LOFLIN DAIRY BUFFER MITIGATION SITE

Randolph County, NC
DENR Contract 003995
NCEEP Project Number 95008

Baseline Monitoring Document and As-Built Baseline Report

FINAL
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LOFLIN DAIRY BUFFER MITIGATION SITE
Baseline Monitoring Document and As-Built Baseline Report

APPENDICES

EXECUTIVE SUMMARY

The Loflin Dairy Buffer Mitigation Site, hereafter referred to as the Site, is located in rural Randolph County, south of Greensboro, NC, in the Cape Fear River Basin (United States Geological Survey (USGS) Hydrologic Unit 03030003). The primary objectives of the project were to remove harmful nutrients from creek flow, reduce pollution of creek by excess sediment, restore the terrestrial habitat, and improve aesthetics. These goals were achieved by restoring 9.1 acres of riparian buffer.

Pre-Construction Site Conditions

The Site is located in the Carolina Slate Belt of the Piedmont Physiographic Province (USGS, 1998). The Site has historically been used for agricultural purposes. The current property owner has confirmed that Area A has been used as an active dairy farm since 1947 and Area B has been surrounded by agricultural fields since the late 1920s. The site is comprised of two areas (Area A and B) on one parcel of land along several unnamed tributaries and ephemeral ditches to Bob Branch which ultimately flows into the Randleman Regional Reservoir. At the downstream limits of the project, Area A has a drainage area of 18 acres and Area B has a drainage area of 59 acres.

Prior to construction activities, the primary watershed stressor was the lack of a vegetated buffer and nutrient runoff from adjacent agricultural maintenance activities. The riparian zones within these areas were maintained in the past and mowed on an annual basis resulting in varying buffer widths and densities. The riparian zones were also actively sprayed due to their locations in an active row crop field and cattle pasture. Several of the tributaries are located adjacent to the dairy farm, which was allowing for concentrated flow of cattle waste to drain directly into them and to downstream waters. Although there is no immediate evidence of increased development within the project site's watersheds; the new NC Highway 311 corridor is being constructed immediately downstream of the project area. This new highway corridor may increase development pressure on the project's watersheds and this area of Randolph County in the future. The restored riparian buffer areas within the Site will aid in protecting water quality and endangered species habitat within the Deep River watershed by filtering runoff from adjacent agricultural practices and restoring terrestrial habitat. The Deep River watershed is an important component of the Randleman Regional Reservoir in the part of the state.

Restoration Approach and Implementation

The project was completed to provide buffer mitigation units (BMUs) in the Cape Fear River Basin. The project design caused no adverse impacts to streams or wetlands.

Herbaceous riparian vegetation was planted but is generally expected to re-establish naturally.
The streams and ditches within the project area are tributaries to Bob Branch, which then flows into the Randleman Regional Reservoir. The buffer restoration work completed will aid in improving water quality and terrestrial habitat throughout the Site. The 50-foot riparian buffer zone restored and re-planted will improve water quality by allowing for the absorption of nutrient runoff from adjacent pastures and cropland and capture sediment from off-site sources by slowing overland flow velocities. Water temperatures will eventually be decreased as the planted trees establish a canopy cover, creating long-term shading. The buffer zones will

improve terrestrial habitat for native wildlife and provide further connectivity to existing off-site forested areas and stream riparian zone habitats.

The final mitigation plan was submitted and accepted by the North Carolina Ecosystem Enhancement Program (NCEEP) in February of 2012. Grading activities were completed by the landowner in March of 2012. Planting activities were completed by Bruton Natural Systems, Inc. in March of 2012. The baseline monitoring and as-built survey were completed in April of 2012. There were no significant deviations reported in the project elements in comparison to the design plans. Appendix 1 provides more detailed project activity, history, contact information, and watershed/site background information for this project.

Monitoring

Baseline monitoring (Year 0 of 5) was conducted in April of 2012. The first annual monitoring assessment (Year 1 of 5) will be completed in September of 2012. The Site will be monitored for a total of five (5) years, with the final monitoring activities conducted in 2016 and the close-out in 2017. Monitoring will consist of collecting vegetative data on an annual basis to assess the project success based on the restoration goals and objectives. The success of the Site will be assessed using measurements of the vegetation monitoring plots. The extent of invasive species coverage will be monitored and controlled as necessary. At the end of the first growing season, species composition, density, and survival will be evaluated. The site will then be evaluated each subsequent year until the final success criteria are achieved.

1.0 Project Goals, Background and Attributes

1.1 Project Location and Setting

The Site is located within the Randleman Reservoir watershed (The North Carolina Division of Water Quality (NCDWQ) Subbasin 03-06-08) of the Cape Fear River Basin (USGS Hydrologic Unit Code 03030003010060). On-site stream channels are unnamed tributaries to Bob Branch (NCDWQ Index No. 17-9.6-(1)) in the Randleman Regional Reservoir. The Site is located approximately six miles southeast of the intersection of Interstate 85 and Highway 311 in Randolph County, NC. The Site is surrounded by fields that are alternately used for cattle and crop production. At the downstream limits of the project, Area A has a drainage area of 18 acres and Area B has a drainage area of 59 acres.

The NCDWQ assigns best usage classifications to State Waters that reflect water quality conditions and potential resource usage. Bob Branch is classified as Class WS-IV waters. Class WS-IV waters are used as sources of water supply for drinking or food processing purposes where a more restrictive WS-I, WS-II, or WS-III classification is not feasible. These waters are also protected for Class C uses such as secondary recreation, fishing, wildlife, fish and aquatic life propagation and survival, and agriculture. WS-IV waters are generally in moderately to highly-developed watersheds or Protected Areas.

A conservation easement has been recorded to protect the 9.8 acres of riparian corridor resources in perpetuity within the Ingram parcel (PIN No. 7746-14-0261). Directions and a map of the Site are provided in Figure 1.

1.2 Project Goals and Objectives

The goals of the Loflin Dairy Buffer Mitigation Project address water quality improvements identified in the Cape Fear River Basin Restoration Priorities Report and include the following:

- Remove harmful nutrients from creek flow;
- Reduce pollution of creek by excess sediment;
- Restore terrestrial habitat; and
- Improve aesthetics.

The following project objectives were established to meet these goals:

- Riparian areas will be fenced off from adjacent agricultural activities and runoff will be filtered through buffer zones. Flood flows will be filtered through restored riparian areas, where flood flow will spread through native vegetation. Vegetation will be planted to uptake excess nutrients.
- Stream bank erosion which contributes sediment load to the creek will be greatly reduced, if not eliminated, in the project area. Eroding streambanks will be stabilized by increased woody root mass in banks and reducing channel incision. Storm flow containing grit and fine sediment will be filtered through restored riparian buffer areas, where flow will spread through native vegetation.

- The establishment and maintenance of riparian buffers will create long-term shading of the channel bed, reducing thermal heating and improving aquatic habitat.
- Adjacent buffer and riparian habitats will be restored with native vegetation and invasive species will be treated as part of the project. Native vegetation will provide cover and food for terrestrial creatures.

Please refer to Appendix 3 for the mitigation plan approval letter from NCDWQ.

1.3 Project Structure, Restoration Type and Approach

1.3.1 Project Structure

Please refer to Figure 2 for the project component/asset map for the monitoring and restoration feature exhibits on the Site and Table 1 for the project component and mitigation credit information.

1.3.2 Restoration Type and Approach

Prior to construction activities, the primary watershed stressors were the nutrient runoff from adjacent agricultural maintenance activities and the lack of a vegetated buffer. The project restoration activities completed provides 9.1 buffer mitigation units (BMUs) in the Cape Fear River Basin (Table 1, Appendix 1). As part of the site preparation for planting, invasive species were removed, which consisted of primarily Chinese privet and Japanese honeysuckle. Invasive species were mowed and treated with a spray application of glyphosate and triclopyr. Following invasive species treatment, the riparian stream buffers were planted and restored to the dominant natural plant community that exists within the project watershed. This natural community within and adjacent to the project easement is classified as Piedmont Bottomland Forest and was determined based on existing canopy and herbaceous species (Schafale and Weakley, 1990). Plant and seed materials were installed on stream banks out to the project easement limits. These areas were planted with bare root trees and a seed mixture of permanent herbaceous vegetation ground cover. An existing dirt road was also relocated along Reach B1 to avoid the conservation easement and relocated to cross Reach B1 outside of the conservation easement within a break located along Reach B1 upstream from the confluence with Reach B3 (refer to Appendix 4).

1.4 Project History, Contacts and Attribute Data

The Site was restored by Wildlands Engineering, Inc. (WEI) through a full-delivery contract with NCEEP. Tables 2, 3, and 4 provide detailed information regarding the Project Activity and Reporting History, Project Contacts, and Project Baseline Information and Attributes.

2.0 Success Criteria

The buffer restoration success criteria for the project site follows the approved success criteria presented in the NCEEP Mitigation Plan Guidance (Version 2.0, 10/01/2010). WEI will oversee annual monitoring of vegetation to assess the condition of the finished project for five years, or until success criteria are met.

2.1 Vegetation

The final vegetative success criteria will be the survival of 320 planted stems per acre in the buffer corridor at the end of year five (5) of the monitoring period. The extent of invasive species coverage will also be monitored and controlled as necessary.

2.2 Schedule and Reporting

Annual monitoring data will be reported using the NCEEP Monitoring Report template (Version 1.3, 11/15/10). The monitoring report shall provide a project data chronology that will facilitate an understanding of project status and trends, population of NCEEP databases for analysis, research purposes, and assist in decision making regarding close-out. The monitoring reports will include the following:

1. Project background which includes project objectives, project structure, restoration type and approach, location and setting, history and background.
2. Monitoring plan view map of major project elements including vegetation plots.
3. Vegetative data as described above including the identification of any invasion by undesirable plant species.
4. A description of damage by animals or vandalism.
5. Maintenance issues and recommended remediation measures will be detailed and documented.

3.0 Monitoring Plan

Monitoring reports will be prepared in the fall of each year of monitoring and submitted to NCEEP.

3.1 Vegetation

Planted woody vegetation will be monitored in accordance with the guidelines and procedures developed by the Carolina Vegetation Survey-NCEEP Level 2 Protocol (Lee et al., 2008) to monitor and assess the planted woody vegetation. A total of 16 vegetation plots were established within the project easement area using standard 10 meter by 10 meter vegetation monitoring plots. Plots were randomly established within planted portions of the stream buffer areas to capture the heterogeneity of the designed vegetative communities. The plot corners have been marked and are recoverable either through field identification or with the use of a GPS unit. Reference photographs at the origin looking diagonally across the plot to the opposite corner were taken with the as-built. Subsequent assessments following baseline survey will capture the same reference photograph locations.

4.0 Maintenance and Contingency Plans

Upon approval for close-out by the NCDWQ, the site will be transferred to the NCDENR Division of Natural Resource Planning and Conservation and Stewardship Program. This party shall be responsible for periodic inspection of the site to ensure that restrictions required in the conservation easement or the deed restriction document(s) are upheld. Endowment funds required to uphold easement and deed restrictions shall be negotiated prior to site transfer to the responsible party.

The NCDENR Division of Natural Resource Planning and Conservation's Stewardship Program currently houses NCEEP stewardship endowments within the non-reverting, interest-bearing Conservation Lands Stewardship Endowment Account. The use of funds from the Endowment Account is governed by North Carolina General Statue GS 113A-232(d)(3). Interest gained by the endowment fund may be used only for the purpose of stewardship, monitoring, stewardship administration, and land transaction costs, if applicable. The NCDENR Stewardship Program intends to manage the account as a non-wasting endowment. Only interest generated from the endowment funds will be used to steward the compensatory mitigation sites. Interest funds not used for those purposes will be re-invested in the Endowment Account to offset losses due to inflation.

Intensive vegetation management and a rigorous herbicide schedule will be implemented over the first few years of tree establishment in the riparian buffer restoration areas to prevent establishment of invasive species that will attempt to out-compete the planted native vegetation. Any vegetation control requiring herbicide application will be performed in accordance with NC Department of Agriculture (NCDA) rules and regulations. If, during the course of annual monitoring it is determined the site's ability to achieve site performance standards are jeopardized, WEI will notify NCDWQ of the need to develop a Plan of Corrective Action. Once the Corrective Action Plan is prepared and finalized WEI will:

1. Notify the NCEEP and NCDWQ in writing.
2. Revise performance standards, maintenance requirements, and monitoring requirements as necessary and/or required by the NCDWQ.
3. Obtain other permits as necessary.
4. Implement the Corrective Action Plan.
5. Provide the NCDWQ a Record Drawing of Corrective Actions. This document shall depict the extent and nature of the work performed.

4.1 Vegetation

Vegetative problem areas will be mapped and included in the Current Condition Plan View (CCPV) map as part of the annual vegetation assessment. Vegetation problems areas may include planted vegetation not meeting success criteria, persistent invasive species, barren areas with little to no herbaceous cover, or grass suffocation/crowding of planted stems. Appropriate remedial actions will be determined with NCEEP correspondence as stated above in section 4.0.

5.0 As-Built Condition (Baseline)

The Site planting and as-built survey was completed during March and April 2012. The baseline monitoring (MY-0 of 5) vegetative survey was completed in April 2012. The baseline vegetation monitoring resulted in an average survival of 764 stems per acre, which is greater than the design density required. There was an average of 19 stems per plot. Please refer to Appendix 2 for vegetation summary tables, raw data tables, and vegetation plot photographs.

6.0 References

Lee, Michael T., Peet, Robert K., Steven D., Wentworth, Thomas R. 2006. CVS-EEP Protocol for Recording Vegetation Version 4.0. Retrieved from http://www.nceep.net/business/

North Carolina Ecosystem Enhancement Program. 2009. Cape Fear River Basin Restoraion Priorities 2009. http://www.nceep.net/services/lwps/cape_fear/RBRP%20Cape%20Fear%202008.pdf

Schafale, M.P. and A.S. Weakley. 1990. Classification of the Natural Communities of North Carolina, 3rd approx. North Carolina Natural Heritage Program, Raleigh, North Carolina.

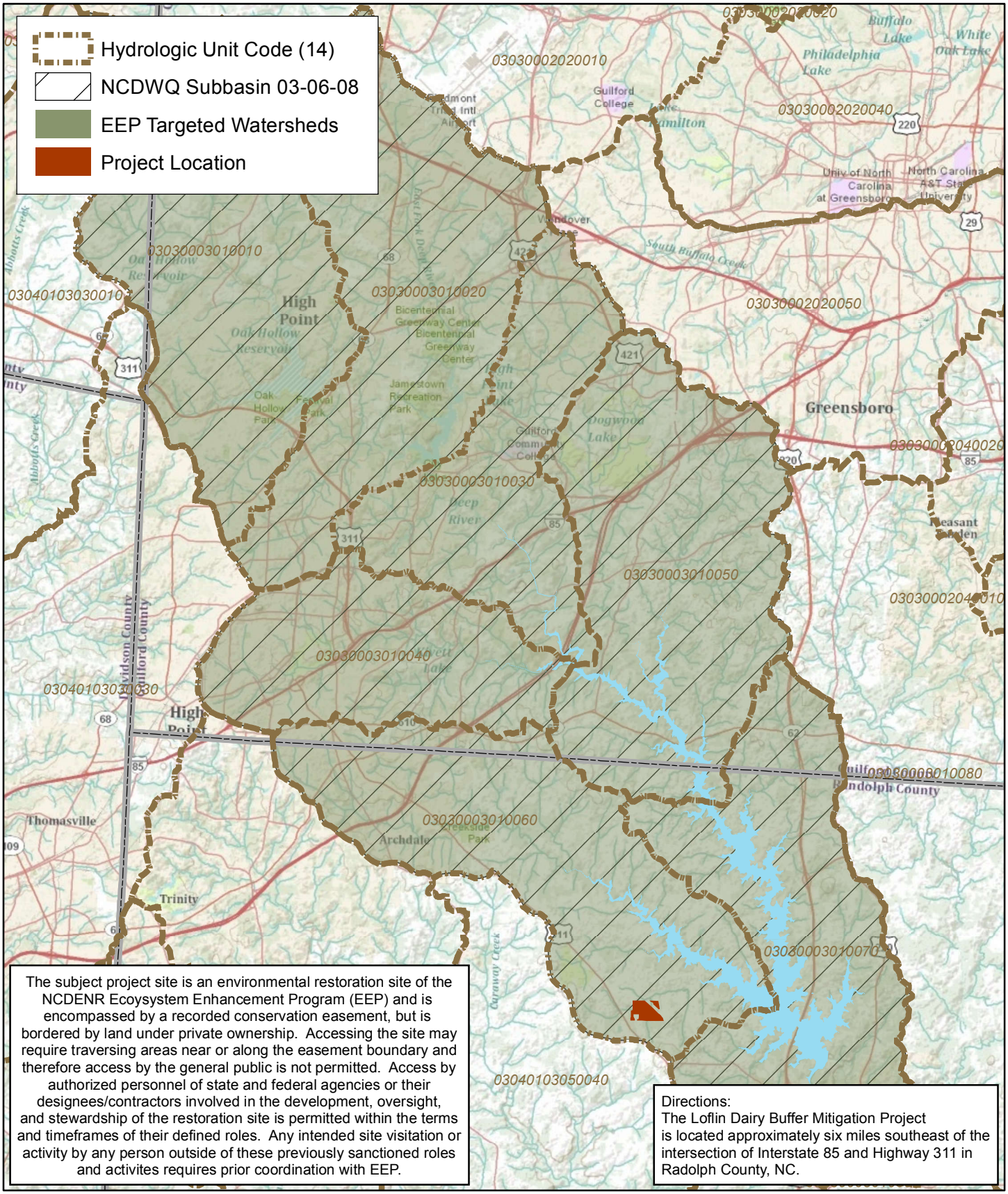
United States Department of Agriculture (USDA), 2009. Natural Resources Conservation Service, Soil Survey Geographic (SSURGO) database for Randolph County, North Carolina. http://SoilDataMart.nrcs.usda.gov

United States Geological Survey (USGS), 1998. North Carolina Geology. http:// http://www.geology.enr.state.nc.us/usgs/carolina.htm

Weakley, A.S. 2008. *Flora of the Carolinas, Virginia, Georgia, Northern Florida, and Surrounding Areas* (Draft April 2008). University of North Carolina at Chapel Hill: Chapel Hill, NC.

Wildlands Engineering, Inc. 2012. Loflin Dairy Buffer Mitigation Site Mitigation Plan. NCEEP, Raleigh, NC.

APPENDIX 1. General Tables and Figures



The subject project site is an environmental restoration site of the NCDENR Ecosystem Enhancement Program (EEP) and is encompassed by a recorded conservation easement, but is bordered by land under private ownership. Accessing the site may require traversing areas near or along the easement boundary and therefore access by the general public is not permitted. Access by authorized personnel of state and federal agencies or their designees/contractors involved in the development, oversight, and stewardship of the restoration site is permitted within the terms and timeframes of their defined roles. Any intended site visitation or activity by any person outside of these previously sanctioned roles and activites requires prior coordination with EEP.

Directions:
The Loflin Dairy Buffer Mitigation Project is located approximately six miles southeast of the intersection of Interstate 85 and Highway 311 in Radolph County, NC.

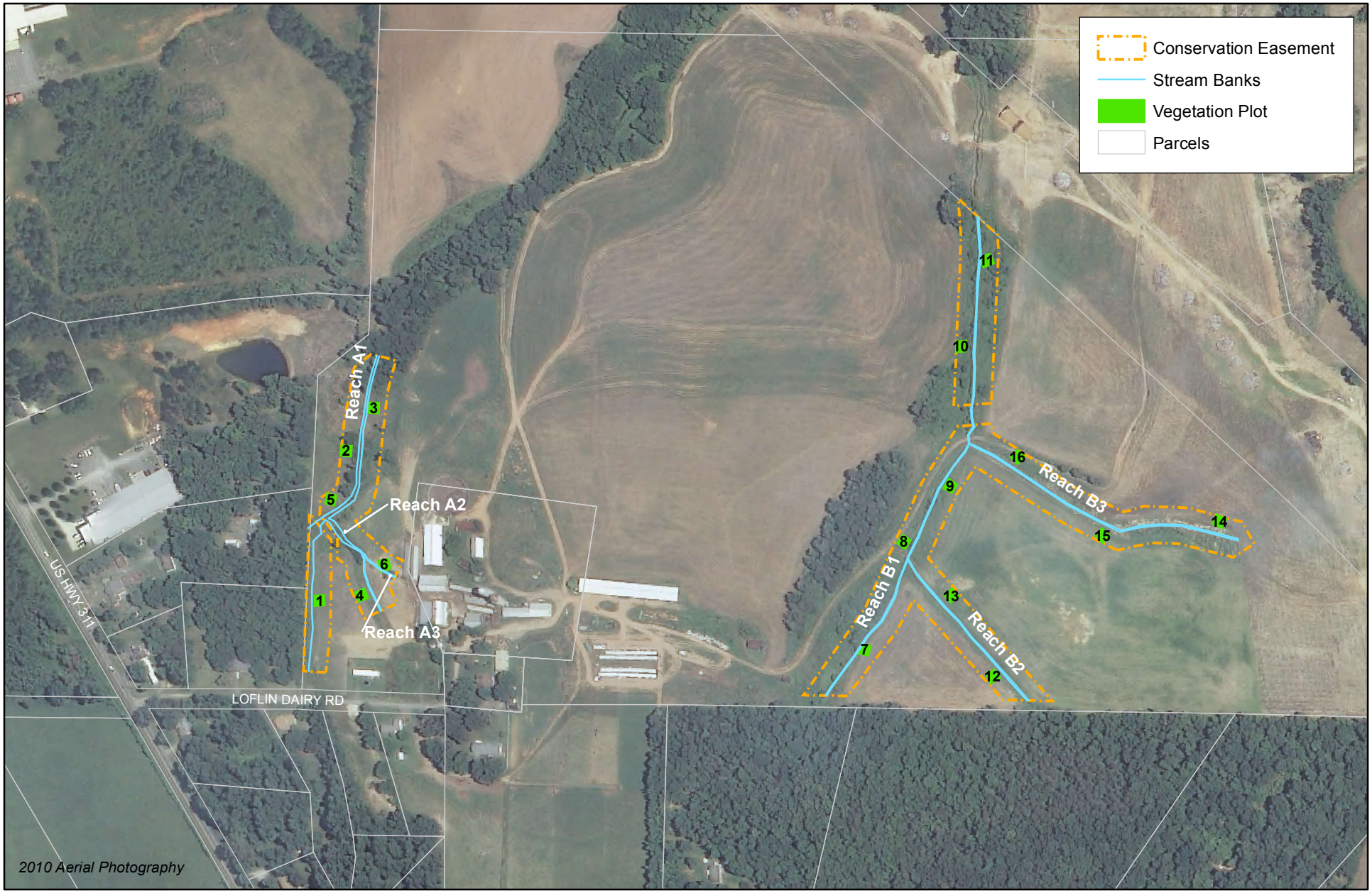
WILDLANDS ENGINEERING

0 1.25 2.5 Miles

N

Figure 1. Project Vicinity Map
Loflin Dairy Buffer Mitigation Site
NCEEP Project Number 95008
Monitoring Year 0 of 5

Randolph County, NC



WILDLANDS ENGINEERING

0 150 300 Feet

N

Figure 2. Project Component/Asset Map
Loflin Dairy Buffer Mitigation Site
NCEEP Project Number 95008
Monitoring Year 0 of 5

Randolph County, NC

Appendix 1. General Tables and Figures
Table 1. Project Components and Mitigation Credits
Loflin Dairy Buffer Mitigation Site (NCEEP Project No.95008)
Monitoring Year 0 of 5

Mitigation Credits									
	Stream		Riparian Wetland		Non-Riparian Wetland		Buffer	Nitrogen Nutrient Offet	Phosphorous Nutrient Offset
Type	R	RE	R	RE	R	RE			
Totals	N/A	N/A	N/A	N/A	N/A	N/A	9.1	N/A	N/A

Project Components						
Reach ID	Stationing/ Location	Exisitng Footage (LF)	Approach	Restoration or Restoration Equivalent	Area (acres)	Mitigation Ratio
Reach A1	Area A		N/A	Restoration	1.7	1:1
Reach A2	Area A		N/A	Restoration	0.7	1:1
Reach B1	Area B		N/A	Restoration	3.6	1:1
Reach B2	Area B		N/A	Restoration	1.1	1:1
Reach B3	Area B		N/A	Restoration	2.0	1:1

Component Summation						
Restoration Level	Stream (linear feet)	Riparian Wetland (acres)		Non-Riparian Wetland (acres)	Buffer (square feet)	Upland (acres)
		Riverine	Non-Riverine			
Restoration					396,396	
Enhancement						
Enhancement I						
Enhancement II						
Creation						
Preservation						
High Quality Preservation						

BMP Elements			
Elements	Location	Purpose/Function	Notes

BR = Bioretention Cell; S F= Sand Filter; SW = Stormwater Wetland; WDP = Wet Detention Pond; DDP = Dry Detention Pond; FS = Filter Strip; S = Grassed Swale; LS = Level Spreader; NI = Natural Infiltration Area; FB = Forested Buffer

Appendix 1. General Tables and Figures
Table 2. Project Activity and Reporting History
Loflin Dairy Buffer Mitigation Site (NCEEP Project No.95008)
Monitoring Year 0 of 5

Activity or Report	Date Collection Complete	Completion or Delivery
Mitigation Plan	December 2011	February 2012
Final Design - Construction Plans	December 2011	February 2012
Construction	January 2012	January 2012
Temporary S&E mix applied to entire project area*	January 2012	January 2012
Permanent seed mix applied to reach/segments	January 2012	January 2012
Containerized and B&B plantings for reach/segments	March 2012	March 2012
Baseline Monitoring Document (Year 0 Monitoring - baseline)	March 2012/April 2012	May 2012
Year 1 Monitoring	Sept 2012	December 2012
Year 2 Monitoring	2013	December 2013
Year 3 Monitoring	2014	December 2014
Year 4 Monitoring	2015	December 2015
Year 5 Monitoring	2016	December 2016

*Seed and mulch is added as each section of construction is completed.

Appendix 1. General Tables and Figures
Table 3. Project Contact Table
Loflin Dairy Buffer Mitigation Site (NCEEP Project No.95008)
Monitoring Year 0 of 5

Designer	**Wildlands Engineering, Inc.**
Daniel Taylor	5605 Chapel Hill Road, Suite 122 Raleigh, NC 27604 919.851.9986
Construction Contractor	**Landowner**
Clifford W. Loflin	2409 Loflin Dairy Road Sophia, NC 27350
Planting Contractor	**Bruton Natural Systems, Inc.**
Charlie Bruton	PO Box 1197 Freemont, NC 27830 919.242.6555
Seeding Contractor	**Bruton Natural Systems, Inc.**
Charlie Bruton	PO Box 1197 Freemont, NC 27830 919.242.6555
Seed Mix Sources	**Mellow Marsh Farm**
Nursery Stock Suppliers	**Arborgen** **Dykes and Son Nursery** **NCForestry Service, Claridge Nursery**
Monitoring Performers	**Wildlands Engineering, Inc.**
Vegetation Monitoring, POC	Kirsten Y. Gimbert 704.332.7754, ext. 110

Appendix 1. General Tables and Figures
Table 4. Project Baseline Information and Attributes
Loflin Dairy Buffer Mitigation Site (NCEEP Project No.95008)
Monitoring Year 0 of 5

Project Information		
Project Name	Loflin Dairy Buffer Mitigation Site	
County	Randolph	
Project Area (acres)	9.8	
Project Coordinates (latitude and longitude)	35° 50' 44.082"N, 79° 52' 22.487"W	
Project Watershed Summary Information		
Physiographic Province	Carolina Slate Belt of the Piedmont	
River Basin	Cape Fear	
USGS Hydrologic Unit 8-digit	03030003	
USGS Hydrologic Unit 14-digit	03030003010060	
DWQ Sub-basin	03-06-08	
	Area A	**Area B**
Project Drainiage Area (acres)	18	59
Project Drainage Area Percentage of Impervious Area	<1%	
CGIA Land Use Classification	82% Cultivated Land and 18% Forested Land	45% Cultivated Land, 40% Forested Land, 10% Residential, and 5 % Commercial
Reach Summary Information		
Parameters	**Area A**	**Area B**
Length of reach (linear feet) - Post-Restoration	Reach A1 : 917 Reach A2 : 155 Reach A2(ephem):180 Reach A3 : 120	Reach B1 : 1489 Reach B2 : 866 Reach B3 : 486
Valley classification	N/A	N/A
Drainage area (acres)	Reach A1 : 61 Reach A2 : 6.5 Reach A3 : 1.0	Reach B1 : 230 Reach B2 : 26 Reach B3 : 22
NCDWQ stream identification score	Reach A1 : 24/ 34.5 Reach A2 : 23.25 Reach A3 : N/A	Reach B1 : 27.25/ 35.5 Reach B2 : 20.75 Reach B3 : 22.75
NCDWQ Water Quality Classification	WS-IV, C	
Morphological Desription (stream type)	Reach A1 – Per. / Int. Reach A2 – Int. / Ephemeral Ditch Reach A3- Ephemeral Ditch	Reach B1 – Per. / Int. Reach B2 – Int. Reach B3 – Int.
Evolutionary trend (Simon's Model) - Pre- Restoration	N/A	N/A
Underlying mapped soils	Wynott-Enon complex	Mecklenburg loam, 8-15% slopes; Mecklenburg clay loam, 2-8% slopes
Drainage class	well drained	well drained
Soil Hydric status	No	No
Slope	8-15%	2-8%
FEMA classification	no regulated floodplain	
Native vegetation community	Bottom-land Forest	
Percent composition of exotic invasive vegetation - Post-Restoration	0%	

Regulatory Considerations			
Regulation	**Applicable?**	**Resolved?**	**Supporting Documentation**
Waters of the United States - Section 404	N/A	N/A	N/A
Waters of the United States - Section 401	N/A	N/A	N/A
Endangered Species Act	X	X	Loflin Dairy Buffer Mitigation Plan; studies found "no effect" (letter from USFWS)
Historic Preservation Act	X	X	No historic resources were found to be impacted (letter from SHPO)
Coastal Zone Management Act (CZMA)/Coastal Area Management Act (CAMA)	N/A	N/A	N/A
FEMA Floodplain Compliance	N/A	N/A	N/A
Essential Fisheries Habitat	N/A	N/A	N/A

U= Unknown

APPENDIX 2. Vegetation Plot Data

Appendix 2. Vegetation Assessment
Table 5a. Planted and Total Stem Counts (Species by Plot with Annual Means)
Loflin Dairy Buffer Mitigation Site (NCEEP Project No. 95008)
Reach A1, A2 and A3
Monitoring Year 0 of 5

			Current Data (MY0-4/2012)												Annual Means	
			Plot 1		Plot 2		Plot 3		Plot 4		Plot 5		Plot 6		Current Mean	
Species	**Common Name**	**Type**	P	T	P	T	P	T	P	T	P	T	P	T	P	T
Betula nigra	River Birch	Tree	1	1	9	9	1	1	5	5	10	10	3	3	**6**	**6**
Carpinus caroliniana	Ironwood	Tree			2	2	4	4	8	8	5	5	2	2	**4**	**4**
Fraxinus pennsylvanica	Green Ash	Tree	1	1			1	1					2	2	**2**	**2**
Liriodendron tulipifera	Tulip Poplar	Tree			4	4	1	1	1	1			2	2	**2**	**2**
Platanus occidentalis	Sycamore	Tree					1	1	1	1			1	1	**2**	**2**
Quercus michauxii	Swamp Chestnut Oak	Tree	12	12	5	5	4	4			2	2	1	1	**5**	**4**
Quercus phellos	Willow Oak	Tree	4	4			4	4	1	1			13	13	**4**	**4**
Quercus rubra	Northern Red Oak	Tree					1	1	1	1					**2**	**2**
		Plot Area (acres)	**0.0247**													
		Species Count	**4**	**4**	**4**	**4**	**8**	**8**	**6**	**6**	**3**	**3**	**7**	**7**	**5**	**5**
		Stem Count	**18**	**18**	**20**	**20**	**17**	**17**	**17**	**17**	**17**	**17**	**24**	**24**	**19**	**18**
		Stems per Acre	**729**	**729**	**810**	**810**	**688**	**688**	**688**	**688**	**688**	**688**	**972**	**972**	**764**	**711**

Type=Shrub or Tree
P = Planted
T = Total

Appendix 2. Vegetation Assessment
Table 6. CVS Vegetation Tables - Metadata
Loflin Dairy Buffer Mitigation Site (NCEEP Project No. 95008)
Monitoring Year 0 of 5

Report Prepared By	Kirsten Gimbert
Date Prepared	*4/18/2012 13:16*
database name	*Loflin Dairy Buffer-MY0.mdb*
database location	*Q:\ActiveProjects\005-02131 Loflin Dairy Buffer Mitigation Site\Monitoring\Baseline Monitoring\Vegetation Assessment*
DESCRIPTION OF WORKSHEETS IN THIS DOCUMENT----------	
Metadata	*Description of database file, the report worksheets, and a summary of project(s) and project data.*
Plots	*List of plots surveyed with location and summary data (live stems, dead stems, missing, etc.).*
Vigor	*Frequency distribution of vigor classes for stems for all plots.*
Vigor by Spp	*Frequency distribution of vigor classes listed by species.*
Damage	*List of most frequent damage classes with number of occurrences and percent of total stems impacted by each.*
Damage by Spp	*Damage values tallied by type for each species.*
Damage by Plot	*Damage values tallied by type for each plot.*
Stem Count by Plot and Spp	*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.*
PROJECT SUMMARY----------	
Project Code	95008
project Name	Loflin Dairy Mitigation Site
Description	Buffer Mitigation
length (ft)	
stream-to-edge width (ft)	
area (sq m)	
Required Plots (calculated)	16
Sampled Plots	16

Appendix 2. Vegetation Assessment

Table 7. CVS Vegetation Tables - Vigor by Species

Loflin Dairy Buffer Mitigation Site (NCEEP Project No. 95008)

Monitoring Year 0 of 5

	Species	**4**	**3**	**2**	**1**	**0**	**Missing**
	Betula nigra	95					
	Carpinus caroliniana	17	1				
	Fraxinus pennsylvanica	60	2				
	Liriodendron tulipifera	30					
	Platanus occidentalis	50					
	Quercus michauxii	7					
	Quercus phellos	19					
	Quercus rubra	21					
TOT:		**299**	**3**				

vigor	**Count**	**Percent**
0	0	0
1	0	0
2	0	0
3	3	1
4	299	99
TOT:	**302**	**100**

Notes: Vigor Scores
4: Excellent
3: Good
2: Fair
1: Unlikely to survive year
2: Dead

Appendix 2. Vegetation Assessment

Table 8. CVS Vegetation Tables - Damage by Species

Loflin Dairy Buffer Mitigation Site (NCEEP Project No. 95008)

Monitoring Year 0 of 5

Species	All Damage Categories	(no damage)
Betula nigra	0	95
Carpinus caroliniana	0	18
Fraxinus pennsylvanica	0	62
Liriodendron tulipifera	0	30
Platanus occidentalis	0	50
Quercus michauxii	0	7
Quercus phellos	0	19
Quercus rubra	0	21
TOT:	**0**	**302**

Damage	Count	Percent Of Stems
no damage	302	100

Appendix 2. Vegetation Assessment

Table 9. CVS Vegetation Tables - Stem Count by Plot and Species

Loflin Dairy Buffer Mitigation Site (NCEEP Project No. 95008)

Monitoring Year 0 of 5

	Species	Total Stems	# plots	avg# stems	95008-WEI-0001	95008-WEI-0002	95008-WEI-0003	95008-WEI-0004	95008-WEI-0005	95008-WEI-0006	95008-WEI-0007	95008-WEI-0008	95008-WEI-0009	95008-WEI-0010	95008-WEI-0011	95008-WEI-0012	95008-WEI-0013	95008-WEI-0014	95008-WEI-0015	95008-WEI-0016
	Betula nigra	95	15	6	1	9	1	5	10	3	9		2	8	2	10	9	8	14	4
	Carpinus caroliniana	18	12	4		2	4	8	5	2	6	1	6		8	3		1		4
	Fraxinus pennsylvanica	62	8	2	1		1			2			1	2		1			5	5
	Liriodendron tulipifera	30	9	2		4	1	1		2	1	1	2	3	4					
	Platanus occidentalis	50	10	2			1	1		1		5	3	2	4	2	1	1		
	Quercus michauxii	7	13	5	12	5	4		2	1	4	8	5	1		2	6	9		3
	Quercus phellos	19	8	4	4		4	1		13	4		1	1				2		
	Quercus rubra	21	4	2			1	1				3					2			
TOT:		**302**	**16**	**19**	**18**	**20**	**17**	**17**	**17**	**24**	**24**	**18**	**20**	**17**	**18**	**18**	**18**	**21**	**19**	**16**

Vegetation Photographs

	
Vegetation Plot 1 (04/09/2012)	Vegetation Plot 2 (04/09/2012)
	
Vegetation Plot 3 (04/09/2012)	Vegetation Plot 4 (04/09/2012)
	
Vegetation Plot 5 (04/09/2012)	Vegetation Plot 6 (04/09/2012)

Vegetation Plot 7 (04/09/2012)

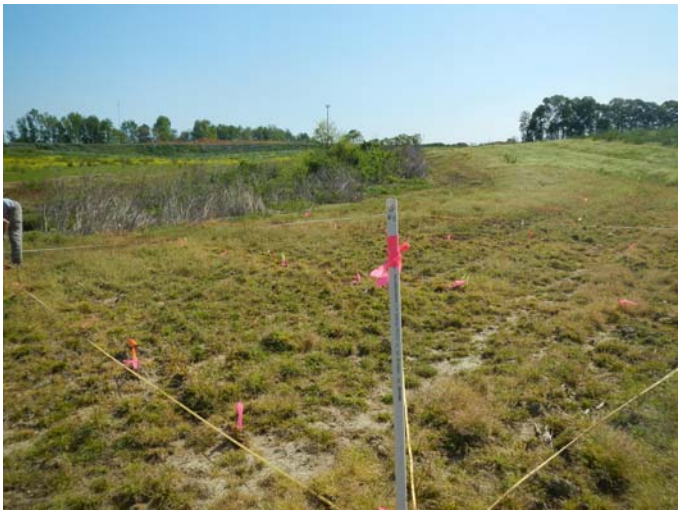
Vegetation Plot 8 (04/09/2012)

Vegetation Plot 9 (04/10/2012)

Vegetation Plot 10 (04/10/2012)

Vegetation Plot 11 (04/10/2012)

Vegetation Plot 12 (04/09/2012)

	
Vegetation Plot 13 (04/09/2012)	Vegetation Plot 14 (04/10/2012)
	
Vegetation Plot 15 (04/10/2012)	Vegetation Plot 16 (04/10/2012)

APPENDIX 3. NCDWQ Restoration Approval Letter

NCDENR
North Carolina Department of Environment and Natural Resources
Division of Water Quality
Beverly Eaves Perdue
Governor
Coleen H. Sullins
Director
Dee Freeman
Secretary

November 10, 2011

Kristie Corson
NC Ecosystem Enhancement Program
1652 Mail Service Center
Raleigh, NC 27699-1652

Re: Loflin Buffer Mitigation Site
Randolph County

Dear Ms. Corson:

The Division of Water Quality (DWQ) Winston-Salem Regional Office has reviewed the Memorandum submitted by Wildlands Engineering dated October 31, 2011 (attached). This memorandum accurately summarizes all discussions conducted during a site visit as well as all follow up correspondence.

The Division concurs that that the proposed buffer planting areas as depicted in the attached October 31, 2011 memo and diagrams should qualify for buffer restoration credits in the Randleman Lake watershed provided that the plantings are shown to meet the buffer mitigation success criteria established in 15A NCAC 02B .0252.

If you have any questions related to our comments or this mitigation project, please feel free to contact me at 336-771-4964 or sue.homewood@ncdenr.gov.

Sincerely,

Sue Homewood
DWQ Winston-Salem Regional Office

Cc: Andrea Eckardt, Wildlands Engineering (via email)
DWQ-WSRO

North Carolina Division of Water Quality, Winston-Salem Regional Office
Location: 585 Waughtown St. Winston-Salem, North Carolina 27107
Phone: 336-771-5000 \ FAX: 336-771-4630 \ Customer Service: 1-877-623-6748
Internet: www.ncwaterquality.org

WILDLANDS
ENGINEERING

1430 S. Mint Street, Suite 104 · Charlotte, NC 28203 · Phone: 704.332.7754 · Fax: 704.332.3306

MEMORANDUM

To: Sue Homewood, NCDWQ
From: Andrea Eckardt

Cc: Kristie Corson
Tim Baumgartner
Date: 10/31/2011

Re: Loflin Dairy Buffer Mitigation Site – Proposed Planting Areas

Representatives of Wildlands Engineering, Inc (WEI), NC Ecosystem Enhancement Program (NCEEP), and NC Division of Water Quality (NCDWQ) attended a site visit to the Loflin Dairy Buffer Mitigation Site on August 18, 2011. Meeting notes and a draft planting area figure were submitted by WEI for agency review following the site visits. WEI received comments from NCDWQ on the notes and initial planting area map via email September 9, 2011. The proposed planting area for the project has since been revised based on agency comments, updated survey data, and site constraints.

Attached is the updated map showing the proposed planting area for the Loflin Dairy Buffer Mitigation Site. The conservation easement boundary is 50 feet from the surveyed top of bank. The project planting area, which is the area that will generate restoration credit, is 8.7 acres out of a 9.5 acre conservation easement area. The jurisdictional streams and ephemeral ditches on the site have been excluded from the planting acreage.

NCDWQ requested additional information on the existing vegetation in three areas: Reaches A1, A2, and B1. Reach A1 had only a single line of four mature trees (>5" DBH) along the right top-of-bank; therefore, no official tree count plot was established. A tree count plot was created on A2 as shown on the attached figure. The result of the plot is included below in Table 1. On Reach B1, there were no trees greater than or equal to 5 inches DBH found along the reach; therefore, so no official plot was created.

Table 1. Loflin Dairy Existing Buffer Vegetation Plots

Plot	Reach	Dimensions (ft.)	No. Trees ≥ 5" DBH	Tree Density Per Acre
#1	Reach A2	75' x 30'	4	77

Below is a summary of the conditions, issues, and mitigation potential at each project Reach.

Reach A1 – As there was only a single line of four trees found along the top-of-bank of this reach with DBH greater than or equal to five inches, the conservation easement area along this entire reach will be riparian buffer restoration.

Reach A2 – As the tree density per acre for this reach was 77, the conservation easement area along this entire reach will be riparian buffer restoration. The upstream ephemeral breaks that had been identified in the field by NCDWQ were surveyed. The project extent stops prior to the breaks due to property owner constraints.

Reach B1 – As there were no trees found with DBH greater than or equal to five inches, the conservation easement area along this entire reach will be riparian buffer restoration.

Reach B2 – The conservation easement area along this entire reach will be riparian buffer restoration.

Reach B3 – The conservation easement area along this entire reach will be riparian buffer restoration. The headcut at the upstream portion of the reach that was identified in the field by NCDWQ was surveyed and used to determine the project extent on this reach. The upstream end of the easement area has been "bubbled" 50 feet per NCDWQ guidance.

Date	October 31, 2011
Job Number	005-02J1
Project Engineer	EGR
Drawn By	JCR
Checked By	MJE

1
Sheet

Reviewers

Loflin Dairy Buffer Mitigation Site
Randolph County, North Carolina - Cape Fear Basin
Buffer Easement Exhibit

DRAFT

WILDLANDS ENGINEERING
1430 South Mint Street, Suite 104
Charlotte, NC 28203
Tel: 704.332.7754
Fax: 704.332.3306
Firm License No. F-0831

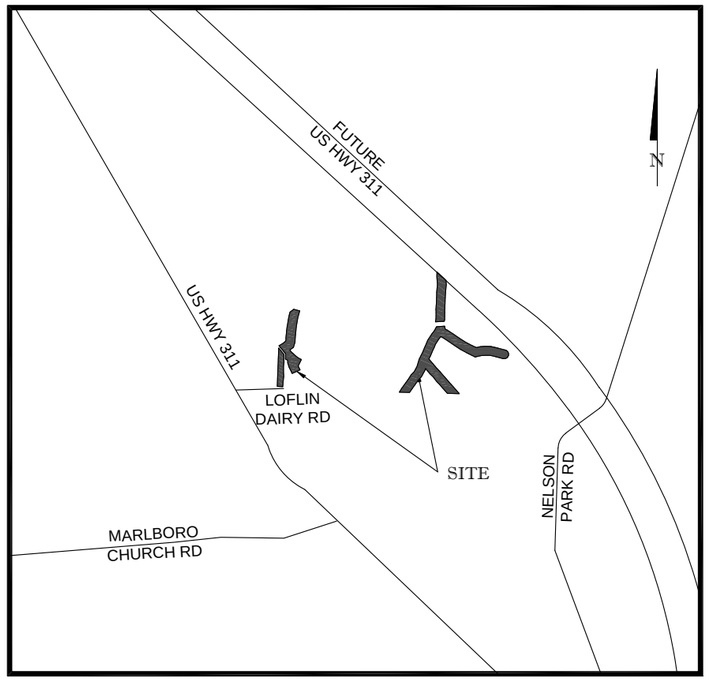
11/10/11

60% Plans - Not For Construction

APPENDIX 4. As-Built Plan Sheets

Loflin Dairy Buffer Mitigation Site

Randolph County, North Carolina
Cape Fear River Basin Cataloging Unit 03030003
For
North Carolina
Ecosystem Enhancement Program



Vicinity Map
Not to Scale

Ecosystem Enhancement PROGRAM

BEFORE YOU DIG!
CALL 1-800-632-4949
N.C. ONE-CALL CENTER
IT'S THE LAW!

FINAL
RECORD DRAWINGS
& AS-BUILT PLANS
June 8, 2012

REACH ORIGINS

Reach	Latitude	Longitude
A1	N35°50'48.2"	W79°52'41.7"
A2	N35°50'41.8"	W79°52'41.0"
B1	N35°50'38.5"	W79°52'25.7"
B2	N35°50'38.4"	W79°52'18.5"
B3	N35°50'43.1"	W79°52'11.0"

Sheet Index

Project Directory

Engineering:
Wildlands Engineering, Inc
5606 Chapel Hill Road, Suite 122
Raleigh, NC 27607
Jeff Keaton, PE
919-851-9986

Surveying:
CE Robertson Associates
Gene Robertson, PLS
310 W. Meadow Road
Eden, NC 27288-3202
336-327-0498

Owner:
Ecosystem Enhancement Program
NC Department of Environment and Natural Resources
1652 Mail Service Center
Raleigh, NC 27699-1652
Guy Pearce
919-715-1157

EEP Project No. 95008

DENR Contract No. 003995

Contractor
Landowner
Clifford W. Loflin
2409 Loflin Dairy Rd.
Sophia, NC 27350

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1430 South Mint Street, Suite 104
Charlotte, NC 28203
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Loflin Dairy Buffer Mitigation Site As-Built
Randolph County, North Carolina

Cover Sheet

Revisions:

Date:	June 8, 2012
Job Number:	008-02131
Project Engineer:	JNK
Drawn By:	JCK
Designed By:	EGR

Sheet 0.1

Final As-Built Plans

Buffer Restoration Plants

Scientific Name	Common Name	Size (ft)	Total # of stems	Planting Composition (%)
Cercis canadensis	American Redbud	2-3	425	5
Liriodendron tulipifera	Tulip Poplar	2-3	1275	15
Quercus phellos	Willow Oak	2-3	850	10
Plantus occidentalis	Sycamore	2-3	1700	20
Betula nigra	River Birch	2-3	850	10
Carpinus caroliniana	Ironwood	2-3	850	10
Quercus michauxii	Swamp Chestnut Oak	2-3	425	5
Fraxinus pennsylvanica	Green Ash	2-3	1700	20
Quercus rubra	Northern Red Oak	2-3	425	5
Totals			**8500**	**100**

Buffer Restoration Seeding

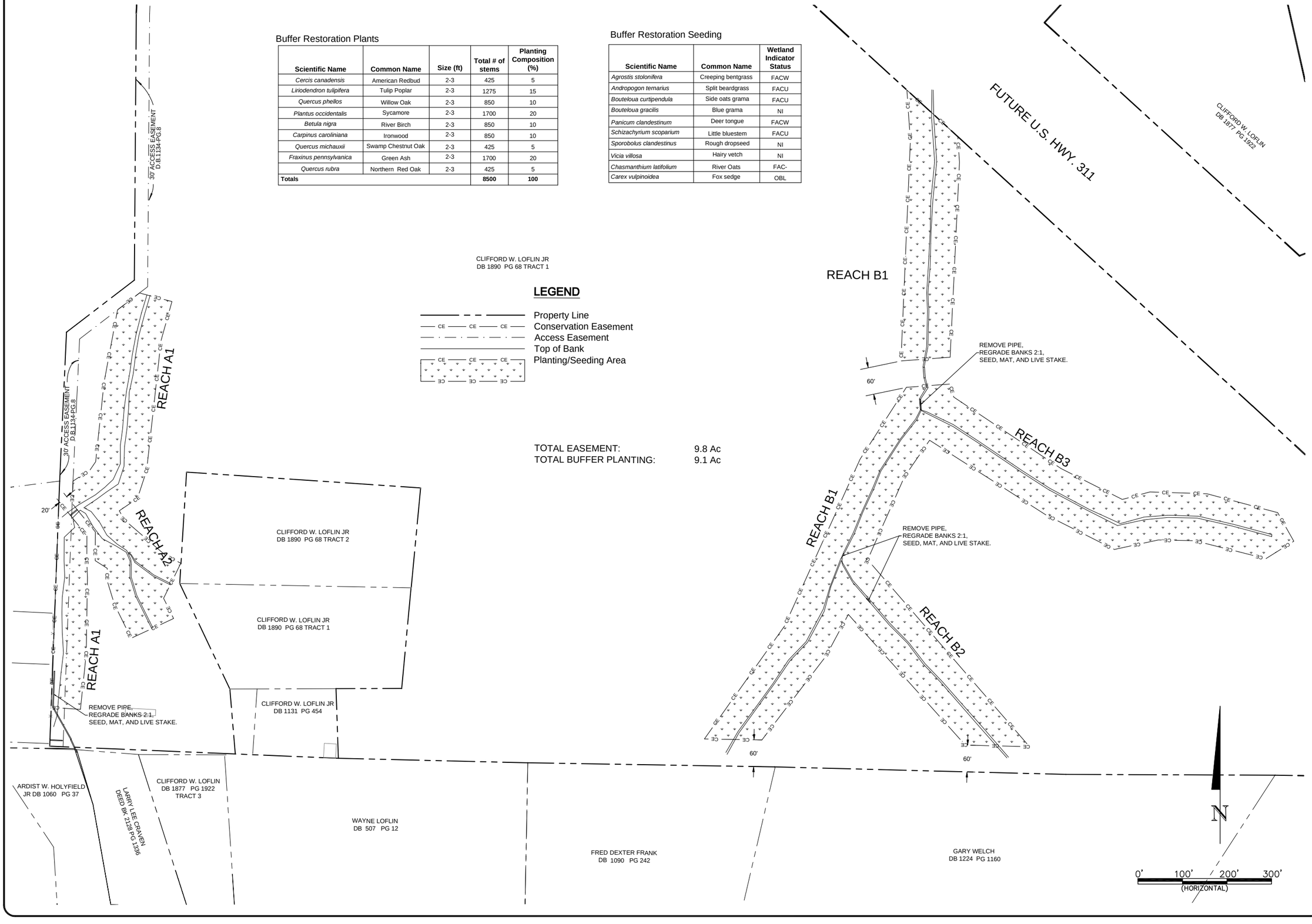
Scientific Name	Common Name	Wetland Indicator Status
Agrostis stolonifera	Creeping bentgrass	FACW
Andropogon ternarius	Split beardgrass	FACU
Bouteloua curtipendula	Side oats grama	FACU
Bouteloua gracilis	Blue grama	NI
Panicum clandestinum	Deer tongue	FACW
Schizachyrium scoparium	Little bluestem	FACU
Sporobolus clandestinus	Rough dropseed	NI
Vicia villosa	Hairy vetch	NI
Chasmanthium latifolium	River Oats	FAC-
Carex vulpinoidea	Fox sedge	OBL

CLIFFORD W. LOFLIN JR
DB 1890 PG 68 TRACT 1

LEGEND

Property Line
Conservation Easement
Access Easement
Top of Bank
Planting/Seeding Area

TOTAL EASEMENT: 9.8 Ac
TOTAL BUFFER PLANTING: 9.1 Ac



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Loflin Dairy Buffer Mitigation Site
Randolph County, North Carolina

Buffer Planting
Construction Plans

Revisions:

Date: June 8, 2012
Job Number: 008-02131
Project Engineer: JNK
Drawn By: JCK
Designed By: EGR

Sheet 1.1

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Schizachyrium scoparium	Little bluestem	FACU
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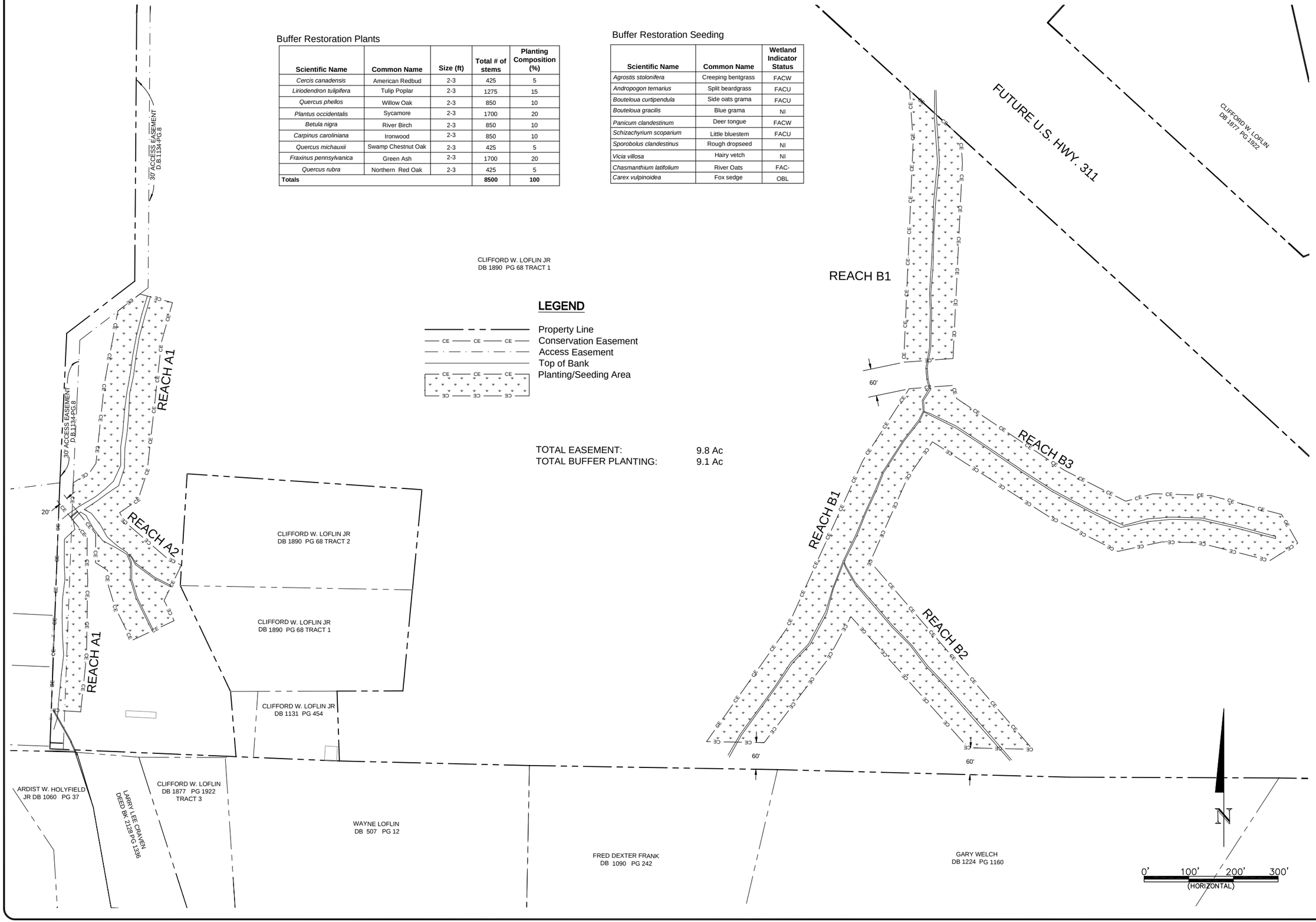
Vicia villosa	Hairy vetch	NI
Chasmanthium latifolium	River Oats	FAC-
Carex vulpinoidea	Fox sedge	OBL

LEGEND

- Property Line
- Conservation Easement
- Access Easement
- Top of Bank
- Planting/Seeding Area

TOTAL EASEMENT: 9.8 Ac
TOTAL BUFFER PLANTING: 9.1 Ac



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Loflin Dairy Buffer Mitigation Site
Randolph County, North Carolina

Buffer Planting
As-Built Plans

Revisions:

Date: June 8, 2012
Job Number: 008-02131
Project Engineer: JNK
Drawn By: JCK
Designed By: EGR

Sheet 2.1

Final As-Built Plans