FINAL
ANNUAL MONITORING REPORT
YEAR 5 (2014)

VICKI'S THICKET RIPARIAN BUFFER MITIGATION SITE
CRAVEN COUNTY, NORTH CAROLINA
(EEP Contract No. 002283, EEP ID No. 94015)
[DWQ Reference No. 10-0652]

Prepared for:

NORTH CAROLINA DEPARTMENT OF ENVIRONMENT AND NATURAL RESOURCES
ECOSYSTEM ENHANCEMENT PROGRAM
RALEIGH, NORTH CAROLINA

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December 2014

EXECUTIVE SUMMARY

Restoration Systems, LLC has completed riparian buffer restoration at the Vicki's Thicket Riparian Buffer Mitigation Site (hereafter referred to as the "Site") through the North Carolina Ecosystem Enhancement Program (NCEEP) Full Delivery Process (RFP 16-001383) to provide 28.00 riparian buffer mitigation units for nutrient offset mitigation (NCEEP Contract #002283). The Site is located approximately 3.5 miles southeast of Dover in Craven County. The Site is located in United States Geological Survey Hydrologic Unit and Targeted Local Watershed 03020202080010 (North Carolina Division of Water Quality Subbasin 03-04-08) of the Neuse River Basin. Site streams drain to Core Creek (Stream Index 27-90), which is included on the draft 2008 303(d) list for impaired biological integrity and low dissolved oxygen resulting from agricultural crop production.

Prior to construction, the Site was characterized by ditched agricultural land used for row crop production. Land use practices including the maintenance and removal of vegetation, regular plowing, and use of agricultural chemicals had resulted in degraded water quality.

The goals and objectives of this project focused on improving local water quality, enhancing flood attenuation, and restoring aquatic and riparian habitat. These goals were accomplished by the following.

1. Removing nonpoint sources of pollution associated with agriculture production by a) ceasing the application of agricultural herbicides, pesticides, fertilizers, and other agricultural materials into and adjacent to Site ditches and open waterways and b) providing a vegetative buffer adjacent to ditches and waterways to treat surface runoff that may be laden with sediment and/or agricultural pollutants.
2. Reducing sedimentation/siltation within on-Site and downstream receiving waters by a) increasing retention time for surface waters entering and leaving the Site, b) reducing erosion associated with vegetation maintenance and agricultural plowing to Site ditches, and c) planting a forested vegetative buffer adjacent to Site ditches and waterways.
3. Promoting floodwater attenuation by ripping compacted soils and revegetating the Site to increase frictional resistance on floodwaters crossing the Site.
4. Providing terrestrial wildlife habitat including a forested riparian corridor within an area that was previously cleared and highly dissected by agricultural land use.

This project was constructed in late winter/early spring 2010. Site restoration activities resulted in 28.63 units of riparian buffer restoration to be used for nutrient offset mitigation. As a whole, the densities of vegetation plots across the Site were above the required 320 stems per acre with an average of 569 planted stems per acre counting towards nutrient offset success in the Fifth Monitoring Year (2014). In addition, each individual plot met success criteria based on planted stems alone counting toward nutrient offset success with the exception of Plot 18, which was two stems shy. However, this plot had numerous natural recruits of red maple (*Acer rubrum*).

Vegetation within a small area of the old farm path has not done well; therefore, 20-3 gallon containerized trees will be planted within this area (denoted in green on Figure 2, Appendix A) in late 2014/early 2015.

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APPENDICES

1.0 INTRODUCTION

1.1 Location and Setting

Restoration Systems, LLC has completed riparian buffer restoration at the Vicki's Thicket Riparian Buffer Mitigation Site (hereafter referred to as the "Site") through the North Carolina Ecosystem Enhancement Program (NCEEP) Full Delivery Process (RFP 16-001383) to provide 28.00 riparian buffer mitigation units for nutrient offset mitigation (NCEEP Contract #002283). The Site is located approximately 3.5 miles southeast of Dover in Craven County (Figure 1, Appendix A). The Site is located in United States Geological Survey Hydrologic Unit and Targeted Local Watershed 03020202080010 (North Carolina Division of Water Quality Subbasin 03-04-08) of the Neuse River Basin (USGS 1974).

Directions to the Site from Kinston, North Carolina:

- Take 70 East for approximately 8 miles
- Take the Dover exit and follow Old 70/Wilson Street for approximately 4.3 miles east
- Turn right over the railroad tracks to wire gate.
- Site coordinates:
    - Latitude 35.18812ºN, Longitude 77.38613ºW (NAD83/WGS84)

1.2 Project Goals and Objectives

The goals and objectives of this project focused on improving local water quality, enhancing flood attenuation, and restoring aquatic and riparian habitat. These goals were accomplished by the following.

1. Removing nonpoint sources of pollution associated with agriculture production by a) ceasing the application of agricultural herbicides, pesticides, fertilizers, and other agricultural materials into and adjacent to Site ditches and open waterways and b) providing a vegetative buffer adjacent to ditches and waterways to treat surface runoff that may be laden with sediment and/or agricultural pollutants.
2. Reducing sedimentation/siltation within on-Site and downstream receiving waters by a) increasing retention time for surface waters entering and leaving the Site, b) reducing erosion associated with vegetation maintenance and agricultural plowing to Site ditches, and c) planting a forested vegetative buffer adjacent to Site ditches and waterways.
3. Promoting floodwater attenuation by ripping compacted soils and revegetating the Site to increase frictional resistance on floodwaters crossing the Site.
4. Providing terrestrial wildlife habitat including a forested riparian corridor within an area that was previously cleared and highly dissected by agricultural land use.

1.3 Project Structure, Restoration Type, and Approach

Prior to construction, the Site was characterized by ditched agricultural land used for row crop production. Land use practices including the maintenance and removal of vegetation, regular plowing, and use of agricultural chemicals had resulted in degraded water quality.

As constructed, Site activities restored historic riparian buffer functions by planting the entire 31.35-acre Site with native riparian vegetation. This resulted in 28.63 units of riparian buffer restoration to be used for nutrient offset mitigation (Table 1, Appendix B and Figure 2, Appendix A). Nutrient Offset Restoration Credits were verified by North Carolina Division of Water Quality (NCDWQ) representative Lia Myott Gilleski during a field visit conducted on June 17, 2010. A copy of the verification letter is included in Appendix D. Approximately 0.45 acre of the Site is surface water and 2.27 acres of the Site is located outside of the 200-foot buffer area. These areas were planted; however, the area is not eligible to provide

credit. The target natural community consisted of a Coastal Plain Bottomland Hardwood Forest (Schafale and Weakley 1990). Table 5 (Appendix C) outlines woody species planted within the Site. Completed project activities, reporting history, completion dates, project contacts, and background information are summarized in Tables 2-4 (Appendix B).

2.0 MONITORING PLAN

Monitoring of Site restoration efforts will be performed for vegetation components of the Site for five years or until success criteria are fulfilled. After planting was completed, an initial evaluation was performed to verify planting methods were successful and to determine initial species composition and density. Twenty-one sample vegetation plots (10-meter by 10-meter) were installed within the Site as per guidelines established in *CVS-EEP Protocol for Recording Vegetation, Version 4.0* (Lee et al. 2006). In each sample plot, vegetation parameters to be monitored include species composition and species density. Visual observations of the percent cover of shrub and herbaceous species will also be documented by photograph.

2.1 Vegetation Success Criteria

Characteristic Tree Species include woody tree and shrub species planted at the Site (Table 5, Appendix C) or outlined for the appropriate plant community in Schafale and Weakley (1990). An average density of 320 stems per acre of Characteristic Tree Species must be surviving after year 5 monitoring.

2.2 Maintenance and Contingency

In the event that success criteria are not fulfilled, a mechanism for contingency will be implemented. If vegetation success criteria are not achieved based on average density calculations from combined plots over the entire restoration area, supplemental planting may be performed with tree species approved by regulatory agencies. Supplemental planting will be performed as needed until achievement of vegetation success criteria.

2.3 Vegetation Sampling Results and Comparison to Success Criteria

Quantitative sampling of vegetation was conducted in October 2014. Results are provided in Appendix C. Vegetation success criteria for year 5 (320 stems per acre) were exceeded for the 2014 annual monitoring year with an average density of 569 planted stems per acre counting towards nutrient offset success across the Site. Average densities of planted stems went up in year 2 in several plots including Plots 1, 3-12, and 17. During year 1, browse by deer and rodents on young planted stems was abundant throughout the Site. Several stems within these plots were not counted, or counted as missing in year 1; however, many survived and were doing well in years 2-5. In addition, several stems that were thought to be dead during year 1 monitoring re-sprouted from the base and were counted during years 2-5 monitoring. Deer browse was prevalent again during year 5 monitoring.

3.0 CONCLUSIONS

As a whole, the densities of vegetation plots across the Site were above the required 320 stems per acre with an average of 569 planted stems per acre counting towards nutrient offset success in the Fifth Monitoring Year (2014). In addition, each individual plot met success criteria based on planted stems alone counting toward nutrient offset success with the exception of Plot 18, which was two stems shy. However, this plot had numerous natural recruits of red maple (*Acer rubrum*). The following table summarizes planted stem data throughout the monitoring period.

Summary of Planted Stem Vegetation Plot Results

Plot	Planted Stems/Acre based on Riparian Buffer Success Criteria				
	Year 1 (2010)	**Year 2 (2011)**	**Year 3 (2012)**	**Year 4 (2013)**	**Year 5 (2014)**
1	647	688	648	648	607
2	728	607	648	648	648
3	809	769	769	769	729
4	809	810	810	769	729
5	931	810	769	769	648
6	890	810	810	850	850
7	971	891	891	891	769
8	526	445	445	445	445
9	486	526	486	486	405
10	769	688	769	648	567
11	688	607	648	526	445
12	971	1012	931	891	769
13	850	769	769	648	607
14	1093	810	769	688	607
15	728	567	567	567	526
16	526	486	486	486	445
17	647	607	607	607	607
18	445	324	243	243	243
19	647	526	486	486	486
20	526	405	364	364	324
21	607	526	486	526	486
Average Plots 1-21	**728**	**651**	**638**	**617**	**569**

4.0 REFERENCES

Lee, M.T., R.K. Peet, S.D. Roberts, and T.R. Wentworth. 2006. CVS-EEP Protocol for Recording Vegetation. Version 4.0. North Carolina Department of Environment and Natural Resources, Ecosystem Enhancement Program. Raleigh, North Carolina.

North Carolina Division of Water Quality (NCDWQ). 2007. Redbook, Surface Waters and Wetlands Standards. North Carolina Department of Environment and Natural Resources, Division of Water Quality. Raleigh, North Carolina.

North Carolina Division of Water Quality (NCDWQ). 2008a. Draft North Carolina Water Quality Assessment and Impaired Waters List (2008 Integrated 305(b) and 303(d) Report) (online). Available: http://h2o.enr.state.nc.us/tmdl/documents/B.Draft2008303dList.pdf [November 10, 2008]. North Carolina Department of Environment and Natural Resources, Raleigh, North Carolina.

North Carolina Division of Water Quality (NCDWQ). 2008b. Draft Basinwide Planning Program: Neuse River Basinwide Water Quality Plan-June 2008. North Carolina Department of Environment and Natural Resources, Division of Water Quality. Raleigh, North Carolina.

Schafale, M.P. and A.S. Weakley. 1990. Classification of the Natural Communities of North Carolina: Third Approximation. North Carolina Natural Heritage Program, Division of Parks and Recreation, North Carolina Department of Environment, Health, and Natural Resources. Raleigh, North Carolina.

United States Geological Survey (USGS). 1974. Hydrologic Unit Map - 1974. State of North Carolina.

Appendix A.
Figures

Figure 1. Site Location
Figure 2. Monitoring Plan View

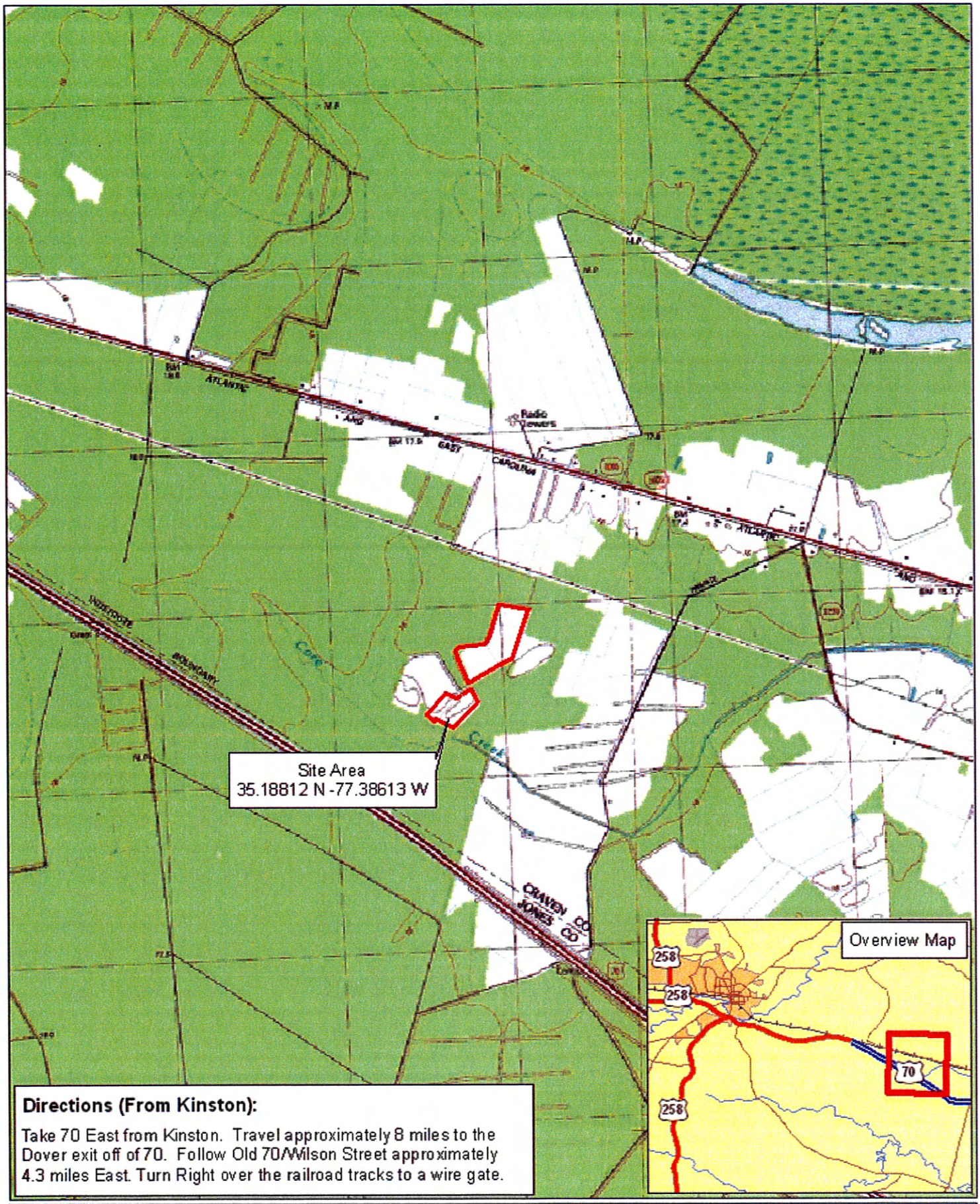

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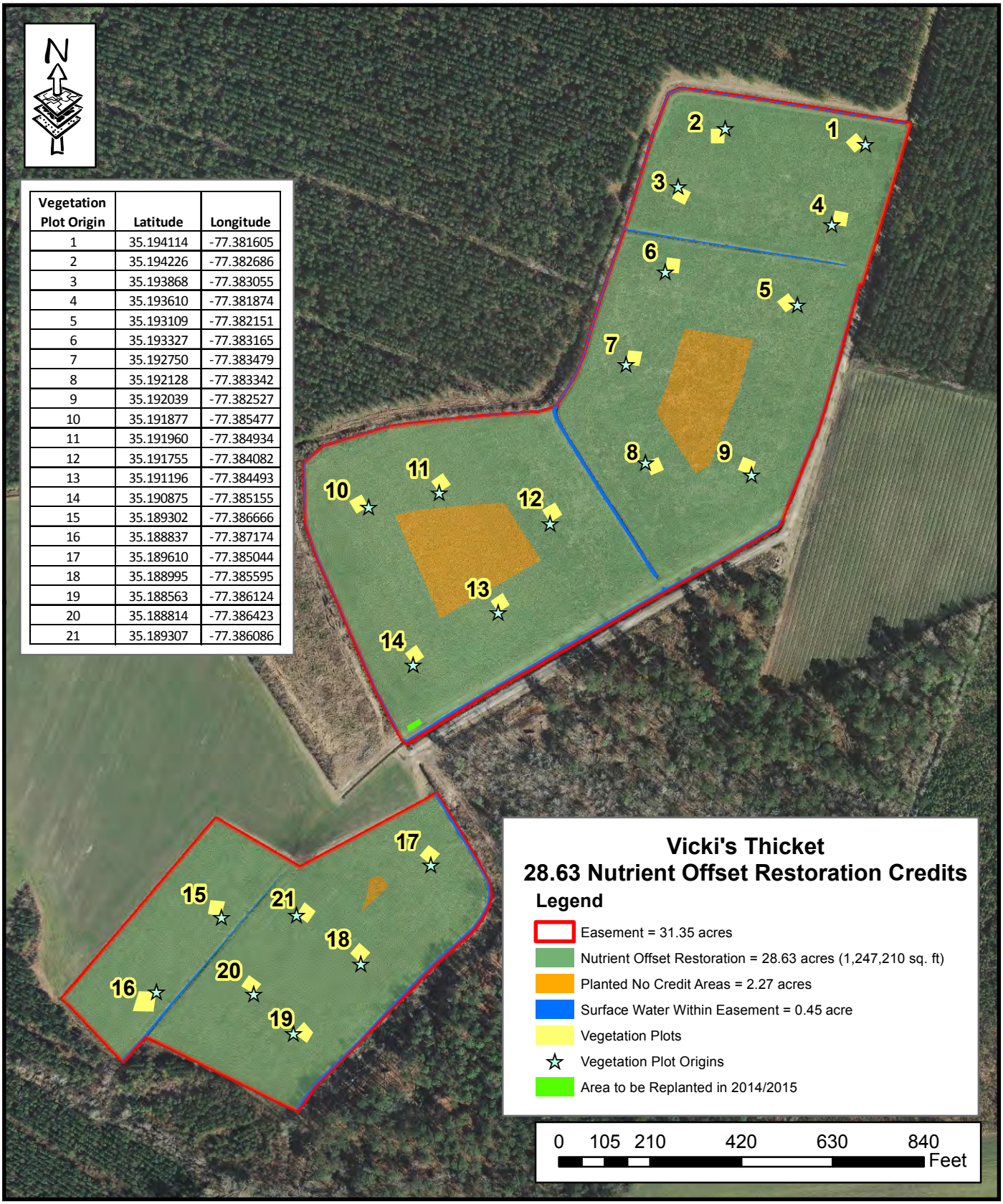
Figure 1: Site Location

Vicki's Thicket Riparian Buffer Mitigation Site
Craven County, NC

1:28,151

N

0 550 1,100 2,200 3,300 4,400
Feet



Vegetation Plot Origin	Latitude	Longitude
1	35.194114	-77.381605
2	35.194226	-77.382686
3	35.193868	-77.383055
4	35.193610	-77.381874
5	35.193109	-77.382151
6	35.193327	-77.383165
7	35.192750	-77.383479
8	35.192128	-77.383342
9	35.192039	-77.382527
10	35.191877	-77.385477
11	35.191960	-77.384934
12	35.191755	-77.384082
13	35.191196	-77.384493
14	35.190875	-77.385155
15	35.189302	-77.386666
16	35.188837	-77.387174
17	35.189610	-77.385044
18	35.188995	-77.385595
19	35.188563	-77.386124
20	35.188814	-77.386423
21	35.189307	-77.386086

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MONITORING PLAN VIEW
VICKI'S THICKET
RIPARIAN BUFFER MITIGATION SITE
Craven County, North Carolina

Dwn. by.: CLF
Date: Dec 2014
Project: 10-001

FIGURE
2

Appendix B.
General Tables

Table 1. Site Restoration Structures and Objectives
Table 2. Project Activity and Reporting History
Table 3. Project Contacts Table
Table 4. Project Attributes Table

Table 1. Site Restoration Structures and Objectives

Component Summation	
Restoration Level	Restoration was completed by planting the entire 31.35-acre Site with native forest vegetation; credit was received for 28.63 acres of the Site.
Nutrient Offset Restoration	
28.63 Nutrient Offset Restoration Credits	

Table 2. Project Activity and Reporting History

Activity or Report	Data Collection Complete	Completion or Delivery
Final Restoration Plan	--	July 2010
Site Planting	--	Late winter/early spring 2010
Mitigation Plan	April 2010	August 2010
Year 1 Monitoring	September 2010	October 2010
Year 2 Monitoring	August 2011	August 2011
Year 3 Monitoring	June 2012	June 2012
Year 4 Monitoring	October 2013	November 2013
Year 5 Monitoring	October 2014	December 2014

Table 3. Project Contacts Table

Designer	Restoration Systems, LLC 1101 Haynes Street, Suite 211 Raleigh, North Carolina 27604 (919) 755-9490
Planting Contractor	Carolina Silvics 908 Indian Trail Road Edenton, North Carolina 27932 Mary-Margaret McKinney (252) 482-8491
Monitoring Performer	Axiom Environmental, Inc. 218 Snow Avenue Raleigh, North Carolina 27603 Grant Lewis (919) 215-1693

Table 4. Project Attribute Table

Project County	Craven County, North Carolina
Physiographic Region	Coastal Plain
Ecoregion	Carolina Flatwoods and Mid-Atlantic Floodplains/Low Terrace
Project River Basin	Neuse
USGS 14-digit HUC	03020202080010
NCDWQ Subbasin	03-04-08
Within EEP Watershed Plan Extent?	Yes-Targeted Local Watershed
WRC Class	Warm
% of project easement fenced	0 %
Beaver activity observed during design phase	No

Appendix C.
Vegetation Data

Table 5. Planted Woody Species
Vegetation Survey Data Tables
Vegetation Monitoring Plot Photographs

Table 5. Planted Woody Vegetation

Species	Quantity
American elm (*Ulmus americana*)	4500
Black gum (*Nyssa sylvatica*)	1500
Elderberry (*Sambucus canadensis*)	1500
Loblolly pine (*Pinus taeda*)	4500
Northern red oak (*Quercus rubra*)	3000
River birch (*Betula nigra*)	1500
Sugarberry (*Celtis laevigata*)	1500
Swamp chestnut oak (*Quercus michauxii*)	4500
Sycamore (*Platanus occidentalis*)	3000
Willow oak (*Quercus phellos*)	4500
TOTAL	**30,000**

CVS Database Output

Living planted stems, excluding live stakes, per acre: Negative (red) numbers indicate the project failed to reach requirements in a particular year.

Project Code	Project Name	River Basin	Year 1	Year 2	Year 3	Year 4	Year 5
VT	Vicki's Thicket	Neuse	728.43	790.10	759.27	716.87	674.48

Total stems, including planted stems of all kinds (including live stakes) and natural/volunteer stems:

Project Code	Project Name	River Basin	Year 1	Year 2	Year 3	Year 4	Year 5
VT	Vicki's Thicket	Neuse	1111.92	2133.27	2333.69	2223.84	2965.76

Vigor

Vigor	Count	Percent
0	12	3.1
1	1	0.3
2	32	8.2
3	120	30.8
4	197	50.6

Damage

Damage	Count	Percent Of Stems
(no damage)	263	67.6
Deer	98	25.2
Unknown	20	5.1
Other/Unknown Animal	6	1.5
Vine Strangulation	1	0.3
Insects	1	0.3

Vigor by Species

Species	CommonName	4	3	2	1	0	Missing	Unknown
Betula nigra	river birch	6	6	10		1	6	
Celtis laevigata	sugarberry	3	6	3		1		
Nyssa sylvatica	blackgum	1	7	2	1	2	3	
Pinus taeda	loblolly pine	51						
Quercus michauxii	swamp chestnut oak	35	22	1				
Quercus nigra	water oak		1					
Quercus phellos	willow oak	37	20	7		1	1	
Sambucus canadensis	Common Elderberry			3		1	6	
Quercus	oak	1	1					
Quercus rubra	northern red oak	5	5	3		5	4	
Magnolia virginiana	sweetbay	2		1			2	
Nyssa	tupelo	1		1				
Platanus occidentalis	American sycamore	43	1					
Ulmus	elm		1					
Ulmus americana	American elm	12	50	1		1	5	
15	**15**	**197**	**120**	**32**	**1**	**12**	**27**	

Damage by Species

Species	CommonName	Count of Damage Categories	(no damage)	Deer	Insects	Other/Unknown Animal	Unknown	Vine Strangulation
Betula nigra	river birch	13	16	6		1	6	
Celtis laevigata	sugarberry	8	5	6		1	1	
Magnolia virginiana	sweetbay	1	4				1	
Nyssa	tupelo	0	2					
Nyssa sylvatica	blackgum	8	8	7		1		
Pinus taeda	loblolly pine	0	51					
Platanus occidentalis	American sycamore	1	43					1
Quercus	oak	0	2					
Quercus michauxii	swamp chestnut oak	18	40	16	1		1	
Quercus nigra	water oak	1		1				
Quercus phellos	willow oak	16	50	6		3	7	
Quercus rubra	northern red oak	6	16	5			1	
Sambucus canadensis	Common Elderberry	2	8				2	
Ulmus	elm	1		1				
Ulmus americana	American elm	51	18	50			1	
15	**15**	**126**	**263**	**98**	**1**	**6**	**20**	**1**

Damage by Plot

plot	Count of Damage Categories	(no damage)	Deer	Insects	Other/Unknown Animal	Unknown	Vine Strangulation	Count of Damage Categories
1	6	12	6					6
2	11	7	10	1				11
3	15	8	15					15
4	11	11	11					11
5	9	18	9					9
6	9	18	9					9
7	7	19	7					7
8	1	15	1					1
9	5	9	5					5
10	7	12	7					7
11	6	13	6					6
12	9	18	9					9
13	2	15				2		2
14	3	22	3					3
15	7	7			2	5		7
16	2	11			2			2
17	2	14			1	1		2
18	2	6				2		2
19	3	10				2	1	3
20	4	8				4		4
21	5	10			1	4		5
21	**126**	**263**	**98**	**1**	**6**	**20**	**1**	**126**

Plot Information

Plot	Plot Level	Year	Planted Living Stems	Planted Living Stems EXCLUDING Live Stakes	Dead/Missing Stems	Natural (Volunteer) Stems	Total Living Stems	Total Living Stems EXCLUDING Live Stakes	Planted Living Stems per ACRE	Planted Living Stems EXCLUDING Live Stakes PER ACRE	Natural (Volunteer) Stems PER ACRE	Total Living Stems PER ACRE	Total Living Stems EXCLUDING Live Stakes PER ACRE	# species
1	2	5	17	17	1	5	22	22	688	688	202	890	890	6
2	2	5	17	17	1	14	31	31	688	688	567	1255	1255	6
3	2	5	22	22	1	23	45	45	890	890	931	1821	1821	7
4	2	5	19	19	3	27	46	46	769	769	1093	1862	1862	6
5	2	5	23	23	4	55	78	78	931	931	2226	3157	3157	5
6	2	5	26	26	1	5	31	31	1052	1052	202	1255	1255	7
7	2	5	23	23	3	17	40	40	931	931	688	1619	1619	7
8	2	5	15	15	1	45	60	60	607	607	1821	2428	2428	5
9	2	5	11	11	3	34	45	45	445	445	1376	1821	1821	6
10	2	5	17	17	2	206	223	223	688	688	8337	9024	9024	9
11	2	5	15	15	4	58	73	73	607	607	2347	2954	2954	4
12	2	5	24	24	3	27	51	51	971	971	1093	2064	2064	9
13	2	5	16	16	1	23	39	39	647	647	931	1578	1578	5
14	2	5	22	22	3	188	210	210	890	890	7608	8498	8498	9
15	2	5	13	13	1	73	86	86	526	526	2954	3480	3480	3
16	2	5	11	11	2	69	80	80	445	445	2792	3237	3237	4
17	2	5	16	16	0	109	125	125	647	647	4411	5059	5059	6
18	2	5	7	7	1	53	60	60	283	283	2145	2428	2428	4
19	2	5	13	13	0	30	43	43	526	526	1214	1740	1740	4
20	2	5	9	9	3	68	77	77	364	364	2752	3116	3116	5
21	2	5	14	14	1	60	74	74	567	567	2428	2995	2995	6

Vicki's Thicket 2014 (Year 5) Total Planted Stems (No Livestakes) by Plot and Species

Type	Species	CommonName	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
tree	***Betula nigra***	**river birch**			2		1		2		2	1				2	4	2			2	1	3
tree	***Celtis laevigata***	**sugarberry**			3	1		1	3					1					1				2
tree	***Magnolia virginiana***	**sweetbay**							1					1								1	
tree	***Nyssa***	**tupelo**														1			1				
tree	***Nyssa sylvatica***	**blackgum**		1		2				1	1	1	1	1		1			2				
tree	*Pinus taeda*	loblolly pine	1	1	4	1	7	5	4	4	1	3	4	5	1	6				1	1	1	1
tree	***Platanus occidentalis***	**American sycamore**		1				5	3			2	1	4	2	1	3	4	2	2	7	1	6
tree	***Quercus***	**oak**		1								1											
tree	***Quercus michauxii***	**swamp chestnut oak**	3	3	3	5	5	1	5	4	1	2	9	6	8	3							
tree	***Quercus nigra***	**water oak**			1																		
tree	***Quercus phellos***	**willow oak**	3				4	6		4	2	5		1	4	5	6	3	9	3	3	5	1
tree	***Quercus rubra***	**northern red oak**	2		2	2		1						2		1		2		1			
shrub	*Sambucus canadensis*	Common Elderberry	1																1				1
tree	***Ulmus***	**elm**										1											
tree	***Ulmus americana***	**American elm**	7	10	7	8	6	7	5	2	4	1		3	1	1							
Totals		**Stem count**	17	17	22	19	23	26	23	15	11	17	15	24	16	21	13	11	16	7	13	9	14
		Species count	6	6	7	6	5	7	7	5	6	9	4	9	5	9	3	4	6	4	4	5	6
		Stems per ACRE	688	688	891	769	931	1053	931	607	445	688	607	972	648	850	526	445	648	283	526	364	567
Riparian Buffer Success Criteria		**Stem count**	15	16	18	18	16	21	19	11	10	14	11	19	15	15	13	11	15	6	12	8	12
		Species count	4	5	6	5	4	6	6	4	5	8	3	8	4	8	3	4	5	3	3	4	4
		Stems per ACRE	607	648	729	729	648	850	769	445	405	567	445	769	607	607	526	445	607	243	486	324	486

***Bolded** hardwood tree species are counted toward riparian buffer success criteria.

Vicki's Thicket 2014 (Year 5) Total Stems (Planted and Natural Recruits) by Plot and Species

Type	Species	CommonName	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
tree	**Acer rubrum**	**red maple**																		8	11		8
shrub	Baccharis halimifolia	eastern baccharis		7	16	16	5	3	5	15	19	1	2		8	2	16	3			5	3	8
tree	**Betula nigra**	**river birch**			2		1		3		2	1				2	4	2	1		2	1	3
shrub	Callicarpa americana	American beautyberry															1						
tree	**Celtis laevigata**	**sugarberry**			3	1		1	3					1					1				3
shrub	Ilex opaca	American holly							2		1									2			4
tree	**Liquidambar styraciflua**	**sweetgum**	1	2		1		2	1	3	3	145	35	15		82	6	6	22	3	8	5	
tree	**Magnolia virginiana**	**sweetbay**			1				1					1								1	
shrub	Morella cerifera	wax myrtle							1														
tree	**Nyssa**	**tupelo**														1			1				
tree	**Nyssa sylvatica**	**blackgum**		1		2				1	1	1	2	2		1			2				
tree	Pinus taeda	loblolly pine	5	6	10	4	15	5	12	31	12	63	25	17	15	110	50	60	86	41	7	61	41
tree	**Platanus occidentalis**	**American sycamore**		1				5	3			2	1	4	2	1	3	4	2	2	7	1	6
tree	**Quercus**	**oak**		1								1											
tree	**Quercus michauxii**	**swamp chestnut oak**	3	3	3	5	5	1	5	4	1	2	9	6	8	3							
tree	**Quercus nigra**	**water oak**			1																		
tree	**Quercus phellos**	**willow oak**	3				4	6		4	2	5		1	4	5	6	3	9	3	3	6	1
tree	**Quercus rubra**	**northern red oak**	2		2	2	1	1						4		2	1	2		1			
shrub	Rhus copallinum	flameleaf sumac				7	42																
shrub	Sambucus canadensis	Common Elderberry	1	1															1				1
tree	**Ulmus**	**elm**										1											
tree	**Ulmus americana**	**American elm**	8	10	7	8	6	7	5	2	4	1		3	1	2							
Totals		**Stem count**	23	32	45	46	79	31	41	60	45	223	74	54	38	211	87	80	125	60	43	78	75
		Species count	7	9	9	9	8	9	11	7	9	11	6	10	6	11	8	7	9	7	7	7	9
		Stems per ACRE	931	1296	1822	1862	3198	1255	1660	2429	1822	9028	2996	2186	1538	8543	3522	3239	5061	2429	1741	3158	3036
Riparian Buffer Success Criteria		**Stem count**	17	18	19	19	17	23	21	14	13	159	47	37	15	99	20	17	38	17	31	14	21
		Species count	5	6	7	6	5	7	7	5	6	9	4	9	4	9	5	5	7	5	5	5	5
		Stems per ACRE	688	729	769	769	688	931	850	567	526	6437	1903	1498	607	4008	810	688	1538	688	1255	567	850

***Bolded** hardwood tree species are counted toward riparian buffer success criteria.

Vickies Thicket
Year 5 (2014)
Vegetation Monitoring Plot Photos
Taken October 2014

Vickies Thicket
Year 5 (2014)
Vegetation Monitoring Plot Photos
Taken October 2014
(continued)

Vickies Thicket
Year 5 (2014)
Vegetation Monitoring Plot Photos
Taken October 2014
(continued)

Appendix D.
NCDWQ Verification Letter

NCDENR
North Carolina Department of Environment and Natural Resources
Division of Water Quality
Coleen H. Sullins
Director

Beverly Eaves Perdue
Governor

Dee Freeman
Secretary

August 13, 2010

Craven County
DWQ #: 10-0652

Mr. Tim Baumgartner
EEP Full Delivery Section
1652 Mail Service Center
Raleigh, NC 27604

Re: Vicki's Thicket Preliminary Restoration Approval

Dear Mr. Baumgartner:

The Division of Water Quality received a final restoration plan for the Vicki's Thicket Riparian Buffer Mitigation Site on August 10, 2010. On June 17, 2010, Lia Myott Gilleski conducted a site visit to the above referenced site. By copy of this correspondence, DWQ approves the concept presented in the restoration plan and that it is expected to produce 28.38 acres of nutrient offset credit for Neuse 03020202. The As-built report will provide a more accurate credit accounting.

Please copy DWQ with the As-built report and yearly monitoring reports, referencing the EEP Contract number (and DWQ number if applicable).

Please feel free to contact Lia Myott Gilleski at (919) 733-1786 if you have any questions regarding this correspondence.

Sincerely,

Ian McMillan, Acting Supervisor
401 Oversight/Express Review Program

Cc (w/out encl.) File Copy (Lia M. Gilleski)
Chris Pullinger – DWQ WaRO
John Huisman – DWQ Nonpoint Source Planning Unit
Cyndi Karoly – DWQ Wetlands and Stormwater Branch

401 Oversight/Express Review Permitting Unit
1650 Mail Service Center, Raleigh, North Carolina 27699-1650
Location: 2321 Crabtree Blvd., Raleigh, North Carolina 27604
Phone: 919-733-1786 \ FAX: 919-733-6893
Internet: http://h2o.enr.state.nc.us/ncwetlands/

Appendix E.
Additional Site Data

Restoration Plan Figure 3. Soils
Preconstruction Photograph

Restoration Systems, LLC
1101 Haynes St. Suite 211
Raleigh, NC 27604
tel: 919.755.9490

Figure 3:
Soils

Vicki's Thicket Riparian Buffer Mitigation Site
Craven County, NC

1:5,000

N

0 100 200 400 600 800
Feet

Preconstruction Photograph
Vicki's Thicket
Taken 2008