"Howard Farm Property"
Buffer Restoration Project

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

Site-Specific Restoration Plan
(Task 3)

NC EEP Contract #D05020-1

Prepared For:

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

January 2006

Prepared By:

Land Management Group, Inc.
PO Box 2522
Wilmington, NC 28403

Phone. 910-452-0001
Fax. 910-452-0060

Project Manager:
Christian A. Preziosi
Office. 910-452-0001
Cell. 910-471-0515
Email. cpreziosi@lmgroup.net

TABLE OF CONTENTS

EXECUTIVE SUMMARY

The proposed restoration project at the Howard 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 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 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 Howard Farm Property is currently farmed for soybean 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 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 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 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).

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

> *From Raleigh (NC), take Highway 70 East to Goldsboro. Out of Goldsboro, take US 13 north to Snow Hill. Continue north to NC 903 toward Maury, NC. From Maury, take NC 123 south to Creek Road (SR #1400). Take left onto Creek Road, then left onto Churchill Road (SR 1404). Proceed approximately ¾ mile. The restoration site is on both the east and west side of Churchill Road.*

The project will buffer 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.

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 manifest in a variety of water quality problems including hypoxia/anoxia, aquatic weed infestations, and toxic algal blooms. The Neuse River and its tributaries, in particular, have exhibited significant water quality impairments. According to data from the NC DWQ's Neuse River Basinwide Plan, Contentnea Creek (Subbasin 03-04-07) is listed as a stream with a "good-fair" bioclassification. The creek was listed as impaired during the 1998 survey and improved to "partially supporting" during the 2002 monitoring event. However, upstream areas are still prone to anoxic events due to discharges from wastewater treatment plants, which release over 12 million gallons of treated sewage per day into Contentnea Creek.

Drainage features of the site are typically located within slightly lower topographic areas, such as stream terraces, and are mapped as Johns and Lumbee sandy loam (refer to Figure 3). Johns sandy loam is a somewhat poorly drained soil exhibiting moderate permeability and negligible surface runoff. Water table depths typically range from 12 to 36 inches under normal conditions. Lumbee sandy loam is found in nearly level areas and is designated as a poorly drained soil. Water table depths typically range from 0 to 12 inches under normal conditions. While these soil types comprise a majority of the farmed acreage, additional soil types such as Kenansville fine sand are found in areas of higher landscape position located to the south of the project site. The

Kenansville series consists of well-drained soils with rapid permeability and slow surface runoff. The high water table typically occurs at a depth of greater than 4 feet.

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 36" below the soil surface prior to anthropogenic impacts (i.e. ditch excavation).

Elevations of the project area range from 10.0 ft to 16.0 ft above mean sea level (MSL). The depth of Mussel Run ranges from 6' to 8' in depth. The perpendicular drainage ditch, located within the project boundary ranges from 2' to 4' in depth. Mussel Run is listed as a "blue-line" stream on the USGS topographic quadrangle (Hookerton). The other drainage features are also depicted on the topographic map, and maintain a direct connection to Mussel Run.

3.0 EXISTING CONDITIONS

The 26.3-acre riparian buffer restoration area represents a portion of a larger 145-acre tract ("Howard 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 threatened and endangered species potentially occurring on the site was conducted at the North Carolina Heritage Program office. The Howard Farm project is located within the Hookerton quadrangle. A review of this area revealed no threatened or endangered species within a 1 $mi.^2$ area. Several state listed species were found to the southeast, near the convergence of Wheat Swamp and Contentnea Creek. The Tar River Crayfish (*Procambarus medialis*) is listed as a specie of special concern, but is not considered

endangered at the state or federal level. The Neuse River waterdog (*Necturus lewisi*) is listed as a vulnerable specie due to pollution problems in the area, but is not considered endangered at the state or federal level.

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 J.C. Howard Jr. as recorded in Deedbook 398, Page 351 and Deedbook 582, Page 636 of the Green 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 Deedbook 27, Page 286 of the Green County Register of Deeds on January 13, 2006.

The site is situated immediately adjacent to a public right-of-way (SR 1404) and therefore is 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, 26.3 acres of riparian buffer habitat will be restored on-site. The proposed restoration project 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 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 enclosed site plan (Figure 4) depicts areas targeted for riparian buffer restoration. Pending site conditions prior to planting, some areas 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 manually on an as-needed basis to control 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*), green ash (*Fraxinus pennsylvanica*), water oak (*Quercus nigra*), willow oak (*Quercus phellos*), 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*), elderberry (*Sambucus canadensis*), and sweet pepperbush (*Clethra alnifolia*). 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. The planting regime is more 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 used to select appropriate shrub species for the project site.

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.

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 conservation easement deed is to be conveyed to the State Property Office (SPO) prior to the initiation of site 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 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.

6.0 CONCLUSION

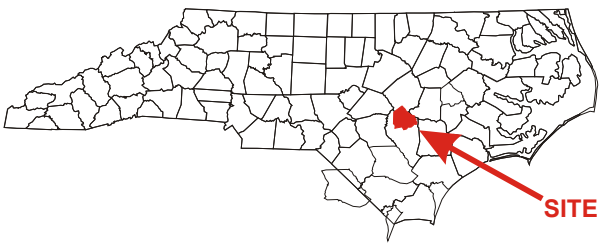
LMG will be initiating site restoration activities that will culminate in the restoration of 26.3 acres of riparian buffer located in NEU-7 of the lower Neuse Basin. Reversion of agricultural land to wooded riparian buffer will decrease source nutrient loading and concurrently increase nutrient removal 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.

Table 1. Proposed Buffer Plant List

Buffer Zone	**Zone 1 (Trees)**		**Zone 2 (Shrubs)**	
Stem Target:	**600/ac.**	**12,000**	**1,200/ac.**	**7,000**
Species	**# planted**	**(% of total)**	**# planted**	**(% of total)**
River Birch (*Betula nigra*)	2,000	16.67%		
Sycamore (*Platanus occidentalis*)	2,000	16.67%		
Green Ash (*Fraxinus pennsylvanica*)	1,000	8.33%		
Willow Oak (*Quercus phellos*)	1,000	8.33%		
Overcup Oak (*Quercus lyrata)*	1,000	8.33%		
Water Oak (*Quercus nigra*)	2,000	16.67%		
Black Gum (*Nyssa sylvatica*)	1,000	8.33%		
Red Bay (*Persea borbonia*)	2,000	16.67%		
Wax Myrtle (*Myrica cerifera*)	2,000	16.67%		
Sweet pepperbush (*Clethra alnifolia*)			2,000	28.57%
Elderberry (*Sambucus canadensis*)			2,000	28.57%
American Beautyberry (*Callicarpa americana*)			1,000	14.29%
Possumhaw (*Viburnum nudum*)			1,000	14.29%

8.0 FIGURES



N

SCALE 1" = 2.0 miles

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. February 2005	**Figure 1** Site Location Map

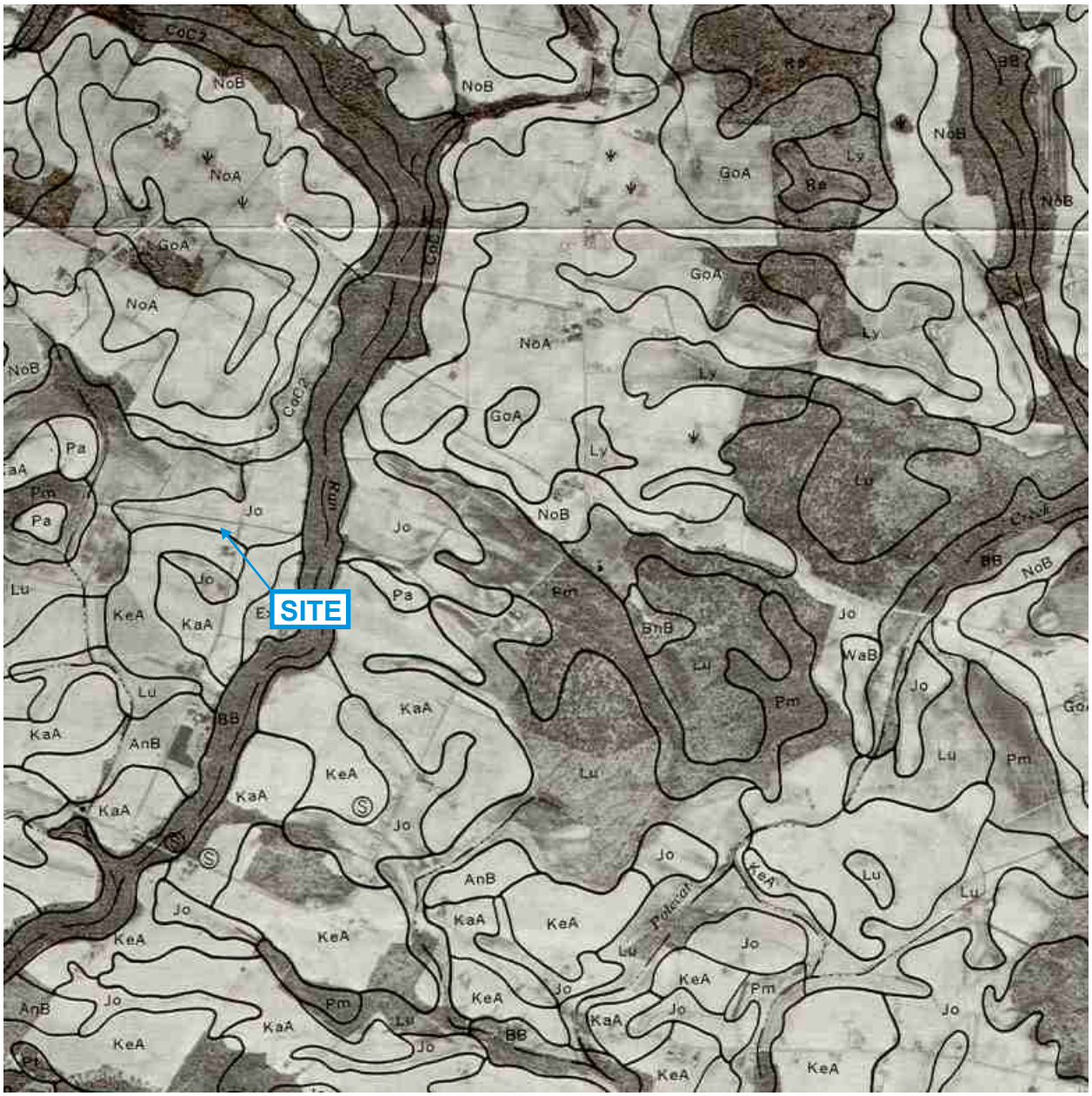
Boundaries are approximate
and not meant to be absolute.

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. February 2005	**Figure 2.** 1982 Topographic Quad



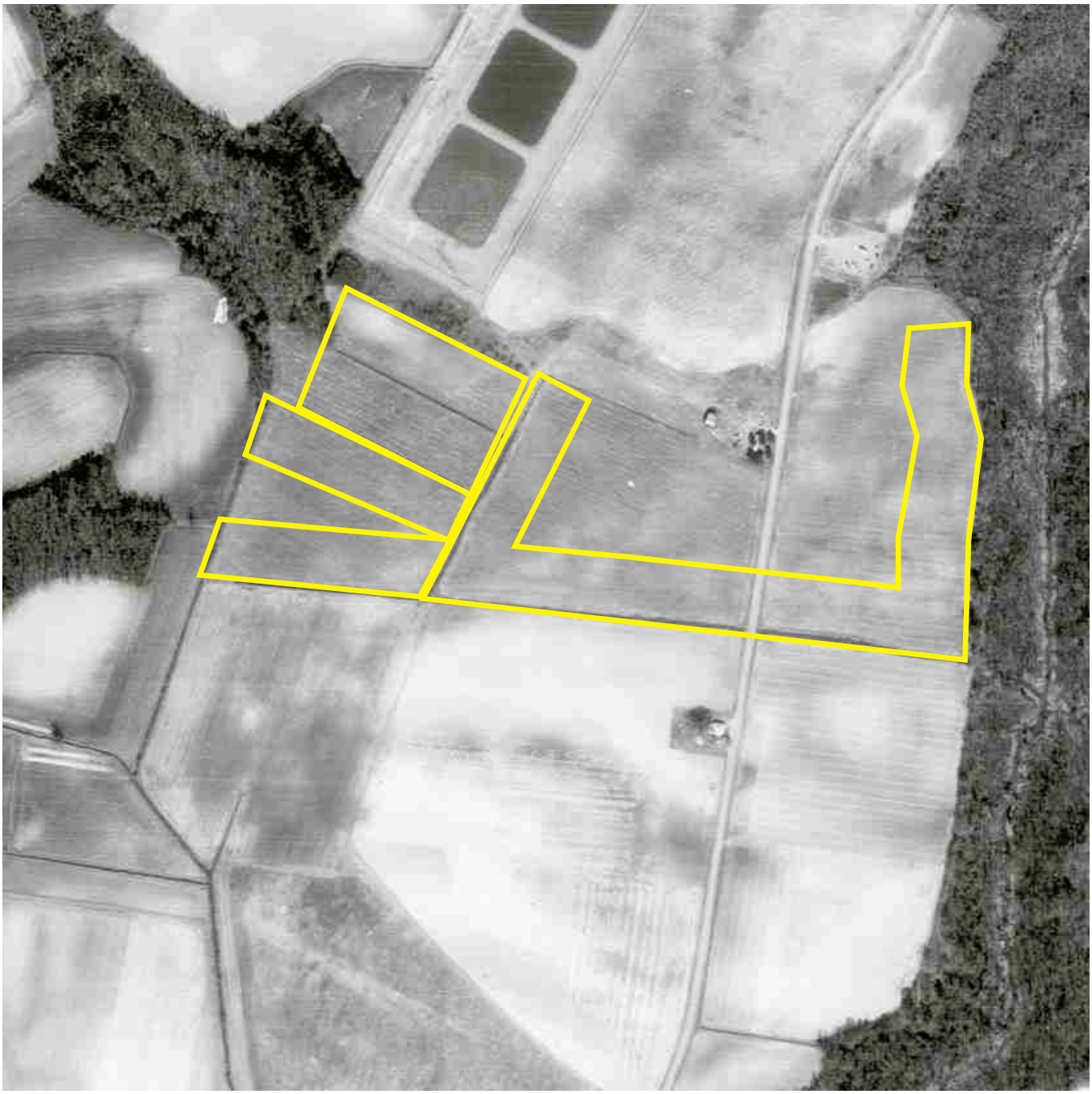
Boundaries are approximate
and not meant to be absolute.

Map Source: Soil Survey of Greene County , 1977.

N

SCALE 1" = 2000'

NC EEP Contentnea Buffer Site Howard Farm Greene County	***Land Management Group, Inc.*** **Environmental Consultants** Wilmington, N.C. February 2005	**Figure 3.** Generalized Soil Map Greene County, NC



200’ Buffer Planting Area (26.3 acres)

N

SCALE 1" = 500’

Boundaries are approximate
and not meant to be absolute.
Map Source: Soil Survey of Greene County , 1977.

NC EEP Contentnea Buffer Site Howard Farm Greene County	***Land Management Group, Inc.*** **Environmental Consultants** Wilmington, N.C. February 2005	**Figure 4.** Buffer Planting Overview

9.0 APPENDICES

Eastern portion of farm ditch

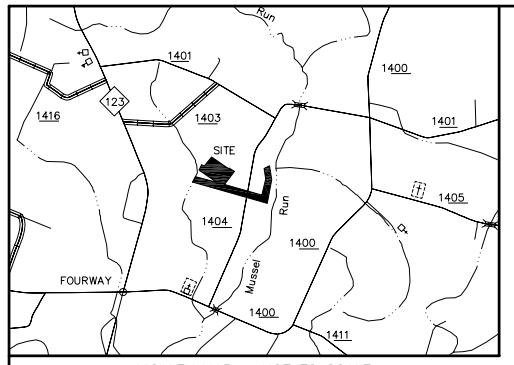
Western portion of farm ditch, Mussel Run in background

NC EEP Contentnea Buffer Site Howard Farm Greene County	***Land Management Group, Inc.*** **Environmental Consultants** Wilmington, N.C. February 2005	Appendix A. Site Photographs

Cultivated fields directly adjacent to proposed buffer site

Main farm ditch emptying into Mussel Run

NC EEP Contentnea Buffer Site Howard Farm Greene County	***Land Management Group, Inc.*** **Environmental Consultants** Wilmington, N.C. February 2005	Appendix A. Site Photographs



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.

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

MAURY SANITARY LAND DISTRICT
DB 438 PG 334

PLAT CAB. 27 PG 184

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

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

NEW CONSERVATION EASEMENT "A"
ACREAGE DATA

2.06 AC. ± (BY
COORDINATE METHOD)

NEW CONSERVATION EASEMENT "B"
ACREAGE DATA

20.90 AC. ± (BY
COORDINATE METHOD)

18' OUTFALL EASEMENT
DB 438 PG 334

EX. DITCH

N 37°57'01" E 401.14'
S 56°22'15" E 668.65'
S 65°53'09" E 232.32'
N 56°22'15" W 718.68'
S 76°17'43" E 732.04'
S 35°10'49" W 334.05'
S 36°36'42" W 210.75'
S 76°17'43" E 761.19'
N 76°17'43" W 1804.84'

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

18' OUTFALL EASEMENT
DB 438 PG 334

EPK IN THE CENTERLINE
OF NCSR 1404 OVER A
48" CULVERT

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

35' WIDE POWER LINE EASEMENT

GREENE COUNTY
DB 456 PG 357

386.76' N 08°51'16" E
S 77°45'45" E 200.00'
575.07' N 12°14'15" E
531.52' S 12°14'15" W
S 04°56'33" W 200.00'
N 72°03'09" W 403.98'
S 72°03'09" E 154.04'
S 75°13'14" E 305.78'
N 75°13'14" W 306.79'
310.01' N 16°45'22" E

NOW OR FORMERLY
MAYO PROPERTY

NEW CONSERVATION EASEMENT "C"
ACREAGE DATA

5.86 AC. ± (BY
COORDINATE METHOD)

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	205.23	N26°40'07"E
L10	251.32	N26°40'07"E
L11	201.48	N26°40'07"E
L12	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	S16°39'08"W

LINES L1–L9 & L17–L22
ARE TIE LINES ONLY

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

REVISION	DATE	INIT.
REVISED ROAD NUMBER	10/11/05	WBH
REVISED CONSERVATION DIMENSIONS/SIZE	11/03/05	WBH
REVISED CONSERVATION DIMENSIONS/SIZE	01/11/06	WBH

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.

L – 4509

I, _____, 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.

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

Appendix B.
Conservation Easement Plat