

**ANNUAL MONITORING REPORT**  
**YEAR 3 (2012)**  
**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**



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**July 2012**

## 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 745 planted hardwood trees per acre based on riparian buffer success criteria in the Third Monitoring Year (2012). In addition, each individual plot met success criteria based on planted stems alone.

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## 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 35.5702°N, Longitude 77.54272°W (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 June 2012. Results are provided in Appendix C. Vegetation success criteria for year 3 (320 hardwood stems per acre) were exceeded for the 2012 annual monitoring year with an average density of 745 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.

Planted stems counts increased in year 3 (2012) monitoring from year 2 (2011) monitoring at Plots 7 and 25. Plot 7 increased by two *Quercus phellos* resprouts; one was thought to be dead in year 2 (2011) and the other was missed in previous years but appear to be planted based on the size of the tree base. Plot 25 increased by one *Nyssa* sp. resprout that was missed in previous years monitoring most likely due to herbivory.

## **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 745 planted hardwood trees per acre based on riparian buffer success criteria in the Third Monitoring Year (2012). In addition, each individual plot met success criteria based on planted stems alone. 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		
2	769	729	729		
3	809	729	688		
4	688	810	769		
5	850	810	810		
6	607	729	729		
7	931	850	931		
8	688	810	769		
9	728	769	729		
10	769	607	567		
11	971	931	931		
12	688	648	607		
13	769	810	769		
14	769	769	729		
15	728	769	769		
16	688	810	729		
17	567	607	607		
18	567	607	607		
19	688	769	729		
20	607	648	648		
21	1133	1053	1053		
22	728	729	729		
23	809	769	769		
24	728	648	648		
25	931	931	972		
<b>Average Plots 1-25</b>	<b>756</b>	<b>761</b>	<b>745</b>		

#### 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](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**



**Legend**

- Vegetation Plots
- ☆ Vegetation Plot Origin
- Conservation Easement = 46.46 acres
- Surface Water Within Easement = 2.32 acres
- Planted No Credit Areas = 0.42 acre

BUFFER CREDIT AREA =  
43.72 acres

Note: The buffer credit area excludes planted no credit areas and surface water area within the easement.



Prepared for:



Project:

**FOX RUN  
RIPARIAN  
BUFFER  
MITIGATION  
SITE**

Pitt County, NC

Title:

**MONITORING  
PLAN VIEW**

Drawn by:

CLF

Date:

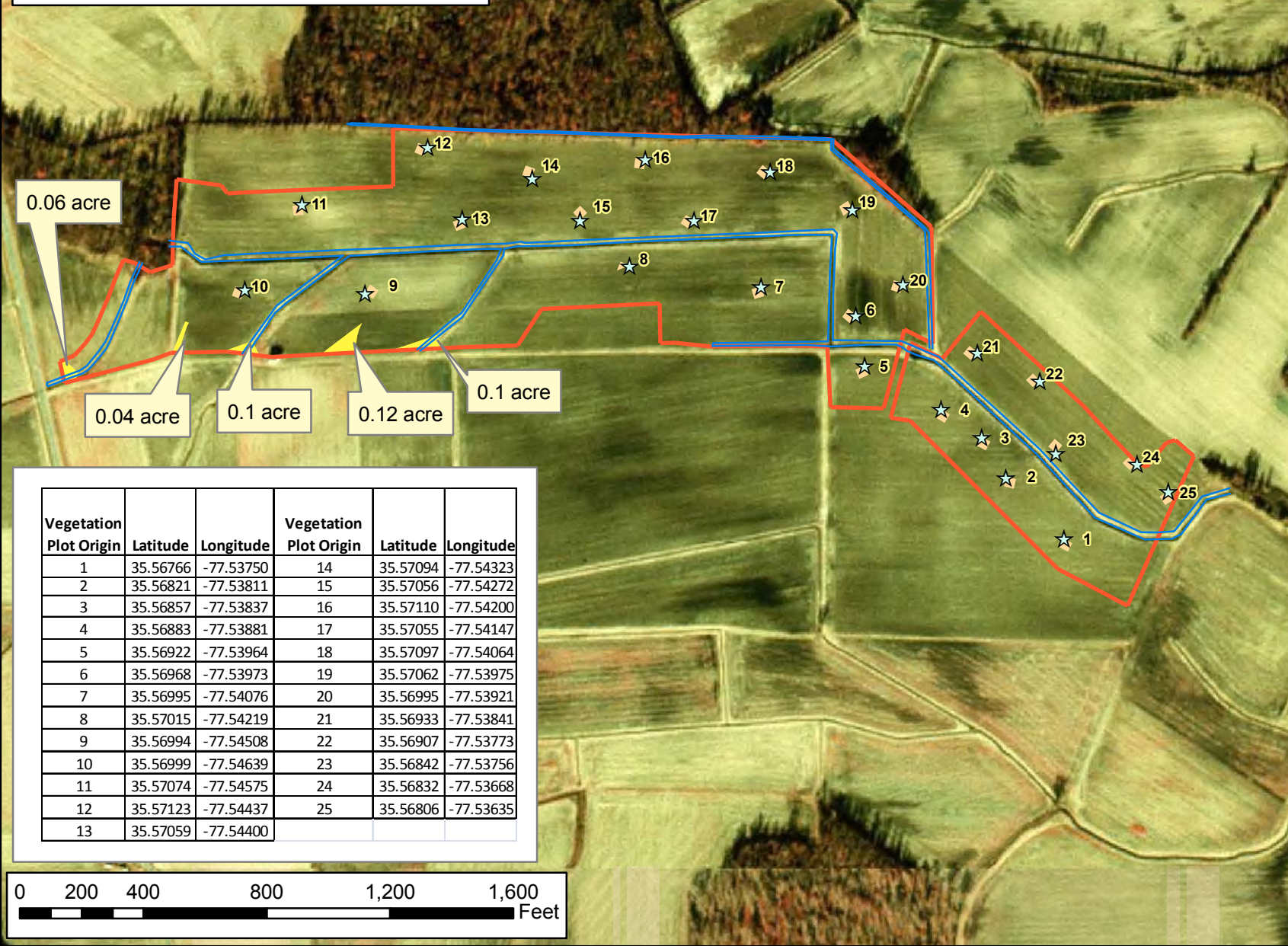
NOV 2010

Scale:

1:5700

Project No.:

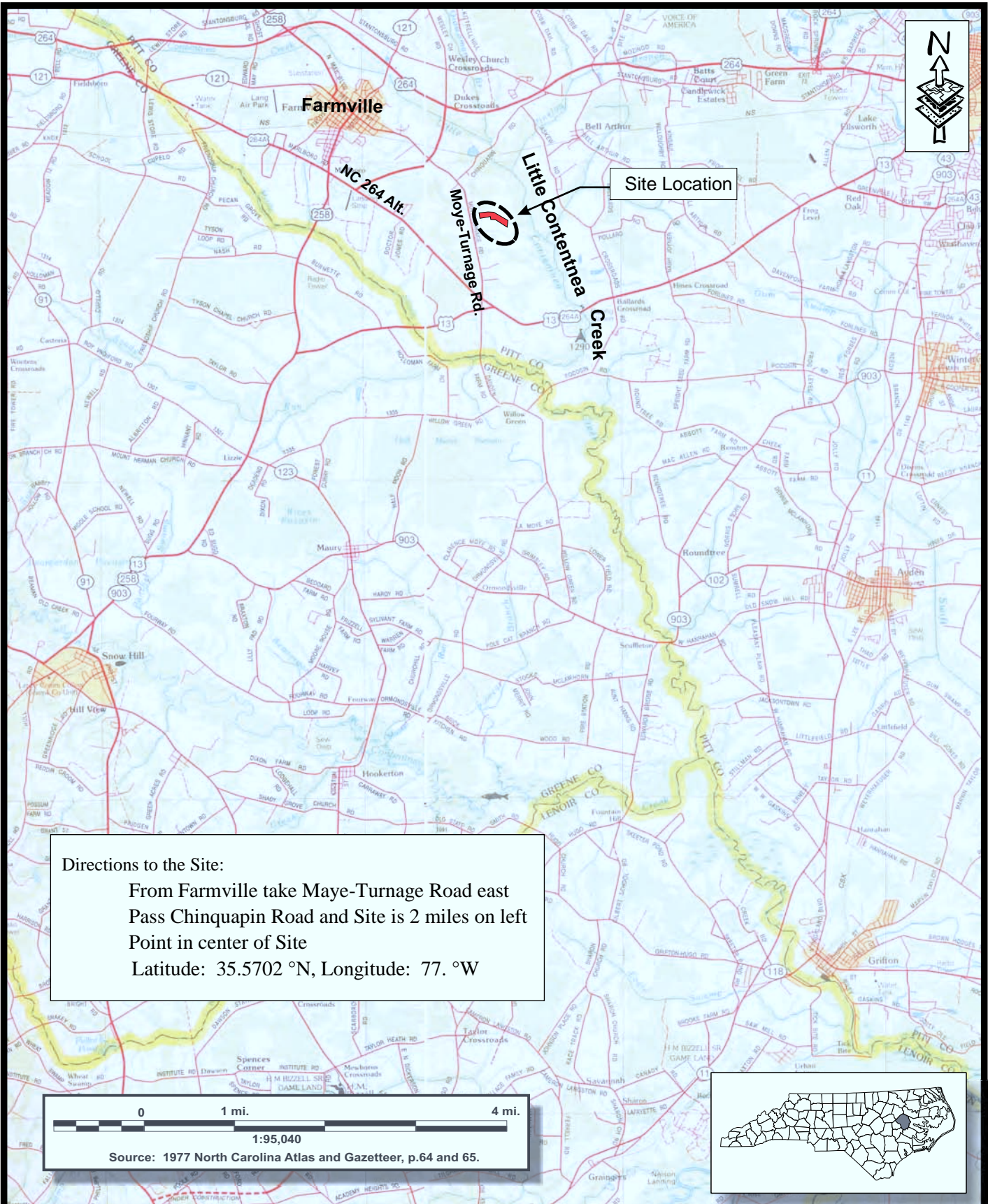
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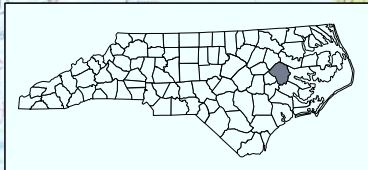
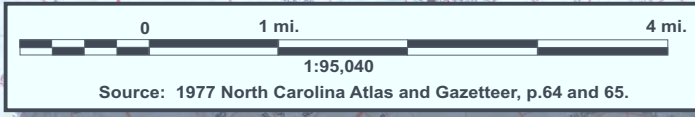
Vegetation Plot Origin	Latitude	Longitude	Vegetation Plot Origin	Latitude	Longitude
1	35.56766	-77.53750	14	35.57094	-77.54323
2	35.56821	-77.53811	15	35.57056	-77.54272
3	35.56857	-77.53837	16	35.57110	-77.54200
4	35.56883	-77.53881	17	35.57055	-77.54147
5	35.56922	-77.53964	18	35.57097	-77.54064
6	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			

FIGURE

2



Directions to the Site:  
 From Farmville take Moyer-Turnage Road east  
 Pass Chinquapin Road and Site is 2 miles on left  
 Point in center of Site  
 Latitude: 35.5702 °N, Longitude: 77. °W




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**

**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**

<b>Component Summation</b>	
<b>Restoration Level</b>	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	
<b>43.72 Buffer Mitigation Units</b>	

**Table 2. Project Activity and Reporting History**

<b>Activity or Report</b>	<b>Data Collection Complete</b>	<b>Completion or Delivery</b>
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

**Table 3. Project Contacts Table**

<b>Designer</b>	Restoration Systems, LLC 1101 Haynes Street, Suite 211 Raleigh, North Carolina 27604 (919) 755-9490
<b>Planting Contractor</b>	Carolina Silvics 908 Indian Trail Road Edenton, North Carolina 27932 Dwight McKinney (252) 482-8491
<b>Monitoring Performer</b>	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**

<b>Species</b>	<b>Quantity</b>
American elm ( <i>Ulmus americana</i> )	7500
Black gum ( <i>Nyssa sylvatica</i> )	2500
Elderberry ( <i>Sambucus canadensis</i> )	2500
Loblolly pine ( <i>Pinus taeda</i> )	7500
Northern red oak ( <i>Quercus rubra</i> )	5000
River birch ( <i>Betula nigra</i> )	2500
Sugarberry ( <i>Celtis laevigata</i> )	2500
Swamp chestnut oak ( <i>Quercus michauxii</i> )	7500
Sycamore ( <i>Platanus occidentalis</i> )	3200
Willow oak ( <i>Quercus phellos</i> )	7500
<b>TOTAL</b>	<b>50,000</b>

## 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 3
Fox Run	Fox Run	Neuse	768.90

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

Project Code	Project Name	River Basin	Year 3
Fox Run	Fox Run		1596.080176

### Vigor

vigor	Count	Percent
0	12	2.4
1	11	2.2
2	103	20.9
3	179	36.2
4	182	36.8
Missing	7	1.4

### Vigor by Species

Species	CommonName	4	3	2	1	0	Missing	Unknown
Betula nigra	river birch	13	3			1		
Celtis laevigata	sugarberry		8	4	2			
Nyssa biflora	swamp tupelo		1	1				
Nyssa sylvatica	blackgum	1	16	17		1	1	
Pinus taeda	loblolly pine	60	10	1		3		
Quercus michauxii	swamp chestnut oak	27	37	6				
Quercus nigra	water oak			1				
Quercus phellos	willow oak	36	44	6		1	4	
Sambucus canadensis	Common Elderberry	1	4	8	2	1		
Quercus	oak		1	1			1	
Quercus rubra	northern red oak	1	20	52	7	5	1	
Nyssa	tupelo			1				
Platanus occidentalis	American sycamore	41	2					
Ulmus americana	American elm	2	33	5				
<b>14</b>	<b>14</b>	<b>182</b>	<b>179</b>	<b>103</b>	<b>11</b>	<b>12</b>	<b>7</b>	

## Damage

Damage	Count	Percent Of Stems
(no damage)	325	65.8
Deer	93	18.8
Unknown	23	4.7
Rodents	22	4.5
Insects	16	3.2
Diseased	12	2.4
(other damage)	2	0.4
Removal	1	0.2

## Damage by Species

Species	CommonName	Count of Damage Categories	(no damage)	Deer	Diseased	Insects	Removal	Rodents	Unknown
Betula nigra	river birch	2	15	2					
Celtis laevigata	sugarberry	6	8	1		1	1	3	
Nyssa	tupelo	1		1					
Nyssa biflora	swamp tupelo	1	1					1	
Nyssa sylvatica	blackgum	24	12	21				1	2
Pinus taeda	loblolly pine	6	68		3	3			
Platanus occidentalis	American sycamore	1	42	1					
Quercus	oak	1	2		1				
Quercus michauxii	swamp chestnut oak	22	48	6	7	6			3
Quercus nigra	water oak	1							1
Quercus phellos	willow oak	13	78	11	1				1
Quercus rubra	northern red oak	65	21	28		6		15	16
Sambucus canadensis	Common Elderberry	10	6	8				1	
Ulmus americana	American elm	16	24	14				1	
<b>14</b>	<b>14</b>	<b>169</b>	<b>325</b>	<b>93</b>	<b>12</b>	<b>16</b>	<b>1</b>	<b>22</b>	<b>23</b>



### Damage by Plot

plot	Count of Damage Categories	(no damage)	Deer	Diseased	Insects	Removal	Rodents	Unknown	(other damage)
1	7	11	2	2			2	1	
2	6	14	5					1	
3	8	13	6	2					
4	12	8	7	2	2				1
5	5	16	3	1		1			
6	13	5	5		3		2	3	
7	3	21			1		1	1	
8	2	18	2						
9	7	13	3				3	1	
10	3	15	2	1					
11	3	21	3						
12	5	12	4					1	
13	6	14	2	1	1			2	
14	7	13	7						
15	3	16	2		1				
16	6	14	2				1	3	
17	4	11	1	1			2		
18	2	13	1		1				
19	6	13	1				4	1	
20	14	3	5		2		1	6	
21	10	19	6	2	2				
22	10	8	9					1	
23	9	11	7		1			1	
24	8	9	2				4	1	1
25	10	14	6		2		2		
<b>25</b>	<b>169</b>	<b>325</b>	<b>93</b>	<b>12</b>	<b>16</b>	<b>1</b>	<b>22</b>	<b>23</b>	<b>2</b>

## 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	3	15	15	3	8	23	23	607	607	324	931	931	7
2	2	3	19	19	1	2	21	21	769	769	81	850	850	6
3	2	3	20	20	1	8	28	28	809	809	324	1133	1133	6
4	2	3	19	19	1	5	24	24	769	769	202	971	971	6
5	2	3	20	20	1	5	25	25	809	809	202	1012	1012	5
6	2	3	18	18	0	0	18	18	728	728	0	728	728	7
7	2	3	23	23	1	6	29	29	931	931	243	1174	1174	5
8	2	3	19	19	1	19	38	38	769	769	769	1538	1538	5
9	2	3	19	19	1	6	25	25	769	769	243	1012	1012	8
10	2	3	18	18	0	20	38	38	728	728	809	1538	1538	8
11	2	3	23	23	1	40	63	63	931	931	1619	2550	2550	6
12	2	3	15	15	2	83	98	98	607	607	3359	3966	3966	5
13	2	3	19	19	1	20	39	39	769	769	809	1578	1578	5
14	2	3	18	18	2	51	69	69	728	728	2064	2792	2792	6
15	2	3	19	19	0	19	38	38	769	769	769	1538	1538	5
16	2	3	18	18	2	67	85	85	728	728	2711	3440	3440	5
17	2	3	15	15	0	7	22	22	607	607	283	890	890	4
18	2	3	15	15	0	27	42	42	607	607	1093	1700	1700	4
19	2	3	18	18	1	13	31	31	728	728	526	1255	1255	4
20	2	3	17	17	0	43	60	60	688	688	1740	2428	2428	4
21	2	3	29	29	0	8	37	37	1174	1174	324	1497	1497	9
22	2	3	18	18	0	5	23	23	728	728	202	931	931	5
23	2	3	20	20	0	0	20	20	809	809	0	809	809	8
24	2	3	17	17	0	3	20	20	688	688	121	809	809	7
25	2	3	24	24	0	46	70	70	971	971	1862	2833	2833	6

**Fox Run 2012 (Year 3) 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	<b>Betula nigra</b>	river birch	1					3			3	4										4		1					
tree	<b>Celtis laevigata</b>	sugarberry					3						2			1	4					1				2	1		
tree	<b>Nyssa</b>	tupelo	1																										
tree	<b>Nyssa biflora</b>	swamp tupelo							2																				
tree	<b>Nyssa sylvatica</b>	blackgum	2		4	3	2			4		2		1									3	3	5	3	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	<b>Platanus occidentalis</b>	American sycamore			1	1	1				1	1			3	4	9		2	4	4		3	4	2	3			
tree	<b>Quercus</b>	oak										1											1						
tree	<b>Quercus michauxii</b>	swamp chestnut oak	3	3	1	6		3	7	3	1	3	5		4	3	2	1	3	6			6		1	3	6		
tree	<b>Quercus nigra</b>	water oak						1																					
tree	<b>Quercus phellos</b>	willow oak	4	9	7		12	1	8	9	3	2	2	2	6			4		1	5		1	5	3		2		
tree	<b>Quercus rubra</b>	northern red oak	2	1		1		5	2		2		2	6	3	2	1	8	5		5	14	3	5	2	2	9		
shrub	Sambucus canadensis	Common Elderberry		1	3						1	4										1	3		1	1			
shrub	<b>Ulmus americana</b>	American elm		3		4		2		2	5		9	4	3	7		1											
<b>Totals</b>			<b>Stem count</b>	15	19	20	19	20	18	23	19	19	18	23	15	19	18	19	18	15	15	18	17	29	18	20	17	24	
			<b>Species count</b>	7	6	6	6	5	7	5	5	8	8	6	6	5	5	6	5	5	4	4	4	4	9	5	8	7	6
			<b>Stems per ACRE</b>	607	769	810	769	810	729	931	769	769	729	931	607	769	729	769	729	607	607	729	688	1174	729	810	688	972	
<b>Riparian Buffer Success Criteria</b>			<b>Stem count</b>	15	18	17	19	20	18	23	19	18	14	23	15	19	18	19	18	15	15	18	16	26	18	19	16	24	
			<b>Species count</b>	7	5	5	6	5	7	5	5	7	7	6	5	5	6	5	5	5	4	4	4	3	8	5	7	6	6
			<b>Stems per ACRE</b>	607	729	688	769	810	729	931	769	729	567	931	607	769	729	769	729	607	607	729	648	1053	729	769	648	972	

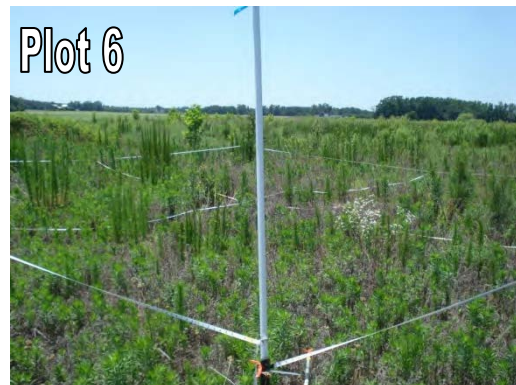
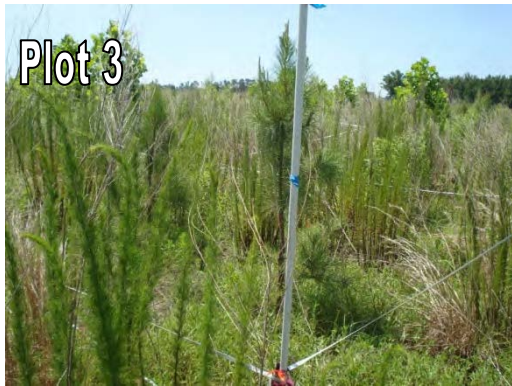
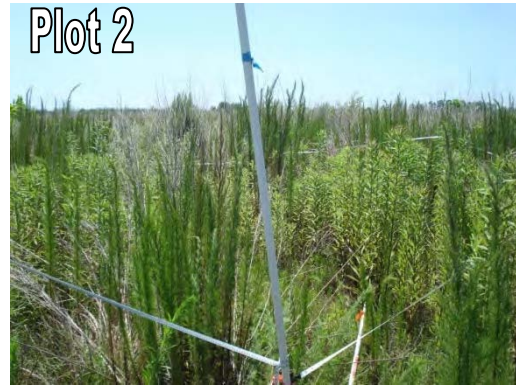
\***Bolded** hardwood tree species are counted toward riparian buffer success criteria.

**Fox Run 2012 (Year 3) 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	<b>Acer rubrum</b>	red maple								2				6	3	4			7		1	1					2		
shrub	Baccharis halimifolia	eastern baccharis	4		3		4		6	12		3	2	5	7	4	3	8		2	1	37				1	15		
tree	<b>Betula nigra</b>	river birch	1					3		1	3	4											4		1				
tree	<b>Celtis laevigata</b>	sugarberry					3						2			1	4					1				2	1		
tree	<b>Liquidambar styraciflua</b>	sweetgum	2	2	5	2				5	5	17	38	72	9	42	14	59		10	7	5	6	5		1	28		
tree	<b>Liriodendron tulipifera</b>	tuliptree															1												
tree	<b>Nyssa</b>	tupelo	1																										
tree	<b>Nyssa biflora</b>	swamp tupelo							2																				
tree	<b>Nyssa sylvatica</b>	blackgum	2		5	3	2			4		2		1										3	3	5	3	2	
tree	Pinus taeda	loblolly pine	5	2	4	7	3	3	4	1	3	1	3	3	1	2	4	4	5	4	8	1	7	1	5	4	5		
tree	<b>Platanus occidentalis</b>	American sycamore			1	1	1				1	1			3	4	9		2	4	4		3	4	2	3			
tree	Pyrus calleryana	Callery pear	1																										
tree	<b>Quercus</b>	oak										1															1		
tree	<b>Quercus michauxii</b>	swamp chestnut oak	3	3	1	6		3	7	3	1	3	5		4	3	2	1	3	6			6		1	3	6		
tree	<b>Quercus nigra</b>	water oak						1																					
tree	<b>Quercus phellos</b>	willow oak	4	9	7		12	1	8	9	3	2	2	2	6			5		1	5		1	5	3		2		
tree	<b>Quercus rubra</b>	northern red oak	2	1		1		5	2		3		2	6	4	3	1	9	5		6	14	3	5	2	2	9		
shrub	Sambucus canadensis	Common Elderberry		2	3						1	4										1	3		1	1			
tree	<b>Ulmus</b>	elm									1									15									
tree	<b>Ulmus americana</b>	American elm		3		4		2		2	5		9	4	3	7		1											
<b>Totals</b>			<b>Stem count</b>	25	22	29	24	25	18	29	39	26	38	63	99	40	70	38	87	22	42	32	60	37	23	20	20	70	
			<b>Species count</b>	10	7	8	7	6	7	6	9	10	10	10	8	8	9	9	8	7	5	7	7	7	10	6	8	9	9
			<b>Stems per ACRE</b>	1012	891	1174	972	1012	729	1174	1579	1053	1538	2551	4008	1619	2834	1538	3522	891	1700	1296	2429	1498	931	810	810	2834	
<b>Riparian Buffer Success Criteria</b>			<b>Stem count</b>	15	18	19	17	18	15	19	26	22	30	58	91	32	64	31	75	17	36	23	21	27	22	14	14	50	
			<b>Species count</b>	7	5	5	6	4	6	4	7	8	7	6	6	7	7	7	6	5	4	5	5	4	8	5	6	6	7
			<b>Stems per ACRE</b>	607	729	769	688	729	607	769	1053	891	1215	2348	3684	1296	2591	1255	3036	688	1457	931	850	1093	891	567	567	2024	

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

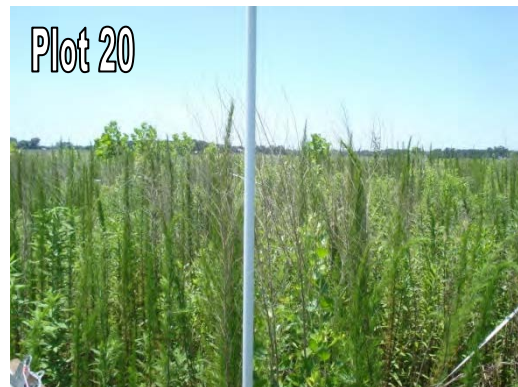
**Fox Run  
Year 3 (2012)  
Vegetation Monitoring Plot Photos  
Taken June 2012**



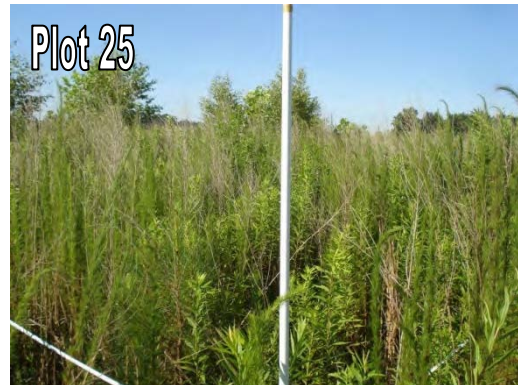
**Fox Run  
Year 3 (2012)  
Vegetation Monitoring Plot Photos  
Taken June 2012  
(continued)**



**Fox Run  
Year 3 (2012)  
Vegetation Monitoring Plot Photos  
Taken June 2012  
(continued)**



**Fox Run  
Year 3 (2012)  
Vegetation Monitoring Plot Photos  
Taken June 2012  
(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**



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

Beverly Eaves Perdue  
Governor

Coleen H. Sullins  
Director

Dee Freeman  
Secretary

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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](http://www.ncwaterquality.org)  
Phone: 252-946-6481  
FAX 252-946-9215

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North Carolina  
*Naturally*

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.

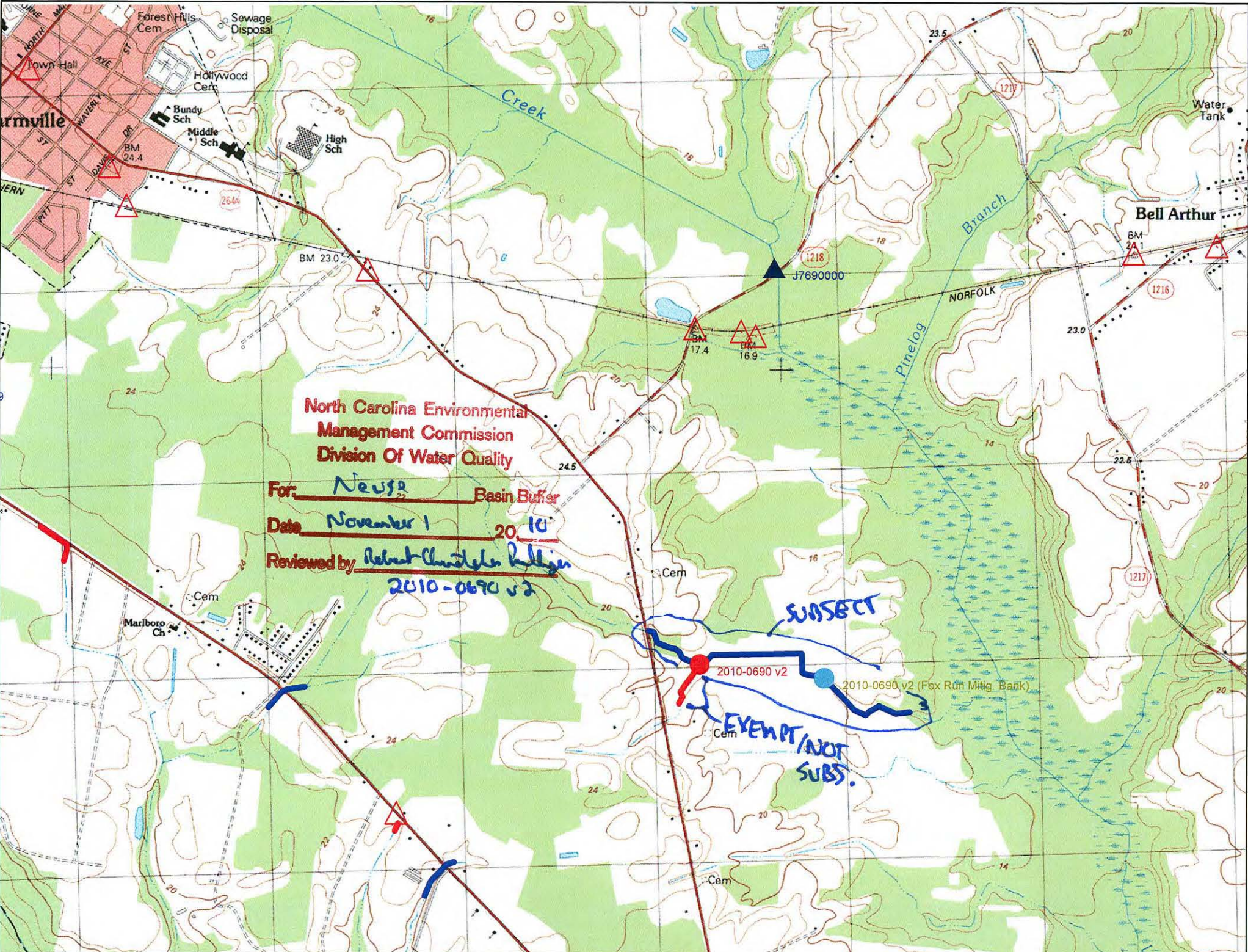
Sincerely,



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



**North Carolina Environmental  
Management Commission  
Division Of Water Quality**

For: Neuse Basin Buffer  
Date: November 1, 2010  
Reviewed by: Robert Christopher Holliger  
2010-0690 v2

**SUBJECT**

2010-0690 v2

2010-0690 v2 (Fox Run Mitig. Bank)

**EXEMPT/NOT  
SUBS.**



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

**Legend**

- Conservation Easement = 46.46 acres
- Surface Water within Easement = 2.32 acres
- Planted No Credit Areas = 0.42 acre

**BUFFER CREDIT AREA =**  
43.72 acres

Note: The buffer credit area excludes planted no credit areas and surface water area within the easement.

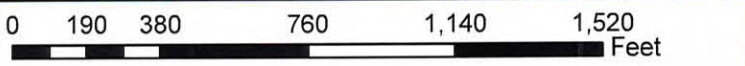
0.06 acre

0.04 acre

0.1 acre

0.12 acre

0.1 acre



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**