

# THUNDER PHASE B NUTRIENT OFFSET SITE

**As-built & Baseline Monitoring Report  
Wayne County, North Carolina  
Neuse River Basin - 03020201**

DMS Project ID No. 100651  
Full Delivery Contract No. 519674731-03  
DWR Project No. 2021-0018 v2  
RFP No. 16-519674731



Prepared for:



NORTH CAROLINA DEPARTMENT OF ENVIRONMENTAL QUALITY  
DIVISION OF MITIGATION SERVICES  
1652 MAIL SERVICE CENTER  
RALEIGH, NORTH CAROLINA 27699-1652

Baseline Data Collected: February 2024  
Date Submitted: March 2024



## Response to DMS Comments

Thunder Phase B Nutrient Offset Mitigation Site, Project ID #100651  
DMS Contract #519674731-02  
DWR Project No. 2021-0018 v2  
Neuse River Basin 03020201, Wayne County  
DMS Reviewers: Jeremiah Dow and Jeff Horton

### Comments Received (Black Text) & Responses (Blue Text):

1. Cover Page: Please update the DWR project number throughout the report to match the Mitigation Plan, 2021-0018v2.  
**Completed.**
2. Table 2: Number 1 states soil and herbaceous vegetation preparation were completed prior to planting. Please describe what those preparation activities entailed.  
**Soil and herbaceous vegetation preparation activities narrative has been added in Section 1 and 3.1.**
3. Figure 2 & 3: Consider combining these 2 figures into 1 CCPV by adding the vegetation plots to the legend of Figure 3. This would eliminate the need for Figure 2.  
**Figures 2 and 3 have been combined into one figure as suggested.**
4. Table 8: Feature 1c (less than 50 feet) is listed as a no credit area on maps/survey but has credit on the credit table and is included in the total credit calculation. If this area is not to be included for credit it should not be included in the total credit calculation throughout the report; please revise. The new total amount of credits would be 29,524.41.  
**Table 8 and the narrative in the report has been revised accordingly.**
5. Appendix B, Table 12: There are species in this table that are not in the Table 3 planting list (hornbeam, sugarberry, white oak, laurel oak, overcup oak, and northern red oak). Including these species in success criteria will require DWR approval. Please update Table 3 to include all species planted with any deviations from the mitigation plan redlined.  
**These species were not planted and these stems were misidentified as they were still dormant at the time of the as-built vegetation survey. Table 12 has been updated accordingly.**
6. Appendix B, Vegetation Plot Photos 1-11: The header states the photos were taken in February, but the timestamp on each photo says January; please update.  
**The photos have been updated to the correct month.**
7. Digital Deliverables: Please include the excel credit table in the digital submission.  
**The excel credit table has been added to the digital deliverables.**
8. Regardless of R.S. response to #4, the project will fall below the 29,580.139 contracted credits. Please update the payment schedule for this shortfall. Due to the small amount below contract, DMS would prefer Task 4 be reduced the full amount instead of adjusting all future tasks.  
**The payment schedule has been updated to account for the contracted credits shortfall.**

# THUNDER PHASE B NUTRIENT OFFSET SITE

**As-built & Baseline Monitoring Report  
Wayne County, North Carolina  
Neuse River Basin - 03020201**

**Prepared by:**



Restoration Systems, LLC  
1101 Haynes Street, Suite 211  
Raleigh, North Carolina 27604

Contact: Raymond Holz  
919-755-9490 (phone)  
919-755-9492 (fax)

**Table of Contents**

1.0 Mitigation Project Summary ..... 2  
    1.1 Project Goals and Objectives ..... 2  
    1.2 Pre-construction Site Conditions ..... 3  
2.0 Determination of Credits ..... 3  
3.0 Baseline Restoration Activities Summary ..... 4  
    3.1 Riparian Area Restoration Activities ..... 4  
4.0 Monitoring Protocol & Success Criteria ..... 6  
    4.1 Monitoring Protocol ..... 6  
    4.2 Monitoring Success Criteria ..... 6  
5.0 References ..... 8

**List of Tables**

Table 1. Ecological and Water Quality Goals ..... 3  
Table 2. Restoration Plan Activities ..... 4  
Table 3. Planting List ..... 5  
Table 4. Permanent Seed ..... 5  
Table 5. Monitoring Schedule ..... 6  
Table 6. Monitoring Summary ..... 6  
Table 7. Success Criteria ..... 6

**Appendices**

Appendix A: General Figures and Tables

- Figure 1 – Vicinity and Service Area Map
- Figure 2 – Current Conditions Plan View
- As-built Survey – Sheets 1-2
- Table 8. Thunder Phase B Nutrient Offset Site, 2021-0018v2, Project Credits
- Table 9. Project Activity and Reporting History
- Table 10. Project Contact
- Table 11. Project Baseline Information and Attributes

Appendix B: Project Photos and Baseline Vegetation Data

- Table 12. Baseline Vegetation Data
- Vegetation Plot Photos 1 – 11

Appendix C: Agency Letters/Correspondence

- DWR Stream Determination Letter, February 26, 2021
- DWR Site Viability Letter, April 13, 2021
- DWR Verification of Site Viability Letter, March 14, 2023
- Jurisdictional Determination Concurrence, May 21, 2021



## 1.0 Mitigation Project Summary

Restoration Systems (Sponsor) is pleased to provide the North Carolina Division of Mitigation Services (NC DMS) this **As-built & Baseline Monitoring Report** for the **Thunder Phase B Site** (hereafter referred to as the “Project” or “Site”). The Project has been implemented in accordance with State Rules 15A NCAC 02B .0295 (Consolidated Buffer Mitigation Rule – CMB Rule) to Neuse River Riparian Buffer Credits (RBC) and 15A NCAC 02B .0703 (Nutrient Offset Credit Trading Rule) to Neuse River Nutrient Offset (Nitrogen) Credits (NOC) for impacts within the Neuse River Basin USGS 8-digit HUC 03020201, excluding the Falls Lake Watershed. The permanent conservation easement encompasses 13.486 acres and will provide 29,524.410 lbs. nitrogen NOCs (Available NOC). The Project provides the State with the Available NOC while permanently protecting the restored riparian area and preserving the forested Thunder Swamp floodplain, a mapped FEMA Floodway (Map 3720256300K, Panel 2563, effective June 20, 2018).

Located in Wayne County, North Carolina, the Project encompasses 13.486 acres, the majority of which were utilized for row crop production, and it is immediately adjacent to the Thunder Mitigation Site, a DMS full-delivery project (#100185) sponsored by Restoration Systems, LLC. (RS). The Project will restore the riparian buffers and adjacent riparian areas along five (5) unnamed tributaries and preserve the established riparian buffer along Thunder Swamp. The Site is located within the warm waters of the United States Geological Society (USGS) Hydrologic Unit 03020201-170030 and NC DWR subbasin 03-04-12. The Thunder Mitigation Site (DMS No. 100185) restoration efforts includes the 0–100 foot buffer of the unnamed tributaries, while this Project includes the buffer at 101-200 feet. Detailed project mapping is provided in Appendix A, along with site-specific data in Appendix B.

The parcels were acquired by RS through a fee-simple purchase agreement with the former landowners (Betty Carraway and Myrtle Mangum) effective July 13, 2021. Following the purchase, RS assigned a conservation easement (13.486 acres) to the State Property Office recorded February 7, 2024.

A DWR representative conducted an on-site stream determination on January 21, 2021. A Stream Determination letter was provided on February 26, 2021. Further, a DWR representative conducted a Site Viability visit on March 24, 2021, and provided an approval letter on April 13, 2021. An additional email was received from a DWR representative on March 14, 2023 confirming the site viability letter is still valid as long as there has been no change in landuse since the initial DWR review of the BDPD document. The landuse remains in agricultural production and has not changed since the initial DWR review. Both the Stream Determination and Site Viability letters are attached in Appendix C.

The Site was prepared for planting in 2024 by completing a final plowing and planting of a cover crop. The Site was planted in January 2024. Riparian buffer restoration activities included bare-root planting and broadcast application of a permanent seed mix. On January 29, 2024, Axiom Environmental installed eleven (11) Carolina Vegetation Survey (CVS) monitoring plots and collected as-built data (Appendix B).

### 1.1 Project Goals and Objectives

The primary goals associated with the restoration of riparian areas within the Site focused on providing ecological and water quality enhancements to the Neuse River Basin by restoring the riparian area to create a functional riparian corridor. The Site is not located within a watershed planning unit but addresses watershed goals outlined by the Neuse River Basin Restoration Priorities (RBRP) report (NCEEP 2010 amended 2018). Table 1 summarizes the RBRP goals and provides site-specific objectives to address the RBRP goals and enhancements to water quality and ecological processes.

**Table 1. Ecological and Water Quality Goals**

<b>Goal</b>	<b>Objective</b>
Decrease nutrient levels	Nutrient input will be decreased 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.
Decrease sediment input	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	Planted riparian trees will shade the streams as they mature reducing thermal pollution.
Create appropriate terrestrial habitat	Buffer areas will be restored by planting native vegetation.
Permanently protect the project Parcel from harmful uses	A permanent conservation easement will be recorded, protecting the Site's assets in perpetuity.

**1.2 Pre-construction Site Conditions**

The nutrient offset project includes riparian restoration of 13.467 acres of open agricultural fields and preservation of 0.019 acres of forested land along unnamed tributaries to Thunder Swamp. The agricultural fields were used for row crop production, including cotton, corn, and peanuts. Agricultural fields within and adjacent to the Site were subject to routine fertilizer and herbicide applications. Site streams and ditches exhibited bank erosion due to long-term plowing and removal of native vegetation throughout the proposed restoration areas. The Project restored the riparian buffers and adjacent riparian areas along five (5) unnamed tributaries and preserved the established riparian buffer along Thunder Swamp. Thunder Swamp is a braided stream system within an old-growth forest. Site tributaries ("features") two, four, and five originate less than one (1) mile south of NC HWY 55. Tributaries one and three originate on-site. All tributaries drain to Thunder Swamp. One ditch was present at the upper end of feature one, the upper most portion of the ditch extends outside of the easement and had been filled while the lower portion of the ditch remained open as it entered feature one. Historic imagery dating back to 1959 indicates that land management practices are consistent with the Site's current conditions.

**2.0 Determination of Credits**

Within the 13.486-acre Site, 13.467 acres of agricultural fields historically used for row crops along unnamed tributaries to Thunder Swamp has been planted for riparian buffer restoration. The primary goals associated with restoring riparian areas within the Site will improve water quality, enhance flood attenuation, and restore wildlife habitat. These goals were achieved by restoring 13.467 acres of forested riparian buffer and preserving 0.019 acres of existing forest and State waters.

### 3.0 Baseline Restoration Activities Summary

The Project restored agriculturally impacted land in the Parcel footprint to a forested riparian corridor, protected in perpetuity, improving the ecological function of the area. Riparian buffer widths associated with restoration range from 50 to 200 feet. The design ensured that no adverse impacts to wetlands or existing riparian buffers would occur. Since the Project expanded upon an existing buffer project no other actions were needed to restore the riparian corridor.

**Table 2. Restoration Plan Activities**

Restoration Plan Activity	Phase Specific Actions
Riparian Restoration	1.) Parcel-wide soil preparation herbaceous vegetation treatment ahead of planting 2.) Establishment of a native herbaceous community via site-specific seed mix (Table 4) 3.) Establishment of 13.467 acres of native hardwood forest via the planting of bare-root saplings (Table 3)

#### 3.1 Riparian Area Restoration Activities

Restoration of Riparian Coastal Plain Bottomland Hardwood Forest and Riparian Upland Mesic-Oak-Hickory forests allows for the development and expansion of characteristic species across the landscape. Ecotonal changes between community types contribute to habitat diversity and provide secondary benefits, such as enhanced feeding and nesting opportunities for mammals, birds, amphibians, and other wildlife.

Revegetating floodplains will provide overall system stability, shade, and wildlife habitat. In addition, viable riparian communities will improve the system's biogeochemical function by filtering pollutants from overland and shallow subsurface flows and providing organic materials to adjacent stream channels.

Prior to planting soil and herbaceous vegetation preparation activities were conducted. Which included a final plowing of the Site followed by planting a cover crop of small grains, both activities took place in 2024. The cover crops provide soil stability at the end of row cropping activities, reduce weed competition from tall herbaceous species such as dog-fennel. Additionally, the cover crops serve as a nurse crop for the planted hardwood stems by providing early growing season shade and eventually contributing surface organic matter which is expected to help reduce the droughty nature of the sandy soils onsite.

Following Site preparation activities a diverse and native herbaceous seed mix was planted across the Site. This mix provides soil stability, ecological diversity, and favorable growing conditions for the planted woody species. Seedings consists of a seasonally appropriate temporary nurse crop (eg. millet or cereal rye), a mix of wildflowers known to benefit wildlife, including pollinators (eg. *Rudbeckia hirta*, *Echinacea purpurea*, *Coreopsis* spp., *Eupatorium* spp., *Chamaecrista* spp.), and a blend of low growing grasses, which provides long term soil stability and wildlife benefit without unduly competing with the desired forbs or woody plantings (eg. *Agrostis* spp.). Species planted and abundance of each species is shown in Table 4.

Bare-root seedlings within the Riparian Coastal Plain Bottomland Hardwood Forest and Riparian Upland Mesic-Oak-Hickory forests were planted at a density between 680 and 720 stems per acre on 8-foot centers. Planting was performed on January 11, 2024 to allow plants to stabilize during the dormant

period and set roots during the spring season. Thirteen different species were well mixed within the planting scheme to ensure diversity of bare roots across planted areas and monitoring plots. Planting density was set to ensure sufficient diversity and density of planted stems outlined in Rule 15A NCAC 02B.0295 of 260 trees per acre at the end of five years. No one tree species was greater than 50% of the established stems. Species planted and number of stems planted are shown in Table 3.

As-built baseline vegetation data is provided in Appendix B. Baseline data was collected in February 2024 by Axiom Environmental and derived an average planted stem density of 651 stems per acre.

**Table 3. Planting List**

Common Name	Scientific Name	Tree/Shrub	Number of Stems	Species % of Total
River birch	<i>Betula nigra</i>	Tree	150	1.8%
Black gum	<i>Nyssa sylvatica</i>	Tree	970	11.5%
Bitternut hickory	<i>Carya cordiformis</i>	Tree	560	6.7%
American elm	<i>Ulmus americana</i>	Tree	870	10.4%
Red bud	<i>Cercis canadensis</i>	Tree	820	9.7%
Persimmon	<i>Diospyros virginiana</i>	Tree	410	4.9%
Hackberry	<i>Celtis occidentalis</i>	Tree	820	9.7%
Sycamore	<i>Platanus occidentalis</i>	Tree	1,325	15.8%
Tulip poplar	<i>Liriodendron tulipifera</i>	Tree	915	10.9%
Red mulberry	<i>Morus rubra</i>	Tree	410	4.9%
Oak (Water)	<i>Quercus nigra</i>	Tree	560	6.7%
Oak (Swamp chestnut)	<i>Quercus michauxii</i>	Tree	150	1.8%
Oak (Willow)	<i>Quercus phellos</i>	Tree	410	4.9%
<b>Total</b>	<b>13 Species</b>		<b>8,370</b>	<b>100%</b>

**Table 4. Permanent Seed**

Permanent Seed – Sitewide @ 2lbs/acre					
Species	%	Species	%	Species	%
<i>Agrostis hyemalis</i>	5	<i>Desmodium canadense</i>	2	<i>Lespedeza capitata</i>	2
<i>Agrostis perennans</i>	5	<i>Echinacea purpurea</i>	7	<i>Liatris spicata</i>	0.5
<i>Bidens aristosa</i>	3	<i>Elymus virginicus</i>	5	<i>Monarda fistulosa</i>	0.5
<i>Carex albolutescens</i>	2	<i>Eupatorium coelestinum</i>	0.5	<i>Panicum anceps</i>	2
<i>Carex lupulina</i>	1	<i>Eupatorium perfoliatum</i>	1	<i>Panicum clandestinum</i>	2
<i>Carex vulpinoidea</i>	2	<i>Helianthus augustifolius</i>	4	<i>Rudbeckia hirta</i>	7
<i>Chamaecrista fasciculata</i>	5	<i>Heliopsis helianthoides</i>	4	<i>Senna hebecarpa</i>	5
<i>Chamaecrista nictitans</i>	2	<i>Hibiscus mosheutos</i>	0.5	<i>Tridens flavus</i>	20
<i>Coreopsis lanceolata</i>	3	<i>Juncus effusus</i>	2	<i>Verbena hastata</i>	2
<i>Coreopsis tinctoria</i>	3	<i>Juncus tenuis</i>	2	--	

## 4.0 Monitoring Protocol & Success Criteria

### 4.1 Monitoring Protocol

Restoration monitoring procedures for vegetation will monitor plant survival and species diversity. Quantitative sampling will include eleven (11) permanent 10 x 10-meter vegetation plots as outlined in the CVS Level 1-2 Protocol for Recording Vegetation, Version 4.2 (Lee et al. 2008) and will occur no earlier than the first calendar day of Fall each year. A reference photo will be taken from the origin point of each plot. All planted stems in the plots will be marked with flagging tape and recorded. Data collected will include species, height, planting type (planted stem and/or volunteer), and vigor. Monitoring will be conducted by Axiom Environment, Inc based on the schedule in Table 5. A summary of monitoring is also outlined in Table 6. Annual monitoring reports will be submitted to the NCDMS by Restoration Systems no later than December 1 of each monitoring year. Appendix B includes the baseline (MY0) vegetation plot photographs along with the planted and total stem counts.

**Table 5. Monitoring Schedule**

Resource	Year 1	Year 2	Year 3	Year 4	Year 5
Vegetation (2% of planted area)	x	x	x	x	x
Visual Assessment (100% of Site)	x	x	x	x	x
Report Submittal	x	x	x	x	x

**Table 6. Monitoring Summary**

Parameter	Method	Schedule/ Frequency	Number/ Extent	Data Collected/Reported
Vegetation	11 Permanent vegetation plots 0.0247 acre (100 square meters) in size; <i>CVS-EEP Protocol for Recording Vegetation, Version 4.2</i> (Lee et al. 2008).	As-built (MY 0), MY 1, 2, 3, 4, and 5	11 plots across the restoration portion of the Site	Species, height, vigor, planted vs. volunteer, stems/acre. Reference photo at each monitoring plot.

### 4.2 Monitoring Success Criteria

Success criteria will be based on the survival of planted species at a density of 260 stems per acre after five years of monitoring. The first annual monitoring activities will commence at the end of the first growing season, at least five months after planting has been completed.

**Table 7. Success Criteria**

Vegetation
<ul style="list-style-type: none"> <li>• Within planted portions of the Site, in accordance with Rule 15A NCAC 02B .0295:               <ol style="list-style-type: none"> <li>a) a minimum of 260 stems per acre must be present at year 5, and</li> <li>b) a minimum of four native hardwood and native shrub species in each vegetation monitoring plot, where no one species is greater than 50 % of stems.</li> </ol> </li> <li>• Planted and volunteer stems are counted, provided they are included in the approved planting list for the Site; natural recruits not on the planting list may be considered by the DWR on a case-by-case basis.</li> </ul>

### 4.3 Maintenance and Contingency Plans

An adaptive management plan will be developed and implemented with the approval of DMS and DWR in the event the Site or a specific component of the Site fails to achieve success criteria as outlined

above. Other vegetation maintenance and repair activities may include pruning, mulching, and fertilizing. If exotic invasive plant species require treatment, such species will be controlled by mechanical (physical removal with the use of a chainsaw) and/or herbicide application in accordance with North Carolina Department of Agriculture (NCDCA) rules and regulations.



## 5.0 References

Consolidated Buffer Mitigation Rule - 15A NCAC 02B .0295 (Published November 17, 2014)

Lee, M.T., R.K. Peet, S.D. Roberts, and T.R. Wentworth. 2008. CVS-EEP Protocol for Recording Vegetation. Version 4.2. North Carolina Department of Environment and Natural Resources, Ecosystem Enhancement Program. Raleigh, North Carolina.

North Carolina Department of Environmental Quality, Division of Mitigation Services (NCDMS), 2017. Riparian Buffer and Nutrient Offset Buffer Baseline and Annual Monitoring Report Template version 2.0.

North Carolina Division of Mitigation Services (NCDMS). 2010, amended 2018. Neuse River Basin Restoration Priorities (online). Available: [https://files.nc.gov/ncdeq/Mitigation%20Services/Watershed\\_Planning/Neuse\\_River\\_Basin/RB\\_RP-Neuse-201807-.pdf](https://files.nc.gov/ncdeq/Mitigation%20Services/Watershed_Planning/Neuse_River_Basin/RB_RP-Neuse-201807-.pdf) (September 11, 2020).

Nutrient Offset Credit Trading Rule - 15A NCAC 02B .0703 (Readopted effective April 1, 2020)

Schafale, M.P. 2012. Guide to the Natural Communities of North Carolina: Fourth Approximation. North Carolina Natural Heritage Program, North Carolina Department of Environment and Natural Resources. Raleigh, North Carolina.

## **Appendix A: General Figures and Tables**

Figure 1. Parcel Location / Service Area

Figure 2. Current Conditions Plan View

As-built Survey – Sheets 1-2

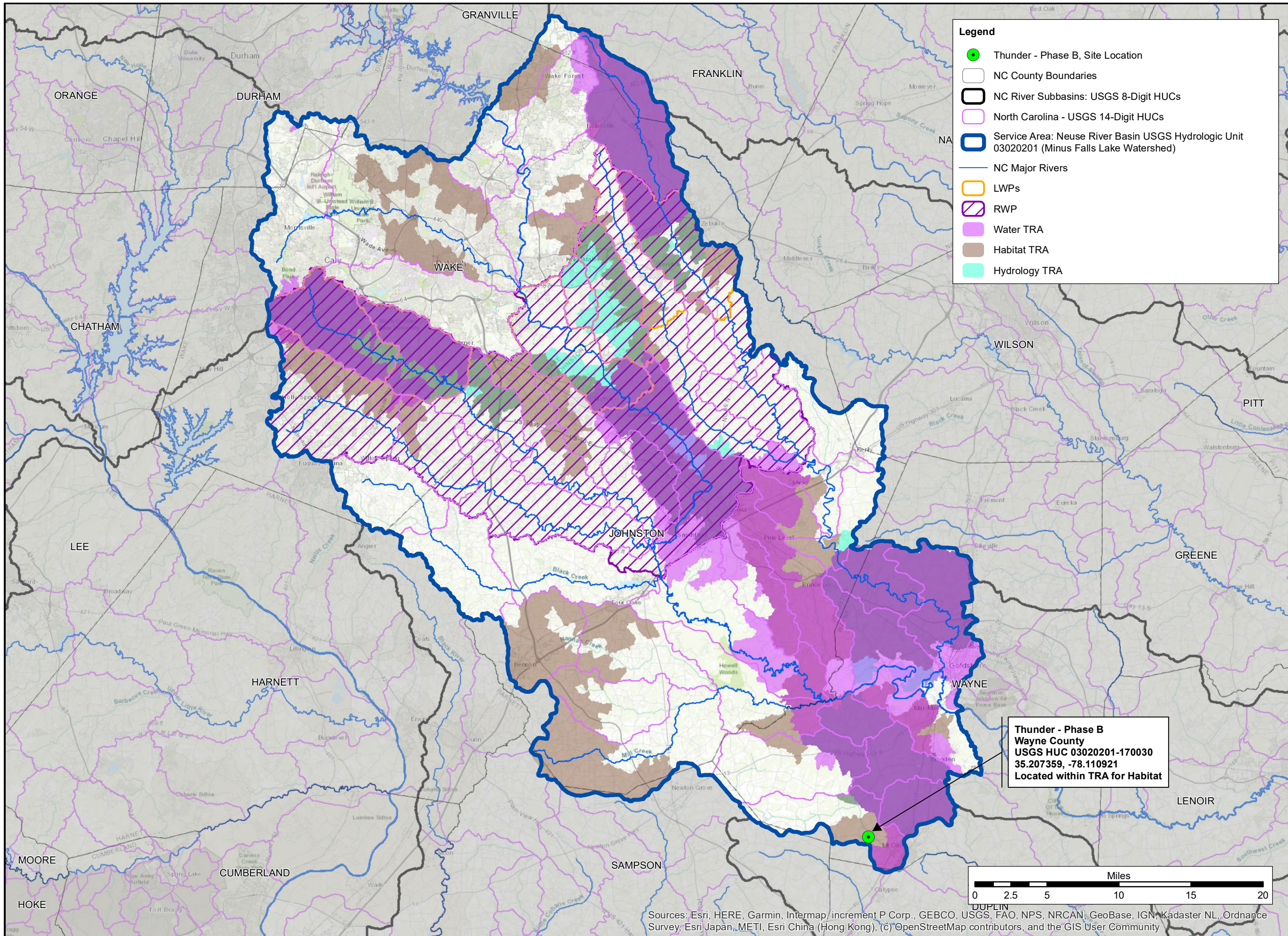
Table 8. Thunder Phase B Nutrient Offset Site, 2021-0018v3, Project Credits

Table 9. Project Activity and Reporting History

Table 10. Project Contact

Table 11. Project Baseline Information and Attributes





**Legend**

- Thunder - Phase B, Site Location
- NC County Boundaries
- NC River Subbasins: USGS 8-Digit HUCs
- North Carolina - USGS 14-Digit HUCs
- Service Area: Neuse River Basin USGS Hydrologic Unit 03020201 (Minus Falls Lake Watershed)
- NC Major Rivers
- LWPs
- RWP
- Water TRA
- Habitat TRA
- Hydrology TRA



Prepared for:  
**NC DEQ  
Division of  
Mitigation Services**

Project:  
**THUNDER  
PHASE B  
NUTRIENT OFFSET  
SITE**

Wayne County, NC

Title:  
**VICINITY &  
SERVICE AREA  
MAP**

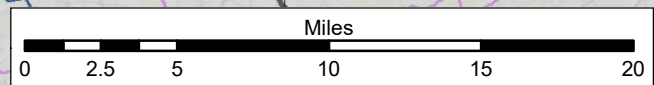
Drawn by: AEB

Date: MARCH 2024

Scale: 1:400,000

Project No.: 2022-08-0001

**Thunder - Phase B  
Wayne County  
USGS HUC 03020201-170030  
35.207359, -78.110921  
Located within TRA for Habitat**



N  
**1**

Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community





Prepared for:  
**NC DEQ  
 Division of  
 Mitigation Services**

Project:  
**THUNDER  
 PHASE B  
 NUTRIENT OFFSET  
 SITE**

Wayne County, NC

Title:  
**CURRENT  
 CONDITIONS  
 PLAN VIEW**

2017 NC OneMap

Drawn by:  
 AEB

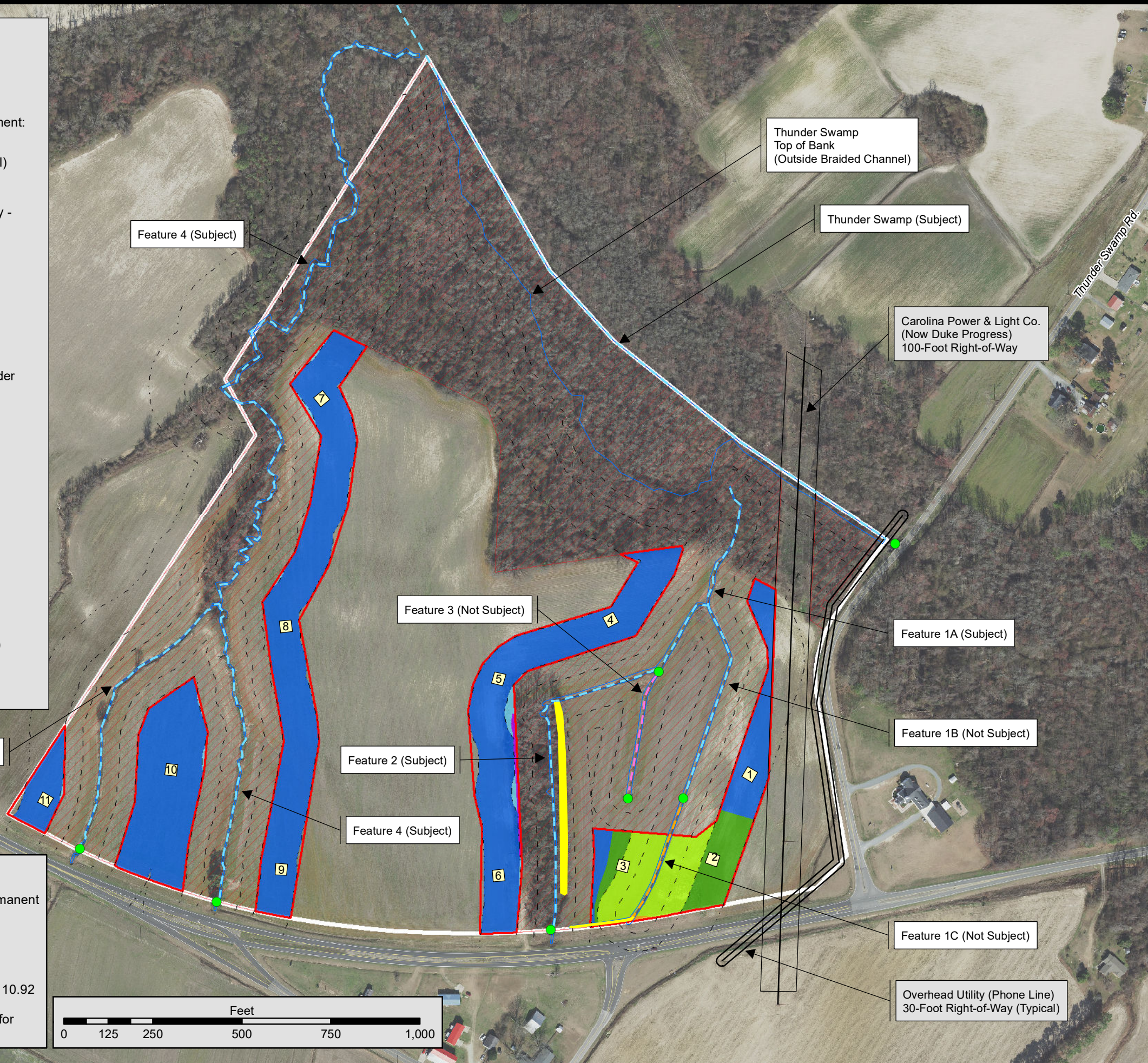
Date:  
 MARCH 2024

Scale:  
 1:3,500

Project No.:  
 2022-08-001

**FIGURE  
 2**

- Legend**
- Subject Site Parcel (NC Pin 2563511701)
  - Thunder Phase B Conservation Easement: 13.486
  - NC DMS Full-Delivery Conservation Easement: 41.78 Acres
  - Thunder Phase B Monitoring Plots (11 Total)
  - Local Utility Lines and Offsets
  - DWR Stream Determination for Applicability - Start Points
- Project Features (Surveyed Centerline)**
- Intermittent/Perennial
  - Ephemeral
  - Ditch
  - Surveyed TOB
  - Ditches Filled During Construction of Thunder (Proj. No. 100185)
- Top of Bank (TOB) Offsets**
- Offset 50-Feet
  - Offset 100-Feet
  - Offset 200-Feet
- As-built Credits**
- I/P Restoration 0-100-feet (NOC - RBC Conversion Eligible)
  - I/P Restoration 101-200-feet (NOC - RBC Conversion Eligible)
  - Ditch Restoration 0-100-feet (NOC Only)
  - Ditch Restoration 101-200-feet (NOC Only)
  - Preservation (No Credit)
  - No Credit (Less Than 50-feet)



**MONITORING NOTES:**

Quantitative sampling will include eleven (11) permanent 10 x10-meter vegetation plots, 2.02% of the Total Restoration Area (TRA).

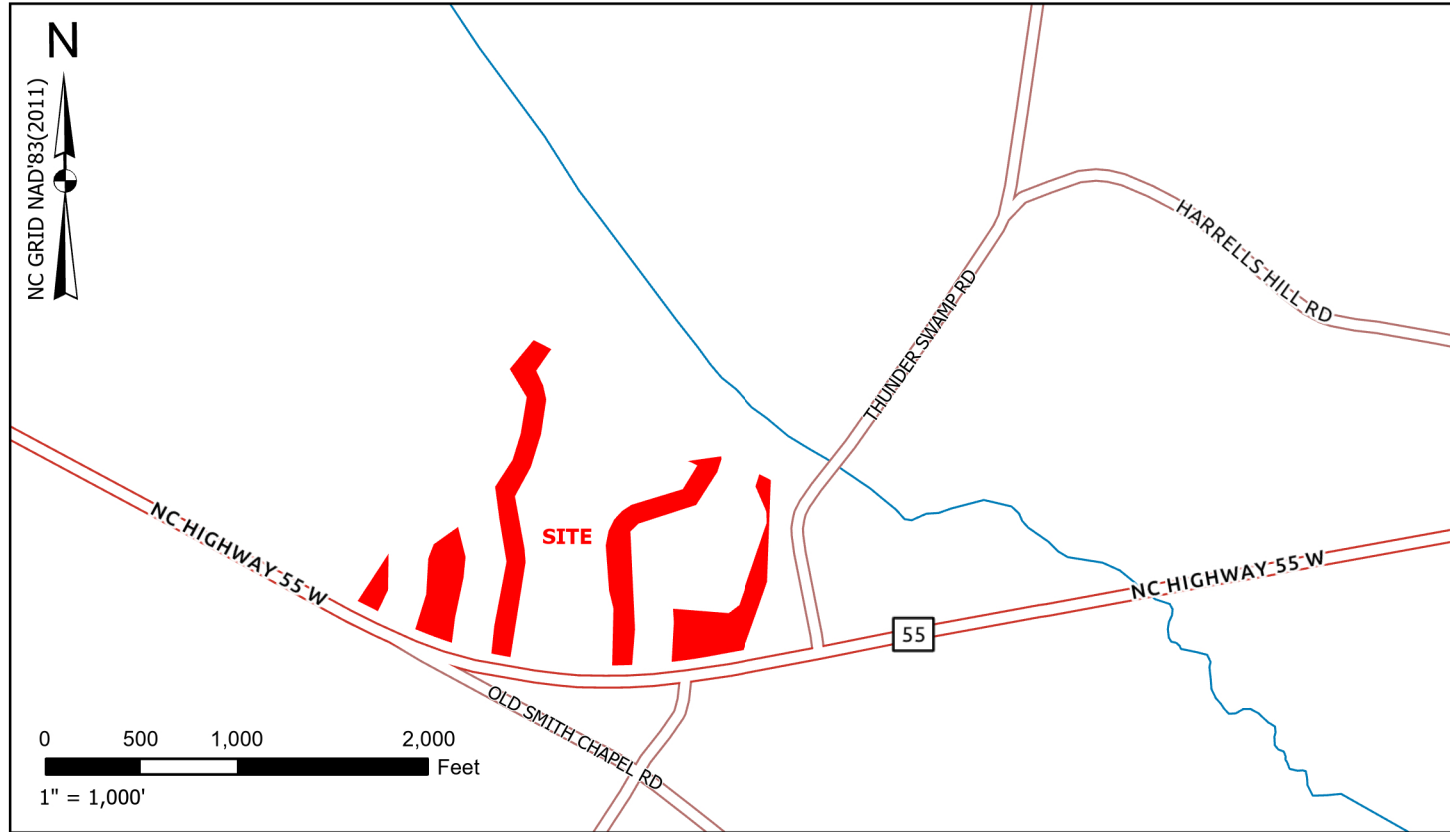
1, 10 x10-meter vegetation plots = 1,076.39 sq. ft.  
 TRA = 587,450.16 sq. ft.  
 2% of TRA = 11,749.003 sq. ft. / 1,076.39 sq. ft. = 10.92

10.92 round-up to 11 vegetation plots accounting for 2.02% of the TRA.





## VICINITY MAP



### TOTAL RIPARIAN BUFFER AND NUTRIENT OFFSET MITIGATION

MITIGATION TOTALS	SQ. FT	ACRES
NO CREDIT (LESS THAN 50FT.)	981.00	0.02
I/P RESTORATION 0-100FT (NOC - RBC CONVERSION ELIGIBLE)	9,358.00	0.21
I/P RESTORATION 101-200FT (NOC - RBC CONVERSION ELIGIBLE)	467,962.00	10.74
PRESERVATION (NO CREDIT)	2,978.00	0.06
DITCH RESTORATION 0-100FT (NOC ONLY)	52,425.00	1.20
DITCH RESTORATION 101-200FT (NOC ONLY)	36,059.00	0.82

#### SURVEYORS CERTIFICATION(S)

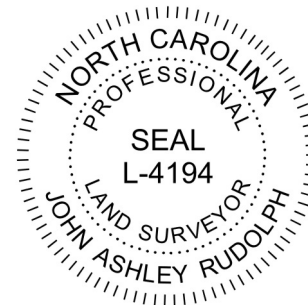
Surveyors disclaimer: No attempt was made to locate any cemeteries, wetlands, hazardous material sites, underground or above ground utilities or any other features above, or below ground other than those shown.

Note for bearings, distances, and coordinates of conservation easement, see P.C. P, SL. 100-J (2 sheets)(By K2 Design Group P.A.) BK. 3873, PG. 174.

I certify that the survey is of another category (credit determination plan), such as the recombination of existing parcels, a court-ordered survey, or other exception to the definition of subdivision.

I certify that this plat does not meet G.S. 47-30 as amended.

I, John A. Rudolph, certify that this project was completed under my direct and responsible charge from an actual survey made under my supervision; that this survey was performed to meet the requirements for an LIS/GIS survey to the accuracy of Class C and no vertical accuracy; method of measurement GNSS; date(s) of survey July of 2022; datum used for survey NAD83 (2011); and all coordinates are based on NAD83 (2011).



Professional Land Surveyor L-4194  
License Number

774 S. Beston Road  
La Grange, NC 28551  
252.582.3097  
www.k2designgroup.com  
Firm License no. C-2111



**RESTORATION SYSTEMS, LLC**  
1101 HAYNES STREET  
SUITE 211  
RALEIGH, NC 27604



Client:

THUNDER MITIGATION SITE (PHASE B)  
BROGDEN TOWNSHIP, WAYNE COUNTY  
NORTH CAROLINA

**CREDIT DETERMINATION PLAN**  
FOR THE PURPOSE  
OF MONITORING

Project:

Title:

**DRAWN BY:** JTR  
**DATE:** 02/12/24  
**SURVEYED BY:** JAR  
**DWG. NO.:** RSS501AB24  
**SHEET:**

**AS-BUILT LEGEND:**

- R/W** RIGHT-OF-WAY
- TOB** TOP OF BANK
- DWR STREAM DETERMINATION FOR APPLICABILITY - START POINTS
- CVS PLOTS
- CONSERVATION EASEMENT
- THUNDER PHASE A
- - - GRID MARKER TIEDOWN
- ROAD
- ROW
- - - 50 FEET FROM TOB
- - - 100 FEET FROM TOB
- - - 200 FEET FROM TOB
- - - PROPERTY LINES
- ||||| NCDOT UTILITY EASEMENT
- ▨ DUKE PROGRESS UTILITY EASEMENT
- SURVEYED TOB
- NO CREDIT (LESS THAN 50FT.)
- PRESERVATION (NO CREDIT)
- I/P RESTORATION 0-100FT (NOC - RBC CONVERSION ELIGIBLE)
- I/P RESTORATION 101-200FT (NOC - RBC CONVERSION ELIGIBLE)
- DITCH RESTORATION 0-100FT (NOC ONLY)
- DITCH RESTORATION 101-200FT (NOC ONLY)
- NO CREDIT AREA(GREATER THAN 200FT, BUT WITHIN CONSERVATION EASEMENT

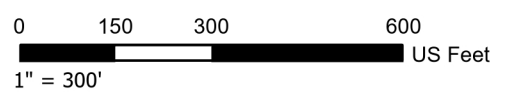
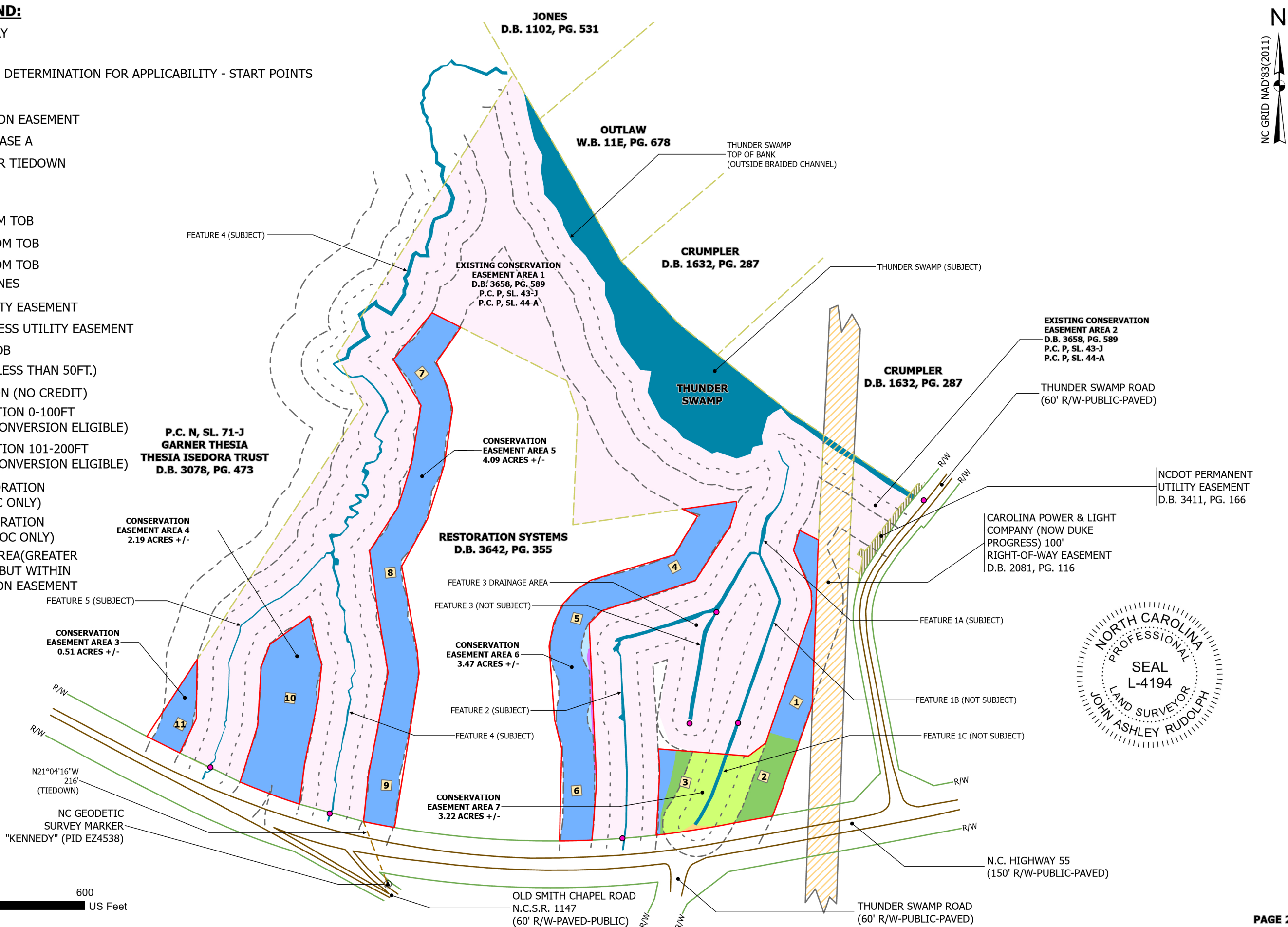




Table 8. Thunder Phase B Nutrient Offset Site, 2021-0018v2, Project Credits

Neuse 03020201 - Outside Falls Lake				Project Area													
19.16394				N Credit Conversion Ratio (ft <sup>2</sup> /pound)													
N/A				P Credit Conversion Ratio (ft <sup>2</sup> /pound)													
Credit Type	Location	Subject? (enter NO if ephemeral or ditch <sup>1</sup> )	Feature Type	Mitigation Activity	Min-Max Buffer Width (ft)	Feature Name	Total Area (ft <sup>2</sup> )	Total (Creditable) Area of Buffer Mitigation (ft <sup>2</sup> )	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)	
Nutrient Offset	Rural	Yes	Ditch	Restoration	0-100	1C	52,425	0	1	100%		No	—	Yes	2,735.607	—	
Nutrient Offset	Rural	No	Ditch	Restoration	101-200	1C	36,059	0	1	33%		No	—	Yes	1,881.607	—	
Nutrient Offset	Rural	No	Ditch	Restoration	0-50	Less Than 50-Foot Feature 1C	981	0	1	100%		No	—	No	—	—	
Nutrient Offset	Rural	No	I / P	Restoration	0-100	1A, 1B, 2, 4, 5, & Thunder Creek	9,358	9,358	1	100%	1.00000	Yes	9,358.000	Yes	488.313	—	
Nutrient Offset	Rural	No	I / P	Restoration	101-200	1A, 1B, 2, 4, 5, & Thunder Creek	467,962	467,962	1	33%	3.03030	Yes	154,427.614	Yes	24,418.883	—	
													—		—	—	
													—		—	—	
													—		—	—	
													—		—	—	
													—		—	—	
													—		—	—	
													—		—	—	
													—		—	—	
													—		—	—	
													—		—	—	
													—		—	—	
<b>Totals (ft<sup>2</sup>):</b>							<b>566,785</b>	<b>477,320</b>					<b>163,785.614</b>		<b>29,524.410</b>	<b>0.000</b>	
<b>Total Buffer (ft<sup>2</sup>):</b>							<b>0</b>	<b>0</b>									
<b>Total Nutrient Offset (ft<sup>2</sup>):</b>							<b>566,785</b>	<b>N/A</b>									
<b>Total Ephemeral Area (ft<sup>2</sup>) for Credit:</b>							<b>0</b>	<b>0</b>									
<b>Total Eligible Ephemeral Area (ft<sup>2</sup>):</b>							<b>0</b>	<b>0.0%</b>	<b>Ephemeral Reaches as % TABM</b>								
<b>Total Eligible for Preservation (ft<sup>2</sup>):</b>							<b>0</b>	<b>0.0%</b>	<b>Preservation as % TABM</b>								

Enter Preservation Credits Below

Credit Type	Location	Subject?	Feature Type	Mitigation Activity	Min-Max Buffer Width (ft)	Feature Name	Total Area (sf)	Total (Creditable) Area for Buffer Mitigation (ft <sup>2</sup> )	Initial Credit Ratio (x:1)	% Full Credit	Final Credit Ratio (x:1)	Riparian Buffer Credits
												—
												—
												—
												—
<b>Preservation Area Subtotals (ft<sup>2</sup>):</b>							<b>0</b>	<b>0</b>				

TOTAL AREA OF BUFFER MITIGATION (TABM)		
Mitigation Totals	Square Feet	Credits
Restoration:	0	0.000
Enhancement:	0	0.000
Preservation:	0	0.000
<b>Total Riparian Buffer:</b>	<b>0</b>	<b>0.000</b>
TOTAL NUTRIENT OFFSET MITIGATION		
Mitigation Totals	Square Feet	Credits
Nutrient Offset:		
Nitrogen:	566,785	29,524.410
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).

**Table 9. Project Activity and Reporting History**

Activity / Milestone	Mitigation Plan Proposed Date	Actual Date
Mitigation Plan Approved	NA	June 2023
Parcel Protection	NA	Recorded February 7, 2024
Planting	February 2024	January 11, 2024
As-built Data Collection	NA	January 2024
As-built Report Submittal	April 2024	March 2024
Year 1-5 Monitoring	December 2024 - 2028	On schedule

**Table 10. Project Contact**

	Firm	POC & Address
<b>Full Delivery Provider / Designer</b>	Restoration Systems, LLC	Raymond Holz: 919.755.9490 1101 Haynes Street, Suite 211 Raleigh, North Carolina 27604
<b>Planting Contractor:</b>	Restoration Systems, LLC	Josh Merritt: 919.755.9490 1101 Haynes Street, Suite 211 Raleigh, North Carolina 27604
<b>Surveyor</b>	K2 Design Group	John Rudolph (L-4194): 919-394-2547 5688 U.S. Hwy 70 East Goldsboro, NC 27534
<b>Monitoring:</b>	Axiom Environmental, Inc.	Grant Lewis; 919.215.1693 218 Snow Ave. Raleigh, NC 27603

**Table 11. Project Baseline Information & Attributes**

Project Information			
Project Name		Thunder Phase B Nutrient Offset Site	
County		Wayne	
Project Area (acres)		13.486	
Project Coordinates (latitude and longitude)		35.207359, -78.110921	
Project Watershed Summary Information			
Physiographic Province		Coastal Plain	
River Basin		Neuse	
USGS Hydrologic Unit 8-digit	03020201	USGS Hydrologic Unit 14-digit	03020201-170030
DWR Sub-basin		03-04-12	
Project Drainage Area (acres)		UT1A: 22.85 UT4: 153.60	
Project Drainage Area Land Use		Row crops, forest	
Project Drainage Area Percentage of Impervious Area		< 2%	

## Appendix B: Project Photos and Baseline Vegetation Data

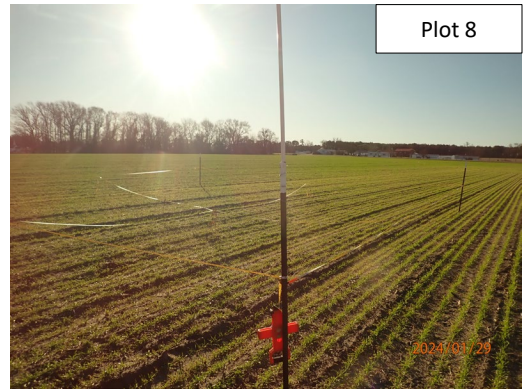
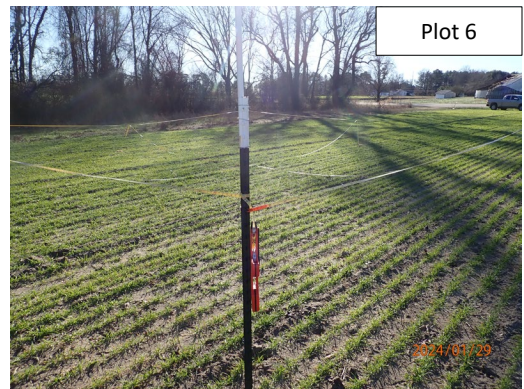
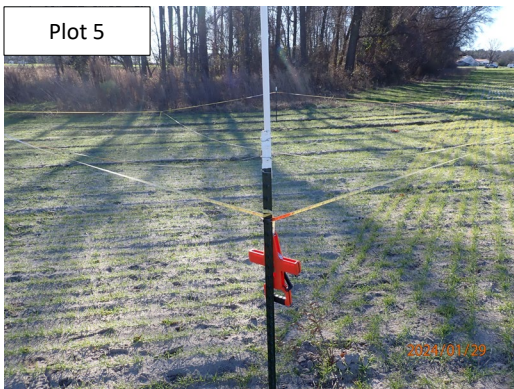
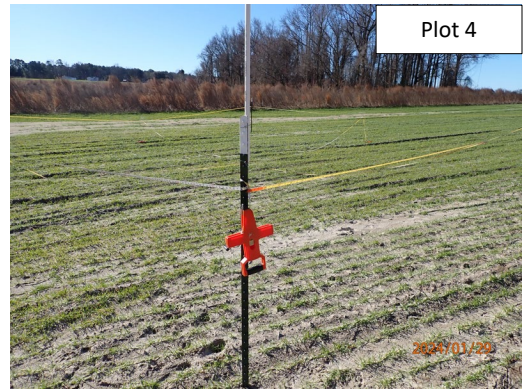
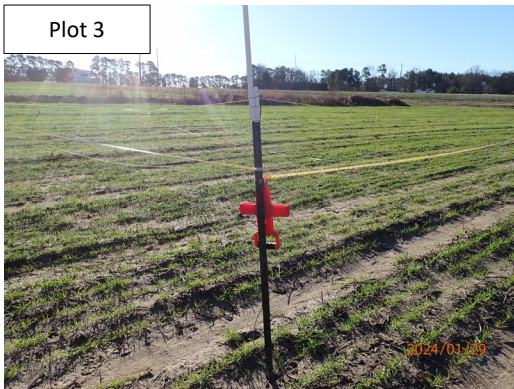
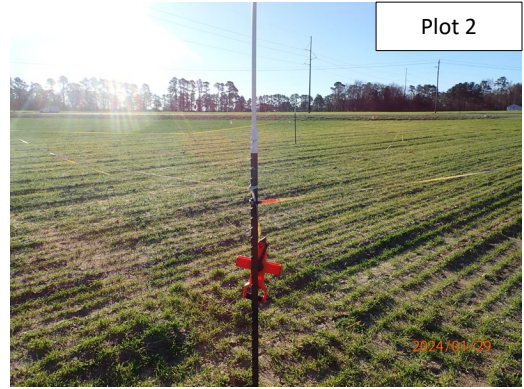
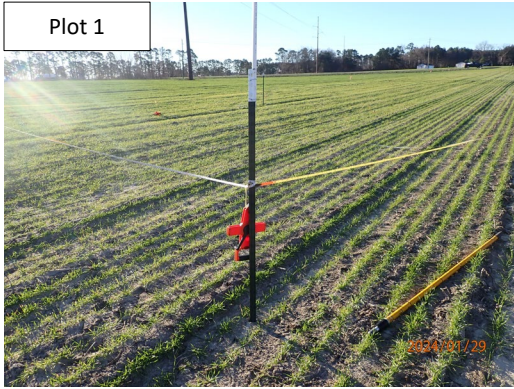
Table 12. Baseline Vegetation Data  
Vegetation Plot Photos 1-11

Table 12. Baseline Vegetation Data  
 Project Code 23017. Project Name: Thunder B

Scientific Name	Common Name	Species Type	Current Plot Data (MY0 2024)																											Annual Means											
			23017-01-0001			23017-01-0002			23017-01-0003			23017-01-0004			23017-01-0005			23017-01-0006			23017-01-0007			23017-01-0008			23017-01-0009			23017-01-0010			23017-01-0011			MY0 (2024)					
			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			
Betula nigra	river birch	Tree	2	2	2	2	2	2	9	9	9	1	1	1				1	1	1																			15	15	15
Carya cordiformis	bitternut hickory	Tree																						1	1	1													1	1	1
Celtis occidentalis	common hackberry	Tree										1	1	1	3	3	3																						4	4	4
Cercis canadensis	eastern redbud	Tree	1	1	1										1	1	1	1	1	1	5	5	5	2	2	2	5	5	5										15	15	15
Diospyros virginiana	common persimmon	Tree				1	1	1				1	1	1	3	3	3	2	2	2				1	1	1	1	1	1	1	1	1	2	2	2	12	12	12			
Liriodendron tulipifera	tuliptree	Tree				2	2	2	3	3	3	2	2	2	3	3	3	5	5	5				3	3	3	2	2	2	2	2	2	1	1	1	23	23	23			
Morus rubra	red mulberry	Tree							1	1	1										3	3	3	2	2	2										6	6	6			
Nyssa sylvatica	blackgum	Tree	5	5	5	4	4	4				4	4	4				1	1	1	1	1	1	4	4	4	2	2	2	3	3	3	4	4	4	28	28	28			
Platanus occidentalis	American sycamore	Tree				3	3	3				2	2	2	1	1	1	2	2	2	2	2	2	3	3	3	3	3	3	1	1	1	1	1	1	18	18	18			
Quercus	oak	Tree	4	4	4																						1	1	1							5	5	5			
Quercus michauxii	swamp chestnut oak	Tree							1	1	1				1	1	1	3	3	3				1	1	1										6	6	6			
Quercus nigra	water oak	Tree	2	2	2	1	1	1	3	3	3	2	2	2	3	3	3				1	1	1	1	1	1	2	2	2	1	1	1	1	1	1	17	17	17			
Quercus phellos	willow oak	Tree	4	4	4				1	1	1	1	1	1	3	3	3	2	2	2	1	1	1				2	2	2				1	1	1	15	15	15			
Ulmus americana	American elm	Tree										3	3	3										1	1	1	1	1	1				6	6	6	1	1	1	12	12	12
	<b>Stem count</b>		18	18	18	13	13	13	18	18	18	17	17	17	18	18	18	17	17	17	14	14	14	19	19	19	18	18	18	14	14	14	11	11	11	177	177	177			
	<b>size (ares)</b>		1			1			1			1			1			1			1			1			1			1			1			11					
	<b>size (ACRES)</b>		0.02			0.02			0.02			0.02			0.02			0.02			0.02			0.02			0.02			0.02			0.02			0.27					
	<b>Species count</b>		6	6	6	6	6	6	6	6	6	9	9	9	8	8	8	8	8	8	7	7	7	10	10	10	8	8	8	6	6	6	7	7	7	14	14	14			
	<b>Stems per ACRE</b>		728.4	728.4	728.4	526.1	526.1	526.1	728.4	728.4	728.4	688	688	688	728.4	728.4	728.4	688	688	688	566.6	566.6	566.6	768.9	768.9	768.9	728.4	728.4	728.4	566.6	566.6	566.6	445.2	445.2	445.2	651.2	651.2	651.2			

**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%

Thunder Phase B  
MY0 (2024) Vegetation Monitoring Photographs (taken January 2024)





**Thunder Phase B  
MY0 (2024) Vegetation Monitoring Photographs (taken January 2024)**





## **Appendix C: Agency Letters/Correspondence**

DWR Stream Determination Letter, February 26, 2021

DWR Site Viability Letter, April 13, 2021

DWR Verification of Site Viability Letter, March 14, 2023

Jurisdictional Determination Concurrence, May 21, 2021



NORTH CAROLINA  
Environmental Quality

February 26, 2021

ROY COOPER  
Governor

MICHAEL S. REGAN  
Secretary

S. DANIEL SMITH  
Director

Betty Carraway  
c/o Raymond Holz  
Restoration Systems, LLC  
1101 Haynes Street Suite 211  
Raleigh, North Carolina 27604

2021 0018 v1  
Wayne County

Subject: **On-Site Determination** for Applicability to Neuse Riparian Buffer Rules (15A NCAC 02B .0714)

Subject Property/ Project Name: Thunder Mitigation Site

Address/Location: 1107 NC Hwy 55, Mt. Olive, NC 28635      Wayne County

Stream(s) Evaluated: (8) – UT 1 to UT 5 to Thunder swamp, Neuse River Basin

Determination Date: January 21, 2021

Staff: Allen Stewart

Determination Type:	
Buffer:	Stream:
X - Neuse (15A NCAC 02B .0714) - Tar-Pamlico (15A NCAC 02B .0734) - Catawba (15A NCAC 02B .0614) - Jordan (15A NCAC 02B .0267) (governmental and/or interjurisdictional projects) - Randleman (15A NCAC 02B .0724) - Goose Creek (15A NCAC 02B .0605-.0608)	X - Intermittent/Perennial Determination

Stream	E/I/P*	Not Subject	Subject	Start@	Stop@	Soil Survey	USGS Topo
Feature 1a / UT 1	P		X	35.207401, -78.110844	35.208634, -78.109632	X	
Feature 1b / UT 1b	I	X		35.206422, -78.110623	35.207909, -78.110380		
Feature 1c / UT 1c	E / Ditch	X		35.205500, -78.111119	35.206422, -78.110623		
Feature 2 / UT 2	I		X	35.205415, -78.111880	35.207401, -78.110844	X	
Feature 3 / UT 3	E	X		35.206422, -78.111144	35.207401, -78.110844	X	
Feature 4 / UT 4	I		X	35.205656, -78.115020	35.207863, -78.115017	X	
Feature 5 / UT 5	I		X	35.206073, -78.116301	35.212163, -78.112973	X	
Thunder Swamp	P		X	35.208370, -78.108611	35.212163, -78.112973	X	X

\*Ephemeral / Intermittent / Perennial

Dear Ms. Carraway,

The Division of Water Resources has determined that the streams listed above and included on the attached map have been located on the most recent published (1974) NRCS Soil Survey of Wayne County, North Carolina and/or the most recent copy of the Mt. Olive USGS Topographic map at a 1:24,000 scale and evaluated for applicability to the Neuse Riparian Buffer Rule. Features 1b and 1c were determined to be the relocation of Feature 3 (the soils map shows it historically continuing to the road) this is backed up by the soil type (Rains) and Lidar imaging. They are not mapped and therefore not subject to buffer rules. What remains of Feature 3 today has a score of 17.25 on the SWIT form and is not subject. Feature 1b scored at 22.75 on the SWIT form and is acting as an intermittent natural stream. Feature 1c scored 17.5 on the SWIT form, remains a ditch and not subject. For Each stream that is checked "Not Subject" it has been determined to not be at least intermittent or not present on the property. Streams that are checked "Subject" have been mapped on (1974) NRCS Soil Survey and/or USGS Topographic map 1:24,000, located on the property and possess characteristics that qualify them to be at least intermittent streams. There may be other streams or features located on the property that do not appear on the maps referenced above but may be considered jurisdictional according to the US Army Corps of Engineers and subject to the Clean Water Act.



North Carolina Department of Environmental Quality | Division of Water Resources  
Washington Regional Office | 943 Washington Square Mall | Washington, North Carolina 27889  
252.946.6481

**This on-site determination shall expire five (5) years from the date of this letter. Landowners or affected parties that dispute a determination made by the DWR may request a determination by the Director. An appeal request must be made within sixty (60) calendar days of date of this letter to the Director in writing.**

*If sending via US Postal Service:*

*c/o Paul Wojoski  
DWR – 401 & Buffer Permitting Unit  
1617 Mail Service Center  
Raleigh, NC 27699-1617*

*If sending via delivery service (UPS, FedEx, etc.):*

*c/o Paul Wojoski  
DWR – 401 & Buffer Permitting Unit  
512 N. Salisbury Street  
Raleigh, NC 27604*

This determination is final and binding as detailed above unless an appeal is requested within sixty (60) days.

This determination only addresses the applicability to the buffer rules and does not approve any activity within the buffers or waters. The project may require a Section 404/401 Permit for the proposed activity. Any inquiries regarding applicability to the Clean Water Act should be directed to the US Army Corps of Engineers Raleigh Regulatory Field Office at (919)-554-4884 Ext. 22.

If you have questions regarding this determination, please feel free to contact Allen Stewart at (252) 946-6481.

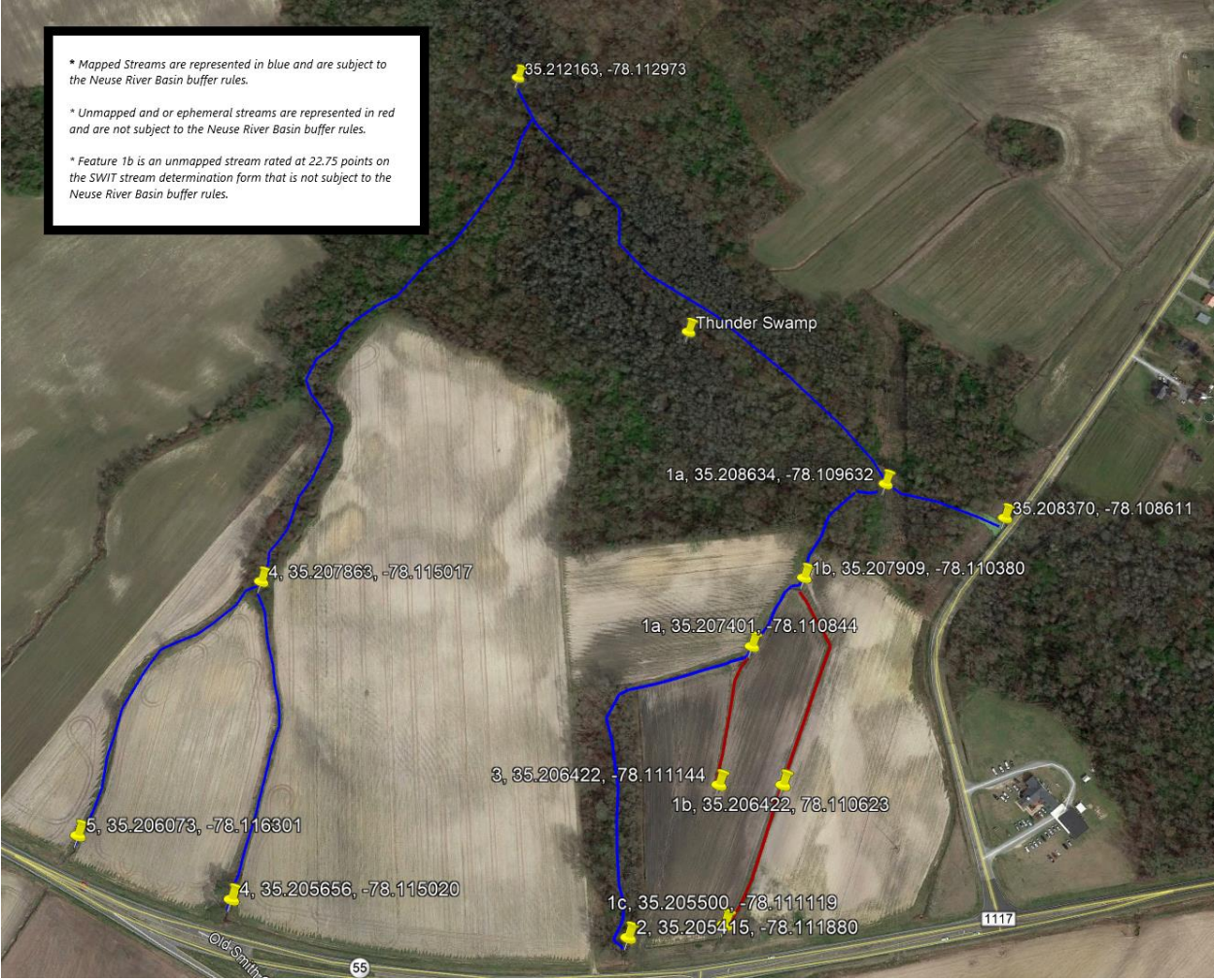
Sincerely,

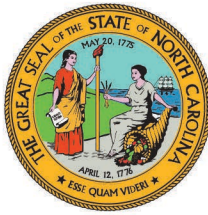
*Robert Tankard*

Robert Tankard, Assistant Regional Supervisor  
Water Quality Regional Operations Section  
Division of Water Resources, NCDEQ

cc: WaRO DWR File Copy/LASERFICHE  
Raymond Holz, Restoration Systems LLC, rholz@restorationsystems.com  
Katie Merritt, NCDWR 401 & Buffer Permitting Branch, Katie.Merritt@ncdenr.gov  
Samantha Dailey, US Army Corps of Engineers Raleigh Regulatory Field Office,

\* Mapped Streams are represented in blue and are subject to the Neuse River Basin buffer rules.  
\* Unmapped and or ephemeral streams are represented in red and are not subject to the Neuse River Basin buffer rules.  
\* Feature 1b is an unmapped stream rated at 22.75 points on the SWIT stream determination form that is not subject to the Neuse River Basin buffer rules.





NORTH CAROLINA  
Environmental Quality

April 13, 2021

ROY COOPER  
Governor

DIONNE DELLI-GATTI  
Secretary

S. DANIEL SMITH  
Director

Raymond Holz  
Restoration Systems, LLC  
(via electronic mail: rholz@restorationsystems.com)

Re: Site Viability for Buffer Mitigation & Nutrient Offset – Thunder Site  
1105 NC-55, Mt. Olive (near 35.205514, -78.110868)  
Neuse 03020201  
Wayne County

Dear Mr. Holz,

On December 11, 2020, Katie Merritt, with the Division of Water Resources (DWR), received a request from you on behalf of Restoration Systems, LLC (RS) for a site visit near the above-referenced site in the Neuse River Basin within the 8-digit Hydrologic Unit Code 03020201. The site visit was to determine the potential for riparian buffer mitigation and nutrient offset within a proposed conservation easement boundary, which is more accurately depicted in the attached map labeled “Figure 1-Existing Conditions” (Figure 1) prepared by RS. The proposed easement boundary in Figure 1, includes all riparian areas intended to be proposed as part of a full-delivery project for the Division of Mitigation Services (RFP #16-20200402) as well as a private mitigation bank by RS. On March 24, 2021, Ms. Merritt performed a site assessment of the subject site. Staff with RS were also present.

Ms. Merritt’s evaluation of the features onsite and their associated mitigation determination for the riparian areas are provided in the table below. This evaluation was made from Top of Bank (TOB) and landward 200’ from each feature for buffer mitigation pursuant to 15A NCAC 02B .0295 (effective November 1, 2015) and for nutrient offset credits pursuant to 15A NCAC 02B .0703.

<u>Feature</u>	<u>Classification onsite</u>	<u><sup>1</sup>Subject to Buffer Rule</u>	<u>Riparian Land uses adjacent to Feature (0-200’)</u>	<u>Buffer Credit Viable</u>	<u><sup>3</sup>Nutrient Offset Viable</u>	<u><sup>4,5</sup>Mitigation Type Determination w/in riparian areas</u>
3	Ephemeral	No	Non-forested agricultural fields	<sup>6</sup> Yes	Yes	<b>Restoration Site</b> per 15A NCAC 02B .0295 (o)(7)
1a	Stream	Yes	Combination of non-forested agricultural fields with mature forest downstream to thunder swamp	<sup>4</sup> Yes	Yes (fields only)	Non-forested fields - <b>Restoration Site</b> per 15A NCAC 02B .0295 (n)  Forested Areas – <b>Preservation Site</b> per 15A NCAC 02B .0295 (o)(5)
1b	Stream	No	Non-forested agricultural fields	Yes	Yes	<b>Restoration Site</b> per 15A NCAC 02B .0295 (n)



<b>Feature</b>	<b>Classification onsite</b>	<b><sup>1</sup>Subject to Buffer Rule</b>	<b>Riparian Land uses adjacent to Feature (0-200')</b>	<b>Buffer Credit Viable</b>	<b><sup>3</sup>Nutrient Offset Viable</b>	<b><sup>4,5</sup>Mitigation Type Determination w/in riparian areas</b>
1c	Ditch >3' depth	No	Non-forested agricultural fields and partially located within a DOT Right Of Way (ROW)	No	Yes	<b>Restoration Site</b> per 15A NCAC 02B .0295 (n)  <u>Note:</u> No credits are allowed within the DOT R.O.W
2	Stream	Yes	Combination of non-forested agricultural fields with mature forest  a linear ditch within the riparian area along the right bank	Yes	Yes (fields only)	Non-forested fields - <b>Restoration Site</b> per 15A NCAC 02B .0295 (n)  Forested Areas – <b>Preservation Site</b> per 15A NCAC 02B .0295 (o)(5)  <u>Note:</u> Ditch needs to be filled
4	Stream	Yes	Combination of non-forested agricultural fields with mature forest downstream below confluence with feature 5. Upstream is partially located within a DOT ROW & Banks are unstable and eroding in many areas, some sink holes are present.	<sup>2</sup> Yes	Yes (fields only)	Non-forested areas - <b>Restoration Site</b> per 15A NCAC 02B .0295 (n)  Forested Areas – <b>Preservation Site</b> per 15A NCAC 02B .0295 (o)(5)  <i>Minor bank stabilization and grading needed where bank stability is compromised and where erosional rills, sink holes and gullies are observed</i>  <u>Note:</u> No credits are allowed within the DOT R.O.W
5	Stream	Yes	Non-forested agricultural fields  Upstream is partially located within a DOT ROW	Yes	Yes	<b>Restoration Site</b> per 15A NCAC 02B .0295 (n)  <i>Minor bank stabilization and grading needed where bank stability is compromised and where erosional rills and gullies are observed</i>  <u>Note:</u> No credits are allowed within the DOT R.O.W
Thunder Swamp	Stream	Yes	Mature forest	<sup>2</sup> Yes	No	<b>Preservation Site</b> per 15A NCAC 02B .0295 (o)(5)

<sup>1</sup>Subjectivity calls for the features were determined by DWR in correspondence dated February 26, 2021 (ID# 2021-0018) using the 1:24,000 scale quadrangle topographic map prepared by USGS and the most recent printed version of the soil survey map prepared by the NRCS.

<sup>2</sup>The area of preservation credit within a buffer mitigation site shall comprise of no more than 25 percent (25%) of the total area of buffer mitigation per 15A NCAC 0295 (o)(5) and 15A NCAC 0295 (o)(4). Site cannot be a Preservation Only site to comply with this rule.

<sup>3</sup>NC Division of Water Resources - Methodology and Calculations for determining Nutrient Reductions associated with Riparian Buffer Establishment

<sup>4</sup>Determinations made for this Site are determined based on the proposal provided in maps and figures submitted with the request.

<sup>5</sup>All features proposed for buffer mitigation or nutrient offset, must have a planted conservation easement established that includes the tops of channel banks when being measured perpendicular and landward from the banks, even if no credit is viable within that riparian area.

<sup>6</sup>The area of the mitigation site on ephemeral channels shall comprise no more than 25 percent (25%) of the total area of buffer mitigation per 15A NCAC 02B .0295 (o)(7).



Determinations provided in the table above were based on the proposed conservation easement boundaries depicted in Figure 1 for the full-delivery mitigation site and the private mitigation bank site. The two easement boundaries are contiguous, and thus, the approval of the private mitigation bank site will be dependent on the approval and implementation of the full-delivery mitigation site. The map representing the proposal for the site is attached to this letter and is initialed by Ms. Merritt on April 13, 2021. Substantial changes to the proposed easement boundaries could affect the site's potential to generate buffer mitigation and nutrient offset credits.

This letter does not constitute an approval of this Site to generate buffer and nutrient offset credits. Pursuant to 15A NCAC 02B .0295, a mitigation proposal and a mitigation plan shall be submitted to DWR for written approval **prior** to conducting any mitigation activities in riparian areas and/or surface waters for buffer mitigation credit. Pursuant to 15A NCAC 02B .0703, a proposal regarding a proposed nutrient load-reducing measure for nutrient offset credit shall be submitted to DWR for approval prior to any mitigation activities in riparian areas and/or surface waters.

All vegetative plantings, performance criteria and other mitigation requirements for riparian restoration, enhancement and preservation must follow the requirements in 15A NCAC 02B .0295 to be eligible for buffer and/or nutrient offset mitigation credits. For any areas depicted as not being viable for nutrient offset credit above, one could propose a different measure, along with supporting calculations and sufficient detail to support estimates of load reduction, for review by the DWR to determine viability for nutrient offset in accordance with 15A NCAC 02B .0703.

**This viability assessment will expire on April 13, 2023 or upon approval of a mitigation plan by the DWR, whichever comes first. This letter should be provided in any nutrient offset, buffer, stream or wetland mitigation plan for this Site.**

Please contact Katie Merritt at (919) 707-3637 if you have any questions regarding this correspondence.

Sincerely,

DocuSigned by:  
*Paul Wojoski*  
949D91BA53EF4E0...

Paul Wojoski, Supervisor  
401 and Buffer Permitting Branch

*PW/kym*

Attachments: "Figure 1 – Existing Conditions"

cc: File Copy (Katie Merritt)

**RS**  
RESTORATION SYSTEMS, LLC  
1001 MAYNES STREET, SUITE 211  
RALEIGH, NC 27604  
PHONE: 919.755.9400  
FAX: 919.755.9492

**RESTORATION SYSTEMS, LLC**  
SCALE: 1 in = 200 ft  
DATE: 01-2021  
SITE: N401

**Thunder Swamp Subject**  
Figure 1 - Existing Conditions

Aerial Imagery: (c) ESRI  
Coordinate System: NAD\_1983\_SP\_NIC\_FIPS\_3000\_F1

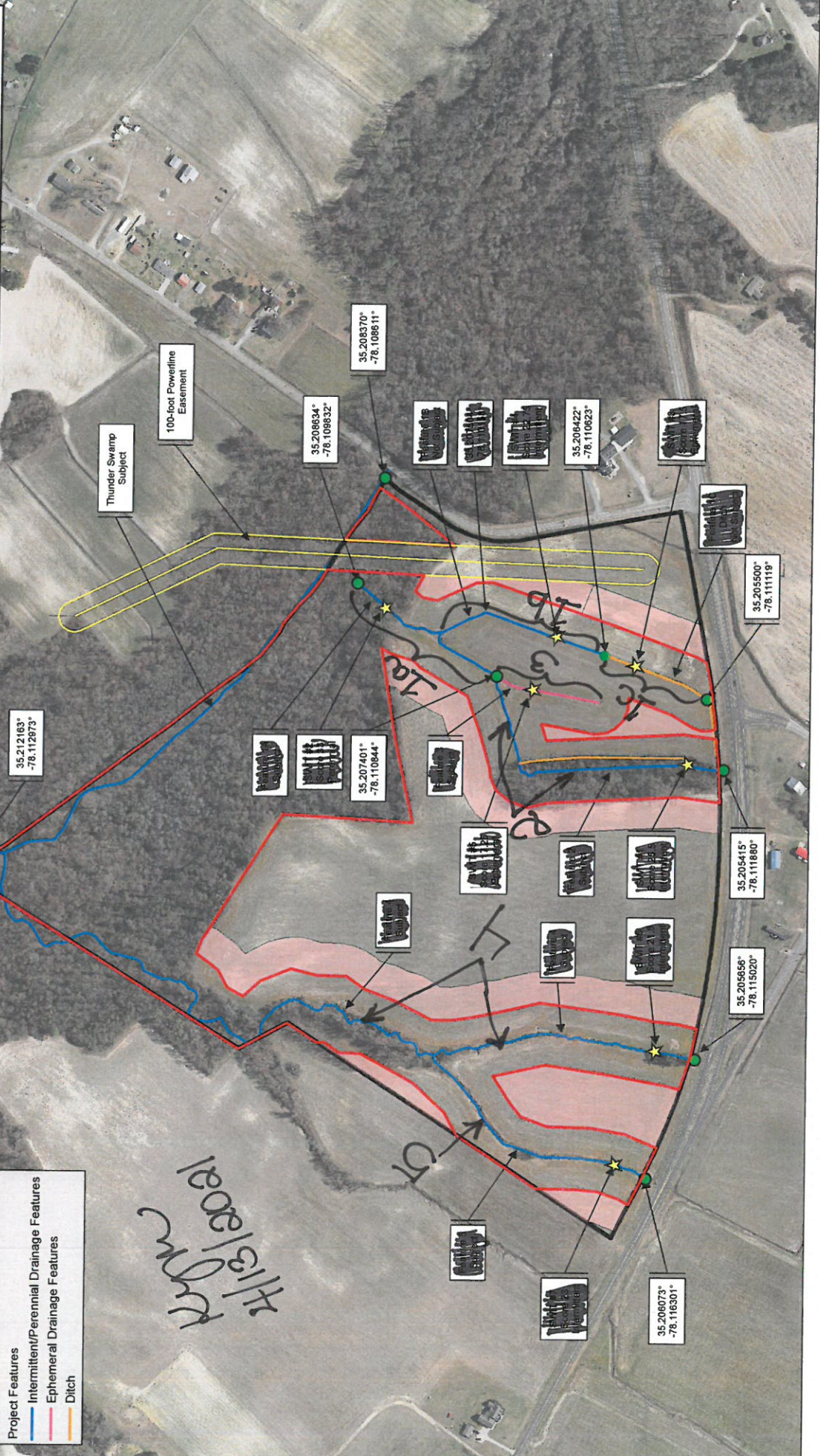
0 75 150 300 450 600  
Feet

**Legend**

- DWR Stream Det.
- Powerline
- DMS - Full-Delivery Easement
- RS - ~~100-foot~~ Easement
- Subject Site Parcel (NC Pin 2563511701)

**Project Features**

- Intermittent/Perennial Drainage Features
- Ephemeral Drainage Features
- Ditch



35.208370°  
-78.108611°

35.208634°  
-78.109632°

35.208422°  
-78.110823°

35.205500°  
-78.111118°

35.212183°  
-78.112873°

35.207401°  
-78.110844°

35.205415°  
-78.111890°

35.205656°  
-78.115020°

35.206073°  
-78.116301°

High local  
100 ft Powerline Easement



Holz, Raymond

---

**From:** Merritt, Katie <katie.merritt@ncdenr.gov>  
**Sent:** Tuesday, March 14, 2023 4:50 PM  
**To:** Ray Holz  
**Cc:** Dunnigan, Emily  
**Subject:** RE: [External] Coor Island Phase B (DWR 2021-0021v2) & Thunder Phase B (DWR 2021-0018v2)

Hey Raymond,

Thank you for you letting me know. The Coor Island Phase B & Thunder Phase B BPDP documents along with the corresponding draft UMBI are formally withdrawn from the DWR Bank review. Please make sure to still use the same DWR project ID numbers that were assigned to these two sites when submitting documents to DMS.

The site viability letters for these two sites are still valid, as long as there have been no landuse changes since the initial DWR review of the two draft BPDP documents.

Thank you,  
Katie

---

**From:** Ray Holz <rholz@restorationsystems.com>  
**Sent:** Tuesday, March 14, 2023 3:26 PM  
**To:** Merritt, Katie <katie.merritt@ncdenr.gov>  
**Cc:** Dunnigan, Emily <emily.dunnigan@ncdenr.gov>  
**Subject:** [External] Coor Island Phase B (DWR 2021-0021v2) & Thunder Phase B (DWR 2021-0018v2)

**CAUTION:** External email. Do not click links or open attachments unless you verify. Send all suspicious email as an attachment to [Report Spam](#).

Katie – Following up on our conversation earlier today, I wanted to provide you with formal notice that Restoration Systems (RS) would like to terminate the banking process for Coor Island Phase B (DWR 2021-0021v2) & Thunder Phase B (DWR 2021-0018v2). RS received contracts from DEQ to provide these sites via full-delivery contracts through DMS. We have started that process and will submit mitigation plans to DMS soon. RS will apply comments received from DWR during the Draft BPDP submittal/review process.

Given that RS has already started the permitting process on these two sites and DWR has reviewed/made comments to the drafts, I wanted to confirm that our viability letters are still valid. Each Site’s viability letter states, “This viability assessment will expire on April 13, 2023, or upon approval of a mitigation plan by the DWR, whichever comes first” – attached for quick reference.

Please let me know if we need to address the expiration of the viability letters.

Thanks,  
RH

-----  
Raymond J. Holz | Restoration Systems, LLC  
1101 Haynes St. Suite 211 | Raleigh, NC 27604  
tel: 919.334.9122 | cell: 919.604.9314 | fax: 919.755.9492  
email: [rholz@restorationsystems.com](mailto:rholz@restorationsystems.com)

**From:** [Thompson, Emily B CIV USARMY CESAW \(US\)](#)  
**To:** [Alex Baldwin](#)  
**Subject:** SAW-2021-01102 (Thunder Buffer Mitigation Site/Wayne)  
**Date:** Friday, May 21, 2021 12:54:31 PM  
**Attachments:** [SAW-2021-01102 Thunder Buffer Mitigation Site Map.pdf](#)

---

Hi Alex,

On May 13, 2021, we received information from you requesting the Wilmington District, Regulatory Division review and concur with the boundaries of an aquatic resource delineation.

We have reviewed the information provided by you concerning the aquatic resources, and by copy of this e-mail, are confirming that the aquatic resources delineation has been verified by the Corps to be a sufficiently accurate and reliable representation of the location and extent of aquatic resources within the identified review area. The location and extent of these aquatic resources are shown on the delineation map, labeled *Figure 5 – Potential Waters of the U.S. Jurisdictional Delineation Concurrence* and provided on May 13, 2021 without revisions.

Regulatory Guidance Letter (RGL) 16-01

<https://usace.contentdm.oclc.org/utills/getfile/collection/p16021coll9/id/1256> provides guidance for Jurisdictional Determinations (JD) and states “The Corps generally does not issue a JD of any type where no JD has been requested”. At this time we are only verifying the delineation. This delineation may be relied upon for use in the permit evaluation process, including determining compensatory mitigation. “This verification does not address nor include any consideration for geographic jurisdiction on aquatic resources and shall not be interpreted as such. This delineation verification is not an Approved Jurisdictional Determination (AJD) and is not an appealable action under the Regulatory Program Administrative Appeal Process (33 CFR Part 331). However, you may request an AJD, which is an appealable action.

If you wish to receive a Preliminary Jurisdictional Determination (PJD), or an Approved Jurisdictional Determination (AJD) please respond accordingly, otherwise nothing further is required and we will not provide any additional documentation.

The delineation included herein has been conducted to identify the location and extent of the aquatic resource boundaries and/or the jurisdictional status of aquatic resources for purposes of the Clean Water Act for the particular site identified in this request. This delineation may not be valid for the Wetland Conservation Provisions of the Food Security Act of 1985, as amended. If you or your tenant are USDA program participants, or anticipate participation in USDA programs, you should discuss the applicability of a certified wetland determination with the local USDA service center, prior to starting work.

Let me know if you have any questions – thank you for providing detailed information to facilitate our review.

Sincerely,  
Emily

Emily B. Thompson  
Regulatory Specialist  
U.S. Army Corps of Engineers  
Washington Regulatory Field Office  
2407 W. 5th Street  
Washington, NC 27889  
(910) 251-4629  
[Emily.B.Thompson@usace.army.mil](mailto:Emily.B.Thompson@usace.army.mil)

---

**From:** Alex Baldwin <[abalwdwin@restorationsystems.com](mailto:abalwdwin@restorationsystems.com)>



**Legend**

- Subject Site Parcel (NC Pin 2563511701)
- DMS - Full-Delivery Easement

**Potential Waters of the U.S.**

- Intermittent/Perennial Tributaries
- Wetlands
- Wetland Boundary Flags

**Datapoints**

- DWR SWIT Form
- USACE Paired Wetland Form

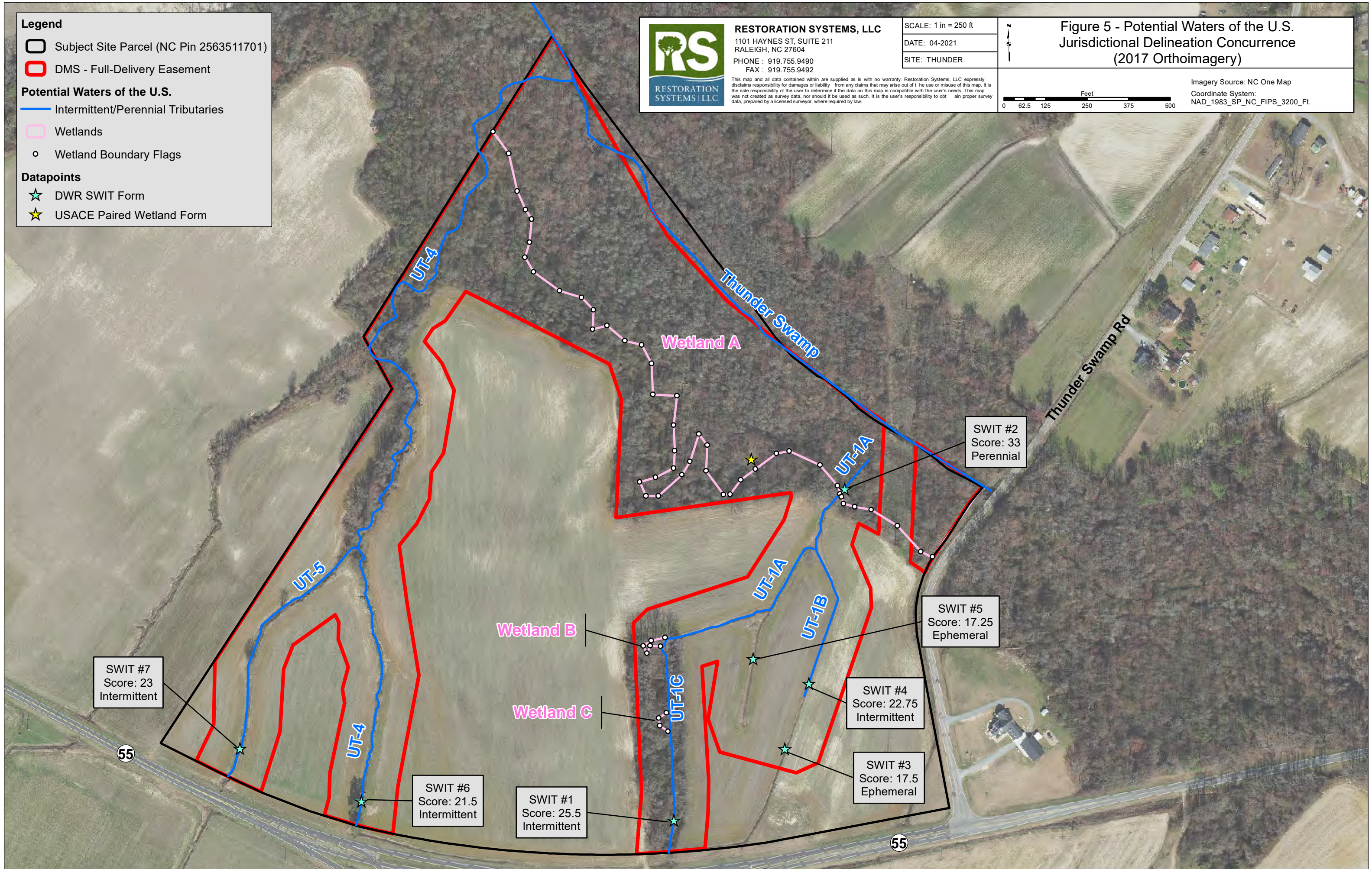
**RESTORATION SYSTEMS, LLC**  
 1101 HAYNES ST, SUITE 211  
 RALEIGH, NC 27604  
 PHONE : 919.755.9490  
 FAX : 919.755.9492

This map and all data contained within are supplied as is with no warranty. Restoration Systems, LLC expressly disclaims responsibility for damages or liability from any claims that may arise out of the use or misuse of this map. It is the sole responsibility of the user to determine if the data on this map is compatible with the user's needs. This map was not created as survey data, nor should it be used as such. It is the user's responsibility to obtain proper survey data, prepared by a licensed surveyor, where required by law.

SCALE: 1 in = 250 ft  
 DATE: 04-2021  
 SITE: THUNDER

**Figure 5 - Potential Waters of the U.S. Jurisdictional Delineation Concurrence (2017 Orthoimagery)**

Imagery Source: NC One Map  
 Coordinate System: NAD\_1983\_SP\_NC\_FIPS\_3200\_Ft.





# Jurisdictional Determination Request

---



**US Army Corps  
of Engineers**  
Wilmington District

This form is intended for use by anyone requesting a jurisdictional determination (JD) from the U.S. Army Corps of Engineers, Wilmington District (Corps). Please include all supporting information, as described within each category, with your request. You may submit your request via mail, electronic mail, or facsimile. Requests should be sent to the appropriate project manager of the county in which the property is located. A current list of project managers by assigned counties can be found on-line at:

<http://www.saw.usace.army.mil/Missions/RegulatoryPermitProgram/Contact/CountyLocator.aspx>, by calling 910-251-4633, or by contacting any of the field offices listed below. Once your request is received you will be contacted by a Corps project manager.

## **ASHEVILLE & CHARLOTTE REGULATORY FIELD OFFICES**

US Army Corps of Engineers  
151 Patton Avenue, Room 208  
Asheville, North Carolina 28801-5006  
General Number: (828) 271-7980  
Fax Number: (828) 281-8120

## **WASHINGTON REGULATORY FIELD OFFICE**

US Army Corps of Engineers  
2407 West Fifth Street  
Washington, North Carolina 27889  
General Number: (910) 251-4610  
Fax Number: (252) 975-1399

## **RALEIGH REGULATORY FIELD OFFICE**

US Army Corps of Engineers  
3331 Heritage Trade Drive, Suite 105  
Wake Forest, North Carolina 27587  
General Number: (919) 554-4884  
Fax Number: (919) 562-0421

## **WILMINGTON REGULATORY FIELD OFFICE**

US Army Corps of Engineers  
69 Darlington Avenue  
Wilmington, North Carolina 28403  
General Number: 910-251-4633  
Fax Number: (910) 251-4025

## **INSTRUCTIONS:**

**All requestors must complete Parts A, B, C, D, E, F and G.**

**NOTE TO CONSULTANTS AND AGENCIES:** If you are requesting a JD on behalf of a paying client or your agency, please note the specific submittal requirements in **Part H**.

**NOTE ON PART D – PROPERTY OWNER AUTHORIZATION:** Please be aware that all JD requests must include the current property owner authorization for the Corps to proceed with the determination, which may include inspection of the property when necessary. This form must be signed by the current property owner(s) or the owner(s) authorized agent to be considered a complete request.

**NOTE ON PART D - NCDOT REQUESTS:** Property owner authorization/notification for JD requests associated with North Carolina Department of Transportation (NCDOT) projects will be conducted according to the current NCDOT/USACE protocols.

**NOTE TO USDA PROGRAM PARTICIPANTS:** A Corps approved or preliminary JD may not be valid for the wetland conservation provisions of the Food Security Act of 1985. If you or your tenant are USDA Program participants, or anticipate participation in USDA programs, you should also request a certified wetland determination from the local office of the Natural Resources Conservation Service, prior to starting work.

## Jurisdictional Determination Request

---

**A. PARCEL INFORMATION**

Street Address: 107 West NC 55 HWY

City, State: Mount Olive, NC

County: Wayne

Parcel Index Number(s) (PIN): 2563511701

**B. REQUESTOR INFORMATION**

Name: Alex Baldwin

Mailing Address: 1101 Haynes Street, Suite 211  
Raleigh, NC 27604

Telephone Number: 919-274-2419

Electronic Mail Address: abaldwin@restorationsystems.com

Select one:

- I am the current property owner.
- I am an Authorized Agent or Environmental Consultant<sup>1</sup>
- Interested Buyer or Under Contract to Purchase
- Other, please explain. \_\_\_\_\_
- \_\_\_\_\_

**C. PROPERTY OWNER INFORMATION<sup>2</sup>**

Name: Myrtle K. Mangum & Betty K. Carraway

Mailing Address: 1002 Old Denbigh Blvd Newport News,  
Newport News, VA 23602

Telephone Number: 757-898-4732

Electronic Mail Address: N/A

---

<sup>1</sup> Must provide completed Agent Authorization Form/Letter.

<sup>2</sup> Documentation of ownership also needs to be provided with request (copy of Deed, County GIS/Parcel/Tax Record).

# Jurisdictional Determination Request

---

## D. PROPERTY ACCESS CERTIFICATION<sup>3,4</sup>

By signing below, I authorize representatives of the Wilmington District, U.S. Army Corps of Engineers (Corps) to enter upon the property herein described for the purpose of conducting on-site investigations, if necessary, and issuing a jurisdictional determination pursuant to Section 404 of the Clean Water Act and/or Section 10 of the Rivers and Harbors Act of 1899. I, the undersigned, am either a duly authorized owner of record of the property identified herein, or acting as the duly authorized agent of the owner of record of the property.

Alex Baldwin

---

Print Name

Capacity:  Owner  Authorized Agent<sup>5</sup>

5/13/2021

---

Date



Signature

---

## E. REASON FOR JD REQUEST: (Check as many as applicable)

- I intend to construct/develop a project or perform activities on this parcel which would be designed to avoid all aquatic resources.
- I intend to construct/develop a project or perform activities on this parcel which would be designed to avoid all jurisdictional aquatic resources under Corps authority.
- I intend to construct/develop a project or perform activities on this parcel which may require authorization from the Corps, and the JD would be used to avoid and minimize impacts to jurisdictional aquatic resources and as an initial step in a future permitting process.
- I intend to construct/develop a project or perform activities on this parcel which may require authorization from the Corps; this request is accompanied by my permit application and the JD is to be used in the permitting process.
- I intend to construct/develop a project or perform activities in a navigable water of the U.S. which is included on the district Section 10 list and/or is subject to the ebb and flow of the tide.
- A Corps JD is required in order to obtain my local/state authorization.
- I intend to contest jurisdiction over a particular aquatic resource and request the Corps confirm that jurisdiction does/does not exist over the aquatic resource on the parcel.
- I believe that the site may be comprised entirely of dry land.
- Other: \_\_\_\_\_

---

<sup>3</sup> For NCDOT requests following the current NCDOT/USACE protocols, skip to Part E.

<sup>4</sup> If there are multiple parcels owned by different parties, please provide the following for each additional parcel on a continuation sheet.

<sup>5</sup> Must provide agent authorization form/letter signed by owner(s).



## Jurisdictional Determination Request

---

### F. JURISDICTIONAL DETERMINATION (JD) TYPE (Select One)

I am requesting that the Corps provide a preliminary JD for the property identified herein.

A Preliminary Jurisdictional Determination (PJD) provides an indication that there may be “waters of the United States” or “navigable waters of the United States” on a property. PJDs are sufficient as the basis for permit decisions. For the purposes of permitting, all waters and wetlands on the property will be treated as if they are jurisdictional “waters of the United States”. PJDs cannot be appealed (33 C.F.R. 331.2); however, a PJD is “preliminary” in the sense that an approved JD can be requested at any time. PJDs do not expire.

I am requesting that the Corps provide an approved JD for the property identified herein.

An Approved Jurisdictional Determination (AJD) is a determination that jurisdictional “waters of the United States” or “navigable waters of the United States” are either present or absent on a site. An approved JD identifies the limits of waters on a site determined to be jurisdictional under the Clean Water Act and/or Rivers and Harbors Act. Approved JDs are sufficient as the basis for permit decisions. AJDs are appealable (33 C.F.R. 331.2). The results of the AJD will be posted on the Corps website. A landowner, permit applicant, or other “affected party” (33 C.F.R. 331.2) who receives an AJD may rely upon the AJD for five years (subject to certain limited exceptions explained in Regulatory Guidance Letter 05-02).

I am unclear as to which JD I would like to request and require additional information to inform my decision.

### G. ALL REQUESTS

Map of Property or Project Area. This Map must clearly depict the boundaries of the review area.

Size of Property or Review Area 79 acres.

The property boundary (or review area boundary) is clearly physically marked on the site.

# Jurisdictional Determination Request

---

## H. REQUESTS FROM CONSULTANTS

Project Coordinates (Decimal Degrees): Latitude: 35.206645  
Longitude: -78.112882

A legible delineation map depicting the aquatic resources and the property/review area. Delineation maps must be no larger than 11x17 and should contain the following: (Corps signature of submitted survey plats will occur after the submitted delineation map has been reviewed and approved).<sup>6</sup>

- North Arrow
- Graphical Scale
- Boundary of Review Area
- Date
- Location of data points for each Wetland Determination Data Form or tributary assessment reach.

### For Approved Jurisdictional Determinations:

- Jurisdictional wetland features should be labeled as Wetland Waters of the US, 404 wetlands, etc. Please include the acreage of these features.
- Jurisdictional non-wetland features (i.e. tidal/navigable waters, tributaries, impoundments) should be labeled as Non-Wetland Waters of the US, stream, tributary, open water, relatively permanent water, pond, etc. Please include the acreage or linear length of each of these features as appropriate.
- Isolated waters, waters that lack a significant nexus to navigable waters, or non-jurisdictional upland features should be identified as Non-Jurisdictional. Please include a justification in the label regarding why the feature is non-jurisdictional (i.e. “Isolated”, “No Significant Nexus”, or “Upland Feature”). Please include the acreage or linear length of these features as appropriate.

### For Preliminary Jurisdictional Determinations:

- Wetland and non-wetland features should not be identified as Jurisdictional, 404, Waters of the United States, or anything that implies jurisdiction. These features can be identified as Potential Waters of the United States, Potential Non-wetland Waters of the United States, wetland, stream, open water, etc. Please include the acreage and linear length of these features as appropriate.

Completed Wetland Determination Data Forms for appropriate region  
(at least one wetland and one upland form needs to be completed for each wetland type)

---

<sup>6</sup> Please refer to the guidance document titled “Survey Standards for Jurisdictional Determinations” to ensure that the supplied map meets the necessary mapping standards. <http://www.saw.usace.army.mil/Missions/Regulatory-Permit-Program/Jurisdiction/>

## Jurisdictional Determination Request

---

- Completed appropriate Jurisdictional Determination form
  - **PJDs**, please complete a Preliminary Jurisdictional Determination Form<sup>7</sup> and include the Aquatic Resource Table
  - **AJDs**, please complete an Approved Jurisdictional Determination Form<sup>8</sup>
- Vicinity Map
- Aerial Photograph
- USGS Topographic Map
- Soil Survey Map
- Other Maps, as appropriate (e.g. National Wetland Inventory Map, Proposed Site Plan, previous delineation maps, LIDAR maps, FEMA floodplain maps)
- Landscape Photos (if taken)
- NCSAM and/or NCWAM Assessment Forms and Rating Sheets
- NC Division of Water Resources Stream Identification Forms
- Other Assessment Forms

---

<sup>7</sup> [www.saw.usace.army.mil/Portals/59/docs/regulatory/regdocs/JD/RGL\\_08-02\\_App\\_A\\_Prelim\\_JD\\_Form\\_fillable.pdf](http://www.saw.usace.army.mil/Portals/59/docs/regulatory/regdocs/JD/RGL_08-02_App_A_Prelim_JD_Form_fillable.pdf)

<sup>8</sup> Please see <http://www.saw.usace.army.mil/Missions/Regulatory-Permit-Program/Jurisdiction/>

**Principal Purpose:** The information that you provide will be used in evaluating your request to determine whether there are any aquatic resources within the project area subject to federal jurisdiction under the regulatory authorities referenced above.

**Routine Uses:** This information may be shared with the Department of Justice and other federal, state, and local government agencies, and the public, and may be made available as part of a public notice as required by federal law. Your name and property location where federal jurisdiction is to be determined will be included in the approved jurisdictional determination (AJD), which will be made available to the public on the District's website and on the Headquarters USAGE website.

**Disclosure:** Submission of requested information is voluntary; however, if information is not provided, the request for an AJD cannot be evaluated nor can an AJD be issued.

LANDOWNER AUTHORIZATION FORM

PROPERTY LEGAL DESCRIPTION:

Deed Book: 0073E Page: 108 County: Wayne

Parcel ID Number: 16555

Street Address: 1107 W NC HWY 55, Mount Olive NC, 28365

Property Owner (please print): Myrtle K. Mangum

Property Owner (please print): Betty K. Carraway

The undersigned, registered property owner(s) of the above property, do hereby authorize

Joshua Merritt of Restoration Systems, LLC. (Contractor/Agent/Project Manager) (Name of Contractor/Agent Firm/Agency)

to take all actions necessary for the evaluation of the property as a potential stream, wetland and/or riparian buffer mitigation project, including conducting stream and/or wetland determinations and delineations, as well as issuance and acceptance of any required permit(s) or certification(s). I agree to allow regulatory agencies, including the NC Division of Water Resources, to visit the property as part of these environmental reviews.

Property Owners(s) Address: 1002 Old Denhigh BLVD, Newport News VA, 23602 (if different from above) 2104 Jarman Dr, Raleigh NC, 27604

Property Owner Telephone Number: 457-898-4732

Property Owner Telephone Number: 919-624-7832

We hereby certify the above information to be true and accurate to the best of our knowledge.

Myrtle K. Mangum 9/11/20 (Property Owner Authorized Signature) (Date)

Betty K. Carraway 9-11-20 (Property Owner Authorized Signature) (Date)

1Name of full delivery staff member (full-deliveries) or DMS project manager (design-bid-build). 2Name of company (full-deliveries) or DMS (design-bid-build).

**Appendix 2 - PRELIMINARY JURISDICTIONAL DETERMINATION (PJD) FORM**

**BACKGROUND INFORMATION**

**A. REPORT COMPLETION DATE FOR PJD:** April 21, 2021

**B. NAME AND ADDRESS OF PERSON REQUESTING PJD:** Alex Baldwin - 1101 Haynes Street, Suite 211, Raleigh, NC 27604

**C. DISTRICT OFFICE, FILE NAME, AND NUMBER:**

**D. PROJECT LOCATION(S) AND BACKGROUND INFORMATION:**

**(USE THE TABLE BELOW TO DOCUMENT MULTIPLE AQUATIC RESOURCES AND/OR AQUATIC RESOURCES AT DIFFERENT SITES)**

State: **NC** County/parish/borough: **Wayne** City: **Mt. Olive**

Center coordinates of site (lat/long in degree decimal format):

Lat.: **35.206645** Long.: **-78.112882**

Universal Transverse Mercator: **17S**

Name of nearest waterbody: **Thunder Swamp**

**E. REVIEW PERFORMED FOR SITE EVALUATION (CHECK ALL THAT APPLY):**

Office (Desk) Determination. Date:

Field Determination. Date(s):

**TABLE OF AQUATIC RESOURCES IN REVIEW AREA WHICH "MAY BE" SUBJECT TO REGULATORY JURISDICTION.**

Site number	Latitude (decimal degrees)	Longitude (decimal degrees)	Estimated amount of aquatic resource in review area (acreage and linear feet, if applicable)	Type of aquatic resource (i.e., wetland vs. non-wetland waters)	Geographic authority to which the aquatic resource "may be" subject (i.e., Section 404 or Section 10/404)
Thunder Swamp	35.210289	-78.111523	2318	non-wetland waters	404
UT-1A	35.208008	-78.110409	572	non-wetland waters	
UT-1B	35.207307	-78.110235	474	non-wetland waters	
UT-1C	35.206842	-78.111879	980	non-wetland waters	
UT-4	35.209367	-78.114467	2944	non-wetland waters	
UT-5	35.207250	-78.115974	853	non-wetland waters	

**TABLE OF AQUATIC RESOURCES IN REVIEW AREA WHICH “MAY BE” SUBJECT TO REGULATORY JURISDICTION (CONTINUED).**

<b>Site number</b>	<b>Latitude (decimal degrees)</b>	<b>Longitude (decimal degrees)</b>	<b>Estimated amount of aquatic resource in review area (acreage and linear feet, if applicable)</b>	<b>Type of aquatic resource (i.e., wetland vs. non-wetland waters)</b>	<b>Geographic authority to which the aquatic resource “may be” subject (i.e., Section 404 or Section 10/404)</b>
Wetland A	35.209833	-78.111555	14.936	wetland	404
Wetland B	35.207136	-78.111996	0.031	wetland	404
Wetland C	35.206489	-78.111904	0.032	wetland	404



- 1) The Corps of Engineers believes that there may be jurisdictional aquatic resources in the review area, and the requestor of this PJD is hereby advised of his or her option to request and obtain an approved JD (AJD) for that review area based on an informed decision after having discussed the various types of JDs and their characteristics and circumstances when they may be appropriate.
- 2) In any circumstance where a permit applicant obtains an individual permit, or a Nationwide General Permit (NWP) or other general permit verification requiring "pre-construction notification" (PCN), or requests verification for a non-reporting NWP or other general permit, and the permit applicant has not requested an AJD for the activity, the permit applicant is hereby made aware that: (1) the permit applicant has elected to seek a permit authorization based on a PJD, which does not make an official determination of jurisdictional aquatic resources; (2) the applicant has the option to request an AJD before accepting the terms and conditions of the permit authorization, and that basing a permit authorization on an AJD could possibly result in less compensatory mitigation being required or different special conditions; (3) the applicant has the right to request an individual permit rather than accepting the terms and conditions of the NWP or other general permit authorization; (4) the applicant can accept a permit authorization and thereby agree to comply with all the terms and conditions of that permit, including whatever mitigation requirements the Corps has determined to be necessary; (5) undertaking any activity in reliance upon the subject permit authorization without requesting an AJD constitutes the applicant's acceptance of the use of the PJD; (6) accepting a permit authorization (e.g., signing a proffered individual permit) or undertaking any activity in reliance on any form of Corps permit authorization based on a PJD constitutes agreement that all aquatic resources in the review area affected in any way by that activity will be treated as jurisdictional, and waives any challenge to such jurisdiction in any administrative or judicial compliance or enforcement action, or in any administrative appeal or in any Federal court; and (7) whether the applicant elects to use either an AJD or a PJD, the JD will be processed as soon as practicable. Further, an AJD, a proffered individual permit (and all terms and conditions contained therein), or individual permit denial can be administratively appealed pursuant to 33 C.F.R. Part 331. If, during an administrative appeal, it becomes appropriate to make an official determination whether geographic jurisdiction exists over aquatic resources in the review area, or to provide an official delineation of jurisdictional aquatic resources in the review area, the Corps will provide an AJD to accomplish that result, as soon as is practicable. This PJD finds that there "*may be*" waters of the U.S. and/or that there "*may be*" navigable waters of the U.S. on the subject review area, and identifies all aquatic features in the review area that could be affected by the proposed activity, based on the following information:


**SUPPORTING DATA. Data reviewed for PJD (check all that apply)**

Checked items should be included in subject file. Appropriately reference sources below where indicated for all checked items:

- Maps, plans, plots or plat submitted by or on behalf of the PJD requestor:  
Map: \_\_\_\_\_.
- Data sheets prepared/submitted by or on behalf of the PJD requestor.
  - Office concurs with data sheets/delineation report.
  - Office does not concur with data sheets/delineation report. Rationale: \_\_\_\_\_.
- Data sheets prepared by the Corps: \_\_\_\_\_.
- Corps navigable waters' study: \_\_\_\_\_.
- U.S. Geological Survey Hydrologic Atlas: \_\_\_\_\_.
  - USGS NHD data.
  - USGS 8 and 12 digit HUC maps.
- U.S. Geological Survey map(s). Cite scale & quad name: 24K - Mt. Olive.
- Natural Resources Conservation Service Soil Survey. Citation: Wayne Co., 1974.
- National wetlands inventory map(s). Cite name: \_\_\_\_\_.
- State/local wetland inventory map(s): \_\_\_\_\_.
- FEMA/FIRM maps: \_\_\_\_\_.
- 100-year Floodplain Elevation is: \_\_\_\_\_.(National Geodetic Vertical Datum of 1929)
- Photographs:  Aerial (Name & Date): NAIP - 2017.  
or  Other (Name & Date): \_\_\_\_\_.
- Previous determination(s). File no. and date of response letter: \_\_\_\_\_.
- Other information (please specify): DWR Stream Determination Letter (DWR# 2021 0018 v1).

**IMPORTANT NOTE: The information recorded on this form has not necessarily been verified by the Corps and should not be relied upon for later jurisdictional determinations.**

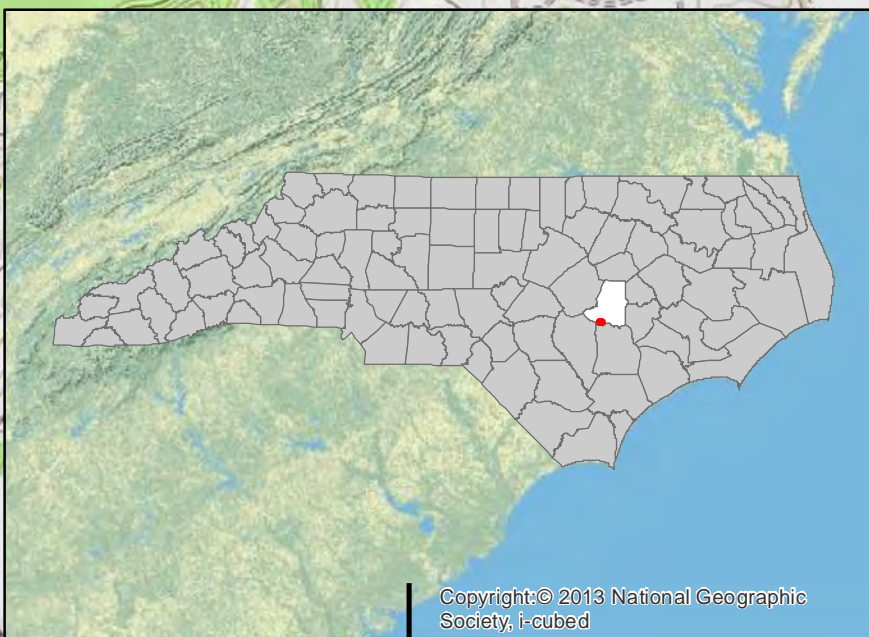
\_\_\_\_\_  
Signature and date of  
Regulatory staff member  
completing PJD

  
\_\_\_\_\_  
Signature and date of  
person requesting PJD  
(REQUIRED, unless obtaining  
the signature is impracticable)<sup>1</sup>

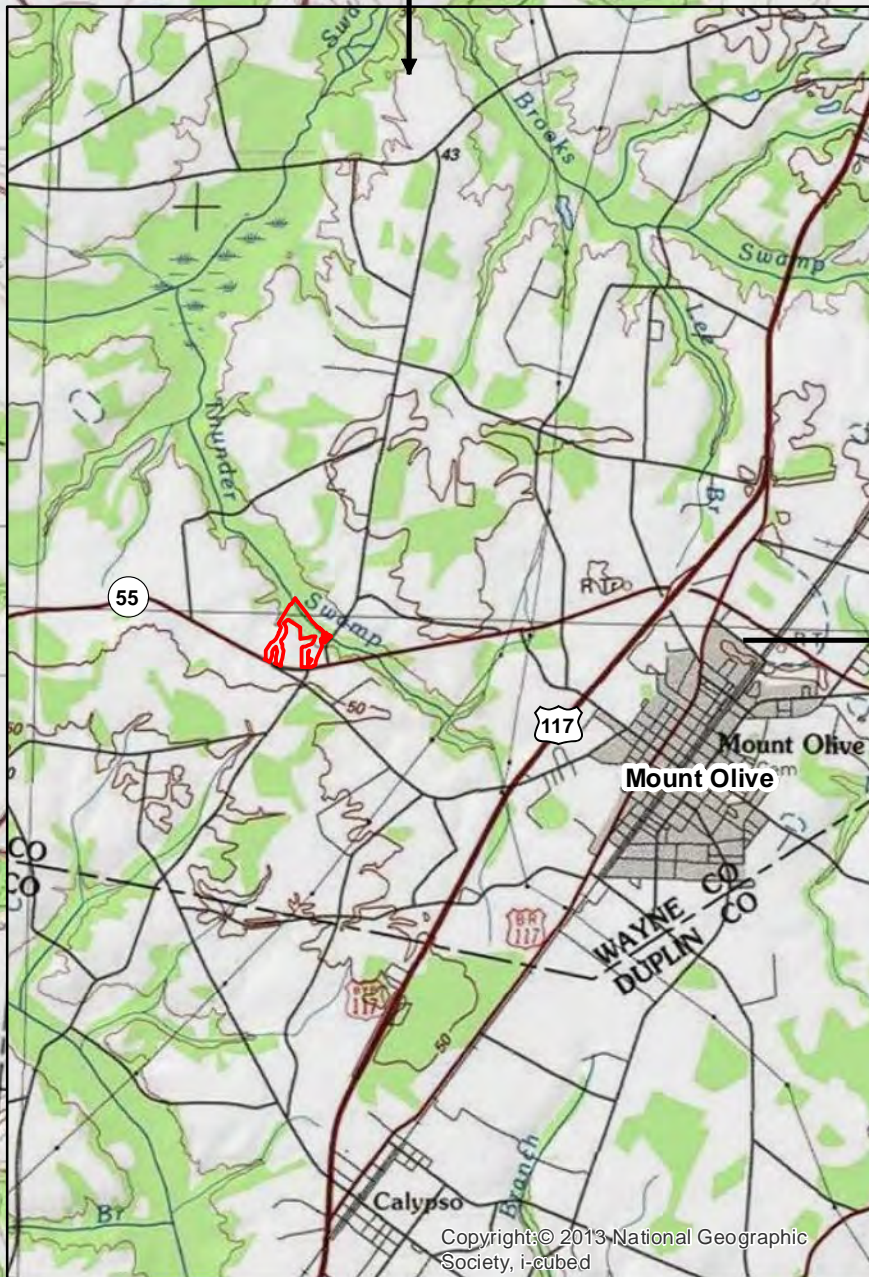
Digitally signed by Alexander E. Baldwin  
DN: cn=Alexander E. Baldwin, o=Restoration Systems, LLC,  
ou=email=alex@restoration-systems.com, c=US  
Date: 2021.05.10 15:57:42 -0400

<sup>1</sup> Districts may establish timeframes for requestor to return signed PJD forms. If the requestor does not respond within the established time frame, the district may presume concurrence and no additional follow up is necessary prior to finalizing an action.

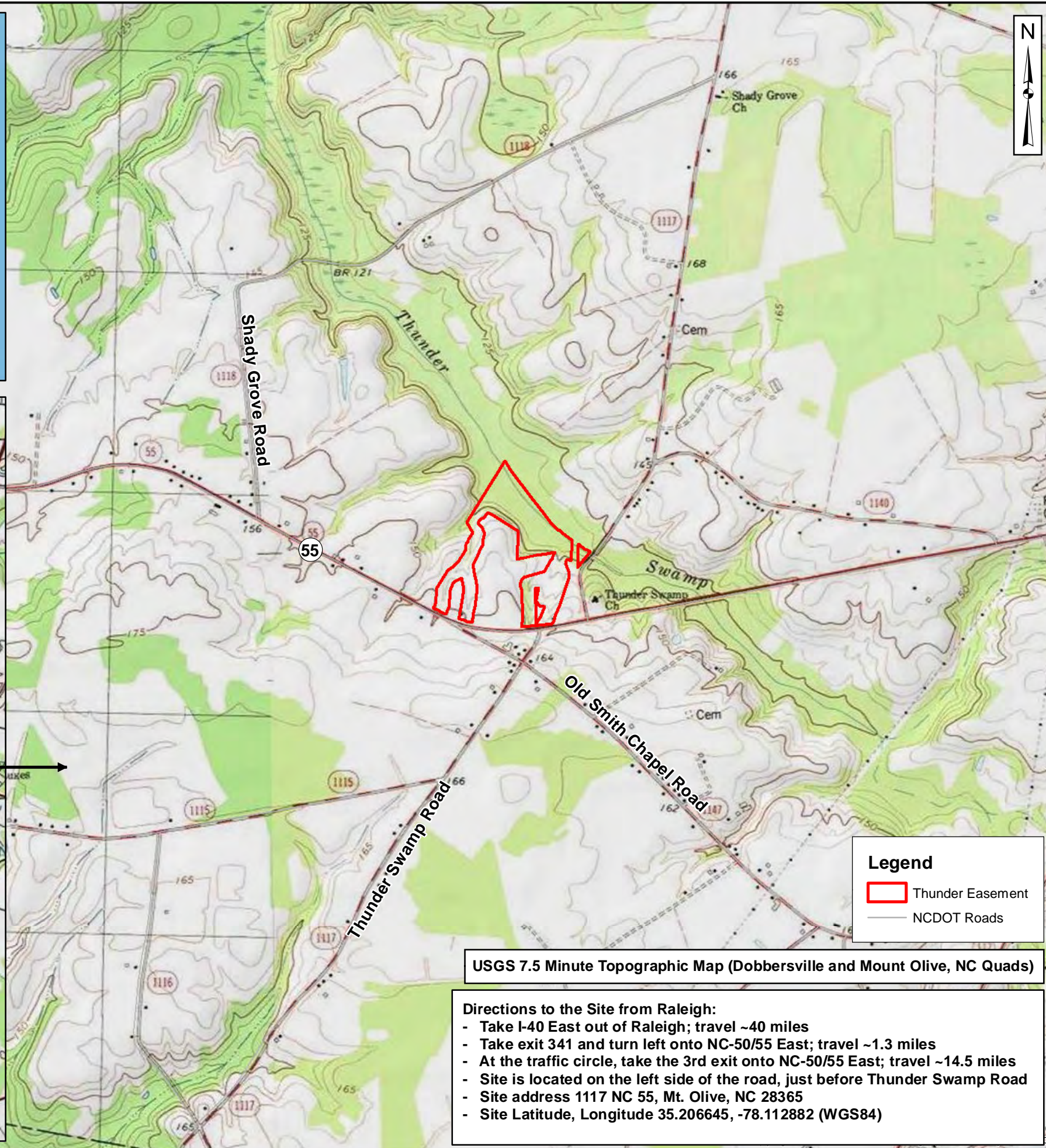




Copyright:© 2013 National Geographic Society, i-cubed



Copyright:© 2013 National Geographic Society, i-cubed



Prepared for:



Project:

**THUNDER MITIGATION SITE**

Wayne County, NC

Title:

**SITE LOCATION**

Drawn by:

KRJ

Date:

SEPT 2020

Scale:

1:15,000

Project No.:

20-001.07

**Legend**

- Thunder Easement
- NCDOT Roads

USGS 7.5 Minute Topographic Map (Dobbersville and Mount Olive, NC Quads)

- Directions to the Site from Raleigh:**
- Take I-40 East out of Raleigh; travel ~40 miles
  - Take exit 341 and turn left onto NC-50/55 East; travel ~1.3 miles
  - At the traffic circle, take the 3rd exit onto NC-50/55 East; travel ~14.5 miles
  - Site is located on the left side of the road, just before Thunder Swamp Road
  - Site address 1117 NC 55, Mt. Olive, NC 28365
  - Site Latitude, Longitude 35.206645, -78.112882 (WGS84)

FIGURE

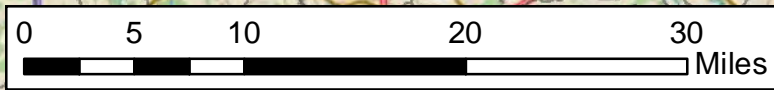
**1**





**Legend**

- Thunder Easement
- USGS Hydrologic Unit 03020201
- 14 Digit Hydrologic Unit Boundaries



Project:

**THUNDER MITIGATION SITE**

Wayne County, NC

Title:

**HYDROLOGIC UNIT MAP**

Drawn by: KRJ

Date: SEPT 2020

Scale: 1:550,000

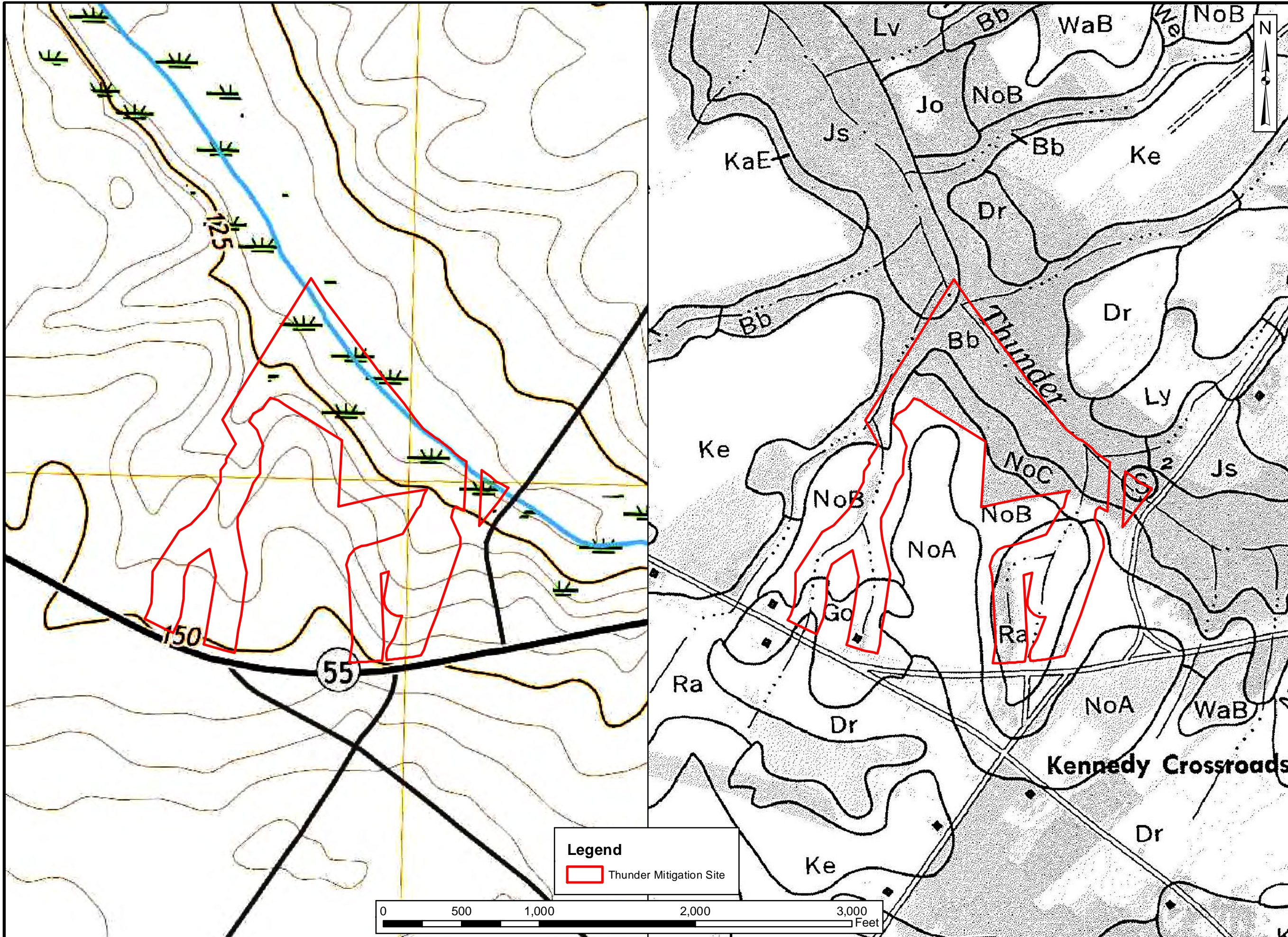
Project No.: 20-001.07

FIGURE

**2**

Location of Thunder Mitigation Site within USGS Hydrologic Unit 03020201170030.





Prepared for:



Project:

**THUNDER  
MITIGATION SITE**

Wayne County, NC

Title:

**PROJECT MAPPING**

Notes:

1. Background Imagery Sources:
  - a. Mount Olive, NC (2019) 7.5 minute topographic quadrangle provided by the U.S. Geological Survey (USGS, left window)
  - b. Soil Survey of Wayne County, NC (1974) provided by the National Resource Conservation Service, sheet 41 (right window)

Drawn by: KRJ

Date: SEPT 2020

Scale: 1:7000

Project No.: 20-001.07

FIGURE

**3**



**Legend**


- Subject Site Parcel (NC Pin 2563511701)
- DMS - Full-Delivery Easement

**Potential Waters of the U.S.**

- Intermittent/Perennial Tributaries
- Wetlands
- Wetland Boundary Flags

**Datapoints**

- DWR SWIT Form
- USACE Paired Wetland Form



**RESTORATION SYSTEMS, LLC**  
1101 HAYNES ST, SUITE 211  
RALEIGH, NC 27604  
PHONE : 919.755.9490  
FAX : 919.755.9492

This map and all data contained within are supplied as is with no warranty. Restoration Systems, LLC expressly disclaims responsibility for damages or liability from any claims that may arise out of the use or misuse of this map. It is the sole responsibility of the user to determine if the data on this map is compatible with the user's needs. This map was not created as survey data, nor should it be used as such. It is the user's responsibility to obtain proper survey data, prepared by a licensed surveyor, where required by law.

SCALE: 1 in = 250 ft

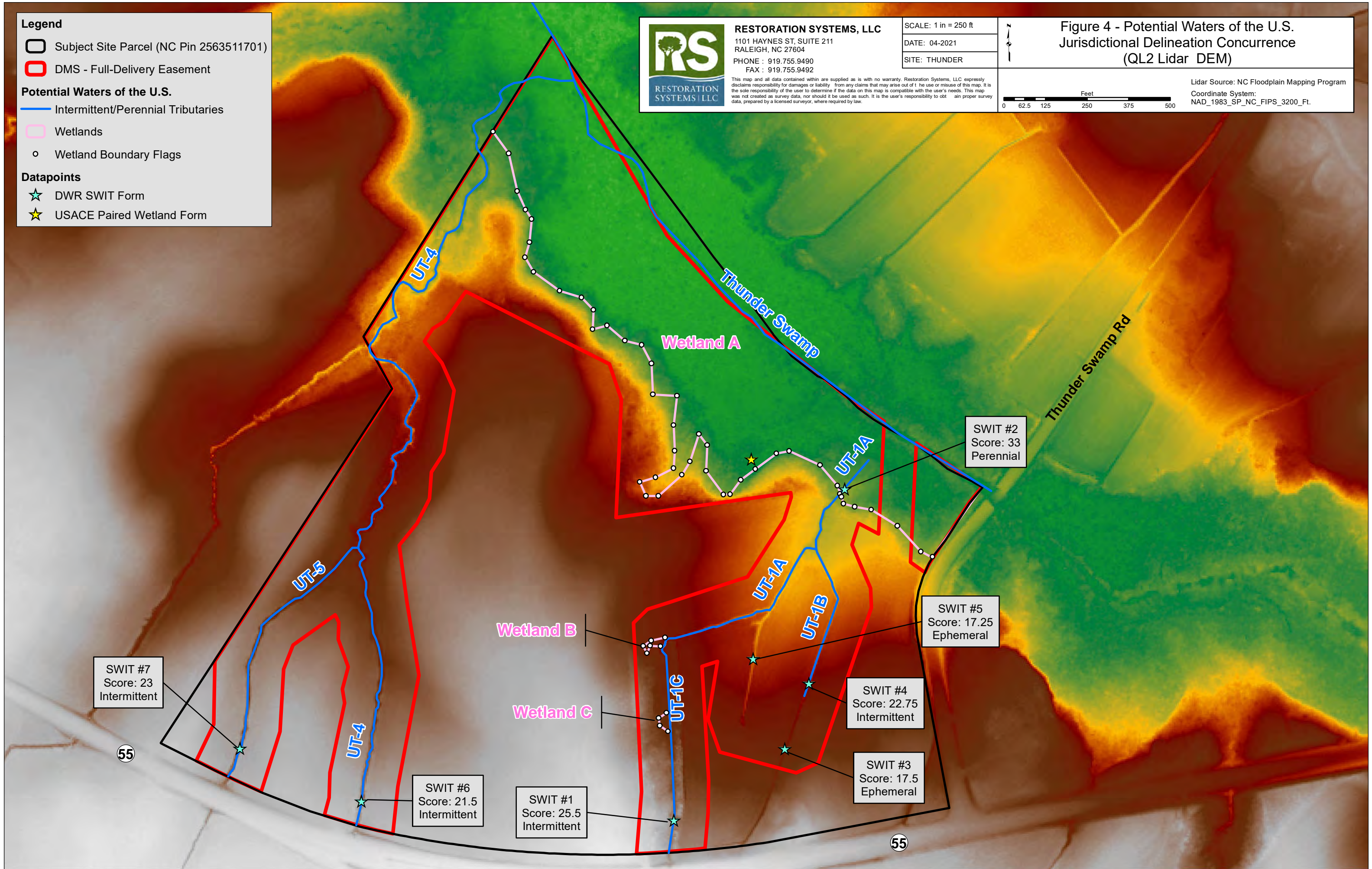
DATE: 04-2021

SITE: THUNDER

**Figure 4 - Potential Waters of the U.S. Jurisdictional Delineation Concurrence (QL2 Lidar DEM)**

Lidar Source: NC Floodplain Mapping Program

Coordinate System: NAD\_1983\_SP\_NC\_FIPS\_3200\_Ft.





**Legend**

- Subject Site Parcel (NC Pin 2563511701)
- DMS - Full-Delivery Easement

**Potential Waters of the U.S.**

- Intermittent/Perennial Tributaries
- Wetlands
- Wetland Boundary Flags

**Datapoints**

- DWR SWIT Form
- USACE Paired Wetland Form

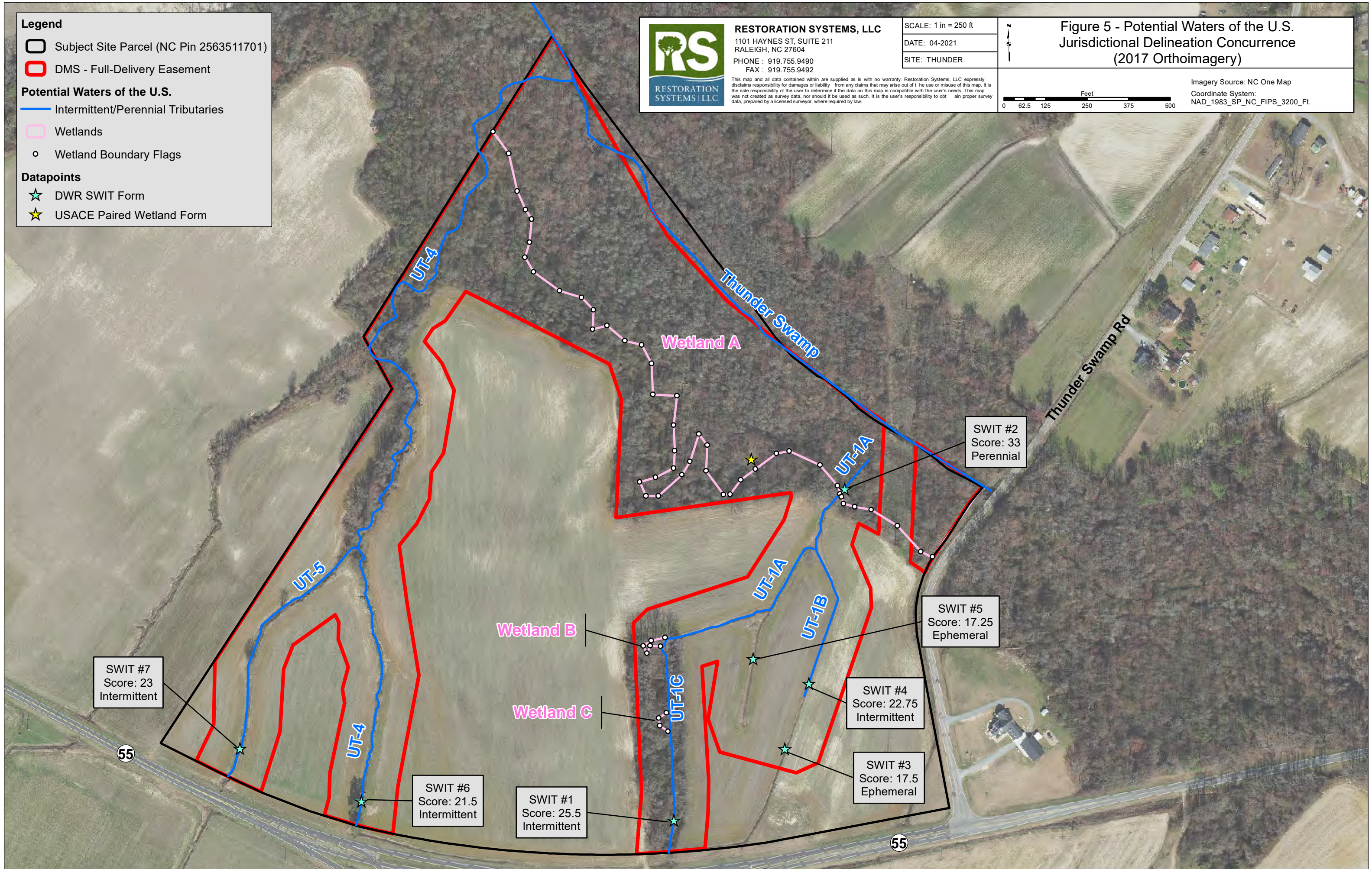
**RESTORATION SYSTEMS, LLC**  
 1101 HAYNES ST, SUITE 211  
 RALEIGH, NC 27604  
 PHONE : 919.755.9490  
 FAX : 919.755.9492

This map and all data contained within are supplied as is with no warranty. Restoration Systems, LLC expressly disclaims responsibility for damages or liability from any claims that may arise out of the use or misuse of this map. It is the sole responsibility of the user to determine if the data on this map is compatible with the user's needs. This map was not created as survey data, nor should it be used as such. It is the user's responsibility to obtain proper survey data, prepared by a licensed surveyor, where required by law.

SCALE: 1 in = 250 ft  
 DATE: 04-2021  
 SITE: THUNDER

**Figure 5 - Potential Waters of the U.S. Jurisdictional Delineation Concurrence (2017 Orthoimagery)**

Imagery Source: NC One Map  
 Coordinate System: NAD\_1983\_SP\_NC\_FIPS\_3200\_Ft.





**WETLAND DETERMINATION DATA FORM - Atlantic and Gulf Coastal Plain Region**

Project/Site: Thunder Buffer Mitigation Site City/County: Wayne Sampling Date: 4/1/2021  
 Applicant/Owner: Restoration Systems, LLC State: NC Sampling Point: WA-UP  
 Investigator(s): A. Baldwin Section, Township, Range: \_\_\_\_\_  
 Landform: (hillslope, terrace, etc.) toeslope Local Relief (concave, convex, none): none Slope (%): 5  
 Subregion (LRR or MLRA) LRR-T Lat: 35.208488 Long: -78.110948 Datum: NAD 83  
 Soil Map Unit Name: NoC - Norfolk loamy sand 6-10% slopes NWI Classification: N/A  
 Are climatic/hydrologic conditions on the site typical for this time of year? Yes  No  (If no, explain in Remarks.)  
 Are Vegetation , Soil , or Hydrology  significantly disturbed? NO Are "Normal Circumstances" present? Yes    
 Are Vegetation , Soil , or Hydrology  naturally problematic? NO (If needed, explain any answers in Remarks.)

**SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.**

Hydrophytic Vegetation Present?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	Is the Sampled Area	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
Hydric Soil Present?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>	within a wetland?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
Wetland Hydrology Present?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>			
Remarks:					

**HYDROLOGY**

<p><b>Wetland Hydrology Indicators:</b>                  Primary Indicators (minimum of one is required; check all that apply):</p> <p><input type="checkbox"/> Surface Water (A1)                      <input type="checkbox"/> Aquatic Fauna (B13)  <input type="checkbox"/> High Water Table (A2)                    <input type="checkbox"/> Marl Deposits (B15) <b>(LRR U)</b>  <input type="checkbox"/> Saturation (A3)                            <input type="checkbox"/> Hydrogen Sulfide Odor (C1)  <input type="checkbox"/> Water Marks (B1)                          <input type="checkbox"/> Oxidized Rhizospheres on Living Roots (C3)  <input type="checkbox"/> Sediment Deposits (B2)                  <input type="checkbox"/> Presence of Reduced Iron (C4)  <input type="checkbox"/> Drift Deposits (B3)                        <input type="checkbox"/> Recent Iron Reduction in Tilled Soils (C6)  <input type="checkbox"/> Algal Mat or Crust (B4)                    <input type="checkbox"/> Thin Much Surface (C7)  <input type="checkbox"/> Iron Deposits (B5)                         <input type="checkbox"/> Other (Explain in Remarks)  <input type="checkbox"/> Inundation Visible on Aerial Imagery (B7)  <input type="checkbox"/> Water-Stained Leaves (B9)</p>	<p><b>Secondary Indicators (minimum of two required)</b></p> <p><input type="checkbox"/> Surface Soil Cracks (B6)  <input type="checkbox"/> Sparsely Vegetated Concave Surface (B8)  <input type="checkbox"/> Drainage Patterns (B10)  <input type="checkbox"/> Moss Trim Lines (B16)  <input type="checkbox"/> Dry-Season Water Table (C2)  <input type="checkbox"/> Crayfish Burrows (C8)  <input type="checkbox"/> Saturation Visible on Aerial Imagery (C9)  <input type="checkbox"/> Geomorphic Position (D2)  <input type="checkbox"/> Shallow Aquitard (D3)  <input type="checkbox"/> FAC-Neutral Test (D5)  <input type="checkbox"/> Sphagnum moss <b>(D8) (LRRT, U)</b></p>
--	--

<p><b>Field Observations:</b></p> <p>Surface Water Present?    Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>    Depth (inches): _____                  Water Table Present?     Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>    Depth (inches): _____                  Saturation Present?        Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>    Depth (inches): _____                  (includes capillary fringe)</p>	<p><b>Wetland Hydrology Present?</b>    Yes <input type="checkbox"/> No <input checked="" type="checkbox"/></p>
--	---

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

**VEGETATION - Use scientific names of plants.**

Sampling Point: WA-UP

	Absolute % Cover	Dominant Species?	Indicator Status	
<b>Tree Stratum (Plot size: 30-ft )</b>				
1. <u>Acer rubrum</u>	60	Y	FACW	<b>Dominance Test Worksheet:</b> Number of Dominant Species That Are OBL, FACW, or FAC: <u>4</u> (A) Total Number of Dominant Species Across All Strata: <u>4</u> (B) Percent of Dominant Species That Are OBL, FACW, or FAC: <u>100%</u> (A/B)
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
5. _____	_____	_____	_____	
6. _____	_____	_____	_____	
7. _____	_____	_____	_____	
60 = Total Cover				
<b>Sapling Stratum (Plot size: 30-ft )</b>				
1. <u>Acer rubrum</u>	5	Y	FACW	<b>Prevalence Index worksheet:</b> Total % Cover of: _____ Multiply by: OBL species <u>0</u> x 1 = <u>0</u> FACW species <u>75</u> x 2 = <u>150</u> FAC species <u>140</u> x 3 = <u>420</u> FACU species <u>0</u> x 4 = <u>0</u> UPL species <u>0</u> x 5 = <u>0</u> Column Totals: <u>215</u> (A) <u>570</u> (B)  Prevalence Index = B/A = <u>2.7</u>
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
5. _____	_____	_____	_____	
6. _____	_____	_____	_____	
7. _____	_____	_____	_____	
5 = Total Cover				
<b>Shrub Stratum (Plot size: 30-ft )</b>				
1. <u>Ligustrum sinense</u>	50	Y	FAC	<b>Hydrophytic Vegetation Indicators:</b> <input type="checkbox"/> 1. Rapid test for hydrophytic Vegetation <input checked="" type="checkbox"/> 2. Dominance Test is > 50% <input type="checkbox"/> 3. Prevalence Index is ≤ 3.0 <sup>1</sup> <input type="checkbox"/> 4. Problematic Hydrophytic Vegetation <sup>1</sup> (Explain)  <sup>1</sup> Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic
2. <u>Acer rubrum</u>	10		FACW	
3. <u>Carpinus caroliniana</u>	10		FAC	
4. _____	_____	_____	_____	
5. _____	_____	_____	_____	
6. _____	_____	_____	_____	
7. _____	_____	_____	_____	
70 = Total Cover				
<b>Herb Stratum (Plot size: 30-ft )</b>				
1. <u>Lonicera japonica</u>	50	Y	FAC	<b>Definitions of Vegetation Strata:</b>  <b>Tree</b> - Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and 3 in. (7.6 cm) or larger in diameter at breast height (DBH). <b>Sapling</b> - Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and less than 3 in. (7.6 cm) DBH. <b>Shrub</b> - Woody plants, excluding woody vines, approximately 3 to 20 ft (1 to 6 m) in height. <b>Herb</b> - All herbaceous (non-woody) plants, including herbaceous vines, regardless of size. Includes woody plants, except woody vines, less than approximately 3 ft (1 m) in height. <b>Woody vine</b> - All woody vines, regardless of height.
2. <u>Vitis aestivalis</u>	10		FAC	
3. <u>Rubus spp.</u>	10		FAC	
4. <u>Smilax rotundifolia</u>	10		FAC	
5. _____	_____	_____	_____	
6. _____	_____	_____	_____	
7. _____	_____	_____	_____	
8. _____	_____	_____	_____	
9. _____	_____	_____	_____	
10. _____	_____	_____	_____	
11. _____	_____	_____	_____	
12. _____	_____	_____	_____	
80 = Total Cover				
<b>Woody Vine Stratum (Plot size: 30-ft )</b>				
2. _____	_____	_____	_____	<b>Hydrophytic Vegetation Present?</b> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
2. _____	_____	_____	_____	
2. _____	_____	_____	_____	
2. _____	_____	_____	_____	
= Total Cover				

Remarks: (If observed, list morphological adaptations below)



**SOIL**

Sampling Point: WA-UP

**Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators).**

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type <sup>1</sup>	Loc <sup>2</sup>		
0-10	10YR 2/2	100					LS	
10-15+	10YR 4/4	100					SL	

<sup>1</sup>Type C = Concentration, D = depletion, RM = Reduced Matrix, CS = Covered or Coated Sand Grains

<sup>2</sup>Location: PL = Pore Lining, M = Matrix

**Hydric Soil Indicators:**

**Indicators for Problematic Hydric Soils<sup>3</sup>:**

- |   |  |  |
|---|--|--|
| <input type="checkbox"/> Histosol (A1)                                | <input type="checkbox"/> Polyvalue Below Surface (S8) <b>(LRR S,T,U)</b>                   | <input type="checkbox"/> 1 cm Muck (A9) <b>(LRR O)</b>                         |
| <input type="checkbox"/> Histic Epipedon (A2)                         | <input type="checkbox"/> Thin Dark Surface (S9) <b>(LRR S,T,U)</b>                         | <input type="checkbox"/> 2 cm Muck (A10) <b>(LRR S)</b>                        |
| <input type="checkbox"/> Black Histic (A3)                            | <input type="checkbox"/> Loamy Mucky Mineral (F1) <b>(LRR O)</b>                           | <input type="checkbox"/> Reduced Vertic (F18) <b>(outside MLRA 150A,B)</b>     |
| <input type="checkbox"/> Hydrogen Sulfide (A4)                        | <input type="checkbox"/> Loamy Gleyed Matrix (F2)  | <input type="checkbox"/> Piedmont Floodplain Soils (F19) <b>(LRR P,S,T)</b>    |
| <input type="checkbox"/> Stratified Layers (A5)                       | <input type="checkbox"/> Depleted Matrix (F3)  | <input type="checkbox"/> Anomalous Bright Loamy Soils (F20) <b>(MLRA 153B)</b> |
| <input type="checkbox"/> Organic Bodies (A6) <b>(LRR P,T,U)</b>       | <input type="checkbox"/> Redox Dark Surface (F6)   | <input type="checkbox"/> Red Parent Material (TF2)                             |
| <input type="checkbox"/> 5 cm Mucky Mineral (A7) <b>(LRR P,T,U)</b>   | <input type="checkbox"/> Depleted Dark Surface (F7)  | <input type="checkbox"/> Very Shallow Dark Surface (TF12) <b>(LRR T,U)</b>     |
| <input type="checkbox"/> Muck Presence (A8) <b>(LRR U)</b>            | <input type="checkbox"/> Redox Depressions (F8)  | <input type="checkbox"/> Other (Explain in Remarks)                            |
| <input type="checkbox"/> 1 cm Muck (A9) <b>(LRR P,T)</b>              | <input type="checkbox"/> Marl (F10) <b>(LRR U)</b>   |  |
| <input type="checkbox"/> Depleted Below Dark Surface (A11)            | <input type="checkbox"/> Depleted Ochric (F11) <b>(MLRA 151)</b>                           |  |
| <input type="checkbox"/> Thick Dark Surface (A12)                     | <input type="checkbox"/> Iron-Manganese Masses (F12) <b>(LRR O,P,T)</b>                    |  |
| <input type="checkbox"/> Coast Prairie Redox (A16) <b>(MLRA 150A)</b> | <input type="checkbox"/> Umbric Surface (F13) <b>(LRR P,T,U)</b>                           |  |
| <input type="checkbox"/> Sandy Mucky Mineral (S1) <b>(LRR O,S)</b>    | <input type="checkbox"/> Delta Ochric (F17) <b>(MLRA 151)</b>                              |  |
| <input type="checkbox"/> Sandy Gleyed Matrix (S4)                     | <input type="checkbox"/> Reduced Vertic (F18) <b>(MLRA 150A, 150B)</b>                     |  |
| <input type="checkbox"/> Sandy Redox (S5)                             | <input type="checkbox"/> Piedmont Floodplain Soils (F19) <b>(MLRA 149A)</b>                |  |
| <input type="checkbox"/> Stripped Matrix (S6)                         | <input type="checkbox"/> Anomalous Bright Loamy Soils (F20) <b>(MLRA 149A, 153C, 153D)</b> |  |
| <input type="checkbox"/> Dark Surface (S7) <b>(LRR P,S,T,U)</b>       |  |  |

<sup>3</sup>Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type:  
Depth (inches)

Hydric Soil Present? Yes  No

**Remarks:**

## WETLAND DETERMINATION DATA FORM - Atlantic and Gulf Coastal Plain Region

Project/Site: Thunder Buffer Mitigation Site City/County: Wayne Sampling Date: 4/1/2021  
 Applicant/Owner: Restoration Systems, LLC State: NC Sampling Point: WA-WET  
 Investigator(s): A. Baldwin Section, Township, Range: \_\_\_\_\_  
 Landform: (hillslope, terrace, etc.) toeslope Local Relief (concave, convex, none): none Slope (%): 0  
 Subregion (LRR or MLRA) LRR-T Lat: 35.208656 Long: -78.111015 Datum: NAD 83  
 Soil Map Unit Name: Bb - Bibb sandy loam NWI Classification: PFO

Are climatic/hydrologic conditions on the site typical for this time of year? Yes  No  (If no, explain in Remarks.)  
 Are Vegetation , Soil , or Hydrology  significantly disturbed? NO Are "Normal Circumstances" present? Yes  No   
 Are Vegetation , Soil , or Hydrology  naturally problematic? NO (If needed, explain any answers in Remarks.)

### SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	Is the Sampled Area within a wetland?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
Hydric Soil Present?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>			
Wetland Hydrology Present?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>			
Remarks:					

### HYDROLOGY

<b>Wetland Hydrology Indicators:</b> Primary Indicators (minimum of one is required; check all that apply): <input checked="" type="checkbox"/> Surface Water (A1) <input type="checkbox"/> Aquatic Fauna (B13) <input checked="" type="checkbox"/> High Water Table (A2) <input type="checkbox"/> Marl Deposits (B15) <b>(LRR U)</b> <input checked="" type="checkbox"/> Saturation (A3) <input type="checkbox"/> Hydrogen Sulfide Odor (C1) <input checked="" type="checkbox"/> Water Marks (B1) <input type="checkbox"/> Oxidized Rhizospheres on Living Roots (C3) <input type="checkbox"/> Sediment Deposits (B2) <input type="checkbox"/> Presence of Reduced Iron (C4) <input checked="" type="checkbox"/> Drift Deposits (B3) <input type="checkbox"/> Recent Iron Reduction in Tilled Soils (C6) <input type="checkbox"/> Algal Mat or Crust (B4) <input type="checkbox"/> Thin Much Surface (C7) <input type="checkbox"/> Iron Deposits (B5) <input type="checkbox"/> Other (Explain in Remarks) <input type="checkbox"/> Inundation Visible on Aerial Imagery (B7) <input checked="" type="checkbox"/> Water-Stained Leaves (B9)	<b>Secondary Indicators (minimum of two required)</b> <input type="checkbox"/> Surface Soil Cracks (B6) <input type="checkbox"/> Sparsely Vegetated Concave Surface (B8) <input type="checkbox"/> Drainage Patterns (B10) <input type="checkbox"/> Moss Trim Lines (B16) <input type="checkbox"/> Dry-Season Water Table (C2) <input type="checkbox"/> Crayfish Burrows (C8) <input type="checkbox"/> Saturation Visible on Aerial Imagery (C9) <input type="checkbox"/> Geomorphic Position (D2) <input type="checkbox"/> Shallow Aquitard (D3) <input type="checkbox"/> FAC-Neutral Test (D5) <input type="checkbox"/> Sphagnum moss <b>(D8) (LRRT, U)</b>
<b>Field Observations:</b> Surface Water Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Depth (inches): <u>0-10</u> Water Table Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Depth (inches): <u>0</u> Saturation Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Depth (inches): <u>0</u> (includes capillary fringe)	<b>Wetland Hydrology Present?</b> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:	
Remarks:	

**VEGETATION - Use scientific names of plants.**

Sampling Point: WA-WET

	Absolute % Cover	Dominant Species?	Indicator Status	
<b>Tree Stratum</b> (Plot size: 30-ft )				
1.	60	Y	FACW	<b>Dominance Test Worksheet:</b> Number of Dominant Species That Are OBL, FACW, or FAC: <u>5</u> (A) Total Number of Dominant Species Across All Strata: <u>5</u> (B) Percent of Dominant Species That Are OBL, FACW, or FAC: <u>100%</u> (A/B)
2.				
3.				
4.				
5.				
6.				
7.				
60 = Total Cover				
<b>Sapling Stratum</b> (Plot size: 30-ft )				
1.	30	Y	FACW	<b>Prevalence Index worksheet:</b> Total % Cover of:                      Multiply by: OBL species <u>45</u> x 1 = <u>45</u> FACW species <u>95</u> x 2 = <u>190</u> FAC species <u>15</u> x 3 = <u>45</u> FACU species <u>0</u> x 4 = <u>0</u> UPL species <u>0</u> x 5 = <u>0</u> Column Totals: <u>155</u> (A) <u>280</u> (B)  Prevalence Index = B/A = 1.8
2.	10	Y	FAC	
3.				
4.				
5.				
6.				
7.				
40 = Total Cover				
<b>Shrub Stratum</b> (Plot size: 30-ft )				
1.	5	Y	FAC	<b>Hydrophytic Vegetation Indicators:</b> <input type="checkbox"/> 1. Rapid test for hydrophytic Vegetation <input checked="" type="checkbox"/> 2. Dominance Test is > 50% <input type="checkbox"/> 3. Prevalence Index is ≤ 3.0 <sup>1</sup> <input type="checkbox"/> 4. Problematic Hydrophytic Vegetation <sup>1</sup> (Explain)  <sup>1</sup> Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic
2.				
3.				
4.				
5.				
6.				
7.				
5 = Total Cover				
<b>Herb Stratum</b> (Plot size: 30-ft )				
1.	40	Y	OBL	<b>Definitions of Vegetation Strata:</b>  <b>Tree</b> - Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and 3 in. (7.6 cm) or larger in diameter at breast height (DBH). <b>Sapling</b> - Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and less than 3 in. (7.6 cm) DBH. <b>Shrub</b> - Woody plants, excluding woody vines, approximately 3 to 20 ft (1 to 6 m) in height. <b>Herb</b> - All herbaceous (non-woody) plants, including herbaceous vines, regardless of size. Includes woody plants, except woody vines, less than approximately 3 ft (1 m) in height. <b>Woody vine</b> - All woody vines, regardless of height.
2.	5		FACW	
3.	5		OBL	
4.				
5.				
6.				
7.				
8.				
9.				
10.				
11.				
12.				
50 = Total Cover				
<b>Woody Vine Stratum</b> (Plot size: 30-ft )				
2.				<b>Hydrophytic Vegetation Present?</b> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
2.				
2.				
2.				
= Total Cover				

Remarks: (If observed, list morphological adaptations below)



**SOIL**

Sampling Point: WA-WET

**Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators).**

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type <sup>1</sup>	Loc <sup>2</sup>		
0-3	10YR 2/1	98	7.5YR 3/4	2	C	PL	SiL	
3-12+	10YR 5/1	80	7.5YR 4/6	20	C	M	LS	

<sup>1</sup>Type C = Concentration, D = depletion, RM = Reduced Matrix, CS = Covered or Coated Sand Grains

<sup>2</sup>Location: PL = Pore Lining, M = Matrix

**Hydric Soil Indicators:**

**Indicators for Problematic Hydric Soils<sup>3</sup>:**

- |  |   |  |
|--|---|--|
| <input type="checkbox"/> Histosol (A1)                         | <input type="checkbox"/> Polyvalue Below Surface (S8) (LRR S,T,U)                   | <input type="checkbox"/> 1 cm Muck (A9) (LRR O)                      |
| <input type="checkbox"/> Histic Epipedon (A2)                  | <input type="checkbox"/> Thin Dark Surface (S9) (LRR S,T,U)                         | <input type="checkbox"/> 2 cm Muck (A10) (LRR S)                     |
| <input type="checkbox"/> Black Histic (A3)                     | <input type="checkbox"/> Loamy Mucky Mineral (F1) (LRR O)                           | <input type="checkbox"/> Reduced Vertic (F18) (outside MLRA 150A,B)  |
| <input type="checkbox"/> Hydrogen Sulfide (A4)                 | <input type="checkbox"/> Loamy Gleyed Matrix (F2)                                   | <input type="checkbox"/> Piedmont Floodplain Soils (F19) (LRR P,S,T) |
| <input type="checkbox"/> Stratified Layers (A5)                | <input type="checkbox"/> Depleted Matrix (F3)                                       | <input type="checkbox"/> Anomalous Bright Loamy Soils (F20)          |
| <input type="checkbox"/> Organic Bodies (A6) (LRR P,T,U)       | <input type="checkbox"/> Redox Dark Surface (F6)                                    | <input type="checkbox"/> (MLRA 153B)                                 |
| <input type="checkbox"/> 5 cm Mucky Mineral (A7) (LRR P,T,U)   | <input type="checkbox"/> Depleted Dark Surface (F7)                                 | <input type="checkbox"/> Red Parent Material (TF2)                   |
| <input type="checkbox"/> Muck Presence (A8) (LRR U)            | <input type="checkbox"/> Redox Depressions (F8)                                     | <input type="checkbox"/> Very Shallow Dark Surface (TF12) (LRR T,U)  |
| <input type="checkbox"/> 1 cm Muck (A9) (LRR P,T)              | <input type="checkbox"/> Marl (F10) (LRR U)   | <input type="checkbox"/> Other (Explain in Remarks)                  |
| <input type="checkbox"/> Depleted Below Dark Surface (A11)     | <input type="checkbox"/> Depleted Ochric (F11) (MLRA 151)                           |  |
| <input type="checkbox"/> Thick Dark Surface (A12)              | <input type="checkbox"/> Iron-Manganese Masses (F12) (LRR O,P,T)                    |  |
| <input type="checkbox"/> Coast Prairie Redox (A16) (MLRA 150A) | <input type="checkbox"/> Umbric Surface (F13) (LRR P,T,U)                           |  |
| <input type="checkbox"/> Sandy Mucky Mineral (S1) (LRR O,S)    | <input type="checkbox"/> Delta Ochric (F17) (MLRA 151)                              |  |
| <input type="checkbox"/> Sandy Gleyed Matrix (S4)              | <input type="checkbox"/> Reduced Vertic (F18) (MLRA 150A, 150B)                     |  |
| <input checked="" type="checkbox"/> Sandy Redox (S5)           | <input type="checkbox"/> Piedmont Floodplain Soils (F19) (MLRA 149A)                |  |
| <input type="checkbox"/> Stripped Matrix (S6)                  | <input type="checkbox"/> Anomalous Bright Loamy Soils (F20) (MLRA 149A, 153C, 153D) |  |
| <input type="checkbox"/> Dark Surface (S7) (LRR P,S,T,U)       |   |  |

<sup>3</sup>Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type:  
Depth (inches)

Hydric Soil Present? Yes  No

**Remarks:**

SWIT #1

NC DWQ Stream Identification Form Version 4.11

Date: 8/12/20	Project/Site: Thunder - Feature 2	Latitude: 35.205656
Evaluator: Terriyon / Avion	County: Wayne	Longitude: -78.111935
Total Points: Stream is at least intermittent if $\geq 19$ or perennial if $\geq 30^*$ 25.5	Stream Determination (circle one) Ephemeral <input checked="" type="radio"/> Intermittent <input checked="" type="radio"/> Perennial <input type="radio"/>	Other e.g. Quad Name: Mt. Olive

A. Geomorphology (Subtotal = 10.5)

	Absent	Weak	Moderate	Strong
1 <sup>a</sup> . Continuity of channel bed and bank	0	1	2	3
2. Sinuosity of channel along thalweg	0	1	2	3
3. In-channel structure: ex. riffle-pool, step-pool, ripple-pool sequence	0	1	2	3
4. Particle size of stream substrate	0	1	2	3
5. Active/relict floodplain	0	1	2	3
6. Depositional bars or benches	0	1	2	3
7. Recent alluvial deposits	0	1	2	3
8. Headcuts	0	1	2	3
9. Grade control	0	0.5	1	1.5
10. Natural valley	0	0.5	1	1.5
11. Second or greater order channel	No = 0		Yes = 3	

<sup>a</sup> artificial ditches are not rated; see discussions in manual

B. Hydrology (Subtotal = 9)

12. Presence of Baseflow	0	1	2	3
13. Iron oxidizing bacteria	0	1	2	3
14. Leaf litter	1.5	1	0.5	0
15. Sediment on plants or debris	0	0.5	1	1.5
16. Organic debris lines or piles	0	0.5	1	1.5
17. Soil-based evidence of high water table?	No = 0		Yes = 3	

C. Biology (Subtotal = 6)

18. Fibrous roots in streambed	3	2	1	0
19. Rooted upland plants in streambed	3	2	1	0
20. Macroinvertebrates (note diversity and abundance)	0	1	2	3
21. Aquatic Mollusks	0	1	2	3
22. Fish	0	0.5	1	1.5
23. Crayfish	0	0.5	1	1.5
24. Amphibians	0	0.5	1	1.5
25. Algae	0	0.5	1	1.5
26. Wetland plants in streambed	FACW = 0.75; OBL = 1.5 Other = 0			

\*perennial streams may also be identified using other methods. See p. 35 of manual.

Notes: Stream flowing out of culvert under NC-55. Strong baseflow and dense canopy here.

Sketch:

NC DWQ Stream Identification Form Version 4.11

SWIT #2

Downstream

Date: 8/17/20	Project/Site: Thunder - Feature 1	Latitude: 35.20843
Evaluator: Jernigan / Axiom	County: Wayne	Longitude: -78.110056
Total Points: Stream is at least intermittent if $\geq 19$ or perennial if $\geq 30^*$ 33	Stream Determination (circle one) Ephemeral Intermittent Perennial	Other e.g. Quad Name: Mt. Olive

A. Geomorphology (Subtotal = 18.5)

	Absent	Weak	Moderate	Strong
1 <sup>a</sup> . Continuity of channel bed and bank	0	1	2	3
2. Sinuosity of channel along thalweg	0	1	2	3
3. In-channel structure: ex. riffle-pool, step-pool, ripple-pool sequence	0	1	2	3
4. Particle size of stream substrate	0	1	2	3
5. Active/relict floodplain	0	1	2	3
6. Depositional bars or benches	0	1	2	3
7. Recent alluvial deposits	0	1	2	3
8. Headcuts	0	1	2	3
9. Grade control	0	0.5	1	1.5
10. Natural valley	0	0.5	1	1.5
11. Second or greater order channel	No = 0		Yes = 3	

<sup>a</sup> artificial ditches are not rated; see discussions in manual

B. Hydrology (Subtotal = 8.5)

12. Presence of Baseflow	0	1	2	3
13. Iron oxidizing bacteria	0	1	2	3
14. Leaf litter	1.5	1	0.5	0
15. Sediment on plants or debris	0	0.5	1	1.5
16. Organic debris lines or piles	0	0.5	1	1.5
17. Soil-based evidence of high water table?	No = 0		Yes = 3	

C. Biology (Subtotal = 0)

18. Fibrous roots in streambed	3	2	1	0
19. Rooted upland plants in streambed	3	2	1	0
20. Macroinvertebrates (note diversity and abundance)	0	1	2	3
21. Aquatic Mollusks	0	1	2	3
22. Fish	0	0.5	1	1.5
23. Crayfish	0	0.5	1	1.5
24. Amphibians	0	0.5	1	1.5
25. Algae	0	0.5	1	1.5
26. Wetland plants in streambed	FACW = 0.75; OBL = 1.5 Other = 0			

\*perennial streams may also be identified using other methods. See p. 35 of manual.

Notes: Very strong baseflow into broad Thunder Swamp footprint. No benthos or fish observed, but habitat has been impacted by recent heavy rains.

Sketch:



NC DWQ Stream Identification Form Version 4.11

upstream SUIT#3

Date: 8/17/20	Project/Site: Thunder - Feature 1	Latitude: 35.206269
Evaluator: Jernigan/Axum	County: Wayne	Longitude: -78.11069
Total Points: Stream is at least intermittent if $\geq 19$ or perennial if $\geq 30$ 17.5	Stream Determination (circle one) Ephemeral Intermittent Perennial	Other e.g. Quad Name: Mt. Olive

A. Geomorphology (Subtotal = 4.5)

	Absent	Weak	Moderate	Strong
1 <sup>a</sup> . Continuity of channel bed and bank *	0	1	2	3
2. Sinuosity of channel along thalweg	0	1	2	3
3. In-channel structure: ex. riffle-pool, step-pool, ripple-pool sequence	0	1	2	3
4. Particle size of stream substrate	0	1	2	3
5. Active/relict floodplain	0	1	2	3
6. Depositional bars or benches	0	1	2	3
7. Recent alluvial deposits	0	1	2	3
8. Headcuts	0	1	2	3
9. Grade control	0	0.5	1	1.5
10. Natural valley	0	0.5	1	1.5
11. Second or greater order channel	No = 0		Yes = 3	

<sup>a</sup> artificial ditches are not rated; see discussions in manual

B. Hydrology (Subtotal = 8)

12. Presence of Baseflow	0	1	2	3
13. Iron oxidizing bacteria	0	1	2	3
14. Leaf litter	1.5	1	0.5	0
15. Sediment on plants or debris	0	0.5	1	1.5
16. Organic debris lines or piles	0	0.5	1	1.5
17. Soil-based evidence of high water table?	No = 0		Yes = 3	

C. Biology (Subtotal = 5)

18. Fibrous roots in streambed	3	2	1	0
19. Rooted upland plants in streambed	3	2	1	0
20. Macroinvertebrates (note diversity and abundance)	0	1	2	3
21. Aquatic Mollusks	0	1	2	3
22. Fish	0	0.5	1	1.5
23. Crayfish	0	0.5	1	1.5
24. Amphibians	0	0.5	1	1.5
25. Algae	0	0.5	1	1.5
26. Wetland plants in streambed	FACW = 0.75; OBL = 1.5 Other = 0			

<sup>a</sup> perennial streams may also be identified using other methods. See p. 35 of manual.

Notes: Stream becomes fairly obviously ephemeral as valley gets weaker and it loses geomorphology.

Sketch:

NC DWQ Stream Identification Form Version 4.11

Middle SWIT #4

Date: 8/17/20	Project/Site: Thunder - Feature 1	Latitude: 35.206818
Evaluator: Jernigan/Axion	County: Wayne	Longitude: -78.11045
Total Points: Stream is at least intermittent if $\geq 19$ or perennial if $\geq 30^*$ 22.75	Stream Determination (circle one) Ephemeral Intermittent Perennial	Other e.g. Quad Name: Mt. Olive

A. Geomorphology (Subtotal = 8)

	Absent	Weak	Moderate	Strong
1 <sup>a</sup> . Continuity of channel bed and bank * Ditch	0	1	2	3
2. Sinuosity of channel along thalweg	0	1	2	3
3. In-channel structure: ex. riffle-pool, step-pool, ripple-pool sequence	0	1	2	3
4. Particle size of stream substrate	0	1	2	3
5. Active/relict floodplain	0	1	2	3
6. Depositional bars or benches	0	1	2	3
7. Recent alluvial deposits	0	1	2	3
8. Headcuts	0	1	2	3
9. Grade control	0	0.5	1	1.5
10. Natural valley	0	0.5	1	1.5
11. Second or greater order channel	No = 0		Yes = 3	

<sup>a</sup> artificial ditches are not rated; see discussions in manual

B. Hydrology (Subtotal = 9)

12. Presence of Baseflow	0	1	2	3
13. Iron oxidizing bacteria	0	1	2	3
14. Leaf litter	1.5	1	0.5	0
15. Sediment on plants or debris	0	0.5	1	1.5
16. Organic debris lines or piles	0	0.5	1	1.5
17. Soil-based evidence of high water table?	No = 0		Yes = 3	

C. Biology (Subtotal = 5)

18. Fibrous roots in streambed	3	2	1	0
19. Rooted upland plants in streambed	3	2	1	0
20. Macroinvertebrates (note diversity and abundance)	0	1	2	3
21. Aquatic Mollusks	0	1	2	3
22. Fish	0	0.5	1	1.5
23. Crayfish	0	0.5	1	1.5
24. Amphibians	0	0.5	1	1.5
25. Algae	0	0.5	1	1.5
26. Wetland plants in streambed	FACW = 0.75; OBL = 1.5 Other = 0			

\*perennial streams may also be identified using other methods. See p. 35 of manual.

Notes: Stream develops more prominent geomorphological and hydrological features.

Sketch:

NC DWQ Stream Identification Form Version 4.11

SWIT #5

Date: 8/17/20	Project/Site: Thunder Feature 3	Latitude: 35.206996
Evaluator: Jernigan/Axelson	County: Wayne	Longitude: -78.111012
Total Points: Stream is at least intermittent if $\geq 19$ or perennial if $\geq 30^*$ 17.25	Stream Determination (circle one) Ephemeral Intermittent Perennial	Other e.g. Quad Name: Mt Olive

A. Geomorphology (Subtotal = 4.5)

	Absent	Weak	Moderate	Strong
1 <sup>a</sup> . Continuity of channel bed and bank *	0	1	2	3
2. Sinuosity of channel along thalweg	0	1	2	3
3. In-channel structure: ex. riffle-pool, step-pool, ripple-pool sequence	0	1	2	3
4. Particle size of stream substrate	0	1	2	3
5. Active/relict floodplain	0	1	2	3
6. Depositional bars or benches	0	1	2	3
7. Recent alluvial deposits	0	1	2	3
8. Headcuts	0	1	2	3
9. Grade control	0	0.5	1	1.5
10. Natural valley	0	0.5	1	1.5
11. Second or greater order channel	No = 0		Yes = 3	

<sup>a</sup> artificial ditches are not rated; see discussions in manual

B. Hydrology (Subtotal = 8)

12. Presence of Baseflow	0	1	2	3
13. Iron oxidizing bacteria	0	1	2	3
14. Leaf litter	1.5	1	0.5	0
15. Sediment on plants or debris	0	0.5	1	1.5
16. Organic debris lines or piles	0	0.5	1	1.5
17. Soil-based evidence of high water table?	No = 0		Yes = 3	

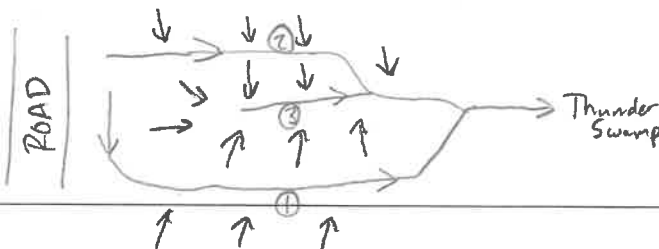
C. Biology (Subtotal = 4.75)

18. Fibrous roots in streambed	3	2	1	0
19. Rooted upland plants in streambed	3	2	1	0
20. Macroinvertebrates (note diversity and abundance)	0	1	2	3
21. Aquatic Mollusks	0	1	2	3
22. Fish	0	0.5	1	1.5
23. Crayfish	0	0.5	1	1.5
24. Amphibians	0	0.5	1	1.5
25. Algae	0	0.5	1	1.5
26. Wetland plants in streambed	FACW = 0.75 OBL = 1.5 Other = 0			

\*perennial streams may also be identified using other methods. See p. 35 of manual.

Notes: This feature lies in the center of the valley. Its drainage area has been partially intercepted by a roadside ditch that feeds Feature 1. It collects and transports the majority of the surface water between features 1 and 2.

Sketch:





T08-5'

NC DWQ Stream Identification Form Version 4.11

SWIT #6

Date: 8/17/20	Project/Site: Thunder - Feature 4	Latitude: 35.205872
Evaluator: Jernigan / Arrom	County: Wayne	Longitude: -78.114768
Total Points: 21.5 <i>Stream is at least intermittent if ≥ 19 or perennial if ≥ 30*</i>	Stream Determination (circle one) Ephemeral <u>Intermittent</u> Perennial	Other e.g. Quad Name: Mt. Olive

A. Geomorphology (Subtotal = 6.5)

	Absent	Weak	Moderate	Strong
1 <sup>a</sup> . Continuity of channel bed and bank * Ditch	0	1	2	3
2. Sinuosity of channel along thalweg	0	1	2	3
3. In-channel structure: ex. riffle-pool, step-pool, ripple-pool sequence	0	1	2	3
4. Particle size of stream substrate	0	1	2	3
5. Active/relict floodplain	0	1	2	3
6. Depositional bars or benches	0	1	2	3
7. Recent alluvial deposits	0	1	2	3
8. Headcuts	0	1	2	3
9. Grade control	0	0.5	1	1.5
10. Natural valley	0	0.5	1	1.5
11. Second or greater order channel	No = 0		Yes = 3	

\*artificial ditches are not rated; see discussions in manual

B. Hydrology (Subtotal = 9)

12. Presence of Baseflow	0	1	2	3
13. Iron oxidizing bacteria	0	1	2	3
14. Leaf litter	1.5	1	0.5	0
15. Sediment on plants or debris	0	0.5	1	1.5
16. Organic debris lines or piles	0	0.5	1	1.5
17. Soil-based evidence of high water table?	No = 0		Yes = 3	

C. Biology (Subtotal = 6)

18. Fibrous roots in streambed	3	2	1	0
19. Rooted upland plants in streambed	3	2	1	0
20. Macroinvertebrates (note diversity and abundance)	0	1	2	3
21. Aquatic Mollusks	0	1	2	3
22. Fish	0	0.5	1	1.5
23. Crayfish	0	0.5	1	1.5
24. Amphibians	0	0.5	1	1.5
25. Algae	0	0.5	1	1.5
26. Wetland plants in streambed	FACW = 0.75; OBL = 1.5 Other = 0			

\*perennial streams may also be identified using other methods. See p. 35 of manual.

Notes:

Sketch:

NC DWQ Stream Identification Form Version 4.11

SWIT # 7

Date: 8/17/20	Project/Site: Thunder - Feature 5	Latitude: 35.206224
Evaluator: Jernigan / Axiom	County: Wayne	Longitude: -78.116223
Total Points: 23 <i>Stream is at least intermittent if ≥ 19 or perennial if ≥ 30*</i>	Stream Determination (circle one) Ephemeral Intermittent Perennial	Other e.g. Quad Name: Mt. Olive

A. Geomorphology (Subtotal = 7.5)

	Absent	Weak	Moderate	Strong
1 <sup>a</sup> . Continuity of channel bed and bank * Ditched	0	1	2	3
2. Sinuosity of channel along thalweg	0	1	2	3
3. In-channel structure: ex. riffle-pool, step-pool, ripple-pool sequence	0	1	2	3
4. Particle size of stream substrate	0	1	2	3
5. Active/relict floodplain	0	1	2	3
6. Depositional bars or benches	0	1	2	3
7. Recent alluvial deposits	0	1	2	3
8. Headcuts	0	1	2	3
9. Grade control	0	0.5	1	1.5
10. Natural valley	0	0.5	1	1.5
11. Second or greater order channel	No = 0		Yes = 3	

<sup>a</sup> artificial ditches are not rated; see discussions in manual

B. Hydrology (Subtotal = 9)

12. Presence of Baseflow	0	1	2	3
13. Iron oxidizing bacteria	0	1	2	3
14. Leaf litter	1.5	1	0.5	0
15. Sediment on plants or debris	0	0.5	1	1.5
16. Organic debris lines or piles	0	0.5	1	1.5
17. Soil-based evidence of high water table?	No = 0		Yes = 3	

C. Biology (Subtotal = 6.5)

18. Fibrous roots in streambed	3	2	1	0
19. Rooted upland plants in streambed	3	2	1	0
20. Macroinvertebrates (note diversity and abundance)	0	1	2	3
21. Aquatic Mollusks	0	1	2	3
22. Fish	0	0.5	1	1.5
23. Crayfish	0	0.5	1	1.5
24. Amphibians	0	0.5	1	1.5
25. Algae	0	0.5	1	1.5
26. Wetland plants in streambed	FACW = 0.75; OBL = 1.5 Other = 0			

\*perennial streams may also be identified using other methods. See p. 35 of manual.

Notes:

Sketch:

**Ray Holz**

---

**From:** Berry Gray <berry.gray@waynegov.com>  
**Sent:** Thursday, July 01, 2021 9:57 AM  
**To:** Ray Holz  
**Subject:** RE: [External] - FEMA Floodplain Coordination - Riparian Buffer Restoration Project  
**Attachments:** DOC070121-07012021093433.pdf

See attached. Let me know if you need anything else.

Berry Gray  
Planning Director  
Wayne County, North Carolina  
134 N John Street  
PO Box 227  
Goldsboro, NC 27533-0227

Phone: 919-731-1650  
Email: [berry.gray@waynegov.com](mailto:berry.gray@waynegov.com)

---

**From:** Ray Holz [mailto:rhoz@restorationsystems.com]  
**Sent:** Thursday, July 1, 2021 9:24 AM  
**To:** Berry Gray <berry.gray@waynegov.com>  
**Subject:** [External] - FEMA Floodplain Coordination - Riparian Buffer Restoration Project

Mr. Gray,

I work with Restoration Systems, and we are implementing a riparian buffer restoration project on behalf of the North Carolina Division of Mitigation Services (DMS) west of Mount Olive, off Highway 55, and adjacent to Thunder Swamp. The project totals 41.78 acres and consists of minimal grading and the planting of hardwood trees. All work is located outside the FEMA-regulated floodplain/floodway. The project is to be permanently protected by a conservation easement that extends into and covers approximately 12.54 acres of the Thunder Swamp FEMA regulated floodplain/floodway (Panel 3720256300K – eff. 06/20/2018). By including the floodplain/floodway within the conservation easement, I am required by DMS to coordinate with the local Floodplain Administrator and to receive concurrence of the attached DMS Floodplain Checklist.

For my coordination, can you please review the attached information, fill out the last portion of the NCDMS floodplain checklist (bottom of page three), and return it to me via e-mail?

Thank you for your time. If you have any questions or would like to discuss, please do not hesitate to give me a call at 919-604-9314 – I am available all day.

Sincerely,  
Raymond H.

**Attachments**

- NCDMS Floodplain Checklist
- Figure 1 – Location Map
- Figure 2 – Existing Conditions
- Figure 3 – Restoration Plan



- Figure 4 – Planting Plan

-----

Raymond J. Holz | Restoration Systems, LLC  
1101 Haynes St. Suite 211 | Raleigh, NC 27604  
tel: 919.334.9122 | cell: 919.604.9314 | fax: 919.755.9492  
email: [holz@restorationsystems.com](mailto:holz@restorationsystems.com)

**CAUTION**

**This email originated outside the County of Wayne's network.**

**Do not open any attachments or click on links unless you trust the sender or expecting this email.**



## DMS Floodplain Requirements Checklist

This form was developed by the National Flood Insurance program, NC Floodplain Mapping program and the Division of Mitigation Services (DMS) to be filled for all DMS projects. The form is intended to summarize the floodplain requirements during the design phase of the projects. The form should be submitted to the Local Floodplain Administrator with three copies submitted to NFIP (attn. State NFIP Engineer), NC Floodplain Mapping Unit (attn. State NFIP Coordinator) and NC Ecosystem Enhancement Program.

### Project Location

Name of project:	Thunder Site
Name if stream or feature:	Thunder Swamp
County:	Wayne
Name of river basin:	Neuse
Is project urban or rural?	Rural
Name of Jurisdictional municipality/county:	Wayne County
DFIRM panel number for entire site:	Panel 3720256300K (eff. 06/20/2018)
Consultant name:	Raymond Holz Restoration Systems, LLC
Phone number:	919-604-9314
Address:	1101 Haynes St. Suite 211 Raleigh, NC 27607

## Design Information

Provide a general description of project (one paragraph). Include project limits on a reference orthophotograph at a scale of 1" = 500". – [Project Figures Attached](#)

[No work is proposed within the FEMA regulated floodplain. A project description is included in the cover letter.](#)

## Floodplain Information

Is project located in a Special Flood Hazard Area (SFHA)? <input checked="" type="radio"/> Yes <input type="radio"/> No <a href="#">The lower reaches</a>
If project is located in a SFHA, check how it was determined: <input type="checkbox"/> Redelineation <input type="checkbox"/> Detailed Study <input type="checkbox"/> Limited Detail Study <input type="checkbox"/> Approximate Study <input type="checkbox"/> Don't know
List flood zone designation: Check if applies: <input checked="" type="checkbox"/> AE Zone <input checked="" type="radio"/> Floodway <input type="radio"/> Non-Encroachment <input type="radio"/> None <input type="checkbox"/> A Zone <input type="radio"/> Local Setbacks Required <input type="radio"/> No Local Setbacks Required
If local setbacks are required, list how many feet:
Does proposed channel boundary encroach outside floodway/non-encroachment/setbacks? <input type="radio"/> Yes <input checked="" type="radio"/> No
Land Acquisition (Check) <input type="checkbox"/> State owned (fee simple)



<input type="checkbox"/> Conservation easment (Design Bid Build) <input checked="" type="checkbox"/> Conservation Easement (Full Delivery Project) Note: if the project property is state-owned, then all requirements should be addressed to the Department of Administration, State Construction Office (attn: Herbert Neily, (919) 807-4101)
Is community/county participating in the NFIP program? <input checked="" type="radio"/> Yes <input type="radio"/> No Note: if community is not participating, then all requirements should be addressed to NFIP (attn: State NFIP Engineer, (919) 715-8000)
Name of Local Floodplain Administrator: Berry Gray Phone Number: 919-731-1650


**Floodplain Requirements**

This section to be filled by designer/applicant following verification with the LFPA

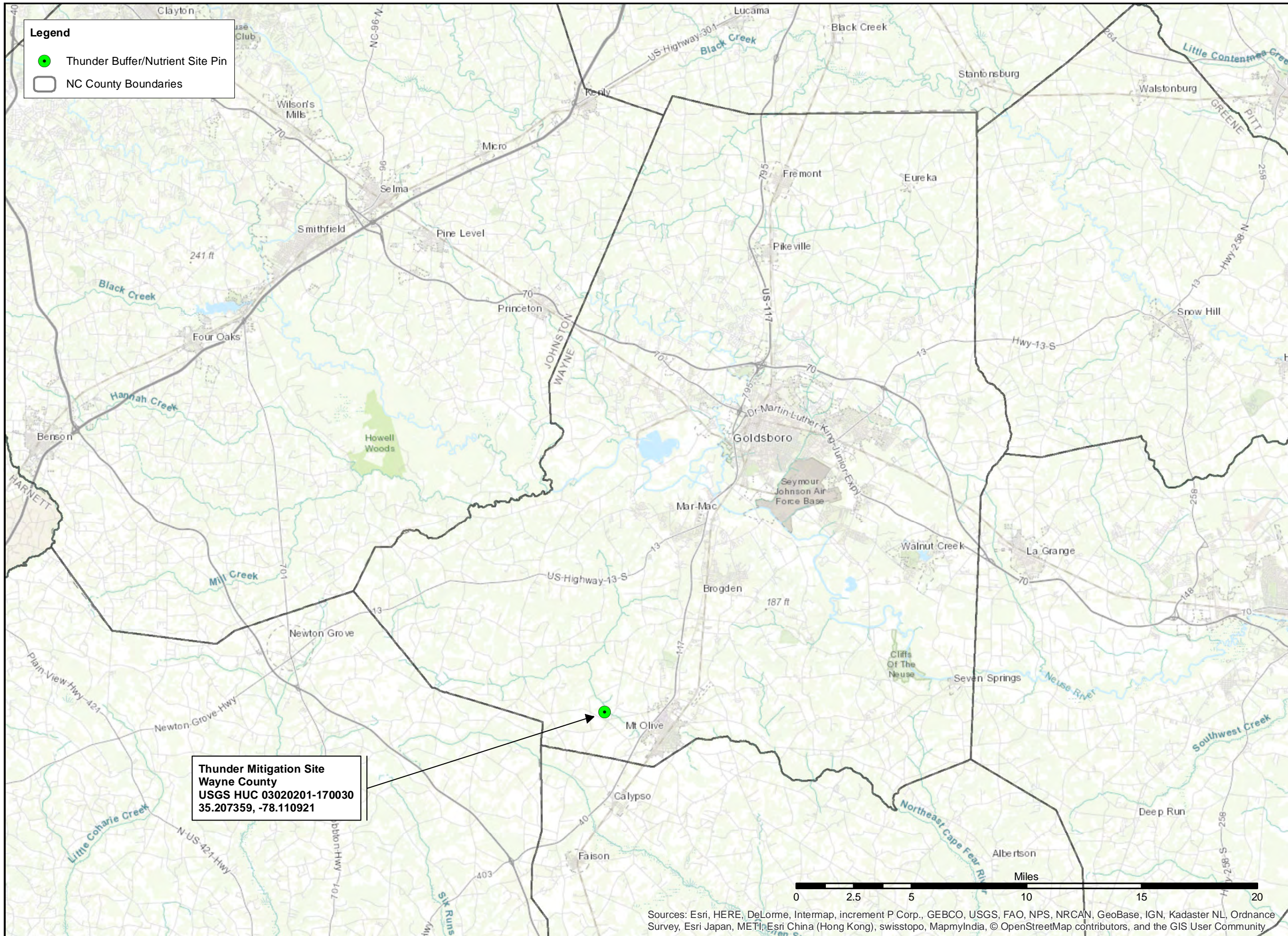
- No Action
- No Rise
- Letter of Map Revision
- Conditional Letter of Map Revision
- Other Requirements

List other requirements:
--------------------------

Comments:
-----------

Name: Raymond Holz                      Signature:   
 Title: Operations Manager                      Date: 07-01-2021





Prepared for:  
**NC DEQ  
 Division of  
 Mitigation Services**

Project:  
**THUNDER  
 MITIGATION SITE**

Wayne County, NC

Title:  
**SITE LOCATION**

Drawn by: R JH

Date: JUNE 2021

Scale: 1:250,000

Project No.: 100185

**FIGURE  
 1**

Sources: Esri, HERE, DeLorme, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community





Prepared for:

**NC DEQ  
Division of  
Mitigation Services**

Project:

**THUNDER  
MITIGATION SITE**

Wayne County, NC

Title:

**EXISTING  
CONDITIONS**

Source: FEMA Flood Insurance Rate Map 3720256300K, Panel 2563, effective June 20, 2018

2017 NC OneMap

Drawn by:

RJH

Date:

JUNE 2021

Scale:

1:3,500

Project No.:

100185

**FIGURE**

**1**



**Legend**

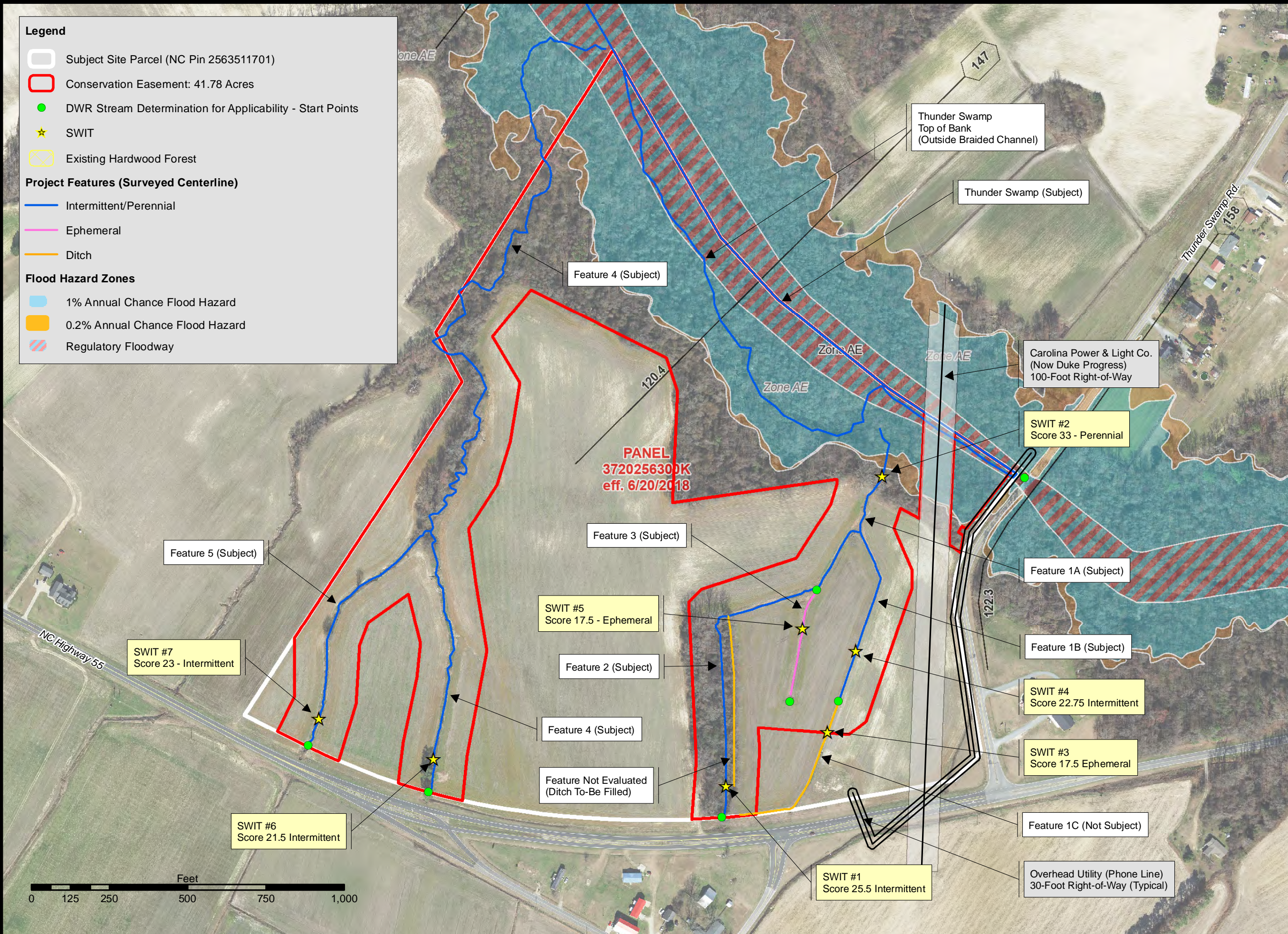
- Subject Site Parcel (NC Pin 2563511701)
- Conservation Easement: 41.78 Acres
- DWR Stream Determination for Applicability - Start Points
- SWIT
- Existing Hardwood Forest

**Project Features (Surveyed Centerline)**

- Intermittent/Perennial
- Ephemeral
- Ditch

**Flood Hazard Zones**

- 1% Annual Chance Flood Hazard
- 0.2% Annual Chance Flood Hazard
- Regulatory Floodway



**PANEL  
3720256300K  
eff. 6/20/2018**

SWIT #7  
Score 23 - Intermittent

SWIT #6  
Score 21.5 Intermittent

SWIT #5  
Score 17.5 - Ephemeral

SWIT #4  
Score 22.75 Intermittent

SWIT #4  
Score 22.75 Intermittent

SWIT #3  
Score 17.5 Ephemeral

SWIT #1  
Score 25.5 Intermittent

Feature 1C (Not Subject)

Overhead Utility (Phone Line)  
30-Foot Right-of-Way (Typical)

Feature 1A (Subject)

Feature 1B (Subject)

Feature 2 (Subject)

Feature 4 (Subject)

Feature Not Evaluated  
(Ditch To-Be Filled)

Feature 3 (Subject)

Feature 4 (Subject)

Thunder Swamp  
Top of Bank  
(Outside Braided Channel)

Thunder Swamp (Subject)

Carolina Power & Light Co.  
(Now Duke Progress)  
100-Foot Right-of-Way

SWIT #2  
Score 33 - Perennial

NC Highway 55

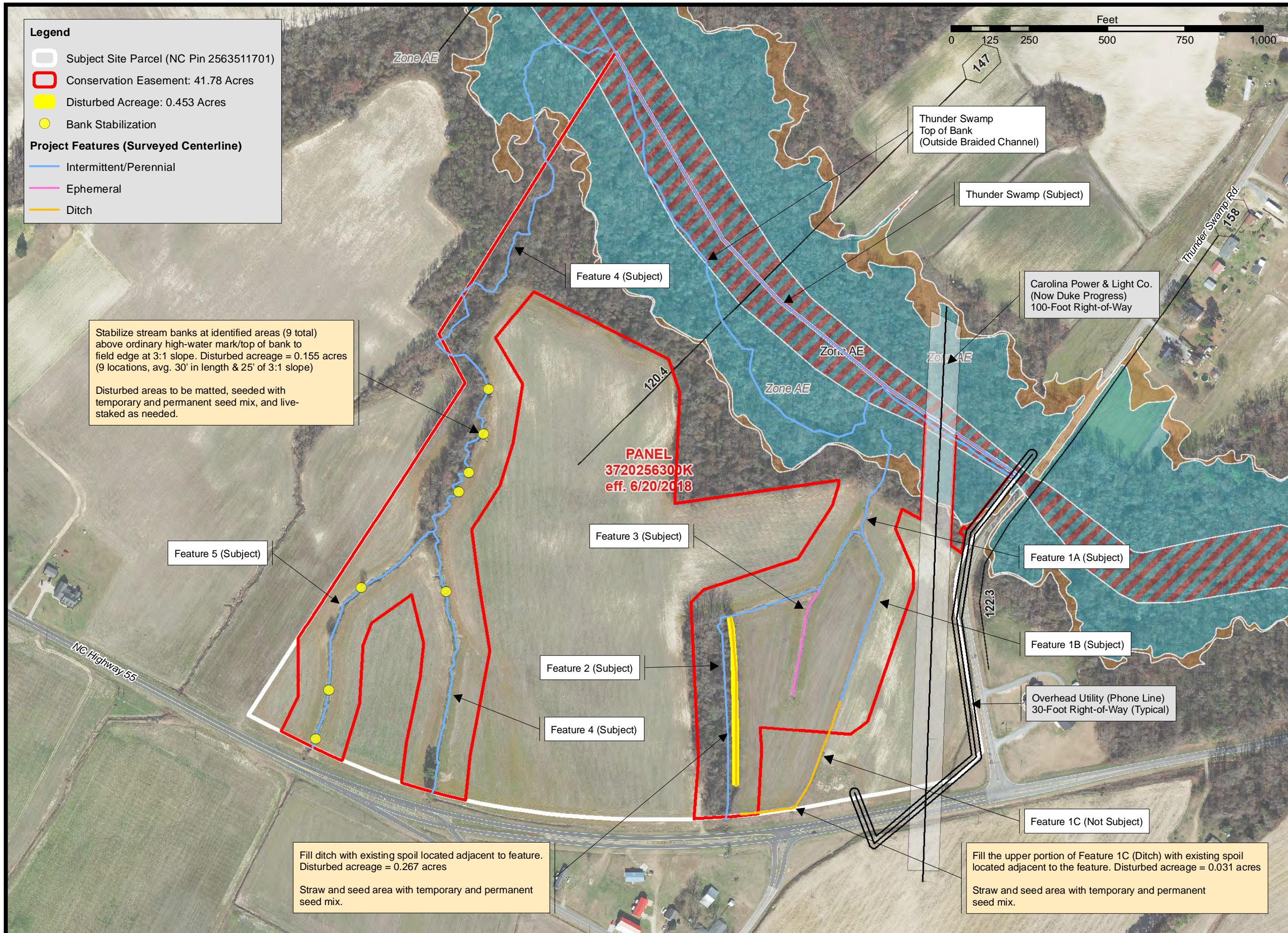
Thunder Swamp Rd.  
158

122.3

120.4

147





**Legend**

- Subject Site Parcel (NC Pin 2563511701)
- Conservation Easement: 41.78 Acres
- Disturbed Acreage: 0.453 Acres
- Bank Stabilization

**Project Features (Surveyed Centerline)**

- Intermittent/Perennial
- Ephemeral
- Ditch



Prepared for:  
**NC DEQ  
 Division of  
 Mitigation Services**

Project:  
**THUNDER  
 MITIGATION SITE**

Wayne County, NC

Title:  
**RESTORATION  
 PLAN**

2017 NC OneMap

Drawn by:  
 RJH

Date:  
 JUNE 2021

Scale:  
 1:3,500

Project No.:  
 100185

**FIGURE  
 2**



Stabilize stream banks at identified areas (9 total) above ordinary high-water mark/top of bank to field edge at 3:1 slope. Disturbed acreage = 0.155 acres (9 locations, avg. 30' in length & 25' of 3:1 slope)

Disturbed areas to be matted, seeded with temporary and permanent seed mix, and live-staked as needed.

Fill ditch with existing spoil located adjacent to feature. Disturbed acreage = 0.267 acres

Straw and seed area with temporary and permanent seed mix.

Fill the upper portion of Feature 1C (Ditch) with existing spoil located adjacent to the feature. Disturbed acreage = 0.031 acres

Straw and seed area with temporary and permanent seed mix.

**PANEL  
 372025630DK  
 eff. 6/20/2018**



**Legend**

- Subject Site Parcel (NC Pin 2563511701)
- Conservation Easement: 41.78 Acres
- Surveyed TOB

**Planting & Seeding Area: 18.737 Acres**

- Coastal Plain Bottomland Hardwood: 6.546 Acres
- Dry Mesic Oak-Hickory Mixed Forest: 12.191 Acres



Prepared for:  
**NC DEQ  
 Division of  
 Mitigation Services**

Project:  
**THUNDER  
 MITIGATION SITE**

Wayne County, NC

Title:  
**PLANTING  
 PLAN**

2017 NC OneMap

Drawn by: R JH

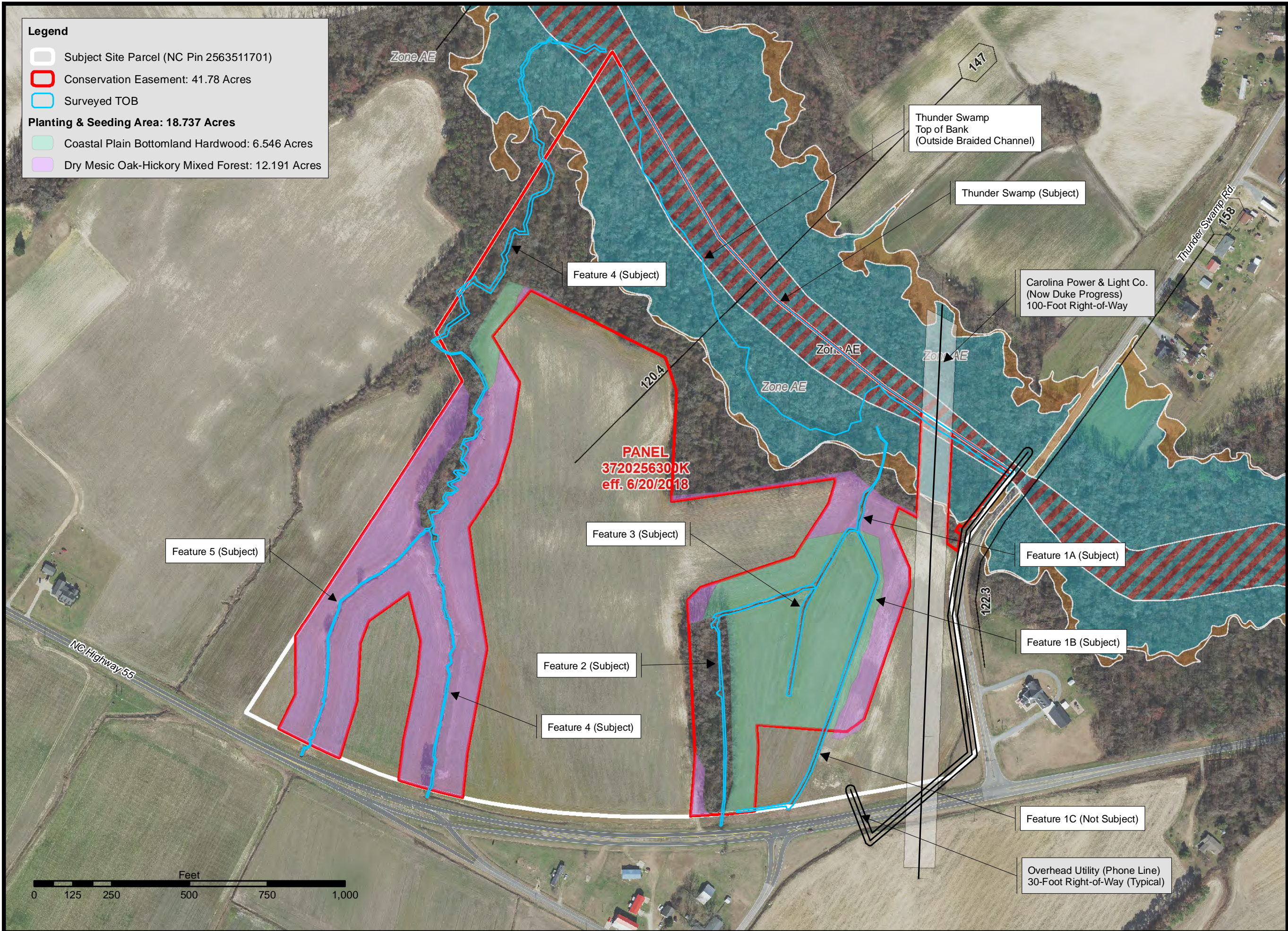
Date: JUNE 2021

Scale: 1:3,500

Project No.: 100185

FIGURE

**3**





**From:** Denton, Bill <[bill.denton@ncdenr.gov](mailto:bill.denton@ncdenr.gov)>  
**Sent:** Monday, June 28, 2021 4:26 PM  
**To:** Worth Creech <[worth@restorationsystems.com](mailto:worth@restorationsystems.com)>  
**Cc:** Summers, Kimberly M <[kimberly.summers@ncdenr.gov](mailto:kimberly.summers@ncdenr.gov)>; Garcia, Lauren V <[lauren.garcia@ncdenr.gov](mailto:lauren.garcia@ncdenr.gov)>  
**Subject:** Permit Question

Mr. Creech:

Based on the description you provided, the best argument for exemption of the buffer restoration activity is that it would not technically meet the definition of a "Land-disturbing activity" as defined by NCGS 113A-52(6) which states:

*(6) "Land-disturbing activity" means any use of the land by any person in residential, industrial, educational, institutional or commercial development, highway and road construction and maintenance that results in a change in the natural cover or topography and that may cause or contribute to sedimentation.*

Inasmuch as the purpose of the activity is to plant trees for buffer restoration, it does not constitute any of the listed development, construction, or maintenance activities and is therefore not a land-disturbing activity by the legal definition. This makes it not subject to the Sedimentation Pollution Control Act in my opinion.

To further solidify the case for exemption under the NCGS 113A-52.01(1) (commonly referred to as the "Agricultural Exemption"), prior to crews arriving at the site to begin planting the buffer vegetation you may wish to have the owner of the agricultural land disc the area. This is assuming discing is part of his/her usual farming activities. Separating those activities, would provide a clear line of demarcation for the site when agriculture ends and buffer restoration begins.

The other option which we discussed by phone would also suffice, which is to plant the buffer vegetation in a manner that minimizes land disturbance (e.g. no-till methods). Our main goal is to keep sediment out of the buffer and surface waters. If that can be achieved and the permitting avoided, that would be acceptable to us.

Feel free to give me a call if we need to discuss or clarify further. Thanks.

Bill

**William H. Denton, IV, PE**  
Regional Engineer – RRO  
Division of Energy, Mineral, and Land Resources – Land Quality Section  
Department of Environmental Quality

919 791 4200 office  
[bill.denton@ncdenr.gov](mailto:bill.denton@ncdenr.gov)

1628 Mail Service Center, Raleigh, North Carolina 27699



*Email correspondence to and from this address is subject to the North Carolina Public Records Law and may be disclosed to third parties.*