"Manning Farm Property"
Buffer Restoration Project

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

Site-Specific Restoration Plan
(Task 3)

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

Ecosystem Enhancement PROGRAM

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EXECUTIVE SUMMARY

The proposed restoration project at the Manning Farm Property is intended to provide suitable, high-quality riparian buffer restoration as compensatory mitigation for riparian buffer impacts authorized through the North Carolina Ecosystem Enhancement Program (EEP). The objective of the proposed 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 primary function of the riparian buffer project outlined in this document will be to restore the nitrogen (N) removal capacity of those areas situated adjacent to surface waters. 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.

The Manning Farm Property is currently farmed for soybean, corn, and cotton production. The site consists 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 EEP, Land Management Group, Inc. (LMG) will restore 10.0 acres of riparian buffer habitat along Knight Canal (a tributary of the Tar River) and contiguous surface-waters (i.e. field ditches) in Edgecombe County, NC.

The following site-specific restoration plan provides site information related to existing conditions and sources of N. In addition, more specific information regarding project implementation and monitoring is enclosed.

1.0 PROJECT SITE IDENTIFICATION AND LOCATION

As approved by the EEP, LMG has targeted 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).

Directions to the project site from Raleigh (NC) are provided below:

> *From Raleigh (NC), take US 64 east to Tarboro. Follow US 64 Alternate out of Tarboro. Turn right onto Ellis Road (approximately 4 miles southeast of Tarboro). Take first right onto gravel access road. Site is located immediately east of canal.*

2.0 WATERSHED CHARACTERIZATION

Riparian buffer restoration is most critical in surface waters susceptible to water quality impairments associated with non-point source discharges of nutrient-rich runoff. Nutrient loading (in the form of excess nitrogen and/or phosphorous) may induce a variety of water quality problems including hypoxia/anoxia, aquatic weed infestations, and toxic algal blooms. The Tar River and its tributaries, in particular, have exhibited significant water quality impairments. According to data from the NC DWQ's Tar River Basinwide Plan, a majority of the monitored streams in the Tar River portion of USGS Cataloging Unit 03020103 are moderately to severely stressed. DWQ has cited agricultural runoff as the primary source of this impairment.

Drainage features of the site are typically located within slightly lower topographic areas mapped as Roanoke and Cape Fear loam (refer to Figure 3). Roanoke loam is a nearly level, poorly drained soil exhibiting slow permeability and slow surface runoff. Cape Fear loam is also found in nearly level areas and is designated as a very poorly drained soil. Seasonal high water table for both types is typically shallow, ranging from 0 to 12 inches. These soil types comprise a majority of the farmed acreage, additional soil types such as Tarboro loamy sand, are found in areas of higher landscape position. The Tarboro series consists of somewhat excessively-drained soils occurring near major drainageways of the county. Tarboro soils exhibit rapid permeability with a seasonal high water table occurring at a depth of 4 to 6 feet. Surface runoff is very low.

Site evaluations of selected soil profiles confirmed the presence of the three major soil series. Soil indicators (including texture, chroma, and redoxymorphic features) indicate that seasonal high water tables varied from 12" to 50" below the soil surface prior to anthropogenic impacts (i.e. ditch excavation).

Elevations of the project area range from 12.0 ft to 16.0 ft above mean sea level (MSL). The depth of Knight Canal ranges from 6' to 8' in depth. The adjoining drainage ditch, located within the project boundary ranges from 2' to 3' in depth. Knight Canal is listed as a "blue-line" stream on the USGS topographic quadrangle (Mildred).

3.0 EXISTING CONDITIONS

The 10.0-acre riparian buffer restoration area represents a portion of a larger 250-acre tract ("Manning Farm") actively farmed for the production of soybean and cotton. Land use practices (including herbicide, pesticide, and fertilizer application) serve as potential contributors to decreased water quality of adjacent surface waters (i.e. ditches and 'blue-line' streams). Application of nitrogen-rich fertilizer represents the most significant non-point source of nitrogen within the immediate project area. Woody vegetation along ditches of proposed riparian buffer restoration is either absent or sparse (less than 100 stems per acre that are > 5 inches diameter at breast height). As a result, nutrient-laden runoff is currently 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.

Threatened and Endangered Species: A review of the threatened and endangered species was conducted for the project at the North Carolina Heritage Program office. All information collected by this agency is listed on USGS quadrangle maps. The Manning Farm project is located within the Conetoe quadrangle. A review of this area revealed no threatened or endangered species within a 1 $mi.^2$ area. The quadrangle located to the north (Mildred) contains a priority habitat area designated as the Mildred Wet Hardwood Forest. This area was protected and enhanced by the NCDOT to address impacts which occurred during the construction of the NC 64 bypass. The quadrangle to the south (Old Sparta) did contain one specie listed as state threatened, the Roanoke Slabshell mussel (*Elliptio roanokensis*).

Cultural Resources: The project will not have an effect on any structures/properties eligible or listed on the National Register of Historic Places. Based upon a review of maps at the North Carolina Office of Archives and History, there are no known significant archaeological resources on the buffer restoration site.

Potential Constraints: The property is currently owned by B.P. Manning as recorded in Deedbook 677, Page 139 and Deedbook 884, Page 156 of the Edgecombe County Register of Deeds. A boundary survey of the conservation easement area has been completed and is included in Appendix B of this document. The conservation area map was recently recorded in Plat Cabinet 8, Slide 276 of the Edgecombe County Register of Deeds on January 13, 2006.

The site is accessed from Ellis Road (SR 1606). As part of the conservation easement deed conveyed to the site, the Grantor allows for unencumbered for ingress and egress for restoration, monitoring, and management activities. There are no known utilities within the conservation easement area. There are no hydrologic trespass issues since restoration does not involve any hydrologic modifications to drainage features or surface waters. In addition, site topography will allow for successful restoration with no potential adverse affects to adjacent property.

4.0 PROJECT SITE RESTORATION PLAN

Based upon site assessments, 10.0 acres of riparian buffer habitat will be restored on-site. The enclosed site plan (Figure 4) depicts areas targeted for riparian buffer restoration. Pending site conditions prior to planting, the restoration area will be plowed and disked to reduce compaction and to enhance microtopography. No federal or state permits will be necessary to conduct the restoration activities.

Bare soil will be stabilized by seeding of rye grain (*Secale cereale*) mix upon completion of grading activities. Post-planting herbicide application may be applied to control of the spread of invasive, exotic plants. The herbicide will be applied by a licensed applicator according to prescribed quantities and methods. (In addition, any proposed application procedures will be reviewed with the NC DWQ prior to herbicide use.)

The riparian buffer will be planted with characteristic tree species including river birch (*Betula nigra*), sycamore (*Platanus occidentalis*), water oak (*Quercus nigra*), tulip poplar (*Liriodendron tulipifera*), and red bay (*Persea borbonia*). Bare-root seedlings will be planted at a density of 600 trees per acre. The outer 50 feet of the proposed buffer areas will be planted with characteristic shrub species including wax myrtle (*Myrica cerifera*), American beautyberry (*Callicarpa americana*), and elderberry (*Sambucus canadensis*). Shrubs will be planted at a density of 1,200

plants per acre. The planting regime for the riparian buffer restoration area is detailed in Table 1. Species were selected based upon the range of soil and hydrologic conditions occurring within the project area. The planting regime is compatible with site conditions since it reflects variation in species composition corresponding to changes in micro-elevation and soil texture. For instance, water oak (adapted for relatively low moisture requirements) will be planted in slightly higher topographic areas. Conversely, river birch and sycamore will be planted in lower landscape positions and finer soils – conditions suitable for these species' relatively high moisture requirements. These same considerations were also used to select appropriate shrub species for the project site.

All species selected for the restoration project naturally occur within the coastal plain as well as undisturbed riparian buffer areas within the farm . These species are also considered to be well-suited for site-specific conditions (including soil characteristics and moisture regimes). In addition, each is listed within NCDENR's "Guidelines for Riparian Buffer Restoration" as appropriate for use in riparian buffer restoration projects.

LMG has arranged for the execution of the conservation easement deed that will ensure the protection of the riparian buffer restoration area in perpetuity. The easement will prohibit any activities (e.g. timbering, farming, building, etc.) that would alter the environmental state of the restoration project. The easement is to be conveyed directly to the State Property Office (SPO) prior to initiation of restoration work.

5.0 PERFORMANCE CRITERIA

Upon completion of the riparian buffer restoration, an 'as-built' report will be prepared and submitted to the EEP to document the extent of riparian buffer restoration. Subsequent annual monitoring will be conducted near the end of each growing season for a period of five years. Vegetative monitoring will include the establishment of five (5) 0.10-acre permanent plots corresponding to a total of 0.5 acres (equivalent to 5% of the restoration area). Vegetative planting will be deemed successful if survivorship of plantings and volunteers of desirable species[1] meets or exceeds a target stem density of 320 stems/acre.

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.

6.0 CONCLUSION

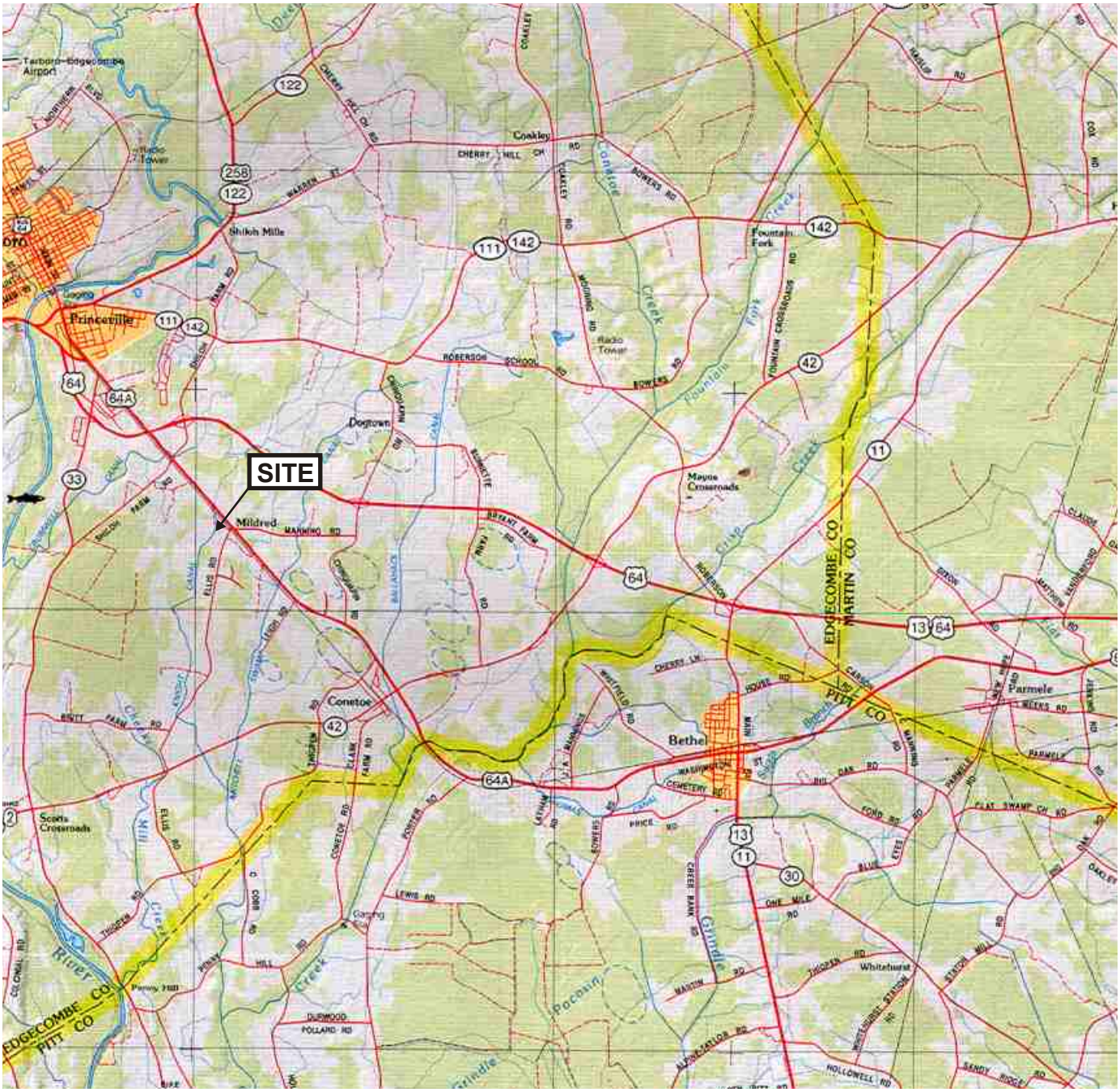
LMG will initiate site restoration activities that will culminate in the restoration of 10.0 acres of riparian buffer located in TAR-3 of the lower Tar-Pamlico Basin. Reversion of agricultural land to wooded riparian buffer will decrease source nutrient loading and concurrently increase nutrient removal 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 Basin.

[1] Desirable species are considered as noninvasive species characteristic of riparian habitat

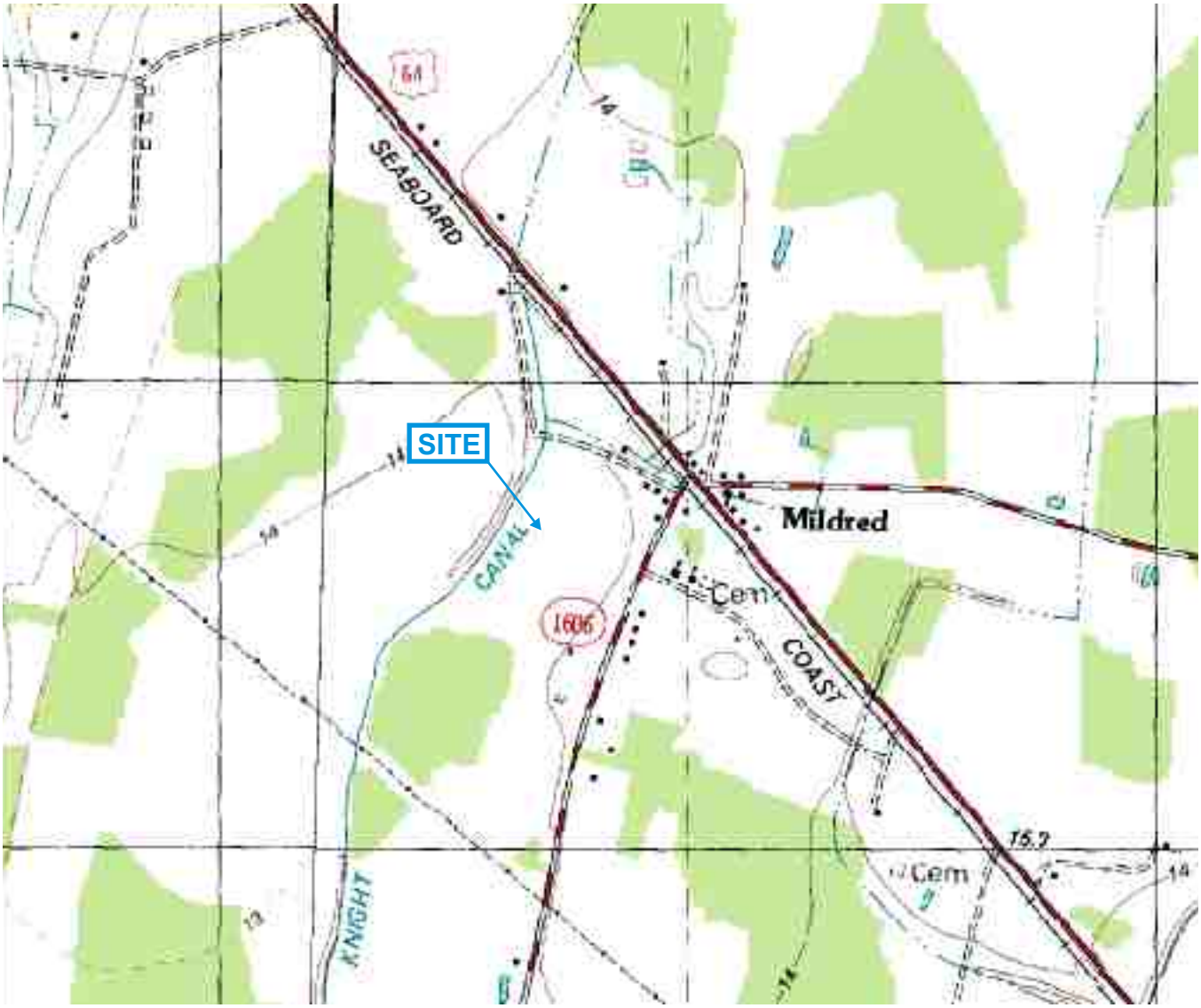
Table 1. Proposed Buffer Plant List

Buffer Zone	**Zone 1 (Trees)**		**Zone 2 (Shrubs)**	
Stem Target:	**600/ac (7.5 ac.)**	**4,500**	**1,200/ac (2.5ac.)**	**3,000**
Species	**# planted**	**(% of total)**	**# planted**	**(% of total)**
River Birch (*Betula nigra*)	1,000	22.22%		
Sycamore (*Platanus occidentalis*)	1,000	22.22%		
Yellow Poplar (*Liriodendron tulipifera*)	1,000	22.22%		
Water Oak (*Quercus nigra*)	1,000	22.22%		
Red Bay (*Persea borbonia*)	500	11.11%		
Wax Myrtle (*Myrica cerifera*)			1,000	33.33%
Elderberry (*Sambucus canadensis*)			1,000	33.33%
American Beautyberry (*Callicarpa americana*)			1,000	33.33%

8.0 FIGURES



NC EEP Conetoe Creek Buffer Site Manning Farm Edgecombe County	***Land Management Group, Inc.*** **Environmental Consultants** Wilmington, N.C. February 2005	**Figure 1** Site Location Map



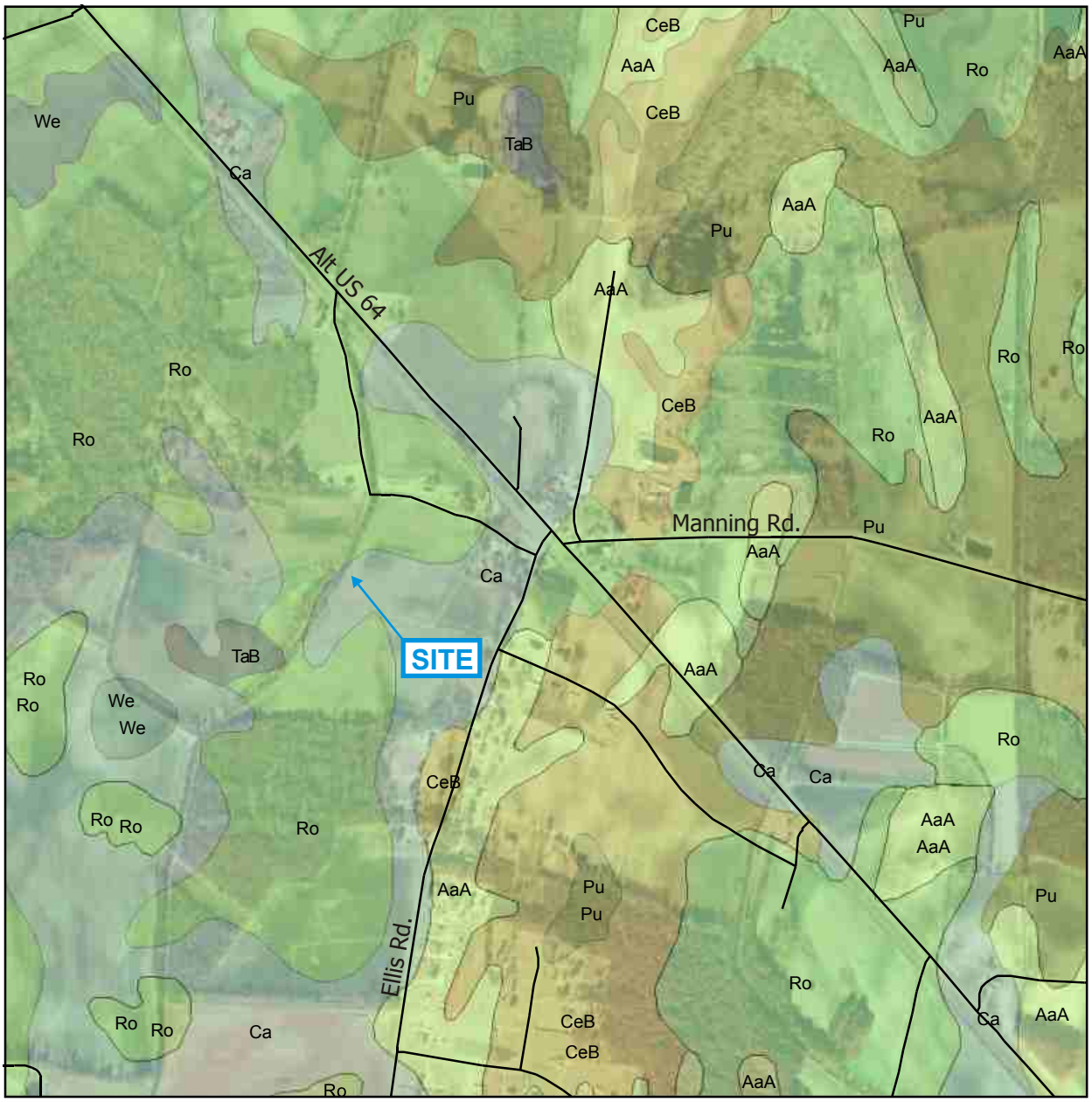
Boundaries are approximate
and not meant to be absolute.

N

SCALE 1" = 2000'

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

NC EEP Conetoe Creek Buffer Site Manning Farm Edgecombe County	***Land Management Group, Inc.*** **Environmental Consultants** Wilmington, N.C. February 2005	**Figure 2.** 1990 Topographic Quad



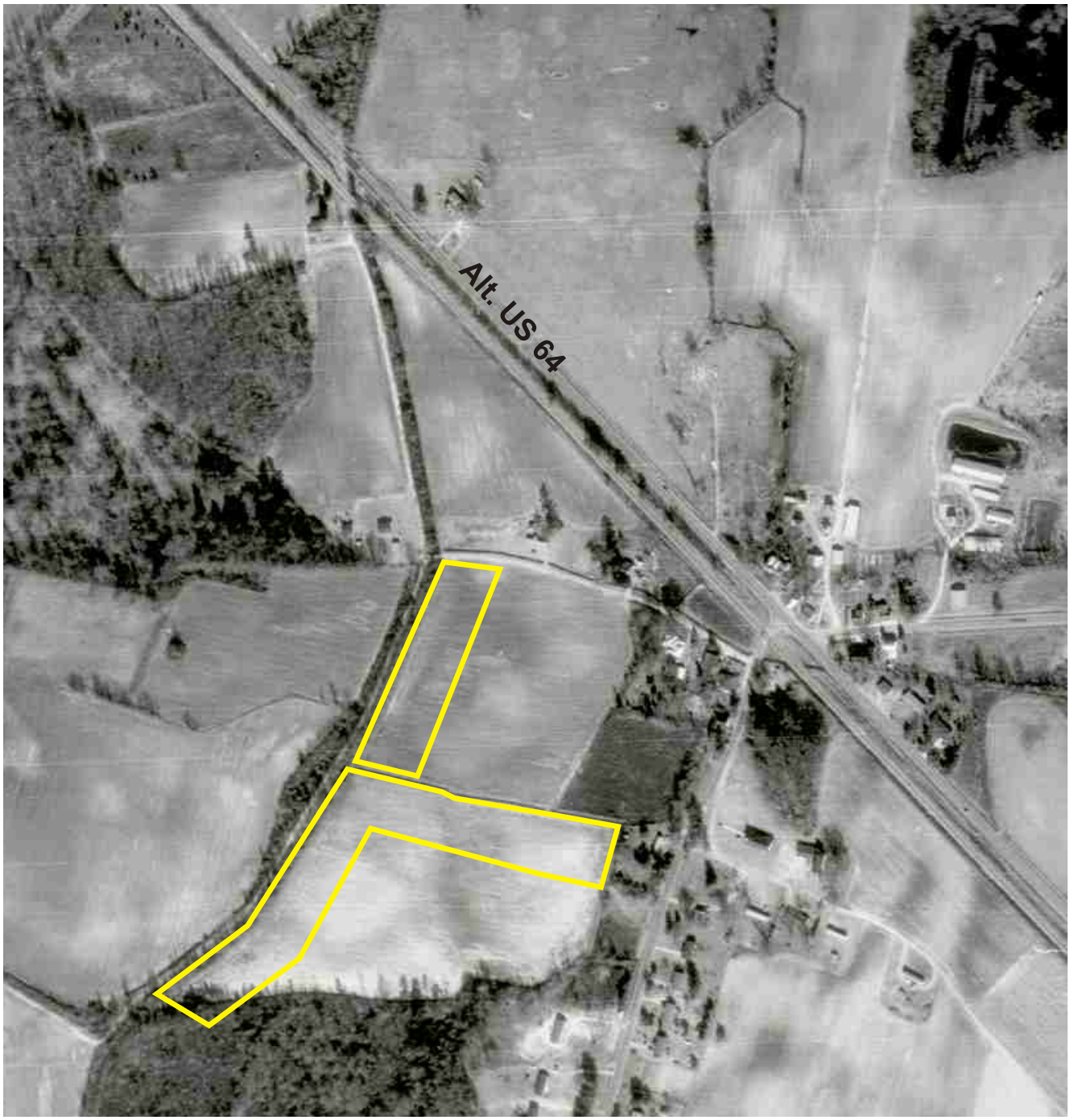
Boundaries are approximate
and not meant to be absolute.

Map Source: Soil Survey of Edgecombe County , 1977.

N

SCALE 1" = 1000'

NC EEP Conetoe Creek Buffer Site Manning Farm Edgecombe County	***Land Management Group, Inc.*** **Environmental Consultants** Wilmington, N.C. February 2005	**Figure 3** Generalized Soil Map Edgecombe County, NC



200’ Buffer Planting Area (10.0 acres)

N

SCALE 1" = 500’

Boundaries are approximate
and not meant to be absolute.

Map Source: Soil Survey of Edgecombe County , 1977.

NC EEP Conetoe Creek Buffer Site Manning Farm Edgecombe County	***Land Management Group, Inc.*** **Environmental Consultants** Wilmington, N.C. February 2005	**Figure 4** Buffer Planting Overview

9.0 APPENDICES

Cultivated farmland directly adjacent to proposed buffer site

Unvegetated area directly adjacent to Knight Canal

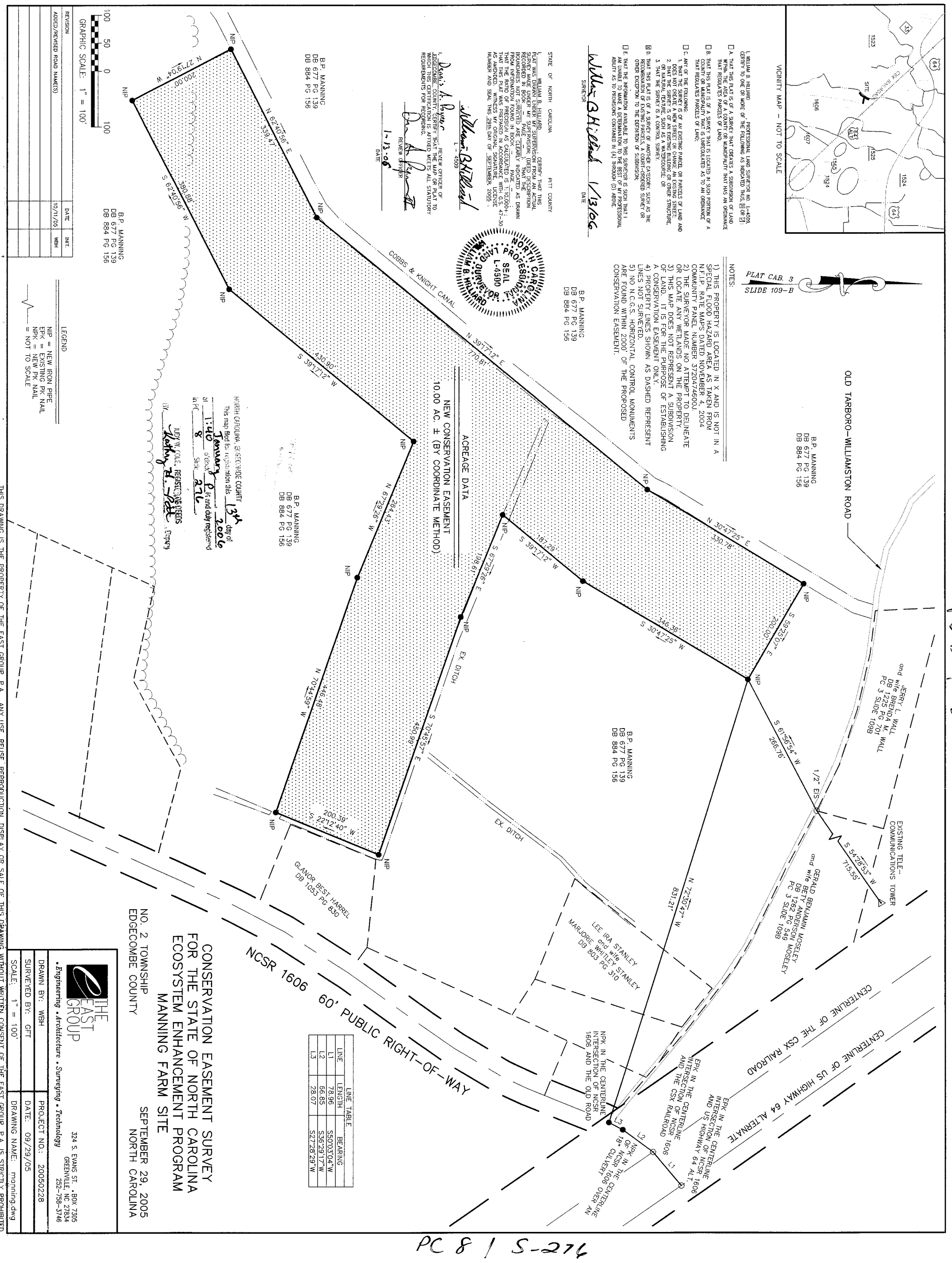
NC EEP Conetoe Creek Buffer Site Manning Farm Edgecombe County	***Land Management Group, Inc.*** **Environmental Consultants** Wilmington, N.C. February 2005	Appendix A. Site Photographs

Perpendicular ditch draining into Knight Canal

Knight Canal flowing south towards Conetoe Creek

NC EEP Conetoe Creek Buffer Site Manning Farm Edgecombe County	***Land Management Group, Inc.*** **Environmental Consultants** Wilmington, N.C. February 2005	Appendix A. Site Photographs

PC 8 / S-276



LINE TABLE		
LINE	LENGTH	BEARING
L1	78.96	S55°03'04"W
L2	66.85	S36°29'17"W
L3	28.07	S27°28'29"W

GRAPHIC SCALE: 1" = 100'
100 50 0 100

REVISION	DATE	INIT.
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

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

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

PC 8 / S-276

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Appendix B.

Conservation Easement Plat