"Howard Farm Property"
Buffer Restoration Project

Greene County, NC
Neuse River Basin
(Cataloging Unit #003020203)

Mitigation Report
(Task 6)

NC EEP Contract #D05020-1

Prepared For:

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

Prior to project implementation, the Howard 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 26.3 acres of riparian buffer habitat along Mussel Run (a tributary of Contentnea Creek) and contiguous surface-waters (i.e. field ditches) in Greene County, NC.

The entire 26.3-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. Thirteen (13) 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.

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.

The following mitigation report summarizes the restoration project and includes more specific information related to project implementation and ‘as-built’ conditions.

1.0 NARRATIVE

Introduction

As approved by the EEP, LMG implemented the restoration of 26.3 acres of farmland located adjacent to Mussel Run (a tributary of the Neuse River) and a series of contiguous surface waters (i.e. field ditches). The project area is part of the "Howard Farm", located approximately 2.5 miles northeast of Hookerton in Greene County, NC (refer to Figure 1). The project includes the establishment of characteristic tree and shrub species adjacent to open field ditches on the east and west side of Churchill Road (SR #1404) as well as Mussel Run (refer to Figure 2). The property is situated within NEU-7 of the lower Neuse River Basin (USGS Cataloging Unit 03020203) and within sub-basin 03-04-07.

Mitigation Goals and Objectives

The proposed restoration project is intended to provide suitable, high-quality riparian buffer restoration as compensatory mitigation for riparian buffer impacts authorized through the EEP. 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 primary function of the riparian buffer project detailed in this document is 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.

Pre-Construction Conditions

The 26.3-acre riparian buffer restoration area represents a portion of a larger 145-acre tract ("Howard 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.

Restoration Summary

The restoration project included the planting of characteristic tree and shrub seedlings adjacent to open ditches and blue-line streams on the 26.3-ac restoration site (refer to Figure 3). No federal or state permits were necessary to conduct the restoration activities. The riparian buffer was planted with various species including river birch (*Betula nigra*), sycamore (*Platanus occidentalis*), green ash (*Fraxinus pennsylvanica*), water oak (*Quercus nigra*), willow oak (*Quercus phellos*), and red bay (*Persea borbonia*). The outer 50 feet of the buffer area was planted with characteristic shrub species including wax myrtle (*Myrica cerifera*), American beautyberry (*Callicarpa americana*), elderberry (*Sambucus canadensis*), and sweet pepperbush (*Clethra alnifolia*). All species selected for the restoration project naturally occur on the site within undisturbed riparian buffer areas. 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 20,000 trees and shrubs were planted throughout the project footprint. Bare-root seedlings were planted at a density of 600 trees per acre. Shrubs were planted at densities of 1,000 to 1,200 plants per acre. 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.

TABLE 1. Howard Farm Plant List

Species (trees)	**Quantity**
River Birch (*Betula nigra*)	2,000
Sycamore (*Platanus occidentalis*)	2,000
Green Ash (*Fraxinus pennsylvanica*)	1,000
Willow Oak (*Quercus phellos*)	1,000
Overcup Oak (*Quercus lyrata)*	1,000
Water Oak (*Quercus nigra*)	2,000
Black Gum (*Nyssa sylvatica*)	1,000
Red Bay (*Persea borbonia*)	2,000
Species (shrubs)	
Wax Myrtle (*Myrica cerifera*)	2,000
Sweet pepperbush (*Clethra alnifolia*)	2,000
Elderberry (*Sambucus canadensis*)	2,000
American Beautyberry (*Callicarpa americana*)	1,000
Possumhaw (*Viburnum nudum*)	1,000
TOTAL	**20,000**

2.0 AS-BUILTS

Refer to the attached survey (Appendix A) of the buffer restoration area with the corresponding location and number of permanent vegetative monitoring plots established on the site.

3.0 MONITORING PLAN

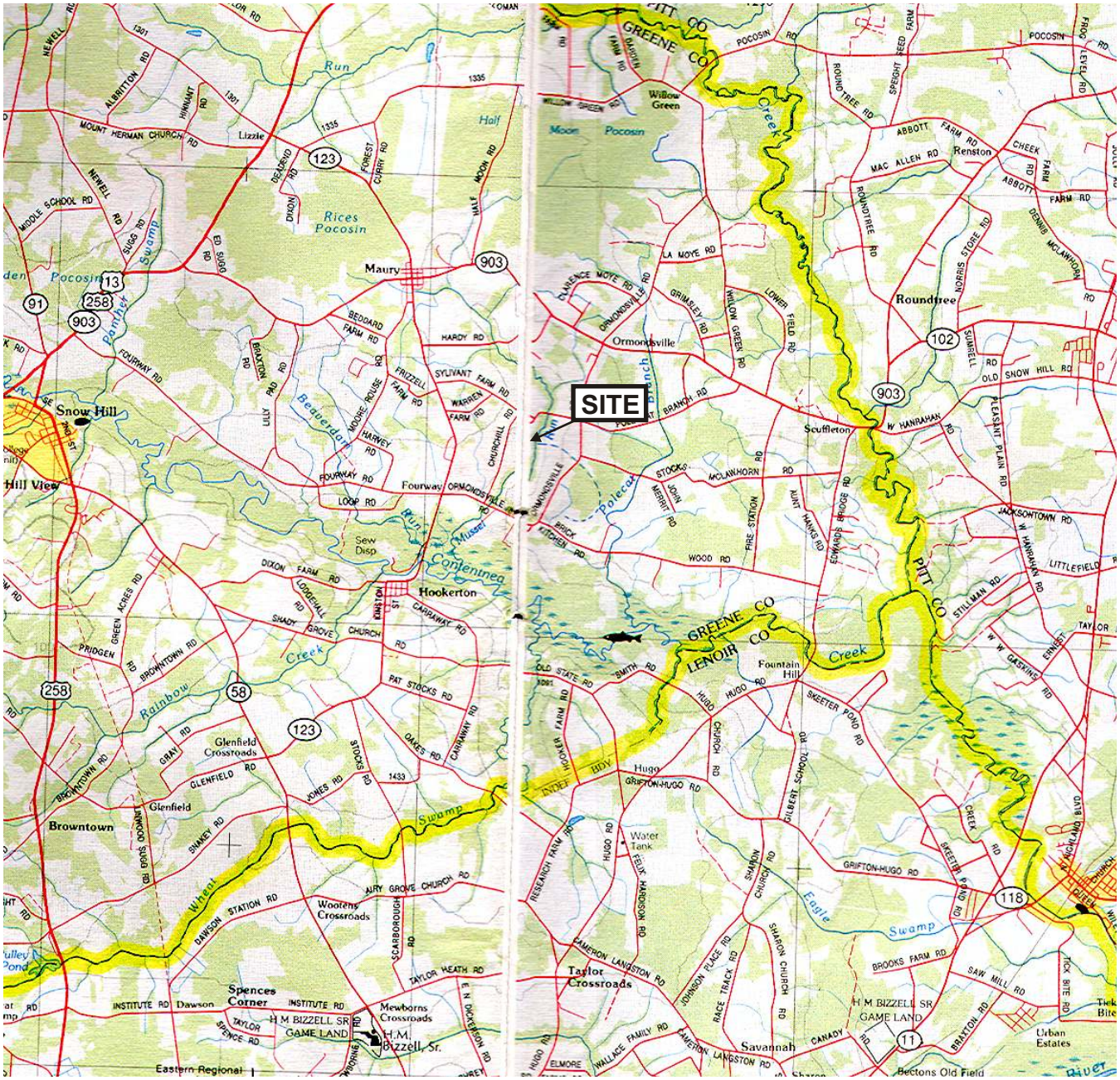
Annual monitoring will be conducted near the end of each growing season for a period of five years. Vegetative monitoring has included the establishment of thirteen (13) 0.10-acre permanent plots corresponding to a total of 1.3 acres (equivalent to 5% of the restoration area). Vegetative planting will 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.

4.0 CONCLUSION

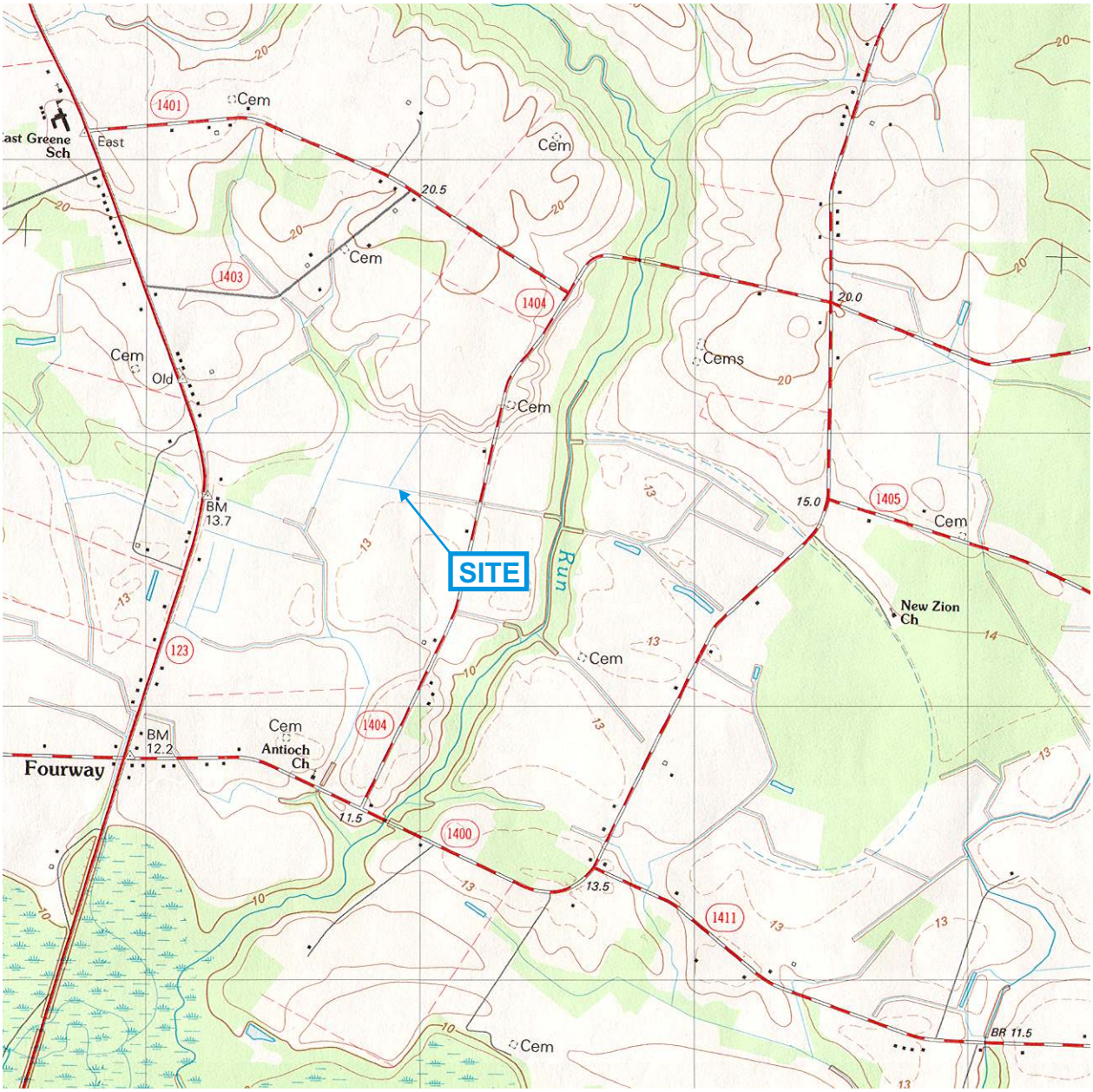
LMG has completed the implementation of 26.3 acres of riparian buffer restoration located in NEU-7 of the lower Neuse Basin. Reversion of agricultural land to wooded riparian buffer will decrease source nutrient loading and concurrently increase nutrient removal capacity. In addition, the project will 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 Neuse Basin.

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



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

NC EEP Contentnea Buffer Site Howard Farm Greene County	***Land Management Group, Inc.*** **Environmental Consultants** Wilmington, N.C. July 2006	**Figure 1** Site Location Map



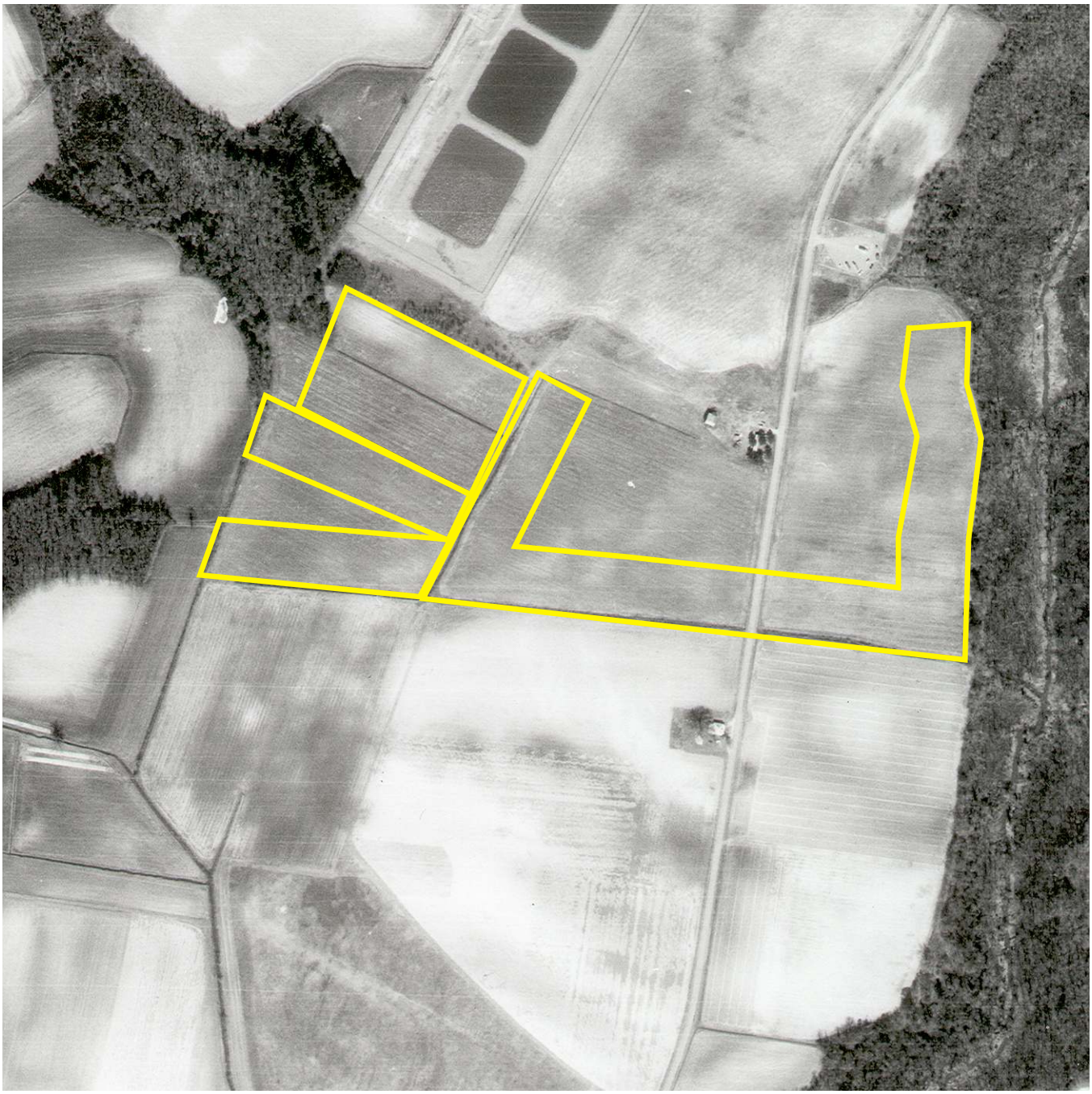
Boundaries are approximate and not meant to be absolute.

N

SCALE 1" = 2000'

Map Source: 1982, USGS 7.5' Topographic Quadrangle. Hookerton Quadrangle

NC EEP Contentnea Buffer Site Howard Farm Greene County	***Land Management Group, Inc.*** **Environmental Consultants** Wilmington, N.C. July 2006	**Figure 2.** 1982 Topographic Quad



200’ Buffer Planting Area (26.3 acres)

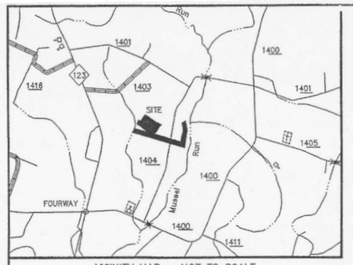
N

SCALE 1" = 500’

Boundaries are approximate
and not meant to be absolute.
Map Source: 1993 Aerial Photography NCGIA

NC EEP Contentnea Buffer Site Howard Farm Greene County	***Land Management Group, Inc.*** **Environmental Consultants** Wilmington, N.C. July 2006	**Figure 3.** Buffer Planting Overview

Appendix A. Conservation Easement Plat (includes monitoring plots)



VICINITY MAP – NOT TO SCALE

LEGEND

NIP = NEW IRON PIPE
EPK = EXISTING PK NAIL
EIP = EXISTING IRON PIPE
= NOT TO SCALE
℄ = PROPERTY LINE

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 JANUARY 2, 2004 COMMUNITY PANEL NUMBER 3720462200J.
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.

LINE TABLE		
LINE	LENGTH	BEARING
L1	41.81	N16°46'30"E
L2	200.02	S73°14'24"E
L3	29.94	S73°15'42"E
L4	88.16	N16°45'42"E
L5	30.00	N73°12'21"W
L6	191.13	N16°29'10"E
L7	33.10	N81°38'37"E
L8	34.23	N44°34'03"W
L9	111.27	N27°03'29"W
L10	130.01	N62°56'31"E
L11	69.99	N62°56'31"E
L12	154.80	S27°03'29"E
L13	30.40	N76°17'43"W
L14	205.23	N26°40'07"E
L15	201.48	N26°40'07"E
L16	94.46	S56°22'15"E
L17	29.94	S73°27'42"E
L18	129.95	S73°27'42"E
L19	233.24	S73°27'42"E
L20	155.70	S64°51'04"E
L21	207.59	S64°51'04"E
L22	190.87	S18°38'45"W
L23	200.11	N16°39'08"E
L24	200.26	N16°39'08"E

NOTE: L1–18, L13, 117–L22 ARE TIE LINES ONLY

NOW OR FORMERLY
RICHARD P. WARREN
DB 336 PG 330
MB 3 PG 89

MAURY SANITARY LAND DISTRICT
DB 438 PG 334

J.C. HOWARD, Jr.
DB 398 PG 351
DB 582 PG 636
PLAT CAB. 27 PG 184

ROBERT LEE TAYLOR
and wife MARY G. TAYLOR
DB 518 PG 452
MB 25 PG 76

NEW CONSERVATION EASEMENT "A"
ACREAGE DATA
13.13 AC. ± (BY COORDINATE METHOD)

18' OUTFALL EASEMENT
DB 438 PG 334

EX. DITCH

BRANN HEIRS
MB 3 PG 47
DB 581 PG 811
MB 27 PG 178

JUDITH B. WHALEY MORRIS
DB 582 PG 848
PLAT CAB. 27 PG 184

15' OUTFALL EASEMENT
DB 438 PG 334

NEW CONSERVATION EASEMENT "B"
ACREAGE DATA
7.31 AC. ± (BY COORDINATE METHOD)

EPK IN THE CENTERLINE OF NCSR 1107 OVER A 48" CULVERT

PLAT CAB. 27 PG 184

NCSR 1404 CHURCHILL FARM ROAD
60' PUBLIC RIGHT-OF-WAY

GREENE COUNTY
DB 456 PG 357

J.C. HOWARD, Jr.
DB 398 PG 351
DB 582 PG 636
PLAT CAB. 27 PG 184

NOW OR FORMERLY
MAYO PROPERTY

NEW CONSERVATION EASEMENT "C"
ACREAGE DATA
7.80 AC. ± (BY COORDINATE METHOD)

JUDITH B. WHALEY MORRIS
DB 582 PG 848
PLAT CAB. 27 PG 184

200 100 0 200
GRAPHIC SCALE: 1" = 200'

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.

NORTH CAROLINA PROFESSIONAL SEAL L-4509 LAND SURVEYOR WILLIAM B. HILLIARD

William B. Hilliard 9/30/05
L – 4509

REVIEW OFFICER OF GREENE COUNTY, CERTIFY THAT THE MAP OR PLAT TO WHICH THIS CERTIFICATION IS AFFIXED MEETS ALL STATUTORY REQUIREMENTS FOR RECORDING.

REVIEW OFFICER

DATE

I, WILLIAM B. HILLIARD, PROFESSIONAL LAND SURVEYOR NO. L-4509, CERTIFY TO ONE OR MORE OF THE FOLLOWING AS INDICATED THUS, ☒ OR ☑:

☐ A. THAT THIS PLAT IS OF A SURVEY THAT CREATES A SUBDIVISION OF LAND WITHIN THE AREA OF A COUNTY OR MUNICIPALITY THAT HAS AN ORDINANCE THAT REGULATES PARCELS OF LAND;

☐ B. THAT THIS PLAT IS OF A SURVEY THAT IS LOCATED IN SUCH PORTION OF A COUNTY OR MUNICIPALITY THAT IS UNREGULATED AS TO AN ORDINANCE THAT REGULATES PARCELS OF LAND;

☐ C. ANY OF THE FOLLOWING:
1. THAT THE SURVEY IS OF AN EXISTING PARCEL OR PARCELS OF LAND AND DOES NOT CREATE A NEW STREET OR CHANGE AN EXISTING STREET;
2. THAT THE SURVEY IS OF AN EXISTING BUILDING OR OTHER STRUCTURE, OR NATURAL FEATURE, SUCH AS A WATERCOURSE; OR
3. THAT THE SURVEY IS A CONTROL SURVEY.

☒ D. THAT THIS PLAT IS OF A SURVEY OF ANOTHER CATEGORY, SUCH AS THE RECOMBINATION OF EXISTING PARCELS, A COURT-ORDERED SURVEY OR OTHER EXCEPTION TO THE DEFINITION OF SUBDIVISION;

☐ E. THAT THE INFORMATION AVAILABLE TO THIS SURVEYOR IS SUCH THAT I AM UNABLE TO MAKE A DETERMINATION TO THE BEST OF MY PROFESSIONAL ABILITY AS TO PROVISIONS CONTAINED IN (A) THROUGH (D) ABOVE.

William B. Hilliard 9/30/05
SURVEYOR DATE

CONSERVATION EASEMENT SURVEY FOR THE STATE OF NORTH CAROLINA ECOSYSTEM ENHANCEMENT PROGRAM HOWARD FARM SITE

ORMONDS TOWNSHIP
GREENE 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: WBH	PROJECT NO.: 20050227
SURVEYED BY: GFT/AJH	DATE: 09/29/05
SCALE: 1" = 200'	DRAWING NAME: howard.dwg

⊗ Permanent Monitoring Plot

Plot #	UTM Coordinates	Plot #	UTM Coordinates
1	740025.940563 189523.165945	7	739480.818314 189764.335203
2	740098.689967 189567.014901	8	739637.279362 189603.887887
3	740086.731161 189628.802066	9	739664.309005597 189677.942642213
4	739538.61921 189587.942812	10	739720.991005 189734.438188
5	739586.454435 189726.46565	11	739681.128318 189564.025199
6	739586.454435 189726.46565	12	739645.251899 189634.781469
		13	739820.647723 189570.004602