis	SH	2	9 ft	Volunteer	0
Pine	SA	1	1 ft	Volunteer	1
Pine	SA	1	3 ft	Volunteer	1
Pine	SA	1	4 ft	Volunteer	1
Persimmon	SA	1	1 ft	Planted	1
Persimmon	SA	3	2 ft	Planted	3
Persimmon	SA	1	3 ft	Planted	1
Sumac	SA	2	6 ft	Volunteer	0
Sumac	SA	1	9 ft	Volunteer	0
Sumac	SA	1	11 ft	Volunteer	0
Sweet Gum	SA	65	2 ft - 15 ft	Volunteer	0
	<b>TOTAL STEMS (planted and all volunteers)</b>	<b>151</b>			
	<b>TOTAL SHRUBS OF PLANTED SPECIES</b>	<b>1</b>			
	<b>TOTAL TREES OF PLANTED SPECIES</b>	<b>73</b>			
	<b>TOTAL STEMS OF PLANTED SPECIES</b>	<b>74</b>		<b>PLANTED DENSITY (PER ACRE)</b>	<b>740</b>
	<b>TOTAL STEMS OF ACCEPTABLE VOLUNTEERS</b>	<b>3</b>		<b>PLANTED + ACCEPTABLE VOLUNTEERS DENSITY (PER ACRE)</b>	<b>770</b>

**MANNING FARM RIPARIAN BUFFER SITE  
ANNUAL MONITORING DATA SHEET - VEGETATION PLOTS**

**PLOT NUMBER**

**4**

SPECIES	STRATUM	Number of Individuals	HEIGHT	Planted vs. Volunteer Species	Number of Individuals Counted toward Success Criteria
	(T, SA, or SH)				
American Beautyberry	SH	9	4 ft	Planted	9
American Beautyberry	SH	3	5 ft	Planted	3
Water Oak	SA	1	1 ft	Planted	1
Water Oak	SA	1	2 ft	Planted	1
Water Oak	SA	2	6 ft	Planted	2
Water Oak	SA	6	7 ft	Planted	6
Water Oak	SA	6	8 ft	Planted	6
Water Oak	SA	4	10 ft	Planted	4
Willow Oak	SA	1	5 ft	Planted	1
Green Ash	SA	1	5 ft	Planted	1
Green Ash	SA	2	6 ft	Planted	2
Green Ash	SA	2	7 ft	Planted	2
Persimmon	SA	1	1 ft	Planted	1
Persimmon	SA	1	3 ft	Planted	1
Persimmon	SA	1	4 ft	Planted	1
Persimmon	SA	1	5 ft	Planted	1
Winged Sumac	SH	3	1 ft	Volunteer	0
Winged Sumac	SH	4	2 ft	Volunteer	0
Winged Sumac	SH	1	3 ft	Volunteer	0
Baccharis	SH	1	6 ft	Volunteer	0
Baccharis	SH	5	7 ft	Volunteer	0
Baccharis	SH	2	8 ft	Volunteer	0
Baccharis	SH	1	10 ft	Volunteer	0
Pine	SA	1	3 ft	Volunteer	1
Pine	SA	1	4 ft	Volunteer	1
Sweet Gum	SA	140	3 ft - 5 ft	Volunteer	0

	TOTAL STEMS (planted and all volunteers)	201			
	TOTAL SHRUBS OF PLANTED SPECIES	12			
	TOTAL TREES OF PLANTED SPECIES	30			
	TOTAL STEMS OF PLANTED SPECIES	42		PLANTED DENSITY (PER ACRE)	420
	TOTAL STEMS OF ACCEPTABLE VOLUNTEERS	2		PLANTED + ACCEPTABLE VOLUNTEERS DENSITY (PER ACRE)	440

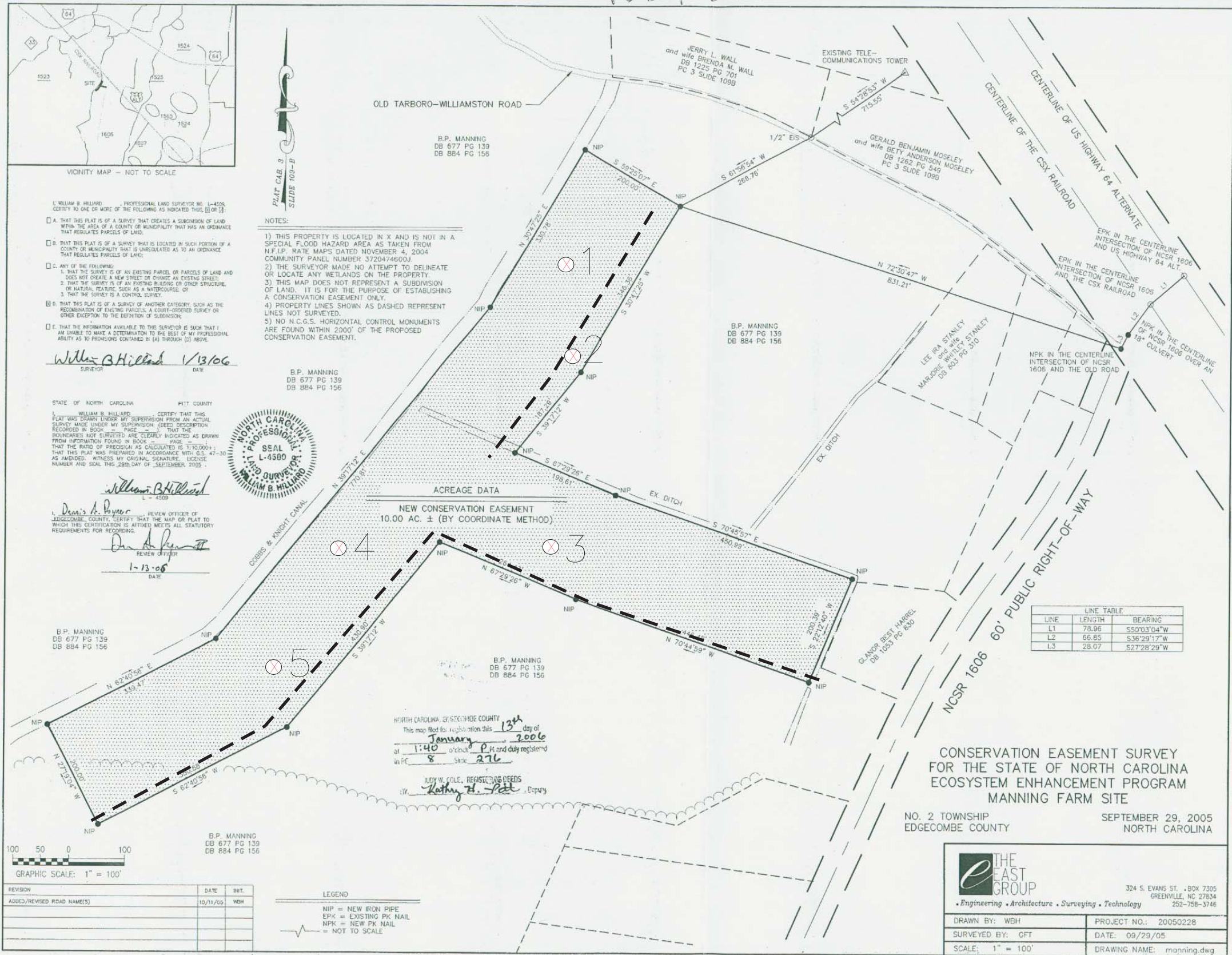




Winged Sumac	SA	1	2 ft	Volunteer	0
Pine	SA	4	2 ft	Volunteer	4
Pine	SA	3	3 ft	Volunteer	3
Pine	SA	12	4 ft	Volunteer	12
Pine	SA	2	5 ft	Volunteer	2
Sweet Gum	SA	120	2 ft - 5 ft	Volunteer	0
	<b>TOTAL STEMS (planted and all volunteers)</b>	<b>275</b>			
	<b>TOTAL SHRUBS OF PLANTED SPECIES</b>	<b>40</b>			
	<b>TOTAL TREES OF PLANTED SPECIES</b>	<b>71</b>			
	<b>TOTAL STEMS OF PLANTED SPECIES</b>	<b>111</b>		<b>PLANTED DENSITY (PER ACRE) PLANTED +</b>	<b>1110</b>
	<b>TOTAL STEMS OF ACCEPTABLE VOLUNTEERS</b>	<b>21</b>		<b>ACCEPTABLE VOLUNTEERS DENSITY (PER ACRE)</b>	<b>1320</b>

**APPENDIX C.  
CONSERVATION EASEMENT PLAT  
(WITH PLOT LOCATIONS)**

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NOTES:  
 1) THIS PROPERTY IS LOCATED IN X AND IS NOT IN A SPECIAL FLOOD HAZARD AREA AS TAKEN FROM N.F.I.P. RATE MAPS DATED NOVEMBER 4, 2004 COMMUNITY PANEL NUMBER 37204745004  
 2) THE SURVEYOR MADE NO ATTEMPT TO DELINEATE OR LOCATE ANY WETLANDS ON THE PROPERTY.  
 3) THIS MAP DOES NOT REPRESENT A SUBDIVISION OF LAND. IT IS FOR THE PURPOSE OF ESTABLISHING A CONSERVATION EASEMENT ONLY.  
 4) PROPERTY LINES SHOWN AS DASHED REPRESENT LINES NOT SURVEYED.  
 5) NO N.C.G.S. HORIZONTAL CONTROL MONUMENTS ARE FOUND WITHIN 2000' OF THE PROPOSED CONSERVATION EASEMENT.

STATE OF NORTH CAROLINA      PITT COUNTY  
 I, WILLIAM B. HILLIARD, CERTIFY THAT THIS PLAT WAS DRAWN UNDER MY SUPERVISION FROM AN ACTUAL SURVEY MADE UNDER MY SUPERVISION (DEED DESCRIPTION RECORDED IN BOOK \_\_\_\_\_ PAGE \_\_\_\_\_) THAT THE BOUNDARIES NOT SURVEYED ARE CLEARLY INDICATED AS DRAWN FROM INFORMATION FOUND IN BOOK \_\_\_\_\_ PAGE \_\_\_\_\_ THAT THE RATIO OF PRECISION AS CALCULATED IS 1:10,000+; THAT THIS PLAT WAS PREPARED IN ACCORDANCE WITH G.S. 47-30 AS AMENDED; WITNESS MY ORIGINAL SIGNATURE, LICENSE NUMBER AND SEAL THIS 29th DAY OF SEPTEMBER 2005.  
 [Signature: William B. Hilliard]  
 SURVEYOR



I, DENA A. BYER, REVIEW OFFICER OF JESSELMAN COUNTY, CERTIFY THAT THE MAP OR PLAT TO WHICH THIS CERTIFICATION IS AFFIXED MEETS ALL STATUTORY REQUIREMENTS FOR RECORDING.  
 [Signature: Dena A. Byer]  
 REVIEW OFFICER  
 1-13-06  
 DATE

NORTH CAROLINA, EDGECOMBE COUNTY  
 This map filed for registration this 13th day of January 2006 at 1:40 o'clock P.M. and duly registered in PC 8 Book 276  
 JUDY W. COLLE, REGISTERED CLERK  
 [Signature: Judy W. Cole]

LINE	LENGTH	BEARING
L1	78.96	S50°03'04"W
L2	66.65	S36°29'17"W
L3	28.07	S27°28'29"W

CONSERVATION EASEMENT SURVEY FOR THE STATE OF NORTH CAROLINA ECOSYSTEM ENHANCEMENT PROGRAM MANNING FARM SITE  
 NO. 2 TOWNSHIP EDGECOMBE COUNTY      SEPTEMBER 29, 2005 NORTH CAROLINA

**THE EAST GROUP**  
 • Engineering • Architecture • Surveying • Technology  
 324 S. EVANS ST., BOX 7305 GREENVILLE, NC 27834 252-758-3746

DRAWN BY: WEH      PROJECT NO.: 20050228  
 SURVEYED BY: GFT      DATE: 09/29/05  
 SCALE: 1" = 100'      DRAWING NAME: manning.dwg

GRAPHIC SCALE: 1" = 100'

REVISION	DATE	BY
ADDED/REVISED ROAD NAME(S)	10/11/05	WGH

LEGEND  
 NIP = NEW IRON PIPE  
 EPK = EXISTING PK NAIL  
 NPK = NEW PK NAIL  
 --- = NOT TO SCALE

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PC 8 / S-276

PC 8 / S-276

Plot #	UTM Coordinates
1	745578.75002 233843.862283
2	745591.202791 233810.111316
3	745575.130088 233667.657117
4	745477.154439 233661.641541
5	745464.062895 233622.895396

**NC EEP**  
 Manning Farm  
 Buffer Restoration Project  
 Edgecombe County

**Land Management Group, Inc.**  
 Environmental Consultants  
 Wilmington, N.C.  
 September 2010

**Appendix C.**  
 Survey with Monitoring Plots