Monitoring Report- Year 4
FINAL VERSION
Pen Dell Mitigation Project (Riparian Buffer Mitigation)
Calendar Year of Data Collection: 2021

NCDEQ DMS Project Identification # 97079
NCDEQ DMS Contract # 6824
Neuse River Basin (Cataloging Unit 03020201)
USACE Action ID Number: SAW-2016-00885
NCDEQ DWR Project # 2016-0403 V2
Johnston County, NC
Contracted Under RFP # 16-006477
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1 Project Summary

Water and Land Solutions, LLC (WLS) completed the construction and planting of the Pen Dell Mitigation Project (Project) full-delivery project for the North Carolina Department of Environmental Quality (NCDEQ), Division of Mitigation Services (DMS) in April 2018. The Project is located in Johnston County, NC between the Community of Archer Lodge and the Town of Wendell at 35.73125°, -78.35281°. The Project site is located in the NCDEQ Sub-basin 03-04-06, in the Lower Buffalo Creek Priority Sub-watershed 030202011504.

The Project involved the restoration, enhancement, preservation, and permanent protection of five stream reaches (R1, R2, R3, R4, and R5) and their riparian buffers, totaling 5,064 linear feet of streams and 633,803 square feet of riparian buffers. WLS staff visited the site several times throughout Monitoring Year 4 (MY4) for monitoring activities. MY4 data collection occurred in September 2021 (Table 2). This report presents the data for the MY4. The Project meets the MY4 success criteria for vegetation. Based on these results, the Project is expected to meet the Monitoring Year 5 (MY5) success criteria in 2022.

2 Project Background

2.1 Project Location, Setting, and Existing Conditions

The Project site is located in the Upper Buffalo Creek Sub-watershed 030202011502 study area of the Neuse 01 Regional Watershed Plan, in the Wake-Johnston Collaborative Local Watershed Plan, and the Targeted Local Watershed 03020201180050.

The catchment area is 156 acres and has an impervious cover of approximately one percent. The dominant surrounding land uses are agriculture and mixed forest. Prior to construction, livestock had access to Reaches R3 and R4, and the riparian buffers were less than 50 feet wide on all reaches except R5.

2.2 Mitigation Project Goals and Objectives

The following riparian buffer mitigation site -specific goals were developed:

- Restore and protect riparian buffer functions and habitat connectivity in perpetuity by recording a permanent conservation easement,
- Implement agricultural BMPs to reduce nonpoint source inputs to receiving waters.

To accomplish these site-specific goals, the following objectives will be measured and included with the performance standards to document overall project success:

- Increase native species riparian buffer vegetation density/composition along streambank and floodplain areas that meet requirements of a minimum 50-foot-wide and 260 stems/acre after monitoring year 5,
- Prevent cattle from accessing the conservation easement boundary by installing permanent fencing and reducing fecal coliform bacteria from the pre-restoration levels.

2.3 Project History, Contacts, and Timeframe

The Project will provide riparian buffer mitigation credits in accordance with North Carolina Administrative Code (NCAC), "Consolidated Buffer Mitigation Rule", Rule 15A NCAC 02B .0295, effective November 1, 2015. Riparian buffer mitigation site viability was confirmed by DWRs April 28, 2016 letter entitled "Site Viability for Buffer Mitigation & Nutrient Offset – Pen Dell Located Near 2505 Wendell Rd, Wendell, NC, Johnston County". The referenced viability letter specified for Reach R1 that riparian buffer credits being only being allowed outside of 25 feet off the top of stream banks. The described site viability confirmation included a determination by DWR that Project Reaches R2, R3 (Includes Project Reach R4) and R5 were either intermittent or perennial. A request for Stream Origin/Buffer Applicability Determination for Project Reach R1, as required in the referenced viability letter, was submitted to DWR on June 10, 2016. On June 20, 2016 and June 21, 2016 DWR performed the requested determination and Reach R1 was determined to be intermittent, as communicated in the DWR June 22, 2016 letter entitled "Subject: Buffer Determination Letter, NBRO #16-180 Johnston County", therefore confirming Reach R1's eligibility for riparian buffer mitigation. See Appendix D for DWR correspondence and approval letters.

The final mitigation plan and PCN were submitted to DMS September 29, 2017 for submission to DWR and the NCIRT. The Section 404 General (Regional and Nationwide) Permit Verification was issued January 12, 2018. Project construction started on January 29, 2018 and mitigation site earthwork was completed on April 1, 2018, and mitigation site planting was completed on April 6, 2018, both by RiverWorks Construction. Trueline Surveying, PC completed the as-built survey in June 2018. WLS completed the installation of baseline monitoring devices on April 19, 2018 and the installation of survey monumentation and conservation easement boundary marking on June 7, 2018. Monitoring year 1 occurred between April and November 2018. Monitoring year 2 occurred in between November 2018 and October 2019. Monitoring Year 3 occurred between September 2020 and October 2020. Monitoring Year 4 occurred in September 2021.

The project background and attribute summary are presented in Table 1. Refer to Figure 1 and Table 2 for the project areas and buffer asset information. Relevant project contact information is presented in Table 3.

3 Project Mitigation Components

3.1 Riparian Buffer Mitigation Types and Approaches

Riparian buffer mitigation included restoring, enhancing and preserving the riparian buffer functions and corridor habitat. The project included planting to re-establish a native species vegetation riparian buffer corridor, which extended a minimum of 50 feet from the top of the streambanks along each of the project reaches, as well as permanently protecting those buffers with a conservation easement. Many areas of the conservation easement had riparian buffer widths greater than 50 feet established along one or both streambanks to provide additional functional uplift. The only exception is at the upstream end of Reach R2, where the width of the proposed left riparian buffer varies between 20 feet and 29 feet from the right top of bank. This narrow area of proposed riparian buffer is due to the site constraint caused by an existing residential driveway. For project reaches proposed for restoration and enhancement, the riparian buffers were restored through reforestation of the entire conservation easement with native species riparian buffer vegetation. For project reach sections proposed for preservation, the existing riparian buffers are permanently protected via the conservation easement. A significant area of the existing northern riparian

buffer for Reach R2 was incorrectly described as "Native hardwood forest, closed canopy" in the referenced site viability letter, as this area of the buffer was a fescue lawn. WLS proposed this area for

riparian buffer restoration in the approved mitigation plan (Figure 11 Riparian Buffer Mitigation). Additionally, permanent fencing was installed along with alternative watering systems to exclude livestock from the restored riparian buffer and conservation easement areas. Table 1 and Figure 1 (Appendix A) provide a summary of the project components.

3.1.1 Tree and Shrub Planting Approaches

The riparian buffer planting zones for the project included the streambanks, floodplain, riparian wetland, and upland transitional areas. The as-built planting boundaries are shown on the as-built vegetation plans in Appendix E and Figure 1. Proposed plantings were conducted using native species bare-root trees and shrubs, live stakes, and seedlings. Proposed plantings predominantly consisted of bare-root vegetation and were generally planted at a total target density of 680 stems per acre. WLS implemented a riparian buffer planting strategy that includes a combination of overstory, or canopy, and understory species. The site planting strategy also included early successional, as well as climax species. The vegetation selections were mixed throughout the project planting areas so that the early successional species will give way to climax species as they mature over time.

3.1.2 Temporary and Permanent Seeding Approaches

Permanent seed mixtures of native species herbaceous vegetation and temporary herbaceous vegetation seed mixtures were applied to all disturbed areas of the project site. Temporary and permanent seeding were conducted simultaneously at all disturbed areas of the site during construction utilizing mechanical broadcast spreaders. The as-built re-vegetation plan lists the utilized species, mixtures, and application rates for permanent seeding.

3.1.3 Invasive Species Vegetation Treatment

During the project construction, invasive species exotic vegetation was either mechanically removed or chemically treated both to control its presence and reduce its spread within the conservation easement areas. During MY4 vegetation assessment, no areas of concern was observed within the conservation easement boundary. Any areas identified during MY5 will be treated and documented in the subsequent annual report.

4 Performance Standards

The applied success criteria for the Project will follow necessary performance standards and monitoring protocols presented in final approved mitigation plan. Annual monitoring and semi-annual site visits will be conducted to assess the condition of the project throughout the monitoring period. Monitoring activities will be conducted for a period of five years. Specific success criteria components and evaluation methods are described below.

4.1 Vegetation

Measurements of the final vegetative restoration success for the project will be achieving a density of not less than 260, five-year-old planted stems per acre in Year 5 of monitoring. This final performance criteria shall include a minimum of four native hardwood tree species or four native hardwood tree and native shrub species, where no one species is greater than 50 percent of the stems. Native hardwood tree and

native shrub volunteer species will be included to meet the final performance criteria of 260 stems per acre. Volunteer species are only counted if they are at least 12" tall. Volunteer species will only be included if surviving for at least two years and are included were included in the approved planting plan. In addition, diffuse flow of runoff shall be maintained in the riparian buffer areas.

5 Monitoring Year 4 Assessment and Results

Annual monitoring was conducted during MY4 in accordance with the monitoring plan as described in the approved mitigation plan and was intended to document the site improvements based on restoration potential, catchment health, ecological stressors and overall constraints. All the monitoring device locations are depicted on CCPV (Figure 1) and MY4 monitoring data results are listed in the appendices. The Project meets the MY4 success criteria for vegetation.

5.1 Vegetation

Vegetation monitoring for MY4 was conducted utilizing the seven vegetation monitoring plots, with monitoring conducted in accordance with the CVS-EEP Level I & II Monitoring Protocol (CVS, 2008) and DMS Stream and Wetland Monitoring Guidelines (DMS, 2017). See Figure 1 in Appendix B for the vegetation monitoring plot locations. All veg plots meet the vegetative success criteria of at least 260 planted stems per acre at the end of MY5 and the site is on trajectory to remain successful. Vegetation plots ranged from 283 to 809 stems per acre. Summary data and photographs of each plot can be found in Appendix 3.

The MY4 vegetation monitoring was also conducted utilizing visual assessment throughout the easement. A small area of encroachment (VPA1) of approximately 0.05 acres was found along R1 left floodplain during a Spring 2021 site visit. Encroachment was a result of mowing along the field edge and has been marked better to prevent further encroachment. The results of the visual assessment did not indicate any additional significant negative changes to the existing vegetation community.

6 References

Lee, M., Peet R., Roberts, S., Wentworth, T. CVS-NCEEP Protocol for Recording Vegetation, Version 4.1, 2007.

North Carolina Department of Environmental Quality, Division of Mitigation Services, Wildlands Engineering, Inc. 2015. Neuse 01 Regional Watershed Plan Phase II. Raleigh, NC.

North Carolina Department of Environmental Quality, Division of Mitigation Services, 2017. Annual Monitoring Report Format, Data and Content Requirement. Raleigh, NC.

Schafale, M. P., and A. S. Weakley. 1990. Classification of the natural communities of North Carolina, third approximation. North Carolina Natural Heritage Program. NCDENR Division of Parks and Recreation. Raleigh, NC.

United States Army Corps of Engineers. 1987. Corps of Engineers Wetlands Delineation Manual. Technical Report Y-87-1. Environmental Laboratory. US Army Engineer Waterways Experiment Station. Vicksburg, MS.

___. 1997. Corps of Engineers Wetlands Research Program. Technical Note VN-RS-4.1. Environmental Laboratory. U.S. Army Engineer Waterways Experiment Station. Vicksburg, MS.

___. 2003. Stream Mitigation Guidelines, April 2003, U.S. Army Corps of Engineers. Wilmington District.

Water and Land Solutions, LLC (2017). Pen Dell Stream and Riparian Buffer Mitigation Plan. NCDMS, Raleigh, NC.

Appendices

Appendix A – Background Tables

Table 1. Buffer Project Attributes	
Project Name	Pen Dell Mitigation Project
Hydrologic Unit Code	03020201
River Basin	Neuse
Geographic Location (Lat, Long)	35˚43’ 52.51’’ N 78˚21’ 10.12’’ W
Site Protection Instrument (DB, PG)	85, 148
Total Credits (BMU)	0
Types of Credits	Riparian Buffer
Mitigation Plan Date	Nov-18
Initial Planting Date	Mar-18
Baseline Report Date	Nov-18
MY1 Report Date	Dec-18
MY2 Report Date	Dec-19
MY3 Report Date	Nov-20
MY4 Report Date	Oct-21
MY5 Report Date	

Table 2. Buffer Project Areas and Assets

RIPARIAN BUFFER (15A NCAC 02B.0295)

Location	Jurisdictional Streams	Restoration Type	Reach ID/Component	Buffer Width (ft)	Total Area (sf)	Creditable Area (sf)*	Initial Credit Ratio (x:1)	% Full Credit	Final Credit Ratio (x:1)	Riparian Buffer Credits	Convertible to Nutrient Offset (Yes or No)	If Converted to Nutrient Offset: Nutrient Offset: N (lbs)	If Converted to Nutrient Offset: Nutrient Offset: P (lbs)
Rural or Urban	Subject or Nonsubject	Restoration		20-29			1	75%	1.33333	0.000		-	0.000
Rural or Urban	Subject or Nonsubject	Restoration	Restoration	0-100	286,888	286,888	1	100%	1.00000	286,888.000	Yes	14,970.199	--
Rural or Urban	Subject or Nonsubject	Restoration		101-200			1	33%	3.03030	0.000		-	0.000
Rural or Urban	Subject or Nonsubject	Enhancement		20-29			2	75%	2.66667	0.000		-	0.000
Rural or Urban	Subject or Nonsubject	Enhancement	Cattle Exc. Enh	0-100	124,088	124,088	2	100%	2.00000	62,044.000	No	-	0.000
Rural or Urban	Subject or Nonsubject	Enhancement		101-200			2	33%	6.06061	0.000		-	0.000
					SUBTOTALS	**410,976**				**348,932.000**		**14,970.199**	**0.000**

			ELIGIBLE PRESERVATION AREA			**136,992**

Location	Jurisdictional Streams	Restoration Type	Reach ID/Component	Buffer Width (ft)	Total Area (sf)	Creditable Area (sf)*	Initial Credit Ratio (x:1)	% Full Credit	Final Credit Ratio (x:1)	Riparian Buffer Credits
Rural	Subject	Preservation		20-29			10	75%	13.33333	0.000
Rural	Subject	Preservation	Preservation	0-100	222,827	136,992	10	100%	10.00000	13,699.200
Rural	Subject	Preservation		101-200			10	33%	30.30303	0.000
Rural	Nonsubject	Preservation		20-29			5	75%	6.66667	0.000
Rural	Nonsubject	Preservation		0-100			5	100%	5.00000	0.000
Rural	Nonsubject	Preservation		101-200			5	33%	15.15152	0.000
Urban	Subject or Nonsubject	Preservation		20-29			3	75%	4.00000	0.000
Urban	Subject or Nonsubject	Preservation		0-100			3	100%	3.00000	0.000
Urban	Subject or Nonsubject	Preservation		101-200			3	33%	9.09091	0.000
					SUBTOTALS	**136,992**				**13,699.200**
					TOTALS	**547,968**				**362,631.200**

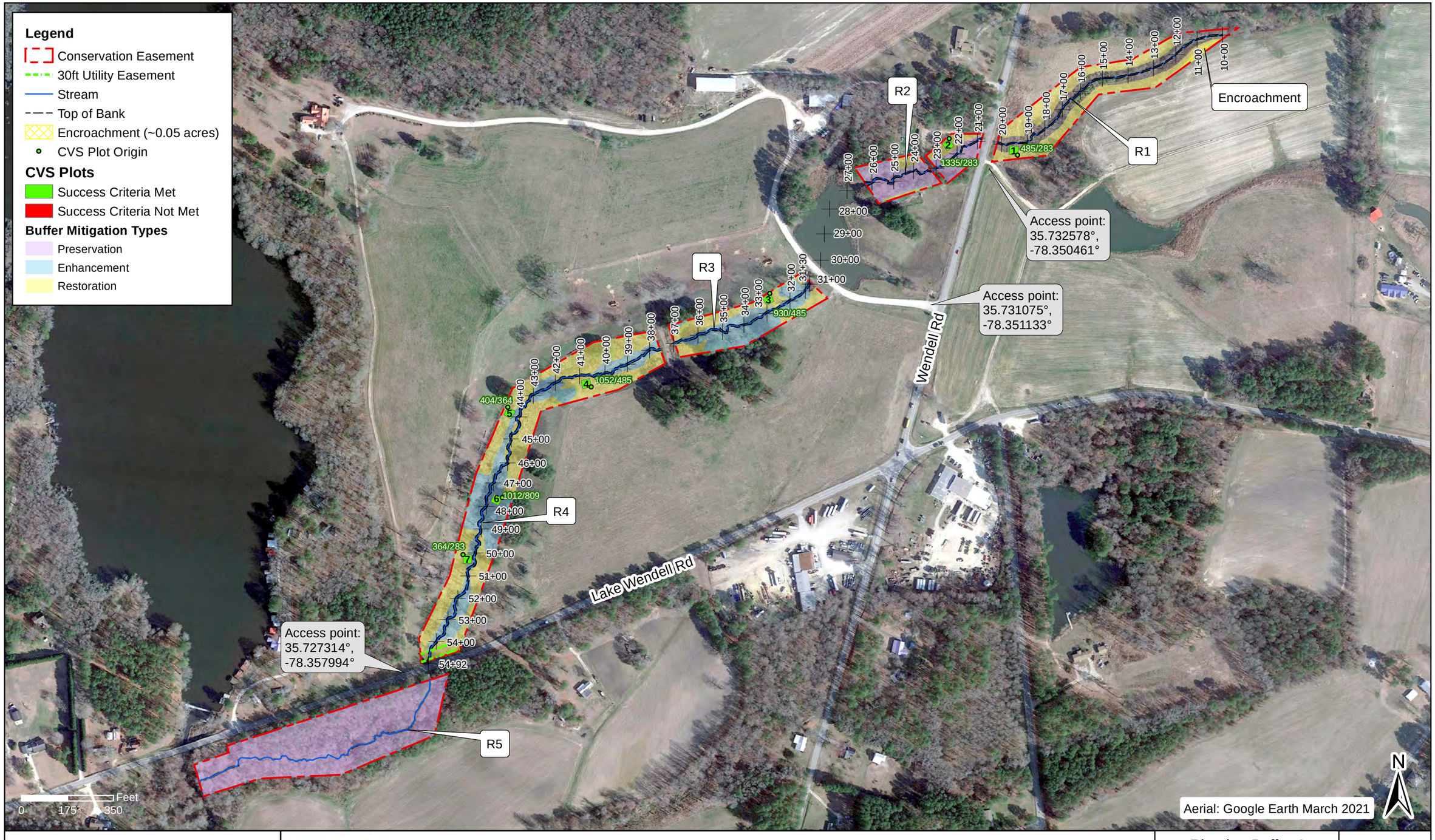
**Area eligible for preservation may be no more than 25% of total area, where total area is back-calculated with the equation R+E/0.75*

**Buffers must be at minimum 20' wide for riparian buffer credit, buffers must be 50' wide for nutrient offset credi*

**When preservation areas exceed the total eligible preservation area, select the areas with the best credit ratios as the creditable areas.*

Table 3. Project Contacts Pen Dell Mitigation Project (NCDEQ DMS Project ID# 97079)	
Mitigation Provider	Water & Land Solutions, LLC
	7721 Six Forks Road, Suite 130, Raleigh, NC 27615
Primary Project POC	Catherine Manner Phone: 571-643-3165
Construction Contractor	RiverWorks Construction
	114 W. Main Street, Suite 106, Clayton, NC 27520
Primary Project POC	Bill Wright Phone: 919-590-5193
Survey Contractor (Existing Condition Surveys)	WithersRavenel
	115 MacKenan Drive, Cary, NC 27511
Primary Project POC	Marshall Wight, PLS Phone: 919-469-3340
Survey Contractor (Conservation Easement, Construction and As-Builts Surveys)	True Line Surveying, PC
	205 West Main Street, Clayton, NC 27520
Primary Project POC	Curk T. Lane, PLS 919-359-0427
Planting Contractor	RiverWorks Construction
	114 W. Main Street, Suite 106, Clayton, NC 27520
Primary Project POC	Bill Wright Phone: 919-590-5193
Seeding Contractor	RiverWorks Construction
	114 W. Main Street, Suite 106, Clayton, NC 27520
Primary Project POC	Bill Wright Phone: 919-590-5193
Seed Mix Sources	Green Resource
	5204 Highgreen Ct., Colfax, NC 27235
	Rodney Montgomery Phone: 336-215-3458
Nursery Stock Suppliers	Foggy Mountain Nursery (Live Stakes) 797 Helton Creek Rd, Lansing, NC 28643 Glenn Sullivan Phone: 336-977-2958
	Dykes & Son Nursery (Bare Root Stock) 825 Maude Etter Rd, Mcminnville, Tn 37110 Jeff Dykes Phone: 931-668-8833
Monitoring Performers	Water & Land Solutions, LLC
	7721 Six Forks Road, Suite 130, Raleigh, NC 27615
Stream Monitoring POC	Emily Dunnigan Phone: 269-908-6306
Vegetation Monitoring POC	Emily Dunnigan Phone: 269-908-6306

Appendix B – Visual Assessment Data



WATER & LAND™ SOLUTIONS

Pen Dell Mitigation Project
Johnston County, North Carolina

NCDMS Contract No. 6824
NCDMS Project No. 97079
September 2021
MY4

Riparian Buffer & Nutrient Offset Buffer Mitigation Plan View

NAD 1983 2011 State Plane North Carolina FIPS 3200 FT US

FIGURE 1

Table 5a. Vegetation Condition Assessment						
Project	Pen Dell Mitigation Project (NCDEQ DMS Project ID# 97079)					
Planted Acreage[1]	10.1					
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 herbaceous material.	1 acre	Pattern and Color	0	0.00	0.0%
2. Low Stem Density Areas	Woody stem densities clearly below target levels based on MY3, 4, or 5 stem count criteria.	0.1 acres	Pattern and Color	0	0.00	0.0%
			Total	0	0.00	0.0%
3. Areas of Poor Growth Rates or Vigor	Areas with woody stems of a size class that are obviously small given the monitoring year.	0.25 acres	Pattern and Color	0	0.00	0.0%
			Cumulative Total	0	0.00	0.0%

Easement Acreage[2]	15.95					
Vegetation Category	**Definitions**	**Mapping Threshold**	**CCPV Depiction**	**Number of Polygons**	**Combined Acreage**	**% of Easement Acreage**
4. Invasive Areas of Concern[4]	Areas or points (if too small to render as polygons at map scale).	1000 SF	Pattern and Color	0	0.00	0.0%
5. Easement Encroachment Areas[3]	Areas or points (if too small to render as polygons at map scale).	none	yellow hatch	1	0.05	0.5%

Veg Plot 1, April 12, 2018 (MY-00)

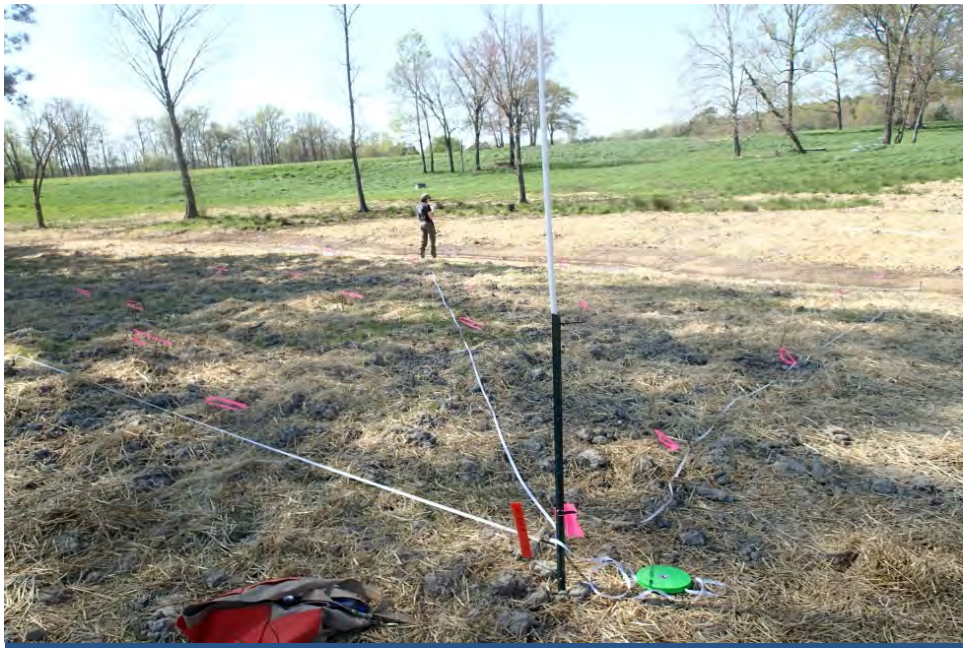
Veg Plot 1, September 14, 2021 (MY-04)

Veg Plot 2, April 12, 2018 (MY-00)

Veg Plot 2, September 14, 2021 (MY-04)

Veg Plot 3, April 12, 2018 (MY-00)

Veg Plot 3, September 14, 2021 (MY-04)

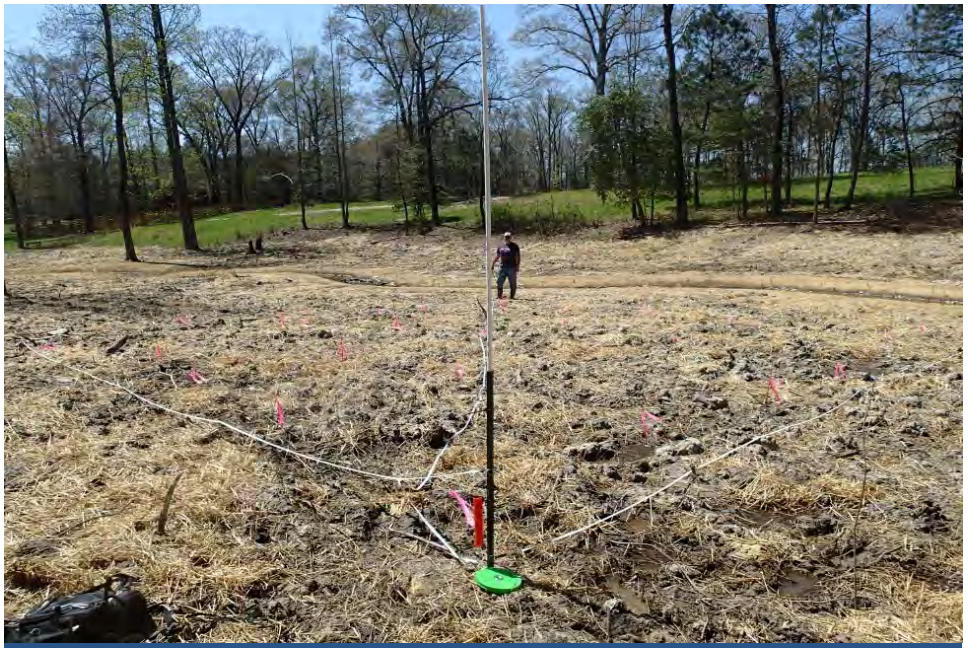


Veg Plot 4, April 12, 2018 (MY-00)

Veg Plot 4, September 14, 2021 (MY-04)

Veg Plot 5, April 12, 2018 (MY-00)

Veg Plot 5, September 14, 2021 (MY-04)



Veg Plot 6, April 12, 2018 (MY-00)

Veg Plot 6, September 14, 2021 (MY-04)

Veg Plot 7, April 12, 2018 (MY-00)

Veg Plot 7, September 14, 2021 (MY-04)

Encroachment (VPA1), R1 Left Floodplain, March 17, 2021 (MY-04)

Encroachment (VPA1), R1 Left Floodplain, March 25, 2021 (MY-04)

Encroachment (VPA1) R1 Left Floodplain, September 14, 2021 (MY-04)

Encroachment (VPA1), R1 Left Floodplain, September 14, 2021 (MY-04)

Appendix C – Vegetation Plot Data

Pen Dell

Table 5: Planted and Total Stem Counts

			Current Plot Data (MY4 2021)																					Annual Means														
			002-01-0001			002-01-0002			002-01-0003			002-01-0004			002-01-0005			002-01-0006			002-01-0007			MY4 (2021)			MY3 (2020)			MY2 (2019)			MY1 (2018)			MY0 (2018)		
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**	**PnoLS**	**P-all**	**T**	**PnoLS**	**P-all**	**T**	**PnoLS**	**P-all**	**T**
Acer rubrum		Tree						20			9	1	1	5	1	1	1	1	1	1			2	3	3	38	3	3	30	3	3	14	4	4	122	3	3	3
Alnus serrulata	Tag Alder, Smooth Alde	Shrub Tree	1	1	1				1	1	1							1	1	1				3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
Baccharis halimifolia	Silverling, High-tide Bu	Shrub Tree																		2						2												
Betula nigra	River Birch, Red Birch	Tree	2	2	2				1	1	1	2	2	2	1	1	1	3	3	3				9	9	9	9	9	9	9	9	9	11	11	11	14	14	14
Carpinus caroliniana		Shrub Tree							1	1	1				1	1	1	3	3	3				5	5	5	5	5	5	5	5	5	9	9	10	10	10	10
Carya	Hickory	Tree																																1				
Cornus amomum	Silky Dogwood	Shrub Tree							2	2	2			1							1	1	1	3	3	4	3	3	3	4	4	4	6	6	6	6	6	6
Diospyros virginiana	American Persimmon,	Tree																									1	1	1	1	1	1	2	2	2	2	2	2
Fraxinus pennsylvanica	Green Ash, Red Ash	Tree	1	1	1				1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
Ilex verticillata	Winterberry	Shrub Tree				3	3	3																3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
Lindera benzoin	Northern Spicebush	Shrub Tree																									1	1	1	2	2	2	3	3	3	13	13	13
Liquidambar styraciflua	Sweet Gum, Red Gum	Tree			3			2			1			4												10			14			5			3			
Liriodendron tulipifera		Tree				1	1	5																1	1	5	2	2	6	2	2	2	5	5	5	13	13	13
Magnolia virginiana		Shrub Tree				1	1	1	1	1	1	2	2	2				1	1	1	2	2	2	7	7	7	7	7	7	6	6	6	8	8	8	14	14	14
Pinus taeda	Loblolly Pine, Old Field	Tree									1															1												
Platanus occidentalis	Sycamore, Plane-tree	Tree							2	2	2				4	4	4	4	4	4	1	1	1	11	11	11	11	11	11	11	11	11	14	14	14	14	14	14
Populus deltoides		Tree																																1				
Quercus michauxii	Basket Oak, Swamp Ch	Tree	2	2	2				3	3	3	2	2	2				3	3	3				10	10	10	10	10	10	9	9	9	11	11	11	9	9	9
Quercus nigra	Water Oak, Paddle Oak	Tree	1	1	1							2	2	2				1	1	1				4	4	4	4	4	5	4	4	4	3	3	3	9	9	9
Quercus phellos	Willow Oak	Tree				2	2	2				1	1	1				1	1	1	1	1	1	5	5	5	5	5	5	6	6	6	8	8	8	8	8	8
Rhus copallinum		Shrub Tree												4						2						6									3			
Rosa carolina		Shrub Vine																		1						1												
Rosa palustris	Swamp Rose	Shrub Vine																														4			39			
Salix nigra	Black Willow	Tree			2												1									3						1			7			
Salix sericea	Silky Willow	Shrub Tree																											2									
Sambucus canadensis	Common Elderberry	Shrub Tree																														5			3			
Ulmus alata	Winged Elm	Tree												1												1			4									
Ulmus rubra	Slippery Elm, Red Elm	Tree																														2			3			
Viburnum nudum	Southern Wild Raisin, F	Shrub Tree																																		1	1	1
	Stem count		7	7	12	7	7	33	12	12	23	12	12	26	9	9	10	20	20	25	7	7	9	74	74	138	77	77	129	78	78	106	100	100	279	132	132	132
	size (ares)		1			1			1			1			1			1			1			7			7			7			7			7		
	size (ACRES)		0.02			0.02			0.02			0.02			0.02			0.02			0.02			0.17			0.17			0.17			0.17			0.17		
	Species count		5	5	7	4	4	6	8	8	11	7	7	11	5	5	6	10	10	13	5	5	6	13	13	20	15	15	18	15	15	20	15	15	23	16	16	16
	Stems per ACRE		283.3	283.3	485.6	283.3	283.3	1335	485.6	485.6	930.8	485.6	485.6	1052	364.2	364.2	404.7	809.4	809.4	1012	283.3	283.3	364.2	427.8	427.8	797.8	445.2	445.2	745.8	450.9	450.9	612.8	578.1	578.1	1613	763.1	763.1	763.1

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%

Table 5a: Vegetation Plot Mitigation Success Summary Table					
Plot #	Planted Stems/Acre	Volunteers/ Acre	Total Stems/Acre	Success Criteria Met	Average Stem Height (ft)
1	283	0	283	Yes	6
2	283	202	485	Yes	5.2
3	485	0	485	Yes	9.4
4	485	40	525	Yes	8.9
5	364	0	364	Yes	14.7
6	809	80	889	Yes	7.1
7	283	0	283	Yes	9.4
Project Average	427	46	473	Yes	8.7

Appendix D – NC DWR Correspondence and Approvals

Water Resources
ENVIRONMENTAL QUALITY

PAT MCCRORY
Governor
DONALD R. VAN DER VAART
Secretary
S. JAY ZIMMERMAN
Director

April 28, 2016

DWR Project #: 2016-0403

Scott Hunt
Water & Land Solutions, LLC
11030 Raven Ridge Rd, Suite 119
Raleigh, NC 27614
(via electronic mail)

Re: Site Viability for Buffer Mitigation & Nutrient Offset – Pen Dell
Located near 2505 Wendell Rd, Wendell, NC
Johnston County

Dear Mr. Hunt,

On April 8, 2016, Katie Merritt, with the Division of Water Resources (DWR), assisted you and others from Water & Land Solutions, LLC at the proposed Pen Dell Mitigation Site (Site) in Wendell, NC. The Site is located in the Neuse River Basin within the 8-digit Hydrologic Unit Code 03020201. The Site is being proposed as part of a full-delivery stream restoration project for the Division of Mitigation Services (RFP #16-006477). The Interagency Review Team (IRT) was also present onsite. At your request, Ms. Merritt performed a site assessment of features onsite to determine suitability for buffer and nutrient offset mitigation. Features are more accurately shown in the attached maps signed by Ms. Merritt on April 25, 2016. If approved, mitigating this site could provide stream mitigation credits, riparian buffer credits and/or nutrient offset credits.

Ms. Merritt's evaluation of the features from Top of Bank (TOB) out to 200' for buffer and nutrient offset mitigation pursuant to Rule 15A NCAC 02B .0295 (effective November 1, 2015) and Rule 15A NCAC 02B .0240 is provided in the table below:

Feature	Classification	[1]Subject to Buffer Rule	Adjacent Land uses	Buffer Credit Viable	[2]Nutrient Offset Viable at 2,273 lbs/acre	Mitigation Type/Comments
R1 (wood line to road)	Undetermined conveyance	n/a	Active and pre-existing row crop; Land use along the conveyance consisted of a +/- 25' narrow forested fringe w/ canopy from 1999-2010	n/a	Yes	Restoration for nutrient offset outside of 25' on both sides of conveyance w/ plantings and easement starting at TOB back max 200'; Need stream determination by DWR if pursuing buffer credit; if feature is a stream, feature is viable for buffer restoration per 15A NCAC 02B .0295 (o)(3) outside of 25' on both sides of conveyance.

R2 (Wendell Rd to below pond)	stream	Yes	Native hardwood forest, closed canopy	Yes	No	Preservation per 15A NCAC 02B .0295 (o)(5)
R3 (dirt path crossing to Lake Wendell Rd	stream	Yes	All pasture actively grazed by cattle with mix of Native hardwood forest canopy	Yes	Yes	entire 50' from TOB and within all clusters of closed canopy hardwoods= Enhancement per 15A NCAC 02B .0295 (6); outside of forested areas *(pine tree clustered areas are not viable for credit)* =Restoration
R5	Stream	Yes	Native hardwood forest, closed canopy	Yes	No	Preservation per 15A NCAC 02B .0295 (o)(5)

[1]Subjectivity calls were determined using the 1:24,000 scale quadrangle topographic map prepared by USGS and the most recent printed version of the soil survey map prepared by the NRCS

[2]For nutrient offset viability to be determined, the landowner must provide proof in writing that the land is being used for agriculture or has been used for agriculture previously (prior to rule baseline). Dates, supported by photos or other written records, must be included to confirm that the uses of the open fields onsite are/were for hay crop cultivation/row crop/cattle.

Maps showing the project site and the features are provided and are signed by Ms. Merritt on April 25, 2016. This letter should be provided in all future mitigation plans for this Site. In addition, all vegetative plantings, performance criteria and other mitigation requirements for riparian restoration, enhancement and preservation must follow the requirements in 15A NCAC 02B .0295 to be eligible for buffer and/or nutrient offset credits. Where buffer and nutrient offset credits are viable in the same area, only one credit type is allowed to be generated for credit, not both.

For any areas depicted as not being viable for nutrient offset credit, one could propose a different measure other than riparian restoration/enhancement, along with supporting calculations and sufficient detail to support estimates of load reduction, for review by the DWR to determine viability for nutrient offset according to 15A NCAC 02B .0240.

Please contact Katie Merritt at (919)-807-6371 if you have any questions regarding this correspondence.

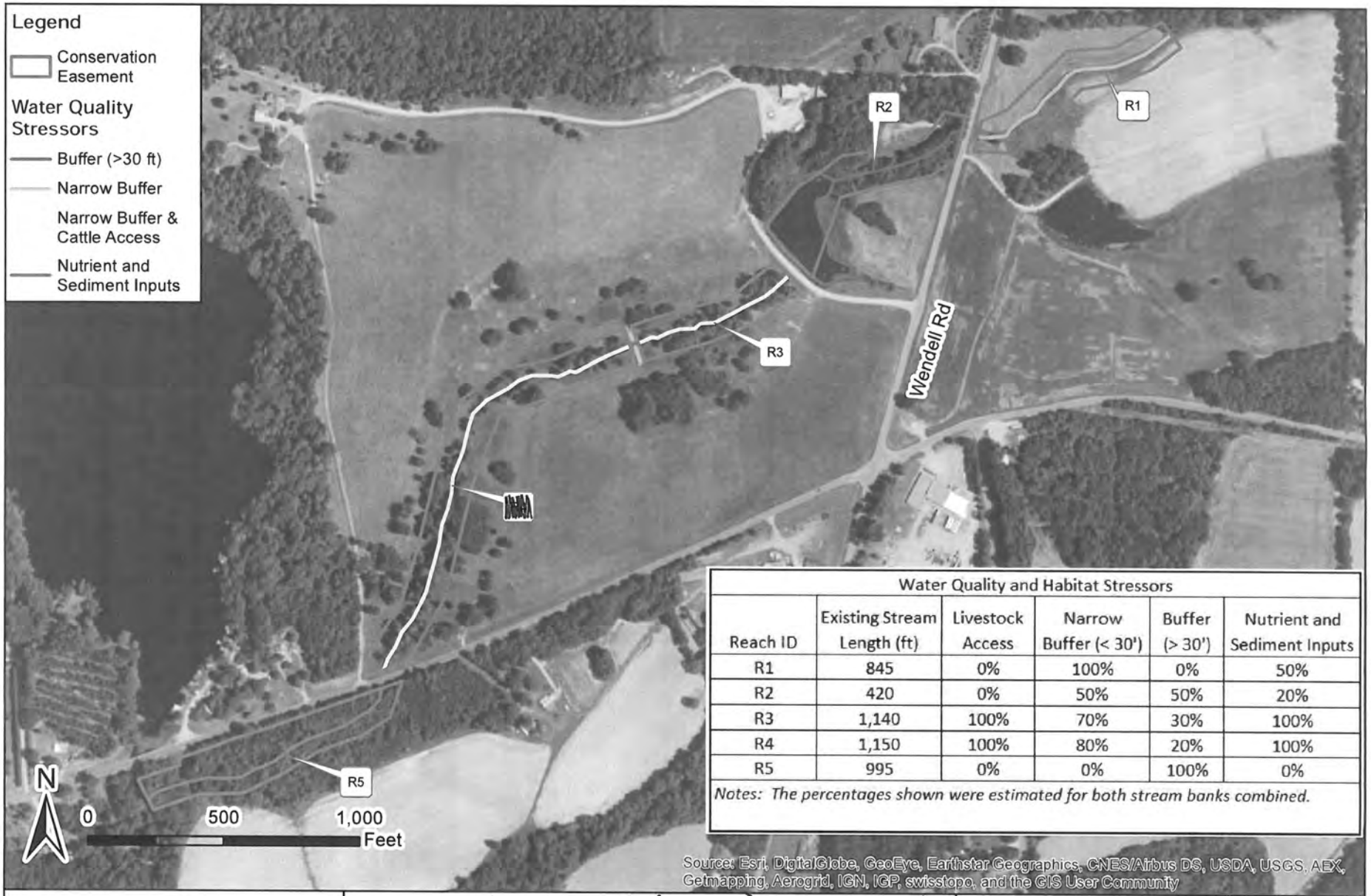
Sincerely,

Karen Higgins

Karen Higgins, Supervisor
401 and Buffer Permitting Branch

KAH/*km*
Attachments: Site Aerial Map, USGS Topographic Map, 1999 Aerial Photo, 2010 Aerial Photo

cc:File Copy (Katie Merritt)
DMS – Jeff Schaffer (via electronic mail)



Water Quality and Habitat Stressors					
Reach ID	Existing Stream Length (ft)	Livestock Access	Narrow Buffer (< 30')	Buffer (> 30')	Nutrient and Sediment Inputs
R1	845	0%	100%	0%	50%
R2	420	0%	50%	50%	20%
R3	1,140	100%	70%	30%	100%
R4	1,150	100%	80%	20%	100%
R5	995	0%	0%	100%	0%

Notes: The percentages shown were estimated for both stream banks combined.

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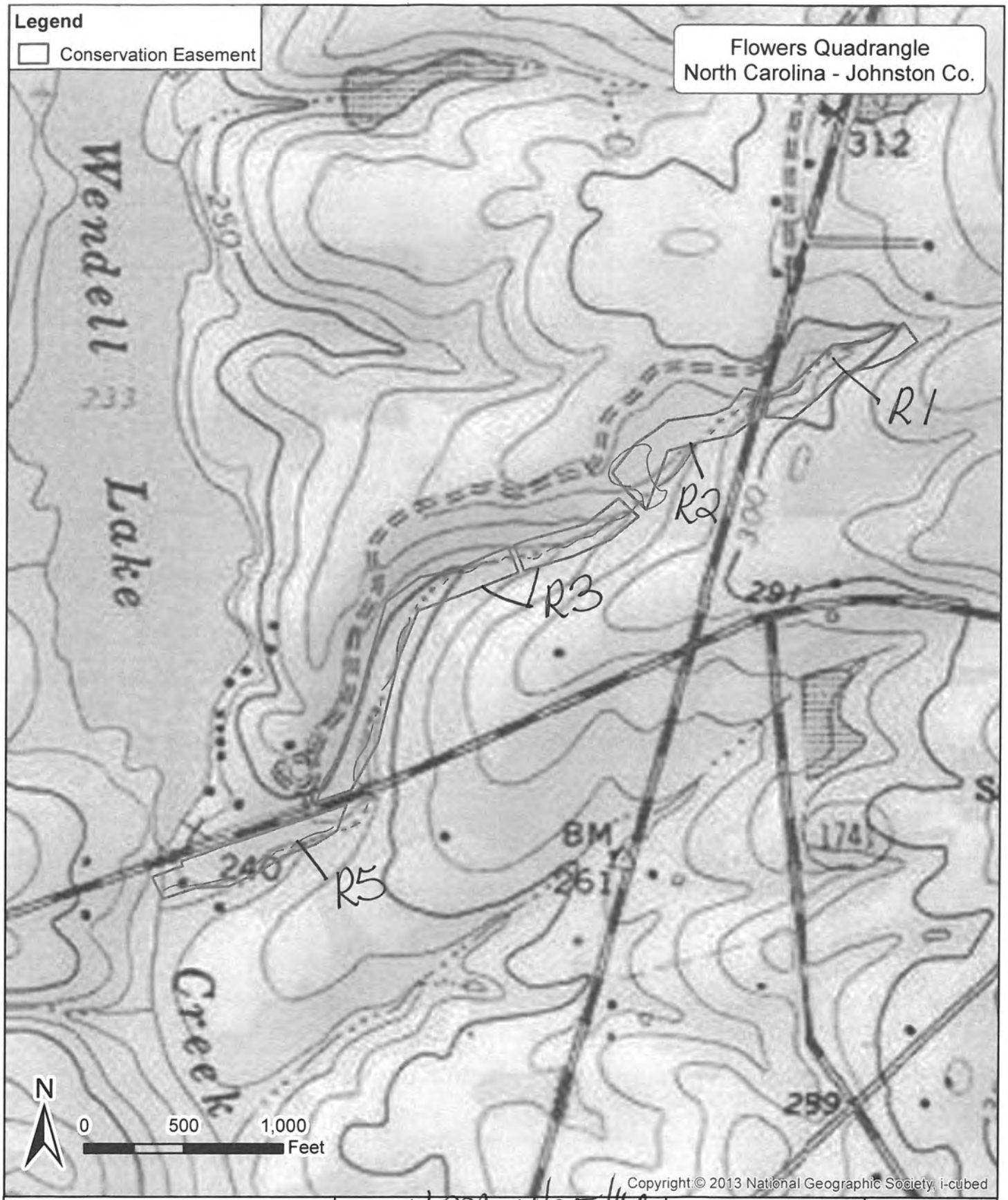
Site Aerial (Current) Kym 4/25/16

Pen Dell
Mitigation Project DWR # 2016-0403

Water Quality Stressors

NAD 1983 2011 State Plane
North Carolina FIPS 3200 FT US

FIGURE
9



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Pen Dell
Mitigation Project
DWR#2016-0403

KJM 4/25/14

USGS
Topographic
Map

NAD 1983 2011 State Plane

FIGURE
2

Google earth feet 600 meters 100

Aerial dated 12/2005
DWR# 2016-0403 (Pen Dell)
Kym 4/25/16

Google earth feet 400 meters 100

Aerial dated 7/2010

DWR# 2014-0403 (Pen Dell)
Kym 4/25/14