

MY01 Monitoring Report

Longhorn Riparian Buffer Mitigation Site

Randolph County, NC

DMS Project No. 100114

DMS Contract Number: 7866

DWR Project Number: 2019-0681

Randleman Lake Watershed

Cape Fear River Basin

HUC 03030003

RFP #16-007703



Prepared For:



NC Department of Environmental Quality

Division of Mitigation Services

1652 Mail Service Center

Raleigh, NC 27699-1652



CLEARWATER MITIGATION

S O L U T I O N S

December 23, 2020

Mr. Jeremiah Dow
NCDEQ Division of Mitigation Services
217 W. Jones Street, Suite 3000
Raleigh, NC 27603

**Re: Longhorn – Task 5 MY 1 (DMS Project No. 100114)
Response to Comments**

Dear Mr. Dow,

Please find below the response to comments on the Longhorn Buffer Mitigation Plan provided by DMS dated December 15, 2020:

1. Title pages – Recommend removing entire part that starts with “This mitigation Plan has been written in conformance...”.
Re: Text removed from Title Pages.
2. Section 1.0, 2nd paragraph – It appears the HUC in the 2nd paragraph has too many digits.
Re: This is the 14-digit HUC, now noted as 14-digit HUC.
3. Section 4.3 & 4.4 – These sections state that supplemental planting will be done in spring of 2021. Is this accurate, or can planting be done prior to March 20? We highly recommend planting much sooner if possible and change this to read winter of 2021 if applicable.
Re: It is intended for supplemental planting to take place in February 2021, and prior to March 20, 2021. Fescue grasses will be treated with herbicide on a warmer day in January 2021.
4. Figure 9 – We recommend color coding veg plots on the CCPV based on whether they met success criteria or not. For example, green for meeting and red for not meeting..
Re: The veg plots on Figure 9 have been color coded per the recommendation.

Please do not hesitate to contact me with questions at 919-624-6901.

Sincerely,

Kevin Yates

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PREPARED FOR:



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Division of Mitigation Services
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PREPARED BY:

Clearwater Mitigation Solutions

CLEARWATER MITIGATION
SOLUTIONS 

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1.0 Mitigation Project Summary

The Longhorn Riparian Buffer Restoration Project (“the Site”) is a buffer restoration project located in Randolph County, approximately 1.5 miles northwest of the Town of Sophia, North Carolina and approximately 9 miles south of High Point (NC). The property is situated just east of NC Highway 311 and is bounded to the south by Marlboro Church Road (refer to Figure 1). The Longhorn Buffer Mitigation Site is located within the Muddy Creek 12-digit HUC (030300030106) of the Randleman Lake watershed (Figure 2). The buffer restoration and enhancement areas are located along an unnamed tributary (UT) of Bob Branch and drainages that flow directly into Randleman Lake Reservoir approximately 2 river miles downstream (refer to Figure 3 and Figure 4). Prior to project completion, the Site was surrounded by areas managed for cattle production and lacked existing forested buffer along a majority of the streams and pond dissecting the site. The Site is expected to generate 376,644.994 riparian buffer credits (BMU).

The Site is located within (14 digit) Hydrologic Unit Code (HUC) 03030003010060 and North Carolina Department of Water Resources (NC DWR) Sub-Basin 03-04-07. The buffer mitigation site consists of one stream reach (A1) and an in-line pond (P1) as illustrated in Figure 8. Reach A1 is a perennial stream that flows from the in-line pond (P1) to the north and into Bob Branch approximately 1,300 lf downstream. Bob Branch has a NC DEQ surface water classification as a WS-IV* waterbody.

1.1 Project Goals

The main goals of the project are to provide high quality compensatory mitigation for authorized riparian buffer impacts credited through the NC DMS in-lieu-fee program and occurring within the Randleman Lake Watershed by creating a riparian corridor and restoring the historic riparian buffer. The project addresses the watershed goals identified in the Cape Fear River Basin Restoration Plan (RBRP) (NC EEP, 2010). These goals include:

- Removal of non-point source pollution (including nitrogen, phosphorous, and fecal bacteria) resulting from current land-use practices (principally cattle pasture);
- Reduction of sediment run-off/sediment loading to creek waters resulting from cattle hoof shear, bank instability, and lack of riparian buffer woody vegetation;
- Increased floodwater attenuation;
- Enhancement and protection of stream ecology and aquatic/semi-aquatic habitats; and
- Enhancement and protection of terrestrial habitats along stream terraces and hillside slopes.

These goals will be achieved via the restoration and protection of riparian buffers and adjacent riparian areas along an unnamed tributary of Bob Branch (which flows east into Randleman Lake Reservoir). Specific objectives of the proposed project to achieve the desired goals include:

- Conversion of existing cattle pasture into wooded riparian buffer and wooded riparian areas along the existing stream channel and pond via planting of characteristic hardwood species and installation of cattle-exclusion fencing;
- Reduction of stream bank instability via woody stem plantings (i.e. increased woody root material) and cattle exclusion fencing;

- Ensuring diffuse flow and increased surface roughness throughout the buffer mitigation area;
- Establishment of a conservation easement to protect the riparian buffer restoration site in perpetuity; and
- Invasive species management (as needed) during monitoring period.

Ancillary benefits of the proposed riparian buffer and adjacent riparian area restoration effort include:

- Increase of organic material as food for invertebrate, 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; and
- Floodwater attenuation via temporary storage, interception and slow releases from heavy rains.

1.2 Pre-construction Site Conditions

The project includes 20.81 acres of mostly open cattle pasture with one stream reach (A1) and an in-line pond (P1) which drains to Bob Branch. An additional 0.89-acres was added to the project area to include the pond dam within the conservation easement and will be reflected in an amendment to the Conservation Easement Plat. The Site has historically been managed for agricultural and cattle production. Site drainage and hydrology have been historically altered via the impoundment of waters. Based upon a review of available aerial photography, the tributary was impounded in the early 1970s (between 1970 and 1973). A portion of the site was in cropland as early as 1948. The remaining land was cleared and converted to agricultural production in the 1950s.

The buffer mitigation site consists of one stream reach (A1) and an in-line pond (P1) as illustrated in Figure 8. Reach A1 is a perennial stream that flows from the in-line pond (P1) to the north and into Bob Branch. There is approximately 625 lf of stream associated with Reach A1 within the proposed buffer easement area. Pond (P1) is an in-line pond that is approximately 5.3-acres and lies entirely within the proposed conservation easement area.

The stream reach (A1) and an in-line pond (P1) have been restored as a forested riparian buffer to 200-ft (approximately 12.73 acres) while approximately 0.40 acres of partially forested areas are considered suitable for buffer enhancement. An additional 0.21 acres of existing, wooded riparian area will be enhanced as cattle exclusion fencing will be installed around the conservation easement boundary. As indicated above, an amendment to the Conservation Easement Plat to include the pond dam will be provided to NCDMS and NCDWR following recordation. The project attributes are listed in Table 1, located in Appendix A.

2.0 Determination of Credits

On June 19th, 2019, 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). Based upon this evaluation, DWR determined that areas within 200 ft of Reach A-1 and Pond P-1

are eligible for buffer credit. Inclusive of this area are approximately 12.73 acres of non-forested restoration site per 15A NCAC 02B 0.0295 (n). In addition, 0.40 acres of partially forested areas are considered suitable for buffer enhancement per 15A NCAC 02B 0.0295 (n) (i.e. areas classified such that the establishment of woody stems (i.e., tree or shrub species) will maximize nutrient removal and other buffer functions).

In addition to buffer restoration and enhancement 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) enhancement of grazing areas adjacent to streams. The project is in compliance with these rules as it meets the following criteria:

Enhancement of Grazing Areas Adjacent to Streams (15A NCAC 02B 0.0295 (o)(6)):

Buffer credit at a 2:1 ratio shall be available for an applicant or mitigation provider who proposes permanent exclusion of grazing livestock that otherwise degrade the stream and riparian zone through trampling, grazing, or waste deposition by fencing the livestock out of the stream and its adjacent buffer.

An additional 0.21 acres of existing, wooded riparian area will be enhanced as cattle exclusion fencing will be installed around the conservation easement boundary.

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.

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

3.0 Baseline Summary

The project team restored high quality riparian buffers along all unnamed tributaries and an in-line pond within the Site. The project design ensured that no adverse impacts to wetlands of existing riparian buffers occurred during implementation. Refer to Figure 8 for the conceptual design of the project. Details of the restoration activity that occurred follows in the sections below.

3.1 Planting Preparation

Based upon pre-project assessment of compaction within the proposed planting areas, all areas targeted for vegetative plantings within the buffer restoration project were ripped to reduce compaction and to enhance microtopography. Spot spraying of herbicide was initiated for control of invasive species within the restoration, enhancement and preservation areas (i.e. Chinese privet (*Ligustrum sinense*), Multiflora rose (*Rosa multiflora*, Japanese honeysuckle (*Lonicera japonica*), and Chinese tree-of-heaven (*Ailanthus altissima*)). Treatment areas are depicted on Figure 9. The existing 84-ft pond spillway was stabilized prior to planting. The spillway was widened to approximately 10-feet and tapered down to 6-feet. The side slopes were lined with coir fiber matting, and the bottom of the spillway lined with rip-rap. Appropriate

erosion control measures were implemented before, during, and after the spillway maintenance to prevent sediment loss into downstream waters. 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

The conservation easement boundary was marked using 6-inch diameter treated post buried 2 feet, standing 5 feet above the ground surface, within the pasture. Woven wire fencing with a top strand of barbed wire was installed along the entire easement boundary. One pedestrian access gate was installed for future monitoring and access. Three 12-ft wide gates were installed in appropriate locations to allow cattle to exit in case they were to breach the fence and enter the conservation easement. The easement boundary was marked with standard yellow Conservation Area signs, per the 01/23/14 NCDMS Boundary Marking Standards.

The planting plan consisted of the planting at least four hardwood species on a density of approximately 538 stems per acre. Species selection and distribution were matched closely to micro-site hydrologic and edaphic conditions and include species characteristic of riparian assemblages in the watershed. In other words, species more tolerant of poorly drained soils (i.e. river birch, green ash, and willow oak) were planted within lower landscape positions generally consisting of the Chewacla and Wedhakee soil series while species characteristically occurring in better drained soils (Wynott-Enon complex) will be planted in higher landscape positions (i.e. hillside slopes). 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 April 1st, 2020 by Carolina Silvics, Inc. and supervised by project managers from both Clearwater Mitigation Solutions and Land Management Group.

Table 3 summarizes the planting plan for the Longhorn mitigation site.

Table 3. Planting Plan¹

Common Name	Scientific Name	% Composition	Acreage	Quantity
American Sycamore	<i>Plantanus occidentalis</i>	30	3.94	2,119
Yellow Poplar	<i>Liriodendron tulipifera</i>	25	3.28	1,766
River Birch	<i>Betula nigra</i>	25	3.28	1,766
Willow Oak	<i>Quercus phellos</i>	15	1.97	1,060
Green Ash	<i>Fraxinus pennsylvanica</i>	5	0.66	353
Total	N/A	100	13.13	7,064

¹Note the planted area includes approximate 0.74 acres of conservation area. 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.

4.0 Annual Monitoring

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 (MY05). Native hardwood and native shrub volunteer species may be included to meet the final performance standard of 260 stems per acre. In addition, the Site must contain at least four native hardwood species. 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. 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.

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 and photos are included in Appendix B.

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.

4.2 Tables

(MY1) vegetation plot photographs and the planted and total stem counts (Table 4) are included in Appendix B.

4.3 Results and Discussion

Annual monitoring (MY01) was conducted on October 6, 2020 by LMG staff. An average stem density of 452 planted stems per acre was tallied across the site (approximately 68% of the recorded baseline (MY0) density (673 stems per acre)). Stem densities within individual monitoring plots range from 283 to 688

planted stems per acre. Stem counts within individual plots range from 7 to 17 stems with an average of 11 planted stems per plot. Six different hardwood species were observed across the site, exceeding the minimum diversity criteria. All but two vegetation plots (Plots 2 and 5) are on track to meet the final stem density success criterion of 260 stems/acre for MY05. Plots 2 and 5 experienced high seedling mortality. Plot 2 seedling mortality was likely caused by inundation and flooding of the plot. Many dead trees were observed buried in recent alluvial deposits. Plot 5 mortality was likely caused by dry conditions post-planting and the subsequent overtopping by dense grasses. In addition, it should be noted that Plots 7, 9, and 10 all exhibited relatively higher stem mortality and lower vigor. It is believed that these areas experienced mortality due to dry conditions following site planting and competition from fescue grass. Although these three plots are currently exceeding the final stem success criteria, supplemental planting will occur in these areas in the Winter of 2021 (January – February). In addition, fescue grass will be treated with herbicide immediately and prior to supplemental planting. The proposed supplemental planting area equates to approximately 3.2-acres. Supplemental planting densities and species will be coordinated with NC DMS prior to execution. Refer to Figure 9 (Current Condition Plan View) and Table 4 in Appendix B for additional information and proposed supplemental planting areas.

Small areas of invasive species were treated on the Site in MY01 (approximately 1.6-acres). Chinese privet (*Ligustrum sinense*) and multiflora rose (*Rosa multiflora*) have been observed within the proposed buffer enhancement and preservation areas and along the eastern bank of Stream A1. A small cluster of tree of heaven (*Ailanthus altissima*) and Japanese honeysuckle (*Lonicera japonica*) were also observed within the easement. These areas were treated prior to site planting and again concurrently with MY01 monitoring. Treatment appears to be working and invasive densities are declining across the Site. Though some invasive species are present throughout the Site, none are currently affecting the survival of the planted stems or the success of the project. Invasive species populations will continue to be monitored and spot herbicide treatments will be conducted as needed during the appropriate time of year. Please refer to Appendix B for visual assessment data and for vegetation plot data and vegetation plot photographs.

4.4 Maintenance and Management

Overall, the Site appears to be progressing well towards the target success criteria. However, based upon the documentation of reduced survivorship in select areas of the Site, supplemental planting will be performed in the Winter of 2021. The specific planting plan and species mix will be coordinated with NC DMS prior to execution. The site will continue to be monitored for problem areas. In addition, invasive treatment areas will continue to be monitored, and invasive vegetation management will continue to be implemented if additional exotic species volunteer into the site. If it is determined that the Site's ability to achieve the performance standards are jeopardized, staff members of NCDMS/ 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 Randolph County.
<http://websoilsurvey.nrcs.usda.gov/app/HomePage.htm>

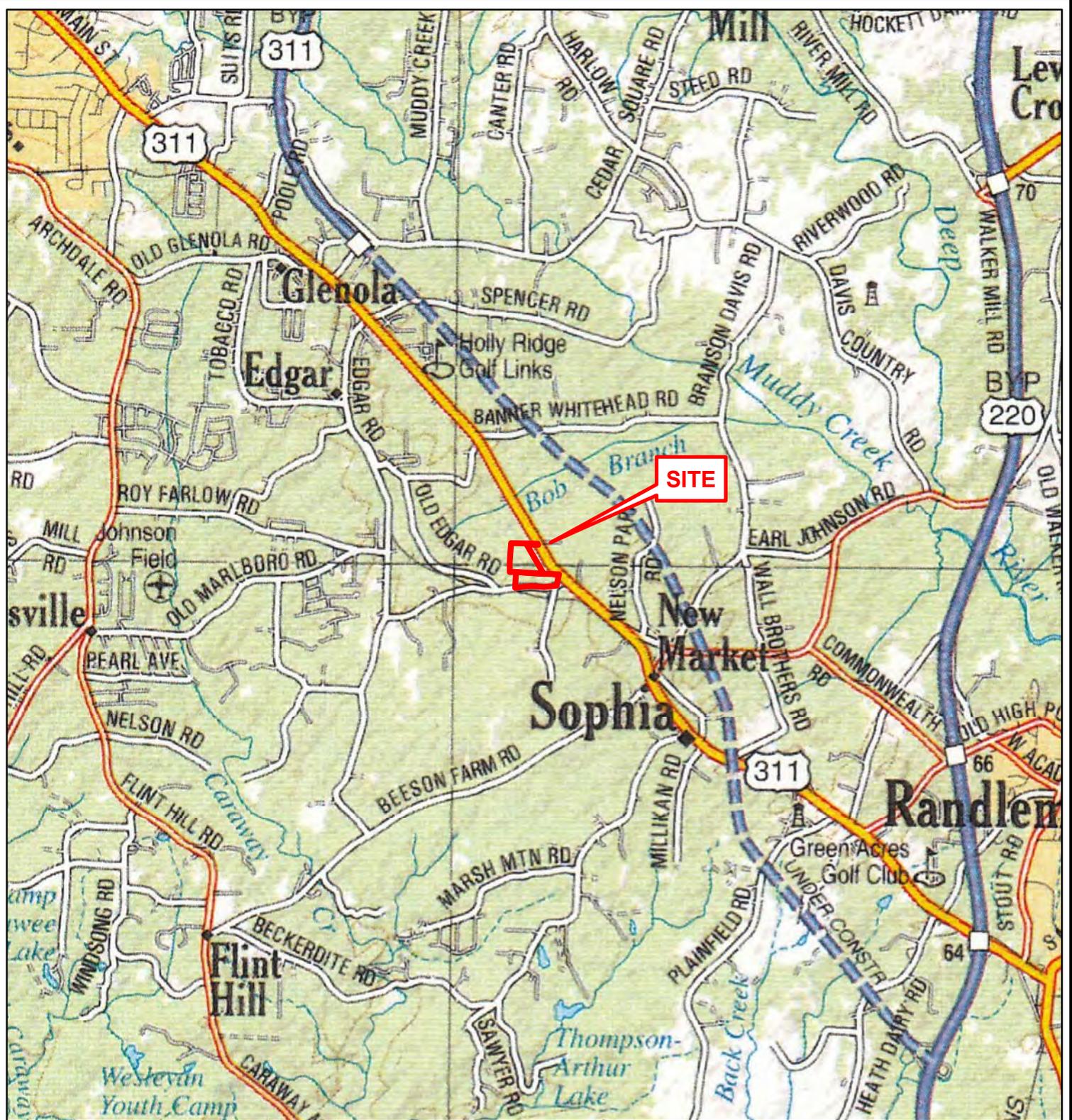
North Carolina Ecosystem Enhancement Program. 2009. Cape Fear River Basin Restoration Priorities 2009. http://www.nceep.net/services/lwps/cape_fear/RBRP%20Cape%20Fear%202008.pdf

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.
https://ncdenr.s3.amazonaws.com/s3fspublic/Mitigation%20Services/Document%20Management%20Library/Guidance%20and%20Template%20Documents/RB_NO_Base_Mon_Template_2.0_2017_5.pdf

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



Boundaries are approximate and not meant to be absolute.

Map Source: DeLorme 2012 Atlas & Gazetteer

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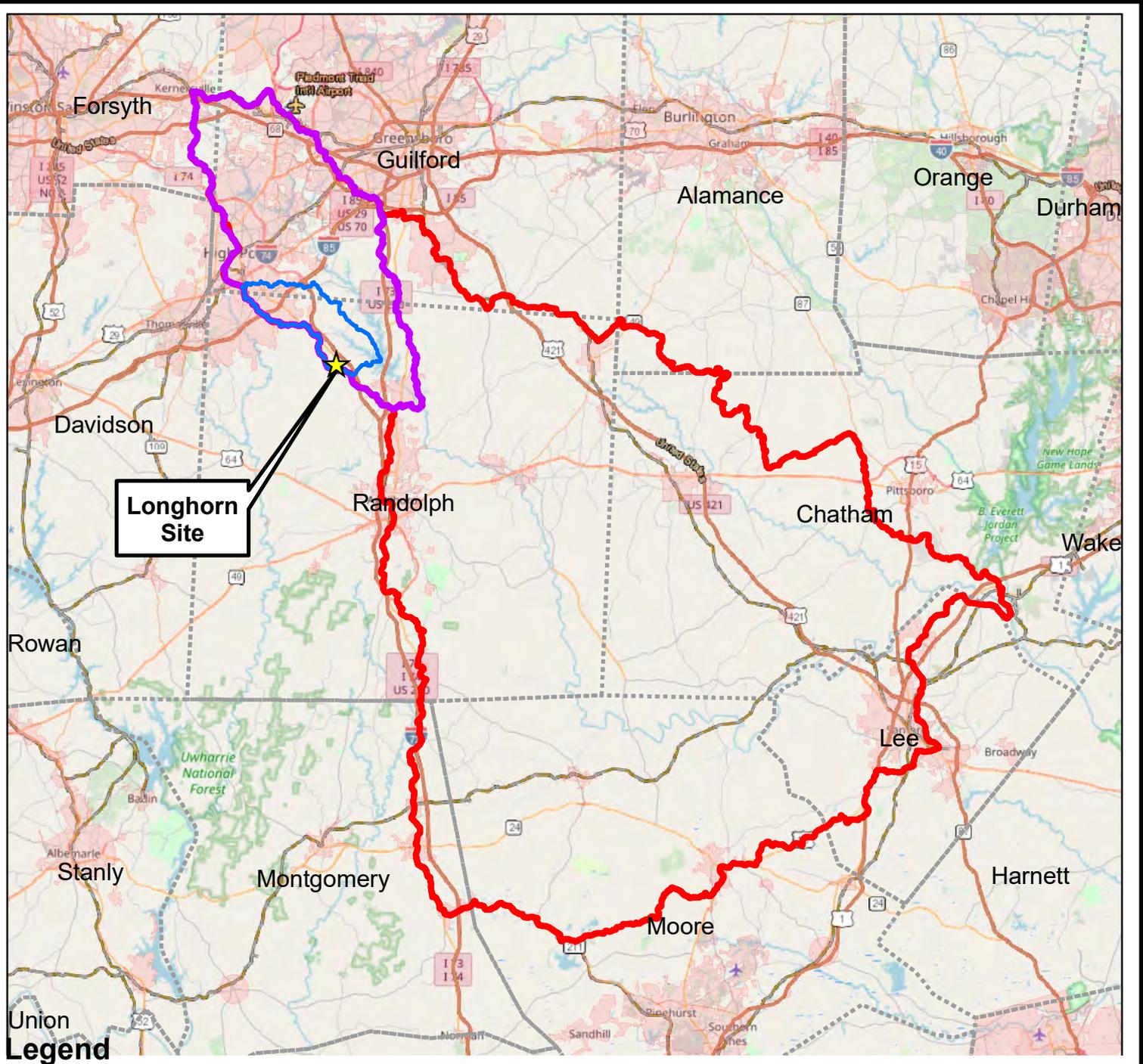


Longhorn Riparian
 Buffer Mitigation Site
 Cataloging Unit 03030003
 Randolph County, NC
 Map Date: 01-07-19
 LMG # 40-18-457

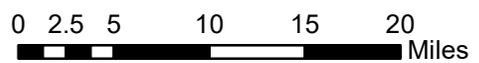
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Figure 1
 Vicinity Map



-  Longhorn Project Boundary
-  Muddy Creek Watershed (030300030106)
-  Randleman Lake Watershed
-  8-Digit Hydrologic Unit (03030003)



Boundaries are approximate and not meant to be absolute.

Map Source: ArcGIS Open Street Map

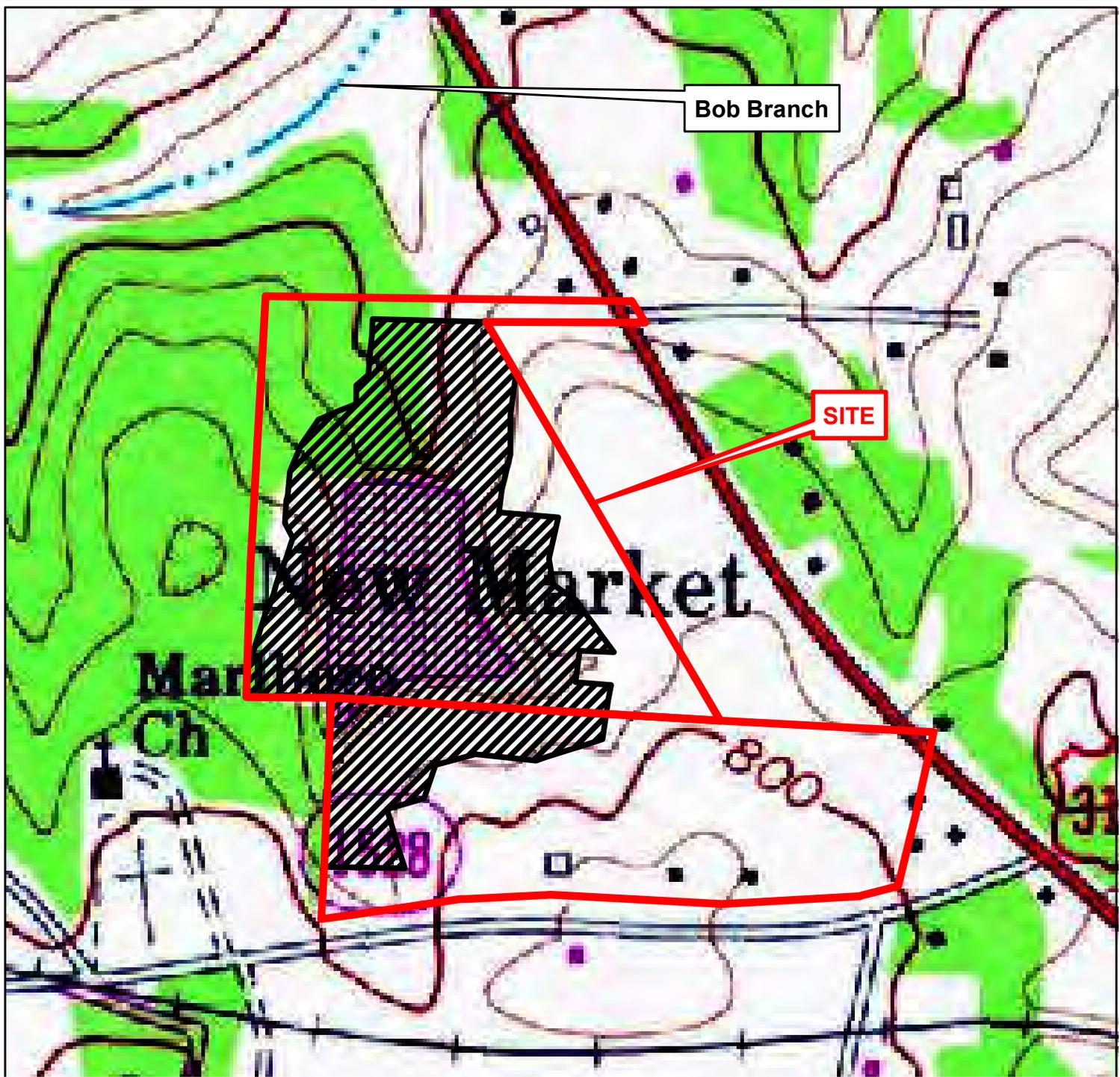
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 LMG # 19.249

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Figure 2
Watershed Map



Legend

-  Parcel Boundary: ~45.18 Acres
-  Longhorn Conservation Easement: ~20.81 Acres

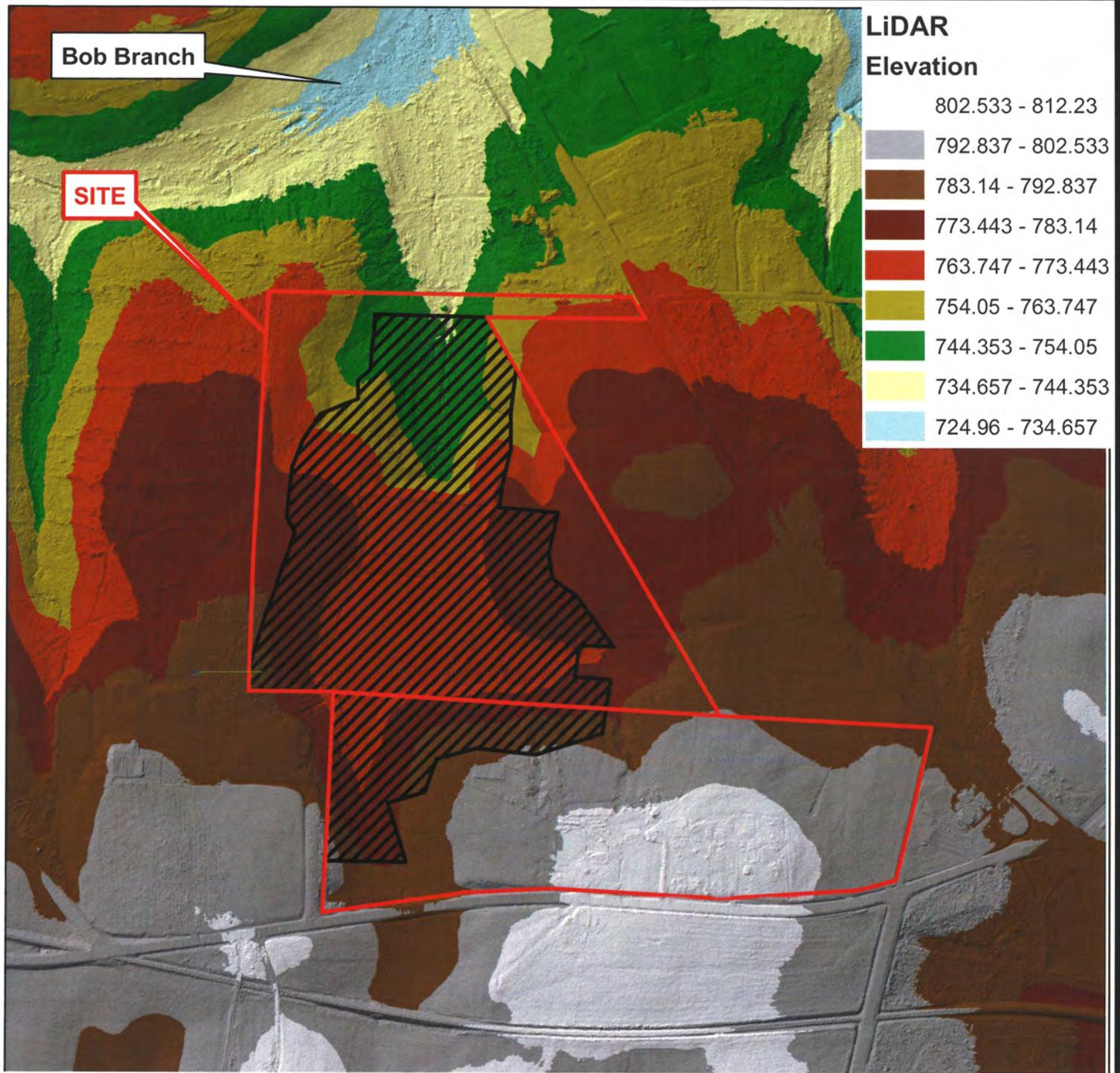
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 Boundaries are approximate and not meant to be absolute.
 Map Source: USGS Glenola Quadrangle 7.5 Minute



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**Figure 3
 Topographic Map**



Legend

- Parcel Boundary: ~45.18 Acres
- Longhorn Conservation Easement: ~20.81 Acres

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Boundaries are approximate and not meant to be absolute.

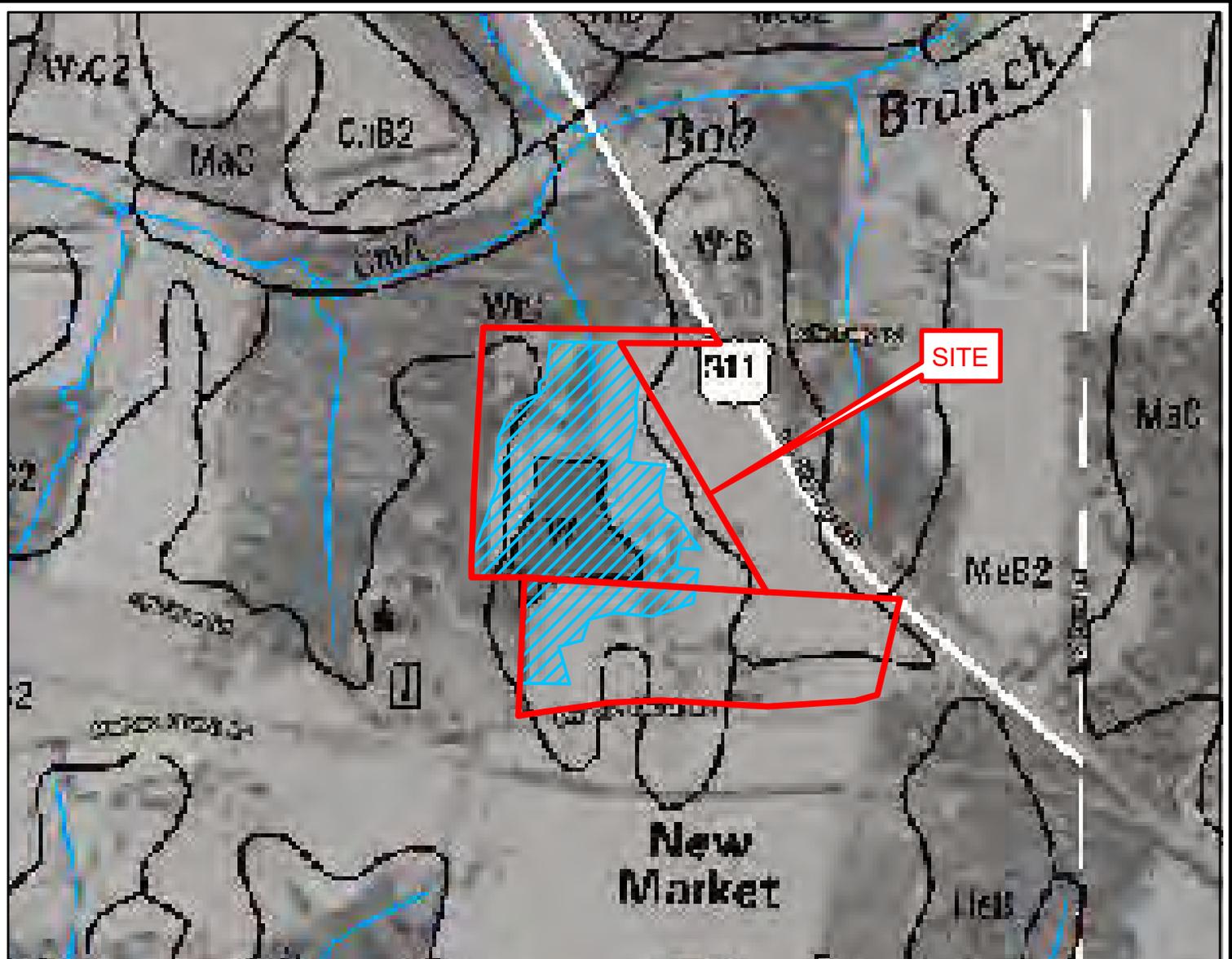
Map Source: NC Floodplain Mapping Program 2014 QL2 LiDAR Data



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**Figure 4
 LiDAR Map**



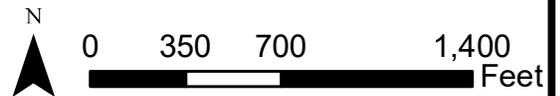
Legend

- CmA: Chewacla and Wehadkee soils, 0-2% slopes, frequently flooded
- CnB2: Coronaca clay loam, 2-8% slopes, moderately eroded
- CnC2: Coronaca clay loam, 8-15% slopes, moderately eroded
- HeB: Helena sandy loam, 2-6% slopes
- HeC: Helena sandy loam, 6-10% slopes
- MaC: Mecklenburg loam, 8-15% slopes
- MeB2: Mecklenburg clay loam, 2-8% slopes, moderately eroded
- MeC2: Mecklenburg clay loam, 8-15% slopes, moderately eroded
- WtB: Wynott-Enon complex, 2-8% slopes
- WtC: Wynott-Enon complex, 8-15% slopes
- WvB2: Wynott-Enon complex, 2-8% slopes, moderately eroded
- WvC2: Wynott-Enon complex, 8-15% slopes, moderately eroded
- WzB: Wynott-Wilkes-Poindexter complex, 2-8% slopes

 Longhorn Conservation Easement

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 Boundaries are approximate and not meant to be absolute.

Map Source: NRCS Randolph County Soil Survey, 2006

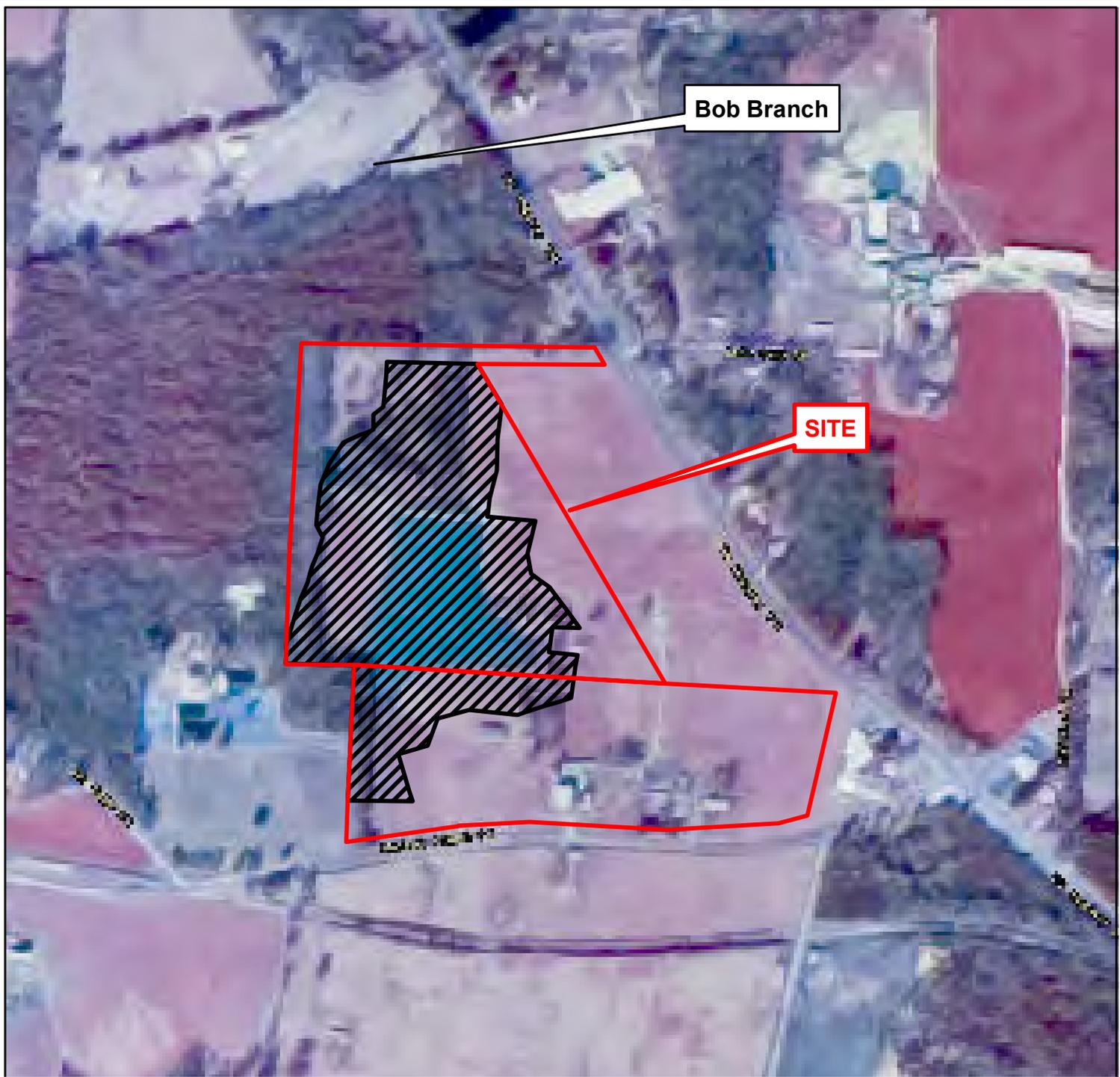


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 LMG # 19.249

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**Figure 5
 Soils Map**



Legend

-  Parcel Boundary: ~45.18 Acres
-  Longhorn Conservation Easement: ~20.81 Acres

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 Boundaries are approximate and not meant to be absolute.
 Map Source: 1998 NAPP Aerial Photography



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 LMG # 19.249



Figure 6
1998 Aerial Photograph



Legend

-  Parcel Boundary: ~45.18 Acres
-  Longhorn Conservation Easement: ~20.81 Acres

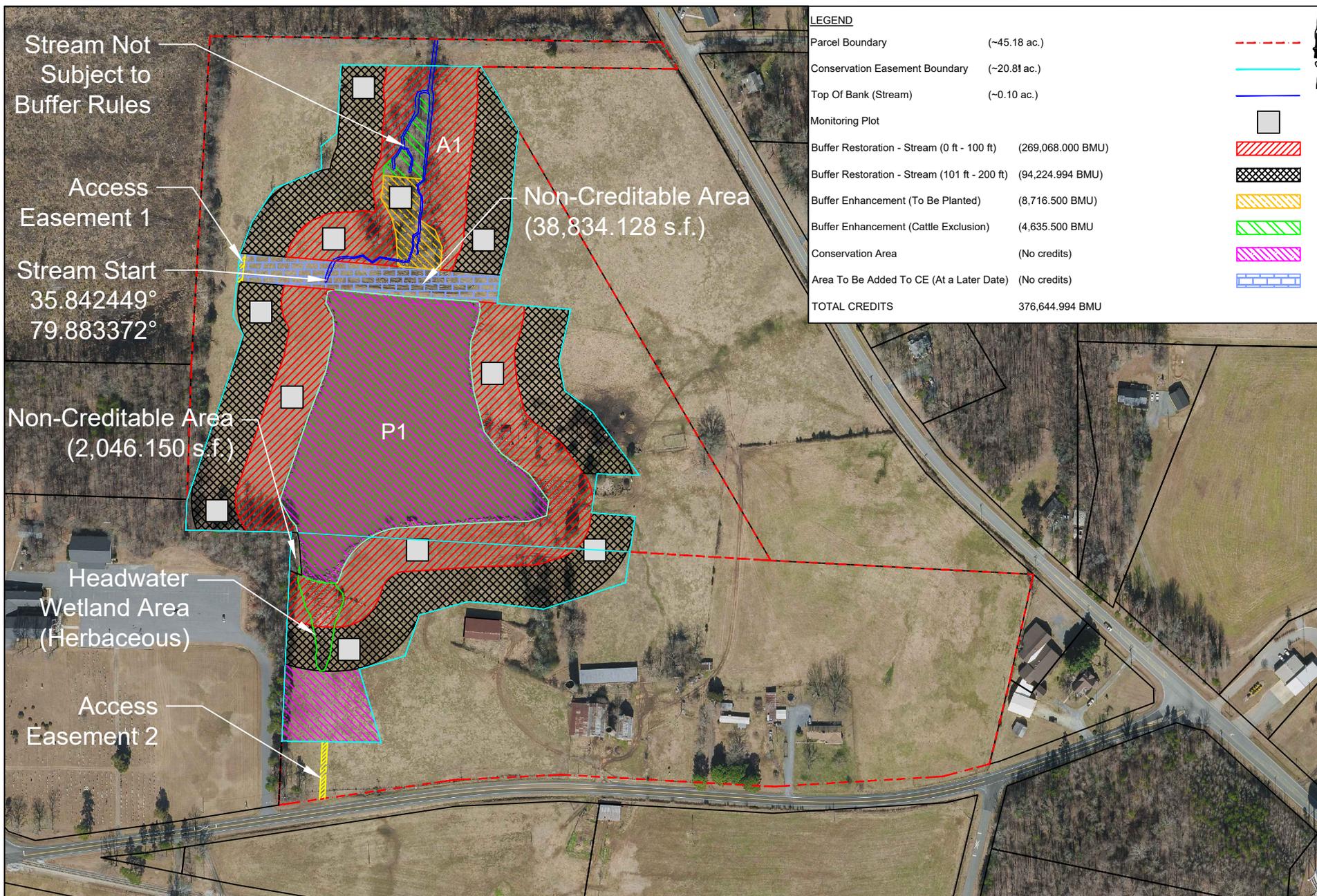
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 Boundaries are approximate and not meant to be absolute.
 Map Source: 2016 ESRI World Imagery



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**Figure 7
 Aerial Photograph**



LEGEND		
Parcel Boundary	(~45.18 ac.)	
Conservation Easement Boundary	(~20.81 ac.)	
Top Of Bank (Stream)	(~0.10 ac.)	
Monitoring Plot		
Buffer Restoration - Stream (0 ft - 100 ft)	(269,068.000 BMU)	
Buffer Restoration - Stream (101 ft - 200 ft)	(94,224.994 BMU)	
Buffer Enhancement (To Be Planted)	(8,716.500 BMU)	
Buffer Enhancement (Cattle Exclusion)	(4,635.500 BMU)	
Conservation Area	(No credits)	
Area To Be Added To CE (At a Later Date)	(No credits)	
TOTAL CREDITS	376,644.994 BMU	

NOTES:

1. TAX PARCEL BOUNDARIES AND 2018 AERIAL FROM NCONEMAP.
2. BOUNDARIES ARE APPROXIMATE AND NOT MEANT TO BE ABSOLUTE.

0 150 300 600



Project:
Longhorn Riparian Buffer
Mitigation Site
Catalog Unit 03030003

Title:
Mitigation Plan

Date:
November 2019

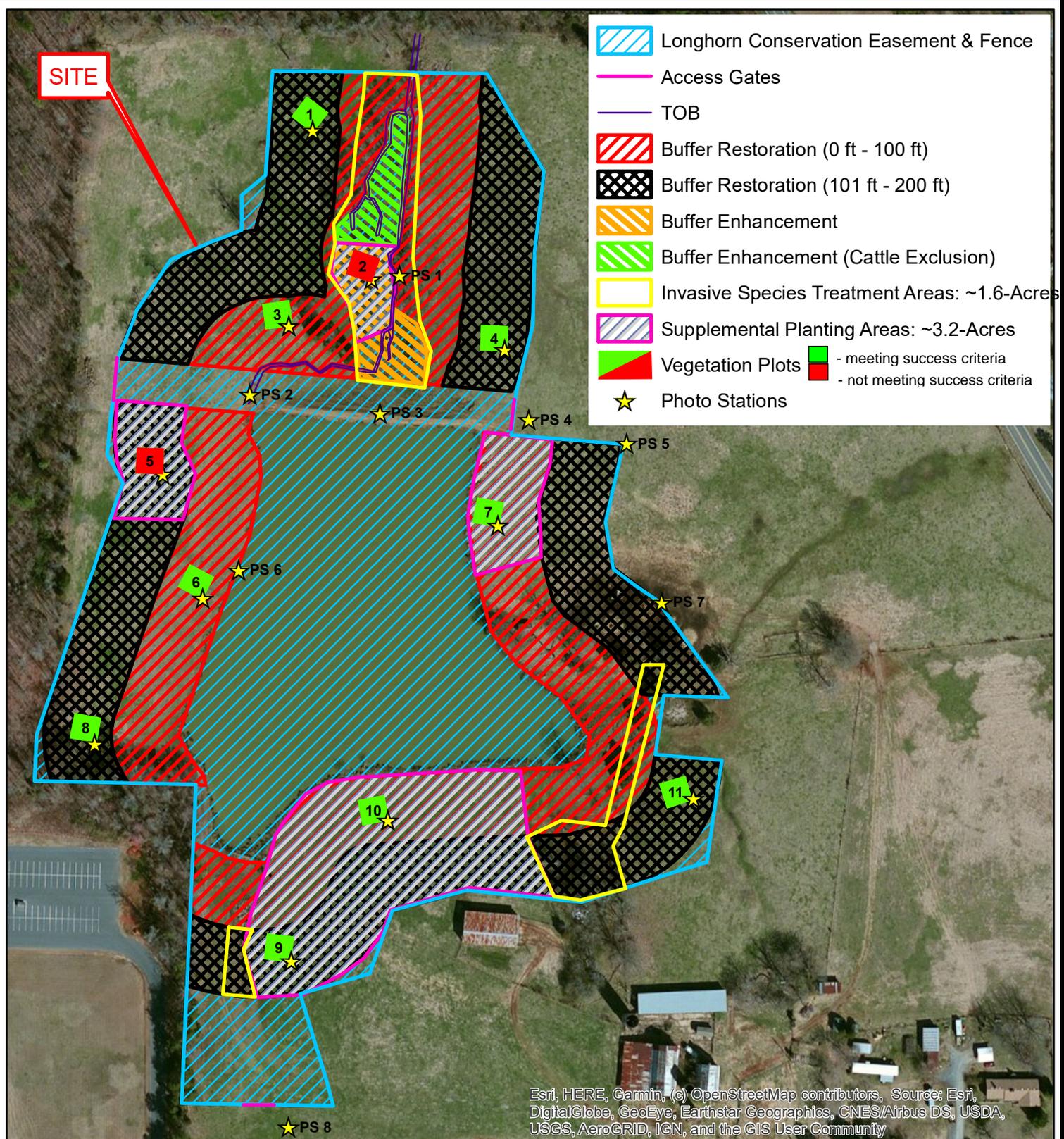
Scale:
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Drawn By:
GSF

Revision Date:
2/26/2020

Job Number:
LMG19.249

Figure:
8



Esri, HERE, Garmin, (c) OpenStreetMap contributors, Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

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 Kevin Yates\Annual Monitoring\Baseline Monitoring\Figures
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 Map Source: 2016 ESRI World Imagery



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 LMG #19.249



Figure 9
Current Condition Plan View

**Table 1. Buffer Project Attributes
 Longhorn Riparian Buffer Mitigation Site
 Monitoring Year 1 - 2020**

Project Name	Longhorn Riparian Buffer Restoration Project
Hydrologic Unit Code	03030003010060 (14 digit)
River Basin	Cape Fear
Geographic Location (Lat, Long)	35.841600, -79.882810
Site Protection Instrument (DB, PG)	DB 163 Page 99
Total Credits (BMU)	376,644.994
Types of Credits	Riparian Buffer
Mitigation Plan Date	February 2020
Initial Planting Date	April 1st, 2020
Baseline Monitoring Date	April 6th, 2020
Baseline Report Date	June, 2020
MY1 Report Date	December 1st, 2020
MY2 Report Date	
MY3 Report Date	
MY4 Report Date	
MY5 Report Date	

Table 2. Longhorn, 100114, Project Mitigation Credits																	
Cape Fear - Randleman				Service Area													
N/A				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	82,245	82,245	1	100%	1.00000	Yes	82,245.000	No	—	—	
Buffer	Rural	Yes	I / P	Restoration	101-200	A1	96,615	96,615	1	33%	3.03030	Yes	31,882.982	No	—	—	
Buffer	Rural	Yes	I / P	Enhancement	0-100	A1	17,433	17,433	2	100%	2.00000	Yes	8,716.500	No	—	—	
Buffer	Rural	Yes	I / P	Enhancement via Cattle Exclusion	0-100	A1	9,271	9,271	2	100%	2.00000	Yes	4,635.500	No	—	—	
Buffer	Rural	Yes	In-Line Pond	Restoration	0-100	P1	186,823	186,823	1	100%	1.00000	Yes	186,823.000	No	—	—	
Buffer	Rural	Yes	In-Line Pond	Restoration	101-200	P1	188,915	188,915	1	33%	3.03030	Yes	62,342.012	No	—	—	
Totals:							581,302	581,302									
Enter Preservation Credits Below								Eligible for Preservation (sf):	193,767								
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					
												—					
Preservation Area Subtotal (sf):								0									
Preservation as % Total Area of Buffer Mitigation:								0.0%									
Ephemeral Reaches as % Total Area of Buffer Mitigation:								0.0%									
												TOTAL AREA OF BUFFER MITIGATION (TABM)					
												Mitigation Totals	Square Feet	Credits			
												Restoration:	554,598	363,292.994			
												Enhancement:	26,704	13,352.000			
												Preservation:	0	0.000			
												Total Riparian Buffer:	581,302	376,644.994			
												TOTAL NUTRIENT OFFSET MITIGATION					
												Mitigation Totals	Square Feet	Credits			
												Nutrient	Nitrogen:	0	0.000		
												Offset:	Phosphorus:	0	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

Longhorn Riparian Buffer Mitigation Site

DMS Project No. 100114

Monitoring Year 1 – 2020

CVS Project Code LRBMS. Project Name: Longhorn Riparian Buffer Mitigation Site

Scientific Name	Common Name	Species Type	Current Plot Data (MY1 2020)																								Annual Means														
			LRBMS-01-0001			LRBMS-01-0002			LRBMS-01-0003			LRBMS-01-0004			LRBMS-01-0005			LRBMS-01-0006			LRBMS-01-0007			LRBMS-01-0008			LRBMS-01-0009			LRBMS-01-0010			LRBMS-01-0011			MY1 (2020)		MY0 (2020)			
			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			1																																				
Betula nigra	River Birch, Red Birch	Tree				2	2	2	5	5	5	1	1	1				2	2	2				1	1	1	1	1	1	1	1	1	1	1	1	14	14	14	28	28	28
Fraxinus pennsylvanica	Green Ash, Red Ash	Tree	7	7	7	5	5	5																																	
Liriodendron tulipifera	Tulip poplar	Tree							3	3	3	3	3	3	2	2	2	4	4	4	4	4	4				3	3	3	2	2	2	8	8	8	29	29	29	46	46	46
Platanus occidentalis	Sycamore, Plane-tree	Tree	4	4	4							6	6	6	5	5	5	3	3	3	4	4	4	6	6	6	5	5	5	3	3	3	3	3	3	39	39	39	57	57	57
Quercus pagoda	Cherrybark Oak, Swam	Tree	1	1	1				1	1	1																														
Quercus phellos	Willow Oak	Tree	5	5	5				4	4	4	1	1	1				3	3	3	1	1	1	5	5	5							3	3	3	22	22	22	27	27	27
	Stem count		17	17	18	7	7	7	13	13	13	13	13	13	7	7	7	12	12	12	9	9	9	12	12	12	9	9	9	9	9	9	15	15	15	123	123	124	183	183	183
	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		4	4	5	2	2	2	4	4	4	5	5	5	2	2	2	4	4	4	3	3	3	3	3	3	3	3	3	4	4	4	6	6	7	5	5	5			
	Stems per ACRE		688	688	728.4	283.3	283.3	283.3	526.1	526.1	526.1	526.1	526.1	526.1	283.3	283.3	283.3	485.6	485.6	485.6	364.2	364.2	364.2	485.6	485.6	485.6	364.2	364.2	364.2	364.2	364.2	364.2	607	607	607	452.5	452.5	456.2	673.2	673.2	673.2

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 B. VEG PLOT PHOTOS



(1) Plot 1



(2) Plot 2



(3) Plot 3



(4) Plot 4



(5) Plot 5



(6) Plot 6

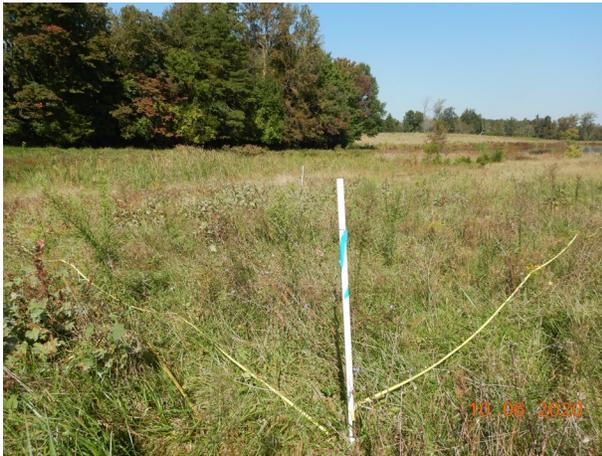
APPENDIX B. VEG PLOT PHOTOS



(7) Plot 7



(8) Plot 8



(9) Plot 9



(10) Plot 10



(11) Plot 11

APPENDIX B. PHOTO STATIONS



(1) PS1 (looking south)



(2) PS2 (looking south towards Pond)



(3) PS2 (looking north towards restoration area)



(4) PS2 (looking east towards pond)



(5) PS3 (looking north into enhancement area)



(6) PS4 (looking west towards dam)

APPENDIX B. PHOTO STATIONS



(7) PS4 (looking south into easement)



(8) PS5 (looking west along conservation easement)



(9) PS6 (looking north along pond edge)



(10) PS7 (looking southwest into restoration area)



(11) PS8 (looking north into restoration area)