

BASELINE MONITORING DOCUMENT & AS BUILT BASELINE REPORT

PEPPERWOOD FARM RIPARIAN BUFFER MITIGATION SITE

Wake County, North Carolina

EEP Project ID: 95713

Data Collected March 18th 2014



Prepared for:



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

May 2014

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1.0 - Executive Summary

This **Baseline Monitoring Document & As-Built Baseline Report** describes the **Pepperwood Farm Riparian Buffer Mitigation Site** (Site) and is designed specifically to assist in fulfilling the North Carolina Ecosystem Enhancement Program riparian buffer mitigation goals within the Neuse 03020201 Watershed.

The Site is located approximately 1 mile northeast of Willow Springs and 4 miles northeast of Fuquay-Varina, in Wake County, North Carolina, (figure 1). The project is situated within the Middle Creek watershed (United States Geological Society (USGS) 14-digit Hydrologic Cataloging Unit (HUC) 03020201120010 of the Neuse River Basin and North Carolina Division of Water Resource (NC DWR) Sub-basin 03-04-03). This sub-basin was identified by the 2010 Neuse River Basin Restoration Priorities (NC DENR) as a Targeted Local Watershed (TLW).

The Site encompasses 12.66 acres and protected in perpetuity by three conservation easements recorded at the Wake County Register of Deeds on 11/25/2013, further detailed in Section 2.3. The Site protects five unnamed tributaries with direct hydrologic connection to Terrible Creek, DWR Stream Index Number 27-43-15-8-(2) and a Best Usage Classification of C, NSW (NC DWR 2009). Prior to restoration activities, riparian areas were cleared of native forest vegetation, heavily degraded by livestock grazing and hoof shear, maintained for hay production, and subject to raw manure fertilization. Streams were straightened, routinely cleared and subject to stormwater runoff from boarding facilities.

The primary goal of this riparian buffer restoration project is to provide **10.70 Neuse River Riparian Buffer Units** (RBMU). The success of this goal is based on the following criteria;

1. Removing nonpoint sources of pollution associated with agricultural activities including a) removal of horses from riparian areas; b) eliminating the application of fertilizer, pesticides, and other agricultural materials into and adjacent to streams; and c) establishing a vegetative buffer adjacent to streams to treat surface runoff, which may contain pollutants such as sediment and/or agricultural pollutants from the adjacent landscape.
2. Reducing sedimentation onsite and downstream by a) reducing bank erosion associated with vegetation maintenance and b) planting a diverse hardwood vegetative buffer adjacent to Site tributaries.
3. Stabilizing stream banks where necessary by sloping channel banks, and installing erosion control matting and livestakes.
4. Improving aquatic habitat by enhancing stream bed shading and natural detritus input.
5. Providing a terrestrial wildlife corridor and refuge in an area continually being developed for commercial and residential use.
6. Restoring and reestablishing natural community structure, habitat diversity, and functional continuity.
7. Protecting the Site's full potential of stream and riparian buffer functions and values in perpetuity.

Accomplishing this criterion is a multi-year process. Restoration activities outlined in the Pepperwood Farm Mitigation Plan were implemented during February and March of 2014. Activities included the installation of a shallow marsh treatment area, stabilization of stream banks, planting of riparian areas with bare root hardwood seedlings, removal of livestock from riparian areas and protecting the Site in perpetuity with a conservation easement. Additionally, the Site has been surveyed and marked per NC EEP guidelines by a licensed NC surveyor (Appendix C – As-Built Survey).

Monitoring of restoration efforts will be performed for a minimum of 5 years or until success criteria are fulfilled. Monitoring protocol and success criteria are further detailed in Section 5.0.

2.0 - Project Background & Goals

2.1 Location and Setting

The Pepperwood Farm Riparian Buffer Mitigation Site (Site) is located approximately 1 mile northeast of Willow Springs and 4 miles northeast of Fuquay-Varina, in southern Wake County, North Carolina (Figure 1).

Directions to Site

- Via Raleigh, North Carolina:
- Travel South on Highway 401 for approximately 12 miles
- Take a left onto Air Park Road (gas station on corner)
- Travel approximately 0.6 miles, turn right on Dunallie Dr.
- Entrance to Pepperwood Farm is located at the end of Dunallie Dr.
- 35.617249°N, -78.715332°W (NAD83/WGS84)

2.2 Site Selection & Historic Conditions

Site selection was based on the conditions outlined in the NC EEP's RFP # 16-004362. The Site is located within the Middle Creek TLW (USGS HUC 03020201120010) of the Neuse River Basin and is designed specifically to assist in fulfilling NC EEP's riparian buffer restoration goals in accordance with the Neuse River Basin Nutrient Sensitive Waters Management Strategy (15A NCAC 02B .0233). Prior to restoration activities, riparian areas were cleared of native forest vegetation, heavily degraded by livestock grazing and hoof shear, maintained for hay production, and subject to raw manure fertilization. Streams were straightened, routinely cleared and subject to stormwater runoff from boarding facilities.

Each of the five unnamed tributaries within the Site are identified on the United States Department of Agriculture 1970 Soil Survey of Wake County, North Carolina and are hydrologically connected to Terrible Creek. On November 8th, 2012 and January 18, 2013 the NC Division of Water Resources (NC DWR) visited the Site and determined the features labeled UT 1-5 (Figure 2) were viable for riparian buffer restoration (Appendix D). Before discharging into Terrible Creek, Site tributaries enter and flow through the *Terrible Creek Riparian Buffer Restoration Project* (NC EEP ID# 134).

2.3 Project Goals and Objectives

2.3.1 Project Goals

- Improving Water Quality
 - Removing nonpoint sources of pollution associated with agricultural production including a) removing livestock and b) ceasing the broadcast application of fertilizer, pesticides, and other agricultural materials into and adjacent to Site streams through treatment of runoff within the forested buffer.
 - Reducing sedimentation within onsite and downstream waters by a) reducing bank erosion and vegetation maintenance, b) eliminating plowing and hoof shear, and c) removing livestock from the Site.
- Enhancing Flood Attenuation
 - Promoting floodwater attenuation by increasing frictional resistance on floodwaters crossing Site floodplains.
- Restoring Wildlife Habitat
 - Improving aquatic habitat by enhancing stream bed shading and natural detritus input.
 - Providing a terrestrial wildlife corridor and refuge in an area extensively developed for agricultural production.
 - Restoring and reestablishing natural community structure, habitat diversity, and functional continuity.

- Protecting the Site’s full potential of stream and riparian buffer functions and values in perpetuity.

2.3.2 Project Objectives

The project goals will be addressed through the following project objectives:

- Providing a minimum of 10.70 Neuse River Riparian Buffer Units, as calculated in accordance with the requirements stipulated in RFP #16-004362, including the;
 - Installation of shallow marsh treatment area on an ephemeral ditches entering the Site from the west along UT-3;
 - Small areas of stream bank stabilization along UT-1;
 - Planting 10.7 acres of riparian area by planting bare root hardwood seedlings;
 - Removal of livestock from riparian areas; and
 - Protecting the Site in perpetuity with a conservation easement.

3.0 - Project Structure, Restoration Type & Approach

3.1 Project Structure

Streams targeted for riparian buffer restoration include five unnamed tributaries to Terrible Creek which are depicted on the 1970 USDA Soil Survey of Wake County, North Carolina. On November 8th, 2012 and January 18, 2013 the NC Division of Water Resources (NC DWR) visited the Site and determined the features labeled UT 1-5 were viable for riparian buffer restoration (Appendix D). Characteristics of Site streams are summarized in table below; each feature is also depicted on Figure 2, Appendix A.

Existing Stream Characteristics - Pepperwood Farm Riparian Buffer Mitigation Site

Stream Reach	Drainage Basin (Acres)	NC DWR Stream Identification Form Score	Status	² Depicted on Wake County NRCS Soils Survey?
UT-1	40.55	38.75	perennial	Yes
UT-2	85.01	32.5	perennial	Yes
UT-3	48.16	37.0	perennial	Yes
UT-4	62.60	30.75	perennial	Yes
UT-5	45.13	¹ not available	¹ not available	Yes

¹On January 18th of 2013 UT-5 was evaluated for applicability to the Neuse River Basin: Nutrient Sensitive Waters Management Strategy (15A NCAC 2B .0233) by NC DWR Personnel. A stream identification form was not executed; written correspondence can be found in Appendix A.

² United States Department of Agriculture (USDA). 1970. Soil Survey of Wake County, North Carolina

- Appendix A: Figure 2 – Preconstruction Conditions / Project Components
- Appendix A: Table 1 – Project Components and Mitigation Credits
- Appendix A: Table 4 – Project Baseline Information & Attributes Table

3.2 Restoration Type & Approach

Site restoration activities were conducted during the months of February and March 2014 and include the cessation of current agricultural practices; including the installation of a shallow marsh treatment area, herbicide treatment to dense fescue areas along UT’s 4 and 5, minor stabilization of stream banks along UT-1, planting of riparian areas with bare root hardwood seedlings, removal of livestock from riparian areas and protecting the Site in perpetuity with a conservation easement (Appendix C, Sheets B and C). These activities and the monitoring of these activities will ultimately result delivering 10.7 Riparian Buffer Mitigation Credits for the NC EEP.

Fescue Herbicide Treatment:

Areas of the Site subject to dense fescue growth (UT’s 4 and 5) were mowed and treated with a onetime application of Sulfomet XP (Sulfometron Methyl) at an application rate of 4 oz. / ac. Herbicide application was made on February 10th 2014 by Carolina Silvics, a licensed NC Department of

Agriculture & Consumer Services Ground Pesticide applicator. Treatment was made over approximately 5.9 acres of the Site. An approximate 5 foot buffer was left untreated along Site streams to prevent destabilizing stream banks.

Stream Bank Stabilization & Piped Channel Crossings:

Stream bank stabilization measures occurred along UT-1 and alleviated minor bank erosion reaches. All stream stabilization work predominantly occurred above the mean high water line and entail sloping banks, installing erosion control matting and planting of livestakes. Stream bank stabilization measures aim to reduce shear stress and sedimentation, improve water quality functions, and improve aquatic and wildlife habitat associated with a stable riparian corridor/stream.

Although outside the conservation easement five piped channel crossings were installed during construction activities. The table below details their location and installation. In field discussions with Martin Richmond of the DWR during our January 18, 2013 Site visit and phone conversations with James Lastinger of the USACE Raleigh Field Office confirmed the activities listed below and total impact from would not require 401 and 404 consultation. This was because restoration activities would result in less than a 1/10 of an acre and/or 150 linear feet of impact to regulated waters. This assumption was confirmed from the as-built numbers detailed in the table below.

Stream Bank Stabilization & Piped Channel Crossings

Activity and Location	Description of Activity	Mitigation Plan (01-10-2014) Estimated Linear Impact	As-Built Impacts: Linear feet of impact
Bank Stabilization along UT-1	Stream bank stabilization work predominantly occur above the mean high water line and will entail sloping banks, installation of erosion control matting, planting of livestakes, and seeding with a riparian seed mix.	Less than 20'	30'
Piped Crossing UT-1	1 – 16' section of corrugated pipe to be installed	20'	20'
Piped Crossing UT-2	1 – 16' section of corrugated pipe to be installed	20'	20'
Replace Piped Crossing UT-3	1 section of degraded agricultural pipe to be removed; 1 – 16' section of corrugated pipe to be installed	n/a – replacement of existing crossing	Pipe not replaced
Piped Crossing UT-4	1 – 16' section of corrugated pipe to be installed	20'	20'
Replace Piped Crossing UT-5	2 sections of degraded agricultural pipe will be removed; 2 – 16' section of corrugated pipe to be installed	n/a – replacement of existing crossings	n/a – replacement of existing crossings
Total		Less than 80 l. ft.	90 l. ft.

Marsh Treatment Area:

A shallow marsh treatment structure was installed adjacent to the UT-3 easement boundary and outside of the credit generating area. The marsh treatment structure defuses the flow of a shallow ephemeral ditch as it enters the Site. The treatment area will intercept surface water prior to discharging into the Site (Appendix C, Sheet B). The marsh treatment consists of a shallow depression in the landscape, filled with rock, and set with a log to control the outfall elevation and will provide treatment and attenuation of initial stormwater pulses.

Vegetation Planting:

Carolina Silvics planted the Site on March 13th, 2014 (Appendix C, Sheet C) with native, regional specific bare root seedlings (Table 6, Appendix A) consistent with the Schafale and Weakley definition of a Piedmont / Low Mountain Alluvial Forest and onsite vegetation observations. The entire riparian buffer restoration area (10.7 acres) was planted and baseline vegetation data was collected by Axiom Environmental on March 18th.

Fencing:

Fencing has been installed by Pepperwood Farm, LLC (current landowner) to exclude horses from restored riparian areas which border horse paddocks. Not all restored riparian areas will receive fencing as horse paddocks are concentrated to riparian areas along UT 1, 2, & 3. Currently, fencing occurs on roughly 50% of the project (Appendix C, Sheet B). It is assumed that additional horse paddocks will be constructed adjacent to protected riparian areas as horse activities continue to grow. Pepperwood Farm, LLC will maintain fencing and construct additional fencing as needed.

4.0 - Project History, Contacts and Attribute Data

Prior to restoration activities, riparian areas were cleared of native forest vegetation, heavily degraded by livestock grazing and hoof shear, maintained for hay production, and subject to raw manure fertilization. Streams were straightened, routinely cleared and subject to stormwater runoff from boarding facilities. The project was submitted to the NC EEP in response to RFP #16-004362 on April 3rd 2012 to assist the NC EEP in meeting riparian buffer restoration goals in the Neuse 03020201 Watershed.

The Site was awarded October 25th, 2012

The land required for the construction, management, and stewardship of this mitigation project includes three tracts and was recorded November 25th, 2013. These tracts are protected in perpetuity by the referenced protection instruments below.

Site Protection Information - Pepperwood Farm Riparian Buffer Mitigation Site

	Landowner	PIN	County	Site Protection Instrument	Deed Book and Page Number	Acreage protected
Tract '2-A'	Pepperwood Farms, LLC	0688400183	Wake	Conservation Easement	Bk : 015513 Pg : 00130	1.05 ac.
Tract '2-B'	Pepperwood Farms, LLC	0687492542	Wake	Conservation Easement	Bk : 015513 Pg : 00142	5.03 ac.
Tract '2-C'	Pepperwood Farms, LLC	0687685542	Wake	Conservation Easement	Bk : 015513 Pg : 00157	6.58 ac.
Total						12.66 ac.

*All site protection instruments require 60-day advance notification to the State prior to any action to void, amend, or modify the document. No such action shall take place unless approved by the State.

Site restoration activities were conducted during the months of February and March 2014.

Appendix A: Table 2 - Project Activity & Reporting History

Appendix A: Table 3 - Project Contact

Appendix A: Table 4 - Project Baseline Information & Attributes Table

5.0 - Vegetation Success Criteria

Success of vegetation criteria at the Site indicates successful restoration of riparian area adjacent to subject streams as well as improvement of overall water quality resulting from the treatment of runoff from agriculture fields. Success criteria are dependent upon the density and growth of planted tree species. An average density of 320 stems per acre of planted species must be surviving after five monitoring years in accordance with NC Division of Water Resources Administrative Code 15A NCAC 02B.0242 (*Neuse River Basin: Nutrient Sensitive Waters Management Strategy*).

6.0 - Monitoring Plan

Monitoring of vegetation restoration efforts will follow Level 2 *CVS-EEP Protocol for Recording Vegetation, Version 4.0* (Lee et al. 2006) and will be conducted between June 1 and October 30. Site monitoring will be conducted at thirteen (13) vegetation monitoring plots representing 3.6% of the 10.7 acres of restored buffer. Monitoring reports will be reported to the NC EEP annually for a minimum of 5 years or until success criteria are fulfilled. Monitoring parameters will include species composition and density. Visual observations to ascertain the degree of shrub and herbaceous species, including overtopping of seedlings during year 1 will be documented with photos and included in the annual monitoring report (Appendix C Sheet D)

Baseline monitoring data was collected March 18th, 2014 by Axiom Environmental, and established an average density of 635 planted stems per acre on Site with all 13 CVS monitoring plots exceeding success criteria (Appendix B). The dominant tree species identified from baseline data collection at the Site was *Betula nigra*, *Celtis Laevigata*, *Liriodendron tulipifera*, and *Quercus pagoda*. In summary, the Site is in compliance with success criteria for vegetation at the Baseline Monitoring Year (2014).

7.0 - Maintenance and Contingency Plans

7.1 Vegetation Contingency

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 may be performed as needed until achievement of vegetation success criteria.

7.2 Stream Bank Stabilization

Periodic monitoring of the Site's stream banks will insure that any areas of concern will be dealt with in a timely matter. Live stake planting with native species, core matting, and seeding comprise primary tools to stabilize problematic areas. Any areas of concern will be noted within annual monitoring reports along with photographic documentation and a plan of action.

7.3 Site Boundary

Site boundaries have been surveyed and marked to ensure clear distinction between the Site and adjacent properties per NC EEP guidelines by a licensed NC surveyor (Appendix C – As-Built Survey). Boundary markers disturbed, damaged, or destroyed will be repaired and/or replaced on an as needed basis.

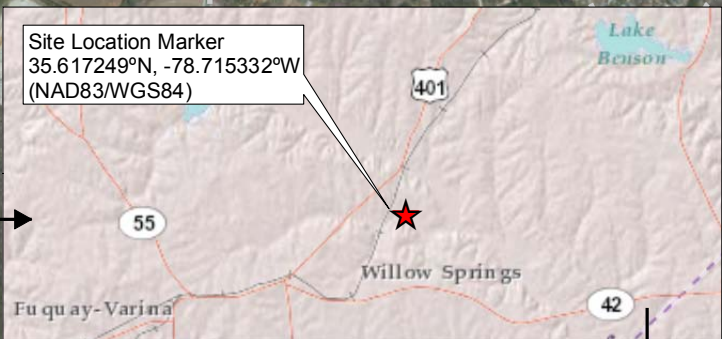
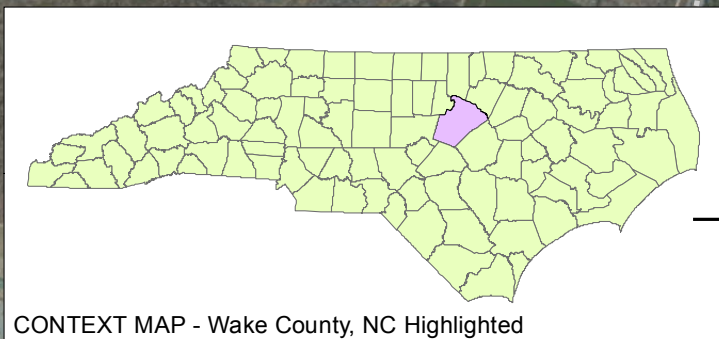
8.0 - References

Griffith, G.E., J.M. Omernik, J.A. Comstock, M.P. Schafale, W.H. McNab, D.R. Lenat, T.F. MacPherson, J.B. Glover, and V.B. Shelbourne. 2002. Ecoregions of North Carolina and South Carolina. U.S. Geological Survey, Reston, Virginia.

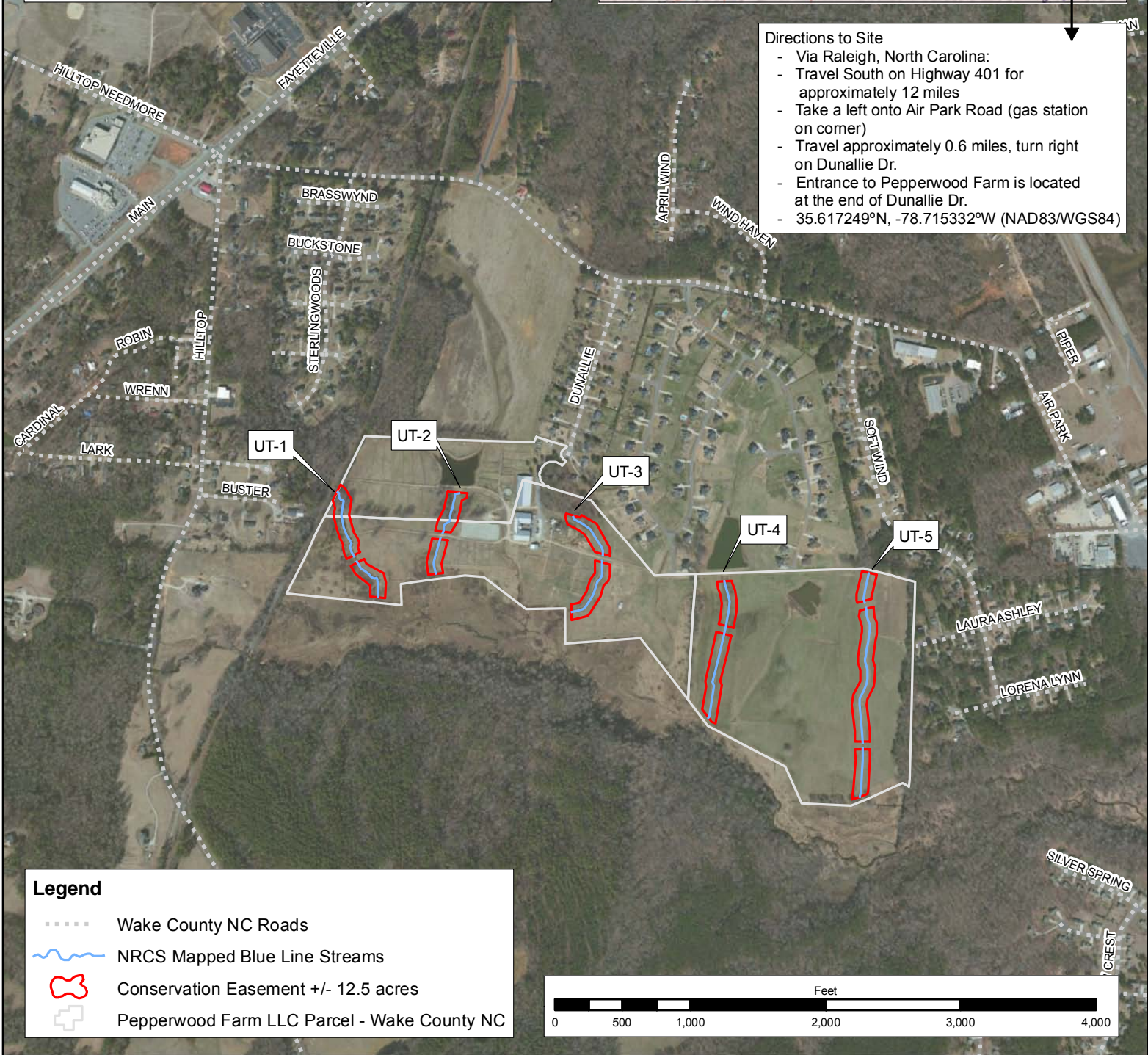
- Lee, M.T., R.K. Peet, S.D. Roberts, and T.R. Wentworth. 2006. CVS-EEP Protocol for Recording Vegetation. Version 4.0. North Carolina Department of Environment and Natural Resources, Ecosystem Enhancement Program. Raleigh, North Carolina.
- North Carolina Division of Water Resources (NCDWR). 2004. Final North Carolina Water Quality Assessment and Impaired Waters List (2004 303(d) Report) (online). Available: <http://portal.ncdenr.org/web/wq/ps/mtu/assessment> [March 2014]. North Carolina Department of Environment and Natural Resources, Raleigh, North Carolina.
- North Carolina Division of Water Resources (NCDWR). 2010. Final North Carolina Water Quality Assessment and Impaired Waters List (2010 Integrated 305(b) and 303(d) Report) (online). Available: http://h2o.enr.state.nc.us/tmdl/documents/draft_2010_Cat_5.pdf [February 1, 2011]. North Carolina Department of Environment and Natural Resources, Raleigh, North Carolina.
- North Carolina Division of Water Resources (NCDWR). 2010. River Restoration Priorities Executive Summary (online). Available: http://portal.ncdenr.org/c/document_library/get_file?uuid=665be84c-cf93-477b-918c-1993778ef11f&groupId=60329 [March 2014]. 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, N.C. Department of Environment, Health, and Natural Resources. Raleigh, North Carolina.

Appendix A: General Figures and Tables

- Fig 1. Vicinity Map
- Fig 2. Preconstruction Conditions Map
- Table 1. Project Components and Mitigation Credits Table
- Table 2. Project Activity and Reporting History Table
- Table 3. Project Contact Table
- Table 4. Project Baseline Information and Attributes Table
- Table 5. Reference Forest Ecosystem
- Table 6. Planted Tree Species



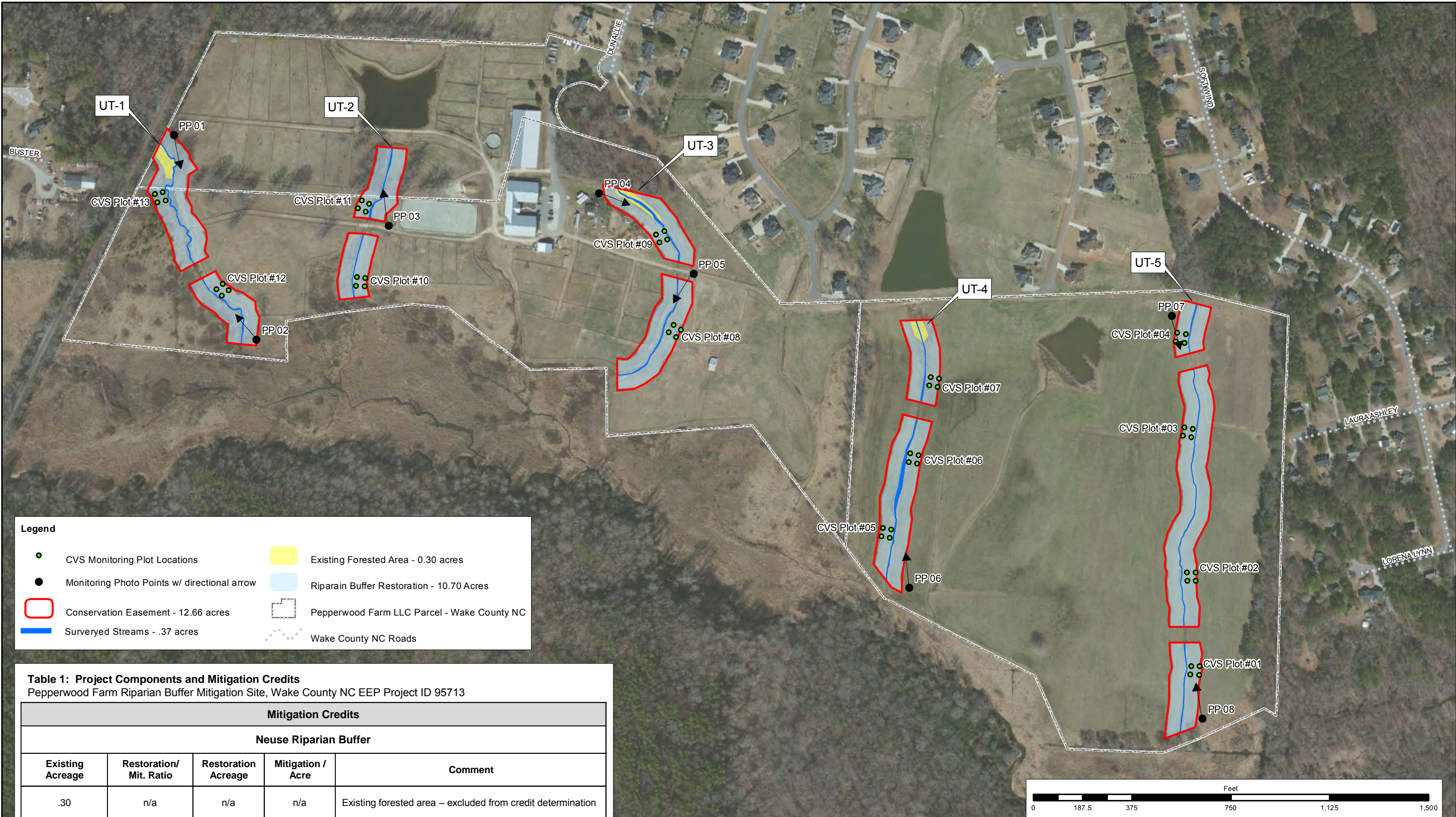
- Directions to Site
- Via Raleigh, North Carolina:
 - Travel South on Highway 401 for approximately 12 miles
 - Take a left onto Air Park Road (gas station on corner)
 - Travel approximately 0.6 miles, turn right on Dunallie Dr.
 - Entrance to Pepperwood Farm is located at the end of Dunallie Dr.
 - 35.617249°N, -78.715332°W (NAD83/WGS84)



Legend

- Wake County NC Roads
- NRCS Mapped Blue Line Streams
- Conservation Easement +/- 12.5 acres
- Pepperwood Farm LLC Parcel - Wake County NC

<p>RESTORATION SYSTEMS, LLC 1101 HAYNES ST, SUITE 211 RALEIGH, NC 27604 PHONE : 919.755.9490 FAX : 919.755.9492</p> <p><small>This map and all data contained within are supplied as is with no warranty. Restoration Systems, LLC expressly disclaims responsibility for damages or liability from any claims that may arise out of the use or misuse of this map. It is the sole responsibility of the user to determine if the data on this map is compatible with the user's needs. This map was not created as survey data, nor should it be used as such. It is the user's responsibility to obtain proper survey data, prepared by a licensed surveyor, where required by law.</small></p>	<p>SCALE: 1 inch = 1,042 feet</p> <p>DATE: May - 2014</p> <p>PROJECT: P-WOOD</p>	<p>FIGURE 1: VICINITY MAP</p> <p>Figure indicates Site's physical location along with directions via Raleigh, NC.</p>	<p>Pepperwood Farm Riparian Buffer Mitigation Site RFP # 16-004362 EEP Project ID 95713 Contract # 004946 SPO # 92-AGZ Wake County, North Carolina</p>
	<p>Aerial Imagery: Sources: Esri, DeLorme, USGS, NPS COORDINATE SYSTEM: NAD 1983 NC FEET</p>		



Legend

- CVS Monitoring Plot Locations
- Monitoring Photo Points w/ directional arrow
- Conservation Easement - 12.66 acres
- Surveyed Streams - .37 acres
- Existing Forested Area - 0.30 acres
- Riparian Buffer Restoration - 10.70 Acres
- Pepperwood Farm LLC Parcel - Wake County NC
- Wake County NC Roads

Table 1: Project Components and Mitigation Credits
 Pepperwood Farm Riparian Buffer Mitigation Site, Wake County NC EEP Project ID 95713

Mitigation Credits				
Neuse Riparian Buffer				
Existing Acreage	Restoration/Mit. Ratio	Restoration Acreage	Mitigation / Acre	Comment
.30	n/a	n/a	n/a	Existing forested area – excluded from credit determination
10.70	Restoration (1:1)	10.70	43,560 sq. ft. / acre	Cessation of current land use practices, removing invasive species, and planting with native forest vegetation.
Component Summation				
Restoration Level		Neuse Riparian Buffer Credits (sq. ft.)		
Restoration		10.70 acres = 466,092 sq. ft.		

RESTORATION SYSTEMS, LLC
 1101 HAYNES ST, SUITE 211
 RALEIGH, NC 27604
 PHONE : 919.755.9490
 FAX : 919.755.9492

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SCALE: 1 inch = 333 feet
 DATE: May - 2014
 PROJECT: P-WOOD

**FIGURE 2:
 COMPONENT & ASSET**

Mitigation credits presented are based on As-Built Surveys. Figure identifies location of vegetation monitoring plots measuring 10m x 10m and representing 3.6% of the restoration riparian area.

Pepperwood Farm Riparian Buffer Mitigation Site
 RFP # 16-004362 EEP Project ID 95713
 Contract # 004946 SPO # 92-AGZ
 Wake County, North Carolina

Aerial Imagery: ESRI, i-cubed, USDA FSA, USGS
 COORDINATE SYSTEM: NAD 1983 NC FEET

Table 1: Project Components and Mitigation Credits

Pepperwood Farm Riparian Buffer Mitigation Site, Wake County NC EEP Project ID 95713

Mitigation Credits				
Neuse Riparian Buffer				
Existing Acreage	Restoration/ Mit. Ratio	Restoration Acreage	Mitigation / Acre	Comment
.30	n/a	n/a	n/a	Existing forested area – excluded from credit determination
10.70	Restoration (1:1)	10.70	43,560 sq. ft. / acre	Cessation of current land use practices, removing invasive species, and planting with native forest vegetation.
Component Summation				
Restoration Level		Neuse Riparian Buffer Credits (sq. ft.)		
Restoration		10.70 acres = 466,092 sq. ft.		
Totals		10.70 acres = 466,092 sq. ft.		

Table 2: Project Activity and Reporting History

Pepperwood Farm Riparian Buffer Mitigation Site, Wake County NC EEP Project ID 95713

Activity or Report	Data Collection Complete	Completion or Delivery
CE Document	NA	August 13 th , 2013
Conservation Easement	NA	November 25 th , 2013
Mitigation Plan	NA	January 30 th , 2014
Earthwork	NA	March 5 th , 2014
Bare Root Planting	NA	March 13 th , 2014
Baseline Monitoring Document	March 2014	May 5 th , 2014

Table 3: Project Contact Table

Pepperwood Farm Riparian Buffer Mitigation Site, Wake County NC EEP Project ID 95713

	Firm	POC & Address
Full Delivery Provider	Restoration Systems, LLC	1101 Haynes Street, Suite 211 Raleigh, North Carolina 27604 George Howard and John Preyer 919-755-9490
Designer:	Restoration Systems, LLC	Raymond Holz: 919-755-9490 1101 Haynes Street, Suite 211 Raleigh, North Carolina 27604
Earthwork Contractor:	Land Mechanics, Inc.	Lloyd Glover; 919.422.3392 780 Landmark Road Willow Spring, NC 27592-7756
Planting Contractor:	Carolina Silvics	Mary-Margaret McKinney 252.333.9852 908 Indian Trail Road Edenton, NC 27932
Seeding Contractor:	Land Mechanics, Inc.	Lloyd Glover; 919.422.3392 780 Landmark Road Willow Spring, NC 27592-7756
Nursery Stock Suppliers:	ArborGen	1.888.888.7158
Baseline Data Collection	Axiom Environmental, Inc.	Grant Lewis; 919.215.1693 218 Snow Ave. Raleigh, NC 27603
Vegetation Monitoring:	Axiom Environmental, Inc.	Grant Lewis; 919.215.1693 218 Snow Ave. Raleigh, NC 27603

Table 4: Project Baseline Information & Attributes Table

Pepperwood Farm Riparian Buffer Mitigation Site, Wake County NC EEP Project ID 95713

Project Information			
Project Name		Pepperwood Farm	
County		Wake	
Project Area (acres)		12.66	
Project Coordinates (latitude and longitude)		35.617249°N, -78.715332°W (NAD83/WGS84)	
Project Watershed Summary Information			
Physiographic Province		Northern Outer Piedmont	
River Basin		Neuse	
USGS Hydrologic Unit 8-digit	3020201	USGS Hydrologic Unit14-digit	3020201120010
DWR Sub-basin		3/4/2003	
Project Drainage Area, Total Outfall (acres)		285.45	
Project Drainage Area Percentage of Impervious Area		> 5%	
Regulatory Considerations			
Regulation	Applicable?	Resolved?	Supporting Documentation
Waters of the United States – Section 404	No		
Waters of the United States – Section 401	No		
Endangered Species Act	No		
Historic Preservation Act	No		
Coastal Zone Management Act [CZMA/Coastal Area Management Act (CAMA)]	No		
FEMA Floodplain Compliance	No		
Essential Fisheries Habitat	No		

Table 5: Reference Forest Ecosystem

Pepperwood Farm Riparian Buffer Mitigation Site, Wake County NC EEP Project ID 95713

Tree Species	Number of Individuals	Frequency (%)
Red maple (<i>Acer rubrum</i>)	3	50
River birch (<i>Betula nigra</i>)	5	100
Ironwood (<i>Carpinus caroliniana</i>)	10	100
Green ash (<i>Fraxinus pennsylvanica</i>)	16	100
Cherrybark oak (<i>Quercus pagoda</i>)	6	100
Winged elm (<i>Ulmus alata</i>)	5	50
American elm (<i>Ulmus americana</i>)	1	50
Total	46	

Table 6: Planted Tree Species

Pepperwood Farm Riparian Buffer Mitigation Site, Wake County NC EEP Project ID 95713

As-built Planting List: Piedmont/Low Mountain Alluvial Forest					
Area (Acres) Total = 10.70 acres		2 acres		8.7 acres	
Vegetation Association:	<u>Live Stake or Bare Root</u>	Streamside Assemblage		Piedmont/Low Mountain Alluvial Forest	
Species		Number Planted	% of Total	Number Planted	% of Total
Black Willow (<i>Salix nigra</i>)	LS	as needed			
River birch (<i>Betula nigra</i>)	BR	600	29.27%		
American Sycamore (<i>Platanus occidentalis</i>)	BR	700	34.15%		
Willow oak (<i>Quercus phellos</i>)	BR	750	36.59%		
Tulip poplar (<i>Liriodendron tulipifera</i>)	BR			600	6.28%
American hornbeam (<i>Carpinus caroliniana</i>)	BR			900	9.42%
Shagbark hickory (<i>Carya ovate</i>)	BR			800	8.38%
Bitternut hickory (<i>Carya cordiformis</i>)	BR			700	7.33%
Southern Hackberry (<i>Celtis laevigata</i>)	BR			1200	12.57%
Green Ash (<i>Fraxinus pennsylvanica</i>)	BR			1200	12.57%
American elm (<i>Ulmus americana</i>)	BR			1200	12.57%
Cherrybark oak (<i>Quercus pagoda</i>)	BR			1350	14.14%
Swamp chestnut oak (<i>Quercus michauxii</i>)	BR			1600	16.75%
Total		2,050	100%	9,550	100%

Appendix B: Baseline Vegetation Data, Plot Photos

Table 7. Baseline Vegetation
Vegetation Plot Photos 1 – 13

Table 7: Baseline Vegetation Table
Pepperwood Farm Riparian Buffer Mitigation Site, Wake County NC EEP Project ID 95713

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

Project Name	River Basin	Year 0 (baseline)
Pepperwood	Neuse	644.3840623

Comment	Species	SpType	CommonName	Total Planted Stems																
				# plots	avg# stems	plot 123-01-0001	plot 123-01-0002	plot 123-01-0003	plot 123-01-0004	plot 123-01-0005	plot 123-01-0006	plot 123-01-0007	plot 123-01-0008	plot 123-01-0009	plot 123-01-0010	plot 123-01-0011	plot 123-01-0012	plot 123-01-0013		
	<i>Betula nigra</i>	Tree	river birch	42	11	3.82	3	5			3	5	5	1	5	3	7	1	4	
	<i>Carpinus caroliniana</i>	Shrub Tree	American hornbeam	8	3	2.67			3		4	1								
	<i>Carya</i>	Tree	hickory	5	4	1.25	1	2				1	1							
	<i>Carya cordiformis</i>	Tree	bitternut hickory	6	3	2			2	2							2			
	<i>Carya ovata</i>	Tree	shagbark hickory	3	1	3									3					
	<i>Celtis</i>	Tree	hackberry	1	1	1						1								
	<i>Celtis laevigata</i>	Shrub Tree	sugarberry	25	7	3.57	5						3	3	3		1	6	4	
	DONTKNOW: unsure record			3	2	1.5	2						1							
	<i>Fraxinus pennsylvanica</i>	Tree	green ash	23	10	2.3	3	1	4	2	2	3				2	1	4	1	
	<i>Liriodendron tulipifera</i>	Tree	tuliptree	17	7	2.43	2	1	6	3	2					2	1			
	<i>Platanus occidentalis</i>	Tree	American sycamore	3	3	1		1		1	1									
	<i>Quercus</i>	Shrub Tree	oak	24	9	2.67		1	3	2		1		8	1	4	3		1	
	<i>Quercus michauxii</i>	Tree	swamp chestnut oak	9	4	2.25	2	4										1	2	
	<i>Quercus pagoda</i>	Tree	cherrybark oak	16	7	2.29	2					1	3	3	1		3		3	
	<i>Quercus phellos</i>	Tree	willow oak	4	3	1.33						1		1				2		
	<i>Ulmus alata</i>	Tree	winged elm	1	1	1						1								
	<i>Ulmus americana</i>	Tree	American elm	17	6	2.83		1	1						2	5	4		4	
TOT:	0	17	15	16	207	17		20	16	19	10	12	15	13	16	15	18	20	14	19



Veg. Plot 1



Veg. Plot 2



Veg. Plot 3



Veg. Plot 4



Veg. Plot 5



Veg. Plot 6



Veg. Plot 7



Veg. Plot 8



Veg. Plot 9



Veg. Plot 10



Veg. Plot 11



Veg. Plot 12



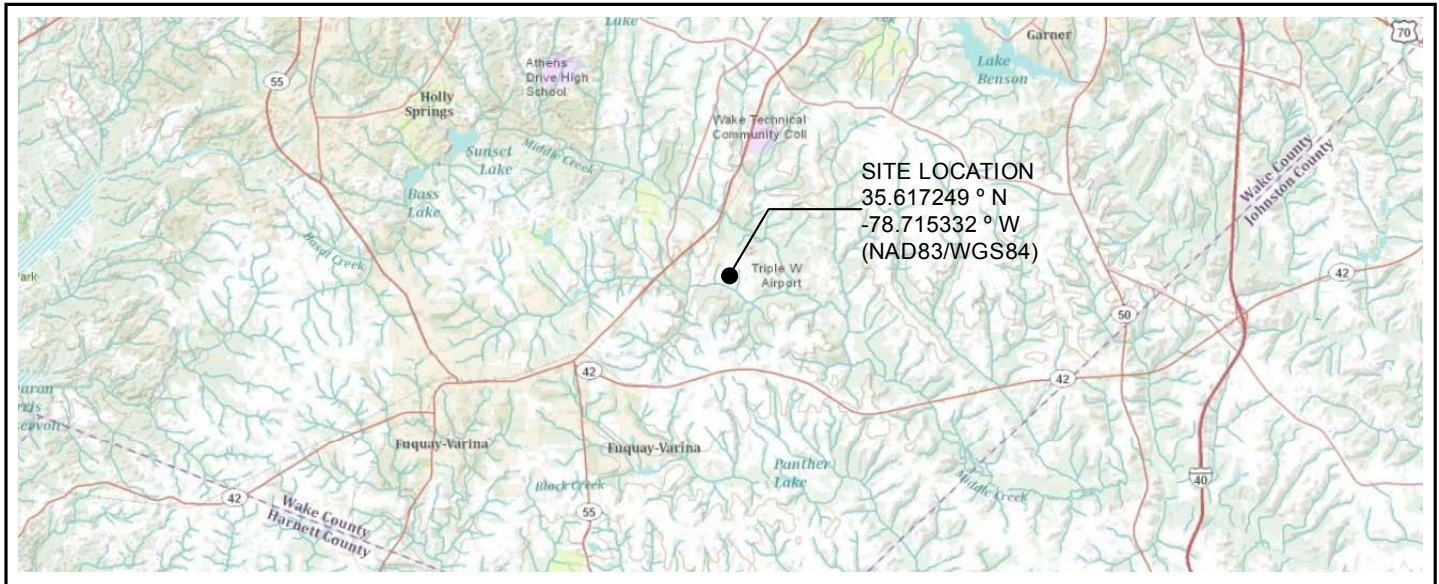
Veg. Plot 13

Appendix C: As-Built Plan Sheets

Sheet A. Title Page
Sheet B. Construction
Sheet C. Planting
Sheet D. Monitoring
As-Built Survey
As-Built Photos

PEPPERWOOD FARM RIPARIAN BUFFER MITIGATION SITE AS-BUILT PLAN SHEETS

WAKE COUNTY, NORTH CAROLINA



PROJECT LOCATION

Directions From Raleigh

- Travel S. on Hwy. 401 for ~12 miles
- Take a left onto Air Park Rd.
- Travel ~ 0.6 miles, turn right on Dunallie Dr.
- Entrance to Pepperwood Farm is located at the end of Dunallie Dr.

Type of Work: Wetland Restoration

- Brush-Hogging
- Fescue Treatment
- Stream Crossings
- Site Planting

Index of Sheets

- A: Title Page
- B: Construction
- C: Planting
- D: Monitoring

Firm Name & POC

Restoration Systems, LLC
Raymond Holz - 919.334.9122
1101 haynes Street, Suite 211
Raleigh, NC 27604

PROJECT DESCRIPTION

The Pepperwood Farm Riparian Buffer Mitigation Site (Site) is designed specifically to assist in fulfilling the North Carolina Ecosystem Enhancement Program riparian buffer mitigation goals within the Neuse 03020201 Watershed. Located approximately 1 mile northeast of Willow Springs and 4 miles northeast of Fuquay-Varina, in Wake County North Carolina, the Site is situated within the Middle Creek watershed (United States Geological Society (USGS) 14-digit Hydrologic Cataloging Unit (HUC) 03020201120010 of the Neuse River Basin and North Carolina Division of Water Resource (NC DWR) Sub-basin 03-04-03) and identified by the 2010 Neuse River Basin Restoration Priorities (NC DENR) as a Targeted Local Watershed (TLW).

The Site encompasses 12.66 acres and protected in perpetuity by three conservation easements recorded at the Wake County Register of Deeds on 11/25/2013, further detailed in Section 2.3. The Site protects five unnamed tributaries with direct hydrologic connection to Terrible Creek, DWR Stream Index Number 27-43-15-8-(2) and a Best Usage Classification of C, NSW (NC DWR 2009). Prior to restoration activities, riparian areas were cleared of native forest vegetation, heavily degraded by livestock grazing and hoof shear, maintained for hay production, and subject to raw manure fertilization. Streams were straightened, routinely cleared and subject to stormwater runoff from boarding facilities.

The primary goal of this riparian buffer restoration project is to provide **10.70 Neuse River Riparian Buffer Units (RBMU)**.



RESTORATION SYSTEMS, LLC

1101 HAYNES ST, SUITE 211
RALEIGH, NC 27604
PHONE : 919.755.9490
FAX : 919.755.9492

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SCALE: 1 in. = 16,667 ft.

DATE: May - 2014

PROJECT: P-WOOD

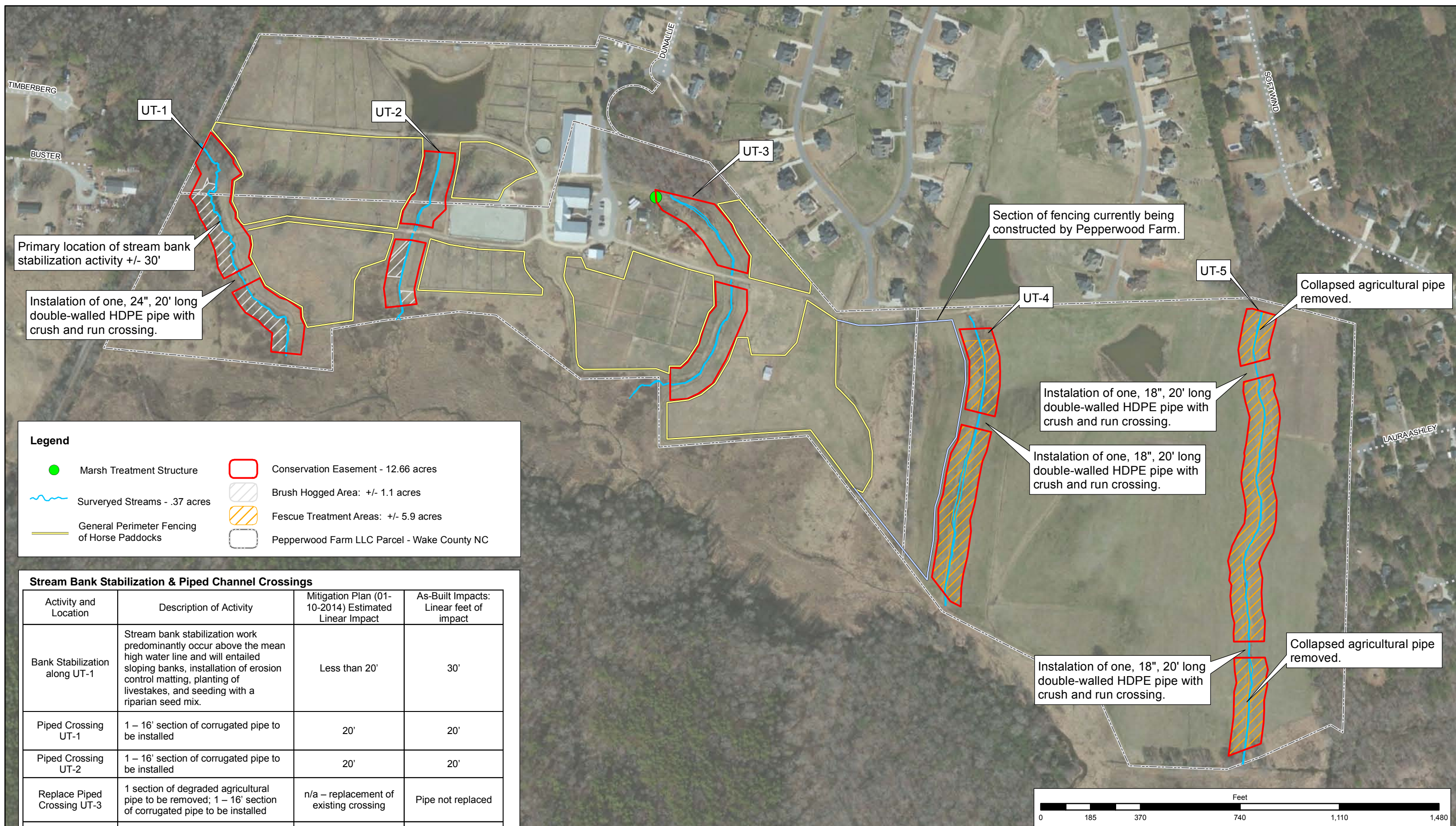


SHEET A: TITLE PAGE

Pepperwood Farm Riparian Buffer Mitigation Site

RFP # 16-004362 EEP Project ID 95713
Contract # 004946 SPO # 92-AGZ
Wake County, North Carolina

Aerial Imagery: Sources: Esri, DeLorme, USGS, NPS
COORDINATE SYSTEM: NAD 1983 NC FEET



Legend

- Marsh Treatment Structure
- ~ Surveyed Streams - .37 acres
- General Perimeter Fencing of Horse Paddocks
- Conservation Easement - 12.66 acres
- Brush Hogged Area: +/- 1.1 acres
- Fescue Treatment Areas: +/- 5.9 acres
- Pepperwood Farm LLC Parcel - Wake County NC

Stream Bank Stabilization & Piped Channel Crossings			
Activity and Location	Description of Activity	Mitigation Plan (01-10-2014) Estimated Linear Impact	As-Built Impacts: Linear feet of impact
Bank Stabilization along UT-1	Stream bank stabilization work predominantly occur above the mean high water line and will entail sloping banks, installation of erosion control matting, planting of livestakes, and seeding with a riparian seed mix.	Less than 20'	30'
Piped Crossing UT-1	1 – 16' section of corrugated pipe to be installed	20'	20'
Piped Crossing UT-2	1 – 16' section of corrugated pipe to be installed	20'	20'
Replace Piped Crossing UT-3	1 section of degraded agricultural pipe to be removed; 1 – 16' section of corrugated pipe to be installed	n/a – replacement of existing crossing	Pipe not replaced
Piped Crossing UT-4	1 – 16' section of corrugated pipe to be installed	20'	20'
Replace Piped Crossing UT-5	2 sections of degraded agricultural pipe will be removed; 2 – 16' section of corrugated pipe to be installed	n/a – replacement of existing crossings	n/a – replacement of existing crossings
Total		Less than 80 l. ft.	90 l. ft.

	RESTORATION SYSTEMS, LLC 1101 HAYNES ST, SUITE 211 RALEIGH, NC 27604 PHONE : 919.755.9490 FAX : 919.755.9492	SCALE: 1 inch = 328 feet DATE: May - 2014 PROJECT: P-WOOD	SHEET B: CONSTRUCTION	Pepperwood Farm Riparian Buffer Mitigation Site RFP # 16-004362 EEP Project ID 95713 Contract # 004946 SPO # 92-AGZ Wake County, North Carolina
	<small>This map and all data contained within are supplied as is with no warranty. Restoration Systems, LLC expressly disclaims responsibility for damages or liability from any claims that may arise out of the use or misuse of this map. It is the sole responsibility of the user to determine if the data on this map is compatible with the user's needs. This map was not created as survey data, nor should it be used as such. It is the user's responsibility to obtain proper survey data, prepared by a licensed surveyor, where required by law.</small>		Figure identifies location of construction activities.	Aerial Imagery: ESRI, i-cubed, USDA FSA, USGS COORDINATE SYSTEM: NAD 1983 NC FEET

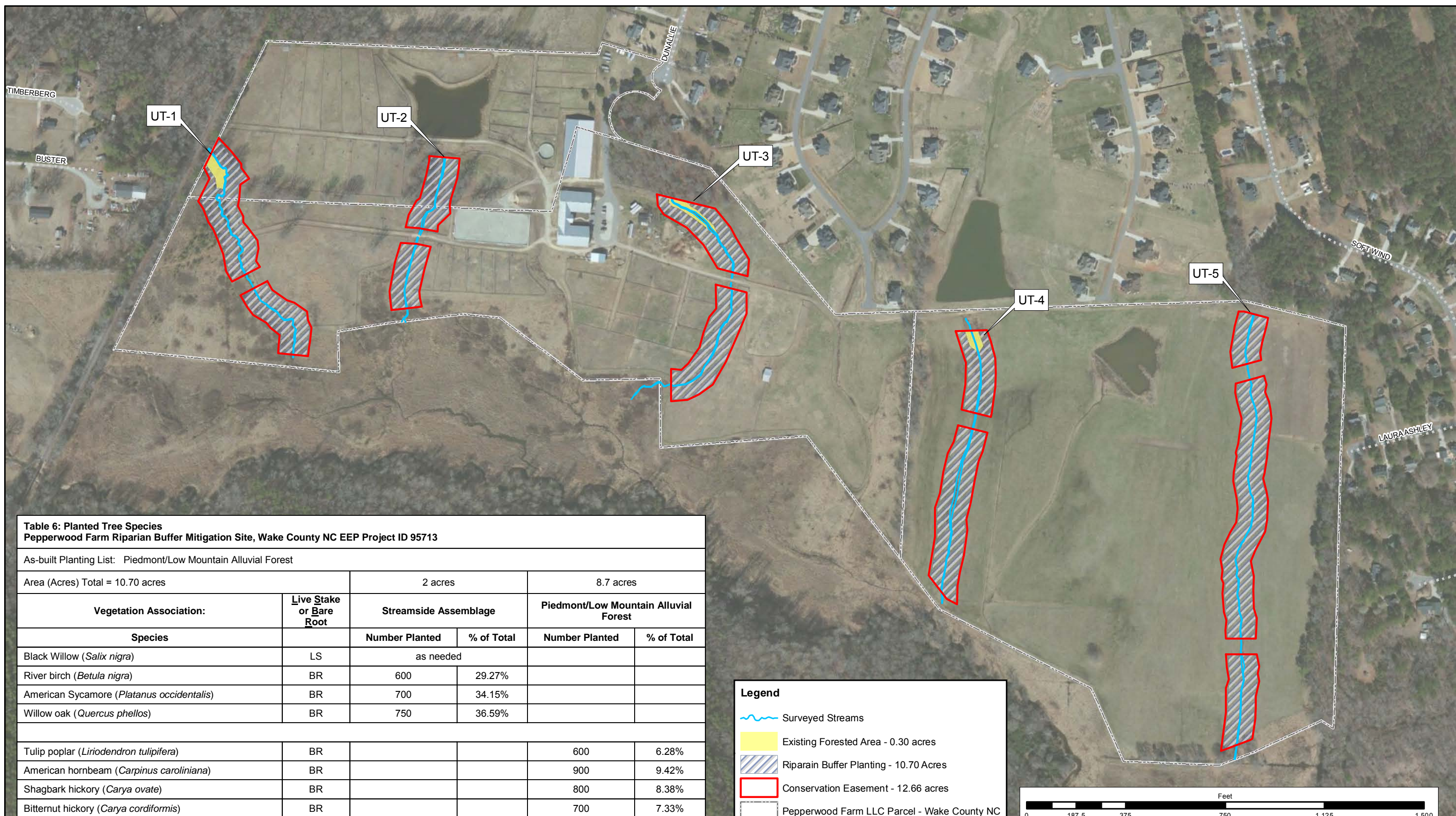
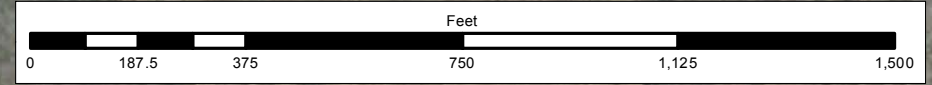


Table 6: Planted Tree Species
Pepperwood Farm Riparian Buffer Mitigation Site, Wake County NC EEP Project ID 95713

As-built Planting List: Piedmont/Low Mountain Alluvial Forest					
Area (Acres) Total = 10.70 acres					
		2 acres		8.7 acres	
Vegetation Association:	Live Stake or Bare Root	Streamside Assemblage		Piedmont/Low Mountain Alluvial Forest	
Species		Number Planted	% of Total	Number Planted	% of Total
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American elm (<i>Ulmus americana</i>)	BR			1200	12.57%
Cherrybark oak (<i>Quercus pagoda</i>)	BR			1350	14.14%
Swamp chestnut oak (<i>Quercus michauxii</i>)	BR			1600	16.75%
Total		2,050	100%	9,550	100%

Legend

- Surveyed Streams
- Existing Forested Area - 0.30 acres
- Riparian Buffer Planting - 10.70 Acres
- Conservation Easement - 12.66 acres
- Pepperwood Farm LLC Parcel - Wake County NC



RESTORATION SYSTEMS, LLC
 1101 HAYNES ST, SUITE 211
 RALEIGH, NC 27604
 PHONE : 919.755.9490
 FAX : 919.755.9492

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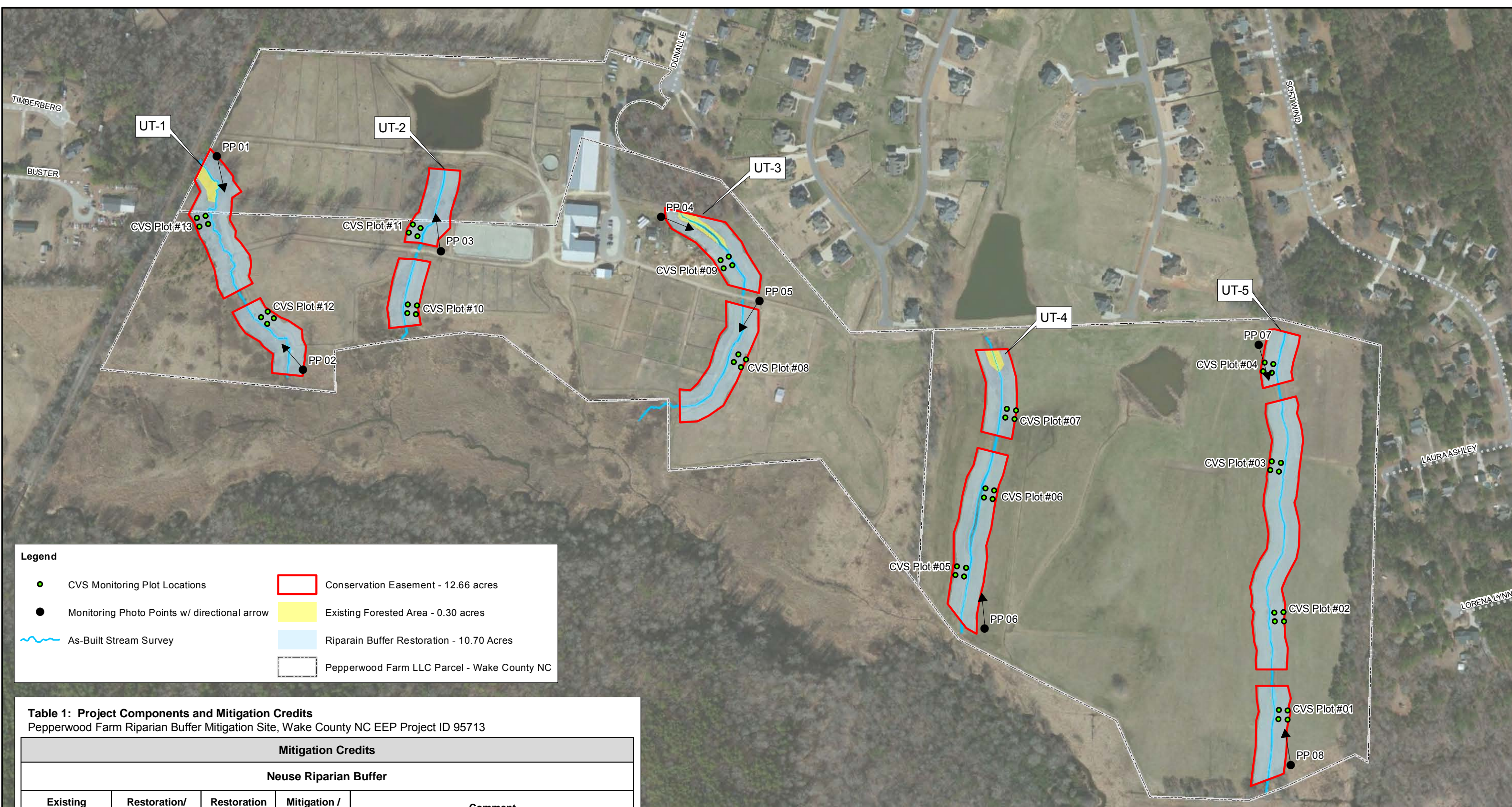
SCALE: 1 inch = 333 feet
 DATE: May - 2014
 PROJECT: P-WOOD

**SHEET C:
 PLANTING**

Figure identifies location of hardwood bare root planting.

Pepperwood Farm Riparian Buffer Mitigation Site
 RFP # 16-004362 EEP Project ID 95713
 Contract # 004946 SPO # 92-AGZ
 Wake County, North Carolina

Aerial Imagery: ESRI, i-cubed, USDA FSA, USGS
 COORDINATE SYSTEM: NAD 1983 NC FEET

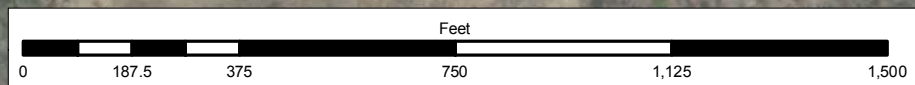


Legend

- CVS Monitoring Plot Locations
- Monitoring Photo Points w/ directional arrow
- As-Built Stream Survey
- Conservation Easement - 12.66 acres
- Existing Forested Area - 0.30 acres
- Riparian Buffer Restoration - 10.70 Acres
- Pepperwood Farm LLC Parcel - Wake County NC

Table 1: Project Components and Mitigation Credits
 Pepperwood Farm Riparian Buffer Mitigation Site, Wake County NC EEP Project ID 95713

Mitigation Credits				
Neuse Riparian Buffer				
Existing Acreage	Restoration/ Mit. Ratio	Restoration Acreage	Mitigation / Acre	Comment
.30	n/a	n/a	n/a	Existing forested area – excluded from credit determination
10.70	Restoration (1:1)	10.70	43,560 sq. ft. / acre	Cessation of current land use practices, removing invasive species, and planting with native forest vegetation.
Component Summation				
Restoration Level		Neuse Riparian Buffer Credits (sq. ft.)		
Restoration		10.70 acres = 466,092 sq. ft.		



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 1101 HAYNES ST, SUITE 211
 RALEIGH, NC 27604
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SCALE: 1 inch = 333 feet
 DATE: May - 2014
 PROJECT: P-WOOD

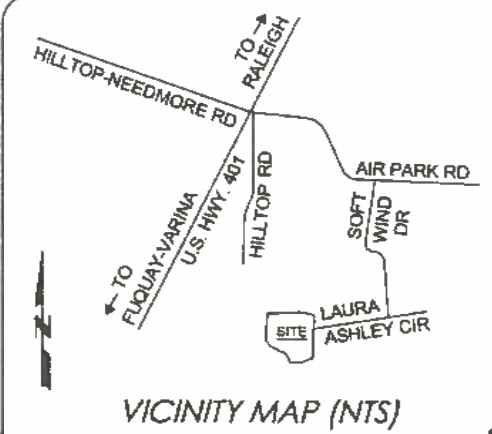
**SHEET D:
 MONITORING**

Pepperwood Farm Riparian Buffer Mitigation Site
 RFP # 16-004362 EEP Project ID 95713
 Contract # 004946 SPO # 92-AGZ
 Wake County, North Carolina

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Figure identifies location of vegetation monitoring plots, measuring 10m x 10m and representing 3.6% riparian restoration area.

Aerial Imagery: ESRI, i-cubed, USDA FSA, USGS
 COORDINATE SYSTEM: NAD 1983 NC FEET



GENERAL NOTES:

- NOTE: NO ABSTRACT TITLE, NOR TITLE COMMITMENT, NOR RESULTS OF TITLE SEARCH WERE FURNISHED TO THE SURVEYOR. ALL DOCUMENTS OF RECORD REVIEWED ARE NOTED HEREON (SEE REFERENCES). THERE MAY EXIST OTHER DOCUMENTS OF RECORD THAT MAY AFFECT THIS SURVEYED PARCEL.
- ALL IRON STAKES SET ON CONSERVATION EASEMENT HAVE AN ALUMINUM 3 1/4" CAP INSCRIBED: "STATE OF NORTH CAROLINA CONSERVATION EASEMENT".
- ALL CORNERS ON NORTH CAROLINA CONSERVATION EASEMENT ARE WITNESSED BY A METAL U-POST WITH SIGN.
- ONLY CORNER #502 IS A TRUE NORTH CAROLINA STATE PLANE COORDINATE. COORDINATES SHOWN ARE BASED ON GROUND DISTANCES TO MATCH PLAT.
- THE NCSPC SHOWN ON EIP 502 WERE OBTAINED FROM AN NGS OFUS SOLUTION. THIS OBSERVATION WAS STARTED ON 2013/08/21 13:17:00 AND ENDED ON 2013/08/21 18:08:00 USING A TOPCON HYPERLITE PLUS GPS UNIT. THE COMBINED FACTOR IS 0.99988464 (GEOID 2012a CONUS). THE DATUM IS NAD '83(2011). THE FOLLOWING BASE STATIONS WERE USED IN THE OPUS SOLUTION:

PID	DESIGNATION	LATITUDE	LONGITUDE
DL3891	NCJL JORDAN LAKE CORS ARP	N354652.496	W079C203.927
AM7024	SNFD SANFORD CORS ARP	N352824.677	W079C928.984
DG6759	NCLI LILLINGTON 2004 CORS ARP	N352512.546	W0784840.339

- STREAMS SHOWN ARE THE EDGE OF WATER TO EDGE OF WATER AT TIME OF SURVEY.

DEED REFERENCE(S):
BEING A PORTION OF THE PROPERTY RECORDED IN D.B. 11251, PG. 2366 OF THE WAKE COUNTY REGISTER OF DEEDS.

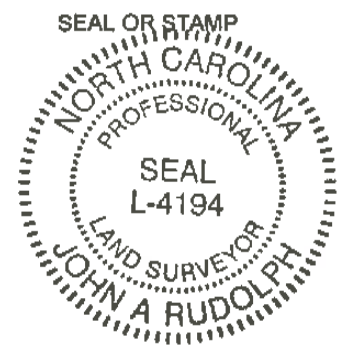
MAP REFERENCE(S):
BEING TRACTS "2-A", "2-B" & "2-C" RECORDED IN B.M. 2005, PG. 2119 OF THE WAKE COUNTY REGISTER OF DEEDS.

MAP REFERENCE(S):
- B.M. 2013, PG(S). 1595 & 1596, TRACT 2-A, SECTIONS "A" - "B"
- B.M. 2013, PG(S). 1597 & 1598, TRACT 2-B, SECTIONS "A" - "F"
- B.M. 2013, PG(S). 1599 & 1600, TRACT 2-C, SECTIONS "A" - "E"

SURVEYORS CERTIFICATION(S)
Surveyor's disclaimer: No attempt was made to locate any cemeteries, wetlands, hazardous material sites, underground or aboveground utilities or any other features above, or below ground other than those shown.

I certify that the survey is of another category (conservation easement), such as the recombination of existing parcels, a court-ordered survey, or other exception to the definition of subdivision.

I JOHN A. RUDOLPH, certify that this plat was drawn under my supervision from (an actual survey made under my supervision) (deed description recorded in Book SEE, Page REFS, etc.) (other); that the ratio of precision as calculated by latitudes and departures is 1 / 10,000+; that the boundaries not surveyed are shown as broken lines plotted from information found in B.M. 2005, Page 416; that this plat was prepared in accordance with G.S. 47-30 as amended. Witness my original signature, registration number, and seal this 30th day of March, A.D. 2014.



[Signature]
Surveyor L-4194



DRAWN BY: FGR
DATE: 4/30/14
DWG. NO.: RRS084AB14
SURVEYED BY: J.A.R.



5688 U.S. Hwy. 70 East
Goldsboro, NC 27534
Tel.: (919) 751-0075
k2design@suddenlink.net

CONSERVATION EASEMENT ACREAGE DATA ON TRACT 2-C:

SECTION "A"	0.83 ACRES±
SECTION "B"	1.71 ACRES±
SECTION "C"	0.50 ACRES±
SECTION "D"	2.63 ACRES±
SECTION "E"	0.91 ACRES±
TOTAL CONSERVATION EASEMENT IS 6.58 ACRES± EXCLUDING ALL EASEMENTS AND RIGHT-OF-WAYS BY COORDINATE COMPUTATION	

CONSERVATION EASEMENT ACREAGE DATA ON TRACT 2-B:

SECTION "A"	1.28 ACRES±
SECTION "B"	1.00 ACRES±
SECTION "C"	0.65 ACRES±
SECTION "D"	0.29 ACRES±
SECTION "E"	0.88 ACRES±
SECTION "F"	0.93 ACRES±
TOTAL CONSERVATION EASEMENT IS 5.03 ACRES± EXCLUDING ALL EASEMENTS AND RIGHT-OF-WAYS BY COORDINATE COMPUTATION	

CONSERVATION EASEMENT ACREAGE DATA ON TRACT 2-A:

SECTION "A"	0.49 ACRES±
SECTION "B"	0.56 ACRES±
TOTAL CONSERVATION EASEMENT IS 1.05 ACRES± EXCLUDING ALL EASEMENTS AND RIGHT-OF-WAYS BY COORDINATE COMPUTATION	

TOTAL CONSERVATION EASEMENT ACREAGE DATA ON TRACT 2-A, 2-B & 2-C
TOTAL CONSERVATION EASEMENT IS 12.66 ACRES± EXCLUDING ALL EASEMENTS AND RIGHT-OF-WAYS BY COORDINATE COMPUTATION

RIPARIAN BUFFER CREDIT AREA WITHIN CONSERVATION EASEMENT

R-1	14598.92 Sq. Feet	0.34 ACRES
R-2	13884.80 Sq. Feet	0.32 ACRES
R-3	32730.00 Sq. Feet	0.75 ACRES
R-4	30453.21 Sq. Feet	0.70 ACRES
R-5	8974.09 Sq. Feet	0.21 ACRES
R-6	10278.73 Sq. Feet	0.24 ACRES
R-7	50849.43 Sq. Feet	1.17 ACRES
R-8	50172.21 Sq. Feet	1.15 ACRES
R-9	17119.58 Sq. Feet	0.39 ACRES
R-10	17774.04 Sq. Feet	0.41 ACRES
R-11	25840.86 Sq. Feet	0.59 ACRES
R-12	22259.54 Sq. Feet	0.51 ACRES
R-13	17077.34 Sq. Feet	0.39 ACRES
R-14	14911.52 Sq. Feet	0.34 ACRES
R-15	12110.73 Sq. Feet	0.28 ACRES
R-16	12710.48 Sq. Feet	0.29 ACRES
R-17	14912.50 Sq. Feet	0.34 ACRES
R-18	14845.00 Sq. Feet	0.34 ACRES
R-19	17910.65 Sq. Feet	0.41 ACRES
R-20	15782.00 Sq. Feet	0.36 ACRES
R-21	21893.16 Sq. Feet	0.50 ACRES
R-22	28980.41 Sq. Feet	0.67 ACRES
TOTAL	485987.9 Sq. Feet	10.7 ACRES

EXISTING RIPARIAN BUFFER AREA WITHIN CONSERVATION EASEMENT

ER-1	1642.48 Sq. Feet	0.04 ACRES
ER-2	1721.91 Sq. Feet	0.04 ACRES
ER-3	2157.86 Sq. Feet	0.05 ACRES
ER-4	2782.38 Sq. Feet	0.06 ACRES
ER-5	4939.44 Sq. Feet	0.11 ACRES
TOTAL	13224.07 Sq. Feet	0.30 ACRES

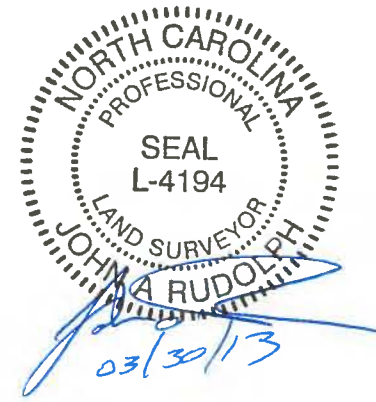
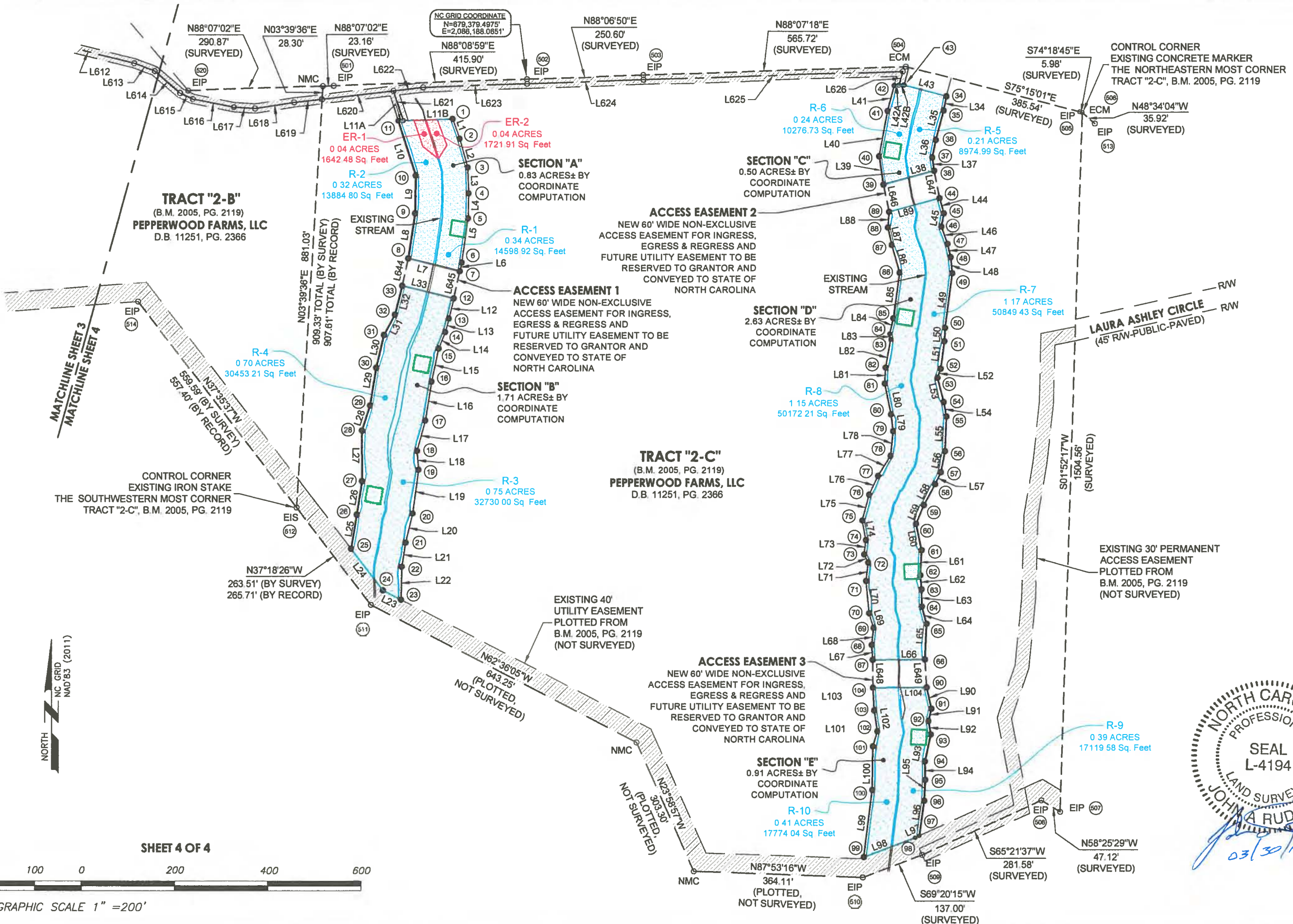
LEGEND:
ISS - IRON STAKE SET
ECM - EXISTING CONCRETE MARKER
EIP - EXISTING IRON PIPE
EN - EXISTING NAIL
MNS - MAG NAIL SET
EIS - EXISTING IRON STAKE
EPP - EXISTING PUMP PIPE
PPS - PUMP PIPE SET
NMC - NON-MONUMENTED CORNER
R/W - RIGHT OF WAY
EOP - EDGE OF PAVEMENT
E/B - EASEMENT BOUNDARY
CL - CENTERLINE
UP - UTILITY POLE
B.M. - BOOK OF MAP
D.B. - DEED BOOK
PG. - PAGE
o No. 5 REBAR FLUSH WITH GRADE
--- CONSERVATION EASEMENT LINE
- - - TIE DOWN LINE
- - - RIGHT OF WAY LINE OR ADJOINER LINE
- - - PLOTTED PROPERTY LINE
- E - UTILITY LINE
- - - CENTERLINE OF NEW 20' INGRESS, EGRESS, REGRESS UTILITY EASEMENT
[Hatched Box] ACCESS EASEMENTS
[Green Box] VEG PLOT AREA
ER EXISTING RIPARIAN BUFFER AREA
R RIPARIAN BUFFER CREDIT AREA

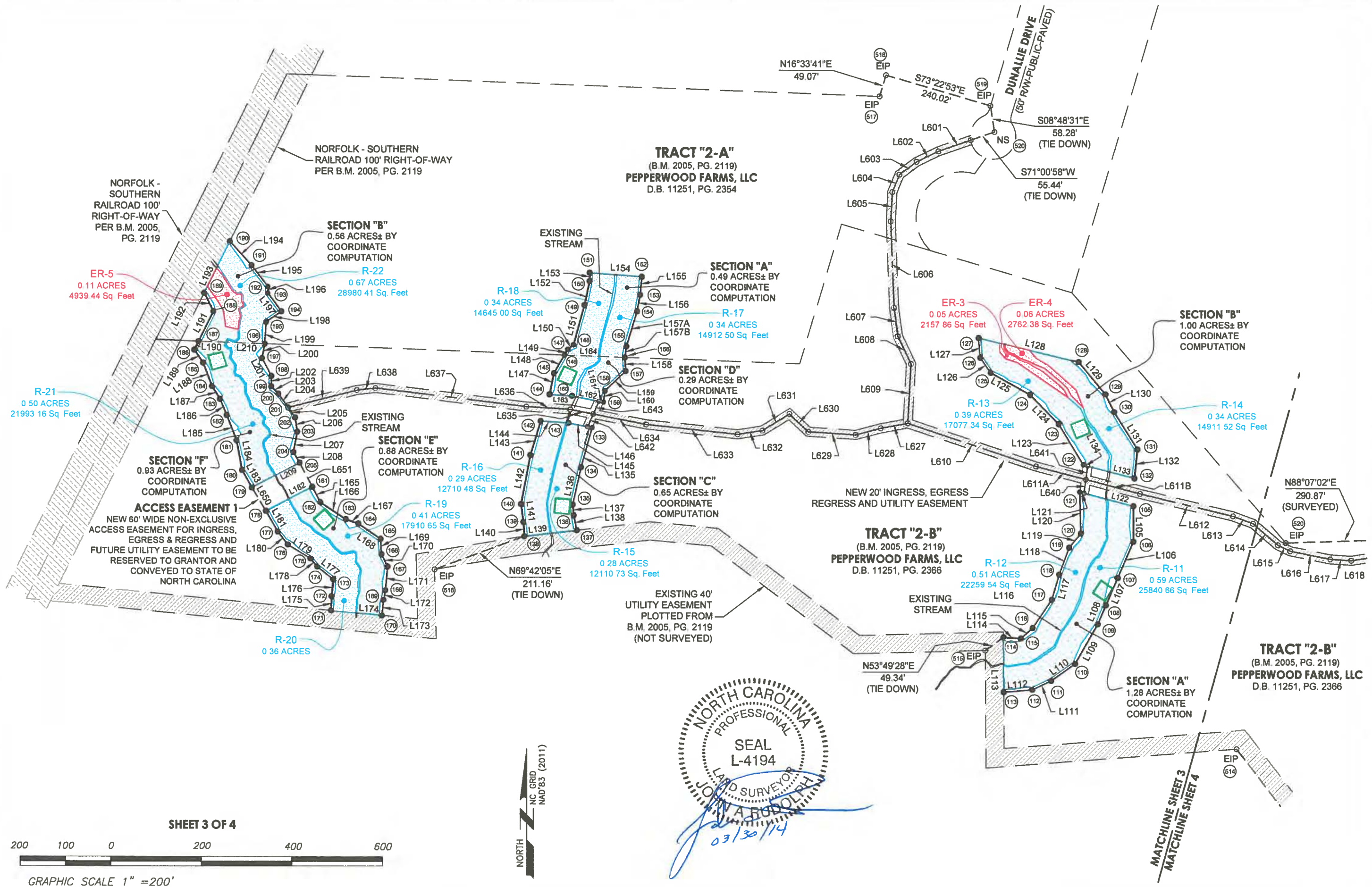
CURRENT OWNER
PEPPERWOOD FARMS, LLC
PER D.B. 11251, PG. 2366

SHEET 1 OF 4
RIPARIAN BUFFER COMPOSITE MAP
OF THE
PEPPERWOOD FARM MITIGATION SITE
FOR
THE STATE OF NORTH CAROLINA, ECOSYSTEM ENHANCEMENT PROGRAM
EEP PROJECT ID #95713
SPO# 92-AGZ
MIDDLE CREEK TOWNSHIP WAKE COUNTY NORTH CAROLINA



RESTORATION SYSTEMS, LLC
1101 HAYNES STREET
SUITE 211
RALEIGH, NC 27604





TRACT "2-A"
 (B.M. 2005, PG. 2119)
PEPPERWOOD FARMS, LLC
 D.B. 11251, PG. 2354

TRACT "2-B"
 (B.M. 2005, PG. 2119)
PEPPERWOOD FARMS, LLC
 D.B. 11251, PG. 2366

TRACT "2-B"
 (B.M. 2005, PG. 2119)
PEPPERWOOD FARMS, LLC
 D.B. 11251, PG. 2366

NORFOLK - SOUTHERN RAILROAD 100' RIGHT-OF-WAY PER B.M. 2005, PG. 2119

NORFOLK - SOUTHERN RAILROAD 100' RIGHT-OF-WAY PER B.M. 2005, PG. 2119

SECTION "B"
 0.56 ACRES± BY COORDINATE COMPUTATION

SECTION "A"
 0.49 ACRES± BY COORDINATE COMPUTATION

SECTION "D"
 0.29 ACRES± BY COORDINATE COMPUTATION

SECTION "C"
 0.65 ACRES± BY COORDINATE COMPUTATION

SECTION "E"
 0.88 ACRES± BY COORDINATE COMPUTATION

SECTION "F"
 0.93 ACRES± BY COORDINATE COMPUTATION

ACCESS EASEMENT 1
 NEW 60' WIDE NON-EXCLUSIVE ACCESS EASEMENT FOR INGRESS, EGRESS & REGRESS AND FUTURE UTILITY EASEMENT TO BE RESERVED TO GRANTOR AND CONVEYED TO STATE OF NORTH CAROLINA

NEW 20' INGRESS, EGRESS REGRESS AND UTILITY EASEMENT

EXISTING 40' UTILITY EASEMENT PLOTTED FROM B.M. 2005, PG. 2119 (NOT SURVEYED)

ER-5
 0.11 ACRES
 4939.44 Sq Feet

R-22
 0.67 ACRES
 28980.41 Sq Feet

R-18
 0.34 ACRES
 14645.00 Sq Feet

R-17
 0.34 ACRES
 14912.50 Sq Feet

ER-3
 0.05 ACRES
 2157.86 Sq Feet

ER-4
 0.06 ACRES
 2762.38 Sq Feet

SECTION "B"
 1.00 ACRES± BY COORDINATE COMPUTATION

R-21
 0.50 ACRES
 21993.16 Sq Feet

R-13
 0.39 ACRES
 17077.34 Sq Feet

R-14
 0.34 ACRES
 14911.52 Sq Feet

R-16
 0.29 ACRES
 12710.48 Sq Feet

R-19
 0.41 ACRES
 17910.65 Sq Feet

R-15
 0.28 ACRES
 12110.73 Sq Feet

R-20
 0.36 ACRES

R-12
 0.51 ACRES
 22259.54 Sq Feet

R-11
 0.59 ACRES
 25840.66 Sq Feet



SHEET 3 OF 4



GRAPHIC SCALE 1" = 200'

MATCHLINE SHEET 3
 MATCHLINE SHEET 4



Photo Point 1 – Looking South along UT-1



Photo Point 2 – Looking North along UT-1



Photo Point 3 – Looking North along UT-2



Photo Point 4 – Looking East into UT-3 @ marsh treatment area



Photo Point 5 – Looking South along UT-3



Photo Point 6 – Looking North along UT-4



Photo Point 7 – Looking South along UT-5



Photo Point 8 – Looking North along UT-5

Appendix D:

NC DWR Site approval letter: November 28th, 2012 and February 8th, 2013



North Carolina Department of Environment and Natural Resources

Division of Water Quality
Charles Wakild, P.E.
Director

Beverly Eaves Perdue
Governor

Dee Freeman
Secretary

November 28, 2012

Ms. Jessica Kemp
N.C. Ecosystem Enhancement Program
1652 Mail Service Center
Raleigh, NC 27699-1652

Re: Site Viability for Mitigation - Pepperwood Farm RFP
Wake County

Dear Ms. Kemp,

Martin Richmond and Katie Merritt from the Division of Water Quality (DWQ) were asked by NCEEP to visit the above-referenced site on November 8, 2012. The subject site is an RFP with an awarded contract between NCEEP and Restoration Systems. The focus of our review was to determine the site's potential for nutrient offset and Neuse riparian buffer mitigation for the purpose of generating mitigation credits. Mr. Richmond performed a stream buffer determination (NBRRO #12-217) and has submitted a letter to NCEEP showing all streams onsite that are subject to the Neuse River Buffer Rules. If approved, mitigating this site could provide both Neuse riparian buffer credits and nutrient offset credits within the 8-digit Hydrologic Unit Code (HUC) 03020201 of the Neuse River Basin. However, nutrient offset credits generated at this site cannot be used toward offsetting impacts in the Falls Lake Watershed.

The site appeared to be a good candidate for planting Neuse riparian buffers (0-50 feet from the top of bank) for riparian buffer credits or nutrient offset credits. Additionally, there were other riparian areas (0-200 feet from top of bank) that were good candidates for nutrient offset only. A map detailing the features and their respective mitigation options is attached.

A mitigation plan must be provided to Ms. Merritt detailing the riparian buffer and nutrient offset restoration for review and approval prior to initiating the project. Once the project is complete, an as-built report must be provided to Ms. Merritt for review and approval showing the total Neuse riparian buffer credits and nutrient offset credits that were generated through the restoration efforts. Please provide riparian buffer credits generated in both acres and square feet. Please provide nutrient offset credits generated in both acres and pounds. Monitoring reports shall follow the as-built reports to provide DWQ a means of tracking the project's restoration success for a period of at least five years.

DWQ appreciates the opportunity to participate in up-front evaluations of potential buffer and nutrient offset projects.

We look forward to future participation with your program in our joint efforts to produce quality restoration sites that will help improve water quality.

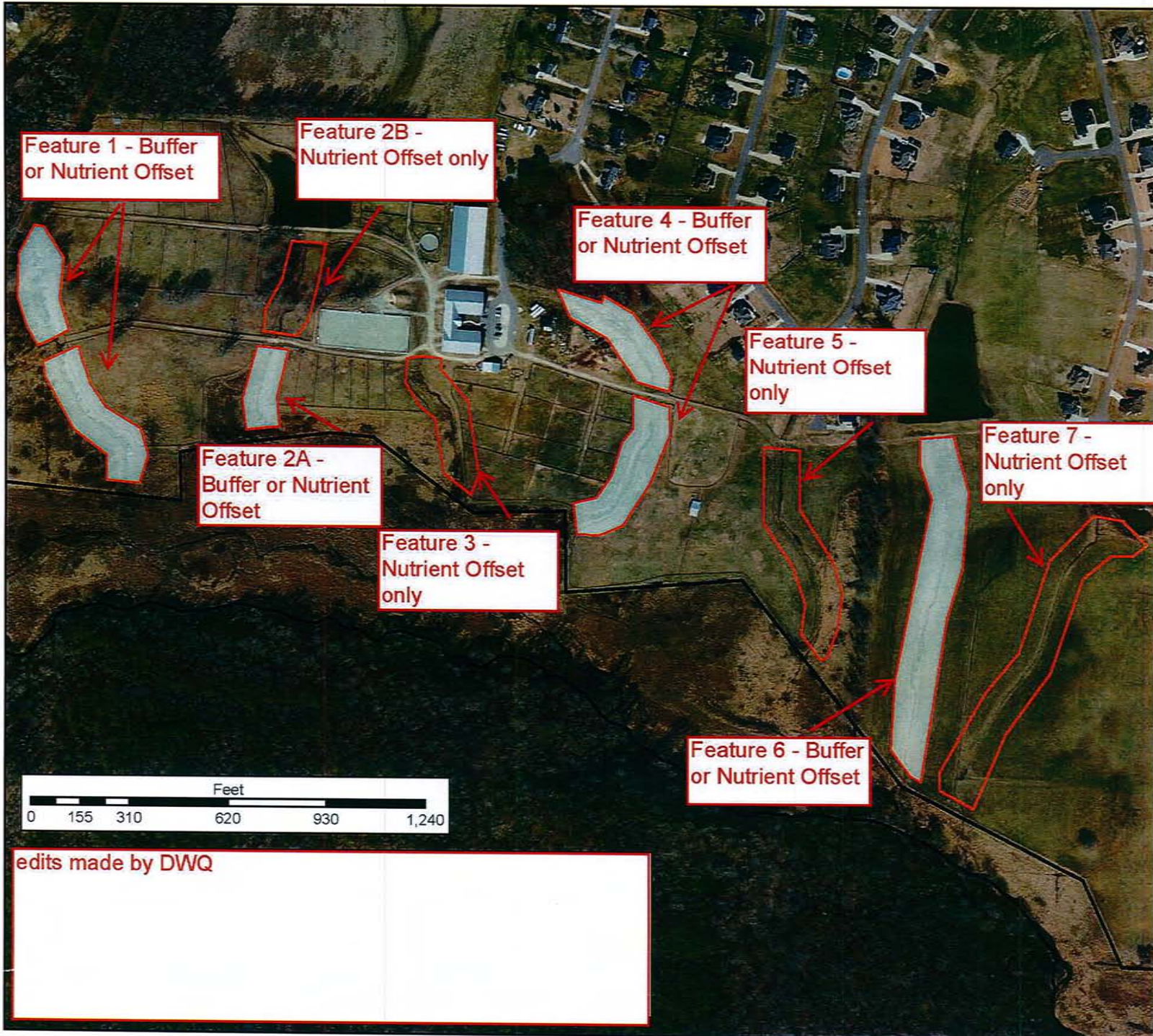
Please feel free to contact Ms. Merritt at (919) 807-6371 if you have any questions.

Sincerely,



Karen Higgins
Wetlands, Buffers, Stormwater Compliance &
Permitting Unit

Cc: File Copy (Katie Merritt)
Martin Richmond – RRO (via mail)



RESTORATION SYSTEMS, LLC
 1101 HAYNES ST, SUITE 211
 RALEIGH, NC 27604
 PHONE : 919.755.9490
 FAX : 919.755.9492

Prepared For:
 NC DENR:
 Ecosystem Enhancement Program
 &
 NC DWQ

Project: Pepperwood Farm Mitigation Site
 Project ID: EEP C #004946
 Drawn By: RJH
 Date: Nov 12, 2012
 Scale: 1 inch = 417 feet

Figure:
 Project Overview



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

Pat McCrory
 Governor

Charles Wakild, PE
 Director

John E Skvarla, III
 Secretary

November 26, 2012
 REVISED February 8, 2013

Jessica Kemp
 Eastern Project Manager
 DENR, Ecosystem Enhancement Program
 1652 Mail Service Center
 Raleigh, NC 27699-1652

Subject: Surface Water Determination Letter
 NBRRO#12-217
 Wake County

The Raleigh Regional Office of the NC Division of Water Quality/Surface Water Protection Section conducted a site visit at the subject property and is providing the below-listed determination pursuant to your request for a formal surface water determination:

BASIN:	
<input checked="" type="checkbox"/> Neuse (15A NCAC 2B .0233)	<input type="checkbox"/> Tar-Pamlico (15A NCAC 2B .0259)
<input checked="" type="checkbox"/> Ephemeral/Intermittent/Perennial Determination	<input type="checkbox"/> Jordan Lake (15A NCAC 2B .0267)

Project Name: Pepperwood Farm Riparian Buffer Restoration Site

Location/Directions: Project is a proposed Neuse River Riparian Buffer restoration and mitigation site in Wake County

Subject Stream: UT's to Terrible Creek

Date of Determination: Nov 8, 2012 and January 18, 2013

Feature	E/I/P*	Not Subject	Subject	Start@	Stop@	Stream Form Pts.	Soil Survey	USGS Topo
1	P		X	Throughout			X	
2	I		X	Farm Road Culvert Pond (Include Pond)			X	X
3	I	X (Not Depicted)		Start Flag				
4	I		X	Throughout			X	



5	I	X (Not Depicted)		Farm Road Culvert				
6	P		X	Throughout			X	X
7		X (Not Depicted)		Pond Outfall				
8	I		X	Throughout			X	

*E/I/P = Ephemeral/Intermittent/Perennial

Explanation: The feature(s) listed above has or have been located on the Soil Survey of Wake County, North Carolina or the most recent copy of the USGS Topographic map at a 1:24,000 scale. Each feature that is checked "Not Subject" has been determined not to be a stream or is not present on the property. Features that are checked "Subject" have been located on the property and possess characteristics that qualify it to be a stream. There may be other streams located on your property that do not show up on the maps referenced above but, still may be considered jurisdictional according to the US Army Corps of Engineers and/or to the Division of Water Quality.

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 may request a determination by the Director. An appeal request must be made within sixty (60) days of date of this letter or from the date the affected party (including downstream and/or adjacent owners) is notified of this letter. A request for a determination by the Director shall be referred to the Director in writing c/o Ian McMillan, DWQ Wetlands/401 Unit, 1650 Mail Service Center, Raleigh NC 27699-1650.

If you dispute the Director's determination you may file a petition for an administrative hearing. You must file the petition with the Office of Administrative Hearings within sixty (60) days of the receipt of this notice of decision. A petition is considered filed when it is received in the Office of Administrative Hearings during normal office hours. The Office of Administrative Hearings accepts filings Monday through Friday between the hours of 8:00 am and 5:00 pm, except for official state holidays. To request a hearing, send the original and one (1) copy of the petition to the Office of Administrative Hearings, 6714 Mail Service Center, Raleigh, NC 27699-6714. The petition may also be faxed to the attention of the Office of Administrative Hearings at (919) 733-3478, provided the original and one (1) copy of the document is received by the Office of Administrative Hearings within five (5) days following the date of the fax transmission. A copy of the petition must also be served to the Department of Natural Resources, c/o Mary Penny Thompson, General Counsel, 1601 Mail Service Center, Raleigh, NC 27699-1601.

This determination is final and binding unless, as detailed above, you ask for a hearing or appeal within sixty (60) days.

The owner/future owners should notify the Division of Water Quality (including any other Local, State, and Federal Agencies) of this decision concerning any future correspondences regarding the subject property (stated above). This project may require a Section 404/401 Permit for the proposed activity. Any inquiries should be directed to the Division of Water Quality (Central Office) at (919)-807-6301, and the US Army Corp of Engineers (Raleigh Regulatory Field Office) at (919)-544-4884.

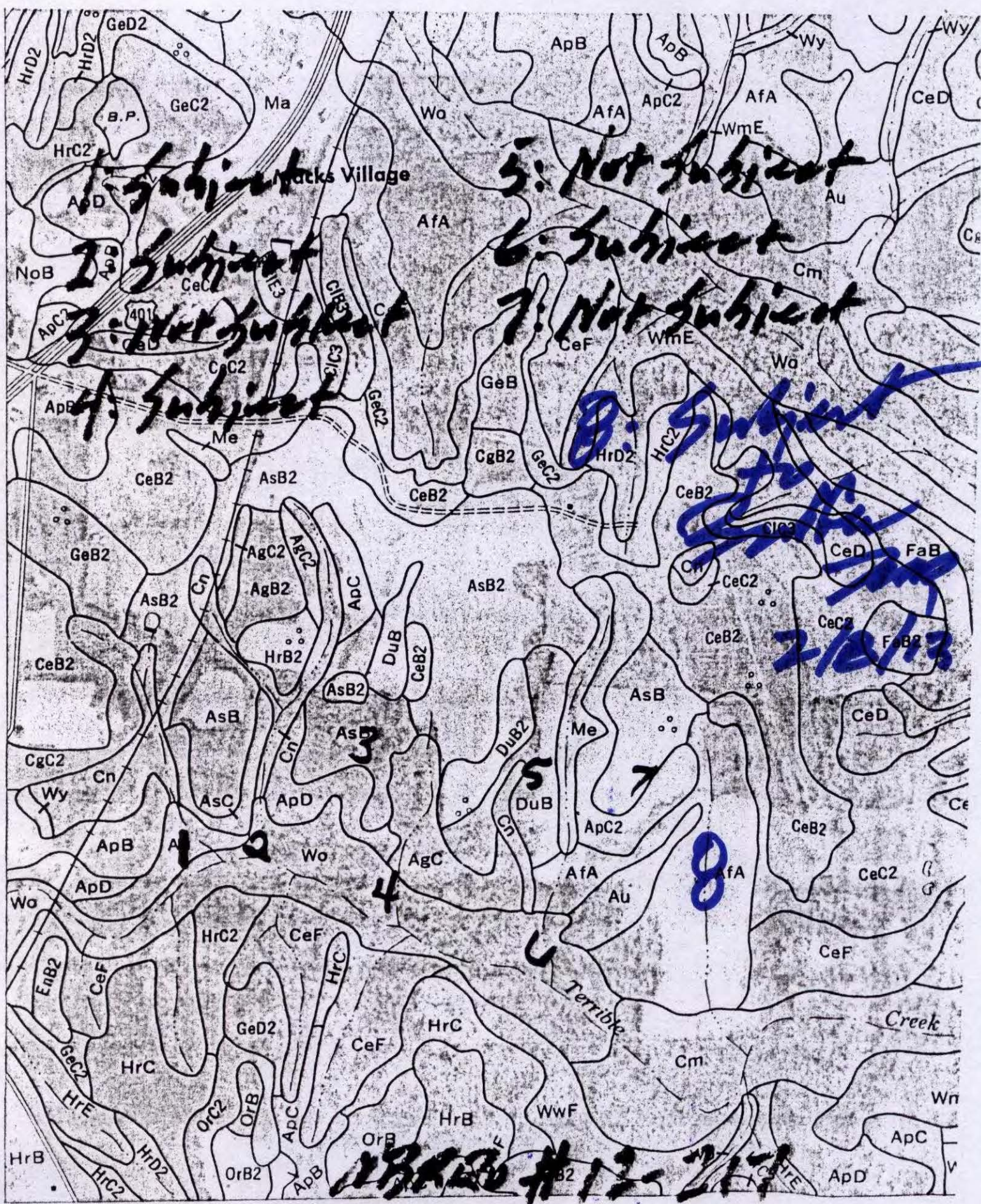
Respectfully,



Martin Richmond
 Environmental Specialist

cc: RRO/SWP File Copy

(Joins sheet 91)



1: Subject
 2: Subject
 3: Not Subject
 4: Subject
 5: Not Subject
 6: Subject
 7: Not Subject

8: Subject
 2/12/13

1822 # 12-217
 217

(Joins sheet 99)

NR20 # 12-217

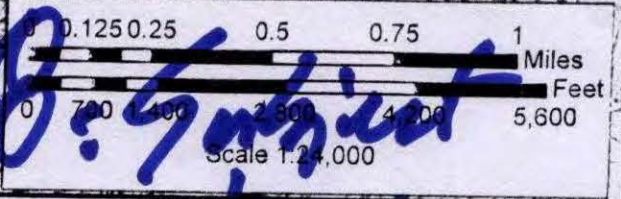
7/11



- 1: Subject
- 2: Subject
- 3: Not Subject
- 4: Subject
- 5: Not Subject
- 6: Subject
- 7: Not Subject

Legend

- Easement
- Existing Conservation Easement
- Drainage Areas



218 Snow Avenue
Raleigh, NC 27603
(919) 215-1593

TOPOGRAPHY AND DRAINAGE AREA
PEPPERWOOD FARM RIPARIAN BUFFER
RESTORATION SITE
Wake County, North Carolina

Owner: [Handwritten]	FIGURE
Date: Feb 2012	3
Project: 09-002.24	

2/10/12 [Handwritten Signature]