"Howard Farm Property"
Buffer Restoration Project

Greene County, NC
Neuse River Basin
(Cataloging Unit #03020203)

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

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 was planted with characteristic tree and shrub species on an average density of 900 stems/ac. The planting plan was developed utilizing the EEP's *Guidelines for Riparian Buffer Restoration (October 2004)* and LMG's knowledge of native species composition of coastal plain vegetative communities. 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 was initiated in October 2006 and has continued over a five-year period. Per the approved restoration plan, vegetative planting is 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 species alone is 883 stems/acre.

The following monitoring report summarizes the restoration project and includes more specific information related to project implementation, 'as-built' conditions, and final site conditions at the end of the final year of required monitoring. Individual plot data are included as an appendix. As indicated above, the success criterion has been met through five years of monitoring.

I. PROJECT BACKGROUND

1. Location and Setting

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.

2. Mitigation Type 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.

3. Project History and Background

Table 1 provides information regarding the reporting and milestone history for the Howard Farm Buffer Restoration project.

4. Monitoring Plan View

Locations of vegetation monitoring plots for the Howard Farm Buffer Restoration are depicted in Appendix C.

II. PROJECT CONDITIONS

1. 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.

2. Soils

The site consists predominantly of Johns sandy loam (refer to Figure 4) – a somewhat poorly drained to moderately well drained soil occurring along stream terraces. Infiltration is moderate and surface runoff is slow in these areas. The seasonal high water table occurs between 1.5 ft and 3.0 ft below the soil surface. The remaining portion of the buffer area consists of Lumbee sandy loam – a poorly drained soil characteristic of broader flats of stream terraces. Lumbee soils exhibit moderate infiltration with a seasonal high water table occurring at or near the soil surface.

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 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 2 for a list of species planted (with corresponding quantities) within the buffer restoration area.

4. Adaptive Management

The invasive vine, common morning glory (*Ipomoea purpurea*), was prevalent during the early stages of site development. Physical removal of the vines was conducted prior to Year 1 and Year 2 monitoring events. In addition to the removal activities a supplemental planting was conducted in February 2007. A total of 12,000 river birch, green ash, and wax myrtle were planted in areas that experienced reduced survivorship and/or suppressed growth. In addition, the herbicide Oust™ was applied in select areas of the tract to selectively target areas of increased occurrence.

LMG identified the continued prevalence of morning glory during site inspections conducted in February 2008. As a result, an additional application of Oust™ (at a rate of 1,500 liters per hectare) was performed. This work was coordinated through, and conducted by a licensed applicator. The extent of morning glory (and its effect on seedling growth) decreased during subsequent monitoring events. Physical and chemical treatment of morning glory during the first two years appeared to be a satisfactory means for controlling this invasive species. As indicated by the density and height of planted trees, the presence of morning glory on the site has not had a significant adverse effect on survivorship of trees and shrubs. Nearly all planted trees now have a competitive height advantage over the morning glory vines. Thus no additional adaptive management measures have been necessary during Year 4 and Year 5 of monitoring.

III. METHODOLOGY & SUCCESS CRITERIA

Annual monitoring has been 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). The locations of the monitoring plots are depicted in Appendix C. Vegetative planting is 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 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 employed to remedy any site deficiencies. As indicated above, physical removal and herbicide application was necessary to control the presence of morning glory on the site. As a

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

result of these measures being implemented during the early phases of the restoration project, no additional measures have been necessary during subsequent monitoring years. As is presented below, survivorship of planted species is relatively high, and there does not appear to be any long-term adverse effect of morning glory on the development of the buffer vegetative community.

IV. MONITORING RESULTS

A total of 2,749 stems (planted and volunteer shrubs/trees) were observed within the thirteen 0.10-acre plots during the Year 5 monitoring event. Of the species planted, wax myrtle (*Myrica cerifera*) and American beautyberry (*Callicarpa americana*) were the most abundant shrubs observed within the thirteen monitoring plots (241 and 131 stems, respectively). The most abundant of the planted tree species were American sycamore (*Platanus occidentalis*) (200 stems) and river birch (*Betula nigra*) (168 stems). The observed mean stem density of planted species during Year 5 monitoring was 883 stems/acre. Densities of planted species within monitoring plots ranged between 570 stems/acre (Plot 2) and 1,280 stems/acre (Plot 10). Refer to the summary table (Table 3) of Year 5 monitoring results. Photographic documentation of site conditions is provided in Appendix A.

Commonly occurring volunteer species of restored sites were observed within the thirteen plots monitored. In consideration of acceptable volunteers species characteristic of coastal plain communities (e.g. red cedar, sweet bay, sassafras, etc.), the observed mean density over the 26.3-acre buffer restoration area is 1,103 stems/acre. Note that this density calculation excludes the more aggressive volunteers such as red maple, baccharis, and sweet gum.

While sweet gum and red maple seedlings are abundant in certain areas of the restoration project, no single volunteer species appears to have a detrimental effect on the

survivorship of the planted species. Red maple and sweet gum seedlings do not have a competitive height advantage over the planted species. This is evidenced by the recorded height information in the individual plot data sheets (Appendix B). As a result, survivorship of the planted species has not been compromised. Given the dispersal mechanism and growth strategy of the opportunistic species, it is relatively common for these volunteers to be numerically abundant within forested restoration sites during the early years of site succession (particularly when the restoration site is located in close proximity to existing wooded areas as is the case for the eastern and western edges of the project area).

V. CONCLUSION

LMG has completed the fifth and final year of monitoring for the 26.3 acres of riparian buffer restoration located in NEU-7 of the lower Neuse Basin. Stem densities within all thirteen plots well exceed the 320 stems/acre target density for restored buffer habitats. The mean density of planted species alone (883 stems/acre) is an indication that the vegetative community has been successfully re-established within the former agricultural fields. Observed densities of non-target, volunteer species such as red maple and sweet gum do not appear to be adversely impacting survivorship of planted individuals. Based upon the conditions documented during Year 5 monitoring, it is expected that the site will continue to mature and provide the intended functions of a vegetated buffer habitat.

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 Neuse Basin.

TABLES

Table 1. Reporting and Milestone History

	Project Milestone	Completion Date	COMMENTS
1	Feasibility Study, CE Document, and Public Meeting	September, 2005	Complete
2	Record a Conservation Easement on the Site	January 2006	Conveyed to SPO
3	Restoration Plan Approved by EEP		
4	Mitigation Site Earthwork Completed	January 2006	
5	Mitigation Site Planting and Installation of Monitoring Devices	February 15, 2006	Complete
6	Submittal of Mitigation Plan (including as-built drawings)	June 2006	Complete
7	Submittal of Monitoring Report #1 to EEP	December 31, 2006	Approved by NCEEP
8	Submittal of Monitoring Report #2 to EEP	December 31, 2007	Approved by NCEEP
9	Submittal of Monitoring Report #3 to EEP	December 31, 2008	Approved by NCEEP
10	Submittal of Monitoring Report #4 to EEP	December 31, 2009	Approved by NCEEP
11	Submittal of Monitoring Report #5 to EEP	December 31, 2010	

Table 2. 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
Supplemental Planting (February 2007)	
Green Ash (*Fraxinus pennsylvanica*)	4,000
River Birch (*Betula nigra*)	4,000
Wax Myrtle (*Myrica cerifera*)	4,000
TOTAL	**32,000**

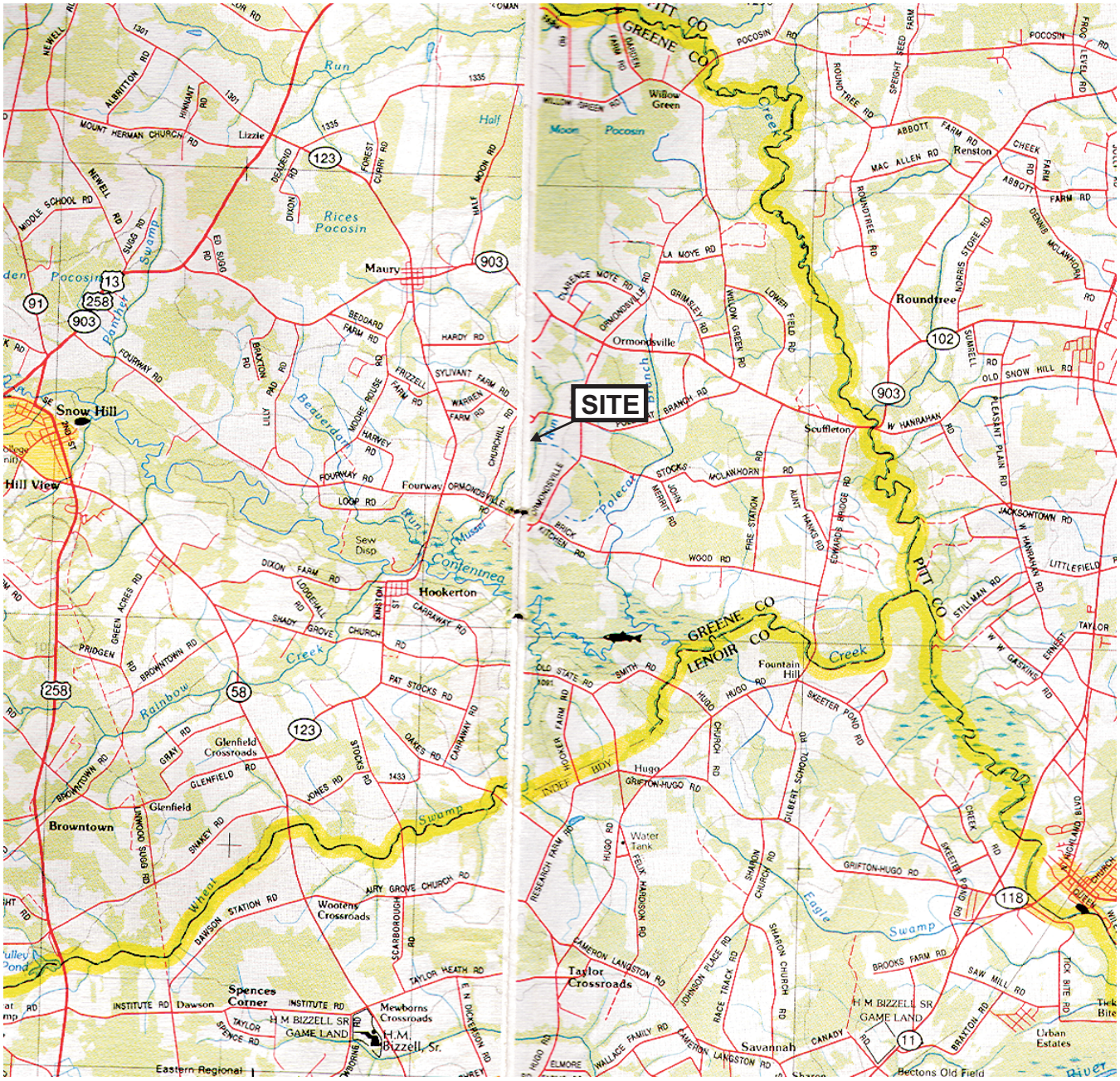
TABLE 3. ANNUAL MONITORING DATA SHEET (YEAR 5) - VEGETATION PLOTS
HOWARD FARM RIPARIAN BUFFER SITE

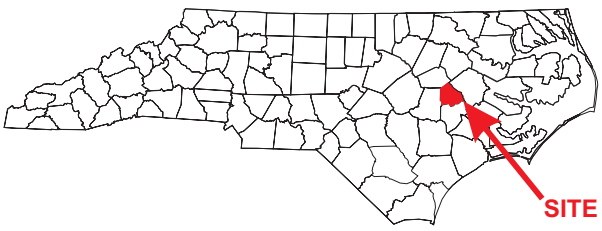
SPECIES	PLOT 1	PLOT 2	PLOT 3	PLOT 4	PLOT 5	PLOT 6	PLOT 7	PLOT 8	PLOT 9	PLOT 10	PLOT 11	PLOT 12	PLOT 13	TOTAL
Amer. Beautyberry	19	32	15			12	19		2	19		13		131
Blackgum														0
Elderberry		1	13			8	6	6	2	19	1	5	2	63
Green Ash	15	16	10	3	13	19	49	13	8	8		11	3	168
Overcup Oak	2		10	7	13	4								36
Persimmon					3			7	22	24	13		10	79
Possumhaw		4	1											5
Red Bay			3	5	4							1		13
River Birch	1	4	8	23	16	8	11	8	13	11	26		39	168
Sweet Pepperbush			4			3	3					2		12
Sycamore	8			1	7			42	63		58	2	19	200
Tulip Poplar					1	2	3		1					7
Water Oak				2		5								7
Wax Myrtle	17		10	18	18	35	26	10		47	9	45	6	241
Willow Oak				7	6	3						2		18
Baccharis	10	9	9	12	29	24	2	4		14	1	10	1	125
Black Cherry	3	2	5								1	1	1	13
Black Willow			1					12	11	36		1		61
Highbush Blueberry					1									1
Loblolly Pine	10	33	42	7	17	13	5		2	23	1	14	4	171
Red Cedar	2	1				10	6					8		27
Red Maple	3	95	3	1		96	87	5	10		1	3	2	306
Sassafras			2											2
Sweetbay		2	4		4									10
Sweet Gum	5	200	143	1	58	200	200	20	40		3	12	3	885
Total Stems	**95**	**399**	**283**	**87**	**190**	**442**	**417**	**127**	**174**	**201**	**114**	**130**	**90**	**2749**
Planted Stems	**62**	**57**	**74**	**66**	**81**	**99**	**117**	**86**	**111**	**128**	**107**	**81**	**79**	**1148**
Stem Density of Planted Only (per ac)	**620**	**570**	**740**	**660**	**810**	**990**	**1170**	**860**	**1110**	**1280**	**1070**	**810**	**790**	**Mean = 883**
Stem Density of Planted & Acceptable Volunteers (per ac)	**770**	**950**	**1280**	**730**	**1030**	**1220**	**1280**	**980**	**1250**	**1870**	**1090**	**1050**	**840**	**Mean = 1103**

Mean Stem Density (Planted Only) = 883 stems/acre

Planted
Volunteer

FIGURES





N

SCALE 1" = 2.0 miles

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

NC EEP
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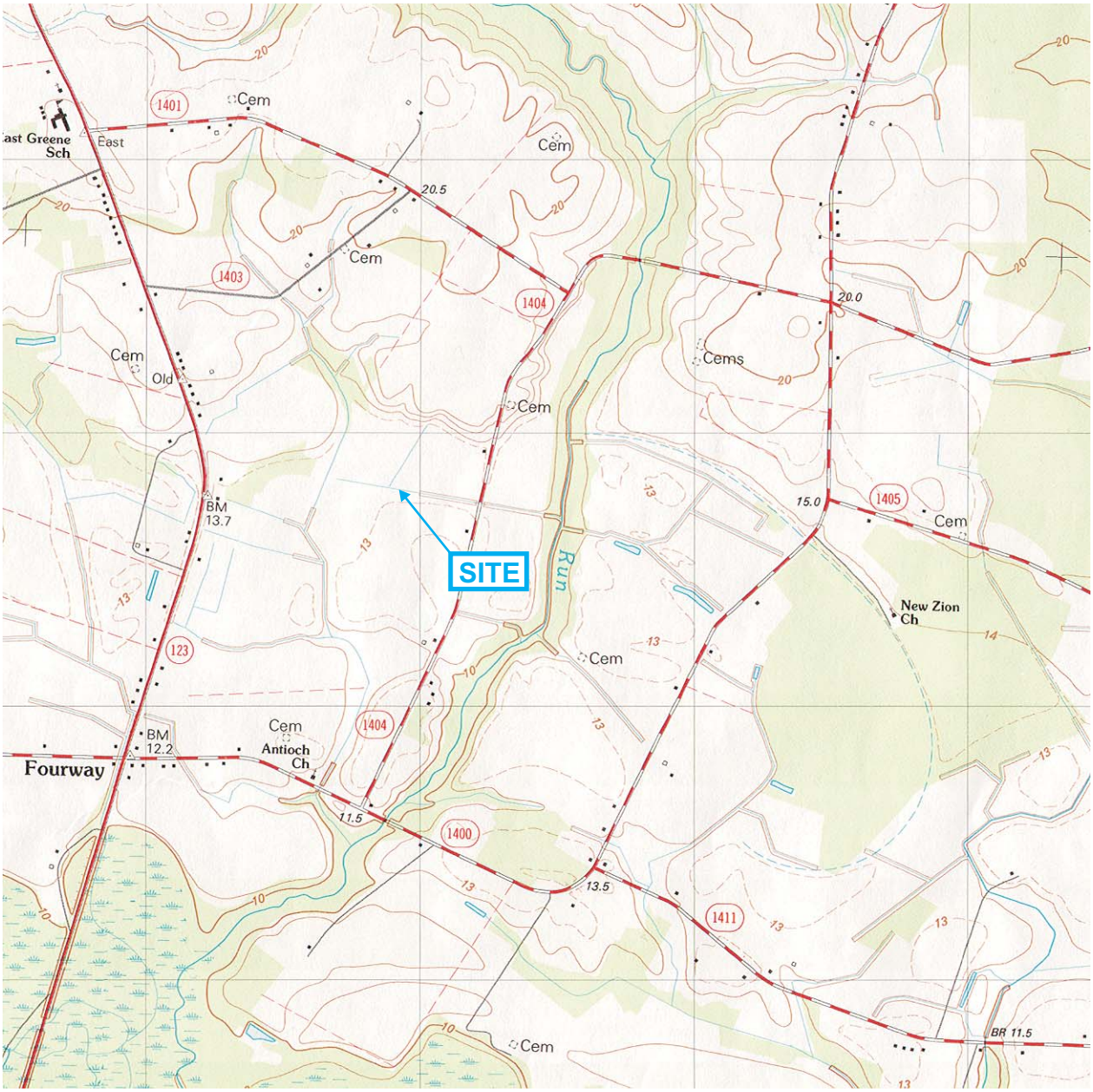
Figure 1.
Site Location Map



Boundaries are approximate
and not meant to be absolute.

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

N

SCALE 1" = 2000'

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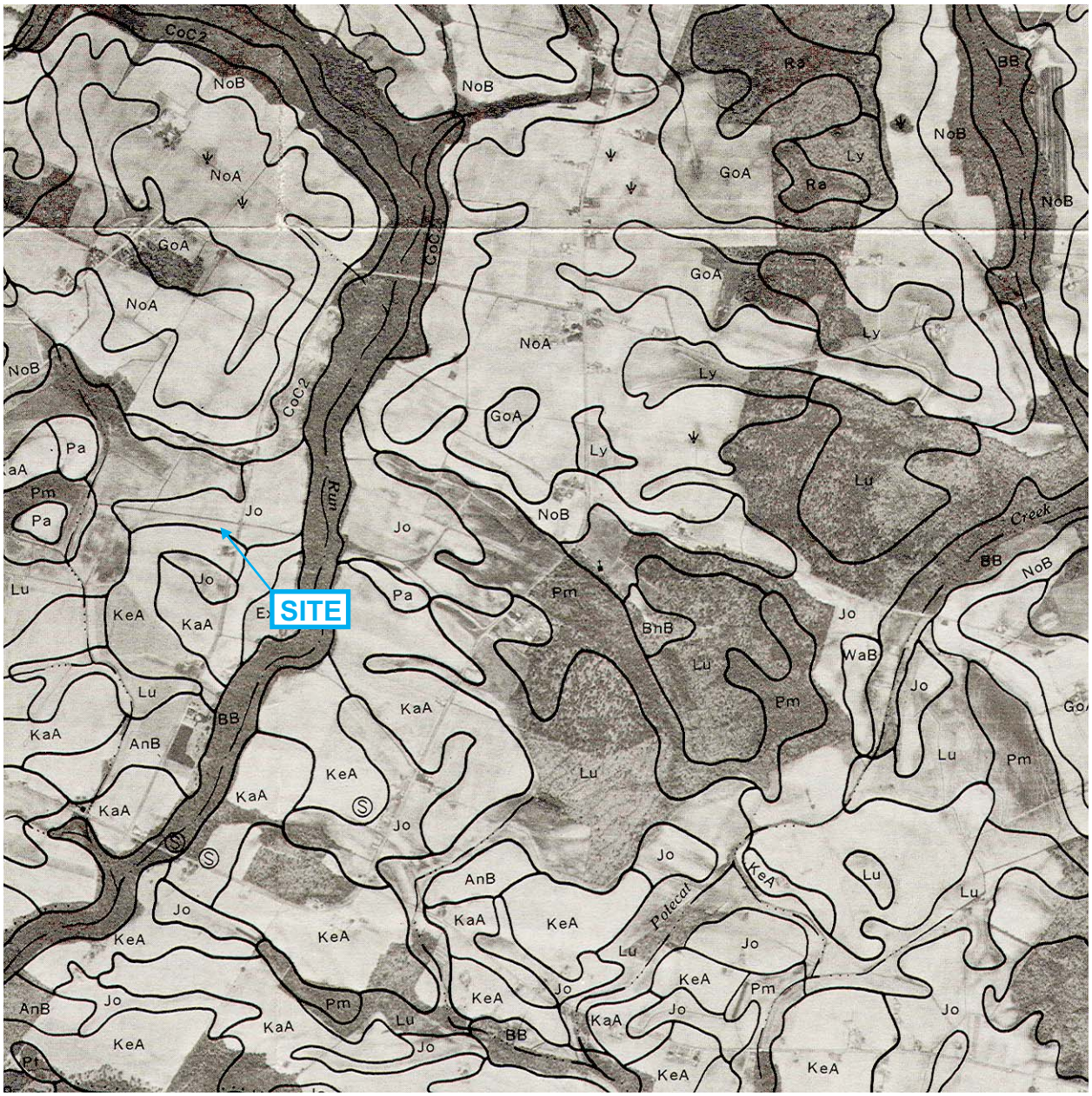
Figure 2.
1982 Topographic Quad



Boundaries are approximate
and not meant to be absolute.

Map Source: Soil Survey of Greene County , 1977.

N

SCALE 1" = 2000'

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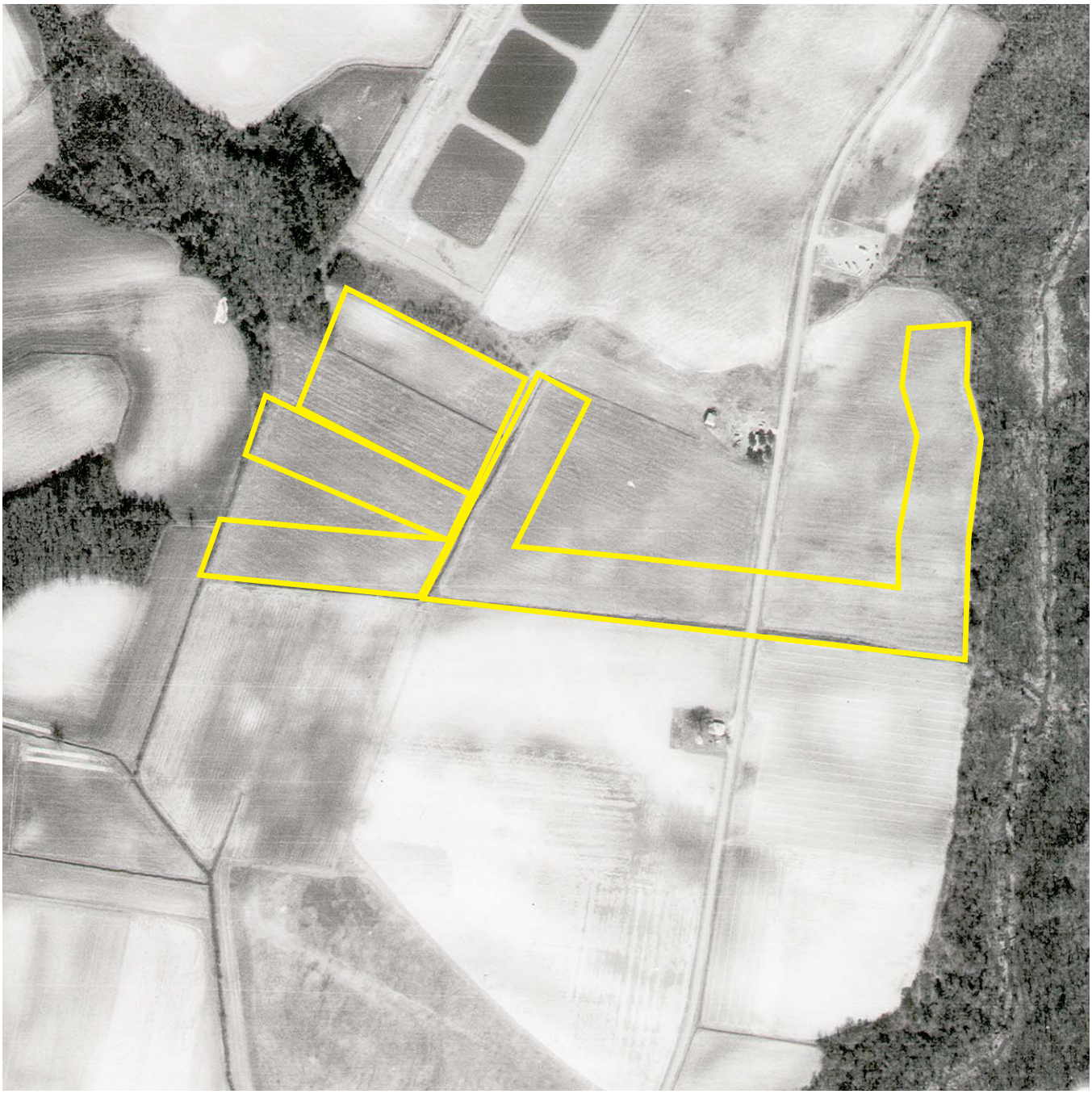
Figure 3.
Generalized Soil Map
Greene County, NC



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.

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Figure 4.
Buffer Planting Overview

APPENDIX A. SITE PHOTOGRAPHS (2010)

1) View of shrub layer in Plot 7.

2) View of American beautyberry shrub in Plot 10.

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Greene County, NC

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Site Photographs
September 2010
(Annual Monitoring Year 5 of 5)

3) View of maturing American sycamore at Plot 13.

4) View of maturing wax myrtle shrub at Plot 12.

5) View of river birch in Plot 4.

6) View of existing stand of planted and volunteer species in Plot 8.

APPENDIX B. INDIVIDUAL PLOT DATA SHEETS (2010)

HOWARD FARM RIPARIAN BUFFER SITE
ANNUAL MONITORING DATA SHEET - VEGETATION PLOTS

PLOT NUMBER **1**

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 ft	Planted	1
American Beautyberry	SH	3	3 ft	Planted	3
American Beautyberry	SH	2	4 ft	Planted	2
American Beautyberry	SH	9	5 ft	Planted	9
American Beautyberry	SH	4	6 ft	Planted	4
River Birch	SA	1	10 ft	Planted	1
American Sycamore	SA	1	8 ft	Planted	1
American Sycamore	SA	1	12 ft	Planted	1
American Sycamore	SA	1	14 ft	Planted	1
American Sycamore	SA	5	15 ft	Planted	5
Green Ash	SA	2	2 ft	Planted	2
Green Ash	SA	2	3 ft	Planted	2
Green Ash	SA	2	4 ft	Planted	2
Green Ash	SA	2	5 ft	Planted	2
Green Ash	SA	1	6 ft	Planted	1
Green Ash	SA	2	7 ft	Planted	2
Green Ash	SA	3	8 ft	Planted	3
Green Ash	SA	1	10 ft	Planted	1
Overcup Oak	SA	1	8 ft	Planted	1
Overcup Oak	SA	1	10 ft	Planted	1
Wax Myrtle	SH	2	3 ft	Planted	2
Wax Myrtle	SH	2	4 ft	Planted	2
Wax Myrtle	SH	6	5 ft	Planted	6
Wax Myrtle	SH	6	6 ft	Planted	6
Wax Myrtle	SH	1	7 ft	Planted	1
Loblolly Pine	SA	2	2 ft	Volunteer	2
Loblolly Pine	SA	1	4 ft	Volunteer	1
Loblolly Pine	SA	3	6 ft	Volunteer	3
Loblolly Pine	SA	1	7 ft	Volunteer	1
Loblolly Pine	SA	2	8 ft	Volunteer	2
Loblolly Pine	SA	1	9 ft	Volunteer	1
Black Cherry	SA	1	5 ft	Volunteer	1
Black Cherry	SA	2	10 ft	Volunteer	2
Red Cedar	SA	1	6 ft	Volunteer	1

Red Cedar	SA	1	10 ft	Volunteer	1
Baccharis	SH	4	2 ft	Volunteer	0
Baccharis	SH	1	3 ft	Volunteer	0
Baccharis	SH	2	4 ft	Volunteer	0
Baccharis	SH	2	8 ft	Volunteer	0
Baccharis	SH	1	10 ft	Volunteer	0
Red Maple	SA	1	2 ft	Volunteer	0
Red Maple	SA	2	3 ft	Volunteer	0
Sweet Gum	SA	1	5 ft	Volunteer	0
Sweet Gum	SA	2	8 ft	Volunteer	0
Sweet Gum	SA	2	10 ft	Volunteer	0
	TOTAL STEMS (planted and all volunteers)	**95**			
	TOTAL SHRUBS OF PLANTED SPECIES	**36**			
	TOTAL TREES OF PLANTED SPECIES	**26**			
	TOTAL STEMS OF PLANTED SPECIES	**62**		**PLANTED DENSITY (PER ACRE)**	**620**
	TOTAL STEMS OF ACCEPTABLE VOLUNTEERS	**15**		**PLANTED + ACCEPTABLE VOLUNTEERS DENSITY (PER ACRE)**	**770**

HOWARD FARM RIPARIAN BUFFER SITE
ANNUAL MONITORING DATA SHEET - VEGETATION PLOTS

PLOT NUMBER 2

SPECIES	STRATUM (T, SA, or SH)	Number of Individuals	HEIGHT	Planted vs. Volunteer Species	Number of Individuals Counted toward Success Criteria
Amer. Beautyberry	SH	1	1 ft	Planted	1
Amer. Beautyberry	SH	3	3 ft	Planted	3
Amer. Beautyberry	SH	6	5 ft	Planted	6
Amer. Beautyberry	SH	8	6 ft	Planted	8
Amer. Beautyberry	SH	3	7 ft	Planted	3
Amer. Beautyberry	SH	6	8 ft	Planted	6
Amer. Beautyberry	SH	5	10 ft	Planted	5
Possumhaw	SH	1	2 ft	Planted	1
Possumhaw	SH	2	3 ft	Planted	2
Possumhaw	SH	1	4 ft	Planted	1
Elderberry	SH	1	6 ft	Planted	1
River Birch	SA	1	3 ft	Planted	1
River Birch	SA	2	15 ft	Planted	2
River Birch	SA	1	20 ft	Planted	1
Green Ash	SA	1	2 ft	Planted	1
Green Ash	SA	2	3 ft	Planted	2
Green Ash	SA	1	4 ft	Planted	1
Green Ash	SA	3	5 ft	Planted	3
Green Ash	SA	2	6 ft	Planted	2
Green Ash	SA	2	7 ft	Planted	2
Green Ash	SA	3	8 ft	Planted	3
Green Ash	SA	1	10 ft	Planted	1
Green Ash	SA	1	12 ft	Planted	1
Baccharis	SH	1	6 ft	Volunteer	0
Baccharis	SH	2	7 ft	Volunteer	0
Baccharis	SH	5	8 ft	Volunteer	0
Baccharis	SH	1	10 ft	Volunteer	0
Red Cedar	SA	1	3 ft	Volunteer	1
Sweet Bay	SA	1	2 ft	Volunteer	1
Sweet Bay	SA	1	3 ft	Volunteer	1
Black Cherry	SA	1	14 ft	Volunteer	1
Black Cherry	SA	1	15 ft	Volunteer	1
Loblolly Pine	SA	2	3 ft	Volunteer	2
Loblolly Pine	SA	1	4 ft	Volunteer	1
Loblolly Pine	SA	1	5 ft	Volunteer	1

Loblolly Pine	SA	7	6 ft	Volunteer	7
Loblolly Pine	SA	2	7 ft	Volunteer	2
Loblolly Pine	SA	6	8 ft	Volunteer	6
Loblolly Pine	SA	1	9 ft	Volunteer	1
Loblolly Pine	SA	11	10 ft	Volunteer	11
Loblolly Pine	SA	1	12 ft	Volunteer	1
Loblolly Pine	SA	1	15 ft	Volunteer	1
Red Maple	SA	1	1 ft	Volunteer	0
Red Maple	SA	3	2 ft	Volunteer	0
Red Maple	SA	11	3 ft	Volunteer	0
Red Maple	SA	11	4 ft	Volunteer	0
Red Maple	SA	6	5 ft	Volunteer	0
Red Maple	SA	10	6 ft	Volunteer	0
Red Maple	SA	5	7 ft	Volunteer	0
Red Maple	SA	15	8 ft	Volunteer	0
Red Maple	SA	12	10 ft	Volunteer	0
Red Maple	SA	9	12 ft	Volunteer	0
Red Maple	SA	8	15 ft	Volunteer	0
Red Maple	SA	4	20 ft	Volunteer	0
Sweet Gum	SA	200	10 ft - 15 ft	Volunteer	0
	TOTAL STEMS (planted and all volunteers)	**399**			
	TOTAL SHRUBS OF PLANTED SPECIES	**37**			
	TOTAL TREES OF PLANTED SPECIES	**20**			
	TOTAL STEMS OF PLANTED SPECIES	**57**		**PLANTED DENSITY (PER ACRE)**	**570**
	TOTAL STEMS OF ACCEPTABLE VOLUNTEERS	**38**		**PLANTED + ACCEPTABLE VOLUNTEERS DENSITY (PER ACRE)**	**950**

HOWARD FARM RIPARIAN BUFFER SITE
ANNUAL MONITORING DATA SHEET - VEGETATION PLOTS

PLOT NUMBER **3**

SPECIES	STRATUM (T, SA, or SH)	Number of Individuals	HEIGHT	Planted vs. Volunteer Species	Number of Individuals Counted toward Success Criteria
Amer. Beautyberry	SH	3	3 ft	Planted	3
Amer. Beautyberry	SH	7	4 ft	Planted	7
Amer. Beautyberry	SH	2	5 ft	Planted	2
Amer. Beautyberry	SH	2	6 ft	Planted	2
Amer. Beautyberry	SH	1	7 ft	Planted	1
Elderberry	SH	2	4 ft	Planted	2
Elderberry	SH	4	5 ft	Planted	4
Elderberry	SH	2	6 ft	Planted	2
Elderberry	SH	2	7 ft	Planted	2
Elderberry	SH	3	8 ft	Planted	3
Wax Myrtle	SH	1	1 ft	Planted	1
Wax Myrtle	SH	3	4 ft	Planted	3
Wax Myrtle	SH	1	5 ft	Planted	1
Wax Myrtle	SH	3	6 ft	Planted	3
Wax Myrtle	SH	1	7 ft	Planted	1
Wax Myrtle	SH	1	8 ft	Planted	1
Green Ash	SA	1	2 ft	Planted	1
Green Ash	SA	1	4 ft	Planted	1
Green Ash	SA	1	6 ft	Planted	1
Green Ash	SA	6	7 ft	Planted	6
Green Ash	SA	1	8 ft	Planted	1
Red Bay	SA	3	1 ft	Planted	3
Overcup Oak	SA	2	8 ft	Planted	2
Overcup Oak	SA	4	10 ft	Planted	4
Overcup Oak	SA	2	12 ft	Planted	2
Overcup Oak	SA	2	15 ft	Planted	2
River Birch	SA	1	4 ft	Planted	1
River Birch	SA	1	6 ft	Planted	1
River Birch	SA	1	7 ft	Planted	1
River Birch	SA	1	8 ft	Planted	1
River Birch	SA	1	9 ft	Planted	1
River Birch	SA	3	10 ft	Planted	3
Possumhaw	SH	1	1 ft	Planted	1
Sweet Pepperbush	SH	1	1 ft	Planted	1
Sweet Pepperbush	SH	3	2 ft	Planted	3
Black Willow	SH	1	4 ft	Volunteer	1

Sassafras	SA	1	2 ft	Volunteer	1
Sassafras	SA	1	3 ft	Volunteer	1
Black Cherry	SA	1	7 ft	Volunteer	1
Black Cherry	SA	4	8 ft	Volunteer	4
Loblolly Pine	SA	8	2 ft	Volunteer	8
Loblolly Pine	SA	2	3 ft	Volunteer	2
Loblolly Pine	SA	1	4 ft	Volunteer	1
Loblolly Pine	SA	4	5 ft	Volunteer	4
Loblolly Pine	SA	3	6 ft	Volunteer	3
Loblolly Pine	SA	2	7 ft	Volunteer	2
Loblolly Pine	SA	9	8 ft	Volunteer	9
Loblolly Pine	SA	2	9 ft	Volunteer	2
Loblolly Pine	SA	8	10 ft	Volunteer	8
Loblolly Pine	SA	3	12 ft	Volunteer	3
Sweet Bay	SA	1	1 ft	Volunteer	1
Sweet Bay	SA	3	2 ft	Volunteer	3
Baccharis	SH	2	4 ft	Volunteer	0
Baccharis	SH	1	5 ft	Volunteer	0
Baccharis	SH	3	6 ft	Volunteer	0
Baccharis	SH	2	7 ft	Volunteer	0
Baccharis	SH	1	8 ft	Volunteer	0
Red Maple	SA	1	2 ft	Volunteer	0
Red Maple	SA	1	4 ft	Volunteer	0
Red Maple	SA	1	6 ft	Volunteer	0
Sweet Gum	SA	5	5 ft	Volunteer	0
Sweet Gum	SA	5	6 ft	Volunteer	0
Sweet Gum	SA	39	7 ft	Volunteer	0
Sweet Gum	SA	66	8 ft	Volunteer	0
Sweet Gum	SA	1	9 ft	Volunteer	0
Sweet Gum	SA	18	10 ft	Volunteer	0
Sweet Gum	SA	9	12 ft	Volunteer	0
	TOTAL STEMS (planted and all volunteers)	**283**			
	TOTAL SHRUBS OF PLANTED SPECIES	**43**			
	TOTAL TREES OF PLANTED SPECIES	**31**			
	TOTAL STEMS OF PLANTED SPECIES	**74**		**PLANTED DENSITY (PER ACRE)**	**740**
	TOTAL STEMS OF ACCEPTABLE VOLUNTEERS	**54**		**PLANTED + ACCEPTABLE VOLUNTEERS DENSITY (PER ACRE)**	**1280**

HOWARD 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
Willow Oak	SA	1	8 ft	Planted	1
Willow Oak	SA	2	10 ft	Planted	2
Willow Oak	SA	3	12 ft	Planted	3
Willow Oak	SA	1	15 ft	Planted	1
Water Oak	SA	1	12 ft	Planted	1
Water Oak	SA	1	20 ft	Planted	1
River Birch	SA	1	4 ft	Planted	1
River Birch	SA	2	6 ft	Planted	2
River Birch	SA	6	8 ft	Planted	6
River Birch	SA	2	10 ft	Planted	2
River Birch	SA	2	12 ft	Planted	2
River Birch	SA	3	15 ft	Planted	3
River Birch	SA	7	20 ft	Planted	7
Overcup Oak	SA	1	1 ft	Planted	1
Overcup Oak	SA	1	9 ft	Planted	1
Overcup Oak	SA	3	10 ft	Planted	3
Overcup Oak	SA	1	12 ft	Planted	1
Overcup Oak	SA	1	12 ft	Planted	1
American Sycamore	SA	1	20 ft	Planted	1
Green Ash	SA	1	2 ft	Planted	1
Green Ash	SA	2	3 ft	Planted	2
Red Bay	SA	1	2 ft	Planted	1
Red Bay	SA	2	3 ft	Planted	2
Red Bay	SA	1	4 ft	Planted	1
Red Bay	SA	1	6 ft	Planted	1
Wax Myrtle	SH	1	3 ft	Planted	1
Wax Myrtle	SH	2	4 ft	Planted	2
Wax Myrtle	SH	7	6 ft	Planted	7
Wax Myrtle	SH	6	8 ft	Planted	6
Wax Myrtle	SH	2	10 ft	Planted	2
Baccharis	SH	1	5 ft	Volunteer	0
Baccharis	SH	4	6 ft	Volunteer	0
Baccharis	SH	5	8 ft	Volunteer	0
Baccharis	SH	2	9 ft	Volunteer	0
Loblolly Pine	SA	1	4 ft	Volunteer	1

Loblolly Pine	SA	1	6 ft	Volunteer	1
Loblolly Pine	SA	1	7 ft	Volunteer	1
Loblolly Pine	SA	2	8 ft	Volunteer	2
Loblolly Pine	SA	1	10 ft	Volunteer	1
Loblolly Pine	SA	1	15 ft	Volunteer	1
Sweet Gum	SA	1	4 ft	Volunteer	0
Red Maple	SA	1	3 ft	Volunteer	0
	TOTAL STEMS (planted and all volunteers)	**87**			
	TOTAL SHRUBS OF PLANTED SPECIES	**18**			
	TOTAL TREES OF PLANTED SPECIES	**48**			
	TOTAL STEMS OF PLANTED SPECIES	**66**		**PLANTED DENSITY (PER ACRE)**	**660**
	TOTAL STEMS OF ACCEPTABLE VOLUNTEERS	**7**		**PLANTED + ACCEPTABLE VOLUNTEERS DENSITY (PER ACRE)**	**730**

HOWARD FARM RIPARIAN BUFFER SITE
ANNUAL MONITORING DATA SHEET - VEGETATION PLOTS

PLOT NUMBER 5

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	4 ft	Planted	1
River Birch	SA	1	7 ft	Planted	1
River Birch	SA	4	8 ft	Planted	4
River Birch	SA	1	10 ft	Planted	1
River Birch	SA	3	12 ft	Planted	3
River Birch	SA	6	15 ft	Planted	6
Overcup Oak	SA	2	3 ft	Planted	2
Overcup Oak	SA	1	6 ft	Planted	1
Overcup Oak	SA	3	8 ft	Planted	3
Overcup Oak	SA	6	12 ft	Planted	6
Overcup Oak	SA	1	15 ft	Planted	1
Green Ash	SA	1	2 ft	Planted	1
Green Ash	SA	2	3 ft	Planted	2
Green Ash	SA	3	4 ft	Planted	3
Green Ash	SA	1	5 ft	Planted	1
Green Ash	SA	1	6 ft	Planted	1
Green Ash	SA	1	7 ft	Planted	1
Green Ash	SA	4	8 ft	Planted	4
Willow Oak	SA	1	6 ft	Planted	1
Willow Oak	SA	2	7 ft	Planted	2
Willow Oak	SA	2	8 ft	Planted	2
Willow Oak	SA	1	20 ft	Planted	1
American Sycamore	SA	3	20 ft	Planted	3
American Sycamore	SA	4	25 ft	Planted	4
Wax Myrtle	SH	2	4 ft	Planted	2
Wax Myrtle	SH	4	5 ft	Planted	4
Wax Myrtle	SH	7	6 ft	Planted	7
Wax Myrtle	SH	2	7 ft	Planted	2
Wax Myrtle	SH	3	8 ft	Planted	3
Red Bay	SA	1	2 ft	Planted	1
Red Bay	SA	1	4 ft	Planted	1
Red Bay	SA	2	8 ft	Planted	2
Tulip Poplar	SA	1	1 ft	Planted	1

Persimmon	SA	2	2 ft	Planted	2
Persimmon	SA	1	3 ft	Planted	1
Highbush Blueberry	SH	1	6 ft	Volunteer	1
Sweet Bay	SA	1	4 ft	Volunteer	1
Sweet Bay	SA	2	6 ft	Volunteer	2
Sweet Bay	SA	1	7 ft	Volunteer	1
Loblolly Pine	SA	1	5 ft	Volunteer	1
Loblolly Pine	SA	3	6 ft	Volunteer	3
Loblolly Pine	SA	2	8 ft	Volunteer	2
Loblolly Pine	SA	3	10 ft	Volunteer	3
Loblolly Pine	SA	2	12 ft	Volunteer	2
Loblolly Pine	SA	6	15 ft	Volunteer	6
Baccharis	SH	1	2 ft	Volunteer	0
Baccharis	SH	1	3 ft	Volunteer	0
Baccharis	SH	1	4 ft	Volunteer	0
Baccharis	SH	1	5 ft	Volunteer	0
Baccharis	SH	8	6 ft	Volunteer	0
Baccharis	SH	9	7 ft	Volunteer	0
Baccharis	SH	5	8 ft	Volunteer	0
Baccharis	SH	3	10 ft	Volunteer	0
Sweet Gum	SA	2	3 ft	Volunteer	0
Sweet Gum	SA	4	4 ft	Volunteer	0
Sweet Gum	SA	4	6 ft	Volunteer	0
Sweet Gum	SA	2	7 ft	Volunteer	0
Sweet Gum	SA	18	8 ft	Volunteer	0
Sweet Gum	SA	8	10 ft	Volunteer	0
Sweet Gum	SA	20	12 ft	Volunteer	0
	TOTAL STEMS (planted and all volunteers)	**190**			
	TOTAL SHRUBS OF PLANTED SPECIES	**18**			
	TOTAL TREES OF PLANTED SPECIES	**63**			
	TOTAL STEMS OF PLANTED SPECIES	**81**		**PLANTED DENSITY (PER ACRE)**	**810**
	TOTAL STEMS OF ACCEPTABLE VOLUNTEERS	**22**		**PLANTED + ACCEPTABLE VOLUNTEERS DENSITY (PER ACRE)**	**1030**

HOWARD FARM RIPARIAN BUFFER SITE
ANNUAL MONITORING DATA SHEET - VEGETATION PLOTS

PLOT NUMBER **6**

SPECIES	STRATUM (T, SA, or SH)	Number of Individuals	HEIGHT	Planted vs. Volunteer Species	Number of Individuals Counted toward Success Criteria
Amer. Beautyberry	SH	1	2 ft	Planted	1
Amer. Beautyberry	SH	1	3 ft	Planted	1
Amer. Beautyberry	SH	2	5 ft	Planted	2
Amer. Beautyberry	SH	5	6 ft	Planted	5
Amer. Beautyberry	SH	3	7 ft	Planted	3
Sweet Pepperbush	SH	2	4 ft	Planted	2
Sweet Pepperbush	SH	1	6 ft	Planted	1
Elderberry	SH	1	4 ft	Planted	1
Elderberry	SH	3	5 ft	Planted	3
Elderberry	SH	2	6 ft	Planted	2
Elderberry	SH	2	7 ft	Planted	2
River Birch	SA	1	5 ft	Planted	1
River Birch	SA	3	8 ft	Planted	3
River Birch	SA	1	12 ft	Planted	1
River Birch	SA	1	15 ft	Planted	1
River Birch	SA	2	20 ft	Planted	2
Green Ash	SA	1	1 ft	Planted	1
Green Ash	SA	1	2 ft	Planted	1
Green Ash	SA	1	3 ft	Planted	1
Green Ash	SA	2	6 ft	Planted	2
Green Ash	SA	5	7 ft	Planted	5
Green Ash	SA	4	8 ft	Planted	4
Green Ash	SA	3	10 ft	Planted	3
Green Ash	SA	2	12 ft	Planted	2
Willow Oak	SA	1	2 ft	Planted	1
Willow Oak	SA	1	8 ft	Planted	1
Willow Oak	SA	1	10 ft	Planted	1
Water Oak	SA	3	10 ft	Planted	3
Water Oak	SA	2	12 ft	Planted	2
Overcup Oak	SA	2	10 ft	Planted	2
Overcup Oak	SA	2	10 ft	Planted	2
Tulip Poplar	SA	1	3 ft	Planted	1
Tulip Poplar	SA	1	14 ft	Planted	1
Wax Myrtle	SH	1	2 ft	Planted	1
Wax Myrtle	SH	1	3 ft	Planted	1
Wax Myrtle	SH	6	4 ft	Planted	6
Wax Myrtle	SH	4	5 ft	Planted	4
Wax Myrtle	SH	5	6 ft	Planted	5
Wax Myrtle	SH	3	7 ft	Planted	3

Wax Myrtle	SH	7	8 ft	Planted	7
Wax Myrtle	SH	4	10 ft	Planted	4
Wax Myrtle	SH	4	12 ft	Planted	4
Baccharis	SH	3	2 ft	Volunteer	0
Baccharis	SH	5	3 ft	Volunteer	0
Baccharis	SH	6	4 ft	Volunteer	0
Baccharis	SH	1	5 ft	Volunteer	0
Baccharis	SH	2	6 ft	Volunteer	0
Baccharis	SH	6	10 ft	Volunteer	0
Baccharis	SH	1	12 ft	Volunteer	0
Red Cedar	SA	1	3 ft	Volunteer	1
Red Cedar	SA	2	6 ft	Volunteer	2
Red Cedar	SA	2	7 ft	Volunteer	2
Red Cedar	SA	5	10 ft	Volunteer	5
Loblolly Pine	SA	2	3 ft	Volunteer	2
Loblolly Pine	SA	2	4 ft	Volunteer	2
Loblolly Pine	SA	1	5 ft	Volunteer	1
Loblolly Pine	SA	1	6 ft	Volunteer	1
Loblolly Pine	SA	2	8 ft	Volunteer	2
Loblolly Pine	SA	1	9 ft	Volunteer	1
Loblolly Pine	SA	1	10 ft	Volunteer	1
Loblolly Pine	SA	3	12 ft	Volunteer	3
Red Maple	SA	1	2 ft	Volunteer	0
Red Maple	SA	1	3 ft	Volunteer	0
Red Maple	SA	1	4 ft	Volunteer	0
Red Maple	SA	3	5 ft	Volunteer	0
Red Maple	SA	5	6 ft	Volunteer	0
Red Maple	SA	9	7 ft	Volunteer	0
Red Maple	SA	14	8 ft	Volunteer	0
Red Maple	SA	38	10 ft	Volunteer	0
Red Maple	SA	18	12 ft	Volunteer	0
Red Maple	SA	3	15 ft	Volunteer	0
Red Maple	SA	3	20 ft	Volunteer	0
Sweet Gum	SA	200	4 ft - 10 ft	Volunteer	0
	TOTAL STEMS (planted and all volunteers)	**442**			
	TOTAL SHRUBS OF PLANTED SPECIES	**58**			
	TOTAL TREES OF PLANTED SPECIES	**41**			
	TOTAL STEMS OF PLANTED SPECIES	**99**		**PLANTED DENSITY (PER ACRE)**	**990**
	TOTAL STEMS OF ACCEPTABLE VOLUNTEERS	**23**		**PLANTED + ACCEPTABLE VOLUNTEERS DENSITY (PER ACRE)**	**1220**

HOWARD FARM RIPARIAN BUFFER SITE
ANNUAL MONITORING DATA SHEET - VEGETATION PLOTS

PLOT NUMBER **7**

SPECIES	STRATUM (T, SA, or SH)	Number of Individuals	HEIGHT	Planted vs. Volunteer Species	Number of Individuals Counted toward Success Criteria
Amer. Beautyberry	SH	3	1 ft	Volunteer	3
Amer. Beautyberry	SH	2	2 ft	Planted	2
Amer. Beautyberry	SH	3	3 ft	Planted	3
Amer. Beautyberry	SH	4	4 ft	Planted	4
Amer. Beautyberry	SH	4	5 ft	Planted	4
Amer. Beautyberry	SH	3	6 ft	Planted	3
Sweet Pepperbush	SH	2	1 ft	Planted	2
Sweet Pepperbush	SH	1	2 ft	Planted	1
Elderberry	SH	1	3 ft	Planted	1
Elderberry	SH	1	4 ft	Planted	1
Elderberry	SH	1	5 ft	Planted	1
Elderberry	SH	2	6 ft	Planted	2
Elderberry	SH	1	8 ft	Planted	1
River Birch	SA	1	4 ft	Planted	1
River Birch	SA	1	6 ft	Planted	1
River Birch	SA	1	12 ft	Planted	1
River Birch	SA	2	14 ft	Planted	2
River Birch	SA	3	15 ft	Planted	3
River Birch	SA	3	20 ft	Planted	3
Green Ash	SA	2	1 ft	Planted	2
Green Ash	SA	5	2 ft	Planted	5
Green Ash	SA	5	3 ft	Planted	5
Green Ash	SA	8	4 ft	Planted	8
Green Ash	SA	8	5 ft	Planted	8
Green Ash	SA	4	6 ft	Planted	4
Green Ash	SA	3	7 ft	Planted	3
Green Ash	SA	5	8 ft	Planted	5
Green Ash	SA	1	9 ft	Planted	1
Green Ash	SA	6	10 ft	Planted	6
Green Ash	SA	2	12 ft	Planted	2
Tulip Poplar	SA	1	4 ft	Planted	1
Tulip Poplar	SA	1	12 ft	Planted	1
Tulip Poplar	SA	1	15 ft	Planted	1
Wax Myrtle	SH	1	3 ft	Planted	1
Wax Myrtle	SH	2	4 ft	Planted	2

Wax Myrtle	SH	3	5 ft	Planted	3
Wax Myrtle	SH	3	6 ft	Planted	3
Wax Myrtle	SH	6	7 ft	Planted	6
Wax Myrtle	SH	4	8 ft	Planted	4
Wax Myrtle	SH	5	10 ft	Planted	5
Wax Myrtle	SH	2	12 ft	Planted	2
Baccharis	SH	2	10 ft	Volunteer	0
Red Cedar	SA	1	5 ft	Volunteer	1
Red Cedar	SA	3	6 ft	Volunteer	3
Red Cedar	SA	2	7 ft	Volunteer	2
Loblolly Pine	SA	2	8 ft	Volunteer	2
Loblolly Pine	SA	2	10 ft	Volunteer	2
Loblolly Pine	SA	1	12 ft	Volunteer	1
Sweet Gum	SA	200	4 ft - 12 ft	Volunteer	0
Red Maple	SA	3	2 ft	Volunteer	0
Red Maple	SA	4	3 ft	Volunteer	0
Red Maple	SA	11	4 ft	Volunteer	0
Red Maple	SA	5	5 ft	Volunteer	0
Red Maple	SA	6	6 ft	Volunteer	0
Red Maple	SA	12	7 ft	Volunteer	0
Red Maple	SA	19	8 ft	Volunteer	0
Red Maple	SA	13	10 ft	Volunteer	0
Red Maple	SA	11	12 ft	Volunteer	0
Red Maple	SA	3	15 ft	Volunteer	0
	TOTAL STEMS (planted and all volunteers)	**417**			
	TOTAL SHRUBS OF PLANTED SPECIES	**54**			
	TOTAL TREES OF PLANTED SPECIES	**63**			
	TOTAL STEMS OF PLANTED SPECIES	**117**		**PLANTED DENSITY (PER ACRE)**	**1170**
	TOTAL STEMS OF ACCEPTABLE VOLUNTEERS	**11**		**PLANTED + ACCEPTABLE VOLUNTEERS DENSITY (PER ACRE)**	**1280**

HOWARD FARM RIPARIAN BUFFER SITE
ANNUAL MONITORING DATA SHEET - VEGETATION PLOTS

PLOT NUMBER 8

SPECIES	STRATUM (T, SA, or SH)	Number of Individuals	HEIGHT	Planted vs. Volunteer Species	Number of Individuals Counted toward Success Criteria
Elderberry	SH	1	5 ft	Planted	1
Elderberry	SH	2	6 ft	Planted	2
Elderberry	SH	1	7 ft	Planted	1
Elderberry	SH	1	8 ft	Planted	1
Elderberry	SH	1	12 ft	Planted	1
Wax Myrtle	SH	1	2 ft	Planted	1
Wax Myrtle	SH	4	3 ft	Planted	4
Wax Myrtle	SH	2	4 ft	Planted	2
Wax Myrtle	SH	1	5 ft	Planted	1
Wax Myrtle	SH	1	6 ft	Planted	1
Wax Myrtle	SH	1	8 ft	Planted	1
Persimmon	SA	1	4 ft	Planted	1
Persimmon	SA	2	8 ft	Planted	2
Persimmon	SA	4	15 ft	Planted	4
Green Ash	SA	4	3 ft	Planted	4
Green Ash	SA	1	5 ft	Planted	1
Green Ash	SA	2	6 ft	Planted	2
Green Ash	SA	4	8 ft	Planted	4
Green Ash	SA	2	10 ft	Planted	2
River Birch	SA	1	7 ft	Planted	1
River Birch	SA	1	10 ft	Planted	1
River Birch	SA	1	15 ft	Planted	1
River Birch	SA	5	25 ft	Planted	5
American Sycamore	SA	8	20 ft	Planted	8
American Sycamore	SA	27	25 ft	Planted	27
American Sycamore	SA	7	30 ft	Planted	7
Black Willow	SA	2	5 ft	Volunteer	2
Black Willow	SA	1	7 ft	Volunteer	1
Black Willow	SA	1	8 ft	Volunteer	1
Black Willow	SA	4	10 ft	Volunteer	4
Black Willow	SA	2	12 ft	Volunteer	2
Black Willow	SA	1	15 ft	Volunteer	1
Black Willow	SA	1	20 ft	Volunteer	1
Baccharis	SH	3	6 ft	Volunteer	0
Baccharis	SH	1	8 ft	Volunteer	0

Red Maple	SA	5	4 ft	Volunteer	0
Sweetgum	SA	20	8 ft	Volunteer	0
	TOTAL STEMS (planted and all volunteers)	**127**			
	TOTAL SHRUBS OF PLANTED SPECIES	**16**			
	TOTAL TREES OF PLANTED SPECIES	**70**			
	TOTAL STEMS OF PLANTED SPECIES	**86**		**PLANTED DENSITY (PER ACRE)**	**860**
	TOTAL STEMS OF ACCEPTABLE VOLUNTEERS	**12**		**PLANTED + ACCEPTABLE VOLUNTEERS DENSITY (PER ACRE)**	**980**

HOWARD FARM RIPARIAN BUFFER SITE
ANNUAL MONITORING DATA SHEET - VEGETATION PLOTS

PLOT NUMBER 9

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	3 ft	Planted	1
American Beautyberry	SH	1	4 ft	Planted	1
Elderberry	SH	1	6 ft	Planted	1
Elderberry	SH	1	10 ft	Planted	1
American Sycamore	SA	5	20 ft	Planted	5
American Sycamore	SA	23	25 ft	Planted	23
American Sycamore	SA	35	30 ft	Planted	35
Green Ash	SA	1	2 ft	Planted	1
Green Ash	SA	2	6 ft	Planted	2
Green Ash	SA	2	7 ft	Planted	2
Green Ash	SA	2	10 ft	Planted	2
Green Ash	SA	1	12 ft	Planted	1
River Birch	SA	1	8 ft	Planted	1
River Birch	SA	4	12 ft	Planted	4
River Birch	SA	3	20 ft	Planted	3
River Birch	SA	5	25 ft	Planted	5
Persimmon	SA	3	5 ft	Planted	3
Persimmon	SA	7	6 ft	Planted	7
Persimmon	SA	3	7 ft	Planted	3
Persimmon	SA	3	8 ft	Planted	3
Persimmon	SA	1	10 ft	Planted	1
Persimmon	SA	2	12 ft	Planted	2
Persimmon	SA	2	15 ft	Planted	2
Persimmon	SA	1	20 ft	Planted	1
Tulip Poplar	SA	1	4 ft	Planted	1
Black willow	SA	1	4 ft	Volunteer	1
Black willow	SA	3	7 ft	Volunteer	3
Black willow	SA	2	8 ft	Volunteer	2
Black willow	SA	2	10 ft	Volunteer	2
Black willow	SA	2	12 ft	Volunteer	2
Black willow	SA	1	20 ft	Volunteer	1
Loblolly Pine	SA	1	5 ft	Volunteer	1
Loblolly Pine	SA	1	8 ft	Volunteer	1
Sweetgum	SA	40	3 ft - 6 ft	Volunteer	0
Red Maple	SA	10	4 ft - 6 ft	Volunteer	0

	TOTAL STEMS (planted and all volunteers)	**174**			
	TOTAL SHRUBS OF PLANTED SPECIES	**4**			
	TOTAL TREES OF PLANTED SPECIES	**107**			
	TOTAL STEMS OF PLANTED SPECIES	**111**		**PLANTED DENSITY (PER ACRE)**	**1110**
	TOTAL STEMS OF ACCEPTABLE VOLUNTEERS	**14**		**PLANTED + ACCEPTABLE VOLUNTEERS DENSITY (PER ACRE)**	**1250**

HOWARD FARM RIPARIAN BUFFER SITE
ANNUAL MONITORING DATA SHEET - VEGETATION PLOTS

PLOT NUMBER 10

SPECIES	STRATUM (T, SA, or SH)	Number of Individuals	HEIGHT	Planted vs. Volunteer Species	Number of Individuals Counted toward Success Criteria
Elderberry	SH	3	5 ft	Planted	3
Elderberry	SH	6	6 ft	Planted	6
Elderberry	SH	6	7 ft	Planted	6
Elderberry	SH	3	8 ft	Planted	3
Elderberry	SH	1	10 ft	Planted	1
Wax Myrtle	SH	1	4 ft	Planted	1
Wax Myrtle	SH	1	5 ft	Planted	1
Wax Myrtle	SH	7	6 ft	Planted	7
Wax Myrtle	SH	2	7 ft	Planted	2
Wax Myrtle	SH	11	8 ft	Planted	11
Wax Myrtle	SH	11	10 ft	Planted	11
Wax Myrtle	SH	12	12 ft	Planted	12
Wax Myrtle	SH	2	15 ft	Planted	2
Amer. Beautyberry	SH	3	3 ft	Planted	3
Amer. Beautyberry	SH	8	4 ft	Planted	8
Amer. Beautyberry	SH	4	5 ft	Planted	4
Amer. Beautyberry	SH	1	6 ft	Planted	1
Amer. Beautyberry	SH	2	7 ft	Planted	2
Amer. Beautyberry	SH	1	8 ft	Planted	1
Persimmon	SA	2	5 ft	Planted	2
Persimmon	SA	1	7 ft	Planted	1
Persimmon	SA	2	8 ft	Planted	2
Persimmon	SA	7	10 ft	Planted	7
Persimmon	SA	6	12 ft	Planted	6
Persimmon	SA	6	15 ft	Planted	6
Green Ash	SA	1	4 ft	Planted	1
Green Ash	SA	2	8 ft	Planted	2
Green Ash	SA	1	9 ft	Planted	1
Green Ash	SA	3	10 ft	Planted	3
Green Ash	SA	1	12 ft	Planted	1
River Birch	SA	1	7 ft	Planted	1
River Birch	SA	3	12 ft	Planted	3
River Birch	SA	1	13 ft	Planted	1
River Birch	SA	2	15 ft	Planted	2
River Birch	SA	1	16 ft	Planted	1

River Birch	SA	1	18 ft	Planted	1
River Birch	SA	2	20 ft	Planted	2
Black Willow	SA	2	5 ft	Volunteer	2
Black Willow	SA	5	6 ft	Volunteer	5
Black Willow	SA	5	7 ft	Volunteer	5
Black Willow	SA	5	8 ft	Volunteer	5
Black Willow	SA	9	10 ft	Volunteer	9
Black Willow	SA	6	12 ft	Volunteer	6
Black Willow	SA	1	13 ft	Volunteer	1
Black Willow	SA	3	15 ft	Volunteer	3
Loblolly Pine	SA	3	3 ft	Volunteer	3
Loblolly Pine	SA	1	4 ft	Volunteer	1
Loblolly Pine	SA	1	5 ft	Volunteer	1
Loblolly Pine	SA	2	6 ft	Volunteer	2
Loblolly Pine	SA	2	7 ft	Volunteer	2
Loblolly Pine	SA	2	8 ft	Volunteer	2
Loblolly Pine	SA	2	10 ft	Volunteer	2
Loblolly Pine	SA	6	12 ft	Volunteer	6
Loblolly Pine	SA	4	15 ft	Volunteer	4
Baccharis	SH	1	3 ft	Volunteer	0
Baccharis	SH	2	4 ft	Volunteer	0
Baccharis	SH	1	5 ft	Volunteer	0
Baccharis	SH	1	7 ft	Volunteer	0
Baccharis	SH	4	8 ft	Volunteer	0
Baccharis	SH	4	10 ft	Volunteer	0
Baccharis	SH	1	12 ft	Volunteer	0
	TOTAL STEMS (planted and all volunteers)	**201**			
	TOTAL SHRUBS OF PLANTED SPECIES	**85**			
	TOTAL TREES OF PLANTED SPECIES	**43**			
	TOTAL STEMS OF PLANTED SPECIES	**128**		**PLANTED DENSITY (PER ACRE)**	**1280**
	TOTAL STEMS OF ACCEPTABLE VOLUNTEERS	**59**		**PLANTED + ACCEPTABLE VOLUNTEERS DENSITY (PER ACRE)**	**1870**

HOWARD FARM RIPARIAN BUFFER SITE
ANNUAL MONITORING DATA SHEET - VEGETATION PLOTS

PLOT NUMBER **11**

SPECIES	STRATUM (T, SA, or SH)	Number of Individuals	HEIGHT	Planted vs. Volunteer Species	Number of Individuals Counted toward Success Criteria
Elderberry	SH	1	12 ft	Planted	1
Persimmon	SA	4	3 ft	Planted	4
Persimmon	SA	1	4 ft	Planted	1
Persimmon	SA	1	5 ft	Planted	1
Persimmon	SA	3	6 ft	Planted	3
Persimmon	SA	3	7 ft	Planted	3
Persimmon	SA	1	10 ft	Planted	1
River Birch	SA	1	8 ft	Planted	1
River Birch	SA	1	10 ft	Planted	1
River Birch	SA	1	12 ft	Planted	1
River Birch	SA	3	15 ft	Planted	3
River Birch	SA	6	20 ft	Planted	6
River Birch	SA	14	25 ft	Planted	14
American Sycamore	SA	1	15 ft	Planted	1
American Sycamore	SA	6	20 ft	Planted	6
American Sycamore	SA	47	25 ft	Planted	47
American Sycamore	T	4	30 ft	Planted	4
Wax Myrtle	SH	3	1 ft	Planted	3
Wax Myrtle	SH	3	2 ft	Planted	3
Wax Myrtle	SH	1	3 ft	Planted	1
Wax Myrtle	SH	2	4 ft	Planted	2
Baccharis	SH	1	10 ft	Volunteer	0
Loblolly Pine	SA	1	4 ft	Volunteer	1
Black Cherry	SA	1	20 ft	Volunteer	1
Red Maple	SA	1	3 ft	Volunteer	0
Sweetgum	SA	1	2 ft	Volunteer	0
Sweetgum	SA	1	10 ft	Volunteer	0
Sweetgum	SA	1	15 ft	Volunteer	0
	TOTAL STEMS (planted and all volunteers)	**114**			
	TOTAL SHRUBS OF PLANTED SPECIES	**10**			
	TOTAL TREES OF PLANTED SPECIES	**97**			

	TOTAL STEMS OF PLANTED SPECIES	107		PLANTED DENSITY (PER ACRE)	1070
	TOTAL STEMS OF ACCEPTABLE VOLUNTEERS	2		PLANTED + ACCEPTABLE VOLUNTEERS DENSITY (PER ACRE)	1090

HOWARD FARM RIPARIAN BUFFER SITE
ANNUAL MONITORING DATA SHEET - VEGETATION PLOTS

PLOT NUMBER **12**

SPECIES	STRATUM (T, SA, or SH)	Number of Individuals	HEIGHT	Planted vs. Volunteer Species	Number of Individuals Counted toward Success Criteria
Amer. Beautyberry	SH	2	3 ft	Planted	2
Amer. Beautyberry	SH	5	4 ft	Planted	5
Amer. Beautyberry	SH	2	5 ft	Planted	2
Amer. Beautyberry	SH	4	6 ft	Planted	4
Elderberry	SH	1	4 ft	Planted	1
Elderberry	SH	3	6 ft	Planted	3
Elderberry	SH	1	10 ft	Planted	1
Wax Myrtle	SH	1	2 ft	Planted	1
Wax Myrtle	SH	4	4 ft	Planted	4
Wax Myrtle	SH	2	5 ft	Planted	2
Wax Myrtle	SH	6	6 ft	Planted	6
Wax Myrtle	SH	10	7 ft	Planted	10
Wax Myrtle	SH	7	8 ft	Planted	7
Wax Myrtle	SH	8	10 ft	Planted	8
Wax Myrtle	SH	5	12 ft	Planted	5
Wax Myrtle	SH	2	15 ft	Planted	2
Sweet Pepperbush	SH	1	3 ft	Planted	1
Sweet Pepperbush	SH	1	7 ft	Planted	1
Willow Oak	SA	1	8 ft	Planted	1
Willow Oak	SA	1	10 ft	Planted	1
American Sycamore	SA	1	25 ft	Planted	1
American Sycamore	SA	1	30 ft	Planted	1
Red Bay	SA	1	6 ft	Planted	1
Green Ash	SA	2	4 ft	Planted	2
Green Ash	SA	2	5 ft	Planted	2
Green Ash	SA	3	7 ft	Planted	3
Green Ash	SA	1	8 ft	Planted	1
Green Ash	SA	2	10 ft	Planted	2
Green Ash	SA	1	15 ft	Planted	1
Red Cedar	SA	1	6 ft	Volunteer	1
Red Cedar	SA	1	7 ft	Volunteer	1
Red Cedar	SA	5	8 ft	Volunteer	5
Red Cedar	SA	1	10 ft	Volunteer	1
Black Cherry	SA	1	10 ft	Volunteer	1
Baccharis	SH	1	4 ft	Volunteer	0

Baccharis	SH	1	6 ft	Volunteer	0
Baccharis	SH	4	7 ft	Volunteer	0
Baccharis	SH	1	8 ft	Volunteer	0
Baccharis	SH	3	10 ft	Volunteer	0
Loblolly Pine	SA	1	6 ft	Volunteer	1
Loblolly Pine	SA	4	10 ft	Volunteer	4
Loblolly Pine	SA	3	12 ft	Volunteer	3
Loblolly Pine	SA	4	15 ft	Volunteer	4
Loblolly Pine	SA	2	20 ft	Volunteer	2
Black Willow	SA	1	12 ft	Volunteer	1
Sweetgum	SA	1	1 ft	Volunteer	0
Sweetgum	SA	3	12 ft	Volunteer	0
Sweetgum	SA	7	15 ft	Volunteer	0
Sweetgum	SA	1	20 ft	Volunteer	0
Red Maple	SA	1	2 ft	Volunteer	0
Red Maple	SA	1	7 ft	Volunteer	0
Red Maple	SA	1	8 ft	Volunteer	0
	TOTAL STEMS (planted and all volunteers)	**130**			
	TOTAL SHRUBS OF PLANTED SPECIES	**65**			
	TOTAL TREES OF PLANTED SPECIES	**16**			
	TOTAL STEMS OF PLANTED SPECIES	**81**		**PLANTED DENSITY (PER ACRE)**	**810**
	TOTAL STEMS OF ACCEPTABLE VOLUNTEERS	**24**		**PLANTED + ACCEPTABLE VOLUNTEERS DENSITY (PER ACRE)**	**1050**

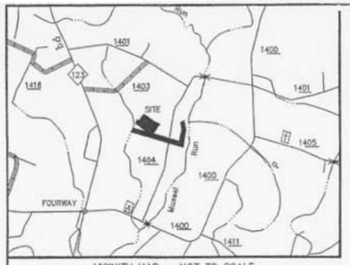
HOWARD FARM RIPARIAN BUFFER SITE
ANNUAL MONITORING DATA SHEET - VEGETATION PLOTS

PLOT NUMBER **13**

SPECIES	STRATUM (T, SA, or SH)	Number of Individuals	HEIGHT	Planted vs. Volunteer Species	Number of Individuals Counted toward Success Criteria
Wax Myrtle	SH	1	2 ft	Planted	1
Wax Myrtle	SH	1	3 ft	Planted	1
Wax Myrtle	SH	4	4 ft	Planted	4
Elderberry	SH	1	5 ft	Planted	1
Elderberry	SH	1	7 ft	Planted	1
Persimmon	SA	3	4 ft	Planted	3
Persimmon	SA	2	5 ft	Planted	2
Persimmon	SA	3	7 ft	Planted	3
Persimmon	SA	1	8 ft	Planted	1
Persimmon	SA	1	10 ft	Planted	1
Green Ash	SA	1	3 ft	Planted	1
Green Ash	SA	1	4 ft	Planted	1
Green Ash	SA	1	6 ft	Planted	1
River Birch	SA	1	6 ft	Planted	1
River Birch	SA	1	7 ft	Planted	1
River Birch	SA	1	8 ft	Planted	1
River Birch	SA	3	10 ft	Planted	3
River Birch	SA	2	12 ft	Planted	2
River Birch	SA	13	15 ft	Planted	13
River Birch	SA	9	20 ft	Planted	9
River Birch	SA	9	25 ft	Planted	9
American Sycamore	SA	2	15 ft	Planted	2
American Sycamore	SA	1	20 ft	Planted	1
American Sycamore	SA	13	25 ft	Planted	13
American Sycamore	SA	3	30 ft	Planted	3
Baccharis	SH	1	8 ft	Volunteer	0
Loblolly Pine	SA	1	3 ft	Volunteer	1
Loblolly Pine	SA	1	7 ft	Volunteer	1
Loblolly Pine	SA	1	10 ft	Volunteer	1
Loblolly Pine	SA	1	15 ft	Volunteer	1
Black Cherry	SA	1	7 ft	Volunteer	1
Red Maple	SA	2	4 ft	Volunteer	0
Sweetgum	SA	3	15 ft	Volunteer	0
	TOTAL STEMS				

	(planted and all volunteers)	90			
	TOTAL SHRUBS OF PLANTED SPECIES	8			
	TOTAL TREES OF PLANTED SPECIES	71			
	TOTAL STEMS OF PLANTED SPECIES	79		PLANTED DENSITY (PER ACRE)	790
	TOTAL STEMS OF ACCEPTABLE VOLUNTEERS	5		PLANTED + ACCEPTABLE VOLUNTEERS DENSITY (PER ACRE)	840

APPENDIX C. CONSERVATION EASEMENT PLAT
(INCLUDING MONITORING PLOT LOCATIONS)



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

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

GREENE COUNTY DB 456 PG 357

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

NOW OR FORMERLY MAYO PROPERTY

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

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

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

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

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 19th 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 ____ 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