FINAL MONITORING REPORT
YEAR 2 of 5

Green Valley Farm Site
Riparian Buffer Restoration
EEP Project ID Number 003994-EEP Site 95012

Randolph County, North Carolina
Cape Fear River Basin
HUC 03030003010070

Submitted to:

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

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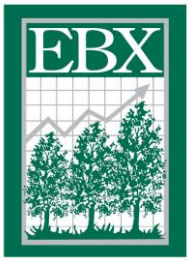

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APPENDICES

1.0 EXECUTIVE SUMMARY / PROJECT ABSTRACT

1.1 Project Goals and Objectives

The Green Valley Buffer Mitigation Project is located in the 03030003 Catalog Unit (CU), in the Cape Fear River Basin. Assets of this CU include the Deep River, the Randleman Reservoir, and major communities including High Point, Asheboro, Siler City, and Sanford. Restoration goals for CU 03030003 as identified in the 2009 Cape Fear River Basin RBRP include protection of several species of mussel and the Cape Fear Shiner. Additional goals include the improvement in water quality to waters draining to Randleman Reservoir.

The Green Valley Buffer Mitigation Project was identified as an opportunity to improve water quality and habitat within the CU. The project goals address stressors identified in the CU. The following table lists the project goals and the project objectives through which the goals will be addressed:

Goals	Objectives
1. Nutrient removal 2. Sediment removal 3. Runoff filtration 4. Increase dissolved oxygen concentration 5. Restore riparian habitats 6. Reduce water temperature	• Restore minimum 50-foot riparian buffer by planting appropriate bottomland hardwood species to filter runoff. • Convert active farm fields to forested buffers. • Plant buffer vegetation to shade channel. • Restore riparian buffer habitat to appropriate bottomland hardwood ecosystem. • Restore canopy tree species in the stream buffer areas to shade channel. • Eliminate and control exotic invasive species. • Replace three (two culverts and one ford) undersized and/or failing channel crossings with appropriately sized structures.

1.2 Project Background

The Green Valley Farms Riparian Buffer Mitigation Site is located on Hockett Dairy Road (SR 1938) in Randolph County approximately 12 miles north of Asheboro, NC (**Figure 1**). The site is located in the Cape Fear River Basin within Cataloging Unit 03030003010070 (NCDWQ sub-basin 03-06-08). The site has four unnamed tributaries (UT) that drain into Randleman Lake (**Figure 2**). The proposed project will result in 8.74 to 9.6 acres of buffer restoration. The upper 400 linear feet of UT 4, which account for the 0.86-acre difference in the buffer restoration acreage range, are not subject to the Randleman Buffer Rules. It is anticipated that performing buffer restoration along the entire length of UT 4 (590 linear feet) will result in a defined channel within the five-year monitoring period, and that the Site will ultimately yield the full 9.6 acres of buffer restoration.

The project site is located in the Piedmont Physiographic Province and in the Carolina Slate Belt. The region is underlain by felsic metavolcanic rocks, which can be seen in the streambed of UT 1 and UT 3. The topography of the project area is generally rolling with elevations ranging from 670 to 760 feet. The four unnamed tributaries to Randleman Lake comprise the principle drainage features. The project's watershed is primarily used for agricultural production. Much of the site is currently used for row crop production for dairy silage. These tributaries have limited hardwood trees present within the buffer and lack significant ground cover. The mature trees have a density of less than 100 stems per acre. The project area has been in agricultural use for several decades.

The Green Valley Farms mitigation project offers an opportunity for high quality riparian buffer restoration. Stream buffer mitigation for the Green Valley Farms Site involves buffering four streams that flow directly and indirectly into Randleman Lake. The mitigation design divides the site into four distinct reaches (**Figure 2**). Buffer restoration is proposed along all four channels. Three existing farm access crossings have been upgraded and stabilized to prevent erosion.

1.3 Vegetation Condition

The measure of vegetative success for the site is the survival of at least 320 five-year old planted trees per acre at the end of year five of the monitoring period. CVS Level 2 was performed in monitoring Year 2 to document any volunteer generation. A total of 2 volunteers were observed across all 11 vegetation plots. Year 2 monitoring recorded an average of 574 planted stems per acre and 581 total stems per acre (planted and volunteers) across all vegetation plots. Many plots continued to show a high rate of mortality in Year 2. In particular, Plots 7, 8, and 10 each had less than 300 stems per acre in Year 2. Other vegetation issues include invasive species within the easement. The invasive Johnsongrass (*Sorghum halepense*) was common and problematic across the majority of the site. Additionally, there was a high density of morning glory vines *(Ipomea quamoclit)* that caused several of the planted trees to be bent over. Along plot 4, Chinese privet (*Ligustrum sinense*) is beginning to encroach on the stream side of the plot. Plot 10 burned previous to year 1 monitoring, and the Year 2 survey confirms that the plot has been re-established. Overall, vegetation across the site is in fair to poor condition. Adaptive management has included mowing herbaceous vegetation (including Johnsongrass) along UT2 and UT3 and supplemental planting. This has decreased invasive competition minimally and resulted in incidental damage to planted trees. The Current Condition Plan View is provided in **Appendix B**, **Figure 2**.

1.4 Summary Information / Data

Summary information/data related to the occurrence of items such as beaver or encroachment and statistics related to performance of various project and monitoring elements can be found in the tables and figures in the report appendices. Narrative background and supporting information formerly found in these reports can be found in the Baseline Monitoring Report (formerly Mitigation Plan) and in the Mitigation Plan (formerly the Restoration Plan) documents available on EEP's website. All raw data supporting the tables and figures in the appendices is available from EEP upon request.

2.0 METHODOLOGY

In order to determine if the success criteria are achieved and the planted areas are developing toward the target community, NCEEP-CVS Protocol for Recording Vegetation Version 4.2 will be utilized. The vegetation monitoring will include Level I and Level II plots distributed across the planted area. An interim vegetation monitoring will occur in spring after leaf-out has occurred. The CVS monitoring will be conducted toward the end of the growing season. Individual plot data will be provided to NCEEP and CVS following NCEEP-CVS guidance. The annual monitoring requirements are summarized in the following table:

Required	Parameter	Quantity	Frequency	Notes
X	Vegetation	11 Plots Located randomly across the project area	Annual	Vegetation will be monitored using the Carolina Vegetation Survey (CVS) protocols (Level I & Level II)
X	Exotic and nuisance vegetation	N/A	Semi-Annual	Exotic vegetation will be evaluated and spot treatment applied as needed
X	Project boundary	N/A	Semi-annual	Locations of fence damage, vegetation damage, boundary encroachments, etc. will be mapped

Photographs will be used to visually document restoration success. Reference photos will be taken once a year and will be used to visually document restoration success. Reference photo stations are marked with wooden stakes. Reference stations will be photographed immediately following planting and continued annually for at least five years following construction. Photographers will make every effort to maintain the same area in each photo over time. Photographs will be used to subjectively evaluate vegetation establishment. A series of photos over time should indicate successional maturation of riparian vegetation.

3.0 REFERENCES

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Appendix A

Project Vicinity Map and Background Tables

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. 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, monitoring, and stewardship of the restoration site is permitted within the terms and timeframes of their defined, pre-approved roles. Any intended site visitation or activity by any person outside of these previously sanctioned activities/roles requires prior coordination with EEP.

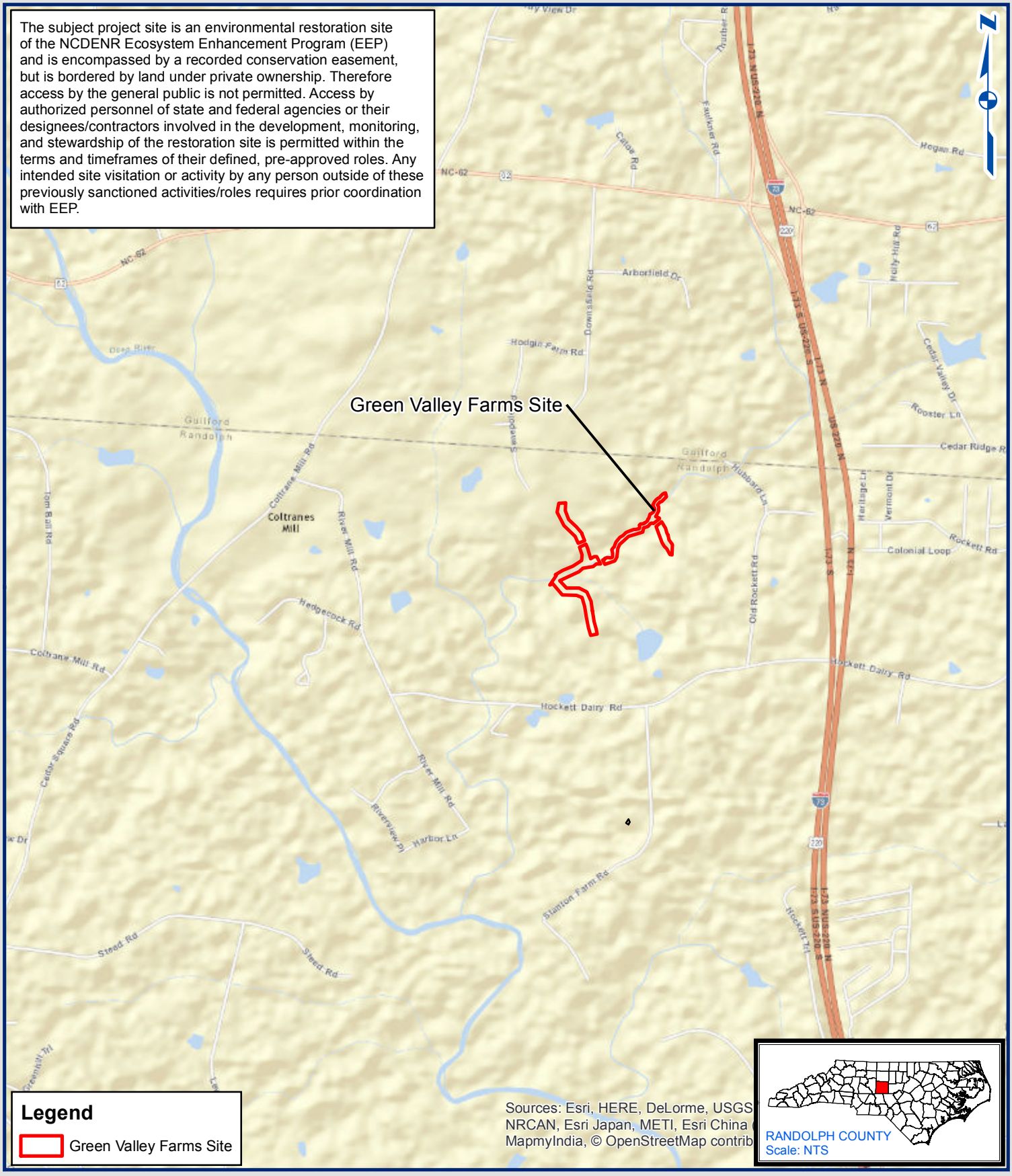

Figure 1. Project Vicinity Map

Green Valley Farms Riparian Buffer Restoration Site

Randolph County, North Carolina

EEP Project ID# 003994

0 1,000 2,000 4,000 Feet

1 inch = 2,000 feet

Date: November 2014

Table 1. Project Components and Mitigation Credits
Green Valley, Randolph County
EEP Project ID Number 003994-EEP Site 95012

Mitigation Credits

	Stream		Riparian Wetland		Non-riparian Wetland		Buffer	Nitrogen Nutrient Offset	Phosphorous Nutrient Offset
Type	N/A	N/A	N/A	N/A	N/A	N/A	Restoration	N/A	N/A
Totals*	N/A	N/A	N/A	N/A	N/A	N/A	8.74 Ac. to 9.6 Ac.	N/A	N/A

Project Components

Reach ID	Stationing/ Location	Existing Footage (LF)	Approach (PI, PII, etc.)	Restoration -or- Restoration Equivalent	Restoration Area (acres)	Mitigation Ratio
Reach UT1	N/A	2,450	N/A	Buffer	3.51	1:1
Reach UT2	N/A	1,156	N/A	Buffer	2.65	1:1
Reach UT3	N/A	1,105	N/A	Buffer	2.30	1:1
Reach UT4*	N/A	190 to 590	N/A	Buffer	0.28 to 1.14	1:1

Component Summation

Restoration Level	Stream (linear feet)	Riparian Wetland		Non-Riparian Wetland (acres)	Buffer (acres)	Upland (acres)
		Riverine	Non-Riverine			
Restoration*	N/A	N/A	N/A	N/A	8.74 to 9.60	N/A

*Currently, the upper 400 LF of UT4 is not subject to the Randleman Buffer Rules; however, the lower 190 LF is subject to the buffer rules and consists of 0.28 acres of proposed buffer restoration. It is anticipated that performing buffer restoration along the entire reach (590 LF) will result in a defined channel within the 5-year monitoring period and ultimately yield 1.14 acres of buffer restoration.

Table 2. Project Activity and Reporting History
Green Valley, Randolph County
EEP Project ID Number 003994-EEP Site 95012

Elapsed time since planting complete: 2 year, 3 months
Number of reporting years: 2

Activity or Report	Data Collection Complete	Completion or Delivery
Mitigation Plan	January 2012	May 2012
Final Design - Construction Plans	N/A	May 2012
Construction	N/A	October 2012
Temporary S&E mix applied to project area	N/A	June 2012
Permanent seed mix applied to project area	N/A	June 2012
Containerized and B&B plantings planted in project area	N/A	June 2012
Baseline Monitoring Document (Year 0 Monitoring - baseline)	June 2012	May 2013
Year 1 Monitoring	October 2013	October 2013
Year 2 Monitoring	September 2014	September 2014
Year 3 Monitoring	Fall 2015*	Fall 2015*
Year 4 Monitoring	Fall 2016*	Fall 2016*
Year 5 Monitoring	Fall 2017*	Fall 2017*

Table 3. Project Contact Table Green Valley, Randolph County EEP Project ID Number 003994-EEP Site 95012	
Designer	WK Dickson & Co., Inc.
Primary project design POC	Daniel Ingram - (919) 782-0495
Construction Contractor	KBS Earthworks
Construction contractor POC	Kory Strader - (336) 362-0289
Planting Contractor	Taylors Lawn and Landscape
Planting contractor POC	Brant Taylor - (919) 606-2431
Seeding Contractor	Taylors Lawn and Landscape
Planting contractor POC	Brant Taylor - (919) 606-2431
Seed Mix Sources	Evergreen Seed, Inc
Nursery Stock Suppliers	ArborGen
Monitoring Performers	WK Dickson & Co., Inc.
Vegetation Monitoring POC	Daniel Ingram - (919) 782-0495

Table 4. Project Baseline Information and Attributes Green Valley, Randolph County EEP Project ID Number 003994-EEP Site 95012	
Project Information	
Project Name	Green Valley Farm Site - Riparian Buffer Restoration
County	Randolph
Project Area (acres)	11.45
Project Coordinates (latitude and longitude)	35° 54' 17.672" N, 79° 50' 3.490"W
Project Watershed Summary Information	
Physiographic Province	Piedmont Physiographic Province
River Basin	Cape Fear River Basin
USGS Hydrologic Unit 8-digit	03030003
USGS Hydrologic Unit 14-digit	03030003010070
DWQ Sub-basin	03-06-08
Project Drainage Area (acres)	389.1
Project Drainage Area Percentage of Impervious Area	1%
CGIA Land Use Classification	1.01 Residential 2.01 Cropland and Pasture 2.03 Confined Animal Operations 2.99 Other Agricultural Land 3.02 Passively Managed Forest Stands

Table 4 (cont.). Project Baseline Information and Attributes Green Valley, Randolph County EEP Project ID Number 003994-EEP Site 95012				
Parameters	**Reach UT1**	**Reach UT2**	**Reach UT3**	**Reach UT4***
Length of reach (linear feet)	2,450	1,156	1,105	190 to 590
Valley Classification	X	X	X	X
Drainage area (acres)	221	18.5	64	19.4
NCDWQ stream identification score	38	20.5	23	26
NCDWQ Water Quality Classification	WS-IV;CA	WS-IV;CA	WS-IV;CA	WS-IV;CA
Morphological Description (stream type)	C	C	C	C
Evolutionary trend	Stable	Stable	Stable	Stable
Underlying mapped soils	Chewacla loam ChA	Mecklenburg CL MeC2, Wynott-Enon complex WvC2	Wynott-Enon complex WtC	Wynott-Enon complex WtC
Drainage class	somewhat poorly drained	well drained	well drained	well drained
Soil Hydric status	Non-hydric	Non-hydric	Non-hydric	Non-hydric
Slope (ft/ft)	0.002	0.024	0.014	0.010
FEMA classification	Zone AE	Zone AE	Zone AE	N/A
Native vegetation community	Cultivated	Cultivated	Cultivated	Cultivated
Percent composition of exotic invasive vegetation	<1%	<1%	<1%	<1%

Regulatory Considerations			
Regulation	**Applicable**	**Resolved**	**Supporting Documentation**
Waters of the United States - Section 404	Yes	Yes	see Mitigation Plan
Waters of the United States - Section 401	Yes	Yes	see Mitigation Plan
Endangered Species Act	Yes	Yes	see Mitigation Plan
Historic Preservation Act	Yes	Yes	see Mitigation Plan
Coastal Zone Management Act (CZMA)/Coastal Area Management Act (CAMA)	No	N/A	N/A
FEMA Floodplain Compliance	No	N/A	N/A
Essential Fisheries Habitat	No	N/A	N/A

Appendix B

Visual Assessment Data

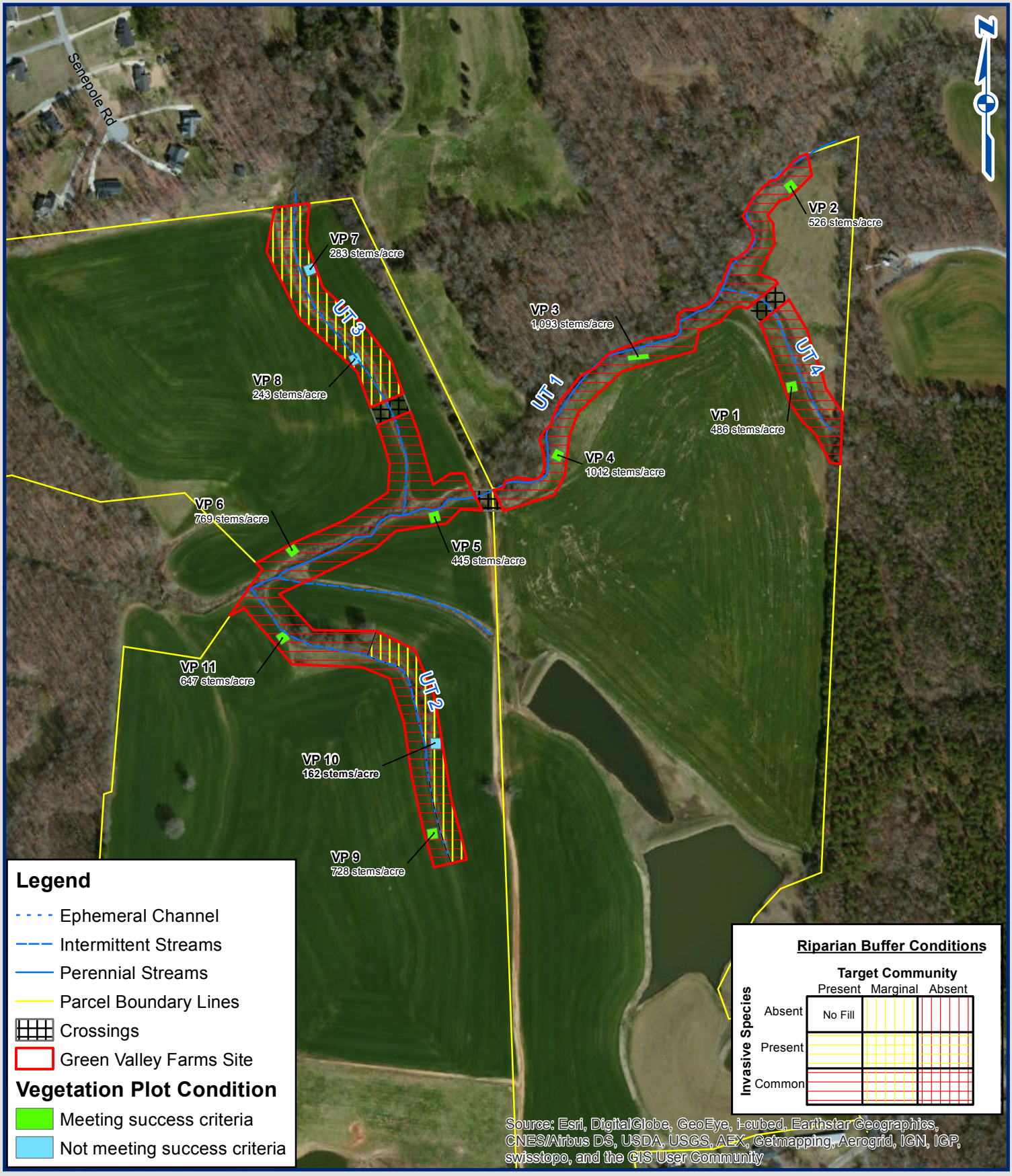

Figure 2. Current Condition Plan View

Green Valley Farms Riparian Buffer Restoration Site

Randolph County, North Carolina

EEP Project ID# 003994

0 200 400 800 Feet

1 inch = 400 feet

Date: November 2014

Table 5. Vegetation Condition Assessment Green Valley, Randolph County EEP Project ID Number 003994-EEP Site 95012						
Planted Acreage:	**11.45**					
Vegetation Category	**Definitions**	**Mapping Threshold**	**CCPV Depiction**	**Number of Polygons**	**Combined Acreage**	**% of Planted Acreage**
1. Bare Areas	Very limited cover of both woody and herbacious material.	0.1 acres	N/A	0	0.00	0%
2. Low Stem Density Areas	Woody stem densities clearly below target levels based on MY3, 4, or 5 stem count criteria.*	0.1 acres	vertical yellow line & horizontal red line hatch	2	2.93	26%
			Total:	**2**	**2.93**	**26%**
3. Areas of Poor Growth Rates or Vigor	Areas with woody stems of a size that are obviously small given the monitoring year.	0.25 acres	N/A	0	0.00	0%
			***Cumulative Total:**	**2**	**2.93**	**26%**
Easement Acreage:	**11.45**					
Vegetation Category	**Definitions**	**Mapping Threshold**	**CCPV Depiction**	**Number of Polygons**	**Combined Acreage**	**% of Planted Acreage**
4. Invasive Areas of Concern	Areas or points (if too small to render as polygons at map scale)	1000 SF	horizontal red line fill	4	11.45	100%
5. Easement Encroachment Areas	Areas or points (if too small to render as polygons at map scale)	none	N/A	0	0.00	0%

*3 vegetation plots are below success criteria, but project is currently in year 2 monitoring

Vegetation Plot Photos

Vegetation Plot 1

Vegetation Plot 2

Vegetation Plot 3

Vegetation Plot 4

Vegetation Plot 5

Vegetation Plot 6

Vegetation Plot 7

Vegetation Plot 8

Vegetation Plot 9

Vegetation Plot 10

Vegetation Plot 11

Appendix C

Vegetation Plot Data

Table 6. Riparian Buffer Vegetation Totals Green Valley, Randolph County EEP Project ID Number 003994-EEP Site 95012		
Plot #	Riparian Buffer Stems[1]	Success Criteria Met?
01	486	Yes
2	526	Yes
3	1093	Yes
4	971	Yes
5	445	Yes
6	769	Yes
7	243	No
8	243	No
9	728	Yes
10	162	No
11	647	Yes
Project Avg	**574**	**Yes**

Stem Class	**characteristics**
[1]Buffer Stems	Native planted hardwood trees. Does NOT include shrubs. No pines. No vines.

Table 7. CVS Stem Count Total and Planted with/without Livestakes by Plot and Species
Green Valley, Randolph County
EEP Project ID Number 003994-EEP Site 95012

			Current Plot Data (MY2 2014)																				
		Species	95012-01-0001			95012-01-0002			95012-01-0003			95012-01-0004			95012-01-0005			95012-01-0006			95012-01-0007		
Scientific Name	Common Name	Type	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
Betula nigra	river birch	Tree							3	3	3												
Fraxinus pennsylvanica	green ash	Tree	2	2	2	7	7	7	4	4	4	11	11	12	1	1	1	6	6	6	1	1	1
Platanus occidentalis	American sycamore	Tree	8	8	8	6	6	6	20	20	20	5	5	5	8	8	8	5	5	5	3	3	4
Quercus	oak	Tree	1	1	1							1	1	1				7	7	7	2	2	2
Quercus falcata	southern red oak	Tree	1	1	1							4	4	4	2	2	2	1	1	1			
Quercus michauxii	swamp chestnut oak	Tree										3	3	3									
Stem count			12	12	12	13	13	13	27	27	27	24	24	25	11	11	11	19	19	19	6	6	7
size (ares)			1			1			1			1			1			1			1		
size (ACRES)			0.02			0.02			0.02			0.02			0.02			0.02			0.02		
Species count			4	4	4	2	2	2	3	3	3	5	5	5	3	3	3	4	4	4	3	3	3
Stems per ACRE			485.62	485.62	485.62	526.09	526.09	526.09	1092.7	1092.7	1092.7	971.25	971.25	1011.7	445.15	445.15	445.15	768.9	768.9	768.9	242.81	242.81	283.28

			Current Plot Data (MY2 2014)												Annual Means								
		Species	95012-01-0008			95012-01-0009			95012-01-0010			95012-01-0011			MY2 (2014)			MY1 (2013)			MY0 (2012)		
Scientific Name	Common Name	Type	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
Betula nigra	river birch	Tree										2	2	2	5	5	5	5	5	5	37	37	37
Fraxinus pennsylvanica	green ash	Tree	3	3	3	11	11	11				9	9	9	55	55	56	58	58	58	61	61	61
Platanus occidentalis	American sycamore	Tree	3	3	3	3	3	3	2	2	2	5	5	5	68	68	69	72	72	72	99	99	99
Quercus	oak	Tree				4	4	4	2	2	2				17	17	17	30	30	30	55	55	55
Quercus falcata	southern red oak	Tree													8	8	8	5	5	5			
Quercus michauxii	swamp chestnut oak	Tree													3	3	3						
Stem count			6	6	6	18	18	18	4	4	4	16	16	16	156	156	158	170	170	170	252	252	252
size (ares)			1			1			1			1			11			11			11		
size (ACRES)			0.02			0.02			0.02			0.02			0.27			0.27			0.27		
Species count			2	2	2	3	3	3	2	2	2	3	3	3	6	6	6	5	5	5	4	4	4
Stems per ACRE			242.81	242.81	242.81	728.43	728.43	728.43	161.87	161.87	161.87	647.5	647.5	647.5	573.92	573.92	581.28	625.42	625.42	625.42	927.1	927.1	927.1

Color Key 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%