ANNUAL MONITORING REPORT
YEAR 4 (2013)
FOX RUN RIPARIAN BUFFER MITIGATION SITE
PITT COUNTY, NORTH CAROLINA
(EEP Contract No. 002281)

Prepared for:

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

Prepared by:

Restoration Systems, L.L.C.
1101 Haynes Street, Suite 211
Raleigh, North Carolina 27604

And

Axiom Environmental, Inc.
218 Snow Avenue
Raleigh, North Carolina 27603

November 2013

EXECUTIVE SUMMARY

Restoration Systems, LLC has completed riparian buffer restoration at the Fox Run 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 43.72 Riparian Buffer Mitigation Units. The Site is located approximately 2.5 miles southeast of Farmville in western Pitt County. The Site is located in United States Geological Survey Hydrologic Unit and Targeted Local Watershed 03020203070030 (North Carolina Division of Water Quality Subbasin 03-04-07) of the Neuse River Basin. Site streams drain to Little Contentnea Creek (Stream Index 27-86-26), which is included on the draft 2008 and 2010 303(d) lists 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, which included an unnamed tributary to Little Contentnea Creek and several lateral drainage ditches. The unnamed tributary was determined to be at least intermittent by NCDWQ representative Chris Pullinger (Appendix D). 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 by a) ceasing the application of agricultural herbicides, pesticides, fertilizers, and other agricultural materials into and adjacent to Site surface waters and b) providing a vegetated buffer adjacent to surface waters 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 adjacent to Site surface waters, and c) planting a forested vegetated buffer adjacent to Site surface waters.
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. Planting of the entire 46.46-acre Site resulted in 43.72 Riparian Buffer Mitigation Units. As a whole, densities of vegetation plots across the Site were above the required 320 stems per acre with an average of 536 planted hardwood trees per acre based on riparian buffer success criteria in the Fourth Monitoring Year (2013). In addition, each individual plot met success criteria based on planted stems alone with the exception of Plot 20; however, when including naturally recruited stems of northern red oak (*Quercus rubra*) this plot was well-above success criteria.

TABLE OF CONTENTS

APPENDICES

1.0 INTRODUCTION

1.1 Location and Setting

Restoration Systems, LLC has completed riparian buffer restoration at the Fox Run 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 43.72 Riparian Buffer Mitigation Units. The Site is located approximately 2.5 miles southeast of Farmville in western Pitt County (Figure 1, Appendix A). The Site is located in United States Geological Survey Hydrologic Unit and Targeted Local Watershed 03020203070030 (North Carolina Division of Water Quality Subbasin 03-04-07) of the Neuse River Basin (USGS 1974).

Directions to the Site from Farmville, North Carolina:

- Take Maye-Turnage Road east
- After passing Chinquapin Road the Site is ~ 2 miles ahead on left
- Site coordinates:
    - Latitude 35.5702ºN, Longitude 77.54272ºW (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 by a) ceasing the application of agricultural herbicides, pesticides, fertilizers, and other agricultural materials into and adjacent to Site surface waters and b) providing a vegetated buffer adjacent to surface waters 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 adjacent to Site surface waters, and c) planting a forested vegetated buffer adjacent to Site surface waters.
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, which included an unnamed tributary to Little Contentnea Creek and several lateral drainage ditches. The unnamed tributary was determined to be at least intermittent by NCDWQ representative Chris Pullinger (Appendix D). 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 46.46-acre Site with native riparian vegetation. This resulted in 43.72 Riparian Buffer Mitigation Units (Table 1, Appendix B and Figure 2, Appendix A). Approximately 2.32 acres of the Site is surface water and 0.42 acre of the Site occurs outside of the 200-foot buffer area or within areas of nondiffuse flow. The target natural community consisted of Coastal Plain Bottomland Hardwood Forest (Schafale and Weakley 1990). Completed project activities, reporting history, completion dates, project contacts, and background

information are summarized in Tables 2-4 (Appendix B). Table 5 (Appendix C) outlines woody species planted within the Site.

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-five 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

An average density of 320 hardwood stems per acre must be surviving after five monitoring years in accordance with North Carolina Division of Water Quality Administrative Code 15A NCAC 02B.0242 (*Neuse River Basin, Mitigation Program for Protection and Maintenance of Existing Riparian Buffers*) (NCDWQ 2007).

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 2013. Results are provided in Appendix C. Vegetation success criteria for year 4 (320 hardwood stems per acre) were exceeded for the 2013 annual monitoring year with an average density of 536 planted hardwood trees per acre based on riparian buffer success criteria across the Site. In addition, each individual plot met success criteria based on planted stems alone with the exception of Plot 20; however, when including naturally recruited stems of northern red oak (*Quercus rubra*) this plot was well-above success criteria.

3.0 CONCLUSIONS

The following table summarized planted stem data collected throughout the monitoring period.

Summary of Planted Hardwood Stem Vegetation Plot Results

Plot	Planted Stems/Acre				
	Year 1 (2010)	Year 2 (2011)	Year 3 (2012)	Year 4 (2013)	Year 5 (2014)
1	688	688	607	364	
2	769	729	729	607	
3	809	729	688	526	
4	688	810	769	607	
5	850	810	810	688	
6	607	729	729	324	
7	931	850	931	688	
8	688	810	769	486	
9	728	769	729	526	
10	769	607	567	526	
11	971	931	931	850	
12	688	648	607	445	
13	769	810	769	688	
14	769	769	729	688	
15	728	769	769	648	
16	688	810	729	324	
17	567	607	607	324	
18	567	607	607	445	
19	688	769	729	445	
20	607	648	648	162	
21	1133	1053	1053	769	
22	728	729	729	567	
23	809	769	769	526	
24	728	648	648	445	
25	931	931	972	729	
Average Plots 1-25	**756**	**761**	**745**	**536**	

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.

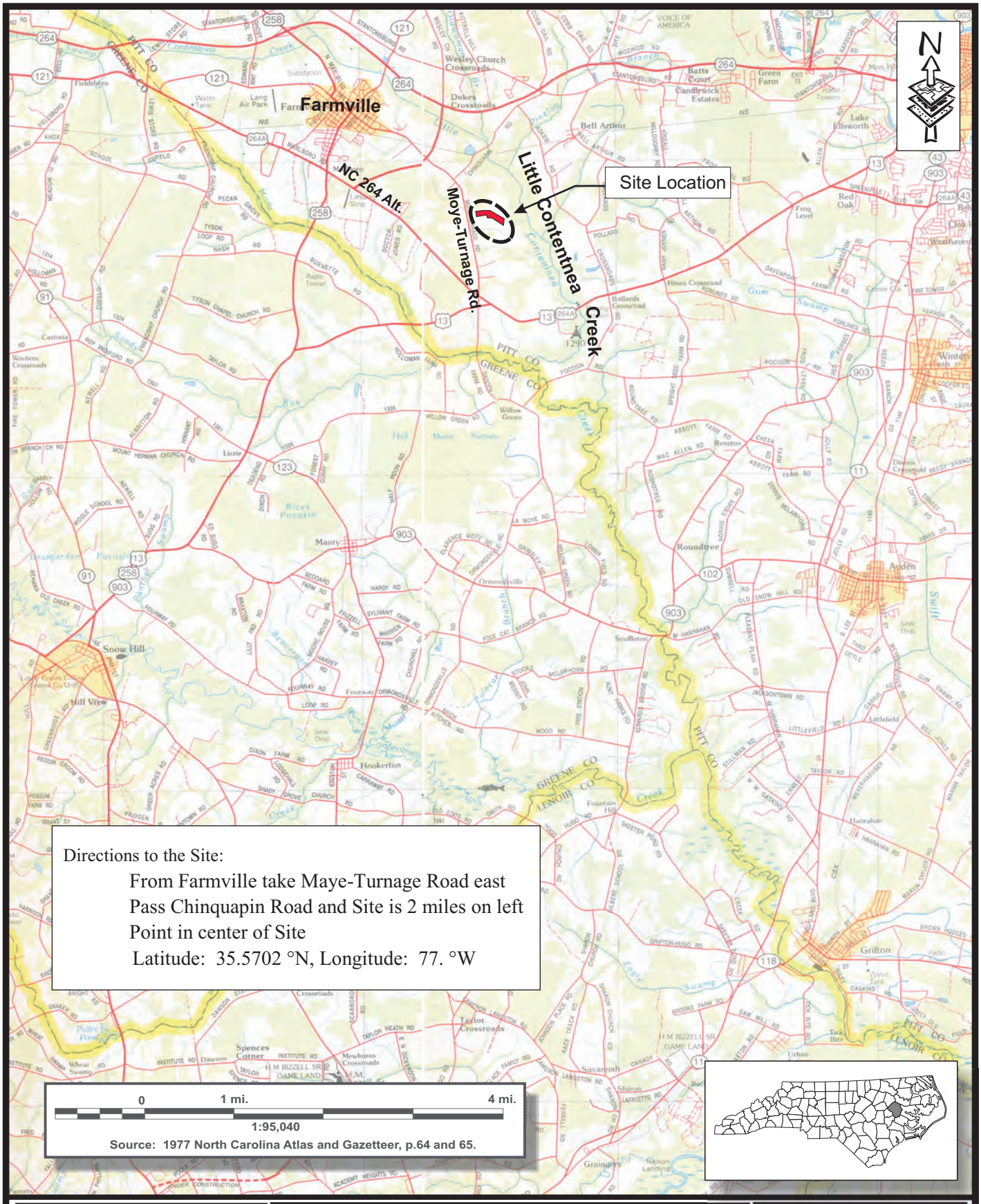
North Carolina Division of Water Quality (NCDWQ). 2010. Draft North Carolina Water Quality Assessment and Impaired Waters List (2010 Integrated 305(b) and 303(d) Report) (online). Available: http://portal.ncdenr.org/c/document_library/get_file? uuid=33a71505-6cdf-4497-b090-aadf79b1f02c&groupId=38364 [August 23, 2010]. North Carolina Department of Environment and Natural Resources, 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

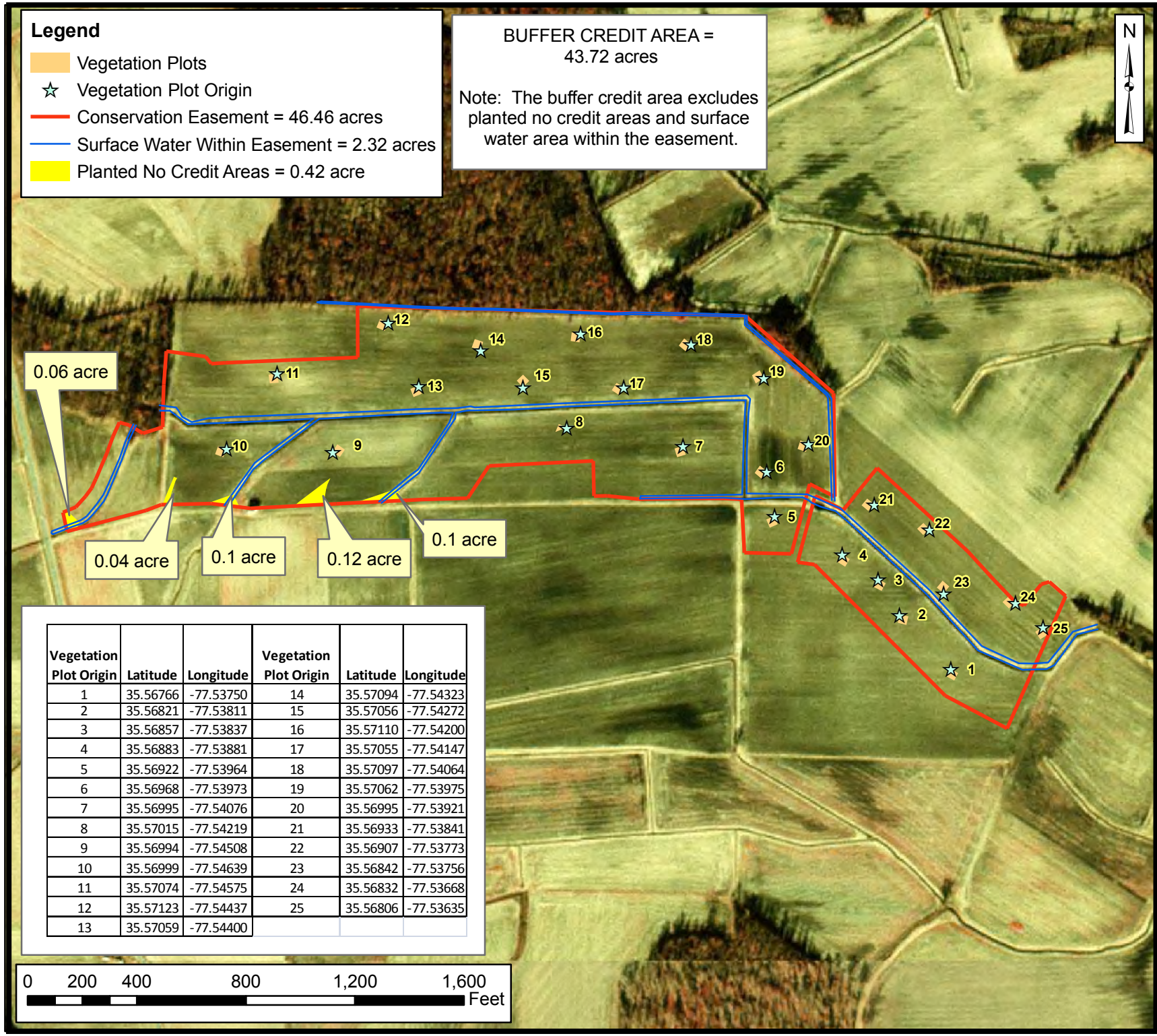


Axiom Environmental, Inc.
2126 Rowland Pond Drive
Willow Spring, NC 27592
(919) 215-1693
(919) 341-3839 fax

SITE LOCATION
FOX RUN BUFFER RESTORATION SITE
Pitt County, North Carolina

Dwn. by:	WGL
Ckd by:	WGL
Date:	Nov 2008
Project:	05-002.49

FIGURE
1



Vegetation Plot Origin	Latitude	Longitude	Vegetation Plot Origin	Latitude	Longitude
1	35.56766	-77.53750	14	35.57094	-77.54323
2	35.56821	-77.53811	15	35.57056	-77.54272
3	35.56857	-77.53837	16	35.57110	-77.54200
4	35.56883	-77.53881	17	35.57055	-77.54147
5	35.56922	-77.53964	18	35.57097	-77.54064
6	35.56968	-77.53973	19	35.57062	-77.53975
7	35.56995	-77.54076	20	35.56995	-77.53921
8	35.57015	-77.54219	21	35.56933	-77.53841
9	35.56994	-77.54508	22	35.56907	-77.53773
10	35.56999	-77.54639	23	35.56842	-77.53756
11	35.57074	-77.54575	24	35.56832	-77.53668
12	35.57123	-77.54437	25	35.56806	-77.53635
13	35.57059	-77.54400			

Axiom Environmental, Inc.

Prepared for:

RESTORATION SYSTEMS | LLC

Project:

FOX RUN RIPARIAN BUFFER MITIGATION SITE

Pitt County, NC

Title:

MONITORING PLAN VIEW

Drawn by: CLF

Date: NOV 2010

Scale: 1:5700

Project No.: 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	Riparian buffer mitigation was completed by planting the entire 46.46-acre Site with native forest vegetation; credit was received for 43.72 acres of the Site.
Riparian Buffer Restoration	
43.72 Buffer Mitigation Units	

Table 2. Project Activity and Reporting History

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

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 Dwight 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	Pitt County, North Carolina
Physiographic Region	Coastal Plain
Ecoregion	Southeastern Plains
Project River Basin	Neuse
USGS 14-digit HUC	03020203070030
NCDWQ Subbasin	03-04-07
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*)	7500
Black gum (*Nyssa sylvatica*)	2500
Elderberry (*Sambucus canadensis*)	2500
Loblolly pine (*Pinus taeda*)	7500
Northern red oak (*Quercus rubra*)	5000
River birch (*Betula nigra*)	2500
Sugarberry (*Celtis laevigata*)	2500
Swamp chestnut oak (*Quercus michauxii*)	7500
Sycamore (*Platanus occidentalis*)	3200
Willow oak (*Quercus phellos*)	7500
TOTAL	**50,000**

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 4
Fox Run	Fox Run	Neuse	658

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

Project Code	Project Name	River Basin	Year 4
Fox Run	Fox Run		1754

Vigor

vigor	Count	Percent
0	45	9.4
1	6	1.3
2	33	6.9
3	131	27.4
4	237	49.6
Missing	26	5.4

Damage

Damage	Count	Percent Of Stems
(no damage)	393	82.2
Deer	66	13.8
Unknown	14	2.9
Other/Unknown Animal	2	0.4
Vine Strangulation	1	0.2
Insects	1	0.2
[Enter other damage]	1	0.2

Vigor by Species

	Species	CommonName	4	3	2	1	0	Missing
	Betula nigra	river birch	14	1	1			
	Celtis laevigata	sugarberry	2	7	3	1		1
	Nyssa biflora	swamp tupelo			2			
	Nyssa sylvatica	blackgum	1	23	3		5	3
	Pinus taeda	loblolly pine	68	3				
	Quercus michauxii	swamp chestnut oak	43	21	3	2		1
	Quercus nigra	water oak						1
	Quercus phellos	willow oak	55	23	5		2	2
	Sambucus canadensis	Common Elderberry	2	1	2		9	1
	Quercus	oak	2					
	Quercus rubra	northern red oak		22	11	3	29	16
	Nyssa	tupelo			1			
	Platanus occidentalis	American sycamore	41	2				
	Ulmus americana	American elm	9	28	2			1
TOT:	**14**	**14**	**237**	**131**	**33**	**6**	**45**	**26**

Damage by Species

Species	CommonName	Count of Damage Categories	(no damage)	Other damage	Deer	Insects	Other/Unknown Animal	Unknown	Vine Strangulation
Betula nigra	river birch	2	14		2				
Celtis laevigata	sugarberry	7	7		6		1		
Nyssa	tupelo	1			1				
Nyssa biflora	swamp tupelo	2						2	
Nyssa sylvatica	blackgum	11	24		9			2	
Pinus taeda	loblolly pine	1	70		1				
Platanus occidentalis	American sycamore	0	43						
Quercus	oak	0	2						
Quercus michauxii	swamp chestnut oak	13	57	1	12				
Quercus nigra	water oak	0	1						
Quercus phellos	willow oak	11	76		9			2	
Quercus rubra	northern red oak	19	62		11	1		6	1
Sambucus canadensis	Common Elderberry	2	13					2	
Ulmus americana	American elm	16	24		15		1		
14	**14**	**85**	**393**	**1**	**66**	**1**	**2**	**14**	**1**

Damage by Plot

plot	Count of Damage Categories	(no damage)	Other damage	Deer	Insects	Other/Unknown Animal	Unknown	Vine Strangulation	Other damage
1	2	13		2					2
2	1	18		1					1
3	9	11		7			2		9
4	7	13		6			1		7
5	4	16		4					4
6	3	15		2		1			3
7	2	21					2		2
8	2	17		2					2
9	5	14		5					5
10	4	14		4					4
11	12	12		12					12
12	4	11		2	1			1	4
13	3	16		3					3
14	5	14		5					5
15	3	16		3					3
16	1	17					1		1
17	0	15							0
18	0	15							0
19	4	14					4		4
20	2	15				1	1		2
21	2	27	1	1					2
22	3	15		2			1		3
23	1	19		1					1
24	1	16		1					1
25	5	19		3			2		5
25	**85**	**393**	**1**	**66**	**1**	**2**	**14**	**1**	**85**

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	4	11	11	4	11	22	22	445	445	445	890	890	6
2	2	4	18	18	1	5	23	23	728	728	202	930	930	5
3	2	4	19	19	1	7	26	26	768	768	283	1052	1052	6
4	2	4	19	19	1	9	28	28	768	768	364	1133	1133	6
5	2	4	19	19	1	7	26	26	768	768	283	1052	1052	5
6	2	4	11	11	7	3	14	14	445	445	121	566	566	5
7	2	4	21	21	2	0	21	21	849	849	0	849	849	4
8	2	4	13	13	6	18	31	31	526	526	728	1254	1254	4
9	2	4	16	16	3	32	48	48	647	647	1294	1942	1942	6
10	2	4	15	15	3	58	73	73	607	607	2347	2954	2954	8
11	2	4	24	24	0	32	56	56	971	971	1294	2266	2266	6
12	2	4	13	13	2	124	137	137	526	526	5018	5544	5544	5
13	2	4	17	17	2	42	59	59	687	687	1699	2387	2387	5
14	2	4	18	18	1	46	64	64	728	728	1861	2589	2589	6
15	2	4	19	19	0	59	78	78	768	768	2387	3156	3156	5
16	2	4	12	12	6	53	65	65	485	485	2144	2630	2630	5
17	2	4	13	13	2	23	36	36	526	526	930	1456	1456	4
18	2	4	15	15	0	14	29	29	607	607	566	1173	1173	4
19	2	4	15	15	3	33	48	48	607	607	1335	1942	1942	4
20	2	4	5	5	12	47	52	52	202	202	1902	2104	2104	3
21	2	4	24	24	5	5	29	29	71	971	202	1173	1173	8
22	2	4	15	15	3	4	19	19	607	607	161	768	768	5
23	2	4	19	19	1	1	20	20	768	768	40	809	809	8
24	2	4	14	14	3	12	26	26	566.	566	485	1052	1052	6
25	2	4	22	22	2	31	53	53	890	890	1254	2144	2144	6

Fox Run 2013 (Year 4) 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	22	23	24	25
tree	**Betula nigra**	**river birch**	1					3			3	4											4		1		
tree	**Celtis laevigata**	**sugarberry**					2						2			1	4					1				2	1
tree	**Nyssa**	**tupelo**	1																								
tree	**Nyssa biflora**	**swamp tupelo**							2																		
tree	**Nyssa sylvatica**	**blackgum**	1		4	3	2					2		1									3	3	5	1	2
tree	Pinus taeda	loblolly pine	2	2	4	4	2	3	4	1	3	1	3	2		1	3	4	5	4	4	1	5	1	5	3	4
tree	**Platanus occidentalis**	**American sycamore**			1	1	1				1	1			3	4	9		2	4	4		3	4	2	3	
tree	**Quercus**	**oak**										1											1				
tree	**Quercus michauxii**	**swamp chestnut oak**	3	3	1	6		3	7	3		3	5		4	3	2	1	3	6			6		1	3	6
tree	**Quercus phellos**	**willow oak**	3	9	7		12	1	8	7	3	2	3	1	6			4		1	5		1	5	3		2
tree	**Quercus rubra**	**northern red oak**				1					1		2	5	1	2	1	2	3		2	3	1	2	1	2	7
shrub	Sambucus canadensis	Common Elderberry		1	2							1													1		
shrub	**Ulmus americana**	**American elm**		3		4		1		2	5		9	4	3	7		1									
Totals		**Stem count**	11	18	19	19	19	11	21	13	16	15	24	13	17	18	19	12	13	15	15	5	24	15	19	14	22
		Species count	6	5	6	6	5	5	4	4	6	8	6	5	5	6	5	5	4	4	4	3	8	5	8	6	6
		Stems per ACRE	445	729	769	769	769	445	850	526	648	607	972	526	688	729	769	486	526	607	607	202	972	607	769	567	891
Riparian Buffer Success Criteria		**Stem count**	9	15	13	15	17	8	17	12	13	13	21	11	17	17	16	8	8	11	11	4	19	14	13	11	18
		Species count	5	3	4	5	4	4	3	3	5	6	5	4	5	5	4	4	3	3	3	2	7	4	6	5	5
		Stems per ACRE	364	607	526	607	688	324	688	486	526	526	850	445	688	688	648	324	324	445	445	162	769	567	526	445	729

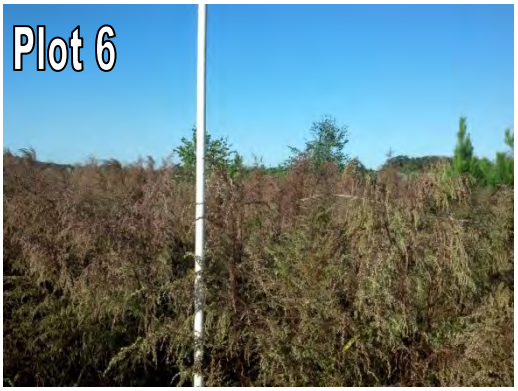
***Bolded** hardwood tree species are counted toward riparian buffer success criteria.

Fox Run 2013 (Year 4) Total Planted and Natural Stems 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	22	23	24	25
tree	**Acer rubrum**	**red maple**			3									40		7			11			6				1	3
shrub	Baccharis halimifolia	eastern baccharis	4		4		5			9			1	6	9	4	7	5		2	1	34				1	3
tree	**Betula nigra**	**river birch**	1					3			3	4											4		1		
tree	**Celtis laevigata**	**sugarberry**					2						2			1	4					1				2	1
shrub	Ilex opaca	American holly										1	1														
tree	**Liquidambar styraciflua**	**sweetgum**	6	3		3				9	31	54	27	77	31	35	50	48	11	8	19	3	4	1		1	25
shrub	Morella cerifera	waxmyrtle																			1						
tree	**Nyssa**	**tupelo**	1																								
tree	**Nyssa biflora**	**swamp tupelo**							2																		
tree	**Nyssa sylvatica**	**blackgum**	1		4	3	2			3		2		1									3	3	5	3	2
tree	Pinus taeda	loblolly pine	2	4	4	10	4	6	4	1	4	1	6	3	1	1	4	4	6	4	15	5	6	4	6	12	4
tree	**Platanus occidentalis**	**American sycamore**			1	1	1				1	1			3	4	9		2	4	4		3	4	2	3	
tree	Pyrus calleryana	Callery pear	1																								
tree	**Quercus**	**oak**										1											1				
tree	**Quercus michauxii**	**swamp chestnut oak**	3	3	1	6		3	7	3		3	5		4	3	2	1	3	6			6		1	3	6
tree	**Quercus phellos**	**willow oak**	3	9	7		12	1	8	9	3	2	3	1	6			4		1	5		1	5	3		2
tree	**Quercus rubra**	**northern red oak**	2			1		4	2		2		2	6	2	2	1	4	3		2	12	3	4	2	2	9
shrub	Sambucus canadensis	Common Elderberry		1	3						1	3										1	3		1	1	
tree	**Ulmus americana**	**American elm**		3		4		1		2	5	3	9	4	4	7	1	1		4	1						
Totals		**Stem count**	24	23	27	28	26	18	23	36	50	75	56	138	60	64	78	67	36	29	48	62	34	21	21	29	55
		Species count	10	6	8	7	6	6	5	7	8	11	9	8	8	9	8	7	6	7	8	7	10	6	8	10	9
		Stems per ACRE	972	931	1093	1134	1053	729	931	1457	2024	3036	2267	5587	2429	2591	3158	2713	1457	1174	1943	2510	1377	850	850	1174	2227
Riparian Buffer Success Criteria		**Stem count**	17	18	16	18	17	12	19	26	45	70	48	129	50	59	67	58	30	23	31	22	25	17	14	15	48
		Species count	7	4	5	6	4	5	4	5	6	8	6	6	6	7	6	5	5	5	5	4	8	5	6	7	7
		Stems per ACRE	688	729	648	729	688	486	769	1053	1822	2834	1943	5223	2024	2389	2713	2348	1215	931	1255	891	1012	688	567	607	1943

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

Fox Run
Year 4 (2013)
Vegetation Monitoring Plot Photos
Taken October 2013



Fox Run
Year 4 (2013)
Vegetation Monitoring Plot Photos
Taken October 2013
(continued)

Fox Run
Year 4 (2013)
Vegetation Monitoring Plot Photos
Taken October 2013
(continued)

Fox Run
Year 4 (2013)
Vegetation Monitoring Plot Photos
Taken October 2013
(continued)

Appendix D. NCDWQ Verification

NCDWQ On-site Determination for Applicability to the Neuse River Riparian Area Protection Rules (15A NCAC 2B .0233) Letter
NCDWQ Preliminary Restoration Plan Approval Letter

NCDENR
North Carolina Department of Environment and Natural Resources
Division of Water Quality

Beverly Eaves Perdue
Governor

Coleen H. Sullins
Director

Dee Freeman
Secretary

November 1, 2010

DWQ Project # 2010-0690 v2
Pitt County

Restoration Systems, LLC
1101 Haynes Street
Suite 211
Raleigh, NC 27604

Subject Property: Fox Run Riparian Buffer Mitigation Site
UT to Contentnea Creek, Neuse River Basin

On-Site Determination for Applicability to the Neuse River Riparian Area Protection Rules (15A NCAC 2B .0233)

Dear Mr. Creech:

At your request I conducted an on-site determination to review drainage features located on the subject property for applicability to the Neuse Buffer Rules (15A NCAC 2B .0233). The project area is labeled as "2010-0690 v2" on the attached map initialed by me on November 1, 2010. The project is located on the east side of Moye-Turnage Road (SR)Road,

The Division of Water Quality (DWQ) has determined that the surface water circled, highlighted in blue, and labeled as "2010-0690 v2 - Fox Run" on the attached map is at least intermittent and is SUBJECT to the Neuse Buffer Rule. The portion of the surface water highlighted in red and labeled as "2010-0690 v2" on the attached map is ephemeral, and NOT SUBJECT to the Neuse Buffer Rule. These features and their associated buffers should be identified on any future plans for this property. The owner (or future owners) should notify the DWQ (and other relevant agencies) of this decision in any future correspondences concerning this property. This on-site determination shall expire five (5) years from the date of this letter.

Landowners or affected parties that dispute a determination made by the DWQ or Delegated Local Authority that a surface water exists and that it is subject to the buffer rule may request a determination by the Director. A request for a determination by the

North Carolina Division of Water Quality
943 Washington Square Mall
Washington, NC 27889

Internet: www.ncwaterquality.org
Phone: 252-946-6481
FAX 252-946-9215

Director shall be referred to the Director in writing c/o Cyndi Karoly, DWQ, 401 Oversight/Express Review Permitting Unit, 2321 Crabtree Blvd., Suite 250, Raleigh, NC 27604-2260. Individuals that dispute a determination by the DWQ or Delegated Local Authority that "exempts" a surface water from the buffer rule may ask for an adjudicatory hearing. You must act within 60 days of the date that you receive this letter. Applicants are hereby notified that the 60-day statutory appeal time does not start until the affected party (including downstream and adjacent landowners) is notified of this decision. DWQ recommends that the applicant conduct this notification in order to be certain that third party appeals are made in a timely manner. To ask for a hearing, send a written petition, which conforms to Chapter 150B of the North Carolina General Statutes to the Office of Administrative Hearings, 6714 Mail Service Center, Raleigh, N.C. 27699-6714. This determination is final and binding unless you ask for a hearing within 60 days.

This letter only addresses the applicability to the buffer rules and does not approve any activity within the buffers. Nor does this letter approve any activity within Waters of the United States or Waters of the State. If you have any additional questions or require additional information please call Chris Pullinger at (252) 948-3920.

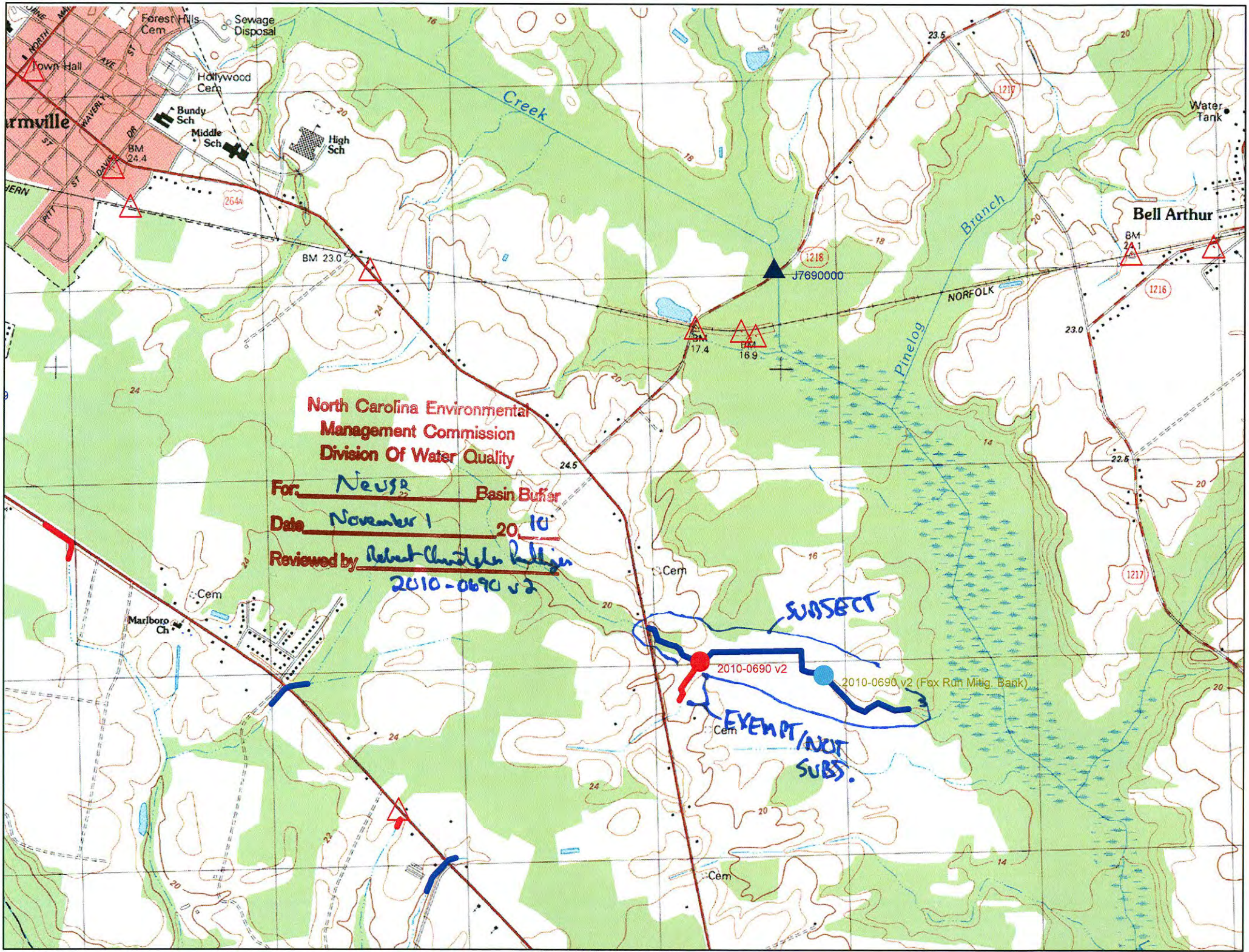
Sincerely,

Chris Pullinger
Division of Water Quality
Surface Water Protection
Washington Regional Office

Enclosures: copy of 1:24,000 scale USGS topographic map, Farmville quadrangle

cc: DWQ 401 Oversight/Express Unit
WaRO File Copy
USACE - Washington Field Office

Filename: **2010-0690 v2**



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

Beverly Eaves Perdue
Governor

Dee Freeman
Secretary

November 17, 2010

Pitt County
DWQ #: 10-0690

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

Re: Fox Run Preliminary Restoration Approval

Dear Mr. Baumgartner:

The Division of Water Quality received a draft restoration plan for the Fox Run Riparian Buffer Mitigation Site on November 8, 2010. On October 26, 2010, Chris Pullinger 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 43.72 acres of nutrient offset credit for Tar-Pamlico 8-digit HUC 03020203. 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 DWQ number.

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

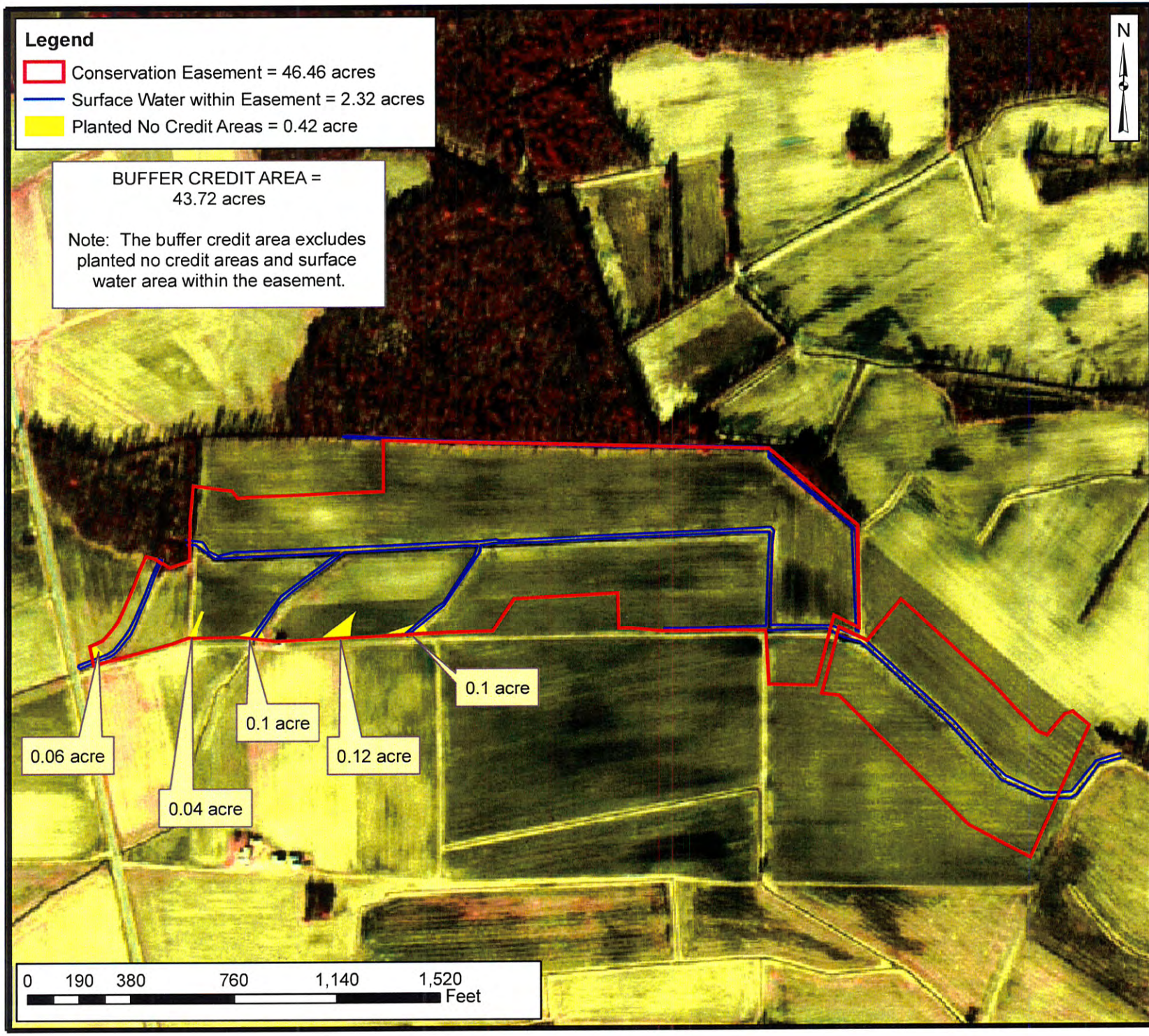
Sincerely,

Lia M. Gilleski

for 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/



Axiom Environmental, Inc.

Prepared for:

RESTORATION SYSTEMS | LLC

Project:

FOX RUN RIPARIAN BUFFER MITIGATION SITE

Pitt County, NC

Title:

EXISTING CONDITIONS

Drawn by: CLF

Date: NOV 2010

Scale: 1:5700

Project No.: 10-001

FIGURE

4