MONITORING YEAR 1 ANNUAL REPORT

Final

Anderson Farm Mitigation Site
Wayne County, NC
NCDEQ Contract No. 0402-10
DMS ID No. 100180
DWR No. 2021-0023v2

Neuse River Basin
HUC 03020201

RFP: 16-20200402

Data Collection Period: October 2022
Draft Submission Date: November 18, 2022
Final Submission Date: January 9, 2023

PREPARED FOR:

NC Department of Environmental Quality,
Division of Mitigation Services
1652 Mail Service Center
Raleigh, NC 27699-1652

WILDLANDS
ENGINEERING

January 9, 2023
Ms. Emily Dunnigan
Project Manager
NCDEQ- Division of Mitigation Services
217 West Jones Street
Raleigh, NC 27603

Subject: Task 5 Draft Monitoring Year 1 Report Comments - Anderson Farm Mitigation Site (DMS #100180)
Neuse River Basin: 03020201; Wayne County, NC
Contract No. 0402-10

Dear Ms. Dunnigan:

We have reviewed the comments on the MY1 draft report for the above referenced project dated November 14, 2022 and have revised the report based on these comments. The revised documents are submitted with this letter. Below are responses to each of your comments. For your convenience, the comments are reprinted with our response in italics.

1. Please edit the cover page to say RFP 16-20200402, to match the Mitigation Plan.

   Response: The cover page is now updated.

2. On page 2, Section 2, The performance standards state "…or four native hardwood tree and native shrub species." Per the Mitigation Plan and previous comments from Katie Merritt, only hardwood trees can be counted towards success criteria. Please revise or provide documentation stating shrubs can be counted towards success.

   Response: The mention of shrub species counting toward success criteria has been removed.

If you have any questions, please contact me by phone (919) 851-9986, or by email (jlorch@wildlandseng.com).

Sincerely,

Jason Lorch, *Monitoring Coordinator*

PREPARED BY:

Wildlands Engineering, Inc.
312 W Millbrook Road, Suite 225
Raleigh, NC 27609
Phone: (919) 851-9986

Anderson Farm Mitigation Site
Monitoring Year 1 Annual Report

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APPENDICES

Section 1: PROJECT OVERVIEW

1.1 Project Description

The Anderson Farm Mitigation Site (Site) is in Wayne County approximately six miles northwest of the Town of Mt. Olive (Figure 1). The Site involved riparian area restoration on three unnamed tributaries that flow to Thoroughfare Swamp. The Site was completed for buffer mitigation credit in the Neuse River Basin Hydrologic Unit Code (HUC) 03020201, in accordance with the Consolidated Buffer Mitigation Rules (15A NCAC 02B .0295) and the Nutrient Offset Payments Rule (15A NCAC 02B .0703). See Figure 2 for the Service Area of the Site. The Site is expected to generate 494,544.362 riparian buffer credits.

The project is located within the Neuse River Basin HUC 03020201170040, and North Carolina Division of Water Resources (NCDWR) Subbasin 03-04-12. Project streams flow approximately one mile to the confluence with Thoroughfare Swamp, which flows to 303d listed stream, Falling Creek, and eventually drains to the Neuse River. Thoroughfare Swamp and the Neuse River are both classified as a Water Supply Watershed for the City of Goldsboro and Nutrient Sensitive Waters (NSW) by NCDWR. The project supports specific goals identified in the 2010 Neuse River Basin Restoration Priorities Plan (RBRP) by "nutrient and sediment reduction in agricultural areas by restoring and preserving wetlands, streams and riparian buffers."

Prior to planting, the buffer restoration area was used as agricultural fields, mainly to produce corn or soybeans. A culvert on UT3 was removed prior to planting. Disturbed areas were tilled with a chisel plow to reduce soil compaction. The area was immediately seeded with a regionally appropriate seed mix and live stakes and coir matting was placed along banks to provide soil stabilization. An area of isolated erosion at the confluence of UT1 and UT3 was identified prior to planting which was stabilized by placing straw bales directly adjacent to the area to divert overland flow during rainfall events. Additionally, live stakes were planted, and a regionally appropriate native seed mix was applied around the area to provide long term soil stabilization.

Tables 2 and 4 in Appendix 1 provide more detailed watershed and Site background information for this project. Project history, location, and design are presented in the Anderson Farm Baseline Monitoring Report (Wildlands, 2022).

1.2 Project Goals and Objectives

The major goals of the riparian restoration project are to provide ecological and water quality enhancements to the Neuse River Basin by creating a functional riparian corridor.

This buffer restoration project will reduce sediment and nutrient loading, provide and improve terrestrial and in stream habitats, and improve stream and bank stability. The area surrounding the streams was previously agricultural fields, typically used to grow corn, soybeans, and wheat. Restoring up to 100 feet of vegetative buffer along the streams and channels has removed the crops and fertilizer inputs within the project area. The restored floodplain areas will assist in filtering sediment during high rainfall events. The establishment of riparian areas will create shading to minimize thermal heating. Finally, invasive vegetation will be treated within the project area and the newly planted native vegetation will provide cover and food for wildlife. Specific enhancements to water quality and ecological processes are outlined below.

- Decrease nutrient levels by filtering runoff from the agricultural fields through restored native buffer zones. The off-site nutrient input will also be absorbed on-site by filtering flood flows through restored floodplain areas, where flood flows can disperse through native vegetation.

- Sediment from off-site sources will be captured by deposition on restored floodplain areas where native vegetation will slow overland flow velocities.
- Decrease water temperature and increase dissolved oxygen concentrations with the establishment and maintenance of riparian areas creating additional long-term shading of the channel flow to reduce thermal pollution.
- Establishment of a riparian area that will slow flood flows and allow for greater infiltration, reducing peak flows downstream.
- Create appropriate terrestrial habitat by removing invasive vegetation and planting native vegetation.
- Permanently protect the project Site from harmful uses by establishing a conservation easement on the Site that will protect the riparian corridor in perpetuity.

Mitigation credits are presented in Table 1 and Figure 3 in Appendix 1 and are based upon the as-built survey included in the Anderson Farm Baseline Monitoring Report (Wildlands, 2022).

Section 2: PERFORMANCE CRITERIA AND MONITORING PROTOCOLS

The performance criteria for the Site follows approved performance criteria presented in the Anderson Farm Mitigation Site Mitigation Plan (Wildlands Engineering, Inc., 2021), the NC DMS Riparian Buffer and Nutrient Offset Buffer Baseline & Annual Monitoring Report Template, Version 2.0 (May 2017) and the Consolidated Buffer Mitigation Rule (15A NCAC 02B .0295).

The buffer restoration project has been assigned specific performance criteria components for vegetation. Performance criteria will be evaluated throughout the five-year post-construction monitoring. The monitoring period will extend for five years beyond the completion of construction or until performance criteria have been met.

The final vegetative success criteria will be the survival of 260 stems per acre in the riparian corridor at the end of monitoring year 5. The final performance standard shall include a minimum of four native hardwood tree species, where no one species is greater than 50 percent of stems. Native hardwood species may be included to meet the final performance standard of 260 stems per acre. Methodology for annual monitoring is presented in the Anderson Farm Baseline Monitoring Report (Wildlands, 2022).

Section 3: RESULTS OF YEAR 1 MONITORING

The MY1 vegetation monitoring resulted in an average stem density of 476 planted stems per acre. Stem densities in individual monitoring plots range from 364 to 607 planted stems per acre with stem counts in individual plots ranging from 9 to 15 stems with an average of 11 planted stems per plot. The number of different species planted per plot range from 5 to 8, with a Site average of 7. The total number of species planted across the Site was 11. All vegetation plots exceed the final stem density success criteria of 260 stems per acre for MY5. Refer to Appendix 2 for visual assessment data and vegetation plot photographs, and Appendix 3 for vegetation plot data.

3.1 Parcel Maintenance

Additional adaptive measures will be developed, or appropriate remedial actions will be implemented if the Site or a specific component of the Site fails to achieve the success criteria outlined in the Mitigation Plan. Site maintenance will be performed to correct any identified problems on the Site that have a high likelihood of affecting project success. Such items include but are not limited to excess tree mortality caused by fire, flooding, drought, or insects. Any actions implemented will be designed to achieve the success criteria and will include a work schedule and updated monitoring criteria.

3.2 Conclusions

The 2022 vegetation monitoring data reflects that the Site is exceeding the final vegetative success criteria. These criteria include both a stem density of 260 stems per acre and a species diversity of at least four native tree or shrub species. No major problems were identified, such as invasive species or excessive tree mortality, during MY1. Therefore, no corrective actions are required at this time.

Section 4: REFERENCES

North Carolina Division of Mitigation Services (DMS). 2017. Riparian Buffer and Nutrient Offset Buffer Baseline & Annual monitoring Report Template (Version 2.0, 05-2017). Raleigh, North Carolina.

North Carolina Ecosystem Enhancement Program (NCEEP), 2010. 2010 Neuse River Basin Restoration Priorities Plan (RBRP). https://files.nc.gov/ncdeq/Mitigation%20Services/Watershed_Planning/Neuse_River_Basin/FINAL%20RBRP%20Neuse%202010_%2020111207%20CORRECTED.pdf

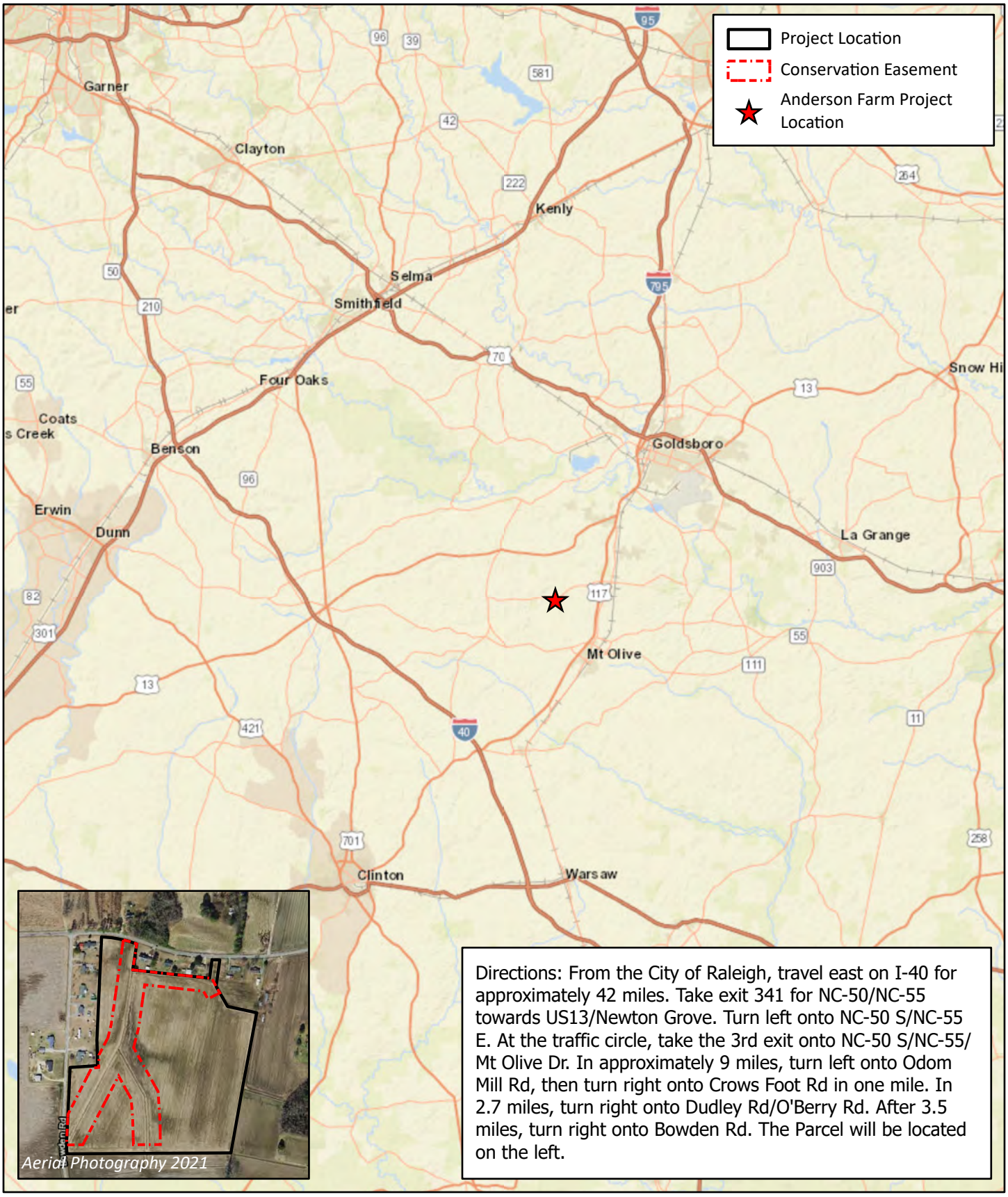
North Carolina Interagency Review Team. 2016. Wilmington District Stream and Wetland Compensatory Mitigation Update. October 24, 2016.

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

Wildlands Engineering, Inc. 2021. Anderson Farm Mitigation Plan. DMS, Raleigh, NC. October 2021.

Wildlands Engineering, Inc. 2022. Anderson Farm Baseline Monitoring Report. DMS, Raleigh, NC. April 2022.

APPENDIX 1. General Figures and Tables



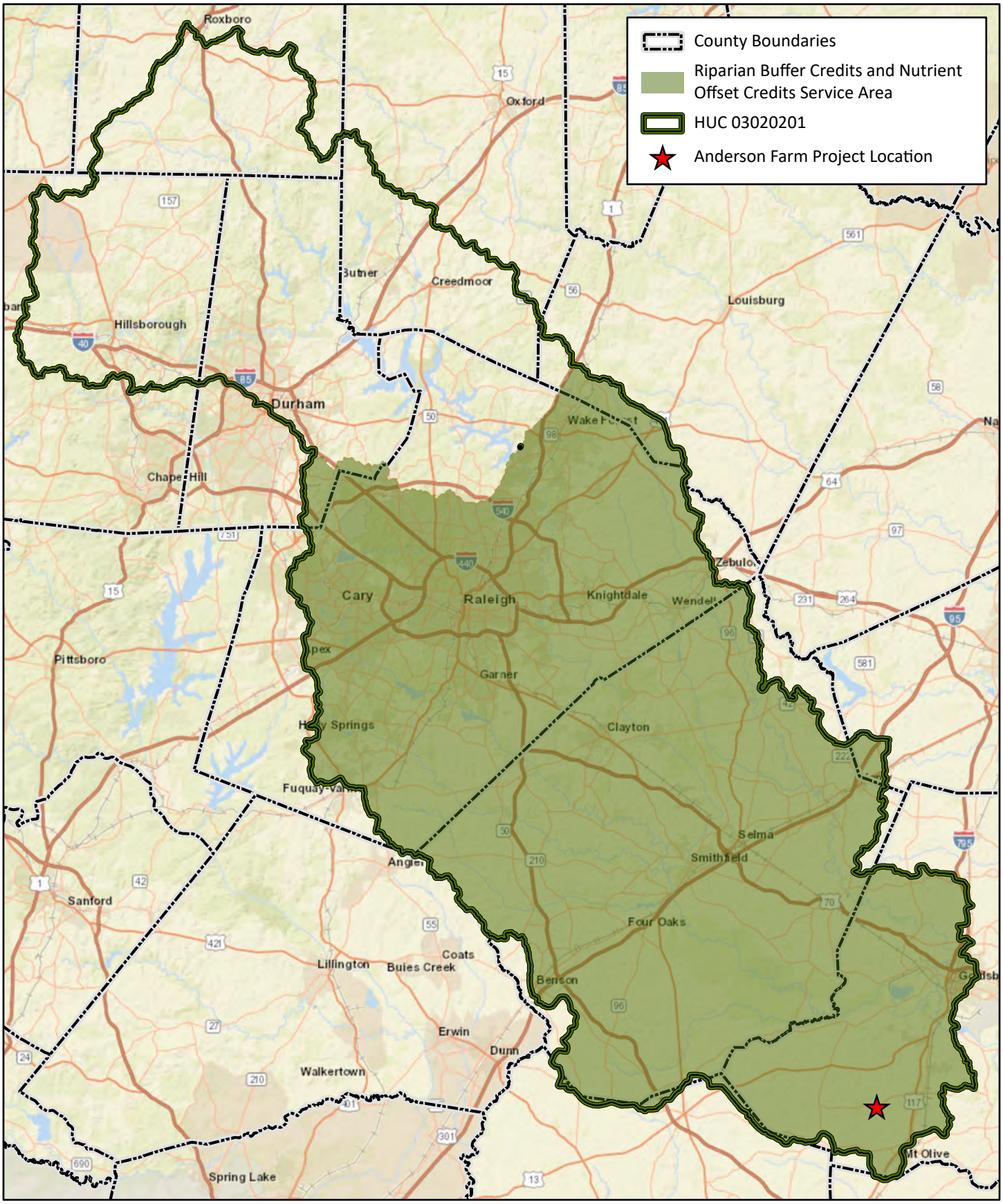
WILDLANDS ENGINEERING

0 5 10 Miles

N

Figure 1. Vicinity Map
Anderson Farm Mitigation Site
Monitoring Year 1 - 2022
Neuse River Basin (03020201)

Wayne County, NC



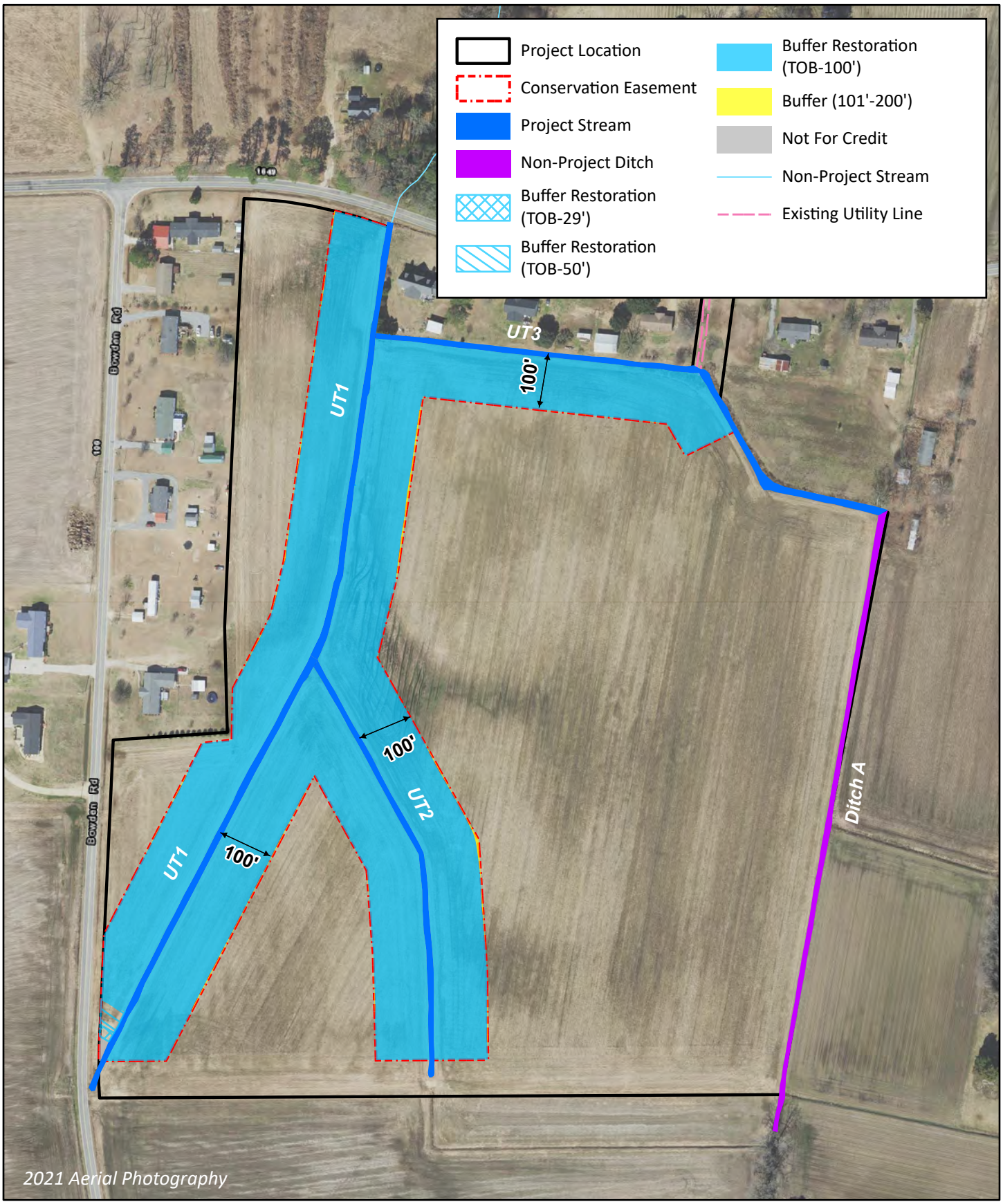
WILDLANDS ENGINEERING

0 6 12 Miles

N

Figure 2. Service Area Map
Anderson Farm Mitigation Site
Monitoring Year 1 - 2022
Neuse River Basin (03020201)

Wayne County, NC



WILDLANDS ENGINEERING

0 125 250 Feet

N

Figure 3. Project Component/Asset Map
Anderson Farm Mitigation Site
Monitoring Year 1 - 2022
Neuse River Basin (03020201)

Wayne County, NC

Table 1. Buffer Project Areas and Assets

Anderson Farm Mitigation Site

DMS Project No. 100180

Monitoring Year 1 - 2022

Neuse 03020201 - Outside Falls Lake	**Project Area**
19.16394	**N Credit Conversion Ratio (ft^2/pound)**
N/A	**P Credit Conversion Ratio (ft^2/pound)**

Credit Type	Location	Subject? (enter NO if ephemeral or ditch [1])	Feature Type	Mitigation Activity	Min-Max Buffer Width (ft)	Feature Name	Total Area (ft^2)	Total (Creditable) Area of Buffer Mitigation (ft^2)	Initial Credit Ratio (x:1)	% Full Credit	Final Credit Ratio (x:1)	Convertible to Riparian Buffer?	Riparian Buffer Credits	Convertible to Nutrient Offset?	Delivered Nutrient Offset: N (lbs)
Buffer	Rural	Yes	I / P	Restoration	101-200	UT1, UT2, UT3	3,267	3,267	1	33%	3.03030	Yes	1,078.111	Yes	170.476
Buffer	Rural	Yes	I / P	Restoration	0-100	UT1, UT2, UT3	491,294	491,294	1	100%	1.00000	Yes	491,294.000	Yes	25,636.378
Buffer	Rural	Yes	I / P	Restoration	0-50	UT1, UT2, UT3	1,816	1,816	1	100%	1.00000	Yes	1,816.000	No	—
Buffer	Rural	Yes	I / P	Restoration	20-29	UT1	475	475	1	75%	1.33333	Yes	356.251	No	—
						Totals (ft2):	**496,852**	**496,852**					**494,544.362**		**25,806.854**
						Total Buffer (ft2):	**496,852**	**496,852**							
						Total Nutrient Offset (ft2):	**0**	**N/A**							

TOTAL AREA OF BUFFER MITIGATION (TABM)			
Mitigation Totals		**Square Feet**	**Credits**
Restoration:		496,852	494,544.362
Enhancement:		0	0.000
Preservation:		0	0.000
Total Riparian Buffer:		496,852	494,544.362
TOTAL NUTRIENT OFFSET MITIGATION			
Mitigation Totals		**Square Feet**	**Credits**
Nutrient Offset:	**Nitrogen:**	0	0.000
	Phosphorus:		0.000

Table 2. Project Activity and Reporting History

Anderson Farm Mitigation Site
DMS Project No. 100180
Monitoring Year 1 - 2022

Activity or Report	Data Collection Complete	Completion or Scheduled Delivery
Mitigation Plan Date	---	December 2021
Bare Roots Planting	---	March 2022
As-Built & Baseline Monitoring Document	March 2022	April 2022
Year 1 Monitoring Report Date	September 2022	December 2022
Year 2 Monitoring Report Date	2023	December 2023
Year 3 Monitoring Report Date	2024	December 2024
Year 4 Monitoring Report Date	2025	December 2025
Year 5 Monitoring Report Date	2026	December 2026

Table 3. Project Contact Table

Anderson Farm Mitigation Site
DMS Project No. 100180
Monitoring Year 1 - 2022

Designers	**Wildlands Engineering, Inc.** 1430 S Mint St Charlotte, NC 28203
Planting Contractor	**Bruton Natural Systems, Inc**
Nursery Stock Suppliers	**Dykes and Son Nursery**
Monitoring Performers	**Wildlands Engineering, Inc.** Jason Lorch 919.851.9986, ext. 107

Table 4. Project Information and Attributes

Anderson Farm Mitigation Site
DMS Project No. 100180
Monitoring Year 1 - 2022

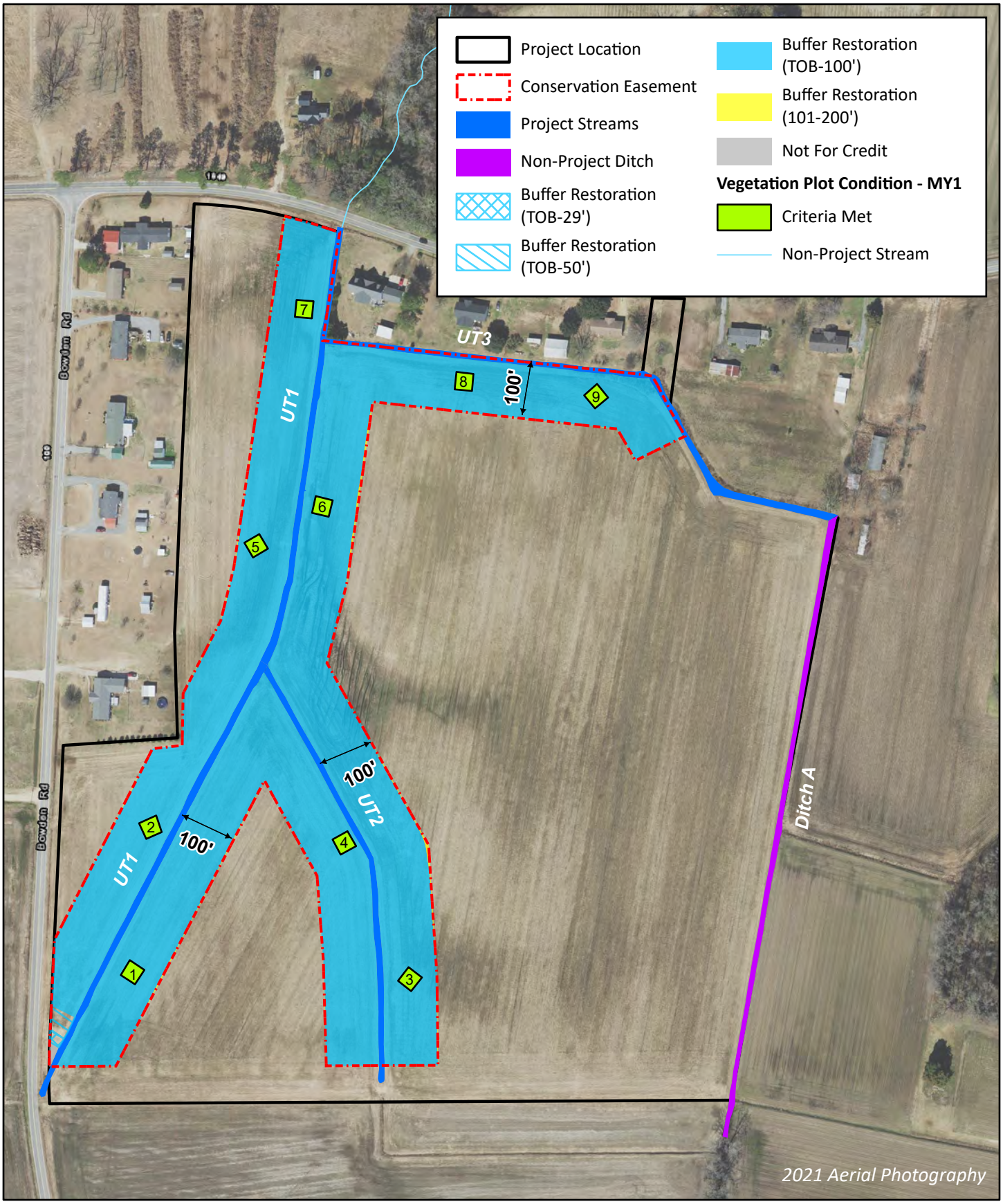
Project Information	
Project Name	Anderson Farm Mitigation Site
USGS Hydrologic Unit 14-digit	03020201170040
River Basin	Neuse
Project Coordinates (latitude and longitude)	35.251662, 78.103729
Total Credits (BMU)	494,544.362
Types of Credits	Riparian Buffer

Table 5. Planted Tree Species

Anderson Farm Mitigation Site
DMS Project No. 100180
Monitoring Year 1 - 2022

Common Name	Scientific Name	Number Planted	% of Total
Boxelder	*Acer negundo*	586	10%
River Birch	*Betula nigra*	869	15%
Sugarberry	*Celtis laevigata*	304	5%
American Persimmon	*Diospyros virginiana*	586	10%
Sweetbay Magnolia	*Magnolia virginiana*	304	5%
Sycamore	*Platanus occidentalis*	869	15%
Eastern Cottonwood	*Populus deltoides*	586	10%
Black Cherry	*Prunus serotina*	304	5%
Swamp Chestnut Oak	*Quercus michauxii*	586	10%
Cherrybark Oak	*Quercus pagoda*	586	10%
American Elm	*Ulmus americana*	304	5%

APPENDIX 2. Visual Assessment Data



WILDLANDS ENGINEERING

0 125 250 Feet

Figure 4. Integrated Current Condition Plan View
Anderson Farm Mitigation Site
Monitoring Year 1 - 2022
Neuse River Basin (03020201)

Wayne County, NC

Table 6. Vegetation Condition Assessment Table

Anderson Farm Mitigation Site
DMS Project No. 100180
Monitoring Year 1 - 2022

Planted Acreage **11.42**

Vegetation Category	Definitions	Mapping Threshold (Ac)	Number of Polygons	Combined Acreage	% of Planted Acreage
Bare Areas	Very limited cover of both woody and herbaceous material.	0.1	0	0	0%
Low Stem Density Areas	Woody stem densities clearly below target levels based on MY3, 4, or 5 stem count criteria.	0.1	0	0	0%
		Total	**0**	**0**	**0%**
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 Ac	0	0	0%
		Cumulative Total	**0**	**0**	**0%**

Easement Acreage **12.15**

Vegetation Category	Definitions	Mapping Threshold (SF)	Number of Polygons	Combined Acreage	% of Easement Acreage
Invasive Areas of Concern	Areas of points (if too small to render as polygons at map scale).	1,000	0	0	0%
Easement Encroachment Areas	Areas of points (if too small to render as polygons at map scale).	none	0	0	0%

OVERVIEW PHOTOGRAPHS

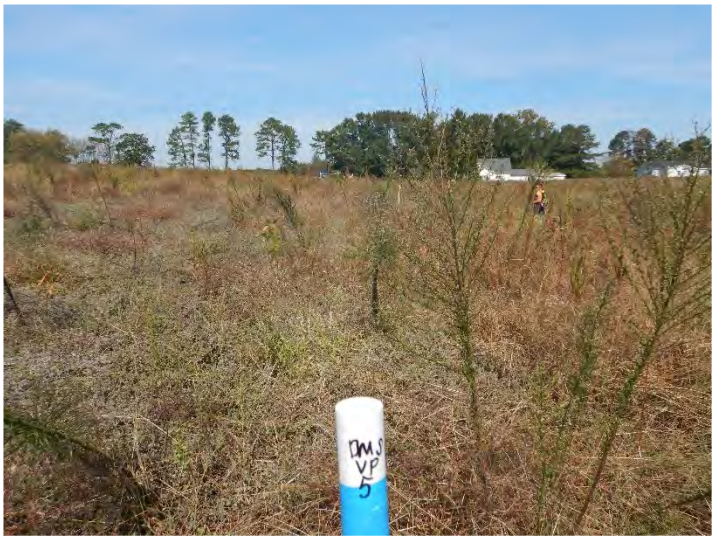
VEGETATION PLOT PHOTOGRAPHS

VEG PLOT 1 *(10/11/2022)*

VEG PLOT 2 *(10/11/2022)*

VEG PLOT 3 *(10/11/2022)*

VEG PLOT 4 *(10/11/2022)*



VEG PLOT 5 *(10/11/2022)*

VEG PLOT 6 *(10/11/2022)*

VEG PLOT 7 *(10/11/2022)*

VEG PLOT 8 *(10/11/2022)*

VEG PLOT 9 *(10/11/2022)*

APPENDIX 3. Vegetation Plot Data

Table 7. Vegetation Plot Criteria Attainment Table

Anderson Farm Mitigation Site

DMS Project No. 100180

Monitoring Year 1 - 2022

Plot	Success Criteria Met *	Tract Mean
Vegetation Plot 1	Yes	100%
Vegetation Plot 2	Yes	
Vegetation Plot 3	Yes	
Vegetation Plot 4	Yes	
Vegetation Plot 5	Yes	
Vegetation Plot 6	Yes	
Vegetation Plot 7	Yes	
Vegetation Plot 8	Yes	
Vegetation Plot 9	Yes	

*Success Criteria Met is based on the final success criteria for MY5 of 260 stems per acre.

Table 8. Vegetation Plot Data
Anderson Farm Mitigation Site
DMS Project No. 100180
Monitoring Year 1 - 2022

Planted Acreage	11.4
Date of Initial Plant	2022-03-21
Date of Current Survey	2022-10-11
Plot size (ACRES)	0.0247

	Scientific Name	Common Name	Tree/ Shrub	Indicator Status	Veg Plot 1 F		Veg Plot 2 F		Veg Plot 3 F		Veg Plot 4 F		Veg Plot 5 F		Veg Plot 6 F		Veg Plot 7 F		Veg Plot 8 F		Veg Plot 9 F	
					Planted	Total	Planted	Total	Planted	Total	Planted	Total	Planted	Total	Planted	Total	Planted	Total	Planted	Total	Planted	Total
Species Included in Approved Mitigation Plan	Acer negundo	boxelder	Tree	FAC			3	3	2	2					1	1	3	3	2	2	1	1
	Betula nigra	river birch	Tree	FACW	2	2	1	1	4	4	1	1	1	1	1	1	1	1	3	3	2	2
	Celtis laevigata	sugarberry	Tree	FACW			1	1	1	1	2	2	1	1	1	1	1	1			1	1
	Diospyros virginiana	common persimmon	Tree	FAC	6	6	1	1					1	1	2	2	2	2	2	2		
	Magnolia virginiana	sweetbay	Tree	FACW			1	1														
	Platanus occidentalis	American sycamore	Tree	FACW	2	2			1	1	4	4	2	2	2	2	4	4			1	1
	Populus deltoides	eastern cottonwood	Tree	FAC	1	1	3	3					1	1	1	1	1	1	2	2	2	2
	Prunus serotina	black cherry	Tree	FACU	1	1					1	1			2	2						
	Quercus michauxii	swamp chestnut oak	Tree	FACW			1	1			2	2	1	1			1	1	2	2		
	Quercus pagoda	cherrybark oak	Tree	FACW	1	1	2	2	1	1	1	1	2	2	2	2	1	1	1	1	2	2
	Ulmus americana	American elm	Tree	FAC	2	2							1	1					1	1		
Sum			Performance Standard		15	15	13	13	9	9	11	11	10	10	12	12	14	14	13	13	9	9
Mitigation Plan Performance Standard			Current Year Stem Count			15		13		9		11		10		12		14		13		9
			Stems/Acre			607		526		364		445		405		486		567		526		364
			Species Count			7		8		5		6		8		8		8		7		6
			Dominant Species Composition (%)			40		23		44		36		20		17		29		23		22
			Average Plot Height (ft.)			1		2		2		2		2		2		3		2		2
			% Invasives			0		0		0		0		0		0		0		0		0
Post Mitigation Plan Performance Standard			Current Year Stem Count			15		13		9		11		10		12		14		13		9
			Stems/Acre			607		526		364		445		405		486		567		526		364
			Species Count			7		8		5		6		8		8		8		7		6
			Dominant Species Composition (%)			40		23		44		36		20		17		29		23		22
			Average Plot Height (ft.)			1		2		2		2		2		2		3		2		2
			% Invasives			0		0		0		0		0		0		0		0		0

1). Bolded species are proposed for the current monitoring year, italicized species are not approved, and a regular font indicates that the species has been approved.
2). The "Species Included in Approved Mitigation Plan" section contains only those species that were included in the original approved mitigation plan. The "Post Mitigation Plan Species" section includes species that are being proposed through a mitigation plan addendum for the current monitoring year (bolded) , species that have been approved in prior monitoring years through a mitigation plan addendum (regular font), and species that are not approved (italicized).
3). The "Mitigation Plan Performance Standard" section is derived only from stems included in the original mitigation plan, whereas the "Post Mitigation Plan Performance Standard" includes data from mitigation plan approved, post mitigation plan approved, and proposed stems.

Table 9. Vegetation Performance Standards Summary Table
Anderson Farm Mitigation Site
DMS Project No. 100180
Monitoring Year 1 - 2022

	Veg Plot 1 F				Veg Plot 2 F				Veg Plot 3 F			
	Stems/Ac.	Av. Ht. (ft)	# Species	% Invasives	Stems/Ac.	Av. Ht. (ft)	# Species	% Invasives	Stems/Ac.	Av. Ht. (ft)	# Species	% Invasives
Monitoring Year 7												
Monitoring Year 5												
Monitoring Year 3												
Monitoring Year 2												
Monitoring Year 1	607	1	7	0	526	2	8	0	364	2	5	0
Monitoring Year 0	607	2	7	0	648	2	10	0	567	2	9	0
	Veg Plot 4 F				Veg Plot 5 F				Veg Plot 6 F			
	Stems/Ac.	Av. Ht. (ft)	# Species	% Invasives	Stems/Ac.	Av. Ht. (ft)	# Species	% Invasives	Stems/Ac.	Av. Ht. (ft)	# Species	% Invasives
Monitoring Year 7												
Monitoring Year 5												
Monitoring Year 3												
Monitoring Year 2												
Monitoring Year 1	445	2	6	0	405	2	8	0	486	2	8	0
Monitoring Year 0	607	2	8	0	607	2	9	0	607	2	8	0
	Veg Plot 7 F				Veg Plot 8 F				Veg Plot 9 F			
	Stems/Ac.	Av. Ht. (ft)	# Species	% Invasives	Stems/Ac.	Av. Ht. (ft)	# Species	% Invasives	Stems/Ac.	Av. Ht. (ft)	# Species	% Invasives
Monitoring Year 7												
Monitoring Year 5												
Monitoring Year 3												
Monitoring Year 2												
Monitoring Year 1	567	3	8	0	526	2	7	0	364	2	6	0
Monitoring Year 0	607	2	8	0	607	2	8	0	607	2	10	0