

Monitoring Report (MY1)

Wingfoot Riparian Buffer Mitigation Site

Pitt County, NC

DMS Project No. 100078

DMS Contract Number: 7607

DWR Project Number: 2018-0854

Data Collection Period: October 21st-22nd, 2019

Submittal Date: December 1st, 2019

Little Contentnea Creek Watershed

Neuse River Basin

HUC 03020203



Prepared For:



NC Department of Environmental Quality

Division of Mitigation Services

1652 Mail Service Center

Raleigh, NC 27699-1652

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PREPARED BY:

Clearwater Mitigation Solutions

CLEARWATER MITIGATION
SOLUTIONS 

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This Mitigation Plan has been written in conformance with the requirements of the following:
NCAC rule 15A NCAC 02B .0295, effective November 1, 2015 and Nutrient Offsets Payments Rule 15A NCAC 02B. 0240, amended effective September 1, 2010 and DWR – 1998. Methodology and Calculations for determining Nutrient Reductions associated with Riparian Buffer Establishment.

**These documents govern DMS operations and procedures
for the delivery of compensatory mitigation.**

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1.0 Mitigation Project Summary

The Wingfoot Riparian Buffer Restoration Project (“the Site”) is a buffer restoration project located in Pitt County, approximately three (3) miles southeast of Farmville, NC and east of State Route 1139 (Moye Turnage Road) (Figure 1). The Site is comprised of 22.31 acres and is located within the Little Contentnea Creek TLW of the Neuse River (Figures 2 & 3). The buffer restoration and enhancement areas are located along unnamed tributaries (UTs) and drainages that flow directly into Little Contentnea Creek approximately 0.3 miles downstream (Figures 3-5). The Site is surrounded by areas managed for agricultural production (corn, cotton, and soybean) and prior to the project completion lacked existing forested buffer along a majority of the streams and drainageways dissecting the site. The Site is expected to generate 541,415.369 riparian buffer credits (BMU).

The Site is located within Hydrologic Unit Code (HUC) 03020203070030 and North Carolina Department of Water Resources (NC DWR) Sub-Basin 03-04-07. Four (4) unnamed tributaries on the Site flow into Little Contentnea Creek (Reach A1, B1-B3). Little Contentnea Creek is a 303d-listed impaired waterbody with a NC DEQ surface water classification of C; Sw, NSW.

1.1 Project Goals

The main goals of the project are to provide water quality and ecological enhancements to the Little Contentnea Creek watershed of the Neuse River basin by creating a riparian corridor and restoring the historic riparian buffer. The project addresses the watershed goals identified in the Neuse River Basin Restoration Plan (RBRP) (NC EEP, 2010). These goals include:

- Promote nutrient and sediment reduction in agricultural areas by restoring and preserving wetlands, streams, and riparian buffers;
- Promote re-establishment of riparian corridors of substantial width to improve connectivity of protected lands; and
- Support implementation of Coastal Habitat Protection Plan (CHPP) strategies.

These watershed goals have been achieved via the restoration and enhancement of woody buffer along unnamed tributaries of the Little Contentnea Creek (a 303d-listed impaired waterbody). Specific objectives of the project which achieved the desired goals included:

- Conversion of existing agricultural fields into wooded riparian buffer zones along existing tributaries via planting of characteristic hardwood species;
- Enhancement of degraded buffer areas (in areas of fields laid to fallow) via planting of characteristic hardwood species;
- Ensuring diffuse flow throughout the riparian buffer zone;
- Establishment of a conservation easement to protect the riparian buffer restoration site in perpetuity and to connect to existing DMS protected site; and
- Invasive species management during the monitoring period.

Ancillary benefits of the project include:

- Increase of organic material as food for invertebrates, fish and wildlife;
- Supply of woody debris that provides increased niche habitat for fish, invertebrates and amphibians;
- Reduction of sunlight reaching the stream and modulation of surface water temperatures;
- Floodwater attenuation via temporary storage, interception and slow releases from heavy rains; and
- Habitat connectivity between currently protected riparian buffer areas (NC DMS Fox Run Site) and downstream riverine swamp forest via a protected riparian habitat corridor (including expansion of refuge and foraging habitat).

1.2 Pre-construction Site Conditions

The project includes 22.31 acres of mostly open agricultural fields along four (4) unnamed tributaries to Little Contentnea Creek. The Site has historically been managed for agricultural production (corn, cotton, and soybean). Site drainage and hydrology have been historically altered with channelized streams and cleared agricultural lands prevalent on historic aerial photos dating back to the 1940s. The majority of the Site has been cleared as recent as 1998 (Figure 6) with some areas revegetating in recent years (Figure 7).

The Site consists of four reaches (A1, B1, B2, and B3) as illustrated in Figures 8A and 8B. Reach A1 is a perennial stream located on the northern boundary of the site and is contiguous with the existing NC DMS buffer project easement (Fox Run). Reach A1 flows from the NC DMS easement on the northwestern boundary to the north and into Little Contentnea Creek approximately 1,800 lf downstream. There is approximately 850 lf of stream associated with Reach A1 within the proposed buffer easement area. The upper portion of Reach A1 has been restored as a forested riparian buffer to 200-ft. The lower segment near the confluence with Reach B1 has been restored to 100-ft. Reach B1 is the perennial stream that dissects the central portion of the site. It drains into Little Contentnea Creek (approximately 1,300 lf downstream from the eastern property boundary). There is approximately 2,690 lf of stream channel associated with Reach B1 within the proposed buffer easement area. The cleared portion of Reach B1 has been restored to 100-ft. A small area along the north side has been enhanced by establishing woody stems to 100-ft. The remaining portion of the reach near the confluence with Reach A1 and along the north side of the reach (extending east to the property line) has re-vegetated in past years and has been preserved. Reaches B2 and B3 flow into Reach B1 from smaller drainage areas on the southern portion of the site. Reach B2 is partly an intermittent stream consisting of approximately 210 lf of stream channel and partly a non-stream tributary of approximately 385 lf of channel. Reach B3 is a non-stream tributary that flows directly into reach B2 and consists of approximately 420 lf of channel. The first 50-ft from these tributaries have been restored. The project attributes are listed in Table 1, located in Appendix A.

2.0 Determination of Credits

On August 30, 2018, Ms. Katie Merritt of the Division of Water Resources (DWR) performed an evaluation of surface water features and adjacent riparian areas within the proposed mitigation site for the determination of riparian buffer mitigation pursuant to 15A NCAC 02B .0295 (effective November 1, 2015) and for nutrient offset credits pursuant to 15A NCAC 02B .0240 (refer to attached Site Viability Letter, Appendix B). Based upon this evaluation, DWR determined that areas within 200 ft of Reach A-1 and Reach B-1 are eligible for both buffer restoration credit and nutrient offset credit (with the latter eligible in non-forested fields only). Riparian areas along Reach B-2 and B-3 are eligible for nutrient offset. In addition, the downstream segment of B-2 is eligible for buffer restoration credits. In addition to buffer restoration on subject streams, per the Consolidated Buffer Mitigation Rules (15 A NCAC 02B 0.0295 (o)), alternative mitigation is proposed on the site in the form of: 1) preservation of buffers on subject streams and, 2) restoration and enhancement on ditches. The project is in compliance with these rules as it meets the following criteria:

Preservation on Subject Streams (15A NCAC 02B 0.0295 (o)(5)):

- (A) The buffer width is at least 30 feet from the stream;
- (B) The area meets the requirements of 15 NCAC 02R 0.0403(c)(7), (8), and (11) with no known structures, infrastructure, hazardous substances, soild waste, or encumbrances within the mitigation boundary;
- (C) Preservation mitigation is being requested on no more than 25% of the total buffer mitigation area (Table 2, Appendix A)

Restoration and Enhancement on Ditches (15 NCAC 02B 0.0295 (o)(8)):

Reach B-3 and the upstream segment of Reach B-2 were determined to be conditionally eligible for buffer credit value provided that the watershed drainage area is of sufficient size to meet the rule criteria per 15A NCAC 02B .0295 (o)(8). Note that the ditches proposed for buffer restoration meet the following criteria:

- (A) are directly connected with and draining towards an intermittent or perennial stream;
- (B) are contiguous with the rest of the mitigation site protected under a perpetual conservation easement;
- (C) stormwater runoff from overland flow shall drain towards the ditch (Not Applicable);
- (D) are between one and three feet in depth; and
- (E) the entire length of the ditches have been in place prior to the effective date of the applicable buffer rule.

F) The buffer width is at least 30 feet from the stream

Similarly, in accordance with Subparagraph (o)(8), the perpetual conservation easement includes the ditch and the confluence of the ditch with the stream. The easement includes language prohibiting future maintenance of the ditch. In addition, the watershed draining to the ditch is at least four times larger than the restored or enhanced area along the ditch. The watershed draining to the upper end of Reach B-2 is approximately 782,392 sf (relative to a corresponding buffer area of 32,671 sf). The watershed draining to Reach B-3 is approximately 312,499 sf (relative to a corresponding buffer area of 35,609 sf).

There are no known site constraints that would impede or adversely affect the restoration, enhancement, and preservation of riparian buffer within the recorded easement area. Diffuse flow of runoff will be maintained in the riparian buffer except where the upstream portions of non-subject ditch segments of B2 and B3 enter the buffered area. Where such diffuse flow cannot be attained in these areas and where NCDWR agrees that such treatment of stormwater is not possible, deduction of credit has been calculated and applied following guidance of Buffer Interpretation/Clarification Memo #2008-019. In these upstream areas, an immediate drainage area equaling 0.10-acre from the point of discharge has been used to calculate the area of buffer being short-circuited by the ditch. Since the upstream origin of the ditch is not buffered, the credit deduction has been applied to the most upstream portion of the ditch on the Site.

Mitigation credits are presented in Table 2 and Figure 8A/8B in Appendix A and are based upon the conservation easement survey included in Appendix C.

3.0 Baseline Summary

The project team restored high quality riparian buffers along all unnamed tributaries within the Site. The project design ensured that no adverse impacts to wetlands of existing riparian buffers occurred during implementation. Refer to Figure 8A/8B for the conceptual design of the project. Details of the restoration activity that occurred follows in the sections below. Refer to site photos in Appendix D.

3.1 Planting Preparation

Based upon pre-project assessment of compaction within the proposed planting areas, the project team identified two select areas of the buffer restoration project that warranted site disking (refer to Figure 7). The areas included an approximate 150-ft long area of the right top of bank of the upper end of Reach B-1 and the riparian area of the right top of bank of Reach A-1 (including the area of field identified as the "Riparian Habitat Corridor"). These areas were disked prior to planting to reduce compaction and to enhance microtopography. In addition, selective mowing occurred within the riparian buffer enhancement area to limit blackberry and smaller, volunteer red maple (refer to Figure 7). This area was observed to contain a population of Japanese honey-suckle (*Lonicera japonica*) which was spot treated with herbicide. No other site preparation occurred. No observed drain tiles were observed prior to, or during, construction and planting and no other land disturbance was needed to maintain diffuse flow as required.

3.2 Riparian Area Restoration and Enhancement Activities

Prior to planting, the conservation easement boundary was marked using 6-inch diameter treated posts buried 2 feet, standing 6 feet above the ground surface, within the agricultural fields. T-posts were installed to provide supplemental marking within areas between the treated posts, within the enhancement area, and within the preservation areas as needed. The easement boundary was also marked with standard yellow Conservation Area signs, per the 01/23/14 NCDMS Boundary Marking Standards.

The planting plan consisted of the planting of four hardwood species and one softwood species on a density of approximately 538 stems per acre. This density was selected to be sufficient to meet performance standards outlined in the Rule 15A NCAC 02B .0295 of 260 trees per acre at the end of five years. Species selection and distribution were matched closely to micro-site hydrologic and edaphic conditions and include species characteristic of riparian buffer assemblages in the watershed and adjacent to the site. Species more tolerant of poorly drained soils (i.e. bald cypress and willow oak) were planted within lower landscape positions generally consisting of the Tuckerman soil series while species characteristically occurring in better drained soils will be planted in slightly higher convex landscape positions. The selected native trees are well-suited to the site-specific conditions of the property to promote high survivorship rates. No one tree species planted was greater than 50% of the established stems. Site planting was conducted on March 12-13th, 2019 by Superior Forestry Services, Inc. and supervised by project managers from both Clearwater Mitigation Solutions and Land Management Group. Table 3 summarizes the trees planted by species for the Wingfoot mitigation site.

Table 3. Planting Plan¹

Common Name	Scientific Name	% Composition	Acreage	Quantity
River Birch	<i>Betula nigra</i>	25	3.72	2,000
American Sycamore	<i>Plantanus occidentalis</i>	17.5	2.60	1,400
Bald Cypress ²	<i>Taxodium distichum</i>	27.5	4.09	2,200
Willow Oak	<i>Quercus phellos</i>	15	2.23	1,200
Water Oak	<i>Quercus nigra</i>	15	2.23	1,200
Total	N/A	100	14.87	8,000

¹Note planted area includes approximate 1.0 acres of field included for riparian habitat corridor. While no credit is proposed for this area, it was planted per the same specifications (species density and composition) as those contained within final, approved mitigation plan.

²Cypress trees are conifers, but unlike most American softwoods, they are deciduous trees that shed foliage in the fall like hardwoods. Although cypress is a softwood, it grows alongside hardwoods and was selected as an appropriate species to be planted in the wetter parts of the site.

3.3 Riparian Area Preservation Activities

No work was done in the buffer preservation areas. The preservation area will be protected in perpetuity under a conservation easement.

4.0 Annual Monitoring and Performance Criteria

Annual Monitoring will be conducted during the growing season for a period of five years. The report will include all information required by DMS monitoring guidelines including photographs, plot locations, and documentation of existing species density and composition. Monitoring will be performed in accordance with the Consolidated Mitigation Buffer Rule (15A NCAC 02B .0295) and current DMS standards. The performance criteria for the Site follows approved performance criteria presented in the guidance documents outlined in the Consolidated Buffer Rule (15A NCAC 02B .0295). Performance criteria will be evaluated throughout the five-year post-construction monitoring.

4.1 Methods

The final vegetative success criteria will be the survival of 260 planted stems per acre in the riparian buffer at the end of the required monitoring period (Monitoring Year (MY) 5). Vegetative monitoring included the establishment of eleven (11) permanent plots consistent with the Carolina Vegetation Survey (CVS) protocol Level 2 (version 4.2) (refer to Figure 9 for plot locations). Reference photos of the vegetation plots and Site were taken at each predetermined photo point location. Appendix E includes the monitoring year one (MY1) vegetation plot photographs and the planted and total stem counts. Any vegetative problem areas in the site will be noted and reported in each monitoring report. Vegetative problem areas may include areas that either lack vegetation or include populations of exotic vegetation. Monitoring reports will identify any contingency measures that may need to be employed to remedy site deficiencies.

4.2 Photo Reference Stations

Permanent photo stations were established across the project area in order to document site stability for five years post construction. Markers were established and located with GPS equipment so that the same locations and view directions on the Site are photographed each year. Photo reference stations are shown on Figure 9.

4.3 Visual Assessments

Visual assessments will be performed annually during the five-year monitoring period. Problem areas of vegetative health will be noted and areas of concern will be mapped, photographed, and documented in the subsequent annual monitoring report. Problem areas that are found will be re-evaluated in each subsequent monitoring event.

4.4 Monitoring Results (MY1)

The monitoring year one (MY1) vegetative monitoring was completed in October 2019. Overall, the Site has exceeded the required vegetative success criteria. MY1 resulted in an average stem count of 625 stems per acre. All vegetation plots have met the MY1 success criteria and many planted stems have exhibited prolific growth during the first year of monitoring. The Site is on track to meet the final success criteria.

Invasive species were observed and limited to the vicinity of Plot #8 and consisted of Japanese honeysuckle (*Lonicera japonica*) and a few sporadic stems of Chinese privet (*Ligustrum sinense*). At this time, populations are not overwhelming the growth of planted trees but will be monitored during monitoring year two (MY2) and any remedial actions will be coordinated with DMS. Refer to Appendix E for monitoring year one (MY1) vegetation plot photographs and the planted and total stem counts.

4.5 Maintenance and Contingency Plans

Small populations of invasive species were noted in the vicinity of Plot #8. At this time, no remedial actions are recommended. However, if it is determined that the Site's ability to achieve the performance standards are jeopardized, staff members of NCDMS/NCDWR will be notified and an adaptive management plan will be developed to address these issues.

5.0 References

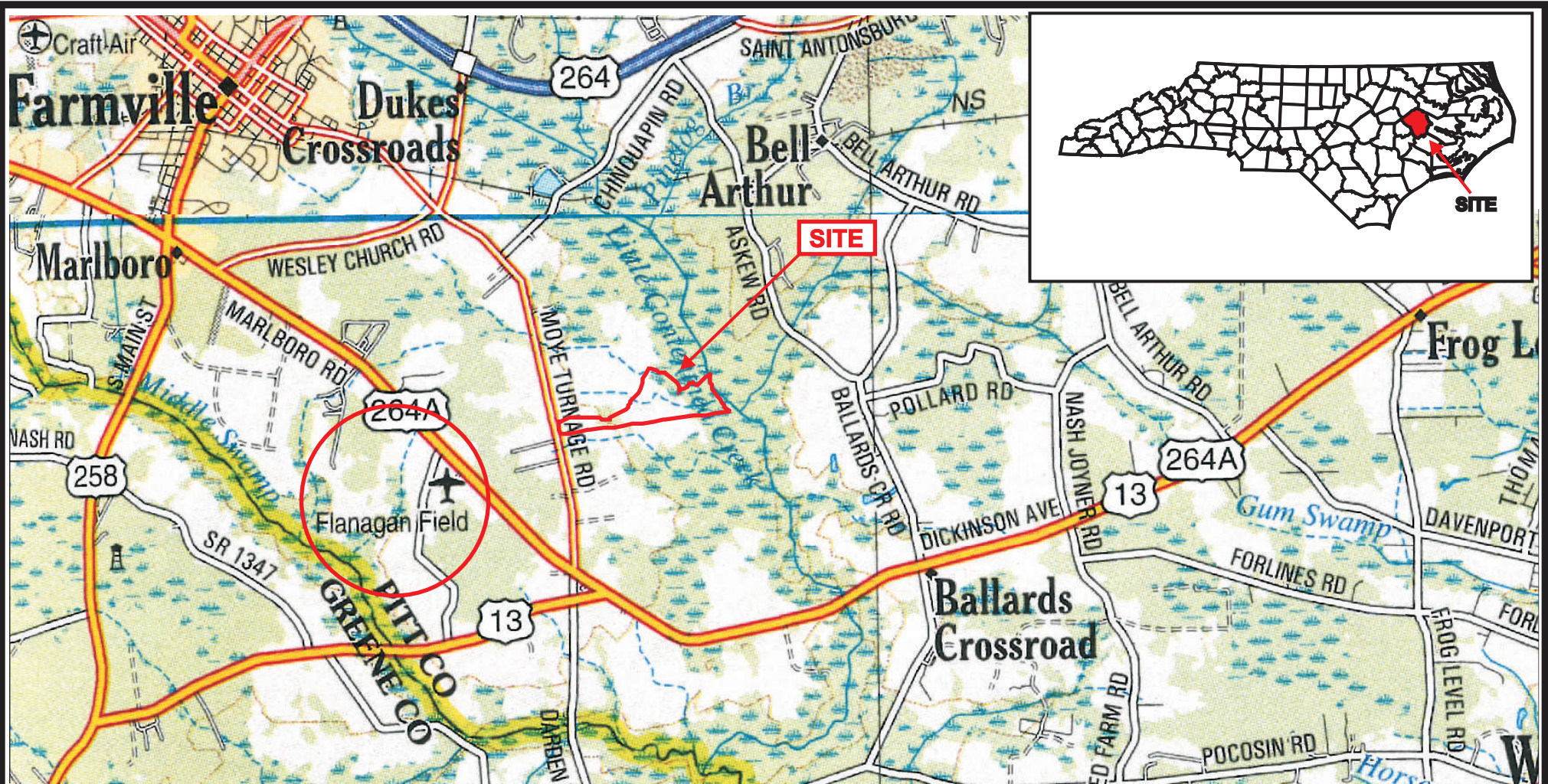
Lee, Michael T. Peet, Robert K., Steven D. Wentworth, Thomas R. 2008. CVS-EEP Protocol for Recording Vegetation Version 4.2. <http://cvs.bio.unc.edu/protocol/cvs-EEP-protocol-v4.2-lev1-2.pdf>

Natural Resources Conservation Service (NRCS). Web Soil Survey of Pitt County. <http://websoilsurvey.nrcs.usda.gov/app/HomePage.htm>

North Carolina Division of Water Quality (NCDWQ), 2011. Surface Water Classifications. <http://deq.nc.gov/about/divisions/water-resources/planning/classification-standards/classifications>

APPENDIX A:

Figures/Tables



 **Public Use Airport (not listed as a general aviation airport nor listed in the National Plan of Integrated Airport Systems or "NPIAS")**

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*Boundaries are approximate and are not meant to be absolute.

Map Source: DeLorme 2012 Atlas & Gazetteer, Pages 43 & 65



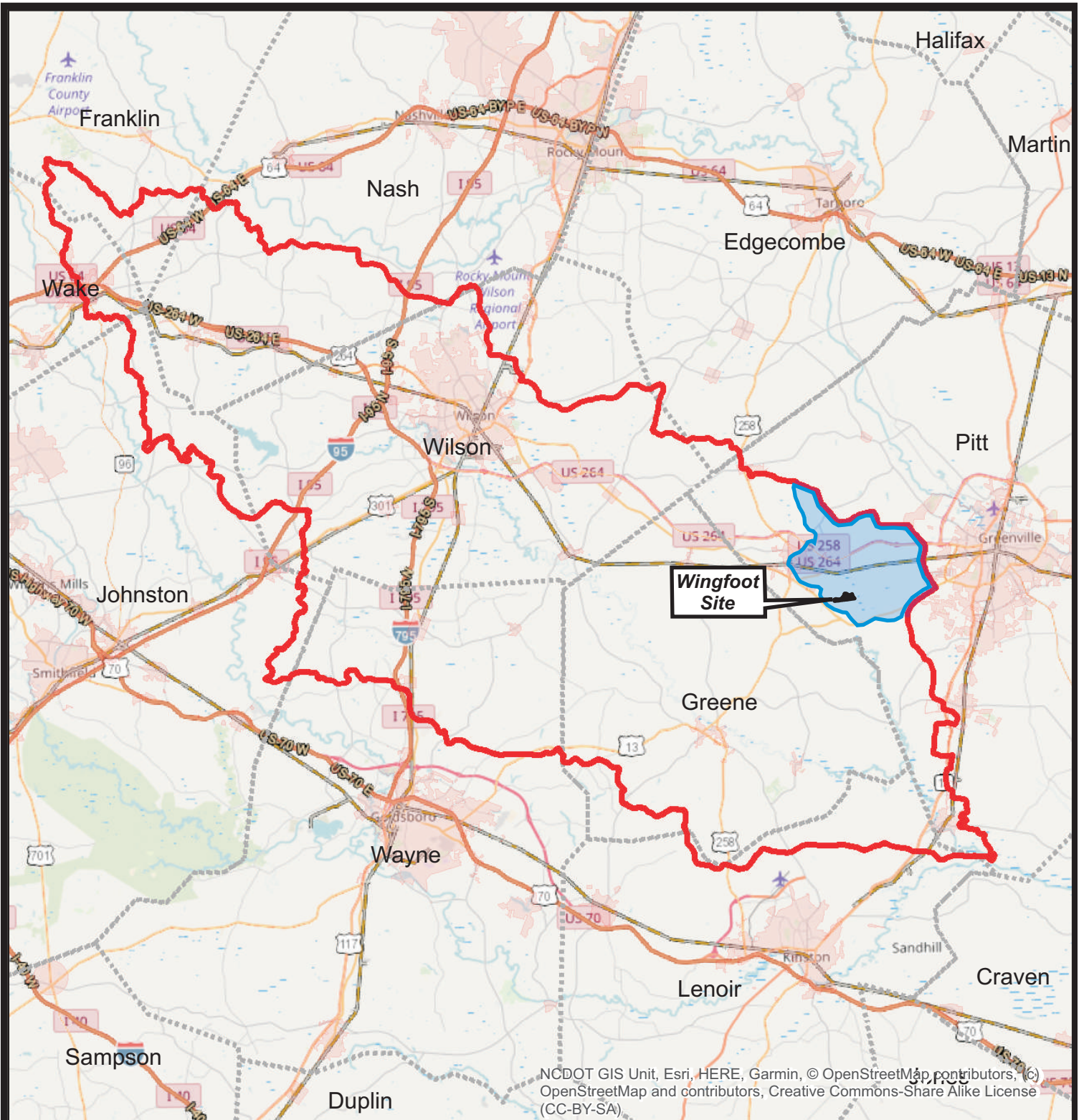
SCALE 1" = 1 mile

Wingfoot Riparian
Buffer Mitigation Site
Cataloging Unit 03020203
Pitt County, NC
March 2018
LMG # 40-18-093




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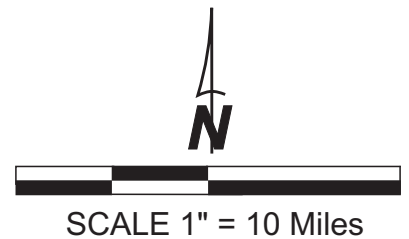


Figure 1
Vicinity Map



Legend

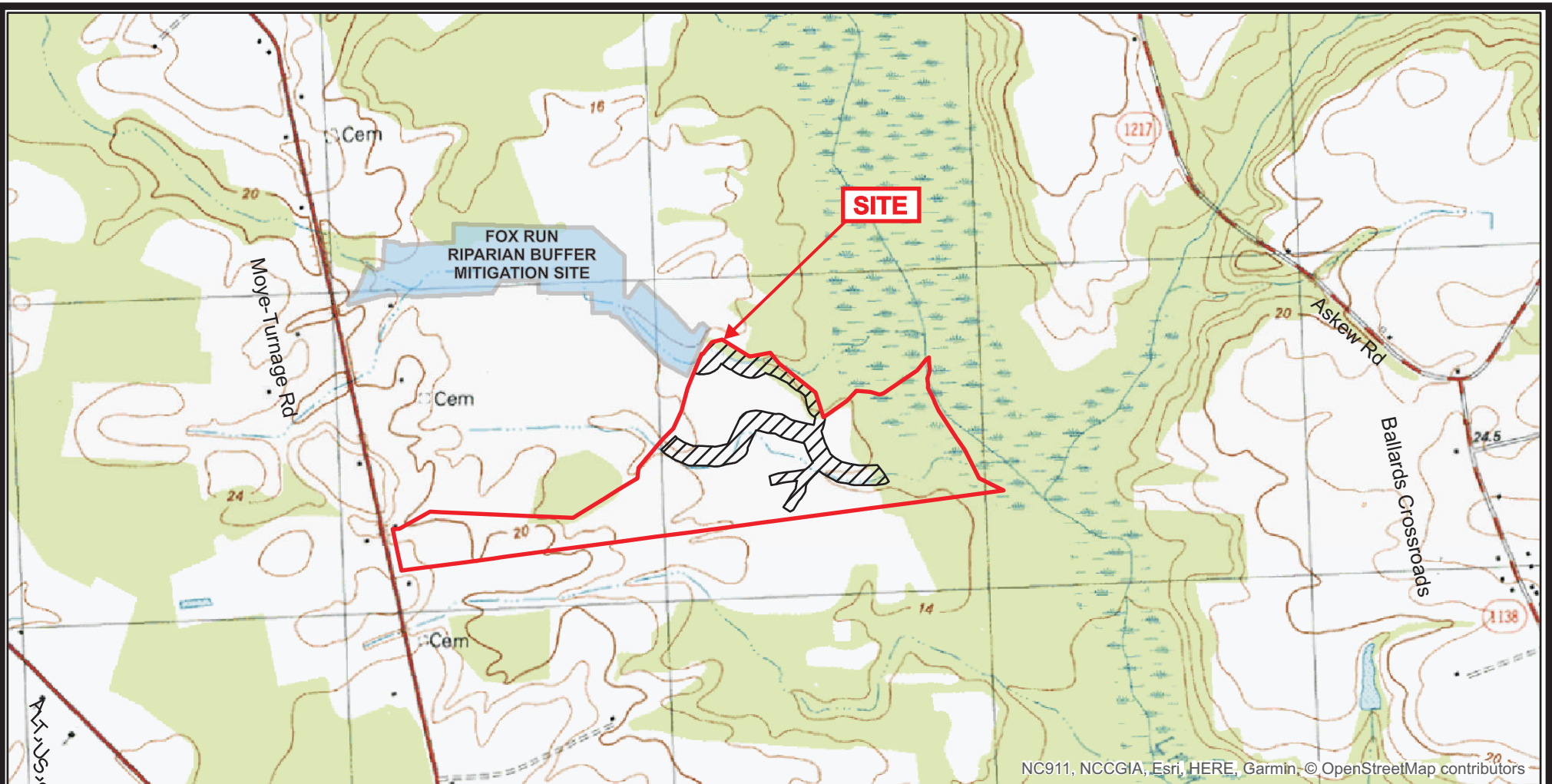
-  Project Boundary
-  Targeted Local Watershed (03020203070030)
-  8-Digit Hydrologic Unit (03020203)



Wingfoot Riparian
Buffer Mitigation Site
Cataloging Unit 03020203
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Figure 2
Watershed Map



Legend

 Conservation Easement

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*Boundaries are approximate and are not meant to be absolute.

Map Source: USGS Farmville Quadrangle 7.5 minute



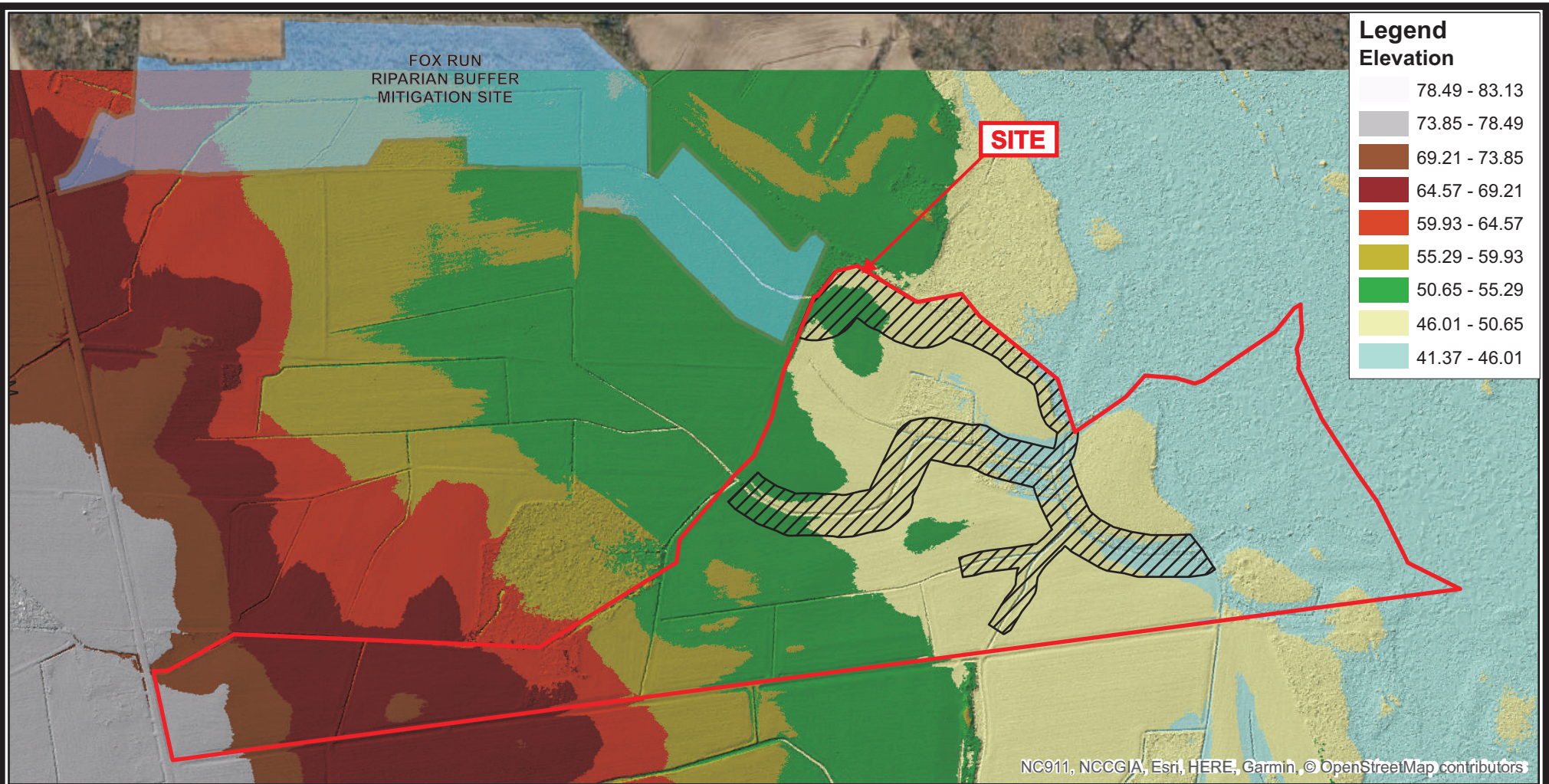
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Figure 3
Topographic Map



Legend

 Conservation Easement

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**Boundaries are approximate and are not meant to be absolute.*

Map Source: NC Floodplain Mapping Program 2014 QL2 LiDAR Data



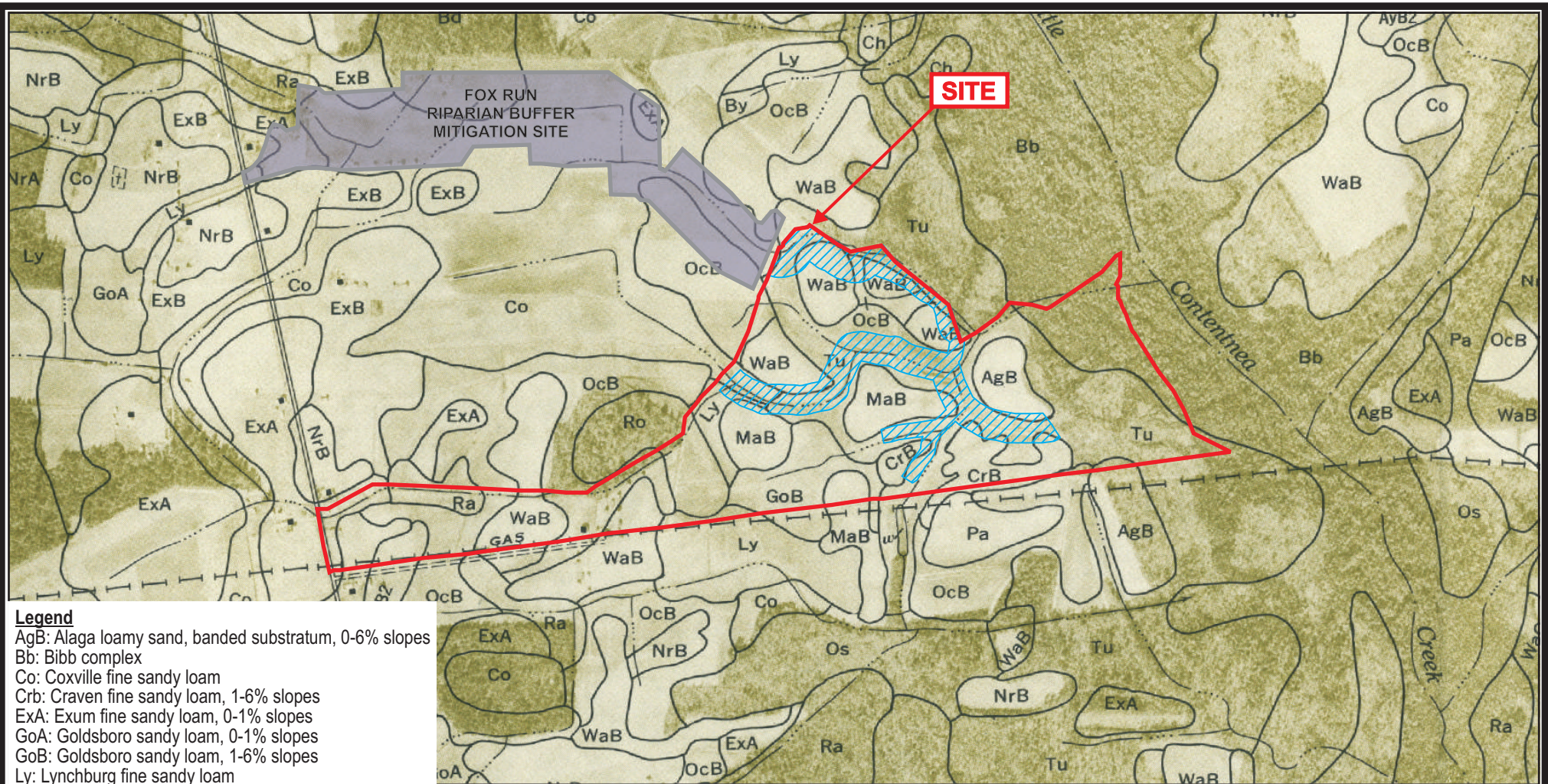
SCALE 1" = 700'

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Figure 4
LiDAR map



Legend

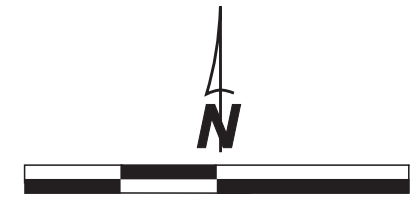
- AgB: Alaga loamy sand, banded substratum, 0-6% slopes
- Bb: Bibb complex
- Co: Coxville fine sandy loam
- CrB: Craven fine sandy loam, 1-6% slopes
- ExA: Exum fine sandy loam, 0-1% slopes
- GoA: Goldsboro sandy loam, 0-1% slopes
- GoB: Goldsboro sandy loam, 1-6% slopes
- Ly: Lynchburg fine sandy loam
- MaB: Masada sandy loam, 0-4% slopes
- NrB2: Norfolk sandy loam, 1-6% slopes, eroded
- OcB: Ocilla loamy fine sand, 0-4% slopes
- Ra: Rains fine sandy loam
- Tu: Tuckerman fine sandy loam
- WaB: Wagram loamy sand, 0-6% slopes

Conservation Easement

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**Boundaries are approximate and are not meant to be absolute.*

Map Source: NRCS Pitt County Soil Survey, 1974



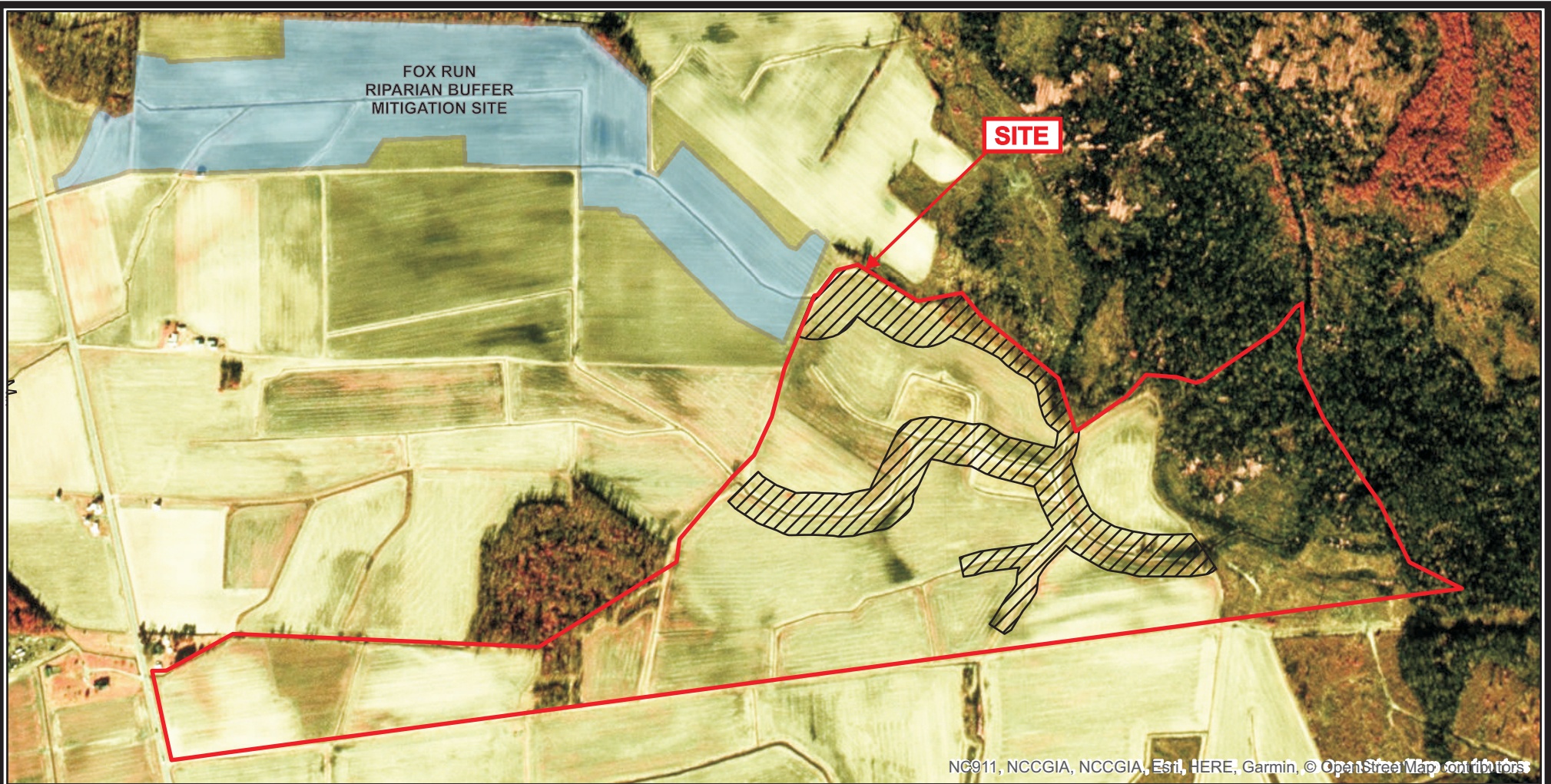
SCALE 1" = 1,000'

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Figure 5
Soils Map



NC911, NCCGIA, NCCGIA, Esri, HERE, Garmin, © OpenStreetMap contributors

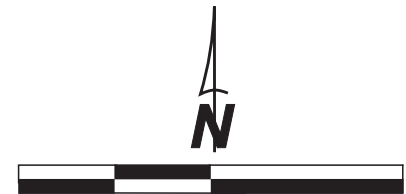
Legend

 Conservation Easement

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**Boundaries are approximate and are not meant to be absolute.*

Map Source: 1998 NAPP Aerial Photography



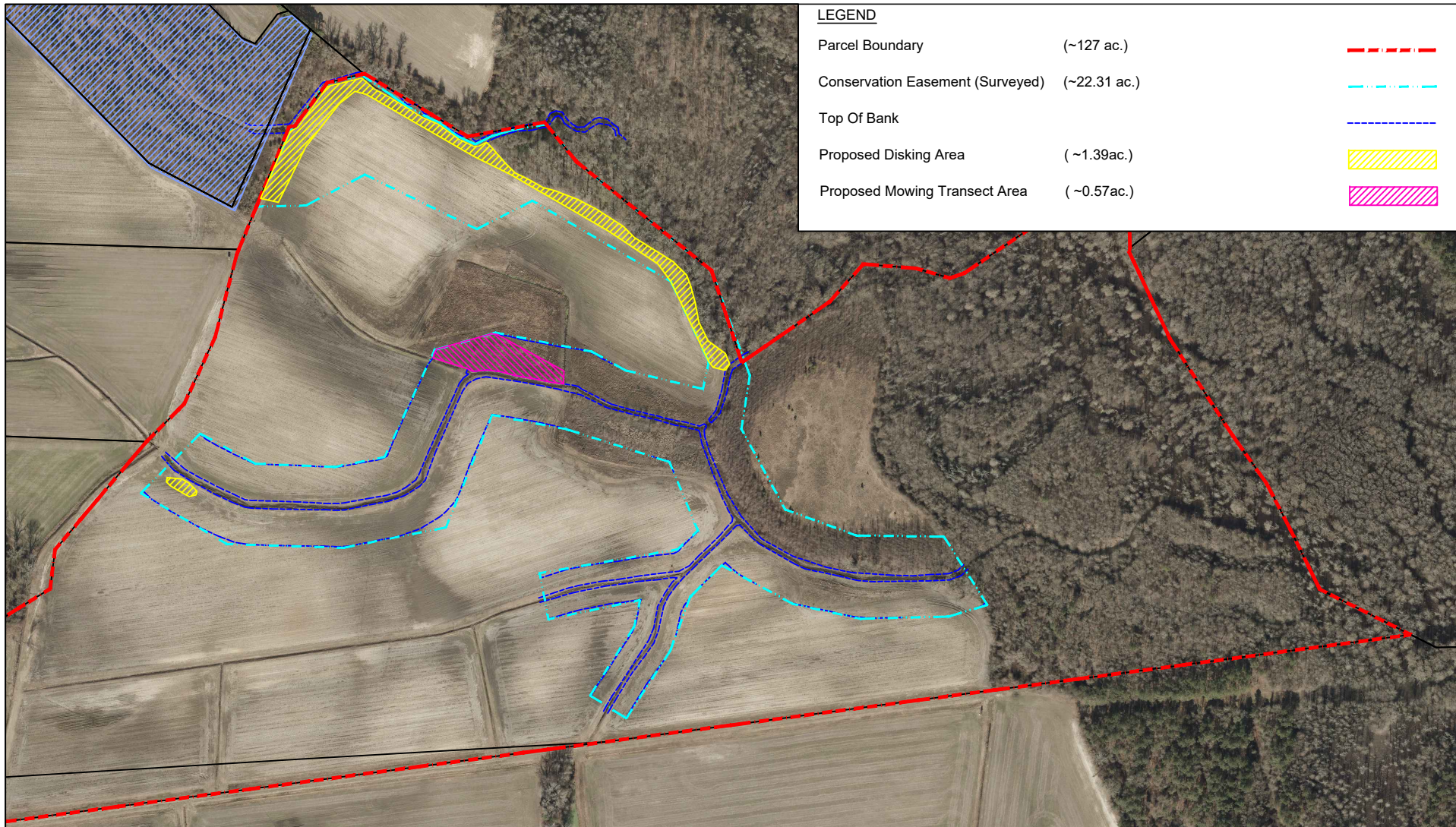
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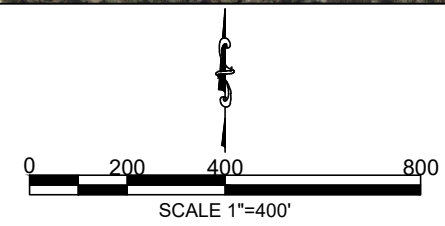


Figure 6
1998 Aerial Photograph



LEGEND		
Parcel Boundary	(~127 ac.)	
Conservation Easement (Surveyed)	(~22.31 ac.)	
Top Of Bank		
Proposed Disking Area	(~1.39ac.)	
Proposed Mowing Transect Area	(~0.57ac.)	

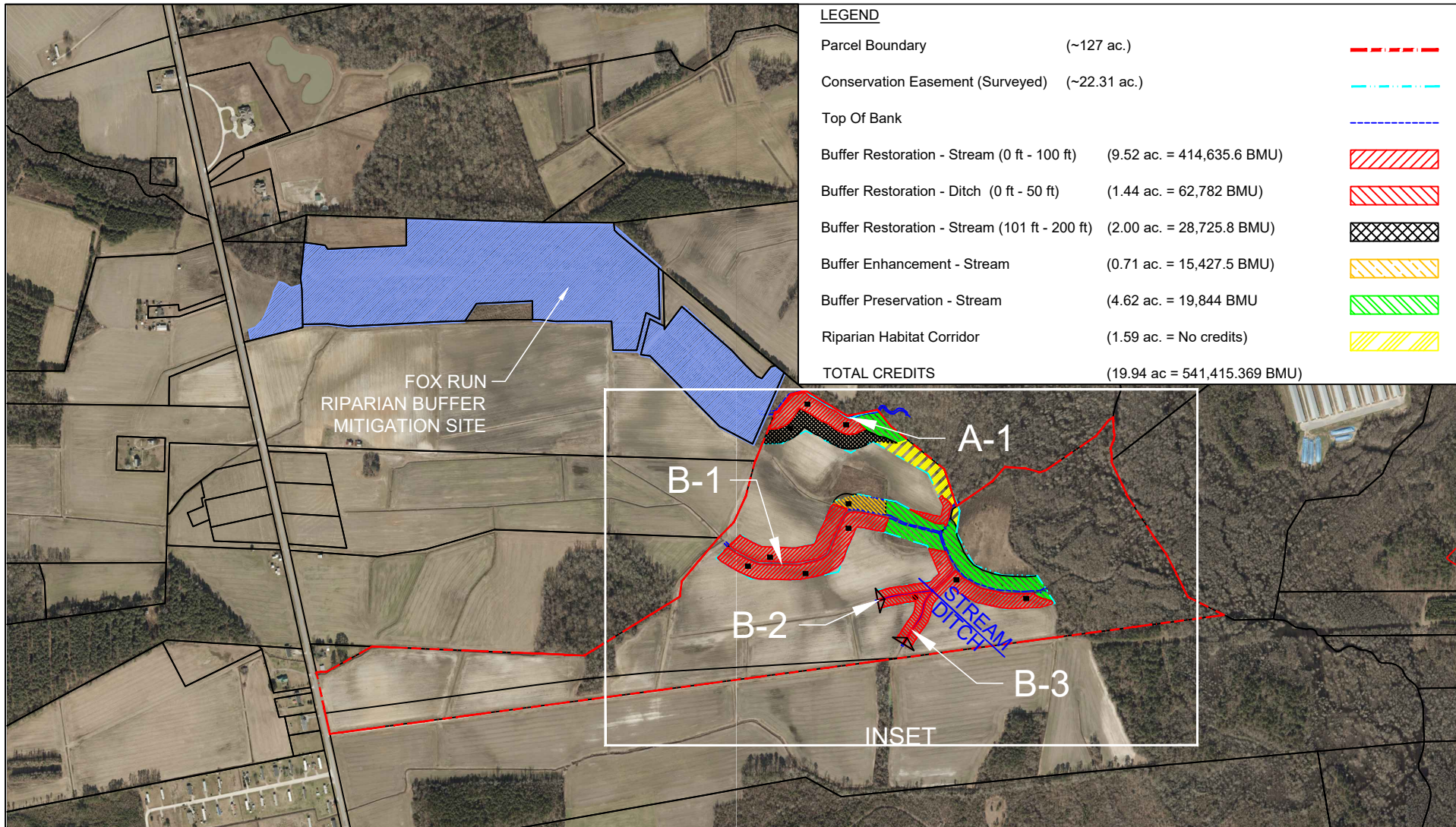
NOTES:
 1. BUFFER MITIGATION BOUNDARIES BASED UPON BASE SURVEY DRAWING FROM K2 DESIGN GROUP.



Wingfoot Riparian Buffer Mitigation Site
 Cataloging Unit 03020203
 Pitt County, NC
 January 2019
 LMG18.093

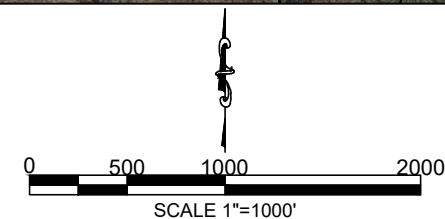


Figure 7
 Conservation Easement
 with Proposed Disking Areas



NOTES:

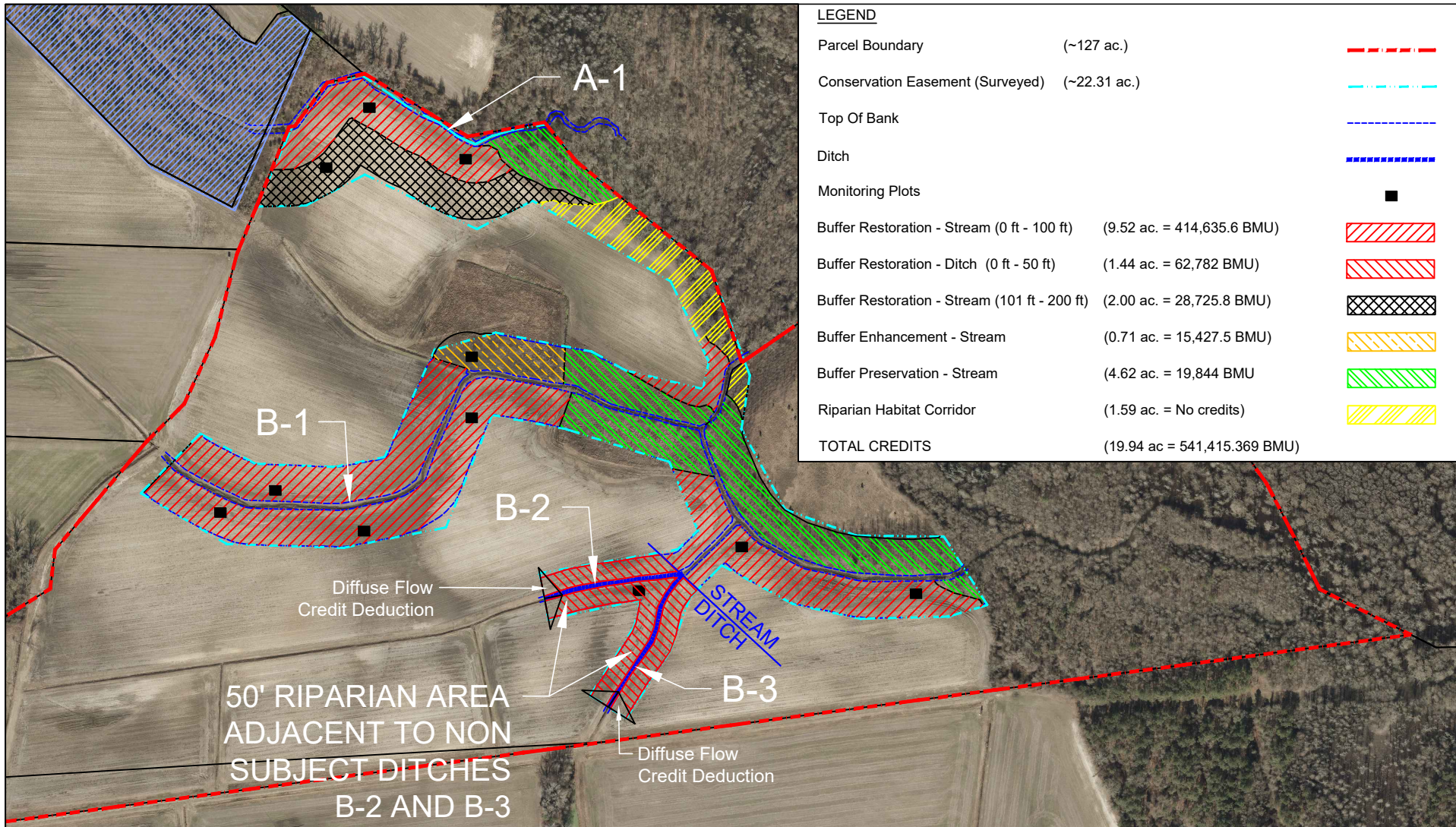
1. BUFFER MITIGATION BOUNDARIES BASED UPON BASE SURVEY DRAWING FROM K2 DESIGN GROUP.



Wingfoot Riparian Buffer Mitigation Site
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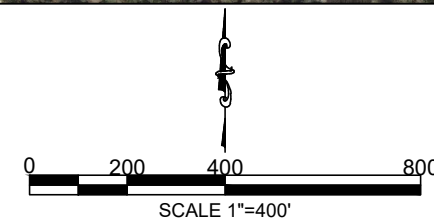


Figure 8A
 Mitigation Plan Overview



NOTES:

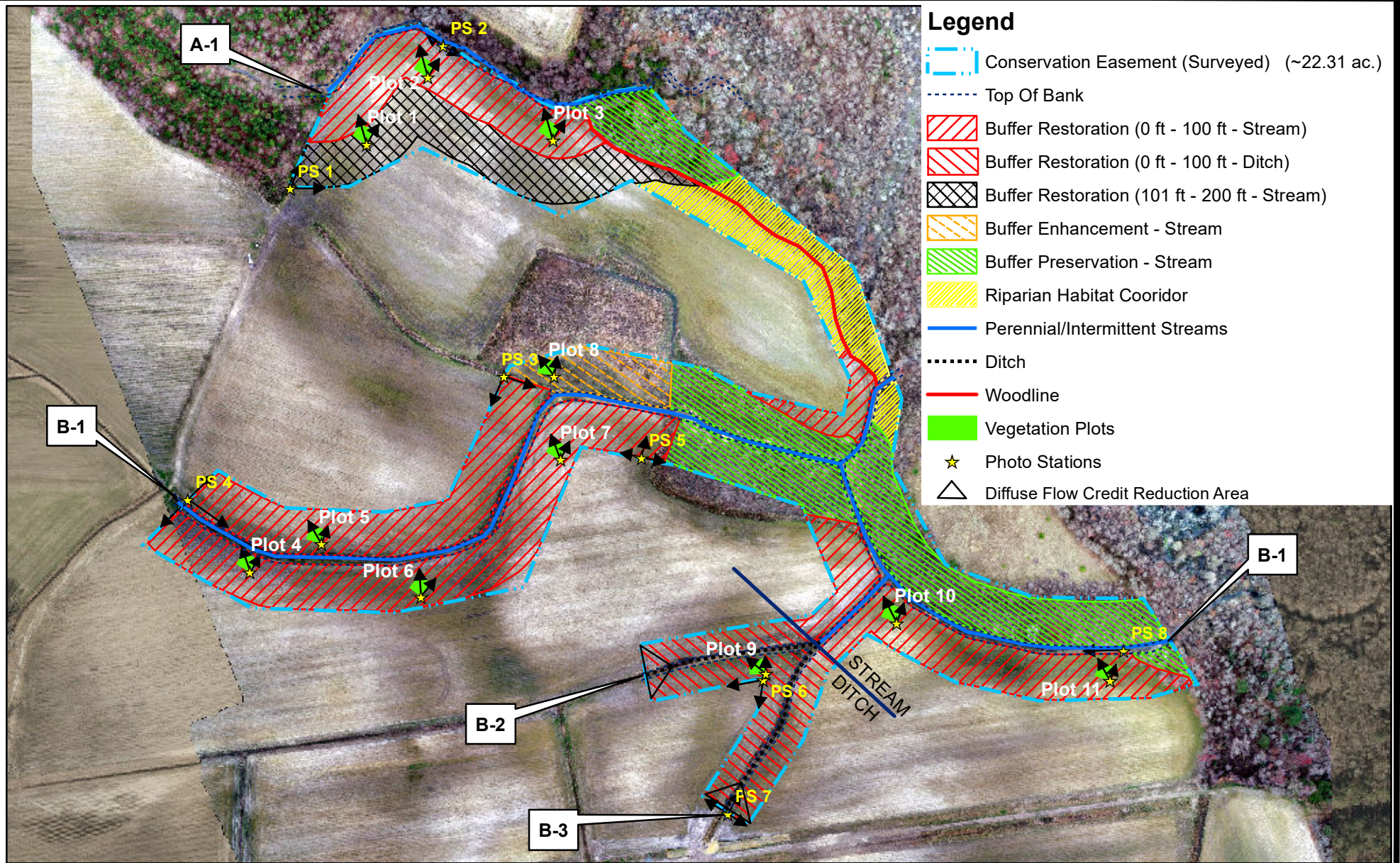
1. BUFFER MITIGATION BOUNDARIES BASED UPON BASE SURVEY DRAWING FROM K2 DESIGN GROUP.



Wingfoot Riparian Buffer Mitigation Site
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Figure 8B
 Mitigation Plan Inset
 with Plot Locations



- ### Legend
- Conservation Easement (Surveyed) (~22.31 ac.)
 - Top Of Bank
 - Buffer Restoration (0 ft - 100 ft - Stream)
 - Buffer Restoration (0 ft - 100 ft - Ditch)
 - Buffer Restoration (101 ft - 200 ft - Stream)
 - Buffer Enhancement - Stream
 - Buffer Preservation - Stream
 - Riparian Habitat Corridor
 - Perennial/Intermittent Streams
 - Ditch
 - Woodline
 - Vegetation Plots
 - Photo Stations
 - Diffuse Flow Credit Reduction Area

L:\WETLANDS\2018 WETLANDS FILES\LMG18.305 --- Wingfoot Buffer Project, Kevin Yates\Maps
 Map Source: 2016 NC OneMap Aerial Photography



Wingfoot Riparian Buffer Mitigation Site
 Cataloging Unit 03020203
 Pitt County, NC

Map Date: 03-22-19
 LMG18.305

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 3805 Wrightsville Avenue
 Wilmington, NC 28403
 (910) 452-0001

Figure 9
Monitoring Plan View

Table 1. Buffer Project Attributes
Wingfoot Riparian Buffer Mitigation Site
Monitoring Year 1 – 2019

Project Name	Wingfoot Riparian Buffer Restoration Project
Hydrologic Unit Code	03020203070030 (14 digit)
River Basin	Neuse
Geographic Location (Lat, Long)	35.565723, -77.533763
Site Protection Instrument (DB, PG)	DB 3765 Page 517
Total Credits (BMU)	541,415.369 (sf)
Types of Credits	Riparian Buffer
Mitigation Plan Date	February 2019
Initial Planting Date	March 12th-13th, 2019
Baseline Monitoring Date	March 13th-20th, 2019
Baseline Report Date	September 2019
MY1 Report Date	December 2019
MY2 Report Date	
MY3 Report Date	
MY4 Report Date	
MY5 Report Date	



Table 2. Wingfoot, 100078, Project Mitigation Credits

Neuse 03020203		Service Area														
19.16394		N Credit Ratio (sf/credit)														
N/A		P Credit Ratio (sf/credit)														
Credit Type	Location	Subject? (enter NO if ephemeral or ditch ¹)	Feature Type	Mitigation Activity	Min-Max Buffer Width (ft)	Feature Name	Total Area (sf)	Total (Creditable) Area of Buffer Mitigation (sf)	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)	Delivered Nutrient Offset: P (lbs)
Buffer	Rural	Yes	I / P	Restoration	0-100	A1, B1, B2	414,636	414,636	1	100%	1.00000	Yes	414,636.000	Yes	21,636.261	—
Buffer	Rural	Yes	I / P	Restoration	101-200	A1, B1, B2	87,048	87,048	1	33%	3.03030	Yes	28,725.869	Yes	4,542.281	—
Buffer	Rural	Yes	I / P	Enhancement	0-100	B1	30,855	30,855	2	100%	2.00000	Yes	15,427.500	No	—	—
Buffer	Rural	No	Ditch	Restoration	0-50	B2, B3 (ditches)	71,494	62,782	1	100%	1.00000	Yes	62,782.000	Yes	3,730.652	—
Totals:							604,033	595,321					—		—	—
Enter Preservation Credits Below								Eligible for Preservation (sf):		198,440						
Credit Type	Location	Subject?	Feature Type	Mitigation Activity	Min-Max Buffer Width (ft)	Feature Name	Total Area (sf)	Total (Creditable) Area for Buffer Mitigation (sf)	Initial Credit Ratio (x:1)	% Full Credit	Final Credit Ratio (x:1)	Riparian Buffer Credits				
	Rural	Yes	I / P		0-100	A1, B1	201,074	198,440	10	100%	10.00000	19,844.000				
Preservation Area Subtotal (sf):								198,440								
Preservation as % Total Area of Buffer Mitigation:								25.0%								
Ephemeral Reaches as % Total Area of Buffer Mitigation:								0.0%								
TOTAL AREA OF BUFFER MITIGATION (TABM)																
Mitigation Totals		Square Feet	Credits													
Restoration:		564,466	506,143.869													
Enhancement:		30,855	15,427.500													
Preservation:		198,440	19,844.000													
Total Riparian Buffer:		793,761	541,415.369													
TOTAL NUTRIENT OFFSET MITIGATION																
Mitigation Totals		Square Feet	Credits													
Nutrient	Nitrogen:	0	0.000													
Offset:	Phosphorus:		0.000													

1. The Randleman Lake buffer rules allow some ditches to be classified as subject according to 15A NCAC 02B .0250 (5)(a).

APPENDIX B:

Veg Data/Veg Plot Photos/Photo Stations

Table 4. Planted and Total Stems

Wingfoot Riparian Buffer Mitigation Site

DMS Project No.

Monitoring Year 1 – 2019

Scientific Name	Common Name	Species Type	Current Plot Data (MY1 2019)																								Annual Means														
			000-01-0001			000-01-0002			000-01-0003			000-01-0004			000-01-0005			000-01-0006			000-01-0007			000-01-0008			000-01-0009			000-01-0010			000-01-0011			MY1 (2019)			MY0 (2019)		
			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									5																														
Betula nigra	River Birch, Red Birch	Tree				3	3	3	1	1	1	4	4	4	1	1	1	3	3	3	2	2	2	2	2	2	3	3	3	4	4	4	7	7	7	30	30	30	31	31	31
Carya illinoensis	Pecan	Tree																																							1
Carya ovata	Common Shagbark H	Tree																					1															1			
Diospyros virginiana	American Persimmon	Tree						1																														1			
Ligustrum sinense	Chinese Privet	Shrub Tree																					1															1			
Liquidambar styraciflua	Sweet Gum, Red Gum	Tree																																				1			
Platanus occidentalis	Sycamore, Plane-tree	Tree	6	6	6	1	1	1				4	4	4	4	4	4	5	5	5	6	6	6	5	5	5	6	6	6	6	6	6	4	4	4	47	47	47	48	48	48
Quercus nigra	Water Oak, Paddle O	Tree				3	3	3	2	2	2	3	3	3	2	2	2	1	1	1				1	1	1										12	12	12	19	19	19
Quercus phellos	Willow Oak	Tree	3	3	3	1	1	1	4	4	4	5	5	5	5	5	5				4	4	4	4	4	4	5	5	5							31	31	31	31	31	31
Rhus copallinum		Shrub Tree																																				6			
Taxodium distichum	Bald-cypress	Tree	9	9	9	5	5	5	9	9	9	2	2	2	2	2	2	7	7	7	4	4	4	1	1	1	1	1	1	6	6	6	4	4	4	50	50	50	52	52	52
Stem count			18	18	18	13	13	14	16	16	21	18	18	18	14	14	14	16	16	16	16	16	16	13	13	21	15	15	15	16	16	16	15	15	16	170	170	185	181	181	188
size (ares)			1			1			1			1			1			1			1			1			1			1			11			11					
size (ACRES)			0.02			0.02			0.02			0.02			0.02			0.02			0.02			0.02			0.02			0.02			0.27			0.27					
Species count			3	3	3	5	5	6	4	4	5	5	5	5	5	5	5	4	4	4	4	4	4	5	5	8	4	4	4	3	3	3	3	3	4	5	5	11	5	5	8
Stems per ACRE			728.4	728.4	728.4	526.1	526.1	566.6	647.5	647.5	849.8	728.4	728.4	728.4	566.6	566.6	566.6	647.5	647.5	647.5	647.5	647.5	647.5	526.1	526.1	849.8	607	607	607	647.5	647.5	647.5	607	607	647.5	625.4	625.4	680.6	665.9	665.9	691.6

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%

PnoLS: Number of planted stems excluding live stakes

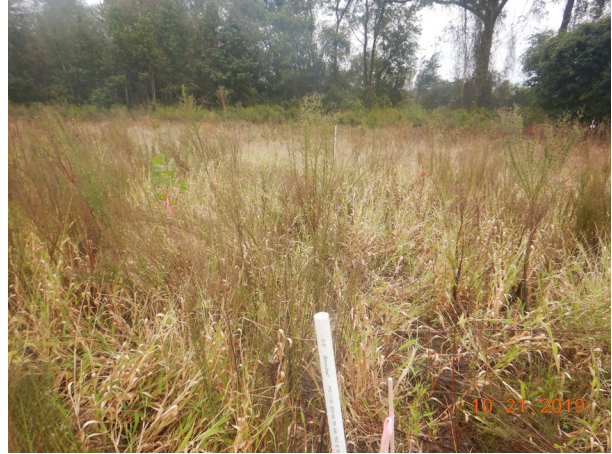
P-All: Number of planted stems including live stakes

T: Total stems

APPENDIX E. VEG PLOT PHOTOS



(1) Plot 1



(2) Plot 2



(3) Plot 3



(4) Plot 4



(5) Plot 5



(6) Plot 6

APPENDIX E. VEG PLOT PHOTOS



(7) Plot 7



(8) Plot 8



(9) Plot 9



(10) Plot 10



(11) Plot 11

APPENDIX E. SITE PHOTOS – EXISTING CONDITIONS



(1) PS1 (looking north towards Reach A1)



(2) PS1 (looking northeast towards CE boundary)



(3) PS2 (looking west along Reach A1)



(4) PS2 (looking east along Reach A1)



(5) PS3 (looking east along enhancement area)



(6) PS3 (looking northeast into Enhancement Area)

APPENDIX E. SITE PHOTOS – EXISTING CONDITIONS



(7) PS4 (looking east along Reach B1)



(8) PS4 (looking northeast into restoration area)



(9) PS5 (looking north towards preservation area)



(10) PS5 (looking west into Restoration Area)



(11) PS6 (looking north towards Reach B2)



(12) PS6 (looking west into Restoration Area)

APPENDIX E. SITE PHOTOS – EXISTING CONDITIONS



(13) PS7 (looking north along Reach B3)



(14) PS7 (looking north into Restoration Area)



(15) PS8 (looking west along Reach B1)