Monitoring Report – Year 4
FINAL VERSION
Lake Wendell Mitigation Project (Riparian Buffer Mitigation)
Calendar Year of Data Collection: 2021

NCDEQ DMS Project Identification # 97081
NCDEQ DMS Contract # 6826
Neuse River Basin (Cataloging Unit 03020201)
USACE Action ID Number: SAW-2016-00876
NCDEQ DWR Project # 2016-0385
Johnston County, NC
Contracted Under RFP # 16-006477
Data Collection Period: September 2021
Submission Date: October 20th, 2021

Prepared for:

Environmental Quality

North Carolina Department of Environmental Quality
Division of Mitigation Services
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LIST OF APPENDICES

1 Project Summary

Water and Land Solutions, LLC (WLS) completed the construction and planting of the Lake Wendell Mitigation Project (Project) full-delivery project for the North Carolina Department of Environmental Quality (NCDEQ), Division of Mitigation Services (DMS) in March 2018. The Project is located in Johnston County, North Carolina between the Community of Archer Lodge and the Town of Wendell at 35.73739˚, -78.3538°. The Project site is located in the NCDEQ Sub-basin 03-04-06, in the Upper Buffalo Creek Sub-watershed 030202011502.

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 4,269 linear feet of streams and 490,477 square feet of riparian buffers. Monitoring Year 4 (MY4) monitoring activities occurred in September 2021 (Table 2). This report presents the data for the fourth year of monitoring (MY4). The Project meets the MY4 success criteria for vegetation except for Plot 2. 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 in Targeted Local Watershed 03020201180050.

The catchment area is 102 acres and has an impervious cover less than one percent. The dominant surrounding land uses are agriculture and mixed forest. Prior to construction, livestock had access to all Project streams, except R4, and the riparian buffers were less than 50 feet wide.

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 – Lake Wendell Located Near 2869 Wendell Road, Wendell, NC, Johnston County". The referenced site viability letter included a determination by DWR that Project Reaches R1, R2, R3 and R4 were either intermittent or perennial. A separate request for Stream Origin/Buffer Applicability Determination for Potential Mitigation for Project Reach R5 was submitted to DWR on May 18, 2017, as required under the referenced site viability letter. On June 1, 2017 DWR performed the requested determination and Reach R5 was determined to be intermittent, as communicated in the DWR June 8, 2017 letter entitled "On-Site Stream Determination for Applicability to the Neuse Riparian Buffer Rules and Water Quality Standards (15A NCAC 02B.0233)", therefore confirming Reach R5'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 August 25, 2017 for submission to DWR and the NCIRT. The Section 404 General (Regional and Nationwide) Permit Verification was issued October 5, 2017. Project construction started on November 13, 2017 and mitigation site earthwork was completed on March 13, 2018, by RiverWorks Construction. Mitigation site planting was completed on March 30, 2018, 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. MY1 was completed on November 24th, 2019 and submitted December 4th, 2019. Monitoring Year 2 data collection was completed from June until October 29th, 2019. Monitoring Year 3 data collection was completed from September – October 15th, 2020. Monitoring Year 4 data collection was completed 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 R1, where the width of the proposed left riparian buffer varies between 20 feet and 29 feet from the left top of bank. This narrow area of proposed riparian buffer is due to the site constraint caused by an existing residential structure. 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 (Table 5). For project reach sections proposed for preservation, the existing riparian

buffers are permanently protected via the recorded conservation easement. Additionally, permanent fencing was installed along with alternative watering systems to exclude livestock from the restored riparian buffer and conservation easement areas. The permanent fencing system consisting of woven wire fencing was installed to NRCS technical standards in the pasture areas along and outside of the northern conservation easement boundaries of Reaches R1, R2, and R3. Table 1 (Appendix A) provides 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. Plantings were conducted using native species bare-root trees and shrubs, live stakes, and seedlings that 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.

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. Volunteers species will only be counted toward success if they were included in the approved planting plan and if they are surviving for at least two years. 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 for all veg plots except plot 2.

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. Plot 2 had an average stem density of 242 stems per acre which does not meet the year 5 minimum of 260 stems per acre. Plot 2 contains six stems total, one stem below the requirement to meet success criteria. Loss in stem density from MY4 to MY5 is due to thick herbaceous vegetation. To determine if there is a larger issue with vegetation in this area, two additional random veg plots were surveyed (10m x 10m). Both plots met success criteria (see table below). During MY5, Plot 2 will be monitored closely, and WLS will assess the need for supplemental planting in at this time. All other vegetation plots met MY4 interim success criteria. The surviving planted stems 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. Summary data and photographs of each plot can be found in Appendix B and C.

Random Veg Plot Data Table

Random Veg Plot	Number of Planted Stems	Trees/Acre	Tree Species	Requirement Met
1	7	283	Water oak, green ash, swamp chestnut oak, sycamore, silky dogwood	Yes
2	8	323	Tag alder, tulip poplar, green ash, river birch, sycamore, red maple, sweetbay magnolia	Yes

The MY4 vegetation monitoring was also conducted utilizing visual assessment along the Project stream reaches. The overall results of the visual assessment did not indicate any negative changes to the existing vegetation community. An area of encroachment approximately 0.008 acres was found along R1 in MY3, see Figure 1. This area was mowed by the adjacent homeowner and was vegetated with fescue. Management of this area began in January 2021 and included additional signage and a physical barrier (horse tape) to delineate the easement boundary and discourage further mowing. During MY4 trees were planted in this area to ensure tree cover is achieved (February 1st, 2021). Trees planted were from the approved list in the mitigation plan (see table below).

Planting List Table

Common Name	Scientific Name	# Planted
Tulip Poplar	*Liriodendron tulipifera*	10
Sycamore	*Platanus occidentalis*	10
River Birch	*Betula nigra*	5
	TOTAL	25

During MY1 an area of concern was observed along R1 buffer as shown on the Figure 1. This area was utilized as a temporary staging area during construction and contains invasive species vegetation (kudzu) along the right buffer. This area was managed once during MY4 using foliar spray of the limited remaining stems in July using a 3 percent solution of Garlon 3A (see table below for treatments). Following these treatments, the percent cover of kudzu was reduced to approximately 1%. This area was planted with species from the approved list in the mitigation plan on February 1st, 2021 (see planting table above). WLS will continue to monitor and treat the kudzu during MY5. Additionally, the visual monitoring confirmed that diffuse flow of runoff is being maintained in the riparian buffer areas.

Kudzu Treatment Table

Monitoring Year	Invasive Treatment	Date Treatment Conducted
2	Kudzu foliar spray and cut	August 15, 2019
	Kudzu foliar spray	September 24, 2019
3	Kudzu crown removal (hand-digging)	March 18, 2020
	Kudzu foliar spray	October 7, 2020
4	Kudzu foliar spray	July 1, 2021

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 Report Format, Data Requirements, and Content Guidance. 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). Lake Wendell Stream and Riparian Buffer Mitigation Plan. NCDMS, Raleigh, NC.

Appendices

Appendix A – Background Tables

Table 1. Buffer Project Attributes	
Project Name	Lake Wendell Mitigation Project
Hydrologic Unit Code	03020201
River Basin	Neuse
Geographic Location (Lat, Long)	35.7373910 N, -78.3538050 W
Site Protection Instrument (DB, PG)	85, 148
Total Credits (BMU)	354,404.00
Types of Credits	Riparian Buffer
Mitigation Plan Date	Aug-18
Initial Planting Date	Mar-18
Baseline Report Date	Nov-18
MY1 Report Date	Dec-18
MY2 Report Date	Nov-19
MY3 Report Date	Dec-20
MY4 Report Date	Oct-21
MY5 Report Date	

Table 2. Buffer Project Areas and Assets: Lake Wendell

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 (BMU)	If Converted to Nutrient Offset: 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	-		-	-
			Restoration	0-100	342,525	342,525		100%	1.00000	342,525.000	Yes	17,873.412	N/A
				101-200				33%	3.03030	-		-	-
	Subject or	Enhancement		20-29			2	75%	2.66667	-		-	-
			Enh & Cattle Ex. Enh	0-100	44,852	44,852		100%	2.00000	22,426.000	No	-	-
				101-200				33%	6.06061	-		-	-
				SUBTOTALS		**387,377**				**364,951.000**		**17,873.412**	-
			ELIGIBLE PRESERVATION AREA			**129,126**							

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	Preservation		20-29			10	75%	13.33333	-
			Preservation	0-100	104,103	104,103		100%	10.00000	10,410.300
				101-200				33%	30.30303	-
	Nonsubject			20-29			5	75%	6.66667	-
				0-100				100%	5.00000	-
				101-200				33%	15.15152	-
Urban	Subject or Nonsubject			20-29			3	75%	4.00000	-
				0-100				100%	3.00000	-
				101-200				33%	9.09091	-
				SUBTOTALS		**104,103**				**10,410.300**
				TOTALS		**491,480**				**375,361.300**

Table 3. Project Contacts Lake Wendell Mitigation Project (NCDEQ DMS Project ID# 97081)	
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

Lake Wendell Mitigation Project
Johnston County, North Carolina

NCDMS Contract No. 6826
NCDMS Project No. 97081
September 2021
MY4

Riparian Buffer
Mitigation Plan View

NAD 1983 2011 State Plane
North Carolina FIPS 3200 FT US

FIGURE
1

Table 4. Vegetation Condition Assessment Project Lake Wendell Mitigation Project (NCDEQ DMS Project ID# 97081) Planted Acreage[1] 8.9						
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	Solid light blue	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%

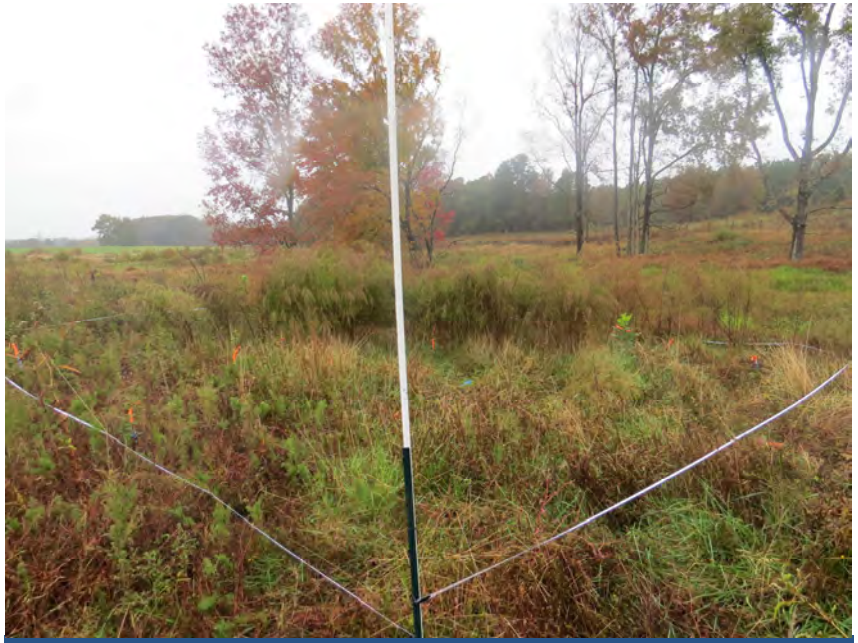
Easement Acreage[2]	**12**					
Vegetation Category	**Definitions**	**Mapping Threshold**	**CCPV Depiction**	**Number of Polygons**	**Combined Acreage**	**% of Easement Acreage**
4. Invasive Areas of Concern[4]	Areas or points (if too small to render as polygons at map scale).	1000 SF	orange hatched	1	0.13	1.1%
5. Easement Encroachment Areas[3]	Areas or points (if too small to render as polygons at map scale).	none	yellow hatched	1	0.01	0.1%

Veg Plot 1, November 5, 2018 (MY-01)

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

Veg Plot 2, April 27, 2018 (MY-00)

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



Veg Plot 3, November 5, 2018 (MY-01)

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

Veg Plot 4, April 13, 2018 (MY-00)

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

Veg Plot 5, April 13, 2018 (MY-00)

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

Veg Plot 6, April 13, 2018 (MY-00)

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

Veg Plot 7, April 13, 2018 (MY-00)

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

Random Veg Plot 1, September 22, 2021 (MY-04)

Random Veg Plot 2, September 22, 2021 (MY-04)

Kudzu Problem Area, October 22, 2020 (MY-03)

Kudzu Problem Area, September 22, 2021 (MY-04)

Kudzu Problem Area, October 22, 2020 (MY-03)

Kudzu Problem Area, September 22, 2021 (MY-04)

Encroachment Area, October 7, 2020 (MY-03)

Encroachment Area, September 14, 2021 (MY-04)

Encroachment Area, October 7, 2020 (MY-03)

Encroachment Area, September 14, 2021 (MY-04)

Appendix C – Vegetation Plot Data

Lake Wendell

Table 5: Planted and Total Stem Counts

			Current Plot Data (MY4 2021)																					Annual Means														
			001-01-0001			001-01-0002			001-01-0003			001-01-0004			001-01-0005			001-01-0006			001-01-0007			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 negundo		Tree																													1							
Acer rubrum		Tree			10							2	2	2			20	2	2	7	2	2	2	6	6	41	6	6	68	6	6	25	6	6	62	7	7	7
Alnus serrulata	Tag Alder, Smooth Alder, Hazel Alder	Shrub Tree							1	1	1							1	1	1	1	1	1	3	3	3	3	3	3	3	3	3	2	2	2	3	3	3
Betula nigra	River Birch, Red Birch	Tree	1	1	1	1	1	1	2	2	2	2	2	2				2	2	2				8	8	8	8	8	8	11	11	11	9	9	9	12	12	12
Carpinus caroliniana		Shrub Tree	1	1	1										2	2	2							3	3	3	3	3	3	3	3	3	4	4	4	5	5	5
Cornus amomum	Silky Dogwood	Shrub Tree	1	1	1	1	1	1																2	2	2	2	2	2	2	2	2	2	2	2	3	3	3
Diospyros virginiana	American Persimmon, Possumwood	Tree										2	2	2										2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Fraxinus pennsylvanica	Green Ash, Red Ash	Tree	1	1	1	1	1	1	1	1	1				1	1	1							4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
Ilex verticillata	Winterberry	Shrub Tree																																		1	1	1
Lindera benzoin	Northern Spicebush	Shrub Tree																																		8	8	8
Liquidambar styraciflua	Sweet Gum, Red Gum	Tree			9						8			1			1			2						21			16			8			9			
Liriodendron tulipifera		Tree	1	1	1				2	2	2				1	1	1	1	1	1	2	2	2	7	7	7	7	7	8	8	8	8	13	13	13	27	27	27
Magnolia virginiana		Shrub Tree				1	1	1	1	1	1	2	2	2				1	1	1	1	1	1	6	6	6	7	7	7	7	7	7	8	8	8	8	8	8
Pinus taeda	Loblolly Pine, Old Field	Tree			2			2									1			4						9			12									
Platanus occidentalis	Sycamore, Plane-tree	Tree	1	1	1	1	1	1	1	1	1				4	4	4	1	1	1	3	3	3	11	11	11	11	11	11	11	11	11	12	12	12	18	18	18
Prunus serotina		Shrub Tree												1												1			1			2						
Quercus michauxii	Basket Oak, Swamp Chestnut Oak	Tree	2	2	2							4	4	4	1	1	1	1	1	1				8	8	8	8	8	8	7	7	7	7	7	7	7	7	7
Quercus nigra	Water Oak, Paddle Oak	Tree				1	1	1				1	1	1										2	2	2	3	3	3	4	4	4	4	4	4	9	9	9
Quercus phellos	Willow Oak	Tree							4	4	4				3	3	3	3	3	3	1	1	1	11	11	11	11	11	11	9	9	9	10	10	10	11	11	11
Rhus copallinum		Shrub Tree																		2						2												
Rosa palustris	Swamp Rose	Shrub Vine																																	1			
Salix nigra	Black Willow	Tree																																	1			
Ulmus alata	Winged Elm	Tree																		1						1												
		Stem count	8	8	29	6	6	8	12	12	20	13	13	15	12	12	34	12	12	26	10	10	10	73	73	142	75	75	167	77	77	107	83	83	150	125	125	125
		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	7	7	10	6	6	7	7	7	8	6	6	8	6	6	9	8	8	12	6	6	6	13	13	18	13	13	16	13	13	16	13	13	16	15	15	15
		Stems per ACRE	323.7	323.7	1174	242.8	242.8	323.7	485.6	485.6	809.4	526.1	526.1	607	485.6	485.6	1376	485.6	485.6	1052	404.7	404.7	404.7	422	422	820.9	433.6	433.6	965.5	445.2	445.2	618.6	479.8	479.8	867.2	722.7	722.7	722.7

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%

Appendix D – DWR Correspondence and Approval

Water Resources
ENVIRONMENTAL QUALITY

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

April 28, 2016

DWR Project #: 2016-0385

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 – Lake Wendell
Located near 2869 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 Lake Wendell 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 20, 2016. If approved, mitigating this site could provide stream mitigation credits, riparian buffer credits and/or nutrient offset credits.

Ms. Merritt's evaluation of 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 Landuses	Buffer Credit Viable	[2]Nutrient Offset Viable at 2,273 lbs/acre	Mitigation Type/Comments
R1 (above pipe)	Modified Natural Stream	Yes	narrow buffer of Mixed native hardwood & pine forest	Yes[3]	No	Enhancement per 15A NCAC 02B .0295 (b)(4) in entire 50' from TOB
R1 (piped portion – fence line)	Piped stream	Yes[3]	managed lawn	Yes[3]	No	Restoration
R1 (below fence line – R5 confluence)	Modified natural stream	Yes	pasture actively grazed by cattle	Yes	Yes	Restoration

R2	Stream	Yes	Pasture actively grazed by cattle and narrow closed canopy of native hardwoods	Yes	Yes *(outside of forested area)*	Narrow closed canopy = Enhancement per 15A NCAC 02B .0295 (o)(6); Outside of forested areas = Restoration
R3	Ag Pond *(to be drained)*	Yes	Pasture actively grazed by cattle	Yes[3]	Yes	Restoration *(if pond is drained, a stream channel has to develop to be viable for any credit)*
R4	Stream	Yes	Native hardwood forest, closed canopy	Yes	No	Preservation per 15A NCAC 02B .0295 (o)(5)
R5	Undetermined conveyance	Not on maps	Pasture actively grazed by cattle	n/a	Yes	Need stream determination by DWR; if feature is a stream, feature is viable for buffer restoration per 15A NCAC 02B .0295 (o)(3)

[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.

[3]Feature has been piped or is a pond, but has potential for buffer mitigation if feature is restored into a stream.

Maps showing the project site and the features are provided and signed by Ms. Merritt on April 20, 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 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.

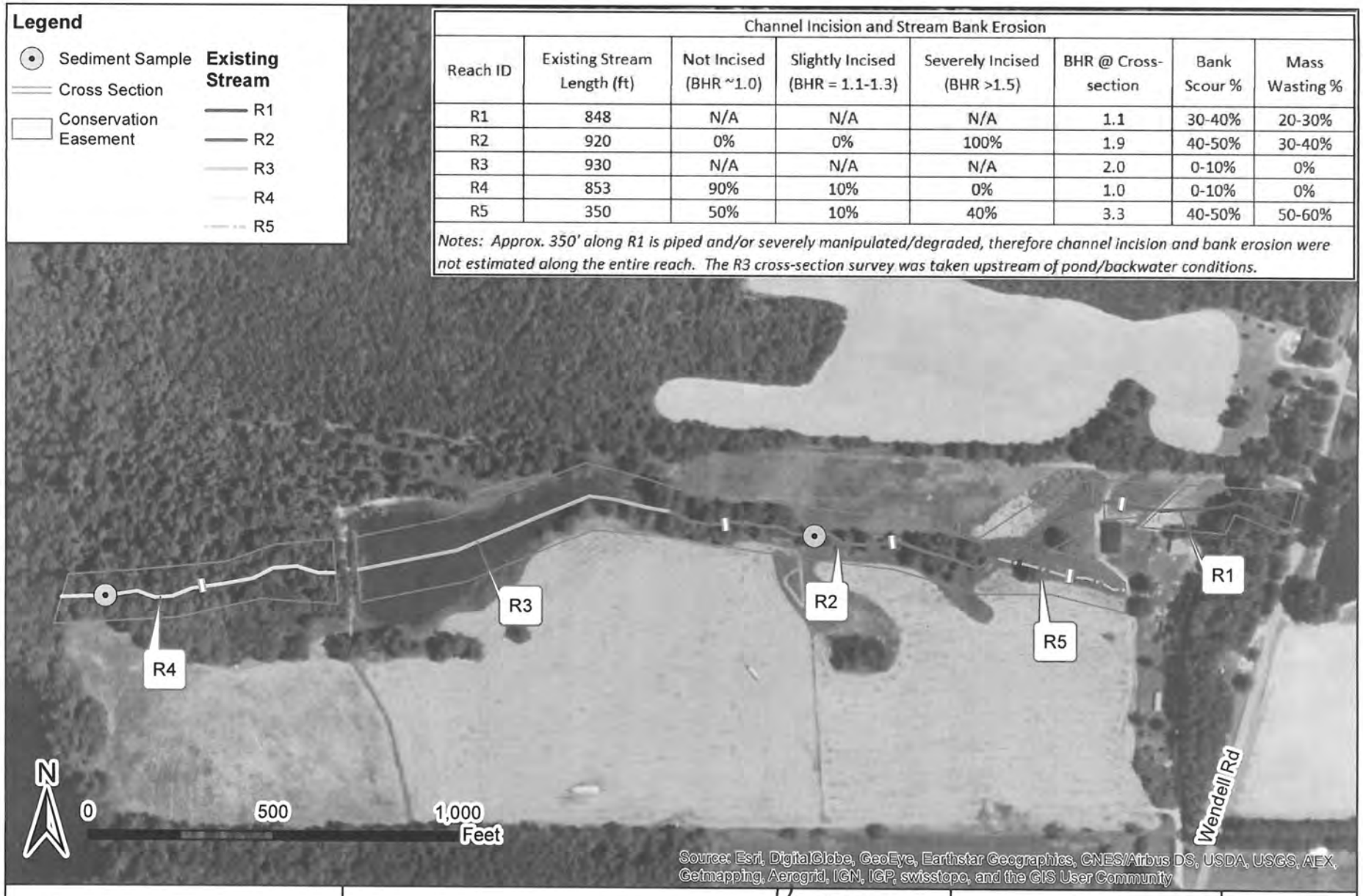
Sincerely,

Karen Higgins

Karen Higgins, Supervisor
401 and Buffer Permitting Branch

KAH/*km*
Attachments: Site Aerial Map, USGS Topographic Map, NRCS Soil Survey

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



Channel Incision and Stream Bank Erosion							
Reach ID	Existing Stream Length (ft)	Not Incised (BHR ~1.0)	Slightly Incised (BHR = 1.1-1.3)	Severely Incised (BHR >1.5)	BHR @ Cross-section	Bank Scour %	Mass Wasting %
R1	848	N/A	N/A	N/A	1.1	30-40%	20-30%
R2	920	0%	0%	100%	1.9	40-50%	30-40%
R3	930	N/A	N/A	N/A	2.0	0-10%	0%
R4	853	90%	10%	0%	1.0	0-10%	0%
R5	350	50%	10%	40%	3.3	40-50%	50-60%

Notes: Approx. 350' along R1 is piped and/or severely manipulated/degraded, therefore channel incision and bank erosion were not estimated along the entire reach. The R3 cross-section survey was taken upstream of pond/backwater conditions.

WATER & LAND™ SOLUTIONS

Lake Wendell Mitigation Project

4/29/16

Channel Stabilty & Monitoring Features

NAD 1983 2011 State Plane North Carolina FIPS 3200 FT US

FIGURE 8

Kpm 4/20/16 #2016-0385
Lake Wendell Site

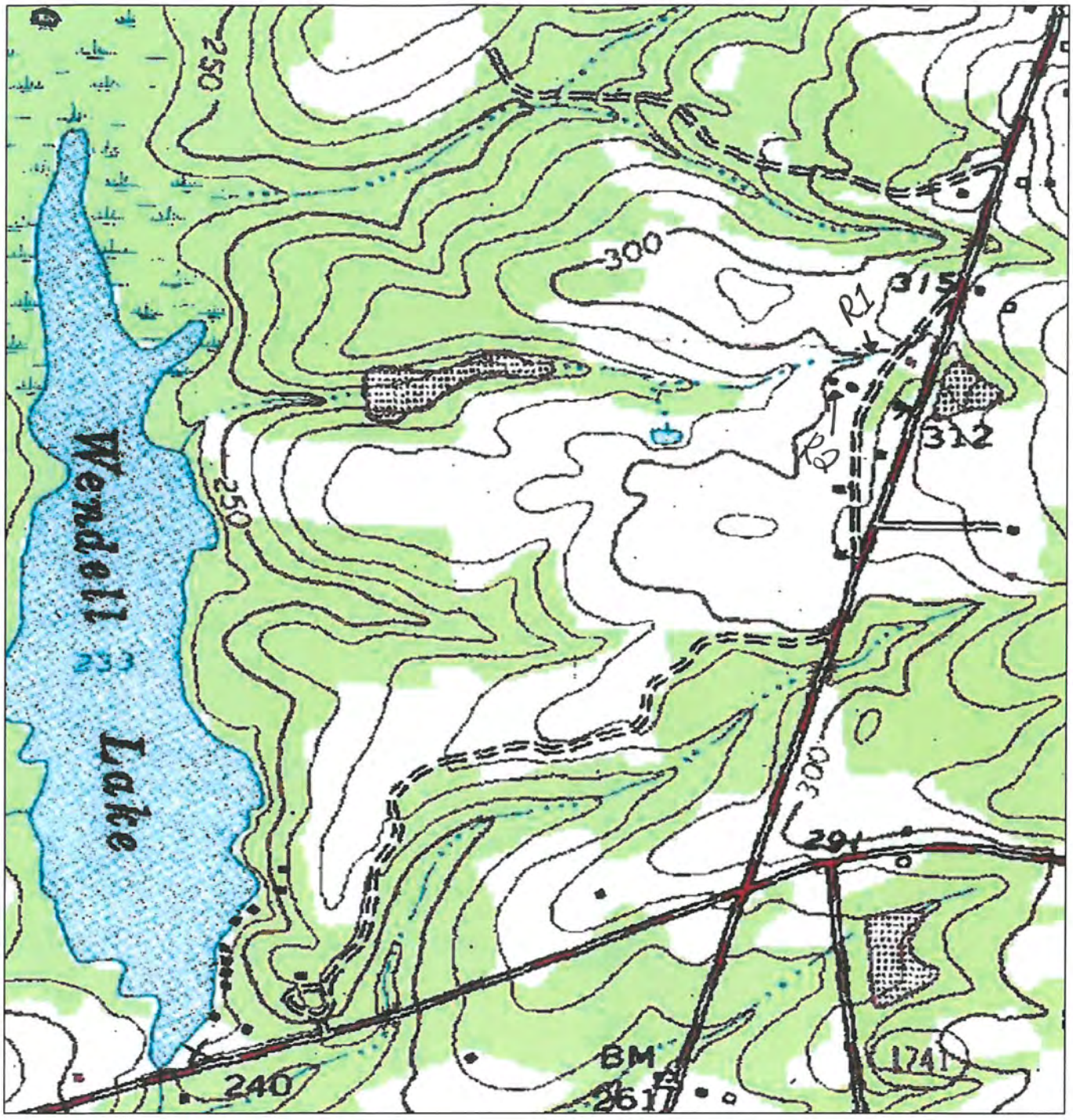
U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SHEET NO. 2
JOHNSTON COUNTY, NORTH CAROLINA

Scale 1:24000

JOHNSTON COUNTY, NORTH CAROLINA NO. 2

NC USGS Topo & Parcels Map



April 20, 2016

1:6,528

0 0.075 0.15 0.3 mi

0 0.1 0.2 0.4 km

Kym 4/20/16

2016-0385
Lake Wendell Site

Participating NC Counties, NCCGIA, NC OneMap, US EPA

bgeorgou