

**YEAR 5 (2018) ANNUAL MONITORING REPORT**

**PEPPERWOOD FARM RIPARIAN BUFFER MITIGATION SITE**

Wake County, North Carolina

DMS Project ID: 95713

Contract No. 004946, DWR Project No. 2013-1262

Data Collected August-October 2018



Prepared for:

NC Department of Environmental Quality  
Division of Mitigation Services  
1652 Mail Service Center  
Raleigh, NC 27699-1652

**November 2018**

## Table of Contents

|                            |   |
|----------------------------|---|
| 1.0 Executive Summary..... | 2 |
| 2.0 Methodology.....       | 3 |
| 3.0 References.....        | 3 |

## Appendices

### Appendix A: Vicinity Map and Background Tables

- Figure 1. Vicinity Map
- Figure 2. Component and Asset
- 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

### Appendix B: Visual Assessment Data

- Figure 3. Current Conditions Plan View
- Table 5. Vegetation Condition Assessment
- Vegetation Plot Photos
- Fixed Photo Points

### Appendix C: Vegetation Plot Data

- Table 6. Vegetation Plot Criteria Attainment Based on Planted Stems
- Table 7. CVS Vegetation Plot Metadata
- Table 8. Total and Planted Stems by Plot and Species

### Appendix D: Additional Data

- Figure 4. Watershed Map
- Figure 5. NRCS Soils Map
- Preconstruction Photographs

### Appendix E: Herbicide Treatment Logs

## 1.0 Executive Summary

This Annual Monitoring Report describes the Pepperwood Farm Riparian Buffer Mitigation Site (Site) and is designed specifically to assist in fulfilling the North Carolina Division of Mitigation Services (NCDMS) riparian buffer mitigation goals within the Neuse 03020201 Watershed. Completed project activities, reporting history, completion dates, project contacts, and project attributes are summarized in Tables 1-4 (Appendix A). This report (compiled based on the NC Division of Mitigation Services (NCDMS) *Procedural Guidance and Content Requirements for DMS Monitoring Reports* Version 1.5 dated 6/8/12) summarizes data for Year 5 (2018) monitoring.

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, Appendix A). 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 DWR) as a Targeted Local Watershed (TLW).

The Site encompasses 12.66 acres and is protected in perpetuity by three conservation easements recorded at the Wake County Register of Deeds on 11/25/2013. 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. 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 storm water 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.

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 livestock stakes.
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 NCDMS guidelines by a licensed NC surveyor.

## **Vegetation Success Criteria**

Success of vegetation criteria at the Site indicates successful restoration of riparian areas adjacent to subject streams as well as improvement of overall water quality resulting from the treatment of runoff from agricultural 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*).

## **2.0 Methodology**

Monitoring of vegetation restoration efforts will follow Level 2 *CVS-DMS Protocol for Recording Vegetation, Version 4.2* (Lee et al. 2008) 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 DMS 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 will be documented with photos and included in the annual monitoring report (Appendix C).

Year 5 (2018) monitoring data was collected in October 2018 by Axiom Environmental and measured an average density of 389 planted stems per acre (excluding livestakes) on Site, with ten out of thirteen CVS monitoring plots exceeding success criteria based on planted stems alone (Appendix C). However, when including natural recruits of sweetgum (*Liquidambar styraciflua*) and eastern baccharis (*Baccharis halimifolia*) in Plot 4, natural recruits of persimmon (*Diospyros virginiana*), eastern red cedar (*Juniperus virginiana*), and water oak (*Quercus nigra*) in Plot 12, and natural recruits of tulip poplar (*Liriodendron tulipifera*) and wax myrtle (*Morella cerifera*) in Plot 13, these plots were well-above success criteria.

### 3.0 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. 2008. CVS-DMS Protocol for Recording Vegetation. Version 4.2. North Carolina Department of Environmental Quality, Division of Mitigation Services. Raleigh, North Carolina.
- North Carolina Division of Water Resources (NCDWR). 2014. Final North Carolina Water Quality Assessment and Impaired Waters List (2014 303(d) Report) (online). Available: <http://portal.ncdenr.org/web/wq/ps/mtu/assessment> [March 2014]. North Carolina Department of Environmental Quality, 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](http://h2o.enr.state.nc.us/tmdl/documents/draft_2010_Cat_5.pdf) [February 1, 2011]. North Carolina Department of Environmental Quality, 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](http://portal.ncdenr.org/c/document_library/get_file?uuid=665be84c-cf93-477b-918c-1993778ef11f&groupId=60329) [March 2014]. North Carolina Department of Environmental Quality, Raleigh, North Carolina.
- Schafale, M.P. and A.S. Weakley. 1990. Classification of the Natural Communities of North Carolina: Third Approximation. North Carolina Natural Heritage Program, Division of Parks and Recreation, North Carolina Department of Environmental Quality. Raleigh, North Carolina.

## **Appendix A: Vicinity Map and Background Tables**

Figure 1. Vicinity Map

Figure 2. Component and Asset

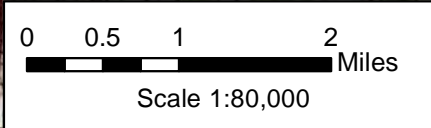
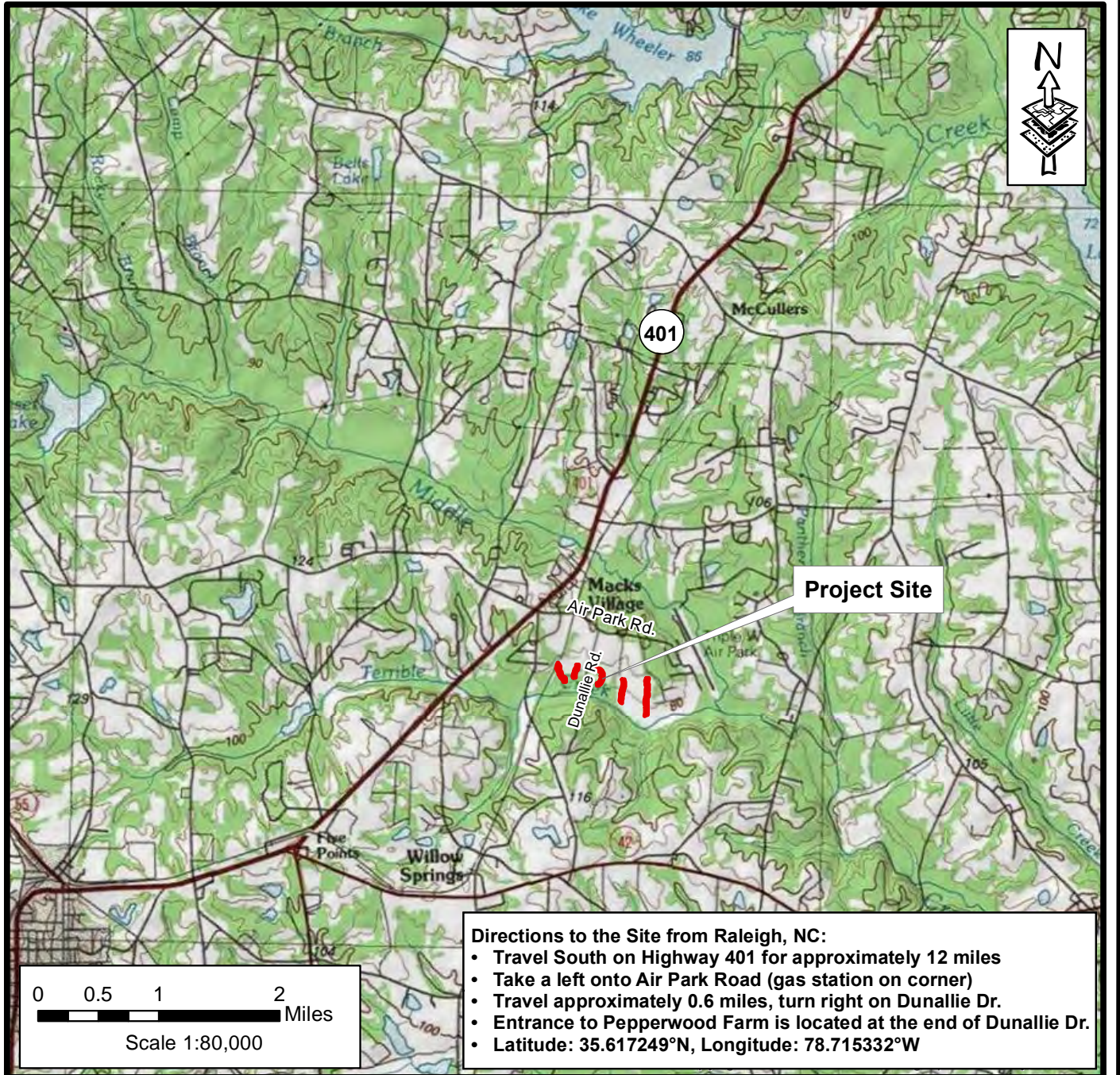
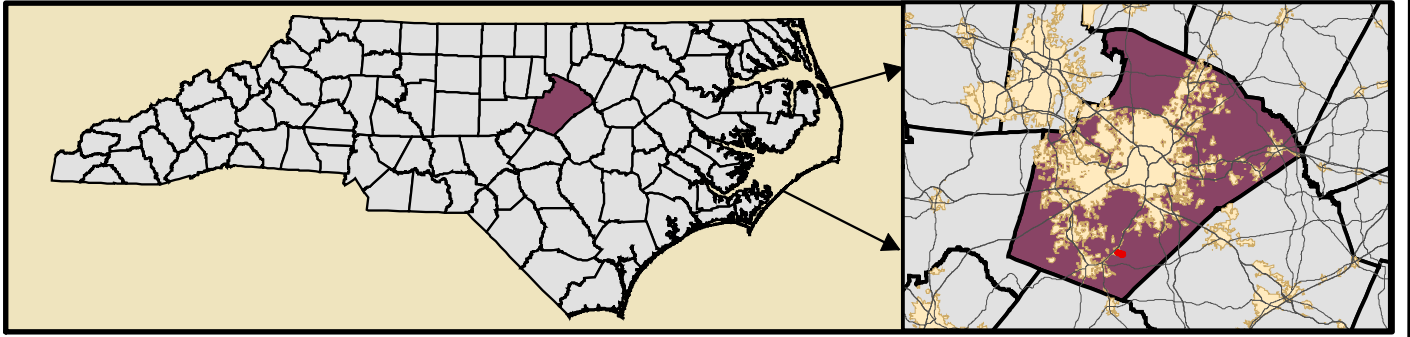
Table 1. Project Components and Mitigation Credits Table

Table 2. Project Activity and Reporting History Table

Table 3. Project Contact Table

Table 4. Project Baseline Information and Attributes Table





**Directions to the Site from Raleigh, NC:**

- 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.
- Latitude: 35.617249°N, Longitude: 78.715332°W

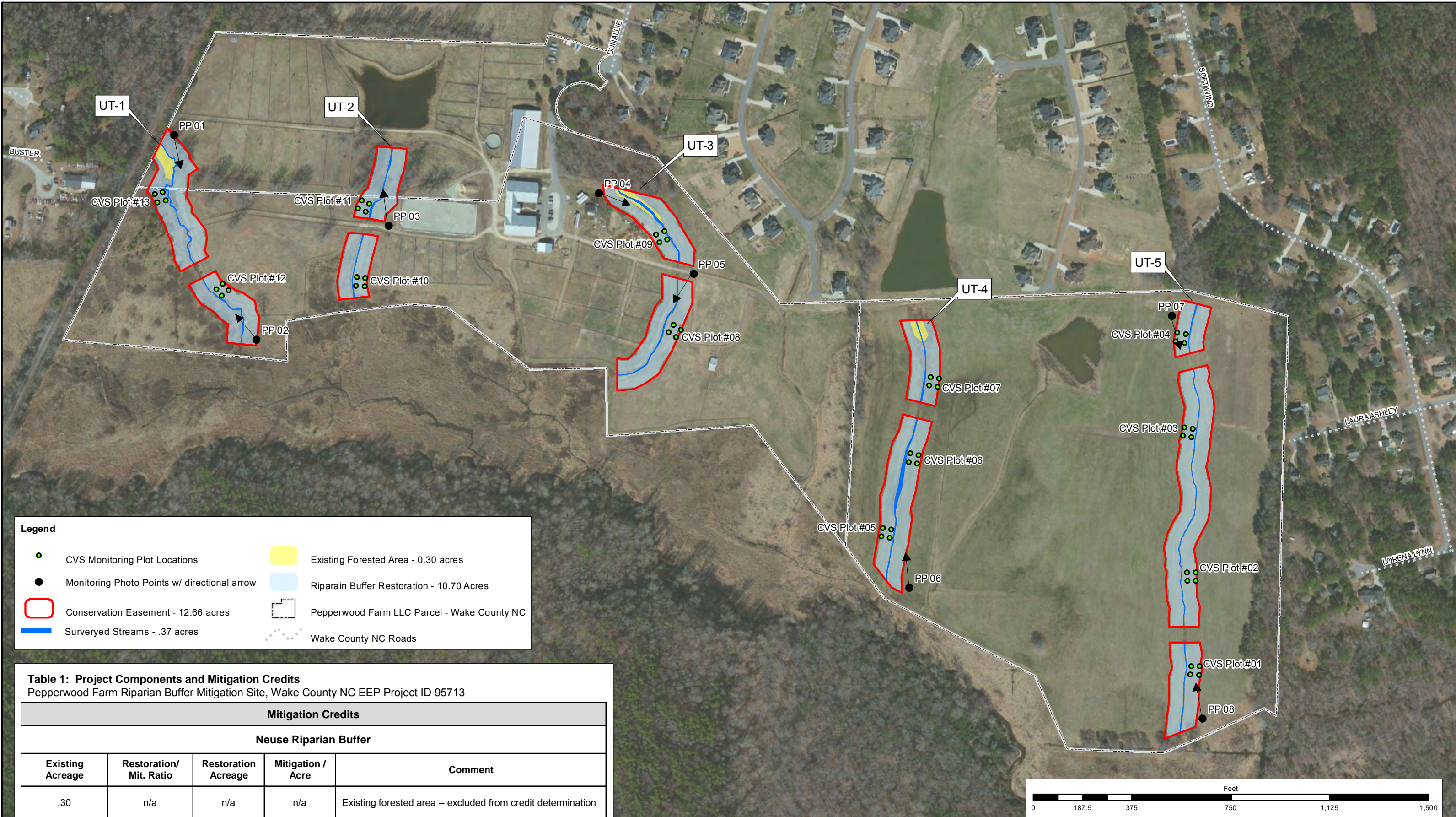
|   |   |
|---|---|
| Prepared by:  | Prepared for:   |
|  |  |

VICINITY MAP  
PEPPERWOOD FARM  
RIPARIAN BUFFER MITIGATION SITE  
Wake County, North Carolina

|          |          |
|----------|----------|
| Dwn. By: | KRJ      |
| Date:    | Oct 2014 |
| Project: | 10-001   |

|        |   |
|--------|---|
| FIGURE | 1 |
|--------|---|





**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

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

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.



**Table 1: Project Components and Mitigation Credits**

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

| <b>Mitigation Credits</b>    |                                |  |                          |   |
|------------------------------|--------------------------------|--|--------------------------|---|
| <b>Neuse Riparian Buffer</b> |                                |  |                          |   |
| <b>Existing Acreage</b>      | <b>Restoration/ Mit. Ratio</b> | <b>Restoration Acreage</b>                     | <b>Mitigation / Acre</b> | <b>Comment</b>  |
| .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. |
| <b>Component Summation</b>   |                                |  |                          |   |
| <b>Restoration Level</b>     |                                | <b>Neuse Riparian Buffer Credits (sq. ft.)</b> |                          |   |
| Restoration                  |                                | 10.70 acres = 466,092 sq. ft.                  |                          |   |
| <b>Totals</b>                |                                | 10.70 acres = 466,092 sq. ft.                  |                          |   |

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

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

| <b>Activity or Report</b>              | <b>Data Collection Complete</b> | <b>Completion or Delivery</b>    |
|--|---------------------------------|----------------------------------|
| CE Document                            | NA                              | August 13 <sup>th</sup> , 2013   |
| Conservation Easement                  | NA                              | November 25 <sup>th</sup> , 2013 |
| Mitigation Plan                        | NA                              | January 30 <sup>th</sup> , 2014  |
| Earthwork                              | NA                              | March 5 <sup>th</sup> , 2014     |
| Bare Root Planting                     | NA                              | March 13 <sup>th</sup> , 2014    |
| Baseline Monitoring Document           | March 2014                      | May 5 <sup>th</sup> , 2014       |
| Year 1 (2014) Annual Monitoring Report | October 2014                    | October 20 <sup>th</sup> , 2014  |
| Year 2 (2015) Annual Monitoring Report | October 2015                    | December 2015                    |
| Year 3 (2016) Annual Monitoring Report | October 2016                    | November 2016                    |
| Year 4 (2017) Annual Monitoring Report | October 2017                    | November 2017                    |
| Year 5 (2018) Annual Monitoring Report | October 2018                    | October 2018                     |

**Table 3: Project Contact Table**

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

|                                 | <b>Firm</b>               | <b>POC &amp; Address</b>  |
|---------------------------------|---------------------------|---|
| <b>Full Delivery Provider</b>   | Restoration Systems, LLC  | 1101 Haynes Street, Suite 211<br>Raleigh, North Carolina 27604<br>George Howard and John Preyer<br>919.755.9490 |
| <b>Designer:</b>                | Restoration Systems, LLC  | Raymond Holz: 919.755.9490<br>1101 Haynes Street, Suite 211<br>Raleigh, North Carolina 27604                    |
| <b>Earthwork Contractor:</b>    | Land Mechanics, Inc.      | Lloyd Glover; 919.422.3392<br>780 Landmark Road<br>Willow Spring, NC 27592-7756                                 |
| <b>Planting Contractor:</b>     | Carolina Silvics          | Mary-Margaret McKinney<br>252.333.9852<br>908 Indian Trail Road<br>Edenton, NC 27932                            |
| <b>Seeding Contractor:</b>      | Land Mechanics, Inc.      | Lloyd Glover; 919.422.3392<br>780 Landmark Road<br>Willow Spring, NC 27592-7756                                 |
| <b>Nursery Stock Suppliers:</b> | ArborGen                  | 1.888.888.7158  |
| <b>Baseline Data Collection</b> | Axiom Environmental, Inc. | Grant Lewis; 919.215.1693<br>218 Snow Ave. Raleigh, NC 27603  |
| <b>Vegetation Monitoring:</b>   | Axiom Environmental, Inc. | Grant Lewis; 919.215.1693<br>218 Snow Ave. Raleigh, NC 27603  |



**Table 4: Project Baseline Information & Attributes Table**

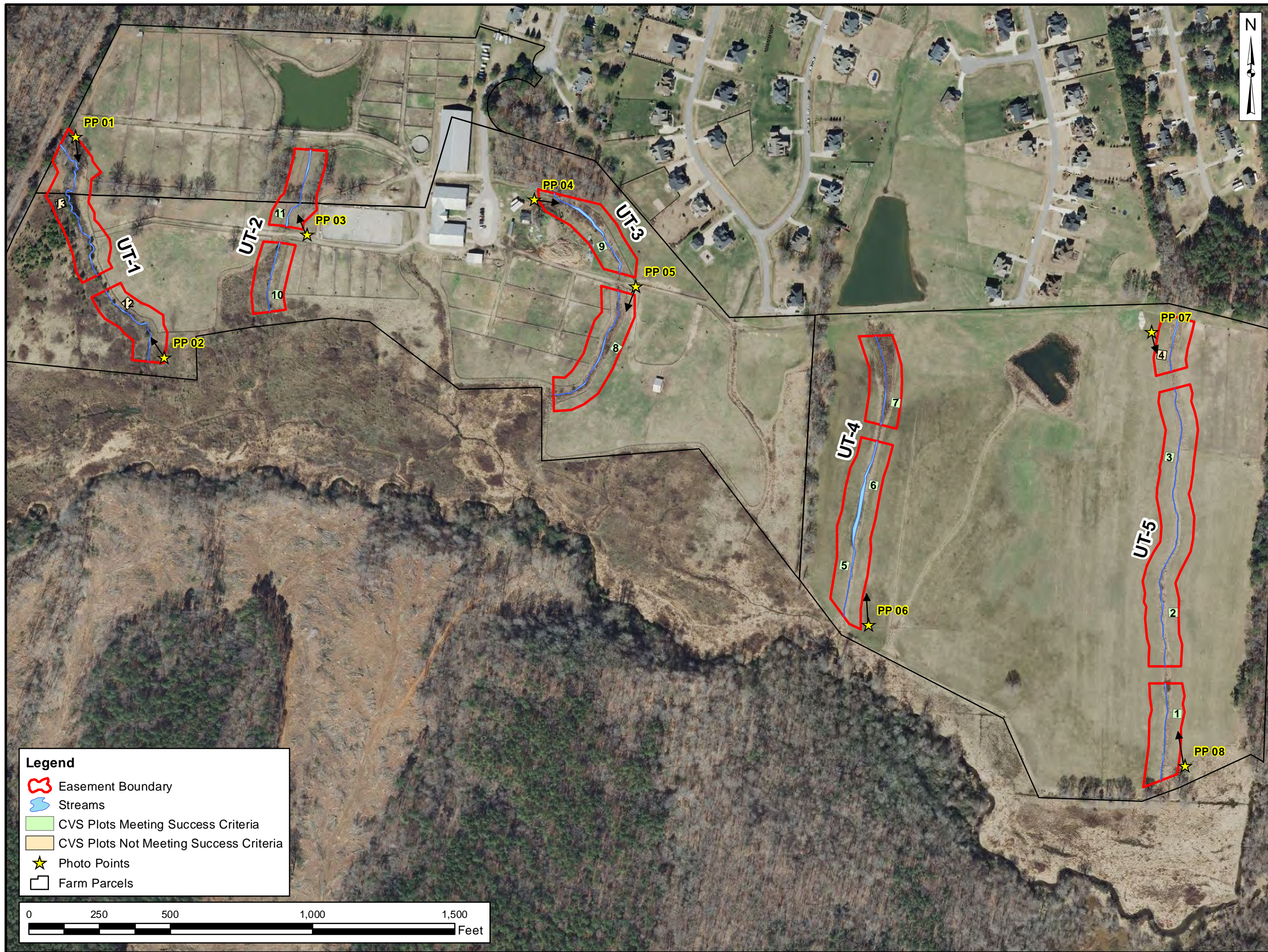
Pepperwood Farm Riparian Buffer Mitigation Site, Wake County NC DMS Project ID 95713

| <b>Project Information</b>  |             |   |                          |
|---|-------------|---|--------------------------|
| Project Name  |             | Pepperwood Farm                         |                          |
| County  |             | Wake                                    |                          |
| Project Area (acres)  |             | 12.66                                   |                          |
| Project Coordinates (latitude and longitude)                          |             | 35.617249°N, -78.715332°W (NAD83/WGS84) |                          |
| <b>Project Watershed Summary Information</b>                          |             |   |                          |
| Physiographic Province  |             | Northern Outer Piedmont                 |                          |
| River Basin   |             | Neuse                                   |                          |
| USGS Hydrologic Unit 8-digit  | 3020201     | USGS Hydrologic Unit 14-digit           | 3020201120010            |
| DWR Sub-basin   |             | 3/4/2003                                |                          |
| Project Drainage Area, Total Outfall (acres)                          |             | 285.45                                  |                          |
| Project Drainage Area Percentage of Impervious Area                   |             | > 5%                                    |                          |
| <b>Regulatory Considerations</b>                                      |             |   |                          |
| 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          |   |                          |

## **Appendix B: Visual Assessment Data**

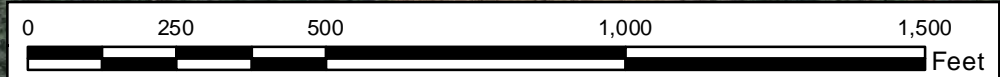
Figure 3. Current Conditions Plan View  
Table 5. Vegetation Condition Assessment  
Vegetation Plot Photos  
Fixed Photo Points





**Legend**

- Easement Boundary
- Streams
- CVS Plots Meeting Success Criteria
- CVS Plots Not Meeting Success Criteria
- Photo Points
- Farm Parcels



Prepared for:



Project:  
**PEPPERWOOD FARM**  
**RIPARIAN BUFFER**  
**MITIGATION SITE**

Wake County, NC  
 Title:  
**CURRENT CONDITIONS**  
**PLAN VIEW**

Notes:  
 1. Background imagery source:  
 2013 CGIA orthoimagery

Drawn by: KRJ/CLF  
 Date: Oct 2018  
 Scale: As shown  
 Project No.: 10-001

**FIGURE**  
**3**



Pepperwood

**Table 5** Vegetation Condition Assessment

Planted Acreage<sup>1</sup>

10.7

| Vegetation Category                    | Definitions | Mapping Threshold | CCPV Depiction | Number of Polygons | Combined Acreage | % of Planted Acreage |
|--|-------------|-------------------|----------------|--------------------|------------------|----------------------|
| 1. Bare Areas                          | None        | 0.1 acres         | N/A            | 0                  | 0.00             | 0.0%                 |
| 2. Low Stem Density Areas              | None        | 0.1 acres         | N/A            | 0                  | 0.00             | 0.0%                 |
| <b>Total</b>                           |             |                   |                |                    | 0.00             | 0.0%                 |
| 3. Areas of Poor Growth Rates or Vigor | None        | 0.25 acres        | N/A            | 0                  | 0.00             | 0.0%                 |
| <b>Cumulative Total</b>                |             |                   |                |                    | 0                | 0.0%                 |

Easement Acreage<sup>2</sup>

12.66

| Vegetation Category                         | Definitions | Mapping Threshold | CCPV Depiction | Number of Polygons | Combined Acreage | % of Easement Acreage |
|---|-------------|-------------------|----------------|--------------------|------------------|-----------------------|
| 4. Invasive Areas of Concern <sup>4</sup>   | None        | 1000 SF           | N/A            | 0                  | 0.00             | 0.0%                  |
| 5. Easement Encroachment Areas <sup>3</sup> | None        | none              | N/A            | 0                  | 0.00             | 0.0%                  |

<sup>1</sup> = Enter the planted acreage within the easement. This number is calculated as the easement acreage minus any existing mature tree stands that were not subject to supplemental planting of the understory, the channel acreage, crossings or any other elements not directly planted as part of the project effort.

<sup>2</sup> = The acreage within the easement boundaries.

<sup>3</sup> = Encroachment may occur within or outside of planted areas and will therefore be calculated against the overall easement acreage. In the event a polygon is cataloged into items 1, 2 or 3 in the table and is the result of encroachment, the associated acreage should be tallied in the relevant item (i.e., item 1,2 or 3) as well as a parallel tally in item 5.

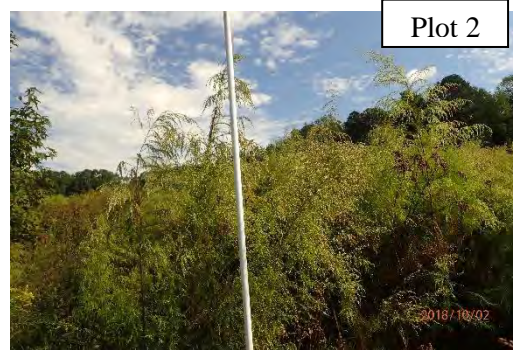
<sup>4</sup> = Invasives may occur in or out of planted areas, but still within the easement and will therefore be calculated against the overall easement acreage. Invasives of concern/interest are listed below. The list of high concern species are those with the potential to directly outcompete native, young, woody stems in the short-term (e.g. monitoring period or shortly thereafter) or affect the community structure for existing, more established tree/shrub stands over timeframes that are slightly longer (e.g. 1-2 decades). The low/moderate concern group are those species that generally do not have this capacity over the timeframes discussed and therefore are not expected to be mapped with regularity, but can be mapped, if in the judgement of the observer their coverage, density or distribution is suppressing the viability, density, or growth of planted woody stems. Decisions as to whether remediation will be needed are based on the integration of risk factors by DMS such as species present, their coverage, distribution relative to native biomass, and the practicality of treatment. For example, even modest amounts of Kudzu or Japanese Knotweed early in the projects history will warrant control, but potentially large coverages of Microstegium in the herb layer will not likely trigger control because of the limited capacities to impact tree/shrub layers within the timeframes discussed and the potential impacts of treating extensive amounts of ground cover. Those species with the "watch list" designator in gray shade are of interest as well, but have yet to be observed across the state with any frequency. Those in *red italics* are of particular interest given their extreme risk/threat level for mapping as points where isolated specimens are found, particularly early in a projects monitoring history. However, areas of discreet, dense patches will of course be mapped as polygons. The symbology scheme below was one that was found to be helpful for symbolizing invasives polygons, particularly for situations where the condition for an area is somewhere between isolated specimens and dense, discreet patches. In any case, the point or polygon/area feature can be symbolized to describe things like high or low concern and species can be listed as a map inset, in legend items if the number of species are limited or in the narrative section of the executive summary.



**Pepperwood Farm  
Vegetation Monitoring Photographs  
Taken October 2018**



Plot 1



Plot 2



Plot 3



Plot 4



Plot 5



Plot 6



Plot 7



**Pepperwood Farm  
Vegetation Monitoring Photographs  
Taken October 2018  
(continued)**





**Pepperwood Farm  
Fixed Photo Points  
Taken October 2018**



Photo Point 1



Photo Point 2



Photo Point 3



Photo Point 4



Photo Point 5



Photo Point 6



Photo Point 7



Photo Point 8



## **Appendix C: Vegetation Plot Data**

Table 6. Vegetation Plot Criteria Attainment Based on Planted Stems

Table 7. CVS Vegetation Plot Metadata

Table 8. Total and Planted Stems by Plot and Species

**Table 6. Vegetation Plot Criteria Attainment Based on Planted Stems**

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

| Vegetation Plot ID | Vegetation Survival Threshold Met? | Tract Mean |
|--------------------|------------------------------------|------------|
| 1                  | Yes                                | 77%        |
| 2                  | Yes                                |            |
| 3                  | Yes                                |            |
| 4                  | No*                                |            |
| 5                  | Yes                                |            |
| 6                  | Yes                                |            |
| 7                  | Yes                                |            |
| 8                  | Yes                                |            |
| 9                  | Yes                                |            |
| 10                 | Yes                                |            |
| 11                 | Yes                                |            |
| 12                 | No**                               |            |
| 13                 | No***                              |            |

\* When including natural recruits of sweetgum (*Liquidambar styraciflua*) and eastern baccharis (*Baccharis halimifolia*) Plot 4 was well-above success criteria.

\*\*When including natural recruits of persimmon (*Diospyros virginiana*), eastern red cedar (*Juniperus virginiana*), and water oak (*Quercus nigra*) Plot 12 was well-above success criteria.

\*\*\*When including natural recruits of tulip poplar (*Liriodendron tulipifera*) and wax myrtle (*Morella cerifera*) Plot 13 was well-above success criteria.

**Table 7. CVS Vegetation Plot Metadata**

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

|                                      |   |
|--------------------------------------|---|
| <b>Report Prepared By</b>            | Corri Faquin  |
| <b>Date Prepared</b>                 | 10/26/2018 16:34  |
| <b>database name</b>                 | RS-Pepperwood-2018-A-v2.3.1.mdb   |
| <b>database location</b>             | S:\Business\Projects\10\10-001 RS 10 Monitoring\Pepperwood Year 0-5\2018 Year 5\CVS   |
| <b>computer name</b>                 | KEENAN-PC   |
| <b>file size</b>                     | 49180672  |
| <b>Metadata</b>                      | Description of database file, the report worksheets, and a summary of project(s) and project data.  |
| <b>Proj, planted</b>                 | Each project is listed with its PLANTED stems per acre, for each year. This excludes live stakes.   |
| <b>Proj, total stems</b>             | Each project is listed with its TOTAL stems per acre, for each year. This includes live stakes, all planted stems, and all natural/volunteer stems.       |
| <b>Plots</b>                         | List of plots surveyed with location and summary data (live stems, dead stems, missing, etc.).  |
| <b>Vigor</b>                         | Frequency distribution of vigor classes for stems for all plots.  |
| <b>Vigor by Spp</b>                  | Frequency distribution of vigor classes listed by species.  |
| <b>Damage</b>                        | List of most frequent damage classes with number of occurrences and percent of total stems impacted by each.  |
| <b>Damage by Spp</b>                 | Damage values tallied by type for each species.   |
| <b>Damage by Plot</b>                | Damage values tallied by type for each plot.  |
| <b>Planted Stems by Plot and Spp</b> | A matrix of the count of PLANTED living stems of each species for each plot; dead and missing stems are excluded.   |
| <b>ALL Stems by Plot and spp</b>     | A matrix of the count of total living stems of each species (planted and natural volunteers combined) for each plot; dead and missing stems are excluded. |
| <b>PROJECT SUMMARY</b>               |   |
| <b>Project Code</b>                  | 123   |
| <b>project Name</b>                  | Pepperwood  |
| <b>River basin</b>                   | Neuse   |
| <b>Sampled Plots</b>                 | 13  |

**Table 8. Total and Planted Stems by Plot and Species**  
 Project Code 10-001. Project Name: Pepperwood

| Scientific Name         | Common Name        | Species Type | Current Plot Data (MY5 2018) |       |     |             |       |       |             |       |      |             |       |     |             |       |       |             |       |       |             |       |     |             |       |       |             |       |       |             |       |       |      |  |  |
|-------------------------|--------------------|--------------|------------------------------|-------|-----|-------------|-------|-------|-------------|-------|------|-------------|-------|-----|-------------|-------|-------|-------------|-------|-------|-------------|-------|-----|-------------|-------|-------|-------------|-------|-------|-------------|-------|-------|------|--|--|
|                         |                    |              | 123-01-0001                  |       |     | 123-01-0002 |       |       | 123-01-0003 |       |      | 123-01-0004 |       |     | 123-01-0005 |       |       | 123-01-0006 |       |       | 123-01-0007 |       |     | 123-01-0008 |       |       | 123-01-0009 |       |       | 123-01-0010 |       |       |      |  |  |
|                         |                    |              | PnoLS                        | P-all | T   | PnoLS       | P-all | T     | PnoLS       | P-all | T    | PnoLS       | P-all | T   | PnoLS       | P-all | T     | PnoLS       | P-all | T     | PnoLS       | P-all | T   | PnoLS       | P-all | T     | PnoLS       | P-all | T     | PnoLS       | P-all | T     |      |  |  |
| Acer negundo            | boxelder           | Tree         |                              |       |     |             |       |       |             |       |      |             |       |     |             |       |       |             |       |       |             |       |     |             |       |       |             |       |       |             |       |       |      |  |  |
| Acer rubrum             | red maple          | Tree         |                              |       |     |             |       |       |             |       |      |             |       |     |             |       |       |             |       |       | 2           |       |     |             |       |       |             |       |       |             |       |       |      |  |  |
| Baccharis halimifolia   | eastern baccharis  | Shrub        |                              |       | 4   |             |       | 1     |             |       |      | 1           |       |     | 3           |       |       | 2           |       |       |             |       |     |             |       |       |             |       |       | 3           |       |       |      |  |  |
| Betula nigra            | river birch        | Tree         |                              |       |     |             |       |       |             |       |      |             |       |     |             |       | 1     | 1           | 1     |       |             |       | 1   | 1           | 1     |       |             |       |       |             |       |       |      |  |  |
| Carpinus caroliniana    | American hornbeam  | Tree         |                              |       |     |             |       |       |             |       |      |             |       | 2   | 2           | 2     |       |             |       |       |             |       |     |             |       | 2     | 2           | 2     | 3     | 3           | 3     |       |      |  |  |
| Carya                   | hickory            | Tree         |                              |       |     |             |       |       |             |       |      |             |       |     |             |       |       |             |       |       |             |       |     |             |       |       |             |       |       |             |       |       |      |  |  |
| Carya cordiformis       | bitternut hickory  | Tree         |                              |       |     |             |       |       |             |       | 1    | 1           | 1     |     |             |       |       |             |       |       |             |       |     |             |       |       |             |       |       |             |       |       |      |  |  |
| Carya ovata             | shagbark hickory   | Tree         |                              |       |     |             |       |       |             |       |      |             |       |     |             |       |       |             |       |       |             |       |     |             |       |       |             |       |       |             |       |       |      |  |  |
| Celtis                  | hackberry          | Tree         |                              |       |     |             |       |       |             |       |      |             |       |     |             |       |       |             |       |       |             |       |     |             |       |       |             |       |       |             |       |       |      |  |  |
| Celtis laevigata        | sugarberry         | Tree         | 2                            | 2     | 2   |             |       | 1     |             |       |      |             |       |     |             |       |       |             |       |       |             |       |     |             |       |       | 2           | 2     | 2     |             |       |       |      |  |  |
| Diospyros virginiana    | common persimmon   | Tree         |                              |       |     |             |       |       |             |       |      | 7           |       |     |             |       |       | 1           |       |       |             |       |     |             |       | 1     |             |       |       |             |       |       |      |  |  |
| DONTKNOW: unsure record |                    |              |                              |       |     |             |       |       |             |       |      |             |       |     |             |       |       |             |       |       |             |       |     |             |       |       |             |       |       |             |       |       |      |  |  |
| Fraxinus pennsylvanica  | green ash          | Tree         | 3                            | 3     | 3   | 1           | 1     | 1     | 2           | 2     | 2    | 1           | 1     | 1   | 2           | 2     | 2     | 2           | 2     | 2     |             |       |     |             |       |       |             |       | 1     | 1           | 1     |       |      |  |  |
| Juniperus virginiana    | eastern redcedar   | Tree         |                              |       |     |             |       |       |             |       |      |             |       |     |             |       |       |             |       |       |             |       |     |             |       |       |             |       |       |             |       |       |      |  |  |
| Liquidambar styraciflua | sweetgum           | Tree         |                              |       | 1   |             |       | 1     |             |       |      | 4           |       | 7   |             |       |       | 4           |       |       | 6           |       |     |             |       |       |             |       |       |             |       |       |      |  |  |
| Liriodendron tulipifera | tuliptree          | Tree         |                              |       |     | 1           | 1     | 1     | 4           | 4     | 4    | 1           | 1     | 1   | 1           | 1     | 1     |             |       |       |             |       |     |             |       |       |             |       |       |             |       |       |      |  |  |
| Morella cerifera        | wax myrtle         | shrub        |                              |       |     |             |       |       |             |       |      |             |       |     |             | 1     |       |             |       |       |             |       |     |             |       |       |             |       |       |             |       |       |      |  |  |
| Pinus taeda             | loblolly pine      | Tree         |                              |       |     |             |       |       |             |       |      | 4           |       |     |             |       |       |             |       |       |             |       |     |             |       |       |             |       |       |             |       |       |      |  |  |
| Platanus occidentalis   | American sycamore  | Tree         |                              |       |     |             |       |       | 1           | 1     | 1    | 1           | 1     | 1   |             |       |       |             |       |       |             |       |     |             |       |       |             |       |       |             |       |       |      |  |  |
| Prunus serotina         | black cherry       | Tree         |                              |       |     |             |       | 1     |             |       |      |             |       |     |             |       |       |             |       |       |             |       |     |             |       |       |             |       |       |             |       |       |      |  |  |
| Quercus                 | oak                | Tree         |                              |       |     |             |       |       |             |       |      |             |       |     |             |       |       |             |       |       |             |       |     |             |       |       |             |       |       |             |       |       |      |  |  |
| Quercus lyrata          | overcup oak        | Tree         |                              |       |     |             |       |       |             |       |      |             |       |     |             |       |       |             |       |       |             |       |     |             |       |       |             |       |       | 1           |       |       |      |  |  |
| Quercus michauxii       | swamp chestnut oak | Tree         | 1                            | 1     | 1   | 3           | 3     | 3     | 4           | 4     | 4    |             |       |     |             |       | 1     | 1           | 1     |       |             |       |     |             |       |       |             | 3     | 3     | 3           |       |       |      |  |  |
| Quercus nigra           | water oak          | Tree         |                              |       |     |             |       |       |             |       |      |             |       |     |             |       |       |             |       |       |             |       |     |             |       |       |             |       |       |             |       |       |      |  |  |
| Quercus pagoda          | cherrybark oak     | Tree         |                              |       |     |             |       |       |             |       |      |             |       | 2   | 2           | 2     | 3     | 3           | 3     | 2     | 2           | 2     | 7   | 7           | 7     | 2     | 2           | 2     |       |             |       |       |      |  |  |
| Quercus phellos         | willow oak         | Tree         | 1                            | 1     | 1   |             |       |       |             |       |      | 1           | 1     | 1   |             |       | 1     | 1           | 1     |       |             |       | 1   | 1           | 1     |       |             |       |       |             |       |       |      |  |  |
| Quercus rubra           | northern red oak   | Tree         |                              |       |     |             |       |       | 1           | 1     | 1    |             |       |     |             |       | 1     | 1           | 1     |       |             |       |     |             |       |       |             |       |       |             |       |       |      |  |  |
| Ulmus alata             | winged elm         | Tree         |                              |       |     |             |       |       |             |       |      |             |       |     |             |       |       |             |       |       |             |       |     |             |       |       |             |       |       |             |       |       |      |  |  |
| Ulmus americana         | American elm       | Tree         | 3                            | 3     | 3   | 5           | 5     | 5     |             |       |      | 2           | 2     | 2   | 3           | 3     | 3     | 4           | 4     | 7     | 6           | 6     | 7   | 1           | 1     | 1     | 4           | 4     | 4     | 3           | 3     | 3     |      |  |  |
| <b>Stem count</b>       |                    |              | 10                           | 10    | 15  | 10          | 10    | 14    | 12          | 12    | 27   | 7           | 7     | 15  | 10          | 10    | 14    | 13          | 13    | 23    | 8           | 8     | 17  | 10          | 10    | 11    | 10          | 10    | 10    | 10          | 10    | 14    |      |  |  |
| <b>size (ares)</b>      |                    |              | 1                            |       |     | 1           |       |       | 1           |       |      | 1           |       |     | 1           |       |       | 1           |       |       | 1           |       |     | 1           |       |       | 1           |       |       | 1           |       |       | 1    |  |  |
| <b>size (ACRES)</b>     |                    |              | 0.02                         |       |     | 0.02        |       |       | 0.02        |       |      | 0.02        |       |     | 0.02        |       |       | 0.02        |       |       | 0.02        |       |     | 0.02        |       |       | 0.02        |       |       | 0.02        |       |       | 0.02 |  |  |
| <b>Species count</b>    |                    |              | 5                            | 5     | 7   | 4           | 4     | 8     | 5           | 5     | 8    | 6           | 6     | 8   | 5           | 5     | 7     | 7           | 7     | 10    | 2           | 2     | 4   | 4           | 4     | 5     | 4           | 4     | 4     | 4           | 4     | 6     |      |  |  |
| <b>Stems per ACRE</b>   |                    |              | 404.7                        | 404.7 | 607 | 404.7       | 404.7 | 566.6 | 485.6       | 485.6 | 1093 | 283.3       | 283.3 | 607 | 404.7       | 404.7 | 566.6 | 526.1       | 526.1 | 930.8 | 323.7       | 323.7 | 688 | 404.7       | 404.7 | 445.2 | 404.7       | 404.7 | 404.7 | 404.7       | 404.7 | 566.6 |      |  |  |

**Color for Density**

- Exceeds requirements by 10%
- Exceeds requirements, but by less than 10%
- Fails to meet requirements, by less than 10%
- Fails to meet requirements by more than 10%

- PnoLS = Planted excluding livestakes
- P-all = Planting including livestakes
- T = All planted and natural recruits including livestakes
- T includes natural recruits



**Table 8. Total and Planted Stems by Plot and Species (Continued)**  
 Project Code 10-001. Project Name: Pepperwood

| Scientific Name         | Common Name        | Species Type | Current Plot Data (MY5 2018) |       |     |             |       |       |             |       |      | Annual Means |       |     |            |       |       |            |       |       |            |       |       |            |       |       |            |       |       |
|-------------------------|--------------------|--------------|------------------------------|-------|-----|-------------|-------|-------|-------------|-------|------|--------------|-------|-----|------------|-------|-------|------------|-------|-------|------------|-------|-------|------------|-------|-------|------------|-------|-------|
|                         |                    |              | 123-01-0011                  |       |     | 123-01-0012 |       |       | 123-01-0013 |       |      | MY5 (2018)   |       |     | MY4 (2017) |       |       | MY3 (2016) |       |       | MY2 (2015) |       |       | MY1 (2014) |       |       | MY0 (2014) |       |       |
|                         |                    |              | PnoLS                        | P-all | T   | PnoLS       | P-all | T     | PnoLS       | P-all | T    | PnoLS        | P-all | T   | PnoLS      | P-all | T     | PnoLS      | P-all | T     | PnoLS      | P-all | T     | PnoLS      | P-all | T     | PnoLS      | P-all | T     |
| Acer negundo            | boxelder           | Tree         |                              |       |     |             |       |       |             |       |      |              |       |     | 2          |       |       |            |       |       |            |       |       |            |       |       |            |       |       |
| Acer rubrum             | red maple          | Tree         |                              |       |     |             |       |       |             |       |      | 2            |       |     |            |       |       |            | 1     |       |            | 1     |       |            |       |       | 1          |       |       |
| Baccharis halimifolia   | eastern baccharis  | Shrub        |                              |       |     |             | 3     |       |             | 4     |      | 21           |       |     | 12         |       |       | 3          |       |       | 7          |       |       |            |       | 3     |            |       |       |
| Betula nigra            | river birch        | Tree         |                              |       |     |             |       |       |             |       |      | 2            | 2     | 2   | 4          | 4     | 5     | 4          | 4     | 4     | 3          | 3     | 11    | 4          | 4     | 4     | 42         | 42    | 42    |
| Carpinus caroliniana    | American hornbeam  | Tree         | 1                            | 1     | 1   |             |       |       |             |       |      | 8            | 8     | 8   | 8          | 8     | 8     | 8          | 8     | 8     | 7          | 7     | 7     | 13         | 13    | 13    | 8          | 8     | 8     |
| Carya                   | hickory            | Tree         |                              |       |     |             |       |       |             |       |      |              |       |     |            |       |       |            |       |       |            |       |       |            |       |       | 5          | 5     | 5     |
| Carya cordiformis       | bitternut hickory  | Tree         |                              |       |     |             |       |       |             |       |      | 1            | 1     | 1   | 2          | 2     | 2     | 2          | 2     | 2     | 3          | 3     | 3     | 5          | 5     | 5     | 6          | 6     | 6     |
| Carya ovata             | shagbark hickory   | Tree         |                              |       |     |             |       |       |             |       |      |              |       |     |            |       |       |            |       |       |            |       |       |            |       | 3     | 3          | 3     |       |
| Celtis                  | hackberry          | Tree         |                              |       |     |             |       |       |             |       |      |              |       |     |            |       |       |            |       |       |            |       |       |            |       | 1     | 1          | 1     |       |
| Celtis laevigata        | sugarberry         | Tree         | 1                            | 1     | 1   | 1           | 1     | 1     | 1           |       |      | 6            | 6     | 7   | 8          | 8     | 8     | 8          | 8     | 8     | 8          | 8     | 8     | 14         | 14    | 14    | 25         | 25    | 25    |
| Diospyros virginiana    | common persimmon   | Tree         |                              |       |     |             |       |       |             |       |      |              |       |     |            |       |       |            |       |       |            |       |       |            |       |       |            |       |       |
| DONTKNOW: unsure record |                    |              |                              |       |     |             |       |       |             |       |      |              |       |     |            |       |       |            |       |       |            |       |       |            |       |       |            |       |       |
| Fraxinus pennsylvanica  | green ash          | Tree         |                              |       |     | 1           | 3     | 3     | 3           |       |      |              |       |     |            |       |       |            |       |       |            |       |       |            |       |       |            |       |       |
| Juniperus virginiana    | eastern redcedar   | Tree         |                              |       |     |             |       |       |             |       |      |              |       |     |            |       |       |            |       |       |            |       |       |            |       |       |            |       |       |
| Liquidambar styraciflua | sweetgum           | Tree         |                              |       |     | 1           |       |       |             |       |      |              |       |     |            |       |       |            |       |       |            |       |       |            |       |       |            |       |       |
| Liriodendron tulipifera | tuliptree          | Tree         |                              |       |     |             |       |       |             |       |      |              |       |     |            |       |       |            |       |       |            |       |       |            |       |       |            |       |       |
| Morella cerifera        | wax myrtle         | shrub        |                              |       |     |             |       |       |             |       |      |              |       |     |            |       |       |            |       |       |            |       |       |            |       |       |            |       |       |
| Pinus taeda             | loblolly pine      | Tree         |                              |       |     |             |       |       |             |       |      |              |       |     |            |       |       |            |       |       |            |       |       |            |       |       |            |       |       |
| Platanus occidentalis   | American sycamore  | Tree         |                              |       |     |             |       |       |             |       |      |              |       |     |            |       |       |            |       |       |            |       |       |            |       |       |            |       |       |
| Prunus serotina         | black cherry       | Tree         |                              |       |     |             |       |       |             |       |      |              |       |     |            |       |       |            |       |       |            |       |       |            |       |       |            |       |       |
| Quercus                 | oak                | Tree         |                              |       |     |             |       |       |             |       |      |              |       |     |            |       |       |            |       |       |            |       |       |            |       |       |            |       |       |
| Quercus lyrata          | overcup oak        | Tree         |                              |       |     |             |       |       |             |       |      |              |       |     |            |       |       |            |       |       |            |       |       |            |       |       |            |       |       |
| Quercus michauxii       | swamp chestnut oak | Tree         | 1                            | 1     | 1   | 2           | 2     | 2     |             |       |      | 15           | 15    | 15  | 15         | 15    | 15    | 14         | 14    | 14    | 15         | 15    | 15    | 15         | 15    | 15    | 9          | 9     | 9     |
| Quercus nigra           | water oak          | Tree         |                              |       |     |             |       |       |             |       |      | 1            | 1     | 2   | 1          | 1     | 1     | 1          | 1     | 1     |            |       |       |            |       |       |            |       |       |
| Quercus pagoda          | cherrybark oak     | Tree         | 2                            | 2     | 2   |             |       |       |             |       |      | 4            | 4     | 4   | 22         | 22    | 22    | 25         | 25    | 25    | 24         | 24    | 24    | 25         | 25    | 25    | 21         | 21    | 21    |
| Quercus phellos         | willow oak         | Tree         |                              |       |     |             |       |       |             |       |      |              |       |     |            |       |       |            |       |       |            |       |       |            |       |       |            |       |       |
| Quercus rubra           | northern red oak   | Tree         |                              |       |     |             |       |       |             |       |      |              |       |     |            |       |       |            |       |       |            |       |       |            |       |       |            |       |       |
| Ulmus alata             | winged elm         | Tree         |                              |       |     |             |       |       |             |       |      |              |       |     |            |       |       |            |       |       |            |       |       |            |       |       |            |       |       |
| Ulmus americana         | American elm       | Tree         | 6                            | 6     | 6   | 1           | 1     | 1     | 2           | 2     | 2    | 40           | 40    | 44  | 41         | 41    | 49    | 42         | 42    | 42    | 45         | 45    | 47    | 45         | 45    | 45    | 17         | 17    | 17    |
| <b>Stem count</b>       |                    |              | 11                           | 11    | 15  | 7           | 7     | 13    | 7           | 7     | 33   | 125          | 125   | 221 | 139        | 139   | 218   | 140        | 140   | 189   | 143        | 143   | 258   | 164        | 164   | 294   | 207        | 207   | 207   |
| <b>size (ares)</b>      |                    |              | 1                            |       |     | 1           |       |       | 1           |       |      | 13           |       |     | 13         |       |       | 13         |       |       | 13         |       |       | 13         |       |       | 13         |       |       |
| <b>size (ACRES)</b>     |                    |              | 0.02                         |       |     | 0.02        |       |       | 0.02        |       |      | 0.32         |       |     | 0.32       |       |       | 0.32       |       |       | 0.32       |       |       | 0.32       |       |       | 0.32       |       |       |
| <b>Species count</b>    |                    |              | 5                            | 5     | 8   | 4           | 4     | 8     | 3           | 3     | 7    | 13           | 13    | 22  | 14         | 14    | 22    | 14         | 14    | 22    | 11         | 11    | 17    | 12         | 12    | 19    | 17         | 17    | 17    |
| <b>Stems per ACRE</b>   |                    |              | 445.2                        | 445.2 | 607 | 283.3       | 283.3 | 526.1 | 283.3       | 283.3 | 1335 | 389.1        | 389.1 | 688 | 432.7      | 432.7 | 678.6 | 435.8      | 435.8 | 588.4 | 445.2      | 445.2 | 803.1 | 510.5      | 510.5 | 915.2 | 644.4      | 644.4 | 644.4 |

**Color for Density**

- Exceeds requirements by 10%
- Exceeds requirements, but by less than 10%
- Fails to meet requirements, by less than 10%
- Fails to meet requirements by more than 10%

- PnoLS = Planted excluding livestakes
- P-all = Planting including livestakes
- T = All planted and natural recruits including livestakes
- T includes natural recruits

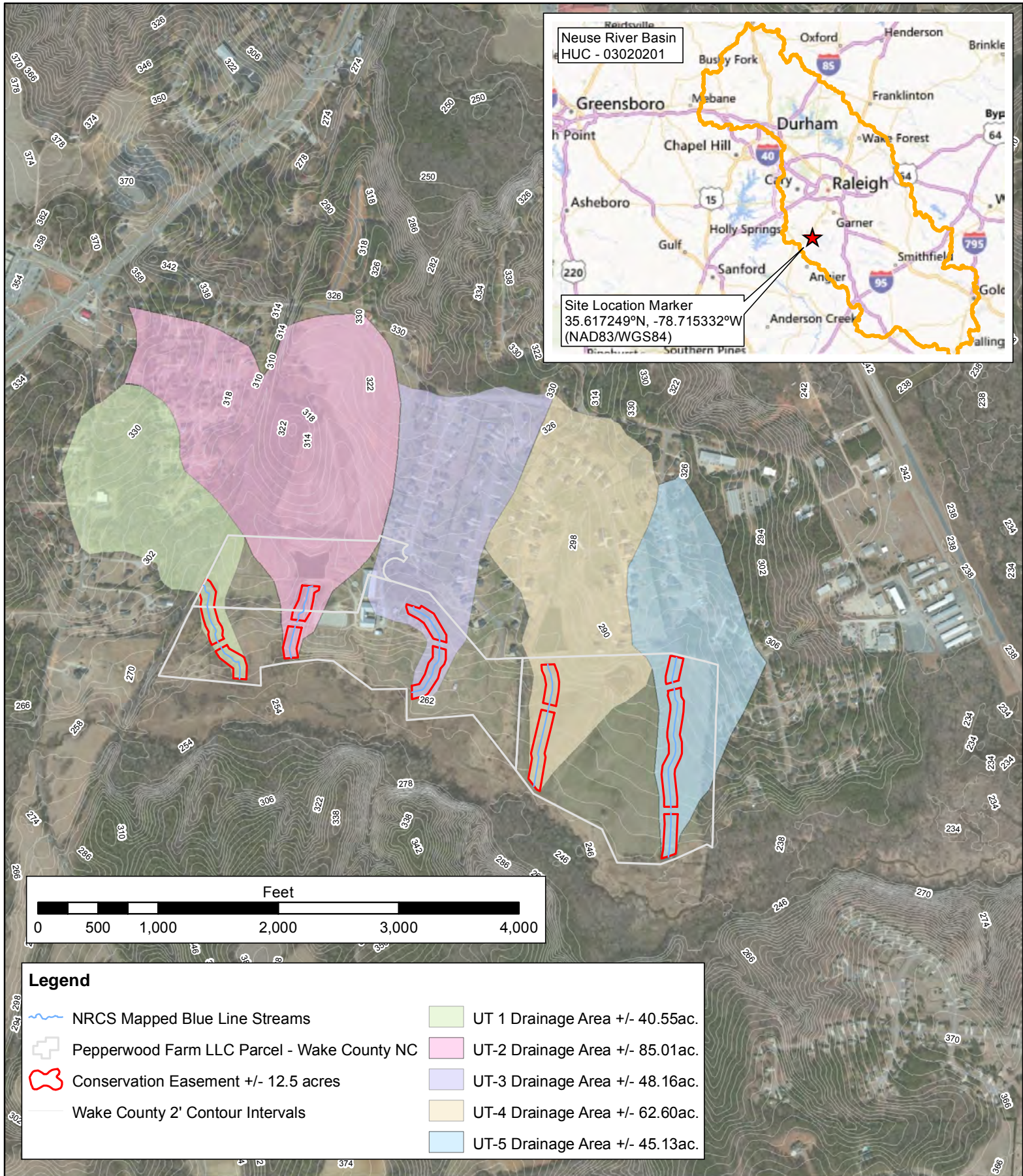
## **Appendix D: Additional Data**

Figure 4. Watershed Map

Figure 5. NRCS Soils Map

Preconstruction Photographs





**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 = 1,042 feet  
DATE: NOV - 2013  
PROJECT: P-WOOD

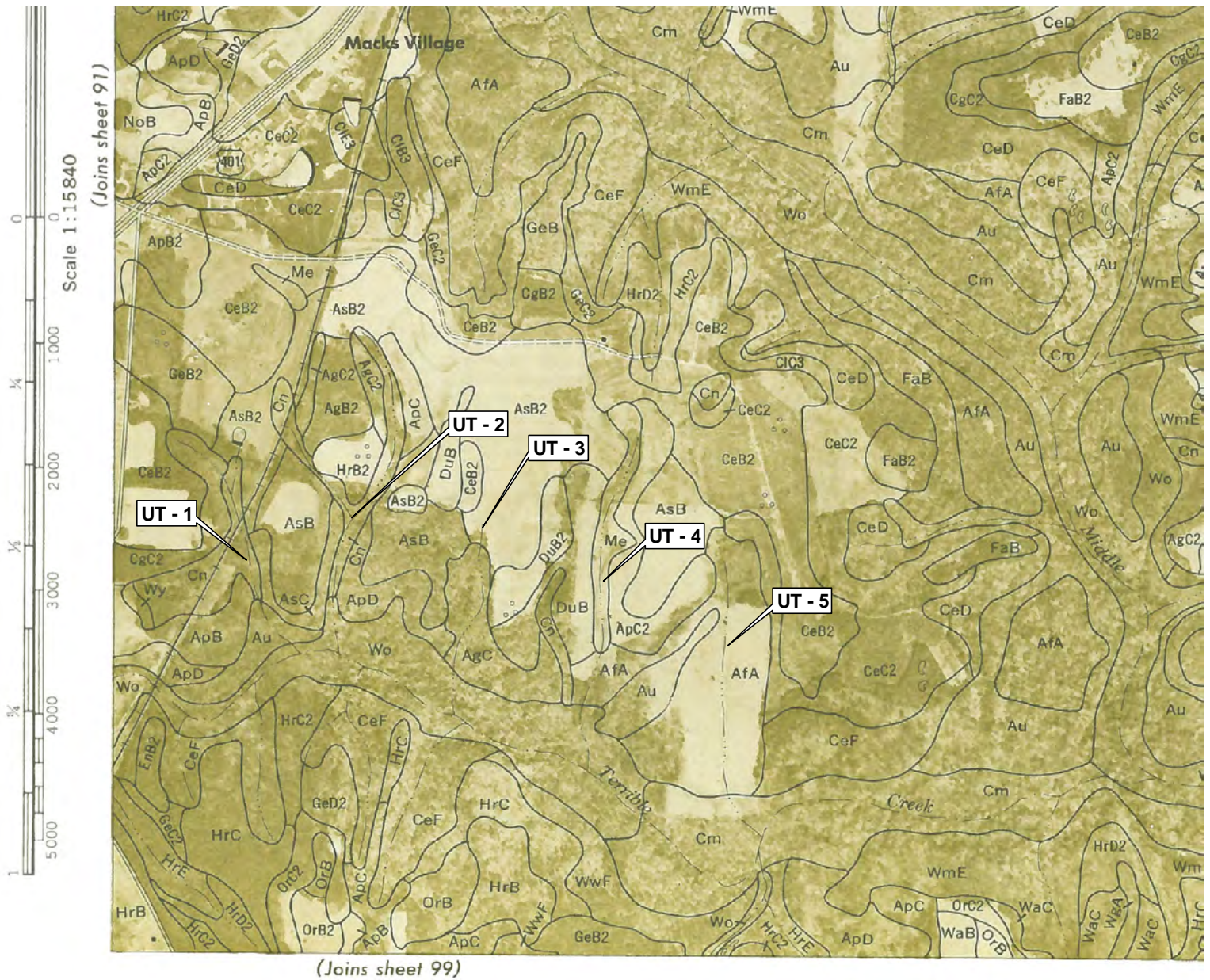
**FIGURE 4:  
WATERSHED MAP**

Figure indicates estimated project drainage area at the outfall of each tributary.



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

Aerial Imagery: USGS Topographical Map  
COORDINATE SYSTEM: NAD 1983 NC FEET





1970 Wake County North Carolina NRCS Soil Manuscript - Map Number 92 - FIGURE NOT TO SCALE

|   |                         |  |  |   |
|---|-------------------------|--|--|---|
|  <p><b>RESTORATION SYSTEMS, LLC</b><br/>1101 HAYNES ST, SUITE 211<br/>RALEIGH, NC 27604<br/>PHONE : 919.755.9490<br/>FAX : 919.755.9492</p>   | <p>SCALE:</p>           |  <p><b>FIGURE 5: NRCS<br/>Soil Survey</b></p> | <p>Pepperwood Farm Riparian Buffer Mitigation Site<br/>RFP # 16-004362 EEP Project ID 95713<br/>Contract # 004946 SPO # 92-AGZ<br/>Wake County, North Carolina</p> |   |
|   | <p>DATE: NOV - 2013</p> |  |  | <p>Figure indicates where the Site physical location is along with directions to the Site</p> |
|   | <p>PROJECT: P-WOOD</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 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> |                         |  |  |   |



Preconstruction Photographs



**Photo Point 1 – Facing South**



**Photo Point 2 – Facing Northwest**





**Photo Point 3 – Facing North**



**Photo Point 4 - Facing South**

---





**Photo Point 5 – Facing North**



**Photo Point 6 - Facing South**



**Photo Point 7**



**Photo Point 8**



## **Appendix E: Herbicide Application Forms**

### Carolina Silvics, Inc. Pesticide Application Log

CarSilv - 0550

|                                 |   |                            |          |
|---------------------------------|---|----------------------------|----------|
| Client                          | Restoration Systems   |                            |          |
| Project Site                    | Pepperwood  |                            |          |
| Date                            | 06-01-2018  |                            |          |
| Start Time                      | 8:00  | End Time                   | 11:00    |
| Only PAL for Site for This Day? | Yes   | If NO, this is PAL # of ## |          |
| Sky Cover                       | Clear   | Temp (F)                   | 85       |
| Wind Direction                  | SW  | Wind Speed                 | 1-5 mph  |
| Applicators                     | Joshua G Merritt (NC 026-33717)   |                            |          |
| Application Method              | Basal Bark  |                            |          |
| Herbicide                       | Garlon® 4 (triclopyr)   |                            |          |
| Herbicide Rate (%)              | 15  | Total Concentrate          | 29 fl oz |
| Surfactant or Adjuvant (1)      |   |                            |          |
| Surfactant/Adjuvant 1 Rate (%)  |   |                            |          |
| Other                           |   |                            |          |
| Other Rate/Amt                  |   |                            |          |
| Diluent                         | Diesel fuel   |                            |          |
| Total Solution                  | 1.5 gal.  |                            |          |
| Species Controlled              | Callery Pear<br>Privet spp.<br>Multiflora Rose<br>Sweet Gum   |                            |          |
| Area Description                | Bradford Pear and Sweet Gums were around the site sporadically. Some, but not many, privet in the site. |                            |          |
| Additional Comments             |   |                            |          |

### Carolina Silvics, Inc. Pesticide Application Log

CarSilv - 0471

|                                 |  |                            |          |
|---------------------------------|--|----------------------------|----------|
| Client                          | Restoration Systems  |                            |          |
| Project Site                    | Pepperwood   |                            |          |
| Date                            | 09-08-2017   |                            |          |
| Start Time                      | 9:00   | End Time                   | 11:00    |
| Only PAL for Site for This Day? | No   | If NO, this is PAL # of ## | 2 of 2   |
| Sky Cover                       | Clear  | Temp (F)                   | 80       |
| Wind Direction                  |  | Wind Speed                 | Calm     |
| Applicators                     | Joshua G Merritt (NC 026-33717)<br>Grainger Coughtrey (NC 026-34612)<br>Sebastian Kimlinger (NC 026-34613) |                            |          |
| Application Method              | Cut and Stump Spray  |                            |          |
| Herbicide                       | Garlon® 3A (triclopyr)   |                            |          |
| Herbicide Rate (%)              | 50   | Total Concentrate          | 10 fl oz |
| Surfactant or Adjuvant (1)      |  |                            |          |
| Surfactant/Adjuvant 1 Rate (%)  |  |                            |          |
| Other                           |  |                            |          |
| Other Rate/Amt                  |  |                            |          |
| Diluent                         | Water  |                            |          |
| Total Solution                  | 20 fl oz   |                            |          |
| Species Controlled              | Callery Pear<br>Privet spp.  |                            |          |
| Area Description                | Very few invasives throughout the site   |                            |          |
| Additional Comments             |  |                            |          |



### Carolina Silvics, Inc. Pesticide Application Log

CarSilv - 0470

|                                 |  |                            |           |
|---------------------------------|--|----------------------------|-----------|
| Client                          | Restoration Systems  |                            |           |
| Project Site                    | Pepperwood   |                            |           |
| Date                            | 09-08-2017   |                            |           |
| Start Time                      | 9:00   | End Time                   | 11:00     |
| Only PAL for Site for This Day? | No   | If NO, this is PAL # of ## | 1 of 2    |
| Sky Cover                       | Clear  | Temp (F)                   | 80        |
| Wind Direction                  |  | Wind Speed                 | Calm      |
| Applicators                     | Joshua G Merritt (NC 026-33717)<br>Grainger Coughtrey (NC 026-34612)<br>Sebastian Kimlinger (NC 026-34613) |                            |           |
| Application Method              | Foliar Spray (Backpack)  |                            |           |
| Herbicide                       | Refuge® (glyphosate)   |                            |           |
| Herbicide Rate (%)              | 5  | Total Concentrate          | 6.4 fl oz |
| Surfactant or Adjuvant (1)      | Hel-fire®  |                            |           |
| Surfactant/Adjuvant 1 Rate (%)  | .5   |                            |           |
| Other                           |  |                            |           |
| Other Rate/Amt                  |  |                            |           |
| Diluent                         | Water  |                            |           |
| Total Solution                  | 1 gallon   |                            |           |
| Species Controlled              | Callery Pear<br>Privet spp.  |                            |           |
| Area Description                | Very few invasives throughout the site   |                            |           |
| Additional Comments             |  |                            |           |

### Carolina Silvics, Inc. Pesticide Application Log

CarSilv - 0401

|                                 |   |                            |          |
|---------------------------------|---|----------------------------|----------|
| Client                          | Restoration Systems   |                            |          |
| Project Site                    | Pepperwood  |                            |          |
| Date                            | 04-07-2017  |                            |          |
| Start Time                      | 9:00  | End Time                   | 11:30    |
| Only PAL for Site for This Day? | Yes   | If NO, this is PAL # of ## |          |
| Sky Cover                       | Cloudy  | Temp (F)                   | 53       |
| Wind Direction                  | WNW   | Wind Speed                 | 6-10 mph |
| Applicators                     | Grainger Coughtrey (NC 026-34612)<br>Sebastian Kimlinger (NC 026-34613)   |                            |          |
| Application Method              | Basal Bark  |                            |          |
| Herbicide                       | Garlon® 4 (triclopyr)   |                            |          |
| Herbicide Rate (%)              | 15  | Total Concentrate          | 76 fl oz |
| Surfactant or Adjuvant (1)      |   |                            |          |
| Surfactant/Adjuvant 1 Rate (%)  |   |                            |          |
| Other                           |   |                            |          |
| Other Rate/Amt                  |   |                            |          |
| Diluent                         | Diesel fuel   |                            |          |
| Total Solution                  | 4 gallons   |                            |          |
| Species Controlled              | Autumn Olive<br>Callery Pear<br>Privet spp.<br>Multiflora Rose<br>Sweetgum  |                            |          |
| Area Description                | Located on a horse farm.  |                            |          |
| Additional Comments             | The sweet gum at the site has been well controlled from previous treatments.<br>There were very few invasive species and the site was easy to walk. |                            |          |

### Carolina Silvics, Inc. Pesticide Application Log

CarSilv - 0354

|  |  |                                   |           |
|--|--|-----------------------------------|-----------|
| <b>Client</b>                          | Restoration Systems  |                                   |           |
| <b>Project Site</b>                    | Pepperwood   |                                   |           |
| <b>Date</b>                            | 11-15-2016   |                                   |           |
| <b>Start Time</b>                      | 8:00   | <b>End Time</b>                   | 11:30     |
| <b>Only PAL for Site for This Day?</b> | Yes  | <b>If NO, this is PAL # of ##</b> |           |
| <b>Sky Cover</b>                       | Clear  | <b>Temp (F)</b>                   | 58        |
| <b>Wind Direction</b>                  | WSW  | <b>Wind Speed</b>                 | 1-5 mph   |
| <b>Applicators</b>                     | Joshua G Merritt (NC 026-33717)<br>Grainger Coughtrey (NC 026-34612)<br>Sebastian Kimlinger (NC 026-34613)                                       |                                   |           |
| <b>Application Method</b>              | Basal Bark   |                                   |           |
| <b>Herbicide</b>                       | Garlon® 4 (triclopyr)  |                                   |           |
| <b>Herbicide Rate (%)</b>              | 15   | <b>Total Concentrate</b>          | 152 fl oz |
| <b>Surfactant or Adjuvant (1)</b>      |  |                                   |           |
| <b>Surfactant/Adjuvant 1 Rate (%)</b>  |  |                                   |           |
| <b>Other</b>                           | Blue Dye   |                                   |           |
| <b>Other Rate/Amt</b>                  | 1 fl oz  |                                   |           |
| <b>Diluent</b>                         | Water  |                                   |           |
| <b>Total Solution</b>                  | 8 gallons  |                                   |           |
| <b>Species Controlled</b>              | Privet spp.<br>Sweet Gum   |                                   |           |
| <b>Area Description</b>                | Did a complete walk through of the site. The density of sweet gum decreased dramatically since the previous treatment. Privet was under control. |                                   |           |
| <b>Additional Comments</b>             |  |                                   |           |

### Carolina Silvics, Inc. Pesticide Application Log

CarSilv - 0238

|  |  |                                   |          |
|--|--|-----------------------------------|----------|
| <b>Client</b>                          | Restoration Systems  |                                   |          |
| <b>Project Site</b>                    | Pepperwood   |                                   |          |
| <b>Date</b>                            | 07-20-2016   |                                   |          |
| <b>Start Time</b>                      | 7:30   | <b>End Time</b>                   | 10:00    |
| <b>Only PAL for Site for This Day?</b> | Yes  | <b>If NO, this is PAL # of ##</b> |          |
| <b>Sky Cover</b>                       | Clear  | <b>Temp (F)</b>                   | 83       |
| <b>Wind Direction</b>                  | WSW  | <b>Wind Speed</b>                 | Calm     |
| <b>Applicators</b>                     | Joshua G Merritt (NC 026-33717)<br>Kemper Sutton   |                                   |          |
| <b>Application Method</b>              | Foliar Spray (Backpack)  |                                   |          |
| <b>Herbicide</b>                       | Other (see comments)   |                                   |          |
| <b>Herbicide Rate (%)</b>              | 15   | <b>Total Concentrate</b>          | 80 fl oz |
| <b>Surfactant or Adjuvant (1)</b>      |  |                                   |          |
| <b>Surfactant/Adjuvant 1 Rate (%)</b>  |  |                                   |          |
| <b>Other</b>                           | Blue Dye   |                                   |          |
| <b>Other Rate/Amt</b>                  | 1 fl oz  |                                   |          |
| <b>Diluent</b>                         | Diesel fuel  |                                   |          |
| <b>Total Solution</b>                  | 4 gallons  |                                   |          |
| <b>Species Controlled</b>              | Callery Pear<br>Privet spp.<br>Multiflora Rose<br>Sweet Gum  |                                   |          |
| <b>Area Description</b>                | We finished spraying the far west easement where the sweet gum was most prominent. The treatment was very thorough but not all of the trees may have been treated due to the high density of sweet gums. |                                   |          |
| <b>Additional Comments</b>             | Chemical used was Garlon 4 (triclopyr)   |                                   |          |



### Carolina Silvics, Inc. Pesticide Application Log

CarSilv - 0235

|                                 |   |                            |           |
|---------------------------------|---|----------------------------|-----------|
| Client                          | Restoration Systems   |                            |           |
| Project Site                    | Pepperwood  |                            |           |
| Date                            | 07-19-2016  |                            |           |
| Start Time                      | 9:30  | End Time                   | 14:00     |
| Only PAL for Site for This Day? | Yes   | If NO, this is PAL # of ## |           |
| Sky Cover                       | Clear   | Temp (F)                   | 98        |
| Wind Direction                  | WNW   | Wind Speed                 | Calm      |
| Applicators                     | Joshua G Merritt (NC 026-33717)<br>Kemper Sutton  |                            |           |
| Application Method              | Basal Bark  |                            |           |
| Herbicide                       | Other (see comments)  |                            |           |
| Herbicide Rate (%)              | 15  | Total Concentrate          | 152 fl oz |
| Surfactant or Adjuvant (1)      |   |                            |           |
| Surfactant/Adjuvant 1 Rate (%)  |   |                            |           |
| Other                           | Blue Dye  |                            |           |
| Other Rate/Amt                  | 1 fl oz   |                            |           |
| Diluent                         | Diesel fuel   |                            |           |
| Total Solution                  | 8 gallons   |                            |           |
| Species Controlled              | Callery Pear<br>Sweet Gum   |                            |           |
| Area Description                | We treated most of the sweet gums in the far west easement. There was a very high density of sweet gums in this area. |                            |           |
| Additional Comments             | Chemical used was Garlon 4 (triclopyr)  |                            |           |

### Carolina Silvics, Inc. Pesticide Application Log

CarSilv - 0164

|                                 |   |                            |       |
|---------------------------------|---|----------------------------|-------|
| Client                          | Restoration Systems                                     |                            |       |
| Project Site                    | Pepperwood  |                            |       |
| Date                            | 03-14-2016  |                            |       |
| Start Time                      | 10:00   | End Time                   | 15:00 |
| Only PAL for Site for This Day? | Yes   | If NO, this is PAL # of ## |       |
| Sky Cover                       | Partly Cloudy   | Temp (F)                   | 70    |
| Wind Direction                  | E   | Wind Speed                 | Calm  |
| Applicators                     | William A Skinner (NC 026-32003/VA 129456)<br>Joel Wise |                            |       |
| Application Method              | Foliar Spray (ATV - Broadcast)                          |                            |       |
| Herbicide                       | Oust® XP (sulfometuron methyl)                          |                            |       |
| Herbicide Rate (%)              |   | Total Concentrate          | 18oz  |
| Surfactant or Adjuvant (1)      |   |                            |       |
| Surfactant/Adjuvant 1 Rate (%)  |   |                            |       |
| Other                           | Grounded (deposition agent)                             |                            |       |
| Other Rate/Amt                  | 8oz/ac  |                            |       |
| Diluent                         | Water   |                            |       |
| Total Solution                  | 87.5 gal  |                            |       |
| Species Controlled              | fescue  |                            |       |
| Area Description                |   |                            |       |
| Additional Comments             | Oust® application rate was 3oz/ac                       |                            |       |