

# **FINAL MITIGATION PLAN FOR IRT REVIEW**

## **COW BRANCH MITIGATION SITE COLUMBUS COUNTY, NORTH CAROLINA**

DMS PROJECT No.100196  
DMS CONTRACT No. 200203-01  
DWR PROJECT No. 20210919v1  
NCDEQ CONTRACT No. 200203-01  
USACE ACTION ID No. SAW-2021-00822

Lumber River Basin  
Cataloging Unit 03040206  
RFP#:16-20200203 (Issued 8/6/2020)



Prepared for:



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

February 2024



**DEPARTMENT OF THE ARMY**  
WILMINGTON DISTRICT, CORPS OF ENGINEERS  
69 DARLINGTON AVENUE  
WILMINGTON, NORTH CAROLINA 28403-1343

June 7, 2024

Regulatory Division

**SUBJECT:** Approval of the NCDMS Cow Branch Site Final Mitigation Plan, Action ID SAW-2021-00822

Mr. Jeremiah Dow  
North Carolina Division of Mitigation Services  
217 West Jones Street  
Raleigh, NC 27603

Dear Mr. Jeremiah Dow:

This letter is to inform you that the Wilmington District, Corps of Engineers (Corps) has reviewed and approved the Cow Branch Site Final Mitigation Plan, Action ID SAW-2021-00822, dated February 2024.

As an In Lieu Fee Program, you are required to comply with the approved Cow Branch Site Final Mitigation Plan, the NCDMS Instrument approved on July 28, 2010, and the Corps' regulations regarding compensatory mitigation (33 CFR 332). Please note that approval for this mitigation plan does not guarantee the project will generate the requested amount of mitigation credit. No credit release is approved with this correspondence.

Additionally, submittal of a pre-construction notification (PCN) application for Nationwide Permit 27 authorization is required for work within waters of the United States associated with the restoration and enhancement of aquatic resources at the project site. Please note that this approval letter does not preclude the inclusion of special conditions in the permit authorization for this project.

Please note that this electronic copy provided to you via email is your official copy. Should you wish to receive a paper copy of this correspondence, please contact us. Thank you for your time and cooperation. If you have any questions, please contact me by email at [todd.j.tugwell@usace.army.mil](mailto:todd.j.tugwell@usace.army.mil) or by phone at (919) 210-6265.

Sincerely,

A handwritten signature in blue ink, appearing to read "Todd Tugwell". The signature is stylized with a large initial "T" and a long, sweeping underline.

Todd Tugwell  
Chief, Mitigation Branch

Enclosure

cc (by email):  
NCIRT Distribution List

**TO:** Erin Davis, USACE  
**CC:** Jeremiah Dow, NCDMS  
**FROM:** Ian Jewell, Bryan Dick, PE, PhD- FNI  
**SUBJECT:** Response to IRT Comments Dated July 25, 2023  
**DATE:** 2/28/2024  
**PROJECT:** Cow Branch Mitigation Site

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Dear Ms. Davis,

Freese & Nichols, Inc (FNI) received comments regarding the Cow Branch Mitigation Site from the Interagency Review Team (IRT) in a transmittal from the US Army Corps of Engineers (USACE) dated July 25, 2023. Comments from the IRT are listed below (Black Text) and followed by a response from FNI (Blue Text).

**Comments from Maria Polizzi / Mac Haupt, DWR:**

1. In reference to a previous comment by Erin Davis (Question 11), can you expand upon potential beaver impacts and how those would be handled during the project?

Beavers are a general threat to any mitigation project, particularly in locations with low slopes like at the Cow Branch Mitigation Site. Beaver activities have been noted downstream of the site.

A general adaptive management plan for beaver includes trapping the beaver and then having the beavers removed from the site. Any beaver dams would be removed. Depending on any damage to the mitigation components, a more detailed plan of action would be developed.

We have added more detail to the Risks and Uncertainties Section of the mitigation plan to expand upon potential beaver impacts and how those would be handled during the project.

2. In reference to a previous comment by Kim Isenhour (Question 3) and the subsequent discussion, DWR's understanding of the recommendation to include the ditch in the easement, was to include the existing ditch rather than creating a new ditch inside the current easement. DWR has concerns that installing a new ditch closer to the proposed wetland would minimize the uplift potential.

We agree that it would not be ideal to have the ditch adjacent to the proposed wetland and only moved it there from a mistaken interpretation of this comment. Based on discussions at a site

visit on June 14, 2023 with NCWRC (who made the initial comment) and DEQ-DWR, we explained that the flow from the ditch is not critical to the flow of the restored tributary and therefore a conservation easement is not needed around the re-routed ditch. We have moved the re-routed ditch back to its original proposed location and expanded the discussion in the mitigation plan regarding the proposed plan to re-route this ditch (Ditch 1) along the path of Ditch 2 towards UT to Sandpit Branch.

3. DWR appreciates the inclusion of the lateral ditch impacts table, this is very helpful. DWR's concern would be that 20-40 ft. buffers may not be enough to offset the ditch effects, based on the information provided. The smallest lateral impact is 37 ft. and ranges up to 55 ft. In order to prevent drawdown effects, DWR requests that a minimum of a 50-foot buffer must be utilized.

We have revised the wetland boundary to include a minimum 50-foot buffer from all ditches (see the response to USACE comment #2 below) and updated the credit values in the mitigation plan.

4. Please update Table 7 to reflect that the Northern long-eared bat is now federally endangered. Is further coordination with USFWS needed?

Table 7 in the mitigation plan has been updated to reflect that Northern long-eared bat is now endangered. We have run iPaC again and re-sent a self-certification letter to the USFWS to ensure there will be no effect on the Tricolored Bat and also to ensure that the NLEB determination is still current. We have included the revised species conclusion table in the final mitigation plan and will update the categorical exclusion documents based on the revised listing updates and USFWS scoping letter.

5. DWR has several concerns regarding the project design as proposed. These concerns are listed below:

a. DWR's position is that this project has a disconnect between the proposed non-riparian and riparian wetland.

b. DWR believes that the site is smaller than the historic footprint of the waters in this location. Since the site is located in a Carolina Bay, it is likely that the area was historically a wetland and trying to contain the proposed wetland/stream in the confines of the easement is a limitation of the project. To avoid issues related to hydrologic trespass, agricultural drainage will be diverted away from the project instead of being treated by the wetland.

c. After further review, DWR believes that this location would likely not support (or would not naturally contain) a meandering stream channel. The reasons for DWR's position are listed below:

i. The geomorphic position of the project, in the center of a Carolina Bay,

With respect, FNI believes we have presented scientific data that factually demonstrates the nature of this site, and that is what we presented in the Mitigation Plan without bias or preconceived notion. We have studied this site over countless hours, almost obsessively, and have presented a complete picture of this site in the mitigation plan.

Since we are at an impasse on the understanding of geomorphology of the site, in order to move the project forward we accept the proposal from USACE to utilize valley length credit, which we believe resolves the issue.

- ii. ii. The size of the drainage area would likely only be enough to support a headwater section towards the bottom of the project,

As noted below in the response to USACE Comment #1, we will propose valley length credit for the stream restoration portion of the project rather than the length of a sinuous channel.

- iii. iii. DWR does not believe that the location and size of the drainage area would support a Rosgen "C" stream type restoration,

We have removed reference to the Rosgen classification for the proposed channel.

- iv. iv. DWR does not believe that the proposed stream restoration is Priority 1 given the elevation of the culvert at the top of the project. It is likely that only the lower half of the proposed stream project could be lifted enough to promote some flooding.

We are uncertain what elevation information is being referenced by DWR. The pipe culvert is above the proposed bankfull channel bed elevation, therefore it cannot possibly limit Priority I restoration (proposed channel bed elevation at the start of the stream restoration is 36.9' vs pipe invert elevation of 37'). Given that the elevation of the culvert is above the channel bed, by definition it will not limit a Priority I Restoration at any point along the channel reach.

- v. v. In addition, the stream channel would need to show some of the physical characteristics as stated in 3 b. of the Regulatory Guidance Letter 05-05, December 7, 2005, DWR recommends that these characteristics be added as a success criterion for this project.

We have added the physical characteristics stated in 3b of the Regulatory Guidance Letter 05-05 as success criteria for this project in the mitigation plan.

**Erin Davis, USACE:**

1. I agree with DWR's Comment 5 points made above. Additionally, I question the effect of scaling down a reference reach that has 3x the drainage area (DA) of the project reach. Will the same riffle, pool and meander features from a 730 acre DA reach be maintained in a 204 acre DA reach, or will the smaller system shift to become a stream/wetland complex? Also, compared to the larger reference reach, the smaller project reach is proposed to have less slope but greater sinuosity. How could the proposed sinuosity affect the long-term stability of the single thread channel and maintenance of stream features? Based on all of the above discussion points and concerns previously stated by the IRT, the Corps will accept valley length stream credit as a more appropriate credit calculation to reflect restoring part of a Carolina Bay to its original functions as a stream/wetland complex.

See response to comment #5(i) above to DWR's comment. While FNI has extensively evaluated this site, and we feel we have presented a strong scientific basis for our approach, in order to move this project forward we will propose valley length stream credit as the basis of credit calculation. We have updated the mitigation plan accordingly to reflect this.

2. In reference to the response of previous USACE Comment #3, in lieu of a credit ratio reduction to account for the limited potential uplift of the non-riparian wetland area due to project related constraints resulting in site fragmentation, I would support a credit area reduction to accommodate a minimum surrounding 50-foot buffer to better protect the wetland resource and reduce the risk of lateral ditch drainage and/or hydrologic trespass.

We have revised the proposed plan to include a 50-foot buffer around the non-riparian wetland from the conservation easement boundary.

3. To clarify the previous USACE Comment #6, the objective of the stated "an alternative is to include this ditch in the easement" was to expand the easement to encompass the existing ditch so it would at minimum be buffered and protected, and the flow connected and controlled long-term. The intent was not to encourage the construction of a new ditch within the original easement area. Constructing a new drainage ditch within an easement is not appropriate for a mitigation project.

We agree. We showed the ditch adjacent to a restored wetland based on a mistaken interpretation of what was being requested by the previous comment, and had adjusted the wetland credit boundary a sufficient distance from the ditch to account for lateral drawdown effects. Construction of a new drainage ditch within the easement has been removed from the proposed project and the ditch has been moved back to its original proposed location.

4. In reference to the response of previous USACE Comment #7, if the intent is to convert the existing Ditch 3 into a multi-thread channel, please show the multi-thread feature on the figures and design sheets starting at the conservation easement boundary. It is typically not

appropriate to keep an active ditch adjacent to a proposed wetland credit area within the conservation easement. Regarding the marsh complex BMP placement at the stream confluence, generally BMPs are constructed closer to the easement boundary to allow the project buffer to function as intended (e.g., filtration, storage, habitat).

We have moved the marsh confluence complex back to the easement boundary to provide treatment of flows immediately upon entering the easement.

5. Section 5.3 / Table 7: Please run iPaC again to ensure that there will be no effect on the Tricolored Bat. Also, please confirm that the NLEB determination is still current due to the recent uplisting to endangered. A new scoping letter to FWS may be necessary due to species updates. Please include the revised species conclusion table in the final mitigation plan. And please confirm Appendix G categorical exclusion documents are current based on ESA species listing updates.

We have run iPaC again and re-sent a self-certification letter to the USFWS to ensure there will be no effect on the Tricolored Bat and also ensure that the NLEB determination is still current. We have included the revised species conclusion table in the final mitigation plan and have updated the categorical exclusion documents based on the revised listing updates and USFWS scoping letter.

6. Section 8:

a. Please confirm the growing season start and end dates and source (e.g., WETS table, soil temp./bud burst) for the wetland hydrology performance standard.

Per the WETS Tables for date range 1981 to 2010 (Whiteville 7 NW, NC WETS Station) the start and end dates of the growing season are March 12 to November 17 (250 Days).

b. Please add a performance standard to include monitoring of stream physical characteristics (e.g., OHWM, sorting, shelving).

We have added this as a performance standard (also see response to DWR Question #5 (c)(v)).

7. Sheet C-1:

a. Please show the existing upstream culvert that is proposed to remain. Please callout the culvert dimensions and elevation.

These data have been added.



b. Please confirm the minimum wetland buffer to the easement boundary (not fence line) is 20 feet as noted in the response to comments.

We have confirmed this and as noted above have shifted all wetland boundaries to 50 ft from the easement boundary.

c. Will existing ditches to be filled be backfilled to meet surrounding grade? Where is the fill material being sourced (i.e., onsite, offsite)? If onsite, please show areas proposed for regrading/excavation.

Yes existing ditches will be backfilled to meet surrounding grade. The fill will be sourced from on-site from the grading of the proposed channel, as well as the removal of relict spoil piles along the existing Tributary 1 banks. These proposed areas of regrading/excavation have been included in the plan sheets showing proposed contours.

d. Please callout approximate locations of proposed vernal pools (max. depth 14 inches) within the existing Tributary 1 ditch as described in Section 7.2.3. If other ditches within the easement are proposed to be partially backfilled, please indicate on the plan sheets and note the max. depth from surrounding grade to remain open.

We have indicated these vernal pools, as well as other areas of proposed partial backfill, on the proposed plans as requested.

e. If feasible, it would be easier to review design sheets oriented with the north arrow up rather than down.

The orientation is due to the fact that, on stream restoration construction drawings, it is typical to show proposed stream restoration features from left to right in order of stationing downstream. A figure is included that shows the same information oriented north. The Engineer of Record has chosen to orient the plansheets in this way as it is the standard convention in linear construction projects, generating an efficient sheet layout.

8. Sheet C-2: Please show existing dimensions of Ditch 3 and proposed grading.

These data have been added.

9. Sheet C-3: The proposed new ditch is not shown. All proposed features should be shown on plans with typical details provided.

These data have been added.

10. Sheet C-4:

a. Shallow swales are shown within a proposed wetland credit area. Please provide a typical detail, including max width and depth.

These data have been added.

b. Based on response to comments, Ditch 2 was proposed to be moved within the easement. As a result, was the existing Ditch 2 proposed to be backfilled?

As shown on the submitted Sheet C-4, Ditch 2 would remain in place while Ditch 1 was rerouted to the west towards UT to Sandpit Branch, within the easement. However, as noted in a previous comment, we have moved the re-routing of Ditch 1 back into the path of Ditch 2 and out of the easement, as was originally proposed in the first submittal to the IRT.

c. Please confirm that channel and ditch plugs shown are a minimum 50 feet long as noted in DT-4 detail.

Yes the channel and ditch plugs will be a minimum of 50 ft long. The symbol shown on the plans has been adjusted to be scaled to this correct distance.

11. Sheet C-5: This is the only sheet that shows Ditch 2 and part of Ditch 1 within the project limits of disturbance. Why aren't these areas shown on Sheet C-4? Why are these areas shown on the planting plan but not included as areas to be planted?

This was a holdover from the previous submittal where we were routing the flow of Ditch 1 into Ditch 2 and regrading Ditch 2 to flow towards UT to Sandpit Branch. As mentioned above, we have revised the plans to reflect this original proposal as we will not route Ditch 1 flow adjacent to the riparian wetland R-2.

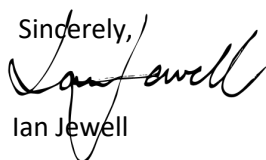
12. Sheet DT-11: Please provide the invert and top of bank elevations of the existing ditch.

These data have been added.

13. A preliminary project grading plan was not provided. Given the extent of wetland restoration, ditch filling, swale construction, and stream restoration, it would be helpful to see preliminary grading information.

A preliminary grading plan has been added to the plans.

Please let us know if additional information is needed for the IRT's further review. Feel free to call me at (919)418-8430 with any questions.

Sincerely,  


Ian Jewell

Associate/Project Manager

**MITIGATION PLAN**

**Cow Branch Mitigation Site**  
Columbus County, NC

DMS Project No. 100196  
DMS Contract No. 200203-01  
DWR Project No. 20210919v1  
NCDEQ Contract No. 200203-01  
USACE Action ID No. SAW-2021-00822

Lumber River Watershed  
HUC 03040206

**Prepared for:**



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

**Prepared by:**



**Freese and Nichols, Inc.**  
531 N Liberty St  
Winston-Salem, NC 27101

***This mitigation plan has been written in conformance with the requirements of the following:***

- Federal rule for compensatory mitigation project sites as described in the Federal Register Title 33 Navigation and Navigable Waters Volume 3 Chapter 2 Section 332.8 paragraphs 1(2) through(c)(14).
- NCDEQ Division of Mitigation Services In-Lieu Fee Instrument signed and dated July 28, 2010.

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

**Contributing Staff:**

Bryan Dick, PhD, PE, PH	<i>Lead Technical Professional/ Lead Quality Assurance</i>
Ian Jewell, JD	<i>Project Manager/Mitigation Plan Development</i>
Emily Brown, PE, ENV SP, CFM	<i>Stream Design/Construction Documents</i>
Lydia Ward, PE, ENV SP	<i>Stream Design/Construction Documents</i>
Jason Steele, PhD, PWS	<i>Wetland Design/Mitigation Plan Development</i>

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## 1.0 INTRODUCTION

The Cow Branch Mitigation Site (hereafter referred to as the “Site”) is located approximately 1.5 miles due east of Nakina and 11 miles southwest of Lake Waccamaw, North Carolina. The Site is accessed from Ervin T Richardson Rd (SR 1006) and Site centroid coordinates are 34.1374, -78.6482 (**Figure 1**). The Site lies within the Lumber River Basin, United States Geological Survey (USGS) hydrologic unit code (HUC) 03040206, and 14-digit HUC 03040206060010. An unnamed tributary of Sand Pit Branch flows through the project limits, shown on the USGS topographic map in **Figure 2**, and will be restored as part of the project. While not included in any Local Watershed Plans (LWPs), the project site is in Targeted Local Watershed (TLW) 03040206060010 (Gore Creek) and is discussed in the Lumber River Basin Restoration Plan (RBRP). Further details regarding site characteristics and targeted resource areas are included in Section 2.0, and the stream and wetland mitigation components are summarized in **Table 1**.

**Table 1.** Project Credits

Restoration Level	Stream (SMU)			Riparian Wetland (WMU)		Non-Rip (WMU)	Coastal (WMU)
	Warm	Cool	Cold	Riverine	Non-Riv	Wetland	Marsh
Restoration	<b>2,128.000</b>						
Re-establishment				<b>19.132</b>		<b>2.830</b>	
Rehabilitation							
Enhancement							
Enhancement I							
Enhancement II							
Creation							
Preservation							
<b>Totals</b>	<b>2,128.000</b>			<b>19.132</b>		<b>2.830</b>	

The streams and wetlands throughout the Site are in various stages of impairment related to existing and historical land uses, including current agricultural uses. The project proposes to restore approximately 2,500 linear feet (LF) of perennial streams to provide 2,128 stream mitigation units (SMU). Approximately 19.132 acres of riparian wetlands and 2.830 acres of non-riparian wetlands will be re-established for 19.132 riparian wetland mitigation units (WMU) and 2.830 non-riparian WMU. A discussion of Site credit determination is provided in **Section 11** of the mitigation plan. The Site will be protected in perpetuity by an approximately 34-acre easement. Further details regarding determination of credits are included in **Table 2**.



A site review meeting was held on April 21, 2021, with the NC Division of Mitigation Services (NCDMS), the Interagency Review Team (IRT) and Freese and Nichols (FNI) in attendance. The minutes from this meeting and the subsequent credit ratio discussion can be found in **Appendix A**.

**Table 2.** Project Components and Mitigation Credits

Project Segment	Existing Footage or Acreage	Mitigation Plan Footage or Acreage	Mitigation Category	Restoration Level	Priority Level	Mitigation Ratio (X:1)
Tributary 1	2,100	2,128.000	Warm	R	1	1.00000
Wetland R-1	0.000	1.637	R	REE		1.00000
Wetland R-2	0.000	6.119	R	REE		1.00000
Wetland R-3	0.000	11.376	R	REE		1.00000
Wetland NR-1	0.000	2.830	NR	REE		1.00000

## 2.0 WATERSHED APPROACH AND SITE SELECTION

While not included in any Local Watershed Plans, the project site is in TLW 03040206060010 (Gore Creek) and is discussed in the Lumber River Basin RBRP. The RBRP notes that this watershed is listed as a TLW due to ‘Significant Natural Heritage Areas’ for rare plant and animal species and that primary restoration goals are to assist with preservation. Specifically, the Waccamaw River Reeves and Gore Lake Bottomlands Natural Area is located approximately 8 miles downstream of the project site. This Natural Heritage Area is listed with a rating of “Exceptional” by the NC Natural Heritage Program. While much of the Waccamaw sub-basin is forested, the project site includes ditched stream channels and is currently used for cattle grazing, providing an opportunity for stream and wetland restoration that will address these impairments and contribute to the preservation of natural areas in the future. The Cow Branch Mitigation project will address current on-site stressors/impairments by restoring the extensively channelized and denuded stream system on the project site to a natural channel, consisting of natural, stable geometry, planform, and function. In addition, areas of heavily grazed and drained riparian and non-riparian wetlands will also be restored to provide ecological and functional uplift.

### 2.1 SITE SELECTION

Currently the Site has bank erosion, sediment deposition, severe channel incision, an absence of riparian buffers, and historical land use practices that have contributed to channelization. The project will directly

and indirectly address stressors identified in the RBRP by stabilizing eroding stream banks, re-establishing floodplain connections, reducing sediment and nutrient loads, restoring wetland hydrology and vegetation, and restoring forested buffers on the stream channels. Project specific goals for the Site are addressed further in Section 6.0. A map of the project area with airports, populated areas, lakes, and streams is included in **Figure 1** and a watershed map of the Site’s drainage areas are shown on **Figure 3**.

The Site addresses goals outlined for the 03040206 (Waccamaw River) watershed in the 2008 Lumber River RBRP. The project builds upon existing restoration efforts in the watershed, and establishing a conservation easement will protect natural resources. Implementation of stream restoration and enhancement and wetland restoration will address erosion, sedimentation, and habitat degradation issues due to current agricultural land use. The Site will further improve water quality and functional uplift of the watershed and will have a positive impact on water quality of downstream watersheds that were identified as TLW in the 2008 RBRP.

The land required for the construction, management and stewardship of the Site includes portions of one tax parcel in Columbus County with the ownership shown in **Table 3** and **Figure 4**. A copy of the land protection instrument is included in **Appendix B**.

**Table 3.** Project Parcel and Landowner Information

Owner of Record	Tax Parcel ID
Wilbur Smith Girls, Inc.	1104.00-60-9568.000

### 3.0 BASELINE AND EXISTING CONDITIONS

The following sections describe the existing conditions of the Site, watershed, and watershed processes, including disturbance and response. A summary of the watershed information is presented in **Table 4** and **Figure 3**.

#### 3.1 WATERSHED SUMMARY INFORMATION

##### 3.1.1 Drainage Area and Land Cover

The Site consists of a former riverine swamp and a coastal plain stream that is a tributary to Sand Pit Branch (Tributary 1). The total drainage area of Tributary 1 is 203 acres (0.32 sq. mi) (**Figure 3**). Primary land use within the drainage area consists of 97% row crop agriculture and cattle pasture, and 2.5% timberlands. Impervious surface accounts for less than one percent of the drainage area. **Table 4** provides a summary of project attributes. Historic and current land use included cattle grazing and row-cropping, which have negatively impacted both water quality and streambank stability along the Site stream. There are no signs of impending land use changes or development pressure that would impact the project throughout the watershed.

**Table 4. Project Attribute Table**

Project Background Information			
Project Name		Cow Branch Mitigation Site	
County		Columbus	
Project Area (acres)		34.3	
Project Coordinates (latitude and longitude)		34.1374, -78.6482	
Planted Acreage (Acres of Woody Stems Planted)		33.82	
Project Watershed Summary Information			
Physiographic Province		Coastal Plain	
River Basin		Lumber	
USGS Hydrologic Unit 8-digit	03040206	USGS Hydrologic Unit 14-digit	03040206060010
DWR Sub-basin		Gore Creek	
Project Drainage Area (Acres and Square Miles)		203 acres (0.32 sq. mi.)	
Project Drainage Area Percentage of Impervious Area		<2%	
CGIA Land Use Classification		Managed Herbaceous Cover	
Reach Summary Information			
Parameters		Tributary 1	
Length of reach (linear feet)		2,100	
Valley confinement (Confined, moderately confined, unconfined)		Unconfined	
Drainage area (Acres and Square Miles)		203 acres, 0.32 sq mi	
Perennial, Intermittent, Ephemeral		Perennial	
NCDWR Water Quality Classification		C; Sw	
Stream Classification (existing)		G5c	
Evolutionary trend (Simon)		II	
FEMA classification		Zone AE	
Wetland Summary Information			
Parameters		Wetlands R-1 – R3	Wetland NR-1
Size of Wetland (acres)		19.132	2.830
Wetland Type (non-riparian, riparian riverine or riparian non-riverine)		Riparian riverine	Non-riparian
Mapped Soil Series		Grifton	Grifton
Drainage class		Poorly Drained	Poorly Drained
Soil Hydric Status		Hydric	Hydric
Source of Hydrology		Groundwater, overbank flow	Groundwater
Restoration or enhancement method (hydrologic, vegetative etc.)		Hydrologic, vegetative, livestock	Hydrologic, vegetative, livestock
Regulatory Considerations			
Parameters	Applicable?	Resolved?	Supporting Docs
Water of the United States - Section 404	Yes	Applying for NWP 27	Appendix D
Water of the United States - Section 401	Yes	Applying for NWP 27	Appendix D
Endangered Species Act	Yes	Yes	Appendix D
Historic Preservation Act	Yes	Yes	Appendix D
Coastal Zone Management Act (CZMA or CAMA)	No	N/A	N/A
FEMA Floodplain Compliance	Yes	Yes	Appendix F
Essential Fisheries Habitat	No	N/A	N/A

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### 3.1.2 Surface Water Classification

The streams to which the project area drains, Sand Pit Branch and Simmons Bay Creek, have been classified as Class C and Swamp (C; Sw) waters by the NC Department of Water Resources (NCDWR). Waters classified as Class C are protected for uses such as secondary recreation, fishing, wildlife, fish consumption, aquatic life including propagation, survival and maintenance of biological integrity, and agriculture. Secondary recreation includes wading, boating, and other uses involving human body contact with water where such activities take place in an infrequent, unorganized, or incidental manner. Swamp waters are a supplemental classification intended to recognize waters with low velocities and other natural characteristics that are different from adjacent streams (NCDEQ, 2021).

## 3.2 LANDSCAPE CHARACTERISTICS

### 3.2.1 Physiography and Topography

The Site is in the Carolina Flatwoods of the Coastal Plain physiographic province. The Site is located within two adjacent Carolina Bays, surrounded by uplands adjacent to the geomorphic floodplain of Sand Pit Branch and Simmons Bay Creek, a tributary to the Waccamaw River. Drainage from the site flows through the ditched natural channel of Tributary 1 to Sand Pit Branch, a small tributary that joins Simmons Bay Creek at the southern corner of the site. Simmons Bay Creek flows through swampy lowlands to the southeast for roughly 3.25 miles to its confluence with Gore Creek, which then flows an additional 3.5 miles southeast to the Waccamaw River. Many of the streams in the area surrounding the project site are characterized by wide, well-vegetated valleys that facilitate the formation of swamps. These areas are underlain by organic, very poorly drained mucks, which are associated with densely vegetated swamplands near the coast. The overall slope is very low, averaging 0.1 to 0.25 percent across the Site.

### 3.2.2 Geology and Soils

The Cow Branch Mitigation Site is located in the Lumber drainage basin of the North Carolina Coastal Plain physiographic province and is underlain by the Waccamaw Formation. The Waccamaw Formation consists of loosely consolidated, bluish gray to tan fossiliferous sand with silt and clay. The site consists predominantly of fine sandy loams, including the Grifton fine sandy loam. Throughout the late Pleistocene and early Holocene, river basins across the Coastal Plain experienced changes in hydrology, sediment load, baseflow, isostatic adjustment, and climate. These changes produced a complex geomorphologic sequence that includes numerous terraces, a modern floodplain, and incised river channels that cut down into underlying Cretaceous and Tertiary geologic units. The terraces consist of a thin layer of Quaternary sediments underlain by fluvial, estuarine, and marine sequences that include various Cretaceous and Tertiary formations (such as the Waccamaw Formation). The overlying layer of Quaternary sands has been influenced by changes in fluvial and aeolian processes, climate (i.e., drought), and vegetation.

The site is mapped by the USDA Web Soil Survey for Columbus County. Site soils are described in **Table 5** and shown in **Figure 6**. The mapped soils are comprised of Grifton fine sandy loam. Grifton soils are deep,

poorly drained, with moderate permeability. Undrained Grifton soils typically have a water table within 10 inches of the soil surface for up to 6 months of the year.

**Table 5.** Mapped Soil Series with the Project Area

Map Unit Symbol	Map Unit Name	Percent of Site	Hydric	Drainage Class	Hydrologic Soil Group
Gt	Grifton fine sandy loam ( <i>Typic Endoaqualfs</i> )	100%	Yes	Poorly drained	B/D

### 3.2.3 Existing Vegetation

Vegetation around site stream reaches is dominated by a sparse shrub and tree layer, with no closed canopy. The riparian areas are disturbed due to the regular land management associated with row crop farming and grazing practices. Non-crop vegetation has historically been controlled by mechanical and chemical methods, limiting the establishment of competing species throughout much of the site. Loblolly pine (*Pinus taeda*), sweetgum (*Liquidambar styraciflua*), red bay (*Persea borbonia*), switch cane (*Arundinaria tecta*), American holly (*Ilex opaca*) and sparse pockets of soft rush (*Juncus effusus*) were observed along Tributary 1.

### 3.2.4 Land Use – Historic, Current, and Future

Historical aerial imagery (**Figure 7**) and anecdotal information from the landowner indicates that the Site was used extensively for row crop production and cattle grazing (**Figure 5**). Current agricultural practices have degraded the riparian areas and contributed to the degradation of the stream channel and wetland areas.

The future land use for the site will include 34.3 acres of conservation easement that will be protected in perpetuity. The Site easement will include 2,500.112 LF of streams (producing 2,128 SMUs), 19.132 acres of riparian wetland, 2.830 acres of non-riparian wetlands, and a minimum 50-foot riparian buffer and will exclude livestock with fencing. Outside of the Site, the area will likely remain in agricultural use and timber production.

## 3.3 PROJECT RESOURCES

### 3.3.1 Reach Summary Information

The Site is comprised of two easement areas consisting of former riverine swamp and a coastal plain stream that is a tributary to Sand Pit Branch. A summary of existing channel characteristics is presented in **Table 6**. Detailed morphological data are included in **Appendix C**. Tributary 1 was classified as perennial using the NCDWR Stream Identification Form, version 4.11.

**Table 6.** Summary of Existing Channel Attributes

Parameters	Tributary 1
Length of reach (linear feet)	2,100
Valley confinement (Confined, moderately confined, unconfined)	Unconfined
Drainage area (Acres and Square Miles)	203 acres
	0.32 mi <sup>2</sup>
Perennial, Intermittent, Ephemeral	Perennial
NCDWR Water Quality Classification	C; Sw
FEMA classification	AE
NCSAM Rating	Low
NCDWR Stream Identification Score	32

### 3.3.1.1 Tributary 1

Tributary 1 bisects the site, flowing west toward UT Sand Pit Branch. The drainage area of Tributary 1 begins on the parent tract approximately 3,000 feet upstream of the project site at Ervin Richardson Rd, at the northern end of one of two Carolina Bays on the site. As with all drainage features on the property, the stream is ditched and manipulated for its entire length through the property. It flows through the upper bay and then into the lower bay (locally known as “Jane Bay”) after passing through a 12” PVC pipe underneath the main farm road on the property. After this point, the stream flows for approximately 2,100 feet before reaching UT Sandpit Branch. The waters from the site eventually reach the Waccamaw River about 8 miles downstream. Numerous lateral ditches are cut through the natural drainage area of the stream and converge with Tributary 1 at various points along its length.

Tributary 1, in its ditched form, is 10 to 14 feet wide and 3 to 3.5 feet deep. The channel slope is approximately 0.15%, and the channel has a Width to Depth Ratio 19 ft/ft, Entrenchment Ratio of 1.7 ft/ft, and a Bank Height Ratio of approximately 4.0 ft/ft. The buffer area is sparsely vegetated with only a single row of scattered trees along Tributary 1.

## 3.3.2 Site Wetland Summary

### 3.3.2.1 Jurisdictional Wetland Information

Waters of the US (WOTUS), including wetlands, were delineated pursuant to the U.S. Army Corps of Engineers (USACE) *1987 Wetland Delineation Manual*, the USACE *2012 Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Atlantic and Gulf Coast, Version 2.0*, and subsequent regulatory

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guidance. Field work was conducted by FNI environmental scientists on May 6, 2021. No wetland features were identified within the proposed easement area, which can be cross-referenced with NWI Mapping in **Figure 10**. While soils exhibited depleted matrix hydric soil indicators, the areas lacked sufficient evidence of wetland hydrology, and no hydrophytic vegetation was observed. The lack of hydrology and vegetation is due to the manipulation of the site for agricultural purposes, particularly ditching and soil preparation for row crop agriculture. A preliminary jurisdictional determination (PJD) for the Site was issued on July 11, 2022. PJD documentation, WOTUS forms, and mapping are included in **Appendix D**.

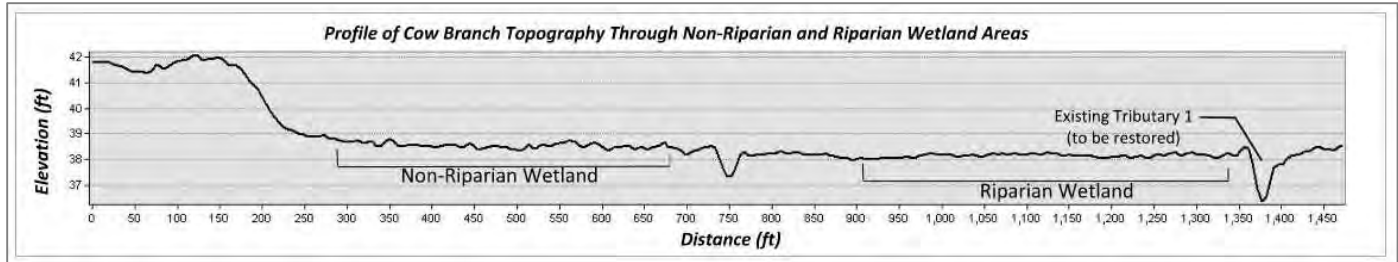
### **3.3.2.2 Hydric Soils Investigation**

The proposed riparian wetland areas consist of hydric soils along Tributary 1. A detailed hydric soil investigation was completed by a NC licensed soil scientist on December 11, 2020 (**Appendix E**). A series of 12 soil borings were performed to describe and determine the areal extent of hydric soils within the site. Soils were characterized and classified using the Field Indicators of Hydric Soils in the United States, Version 8.2 (USDA 2018). Hydric indicators were found within 12 inches of the soil surface and found in both the riparian and non-riparian areas of the site. The *F3-Depleted Matrix* indicator was observed in all soil boring locations.

### **3.3.2.3 Existing Hydrology**

The riparian wetland areas are adjacent to the stream channel, and topographically within the valley of the stream as evidenced by a similarity in elevation compared with other areas further away in the Bay. While underlain by hydric soils, these areas lack the hydrology and hydrophytic vegetation necessary to classify as jurisdictional wetlands. This area has been historically extensively grazed by cattle and is now managed for row crop agriculture. The cultivated surfaces and ditches quickly remove surface water to prevent accumulation and limit infiltration. These drainage modifications limit both surface and subsurface storage. The area is divided by several ditches that run both perpendicular and parallel to Tributary 1. The modified channel of Tributary 1, at 3 to 3.5 feet deep, also impacts hydrology through drawdown effect.

The proposed non-riparian wetland area is located at the northern end of the geomorphic Carolina Bay through which Tributary 1 flows. A prominent “lip” of the Bay is present along the northern end of the proposed wetland, creating a natural hydrologic barrier. Unlike the riparian wetlands area, the base elevation of the non-riparian wetlands area is higher in elevation (approximately 0.5 feet above the valley of Tributary 1) and located a considerable distance away from Tributary 1 (approximately 700 feet) thus placing it outside a geomorphic floodplain or crenulation. The area is underlain by hydric soils, was historically grazed by cattle and is currently being managed for row crop agriculture. An Existing Conditions map can be found in **Figure 9**.



**Exhibit 1.** Profile of existing topography of the Cow Branch Mitigation Site, oriented from north (left) to south (right), depicting the general elevations of the proposed non-riparian and riparian wetland areas. Note that the non-riparian wetland area is approximately 0.5' higher than the base elevation of the riparian wetland. Also note prominent rim of Carolina Bay on the left (north) side of profile. Refer to Figure 9 for profile alignment location (Section A-A').

## 4.0 FUNCTIONAL UPLIFT POTENTIAL

The potential for stream functional uplift is qualitatively described in this section using terminology from the Stream Functions Pyramid Framework (Framework) (Harman and Jones 2016). The Framework describes a hierarchy of five stream functions, each of which supports the functions above it on the pyramid and sometimes reinforces those below it. The five functions in order from bottom to top are hydrology, hydraulics, geomorphology, physiochemical, and biology. The Framework is not proposed to determine the success of the Site. The Site has a focus on total ecosystem restoration, and the mitigation design will improve stream and wetland function while providing numerous ecological and environmental benefits to the broader Lumber River basin. Benefits, which are described in more detail below, will include increased hydrological function, improvements to water quality and improved aquatic habitat.

A functional based approach broadens the reach-scale goals of a restoration project by contextualizing the functional uplift to the watershed scale. Utilizing an ecosystem restoration approach will provide localized ecological and water quality benefits that could, in combination with other restoration projects within the watershed, have beneficial impacts to the Lumber River Basin. The restoration approach at the reach scale at this Site will benefit the hydraulic and geomorphology functions of the system and could also benefit higher level functions, including physiochemical and biology, over time and in conjunction with other restoration projects in the watershed. Site goals and objects, as based upon the anticipated functional benefits and improvements, are detailed in **Section 6.0** are outlined in **Table 8**.

### 4.1 ANTICIPATED FUNCTIONAL BENEFITS AND IMPROVEMENTS

#### 4.1.1 Hydrology

The Stream Functions Pyramid Framework defines hydrology as the transport of water from the watershed to the channel. The Site will locally address several historic hydrologic disturbances, including channelization and deforestation. Even though trees will be planted within the conservation easement,



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this will not significantly improve the watershed hydrology, therefore, there are no significant opportunities for this project to improve the hydrologic function at a watershed level.

The restoration approach will focus on establishing a natural channel typical of coastal plain headwater systems using the techniques and approaches described in the *Information Regarding Stream Restoration with Emphasis on the Coastal Plain, Version 2* (April 2007) guidance document. The existing lateral ditches within the conservation easement will be graded to sheet flow to the restored valley, which will allow diffuse flow to enter the restored riparian buffer and wetland areas at a slower rate, thereby increasing sediment filtration and nutrient uptake. Based on the landscape position of the wetland restoration areas of the Site and the surrounding landscape, improvement of hydrologic function will be realized in various degrees across the landscape. The restoration areas will improve surface water storage and retention and will also work in conjunction with landscape position to improve subsurface water storage and retention. The improved hydrologic function and water storage of Site wetlands will also improve water quality by reducing sediment, improving runoff filtration, and increasing nutrient cycling. The improved hydrologic function and water quality will lead to direct and indirect uplift of aquatic and terrestrial habitat both within the site and downstream.

#### **4.1.2 Hydraulic**

Hydraulic function within the Framework is defined as the transport of water in the channel, on the floodplain and through sediment. The greatest potential uplift at the Site will be achieved through increasing floodplain connectivity along Tributary 1. Tributary 1 does not have functioning floodplain connectivity (Average Bank Height Ratio = 4.0). Areas where the floodplain connectivity is not-functioning or functioning-at-risk will be improved to functioning by reducing the bank height ratio and increasing the entrenchment ratios. Reaches in which stable flow dynamics are not-functioning or functioning-at-risk will be improved by construction a new stable channel with dynamic bedform.

#### **4.1.3 Geomorphology**

The Framework defines geomorphology as the transport of wood and sediment to create bedforms and dynamic equilibrium. Site streams are currently classified as not-functioning for sediment transport due to non-functioning buffers, limited floodplain access, high bank height ratios and low entrenchment ratios. Sediment transport will be reduced through construction of a channel with stable dimension, plan, and profile for Tributary 1, and establishing functioning riparian buffer along the stream. Channel stability and bedform will be improved in restoration reaches by installing structures to establish pools and increase bedform diversity. Transport and storage of woody debris will be improved by increased channel roughness from woody structures and plantings. Riparian buffers will be established at a minimum of 50-foot widths from the proposed restored streambanks to increase riparian vegetation to functional levels and provide terrestrial habitat. All these functional parameters are interconnected and will result in a long-term functional geomorphic uplift.

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#### **4.1.4 Physiochemical**

Physiochemical function is defined by the Framework as temperature and oxygen regulation and process of organic matter and nutrients. The Site will support the overarching goal of decreasing nutrient and sediment production in agricultural areas. Quantification of these improvements is difficult to measure as they are affected by a variety of variables at the watershed level. Restoration activities are known to help reduce nutrient loading and sediment transport even though these parameters are not directly measurable at a project level. The Site will decrease nutrient loading by establishing a riparian buffer to decrease concentrated agricultural input from adjacent land practices, which includes nutrient loading, fecal coliform inputs, and sediment loading. A riparian buffer will eventually provide shading, resulting in reduced water temperatures. Water will flow over in-stream structures, providing aeration. The streams will be reconnected to floodplains and floodplain wetlands, reducing stream erosion, increasing floodplain storage, and improving nutrient cycling. Restoration of non-riparian wetland areas will increase groundwater recharge, increase sediment trapping and filtration, increase biogeochemical cycling, and increase carbon storage. These benefits develop slowly over time and are dependent upon multiple variables. It is not practical or feasible to directly measure these variables within the monitoring timeframe for this project. However, visual observations of the riparian buffer will be documented, and these observations are expected to demonstrate that the Site is trending toward improved function.

#### **4.1.5 Biology**

The highest category of the Framework is biology, which is defined as the biodiversity and life histories of aquatic and terrestrial life, specifically animals. As with physiochemical stream function, it is difficult to quantify biological uplift with measurable results in the timeframe of the project. Improvements to biological activity will be noted during visual assessments of the project, and through direct measurement of categories 2 and 3 (hydraulics and geomorphology) of the Framework.

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## **5.0 SITE DESIGN AND IMPLEMENTATION CONSTRAINTS**

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The presence of conditions or characteristics that could hinder proposed restoration activities at the Site were evaluated. The evaluation focused on the presence of hazardous materials, utilities, easements, threatened and endangered species, and potential for hydrologic trespass. Any additional Site conditions that could restrict the restoration design and implementation were documented during field investigations.

No known Site constraints that may hinder the proposed mitigation activities were identified during field investigations. Potential constraints reviewed are included below.

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## 5.1 FEMA FLOODPLAIN

According to the North Carolina Floodplain Mapping Information System, the Site lies within a FEMA Special Flood Hazard Area 100-year floodplain (one percent annual chance of flooding) (**Figure 8**). Any project within a floodway must be reviewed to determine if the project will increase Base Flood Elevations above the regulatory standard. A no-rise study was completed for the project and is included in **Appendix F**. No hydrologic trespass will be permitted to adjacent properties upstream or downstream of the project.

## 5.2 ENVIRONMENTAL SCREENING AND DOCUMENTATION

To ensure that a project meets “Categorical Exclusion” criteria, the Federal Highways Administration (FHWA) and NCDMS have developed a Categorical Exclusion (CE) checklist that is included as part of the environmental screening process. The CE documentation and CE approval Form for the Site are included in **Appendix G** and was approved by FHWA and DMS on August 31, 2021.

## 5.3 THREATENED AND ENDANGERED SPECIES

Plants and animals with a federal classification of endangered or threatened are protected under provisions of Sections 7 and 9 of the Endangered Species Act of 1973, as amended. The United States Fish and Wildlife Service (USFWS) Information for Planning and Consultation (IPaC) data base lists five federally protected species for the Site, which include the Northern long-eared bat (*Myotis septentrionalis*), red-cockaded woodpecker (*Picoides borealis*), wood stork (*Mycteria americana*), American alligator (*Alligator mississippiensis*), and Cooley’s meadowrue (*Thalictrum cooleyi*) (**Table 7**). A pedestrian survey conducted on March 24, 2021, indicated that the Site does not provide potential habitat for any of the identified federally listed species. The site was reviewed by USFWS on May 4, 2021, and the agency concurred that the site did not provide suitable habitat for identified listed species, and the USFWS “does not believe the project will adversely affect any federally listed or proposed species”. An updated USFWS self-certification was submitted on July 26, 2023. The site was reviewed by USFWS on September 15, 2023, and the USFWS noted, “The Service concurs with your species determinations for effects to listed species from this project. We note that you have not made a determination for tricolored bat, but the species is not currently listed. If the species is listed prior to completion of tree removal on the site, the lead federal agency (FHWA or Corps) should coordinate again with the Service.” USFWS correspondence is included in **Appendix G**.

**Table 7. Federally Protected Species (IPaC, July 2023)**

Species and Federal Status	Habitat	Potential Habitat at Site	Biological Conclusion
<i>Haliaeetus leucocephalus</i> Bald eagle	Mature forest in proximity to large bodies of open water for foraging. Large dominant trees are utilized for nesting sites, typically within 1.0 mile of open water.	No	No Eagle Act Permit Required
<i>Myotis septentrionalis</i> Northern long-eared bat  Endangered	Winter: hibernating in caves and mines. Since this species is not known to be a long-distance migrant, and caves and subterranean mines are extremely rare in eastern North Carolina, it is uncertain whether or where it hibernates in eastern North Carolina. Summer: roost singly or in colonies underneath bark, in cavities, or in crevices of both live and dead trees (typically $\geq 3$ inches dbh).	Yes	May affect, not likely to adversely affect*
<i>Picoides borealis</i> Red-cockaded woodpecker  Endangered	Open, mature stands of southern pines, particularly longleaf pine ( <i>Pinus palustris</i> ) aged 60 years or older, which are contiguous with pine stands at least 30 years of age to provide foraging habitat.	No	No effect
<i>Mycteria americana</i> Wood stork  Threatened	Wood storks typically construct their nests in medium to tall trees that occur in stands located either in swamps or on islands surrounded by relatively broad expanses of open water. In many areas, bald cypress and red mangrove trees are preferred. Wood storks also occur in a wide variety of wetland habitats, including freshwater marshes and stock ponds, shallow, seasonally flooded roadside or agricultural ditches, narrow tidal creeks or shallow tidal pools, managed impoundments, and depressions in cypress heads and swamp sloughs.	No	No effect
<i>Alligator mississippiensis</i> American alligator  Endangered	In North Carolina, alligators have been recorded in nearly every coastal county, and many inland counties to the fall line. The alligator is found in rivers, streams, canals, lakes, swamps, and coastal marshes.	Yes	No effect*
<i>Thalictrum cooleyi</i> Cooley's meadowrue  Endangered	Occurs in circumneutral soils in sunny, moist to wet grass-sedge bogs, wet-pine savannas over calcareous clays, and savannah-like areas, often at the ecotones of intermittent drainages or non-riverine swamp forests. This rhizomatous perennial herb is also found along plowed firebreaks, roadside ditches and rights-of-way, forest clearings dominated by grass or sedge, and power line or utility rights-of-way. The species requires some type of disturbance (e.g., mowing, clearing, periodic fire) to maintain its open habitat.	No	No effect

\* See the approved Categorical Exclusion document in **Appendix G** for species habitat assessment information.

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A review of the North Carolina Natural Heritage Program (NCNHP) records on April 8, 2021, included an observation of the species in 1928 within the one-mile search radius of the project, however, the USFWS Cooley’s meadowrue Recovery Plan has indicated that many of these historic observances were extirpated by the early 1990s. A letter was sent to the North Carolina Wildlife Resources Commission (NCWRC) on May 19, 2021 requesting review and comment of possible issues with respect to fish and wildlife resources on the site. NCWRC responded on June 8, 2021, stating, “... the NWRC recommends the use of biodegradable and wildlife-friendly sediment and erosion control devices...”. Documentation is included in **Appendix G**.

#### **5.4 CULTURAL RESOURCES**

A review of the North Carolina State Historic Preservation Office GIS Web Service database on June 18, 2021, revealed no National Register listings within a one-mile radius of the Site. A letter was submitted to the North Carolina State Historic Preservation Office (SHPO) on June 18, 2021. SHPO responded on June 30, 2021 and stated that they were aware “of no historic resources which would be affected by the project”. Cultural resources met the Categorical Exclusion criteria for FHWA and NCDMS projects, and documentation is included in **Appendix G**.

#### **5.5 401/404**

There will not be permanent or temporary impacts to existing wetlands onsite due to channel realignment or grading during project construction. A Pre-Construction Notification (PCN) will be submitted to the IRT with the Final Mitigation Plan. The Section 401 pre-filing request for the project was submitted to NCDEQ on January 27, 2023.

#### **5.6 UTILITIES**

No utilities are located on the Site.

#### **5.7 AIR TRANSPORT FACILITIES**

One air transport facility (Columbus County Airport) is located within 5 miles of the Site. The proposed mitigation design will not result in appreciable increase in bird populations or bird nesting areas; therefore, the airport is not considered a project constraint.

#### **5.8 EASEMENT BREAKS**

Easement breaks were evaluated as a potential project constraint as they fragment the Site and reduce potential functional uplift. The project has one proposed easement break between the non-riparian wetland cell and the channel restoration/riparian wetland cells. The non-riparian wetland cell is located against the northeastern rim of the Carolina Bay in which the project sits and is slightly higher in elevation than the riparian wetland/stream restoration cell. The proposed wetland as non-riparian as it will not receive the frequency of hydrology input from overbank flooding as the riparian wetlands. Hydrology in

this cell is primarily from precipitation and surface runoff from the north which flows down-gradient over the bay rim and into the non-riparian wetland area. Flow then exits the wetland cell into an existing east-west trending ditch/shallow swale and then into a larger ditch that runs south toward the riparian cell. This ditch will be re-routed to the west inside the riparian easement boundary but low points within the ditch and shallow graded swales will allow surface water to discharge into riparian wetland cells to provide water quality treatment during storm events and mimic historic flow patterns of the Carolina Bay prior to ditching (see **Figure 11**). Thus, despite an easement disconnect, a connection between hydrology of the riparian and non-riparian wetlands will be established and runoff from agricultural fields will be treated by both wetland types.

## 6.0 MITIGATION PROJECT GOALS AND OBJECTIVES

The project will improve stream and wetland functions as described in **Section 4.0** through stream restoration, wetland restoration, and conversion of agricultural fields into riparian buffer within the Lumber River basin. Specific, attainable goals and objects will be realized by the project, and these are verifiable through measurement and/or visual assessment. The project will be monitored after construction to evaluate performance as described in **Section 8.0**. The project stressors, goals, and objectives are described in **Table 8**.

**Table 8.** Stressors, Goals, and Objectives

On-Site Stressor/Impairment	Goals to Address/Remove Stressor	Objectives
Lack of riparian buffer, leading to lack of riparian habitat, streambank instability and lack of filter for runoff of non-point source pollutants such as fertilizers and pesticides into stream	<ul style="list-style-type: none"> <li>Restore riparian buffer and native vegetation communities.</li> </ul>	<ul style="list-style-type: none"> <li>Establishment of minimum 50 ft buffer along channel</li> <li>Plant native overstory and understory species in the riparian zone, along with native shrubs and herbaceous plants.</li> </ul>
Ditching and straightening of stream channels leading to lack of bedform diversity and lack of floodplain access, increased velocity during stormflows and lack of large woody debris in channel.	<ul style="list-style-type: none"> <li>Restore natural channel geometry to ditched streams to provide functional uplift</li> </ul>	<ul style="list-style-type: none"> <li>Restore stream dimension, pattern, and profile</li> <li>Construct streams that provide naturally stable dimensions and stabilize constructed banks with appropriate bioengineering methods.</li> <li>Construct streams with proper bankfull to floodplain relationship</li> <li>Construct streams that maintain an appropriate sediment transport balance with the sediment that is supplied by the watershed so that the overall</li> </ul>

On-Site Stressor/Impairment	Goals to Address/Remove Stressor	Objectives
		stream profile neither aggrades nor degrades over time. <ul style="list-style-type: none"> <li>• Create and improve stream bedform diversity by constructing pools of varied depths and riffles of varied slopes</li> <li>• Construct in-stream habitat features from native material to provide a diversity of habitats</li> </ul>
Non-functioning wetland vegetation	<ul style="list-style-type: none"> <li>• Restore native wetland vegetation communities</li> </ul>	<ul style="list-style-type: none"> <li>• Create appropriate wetland topography and plant native hydrophytic woody and herbaceous vegetation that reflects a high-quality riverine swamp forest riparian wetland type and non-riverine swamp forest non-riparian wetland type.</li> </ul>
Ditching and draining of former and existing wetland, leading to degradation of wetland function	<ul style="list-style-type: none"> <li>• Restore wetland hydrology and function</li> </ul>	<ul style="list-style-type: none"> <li>• Re-grade topography to eliminate ditches and drainage features</li> </ul>
Terrestrial Habitat Fragmentation – The area currently lacks a diversity of plant species, topographic habitat, and appropriate woody vegetation cover.	<ul style="list-style-type: none"> <li>• Restore native woody and herbaceous vegetation</li> </ul>	<ul style="list-style-type: none"> <li>• Create appropriate woody and herbaceous vegetation cover to increase the available habitat for wildlife travel (e.g., large mammals, birds).</li> <li>• Create dynamic wetland topography to provide habitat for lower trophic level organisms (e.g., amphibians, small mammals, small reptiles)</li> </ul>

## 7.0 DESIGN APPROACH AND MITIGATION WORK PLAN

The design approach for the Site was developed to meet the goals and objectives of **Section 6.0**, which were developed to maximize the functional uplift described in **Section 4.0**. The design approach for the Site involves the restoration of Tributary 1 and the restoration of riparian and non-riparian wetlands R-1 through R-3 and NR-1. Physical parameters of the Site were used, including reference sites, to determine the target stream type. An analog design approach is used whereby the geometry of stable reference conditions will be scaled and applied to Tributary 1 to establish appropriate pattern and profile. The channel was sized based upon design discharge analysis and evaluated for sediment transport capacity

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and competency. These design approaches have been used on other Coastal Plain stream restoration projects and are appropriate for the goals and objectives for the Site.

## **7.1 REFERENCE STREAM**

Reference streams provide geomorphic patterns of a stable system, which can be used to design stable channels of similar stream type in similar landscape and watershed settings. The Site reference reach was selected due to its similarity to the Site, including drainage area, valley type, physiography, bed material, and morphology. Geomorphological parameters for selected reference reach are detailed in **Appendix C**.

### **7.1.1 Reference Watershed Characterization**

The selected reference stream is an Unnamed Tributary to Bear Pen Islands Swamp (UT to Bear Pen Swamp) located immediately north of NC Highway 211, approximately 9 miles north of Supply, NC and adjacent to Juniper Creek Game land. The assessed reach was approximately 300 LF long, comprised of two meander sequences of the channel. The drainage area of the reference reach is approximately 730 acres (1.14 square miles). The land use of the watershed is characterized as mostly planted loblolly pine plantation (56%) and cultivated row crops (44%). The reference channel is in a forested corridor consisting of a mature canopy of swamp tupelo (*Nyssa biflora*) and bald cypress (*Taxodium distichum*) intermixed with red maple (*Acer rubrum*), Atlantic white cedar (*Chamaecyparis thyoides*) and loblolly pine (*Pinus taeda*). Site photographs of the reference streams are included in **Appendix C**.

### **7.1.2 Reference Reach Morphology**

In comparison to the restoration reaches, UT to Bear Pen Swamp possesses a larger drainage area (drainage area of 1.14 square miles versus 0.32 square miles), thus a scaling factor is used to scale the morphological parameters down to the design reach. The scaling factor is based on the difference in bankfull width of the reference channel and the design channel. The reference reach was approximately 26.7 feet in width with a mean depth of 0.7 feet with a width/depth ratio of 38 ft/ft. The cross-sectional area was approximately 19 square feet. Notable field observations of channel morphology of the reference reach included the following:

- The reference reach bedform included distinctive pools and riffles created through the meandering of the stream and deposition of fine organic debris material. Riffles were comprised primarily of short, shallow areas between pools, rather than longer, shallow features with increased slopes as might be seen in the piedmont or portions of the coastal plain with more relief. A distinctive point bar was present approximately halfway through the reach comprised entirely of deposited organic debris. This feature demonstrated that the small debris, although not composed of the typical sand as seen in other areas of the coastal plain, is functioning as a sediment supply that is shaping and forming an alluvial channel. This same type of material is present in the bed of the design reach, which suggests the natural morphology of the design reach



would also be influenced by the deposition of this material and features such as point bars, pools and riffles would have historically been present prior to manipulation.

- As the channel was observed during a time of “moderate drought”, it was easy to observe and note the distinctive features of the channel shape and morphology. Notably, the channel possessed a shallow arch shape, as opposed to a trapezoidal shape often seen in larger coastal systems. The entire bed of the arch-shaped channel is lined with deposited organic detritus which appears to form and maintain the shallow arch shape. As a similar material is observed to be present in the bed of the design reach, this shape provides a good analog of a channel shape for the restored channel.
- Abundant woody debris in the form of branches, small sticks and roots were present throughout the channel. The streambanks were heavily lined with the roots of adjacent trees and shrubs. Riparian wetlands lie adjacent to both sides of the channel, and it was noted that the low point of these wetlands was below the top of bank elevation of the stream channel.

A summary of the reference reach morphological parameters is shown in **Table 9**. A more detailed summary of geomorphic parameters is included in **Appendix C**.

**Table 9.** Summary of Existing, Proposed, and Reference Morphological Parameters

Parameter	Existing	Reference	Proposed
	Tributary 1*	UT to Bear Pen Swamp	Tributary 1
Valley Width (ft)	773	184	773
Contributing Drainage Area (acres)	204	730	204
Channel/Reach Classification**	N/A	C	N/A
Bankfull Width (ft)	14.3	24.6	14
Bankfull Mean Depth (ft)	0.73	0.6	1.07
Bankfull Area (ft <sup>2</sup> )	10.5	14.9	15
Bankfull Velocity (ft/s)	1.3	0.86	0.95
Bankfull Discharge (cfs)	13	25	13
Water Surface Slope (ft/ft)	0.0008	0.0007	0.00072
Sinuosity	1.0	1.06	1.12
Width/Depth Ratio	19.6	41	13.1
Bank Height Ratio	4.0	1	1
Entrenchment Ratio	1.7	7.3	>2.2

Parameter	Existing	Reference	Proposed
	Tributary 1*	UT to Bear Pen Swamp	Tributary 1
Substrate	Organic detritus and muck soils	Organic detritus and muck soils	Organic detritus and muck soils

\*Tributary 1 was historically ditched with uniform depth of approximately 3 feet deep. The bankfull values listed here are an approximation based on a line of perennial vegetation and scour. The bankfull parameters listed for the existing channel are provided for comparison purposes with proposed and referenced conditions.

\*\*Due to historic nature of the site as a stream-wetland complex, the Rosgen classification system was deemed not applicable to the existing and proposed channel of Tributary 1. Thus, no classification is provided here for this channel.

### 7.1.3 Reference Channel Discharge



**Photo 1.** Looking downstream at reference channel. Note streambed composed entirely of organic detritus and small woody debris with organic and silty soils beneath.

Several hydrologic models/methods, along with indicators of bankfull stage, for the reference site were used to estimate bankfull discharge. Using the surveyed cross-section and longitudinal profile data along with estimates of channel substrate particle size, the existing discharge for UT to Bear Pen Swamp was calculated to be approximately 25 cubic feet per second (cfs) based on resistance equations using site measurements. The value was compared with regional curve values of bankfull discharge from coastal plain regions of Virginia and Maryland (Kristolic et al., 2007), and North Carolina (Doll et al., 2003). These regional curves predicted a wide range of bankfull discharge values for this drainage area, with the NC curve predicting a discharge of 20.1 cfs at the low end versus a maximum prediction of 36.5 cfs from the Virginia/Maryland curve (Kristolic). Thus, the bankfull discharge calculated from site falls within the range of values of the several regional curves. This

wide range of discharges highlights the relative variability and unpredictability of coastal plain discharge, where underlying karst geology, high permeability soils and influence of nearby ditches can

make relationships between drainage area and discharge more variable than found in the Piedmont and mountains.

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## 7.1.4 Reference Reach Channel Stability Assessment

The UT to Bear Pen Swamp reference reach is stable and shows no evidence of incision, erosion, or atypical aggradation in the reach that was surveyed and analyzed. Streambanks were lined and stabilized with the extensive mats of roots of cypress and gum trees, contributing to ratings of “Very Low” on the Bank Erosion Hazard Index (BEHI) rating system. It is evident that the stream is able to frequently access its floodplain and, based on the buttressing of tree trunks, the whole floodplain is mostly likely subject to periods of prolonged inundation. The reach has a stable, meandering pattern and well-developed riparian area that includes mature overstory, understory, and herbaceous vegetation layers.

## 7.1.5 Reference Reach Riparian Vegetation

The reference reach riparian community is most characteristic of a Cypress-Gum Swamp (Blackwater subtype) based on the *Guide to The Natural Communities Of North Carolina Fourth Approximation* which are noted as occurring on “the entire floodplain on many small streams” within the Coastal Plain region (Schafale, 2012). The presence of abundant Atlantic white cedar (*Chamaecyparis thyoides*) seedlings and young trees indicated a possible future trend towards a Peatland Atlantic White Cedar Forest in some patches of the forest. Tree and shrub species identified within the reference reach riparian area are outlined in **Table 10**.

**Table 10.** Reference Reach Riparian Vegetation

Canopy Species	Mid-Story Species	Understory Species
Swamp Gum ( <i>Nyssa biflora</i> ) Bald cypress ( <i>Taxodium distichum</i> ) Red Maple ( <i>Acer rubrum</i> ) Loblolly pine ( <i>Pinus taeda</i> )	Carolina ash ( <i>Fraxinus caroliniana</i> ) Atlantic white cedar ( <i>Chamaecyparis thyoides</i> )	Inkberry ( <i>Ilex glabra</i> ) American holly ( <i>Ilex opaca</i> ) (on mounded areas of floodplain) Swamp bay ( <i>Persea palustris</i> ) Sweet pepperbush ( <i>Clethra alnifolia</i> )

## 7.2 DESIGN PARAMETERS

### 7.2.1 Stream Restoration Approach

The restoration approach to restoring Tributary 1 will be to reconnect the channel to its relict floodplain (Priority 1 restoration). Stream restoration will incorporate the design of stable planform, with parameters based on data taken from reference sites, published empirical relationships, and NC regional curve data. The valley shape and valley width relative to the stream width as well as the valley slopes at the Site indicate that some level of sinuosity was once present in these systems and that these were not just confined, straight channels as would be typical in some natural channels of the Coastal Plain. Relict meanders and low points within the existing valleys indicate where the stream was once flowing across

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its floodplain. By restoring planform, the other variables of dimension and profile will also be restored. All stream channels will be designed with stable dimension based off analysis of sediment transport capacity and competency. Cross section parameters such as area, depth and width were designed based on the design discharge, stable bank slopes, and width to depth ratios similar to reference conditions. A summary of the morphological parameters for the restoration reaches are included in **Table 9**. Proposed plan views are provided in **Figure 11**. LiDAR mapping to support the conceptual plan is included in **Figure 12**. Complete morphological tables for existing, reference, and proposed conditions are included in **Appendix C**.

Tributary 1 will undergo Priority 1 restoration, which includes establishing a new, sinuous channel based on stable reference reach conditions. The channel bed elevation will be raised to reconnect streambanks to the floodplain, and natural bedform with riffle-pool sequence and deep pool habitat will be established to provide diversity of aquatic habitat. A 50-foot riparian buffer will be planted with native woody and herbaceous species. In-channel structures will be installed where necessary to maintain grade and establish bedform.

## **7.2.2 Typical Design Sections**

Typical cross sections for riffles and pools are shown on the design plans sheets in **Appendix H**. The cross-section dimensions were developed for each design reach by using the parameters detailed in **Section 7.2.1**.

## **7.2.3 Meander Pattern**

The design plans showing the proposed channel alignments are included in **Appendix H**. The meander pattern was derived from analysis of relict low points in the valley and reference parameters from the reference reach. The meander pattern was altered in some locations to provide variability and to account for variations in valley pattern, and to make the channel more constructible. The morphological parameters included in **Appendix C** were applied to areas that deviated from the analog reference reach.

Based on analysis of the reference reach, a highly sinuous meander pattern would not be appropriate for the design reach. Analysis of Quality-Level 2 (QL2) LiDAR topography and aerial photographs of the project site, provided in **Figure 13**, show a distinctive low point and meander pattern that were once present on the site. This pattern possesses a relatively long meander length, narrow belt width and meander bends with relatively large radius of curvature to bankfull width ratios, similar to that seen in the reference reach. This suggests that the meander pattern of the system was historically influenced more by localized topography of the Carolina Bay through which the stream flowed than by the erosion and deposition patterns more typical of a low slope, alluvial channel. The proposed alignment approximates the route of this historic alignment while following the apparent low point of the Carolina Bay, incorporating meander pattern features similar to the reference reach.

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It should be noted that the full length of restored stream channel will be approximately 2,500.112 feet. However, in the final 140 feet, the stream channel has been aligned in such a way that it can reach a stable confluence with the receiving tributary. This results in the right bank getting closer than 50' to the proposed easement boundary (which is located along the bank of the receiving tributary) and thus having less than the required 50-foot of buffer width for that length. As a result, the final 140 feet of the stream are assumed to be a “no credit” area and the proposed stream mitigation credits for the site are shown as 2,128 SMUs given that stream credits are based on valley length, and not linear feet of sinuous stream channel, which is discussed further in **Section 11**.

The existing Tributary 1 ditch will be backfilled with excavated materials. Portions of this channel will be filled up to a depth such that “vernal pools will be created with a depth no greater than 14 inches. These vernal pools will provide additional variety of habitat to the proposed riparian wetlands, particularly for obligate wetland trees such as bald cypress and swamp tupelo. As the base level of the restored Tributary 1 will be raised up, it is expected that the surrounding groundwater table will be sufficiently close to the surface in a normal rainfall year to support the hydrology of the vernal pools.

#### **7.2.4 Longitudinal Profiles**

The design profiles are presented in **Appendix H**. These profiles extend throughout the project area for each stream channel realignment. Bed slopes were determined for each restoration reach based on the existing valley slope and the proposed sinuosity of the reach. As was observed in the reference reach, the design channel will be comprised of long pool features at each meander, with short, shallow “riffles” on straighter sections. Between pools, log sill structures will be utilized in the design to control grade and provide habitat diversity and stability. Where Tributary 1 joins with the receiving stream (UT to Sandpit Branch), a series of log sill drops will be used to transition the bed down to the existing streambed.

The channel will be designed as a Priority I restoration, meaning the bankfull elevation will be at the relict floodplain elevation and above-bankfull flows will be allowed to access the floodplain and riparian areas. However, in the final approximately 100 feet of the stream profile, the channel bed will be steepened slightly to a slope of approximately 0.009 ft/ft in order to meet the existing bed of the receiving stream. This final section of the channel is designed with a series of alternating log sills to provide bed stability for the slightly increased velocity and shear stress over this final length.

#### **7.2.5 In-Stream Structures**

Several structures will be incorporated into the channel design to provide additional stability and improve aquatic habitat. Native materials including large woody debris and logs will be used for grade control structures. Woody habitat features will include a series of log sills arranged along riffle. Typical details for proposed in-stream structures are in **Appendix H**.

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## 7.2.6 Wetland Re-establishment Approach

Proposed wetland re-establishment areas are designed to restore a fully functioning wetland system, provide surface water storage, biogeochemical cycling, sediment removal, and create a varied wildlife habitat. As shown in the hydric soil investigation in **Appendix E**, the site is underlain by Grifton soils that exhibit hydric soil indicators in the form of *F3 – Depleted Matrix*. The Site has been impacted by ditching, stream entrenchment, vegetative clearing, plowing, grazing, and other disturbances associated with intensive agricultural management. Wetland re-establishment will focus on the restoration of historic surface water flow through filling of drainage ditches, restoration of historic groundwater tables, and the re-establishment of soil structure and microtopographic variations. These activities will re-establish 19.132 acres of riparian riverine wetlands and 2.830 acres of non-riparian wetlands. Historically, wetlands on the site would have supported obligate species, including bald cypress and swamp tupelo, which require inundation or saturation to the soil surface for much of the growing season. Removal of drainage ditches, restoration of the stream channel to provide floodplain interaction with overbank flows, and re-introduction of roughened topography will restore the hydrology necessary to support the proposed wetland vegetation types. Trees removed from the site will be added to the wetland re-establishment areas for wetland habitat enhancement and to reduce the seed source available to compete with desired planted wetland species.

### ***Riparian vs. Non-Riparian Wetland Re-establishment Approach***

The wetland re-establishment approach between the riparian and non-riparian areas is similar in that the hydrology of both systems have substantial inputs from groundwater and are impacted by several ditches located across the site that reduce the wetness of both the proposed wetland areas. In both wetland areas, these ditches will be plugged and filled to disrupt these impacts and increase the hydroperiod. The difference between the two areas, as discussed previously in this report, is that the non-riparian area is higher in elevation and more remote from the stream, meaning the riparian wetlands will be more influenced by frequent overbank flooding in addition to high water table levels across the Carolina Bay. In contrast, the hydrology of the non-riparian wetland is primarily driven by groundwater interaction, with both local and regional sources of groundwater, as well as inputs from precipitation. A water budget was prepared and demonstrates that the wetland will meet hydrology during wet, normal and dry years for the required hydroperiod. This water budget is described in detail in **Appendix N**. Some key summary points regarding this water budget are described below:

- The non-riparian wetland sits at the northeastern end of the Carolina Bay that comprises the project site and is adjacent to the north “rim” of the bay. Based on review of LiDAR elevation data, the elevation of the non-riparian wetland is about 3 ft lower than the ground above the bay rim to the northeast.
- This topography causes precipitation to pond above the non-riparian wetland, with the bay’s naturally occurring rim acting as a small embankment of approximately 2-3’ in height above the ground elevation in the field to the north. Based on observations of seeps at the base of the bay

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rim, it appears this water infiltrates through the soil from the higher ground to the non-riparian wetland area.

- There is a “break” in the north rim of the bay that allows storm runoff from the drainage area to the north to drain towards the wetland. This was accounted for in the water budget. The excess runoff then flows into the upslope end of the restored non-riparian wetland cell.
- The wetness of the soil in this area is evidenced by the drainage swale that was constructed to drain this area of the bay. Aside from the natural lowering of the water table during times of drought across the bay, the swale is the primary output of hydrology from the non-riparian wetland area.
- Removal of the swale will restore the wetness/hydroperiod and support the re-establishment of a high quality non-riverine swamp forest.
- In addition, by using rough grading on the proposed wetland area, more runoff will be captured. Currently, the field is plowed in a way that promotes drainage to the receiving drainage system to the south (i.e., parallel with the swale and towards the drainage ditch to the south). Removing the existing swale and cross-plowing during construction will only enhance the flow captured from runoff and seeps.

Based on multiple inputs for hydrology, and the proposed modification to the anthropogenic impacts to the proposed restoration, we are confident in the ability to meet the success criteria.

### ***Lateral Effects of Existing Ditches***

A lateral effects model using the Boussinesq equation was used to predict groundwater impacts associated with ditches located to the west of the non-riparian wetland NR-1 and north of riparian wetland R-2, as well as the drainage canal located to the west of riparian wetlands R-2 and R-3 (UT to Sandpit Branch). The Boussinesq equation was applied to Site ditches to predict the linear distance from drainage ditches where groundwater drawdown exceeds 1 foot for 12.5% of the growing season, as suggested by the USACE Wetland Delineation Manual (Environmental Laboratory, 1987). The equation was solved for the following variables: hydraulic conductivity, drainable porosity, estimated depth to an impermeable surface or aquiclude to the wetland surface, time duration of drawdown based upon North Carolina  $T_{25}$  values, distance from the impervious surface or aquiclude to the wetland water table at 12 inches below ground surface, and the minimum ditch depth.

Results from the Boussinesq equation predicted lateral drainage effects to the groundwater table from agricultural ditches and canals associated with Sand Pit Branch after the project is complete. The zone of influence for each drainage feature is included in **Table 11** and calculation forms are located in **Appendix N**. The proposed project wetland areas were designed to be outside of the drainage zone of influence and will not be affected by the drainage features that are outside of the Site easement area. All ditches within the easement area will be plugged and will not cause a groundwater drawdown. In addition, an internal buffer of at least 50 feet is proposed from the conservation easement boundary to the wetland boundary around the perimeter of all proposed wetlands. This will further help to protect the proposed wetlands from future land use changes or management practices that occur outside the protected areas.

**Table 11.** Results of Drainage Ditch Lateral Effects Models.

Drainage Ditch Location	Ditch Depth (ft)	Lateral Ditch Impact (ft)
Ditch 1	3	49
Ditch 2	2	40
Ditch 3	2	37
UT Sandpit Branch	4	55

### ***Hydrologic Trespass and Standing Water Considerations***

Several ditches cross through the proposed wetland restoration areas and will be modified to restore hydrology. For ditches that flow out and away from proposed wetland restoration areas, the ditches will be plugged at the easement boundary and backfilled within the restoration areas. However, two ditches currently flow through the fields proposed for riparian wetlands restoration and into Tributary 1, one from the north (Ditch 1) and one from the south (Ditch 3). Consideration has been given in the design to provide treatment of water quality of these ditches prior to their flowing into Tributary 1 and also to avoid hydrologic trespass in parts of the surrounding property that are upstream of the site. Based on analysis of relict topography as shown on detailed LiDAR mapping (**Figure 13**), the part of the watershed in which Ditch 1 flows once likely delivered stormwater runoff to the Carolina Bay which encompasses the project site via shallow concentrated flow areas and sheet flow. For Ditch 1, this drainage pattern will be restored by plugging the ditch at the easement boundary, leaving a shallow depression outlet at the top of the plug and grading shallow flow paths to disperse the ditch flow through the proposed riparian wetland areas. To avoid hydrologic trespass, Ditch 2, which currently runs from west to east and into Ditch 1, but outside of the easement area, will be regraded to route non-storm ditch flow to the west and into UT to Sandpit Branch. In this way, the historic drainage patterns will be mimicked while allowing treatment of the ditch storm-flow water quality through dispersal in the riparian wetlands. This will not create a concern of removing baseflow contribution to the proposed restored stream (Tributary 1) since these ditches only serve to drain groundwater from surrounding fields and are not a historic conveyance of stream baseflows into Tributary 1. Treatment of Ditch 3 (which flows into the easement from the south) will be different, as elevation differences between the start of the ditch in the proposed easement and the confluence with Tributary 1 allow for the connection to be maintained without risk of hydrologic trespass upstream. Here, a multi-threaded, flat marsh area will be constructed where Ditch 3 enters the conservation easement and planted in the same way as the riparian wetlands. Elevations have been checked to ensure that any backwater created in the marsh will not affect surface water elevations upstream and cause hydrologic trespass. These proposed approaches are shown in detail on **Figure 11** and the design plans in **Appendix H**.



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Overall, standing water is not anticipated to occur in the wetland areas. No depressions greater than 6 inches depth will be graded within the wetland cells, which will reduce areas of ponded water and increase the survivability of planted woody species. As discussed above, grading efforts will be focused primarily on “roughening” the terrain to provide water retention in small shallow areas and disrupt historic plow paths that currently direct surface water towards adjacent ditches.

### **7.2.7 Soil Restoration Approach**

Soil grading will occur during stream restoration activities. Topsoil will be stockpiled during construction and spread on the soil surface once a subgrade has been established. Areas of soil compaction from livestock or other land uses will be deep ripped to break up the soil surface prior to planting. Surface roughening will create microtopography and shallow depressional areas within floodplain, re-establishing more natural conditions and establishing habitat diversity. However, no depressional areas will be created deeper than 6” within the wetland cells. Coarse woody debris from site clearing will be added to wetland areas to provide wildlife habitat, increase surface roughness, and absorb water energy during overbank events.

### **7.3 DESIGN DISCHARGE ANALYSIS**

Multiple methods were used to determine bankfull discharge estimates for design reaches. The use of various methods allows for comparison of results and eliminates reliance on a single model or data source. Peak flows (2) were determined for comparison to design parameters using the following methods:

- Resistance equation using channel measurements derived from bankfull indicators on site
- Virginia and North Carolina Regional Curve for the Coastal Plain

#### ***Existing Channel Bankfull Indicators***

Although the existing channel is an artificially modified stream, indications of a “bankfull” are nonetheless still visible in the channel using accepted indicators such as the line of perennial rooted vegetation and scour. In this case, the bankfull indicators represent the stage at which the channel is inundated with enough frequency that perennial vegetation is not able to grow, and thus provides an estimate of the channel capacity that must be maintained in order to prevent excessive growth of vegetation within the design reach. A similar feature was observed on the reference reach and coincided with the floodplain stage (incipient point of flooding). A cross-section was obtained on the existing channel to estimate discharge at the “bankfull” stage and compare with regional curves. Water surface slope was obtained from site data water surface along the existing channel using a survey-grade GPS unit.

#### ***Regional Curves***

Regional curves for bankfull discharge from the coastal plain regions of Virginia and North Carolina were used as a secondary line of evidence of bankfull discharges for the Site. The regional curve equations for

(1) Virginia discharges by Kristolic et al. (2007), (2) North Carolina discharges by Kristolic et al. (2007), and (3) North Carolina discharges by Doll et al. (2003) are shown below:

$$(1) \quad Q_{\text{bkf}} = 34.413 (DA)^{0.459} \quad (\text{Kristolic et al., 2007})$$

$$(2) \quad Q_{\text{bkf}} = 18.281 (DA)^{0.704} \quad (\text{Kristolic et al., 2007})$$

$$(3) \quad Q_{\text{bkf}} = 16.56 (DA)^{0.72} \quad (\text{Doll et al., 2003})$$

Where  $Q_{\text{bkf}}$  = bankfull discharge (cfs) and DA = drainage area (sq mi).

### **Bankfull Discharge Analysis**

In general, the range of bankfull discharges from available coastal plain regional curves varied widely with a range of 5.0 cfs on the low end to 16.1 cfs on the high end (Virginia). The results of using a steady state calculation using Manning’s equation from surveyed cross-sections and bankfull indicators in the existing channel resulted in a bankfull discharge value of 13.6 cfs. In contrast, the average value of the coastal plain bankfull discharge predictions is 12.5 cfs, which is reasonably close to the on-site estimate. Thus, a bankfull discharge value of 13 cfs was selected for use on the project as it is reasonably close to the bankfull discharge of 13.6 cfs as calculated from site indicators as well as close to the average of regional curve calculations. Results from each discharge estimate are included in **Table 12**.

**Table 12.** Summary of Bankfull Discharge Analysis

Reach	Drainage Area (sq mi)	Calculated from bankfull site indicators (cfs)	VA Regional Curve (1) (cfs)	NC Regional Curve (2) (cfs)	NC Regional Curve (3) (cfs)	Design Q (cfs)
Tributary 1	0.19-0.314	13.6	16.1	5.7	5.0	13

## **7.4 SEDIMENT TRANSPORT ANALYSIS**

Sediment transport analyses were conducted to determine the channel geometry needed to convey the channel’s sediment load over time while neither aggrading nor degrading. An understanding of sediment transport is a critical component of natural channel design.

As discussed in the reference reach section, the sediment supply of the design reach consists of fine to medium sized organic detritus, which appears to be primarily composed of decomposed leaf matter, wood bark and small sticks and woody debris. No deposits of silt, sand or larger particles were observed in the existing channel, indicating a low or nearly absent supply of bedload into the channel. This is further supported by the lack of observed areas of deposition upstream of the Tributary 1, including the following observations:

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- Immediately upstream of Tributary 1 is a culvert that passes under an existing farm road. If there were sediment it would be caught upstream of the culvert, but there is no evidence in the channel of sediment accumulation or accretion in this area.
  - Additionally, the culvert drains into a small pond upstream of Tributary 1 that appears to have been in existence for 50 to 60 years, based on historic aerial photography. If appreciable amounts of sediment were being transported from upstream, it should be dropping out and filling the pond, but there is no evidence of sediment in the pond.

Based on these lines of evidence, this is a sediment-limited system and there is no appreciable sediment moving through. What does move through is organic detritus/silt that will accrete to the streambanks, equivalent to a nepheloid layer. Given this, the detritus appears to function like a washload particle, in which it can be assumed to move on all events and settles out after a period of time after storm events. Thus, the channel is not quite a “sediment starved” system that has no suspended load, but at the same time does not have a sizeable sand or bedload component which it must move. For this reason, the sediment transport analysis is limited to a threshold analysis by comparing the ability of the channel boundary to resist the expected shear stresses produced by the channel. This analysis is further described below. A competence and capacity analysis would not be appropriate for this system.

#### **7.4.1 Threshold Analysis**

Threshold channel analyses were conducted during design for the restoration reach by comparing shear stress associated with the design bankfull discharge, proposed channel dimension and proposed channel slopes with the proposed boundary material of the channel. Since it is anticipated that the channel will have very little to no sediment load (see discussion above) apart from woody detritus, the proposed stability of the channel was evaluated from a “threshold” channel design perspective, wherein the anticipated shear stresses produced by the channel at various flow events were compared with the permissible shear stress of the proposed boundary material of the channel. In this case, the proposed channel will be composed of vegetated banks with coir matting and temporary stabilizing vegetation immediately after construction, followed by woody material in subsequent years that will grow to further stabilize the banks with deep roots.

**Table 13** provides a comparison of proposed bed shear stress for Tributary 1 of existing and allowable shear stresses for the proposed channel lining at both initial post-construction conditions and conditions in subsequent years. As demonstrated in the table, the expected shear stress at the bankfull discharge ( $Q_{bkf}$ ) is 0.02 lb/ft<sup>2</sup>. Because the channel is designed to reconnect to its expansive floodplain, bankfull discharge can be assumed to be the stage at which the highest shear stress occurs in the channel. In addition, proposed riffles will be supplemented with log sills that will provide additional resistance to shear stress above what is reported as the threshold shear stress in **Table 13**. Thus, the design is expected to resist degradation or scour of the channel bed.

**Table 13.** Sediment Competence Analysis Results

Reach	Proposed Bed Shear Stress at $Q_{bkf}$ (lb/ft <sup>2</sup> )	Allowable Shear Stress of Channel Lining <sup>1</sup>		
		Sand to Alluvial Silt (lb/ft <sup>2</sup> )	Short and Long Native Grasses(lb/ft <sup>2</sup> )	Hardwood Tree Plantings (lb/ft <sup>2</sup> )
Tributary 1	0.02	0.02 - 0.075	0.7-1.7	0.41-2.5

<sup>1</sup> Fischenich, 2001

#### 7.4.2 Sediment Capacity Analysis

As discussed above, given that the channel sediment load is expected to be minimal in nature and comprised mostly of “washload” detritus particles, the channel is expected to be a “supply-limited” system with low sediment load. Thus, the channel can be assumed to have the capacity to move its sediment load at the design discharge. The defining criteria for the channel dimension, therefore, is that it must accommodate the design discharge and resist the shear stress on the boundary of the channel (i.e., threshold channel design). For this reason, a sediment capacity analysis was not conducted for this project.

### 7.5 VEGETATION AND PLANTING PLAN

The restoration of the plant communities is an important aspect of the restoration of the Site. Reference vegetation from the Unnamed Tributary to Bear Pen Swamp, on-site observations, and community descriptions from the Guide to the Natural Communities of North Carolina (Schafale, 2012) were used to develop the primary plant community associations that will be promoted during site activities. The selection of plant species is based upon use of native species typically associated with a Coastal Plain Small Stream Swamp (for riparian wetland areas) and Nonriverine Swamp Forest (for non-riparian wetland areas). The species in these communities match the range of species observed in the reference community, which had diagnostic features similar to both Coastal Plain Small Stream Swamp, Cypress-Gum Swamp (Blackwater Subtype) communities and small patches of Atlantic White Cedar Peatland, depending on the location within the topography of the reference site. The Coastal Plain Small Stream Swamp is very similar to the Cypress-Gum Swamp (Blackwater Subtype) but is drier and thus has more flood-intolerant species. Unlike the reference site, the riparian areas are expected to be somewhat drier than the Cypress-Gum Swamp and thus species were selected more representative of a Coastal Plain Small Stream Swamp. Atlantic white cedar historically occurred within Carolina bays and along Coastal Plain stream drainages and once covered over 200,000 acres of eastern North Carolina. The species has been in decline since the early 1900s, when it was extensively logged and much of its range was drained and cleared for agricultural production, resulting in less than 10,000 acres of cedar stands remaining in North Carolina. The North Carolina Forest Service has advocated for Atlantic white cedar conservation and restoration within its natural range. Evaluation of the site by silvicultural experts suggest that the area matches the ecological characteristics historically required for Atlantic white cedar colonization. The target Coastal Plain Small Stream Swamp community will be used for the planting areas within the Site,

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with inclusions of species typical of Atlantic white cedar stands where appropriate, as shown in **Appendix H**. The native species selected for establishment at the Site will be early successional species that represent a range of growth rates and varying tolerances to shade and moisture. This range of characteristics was selected to ensure that the appropriate vegetation cover develops throughout the Site. Stream banks will be planted with live stakes and the channel toe will be planted with multiple herbaceous species. Permanent herbaceous seed will be spread on the streambanks, floodplain, and disturbed areas within the Site easement. **Table 15** depicts the total number of stems and species distribution within each vegetation association. Planting will be conducted between November 15 and March 15 per IRT monitoring guidance.

### **7.5.1 Invasive Species Management**

Invasive species within the easement area will be treated at the time of construction. The extent of invasive species coverage will be monitored, mapped, and controlled as necessary throughout the required monitoring period. Invasive management will require different and multiple treatment methods depending upon phenology and location of the species. An invasive species vegetation treatment plan for the Site is included in **Appendix I**.

## **7.6 RISKS AND UNCERTAINTIES**

Overall, this project has some risk due to landscape position, soil conditions, and the location of the non-riparian wetland within the watershed of Sand Pit Branch, which has been addressed in **Section 7.2.6**. Given the location of the project, few issues should arise affecting potential project success and meeting ecological performance standards. Adjacent parcels consist of agricultural row crops which could contribute runoff and sediments into the protected easement as well as incidental impacts to vegetation from machinery. Additional drainage ditches could be excavated adjacent to the site boundary to facilitate the production of inundation sensitive crops. To address these risks, a 50-foot buffer has been proposed to protect the easement and wetland areas from lateral drainage effects. Adjacent seed source trees (i.e., pine and sweetgum) may be cut and/or girdled to reduce the effects of competition on the site. The risks and uncertainties associated with the project and actions to address these concerns are presented below. Action steps to address. Actions to address issues may be included in an Adaptive Management Plan, if necessary. Adaptive management is discussed in **Section 10**.

1. **Easement Encroachment:** The isolated nature of the site will minimize this risk. Easement boundaries will be clearly marked to prevent encroachment, and the easement will be fenced to prevent cattle access. The landowner has been made aware of the importance of encroachment prevention and accountability. Any encroachments that occur will be remedied to address any damage and provide any corrections required by the IRT.
2. **Invasive/Nuisance Species:** Herbaceous and woody competition control from surrounding loblolly pine and sweetgum trees is the biggest concern for the site. Herbaceous competition will be managed during the first two years by mechanical mowing and chemical herbicides. All herbicide

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application will be performed by a certified application in accordance with NC Department of Agriculture rules and regulations. Loblolly pine and sweetgum trees will be removed from the project area, and any trees directly adjacent to the site may be removed and/or girdled. Should woody competition emerge as an issue affecting the proposed planting community, mechanical and chemical measures will be implemented during the remaining monitoring period where problem areas are identified.

3. Beaver Impacts: Beavers are a potential threat to any mitigation project, particularly in locations with low slopes such as UT-1. Beaver activity has been noted downstream of the site, and if beaver activity is observed at the Site, a general adaptive management plan would be to trap the beaver and have it removed from the site. Any beaver dams would also be removed. If damage occurred to any mitigation components, a more detailed plan of action would be developed.
4. Droughts and Floods: Extreme climate conditions may occur during the monitoring period, including long-term inundation due to landscape position and soil characteristics. Site vegetation includes obligate woody species that are adapted to periods of long-term inundation. Supplemental planting or replanting will be conducted if necessary. Additional actions may include removal of downstream obstructions (e.g., beaver dams, soil deposition) within the project easement. Other remedial actions may include removing any downgradient obstructions such as beaver dams or debris jams.
5. Hydrologic Trespass/Encroachment: Potential hydrologic trespass on adjoining landowners or excavation of drainage ditches along site easement boundaries. The project is designed with a Priority 1 restoration approach, and all adjacent wetland cells will be graded to move water toward Tributary 1. A no-rise evaluation was also conducted to ensure that hydrologic trespass is an unlikely event and is not expected to be an issue. A natural land barrier exists to the north of the easement surrounding the proposed Non-Riparian wetland in the form of the lip of a Carolina Bay. This natural berm is three to four feet higher than the wetland elevation, therefore concerns of hydrologic trespass to the north are mitigated. A minimum 50-foot buffer will be maintained around all wetland areas within the site to address potential lateral effects from off-site ditch excavation. The landowner has been made aware of the importance of hydrologic encroachment and accountability. Any drainage encroachments that occur will be remedied to address any damage and provide corrections required by the IRT.
6. Off-site Pond Outflows: One pond, located at the upstream end of Tributary 1, drains into the proposed restored reach. This pond does not have a dam but is a widened and deepened area of the stream that then narrows into the existing Tributary 1 channel. As such there is no threat of a pond dam breach and this feature poses minimal risk to the project.
7. Watershed Changes: The isolated nature of the site will minimize this risk. The project is designed with a Priority 1 restoration approach, and all adjacent wetland cells will be graded to move water

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toward Tributary 1, which is not dependent upon off-site ditches to provide base flow. Changes to the ditch network outside of the easement area may result in a decrease in drainage flows into the site or an increase in sediment entering the site. A marsh treatment area is proposed to capture drainage effluent from offsite drainage ditches. Maintenance of the marsh treatment area is not expected to occur over an extended period of time; however, short term maintenance may be required to address excessive sediment entering the site from discrete, short-term changes within the watershed until stabilization of the adjacent landscape occurs.

Remedial actions will be designed to achieve the success criteria specified in the Plan and will include the identification of the causes of failure, remedial design approach, work schedule, and monitoring criteria that will consider physical and climatic conditions.

**Table 14.** Site Woody Species Planting Plan with Species Type and Distribution

Vegetation Association			Coastal Plain Small Stream Swamp Forest*		Nonriverine Swamp Forest, Mixed Subtype*		Streamside (Zone 1)**		Total
Area (acres)			28.08		4.71		1.03		33.82
Scientific Name	Common Name	Wetland Indicator Status	# Planted	% of Total	# Planted	% of Total	# Planted	% of Total	# Planted
<i>Cephalanthus occidentalis</i>	Buttonbush	OBL	--	--	--	--	1100	20%	1,100
<i>Chamaecyparis thyoides</i>	Atlantic white cedar	OBL	2,491	15%	502	18%	--	--	2,993
<i>Clethra alnifolia</i>	Sweet pepperbush	FACW	1,329	8%	--	--	--	--	1,329
<i>Cornus amomum</i>	Silky dogwood	OBL	--	--	--	--	1100	20%	1,100
<i>Cyrilla racemiflora</i>	Swamp titi	FACW	830	5%	223	8%	--	--	1,053
<i>Ilex coriacea</i>	Large gallberry	FACW	1,329	8%	--	--	--	--	1,329
<i>Ilex opaca</i>	American holly	FAC	664	4%	--	--	--	--	664
<i>Lyonia lucida</i>	Fetterbush	FACW	--	--	139	5%	--	--	139
<i>Magnolia virginiana</i>	Sweet bay	FACW	--	--	167	6%	--	--	167
<i>Nyssa biflora</i>	Swamp tupelo	OBL	2,491	15%	502	18%	--	--	2,993
<i>Persea borbonia</i>	Red bay	FACW	830	5%	139	5%	--	--	969
<i>Physocarpus opulifolius</i>	Ninebark	FACW	--	--	--	--	1100	20%	1,100
<i>Quercus laurifolia</i>	Laurel oak	FACW	1,661	10%	279	10%	--	--	1,940
<i>Quercus nigra</i>	Water oak	FAC	1,661	10%	279	10%	--	--	1,940
<i>Salix caroliniana</i>	Carolina willow	OBL	--	--	--	--	1100	20%	1,100
<i>Sambucus nigra</i>	Elderberry	FACW	--	--	139	5%	1100	20%	1,239
<i>Taxodium distichum</i>	Baldcypress	OBL	2,491	15%	418	15%	--	--	2,909
<i>Vaccinium corymbosum</i>	Highbush blueberry	FACW	830	5%	--	--	--	--	830
<b>Total</b>			<b>16,607</b>	<b>100%</b>	<b>2,787</b>	<b>100%</b>	<b>5,500</b>	<b>100%</b>	<b>24,894</b>

\*Planted at a density of 538 stems/acre    \*\* Planted at a density of 4,840 stems/acre



## 8.0 PERFORMANCE STANDARDS

The stream and wetland performance standards will conform to the performance criteria outlined US Army Corps of Engineers – Wilmington District Public Notice: Notification of Issuance of Guidance for Compensatory Stream and Wetland Mitigation Conducted for Wilmington District (October 24, 2016). The restoration and re-establishment components are assigned specific performance standards for geomorphology, hydrology, and vegetation. Performance criteria are proposed to be evaluated throughout the seven-year monitoring period. **Table 15** provides a list of the performance standards associated with each project objective along with the associated monitoring approach. Annual monitoring and quarterly site visits will be conducted to assess the condition of the finished project and to confirm that monitoring equipment is functioning and no maintenance issues that require immediate attention are encountered (encroachment, beaver, etc.). Performance standards will be evaluated throughout the seven years post construction monitoring. Monitoring information can be found in **Section 9.0**.

**Table 15.** Site Performance Standards

Objective	Performance Standard	Monitoring Approach
Establishment of minimum 50 ft buffer along channel	Record conservation easement prior to implementation.	Visual monitoring of easement boundary for all forms of encroachment.
Plant native overstory tree species and understory species in the riparian zone	Minimum of 320 stems/ac present at MY-3. Minimum of 260 stems/ac present at MY-5. Minimum of 210 stems/ac present at MY-7. Planted trees reach an average height of 7-ft by Year 5 and 10-ft by Year 7.	Vegetation plots
Restore stream dimension, pattern, and profile	Riffle section W/D ratios should remain within the range of the appropriate stream type. BHR should not exceed 1.2. BHR should not change more than 10% in any given monitoring interval. Changes that do occur should indicate a trend toward stability.	Survey of 8 cross sections and visual assessment.
Construct streams that provide naturally stable dimensions and stabilize constructed banks with appropriate bioengineering methods.	Channel banks should generally remain stable. Where bank migration does occur, it should not exceed 20% of the bankfull width for the duration of monitoring.	Visual assessment and surveys.

Objective	Performance Standard	Monitoring Approach
Construct streams with proper bankfull to floodplain relationship.	Four bankfull events or greater, in separate years, will be documented during the monitoring period.	Continuous stage recorders and debris lines.
Construct streams that maintain an appropriate sediment transport balance with the sediment that is supplied by the watershed so that the overall stream profile neither aggrades nor degrades over time.	Profile adjustments should not indicate significant aggradation or degradation.  BHR requirements as stated above.	Resurvey of longitudinal profile if visual assessment indicates potential instability.
Create and improve stream bedform diversity by constructing pools of varied depths and riffles of varied slopes.	Profile should maintain a diversity of depths expressed in riffle/pool forms.	Visual assessment
Construct streams that display physical characteristics concurrent with USACE guidance in determination of Ordinary High Water Mark (OHWM).	Over the course of natural flow, the channel forms indicators of OHWM typical of a stable, functioning stream system.  Physical characteristics of OHWM, as defined in USACE Regulatory Letter 05-05 (December 7, 2005) 3b include but are not limited to bank shelving, changes in soil characteristics, matted or absent vegetation, deposition, sediment sorting, bed and banks, disturbed or washed away leaf litter, or change in plant community.	Visual assessment
Construct in-stream habitat features from native material to provide a diversity of habitats.	In-stream habitat structures should remain intact and functional.	Visual assessment
Create appropriate wetland topography and plant native hydrophytic woody and herbaceous vegetation that reflects a high-quality riverine swamp forest riparian wetland type and non-riverine swamp forest non-riparian wetland type.	Minimum of 320 stems/ac present at MY-3.  Minimum of 260 stems/ac present at MY-5.  Minimum of 210 stems/ac present at MY-7.  Planted trees reach an average height of 7-ft by Year 5 and 10-ft by Year 7.	Vegetation plots
Prevent cattle from access to the streams and riparian areas by installing exclusion fencing	Exclusion fencing should remain intact and effective at preventing livestock access	Visual assessment

Objective	Performance Standard	Monitoring Approach
Re-grade topography to eliminate ditches and drainage features to restore wetland hydrology and function	Groundwater elevation within 12 inches of the ground surface for at least 12% (30 days) of the growing season. Per the WETS tables for date range 1981 to 2010 (Whiteville 7 NW, NC WETS Station), the start and end dates of the growing season are March 12 to November 17 (250 days).	Groundwater monitoring gauges
Create appropriate woody and herbaceous vegetation cover to increase the available habitat for wildlife travel (e.g., large mammals, birds) and create dynamic wetland topography to provide habitat for lower trophic level organisms (e.g., amphibians, small mammals, small reptiles).	Minimum of 320 stems/ac present at MY-3. Minimum of 260 stems/ac present at MY-5. Minimum of 210 stems/ac present at MY-7. Planted trees reach an average height of 7-ft by Year 5 and 10-ft by Year 7.	Vegetation plots

## 9.0 MONITORING PLAN

The Site monitoring plan has been developed to ensure that the required performance standards are met, and project goals and objectives are achieved. Annual monitoring data will be reported using the DMS Annual Monitoring Reporting Template (June 2017). The monitoring report shall provide project data chronology that will facilitate an understanding of project status and trends, ease population of DMS databases for analysis and research purposes and assist in close-out decision making.

Using the DMS As-Built Baseline Monitoring Report Template (June 2017), a baseline monitoring document, redline construction drawings, any deviations in plant species and/quantities, soil profiles from groundwater gage locations, and as-built record drawings of the project will be developed within 60 days of the planting completion and monitoring installation on the restored site. Monitoring reports will be prepared in the fall of each monitoring year and submitted to DMS by December 1. These reports will be based on the DMS Annual Monitoring Template (June 2017) and Closeout Report Template version 2.2 (January 2016). Closeout monitoring period will be seven years beyond completion of construction or until performance standards have been met.

Vegetation monitoring quadrants will be installed across the Site to measure the survival of the planted trees. The number of monitoring quadrants required, and frequency of monitoring will be based on the DMS monitoring guidance documents. The IRT 2016 guidance document requires that planted stems reach an average of 7' by Year 5 and 10' in height by Year 7 of monitoring. As the majority of woody stems proposed in this plan are shrubs, only the planted overstory tree species will be considered in evaluating whether this requirement has been met. Vegetation monitoring will occur in the fall and will follow the CVS-EEP Protocol for Recording Vegetation (2008) or another DMS approved protocol.

Groundwater monitoring gauges will be established throughout the wetland re-establishment areas. Generally, the gauges will be installed at appropriate locations so that the data collected will provide an indication of groundwater levels throughout the wetland project area.

While monitoring reports will be completed annually, not all monitoring reports will include the same information. All monitoring reports will include at least a brief narrative of site developments, a representative photo log, and a Current Condition Plan View (CCPV). Further monitoring measurements are detailed in the following sections.

**Table 16** details site monitoring components. Locations of vegetation plots, groundwater gauges, and pressure transducer/continuous stream stage recorders are included in **Figure 14** and the monitoring schedule can be found in **Table 17**.

**Table 16.** Site Monitoring Components

Parameter	Method	Quantity	Frequency	Corresponding Notes
Dimension	Riffle Cross Sections	4	Year 1, 2, 3, 5 and 7	1
	Pool Cross Sections	4		
Pattern	Pattern	All restored channels	Year 0	2
Profile	Longitudinal Profile	All restored channels	Year 0	
Surface Water Hydrology	Crest Gage (Continuous stage recorder) to document bankfull event	1 continuous stage recorder on Tributary 1	Stage recorded in 10-15 min intervals; data downloaded on each site visit	3
Groundwater Hydrology	Groundwater Gauges	12 gauges (8 in riparian wetland, 4 in non-riparian wetland)	Semi-Annual	
Vegetation	Vegetation Plots	28 plots (16 Fixed/12 Random)	Year 1, 2, 3, 5 and 7	4
Invasive and Noxious Vegetation	Visual		Annual	5
Site Boundary	Visual		Annual	6
Reference Photos	Photographs		Annual	

Notes:

1. Cross-sections will be permanently marked with rebar to establish location. Surveys will include points measured at all breaks in slope, including top of bank, bankfull, edge of water, and thalweg.

2. Pattern and profile will be assessed visually during semi-annual site visits. Longitudinal profile will be collected during as-built baseline monitoring survey only unless observations indicate lack of stability and profile survey is warranted in additional years.
3. Data from pressure transducers and continuous stage recorders will be collected in 10-15 min intervals and will be collected at each site visit. Groundwater gauges will be inspected semi-annually and will be set to record every 4 hours.
4. Both mobile and permanent vegetation plots will be utilized to evaluate the vegetation performance for the open areas planted. 2% of the open planted acreage will be monitored with permanent plots and mobile plots. Permanent vegetation monitoring plot assessments will follow CVS Level 2 protocols. Mobile vegetation monitoring plot assessments will be established if poor vegetation growth is documented during monitoring. Mobile vegetation monitoring plots will document number of planted stems and species using a circular or 100 m<sup>2</sup> square/rectangular plot. Planted shaded areas will be visually assessed.
5. Locations of exotic and nuisance vegetation will be mapped.
6. Locations of vegetation damage, boundary encroachments, etc. will be mapped.

**Table 17.** Monitoring Schedule

Resource	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7
Streams	X	X	X		X		X
Wetlands	X	X	X	X	X	X	X
Vegetation	X	X	X		X		X
Visual Assessment	X	X	X	X	X	X	X
Report Submittal	X	X	X	X	X	X	X

## 10.0 ADAPTIVE MANAGEMENT PLAN

Adaptive management at the Site will include the Adaptive Management Remedial Action Plan (AMRAP), which provides detailed steps to address how potential problems identified during project development are resolved to ensure project success through the achievement of ecological performance standards. If the Site fails to achieve the defined performance standards, an AMRAP will be developed in coordination with NC DMS and the IRT. Remedial action required will be designed to achieve the success criteria previously specified and will include the identification and causes of the failure, actions to remedy the failure, schedule to implement the actions, and monitoring criteria. Most minor issues will be identified during annual post-construction monitoring and site inspections. Minor issues are considered issues that require small scale corrective actions, such as supplemental planting and management of invasive species.

Anticipated project maintenance at the Site includes herbaceous vegetation control and addressing any areas that do not meet native woody species density due to seedling mortality during the first two years

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of establishment. Maintenance of groundwater gauges and pressure transducers/continuous stage recorders is anticipated during the post-construction monitoring period. The easement boundary will be marked by cattle fencing and signage and will be monitored until project closeout. Identification of problems with project infrastructure during post-construction monitoring and site inspections will help address minor issues and help to prevent gaps in monitoring data.

Major issues discovered requiring large scale corrective measures include, but are not limited to, re-grading of the Site, repair, or reinstallation of stream structures, replanting more than 20% of the site to improve species composition or diversity, or the addition of additional stabilization structures. The AMRAP will follow Section 332.8(o)(9) of the 2008 Mitigation Rule.

Should issues arise during site monitoring and inspections that may affect project success and performance standards, NC DMS and the IRT will be notified of the need for an AMRAP. Once the plan has been prepared, the following actions will occur:

- USACE will be notified as required by NWP 27 general conditions
- NCDWR will be notified of Section 401 conditions, as necessary
- Performance standards, maintenance requirements, and monitoring requirements will be modified as required by USACE
- Obtain any additional required permits
- Submit the AMRAP for IRT review and approval
- Implement the AMRAP
- Provide NC DMS/IRT an as-built of remedial actions

## **11.0 DETERMINATION OF CREDITS**

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The determination of credits was determined by on-site investigations of the Site, including soils, topography, stream characteristics, and existing and proposed hydrologic conditions. As reflected in **Table 2**, stream restoration is proposed at a ratio of 1:1, and wetland reestablishment for riparian and non-riparian wetlands is proposed at a ratio of 1:1. The number of stream restoration credits will be based on the straight-line valley length of the restored channel. After extensive review and discussion of the geomorphology of the site with the IRT, this crediting approach was determined to be the most appropriate basis of crediting for a stream-wetland complex of this type rather than using the full length of stream based on proposed sinuosity. It should be noted that the crediting point of the stream will end approximately 140 feet upstream of the restored channel's confluence with UT Sandpit Branch, as one

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side of the easement limits the ability to achieve a 50-foot buffer from proposed top of bank. The credit release schedule is included in **Appendix L**.

## **12.0 LONG TERM MANAGEMENT PLAN**

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The site will be transferred to the NCDEQ Stewardship Program (or 3rd party if approved for long term management). This party shall serve as conservation easement holder and long-term steward for the property and will conduct periodic inspection of the site to ensure that restrictions required in the conservation easement are upheld. Funding will be supplied by the responsible party on a yearly basis until such time an endowment is established. The NCDEQ Stewardship Program is developing an endowment system within the non-reverting, interest-bearing Conservation Lands Conservation Fund Account. The use of funds from the Endowment Account will be governed by North Carolina General Statute GS 113A-232(d)(3). Interest gained by the endowment fund may be used for the purpose of stewardship, monitoring, stewardship administration, and land transaction costs, if applicable. The Stewardship Program will periodically install signage as needed to identify warranted boundary markings. Any livestock or associated fencing or permanent crossings will be the responsibility of the owner of the underlying fee to maintain.

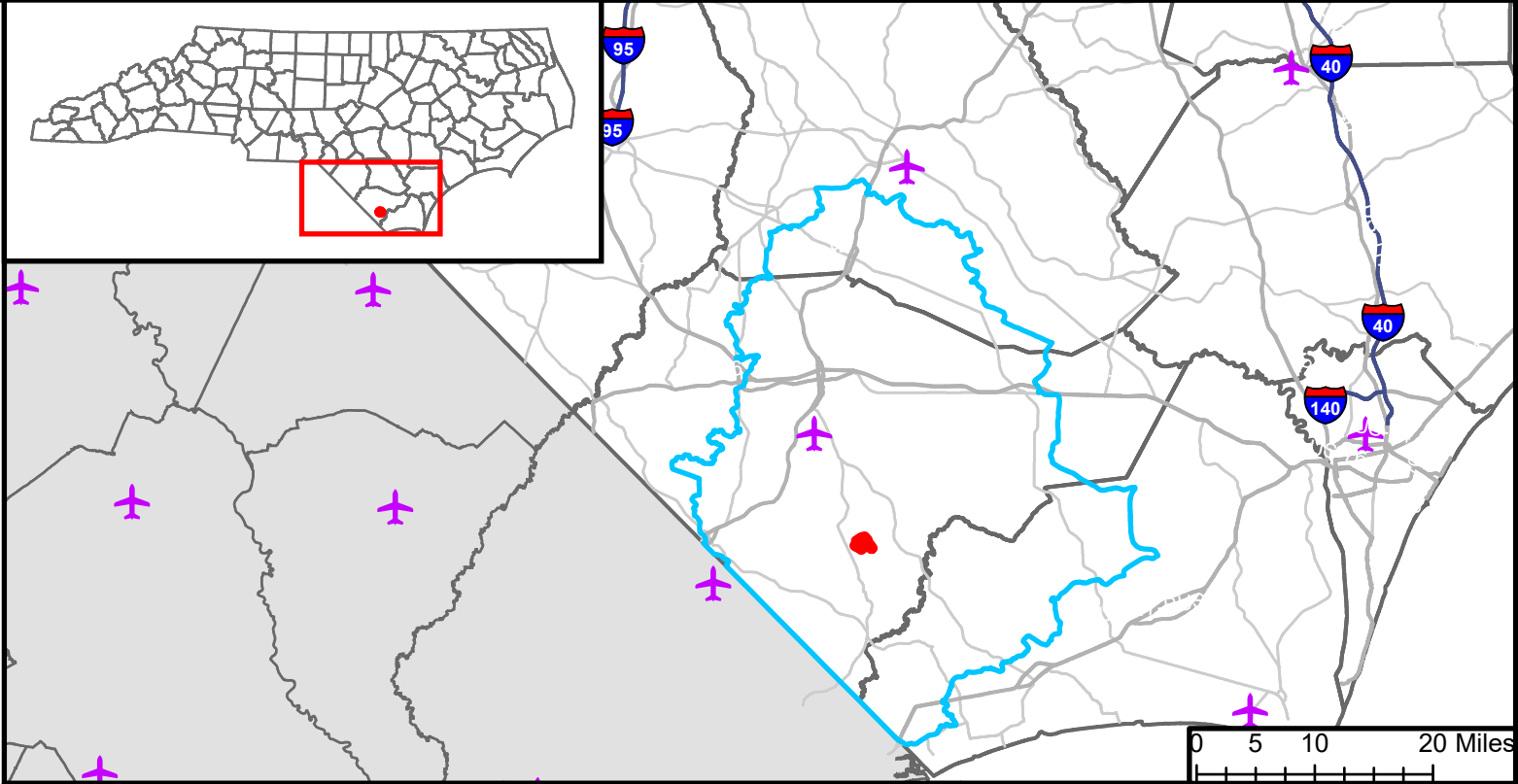
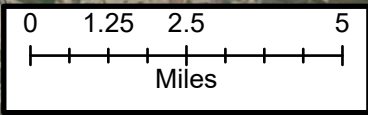
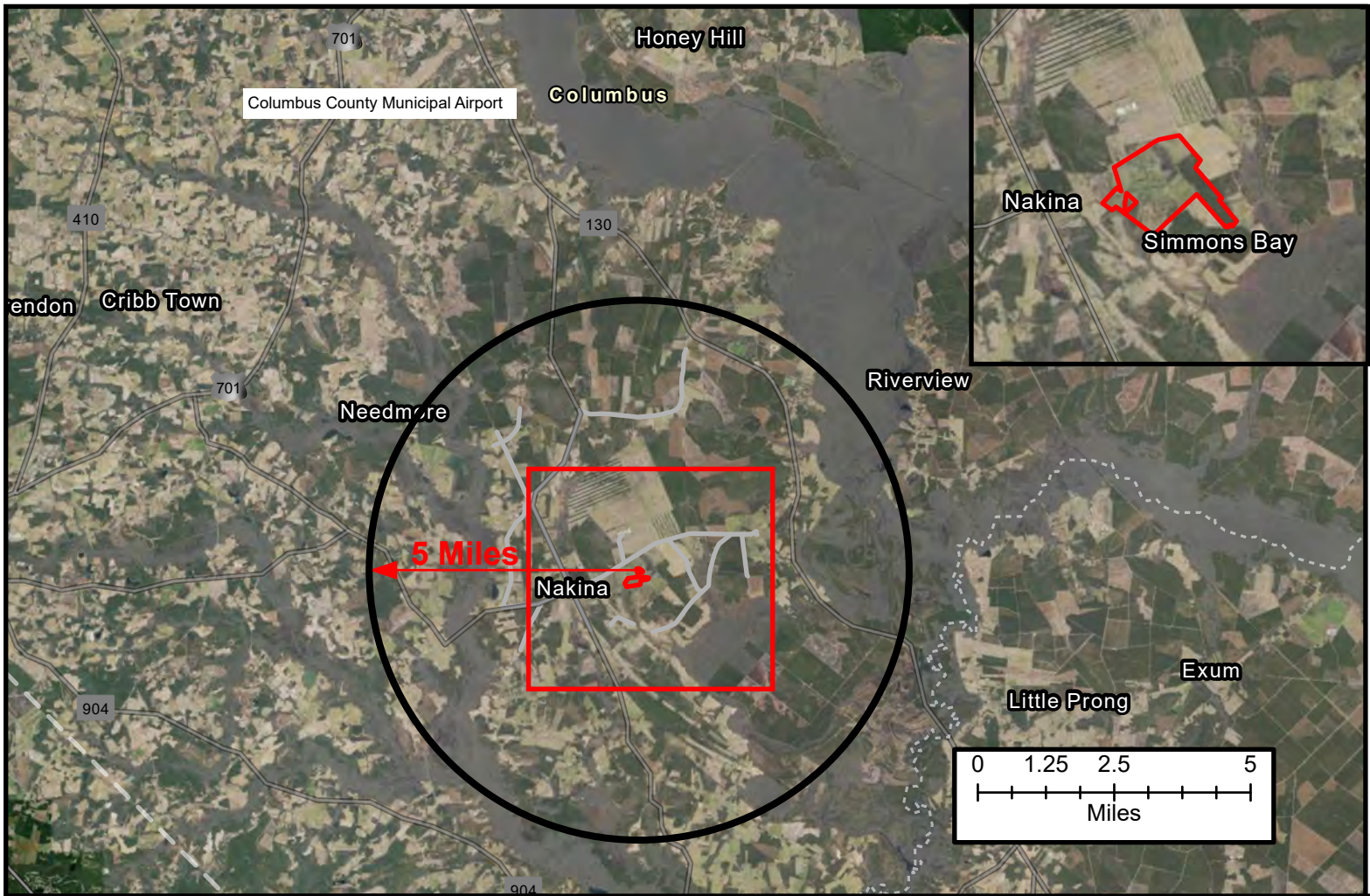
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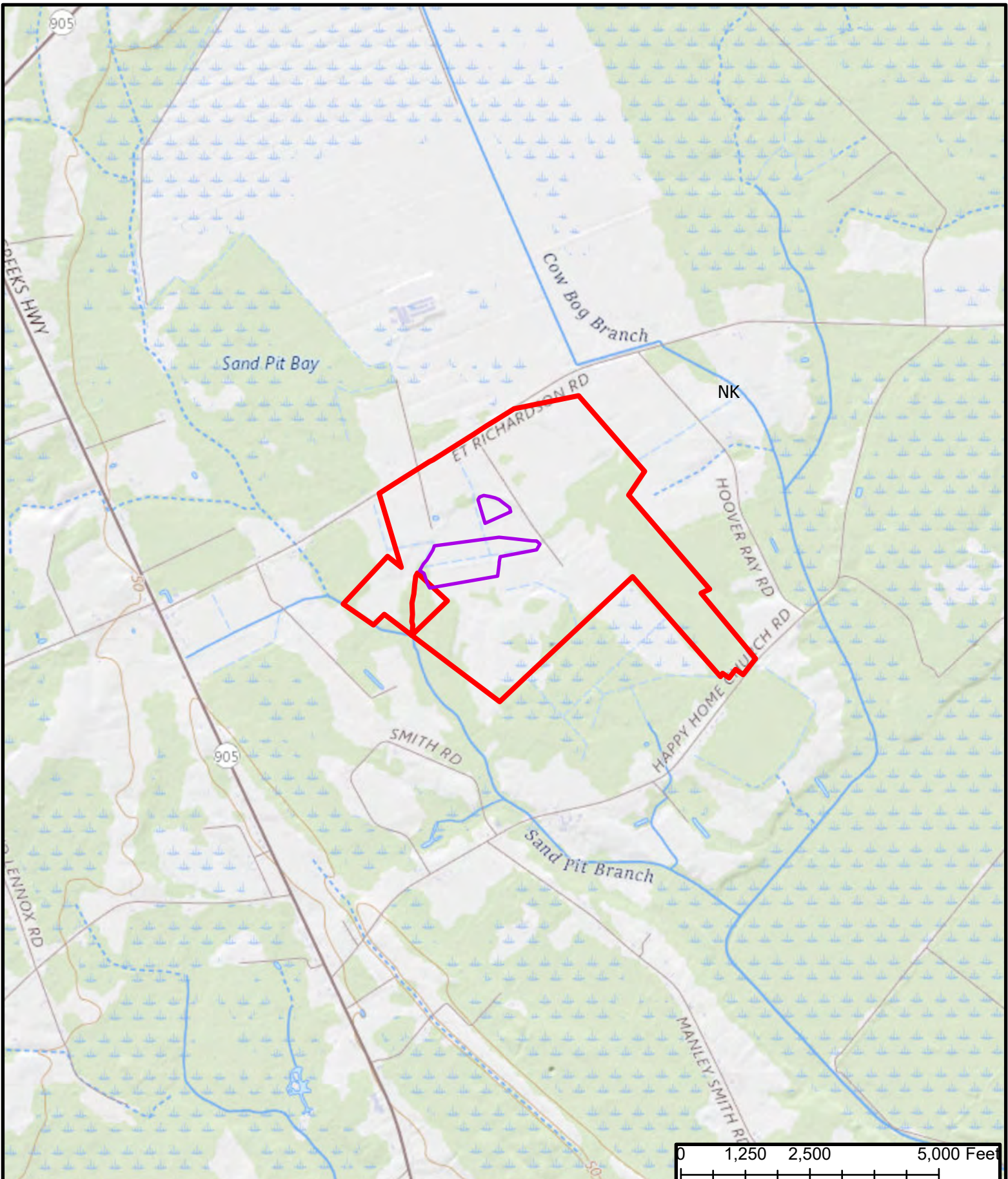
**Legend**



- Interstate
- Roads
- Airports
- North Carolina Counties
- South Carolina Counties
- USA Major Highways
- Project Parent Parcel
- Lumber River Basin HUC 03040206

  
**FREESE AND NICHOLS**  
 531 N Liberty St  
 Winston-Salem, NC 27101

**Figure 1**  
**Cow Branch**  
**Stream and Wetland Mitigation Site**  
**Vicinity Map**  
**NCDMS Project #: 100196**



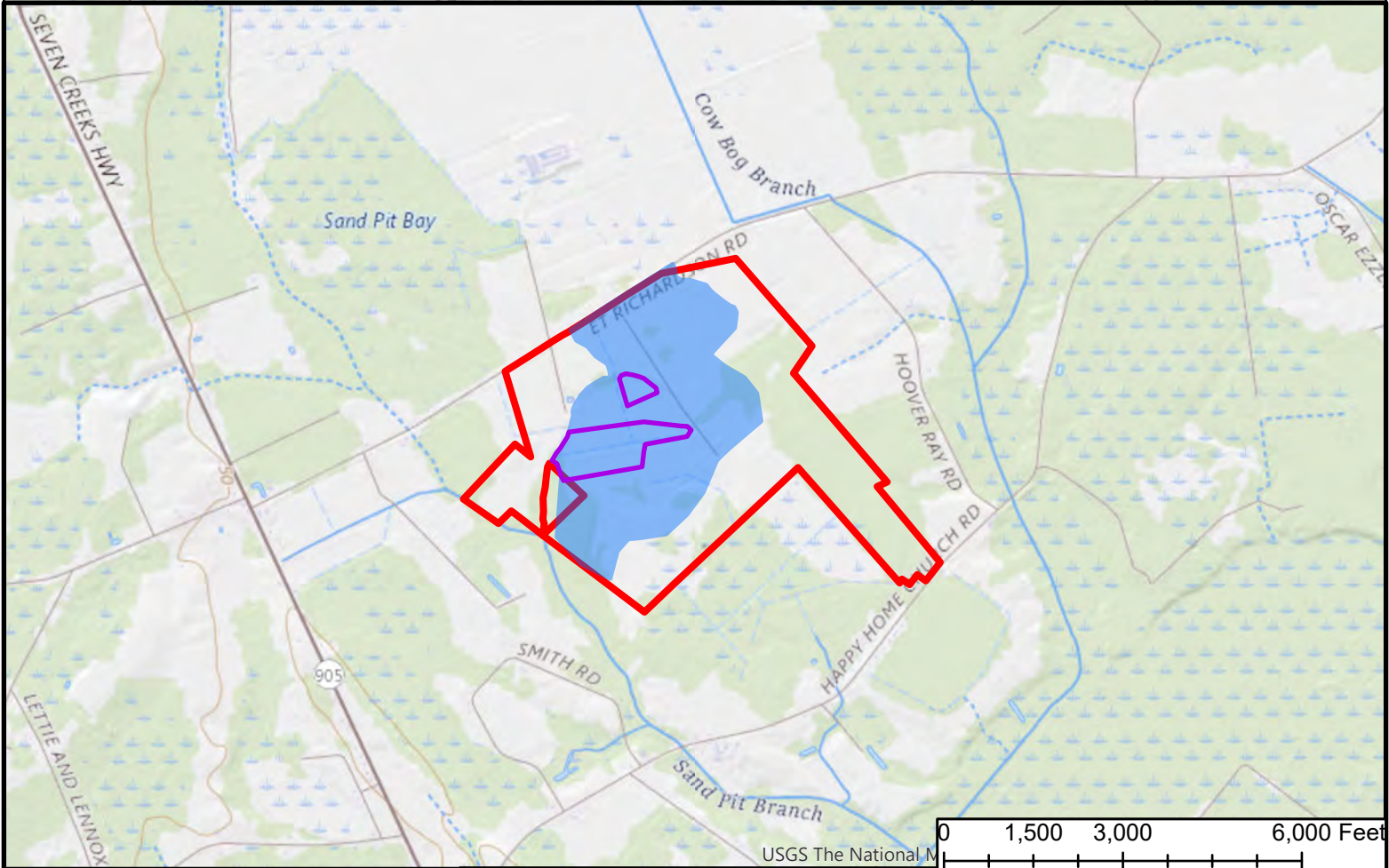
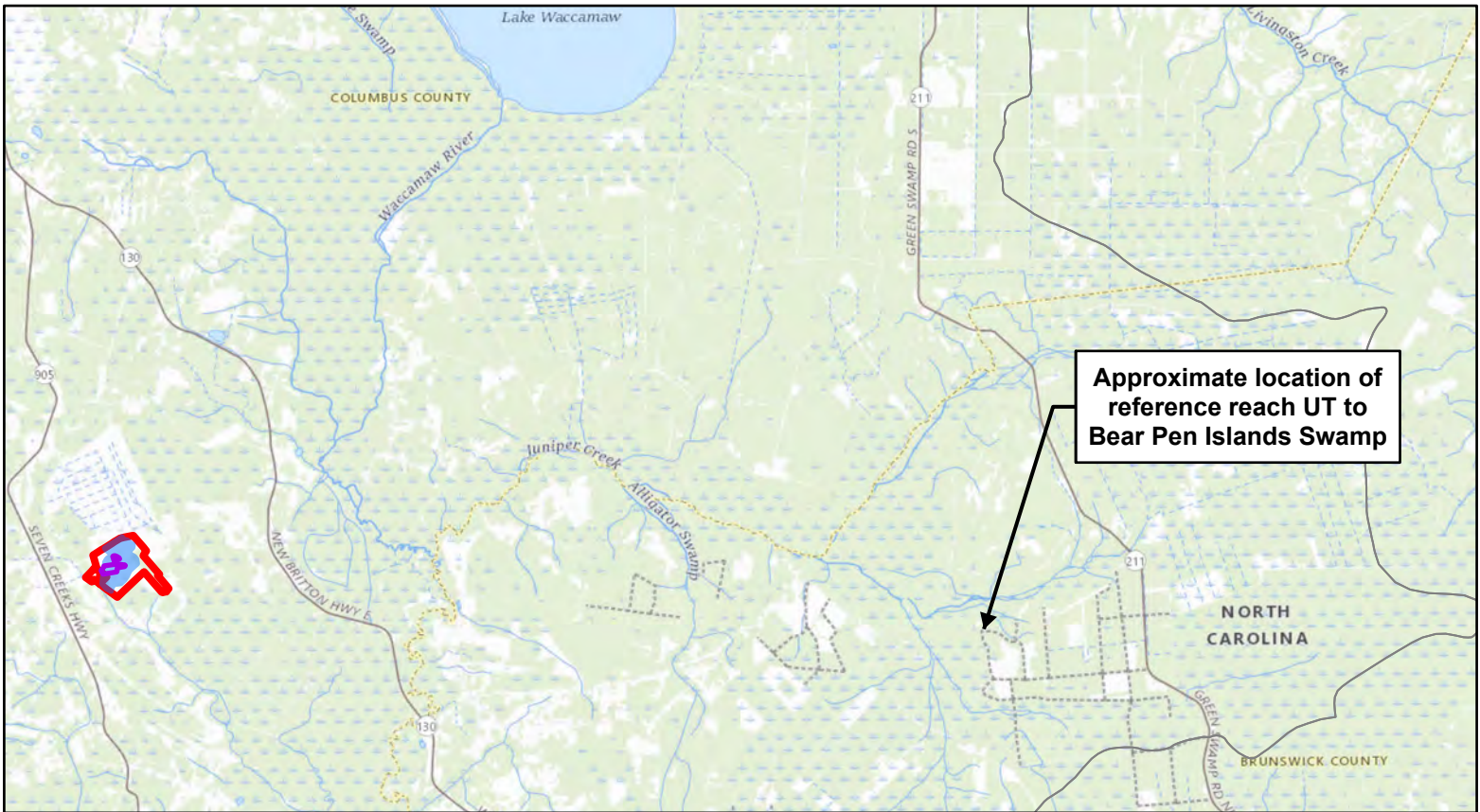


- Legend**
-  Project Parent Parcel
  -  Easement Boundary

**FREESE AND NICHOLS**  
 531 N Liberty St  
 Winston-Salem, NC 27101



**Figure 2**  
**Cow Branch**  
 Stream and Wetland Mitigation Site  
 USGS Topographic Map  
 NCDMS Project #: 100196



**Legend**

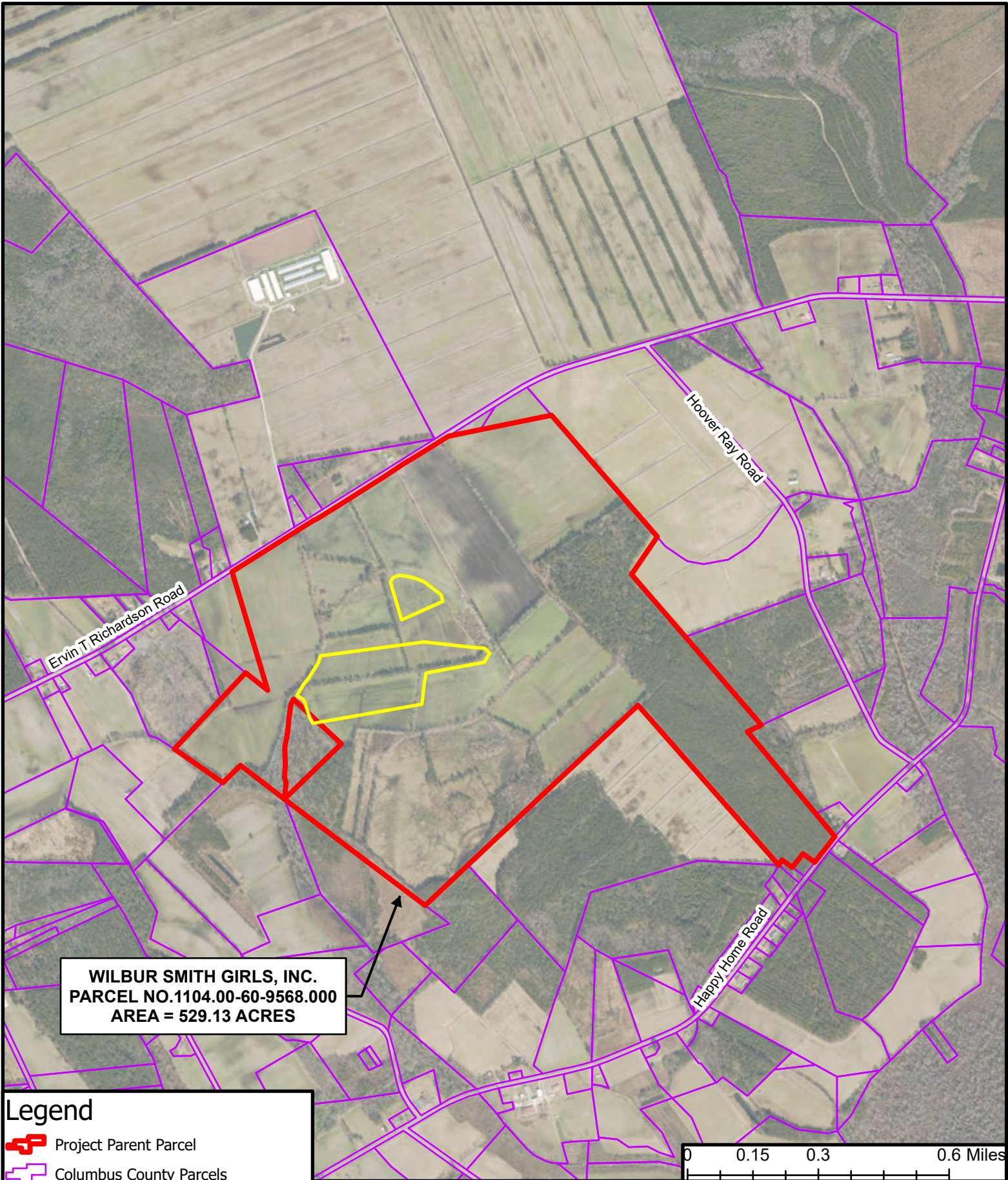
- Drainage Area - 203 Acres
- Project Parent Parcel
- Easement Boundary

**FREESE AND NICHOLS**

531 N Liberty St  
Winston-Salem, NC 27101




**Figure 3**  
Cow Branch  
Stream and Wetland Mitigation Site  
Watershed Area Map  
NCDMS Project #: 100196

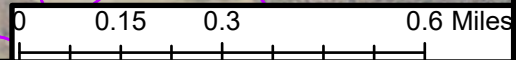
N



**WILBUR SMITH GIRLS, INC.**  
**PARCEL NO. 1104.00-60-9568.000**  
**AREA = 529.13 ACRES**

**Legend**

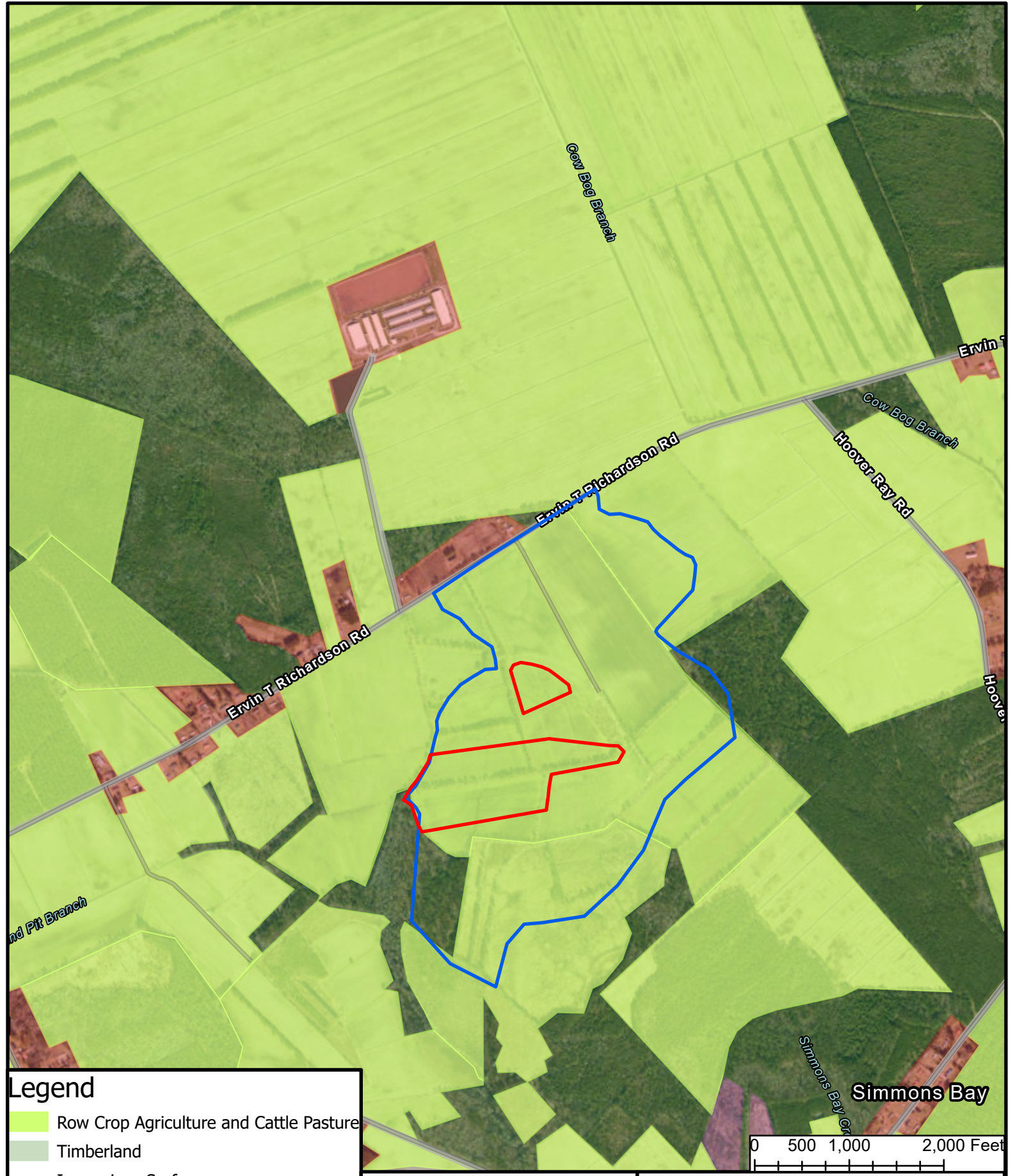
-  Project Parent Parcel
-  Columbus County Parcels
-  Easement Boundary



531 N Liberty St  
 Winston-Salem, NC 27101



**Figure 4**  
**Cow Branch**  
**Stream and Wetland Mitigation Site**  
**Land Owner Map**  
**NCDMS Project #: 100196**



**Legend**


- Row Crop Agriculture and Cattle Pasture
- Timberland
- Impervious Surface
- Residential Development
- Bare
- Drainage Area
- Easement Boundary



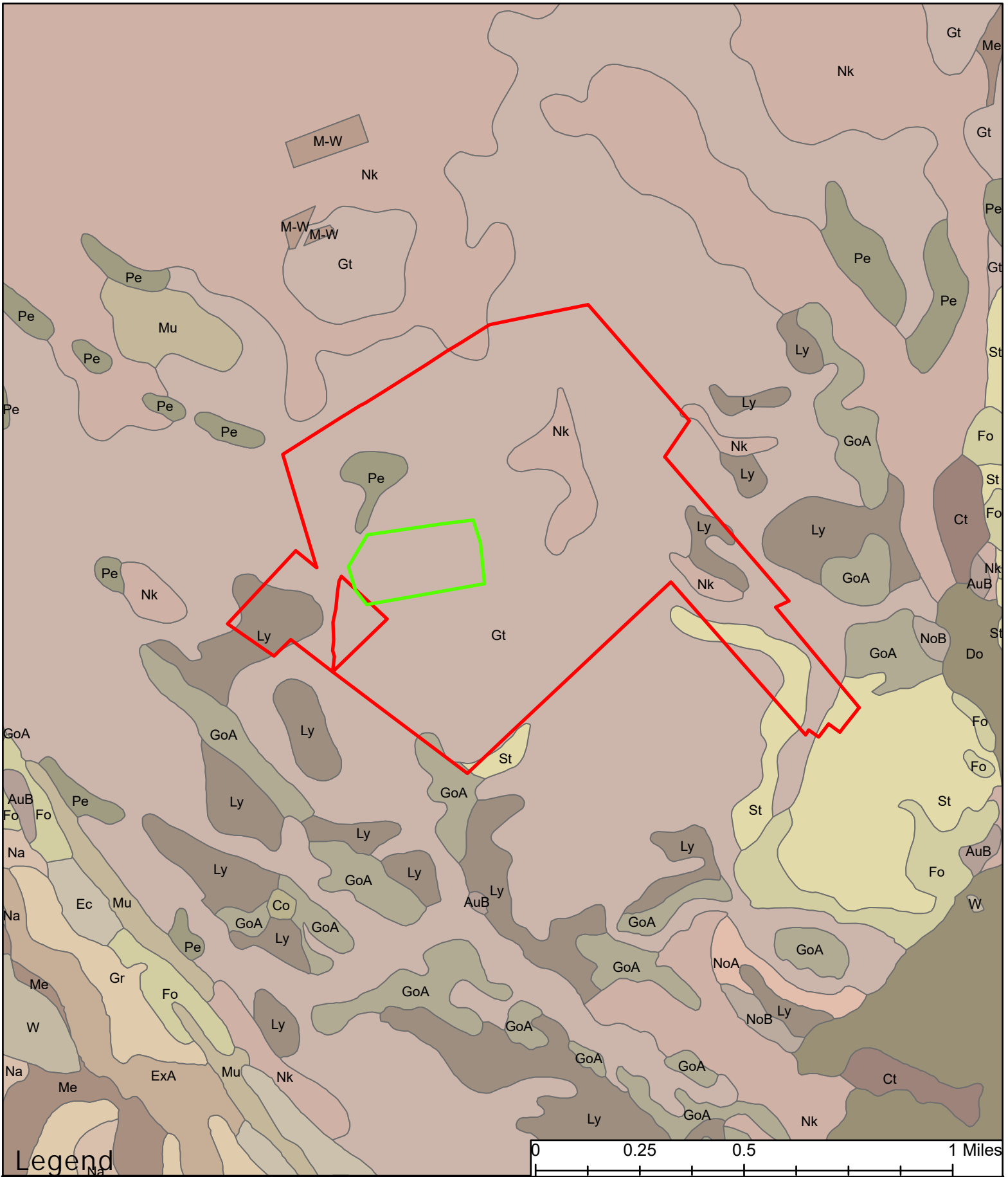
**FREESE  
AND  
NICHOLS**

531 N Liberty St  
Winston-Salem, NC 27101





N



**Figure 5**  
**Cow Branch**  
**Stream and Wetland Mitigation Site**  
**Land Use Map**  
**NCDMS Project #: 100196**



**Legend**

-  Project Parent Parcel
-  Confirmed Hydric Soils
-  Easement Boundary
-  Gt - Grifton fine sandy loam


  
**FREESE AND NICHOLS**
  
 531 N Liberty St
   
 Winston-Salem, NC 27101

Figure 6  
 Cow Branch  
 Stream and Wetland Mitigation Site  
 Soils Map  
 NCDMS Project #: 100196

1988



Source: USGS Earth Explorer

1999



Source: Google Earth

2008



Source: Google Earth

2021



Source: Google Earth

0 0.250.5 1 Miles  
|-----|-----|-----|-----|-----|

Legend

 Revised Easement Boundary



531 N Liberty St  
Winston-Salem, NC 27101

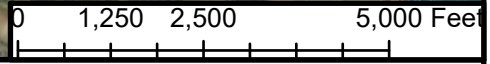
Figure 7  
Cow Branch  
Stream and Wetland Mitigation Site  
Historical Aerials Map  
NCDMS Project #: 100196



**Legend**

- Project Parent Parcel
- Easement Boundary
- Flood Hazard Zones**
- 1% Annual Chance Flood Hazard
- Regulatory Floodway
- Special Floodway
- Area of Undetermined Flood Hazard
- 0.2% Annual Chance Flood Hazard
- Future Conditions 1% Annual Chance Flood Hazard
- Area with Reduced Risk Due to Levee
- Area with Risk Due to Levee

NC CGIA, Maxar, Public use with attribution to FEMA and Montgomery County, Texas. This data is not intended for insurance rating purposes and is for information only. This map is not an official FEMA Digital Flood Insurance Rate Map. The effective DFIRMs are produced, maintained, and published by FEMA and not by Montgomery County. Official determinations are provided by FEMA.

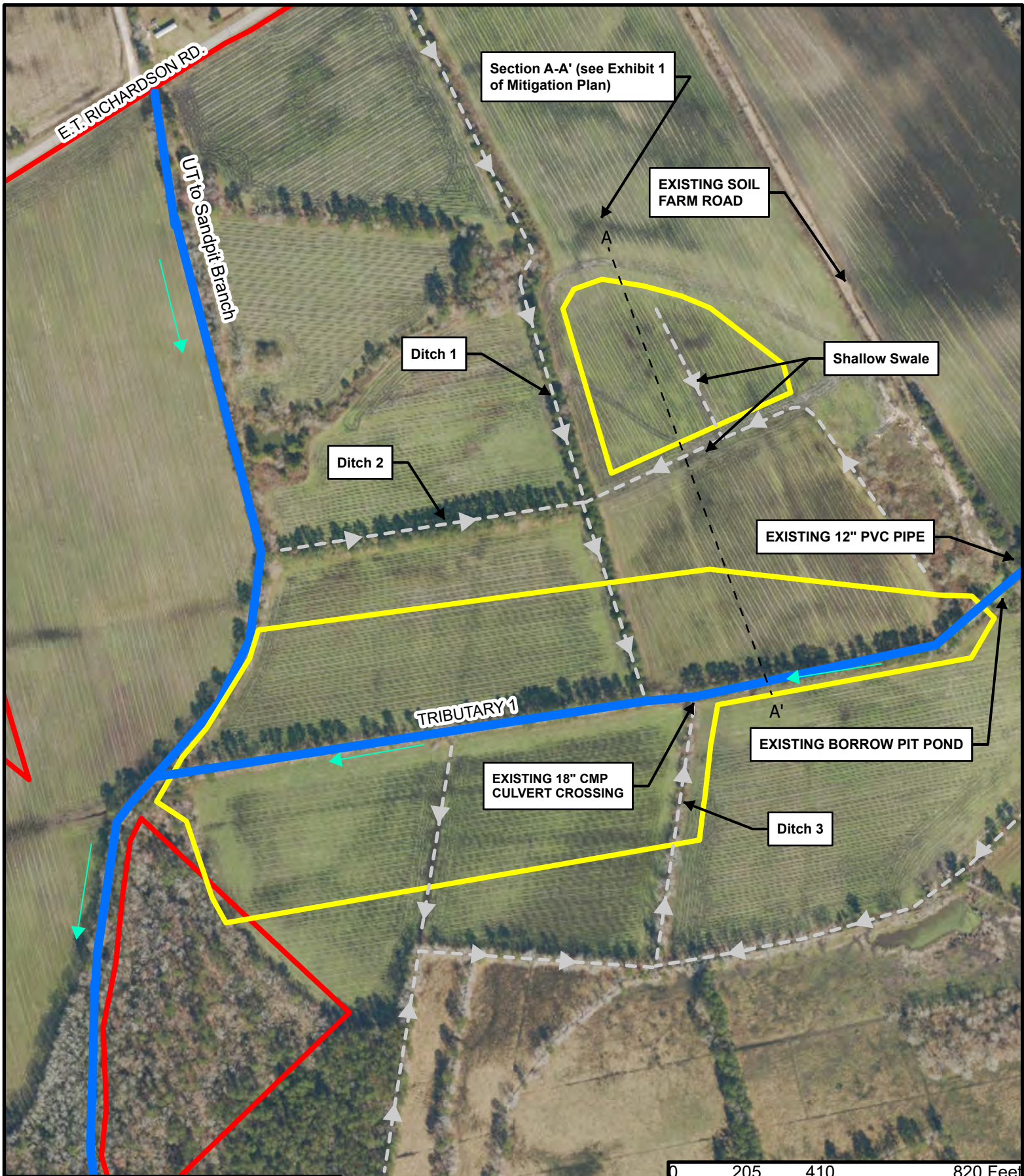


531 N Liberty St  
Winston-Salem, NC 27101



**Figure 8**  
**Cow Branch**  
**Stream and Wetland Mitigation Site**  
**Flood Zone Mapping**  
**NCDMS Project #: 100196**



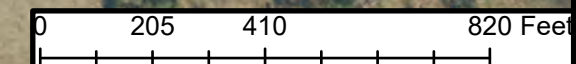


**Legend**

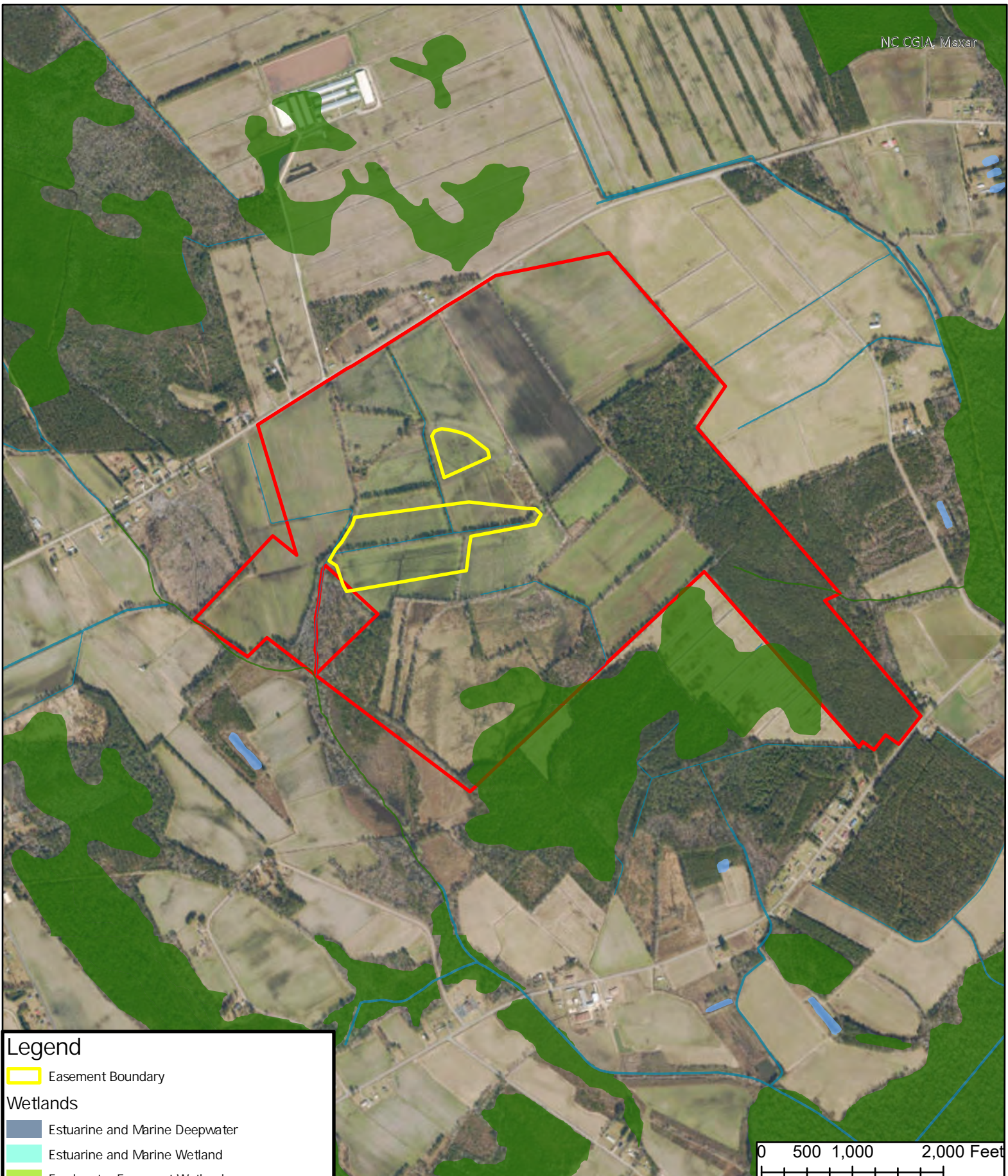
- ▭ Project Parent Parcel
- ▬ Existing Stream
- ▬ Easement Boundary
- - - Existing Ditches

**FREESE AND NICHOLS**


531 N Liberty St  
Winston-Salem, NC 27101



**Figure 9**  
Cow Branch  
Stream and Wetland Mitigation Site  
Existing Conditions Map  
NCDMS Project #: 100196



**Legend**

 Easement Boundary

**Wetlands**

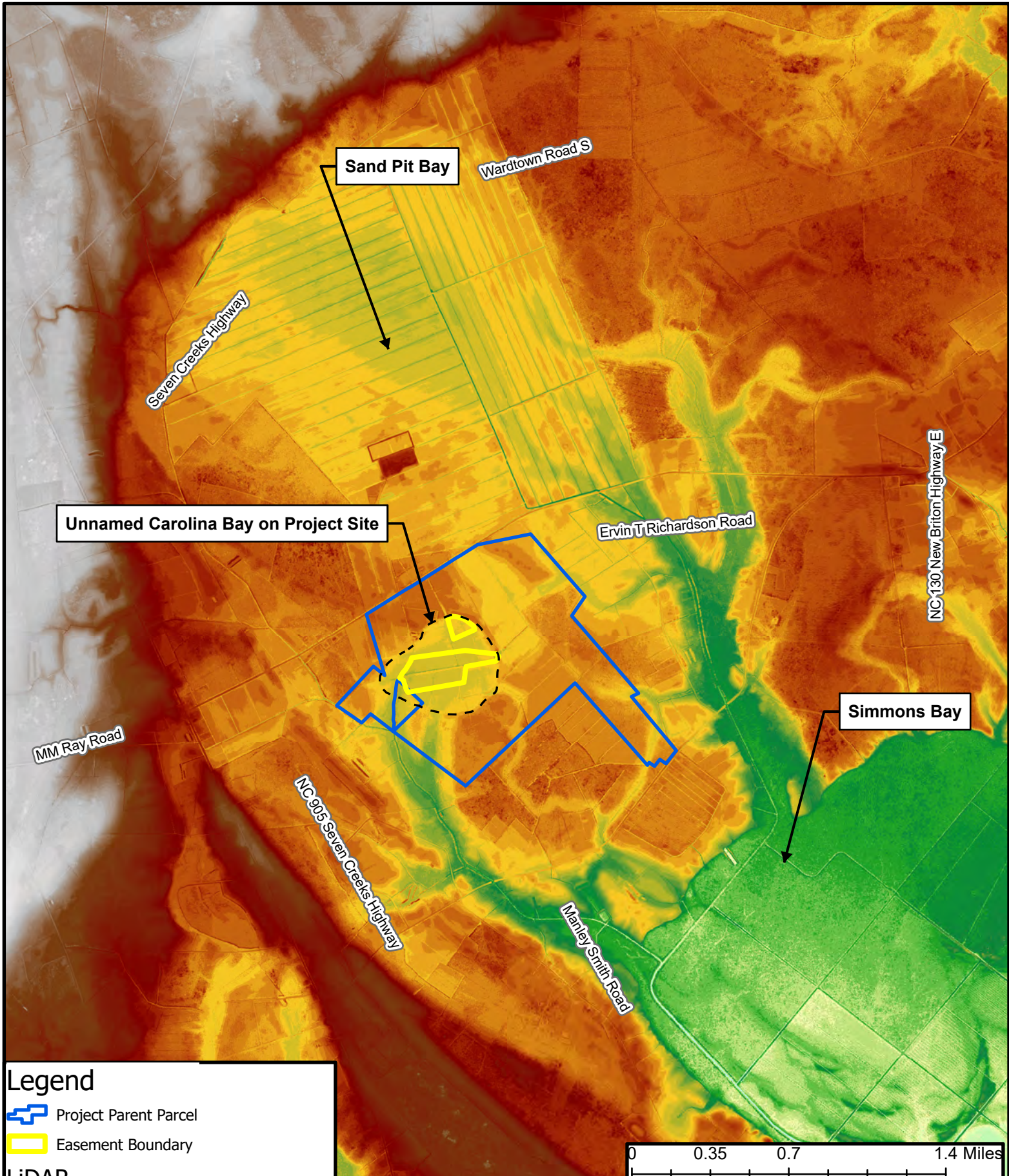
-  Estuarine and Marine Deepwater
-  Estuarine and Marine Wetland
-  Freshwater Emergent Wetland
-  Freshwater Forested/Shrub Wetland
-  Freshwater Pond
-  Lake
-  Riverine
-  Project Parent Parcel

0 500 1,000 2,000 Feet





531 N Liberty St  
Winston-Salem, NC 27101

Figure 10  
Cow Branch  
Stream and Wetland Mitigation Site  
NWI Mapping  
NCDMS Project #: 100196

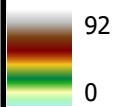


**Legend**

-  Project Parent Parcel
-  Easement Boundary

**LiDAR**

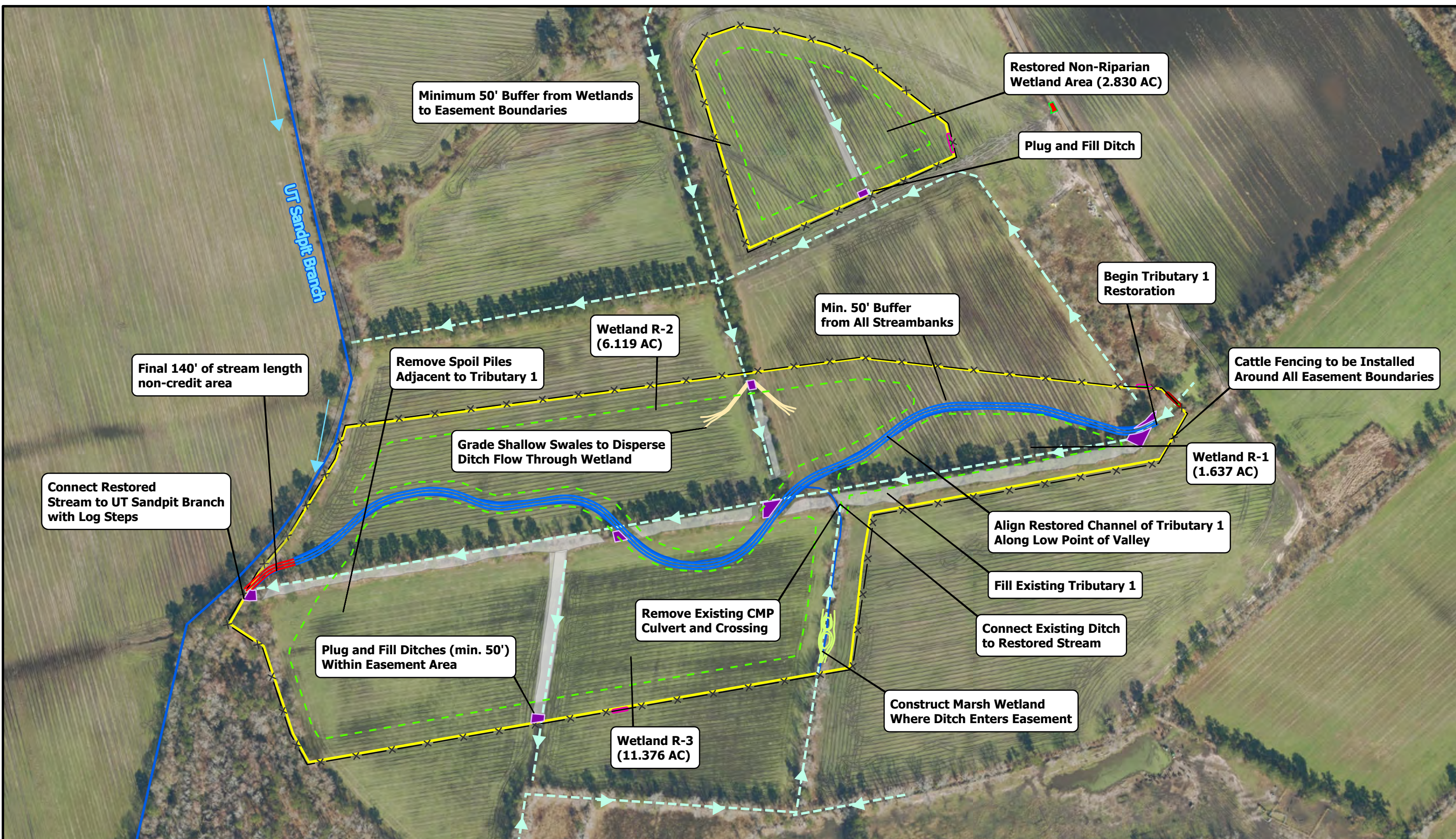
Elevation (feet)



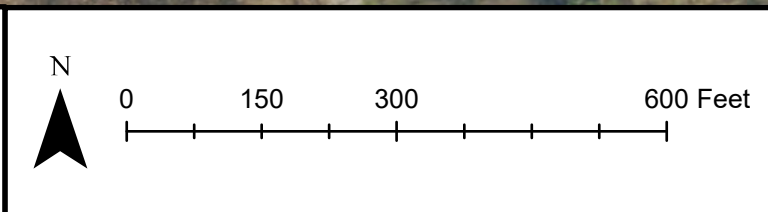
531 N Liberty St  
Winston-Salem, NC 27101



**Figure 12**  
**Cow Branch**  
**Stream and Wetland Mitigation Site**  
**LiDAR Map**  
**NC DMS Project #: 100196**



Legend			
	Existing Ditches		Easement Boundary
	Proposed Stream Restoration		Proposed Wetlands
	Proposed Top of Bank		Constructed Marsh Wetland
	Floodgate		Channel Plug
	Fence Gate		FILL
	Fence		Ditch Confluence Marsh Complex
			Construction Entrance



**FREASE AND NICHOLS**  
 531 N Liberty St  
 Winston-Salem, NC 27101

**Figure 11**  
**Cow Branch**  
 Stream and Wetland Mitigation Site  
 Mitigation Plan  
 NCDMS Project #: 100196

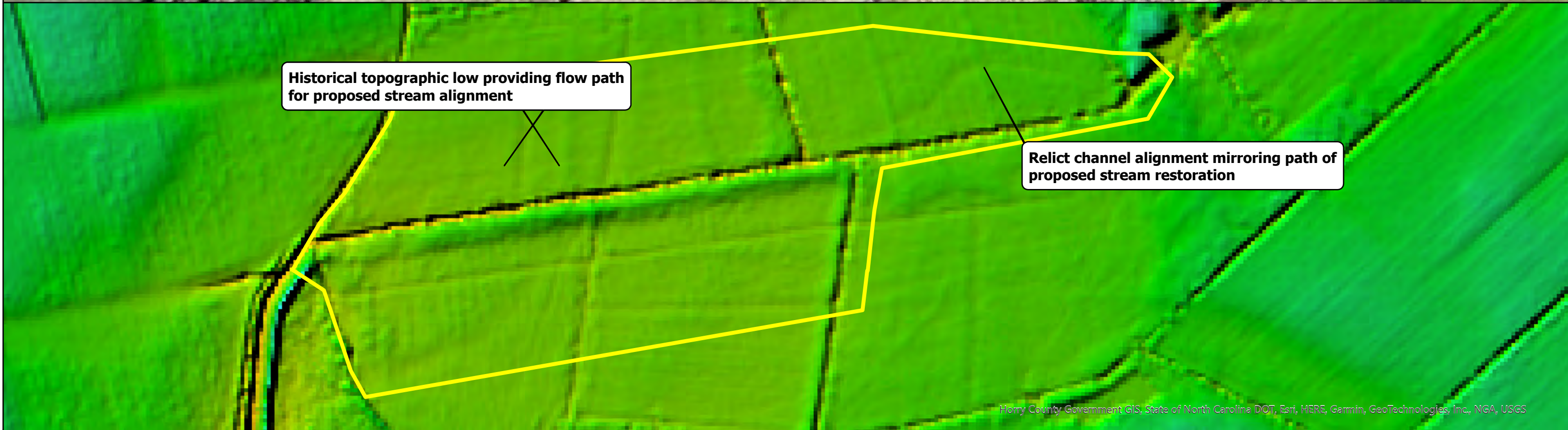
Historical aerial imagery taken December of 2004. Photo obtained from Google Earth.



Historical topographic low providing flow path for proposed stream alignment

Relict channel alignment mirroring path of proposed stream restoration

NC CGIA, Maxar, Microsoft



Historical topographic low providing flow path for proposed stream alignment


Relict channel alignment mirroring path of proposed stream restoration

Horry County Government GIS, State of North Carolina DOT, Esri, HERE, Garmin, GeoTechnologies, Inc., NGA, USGS

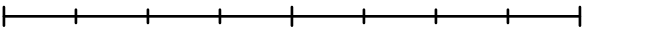
**Legend**

 Easement Boundary

N



0 187.5 375 750 Feet




531 N Liberty St  
Winston-Salem, NC 27101

**Figure 13**  
**Cow Branch**  
**Stream and Wetland Mitigation Site**  
**Analysis of Relict Alignment**  
**NCDMS Project #: 100196**



Permanent photo documentation points will be located at the origin of each vegetation plot and at each cross-section.

**Legend**

Vegetation Plot- Fixed	Weather Station	Proposed Wetland
Vegetation Plot- Random	Permanent Monumented Cross Sections	Proposed Stream Restoration For Credit
Continuous Stage Recorder	Pressure Transducer	Proposed Stream Restoration Non Credit
Groundwater Gauge	Easement Boundary	

N

0 175 350 700 Feet

**FREESE AND NICHOLS**

531 N Liberty St  
Winston-Salem, NC 27101

**Figure 14**  
**Cow Branch**  
**Stream and Wetland Mitigation Site**  
**Monitoring Plan**  
**NC DMS Project #: 100196**

## **Appendix A**

### **IRT Meeting Minutes**

**PROJECT:** Cow Branch Stream and Wetland Mitigation Site (DMS ID # 100196)

**NAME OF MEETING:** Post-Contract IRT Site Visit

**RECORDED BY:** Ian Jewell, Bryan Dick

**DATE:** April 21, 2021

**LOCATION:** Cow Branch Mitigation Site, Columbus County, NC

**ATTENDEES:** Kim Browning (USACE) Erin Davis (NCDEQ-DWR)  
Lindsay Crocker (NCDEQ- DMS) Bryan Dick (FNI)  
Kelly Phillips (NCDEQ- DMS) Ian Jewell (FNI)

*The following reflects our understanding of the items discussed during the subject meeting.*

ITEM	DESCRIPTION
1.	<p>DWR and USACE expressed concern with creating a berm around the non-riparian area to restore hydrology and that this may create an unacceptable depth of water/impoundment.</p> <ul style="list-style-type: none"> <li>FNI explained that this was not the plan, that there is a natural slope to the bottom of the bay from the non-riparian area that slopes down to the stream restoration area, and the non-riparian area is naturally higher so there is no need to create a berm to restore hydrology as it is provided from groundwater flow from above the bay.</li> <li>USACE asked for this description to be included in the mitigation plan, and to show a profile of the land how it slopes down from the non-riparian wetland to the stream.</li> </ul>
2.	<p>USACE asked about reference sites for vegetation for the project.</p> <ul style="list-style-type: none"> <li>FNI stated that the Green Swamp and other nearby game lands are known to have good reference communities present and that we would investigate these areas as part of the mitigation plan.</li> </ul>
3.	<p>USACE and DWR commented on backfilling the abandoned portions of the existing stream. If these are to be left as oxbow ponds or vernal pools, then they should not be left too deep. 14 inches is a maximum depth for permanent ponding.</p>
4.	<p>DWR and USACE stated that they would be looking to see habitat log/wood structures placed in the restored wetland areas. Microtopography can be created by using the logs and not by grading depressions.</p>
5.	<p>USACE asked if the cows will be fenced out?</p> <ul style="list-style-type: none"> <li>FNI: Yes, there will be cattle fencing around the perimeter of all the easement areas.</li> <li>USACE asked that gates be added into the fencing to make access easier.</li> </ul>
6.	<p>USACE would like to see the ditches that are entering the restored stream to be made into wetland/marsh complexes as a type of BMP to treat water quality prior to entering the stream restoration.</p>
7.	<p>DWR asked if the project is capturing the stream origin?</p> <ul style="list-style-type: none"> <li>FNI: no, the stream origin is further upstream from where the project begins.</li> <li>DWR stated that a wetland BMP will not be able to be placed at the head of the project as it would be in a jurisdictional stream.</li> </ul>



ITEM	DESCRIPTION
8.	USACE stated that if the culvert upstream of the project is replaced, then it will need to be handled under a separate permit from the stream/wetland restoration (NW 3 vs. NW 27). However, because it is essential to the project, USACE will review both permits at the same time.
9.	DWR stated some additional requirements for vegetation plans: <ul style="list-style-type: none"><li>• No species should be more than 20% in the plant list.</li><li>• DWR recommends planting shrubs in addition to trees.</li><li>• DWR would like to see a variety of species.</li><li>• USACE stated that if we see a species outside of the “standard”, then we can propose a different performance standard.</li><li>• It is important to propose alternative species in the mitigation plan so we can get pre-approval for using those species if needed.</li></ul> FNI stated the key is to plant species that will grow on the site.
10.	DWR asked if there will be a risks and uncertainty section in the mitigation plan? <ul style="list-style-type: none"><li>• Stated that FNI should talk about any risks of the project in this section.</li><li>• Show a strategy for mitigating these risks.</li></ul>
11.	The IRT agreed with the overall restoration approach and ratios.

## **Appendix B**

### **Site Protection Instrument**



**2023000844**

COLUMBUS CO, NC FEE \$26.00  
STATE OF NC REAL ESTATE EXT  
**\$551.00**

PRESENTED & RECORDED:  
02-21-2023 03:32:52 PM

KANDANCE H. BULLOCK  
REGISTER OF DEEDS  
BY: CAROLINE H. REEVES  
DEPUTY

**BK: RB 1312**

**PG: 288-300**

Excise Tax: \$551.00

**STATE OF NORTH CAROLINA**

**DEED OF CONSERVATION EASEMENT  
AND RIGHT OF ACCESS PROVIDED  
PURSUANT TO FULL DELIVERY  
MITIGATION CONTRACT**

**COLUMBUS COUNTY**

**SPO File Number: 24-LA 109**

**DMS Project Number: 100196**

Prepared by: Office of the Attorney General  
Property Control Section  
Return to: NC Department of Administration  
State Property Office  
1321 Mail Service Center  
Raleigh, NC 27699-1321

**THIS DEED OF CONSERVATION EASEMENT AND RIGHT OF ACCESS**, made this 21<sup>st</sup> day of February, 2023, by Wilbur Smith Girls Inc., (“Grantor”), whose mailing address is P.O. Box 2493, Shallotte, NC, 28470, to the State of North Carolina, (“Grantee”), whose mailing address is State of North Carolina, Department of Administration, State Property Office, 1321 Mail Service Center, Raleigh, NC 27699-1321. The designations of Grantor and Grantee as used herein shall include said parties, their heirs, successors, and assigns, and shall include singular, plural, masculine, feminine, or neuter as required by context.

**WITNESSETH:**

**WHEREAS**, pursuant to the provisions of N.C. Gen. Stat. § 143-214.8 et seq., the State of North Carolina has established the Division of Mitigation Services (formerly known as the Ecosystem Enhancement Program and Wetlands Restoration Program) within the Department of Environmental Quality (formerly Department of Environment and Natural Resources), for the purposes of acquiring, maintaining, restoring, enhancing, creating and preserving wetland and riparian resources that contribute to the protection and improvement of water quality, flood prevention, fisheries, aquatic habitat, wildlife habitat, and recreational opportunities; and

**WHEREAS**, this Conservation Easement from Grantor to Grantee has been negotiated, arranged, and provided for as a condition of a full delivery contract between arranged and provided for as a condition of a full delivery contract between Freese and Nichols, Inc., and the North Carolina Department of Environment and Natural Resources, to provide stream, wetland and/or buffer mitigation pursuant to the North Carolina Department of Environment and Natural Resources Purchase and Services Contract Number 200203-01.

**WHEREAS**, The State of North Carolina is qualified to be the Grantee of a Conservation Easement pursuant to N.C. Gen. Stat. § 121-35; and

**WHEREAS**, the Department of Environment and Natural Resources and the United States Army Corps of Engineers, Wilmington District entered into a Memorandum of Understanding, (MOU) duly executed by all parties on November 4, 1998. This MOU recognized that the Wetlands Restoration Program was to provide effective compensatory mitigation for authorized impacts to wetlands, streams and other aquatic resources by restoring, enhancing and preserving the wetland and riparian areas of the State; and

**WHEREAS**, the Department of Environment and Natural Resources, the North Carolina Department of Transportation and the United States Army Corps of Engineers, Wilmington District entered into a Memorandum of Agreement, (MOA) duly executed by all parties in Greensboro, NC on July 22, 2003, which recognizes that the Division of Mitigation Services (formerly Ecosystem Enhancement Program) is to provide for compensatory mitigation by effective protection of the land, water and natural resources of the State by restoring, enhancing and preserving ecosystem functions; and

**WHEREAS**, the Department of Environment and Natural Resources, the U.S. Army Corps of Engineers, the U.S. Environmental Protection Agency, the U.S. Fish and Wildlife Service, the North Carolina Wildlife Resources Commission, the North Carolina Division of Water Quality, the North Carolina Division of Coastal Management, and the National Marine Fisheries Service entered into an agreement to continue the In-Lieu Fee operations of the North Carolina Department of Natural Resources' Division of Mitigation Services (formerly Ecosystem Enhancement Program) with an effective date of 28 July, 2010, which supersedes and replaces the previously effective MOA and MOU referenced above; and

**WHEREAS**, the acceptance of this instrument for and on behalf of the State of North Carolina was granted to the Department of Administration by resolution as approved by the Governor and Council of State adopted at a meeting held in the City of Raleigh, North Carolina, on the 8<sup>th</sup> day of February 2000; and

**WHEREAS**, the Division of Mitigation Services in the Department of Environmental Quality (formerly Department of Environment and Natural Resources), which has been delegated the authority authorized by the Governor and Council of State to the Department of Administration, has approved acceptance of this instrument; and

**WHEREAS**, Grantor owns in fee simple certain real property situated, lying, and being in Bug Hill Township, Columbus County, North Carolina (the "**Property**"), and being more particularly described as that certain parcel of land containing approximately 509 acres and being conveyed to the Grantor by deed as recorded in **Deed Book 320 at Page 664** of the Columbus County Registry, North Carolina; and

**WHEREAS**, Grantor is willing to grant a Conservation Easement and Right of Access over the herein described areas of the Property, thereby restricting, and limiting the use of the areas of the Property subject to the Conservation Easement to the terms and conditions and purposes hereinafter set forth, and Grantee is willing to accept said Easement and Access Rights. The Conservation Easement shall be for the protection and benefit of the waters of Sandpit Branch.

**NOW, THEREFORE**, in consideration of the mutual covenants, terms, conditions, and restrictions hereinafter set forth, Grantor unconditionally and irrevocably hereby grants and conveys unto Grantee, its successors and assigns, forever and in perpetuity, a Conservation Easement and Right of Access together with an access easement to and from the Conservation Easement Area described below.

The Conservation Easement Area consists of the following:

Tracts Number 1 and 2 containing a total of 34.39 acres as shown on the plats of survey entitled "Conservation Easement Survey for the State of North Carolina Division of Mitigation Services, Project Name: Cow Branch, SPO File No. 24-LA-109, DMS Site No. 100196, Property of Wilbur Smith Girls, Inc," dated December 16, 2021 by Samuel Landy Anderson, II, PLS Number L-4546 and recorded in the Columbus County, North Carolina Register of Deeds at **Plat Book 116** **Page 37**.

See attached "**Exhibit A**", Legal Description of area of the Property hereinafter referred to as the "Conservation Easement Area"

The purposes of this Conservation Easement are to maintain, restore, enhance, construct, create and preserve wetland and/or riparian resources in the Conservation Easement Area that contribute to the protection and improvement of water quality, flood prevention, fisheries, aquatic habitat, wildlife habitat, and recreational opportunities; to maintain permanently the Conservation Easement Area in its natural condition, consistent with these purposes; and to prevent any use of the Easement Area that will significantly impair or interfere with these purposes. To achieve these purposes, the following conditions and restrictions are set forth:

#### **I. DURATION OF EASEMENT**

Pursuant to law, including the above referenced statutes, this Conservation Easement and Right of Access shall be perpetual and it shall run with, and be a continuing restriction upon the use of, the Property, and it shall be enforceable by the Grantee against the Grantor and against Grantor's heirs, successors and assigns, personal representatives, agents, lessees, and licensees.

## II. ACCESS EASEMENT

Grantor hereby grants and conveys unto Grantee, its employees, agents, successors and assigns, a perpetual, non-exclusive easement for ingress and egress over and upon the Property at all reasonable times and at the location more particularly described on **Exhibit A** attached hereto and incorporated herein by this reference, to access the Conservation Easement Area for the purposes set forth herein. This grant of easement shall not vest any rights in the public and shall not be construed as a public dedication of the Access Easement. Grantor covenants, represents, and warrants that it is the sole owner of and is seized of the Property in fee simple and has the right to grant and convey this Access Easement.

## III. GRANTOR RESERVED USES AND RESTRICTED ACTIVITIES

The Conservation Easement Area shall be restricted from any development or usage that would impair or interfere with the purposes of this Conservation Easement. Unless expressly reserved as a compatible use herein, any activity in, or use of, the Conservation Easement Area by the Grantor is prohibited as inconsistent with the purposes of this Conservation Easement. Any rights not expressly reserved hereunder by the Grantor have been acquired by the Grantee. Any rights not expressly reserved hereunder by the Grantor, including the rights to all mitigation credits, including, but not limited to, stream, wetland, and riparian buffer mitigation units, derived from each site within the area of the Conservation Easement, are conveyed to and belong to the Grantee. Without limiting the generality of the foregoing, the following specific uses are prohibited, restricted, or reserved as indicated:

**A. Recreational Uses.** Grantor expressly reserves the right to undeveloped recreational uses, including hiking, bird watching, hunting and fishing, and access to the Conservation Easement Area for the purposes thereof.

**B. Motorized Vehicle Use.** Motorized vehicle use in the Conservation Easement Area is prohibited except within a Crossing Area(s) or Road or Trail as shown on the recorded survey plat.

**C. Educational Uses.** The Grantor reserves the right to engage in and permit others to engage in educational uses in the Conservation Easement Area not inconsistent with this Conservation Easement, and the right of access to the Conservation Easement Area for such purposes including organized educational activities such as site visits and observations. Educational uses of the property shall not alter vegetation, hydrology or topography of the site.

**D. Damage to Vegetation.** Except within Crossing Area(s) as shown on the recorded survey plat and as related to the removal of non-native plants, diseased or damaged trees, or vegetation that destabilizes or renders unsafe the Conservation Easement Area to persons or natural habitat, all cutting, removal, mowing, harming, or destruction of any trees and vegetation in the Conservation Easement Area is prohibited.

**E. Industrial, Residential and Commercial Uses.** All industrial, residential and commercial uses are prohibited in the Conservation Easement Area.

**F. Agricultural Use.** All agricultural uses are prohibited within the Conservation Easement Area including any use for cropland, waste lagoons, or pastureland.

**G. New Construction.** There shall be no building, facility, mobile home, antenna, utility pole, tower, or other structure constructed or placed in the Conservation Easement Area.

**H. Roads and Trails.** There shall be no construction or maintenance of new roads, trails, walkways, or paving in the Conservation Easement.

All existing roads, trails and crossings within the Conservation Easement Area shall be shown on the recorded survey plat.

**I. Signs.** No signs shall be permitted in the Conservation Easement Area except interpretive signs describing restoration activities and the conservation values of the Conservation Easement Area, signs identifying the owner of the Property and the holder of the Conservation Easement, signs giving directions, or signs prescribing rules and regulations for the use of the Conservation Easement Area.

**J. Dumping or Storing.** Dumping or storage of soil, trash, ashes, garbage, waste, abandoned vehicles, appliances, machinery, or any other material in the Conservation Easement Area is prohibited.

**K. Grading, Mineral Use, Excavation, Dredging.** There shall be no grading, filling, excavation, dredging, mining, drilling, hydraulic fracturing; removal of topsoil, sand, gravel, rock, peat, minerals, or other materials.

**L. Water Quality and Drainage Patterns.** There shall be no diking, draining, dredging, channeling, filling, leveling, pumping, impounding or diverting, causing, allowing or permitting the diversion of surface or underground water in the Conservation Easement Area. No altering or tampering with water control structures or devices, or disruption or alteration of the restored, enhanced, or created drainage patterns is allowed. All removal of wetlands, polluting or discharging into waters, springs, seeps, or wetlands, or use of pesticide or biocides in the Conservation Easement Area is prohibited. In the event of an emergency interruption or shortage of all other water sources, water from within the Conservation Easement Area may temporarily be withdrawn for good cause shown as needed for the survival of livestock on the Property.

**M. Subdivision and Conveyance.** Grantor voluntarily agrees that no further subdivision, partitioning, or dividing of the Conservation Easement Area portion of the Property owned by the Grantor in fee simple ("fee") that is subject to this Conservation Easement is allowed. Any future transfer of the Property shall be subject to this Conservation Easement and Right of Access and to the Grantee's right of unlimited and repeated ingress and egress over and across the Property to the Conservation Easement Area for the purposes set forth herein.

**N. Development Rights.** All development rights are permanently removed from the Conservation Easement Area and are non-transferrable.

**O. Disturbance of Natural Features.** Any change, disturbance, alteration or impairment of the natural features of the Conservation Easement Area or any intentional introduction of non-native plants, trees and/or animal species by Grantor is prohibited.

The Grantor may request permission to vary from the above restrictions for good cause shown, provided that any such request is not inconsistent with the purposes of this Conservation Easement, and the Grantor obtains advance written approval from the Division of Mitigation Services, 1652 Mail Services Center, Raleigh, NC 27699-1652.

#### IV. GRANTEE RESERVED USES

**A. Right of Access, Construction, and Inspection.** The Grantee, its employees, agents, successors and assigns, shall have a perpetual Right of Access over and upon the Conservation Easement Area to undertake or engage in any activities necessary to construct, maintain, manage, enhance, repair, restore, protect, monitor and inspect the stream, wetland and any other riparian resources in the Conservation Easement Area for the purposes set forth herein or any long-term management plan for the Conservation Easement Area developed pursuant to this Conservation Easement.

**B. Restoration Activities.** These activities include planting of trees, shrubs and herbaceous vegetation, installation of monitoring wells, utilization of heavy equipment to grade, fill, and prepare the soil, modification of the hydrology of the site, and installation of natural and manmade materials as needed to direct in-stream, above ground, and subterranean water flow.

**C. Signs.** The Grantee, its employees and agents, successors or assigns, shall be permitted to place signs and witness posts on the Property to include any or all of the following: describe the project, prohibited activities within the Conservation Easement, or identify the project boundaries and the holder of the Conservation Easement.

**D. Fences.** Conservation Easements are purchased to protect the investments by the State (Grantee) in natural resources. Livestock within conservations easements damages the investment and can result in reductions in natural resource value and mitigation credits which would cause financial harm to the State. Therefore, Landowners (Grantor) with livestock are required to restrict livestock access to the Conservation Easement area. Repeated failure to do so may result in the State (Grantee) repairing or installing livestock exclusion devices (fences) within the conservation area for the purpose of restricting livestock access. In such cases, the landowner (Grantor) must provide access to the State (Grantee) to make repairs.

**E. Crossing Area(s).** The Grantee is not responsible for maintenance of crossing area(s), however, the Grantee, its employees and agents, successors or assigns, reserve the right to repair crossing area(s), at its sole discretion and to recover the cost of such repairs from the Grantor if such repairs are needed as a result of activities of the Grantor, his successors or assigns.

#### V. ENFORCEMENT AND REMEDIES

**A. Enforcement.** To accomplish the purposes of this Conservation Easement, Grantee is allowed to prevent any activity within the Conservation Easement Area that is inconsistent with



the purposes of this Conservation Easement and to require the restoration of such areas or features in the Conservation Easement Area that may have been damaged by such unauthorized activity or use. Upon any breach of the terms of this Conservation Easement by Grantor, the Grantee shall, except as provided below, notify the Grantor in writing of such breach and the Grantor shall have ninety (90) days after receipt of such notice to correct the damage caused by such breach. If the breach and damage remains uncured after ninety (90) days, the Grantee may enforce this Conservation Easement by bringing appropriate legal proceedings including an action to recover damages, as well as injunctive and other relief. The Grantee shall also have the power and authority, consistent with its statutory authority: (a) to prevent any impairment of the Conservation Easement Area by acts which may be unlawful or in violation of this Conservation Easement; (b) to otherwise preserve or protect its interest in the Property; or (c) to seek damages from any appropriate person or entity. Notwithstanding the foregoing, the Grantee reserves the immediate right, without notice, to obtain a temporary restraining order, injunctive or other appropriate relief, if the breach is or would irreversibly or otherwise materially impair the benefits to be derived from this Conservation Easement, and the Grantor and Grantee acknowledge that the damage would be irreparable and remedies at law inadequate. The rights and remedies of the Grantee provided hereunder shall be in addition to, and not in lieu of, all other rights and remedies available to Grantee in connection with this Conservation Easement.

**B. Inspection.** The Grantee, its employees and agents, successors and assigns, have the right, with reasonable notice, to enter the Conservation Easement Area over the Property at reasonable times for the purpose of inspection to determine whether the Grantor is complying with the terms, conditions and restrictions of this Conservation Easement.

**C. Acts Beyond Grantor's Control.** Nothing contained in this Conservation Easement shall be construed to entitle Grantee to bring any action against Grantor for any injury or change in the Conservation Easement Area caused by third parties, resulting from causes beyond the Grantor's control, including, without limitation, fire, flood, storm, and earth movement, or from any prudent action taken in good faith by the Grantor under emergency conditions to prevent, abate, or mitigate significant injury to life or damage to the Property resulting from such causes.

**D. Costs of Enforcement.** Beyond regular and typical monitoring expenses, any costs incurred by Grantee in enforcing the terms of this Conservation Easement against Grantor, including, without limitation, any costs of restoration necessitated by Grantor's acts or omissions in violation of the terms of this Conservation Easement, shall be borne by Grantor.

**E. No Waiver.** Enforcement of this Easement shall be at the discretion of the Grantee and any forbearance, delay or omission by Grantee to exercise its rights hereunder in the event of any breach of any term set forth herein shall not be construed to be a waiver by Grantee.

## VI. MISCELLANEOUS

**A.** This instrument sets forth the entire agreement of the parties with respect to the Conservation Easement and supersedes all prior discussions, negotiations, understandings or agreements relating to the Conservation Easement. If any provision is found to be invalid, the remainder of the provisions of the Conservation Easement, and the application of such provision

to persons or circumstances other than those as to which it is found to be invalid, shall not be affected thereby.

**B.** Grantor is responsible for any real estate taxes, assessments, fees, or charges levied upon the Property. Grantee shall not be responsible for any costs or liability of any kind related to the ownership, operation, insurance, upkeep, or maintenance of the Property, except as expressly provided herein. Upkeep of any constructed bridges, fences, or other amenities on the Property are the sole responsibility of the Grantor. Nothing herein shall relieve the Grantor of the obligation to comply with federal, state or local laws, regulations and permits that may apply to the exercise of the Reserved Rights.

**C.** Any notices shall be sent by registered or certified mail, return receipt requested to the parties at their addresses shown herein or to other addresses as either party establishes in writing upon notification to the other.

**D.** Grantor shall notify Grantee in writing of the name and address and any party to whom the Property or any part thereof is to be transferred at or prior to the time said transfer is made. Grantor further agrees that any subsequent lease, deed, or other legal instrument by which any interest in the Property is conveyed is subject to the Conservation Easement herein created.

**E.** The Grantor and Grantee agree that the terms of this Conservation Easement shall survive any merger of the fee and easement interests in the Property or any portion thereof.

**F.** This Conservation Easement and Right of Access may be amended, but only in writing signed by all parties hereto, or their successors or assigns, if such amendment does not affect the qualification of this Conservation Easement or the status of the Grantee under any applicable laws, and is consistent with the purposes of the Conservation Easement. The owner of the Property shall notify the State Property Office and the U.S. Army Corps of Engineers in writing sixty (60) days prior to the initiation of any transfer of all or any part of the Property or of any request to void or modify this Conservation Easement. Such notifications and modification requests shall be addressed to:

Division of Mitigation Services Program Manager  
NC State Property Office  
1321 Mail Service Center  
Raleigh, NC 27699-1321

and

General Counsel  
US Army Corps of Engineers  
69 Darlington Avenue  
Wilmington, NC 28403

**G.** The parties recognize and agree that the benefits of this Conservation Easement are in gross and assignable provided, however, that the Grantee hereby covenants and agrees, that in the event it transfers or assigns this Conservation Easement, the organization receiving the interest will be a qualified holder under N.C. Gen. Stat. § 121-34 et seq. and § 170(h) of the Internal Revenue Code, and the Grantee further covenants and agrees that the terms of the transfer or assignment will be such that the transferee or assignee will be required to continue in perpetuity the conservation purposes described in this document.

## **VII. QUIET ENJOYMENT**

Grantor reserves all remaining rights accruing from ownership of the Property, including the right to engage in or permit or invite others to engage in only those uses of the Conservation Easement Area that are expressly reserved herein, not prohibited or restricted herein, and are not inconsistent with the purposes of this Conservation Easement. Without limiting the generality of the foregoing, the Grantor expressly reserves to the Grantor, and the Grantor's invitees and licensees, the right of access to the Conservation Easement Area, and the right of quiet enjoyment of the Conservation Easement Area,

**TO HAVE AND TO HOLD**, the said rights and easements perpetually unto the State of North Carolina for the aforesaid purposes,

**AND** Grantor covenants that Grantor is seized of the Property in fee and has the right to convey the permanent Conservation Easement herein granted; that the same is free from encumbrances and that Grantor will warrant and defend title to the same against the claims of all persons whomsoever.

IN TESTIMONY, WHEREOF, the Grantor has hereunto set his hand and seal, the day and year first above written.

Gloria G. Smith (SEAL)  
Gloria G. Smith, President

Corporate Seal

STATE OF NORTH CAROLINA  
COUNTY OF COLUMBUS

I, Kathy Nobles, a notary Public for said County and State, certify that Gloria G. Smith personally came before me this day and acknowledged that she is President of Wilbur Smith Girls, Inc., a corporation, and that by authority duly given and as the act of the corporation the foregoing instrument was signed in its name by its President and sealed with its corporate seal.

Witness my hand and official seal, this the 21<sup>st</sup> day of February, 2023

(Notary Seal)

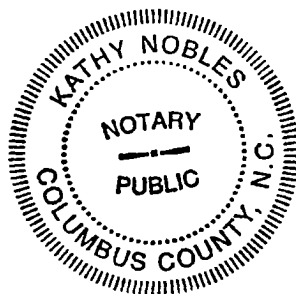
Kathy Nobles

Notary Public

My Commission Expires: 10-19-2023

NORTH CAROLINA COLUMBUS COUNTY  
The foregoing or annexed certificate(s) of

Kathy Nobles  
Notary Public (has) been verified to have a signature, seal or stamp, and an expiration date. This instrument and this certificate are duly registered at the date and time and in the book and page shown on the next page thereof.



Kandance H Bullock  
Register of Deeds

Caroline H Reeves  
By: Asst./Deputy Register of Deeds

Ret-to: Coburn

NCDMS Full Delivery Conservation Easement Template

AG reviewed 11 May 2017

## Exhibit A

### Tract 1:

**All that certain parcel or tract of land located in Bug Hill Township, Columbus County, North Carolina. Being a portion of the lands as described in deed to Wilbur Smith Girls, Inc. as recorded in deed book 320, page 664 and being more particularly described as follows:**

**To located the beginning point, proceed from the intersection of S.R.1006 (Ervin T. Richardson Road) and S.R.1933 (Hoover Ray Road), southwest along S.R.1006 for a distance of 0.64 of a mile to a Mag.Nail set at the point of intersection of the centerline of S.R.1006 and the eastern edge of a soil farm road. Proceed thence with the eastern edge of said soil farm road, this also being the eastern boundary of a proposed 25' ingress/egress easement, the following bearings and distances, S 85-48-47 E 1530.98' to an iron stake set at the head of a ditch. Thence with said ditch S 30-22-45-E 209.36' to an iron stake set. Thence leaving said ditch and crossing said soil farm road, S 68-15-18 W 296.04' to an iron stake set (point #1) this being the point of terminus of the 25' proposed ingress/egress easement, and also the Point and Place of Beginning. Proceed thence from said beginning point S 65-5232 W 546.45' to an iron stake set (point #2). Proceed thence N 16-36-14 W 477.38' to an iron stake set (point #3), thence N 30-11-34 E 63.08' to an iron stake set (point #4), thence N 70-07-01 E 82.71' to an iron stake set (point #5), thence S 80-08-19 E 116.96' to an iron stake set (point #6), thence S 75-34-48 E 109.57' to an iron stake set (point #7), thence S 67-25-24 E 87.79' to an iron stake set (point #8), thence S 52-26-20 E 86.78' to an iron stake set (point #9), thence S 52-13-02 E 169.15' to an iron stake set (point #10), thence S 14-39-55 E 81.91' the beginning containing 4.72 acres.**

**Being all of lot one as shown on a Conservation Easement Survey for the State of North Carolina, Division of Mitigation Services, Cow Branch Stream and Wetland Mitigation Site, dated 16 December 2021, by Samuel Landy Anderson II, PLS.**

**Tract 2:**

**All that certain parcel or tract of land located in Bug Hill Township, Columbus County, North Carolina. Being a portion of the lands as described in deed to Wilbur Smith Girls, Inc. as recorded in deed book 320, page 664 and being more particularly described as follows:**

To located the beginning point, proceed from the intersection of S.R.1006 (Ervin T. Richardson Road) and S.R.1933 (Hoover Ray Road), southwest along S.R.1006 for a distance of 0.64 of a mile to a Mag.Nail set at the point of intersection of the centerline of S.R.1006 and the eastern edge of a soil farm road. Proceed thence with the eastern edge of said soil farm road, this also being the eastern boundary of a proposed 25' ingress/egress easement, the following bearings and distances, S 85-48-47 E 1530.98' to an iron stake set at the head of a ditch. Thence with said ditch S 30-22-45-E 209.36' to an iron stake set. Thence S 30-22-45 E 209.36' to an iron stake set in said ditch. Thence continuing with said ditch S 31-40-59 E 400.58' to an iron stake set in said ditch. Thence leaving said ditch and crossing said soil farm road, S 51-45-29 W 236.52' to an iron stake set (point #27) this being the point of terminus of the 25' proposed ingress/egress easement, and also the Point and Place of Beginning. Proceed thence from said beginning point S 84-47-58 E 98.77' to an iron stake set (point #28). Proceed thence S 44-15-18 E 83.80' to an iron stake set (point #29), thence S 28-10-19 W 126.02' to an iron stake set (point #11), thence S 79-35-55 W 717.78 to an iron stake set (point #12), thence S 09-50-57 W 113.01' to an iron stake set (point #13), thence S 07-07-30 W 26.54' to an iron stake set (point #14), thence S 06-20-51 W 135.32' to an iron stake set (point #15), thence S 07-22-35 W 106.28' to an iron stake set (point #16), thence S 80-07-40 W 1337.86' to an iron stake set (point #17), thence N 28-40-25 W 79.63' to an iron stake set (point #18). Thence N 18-35-17 W 224.23' to an iron stake set (point #19). Thence N 56-25-02 W 99.45' to an iron stake set on the eastern edge of a canal (point # 20), thence along the eastern edge of said canal N 33-09-20 E 148.68' to an iron stake set (point # 21). Thence N 35-41-05 E 98.56' to an iron stake set (point # 22). Thence N 31-22-00 E 229.04' to an iron stake set (point #23). Thence N 18-08-14 E 81.20' to an iron stake set (point # 24) Thence N 82-18-56 E 1266.52' to an iron stake set (point #25). Thence S 83-37-50 E 286.44 to an iron stake set (point # 26). Thence S 84-08-30 E 349.15' to the beginning containing 29.67 acres.

**Being all of lot two as shown on a Conservation Easement Survey for the State of North Carolina, Division of Mitigation Services, Cow Branch Stream and Wetland Mitigation Site, dated 16 December 2021, by Samuel Landy Anderson II, PLS.**

**SCHEDULE "A"**  
**STATE OF NORTH CAROLINA**  
**DESCRIPTION**

Lying and being in Bug Hill Township, Columbus County, North Carolina:

**TRACT ONE:**

All of **Tract 1, containing 4.72 acres**, more or less, as shown and delineated on map entitled, "Conservation Easement Survey for the State of North Carolina Division of Mitigation Services Cow Branch" dated December 16, 2021 prepared by Samuel Landy Anderson, II, PLS. Said map is recorded in Map Book 116, Page 37 of the Columbus County Registry and is incorporated herein by reference for more particularity of description.

**TRACT TWO:**

All of **Tract 2, containing 29.67 acres**, more or less, as shown and delineated on map entitled, "Conservation Easement Survey for the State of North Carolina Division of Mitigation Services Cow Branch" dated December 16, 2021 prepared by Samuel Landy Anderson, II, PLS. Said map is recorded in Map Book 116, Page 37 of the Columbus County Registry and is incorporated herein by reference for more particularity of description.

The property described above is a portion of the Third Tract as conveyed in Deed dated December 29, 1978 from Wilbur M. Smith and wife, Esther Smith to Wilbur Smith Girls, Inc. recorded in Book 320, Page 664 of the Columbus County Registry.

WS

Grantor's Initials

## **Appendix C**

### **Geomorphological Site Data**



## Tributary 1

Geomorphic Parameter	Reference Reach- UT to Bear Pen Swamp		Existing Tributary 1		Proposed Tributary 1	
Rosgen Stream Type*	C6		-		-	
Drainage Area	1.14 square miles		0.3 square miles		0.3 square miles	
NC Regional Curve Discharge	20.1		16.1		16.1	
VA regional Curve Discharge	36.5		5.7		5.7	
Design/Calculated Discharge	25		13.6		13	
<b>Dimension</b>	<b>Riffle</b>	<b>Pool</b>	<b>Riffle</b>	<b>Pool</b>	<b>Riffle</b>	<b>Pool</b>
FP Width (ft)	180.00	180.0	24.80	-	773.00	773.00
BF Width (ft)	24.6	24.5	14.30	Channel has	14.0	18.0
BF Cross Sectional Area (ft <sup>2</sup> )	14.9	23.8	10.50	been	15.0	27.7
BF Mean Depth (ft)	0.6	1.0	0.73	historically	1.10	1.5
BF Max Depth (ft)	1.1	2.1	1.26	modified into	2.00	3.0
Width/Depth Ratio	41.0	25.3	19.55	ditch with	13.10	12.3
Entrenchment Ratio	7.3	7.3	1.74	uniform	55.00	42.0
Wetted Perimeter (ft)	24.8	25.4	14.52	bedform- No	14.60	20.7
Hydraulic radius (ft)	0.6	0.9	0.72	Pools Present.	1.03	1.3
Bank Height Ratio	1.0	1.0	4.00	-	1.00	1.0
Pool Area/Riffle Area	-	1.6	-	-	-	1.85
Max riffle depth/mean riffle depth	1.9	-	-	-	1.82	-
Max pool depth/mean riffle depth	-	2.2	-	-	-	2.73
<b>Substrate</b>						
Description (based on D50)						
D16	Organic detritus and silt.		Organic detritus and silt.		Organic detritus and silt.	
D50						
D84						
<b>Pattern</b>						
	<b>Min</b>	<b>Max</b>	<b>Min</b>	<b>Max</b>	<b>Min</b>	<b>Max</b>
Channel Beltwidth (ft)	25.00	50.00			37.00	83.00
Radius of Curvature (ft)	67.00	76.50	Channel has been		100.00	240.00
Meander Wavelength	161.00	173.00	historically modified		290.00	434.00
Meander Width ratio	1.02	2.03	into straight ditch-		2.64	5.93
Radius of Curvature/Riffle Width (ft)	2.72	5.15	no planform		7.14	16.00
Meander Length Ratio	6.54	7.03	present.		20.71	31.00
Pool Length/Riffle Width	0.69	1.67			13.93	19.14
Pool to Pool Spacing/ Riffle Width	1.54	6.61	-	-	14.50	20.00
<b>Profile</b>						
	<b>Min</b>	<b>Max</b>	<b>Min</b>	<b>Max</b>	<b>Min</b>	<b>Max</b>
Riffle Length (ft)	10.00	25.00	Channel has been historically		18.00	30.00
Pool Length (ft)	17.00	41.00	modified into ditch with		195.00	268.00
Pool to Pool Spacing (ft)	38.00	162.00	uniform bedform.		203.00	280.00
<b>Additional Reach Parameters</b>						
Valley Length (ft)	206.00		2254.00		2196.00	
Channel Length (ft)	219.00		2254.00		2530.00	
Valley Slope (ft/ft)	0.00032		0.00052		0.00052	
Channel Slope (ft/ft)	0.00030		0.0052		0.00045	
Sinuosity	1.06		1.00		1.15	

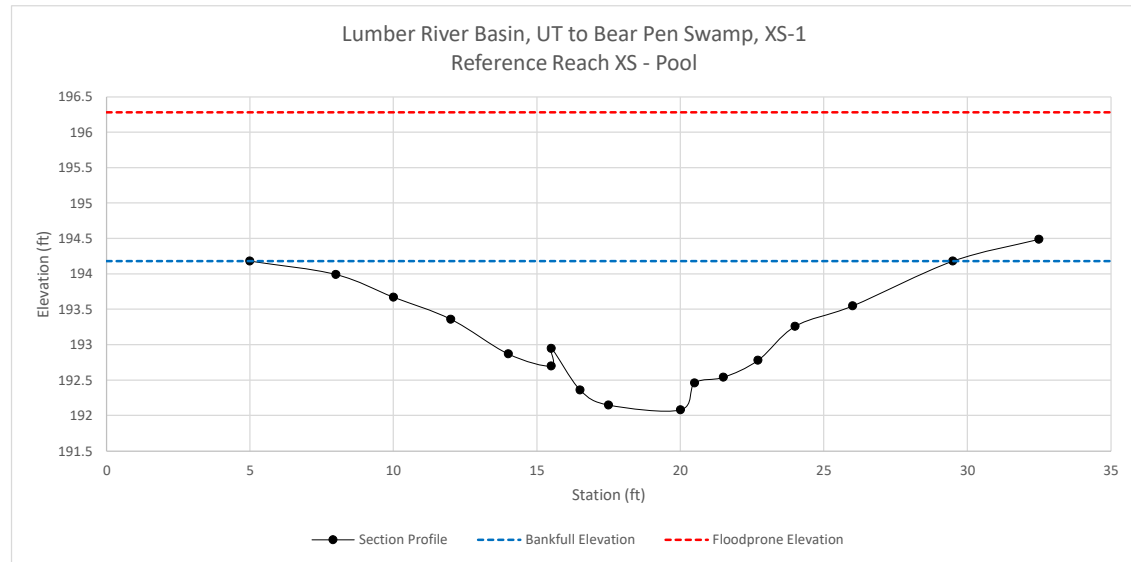
\* Due to the historic nature of the site as a stream-wetland complex, the Rosgen classification system was deemed not applicable to the existing and proposed channel of Tributary 1. Thus, no classification is provided here for this channel.

River Basin:	Lumber
Site	UT to Bear Pen Swamp
XS ID	XS-1, Pool Reference Section
Drainage Area (sq. mi.)	1.14
Date:	June 18th, 2021
Field Crew:	I. Jewell, L. Ward



Station	Elevation
5	194.18
8	193.99
10	193.67
12	193.36
14	192.87
15.5	192.7
15.5	192.95
16.5	192.36
17.5	192.15
20	192.08
20.5	192.46
21.5	192.54
22.7	192.78
24	193.26
26	193.55
29.5	194.18
32.5	194.49

Geomorphic Summary Data	
Bankfull Elevation (ft):	194.18
Bankfull Cross-sectional Area (ft <sup>2</sup> ):	23.77
Bankfull Width (ft):	24.5
Floodprone Area Elevation (ft):	196.28
Floodprone Width (ft):	180
Max Depth at Bankfull (ft):	2.1
Mean Depth at Bankfull (ft):	0.97
W/D Ratio:	25.26
Entrenchment Ratio:	7.35
Bank Height Ratio:	1.00

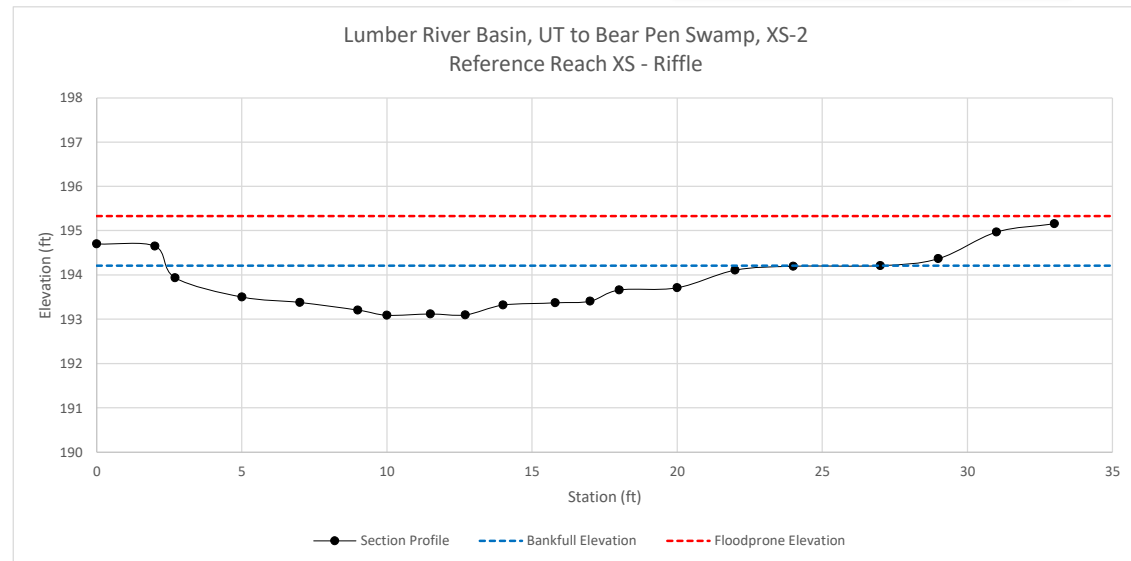


<b>River Basin:</b>	Lumber
<b>Site</b>	UT to Bear Pen Swamp
<b>XS ID</b>	XS-2, Riffle Reference Section
<b>Drainage Area (sq. mi.)</b>	1.14
<b>Date:</b>	June 18th, 2021
<b>Field Crew:</b>	I. Jewell, L. Ward



Station	Elevation
0	194.7
2	194.65
2.7	193.94
5	193.5
7	193.38
9	193.21
10	193.09
11.5	193.12
12.7	193.1
14	193.32
15.8	193.37
17	193.41
18	193.66
20	193.71
22	194.11
24	194.2
27	194.21
29	194.37
31	194.97
33	195.16

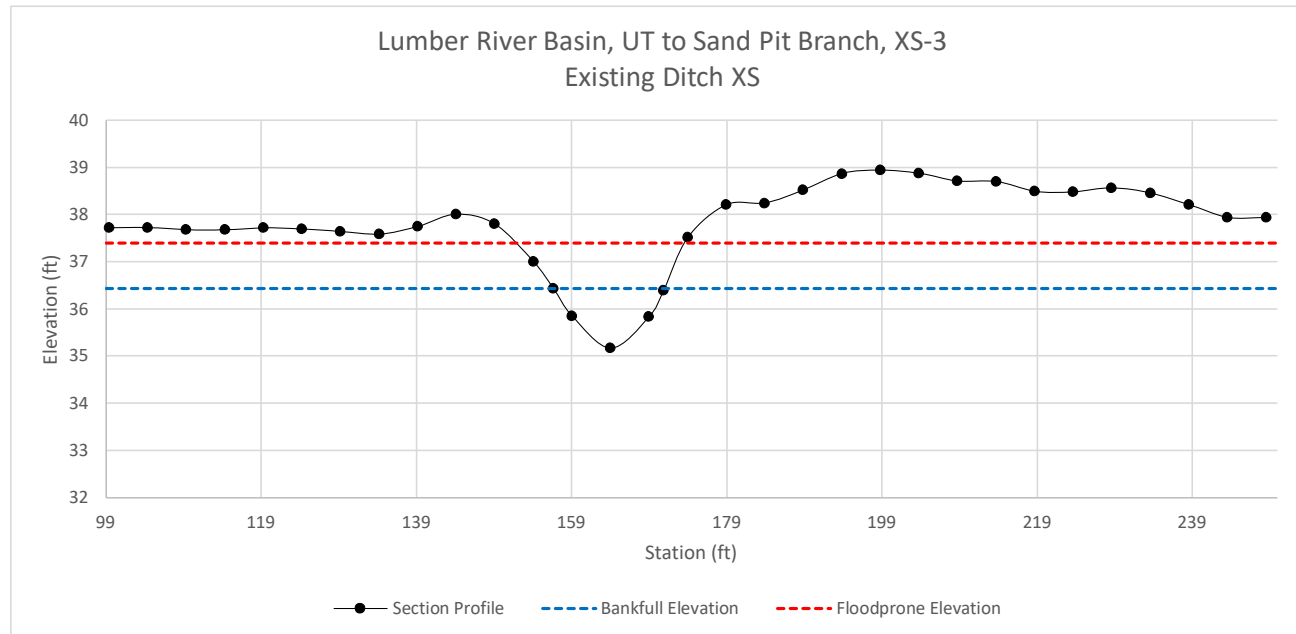
Geomorphic Summary Data	
<b>Bankfull Elevation (ft):</b>	194.21
<b>Bankfull Cross-sectional Area (ft<sup>2</sup>):</b>	14.86
<b>Bankfull Width (ft):</b>	24.57
<b>Floodprone Area Elevation (ft):</b>	195.33
<b>Floodprone Width (ft):</b>	180
<b>Max Depth at Bankfull (ft):</b>	1.12
<b>Mean Depth at Bankfull (ft):</b>	0.6
<b>W/D Ratio:</b>	40.95
<b>Entrenchment Ratio:</b>	7.33
<b>Bank Height Ratio:</b>	1.00



<b>River Basin:</b>	Lumber
<b>Site</b>	UT to Sand Pit Branch- Project Reach
<b>XS ID</b>	XS-3, Existing Ditch Section
<b>Drainage Area (sq. mi.)</b>	0.32
<b>Date:</b>	May 20th, 2021
<b>Field Crew:</b>	I. Jewell, B. Dick

Station	Elevation
99.409	37.7181
104.379	37.7263
109.35	37.6825
114.321	37.6802
119.291	37.7165
124.261	37.6966
129.232	37.6439
134.202	37.5889
139.173	37.7507
144.143	38.0109
149.114	37.8055
154.084	37.0017
156.68	36.43
159.054	35.8558
164.025	35.1663
168.995	35.8343
170.84	36.39
173.966	37.5148
178.936	38.2139
183.907	38.2455
188.877	38.5228
193.848	38.87
198.818	38.948
203.789	38.8834
208.759	38.7109
213.729	38.7035
218.7	38.4945
223.67	38.4813
228.641	38.5705
233.611	38.4593
238.582	38.2132
243.552	37.9458
248.523	37.9444

Geomorphic Summary Data	
<b>Bankfull Elevation (ft):</b>	36.43
<b>Bankfull Cross-sectional Area (ft<sup>2</sup>):</b>	10.46
<b>Bankfull Width (ft):</b>	14.27
<b>Floodprone Area Elevation (ft):</b>	37.4
<b>Floodprone Width (ft):</b>	180
<b>Max Depth at Bankfull (ft):</b>	1.26
<b>Mean Depth at Bankfull (ft):</b>	0.73
<b>W/D Ratio:</b>	19.55
<b>Entrenchment Ratio:</b>	3.25
<b>Bank Height Ratio:</b>	4.00



**NC DWQ Stream Identification Form Version 4.11**

<b>Date:</b> 5/9/2021	<b>Project/Site:</b> Cow Branch Mitigation Site	<b>Latitude:</b> 34.13716
<b>Evaluator:</b> J. Steele	<b>County:</b> Columbus	<b>Longitude:</b> -78.64807
<b>Total Points:</b> <i>Stream is at least intermittent if ≥ 19 or perennial if ≥ 30*</i>	<b>Stream Determination:</b>  <b>Perennial</b>	<b>Other</b> <b>Stream Name:</b> UT to Sandpit Branch (Trib 1)
<b>32</b>		

	Absent	Weak	Moderate	Strong
1. 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	

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

A. Geomorphology Subtotal 16

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	

B. Hydrology Subtotal 9

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			0

\*perennial streams may also be identified using other methods.

C. Biology Subtotal 7

Notes:

---

Sketch:

**NC SAM Stream Rating Sheet**  
**Accompanies User Manual Version 2.1**

Stream Site Name Cow Branch  
 Stream Category Ia2

Date of Evaluation 5/9/2021  
 Assessor Name/Organization Freese and Nichols

Notes of Field Assessment Form (Y/N) NO  
 Presence of regulatory considerations (Y/N) NO  
 Additional stream information/supplementary measurements included (Y/N) NO  
 NC SAM feature type (perennial, intermittent, Tidal Marsh Stream) Perennial

<b>Function Class Rating Summary</b>	<b>USACE/ All Streams</b>	<b>NCDWR Intermittent</b>
(1) Hydrology	<b>LOW</b>	
(2) Baseflow	<b>HIGH</b>	
(2) Flood Flow	<b>LOW</b>	
(3) Streamside Area Attenuation	<b>LOW</b>	
(4) Floodplain Access	<b>LOW</b>	
(4) Wooded Riparian Buffer	<b>LOW</b>	
(4) Microtopography	<b>LOW</b>	
(3) Stream Stability	<b>LOW</b>	
(4) Channel Stability	<b>MEDIUM</b>	
(4) Sediment Transport	<b>LOW</b>	
(4) Stream Geomorphology	<b>LOW</b>	
(2) Stream/Intertidal Zone Interaction	NA	
(2) Longitudinal Tidal Flow	NA	
(2) Tidal Marsh Stream Stability	NA	
(3) Tidal Marsh Channel Stability	NA	
(3) Tidal Marsh Stream Geomorphology	NA	
(1) Water Quality	<b>LOW</b>	
(2) Baseflow	<b>HIGH</b>	
(2) Streamside Area Vegetation	<b>LOW</b>	
(3) Upland Pollutant Filtration	<b>LOW</b>	
(3) Thermoregulation	<b>LOW</b>	
(2) Indicators of Stressors	<b>YES</b>	
(2) Aquatic Life Tolerance	<b>HIGH</b>	
(2) Intertidal Zone Filtration	NA	
(1) Habitat	<b>LOW</b>	
(2) In-stream Habitat	<b>LOW</b>	
(3) Baseflow	<b>HIGH</b>	
(3) Substrate	<b>LOW</b>	
(3) Stream Stability	<b>MEDIUM</b>	
(3) In-stream Habitat	<b>LOW</b>	
(2) Stream-side Habitat	<b>LOW</b>	
(3) Stream-side Habitat	<b>LOW</b>	
(3) Thermoregulation	<b>LOW</b>	
(2) Tidal Marsh In-stream Habitat	NA	
(3) Flow Restriction	NA	
(3) Tidal Marsh Stream Stability	NA	
(4) Tidal Marsh Channel Stability	NA	
(4) Tidal Marsh Stream Geomorphology	NA	
(3) Tidal Marsh In-stream Habitat	NA	
(2) Intertidal Zone Habitat	NA	
<b>Overall</b>	<b>LOW</b>	

## **Appendix D**

### **Jurisdictional Determination Information**

**U.S. ARMY CORPS OF ENGINEERS  
WILMINGTON DISTRICT**

Action Id. SAW-2021-00822

County: Columbus County

**NOTIFICATION OF JURISDICTIONAL DETERMINATION**

**Property Owner/Applicant:** Wilbur Smith Girls, Inc.  
**Address:** PO Box 2493  
Shallotte, NC 28459

**Telephone Number:** 910-880-4092

Size (acres) 34  
Nearest Waterway Sand Pit Branch  
USGS HUC 03020301

Nearest Town Nakina  
River Basin Lumber River  
Coordinates:  
Latitude: 34.1371  
Longitude: -78.6482

Location description: The Property is near 3162 Ervin T. Richardson Rd. Nakina, NC, PIN# 1104.00-60-9568.00. The applicant proposes to construct an in-lieu fee stream and wetland mitigation on behalf of the North Carolina Division of Mitigation Services (NCDMS) at the Cow Branch Mitigation Site in Columbus County.

**Indicate Which of the Following Apply:**

**A. Preliminary Determination**

- There appear to be waters, including wetlands, on the above described property, that may be subject to Section 404 of the Clean Water Act (CWA)(33 USC § 1344) and/or Section 10 of the Rivers and Harbors Act (RHA) (33 USC § 403). The waters, including wetlands, have been delineated, and the delineation has been verified by the Corps to be sufficiently accurate and reliable. Therefore this preliminary jurisdiction determination may be used in the permit evaluation process, including determining compensatory mitigation. For purposes of computation of impacts, compensatory mitigation requirements, and other resource protection measures, a permit decision made on the basis of a preliminary JD will treat all waters and wetlands that would be affected in any way by the permitted activity on the site as if they are jurisdictional waters of the U.S. This preliminary determination is not an appealable action under the Regulatory Program Administrative Appeal Process (Reference 33 CFR Part 331). However, you may request an approved JD, which is an appealable action, by contacting the Corps district for further instruction.
- There appear to be waters, including wetlands, on the above described property, that may be subject to Section 404 of the Clean Water Act (CWA)(33 USC § 1344) and/or Section 10 of the Rivers and Harbors Act (RHA) (33 USC § 403). The waters, including wetlands, have been delineated, and the delineation has been verified by the Corps to be sufficiently accurate and reliable. Therefore this preliminary jurisdiction determination may be used in the permit evaluation process, including determining compensatory mitigation. For purposes of computation of impacts, compensatory mitigation requirements, and other resource protection measures, a permit decision made on the basis of a preliminary JD will treat all waters and wetlands that would be affected in any way by the permitted activity on the site as if they are jurisdictional waters of the U.S. This preliminary determination is not an appealable action under the Regulatory Program Administrative Appeal Process (Reference 33 CFR Part 331). However, you may request an approved JD, which is an appealable action, by contacting the Corps district for further instruction.
- There appear to be waters, including wetlands, on the above described property, that may be subject to Section 404 of the Clean Water Act (CWA)(33 USC § 1344) and/or Section 10 of the Rivers and Harbors Act (RHA) (33 USC § 403). However, since the waters, including wetlands, have not been properly delineated, this preliminary jurisdiction determination may not be used in the permit evaluation process. Without a verified wetland delineation, this preliminary determination is merely an effective presumption of CWA/RHA jurisdiction over all of the waters, including wetlands, at the project area, which is not sufficiently accurate and



reliable to support an enforceable permit decision. We recommend that you have the waters of the U.S., including wetlands, on your property delineated. As the Corps may not be able to accomplish this wetland delineation in a timely manner, you may wish to obtain a consultant to conduct a delineation that can be verified by the Corps.

## **B. Approved Determination**

- There are Navigable Waters of the United States within the above described property subject to the permit requirements of Section 10 of the Rivers and Harbors Act (RHA) (33 USC § 403) and Section 404 of the Clean Water Act (CWA)(33 USC § 1344). Unless there is a change in law or our published regulations, this determination may be relied upon for a period not to exceed five years from the date of this notification.
- There are waters of the U.S., including wetlands, on the above described property subject to the permit requirements of Section 404 of the Clean Water Act (CWA) (33 USC § 1344). Unless there is a change in law or our published regulations, this determination may be relied upon for a period not to exceed five years from the date of this notification.
  - We recommend you have the waters of the U.S., including wetlands, on your property delineated. As the Corps may not be able to accomplish this wetland delineation in a timely manner, you may wish to obtain a consultant to conduct a delineation that can be verified by the Corps.
  - The waters of the U.S., including wetlands, on your property have been delineated and the delineation has been verified by the Corps. We strongly suggest you have this delineation surveyed. Upon completion, this survey should be reviewed and verified by the Corps. Once verified, this survey will provide an accurate depiction of all areas subject to CWA jurisdiction on your property which, unless there is a change in law or our published regulations, may be relied upon for a period not to exceed five years from the date of this notification.
  - The waters of the U.S., including wetlands, have been delineated and surveyed and are accurately depicted on the plat signed by the Corps Regulatory Official identified below on \_\_\_\_\_. Unless there is a change in law or our published regulations, this determination may be relied upon for a period not to exceed five years from the date of this notification.
- There are no waters of the U.S., to include wetlands, present on the above described property which are subject to the permit requirements of Section 404 of the Clean Water Act (33 USC 1344). Unless there is a change in law or our published regulations, this determination may be relied upon for a period not to exceed five years from the date of this notification.
- The property is located in one of the 20 Coastal Counties subject to regulation under the Coastal Area Management Act (CAMA). You should contact the Division of Coastal Management in Morehead City, NC, at (252) 808-2808 to determine their requirements.

Placement of dredged or fill material within waters of the US, including wetlands, without a Department of the Army permit may constitute a violation of Section 301 of the Clean Water Act (33 USC § 1311). Placement of dredged or fill material, construction or placement of structures, or work within navigable waters of the United States without a Department of the Army permit may constitute a violation of Sections 9 and/or 10 of the Rivers and Harbors Act (33 USC § 401 and/or 403). If you have any questions regarding this determination and/or the Corps regulatory program, please contact **Thomas Charles at (910) 251-4101 or thomas.p.charles@usace.army.mil**.

**C. Basis For Determination: N/A. An Approved JD has not been completed.**

**D. Remarks: The project area exhibits wetland criteria as described in the 1987 Corps Wetland Delineation Manual and appropriate Regional Supplement. This determination is based on information submitted by Freese & Nichols, Inc and a Site visit by Jason Steele & Thomas Charles on 4/14/ 2022.**

**This determination is only for the project area Exhibit 1, Cow Branch Stream and Wetland Mitigation Site WOTUS Features NCDMS Project #: 100151 dated 2/10/2022.**

**E. Attention USDA Program Participants**

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 and/or jurisdictional determination 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.

**F. Appeals Information for Approved Jurisdiction Determinations (as indicated in Section B. above)**


If you object to this determination, you may request an administrative appeal under Corps regulations at 33 CFR Part 331. Enclosed you will find a Notification of Appeal Process (NAP) fact sheet and Request for Appeal (RFA) form. If you request to appeal this determination you must submit a completed RFA form to the following address:

US Army Corps of Engineers  
South Atlantic Division  
Attn: Mr. Philip A. Shannin  
Administrative Appeal Review Officer  
60 Forsyth Street SW, Floor M9  
Atlanta, Georgia 30303-8803

**AND**  
[PHILIP.A.SHANNIN@USACE.ARMY.MIL](mailto:PHILIP.A.SHANNIN@USACE.ARMY.MIL)

In order for an RFA to be accepted by the Corps, the Corps must determine that it is complete, that it meets the criteria for appeal under 33 CFR part 331.5, and that it has been received by the Division Office within 60 days of the date of the NAP. Should you decide to submit an RFA form, it must be received at the above address by **N/A**. **It is not necessary to submit an RFA form to the Division Office if you do not object to the determination in this correspondence.**

Corps Regulatory Official: **Thomas Charles**

 Digitally signed by Thomas Charles  
Date: 2022.07.11 19:05:23 -04'00'

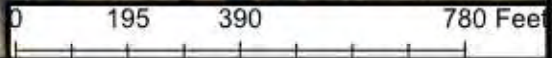
Date of JD: **7/11/2022** Expiration Date: **N/A**

The Wilmington District is committed to providing the highest level of support to the public. To help us ensure we continue to do so, please complete our Customer Satisfaction Survey, located online at <https://regulatory.ops.usace.army.mil/customer-service-survey/>.

Copy Furnished:  
**Jason Steele, PhD, PWS**  
**Environmental Scientist**  
**Freese & Nichols, Inc.**



Date: February 10, 2022



**Legend**

- DP-NR
- DP-R
- Easement Boundary
- S01
- S02



531 N Liberty St  
Winston-Salem, NC 27101



**Exhibit 1**  
**Cow Branch**  
**Stream and Wetland Mitigation Site**  
**WOTUS Features**  
**NCDCMS Project #: 100151**

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

**BACKGROUND INFORMATION**

**A. REPORT COMPLETION DATE FOR PJD:**

**B. NAME AND ADDRESS OF PERSON REQUESTING PJD:** Jason Steele, 531 N. Liberty St, Winston-Salem, NC 27101

**C. DISTRICT OFFICE, FILE NAME, AND NUMBER:** SAW-2021-00822

**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: Columbus City:

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

Lat.: 34.1371 Long.: -78.6482

Universal Transverse Mercator:

Name of nearest waterbody: Sand Pit Branch

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

Office (Desk) Determination. Date: 2/1/2022

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)
S01	34.1371	-78.6480	2283.2	Non-wetland water	Section 404
S02	34.1377	-78.6507	646.5	Non-wetland water	Section 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: \_\_\_\_\_.
- Natural Resources Conservation Service Soil Survey. Citation: \_\_\_\_\_.
- 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): Most recent available, State of NC (accessed 2021) \_\_\_\_\_.  
or  Other (Name & Date): \_\_\_\_\_.
- Previous determination(s). File no. and date of response letter: \_\_\_\_\_.
- Other information (please specify): \_\_\_\_\_.

**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.**

Thomas Charles Digitally signed by Thomas Charles  
Date: 2022.07.11 19:06:16 -04'00'

\_\_\_\_\_  
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>

<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.

## **Appendix E**

### **Hydric Soils Information**

**ACER**



Environmental, L.L.C.

## **GLORIA SMITH TRACTS**

### **Hydric Soil Investigation**

#### **Executive Summary**

The Gloria Smith Tracts are located near the Town of Whiteville, Columbus County, North Carolina. A site investigation was undertaken to determine the presence/absence of hydric soils within two areas of this property, located in pasture fields. The investigation was conducted by NC Licensed Soil Scientist, Jan Gay (#1158) on 11 December 2020. Two areas of hydric soil were identified, totaling approximately 35.8 acres.

#### **Introduction**

The Gloria Smith tracts are located within pasture land near the Town of Whiteville, Columbus County, North Carolina. Two areas are being considered as a wetland mitigation area. The investigated areas of this property, totaling approximately 35.8 acres, were targeted for the hydric soil investigation. This report outlines key personnel, methodology, and results.

The investigation areas are located within two separate active pasture fields, with a relatively flat landscape.

#### **Key Personnel**

Mr. Jan Gay, NC Licensed Soil Scientist #1158, conducted the hydric soil delineation. Mr. Gay has been a Licensed Soil Scientist for more than 23 years, as well as a professional ecologist. Mr. Gay has conducted jurisdictional wetland delineations for more than 25 years, across 7 states.

#### **Methods**

The field investigation centered on identification of soil characteristics following criteria set forth by the USDA Natural Resources Conservation Service *Field Indicators of Hydric Soils in the United States* Version 8.2 (USDA 2018). Soil characteristics evaluated include horizon depth, soil texture, moist soil color (determined using a Munsell color chart), and identification of any other soil features (redoximorphic concentrations, depletions, Mn concentrations, *etc.*).

The field investigation was conducted using a hand auger to evaluate the soil profile across each review area. The investigation area was subjected to a pedestrian survey, with a hand auger evaluation conducted in areas deemed likely to contain hydric soils. The hand auger evaluation was conducted to a depth of 3 feet, or until a hydric soil indicator was identified. After a hydric soil had been identified in the field, a series of soil borings were conducted on a closer spacing, to establish a boundary for a hydric soil unit. A transect of soil borings was conducted, beginning within the hydric soil unit, and continued until a non-hydric soil was encountered or the project area boundary was reached. Flagging tape was hung at this boundary and location data was collected, using a hand held Garmin GPSMAP 64st, which is a non-survey grade unit. The gps data was used to approximate hydric soil unit boundaries.

Prior to initiation of the field effort, available resources were reviewed, including available NRCS online soil mapping and USGS topographic mapping. One soil mapping unit is shown as present within the study



areas, Grifton fine sandy loam. The Grifton soil series is very deep, poorly drained soil found on uplands, stream terraces and floodplains in the Coastal Plain.

**Results**

Two areas of hydric soil were delineated. The hydric soil areas were large, contiguous areas, as expected in a Coastal Plain setting.

Hydric Soil Site 1 is approximately 31 acres in areal extent. Soils within this area have been impacted by agricultural practices, with rutting and compaction from cattle use. The entire reviewed area was determined to be hydric soil, with Depleted Matrix as the hydric soil indicator.

Hydric Soil Site 2 is approximately 4.8 acres in areal extent. This site mapped as containing the Portsmouth soil series. Soils within this area have been impacted by agricultural practices. The entire reviewed area was determined to contain hydric soils, with Thick Dark Surface as the hydric soil indicator.

On 11 December 2020, I conducted the soil evaluation within the Gloria Smith Tracts and delineated the hydric soil boundaries as shown in this report.



**LEGEND**

**1 – Approximate soil boring location**

1006



Site 2



Site 1

Google Earth

©2020 Google



1000 ft

SSURGO | nc019,nc047,sc051 | 0.19 seconds | 0.8 cache ratio | BBOX:(-78.6566, 34.1345) (-78.6411, 34.1416) | 282 acres

**LEGEND**

**Gr – Grifton fine sandy loam**

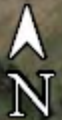
1006

Pe

Gr

Ly  
Google Earth

©2020 Google



1000 ft



Soil Borings	Site 1		
1			Hydric Soil Indicator: Depleted Matrix
Depth (inches)	Color	Texture	Notes
0-8	10YR 2/2	Sandy loam	
8-16	10YR 5/1	Loamy sand	
2			Hydric Soil Indicator: Depleted Matrix
Depth (inches)	Color	Texture	Notes
0-8	10YR 2/1	Sandy loam	
8-14	10YR 5/1	Sandy loam	
3			Hydric Soil Indicator: Depleted Matrix
Depth (inches)	Color	Texture	Notes
0-5	10YR 3/2	Sandy loam	
5-14	10YR 5/1	Sandy clay loam	
4			Hydric Soil Indicator: Depleted Matrix
Depth (inches)	Color	Texture	Notes
0-8	10YR 5/2	Sandy clay loam	
8-14	10YR 5/1	Sandy clay loam	
5			Hydric Soil Indicator: Depleted Matrix
Depth (inches)	Color	Texture	Notes
0-5	10YR 2/2	Sandy Loam	
5-14	10YR 5/1	Sandy Loam	5% 10YR 5/4 concentrations in matrix
6			Hydric Soil Indicator: Depleted Matrix
Depth (inches)	Color	Texture	Notes
0-8	10YR 2/2	Sandy loam	
8-14	10YR 5/2	Sandy clay loam	5% 10YR 5/4 concentrations in the matrix
7			Hydric Soil Indicator: Depleted Matrix
Depth (inches)	Color	Texture	Notes
0-15	10YR 5/2	Sandy clay loam	2% 10YR 5/4 concentrations in the matrix
8			Hydric Soil Indicator: Depleted Matrix
Depth (inches)	Color	Texture	Notes
0-14	10YR 5/2	Sandy clay loam	2% 10YR 5/4 concentrations in matrix
Soil Borings	Site 2		
9			Hydric Soil Indicator: Depleted Matrix
Depth (inches)	Color	Texture	Notes
0-4	10YR 3/2	Sandy loam	
4-14	10YR 5/1	Sand	5% 10YR 5/6 concentrations in the matrix

10			Hydric Soil Indicator: Depleted Matrix
Depth (inches)	Color	Texture	Notes
0-2	10YR 5/2	Loamy sand	
2-14	10YR 5/1	Sand	5% 10YR 5/6 concentrations in the matrix

11			Hydric Soil Indicator: Depleted Matrix
Depth (inches)	Color	Texture	Notes
0-3	10YR 3/2	Sandy loam	
3-18	10YR 5/2	Loamy sand	2% 10YR 5/4 concentrations in the matrix

12			Hydric Soil Indicator: Depleted Matrix
Depth (inches)	Color	Texture	Notes
0-6	10YR 2/1	Sandy loam	
6-16	10YR 5/1	Sandy loam	5% 10YR 5/6 concentrations in the matrix

## **Appendix F**

### **DMS Floodplain Requirements Checklist**



## DMS Floodplain Requirements Checklist

This form was developed by the National Flood Insurance program, NC Floodplain Mapping program and 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.

### Project Location

Name of project:	Cow Branch Mitigation Site
Name if stream or feature:	Unnamed Tributary to Sand Pit Branch
County:	Columbus County
Name of river basin:	Lumber
Is project urban or rural?	Rural
Name of Jurisdictional municipality/county:	Columbus County
DFIRM panel number for entire site:	3720110200K, 3720110400K
Consultant name:	Freese and Nichols, Inc.
Phone number:	919-582-5852
Address:	531 N Liberty St. Winston-Salem, NC 27101

## Design Information

Provide a general description of project (one paragraph). Include project limits on a reference orthophotograph at a scale of 1" = 500".

The Cow Branch Mitigation Site (hereafter referred to as the "Site") is located approximately 1.5 miles due east of Nakina and 11 miles southwest of Lake Waccamaw, North Carolina. The Site is accessed from Ervin T Richardson Rd (SR 1006) and Site centroid coordinates are 34.1374, -78.6482 (**Figure 1**). The Site lies within the Lumber River Basin, United States Geological Survey (USGS) hydrologic unit code (HUC) 03040206, and 14-digit HUC 03040206060010. An unnamed tributary of Sand Pit Branch flows through the project limits and will be restored as part of the project. While not included in any Local Watershed Plans (LWPs), the project site is in Targeted Local Watershed (TLW) 03040206060010 (Gore Creek) and is discussed in the Lumber River Basin Restoration Plan (RBRP). The streams and wetlands throughout the Site are in various stages of impairment related to existing and historical land uses, including current agricultural uses. The project proposes to restore approximately 2,001 linear feet (LF) of perennial streams to provide 2,530 stream mitigation units (SMU). Approximately 18.0 acres of riparian wetlands and 4 acres of non-riparian wetlands will be re-established for 18.0 riparian wetland mitigation units (WMU) and 4.0 non-riparian WMU. The Site will be protected in perpetuity by an approximately 34-acre easement.

Summarize stream reaches or wetland areas according to their restoration priority.

Reach	Length/Area	Priority
<i>Tributary 1</i>	<i>2500 lf</i>	<i>One (Restoration)</i>
<i>Non-Riparian Wetland</i>	<i>4.0 ac</i>	<i>Reestablishment</i>
<i>Riparian Wetland</i>	<i>1.1 ac</i>	<i>Reestablishment</i>
<i>Riparian Wetland</i>	<i>4.8 ac</i>	<i>Reestablishment</i>
<i>Riparian Wetland</i>	<i>1.4 ac</i>	<i>Reestablishment</i>
<i>Riparian Wetland</i>	<i>11.1 ac</i>	<i>Reestablishment</i>

## Floodplain Information

<p>Is project located in a Special Flood Hazard Area (SFHA)?</p> <p><input checked="" type="checkbox"/> Yes                      <input type="checkbox"/> No</p>
<p>If project is located in a SFHA, check how it was determined:</p> <p><input type="checkbox"/> Redelineation</p> <p><input checked="" type="checkbox"/> Detailed Study</p> <p><input type="checkbox"/> Limited Detail Study</p> <p><input type="checkbox"/> Approximate Study</p> <p><input type="checkbox"/> Don't know</p>
<p>List flood zone designation: AE Zone with BFE</p>



Check if applies:

AE Zone

Floodway

Non-Encroachment

None

A Zone

Local Setbacks Required

No Local Setbacks Required

If local setbacks are required, list how many feet: No local setbacks required.

Does proposed channel boundary encroach outside floodway/non-encroachment/setbacks?

Yes

No

Land Acquisition (Check)

State owned (fee simple)

Conservation easment (Design Bid Build)

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

Is community/county participating in the NFIP program?

Yes

No

Note: if community is not participating, then all requirements should be addressed to NFIP (attn: Steve Garrett, (919) 715-5711 x118)

Name of Local Floodplain Administrator: Gary Lanier

Phone Number: (910) 640-2851

## 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: Emily D. Brown, PE Signature: Emily D. Brown

Title: Project Engineer Date: March 14, 2022

## Emily Brown

---

**From:** Bridgette Spann <bridgette.spann@columbusco.org>  
**Sent:** Tuesday, June 7, 2022 3:34 PM  
**To:** Emily Brown  
**Subject:** RE: [External] Floodplain Permit Application - No Rise for Cow Branch Project

This is an email from an EXTERNAL source. DO NOT click links or open attachments without positive sender verification of purpose. Never enter USERNAME, PASSWORD or sensitive information on linked pages from this email. Please report all suspicious messages using the Report Message button in Outlook.

As far as I know there is nothing else you need from us. Thank you

---

**From:** Emily Brown [mailto:Emily.Brown@freese.com]  
**Sent:** Tuesday, June 7, 2022 2:58 PM  
**To:** Bridgette Spann <bridgette.spann@columbusco.org>  
**Subject:** RE: [External] Floodplain Permit Application - No Rise for Cow Branch Project

Thank you Bridgette!

I just put the check in the mail so hopefully you get it within the week. Is there anything else I need to do or fill out?

Thank you,  
Emil

*Emily D. Brown, PE, ENVSP, CFM  
Engineer V*

---

**From:** Bridgette Spann <[bridgette.spann@columbusco.org](mailto:bridgette.spann@columbusco.org)>  
**Sent:** Tuesday, June 7, 2022 1:48 PM  
**To:** Emily Brown <[Emily.Brown@freese.com](mailto:Emily.Brown@freese.com)>  
**Subject:** RE: [External] Floodplain Permit Application - No Rise for Cow Branch Project

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Hi Ms. Brown,  
Here is a copy of the Floodplain Permit for your records. There is a \$50.00 application fee for this document. We only accept checks and cash. If writing a check, please make payable to Columbus County Planning Department at 127 W. Webster St. Whiteville, NC 28742. If you have any questions, please do not hesitate to contact us. Thank you

---

**From:** Emily Brown [mailto:Emily.Brown@freese.com]  
**Sent:** Monday, June 6, 2022 2:45 PM  
**To:** Bridgette Spann <[bridgette.spann@columbusco.org](mailto:bridgette.spann@columbusco.org)>  
**Subject:** RE: [External] Floodplain Permit Application - No Rise for Cow Branch Project

Thank you Bridgette. Please let me know if you have any questions or need any other information.

Thanks,

Emily

*Emily D. Brown, PE, ENVSP, CFM  
Engineer V*

---

**From:** Bridgette Spann <[bridgette.spann@columbusco.org](mailto:bridgette.spann@columbusco.org)>  
**Sent:** Monday, June 6, 2022 2:31 PM  
**To:** Emily Brown <[Emily.Brown@freese.com](mailto:Emily.Brown@freese.com)>  
**Subject:** RE: [External] Floodplain Permit Application - No Rise for Cow Branch Project

You don't often get email from [bridgette.spann@columbusco.org](mailto:bridgette.spann@columbusco.org). [Learn why this is important](#)

This is an email from an EXTERNAL source. DO NOT click links or open attachments without positive sender verification of purpose. Never enter USERNAME, PASSWORD or sensitive information on linked pages from this email. Please report all suspicious messages using the Report Message button in Outlook.

Good Afternoon Ms. Brown,  
I have received your documents today from Gary Lanier. Please allow me a moment to review. I will contact you with any questions before end of day today. Thank you

---

**From:** Gary Lanier [<mailto:glanier@columbusco.org>]  
**Sent:** Monday, June 6, 2022 2:15 PM  
**To:** Bridgette Spann <[bridgette.spann@columbusco.org](mailto:bridgette.spann@columbusco.org)>  
**Subject:** FW: [External] Floodplain Permit Application - No Rise for Cow Branch Project

---

**From:** Emily Brown [<mailto:Emily.Brown@freese.com>]  
**Sent:** Monday, March 28, 2022 4:53 PM  
**To:** [glanier@columbusco.org](mailto:glanier@columbusco.org)  
**Cc:** Ian Jewell <[ian.jewell@freese.com](mailto:ian.jewell@freese.com)>  
**Subject:** [External] Floodplain Permit Application - No Rise for Cow Branch Project

Hi Gary,

My name is Emily Brown and I work for Freese and Nichols, Inc. We have a stream restoration mitigation project in your county that falls within a FEMA-mapped floodplain. Attached to this email are the following documents related to floodplain impacts:

1. Columbus County Floodplain Permit Application
2. No Rise Report
3. Signed No-Rise Certification

I apologize if you are the incorrect recipient of this information. If that is the case, could you please provide me with the correct contact information for the County Floodplain Administrator. Please let me know if you have any questions or need any additional information.

Thank you,  
Emily

**Emily D. Brown, PE, ENVSP, CFM  
Engineer V**

## **Appendix G**

### **Approved FHWA Categorical Exclusion**

Appendix A

Categorical Exclusion Form for Division of Mitigation Services Projects  
Version 2

**Note: Only Appendix A should be submitted (along with any supporting documentation) as the environmental document.**

Part 1: General Project Information	
<b>Project Name:</b>	Cow Branch Mitigation Site
<b>County Name:</b>	Columbus County
<b>DMS Number:</b>	100196
<b>Project Sponsor:</b>	Freese and Nichols, Inc.
<b>Project Contact Name:</b>	Ian Jewell
<b>Project Contact Address:</b>	531 N. Liberty St, Winston-Salem, NC 27101
<b>Project Contact E-mail:</b>	Ian.Jewell@freese.com
<b>DMS Project Manager:</b>	Kelly Phillips
Project Description	
<p>The Middendorf Springs Mitigation Site is a stream and wetland mitigation project located approximately 10 miles south of Wadesboro and 5 miles east of Lowrys in Anson County, NC. The project includes 6 unnamed tributaries to South Fork Jones Creek for a total of more than 14,000 linear feet of stream and associated wetlands. The site has historically been managed for timber and is currently managed for row crop agriculture. The project will provide stream and wetland mitigation units to the Division of Mitigation Services in the Yadkin Pee-Dee River Basin (03040201).</p>	
For Official Use Only	
<b>Reviewed By:</b>	
<i>8/30/2021</i>	<i>Kelly Phillips</i>
<b>Date</b>	<b>DMS Project Manager</b>
<b>Conditional Approved By:</b>	
<b>Date</b>	<b>For Division Administrator FHWA</b>
<input type="checkbox"/> Check this box if there are outstanding issues	
<b>Final Approval By:</b>	
<i>8-31-21</i>	<i>Donald W Brew</i>
<b>Date</b>	<b>For Division Administrator FHWA</b>

Part 2: All Projects Regulation/Question		Response
<b>Coastal Zone Management Act (CZMA)</b>		
1. Is the project located in a CAMA county?		<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
2. Does the project involve ground-disturbing activities within a CAMA Area of Environmental Concern (AEC)?		<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A
3. Has a CAMA permit been secured?		<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A
4. Has NCDPCM agreed that the project is consistent with the NC Coastal Management Program?		<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A
<b>Comprehensive Environmental Response, Compensation and Liability Act (CERCLA)</b>		
1. Is this a "full-delivery" project?		<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
2. Has the zoning/land use of the subject property and adjacent properties ever been designated as commercial or industrial?		<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A
3. As a result of a limited Phase I Site Assessment, are there known or potential hazardous waste sites within or adjacent to the project area?		<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A
4. As a result of a Phase I Site Assessment, are there known or potential hazardous waste sites within or adjacent to the project area?		<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A
5. As a result of a Phase II Site Assessment, are there known or potential hazardous waste sites within the project area?		<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A
6. Is there an approved hazardous mitigation plan?		<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A
<b>National Historic Preservation Act (Section 106)</b>		
1. Are there properties listed on, or eligible for listing on, the National Register of Historic Places in the project area?		<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
2. Does the project affect such properties and does the SHPO/THPO concur?		<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A
3. If the effects are adverse, have they been resolved?		<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A
<b>Uniform Relocation Assistance and Real Property Acquisition Policies Act (Uniform Act)</b>		
1. Is this a "full-delivery" project?		<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
2. Does the project require the acquisition of real estate?		<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A
3. Was the property acquisition completed prior to the intent to use federal funds?		<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A
4. Has the owner of the property been informed: * prior to making an offer that the agency does not have condemnation authority; and * what the fair market value is believed to be?		<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A

<b>Part 3: Ground-Disturbing Activities</b>	
<b>Regulation/Question</b>	<b>Response</b>
<b>American Indian Religious Freedom Act (AIRFA)</b>	
1. Is the project located in a county claimed as "territory" by the Eastern Band of Cherokee Indians?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
2. Is the site of religious importance to American Indians?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A
3. Is the project listed on, or eligible for listing on, the National Register of Historic Places?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A
4. Have the effects of the project on this site been considered?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A
<b>Antiquities Act (AA)</b>	
1. Is the project located on Federal lands?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
2. Will there be loss or destruction of historic or prehistoric ruins, monuments or objects of antiquity?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A
3. Will a permit from the appropriate Federal agency be required?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A
4. Has a permit been obtained?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A
<b>Archaeological Resources Protection Act (ARPA)</b>	
1. Is the project located on federal or Indian lands (reservation)?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
2. Will there be a loss or destruction of archaeological resources?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A
3. Will a permit from the appropriate Federal agency be required?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A
4. Has a permit been obtained?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A
<b>Endangered Species Act (ESA)</b>	
1. Are federal Threatened and Endangered species and/or Designated Critical Habitat listed for the county?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
2. Is Designated Critical Habitat or suitable habitat present for listed species?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A
3. Are T&E species present or is the project being conducted in Designated Critical Habitat?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A
4. Is the project "likely to adversely affect" the specie and/or "likely to adversely modify" Designated Critical Habitat?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A
5. Does the USFWS/NOAA-Fisheries concur in the effects determination?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A
6. Has the USFWS/NOAA-Fisheries rendered a "jeopardy" determination?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A



<b>Executive Order 13007 (Indian Sacred Sites)</b>	
1. Is the project located on Federal lands that are within a county claimed as "territory" by the EBCI?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
2. Has the EBCI indicated that Indian sacred sites may be impacted by the proposed project?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A
3. Have accommodations been made for access to and ceremonial use of Indian sacred sites?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A
<b>Farmland Protection Policy Act (FPPA)</b>	
1. Will real estate be acquired?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
2. Has NRCS determined that the project contains prime, unique, statewide or locally important farmland?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A
3. Has the completed Form AD-1006 been submitted to NRCS?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A
<b>Fish and Wildlife Coordination Act (FWCA)</b>	
1. Will the project impound, divert, channel deepen, or otherwise control/modify any water body?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
2. Have the USFWS and the NCWRC been consulted?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A
<b>Land and Water Conservation Fund Act (Section 6(f))</b>	
1. Will the project require the conversion of such property to a use other than public, outdoor recreation?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
2. Has the NPS approved of the conversion?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A
<b>Magnuson-Stevens Fishery Conservation and Management Act (Essential Fish Habitat)</b>	
1. Is the project located in an estuarine system?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
2. Is suitable habitat present for EFH-protected species?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A
3. Is sufficient design information available to make a determination of the effect of the project on EFH?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A
4. Will the project adversely affect EFH?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A
5. Has consultation with NOAA-Fisheries occurred?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A
<b>Migratory Bird Treaty Act (MBTA)</b>	
1. Does the USFWS have any recommendations with the project relative to the MBTA?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
2. Have the USFWS recommendations been incorporated?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A
<b>Wilderness Act</b>	
1. Is the project in a Wilderness area?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
2. Has a special use permit and/or easement been obtained from the maintaining federal agency?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A

## COW BRANCH MITIGATION SITE CATEGORICAL EXCLUSION SUMMARY

### **Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA)**

The Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) provides a Federal “Superfund” to clean up uncontrolled or abandoned hazardous-waste sites as well as accidents, spills, or other emergency releases of pollutants and contaminants into the environment.

Since the Cow Branch Mitigation Site is a full-delivery project, a Government Environmental Records Report was ordered for the site through EnviroSite Corporation on March 23, 2021. Neither the target property, nor adjacent properties, were listed in any of the Federal, State, or Tribal environmental databases searched by EnviroSite. The assessment revealed no evidence of any recognized environmental conditions (RECs) connected to the target property. The Report is included in the Appendix.

### **National Historic Preservation Action (Section 106)**

National Historic Preservation Action (Section 106) declares a national policy of historic preservation to protect, rehabilitate, restore, and reuse districts, sites, buildings, structures, and objects significant in American architecture, history, archaeology and culture, and Section 106 mandates that federal agencies consider the effect of an undertaking on a property that is included in, or is eligible for inclusion in, the National Register of Historic Places.

Freese and Nichols, Inc. (FNI) requested a review and comment from the State Historic Preservation Office (SHPO) with respect to architectural and archaeological resources related to Cow Branch Mitigation Site on April 14, 2021. SHPO responded on June 30, 2021, and stated they were aware of “no historic resources which would be affected by the project” and would have no further comment. Section 106 correspondence is included in the Appendix.

### **Uniform Relocation Assistance and Real Property Acquisition Act (Uniform Act)**

These acts, known collectively as the Uniform Act, provide for uniform and equitable treatment of persons displaced from their homes, businesses, non-profit associations, or farms by Federal and Federally-assisted programs, and establish uniform and equitable land acquisition policies.

The Cow Branch Mitigation Site is a full-delivery project that includes land acquisition. Notification of the fair market value of the project property and the lack of condemnation authority by FNI was included in a letter to the landowners of the project property. A copy of the relevant section of the landowner letter is included in the Appendix.

### **Endangered Species Act (ESA)**

Section 7 requires federal agencies, in consultation with and with the assistance of the Secretary of the Interior or of Commerce, as appropriate, to ensure that actions they authorize, fund, or carry out are not likely to jeopardize the continued existence of threatened or endangered species or result in the destruction or adverse modification of critical habitat for these species. The US Fish and Wildlife Service (USFWS), Raleigh Field Office, 9-step compliance process was adhered to in reviewing potential effects on threatened and endangered species.

The Cow Branch Mitigation Site action area was defined as the parcel boundary that included the site and any potential access roads, stockpile, and other potential construction areas, and was submitted to the USFWS Information for Planning and Consultation (IPaC) project planning tool for ESA review on April 8,

2021. IPaC identified the following species as potentially occurring within the action area: Northern long-eared bat (NLEB), red-cockaded woodpecker, wood stork, American alligator, and Cooley's meadowrue. The official species list from IPaC is included in the Appendix. The North Carolina Natural Heritage Program (NCNHP) was consulted on April 8, 2021, to determine if any documented occurrences of any listed, proposed, or candidate species were within the action area. One listed species, Cooley's meadowrue, was identified as an occurrence in 1928 within 1 mile of the action area. However, the USFWS Cooley's meadowrue recovery plan has indicated that many of these historic observations were extirpated by the early 1990s.

A suitable habitat desktop and field assessment was conducted for listed, proposed, and candidate species within the action area. A desktop GIS assessment of the action area as well as the area with 1.0 mile radius of the project limits was conducted using NC One Map color aerials to fulfill the requirements of the Bald and Golden Eagle Protection Act (Eagle Act). No water bodies large enough or sufficiently open to be considered potential feeding sources were identified. Since there was no foraging habitat within the review area, a survey of the project study area and the area within 660 feet of the project limits was not conducted. Additionally, a review of the NCNHP database revealed no known occurrences of this species within 1.0 mile of the project study area. Due to the lack of habitat, known occurrences, and minimal impact anticipated for this project, it has been determined that this project will not affect this species.

Scattered trees are present along the ditched Tributary; however, the project is relying upon the findings of the 1/5/2016 Programmatic Biological Opinion for Final 4(d) Rule for the Northern long-eared bat. No other habitat for the listed species is present in the project area. Therefore, due to lack of habitat for the listed species at the site, the project has been determined by FNI to have "no effect" on all listed species except NLEB. Results of the habitat assessment are included with the Species Conclusion Table in the Appendix. Federal agencies are not required to contact USFWS or provide documentation for "no effect" and/or "no Eagle Act permit required" determinations. For "may affect, not likely to adversely affect" determinations, federal agencies are required to submit a project certification letter and the project review package. The project review package and project certification letter are included in the Appendix.

FNI submitted the project review package for review and comment from (USFWS) on April 19, 2021, for the Cow Branch Mitigation Site and its potential impacts on threatened and endangered species. USFWS responded on May 4, 2021, stating "that the proposed action is not likely to adversely affect any federally-listed endangered or threatened species..." All correspondence with USFWS are included in the Appendix.

#### **Farmland Protection Policy Act (FPPA)**

The FPPA requires that, before taking or approving any Federal action that would result in the conversion of farmland, the agency must examine the effects of the action using the criteria set forth in the FPPA, and, if there are adverse effects, must consider alternatives to lessen them.

The Cow Branch Mitigation Site includes the conversion of prime farmland. As such, Form AD-1006 has been completed and submitted to the National Resources Conservation Service (NRCS). The completed form and correspondence documenting its submittal are included in the Appendix.

#### **Fish and Wildlife Coordination Act (FWCA)**

The FWCA requires consultation with the USFWS and appropriate state wildlife agencies on projects that impounded, diverted, deepened, or otherwise modify waterbodies. The Cow Branch Mitigation project is

situated directly adjacent to an unnamed tributary of Sand Pit Branch, and while modification of the waterbody is unlikely, coordination with USFWS and the North Carolina Wildlife Resources Commission (WRC) was requested on April 19, 2021. NCWRC responded on June 8, 2021, stating, “..the NWRC recommends the use of biodegradable and wildlife-friendly sediment and erosion control devices...”. All correspondence with USFWS and WRC are included in the Appendix.

### **Migratory Bird Treaty Act (MBTA)**

The MBTA makes it unlawful for anyone to kill, capture, collect, possess, buy, sell, trade, ship, import, or export any migratory bird. The indirect killing of birds by destroying their nests and eggs is covered by the MBTA, so construction in nesting areas during nesting seasons can constitute a taking.

FNI requested comment on the Cow Branch Mitigation Site from the USFWS regarding migratory birds on April 19, 2021. The USFWS responded on May 4, 2021 but had no comment regarding migratory birds. All correspondence with USFWS is included in the Appendix.

**COMPREHENSIVE ENVIRONMENTAL RESPONSE, COMPENSATION, AND LIABILITY ACT (CERCLA)**

**ENVIROSITE RESULTS**



## Government Records Report | 2021

Order Number: 52642

Report Generated: 03/23/2021

Project Name: Cow Branch

Project Number: Cow Branch

Cow Branch  
Et Richardson Rd  
Nakina, NC 28455

---

2 Corporate Drive  
Suite 450  
Shelton, CT 06484  
Toll Free: 866-211-2028  
[www.envirositecorp.com](http://www.envirositecorp.com)

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Envirosite Corporation has conducted a search of all reasonably ascertainable records in accordance with EPA's AAI (40 CFR Part 312) requirements and the ASTM E-1527-13 Environmental Site Assessments standard.

**SUBJECT PROPERTY INFORMATION:**

**ADDRESS:**

Cow Branch  
Et Richardson Rd  
Nakina, NC 28455

**COORDINATES:**

Latitude (North):	34.138059 - 34°8'17"
Longitude (West):	-78.647895 - -78°38'52.4"
Universal Transverse Mercator:	Zone 17N
UTM X (Meters):	716882.46
UTM Y (Meters):	3779962.95

**ELEVATION:**

Elevation:	38.278 ft. above sea level
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**USGS TOPOGRAPHIC MAP ASSOCIATED WITH SUBJECT PROPERTY:**

Subject Property Map: 34078-B6 Nakina, NC  
Most Recent Revision: 2016

**No Mapped Sites**

**SUBJECT PROPERTY SEARCH RESULTS:**

The subject property was not listed in any of the databases searched by EnviroSite Corporation.

**SEARCH RESULTS:**

**No un-mappable sites reported.**

**DATABASE(S) WITH NO MAPPED SITES:****FEDERAL RCRA NON-CORRACTS TSD FACILITIES LIST**

ARCHIVED RCRA TSDF	Archived Resource Conservation and Recovery Act: Treatment Storage and Disposal Facilities
RCRA_TSDF	Resource Conservation and Recovery Act: Treatment Storage and Disposal Facilities

**FEDERAL CERCLIS LIST**

CERCLIS NFRAP	Comprehensive Environmental Response Compensation and Liability Act No Further Remedial Action Planned
CERCLIS-HIST	Comprehensive Environmental Response Compensation and Liability Act
FEDERAL FACILITY	Federal Facility sites
SEMS_8R_ACTIVE SITES	Sites on SEMS Active Site Inventory
SEMS_8R_ARCHIVED SITES	Sites on SEMS Archived Site Inventory

**FEDERAL RCRA CORRACTS FACILITIES LIST**

CORRACTS	Hazardous Waste Corrective Action
HIST CORRACTS 2	Historical Hazardous Waste Corrective Action

**FEDERAL DELISTED NPL SITE LIST**

DELISTED NPL	Delisted National Priority List
DELISTED PROPOSED NPL	Delisted proposed National Priority List
SEMS_DELETED NPL	Sites Deleted from National Priorities List

**FEDERAL LANDFILL AND/OR SOLID WASTE DISPOSAL SITE LISTS**

EPA LF MOP	EPA Landfill Methane Outreach Project Database
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**FEDERAL ERNS LIST**

ERNS	Emergency Response Notification System
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**FEDERAL INSTITUTIONAL CONTROLS / ENGINEERING CONTROLS REGISTRIES**

FED E C	Engineering Controls
FED I C	Institutional Controls
RCRA IC_EC	RCRA sites with Institutional and Engineering Controls

**FEDERAL RCRA GENERATORS LIST**

HIST RCRA_CESQG	Historical Resource Conservation and Recovery Act_Conditionally Exempt Small Quantity Generators
HIST RCRA_LQG	Historical Resource Conservation and Recovery Act_Large Quantity Generators
HIST RCRA_NONGEN	Historical Resource Conservation and Recovery Act_Non Generators
HIST RCRA_SQG	Historical Resource Conservation and Recovery Act_Small Quantity Generators
RCRA_LQG	Resource Conservation and Recovery Act_Large Quantity Generators
RCRA_NONGEN	Resource Conservation and Recovery Act_Non Generators
RCRA_SQG	Resource Conservation and Recovery Act_Small Quantity Generators
RCRA_VSQG	Resource Conservation and Recovery Act_Very Small Quantity Generator

**FEDERAL NPL SITE LIST**

NPL	National Priority List
NPL EPA R1 GIS	GIS for EPA Region 1 NPL
NPL EPA R3 GIS	GIS for EPA Region 3 NPL

**FEDERAL NPL SITE LIST (cont.)**

NPL EPA R6 GIS	GIS for EPA Region 6 NPL
NPL EPA R8 GIS	GIS for EPA Region 8 NPL
NPL EPA R9 GIS	GIS for EPA Region 9 NPL
PART NPL	Part National Priority List
PROPOSED NPL	Proposed National Priority List
SEMS_FINAL NPL	Sites included on the Final National Priorities List
SEMS_PROPOSED NPL	Sites Proposed to be Added to the National Priorities List

**STATE- AND TRIBAL - EQUIVALENT CERCLIS**

ARCHIVED HSDS - NC	Archived Hazardous Substance Disposal Sites
ARCHIVED HSDS AREAS - NC	Areas of Archived Hazardous Substance Disposal Sites
FRB SUPERFUND - NC	FRB Superfund - NC
SHWS - NC	State Hazardous Waste Sites

**STATE AND TRIBAL REGISTERED STORAGE TANK LISTS**

FEMA UST	FEMA Underground Storage Tanks
INDIAN UST R1	Underground Storage Tanks on Indian Land in EPA Region 1
INDIAN UST R10	Underground Storage Tanks on Indian Land in EPA Region 10
INDIAN UST R2	Underground Storage Tanks on Indian Land in EPA Region 2
INDIAN UST R4	Underground Storage Tanks on Indian Land in EPA Region 4
INDIAN UST R5	Underground Storage Tanks on Indian Land in EPA Region 5
INDIAN UST R6	Underground Storage Tanks on Indian Land in EPA Region 6
INDIAN UST R7	Underground Storage Tanks on Indian Land in EPA Region 7
INDIAN UST R8	Underground Storage Tanks on Indian Land in EPA Region 8
INDIAN UST R9	Underground Storage Tanks on Indian Land in EPA Region 9
AST - NC	Aboveground Storage Tanks
UST - NC	Underground Storage Tanks
UST 2 - NC	UST Facilities

**STATE AND TRIBAL BROWNFIELD SITES**

TRIBAL BROWNFIELDS	Tribal Brownfields
BROWNFIELDS - NC	Brownfield

**STATE RCRA GENERATORS LIST**

HWG - NC	State Hazardous Waste Generators
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**STATE INSTITUTIONAL CONTROLS / ENGINEERING CONTROLS REGISTRIES**

I C - NC	Institutional Controls
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**STATE AND TRIBAL LEAKING STORAGE TANK LISTS**

INDIAN LUST R1	Leaking Underground Storage Tanks on Indian Land in EPA Region 1
INDIAN LUST R10	Leaking Underground Storage Tanks on Indian Land in EPA Region 10
INDIAN LUST R2	Leaking Underground Storage Tanks on Indian Land in EPA Region 2
INDIAN LUST R4	Leaking Underground Storage Tanks on Indian Land in EPA Region 4
INDIAN LUST R5	Leaking Underground Storage Tanks on Indian Land in EPA Region 5
INDIAN LUST R6	Leaking Underground Storage Tanks on Indian Land in EPA Region 6
INDIAN LUST R7	Leaking Underground Storage Tanks on Indian Land in EPA Region 7
INDIAN LUST R8	Leaking Underground Storage Tanks on Indian Land in EPA Region 8
INDIAN LUST R9	Leaking Underground Storage Tanks on Indian Land in EPA Region 9
LAST - NC	Leaking Aboveground Storage Tanks
LUST - NC	Leaking Underground Storage Tanks
LUST TRUST - NC	Leaking Underground Storage Tanks: Trust

**STATE AND TRIBAL LANDFILL AND/OR SOLID WASTE DISPOSAL SITE LISTS**

PRLF - NC	Pre-Regulatory Landfill Sites
SWF/LF - NC	Solid Waste Facilities Landfills

**LOCAL BROWNFIELD LISTS**

BROWNFIELDS-ACRES	EPA ACRES Brownfields
FED BROWNFIELDS	Federal Brownfields

**LOCAL LISTS OF HAZARDOUS WASTE / CONTAMINATED SITES**

FED CDL	DOJ Clandestine Drug Labs
US HIST CDL	Historical Clandestine Drug Labs
INACTIVE HWS - NC	Inactive Hazardous Waste Sites

**LOCAL LISTS OF LANDFILL / SOLID WASTE DISPOSAL SITES**

HIST INDIAN ODI R8	Historical Open Dump Inventory
INDIAN ODI R8	Open Dump Inventory
ODI	Open Dump Inventory
TRIBAL ODI	Indian Open Dump Inventory Sites
SWRCY - NC	Recycling Facilities
SWRCY 2 - NC	Material Recovery Facilities
SWTIRE - NC	Solid Waste Tire

**RECORDS OF EMERGENCY RELEASE REPORTS**

HMIRS (DOT)	Hazardous Materials Information Reporting Systems
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**LOCAL LAND RECORDS**

LIENS 2	CERCLA Lien Information
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**OTHER ASCERTAINABLE RECORDS**

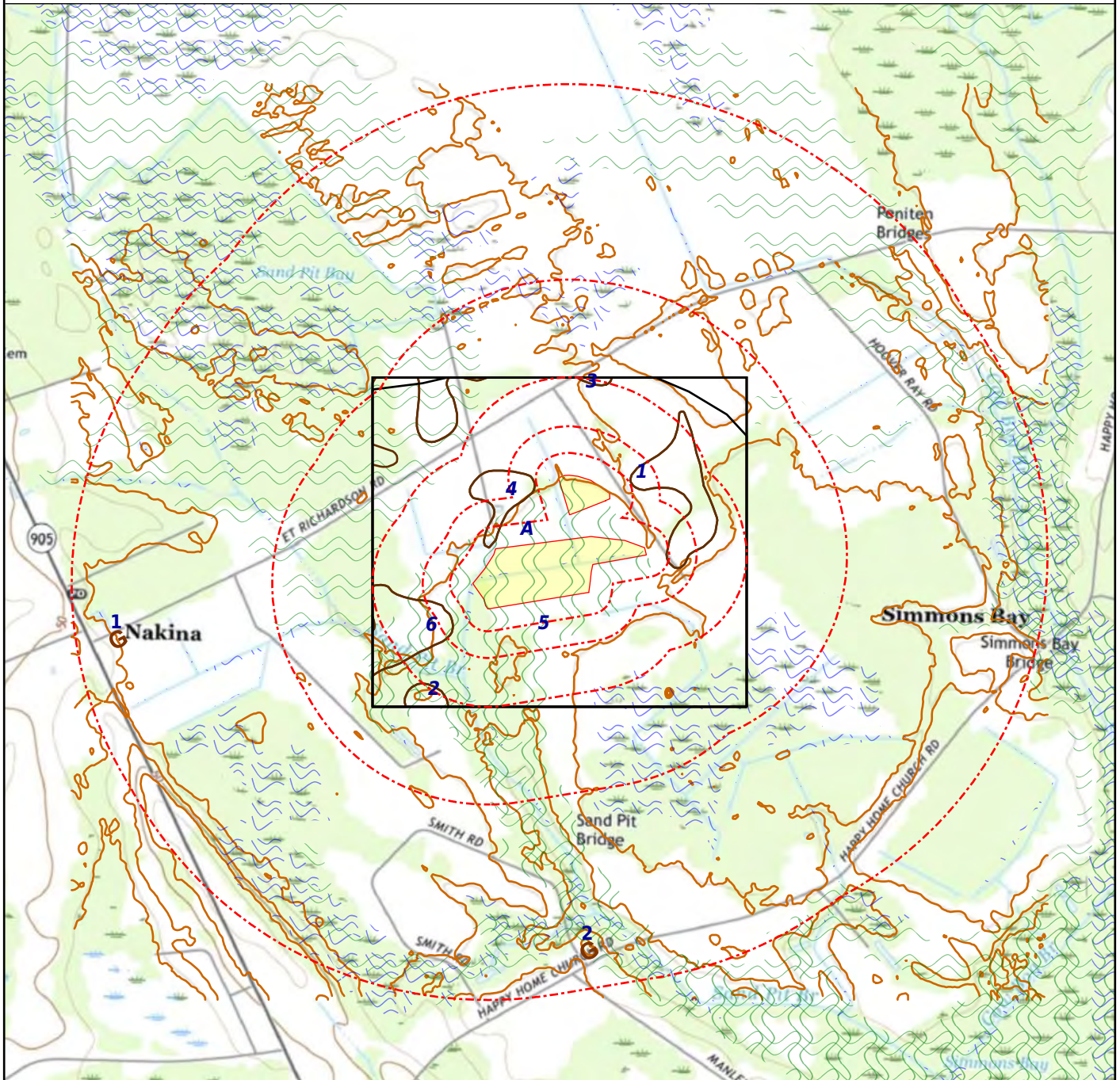
AFS	Air Facility Systems
ALT FUELING	Alternative Fueling Stations
AST PBS	ASTs at Bulk Petroleum Terminals
BRS	Biennial Reporting Systems
CDC HAZDAT	Hazardous Substance Release and Health Effects Information
COAL ASH DOE	Coal Ash: Department of Energy
COAL ASH EPA	Coal Ash: Environmental Protection Agency
COAL GAS	Coal Gas Plants
CONSENT (DECREES)	Superfund Consent Decree
CORRECTIVE ACTIONS_2020	Wastes - Hazardous Waste - Corrective Action
DEBRIS EPA LF	EPA Disaster Debris Landfill Sites
DEBRIS EPA SWRCY	EPA Disaster Debris Recovery Sites
DOD	Department of Defense
DOT OPS	Department of Transportation Office of Pipeline Safety
ECHO	EPA Enforcement and Compliance History Online
ENOI	Electronic Notice of Intent
EPA FUELS	EPA Fuels Registration, Reporting, and Compliance List
EPA OSC	EPA On-Site Coordinator
EPA WATCH	EPA Watch List
FA HWF	Financial Assurance for Hazardous Waste Facilities
FEDLAND	Federal Lands
FRS	Facility Index Systems
FTTS	FIFRA/TSCA Tracking System
FTTS INSP	FIFRA/TSCA Tracking System: Inspections
FUDS	Formerly Used Defense Sites
HIST AFS	Historical Air Facility Systems
HIST AFS 2	Historical Air Facility Systems
HIST DOD	Department of Defense historical sites
HIST LEAD_SMELTER	Historical Lead Smelter Sites
HIST MLTS	Historical Material Licensing Tracking Systems
HIST PCB TRANS	Historical Polychlorinated Biphenyl (PCB) Facilities
HIST PCS ENF	Historical Enforced Permit Compliance Facilities
HIST PCS FACILITY	Historical Permit Compliance Facilities
HIST SSTS	Historical Section 7 Tracking Systems
HWC DOCKET	Hazardous Waste Compliance Docket
ICIS	Integrated Compliance Information System
INACTIVE PCS	Inactive Permit Compliance Facilities
INDIAN RESERVATION	Indian Reservations
LUCIS	Land Use Control Information Systems

**OTHER ASCERTAINABLE RECORDS (cont.)**

LUCIS 2	Land Use Control Information Systems 2
MINES	Mines
MINES USGS	Mines list from USGS
MLTS	Material Licensing Tracking Systems
NPL AOC	Areas related to NPL remediation sites
NPL LIENS	National Priority List Liens
OSHA	Occupational Safety & Health Administration
PADS	PCB Activity Database Systems
PCB TRANSFORMER	Polychlorinated Biphenyl (PCB) Waste
PCS ENF	Enforced Permit Compliance Facilities
PCS FACILITY	Permit Compliance Facilities
RAATS	RCRA Administrative Action Tracking Systems
RADINFO	Radiation Information Systems
RMP	Risk Management Plans
ROD	Record of Decision
SCRD DRYCLEANERS	SCRD Drycleaners
SEMS_SMELTER	Sites on SEMS Potential Smelter Activity
SSTS	Section 7 Tracking Systems
STORMWATER	Storm Water Permits
TOSCA-PLANT	Toxic Substance Control Act: Plants
TRIS	Toxic Release Inventory Systems
UMTRA	Uranium Mill Tailing Sites
VAPOR	EPA Vapor Intrusion
BROWNFIELDS AEC - NC	Brownfields with Areas of Environmental Concern
COAL ASH - NC	Coal Ash sites
DAYCARE - NC	Daycare Facility
DRYCLEANERS - NC	Drycleaners
DRYCLEANERS 2 - NC	Drycleaners
DRYCLEANERS CLEANUP - NC	Drycleaners Cleanup
HIST COAL ASH - NC	Historical Coal Ash sites
IMD - NC	Incident Management Database
MGP - NC	Manufactured Gas Plant Sites
NFA - NC	No Further Action Sites
NPDES - NC	State Wastewater and NPDES Permits
OLI - NC	Old Landfill Inventory
UIC - NC	Underground Injection Controls

SUBJECT NAME: Cow Branch  
 ADDRESS: Et Richardson Rd, Nakina, NC, 28455  
 LAT/LONG: 34.138059 / -78.647895

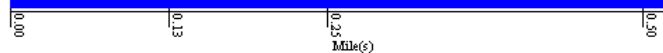
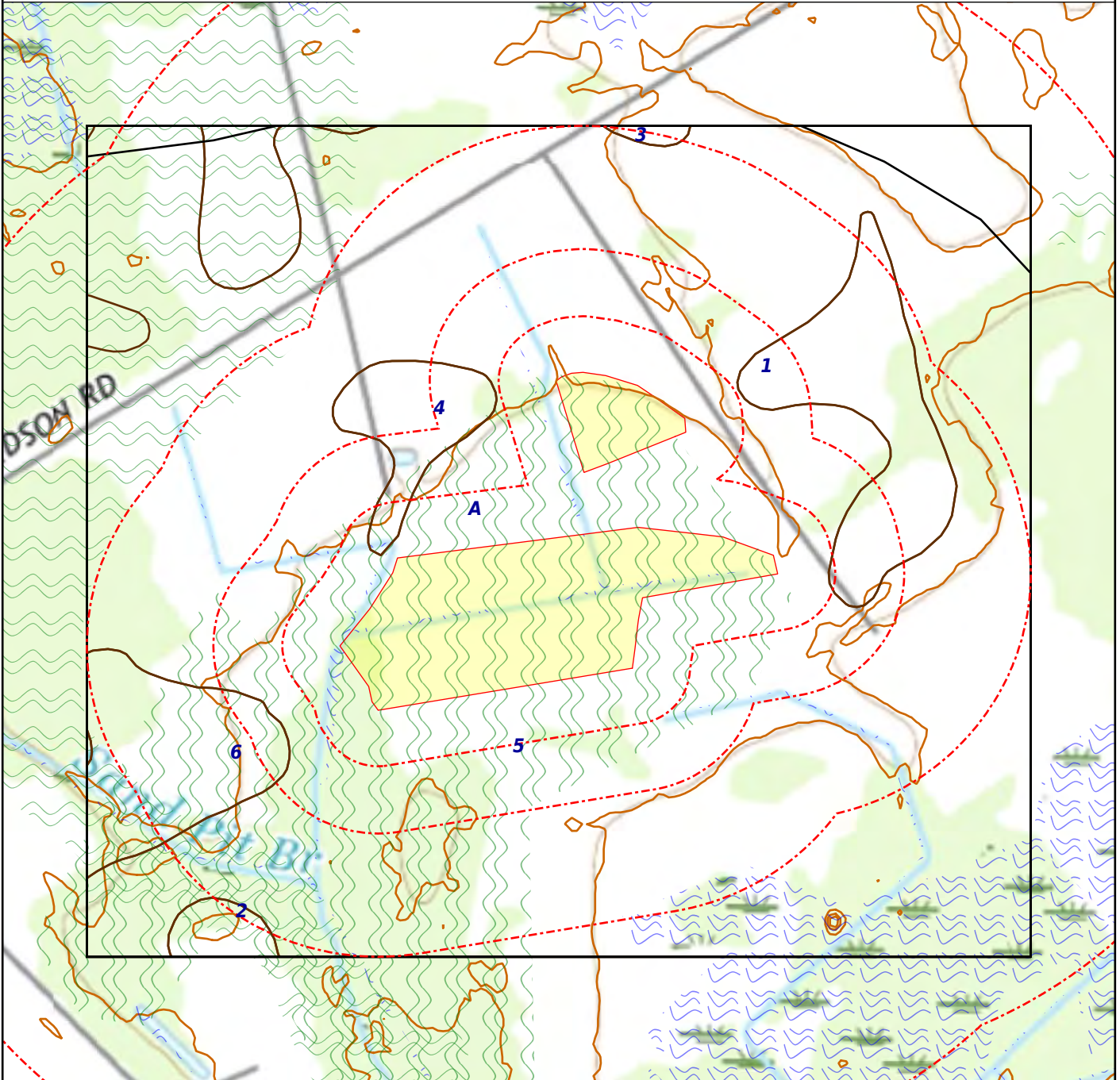
PREPARED FOR: Freese and Nichols, Inc.  
 ORDER #: 52642  
 REPORT DATE: March 23, 2021



- |   |   |  |   |
|---|---|--|---|
| <ul style="list-style-type: none"> <li>✦ Subject Property</li> <li>✦ CDC HAZDAT (No Data)</li> <li>✦ Federal Lands (No Data)</li> <li>✦ Historical DOD (No Data)</li> </ul> | <ul style="list-style-type: none"> <li>● Equal/Higher Elevation</li> <li>■ Department of Defense (No Data)</li> <li>⊃ FEMA FloodZone 100</li> <li>▲ Indian Reservation (No Data)</li> </ul> | <ul style="list-style-type: none"> <li>● Lower Elevation</li> <li>⊃ DFIRM Floodzone 100</li> <li>⊃ FEMA FloodZone 500 (No Data)</li> <li>■ National Priority List (No Data)</li> </ul> | <ul style="list-style-type: none"> <li>◆ Brownfields Areas (No Data)</li> <li>⊃ DFIRM Floodzone 500 (No Data)</li> <li>■ Hazardous Substance Disposal Sites (No Data)</li> <li>⊃ NWI</li> </ul> |
|---|---|--|---|

SUBJECT NAME: Cow Branch  
 ADDRESS: Et Richardson Rd, Nakina, NC, 28455  
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| <ul style="list-style-type: none"> <li>+ Subject Property</li> <li>+ CDC HAZDAT (No Data)</li> <li>+ Federal Lands (No Data)</li> <li>+ Historical DOD (No Data)</li> </ul> | <ul style="list-style-type: none"> <li>● Equal/Higher Elevation</li> <li>■ Department of Defense (No Data)</li> <li>~ FEMA FloodZone 100</li> <li>▲ Indian Reservation (No Data)</li> </ul> | <ul style="list-style-type: none"> <li>● Lower Elevation</li> <li>⊘ DFIRM Floodzone 100</li> <li>⊘ FEMA FloodZone 500 (No Data)</li> <li>■ National Priority List (No Data)</li> </ul> | <ul style="list-style-type: none"> <li>◆ Brownfields Areas (No Data)</li> <li>⊘ DFIRM Floodzone 500 (No Data)</li> <li>■ Hazardous Substance Disposal Sites (No Data)</li> <li>■ NWI</li> </ul> |
|---|---|--|---|



<u>DATABASE</u>	<u>SUBJECT PROPERTY</u>	<u>SEARCH DISTANCE (MILES)</u>	<u>&lt;1/8</u>	<u>1/8 - 1/4</u>	<u>1/4 - 1/2</u>	<u>1/2 - 1</u>	<u>&gt;1</u>	<u>TOTAL MAPPED</u>
<b>FEDERAL RCRA NON-CORRACTS TSD FACILITIES LIST</b>								
ARCHIVED RCRA TSD		0.500	0	0	0	--	--	0
RCRA_TSD		0.500	0	0	0	--	--	0
<b>FEDERAL CERCLIS LIST</b>								
CERCLIS NFRAP		0.500	0	0	0	--	--	0
CERCLIS-HIST		0.500	0	0	0	--	--	0
FEDERAL FACILITY		1.000	0	0	0	0	--	0
SEMS_8R_ACTIVE SITES		0.500	0	0	0	--	--	0
SEMS_8R_ARCHIVED SITES		0.500	0	0	0	--	--	0
<b>FEDERAL RCRA CORRACTS FACILITIES LIST</b>								
CORRACTS		1.000	0	0	0	0	--	0
HIST CORRACTS 2		1.000	0	0	0	0	--	0
<b>FEDERAL DELISTED NPL SITE LIST</b>								
DELISTED NPL		1.000	0	0	0	0	--	0
DELISTED PROPOSED NPL		1.000	0	0	0	0	--	0
SEMS_DELETED NPL		1.000	0	0	0	0	--	0
<b>FEDERAL LANDFILL AND/OR SOLID WASTE DISPOSAL SITE LISTS</b>								
EPA LF MOP		0.500	0	0	0	--	--	0
<b>FEDERAL ERNS LIST</b>								
ERNS		SP	0	--	--	--	--	0
<b>FEDERAL INSTITUTIONAL CONTROLS / ENGINEERING CONTROLS REGISTRIES</b>								
FED E C		0.500	0	0	0	--	--	0
FED I C		0.500	0	0	0	--	--	0
RCRA IC_EC		0.250	0	0	--	--	--	0
<b>FEDERAL RCRA GENERATORS LIST</b>								
HIST RCRA_CESQG		0.250	0	0	--	--	--	0
HIST RCRA_LQG		0.250	0	0	--	--	--	0
HIST RCRA_NONGEN		0.250	0	0	--	--	--	0
HIST RCRA_SQG		0.250	0	0	--	--	--	0
RCRA_LQG		0.250	0	0	--	--	--	0
RCRA_NONGEN		0.250	0	0	--	--	--	0
RCRA_SQG		0.250	0	0	--	--	--	0
RCRA_VSQG		0.250	0	0	--	--	--	0

<u>DATABASE</u>	<u>SUBJECT PROPERTY</u>	<u>SEARCH DISTANCE (MILES)</u>	<u>&lt;1/8</u>	<u>1/8 - 1/4</u>	<u>1/4 - 1/2</u>	<u>1/2 - 1</u>	<u>&gt;1</u>	<u>TOTAL MAPPED</u>
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**FEDERAL NPL SITE LIST**

NPL		1.000	0	0	0	0	--	0
NPL EPA R1 GIS		1.000	0	0	0	0	--	0
NPL EPA R3 GIS		1.000	0	0	0	0	--	0
NPL EPA R6 GIS		1.000	0	0	0	0	--	0
NPL EPA R8 GIS		1.000	0	0	0	0	--	0
NPL EPA R9 GIS		1.000	0	0	0	0	--	0
PART NPL		1.000	0	0	0	0	--	0
PROPOSED NPL		1.000	0	0	0	0	--	0
SEMS_FINAL NPL		1.000	0	0	0	0	--	0
SEMS_PROPOSED NPL		1.000	0	0	0	0	--	0

**STATE- AND TRIBAL - EQUIVALENT CERCLIS**

ARCHIVED HSDS - NC		1.000	0	0	0	0	--	0
ARCHIVED HSDS AREAS - NC		1.000	0	0	0	0	--	0
FRB SUPERFUND - NC		1.000	0	0	0	0	--	0
SHWS - NC		1.000	0	0	0	0	--	0

**STATE AND TRIBAL REGISTERED STORAGE TANK LISTS**

FEMA UST		0.250	0	0	--	--	--	0
INDIAN UST R1		0.250	0	0	--	--	--	0
INDIAN UST R10		0.250	0	0	--	--	--	0
INDIAN UST R2		0.250	0	0	--	--	--	0
INDIAN UST R4		0.250	0	0	--	--	--	0
INDIAN UST R5		0.250	0	0	--	--	--	0
INDIAN UST R6		0.250	0	0	--	--	--	0
INDIAN UST R7		0.250	0	0	--	--	--	0
INDIAN UST R8		0.250	0	0	--	--	--	0
INDIAN UST R9		0.250	0	0	--	--	--	0
AST - NC		0.250	0	0	--	--	--	0
UST - NC		0.250	0	0	--	--	--	0
UST 2 - NC		0.250	0	0	--	--	--	0

**STATE AND TRIBAL BROWNFIELD SITES**

TRIBAL BROWNFIELDS		0.500	0	0	0	--	--	0
BROWNFIELDS - NC		0.500	0	0	0	--	--	0

**STATE RCRA GENERATORS LIST**

HWG - NC		0.250	0	0	--	--	--	0
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<u>DATABASE</u>	<u>SUBJECT PROPERTY</u>	<u>SEARCH DISTANCE (MILES)</u>	<u>&lt;1/8</u>	<u>1/8 - 1/4</u>	<u>1/4 - 1/2</u>	<u>1/2 - 1</u>	<u>&gt;1</u>	<u>TOTAL MAPPED</u>
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**STATE INSTITUTIONAL CONTROLS / ENGINEERING CONTROLS REGISTRIES**

I C - NC		0.500	0	0	0	--	--	0
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**STATE AND TRIBAL LEAKING STORAGE TANK LISTS**

INDIAN LUST R1		0.500	0	0	0	--	--	0
INDIAN LUST R10		0.500	0	0	0	--	--	0
INDIAN LUST R2		0.500	0	0	0	--	--	0
INDIAN LUST R4		0.500	0	0	0	--	--	0
INDIAN LUST R5		0.500	0	0	0	--	--	0
INDIAN LUST R6		0.500	0	0	0	--	--	0
INDIAN LUST R7		0.500	0	0	0	--	--	0
INDIAN LUST R8		0.500	0	0	0	--	--	0
INDIAN LUST R9		0.500	0	0	0	--	--	0
LAST - NC		0.500	0	0	0	--	--	0
LUST - NC		0.500	0	0	0	--	--	0
LUST TRUST - NC		0.500	0	0	0	--	--	0

**STATE AND TRIBAL LANDFILL AND/OR SOLID WASTE DISPOSAL SITE LISTS**

PRLF - NC		1.000	0	0	0	0	--	0
SWF/LF - NC		0.500	0	0	0	--	--	0

**LOCAL BROWNFIELD LISTS**

BROWNFIELDS-ACRES		0.500	0	0	0	--	--	0
FED BROWNFIELDS		0.500	0	0	0	--	--	0

**LOCAL LISTS OF HAZARDOUS WASTE / CONTAMINATED SITES**

FED CDL		SP	0	--	--	--	--	0
US HIST CDL		SP	0	--	--	--	--	0
INACTIVE HWS - NC		1.000	0	0	0	0	--	0

**LOCAL LISTS OF LANDFILL / SOLID WASTE DISPOSAL SITES**

HIST INDIAN ODI R8		0.500	0	0	0	--	--	0
INDIAN ODI R8		0.500	0	0	0	--	--	0
ODI		0.500	0	0	0	--	--	0
TRIBAL ODI		0.500	0	0	0	--	--	0
SWRCY - NC		0.500	0	0	0	--	--	0
SWRCY 2 - NC		0.500	0	0	0	--	--	0
SWTIRE - NC		0.500	0	0	0	--	--	0

<u>DATABASE</u>	<u>SUBJECT PROPERTY</u>	<u>SEARCH DISTANCE (MILES)</u>	<u>&lt;1/8</u>	<u>1/8 - 1/4</u>	<u>1/4 - 1/2</u>	<u>1/2 - 1</u>	<u>&gt;1</u>	<u>TOTAL MAPPED</u>
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**RECORDS OF EMERGENCY RELEASE REPORTS**

HMIRS (DOT)		SP	0	--	--	--	--	0
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**LOCAL LAND RECORDS**

LIENS 2		SP	0	--	--	--	--	0
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**OTHER ASCERTAINABLE RECORDS**

AFS		SP	0	--	--	--	--	0
ALT FUELING		0.250	0	0	--	--	--	0
AST PBS		0.250	0	0	--	--	--	0
BRS		SP	0	--	--	--	--	0
CDC HAZDAT		1.000	0	0	0	0	--	0
COAL ASH DOE		0.500	0	0	0	--	--	0
COAL ASH EPA		0.500	0	0	0	--	--	0
COAL GAS		1.000	0	0	0	0	--	0
CONSENT (DECREEES)		1.000	0	0	0	0	--	0
CORRECTIVE ACTIONS_2020		0.500	0	0	0	--	--	0
DEBRIS EPA LF		0.500	0	0	0	--	--	0
DEBRIS EPA SWRCY		0.500	0	0	0	--	--	0
DOD		1.000	0	0	0	0	--	0
DOT OPS		SP	0	--	--	--	--	0
ECHO		SP	0	--	--	--	--	0
ENOI		SP	0	--	--	--	--	0
EPA FUELS		SP	0	--	--	--	--	0
EPA OSC		0.125	0	--	--	--	--	0
EPA WATCH		SP	0	--	--	--	--	0
FA HWF		SP	0	--	--	--	--	0
FEDLAND		1.000	0	0	0	0	--	0
FRS		SP	0	--	--	--	--	0
FTTS		SP	0	--	--	--	--	0
FTTS INSP		SP	0	--	--	--	--	0
FUDS		1.000	0	0	0	0	--	0
HIST AFS		SP	0	--	--	--	--	0
HIST AFS 2		SP	0	--	--	--	--	0
HIST DOD		1.000	0	0	0	0	--	0
HIST LEAD_SMELTER		SP	0	--	--	--	--	0
HIST MLTS		SP	0	--	--	--	--	0
HIST PCB TRANS		SP	0	--	--	--	--	0

<u>DATABASE</u>	<u>SUBJECT PROPERTY</u>	<u>SEARCH DISTANCE (MILES)</u>	<u>&lt;1/8</u>	<u>1/8 - 1/4</u>	<u>1/4 - 1/2</u>	<u>1/2 - 1</u>	<u>&gt;1</u>	<u>TOTAL MAPPED</u>
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**OTHER ASCERTAINABLE RECORDS (cont.)**

HIST PCS ENF		SP	0	--	--	--	--	0
HIST PCS FACILITY		SP	0	--	--	--	--	0
HIST SSTS		SP	0	--	--	--	--	0
HWC DOCKET		SP	0	--	--	--	--	0
ICIS		SP	0	--	--	--	--	0
INACTIVE PCS		SP	0	--	--	--	--	0
INDIAN RESERVATION		1.000	0	0	0	0	--	0
LUCIS		0.500	0	0	0	--	--	0
LUCIS 2		0.500	0	0	0	--	--	0
MINES		0.250	0	0	--	--	--	0
MINES USGS		0.250	0	0	--	--	--	0
MLTS		SP	0	--	--	--	--	0
NPL AOC		1.000	0	0	0	0	--	0
NPL LIENS		SP	0	--	--	--	--	0
OSHA		SP	0	--	--	--	--	0
PADS		SP	0	--	--	--	--	0
PCB TRANSFORMER		SP	0	--	--	--	--	0
PCS ENF		SP	0	--	--	--	--	0
PCS FACILITY		SP	0	--	--	--	--	0
RAATS		SP	0	--	--	--	--	0
RADINFO		SP	0	--	--	--	--	0
RMP		0.500	0	0	0	--	--	0
ROD		1.000	0	0	0	0	--	0
SCRD DRYCLEANERS		0.250	0	0	--	--	--	0
SEMS_SMELTER		SP	0	--	--	--	--	0
SSTS		SP	0	--	--	--	--	0
STORMWATER		SP	0	--	--	--	--	0
TOSCA-PLANT		SP	0	--	--	--	--	0
TRIS		SP	0	--	--	--	--	0
UMTRA		0.500	0	0	0	--	--	0
VAPOR		0.500	0	0	0	--	--	0
BROWNFIELDS AEC - NC		0.500	0	0	0	--	--	0
COAL ASH - NC		0.500	0	0	0	--	--	0
DAYCARE - NC		SP	0	--	--	--	--	0
DRYCLEANERS - NC		0.250	0	0	--	--	--	0
DRYCLEANERS 2 - NC		0.250	0	0	--	--	--	0

<u>DATABASE</u>	<u>SUBJECT PROPERTY</u>	<u>SEARCH DISTANCE (MILES)</u>	<u>&lt;1/8</u>	<u>1/8 - 1/4</u>	<u>1/4 - 1/2</u>	<u>1/2 - 1</u>	<u>&gt;1</u>	<u>TOTAL MAPPED</u>
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**OTHER ASCERTAINABLE RECORDS (cont.)**

DRYCLEANERS CLEANUP - NC		0.500	0	0	0	--	--	0
HIST COAL ASH - NC		0.500	0	0	0	--	--	0
IMD - NC		0.500	0	0	0	--	--	0
MGP - NC		1.000	0	0	0	0	--	0
NFA - NC		0.500	0	0	0	--	--	0
NPDES - NC		SP	0	--	--	--	--	0
OLI - NC		0.500	0	0	0	--	--	0
UIC - NC		SP	0	--	--	--	--	0

No unmappable sites reported.

**FEDERAL RCRA NON-CORRACTS TSD FACILITIES LIST**

ARCHIVED RCRA TSD: Resource Conservation and Recovery Act hazardous waste transportation storage disposal and treatment facilities

Agency Version Date: 10/12/2020	Agency: U.S. Environmental Protection Agency
Agency Update Frequency: Quarterly	Agency Contact: 215-814-2469
Planned Next Contact: 04/13/2021	Most Recent Contact: 01/15/2021

RCRA\_TSD: Resource Conservation and Recovery Act hazardous waste transportation storage disposal and treatment facilities

Agency Version Date: 10/12/2020	Agency: U.S. Environmental Protection Agency
Agency Update Frequency: Quarterly	Agency Contact: 215-814-2469
Planned Next Contact: 04/13/2021	Most Recent Contact: 01/15/2021

**FEDERAL CERCLIS LIST**

CERCLIS NFRAP: The CERCLIS sites with No Further Remedial Action Planned from the CERCLIS program database. The Environmental Protection Agency decommissioned the CERCLIS data in 2014. The last update was November 12, 2013.

Agency Version Date: 10/25/2013	Agency: U.S. Environmental Protection Agency
Agency Update Frequency: Quarterly	Agency Contact: 800-424-9346
Planned Next Contact: 05/11/2021	Most Recent Contact: 02/12/2021

CERCLIS-HIST: The CERCLIS program database contains information on the assessment and remediation of federal hazardous waste sites. The Environmental Protection Agency decommissioned the CERCLIS data in 2014. The last update was November 12, 2013.

Agency Version Date: 10/29/2013	Agency: U.S. Environmental Protection Agency
Agency Update Frequency: Quarterly	Agency Contact: 800-424-9346
Planned Next Contact: 05/11/2021	Most Recent Contact: 02/12/2021

FEDERAL FACILITY: Sites where Federal Facilities Restoration and Reuse Office (FFRRO) arranged cleanup for Base Closure and Property Transfer at Federal Facilities

Agency Version Date: 11/17/2020	Agency: U.S. Environmental Protection Agency
Agency Update Frequency: Varies	Agency Contact: 703-603-8712
Planned Next Contact: 05/11/2021	Most Recent Contact: 02/12/2021

SEMS\_8R\_ACTIVE SITES: The Active Site Inventory Report displays site and location information at active SEMS sites. An active site is one at which site assessment, removal, remedial, enforcement, cost recovery, or oversight activities are being planned or conducted. NPL sites include latitude and longitude information. For non-NPL sites, a brief site status is provided.

Agency Version Date: 11/17/2020	Agency: U.S. Environmental Protection Agency
Agency Update Frequency: Quarterly	Agency Contact: 703-603-8867
Planned Next Contact: 05/11/2021	Most Recent Contact: 02/12/2021

SEMS\_8R\_ARCHIVED SITES: The Archived Site Inventory displays site and location information at sites archived from SEMS. An archived site is one at which EPA has determined that assessment has been completed and no further remedial action is planned under the Superfund program at this time.

Agency Version Date: 10/28/2020	Agency: U.S. Environmental Protection Agency
Agency Update Frequency: Quarterly	Agency Contact: 703-603-8867
Planned Next Contact: 05/11/2021	Most Recent Contact: 02/12/2021



**FEDERAL RCRA CORRACTS FACILITIES LIST**

CORRACTS: List of facilities where Resource Conservation and Recovery Act Corrective Action Program used to investigate and remediate hazardous releases

Agency Version Date: 10/12/2020	Agency: U.S. Environmental Protection Agency
Agency Update Frequency: Quarterly	Agency Contact: 202-566-1667
Planned Next Contact: 04/13/2021	Most Recent Contact: 01/15/2021

HIST CORRACTS 2: List of facilities where Resource Conservation and Recovery Act Corrective Action Program used to investigate and remediate hazardous releases that are no longer in current agency list.

Agency Version Date: 10/12/2018	Agency: U.S. Environmental Protection Agency
Agency Update Frequency: Annually	Agency Contact: 202-566-1667
Planned Next Contact: 06/08/2021	Most Recent Contact: 03/12/2021

**FEDERAL DELISTED NPL SITE LIST**

DELISTED NPL: National Priority List of sites that were delisted and no longer require action

Agency Version Date: 11/17/2020	Agency: U.S. Environmental Protection Agency
Agency Update Frequency: Quarterly	Agency Contact: 703-603-8867
Planned Next Contact: 05/11/2021	Most Recent Contact: 02/12/2021

DELISTED PROPOSED NPL: Sites that have been delisted from the proposed National Priority List

Agency Version Date: 11/17/2020	Agency: U.S. Environmental Protection Agency
Agency Update Frequency: Quarterly	Agency Contact: 703-603-8867
Planned Next Contact: 05/11/2021	Most Recent Contact: 02/12/2021

SEMS\_DELETED NPL: All Deleted National Priority List Sties

Agency Version Date: 10/28/2020	Agency: U.S. Environmental Protection Agency
Agency Update Frequency: Quarterly	Agency Contact: 703-603-8867
Planned Next Contact: 05/11/2021	Most Recent Contact: 02/12/2021

**FEDERAL LANDFILL AND/OR SOLID WASTE DISPOSAL SITE LISTS**

EPA LF MOP: Sites in the EPA Landfill Methane Outreach Program

Agency Version Date: 01/11/2021	Agency: U.S. Environmental Protection Agency
Agency Update Frequency: Quarterly	Agency Contact: 703-603-8867
Planned Next Contact: 04/09/2021	Most Recent Contact: 01/11/2021

**FEDERAL ERNS LIST**

ERNS: Emergency Response Notification System records of reported spills

Agency Version Date: 02/04/2021	Agency: National Response Center United States Coast Guard
Agency Update Frequency: Annually	Agency Contact: N/R
Planned Next Contact: 05/03/2021	Most Recent Contact: 02/04/2021

**FEDERAL INSTITUTIONAL CONTROLS / ENGINEERING CONTROLS REGISTRIES**

FED E C: Federal listing of remediation sites with engineering controls

Agency Version Date: 03/11/2021	Agency: U.S. Environmental Protection Agency
Agency Update Frequency: Varies	Agency Contact: 800-424-9346
Planned Next Contact: 06/07/2021	Most Recent Contact: 03/11/2021

**FEDERAL INSTITUTIONAL CONTROLS / ENGINEERING CONTROLS REGISTRIES (cont.)**

FED I C: Federal listing of remediation sites with institutional controls

Agency Version Date: 03/11/2021	Agency: U.S. Environmental Protection Agency
Agency Update Frequency: Varies	Agency Contact: 800-424-9346
Planned Next Contact: 06/07/2021	Most Recent Contact: 03/11/2021

RCRA IC\_EC: Sites with institutional or engineering controls related to Resource Conservation and Recovery Act

Agency Version Date: 02/19/2021	Agency: U.S. Environmental Protection Agency
Agency Update Frequency: Varies	Agency Contact: 215-814-2469
Planned Next Contact: 05/18/2021	Most Recent Contact: 02/19/2021

**FEDERAL RCRA GENERATORS LIST**

HIST RCRA\_CESQG: List of Resource Conservation and Recovery Act licensed conditionally exempt small quantity generators that are no longer in current agency list.

Agency Version Date: 10/12/2018	Agency: U.S. Environmental Protection Agency
Agency Update Frequency: Annually	Agency Contact: 215-814-2469
Planned Next Contact: 06/08/2021	Most Recent Contact: 03/12/2021

HIST RCRA\_LQG: List of Resource Conservation and Recovery Act licensed large quantity generators that are no longer in current agency list.

Agency Version Date: 10/12/2018	Agency: U.S. Environmental Protection Agency
Agency Update Frequency: Annually	Agency Contact: 215-814-2469
Planned Next Contact: 06/08/2021	Most Recent Contact: 03/12/2021

HIST RCRA\_NONGEN: List of Resource Conservation and Recovery Act licensed non-generators that are no longer in current agency list.

Agency Version Date: 10/12/2018	Agency: U.S. Environmental Protection Agency
Agency Update Frequency: Annually	Agency Contact: 215-814-2469
Planned Next Contact: 06/08/2021	Most Recent Contact: 03/12/2021

HIST RCRA\_SQG: List of Resource Conservation and Recovery Act licensed small quantity generators that are no longer in current agency list.

Agency Version Date: 10/12/2018	Agency: U.S. Environmental Protection Agency
Agency Update Frequency: Annually	Agency Contact: 215-814-2469
Planned Next Contact: 06/08/2021	Most Recent Contact: 03/12/2021

RCRA\_LQG: Resource Conservation and Recovery Act listing of licensed large quantity generators

Agency Version Date: 10/12/2020	Agency: U.S. Environmental Protection Agency
Agency Update Frequency: Quarterly	Agency Contact: 215-814-2469
Planned Next Contact: 04/13/2021	Most Recent Contact: 01/15/2021

RCRA\_NONGEN: Resource Conservation and Recovery Act listing of licensed non-generators

Agency Version Date: 10/12/2020	Agency: U.S. Environmental Protection Agency
Agency Update Frequency: Varies	Agency Contact: 215-814-2469
Planned Next Contact: 04/13/2021	Most Recent Contact: 01/15/2021

RCRA\_SQG: Resource Conservation and Recovery Act listing of licensed small quantity generators

Agency Version Date: 10/12/2020	Agency: U.S. Environmental Protection Agency
Agency Update Frequency: Quarterly	Agency Contact: 215-814-2469
Planned Next Contact: 04/13/2021	Most Recent Contact: 01/15/2021

**FEDERAL RCRA GENERATORS LIST (cont.)**

RCRA\_VSQG: Resource Conservation and Recovery Act listing of licensed very small quantity generators.

Agency Version Date: 10/12/2020	Agency: U.S. Environmental Protection Agency
Agency Update Frequency: Varies	Agency Contact: 215-814-2469
Planned Next Contact: 04/13/2021	Most Recent Contact: 01/15/2021

**FEDERAL NPL SITE LIST**

NPL: List of priority contaminated sites among identified releases or threatened releases of hazardous substances pollutants or contaminants nationally

Agency Version Date: 11/17/2020	Agency: U.S. Environmental Protection Agency
Agency Update Frequency: Quarterly	Agency Contact: 703-603-8867
Planned Next Contact: 05/11/2021	Most Recent Contact: 02/12/2021

NPL EPA R1 GIS: Geospatial data for the Environmental Protection Agency Region 1 National Priority List subject to environmental regulation

Agency Version Date: 11/17/2020	Agency: U.S. Environmental Protection Agency
Agency Update Frequency: Quarterly	Agency Contact: 202-566-2132
Planned Next Contact: 05/11/2021	Most Recent Contact: 02/12/2021

NPL EPA R3 GIS: Geospatial data for the Environmental Protection Agency Region 3 National Priority List subject to environmental regulation

Agency Version Date: 11/17/2020	Agency: U.S. Environmental Protection Agency
Agency Update Frequency: Quarterly	Agency Contact: 202-566-2132
Planned Next Contact: 05/11/2021	Most Recent Contact: 02/12/2021

NPL EPA R6 GIS: Geospatial data for the Environmental Protection Agency Region 6 National Priority List subject to environmental regulation

Agency Version Date: 11/17/2020	Agency: U.S. Environmental Protection Agency
Agency Update Frequency: Quarterly	Agency Contact: 202-566-2132
Planned Next Contact: 05/11/2021	Most Recent Contact: 02/12/2021

NPL EPA R8 GIS: Geospatial data for the Environmental Protection Agency Region 8 National Priority List subject to environmental regulation

Agency Version Date: 11/17/2020	Agency: U.S. Environmental Protection Agency
Agency Update Frequency: Quarterly	Agency Contact: 202-566-2132
Planned Next Contact: 05/11/2021	Most Recent Contact: 02/12/2021

NPL EPA R9 GIS: Geospatial data for the Environmental Protection Agency Region 9 National Priority List subject to environmental regulation

Agency Version Date: 11/17/2020	Agency: U.S. Environmental Protection Agency
Agency Update Frequency: Quarterly	Agency Contact: 202-566-2132
Planned Next Contact: 05/11/2021	Most Recent Contact: 02/12/2021

PART NPL: Sites that are a part of an National Priority List site referred to as the parent site

Agency Version Date: 11/17/2020	Agency: U.S. Environmental Protection Agency
Agency Update Frequency: Quarterly	Agency Contact: 703-603-8867
Planned Next Contact: 05/11/2021	Most Recent Contact: 02/12/2021

**FEDERAL NPL SITE LIST (cont.)**

PROPOSED NPL: Sites that have been proposed for the National Priority List

Agency Version Date: 11/17/2020	Agency: U.S. Environmental Protection Agency
Agency Update Frequency: Quarterly	Agency Contact: 703-603-8867
Planned Next Contact: 05/11/2021	Most Recent Contact: 02/12/2021

SEMS\_FINAL NPL: All Included National Priority List Sites

Agency Version Date: 10/28/2020	Agency: U.S. Environmental Protection Agency
Agency Update Frequency: Quarterly	Agency Contact: 703-603-8867
Planned Next Contact: 05/11/2021	Most Recent Contact: 02/12/2021

SEMS\_PROPOSED NPL: All Proposed National Priority List Sites

Agency Version Date: 10/28/2020	Agency: U.S. Environmental Protection Agency
Agency Update Frequency: Quarterly	Agency Contact: 703-603-8867
Planned Next Contact: 05/11/2021	Most Recent Contact: 02/12/2021

**STATE- AND TRIBAL - EQUIVALENT CERCLIS**

ARCHIVED HSDS - NC: The Hazardous Substance Disposal Sites that were listed on both the National Priority List and the State Priority List as of June 21, 1995. Updated 1998 and 2004.

Agency Version Date: 12/13/2018	Agency: North Carolina Center for Geographic Information and analysis
Agency Update Frequency: No Longer Maintained	Agency Contact: (919) 754-6585
Planned Next Contact: 05/24/2021	Most Recent Contact: 02/25/2021

ARCHIVED HSDS AREAS - NC: Areas of Archived Hazardous Substance Disposal Sites

Agency Version Date: 12/13/2018	Agency: North Carolina Center for Geographic Information and analysis
Agency Update Frequency: Quarterly	Agency Contact: (919) 754-6585
Planned Next Contact: 05/24/2021	Most Recent Contact: 02/25/2021

FRB SUPERFUND - NC: The NC DENR Federal Remediation Branch list of Superfund and CERCLA sites.

Agency Version Date: 12/21/2020	Agency: Department of Environmental Quality
Agency Update Frequency: Quarterly	Agency Contact: (919) 707-8200
Planned Next Contact: 06/15/2021	Most Recent Contact: 03/19/2021

SHWS - NC: Hazardous Substances Cleanup Fund list of sites

Agency Version Date: 02/11/2021	Agency: Department of Environmental Quality
Agency Update Frequency: Quarterly	Agency Contact: (919) 707-8200
Planned Next Contact: 05/10/2021	Most Recent Contact: 02/11/2021

**STATE AND TRIBAL REGISTERED STORAGE TANK LISTS**

FEMA UST: FEMA underground storage tank listing

Agency Version Date: 06/21/2019	Agency: FEMA
Agency Update Frequency: Varies	Agency Contact: 202-212-5283
Planned Next Contact: 04/16/2021	Most Recent Contact: 01/19/2021

INDIAN UST R1: Underground Storage Tanks on Indian Land in EPA Region 1

Agency Version Date: 02/03/2021	Agency: U.S. Environmental Protection Agency Region 1
Agency Update Frequency: Quarterly	Agency Contact: 855-246-3642
Planned Next Contact: 05/03/2021	Most Recent Contact: 02/03/2021

**STATE AND TRIBAL REGISTERED STORAGE TANK LISTS (cont.)**

INDIAN UST R10: Underground Storage Tanks on Indian Land in EPA Region 10

Agency Version Date: 12/02/2020	Agency: U.S. Environmental Protection Agency Region 10
Agency Update Frequency: Quarterly	Agency Contact: 855-246-3642
Planned Next Contact: 05/27/2021	Most Recent Contact: 03/01/2021

INDIAN UST R2: Underground Storage Tanks on Indian Land in EPA Region 2

Agency Version Date: 12/07/2016	Agency: U.S. Environmental Protection Agency Region 2
Agency Update Frequency: Quarterly	Agency Contact: 855-246-3642
Planned Next Contact: 05/05/2021	Most Recent Contact: 02/05/2021

INDIAN UST R4: Underground Storage Tanks on Indian Land in EPA Region 4

Agency Version Date: 04/14/2020	Agency: U.S. Environmental Protection Agency Region 4
Agency Update Frequency: Semi Annually	Agency Contact: 855-246-3642
Planned Next Contact: 05/27/2021	Most Recent Contact: 03/01/2021

INDIAN UST R5: Underground Storage Tanks on Indian Land in EPA Region 5

Agency Version Date: 11/19/2020	Agency: U.S. Environmental Protection Agency Region 5
Agency Update Frequency: Varies	Agency Contact: 855-246-3642
Planned Next Contact: 05/14/2021	Most Recent Contact: 02/15/2021

INDIAN UST R6: Underground Storage Tanks on Indian Land in EPA Region 6

Agency Version Date: 12/18/2020	Agency: U.S. Environmental Protection Agency Region 6
Agency Update Frequency: Semi Annually	Agency Contact: 855-246-3642
Planned Next Contact: 06/11/2021	Most Recent Contact: 03/17/2021

INDIAN UST R7: Underground Storage Tanks on Indian Land in EPA Region 7

Agency Version Date: 11/19/2020	Agency: U.S. Environmental Protection Agency Region 7
Agency Update Frequency: Varies	Agency Contact: 855-246-3642
Planned Next Contact: 05/14/2021	Most Recent Contact: 02/15/2021

INDIAN UST R8: Underground Storage Tanks on Indian Land in EPA Region 8

Agency Version Date: 02/01/2021	Agency: U.S. Environmental Protection Agency Region 8
Agency Update Frequency: Quarterly	Agency Contact: 855-246-3642
Planned Next Contact: 04/29/2021	Most Recent Contact: 02/01/2021

INDIAN UST R9: Underground Storage Tanks on Indian Land in EPA Region 9

Agency Version Date: 02/01/2021	Agency: U.S. Environmental Protection Agency Region 9
Agency Update Frequency: Quarterly	Agency Contact: 855-246-3642
Planned Next Contact: 04/29/2021	Most Recent Contact: 02/01/2021

AST - NC: Oil terminal facility Locations

Agency Version Date: 02/05/2021	Agency: Department of Environment and Natural Resources
Agency Update Frequency: Varies	Agency Contact: (919) 715-1117
Planned Next Contact: 05/04/2021	Most Recent Contact: 02/05/2021

UST - NC: Registered Underground Storage Tanks

Agency Version Date: 01/08/2021	Agency: Department of Environment and Natural Resources
Agency Update Frequency: Varies	Agency Contact: (919) 707-8234
Planned Next Contact: 04/06/2021	Most Recent Contact: 01/08/2021

**STATE AND TRIBAL REGISTERED STORAGE TANK LISTS (cont.)**

UST 2 - NC: UST Facility Operating Permits

Agency Version Date: 01/26/2021  
 Agency Update Frequency: Varies  
 Planned Next Contact: 04/23/2021

Agency: Department of Environment and Natural Resources  
 Agency Contact: (919) 707-8234  
 Most Recent Contact: 01/26/2021

**STATE AND TRIBAL BROWNFIELD SITES**

TRIBAL BROWNFIELDS: Tribal brownfield remediation site listing

Agency Version Date: 02/10/2017  
 Agency Update Frequency: No Longer Maintained  
 Planned Next Contact: 04/02/2021

Agency: U.S. Environmental Protection Agency  
 Agency Contact: 855-246-3642  
 Most Recent Contact: 01/05/2021

BROWNFIELDS - NC: Brownfield Projects Inventory

Agency Version Date: 02/11/2021  
 Agency Update Frequency: Varies  
 Planned Next Contact: 05/10/2021

Agency: Department of Environment and Natural Resources  
 Agency Contact: (919) 707-8234  
 Most Recent Contact: 02/11/2021

**STATE RCRA GENERATORS LIST**

HWG - NC: Hazardous Waste sites that are regulated by the hazardous waste portions of the Resource Conservation and Recovery Act (RCRA)

Agency Version Date: 01/05/2021  
 Agency Update Frequency: Varies  
 Planned Next Contact: 04/01/2021

Agency: North Carolina Center for Geographic Information and analysis  
 Agency Contact: (919) 754-6585  
 Most Recent Contact: 01/05/2021

**STATE INSTITUTIONAL CONTROLS / ENGINEERING CONTROLS REGISTRIES**

I C - NC: Sites with land Use Restrictions Monitoring

Agency Version Date: 02/11/2021  
 Agency Update Frequency: Varies  
 Planned Next Contact: 05/10/2021

Agency: Department of Environment and Natural Resources  
 Agency Contact: (919) 707-8234  
 Most Recent Contact: 02/11/2021

**STATE AND TRIBAL LEAKING STORAGE TANK LISTS**

INDIAN LUST R1: Leaking Underground Storage Tanks on Indian Land in EPA Region 1

Agency Version Date: 02/02/2021  
 Agency Update Frequency: Quarterly  
 Planned Next Contact: 04/30/2021

Agency: U.S. Environmental Protection Agency Region 1  
 Agency Contact: 855-246-3642  
 Most Recent Contact: 02/02/2021

INDIAN LUST R10: Leaking Underground Storage Tanks on Indian Land in EPA Region 10

Agency Version Date: 04/14/2020  
 Agency Update Frequency: Quarterly  
 Planned Next Contact: 05/27/2021

Agency: U.S. Environmental Protection Agency Region 10  
 Agency Contact: 855-246-3642  
 Most Recent Contact: 03/01/2021

INDIAN LUST R2: Leaking Underground Storage Tanks on Indian Land in EPA Region 2

Agency Version Date: 12/07/2016  
 Agency Update Frequency: Quarterly  
 Planned Next Contact: 05/05/2021

Agency: U.S. Environmental Protection Agency Region 2  
 Agency Contact: 855-246-3642  
 Most Recent Contact: 02/05/2021

**STATE AND TRIBAL LEAKING STORAGE TANK LISTS (cont.)**

INDIAN LUST R4: Leaking Underground Storage Tanks on Indian Land in EPA Region 4

Agency Version Date: 12/02/2020	Agency: U.S. Environmental Protection Agency Region 4
Agency Update Frequency: Semi Annually	Agency Contact: 855-246-3642
Planned Next Contact: 05/27/2021	Most Recent Contact: 03/01/2021

INDIAN LUST R5: Leaking Underground Storage Tanks on Indian Land in EPA Region 5

Agency Version Date: 11/19/2020	Agency: U.S. Environmental Protection Agency Region 5
Agency Update Frequency: Varies	Agency Contact: 855-246-3642
Planned Next Contact: 05/14/2021	Most Recent Contact: 02/15/2021

INDIAN LUST R6: Leaking Underground Storage Tanks on Indian Land in EPA Region 6

Agency Version Date: 11/23/2020	Agency: U.S. Environmental Protection Agency Region 6
Agency Update Frequency: Quarterly	Agency Contact: 855-246-3642
Planned Next Contact: 05/18/2021	Most Recent Contact: 02/19/2021

INDIAN LUST R7: Leaking Underground Storage Tanks on Indian Land in EPA Region 7

Agency Version Date: 04/15/2020	Agency: U.S. Environmental Protection Agency Region 7
Agency Update Frequency: Varies	Agency Contact: 855-246-3642
Planned Next Contact: 05/14/2021	Most Recent Contact: 02/15/2021

INDIAN LUST R8: Leaking Underground Storage Tanks on Indian Land in EPA Region 8

Agency Version Date: 11/23/2020	Agency: U.S. Environmental Protection Agency Region 8
Agency Update Frequency: Quarterly	Agency Contact: 855-246-3642
Planned Next Contact: 05/18/2021	Most Recent Contact: 02/19/2021

INDIAN LUST R9: Leaking Underground Storage Tanks on Indian Land in EPA Region 9

Agency Version Date: 02/01/2021	Agency: U.S. Environmental Protection Agency Region 9
Agency Update Frequency: Quarterly	Agency Contact: 855-246-3642
Planned Next Contact: 04/29/2021	Most Recent Contact: 02/01/2021

LAST - NC: Aboveground Storage Tanks with reported leaks

Agency Version Date: 12/15/2020	Agency: Department of Environment and Natural Resources
Agency Update Frequency: Varies	Agency Contact: (919) 707-8234
Planned Next Contact: 06/09/2021	Most Recent Contact: 03/12/2021

LUST - NC: Underground Storage Tanks with reported leaks

Agency Version Date: 12/15/2020	Agency: Department of Environment and Natural Resources
Agency Update Frequency: Varies	Agency Contact: (919) 707-8150
Planned Next Contact: 06/09/2021	Most Recent Contact: 03/12/2021

LUST TRUST - NC: State Trust Fund Database

Agency Version Date: 01/07/2021	Agency: Department of Environment and Natural Resources
Agency Update Frequency: Varies	Agency Contact: (919) 707-8234
Planned Next Contact: 04/05/2021	Most Recent Contact: 01/07/2021

**STATE AND TRIBAL LANDFILL AND/OR SOLID WASTE DISPOSAL SITE LISTS**

PRLF - NC: List of non-permitted landfills that have been closed since 1/1/1983.

Agency Version Date: 01/29/2021  
 Agency Update Frequency: Varies  
 Planned Next Contact: 04/27/2021

Agency: North Carolina Center for Geographic Information and analysis  
 Agency Contact: (919) 754-6585  
 Most Recent Contact: 01/29/2021

SWF/LF - NC: Landfill sites

Agency Version Date: 02/10/2021  
 Agency Update Frequency: Varies  
 Planned Next Contact: 05/10/2021

Agency: Department of Environment and Natural Resources  
 Agency Contact: (919) 707-8200  
 Most Recent Contact: 02/10/2021

**LOCAL BROWNFIELD LISTS**

BROWNFIELDS-ACRES: EPA Brownfields Assessment, Cleanup and Redevelopment Exchange System.

Agency Version Date: 12/28/2020  
 Agency Update Frequency: Quarterly  
 Planned Next Contact: 03/26/2021

Agency: U.S. Environmental Protection Agency  
 Agency Contact: 855-246-3642  
 Most Recent Contact: 12/28/2020

FED BROWNFIELDS: Federal brownfield remediation sites

Agency Version Date: 02/05/2021  
 Agency Update Frequency: Semi Annually  
 Planned Next Contact: 05/05/2021

Agency: U.S. Environmental Protection Agency  
 Agency Contact: 855-246-3642  
 Most Recent Contact: 02/05/2021

**LOCAL LISTS OF HAZARDOUS WASTE / CONTAMINATED SITES**

FED CDL: The U.S. Department of Justice listing of clandestine drug lab locations

Agency Version Date: 01/28/2021  
 Agency Update Frequency: Quarterly  
 Planned Next Contact: 04/26/2021

Agency: U.S. Department of Justice  
 Agency Contact: 202-307-7610  
 Most Recent Contact: 01/28/2021

US HIST CDL: The U.S. Department of Justice historical listing of clandestine drug lab locations

Agency Version Date: 08/05/2019  
 Agency Update Frequency: Quarterly  
 Planned Next Contact: 05/31/2021

Agency: U.S. Department of Justice  
 Agency Contact: 202-307-7610  
 Most Recent Contact: 03/03/2021

INACTIVE HWS - NC: Listing of inactive hazardous sites where a hazardous substance release has been identified

Agency Version Date: 01/07/2021  
 Agency Update Frequency: Varies  
 Planned Next Contact: 04/05/2021

Agency: North Carolina Center for Geographic Information and analysis  
 Agency Contact: (919) 754-6585  
 Most Recent Contact: 01/07/2021

**LOCAL LISTS OF LANDFILL / SOLID WASTE DISPOSAL SITES**

HIST INDIAN ODI R8: List of Region 8 Indian land open dump inventory sites maintained within the STARS program that is no longer in current agency list.

Agency Version Date: 11/12/2018  
 Agency Update Frequency: Annually  
 Planned Next Contact: 04/29/2021

Agency: Indian Health Service  
 Agency Contact: 855-246-3642  
 Most Recent Contact: 02/01/2021

INDIAN ODI R8: Region 8 Indian land open dump inventory sites maintained within the STARS program

Agency Version Date: 02/12/2021  
 Agency Update Frequency: Varies  
 Planned Next Contact: 05/11/2021

Agency: Indian Health Service  
 Agency Contact: 855-246-3642  
 Most Recent Contact: 02/12/2021



**LOCAL LISTS OF LANDFILL / SOLID WASTE DISPOSAL SITES (cont.)**

ODI: Open dump inventory sites

Agency Version Date: 10/03/2017  
 Agency Update Frequency: No Update  
 Planned Next Contact: 05/24/2021

Agency: U.S. Environmental Protection Agency  
 Agency Contact: 855-246-3642  
 Most Recent Contact: 02/25/2021

TRIBAL ODI: Indian land open dump inventory for all regions

Agency Version Date: 12/18/2020  
 Agency Update Frequency: Varies  
 Planned Next Contact: 06/04/2021

Agency: Indian Health Service  
 Agency Contact: 301-443-3593  
 Most Recent Contact: 03/10/2021

SWRCY - NC: Listing of recycling facilities

Agency Version Date: 11/13/2020  
 Agency Update Frequency: Quarterly  
 Planned Next Contact: 05/10/2021

Agency: Department of Environment and Natural Resources  
 Agency Contact: 919.707.8236  
 Most Recent Contact: 02/10/2021

SWRCY 2 - NC: Material Recovery Facilities (MRFs)

Agency Version Date: 02/04/2021  
 Agency Update Frequency: Quarterly  
 Planned Next Contact: 05/03/2021

Agency: Department of Environment and Natural Resources  
 Agency Contact: 919.707.8236  
 Most Recent Contact: 02/04/2021

SWTIRE - NC: Solid Waste Permitted Facility List

Agency Version Date: 02/11/2021  
 Agency Update Frequency: Quarterly  
 Planned Next Contact: 05/10/2021

Agency: Department of Environmental Quality  
 Agency Contact: (919) 707-8200  
 Most Recent Contact: 02/11/2021

**RECORDS OF EMERGENCY RELEASE REPORTS**

HMIRS (DOT): Hazardous Material spills reported by the Department of Transportation

Agency Version Date: 01/05/2021  
 Agency Update Frequency: Varies  
 Planned Next Contact: 04/02/2021

Agency: U.S. Department of Transportation  
 Agency Contact: (202) 366-4996  
 Most Recent Contact: 01/05/2021

**LOCAL LAND RECORDS**

LIENS 2: Comprehensive Environmental Response Compensation and Liability Act sites with liens

Agency Version Date: 05/11/2017  
 Agency Update Frequency: No Longer Maintained  
 Planned Next Contact: 04/02/2021

Agency: U.S. Environmental Protection Agency  
 Agency Contact: 800-424-9346  
 Most Recent Contact: 01/05/2021

**OTHER ASCERTAINABLE RECORDS**

AFS: Air Facility Systems Quarterly Extract

Agency Version Date: 02/16/2021  
 Agency Update Frequency: Quarterly  
 Planned Next Contact: 05/14/2021

Agency: Environmental Protection Agency  
 Agency Contact: (202) 566-1667  
 Most Recent Contact: 02/16/2021

ALT FUELING: Alternative Fueling Stations by fuel type.

Agency Version Date: 01/14/2021  
 Agency Update Frequency: Quarterly  
 Planned Next Contact: 04/12/2021

Agency: U.S. Department of Energy  
 Agency Contact: N/R  
 Most Recent Contact: 01/14/2021

**OTHER ASCERTAINABLE RECORDS (cont.)**

AST PBS: Bulk petroleum terminals with a total bulk storage capacity of 50,000 barrels or more.

Agency Version Date: 12/11/2020	Agency: Department of Homeland Security
Agency Update Frequency: Quarterly	Agency Contact: 202-853-5361
Planned Next Contact: 06/04/2021	Most Recent Contact: 03/09/2021

BRS: Reporting of hazardous waste generation and management from large quantity generators

Agency Version Date: 10/12/2020	Agency: Environmental Protection Agency
Agency Update Frequency: Biennial	Agency Contact: (202) 566-1667
Planned Next Contact: 04/13/2021	Most Recent Contact: 01/15/2021

CDC HAZDAT: The Agency for Toxic Substances and Disease Registry's Hazardous Substance Release/Health Effects Database.

Agency Version Date: 08/21/2020	Agency: Agency for Toxic Substances and Disease Registry
Agency Update Frequency: Varies	Agency Contact: 770-488-6399
Planned Next Contact: 05/11/2021	Most Recent Contact: 02/12/2021

COAL ASH DOE: List of existing and planned generators with 1 megawatt or greater of combined capacity that are utilizing coal ash impoundments.

Agency Version Date: 01/08/2021	Agency: Department of Energy
Agency Update Frequency: Varies	Agency Contact: (202) 586-8800
Planned Next Contact: 04/07/2021	Most Recent Contact: 01/08/2021

COAL ASH EPA: Coal Combustion Residues Surface Impoundments List

Agency Version Date: 02/18/2021	Agency: Environmental Protection Agency
Agency Update Frequency: Varies	Agency Contact: (202) 566-1667
Planned Next Contact: 05/17/2021	Most Recent Contact: 02/18/2021

COAL GAS: Manufactured Gas Plant locations

Agency Version Date: 01/22/2021	Agency: U.S. Environmental Protection Agency
Agency Update Frequency: Quarterly	Agency Contact: 855-246-3642
Planned Next Contact: 04/20/2021	Most Recent Contact: 01/22/2021

CONSENT (DECREES): Legal decisions regarding responsibility for Superfund locations

Agency Version Date: 11/13/2020	Agency: Environmental Protection Agency
Agency Update Frequency: Varies	Agency Contact: (800) 424-9346
Planned Next Contact: 05/10/2021	Most Recent Contact: 02/10/2021

CORRECTIVE ACTIONS\_2020: In 2009 the EPA created the 2020 Corrective Action Baseline list of contaminated or potentially contaminated sites with a cleanup goal to complete 95% by the year 2020. The names on the list indicate the facility owners who may or may not have caused the contamination.

Agency Version Date: 12/21/2018	Agency: U.S. Environmental Protection Agency
Agency Update Frequency: No Longer Maintained	Agency Contact: N/R
Planned Next Contact: 05/04/2021	Most Recent Contact: 02/05/2021

DEBRIS EPA LF: EPA list of designated landfill facilities for the safe disposal of disaster debris.

Agency Version Date: 01/26/2021	Agency: U.S. Environmental Protection Agency
Agency Update Frequency: Quarterly	Agency Contact: 855-246-3642
Planned Next Contact: 04/27/2021	Most Recent Contact: 01/26/2021

**OTHER ASCERTAINABLE RECORDS (cont.)**

DEBRIS EPA SWRCY: EPA list of facilities for the safe recovery, recycling, and disposal of disaster debris.

Agency Version Date: 01/26/2021	Agency: U.S. Environmental Protection Agency
Agency Update Frequency: Quarterly	Agency Contact: 855-246-3642
Planned Next Contact: 04/27/2021	Most Recent Contact: 01/26/2021

DOD: Department of Defense sites

Agency Version Date: 11/17/2020	Agency: Environmental Protection Agency
Agency Update Frequency: Varies	Agency Contact: (800) 424-9346
Planned Next Contact: 05/11/2021	Most Recent Contact: 02/12/2021

DOT OPS: Incident Data Report

Agency Version Date: 11/30/2020	Agency: U.S. Department of Transportation
Agency Update Frequency: Varies	Agency Contact: (202) 366-4996
Planned Next Contact: 05/26/2021	Most Recent Contact: 02/26/2021

ECHO: ECHO is EPA Enforcement and Compliance History Online website to search for facilities in your community to assess their compliance with environmental regulations related to CAA, CWA, RCRA, & SDWA.

Agency Version Date: 01/07/2021	Agency: U.S. Environmental Protection Agency
Agency Update Frequency: Quarterly	Agency Contact: 202-566-1667
Planned Next Contact: 04/05/2021	Most Recent Contact: 01/07/2021

ENOI: The Electronic Notice of Intent (eNOI) database contains construction sites and industrial facilities that submit permit requests to EPA for Construction General Permits (CGP) and Multi-Sector General Permits (MSGP).

Agency Version Date: 09/25/2020	Agency: Environmental Protection Agency
Agency Update Frequency: Quarterly	Agency Contact: (202) 566-1667
Planned Next Contact: 06/15/2021	Most Recent Contact: 03/19/2021

EPA FUELS: List of companies and facilities registered to participate in EPA Fuel Programs under Title 40 CFR Part 80.

Agency Version Date: 11/23/2020	Agency: U.S. Environmental Protection Agency
Agency Update Frequency: Quarterly	Agency Contact: (202) 564-2307
Planned Next Contact: 05/18/2021	Most Recent Contact: 02/19/2021

EPA OSC: Listing of oil spills and hazardous substance release sites requiring EPA On-Site Coordinators.

Agency Version Date: 10/09/2020	Agency: U.S. Environmental Protection Agency
Agency Update Frequency: Quarterly	Agency Contact: (202) 564-2307
Planned Next Contact: 04/02/2021	Most Recent Contact: 01/05/2021

EPA WATCH: The EPA Watch List was used to facilitate dialogue between EPA, state and local environmental agencies on enforcement matters relating to facilities with alleged violations identified as either significant or high priority. EPA maintained the lists from 2011 - 2013.

Agency Version Date: 02/09/2018	Agency: U.S. Environmental Protection Agency
Agency Update Frequency: No Longer Maintained	Agency Contact: (202) 564-2307
Planned Next Contact: 04/02/2021	Most Recent Contact: 01/05/2021

FA HWF: Hazardous Waste Facilities with Financial Assurance

Agency Version Date: 01/20/2021	Agency: Environmental Protection Agency
Agency Update Frequency: Varies	Agency Contact: (800) 424-9346
Planned Next Contact: 04/19/2021	Most Recent Contact: 01/20/2021

**OTHER ASCERTAINABLE RECORDS (cont.)**

FEDLAND: Federal land locations

Agency Version Date: 01/06/2020  
 Agency Update Frequency: Varies  
 Planned Next Contact: 05/07/2021

Agency: Environmental Protection Agency  
 Agency Contact: (800) 424-9346  
 Most Recent Contact: 02/09/2021

FRS: Facility Registry Systems

Agency Version Date: 11/27/2020  
 Agency Update Frequency: Varies  
 Planned Next Contact: 05/24/2021

Agency: Environmental Protection Agency  
 Agency Contact: (202) 566-1667  
 Most Recent Contact: 02/23/2021

FTTS: Tracking of administrative and enforcement activities related to FIFRA/TSCA

Agency Version Date: 04/16/2013  
 Agency Update Frequency: No Longer Maintained  
 Planned Next Contact: 04/20/2021

Agency: Environmental Protection Agency  
 Agency Contact: (202) 564-2280  
 Most Recent Contact: 01/22/2021

FTTS INSP: Tracking of inspections related to FIFRA/TSCA

Agency Version Date: 05/08/2017  
 Agency Update Frequency: No Longer Maintained  
 Planned Next Contact: 04/13/2021

Agency: Environmental Protection Agency  
 Agency Contact: (202) 564-2280  
 Most Recent Contact: 01/15/2021

FUDS: Defense sites that require cleanup

Agency Version Date: 11/23/2020  
 Agency Update Frequency: Varies  
 Planned Next Contact: 05/19/2021

Agency: US Army Corps of Engineering  
 Agency Contact: (202) 761-0011  
 Most Recent Contact: 02/19/2021

HIST AFS: List of Air Facility Systems Quarterly Extract that are no longer in current agency list.

Agency Version Date: 06/14/2019  
 Agency Update Frequency: Quarterly  
 Planned Next Contact: 04/01/2021

Agency: Environmental Protection Agency  
 Agency Contact: (202) 566-1667  
 Most Recent Contact: 01/05/2021

HIST AFS 2: List of Air Facility Systems Quarterly Extract that are no longer in current agency list.

Agency Version Date: 11/26/2018  
 Agency Update Frequency: Quarterly  
 Planned Next Contact: 05/04/2021

Agency: Environmental Protection Agency  
 Agency Contact: (202) 566-1667  
 Most Recent Contact: 02/05/2021

HIST DOD: Department of Defense historical sites

Agency Version Date: 08/17/2018  
 Agency Update Frequency: No Longer Maintained  
 Planned Next Contact: 05/11/2021

Agency: Environmental Protection Agency  
 Agency Contact: (800) 424-9346  
 Most Recent Contact: 02/12/2021

HIST LEAD\_SMELTER: List of former lead smelter sites that is no longer in current agency list.

Agency Version Date: 12/12/2018  
 Agency Update Frequency: Annually  
 Planned Next Contact: 04/19/2021

Agency: Environmental Protection Agency  
 Agency Contact: (202) 566-1667  
 Most Recent Contact: 01/21/2021

HIST MLTS: List of sites in possession/use of radioactive materials regulated by NRC that is no longer in current agency list.

Agency Version Date: 07/13/2016  
 Agency Update Frequency: Annually  
 Planned Next Contact: 04/29/2021

Agency: Nuclear Regulatory Commission  
 Agency Contact: (800) 397-4209  
 Most Recent Contact: 02/01/2021

**OTHER ASCERTAINABLE RECORDS (cont.)**

HIST PCB TRANS: List of PCB Disposal Facilities that are no longer in current agency list.

Agency Version Date: 01/18/2018	Agency: Environmental Protection Agency
Agency Update Frequency: No Update	Agency Contact: (703) 308-8404
Planned Next Contact: 05/17/2021	Most Recent Contact: 02/18/2021

HIST PCS ENF: List of permitted facilities to discharge wastewater (Federal equivalent to NPDES) that are no longer in current agency list.

Agency Version Date: 12/08/2018	Agency: Environmental Protection Agency
Agency Update Frequency: Annually	Agency Contact: (202) 564-6582
Planned Next Contact: 06/04/2021	Most Recent Contact: 03/09/2021

HIST PCS FACILITY: List of Permitted facilities to discharge wastewater (Federal equivalent to NPDES) that are no longer in current agency list.

Agency Version Date: 12/18/2018	Agency: Environmental Protection Agency
Agency Update Frequency: Annually	Agency Contact: (202) 564-6582
Planned Next Contact: 06/03/2021	Most Recent Contact: 03/09/2021

HIST SSTS: List of tracking of facilities who produce pesticides and their quantity that are no longer in current agency list.

Agency Version Date: 02/13/2019	Agency: Environmental Protection Agency
Agency Update Frequency: Annually	Agency Contact: (202) 566-1667
Planned Next Contact: 05/21/2021	Most Recent Contact: 02/23/2021

HWC DOCKET: Listing of Federal facilities which are managing or have managed hazardous waste; or have had a release of hazardous waste.

Agency Version Date: 02/16/2021	Agency: U.S. Environmental Protection Agency
Agency Update Frequency: Quarterly	Agency Contact: (202) 564-2307
Planned Next Contact: 05/17/2021	Most Recent Contact: 02/16/2021

ICIS: Comprised of all Federal Administrative and Judicial enforcement information [intended to replace PCS] by tracking enforcement and compliance information (also contains what used to be known as FFTS)

Agency Version Date: 01/12/2021	Agency: Environmental Protection Agency
Agency Update Frequency: Varies	Agency Contact: (202) 566-1667
Planned Next Contact: 04/09/2021	Most Recent Contact: 01/12/2021

INACTIVE PCS: Inactive Permitted facilities to discharge wastewater

Agency Version Date: 01/12/2021	Agency: Environmental Protection Agency
Agency Update Frequency: Varies	Agency Contact: (202) 564-6582
Planned Next Contact: 04/09/2021	Most Recent Contact: 01/12/2021

INDIAN RESERVATION: Indian Reservation sites

Agency Version Date: 10/26/2020	Agency: Environmental Protection Agency
Agency Update Frequency: Varies	Agency Contact: (800) 424-9346
Planned Next Contact: 04/19/2021	Most Recent Contact: 01/21/2021

LUCIS: Land Use Control Information Systems

Agency Version Date: 07/24/2020	Agency: Department of the Navy: BRAC PMO
Agency Update Frequency: Quarterly	Agency Contact: (619) 532-0900
Planned Next Contact: 04/06/2021	Most Recent Contact: 01/08/2021

**OTHER ASCERTAINABLE RECORDS (cont.)**

LUCIS 2: Land Use Control Information Systems

Agency Version Date: 01/17/2018  
 Agency Update Frequency: No Longer Maintained  
 Planned Next Contact: 05/18/2021

Agency: Department of the Navy: BRAC PMO  
 Agency Contact: (619) 532-0900  
 Most Recent Contact: 02/19/2021

MINES: Mines Master Index Files

Agency Version Date: 01/11/2021  
 Agency Update Frequency: Varies  
 Planned Next Contact: 04/09/2021

Agency: Department of Labor  
 Agency Contact: (202) 693-9400  
 Most Recent Contact: 01/11/2021

MINES USGS: Listing of all active mines and mineral plants in 2003

Agency Version Date: 02/02/2021  
 Agency Update Frequency: Varies  
 Planned Next Contact: 04/13/2021

Agency: USGS Mineral Resources Program  
 Agency Contact: (703) 648-5953  
 Most Recent Contact: 01/15/2021

MLTS: Sites in possession/use of radioactive materials regulated by NRC

Agency Version Date: 05/19/2020  
 Agency Update Frequency: Varies  
 Planned Next Contact: 05/04/2021

Agency: Nuclear Regulatory Commission  
 Agency Contact: (800) 397-4209  
 Most Recent Contact: 02/05/2021

NPL AOC: Areas of Concern related to NPL remediation sites

Agency Version Date: 11/17/2020  
 Agency Update Frequency: Quarterly  
 Planned Next Contact: 05/11/2021

Agency: Environmental Protection Agency  
 Agency Contact: N/R  
 Most Recent Contact: 02/12/2021

NPL LIENS: National Priority List of sites with Liens

Agency Version Date: 10/28/2020  
 Agency Update Frequency: Varies  
 Planned Next Contact: 05/11/2021

Agency: U.S. Environmental Protection Agency  
 Agency Contact: 703-603-8867  
 Most Recent Contact: 02/12/2021

OSHA: OSHA's listing of inspections violations and fatality information

Agency Version Date: 10/16/2020  
 Agency Update Frequency: Varies  
 Planned Next Contact: 04/08/2021

Agency: Occupational Safety & Health Administration  
 Agency Contact: 800-321-6742  
 Most Recent Contact: 01/11/2021

PADS: Listing of generators transporters commercial store/ brokers and disposers of PCB

Agency Version Date: 02/12/2021  
 Agency Update Frequency: Varies  
 Planned Next Contact: 05/11/2021

Agency: Environmental Protection Agency  
 Agency Contact: (703) 308-8404  
 Most Recent Contact: 02/12/2021

PCB TRANSFORMER: Disposal and Storage of Polychlorinated Biphenyl (PCB) Waste

Agency Version Date: 11/27/2020  
 Agency Update Frequency: Quarterly  
 Planned Next Contact: 05/24/2021

Agency: Environmental Protection Agency  
 Agency Contact: (703) 308-8404  
 Most Recent Contact: 02/24/2021

PCS ENF: Permitted facilities to discharge wastewater (Federal equivalent to NPDES)

Agency Version Date: 01/12/2021  
 Agency Update Frequency: Varies  
 Planned Next Contact: 04/09/2021

Agency: Environmental Protection Agency  
 Agency Contact: (202) 564-6582  
 Most Recent Contact: 01/12/2021

**OTHER ASCERTAINABLE RECORDS (cont.)**

PCS FACILITY: Permitted facilities to discharge wastewater (Federal equivalent to NPDES)

Agency Version Date: 01/12/2021	Agency: Environmental Protection Agency
Agency Update Frequency: Varies	Agency Contact: (202) 564-6582
Planned Next Contact: 04/09/2021	Most Recent Contact: 01/12/2021

RAATS: Listing of major violators with enforcement actions issued under RCRA. Includes administrative and civil actions filed by the EPA. This dataset is no longer maintained.

Agency Version Date: 09/23/2019	Agency: Environmental Protection Agency
Agency Update Frequency: Varies	Agency Contact: (202) 566-1667
Planned Next Contact: 05/04/2021	Most Recent Contact: 02/05/2021

RADINFO: EPA regulated facilities with radiation and radioactive materials

Agency Version Date: 08/01/2019	Agency: Environmental Protection Agency
Agency Update Frequency: Varies	Agency Contact: (202) 566-1667
Planned Next Contact: 04/23/2021	Most Recent Contact: 01/26/2021

RMP: Facilities producing/handling/ process/ distribute/ store specific chemicals report plans required by the Clean Air Act

Agency Version Date: 03/17/2020	Agency: Environmental Protection Agency
Agency Update Frequency: Monthly	Agency Contact: (202) 564-2534
Planned Next Contact: 04/16/2021	Most Recent Contact: 01/19/2021

ROD: Permanent remedy at an NPL site

Agency Version Date: 11/17/2020	Agency: Environmental Protection Agency
Agency Update Frequency: Varies	Agency Contact: (800) 424-9346
Planned Next Contact: 05/11/2021	Most Recent Contact: 02/12/2021

SCRD DRYCLEANERS: State Coalition for Remediation of Drycleaners

Agency Version Date: 12/18/2020	Agency: Environmental Protection Agency
Agency Update Frequency: No Update	Agency Contact: (202) 566-1667
Planned Next Contact: 06/14/2021	Most Recent Contact: 03/16/2021

SEMS\_SMELTER: This report includes sites that have smelting-related, or potentially smelting-related, indicators in the SEMS database. The report includes information on the site location as well as contaminants of concern.

Agency Version Date: 10/28/2020	Agency: U.S. Environmental Protection Agency
Agency Update Frequency: Quarterly	Agency Contact: 703-603-8867
Planned Next Contact: 05/11/2021	Most Recent Contact: 02/12/2021

SSTS: Tracking of facilities who produce pesticides and their quantity

Agency Version Date: 12/25/2020	Agency: Environmental Protection Agency
Agency Update Frequency: Annually	Agency Contact: (202) 566-1667
Planned Next Contact: 06/18/2021	Most Recent Contact: 03/23/2021

STORMWATER: Permitted storm water sites

Agency Version Date: 01/12/2021	Agency: Environmental Protection Agency
Agency Update Frequency: Varies	Agency Contact: (202) 566-1667
Planned Next Contact: 04/09/2021	Most Recent Contact: 01/12/2021

**OTHER ASCERTAINABLE RECORDS (cont.)**

TOSCA-PLANT: Plants controlled by the Toxic Substance Control Act

Agency Version Date: 12/28/2020	Agency: Environmental Protection Agency
Agency Update Frequency: Varies	Agency Contact: (202) 566-1667
Planned Next Contact: 03/26/2021	Most Recent Contact: 12/28/2020

TRIS: Information regarding toxic chemicals that are being used/manufactured/ treated/ transported/released into the environment

Agency Version Date: 10/14/2020	Agency: Environmental Protection Agency
Agency Update Frequency: Varies	Agency Contact: (202) 566-1667
Planned Next Contact: 04/09/2021	Most Recent Contact: 01/11/2021

UMTRA: Uranium Recovery Sites

Agency Version Date: 01/14/2021	Agency: United States Nuclear Regulatory Commission
Agency Update Frequency: Varies	Agency Contact: (301) 415-8200
Planned Next Contact: 04/12/2021	Most Recent Contact: 01/14/2021

VAPOR: EPA Vapor Intrusion Database

Agency Version Date: 12/21/2020	Agency: U.S. Environmental Protection Agency
Agency Update Frequency: Varies	Agency Contact: 855-246-3642
Planned Next Contact: 06/15/2021	Most Recent Contact: 03/19/2021

BROWNFIELDS AEC - NC: Brownfield projects with Areas of Environmental Concern (AEC) boundaries.

Agency Version Date: 11/16/2020	Agency: North Carolina Center for Geographic Information and analysis
Agency Update Frequency: Quarterly	Agency Contact: (919) 754-6585
Planned Next Contact: 05/10/2021	Most Recent Contact: 02/11/2021

COAL ASH - NC: Coal Ash Disposal Sites

Agency Version Date: 01/15/2021	Agency: North Carolina Center for Geographic Information and analysis
Agency Update Frequency: Varies	Agency Contact: (919) 754-6585
Planned Next Contact: 04/13/2021	Most Recent Contact: 01/15/2021

DAYCARE - NC: Daycare facility sites

Agency Version Date: 11/10/2020	Agency: Division of Child Development and Early Education
Agency Update Frequency: Varies	Agency Contact: (919) 662-4499
Planned Next Contact: 05/05/2021	Most Recent Contact: 02/05/2021

DRYCLEANERS - NC: Drycleaner Sites

Agency Version Date: 12/18/2020	Agency: Department of Environment and Natural Resources
Agency Update Frequency: Varies	Agency Contact: (919) 707-8234
Planned Next Contact: 06/14/2021	Most Recent Contact: 03/16/2021

DRYCLEANERS 2 - NC: Listing of dry cleaning facilities.

Agency Version Date: 02/22/2021	Agency: North Carolina Department of Environmental Quality
Agency Update Frequency: Quarterly	Agency Contact: N/R
Planned Next Contact: 05/19/2021	Most Recent Contact: 02/22/2021

DRYCLEANERS CLEANUP - NC: Listing dry cleaning facilities under remediation.

Agency Version Date: 11/25/2020	Agency: North Carolina Department of Environmental Quality
Agency Update Frequency: Quarterly	Agency Contact: N/R
Planned Next Contact: 05/19/2021	Most Recent Contact: 02/22/2021



## OTHER ASCERTAINABLE RECORDS (cont.)

HIST COAL ASH - NC: List of Coal Ash Disposal Sites that is no longer in current agency list.

Agency Version Date: 06/05/2017  
Agency Update Frequency: Annually  
Planned Next Contact: 06/04/2021

Agency: North Carolina Center for Geographic Information and analysis  
Agency Contact: (919) 754-6585  
Most Recent Contact: 03/08/2021

IMD - NC: List of sites from the Incident Management Database for Regional Underground Storage Tanks (RUST) and the Aboveground Incident Management Database

Agency Version Date: 12/15/2020  
Agency Update Frequency: Varies  
Planned Next Contact: 06/09/2021

Agency: Department of Environment and Natural Resources  
Agency Contact: (919) 707-8234  
Most Recent Contact: 03/12/2021

MGP - NC: Locations of all Manufactured Gas Plants involved in the MGP Assessment and Remediation Program

Agency Version Date: 01/15/2021  
Agency Update Frequency: No Update  
Planned Next Contact: 04/13/2021

Agency: North Carolina Center for Geographic Information and analysis  
Agency Contact: (919) 754-6585  
Most Recent Contact: 01/15/2021

NFA - NC: No further action cleanup sites listing

Agency Version Date: 02/11/2021  
Agency Update Frequency: Quarterly  
Planned Next Contact: 05/10/2021

Agency: Department of Environment and Natural Resources  
Agency Contact: (919) 707-8234  
Most Recent Contact: 02/11/2021

NPDES - NC: Active General permits: NPDES and wastewater facility Location listing

Agency Version Date: 02/04/2021  
Agency Update Frequency: Varies  
Planned Next Contact: 05/03/2021

Agency: Department of Environment and Natural Resources  
Agency Contact: (919) 707-8234  
Most Recent Contact: 02/04/2021

OLI - NC: Old Landfill inventory location information

Agency Version Date: 02/10/2021  
Agency Update Frequency: Varies  
Planned Next Contact: 05/10/2021

Agency: Department of Environment and Natural Resources  
Agency Contact: (919) 707-8200  
Most Recent Contact: 02/10/2021

UIC - NC: Underground Injection Wells Database List

Agency Version Date: 01/19/2021  
Agency Update Frequency: Varies  
Planned Next Contact: 04/16/2021

Agency: Department of Environment and Natural Resources  
Agency Contact: (919) 707-8234  
Most Recent Contact: 01/19/2021

**SUBJECT PROPERTY ADDRESS:**

Cow Branch  
Et Richardson Rd  
Nakina, NC 28455

**SUBJECT PROPERTY COORDINATES:**

Latitude(North):	34.138059 - 34°8'17"
Longitude(West):	-78.647895 - -78°38'52.4"
Universal Transverse Mercator:	Zone 17N
UTM X (Meters):	716882.46
UTM Y (Meters):	3779962.95

**ELEVATION:**

Elevation: 38.278 ft. above sea level

**USGS TOPOGRAPHIC MAP:**

Subject Property Map:	34078-B6 Nakina, NC
Most Recent Revision:	2016

**GEOHYDROLOGY DATA:**

**SUBJECT PROPERTY TOPOGRAPHY:**

Topographic Gradient: Southeast

**DFIRM FLOOD ZONE:**

	DFIRM Flood
Subject Property County:	Electronic Data:
COLUMBUS	Yes - refer to the PROPERTY PROXIMITY MAP and AREA MAP
Flood Plain Panel at Subject Property:	37047C
Additional Panels in search area:	No available data

**FEMA FLOOD ZONE:**

	FEMA Flood
Subject Property County:	Electronic Data:
COLUMBUS	Yes - refer to the PROPERTY PROXIMITY MAP and AREA MAP
Flood Plain Panel at Subject Property:	3703050275B
Additional Panels in search area:	No available data

**NATIONAL WETLAND INVENTORY:**

	NWI Electronic
<u>NWI Quad at Subject Property:</u>	<u>Data Coverage:</u>
Nakina	Yes - refer to the Geological Findings Map

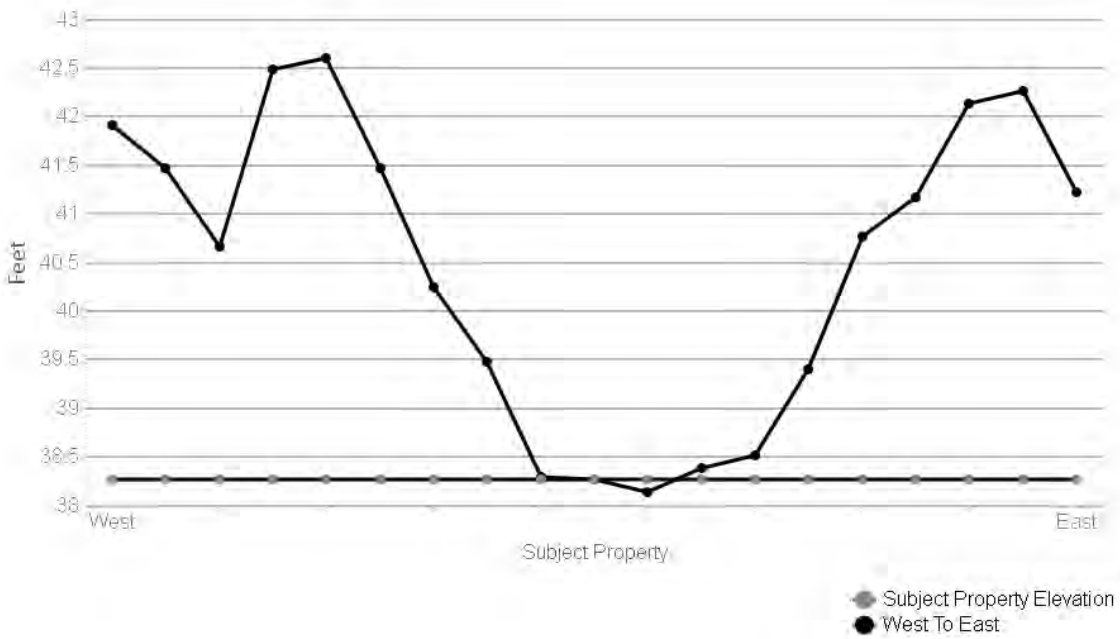
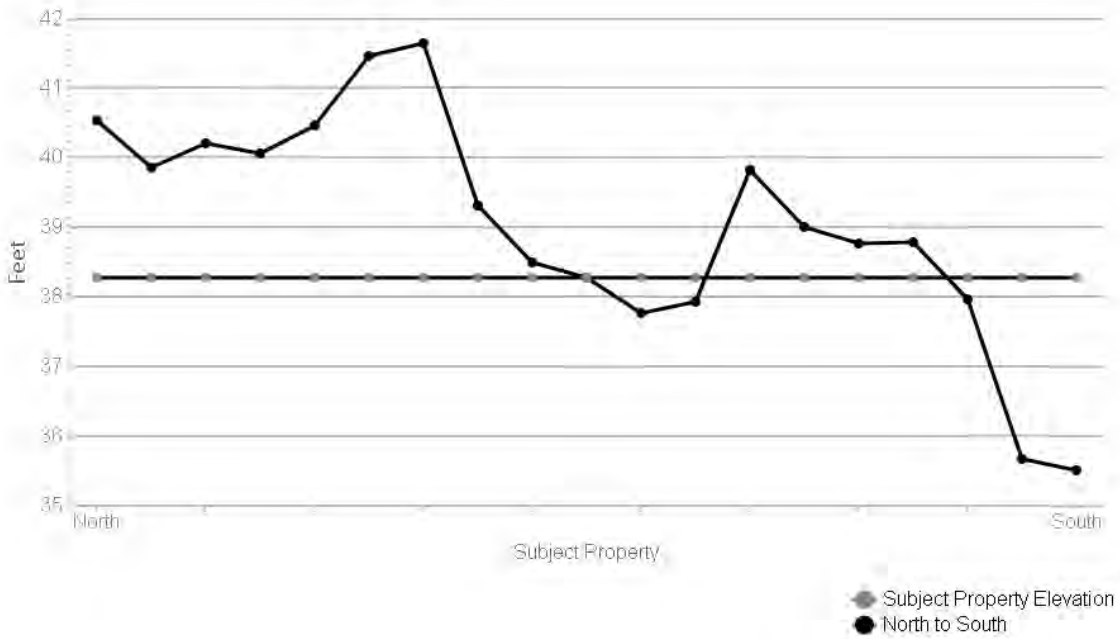
**LITHOSTRATIGRAPHIC INFORMATION:**

**ROCK STRATIGRAPHIC UNIT:**

**GEOLOGIC AGE IDENTIFICATION**

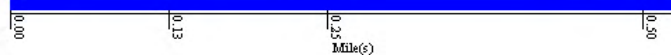
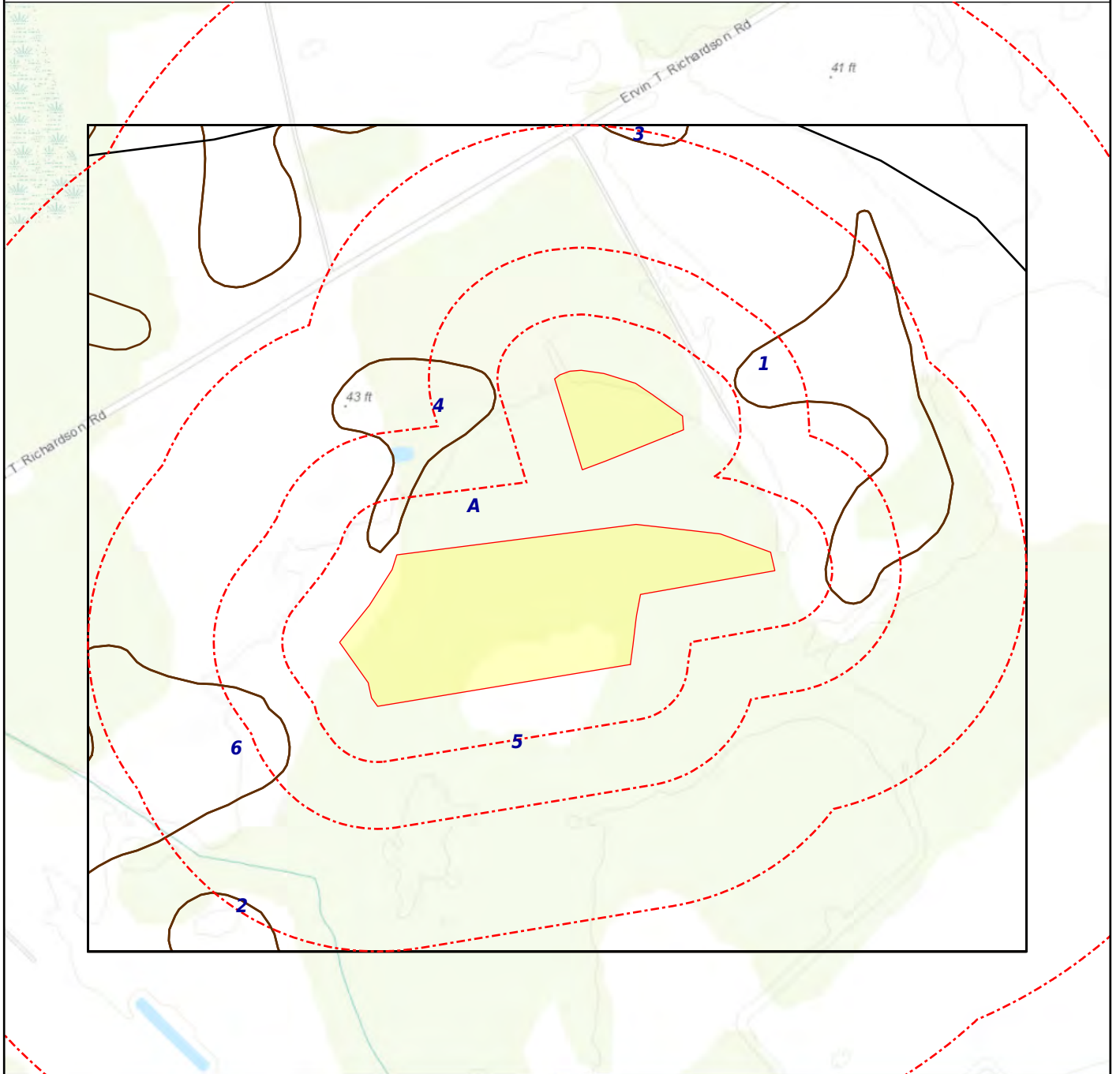
Era: N/R	Category: 34 uK4 Navarro Group
System: N/R	
Series: Navarro Group	
Code: uK4	

**SURROUNDING ELEVATION PROFILES:**



SUBJECT NAME: Cow Branch  
ADDRESS: Et Richardson Rd, Nakina, NC, 28455  
LAT/LONG: 34.138059 / -78.647895

PREPARED FOR: Freese and Nichols, Inc.  
ORDER #: 52642  
REPORT DATE: March 23, 2021



- + Subject Property
- SSURGO
- STATSGO

**SOIL COMPOSITION IN GENERAL AREA OF SUBJECT PROPERTY:**

Agency source: Soil Conservation Service, US Department of Agriculture

**SOIL MAP ID 1**

USDA Soil Name	Nakina, Series
USDA Soil Texture	Fine sandy loam
Hydrologic Soil Group	A/D
Soil Drainage Class	Very poorly drained
Hydric Classification	90
Corrosion Potential - Uncoated Steel	High

Layer	Depth (inches)	Soil Texture	AASHTO Group	Unified Soil Description	Saturated Hydraulic Conductivity micro m/sec	Soil Reaction pH
1	0-14	Fine sandy loam	Silt-Clay materials (more than 35% passing NO. 200), silty soils. Reference: This is a classification of soil material for highway and airfield construction (Procedure M 145-73 in Am. Assoc. of State Highway and Transportation Officials, 1984.	FINE-GRAINED SOILS, Silts and clays, (liquid limit is less than 50%), Silt. Reference: This is a classification of soil material designed for general construction purposes. It is dependent on the particle size distribution of the <75 mm, the liquid limit, and the plasticity index and on whether the soil material is high in organic matter (ASTM test D 2487, in ASTM, 1984).	14-42	4.5-6.5
2	14-19	Fine sandy loam	Silt-Clay materials (more than 35% passing NO. 200), silty soils. Reference: This is a classification of soil material for highway and airfield construction (Procedure M 145-73 in Am. Assoc. of State Highway and Transportation Officials, 1984.	COARSE-GRAINED SOILS, Sands, Sands with fines, Silty Sand. Reference: This is a classification of soil material designed for general construction purposes. It is dependent on the particle size distribution of the <75 mm, the liquid limit, and the plasticity index and on whether the soil material is high in organic matter (ASTM test D 2487, in ASTM, 1984).	4-42	5.1-8.4
3	19-33	Fine sandy loam	Silt-Clay materials (more than 35% passing NO. 200), silty soils. Reference: This is a classification of soil material for highway and airfield construction (Procedure M 145-73 in Am. Assoc. of State Highway and Transportation Officials, 1984.	COARSE-GRAINED SOILS, Sands, sands with fines, Clayey Sand. Reference: This is a classification of soil material designed for general construction purposes. It is dependent on the particle size distribution of the <75 mm, the liquid limit, and the plasticity index and	4-42	5.1-8.4

Layer	Depth (inches)	Soil Texture	AASHTO Group	Unified Soil Description	Saturated Hydraulic Conductivity micro m/sec	Soil Reaction pH
3	19-33	Fine sandy loam	Silt-Clay materials (more than 35% passing NO. 200), silty soils. Reference: This is a classification of soil material for highway and airfield construction (Procedure M 145-73 in Am. Assoc. of State Highway and Transportation Officials, 1984.	on whether the soil material is high in organic matter (ASTM test D 2487, in ASTM, 1984).	4-42	5.1-8.4
4	33-39	Sandy clay loam	Silt-Clay materials (more than 35% passing No. 200) clayey soils. Reference: This is a classification of soil material for highway and airfield construction (Procedure M 145-73 in Am. Assoc. of State Highway and Transportation Officials, 1984.	COARSE-GRAINED SOILS, Sands, sands with fines, Clayey Sand. Reference: This is a classification of soil material designed for general construction purposes. It is dependent on the particle size distribution of the <75 mm, the liquid limit, and the plasticity index and on whether the soil material is high in organic matter (ASTM test D 2487, in ASTM, 1984).	4-42	5.1-8.4
5	39-49	Sandy loam	Reference: This is a classification of soil material for highway and airfield construction (Procedure M 145-73 in Am. Assoc. of State Highway and Transportation Officials, 1984.	COARSE-GRAINED SOILS, Sands, Sands with fines, Silty Sand. Reference: This is a classification of soil material designed for general construction purposes. It is dependent on the particle size distribution of the <75 mm, the liquid limit, and the plasticity index and on whether the soil material is high in organic matter (ASTM test D 2487, in ASTM, 1984).	4-42	5.1-8.4
6	49-70	Sandy loam	Reference: This is a classification of soil material for highway and airfield construction (Procedure M 145-73 in Am. Assoc. of State Highway and Transportation Officials, 1984.	COARSE-GRAINED SOILS, Sands, Sands with fines, Silty Sand. Reference: This is a classification of soil material designed for general construction purposes. It is dependent on the particle size distribution of the <75 mm, the liquid limit, and the plasticity index and on whether the soil material is high in organic matter (ASTM test D 2487, in ASTM,	14-42	5.1-8.4

Layer	Depth (inches)	Soil Texture	AASHTO Group	Unified Soil Description	Saturated Hydraulic Conductivity micro m/sec	Soil Reaction pH
6	49-70	Sandy loam	Reference: This is a classification of soil material for highway and airfield construction (Procedure M 145-73 in Am. Assoc. of State Highway and Transportation Officials, 1984).	1984).	14-42	5.1-8.4
7	70-80	Sandy loam	Reference: This is a classification of soil material for highway and airfield construction (Procedure M 145-73 in Am. Assoc. of State Highway and Transportation Officials, 1984).	COARSE-GRAINED SOILS, Sands, sands with fines, Clayey Sand. Reference: This is a classification of soil material designed for general construction purposes. It is dependent on the particle size distribution of the <75 mm, the liquid limit, and the plasticity index and on whether the soil material is high in organic matter (ASTM test D 2487, in ASTM, 1984).	4-42	5.1-8.4

**SOIL MAP ID 2**

USDA Soil Name	Lynchburg, Series
USDA Soil Texture	Fine sandy loam
Hydrologic Soil Group	B/D
Soil Drainage Class	Somewhat poorly drained
Hydric Classification	10
Corrosion Potential - Uncoated Steel	High

Layer	Depth (inches)	Soil Texture	AASHTO Group	Unified Soil Description	Saturated Hydraulic Conductivity micro m/sec	Soil Reaction pH
1	0-6	Fine sandy loam	Silt-Clay materials (more than 35% passing NO. 200), silty soils. Reference: This is a classification of soil material for highway and airfield construction (Procedure	COARSE-GRAINED SOILS, Sands, sands with fines, Clayey Sand. Reference: This is a classification of soil material designed for general construction purposes. It is dependent	14-42	3.6-6



Layer	Depth (inches)	Soil Texture	AASHTO Group	Unified Soil Description	Saturated Hydraulic Conductivity micro m/sec	Soil Reaction pH
1	0-6	Fine sandy loam	M 145-73 in Am. Assoc. of State Highway and Transportation Officials, 1984.	on the particle size distribution of the <75 mm, the liquid limit, and the plasticity index and on whether the soil material is high in organic matter (ASTM test D 2487, in ASTM, 1984).	14-42	3.6-6
2	6-13	Fine sandy loam	Silt-Clay materials (more than 35% passing NO. 200), silty soils. Reference: This is a classification of soil material for highway and airfield construction (Procedure M 145-73 in Am. Assoc. of State Highway and Transportation Officials, 1984.	Reference: This is a classification of soil material designed for general construction purposes. It is dependent on the particle size distribution of the <75 mm, the liquid limit, and the plasticity index and on whether the soil material is high in organic matter (ASTM test D 2487, in ASTM, 1984).	14-42	3.5-5.5
3	13-21	Sandy clay loam	Silt-Clay materials (more than 35% passing No. 200) clayey soils. Reference: This is a classification of soil material for highway and airfield construction (Procedure M 145-73 in Am. Assoc. of State Highway and Transportation Officials, 1984.	COARSE-GRAINED SOILS, Sands, sands with fines, Clayey Sand. Reference: This is a classification of soil material designed for general construction purposes. It is dependent on the particle size distribution of the <75 mm, the liquid limit, and the plasticity index and on whether the soil material is high in organic matter (ASTM test D 2487, in ASTM, 1984).	4-14	3.6-5.5
4	21-45	Sandy clay loam	Silt-Clay materials (more than 35% passing No. 200) clayey soils. Reference: This is a classification of soil material for highway and airfield construction (Procedure M 145-73 in Am. Assoc. of State Highway and Transportation Officials, 1984.	COARSE-GRAINED SOILS, Sands, sands with fines, Clayey Sand. Reference: This is a classification of soil material designed for general construction purposes. It is dependent on the particle size distribution of the <75 mm, the liquid limit, and the plasticity index and on whether the soil material is high in organic matter (ASTM test D 2487, in ASTM, 1984).	4-14	3.6-5.5
5	45-63	Sandy clay loam	Silt-Clay materials (more than 35% passing No. 200) clayey	COARSE-GRAINED SOILS, Sands, sands with fines, Clayey Sand.	4-14	3.6-5.5

Layer	Depth (inches)	Soil Texture	AASHTO Group	Unified Soil Description	Saturated Hydraulic Conductivity micro m/sec	Soil Reaction pH
5	45-63	Sandy clay loam	soils. Reference: This is a classification of soil material for highway and airfield construction (Procedure M 145-73 in Am. Assoc. of State Highway and Transportation Officials, 1984).	Reference: This is a classification of soil material designed for general construction purposes. It is dependent on the particle size distribution of the <75 mm, the liquid limit, and the plasticity index and on whether the soil material is high in organic matter (ASTM test D 2487, in ASTM, 1984).	4-14	3.6-5.5

**SOIL MAP ID 3**

USDA Soil Name	Nakina, Series
USDA Soil Texture	Fine sandy loam
Hydrologic Soil Group	A/D
Soil Drainage Class	Very poorly drained
Hydric Classification	90
Corrosion Potential - Uncoated Steel	High

Layer	Depth (inches)	Soil Texture	AASHTO Group	Unified Soil Description	Saturated Hydraulic Conductivity micro m/sec	Soil Reaction pH
1	0-14	Fine sandy loam	Silt-Clay materials (more than 35% passing NO. 200), silty soils. Reference: This is a classification of soil material for highway and airfield construction (Procedure M 145-73 in Am. Assoc. of State Highway and Transportation Officials, 1984).	FINE-GRAINED SOILS, Silts and clays, (liquid limit is less than 50%), Silt. Reference: This is a classification of soil material designed for general construction purposes. It is dependent on the particle size distribution of the <75 mm, the liquid limit, and the plasticity index and on whether the soil material is high in organic matter (ASTM test D 2487, in ASTM, 1984).	14-42	4.5-6.5
2	14-19	Fine sandy loam	Silt-Clay materials (more than 35% passing NO. 200), silty soils. Reference: This is a classification of soil material for highway and airfield construction (Procedure M 145-73 in Am. Assoc. of State Highway and	COARSE-GRAINED SOILS, Sands, Sands with fines, Silty Sand. Reference: This is a classification of soil material designed for general construction purposes. It is dependent on the particle size distribution of the <75 mm, the liquid limit, and	4-42	5.1-8.4

Layer	Depth (inches)	Soil Texture	AASHTO Group	Unified Soil Description	Saturated Hydraulic Conductivity micro m/sec	Soil Reaction pH
2	14-19	Fine sandy loam	Transportation Officials, 1984.	the plasticity index and on whether the soil material is high in organic matter (ASTM test D 2487, in ASTM, 1984).	4-42	5.1-8.4
3	19-33	Fine sandy loam	Silt-Clay materials (more than 35% passing NO. 200), silty soils. Reference: This is a classification of soil material for highway and airfield construction (Procedure M 145-73 in Am. Assoc. of State Highway and Transportation Officials, 1984.	COARSE-GRAINED SOILS, Sands, sands with fines, Clayey Sand. Reference: This is a classification of soil material designed for general construction purposes. It is dependent on the particle size distribution of the <75 mm, the liquid limit, and the plasticity index and on whether the soil material is high in organic matter (ASTM test D 2487, in ASTM, 1984).	4-42	5.1-8.4
4	33-39	Sandy clay loam	Silt-Clay materials (more than 35% passing No. 200) clayey soils. Reference: This is a classification of soil material for highway and airfield construction (Procedure M 145-73 in Am. Assoc. of State Highway and Transportation Officials, 1984.	COARSE-GRAINED SOILS, Sands, sands with fines, Clayey Sand. Reference: This is a classification of soil material designed for general construction purposes. It is dependent on the particle size distribution of the <75 mm, the liquid limit, and the plasticity index and on whether the soil material is high in organic matter (ASTM test D 2487, in ASTM, 1984).	4-42	5.1-8.4
5	39-49	Sandy loam	Reference: This is a classification of soil material for highway and airfield construction (Procedure M 145-73 in Am. Assoc. of State Highway and Transportation Officials, 1984.	COARSE-GRAINED SOILS, Sands, Sands with fines, Silty Sand. Reference: This is a classification of soil material designed for general construction purposes. It is dependent on the particle size distribution of the <75 mm, the liquid limit, and the plasticity index and on whether the soil material is high in organic matter (ASTM test D 2487, in ASTM, 1984).	4-42	5.1-8.4

Layer	Depth (inches)	Soil Texture	AASHTO Group	Unified Soil Description	Saturated Hydraulic Conductivity micro m/sec	Soil Reaction pH
6	49-70	Sandy loam	Reference: This is a classification of soil material for highway and airfield construction (Procedure M 145-73 in Am. Assoc. of State Highway and Transportation Officials, 1984.	COARSE-GRAINED SOILS, Sands, Sands with fines, Silty Sand. Reference: This is a classification of soil material designed for general construction purposes. It is dependent on the particle size distribution of the <75 mm, the liquid limit, and the plasticity index and on whether the soil material is high in organic matter (ASTM test D 2487, in ASTM, 1984).	14-42	5.1-8.4
7	70-80	Sandy loam	Reference: This is a classification of soil material for highway and airfield construction (Procedure M 145-73 in Am. Assoc. of State Highway and Transportation Officials, 1984.	COARSE-GRAINED SOILS, Sands, sands with fines, Clayey Sand. Reference: This is a classification of soil material designed for general construction purposes. It is dependent on the particle size distribution of the <75 mm, the liquid limit, and the plasticity index and on whether the soil material is high in organic matter (ASTM test D 2487, in ASTM, 1984).	4-42	5.1-8.4

**SOIL MAP ID 4**

USDA Soil Name	Pender, Series
USDA Soil Texture	Fine sandy loam
Hydrologic Soil Group	C
Soil Drainage Class	Moderately well drained
Hydric Classification	0
Corrosion Potential - Uncoated Steel	High

Layer	Depth (inches)	Soil Texture	AASHTO Group	Unified Soil Description	Saturated Hydraulic Conductivity micro m/sec	Soil Reaction pH
1	0-6	Fine sandy loam	Silt-Clay materials (more than 35% passing NO. 200), silty soils. Reference: This is a classification of soil material for highway and airfield construction (Procedure	Reference: This is a classification of soil material designed for general construction purposes. It is dependent on the particle size distribution of the <75 mm, the liquid limit, and	14-42	4.5-6.5

Layer	Depth (inches)	Soil Texture	AASHTO Group	Unified Soil Description	Saturated Hydraulic Conductivity micro m/sec	Soil Reaction pH
1	0-6	Fine sandy loam	M 145-73 in Am. Assoc. of State Highway and Transportation Officials, 1984.	the plasticity index and on whether the soil material is high in organic matter (ASTM test D 2487, in ASTM, 1984).	14-42	4.5-6.5
2	6-13	Fine sandy loam	Silt-Clay materials (more than 35% passing NO. 200), silty soils. Reference: This is a classification of soil material for highway and airfield construction (Procedure M 145-73 in Am. Assoc. of State Highway and Transportation Officials, 1984.	Reference: This is a classification of soil material designed for general construction purposes. It is dependent on the particle size distribution of the <75 mm, the liquid limit, and the plasticity index and on whether the soil material is high in organic matter (ASTM test D 2487, in ASTM, 1984).	14-42	4.5-6.5
3	13-42	Sandy clay loam	Silt-Clay materials (more than 35% passing No. 200) clayey soils. Reference: This is a classification of soil material for highway and airfield construction (Procedure M 145-73 in Am. Assoc. of State Highway and Transportation Officials, 1984.	FINE-GRAINED SOILS, Silts and clays (liquid limit is less than 50%), Lean Clay. Reference: This is a classification of soil material designed for general construction purposes. It is dependent on the particle size distribution of the <75 mm, the liquid limit, and the plasticity index and on whether the soil material is high in organic matter (ASTM test D 2487, in ASTM, 1984).	4-14	5.6-7.8
4	42-58	Sandy clay loam	Silt-Clay materials (more than 35% passing No. 200) clayey soils. Reference: This is a classification of soil material for highway and airfield construction (Procedure M 145-73 in Am. Assoc. of State Highway and Transportation Officials, 1984.	FINE-GRAINED SOILS, Silts and clays (liquid limit is less than 50%), Lean Clay. Reference: This is a classification of soil material designed for general construction purposes. It is dependent on the particle size distribution of the <75 mm, the liquid limit, and the plasticity index and on whether the soil material is high in organic matter (ASTM test D 2487, in ASTM, 1984).	4-14	5.6-7.8
5	58-80		No data	No data	0.01-42	0-0

**SOIL MAP ID 5**

USDA Soil Name	Grifton, Series
USDA Soil Texture	Fine sandy loam
Hydrologic Soil Group	B/D
Soil Drainage Class	Poorly drained
Hydric Classification	90
Corrosion Potential - Uncoated Steel	High

Layer	Depth (inches)	Soil Texture	AASHTO Group	Unified Soil Description	Saturated Hydraulic Conductivity micro m/sec	Soil Reaction pH
1	0-8	Fine sandy loam	Reference: This is a classification of soil material for highway and airfield construction (Procedure M 145-73 in Am. Assoc. of State Highway and Transportation Officials, 1984).	COARSE-GRAINED SOILS, Sands, Sands with fines, Silty Sand. Reference: This is a classification of soil material designed for general construction purposes. It is dependent on the particle size distribution of the <75 mm, the liquid limit, and the plasticity index and on whether the soil material is high in organic matter (ASTM test D 2487, in ASTM, 1984).	14-42	4.5-6.5
2	8-11	Sandy loam	Reference: This is a classification of soil material for highway and airfield construction (Procedure M 145-73 in Am. Assoc. of State Highway and Transportation Officials, 1984).	COARSE-GRAINED SOILS, Sands, Sands with fines, Silty Sand. Reference: This is a classification of soil material designed for general construction purposes. It is dependent on the particle size distribution of the <75 mm, the liquid limit, and the plasticity index and on whether the soil material is high in organic matter (ASTM test D 2487, in ASTM, 1984).	14-42	4.5-6.5
3	11-50	Sandy clay loam	Silt-Clay materials (more than 35% passing No. 200) clayey soils. Reference: This is a classification of soil material for highway and airfield construction (Procedure M 145-73 in Am. Assoc. of State Highway and Transportation Officials, 1984).	COARSE-GRAINED SOILS, Sands, sands with fines, Clayey Sand. Reference: This is a classification of soil material designed for general construction purposes. It is dependent on the particle size distribution of the <75 mm, the liquid limit, and the plasticity index and on whether the soil material is high in organic matter (ASTM test D 2487, in ASTM, 1984).	4-14	4.5-7.3

Layer	Depth (inches)	Soil Texture	AASHTO Group	Unified Soil Description	Saturated Hydraulic Conductivity micro m/sec	Soil Reaction pH
4	50-60	Loamy sand	Reference: This is a classification of soil material for highway and airfield construction (Procedure M 145-73 in Am. Assoc. of State Highway and Transportation Officials, 1984.	COARSE-GRAINED SOILS, Sands, Sands with fines, Silty Sand. Reference: This is a classification of soil material designed for general construction purposes. It is dependent on the particle size distribution of the <75 mm, the liquid limit, and the plasticity index and on whether the soil material is high in organic matter (ASTM test D 2487, in ASTM, 1984).	14-141	5.6-8.4
5	60-80	Loamy sand	Reference: This is a classification of soil material for highway and airfield construction (Procedure M 145-73 in Am. Assoc. of State Highway and Transportation Officials, 1984.	COARSE-GRAINED SOILS, Sands, Sands with fines, Silty Sand. Reference: This is a classification of soil material designed for general construction purposes. It is dependent on the particle size distribution of the <75 mm, the liquid limit, and the plasticity index and on whether the soil material is high in organic matter (ASTM test D 2487, in ASTM, 1984).	14-141	5.6-8.4

**SOIL MAP ID 6**

USDA Soil Name	Lynchburg, Series
USDA Soil Texture	Fine sandy loam
Hydrologic Soil Group	B/D
Soil Drainage Class	Somewhat poorly drained
Hydric Classification	10
Corrosion Potential - Uncoated Steel	High

Layer	Depth (inches)	Soil Texture	AASHTO Group	Unified Soil Description	Saturated Hydraulic Conductivity micro m/sec	Soil Reaction pH
1	0-6	Fine sandy loam	Silt-Clay materials (more than 35% passing NO. 200), silty soils. Reference: This is a classification of soil material for highway and airfield construction (Procedure M 145-73 in Am. Assoc.	COARSE-GRAINED SOILS, Sands, sands with fines, Clayey Sand. Reference: This is a classification of soil material designed for general construction purposes. It is dependent on the particle size	14-42	3.6-6

Layer	Depth (inches)	Soil Texture	AASHTO Group	Unified Soil Description	Saturated Hydraulic Conductivity micro m/sec	Soil Reaction pH
1	0-6	Fine sandy loam	of State Highway and Transportation Officials, 1984.	distribution of the <75 mm, the liquid limit, and the plasticity index and on whether the soil material is high in organic matter (ASTM test D 2487, in ASTM, 1984).	14-42	3.6-6
2	6-13	Fine sandy loam	Silt-Clay materials (more than 35% passing NO. 200), silty soils. Reference: This is a classification of soil material for highway and airfield construction (Procedure M 145-73 in Am. Assoc. of State Highway and Transportation Officials, 1984.	Reference: This is a classification of soil material designed for general construction purposes. It is dependent on the particle size distribution of the <75 mm, the liquid limit, and the plasticity index and on whether the soil material is high in organic matter (ASTM test D 2487, in ASTM, 1984).	14-42	3.5-5.5
3	13-21	Sandy clay loam	Silt-Clay materials (more than 35% passing No. 200) clayey soils. Reference: This is a classification of soil material for highway and airfield construction (Procedure M 145-73 in Am. Assoc. of State Highway and Transportation Officials, 1984.	COARSE-GRAINED SOILS, Sands, sands with fines, Clayey Sand. Reference: This is a classification of soil material designed for general construction purposes. It is dependent on the particle size distribution of the <75 mm, the liquid limit, and the plasticity index and on whether the soil material is high in organic matter (ASTM test D 2487, in ASTM, 1984).	4-14	3.6-5.5
4	21-45	Sandy clay loam	Silt-Clay materials (more than 35% passing No. 200) clayey soils. Reference: This is a classification of soil material for highway and airfield construction (Procedure M 145-73 in Am. Assoc. of State Highway and Transportation Officials, 1984.	COARSE-GRAINED SOILS, Sands, sands with fines, Clayey Sand. Reference: This is a classification of soil material designed for general construction purposes. It is dependent on the particle size distribution of the <75 mm, the liquid limit, and the plasticity index and on whether the soil material is high in organic matter (ASTM test D 2487, in ASTM, 1984).	4-14	3.6-5.5
5	45-63	Sandy clay loam	Silt-Clay materials (more than 35% passing No. 200) clayey	COARSE-GRAINED SOILS, Sands, sands with fines, Clayey Sand.	4-14	3.6-5.5



Layer	Depth (inches)	Soil Texture	AASHTO Group	Unified Soil Description	Saturated Hydraulic Conductivity micro m/sec	Soil Reaction pH
5	45-63	Sandy clay loam	soils. Reference: This is a classification of soil material for highway and airfield construction (Procedure M 145-73 in Am. Assoc. of State Highway and Transportation Officials, 1984.	Reference: This is a classification of soil material designed for general construction purposes. It is dependent on the particle size distribution of the <75 mm, the liquid limit, and the plasticity index and on whether the soil material is high in organic matter (ASTM test D 2487, in ASTM, 1984).	4-14	3.6-5.5

**SOIL MAP ID A**

USDA Soil Name	Rains, Series
USDA Soil Texture	Sandy loam
Hydrologic Soil Group	B/D
Soil Drainage Class	Poorly drained
Hydric Classification	66
Corrosion Potential - Uncoated Steel	High

Layer	Depth (inches)	Soil Texture	AASHTO Group	Unified Soil Description	Saturated Hydraulic Conductivity micro m/sec	Soil Reaction pH
1	0-12	Sandy loam	No data	No data	14.1143-42.343	3.6-6.5
2	12-40	No data	No data	No data	4.2343-14.1143	3.6-5.5
3	40-62	No data	No data	No data	4.2343-14.1143	3.6-5.5
4	62-79	No data	No data	No data	4.2343-14.1143	3.6-5.5

**WATER AGENCY DATA:**

**WATER AGENCY SEARCH DISTANCES:**

<u>DATABASE:</u>	<u>SEARCH DISTANCE (MILES):</u>
NWIS	1.000
PWS	1.000
WELLS - NC	1.000
WELLS DWR - NC	1.000
WELLS MON - NC	1.000

<u>DISTANCE TO NEAREST:</u>	<u>DISTANCE:</u>
NWIS	N/A
PWS	N/A

<u>DISTANCE TO NEAREST:</u> WELLS - NC WELLS DWR - NC WELLS MON - NC	<u>DISTANCE:</u> 0.898 mi / 4743 ft 0.989 mi / 5222 ft N/A
---	---

**FEDERAL WATER AGENCY DATA SUMMARY:**

<u>MAP ID:</u> No Wells Found	<u>WELL ID:</u> N/R	<u>LOCATION FROM SP:</u> N/R
----------------------------------	------------------------	---------------------------------

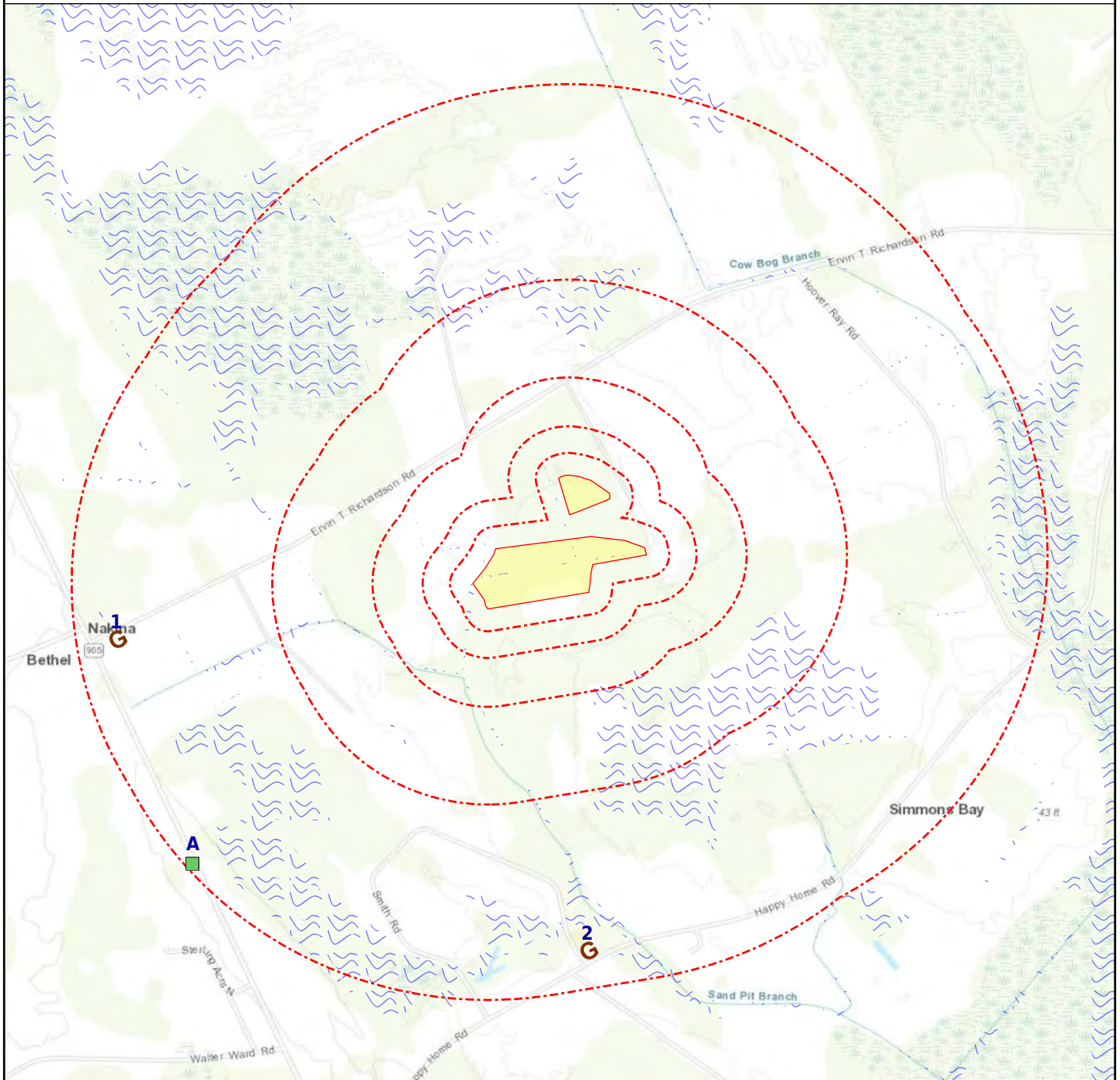
Note: PWS System location is not always the same as well location.

**STATE/LOCAL WATER AGENCY DATA SUMMARY:**

<u>MAP ID:</u> 1 2 A4	<u>WELL ID:</u> NC0424859 NC0424685 Nakina	<u>LOCATION FROM SP:</u> 1/2 - 1 Mile W 1/2 - 1 Mile S 1/2 - 1 Mile SW
--------------------------------	---	---

SUBJECT NAME: Cow Branch  
 ADDRESS: Et Richardson Rd, Nakina, NC, 28455  
 LAT/LONG: 34.138059 / -78.647895

PREPARED FOR: Freese and Nichols, Inc.  
 ORDER #: 52642  
 REPORT DATE: March 23, 2021



- + Subject Property
 X Basins (No Data)
■ Geologic Cluster
○ Geological Site
- S NWI
 ~ NWIS (No Data)

Map Id: 1  
 Direction: W  
 Distance: 0.898 mi.  
 Actual: 4743.306 ft.  
 Elevation: 0.008 mi. / 44.183 ft.  
 Relative: Higher

**Site Name :** NC0424859  
 34.13438, -78.667165  
 NC  
**Database(s) :** [WELLS - NC]

**Envirosite ID:** 40268621  
**EPA ID:** N/R

WELLS - NC

PWS ID : 0424859  
 PWS ID Full : NC0424859  
 Federal ID : 33070  
 State ID : S02  
 PWS Type Name : Non-Community Transient

PWS Type Description : Serves 25+ people at least 60 days per year. ex. restaurants, churches, DOT rest areas.

Source Name : WELL#2  
 Source Type : Groundwater  
 Source Availability : Permanent  
 Well Yield GPM : 55  
 Well Depth Feet : 160  
 DEQ Region Name : WILMINGTON REGIONAL OFFICE  
 System Name : NAKINA BAPTIST CHURCH  
 System Address : 7883 SEVEN CREEKS HWY, NAKINA, NC 28455  
 System Primary County : COLUMBUS  
 Owner Name : NAKINA BAPTIST CHURCH\_0424859  
 Owner Address : PO BOX 210, NAKINA, NC 28455  
 WSW Class : N/R  
 Susceptibility : Moderate  
 Source System Type : Groundwater Non-Community Transient  
 Type : Point  
 Latitude : 34.13438000000008  
 Longitude : -78.66716499999995  
 SWAP Report Link : [Click here for hyperlink provided by the agency.](#)  
 Last Date in Agency List : 2021-03-04

Map Id: 2  
 Direction: S  
 Distance: 0.909 mi.  
 Actual: 4798.785 ft.  
 Elevation: 0.008 mi. / 40.151 ft.  
 Relative: Higher

**Site Name :** NC0424685  
 34.122839, -78.646692  
 NC  
**Database(s) :** [WELLS - NC]

**Envirosite ID:** 40269051  
**EPA ID:** N/R

WELLS - NC

PWS ID : 0424685  
 PWS ID Full : NC0424685  
 Federal ID : 74859  
 State ID : W02  
 PWS Type Name : Non-Community Transient

PWS Type Description : Serves 25+ people at least 60 days per year. ex. restaurants, churches, DOT rest areas.

Source Name : WELL #2  
 Source Type : Groundwater  
 Source Availability : Permanent  
 Well Yield GPM : 60  
 Well Depth Feet : 214

Map Id: 2  
 Direction: S  
 Distance: 0.909 mi.  
 Actual: 4798.785 ft.  
 Elevation: 0.008 mi. / 40.151 ft.  
 Relative: Higher

**Site Name :** NC0424685  
 34.122839, -78.646692  
 NC  
**Database(s) :** [WELLS - NC] (*cont.*)

**Envirosite ID:** 40269051  
**EPA ID:** N/R

**WELLS - NC (*cont.*)**

DEQ Region Name :	WILMINGTON REGIONAL OFFICE
System Name :	HAPPY HOME BAPTIST CHURCH
System Address :	2670 HAPPY HOME CHURCH RD, NAKINA, NC 28455
System Primary County :	COLUMBUS
Owner Name :	HAPPY HOME BAPTIST CHURCH_424685
Owner Address :	1853 MANLY SMITH RD, NAKINA, NC 28455
WSW Class :	N/R
Susceptibility :	Lower
Source System Type :	Groundwater Non-Community Transient
Type :	Point
Latitude :	34.122839000000056
Longitude :	-78.646691999999997
SWAP Report Link :	<a href="#">Click here for hyperlink provided by the agency.</a>
Last Date in Agency List :	2021-03-04

Map Id: A3  
 Direction: SW  
 Distance: 0.972 mi.  
 Actual: 5133.332 ft.  
 Elevation: 0.011 mi. / 56.939 ft.  
 Relative: Higher

**Site Name :** TOWER  
 34.126389, -78.663889  
 NAKINA, NC  
**Database(s) :** [DIGITAL OBSTACLE]

**Envirosite ID:** 3956717  
**EPA ID:** N/R

**DIGITAL OBSTACLE**

Date of Action :	1996-11-25
Action :	Change
FAA Study Number :	N/R
OBS Number :	37-006282
Obstacle Type :	TOWER
City Name :	NAKINA
State Identifier :	NC
Country Identifier :	USA
Type of Lighting :	None
Verification Status :	Unverified
Quantity :	1
Mark Indicator :	None
Above Ground Level Height (Feet) :	00110
Above Mean Sea Level Height (Feet) :	00165
Horizontal Accuracy :	N/R
Vertical Accuracy :	N/R
Latitude :	34 07 35.00N
Longitude :	078 39 50.00W

Map Id: A4  
 Direction: SW  
 Distance: 0.989 mi.  
 Actual: 5221.980 ft.  
 Elevation: 0.011 mi. / 57.618 ft.  
 Relative: Higher

**Site Name :** Nakina  
 34.125932, -78.663792  
 NC  
**Database(s) :** [WELLS DWR - NC]

**Envirosite ID:** 40273216  
**EPA ID:** N/R

WELLS DWR - NC

Facility Name : Nakina  
 County : Columbus

Date Constructed : 2014-05-30  
 Source : DWR ACTIVE WELLS  
 Type : Point  
 Quad : EE 3903  
 Aquifer : Black Creek (Kbc)  
 River Basin : Lumber  
 Diameter : 4.5  
 Depth : 375  
 Screened Interval : 360 - 370  
 Open Hole : n  
 Casing : PVC  
 Screen : stainless steel  
 Latitude : 34.125932  
 Longitude : -78.663792  
 Water Levels : [Click here for hyperlink provided by the agency.](#)  
 Last Date in Agency List : 2021-03-04

Date Constructed : 2014-05-22  
 Source : DWR ACTIVE WELLS  
 Type : Point  
 Quad : EE 3901  
 Aquifer : Lower Cape Fear (Klcf)  
 River Basin : Lumber  
 Diameter : 4.5  
 Depth : 859  
 Screened Interval : 844 - 854  
 Open Hole : n  
 Casing : PVC  
 Screen : stainless steel  
 Latitude : 34.125932  
 Longitude : -78.663792  
 Water Levels : [Click here for hyperlink provided by the agency.](#)  
 Last Date in Agency List : 2021-03-04

Date Constructed : 2014-05-22  
 Source : DWR ACTIVE WELLS  
 Type : Point  
 Quad : EE 3902  
 Aquifer : Surficial (S)  
 River Basin : Lumber  
 Diameter : 4.5  
 Depth : 23  
 Screened Interval : 8 - 18  
 Open Hole : n  
 Casing : PVC  
 Screen : stainless steel  
 Latitude : 34.125932  
 Longitude : -78.663792  
 Water Levels : [Click here for hyperlink provided by the agency.](#)  
 Last Date in Agency List : 2021-03-04

Map Id: A4  
 Direction: SW  
 Distance: 0.989 mi.  
 Actual: 5221.980 ft.  
 Elevation: 0.011 mi. / 57.618 ft.  
 Relative: Higher

**Site Name :** Nakina  
 34.125932, -78.663792  
 NC  
**Database(s) :** [WELLS DWR - NC] (**cont.**)

**Envirosite ID:** 40273216  
**EPA ID:** N/R

**WELLS DWR - NC (cont.)**

Date Constructed : 1977-03-14  
 Source : DWR ACTIVE WELLS  
 Type : Point  
 Quad : EE 3906  
 Aquifer : Peedee (Kpd)  
 River Basin : Lumber  
 Diameter : 4  
 Depth : 308  
 Screened Interval : 298 - 308  
 Open Hole : n  
 Casing : black ductile iron  
 Screen : galvanized steel  
 Latitude : 34.125932  
 Longitude : -78.663792  
 Water Levels : [Click here for hyperlink provided by the agency.](#)  
 Last Date in Agency List : 2021-03-04

Date Constructed : 1977-03-03  
 Source : DWR ACTIVE WELLS  
 Type : Point  
 Quad : EE 3905  
 Aquifer : Upper Cape Fear (Kucf)  
 River Basin : Lumber  
 Diameter : 4  
 Depth : 588  
 Screened Interval : 578 - 588  
 Open Hole : n  
 Casing : black ductile iron  
 Screen : galvanized steel  
 Latitude : 34.125932  
 Longitude : -78.663792  
 Water Levels : [Click here for hyperlink provided by the agency.](#)  
 Last Date in Agency List : 2021-03-04

Date Constructed : 1976-11-08  
 Source : DWR ACTIVE WELLS  
 Type : Point  
 Quad : EE 3904  
 Aquifer : Peedee (Kpd)  
 River Basin : Lumber  
 Diameter : 2.5  
 Depth : 208  
 Screened Interval : 198 - 208  
 Open Hole : n  
 Casing : black ductile iron  
 Screen : galvanized steel  
 Latitude : 34.125932  
 Longitude : -78.663792  
 Water Levels : [Click here for hyperlink provided by the agency.](#)  
 Last Date in Agency List : 2021-03-04

**RADON DATA:**

STATE SOURCE: No Available Data

FEDERAL AREA RADON INFORMATION FOR: 28455

NUMBER OF SAMPLE SITES: 1

<u>Area:</u>	<u>Average Activity:</u>	<u>% &lt;4 pCi/L:</u>	<u>% 4-20 pCi/L:</u>	<u>% &gt;20 pCi/L:</u>
first floor	0.4 pCi/L	100%	0%	0%



## HIST PWS ENF

Historical Public Water Supply locations with Enforcement Violations

Environmental Protection Agency

(800) 426-4791

List of Safe Drinking Water Information Systems (SDWIS) with enforcement violations that are no longer in current agency list.

## NWIS

National Water Information Systems

United States Geological Society

(703) 648-5953

Information on all water resources for the United States. This database contains all current and historical data for the nation.

## PWS

Public Water Supply

Environmental Protection Agency

(800) 426-4791

Safe drinking water information Systems

## PWS ENF

Public Water Supply locations with Enforcement Violations

Environmental Protection Agency

(800) 426-4791

Safe drinking water information Systems with enforcement violations

## WELLS - NC

PWS Wells & surface water intakes

Department of Environmental Quality (NCDEQ)

(877) 623-6748

PWS Wells & surface water intakes

## WELLS DWR - NC

Active and inactive DWR wells

Department of Environmental Quality (NCDEQ)

(877) 623-6748

Active and inactive DWR wells

## WELLS MON - NC

GW Monitoring Wells

Department of Environmental Quality (NCDEQ)

(877) 623-6748

Groundwater Monitoring Well Permits

## FLOOD Q3

Flood data

Environmental Protection Agency

(202) 566-1667

Q3 Flood Data

## HYDROLOGIC UNIT

Hydrologic Unit Maps

USGS

The United States Geological Survey created a hierarchical system of hydrologic units originally called regions, sub-regions, accounting units, and cataloging units. Each unit was assigned a unique Hydrologic Unit Code (HUC). As first implemented the system had 21 regions, 221 subregions, 378 accounting units, and 2,264 cataloging units. Over time the system was changed and expanded. As of 2010 there are six levels in the hierarchy, represented by hydrologic unit codes from 2 to 12 digits long, called regions, subregions, basins, subbasins, watersheds, and subwatersheds. The table below describes the system's hydrologic unit levels and their characteristics, along with example names and codes.

## WETLANDS NWI

National Wetland Inventory

U.S. Fish and Wildlife Service

(703) 358-2171

Wetland Inventory for the United States

## SSURGO

Detailed Soil Data Map

Natural Resources Conservation Service: U.S. Department of Agriculture

(202) 690-4985

Detailed Soil Data Map

## STATSGO & MUI

General Soil Data Map

Natural Resources Conservation Service: U.S. Department of Agriculture

(202) 690-4985

General Soil Data Map

## USGS GEOLOGIC AGE

USGS Digital Data Series DDS

Natural Resources Conservation Service: U.S. Department of Agriculture

(202) 690-4985

USGS Digital Data Series DDS: Geologic Age and Rock Stratigraphic Unit

## RADON

National Radon Database

USGS

703-605-6008

A study of the EPA/State Residential Radon Survey and the National Residential Radon Survey.

## AIRPORT FACILITIES

Airport landing facilities

Federal Aviation Administration

(866) 835-5322

Airport landing facilities

## BASINS

Better Assessment Science Integrating point & Non-point Sources

U.S. Environmental Protection Agency

855-246-3642

Integrated geographical information system national watershed data and environmental assessment known as Better Assessment Science Integrating point & Non-point Sources

## DIGITAL OBSTACLE

Obstacles of interest to aviation users

Federal Aviation Administration

855-379-6518

The Digital Obstacle File describes all known obstacles of interest to aviation users in the U.S. with limited coverage of the Pacific the Caribbean Canada and Mexico. The obstacles are assigned unique numerical identifiers; accuracy codes and listed in order of ascending latitude within each state or area by FAA Region.

## EPICENTERS

National Geographical Data Center

National Geographical Data Center

303-497-6826

List of recent and historic earthquakes and information.

## FLOOD DFIRM

National Flood Hazard Layer Database

Federal Emergency Management Agency

The National Flood Hazard Layer Database (NFHL) is a computer database that contains the flood hazard map information from FEMA's Flood Map Modernization program. These map data are from Digital Flood Insurance Rate Map (DFIRM) databases and Letters of Map Revision.

**NATIONAL HISTORIC PRESERVATION ACTION (SECTION 106)**

**CORRESPONDENCE**



**North Carolina Department of Natural and Cultural Resources  
State Historic Preservation Office**

Ramona M. Bartos, Administrator

Governor Roy Cooper  
Secretary Reid Wilson

Office of Archives and History  
Deputy Secretary Kevin Cherry

June 30, 2021

Jason Steele, PhD, PWS  
Freese and Nichols, Inc.  
531 North Liberty Street  
Winston-Salem, NC 27101

[jason.steele@freese.com](mailto:jason.steele@freese.com)

Re: Cow Branch site, 34.143982, -78.647617, Columbus County, ER 21-1189

Dear Dr. Steele:

Thank you for your letter of June 18, 2021 regarding the above-referenced undertaking. We have reviewed the submittal and offer the following comments.

We have conducted a review of the project and are aware of no historic resources which would be affected by the project. Therefore, we have no comment on the project as proposed.

The above comments are made pursuant to Section 106 of the National Historic Preservation Act and the Advisory Council on Historic Preservation's Regulations for Compliance with Section 106 codified at 36 CFR Part 800.

Thank you for your cooperation and consideration. If you have questions concerning the above comment, contact Renee Gledhill-Earley, environmental review coordinator, at 919-814-6579 or [environmental.review@ncdcr.gov](mailto:environmental.review@ncdcr.gov). In all future communication concerning this project, please cite the above referenced tracking number.

Sincerely,

A handwritten signature in blue ink that reads "Renee Gledhill-Earley".

*for* Ramona Bartos, Deputy  
State Historic Preservation Officer

June 18, 2021

Renee Gledhill-Earley  
State Historic Preservation Office  
4617 Mail Service Center  
Raleigh, NC 27699-4617

Subject: Cow Branch Mitigation Site  
Columbus County, North Carolina

Dear Ms. Gledhill-Earley,

Freese and Nichols, Inc. requests review and comment on any possible issues that may emerge with respect to archaeological or cultural resources associated with the Cow Branch Mitigation Site. A project review narrative, Site Map, Topographic Map, Aerial Photograph and results from the NC Historic Preservation Office database are attached.

The Cow Branch Mitigation Site is being developed to provide wetland and stream mitigation in the Lumber River Basin. The project includes the restoration and enhancement of unnamed tributaries of Sandpit Branch and the restoration and rehabilitation of riparian and non-riparian wetlands. The site has been disturbed due to agricultural row crop use and cattle grazing. Historically the site has been in agricultural production (crops, timber, cattle) for at least the last 70 years. Furthermore, no archaeological artifacts have been observed or noted during preliminary surveys for restoration purposes.

We ask that you review this site based on the attached information to determine the presence of any historic properties.

We thank you in advance for your timely response and cooperation. Please feel free to contact us with any questions that you may have concerning the project.

Sincerely,  
Freese and Nichols, Inc.



Jason Steele, PhD, PWS  
Environmental Scientist

Enclosures:

- 1) Project Review Package

**TO:** NC State Historic Preservation Office

**FROM:** Jason Steele, Freese and Nichols, Inc.

**SUBJECT:** Project Review Submittal

**DATE:** June 18, 2021

**PROJECT:** Cow Branch Mitigation Site

---

**Project Name:** Cow Branch Mitigation Site

**Project Location:**

3540 Et Richardson Road, Nakina, NC (Columbus County)

Project Coordinates: 34.1374, -78.6482

**Project Contact Information:**

Jason Steele

Freese and Nichols, Inc.

531 N. Liberty Street, Winston-Salem, NC 27101

Phone: 540-449-2837, Email: [jason.steele@freese.com](mailto:jason.steele@freese.com)

**Project Description:**

The Cow Branch Mitigation Site is being developed to provide wetland and stream mitigation in the Lumber River Basin. The project includes the restoration and enhancement of unnamed tributaries of Sandpit Branch and the restoration and rehabilitation of riparian and non-riparian wetlands. The site has been disturbed due to agricultural row crop use and cattle grazing. Historically the site has been in agricultural production (crops, timber, cattle) for at least the last 70 years. Furthermore, no archaeological artifacts have been observed or noted during preliminary surveys for restoration purposes.

The project is proposed by NC Department of Mitigation Services and is being funded by North Carolina Department of Water Quality .

No historic properties were identified within a 1 mile radius to the project area using the NCHPO database search. No buildings were found within or immediately adjacent to the project area during field investigations. No impacts to historic properties are proposed as part of this project.

As described in the **Project Location** section above, the property has been managed for agricultural activities for the past 70 years. No structures are present within the project area or adjacent to the property.

**Project Area Map:**

Vicinity, Aerial and topographic maps of the project site and APE are attached. Results of the NCHPOWEB database search are shown on Figure 4.

**Site Photographs:**

Photographs of the site are below. The project will not impact any existing structures.

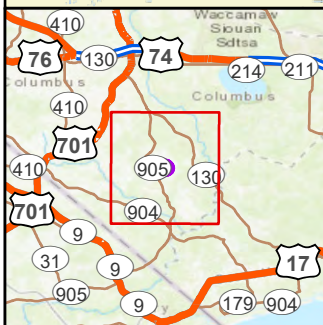
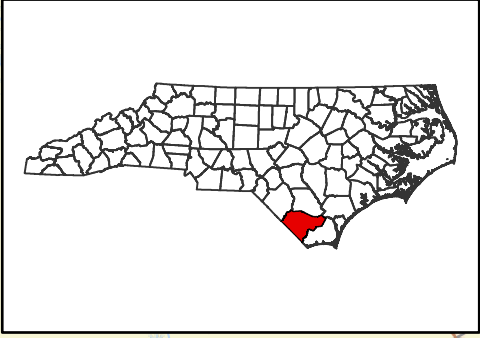
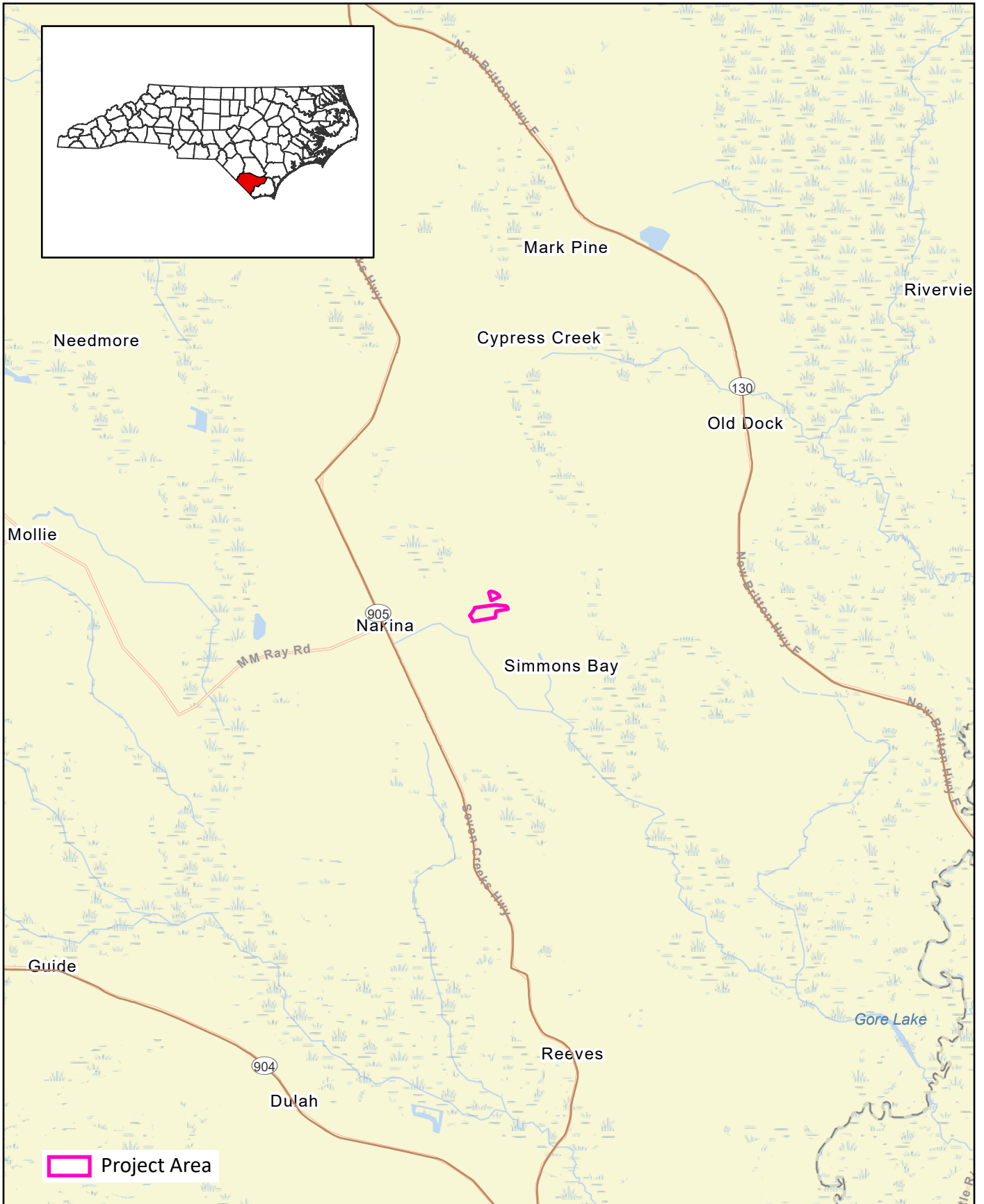


**Photograph 1.** Example of typical agricultural area within APE outside of the growing season.





**Photograph 2.** Wetland restoration area along UT Sand Pit Branch, photograph taken outside of growing season.

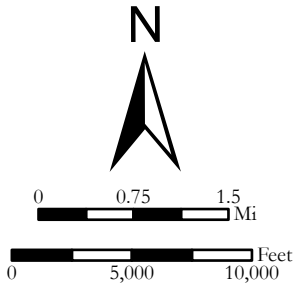


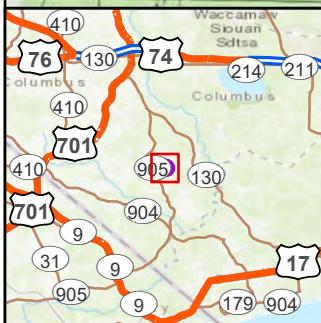
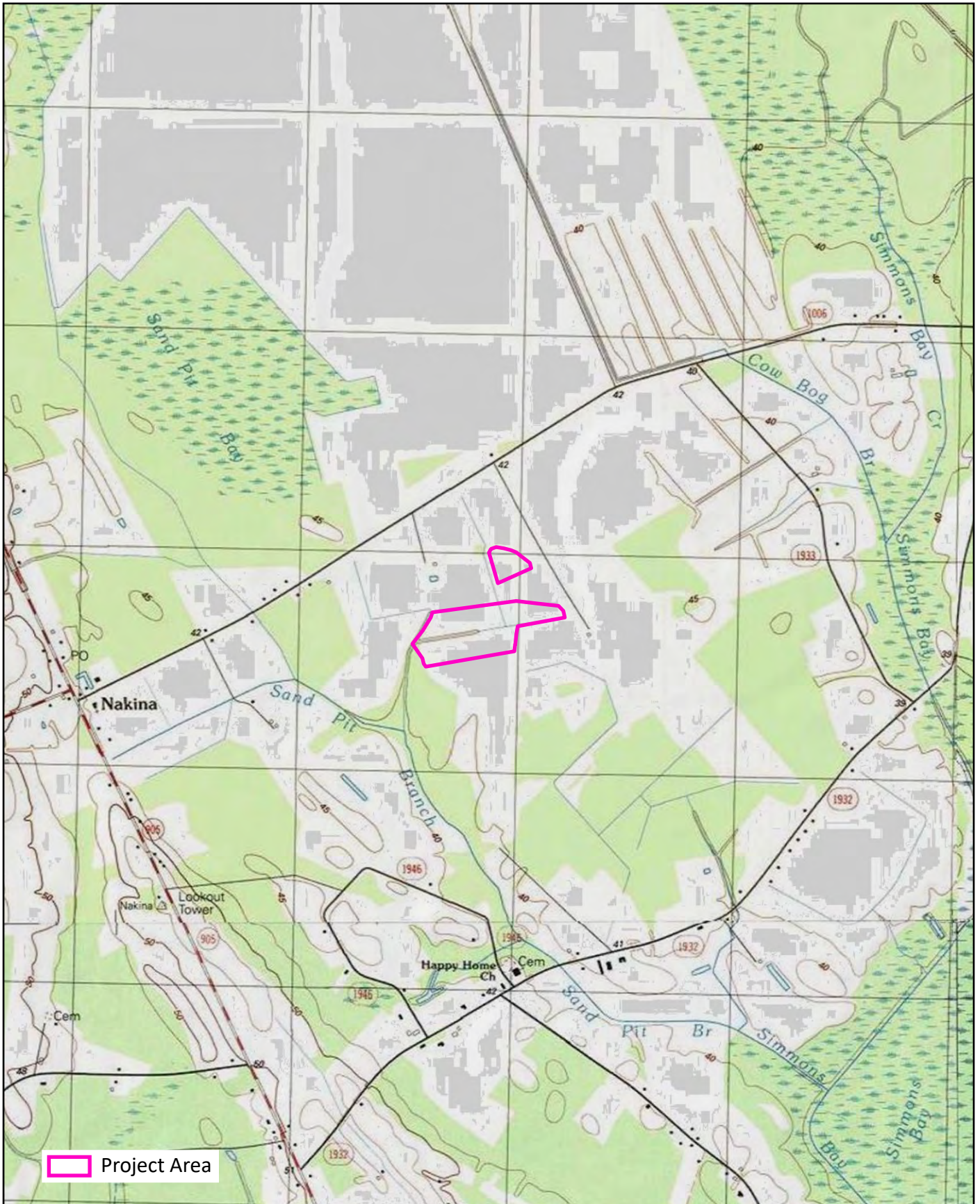
**Figure 1 Project Location**  
 Cow Branch Mitigation Site  
 Columbus County, NC



531 N. Liberty St  
 Winston-Salem, NC 27101

Coordinate System: NAD 1983 StatePlane North Carolina FIPS 3200 Feet  
 Date Exported: 5/3/2021 2:21 PM

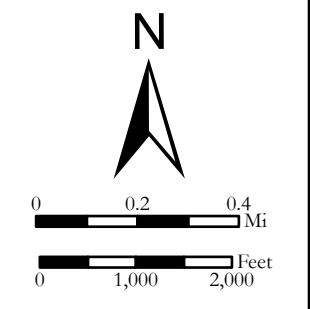


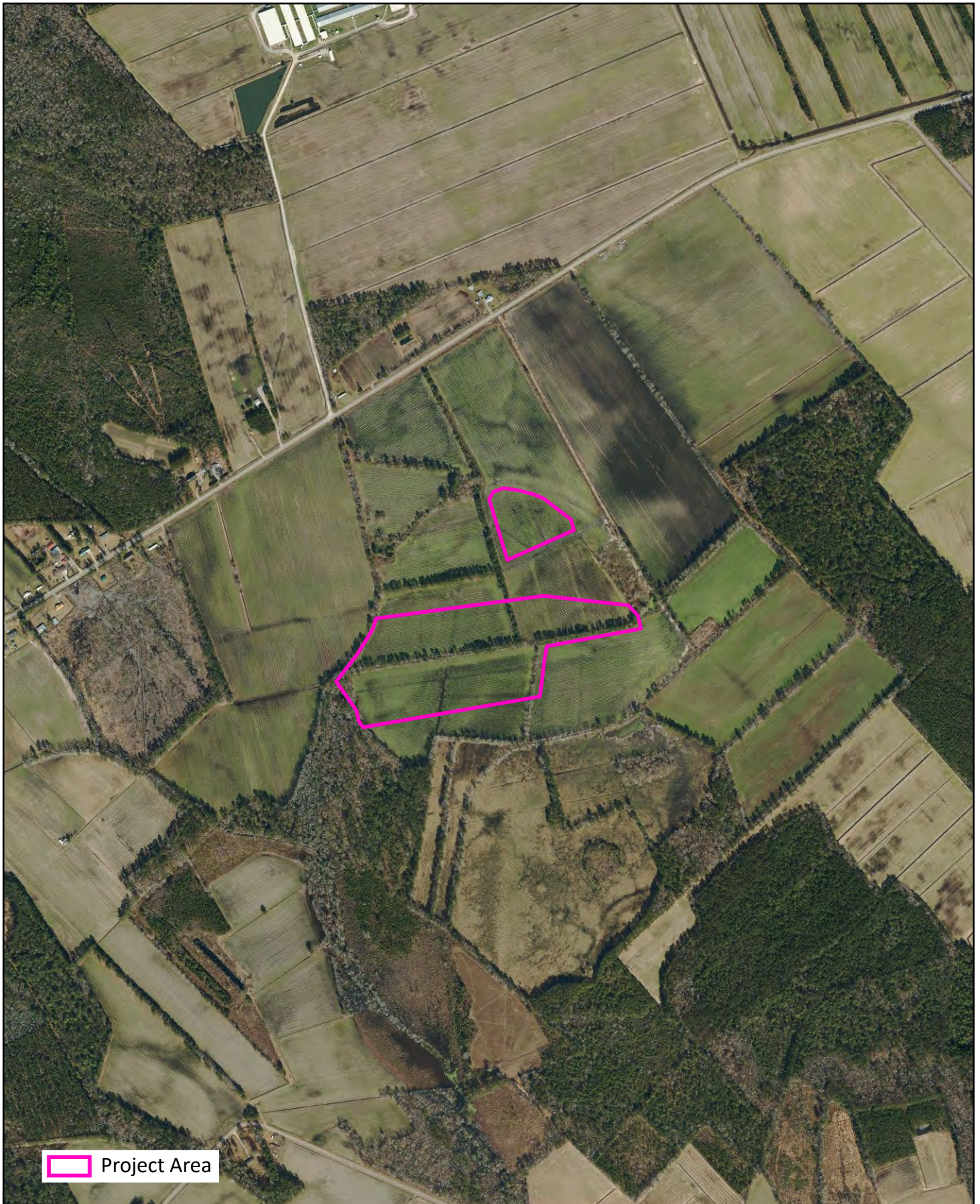



**Figure 2 Project Location and Topography**  
 Cow Branch Mitigation Site  
 Columbus County, NC

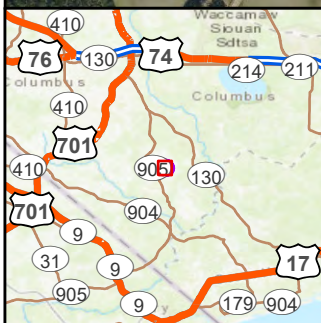
**FREESE AND NICHOLS** 531 N. Liberty St  
 Winston-Salem, NC 27101

Coordinate System: NAD 1983 StatePlane North Carolina FIPS 3200 Feet  
 Date Exported: 5/3/2021 2:23 PM





 Project Area

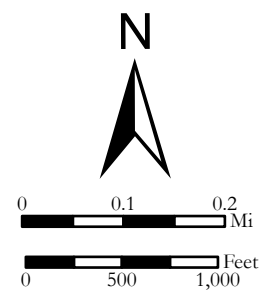


**Figure 3 Project Location with Aerial**  
Cow Branch Mitigation Site  
Columbus County, NC



531 N. Liberty St  
Winston-Salem, NC 27101

Coordinate System: NAD 1983 StatePlane North Carolina FIPS 3200 Feet  
Date Exported: 5/3/2021 2:35 PM





**Figure 4.** Cow Branch Mitigation Site area of potential effects with 1-mile search radius. No historical structures were identified within the search radius or APE.

**UNIFORM RELOCATION ASSISTANCE AND REAL PROPERTY ACQUISITION ACT (UNIFORM ACT)**

**DOCUMENTATION**

June 10, 2021

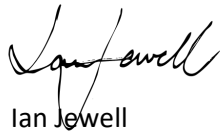
Gloria Smith  
Wilbur Smith Girls, Inc.  
P O Box 2493  
Shallotte, NC 28459

Dear Ms. Smith:

The purpose of this letter is to notify you that Freese and Nichols, Inc., in offering to purchase an easement on your property in Columbus County, North Carolina, does not have the power to acquire it by eminent domain. Also, Freese and Nichol's offer to purchase an easement on your property is based on what we believe to be its fair market value.

If you have any questions, please feel free to call me at 919-418-8430.

Sincerely,



Ian Jewell  
Project Manager

**ENDANGERED SPECIES ACT (ESA)**

**USFWS CORRESPONDENCE**



July 26, 2023

Gary Jordan  
US Fish and Wildlife Service  
Raleigh Field Office  
PO Box 33726  
Raleigh, NC 27636  
Via email: [raleigh@fws.gov](mailto:raleigh@fws.gov)

**Re:** Cow Branch Mitigation Site, Columbus County, North Carolina  
**Ref:** USFWS Consultation Code 2022-0026578

Dear Mr. Jordan,

Freese and Nichols, Inc. requests review and comment on any possible issues that might emerge with respect to threatened, endangered and candidate species, migratory birds, or other trust resources with a potential stream and wetland restoration project on the Cow Branch Mitigation Site located in Columbus County, NC. A USGS Topographic Map and Overview Map showing the approximate project are enclosed. The site is depicted on the attached project location map (**Figure 1**), quadrangle map (**Figure 2**) and aerial photograph (**Figure 3**).

The Cow Branch Mitigation Site is being developed to provide wetland and stream mitigation in the Lumber River Basin. The project includes the restoration and enhancement of unnamed tributaries of Sandpit Branch and the restoration and rehabilitation of riparian and non-riparian wetlands. Currently, streams throughout the site are extensively impacted by cattle grazing and row crop agriculture, lack riparian and streambank vegetation, active erosion, nutrient loading from fertilizer practices, upland erosion and sedimentation, and altered groundwater hydrology. The major goals of the proposed project are to provide ecological and water quality enhancement to the Lumber River Basin while creating a functional riparian corridor at the site level. This will be accomplished by restoring native riparian vegetation, creating stable stream pattern and profile, improving in-stream habitat, and protecting the site in perpetuity through establishing a conservation easement.

The enclosed project review package provides the information about the species, critical habitat, and bald eagles considered in our review, and the species conclusions table included in the package identifies our determinations for the resources that may be affected by the project. The March 2022 red-cockaded woodpecker (RCW) effects determination key is also included with the previous coordination packages to support the "No Effect" determination for RCW. All applicable erosion and sediment control and stormwater regulations will be adhered to for the entirety of the project.

If we have not heard from you in 30 days, we will assume that you concur with the Species Conclusion

Table, do not have any comments regarding any associated laws, and that you do not have any information relevant to this project at the current time.

We thank you in advance for your timely response and cooperation. Please feel free to contact us with any questions that you may have concerning the extent of site disturbance associated with this project.

Sincerely,

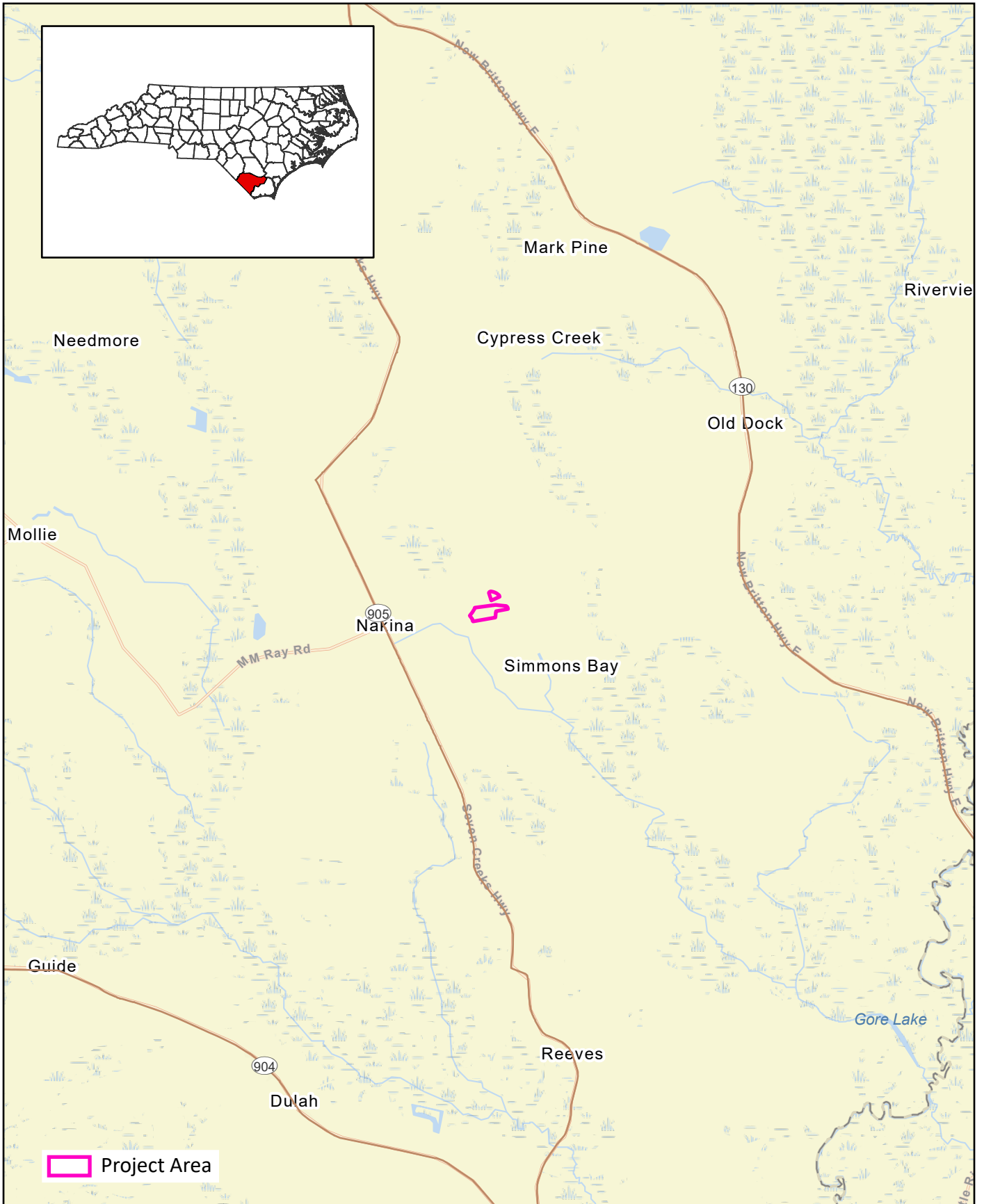
*Freese and Nichols, Inc.*

A handwritten signature in blue ink, appearing to read 'J. Steele', written in a cursive style.

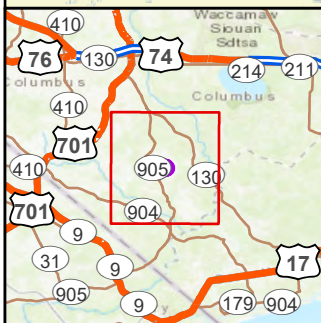
Jason Steele, PhD, PWS  
Senior Environmental Scientist

Enclosures:

- 1) Figures
  - a. Figure 1 – Project Location
  - b. Figure 2 – Topographic Map
  - c. Figure 3 – Aerial Photograph
- 2) USFWS Self Certification Letter
- 3) USFWS IPaC Official Species List with NLEB DKey Results (Updated July 2023)
- 4) Previous USFWS coordination documentation



 Project Area

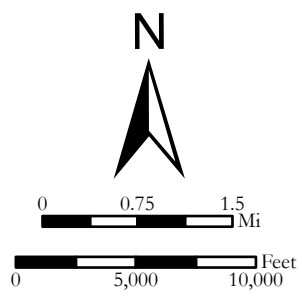


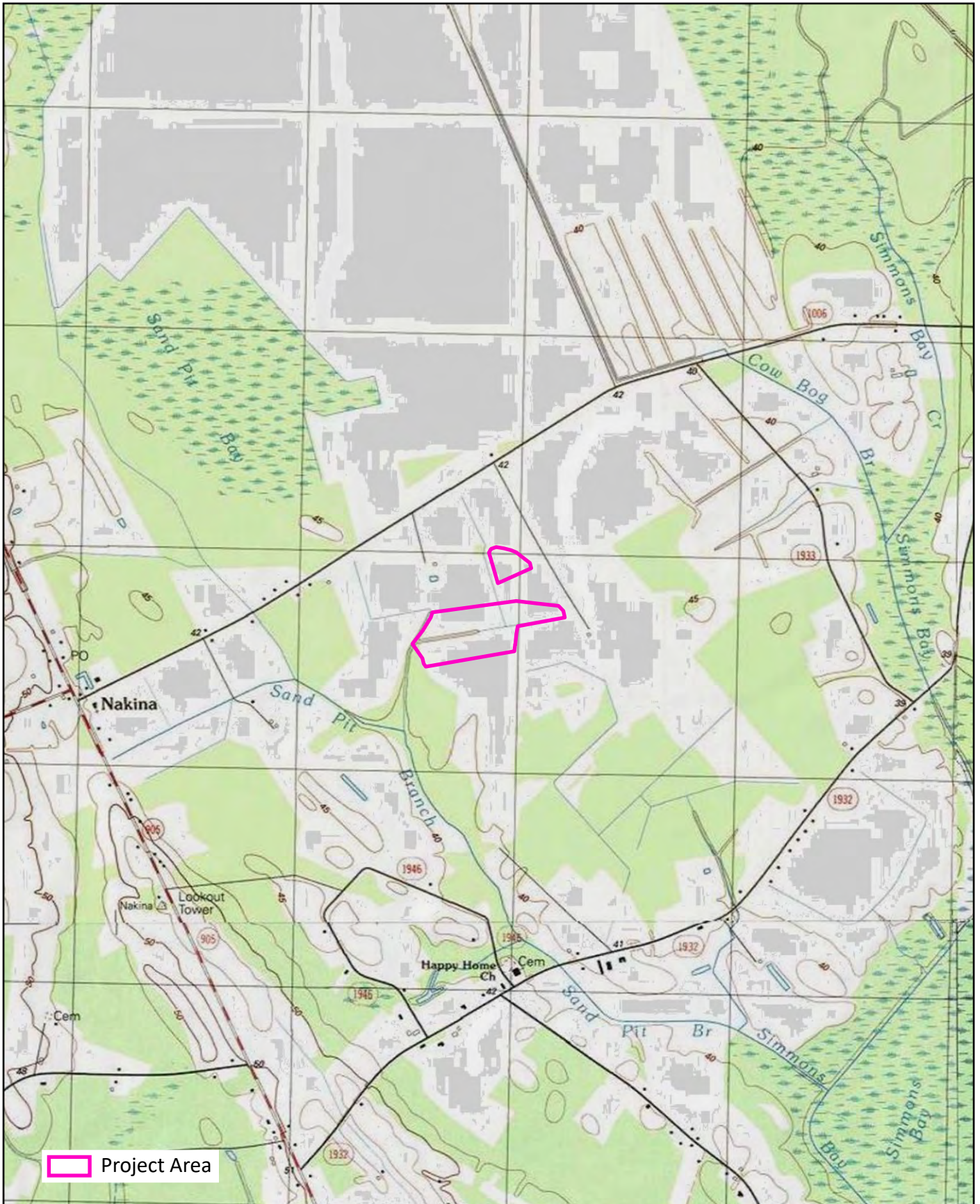
**Figure 1 Project Location**  
 Cow Branch Mitigation Site  
 Columbus County, NC



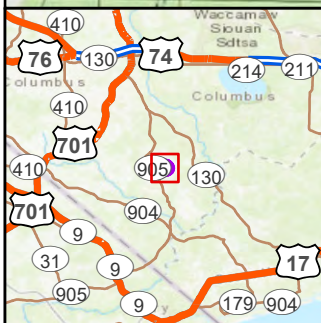
531 N. Liberty St  
 Winston-Salem, NC 27101

Coordinate System: NAD 1983 StatePlane North Carolina FIPS 3200 Feet  
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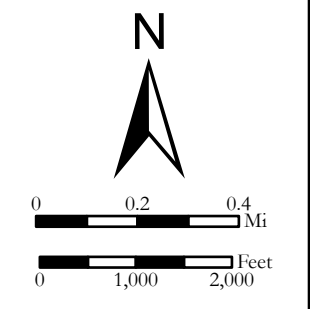
 Project Area

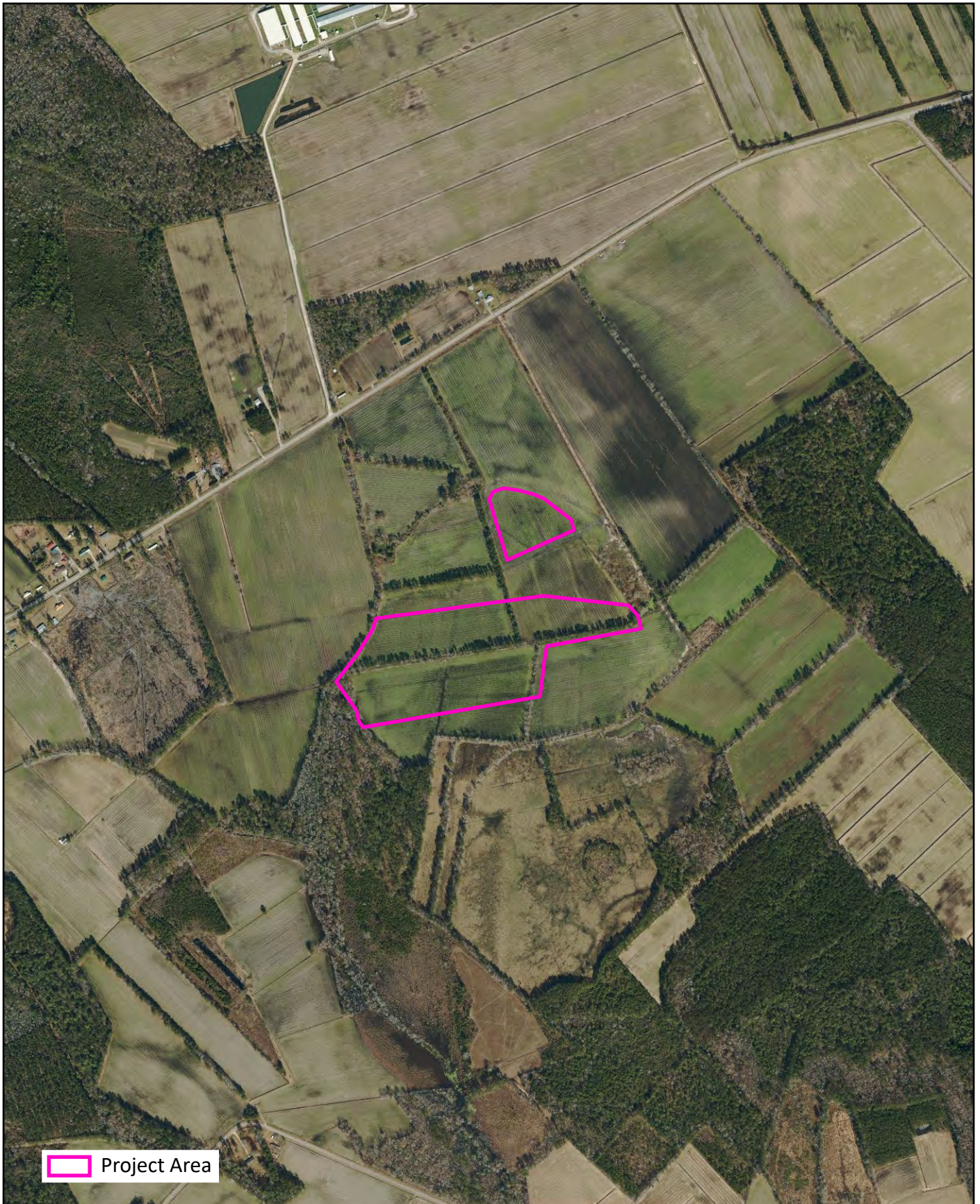



**Figure 2 Project Location and Topography**  
 Cow Branch Mitigation Site  
 Columbus County, NC

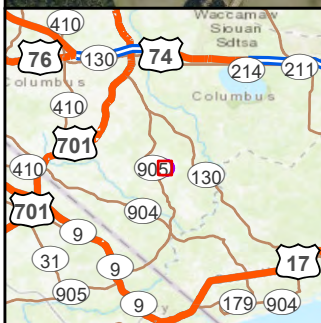
**FREESE AND NICHOLS** 531 N. Liberty St  
 Winston-Salem, NC 27101

Coordinate System: NAD 1983 StatePlane North Carolina FIPS 3200 Feet  
 Date Exported: 5/3/2021 2:23 PM





 Project Area

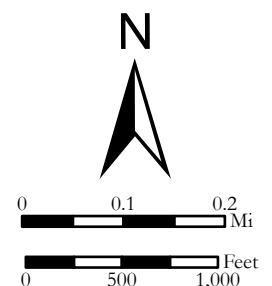


### Figure 3 Project Location with Aerial Cow Branch Mitigation Site Columbus County, NC



531 N. Liberty St  
Winston-Salem, NC 27101

Coordinate System: NAD 1983 StatePlane North Carolina FIPS 3200 Feet  
Date Exported: 5/3/2021 2:35 PM





# United States Department of the Interior



## FISH AND WILDLIFE SERVICE

Raleigh Field Office  
P.O. Box 33726  
Raleigh, NC 27636-3726

Date: July 26, 2023

### Self-Certification Letter

Project Name Cow Branch Mitigation Site

IPaC Project Code: 2022-0026578 IPaC Record Locator # \_\_\_\_\_

Dear Applicant:

Thank you for using the U.S. Fish and Wildlife Service (Service) Raleigh Ecological Services online project review process. By printing this letter in conjunction with your project review package, you are certifying that you have completed the online project review process for the project named above in accordance with all instructions provided, using the best available information to reach your conclusions. This letter, and the enclosed project review package, completes the review of your project in accordance with the Endangered Species Act of 1973 (16 U.S.C. 1531-1544, 87 Stat. 884), as amended (ESA), and the Bald and Golden Eagle Protection Act (16 U.S.C. 668-668c, 54 Stat. 250), as amended (Eagle Act). This letter also provides information for your project review under the National Environmental Policy Act of 1969 (P.L. 91-190, 42 U.S.C. 4321-4347, 83 Stat. 852), as amended. A copy of this letter and the project review package must be submitted to this office for this certification to be valid. This letter and the project review package will be maintained in our records.

The species conclusions table in the enclosed project review package summarizes your ESA and Eagle Act conclusions. Based on your analysis, mark all the determinations that apply:

- “no effect” determinations for proposed/listed species and/or proposed/designated critical habitat; and/or
- “may affect, not likely to adversely affect” determinations for proposed/listed species and/or proposed/designated critical habitat; and/or
- “no Eagle Act permit required” determinations for eagles.

We certify that use of the online project review process in strict accordance with the instructions provided as documented in the enclosed project review package results in reaching the appropriate determinations. Therefore, we concur with the “no effect” or “not likely to adversely affect” determinations for proposed and listed species and proposed and designated critical habitat; the “may affect” determination for Northern long-eared bat; and/or the “no Eagle Act permit required” determinations for eagles. Additional coordination with this office is not needed. Candidate species are not legally protected pursuant to the ESA. However, the Service encourages consideration of these species by avoiding adverse impacts to them. Please contact this office for additional coordination if your project action area contains candidate species. Should project plans change or if additional information on the distribution of proposed or listed species, proposed or designated critical habitat, or bald eagles becomes available, this determination may be reconsidered. This certification letter is valid for 1 year. Information about the online project review process including instructions, species information, and other information regarding project reviews within North Carolina is available at our website <http://www.fws.gov>. If you have any questions, you can write to us at [Raleigh@fws.gov](mailto:Raleigh@fws.gov) or please contact Leigh Mann of this office at 919-856-4520, ext. 10.

Sincerely,

/s/Pete Benjamin

Pete Benjamin  
Field Supervisor  
Raleigh Ecological Services

Enclosures - project review package



## United States Department of the Interior



FISH AND WILDLIFE SERVICE  
Raleigh Ecological Services Field Office  
Post Office Box 33726  
Raleigh, NC 27636-3726  
Phone: (919) 856-4520 Fax: (919) 856-4556

In Reply Refer To:  
Project Code: 2022-0026578  
Project Name: Cow Branch

July 26, 2023

Subject: List of threatened and endangered species that may occur in your proposed project location or may be affected by your proposed project

### To Whom It May Concern:

The enclosed species list identifies threatened, endangered, proposed and candidate species, as well as proposed and final designated critical habitat, that may occur within the boundary of your proposed project and/or may be affected by your proposed project. The species list fulfills the requirements of the U.S. Fish and Wildlife Service (Service) under section 7(c) of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 *et seq.*). If your project area contains suitable habitat for any of the federally-listed species on this species list, the proposed action has the potential to adversely affect those species. If suitable habitat is present, surveys should be conducted to determine the species' presence or absence within the project area. The use of this species list and/or North Carolina Natural Heritage program data should not be substituted for actual field surveys.

New information based on updated surveys, changes in the abundance and distribution of species, changed habitat conditions, or other factors could change this list. Please feel free to contact us if you need more current information or assistance regarding the potential impacts to federally proposed, listed, and candidate species and federally designated and proposed critical habitat. Please note that under 50 CFR 402.12(e) of the regulations implementing section 7 of the Act, the accuracy of this species list should be verified after 90 days. This verification can be completed formally or informally as desired. The Service recommends that verification be completed by visiting the ECOS-IPaC website at regular intervals during project planning and implementation for updates to species lists and information. An updated list may be requested through the ECOS-IPaC system by completing the same process used to receive the enclosed list.

The purpose of the Act is to provide a means whereby threatened and endangered species and the ecosystems upon which they depend may be conserved. Under sections 7(a)(1) and 7(a)(2) of the Act and its implementing regulations (50 CFR 402 *et seq.*), Federal agencies are required to utilize their authorities to carry out programs for the conservation of threatened and endangered



species and to determine whether projects may affect threatened and endangered species and/or designated critical habitat.

A Biological Assessment is required for construction projects (or other undertakings having similar physical impacts) that are major Federal actions significantly affecting the quality of the human environment as defined in the National Environmental Policy Act (42 U.S.C. 4332(2)(c)). For projects other than major construction activities, the Service suggests that a biological evaluation similar to a Biological Assessment be prepared to determine whether the project may affect listed or proposed species and/or designated or proposed critical habitat. Recommended contents of a Biological Assessment are described at 50 CFR 402.12.

If a Federal agency determines, based on the Biological Assessment or biological evaluation, that listed species and/or designated critical habitat may be affected by the proposed project, the agency is required to consult with the Service pursuant to 50 CFR 402. In addition, the Service recommends that candidate species, proposed species and proposed critical habitat be addressed within the consultation. More information on the regulations and procedures for section 7 consultation, including the role of permit or license applicants, can be found in the "Endangered Species Consultation Handbook" at:

<http://www.fws.gov/endangered/esa-library/pdf/TOC-GLOS.PDF>

**Migratory Birds:** In addition to responsibilities to protect threatened and endangered species under the Endangered Species Act (ESA), there are additional responsibilities under the Migratory Bird Treaty Act (MBTA) and the Bald and Golden Eagle Protection Act (BGEPA) to protect native birds from project-related impacts. Any activity, intentional or unintentional, resulting in take of migratory birds, including eagles, is prohibited unless otherwise permitted by the U.S. Fish and Wildlife Service (50 C.F.R. Sec. 10.12 and 16 U.S.C. Sec. 668(a)). For more information regarding these Acts see <https://www.fws.gov/birds/policies-and-regulations.php>.

The MBTA has no provision for allowing take of migratory birds that may be unintentionally killed or injured by otherwise lawful activities. It is the responsibility of the project proponent to comply with these Acts by identifying potential impacts to migratory birds and eagles within applicable NEPA documents (when there is a federal nexus) or a Bird/Eagle Conservation Plan (when there is no federal nexus). Proponents should implement conservation measures to avoid or minimize the production of project-related stressors or minimize the exposure of birds and their resources to the project-related stressors. For more information on avian stressors and recommended conservation measures see <https://www.fws.gov/birds/bird-enthusiasts/threats-to-birds.php>.

In addition to MBTA and BGEPA, Executive Order 13186: *Responsibilities of Federal Agencies to Protect Migratory Birds*, obligates all Federal agencies that engage in or authorize activities that might affect migratory birds, to minimize those effects and encourage conservation measures that will improve bird populations. Executive Order 13186 provides for the protection of both migratory birds and migratory bird habitat. For information regarding the implementation of Executive Order 13186, please visit <https://www.fws.gov/birds/policies-and-regulations/executive-orders/e0-13186.php>.

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We appreciate your concern for threatened and endangered species. The Service encourages Federal agencies to include conservation of threatened and endangered species into their project planning to further the purposes of the Act. Please include the Consultation Code in the header of this letter with any request for consultation or correspondence about your project that you submit to our office.

Attachment(s):

- Official Species List
  - Migratory Birds
-

## **OFFICIAL SPECIES LIST**

This list is provided pursuant to Section 7 of the Endangered Species Act, and fulfills the requirement for Federal agencies to "request of the Secretary of the Interior information whether any species which is listed or proposed to be listed may be present in the area of a proposed action".

This species list is provided by:

**Raleigh Ecological Services Field Office**

Post Office Box 33726

Raleigh, NC 27636-3726

(919) 856-4520

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## PROJECT SUMMARY

Project Code: 2022-0026578  
Project Name: Cow Branch  
Project Type: Restoration / Enhancement - Agricultural  
Project Description: Potential mitigation area  
Project Location:

The approximate location of the project can be viewed in Google Maps: <https://www.google.com/maps/@34.136815049999996,-78.64479242376305,14z>



Counties: Columbus County, North Carolina

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## ENDANGERED SPECIES ACT SPECIES

There is a total of 7 threatened, endangered, or candidate species on this species list.

Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species.

IPaC does not display listed species or critical habitats under the sole jurisdiction of NOAA Fisheries<sup>1</sup>, as USFWS does not have the authority to speak on behalf of NOAA and the Department of Commerce.

See the "Critical habitats" section below for those critical habitats that lie wholly or partially within your project area under this office's jurisdiction. Please contact the designated FWS office if you have questions.

- 
1. [NOAA Fisheries](#), also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

### MAMMALS

NAME	STATUS
Northern Long-eared Bat <i>Myotis septentrionalis</i> No critical habitat has been designated for this species. Species profile: <a href="https://ecos.fws.gov/ecp/species/9045">https://ecos.fws.gov/ecp/species/9045</a>	Endangered
Tricolored Bat <i>Perimyotis subflavus</i> No critical habitat has been designated for this species. Species profile: <a href="https://ecos.fws.gov/ecp/species/10515">https://ecos.fws.gov/ecp/species/10515</a>	Proposed Endangered

### BIRDS

NAME	STATUS
Red-cockaded Woodpecker <i>Picoides borealis</i> No critical habitat has been designated for this species. Species profile: <a href="https://ecos.fws.gov/ecp/species/7614">https://ecos.fws.gov/ecp/species/7614</a>	Endangered
Wood Stork <i>Mycteria americana</i> Population: AL, FL, GA, MS, NC, SC No critical habitat has been designated for this species. Species profile: <a href="https://ecos.fws.gov/ecp/species/8477">https://ecos.fws.gov/ecp/species/8477</a>	Threatened

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**REPTILES**

NAME	STATUS
American Alligator <i>Alligator mississippiensis</i> No critical habitat has been designated for this species. Species profile: <a href="https://ecos.fws.gov/ecp/species/776">https://ecos.fws.gov/ecp/species/776</a>	Similarity of Appearance (Threatened)

**INSECTS**

NAME	STATUS
Monarch Butterfly <i>Danaus plexippus</i> No critical habitat has been designated for this species. Species profile: <a href="https://ecos.fws.gov/ecp/species/9743">https://ecos.fws.gov/ecp/species/9743</a>	Candidate

**FLOWERING PLANTS**

NAME	STATUS
Cooley's Meadowrue <i>Thalictrum cooleyi</i> No critical habitat has been designated for this species. Species profile: <a href="https://ecos.fws.gov/ecp/species/3281">https://ecos.fws.gov/ecp/species/3281</a>	Endangered

**CRITICAL HABITATS**

THERE ARE NO CRITICAL HABITATS WITHIN YOUR PROJECT AREA UNDER THIS OFFICE'S JURISDICTION.

YOU ARE STILL REQUIRED TO DETERMINE IF YOUR PROJECT(S) MAY HAVE EFFECTS ON ALL ABOVE LISTED SPECIES.

## MIGRATORY BIRDS

Certain birds are protected under the Migratory Bird Treaty Act<sup>1</sup> and the Bald and Golden Eagle Protection Act<sup>2</sup>.

Any person or organization who plans or conducts activities that may result in impacts to migratory birds, eagles, and their habitats should follow appropriate regulations and consider implementing appropriate conservation measures, as described [below](#).

- 
1. The [Migratory Birds Treaty Act](#) of 1918.
  2. The [Bald and Golden Eagle Protection Act](#) of 1940.
  3. 50 C.F.R. Sec. 10.12 and 16 U.S.C. Sec. 668(a)

**The birds listed below are birds of particular concern either because they occur on the [USFWS Birds of Conservation Concern \(BCC\) list](#) or warrant special attention in your project location.** To learn more about the levels of concern for birds on your list and how this list is generated, see the FAQ [below](#). This is not a list of every bird you may find in this location, nor a guarantee that every bird on this list will be found in your project area. To see exact locations of where birders and the general public have sighted birds in and around your project area, visit the [E-bird data mapping tool](#) (Tip: enter your location, desired date range and a species on your list). For projects that occur off the Atlantic Coast, additional maps and models detailing the relative occurrence and abundance of bird species on your list are available. Links to additional information about Atlantic Coast birds, and other important information about your migratory bird list, including how to properly interpret and use your migratory bird report, can be found [below](#).

For guidance on when to schedule activities or implement avoidance and minimization measures to reduce impacts to migratory birds on your list, click on the PROBABILITY OF PRESENCE SUMMARY at the top of your list to see when these birds are most likely to be present and breeding in your project area.

NAME	BREEDING SEASON
Brown-headed Nuthatch <i>Sitta pusilla</i> This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA	Breeds Mar 1 to Jul 15
Chimney Swift <i>Chaetura pelagica</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds Mar 15 to Aug 25
Prothonotary Warbler <i>Protonotaria citrea</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds Apr 1 to Jul 31

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NAME	BREEDING SEASON
Red-headed Woodpecker <i>Melanerpes erythrocephalus</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds May 10 to Sep 10
Rusty Blackbird <i>Euphagus carolinus</i> This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA	Breeds elsewhere

## PROBABILITY OF PRESENCE SUMMARY

The graphs below provide our best understanding of when birds of concern are most likely to be present in your project area. This information can be used to tailor and schedule your project activities to avoid or minimize impacts to birds. Please make sure you read and understand the FAQ "Proper Interpretation and Use of Your Migratory Bird Report" before using or attempting to interpret this report.

### Probability of Presence (■)

Each green bar represents the bird's relative probability of presence in the 10km grid cell(s) your project overlaps during a particular week of the year. (A year is represented as 12 4-week months.) A taller bar indicates a higher probability of species presence. The survey effort (see below) can be used to establish a level of confidence in the presence score. One can have higher confidence in the presence score if the corresponding survey effort is also high.

How is the probability of presence score calculated? The calculation is done in three steps:

1. The probability of presence for each week is calculated as the number of survey events in the week where the species was detected divided by the total number of survey events for that week. For example, if in week 12 there were 20 survey events and the Spotted Towhee was found in 5 of them, the probability of presence of the Spotted Towhee in week 12 is 0.25.
2. To properly present the pattern of presence across the year, the relative probability of presence is calculated. This is the probability of presence divided by the maximum probability of presence across all weeks. For example, imagine the probability of presence in week 20 for the Spotted Towhee is 0.05, and that the probability of presence at week 12 (0.25) is the maximum of any week of the year. The relative probability of presence on week 12 is  $0.25/0.25 = 1$ ; at week 20 it is  $0.05/0.25 = 0.2$ .
3. The relative probability of presence calculated in the previous step undergoes a statistical conversion so that all possible values fall between 0 and 10, inclusive. This is the probability of presence score.

### Breeding Season (■)

Yellow bars denote a very liberal estimate of the time-frame inside which the bird breeds across its entire range. If there are no yellow bars shown for a bird, it does not breed in your project area.

### Survey Effort (|)



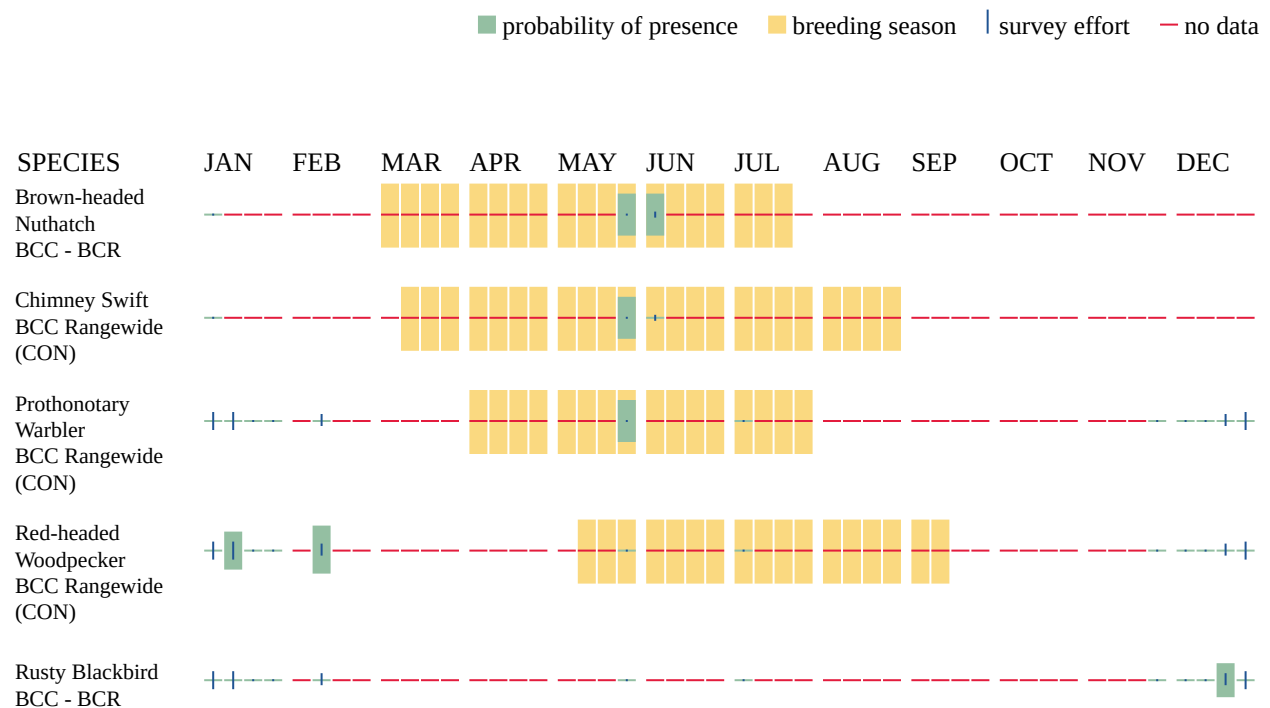
Vertical black lines superimposed on probability of presence bars indicate the number of surveys performed for that species in the 10km grid cell(s) your project area overlaps. The number of surveys is expressed as a range, for example, 33 to 64 surveys.

### No Data (—)

A week is marked as having no data if there were no survey events for that week.

### Survey Timeframe

Surveys from only the last 10 years are used in order to ensure delivery of currently relevant information. The exception to this is areas off the Atlantic coast, where bird returns are based on all years of available data, since data in these areas is currently much more sparse.



Additional information can be found using the following links:

- Birds of Conservation Concern <https://www.fws.gov/program/migratory-birds/species>
- Measures for avoiding and minimizing impacts to birds <https://www.fws.gov/library/collections/avoiding-and-minimizing-incident-take-migratory-birds>
- Nationwide conservation measures for birds <https://www.fws.gov/sites/default/files/documents/nationwide-standard-conservation-measures.pdf>

## MIGRATORY BIRDS FAQ

**Tell me more about conservation measures I can implement to avoid or minimize impacts to migratory birds.**

[Nationwide Conservation Measures](#) describes measures that can help avoid and minimize impacts to all birds at any location year round. Implementation of these measures is particularly important when birds are most likely to occur in the project area. When birds may be breeding in the area, identifying the locations of any active nests and avoiding their destruction is a very helpful impact minimization measure. To see when birds are most likely to occur and be breeding in your project area, view the Probability of Presence Summary. [Additional measures](#) or [permits](#) may be advisable depending on the type of activity you are conducting and the type of infrastructure or bird species present on your project site.

### **What does IPaC use to generate the list of migratory birds that potentially occur in my specified location?**

The Migratory Bird Resource List is comprised of USFWS [Birds of Conservation Concern \(BCC\)](#) and other species that may warrant special attention in your project location.

The migratory bird list generated for your project is derived from data provided by the [Avian Knowledge Network \(AKN\)](#). The AKN data is based on a growing collection of [survey, banding, and citizen science datasets](#) and is queried and filtered to return a list of those birds reported as occurring in the 10km grid cell(s) which your project intersects, and that have been identified as warranting special attention because they are a BCC species in that area, an eagle ([Eagle Act](#) requirements may apply), or a species that has a particular vulnerability to offshore activities or development.

Again, the Migratory Bird Resource list includes only a subset of birds that may occur in your project area. It is not representative of all birds that may occur in your project area. To get a list of all birds potentially present in your project area, please visit the [Rapid Avian Information Locator \(RAIL\) Tool](#).

### **What does IPaC use to generate the probability of presence graphs for the migratory birds potentially occurring in my specified location?**

The probability of presence graphs associated with your migratory bird list are based on data provided by the [Avian Knowledge Network \(AKN\)](#). This data is derived from a growing collection of [survey, banding, and citizen science datasets](#).

Probability of presence data is continuously being updated as new and better information becomes available. To learn more about how the probability of presence graphs are produced and how to interpret them, go the Probability of Presence Summary and then click on the "Tell me about these graphs" link.

### **How do I know if a bird is breeding, wintering or migrating in my area?**

To see what part of a particular bird's range your project area falls within (i.e. breeding, wintering, migrating or year-round), you may query your location using the [RAIL Tool](#) and look at the range maps provided for birds in your area at the bottom of the profiles provided for each bird in your results. If a bird on your migratory bird species list has a breeding season associated with it, if that bird does occur in your project area, there may be nests present at some point within the timeframe specified. If "Breeds elsewhere" is indicated, then the bird likely does not breed in your project area.

### **What are the levels of concern for migratory birds?**

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Migratory birds delivered through IPaC fall into the following distinct categories of concern:

1. "BCC Rangewide" birds are [Birds of Conservation Concern](#) (BCC) that are of concern throughout their range anywhere within the USA (including Hawaii, the Pacific Islands, Puerto Rico, and the Virgin Islands);
2. "BCC - BCR" birds are BCCs that are of concern only in particular Bird Conservation Regions (BCRs) in the continental USA; and
3. "Non-BCC - Vulnerable" birds are not BCC species in your project area, but appear on your list either because of the [Eagle Act](#) requirements (for eagles) or (for non-eagles) potential susceptibilities in offshore areas from certain types of development or activities (e.g. offshore energy development or longline fishing).

Although it is important to try to avoid and minimize impacts to all birds, efforts should be made, in particular, to avoid and minimize impacts to the birds on this list, especially eagles and BCC species of rangewide concern. For more information on conservation measures you can implement to help avoid and minimize migratory bird impacts and requirements for eagles, please see the FAQs for these topics.

### **Details about birds that are potentially affected by offshore projects**

For additional details about the relative occurrence and abundance of both individual bird species and groups of bird species within your project area off the Atlantic Coast, please visit the [Northeast Ocean Data Portal](#). The Portal also offers data and information about other taxa besides birds that may be helpful to you in your project review. Alternately, you may download the bird model results files underlying the portal maps through the [NOAA NCCOS Integrative Statistical Modeling and Predictive Mapping of Marine Bird Distributions and Abundance on the Atlantic Outer Continental Shelf](#) project webpage.

Bird tracking data can also provide additional details about occurrence and habitat use throughout the year, including migration. Models relying on survey data may not include this information. For additional information on marine bird tracking data, see the [Diving Bird Study](#) and the [nanotag studies](#) or contact [Caleb Spiegel](#) or [Pam Loring](#).

### **What if I have eagles on my list?**

If your project has the potential to disturb or kill eagles, you may need to [obtain a permit](#) to avoid violating the Eagle Act should such impacts occur.

### **Proper Interpretation and Use of Your Migratory Bird Report**

The migratory bird list generated is not a list of all birds in your project area, only a subset of birds of priority concern. To learn more about how your list is generated, and see options for identifying what other birds may be in your project area, please see the FAQ "What does IPaC use to generate the migratory birds potentially occurring in my specified location". Please be aware this report provides the "probability of presence" of birds within the 10 km grid cell(s) that overlap your project; not your exact project footprint. On the graphs provided, please also look carefully at the survey effort (indicated by the black vertical bar) and for the existence of the "no data" indicator (a red horizontal bar). A high survey effort is the key component. If the survey effort is high, then the probability of presence score can be viewed as more dependable. In contrast, a low survey effort bar or no data bar means a lack of data and, therefore, a lack of

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certainty about presence of the species. This list is not perfect; it is simply a starting point for identifying what birds of concern have the potential to be in your project area, when they might be there, and if they might be breeding (which means nests might be present). The list helps you know what to look for to confirm presence, and helps guide you in knowing when to implement conservation measures to avoid or minimize potential impacts from your project activities, should presence be confirmed. To learn more about conservation measures, visit the FAQ "Tell me about conservation measures I can implement to avoid or minimize impacts to migratory birds" at the bottom of your migratory bird trust resources page.

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## **IPAC USER CONTACT INFORMATION**

Agency: Freese and Nichols, Inc.

Name: Jason Steele

Address: 531 North Liberty St

City: Winston-Salem

State: NC

Zip: 27101

Email: jason.steele@freese.com

Phone: 5404492837

## **LEAD AGENCY CONTACT INFORMATION**

Lead Agency: Army Corps of Engineers

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## United States Department of the Interior



FISH AND WILDLIFE SERVICE  
Raleigh Ecological Services Field Office  
Post Office Box 33726  
Raleigh, NC 27636-3726  
Phone: (919) 856-4520 Fax: (919) 856-4556

In Reply Refer To:  
Project code: 2022-0026578  
Project Name: Cow Branch

July 26, 2023

Federal Nexus: yes  
Federal Action Agency (if applicable): Army Corps of Engineers

**Subject:** Technical assistance for 'Cow Branch'

Dear Jason Steele:

This letter records your determination using the Information for Planning and Consultation (IPaC) system provided to the U.S. Fish and Wildlife Service (Service) on July 26, 2023, for 'Cow Branch' (here forward, Project). This project has been assigned Project Code 2022-0026578 and all future correspondence should clearly reference this number. **Please carefully review this letter. Your Endangered Species Act (Act) requirements are not complete.**

### **Ensuring Accurate Determinations When Using IPaC**

The Service developed the IPaC system and associated species' determination keys in accordance with the Endangered Species Act of 1973 (ESA; 87 Stat. 884, as amended; 16 U.S.C. 1531 et seq.) and based on a standing analysis. All information submitted by the Project proponent into IPaC must accurately represent the full scope and details of the Project.

Failure to accurately represent or implement the Project as detailed in IPaC or the Northern Long-eared Bat Rangewide Determination Key (Dkey), invalidates this letter. ***Answers to certain questions in the DKey commit the project proponent to implementation of conservation measures that must be followed for the ESA determination to remain valid.***

### **Determination for the Northern Long-Eared Bat**

Based upon your IPaC submission and a standing analysis, your project is not reasonably certain to cause incidental take of the northern long-eared bat. Unless the Service advises you within 15 days of the date of this letter that your IPaC-assisted determination was incorrect, this letter verifies that the Action is not likely to result in unauthorized take of the northern long-eared bat.

## Other Species and Critical Habitat that May be Present in the Action Area

The IPaC-assisted determination for the northern long-eared bat does not apply to the following ESA-protected species and/or critical habitat that also may occur in your Action area:

- American Alligator *Alligator mississippiensis* Similarity of Appearance (Threatened)
- Cooley's Meadowrue *Thalictrum cooleyi* Endangered
- Monarch Butterfly *Danaus plexippus* Candidate
- Red-cockaded Woodpecker *Picoides borealis* Endangered
- Tricolored Bat *Perimyotis subflavus* Proposed Endangered
- Wood Stork *Mycteria americana* Threatened

You may coordinate with our Office to determine whether the Action may cause prohibited take of the animal species listed above. Note that if a new species is listed that may be affected by the identified action before it is complete, additional review is recommended to ensure compliance with the Endangered Species Act.

## Next Step

Consultation with the Service is necessary. The project has a federal nexus (e.g., Federal funds, permit, etc.), but you are not the federal action agency or its designated (in writing) non-federal representative. Therefore, the ESA consultation status is incomplete and no project activities should occur until consultation between the Service and the Federal action agency (or designated non-federal representative), is completed.

As the federal agency or designated non-federal representative deems appropriate, they should submit their determination of effects to the Service by doing the following.

1. Log into IPaC using an agency email account and click on My Projects, click "Search by record locator" to find this Project using **612-129602202**. (Alternatively, the originator of the project in IPaC can add the agency representative to the project by using the Add Member button on the project home page.)
2. Review the answers to the Northern Long-eared Bat Range-wide Determination Key to ensure that they are accurate.
3. Click on Review/Finalize to convert the 'not likely to adversely affect' consistency letter to a concurrence letter. Download the concurrence letter for your files if needed.

If no changes occur with the Project or there are no updates on listed species, no further consultation/coordination for this project is required for the northern long-eared bat. However, the Service recommends that project proponents re-evaluate the Project in IPaC if: 1) the scope, timing, duration, or location of the Project changes (includes any project changes or amendments); 2) new information reveals the Project may impact (positively or negatively) federally listed species or designated critical habitat; or 3) a new species is listed, or critical habitat designated. If any of the above conditions occurs, additional coordination with the

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Service should take place before project implements any changes which are final or commits additional resources.

If you have any questions regarding this letter or need further assistance, please contact the Raleigh Ecological Services Field Office and reference Project Code 2022-0026578 associated with this Project.

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**Action Description**

You provided to IPaC the following name and description for the subject Action.

**1. Name**

Cow Branch

**2. Description**

The following description was provided for the project 'Cow Branch':

Construction of the Cow Branch stream and wetland mitigation site.

The approximate location of the project can be viewed in Google Maps: <https://www.google.com/maps/@34.136815049999996,-78.64479242376305,14z>



## DETERMINATION KEY RESULT

Based on the answers provided, the proposed Action is consistent with a determination of “may affect, but not likely to adversely affect” for the Endangered northern long-eared bat (*Myotis septentrionalis*).

## QUALIFICATION INTERVIEW

1. Does the proposed project include, or is it reasonably certain to cause, intentional take of the northern long-eared bat or any other listed species?

**Note:** Intentional take is defined as take that is the intended result of a project. Intentional take could refer to research, direct species management, surveys, and/or studies that include intentional handling/encountering, harassment, collection, or capturing of any individual of a federally listed threatened, endangered or proposed species?

No

2. Your project overlaps with an area where northern long-eared bats may be present year-round. Time-of-year restrictions may not be appropriate for your project due to bats being active all year.

Do you understand that your project may impact bats at any time during the year and time-of-year restrictions may not apply to your project?

Yes

3. Do you have post-white nose syndrome occurrence data that indicates that northern long-eared bats (NLEB) are likely to be present in the action area?

Bat occurrence data may include identification of NLEBs in hibernacula, capture of NLEBs, tracking of NLEBs to roost trees, or confirmed acoustic detections. With this question, we are looking for data that, for some reason, may have not yet been made available to U.S. Fish and Wildlife Service.

No

4. Does any component of the action involve construction or operation of wind turbines?

**Note:** For federal actions, answer ‘yes’ if the construction or operation of wind power facilities is either (1) part of the federal action or (2) would not occur but for a federal agency action (federal permit, funding, etc.).

No

5. Is the proposed action authorized, permitted, licensed, funded, or being carried out by a Federal agency in whole or in part?

Yes

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6. Is the Federal Highway Administration (FHWA), Federal Railroad Administration (FRA), or Federal Transit Administration (FTA) funding or authorizing the proposed action, in whole or in part?

*Yes*

7. FHWA, FRA, and FTA have completed a range-wide programmatic consultation for transportation-related actions within the range of the Indiana bat and northern long-eared bat.

Does your proposed action fall within the scope of this programmatic consultation?

**Note:** If you have **previously consulted** on your proposed action with the Service under the NLEB 4dRule, answer 'no' to this question and proceed with using this key. If you have **not yet consulted** with the Service on your proposed action and are unsure whether your proposed action falls within the scope of the FHWA, FRA, FTA range-wide programmatic consultation, please select "Yes" and use the FHWA, FRA, FTA Assisted Determination Key in IPaC to determine if the programmatic consultation is applicable to your action. Return to this key and answer 'no' to this question if it is not.

*No*

8. Are you an employee of the federal action agency or have you been officially designated in writing by the agency as its designated non-federal representative for the purposes of Endangered Species Act Section 7 informal consultation per 50 CFR § 402.08?

**Note:** This key may be used for federal actions and for non-federal actions to facilitate section 7 consultation and to help determine whether an incidental take permit may be needed, respectively. This question is for information purposes only.

*No*

9. Is the lead federal action agency the Environmental Protection Agency (EPA) or Federal Communications Commission (FCC)? Is the Environmental Protection Agency (EPA) or Federal Communications Commission (FCC) funding or authorizing the proposed action, in whole or in part?

*No*

10. Is the lead federal action agency the Federal Energy Regulatory Commission (FERC)?

*No*

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11. Have you determined that your proposed action will have no effect on the northern long-eared bat? Remember to consider the [effects of any activities](#) that would not occur but for the proposed action.

If you think that the northern long-eared bat may be affected by your project or if you would like assistance in deciding, answer “No” below and continue through the key. If you have determined that the northern long-eared bat does not occur in your project’s action area and/or that your project will have no effects whatsoever on the species despite the potential for it to occur in the action area, you may make a “no effect” determination for the northern long-eared bat.

**Note:** Federal agencies (or their designated non-federal representatives) must consult with USFWS on federal agency actions that may affect listed species [50 CFR 402.14(a)]. Consultation is not required for actions that will not affect listed species or critical habitat. Therefore, this determination key will not provide a consistency or verification letter for actions that will not affect listed species. If you believe that the northern long-eared bat may be affected by your project or if you would like assistance in deciding, please answer “No” and continue through the key. Remember that this key addresses only effects to the northern long-eared bat. Consultation with USFWS would be required if your action may affect another listed species or critical habitat. The definition of [Effects of the Action](#) can be found here: <https://www.fws.gov/media/northern-long-eared-bat-assisted-determination-key-selected-definitions>

No

12. Your project overlaps with an area where northern long-eared bats may be present year-round.

Is suitable northern long-eared bat habitat present within 1000 feet of project activities?

Yes

13. Will the action cause effects to a bridge?

No

14. Will the action result in effects to a culvert or tunnel?

No

15. Does the action include the intentional exclusion of northern long-eared bats from a building or structure?

**Note:** Exclusion is conducted to deny bats’ entry or reentry into a building. To be effective and to avoid harming bats, it should be done according to established standards. If your action includes bat exclusion and you are unsure whether northern long-eared bats are present, answer “Yes.” Answer “No” if there are no signs of bat use in the building/structure. If unsure, contact your local U.S. Fish and Wildlife Services Ecological Services Field Office to help assess whether northern long-eared bats may be present. Contact a Nuisance Wildlife Control Operator (NWCO) for help in how to exclude bats from a structure safely without causing harm to the bats (to find a NWCO certified in bat standards, search the Internet using the search term “National Wildlife Control Operators Association bats”). Also see the White-Nose Syndrome Response Team's guide for bat control in structures

No

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16. Does the action involve removal, modification, or maintenance of a human-made structure (barn, house, or other building) **known or suspected to contain roosting bats**?

*No*

17. Will the action cause construction of one or more new roads open to the public?

For federal actions, answer 'yes' when the construction or operation of these facilities is either (1) part of the federal action or (2) would not occur but for an action taken by a federal agency (federal permit, funding, etc.).

*No*

18. Will the action include or cause any construction or other activity that is reasonably certain to increase average daily traffic on one or more existing roads?

**Note:** For federal actions, answer 'yes' when the construction or operation of these facilities is either (1) part of the federal action or (2) would not occur but for an action taken by a federal agency (federal permit, funding, etc.). .

*Yes*

19. Will the increased vehicle traffic occur on any road that lies between any two areas of contiguous forest that are each greater than or equal to 10 acres in extent and are separated by less than 1,000 feet? Northern long-eared bats may cross a road by flying between forest patches that are up to 1,000 feet apart.

**Note:** "Contiguous forest" of 10 acres or more may include areas where multiple forest patches are separated by less than 1,000 feet of non-forested area if the forested patches, added together, comprise at least 10 acres.

*No*

20. Will the proposed action involve the creation of a new water-borne contaminant source (e.g., leachate pond pits containing chemicals that are not NSF/ANSI 60 compliant)?

*No*

21. Will the proposed action involve the creation of a new point source discharge from a facility other than a water treatment plant or storm water system?

*No*

22. Will the action include drilling or blasting?

*No*

23. Will the action involve military training (e.g., smoke operations, obscurant operations, exploding munitions, artillery fire, range use, helicopter or fixed wing aircraft use)?

*No*

24. Will the proposed action involve the use of herbicides or pesticides other than herbicides (e.g., fungicides, insecticides, or rodenticides)?

*No*

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25. Will the action include or cause activities that are reasonably certain to cause chronic nighttime noise in suitable summer habitat for the northern long-eared bat? Chronic noise is noise that is continuous or occurs repeatedly again and again for a long time.

**Note:** Additional information defining suitable summer habitat for the northern long-eared bat can be found at:

<https://www.fws.gov/media/northern-long-eared-bat-assisted-determination-key-selected-definitions>

*No*

26. Does the action include, or is it reasonably certain to cause, the use of artificial lighting within 1000 feet of suitable northern long-eared bat roosting habitat?

**Note:** Additional information defining suitable roosting habitat for the northern long-eared bat can be found at:

<https://www.fws.gov/media/northern-long-eared-bat-assisted-determination-key-selected-definitions>

*No*

27. Will the action include tree cutting or other means of knocking down or bringing down trees, tree topping, or tree trimming?

*Yes*

28. Has a presence/probable absence summer bat survey targeting the northern long-eared bat following the Service's [Range-wide Indiana Bat and Northern Long-Eared Bat Survey Guidelines](#) been conducted within the project area? If unsure, answer "No."

*No*

29. Does the action include emergency cutting or trimming of hazard trees in order to remove an imminent threat to human safety or property? See hazard tree note at the bottom of the key for text that will be added to response letters

**Note:** A "hazard tree" is a tree that is an immediate threat to lives, public health and safety, or improved property and has a diameter breast height of six inches or greater.

*No*

30. Your project overlaps with an area where northern long-eared bats may be present year-round. To minimize or avoid impacts to the northern long-eared bat, all activities affecting trees should not occur from December 15th to February 15th and April 15th to July 30th.

Will any project activities occur from December 15th to February 15th and/or April 15th to July 30th.

*No*

31. Will the action cause trees to be cut, knocked down, or otherwise brought down across an area greater than 1 acre?

*Yes*

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## PROJECT QUESTIONNAIRE

Enter the extent of the action area (in acres) from which trees will be removed - round up to the nearest tenth of an acre. For this question, include the entire area where tree removal will take place, even if some live or dead trees will be left standing.

2.5

Will all potential northern long-eared bat (NLEB) roost trees (trees  $\geq 3$  inches diameter at breast height, dbh) be cut, knocked, or brought down from any portion of the action area greater than or equal to 0.1 acre? If all NLEB roost trees will be removed from multiple areas, select 'Yes' if the cumulative extent of those areas meets or exceeds 0.1 acre.

Yes

Enter the extent of the action area (in acres) from which all potential NLEB roost trees will be removed. If all NLEB roost trees will be removed from multiple areas, entire the total extent of those areas. Round up to the nearest tenth of an acre.

2.5

For the area from which all potential northern long-eared bat (NLEB) roost trees will be removed, on how many acres (round to the nearest tenth of an acre) will trees be allowed to regrow? Enter '0' if the entire area from which all potential NLEB roost trees are removed will be developed or otherwise converted to non-forest for the foreseeable future.

2.5

Will any snags (standing dead trees)  $\geq 3$  inches dbh be left standing in the area(s) in which all northern long-eared bat roost trees will be cut, knocked down, or otherwise brought down?

No

Will all project activities be completed by April 1, 2024?

No

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**IPAC USER CONTACT INFORMATION**

Agency: Freese and Nichols, Inc.

Name: Jason Steele

Address: 531 North Liberty St

City: Winston-Salem

State: NC

Zip: 27101

Email: jason.steele@freese.com

Phone: 5404492837

**LEAD AGENCY CONTACT INFORMATION**

Lead Agency: Army Corps of Engineers

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**Species Conclusions Table**

Project Name: Cow Branch Mitigation Site (Consultation Code 2022-0026578)

Date: July 26, 2023

Species / Resource Name	Conclusion	ESA Section 7 / Eagle Act Determination	Notes / Documentation
Northern Long-eared bat <i>Myotis septentrionalis</i>	Suitable habitat present	May affect, not likely to adversely affect	<p>The project is not located in, or within 0.25 miles of, identified Red HUC areas as of the 3/20/2021 updated mapping.</p> <p>The project will not clear trees between December 15 to February 15, and April 15 through July 31.</p> <p>Based upon the determination key results (attached), the project was determined to may affect, not likely to adversely affect.</p>
Tricolored bat <i>Perimyotis septentrionalis</i>	Suitable habitat present	May affect	<p>The project area contains approximately 2.5 acres of trees that present potential habitat for tricolored bat. The project will limit tree clearing outside of the Northern long-eared bat suggested time period and will evaluate tricolored bat requirements when the species is officially listed by USFWS, as necessary.</p>
Red-cockaded woodpecker <i>Picoides borealis</i>	No suitable habitat present	No effect	<p>The species typically occupies open, mature stands of southern pines, particularly longleaf pine (<i>Pinus palustris</i>) for foraging and nesting/roosting habitat. Nesting and roosting trees are typically aged 60 years or older, which are usually contiguous with pine stands of at least 30 years of age for foraging habitat.</p> <p>The site is comprised of open agricultural row crop fields. Loblolly pine trees are present in dispersed areas along active field edges, but not in a density that would support red-cockaded woodpecker. A search of the NC Natural Heritage database did not indicate any observances of the species within 1 mile of the project area. The red-cockaded woodpecker</p>

Species / Resource Name	Conclusion	ESA Section 7 / Eagle Act Determination	Notes / Documentation
			effects determination key was to determine that the action area of the project is not located within suitable RCW nesting or foraging habitat.
Wood Stork <i>Mycteria americana</i>	No suitable habitat present	No effect	<p>Wood storks are known to occur in several coastal North Carolina counties, and records indicate that they have been breeding in North Carolina since 2005. Wood storks typically construct their nests in medium to tall trees that occur in stands located either in swamps or on islands surrounded by relatively broad expanses of open water. In many areas, bald cypress and red mangrove trees are preferred. During the nonbreeding season or while foraging, wood storks occur in a wide variety of wetland habitats, including freshwater marshes and stock ponds, shallow, seasonally flooded roadside or agricultural ditches, narrow tidal creeks or shallow tidal pools, managed impoundments, and depressions in cypress heads and swamp sloughs. Because of their specialized feeding behavior, the most attractive feeding areas are swamp or marsh depressions where fish become concentrated during dry periods.</p> <p>A search of the NC Natural Heritage database did not indicate any observances of the species within 1 mile of the project area. The project area does not support open water and is predominantly comprised of agricultural fields and areas of active cattle grazing. While suitable habitat is not currently present within the project area, proposed actions will create viable foraging habitat.</p>

Species / Resource Name	Conclusion	ESA Section 7 / Eagle Act Determination	Notes / Documentation
<p>American Alligator <i>Alligator mississippiensis</i></p>	<p>Suitable habitat present, species not present</p>	<p>May affect, not likely to adversely affect</p>	<p>In North Carolina, alligators have been recorded in nearly every coastal county, and many inland counties to the fall line. The alligator is found rivers, streams, canals, lakes, swamps, and coastal marshes. The American alligator remains on the protected species list due to its similarity in appearance to the Endangered American crocodile.</p> <p>A search of the NC Natural Heritage database on April 8, 2021 did not indicate any observances of the species within 1 mile of the project area. No individuals were observed during a March 24, 2021 habitat assessment. The project will not adversely impact habitat and will not remove upstream and downstream access to other suitable habitat areas.</p>
<p>Cooley's Meadowrue <i>Thalictrum cooleyi</i></p>	<p>No suitable habitat present</p>	<p>No effect</p>	<p>Cooley's meadowrue, documented in the Pine Savanna natural community, occurs in circumneutral soils in sunny, moist to wet grass-sedge bogs, wet-pine savannas over calcareous clays, and savannah-like areas, often at the ecotones of intermittent drainages or non-riverine swamp forests. This rhizomatous perennial herb is also found along plowed firebreaks, roadside ditches and rights-of-way, forest clearings dominated by grass or sedge, and power line or utility rights-of-way. The species requires some type of disturbance (e.g., mowing, clearing, periodic fire) to maintain its open habitat. The plant typically occurs on slightly acidic (pH 5.8-6.6) soils that are loamy fine sand, sandy loam, or fine sandy loam; at least seasonally moist or saturated; and mapped as Foreston, Grifton, Muckalee, Torhunta, or Woodington series.</p> <p>Based upon a habitat assessment conducted</p>

Species / Resource Name	Conclusion	ESA Section 7 / Eagle Act Determination	Notes / Documentation
			<p>on March 24, 2021, the project area does not include habitat for Cooley's Meadowrue. Site soils have been drained by numerous agricultural ditches, removing the requisite hydrologic regime (moist to saturated) required by the species. The site has been cleared for agriculture, and management practices, including control of non-crop species by herbicide application, have removed any associate or indicator species for Cooley's meadowrue. A search of the NC Natural Heritage database included an observation of the species in 1928 within the one-mile search radius of the project, however, the USFWS Cooley's meadowrue Recovery Plan has indicated that many of these historic observances were extirpated by the early 1990s.</p> <p>Email correspondence from Kathy Matthews on May 4, 2021 indicated that "...the site does not appear to currently have suitable habitat [for Cooley's meadowrue]..." and "It is possible that the restoration activities on the site will benefit listed species by increasing the acreage of suitable habitat". Furthermore, the USFWS determined, "The Service does not believe that the project will adversely affect any federally listed or proposed species." The email correspondence is attached.</p>
Critical habitat	No critical habitat present		
Bald Eagle <i>Haliaeetus leucocephalus</i>	Unlikely to disturb nesting bald eagles	No Eagle Act Permit Required	A desktop review of available aerial imagery identified four small water bodies within a 1.0 mile plus 660 feet radius of the project alignment, however, the water bodies are not large enough or sufficiently open enough to be considered potential feeding sources for bald

Species / Resource Name	Conclusion	ESA Section 7 / Eagle Act Determination	Notes / Documentation
			eagle. A pedestrian survey for bald eagle nests within areas of potential nesting habitat located in or within 660 feet of the project alignments was conducted during site delineation efforts in March 2021 and multiple times during site visits in 2022 and 2023. No nests or individuals were observed. A review of the NCNHP database did not identify any eagle observations within 1-mile of the project alignment.

Acknowledgement: I agree that the above information about my proposed project is true. I used all of the provided resources to make an informed decision about impacts in the immediate and surrounding areas.



Jason Steele, PhD, PWS  
Senior Environmental Scientist

July 26, 2023

\_\_\_\_\_  
Signature /Title

\_\_\_\_\_  
Date

March 31, 2022

Gary Jordan  
US Fish and Wildlife Service  
Raleigh Field Office  
PO Box 33726  
Raleigh, NC 27636  
Via email: [raleigh@fws.gov](mailto:raleigh@fws.gov)

**Re:** Cow Branch Mitigation Site, Columbus County, North Carolina  
**Ref:** USFWS Consultation Code 2022-0026578

Dear Mr. Jordan,

Freese and Nichols, Inc. requests review and comment on any possible issues that might emerge with respect to threatened, endangered and candidate species, migratory birds, or other trust resources with a potential stream and wetland restoration project on the Cow Branch Mitigation Site located in Columbus County, NC. A USGS Topographic Map and Overview Map showing the approximate project are enclosed. The site is depicted on the attached project location map (**Figure 1**), quadrangle map (**Figure 2**) and aerial photograph (**Figure 3**).

The Cow Branch Mitigation Site is being developed to provide wetland and stream mitigation in the Lumber River Basin. The project includes the restoration and enhancement of unnamed tributaries of Sandpit Branch and the restoration and rehabilitation of riparian and non-riparian wetlands. Currently, streams throughout the site are extensively impacted by cattle grazing and row crop agriculture, lack riparian and streambank vegetation, active erosion, nutrient loading from fertilizer practices, upland erosion and sedimentation, and altered groundwater hydrology. The major goals of the proposed project are to provide ecological and water quality enhancement to the Lumber River Basin while creating a functional riparian corridor at the site level. This will be accomplished by restoring native riparian vegetation, creating stable stream pattern and profile, improving in-stream habitat, and protecting the site in perpetuity through establishing a conservation easement.

The enclosed project review package provides the information about the species, critical habitat, and bald eagles considered in our review, and the species conclusions table included in the package identifies our determinations for the resources that may be affected by the project. The March 2022 red-cockaded woodpecker (RCW) effects determination key is also included to support the "No Effect" determination for RCW. All applicable erosion and sediment control and stormwater regulations will be adhered to for the entirety of the project.

If we have not heard from you in 30 days, we will assume that you concur with the Species Conclusion

Table, do not have any comments regarding any associated laws, and that you do not have any information relevant to this project at the current time.

We thank you in advance for your timely response and cooperation. Please feel free to contact us with any questions that you may have concerning the extent of site disturbance associated with this project.

Sincerely,

*Freese and Nichols, Inc.*

A handwritten signature in blue ink, appearing to read 'J. Steele', with a long horizontal flourish extending to the right.

Jason Steele, PhD, PWS  
Senior Environmental Scientist

Enclosures:

- 1) Figures
  - a. Figure 1 – Project Location
  - b. Figure 2 – Topographic Map
  - c. Figure 3 – Aerial Photograph
- 2) USFWS Self Certification Letter
- 3) USFWS IPaC Official Species List (Updated March 2022)
- 4) NC Natural Heritage Program Project Review Species List
- 5) USFWS IPaC Species Conclusion Table (Updated March 2022)
- 6) Site Photographs
- 7) RCW Effects Determination Key
- 8) Previous USFWS coordination documentation

## Jason Steele

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**From:** Matthews, Kathryn H <kathryn\_matthews@fws.gov>  
**Sent:** Friday, September 15, 2023 03:27 PM  
**To:** Jason Steele  
**Cc:** Mann, Leigh  
**Subject:** Re: USFWS Project Code 2022-0026578; Cow Branch Mitigation Site  
**Attachments:** 23 0726\_USFWS Self certification package\_Cow Branch.pdf

**Follow Up Flag:** Follow up  
**Flag Status:** Flagged

You don't often get email from kathryn\_matthews@fws.gov. [Learn why this is important](#)

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Hi Jason,

The Service concurs with your species determinations for effects to listed species from this project. We note that you have not made a determination for tricolored bat, but the species is not currently listed. If the species is listed prior to completion of tree removal on the site, the lead federal agency (FHWA or Corps) should coordinate again with the Service.

Thanks, and have a good weekend.

*Please note that I am teleworking Wednesday through Friday, every week. I have a new phone number - See Below!*

Kathy Matthews  
NC Renewable Energy Coordinator &  
Fish and Wildlife Biologist  
U.S. Fish and Wildlife Service  
551-F Pylon Drive  
Raleigh, NC 27606  
NEW Phone! 984-308-0852

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**From:** Jason Steele <Jason.Steele@freese.com>  
**Sent:** Friday, September 8, 2023 3:23 PM  
**To:** Raleigh, FW4 <raleigh@fws.gov>  
**Subject:** [EXTERNAL] Online Project Review Certification Project Code 2022-0026578



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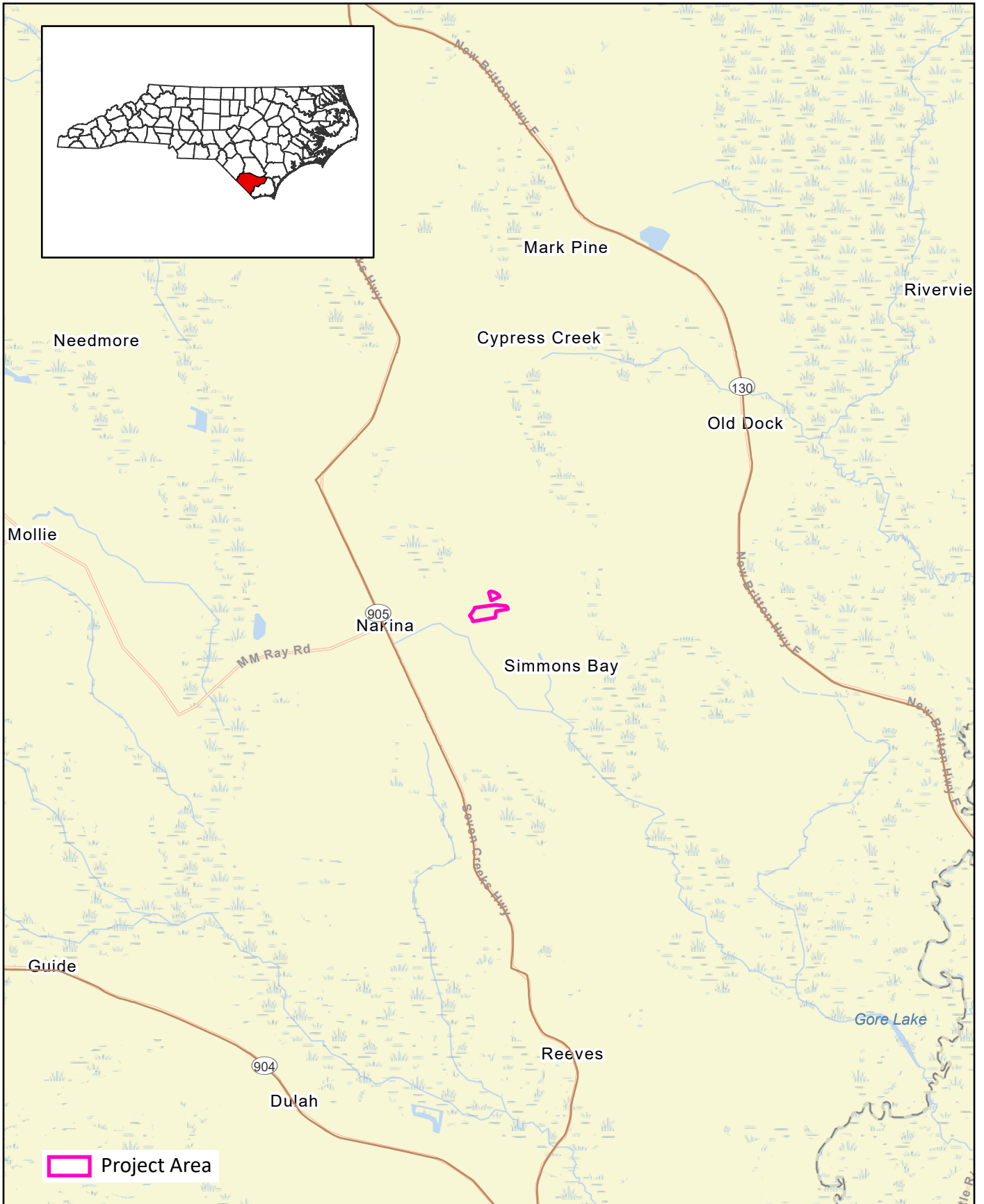
Please find the updated self-certification letter and associated documentation for the above referenced Project Code attached.

Best Regards,

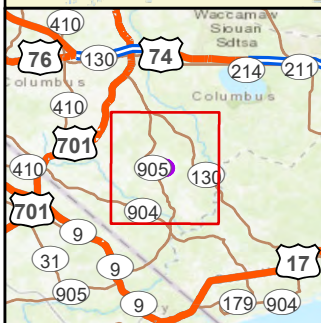
**Jason Steele, PhD, PWS** | Environmental Scientist | Freese and Nichols, Inc. | 540-449-2837 | [Jason.Steele@freese.com](mailto:Jason.Steele@freese.com) | [www.freese.com](http://www.freese.com)



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 Project Area

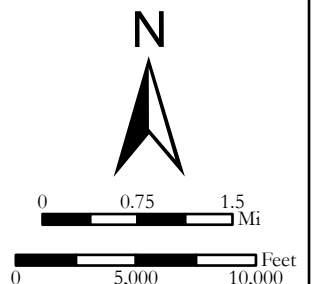


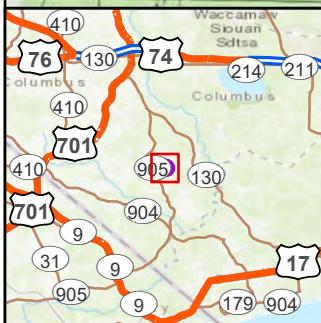
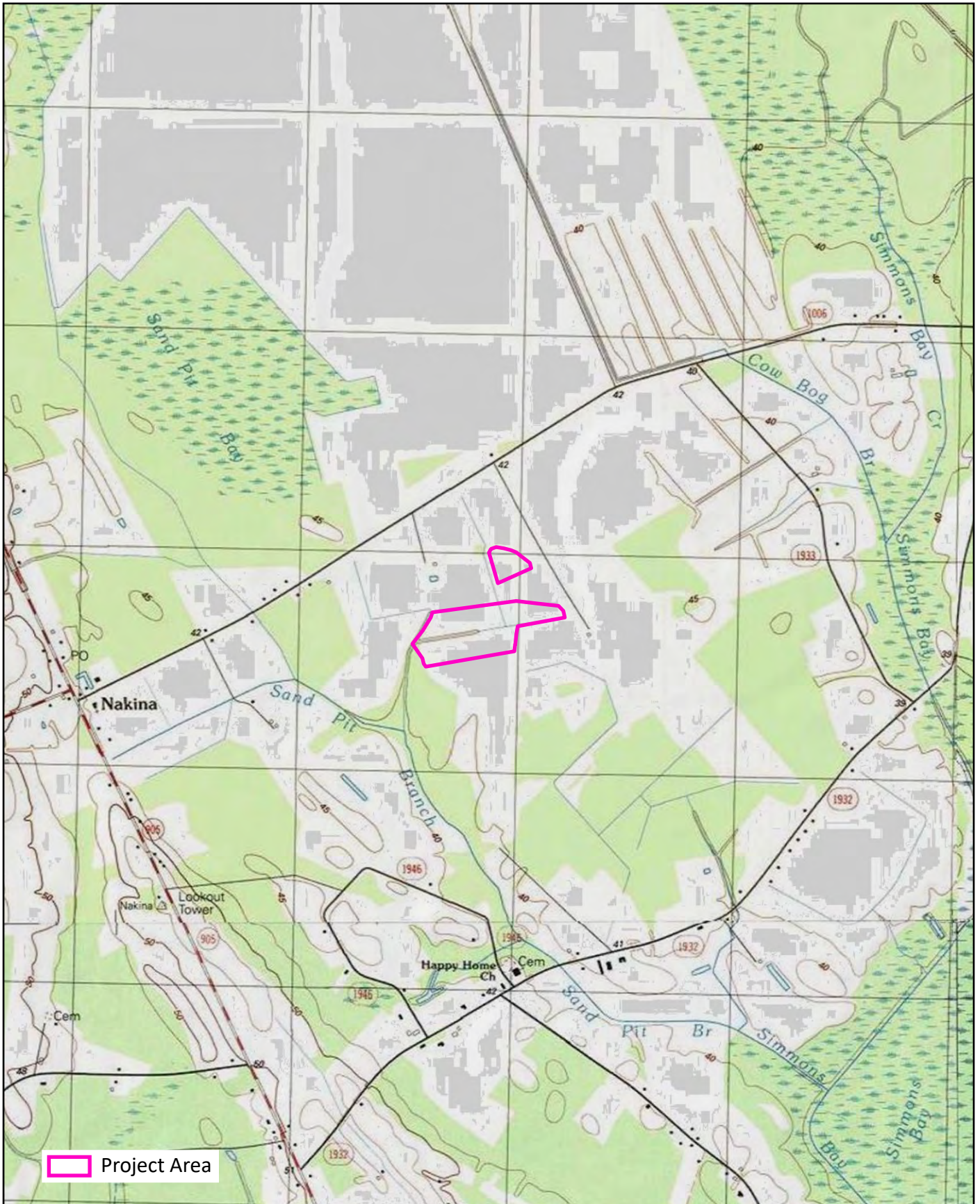
**Figure 1 Project Location**  
 Cow Branch Mitigation Site  
 Columbus County, NC



531 N. Liberty St  
 Winston-Salem, NC 27101

Coordinate System: NAD 1983 StatePlane North Carolina FIPS 3200 Feet  
 Date Exported: 5/3/2021 2:21 PM

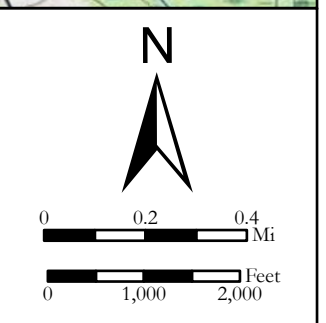


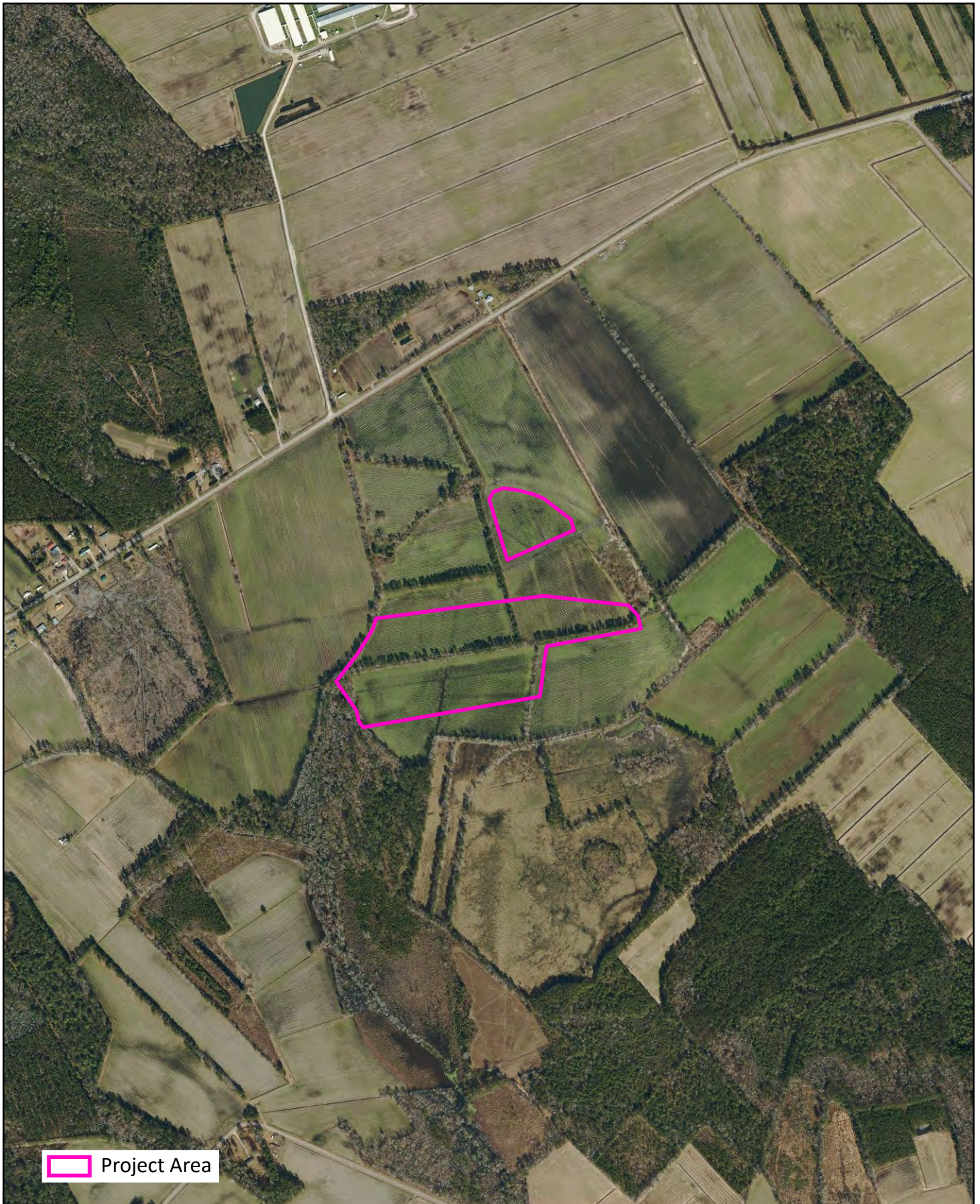



**Figure 2 Project Location and Topography**  
 Cow Branch Mitigation Site  
 Columbus County, NC

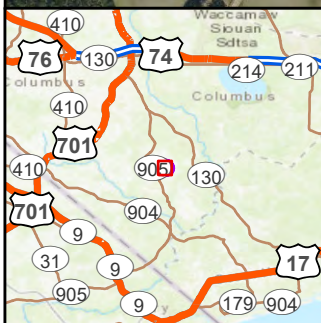
**FREESE AND NICHOLS** 531 N. Liberty St  
 Winston-Salem, NC 27101

Coordinate System: NAD 1983 StatePlane North Carolina FIPS 3200 Feet  
 Date Exported: 5/3/2021 2:23 PM





 Project Area

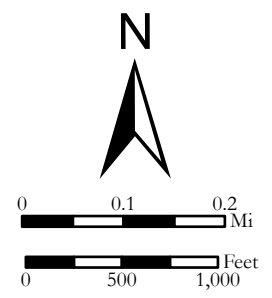


### Figure 3 Project Location with Aerial Cow Branch Mitigation Site Columbus County, NC



531 N. Liberty St  
Winston-Salem, NC 27101

Coordinate System: NAD 1983 StatePlane North Carolina FIPS 3200 Feet  
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# United States Department of the Interior



## FISH AND WILDLIFE SERVICE

Raleigh Field Office  
P.O. Box 33726  
Raleigh, NC 27636-3726

Date: \_\_\_\_\_

### Self-Certification Letter

Project Name \_\_\_\_\_

Dear Applicant:

Thank you for using the U.S. Fish and Wildlife Service (Service) Raleigh Ecological Services online project review process. By printing this letter in conjunction with your project review package, you are certifying that you have completed the online project review process for the project named above in accordance with all instructions provided, using the best available information to reach your conclusions. This letter, and the enclosed project review package, completes the review of your project in accordance with the Endangered Species Act of 1973 (16 U.S.C. 1531-1544, 87 Stat. 884), as amended (ESA), and the Bald and Golden Eagle Protection Act (16 U.S.C. 668-668c, 54 Stat. 250), as amended (Eagle Act). This letter also provides information for your project review under the National Environmental Policy Act of 1969 (P.L. 91-190, 42 U.S.C. 4321-4347, 83 Stat. 852), as amended. A copy of this letter and the project review package must be submitted to this office for this certification to be valid. This letter and the project review package will be maintained in our records.

The species conclusions table in the enclosed project review package summarizes your ESA and Eagle Act conclusions. Based on your analysis, mark all the determinations that apply:

“no effect” determinations for proposed/listed species and/or proposed/designated critical habitat; and/or

“may affect, not likely to adversely affect” determinations for proposed/listed species and/or proposed/designated critical habitat; and/or

“may affect, likely to adversely affect” determination for the Northern long-eared bat (*Myotis septentrionalis*) and relying on the findings of the January 5, 2016, Programmatic Biological Opinion for the Final 4(d) Rule on the Northern long-eared bat;

“no Eagle Act permit required” determinations for eagles.

We certify that use of the online project review process in strict accordance with the instructions provided as documented in the enclosed project review package results in reaching the appropriate determinations. Therefore, we concur with the “no effect” or “not likely to adversely affect” determinations for proposed and listed species and proposed and designated critical habitat; the “may affect” determination for Northern long-eared bat; and/or the “no Eagle Act permit required” determinations for eagles. Additional coordination with this office is not needed. Candidate species are not legally protected pursuant to the ESA. However, the Service encourages consideration of these species by avoiding adverse impacts to them. Please contact this office for additional coordination if your project action area contains candidate species. Should project plans change or if additional information on the distribution of proposed or listed species, proposed or designated critical habitat, or bald eagles becomes available, this determination may be reconsidered. This certification letter is valid for 1 year. Information about the online project review process including instructions, species information, and other information regarding project reviews within North Carolina is available at our website <http://www.fws.gov/raleigh/pp.html>. If you have any questions, you can write to us at [Raleigh@fws.gov](mailto:Raleigh@fws.gov) or please contact Leigh Mann of this office at 919-856-4520, ext. 10.

Sincerely,

/s/Pete Benjamin

Pete Benjamin  
Field Supervisor  
Raleigh Ecological Services

Enclosures - project review package



## United States Department of the Interior



FISH AND WILDLIFE SERVICE  
Raleigh Ecological Services Field Office  
Post Office Box 33726  
Raleigh, NC 27636-3726  
Phone: (919) 856-4520 Fax: (919) 856-4556

In Reply Refer To:  
Project Code: 2022-0026578  
Project Name: Cow Branch

March 31, 2022

Subject: List of threatened and endangered species that may occur in your proposed project location or may be affected by your proposed project

### To Whom It May Concern:

The enclosed species list identifies threatened, endangered, proposed and candidate species, as well as proposed and final designated critical habitat, that may occur within the boundary of your proposed project and/or may be affected by your proposed project. The species list fulfills the requirements of the U.S. Fish and Wildlife Service (Service) under section 7(c) of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 *et seq.*). If your project area contains suitable habitat for any of the federally-listed species on this species list, the proposed action has the potential to adversely affect those species. If suitable habitat is present, surveys should be conducted to determine the species' presence or absence within the project area. The use of this species list and/or North Carolina Natural Heritage program data should not be substituted for actual field surveys.

New information based on updated surveys, changes in the abundance and distribution of species, changed habitat conditions, or other factors could change this list. Please feel free to contact us if you need more current information or assistance regarding the potential impacts to federally proposed, listed, and candidate species and federally designated and proposed critical habitat. Please note that under 50 CFR 402.12(e) of the regulations implementing section 7 of the Act, the accuracy of this species list should be verified after 90 days. This verification can be completed formally or informally as desired. The Service recommends that verification be completed by visiting the ECOS-IPaC website at regular intervals during project planning and implementation for updates to species lists and information. An updated list may be requested through the ECOS-IPaC system by completing the same process used to receive the enclosed list.

The purpose of the Act is to provide a means whereby threatened and endangered species and the ecosystems upon which they depend may be conserved. Under sections 7(a)(1) and 7(a)(2) of the Act and its implementing regulations (50 CFR 402 *et seq.*), Federal agencies are required to utilize their authorities to carry out programs for the conservation of threatened and endangered

species and to determine whether projects may affect threatened and endangered species and/or designated critical habitat.

A Biological Assessment is required for construction projects (or other undertakings having similar physical impacts) that are major Federal actions significantly affecting the quality of the human environment as defined in the National Environmental Policy Act (42 U.S.C. 4332(2)(c)). For projects other than major construction activities, the Service suggests that a biological evaluation similar to a Biological Assessment be prepared to determine whether the project may affect listed or proposed species and/or designated or proposed critical habitat. Recommended contents of a Biological Assessment are described at 50 CFR 402.12.

If a Federal agency determines, based on the Biological Assessment or biological evaluation, that listed species and/or designated critical habitat may be affected by the proposed project, the agency is required to consult with the Service pursuant to 50 CFR 402. In addition, the Service recommends that candidate species, proposed species and proposed critical habitat be addressed within the consultation. More information on the regulations and procedures for section 7 consultation, including the role of permit or license applicants, can be found in the "Endangered Species Consultation Handbook" at:

<http://www.fws.gov/endangered/esa-library/pdf/TOC-GLOS.PDF>

**Migratory Birds:** In addition to responsibilities to protect threatened and endangered species under the Endangered Species Act (ESA), there are additional responsibilities under the Migratory Bird Treaty Act (MBTA) and the Bald and Golden Eagle Protection Act (BGEPA) to protect native birds from project-related impacts. Any activity, intentional or unintentional, resulting in take of migratory birds, including eagles, is prohibited unless otherwise permitted by the U.S. Fish and Wildlife Service (50 C.F.R. Sec. 10.12 and 16 U.S.C. Sec. 668(a)). For more information regarding these Acts see <https://www.fws.gov/birds/policies-and-regulations.php>.

The MBTA has no provision for allowing take of migratory birds that may be unintentionally killed or injured by otherwise lawful activities. It is the responsibility of the project proponent to comply with these Acts by identifying potential impacts to migratory birds and eagles within applicable NEPA documents (when there is a federal nexus) or a Bird/Eagle Conservation Plan (when there is no federal nexus). Proponents should implement conservation measures to avoid or minimize the production of project-related stressors or minimize the exposure of birds and their resources to the project-related stressors. For more information on avian stressors and recommended conservation measures see <https://www.fws.gov/birds/bird-enthusiasts/threats-to-birds.php>.

In addition to MBTA and BGEPA, Executive Order 13186: *Responsibilities of Federal Agencies to Protect Migratory Birds*, obligates all Federal agencies that engage in or authorize activities that might affect migratory birds, to minimize those effects and encourage conservation measures that will improve bird populations. Executive Order 13186 provides for the protection of both migratory birds and migratory bird habitat. For information regarding the implementation of Executive Order 13186, please visit <https://www.fws.gov/birds/policies-and-regulations/executive-orders/e0-13186.php>.

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We appreciate your concern for threatened and endangered species. The Service encourages Federal agencies to include conservation of threatened and endangered species into their project planning to further the purposes of the Act. Please include the Consultation Code in the header of this letter with any request for consultation or correspondence about your project that you submit to our office.

Attachment(s):

- Official Species List
  - Migratory Birds
-

## **Official Species List**

This list is provided pursuant to Section 7 of the Endangered Species Act, and fulfills the requirement for Federal agencies to "request of the Secretary of the Interior information whether any species which is listed or proposed to be listed may be present in the area of a proposed action".

This species list is provided by:

**Raleigh Ecological Services Field Office**

Post Office Box 33726

Raleigh, NC 27636-3726

(919) 856-4520

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## Project Summary

Project Code: 2022-0026578  
Event Code: None  
Project Name: Cow Branch  
Project Type: Restoration / Enhancement - Agricultural  
Project Description: Potential mitigation area  
Project Location:

Approximate location of the project can be viewed in Google Maps: <https://www.google.com/maps/@34.136815049999996,-78.64479242376305,14z>



Counties: Columbus County, North Carolina

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## Endangered Species Act Species

There is a total of 6 threatened, endangered, or candidate species on this species list.

Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species.

IPaC does not display listed species or critical habitats under the sole jurisdiction of NOAA Fisheries<sup>1</sup>, as USFWS does not have the authority to speak on behalf of NOAA and the Department of Commerce.

See the "Critical habitats" section below for those critical habitats that lie wholly or partially within your project area under this office's jurisdiction. Please contact the designated FWS office if you have questions.

1. [NOAA Fisheries](#), also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

### Mammals

NAME	STATUS
Northern Long-eared Bat <i>Myotis septentrionalis</i> No critical habitat has been designated for this species. Species profile: <a href="https://ecos.fws.gov/ecp/species/9045">https://ecos.fws.gov/ecp/species/9045</a>	Threatened

### Birds

NAME	STATUS
Red-cockaded Woodpecker <i>Picoides borealis</i> No critical habitat has been designated for this species. Species profile: <a href="https://ecos.fws.gov/ecp/species/7614">https://ecos.fws.gov/ecp/species/7614</a>	Endangered
Wood Stork <i>Mycteria americana</i> Population: AL, FL, GA, MS, NC, SC No critical habitat has been designated for this species. Species profile: <a href="https://ecos.fws.gov/ecp/species/8477">https://ecos.fws.gov/ecp/species/8477</a>	Threatened

### Reptiles

NAME	STATUS
American Alligator <i>Alligator mississippiensis</i> No critical habitat has been designated for this species. Species profile: <a href="https://ecos.fws.gov/ecp/species/776">https://ecos.fws.gov/ecp/species/776</a>	Similarity of Appearance (Threatened)

## Insects

NAME	STATUS
Monarch Butterfly <i>Danaus plexippus</i> No critical habitat has been designated for this species. Species profile: <a href="https://ecos.fws.gov/ecp/species/9743">https://ecos.fws.gov/ecp/species/9743</a>	Candidate

## Flowering Plants

NAME	STATUS
Cooley's Meadowrue <i>Thalictrum cooleyi</i> No critical habitat has been designated for this species. Species profile: <a href="https://ecos.fws.gov/ecp/species/3281">https://ecos.fws.gov/ecp/species/3281</a>	Endangered

## Critical habitats

THERE ARE NO CRITICAL HABITATS WITHIN YOUR PROJECT AREA UNDER THIS OFFICE'S JURISDICTION.

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## Migratory Birds

Certain birds are protected under the Migratory Bird Treaty Act<sup>1</sup> and the Bald and Golden Eagle Protection Act<sup>2</sup>.

Any person or organization who plans or conducts activities that may result in impacts to migratory birds, eagles, and their habitats should follow appropriate regulations and consider implementing appropriate conservation measures, as described [below](#).

- 
1. The [Migratory Birds Treaty Act](#) of 1918.
  2. The [Bald and Golden Eagle Protection Act](#) of 1940.
  3. 50 C.F.R. Sec. 10.12 and 16 U.S.C. Sec. 668(a)

The birds listed below are birds of particular concern either because they occur on the [USFWS Birds of Conservation Concern](#) (BCC) list or warrant special attention in your project location. To learn more about the levels of concern for birds on your list and how this list is generated, see the FAQ [below](#). This is not a list of every bird you may find in this location, nor a guarantee that every bird on this list will be found in your project area. To see exact locations of where birders and the general public have sighted birds in and around your project area, visit the [E-bird data mapping tool](#) (Tip: enter your location, desired date range and a species on your list). For projects that occur off the Atlantic Coast, additional maps and models detailing the relative occurrence and abundance of bird species on your list are available. Links to additional information about Atlantic Coast birds, and other important information about your migratory bird list, including how to properly interpret and use your migratory bird report, can be found [below](#).

For guidance on when to schedule activities or implement avoidance and minimization measures to reduce impacts to migratory birds on your list, click on the PROBABILITY OF PRESENCE SUMMARY at the top of your list to see when these birds are most likely to be present and breeding in your project area.

NAME	BREEDING SEASON
<p>American Kestrel <i>Falco sparverius paulus</i></p> <p>This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA</p> <p><a href="https://ecos.fws.gov/ecp/species/9587">https://ecos.fws.gov/ecp/species/9587</a></p>	Breeds Apr 1 to Aug 31
<p>Bald Eagle <i>Haliaeetus leucocephalus</i></p> <p>This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.</p> <p><a href="https://ecos.fws.gov/ecp/species/1626">https://ecos.fws.gov/ecp/species/1626</a></p>	Breeds Sep 1 to Jul 31

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NAME	BREEDING SEASON
<b>Red-headed Woodpecker <i>Melanerpes erythrocephalus</i></b> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds May 10 to Sep 10
<b>Rusty Blackbird <i>Euphagus carolinus</i></b> This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA	Breeds elsewhere

## Probability Of Presence Summary

The graphs below provide our best understanding of when birds of concern are most likely to be present in your project area. This information can be used to tailor and schedule your project activities to avoid or minimize impacts to birds. Please make sure you read and understand the FAQ "Proper Interpretation and Use of Your Migratory Bird Report" before using or attempting to interpret this report.

### Probability of Presence (■)

Each green bar represents the bird's relative probability of presence in the 10km grid cell(s) your project overlaps during a particular week of the year. (A year is represented as 12 4-week months.) A taller bar indicates a higher probability of species presence. The survey effort (see below) can be used to establish a level of confidence in the presence score. One can have higher confidence in the presence score if the corresponding survey effort is also high.

How is the probability of presence score calculated? The calculation is done in three steps:

1. The probability of presence for each week is calculated as the number of survey events in the week where the species was detected divided by the total number of survey events for that week. For example, if in week 12 there were 20 survey events and the Spotted Towhee was found in 5 of them, the probability of presence of the Spotted Towhee in week 12 is 0.25.
2. To properly present the pattern of presence across the year, the relative probability of presence is calculated. This is the probability of presence divided by the maximum probability of presence across all weeks. For example, imagine the probability of presence in week 20 for the Spotted Towhee is 0.05, and that the probability of presence at week 12 (0.25) is the maximum of any week of the year. The relative probability of presence on week 12 is  $0.25/0.25 = 1$ ; at week 20 it is  $0.05/0.25 = 0.2$ .
3. The relative probability of presence calculated in the previous step undergoes a statistical conversion so that all possible values fall between 0 and 10, inclusive. This is the probability of presence score.

### Breeding Season (■)

Yellow bars denote a very liberal estimate of the time-frame inside which the bird breeds across its entire range. If there are no yellow bars shown for a bird, it does not breed in your project area.

### Survey Effort (|)

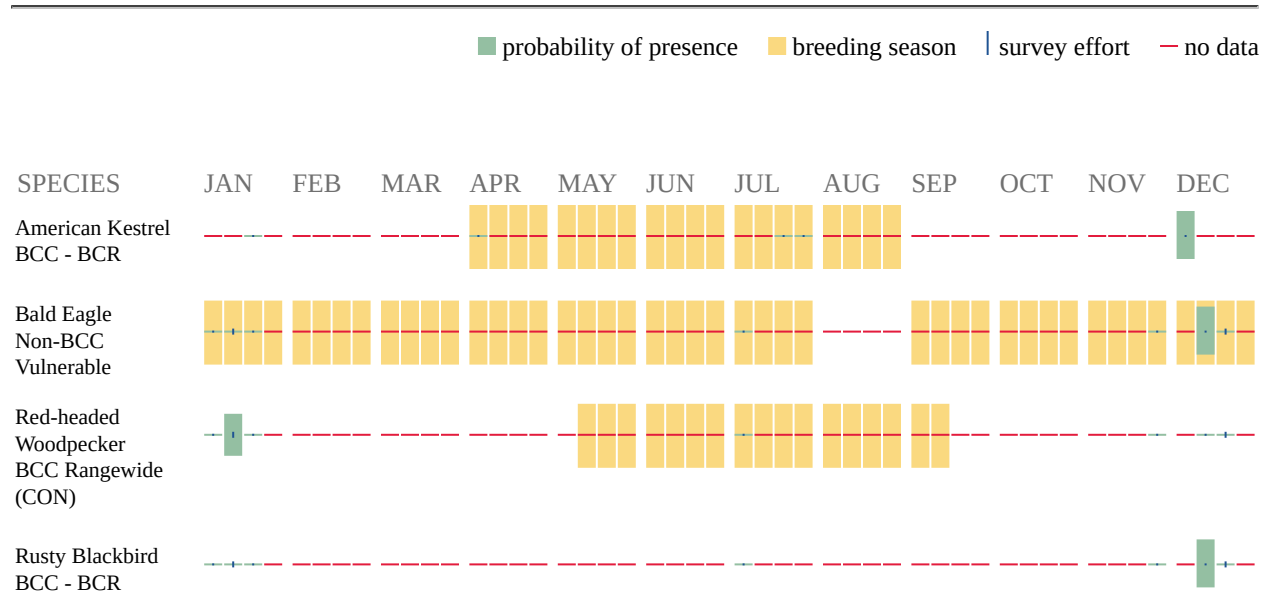
Vertical black lines superimposed on probability of presence bars indicate the number of surveys performed for that species in the 10km grid cell(s) your project area overlaps. The number of surveys is expressed as a range, for example, 33 to 64 surveys.

### No Data (-)

A week is marked as having no data if there were no survey events for that week.

### Survey Timeframe

Surveys from only the last 10 years are used in order to ensure delivery of currently relevant information. The exception to this is areas off the Atlantic coast, where bird returns are based on all years of available data, since data in these areas is currently much more sparse.



Additional information can be found using the following links:

- Birds of Conservation Concern <http://www.fws.gov/birds/management/managed-species/birds-of-conservation-concern.php>
- Measures for avoiding and minimizing impacts to birds <http://www.fws.gov/birds/management/project-assessment-tools-and-guidance/conservation-measures.php>
- Nationwide conservation measures for birds <http://www.fws.gov/migratorybirds/pdf/management/nationwidestandardconservationmeasures.pdf>

## Migratory Birds FAQ

**Tell me more about conservation measures I can implement to avoid or minimize impacts to migratory birds.**

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[Nationwide Conservation Measures](#) describes measures that can help avoid and minimize impacts to all birds at any location year round. Implementation of these measures is particularly important when birds are most likely to occur in the project area. When birds may be breeding in the area, identifying the locations of any active nests and avoiding their destruction is a very helpful impact minimization measure. To see when birds are most likely to occur and be breeding in your project area, view the Probability of Presence Summary. [Additional measures](#) or [permits](#) may be advisable depending on the type of activity you are conducting and the type of infrastructure or bird species present on your project site.

### **What does IPaC use to generate the migratory birds potentially occurring in my specified location?**

The Migratory Bird Resource List is comprised of USFWS [Birds of Conservation Concern \(BCC\)](#) and other species that may warrant special attention in your project location.

The migratory bird list generated for your project is derived from data provided by the [Avian Knowledge Network \(AKN\)](#). The AKN data is based on a growing collection of [survey, banding, and citizen science datasets](#) and is queried and filtered to return a list of those birds reported as occurring in the 10km grid cell(s) which your project intersects, and that have been identified as warranting special attention because they are a BCC species in that area, an eagle ([Eagle Act](#) requirements may apply), or a species that has a particular vulnerability to offshore activities or development.

Again, the Migratory Bird Resource list includes only a subset of birds that may occur in your project area. It is not representative of all birds that may occur in your project area. To get a list of all birds potentially present in your project area, please visit the [AKN Phenology Tool](#).

### **What does IPaC use to generate the probability of presence graphs for the migratory birds potentially occurring in my specified location?**

The probability of presence graphs associated with your migratory bird list are based on data provided by the [Avian Knowledge Network \(AKN\)](#). This data is derived from a growing collection of [survey, banding, and citizen science datasets](#).

Probability of presence data is continuously being updated as new and better information becomes available. To learn more about how the probability of presence graphs are produced and how to interpret them, go the Probability of Presence Summary and then click on the "Tell me about these graphs" link.

### **How do I know if a bird is breeding, wintering, migrating or present year-round in my project area?**

To see what part of a particular bird's range your project area falls within (i.e. breeding, wintering, migrating or year-round), you may refer to the following resources: [The Cornell Lab of Ornithology All About Birds Bird Guide](#), or (if you are unsuccessful in locating the bird of interest there), the [Cornell Lab of Ornithology Neotropical Birds guide](#). If a bird on your migratory bird species list has a breeding season associated with it, if that bird does occur in your project area, there may be nests present at some point within the timeframe specified. If "Breeds elsewhere" is indicated, then the bird likely does not breed in your project area.

### **What are the levels of concern for migratory birds?**

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Migratory birds delivered through IPaC fall into the following distinct categories of concern:

1. "BCC Rangewide" birds are [Birds of Conservation Concern](#) (BCC) that are of concern throughout their range anywhere within the USA (including Hawaii, the Pacific Islands, Puerto Rico, and the Virgin Islands);
2. "BCC - BCR" birds are BCCs that are of concern only in particular Bird Conservation Regions (BCRs) in the continental USA; and
3. "Non-BCC - Vulnerable" birds are not BCC species in your project area, but appear on your list either because of the [Eagle Act](#) requirements (for eagles) or (for non-eagles) potential susceptibilities in offshore areas from certain types of development or activities (e.g. offshore energy development or longline fishing).

Although it is important to try to avoid and minimize impacts to all birds, efforts should be made, in particular, to avoid and minimize impacts to the birds on this list, especially eagles and BCC species of rangewide concern. For more information on conservation measures you can implement to help avoid and minimize migratory bird impacts and requirements for eagles, please see the FAQs for these topics.

### **Details about birds that are potentially affected by offshore projects**

For additional details about the relative occurrence and abundance of both individual bird species and groups of bird species within your project area off the Atlantic Coast, please visit the [Northeast Ocean Data Portal](#). The Portal also offers data and information about other taxa besides birds that may be helpful to you in your project review. Alternately, you may download the bird model results files underlying the portal maps through the [NOAA NCCOS Integrative Statistical Modeling and Predictive Mapping of Marine Bird Distributions and Abundance on the Atlantic Outer Continental Shelf](#) project webpage.

Bird tracking data can also provide additional details about occurrence and habitat use throughout the year, including migration. Models relying on survey data may not include this information. For additional information on marine bird tracking data, see the [Diving Bird Study](#) and the [nanotag studies](#) or contact [Caleb Spiegel](#) or [Pam Loring](#).

### **What if I have eagles on my list?**

If your project has the potential to disturb or kill eagles, you may need to [obtain a permit](#) to avoid violating the Eagle Act should such impacts occur.

### **Proper Interpretation and Use of Your Migratory Bird Report**

The migratory bird list generated is not a list of all birds in your project area, only a subset of birds of priority concern. To learn more about how your list is generated, and see options for identifying what other birds may be in your project area, please see the FAQ "What does IPaC use to generate the migratory birds potentially occurring in my specified location". Please be aware this report provides the "probability of presence" of birds within the 10 km grid cell(s) that overlap your project; not your exact project footprint. On the graphs provided, please also look carefully at the survey effort (indicated by the black vertical bar) and for the existence of the "no data" indicator (a red horizontal bar). A high survey effort is the key component. If the survey effort is high, then the probability of presence score can be viewed as more dependable. In contrast, a low survey effort bar or no data bar means a lack of data and, therefore, a lack of

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certainty about presence of the species. This list is not perfect; it is simply a starting point for identifying what birds of concern have the potential to be in your project area, when they might be there, and if they might be breeding (which means nests might be present). The list helps you know what to look for to confirm presence, and helps guide you in knowing when to implement conservation measures to avoid or minimize potential impacts from your project activities, should presence be confirmed. To learn more about conservation measures, visit the FAQ "Tell me about conservation measures I can implement to avoid or minimize impacts to migratory birds" at the bottom of your migratory bird trust resources page.

---

## **IPaC User Contact Information**

Agency: Freese and Nichols, Inc.

Name: Jason Steele

Address: 531 North Liberty St

City: Winston-Salem

State: NC

Zip: 27101

Email: [jason.steele@freese.com](mailto:jason.steele@freese.com)

Phone: 5404492837

---



Roy Cooper, Governor

D. Reid Wilson, Secretary

Walter Clark

Director, Division of Land and Water Stewardship

NCNHDE-14420

April 8, 2021

Jason Steele  
Freese and Nichols, Inc.  
531 North Liberty St  
Winston-Salem, NC 27101  
RE: Cow Branch Mitigation Site

Dear Jason Steele:

The North Carolina Natural Heritage Program (NCNHP) appreciates the opportunity to provide information about natural heritage resources for the project referenced above.

Based on the project area mapped with your request, a query of the NCNHP database indicates that there are no records for rare species, important natural communities, natural areas, and/or conservation/managed areas within the proposed project boundary. Please note that although there may be no documentation of natural heritage elements within the project boundary, it does not imply or confirm their absence; the area may not have been surveyed. The results of this query should not be substituted for field surveys where suitable habitat exists. In the event that rare species are found within the project area, please contact the NCNHP so that we may update our records.

The attached 'Potential Occurrences' table summarizes rare species and natural communities that have been documented within a one-mile radius of the property boundary. The proximity of these records suggests that these natural heritage elements may potentially be present in the project area if suitable habitat exists. Tables of natural areas and conservation/managed areas within a one-mile radius of the project area, if any, are also included in this report.

If a Federally-listed species is found within the project area or is indicated within a one-mile radius of the project area, the NCNHP recommends contacting the US Fish and Wildlife Service (USFWS) for guidance. Contact information for USFWS offices in North Carolina is found here: <https://www.fws.gov/offices/Directory/ListOffices.cfm?statecode=37>.

Please note that natural heritage element data are maintained for the purposes of conservation planning, project review, and scientific research, and are not intended for use as the primary criteria for regulatory decisions. Information provided by the NCNHP database may not be published without prior written notification to the NCNHP, and the NCNHP must be credited as an information source in these publications. Maps of NCNHP data may not be redistributed without permission.

The NC Natural Heritage Program may follow this letter with additional correspondence if a Dedicated Nature Preserve, Registered Heritage Area, Land and Water Fund easement, or Federally-listed species are documented near the project area.

If you have questions regarding the information provided in this letter or need additional assistance, please contact Rodney A. Butler at [rodney.butler@ncdcr.gov](mailto:rodney.butler@ncdcr.gov) or 919-707-8603.

Sincerely,  
NC Natural Heritage Program

Natural Heritage Element Occurrences, Natural Areas, and Managed Areas Within a One-mile Radius of the Project Area  
 Cow Branch Mitigation Site  
 April 8, 2021  
 NCNHDE-14420

Element Occurrences Documented Within a One-mile Radius of the Project Area

Taxonomic Group	EO ID	Scientific Name	Common Name	Last Observation Date	Element Occurrence Rank	Accuracy	Federal Status	State Status	Global Rank	State Rank
Dragonfly or Damselfly	33739	Somatochlora georgiana	Coppery Emerald	2004-Pre	H?	5-Very Low	---	Significantly Rare	G3G4	S1?
Freshwater Fish	39231	Enneacanthus chaetodon	Blackbanded Sunfish	2018-02-09	E	3-Medium	---	Significantly Rare	G3G4	S3
Vascular Plant	14760	Amorpha confusa	Savanna Indigo-bush	1935-06-25	H	4-Low	---	Threatened	G3T3	S3
Vascular Plant	15397	Dionaea muscipula	Venus Flytrap	1981-Pre	X	4-Low	---	Special Concern Vulnerable	G2	S2
Vascular Plant	22600	Helianthus floridanus	Florida Sunflower	1934-10-18	H	4-Low	---	Threatened	G3G4	S1
Vascular Plant	3108	Thalictrum cooleyi	Cooley's Meadowrue	1928-06-30	H	4-Low	Endangered	Endangered	G1	S1

No Natural Areas are Documented Within a One-mile Radius of the Project Area



No Managed Areas are Documented Within a One-mile Radius of the Project Area

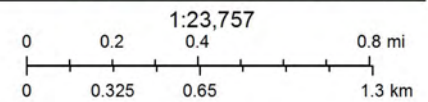
Definitions and an explanation of status designations and codes can be found at <https://ncnhde.natureserve.org/help>. Data query generated on April 8, 2021; source: NCNHP, Q4 January 2021. Please resubmit your information request if more than one year elapses before project initiation as new information is continually added to the NCNHP database.

# NCNHDE-14420: Cow Branch Mitigation Site



April 8, 2021

-  Project Boundary
-  Buffered Project Boundary



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

Species Conclusions Table

Project Name: Cow Branch Mitigation Site (Consultation Code 2022-0026578)

Date: March 31, 2022

Species / Resource Name	Conclusion	ESA Section 7 / Eagle Act Determination	Notes / Documentation
<p>Northern Long-eared bat <i>Myotis septentrionalis</i></p>	<p>Suitable habitat present</p>	<p>May affect, not likely to adversely affect</p>	<p>The project is not located in, or within 0.25 miles of, identified Red HUC areas as of the 3/20/2021 updated mapping.</p> <p>Relying upon the findings of the 1/5/2016 Programmatic Biological Opinion for Final 4(d) Rule on the Northern Long-Eared Bat and Activities Excepted from Take Prohibitions to fulfill our project-specific section 7 responsibilities.</p>
<p>Red-cockaded woodpecker <i>Picoides borealis</i></p>	<p>No suitable habitat present</p>	<p>No effect</p>	<p>The species typically occupies open, mature stands of southern pines, particularly longleaf pine (<i>Pinus palustris</i>) for foraging and nesting/roosting habitat. Nesting and roosting trees are typically aged 60 years or older, which are usually contiguous with pine stands of at least 30 years of age for foraging habitat.</p> <p>The site is comprised of open agricultural row crop fields. Loblolly pine trees are present in dispersed areas along active field edges, but not in a density that would support red-cockaded woodpecker. A search of the NC Natural Heritage database on April 8, 2021 did not indicate any observances of the species within 1 mile of the project area. The red-cockaded woodpecker effects determination key was to determine that the action area of the project is not located within suitable RCW nesting or foraging habitat.</p>



Species / Resource Name	Conclusion	ESA Section 7 / Eagle Act Determination	Notes / Documentation
<p>Wood Stork <i>Mycteria americana</i></p>	<p>No suitable habitat present</p>	<p>No effect</p>	<p>Wood storks are known to occur in several coastal North Carolina counties, and records indicate that they have been breeding in North Carolina since 2005. Wood storks typically construct their nests in medium to tall trees that occur in stands located either in swamps or on islands surrounded by relatively broad expanses of open water. In many areas, bald cypress and red mangrove trees are preferred. During the nonbreeding season or while foraging, wood storks occur in a wide variety of wetland habitats, including freshwater marshes and stock ponds, shallow, seasonally flooded roadside or agricultural ditches, narrow tidal creeks or shallow tidal pools, managed impoundments, and depressions in cypress heads and swamp sloughs. Because of their specialized feeding behavior, the most attractive feeding areas are swamp or marsh depressions where fish become concentrated during dry periods.</p> <p>A search of the NC Natural Heritage database on April 8, 2021 did not indicate any observances of the species within 1 mile of the project area. The project area does not support open water and is predominantly comprised of agricultural fields and areas of active cattle grazing. While suitable habitat is not currently present within the project area, proposed actions will create viable foraging habitat.</p>
<p>American Alligator <i>Alligator mississippiensis</i></p>	<p>Suitable habitat present, species not present</p>	<p>May affect, not likely to adversely affect</p>	<p>In North Carolina, alligators have been recorded in nearly every coastal county, and many inland counties to the fall line. The alligator is found rivers, streams, canals, lakes, swamps, and coastal marshes. The American alligator</p>

Species / Resource Name	Conclusion	ESA Section 7 / Eagle Act Determination	Notes / Documentation
			<p>remains on the protected species list due to its similarity in appearance to the Endangered American crocodile.</p> <p>A search of the NC Natural Heritage database on April 8, 2021 did not indicate any observances of the species within 1 mile of the project area. No individuals were observed during a March 24, 2021 habitat assessment. The project will not adversely impact habitat and will not remove upstream and downstream access to other suitable habitat areas.</p>
<p>Cooley's Meadowrue <i>Thalictrum cooleyi</i></p>	<p>No suitable habitat present</p>	<p>No effect</p>	<p>Cooley's meadowrue, documented in the Pine Savanna natural community, occurs in circumneutral soils in sunny, moist to wet grass-sedge bogs, wet-pine savannas over calcareous clays, and savannah-like areas, often at the ecotones of intermittent drainages or non-riverine swamp forests. This rhizomatous perennial herb is also found along plowed firebreaks, roadside ditches and rights-of-way, forest clearings dominated by grass or sedge, and power line or utility rights-of-way. The species requires some type of disturbance (e.g., mowing, clearing, periodic fire) to maintain its open habitat. The plant typically occurs on slightly acidic (pH 5.8-6.6) soils that are loamy fine sand, sandy loam, or fine sandy loam; at least seasonally moist or saturated; and mapped as Foreston, Grifton, Muckalee, Torhunta, or Woodington series.</p> <p>Based upon a habitat assessment conducted on March 24, 2021, the project area does not include habitat for Cooley's Meadowrue. Site soils have been drained by numerous agricultural ditches, removing the requisite</p>

Species / Resource Name	Conclusion	ESA Section 7 / Eagle Act Determination	Notes / Documentation
			hydrologic regime (moist to saturated) required by the species. The site has been cleared for agriculture, and management practices, including control of non-crop species by herbicide application, have removed any associate or indicator species for Cooley's meadowrue. A search of the NC Natural Heritage database included an observation of the species in 1928 within the one-mile search radius of the project, however, the USFWS Cooley's meadowrue Recovery Plan has indicated that many of these historic observances were extirpated by the early 1990s.
Critical habitat	No critical habitat present		
Bald Eagle ( <i>Haliaeetus leucocephalus</i> )	Unlikely to disturb nesting bald eagles	No Eagle Act Permit Required	

Acknowledgement: I agree that the above information about my proposed project is true. I used all of the provided resources to make an informed decision about impacts in the immediate and surrounding areas.



Jason Steele, PhD, PWS  
Senior Environmental Scientist

March 31, 2022

Signature /Title

Date



**Photograph 1.** Proposed riparian wetland restoration area. Areas of soil compaction from cattle are readily observable.



**Photograph 2.** Typical channel morphology for unnamed tributaries to Sandpit Branch at the Cow Branch mitigation site. Note lack of riparian vegetation beyond a single layer of trees adjacent to active agricultural fields on both sides of the channel.



### Appendix B – Red-cockaded Woodpecker Effects Determination Key

ORM2 No.: \_\_\_\_\_

Date March 31, 2022

USFWS Reference No. (if applicable): 2022-0026578

- 1) Is the action area<sup>1</sup> located within the RCW consultation area (see **Appendix A** and project-specific results from a project-specific IPaC or internal USACE GIS review)?
  - a) **Yes** .....go to 2
  - b) No .....No effect<sup>2</sup>
  
- 2) Is the action area<sup>1</sup> located in the northeastern coastal plain (see **Appendix A**)?
  - a) Yes .....go to 3
  - b) **No** the project is located in piedmont, sandhills, or southeastern coastal plain) .....go to 4
  
- 3) Is the action area<sup>1</sup> located in a forested area with pine trees present in northeast North Carolina (e.g., high pocosin, Atlantic white cedar, nonriverine swamp forests, pond pine woodland, coastal fringe evergreen forest, wet successional pine/pine-hardwood forest, or pine plantation or uplands)? If yes, are the pine trees greater than 30 years of age (if stand age is not readily determined, refer to **Table 1** for a description of the minimum dbh of 30-year-old pines associated with each community type). If the answer to both of these questions is yes, choose Yes below. If the answer to one or both questions is no, then choose No below.
  - a) Yes .....go to 8
  - b) No .....No effect<sup>2</sup>
  
- 4) Is the action area<sup>1</sup> located within suitable RCW foraging or nesting habitat (pine or pine/hardwood stands in which 50% or more of the dominant trees are pines and the dominant pine trees are 30 years of age or older or  $\geq 8$ -inches dbh<sup>5</sup>)?
  - a) Yes .....go to 5
  - b) **No** ..... **No effect<sup>2</sup>**
  
- 5) Will any activity in the action area<sup>1</sup> remove trees equal to or greater than 8 inches dbh; or will any activity occur within 200 feet of known RCW cavity trees? If unable to determine the location of a cavity tree with confidence, contact the USFWS Raleigh Ecological Services Field Office.
  - a) Yes (to one or both) .....go to 6
  - b) No .....NLAA<sup>3</sup>

- 6) Is the action area<sup>1</sup> located in suitable RCW nesting habitat (in the sandhills and piedmont: pine or pine/hardwood stands that contain pines 60 years in age or older or  $\geq 10$  inches dbh; in the southeastern coastal plain: pine or pine/hardwood stands that contain pines  $\geq 8$  inches dbh, including but not limited to pine flatwoods, pocosin, pine savannah, upland pine/hardwood)?
  - a) Yes.....go to 9
  - b) No.....go to 7
  
- 7) Does suitable nesting habitat occur within 0.5 miles of suitable foraging habitat that would be impacted by any activity in the action area<sup>1</sup>?
  - a) Yes.....go to 9
  - b) No.....NLAA<sup>3</sup>
  
- 8) Refer to **Table 1** in the SLOPES for the northeastern North Carolina habitat type in the action area<sup>1</sup>. Are pine trees with a dbh equal to or greater than that shown in **Table 1** proposed to be removed in the action area<sup>1</sup>, or is the action area<sup>1</sup> within 200 feet of a cavity tree? If the answer to either of these questions is yes, choose Yes below. If unable to determine the location of a cavity tree with confidence, then contact the USFWS Raleigh Field Office.
  - a) Yes.....go to 9
  - b) No.....NLAA<sup>3</sup>
  
- 9) Contact the appropriate USACE representative for a pre-application meeting to determine if a survey is necessary (for a list of USACE representatives please see the contact list at <http://saw-reg.usace.army.mil/FO/PMList.pdf>). Note that project-specific information, such as a delineation of waters of the U.S., project plans, and details concerning certain activities or disturbances that would occur in the action area<sup>1</sup> (e.g. percussive activities, forest management, or similar disturbances), may be needed for the USACE to determine the action area(s)<sup>1</sup> of the project. If a survey is required and agreed to by the applicant, all suitable RCW nesting habitat within 0.5 miles of the action area<sup>1</sup> should be surveyed according to USFWS protocol for the presence of RCW cavity trees<sup>4</sup>. If the applicant is unwilling or unable to conduct the survey, standard consultation with the USFWS should begin. Such surveys are conducted by running line transects through stands and visually inspecting all medium-sized and large pines for evidence of cavity excavation by RCWs. Transects must be spaced so that all trees are inspected and are run north-south.  
Was a survey performed?
  - a) Yes, a survey was performed, and RCW cavity trees were observed.....go to 10
  - b) Yes, the survey was submitted to the USFWS for concurrence, and the USFWS concurred with the results (no RCW cavity trees were observed) .....NLAA<sup>3</sup>
  - c) No, the USACE determined that a survey was not required and the USFWS concurred.....NLAA<sup>3</sup>
  - d) No, a survey was not performed.....Consultation required<sup>5</sup>
  
- 10) Does the project involve activities or disturbances in the action area<sup>1</sup> (e.g., percussive activities, forest management, or similar disturbances) within the 200-foot cavity tree buffer, and/or cause removal or damage to RCW cavity trees (e.g., via root compaction, soil compaction)? If yes to either or both then consultation is required.
  - a) Yes.....Consultation required<sup>5</sup>
  - b) No.....go to 11

- 11) Has a foraging habitat analysis (FHA)<sup>6</sup> been conducted to determine whether enough foraging habitat would remain for each RCW group post-project? For information on how to conduct an FHA<sup>6</sup>, refer to the “Procedures for Determining Foraging Habitat Availability” and the Private Land Guidelines.<sup>7</sup>
- a) Yes, the FHA<sup>6</sup> has been submitted to the USFWS for concurrence<sup>8</sup> and the USFWS concurred that **adequate** amounts of foraging habitat would remain post-project.....NLAA<sup>3</sup>
  - b) Yes, and review of the FHA<sup>6</sup> by the USACE along with concurrence from USFWS determined **inadequate** amounts of foraging habitat would remain post-project.....Consultation required<sup>5</sup>
  - c) No, an FHA<sup>6</sup> has not been conducted.....Consultation required<sup>5</sup>

<sup>1</sup>Action Area means all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action. Please contact the appropriate USACE representative for any questions as to the action area for the Federal action. For a list of USACE representatives, please see the contact list at: <http://saw-reg.usace.army.mil/FO/PMList.pdf>.

<sup>2</sup>No effect – The proposed project would result in no effect to this species and/or its federally designated critical habitat (if applicable). Further consultation with the USFWS Raleigh and Asheville Ecological Services field offices is not necessary for the project as described.

<sup>3</sup>NLAA – The proposed project may affect but is not likely to adversely affect this species and/or its designated critical habitat (if applicable). NLAA determinations for projects made pursuant to this key require no further consultation with the USFWS Raleigh and Asheville Ecological Services field offices, therefore, consultation is considered complete for this species. For General Permits, submittal of a Pre-Construction Notification to the USACE will be required for all NLAA determinations.

<sup>4</sup>Follow link to USFWS RCW Recovery Plan, Appendix 4 for additional information on nesting and foraging habitats, and survey protocol ([https://www.fws.gov/rcwrecovery/files/RecoveryPlan/survey\\_protocol.pdf](https://www.fws.gov/rcwrecovery/files/RecoveryPlan/survey_protocol.pdf))

<sup>5</sup>Consultation required – Contact the USACE to begin this consultation process. For a list of USACE representatives please see the contact list at <http://saw-reg.usace.army.mil/FO/PMList.pdf>. Further consultation with the USFWS Raleigh and Asheville Ecological Services field offices is necessary to discern if the activity would result in a “no effect,” “not likely to adversely affect,” or “likely to adversely affect” determination.

<sup>6</sup>Follow links for additional information on conducting FHA (<https://www.fws.gov/rcwrecovery/matrix.html>) and for determining foraging habitat availability ([https://www.fws.gov/ncsandhills/files/fha\\_data\\_collection\\_procedures.pdf](https://www.fws.gov/ncsandhills/files/fha_data_collection_procedures.pdf)).

<sup>7</sup>Follow link for additional information regarding determination for adequate amount of foraging habitat ([https://www.fws.gov/rcwrecovery/files/RecoveryPlan/private\\_lands\\_guidelines.pdf](https://www.fws.gov/rcwrecovery/files/RecoveryPlan/private_lands_guidelines.pdf)).

<sup>8</sup> FHA – When an FHA is conducted, the USACE must provide the FHA to USFWS for review and concurrence.

#### Additional Information \_\_\_\_\_

Species conclusion table detailing the findings outlined on this key is attached. The site is cleared and intensively farmed for row crop agriculture (e.g., soybeans, corn), with a single layer of trees lining the large, ditched tributary and adjacent drainage ditches at the site. These tree lined areas adjacent to the ditches are a mix of pine and hardwood species, with a dense midstory layer that is primarily mixed hardwood species. No contiguous pine stands, or stands that are co-dominant (50%) pine, that meet the minimum dbh detailed in Table 1 are present within the project area. The action area is limited to the project area, as none of the proposed activities will impact adjacent wooded areas beyond temporary construction noise and traffic that will only occur in areas that have been managed for row crop agriculture and drainage ditches.

**From:** [Matthews, Kathryn H](#)  
**To:** [Haywood, Casey M CIV \(USA\)](#)  
**Cc:** [Mann, Leigh](#)  
**Subject:** [Non-DoD Source] US Army Corps of Engineers Public Notice NCDMS ILF - Cow Branch SAW-2021-00822  
**Date:** Tuesday, May 4, 2021 5:51:43 PM

---

Hi Casey,

I have reviewed the public notice for the NCDMS Cow Branch Project in Columbus County. Although there are historic records of Cooley's meadowrue and current records of Venus flytrap near the site, the site does not appear to currently have suitable habitat for either species. It is possible that restoration activities on the site will benefit listed species by increasing the acreage of suitable habitat.

The Service does not believe that the project will adversely affect any federally listed or proposed species. We do not have any significant comments or objections at this time, but look forward to reviewing the mitigation plans.

thanks,  
Kathy

*Please note that I am teleworking almost exclusively. Email is the best way to reach me.  
Thanks,*

Kathy Matthews  
Fish and Wildlife Biologist  
U.S. Fish and Wildlife Service  
551-F Pylon Drive  
Raleigh, NC 27606  
919-856-4520, x. 27

**From:** CESA-W-PublicNoticeList <CESAW-PublicNoticeList@usace.army.mil>  
**Sent:** Thursday, April 29, 2021 12:02 PM  
**Cc:** Haywood, Casey M CIV (USA) <Casey.M.Haywood@usace.army.mil>  
**Subject:** [EXTERNAL] US Army Corps of Engineers Public Notice

**This email has been received from outside of DOI - Use caution before clicking on links, opening attachments, or responding.**

As you requested, you are hereby notified that the Wilmington District, United States Corps of



Engineers, has issued a Public Notice. The text of this document can be found on the Public Notices portion of the Regulatory Division Home Page. The Public Notice and the full Prospectus are available on the RIBITS web site at <https://ribits.ops.usace.army.mil/ords/f?p=107:2>:. To access the public notices, first select the Wilmington District from the Filter View drop-down menu in the lower left-hand corner, and then select the Bank & ILF Establishment tab.

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The current notice involves:

Name: SAW-2021-00822 (NCDMS ILF - Cow Branch)

Action ID: SAW-2021-00822

Issue Date: April 29, 2021

Expiration Date: May 29, 2021

Point of Contact: [Casey.M.Haywood@usace.army.mil](mailto:Casey.M.Haywood@usace.army.mil)

Project Description:

The Cow Branch Mitigation Site proposes the restoration of approximately 2,326 linear feet of stream. Stream restoration activities will include restoring appropriate dimension, pattern, and profile with Priority 1 restoration. Stabilization structures will be installed, which will also provide habitat. Native riparian buffers will be established, and all reaches will have fencing for livestock exclusion. The Project will also include riparian wetland restoration of 18-acres and non-riparian wetland restoration (re-establishment and rehabilitation) of approximately 4-acres. These areas will be restored by implementing a Priority Level I restoration, removal of livestock trampling, plugging and filling ditches, and planting native vegetation.

**Subscribe/Unsubscribe:** This email was sent out as a result of subscribing to the Wilmington District regulatory program public notices. Please reply to this email with the subject or message "unsubscribe" to remove your address from future mailings.

**FARMLAND PROTECTION POLICY ACT (FPPA)**

**NRCS CORRESPONDENCE**



Natural Resources  
Conservation Service

July 15, 2021

North Carolina  
State Office

Jason Steele  
Environmental Scientist  
Freese and Nichols Inc.  
531 N. Liberty Street  
Winston-Salem, NC 27101

4407 Bland Rd.  
Suite 117  
Raleigh  
North Carolina 27609  
Voice (704) 680-3541  
Fax (844) 325-2156

Dear Jason Steele;

The following information is in response to your request soliciting comments regarding the Cow Branch Mitigation Site in Columbus County, NC.

Projects are subject to Farmland Protection Policy Act (FPPA) requirements if they may irreversibly convert farmland (directly or indirectly) to nonagricultural use and are completed by a Federal agency or with assistance from a Federal agency.

For the purpose of FPPA, farmland includes prime farmland, unique farmland, and land of statewide or local importance. Farmland subject to FPPA requirements does not have to be currently used for cropland. It can be forest land, pastureland, cropland, or other land, but not water or urban built-up land. Farmland means prime or unique farmlands as defined in section 1540(c)(1) of the Act or farmland that is determined by the appropriate state or unit of local government agency or agencies with concurrence of the Secretary to be farmland of statewide or local importance.

"Farmland" does not include land already in or committed to urban development or water storage. Farmland "already in" urban development or water storage includes all such land with a density of 30 structures per 40-acre area. Farmland already in urban development also includes lands identified as "urbanized area" (UA) on the Census Bureau Map, or as urban area mapped with a "tint overprint" on the USGS topographical maps, or as "urban-built-up" on the USDA Important Farmland Maps. See over for more information.

The area in question includes land already in or committed to urban development or is not considered Prime Farmland since it is not drained. There are no needs to initiate an AD-1006 form according to the Code of Federal Regulation 7CFR 658, Farmland Protection Policy Act. The area in question is exempt of the FPPA regulations.

If you have any questions, please feel free to call me at (704) 680-3541 or (704) 754-6734.

Sincerely,

Kristin L May  
Resource Soil Scientist

cc:

Joshua Davis, supervisory soil conservationist, NRCS, Lumberton, NC

**FARMLAND CONVERSION IMPACT RATING**

<b>PART I</b> <i>(To be completed by Federal Agency)</i>		Date Of Land Evaluation Request			
Name of Project		Federal Agency Involved			
Proposed Land Use		County and State			
<b>PART II</b> <i>(To be completed by NRCS)</i>		Date Request Received By NRCS		Person Completing Form:	
Does the site contain Prime, Unique, Statewide or Local Important Farmland? <i>(If no, the FPPA does not apply - do not complete additional parts of this form)</i>		YES <input type="checkbox"/>	NO <input type="checkbox"/>	Acres Irrigated	Average Farm Size
Major Crop(s)	Farmable Land In Govt. Jurisdiction Acres:            %	Amount of Farmland As Defined in FPPA Acres:            %			
Name of Land Evaluation System Used	Name of State or Local Site Assessment System	Date Land Evaluation Returned by NRCS			
<b>PART III</b> <i>(To be completed by Federal Agency)</i>		Alternative Site Rating			
		Site A	Site B	Site C	Site D
A. Total Acres To Be Converted Directly					
B. Total Acres To Be Converted Indirectly					
C. Total Acres In Site					
<b>PART IV</b> <i>(To be completed by NRCS)</i> Land Evaluation Information					
A. Total Acres Prime And Unique Farmland					
B. Total Acres Statewide Important or Local Important Farmland					
C. Percentage Of Farmland in County Or Local Govt. Unit To Be Converted					
D. Percentage Of Farmland in Govt. Jurisdiction With Same Or Higher Relative Value					
<b>PART V</b> <i>(To be completed by NRCS)</i> Land Evaluation Criterion Relative Value of Farmland To Be Converted (Scale of 0 to 100 Points)					
<b>PART VI</b> <i>(To be completed by Federal Agency)</i> Site Assessment Criteria <i>(Criteria are explained in 7 CFR 658.5 b. For Corridor project use form NRCS-CPA-106)</i>		<b>Maximum Points</b>	Site A	Site B	Site C
1. Area In Non-urban Use		(15)			
2. Perimeter In Non-urban Use		(10)			
3. Percent Of Site Being Farmed		(20)			
4. Protection Provided By State and Local Government		(20)			
5. Distance From Urban Built-up Area		(15)			
6. Distance To Urban Support Services		(15)			
7. Size Of Present Farm Unit Compared To Average		(10)			
8. Creation Of Non-farmable Farmland		(10)			
9. Availability Of Farm Support Services		(5)			
10. On-Farm Investments		(20)			
11. Effects Of Conversion On Farm Support Services		(10)			
12. Compatibility With Existing Agricultural Use		(10)			
TOTAL SITE ASSESSMENT POINTS		160			
<b>PART VII</b> <i>(To be completed by Federal Agency)</i>					
Relative Value Of Farmland <i>(From Part V)</i>		100			
Total Site Assessment <i>(From Part VI above or local site assessment)</i>		160			
<b>TOTAL POINTS</b> <i>(Total of above 2 lines)</i>		260			
Site Selected:	Date Of Selection	Was A Local Site Assessment Used? YES <input type="checkbox"/> NO <input type="checkbox"/>			
Reason For Selection:					
Name of Federal agency representative completing this form:					Date:

*(See Instructions on reverse side)*

## STEPS IN THE PROCESSING THE FARMLAND AND CONVERSION IMPACT RATING FORM

- Step 1 - Federal agencies (or Federally funded projects) involved in proposed projects that may convert farmland, as defined in the Farmland Protection Policy Act (FPPA) to nonagricultural uses, will initially complete Parts I and III of the form. For Corridor type projects, the Federal agency shall use form NRCS-CPA-106 in place of form AD-1006. The Land Evaluation and Site Assessment (LESA) process may also be accessed by visiting the FPPA website, <http://fppa.nrcs.usda.gov/lesa/>.
- Step 2 - Originator (Federal Agency) will send one original copy of the form together with appropriate scaled maps indicating location(s) of project site(s), to the Natural Resources Conservation Service (NRCS) local Field Office or USDA Service Center and retain a copy for their files. (NRCS has offices in most counties in the U.S. The USDA Office Information Locator may be found at [http://offices.usda.gov/scripts/ndISAPI.dll/oip\\_public/USA\\_map](http://offices.usda.gov/scripts/ndISAPI.dll/oip_public/USA_map), or the offices can usually be found in the Phone Book under U.S. Government, Department of Agriculture. A list of field offices is available from the NRCS State Conservationist and State Office in each State.)
- Step 3 - NRCS will, within 10 working days after receipt of the completed form, make a determination as to whether the site(s) of the proposed project contains prime, unique, statewide or local important farmland. (When a site visit or land evaluation system design is needed, NRCS will respond within 30 working days.
- Step 4 - For sites where farmland covered by the FPPA will be converted by the proposed project, NRCS will complete Parts II, IV and V of the form.
- Step 5 - NRCS will return the original copy of the form to the Federal agency involved in the project, and retain a file copy for NRCS records.
- Step 6 - The Federal agency involved in the proposed project will complete Parts VI and VII of the form and return the form with the final selected site to the servicing NRCS office.
- Step 7 - The Federal agency providing financial or technical assistance to the proposed project will make a determination as to whether the proposed conversion is consistent with the FPPA.

## INSTRUCTIONS FOR COMPLETING THE FARMLAND CONVERSION IMPACT RATING FORM

*(For Federal Agency)*

**Part I:** When completing the "County and State" questions, list all the local governments that are responsible for local land use controls where site(s) are to be evaluated.

**Part III:** When completing item B (Total Acres To Be Converted Indirectly), include the following:

1. Acres not being directly converted but that would no longer be capable of being farmed after the conversion, because the conversion would restrict access to them or other major change in the ability to use the land for agriculture.
2. Acres planned to receive services from an infrastructure project as indicated in the project justification (e.g. highways, utilities planned build out capacity) that will cause a direct conversion.

**Part VI:** Do not complete Part VI using the standard format if a State or Local site assessment is used. With local and NRCS assistance, use the local Land Evaluation and Site Assessment (LESA).

1. Assign the maximum points for each site assessment criterion as shown in § 658.5(b) of CFR. In cases of corridor-type project such as transportation, power line and flood control, criteria #5 and #6 will not apply and will, be weighted zero, however, criterion #8 will be weighed a maximum of 25 points and criterion #11 a maximum of 25 points.
2. Federal agencies may assign relative weights among the 12 site assessment criteria other than those shown on the FPPA rule after submitting individual agency FPPA policy for review and comment to NRCS. In all cases where other weights are assigned, relative adjustments must be made to maintain the maximum total points at 160. For project sites where the total points equal or exceed 160, consider alternative actions, as appropriate, that could reduce adverse impacts (e.g. Alternative Sites, Modifications or Mitigation).

**Part VII:** In computing the "Total Site Assessment Points" where a State or local site assessment is used and the total maximum number of points is other than 160, convert the site assessment points to a base of 160.

Example: if the Site Assessment maximum is 200 points, and the alternative Site "A" is rated 180 points:

$$\frac{\text{Total points assigned Site A}}{\text{Maximum points possible}} = \frac{180}{200} \times 160 = 144 \text{ points for Site A}$$

For assistance in completing this form or FPPA process, contact the local NRCS Field Office or USDA Service Center.

NRCS employees, consult the FPPA Manual and/or policy for additional instructions to complete the AD-1006 form.

June 18, 2021

Kristin May  
Acting State Soil Scientist  
Natural Resources Conservation Service  
4407 Bland Rd, Suite 117  
Raleigh, NC 27609  
Via email: [kristin.may@usda.gov](mailto:kristin.may@usda.gov)

Subject: Cow Branch Mitigation Site  
Columbus County, North Carolina

Dear Ms. May,

Freese and Nichols, Inc. requests review and a completed AD-1006 form for a NC Department of Mitigation Services stream and wetland mitigation project (Cow Branch Mitigation Site) located in Columbus County, NC. A zipped shapefile of the project boundary is attached for your review.

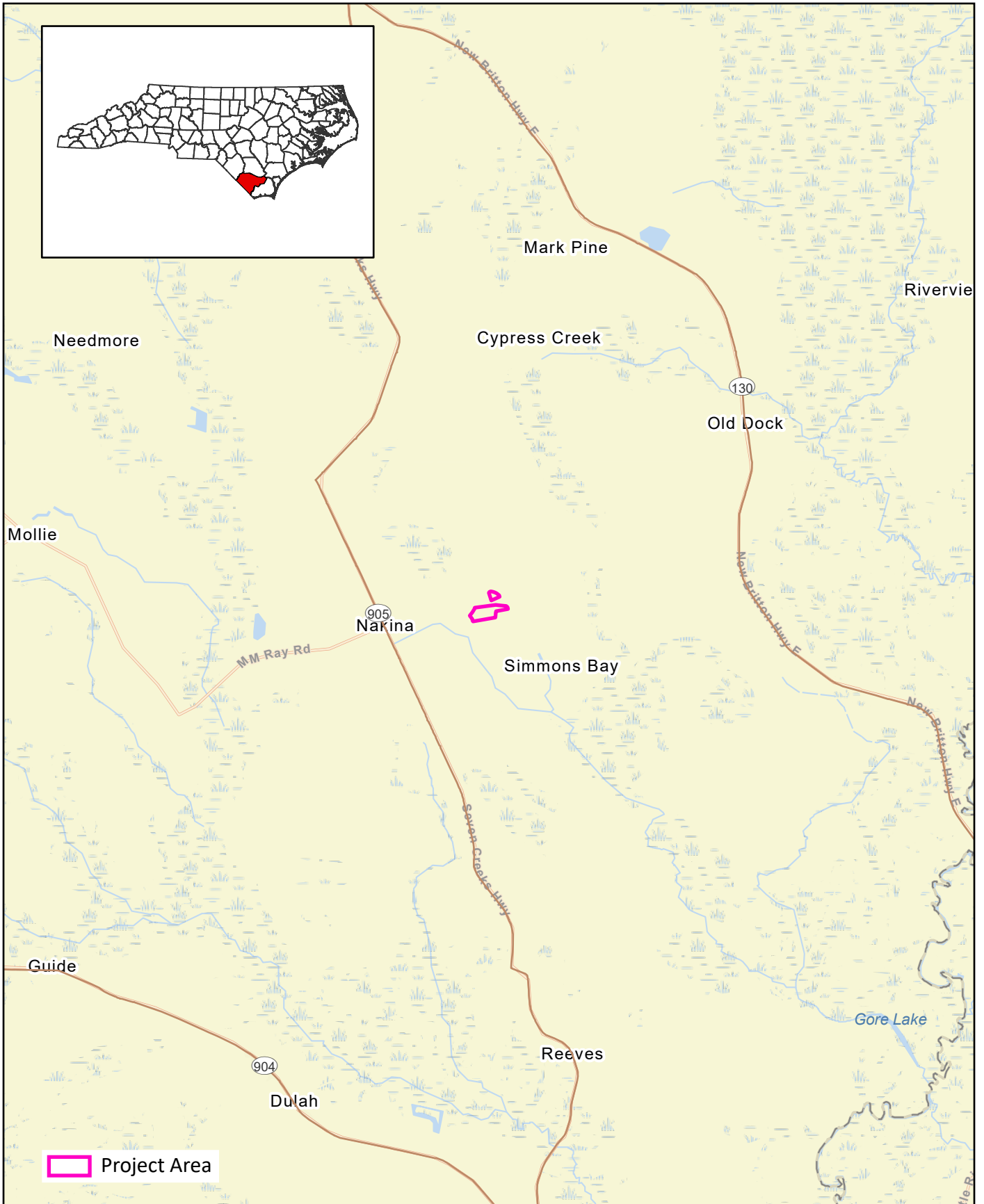
The Cow Branch Mitigation Site is being developed to provide in-kind mitigation for unavoidable stream channel and wetland impacts in the Lumber River Basin. This project will include stream restoration to an unnamed tributary of Sandpit Branch and rehabilitation of degraded riparian and non-riparian wetlands located on the property. The site has been disturbed due to agricultural row crop use and cattle grazing. Historically the site has been in agricultural production (crops and timber) for the last 70 years.

We thank you in advance for your timely response and cooperation. Please feel free to contact us with any questions that you may have concerning the project.

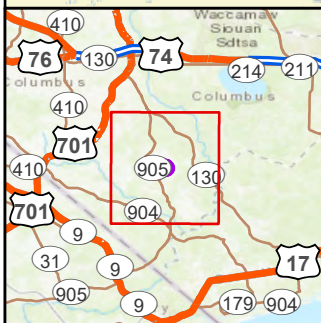
Sincerely,  
*Freese and Nichols, Inc.*



Jason Steele, PhD, PWS  
Environmental Scientist



 Project Area

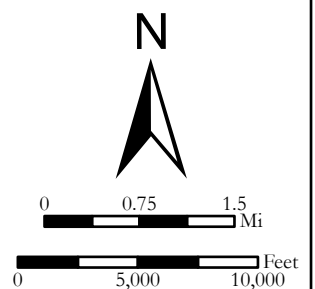


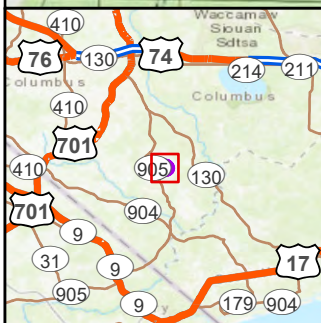
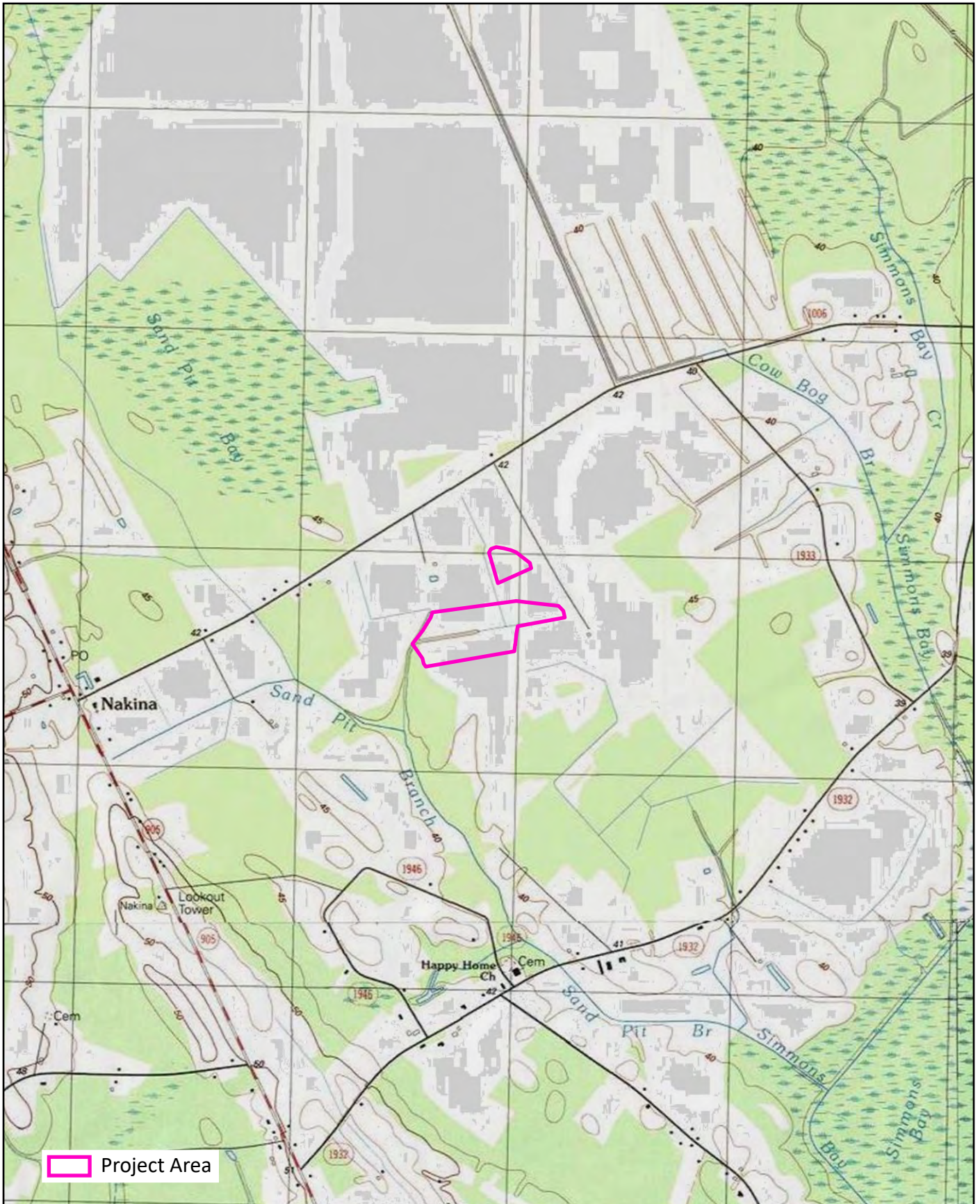
**Figure 1 Project Location**  
 Cow Branch Mitigation Site  
 Columbus County, NC



531 N. Liberty St  
 Winston-Salem, NC 27101

Coordinate System: NAD 1983 StatePlane North Carolina FIPS 3200 Feet  
 Date Exported: 5/3/2021 2:21 PM

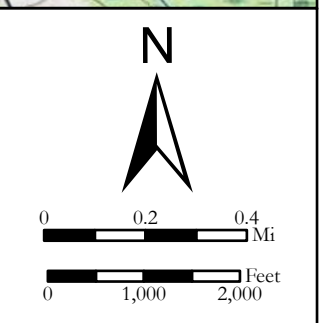




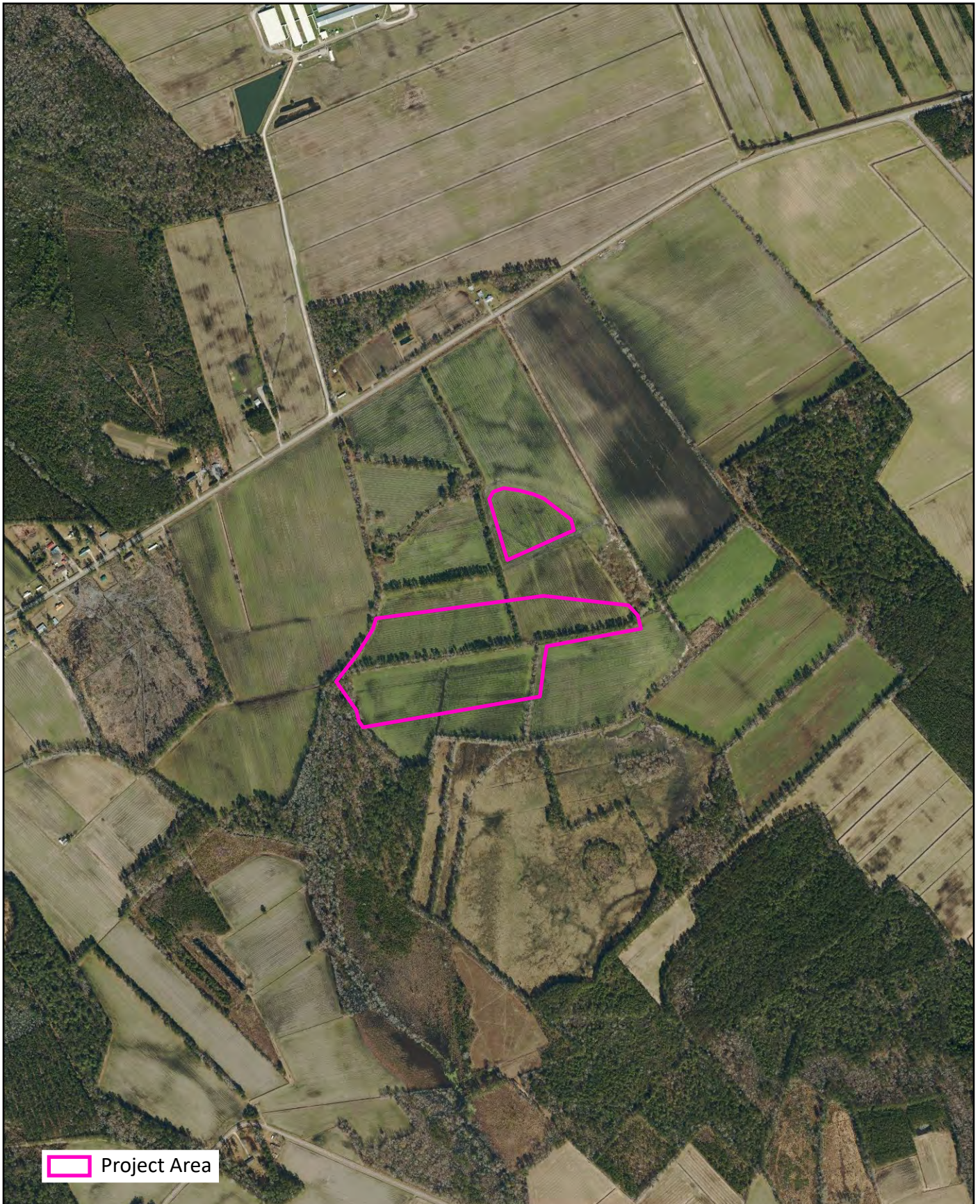
**Figure 2 Project Location and Topography**  
 Cow Branch Mitigation Site  
 Columbus County, NC


**FREESE AND NICHOLS** 531 N. Liberty St  
 Winston-Salem, NC 27101

Coordinate System: NAD 1983 StatePlane North Carolina FIPS 3200 Feet  
 Date Exported: 5/3/2021 2:23 PM

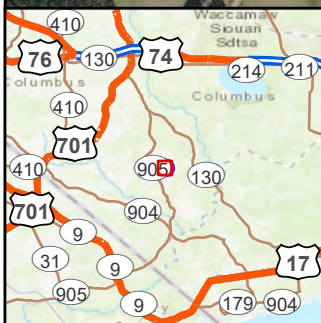






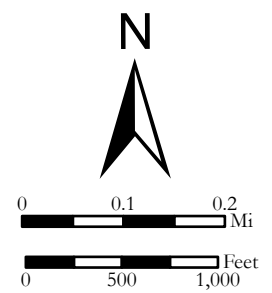
 Project Area

**Figure 3 Project Location with Aerial**  
Cow Branch Mitigation Site  
Columbus County, NC



531 N. Liberty St  
Winston-Salem, NC 27101

Coordinate System: NAD 1983 StatePlane North Carolina FIPS 3200 Feet  
Date Exported: 5/3/2021 2:35 PM



**FISH AND WILDLIFE COORDINATION ACT (FWCA)**

**CORRESPONDENCE**



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☒ NORTH CAROLINA WILDLIFE RESOURCES COMMISSION ☒

---

Cameron Ingram, Executive Director

June 8, 2021

Mr. Jason Steele  
Freese and Nichols, Inc.  
531 N. Liberty Street  
Winston-Salem, NC 27101

**Subject:** Request for Environmental Information for the Cow Branch Mitigation Site, Columbus County, North Carolina.

Mr. Steele,

Biologists with the North Carolina Wildlife Resources Commission (NCWRC) have reviewed the proposed project description. Comments are provided in accordance with certain provisions of the Clean Water Act of 1977 (as amended), Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S.C. 661-667e) and North Carolina General Statutes (G.S. 113-131 et seq.).

Freese and Nichols, Inc. has identified and developed the Cow Branch Stream and Wetland Mitigation Site. The site has been heavily degraded through historic dredging and is currently used for row crop agriculture and cattle grazing. Proposed restoration will remove stressors and provide ecological uplift of the site, decrease habitat fragmentation, and increase water quality of downstream receiving waters. This site is located south of Et Richardson Road, east of its intersection with Highway 905, east of Tabor City.

The project area drains to Sand Pit Branch in the Lumber River basin. Stream restoration projects often improve water quality and aquatic habitat. Establishing native, forested buffers in riparian areas will improve both aquatic and terrestrial habitats and provide a travel corridor for wildlife species.

In addition to stringent best management practices for erosion and sediment control during construction, the NCWRC recommends the use of biodegradable and wildlife-friendly sediment and erosion control devices. Silt fencing, fiber rolls and/or other products should have loose-weave netting that is made of natural fiber materials with movable joints between the vertical and horizontal twines. Silt fencing and similar products that have been reinforced with plastic or metal mesh should be avoided as they impede the movement of terrestrial wildlife species. Excessive silt and sediment loads can have detrimental effects on aquatic resources including destruction of spawning habitat, suffocation of eggs and clogging of gills. Only native vegetation should be installed onsite and any invasive plant species found in or near the project area should be removed and destroyed.

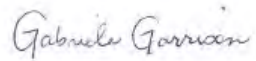
Page 2

June 8, 2021

Scoping – Cow Branch Mitigation Site

Thank you for the opportunity to review and comment on this project. If I can be of further assistance, please contact me at (910) 409-7350 or [gabriela.garrison@ncwildlife.org](mailto:gabriela.garrison@ncwildlife.org).

Sincerely,

A handwritten signature in cursive script that reads "Gabriela Garrison".

Gabriela Garrison  
Eastern Piedmont Habitat Conservation Coordinator  
Habitat Conservation Program

May 19, 2021

Gabriela Garrison  
Eastern Piedmont Coordinator  
North Carolina Wildlife Resource Commission  
Sandhills Depot  
PO Box 149  
Hoffman, NC 28347  
Via email: [gabriela.garrison@ncwildlife.org](mailto:gabriela.garrison@ncwildlife.org)

Subject: Cow Branch Mitigation Site  
Columbus County, North Carolina

Dear Ms. Garrison,

Freese and Nichols, Inc. requests review and comment on any possible issues that may emerge with respect to fish and wildlife issues associated with the Cow Branch Mitigation Site. A Site Map, Topographic Map and Aerial Photograph showing the approximate project area are enclosed.

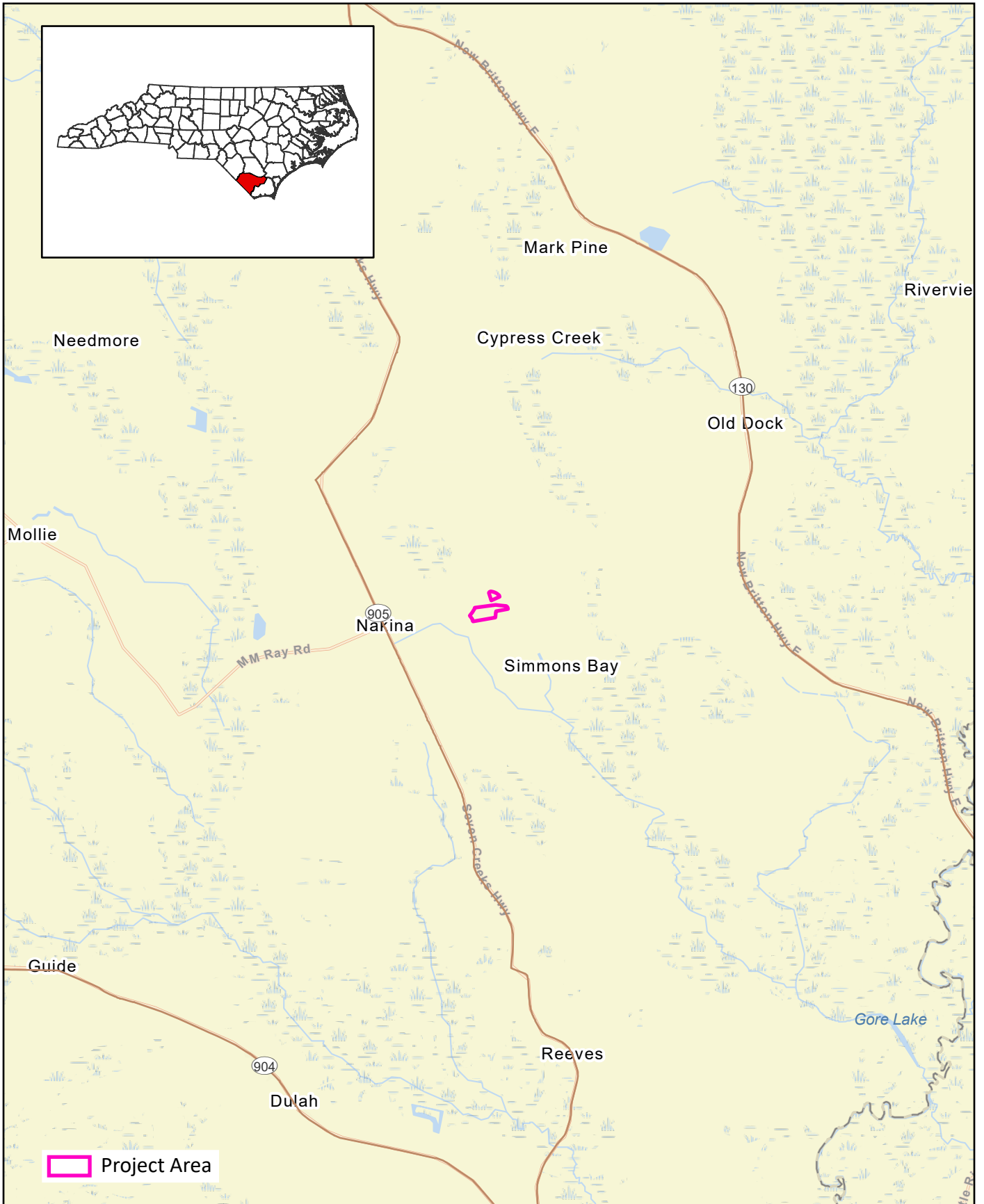
The Cow Branch Stream and Wetland Mitigation Site consists of a former riverine swamp forest located in the geomorphic floodplain of a ditched tributary of Sandpit Branch that supports drained and manipulated hydric soils and a ditched coastal plain stream. The project property has been heavily degraded through historic (pre-1972) ditching and has been managed for row crop agriculture and cattle grazing for decades. The impacts from these practices have limited ecological function of the site and increased input of nutrients, fecal coliform and sediment into receiving waterways, including an adjacent unnamed tributary to Sandpit Branch. Waters from the site eventually flow into the Waccamaw River. Proposed restoration of the site will remove stressors and provide ecological uplift of the site, decrease habitat fragmentation, and increase water quality of downstream receiving waters.

We thank you in advance for your timely response and cooperation. Please feel free to contact us with any questions that you may have concerning the project.

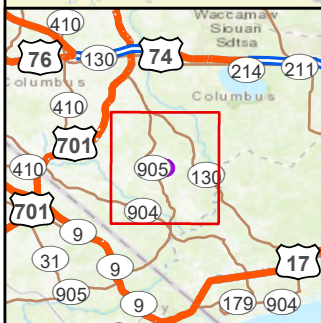
Sincerely,  
*Freese and Nichols, Inc.*



Jason Steele, PhD, PWS  
Environmental Scientist



 Project Area



**Figure 1 Project Location**  
 Cow Branch Mitigation Site  
 Columbus County, NC



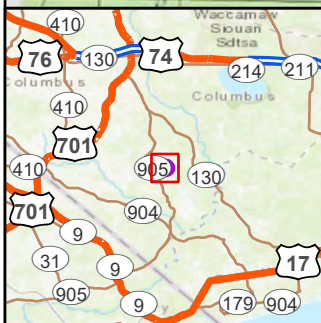
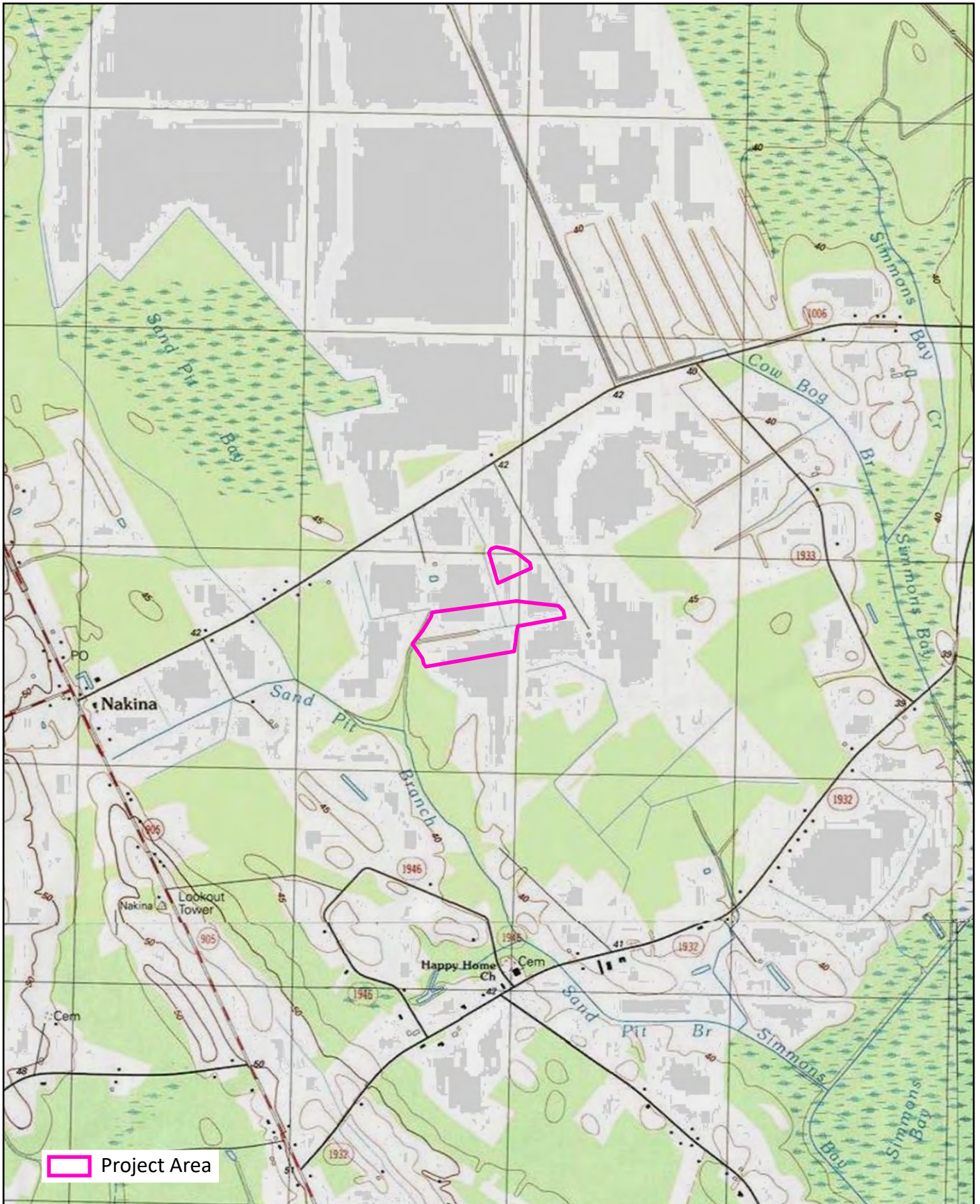
531 N. Liberty St  
 Winston-Salem, NC 27101

Coordinate System: NAD 1983 StatePlane North Carolina FIPS 3200 Feet  
 Date Exported: 5/3/2021 2:21 PM



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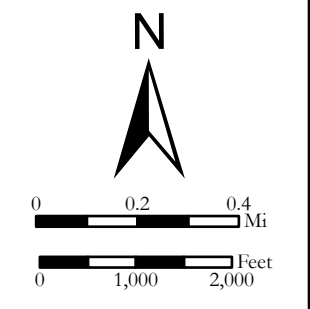
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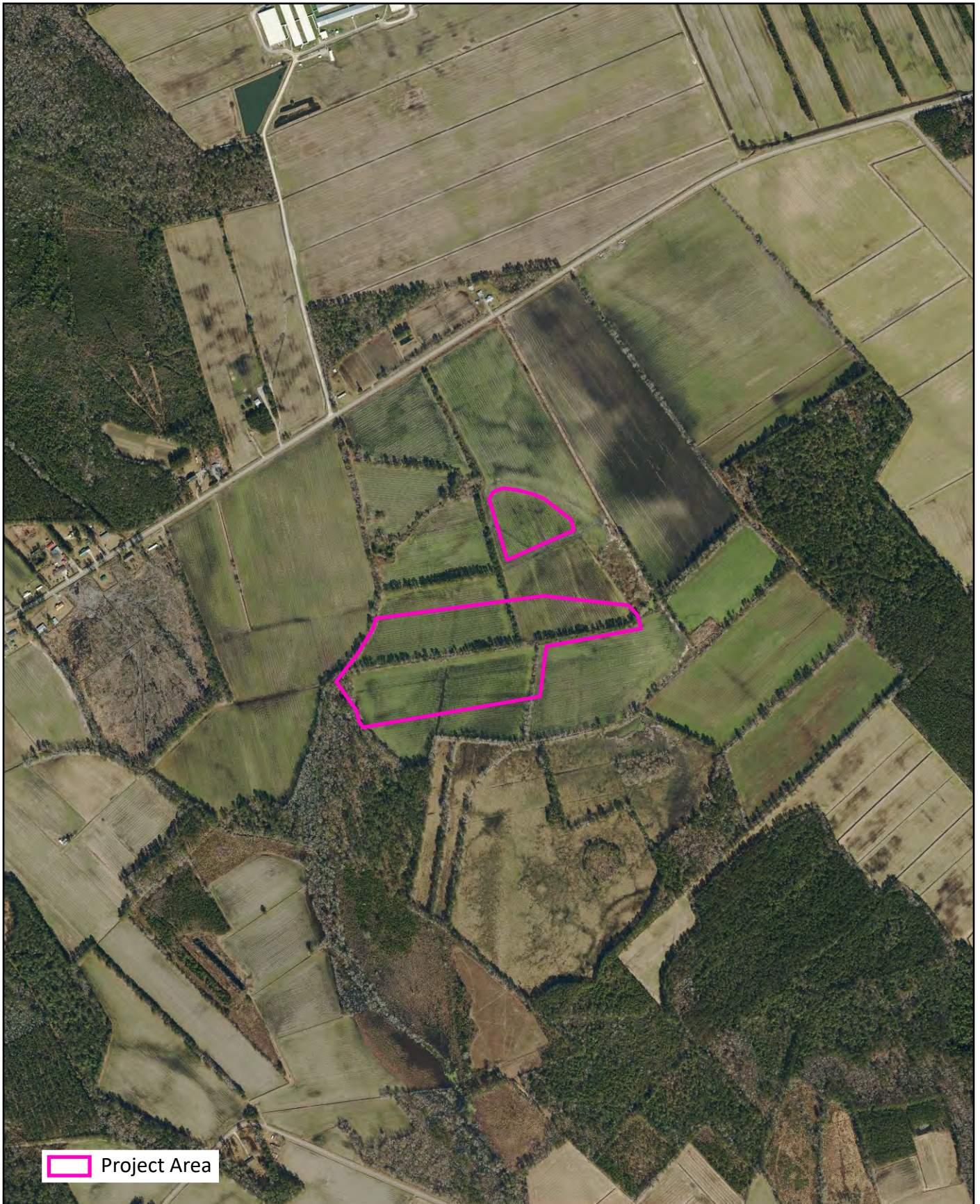



**Figure 2 Project Location and Topography**  
 Cow Branch Mitigation Site  
 Columbus County, NC

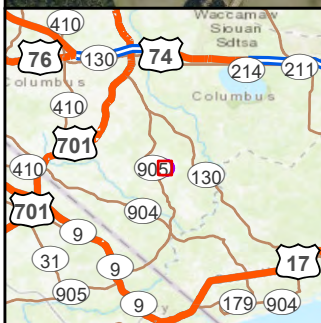
**FREESE AND NICHOLS** 531 N. Liberty St  
 Winston-Salem, NC 27101

Coordinate System: NAD 1983 StatePlane North Carolina FIPS 3200 Feet  
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 Project Area

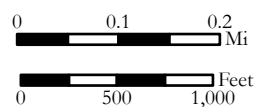


**Figure 3 Project Location with Aerial**  
Cow Branch Mitigation Site  
Columbus County, NC



531 N. Liberty St  
Winston-Salem, NC 27101

Coordinate System: NAD 1983 StatePlane North Carolina FIPS 3200 Feet  
Date Exported: 5/3/2021 2:35 PM





## **Appendix H**

### **Design Data and Plan Sheets**

# NC DEPARTMENT OF ENVIRONMENTAL QUALITY

## DIVISION OF MITIGATION SERVICES

### CONSTRUCTION PLANS COW BRANCH MITIGATION SITE

COLUMBUS COUNTY

DATE: March 4, 2024

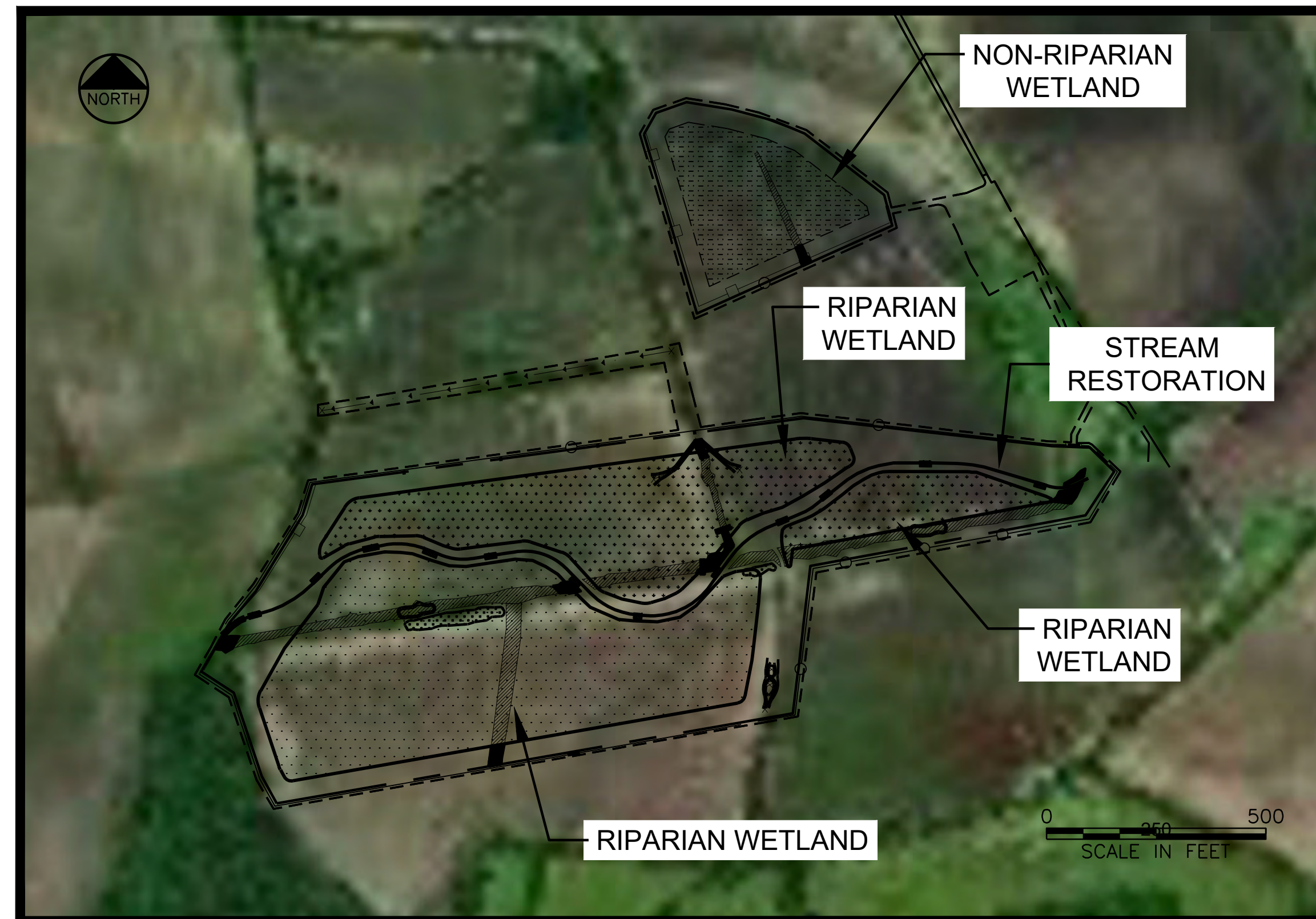
#### SHEET INDEX

CIVIL	
C-1	PLAN AND PROFILE
C-2	PLAN AND PROFILE
C-3	PLAN AND PROFILE
C-4	WETLAND LAYOUT
C-5	PROPOSED GRADING OVERVIEW PLAN
C-6	PLANTING ZONES

DETAILS	
DT-1	TYPICAL CROSS SECTIONS
DT-2	GENERAL DETAILS
DT-3	GENERAL DETAILS
DT-4	CHANNEL PLUG AND SWALE DETAILS
DT-5	EROSION CONTROL DETAILS
DT-6	EROSION CONTROL DETAILS
DT-7	PLANTING PLAN
DT-8	PLANTING PLAN
DT-9	FENCE DETAILS
DT-10	FENCE DETAILS
DT-11	DITCH CONFLUENCE MARSH COMPLEX

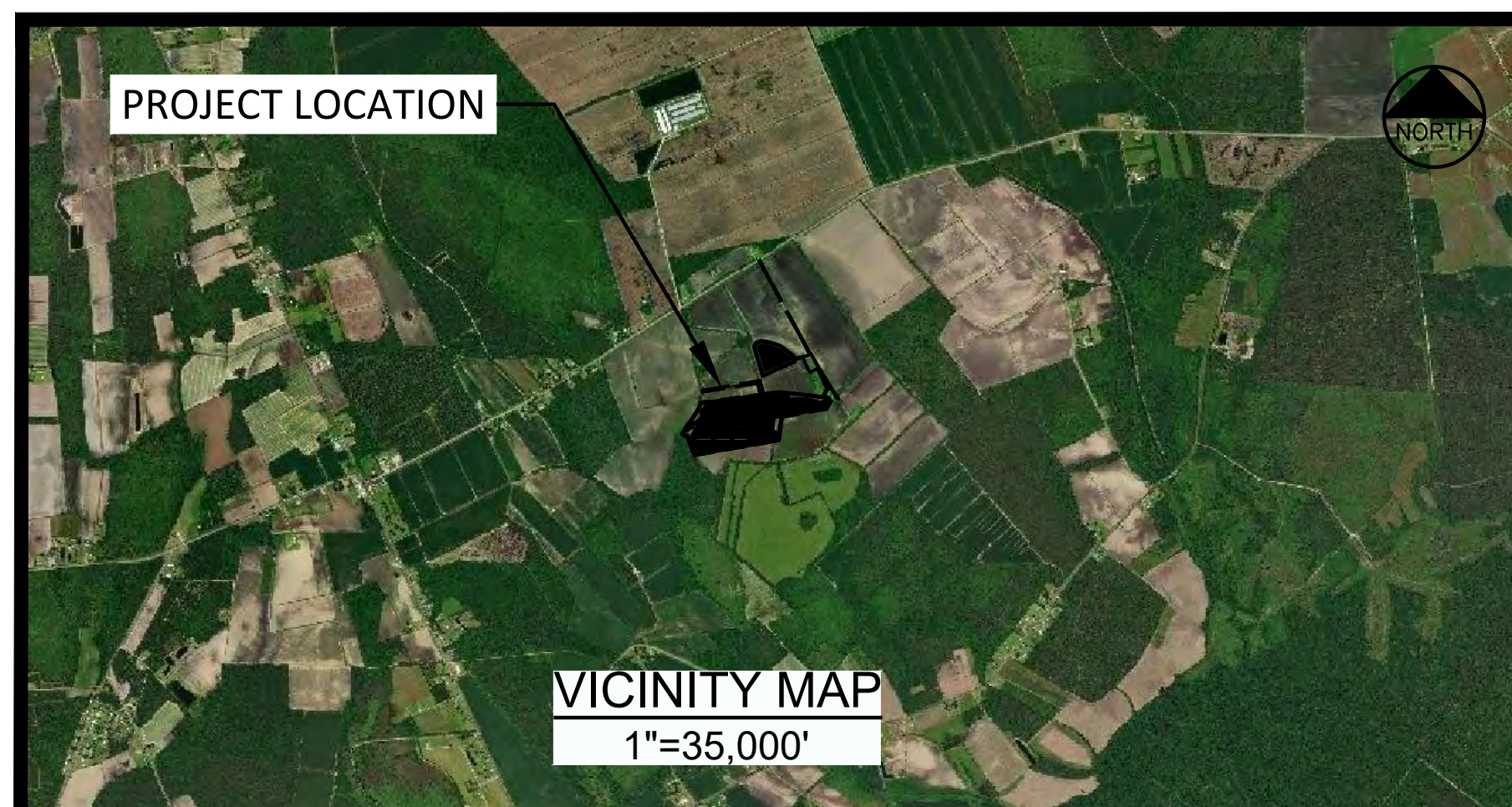
SITE DATA TABLE	
RIVER BASIN	LUMBER
8-DIGIT HUC	03040206
TOTAL DISTURBED AREA	38.53 AC
DMS PROJECT ID NO.	100196
FULL DELIVERY CONTRACT NO.	200203-01
USACE ACTION ID NO.	SAW-2021-00822
DWR PROJECT NO.	20210919v1
RFP NO.	16-20200203 (Issued 8/6/2020)
COORDINATE SYSTEM	NAD83 NORTH CAROLINA STATE PLANE, US FOOT

MITIGATION SUMMARY	
STREAM RESTORATION LENGTH	2500.112 LF
RIPARIAN WETLAND ACREAGE (R-1)	1.637 AC
RIPARIAN WETLAND ACREAGE (R-2)	6.119 AC
RIPARIAN WETLAND ACREAGE (R-3)	11.376 AC
NON-RIPARIAN WETLAND ACREAGE	2.830 AC



TOTAL DISTURBED AREA = 39.21 AC

RESTORATION LEVEL	STREAM (LF)	RIPARIAN WETLAND (AC)	NON-RIPARIAN WETLAND (AC)
RESTORATION	2,500.112		
REESTABLISHMENT		19.132	2.830
TOTALS	2,500.112	19.132	2.830
MITIGATION UNITS (1:1)	2,128.000	19.132	2.830

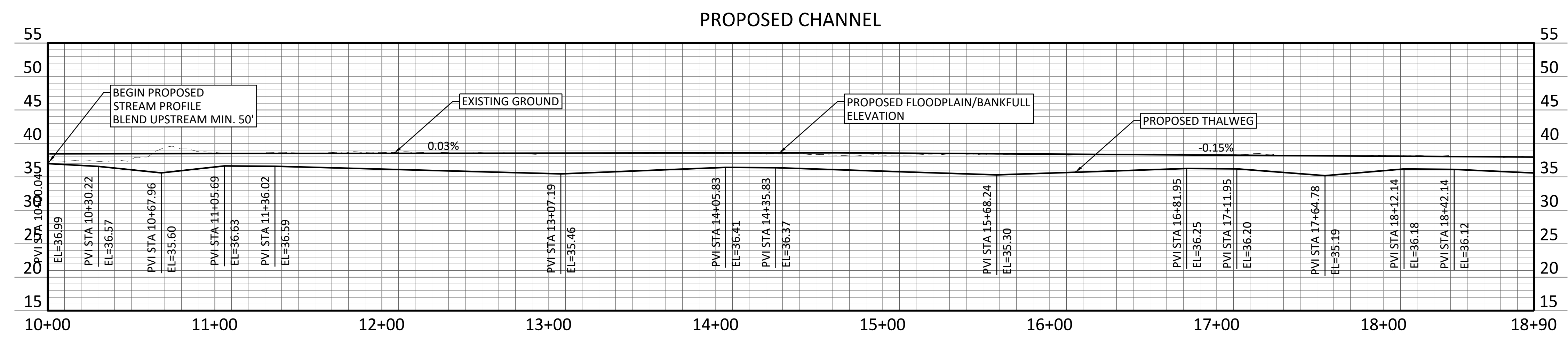
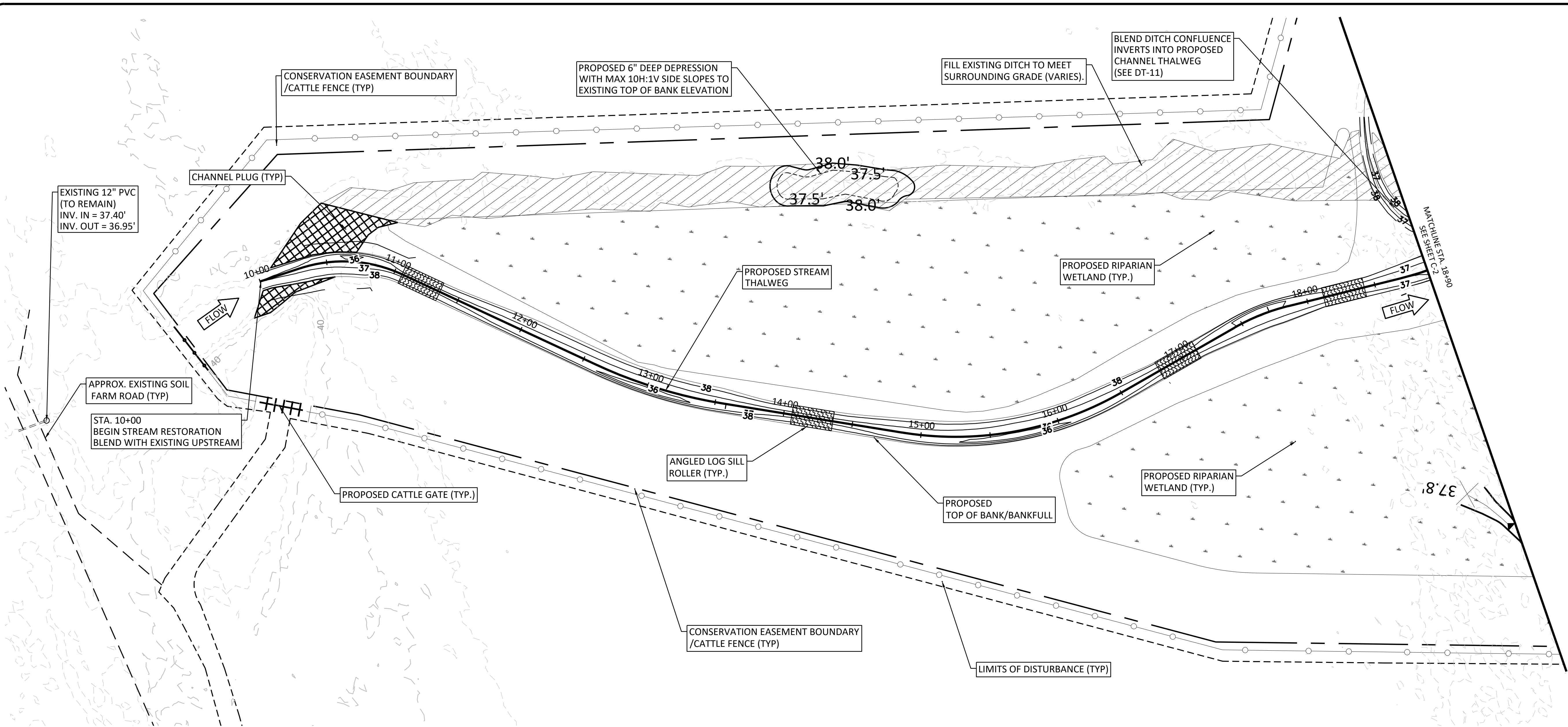


**NOT FOR CONSTRUCTION**  
 THIS DOCUMENT IS RELEASED FOR THE PURPOSE OF INTERIM REVIEW UNDER THE AUTHORITY OF BRYAN M. DICK, P.E., N. CAROLINA NO-035724 ON DATE: 3/4/2024. IT IS NOT TO BE USED FOR CONSTRUCTION, BIDDING OR PERMIT PURPOSES.

**FREESE & NICHOLS**  
 531 N. Liberty Street  
 Winston-Salem, North Carolina 27101  
 Phone - (336) 790-6744  
 Web - www.freese.com

Freese and Nichols, Inc.  
 North Carolina Registered Engineering Firm C-3916

MITIGATION PLAN SUBMITTAL



**LEGEND**

- RIPARIAN WETLAND
- NON-RIPARIAN WETLAND
- ANGLED LOG SILL ROLLER
- BACKFILL EXISTING DITCH
- PROPOSED MINOR CONTOUR - 1'
- PROPOSED MAJOR CONTOUR - 5'
- EXISTING MINOR CONTOUR - 1'
- EXISTING MAJOR CONTOUR - 5'
- RELICT SPOIL PILES/ BORROW AREAS

Scale in Feet Horizontal: 0, 40', 80'

Scale in Feet Vertical: 0, 10', 20'

North Arrow

Freeze and Nichols, Inc.  
North Carolina Registered Engineering Firm C-3916

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**FREEZE & NICHOLS**

531 N. Liberty Street  
Winston-Salem, NC 27101  
Phone - (336) 790-6744  
Web - www.freeze.com

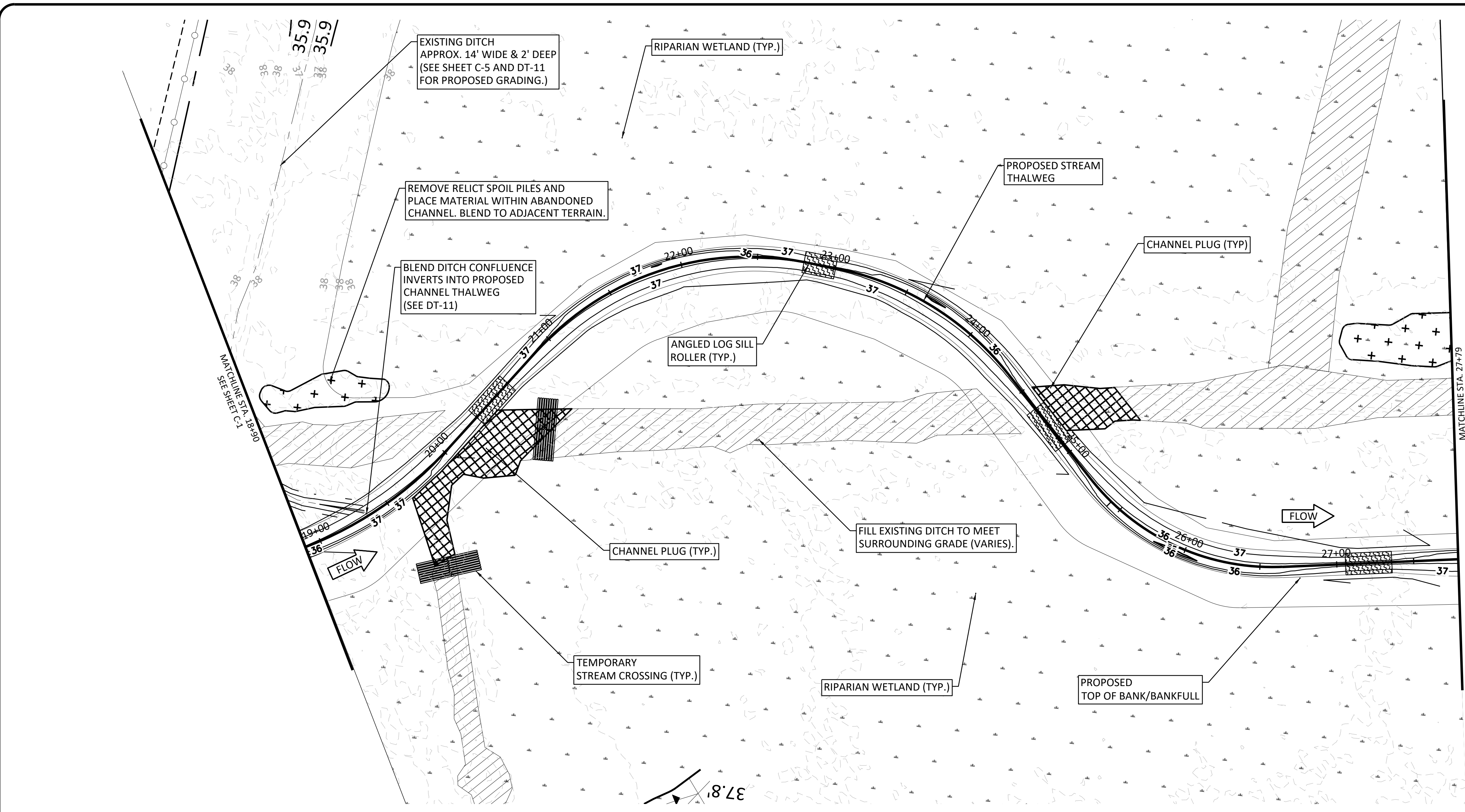
NC DIVISION OF MITIGATION SERVICES  
**COW BRANCH MITIGATION SITE**  
NCDMS PROJECT #: 100196

**STREAM RESTORATION PLAN AND PROFILE**

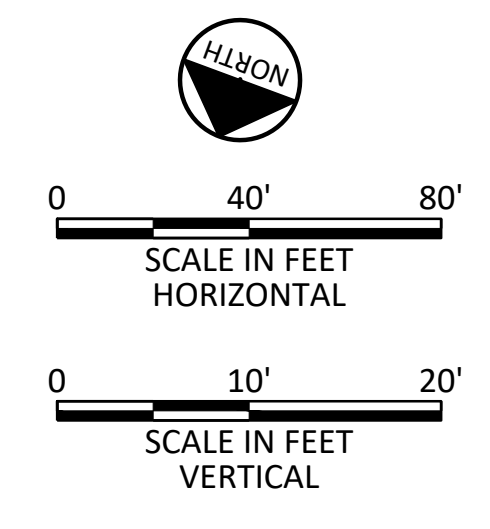
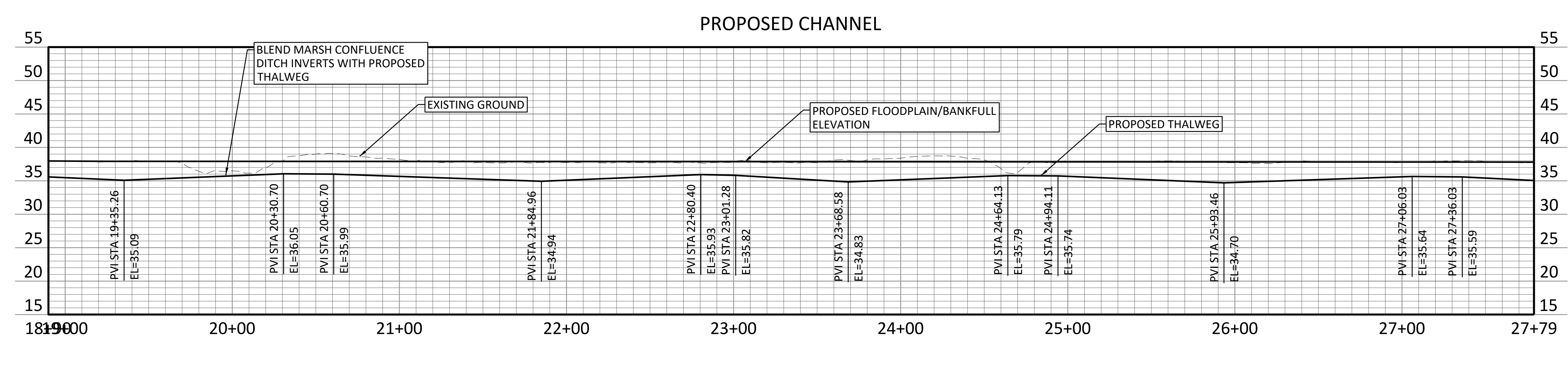
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SHEET							C-1
SEQ.							1

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 Last Saved: 2/28/2024 12:12 PM Saved By: 04322



- LEGEND**
- RIPARIAN WETLAND
  - NON-RIPARIAN WETLAND
  - ANGLED LOG SILL ROLLER
  - BACKFILL EXISTING DITCH
  - PROPOSED MINOR CONTOUR - 1'
  - PROPOSED MAJOR CONTOUR - 5'
  - EXISTING MINOR CONTOUR - 1'
  - EXISTING MAJOR CONTOUR - 5'
  - RELICT SPOIL PILES/BORROW AREAS



Freese and Nichols, Inc.  
 North Carolina Registered Engineering Firm, C-3916

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**FREES & NICHOLS**

531 N. Liberty Street  
 Winston-Salem, NC 27101  
 Phone - (336) 790-6744  
 Web - www.freese.com

NC DIVISION OF MITIGATION SERVICES  
**COW BRANCH MITIGATION SITE**  
 NCDMS PROJECT #: 100196

**STREAM RESTORATION  
 PLAN AND PROFILE**

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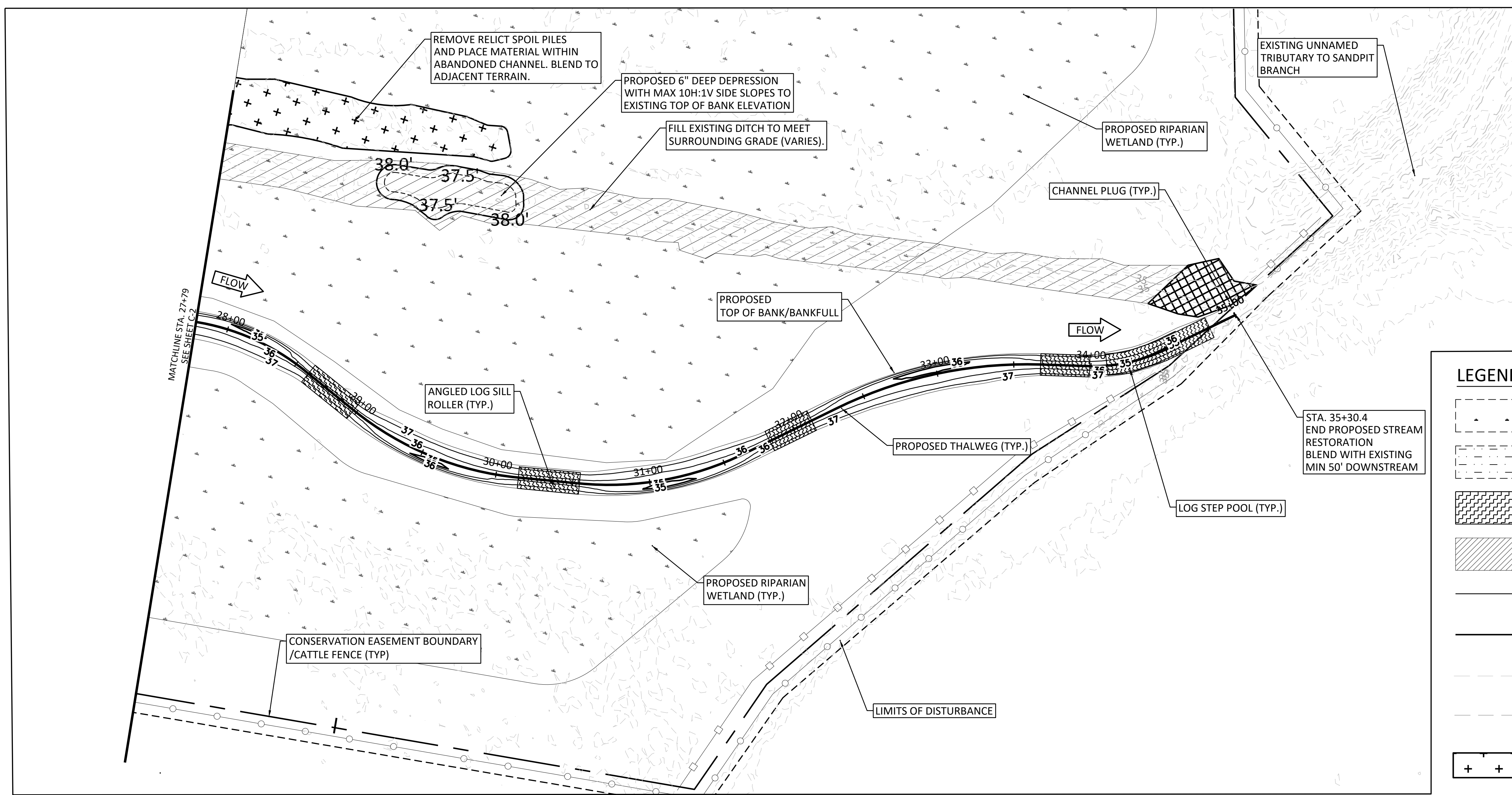
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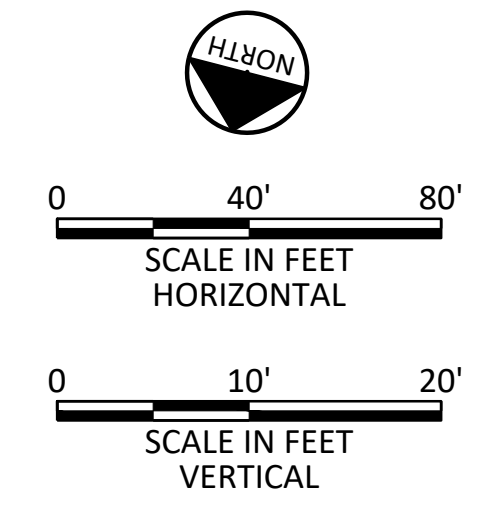
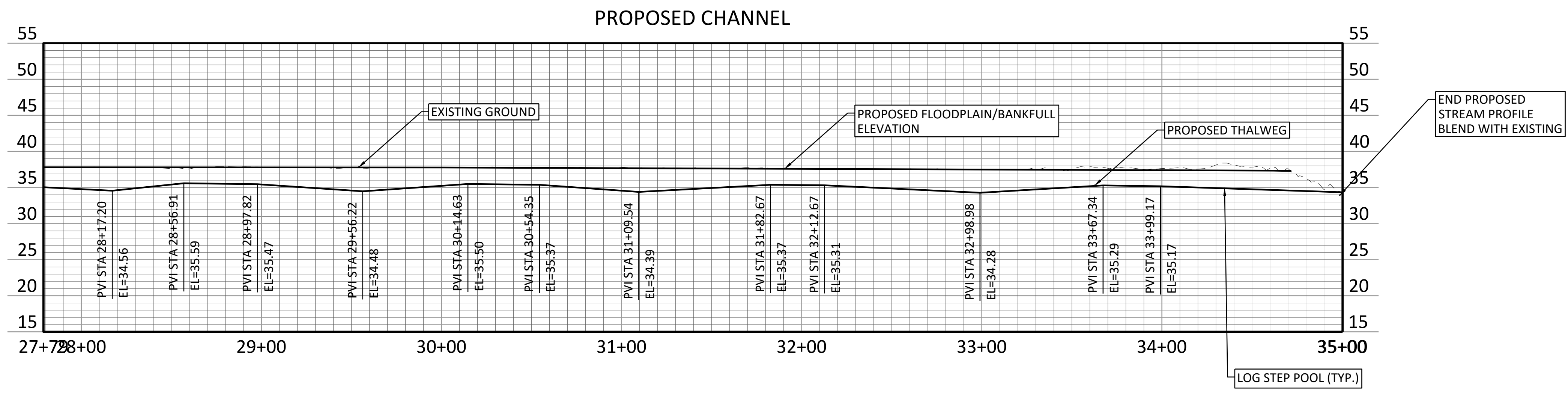
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**LEGEND**

- RIPARIAN WETLAND
- NON-RIPARIAN WETLAND
- ANGLED LOG SILL ROLLER
- BACKFILL EXISTING DITCH
- PROPOSED MINOR CONTOUR - 1'
- PROPOSED MAJOR CONTOUR - 5'
- EXISTING MINOR CONTOUR - 1'
- EXISTING MAJOR CONTOUR - 5'
- RELICT SPOIL PILES/ BORROW AREAS



Freese and Nichols, Inc.  
 North Carolina Registered Engineering Firm C-3916

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 Winston-Salem, NC 27101  
 Phone - (336) 790-6744  
 Web - www.freese.com

NC DIVISION OF MITIGATION SERVICES  
**COW BRANCH MITIGATION SITE**  
 NCDMS PROJECT #: 100196

**STREAM RESTORATION PLAN AND PROFILE**

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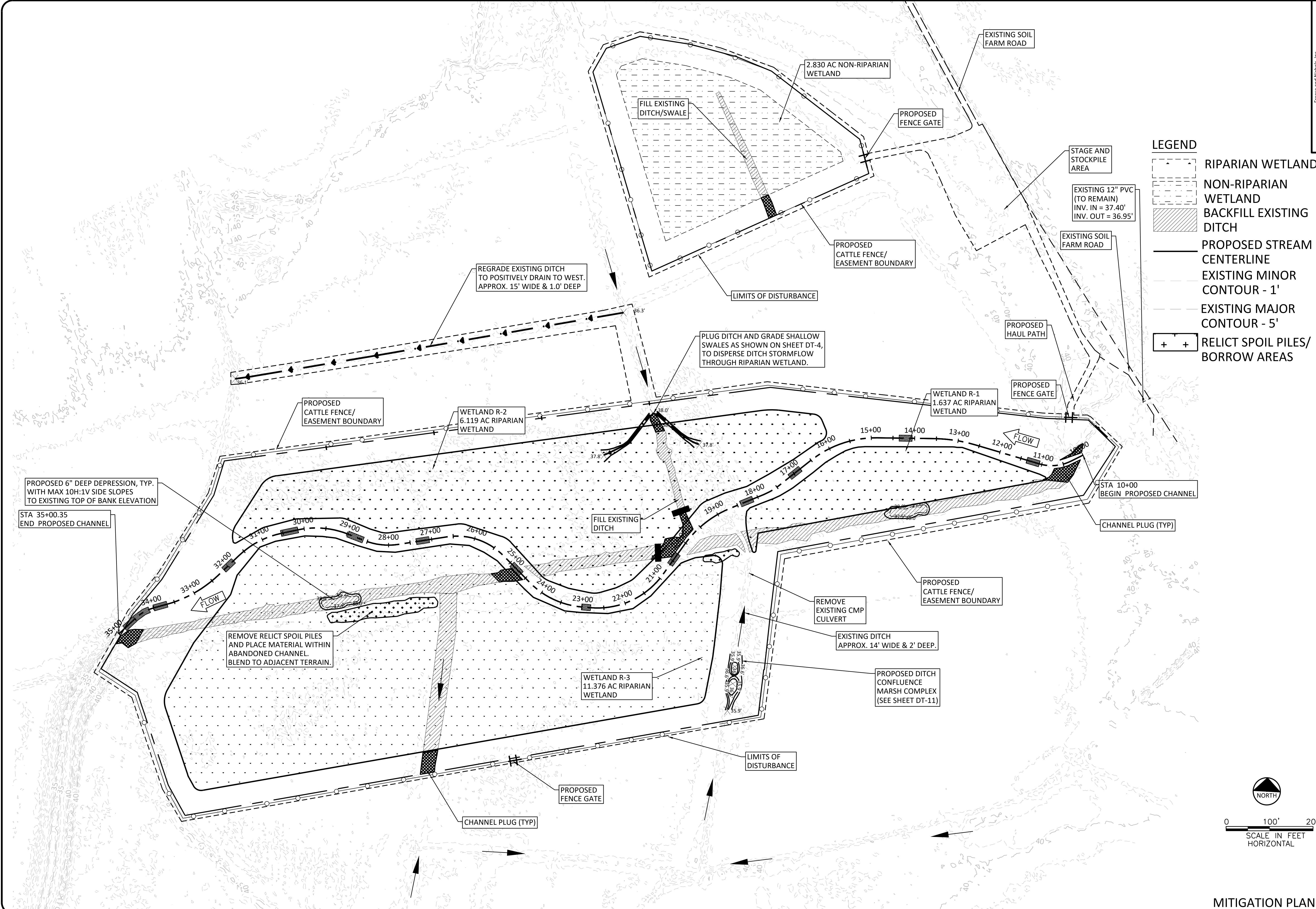
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SEQ. 1

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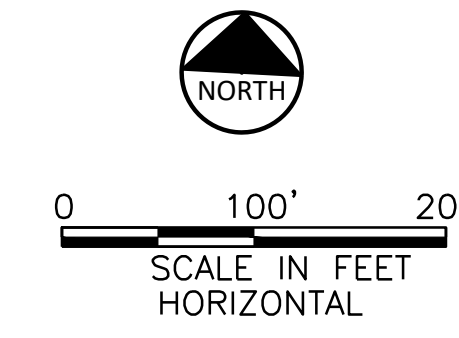
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**LEGEND**

- RIPARIAN WETLAND
- NON-RIPARIAN WETLAND
- BACKFILL EXISTING DITCH
- PROPOSED STREAM CENTERLINE
- EXISTING MINOR CONTOUR - 1'
- EXISTING MAJOR CONTOUR - 5'
- RELICT SPOIL PILES/BORROW AREAS



Freese and Nichols, Inc.  
 North Carolina Registered Engineering Firm C-3916

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NC DIVISION OF MITIGATION SERVICES  
**COW BRANCH MITIGATION SITE**  
 NCDMIS PROJECT #: 100196

CIVIL  
**WETLAND RESTORATION/SITE OVERVIEW**  
**COW BRANCH MITIGATION**

NO.	ISSUE	BY	DATE	FRN OR NO.	DESIGNED	BWD	AE	REVISION	BWD	AE	FILE NAME
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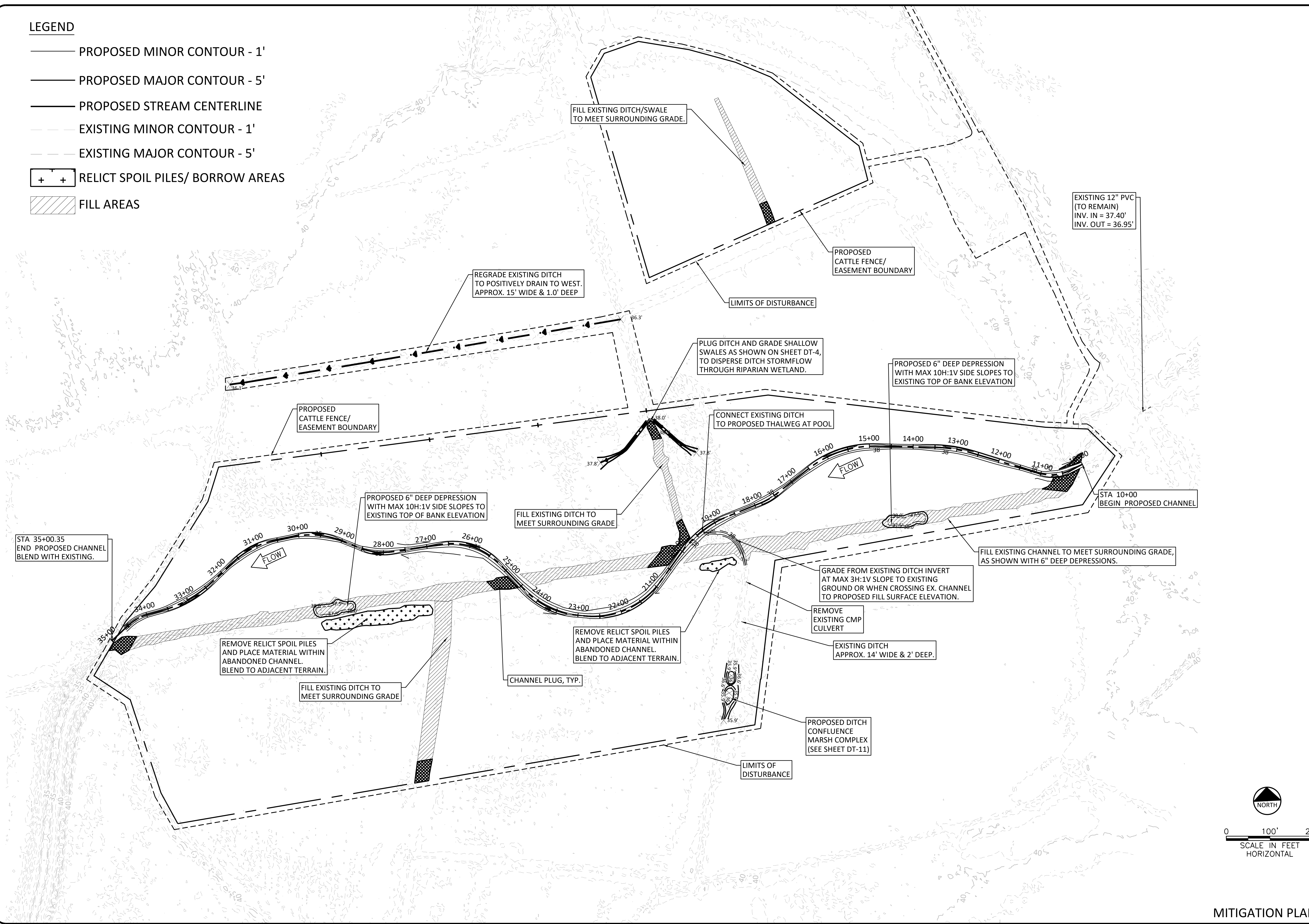
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SEQ. 1

MITIGATION PLAN

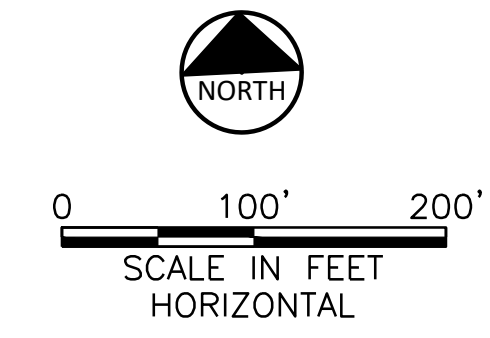
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- PROPOSED MINOR CONTOUR - 1'
- PROPOSED MAJOR CONTOUR - 5'
- PROPOSED STREAM CENTERLINE
- - - EXISTING MINOR CONTOUR - 1'
- - - EXISTING MAJOR CONTOUR - 5'
- + + RELICT SPOIL PILES/ BORROW AREAS
- ▨ FILL AREAS



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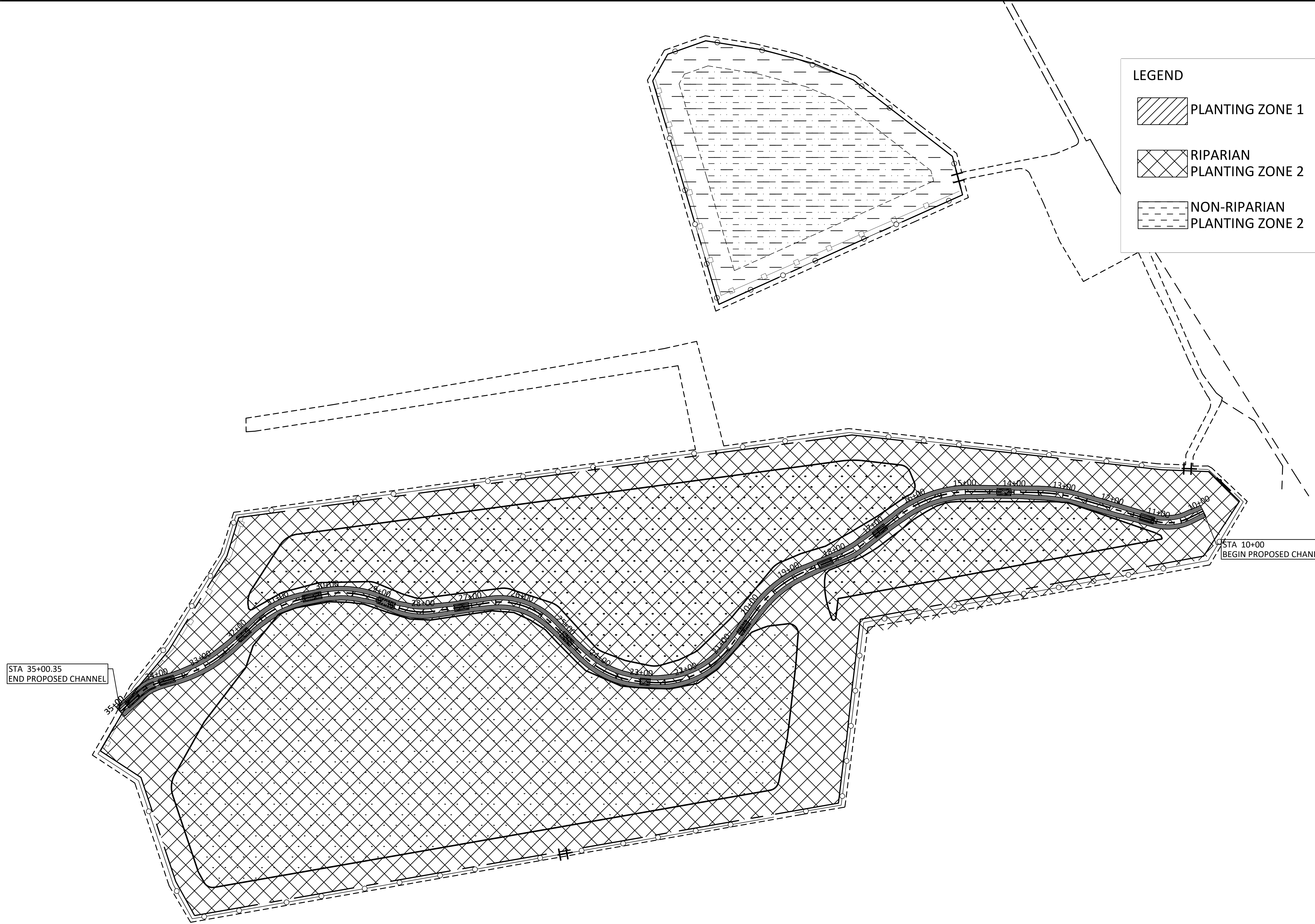
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**COW BRANCH MITIGATION**

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			2/28/2024					

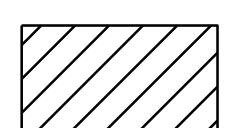
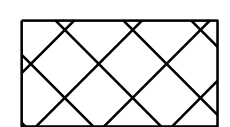
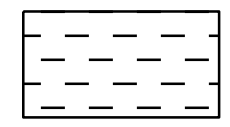
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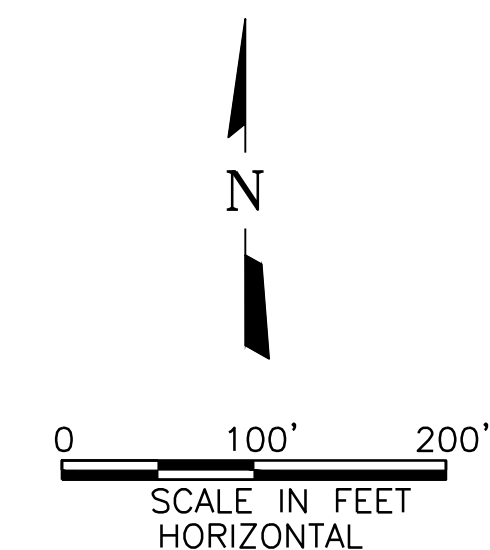
SHEET **C-5**  
 SEQ. **1**

MITIGATION PLAN



**LEGEND**

-  PLANTING ZONE 1
-  RIPARIAN PLANTING ZONE 2
-  NON-RIPARIAN PLANTING ZONE 2



MITIGATION PLAN

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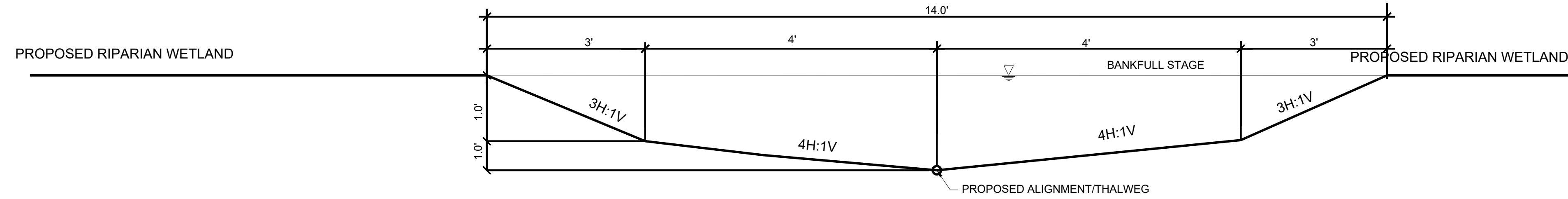
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CIVIL  
**PLANTING ZONES**  
**COW BRANCH MITIGATION**

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				DATE	2/19/2024
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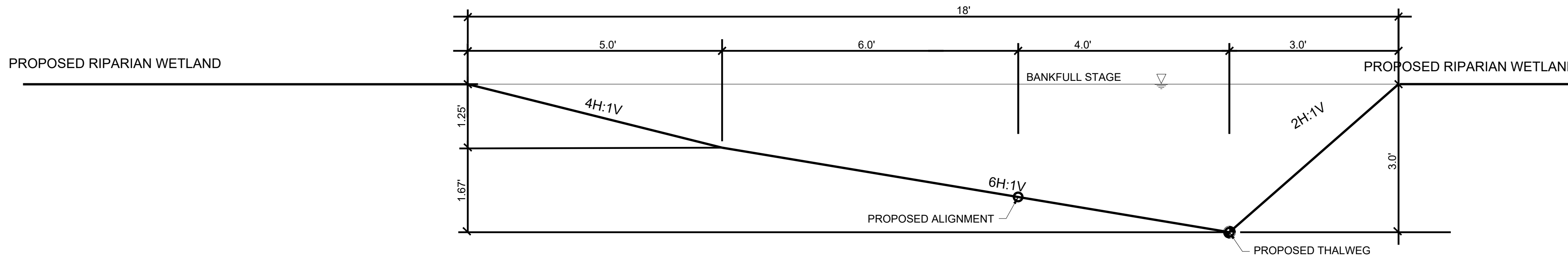




NOTES:

1. POOL TYPICAL FOR RIGHT MEANDER SHOWN. MIRROR SECTION FOR LEFT MEANDERS.
2. RIFFLE CROSS-SECTION TYPICALLY OCCURS AT MID-RIFFLE AND POOL CROSS-SECTION AT THE MID-POOL. CHANNEL DEPTH AND SIDE SLOPES WILL VARY ALONG TRANSITION FROM POOL CROSS-SECTION TO RIFFLE CROSS-SECTION. REFER TO PROPOSED PROFILE FOR DEPTHS FROM BANKFULL ELEVATION TO THALWEG ELEVATION.
3. SEE DETAILED CROSS-SECTION SHEETS FOR VARIATION IN SLOPES AND WIDTHS.

1  
 DT-1 TYPICAL RIFFLE CROSS SECTION  
 NOT TO SCALE



2  
 DT-1 TYPICAL POOL CROSS SECTION  
 NOT TO SCALE

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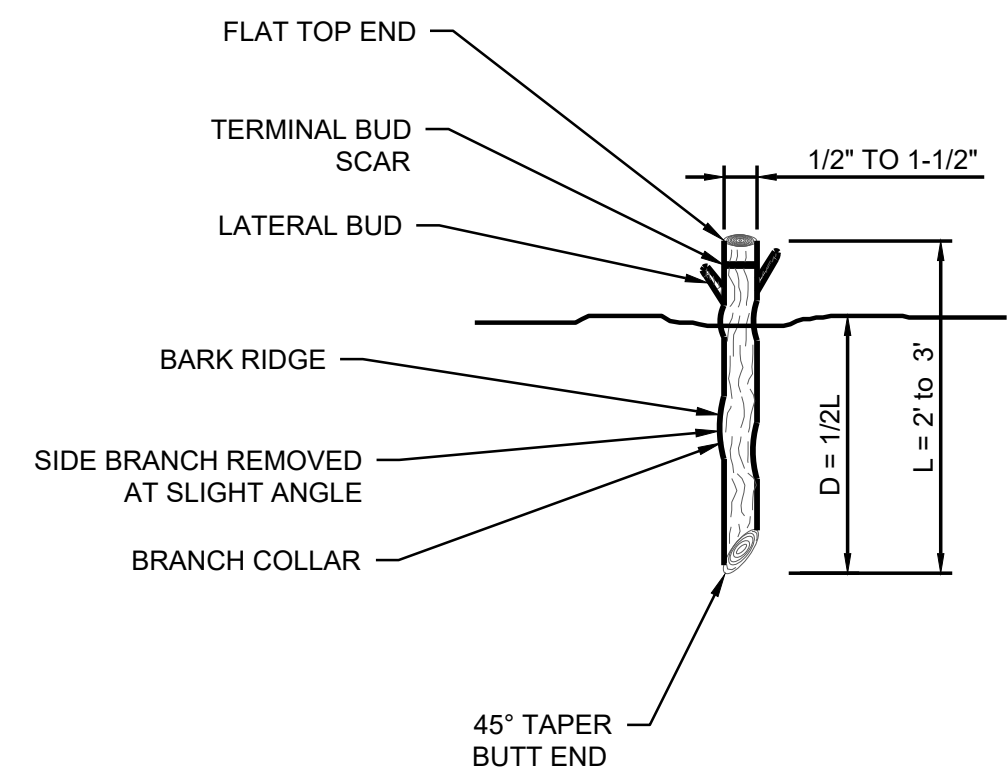
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**COW BRANCH MITIGATION SITE**  
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TYPICAL SECTIONS

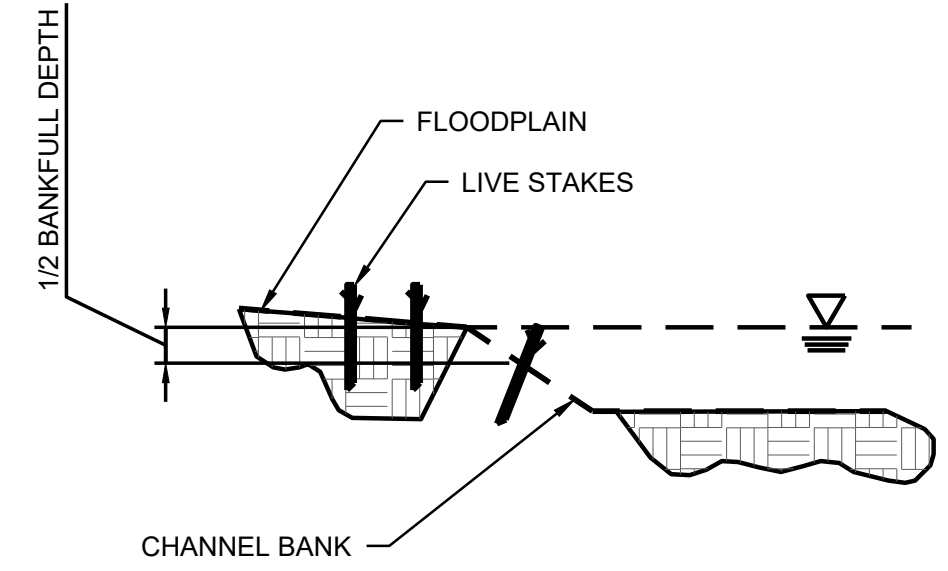
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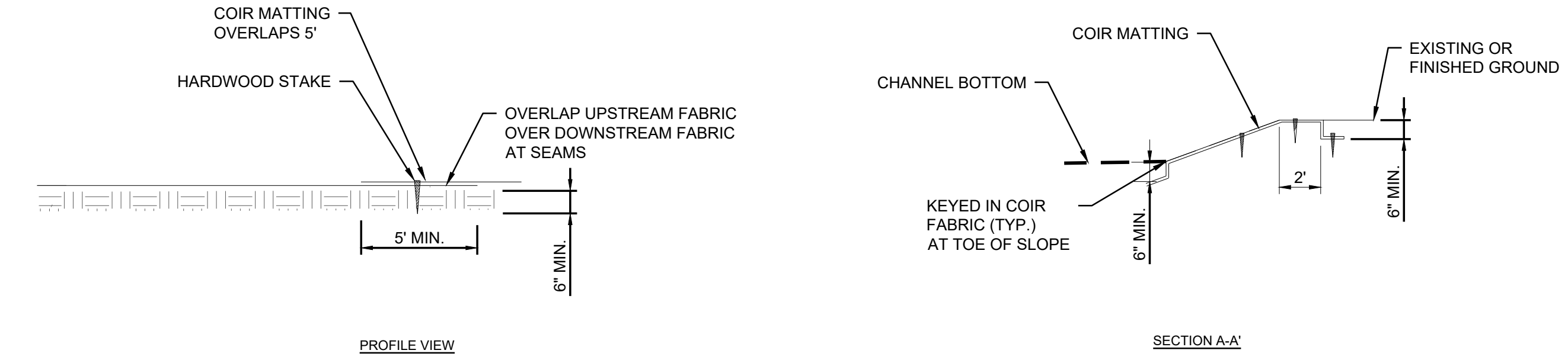
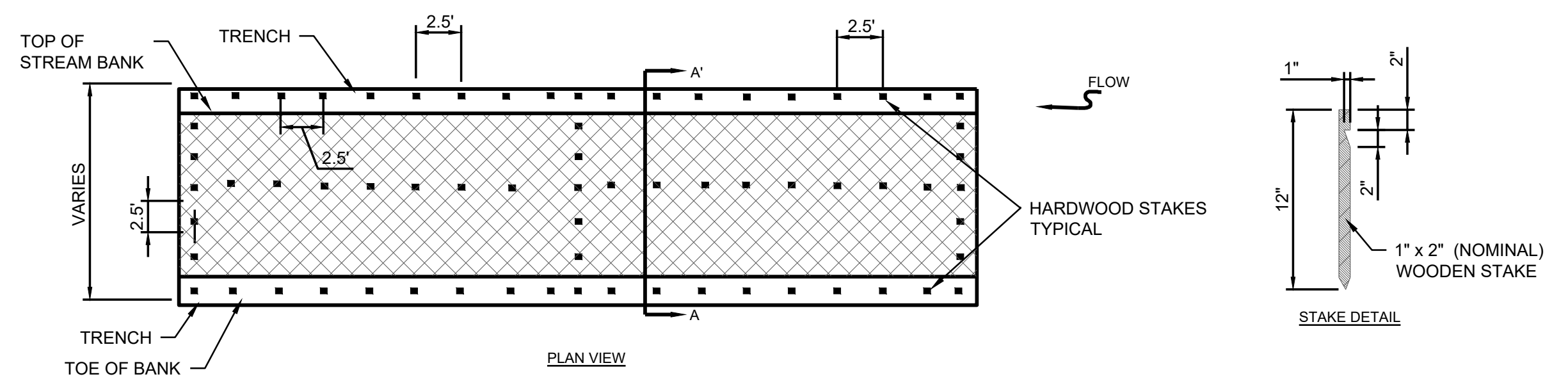
SHEET  
 DT-1  
 SEQ. #####



- NOTES:**
1. ALL LATERAL BRANCHES SHALL BE TRIMMED TO AVOID DAMAGE TO THE BARK RIDGE AND BRANCH COLLAR. A MINIMUM OF TWO BUDS (ONE LATERAL PLUS ONE TERMINAL OR TWO TERMINAL) SHALL BE ABOVE THE PLANTING DEPTH.

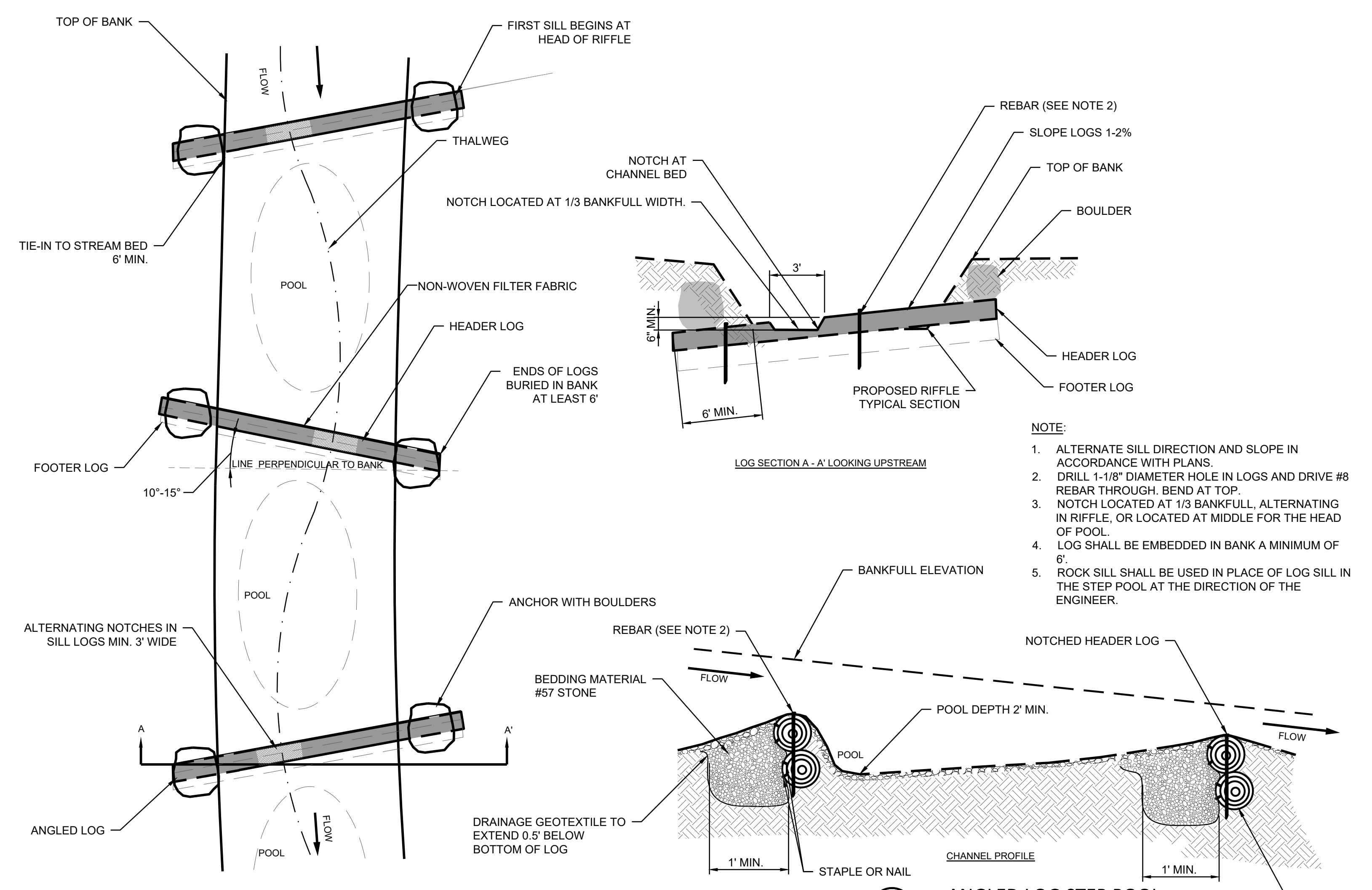


**1 LIVE STAKES**  
DT-2 NOT TO SCALE



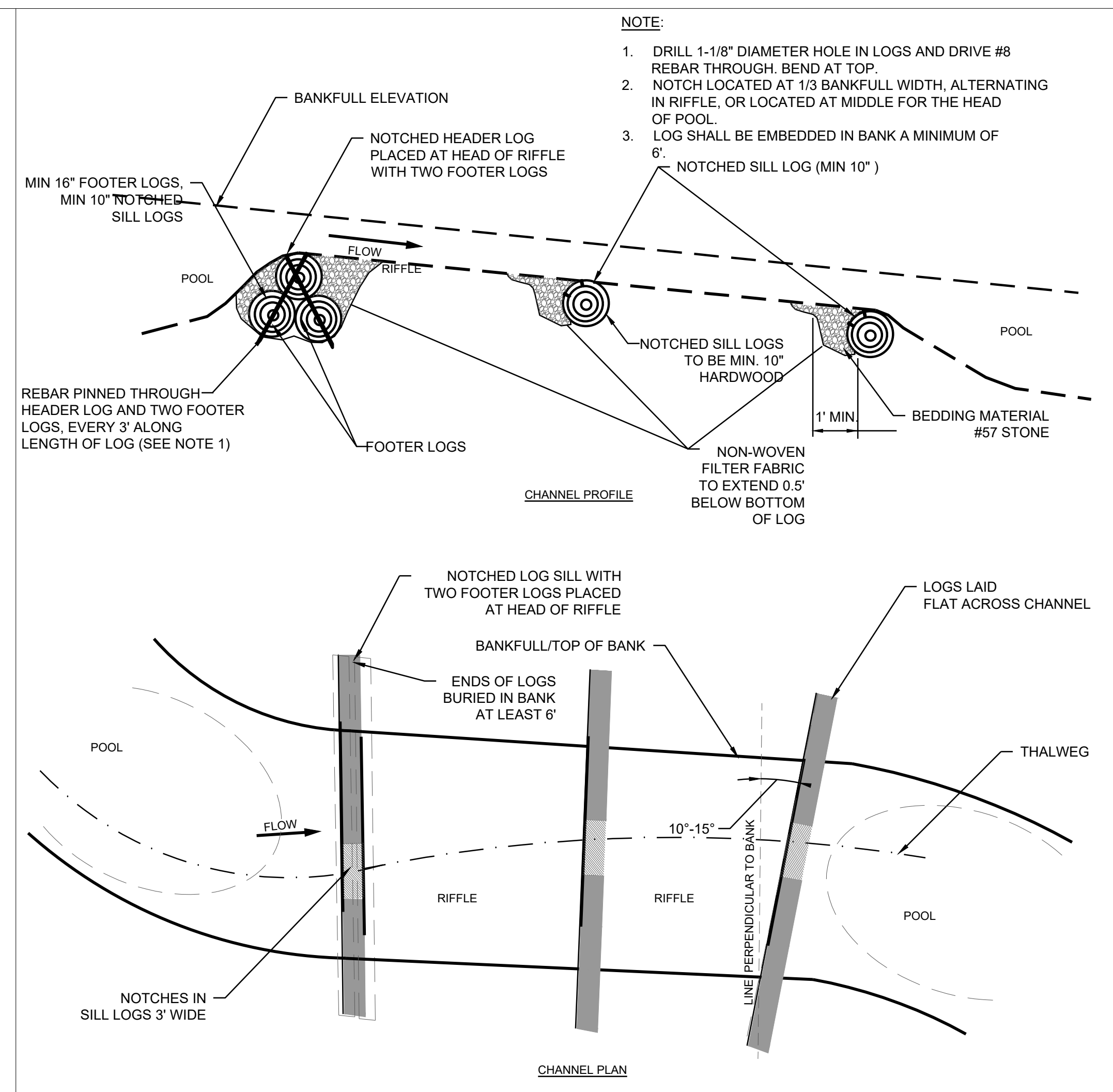
- NOTES:**
1. MAXIMUM SINGLE LENGTH OF MATTING/MESH IS 100'.
  2. TOP AND BOTTOM EDGES OF MATTING/MESH SHALL BE KEYED IN.
  3. COIR MATTING DETAIL SHOWN IS FOR PERMANENT INSTALLATION. TEMPORARY INSTALLATION FOR EROSION CONTROL PROTECTION AS STIPULATED SHALL BE TO THE EXTENT THAT THE PROJECT SITE NEEDS TO BE PROTECTED FOR EROSION AND SEDIMENT CONTROL DURING NON-WORKING HOURS.

**2 COIR MATTING**  
DT-2 NOT TO SCALE



- NOTE:**
1. ALTERNATE SILL DIRECTION AND SLOPE IN ACCORDANCE WITH PLANS.
  2. DRILL 1-1/8" DIAMETER HOLE IN LOGS AND DRIVE #8 REBAR THROUGH. BEND AT TOP.
  3. NOTCH LOCATED AT 1/3 BANKFULL, ALTERNATING IN RIFFLE, OR LOCATED AT MIDDLE FOR THE HEAD OF POOL.
  4. LOG SHALL BE EMBEDDED IN BANK A MINIMUM OF 6".
  5. ROCK SILL SHALL BE USED IN PLACE OF LOG SILL IN THE STEP POOL AT THE DIRECTION OF THE ENGINEER.

**3 ANGLED LOG STEP POOL**  
DT-2 NOT TO SCALE



- NOTE:**
1. DRILL 1-1/8" DIAMETER HOLE IN LOGS AND DRIVE #8 REBAR THROUGH. BEND AT TOP.
  2. NOTCH LOCATED AT 1/3 BANKFULL WIDTH, ALTERNATING IN RIFFLE, OR LOCATED AT MIDDLE FOR THE HEAD OF POOL.
  3. LOG SHALL BE EMBEDDED IN BANK A MINIMUM OF 6".

**4 ANGLED LOG SILL ROLLER**  
DT-2 NOT TO SCALE

**MITIGATION PLAN**

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NCDMS PROJECT #: 100196

**GENERAL DETAILS**

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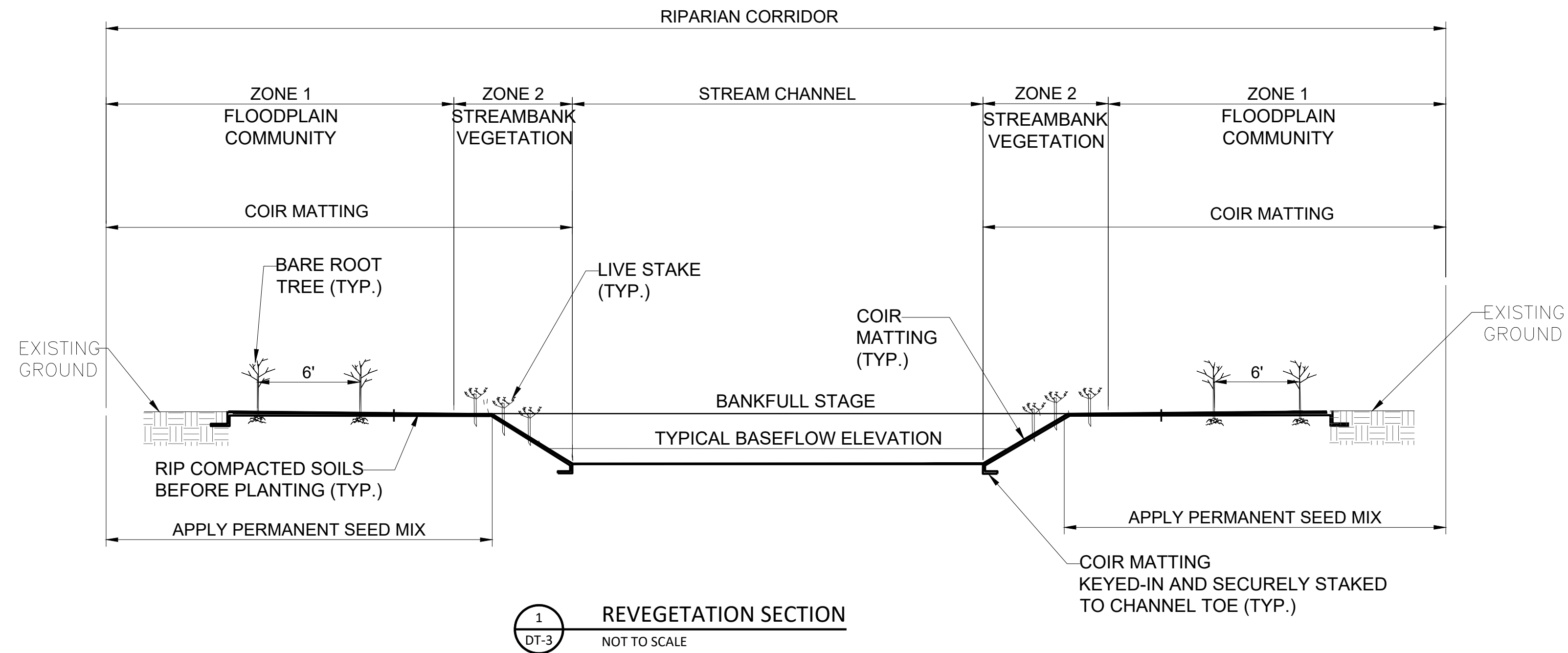
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SHEET: **DT-2**

SEQ. #####

NOTES:

1. THIS IS A TYPICAL SECTION; DIMENSIONS WILL VARY BASED ON STREAM REACH LOCATION AND EXISTING TIE-IN CONDITIONS.
3. RIP COMPACTED SOILS BEFORE PLANTING.
4. PLANT BARE ROOT SEEDLINGS ON 6X6 SPACING, STAGGER BETWEEN ROWS.
5. SEE LANDSCAPE SHEETS FOR CHANNEL PLANTING ZONE LOCATIONS AND LIST OF SPECIES TO BE APPLIED IN CHANNEL.



1 REVEGETATION SECTION  
 DT-3 NOT TO SCALE

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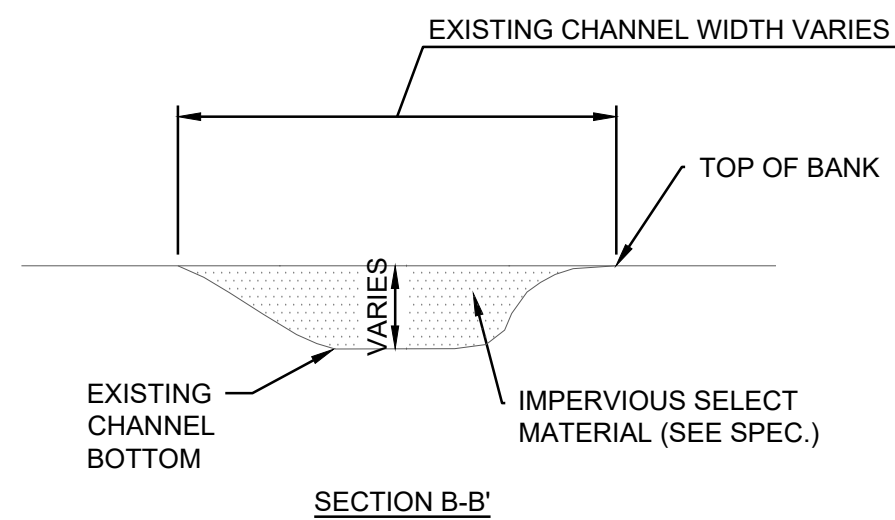
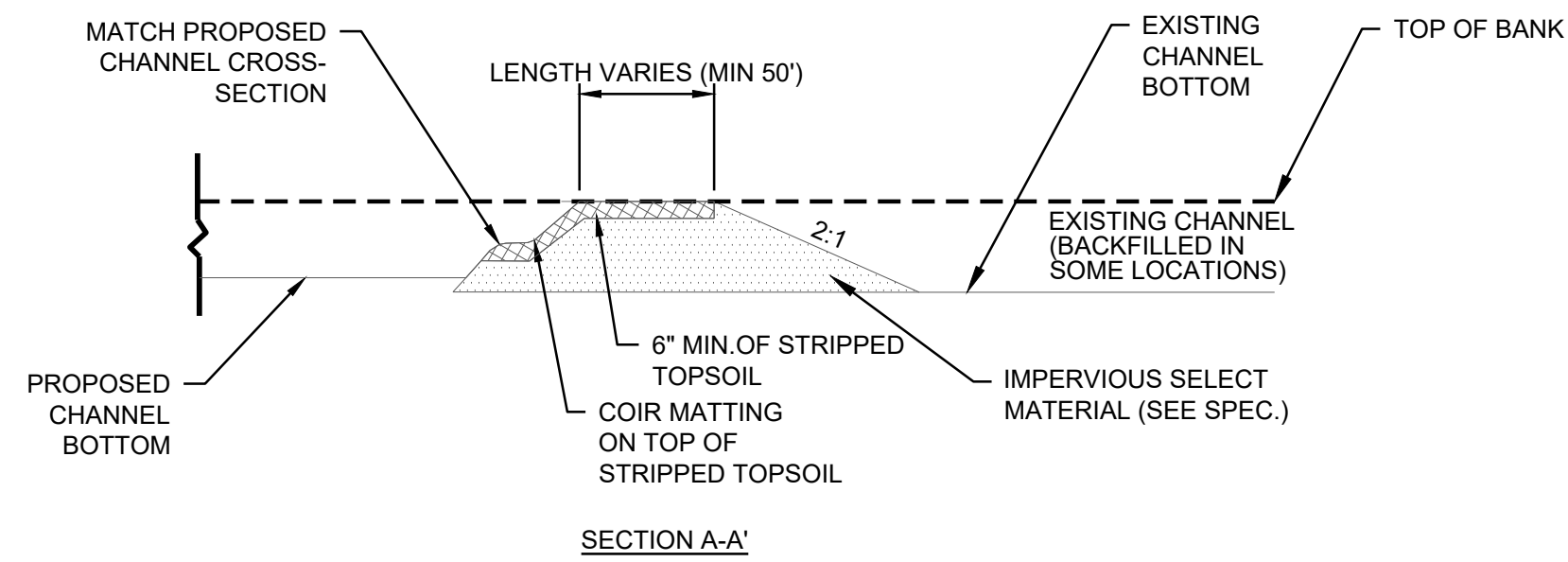
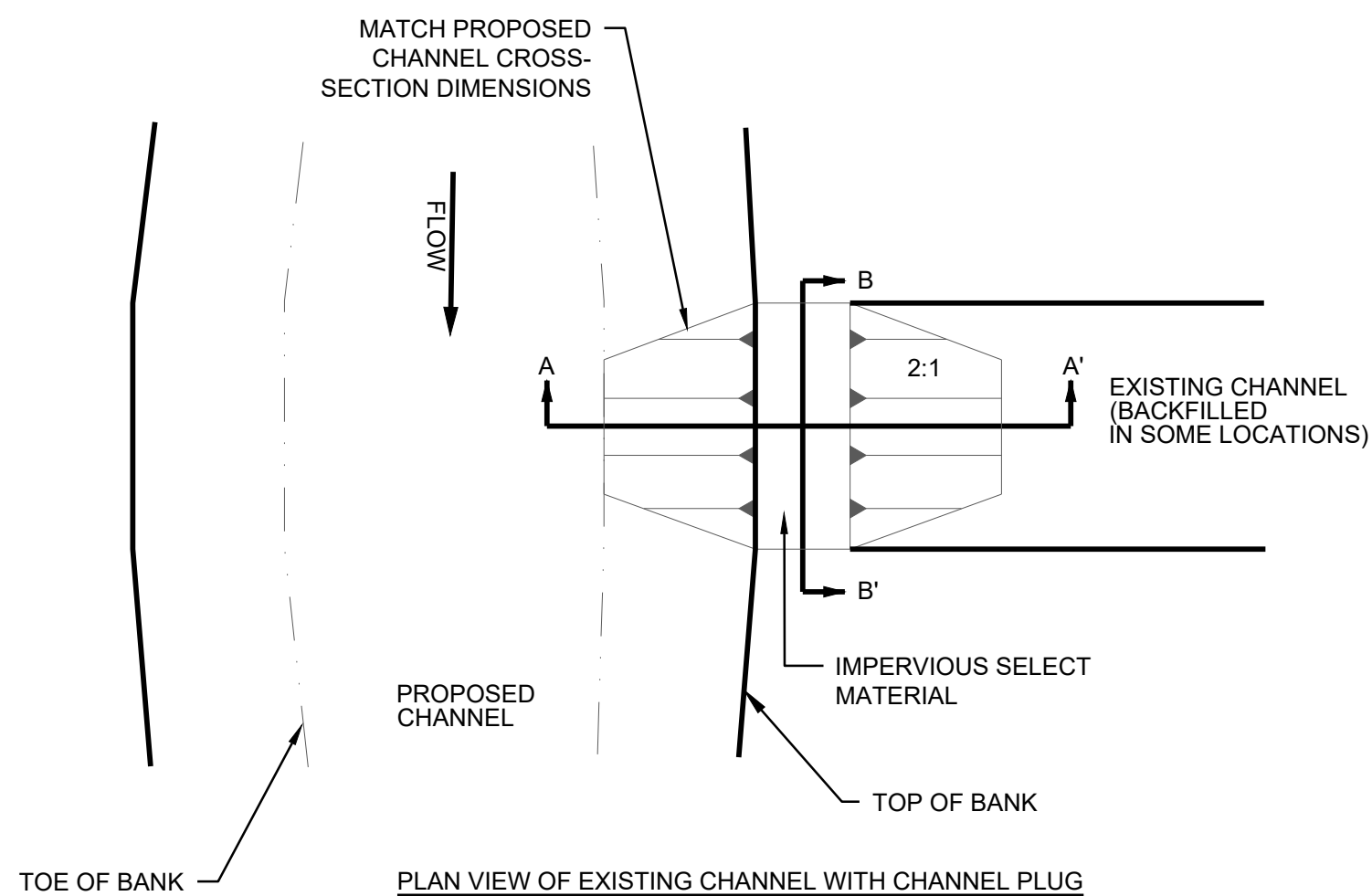
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SHEET DT-3  
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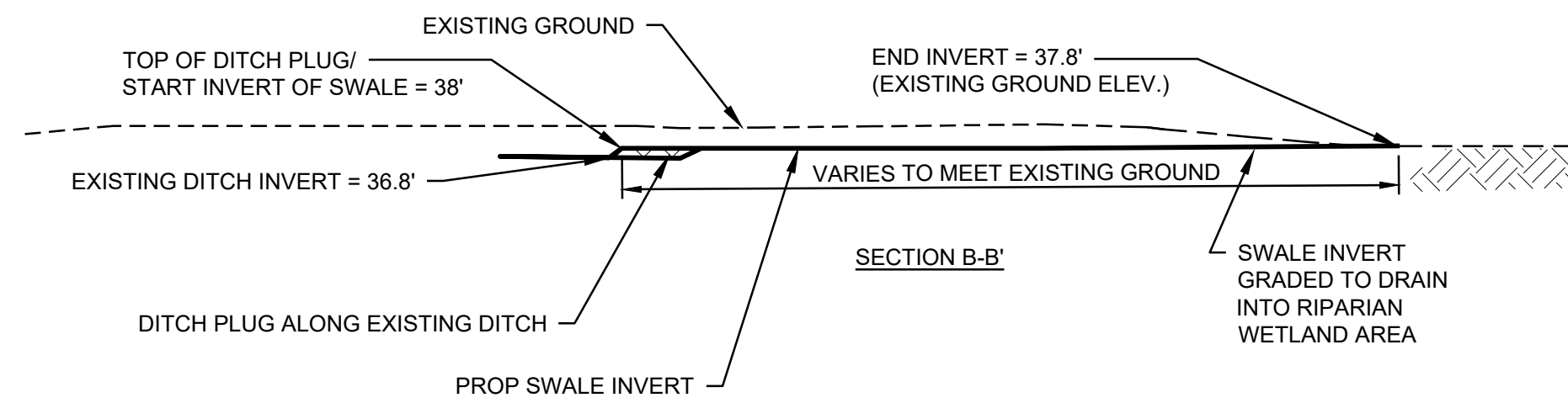
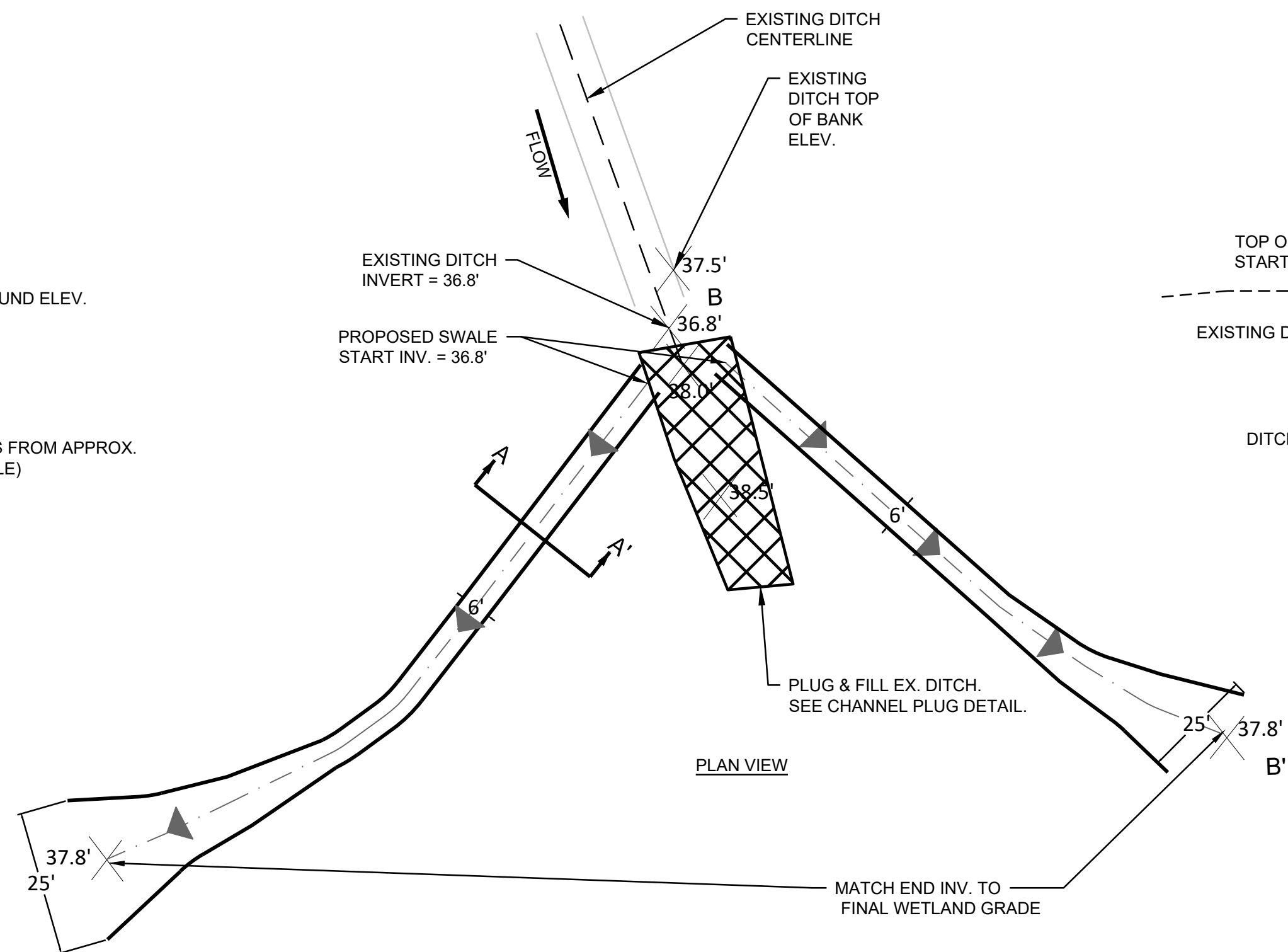
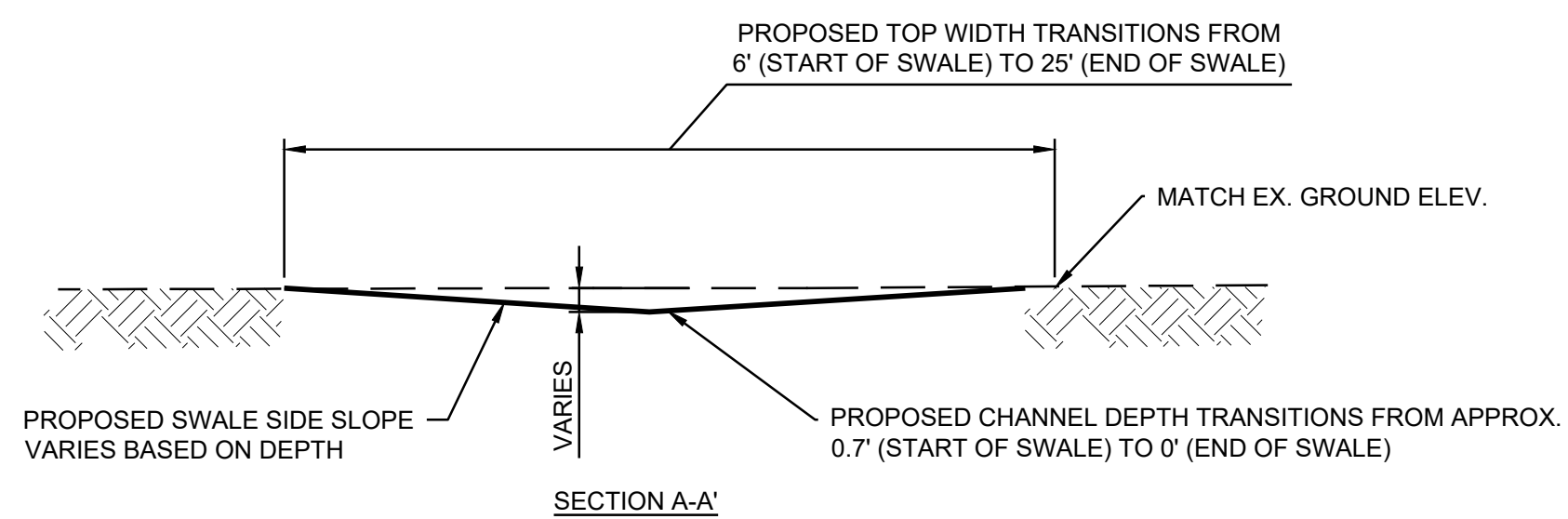
MITIGATION PLAN

**NOTES:**

- 90% COMPACTION RATE IS REQUIRED ON CHANNEL PLUG OR AS APPROVED BY THE ENGINEER.
- IMPERVIOUS SELECT MATERIAL TO BE ON SITE FILL COMPACTED IN 6" LIFTS
- SIDE SLOPE THAT IS ADJACENT TO PROPOSED STREAM NEEDS TO MATCH PROPOSED CROSS SECTION IN THAT REGION.
- CHANNEL PLUG LENGTH IS 15' UNLESS SPECIFIED TO BE LONGER BY DIRECTION OF THE ENGINEER.



**1** CHANNEL PLUG - FOR ABANDONED CHANNELS AND DITCHES  
DT-4 NOT TO SCALE



**2** SHALLOW SWALES GRADING  
DT-4 NOT TO SCALE

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NCDMS PROJECT #: 100196

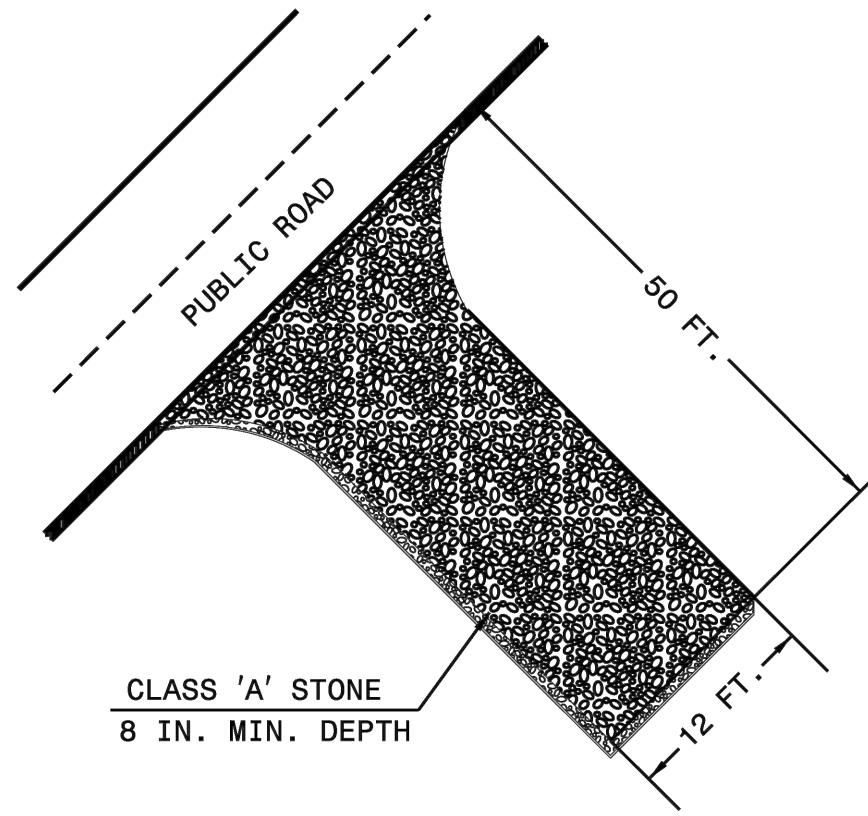
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MITIGATION PLAN

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- NOTES**
1. PROVIDE TURNING RADIUS SUFFICIENT TO ACCOMMODATE LARGE TRUCKS.
  2. LOCATE ENTRANCES TO PROVIDE FOR UTILIZATION BY ALL CONSTRUCTION VEHICLES.
  3. MUST BE MAINTAINED IN A CONDITION WHICH WILL PREVENT TRACKING OR DIRECT FLOW OF MUD ONTO STREETS. PERIODIC TOPDRESSING WITH STONE WILL BE NECESSARY.
  4. ANY MATERIAL TRACKED ONTO THE ROADWAY MUST BE CLEANED UP IMMEDIATELY.
  5. LOCATE GRAVEL CONSTRUCTION ENTRANCE AT ALL POINTS OF INGRESS AND EGRESS UNTIL SITE IS STABILIZED. PROVIDE FREQUENT CHECKS OF THE DEVICE AND TIMELY MAINTENANCE.
  6. NUMBER AND LOCATION OF CONSTRUCTION ENTRANCES TO BE DETERMINED BY THE ENGINEER.
  7. USE CLASS 'A' STONE OR OTHER COARSE AGGREGATE APPROVED BY THE ENGINEER.
  8. INSTALL CONSTRUCTION ENTRANCES IN A WAY TO PREVENT VEHICLES FROM BYPASSING CONSTRUCTION ENTRANCE LEAVING PROJECT SITE.

NOTE: PLACE GEOTEXTILE FOR DRAINAGE BENEATH STONE

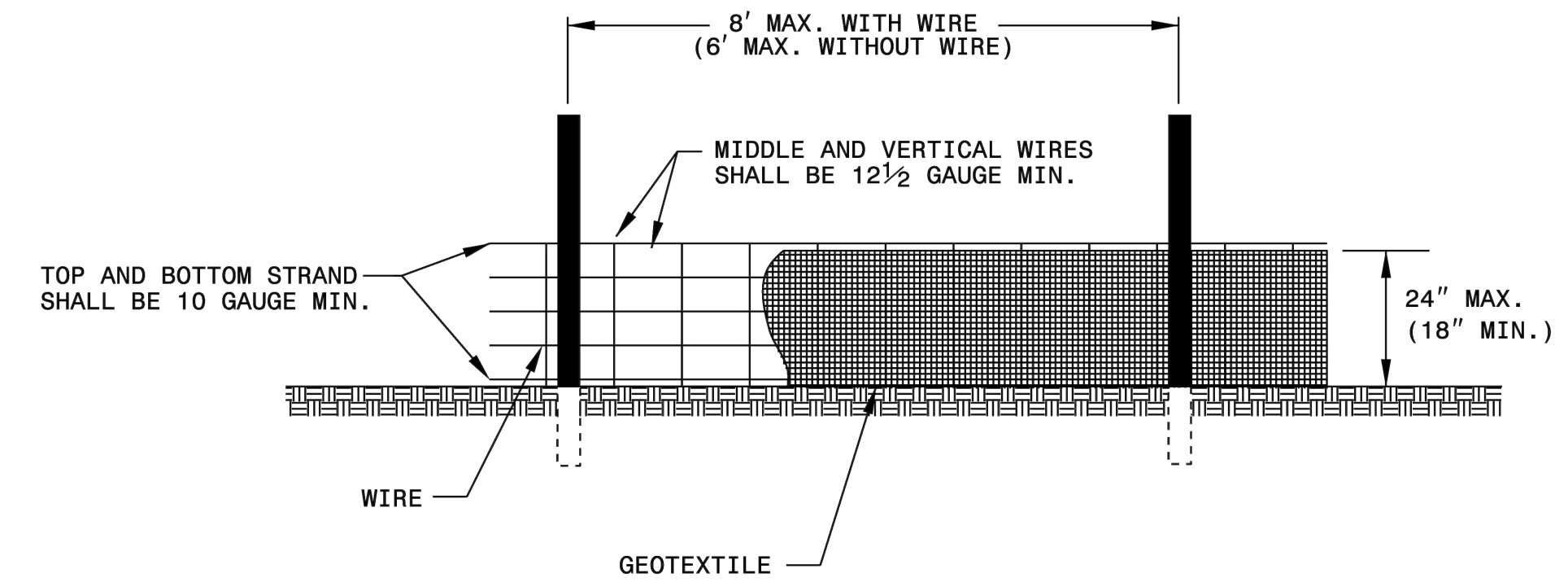
STATE OF NORTH CAROLINA  
DEPT. OF TRANSPORTATION  
DIVISION OF HIGHWAYS  
RALEIGH, N.C.

ROADWAY STANDARD DRAWING FOR  
**GRAVEL CONSTRUCTION ENTRANCE**

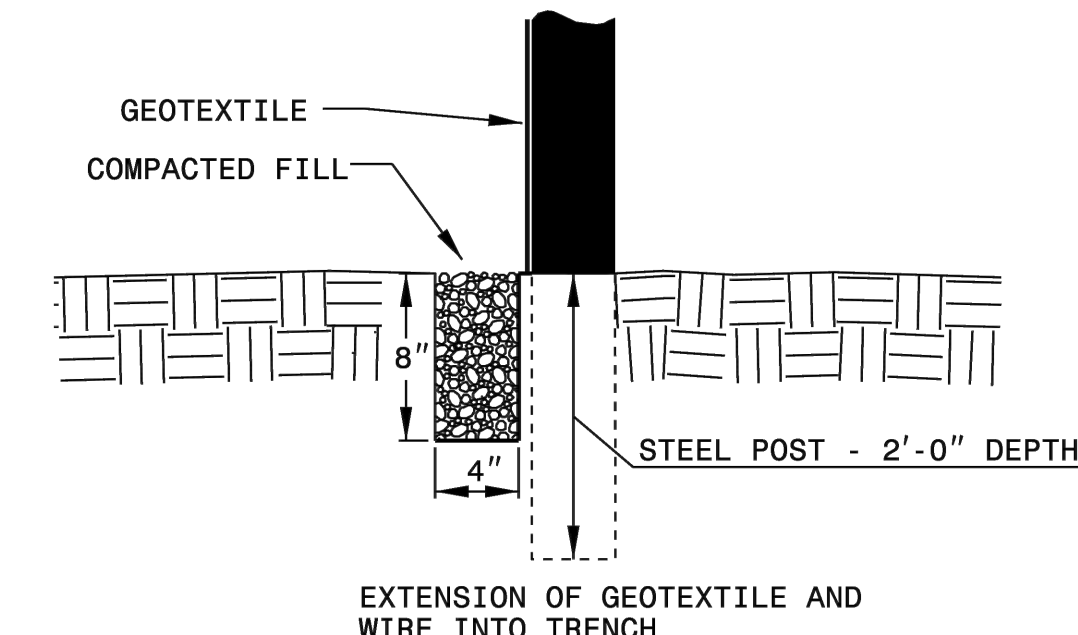
SHEET 1 OF 1  
**1607.01**

**1**  
DT-5  
**GRAVEL CONSTRUCTION ENTRANCE**  
NOT TO SCALE

- MAINTENANCE REQUIREMENTS:**
1. GRAVEL CONSTRUCTION ENTRANCES MUST BE MAINTAINED PER THE NCDOT EROSION AND SEDIMENT CONTROL MANUAL.
  2. GRAVEL CONSTRUCTION ENTRANCES MUST BE MAINTAINED IN A CONDITION TO PREVENT TRACKING OR DIRECT FLOW OF SEDIMENT ONTO ADJACENT ROADWAYS.



- NOTES**
- USE GEOTEXTILE A MINIMUM OF 36" IN WIDTH AND FASTEN ADEQUATELY TO THE POSTS AND WIRE AS DIRECTED. USE WIRE A MINIMUM OF 32" IN WIDTH AND WITH A MINIMUM OF 5 LINE WIRES WITH 12" VERTICAL SPACING.
- PROVIDE 5'-0" STEEL POST OF THE SELF-FASTENER ANGLE STEEL TYPE.
- FOR MECHANICAL SLICING METHOD INSTALLATION, GEOTEXTILE SHALL BE A MAXIMUM OF 18" ABOVE GROUND SURFACE.



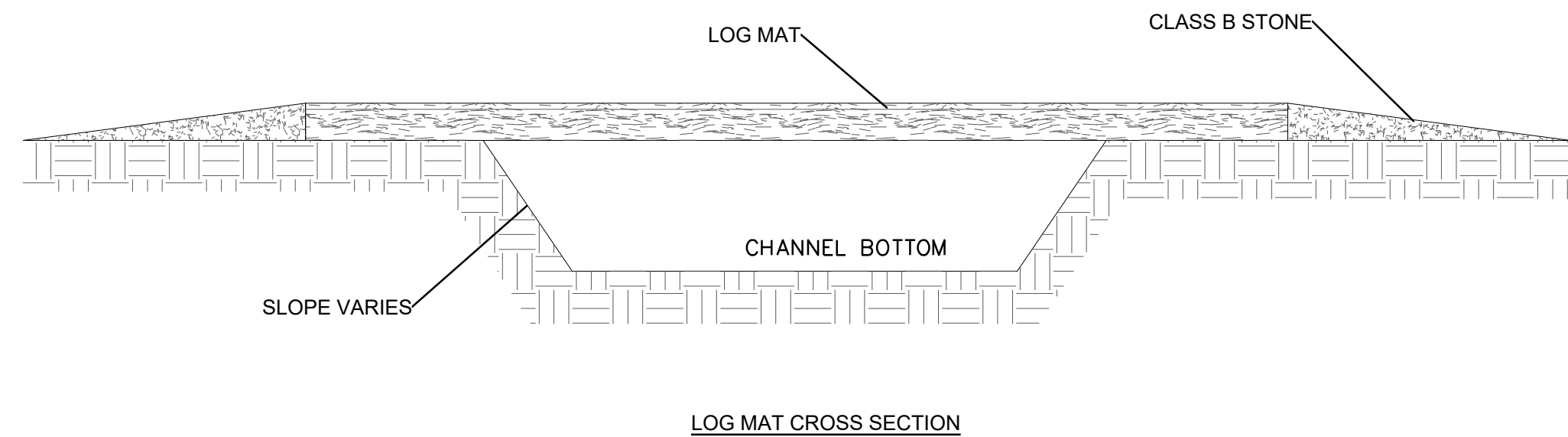
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DT-5  
**TEMPORARY SILT FENCE**  
NOT TO SCALE

- MAINTENANCE REQUIREMENTS:**
1. TEMPORARY SILT FENCE MUST BE MAINTAINED PER THE NCDOT EROSION AND SEDIMENT CONTROL MANUAL.
  2. AT A MINIMUM, REMOVE AND DISPOSE OF ALL SILT ACCUMULATION WHEN THE DEPTH REACHES 1/2 OF THE HEIGHT OF THE MAT. DO NOT UNDERMINE DURING CLEANOUT.

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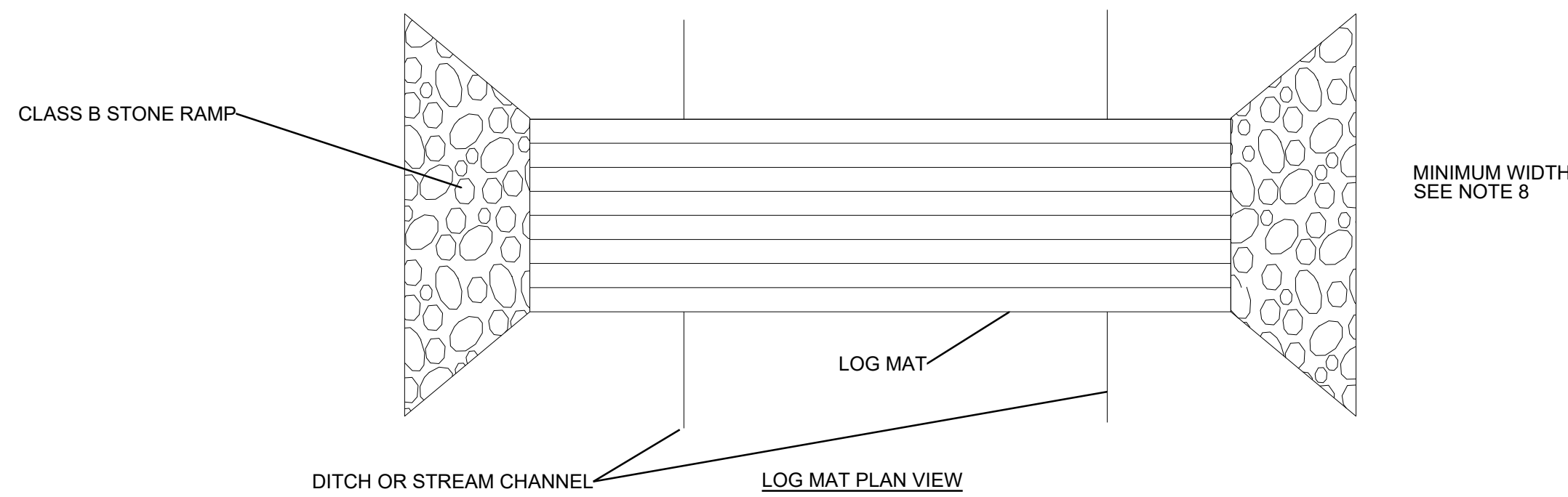
ROADWAY STANDARD DRAWING FOR  
**TEMPORARY SILT FENCE**

SHEET 1 OF 1  
**1605.01**



- NOTES:**
1. CONSTRUCT STREAM CROSSING WHEN FLOW IS LOW.
  2. HAVE ALL NECESSARY MATERIALS AND EQUIPMENT ON-SITE BEFORE WORK BEGINS.
  3. MINIMIZE CLEARING AND EXCAVATION OF STREAMBANKS. DO NOT EXCAVATE CHANNEL BOTTOM.
  4. LINE STREAMBANK AND ACCESS RAMP AREA WITH NON-WOVEN FILTER FABRIC.
  5. INSTALL STREAM CROSSING AT RIGHT ANGLE TO THE FLOW.
  6. MAINTAIN CROSSING SO THAT RUNOFF IN THE CONSTRUCTION ROAD DOES NOT ENTER EXISTING CHANNEL BY INSTALLING SILT FENCE ON ALL FOUR CORNERS ADJACENT TO THE STREAM. SEE SILT FENCE DETAIL.
  7. STABILIZE AN ACCESS RAMP OF CLASS B STONE TO THE EDGE OF THE MUD MAT.
  8. THE LOG MAT SHALL BE OF SUFFICIENT SIZE AND WIDTH TO SUPPORT THE LARGEST VEHICLE CROSSING THE CHANNEL.
  9. CONTRACTOR SHALL DETERMINE AN APPROPRIATE RAMP ANGLE ACCORDING TO EQUIPMENT UTILIZED, RECOMMENDED AT A 5:1 SLOPE.

**3**  
DT-5  
**LOG MAT - TEMPORARY STREAM CROSSING**  
NOT TO SCALE



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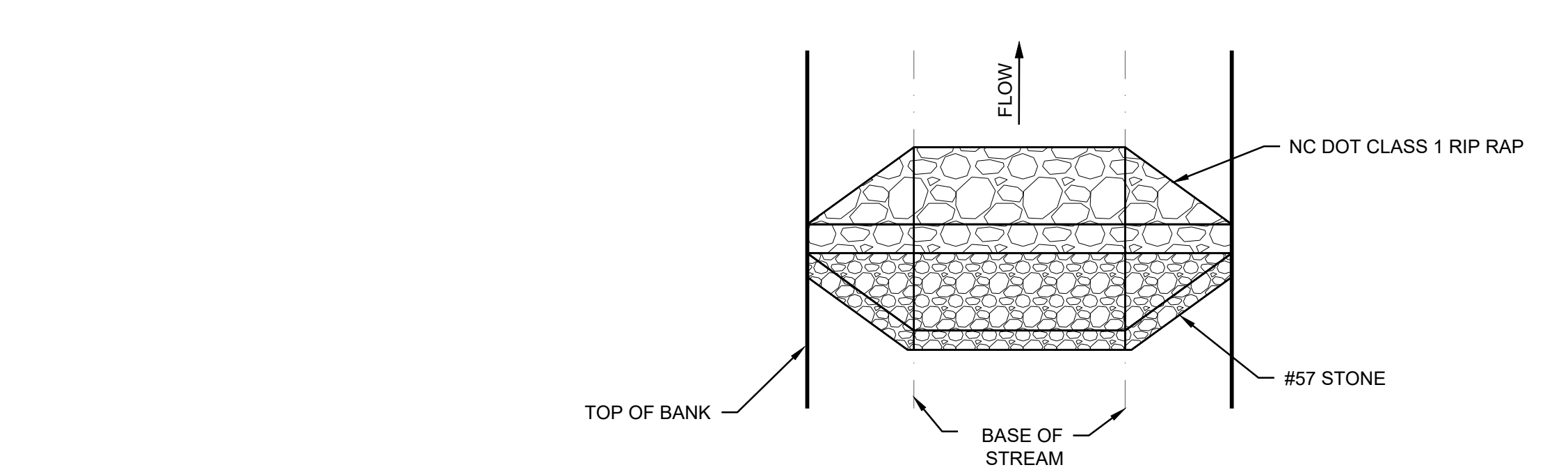
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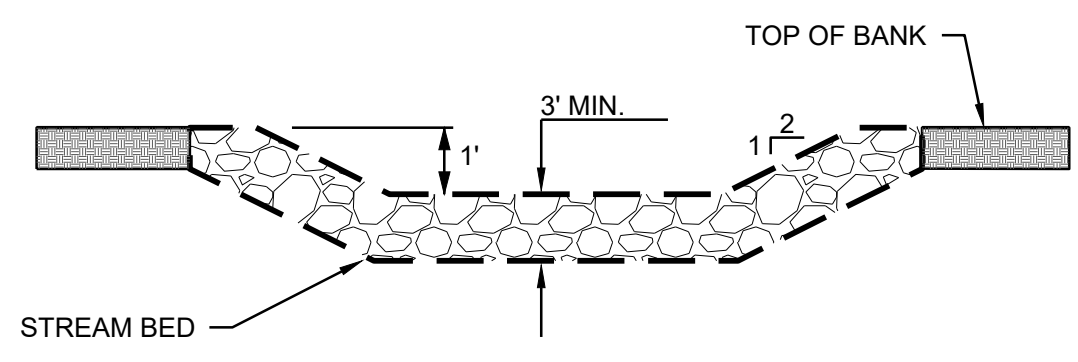
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**EROSION CONTROL DETAILS**

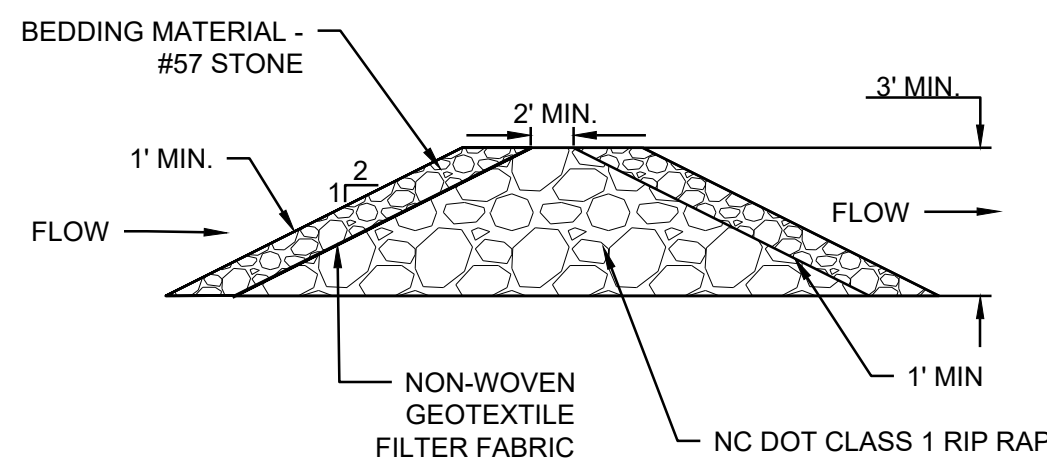
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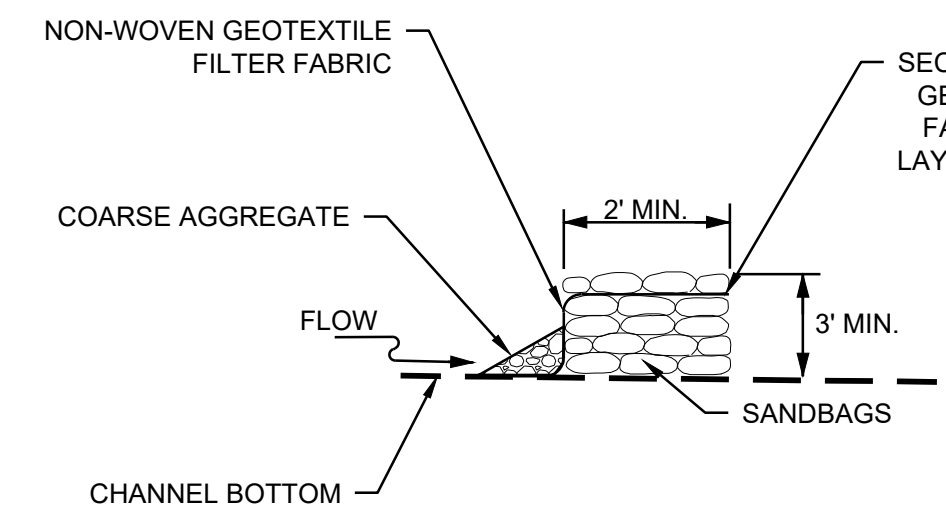
STONE IMPERVIOUS DIKE  
PLAN VIEW



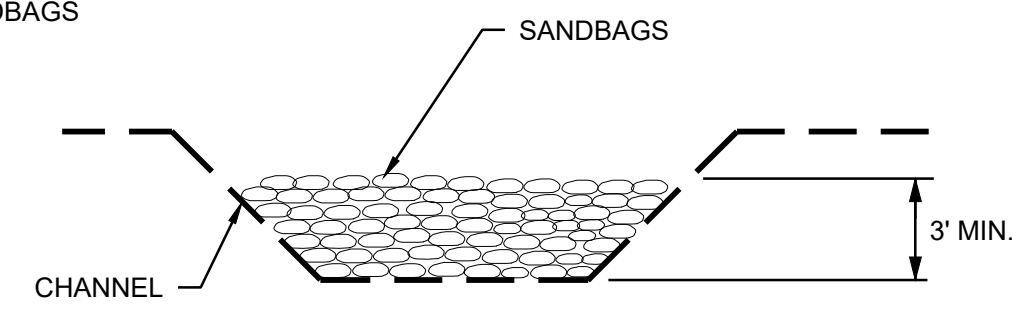
STONE IMPERVIOUS DIKE  
CROSS SECTION



STONE IMPERVIOUS DIKE  
PROFILE



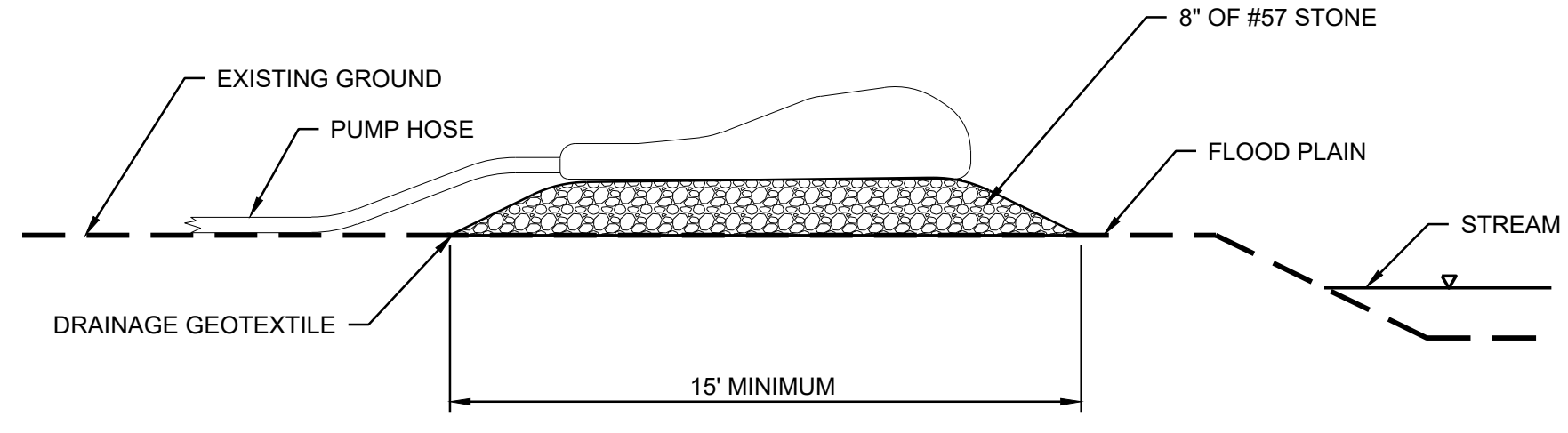
SANDBAG IMPERVIOUS DIKE  
PROFILE



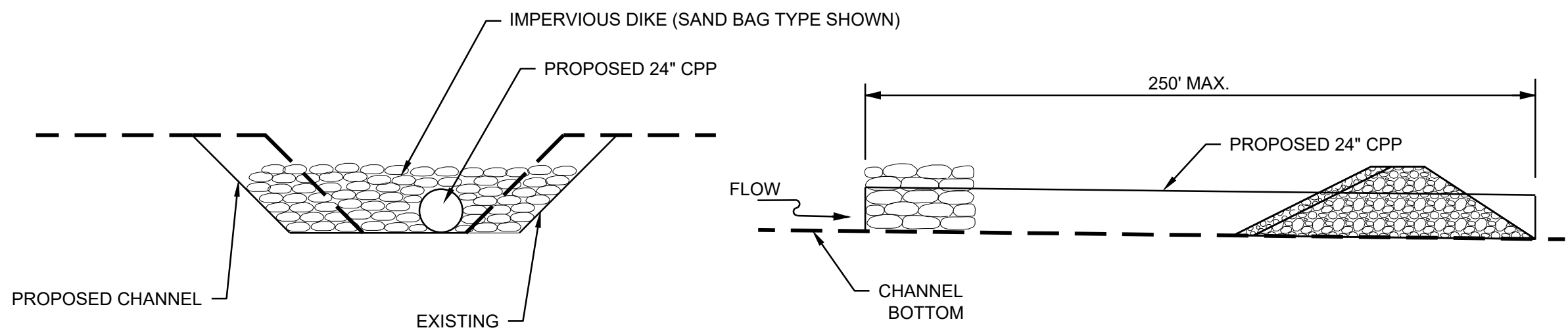
SANDBAG IMPERVIOUS DIKE  
CROSS SECTION

- NOTE:**
1. THE STRUCTURE SHALL BE USED FOR DIVERTING AND PUMPING ONLY. THE STRUCTURE SHALL BE RELOCATED OR REMOVED ONCE PUMPING/DIVERTING IS COMPLETE.
  2. EITHER TYPE OF IMPERVIOUS DIKE (SANDBAG OR STONE) MAY BE USED.

1  
DT-6 IMPERVIOUS DIKE  
NOT TO SCALE



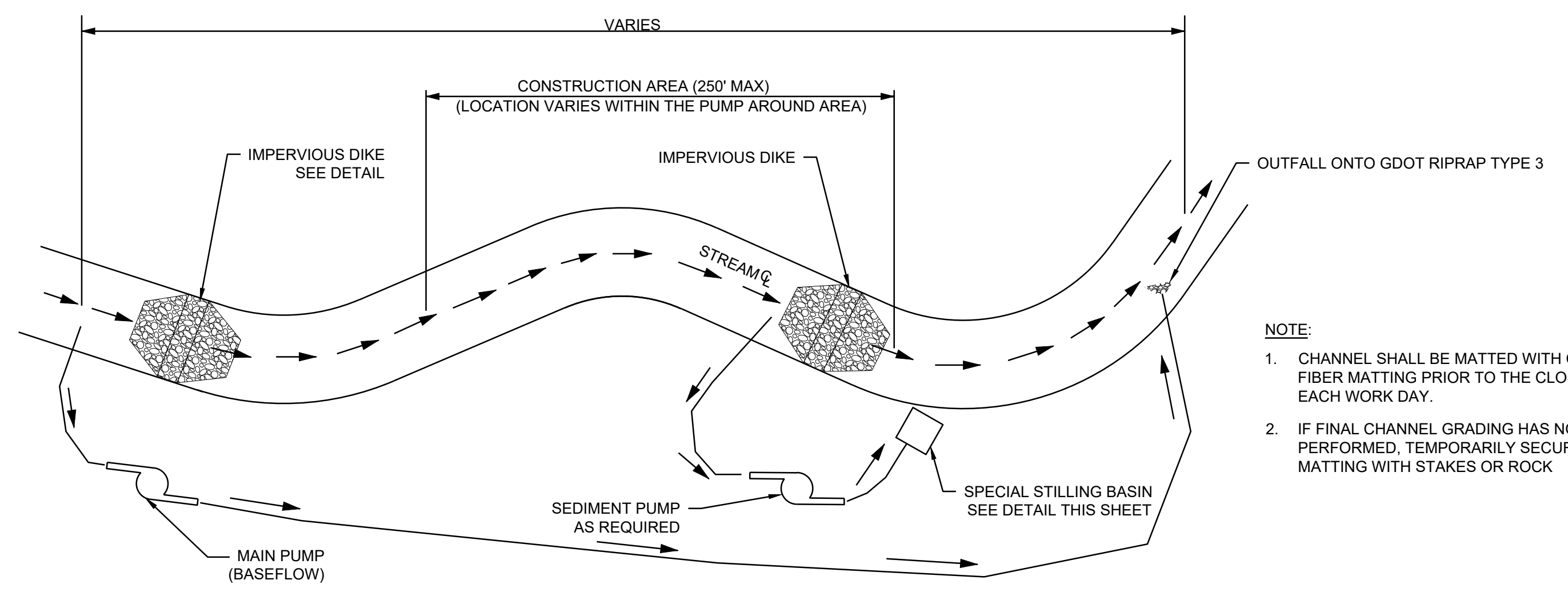
SPECIAL STILLING BASIN  
SCALE: NTS



PIPE DIVERSION CROSS SECTION

PIPE DIVERSION PROFILE

- NOTE:**
1. PIPE MUST HAVE POSITIVE DRAINAGE WHEN USING DIVERSION (0.3% TO 2.0% PIPE SLOPE IS RECOMMENDED)



PUMP-AROUND DIVERSION PLANVIEW

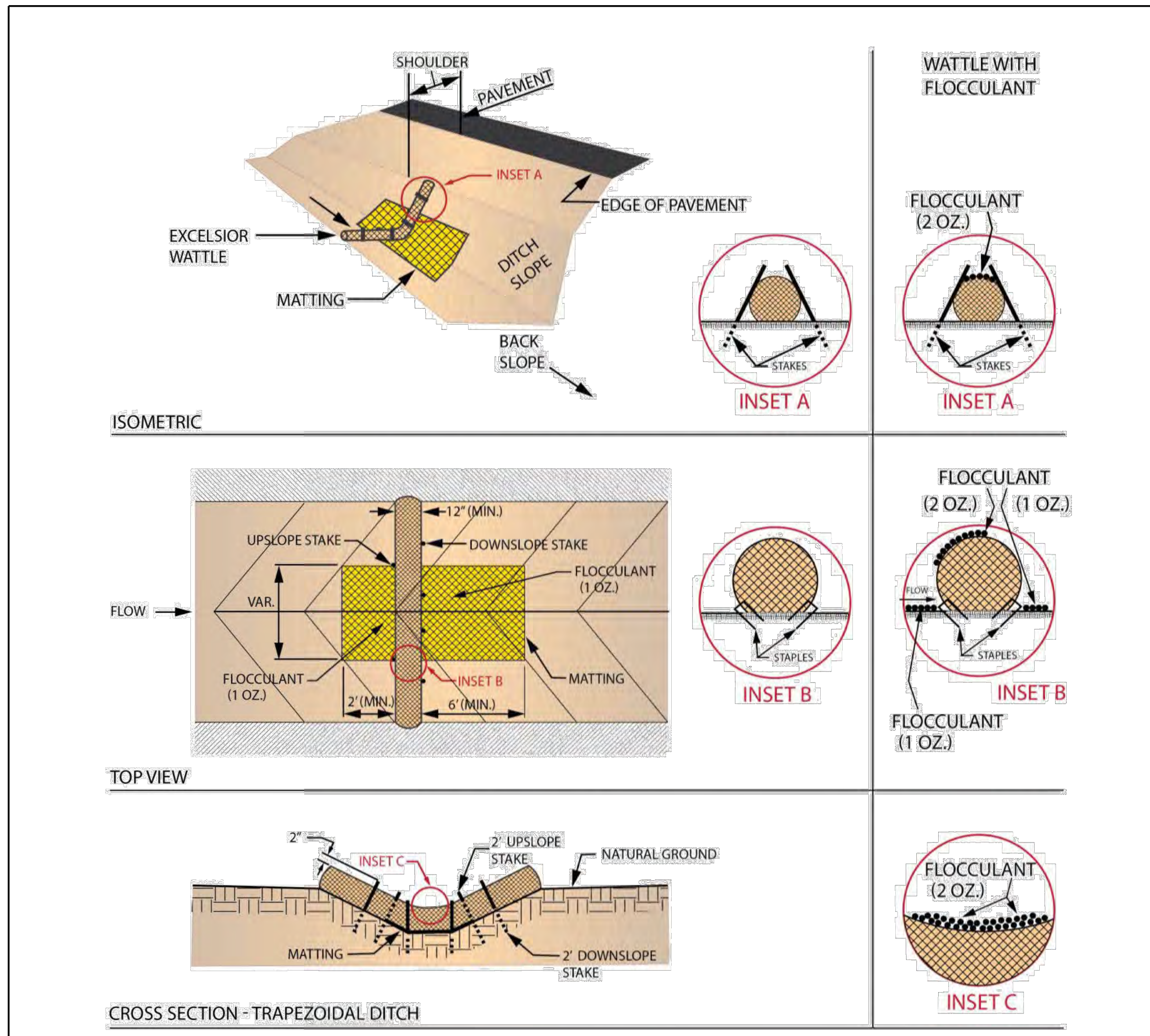
2  
DT-6 PUMP AROUND DIVERSION  
NOT TO SCALE

- NOTE:**
1. CHANNEL SHALL BE MATTED WITH COIR FIBER MATTING PRIOR TO THE CLOSE OF EACH WORK DAY.
  2. IF FINAL CHANNEL GRADING HAS NOT BEEN PERFORMED, TEMPORARILY SECURE COIR MATTING WITH STAKES OR ROCK

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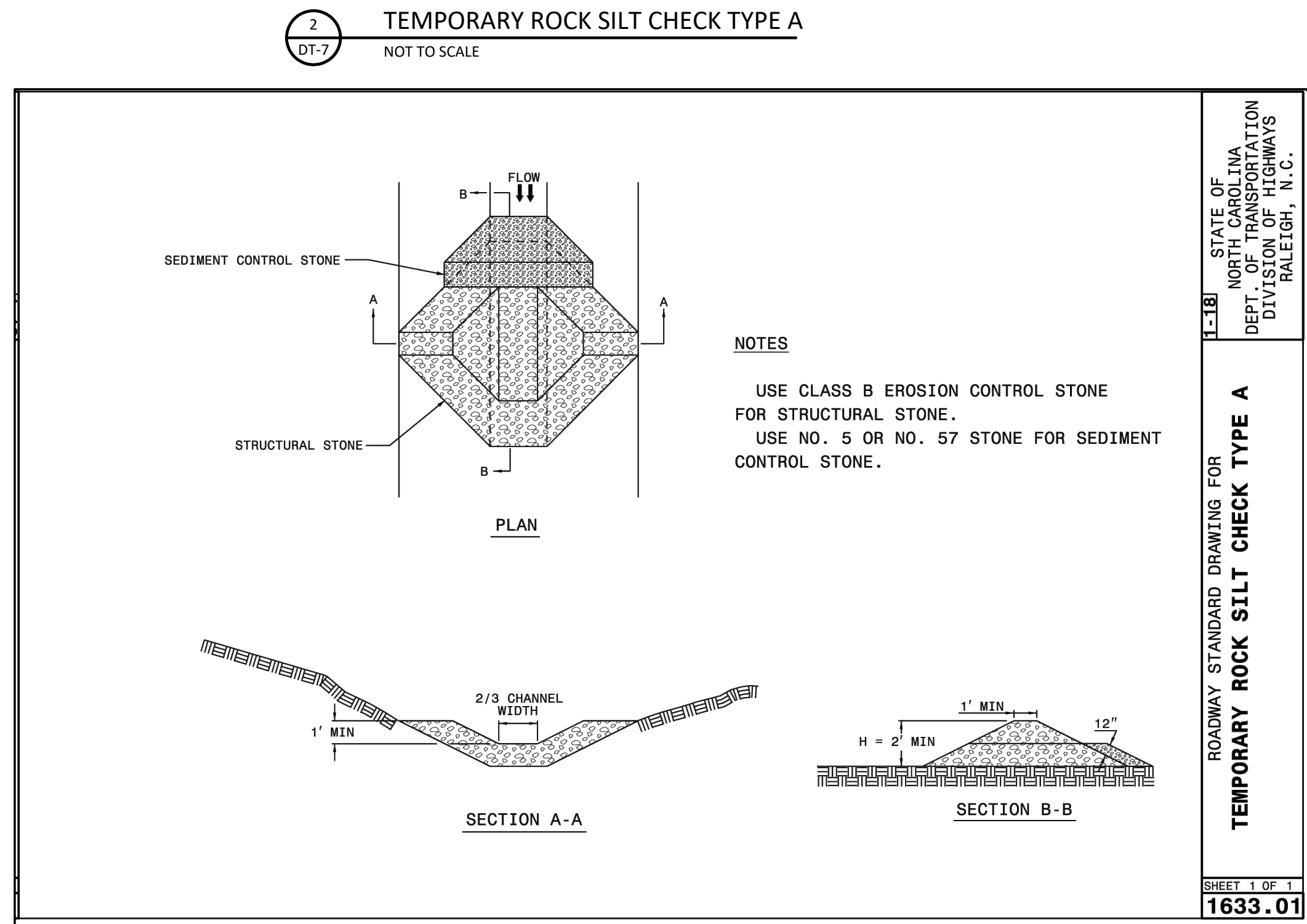


**NOTES:**

1. WATTLES SHALL BE CONSTRUCTED PER THE NCDOT EROSION AND SEDIMENT CONTROL MANUAL. THE DIAMETER SHALL BE A MINIMUM OF 12 INCHES AND A MAXIMUM OF 20 INCHES.
2. THE LENGTH SHALL BE 10 FEET.

**MAINTENANCE REQUIREMENTS:**

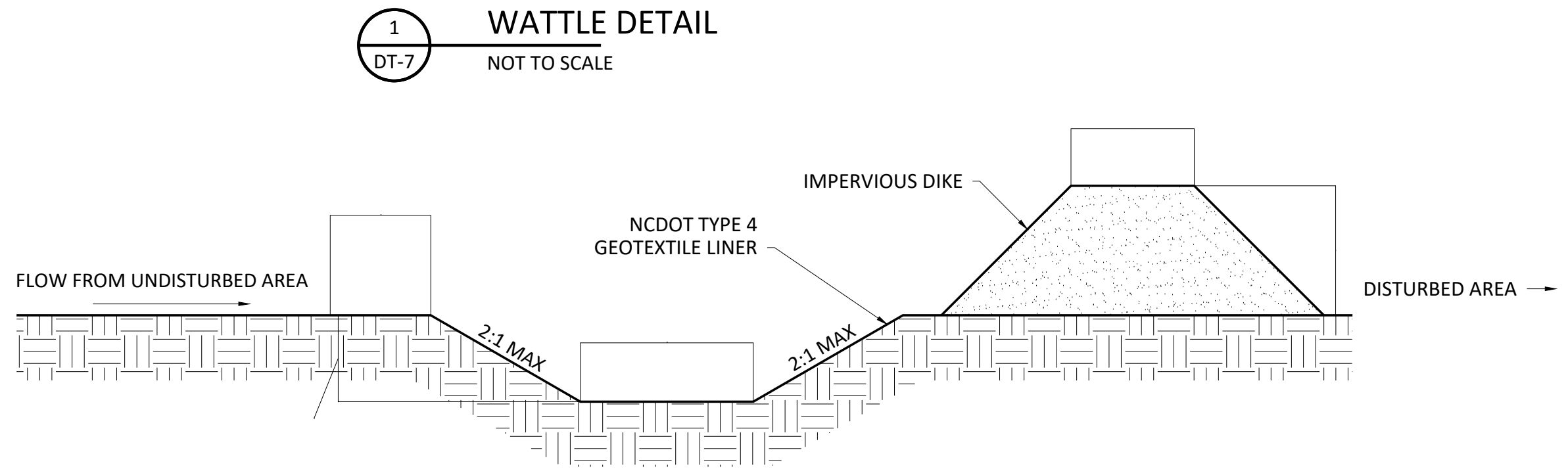
1. WATTLES SHALL BE MAINTAINED PER THE NCDOT EROSION AND SEDIMENT CONTROL MANUAL. THE UPSTREAM SIDE OF THE WATTLE SHOULD BE MAINTAINED TO ALLOW THE WATER TO FLOW THROUGH AND ALLOW SEDIMENTATION TO OCCUR. STAPLES SHOULD BE USED TO ANCHOR THE WATTLE TO THE GROUND TO PREVENT SCOURING AND WASHOUT DURING STORM EVENTS.



STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 DIVISION OF HIGHWAYS  
 RALEIGH, N.C.

ROADWAY STANDARD DRAWING FOR  
**TEMPORARY ROCK SILT CHECK TYPE A**

SHEET 1 OF 1  
**1633.01**



**MAINTENANCE REQUIREMENTS:**

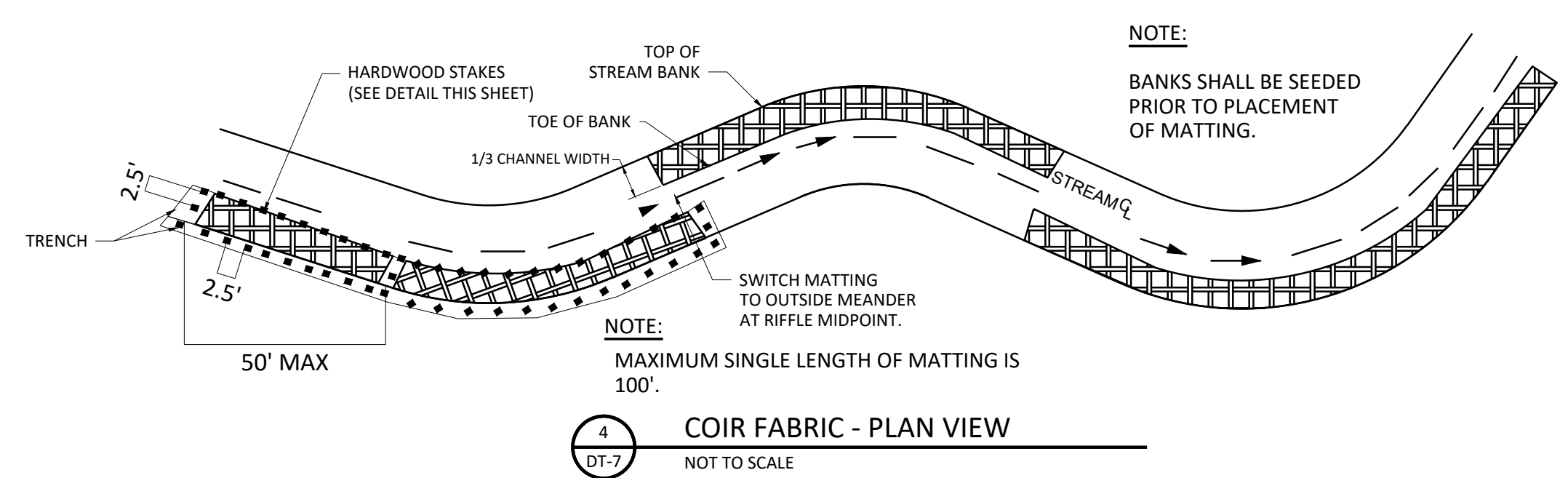
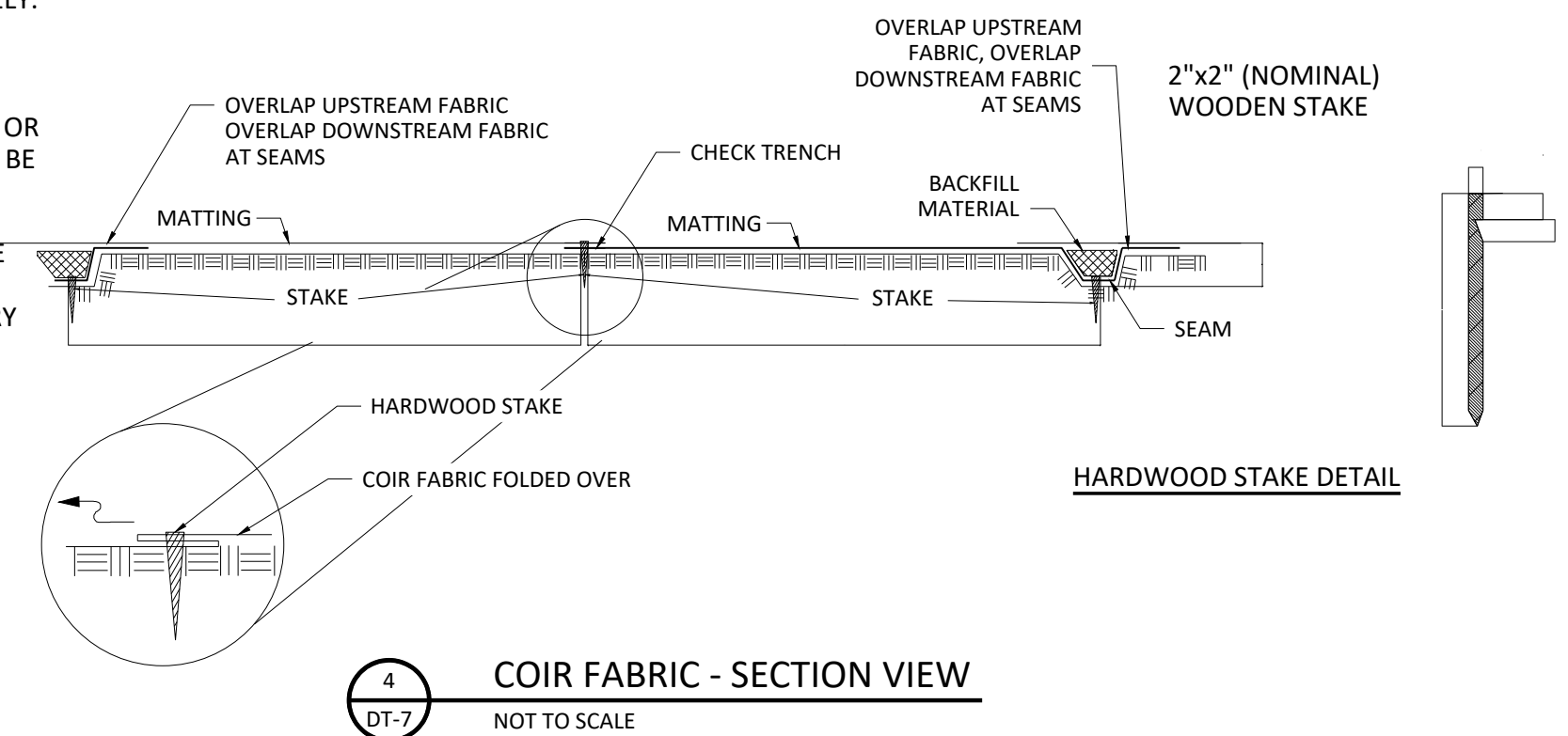
1. CLEAN WATER DIVERSION MUST BE MAINTAINED PER THE NCDOT EROSION AND SEDIMENT CONTROL MANUAL.
2. CONFIRM THAT THE GEOTEXTILE IS KEYED IN PROPERLY.

**NOTES:**

1. DIVERSION TO BE USED UPSLOPE OF A CONSTRUCTION SITE TO PREVENT STORM RUNOFF FROM ENTERING THE DISTURBED AREA.
2. IMMEDIATELY LINE AND STABILIZE BEFORE ANY DOWNSLOPE GRADING BEGINS (STABILIZATION MUST OCCUR BEFORE ISSUANCE OF A CERTIFICATE OF COMPLIANCE). STABILIZATION METHOD IS BASED ON VELOCITY OF OFFSITE DRAINAGE.
3. DIVERSIONS SHOULD ONLY BE USED FOR DRAINAGES 5 ACRES OR LESS.
4. ANY SEDIMENT LADEN WATER PRIOR TO STABILIZATION OF THE DIVERSION MUST BE DIVERTED INTO AN APPROVED EROSION AND SEDIMENT CONTROL BMP. CLEAN WATER SHOULD EMPTY INTO AN APPROVED OUTLET DEVICE.
5. NCDOT TYPE 4 GEOTEXTILE FABRIC TO BE USED TO STABILIZE ALL CLEAN WATER DIVERSION SLOPES. SEE COIR MATTING DETAIL FOR MAINTENANCE.

**MAINTENANCE REQUIREMENTS:**

1. INSPECT ROLLED EROSION CONTROL PRODUCTS AT LEAST WEEKLY AND AFTER EACH SIGNIFICANT (1/2 INCH OR GREATER) RAINFALL EVENT, REPAIR IMMEDIATELY.
2. GOOD CONTACT WITH THE GROUND MUST BE MAINTAINED AND EROSION MUST NOT OCCUR BENEATH THE MATTING.
3. ANY AREAS OF THE MATTING THAT ARE DAMAGED OR NOT IN CLOSE CONTACT WITH THE GROUND SHALL BE REPAIRED AND STAPLED.
4. IF EROSION OCCURS DUE TO POORLY CONTROLLED DRAINAGE, THE PROBLEM SHALL BE FIXED AND THE ERODED AREA PROTECTED.
5. MONITOR AND REPAIR THE MATTING AS NECESSARY UNTIL GROUND COVER IS ESTABLISHED.



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NC DIVISION OF MITIGATION SERVICES  
**COW BRANCH MITIGATION SITE**  
 NCDMS PROJECT #: 100196

**EROSION CONTROL DETAILS**

NO.	ISSUE	DATE	BY	FILE NAME
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VERIFY SCALE: 1" = 100'

DT-7

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Riparian Area Including Wetland Cells (801504.0 square feet, 18.40 acres)													
Planting Stock	Scientific Name	Common Name	Stratum	Wildlife Value	Wetland Indicator Status	Planting Quantity				Riparian Area	Total	Percent Composition	Remarks
						Wetland A (1.4 acres)	Wetland B (1.1 acres)	Wetland C (4.8 acres)	Wetland D (11.1 acres)				
	<i>Taxodium distichum</i>	Bald cypress	Overstory	Seed food source for wood duck, turkey, grosbeak, squirrels, waterfowl, and wading birds. Mature trees provide nesting habitat for wildlife.	OBL	124	98	426	985	859	2491	15%	
	<i>Nyssa biflora</i>	Swamp tupelo	Overstory	Attracts pollinators, soft mast food source for birds and herbivores, nesting	OBL	124	98	426	985	859	2491	15%	
	<i>Quercus nigra</i>	Water oak	Overstory	Hard mast food source for game birds, medium and large herbivores, nesting	FAC	83	65	284	657	573	1661	10%	
	<i>Quercus laurifolia</i>	Laurel oak	Overstory	Hard mast food source for game birds, medium and large herbivores, nesting	FACW	83	65	284	657	573	1661	10%	
	<i>Chamaecyparis thuyoides</i>	Atlantic white cedar	Understory	Provides cover, supports Hessel's Hairstreak larvae. Medium herbivore food source.	OBL	124	98	426	985	859	2491	15%	
BARE ROOT	<i>Clethra alnifolia</i>	Sweet pepperbush	Understory	Attracts pollinators, soft mast food source for birds and small herbivores, nesting	FACW	66	52	227	525	458	1329	8%	Planted on 9-ft centers, with species randomly distributed.
	<i>Persea borbonia</i>	Red bay	Understory	Winter cover and nesting. Supports Palamedes Swallowtail larvae. Soft mast food source for small to large herbivores and bear, songbirds, turkey, quail.	FACW	41	33	142	328	286	830	5%	
	<i>Ilex coriacea</i>	Large gallberry	Understory	Attracts pollinators, soft mast food source for small herbivores and birds.	FACW	66	52	227	525	458	1329	8%	
	<i>Ilex opaca</i>	American holly	Understory	Larval host for Henry's Elfin larvae. Soft mast food source for song birds, turkey, quail, deer, squirrels. Provides winter cover.	FAC	33	26	114	263	229	664	4%	
	<i>Cyrilla racemiflora</i>	Swamp titi	Understory	Attracts pollinators, soft masts food source for mammals and birds.	FACW	41	33	142	328	286	830	5%	
	<i>Vaccinium corymbosum</i>	Highbush blueberry	Understory	Soft mast food source for birds, medium and large mammals	FACW	41	33	142	328	286	830	5%	

1  
DT-8

RIPARIAN WETLAND PLANT LIST

NOT TO SCALE

Nonriparian Wetland Cells (205242.3 square feet, 4.71 acres)								
Planting Stock	Scientific Name	Common Name	Stratum	Wildlife Value	Wetland Indicator Status	Total	Percent Composition	Remarks
	<i>Nyssa biflora</i>	swamp tupelo	Overstory	Seed food source for wood duck, turkey, grosbeak, squirrels, waterfowl, and wading birds. Mature trees provide nesting habitat for wildlife.	OBL	502	18%	
	<i>Taxodium distichum</i>	baldcypress	Overstory	Attracts pollinators, soft mast food source for birds and herbivores, nesting	OBL	418	15%	
	<i>Quercus nigra</i>	water oak	Overstory	Hard mast food source for game birds, medium and large herbivores, nesting	FAC	279	10%	
	<i>Quercus laurifolia</i>	laurel oak	Overstory	Hard mast food source for game birds, medium and large herbivores, nesting	FACW	279	10%	
BARE ROOT	<i>Chamaecyparis thuyoides</i>	atlantic white ced	Understory	Provides cover, supports Hessel's Hairstreak larvae. Medium herbivore food source.	OBL	502	18%	Planted on 9-ft centers, with species randomly distributed.
	<i>Cyrilla racemiflora</i>	American titi	Understory	Attracts pollinators, soft mast food source for birds and small herbivores, nesting	FACW	223	8%	
	<i>Magnolia virginiana</i>	sweet bay	Understory	Winter cover and nesting. Supports Palamedes Swallowtail larvae. Soft mast food source for small to large herbivores and bear, songbirds, turkey, quail.	FACW	167	6%	
	<i>Persea borbonia</i>	red bay	Understory	Attracts pollinators, soft masts food source for mammals and birds.	FACW	139	5%	
	<i>Lyonia lucida</i>	fetterbush	Understory	Winter cover and nesting, attracts pollinators	FACW	139	5%	
	<i>Sambucus nigra</i>	elderberry	Understory	Attracts pollinators, fruits eaten by songbirds and mammals, nesting and cover for quail and pheasants.	FACW	139	5%	

2  
DT-8

NONRIPARIAN WETLAND PLANT LIST

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NC DIVISION OF MITIGATION SERVICES  
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 NCDMS PROJECT #: 100196

PLANTING PLAN

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MITIGATION PLAN



WOODY PLANTING								
Nonriparian Wetland Cells (45009.5 square feet, 1.03 acres)								
Planting Stock	Scientific Name	Common Name	Stratum	Wildlife Value	Wetland Indicator Status	Total	Percent Composition	Remarks
LIVE STAKES	<i>Salix caroliniana</i>	Carolina willow	Shrub	Attracts pollinators, only native larval host for viceroy butterfly. Also larval host for Eastern Tiger Swallowtail. Wildlife cover and nesting, browse for mammals.	OBL	1100	20%	Planted on 3-ft centers, with species randomly distributed.
	<i>Cornus amomum</i>	Silky dogwood	Shrub	Pollinator food source, fruits eaten by songbirds, grouse, quail, turkey, large mammals. Wildlife cover and nesting.	OBL	1100	20%	
	<i>Lephalanthus occidentalis</i>	Buttonbush	Shrub	Attracts hummingbirds, butterflies, and bees. Food source for waterfowl and songbirds.	FAC	1100	20%	
	<i>Sambucus nigra</i>	Elderberry	Shrub	Attracts pollinators, fruits eaten by songbirds and mammals, nesting and cover for quail and pheasants.	FACW	1100	20%	
	<i>Physocarpus opulifolius</i>	Ninebark	Shrub	Attracts pollinators and birds.	FACW	1100	20%	

3  
 DT-8  
 LIVE STAKE PLANT LIST  
 NOT TO SCALE

HERBACEOUS PLANTING			
All Disturbed Area (1473345.9 square feet, 33.82 acres)			
TEMPORARY SEEDING	Warm Season (May 15 - Aug 15) - German Millet Cool Season (Aug 15 - May 15) - Virginia Rye		Apply at 40 lbs/acre to all disturbed areas
PERMANENT SEEDING	Scientific Name	Common Name	% by Weight
	<i>Bidens aristosa</i>	Showy tickseed	7
	<i>Carex vulpinoidea</i>	Fox sedge	12
	<i>Dichanthelium clandestinum</i>	Deertongue	8
	<i>Elymus virginicus</i>	Virginia wildrye	20
	<i>Juncus effusus</i>	Soft rush	4
	<i>Panicum dichotomiflorum</i>	Smooth panicgrass	14
	<i>Panicum rigidulum</i>	Redtop panicgrass	8
	<i>Panicum virgatum</i>	Switchgrass	23
	<i>Polygonum pensylvanicum</i>	Pennsylvania smartweed	2
	<i>Sparganium americanum</i>	Eastern bur reed	2

4  
 DT-8  
 HERBACEOUS PLANT LIST  
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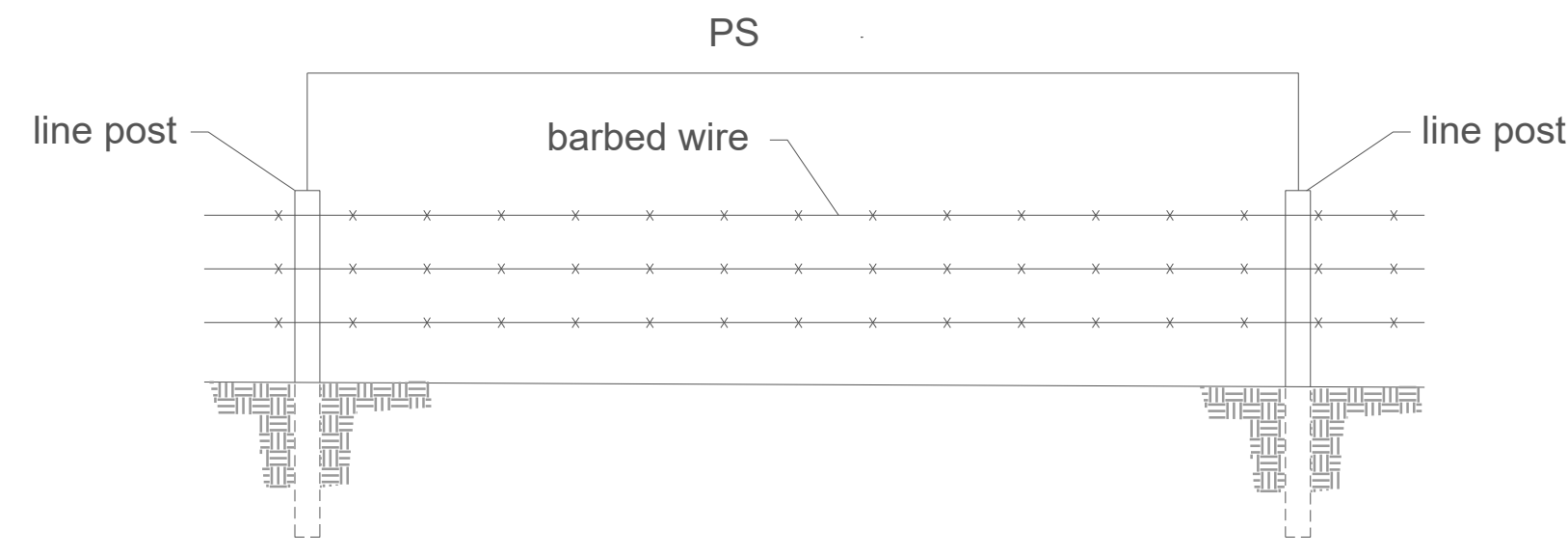
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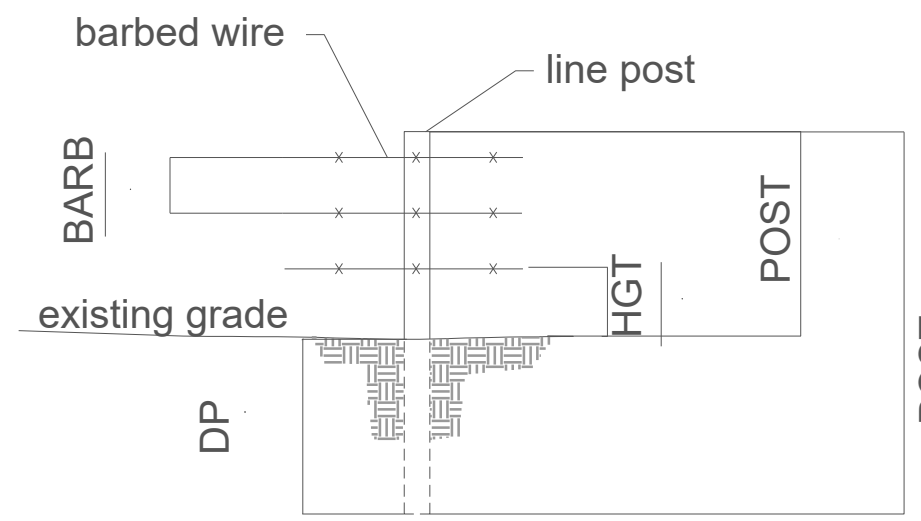
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LINE PANEL



BARBED WIRE ASTM Class 3 galvanized, double strand. Standard wire min. 12 1/2 gauge. High-tensile wire min. 15 1/2 gauge.

Number of wires needed:      WIRE

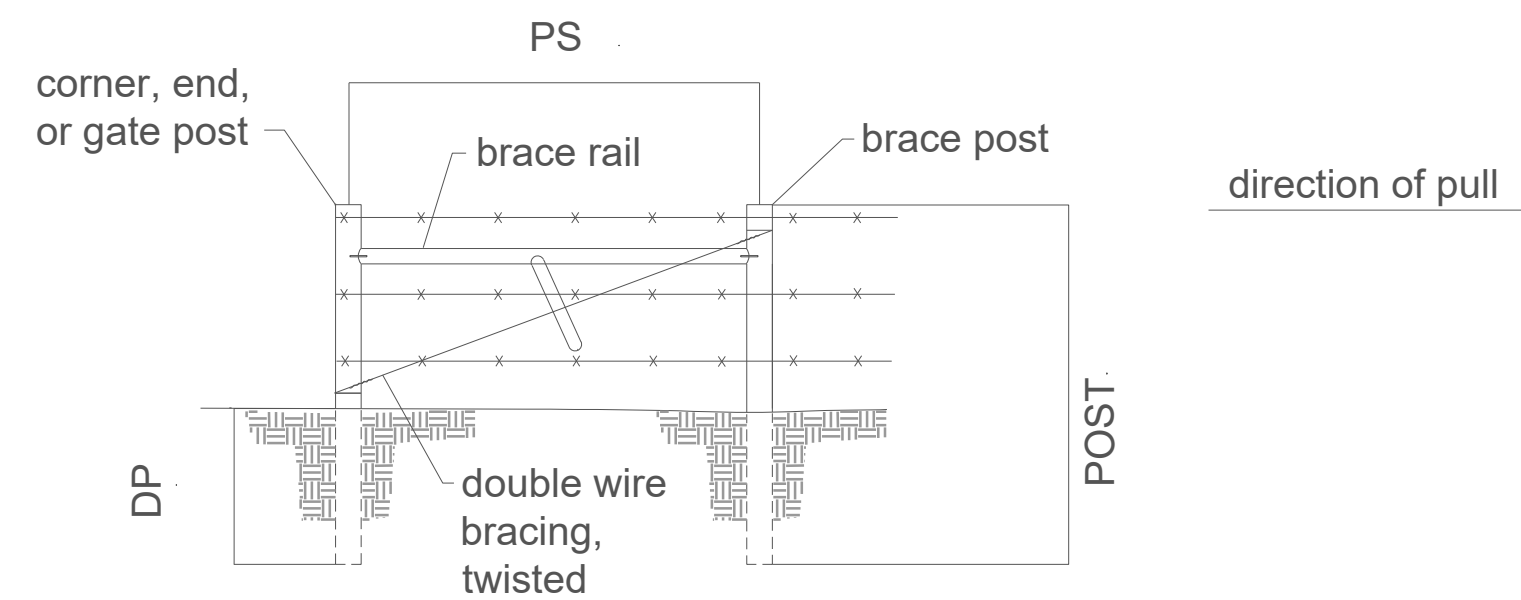
Spacing at      SP inches above the ground.

1 BARBED WIRE DETAIL  
DT-9 NOT TO SCALE

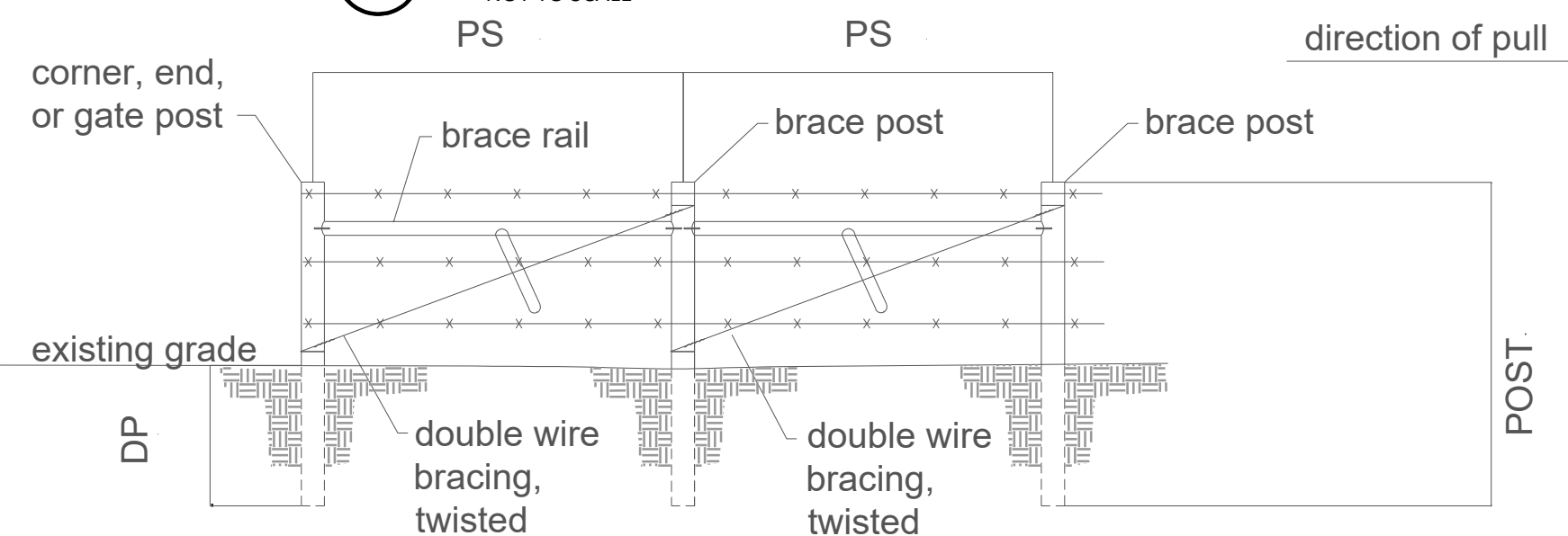
Line posts (wooden): min. 4 in. diam. or 4 in. square.

Line posts (steel): studded or punched T, U, or Y shaped, with anchor plates. Min. weight 1.3 lbs./ft. (excluding anchor plate).

SPECIES AND TREATMENT FOR ALL WOOD: Use untreated durable posts of species such as red cedar, black locust or osage-orange with bark removed, or non-durable wood that is preservative pressure treated (0.40 lbs./cubic foot CCA, or equivalent non-CCA treatment). Do not use red pine.



4 SINGLE SPAN BRACE ASSEMBLY (AT CORNERS, ENDS OR GATES)  
DT-9 NOT TO SCALE



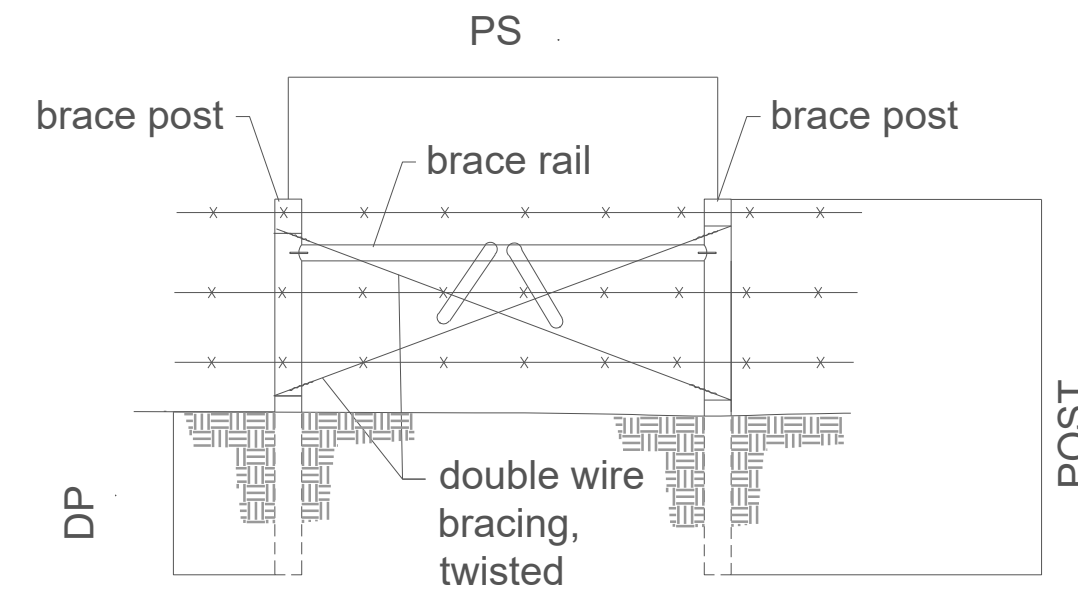
5 DOUBLE SPAN BRACE ASSEMBLY (AT CORNERS, ENDS OR GATES)  
DT-9 NOT TO SCALE

All corner, end, and gate posts: min. 6 in. diam. or 6 in. square.

All brace posts: min. 5 in. diam. or 5 in. square.

Brace rails (steel): min. 2 in. diam. Brace rails (wooden): min. 3 1/2 in. diam. or 4 in. square.

SPECIES AND TREATMENT FOR ALL WOOD: Use untreated durable posts of species such as red cedar, black locust or osage-orange with bark removed, or non-durable wood that is preservative pressure treated (0.40 lbs./cubic foot CCA, or equivalent non-CCA treatment). Do not use red pine.



2 SINGLE SPAN LINE BRACE ASSEMBLY  
DT-9 NOT TO SCALE

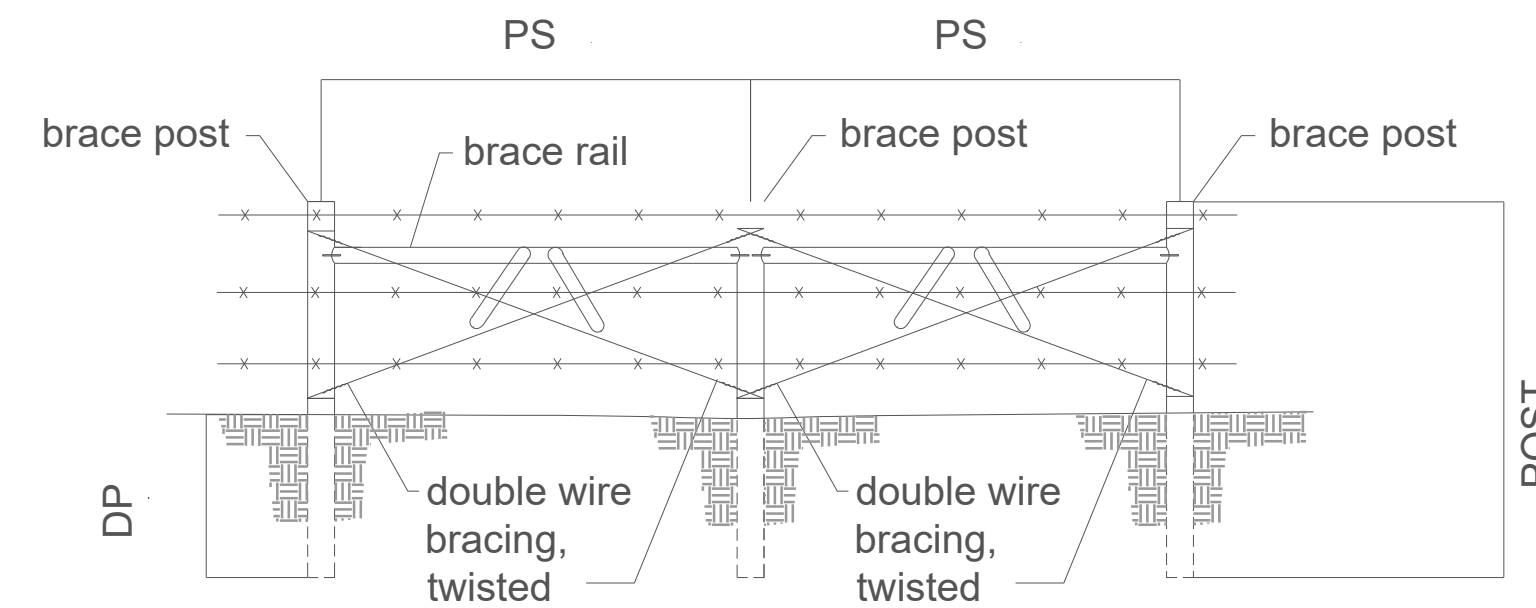
All corner, end, and gate posts: min. 6 in. diam. or 6 in. square.

All brace posts: min. 5 in. diam. or 5 in. square.

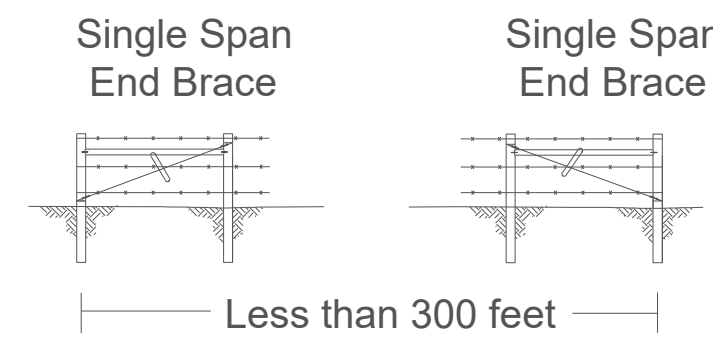
Brace rails (steel): min. 2 in. diam. Brace rails (wooden): min. 3 1/2 in. diam. or 4 in. square.

SPECIES AND TREATMENT FOR ALL WOOD: Use untreated durable posts of species such as cedar, black locust or osage-orange with bark removed, or non-durable wood that is preservative pressure treated (0.40 lbs./cubic foot CCA, or equivalent non-CCA treatment). Do not use red p

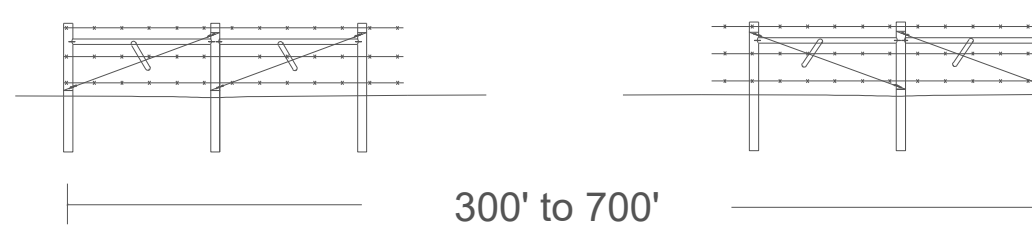
1. Use single span brace assemblies for runs of fence that are less than 300 feet between corner, end, and/or gate posts.



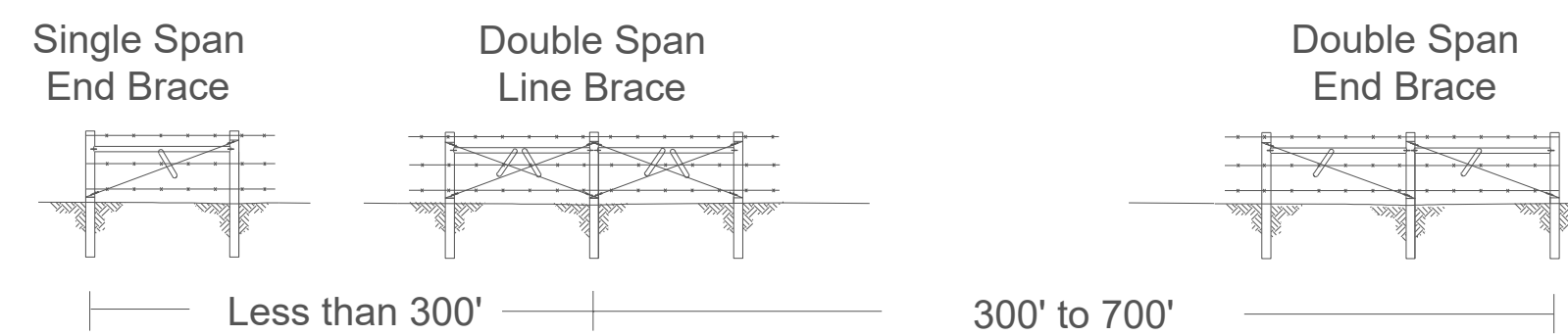
3 DOUBLE SPAN LINE BRACE ASSEMBLY  
DT-9 NOT TO SCALE



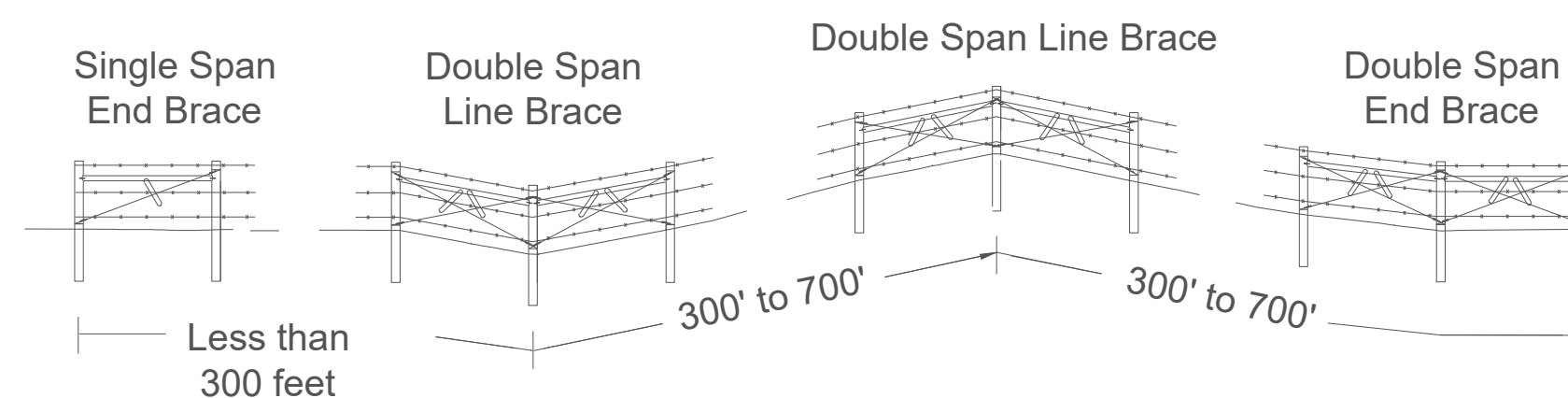
2. Use double span brace assemblies for runs of fence that are 300 to 700 feet between corner, end, and/or gate posts.



3. Use line braces to divide fence lengths where runs of fence are more than 700 feet long. A run is the distance between a corner, end or gate post and the next corner, end, or gate post.



4. On uneven terrain, locate line braces at the top and bottom of each hill.



6 USING BRACES  
DT-9 NOT TO SCALE

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NCDMS PROJECT #: 100196

FENCE DETAILS

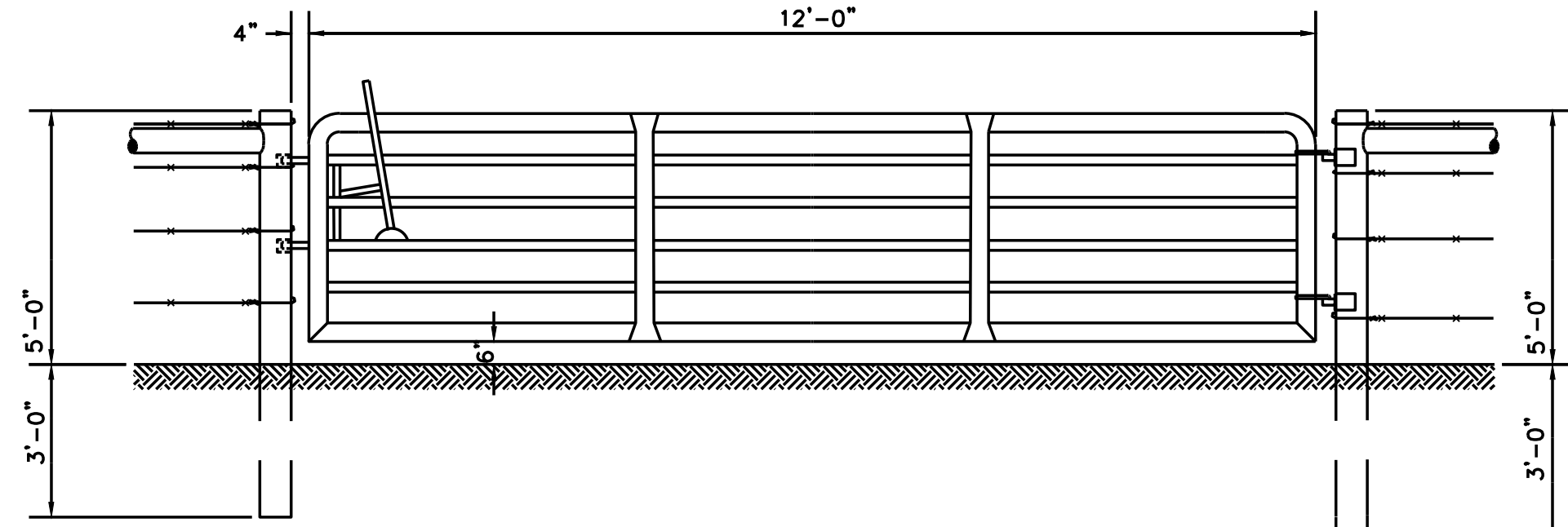
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MITIGATION PLAN

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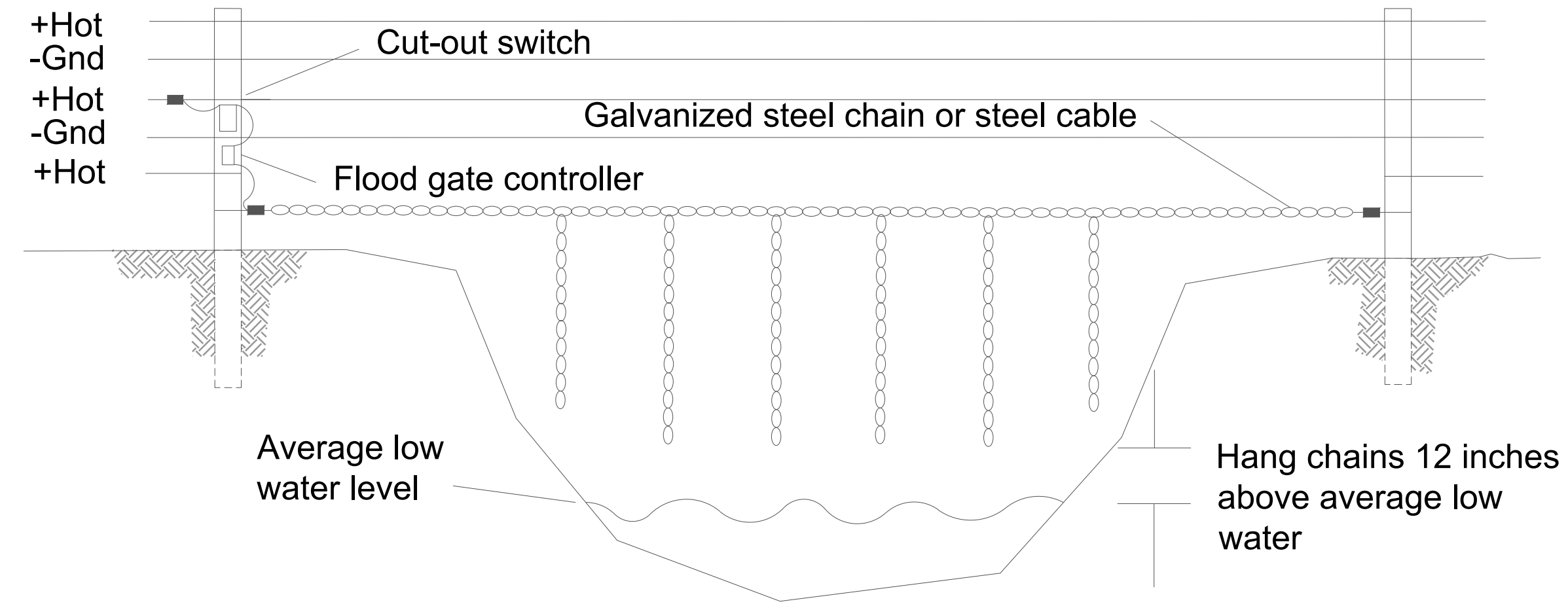
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1 STEEL FRAME GATE  
 DT-10 NOT TO SCALE

**NOTES:**

1. Post height dimension shall be the same as required for the adjacent fence.
2. Construct on end or stress panel, as required in the specifications, on each side of gate.
3. Hinges and locks shall be installed as specified by gate manufacturer.



2 ELECTRIFIED CHAIN FLOOD GATE  
 DT-10 NOT TO SCALE

Stretch a galvanized chain or steel cable between two fence posts (one on each side of the stream). Attach lengths of galvanized chain so that they hang approximately 12 inches above the elevation of average low water. Space the vertical sections of chain 12 inches apart.

Install a flood gate controller (energy limiter) between the hot wire of the fence and the flood gate. The controller will limit the amount of power supplied to the gate during flooding, so that the fence will continue to have high voltage. If extended flooding is likely, installation of a cut-out switch is recommended.

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 North Carolina Registered Engineering Firm C-3916

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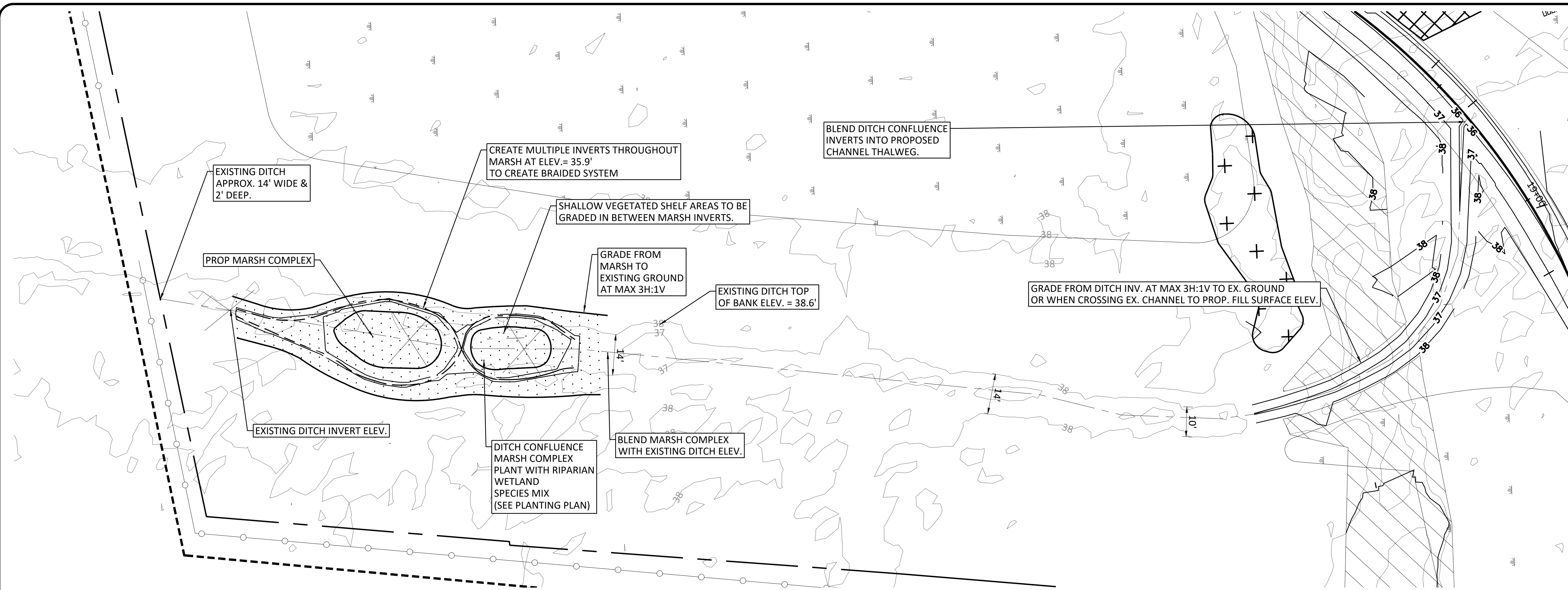
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				DESIGNED	###
				DRAWN	###
				REVISED	###
				CHECKED	###
				FILE NAME	DETAILS.dwg
	VERIFY SCALE				
	0				
	1				
	Bar is one inch on original drawing. If not one inch on this sheet, adjust scale.				

SHEET DT-10  
 SEQ. #####

MITIGATION PLAN



NOTES:  
 1. CONTRACTOR SHALL VERIFY LOCATION AND DEPTH OF ALL UTILITIES PRIOR TO BEGINNING OF CONSTRUCTION.

1 DITCH CONFLUENCE MARSH COMPLEX  
 DT-11 NOT TO SCALE

Freese and Nichols, Inc.  
 North Carolina Registered Engineering Firm C-3936

**NOT FOR CONSTRUCTION**  
 THIS DOCUMENT IS RELEASED FOR THE PURPOSE OF INTERIM REVIEW UNDER THE AUTHORITY OF BRIAN M. DICK, P.E., PEIN 0000000000. IT IS NOT TO BE USED FOR CONSTRUCTION, BIDDING OR PERMIT PURPOSES.

**FREES & NICHOLS**  
 531 N. Liberty Street  
 Winston-Salem, NC 27101  
 Phone - (336) 790-6744  
 Web - www.freese.com

NC DIVISION OF MITIGATION SERVICES  
**COW BRANCH MITIGATION SITE**  
 NCDMS PROJECT #: 100196  
**STREAM RESTORATION  
 DETAILS**

NO.	ISSUE	BY	DATE	FRN JOB NO.
DESIGNED	###		2/19/2024	NCM21211
DRAWN	###			
REVISED	###			
CHECKED	###			
FILE NAME	DT-11-MARSH COMPLEX.dwg			

VERIFY SCALE: Bar is one inch on original drawing. If not one inch on this sheet, adjust scale.

0 1

SHEET **DT-11**  
 SEQ.

## **Appendix J**

### **Maintenance Plan**

## MAINTENANCE PLAN

The site will be monitored on a regular basis and a physical inspection will be conducted a minimum of once per year throughout the post construction monitoring period until performance standards are met. These site inspections may identify site components and features that require routine maintenance. Routine maintenance should be expected most often in the first two years following site construction and may include the following:

### F1. Maintenance Plan

Component/Feature	Maintenance through project close-out
Stream	Routine channel maintenance and repair activities may include chinking of in-stream structures to prevent piping, securing of loose coir matting, and supplemental installations of live stakes and other target vegetation along the channel. Areas where stormwater and floodplain flows intercept the channel may also require maintenance to prevent bank failures and head-cutting. Stream maintenance activities will be documented and reported in annual monitoring reports. Stream maintenance will continue through the monitoring period.
Wetland	Routine wetland maintenance and repair activities may include securing of loose coir matting, channel plug maintenance, and supplemental installations of live stakes and other target vegetation within the wetland.
Vegetation	Vegetation shall be maintained to ensure the health and vigor of the targeted plant community. Routine vegetation maintenance and repair activities may include supplemental planting, pruning, mulching, and fertilizing. Exotic invasive plant species shall be treated by mechanical and/or chemical methods. Any vegetation requiring herbicide application will be performed in accordance with NC Department of Agriculture (NCDA) rules and regulations. Vegetation maintenance activities will be documented and reported in annual monitoring reports. Vegetation maintenance will continue through the monitoring period.
Site Boundary	Site boundaries shall be identified in the field to ensure clear distinction between the mitigation site and adjacent properties. Boundaries will be marked with signs identifying the property as a mitigation site, and will include the name of the long-term steward and a contact number. Boundaries may be identified by fence, marker, bollard, post, tree-blazing, or other means as allowed by site conditions and/or conservation easement. Boundary markers disturbed, damaged, or destroyed will be repaired and/or replaced on an as-needed basis. Easement monitoring and staking/signage maintenance will continue in perpetuity as a stewardship activity.
Road Crossing	N/A
Livestock Fencing	Livestock fencing is to be placed outside the easement limits. Maintenance of fencing is the responsibility of the landowner.
Beaver	Routine site visits and monitoring will be used to determine if beaver management is needed. If beaver activity poses a threat to project stability or vegetative success, RES will trap beavers and remove impoundments as needed. All beaver management activities will be documented and included in annual monitoring reports. Beaver monitoring and management will continue through the monitoring period.

## **Appendix K**

### **Financial Assurance**

## **Financial Assurance**

Pursuant to Section IV H and Appendix III of the NCDEQ DMS (formerly Ecosystem Enhancement Program) In-Lieu Fee Instrument dated July 28, 2010, the North Carolina Department of Environmental Quality (NCDEQ) has provided the USACE Wilmington District with a formal commitment to fund projects to satisfy mitigation requirements assumed by NCDEQ DMS. This commitment provides financial assurance for all mitigation projects implemented by the program.



## **Appendix L**

### **Credit Release Schedule**

## CREDIT RELEASE SCHEDULE

All credit releases will be based on the total credit generated as reported in the approved final mitigation plan, unless there are major discrepancies and then a mitigation plan addendum will be submitted. Under no circumstances shall any mitigation project be debited until the necessary Department of the Army (DA) authorization has been received for its construction or the District Engineer (DE) has otherwise provided written approval for the project in the case where no DA authorization is required for construction of the mitigation project. The DE, in consultation with the IRT, will determine if performance standards have been satisfied sufficiently to meet the requirements of the release schedules below. In cases where some performance standards have not been met, credits may still be released depending on the specifics of the case. Monitoring may be required to be restarted or be extended, depending on the extent to which the site fails to meet the specified performance standard. The release of project credits will be subject to the criteria described as follows in **Table D1** and **Table D2**.

**Table D1. Stream Credit Release Schedule**

Credit Release Milestone	Release Activity	Interim Release	Total Release
0	Initial Allocation – see requirements below	30%	30%
1	First year monitoring report demonstrates performance standards are being met	10%	40%
2	Second year monitoring report demonstrates performance standards are being met	10%	50%
3	Third year monitoring report demonstrates performance standards are being met	10%	60%
4*	Fourth year monitoring report demonstrates performance standards are being met	5%	65% (75%**)
5	Fifth year monitoring report demonstrates performance standards are being met	10%	75% (85%**)
6*	Sixth year monitoring report demonstrates performance standards are being met	5%	80% (90%**)
7	Seventh year monitoring report demonstrates performance standards are being met and project has received closeout approval	10%	90% (100%**)

*\*Please note that vegetation data may not be required with monitoring reports submitted during these monitoring years unless otherwise required by the Mitigation Plan or directed by the IRT.*

*\*\*10% reserve of credits to be held back until the bankfull event performance standard has been met.*

**Table D2. Wetland Credit Release Schedule**

<b>Credit Release Milestone</b>	<b>Release Activity</b>	<b>Interim Release</b>	<b>Total Release</b>
0	Initial Allocation – see requirements below	30%	30%
1	First year monitoring report demonstrates performance standards are being met	10%	40%
2	Second year monitoring report demonstrates performance standards are being met	10%	50%
3	Third year monitoring report demonstrates performance standards are being met	15%	65%
4*	Fourth year monitoring report demonstrates performance standards are being met	5%	70%
5	Fifth year monitoring report demonstrates performance standards are being met	15%	85%
6*	Sixth year monitoring report demonstrates performance standards are being met	5%	90%
7	Seventh year monitoring report demonstrates performance standards are being met and project has received closeout approval	10%	100%

*\*Please note that vegetation data may not be required with monitoring reports submitted during these monitoring years unless otherwise required by the Mitigation Plan or directed by the IRT.*

### **Initial Allocation of Released Credits**

The initial allocation of released credits, as specified in the mitigation plan, can be released by DMS without prior written approval of the DE upon satisfactory completion of the following activities:

- 1) Approval of the final Mitigation Plan.
- 2) Recordation of the preservation mechanism, as well as a title opinion acceptable to the USACE covering the property.
- 3) Completion of project construction (the initial physical and biological improvements to the mitigation site) pursuant to the mitigation plan; per the DMS Instrument, construction means that a mitigation site has been constructed in its entirety, to include planting, and a record drawing has been produced. Record drawings must be sealed by an engineer prior to project closeout, if appropriate but not prior to the initial allocation of released credits.
- 4) Receipt of necessary DA permit authorization or written DA approval for projects where DA permit issuance is not required.

### **Subsequent Credit Releases**

All subsequent credit releases must be approved by the DE, in consultation with the IRT, based on a determination that required performance standards have been achieved. For stream projects a reserve of 10% of a site's total stream credits shall be released after four bankfull events have occurred, in separate years, provided the channel is stable and all other performance standards are met. In the event that less than four bankfull events occur during the monitoring period, release of these reserve credits shall be at the discretion of the IRT. As projects approach milestones associated with credit release, DMS will submit a request for credit release to the DE along with documentation substantiating achievement of criteria required for release to occur. This documentation will be included with the annual monitoring report.

**Appendix M**  
**Photo Log**



**Photo 1.**  
Upper  
Unnamed  
Tributary  
1  
(Ditched)  
**Direction  
of View:**  
West



**Photo 2.**  
Ditched,  
farmed  
hydric soil  
area  
adjacent  
to south  
side of  
Tributary  
1  
**Direction  
of View:**  
North



**Photo 3.**  
Lower  
Unnamed  
Tributary  
1  
(Ditched)  
**Direction  
of View:**  
West



**Photo 4.**  
Ditched,  
farmed  
hydric soil  
area  
adjacent  
to north  
side of  
Tributary  
1  
**Direction  
of View:**  
West



**Photo 5.** Proposed non-riparian wetland area, currently ditched, farmed hydric soil area. **Direction of View:** Northwest



**Photo 6.**  
Proposed  
non-riparian  
wetland  
area, view of  
existing  
swale/ditch  
that flows  
through  
area.

**Direction of  
View:** South





**Photo 7.** View of reference reach, UT to Bear Swamp Creek. The photo was taken during moderate drought conditions.

**Direction of View:** southeast



**Photo 8.** View of reference reach, UT to Bear Swamp Creek. The photo was taken during moderate drought conditions. Note the mildly sinuous planform and bed material comprised of organic detritus.

**Direction of View:** Southeast



**Photo 9.** View of reference reach, UT to Bear Swamp Creek. The photo was taken during moderate drought conditions. Note the meander bend and pool holding water during drought conditions.

**Direction of View:** Southeast



**Photo 10.** View of riparian wetland adjacent to reference reach, with canopy species that include swamp tupelo (*Nyssa biflora*), Bald Cypress (*Toxodium distichum*), and red maple (*Acer rubrum*).

**Direction of View:** South

**Appendix N**  
**Water Budget Analysis**

## **Cow Branch Non-riparian Wetland Cell Water Budget Calculation**

### Water Budget Equation

The hydrologic cycle of a wetland can be expressed in a mass balance equation that accounts for water inflows and outflows to the system, as follows:

$$\Delta S = [P + S_i + G_i] - [ET + S_o + G_o]$$

where:

$\Delta S$  = change in volume of water storage in a defined area over time

P = precipitation

$S_i$  = surface water inflow

$G_i$  = ground water inflow

ET = evapotranspiration

$S_o$  = surface water outflow

$G_o$  = groundwater outflow

### Water Budget Calculation Assumptions

The proposed non-riparian wetland will be restored as an entire system surrounded by drained hydric soils. The following assumptions apply to the water budget calculation:

1. Precipitation that falls within the 4.1-acre footprint will be the primary hydrologic input.
2. Initial water fill of the wetland cell will be 3-inches above ground surface.
3. Surface water and ground water inflow (lateral) will be secondary hydrologic inputs and are not expected to be critical factors in restoring wetland hydrology on the Project Site. Surface water inflow is estimated at 10% of the total rainfall. Ground water lateral inputs from upslope areas are assumed to be minimal due to the size of the local watershed (19-acres excluding the 4.1-acre footprint of the restoration area). The site is bounded by well-drained Grifton soils.
4. Currently, surface water outflow for the Project Site is being conveyed off site via cross-rowing and a single drainage swale. These features will be removed during construction. Site grading will remove the current outflow paths, allowing the surface water from the Project Site to accumulate to a level that allows for up to 3 inches of water storage within the wetland cell.
5. The proposed wetland area is currently plowed in a way that promotes drainage to the receiving drainage system to the south via a drainage swale. The drainage swale has broken through the Site's restrictive soil layer commonly found in Grifton series soils. This soil has an observed restrictive layer starting at approximately 12-16 inches below the surface. The restrictive soil layer supports wetland hydrology by creating a perched water table. During construction, the existing drainage swale and cross-plowing will be removed which will restore the fragmented restrictive soil layer and prevent vertical groundwater outflow.

Based on these assumptions it is assumed that no significant groundwater inflow/outflow or surface water outflow will occur at the Project Site to the degree that it will affect the restoration of wetland hydrology. Applying these assumptions to the water budget equation, modifies the water balance equation for the Project Site to:

$$\Delta S = [P + Si] - [ET]$$

### Model

Wetland water budget modeling was conducted using Wetbud (Version 3.0), a program specifically developed for wetland water budget modeling created by a team from University of Kentucky, Virginia Tech, Old Dominion University, and Wetland Studies and Solutions (Wetbud, 2022). The program allows for modification of traditional water budget calculations by utilizing site specific topographic, soil and hydrologic data (Neuhaus, 2013). The Basic Scenario option allows for use of the mass balance equation referenced above to quantify inputs and outputs on a monthly basis for statistically determined normal, wet, and dry years. These years are determined from a minimum 30-year record using the Natural Resources Conservation Service Climate Analysis for Wetlands (WETS) table statistical analyses, and are based upon a percentile comparison of total annual precipitation with a wet, normal, or dry spring, respectively (Stone, et al., 2017; Thompson, et al., 2016). Data and parameters included in the calculation of the water budget for the Project Site include:

- NOAA Weather Station: Myrtle Beach International Airport (Station Code 747910-WB)
- Evapotranspiration (ET) estimated using the Thornthwaite Method, which is the most conservative ET estimation method in Wetbud.
- Analysis Years (WETS Station NC9357, Whiteville 7 NW):
  - Dry – 1997
  - Normal – 1991
  - Wet – 1998
- Watershed Area for Direct Surface Runoff: 19 acres
- Constructed Wetland Acres: 4.1 acres
- Net Watershed Area for Direct Surface Runoff: 14.30 acres
- Watershed NRCS Curve Number: 89
- Reference Wetland Bottom Elevation: 38.36 feet

### Results and Conclusions

The monthly and annual water budget results for the proposed wetlands are presented in **Tables 1- 3**. Data and calculations used for all analyses are included in **Attachment 1**. The lowest predicted water levels were observed during the main growing season and highest ET months of the year. On average, a water surplus is available on a monthly and annual basis. As this is a primarily precipitation driven system, increased ET values should not affect the surplus water as significantly as decreased precipitation. This analysis reflects monthly water budget conditions based on monthly direct precipitation and subtracting monthly evapotranspiration to arrive at monthly water budget summaries.

Based on these calculations, approximately 3 inches of surplus water will cover the entire 4.1 acre site on an annual basis. Considering the approximate depth to the restrictive soil layer (10-14 in), the proposed

wetland project is projected to meet the wetland hydrology requirements during years of normal, dry and wet precipitation.

**Table 1.** Wetbud Modeling Results for Normal Precipitation Years

Month	Precipitation (in)	Direct Surface Runoff (in)	Evapotranspiration (Thornthwaite) (in)	Surface Water Outflow (in)	Net Gain/Loss	Actual Water Level in Relation to Ground Surface (in)*
Jan	11.00	11.74	-.51	-22.23	.00	3.00
Feb	2.54	.82	-.88	-2.48	.00	3.00
Mar	2.59	1.32	-1.84	-2.07	.00	3.00
Apr	.90	.00	-3.09	.00	-2.19	.81
May	3.85	2.27	-5.06	.00	1.06	1.88
Jun	1.37	.33	-5.62	.00	-3.92	-8.19
Jul	8.48	7.10	-6.69	-3.85	5.05	3.00
Aug	9.77	12.27	-5.87	-16.17	.00	3.00
Sep	4.34	4.39	-4.42	-4.31	.00	3.00
Oct	1.45	.83	-2.52	.00	-.24	2.76
Nov	2.71	2.84	-.90	-4.41	.24	3.00
Dec	1.59	.06	-.75	-.90	.00	3.00

\*Model assumes initial water depth of 3 inches in wetland cell on January 1

**Table 2.** Wetbud Modeling Results for Dry Precipitation Years

Month	Precipitation (in)	Direct Surface Runoff (in)	Evapotranspiration (Thornthwaite) (in)	Surface Water Outflow (in)	Net Gain/Loss	Actual Water Level in Relation to Ground Surface (in)*
Jan	4.84	3.30	-.64	-7.50	.00	3.00
Feb	3.66	2.67	-.91	-5.42	.00	3.00
Mar	.95	.10	-2.49	.00	-1.44	1.56
Apr	6.23	8.01	-2.20	-10.59	1.44	3.00
May	1.65	.58	-3.78	.00	-1.55	1.45
Jun	6.27	5.16	-4.15	-5.13	1.55	3.00
Jul	5.78	8.80	-6.53	-8.05	.00	3.00
Aug	2.87	2.13	-5.63	.00	-.63	2.37
Sep	6.92	6.79	-4.39	-8.68	.63	3.00
Oct	1.76	.92	-2.42	-.26	.00	3.00
Nov	4.23	3.46	-.84	-6.85	.00	3.00
Dec	5.47	2.21	-.52	-7.16	.00	3.00

\*Model assumes initial water depth of 3 inches in wetland cell on January 1



**Table 3.** Wetbud Modeling Results for Wet Precipitation Years

Month	Precipitation (in)	Direct Surface Runoff (in)	Evapotranspiration (Thornthwaite) (in)	Surface Water Outflow (in)	Net Gain/Loss	Actual Water Level in Relation to Ground Surface (in)*
Jan	7.98	7.53	-.56	-14.95	.00	3.00
Feb	14.37	28.25	-.65	-41.97	.00	3.00
Mar	5.47	7.68	-1.14	-12.01	.00	3.00
Apr	5.80	6.03	-2.31	-9.52	.00	3.00
May	2.24	.38	-4.98	.00	-2.36	.64
Jun	2.80	1.26	-6.76	.00	-2.70	-8.27
Jul	6.17	5.11	-7.18	.00	4.10	2.03
Aug	6.65	8.45	-5.97	-8.16	.97	3.00
Sep	5.45	7.53	-4.56	-8.42	.00	3.00
Oct	.45	.01	-2.56	.00	-2.10	.90
Nov	1.60	1.07	-1.47	.00	1.20	2.10
Dec	3.66	2.85	-.83	-4.18	.90	3.00

\*Model assumes initial water depth of 3 inches in wetland cell on January 1

### References

Neuhaus, E., 2013. *Evaluation of a water budget model for use in wetland design* (Doctoral dissertation, Virginia Tech).

Stone, S., Agioutantis, Z., Whittecar, G.R., Daniels, W.L., Thompson, T. and Dobbs, K., 2017. Wetbud—A Free Water Budget Modeling Tool for Created Wetland Design. *Geo-Resources Environment and Engineering (GREE)*, 2, pp.182-188.

Thompson, T.M., Daniels, W.L., Whittecar, G.R. and Agioutantis, Z., 2016, May. Wetbud: A wetland hydrologic design model. In *ASCE 2016 World Environmental & Water Resources Congress*.

Wetbud (2022). Available at <https://resourceprotectiongroup.org/wetbud/>.

**Attachment 1**

Wetbud Data and Calculations

Wetbud Version: 3.0.0.6  
Date and Time: 2023-02-07 10:48

Project Information

Code: Cow Branch NRWL  
Description: Non-Riparian Wetland Cell  
Units: English  
Latitude: 34.1371  
Longitude: -78.6482  
Reference Elevation (ft): 38.36  
Growing Season Start (mm/dd): 3/15  
Growing Season End (mm/dd): 11/15

Basic Scenario: NR WL

Reference Weather Station: MYRTLE BEACH INTL AIRPORT  
Station Code: 747910-WB  
Station Latitude: 33.6800  
Station Longitude: -78.9300

Analysis Years

Dry Year: 1997  
Normal Year: 1991  
Wet Year: 1998

Watershed and Wetland Parameters

Total Watershed Area for Direct Surface Runoff (acres): 19.00  
Constructed Wetland Area (acres): 4.10  
Existing Wetland Area (acres): 0.00  
Total Wetland Area (acres): 4.10  
Net Watershed Area for Direct Surface Runoff (acres): 14.30  
Watershed NRCS Curve Number: 89

Storage Factors

Soil Storage Factor: 0.25  
Surface Storage Factor: 1.00

Weir Parameters

Maximum Weir Elevation (ft): 38.6  
Wetland Depth to Outlet Weir Specification: Constant Depth  
Constant Outlet Weir Depth (in): 3.00

Average Wetland Bottom Elevation (ft): 38.4

Precipitation Distribution for Dry Year (in)

Dec.	Year	1997	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.
	0.10	1	0.38	0.00	0.00	0.00	0.00	0.14	0.00	0.17	0.00	0.00	1.54
	0.10	2	0.30	0.00	0.00	0.00	0.00	0.00	0.10	0.00	0.00	0.00	0.32
	0.00	3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	0.08	4	0.00	0.00	0.00	0.00	0.75	0.92	0.00	0.00	0.07	0.00	0.00
	0.05	5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.70	0.00	0.00	0.00
	0.00	6	0.00	0.00	0.00	0.00	0.00	0.50	0.00	1.37	0.00	0.00	0.00
	0.00	7	0.00	0.00	0.00	0.00	0.00	2.00	0.00	0.00	0.00	0.00	0.03
	0.00	8	0.00	0.00	0.00	0.00	0.00	0.22	0.00	0.00	0.00	0.00	0.11
	0.70	9	1.10	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	0.15	10	1.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	0.40	11	0.00	0.20	0.00	0.00	0.00	0.00	0.00	0.01	1.80	0.00	0.00
	0.15	12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.30	0.00	0.00
	0.20	13	0.00	0.01	0.00	1.70	0.45	0.00	0.00	0.00	0.20	0.00	0.80
	0.02	14	0.00	0.70	0.46	0.00	0.00	0.20	0.00	0.00	0.00	0.00	0.40
	0.00	15	0.00	1.40	0.00	0.00	0.00	0.40	0.00	0.00	0.37	0.00	0.00



0.05	11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.63	0.00	0.00
0.00	12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00
0.00	13	0.00	0.00	0.00	2.39	0.09	0.00	0.00	0.00	0.00	0.00	0.52
0.00	14	0.00	0.37	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.05
0.00	15	0.00	1.69	0.00	0.00	0.00	0.05	0.00	0.00	0.03	0.00	0.00
0.00	16	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	17	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	18	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	19	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.13	0.00	0.87	0.00
0.00	20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	21	0.00	0.00	0.00	0.00	0.05	0.00	0.00	0.00	0.00	0.00	0.00
0.00	22	0.00	0.60	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.78	23	0.01	0.01	0.00	0.69	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	24	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00
0.54	25	0.01	0.00	0.00	0.00	0.00	0.00	0.87	0.00	1.26	0.01	0.00
0.00	26	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.41	27	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.69	0.05	0.00
0.00	28	0.00	0.00	0.00	1.80	0.00	0.36	0.00	0.00	1.16	0.00	0.00
0.00	29	0.00	0.00	0.00	3.13	0.00	0.78	0.00	0.00	0.00	0.00	0.00
0.06	30	0.24	0.00	0.00	0.00	0.00	0.00	7.88	0.00	0.00	0.00	0.87
0.00	31	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.00	0.00	0.00	0.00
2.21	Total	3.30	2.67	0.10	8.01	0.58	5.16	8.80	2.13	6.79	0.92	3.46
44.13												

ET (Thornthwaite) Distribution for Dry Year (in)

Basis: Calculated by Wetbud using mean air temperature and monthly heat index

Dec.	Year	1997	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.
0.52	35.10	Total	0.64	0.91	2.49	2.20	3.78	4.15	6.53	5.63	4.39	2.42	0.84

Projected Water Level (in)

Dec.	Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	
		Input											
		Initial Fill	3.00	-.--	-.--	-.--	-.--	-.--	-.--	-.--	-.--	-.--	
		Precipitation	4.84	3.66	0.95	6.23	1.65	6.27	5.78	2.87	6.92	1.76	4.23
5.47	50.63	Runoff	3.30	2.67	0.10	8.01	0.58	5.16	8.80	2.13	6.79	0.92	3.46
2.21	44.13	Output											
		PET	0.64	0.91	2.49	2.20	3.78	4.15	6.53	5.63	4.39	2.42	0.84
0.52	35.10	Outflow	7.50	5.42	0.00	10.59	0.00	5.13	8.05	0.00	8.68	0.26	6.85
7.16	59.64												

Budget

Total Water	3.00	3.00	1.56	3.00	1.45	3.00	3.00	2.37	3.00	3.00	3.00
3.00											
Net Gain/Loss	0.00	0.00	-1.44	1.44	-1.55	1.55	0.00	-0.63	0.63	0.00	0.00
0.00	0.00										
Actual Water Level	3.00	3.00	1.56	3.00	1.45	3.00	3.00	2.37	3.00	3.00	3.00
3.00											

Projected Water Elevation [+0] (ft)

Actual Elevation	38.6	38.6	38.5	38.6	38.5	38.6	38.6	38.6	38.6	38.6	38.6
38.6											

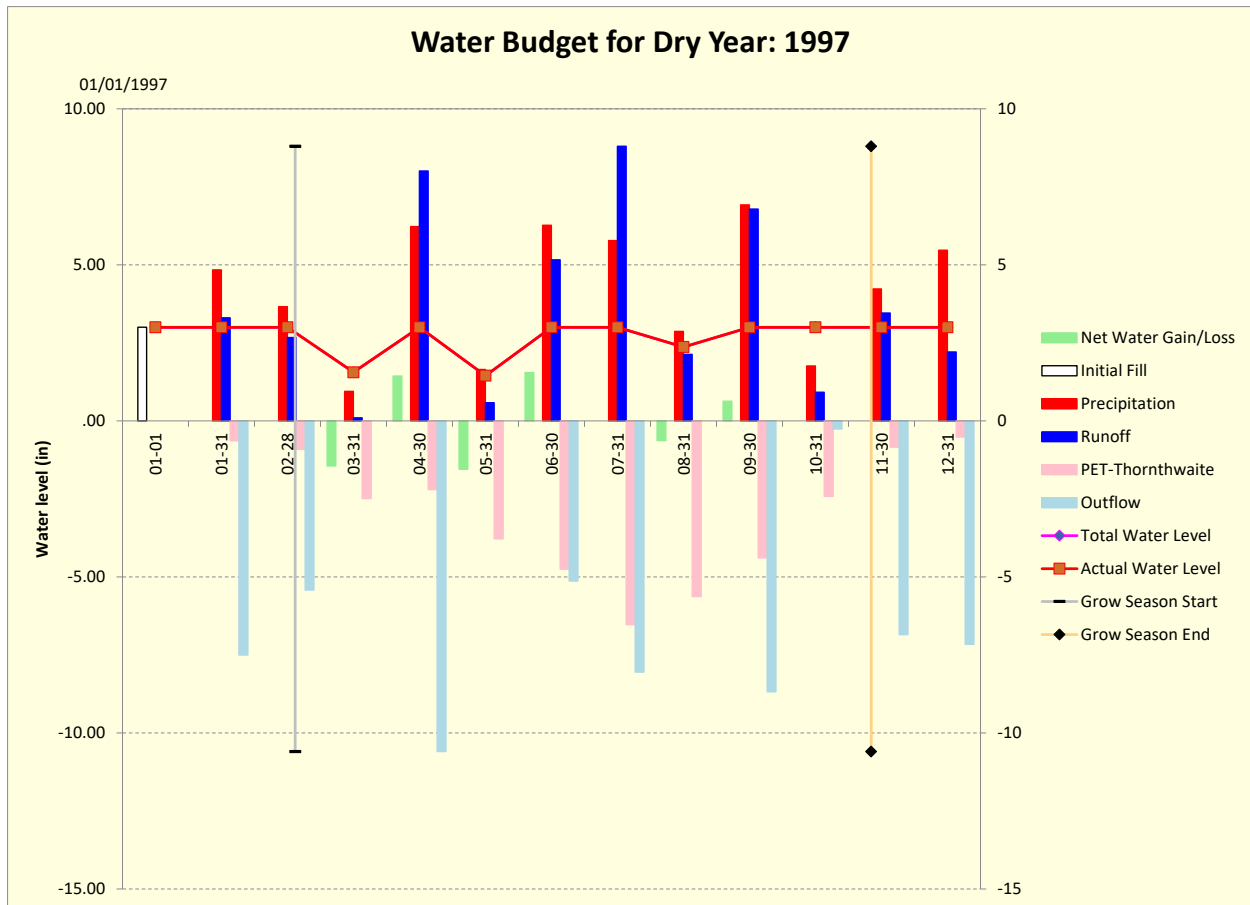
(\*) No stage storage curve used. Projected Water Levels are relative to wetland bottom elevation and represent the water level that would result from a flat bottom system with vertical side walls.

(\*) the Actual Water Level is expressed in depth over baseline elevation, which is approximately the difference between the weir invert elevation and the average elevation of the soil substrate in the wetland.

(\*) Projected Water Elevation is applied laterally throughout the site when Actual Water Levels are less than 0.

No approximation of a sloping water table is made in this model.

(\*) Analysis assumes that net Gain/Loss is not adjusted by impermeable layer or high water table.



Precipitation Distribution for Normal Year (in)

Dec. Year	1991	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.
0.01	1	0.87	0.00	0.00	0.00	1.26	0.00	0.00	0.00	0.00	0.00	0.00
0.00	2	1.18	0.00	0.91	0.00	0.00	0.16	0.00	1.18	2.01	0.08	0.00
0.04	3	0.00	0.00	0.12	0.00	0.00	0.00	0.08	0.01	0.00	0.28	0.00

0.35	4	0.04	0.00	0.83	0.00	0.00	0.00	0.04	0.00	0.02	0.02	0.01
0.00	5	0.00	0.00	0.00	0.00	0.00	0.00	0.98	0.00	0.00	0.00	0.00
0.00	6	0.00	0.00	0.00	0.04	0.00	0.00	0.20	0.00	0.00	0.08	0.00
0.00	7	0.00	0.08	0.00	0.00	0.24	0.00	0.43	0.08	0.04	0.00	0.00
0.00	8	0.28	0.83	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.00	0.00
0.00	9	0.04	0.12	0.04	0.00	0.91	0.00	0.00	0.00	0.00	0.00	0.20
0.00	10	0.00	0.00	0.08	0.00	0.55	0.00	0.00	0.00	0.00	0.00	1.81
0.00	11	0.08	0.00	0.00	0.00	0.00	0.00	0.00	0.59	0.00	0.00	0.02
0.00	12	0.98	0.00	0.00	0.00	0.00	0.00	2.17	1.34	0.00	0.00	0.00
0.00	13	0.00	0.00	0.04	0.00	0.08	0.00	0.00	3.15	0.00	0.00	0.00
0.00	14	0.00	0.16	0.39	0.00	0.04	0.04	0.02	0.00	0.00	0.00	0.00
0.00	15	0.00	0.00	0.00	0.00	0.00	0.00	0.47	0.43	0.00	0.00	0.00
0.00	16	0.75	0.00	0.00	0.12	0.04	0.00	1.65	0.00	0.00	0.98	0.00
0.00	17	0.00	0.00	0.00	0.00	0.00	0.00	0.28	0.00	0.00	0.01	0.00
0.00	18	0.00	0.02	0.08	0.00	0.00	0.02	0.20	0.00	0.00	0.00	0.00
0.00	19	0.04	0.00	0.02	0.02	0.00	0.04	0.31	0.00	0.02	0.00	0.00
0.00	20	2.80	0.00	0.00	0.24	0.00	0.12	0.08	0.12	0.24	0.00	0.00
0.00	21	0.00	0.00	0.00	0.01	0.24	0.67	0.04	0.01	0.00	0.00	0.12
0.00	22	0.00	0.00	0.00	0.12	0.00	0.00	0.00	0.00	0.00	0.00	0.55
0.00	23	0.00	0.47	0.00	0.01	0.04	0.00	0.00	0.01	0.08	0.00	0.00
0.24	24	0.04	0.39	0.00	0.02	0.05	0.16	0.00	1.69	0.20	0.00	0.00
0.00	25	0.94	0.47	0.00	0.00	0.04	0.00	0.51	0.87	0.67	0.00	0.00
0.01	26	0.00	0.00	0.00	0.02	0.00	0.08	0.00	0.20	1.02	0.00	0.00
0.28	27	0.00	0.00	0.00	0.00	0.24	0.08	0.00	0.00	0.00	0.00	0.00
0.35	28	0.28	0.00	0.00	0.28	0.00	0.00	0.00	0.01	0.00	0.00	0.00
0.31	29	0.24	0.00	0.08	0.00	0.12	0.00	0.20	0.08	0.00	0.00	0.00
0.00	30	1.10	0.00	0.00	0.02	0.00	0.00	0.39	0.00	0.00	0.00	0.00
0.00	31	1.34	0.00	0.00	0.00	0.00	0.00	0.43	0.00	0.00	0.00	0.00
1.59	Total	11.00	2.54	2.59	0.90	3.85	1.37	8.48	9.77	4.34	1.45	2.71
50.59												

Runoff Calculations for Normal Year (in)

Basis:  $Q = [(P - 0.2S) * (P - 0.2S)] / (P + 0.8S)$

Where:

Q = Runoff volume expressed as inches of depth over the watershed

P = 24 - Hour precipitation expressed in inches

S = Retention; Estimated at  $S = (1000/CN) - 10$

Note: Slope adjustment factor assumed = 1.0 (relatively flat)

Therefore:

P min = 0.25 (in) the minimum size storm that creates runoff

S = 1.24 unitless watershed constant

Thus, Runoff (R) into the wetland system expressed in inches of depth in wetland

$R = (Q \times \text{Contributing Watershed [acres]}) / (\text{Constructed Wetland Area plus$

the Existing Wetland Area within Site [acres])

Dec.	Year	1991	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.
0.00		1	0.63	0.00	0.00	0.00	1.39	0.00	0.00	0.00	0.00	0.00	0.00
0.00		2	1.22	0.00	0.70	0.00	0.00	0.00	0.00	1.22	3.15	0.00	0.00
0.00		3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.02		4	0.00	0.00	0.57	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00		5	0.00	0.00	0.00	0.00	0.00	0.00	0.83	0.00	0.00	0.00	0.00
0.00		6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00		7	0.00	0.00	0.00	0.00	0.00	0.00	0.07	0.00	0.00	0.00	0.00
0.00		8	0.00	0.57	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00		9	0.00	0.00	0.00	0.00	0.70	0.00	0.00	0.00	0.00	0.00	0.00
0.00		10	0.00	0.00	0.00	0.00	0.18	0.00	0.00	0.00	0.00	0.00	2.66
0.00		11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.23	0.00	0.00	0.00
0.00		12	0.83	0.00	0.00	0.00	0.00	0.00	3.56	1.56	0.00	0.00	0.00
0.00		13	0.00	0.00	0.00	0.00	0.00	0.00	0.00	6.19	0.00	0.00	0.00
0.00		14	0.00	0.00	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00		15	0.00	0.00	0.00	0.00	0.00	0.00	0.10	0.07	0.00	0.00	0.00
0.00		16	0.44	0.00	0.00	0.00	0.00	0.00	2.27	0.00	0.00	0.83	0.00
0.00		17	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00		18	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00		19	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00
0.00		20	5.23	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00		21	0.00	0.00	0.00	0.00	0.00	0.33	0.00	0.00	0.00	0.00	0.00
0.00		22	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.18
0.00		23	0.00	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00		24	0.00	0.05	0.00	0.00	0.00	0.00	0.00	2.36	0.00	0.00	0.00
0.00		25	0.76	0.10	0.00	0.00	0.00	0.00	0.14	0.63	0.33	0.00	0.00
0.00		26	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.90	0.00	0.00
0.00		27	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.02		28	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.01		29	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00		30	1.06	0.00	0.00	0.00	0.00	0.00	0.05	0.00	0.00	0.00	0.00
0.00		31	1.56	0.00	0.00	0.00	0.00	0.00	0.07	0.00	0.00	0.00	0.00
0.06	43.97	Total	11.74	0.82	1.32	0.00	2.27	0.33	7.10	12.27	4.39	0.83	2.84

ET (Thornthwaite) Distribution for Normal Year (in)

Basis: Calculated by Wetbud using mean air temperature and monthly heat index



Dec.	Year	1991	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.
0.75	38.15	Total	0.51	0.88	1.84	3.09	5.06	5.62	6.69	5.87	4.42	2.52	0.90

Projected Water Level (in)		Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.
Dec.	Year											
Input												
Initial Fill		3.00	-.--	-.--	-.--	-.--	-.--	-.--	-.--	-.--	-.--	-.--
Precipitation		11.00	2.54	2.59	0.90	3.85	1.37	8.48	9.77	4.34	1.45	2.71
1.59	50.59											
Runoff		11.74	0.82	1.32	0.00	2.27	0.33	7.10	12.27	4.39	0.83	2.84
0.06	43.97											
Output												
PET		0.51	0.88	1.84	3.09	5.06	5.62	6.69	5.87	4.42	2.52	0.90
0.75	38.15											
Outflow		22.23	2.48	2.07	0.00	0.00	0.00	3.85	16.17	4.31	0.00	4.41
0.90	56.42											
Budget												
Total Water		3.00	3.00	3.00	0.81	1.88	-2.05	3.00	3.00	3.00	2.76	3.00
3.00												
Net Gain/Loss		0.00	0.00	0.00	-2.19	1.06	-3.92	5.05	0.00	0.00	-0.24	0.24
0.00	0.00											
Actual Water Level		3.00	3.00	3.00	0.81	1.88	-8.19	3.00	3.00	3.00	2.76	3.00
3.00												

Projected Water Elevation [+0] (ft)		Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.
Actual Elevation		38.6	38.6	38.6	38.4	38.5	37.7	38.6	38.6	38.6	38.6	38.6

(\*) No stage storage curve used. Projected Water Levels are relative to wetland bottom elevation and represent the water level that would result from a flat bottom system with vertical side walls.

(\*) the Actual Water Level is expressed in depth over baseline elevation, which is approximately the difference between the weir invert elevation and the average elevation of the soil substrate in the wetland.

(\*) Projected Water Elevation is applied laterally throughout the site when Actual Water Levels are less than 0.

No approximation of a sloping water table is made in this model.

(\*) Analysis assumes that net Gain/Loss is not adjusted by impermeable layer or high water table.



0.90	16	0.56	0.00	0.00	0.00	0.00	0.00	0.13	0.10	0.00	0.00	0.00
0.01	17	0.03	4.20	0.00	0.00	0.00	0.00	0.10	0.16	0.00	0.00	0.20
0.00	18	0.00	0.02	0.70	1.50	0.30	0.00	0.50	0.00	0.00	0.00	0.00
0.00	19	0.50	0.00	1.28	0.00	0.00	0.00	0.25	0.20	0.06	0.00	0.00
0.00	20	0.60	0.02	0.03	0.05	0.00	0.20	0.00	0.55	0.87	0.00	1.10
0.00	21	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	22	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.00
0.00	23	1.70	1.46	0.00	0.55	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	24	1.00	0.00	0.00	0.50	0.00	0.12	0.00	0.00	0.00	0.00	0.00
0.10	25	0.00	0.00	0.00	0.00	0.00	0.00	0.76	0.00	0.00	0.00	0.00
1.60	26	0.00	0.00	0.00	0.00	0.00	0.00	1.05	0.10	0.00	0.00	0.00
0.28	27	0.00	0.00	0.00	0.00	0.00	0.00	0.02	2.01	0.00	0.00	0.00
0.30	28	0.82	0.15	0.00	0.00	0.48	0.00	1.80	0.10	0.00	0.00	0.00
0.04	29	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00
0.01	30	0.00	0.00	0.00	0.00	0.00	0.08	0.00	0.00	0.02	0.00	0.00
0.00	31	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3.66	Total	7.98	14.37	5.47	5.80	2.24	2.80	6.17	6.65	5.45	0.45	1.60
62.64												

Runoff Calculations for Wet Year (in)

Basis:  $Q = [(P - 0.2S) * (P - 0.2S)] / (P + 0.8S)$

Where:

Q = Runoff volume expressed as inches of depth over the watershed

P = 24 - Hour precipitation expressed in inches

S = Retention; Estimated at  $S = (1000/CN) - 10$

Note: Slope adjustment factor assumed = 1.0 (relatively flat)

Therefore:

P min = 0.25 (in) the minimum size storm that creates runoff

S = 1.24 unitless watershed constant

Thus, Runoff (R) into the wetland system expressed in inches of depth in wetland

$R = (Q \times \text{Contributing Watershed [acres]}) / (\text{Constructed Wetland Area plus the Existing Wetland Area within Site [acres]})$

Dec. Year	1998	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.
0.00	1	0.00	0.00	0.10	0.00	0.00	0.00	0.00	0.69	0.00	0.00	0.00
0.00	2	0.00	0.00	0.00	0.37	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	4	0.00	7.17	0.00	0.00	0.18	0.00	0.00	0.00	5.51	0.00	0.00
0.00	5	0.00	10.03	0.00	0.00	0.05	0.00	0.00	0.00	0.00	0.01	0.00
0.00	6	0.00	0.00	0.00	0.00	0.00	0.19	0.06	0.00	0.00	0.00	0.00
0.00	7	1.24	0.00	0.00	0.00	0.00	0.01	0.00	4.43	0.00	0.00	0.00
0.00	8	1.92	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00
0.00	9	0.00	0.00	5.78	3.38	0.00	0.00	0.00	0.00	1.39	0.00	0.00
0.00	10	0.00	0.00	0.00	0.00	0.00	0.00	0.87	0.00	0.00	0.00	0.00

0.00	11	0.00	0.00	0.00	0.00	0.00	1.06	0.00	0.00	0.00	0.00	0.00
0.00	12	0.00	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.01	13	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	14	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	15	0.00	0.00	0.00	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.01
0.69	16	0.19	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	17	0.00	9.16	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	18	0.00	0.00	0.37	1.92	0.01	0.00	0.13	0.00	0.00	0.00	0.00
0.00	19	0.13	0.00	1.43	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	20	0.24	0.00	0.00	0.00	0.00	0.00	0.00	0.18	0.63	0.00	1.06
0.00	21	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	22	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	23	2.39	1.83	0.00	0.18	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	24	0.87	0.00	0.00	0.13	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	25	0.00	0.00	0.00	0.00	0.00	0.00	0.46	0.00	0.00	0.00	0.00
2.15	26	0.00	0.00	0.00	0.00	0.00	0.00	0.96	0.00	0.00	0.00	0.00
0.00	27	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.15	0.00	0.00	0.00
0.01	28	0.55	0.00	0.00	0.00	0.11	0.00	2.63	0.00	0.00	0.00	0.00
0.00	29	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	31	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2.85	Total	7.53	28.25	7.68	6.03	0.38	1.26	5.11	8.45	7.53	0.01	1.07
76.15												

ET (Thornthwaite) Distribution for Wet Year (in)

Basis: Calculated by Wetbud using mean air temperature and monthly heat index

Dec.	Year	1998	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.
0.83	38.97	Total	0.56	0.65	1.14	2.31	4.98	6.76	7.18	5.97	4.56	2.56	1.47

Projected Water Level (in)

Dec.	Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	
	Input												
	Initial Fill	3.00	-.--	-.--	-.--	-.--	-.--	-.--	-.--	-.--	-.--	-.--	
	Precipitation	7.98	14.37	5.47	5.80	2.24	2.80	6.17	6.65	5.45	0.45	1.60	
3.66	62.64	Runoff	7.53	28.25	7.68	6.03	0.38	1.26	5.11	8.45	7.53	0.01	1.07
2.85	76.15												
	Output												
0.83	38.97	PET	0.56	0.65	1.14	2.31	4.98	6.76	7.18	5.97	4.56	2.56	1.47
4.18	99.81	Outflow	14.95	41.97	12.01	9.52	0.00	0.00	0.00	8.16	8.42	0.00	0.00

Budget

Total Water	3.00	3.00	3.00	3.00	0.64	-2.07	2.03	3.00	3.00	0.90	2.10
3.00											
Net Gain/Loss	0.00	0.00	0.00	0.00	-2.36	-2.70	4.10	0.97	0.00	-2.10	1.20
0.90	0.01										
Actual Water Level	3.00	3.00	3.00	3.00	0.64	-8.27	2.03	3.00	3.00	0.90	2.10
3.00											

Projected Water Elevation [+0] (ft)

Actual Elevation	38.6	38.6	38.6	38.6	38.4	37.7	38.5	38.6	38.6	38.4	38.5
38.6											

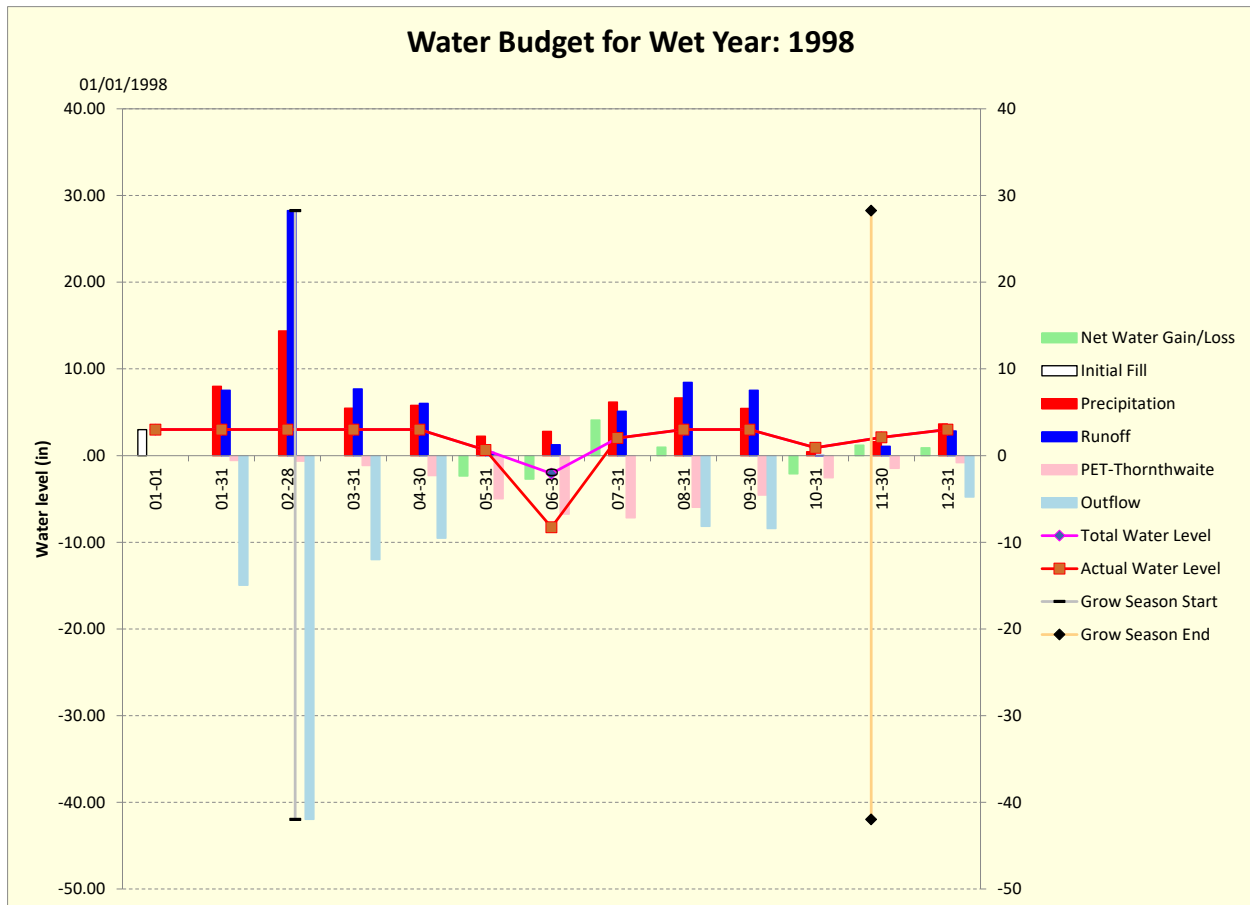
(\*) No stage storage curve used. Projected Water Levels are relative to wetland bottom elevation and represent the water level that would result from a flat bottom system with vertical side walls.

(\*) the Actual Water Level is expressed in depth over baseline elevation, which is approximately the difference between the weir invert elevation and the average elevation of the soil substrate in the wetland.

(\*) Projected Water Elevation is applied laterally throughout the site when Actual Water Levels are less than 0.

No approximation of a sloping water table is made in this model.

(\*) Analysis assumes that net Gain/Loss is not adjusted by impermeable layer or high water table.



WETS Dry/Normal/Wet year calculations. Procedure version 2020-04-06

Precipitation Data based on WETS Station: NC9357

Wet / Dry / Normal Splits based on WETS Station: NC9357

Data set examined: From year: 1954

Data set examined: To year: 2002

User input: Minimum accepted year: 1954

Total Available Records for Station: 49

Dry Year Maximum Precipitation (in): 45.86

Wet Year Minimum Precipitation (in): 53.49

Records in the 30% Dry split (sorted by precipitation): 20

Year in the 30% Dry split: 1:2002-->0.00

Year in the 30% Dry split: 2:1954-->26.25

Year in the 30% Dry split: 3:2001-->33.42

Year in the 30% Dry split: 4:1961-->33.71

Year in the 30% Dry split: 5:1968-->33.91

Year in the 30% Dry split: 6:1990-->38.55

Year in the 30% Dry split: 7:1988-->38.72

Year in the 30% Dry split: 8:1986-->39.29

Year in the 30% Dry split: 9:1984-->39.31

Year in the 30% Dry split: 10:1960-->39.79

Year in the 30% Dry split: 11:1997-->40.61

Year in the 30% Dry split: 12:1976-->40.65

Year in the 30% Dry split: 13:1956-->41.57

Year in the 30% Dry split: 14:1980-->42.17

Year in the 30% Dry split: 15:1981-->42.78

Year in the 30% Dry split: 16:1955-->42.85

Year in the 30% Dry split: 17:1985-->43.24

Year in the 30% Dry split: 18:1957-->43.55

Year in the 30% Dry split: 19:1972-->44.26

Year in the 30% Dry split: 20:1992-->45.14

Records in the 40% Normal split (sorted by precipitation): 23

Year in the 40% Normal split: 1:1967-->45.95

Year in the 40% Normal split: 2:1993-->46.36

Year in the 40% Normal split: 3:1963-->47.08

Year in the 40% Normal split: 4:1970-->47.63

Year in the 40% Normal split: 5:1975-->47.64

Year in the 40% Normal split: 6:1989-->47.71

Year in the 40% Normal split: 7:1982-->47.82

Year in the 40% Normal split: 8:1979-->48.74

Year in the 40% Normal split: 9:1978-->48.78

Year in the 40% Normal split: 10:1977-->48.86

Year in the 40% Normal split: 11:1965-->49.47

Year in the 40% Normal split: 12:1995-->50.03

Year in the 40% Normal split: 13:1966-->50.23

Year in the 40% Normal split: 14:1991-->50.53

Year in the 40% Normal split: 15:1974-->50.62

Year in the 40% Normal split: 16:1959-->50.76

Year in the 40% Normal split: 17:1987-->51.89

Year in the 40% Normal split: 18:1973-->52.21

Year in the 40% Normal split: 19:2000-->52.22

Year in the 40% Normal split: 20:1999-->52.32

Year in the 40% Normal split: 21:1983-->52.62

Year in the 40% Normal split: 22:1969-->52.66

Year in the 40% Normal split: 23:1994-->52.80

Records in the 30% Wet split (sorted by precipitation): 6

Year in the 30% Wet split: 1:1962-->54.97

Year in the 30% Wet split: 2:1996-->55.02

Year in the 30% Wet split: 3:1958-->56.44

Year in the 30% Wet split: 4:1971-->56.99

Year in the 30% Wet split: 5:1964-->58.15

Year in the 30% Wet split: 6:1998-->62.56

-----  
Starting calculations for the Dry year

Records in the 30% Dry split: 20

Median in the 30% Dry split: 10

Checking year: 1960 in slot: 10

Dry Spring Check: Score for Month: 3 is 3

Dry Spring Check: Score for Month: 4 is 2

Dry Spring Check: Score for Month: 5 is 2

Dry Spring Check: Score for Month: 6 is 1

Dry Spring Check: Total Score: 8

Spring is Normal: Year Rejected: 1960  
Checking year: 1997 in slot: 11  
Dry Spring Check: Score for Month: 3 is 2  
Dry Spring Check: Score for Month: 4 is 1  
Dry Spring Check: Score for Month: 5 is 2  
Dry Spring Check: Score for Month: 6 is 1  
Dry Spring Check: Total Score: 6  
Spring is Dry: Year Accepted: 1997

-----  
Starting calculations for the Normal year  
Records in the 40% Normal split: 23  
Median in the 40% Normal split: 12  
Checking year: 1995 in slot: 12  
Normal Spring Check: Score for Month: 3 is 3  
Normal Spring Check: Score for Month: 4 is 3  
Normal Spring Check: Score for Month: 5 is 2  
Normal Spring Check: Score for Month: 6 is 2  
Normal Spring Check: Total Score: 10  
Spring is Wet: Year Rejected: 1995  
Checking year: 1966 in slot: 13  
Normal Spring Check: Score for Month: 3 is 3  
Normal Spring Check: Score for Month: 4 is 3  
Normal Spring Check: Score for Month: 5 is 2  
Normal Spring Check: Score for Month: 6 is 2  
Normal Spring Check: Total Score: 10  
Spring is Wet: Year Rejected: 1966  
Checking year: 1965 in slot: 11  
Normal Spring Check: Score for Month: 3 is 2  
Normal Spring Check: Score for Month: 4 is 3  
Normal Spring Check: Score for Month: 5 is 3  
Normal Spring Check: Score for Month: 6 is 2  
Normal Spring Check: Total Score: 10  
Spring is Wet: Year Rejected: 1965  
Checking year: 1991 in slot: 14  
Normal Spring Check: Score for Month: 3 is 2  
Normal Spring Check: Score for Month: 4 is 2  
Normal Spring Check: Score for Month: 5 is 2  
Normal Spring Check: Score for Month: 6 is 2  
Normal Spring Check: Total Score: 8  
Spring is Normal: Year Accepted: 1991

-----  
Starting calculations for the Wet year  
Records in the 30% Wet split: 6  
Median in the 30% Wet split: 3  
Checking year: 1958 in slot: 3  
Wet Spring Check: Score for Month: 3 is 2  
Wet Spring Check: Score for Month: 4 is 2  
Wet Spring Check: Score for Month: 5 is 3  
Wet Spring Check: Score for Month: 6 is 2  
Wet Spring Check: Total Score: 9  
Spring is Normal: Year Rejected: 1958  
Checking year: 1971 in slot: 4  
Wet Spring Check: Score for Month: 3 is 2  
Wet Spring Check: Score for Month: 4 is 3  
Wet Spring Check: Score for Month: 5 is 2  
Wet Spring Check: Score for Month: 6 is 2  
Wet Spring Check: Total Score: 9  
Spring is Normal: Year Rejected: 1971  
Checking year: 1996 in slot: 2  
Wet Spring Check: Score for Month: 3 is 1  
Wet Spring Check: Score for Month: 4 is 2  
Wet Spring Check: Score for Month: 5 is 3  
Wet Spring Check: Score for Month: 6 is 2  
Wet Spring Check: Total Score: 8  
Spring is Normal: Year Rejected: 1996  
Checking year: 1964 in slot: 5  
Wet Spring Check: Score for Month: 3 is 3  
Wet Spring Check: Score for Month: 4 is 2  
Wet Spring Check: Score for Month: 5 is 2  
Wet Spring Check: Score for Month: 6 is 2  
Wet Spring Check: Total Score: 9

Spring is Normal: Year Rejected: 1964  
Checking year: 1962 in slot: 1  
Wet Spring Check: Score for Month: 3 is 2  
Wet Spring Check: Score for Month: 4 is 2  
Wet Spring Check: Score for Month: 5 is 3  
Wet Spring Check: Score for Month: 6 is 2  
Wet Spring Check: Total Score: 9  
Spring is Normal: Year Rejected: 1962  
Checking year: 1998 in slot: 6  
Wet Spring Check: Score for Month: 3 is 3  
Wet Spring Check: Score for Month: 4 is 3  
Wet Spring Check: Score for Month: 5 is 3  
Wet Spring Check: Score for Month: 6 is 3  
Wet Spring Check: Total Score: 12  
Spring is Wet: Year Accepted: 1998  
WETS Station & Splits: NC9357, From: 1954, To: 2002, Min: 1954



# Ditch 1

\*\*\*\*\*  
----Lateral Effect Program Summary----  
Application of Skaggs Method  
Copyright 2006-2014. Brian D Phillips, R Wayne Skaggs, G M Chescheir  
North Carolina State University Dept of Biological & Agricultural Engineering  
Version: 2.8.1.0  
Project Run Date and Time: 02/01/2023 13:30:20  
Output Filename: C:\LateralEffect\outputs\Lateral\_Effect\_Summary.txt  
\*\*\*\*\*

## Project Information

-----  
Project : Cow Branch Mitigation Site - West of NR-1 Ditch  
User: Jason Steele  
Company / Agency: Freese and Nichols, Inc.  
Project Location: Nakina, NC  
Soil ID: Grifton  
Notes: T25 from Phillips, B.D., Chescheir, G.M. and Skaggs, R.W., 2006. Development of Methods to Determine Lateral Effect of Highway Drainage Systems on Wetland Hydrology-Phase 2 (No. FHWA/NC/2006-17). CTE/NCDOT Joint Environmental Research Program.

## Site Parameters

-----  
State: North\_Carolina  
County / Parish: Columbus

Surface Storage: 2\_inch\_(5.0\_cm)  
Ditch Depth or Depth to Water Surface: 3 ft  
Depth to Restrictive Layer: 6.67 ft  
Drainable Porosity: .06

Hydroperiod: Not Applicable. User Defined T25

User defined T25 or Default T25: USER  
T25 value: 4.9 days

User Conductivity or Soil Survey Conductivity: SOIL SURVEY  
Weighted Hydraulic Conductivity: 1.2926 in/hr

Hydraulic Conductivity Data by Layer for Soil: Gt\_\_Grifton\_\_drained  
Weighted Hydraulic Conductivity Calculated Using: Low K Values

	Bottom Depth in	Low K in/hr	High K in/hr	Average K in/hr
Layer 1	8.00	1.98	5.95	3.968496
Layer 2	11.00	1.98	5.95	3.968496
Layer 3	50.00	0.57	1.98	1.275588
Layer 4	60.00	1.98	19.98	10.98423
Layer 5	80.00	1.98	19.98	10.98423
Layer 6	0.00	0.00	0.00	0.00
Layer 7	0.00	0.00	0.00	0.00
Layer 8	0.00	0.00	0.00	0.00

-----  
Lateral Effect: 49.0 ft

## Ditch 2

\*\*\*\*\*  
---Lateral Effect Program Summary---  
Applica. on of Skaggs Method  
Copyright 2006-2014. Brian D Phillips, R Wayne Skaggs, G M Chescheir  
North Carolina State University Dept of Biological & Agricultural Engineering  
Version: 2.8.1.0  
Project Run Date and Time: 02/01/2023 13:20:28  
Output Filename: C:\LateralEffect\outputs\Lateral\_Effect\_Summary.txt  
\*\*\*\*\*

### Project Information

-----  
Project : Cow Branch Mitigation Site North of R-2 Ditch  
User: Jason Steele  
Company / Agency: Freese and Nichols, Inc.  
Project Location: Nakina, NC  
Project Coordinates:  
Soil ID: Grifton  
Notes: T25 from Phillips, B.D., Chescheir, G.M. and Skaggs, R.W., 2006. Development of Methods to Determine Lateral Effect of Highway Drainage Systems on Wetland Hydrology-Phase 2 (No. FHWA/NC/2006-17). CTE/NCDOT Joint Environmental Research Program.

### Site Parameters

-----  
State: North\_Carolina  
County / Parish: Columbus

Surface Storage: 2\_inch\_(5.0\_cm)  
Ditch Depth or Depth to Water Surface: 2.1 ft  
Depth to Restrictive Layer: 6.67 ft  
Drainable Porosity: .06

Hydroperiod: Not Applicable. User Defined T25

User defined T25 or Default T25: USER  
T25 value: 4.9 days

User Conductivity or Soil Survey Conductivity: SOIL SURVEY  
Weighted Hydraulic Conductivity: 1.2926 in/hr

Hydraulic Conductivity Data by Layer for Soil: Gt\_\_Grifton\_\_drained  
Weighted Hydraulic Conductivity Calculated Using: Low K Values

	Bottom Depth in	Low K in/hr	High K in/hr	Average K in/hr
Layer 1	8.00	1.98	5.95	3.968496
Layer 2	11.00	1.98	5.95	3.968496
Layer 3	50.00	0.57	1.98	1.275588
Layer 4	60.00	1.98	19.98	10.98423
Layer 5	80.00	1.98	19.98	10.98423
Layer 6	0.00	0.00	0.00	0.00
Layer 7	0.00	0.00	0.00	0.00
Layer 8	0.00	0.00	0.00	0.00

-----  
Lateral Effect: 39.8 ft

### Ditch 3

\*\*\*\*\*  
----Lateral Effect Program Summary----  
Application of Skaggs Method  
Copyright 2006-2014. Brian D Phillips, R Wayne Skaggs, G M Chescheir  
North Carolina State University Dept of Biological & Agricultural Engineering  
Version: 2.8.1.0  
Project Run Date and Time: 03/28/2023 11:55  
Output Filename: C:\LateralEffect\outputs\Lateral\_Effect\_Summary.txt  
\*\*\*\*\*

#### Project Information

-----  
Project : Cow Branch Mitigation Site  
User: Jason Steele  
Company / Agency: Freese and Nichols, Inc.  
Project Location: Nakina, NC  
Soil ID: Grifton  
Notes: T25 from Phillips, B.D., Chescheir, G.M. and Skaggs, R.W., 2006. Development of Methods to Determine Lateral Effect of Highway Drainage Systems on Wetland Hydrology-Phase 2 (No. FHWA/NC/2006-17). CTE/NCDOT Joint Environmental Research Program.

#### Site Parameters

-----  
State: North\_Carolina  
County / Parish: Columbus

Surface Storage: 2\_inch\_(5.0\_cm)  
Ditch Depth or Depth to Water Surface: 2.00 ft  
Depth to Restrictive Layer: 6.67 ft  
Drainable Porosity: 0.06

Hydroperiod: Not Applicable. User Defined T25

User defined T25 or Default T25: USER  
T25 value: 4.6 days (5% of growing season)

User Conductivity or Soil Survey Conductivity: SOIL SURVEY  
Weighted Hydraulic Conductivity: 1.2926 in/hr

Hydraulic Conductivity Data by Layer for Soil: Gt\_\_Grifton\_\_drained  
Weighted Hydraulic Conductivity Calculated Using: Low K Values

	Bottom Depth in	Low K in/hr	High K in/hr	Average K in/hr
Layer 1	8.00	1.98	5.95	3.968496
Layer 2	11.00	1.98	5.95	3.968496
Layer 3	50.00	0.57	1.98	1.275588
Layer 4	60.00	1.98	19.98	10.98423
Layer 5	80.00	1.98	19.98	10.98423
Layer 6	0.00	0.00	0.00	0.00
Layer 7	0.00	0.00	0.00	0.00
Layer 8	0.00	0.00	0.00	0.00

-----  
Lateral Effect: 37.1 ft

# UT to Sandpit Branch

\*\*\*\*\*  
----Lateral Effect Program Summary----  
Application of Skaggs Method  
Copyright 2006-2014. Brian D Phillips, R Wayne Skaggs, G M Chescheir  
North Carolina State University Dept of Biological & Agricultural Engineering  
Version: 2.8.1.0  
Project Run Date and Time: 02/01/2023 13:38:13  
Output Filename: C:\LateralEffect\outputs\Lateral\_Effect\_Summary.txt  
\*\*\*\*\*

## Project Information

-----  
Project : Cow Branch Mitigation Site - West of R-2 & R-3  
User: Jason Steele  
Company / Agency: Freese and Nichols, Inc.  
Project Location: Nakina, NC  
Soil ID: Grifton  
Notes: T25 from Phillips, B.D., Chescheir, G.M. and Skaggs, R.W., 2006. Development of Methods to Determine Lateral Effect of Highway Drainage Systems on Wetland Hydrology-Phase 2 (No. FHWA/NC/2006-17). CTE/NCDOT Joint Environmental Research Program.

## Site Parameters

-----  
State: North\_Carolina  
County / Parish: Columbus

Surface Storage: 2\_inch\_(5.0\_cm)  
Ditch Depth or Depth to Water Surface: 4.2 ft  
Depth to Restrictive Layer: 6.67 ft  
Drainable Porosity: .06

Hydroperiod: Not Applicable. User Defined T25

User defined T25 or Default T25: USER  
T25 value: 4.9 days

User Conductivity or Soil Survey Conductivity: SOIL SURVEY  
Weighted Hydraulic Conductivity: 1.2926 in/hr

Hydraulic Conductivity Data by Layer for Soil: Gt\_\_Grifton\_\_drained  
Weighted Hydraulic Conductivity Calculated Using: Low K Values

	Bottom Depth in	Low K in/hr	High K in/hr	Average K in/hr
Layer 1	8.00	1.98	5.95	3.968496
Layer 2	11.00	1.98	5.95	3.968496
Layer 3	50.00	0.57	1.98	1.275588
Layer 4	60.00	1.98	19.98	10.98423
Layer 5	80.00	1.98	19.98	10.98423
Layer 6	0.00	0.00	0.00	0.00
Layer 7	0.00	0.00	0.00	0.00
Layer 8	0.00	0.00	0.00	0.00

-----  
Lateral Effect: 55.4 ft  
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