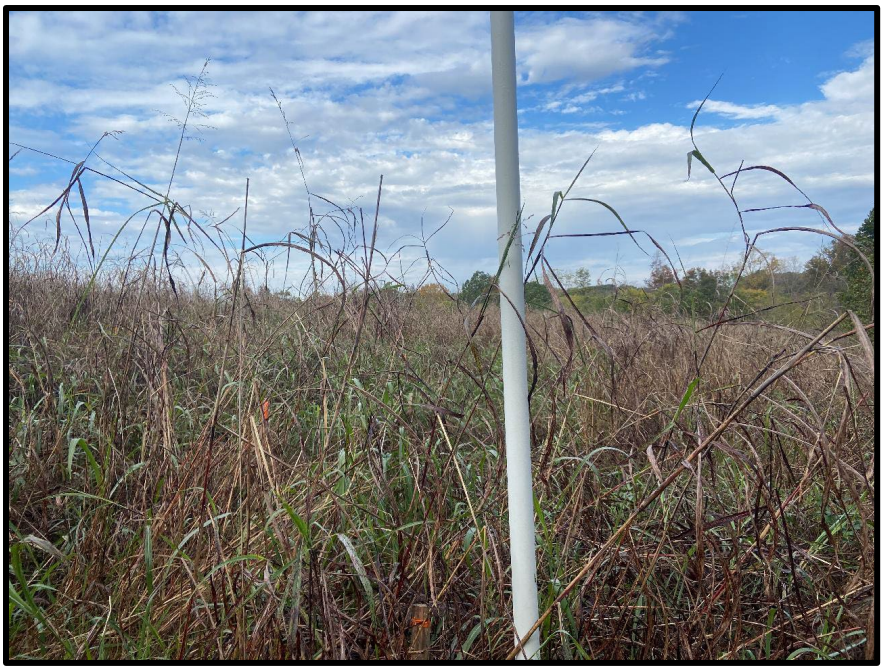
Year 2 Monitoring Report
FINAL
Green Valley Farm II Mitigation Project

DMS Project #: 100111 | Contract #: 7862 | DWR # 20140073v2 | RFP: 16-007703

Randolph County, North Carolina
Cape Fear River Basin
Randleman Lake Watershed
HUC 03030003



Prepared By:

Resource Environmental Solutions, LLC
For Environmental Banc and Exchange, LLC

Prepared For:
NC Department of Environmental Quality
Division of Mitigation Services

January 2022

3600 Glenwood Avenue, Suite 100
Raleigh, NC 27612

Corporate Headquarters
6575 West Loop South, Suite 300
Bellaire, TX 77401
Main: 713.520.5400

January 18, 2022

Jeremiah Dow
NC DEQ Division of Mitigation Services
217 West Jones Street
Raleigh, NC 27604

RE: RES Green Valley Farm II: Year 2 Monitoring Report (NCDMS ID 100111)

Listed below are comments provided by DMS on January 12, 2022 regarding the RES Green Valley Farm II: Draft Year 2 Monitoring Report and RES' responses.

1. Section 1.6 and Figure 2 reference a 320 stem/acre success criteria. My understanding is that 260 stems/acre at the end of MY5 is the only requirement for buffer-only projects. 320 stems/acre is an interim success criteria from the 2016 IRT stream and wetland mitigation guidance.
   Section 1.6 and Figure 2 have been fixed to say 260 stems/acre instead of 320 stems/acre.
2. Table 7 – based on comment #1 above, veg plot 4 would have met the success criteria.
   Table 7 is fixed to show VP4 has met criteria.

3. The CVS mdb Table 7 export and simple export produce a table with different values relative to Table 7 in the report. Please review and ensure the submitted mdb contains data that support the table included in the report.
   The submitted mdb and table 7 have been reviewed and now match.

4. Please submit monitoring photos as JPEGS.
   Done

Table of Contents

1 Project Summary

1.1 Project Location and Description

The Green Valley Farm II Project is within the Randleman Lake Watershed of the Cape Fear River Basin within the 8-digit Hydrologic Unit Code (HUC) 03030003, 14-digit HUC 03030003010070 and DWR Sub-basin Number 03-06-08.

The Project is located in Randolph County approximately 2.3 miles northwest of Level Cross, North Carolina (**Figure 1**). To access the Project head North on Randleman Road from city center for one mile and turn left on Hockett Dairy Road. Go about 1.3 miles before taking a farm access road to reach the project, on the right side. The coordinates are 35.9086 °N and -79.833 °W.

Environmental Banc & Exchange, LLC (EBX), a wholly-owned subsidiary of Resource Environmental Solutions (RES), is pleased to provide this Monitoring Report for the Green Valley Farm II Riparian Buffer Mitigation Project (Project) as a full-delivery buffer mitigation project for the Division of Mitigation Services (DMS) (DMS #100111). This Project provides riparian buffer mitigation credits for unavoidable impacts due to development within the Randleman Lake Watershed (**Figure 1**). This Monitoring Report is in accordance with the Consolidated Buffer Mitigation Rule 15A NCAC 02B .0295 and the Randleman Lake Water Supply Watershed Buffer Rule 15A NCAC 02B .0250.

The conservation easement of the Green Valley Farm II Project totals approximately 7.19 acres and includes two unnamed tributaries that drain directly into Randleman Lake approximately 1,000 feet downstream of the Project. Land use within the Project parcel was primarily actively farmed row crops and newly planted riparian forest. The goal of the Project was to restore ecological function to the existing stream and riparian area by establishing appropriate plant communities while minimizing temporal and land disturbing impacts. Riparian area improvements help filter runoff from agricultural fields, thereby reducing nutrient and sediment loads to Project channels and the overall watershed. Restoration, of the Randleman Lake riparian area (as defined in 15A NCAC 02B .0250), results in a reduction of the water quality stressors affecting the Project. This Project is consistent with the management strategy for maintaining and protecting riparian areas in the Randleman Lake watershed.

The easement is comprised of four sections, separated by two crossings and UT4. This Project surrounds an existing DMS project, Green Valley Farm Buffer Restoration Site (DMS # 95012, 2014-0073v1) that was closed out (**Figure 2**). The Green Valley II Project is composed of two stream channels: UT1 and UT4. Both of these reaches are outside of the actual easement boundaries but included in the previous Green Valley Farm Project. UT4 is a tributary to UT1, which then flows into Randleman Lake. UT1 is approximately 1,677 linear feet and is on the western side of the project. UT4 is approximately 590 linear feet and runs between the four easement segments. Stream identifications were verified by the DWR site visit on September 1, 2011, as well as a re-evaluation for UT4 on February 23, 2017.

1.2 Monitoring Protocol and Project Success Criteria

Vegetation monitoring and visual assessments are to be conducted annually. Riparian area vegetation monitoring is based on the "Carolina Vegetation Survey-Ecosystem Enhancement Program Protocol for Recording Vegetation: Level 2 Plot Sampling Only Version 4.2". Monitoring plots were installed a minimum of 100 meters squared in size and covered at least two percent of the planted mitigation area. These plots were randomly placed throughout the planted riparian restoration area and was representative of the riparian area restoration. The following data was recorded for all trees in the plots: species, height,

planting date (or volunteer), and grid location. All stems in plots were flagged with flagging tape. There are six fixed vegetation monitoring plots (**Figure 2**).

Photos are to be taken at all vegetation plot origins each monitoring year and be provided in the annual reports. Visual inspections and photos are to be taken to ensure that restoration areas are being maintained and compliant. The measures of vegetative success for the Project are the survival of at least four native hardwood tree species, where no one species is greater than 50 percent of stems, at a density of at least 260 stems per acre at the end of Year 5. Native volunteer species may be included to meet the performance standards as determined by NC Division of Water Resources (DWR).

A visual assessment of the conservation easement was performed each year to confirm:

- No encroachment has occurred;
- No invasive species in areas were invasive species were treated,
- Diffuse flow is being maintained in the conservation easement areas; and there has not been any cutting, clearing, filling, grading, or similar activities that would negatively affect the functioning of the riparian area.

Component/ Feature	Monitoring	Maintenance through project close-out
Vegetation	Annual vegetation monitoring	Vegetation shall be maintained to ensure the health and vigor of the targeted plant community. Routine vegetation maintenance and repair activities may include supplemental planting, pruning, mulching, and fertilizing. Exotic invasive plant species shall be treated by mechanical and/or chemical methods. Any vegetation requiring herbicide application will be performed in accordance with NC Department of Agriculture (NCDA) rules and regulations. Vegetation maintenance activities will be documented and reported in annual monitoring reports. Vegetation maintenance will continue through the monitoring period.
Invasive and Nuisance Vegetation	Visual Assessment	Invasive and noxious species will be monitored and treated so that none become dominant or alter the desired community structure of the Project. Locations of invasive and nuisance vegetation will be mapped.
Project Boundary	Visual Assessment	Project boundaries shall be identified in the field to ensure clear distinction between the mitigation project and adjacent properties. Boundaries will be marked with signs identifying the property as a mitigation project and will include the name of the long-term steward and a contact number. Boundaries may be identified by fence, marker, bollard, post, tree-blazing, or other means as allowed by Project conditions and/or conservation easement. Boundary markers disturbed, damaged, or destroyed will be repaired and/or replaced on an as-needed basis. Easement monitoring and staking/ signage maintenance will continue in perpetuity as a stewardship activity.
Road Crossing	Visual Assessment	Road crossings within the Project may be maintained only as allowed by conservation easement or existing easement, deed restrictions, rights of way, or corridor agreements. Crossings in easement breaks are the responsibility of the landowner to maintain.

1.3 Project Components

This Project generates 175,509.615 riparian restoration credits on existing cropland. These riparian mitigation credits generated service Randleman Lake buffer impacts within the Randleman Lake watershed. The total mitigation credits that the Green Valley Farm II Mitigation Project generates are summarized below and in **Table 1.**

Location	Jurisdictional Streams	Restoration Type	Reach ID/Component	Buffer Width (ft)	Creditable Area (sf)*	Initial Credit Ratio (x:1)	% Full Credit	Final Credit Ratio (x:1)	Riparian Buffer Credits (BMU)
Rural	Subject	Restoration	UT1/4	50-100	110,917	1	100%	1.00000	110,917.000
Rural	Subject	Restoration	UT1/4	101-200	195,735	1	33%	3.03030	64,592.615
			TOTALS		**306,652**				**175,509.615**

1.4 Riparian Mitigation Approach

Restoration efforts along UT1 and UT4 were accomplished through the planting, establishment, and protection of a hardwood forest community. The result was a riparian habitat that functions to mitigate nutrient and sediments inputs from the surrounding uplands. Traditional riparian restoration, as outlined in 15A NCAC 02B .0295 (n), was utilized. All riparian restoration activities took place within the 50-200' riparian area along to UT1 and UT4 and was subject to crediting and ratios as outlined in the Consolidated Buffer Mitigation Rule. Mitigation ratios followed those provided in the Consolidated Buffer Mitigation Rule. Prior to the issuance of the RFP (#16-007703), RES received approval for restoration on February 27, 2012, and an update on March 24, 2017. RES received an email from DWR on May 13, 2019, that indicated that an updated site visit was not necessary.

1.5 Construction and As-Built Conditions

Revegetation of the Site included treating invasive species and planting native hardwood bareroot trees. Prior to planting, RES prepped the Site by spraying and ripping the easement. Piedmont Alluvial Forest is the target community type for the riparian restoration areas. The community is defined by Schafale (2012). The planting of bareroot trees occurred in May 2020. Deviations from the initial planting plan were due to bareroot availability. A list of the planted tree species can be found in **Table 5**. Additionally, a temporary and permanent seed mixture was applied in areas where row crops were present. Among a variety of seeds, the mixture also included black-eyed Susan (*Rudbeckia hirta*) which is a perennial, pollinator species.

1.6 Year 2 Monitoring Performance

Monitoring of the six permanent vegetation plots was completed on November 2, 2021. Vegetation tables are in **Appendix B** and associated photos are in **Appendix C**. Year 2 monitoring data indicates that five out of six plots are exceeding the success criteria of 260 planted stems per acre. Planted stem densities ranged from 0 to 728 planted stems per acre with a mean of 492 planted stems per acre across all plots. A total of 18 species were documented within the plots. Volunteer species were noted at Year 2 monitoring and are expected to increase in upcoming years. The average tree height observed was 2.2 feet. The southern areas of the easement, about 5.33 acres, will be supplemental planted with larger container trees as needed to exceed the success criteria. RES believes the low stem densities are attributed to the aggressive herbaceous growth outcompeting bareroot stems.

Visual assessment of vegetation outside of the monitoring plots indicates that the areas surrounding VP3 and VP4 as well as VP5 and VP6 are covered in Johnson grass, an invasive species. RES will treat the grass before planting. Additionally, there were no signs of encroachment or concentrated flow in the easement area.

2 Reference

Lee Michael T., Peet Robert K., Roberts Steven D., and Wentworth Thomas R., 2008. *CVS-EEP Protocol for Recording Vegetation Level*. Version 4.2

NC Environmental Management Commission. 2014. Rule 15A NCAC 02B.0295 - Mitigation Program Requirements for the Protection and Maintenance of Riparian Buffers.

NC Environmental Management Commission. 2010. Rule 15A NCAC 02B .0250 - Randleman Lake Water Supply Watershed: Protection and Maintenance of Existing Riparian Buffers.

Resource Environmental Solutions, LLC (2020). Green Valley Farm II Mitigation Project – Final Mitigation Plan.

Schafale, M.P. 2012. Classification of the Natural Communities of North Carolina, Fourth Approximation. North Carolina Natural Heritage Program, Division of Parks and Recreation, NCDENR, Raleigh, NC.

Appendix A

Project Background Tables and Site Maps

Table 1. Buffer Project Areas and Assets

Credit Type	Location	Subject?	Feature Type	Mitigation Activity	Min-Max Buffer Width (ft)	Feature Name	Total Area (sf)	Creditable Area (sf)	Initial Credit Ratio (x:1)	% Full Credit	Final Credit Ratio (x:1)	Riparian Buffer Credits
Buffer	Rural	Yes	I / P	Restoration	50-100	UT1/4	110,917	110,917	1	100%	1	110,917.000
Buffer	Rural	Yes	I / P	Restoration	101-200	UT1/4	195,735	195,735	1	33%	3.0303	64,592.615
						Totals	**306,652**	**306,652**				**175,509.615**

Table 2. Project Activity and Reporting History
Green Valley Farm II Site

Elapsed Time Since planting complete: 1 year 7 months
Number of reporting Years[1]: 2

Activity or Deliverable	Data Collection Complete	Completion or Delivery
Restoration Plan	NA	Jan-20
Final Design – Construction Plans	NA	NA
Stream Construction	NA	NA
Site Planting	NA	May-20
As-built (Year 0 Monitoring – baseline)	May-20	Jun-20
Year 1 Monitoring	Nov-20	Dec-20
Year 2 Monitoring	Nov-21	Nov-21
Year 3 Monitoring		
Year 4 Monitoring		
Year 5 Monitoring		

1 = The number of reports or data points produced excluding the baseline

Table 3. Project Contacts Table Green Valley Farm II Site	
Planting Contractor	H&J Forestry
Planting contractor POC	Matt Hitch
Nursery Stock Suppliers	Arborgen
Monitoring Performers	RES / 3300 Glenwood Ave, Suite 100, Raleigh, NC 27612
Monitoring POC	Ryan Medric (919) 741-6268

Table 4. Project Background Information			
Project Name	Green Valley Farm II		
County	Randolph		
Project Area (acres)	7.19		
Project Coordinates (latitude and longitude)	Latitude: 35.9086 N Longitude: -79.833 W		
Planted Acreage (Acres of Woody Stems Planted)	7.19		
Project Watershed Summary Information			
Physiographic Province	Southern Outer Piedmont		
River Basin	Randleman Lake		
USGS Hydrologic Unit 8-digit	03030003	USGS Hydrologic Unit 14-digit	03030003010070
DWR Sub-basin	03-06-08		

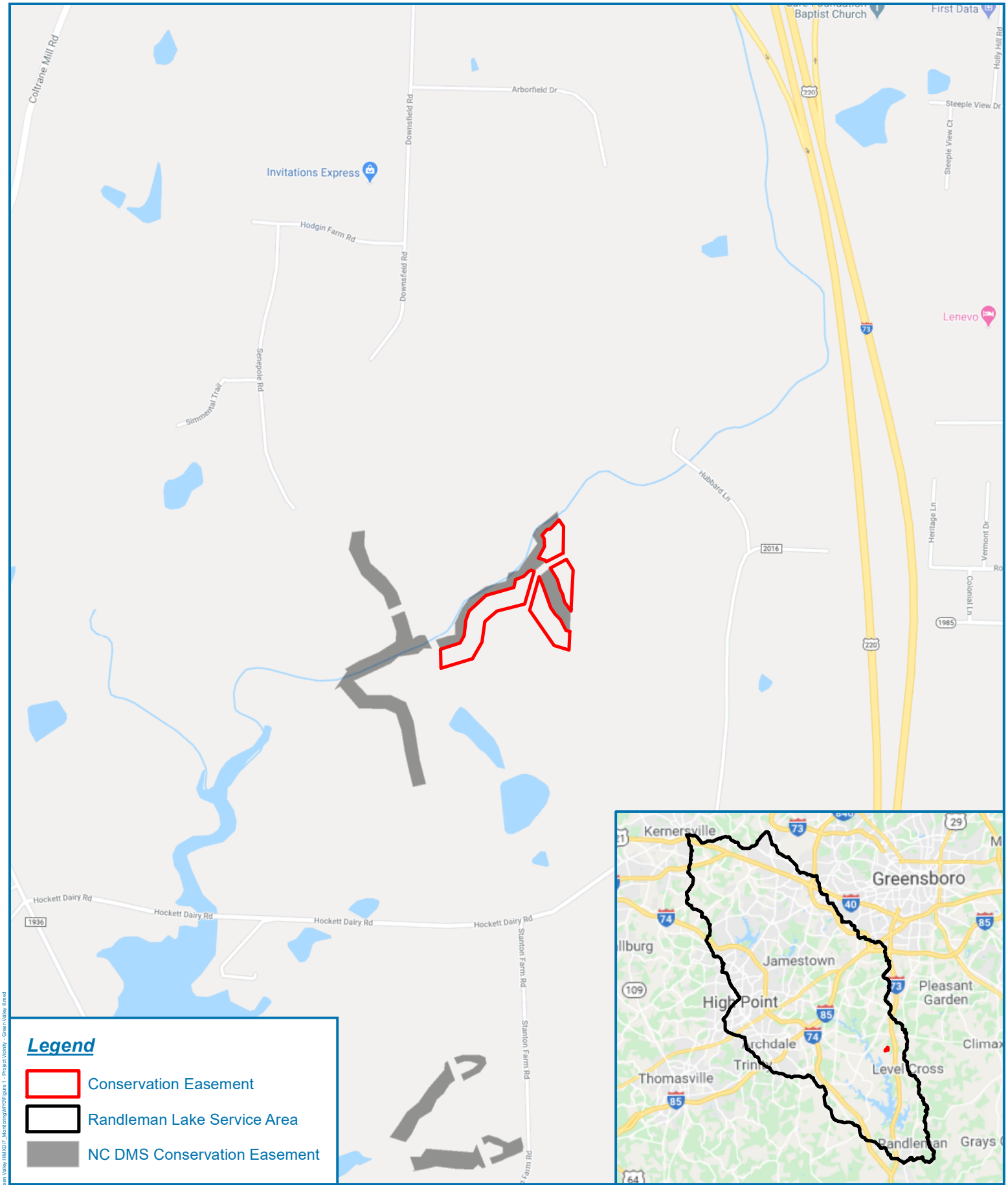


Figure 1 - Site Location Map

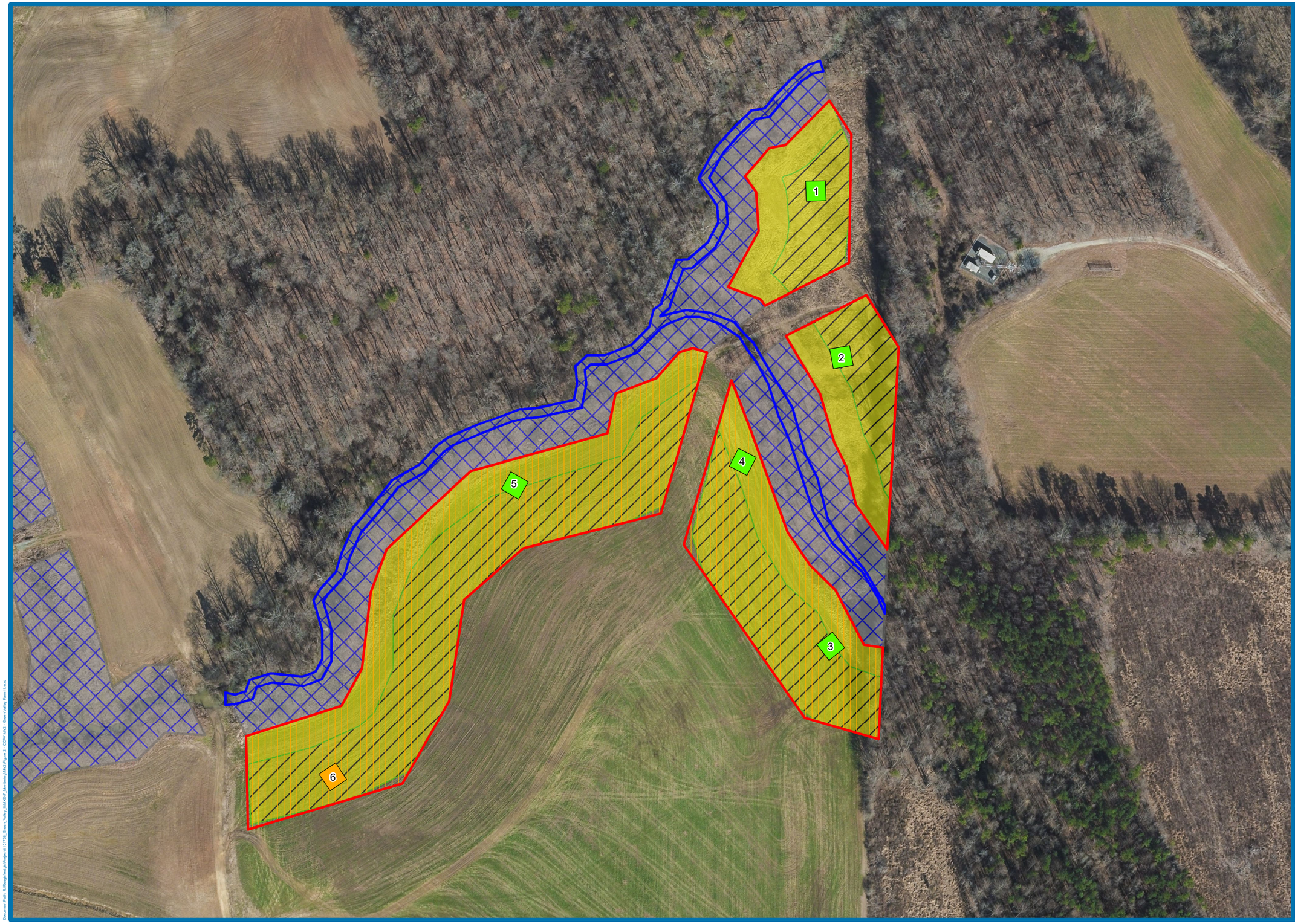
Green Valley Farm II Mitigation Project

Randolph County, North Carolina

Date:	5/19/2020
Drawn by:	GDS
Checked by:	RTM
	1 inch = 1,000 feet

res

Document Path: R:\Regional\Projects\NC\Green Valley II\MXD\7_Monitoring\MYO\Figure 1 - Project Vicinity - Green Valley II.mxd



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N
W
E
S

0 75 150
Feet

Figure 2 - Monitoring CCPV

Green Valley Farm II Mitigation Project

MY2 2021

Randolph County, North Carolina

Date: 1/17/2022	Drawn by: GDS
Checked by: RTM	1 in = 150 feet

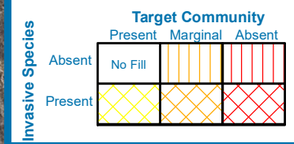
Legend

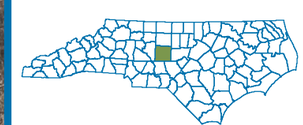
- Conservation Easement
- Green Valley Farm Easement from 0-50' (Closed-Out)
- Stream Top of Bank
- >320 stems/acre
- <320 stems/acre

Buffer Zones (Restoration)

- 50-100
- 101-200

Vegetation Condition Assessment





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Appendix B

Vegetation Assessment Data

Table 5. Green Valley Farm II Planted Species Summary

Common Name	Scientific Name	Total Stems Planted
Willow Oak	*Quercus phellos*	1,900
River Birch	*Betula nigra*	1,200
White Oak	*Quercus alba*	1,100
Water Oak	*Quercus nigra*	1,000
American Sycamore	*Platanus occidentalis*	800
Tulip Poplar	*Liriodendron tulipfera*	800
Southern Crabapple	*Malus angustifolia*	800
Northern Red Oak	*Quercus rubra*	600
Common Persimmon	*Diospyros virginiana*	500
American Plum	*Prunus americana*	500
Eastern Redbud	*Cercis canadensis*	500
Common Elderberry	*Sambucus canadensis*	200
Black Walnut	*Juglans nigra*	100
	Total	10,000

Table 6. Green Valley Farm II Vegetation Plot Mitigation Success Summary

Plot #	Planted Stems/Acre	Volunteer Stems/Acre	Total Stems/Acre	Success Criteria Met?	Average Planted Stem Height (ft)
1	890	2388	3278	Yes	2.3
2	647	1295	1942	Yes	2.5
3	283	0	283	Yes	2.1
4	728	0	728	Yes	1.7
5	405	0	405	Yes	1.6
6	0	0	0	No	0.0
Project Avg	**492**	**614**	**1106**	**Yes**	**2.2**

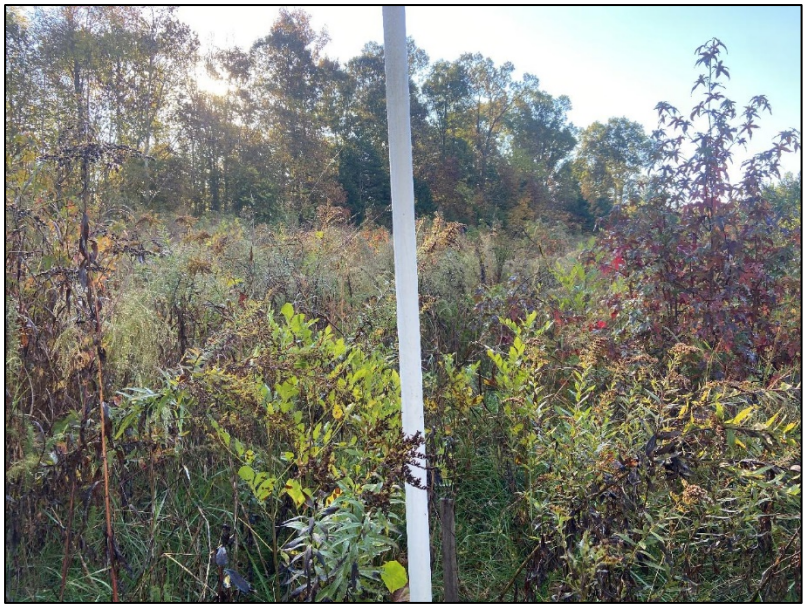
Table 7. Green Valley Farm II Stem Count Total and Planted by Plot Species

Green Valley Farm II			Current Plot Data (MY2 2021)																		Annual Means								
			100111-01-0001			100111-01-0002			100111-01-0003			100111-01-0004			100111-01-0005			100111-01-0006			MY2 (2021)			MY1 (2020)			MY0 (2020)		
Scientific Name	Common Name	Species 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	PnoLS	P-all	T	PnoLS	P-all	T
Acer rubrum	red maple	Tree			17																		17						
Betula nigra	river birch	Tree	8	8	9	3	3	3				1	1	1							12	12	13	15	15	15	18	18	18
Cercis canadensis	eastern redbud	Tree				5	5	5													5	5	5	6	6	6	1	1	1
Diospyros virginiana	common persimmon	Tree							1	1	1										1	1	1	1	1	1	14	14	14
Fraxinus pennsylvanica	green ash	Tree			15																		15			25			
Juglans nigra	black walnut	Tree																									3	3	3
Liquidambar styraciflua	sweetgum	Tree			22			31															53			22			
Liriodendron tulipifera	tuliptree	Tree	2	2	3			1													2	2	4	2	2	8	3	3	3
Malus angustifolia	southern crabapple	Tree																						1	1	1	4	4	4
Morus rubra	red mulberry	Tree										4	4	4							4	4	4	5	5	5			
Platanus occidentalis	American sycamore	Tree			3	3	3	3	1	1	1				1	1	1				5	5	8	6	6	12	14	14	14
Prunus americana	American plum	Tree																									5	5	5
Quercus	oak	Tree										1	1	1							1	1	1						
Quercus alba	white oak	Tree	7	7	7	1	1	1	3	3	3	1	1	1							12	12	12	13	13	13	16	16	16
Quercus nigra	water oak	Tree	1	1	1																1	1	1	2	2	2	14	14	14
Quercus phellos	willow oak	Tree	4	4	4	4	4	4				2	2	2	1	1	1				11	11	11	12	12	12	43	43	43
Quercus rubra	northern red oak	Tree							2	2	2	9	9	9	8	8	8				19	19	19	26	26	26	19	19	19
Sambucus canadensis	Common Elderberry	Shrub																									1	1	1
Stem count			22	22	81	16	16	48	7	7	7	18	18	18	10	10	10	0	0	0	73	73	164	89	89	148	155	155	155
size (ares)			1			1			1			1			1			1			6			6			6		
size (ACRES)			0.02			0.02			0.02			0.02			0.02			0.02			0.15			0.15			0.15		
Species count			5	5	9	5	5	7	4	4	4	6	6	6	3	3	3	0	0	0	11	11	14	11	11	13	13	13	13
Stems per ACRE			890	890	3278	647	647	1942	283	283	283	728	728	728	405	405	405	0	0	0	492	492	1106	600	600	998	1045	1045	1045

Appendix C

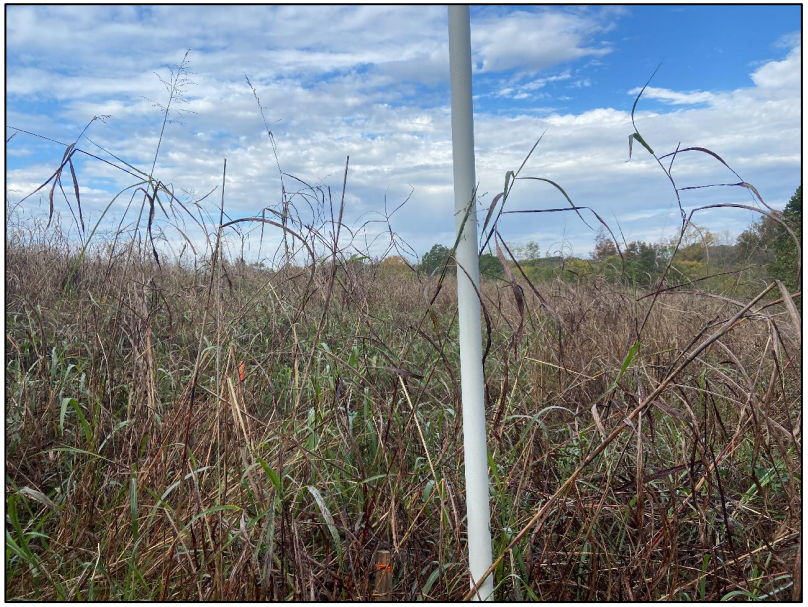
Vegetation Monitoring Plot Photos

Green Valley Farm II Vegetation Monitoring Plot Photos



Vegetation Plot 1
11/02/2021

Vegetation Plot 2
11/02/2021



Vegetation Plot 3
11/02/2021

Vegetation Plot 4
11/02/2021

Vegetation Plot 5
11/02/2021

Vegetation Plot 6
11/02/2021