

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

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

**2006 Annual Monitoring Report (Year 1 of 5)  
(Task 7)**

**NC EEP Contract #D05026**



*Prepared For:*

**North Carolina Department of Environment and Natural Resources  
Ecosystem Enhancement Program  
1652 Mail Service Center  
Raleigh, NC 27699-1652**



November 2006

*Prepared By:*

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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 10.0 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 entire 10.0-ac project area has been planted with characteristic tree and shrub species on an average density of 900 stems/ac. 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 will be conducted near the end of each growing season for a period of five years beginning in October 2006. 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 1 monitoring, the buffer restoration area appears to be progressing well toward the targeted stem density. A total of 356 stems (excluding red maple, sweet gum, and privet) were enumerated within the five plots (corresponding to an average density of 712 stems/acre).

The following monitoring report summarizes the restoration project and includes specific plot data from the October 2006 (Year 1) monitoring event.

## **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 10.0 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 10.0-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. Photographs documenting pre-project conditions are provided in Appendix A.

### 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 10.0-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 NCDENR's "Guidelines for Riparian Buffer Restoration" 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 1 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 will be 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 Figure 5. 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 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.

Monitoring reports will be submitted annually to the EEP (by January 1 of each year). These reports will include results of vegetative monitoring and photographic documentation of site conditions. Monitoring reports will also identify any contingency measures that may need to be employed to remedy any site deficiencies. For instance, deer browse tubes and fencing may need to be used if evidence of significant herbivory or deer browse is observed. In addition, supplemental planting may be necessary in areas of reduced survivorship.

#### **IV. MONITORING**

A total of 414 stems (planted and volunteer shrubs/trees) were observed within the five 0.10-acre plots. Of the total observed, 356 stems (total excluding privet, red maple and sweet gum) were counted toward the success criteria (corresponding to 712 stems/acre). Of the species planted, river birch (*Betula nigra*) was the most abundant tree observed and elderberry (*Sambucus canadensis*) was the most abundant shrub observed within the five monitoring plots. Refer to Table 2 for a comprehensive list of monitoring plot totals. Site photographs from the 2006 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 10.0-acre project site through the first year of annual monitoring. The observed density (712 stems/acre) indicates that the site is progressing well toward a maturity density of 320 stems/acre (considered the target density five years post-planting).

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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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Land Management Group, Inc.  
November 2006  
Contract No. D05026



Reversion of agricultural land to wooded riparian buffer will 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	
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	
8	Submittal of Monitoring Report #2 to EEP	December 31, 2007	
9	Submittal of Monitoring Report #3 to EEP	December 31, 2008	
10	Submittal of Monitoring Report #4 to EEP	December 31, 2009	
11	Submittal of Monitoring Report #5 to EEP	December 31, 2010	

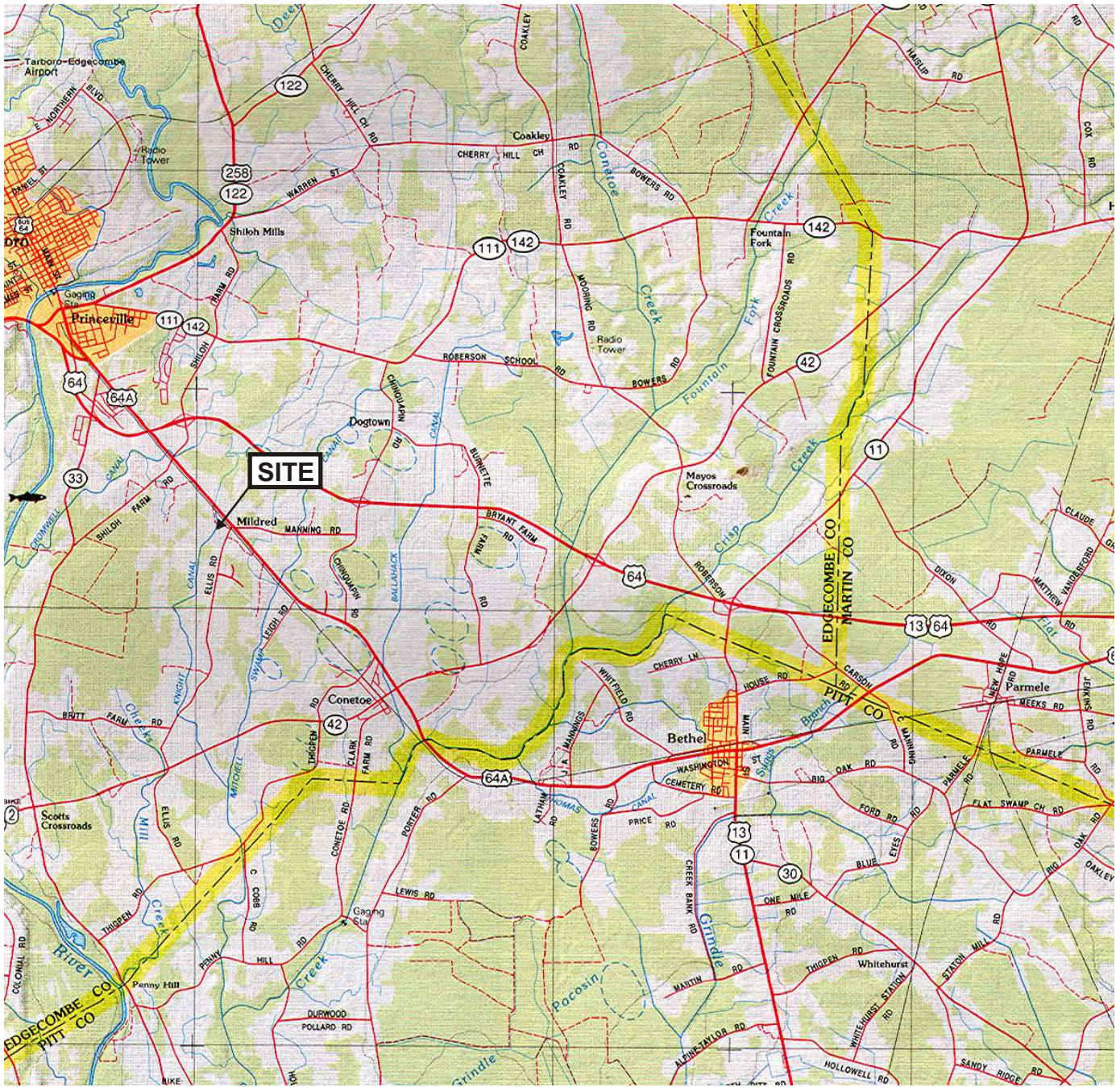
Table 2. Manning Farm Plant List.

<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>Species</b>	<b># planted</b>	<b>(% of total)</b>	<b># planted</b>
			<b>3,000</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 (Year 1) – Vegetation Plots  
Manning Farm Riparian Buffer Site

SPECIES	PLOT 1	PLOT 2	PLOT 3	PLOT 4	PLOT 5	TOTAL
American beautyberry				14	30	44
Baccharis	8	5	1	1		15
Elderberry		28		3	15	46
Green Ash	3			7	15	25
Overcup Oak	14		3	13	41	71
Persimmon	1					1
Privet	1	1				2
Red Bay	1					1
River Birch	22	7	21			50
Sweet Gum	17	8	7	24		56
Sweet Pepperbush		9				9
Sycamore	12	13	19			44
Tulip Poplar	15	5	22			42
Water Oak					3	3
Willow Oak			1	1	3	5
<b>TOTAL</b>	<b>94</b>	<b>76</b>	<b>74</b>	<b>63</b>	<b>107</b>	<b>414</b>
<b>Total Counted toward Success</b>	<b>76</b>	<b>67</b>	<b>67</b>	<b>39</b>	<b>107</b>	<b>356</b>
<b>Stem Density (per acre)</b>	<b>760</b>	<b>670</b>	<b>670</b>	<b>390</b>	<b>1070</b>	<b>712</b>

## **FIGURES**



SCALE 1" = 2.0 miles

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

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

**Land Management Group, Inc.**  
Environmental Consultants  
Wilmington, N.C.  
November 2006

**Figure 1.**  
Site Location Map



Boundaries are approximate  
and not meant to be absolute.

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



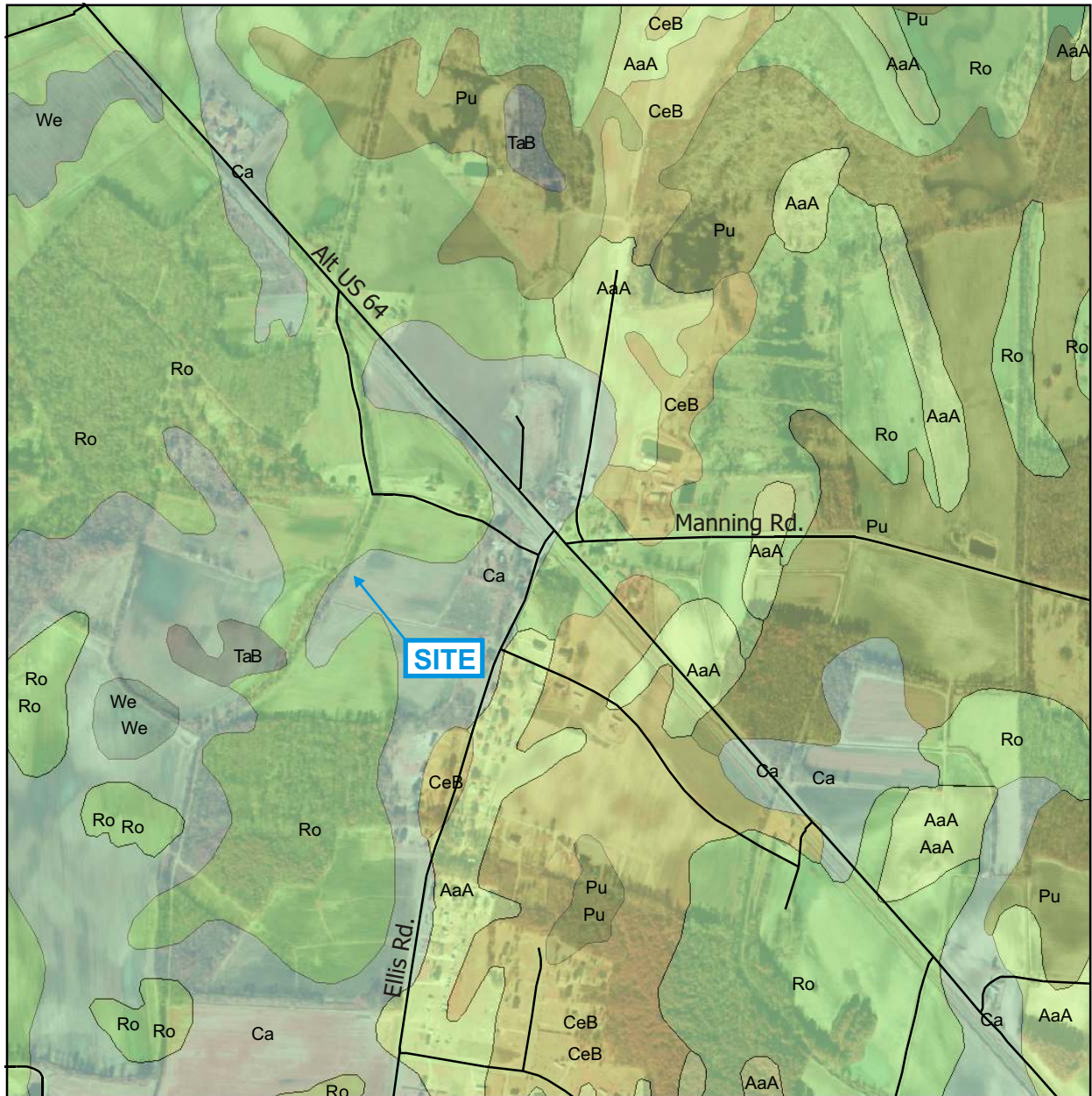
SCALE 1" = 2000'

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**Figure 2.**  
1990 Topographic Quad





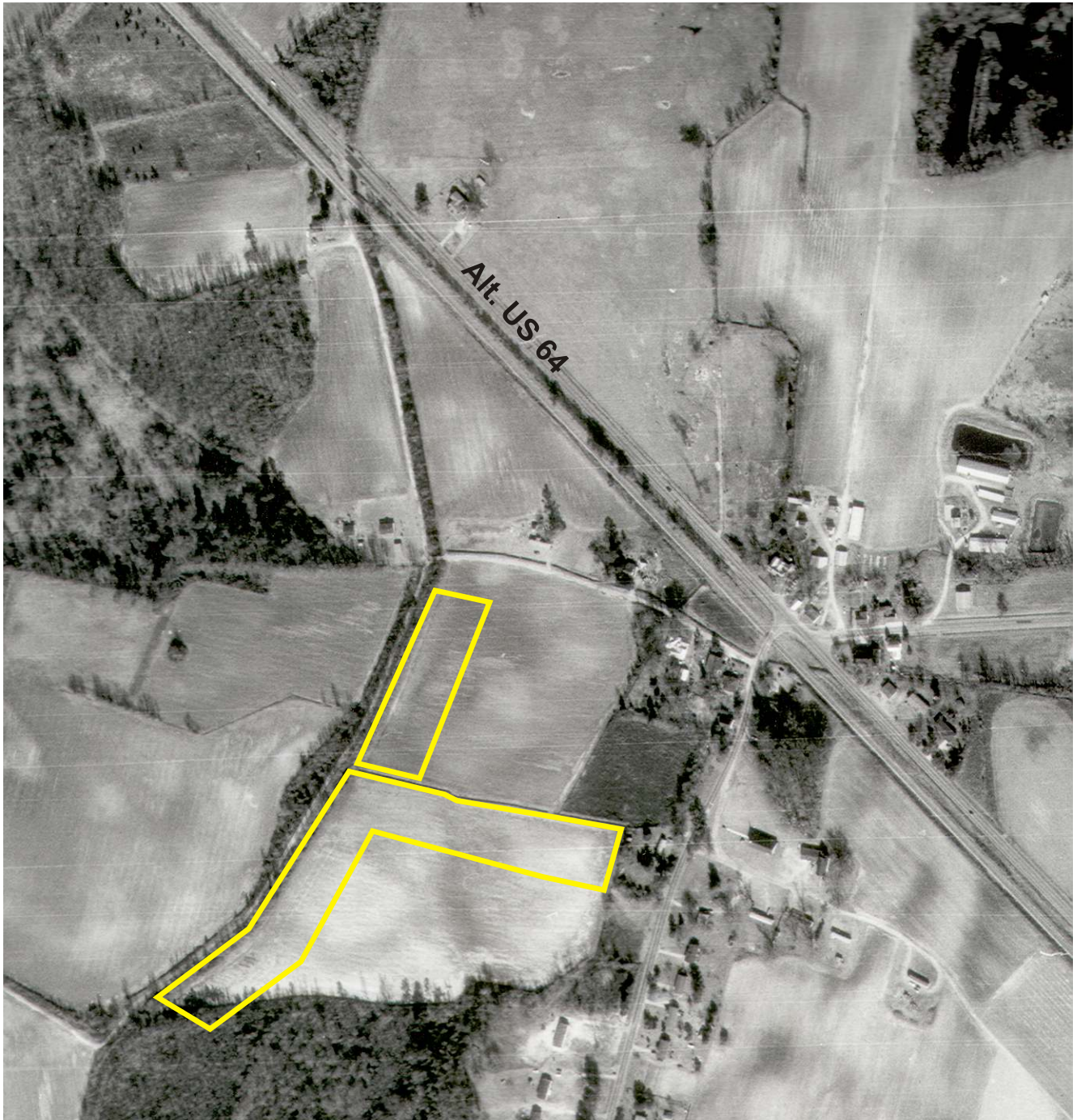
SCALE 1" = 1000'

Map Source: Soil Survey of Edgecombe County , 1977.

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November 2006

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



 200' Buffer Planting Area (10.0 acres)



SCALE 1" = 500'

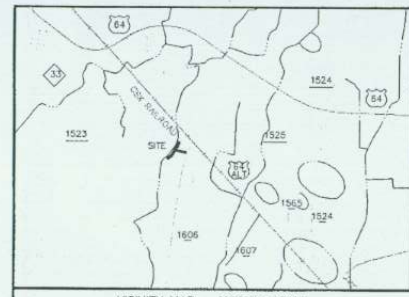
Boundaries are approximate  
and not meant to be absolute.

**Map Source:** 1993 Aerial Photography NCGIA

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Edgecombe County

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Wilmington, N.C.  
November 2006

**Figure 4.**  
Buffer Planting Overview



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 37204746004.
- 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.

William B. Hilliard 1/13/06  
SURVEYOR DATE

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.

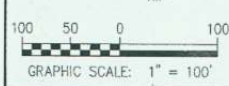


Debra A. Boyer REVIEW OFFICER OF EDGECOMBE COUNTY, CERTIFY THAT THE MAP OR PLAT TO WHICH THIS CERTIFICATION IS AFFIXED MEETS ALL STATUTORY REQUIREMENTS FOR RECORDING.  
1-13-06 DATE

B.P. MANNING  
DB 677 PG 139  
DB 884 PG 156

B.P. MANNING  
DB 677 PG 139  
DB 884 PG 156

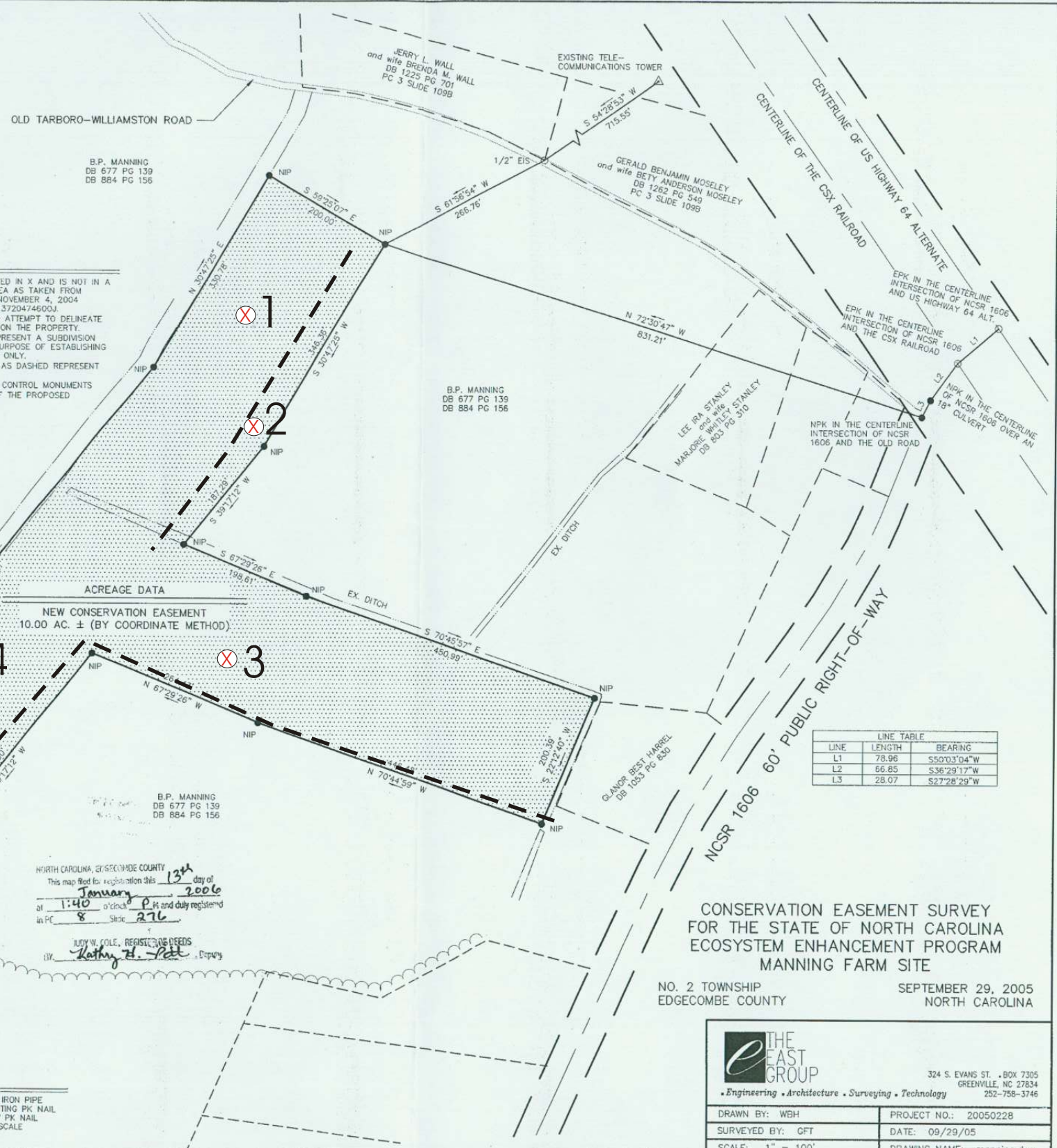
NORTH CAROLINA, EDGECOMBE COUNTY  
This map filed for registration this 13th day of January 2006 at 1:40 o'clock P.M. and duly registered in PC 8 Slide 276  
JUDY W. COLLE, REGISTERED CLERK  
Kathy H. Pitt, Deputy



REVISION	DATE	INT.
ADDED/REVISED ROAD NAME(S)	10/11/05	WBH

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

THIS DRAWING IS THE PROPERTY OF THE EAST GROUP, P.A. ANY USE, REUSE, REPRODUCTION, DISPLAY OR SALE OF THIS DRAWING WITHOUT WRITTEN CONSENT OF THE EAST GROUP, P.A. IS STRICTLY PROHIBITED.



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



324 S. EVANS ST., BOX 7305 GREENVILLE, NC 27834 252-758-3746  
DRAWN BY: WBH PROJECT NO.: 20050228  
SURVEYED BY: GFT DATE: 09/29/05  
SCALE: 1" = 100' DRAWING NAME: manning.dwg

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

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Buffer Restoration Project  
Edgecombe County

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November 2006

Figure 5.  
Survey with Monitoring Plots

**APPENDIX A.**

**SITE PHOTOGRAPHS (OCTOBER 2006, YEAR 1 OF 5)**

**(1) View of Plot #1 directly adjacent to Knight Canal**



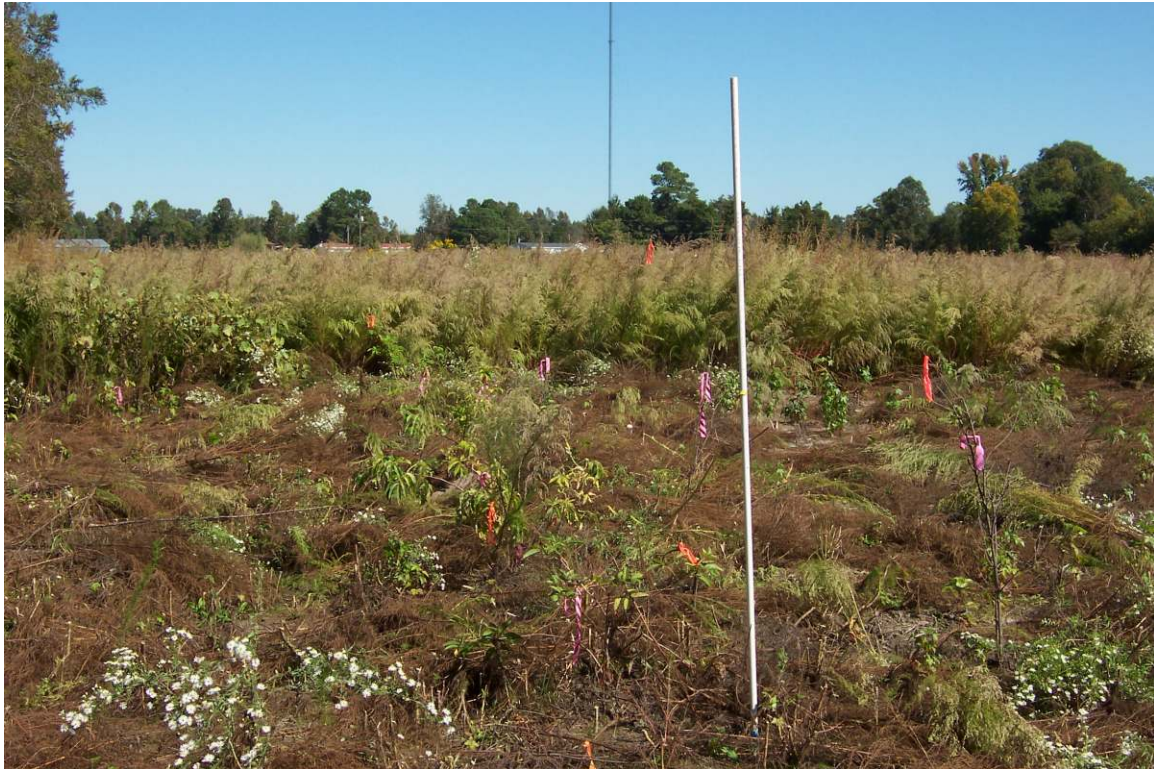
**(2) View of Plot #2**



(3) View of Plot #3



(4) View of Plot #4



(5) View of Plot #5



(6) View of cotton fields directly adjacent to project area



**APPENDIX B.**

**VEGETATION SURVEY DATA BY PLOT**



**MANNING FARM RIPARIAN BUFFER SITE**  
**ANNUAL MONITORING DATA SHEET - VEGETATION PLOTS**  
**PLOT#: 1**

SPECIES	STRATUM (T, SA, or SH)	Number of Individuals	HEIGHT	Planted vs. Volunteer Species	Number of Individuals Counted toward Success Criteria
River Birch	SA	2	<2.0ft	Planted	2
River Birch	SA	3	2.0ft	Planted	3
River Birch	SA	3	2.5ft	Planted	3
River Birch	SA	3	3.0ft	Planted	3
River Birch	SA	5	3.5ft	Planted	5
River Birch	SA	6	4.0ft	Planted	6
Sycamore	SA	1	2.5ft	Planted	1
Sycamore	SA	3	3.0ft	Planted	3
Sycamore	SA	4	4.0ft	Planted	4
Sycamore	SA	2	4.5ft	Planted	2
Sycamore	SA	1	5.5ft	Planted	1
Sycamore	SA	1	6.0ft	Planted	1
Overcup Oak	SA	2	<2.0ft	Planted	2
Overcup Oak	SA	3	2.0ft	Planted	3
Overcup Oak	SA	2	2.5ft	Planted	2
Overcup Oak	SA	5	3.0ft	Planted	5
Overcup Oak	SA	1	3.5ft	Planted	1
Overcup Oak	SA	1	4.0ft	Planted	1
Green Ash	SA	1	<2.0ft	Planted	1
Green Ash	SA	2	2.0ft	Planted	2
Red Bay	SA	1	<2.0ft	Planted	1
Privet	SH	1	<2.0ft	Volunteer	0
Persimmon	SA	1	<2.0ft	Volunteer	1
Baccharis	SH	3	<2.0ft	Volunteer	3
Baccharis	SH	2	2.0ft	Volunteer	2
Baccharis	SH	2	2.5ft	Volunteer	2
Baccharis	SH	1	3.0ft	Volunteer	1
Sweet Gum	SA	12	<2.0ft	Volunteer	0
Sweet Gum	SA	5	2.0ft	Volunteer	0
Tulip Poplar	SA	9	<2.0ft	Volunteer	9
Tulip Poplar	SA	5	2.0ft	Volunteer	5
Tulip Poplar	SA	1	2.5ft	Volunteer	1
	<b>TOTAL SHRUBS</b>	<b>9</b>		<b>OBSERVED DENSITY (PER PLOT)</b>	<b>76</b>
	<b>TOTAL TREES OF PLANTED SPECIES</b>	<b>52</b>		<b>OBSERVED DENSITY (PER ACRE)</b>	<b>760</b>
	<b>TOTAL TREES OF VOLUNTEER SPECIES</b>	<b>33</b>			
	<b>TOTAL INDIVIDUALS</b>	<b>94</b>			

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

**PLOT#:**     2    

SPECIES	STRATUM (T, SA, or SH)	Number of Individuals	HEIGHT	Planted vs. Volunteer Species	Number of Individuals Counted toward Success Criteria
River Birch	SA	1	<2.0ft	Planted	1
River Birch	SA	3	2.0ft	Planted	3
River Birch	SA	2	3.0ft	Planted	2
River Birch	SA	1	4.0ft	Planted	1
Sycamore	SA	7	2.5ft	Planted	7
Sycamore	SA	1	3.0ft	Planted	1
Sycamore	SA	5	3.5ft	Planted	5
Sweet Pepperbush	SH	9	<2.0ft	Planted	9
Elderberry	SH	23	<2.0ft	Planted	23
Elderberry	SH	5	2.0ft	Planted	5
Privet	SH	1	<2.0ft	Volunteer	0
Baccharis	SH	3	<2.0ft	Volunteer	3
Baccharis	SH	2	2.0ft	Volunteer	2
Tulip Poplar	SA	3	2.0ft	Volunteer	3
Tulip Poplar	SA	2	2.5ft	Volunteer	2
Sweet Gum	SA	8	<2.0ft	Volunteer	0
	<b>TOTAL SHRUBS</b>	<b>43</b>		<b>OBSERVED DENSITY (PER PLOT)</b>	<b>67</b>
	<b>TOTAL TREES OF PLANTED SPECIES</b>	<b>20</b>		<b>OBSERVED DENSITY (PER ACRE)</b>	<b>670</b>
	<b>TOTAL TREES OF VOLUNTEER SPECIES</b>	<b>13</b>			
	<b>TOTAL INDIVIDUALS</b>	<b>76</b>			

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

**PLOT#:**     3    

SPECIES	STRATUM (T, SA, or SH)	Number of Individuals	HEIGHT	Planted vs. Volunteer Species	Number of Individuals Counted toward Success Criteria
River Birch	SA	2	<2.0ft	Planted	2
River Birch	SA	5	2.0ft	Planted	5
River Birch	SA	3	3.0ft	Planted	3
River Birch	SA	1	3.5ft	Planted	1
River Birch	SA	10	4.0ft	Planted	10
Sycamore	SA	3	3.0ft	Planted	3
Sycamore	SA	3	4.0ft	Planted	3
Sycamore	SA	6	5.0ft	Planted	6
Sycamore	SA	5	5.5ft	Planted	5
Sycamore	SA	2	6.5ft	Planted	2
Overcup Oak	SA	3	2.5ft	Planted	3
Tulip Poplar	SA	3	<2.0ft	Volunteer	3
Tulip Poplar	SA	2	2.0ft	Volunteer	2
Tulip Poplar	SA	4	2.5ft	Volunteer	4
Tulip Poplar	SA	9	3.0ft	Volunteer	9
Tulip Poplar	SA	1	3.5ft	Volunteer	1
Tulip Poplar	SA	2	4.0ft	Volunteer	2
Tulip Poplar	SA	1	5.0ft	Volunteer	1
Willow Oak	SA	1	<2.0ft	Volunteer	1
Baccharis	SH	1	2.0ft	Volunteer	1
Sweet Gum	SA	7	<2.0ft	Volunteer	0
	<b>TOTAL SHRUBS</b>	<b>1</b>		<b>OBSERVED DENSITY (PER PLOT)</b>	<b>67</b>
	<b>TOTAL TREES OF PLANTED SPECIES</b>	<b>43</b>		<b>OBSERVED DENSITY (PER ACRE)</b>	<b>670</b>
	<b>TOTAL TREES OF VOLUNTEER SPECIES</b>	<b>30</b>			
	<b>TOTAL INDIVIDUALS</b>	<b>74</b>			

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

**PLOT#:**     4    

SPECIES	STRATUM (T, SA, or SH)	Number of Individuals	HEIGHT	Planted vs. Volunteer Species	Number of Individuals Counted toward Success Criteria
American Beautyberry	SH	1	<2.0ft	Planted	1
American Beautyberry	SH	4	2.0ft	Planted	4
American Beautyberry	SH	9	3.0ft	Planted	9
Overcup Oak	SA	1	<2.0ft	Planted	1
Overcup Oak	SA	6	2.0ft	Planted	6
Overcup Oak	SA	6	3.0ft	Planted	6
Green Ash	SA	4	3.0ft	Planted	4
Green Ash	SA	3	4.0ft	Planted	3
Elderberry	SH	2	2.0ft	Planted	2
Elderberry	SH	1	3.0ft	Planted	1
Willow Oak	SA	1	3.0ft	Volunteer	1
Baccharis	SH	1	<2.0ft	Volunteer	1
Sweet Gum	SA	24	<2.0ft	Volunteer	0
	<b>TOTAL SHRUBS</b>	<b>18</b>		<b>OBSERVED DENSITY (PER PLOT)</b>	<b>39</b>
	<b>TOTAL TREES OF PLANTED SPECIES</b>	<b>20</b>		<b>OBSERVED DENSITY (PER ACRE)</b>	<b>390</b>
	<b>TOTAL TREES OF VOLUNTEER SPECIES</b>	<b>25</b>			
	<b>TOTAL INDIVIDUALS</b>	<b>63</b>			

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

**PLOT#:**     5    

SPECIES	STRATUM (T, SA, or SH)	Number of Individuals	HEIGHT	Planted vs. Volunteer Species	Number of Individuals Counted toward Success Criteria
Overcup Oak	SA	2	<2.0ft	Planted	2
Overcup Oak	SA	15	2.0ft	Planted	15
Overcup Oak	SA	22	3.0ft	Planted	22
Overcup Oak	SA	2	4.0ft	Planted	2
American Beautyberry	SH	3	<2.0ft	Planted	3
American Beautyberry	SH	20	2.0ft	Planted	20
American Beautyberry	SH	5	3.0ft	Planted	5
American Beautyberry	SH	2	4.0ft	Planted	2
Green Ash	SA	1	<2.0ft	Planted	1
Green Ash	SA	1	2.0ft	Planted	1
Green Ash	SA	6	3.0ft	Planted	6
Green Ash	SA	3	4.0ft	Planted	3
Green Ash	SA	4	5.0ft	Planted	4
Elderberry	SH	3	<2.0ft	Planted	3
Elderberry	SH	12	2.0ft	Planted	12
Water Oak	SA	1	2.0ft	Planted	1
Water Oak	SA	1	3.0ft	Planted	1
Water Oak	SA	1	4.0ft	Planted	1
Willow Oak	SA	1	2.0ft	Planted	1
Willow Oak	SA	2	4.0ft	Planted	2
	<b>TOTAL SHRUBS</b>	<b>45</b>		<b>OBSERVED DENSITY (PER PLOT)</b>	<b>107</b>
	<b>TOTAL TREES OF PLANTED SPECIES</b>	<b>62</b>		<b>OBSERVED DENSITY (PER ACRE)</b>	<b>1,070</b>
	<b>TOTAL TREES OF VOLUNTEER SPECIES</b>	<b>0</b>			
	<b>TOTAL INDIVIDUALS</b>	<b>107</b>			