



# MITIGATION PLAN

## Final Report for DMS

June 2024

### CASEY CREEK MITIGATION SITE

Wayne County, NC

Neuse River Basin

HUC 03020201

USACE Action ID: SAW-2022-01239

NCDWR ID No. 20220664 v2

NCDEQ Contract No. 210201-01

RFP#: 16-20210201 (Issued: 7/7/2021)

DMS ID No. 100597

#### PREPARED FOR:



**NC Department of Environmental Quality**  
**Division of Mitigation Services**

1652 Mail Service Center

Raleigh, NC 27699-1652



June 4, 2024

U.S. Army Corps of Engineers  
Regulatory Division  
Raleigh Field Office  
3331 Heritage Trade Drive, Suite 105  
Wake Forest, NC 27587

Attention: Erin Davis

Subject: Mitigation Plan Report and Construction Plans Review Comment Response  
Casey Creek Mitigation Site, Wayne County  
Neuse River Basin HUC 03020201  
DMS Project ID No. 100597/Contract No. 210201-01

Dear Erin:

We have reviewed the IRT's comments on the draft mitigation plan and draft construction documents for the Casey Creek Mitigation Site. We have made the necessary revisions to the draft documents and we are submitting revised versions of the documents along with this letter. Below are responses to each of the IRT's comments in your memo dated March 28, 2024. Your original comments are provided below followed by our responses in bold italics.

Specific Comments on Stream Mitigation Plan

**Maria Polizzi, NCDWR**

1. Please include a list of all soil amendments used on site in the As-built and subsequent monitoring reports if applied. Soil test results are also a welcome inclusion in the appendix.  
***Wildlands will seek to do this.***
2. DWR also recommends incorporating organic matter prior to planting, if possible, especially in areas with P2 cuts.  
***Wildlands agrees and plans to incorporate organic matter, especially in areas with P2 cut. Soil amendments have been included in the General Notes of the plan sheets included with the final mitigation plan.***
3. DWR recommends that the performance standard for flow on intermittent channels be 60 consecutive days of flow during the growing season.

***Wildlands will follow the updated guidance provided Erin Davis via email on May 8, 2024. This requires 90 consecutive days of streamflow for intermittent streams which can occur outside of the growing season. 30 consecutive days of streamflow is acceptable if benthic macroinvertebrate monitoring shows presence of benthos in the intermittent reaches proposed for credit. Last, on***

***Erin's advice, a statement was added to Section 10.0 Adaptive Management Plan that an alternative protocol may be proposed during the monitoring phase to still achieve the intermittent performance standard.***

4. Section 11.0: DWR would like more information about why 50 ft. buffer widths cannot be provided across the entirety of the site. Although the 2016 guidance does not require a credit adjustment under 5%, this is not ideal and buffer widths should (be) 50 ft or wider on all project streams unless there is a significant constraint that prevents this from being possible. DWR also does not consider wider buffers in other areas to be adequate justification, since these areas are proposed for buffer/nutrient offset credit.

***All of these areas are close to crossings or termini, such as Highway 13, the Casey Creek Reach 3 crossing, and the downstream project extent. This is necessary because streams meander and approach the CE boundaries in the vicinity of the crossings and termini. So often the limiting CE boundary is not the one parallel to the general direction of streamflow. Additionally, landowners require a simplified CE with straight lines. This is the reason for the 2016 guidance and 5% allowance.***

5. Please include the buffer mitigation plan as an amendment to the draft plan.

***It has been included as an appendix in the final mitigation plan.***

6. Please note that these comments are only regarding the Stream and Wetland portion of this project. Kate Merritt (DWR) will be reviewing the Appendix I-Buffer Mitigation and Nutrient Offset Plan separately. Additionally, all project components (stream/wetland and nutrient/buffer) must be constructed simultaneously. The approval of one plan before the other does not allow for separate construction timelines.

***Wildlands is aware of this.***

7. DWR appreciates that the project area is shown on the historical aerials.

***Thanks for the compliment.***

8. Please include a figure showing all mitigation credit types on one map (stream/wetland and buffer/NO). This should be included in the Figures section of the Appendix.

***This figure has been added.***

9. IRT Site Visit Meeting Minutes: The IRT recommended culvert crossings on sand bed streams; however, the Afton Branch crossing is proposed as a ford. Why was a culvert not proposed for this crossing? There is also no specification provided for this ford.

***This is not an active crossing, but rather the terminus to the project intended to not create an isolated parcel on the south side. Nevertheless, to avoid future construction on the channel, we've added a ford crossing to the middle of the riffle that was shown on the preliminary plan sheet. This will allow for the sand bedload to pass through the system. A culvert would clog more easily and potentially cause hydrologic trespass on the adjacent property immediately upstream. It's very likely that this crossing will be seldom used and certainly not by livestock.***

10. DWR appreciates the diversity of species proposed for the buffer planting zone.

**Thanks for the compliment.**

11. Consider installing a crest gage on Afton Branch.

**Wildlands will install a crest gage on Afton Branch.**

12. Section 6.3, Page 20: WEI states that slightly larger design discharges are proposed, leading to larger channels, which has been successful on past projects. What is the reasoning for this? What benefits have been found and what risks does WEI foresee if a smaller channel/discharge was proposed? It seems like higher discharge would be riskier, especially in a system with only moderate sediment inputs and a sand bed system with smaller particles.

**One of the benefits of slightly larger channels is reduced growth of vegetation within the channel. If vegetation becomes too thick, we have to treat it with herbicide, which is generally undesirable. One downside to a larger channel is difficulty with attaining bankfull flows. However, we believe the Casey Creek channels are only slightly oversized and will not have difficulty meeting the bankfull discharge requirements.**

13. Section 6.5.3, Page 25: This section explains that higher design discharge is proposed to maintain transport capacity, but aggradation is not currently an issue and sediment inputs are expected to go down as a result of the project. If degradation is a current problem, wouldn't it be preferable to decrease the discharge? DWR is unsure whether hurricane resiliency is worth an increased need to armor the channel with larger rock. Won't activated floodplains also help to improve hurricane resiliency without direct channel discharge needing to be this high?

**The unit stream power, which is a measure of transport capacity, is generally lower for the proposed conditions than the existing conditions at the proposed design discharge. As such, the channels are not oversized and should move the available sediment without aggrading or degrading. The hurricane resiliency comes from floodplain interaction.**

14. Design Sheet 1.1: An "existing drainage" is shown connecting to Casey Creek at STA 122+00 but is not shown on other maps or figures. What is the condition of this drainage? Could a BMP of some kind be utilized in this location? Please be sure to show drainages/ditches like this on the site map.

**This is a very shallow ditch and it will be planted within the conservation easement area.**

15. Design Sheet 5.1:

- a. Please provide more information about the Native Material Constructed Riffle. Will all material for this structure type be sources on site? Is it all stone material? Sizing is TBD, which makes it difficult to evaluate whether this structure type is appropriate for the location/ecoregion, especially if material will not be source locally.

**It is unlikely that material used in the Native Material Constructed Riffle will be found onsite. The soil descriptions in the project area do not list any gravels or cobbles suitable for construction activities. Riffle material will be sourced from nearby sand and gravel mines and will consist of a mixture of sand and gravel with the largest particles slightly exceeding the largest movable particles shown in the sediment transport section of the mitigation plan.**

**As described in the May 8, 2024 IRT Teams call meeting minutes:**

***John Hutton explained that in steeper sand bed systems like this, Wildlands has learned that using rock to provide grade control is the safest approach to maintaining system stability. Reference reaches in the area rely on dense networks of tree roots that can't be created during construction. That requires several decades and the rock riffles will help it get there. Additionally, Wildlands expects that the riffles will embed with sand to some degree and that will provide a more natural appearance.***

***Language to this effect has been added to the mitigation plan in Sections 6.1 (fifth paragraph) and 6.5.2 (last paragraph).***

- b. There are multiple references to a riffle material table, but no table was found. DWR would like to review the sizing of the riffle material, so please include that in the final plan or provide a page number if it has been overlooked somewhere.

***The details have been changed to include riffle material sizing for all structures (angled log and native material constructed riffles). The D50 for the proposed riffles is 1-3" and the largest material is Class A (2-6"). A riffle material size table has been added to Sheet 5.2 of the plan set.***

16. Design Plans General:

- a. There are very few angled log riffles, and a lot of stone-based riffles. Could more woody structure types be incorporated? From the particle size analysis, the largest diameter particles in the current system are 28 mm, and most are much smaller. DWR is concerned that the amount of rock proposed for this project will make the system less natural from that perspective. DWR is not opposed to occasional "immovable larger stone" in riffles but wants to avoid a significant replacement of native bed material with larger particle diameters.

***Although there are not many angled log riffles in the project, there are numerous log sills, many of which are directly below constructed riffles. These sills will help to minimize downstream movement of riffle material as well as encourage scour below the sills to improve bedform diversity. The rock used in the riffles will be sourced from nearby gravel and rock mines and consist of a mixture of sand and larger gravel particles. The sand bed load will continue to move downstream through the project and will likely settle in with the riffle stone and function more like a typical sand bed system. Note that although the largest particle size found was 28 mm, many of the sections had downcut to a dense clay/saprolite feature that is currently holding grade. This material shows up as fine sediment in pebble counts which results in the small particle size. The riffles used in the project will serve as grade control while functioning more naturally than the existing grade control features.***

- b. Some riffles are not labeled on the plans and since the symbology is the same for all riffles, it is unclear what type of riffles these are.

***The riffles are now correctly labeled on the plan and profile sheets.***

- c. There are several riffles that are quite long (~40 ft.), which feel like they are functioning more as channel hardening rather than creating bedform diversity. Is there a reason for these extra long riffles? Would a sequence of structures be able to provide similar function with greater uplift potential?

***The length of the riffles do not violate our design criteria, which consider ranges for stable pattern. Longer riffles are common in a sand bed system. There are about three riffles that are just under 40', two of which are on Martha Branch. One is at the confluence with Casey Creek and the other spans the existing channel.***

- d. It would be helpful if more grading details were shown on the plans. This would provide the IRT with a better understanding of where P2 cuts are located, as well as their shape and size.

***Grading is shown on the plan set with the final mitigation plan.***

17. Is there a reason why Casey Creek Reach 1 is only a reference for pattern and not for profile, discharge, etc.? It seems that this feature would be the most relevant reference since it is directly upstream of the restoration reach.

***Casey Creek Reach 1 is a bit incised. We know this because when using the existing TOB for calculating design discharge, we get higher estimates than other sources. Also, tree roots are frequently visible within the channel. If the channel is slightly incised, we'd rather not use that for profile either.***

18. Would it be possible to fully incorporate Wetland B in the conservation easement? This would help prevent any future land uses from degrading the wetland and/or water quality in this area.

***More than 200 feet of wetland B has been included perpendicular to lower Casey Creek and we feel that is ample buffer to the stream channel.***

**Erin Davis, USACE**

1. Page 5, Section 3.1 – Thank you for investigating multiple planning resources to inform on potential future project vicinity and watershed development.
2. Page 15, Section 3.5 – This section states that easement boundaries provide the required 50-ft minimum stream buffer. However, Section 11 identifies 4.3% of the site as having less than the 50-ft standard stream buffer width. Please make sure section information is consistent. Additionally, Section 3.4 hydrology subsection asserts that site constraints necessitated the stream restoration be designed as Priority 2, which has an affect on the potential functional uplift of the site and should be discussed in Section 3.5 as a limited factor for achieving Priority 1 restoration.

***Please see response above to DWR comment 4.***

***Added that in the vicinity of crossings, some buffer widths are not 50 feet. Added a discussion of Priority 2 in Section 3.5.***

3. Page 27, Section 6.6.4 –
  - a. The IRT site walk meeting minutes dated July 27, 2022, included a recommendation to coordinate with NC DOT on a perched culvert under Highway 13 to allow a degree of

backwater which would aid in aquatic species passage and potentially reduce the amount of Priority 2 restoration. Please include a brief discussion on coordination with NC DOT.

***That has been added. Wildlands coordinated with NC DOT and determined the culvert design sizing includes 20% for baseflow. Consequently, Wildlands designed the stream invert below the culvert to create this effect and make the profile as high as possible.***

- b. Typically, we ask that Priority 2 restoration be limited to tie-in areas and that widening of the stream buffer be the first choice considered to reduce the risk of hydrologic trespass, which is based on Priority 2 restoration having functional uplift limitations. However, we also have concerns about the long term stability of a series of log drop structures as grade control in certain stream systems. Casey Creek Reach 3 appears to have a middle section of approximately 250 feet of Priority 1 restoration followed by a 100-foot straight channel log step system. What is the worst-case scenario if the log step system fails after project closeout? What is the potential likelihood of structure/system failure. Would the log step system be necessary if the short section of Priority 1 was adjusted to a continuation of Priority 2?

***As discussed on the May 8, 2024 IRT Teams call and subsequently showed on the plan sheets, we replaced the log step system with a section that spreads the three feet of drop over a sequence of riffles that end in log steps. This will require fewer structures and is more stable.***

4. Page 27, Section 6.6.5 – During the IRT site walk, the IRT expressed concerns about the culvert just downstream of the project terminus. The meeting minutes note that it may be necessary for Wildlands to obtain a temporary construction easement to install a stable connection. Has this action been coordinated?

***Yes, we tried to do this. It turns out that the downstream landowner, who owns the land that includes the culvert and the entry road, lives out of state and is non-responsive to all inquiries about the project. Consequently, we had to give up the thoughts of using that property at all and obtaining a temporary construction easement.***

5. Sheets 1.1 – 2.2 – The lack of approximate proposed grading contours and limits of disturbance lines made this review difficult, especially given considerable amounts of Priority 2 restoration. This information is required in the Final Mitigation Plan and since that will be the first opportunity the IRT has to review this information, it may result in additional questions/comments. Moving forward we recommend inclusion of rough/approx. grading and limit of disturbance lines in draft mitigation plans.

***The grading model is completed after the mitigation plan is submitted for review, or more or less simultaneous to the IRT review. We included the approximate limits on the concept map, as requested at the Site Visit. Grading is shown on the plan set with the final mitigation plan.***

6. Sheet 1.5 – What is the rationale for shifting the section of Casey Creek Reach 3 approximately 80 feet to the east? Is this additional linear footage needed to achieve the downstream section of Priority 1 restoration?

***We shifted the section of Casey Creek Reach 3 80 feet to the east so that the alignment follows a path where the existing grade was slightly lower and aligns with existing drainage patterns. One added benefit is it increases the size of the conservation easement.***

7. Sheet 1.7 – Please callout the roadside ditch top of bank. Is the ditch running between the mapped wetland area and road fully excluded from the conservation easement? If not, will a portion of the ditch be filled? Will allowable ditch maintenance and offset boundary signage be address in the easement agreement and plat?

***The roadside ditch top of bank is shown on the plans with the TB label, as shown for other ditches and channels. The western side of the ditch aligns with the edge of the conservation easement. Grading to the ditch is not anticipated and it will not be maintained in the future. We will place regular signage so the adjacent landowner knows it should not be maintained.***

8. Sheet 5.1 – Chunky riffle is proposed constructed riffle type included in the design details. However, all of the project streams have been identified as sand bed systems. Were boulders and 20-ft long cobble/gravel riffles observed in reference sand bed streams of similar watershed size and slope? What functions will these structures be providing? Have chunky riffles been successful in other sand bed stream restoration projects?

***Per the May 8, 2024 IRT Teams call, Wildlands removed chunky riffles in favor of native material riffles. Also, a sandbed system will have active bedload and this may embed the riffle; however, the coarser rock will remain, potentially providing habitat for macroinvertebrates.***

9. Sheet 5.3 – Please provide a detail for the proposed swale with pilot channel, including dimensions and materials.

***We provided a typical section, which includes dimensions, and a detail for buried log sills. This is all that's needed for the contractor to build the proposed swale with pilot channel. It is very simple and should remain stable without matting.***

10. Figures – Please include a figure showing all mitigation credit types on one map, including all proposed stream and buffer/nutrient offset assets.

***We will do that.***

11. Figure 10 –

- a. Please shift the upstream flow gauge on Martha Branch further up to the photo point location.

***The change has been made.***

- b. Please shift two fixed veg plots based on the figure markup provided. And due to concerns regarding vegetation establishment on Priority 2 bench and slope areas, please change the division of veg plot type to 3 random plots and 8 fixed plots.

***The changes have been made.***

- c. Please add a photo point at the start of the BMP on Martha Branch, and shift photo points upstream and downstream of the culvert crossing (#1) closer to the structure.

***A photo point has been added to the start of the BMP on Martha Branch. Photo points upstream and downstream of the culvert crossing (#1) were not shifted. Wildlands will***

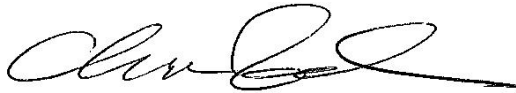


***be collecting outlet and inlet photos of culvert crossing (#1) in addition to the photo points located upstream and downstream and will include these photographs within a separate log in baseline and annual monitoring reports.***

12. While we did not reiterate all concerns noted by DWR, we support their comments included above.

Thanks very much for the mitigation plan feedback via the comments. Please contact me at 919.624.0905 if you have any questions.

Sincerely,

A handwritten signature in black ink, appearing to read "Chris Roessler". The signature is fluid and cursive, with a long horizontal stroke extending to the right.

Chris Roessler  
Project Manager

PREPARED BY:

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(919) 851-9986

**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 (c)(2) through (c)(14).
- NCDEQ Division of Mitigation Services In-Lieu Fee Instrument signed and dated July 28, 2010.

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

**Contributing Staff:**

Chris Roessler, *Project Manager*  
John Hutton, *Principal in Charge*  
Win Taylor, PWS, *Wetland Delineations*  
Matthew Key, *Designer*  
Kaitlyn Hogarth, *Lead Scientist*  
Ty Williams, *Construction Documents*  
Angela Allen, PE, *Lead Quality Assurance*



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## 1.0 Introduction

The Casey Creek Mitigation Site (Site) is in Wayne County approximately one mile west of the town of Grantham (Figure 1). The project includes restoration and preservation of project streams, as well as restoration and preservation of riparian buffers. The Site is located within 14-digit Hydrologic Unit Code (HUC 14) 03020201170010, North Carolina Division of Water Resources Sub-basin 03-04-12, and is being submitted for mitigation credit in the Neuse River Basin Cataloging Unit (CU) 03020201.

This Site is not located in a targeted resource area (TRA), local watershed plan (LWP) area, or regional watershed plan (RWP) area. However, stressors to the Site are documented in other watershed planning documents including the 2010 DMS Neuse River Basin Restoration Priorities (RBRP), the 2009 The Division of Water Resources (DWR) Neuse River Basin Water Quality Plan, and the 2015 Wildlife Resources Commission Wildlife Action Plan (WAP).

The Site is primarily agricultural land used for row crops and the remaining area is primarily wooded. Site streams, as presented in Figure 2, are in various stages of degradation due to past agricultural practices, including land clearing and stream channelization. The project will restore 3,166 existing linear feet (LF) and preserve 1,982 LF of streams. The site is also proposed for riparian buffer mitigation and nutrient offset mitigation. The total area of riparian buffer mitigation will include 349,182 square feet (SF) of restoration and 117,325 SF of preservation. A 25.1-acre conservation easement will protect the Site in perpetuity. The mitigation total for nutrient offset includes 175,913 SF, which will reduce nitrogen loading from agricultural runoff. The Site Protection Instrument detailing the terms and restrictions of the conservation easement is in Appendix 1.

**Table 1: Project Attribute Table Part 1**

<b>Project Name</b>	<b>Casey Creek Mitigation Site</b>
<b>County</b>	<b>Wayne</b>
<b>Project Area (acres)</b>	<b>25.1</b>
<b>Project Coordinates (latitude and longitude)</b>	<b>35° 17' 45.33"N, 78° 11' 06.29"W</b>
<b>Planted Acreage (acres of woody stems planted)</b>	<b>14</b>

## 2.0 Basin Characterization and Site Selection

The Neuse 01 basin is rural and dominated by forest (50%) and agriculture (40%), with 10% of the land developed. In general, stream degradation and water quality issues within the Neuse 01 are primarily linked to development-related and agricultural stressors.

Several North Carolina agencies have conservation and watershed planning documents that outline stream and water quality conditions in the Neuse 01 and goals for improving noted deficiencies. DWR developed the 2009 Neuse River Basin Water Quality Plan which notes common watershed stressors are a result of new development contributions, industrial, municipal, and agricultural waste contributions, and agricultural and forestry practices. Primary stressors are identified as habitat degradation, nutrient loading, and turbidity. Degraded stream conditions such as moderate to severe stream bank erosion, stream channelization, and stream sedimentation are discussed. Stream restoration and riparian buffer establishment are discussed as potential processes for recovery. The Division of Mitigation Services (DMS) developed the 2010 DMS Neuse River RBRP document, and amended it in 2018, which identifies a pattern of habitat degradation across the Neuse 01. The RBRP presents broad basin water quality and restoration goals, which include:



- Reducing nutrient and sediment loading in agricultural areas by restoring and preserving wetlands, streams, and riparian buffers;
- Implementing targeted projects;
- restoring water quality and aquatic habitat in impaired streams;
- protecting high-resource value waters;
- continuing existing watershed restoration and protection efforts in the basin;
- promoting nutrient reduction with stormwater management in BMPs in municipal areas; and
- implementing agricultural BMPs to limit sediment, nutrients, and fecal coliform to streams.

The Neuse River Basin is also discussed in the 2015 Wildlife Resource Commission’s (WRC) Wildlife Action Plan (WAP). This report notes that sedimentation and changes in hydrology and geomorphology due to urban development, agriculture, and instream mining impacts streams in the basin. The report also notes that water quality is degraded by excessive nutrient and chemical inputs and agricultural runoff.

The Site was selected to fulfill DMS’s mitigation need due to its ability to, directly and indirectly, address stressors identified in the RBRP and the WAP by creating stable stream banks and restoring a forest in agriculturally-maintained buffer areas. These actions will reduce nutrient and sediment inputs to Casey Creek, and ultimately to Falling Creek and the Neuse River, as well as reconnect instream and terrestrial habitats on the Site. Restoration of the Site aligns with recommended management strategies outlined in the RBRP.

### 3.0 Baseline and Existing Conditions

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#### 3.1 Watershed Conditions

The Site watershed (Table 2 and Figure 5) is in the southeast portion of the Neuse 01. It is situated in the rural countryside in Wayne County, approximately one mile west of the town of Grantham, NC.

The proposed project is located on three parcels that contain tributaries to Falling Creek. For decades, a large portion of the properties has been used for row crop agriculture. The remaining acreage is primarily wooded with a mix of pines and hardwoods. Currently, the agricultural fields are used to grow a rotation of corn and soybeans with an occasional rotation of peanuts, cotton, or sweet potatoes. Cattle were grazed in the fields south of US Highway 13 (Highway 13) until 1982. Perennial and intermittent streams on the Site have been historically channelized to increase crop production. Aerial photography dating back to 1950 (Appendix 2) shows that the Site has remained in substantially the same configuration since that time.

The Site’s watershed totals 0.684 square miles and is within North Carolina’s rolling coastal plain ecoregion. Casey Creek originates on an adjacent, non-project property to the north, as an intermittent stream. It becomes perennial after its confluence with Martha Branch, another Site intermittent stream that flows from the west. After Casey Creek crosses under Highway 13, it is joined by Afton Branch near the southern and downstream limits of the project area. The Martha Branch watershed consists mostly of forest. The Casey Creek and Afton Branch watersheds are comprised of agricultural land as well as wooded areas. One drain tile for agricultural field drainage exists on site and ties into Casey Creek approximately 100 feet upstream from Highway 13.

The Site and its watershed are not within a Wayne County zoning development district. It appears that the land use within the Site’s watershed will remain rural over the next ten years with development unlikely. No road improvements in the Site vicinity are recommended in the 2016 Wayne County Comprehensive Transportation Plan.



Aerial photography (Appendix 2) dating back to 1950 shows that the Site has had limited changes to its riparian buffers and stream channels. Before 1983, there was no buffer on Martha Branch’s left bank. The 1983 aerial photograph shows new and clear stream channelization on Casey Creek Reaches 2 and 3, Martha Branch, and Afton Branch. Since 2006, additional forestation has been allowed on upper Casey Creek. The streams and buffers have been in the same configuration since 2009.

Falling Creek and its tributaries are classified as Class C, Nutrient Sensitive Waters. Class C uses include infrequent or unorganized wading and boating events, fishing and fish consumption, wildlife, aquatic life, and agriculture. The Nutrient Sensitive designation is to protect the Neuse River estuary from high nitrogen loading.

**Table 2: Project Attribute Table Part 2**

Project Watershed Summary Information			
Physiographic Province	Coastal Plain		
Ecoregion	Rolling Coastal Plain		
River Basin	Neuse River		
USGS HUC (8 digit, 14 digit)	03020201, 03020201170010		
NCDWR Sub-basin	03-04-12		
NCDWR Water Quality Classification	C; NSW		
Stream Thermal Regime	Warm		
	Casey Creek	Martha Branch	Afton Branch
Drainage Area (acres)	439	82	210
2019 NLCD Land Use Classification			
Forest	18%	46%	9%
Agricultural	38%	16%	33%
Grassland	4%	8%	3%
Shrubland	12%	10%	12%
Developed	9%	9%	9%
Wetlands	18%	11%	34%
Open Water	<1%	<1%	<1%

Notes: Land Use Source – National Land Cover Database 2019 (NLCD 2019), Multi-Resolution Land Characteristics (MRLC) consortium, <https://www.mrlc.gov/data> and visual assessment of the 2020 aerial.

### 3.2 Landscape Characteristics

The Site is in the Coastal Plain physiographic province. The landscape of the Coastal Plain is characterized by flat lands to gently rolling hills and valleys. Elevations of the Coastal Plain range from sea level to 600 feet, and from 125 to 175 feet within the project vicinity. The Coastal Plain largely consists of marine sedimentary rocks comprised of sand, clay, and limestone that formed through the deposition of estuarine and marine sediments within the last 140 million years. According to the Geologic Map of North Carolina (1985), the underlying geology of the proposed Site is mapped as the Black Creek Formation (Kb) which is described as gray to brown lignitic clay that contains thin beds and laminae of fine-grained micaceous sand and thick lenses of cross-bedded sand. Glauconitic, fossiliferous clayey sand lenses are present in the upper portion of the unit. Bedrock was observed within the channel on Casey Creek Reach 3 but is not anticipated to be a constraint as it is below the proposed design depth.



The presence of erodible soils influenced the stream design, particularly in the slope of the stream banks, which have been laid back to encourage vegetation establishment. The predominant floodplain soils on site are described in Table 3 below and depicted in Figure 6.

**Table 3: Project Soil Types**

Soil Name	Slopes	Description
<b>We- Weston loamy sand (Woodington)</b>	0 to 2% slopes	Deep, coarse-loamy, poorly drained soil that occurs on gently rolling coastal plain uplands, flats, and stream terraces. Located along upper Casey Creek.
<b>Ke - Kenansville loamy sand</b>	0 to 3% slopes	Well drained, loamy, and deep soils formed of marine and fluvial sediment. Kenansville occurs on level and gently sloping coastal plain uplands and stream terraces. Located along upper Casey Creek.
<b>Dr - Dragston loamy sand</b>	0 to 2% slopes	Very deep, coarse-loamy, and somewhat poorly drained found on marine terraces. Located along the middle portion of Casey Creek.
<b>NoB - Norfolk loamy sand</b>	2 to 6% slopes	Well drained, fine-loamy and very deep soils located on coastal plain uplands and marine terraces. A very small area of Norfolk is located near the middle portion of Casey Creek.
<b>Ly - Lynchburg sandy loam</b>	0 to 2% slopes	Very deep, fine-loamy, and somewhat poorly drained soils occurring on coastal plain flats and marine terraces. Located along Martha Branch.
<b>Ra - Rains sandy loam</b>	0 to 2% slopes	Very deep, poorly drained, fine-loamy soils with a shallow, persistent water table occurring on coastal plain flats and depressions. Located along lower Casey Creek.

Source: Soil Survey of Wayne County, North Carolina, USDA-NRCS, <https://websoilsurvey.nrcs.usda.gov/app/WebSoilSurvey.aspx>

Casey Creek’s riparian buffer condition varies throughout the Site. Casey Creek Reach 1 possesses a forested buffer greater than 50 feet on both floodplains. Following its confluence with Martha Branch, Casey Creek Reach 2 lacks a riparian buffer, with agricultural fields occupying the floodplain and a narrow community of winged sumac (*Rhus copallinum*), sweetgum (*Liquidambar styraciflua*), tulip poplar (*Liriodendron tulipifera*), blackberry (*Rubus* sp.), and rivercane (*Arundinaria gigantea*) mixed with annual herbaceous vegetation dispersed along its banks. Casey Creek Reach 3 is bordered by agricultural fields on either side, with annual herbaceous vegetation and occasional sweetgum, winged sumac, blackberry, and black willow (*Salix nigra*) stems scattered along its banks. Downstream from its confluence with Afton Branch, Casey Creek lacks a riparian buffer and agricultural fields occupy the floodplain. A mature forest is present 30 feet beyond the left bank of lower Casey Creek. Martha Branch has a forested riparian buffer greater than 50 feet on its left floodplain, while the right floodplain is used for growing row crops. Afton Branch lacks a forested buffer throughout the project extent, with row crops occupying its floodplain and occasional red maple (*Acer rubrum*) saplings, blackberry, rivercane, dogfennel (*Eupatorium capillifolium*) and other annual herbaceous vegetation dispersed across its banks.



Within the forested area surrounding Casey Creek Reach 1 and the left floodplain of Martha Branch, there is a predominantly hardwood mix interspersed with occasional loblolly pine (*Pinus taeda*) within

the first approximate 30-50 feet from the stream. Typical overstory species include red maple, tulip poplar, water oak (*Quercus nigra*), swamp tupelo (*Nyssa biflora*), and white oak (*Quercus alba*). The mid-story contains American holly (*Ilex opaca*), wax myrtle (*Morella cerifera*), and a small amount of Chinese privet (*Ligustrum sinense*). Typical understory species include rivercane, slender woodoats (*Chasmanthium laxum*), and various fern species. Outside of the hardwood mix includes areas of forest dominated by loblolly pine. Typical species within the forested floodplain on the left side of lower Casey Creek (Reach 4) include willow oak (*Quercus phellos*), water oak, sweetbay magnolia (*Magnolia virginiana*), and sweetgum, with rivercane and greenbriar (*Smilax spp.*) in the understory.

### 3.3 Project Resources

#### 3.3.1 Existing Streams

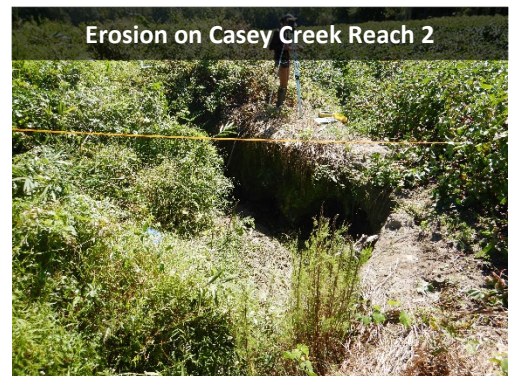
On September 24, 2021, all on-site jurisdictional streams within the proposed project area streams were evaluated and scored. Casey Creek Reaches 2, 3, and 4 and Afton Branch were identified as perennial within the project limits. Casey Creek Reach 1 and Martha Branch were identified as intermittent streams. Jurisdictional stream features are shown on Figure 2 and supporting documentation is provided in Appendix 3.

Geomorphic surveys were conducted on Site streams to characterize their existing condition. Existing streams and cross section locations are illustrated in Figure 2. NCDWR stream assessment forms are in Appendix 3 and reach specific cross sections and geomorphic summaries are provided in Appendix 4.

#### Casey Creek

Casey Creek flows south through the Site in a moderately sloped, unconfined valley with a mixture of mature vegetation and row crops in the riparian area. Crops are planted close to the top of the stream banks in Reaches 2, 3, and 4. Reach 1 is an intermittent, reference-quality sand bed stream system with extensive grade control from mature vegetation. It has high bedform diversity and large woody debris throughout the reach. Reach 1 ends at a knickpoint that is held by a dense root system and drops approximately six feet to the start of Reach 2.

Casey Creek Reach 2 begins as an intermittent stream but quickly changes to perennial near the confluence with Martha Branch. This reach is highly incised and bank erosion is prevalent. Row crops are planted close to the top of bank. It appears that this reach has been historically channelized and that is the main cause of the pronounced incision. This is true of all reaches on the Site with the exception of Casey Creek Reach 1.



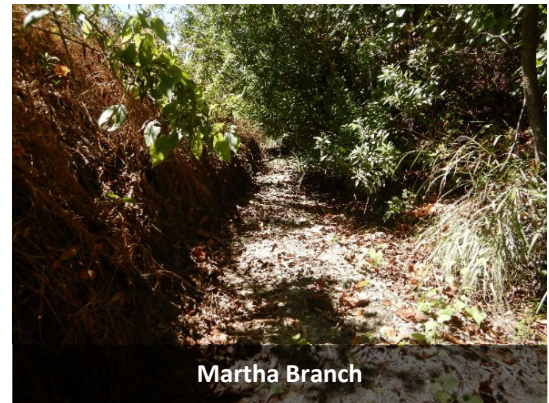
Reach 3 begins at the confluence with Martha Branch. A drain tile empties into Casey Creek from the east side approximately 100 feet upstream from the Highway 13 culvert. No other drain tiles could be located and are presumed to be not present. The Highway 13 culvert marks the reach end.

Reaches 3 and 4 are perennial reaches that have incised, apparently because of channelization, to saprolite and downstream from the US Hwy 13 culvert this has slowed incision. Reach 3 transitions to Reach 4 at the Afton Branch confluence. The reaches are highly incised with measured bank height ratios ranging from 2.5 to 7.2 and entrenchment ratios of 1.1 to 3.0. Bank erosion is prevalent throughout the reaches and row crops are planted close to the top of bank. Reach 4 ends at the downstream property line. The property line is a short distance upstream from the farm road culvert.

Casey Creek is a sand-dominated stream with bed material consisting of approximately 41% silt/clay and no gravel in Reach 1; no silt/clay and 3% gravel in Reach 2; and, 32% silt/clay and 2% gravel in Reach 3.

#### Martha Branch

Martha Branch becomes an intermittent stream where a ditch enters from the left bank. This point is approximately 200 feet east of the property line. According to the landowners, the branch was ditched in the 1940s to improve drainage from the adjacent parcel. The stream is highly incised with a measured bank height ratios of 4.4 - 4.5 and entrenchment ratios of 1.6 – 1.8 (Cross Sections RAL3 and XS5). Bank erosion is prevalent throughout this reach and row crops are planted close to the top of bank on the right side while the left side is forested. Martha Branch is a sand bed stream with 5% silt/clay and 2% gravel. The reach ends at the confluence with Casey Creek.



There is an approximately 0.1-acre pond located on the neighboring property approximately 170 linear feet upstream of this project reach. This small, off-site pond lacks significant surface and groundwater connection with Martha Branch because a 12-inch outfall pipe controls its drainage. Therefore, Wildlands expects this pond will affect the frequency, and to a lesser extent the volume, of hydrologic and sediment inputs. That is, low flow events will be slightly affected by attenuation, but high flow events will be similar to what would occur if the pond was not present. Should this minor pond breach, the forested area above Martha Branch is expected to serve as a sediment sink. The existing pond embankment is stable and not at risk of breaching.

#### Afton Branch

Afton Branch is a perennial stream that, according to the landowners, was excavated and straightened in the 1940s to improve drainage from the adjacent parcel and drain surrounding wetlands. The stream is highly incised with a measured bank height ratio of 2.4 and an entrenchment ratio of 1.8 (Cross Section RAL4). Bank erosion is prevalent throughout this reach and row crops are planted close to the top of bank. Afton Branch is a sand bed stream with approximately 22% silt/clay and 24% gravel. The reach ends at the confluence with Casey Creek.



Afton Branch has an off-site, 1.3-acre pond approximately 760 feet upstream from the Site. This pond lies to the north of US Highway 13 and outfalls via an 18" HDPE pipe to the stormwater drainage ditch along the highway. The flow then continues approximately 50 linear feet to the east where it is routed south under Highway 13 via a 72" x 37" single concrete box culvert. The pond provides limited hydrology to the downstream receiving waters through discharge via a surface withdrawal standpipe. Rather than reducing the overall hydrologic input to the system, the pond serves as a source of attenuation. The attenuation effect causes a lateral shift in the hydrograph of Afton Branch in comparison to other restoration reaches. The peak flow into Afton Branch's drainage area is not reduced, but rather flow from Afton Branch is delayed and staggered laterally in relation to peak flows from other surface water sources. The pond banks are heavily vegetated and stable, thus are at low risk of breach during the life of the project. Should the pond breach, the forested area above the Site is expected to serve as a

sediment sink. Overall, Wildlands does not expect the pond to affect the volume or frequency of hydrologic inputs to Afton Branch.

**Table 4: Casey Creek Reach 2 Attribute Table**

Reach Summary Information	
Parameters	Casey Creek Reach 2
Length of Reach (Linear Feet)	479
Valley confinement (Confined, moderately confined, unconfined)	Moderately Confined to Unconfined
Drainage area (acres)	102
Perennial, Intermittent, Ephemeral	Perennial
NCSAM Score/Stream Function	Low/Low
NCDWR Water Quality Classification	Class C; NSW
Width to Depth Ratio (ft/ft)	20.3
Bank Height Ratio (ft/ft)	7.2
Gradient (ft/ft)	0.0139
Reachwide d50 (mm)	0.375 Medium Sand
Stream Classification (Existing and Proposed)	Existing: G5 Proposed: C5
Evolutionary Trend	IV – degradation above/stable below headcut and channel widening
FEMA Zone Classification	none

**Table 5: Casey Creek Reach 3 Attribute Table**

Reach Summary Information	
Parameters	Casey Creek Reach 3
Length of Reach (Linear Feet)	1,514
Valley confinement (Confined, moderately confined, unconfined)	Moderately Confined to Unconfined
Drainage area (acres)	229
Perennial, Intermittent, Ephemeral	Perennial
NCSAM Score/Stream Function	Low/Low
NCDWR Water Quality Classification	Class C; NSW
Width to Depth Ratio (ft/ft)	6.2 - 9.3
Bank Height Ratio (ft/ft)	2.5 - 4.9
Gradient (ft/ft)	0.0065
Reachwide d50 (mm)	0.1875 Fine Sand
Stream Classification (Existing and Proposed)	Existing: G5 Proposed: C5
Evolutionary Trend	IV – bed stable but channel widening
FEMA Zone Classification	none

**Table 6: Casey Creek Reach 4 Attribute Table**

Reach Summary Information	
Parameters	Casey Creek Reach 4
Length of Reach (Linear Feet)	168
Valley confinement (Confined, moderately confined, unconfined)	Unconfined
Drainage area (acres)	439
Perennial, Intermittent, Ephemeral	Perennial
NCSAM Score/Stream Function	Low/Low
NCDWR Water Quality Classification	Class C; NSW
Width to Depth Ratio (ft/ft)	8.3
Bank Height Ratio (ft/ft)	1.8
Gradient (ft/ft)	0.0132
Reachwide d50 (mm)	0.1875 Fine Sand
Stream Classification (Existing and Proposed)	Existing: G5 Proposed: C5
Evolutionary Trend	IV – bed stable but channel widening
FEMA Zone Classification	none

**Table 7: Martha Branch Attribute Table**

Reach Summary Information	
Parameters	Martha Branch
Length of Reach (Linear Feet)	507
Valley confinement (Confined, moderately confined, unconfined)	Moderately Confined
Drainage area (acres)	82
Perennial, Intermittent, Ephemeral	Intermittent
NCSAM Score/Stream Function	Low/Low
NCDWR Water Quality Classification	Class C; NSW
Width to Depth Ratio (ft/ft)	6.2 - 9.0
Bank Height Ratio (ft/ft)	4.4 - 4.5
Gradient (ft/ft)	0.0094
Reachwide d50 (mm)	0.375 Medium Sand
Stream Classification (Existing and Proposed)	Existing: G5 Proposed: C5
Evolutionary Trend	IV – degradation above/stable below headcut and channel widening
FEMA Zone Classification	none



**Table 8: Afton Branch Attribute Table**

Reach Summary Information	
Parameters	Afton Branch
Length of Reach (Linear Feet)	533
Valley confinement (Confined, moderately confined, unconfined)	Unconfined
Drainage area (acres)	210
Perennial, Intermittent, Ephemeral	Perennial
NCSAM Score/Stream Function	Low/Low
NCDWR Water Quality Classification	Class C; NSW
Width to Depth Ratio (ft/ft)	5.7
Bank Height Ratio (ft/ft)	2.4
Gradient (ft/ft)	0.00468
Reachwide d50 (mm)	0.375 Medium Sand
Stream Classification (Existing and Proposed)	Existing: G5 Proposed: C5
Evolutionary Trend	IV – bed stable but channel widening
FEMA Zone Classification	none

**3.3.2 Existing Wetlands**

Wildlands investigated the extent of Waters of the United States within and immediately adjacent to the proposed project easement in November of 2022. All jurisdictional resources were located by sub-meter GPS or conventional survey. USACE staff provided email concurrence with jurisdictional resource mapping on June 23, 2023. See Appendix 5 for supporting documentation.

Wetlands within the conservation easement were classified using the North Carolina Wetland Assessment Method (NCWAM). There are two wetlands (Wetlands A and B) within the conservation easement area which were classified as Headwater Forests (HWF) and Bottomland Hardwood Forests (BLH). The distinguishing factor between BLH and HWF wetland types is the order of the most closely associated stream channel. Both features exhibited evidence of prolonged saturation within the upper 12 inches of the soil profile through an umbric surface, wetland plant communities, and primary and secondary hydrology indicators. Hydrology indicators observed include sediment deposits, drift deposits, sparsely vegetated concave surfaces, drainage patterns, a positive FAC-Neutral test, and geomorphic position. Plant species noted within wetlands A and B include, but are not limited to, *Acer rubrum*, *Liquidambar styraciflua*, *Quercus phellos*, *Pinus taeda*, *Ligustrum sinense*, and *Arundinaria tecta*.

**Table 9: Summary of Wetland Resources**

Wetland Summary Information		
Parameter	Wetland A	Wetland B
Size of Wetland (AC)	0.098	0.216
Wetland Type	Headwater Forest	Bottomland Hardwood Forest
NCWAM Rating	High	Medium
Mapped Soil Series	Wehadkee	Rains
Drainage Class	Poorly Drained	Poorly Drained
Soil Hydric Status	Yes	Yes
Source of Hydrology	Groundwater	Groundwater



### 3.4 Potential for Functional Lift

The Wildlands Team proposes to restore a high quality of ecological function to streams and riparian areas on this Site. The project design will be developed to avoid adverse impacts to existing streams, wetland resources, or mature wooded vegetation where possible. Management strategies for individual resources are tailored to their functional uplift potential.

#### Non-functioning Riparian Buffer

The restoration reaches of Casey Creek, Martha Branch, and Afton Branch are row cropped up to the top of the stream banks, rendering the existing riparian zone non-functional. Planting riparian buffers on project stream corridors will not only improve terrestrial habitat but will contribute to water quality improvements as well. North of Highway 13, planted riparian buffers will meet and often exceed the required 50-foot minimum width. South of Highway 13, the entire 13.3-acre parcel will be removed from row crop production, 9.5-acres of which will be placed in conservation easement and planted with woody vegetation.

#### Sediment

A preliminary watershed analysis was performed to evaluate onsite and offsite sediment sources. Currently, sediment loading on Casey Creek, Martha Branch, and Afton Branch is largely dictated by onsite sources. These streams are impacted by sediment runoff from row crops, which are planted throughout the floodplains and up to the top of the stream banks. The lack of stabilizing streambank vegetation has also resulted in systemic streambank erosion and incision through the row crop fields. Both sources will be addressed through restoration of stable stream geomorphology and the riparian zone. Reconnection of these systems with flood relief areas will also allow the streams to use their floodprone areas for sediment storage from any remaining upstream sources.

#### Nutrients and Fecal Coliform

The annual rate of nutrient removal from buffer establishment is calculated by using the NC Division of Water Quality "Methodology and Calculations for determining nutrient reductions associated with riparian buffer establishment" (1998). Row cropping accounts for approximately 12 acres, or 47%, of the proposed 25.5-acre conservation easement. The 13.3-acre parcel south of Highway 13 will be completely removed from row crop production. The remaining 4.3 acres of converted row crops upstream of Highway 13 will continue to receive drainage from adjacent row crops. This 4.3 acres is estimated to remove 327 pounds of total nitrogen (TN) and 21 pounds of total phosphorus (TP) annually. Additionally, storm runoff from a cattle operation in Casey Creek's watershed containing nutrients and fecal coliform will be treated via filtration on the enhanced and restored Casey Creek floodplain. Wildlands has included additional buffer, ranging up to 500 feet off the top of stream bank along Casey Creek Reach 3, to enhance these watershed treatment efforts.

#### Hydrology

Site streams slated for restoration are severely incised. Bank height ratios are greater than 1.8 on all restoration reaches and exceed 4 on Martha Branch and Casey Creek north of Highway 13. The current owners state that both Casey Creek and Afton Branch were ditched and straightened in the early 1940s to create larger fields and stated that Martha Branch was ditched at the edge of the property to prevent field flooding. It appears that Casey Creek was channelized again between 1973 and 1983. Peak flow confinement within these ditched channels has led to systemic scour, incision, and mass wasting of bank material. Restoration activities will be tailored to restore the hydrologic connection between the stream and floodplain on incised reaches with effort made to attain Priority 1 restoration. Downstream of Highway 13, topographic constraints necessitate a mostly Priority 2 restoration approach to create a new, stable floodplain elevation at a lower elevation. Raising the stream beds upstream of Highway 13 and lowering the floodplain downstream of Highway 13 will improve floodplain connectivity, reduce the



erosive effects of peak flows, and decrease the drainage effect on surrounding wetlands. The existing channelized streams will be filled.

One known length of drainage tile will be removed from within the conservation easement to prevent hydrologic bypass of the riparian zone. An ephemeral floodplain pool will be established near the easement edge to treat any remaining concentrated drainage as it enters the easement. Floodplain pools provide attenuation and treatment of surface water runoff, as well as habitat variety.

#### Habitat

The 6-foot headcut/knickpoint between the preservation section of Casey Creek and the restoration reach and the 4- to 5-inch drop from the Highway 13 culvert on Casey Creek impacts hydrologic connectivity and fragments habitat. Raising Casey Creek's bed elevation in both locations will promote aquatic species passage.

Casey Creek, Martha Branch, and Afton Branch all exhibit poor bedform diversity due to silted in pools and embedded riffles. The lack of stabilizing riparian vegetation and widespread stream bank erosion has also created a lack of bank habitats. Installing wood and rock step structures, as well as riffles and bank revetments, provide habitat for macroinvertebrates, catch debris for leaf packs, and create shelter for fish in undercut banks. A diverse bedform will be created in restoration reaches to provide habitat for an increased number of species of insects, fish, and amphibians.

The restoration reaches also lack large woody debris and leaf and debris packs usually found in streams with ample riparian vegetation. Restoration efforts will incorporate woody material to seed channels with sources of carbon and to provide physical roughness to enhance retention of beneficial material. Planting the riparian buffers with woody vegetation will provide future sources of large woody debris for the streams.

#### Summary

The primary stressors on site are incision and entrenchment from channelization and a lack of riparian buffers. These stressors led to low NCSAM scores on all reaches proposed for restoration. Without intervention, Casey Creek, Afton Branch, and Martha Branch will continue to erode, contributing more sediment and embedding habitat in nutrient sensitive waters.

Ultimately, functional uplift for this Site is linked to improvement in and maintenance of hydrologic connectivity between streams and floodplains. Additionally, establishing a riparian buffer will protect and enhance this connectivity. Functional uplift for the site will be achieved through the following:

- Restoring degraded stream channels to reduce erosion and connecting these streams to a floodplain to improve hydrologic connectivity;
- Eliminating bank erosion and associated pollutants;
- Planting riparian buffers to shade streams, help stabilize stream banks, promote woody debris in system, and diffuse overland non-point source pollutants from adjacent land use;
- Protecting the Site with a conservation easement.

These project components are described in Section 5 in terms of goals, objectives, and outcomes for the project and in greater detail in Section 6 through description of the design approach.

### **3.5 Site Constraints to Functional Uplift**

One internal easement crossing is proposed at the Site to allow the tenant farmer to access fields without using Highway 13. A culvert is proposed at the internal easement crossing. The culvert will be designed with the restored stream bed profile to allow for aquatic organism passage. An external easement break is proposed to account for the Highway 13 right-of-way.





The easement boundaries around streams proposed for mitigation credit provide the required 50-foot minimum riparian buffer for Coastal Plain streams and nutrient offset mitigation. There are limited exceptions to the 50-foot buffer in the vicinity of crossings and conservation easement termini, such as the project downstream extent.

The elevation of the Highway 13 culvert necessitates the use of Priority 2 restoration going into and out of that crossing. Afton Branch and the lower end of Casey Creek also require Priority 2 restoration because starting and ending elevations cannot be controlled. Wildlands has designed the Priority 2 restoration in such a way that provides adequate floodplain width and interaction. Nearby Grantham Branch was constructed this way and is meeting performance and stability standards in the areas with Priority 2 restoration.

The entire easement area can be accessed for construction, monitoring, and long-term stewardship from Highway 13.

## 4.0 Regulatory Considerations

Table 10, below, is a summary of regulatory considerations for the Site. These considerations are expanded upon in Sections 4.1-4.3.

**Table 10: Regulatory Considerations Attribute Table**

Regulatory Considerations			
Parameters	Applicable?	Resolved?	Supporting Docs?
Water of the United States - Section 404	Yes	No	PCN <sup>1</sup>
Water of the United States - Section 401	Yes	No	PCN <sup>1</sup>
Endangered Species Act	Yes	Yes	Appendix 5
Historic Preservation Act	Yes	Yes	Appendix 5
Coastal Zone Management Act	No	N/A	N/A
FEMA Floodplain Compliance	No	Yes <sup>2</sup>	N/A
Essential Fisheries Habitat	No	N/A	N/A

1: PJD approved by USACE on 6/23/23. PCN to be provided to IRT with Final Mitigation Plan.

2: Floodplain permit not required by Wayne County local floodplain administrator.

### 4.1 Biological and Cultural Resources

A Categorical Exclusion was approved by the Federal Highway Administration (FHWA) on October 27, 2022. As part of the screening process to meet regulatory standards, Wildlands conducted an assessment within the project boundary for the presence of threatened and endangered (T&E) species protected under the Endangered Species Act of 1973 and historical resources protected under the National Historic Preservation Act of 1966. As part of the Categorical Exclusion consultation process, scoping letters were submitted to the United States Fish and Wildlife Service (USFWS), North Carolina Wildlife Resources Commission (NCWRC), and the State Historic Preservation Office (SHPO). See Figure 1 for locations of protected lands within proximity to the Site and Appendix 6 for the approved Categorical Exclusion and agency correspondence.

#### 4.1.1 Cultural Resources / Conservation Lands / Natural Heritage

No historic resources are listed in the State Historic Preservation Office's National Register on or in close proximity to the Site parcels. No other architectural structures or archaeological artifacts have been observed or noted on the site. The NC Natural Heritage Program (NHP) Managed Areas references two Unique Places to Save Easements within one mile of the Site. There are no Managed or Significant Natural Areas within or adjacent to Site parcels. All appropriate cultural resource agencies have been



contacted for their review and comment. There are no objections to the proposed project from SHPO. SHPO correspondence is included in Appendix 6.

#### 4.1.2 Threatened and Endangered Species

Wildlands searched the USFWS' Information for Planning and Consultation (IPaC) and the NC Natural Heritage Program (NHP) data explorer for federally listed threatened and endangered plant and animal species within the project action area. There are currently three federally protected species listed for the proposed Site: red-cockaded woodpecker (*Picoides borealis*), Neuse River waterdog (*Necturus lewisi*), and Carolina madtom (*Noturus furiosus*). Additionally, the tricolored bat (*Perimyotis subflavus*) (TCB) was proposed endangered on September 14, 2022 after initial assessments were completed. The TCB was not included on the original IPaC species list in the Categorical Exclusion. In anticipation of its formal listing, the species list was updated on July 6, 2023 and is included in Appendix 6.

In a pedestrian survey conducted on August 16, 2022, no suitable habitat or individuals were observed for the federally listed threatened and endangered species. USFWS did not have any objections to the proposed activities in their response to the public notice (SAW-2022-001239) on August 12, 2022 and expected minimal adverse impacts to fish and wildlife resources. Additionally, NCWRC has no issue with the project as proposed.

In anticipation of the final TCB ruling, Wildlands conducted a pedestrian survey on July 21, 2023. Pedestrian surveys identified suitable summer habitat for the TCB in the form of roost trees; however, the vast majority of the forested area is along the reach of the stream proposed for preservation. Additionally, there is a culvert bisecting the project as Casey Creek runs beneath Highway 13, also known as the Blue-Gray Scenic Byway. Stream restoration will occur on both sides of the culvert but the culvert itself will remain as is. Per the NHP data explorer, there are no known occurrences of the TCB within 10-miles of the project area. Wildlands will continue to monitor the listing status for TCB. If project construction activities are not complete once the listing becomes finalized, the project team will re-initiate consultation with USFWS, as appropriate, in order to ensure ESA, Section 7 compliance.

Results from pedestrian surveys and agency correspondence are located in Appendix 6.

#### **4.2 FEMA Floodplain Compliance and Hydrologic Trespass**

The Site is represented on the Wayne County Flood Map 3720254600J. There is no mapped floodplain or floodway on the Site. Wildlands contacted the Wayne County floodplain administrator on April 13, 2023 and was told that a floodplain development permit would not be needed to meet local requirements. The project will be designed to avoid adverse floodplain impacts or hydrologic trespass on adjacent properties or local roadways.

#### **4.3 401/404**

Design of the Site prioritized avoidance and minimization of impacts to wetlands that currently provide appropriate function. Some wetland impacts are unavoidable and necessary to maximize ecological uplift potential to Casey Creek and its tributaries. One wetland area adjacent to Casey Creek (Wetland B) will have 0.012 acres permanently impacted during realignment of Casey Creek and 0.088 acres temporarily impacted for grading and construction access. The open water feature adjacent to Wetland B will be filled within 50 feet of the new channel. Additionally, the jurisdictional ditch (Ditch A) will be impacted. A swale with a small channel running through it will be constructed where the ditch currently exists. Wetlands within limits of disturbance will be shown on construction plans, erosion control and sediment control plan detail sheets, and avoidance procedures described in project specifications. Final impacts to jurisdictional resources will be provided in the Pre-Construction Notification after proposed floodplain grading and the erosion control plan are complete. The Pre-Construction Notification will be submitted to the IRT with the Final Mitigation Plan.



## 5.0 Mitigation Site Goals and Objectives

The project will improve stream functions through the conversion of pasture and agricultural fields to riparian buffer, and through restoring streams throughout the entire Site. Within the project limits, Martha Branch, Afton Branch, and Casey Creek will be reconnected to floodplain.

Project goals are desired project outcomes and are verifiable through measurement and/or visual assessment. Objectives are activities that will result in the accomplishment of goals. The project will be monitored after construction to evaluate performance as described in Section 8 of this report. The project goals and related objectives are described in Table 11.

**Table 11: Mitigation Goals and Objectives**

Goal	Objective	Expected Outcomes and RBRP Objectives Supported
Restore and enhance native floodplain vegetation.	Convert active agricultural fields to forested riparian buffers along all Site streams, which will slow and treat sediment laden runoff from adjacent pastures and fields before entering streams. Protect and enhance existing forested riparian buffers. Treat invasive species.	<ul style="list-style-type: none"> <li>• Reduce sediment inputs from bank erosion and runoff. Increase nutrient cycling and storage in floodplain. Provide riparian habitat. Add a source of LWD and organic material to stream. Support all stream functions.</li> <li>• <i>Support RBRP objective of restoring riparian buffers.</i></li> </ul>
Improve the stability of stream channels.	Reconstruct stream channels slated for restoration with stable dimensions and appropriate depth relative to the existing floodplain. Add bank revetments and instream structures to protect restored/enhanced streams.	<ul style="list-style-type: none"> <li>• Reduce shear stress on channel boundary. Reduce sediment inputs from bank erosion.</li> <li>• <i>Support LWP/RBRP objective of reducing turbidity inputs and stabilizing streambanks.</i></li> </ul>
Improve instream habitat.	Install habitat features such as constructed steps, cover logs, and brush toes on restored reaches. Add woody materials/ LWD to channel beds. Construct pools of varying depth. Remove aquatic habitat barrier.	<ul style="list-style-type: none"> <li>• Increase and diversify available habitats for macroinvertebrates, fish, and amphibians. Promote aquatic species migration and recolonization from refugia, leading to colonization and increase in biodiversity over time. Add complexity including LWD to the streams.</li> </ul>
Diffuse concentrated agricultural runoff.	Remove drainage tiles to prevent hydrologic bypass of the riparian zone. Treat concentrated drainage tile runoff through floodplain pools.	<ul style="list-style-type: none"> <li>• Prevent hydrologic bypass of the buffer and treat concentrated runoff points thereby reducing agricultural and sediment inputs to the project, which will reduce likelihood of accumulated fines and excessive algal blooms from nutrients.</li> </ul>
Permanently protect the project site from harmful uses.	Establish a conservation easement on the Site.	<ul style="list-style-type: none"> <li>• Protect Site from encroachment on the riparian corridor and direct impact to streams and wetlands. Support all stream functions.</li> </ul>



## 6.0 Design Approach and Mitigation Work Plan

### 6.1 Design Approach Overview

Wildlands designed and developed mitigation activities for this Site to meet the goals and objectives described in Section 5, which were formulated based on the potential for functional lift described in Section 3.4. Expected outcomes are identified in Section 5, though these are not tied to performance criteria.

The design approach for this Site utilized a combination of analog and analytical approaches for stream restoration. Reference reaches were identified, and these references serve as the basis for design parameter and design discharge determination. Wildlands then sized channels based on a determined design discharge. This approach has been used on other successful coastal plain stream restoration projects and is appropriate for the goals and objectives identified for this Site.

The project streams proposed for restoration on the Site will be reconnected with their historic floodplain. Channels will be reconstructed with stable dimension, pattern, and profile to transport the water and sediment delivered to the system. The design approach for project streams varies by reach and specific parameters were determined based on site data and design goals. The design approach maximizes (where feasible) a Priority 1 restoration approach that promotes frequent floodplain inundation. In circumstances where Priority 1 design is unachievable due to site constraints, the approach will shift to Priority 2. Details are provided for each stream reach in Section 6.6 and the extent of Priority 1 and 2 restoration is shown on Figure 9a.

Though the Priority 2 channels will meander, the floodplain bench surrounding it will be straight and not follow the channel meander. The floodplain bench will extend at least 10 feet past the outside meander bends and will gradually slope (5:1 or flatter) to existing grade. This approach was successfully employed by Wildlands at the nearby Grantham Branch Mitigation Site.

Wildlands will employ rock riffles to provide grade control on the Site even though this is a sand bed system. Reference reaches in the area rely on dense networks of tree roots that can't be created during construction. Root systems require several decades to form, and the rock riffles will provide grade control in the meantime. Additionally, Wildlands expects that the riffles will embed with sand to some degree and that will provide a more natural appearance. The material used on Site will be sourced from, in order of preference, local pea gravel mines that have larger waste material, nearby mitigation sites in the eastern Piedmont, and quarry-sourced stone.

The adjacent floodplain will be planted with native tree species. Instream structures will be constructed in the channels to help maintain stable channel morphology and improve aquatic habitat. The entire project area will be protected in perpetuity by a conservation easement.

**Table 12: Stream Stressors and Restoration Approach**

Design Reach	Primary Stressors/Impairments	Approach	Mitigation Activities
Martha Branch	Severe erosion, severe incision, channelization, lack of buffer on right bank	R	Restoring dimension, pattern, and profile, planting buffers
Afton Branch	Erosion, incision, channelization, lack of buffer	R	Restoring dimension, pattern, and profile, planting buffers
Casey Creek Reach 1	None	P	Protect with conservation easement



Design Reach	Primary Stressors/Impairments	Approach	Mitigation Activities
Casey Creek Reach 2	Severe erosion, severe incision, channelization, lack of buffer on left bank	R	Restoring dimension, pattern, and profile, planting buffers
Casey Creek Reach 3	Bank erosion, incision, channelization, lack of buffer	R	Restoring dimension, pattern, and profile, planting buffers
Casey Creek Reach 4	Bank scour, incision, channelization, lack of buffer	R	Restoring dimension, pattern, and profile, planting buffers

## 6.2 Reference Streams

Reference streams provide geomorphic parameters of a stable system, which can inform the design of stable channels of similar stream types in similar landscapes and watersheds. A total of seven reference reaches were identified for this Site and used to support the design of Casey Creek, Martha Branch, and Afton Branch (Figure 7). These reference reaches were chosen because of their similarities to the Site streams including drainage area, valley slope, morphology, and bed material. The reference reaches are all located within the coastal plain region of North Carolina. The references to be used for each Site stream are listed in Table 13.

**Table 13: Stream Reference Data Used in Development of Design Parameters**

	Stream Type	Martha Branch	Afton Branch	Casey Creek R2	Casey Creek R3	Casey Creek R4
Scout East 1	E5b	Q	Q	Q	Q	Q
Scout West 1	E/C5b	Q-XS-PRO	Q-PRO	Q-XS-PRO	Q-PRO	Q-PRO
Still Creek	E5	Q-PAT-PRO	ALL	Q-PAT-PRO	ALL	ALL
Casey Creek R1	C5	PAT	PAT	PAT	PAT	PAT
Scout West 2	E5	ALL	Q-PAT-PRO	ALL	Q-PAT-PRO	Q-PAT-PRO
Scout East 2	E5	Q-PAT	Q-PAT	Q-PAT	Q-PAT	Q-PAT
Johanna Creek	E5/C5	Q-PAT-XS	ALL	Q-PAT-XS	ALL	ALL
Cedar Creek	E5	Q-PAT-PRO	Q-PAT	Q-PAT-PRO	Q-PAT	Q-PAT

Q – Discharge; PAT – Pattern; PRO – Profile; XS – Cross-Section

## 6.3 Design Discharge Analysis

Multiple methods were used to develop bankfull discharge estimates for the project reaches: the NC Coastal Plain Regional Curve (Doll et al., 2003), a Wildlands Regional USGS Flood Frequency Analysis, a Site Specific Reference Reach Curve, estimates of discharge at existing bankfull indicators, and data from previous successful restoration projects. The resulting values were compared and best professional judgment was used to determine the specific design discharge for each reach.

### Wildlands Regional USGS Flood Frequency Analysis

Twelve U.S. Geological Survey (USGS) stream gage sites were identified within the southeast (Virginia to Georgia) coastal plain for use in development of a project specific regional flood frequency analysis. The gages used were:

- USGS 02227422 – Crooked Creek near Bristol, GA (DA = 0.28 mi<sup>2</sup>)
- USGS 0209173190 – Unnamed Tributary to Sandy Run near Lizzie, NC (DA = 0.57 mi<sup>2</sup>)
- USGS 02227990 – Saltila River Tributary 2 at Atkinson, GA (DA = 0.67 mi<sup>2</sup>)

- USGS 02169960 – Lake Marion Tributary near Vance, SC (DA = 1.21 mi<sup>2</sup>)
- USGS 01668300 – Farmers Hall Creek near Champlain, VA (DA = 2.18 mi<sup>2</sup>)
- USGS 021355013 – Davis Branch near Sumter, SC (DA = 2.50 mi<sup>2</sup>)
- USGS 02136361 – Turkey Creek near Maryville, SC (DA = 4.25 mi<sup>2</sup>)
- USGS 021720725 – Canton Creek near Moncks Corner, SC (DA = 4.82 mi<sup>2</sup>)
- USGS 02148090 – Swift Creek near Camden, SC (DA = 4.90 mi<sup>2</sup>)
- USGS 02130800 – Back Swamp near Darlington, SC (DA = 6.22 mi<sup>2</sup>)
- USGS 01661800 – Bush Mill Stream near Heathsville, VA (DA = 6.77 mi<sup>2</sup>)
- USGS 02102908 – Flat Creek near Inverness, SC (DA = 7.63 mi<sup>2</sup>)

Flood frequency curves were developed for the design discharges using the above gage data. These drainage area–discharge relationships were used to estimate discharges for the streams on Site. Discharge estimates for Martha Branch and Casey Creek Reach 2 using this tool were evaluated with caution since the drainage area for Martha Branch and Casey Creek Reach 2 falls outside the range of data used to develop the tool.

#### Published Regional Curve Data

Discharge was estimated using the published NC Coastal Plain Regional Curve (Doll et al., 2003).

#### Site Specific Reference Reach Curve

##### Site Specific Reference Reach Curve

A local site-specific reference reach curve, including seven reaches, was also used for design discharge estimates. The curve includes Scout West 1, Scout West 2, Scout East 1, Scout East 2, Still Creek, Johanna Creek, and Cedar Creek.

Each reference reach was surveyed to develop information for hydrologic and geomorphic analyses. Stable cross-sectional dimensions and channel slopes were used to compute a bankfull discharge with Manning’s equation for each reference reach. The resulting discharge values were plotted with drainage area and compared to the regional curve datasets described in previous sections.

##### Design Discharge Analysis Summary

In examining the different methods of determining discharge, the Wildlands USGS Flood Frequency Analysis for the 1.5-year event had the highest estimations, and Coastal Plain Curve had the lowest. The site-specific reference reach curve fell between the two but was closer to values predicted by the Coastal Plain Regional Curve. The design discharges selected for the project restoration reaches were at the upper end of the suitable range based on the data and fell between the Coastal Plain Regional Curve and predicted 1.2-year event from the Wildlands USGS tool.

Wildlands established slightly larger design discharges (relative to drainage areas) for the small tributaries so that slightly larger channels are constructed for these reaches. This design practice has produced successful results on past projects regarding stability and sustainable vegetation establishment in sandbed streams. Results of each method and the final design discharges are shown in Table 14 and illustrated in Figure 8.



**Table 14: Summary of Design Bankfull Discharge Analysis**

	Martha Branch	Afton Branch	Casey Creek Reach 2	Casey Creek Reach 3	Casey Creek Reach 4
DA (acres)	82	210	102	229	439
DA (sq. mi.)	0.13	0.33	0.16	0.36	0.69
USGS Flood Analysis, 1.2-yr event (cfs)	6	11	11	11	16
USGS Flood Analysis, 1.5-yr event (cfs)	11	17	17	18	25
NC Coastal Plain Curve (cfs)	4	7	4	8	13
Site Specific Reference Reach Curve (cfs)	5	9	5	9	15
Final Design Q (cfs)	6	9	7	9	15

**6.4 Design Channel Morphological Parameters**

Reference reach data, prior designed projects, and designer experience were used to develop design morphologic parameters for each of the restoration reaches. Key morphologic parameters are summarized in Tables 15-19. Complete design morphologic parameters are included in Appendix 4.

**Table 15: Summary of Design Morphologic Parameters for Martha Branch**

Parameter	Existing Parameters	Reference Parameters		Proposed Parameters
	Martha Branch	Scout West 1	Scout West 2	Martha Branch
Contributing Drainage Area (acres)	82	38	218	82
Channel/Reach Classification	G5c	E/C5b	E5	C5/E5
Discharge Width (ft)	3.5 - 4.8	2.6 – 6.3	5.6 – 7.6	6.8
Discharge Depth (ft)	0.5 – 0.6	0.3 – 0.5	0.7 – 1.0	0.5
Discharge Area (ft <sup>2</sup> )	1.9 - 2.6	1.2 – 2	5.3 – 5.4	3.5
Discharge Velocity (ft/s)	2.2 – 2.3	1.3 – 2.3	1.2	1.8
Discharge (cfs)	4 – 6	2.6	6.4	6
Channel Slope (ft/ft)	0.0094	0.026	0.004	0.0056 – 0.0060
Sinuosity	1.0	1.1	1.2	1.2
Width/Depth Ratio	6.2 – 9.0	5.4 – 19.9	5.7 - 11	13
Bank Height Ratio	4.4 – 4.5	1.1 – 1.3	1.1 – 1.2	1.0
Entrenchment Ratio	1.6 – 1.8	> 2.2	> 2.2	2.2 – 5.0

**Table 16: Summary of Design Morphologic Parameters for Afton Branch**

Parameter	Existing Parameters	Reference Parameters			Proposed Parameters
	Afton Branch	Scout West 2	Still Creek	Johanna Creek	Afton Branch
<b>Contributing Drainage Area (acres)</b>	210	218	224	576	210
<b>Channel/Reach Classification</b>	G5c	E5	E5	E5/C5	C5/E5
<b>Discharge Width (ft)</b>	5.0	5.6 – 7.6	6.8 – 8.0	9.7	8.5
<b>Discharge Depth (ft)</b>	0.9	0.7 – 1.0	0.7 – 1.0	0.8	0.6
<b>Discharge Area (ft<sup>2</sup>)</b>	4.3	5.3 – 5.4	5.7 – 6.7	7.2 – 7.8	5.2
<b>Discharge Velocity (ft/s)</b>	1.9	1.2	1.2	1.8 – 1.9	1.8
<b>Discharge (cfs)</b>	9.0	6.4	7.3	14	9.0
<b>Channel Slope (ft/ft)</b>	0.0047	0.004	0.0066	0.0022	0.0042 – 0.0050
<b>Sinuosity</b>	1.1	1.2	1.2	1.2	1.2
<b>Width/Depth Ratio</b>	5.7	5.7 - 11	7.4 – 11.3	10.1 – 19.7	14.0
<b>Bank Height Ratio</b>	2.4	1.1 – 1.2	1.0	1.0	1.0
<b>Entrenchment Ratio</b>	1.8	> 2.2	4.9 - 13	>2.2	2.2 – 5.0

**Table 17: Summary of Design Morphologic Parameters for Casey Creek Reach 2**

Parameter	Existing Parameters	Reference Parameters		Proposed Parameters
	Casey Creek Reach 2	Scout West 1	Scout West 2	Casey Creek Reach 2
<b>Contributing Drainage Area (acres)</b>	102	38	218	102
<b>Channel/Reach Classification</b>	G5c	E/C5b	E5	C5/E5
<b>Discharge Width (ft)</b>	5.7	2.6 – 6.3	5.6 – 7.6	7.0
<b>Discharge Depth (ft)</b>	0.9	0.3 – 0.5	0.7 – 1.0	0.5
<b>Discharge Area (ft<sup>2</sup>)</b>	5.3	1.2 – 2	5.3 – 5.4	3.7
<b>Discharge Velocity (ft/s)</b>	2.2	1.3 – 2.3	1.2	2.0
<b>Discharge (cfs)</b>	12.0	2.6	6.4	7
<b>Channel Slope (ft/ft)</b>	0.0139	0.026	0.004	0.0067 – 0.0076
<b>Sinuosity</b>	1.1	1.1	1.2	1.2
<b>Width/Depth Ratio</b>	20.3	5.4 – 19.9	5.7 - 11	13
<b>Bank Height Ratio</b>	7.2	1.1 – 1.3	1.1 – 1.2	1.0
<b>Entrenchment Ratio</b>	1.6	> 2.2	> 2.2	2.2 – 5.0



**Table 18: Summary of Design Morphologic Parameters for Casey Creek Reach 3**

Parameter	Existing Parameters	Reference Parameters			Proposed Parameters
	Casey Creek Reach 3	Scout West 2	Still Creek	Johanna Creek	Casey Creek Reach 3
Contributing Drainage Area (acres)	229	218	224	576	229
Channel/Reach Classification	G5c	E5	E5	E5/C5	C5/E5
Discharge Width (ft)	7.1	5.6 – 7.6	6.8 – 8.0	9.7	8.2
Discharge Depth (ft)	0.8	0.7 – 1.0	0.7 – 1.0	0.8	0.6
Discharge Area (ft <sup>2</sup> )	5.5	5.3 – 5.4	5.7 – 6.7	7.2 – 7.8	4.6
Discharge Velocity (ft/s)	2.0	1.2	1.2	1.8 – 1.9	2.0
Discharge (cfs)	11.0	6.4	7.3	14	9
Channel Slope (ft/ft)	0.0065	0.004	0.0066	0.0022	0.0057 – 0.0074
Sinuosity	1.1	1.2	1.2	1.2	1.2
Width/Depth Ratio	9.3	5.7 - 11	7.4 – 11.3	10.1 – 19.7	14
Bank Height Ratio	4.9	1.1 – 1.2	1.0	1.0	1.0
Entrenchment Ratio	1.1	> 2.2	4.9 - 13	>2.2	2.2 – 5.0

**Table 19: Summary of Design Morphologic Parameters for Casey Creek Reach 4**

Parameter	Existing Parameters	Reference Parameters			Proposed Parameters
	Casey Creek Reach 4	Scout West 2	Still Creek	Johanna Creek	Casey Creek Reach 4
Contributing Drainage Area (acres)	439	218	224	576	439
Channel/Reach Classification	G5c	E5	E5	E5/C5	E5/C5
Discharge Width (ft)	8.5	5.6 – 7.6	6.8 – 8.0	9.7	10.2
Discharge Depth (ft)	1.0	0.7 – 1.0	0.7 – 1.0	0.8	0.8
Discharge Area (ft <sup>2</sup> )	8.8	5.3 – 5.4	5.7 – 6.7	7.2 – 7.8	7.9
Discharge Velocity (ft/s)	2.4	1.2	1.2	1.8 – 1.9	1.9
Discharge (cfs)	21.0	6.4	7.3	14	15
Channel Slope (ft/ft)	0.0132	0.004	0.0066	0.0022	0.0037 – 0.0048
Sinuosity	1.0	1.2	1.2	1.2	1.25
Width/Depth Ratio	8.3	5.7 - 11	7.4 – 11.3	10.1 – 19.7	13
Bank Height Ratio	1.8	1.1 – 1.2	1.0	1.0	1.0
Entrenchment Ratio	>2.2	> 2.2	4.9 - 13	>2.2	2.2 – 5.0

## 6.5 Sediment Transport Analysis

### 6.5.1 Capacity Analysis

Given the observations of a moderate sediment supply within the project area, Wildlands used stream power to evaluate capacity of the design stream channels. The existing Casey Creek channel has stream banks that exceed 5 feet (in Reaches 2 and 3), and higher discharges are confined to a stream channel that can move excess material during and following periods of high sediment supply. There is limited evidence of aggradation of the existing, incised channel. The design channels will be roughly 1-foot deep, and transport capacity will reach an inflection point at the bankfull stage, above which there will be diminished increase in transport capacity as flow spreads onto the design floodplain.

During bankfull and larger storm events, much of the flow will be on the floodplain of the design channel. In such cases, the floodplain will serve as a sediment sink to accommodate the additional load that is in excess of the transport capacity of the design bankfull stream channel. Incorporation of a concave floodplain and flat point bars and riffle side slopes will all serve to minimize aggradation in the channel bed.

To address the concern of the export of too much material given the moderate sediment supply, the design includes wide pools and stream pattern that will allow for storage of transported sediment on point bars. Point bars will form on the inside bends and act as sediment storage locations. The potential erosion upstream of the project area may act as a beneficial sediment source that will help to maintain these point bars.

During bankfull design flow, the capacity of the design channel has been compared to the capacity of the existing channel to assess whether sufficient stream power is present to move sediment through the design channel.

Table 20 lists the estimated existing and design stream power for all restoration reaches. At the design discharge, the stream power within the proposed bankfull channel is comparable to the stream power in the existing channel. The proposed channel has a smaller hydraulic radius for a given stage as compared to the existing channel, due to the gentle bank slopes, but the stream gradient has been increased slightly to accommodate the increased influence of channel roughness on sediment transport capacity. Removing the headcut at the upper end of Reach 2 and the bed invert at the Highway 13 culvert raises the channel bed and increases the stream gradient.

One exception is Martha Branch where, from the existing to the proposed conditions, stream power will decrease. Ultimately, a decrease in stream power between existing and proposed must be accommodated by the channel sinks (gentle riffle side slopes and flat point bars). Prior projects demonstrate that these are effective sinks of sediment and can serve to maintain the bankfull channel in a stable form. Martha Branch and other Site channels may narrow over time, as channel sinks are filled, and result in a lower width-to-depth ratio. This is not considered a trajectory towards instability.

### 6.5.2 Competence Analysis

In natural streams, shear stress increases with increasing discharge until the point at which the channel gains access to the floodplain. Floodplain access disperses the flow and reduces the rate of shear stress increase within the channel. This relationship of shear stress, channel dimension, and discharge influences erosion potential within the channel and the channel's ability to transport certain sizes of sediment. The latter is a measure of stream competence, which is quantified by shear stress.

In sand bed streams, competence is not typically a concern. The sediment sampling data indicate that particle sizes found in the stream are predominantly sands with some small and medium gravels, up to a maximum size diameter found of 28 mm. Wildlands' calculations demonstrate that existing and design streams can readily mobilize nearly all sediment sizes sampled at the Site.



In the proposed restoration, design riffles and grade control structures will rely on this competence analysis for sizing the material that will be used to build these. For newly constructed channels, it is often desirable to have a portion of the design riffle material be an immobile component, and/or to place grade control structures (e.g., logs) intermittently and often at the head of riffles. This approach helps maintain short and long-term grade stabilization, allowing for the restored reach to remain vertically stable while more long-term grade control establishes in the form of natural armoring, root masses, and woody material.

Shield's Curve is a relationship of streambed particle size to critical shear stress which mobilizes this particle. Calculating the shear stress at bankfull is an appropriate method, used here, to assess particle size mobility. Table 20 lists the estimated existing and design shear stress and corresponding movable particle size based on Shield's relationship and the channel filling stage (which represents a much higher discharge for the existing condition versus the proposed). The Shield's moveable particle sizes listed inform how large the material in a constructed riffles needs to be to prevent degradation. This is necessary because tree roots, which typically provide grade control in Coastal Plain streams, will not be present right after construction.

The existing shear stress for channel filling flows is sufficient to move 20-70 mm size particles; however, the maximum particle size found of 28 mm (but typically <10 mm) indicates that few if any particles in excess of this size are present within the Site. It is common for grade control in Coastal Plain streams to rely on roots and woody material, rather than native coarse sediment, and despite the low slope of the stream system, grade control will be necessary to help maintain stability in the restored channels. The design channel competence is sufficient to move 12-15 mm particles, and addition of gravels in this range will supplement constructed riffles that include immovable, larger stone. Alternatively, logs and brush may be used to serve this purpose.

Some sections of the design, such as lower Casey Reach 3 where the stream transitions from Priority 1 to existing grade, include steeper riffles with profile slopes that are 3 percent. For this, the riffle material includes a portion of Class A stone (2-6 inches) to ensure stream stability. A riffle stone size table is included on Sheet 5.2 of the plan set.

### 6.5.3 Sediment Transport Design Summary

The proposed activities will reduce the volume of on-site sediment (fines contributed from bank erosion), resulting in lower overall sediment inputs. As such, sediment supply is expected to be low. If the design channels provide comparable stream power to existing conditions, it is proposed that the risk of aggradation will be low. As discussed in the design discharge section, a slightly larger channel was designed to maintain transport capacity while staying within an acceptable range of flood frequency and adequate floodplain connectivity. This will provide resiliency in the system for large storm events such as hurricanes.

Competency analysis for Casey Creek within the project area indicates that both the existing and design channels are competent to move available sediment. The results presented in Table 13 show that, according to Shield Curve predictions, the entire bed is likely to be mobile at design discharge. Wildlands therefore determined that it will be important to provide adequate grade control in the design channel to limit the potential for incision. The design will incorporate less mobile material in the form of coarse gravel (greater than 25 mm) and wood structures such as angled log drops to mimic the common form of grade control in Coastal Plain streams.



In summary, design considerations that focus on enhanced sediment transport include the following:

- Selection of a design discharge to promote sediment transport rather than deposition;
- Sediment storage features on the floodplain, point bars, and on streambanks (not ponded features);
- Encourage point bar formation through wide pools and suitable stream pattern. Point bars will be maintained by transported material;
- Roughen the floodplain to allow the channel to experience higher peak shear stresses and capacity during floodplain activating events.

**Table 20: Results of Competence and Capacity Analysis**

	Casey Creek R2	Casey Creek R3	Casey Creek R4	Martha Branch	Afton Branch
<b>Ex. Cond. Cross Section</b>	XS RAL 1	XS RAL 2	XS 4	XS 5	XS RAL 4
<b>Ex. Cond. Sediment Sample D<sub>100</sub> (mm)</b>	4	28	8	4	8
<b>Existing Vertical Stability Conditions</b>	Degrading	Stable	Stable	Degrading/ Stable	Stable
<b>Existing Conditions for Channel Filling Flow (at top of bank)</b>					
<b>Schan, existing (ft/ft)<sup>1</sup></b>	0.0053	0.0046	0.0046	0.0094	0.0047
<b>Mean Depth at top of bank (Dtob), existing (ft)</b>	1.9	1.2	1.6	1.7	2.7
<b>Q at top of bank (Qtob), existing (cfs)</b>	97.4	166.4	61.9	138.9	67.6
<b>Exist. Shear Stress, t (lb/sq ft) at Dtob</b>	0.51	0.30	0.40	0.91	0.55
<b>Shields Movable particle size at Dtob (mm)</b>	39	22	30	71	42
<b>Exist. Unit Stream Power (lb/ft/s) at tob</b>	1.9	0.8	1.3	4.4	2.2
<b>Existing Conditions for Approximate Design Discharge (bankfull)</b>					
<b>Schan, existing (ft/ft)<sup>1</sup></b>	0.0053	0.0046	0.0046	0.0094	0.0047
<b>Mean Depth (Dbkf), existing (ft)</b>	0.7	0.7	0.9	0.5	0.9
<b>Q, design, existing (cfs)</b>	7.0	9.0	15.0	6.0	9.0
<b>Shear Stress, t (lb/sq ft) at Dbkf</b>	0.19	0.18	0.23	0.29	0.20
<b>Shields Movable particle size (mm)</b>	14	13	17	21	15
<b>Unit Stream Power (lb/ft/s)</b>	0.36	0.34	0.49	0.65	0.39
<b>Proposed Conditions for Design Discharge (Typical Riffle at bankfull discharge)</b>					
<b>Schan, design (ft/ft)</b>	0.0060	0.0062	0.0038	0.0060	0.0046
<b>Mean Depth (Dbkf), design (ft)</b>	0.5	0.6	0.8	0.5	0.6
<b>Q, design (cfs)</b>	7.0	9.0	15.0	6.0	9.0
<b>Shear Stress, t (lb/sq ft)</b>	0.19	0.21	0.18	0.18	0.17
<b>Shields Movable particle size (mm)</b>	14	15	13	13	12
<b>Unit Stream Power (lb/ft/s)</b>	0.35	0.41	0.34	0.33	0.30

<sup>1</sup> The slopes listed are the prevailing slopes in the vicinity of the cross section.

## 6.6 Stream Design Implementation

The streams slated for restoration will be raised using a Priority 1 approach to the maximum extent practicable, with Priority 2 where necessary to stably tie to existing grade such as the Highway 13 culvert. This will raise the water table, improve hydrologic connectivity, allow for frequent inundation of the floodplain, and reduce shear stress on the channel. In sections of Priority 2 restoration, a floodplain will be graded at bankfull elevation.

A variety of instream structures will be used in restoration reaches to promote water quality, increase bed and bank stabilization, provide bedform diversity, and promote increased aquatic and terrestrial habitat.

Figure 9a illustrates the concept design; below are descriptions of the designs for each reach.

#### 6.6.1 Martha Branch

While Martha Branch is an intermittent stream, the level of incision and bank erosion require restoration rather than enhancement to develop a stable system. Martha Branch will be built as a C/E stream type with design parameters primarily derived from previous project experience and the provided reference reaches. Design discharge closer to the higher results of the regional flood frequency analysis result in a larger cross-sectional area which discourages instream vegetation encroachment.

Above the point at which Martha Branch was determined to be an intermittent stream, Wildlands will convert the ditch to a swale that contains a pilot channel. The pilot channel will convey baseflow and the swale will serve to prevent erosion and slow storm runoff, promoting infiltration and plant uptake.

#### 6.6.2 Afton Branch

Priority 2 restoration will be implemented throughout Afton Branch to avoid hydrologic trespass on the upstream landowner. A vegetated buffer will also be established in place of the active row crops that border the stream.

#### 6.6.3 Casey Creek Reach 2

Casey Creek Reach 2 will be built as a C/E stream type using Priority 1 restoration.

#### 6.6.4 Casey Creek Reach 3

Casey Creek Reach 3 begins at the confluence of Casey Creek Reach 2 with Martha Branch. Priority 1 restoration will be continued until grade is dropped to reach the Highway 13 culvert invert elevation. This will require Priority 2 restoration so that the restored stream is not incised. Priority 2 restoration will also be needed below the Highway 13 culvert until the bed elevation can rise to an elevation where existing grade is the top of bank. A log step system is proposed to drop Reach 3 to tie to Afton Branch; this will also require Priority 2 restoration. The Priority 1 and 2 restoration extents are shown on Figure 9a.

If drain tiles are discovered downstream of the confluence with Martha Branch, they will be removed from within the conservation easement to prevent hydrological bypass of the riparian zone. Wildlands has searched diligently for these and found only one. It will be removed from within the conservation easement.

Wildlands coordinated with NC DOT to determine the culvert design includes 20% of its capacity is for baseflow. Consequently, Wildlands designed the stream invert below the culvert to create this effect and make the profile as high as possible.

#### 6.6.5 Casey Creek Reach 4

Casey Creek Reach 4 begins after the confluence of Casey Creek Reach 3 and Afton Branch. Casey Creek Reach 4 is designed entirely with Priority 2 restoration to match Afton Branch. Reach 4 ends prior to the existing culvert, which is on the adjacent property. Grade control structures will be implemented to prevent a headcut from migrating into the Site.

### **6.7 Vegetation, Planting Plan, and Land Management**

The objective of the planting plan is to establish, over time, a thriving riparian buffer composed of native species. The restored buffer will improve riparian and wetland habitat, enhance stream stability, shade the streams and wetlands, and provide a source of organic material. Non-forested areas within the



conservation easement will be planted with trees, shrubs, forbs, and grasses, which includes additional buffer areas beyond the minimum requirement of 50 feet from top of bank. Riparian buffers will be planted with a mix of early and late successional species chosen to develop a forested riparian zone. The specific species composition to be planted was selected based on the existing plant community, anticipated Site conditions in the early years following project implementation, and best professional judgement on species establishment. Based on these factors, the Coastal Plain Small Stream Swamp community type was identified as a model natural community and used as a reference for creating the site planting plan (Schafale, 2022). Coastal Plain small stream swamps are explicitly described as being highly varied in species composition, though Carolina Vegetation Survey data indicates that sweetgum, water oak, laurel oak, red maple, loblolly pine, tulip poplar, and swamp tupelo are most commonly the dominant canopy species (Schafale, 2022). The proposed species compositions for this Site reflect the existing native vegetation, which includes many of the indicator species for Coastal Plain small stream swamps. Some adaptations were made to target community species composition based on commercial availability, and to omit tree species (red maple, sweetgum, and loblolly pine) per agency guidance. Additionally, a few additional early successional species were included to help establish vegetative cover on the Site. Species chosen for the planting plan are listed in the construction plans located in Appendix 11.

The riparian buffer will be planted with bare root seedlings. To help ensure tree growth and survival, soil tests may be performed across the Site and amendments may be applied during construction based on results. The stream banks will be planted with live stakes and multiple herbaceous species. Permanent herbaceous seed will be spread on streambanks, floodplain areas, and disturbed areas within the project easement. Bare root seedlings and live stakes will be planted in the dormant season.

Invasive species, including multiflora rose and privet, will be treated during construction primarily by mechanical removal. The extent of invasive species coverage will be monitored, mapped, and controlled as necessary throughout the required monitoring period. Please refer to Appendix 7 for the post-construction invasive species treatment plan. Additional monitoring and maintenance issues regarding vegetation are in Sections 8 and 9 and Appendix 8.

**6.8 Utilities, Stream Crossings, and Site Access**

Table 21 summarizes the proposed crossings on the Site. No utilities cross the Site streams.

The maintenance of the crossings will be the responsibility of the landowner once the project is closed by the NCIRT and transferred to NCDEQ stewardship.

The easement area can be accessed for construction, monitoring, and long-term stewardship US Highway 13.

**Table 21: Crossings Summary**

Reach	Crossing Location (STA)	Crossing Type	Within Conservation Easement?
Casey Creek Reach 3	130+07 – 130+67	Farm crossing to access fields on both sides of Casey Creek.	Yes
Casey Creek Reach 3	136+76 – 137+66	NCDOT right-of-way for US Highway 13	No
Afton Branch Reach 1	300+00 – 300+41	Ford crossing to allow access to property south of branch.	No

## 6.9 Project Risk and Uncertainties

In general, this project has low risk. Potential risks include accidental encroachment, land clearing, hydraulic trespass, and beaver colonization. Each risk is addressed below.

Much of the land adjacent to the Site is tended by tenant farmers. To prevent accidental encroachment, the conservation easement will be heavily posted with signs, as outlined in NC DMS's 2018 guidance document to discourage accidental encroachment.

Logging, and potentially subsequent land development, is a potential risk that could increase peak flows and sediment inputs. Much of Casey Creek headwaters (Reach 1) will be protected as part of this project. The headwaters of Martha Branch could be logged; however, grade control structures will prevent degradation, streambank revetments will provide resistance to erosion, and low-sloped point bars will provide fine sediment storage.

There is little to no risk of hydraulic trespass from the project due to the current and designed slopes of the project channels. Erosive soils were observed onsite and the design incorporates low sloped banks to mitigate this risk while vegetation and root mass establishes, which will increase the stability of the banks over time.

All stream projects have some risk for beaver colonization. There is no evidence of current/past beaver activity on the Site. However, the area will be watched for beaver activity. If beaver become active on the Site, Wildlands will follow the Maintenance Plan (Appendix 8) to address the issue. Similarly, should utility/roadway maintenance work occur in the future and encroach within the conservation easement, Wildlands will follow the Maintenance Plan to repair disturbed signage or damaged stream areas.

## 7.0 Performance Standards

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The stream performance standards for the project will follow approved performance standards presented in North Carolina Interagency Review Team's (NCIRT) Monitoring Requirements and Performance Standards for Compensatory Mitigation in North Carolina (February 2013) and the Wilmington District Stream and Wetland Compensatory Mitigation Update (NCIRT, October 2016). Annual monitoring and routine site visits will be conducted to assess the condition of the finished project by a qualified scientist. Specific performance standards that apply to this project are those described in the 2016 Compensatory Mitigation Update including Vegetation (Section V, B, Items 1 through 3) and Stream Channel Stability and Stream Hydrology Performance Standards (Section VI, B, Items 1 through 7). Table 22 summarizes performance standards.



**Table 22: Summary of Performance Standards**

Parameter	Monitoring Feature	Performance Standard
Dimension	Cross-Section Survey	BHR <1.2; ER >2.2 for C/E channels
Pattern and Profile	Visual Assessment	Should indicate stream stability
Photo Documentation	<ul style="list-style-type: none"> <li>• Cross-Section Photos</li> <li>• Photo Points</li> <li>• Crossing Photos</li> </ul>	No excessive erosion or degradation of banks No mid-channel bars, Stable grade control
Hydrology	Transducer	Four bankfull events during the 7-year period in separate years. At least 90 consecutive days of flow on intermittent restoration and enhancement reaches or 30 consecutive days if benthic macroinvertebrate monitoring shows presence of benthos in the intermittent reaches proposed for credit. See Section 10.0 Adaptive Management for possibility of a future alternative protocol.
Vegetation	Vegetation Plots	MY3 success criteria: 320 planted stems per acre. MY5 success criteria: 260 planted stems per acre, average of 7 feet in height in each plot. Subcanopy and shrub species will not be included in average height calculations. MY7 success criteria: 210 planted stems per acre, average of 10 feet in height in each plot. Subcanopy and shrub species will not be included in average height calculations. Minimum of 4 native species with no single species comprising more than 50% of stems.
Invasive Species	Visual Assessment and GPS mapping	Invasives no more than 5% by area in the conservation easement, and no kudzu.
Visual Assessment	CCPV	Signs of encroachment, stream instability, invasive species.

Changes in the channel that indicate a movement toward stability or enhanced habitat include a decrease in the width-to-depth ratio in meandering channels or an increase in pool depth. It is important to note that pools and bed forms (ripples, dunes, etc.) in sand bed channels may migrate over time as a natural function of the channel hydraulics. It is also of note that sand bed streams are highly mobile and movement of the bed material during storm events is not considered a sign of instability. This could lead to changes in pool depth from storm to storm. These sorts of bed changes do not constitute a problem or indicate a need for remedial actions. If channel changes indicate a movement toward stability, remedial action will not be taken. Sand bed streams do not require substrate monitoring so no pebble counts will be conducted.

Exotic invasive vegetation will be mapped, photographed, and visually assessed annually. Exotic invasive species will be treated by mechanical and chemical methods so that exotic invasive species percent coverage does not exceed 5% of the total easement acreage and that there is no presence of kudzu. All herbicide applications will be performed in accordance with the product label and NC Department of Agriculture rules and regulations. Benthic data will be collected but no performance standard will be defined.





## 8.0 Long-Term Management Plan

The Site will be transferred to the North Carolina Department of Environmental Quality (NCDEQ) Stewardship Program. 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 boundary markings as needed. Any livestock or associated fencing or permanent crossings will be the responsibility the owner of the underlying fee to maintain.

The Site Protection Instrument can be found in Appendix 1.

**Table 23: Long-term Management Plan**

Long-Term Management Activity	Long-Term Manager Responsibility	Landowner Responsibility
Signage will be installed and maintained along the Site boundary to denote the area protected by the recorded conservation easement.	The long-term steward will be responsible for inspecting the Site boundary during periodic inspections (every one to three years) and for maintaining or replacing signage to ensure that the conservation easement area is clearly marked.	The landowner shall report damaged or missing signs to the long-term manager, as well as contact the long-term manager if a boundary needs to be marked, or clarification is needed regarding a boundary location. If land use changes in future and fencing is required to protect the easement, the landowner is responsible for installing appropriate approved fencing.
The Site will be protected in its entirety and managed under the terms outlined in the recorded conservation easement.	The long-term manager will be responsible for conducting periodic inspections (every one to three years) and for undertaking actions that are reasonably calculated to swiftly correct the conditions constituting a breach. The USACE, and their authorized agents, shall have the right to enter and inspect the Site and to take actions necessary to verify compliance with the conservation easement.	The landowner shall contact the long-term manager if clarification is needed regarding the restrictions associated with the recorded conservation easement.

## 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.

Project monitoring components are listed in more detail in Table 24. Approximate locations of the proposed monitoring components are illustrated in Figure 10.

**Table 24: Monitoring Components**

Parameter	Monitoring Feature	Quantity by Approach		Frequency	Notes
		Restoration	Preservation		
Dimension	Riffle Cross Sections	6	N/A	Year 1, 2, 3, 5, and 7	1, 2
	Pool Cross Sections	5	N/A		
Pattern	Pattern	N/A		N/A	3
Profile	Longitudinal Profile	N/A		N/A	
Hydrology	Stream Gauge	2 Crest Gauges 3 Flow Gauges	1 Flow Gauge	Quarterly	4
Vegetation	100 m <sup>2</sup> Plot	8 Fixed, 3 Random	N/A	Year 1, 2, 3, 5, and 7	5
Visual Assessment		1		Semi-Annual	6
Reference Photos	Stream Photographs	22		Annual	
	Crossing Photographs	2	N/A		

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. Entrenchment ratios will be monitored but not provided in annual monitoring reports unless requested.
3. 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. Project streams are sand bed systems; thus, riffles and pools may vary over time.
4. Stream gauges will be inspected and downloaded quarterly. Transducers will be set to record stage once every 2 hours.
5. Vegetation monitoring will follow an IRT approved protocol. The number of vegetation plots was calculated based on sampling 2% of the anticipated planting area.
6. Locations of exotic and nuisance vegetation along with locations of vegetation damage or boundary encroachments will be mapped.

## 10.0 Adaptive Management Plan

Upon completion of Site construction, Wildlands will implement the post-construction monitoring defined in Sections 7 and 8. Project maintenance will be performed during the monitoring years to address minor issues as necessary (Appendix 9). If during annual monitoring it is determined the Site's ability to achieve Site performance standards are jeopardized in any other way, Wildlands and DMS will notify the members of the IRT and work with the IRT to develop contingency plans and remedial actions. This procedure will hold true for any future problems related to the Priority 2 drop in Casey Creek Reach 3 and other locations that have higher slopes for a sand bed system.

Based on benthic macroinvertebrate monitoring before construction at Casey Creek, only one benthic macroinvertebrate was found in a downstream, perennial reach. Consequently, there are low expectations for finding benthos in the post-restoration intermittent channels. As such, there may be an alternative protocol proposed during the monitoring phase to still achieve the intermittent stream performance standard.

## 11.0 Determination of Credits

Mitigation credits presented in Table 25 are projections based upon the proposed design.

The credit ratios proposed for the Site have been developed in consultation with the Interagency Review Team (IRT) as summarized in the IRT contracting meeting minutes dated July 27, 2022. This correspondence is included in Appendix 6.

1. The requested stream restoration credit ratio is 1:1 for mitigation activities that include reconstruction of the channels to a stable form and connection of the channels to the adjacent floodplain.
2. No direct stream credit is proposed for the swale and pilot channel immediately above the intermittent break on Martha Branch.

An analysis of buffer width shows 4.3% of the project stream length has less than the 50-foot standard buffer width for Coastal Plain streams. Most of this stream length is either on the upstream end of Reach 1 or in Reach 3 around the internal crossing or Highway 13. Since the project length with less than 50-foot riparian buffers will be less than 5%, credit adjustments for buffer widths will not be required. In most cases, the buffer width far exceeds the standard.

**Table 25: Project Asset Table**

Project Components							
Project Component or Reach ID	Existing Footage/Acreage	Restoration Footage/Acreage	Mitigation Category	Restoration Level	Priority Level	Mitigation Ratio	Proposed Credit <sup>1, 2</sup>
Casey Creek Reach 1	1,982	1982	Warm	P	NA	10	198.200
Casey Creek Reach 2	479	610	Warm	R	P1	1	610.000
Casey Creek Reach 3	1,514	1758	Warm	R	P1, P2	1	1758.000
Casey Creek Reach 4	168	262	Warm	R	P2	1	262.000
Martha Branch	507	697	Warm	R	P1, P2	1	697.000
Afton Branch	498	584	Warm	R	P2	1	584.000
Project Credits							
Restoration Level	Stream			Riparian Wetland		Non-Rip Wetland	Coastal Marsh
	Warm	Cool	Cold	Riverine	Non-Riv		
Restoration	3,911.000						
Re-establishment							
Rehabilitation							
Enhancement							
Enhancement I							
Enhancement II							
Creation							
Preservation	198.200						
<b>Totals</b>	<b>4,109.200</b>						

Notes: 1. Crossing lengths have been removed from restoration footage.

2. No direct credit for BMPs.

## 12.0 References

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<http://SoilDataMart.nrcs.usda.gov>



## Figures

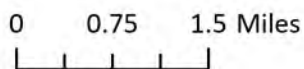
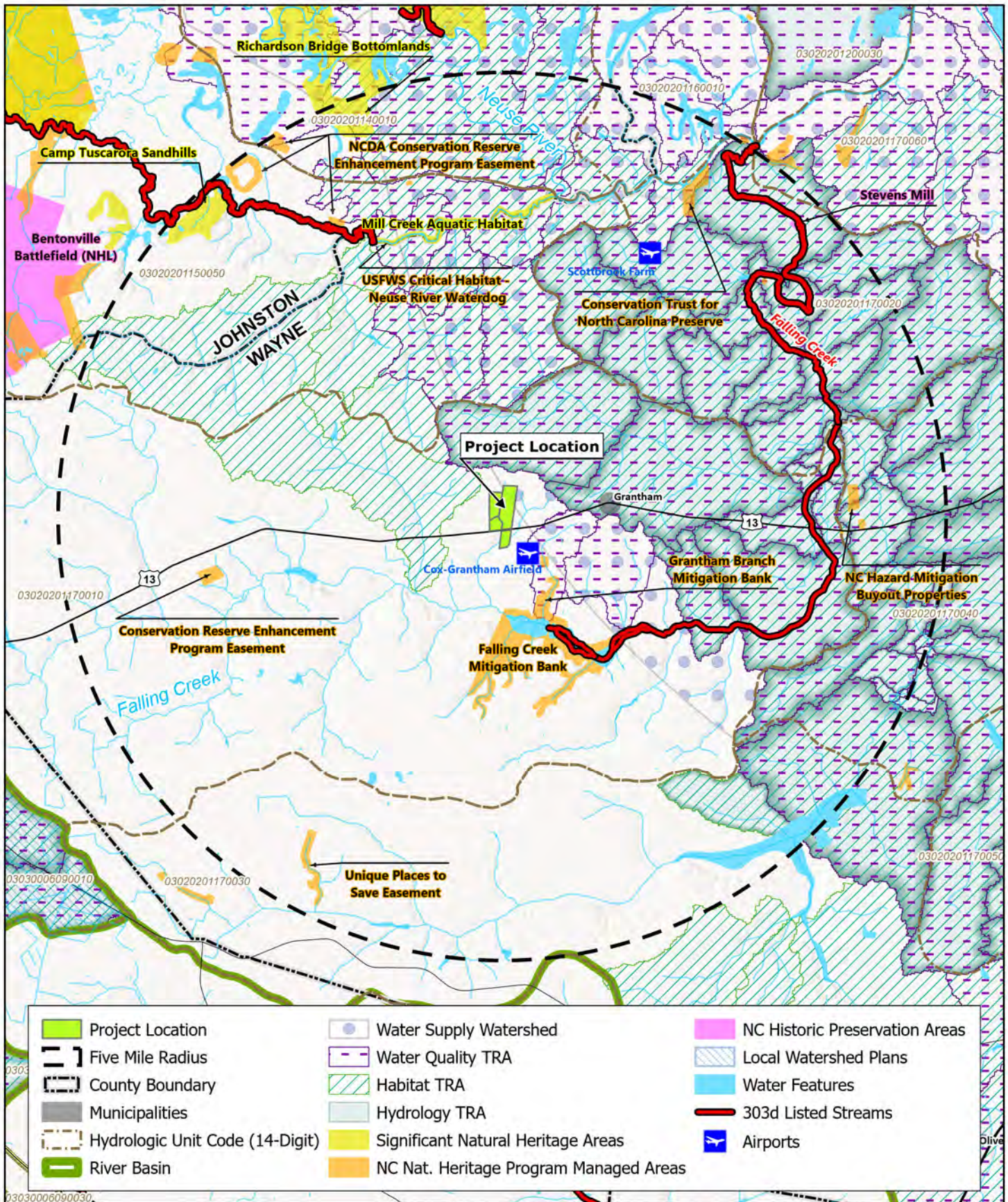
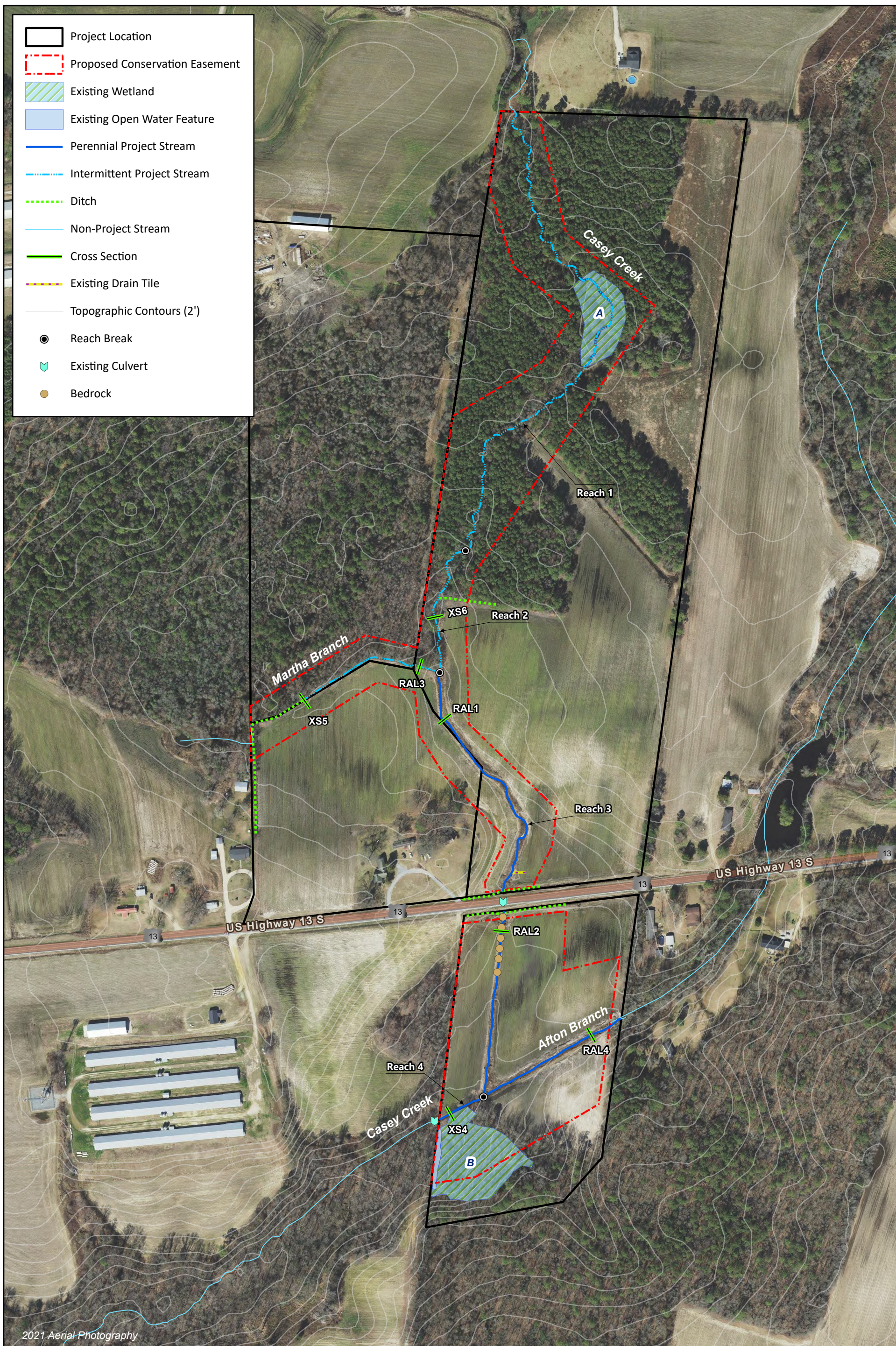


Figure 1 Vicinity Map  
Casey Creek Mitigation Plan  
Neuse River Basin (03020201)



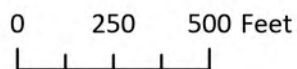
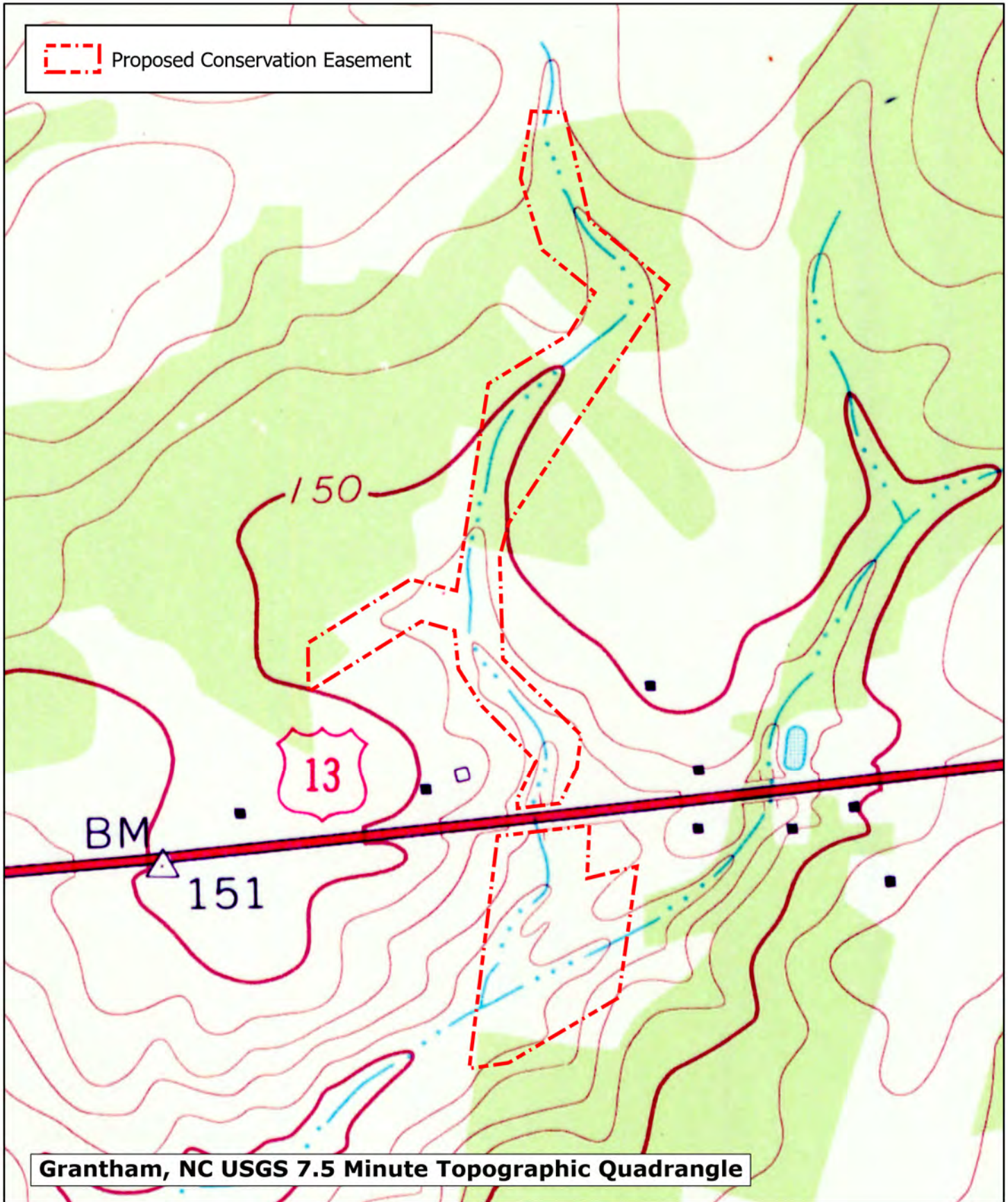


Figure 3 USGS Topographic Map  
Casey Creek Mitigation Plan  
Neuse River Basin (03020201)

Wayne County, NC



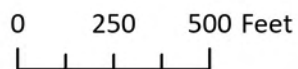
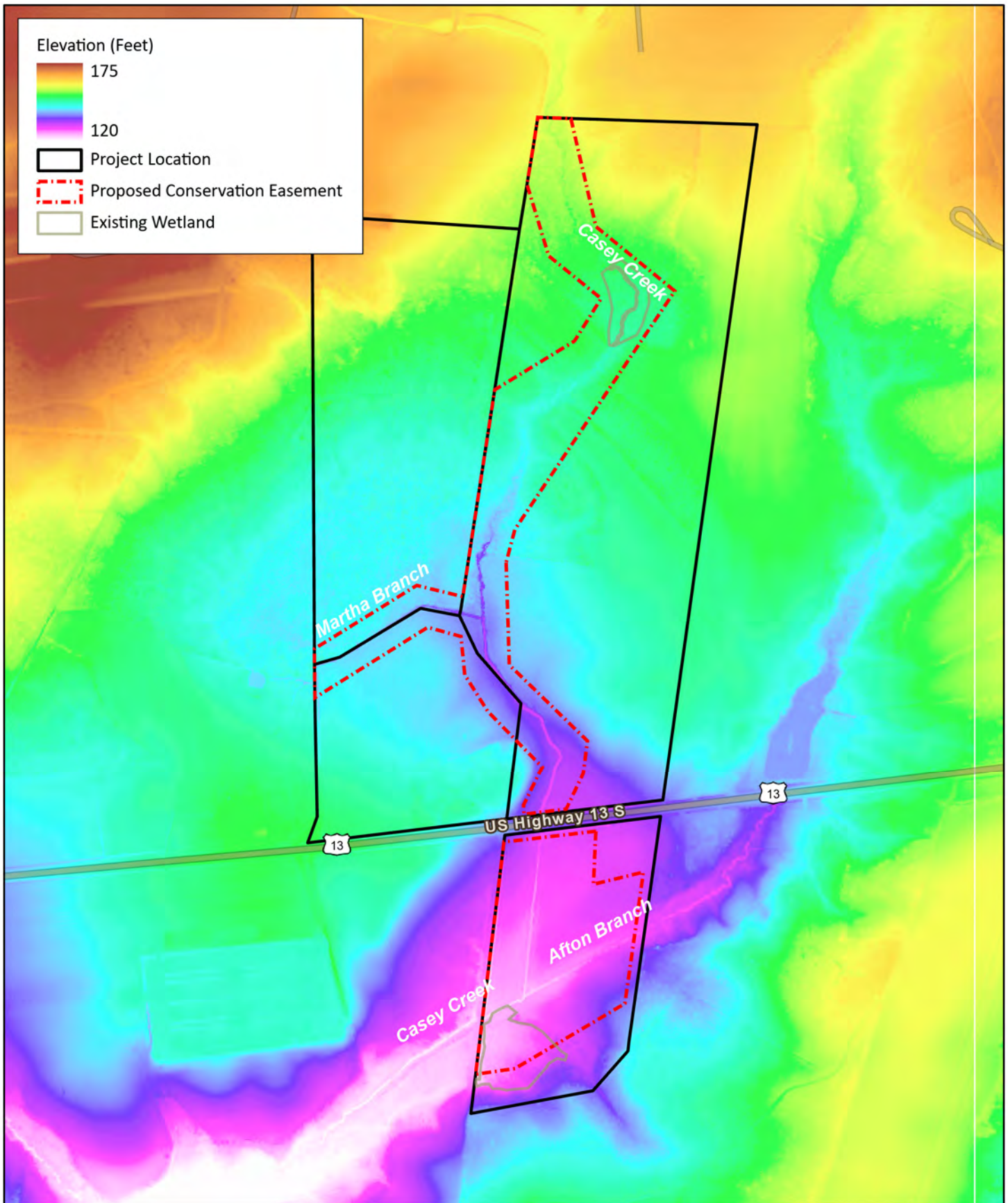


Figure 4 Lidar Map  
Casey Creek Mitigation Plan  
Neuse River Basin (03020201)

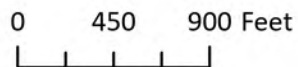
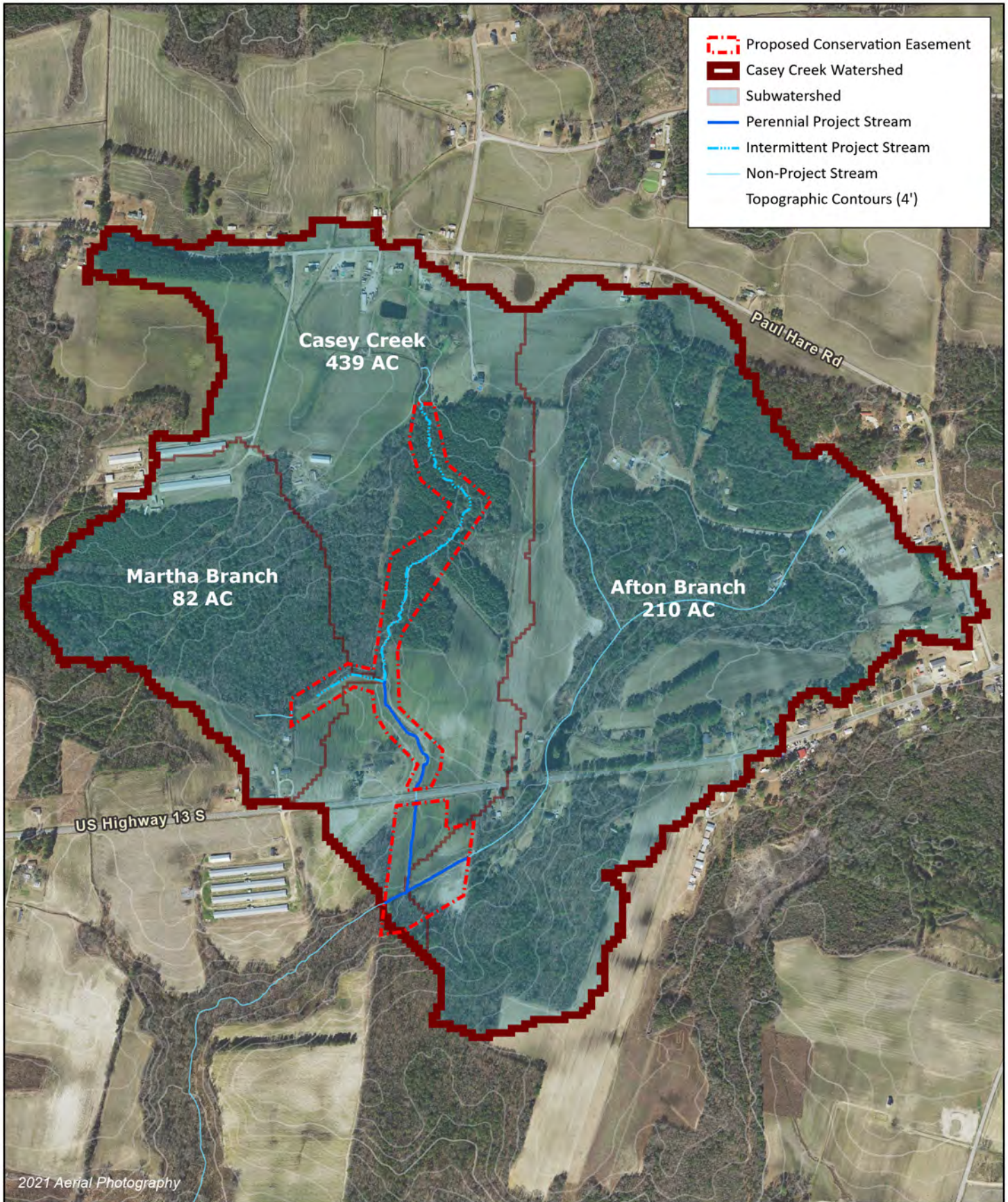


Figure 5 Watershed Map  
Casey Creek Mitigation Plan  
Neuse River Basin (03020201)

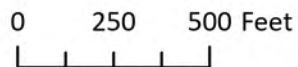
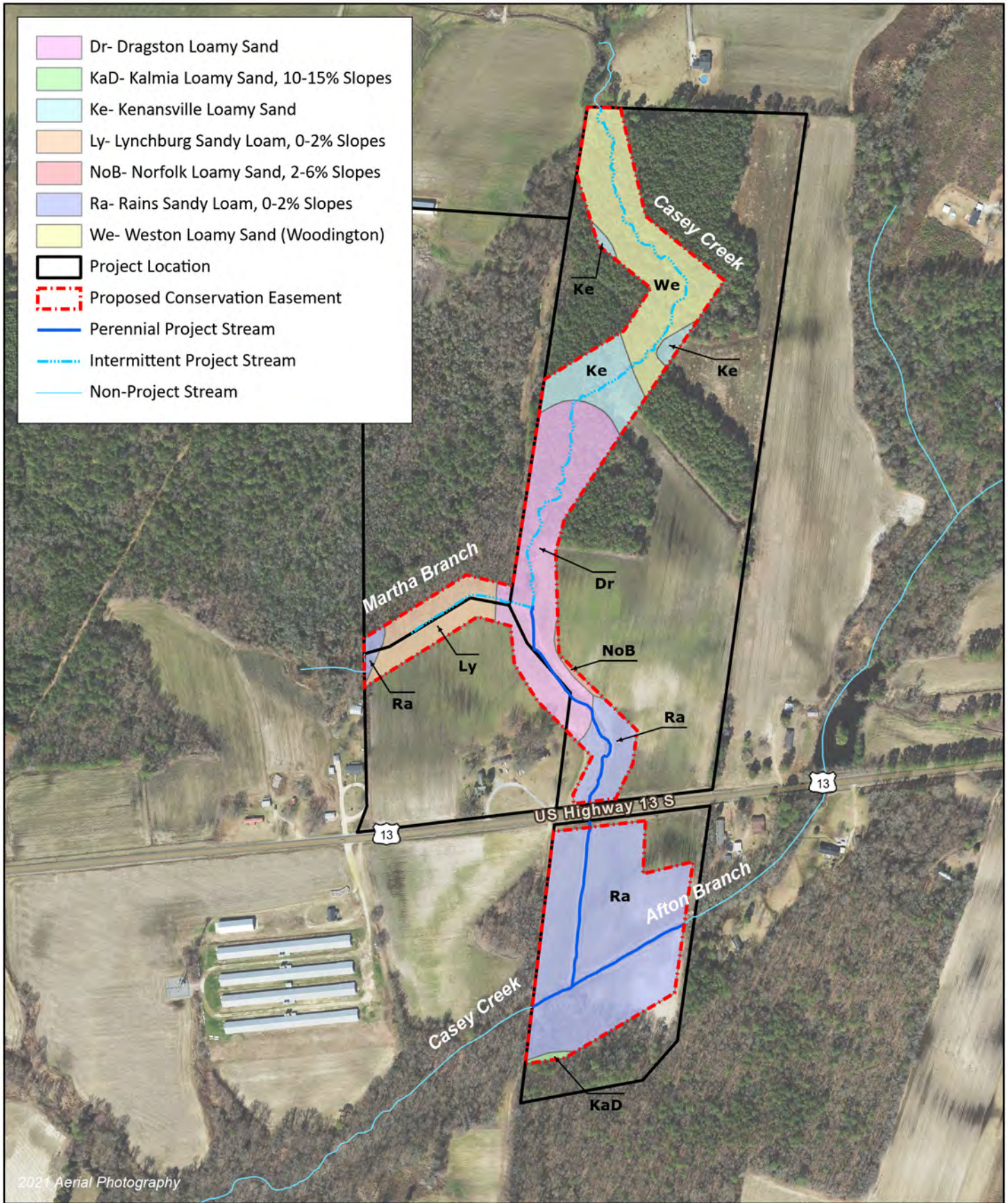


Figure 6 Soils Map  
Casey Creek Mitigation Plan  
Neuse River Basin (03020201)

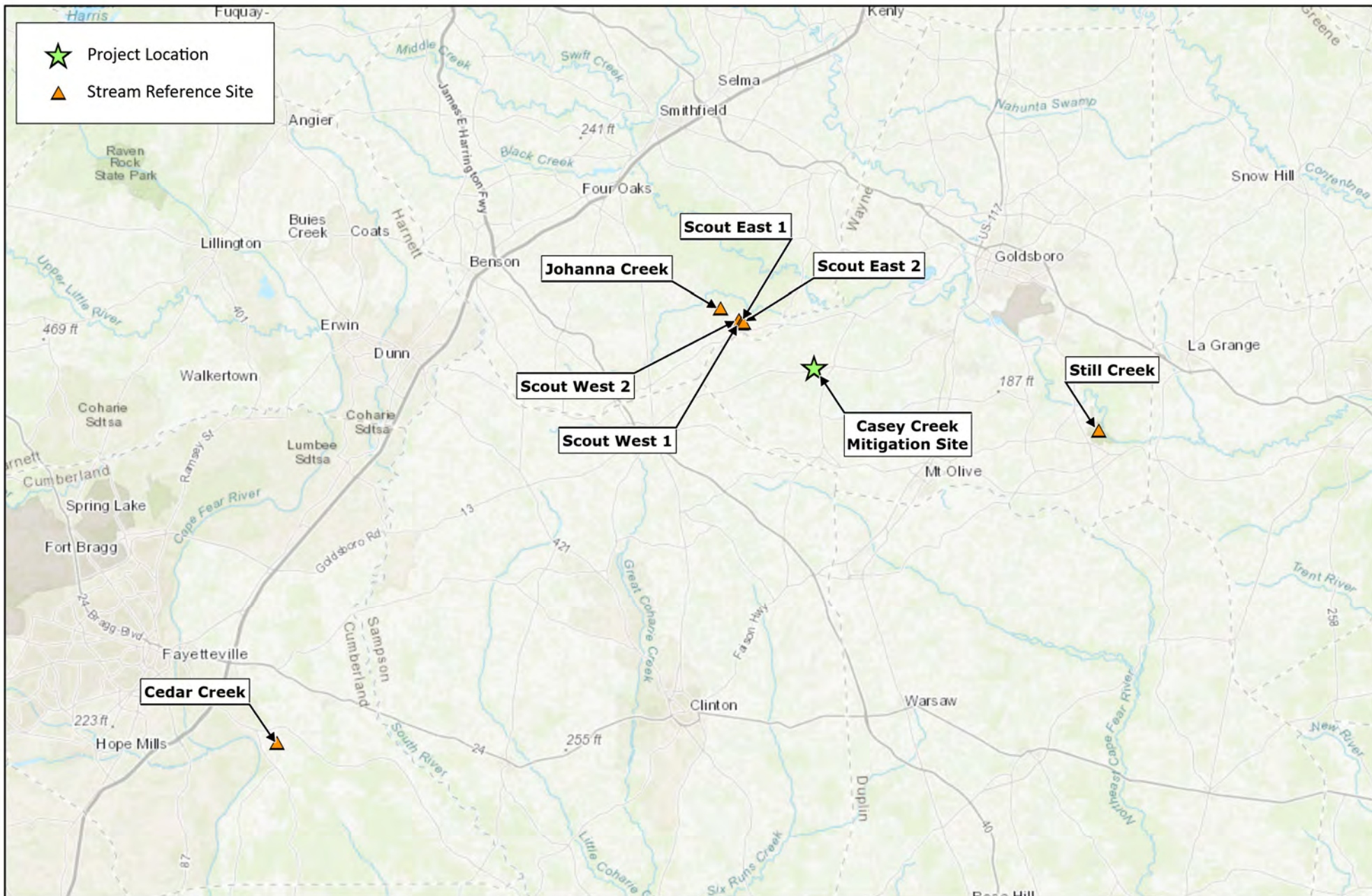
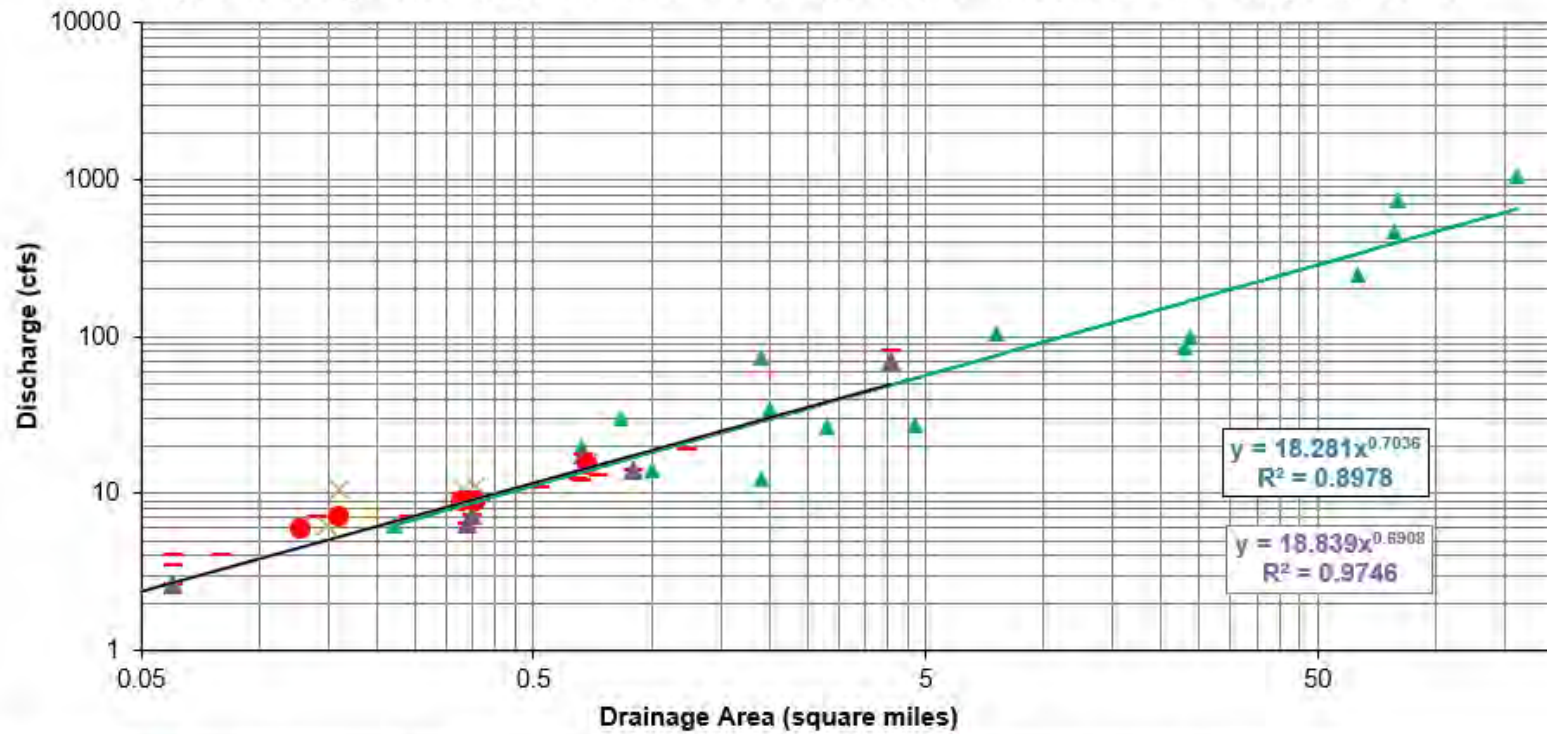
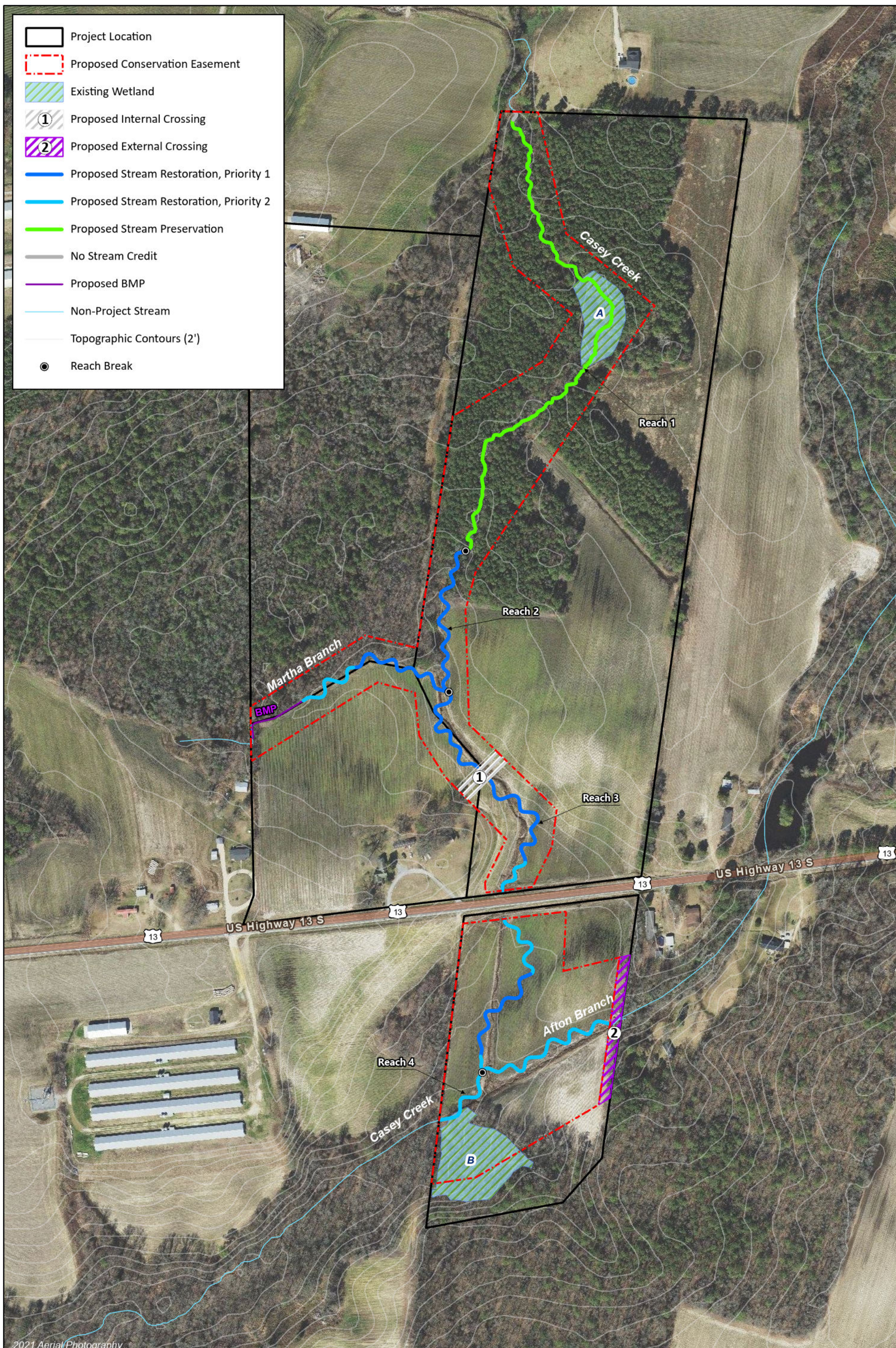


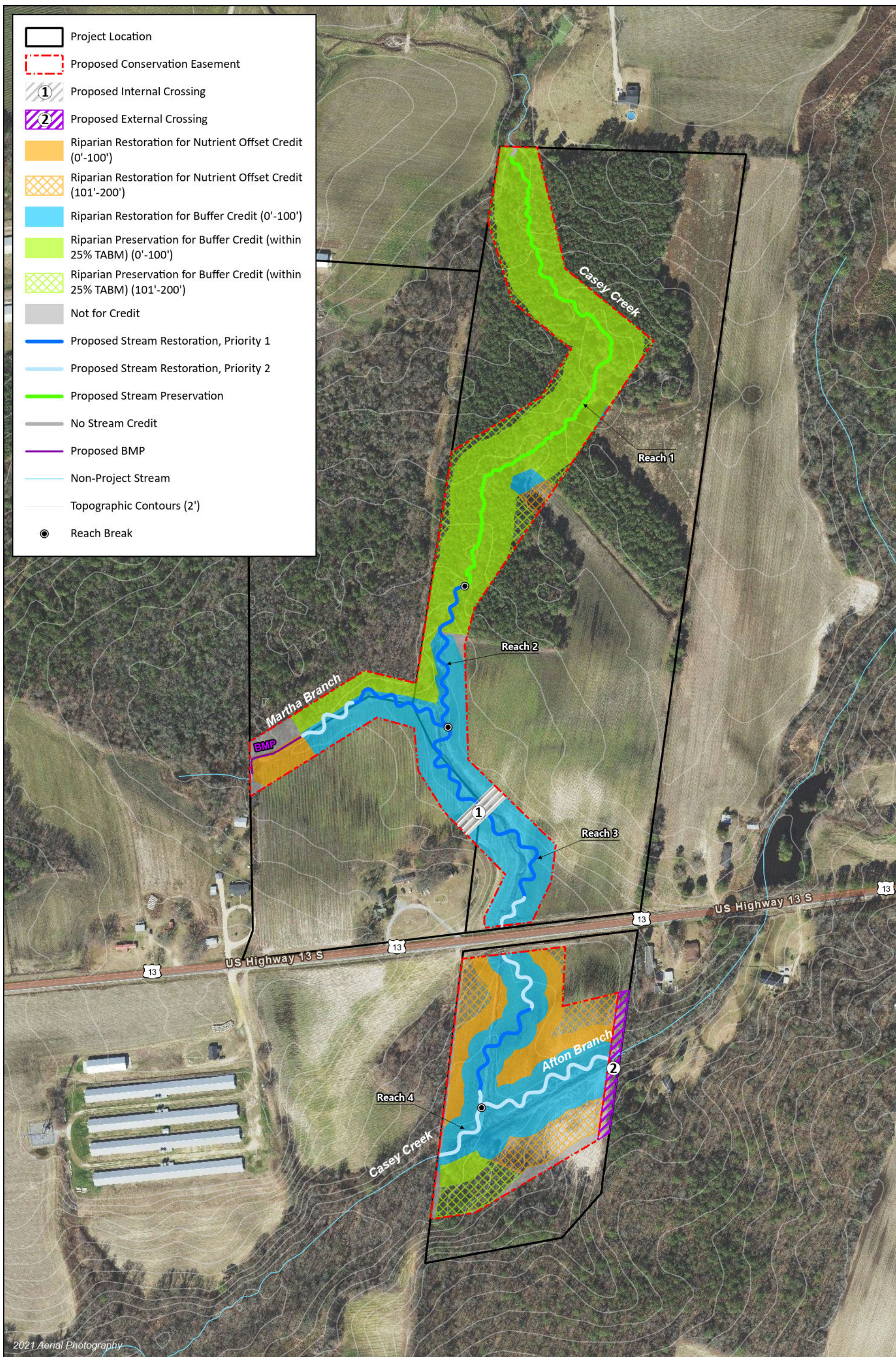
Figure 7 Reference Reach Map  
Casey Creek Mitigation Plan  
Neuse River Basin (03020201)

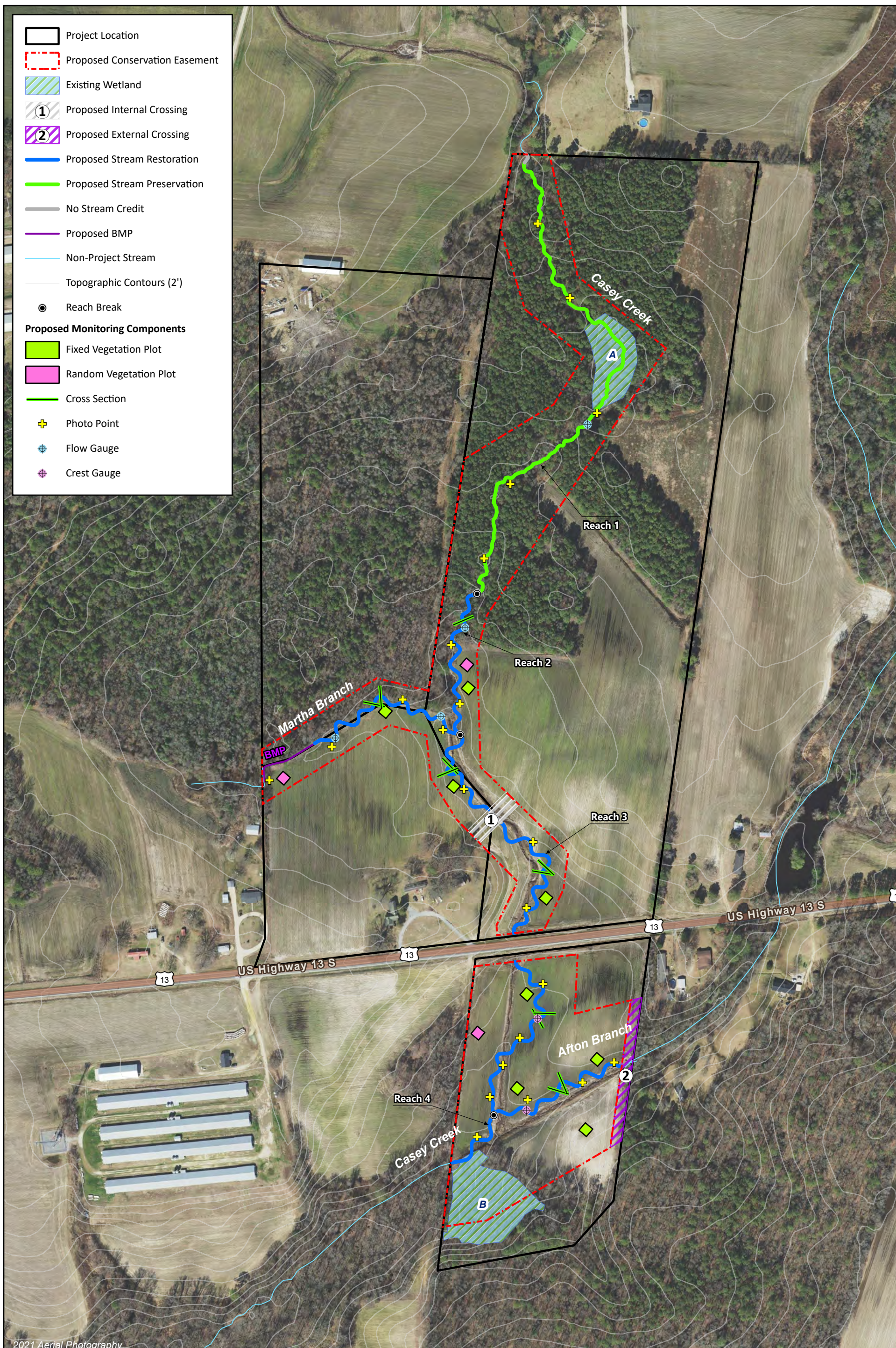
**Figure 8. Design Discharge Data Overlaid on North Carolina Coastal Plain Regional Curve**



- |   |  |
|---|--|
| ▲ Coastal Plain Regional Curve                          | - Possible Reference Reaches           |
| × Wildlands Regional Flood Frequency 1.2-yr Predictions | ▲ Selected Reference Reaches           |
| ● Design Discharges                                     | — Power (Coastal Plain Regional Curve) |
| — Power (Selected Reference Reaches)                    | — Power (Selected Reference Reaches)   |









## **Appendix 1: Site Protection Instrument**

## Appendix 1 Site Protection Instrument

---

The land required for construction, management, and stewardship of this mitigation project includes portions of the parcels listed in Table 1. Parcels are optioned for easement purchase by Wildlands Engineering, Inc. (Wildlands). Upon transfer of lands to Wildlands, a conservation easement will be recorded on the parcels and includes streams and wetlands being restored and preserved along with their corresponding riparian buffers.

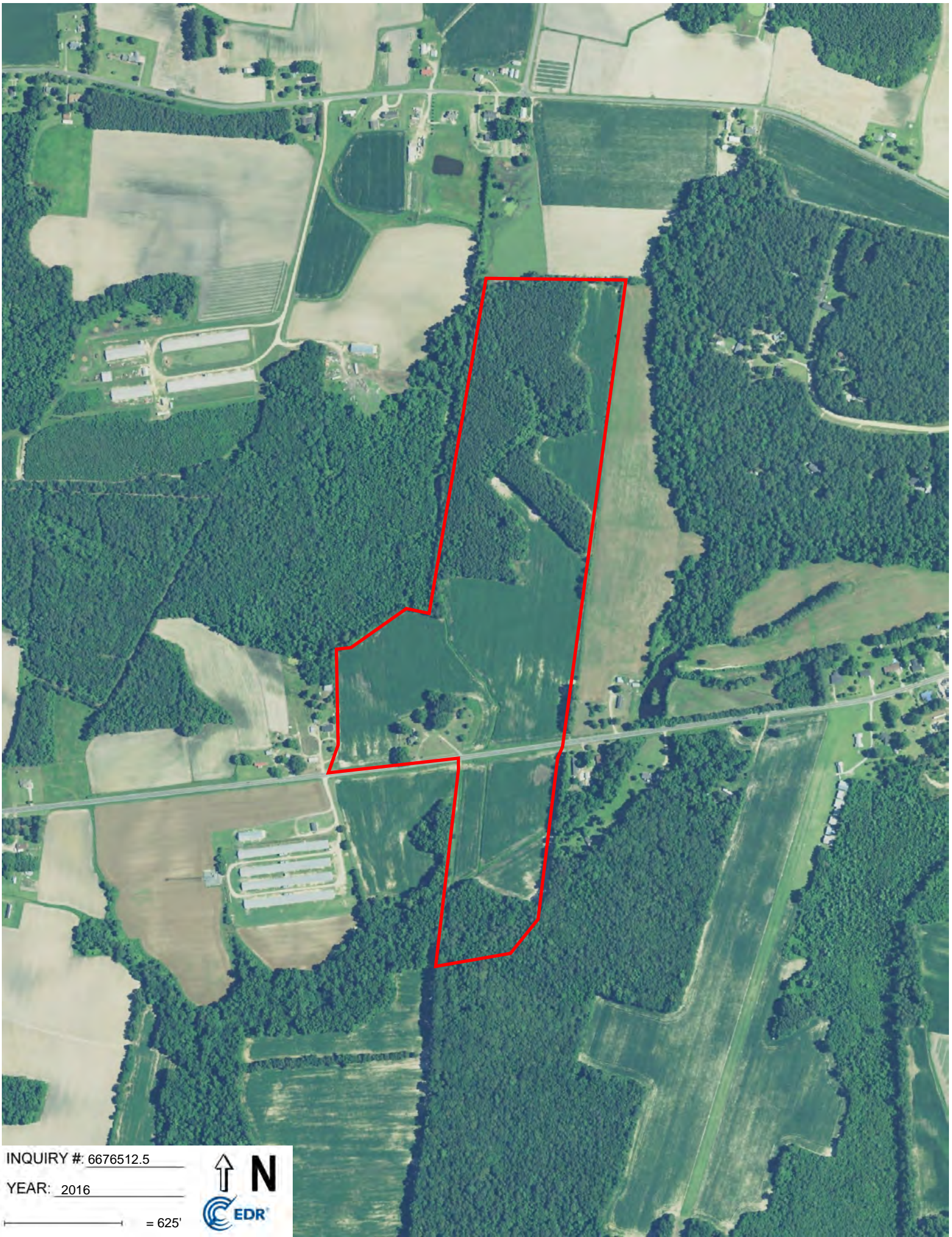
**Table 1: Site Protection Instrument**

Current Landowner	PIN	County	Under Option to Purchase by Wildlands?	Memorandum of Option Conservation Easement Deed Book (DB) and Page Number (PG)	Acreage to be Protected
Martha C. Kornegay Trust	2546314958 2546229607 2546335459	Wayne	Yes	BK 3671 PG 511-514	24.0
Johnnie Mangrum Brock	2546248066	Wayne	Yes	BK 3671 PG 515 – 518	1.1

All site protection instruments require 60-day advance notification to the USACE and or DMS prior to any action to void, amend, or modify the document. No such action shall take place unless approved by the State.



**Appendix 2: Historic Aerials**

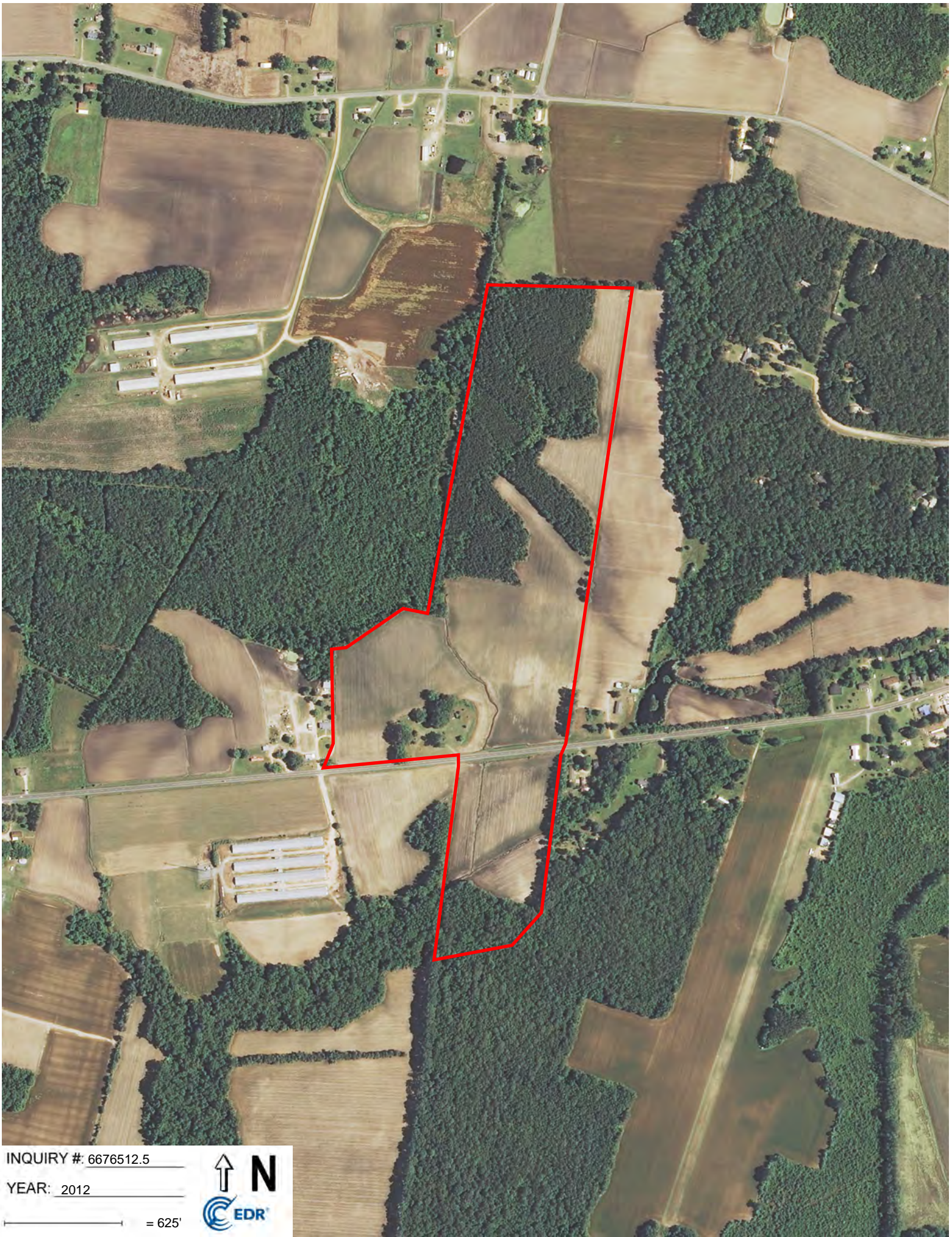


INQUIRY #: 6676512.5

YEAR: 2016

— = 625'





INQUIRY # 6676512.5

YEAR: 2012

— = 625'



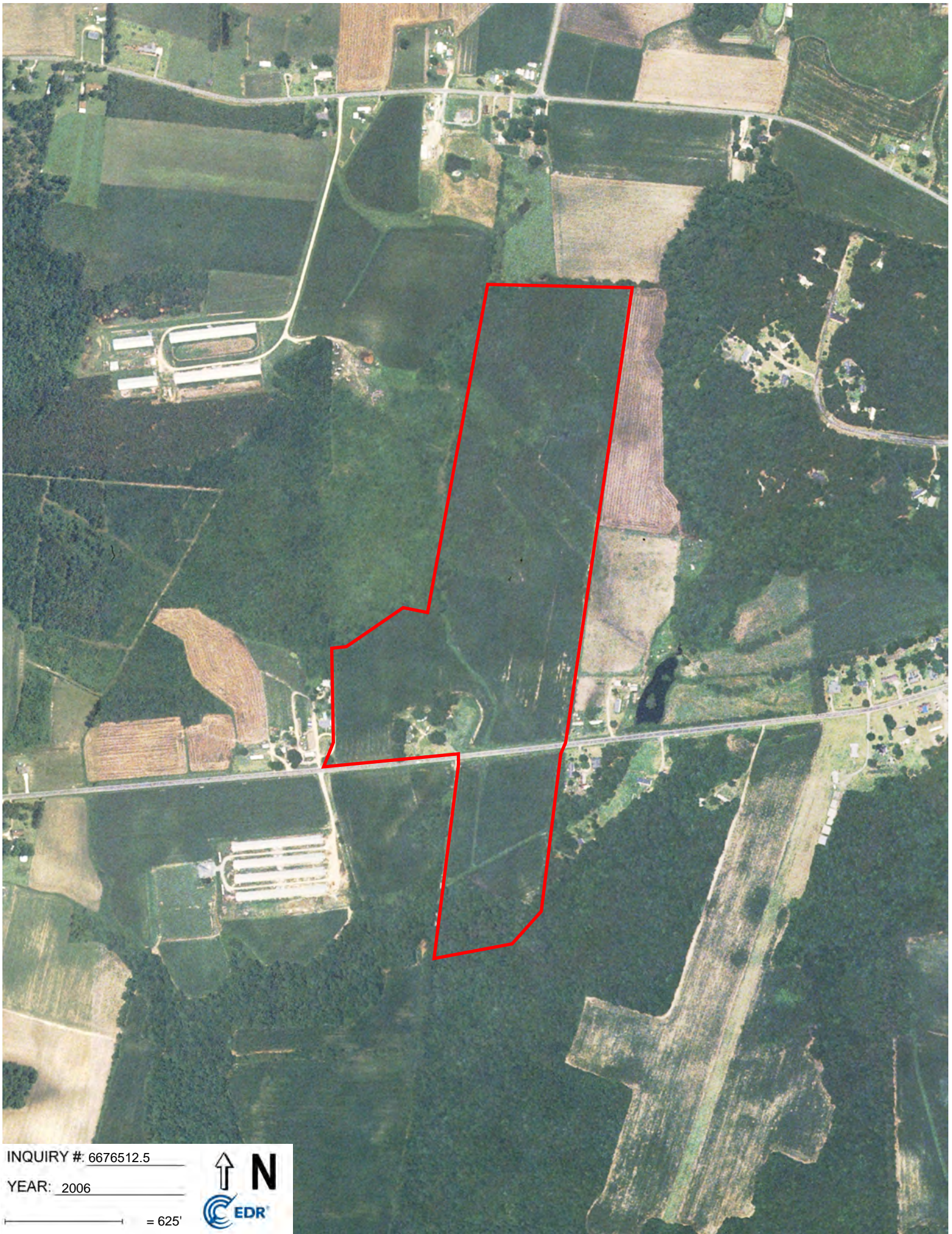


INQUIRY # 6676512.5

YEAR: 2009

— = 625'



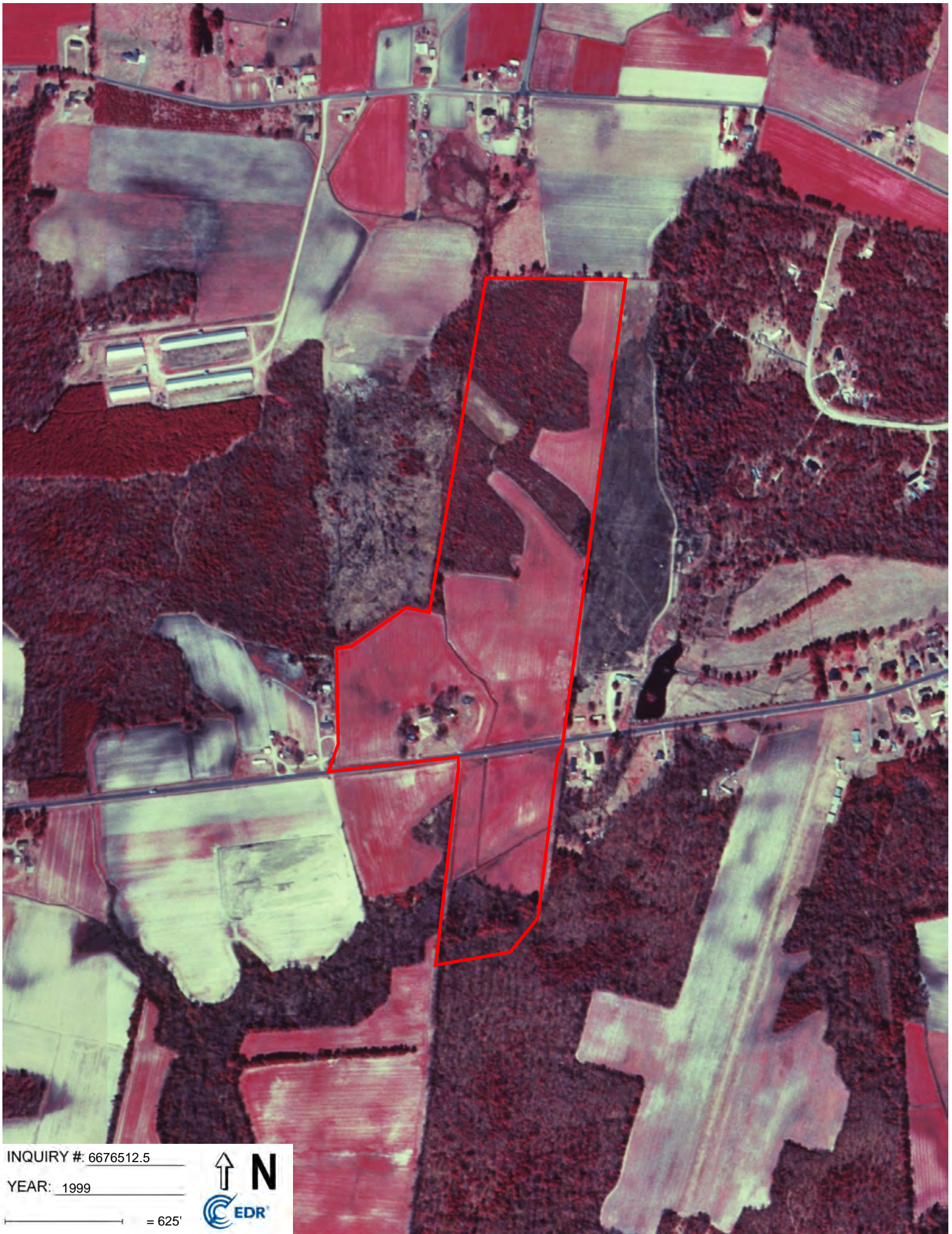


INQUIRY # 6676512.5

YEAR: 2006

— = 625'





INQUIRY #: 6676512.5

YEAR: 1999

— = 625'







INQUIRY #: 6676512.5

YEAR: 1993

— = 625'





INQUIRY #: 6676512.5

YEAR: 1983

— = 625'





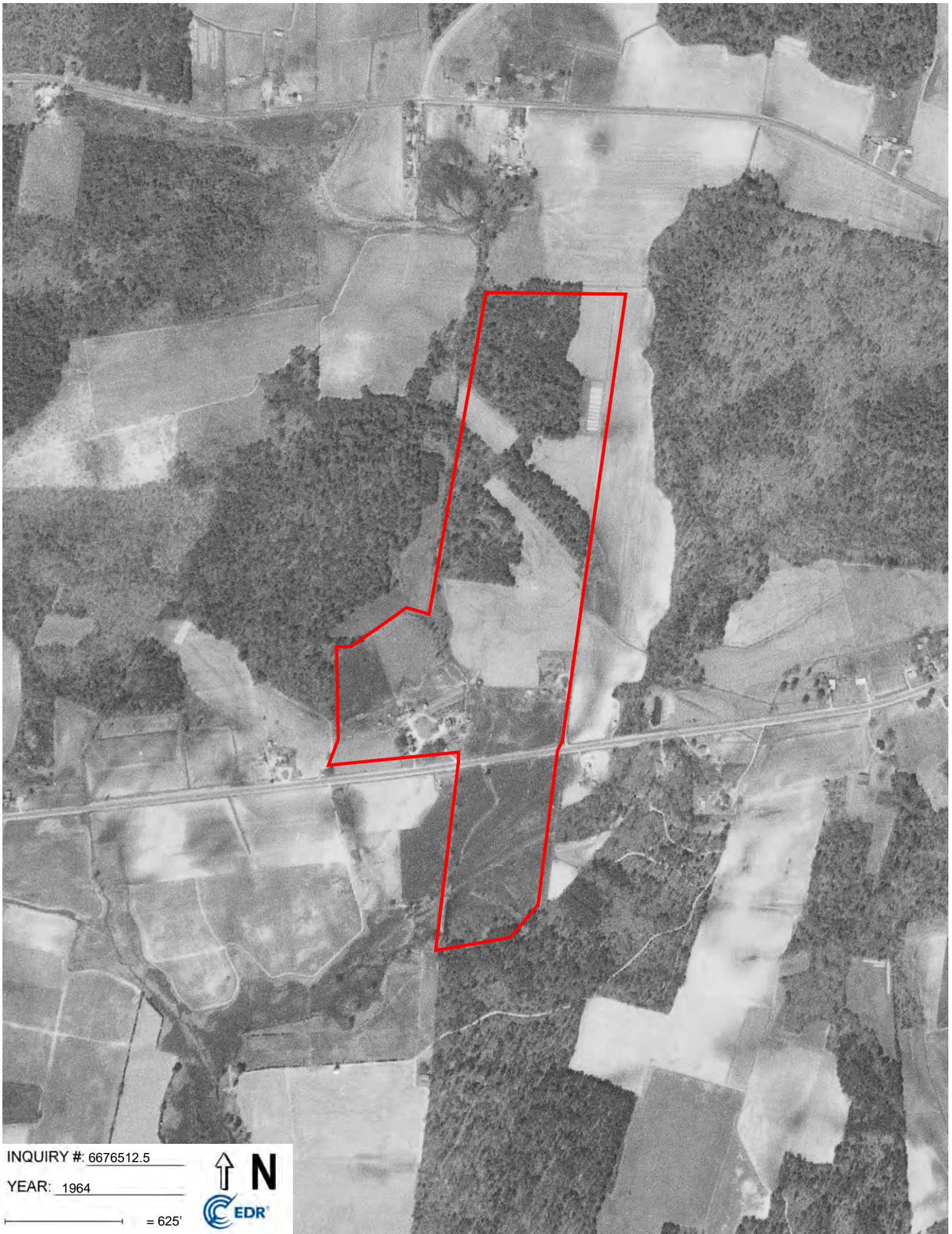
INQUIRY #: 6676512.5

YEAR: 1973

— = 625'



Subject boundary not shown because it exceeds image extent or image is not georeferenced.

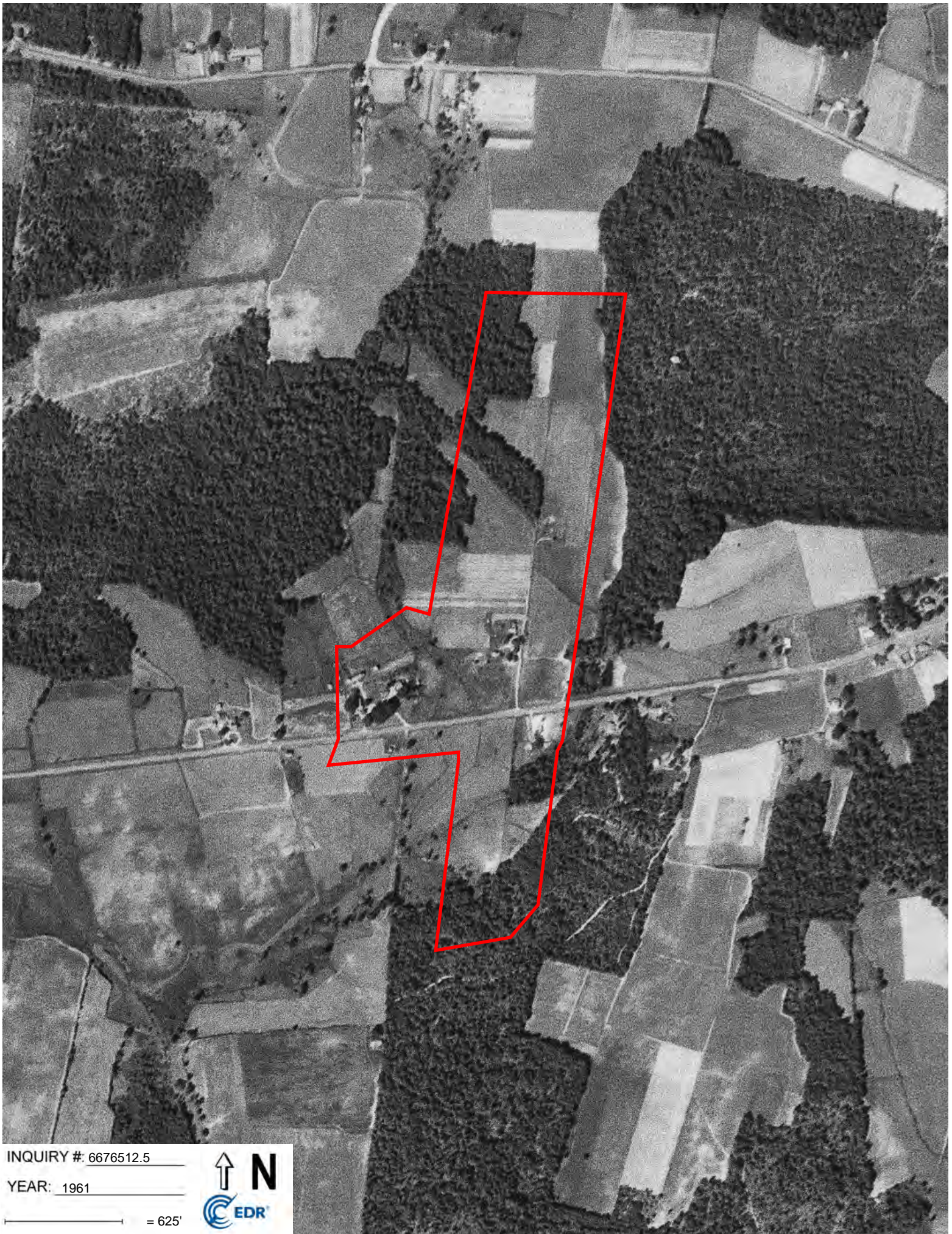


INQUIRY # 6676512.5

YEAR: 1964

— = 625'



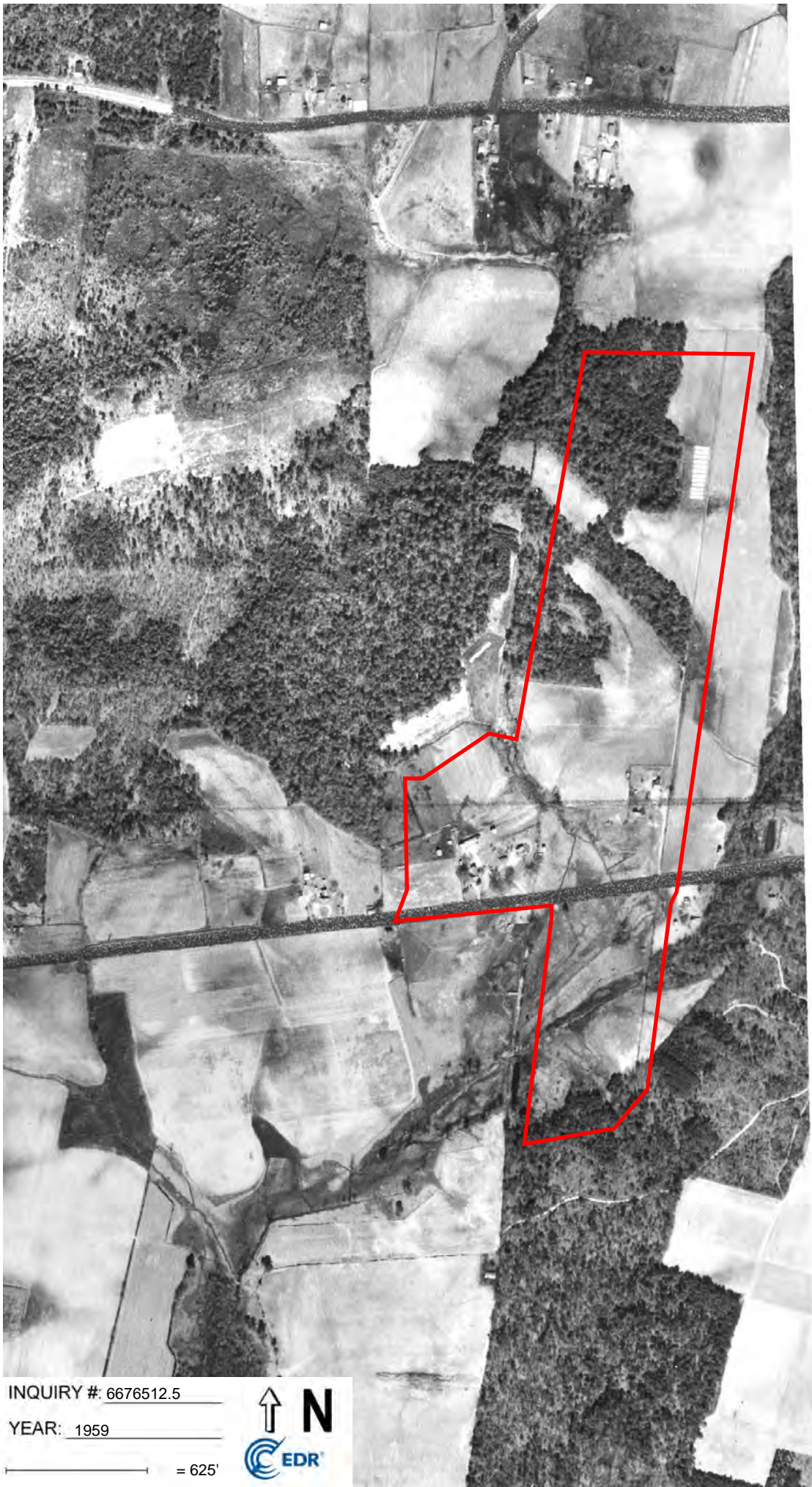


INQUIRY # 6676512.5

YEAR: 1961

— = 625'



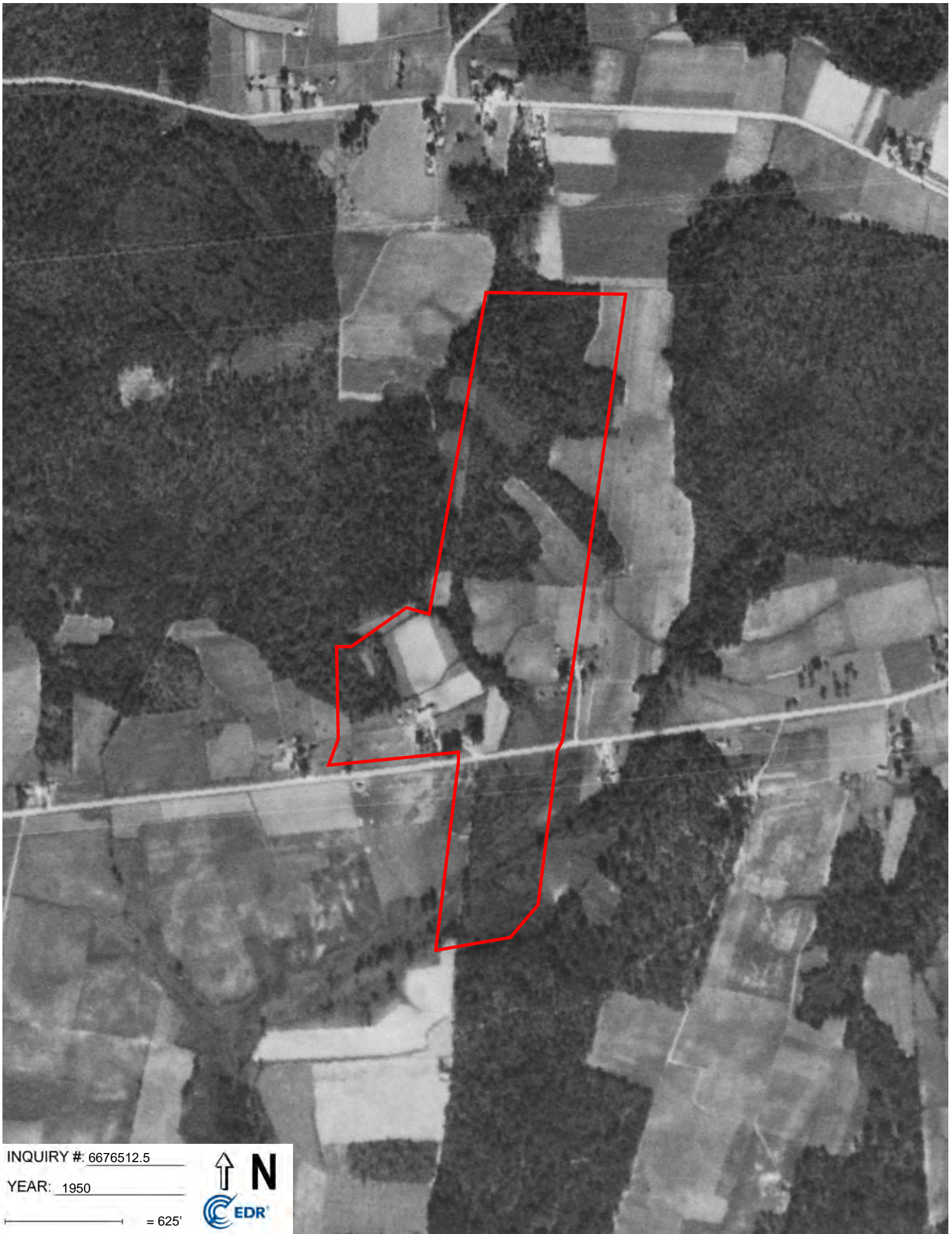


INQUIRY #: 6676512.5

YEAR: 1959

— = 625'





INQUIRY #: 6676512.5

YEAR: 1950

— = 625'



### **Appendix 3: DWR, NCSM, and NCWAM Forms**



NC DWQ Stream Identification Form Version 4.11

Casey  
Creek  
RI

Date: 9/24/21	Project/Site: Casey Creek	Latitude:
Evaluator: CN/KH	County: Wayne	Longitude:
<b>Total Points:</b> Stream is at least intermittent if $\geq 19$ or perennial if $\geq 30^*$ 25.5	Stream Determination (circle one) Ephemeral Intermittent Perennial	Other e.g. Quad Name:

A. Geomorphology (Subtotal = 15.5)

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

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

B. Hydrology (Subtotal = 4)

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

C. Biology (Subtotal = 6)

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

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

Notes:

Sketch:

NC DWQ Stream Identification Form Version 4.11 *N of Hwy 13*

Date: <i>9/24/21</i>	Project/Site: <i>Ossey Cr.</i>	Latitude:
Evaluator: <i>CN</i>	County: <i>Wayne</i>	Longitude:
Total Points: <i>36.5</i> <small>Stream is at least intermittent if ≥ 19 or perennial if ≥ 30*</small>	Stream Determination (circle one) Ephemeral Intermittent <u>Perennial</u>	Other <small>e.g. Quad Name:</small>

A. Geomorphology (Subtotal = *14.5*)

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

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

B. Hydrology (Subtotal = *10.5*)

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

C. Biology (Subtotal = *11.5*)

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

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

Notes:

Sketch:

NC DWQ Stream Identification Form Version 4.11 *S. of Hwy 13*

Date: <i>9/24/21</i>	Project/Site: <i>Cobles Creek</i>	Latitude:
Evaluator: <i>CN T+H</i>	County: <i>Wayne</i>	Longitude:
<b>Total Points:</b> Stream is at least intermittent if $\geq 19$ or perennial if $\geq 30^*$ <i>35</i>	Stream Determination (circle one) Ephemeral Intermittent <u>Perennial</u>	Other e.g. Quad Name:

A. Geomorphology (Subtotal = *15.5*)

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

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

B. Hydrology (Subtotal = *9*)

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

C. Biology (Subtotal = *10.5*)

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

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

Notes:

Sketch:

NC DWQ Stream Identification Form Version 4.11

Apron Branch

Date: 9/24/21	Project/Site: cadby creek	Latitude:
Evaluator: JH/KH	County: Wayne	Longitude:
Total Points: 35.25 Stream is at least intermittent if ≥ 19 or perennial if ≥ 30*	Stream Determination (circle one) Ephemeral Intermittent <u>Perennial</u>	Other e.g. Quad Name:

A. Geomorphology (Subtotal = 10)

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

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

B. Hydrology (Subtotal = 8)

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

C. Biology (Subtotal = 11.25)

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

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

Notes:

Sketch:

NC DWQ Stream Identification Form Version 4.11 *Casey Cr.*

Date: <i>9/26/21</i>	Project/Site: <i>Martha Br.</i>	Latitude:
Evaluator: <i>CN/JH</i>	County: <i>Wayne</i>	Longitude:
Total Points: <i>Stream is at least intermittent if ≥ 19 or perennial if ≥ 30*</i> <b>23</b>	Stream Determination (circle one) Ephemeral <u>Intermittent</u> Perennial	Other e.g. Quad Name:

A. Geomorphology (Subtotal = 9)

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

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

B. Hydrology (Subtotal = 7.5)

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

C. Biology (Subtotal = 6.5)

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

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

Notes:

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Sketch:

NC DWQ Stream Identification Form Version 4.11

Ditch to Casey Creek

Date: 1/19/23	Project/Site: Casey Creek	Latitude:
Evaluator: K4	County:	Longitude:
Total Points: Stream is at least intermittent if ≥ 19 or perennial if ≥ 30* 5.5	Stream Determination (circle one) Ephemeral Intermittent Perennial	Other e.g. Quad Name:

A. Geomorphology (Subtotal = 3)

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

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

B. Hydrology (Subtotal = 0.5)

\* lots of leaf litter in channel

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

C. Biology (Subtotal = 2)

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

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

Notes:

Sketch:

NC DWQ Stream Identification Form Version 4.11

Ditch to maintain

Date: 1/19/23	Project/Site: Casey Creek	Latitude:
Evaluator: KH	County:	Longitude:
Total Points: Stream is at least intermittent if $\geq 19$ or perennial if $\geq 30^*$ 12.5	Stream Determination (circle one) Ephemeral Intermittent Perennial	Other e.g. Quad Name:

A. Geomorphology (Subtotal = 5)

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

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

B. Hydrology (Subtotal = 3)

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

C. Biology (Subtotal = 4.5)



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

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

Notes: Juncus

Sketch:

**NC SAM FIELD ASSESSMENT FORM**  
**Accompanies User Manual Version 2.1**

USACE AID #:	NCDWR #:
<p><b>INSTRUCTIONS:</b> Attach a sketch of the assessment area and photographs. Attach a copy of the USGS 7.5-minute topographic quadrangle, and circle the location of the stream reach under evaluation. If multiple stream reaches will be evaluated on the same property, identify and number all reaches on the attached map, and include a separate form for each reach. See the NC SAM User Manual for detailed descriptions and explanations of requested information. Record in the "Notes/Sketch" section if supplementary measurements were performed. See the NC SAM User Manual for examples of additional measurements that may be relevant.</p> <p><b>NOTE EVIDENCE OF STRESSORS AFFECTING THE ASSESSMENT AREA (do not need to be within the assessment area).</b></p> <p><b>PROJECT/SITE INFORMATION:</b></p>	
1. Project name (if any): <u>Casey Creek Mitigation Site</u>	2. Date of evaluation: <u>11/14/2022</u>
3. Applicant/owner name: <u>NC DMS</u>	4. Assessor name/organization: <u>Wildlands Engineering</u>
5. County: <u>Wayne</u>	6. Nearest named water body on USGS 7.5-minute quad: <u>Falling Creek</u>
7. River basin: <u>Neuse</u>	
8. Site coordinates (decimal degrees, at lower end of assessment reach): <u>35.291162, -78.184589</u>	
<b>STREAM INFORMATION: (depth and width can be approximations)</b>	
9. Site number (show on attached map): <u>Afton Branch</u>	10. Length of assessment reach evaluated (feet): <u>500</u>
11. Channel depth from bed (in riffle, if present) to top of bank (feet): <u>4</u>	<input type="checkbox"/> Unable to assess channel depth.
12. Channel width at top of bank (feet): <u>10</u>	13. Is assessment reach a swamp steam? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
14. Feature type: <input checked="" type="checkbox"/> Perennial flow <input type="checkbox"/> Intermittent flow <input type="checkbox"/> Tidal Marsh Stream	
<b>STREAM CATEGORY INFORMATION:</b>	
15. NC SAM Zone: <input type="checkbox"/> Mountains (M) <input type="checkbox"/> Piedmont (P) <input checked="" type="checkbox"/> Inner Coastal Plain (I) <input type="checkbox"/> Outer Coastal Plain (O)	
16. Estimated geomorphic valley shape (skip for Tidal Marsh Stream):	<input checked="" type="checkbox"/> A  (more sinuous stream, flatter valley slope) <input type="checkbox"/> B  (less sinuous stream, steeper valley slope)
17. Watershed size: (skip for Tidal Marsh Stream)	<input type="checkbox"/> Size 1 (< 0.1 mi <sup>2</sup> ) <input checked="" type="checkbox"/> Size 2 (0.1 to < 0.5 mi <sup>2</sup> ) <input type="checkbox"/> Size 3 (0.5 to < 5 mi <sup>2</sup> ) <input type="checkbox"/> Size 4 (≥ 5 mi <sup>2</sup> )
<b>ADDITIONAL INFORMATION:</b>	
18. Were regulatory considerations evaluated? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No If Yes, check all that apply to the assessment area.	
<input type="checkbox"/> Section 10 water	<input type="checkbox"/> Classified Trout Waters
<input type="checkbox"/> Essential Fish Habitat	<input type="checkbox"/> Primary Nursery Area
<input type="checkbox"/> Publicly owned property	<input checked="" type="checkbox"/> NCDWR Riparian buffer rule in effect
<input type="checkbox"/> Anadromous fish	<input type="checkbox"/> 303(d) List
<input type="checkbox"/> Documented presence of a federal and/or state listed protected species within the assessment area.	<input checked="" type="checkbox"/> Nutrient Sensitive Waters
List species: _____	<input type="checkbox"/> CAMA Area of Environmental Concern (AEC)
<input type="checkbox"/> Designated Critical Habitat (list species) _____	
19. Are additional stream information/supplementary measurements included in "Notes/Sketch" section or attached? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	

**1. Channel Water – assessment reach metric (skip for Size 1 streams and Tidal Marsh Streams)**

- A Water throughout assessment reach.
- B No flow, water in pools only.
- C No water in assessment reach.

**2. Evidence of Flow Restriction – assessment reach metric**

- A At least 10% of assessment reach in-stream habitat or riffle-pool sequence is severely affected by a flow restriction or fill to the point of obstructing flow or a channel choked with aquatic macrophytes or ponded water or impoundment on flood or ebb within the assessment reach (examples: undersized or perched culverts, causeways that constrict the channel, tidal gates, debris jams, beaver dams).
- B Not A

**3. Feature Pattern – assessment reach metric**

- A A majority of the assessment reach has altered pattern (examples: straightening, modification above or below culvert).
- B Not A

**4. Feature Longitudinal Profile – assessment reach metric**

- A Majority of assessment reach has a substantially altered stream profile (examples: channel down-cutting, existing damming, over widening, active aggradation, dredging, and excavation where appropriate channel profile has not reformed from any of these disturbances).
- B Not A

**5. Signs of Active Instability – assessment reach metric**

**Consider only current instability, not past events from which the stream has currently recovered.** Examples of instability include active bank failure, active channel down-cutting (head-cut), active widening, and artificial hardening (such as concrete, gabion, rip-rap).

- A < 10% of channel unstable
- B 10 to 25% of channel unstable
- C > 25% of channel unstable



6. Streamside Area Interaction – streamside area metric

Consider for the Left Bank (LB) and the Right Bank (RB).

- LB RB
A A Little or no evidence of conditions that adversely affect reference interaction
B B Moderate evidence of conditions (examples: berms, levees, down-cutting, aggradation, dredging) that adversely affect reference interaction
C C Extensive evidence of conditions that adversely affect reference interaction

7. Water Quality Stressors – assessment reach/intertidal zone metric

Check all that apply.

- A Discolored water in stream or intertidal zone (milky white, blue, unnatural water discoloration, oil sheen, stream foam)
B Excessive sedimentation (burying of stream features or intertidal zone)
C Noticeable evidence of pollutant discharges entering the assessment reach and causing a water quality problem
D Odor (not including natural sulfide odors)
E Current published or collected data indicating degraded water quality in the assessment reach. Cite source in "Notes/Sketch" section.
F Livestock with access to stream or intertidal zone
G Excessive algae in stream or intertidal zone
H Degraded marsh vegetation in the intertidal zone (removal, burning, regular mowing, destruction, etc)
I Other: (explain in "Notes/Sketch" section)
J Little to no stressors

8. Recent Weather – watershed metric (skip for Tidal Marsh Streams)

For Size 1 or 2 streams, D1 drought or higher is considered a drought; for Size 3 or 4 streams, D2 drought or higher is considered a drought.

- A Drought conditions and no rainfall or rainfall not exceeding 1 inch within the last 48 hours
B Drought conditions and rainfall exceeding 1 inch within the last 48 hours
C No drought conditions

9. Large or Dangerous Stream – assessment reach metric

Yes No Is stream is too large or dangerous to assess? If Yes, skip to Metric 13 (Streamside Area Ground Surface Condition).

10. Natural In-stream Habitat Types – assessment reach metric

10a. Yes No Degraded in-stream habitat over majority of the assessment reach (examples of stressors include excessive sedimentation, mining, excavation, in-stream hardening [for example, rip-rap], recent dredging, and snagging) (evaluate for Size 4 Coastal Plain streams only, then skip to Metric 12)

10b. Check all that occur (occurs if > 5% coverage of assessment reach) (skip for Size 4 Coastal Plain streams)

- A Multiple aquatic macrophytes and aquatic mosses (include liverworts, lichens, and algal mats)
B Multiple sticks and/or leaf packs and/or emergent vegetation
C Multiple snags and logs (including lap trees)
D 5% undercut banks and/or root mats and/or roots in banks extend to the normal wetted perimeter
E Little or no habitat
F 5% oysters or other natural hard bottoms
G Submerged aquatic vegetation
H Low-tide refugia (pools)
I Sand bottom
J 5% vertical bank along the marsh
K Little or no habitat

\*\*\*\*\*REMAINING QUESTIONS ARE NOT APPLICABLE FOR TIDAL MARSH STREAMS\*\*\*\*\*

11. Bedform and Substrate – assessment reach metric (skip for Size 4 Coastal Plain streams and Tidal Marsh Streams)

11a. Yes No Is assessment reach in a natural sand-bed stream? (skip for Coastal Plain streams)

11b. Bedform evaluated. Check the appropriate box(es).

- A Riffle-run section (evaluate 11c)
B Pool-glide section (evaluate 11d)
C Natural bedform absent (skip to Metric 12, Aquatic Life)

11c. In riffle sections, check all that occur below the normal wetted perimeter of the assessment reach – whether or not submerged. Check at least one box in each row (skip for Size 4 Coastal Plain streams and Tidal Marsh Streams). Not Present (NP) = absent, Rare (R) = present but <= 10%, Common (C) = > 10-40%, Abundant (A) = > 40-70%, Predominant (P) = > 70%. Cumulative percentages should not exceed 100% for each assessment reach.

Table with 5 columns: NP, R, C, A, P and rows for Bedrock/saprolite, Boulder (256 – 4096 mm), Cobble (64 – 256 mm), Gravel (2 – 64 mm), Sand (.062 – 2 mm), Silt/clay (< 0.062 mm), Detritus, Artificial (rip-rap, concrete, etc.)

11d. Yes No Are pools filled with sediment? (skip for Size 4 Coastal Plain streams and Tidal Marsh Streams)

**12. Aquatic Life – assessment reach metric (skip for Tidal Marsh Streams)**

12a.  Yes  No Was an in-stream aquatic life assessment performed as described in the User Manual?  
If No, select one of the following reasons and skip to Metric 13.  No Water  Other: \_\_\_\_\_

12b.  Yes  No Are aquatic organisms present in the assessment reach (look in riffles, pools, then snags)? If Yes, check all that apply. If No, skip to Metric 13.

1 >1 Numbers over columns refer to "individuals" for Size 1 and 2 streams and "taxa" for Size 3 and 4 streams.

- Adult frogs
- Aquatic reptiles
- Aquatic macrophytes and aquatic mosses (include liverworts, lichens, and algal mats)
- Beetles
- Caddisfly larvae (T)
- Asian clam (*Corbicula*)
- Crustacean (isopod/amphipod/crayfish/shrimp)
- Damselfly and dragonfly larvae
- Dipterans
- Mayfly larvae (E)
- Megaloptera (alderfly, fishfly, dobsonfly larvae)
- Midges/mosquito larvae
- Mosquito fish (*Gambusia*) or mud minnows (*Umbra pygmaea*)
- Mussels/Clams (not *Corbicula*)
- Other fish
- Salamanders/tadpoles
- Snails
- Stonefly larvae (P)
- Tipulid larvae
- Worms/leeches

**13. Streamside Area Ground Surface Condition – streamside area metric (skip for Tidal Marsh Streams and B valley types)**

**Consider for the Left Bank (LB) and the Right Bank (RB).** Consider storage capacity with regard to both overbank flow and upland runoff.

- |                                       |                                       |  |
|---------------------------------------|---------------------------------------|--|
| LB                                    | RB                                    |  |
| <input type="checkbox"/> A            | <input type="checkbox"/> A            | Little or no alteration to water storage capacity over a majority of the streamside area   |
| <input type="checkbox"/> B            | <input type="checkbox"/> B            | Moderate alteration to water storage capacity over a majority of the streamside area   |
| <input checked="" type="checkbox"/> C | <input checked="" type="checkbox"/> C | Severe alteration to water storage capacity over a majority of the streamside area (examples: ditches, fill, soil compaction, livestock disturbance, buildings, man-made levees, drainage pipes) |

**14. Streamside Area Water Storage – streamside area metric (skip for Size 1 streams, Tidal Marsh Streams, and B valley types)**

**Consider for the Left Bank (LB) and the Right Bank (RB) of the streamside area.**

- |                                       |                                       |  |
|---------------------------------------|---------------------------------------|--|
| LB                                    | RB                                    |  |
| <input type="checkbox"/> A            | <input type="checkbox"/> A            | Majority of streamside area with depressions able to pond water $\geq$ 6 inches deep |
| <input type="checkbox"/> B            | <input type="checkbox"/> B            | Majority of streamside area with depressions able to pond water 3 to 6 inches deep   |
| <input checked="" type="checkbox"/> C | <input checked="" type="checkbox"/> C | Majority of streamside area with depressions able to pond water < 3 inches deep      |

**15. Wetland Presence – streamside area metric (skip for Tidal Marsh Streams)**

**Consider for the Left Bank (LB) and the Right Bank (RB).** Do not consider wetlands outside of the streamside area or within the normal wetted perimeter of assessment reach.

- |                                       |                                       |  |
|---------------------------------------|---------------------------------------|--|
| LB                                    | RB                                    |  |
| <input type="checkbox"/> Y            | <input type="checkbox"/> Y            | Are wetlands present in the streamside area? |
| <input checked="" type="checkbox"/> N | <input checked="" type="checkbox"/> N |  |

**16. Baseflow Contributors – assessment reach metric (skip for Size 4 streams and Tidal Marsh Streams)**

**Check all contributors within the assessment reach or within view of and draining to the assessment reach.**

- A Streams and/or springs (jurisdictional discharges)
- B Ponds (include wet detention basins; do not include sediment basins or dry detention basins)
- C Obstruction passing flow during low-flow periods within the assessment area (beaver dam, leaky dam, bottom-release dam, weir)
- D Evidence of bank seepage or sweating (iron in water indicates seepage)
- E Stream bed or bank soil reduced (dig through deposited sediment if present)
- F None of the above

**17. Baseflow Detractors – assessment area metric (skip for Tidal Marsh Streams)**

**Check all that apply.**

- A Evidence of substantial water withdrawals from the assessment reach (includes areas excavated for pump installation)
- B Obstruction not passing flow during low-flow periods affecting the assessment reach (ex: watertight dam, sediment deposit)
- C Urban stream ( $\geq$  24% impervious surface for watershed)
- D Evidence that the streamside area has been modified resulting in accelerated drainage into the assessment reach
- E Assessment reach relocated to valley edge
- F None of the above

**18. Shading – assessment reach metric (skip for Tidal Marsh Streams)**

Consider aspect. Consider "leaf-on" condition.

- A Stream shading is appropriate for stream category (may include gaps associated with natural processes)
- B Degraded (example: scattered trees)
- C Stream shading is gone or largely absent

**19. Buffer Width – streamside area metric (skip for Tidal Marsh Streams)**

Consider “vegetated buffer” and “wooded buffer” separately for left bank (LB) and right bank (RB) starting at the top of bank out to the first break.

Vegetated		Wooded		
LB	RB	LB	RB	
<input type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A	≥ 100 feet wide <u>or</u> extends to the edge of the watershed
<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	From 50 to < 100 feet wide
<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	From 30 to < 50 feet wide
<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D	From 10 to < 30 feet wide
<input checked="" type="checkbox"/> E	<input checked="" type="checkbox"/> E	<input checked="" type="checkbox"/> E	<input checked="" type="checkbox"/> E	< 10 feet wide <u>or</u> no trees

**20. Buffer Structure – streamside area metric (skip for Tidal Marsh Streams)**

Consider for left bank (LB) and right bank (RB) for Metric 19 (“Vegetated” Buffer Width).

LB	RB	
<input type="checkbox"/> A	<input type="checkbox"/> A	Mature forest
<input type="checkbox"/> B	<input type="checkbox"/> B	Non-mature woody vegetation <u>or</u> modified vegetation structure
<input type="checkbox"/> C	<input type="checkbox"/> C	Herbaceous vegetation with or without a strip of trees < 10 feet wide
<input type="checkbox"/> D	<input type="checkbox"/> D	Maintained shrubs
<input checked="" type="checkbox"/> E	<input checked="" type="checkbox"/> E	Little or no vegetation

**21. Buffer Stressors – streamside area metric (skip for Tidal Marsh Streams)**

Check all appropriate boxes for left bank (LB) and right bank (RB). Indicate if listed stressor abuts stream (Abuts), does not abut but is within 30 feet of stream (< 30 feet), or is between 30 to 50 feet of stream (30-50 feet).

If none of the following stressors occurs on either bank, check here and skip to Metric 22:

Abuts		< 30 feet		30-50 feet		
LB	RB	LB	RB	LB	RB	
<input checked="" type="checkbox"/> A	<input checked="" type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A	Row crops
<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	Maintained turf
<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	Pasture (no livestock)/commercial horticulture
<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D	Pasture (active livestock use)

**22. Stem Density – streamside area metric (skip for Tidal Marsh Streams)**

Consider for left bank (LB) and right bank (RB) for Metric 19 (“Wooded” Buffer Width).

LB	RB	
<input type="checkbox"/> A	<input type="checkbox"/> A	Medium to high stem density
<input type="checkbox"/> B	<input type="checkbox"/> B	Low stem density
<input checked="" type="checkbox"/> C	<input checked="" type="checkbox"/> C	No wooded riparian buffer <u>or</u> predominantly herbaceous species <u>or</u> bare ground

**23. Continuity of Vegetated Buffer – streamside area metric (skip for Tidal Marsh Streams)**

Consider whether vegetated buffer is continuous along stream (parallel). Breaks are areas lacking vegetation > 10 feet wide.

LB	RB	
<input type="checkbox"/> A	<input type="checkbox"/> A	The total length of buffer breaks is < 25 percent.
<input type="checkbox"/> B	<input type="checkbox"/> B	The total length of buffer breaks is between 25 and 50 percent.
<input checked="" type="checkbox"/> C	<input checked="" type="checkbox"/> C	The total length of buffer breaks is > 50 percent.

**24. Vegetative Composition – streamside area metric (skip for Tidal Marsh Streams)**

Evaluate the dominant vegetation within 100 feet of each bank or to the edge of the watershed (whichever comes first) as it contributes to assessment reach habitat.

LB	RB	
<input type="checkbox"/> A	<input type="checkbox"/> A	Vegetation is close to undisturbed in species present and their proportions. Lower strata composed of native species, with non-native invasive species absent or sparse.
<input type="checkbox"/> B	<input type="checkbox"/> B	Vegetation indicates disturbance in terms of species diversity or proportions, but is still largely composed of native species. This may include communities of weedy native species that develop after clear-cutting or clearing <u>or</u> communities with non-native invasive species present, but not dominant, over a large portion of the expected strata <u>or</u> communities missing understory but retaining canopy trees.
<input checked="" type="checkbox"/> C	<input checked="" type="checkbox"/> C	Vegetation is severely disturbed in terms of species diversity or proportions. Mature canopy is absent <u>or</u> communities with non-native invasive species dominant over a large portion of expected strata <u>or</u> communities composed of planted stands of non-characteristic species <u>or</u> communities inappropriately composed of a single species <u>or</u> no vegetation.

**25. Conductivity – assessment reach metric (skip for all Coastal Plain streams)**

25a. Yes No Was conductivity measurement recorded?  
If No, select one of the following reasons. No Water Other: \_\_\_\_\_

25b. Check the box corresponding to the conductivity measurement (units of microsiemens per centimeter).  
A < 46 B 46 to < 67 C 67 to < 79 D 79 to < 230 E ≥ 230

Notes/Sketch:



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

Stream Site Name Casey Creek Mitigation Site Date of Assessment 11/14/2022  
 Stream Category la2 Assessor Name/Organization Wildlands Engineering

Notes of Field Assessment Form (Y/N) NO  
 Presence of regulatory considerations (Y/N) YES  
 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>LOW</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>LOW</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>LOW</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	NA	
<b>Overall</b>	<b>LOW</b>	

**NC SAM FIELD ASSESSMENT FORM**  
**Accompanies User Manual Version 2.1**

USACE AID #:	NCDWR #:
<p><b>INSTRUCTIONS:</b> Attach a sketch of the assessment area and photographs. Attach a copy of the USGS 7.5-minute topographic quadrangle, and circle the location of the stream reach under evaluation. If multiple stream reaches will be evaluated on the same property, identify and number all reaches on the attached map, and include a separate form for each reach. See the NC SAM User Manual for detailed descriptions and explanations of requested information. Record in the "Notes/Sketch" section if supplementary measurements were performed. See the NC SAM User Manual for examples of additional measurements that may be relevant.</p> <p><b>NOTE EVIDENCE OF STRESSORS AFFECTING THE ASSESSMENT AREA (do not need to be within the assessment area).</b></p> <p><b>PROJECT/SITE INFORMATION:</b></p>	
1. Project name (if any): <u>Casey Creek Mitigation Site</u>	2. Date of evaluation: <u>11/14/2022</u>
3. Applicant/owner name: <u>NC DMS</u>	4. Assessor name/organization: <u>Wildlands Engineering</u>
5. County: <u>Wayne</u>	6. Nearest named water body on USGS 7.5-minute quad: <u>Falling Creek</u>
7. River basin: <u>Neuse</u>	
8. Site coordinates (decimal degrees, at lower end of assessment reach): <u>35.296437, -78.184601</u>	
<b>STREAM INFORMATION: (depth and width can be approximations)</b>	
9. Site number (show on attached map): <u>Casey Reach 1</u>	10. Length of assessment reach evaluated (feet): <u>1,000</u>
11. Channel depth from bed (in riffle, if present) to top of bank (feet): <u>0.5</u>	<input type="checkbox"/> Unable to assess channel depth.
12. Channel width at top of bank (feet): <u>5</u>	13. Is assessment reach a swamp steam? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
14. Feature type: <input type="checkbox"/> Perennial flow <input checked="" type="checkbox"/> Intermittent flow <input type="checkbox"/> Tidal Marsh Stream	
<b>STREAM CATEGORY INFORMATION:</b>	
15. NC SAM Zone: <input type="checkbox"/> Mountains (M) <input type="checkbox"/> Piedmont (P) <input checked="" type="checkbox"/> Inner Coastal Plain (I) <input type="checkbox"/> Outer Coastal Plain (O)	
16. Estimated geomorphic valley shape (skip for Tidal Marsh Stream):	<input checked="" type="checkbox"/> A  (more sinuous stream, flatter valley slope) <input type="checkbox"/> B  (less sinuous stream, steeper valley slope)
17. Watershed size: (skip for Tidal Marsh Stream)	<input type="checkbox"/> Size 1 (< 0.1 mi <sup>2</sup> ) <input checked="" type="checkbox"/> Size 2 (0.1 to < 0.5 mi <sup>2</sup> ) <input type="checkbox"/> Size 3 (0.5 to < 5 mi <sup>2</sup> ) <input type="checkbox"/> Size 4 (≥ 5 mi <sup>2</sup> )
<b>ADDITIONAL INFORMATION:</b>	
18. Were regulatory considerations evaluated? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No If Yes, check all that apply to the assessment area.	
<input type="checkbox"/> Section 10 water	<input type="checkbox"/> Classified Trout Waters
<input type="checkbox"/> Essential Fish Habitat	<input type="checkbox"/> Primary Nursery Area
<input type="checkbox"/> Publicly owned property	<input checked="" type="checkbox"/> NCDWR Riparian buffer rule in effect
<input type="checkbox"/> Anadromous fish	<input type="checkbox"/> 303(d) List
<input type="checkbox"/> Documented presence of a federal and/or state listed protected species within the assessment area.	<input type="checkbox"/> CAMA Area of Environmental Concern (AEC)
List species: _____	
<input type="checkbox"/> Designated Critical Habitat (list species) _____	
19. Are additional stream information/supplementary measurements included in "Notes/Sketch" section or attached? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	

**1. Channel Water – assessment reach metric (skip for Size 1 streams and Tidal Marsh Streams)**

- A Water throughout assessment reach.
- B No flow, water in pools only.
- C No water in assessment reach.

**2. Evidence of Flow Restriction – assessment reach metric**

- A At least 10% of assessment reach in-stream habitat or riffle-pool sequence is severely affected by a flow restriction or fill to the point of obstructing flow or a channel choked with aquatic macrophytes or ponded water or impoundment on flood or ebb within the assessment reach (examples: undersized or perched culverts, causeways that constrict the channel, tidal gates, debris jams, beaver dams).
- B Not A

**3. Feature Pattern – assessment reach metric**

- A A majority of the assessment reach has altered pattern (examples: straightening, modification above or below culvert).
- B Not A

**4. Feature Longitudinal Profile – assessment reach metric**

- A Majority of assessment reach has a substantially altered stream profile (examples: channel down-cutting, existing damming, over widening, active aggradation, dredging, and excavation where appropriate channel profile has not reformed from any of these disturbances).
- B Not A

**5. Signs of Active Instability – assessment reach metric**

**Consider only current instability, not past events from which the stream has currently recovered.** Examples of instability include active bank failure, active channel down-cutting (head-cut), active widening, and artificial hardening (such as concrete, gabion, rip-rap).

- A < 10% of channel unstable
- B 10 to 25% of channel unstable
- C > 25% of channel unstable

**6. Streamside Area Interaction – streamside area metric**

Consider for the Left Bank (LB) and the Right Bank (RB).

- |                                       |                                       |   |
|---------------------------------------|---------------------------------------|---|
| LB                                    | RB                                    |   |
| <input checked="" type="checkbox"/> A | <input checked="" type="checkbox"/> A | Little or no evidence of conditions that adversely affect reference interaction   |
| <input type="checkbox"/> B            | <input type="checkbox"/> B            | Moderate evidence of conditions (examples: berms, levees, down-cutting, aggradation, dredging) that adversely affect reference interaction (examples: limited streamside area access, disruption of flood flows through streamside area, leaky or intermittent bulkheads, causeways with floodplain constriction, minor ditching [including mosquito ditching])   |
| <input type="checkbox"/> C            | <input type="checkbox"/> C            | Extensive evidence of conditions that adversely affect reference interaction (little to no floodplain/intertidal zone access [examples: causeways with floodplain and channel constriction, bulkheads, retaining walls, fill, stream incision, disruption of flood flows through streamside area] <u>or</u> too much floodplain/intertidal zone access [examples: impoundments, intensive mosquito ditching]) <u>or</u> floodplain/intertidal zone unnaturally absent <u>or</u> assessment reach is a man-made feature on an interstream divide |

**7. Water Quality Stressors – assessment reach/intertidal zone metric**

Check all that apply.

- A Discolored water in stream or intertidal zone (milky white, blue, unnatural water discoloration, oil sheen, stream foam)
- B Excessive sedimentation (burying of stream features or intertidal zone)
- C Noticeable evidence of pollutant discharges entering the assessment reach and causing a water quality problem
- D Odor (not including natural sulfide odors)
- E Current published or collected data indicating degraded water quality in the assessment reach. Cite source in “Notes/Sketch” section.
- F Livestock with access to stream or intertidal zone
- G Excessive algae in stream or intertidal zone
- H Degraded marsh vegetation in the intertidal zone (removal, burning, regular mowing, destruction, etc)
- I Other: \_\_\_\_\_ (explain in “Notes/Sketch” section)
- J Little to no stressors

**8. Recent Weather – watershed metric (skip for Tidal Marsh Streams)**

For Size 1 or 2 streams, D1 drought or higher is considered a drought; for Size 3 or 4 streams, D2 drought or higher is considered a drought.

- A Drought conditions and no rainfall or rainfall not exceeding 1 inch within the last 48 hours
- B Drought conditions and rainfall exceeding 1 inch within the last 48 hours
- C No drought conditions

**9. Large or Dangerous Stream – assessment reach metric**

Yes No Is stream is too large or dangerous to assess? If Yes, skip to Metric 13 (Streamside Area Ground Surface Condition).

**10. Natural In-stream Habitat Types – assessment reach metric**

10a. Yes No Degraded in-stream habitat over majority of the assessment reach (examples of stressors include excessive sedimentation, mining, excavation, in-stream hardening [for example, rip-rap], recent dredging, and snagging) (evaluate for Size 4 Coastal Plain streams only, then skip to Metric 12)

10b. Check all that occur (occurs if > 5% coverage of assessment reach) (skip for Size 4 Coastal Plain streams)

- |  |                                    |   |
|--|------------------------------------|---|
| <input type="checkbox"/> A Multiple aquatic macrophytes and aquatic mosses (include liverworts, lichens, and algal mats)             | Check for Tidal Marsh Streams Only | <input type="checkbox"/> F 5% oysters or other natural hard bottoms |
| <input checked="" type="checkbox"/> B Multiple sticks and/or leaf packs and/or emergent vegetation                                   |                                    | <input type="checkbox"/> G Submerged aquatic vegetation             |
| <input checked="" type="checkbox"/> C Multiple snags and logs (including lap trees)  |                                    | <input type="checkbox"/> H Low-tide refugia (pools)                 |
| <input checked="" type="checkbox"/> D 5% undercut banks and/or root mats and/or roots in banks extend to the normal wetted perimeter |                                    | <input type="checkbox"/> I Sand bottom                              |
| <input type="checkbox"/> E Little or no habitat  |                                    | <input type="checkbox"/> J 5% vertical bank along the marsh         |
|  |                                    | <input type="checkbox"/> K Little or no habitat                     |

\*\*\*\*\*REMAINING QUESTIONS ARE NOT APPLICABLE FOR TIDAL MARSH STREAMS\*\*\*\*\*

**11. Bedform and Substrate – assessment reach metric (skip for Size 4 Coastal Plain streams and Tidal Marsh Streams)**

11a. Yes No Is assessment reach in a natural sand-bed stream? (skip for Coastal Plain streams)

11b. Bedform evaluated. Check the appropriate box(es).

- A Riffle-run section (evaluate 11c)
- B Pool-glide section (evaluate 11d)
- C Natural bedform absent (skip to Metric 12, Aquatic Life)

11c. In riffle sections, check all that occur below the normal wetted perimeter of the assessment reach – whether or not submerged. Check at least one box in each row (skip for Size 4 Coastal Plain streams and Tidal Marsh Streams). Not Present (NP) = absent, Rare (R) = present but ≤ 10%, Common (C) = > 10-40%, Abundant (A) = > 40-70%, Predominant (P) = > 70%. Cumulative percentages should not exceed 100% for each assessment reach.

- |                                     |                                     |                          |                          |                                     |                                      |
|-------------------------------------|-------------------------------------|--------------------------|--------------------------|-------------------------------------|--------------------------------------|
| NP                                  | R                                   | C                        | A                        | P                                   |                                      |
| <input checked="" type="checkbox"/> | <input type="checkbox"/>            | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/>            | Bedrock/saprolite                    |
| <input checked="" type="checkbox"/> | <input type="checkbox"/>            | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/>            | Boulder (256 – 4096 mm)              |
| <input checked="" type="checkbox"/> | <input type="checkbox"/>            | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/>            | Cobble (64 – 256 mm)                 |
| <input type="checkbox"/>            | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/>            | Gravel (2 – 64 mm)                   |
| <input type="checkbox"/>            | <input type="checkbox"/>            | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | Sand (.062 – 2 mm)                   |
| <input type="checkbox"/>            | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/>            | Silt/clay (< 0.062 mm)               |
| <input checked="" type="checkbox"/> | <input type="checkbox"/>            | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/>            | Detritus                             |
| <input checked="" type="checkbox"/> | <input type="checkbox"/>            | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/>            | Artificial (rip-rap, concrete, etc.) |

11d. Yes No Are pools filled with sediment? (skip for Size 4 Coastal Plain streams and Tidal Marsh Streams)

**12. Aquatic Life – assessment reach metric (skip for Tidal Marsh Streams)**

- 12a.  Yes  No Was an in-stream aquatic life assessment performed as described in the User Manual?  
If No, select one of the following reasons and skip to Metric 13.  No Water  Other: \_\_\_\_\_
- 12b.  Yes  No Are aquatic organisms present in the assessment reach (look in riffles, pools, then snags)? If Yes, check all that apply. If No, skip to Metric 13.
- 1 >1 Numbers over columns refer to "individuals" for Size 1 and 2 streams and "taxa" for Size 3 and 4 streams.
- Adult frogs
  - Aquatic reptiles
  - Aquatic macrophytes and aquatic mosses (include liverworts, lichens, and algal mats)
  - Beetles
  - Caddisfly larvae (T)
  - Asian clam (*Corbicula*)
  - Crustacean (isopod/amphipod/crayfish/shrimp)
  - Damselfly and dragonfly larvae
  - Dipterans
  - Mayfly larvae (E)
  - Megaloptera (alderfly, fishfly, dobsonfly larvae)
  - Midges/mosquito larvae
  - Mosquito fish (*Gambusia*) or mud minnows (*Umbra pygmaea*)
  - Mussels/Clams (not *Corbicula*)
  - Other fish
  - Salamanders/tadpoles
  - Snails
  - Stonefly larvae (P)
  - Tipulid larvae
  - Worms/leeches

**13. Streamside Area Ground Surface Condition – streamside area metric (skip for Tidal Marsh Streams and B valley types)**

- Consider for the Left Bank (LB) and the Right Bank (RB).** Consider storage capacity with regard to both overbank flow and upland runoff.
- |                                       |                                       |  |
|---------------------------------------|---------------------------------------|--|
| LB                                    | RB                                    |  |
| <input checked="" type="checkbox"/> A | <input checked="" type="checkbox"/> A | Little or no alteration to water storage capacity over a majority of the streamside area   |
| <input type="checkbox"/> B            | <input type="checkbox"/> B            | Moderate alteration to water storage capacity over a majority of the streamside area   |
| <input type="checkbox"/> C            | <input type="checkbox"/> C            | Severe alteration to water storage capacity over a majority of the streamside area (examples: ditches, fill, soil compaction, livestock disturbance, buildings, man-made levees, drainage pipes) |

**14. Streamside Area Water Storage – streamside area metric (skip for Size 1 streams, Tidal Marsh Streams, and B valley types)**

- Consider for the Left Bank (LB) and the Right Bank (RB) of the streamside area.**
- |                                       |                                       |  |
|---------------------------------------|---------------------------------------|--|
| LB                                    | RB                                    |  |
| <input type="checkbox"/> A            | <input type="checkbox"/> A            | Majority of streamside area with depressions able to pond water ≥ 6 inches deep    |
| <input checked="" type="checkbox"/> B | <input checked="" type="checkbox"/> B | Majority of streamside area with depressions able to pond water 3 to 6 inches deep |
| <input type="checkbox"/> C            | <input type="checkbox"/> C            | Majority of streamside area with depressions able to pond water < 3 inches deep    |

**15. Wetland Presence – streamside area metric (skip for Tidal Marsh Streams)**

- Consider for the Left Bank (LB) and the Right Bank (RB).** Do not consider wetlands outside of the streamside area or within the normal wetted perimeter of assessment reach.
- |                                       |                                       |  |
|---------------------------------------|---------------------------------------|--|
| LB                                    | RB                                    |  |
| <input checked="" type="checkbox"/> Y | <input checked="" type="checkbox"/> Y | Are wetlands present in the streamside area? |
| <input type="checkbox"/> N            | <input type="checkbox"/> N            |  |

**16. Baseflow Contributors – assessment reach metric (skip for Size 4 streams and Tidal Marsh Streams)**

- Check all contributors within the assessment reach or within view of and draining to the assessment reach.**
- A Streams and/or springs (jurisdictional discharges)
  - B Ponds (include wet detention basins; do not include sediment basins or dry detention basins)
  - C Obstruction passing flow during low-flow periods within the assessment area (beaver dam, leaky dam, bottom-release dam, weir)
  - D Evidence of bank seepage or sweating (iron in water indicates seepage)
  - E Stream bed or bank soil reduced (dig through deposited sediment if present)
  - F None of the above

**17. Baseflow Detractors – assessment area metric (skip for Tidal Marsh Streams)**

- Check all that apply.**
- A Evidence of substantial water withdrawals from the assessment reach (includes areas excavated for pump installation)
  - B Obstruction not passing flow during low-flow periods affecting the assessment reach (ex: watertight dam, sediment deposit)
  - C Urban stream (≥ 24% impervious surface for watershed)
  - D Evidence that the streamside area has been modified resulting in accelerated drainage into the assessment reach
  - E Assessment reach relocated to valley edge
  - F None of the above

**18. Shading – assessment reach metric (skip for Tidal Marsh Streams)**

- Consider aspect. Consider "leaf-on" condition.
- A Stream shading is appropriate for stream category (may include gaps associated with natural processes)
  - B Degraded (example: scattered trees)
  - C Stream shading is gone or largely absent

**19. Buffer Width – streamside area metric (skip for Tidal Marsh Streams)**

Consider “vegetated buffer” and “wooded buffer” separately for left bank (LB) and right bank (RB) starting at the top of bank out to the first break.

Vegetated		Wooded		
LB	RB	LB	RB	
<input checked="" type="checkbox"/> A	<input checked="" type="checkbox"/> A	<input checked="" type="checkbox"/> A	<input checked="" type="checkbox"/> A	≥ 100 feet wide <u>or</u> extends to the edge of the watershed
<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	From 50 to < 100 feet wide
<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	From 30 to < 50 feet wide
<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D	From 10 to < 30 feet wide
<input type="checkbox"/> E	<input type="checkbox"/> E	<input type="checkbox"/> E	<input type="checkbox"/> E	< 10 feet wide <u>or</u> no trees

**20. Buffer Structure – streamside area metric (skip for Tidal Marsh Streams)**

Consider for left bank (LB) and right bank (RB) for Metric 19 (“Vegetated” Buffer Width).

LB	RB	
<input checked="" type="checkbox"/> A	<input checked="" type="checkbox"/> A	Mature forest
<input type="checkbox"/> B	<input type="checkbox"/> B	Non-mature woody vegetation <u>or</u> modified vegetation structure
<input type="checkbox"/> C	<input type="checkbox"/> C	Herbaceous vegetation with or without a strip of trees < 10 feet wide
<input type="checkbox"/> D	<input type="checkbox"/> D	Maintained shrubs
<input type="checkbox"/> E	<input type="checkbox"/> E	Little or no vegetation

**21. Buffer Stressors – streamside area metric (skip for Tidal Marsh Streams)**

Check all appropriate boxes for left bank (LB) and right bank (RB). Indicate if listed stressor abuts stream (Abuts), does not abut but is within 30 feet of stream (< 30 feet), or is between 30 to 50 feet of stream (30-50 feet).

If none of the following stressors occurs on either bank, check here and skip to Metric 22:

Abuts	< 30 feet		30-50 feet		
LB	RB	LB	RB	LB	RB
<input type="checkbox"/> A	<input checked="" type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A
<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B
<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C
<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D
					Row crops
					Maintained turf
					Pasture (no livestock)/commercial horticulture
					Pasture (active livestock use)

**22. Stem Density – streamside area metric (skip for Tidal Marsh Streams)**

Consider for left bank (LB) and right bank (RB) for Metric 19 (“Wooded” Buffer Width).

LB	RB	
<input checked="" type="checkbox"/> A	<input checked="" type="checkbox"/> A	Medium to high stem density
<input type="checkbox"/> B	<input type="checkbox"/> B	Low stem density
<input type="checkbox"/> C	<input type="checkbox"/> C	No wooded riparian buffer <u>or</u> predominantly herbaceous species <u>or</u> bare ground

**23. Continuity of Vegetated Buffer – streamside area metric (skip for Tidal Marsh Streams)**

Consider whether vegetated buffer is continuous along stream (parallel). Breaks are areas lacking vegetation > 10 feet wide.

LB	RB	
<input checked="" type="checkbox"/> A	<input checked="" type="checkbox"/> A	The total length of buffer breaks is < 25 percent.
<input type="checkbox"/> B	<input type="checkbox"/> B	The total length of buffer breaks is between 25 and 50 percent.
<input type="checkbox"/> C	<input type="checkbox"/> C	The total length of buffer breaks is > 50 percent.

**24. Vegetative Composition – streamside area metric (skip for Tidal Marsh Streams)**

Evaluate the dominant vegetation within 100 feet of each bank or to the edge of the watershed (whichever comes first) as it contributes to assessment reach habitat.

LB	RB	
<input checked="" type="checkbox"/> A	<input checked="" type="checkbox"/> A	Vegetation is close to undisturbed in species present and their proportions. Lower strata composed of native species, with non-native invasive species absent or sparse.
<input type="checkbox"/> B	<input type="checkbox"/> B	Vegetation indicates disturbance in terms of species diversity or proportions, but is still largely composed of native species. This may include communities of weedy native species that develop after clear-cutting or clearing <u>or</u> communities with non-native invasive species present, but not dominant, over a large portion of the expected strata <u>or</u> communities missing understory but retaining canopy trees.
<input type="checkbox"/> C	<input type="checkbox"/> C	Vegetation is severely disturbed in terms of species diversity or proportions. Mature canopy is absent <u>or</u> communities with non-native invasive species dominant over a large portion of expected strata <u>or</u> communities composed of planted stands of non-characteristic species <u>or</u> communities inappropriately composed of a single species <u>or</u> no vegetation.

**25. Conductivity – assessment reach metric (skip for all Coastal Plain streams)**

25a. Yes No Was conductivity measurement recorded?  
If No, select one of the following reasons. No Water Other: \_\_\_\_\_

25b. Check the box corresponding to the conductivity measurement (units of microsiemens per centimeter).  
A < 46 B 46 to < 67 C 67 to < 79 D 79 to < 230 E ≥ 230

Notes/Sketch:





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

Stream Site Name Casey Creek Mitigation Site Date of Assessment 11/14/2022  
 Stream Category la2 Assessor Name/Organization Wildlands Engineering

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

<b>Function Class Rating Summary</b>	<b>USACE/ All Streams</b>	<b>NCDWR Intermittent</b>
(1) Hydrology	<b>MEDIUM</b>	<b>HIGH</b>
(2) Baseflow	<b>LOW</b>	<b>HIGH</b>
(2) Flood Flow	<b>HIGH</b>	<b>HIGH</b>
(3) Streamside Area Attenuation	<b>HIGH</b>	<b>HIGH</b>
(4) Floodplain Access	<b>HIGH</b>	<b>HIGH</b>
(4) Wooded Riparian Buffer	<b>HIGH</b>	<b>HIGH</b>
(4) Microtopography	<b>MEDIUM</b>	<b>MEDIUM</b>
(3) Stream Stability	<b>HIGH</b>	<b>HIGH</b>
(4) Channel Stability	<b>HIGH</b>	<b>HIGH</b>
(4) Sediment Transport	<b>HIGH</b>	<b>HIGH</b>
(4) Stream Geomorphology	<b>HIGH</b>	<b>HIGH</b>
(2) Stream/Intertidal Zone Interaction	NA	NA
(2) Longitudinal Tidal Flow	NA	NA
(2) Tidal Marsh Stream Stability	NA	NA
(3) Tidal Marsh Channel Stability	NA	NA
(3) Tidal Marsh Stream Geomorphology	NA	NA
(1) Water Quality	<b>MEDIUM</b>	<b>HIGH</b>
(2) Baseflow	<b>LOW</b>	<b>HIGH</b>
(2) Streamside Area Vegetation	<b>HIGH</b>	<b>HIGH</b>
(3) Upland Pollutant Filtration	<b>HIGH</b>	<b>HIGH</b>
(3) Thermoregulation	<b>HIGH</b>	<b>HIGH</b>
(2) Indicators of Stressors	<b>NO</b>	<b>NO</b>
(2) Aquatic Life Tolerance	<b>OMITTED</b>	<b>NA</b>
(2) Intertidal Zone Filtration	NA	NA
(1) Habitat	<b>HIGH</b>	<b>HIGH</b>
(2) In-stream Habitat	<b>MEDIUM</b>	<b>HIGH</b>
(3) Baseflow	<b>LOW</b>	<b>HIGH</b>
(3) Substrate	<b>HIGH</b>	<b>HIGH</b>
(3) Stream Stability	<b>HIGH</b>	<b>HIGH</b>
(3) In-stream Habitat	<b>HIGH</b>	<b>HIGH</b>
(2) Stream-side Habitat	<b>HIGH</b>	<b>HIGH</b>
(3) Stream-side Habitat	<b>HIGH</b>	<b>HIGH</b>
(3) Thermoregulation	<b>HIGH</b>	<b>HIGH</b>
(2) Tidal Marsh In-stream Habitat	NA	NA
(3) Flow Restriction	NA	NA
(3) Tidal Marsh Stream Stability	NA	NA
(4) Tidal Marsh Channel Stability	NA	NA
(4) Tidal Marsh Stream Geomorphology	NA	NA
(3) Tidal Marsh In-stream Habitat	NA	NA
(2) Intertidal Zone	NA	NA
<b>Overall</b>	<b>MEDIUM</b>	<b>HIGH</b>

**NC SAM FIELD ASSESSMENT FORM**  
**Accompanies User Manual Version 2.1**

USACE AID #:	NCDWR #:
<p><b>INSTRUCTIONS:</b> Attach a sketch of the assessment area and photographs. Attach a copy of the USGS 7.5-minute topographic quadrangle, and circle the location of the stream reach under evaluation. If multiple stream reaches will be evaluated on the same property, identify and number all reaches on the attached map, and include a separate form for each reach. See the NC SAM User Manual for detailed descriptions and explanations of requested information. Record in the "Notes/Sketch" section if supplementary measurements were performed. See the NC SAM User Manual for examples of additional measurements that may be relevant.</p> <p><b>NOTE EVIDENCE OF STRESSORS AFFECTING THE ASSESSMENT AREA (do not need to be within the assessment area).</b></p> <p><b>PROJECT/SITE INFORMATION:</b></p>	
1. Project name (if any): <u>Casey Creek Mitigation Site</u>	2. Date of evaluation: <u>11/14/2022</u>
3. Applicant/owner name: <u>NC DMS</u>	4. Assessor name/organization: <u>Wildlands Engineering</u>
5. County: <u>Wayne</u>	6. Nearest named water body on USGS 7.5-minute quad: <u>Falling Creek</u>
7. River basin: <u>Neuse</u>	
8. Site coordinates (decimal degrees, at lower end of assessment reach): <u>35.293072, -78.184402</u>	
<b>STREAM INFORMATION: (depth and width can be approximations)</b>	
9. Site number (show on attached map): <u>Casey Reach 2</u>	10. Length of assessment reach evaluated (feet): <u>800</u>
11. Channel depth from bed (in riffle, if present) to top of bank (feet): <u>5</u>	<input type="checkbox"/> Unable to assess channel depth.
12. Channel width at top of bank (feet): <u>25</u>	13. Is assessment reach a swamp steam? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
14. Feature type: <input checked="" type="checkbox"/> Perennial flow <input type="checkbox"/> Intermittent flow <input type="checkbox"/> Tidal Marsh Stream	
<b>STREAM CATEGORY INFORMATION:</b>	
15. NC SAM Zone: <input type="checkbox"/> Mountains (M) <input type="checkbox"/> Piedmont (P) <input checked="" type="checkbox"/> Inner Coastal Plain (I) <input type="checkbox"/> Outer Coastal Plain (O)	
16. Estimated geomorphic valley shape (skip for Tidal Marsh Stream):	<input checked="" type="checkbox"/> A  (more sinuous stream, flatter valley slope) <input type="checkbox"/> B  (less sinuous stream, steeper valley slope)
17. Watershed size: (skip for Tidal Marsh Stream)	<input type="checkbox"/> Size 1 (< 0.1 mi <sup>2</sup> ) <input checked="" type="checkbox"/> Size 2 (0.1 to < 0.5 mi <sup>2</sup> ) <input type="checkbox"/> Size 3 (0.5 to < 5 mi <sup>2</sup> ) <input type="checkbox"/> Size 4 (≥ 5 mi <sup>2</sup> )
<b>ADDITIONAL INFORMATION:</b>	
18. Were regulatory considerations evaluated? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No If Yes, check all that apply to the assessment area.	
<input type="checkbox"/> Section 10 water	<input type="checkbox"/> Classified Trout Waters
<input type="checkbox"/> Essential Fish Habitat	<input type="checkbox"/> Primary Nursery Area
<input type="checkbox"/> Publicly owned property	<input checked="" type="checkbox"/> NCDWR Riparian buffer rule in effect
<input type="checkbox"/> Anadromous fish	<input type="checkbox"/> 303(d) List
<input type="checkbox"/> Documented presence of a federal and/or state listed protected species within the assessment area.	<input checked="" type="checkbox"/> Nutrient Sensitive Waters
List species: _____	<input type="checkbox"/> CAMA Area of Environmental Concern (AEC)
<input type="checkbox"/> Designated Critical Habitat (list species) _____	
19. Are additional stream information/supplementary measurements included in "Notes/Sketch" section or attached? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	

**1. Channel Water – assessment reach metric (skip for Size 1 streams and Tidal Marsh Streams)**

- A Water throughout assessment reach.
- B No flow, water in pools only.
- C No water in assessment reach.

**2. Evidence of Flow Restriction – assessment reach metric**

- A At least 10% of assessment reach in-stream habitat or riffle-pool sequence is severely affected by a flow restriction or fill to the point of obstructing flow or a channel choked with aquatic macrophytes or ponded water or impoundment on flood or ebb within the assessment reach (examples: undersized or perched culverts, causeways that constrict the channel, tidal gates, debris jams, beaver dams).
- B Not A

**3. Feature Pattern – assessment reach metric**

- A A majority of the assessment reach has altered pattern (examples: straightening, modification above or below culvert).
- B Not A

**4. Feature Longitudinal Profile – assessment reach metric**

- A Majority of assessment reach has a substantially altered stream profile (examples: channel down-cutting, existing damming, over widening, active aggradation, dredging, and excavation where appropriate channel profile has not reformed from any of these disturbances).
- B Not A

**5. Signs of Active Instability – assessment reach metric**

**Consider only current instability, not past events from which the stream has currently recovered.** Examples of instability include active bank failure, active channel down-cutting (head-cut), active widening, and artificial hardening (such as concrete, gabion, rip-rap).

- A < 10% of channel unstable
- B 10 to 25% of channel unstable
- C > 25% of channel unstable

6. Streamside Area Interaction – streamside area metric

Consider for the Left Bank (LB) and the Right Bank (RB).

- LB RB
A A Little or no evidence of conditions that adversely affect reference interaction
B B Moderate evidence of conditions (examples: berms, levees, down-cutting, aggradation, dredging) that adversely affect reference interaction
C C Extensive evidence of conditions that adversely affect reference interaction

7. Water Quality Stressors – assessment reach/intertidal zone metric

Check all that apply.

- A Discolored water in stream or intertidal zone (milky white, blue, unnatural water discoloration, oil sheen, stream foam)
B Excessive sedimentation (burying of stream features or intertidal zone)
C Noticeable evidence of pollutant discharges entering the assessment reach and causing a water quality problem
D Odor (not including natural sulfide odors)
E Current published or collected data indicating degraded water quality in the assessment reach. Cite source in "Notes/Sketch" section.
F Livestock with access to stream or intertidal zone
G Excessive algae in stream or intertidal zone
H Degraded marsh vegetation in the intertidal zone (removal, burning, regular mowing, destruction, etc)
I Other: (explain in "Notes/Sketch" section)
J Little to no stressors

8. Recent Weather – watershed metric (skip for Tidal Marsh Streams)

For Size 1 or 2 streams, D1 drought or higher is considered a drought; for Size 3 or 4 streams, D2 drought or higher is considered a drought.

- A Drought conditions and no rainfall or rainfall not exceeding 1 inch within the last 48 hours
B Drought conditions and rainfall exceeding 1 inch within the last 48 hours
C No drought conditions

9. Large or Dangerous Stream – assessment reach metric

Yes No Is stream is too large or dangerous to assess? If Yes, skip to Metric 13 (Streamside Area Ground Surface Condition).

10. Natural In-stream Habitat Types – assessment reach metric

10a. Yes No Degraded in-stream habitat over majority of the assessment reach (examples of stressors include excessive sedimentation, mining, excavation, in-stream hardening [for example, rip-rap], recent dredging, and snagging) (evaluate for Size 4 Coastal Plain streams only, then skip to Metric 12)

10b. Check all that occur (occurs if > 5% coverage of assessment reach) (skip for Size 4 Coastal Plain streams)

- A Multiple aquatic macrophytes and aquatic mosses (include liverworts, lichens, and algal mats)
B Multiple sticks and/or leaf packs and/or emergent vegetation
C Multiple snags and logs (including lap trees)
D 5% undercut banks and/or root mats and/or roots in banks extend to the normal wetted perimeter
E Little or no habitat
F 5% oysters or other natural hard bottoms
G Submerged aquatic vegetation
H Low-tide refugia (pools)
I Sand bottom
J 5% vertical bank along the marsh
K Little or no habitat

\*\*\*\*\*REMAINING QUESTIONS ARE NOT APPLICABLE FOR TIDAL MARSH STREAMS\*\*\*\*\*

11. Bedform and Substrate – assessment reach metric (skip for Size 4 Coastal Plain streams and Tidal Marsh Streams)

11a. Yes No Is assessment reach in a natural sand-bed stream? (skip for Coastal Plain streams)

11b. Bedform evaluated. Check the appropriate box(es).

- A Riffle-run section (evaluate 11c)
B Pool-glide section (evaluate 11d)
C Natural bedform absent (skip to Metric 12, Aquatic Life)

11c. In riffle sections, check all that occur below the normal wetted perimeter of the assessment reach – whether or not submerged. Check at least one box in each row (skip for Size 4 Coastal Plain streams and Tidal Marsh Streams). Not Present (NP) = absent, Rare (R) = present but <= 10%, Common (C) = > 10-40%, Abundant (A) = > 40-70%, Predominant (P) = > 70%. Cumulative percentages should not exceed 100% for each assessment reach.

Table with 5 columns (NP, R, C, A, P) and 7 rows of habitat types: Bedrock/saprolite, Boulder (256 – 4096 mm), Cobble (64 – 256 mm), Gravel (2 – 64 mm), Sand (.062 – 2 mm), Silt/clay (< 0.062 mm), Detritus, Artificial (rip-rap, concrete, etc.)

11d. Yes No Are pools filled with sediment? (skip for Size 4 Coastal Plain streams and Tidal Marsh Streams)

**12. Aquatic Life – assessment reach metric (skip for Tidal Marsh Streams)**

12a.  Yes  No Was an in-stream aquatic life assessment performed as described in the User Manual?  
If No, select one of the following reasons and skip to Metric 13.  No Water  Other: \_\_\_\_\_

12b.  Yes  No Are aquatic organisms present in the assessment reach (look in riffles, pools, then snags)? If Yes, check all that apply. If No, skip to Metric 13.

- 1 >1 Numbers over columns refer to "individuals" for Size 1 and 2 streams and "taxa" for Size 3 and 4 streams.
- Adult frogs
  - Aquatic reptiles
  - Aquatic macrophytes and aquatic mosses (include liverworts, lichens, and algal mats)
  - Beetles
  - Caddisfly larvae (T)
  - Asian clam (*Corbicula*)
  - Crustacean (isopod/amphipod/crayfish/shrimp)
  - Damselfly and dragonfly larvae
  - Dipterans
  - Mayfly larvae (E)
  - Megaloptera (alderfly, fishfly, dobsonfly larvae)
  - Midges/mosquito larvae
  - Mosquito fish (*Gambusia*) or mud minnows (*Umbra pygmaea*)
  - Mussels/Clams (not *Corbicula*)
  - Other fish
  - Salamanders/tadpoles
  - Snails
  - Stonefly larvae (P)
  - Tipulid larvae
  - Worms/leeches

**13. Streamside Area Ground Surface Condition – streamside area metric (skip for Tidal Marsh Streams and B valley types)**

Consider for the Left Bank (LB) and the Right Bank (RB). Consider storage capacity with regard to both overbank flow and upland runoff.

- | LB                                    | RB                                    |  |
|---------------------------------------|---------------------------------------|--|
| <input type="checkbox"/> A            | <input type="checkbox"/> A            | Little or no alteration to water storage capacity over a majority of the streamside area   |
| <input type="checkbox"/> B            | <input type="checkbox"/> B            | Moderate alteration to water storage capacity over a majority of the streamside area   |
| <input checked="" type="checkbox"/> C | <input checked="" type="checkbox"/> C | Severe alteration to water storage capacity over a majority of the streamside area (examples: ditches, fill, soil compaction, livestock disturbance, buildings, man-made levees, drainage pipes) |

**14. Streamside Area Water Storage – streamside area metric (skip for Size 1 streams, Tidal Marsh Streams, and B valley types)**

Consider for the Left Bank (LB) and the Right Bank (RB) of the streamside area.

- | LB                                    | RB                                    |  |
|---------------------------------------|---------------------------------------|--|
| <input type="checkbox"/> A            | <input type="checkbox"/> A            | Majority of streamside area with depressions able to pond water $\geq$ 6 inches deep |
| <input type="checkbox"/> B            | <input type="checkbox"/> B            | Majority of streamside area with depressions able to pond water 3 to 6 inches deep   |
| <input checked="" type="checkbox"/> C | <input checked="" type="checkbox"/> C | Majority of streamside area with depressions able to pond water < 3 inches deep      |

**15. Wetland Presence – streamside area metric (skip for Tidal Marsh Streams)**

Consider for the Left Bank (LB) and the Right Bank (RB). Do not consider wetlands outside of the streamside area or within the normal wetted perimeter of assessment reach.

- | LB                                    | RB                                    |  |
|---------------------------------------|---------------------------------------|--|
| <input type="checkbox"/> Y            | <input type="checkbox"/> Y            | Are wetlands present in the streamside area? |
| <input checked="" type="checkbox"/> N | <input checked="" type="checkbox"/> N |  |

**16. Baseflow Contributors – assessment reach metric (skip for Size 4 streams and Tidal Marsh Streams)**

Check all contributors within the assessment reach or within view of and draining to the assessment reach.

- A Streams and/or springs (jurisdictional discharges)
- B Ponds (include wet detention basins; do not include sediment basins or dry detention basins)
- C Obstruction passing flow during low-flow periods within the assessment area (beaver dam, leaky dam, bottom-release dam, weir)
- D Evidence of bank seepage or sweating (iron in water indicates seepage)
- E Stream bed or bank soil reduced (dig through deposited sediment if present)
- F None of the above

**17. Baseflow Detractors – assessment area metric (skip for Tidal Marsh Streams)**

Check all that apply.

- A Evidence of substantial water withdrawals from the assessment reach (includes areas excavated for pump installation)
- B Obstruction not passing flow during low-flow periods affecting the assessment reach (ex: watertight dam, sediment deposit)
- C Urban stream ( $\geq$  24% impervious surface for watershed)
- D Evidence that the streamside area has been modified resulting in accelerated drainage into the assessment reach
- E Assessment reach relocated to valley edge
- F None of the above

**18. Shading – assessment reach metric (skip for Tidal Marsh Streams)**

Consider aspect. Consider "leaf-on" condition.

- A Stream shading is appropriate for stream category (may include gaps associated with natural processes)
- B Degraded (example: scattered trees)
- C Stream shading is gone or largely absent

**19. Buffer Width – streamside area metric (skip for Tidal Marsh Streams)**

Consider “vegetated buffer” and “wooded buffer” separately for left bank (LB) and right bank (RB) starting at the top of bank out to the first break.

Vegetated		Wooded		
LB	RB	LB	RB	
<input type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A	≥ 100 feet wide <u>or</u> extends to the edge of the watershed
<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	From 50 to < 100 feet wide
<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	From 30 to < 50 feet wide
<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D	From 10 to < 30 feet wide
<input checked="" type="checkbox"/> E	<input checked="" type="checkbox"/> E	<input checked="" type="checkbox"/> E	<input checked="" type="checkbox"/> E	< 10 feet wide <u>or</u> no trees

**20. Buffer Structure – streamside area metric (skip for Tidal Marsh Streams)**

Consider for left bank (LB) and right bank (RB) for Metric 19 (“Vegetated” Buffer Width).

LB	RB	
<input type="checkbox"/> A	<input type="checkbox"/> A	Mature forest
<input type="checkbox"/> B	<input type="checkbox"/> B	Non-mature woody vegetation <u>or</u> modified vegetation structure
<input type="checkbox"/> C	<input type="checkbox"/> C	Herbaceous vegetation with or without a strip of trees < 10 feet wide
<input type="checkbox"/> D	<input type="checkbox"/> D	Maintained shrubs
<input checked="" type="checkbox"/> E	<input checked="" type="checkbox"/> E	Little or no vegetation

**21. Buffer Stressors – streamside area metric (skip for Tidal Marsh Streams)**

Check all appropriate boxes for left bank (LB) and right bank (RB). Indicate if listed stressor abuts stream (Abuts), does not abut but is within 30 feet of stream (< 30 feet), or is between 30 to 50 feet of stream (30-50 feet).

If none of the following stressors occurs on either bank, check here and skip to Metric 22:

Abuts		< 30 feet		30-50 feet		
LB	RB	LB	RB	LB	RB	
<input checked="" type="checkbox"/> A	<input checked="" type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A	Row crops
<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	Maintained turf
<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	Pasture (no livestock)/commercial horticulture
<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D	Pasture (active livestock use)

**22. Stem Density – streamside area metric (skip for Tidal Marsh Streams)**

Consider for left bank (LB) and right bank (RB) for Metric 19 (“Wooded” Buffer Width).

LB	RB	
<input type="checkbox"/> A	<input type="checkbox"/> A	Medium to high stem density
<input type="checkbox"/> B	<input type="checkbox"/> B	Low stem density
<input checked="" type="checkbox"/> C	<input checked="" type="checkbox"/> C	No wooded riparian buffer <u>or</u> predominantly herbaceous species <u>or</u> bare ground

**23. Continuity of Vegetated Buffer – streamside area metric (skip for Tidal Marsh Streams)**

Consider whether vegetated buffer is continuous along stream (parallel). Breaks are areas lacking vegetation > 10 feet wide.

LB	RB	
<input type="checkbox"/> A	<input type="checkbox"/> A	The total length of buffer breaks is < 25 percent.
<input type="checkbox"/> B	<input type="checkbox"/> B	The total length of buffer breaks is between 25 and 50 percent.
<input checked="" type="checkbox"/> C	<input checked="" type="checkbox"/> C	The total length of buffer breaks is > 50 percent.

**24. Vegetative Composition – streamside area metric (skip for Tidal Marsh Streams)**

Evaluate the dominant vegetation within 100 feet of each bank or to the edge of the watershed (whichever comes first) as it contributes to assessment reach habitat.

LB	RB	
<input type="checkbox"/> A	<input type="checkbox"/> A	Vegetation is close to undisturbed in species present and their proportions. Lower strata composed of native species, with non-native invasive species absent or sparse.
<input type="checkbox"/> B	<input type="checkbox"/> B	Vegetation indicates disturbance in terms of species diversity or proportions, but is still largely composed of native species. This may include communities of weedy native species that develop after clear-cutting or clearing <u>or</u> communities with non-native invasive species present, but not dominant, over a large portion of the expected strata <u>or</u> communities missing understory but retaining canopy trees.
<input checked="" type="checkbox"/> C	<input checked="" type="checkbox"/> C	Vegetation is severely disturbed in terms of species diversity or proportions. Mature canopy is absent <u>or</u> communities with non-native invasive species dominant over a large portion of expected strata <u>or</u> communities composed of planted stands of non-characteristic species <u>or</u> communities inappropriately composed of a single species <u>or</u> no vegetation.

**25. Conductivity – assessment reach metric (skip for all Coastal Plain streams)**

25a. Yes No Was conductivity measurement recorded?  
If No, select one of the following reasons. No Water Other: \_\_\_\_\_

25b. Check the box corresponding to the conductivity measurement (units of microsiemens per centimeter).  
A < 46 B 46 to < 67 C 67 to < 79 D 79 to < 230 E ≥ 230

Notes/Sketch:



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

Stream Site Name Casey Creek Mitigation Site Date of Assessment 11/14/2022  
 Stream Category la2 Assessor Name/Organization Wildlands Engineering

Notes of Field Assessment Form (Y/N) NO  
 Presence of regulatory considerations (Y/N) YES  
 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>LOW</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>MEDIUM</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>LOW</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	NA	
<b>Overall</b>	<b>LOW</b>	

**NC SAM FIELD ASSESSMENT FORM**  
**Accompanies User Manual Version 2.1**

USACE AID #:	NCDWR #:		
<p><b>INSTRUCTIONS:</b> Attach a sketch of the assessment area and photographs. Attach a copy of the USGS 7.5-minute topographic quadrangle, and circle the location of the stream reach under evaluation. If multiple stream reaches will be evaluated on the same property, identify and number all reaches on the attached map, and include a separate form for each reach. See the NC SAM User Manual for detailed descriptions and explanations of requested information. Record in the "Notes/Sketch" section if supplementary measurements were performed. See the NC SAM User Manual for examples of additional measurements that may be relevant.</p> <p><b>NOTE EVIDENCE OF STRESSORS AFFECTING THE ASSESSMENT AREA (do not need to be within the assessment area).</b></p> <p><b>PROJECT/SITE INFORMATION:</b></p>			
1. Project name (if any):	<u>Casey Creek Mitigation Site</u>	2. Date of evaluation:	<u>11/14/2022</u>
3. Applicant/owner name:	<u>NC DMS</u>	4. Assessor name/organization:	<u>Wildlands Engineering</u>
5. County:	<u>Wayne</u>	6. Nearest named water body	
7. River basin:	<u>Neuse</u>	on USGS 7.5-minute quad:	<u>Falling Creek</u>
8. Site coordinates (decimal degrees, at lower end of assessment reach):	<u>35.291161, -78.184640</u>		
<b>STREAM INFORMATION: (depth and width can be approximations)</b>			
9. Site number (show on attached map):	<u>Casey Reach 3</u>	10. Length of assessment reach evaluated (feet):	<u>600</u>
11. Channel depth from bed (in riffle, if present) to top of bank (feet):	<u>5</u>	<input type="checkbox"/> Unable to assess channel depth.	
12. Channel width at top of bank (feet):	<u>15</u>	13. Is assessment reach a swamp steam?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
14. Feature type:	<input checked="" type="checkbox"/> Perennial flow <input type="checkbox"/> Intermittent flow <input type="checkbox"/> Tidal Marsh Stream		
<b>STREAM CATEGORY INFORMATION:</b>			
15. NC SAM Zone:	<input type="checkbox"/> Mountains (M) <input type="checkbox"/> Piedmont (P) <input checked="" type="checkbox"/> Inner Coastal Plain (I) <input type="checkbox"/> Outer Coastal Plain (O)		
16. Estimated geomorphic valley shape (skip for Tidal Marsh Stream):	<input checked="" type="checkbox"/> A  (more sinuous stream, flatter valley slope)	<input type="checkbox"/> B  (less sinuous stream, steeper valley slope)	
17. Watershed size: (skip for Tidal Marsh Stream)	<input type="checkbox"/> Size 1 (< 0.1 mi <sup>2</sup> ) <input checked="" type="checkbox"/> Size 2 (0.1 to < 0.5 mi <sup>2</sup> ) <input type="checkbox"/> Size 3 (0.5 to < 5 mi <sup>2</sup> ) <input type="checkbox"/> Size 4 (≥ 5 mi <sup>2</sup> )		
<b>ADDITIONAL INFORMATION:</b>			
18. Were regulatory considerations evaluated? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No If Yes, check all that apply to the assessment area.			
<input type="checkbox"/> Section 10 water	<input type="checkbox"/> Classified Trout Waters	<input type="checkbox"/> Water Supply Watershed ( <input type="checkbox"/> I <input type="checkbox"/> II <input type="checkbox"/> III <input type="checkbox"/> IV <input type="checkbox"/> V)	
<input type="checkbox"/> Essential Fish Habitat	<input type="checkbox"/> Primary Nursery Area	<input type="checkbox"/> High Quality Waters/Outstanding Resource Waters	
<input type="checkbox"/> Publicly owned property	<input checked="" type="checkbox"/> NCDWR Riparian buffer rule in effect	<input checked="" type="checkbox"/> Nutrient Sensitive Waters	
<input type="checkbox"/> Anadromous fish	<input type="checkbox"/> 303(d) List	<input type="checkbox"/> CAMA Area of Environmental Concern (AEC)	
<input type="checkbox"/> Documented presence of a federal and/or state listed protected species within the assessment area.			
List species: _____			
<input type="checkbox"/> Designated Critical Habitat (list species) _____			
19. Are additional stream information/supplementary measurements included in "Notes/Sketch" section or attached? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No			

**1. Channel Water – assessment reach metric (skip for Size 1 streams and Tidal Marsh Streams)**

- A Water throughout assessment reach.
- B No flow, water in pools only.
- C No water in assessment reach.

**2. Evidence of Flow Restriction – assessment reach metric**

- A At least 10% of assessment reach in-stream habitat or riffle-pool sequence is severely affected by a flow restriction or fill to the point of obstructing flow or a channel choked with aquatic macrophytes or ponded water or impoundment on flood or ebb within the assessment reach (examples: undersized or perched culverts, causeways that constrict the channel, tidal gates, debris jams, beaver dams).
- B Not A

**3. Feature Pattern – assessment reach metric**

- A A majority of the assessment reach has altered pattern (examples: straightening, modification above or below culvert).
- B Not A

**4. Feature Longitudinal Profile – assessment reach metric**

- A Majority of assessment reach has a substantially altered stream profile (examples: channel down-cutting, existing damming, over widening, active aggradation, dredging, and excavation where appropriate channel profile has not reformed from any of these disturbances).
- B Not A

**5. Signs of Active Instability – assessment reach metric**

**Consider only current instability, not past events from which the stream has currently recovered.** Examples of instability include active bank failure, active channel down-cutting (head-cut), active widening, and artificial hardening (such as concrete, gabion, rip-rap).

- A < 10% of channel unstable
- B 10 to 25% of channel unstable
- C > 25% of channel unstable

6. Streamside Area Interaction – streamside area metric

Consider for the Left Bank (LB) and the Right Bank (RB).

- LB RB
A A Little or no evidence of conditions that adversely affect reference interaction
B B Moderate evidence of conditions (examples: berms, levees, down-cutting, aggradation, dredging) that adversely affect reference interaction
C C Extensive evidence of conditions that adversely affect reference interaction

7. Water Quality Stressors – assessment reach/intertidal zone metric

Check all that apply.

- A Discolored water in stream or intertidal zone (milky white, blue, unnatural water discoloration, oil sheen, stream foam)
B Excessive sedimentation (burying of stream features or intertidal zone)
C Noticeable evidence of pollutant discharges entering the assessment reach and causing a water quality problem
D Odor (not including natural sulfide odors)
E Current published or collected data indicating degraded water quality in the assessment reach. Cite source in "Notes/Sketch" section.
F Livestock with access to stream or intertidal zone
G Excessive algae in stream or intertidal zone
H Degraded marsh vegetation in the intertidal zone (removal, burning, regular mowing, destruction, etc)
I Other: (explain in "Notes/Sketch" section)
J Little to no stressors

8. Recent Weather – watershed metric (skip for Tidal Marsh Streams)

For Size 1 or 2 streams, D1 drought or higher is considered a drought; for Size 3 or 4 streams, D2 drought or higher is considered a drought.

- A Drought conditions and no rainfall or rainfall not exceeding 1 inch within the last 48 hours
B Drought conditions and rainfall exceeding 1 inch within the last 48 hours
C No drought conditions

9. Large or Dangerous Stream – assessment reach metric

Yes No Is stream is too large or dangerous to assess? If Yes, skip to Metric 13 (Streamside Area Ground Surface Condition).

10. Natural In-stream Habitat Types – assessment reach metric

10a. Yes No Degraded in-stream habitat over majority of the assessment reach (examples of stressors include excessive sedimentation, mining, excavation, in-stream hardening [for example, rip-rap], recent dredging, and snagging) (evaluate for Size 4 Coastal Plain streams only, then skip to Metric 12)

10b. Check all that occur (occurs if > 5% coverage of assessment reach) (skip for Size 4 Coastal Plain streams)

- A Multiple aquatic macrophytes and aquatic mosses (include liverworts, lichens, and algal mats)
B Multiple sticks and/or leaf packs and/or emergent vegetation
C Multiple snags and logs (including lap trees)
D 5% undercut banks and/or root mats and/or roots in banks extend to the normal wetted perimeter
E Little or no habitat
F 5% oysters or other natural hard bottoms
G Submerged aquatic vegetation
H Low-tide refugia (pools)
I Sand bottom
J 5% vertical bank along the marsh
K Little or no habitat

\*\*\*\*\*REMAINING QUESTIONS ARE NOT APPLICABLE FOR TIDAL MARSH STREAMS\*\*\*\*\*

11. Bedform and Substrate – assessment reach metric (skip for Size 4 Coastal Plain streams and Tidal Marsh Streams)

11a. Yes No Is assessment reach in a natural sand-bed stream? (skip for Coastal Plain streams)

11b. Bedform evaluated. Check the appropriate box(es).

- A Riffle-run section (evaluate 11c)
B Pool-glide section (evaluate 11d)
C Natural bedform absent (skip to Metric 12, Aquatic Life)

11c. In riffle sections, check all that occur below the normal wetted perimeter of the assessment reach – whether or not submerged. Check at least one box in each row (skip for Size 4 Coastal Plain streams and Tidal Marsh Streams). Not Present (NP) = absent, Rare (R) = present but <= 10%, Common (C) = > 10-40%, Abundant (A) = > 40-70%, Predominant (P) = > 70%. Cumulative percentages should not exceed 100% for each assessment reach.

Table with 5 columns: NP, R, C, A, P and rows for Bedrock/saprolite, Boulder (256 – 4096 mm), Cobble (64 – 256 mm), Gravel (2 – 64 mm), Sand (.062 – 2 mm), Silt/clay (< 0.062 mm), Detritus, Artificial (rip-rap, concrete, etc.)

11d. Yes No Are pools filled with sediment? (skip for Size 4 Coastal Plain streams and Tidal Marsh Streams)



**12. Aquatic Life – assessment reach metric (skip for Tidal Marsh Streams)**

12a.  Yes  No Was an in-stream aquatic life assessment performed as described in the User Manual?

If No, select one of the following reasons and skip to Metric 13.  No Water  Other: \_\_\_\_\_

12b.  Yes  No Are aquatic organisms present in the assessment reach (look in riffles, pools, then snags)? If Yes, check all that apply. If No, skip to Metric 13.

1 >1 Numbers over columns refer to "individuals" for Size 1 and 2 streams and "taxa" for Size 3 and 4 streams.

- Adult frogs
- Aquatic reptiles
- Aquatic macrophytes and aquatic mosses (include liverworts, lichens, and algal mats)
- Beetles
- Caddisfly larvae (T)
- Asian clam (*Corbicula*)
- Crustacean (isopod/amphipod/crayfish/shrimp)
- Damselfly and dragonfly larvae
- Dipterans
- Mayfly larvae (E)
- Megaloptera (alderfly, fishfly, dobsonfly larvae)
- Midges/mosquito larvae
- Mosquito fish (*Gambusia*) or mud minnows (*Umbra pygmaea*)
- Mussels/Clams (not *Corbicula*)
- Other fish
- Salamanders/tadpoles
- Snails
- Stonefly larvae (P)
- Tipulid larvae
- Worms/leeches

**13. Streamside Area Ground Surface Condition – streamside area metric (skip for Tidal Marsh Streams and B valley types)**

**Consider for the Left Bank (LB) and the Right Bank (RB).** Consider storage capacity with regard to both overbank flow and upland runoff.

- | LB                                    | RB                                    |  |
|---------------------------------------|---------------------------------------|--|
| <input type="checkbox"/> A            | <input type="checkbox"/> A            | Little or no alteration to water storage capacity over a majority of the streamside area   |
| <input type="checkbox"/> B            | <input type="checkbox"/> B            | Moderate alteration to water storage capacity over a majority of the streamside area   |
| <input checked="" type="checkbox"/> C | <input checked="" type="checkbox"/> C | Severe alteration to water storage capacity over a majority of the streamside area (examples: ditches, fill, soil compaction, livestock disturbance, buildings, man-made levees, drainage pipes) |

**14. Streamside Area Water Storage – streamside area metric (skip for Size 1 streams, Tidal Marsh Streams, and B valley types)**

**Consider for the Left Bank (LB) and the Right Bank (RB) of the streamside area.**

- | LB                                    | RB                                    |  |
|---------------------------------------|---------------------------------------|--|
| <input type="checkbox"/> A            | <input type="checkbox"/> A            | Majority of streamside area with depressions able to pond water $\geq$ 6 inches deep |
| <input type="checkbox"/> B            | <input type="checkbox"/> B            | Majority of streamside area with depressions able to pond water 3 to 6 inches deep   |
| <input checked="" type="checkbox"/> C | <input checked="" type="checkbox"/> C | Majority of streamside area with depressions able to pond water < 3 inches deep      |

**15. Wetland Presence – streamside area metric (skip for Tidal Marsh Streams)**

**Consider for the Left Bank (LB) and the Right Bank (RB).** Do not consider wetlands outside of the streamside area or within the normal wetted perimeter of assessment reach.

- | LB                                    | RB                                    |  |
|---------------------------------------|---------------------------------------|--|
| <input type="checkbox"/> Y            | <input type="checkbox"/> Y            | Are wetlands present in the streamside area? |
| <input checked="" type="checkbox"/> N | <input checked="" type="checkbox"/> N |  |

**16. Baseflow Contributors – assessment reach metric (skip for Size 4 streams and Tidal Marsh Streams)**

**Check all contributors within the assessment reach or within view of and draining to the assessment reach.**

- A Streams and/or springs (jurisdictional discharges)
- B Ponds (include wet detention basins; do not include sediment basins or dry detention basins)
- C Obstruction passing flow during low-flow periods within the assessment area (beaver dam, leaky dam, bottom-release dam, weir)
- D Evidence of bank seepage or sweating (iron in water indicates seepage)
- E Stream bed or bank soil reduced (dig through deposited sediment if present)
- F None of the above

**17. Baseflow Detractors – assessment area metric (skip for Tidal Marsh Streams)**

**Check all that apply.**

- A Evidence of substantial water withdrawals from the assessment reach (includes areas excavated for pump installation)
- B Obstruction not passing flow during low-flow periods affecting the assessment reach (ex: watertight dam, sediment deposit)
- C Urban stream ( $\geq$  24% impervious surface for watershed)
- D Evidence that the streamside area has been modified resulting in accelerated drainage into the assessment reach
- E Assessment reach relocated to valley edge
- F None of the above

**18. Shading – assessment reach metric (skip for Tidal Marsh Streams)**

Consider aspect. Consider "leaf-on" condition.

- A Stream shading is appropriate for stream category (may include gaps associated with natural processes)
- B Degraded (example: scattered trees)
- C Stream shading is gone or largely absent

**19. Buffer Width – streamside area metric (skip for Tidal Marsh Streams)**

Consider “vegetated buffer” and “wooded buffer” separately for left bank (LB) and right bank (RB) starting at the top of bank out to the first break.

Vegetated		Wooded		
LB	RB	LB	RB	
<input type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A	≥ 100 feet wide <u>or</u> extends to the edge of the watershed
<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	From 50 to < 100 feet wide
<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	From 30 to < 50 feet wide
<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D	From 10 to < 30 feet wide
<input checked="" type="checkbox"/> E	<input checked="" type="checkbox"/> E	<input checked="" type="checkbox"/> E	<input checked="" type="checkbox"/> E	< 10 feet wide <u>or</u> no trees

**20. Buffer Structure – streamside area metric (skip for Tidal Marsh Streams)**

Consider for left bank (LB) and right bank (RB) for Metric 19 (“Vegetated” Buffer Width).

LB	RB	
<input type="checkbox"/> A	<input type="checkbox"/> A	Mature forest
<input type="checkbox"/> B	<input type="checkbox"/> B	Non-mature woody vegetation <u>or</u> modified vegetation structure
<input type="checkbox"/> C	<input type="checkbox"/> C	Herbaceous vegetation with or without a strip of trees < 10 feet wide
<input type="checkbox"/> D	<input type="checkbox"/> D	Maintained shrubs
<input checked="" type="checkbox"/> E	<input checked="" type="checkbox"/> E	Little or no vegetation

**21. Buffer Stressors – streamside area metric (skip for Tidal Marsh Streams)**

Check all appropriate boxes for left bank (LB) and right bank (RB). Indicate if listed stressor abuts stream (Abuts), does not abut but is within 30 feet of stream (< 30 feet), or is between 30 to 50 feet of stream (30-50 feet).

If none of the following stressors occurs on either bank, check here and skip to Metric 22:

Abuts		< 30 feet		30-50 feet		
LB	RB	LB	RB	LB	RB	
<input checked="" type="checkbox"/> A	<input checked="" type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A	Row crops
<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	Maintained turf
<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	Pasture (no livestock)/commercial horticulture
<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D	Pasture (active livestock use)

**22. Stem Density – streamside area metric (skip for Tidal Marsh Streams)**

Consider for left bank (LB) and right bank (RB) for Metric 19 (“Wooded” Buffer Width).

LB	RB	
<input type="checkbox"/> A	<input type="checkbox"/> A	Medium to high stem density
<input type="checkbox"/> B	<input type="checkbox"/> B	Low stem density
<input checked="" type="checkbox"/> C	<input checked="" type="checkbox"/> C	No wooded riparian buffer <u>or</u> predominantly herbaceous species <u>or</u> bare ground

**23. Continuity of Vegetated Buffer – streamside area metric (skip for Tidal Marsh Streams)**

Consider whether vegetated buffer is continuous along stream (parallel). Breaks are areas lacking vegetation > 10 feet wide.

LB	RB	
<input type="checkbox"/> A	<input type="checkbox"/> A	The total length of buffer breaks is < 25 percent.
<input type="checkbox"/> B	<input type="checkbox"/> B	The total length of buffer breaks is between 25 and 50 percent.
<input checked="" type="checkbox"/> C	<input checked="" type="checkbox"/> C	The total length of buffer breaks is > 50 percent.

**24. Vegetative Composition – streamside area metric (skip for Tidal Marsh Streams)**

Evaluate the dominant vegetation within 100 feet of each bank or to the edge of the watershed (whichever comes first) as it contributes to assessment reach habitat.

LB	RB	
<input type="checkbox"/> A	<input type="checkbox"/> A	Vegetation is close to undisturbed in species present and their proportions. Lower strata composed of native species, with non-native invasive species absent or sparse.
<input type="checkbox"/> B	<input type="checkbox"/> B	Vegetation indicates disturbance in terms of species diversity or proportions, but is still largely composed of native species. This may include communities of weedy native species that develop after clear-cutting or clearing <u>or</u> communities with non-native invasive species present, but not dominant, over a large portion of the expected strata <u>or</u> communities missing understory but retaining canopy trees.
<input checked="" type="checkbox"/> C	<input checked="" type="checkbox"/> C	Vegetation is severely disturbed in terms of species diversity or proportions. Mature canopy is absent <u>or</u> communities with non-native invasive species dominant over a large portion of expected strata <u>or</u> communities composed of planted stands of non-characteristic species <u>or</u> communities inappropriately composed of a single species <u>or</u> no vegetation.

**25. Conductivity – assessment reach metric (skip for all Coastal Plain streams)**

25a. Yes No Was conductivity measurement recorded?  
If No, select one of the following reasons. No Water Other: \_\_\_\_\_

25b. Check the box corresponding to the conductivity measurement (units of microsiemens per centimeter).  
A < 46 B 46 to < 67 C 67 to < 79 D 79 to < 230 E ≥ 230

Notes/Sketch:



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

Stream Site Name Casey Creek Mitigation Site Date of Assessment 11/14/2022  
 Stream Category la2 Assessor Name/Organization Wildlands Engineering

Notes of Field Assessment Form (Y/N) NO  
 Presence of regulatory considerations (Y/N) YES  
 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>LOW</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>MEDIUM</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>LOW</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	NA	
<b>Overall</b>	<b>LOW</b>	

**NC SAM FIELD ASSESSMENT FORM**  
**Accompanies User Manual Version 2.1**

USACE AID #:	NCDWR #:
<p><b>INSTRUCTIONS:</b> Attach a sketch of the assessment area and photographs. Attach a copy of the USGS 7.5-minute topographic quadrangle, and circle the location of the stream reach under evaluation. If multiple stream reaches will be evaluated on the same property, identify and number all reaches on the attached map, and include a separate form for each reach. See the NC SAM User Manual for detailed descriptions and explanations of requested information. Record in the "Notes/Sketch" section if supplementary measurements were performed. See the NC SAM User Manual for examples of additional measurements that may be relevant.</p> <p><b>NOTE EVIDENCE OF STRESSORS AFFECTING THE ASSESSMENT AREA (do not need to be within the assessment area).</b></p> <p><b>PROJECT/SITE INFORMATION:</b></p>	
1. Project name (if any): <u>Casey Creek Mitigation Site</u>	2. Date of evaluation: <u>11/14/2022</u>
3. Applicant/owner name: <u>NC DMS</u>	4. Assessor name/organization: <u>Wildlands Engineering</u>
5. County: <u>Wayne</u>	6. Nearest named water body on USGS 7.5-minute quad: <u>Falling Creek</u>
7. River basin: <u>Neuse</u>	
8. Site coordinates (decimal degrees, at lower end of assessment reach): <u>35.295129, -78.185460</u>	
<b>STREAM INFORMATION: (depth and width can be approximations)</b>	
9. Site number (show on attached map): <u>Martha Branch</u>	10. Length of assessment reach evaluated (feet): <u>500</u>
11. Channel depth from bed (in riffle, if present) to top of bank (feet): <u>4</u>	<input type="checkbox"/> Unable to assess channel depth.
12. Channel width at top of bank (feet): <u>13</u>	13. Is assessment reach a swamp steam? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
14. Feature type: <input type="checkbox"/> Perennial flow <input checked="" type="checkbox"/> Intermittent flow <input type="checkbox"/> Tidal Marsh Stream	
<b>STREAM CATEGORY INFORMATION:</b>	
15. NC SAM Zone: <input type="checkbox"/> Mountains (M) <input type="checkbox"/> Piedmont (P) <input checked="" type="checkbox"/> Inner Coastal Plain (I) <input type="checkbox"/> Outer Coastal Plain (O)	
16. Estimated geomorphic valley shape (skip for Tidal Marsh Stream):	<input checked="" type="checkbox"/> A  (more sinuous stream, flatter valley slope) <input type="checkbox"/> B  (less sinuous stream, steeper valley slope)
17. Watershed size: (skip for Tidal Marsh Stream)	<input type="checkbox"/> Size 1 (< 0.1 mi <sup>2</sup> ) <input checked="" type="checkbox"/> Size 2 (0.1 to < 0.5 mi <sup>2</sup> ) <input type="checkbox"/> Size 3 (0.5 to < 5 mi <sup>2</sup> ) <input type="checkbox"/> Size 4 (≥ 5 mi <sup>2</sup> )
<b>ADDITIONAL INFORMATION:</b>	
18. Were regulatory considerations evaluated? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No If Yes, check all that apply to the assessment area.	
<input type="checkbox"/> Section 10 water	<input type="checkbox"/> Classified Trout Waters
<input type="checkbox"/> Essential Fish Habitat	<input type="checkbox"/> Primary Nursery Area
<input type="checkbox"/> Publicly owned property	<input checked="" type="checkbox"/> NCDWR Riparian buffer rule in effect
<input type="checkbox"/> Anadromous fish	<input type="checkbox"/> 303(d) List
<input type="checkbox"/> Documented presence of a federal and/or state listed protected species within the assessment area.	<input checked="" type="checkbox"/> Nutrient Sensitive Waters
List species: _____	<input type="checkbox"/> CAMA Area of Environmental Concern (AEC)
<input type="checkbox"/> Designated Critical Habitat (list species) _____	
19. Are additional stream information/supplementary measurements included in "Notes/Sketch" section or attached? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	

**1. Channel Water – assessment reach metric (skip for Size 1 streams and Tidal Marsh Streams)**

- A Water throughout assessment reach.
- B No flow, water in pools only.
- C No water in assessment reach.

**2. Evidence of Flow Restriction – assessment reach metric**

- A At least 10% of assessment reach in-stream habitat or riffle-pool sequence is severely affected by a flow restriction or fill to the point of obstructing flow or a channel choked with aquatic macrophytes or ponded water or impoundment on flood or ebb within the assessment reach (examples: undersized or perched culverts, causeways that constrict the channel, tidal gates, debris jams, beaver dams).
- B Not A

**3. Feature Pattern – assessment reach metric**

- A A majority of the assessment reach has altered pattern (examples: straightening, modification above or below culvert).
- B Not A

**4. Feature Longitudinal Profile – assessment reach metric**

- A Majority of assessment reach has a substantially altered stream profile (examples: channel down-cutting, existing damming, over widening, active aggradation, dredging, and excavation where appropriate channel profile has not reformed from any of these disturbances).
- B Not A

**5. Signs of Active Instability – assessment reach metric**

**Consider only current instability, not past events from which the stream has currently recovered.** Examples of instability include active bank failure, active channel down-cutting (head-cut), active widening, and artificial hardening (such as concrete, gabion, rip-rap).

- A < 10% of channel unstable
- B 10 to 25% of channel unstable
- C > 25% of channel unstable

6. Streamside Area Interaction – streamside area metric

Consider for the Left Bank (LB) and the Right Bank (RB).

- LB RB
A A Little or no evidence of conditions that adversely affect reference interaction
B B Moderate evidence of conditions (examples: berms, levees, down-cutting, aggradation, dredging) that adversely affect reference interaction
C C Extensive evidence of conditions that adversely affect reference interaction

7. Water Quality Stressors – assessment reach/intertidal zone metric

Check all that apply.

- A Discolored water in stream or intertidal zone (milky white, blue, unnatural water discoloration, oil sheen, stream foam)
B Excessive sedimentation (burying of stream features or intertidal zone)
C Noticeable evidence of pollutant discharges entering the assessment reach and causing a water quality problem
D Odor (not including natural sulfide odors)
E Current published or collected data indicating degraded water quality in the assessment reach. Cite source in "Notes/Sketch" section.
F Livestock with access to stream or intertidal zone
G Excessive algae in stream or intertidal zone
H Degraded marsh vegetation in the intertidal zone (removal, burning, regular mowing, destruction, etc)
I Other: (explain in "Notes/Sketch" section)
J Little to no stressors

8. Recent Weather – watershed metric (skip for Tidal Marsh Streams)

For Size 1 or 2 streams, D1 drought or higher is considered a drought; for Size 3 or 4 streams, D2 drought or higher is considered a drought.

- A Drought conditions and no rainfall or rainfall not exceeding 1 inch within the last 48 hours
B Drought conditions and rainfall exceeding 1 inch within the last 48 hours
C No drought conditions

9. Large or Dangerous Stream – assessment reach metric

Yes No Is stream is too large or dangerous to assess? If Yes, skip to Metric 13 (Streamside Area Ground Surface Condition).

10. Natural In-stream Habitat Types – assessment reach metric

10a. Yes No Degraded in-stream habitat over majority of the assessment reach (examples of stressors include excessive sedimentation, mining, excavation, in-stream hardening [for example, rip-rap], recent dredging, and snagging) (evaluate for Size 4 Coastal Plain streams only, then skip to Metric 12)

10b. Check all that occur (occurs if > 5% coverage of assessment reach) (skip for Size 4 Coastal Plain streams)

- A Multiple aquatic macrophytes and aquatic mosses (include liverworts, lichens, and algal mats)
B Multiple sticks and/or leaf packs and/or emergent vegetation
C Multiple snags and logs (including lap trees)
D 5% undercut banks and/or root mats and/or roots in banks extend to the normal wetted perimeter
E Little or no habitat
F 5% oysters or other natural hard bottoms
G Submerged aquatic vegetation
H Low-tide refugia (pools)
I Sand bottom
J 5% vertical bank along the marsh
K Little or no habitat

\*\*\*\*\*REMAINING QUESTIONS ARE NOT APPLICABLE FOR TIDAL MARSH STREAMS\*\*\*\*\*

11. Bedform and Substrate – assessment reach metric (skip for Size 4 Coastal Plain streams and Tidal Marsh Streams)

11a. Yes No Is assessment reach in a natural sand-bed stream? (skip for Coastal Plain streams)

11b. Bedform evaluated. Check the appropriate box(es).

- A Riffle-run section (evaluate 11c)
B Pool-glide section (evaluate 11d)
C Natural bedform absent (skip to Metric 12, Aquatic Life)

11c. In riffle sections, check all that occur below the normal wetted perimeter of the assessment reach – whether or not submerged. Check at least one box in each row (skip for Size 4 Coastal Plain streams and Tidal Marsh Streams). Not Present (NP) = absent, Rare (R) = present but <= 10%, Common (C) = > 10-40%, Abundant (A) = > 40-70%, Predominant (P) = > 70%. Cumulative percentages should not exceed 100% for each assessment reach.

Table with 5 columns: NP, R, C, A, P and rows for Bedrock/saprolite, Boulder (256 – 4096 mm), Cobble (64 – 256 mm), Gravel (2 – 64 mm), Sand (.062 – 2 mm), Silt/clay (< 0.062 mm), Detritus, Artificial (rip-rap, concrete, etc.)

11d. Yes No Are pools filled with sediment? (skip for Size 4 Coastal Plain streams and Tidal Marsh Streams)

**12. Aquatic Life – assessment reach metric (skip for Tidal Marsh Streams)**

12a.  Yes  No Was an in-stream aquatic life assessment performed as described in the User Manual?

If No, select one of the following reasons and skip to Metric 13.  No Water  Other: \_\_\_\_\_

12b.  Yes  No Are aquatic organisms present in the assessment reach (look in riffles, pools, then snags)? If Yes, check all that apply. If No, skip to Metric 13.

1 >1 Numbers over columns refer to "individuals" for Size 1 and 2 streams and "taxa" for Size 3 and 4 streams.

- Adult frogs
- Aquatic reptiles
- Aquatic macrophytes and aquatic mosses (include liverworts, lichens, and algal mats)
- Beetles
- Caddisfly larvae (T)
- Asian clam (*Corbicula*)
- Crustacean (isopod/amphipod/crayfish/shrimp)
- Damselfly and dragonfly larvae
- Dipterans
- Mayfly larvae (E)
- Megaloptera (alderfly, fishfly, dobsonfly larvae)
- Midges/mosquito larvae
- Mosquito fish (*Gambusia*) or mud minnows (*Umbra pygmaea*)
- Mussels/Clams (not *Corbicula*)
- Other fish
- Salamanders/tadpoles
- Snails
- Stonefly larvae (P)
- Tipulid larvae
- Worms/leeches

**13. Streamside Area Ground Surface Condition – streamside area metric (skip for Tidal Marsh Streams and B valley types)**

**Consider for the Left Bank (LB) and the Right Bank (RB).** Consider storage capacity with regard to both overbank flow and upland runoff.

- | LB                                    | RB                                    |  |
|---------------------------------------|---------------------------------------|--|
| <input type="checkbox"/> A            | <input type="checkbox"/> A            | Little or no alteration to water storage capacity over a majority of the streamside area   |
| <input type="checkbox"/> B            | <input type="checkbox"/> B            | Moderate alteration to water storage capacity over a majority of the streamside area   |
| <input checked="" type="checkbox"/> C | <input checked="" type="checkbox"/> C | Severe alteration to water storage capacity over a majority of the streamside area (examples: ditches, fill, soil compaction, livestock disturbance, buildings, man-made levees, drainage pipes) |

**14. Streamside Area Water Storage – streamside area metric (skip for Size 1 streams, Tidal Marsh Streams, and B valley types)**

**Consider for the Left Bank (LB) and the Right Bank (RB) of the streamside area.**

- | LB                                    | RB                                    |  |
|---------------------------------------|---------------------------------------|--|
| <input type="checkbox"/> A            | <input type="checkbox"/> A            | Majority of streamside area with depressions able to pond water $\geq$ 6 inches deep |
| <input type="checkbox"/> B            | <input type="checkbox"/> B            | Majority of streamside area with depressions able to pond water 3 to 6 inches deep   |
| <input checked="" type="checkbox"/> C | <input checked="" type="checkbox"/> C | Majority of streamside area with depressions able to pond water < 3 inches deep      |

**15. Wetland Presence – streamside area metric (skip for Tidal Marsh Streams)**

**Consider for the Left Bank (LB) and the Right Bank (RB).** Do not consider wetlands outside of the streamside area or within the normal wetted perimeter of assessment reach.

- | LB                                    | RB                                    |  |
|---------------------------------------|---------------------------------------|--|
| <input type="checkbox"/> Y            | <input type="checkbox"/> Y            | Are wetlands present in the streamside area? |
| <input checked="" type="checkbox"/> N | <input checked="" type="checkbox"/> N |  |

**16. Baseflow Contributors – assessment reach metric (skip for Size 4 streams and Tidal Marsh Streams)**

**Check all contributors within the assessment reach or within view of and draining to the assessment reach.**

- A Streams and/or springs (jurisdictional discharges)
- B Ponds (include wet detention basins; do not include sediment basins or dry detention basins)
- C Obstruction passing flow during low-flow periods within the assessment area (beaver dam, leaky dam, bottom-release dam, weir)
- D Evidence of bank seepage or sweating (iron in water indicates seepage)
- E Stream bed or bank soil reduced (dig through deposited sediment if present)
- F None of the above

**17. Baseflow Detractors – assessment area metric (skip for Tidal Marsh Streams)**

**Check all that apply.**

- A Evidence of substantial water withdrawals from the assessment reach (includes areas excavated for pump installation)
- B Obstruction not passing flow during low-flow periods affecting the assessment reach (ex: watertight dam, sediment deposit)
- C Urban stream ( $\geq$  24% impervious surface for watershed)
- D Evidence that the streamside area has been modified resulting in accelerated drainage into the assessment reach
- E Assessment reach relocated to valley edge
- F None of the above

**18. Shading – assessment reach metric (skip for Tidal Marsh Streams)**

Consider aspect. Consider "leaf-on" condition.

- A Stream shading is appropriate for stream category (may include gaps associated with natural processes)
- B Degraded (example: scattered trees)
- C Stream shading is gone or largely absent

**19. Buffer Width – streamside area metric (skip for Tidal Marsh Streams)**

Consider “vegetated buffer” and “wooded buffer” separately for left bank (LB) and right bank (RB) starting at the top of bank out to the first break.

Vegetated		Wooded		
LB	RB	LB	RB	
<input checked="" type="checkbox"/> A	<input type="checkbox"/> A	<input checked="" type="checkbox"/> A	<input type="checkbox"/> A	≥ 100 feet wide <u>or</u> extends to the edge of the watershed
<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	From 50 to < 100 feet wide
<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	From 30 to < 50 feet wide
<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D	From 10 to < 30 feet wide
<input type="checkbox"/> E	<input checked="" type="checkbox"/> E	<input type="checkbox"/> E	<input checked="" type="checkbox"/> E	< 10 feet wide <u>or</u> no trees

**20. Buffer Structure – streamside area metric (skip for Tidal Marsh Streams)**

Consider for left bank (LB) and right bank (RB) for Metric 19 (“Vegetated” Buffer Width).

LB	RB	
<input type="checkbox"/> A	<input type="checkbox"/> A	Mature forest
<input checked="" type="checkbox"/> B	<input type="checkbox"/> B	Non-mature woody vegetation <u>or</u> modified vegetation structure
<input type="checkbox"/> C	<input type="checkbox"/> C	Herbaceous vegetation with or without a strip of trees < 10 feet wide
<input type="checkbox"/> D	<input type="checkbox"/> D	Maintained shrubs
<input type="checkbox"/> E	<input checked="" type="checkbox"/> E	Little or no vegetation

**21. Buffer Stressors – streamside area metric (skip for Tidal Marsh Streams)**

Check all appropriate boxes for left bank (LB) and right bank (RB). Indicate if listed stressor abuts stream (Abuts), does not abut but is within 30 feet of stream (< 30 feet), or is between 30 to 50 feet of stream (30-50 feet).

If none of the following stressors occurs on either bank, check here and skip to Metric 22:

Abuts	< 30 feet		30-50 feet		
LB	RB	LB	RB	LB	RB
<input type="checkbox"/> A	<input checked="" type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A
<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B
<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C
<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D
					Row crops
					Maintained turf
					Pasture (no livestock)/commercial horticulture
					Pasture (active livestock use)

**22. Stem Density – streamside area metric (skip for Tidal Marsh Streams)**

Consider for left bank (LB) and right bank (RB) for Metric 19 (“Wooded” Buffer Width).

LB	RB	
<input checked="" type="checkbox"/> A	<input type="checkbox"/> A	Medium to high stem density
<input type="checkbox"/> B	<input type="checkbox"/> B	Low stem density
<input type="checkbox"/> C	<input checked="" type="checkbox"/> C	No wooded riparian buffer <u>or</u> predominantly herbaceous species <u>or</u> bare ground

**23. Continuity of Vegetated Buffer – streamside area metric (skip for Tidal Marsh Streams)**

Consider whether vegetated buffer is continuous along stream (parallel). Breaks are areas lacking vegetation > 10 feet wide.

LB	RB	
<input checked="" type="checkbox"/> A	<input type="checkbox"/> A	The total length of buffer breaks is < 25 percent.
<input type="checkbox"/> B	<input type="checkbox"/> B	The total length of buffer breaks is between 25 and 50 percent.
<input type="checkbox"/> C	<input checked="" type="checkbox"/> C	The total length of buffer breaks is > 50 percent.

**24. Vegetative Composition – streamside area metric (skip for Tidal Marsh Streams)**

Evaluate the dominant vegetation within 100 feet of each bank or to the edge of the watershed (whichever comes first) as it contributes to assessment reach habitat.

LB	RB	
<input type="checkbox"/> A	<input type="checkbox"/> A	Vegetation is close to undisturbed in species present and their proportions. Lower strata composed of native species, with non-native invasive species absent or sparse.
<input checked="" type="checkbox"/> B	<input type="checkbox"/> B	Vegetation indicates disturbance in terms of species diversity or proportions, but is still largely composed of native species. This may include communities of weedy native species that develop after clear-cutting or clearing <u>or</u> communities with non-native invasive species present, but not dominant, over a large portion of the expected strata <u>or</u> communities missing understory but retaining canopy trees.
<input type="checkbox"/> C	<input checked="" type="checkbox"/> C	Vegetation is severely disturbed in terms of species diversity or proportions. Mature canopy is absent <u>or</u> communities with non-native invasive species dominant over a large portion of expected strata <u>or</u> communities composed of planted stands of non-characteristic species <u>or</u> communities inappropriately composed of a single species <u>or</u> no vegetation.

**25. Conductivity – assessment reach metric (skip for all Coastal Plain streams)**

25a. Yes No Was conductivity measurement recorded?  
If No, select one of the following reasons. No Water Other: \_\_\_\_\_

25b. Check the box corresponding to the conductivity measurement (units of microsiemens per centimeter).  
A < 46 B 46 to < 67 C 67 to < 79 D 79 to < 230 E ≥ 230

Notes/Sketch:

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

Stream Site Name Casey Creek Mitigation Site Date of Assessment 11/14/2022  
 Stream Category la2 Assessor Name/Organization Wildlands Engineering

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

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



**NC WAM FIELD ASSESSMENT FORM**  
**Accompanies User Manual Version 5.0**

USACE AID #	SAW-2022-01239	NCDWR#	2022-0664v2
Project Name	Casey Creek Mitigation Site	Date of Evaluation	11/15/2022
Applicant/Owner Name	Wildlands Engineering	Wetland Site Name	Wetland A
Wetland Type	Headwater Forest	Assessor Name/Organization	K.Hogarth/Wildlands
Level III Ecoregion	Middle Atlantic Coastal Plain	Nearest Named Water Body	Falling Creek
River Basin	Neuse	USGS 8-Digit Catalogue Unit	03020201
County	Wayne	NCDWR Region	Wilmington
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Precipitation within 48 hrs?	Latitude/Longitude (deci-degrees)	35.298390, -78.183244

**Evidence of stressors affecting the assessment area (may not be within the assessment area)**

Please circle and/or make note on the last page if evidence of stressors is apparent. Consider departure from reference, if appropriate, in recent past (for instance, within 10 years). Noteworthy stressors include, but are not limited to the following.

- Hydrological modifications (examples: ditches, dams, beaver dams, dikes, berms, ponds, etc.)
- Surface and sub-surface discharges into the wetland (examples: discharges containing obvious pollutants, presence of nearby septic tanks, underground storage tanks (USTs), hog lagoons, etc.)
- Signs of vegetation stress (examples: vegetation mortality, insect damage, disease, storm damage, salt intrusion, etc.)
- Habitat/plant community alteration (examples: mowing, clear-cutting, exotics, etc.)

Is the assessment area intensively managed?  Yes  No

**Regulatory Considerations** - Were regulatory considerations evaluated?  Yes  No If Yes, check all that apply to the assessment area.

- Anadromous fish
- Federally protected species or State endangered or threatened species
- NCDWR riparian buffer rule in effect
- Abuts a Primary Nursery Area (PNA)
- Publicly owned property
- N.C. Division of Coastal Management Area of Environmental Concern (AEC) (including buffer)
- Abuts a stream with a NCDWQ classification of SA or supplemental classifications of HQW, ORW, or Trout
- Designated NCNHP reference community
- Abuts a 303(d)-listed stream or a tributary to a 303(d)-listed stream

**What type of natural stream is associated with the wetland, if any? (check all that apply)**

- Blackwater
- Brownwater
- Tidal (if tidal, check one of the following boxes)  Lunar  Wind  Both

Is the assessment area on a coastal island?  Yes  No

Is the assessment area's surface water storage capacity or duration substantially altered by beaver?  Yes  No

Does the assessment area experience overbank flooding during normal rainfall conditions?  Yes  No

**1. Ground Surface Condition/Vegetation Condition – assessment area condition metric**

**Check a box in each column.** Consider alteration to the ground surface (GS) in the assessment area and vegetation structure (VS) in the assessment area. Compare to reference wetland if applicable (see User Manual). If a reference is not applicable, then rate the assessment area based on evidence an effect.

- |                                       |                                       |  |
|---------------------------------------|---------------------------------------|--|
| GS                                    | VS                                    |  |
| <input checked="" type="checkbox"/> A | <input checked="" type="checkbox"/> A | Not severely altered   |
| <input type="checkbox"/> B            | <input type="checkbox"/> B            | Severely altered over a majority of the assessment area (ground surface alteration examples: vehicle tracks, excessive sedimentation, fire-plow lanes, skidder tracks, bedding, fill, soil compaction, obvious pollutants) (vegetation structure alteration examples: mechanical disturbance, herbicides, salt intrusion [where appropriate], exotic species, grazing, less diversity [if appropriate], hydrologic alteration) |

**2. Surface and Sub-Surface Storage Capacity and Duration – assessment area condition metric**

**Check a box in each column.** Consider surface storage capacity and duration (Surf) and sub-surface storage capacity and duration (Sub). Consider both increase and decrease in hydrology. A ditch ≤ 1 foot deep is considered to affect surface water only, while a ditch > 1 foot deep is expected to affect both surface and sub-surface water. Consider tidal flooding regime, if applicable.

- |                                       |                                       |  |
|---------------------------------------|---------------------------------------|--|
| Surf                                  | Sub                                   |  |
| <input checked="" type="checkbox"/> A | <input checked="" type="checkbox"/> A | Water storage capacity and duration are not altered.   |
| <input type="checkbox"/> B            | <input type="checkbox"/> B            | Water storage capacity or duration are altered, but not substantially (typically, not sufficient to change vegetation).  |
| <input type="checkbox"/> C            | <input type="checkbox"/> C            | Water storage capacity or duration are substantially altered (typically, alteration sufficient to result in vegetation change) (examples: draining, flooding, soil compaction, filling, excessive sedimentation, underground utility lines). |

**3. Water Storage/Surface Relief – assessment area/wetland type condition metric (skip for all marshes)**

**Check a box in each column.** Select the appropriate storage for the assessment area (AA) and the wetland type (WT).

- |                                       |                                       |   |
|---------------------------------------|---------------------------------------|---|
| AA                                    | WT                                    |   |
| 3a. <input type="checkbox"/> A        | <input type="checkbox"/> A            | Majority of wetland with depressions able to pond water > 1 deep                |
| <input type="checkbox"/> B            | <input type="checkbox"/> B            | Majority of wetland with depressions able to pond water 6 inches to 1 foot deep |
| <input type="checkbox"/> C            | <input type="checkbox"/> C            | Majority of wetland with depressions able to pond water 3 to 6 inches deep      |
| <input checked="" type="checkbox"/> D | <input checked="" type="checkbox"/> D | Depressions able to pond water < 3 inches deep                                  |
| 3b. <input type="checkbox"/> A        |                                       | Evidence that maximum depth of inundation is greater than 2 feet                |
| <input type="checkbox"/> B            |                                       | Evidence that maximum depth of inundation is between 1 and 2 feet               |
| <input checked="" type="checkbox"/> C |                                       | Evidence that maximum depth of inundation is less than 1 foot                   |

4. **Soil Texture/Structure – assessment area condition metric (skip for all marshes)**

Check a box from each of the three soil property groups below. Dig soil profile in the dominant assessment area landscape feature. Make soil observations within the top 12 inches. Use most recent National Technical Committee for Hydric Soils guidance for regional indicators.

- 4a. A Sandy soil  
B Loamy or clayey soils exhibiting redoximorphic features (concentrations, depletions, or rhizospheres)  
C Loamy or clayey soils not exhibiting redoximorphic features  
D Loamy or clayey gleyed soil  
E Histosol or histic epipedon
- 4b. A Soil ribbon < 1 inch  
B Soil ribbon ≥ 1 inch
- 4c. A No peat or muck presence  
B A peat or muck presence

5. **Discharge into Wetland – opportunity metric**

Check a box in each column. Consider surface pollutants or discharges (Surf) and sub-surface pollutants or discharges (Sub). Examples of sub-surface discharges include presence of nearby septic tank, underground storage tank (UST), etc.

- |                                       |                                       |   |
|---------------------------------------|---------------------------------------|---|
| Surf                                  | Sub                                   |   |
| <input checked="" type="checkbox"/> A | <input checked="" type="checkbox"/> A | Little or no evidence of pollutants or discharges entering the assessment area  |
| <input type="checkbox"/> B            | <input type="checkbox"/> B            | Noticeable evidence of pollutants or discharges entering the wetland and stressing, but not overwhelming the treatment capacity of the assessment area  |
| <input type="checkbox"/> C            | <input type="checkbox"/> C            | Noticeable evidence of pollutants or discharges (pathogen, particulate, or soluble) entering the assessment area and potentially overwhelming the treatment capacity of the wetland (water discoloration, dead vegetation, excessive sedimentation, odor) |

6. **Land Use – opportunity metric (skip for non-riparian wetlands)**

Check all that apply (at least one box in each column). Evaluation involves a GIS effort with field adjustment. Consider sources draining to assessment area within entire upstream watershed (WS), within 5 miles and within the watershed draining to the assessment area (5M), and within 2 miles and within the watershed draining to the assessment area (2M).

- |                                       |                                       |                                       |   |
|---------------------------------------|---------------------------------------|---------------------------------------|---|
| WS                                    | 5M                                    | 2M                                    |   |
| <input type="checkbox"/> A            | <input type="checkbox"/> A            | <input type="checkbox"/> A            | ≥ 10% impervious surfaces   |
| <input type="checkbox"/> B            | <input type="checkbox"/> B            | <input type="checkbox"/> B            | Confined animal operations (or other local, concentrated source of pollutants)  |
| <input type="checkbox"/> C            | <input type="checkbox"/> C            | <input type="checkbox"/> C            | ≥ 20% coverage of pasture   |
| <input checked="" type="checkbox"/> D | <input checked="" type="checkbox"/> D | <input checked="" type="checkbox"/> D | ≥ 20% coverage of agricultural land (regularly plowed land)   |
| <input type="checkbox"/> E            | <input type="checkbox"/> E            | <input type="checkbox"/> E            | ≥ 20% coverage of maintained grass/herb   |
| <input type="checkbox"/> F            | <input type="checkbox"/> F            | <input type="checkbox"/> F            | ≥ 20% coverage of clear-cut land  |
| <input type="checkbox"/> G            | <input type="checkbox"/> G            | <input type="checkbox"/> G            | Little or no opportunity to improve water quality. Lack of opportunity may result from little or no disturbance in the watershed <u>or</u> hydrologic alterations that prevent drainage <u>and/or</u> overbank flow from affecting the assessment area. |

7. **Wetland Acting as Vegetated Buffer – assessment area/wetland complex condition metric (skip for non-riparian wetlands)**

- 7a. Is assessment area within 50 feet of a tributary or other open water?  
Yes No If Yes, continue to 7b. If No, skip to Metric 8.  
Wetland buffer need only be present on one side of the water body. Make buffer judgment based on the average width of wetland. Record a note if a portion of the buffer has been removed or disturbed.
- 7b. How much of the first 50 feet from the bank is wetland? (Wetland buffer need only be present on one side of the water body. Make buffer judgment based on the average width of wetland. Record a note if a portion of the buffer has been removed or disturbed.)  
A ≥ 50 feet  
B From 30 to < 50 feet  
C From 15 to < 30 feet  
D From 5 to < 15 feet  
E < 5 feet or buffer bypassed by ditches
- 7c. Tributary width. If the tributary is anastomosed, combine widths of channels/braids for a total width.  
≤ 15-feet wide  > 15-feet wide  Other open water (no tributary present)
- 7d. Do roots of assessment area vegetation extend into the bank of the tributary/open water?  
Yes No
- 7e. Is stream or other open water sheltered or exposed?  
Sheltered – adjacent open water with width < 2500 feet and no regular boat traffic.  
Exposed – adjacent open water with width ≥ 2500 feet or regular boat traffic.

8. **Wetland Width at the Assessment Area – wetland type/wetland complex condition metric (evaluate WT for all marshes and Estuarine Woody Wetland only; evaluate WC for Bottomland Hardwood Forest, Headwater Forest, and Riverine Swamp Forest only)**

Check a box in each column for riverine wetlands only. Select the average width for the wetland type at the assessment area (WT) and the wetland complex at the assessment area (WC). See User Manual for WT and WC boundaries.

- |                                       |                                       |                       |
|---------------------------------------|---------------------------------------|-----------------------|
| WT                                    | WC                                    |                       |
| <input type="checkbox"/> A            | <input type="checkbox"/> A            | ≥ 100 feet            |
| <input type="checkbox"/> B            | <input type="checkbox"/> B            | From 80 to < 100 feet |
| <input checked="" type="checkbox"/> C | <input checked="" type="checkbox"/> C | From 50 to < 80 feet  |
| <input type="checkbox"/> D            | <input type="checkbox"/> D            | From 40 to < 50 feet  |
| <input type="checkbox"/> E            | <input type="checkbox"/> E            | From 30 to < 40 feet  |
| <input type="checkbox"/> F            | <input type="checkbox"/> F            | From 15 to < 30 feet  |
| <input type="checkbox"/> G            | <input type="checkbox"/> G            | From 5 to < 15 feet   |
| <input type="checkbox"/> H            | <input type="checkbox"/> H            | < 5 feet              |

**9. Inundation Duration – assessment area condition metric (skip for non-riparian wetlands)**

Answer for assessment area dominant landform.

- A Evidence of short-duration inundation (< 7 consecutive days)
- B Evidence of saturation, without evidence of inundation
- C Evidence of long-duration inundation or very long-duration inundation (7 to 30 consecutive days or more)

**10. Indicators of Deposition – assessment area condition metric (skip for non-riparian wetlands and all marshes)**

Consider recent deposition only (no plant growth since deposition).

- A Sediment deposition is not excessive, but at approximately natural levels.
- B Sediment deposition is excessive, but not overwhelming the wetland.
- C Sediment deposition is excessive and is overwhelming the wetland.

**11. Wetland Size – wetland type/wetland complex condition metric**

**Check a box in each column.** Involves a GIS effort with field adjustment. This metric evaluates three aspects of the wetland area: the size of the wetland type (WT), the size of the wetland complex (WC), and the size of the forested wetland (FW) (if applicable, see User Manual). See the User Manual for boundaries of these evaluation areas. If assessment area is clear-cut, select "K" for the FW column.

- | WT                                    | WC                                    | FW (if applicable)  |
|---------------------------------------|---------------------------------------|---|
| <input type="checkbox"/> A            | <input type="checkbox"/> A            | <input type="checkbox"/> A ≥ 500 acres  |
| <input type="checkbox"/> B            | <input type="checkbox"/> B            | <input type="checkbox"/> B From 100 to < 500 acres                            |
| <input type="checkbox"/> C            | <input type="checkbox"/> C            | <input type="checkbox"/> C From 50 to < 100 acres                             |
| <input type="checkbox"/> D            | <input type="checkbox"/> D            | <input type="checkbox"/> D From 25 to < 50 acres                              |
| <input type="checkbox"/> E            | <input type="checkbox"/> E            | <input type="checkbox"/> E From 10 to < 25 acres                              |
| <input type="checkbox"/> F            | <input type="checkbox"/> F            | <input type="checkbox"/> F From 5 to < 10 acres                               |
| <input type="checkbox"/> G            | <input type="checkbox"/> G            | <input type="checkbox"/> G From 1 to < 5 acres                                |
| <input type="checkbox"/> H            | <input type="checkbox"/> H            | <input type="checkbox"/> H From 0.5 to < 1 acre                               |
| <input checked="" type="checkbox"/> I | <input checked="" type="checkbox"/> I | <input checked="" type="checkbox"/> I From 0.1 to < 0.5 acre                  |
| <input type="checkbox"/> J            | <input type="checkbox"/> J            | <input type="checkbox"/> J From 0.01 to < 0.1 acre                            |
| <input type="checkbox"/> K            | <input type="checkbox"/> K            | <input type="checkbox"/> K < 0.01 acre <u>or</u> assessment area is clear-cut |

**12. Wetland Intactness – wetland type condition metric (evaluate for Pocosins only)**

- A Pocosin is the full extent (≥ 90%) of its natural landscape size.
- B Pocosin type is < 90% of the full extent of its natural landscape size.

**13. Connectivity to Other Natural Areas – landscape condition metric**

13a. **Check appropriate box(es) (a box may be checked in each column).** Involves a GIS effort with field adjustment. This metric evaluates whether the wetland is well connected (Well) and/or loosely connected (Loosely) to the landscape patch, the contiguous naturally vegetated area and open water (if appropriate). Boundaries are formed by four-lane roads, regularly maintained utility line corridors the width of a four-lane road or wider, urban landscapes, maintained fields (pasture and agriculture), or open water > 300 feet wide.

- | Well                                  | Loosely                               |  |
|---------------------------------------|---------------------------------------|--|
| <input type="checkbox"/> A            | <input checked="" type="checkbox"/> A | ≥ 500 acres  |
| <input type="checkbox"/> B            | <input type="checkbox"/> B            | From 100 to < 500 acres  |
| <input checked="" type="checkbox"/> C | <input type="checkbox"/> C            | From 50 to < 100 acres   |
| <input type="checkbox"/> D            | <input type="checkbox"/> D            | From 10 to < 50 acres  |
| <input type="checkbox"/> E            | <input type="checkbox"/> E            | < 10 acres   |
| <input type="checkbox"/> F            | <input type="checkbox"/> F            | Wetland type has a poor or no connection to other natural habitats |

13b. **Evaluate for marshes only.**

- Yes  No Wetland type has a surface hydrology connection to open waters/stream or tidal wetlands.

**14. Edge Effect – wetland type condition metric (skip for all marshes and Estuarine Woody Wetland)**

May involve a GIS effort with field adjustment. Estimate distance from wetland type boundary to artificial edges. Artificial edges include non-forested areas ≥ 40 feet wide such as fields, development, roads, regularly maintained utility line corridors, and clear-cuts. Consider the eight main points of the compass. Artificial edge occurs within 150 feet in how many directions? If the assessment area is clear cut, select option "C."

- A 0
- B 1 to 4
- C 5 to 8

**15. Vegetative Composition – assessment area condition metric (skip for all marshes and Pine Flat)**

- A Vegetation is close to reference condition in species present and their proportions. Lower strata composed of appropriate species, with exotic plants absent or sparse within the assessment area.
- B Vegetation is different from reference condition in species diversity or proportions, but still largely composed of native species characteristic of the wetland type. This may include communities of weedy native species that develop after clearcutting or clearing. It also includes communities with exotics present, but not dominant, over a large portion of the expected strata.
- C Vegetation severely altered from reference in composition, or expected species are unnaturally absent (planted stands of non-characteristic species or at least one stratum inappropriately composed of a single species), or exotic species are dominant in at least one stratum.

**16. Vegetative Diversity – assessment area condition metric (evaluate for Non-tidal Freshwater Marsh only)**

- A Vegetation diversity is high and is composed primarily of native species (< 10% cover of exotics).
- B Vegetation diversity is low or has > 10% to 50% cover of exotics.
- C Vegetation is dominated by exotic species (> 50 % cover of exotics).

**17. Vegetative Structure – assessment area/wetland type condition metric**

17a. Is vegetation present?

Yes  No If Yes, continue to 17b. If No, skip to Metric 18.

17b. Evaluate percent coverage of assessment area vegetation **for all marshes only**. Skip to 17c for non-marsh wetlands.

A ≥ 25% coverage of vegetation  
 B < 25% coverage of vegetation

17c. **Check a box in each column for each stratum**. Evaluate this portion of the metric **for non-marsh wetlands**. Consider structure in airspace above the assessment area (AA) and the wetland type (WT) separately.

	AA	WT	
Canopy	<input checked="" type="checkbox"/> A	<input type="checkbox"/> A	Canopy closed, or nearly closed, with natural gaps associated with natural processes
	<input type="checkbox"/> B	<input type="checkbox"/> B	Canopy present, but opened more than natural gaps
	<input type="checkbox"/> C	<input type="checkbox"/> C	Canopy sparse or absent
Mid-Story	<input type="checkbox"/> A	<input type="checkbox"/> A	Dense mid-story/sapling layer
	<input checked="" type="checkbox"/> B	<input type="checkbox"/> B	Moderate density mid-story/sapling layer
	<input type="checkbox"/> C	<input type="checkbox"/> C	Mid-story/sapling layer sparse or absent
Shrub	<input type="checkbox"/> A	<input type="checkbox"/> A	Dense shrub layer
	<input checked="" type="checkbox"/> B	<input type="checkbox"/> B	Moderate density shrub layer
	<input type="checkbox"/> C	<input type="checkbox"/> C	Shrub layer sparse or absent
Herb	<input type="checkbox"/> A	<input type="checkbox"/> A	Dense herb layer
	<input type="checkbox"/> B	<input type="checkbox"/> B	Moderate density herb layer
	<input checked="" type="checkbox"/> C	<input type="checkbox"/> C	Herb layer sparse or absent

**18. Snags – wetland type condition metric (skip for all marshes)**

A Large snags (more than one) are visible (> 12 inches DBH, or large relative to species present and landscape stability).  
 B Not A

**19. Diameter Class Distribution – wetland type condition metric (skip for all marshes)**

A Majority of canopy trees have stems > 6 inches in diameter at breast height (DBH); many large trees (> 12 inches DBH) are present.  
 B Majority of canopy trees have stems between 6 and 12 inches DBH, few are > 12 inch DBH.  
 C Majority of canopy trees are < 6 inches DBH or no trees.

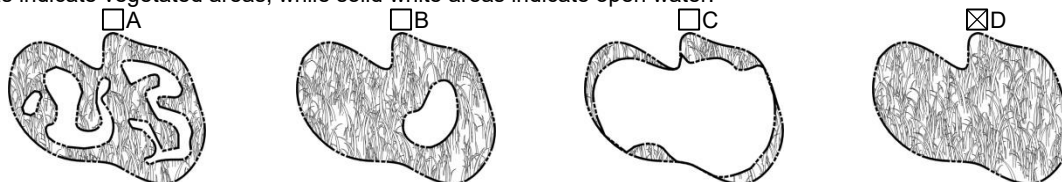
**20. Large Woody Debris – wetland type condition metric (skip for all marshes)**

Include both natural debris and man-placed natural debris.

A Large logs (more than one) are visible (> 12 inches in diameter, or large relative to species present and landscape stability).  
 B Not A

**21. Vegetation/Open Water Dispersion – wetland type/open water condition metric (evaluate for Non-Tidal Freshwater Marsh only)**

Select the figure that best describes the amount of interspersion between vegetation and open water in the growing season. Patterned areas indicate vegetated areas, while solid white areas indicate open water.



**22. Hydrologic Connectivity – assessment area condition metric (evaluate for riparian wetlands and Salt/Brackish Marsh only)**

Examples of activities that may severely alter hydrologic connectivity include intensive ditching, fill, sedimentation, channelization, diversion, man-made berms, beaver dams, and stream incision. Documentation required if evaluated as B, C, or D.

A Overbank and overland flow are not severely altered in the assessment area.  
 B Overbank flow is severely altered in the assessment area.  
 C Overland flow is severely altered in the assessment area.  
 D Both overbank and overland flow are severely altered in the assessment area.

Notes

**NC WAM Wetland Rating Sheet  
Accompanies User Manual Version 5.0**

Wetland Site Name Wetland A Date of Assessment 11/15/2022  
 Wetland Type Headwater Forest Assessor Name/Organization K.Hogarth/Wildlands

Notes on Field Assessment Form (Y/N) NO  
 Presence of regulatory considerations (Y/N) YES  
 Wetland is intensively managed (Y/N) NO  
 Assessment area is located within 50 feet of a natural tributary or other open water (Y/N) YES  
 Assessment area is substantially altered by beaver (Y/N) NO  
 Assessment area experiences overbank flooding during normal rainfall conditions (Y/N) YES  
 Assessment area is on a coastal island (Y/N) NO

**Sub-function Rating Summary**

Function	Sub-function	Metrics	Rating
Hydrology	Surface Storage and Retention Sub-surface Storage and Retention	Condition	<b>HIGH</b>
		Condition	<b>MEDIUM</b>
Water Quality	Pathogen Change	Condition	<b>HIGH</b>
		Condition/Opportunity	<b>HIGH</b>
		Opportunity Presence (Y/N)	<b>NO</b>
	Particulate Change	Condition	<b>HIGH</b>
		Condition/Opportunity	NA
		Opportunity Presence (Y/N)	NA
	Soluble Change	Condition	<b>HIGH</b>
		Condition/Opportunity	<b>HIGH</b>
		Opportunity Presence (Y/N)	<b>YES</b>
	Physical Change	Condition	<b>HIGH</b>
		Condition/Opportunity	<b>HIGH</b>
		Opportunity Presence (Y/N)	<b>YES</b>
Pollution Change	Condition	NA	
	Condition/Opportunity	NA	
	Opportunity Presence (Y/N)	NA	
Habitat	Physical Structure	Condition	<b>HIGH</b>
	Landscape Patch Structure	Condition	<b>LOW</b>
	Vegetation Composition	Condition	<b>MEDIUM</b>

**Function Rating Summary**

Function	Metrics	Rating
Hydrology	Condition	<b>HIGH</b>
Water Quality	Condition	<b>HIGH</b>
	Condition/Opportunity	<b>HIGH</b>
	Opportunity Presence (Y/N)	<b>YES</b>
Habitat	Condition	<b>MEDIUM</b>

**Overall Wetland Rating**     HIGH

**NC WAM FIELD ASSESSMENT FORM**  
**Accompanies User Manual Version 5.0**

USACE AID #	SAW-2022-01239	NCDWR#	2022-0664v2
Project Name	Casey Creek Mitigation Site	Date of Evaluation	11/15/2022
Applicant/Owner Name	Wildlands Engineering	Wetland Site Name	Wetland B
Wetland Type	Bottomland Hardwood Forest	Assessor Name/Organization	K. Hogarth/Wildlands
Level III Ecoregion	Middle Atlantic Coastal Plain	Nearest Named Water Body	Falling Creek
River Basin	Neuse	USGS 8-Digit Catalogue Unit	03020201
County	Wayne	NCDWR Region	Wilmington
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Precipitation within 48 hrs?	Latitude/Longitude (deci-degrees)	35.2901961, -78.1850029

**Evidence of stressors affecting the assessment area (may not be within the assessment area)**

Please circle and/or make note on the last page if evidence of stressors is apparent. Consider departure from reference, if appropriate, in recent past (for instance, within 10 years). Noteworthy stressors include, but are not limited to the following.

- Hydrological modifications (examples: ditches, dams, beaver dams, dikes, berms, ponds, etc.)
- Surface and sub-surface discharges into the wetland (examples: discharges containing obvious pollutants, presence of nearby septic tanks, underground storage tanks (USTs), hog lagoons, etc.)
- Signs of vegetation stress (examples: vegetation mortality, insect damage, disease, storm damage, salt intrusion, etc.)
- Habitat/plant community alteration (examples: mowing, clear-cutting, exotics, etc.)

Is the assessment area intensively managed?  Yes  No

**Regulatory Considerations** - Were regulatory considerations evaluated?  Yes  No If Yes, check all that apply to the assessment area.

- Anadromous fish
- Federally protected species or State endangered or threatened species
- NCDWR riparian buffer rule in effect
- Abuts a Primary Nursery Area (PNA)
- Publicly owned property
- N.C. Division of Coastal Management Area of Environmental Concern (AEC) (including buffer)
- Abuts a stream with a NCDWQ classification of SA or supplemental classifications of HQW, ORW, or Trout
- Designated NCNHP reference community
- Abuts a 303(d)-listed stream or a tributary to a 303(d)-listed stream

**What type of natural stream is associated with the wetland, if any? (check all that apply)**

- Blackwater
- Brownwater
- Tidal (if tidal, check one of the following boxes)  Lunar  Wind  Both

Is the assessment area on a coastal island?  Yes  No

Is the assessment area's surface water storage capacity or duration substantially altered by beaver?  Yes  No

Does the assessment area experience overbank flooding during normal rainfall conditions?  Yes  No

**1. Ground Surface Condition/Vegetation Condition – assessment area condition metric**

**Check a box in each column.** Consider alteration to the ground surface (GS) in the assessment area and vegetation structure (VS) in the assessment area. Compare to reference wetland if applicable (see User Manual). If a reference is not applicable, then rate the assessment area based on evidence an effect.

- |                                       |                                       |  |
|---------------------------------------|---------------------------------------|--|
| GS                                    | VS                                    |  |
| <input checked="" type="checkbox"/> A | <input checked="" type="checkbox"/> A | Not severely altered   |
| <input type="checkbox"/> B            | <input type="checkbox"/> B            | Severely altered over a majority of the assessment area (ground surface alteration examples: vehicle tracks, excessive sedimentation, fire-plow lanes, skidder tracks, bedding, fill, soil compaction, obvious pollutants) (vegetation structure alteration examples: mechanical disturbance, herbicides, salt intrusion [where appropriate], exotic species, grazing, less diversity [if appropriate], hydrologic alteration) |

**2. Surface and Sub-Surface Storage Capacity and Duration – assessment area condition metric**

**Check a box in each column.** Consider surface storage capacity and duration (Surf) and sub-surface storage capacity and duration (Sub). Consider both increase and decrease in hydrology. A ditch ≤ 1 foot deep is considered to affect surface water only, while a ditch > 1 foot deep is expected to affect both surface and sub-surface water. Consider tidal flooding regime, if applicable.

- |                                       |                                       |  |
|---------------------------------------|---------------------------------------|--|
| Surf                                  | Sub                                   |  |
| <input type="checkbox"/> A            | <input type="checkbox"/> A            | Water storage capacity and duration are not altered.   |
| <input checked="" type="checkbox"/> B | <input checked="" type="checkbox"/> B | Water storage capacity or duration are altered, but not substantially (typically, not sufficient to change vegetation).  |
| <input type="checkbox"/> C            | <input type="checkbox"/> C            | Water storage capacity or duration are substantially altered (typically, alteration sufficient to result in vegetation change) (examples: draining, flooding, soil compaction, filling, excessive sedimentation, underground utility lines). |

**3. Water Storage/Surface Relief – assessment area/wetland type condition metric (skip for all marshes)**

**Check a box in each column.** Select the appropriate storage for the assessment area (AA) and the wetland type (WT).

- |                                       |                                       |   |
|---------------------------------------|---------------------------------------|---|
| AA                                    | WT                                    |   |
| 3a. <input type="checkbox"/> A        | <input type="checkbox"/> A            | Majority of wetland with depressions able to pond water > 1 deep                |
| <input type="checkbox"/> B            | <input type="checkbox"/> B            | Majority of wetland with depressions able to pond water 6 inches to 1 foot deep |
| <input checked="" type="checkbox"/> C | <input checked="" type="checkbox"/> C | Majority of wetland with depressions able to pond water 3 to 6 inches deep      |
| <input type="checkbox"/> D            | <input type="checkbox"/> D            | Depressions able to pond water < 3 inches deep                                  |
| 3b. <input type="checkbox"/> A        |                                       | Evidence that maximum depth of inundation is greater than 2 feet                |
| <input type="checkbox"/> B            |                                       | Evidence that maximum depth of inundation is between 1 and 2 feet               |
| <input checked="" type="checkbox"/> C |                                       | Evidence that maximum depth of inundation is less than 1 foot                   |

**4. Soil Texture/Structure – assessment area condition metric (skip for all marshes)**

**Check a box from each of the three soil property groups below.** Dig soil profile in the dominant assessment area landscape feature. Make soil observations within the top 12 inches. Use most recent National Technical Committee for Hydric Soils guidance for regional indicators.

- 4a. A Sandy soil  
B Loamy or clayey soils exhibiting redoximorphic features (concentrations, depletions, or rhizospheres)  
C Loamy or clayey soils not exhibiting redoximorphic features  
D Loamy or clayey gleyed soil  
E Histosol or histic epipedon
- 4b. A Soil ribbon < 1 inch  
B Soil ribbon ≥ 1 inch
- 4c. A No peat or muck presence  
B A peat or muck presence

**5. Discharge into Wetland – opportunity metric**

**Check a box in each column.** Consider surface pollutants or discharges (Surf) and sub-surface pollutants or discharges (Sub). Examples of sub-surface discharges include presence of nearby septic tank, underground storage tank (UST), etc.

- |                                       |                                       |   |
|---------------------------------------|---------------------------------------|---|
| Surf                                  | Sub                                   |   |
| <input checked="" type="checkbox"/> A | <input checked="" type="checkbox"/> A | Little or no evidence of pollutants or discharges entering the assessment area  |
| <input type="checkbox"/> B            | <input type="checkbox"/> B            | Noticeable evidence of pollutants or discharges entering the wetland and stressing, but not overwhelming the treatment capacity of the assessment area  |
| <input type="checkbox"/> C            | <input type="checkbox"/> C            | Noticeable evidence of pollutants or discharges (pathogen, particulate, or soluble) entering the assessment area and potentially overwhelming the treatment capacity of the wetland (water discoloration, dead vegetation, excessive sedimentation, odor) |

**6. Land Use – opportunity metric (skip for non-riparian wetlands)**

**Check all that apply (at least one box in each column).** Evaluation involves a GIS effort with field adjustment. Consider sources draining to assessment area within entire upstream watershed (WS), within 5 miles and within the watershed draining to the assessment area (5M), and within 2 miles and within the watershed draining to the assessment area (2M).

- |                                       |                                       |                                       |   |
|---------------------------------------|---------------------------------------|---------------------------------------|---|
| WS                                    | 5M                                    | 2M                                    |   |
| <input type="checkbox"/> A            | <input type="checkbox"/> A            | <input type="checkbox"/> A            | ≥ 10% impervious surfaces   |
| <input type="checkbox"/> B            | <input type="checkbox"/> B            | <input type="checkbox"/> B            | Confined animal operations (or other local, concentrated source of pollutants)  |
| <input type="checkbox"/> C            | <input type="checkbox"/> C            | <input type="checkbox"/> C            | ≥ 20% coverage of pasture   |
| <input type="checkbox"/> D            | <input checked="" type="checkbox"/> D | <input checked="" type="checkbox"/> D | ≥ 20% coverage of agricultural land (regularly plowed land)   |
| <input type="checkbox"/> E            | <input type="checkbox"/> E            | <input type="checkbox"/> E            | ≥ 20% coverage of maintained grass/herb   |
| <input type="checkbox"/> F            | <input type="checkbox"/> F            | <input type="checkbox"/> F            | ≥ 20% coverage of clear-cut land  |
| <input checked="" type="checkbox"/> G | <input type="checkbox"/> G            | <input type="checkbox"/> G            | Little or no opportunity to improve water quality. Lack of opportunity may result from little or no disturbance in the watershed <u>or</u> hydrologic alterations that prevent drainage <u>and/or</u> overbank flow from affecting the assessment area. |

**7. Wetland Acting as Vegetated Buffer – assessment area/wetland complex condition metric (skip for non-riparian wetlands)**

- 7a. Is assessment area within 50 feet of a tributary or other open water?  
Yes No If Yes, continue to 7b. If No, skip to Metric 8.  
Wetland buffer need only be present on one side of the water body. Make buffer judgment based on the average width of wetland. Record a note if a portion of the buffer has been removed or disturbed.
- 7b. How much of the first 50 feet from the bank is wetland? (Wetland buffer need only be present on one side of the water body. Make buffer judgment based on the average width of wetland. Record a note if a portion of the buffer has been removed or disturbed.)  
A ≥ 50 feet  
B From 30 to < 50 feet  
C From 15 to < 30 feet  
D From 5 to < 15 feet  
E < 5 feet or buffer bypassed by ditches
- 7c. Tributary width. If the tributary is anastomosed, combine widths of channels/braids for a total width.  
≤ 15-feet wide  > 15-feet wide  Other open water (no tributary present)
- 7d. Do roots of assessment area vegetation extend into the bank of the tributary/open water?  
Yes No
- 7e. Is stream or other open water sheltered or exposed?  
Sheltered – adjacent open water with width < 2500 feet and no regular boat traffic.  
Exposed – adjacent open water with width ≥ 2500 feet or regular boat traffic.

**8. Wetland Width at the Assessment Area – wetland type/wetland complex condition metric (evaluate WT for all marshes and Estuarine Woody Wetland only; evaluate WC for Bottomland Hardwood Forest, Headwater Forest, and Riverine Swamp Forest only)**

**Check a box in each column for riverine wetlands only.** Select the average width for the wetland type at the assessment area (WT) and the wetland complex at the assessment area (WC). See User Manual for WT and WC boundaries.

- |                                       |                                       |                       |
|---------------------------------------|---------------------------------------|-----------------------|
| WT                                    | WC                                    |                       |
| <input checked="" type="checkbox"/> A | <input checked="" type="checkbox"/> A | ≥ 100 feet            |
| <input type="checkbox"/> B            | <input type="checkbox"/> B            | From 80 to < 100 feet |
| <input type="checkbox"/> C            | <input type="checkbox"/> C            | From 50 to < 80 feet  |
| <input type="checkbox"/> D            | <input type="checkbox"/> D            | From 40 to < 50 feet  |
| <input type="checkbox"/> E            | <input type="checkbox"/> E            | From 30 to < 40 feet  |
| <input type="checkbox"/> F            | <input type="checkbox"/> F            | From 15 to < 30 feet  |
| <input type="checkbox"/> G            | <input type="checkbox"/> G            | From 5 to < 15 feet   |
| <input type="checkbox"/> H            | <input type="checkbox"/> H            | < 5 feet              |

**9. Inundation Duration – assessment area condition metric (skip for non-riparian wetlands)**

Answer for assessment area dominant landform.

- A Evidence of short-duration inundation (< 7 consecutive days)
- B Evidence of saturation, without evidence of inundation
- C Evidence of long-duration inundation or very long-duration inundation (7 to 30 consecutive days or more)

**10. Indicators of Deposition – assessment area condition metric (skip for non-riparian wetlands and all marshes)**

Consider recent deposition only (no plant growth since deposition).

- A Sediment deposition is not excessive, but at approximately natural levels.
- B Sediment deposition is excessive, but not overwhelming the wetland.
- C Sediment deposition is excessive and is overwhelming the wetland.

**11. Wetland Size – wetland type/wetland complex condition metric**

**Check a box in each column.** Involves a GIS effort with field adjustment. This metric evaluates three aspects of the wetland area: the size of the wetland type (WT), the size of the wetland complex (WC), and the size of the forested wetland (FW) (if applicable, see User Manual). See the User Manual for boundaries of these evaluation areas. If assessment area is clear-cut, select "K" for the FW column.

- | WT                                    | WC                                    | FW (if applicable)  |
|---------------------------------------|---------------------------------------|---|
| <input type="checkbox"/> A            | <input type="checkbox"/> A            | <input type="checkbox"/> A ≥ 500 acres  |
| <input type="checkbox"/> B            | <input type="checkbox"/> B            | <input type="checkbox"/> B From 100 to < 500 acres                            |
| <input type="checkbox"/> C            | <input type="checkbox"/> C            | <input type="checkbox"/> C From 50 to < 100 acres                             |
| <input type="checkbox"/> D            | <input type="checkbox"/> D            | <input type="checkbox"/> D From 25 to < 50 acres                              |
| <input type="checkbox"/> E            | <input type="checkbox"/> E            | <input type="checkbox"/> E From 10 to < 25 acres                              |
| <input type="checkbox"/> F            | <input type="checkbox"/> F            | <input type="checkbox"/> F From 5 to < 10 acres                               |
| <input type="checkbox"/> G            | <input type="checkbox"/> G            | <input type="checkbox"/> G From 1 to < 5 acres                                |
| <input type="checkbox"/> H            | <input type="checkbox"/> H            | <input type="checkbox"/> H From 0.5 to < 1 acre                               |
| <input checked="" type="checkbox"/> I | <input checked="" type="checkbox"/> I | <input checked="" type="checkbox"/> I From 0.1 to < 0.5 acre                  |
| <input type="checkbox"/> J            | <input type="checkbox"/> J            | <input type="checkbox"/> J From 0.01 to < 0.1 acre                            |
| <input type="checkbox"/> K            | <input type="checkbox"/> K            | <input type="checkbox"/> K < 0.01 acre <u>or</u> assessment area is clear-cut |

**12. Wetland Intactness – wetland type condition metric (evaluate for Pocosins only)**

- A Pocosin is the full extent (≥ 90%) of its natural landscape size.
- B Pocosin type is < 90% of the full extent of its natural landscape size.

**13. Connectivity to Other Natural Areas – landscape condition metric**

13a. **Check appropriate box(es) (a box may be checked in each column).** Involves a GIS effort with field adjustment. This metric evaluates whether the wetland is well connected (Well) and/or loosely connected (Loosely) to the landscape patch, the contiguous naturally vegetated area and open water (if appropriate). Boundaries are formed by four-lane roads, regularly maintained utility line corridors the width of a four-lane road or wider, urban landscapes, maintained fields (pasture and agriculture), or open water > 300 feet wide.

- | Well                                  | Loosely                               |  |
|---------------------------------------|---------------------------------------|--|
| <input checked="" type="checkbox"/> A | <input checked="" type="checkbox"/> A | ≥ 500 acres  |
| <input type="checkbox"/> B            | <input type="checkbox"/> B            | From 100 to < 500 acres  |
| <input type="checkbox"/> C            | <input type="checkbox"/> C            | From 50 to < 100 acres   |
| <input type="checkbox"/> D            | <input type="checkbox"/> D            | From 10 to < 50 acres  |
| <input type="checkbox"/> E            | <input type="checkbox"/> E            | < 10 acres   |
| <input type="checkbox"/> F            | <input type="checkbox"/> F            | Wetland type has a poor or no connection to other natural habitats |

13b. **Evaluate for marshes only.**

- Yes  No Wetland type has a surface hydrology connection to open waters/stream or tidal wetlands.

**14. Edge Effect – wetland type condition metric (skip for all marshes and Estuarine Woody Wetland)**

May involve a GIS effort with field adjustment. Estimate distance from wetland type boundary to artificial edges. Artificial edges include non-forested areas ≥ 40 feet wide such as fields, development, roads, regularly maintained utility line corridors, and clear-cuts. Consider the eight main points of the compass. Artificial edge occurs within 150 feet in how many directions? If the assessment area is clear cut, select option "C."

- A 0
- B 1 to 4
- C 5 to 8

**15. Vegetative Composition – assessment area condition metric (skip for all marshes and Pine Flat)**

- A Vegetation is close to reference condition in species present and their proportions. Lower strata composed of appropriate species, with exotic plants absent or sparse within the assessment area.
- B Vegetation is different from reference condition in species diversity or proportions, but still largely composed of native species characteristic of the wetland type. This may include communities of weedy native species that develop after clearcutting or clearing. It also includes communities with exotics present, but not dominant, over a large portion of the expected strata.
- C Vegetation severely altered from reference in composition, or expected species are unnaturally absent (planted stands of non-characteristic species or at least one stratum inappropriately composed of a single species), or exotic species are dominant in at least one stratum.

**16. Vegetative Diversity – assessment area condition metric (evaluate for Non-tidal Freshwater Marsh only)**

- A Vegetation diversity is high and is composed primarily of native species (< 10% cover of exotics).
- B Vegetation diversity is low or has > 10% to 50% cover of exotics.
- C Vegetation is dominated by exotic species (> 50 % cover of exotics).



**17. Vegetative Structure – assessment area/wetland type condition metric**

17a. Is vegetation present?

Yes  No If Yes, continue to 17b. If No, skip to Metric 18.

17b. Evaluate percent coverage of assessment area vegetation **for all marshes only**. Skip to 17c for non-marsh wetlands.

A ≥ 25% coverage of vegetation  
 B < 25% coverage of vegetation

17c. **Check a box in each column for each stratum**. Evaluate this portion of the metric **for non-marsh wetlands**. Consider structure in airspace above the assessment area (AA) and the wetland type (WT) separately.

	AA	WT	
Canopy	<input checked="" type="checkbox"/> A	<input checked="" type="checkbox"/> A	Canopy closed, or nearly closed, with natural gaps associated with natural processes
	<input type="checkbox"/> B	<input type="checkbox"/> B	Canopy present, but opened more than natural gaps
	<input type="checkbox"/> C	<input type="checkbox"/> C	Canopy sparse or absent
Mid-Story	<input type="checkbox"/> A	<input type="checkbox"/> A	Dense mid-story/sapling layer
	<input checked="" type="checkbox"/> B	<input checked="" type="checkbox"/> B	Moderate density mid-story/sapling layer
	<input type="checkbox"/> C	<input type="checkbox"/> C	Mid-story/sapling layer sparse or absent
Shrub	<input type="checkbox"/> A	<input type="checkbox"/> A	Dense shrub layer
	<input checked="" type="checkbox"/> B	<input checked="" type="checkbox"/> B	Moderate density shrub layer
	<input type="checkbox"/> C	<input type="checkbox"/> C	Shrub layer sparse or absent
Herb	<input checked="" type="checkbox"/> A	<input checked="" type="checkbox"/> A	Dense herb layer
	<input type="checkbox"/> B	<input type="checkbox"/> B	Moderate density herb layer
	<input type="checkbox"/> C	<input type="checkbox"/> C	Herb layer sparse or absent

**18. Snags – wetland type condition metric (skip for all marshes)**

A Large snags (more than one) are visible (> 12 inches DBH, or large relative to species present and landscape stability).  
 B Not A

**19. Diameter Class Distribution – wetland type condition metric (skip for all marshes)**

A Majority of canopy trees have stems > 6 inches in diameter at breast height (DBH); many large trees (> 12 inches DBH) are present.  
 B Majority of canopy trees have stems between 6 and 12 inches DBH, few are > 12 inch DBH.  
 C Majority of canopy trees are < 6 inches DBH or no trees.

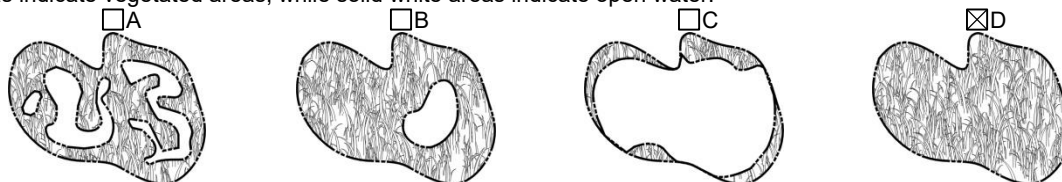
**20. Large Woody Debris – wetland type condition metric (skip for all marshes)**

Include both natural debris and man-placed natural debris.

A Large logs (more than one) are visible (> 12 inches in diameter, or large relative to species present and landscape stability).  
 B Not A

**21. Vegetation/Open Water Dispersion – wetland type/open water condition metric (evaluate for Non-Tidal Freshwater Marsh only)**

Select the figure that best describes the amount of interspersion between vegetation and open water in the growing season. Patterned areas indicate vegetated areas, while solid white areas indicate open water.



**22. Hydrologic Connectivity – assessment area condition metric (evaluate for riparian wetlands and Salt/Brackish Marsh only)**

Examples of activities that may severely alter hydrologic connectivity include intensive ditching, fill, sedimentation, channelization, diversion, man-made berms, beaver dams, and stream incision. Documentation required if evaluated as B, C, or D.

A Overbank and overland flow are not severely altered in the assessment area.  
 B Overbank flow is severely altered in the assessment area.  
 C Overland flow is severely altered in the assessment area.  
 D Both overbank and overland flow are severely altered in the assessment area.

Notes

**NC WAM Wetland Rating Sheet  
Accompanies User Manual Version 5.0**

Wetland Site Name Wetland B Date of Assessment 11/15/2022  
 Wetland Type Bottomland Hardwood Forest Assessor Name/Organization K. Hogarth/Wildlands

Notes on Field Assessment Form (Y/N) NO  
 Presence of regulatory considerations (Y/N) YES  
 Wetland is intensively managed (Y/N) NO  
 Assessment area is located within 50 feet of a natural tributary or other open water (Y/N) YES  
 Assessment area is substantially altered by beaver (Y/N) NO  
 Assessment area experiences overbank flooding during normal rainfall conditions (Y/N) NO  
 Assessment area is on a coastal island (Y/N) NO

**Sub-function Rating Summary**

Function	Sub-function	Metrics	Rating	
Hydrology	Surface Storage and Retention Sub-surface Storage and Retention	Condition	<b>MEDIUM</b>	
		Condition	<b>MEDIUM</b>	
Water Quality	Pathogen Change	Condition	<b>LOW</b>	
		Condition/Opportunity	<b>LOW</b>	
		Opportunity Presence (Y/N)	<b>NO</b>	
	Particulate Change	Condition	<b>MEDIUM</b>	
		Condition/Opportunity	<b>MEDIUM</b>	
		Opportunity Presence (Y/N)	<b>NO</b>	
	Soluble Change	Condition	Condition	<b>LOW</b>
			Condition/Opportunity	<b>LOW</b>
			Opportunity Presence (Y/N)	<b>NO</b>
		Physical Change	Condition	<b>MEDIUM</b>
			Condition/Opportunity	<b>MEDIUM</b>
			Opportunity Presence (Y/N)	<b>NO</b>
Pollution Change	Condition	NA		
	Condition/Opportunity	NA		
	Opportunity Presence (Y/N)	NA		
Habitat	Physical Structure	Condition	<b>HIGH</b>	
	Landscape Patch Structure	Condition	<b>MEDIUM</b>	
	Vegetation Composition	Condition	<b>HIGH</b>	

**Function Rating Summary**

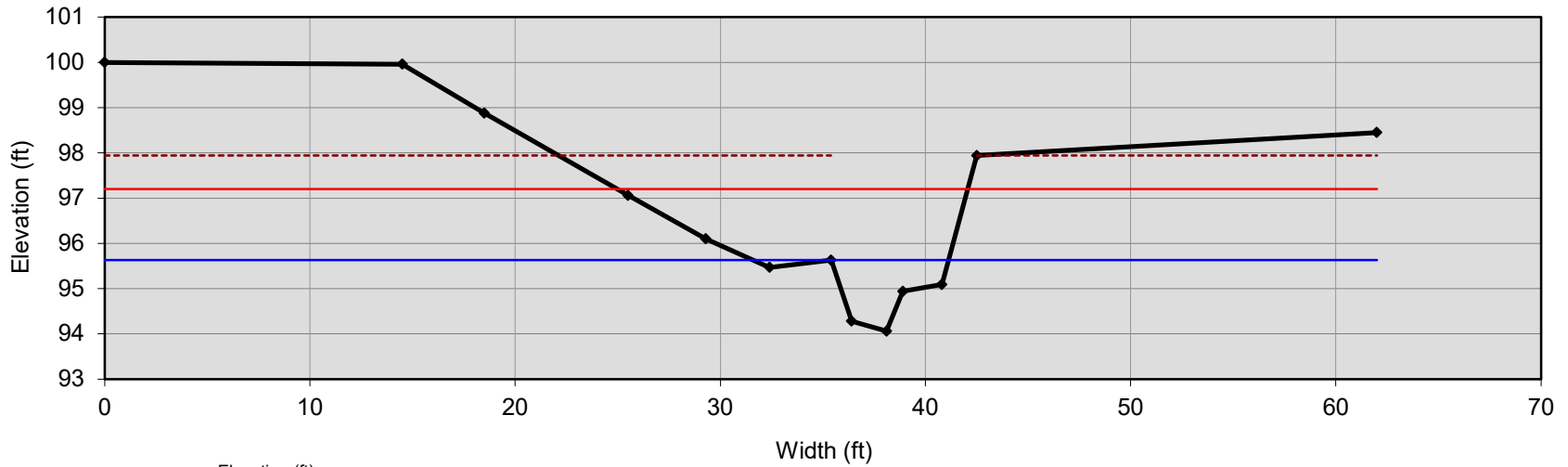
Function	Metrics	Rating
Hydrology	Condition	<b>MEDIUM</b>
Water Quality	Condition	<b>LOW</b>
	Condition/Opportunity	<b>LOW</b>
	Opportunity Presence (Y/N)	<b>NO</b>
Habitat	Condition	<b>HIGH</b>

**Overall Wetland Rating** **MEDIUM**

## **Appendix 4: Supplementary Design Information**

**Cross Section Casey Creek R3, RAL1**

rifle



Bankfull Dimensions

5.3	x-section area (ft.sq.)
5.7	width (ft)
0.9	mean depth (ft)
1.6	max depth (ft)
7.1	wetted perimeter (ft)
0.7	hydraulic radius (ft)
6.2	width-depth ratio

Flood Dimensions

17.1	W flood prone area (ft)
3.0	entrenchment ratio
3.9	low bank height (ft)
2.5	low bank height ratio

Materials

---	D50 (mm)
---	D84 (mm)
12	threshold grain size (mm):

Rosgen Stream Type

--- Missing: , , Sinuosity, D50,

Bankfull Flow

2.2	velocity (ft/s)
11.9	discharge rate (cfs)
0.45	Froude number

Flow Resistance

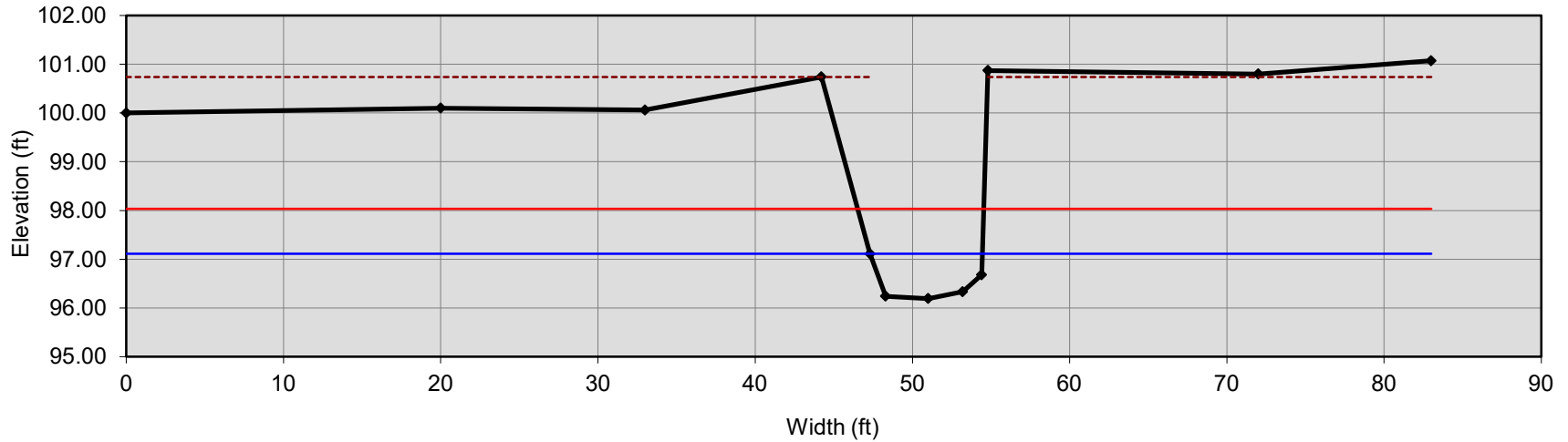
0.040	Manning's roughness
0.20	Darcy-Weisbach fric.
---	resistance factor u/u*
---	relative roughness

Forces & Power

0.529	channel slope (%)
0.25	shear stress (lb/sq.ft.)
0.36	shear velocity (ft/s)
0.68	unit strm power (lb/ft/s)

**Cross Section Casey Creek R3, RAL2**

riffle



Bankfull Dimensions

5.5	x-section area (ft.sq.)
7.1	width (ft)
0.8	mean depth (ft)
0.9	max depth (ft)
7.9	wetted perimeter (ft)
0.7	hydraulic radius (ft)
9.3	width-depth ratio

Flood Dimensions

8.0	W flood prone area (ft)
1.1	entrenchment ratio
4.6	low bank height (ft)
4.9	low bank height ratio

Materials

---	D50 (mm)
---	D84 (mm)
10	threshold grain size (mm):

Rosgen Stream Type

--- Missing: , , Sinuosity, D50,

Bankfull Flow

2.0	velocity (ft/s)
10.7	discharge rate (cfs)
0.42	Froude number

Flow Resistance

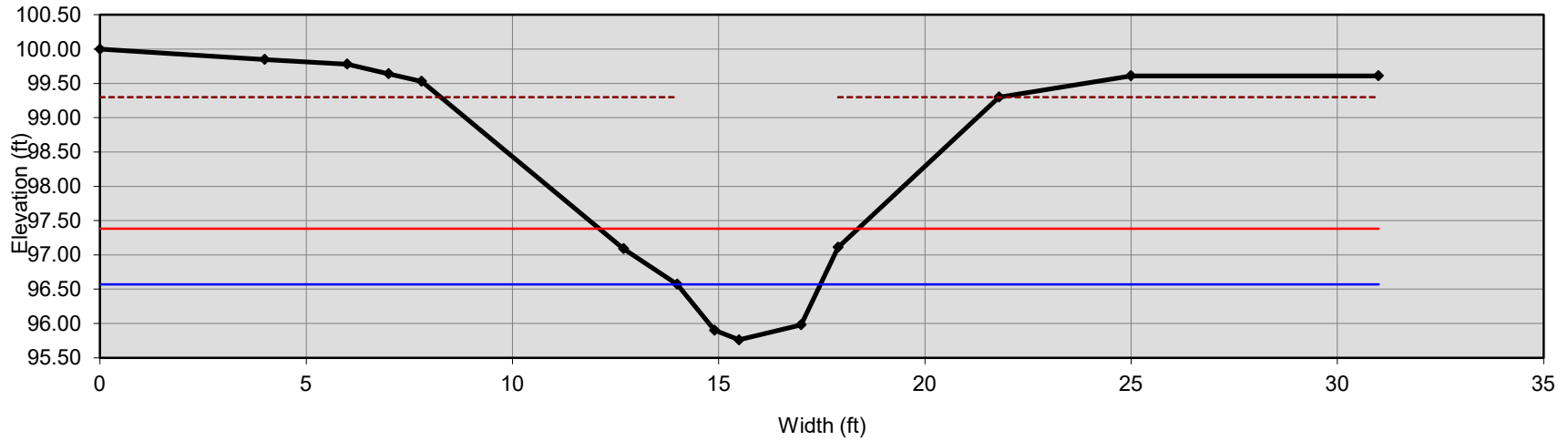
0.040	Manning's roughness
0.21	Darcy-Weisbach fric.
---	resistance factor u/u*
---	relative roughness

Forces & Power

0.457	channel slope (%)
0.20	shear stress (lb/sq.ft.)
0.32	shear velocity (ft/s)
0.43	unit strm power (lb/ft/s)

**Cross Section Martha Branch, RAL3**

riffle



Bankfull Dimensions

1.9	x-section area (ft.sq.)
3.5	width (ft)
0.6	mean depth (ft)
0.8	max depth (ft)
4.0	wetted perimeter (ft)
0.5	hydraulic radius (ft)
6.2	width-depth ratio

Flood Dimensions

6.3	W flood prone area (ft)
1.8	entrenchment ratio
3.5	low bank height (ft)
4.4	low bank height ratio

Materials

---	D50 (mm)
---	D84 (mm)
14	threshold grain size (mm):

Rosgen Stream Type

--- Missing: , Sinuosity, D50,

Bankfull Flow

2.2	velocity (ft/s)
4.3	discharge rate (cfs)
0.56	Froude number

Flow Resistance

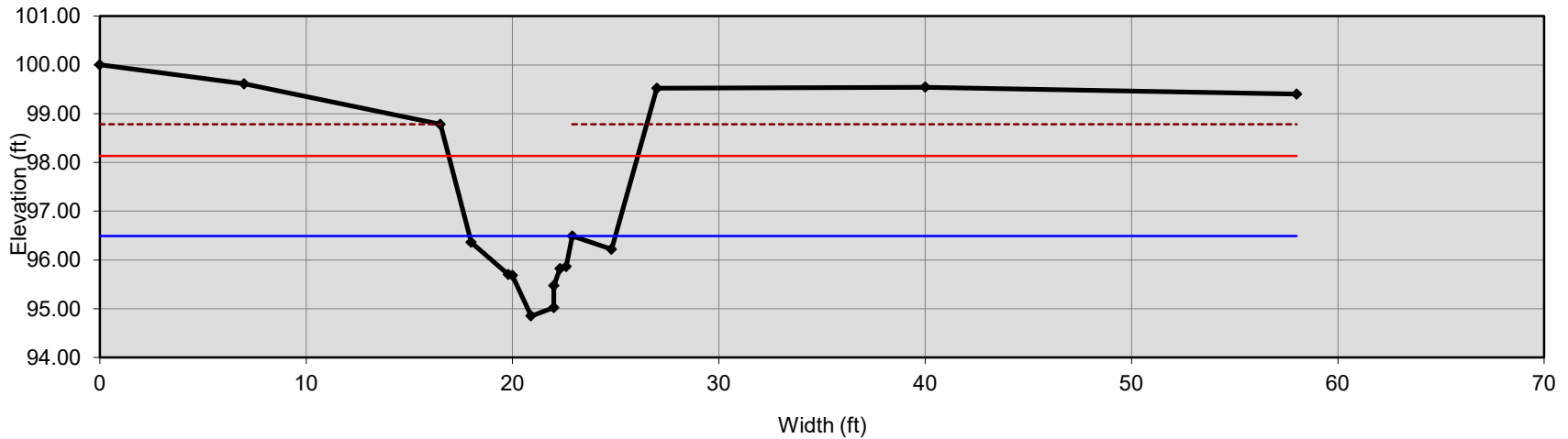
0.040	Manning's roughness
0.24	Darcy-Weisbach fric.
---	resistance factor $u/u^*$
---	relative roughness

Forces & Power

0.936	channel slope (%)
0.28	shear stress (lb/sq.ft.)
0.38	shear velocity (ft/s)
0.72	unit strm power (lb/ft/s)

**Cross Section Afton Branch, RAL4**

riffle



Bankfull Dimensions

4.3	x-section area (ft.sq.)
5.0	width (ft)
0.9	mean depth (ft)
1.6	max depth (ft)
6.5	wetted perimeter (ft)
0.7	hydraulic radius (ft)
5.7	width-depth ratio

Flood Dimensions

9.2	W flood prone area (ft)
1.8	entrenchment ratio
3.9	low bank height (ft)
2.4	low bank height ratio

Materials

---	D50 (mm)
---	D84 (mm)
10	threshold grain size (mm):

Rosgen Stream Type

--- Missing: , , Sinuosity, D50,

Bankfull Flow

1.9	velocity (ft/s)
8.5	discharge rate (cfs)
0.42	Froude number

Flow Resistance

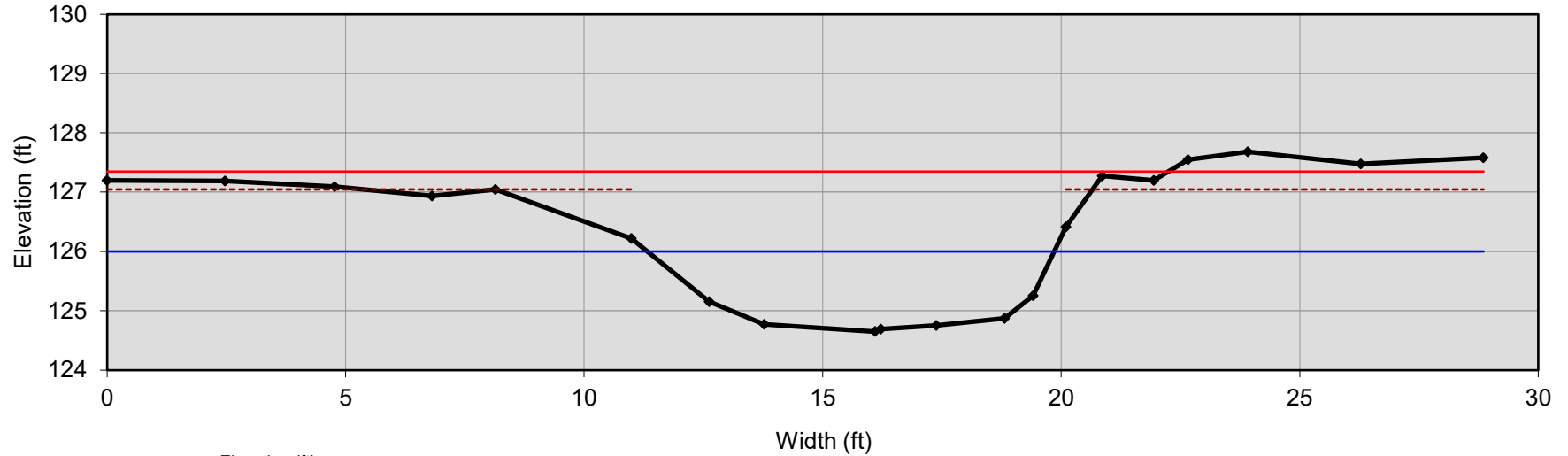
0.040	Manning's roughness
0.21	Darcy-Weisbach fric.
---	resistance factor u/u*
---	relative roughness

Forces & Power

0.468	channel slope (%)
0.19	shear stress (lb/sq.ft.)
0.32	shear velocity (ft/s)
0.5	unit strm power (lb/ft/s)

Cross Section Casey Creek R4, XS4

riffle



Bankfull Dimensions	
8.8	x-section area (ft.sq.)
8.5	width (ft)
1.0	mean depth (ft)
1.3	max depth (ft)
9.4	wetted perimeter (ft)
0.9	hydraulic radius (ft)
8.3	width-depth ratio

Flood Dimensions	
---	W flood prone area (ft)
---	entrenchment ratio
2.4	low bank height (ft)
1.8	low bank height ratio

Materials	
---	D50 (mm)
---	D84 (mm)
13	threshold grain size (mm):

Rosgen Stream Type	
---	Missing: , , Sinuosity, D50,

Bankfull Flow	
2.4	velocity (ft/s)
21.4	discharge rate (cfs)
0.44	Froude number

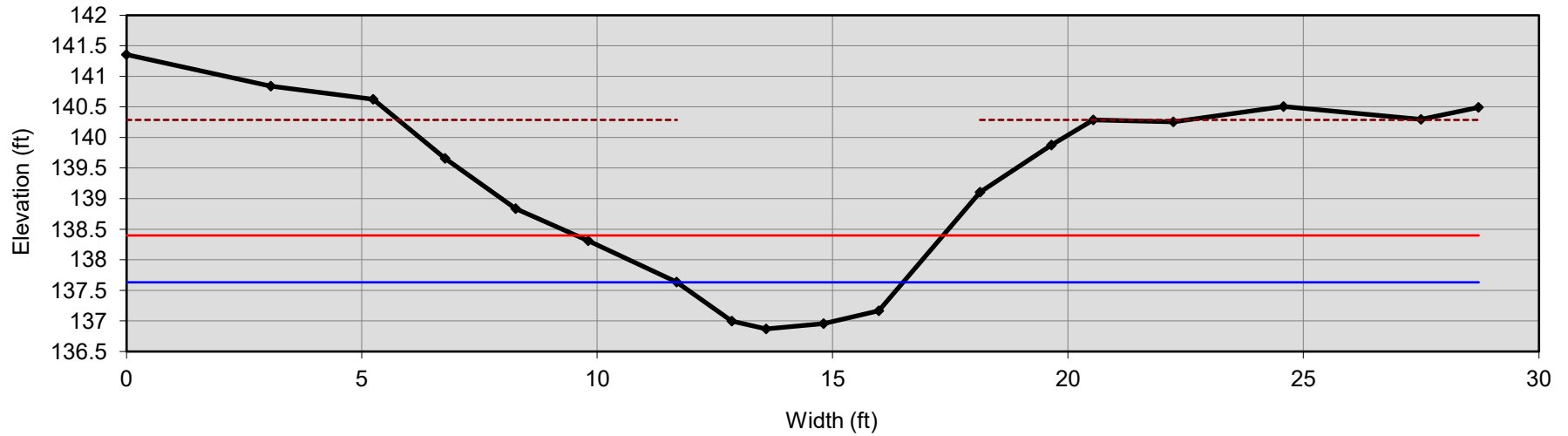
Flow Resistance	
0.040	Manning's roughness
0.19	Darcy-Weisbach fric.
---	resistance factor u/u*
---	relative roughness

Forces & Power	
0.46	channel slope (%)
0.27	shear stress (lb/sq.ft.)
0.37	shear velocity (ft/s)
0.72	unit strm power (lb/ft/s)



**Cross Section 5 (Martha Branch)**

riffle



Bankfull Dimensions

2.6	x-section area (ft.sq.)
4.8	width (ft)
0.5	mean depth (ft)
0.8	max depth (ft)
5.2	wetted perimeter (ft)
0.5	hydraulic radius (ft)
9.0	width-depth ratio

Flood Dimensions

7.8	W flood prone area (ft)
1.6	entrenchment ratio
3.4	low bank height (ft)
4.5	low bank height ratio

Materials

---	D50 (mm)
---	D84 (mm)
14	threshold grain size (mm):

Rosgen Stream Type

--- Missing: , , Sinuosity, D50,

Bankfull Flow

2.3	velocity (ft/s)
5.8	discharge rate (cfs)
0.57	Froude number

Flow Resistance

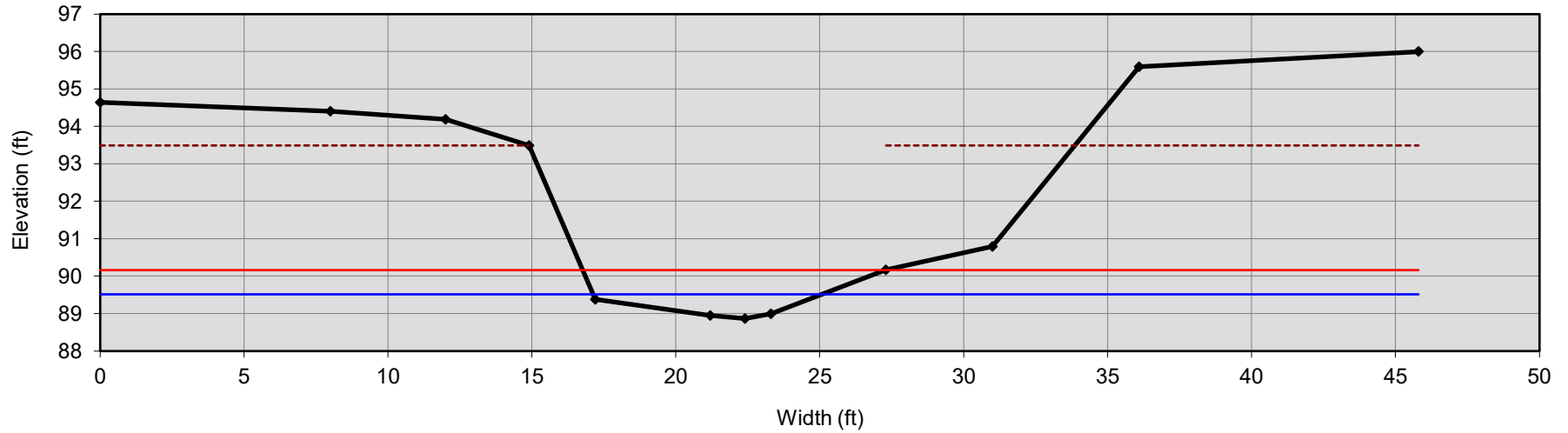
0.040	Manning's roughness
0.23	Darcy-Weisbach fric.
---	resistance factor $u/u^*$
---	relative roughness

Forces & Power

0.94	channel slope (%)
0.29	shear stress (lb/sq.ft.)
0.39	shear velocity (ft/s)
0.7	unit strm power (lb/ft/s)

**Cross Section 6 (Casey Cr R2)**

riffle



Bankfull Dimensions

3.1	x-section area (ft.sq.)
8.0	width (ft)
0.4	mean depth (ft)
0.6	max depth (ft)
8.1	wetted perimeter (ft)
0.4	hydraulic radius (ft)
20.3	width-depth ratio

Flood Dimensions

12.4	W flood prone area (ft)
1.6	entrenchment ratio
4.6	low bank height (ft)
7.2	low bank height ratio

Materials

---	D50 (mm)
---	D84 (mm)
15	threshold grain size (mm):

Rosgen Stream Type

c	Missing: , , Sinuosity, D50,
---	------------------------------

Bankfull Flow

2.2	velocity (ft/s)
7.0	discharge rate (cfs)
0.64	Froude number

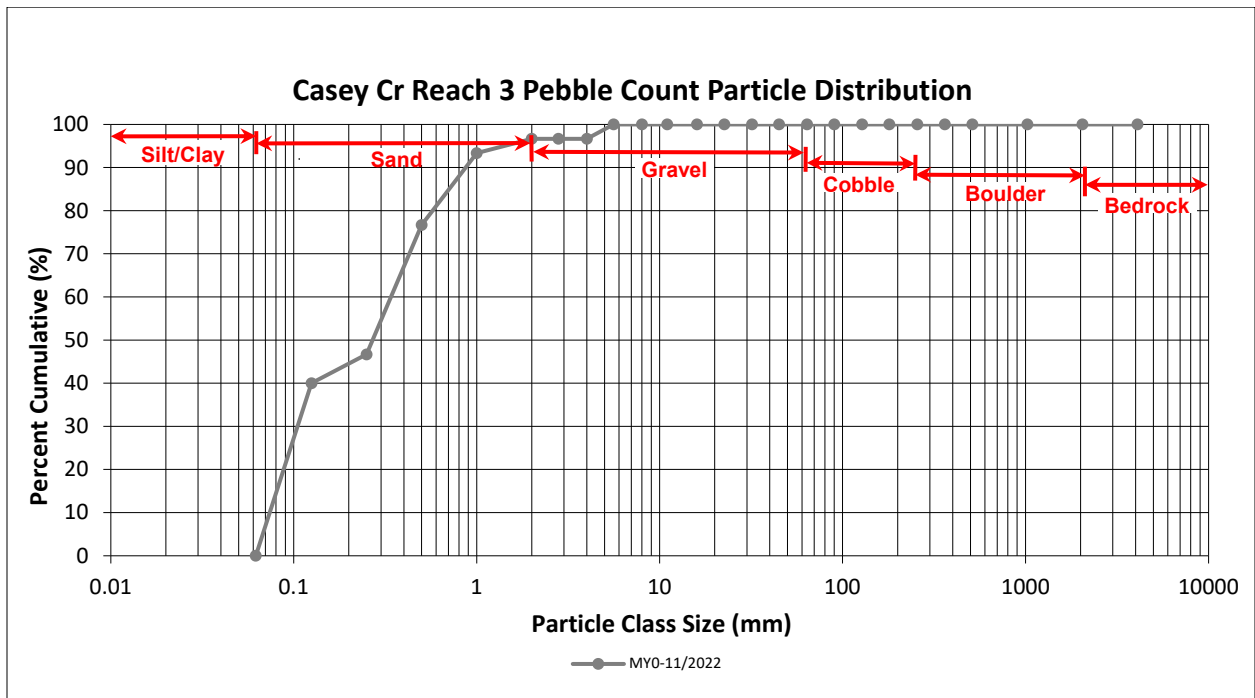
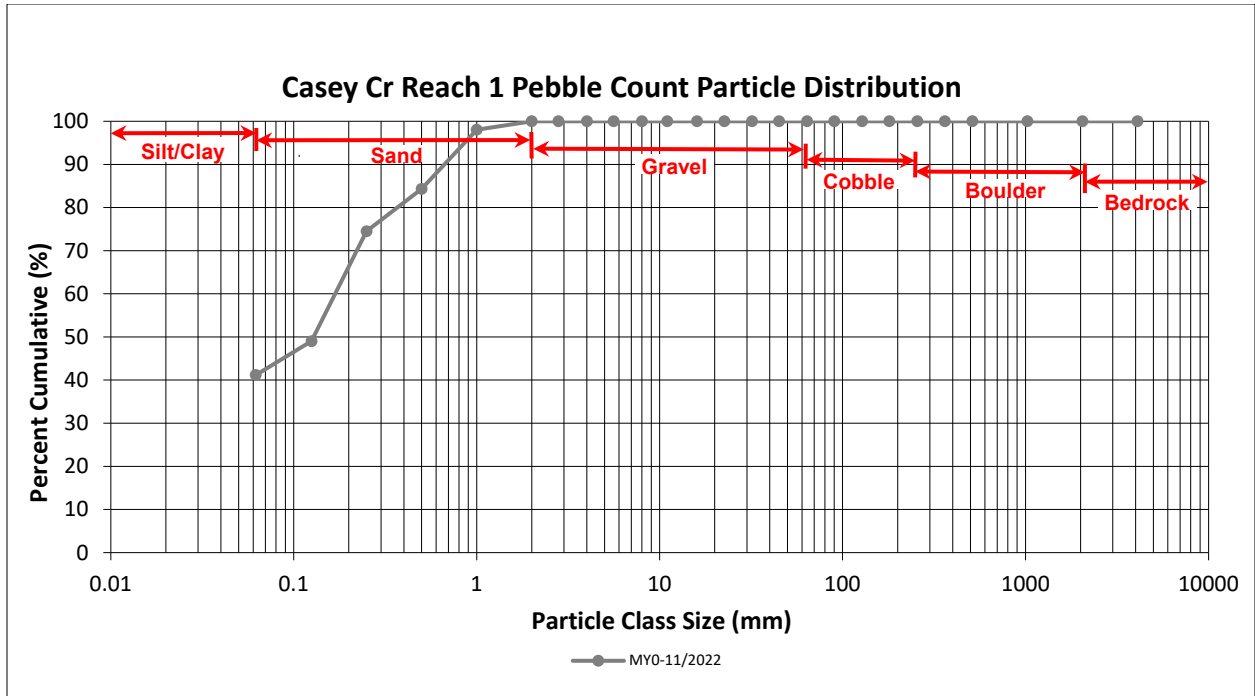
Flow Resistance

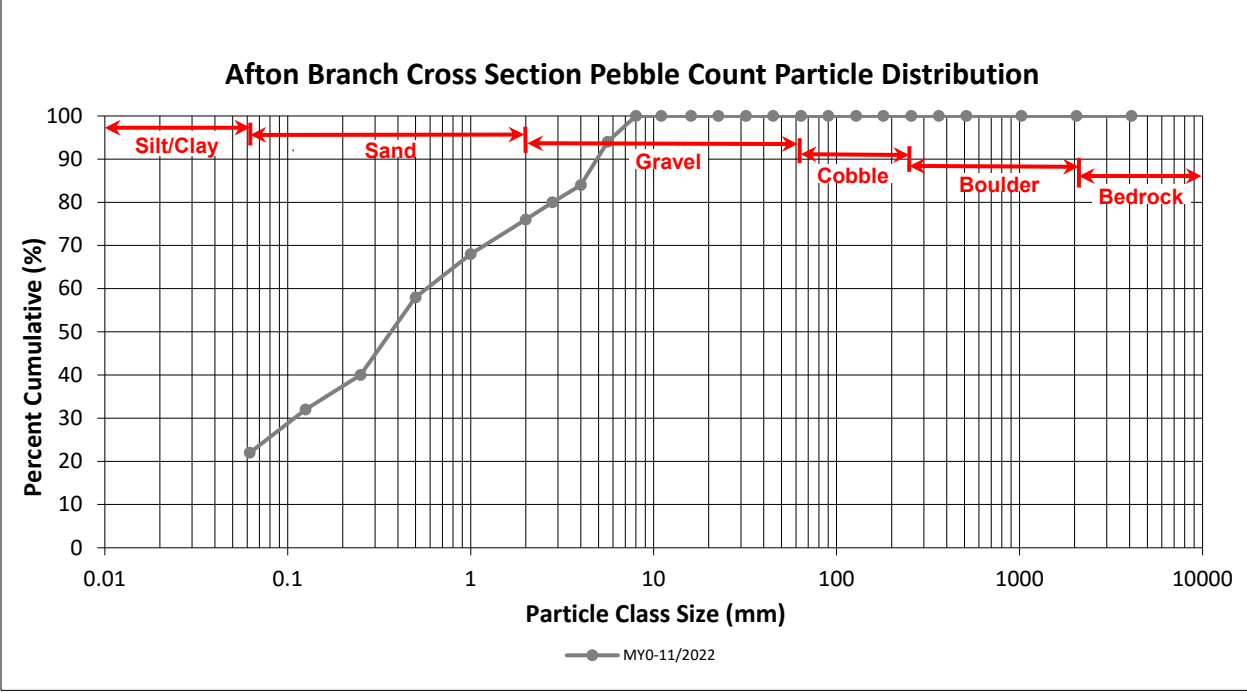
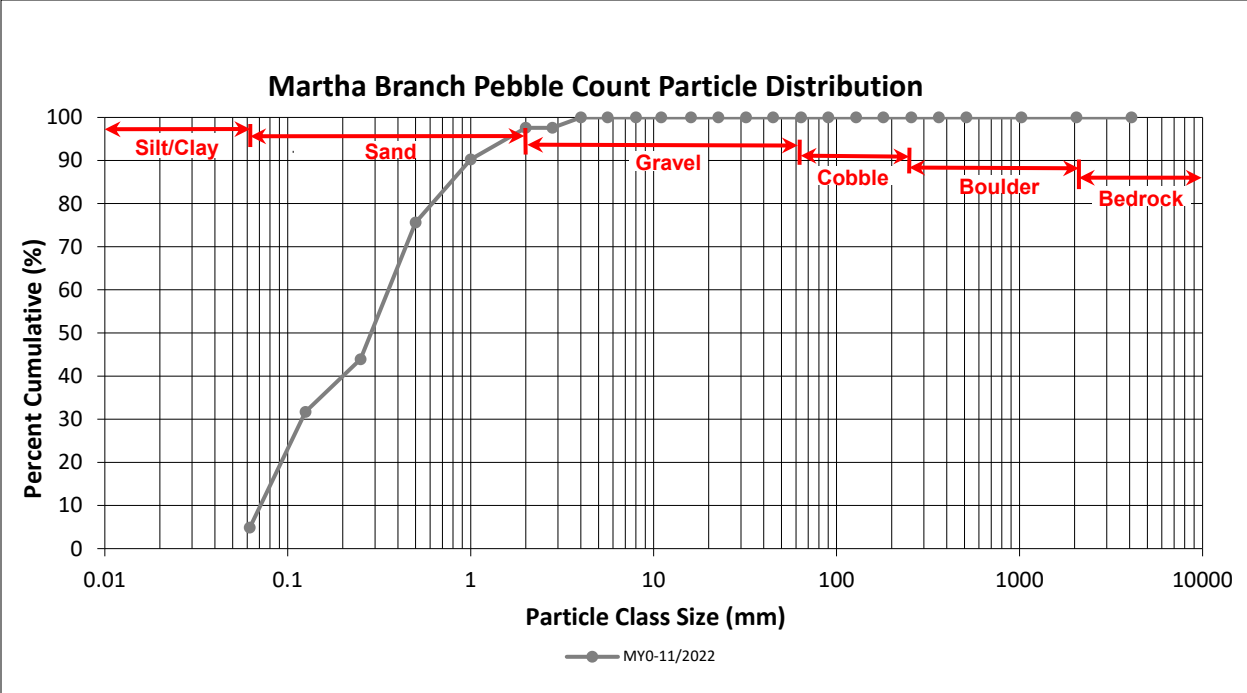
0.040	Manning's roughness
0.26	Darcy-Weisbach fric.
---	resistance factor $u/u^*$
---	relative roughness

Forces & Power

1.3	channel slope (%)
0.31	shear stress (lb/sq.ft.)
0.40	shear velocity (ft/s)
0.72	unit strm power (lb/ft/s)

Casey Creek Sediment Distribution Curves





Restoration Reach Proposed Geomorphic Parameters

	Notation	Units	Martha Branch			Afton Branch			Casey Creek R2			Casey Creek R3			Casey Creek R4		
			Typical Section Values	Min	Max	Typical Section Values	Min	Max	Typical Section Values	Min	Max	Typical Section Values	Min	Max	Typical Section Values	Min	Max
stream type			C5/E5			C5/E5			C5/E5			C5/E5			C5/E5		
drainage area	DA	sq mi	0.13			0.33			0.16			0.36			0.69		
design discharge	Q	cfs	6	-		9	-		7	-		9	-		15	-	
bankfull cross-sectional area	A <sup>bkf</sup>	SF	3.5	-		5.2	-		3.7	-		4.6	-		7.9	-	
average velocity during bankfull event	V <sup>bkf</sup>	fps	1.8	-		1.8	-		2.0	-		2.0	-		1.9	-	
<b>Cross Section</b>																	
width at bankfull	w <sup>bkf</sup>	feet	6.8	-		8.5	-		7.0	-		8.2	-		10.2	-	
maximum depth at bankfull	d <sup>max</sup>	feet	0.8	-		1.0	-		0.8	-		1.0	-		1.3	-	
mean depth at bankfull	d <sup>bkf</sup>	feet	0.5	-		0.6	-		0.5	-		0.6	-		0.8	-	
bankfull width to depth ratio	w <sup>bkf</sup> /d <sup>bkf</sup>		13.0	-		14.0	-		13.0	-		14.0	-		13.0	-	
depth ratio	d <sup>max</sup> /d <sup>bkf</sup>	feet	1.6	-		1.7	-		1.6	-		1.7	-		1.7	-	
bank height ratio	BHR		1.0	-		1.0	-		1.0	-		1.0	-		1.0	-	
floodprone area width	w <sup>fpa</sup>	feet	-	15	34	-	19	43	-	15	35	-	18	41	-	22	51
entrenchment ratio	ER		-	2.2	5.0	-	2.2	5.0	-	2.2	5.0	-	2.2	5.0	-	2.2	5.0
<b>Slope</b>																	
valley slope	S <sup>valley</sup>	feet/foot	0.0072			0.0055			0.0084			0.0074			0.0048		
channel slope	S <sup>chnl</sup>	feet/foot	-	0.0056	0.0060	-	0.0042	0.0050	-	0.0067	0.0076	-	0.0057	0.0074	-	0.0037	0.0048
<b>Profile</b>																	
riffle slope	S <sup>riffle</sup>	feet/foot	-	0.0067	0.020	-	0.0042	0.015	-	0.0081	0.0260	-	0.0057	0.0222	-	0.0037	0.0144
riffle slope ratio	S <sup>riffle</sup> /S <sup>chnl</sup>		-	1.2	3.4	-	1.0	3.0	-	1.2	3.4	-	1.0	3.0	-	1.0	3.0
pool slope	S <sub>p</sub>	feet/foot	-	0.000	0.000	-	0.000	0.000	-	0.000	0.000	-	0.000	0.000	-	0.000	0.000
pool slope ratio	S <sub>p</sub> /S <sup>chnl</sup>		-	0.0	0.0	-	0.0	0.0	-	0.0	0.0	-	0.0	0.0	-	0.0	0.0
pool-to-pool spacing	L <sup>p-p</sup>	feet	-	11	51	-	14	51	-	11	53	-	13	55	-	16	79
pool spacing ratio	L <sup>p-p</sup> /w <sup>bkf</sup>		-	1.6	7.5	-	1.6	6.0	-	1.6	7.5	-	1.6	6.8	-	1.6	7.7
pool cross-sectional area	A <sup>pool</sup>	SF	-	3.9	10.6	-	5.7	18.2	-	4.0	11.0	-	5.1	16.2	-	10.3	27.7
pool area ratio	A <sup>pool</sup> /A <sup>bkf</sup>		-	1.1	3.0	-	1.1	3.5	-	1.1	3.0	-	1.1	3.5	-	1.3	3.5
maximum pool depth	d <sup>pool</sup>	feet	-	0.8	2.1	-	0.9	2.4	-	0.8	2.1	-	0.8	2.3	-	1.2	3.1
pool depth ratio	d <sup>pool</sup> /d <sup>bkf</sup>		-	1.5	4.0	-	1.5	4.0	-	1.5	4.0	-	1.5	4.0	-	1.5	4.0
pool width at bankfull	w <sup>pool</sup>	feet	-	8.2	10.9	-	10.2	13.6	-	8.4	11.2	-	9.8	13.1	-	12.2	16.3
pool width ratio	w <sup>pool</sup> /w <sup>bkf</sup>		-	1.2	1.6	-	1.2	1.6	-	1.2	1.6	-	1.2	1.6	-	1.2	1.6
<b>Pattern</b>																	
sinuosity	K		-	1.20		-	1.20		-	1.20		-	1.20		-	1.25	
belt width	w <sup>blt</sup>	feet	-	14	54	-	17	56	-	14	56	-	16	54	-	20	82
meander width ratio	w <sup>blt</sup> /w <sup>bkf</sup>		-	2.0	8.0	-	2.0	6.6	-	2.0	8.0	-	2.0	6.6	-	2.0	8.0
linear wavelength (formerly meander length)	L <sub>m</sub>	feet	-	34	102	-	42	102	-	35	105	-	40	111	-	61	157
linear wavelength ratio (formerly meander length ratio)	L <sub>m</sub> /w <sup>bkf</sup>		-	5.0	15.0	-	4.9	12.0	-	5.0	15.0	-	4.9	13.5	-	6.0	15.4
Meander Length		feet	-	41	122	-	31	259	-	42	126	-	48	133	-	77	196
Meander Length Ratio			-	6.0	18.0	-	3.6	30.5	-	6.0	18.0	-	5.9	16.2	-	7.5	19.3
radius of curvature	R <sub>c</sub>	feet	-	14	34	-	17	30	-	14	35	-	16	41	-	20	51
radius of curvature ratio	R <sub>c</sub> /w <sup>bkf</sup>		-	2.0	5.0	-	2.0	3.5	-	2.0	5.0	-	2.0	5.0	-	2.0	5.0

## **Appendix 5: Preliminary Jurisdictional Determination**

## Chris Roessler

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**From:** Thompson, Emily B CIV USARMY CESAW (USA) <Emily.B.Thompson@usace.army.mil>  
**Sent:** Friday, June 23, 2023 10:04 AM  
**To:** Kaitlyn Hogarth  
**Subject:** SAW-2022-01239 (NCDMS ILF - Casey Creek Mitigation Site)

Dear Kaitlyn (on behalf of Wildlands Engineering, Inc.),

Reference is made to ORM ID **SAW-2022-01239**, please reference this number on any correspondence regarding this action.

On May 24, 2012 we met at the proposed Casey Creek Mitigation site located adjacent to 3890 S US 13 HWY in Goldsboro, Wayne County, North Carolina to review the boundaries of the aquatic resources delineation you submitted March 24, 2023.

We have reviewed the information provided by you concerning the aquatic resources, and by copy of this e-mail, are confirming that the aquatic resources delineation has been verified by the Corps to be a sufficiently accurate and reliable representation of the location and extent of aquatic resources within the identified review area. The location and extent of these aquatic resources are shown on the delineation map, labeled "Figure 3. Site Map" and provided on June 1, 2023 with revisions from the original submittal.

Regulatory Guidance Letter (RGL) 16-01

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

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

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

Sincerely,  
Emily

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

We at the U.S. Army Corps of Engineers Regulatory Branch are committed to improving service to our customers. We would appreciate your feedback on how we are performing our duties. Our automated Customer Service Survey is located at: <https://regulatory.ops.usace.army.mil/customer-service-survey/>

Preliminary ORM Data Entry Fields for New Actions

ACTION ID #: SAW- SAW-2022-01239

Begin Date (Date Received):

Prepare file folder

Assign Action ID Number in ORM

1. Project Name [PCN Form A2a]: Casey Creek Mitigation Site

2. Work Type:  Private  Institutional  Government  Commercial

3. Project Description / Purpose [PCN Form B3d and B3e]:

Stream mitigation site for NC Division of Mitigation Services.

4. Property Owner / Applicant [PCN Form A3 or A4]: See attached property owner table

5. Agent / Consultant [PNC Form A5 – or ORM Consultant ID Number]:

Kaitlyn Hogarth Wildlands Engineering

6. Related Action ID Number(s) [PCN Form B5b]:

7. Project Location – Coordinates, Street Address, and/or Location Description [PCN Form B1b]:

35.2951103, -78.1851553

8. Project Location – Tax Parcel ID [PCN Form B1a]: See attached property owner table

9. Project Location – County [PCN Form A2b]: Wayne

10. Project Location – Nearest Municipality or Town [PCN Form A2c]: Grantham

11. Project Information – Nearest Waterbody [PCN Form B2a]: Falling Creek

12. Watershed / 8-Digit Hydrologic Unit Code [PCN Form B2c]: Neuse 03020201

Authorization: Section 10  Section 404  Section 10 and 404

Regulatory Action Type:

- |  |   |
|--|---|
| <input type="checkbox"/> Standard Permit                                 | <input checked="" type="checkbox"/> Pre-Application Request |
| <input type="checkbox"/> Nationwide Permit #                             | <input type="checkbox"/> Unauthorized Activity              |
| <input type="checkbox"/> Regional General Permit #                       | <input type="checkbox"/> Compliance                         |
| <input checked="" type="checkbox"/> Jurisdictional Determination Request | <input type="checkbox"/> No Permit Required                 |





March 24, 2023

Kim Isenhour  
Raleigh Regulatory Field Office  
3331 Heritage Trade Drive, Suite 105  
Wake Forest, North Carolina 27587

Subject: **Preliminary Jurisdictional Delineation and Request for Verification  
Casey Creek Mitigation Site  
Wayne County, North Carolina**

Dear Ms. Isenhour:

Wildlands Engineering, Inc. (Wildlands) is requesting written verification from the U.S. Army Corps of Engineers (USACE) regarding the extent of potential waters of the U.S. within the subject project area. The Casey Creek Mitigation Site is in Wayne County, NC approximately one mile west of Grantham, NC (Figure 1). The Casey Creek Mitigation Site is being developed to provide mitigation for unavoidable stream impacts that occur in the Neuse 01 River Basin (HUC 03020201). A draft mitigation plan is being developed and the design process is underway.

### **Methodology**

Wildlands delineated potential waters of the U.S. within the proposed project area using the USACE Routine On-Site Determination Method defined by the 1987 Corps of Engineers Wetlands Delineation Manual and subsequent Atlantic and Gulf Coastal Plain Regional Supplement Version 2.0 (2010). Wetland Determination Data Forms representative of on-site wetland areas as well as upland areas are enclosed (DP1-DP4).

Non-wetland waters (streams) were reviewed using USACE Ordinary High-Water Marks guidance (2005) and classified using the North Carolina Department of Water Resources (NCDWR) Methodology for Identification of Intermittent and Perennial Streams and Their Origins (Version 4.11, 2010). NCDWR Stream Classification Forms representative of on-site stream channels are enclosed.

### **Potential Waters of the United States**

The results of the on-site field investigation indicate there are 3 streams and 2 wetlands located within the assessment area (Figure 3). The primary project stream is previously unnamed tributary to Falling Creek and has 2 additional previously unnamed tributaries within the project area. Names have been assigned to these streams for this project (Table 1). Falling Creek is Classified as a Class C and Nutrient Sensitive Waters. On-Site stream channels are located within NCDWR Sub-basin 03-04-12 of the Neuse River Basin (HUC 03020201). The 2 wetlands were labeled A and B. Linear footage of streams and area of wetlands are summarized in Table 1.

### Streams

Streams exhibited continuity of bed and bank, presence of an ordinary high-water mark, and absence of in-channel vegetation. NCDWR Stream Identification form scores also supported determination of potentially jurisdictional stream channels. Most of the stream channels on site were straightforward in determining presence of a jurisdictional channel and points of origin. Martha Branch was the exception to this, as there is a non-jurisdictional ditch which is connected to Martha Branch upstream of its intermittent origin point. The

origin was determined to be where the non-jurisdictional ditch reaches a confluence with an ephemeral feature. NCDWR performed a stream determination on June 2, 2022, and concurred with the origin point determination. Written concurrence with stream determinations was provided by NCWDR and is enclosed within the appendix.

### Wetlands

Wetland A was classified as a headwater forest wetland, while wetland B was classified as a bottomland hardwood forest wetland. These features were classified using the North Carolina Wetland Assessment Method (NCWAM) classification key and the evaluator’s best professional judgement. These features exhibited evidence of saturation within the first 12 inches via an umbric surface and wetland plant communities. Sediment and drift deposits, along with sparsely vegetated concave surfaces were present in wetland A. Wetland B is located within a depression.

**Table 1. Summary of Potential On-Site Waters**

Feature	Classification	Length (lf)	Area (ac)
Casey Creek	Intermittent/Perennial	4,145	-
Martha Branch	Intermittent	510	-
Afton Branch	Perennial	523	-
Wetland A	Headwater Forest	-	0.098
Wetland B	Bottomland Hardwood Forest	-	0.216
Total		5,178	0.314

### **Soils**

NRCS soil mapping indicates the predominant soil type within the assessment area are the Rains and Dragston Loamy Sands series (Figure 4). Dragston Loamy Sands are very deep, somewhat poorly drained, fine-loamy sand soils with a water table typically occurring within 12-30 inches. Rains soils are very deep, poorly drained, sandy-loam soils with a shallow, persistent water table occurring on coastal plain flats and depressions.

Please do not hesitate to contact me at 540-907-9432 or at [khogarth@wildlandseng.com](mailto:khogarth@wildlandseng.com) should you have any questions regarding this request for jurisdictional verification.

Sincerely,



Kaitlyn Hogarth

Environmental Scientist

# Jurisdictional Determination Request

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**US Army Corps  
of Engineers**  
Wilmington District

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

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

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

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

## **WASHINGTON REGULATORY FIELD OFFICE**

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

## **RALEIGH REGULATORY FIELD OFFICE**

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

## **WILMINGTON REGULATORY FIELD OFFICE**

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

## **INSTRUCTIONS:**

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

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

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

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

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

# Jurisdictional Determination Request

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**A. PARCEL INFORMATION**

Street Address: \_\_\_\_\_

City, State: \_\_\_\_\_

County: \_\_\_\_\_

Parcel Index Number(s) (PIN): \_\_\_\_\_

**B. REQUESTOR INFORMATION**

Name: \_\_\_\_\_

Mailing Address: \_\_\_\_\_

\_\_\_\_\_

Telephone Number: \_\_\_\_\_

Electronic Mail Address: \_\_\_\_\_

Select one:

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

\_\_\_\_\_

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

Name: \_\_\_\_\_

Mailing Address: \_\_\_\_\_

\_\_\_\_\_

Telephone Number: \_\_\_\_\_

Electronic Mail Address: \_\_\_\_\_

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

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

## Jurisdictional Determination Request

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

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

Kaitlyn Hogarth

Print Name

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

3/17/2023

Date

Kaitlyn Hogarth

Signature

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

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

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

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

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

## Jurisdictional Determination Request

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

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

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

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

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

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

### G. ALL REQUESTS

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

Size of Property or Review Area ~54.7 acres.

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

# Jurisdictional Determination Request

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## H. REQUESTS FROM CONSULTANTS



Project Coordinates (Decimal Degrees): Latitude: 35.2951103  
Longitude: -78.1851553



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

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

### For Approved Jurisdictional Determinations:

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

### For Preliminary Jurisdictional Determinations:

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



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

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

## Jurisdictional Determination Request

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

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

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

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

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

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



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

**BACKGROUND INFORMATION**

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

**B. NAME AND ADDRESS OF PERSON REQUESTING PJD:** Kaitlyn Hogarth 312 W Millbrook Rd Suite 225 Raleigh, NC 27609

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

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

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

State: **NC** County/parish/borough: **Wayne** City: **Grantham**

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

Lat.: **35.2951103** Long.: **-78.1851553**

Universal Transverse Mercator:

Name of nearest waterbody: **Falling Creek**

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

Office (Desk) Determination. Date:

Field Determination. Date(s):

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

Site number	Latitude (decimal degrees)	Longitude (decimal degrees)	Estimated amount of aquatic resource in review area (acreage and linear feet, if applicable)	Type of aquatic resource (i.e., wetland vs. non-wetland waters)	Geographic authority to which the aquatic resource “may be” subject (i.e., Section 404 or Section 10/404)
Casey Creek (I)	35.297314	-78.184165	2,450 lf	Potential Non-Wetland Waters of the US	Section 404
Casey Creek (P)	35.293828	-78.184291	1,695 lf	Potential Non-Wetland Waters of the US	Section 404
Martha Branch	35.295008	-78.186169	510 lf	Potential Non-Wetland Waters of the US	Section 404
Afton Branch	35.291528	-78.183751	523 lf	Potential Non-Wetland Waters of the US	Section 404
Wetland A	35.298390	-78.183244	0.098 ac	Potential Wetland Waters of the US	Section 404
Wetland B	35.290605	-78.184799	0.216 ac	Potential Wetland Waters of the US	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: Figure 3. Site 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: Excerpted from Grantham 7.5 Minute Topographic Quad
- Natural Resources Conservation Service Soil Survey. Citation: Web Soil Survey
- 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): ESRI World Imagery, 2019  
or  Other (Name & Date): Representative Site Photos, various dates
- 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.**

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

Kaitlyn Hogarth 3/24/2023  
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.

**Table 1. Summary of On-Site Jurisdictional Waters**

<b>Feature</b>	<b>Latitude</b>	<b>Longitude</b>	<b>Cowardin Class</b>	<b>Estimated Amount Of Aquatic Resource in Review Area</b>	<b>Class of Aquatic Resource</b>
Casey Creek (I)	35.297314	-78.184165	Riverine - Streambed	2,450	Potential Non-Wetland Waters of the US
Casey Creek (P)	35.293828	-78.184291	Riverine - Unconsolidated Bottom	1,695	Potential Non-Wetland Waters of the US
Martha Branch	35.295008	-78.186169	Riverine - Streambed	510	Potential Non-Wetland Waters of the US
Afton Branch	35.291528	-78.183751	Riverine - Unconsolidated Bottom	523	Potential Non-Wetland Waters of the US
Wetland A	35.298390	-78.183244	Palustrine - Forested	0.098	Potential Wetland Waters of the US
Wetland B	35.290605	-78.184799	Palustrine - Forested	0.216	Potential Wetland Waters of the US

## Figures

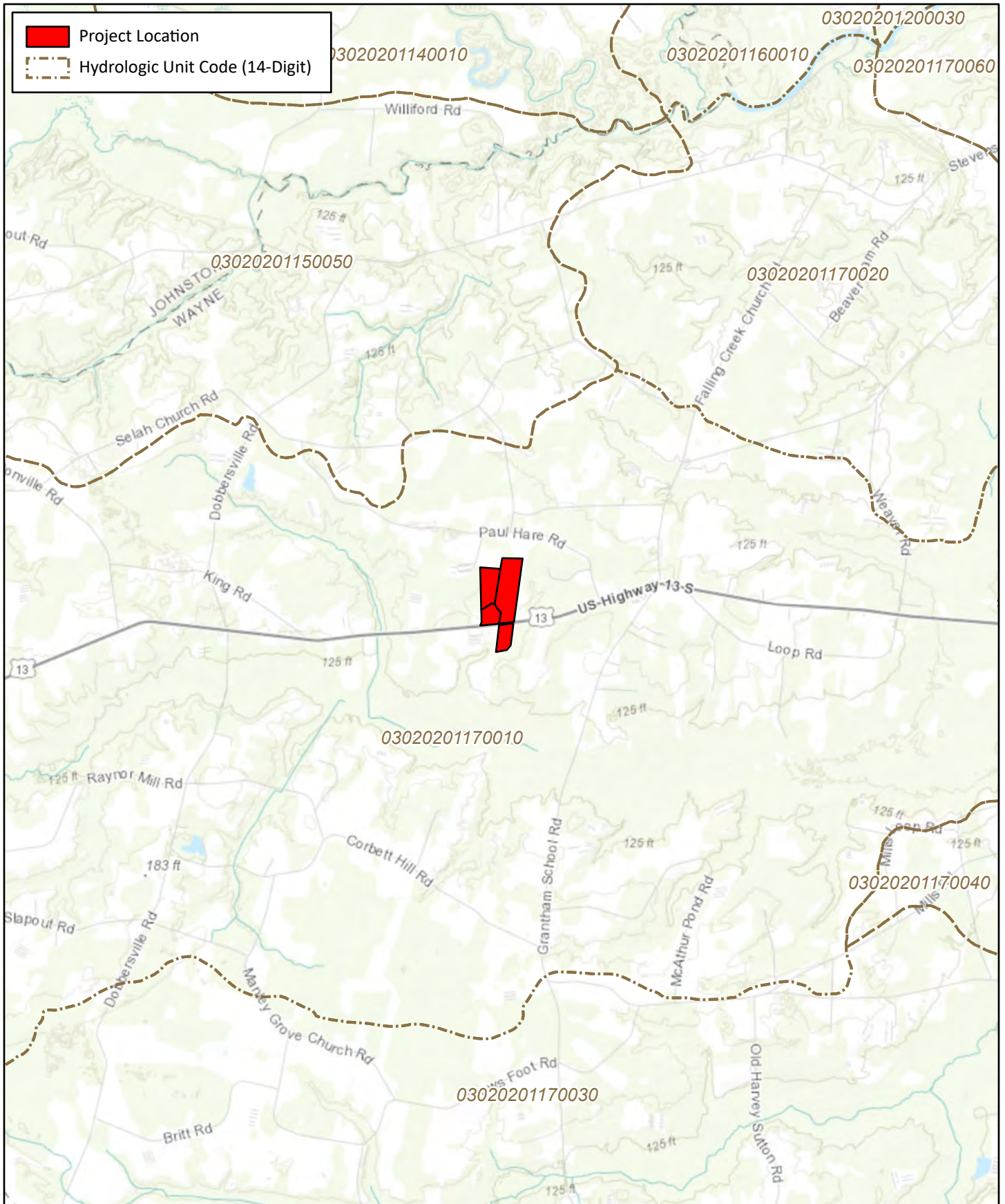



Figure 1. Vicinity Map  
Casey Creek Mitigation Site  
Neuse River Basin (03020201)

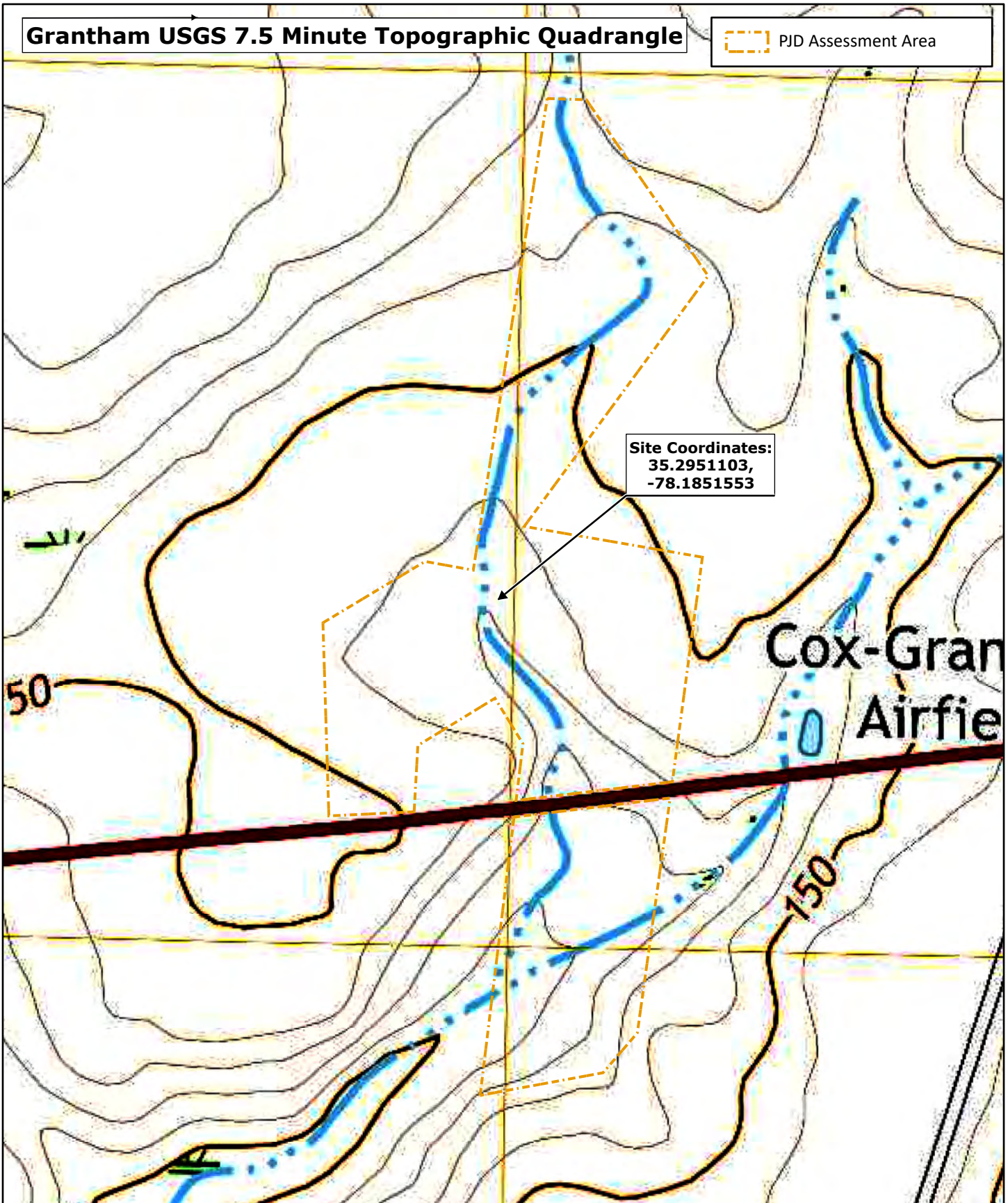


0 0.5 1 Miles



**Grantham USGS 7.5 Minute Topographic Quadrangle**

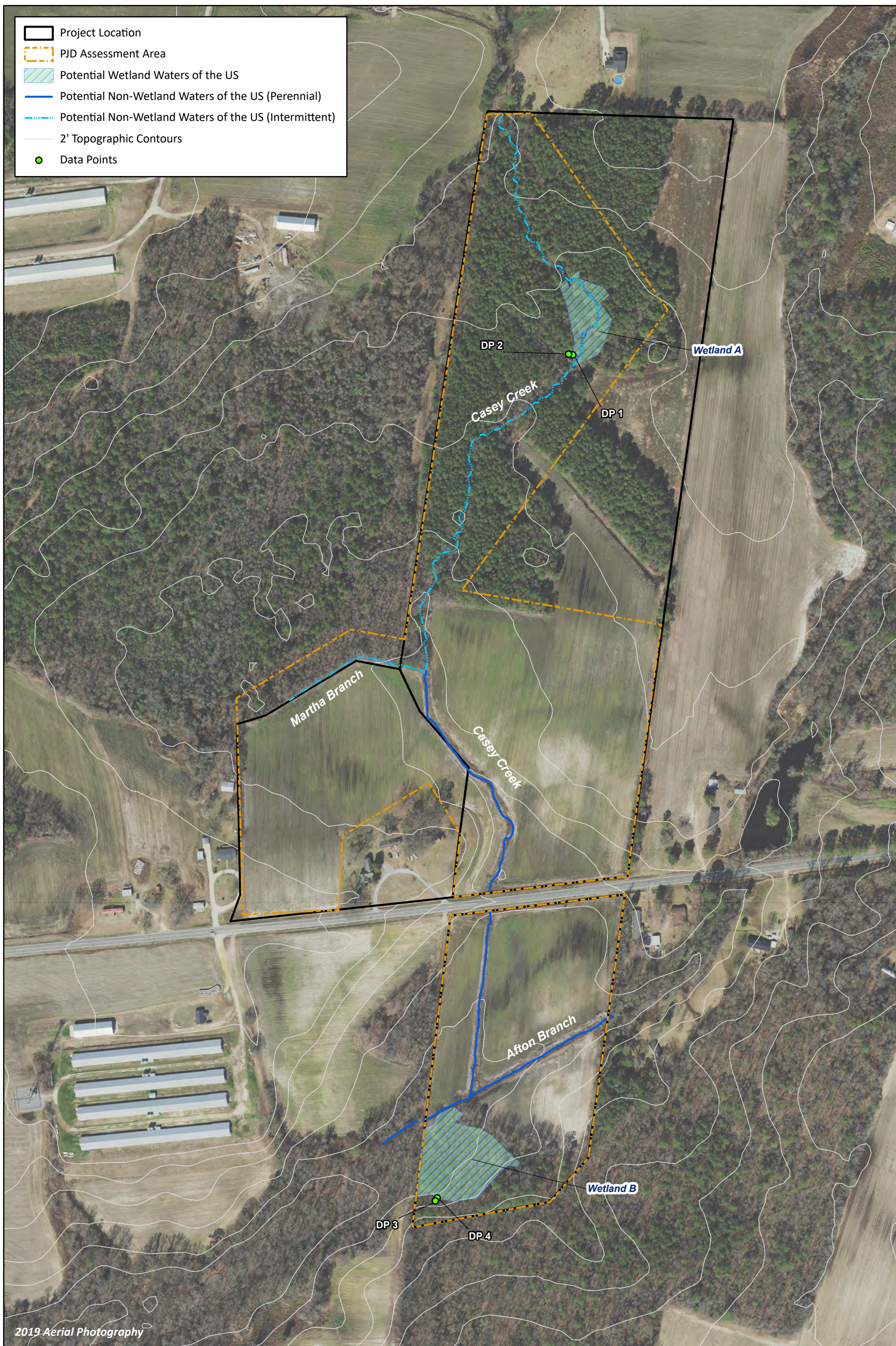
 PJD Assessment Area



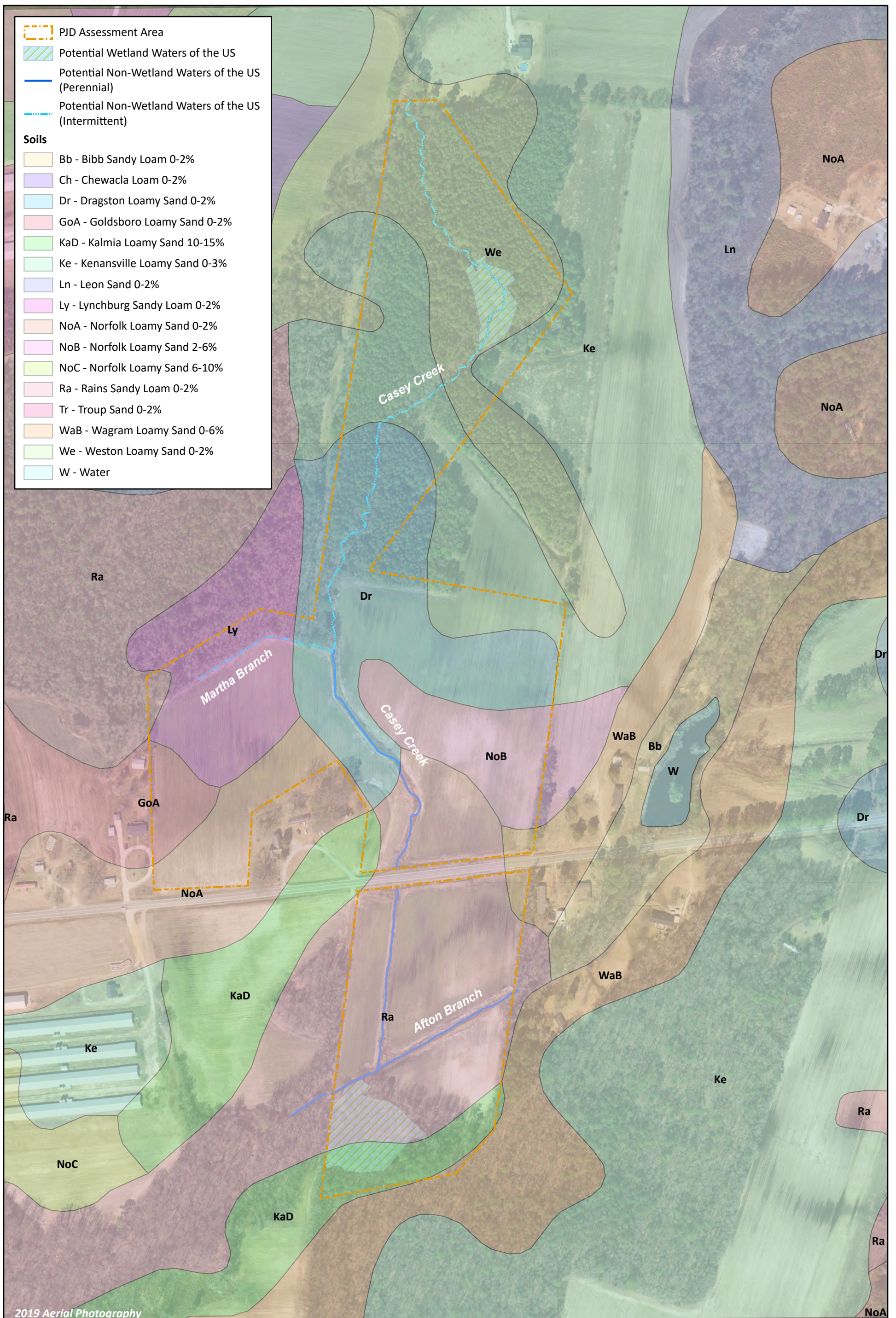
0 250 500 Feet



Figure 2. USGS Topographic Map  
Casey Creek Mitigation Site  
Neuse River Basin (03020201)







**Landowner Map and Landowner Authorization**



**Property Owner Table**

<b>Parcel Identification Number (PIN)</b>	<b>Property Owner</b>	<b>Electronic Mail Address</b>	<b>Telephone Number</b>	<b>Mailing Address</b>
2546248066	Johnnie Mangrum Brock	bedrockconst43@gmail.com	919-705-3277	536 Paul Hare Road, Goldsboro, NC 27530
2546335459	Martha C. Kornegay, Trustee	croessler@wildlandseng.com	757-288-4880	4200 Country Club Circle, Virginia Beach, VA 23455-4414
2546229607	Martha C. Kornegay, Trustee	croessler@wildlandseng.com	757-288-4880	4200 Country Club Circle, Virginia Beach, VA 23455-4414
2546314958	Martha C. Kornegay, Trustee	croessler@wildlandseng.com	757-288-4880	4200 Country Club Circle, Virginia Beach, VA 23455-4414

# LANDOWNER AUTHORIZATION FORM

## PROPERTY LEGAL DESCRIPTION:

Deed Book: 916

Page: 852

County: Wayne

Parcel ID Number: 2546248066

Street Address: Paul Hare Road, Goldsboro, NC 27530

Property Owner (please print): Johnnie Mangrum Brock

The undersigned, registered property owner of the above property, does hereby authorize Wildlands Engineering, Inc. to take all actions necessary for the evaluation of the property as a potential stream, wetland and/or riparian buffer mitigation project, including conducting stream and/or wetland determinations and delineations, as well as issuance and acceptance of any required permit(s) or certification(s). I agree to allow regulatory agencies, including the US Army Corps of Engineers, to visit the property as part of these environmental reviews.

Property Owner's Address: 536 Paul Hare Road, Goldsboro, NC 27530  
(if different from above)

Property Owner Telephone Number: 919 922 2570

I hereby certify the above information to be true and accurate to the best of my knowledge.

Johnnie Mangrum Brock  
(Property Owner Authorized Signature) (Date)

## LANDOWNER AUTHORIZATION FORM

### PROPERTY LEGAL DESCRIPTION:

Deed Book: 1823

Page: 155

County: Wayne

Parcel ID Numbers: 2546314958, 2546229607 and 2546335459

Street Address: 3890 S US 13 Hwy, Goldsboro, NC 27530

Property Owner: Martha C. Kornegay, Trustee, or her successors in Trust, under the Martha C. Kornegay Declaration of Trust, dated November 21, 2000

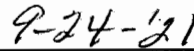
The undersigned, registered property owner of the above property, does hereby authorize Wildlands Engineering, Inc. to take all actions necessary for the evaluation of the property as a potential stream, wetland and/or riparian buffer mitigation project, including conducting stream and/or wetland determinations and delineations, as well as issuance and acceptance of any required permit(s) or certification(s). I agree to allow regulatory agencies, including the US Army Corps of Engineers, to visit the property as part of these environmental reviews.

Property Owner's Address: 4200 Country Club Circle, Virginia Beach, VA 23455-4414

Property Owner Telephone Number: 757-363-7040

I hereby certify the above information to be true and accurate to the best of my knowledge.

  
Martha C. Kornegay, Trustee

  
(Date)

**USACE Wetland Data Forms**

Project/Site: Casey Creek Mitigation Site City/County: Grantham / Wayne Sampling Date: 11/14/2022  
 Applicant/Owner: Wildlands Engineering State: NC Sampling Point: Wet A DP1  
 Investigator(s): W. Taylor Section, Township, Range: \_\_\_\_\_  
 Landform (hillside, terrace, etc.): Floodplain Local relief (concave, convex, none): Concave Slope (%): <1  
 Subregion (LRR or MLRA): LRR P, MLRA 133A Lat: 35.2979250 Long: -78.1833981 Datum: NAD 83  
 Soil Map Unit Name: Weston Loamy Sand NWI classification: NA

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

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

Hydrophytic Vegetation Present? Yes <u>X</u> No _____ Hydric Soil Present? Yes <u>X</u> No _____ Wetland Hydrology Present? Yes <u>X</u> No _____	<b>Is the Sampled Area within a Wetland?</b> Yes <u>X</u> No _____
Remarks:	

**HYDROLOGY**

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

<b>Field Observations:</b> Surface Water Present? Yes _____ No <u>X</u> Depth (inches): _____ Water Table Present? Yes _____ No <u>X</u> Depth (inches): _____ Saturation Present? Yes _____ No <u>X</u> Depth (inches): _____ (includes capillary fringe)	<b>Wetland Hydrology Present?</b> Yes <u>X</u> No _____
--	---

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

Remarks:  
 The delineated wetland area begins where the Casey Creek channel is less defined and flows into a depositional area within the valley. This depositional area has resulted in an area in which hydrology is allowed to connect to the floodplain resulting in this wetland.



**VEGETATION (Five Strata) – Use scientific names of plants.**

Sampling Point: Wet A DP1

Tree Stratum (Plot size: <u>30</u> )	Absolute % Cover	Dominant Species?	Indicator Status
1. <u>Liquidambar styraciflua</u>	<u>25</u>	<u>Yes</u>	<u>FAC</u>
2. <u>Quercus phellos</u>	<u>10</u>	<u>Yes</u>	<u>FACW</u>
3. _____	_____	_____	_____
4. _____	_____	_____	_____
5. _____	_____	_____	_____
6. _____	_____	_____	_____
	<u>35</u> =Total Cover		
	50% of total cover: <u>18</u>	20% of total cover: <u>7</u>	

Sapling Stratum (Plot size: <u>15</u> )	Absolute % Cover	Dominant Species?	Indicator Status
1. <u>Ilex opaca</u>	<u>10</u>	<u>Yes</u>	<u>FAC</u>
2. <u>Ligustrum japonicum</u>	<u>15</u>	<u>Yes</u>	<u>FAC</u>
3. _____	_____	_____	_____
4. _____	_____	_____	_____
5. _____	_____	_____	_____
6. _____	_____	_____	_____
	<u>25</u> =Total Cover		
	50% of total cover: <u>13</u>	20% of total cover: <u>5</u>	

Shrub Stratum (Plot size: <u>15</u> )	Absolute % Cover	Dominant Species?	Indicator Status
1. <u>Ligustrum japonicum</u>	<u>5</u>	<u>Yes</u>	<u>FAC</u>
2. _____	_____	_____	_____
3. _____	_____	_____	_____
4. _____	_____	_____	_____
5. _____	_____	_____	_____
6. _____	_____	_____	_____
	<u>5</u> =Total Cover		
	50% of total cover: <u>3</u>	20% of total cover: <u>1</u>	

Herb Stratum (Plot size: <u>5</u> )	Absolute % Cover	Dominant Species?	Indicator Status
1. <u>Woodwardia areolata</u>	<u>2</u>	<u>No</u>	<u>OBL</u>
2. _____	_____	_____	_____
3. _____	_____	_____	_____
4. _____	_____	_____	_____
5. _____	_____	_____	_____
6. _____	_____	_____	_____
7. _____	_____	_____	_____
8. _____	_____	_____	_____
9. _____	_____	_____	_____
10. _____	_____	_____	_____
11. _____	_____	_____	_____
	<u>2</u> =Total Cover		
	50% of total cover: <u>1</u>	20% of total cover: <u>1</u>	

Woody Vine Stratum (Plot size: <u>5</u> )	Absolute % Cover	Dominant Species?	Indicator Status
1. _____	_____	_____	_____
2. _____	_____	_____	_____
3. _____	_____	_____	_____
4. _____	_____	_____	_____
5. _____	_____	_____	_____
	_____ =Total Cover		
	50% of total cover: _____	20% of total cover: _____	

**Dominance Test worksheet:**

Number of Dominant Species That Are OBL, FACW, or FAC: 5 (A)

Total Number of Dominant Species Across All Strata: 5 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100.0% (A/B)

**Prevalence Index worksheet:**

Total % Cover of:	Multiply by:
OBL species <u>2</u>	x 1 = <u>2</u>
FACW species <u>10</u>	x 2 = <u>20</u>
FAC species <u>55</u>	x 3 = <u>165</u>
FACU species <u>0</u>	x 4 = <u>0</u>
UPL species <u>0</u>	x 5 = <u>0</u>
Column Totals: <u>67</u> (A)	<u>187</u> (B)
Prevalence Index = B/A = <u>2.79</u>	

**Hydrophytic Vegetation Indicators:**

   1 - Rapid Test for Hydrophytic Vegetation

2 - Dominance Test is >50%

3 - Prevalence Index is ≤3.0<sup>1</sup>

   Problematic Hydrophytic Vegetation<sup>1</sup> (Explain)

<sup>1</sup>Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

**Definitions of Five Vegetation Strata:**

**Tree** – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and 3 in. (7.6 cm) or larger in diameter at breast height (DBH).

**Sapling** – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and less than 3 in. (7.6 cm) DBH.

**Shrub** - Woody Plants, excluding woody vines, approximately 3 to 20 ft (1 to 6 m) in height.

**Herb** – All herbaceous (non-woody) plants, including herbaceous vines, regardless of size, and woody plants, except woody vines, less than approximately 3 ft (1 m) in height.

**Woody Vine** – All woody vines, regardless of height.

**Hydrophytic Vegetation Present?** Yes  No   

Remarks: (If observed, list morphological adaptations below.)

**SOIL**

Sampling Point: Wet A DP1

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)								
Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type <sup>1</sup>	Loc <sup>2</sup>		
0-36	10YR 2/1	100					Loamy/Clayey	

<sup>1</sup>Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

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

**Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)**

- Histosol (A1)
- Histic Epipedon (A2)
- Black Histic (A3)
- Hydrogen Sulfide (A4)
- Stratified Layers (A5)
- Organic Bodies (A6) **(LRR P, T, U)**
- 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
- Muck Presence (A8) **(LRR U)**
- 1 cm Muck (A9) **(LRR P, T)**
- Depleted Below Dark Surface (A11)
- Thick Dark Surface (A12)
- Coast Prairie Redox (A16) **(MLRA 150A)**
- Sandy Mucky Mineral (S1) **(LRR O, S)**
- Sandy Gleyed Matrix (S4)
- Sandy Redox (S5)
- Stripped Matrix (S6)
- Dark Surface (S7) **(LRR P, S, T, U)**
- Polyvalue Below Surface (S8) **(LRR S, T, U)**
- Thin Dark Surface (S9) **(LRR S, T, U)**
- Barrier Islands 1 cm Muck (S12) **(MLRA 153B, 153D)**
- Loamy Mucky Mineral (F1) **(LRR O)**
- Loamy Gleyed Matrix (F2)
- Depleted Matrix (F3)
- Redox Dark Surface (F6)
- Depleted Dark Surface (F7)
- Redox Depressions (F8)
- Marl (F10) **(LRR U)**
- Depleted Ochric (F11) **(MLRA 151)**
- Iron-Manganese Masses (F12) **(LRR O, P, T)**
- Umbric Surface (F13) **(LRR P, T, U)**
- Delta Ochric (F17) **(MLRA 151)**
- Reduced Vertic (F18) **(MLRA 150A, 150B)**
- Piedmont Floodplain Soils (F19) **(MLRA 149A)**
- Anomalous Bright Floodplain Soils (F20) **(MLRA 149A, 153C, 153D)**
- Very Shallow Dark Surface (F22) **(MLRA 138, 152A in FL, 154)**

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

- 1 cm Muck (A9) **(LRR O)**
- 2 cm Muck (A10) **(LRR S)**
- Coast Prairie Redox (A16) **(outside MLRA 150A)**
- Reduced Vertic (F18) **(outside MLRA 150A, 150B)**
- Piedmont Floodplain Soils (F19) **(LRR P, T)**
- Anomalous Bright Floodplain Soils (F20) **(MLRA 153B)**
- Red Parent Material (F21)
- Very Shallow Dark Surface (F22) **(outside MLRA 138, 152A in FL, 154)**
- Barrier Islands Low Chroma Matrix (TS7) **(MLRA 153B, 153D)**
- Other (Explain in Remarks)

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

**Restrictive Layer (if observed):**

Type: \_\_\_\_\_  
 Depth (inches): \_\_\_\_\_

Hydric Soil Present? Yes X No \_\_\_\_\_

Remarks:

Project/Site: Casey Creek Mitigation Site City/County: Grantham / Wayne Sampling Date: 11/14/2022  
 Applicant/Owner: Wildlands Engineering State: NC Sampling Point: Upl DP2  
 Investigator(s): W. Taylor Section, Township, Range: \_\_\_\_\_  
 Landform (hillside, terrace, etc.): Floodplain Local relief (concave, convex, none): Concave Slope (%): <1  
 Subregion (LRR or MLRA): LRR P, MLRA 133A Lat: 35.2979468 Long: -78.1834545 Datum: NAD 83  
 Soil Map Unit Name: Weston Loamy Sand NWI classification: NA

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

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

Hydrophytic Vegetation Present?	Yes <u>X</u> No _____	<b>Is the Sampled Area within a Wetland?</b>	Yes _____ No <u>X</u>
Hydric Soil Present?	Yes _____ No <u>X</u>		
Wetland Hydrology Present?	Yes _____ No <u>X</u>		

Remarks:

**HYDROLOGY**

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

<b>Field Observations:</b> Surface Water Present? Yes _____ No <u>X</u> Depth (inches): _____ Water Table Present? Yes _____ No <u>X</u> Depth (inches): _____ Saturation Present? Yes _____ No <u>X</u> Depth (inches): _____ (includes capillary fringe)	<b>Wetland Hydrology Present?</b> Yes _____ No <u>X</u>
--	---

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

Remarks:

**VEGETATION (Five Strata) – Use scientific names of plants.**

Sampling Point: Upl DP2

Tree Stratum (Plot size: <u>30</u> )	Absolute % Cover	Dominant Species?	Indicator Status
1. <u>Liquidambar styraciflua</u>	<u>20</u>	<u>Yes</u>	<u>FAC</u>
2. <u>Quercus phellos</u>	<u>10</u>	<u>Yes</u>	<u>FACW</u>
3. <u>Pinus taeda</u>	<u>5</u>	<u>No</u>	<u>FAC</u>
4. _____	_____	_____	_____
5. _____	_____	_____	_____
6. _____	_____	_____	_____
<u>35</u> = Total Cover			
50% of total cover: <u>18</u>		20% of total cover: <u>7</u>	

Sapling Stratum (Plot size: <u>15</u> )	Absolute % Cover	Dominant Species?	Indicator Status
1. <u>Ilex opaca</u>	<u>10</u>	<u>Yes</u>	<u>FAC</u>
2. <u>Ligustrum japonicum</u>	<u>15</u>	<u>Yes</u>	<u>FAC</u>
3. <u>Persea borbonia</u>	<u>5</u>	<u>No</u>	<u>FACW</u>
4. _____	_____	_____	_____
5. _____	_____	_____	_____
6. _____	_____	_____	_____
<u>30</u> = Total Cover			
50% of total cover: <u>15</u>		20% of total cover: <u>6</u>	

Shrub Stratum (Plot size: <u>15</u> )	Absolute % Cover	Dominant Species?	Indicator Status
1. <u>Arundinaria tecta</u>	<u>5</u>	<u>Yes</u>	<u>FACW</u>
2. _____	_____	_____	_____
3. _____	_____	_____	_____
4. _____	_____	_____	_____
5. _____	_____	_____	_____
6. _____	_____	_____	_____
<u>5</u> = Total Cover			
50% of total cover: <u>3</u>		20% of total cover: <u>1</u>	

Herb Stratum (Plot size: <u>5</u> )	Absolute % Cover	Dominant Species?	Indicator Status
1. <u>Athyrium filix-femina</u>	<u>1</u>	<u>No</u>	<u>UPL</u>
2. _____	_____	_____	_____
3. _____	_____	_____	_____
4. _____	_____	_____	_____
5. _____	_____	_____	_____
6. _____	_____	_____	_____
7. _____	_____	_____	_____
8. _____	_____	_____	_____
9. _____	_____	_____	_____
10. _____	_____	_____	_____
11. _____	_____	_____	_____
<u>1</u> = Total Cover			
50% of total cover: <u>1</u>		20% of total cover: <u>1</u>	

Woody Vine Stratum (Plot size: <u>5</u> )	Absolute % Cover	Dominant Species?	Indicator Status
1. _____	_____	_____	_____
2. _____	_____	_____	_____
3. _____	_____	_____	_____
4. _____	_____	_____	_____
5. _____	_____	_____	_____
_____ = Total Cover			
50% of total cover: _____		20% of total cover: _____	

**Dominance Test worksheet:**

Number of Dominant Species That Are OBL, FACW, or FAC: 5 (A)

Total Number of Dominant Species Across All Strata: 5 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100.0% (A/B)

**Prevalence Index worksheet:**

Total % Cover of:	Multiply by:
OBL species <u>0</u>	x 1 = <u>0</u>
FACW species <u>20</u>	x 2 = <u>40</u>
FAC species <u>50</u>	x 3 = <u>150</u>
FACU species <u>0</u>	x 4 = <u>0</u>
UPL species <u>1</u>	x 5 = <u>5</u>
Column Totals: <u>71</u> (A)	<u>195</u> (B)
Prevalence Index = B/A = <u>2.75</u>	

**Hydrophytic Vegetation Indicators:**

   1 - Rapid Test for Hydrophytic Vegetation

X 2 - Dominance Test is >50%

   3 - Prevalence Index is ≤3.0<sup>1</sup>

   Problematic Hydrophytic Vegetation<sup>1</sup> (Explain)

<sup>1</sup>Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

**Definitions of Five Vegetation Strata:**

**Tree** – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and 3 in. (7.6 cm) or larger in diameter at breast height (DBH).

**Sapling** – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and less than 3 in. (7.6 cm) DBH.

**Shrub** - Woody Plants, excluding woody vines, approximately 3 to 20 ft (1 to 6 m) in height.

**Herb** – All herbaceous (non-woody) plants, including herbaceous vines, regardless of size, and woody plants, except woody vines, less than approximately 3 ft (1 m) in height.

**Woody Vine** – All woody vines, regardless of height.

**Hydrophytic Vegetation Present?** Yes X No \_\_\_\_\_

Remarks: (If observed, list morphological adaptations below.)

**SOIL**

Sampling Point: Upl DP2

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)								
Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type <sup>1</sup>	Loc <sup>2</sup>		
0-9	10YR 2/2	100					Loamy/Clayey	
9-18	10YR 3/2	100					Loamy/Clayey	
18-34	10YR 3/4	100					Loamy/Clayey	

<sup>1</sup>Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

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

**Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)**

- Histosol (A1)
- Histic Epipedon (A2)
- Black Histic (A3)
- Hydrogen Sulfide (A4)
- Stratified Layers (A5)
- Organic Bodies (A6) (LRR P, T, U)
- 5 cm Mucky Mineral (A7) (LRR P, T, U)
- Muck Presence (A8) (LRR U)
- 1 cm Muck (A9) (LRR P, T)
- Depleted Below Dark Surface (A11)
- Thick Dark Surface (A12)
- Coast Prairie Redox (A16) (MLRA 150A)
- Sandy Mucky Mineral (S1) (LRR O, S)
- Sandy Gleyed Matrix (S4)
- Sandy Redox (S5)
- Stripped Matrix (S6)
- Dark Surface (S7) (LRR P, S, T, U)
- Polyvalue Below Surface (S8) (LRR S, T, U)
- Thin Dark Surface (S9) (LRR S, T, U)
- Barrier Islands 1 cm Muck (S12) (MLRA 153B, 153D)
- Loamy Mucky Mineral (F1) (LRR O)
- Loamy Gleyed Matrix (F2)
- Depleted Matrix (F3)
- Redox Dark Surface (F6)
- Depleted Dark Surface (F7)
- Redox Depressions (F8)
- Marl (F10) (LRR U)
- Depleted Ochric (F11) (MLRA 151)
- Iron-Manganese Masses (F12) (LRR O, P, T)
- Umbric Surface (F13) (LRR P, T, U)
- Delta Ochric (F17) (MLRA 151)
- Reduced Vertic (F18) (MLRA 150A, 150B)
- Piedmont Floodplain Soils (F19) (MLRA 149A)
- Anomalous Bright Floodplain Soils (F20) (MLRA 149A, 153C, 153D)
- Very Shallow Dark Surface (F22) (MLRA 138, 152A in FL, 154)

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

- 1 cm Muck (A9) (LRR O)
- 2 cm Muck (A10) (LRR S)
- Coast Prairie Redox (A16) (outside MLRA 150A)
- Reduced Vertic (F18) (outside MLRA 150A, 150B)
- Piedmont Floodplain Soils (F19) (LRR P, T)
- Anomalous Bright Floodplain Soils (F20) (MLRA 153B)
- Red Parent Material (F21)
- Very Shallow Dark Surface (F22) (outside MLRA 138, 152A in FL, 154)
- Barrier Islands Low Chroma Matrix (TS7) (MLRA 153B, 153D)
- Other (Explain in Remarks)

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

**Restrictive Layer (if observed):**

Type: \_\_\_\_\_  
 Depth (inches): \_\_\_\_\_

Hydric Soil Present? Yes \_\_\_\_\_ No X

Remarks:

Project/Site: Casey Creek Mitigation Site City/County: Wayne Sampling Date: 11/15/2022  
 Applicant/Owner: Wildlands Engineering State: NC Sampling Point: DP 3  
 Investigator(s): W. Taylor, K. Hogarth Section, Township, Range: \_\_\_\_\_  
 Landform (hillside, terrace, etc.): hillside Local relief (concave, convex, none): concave Slope (%): 1  
 Subregion (LRR or MLRA): LRR P, MLRA 133A Lat: 35.2901620 Long: 78.1850256 Datum: NAD 83  
 Soil Map Unit Name: Rains Sandy Loam NWI classification: \_\_\_\_\_

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

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

Hydrophytic Vegetation Present?	Yes <u>X</u> No _____	<b>Is the Sampled Area within a Wetland?</b> Yes _____ No <u>X</u>
Hydric Soil Present?	Yes _____ No <u>X</u>	
Wetland Hydrology Present?	Yes _____ No <u>X</u>	

Remarks:

**HYDROLOGY**

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

Remarks:

**VEGETATION (Five Strata) – Use scientific names of plants.**

Sampling Point: DP 3

Tree Stratum (Plot size: <u>30'</u> )	Absolute % Cover	Dominant Species?	Indicator Status
1. <u>Pinus taeda</u>	<u>20</u>	<u>Yes</u>	<u>FAC</u>
2. <u>Liquidambar styraciflua</u>	<u>10</u>	<u>Yes</u>	<u>FAC</u>
3. <u>Acer rubrum</u>	<u>5</u>	<u>No</u>	<u>FAC</u>
4. <u>Quercus phellos</u>	<u>5</u>	<u>No</u>	<u>FACW</u>
5. <u>Liriodendron tulipifera</u>	<u>10</u>	<u>Yes</u>	<u>FACU</u>
6. _____	_____	_____	_____
	<u>50</u> =Total Cover		
	50% of total cover: <u>25</u>	20% of total cover: <u>10</u>	

Sapling Stratum (Plot size: <u>15'</u> )	Absolute % Cover	Dominant Species?	Indicator Status
1. <u>Coastal Sweet-Pepperbush</u>	<u>5</u>	<u>Yes</u>	_____
2. <u>Acer rubrum</u>	<u>7</u>	<u>Yes</u>	<u>FAC</u>
3. <u>Liquidambar styraciflua</u>	<u>2</u>	<u>No</u>	<u>FAC</u>
4. <u>Gordonia lasianthus</u>	<u>5</u>	<u>Yes</u>	<u>FACW</u>
5. _____	_____	_____	_____
6. _____	_____	_____	_____
	<u>19</u> =Total Cover		
	50% of total cover: <u>10</u>	20% of total cover: <u>4</u>	

Shrub Stratum (Plot size: <u>15'</u> )	Absolute % Cover	Dominant Species?	Indicator Status
1. <u>Gordonia lasianthus</u>	<u>3</u>	<u>No</u>	<u>FACW</u>
2. _____	_____	_____	_____
3. _____	_____	_____	_____
4. _____	_____	_____	_____
5. _____	_____	_____	_____
6. _____	_____	_____	_____
	<u>3</u> =Total Cover		
	50% of total cover: <u>2</u>	20% of total cover: <u>1</u>	

Herb Stratum (Plot size: <u>5'</u> )	Absolute % Cover	Dominant Species?	Indicator Status
1. <u>Switch Cane</u>	<u>30</u>	<u>Yes</u>	<u>FACW</u>
2. _____	_____	_____	_____
3. _____	_____	_____	_____
4. _____	_____	_____	_____
5. _____	_____	_____	_____
6. _____	_____	_____	_____
7. _____	_____	_____	_____
8. _____	_____	_____	_____
9. _____	_____	_____	_____
10. _____	_____	_____	_____
11. _____	_____	_____	_____
	<u>30</u> =Total Cover		
	50% of total cover: <u>15</u>	20% of total cover: <u>6</u>	

Woody Vine Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status
1. _____	_____	_____	_____
2. _____	_____	_____	_____
3. _____	_____	_____	_____
4. _____	_____	_____	_____
5. _____	_____	_____	_____
	_____ =Total Cover		
	50% of total cover: _____	20% of total cover: _____	

**Dominance Test worksheet:**

Number of Dominant Species That Are OBL, FACW, or FAC: 5 (A)

Total Number of Dominant Species Across All Strata: 7 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 71.4% (A/B)

**Prevalence Index worksheet:**

Total % Cover of:	Multiply by:
OBL species <u>0</u>	x 1 = <u>0</u>
FACW species <u>43</u>	x 2 = <u>86</u>
FAC species <u>44</u>	x 3 = <u>132</u>
FACU species <u>10</u>	x 4 = <u>40</u>
UPL species <u>0</u>	x 5 = <u>0</u>
Column Totals: <u>97</u> (A)	<u>258</u> (B)
Prevalence Index = B/A = <u>2.66</u>	

**Hydrophytic Vegetation Indicators:**

1 - Rapid Test for Hydrophytic Vegetation

2 - Dominance Test is >50%

3 - Prevalence Index is ≤3.0<sup>1</sup>

\_\_\_\_\_ Problematic Hydrophytic Vegetation<sup>1</sup> (Explain)

<sup>1</sup>Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

**Definitions of Five Vegetation Strata:**

**Tree** – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and 3 in. (7.6 cm) or larger in diameter at breast height (DBH).

**Sapling** – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and less than 3 in. (7.6 cm) DBH.

**Shrub** - Woody Plants, excluding woody vines, approximately 3 to 20 ft (1 to 6 m) in height.

**Herb** – All herbaceous (non-woody) plants, including herbaceous vines, regardless of size, and woody plants, except woody vines, less than approximately 3 ft (1 m) in height.

**Woody Vine** – All woody vines, regardless of height.

**Hydrophytic Vegetation Present?** Yes  No \_\_\_\_\_

Remarks: (If observed, list morphological adaptations below.)

**SOIL**

Sampling Point: DP 3

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)								
Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type <sup>1</sup>	Loc <sup>2</sup>		
0-2	10YR 2/2	100					Loamy/Clayey	
2-13	10YR 3/3	100					Loamy/Clayey	
13-25	10YR 3/2	100					Loamy/Clayey	
25-35	10YR 3/1	100					Loamy/Clayey	

<sup>1</sup>Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

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

**Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)**

- Histosol (A1)
- Histic Epipedon (A2)
- Black Histic (A3)
- Hydrogen Sulfide (A4)
- Stratified Layers (A5)
- Organic Bodies (A6) (LRR P, T, U)
- 5 cm Mucky Mineral (A7) (LRR P, T, U)
- Muck Presence (A8) (LRR U)
- 1 cm Muck (A9) (LRR P, T)
- Depleted Below Dark Surface (A11)
- Thick Dark Surface (A12)
- Coast Prairie Redox (A16) (MLRA 150A)
- Sandy Mucky Mineral (S1) (LRR O, S)
- Sandy Gleyed Matrix (S4)
- Sandy Redox (S5)
- Stripped Matrix (S6)
- Dark Surface (S7) (LRR P, S, T, U)
- Polyvalue Below Surface (S8) (LRR S, T, U)
- Thin Dark Surface (S9) (LRR S, T, U)
- Barrier Islands 1 cm Muck (S12) (MLRA 153B, 153D)
- Loamy Mucky Mineral (F1) (LRR O)
- Loamy Gleyed Matrix (F2)
- Depleted Matrix (F3)
- Redox Dark Surface (F6)
- Depleted Dark Surface (F7)
- Redox Depressions (F8)
- Marl (F10) (LRR U)
- Depleted Ochric (F11) (MLRA 151)
- Iron-Manganese Masses (F12) (LRR O, P, T)
- Umbric Surface (F13) (LRR P, T, U)
- Delta Ochric (F17) (MLRA 151)
- Reduced Vertic (F18) (MLRA 150A, 150B)
- Piedmont Floodplain Soils (F19) (MLRA 149A)
- Anomalous Bright Floodplain Soils (F20) (MLRA 149A, 153C, 153D)
- Very Shallow Dark Surface (F22) (MLRA 138, 152A in FL, 154)

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

- 1 cm Muck (A9) (LRR O)
- 2 cm Muck (A10) (LRR S)
- Coast Prairie Redox (A16) (outside MLRA 150A)
- Reduced Vertic (F18) (outside MLRA 150A, 150B)
- Piedmont Floodplain Soils (F19) (LRR P, T)
- Anomalous Bright Floodplain Soils (F20) (MLRA 153B)
- Red Parent Material (F21)
- Very Shallow Dark Surface (F22) (outside MLRA 138, 152A in FL, 154)
- Barrier Islands Low Chroma Matrix (TS7) (MLRA 153B, 153D)
- Other (Explain in Remarks)

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

**Restrictive Layer (if observed):**

Type: \_\_\_\_\_  
 Depth (inches): \_\_\_\_\_

Hydric Soil Present? Yes \_\_\_\_\_ No X

Remarks:



Project/Site: Casey Creek Mitigation Site City/County: Wayne Sampling Date: 11/15/2022  
 Applicant/Owner: Wildlands Engineering State: NC Sampling Point: DP 4  
 Investigator(s): K. Hogarth Section, Township, Range: \_\_\_\_\_  
 Landform (hillside, terrace, etc.): Toe of Slope Local relief (concave, convex, none): concave Slope (%): 1  
 Subregion (LRR or MLRA): LRR P, MLRA 133A Lat: 35.2901961 Long: -78.1850029 Datum: NAD 83  
 Soil Map Unit Name: Rains Sandy Loam NWI classification: \_\_\_\_\_

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

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

Hydrophytic Vegetation Present?	Yes <u>X</u> No _____	<b>Is the Sampled Area within a Wetland?</b>	Yes <u>X</u> No _____
Hydric Soil Present?	Yes <u>X</u> No _____		
Wetland Hydrology Present?	Yes <u>X</u> No _____		

Remarks:

**HYDROLOGY**

<b>Wetland Hydrology Indicators:</b> <u>Primary Indicators (minimum of one is required; check all that apply)</u> _____ Surface Water (A1)                      _____ Aquatic Fauna (B13) _____ High Water Table (A2)                      _____ Marl Deposits (B15) <b>(LRR U)</b> _____ Saturation (A3)                                      _____ Hydrogen Sulfide Odor (C1) _____ Water Marks (B1)                                      _____ Oxidized Rhizospheres on Living Roots (C3) _____ Sediment Deposits (B2)                                      _____ Presence of Reduced Iron (C4) _____ Drift Deposits (B3)                                      _____ Recent Iron Reduction in Tilled Soils (C6) _____ Algal Mat or Crust (B4)                                      _____ Thin Muck Surface (C7) _____ Iron Deposits (B5)                                      _____ Other (Explain in Remarks) _____ Inundation Visible on Aerial Imagery (B7) _____ Water-Stained Leaves (B9)	<u>Secondary Indicators (minimum of two required)</u> _____ Surface Soil Cracks (B6) _____ Sparsely Vegetated Concave Surface (B8) _____ Drainage Patterns (B10) _____ Moss Trim Lines (B16) _____ Dry-Season Water Table (C2) _____ Crayfish Burrows (C8) _____ Saturation Visible on Aerial Imagery (C9) _____ <u>X</u> Geomorphic Position (D2) _____ Shallow Aquitard (D3) _____ <u>X</u> FAC-Neutral Test (D5) _____ Sphagnum Moss (D8) <b>(LRR T, U)</b>
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<b>Field Observations:</b> Surface Water Present? Yes _____ No <u>X</u> Depth (inches): _____ Water Table Present? Yes _____ No <u>X</u> Depth (inches): _____ Saturation Present? Yes <u>X</u> No _____ Depth (inches): <u>8</u> (includes capillary fringe)	<b>Wetland Hydrology Present?</b> Yes <u>X</u> No _____
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Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

**NCDWR Stream ID Forms**

NC DWQ Stream Identification Form Version 4.11

Casey Creek R1

Date: 9/24/21	Project/Site: Casey Creek	Latitude: 35.297314
Evaluator: CNIKH	County: Wayne	Longitude: -78.184105
Total Points: Stream is at least intermittent if $\geq 19$ or perennial if $\geq 30^*$ 25.5	Stream Determination (circle one) Ephemeral Intermittent <u>Perennial</u>	Other e.g. Quad Name:

A. Geomorphology (Subtotal = 15.5)

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

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

B. Hydrology (Subtotal = 4)

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

C. Biology (Subtotal = 0)

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

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

Notes:

Sketch:

NC DWQ Stream Identification Form Version 4.11

N of Hwy 13

Date: 9/24/21	Project/Site: Casey Creek	Latitude: 35.293828
Evaluator: CN	County: Wayne	Longitude: -78.184291
Total Points: 36.5 Stream is at least intermittent if $\geq 19$ or perennial if $\geq 30^*$	Stream Determination (circle one) Ephemeral Intermittent <u>Perennial</u>	Other e.g. Quad Name:

A. Geomorphology (Subtotal = 14.5)

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

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

B. Hydrology (Subtotal = 10.5)

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

C. Biology (Subtotal = 11.5)

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

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

Notes:

Sketch:

NC DWQ Stream Identification Form Version 4.11

8 of Hwy 13

Date: 9/24/21	Project/Site: Casey Creek	Latitude: 35.292225
Evaluator: CN	County: Wayne	Longitude: -78.184489
Total Points: 35 Stream is at least intermittent if $\geq 19$ or perennial if $\geq 30^*$	Stream Determination (circle one) Ephemeral Intermittent <u>Perennial</u>	Other e.g. Quad Name:

A. Geomorphology (Subtotal = 15.5)

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

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

B. Hydrology (Subtotal = 9)

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

C. Biology (Subtotal = 10.5)

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

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

Notes:

Sketch:

NC DWQ Stream Identification Form Version 4.11

Apfen Branch

Date: 9/24/21	Project/Site: Casey Creek	Latitude: 35.291528
Evaluator: JH/KH	County: Wayne	Longitude: -78.183751
Total Points: 35.25 Stream is at least intermittent if $\geq 19$ or perennial if $\geq 30^*$	Stream Determination (circle one) Ephemeral Intermittent <u>Perennial</u>	Other e.g. Quad Name:

A. Geomorphology (Subtotal = 16)

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

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

B. Hydrology (Subtotal = 8)

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

C. Biology (Subtotal = 11.25)

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

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

Notes:

Sketch:

NC DWQ Stream Identification Form Version 4.11 Martha Branch

Date: <u>9/24/21</u>	Project/Site: <u>Casey Creek</u>	Latitude: <u>35.295008</u>
Evaluator: <u>CN/JH</u>	County: <u>Wayne</u>	Longitude: <u>-78.186169</u>
Total Points: Stream is at least intermittent if ≥ 19 or perennial if ≥ 30* <u>23</u>	Stream Determination (circle one) Ephemeral <u>Intermittent</u> Perennial	Other e.g. Quad Name:

A. Geomorphology (Subtotal = 9)

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

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

B. Hydrology (Subtotal = 7.5)

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

C. Biology (Subtotal = 0.5)

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

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

Notes:

Sketch:

**NCDWR Stream Determination Letter**





ROY COOPER  
Governor

ELIZABETH S. BISER  
Secretary

RICHARD E. ROGERS, JR.  
Director

August 10, 2022

DWR Project #20220664  
Wayne County

Chris Roessler  
Wildlands Engineering, Inc.  
[croessler@wildlandseng.com](mailto:croessler@wildlandseng.com)

**Subject:** Determination for Applicability to the Neuse Buffer Rules 15A NCAC 02B .0714  
**Project Name:** Casey Creek Mitigation Project  
**Address:** 3890 US Hwy 13 South, Goldsboro, NC 27530  
**Location:** Lat., Long: 35.2934495, -78.1854881

Dear Mr. Roessler:

On June 2, 2022, Shelton Sullivan of the Division of Water Resources (DWR) conducted an on-site review of features located on the Casey Creek Mitigation Project site at the request of Wildlands Engineering, Inc. to determine the applicability of features on the site to the Neuse River Riparian Area Protection Rules, Title 15A North Carolina Administrative Code 02B .0714.

The enclosed map(s), provided by Wildlands Engineering, Inc., depict the feature(s) evaluated and this information is also summarized in the table below. Streams were evaluated for being ephemeral, at least intermittent, and for subjectivity to the Neuse River Riparian Area Protection Rules. Streams that are considered "Subject" have been located on the most recently published NRCS Soil Survey of Johnston County and/or the most recent copy of the USGS Topographic (at 1:24,000 scale) map(s), have been located on the ground at the site, and possess characteristics that qualify them to be at least intermittent streams. Features that are considered "Not Subject" have been determined to not be at least intermittent, not present on the property, or not depicted on the required maps.

**This determination only addresses the applicability to the buffer rules within the proposed project and property boundaries as presented by Wildlands Engineering, Inc. and does not approve any activity within buffers or within waters of the state. There may be other streams or features located on the property that appear or do not appear on the**



North Carolina Department of Environmental Quality | Division of Water Resources  
512 North Salisbury Street | 1617 Mail Service Center | Raleigh, North Carolina 27699-1617  
919.707.9000

**maps referenced above. Any of the features on the site may be considered jurisdictional according to the US Army Corps of Engineers and subject to the Clean Water Act.**

The following table addresses the features observed and rated during the DWR site visit.

Feature ID	Feature Type: stream (E, I, P, ), ditch, swale, wetland, other	Subject to Buffer Rules	Start @	Stop @	Depicted on Soil Survey	Depicted on USGS Topo
Martha Branch	Stream, at least I	No	Start Point as indicated on map	Continues downstream, along wood line and field to confluence with Casey Creek	No	No
Casey Creek	Stream, at least I	Yes	Starts at least at the northern property and easement boundary; See Map	Continues downstream, under Hwy. 13, and beyond the property and easement boundary	Yes	Yes
Afton Branch	Stream, at least I	Yes	Starts at least at the southeastern property and easement boundary; See Map	Confluence with Casey Creek	Yes	Yes

\* E: Ephemeral, I: Intermittent, P: Perennial

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

<i>If sending via U.S. Postal Service:</i>	<i>If sending via delivery service (UPS, FedEx, etc.)</i>
Paul Wojoski - DWR 401 & Buffer Permitting Branch Supervisor 1617 Mail Service Center Raleigh, NC 27699-1617	Paul Wojoski - DWR 401 & Buffer Permitting Branch Supervisor 512 N Salisbury St. Raleigh, NC 27604

This determination is final, and binding as detailed above unless an appeal is requested **within sixty (60) calendar days of the date of this letter.**

If you have any additional questions or require additional information, please contact Shelton Sullivan at [shelton.sullivan@ncdenr.gov](mailto:shelton.sullivan@ncdenr.gov) or 919-707-3636. This determination is subject to review as provided in G.S. 150B.

Sincerely,

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

Paul Wojoski, Supervisor  
401 & Buffer Permitting Branch

Attachments provided by Wildlands Engineering, Inc.: Site Map with DWR Labels, NRCS Soil Survey, USGS Topographical Map

cc: Martha Kornegay, 4200 Country Club Circle, Virginia Beach, VA 23455-4414  
Johnnie Mangrum Brock, [bedrockconst43@gmail.com](mailto:bedrockconst43@gmail.com)  
Carolyn Lanza, Wildlands Engineering, Inc., [clanza@wildlandseng.com](mailto:clanza@wildlandseng.com)  
401 & Buffer Permitting Branch Laserfiche File  
DWR Washington Regional Office

Filename: 20220664\_Casey Creek \_DWR\_StreamCalls\_8-10-22

Casey Creek Stream Calls 6/2/22 Shelton Sullivan

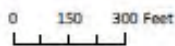
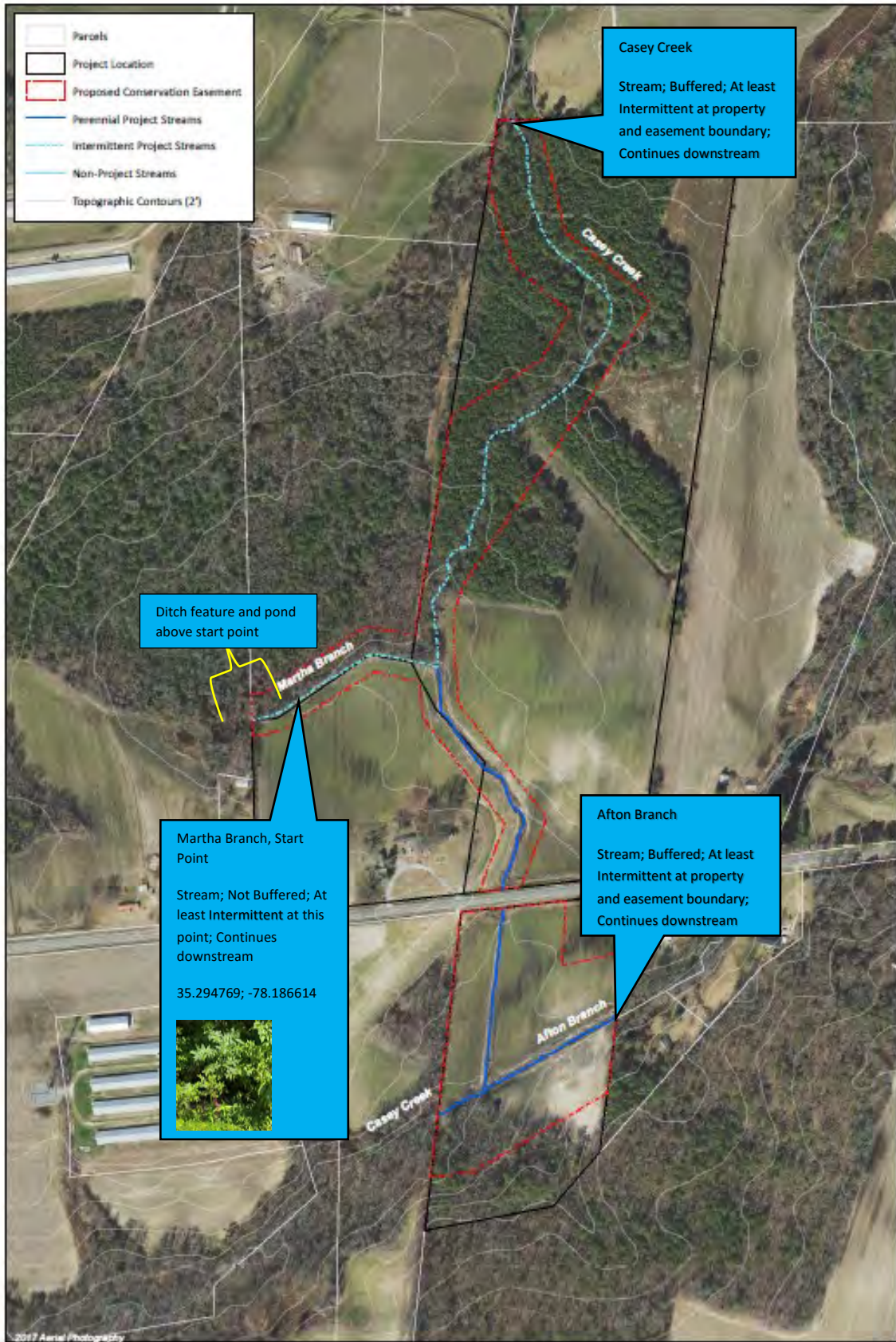
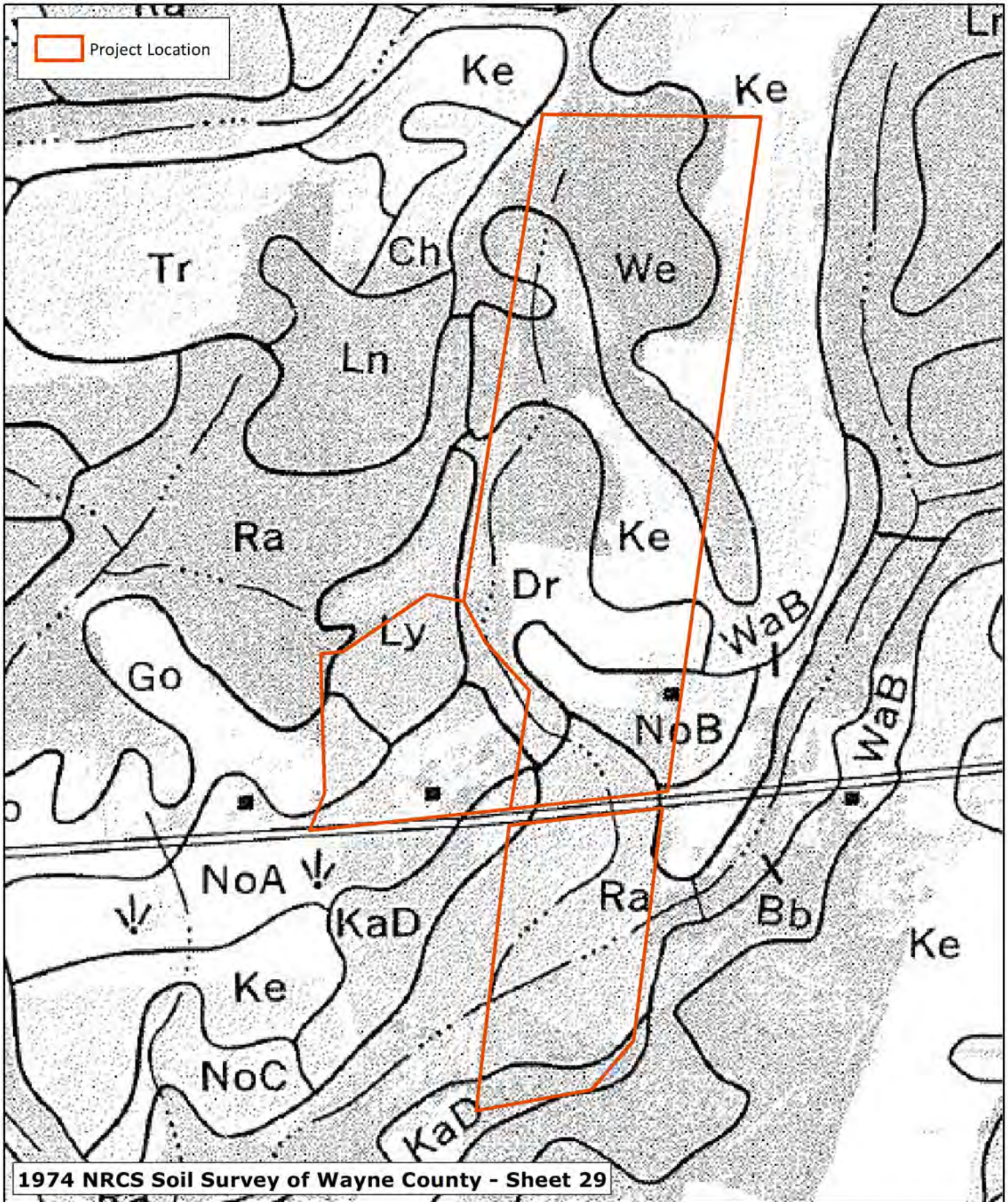


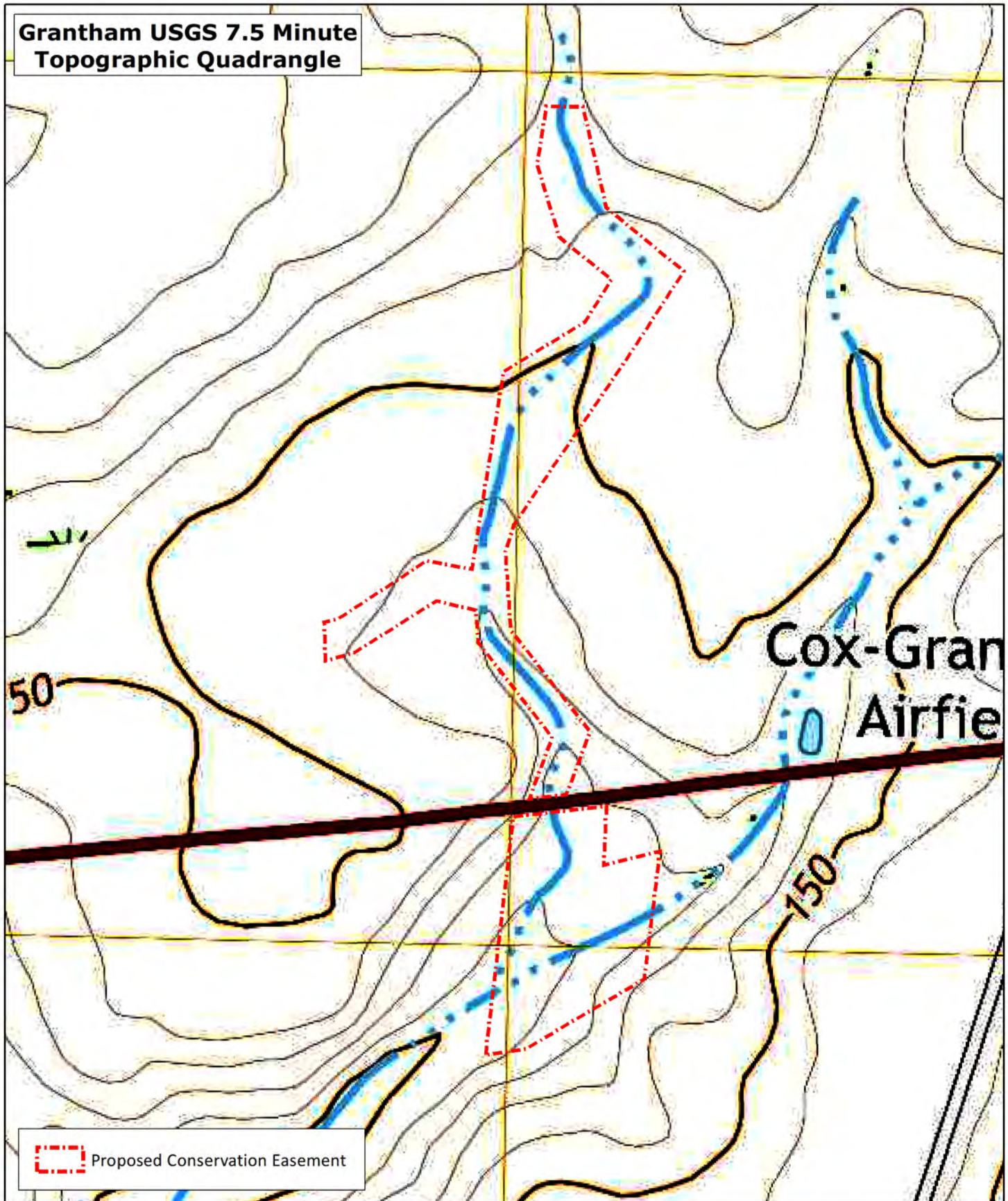
Figure 2 Site Map  
Casey Creek Mitigation Site  
Neuse River Basin (03020201)



0 250 500 Feet

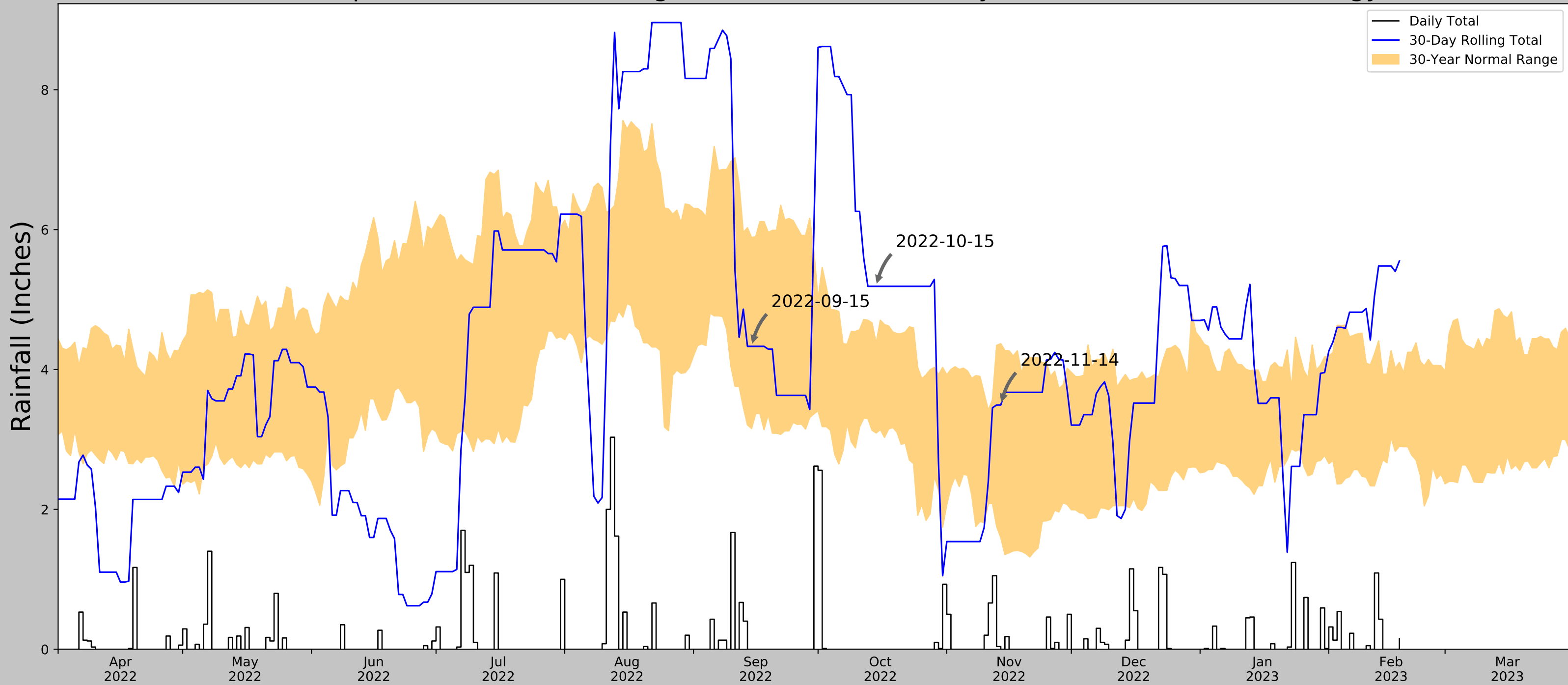


Figure 6b 1974 NRCS Soil Survey Map  
Casey Creek Mitigation Site  
Neuse River Basin (03020201)



## **Antecedent Precipitation Tool Output**

# Antecedent Precipitation vs Normal Range based on NOAA's Daily Global Historical Climatology Network



Coordinates	35.294804, -78.184666
Observation Date	2022-11-14
Elevation (ft)	143.56
Drought Index (PDSI)	Moderate drought
WebWIMP H <sub>2</sub> O Balance	Wet Season

30 Days Ending	30 <sup>th</sup> %ile (in)	70 <sup>th</sup> %ile (in)	Observed (in)	Wetness Condition	Condition Value	Month Weight	Product
2022-11-14	1.59685	4.368504	3.492126	Normal	2	3	6
2022-10-15	3.092126	4.37874	5.188977	Wet	3	2	6
2022-09-15	3.155512	5.88504	4.330709	Normal	2	1	2
Result							Normal Conditions - 14



Figure and tables made by the  
**Antecedent Precipitation Tool**  
Version 1.0

Written by Jason Deters  
U.S. Army Corps of Engineers

Weather Station Name	Coordinates	Elevation (ft)	Distance (mi)	Elevation Δ	Weighted Δ	Days Normal	Days Antecedent
SMITHFIELD	35.5175, -78.3444	149.934	17.823	6.374	8.134	10897	60
SMITHFIELD 2.8 SE	35.4762, -78.3122	130.906	3.38	19.028	1.585	5	0
SELMA 2.3 N	35.5707, -78.2869	194.882	4.895	44.948	2.423	288	30
CLAYTON 5.7 SSE	35.5724, -78.4154	209.974	5.506	60.04	2.808	131	0
CLAYTON 6.8 ESE	35.6194, -78.3411	167.979	7.043	18.045	3.296	31	0
CLAYTON WTP	35.6408, -78.4633	299.869	10.827	149.935	6.495	1	0



## **Representative Site Photographs**



**Casey Creek - Intermittent (3/14/2023)**



**Casey Creek - Perennial (3/14/2023)**



**Martha Branch (3/14/2023)**



**Martha Branch Origin (3/14/2023)**



**Afton Branch (3/14/2023)**



**Afton Branch (3/14/2023)**





**Wetland A – DP 1 (11/16/2022)**



**Wetland B – DP 4 (11/16/2022)**



**DP 2 - Upland (11/16/2022)**



**DP 3 - Upland (01/09/2023)**

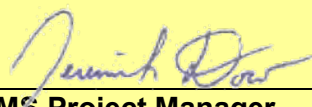


## **Appendix 6: Categorical Exclusion and Resource Agency Correspondence**

Appendix A

## Categorical Exclusion Form for Division of Mitigation Services Projects Version 2


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

Part 1: General Project Information	
<b>Project Name:</b>	Casey Creek Mitigation Site
<b>County Name:</b>	Wayne
<b>DMS Number:</b>	100597
<b>Project Sponsor:</b>	Wildlands Engineering, Inc.
<b>Project Contact Name:</b>	Kirsten Gimbert
<b>Project Contact Address:</b>	1430 S. Mint Street, Suite 104, Charlotte, NC 28203
<b>Project Contact E-mail:</b>	kgimbert@wildlandseng.com
<b>DMS Project Manager:</b>	Jeremiah Dow
Project Description	
<p>The site is being developed to provide stream, buffer, and nutrient mitigation within the Neuse River Basin. The project will include the restoration of Casey Creek R2 &amp; R3, Martha Branch, and Afton Branch. Casey Creek R1 is slated for preservation. Current land use consists of row crop production with a mix of pines and hardwoods. The major goals of the proposed stream, buffer, and nutrient offset mitigation project are to provide ecological and water quality enhancements to the Neuse River Basin while creating a functional riparian corridor at the site level. The project design will avoid major adverse impacts to existing streams, wetland resources, and existing forested areas. This will be accomplished by restoring and enhancing native floodplain vegetation, creating stable stream banks, improving stream habitat, and protecting the Site in perpetuity through establishing a conservation easement.</p>	
For Official Use Only	
<b>Reviewed By:</b>	
<div style="border-bottom: 1px solid black; padding-bottom: 5px;">10/28/2022</div>	<div style="border-bottom: 1px solid black; padding-bottom: 5px;">                       Jeremiah Dow                 </div>
<b>Date</b>	<b>DMS Project Manager</b>
<b>Conditional Approved By:</b>	
<div style="border-bottom: 1px solid black; height: 20px;"></div>	<div style="border-bottom: 1px solid black; height: 20px;"></div>
<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>	
<div style="border-bottom: 1px solid black; padding-bottom: 5px;">10-27-22</div>	<div style="border-bottom: 1px solid black; padding-bottom: 5px;">                       Donald W Brew                 </div>
<b>Date</b>	<b>For Division Administrator FHWA</b>

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>	Casey Creek Mitigation Site
<b>County Name:</b>	Wayne
<b>DMS Number:</b>	100597
<b>Project Sponsor:</b>	Wildlands Engineering, Inc.
<b>Project Contact Name:</b>	Kirsten Gimbert
<b>Project Contact Address:</b>	1430 S. Mint Street, Suite 104, Charlotte, NC 28203
<b>Project Contact E-mail:</b>	kgimbert@wildlandseng.com
<b>DMS Project Manager:</b>	Jeremiah Dow
Project Description	
The site is being developed to provide stream, buffer, and nutrient mitigation within the Neuse River Basin. The project will include the restoration of Casey Creek R2 & R3, Martha Branch, and Afton Branch. Casey Creek R1 is slated for preservation. Current land use consists of row crop production with a mix of pines and hardwoods. The major goals of the proposed stream, buffer, and nutrient offset mitigation project are to provide ecological and water quality enhancements to the Neuse River Basin while creating a functional riparian corridor at the site level. The project design will avoid major adverse impacts to existing streams, wetland resources, and existing forested areas. This will be accomplished by restoring and enhancing native floodplain vegetation, creating stable stream banks, improving stream habitat, and protecting the Site in perpetuity through establishing a conservation easement.	
For Official Use Only	
<b>Reviewed By:</b>	
10/28/2022	
<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>	
10-27-22	
<b>Date</b>	<b>For Division Administrator FHWA</b>

<b>Part 2: All Projects</b>	
<b>Regulation/Question</b>	<b>Response</b>
<b><u>Coastal Zone Management Act (CZMA)</u></b>	
1. Is the project located in a CAMA county?	<input type="checkbox"/> Yes <input 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 type="checkbox"/> N/A
3. Has a CAMA permit been secured?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input 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 type="checkbox"/> N/A
<b><u>Comprehensive Environmental Response, Compensation and Liability Act (CERCLA)</u></b>	
1. Is this a "full-delivery" project?	<input 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 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 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 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 type="checkbox"/> N/A
6. Is there an approved hazardous mitigation plan?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A
<b><u>National Historic Preservation Act (Section 106)</u></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 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 type="checkbox"/> N/A
3. If the effects are adverse, have they been resolved?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A
<b><u>Uniform Relocation Assistance and Real Property Acquisition Policies Act (Uniform Act)</u></b>	
1. Is this a "full-delivery" project?	<input type="checkbox"/> Yes <input type="checkbox"/> No
2. Does the project require the acquisition of real estate?	<input 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 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 type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A

Part 3: Ground-Disturbing Activities Regulation/Question		Response
<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 type="checkbox"/> No
2. Is the site of religious importance to American Indians?		<input type="checkbox"/> Yes <input type="checkbox"/> No <input 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 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 type="checkbox"/> N/A
<b>Antiquities Act (AA)</b>		
1. Is the project located on Federal lands?		<input type="checkbox"/> Yes <input 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 type="checkbox"/> N/A
3. Will a permit from the appropriate Federal agency be required?		<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A
4. Has a permit been obtained?		<input type="checkbox"/> Yes <input type="checkbox"/> No <input 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 type="checkbox"/> No
2. Will there be a loss or destruction of archaeological resources?		<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A
3. Will a permit from the appropriate Federal agency be required?		<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A
4. Has a permit been obtained?		<input type="checkbox"/> Yes <input type="checkbox"/> No <input 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 type="checkbox"/> Yes <input type="checkbox"/> No
2. Is Designated Critical Habitat or suitable habitat present for listed species?		<input type="checkbox"/> Yes <input 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 type="checkbox"/> N/A
4. Is the project "likely to adversely affect" the species and/or "likely to adversely modify" Designated Critical Habitat?		<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A
5. Does the USFWS/NOAA-Fisheries concur in the effects determination?		<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A
6. Has the USFWS/NOAA-Fisheries rendered a "jeopardy" determination?		<input type="checkbox"/> Yes <input type="checkbox"/> No <input 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 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 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 type="checkbox"/> N/A
<b>Farmland Protection Policy Act (FPPA)</b>	
1. Will real estate be acquired?	<input type="checkbox"/> Yes <input type="checkbox"/> No
2. Has NRCS determined that the project contains prime, unique, statewide or locally important farmland?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A
3. Has the completed Form AD-1006 been submitted to NRCS?	<input 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 type="checkbox"/> Yes <input type="checkbox"/> No
2. Have the USFWS and the NCWRC been consulted?	<input 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 type="checkbox"/> No
2. Has the NPS approved of the conversion?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input 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 type="checkbox"/> No
2. Is suitable habitat present for EFH-protected species?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input 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 type="checkbox"/> N/A
4. Will the project adversely affect EFH?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A
5. Has consultation with NOAA-Fisheries occurred?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input 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 type="checkbox"/> No
2. Have the USFWS recommendations been incorporated?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A
<b>Wilderness Act</b>	
1. Is the project in a Wilderness area?	<input type="checkbox"/> Yes <input 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 type="checkbox"/> N/A

Casey Creek 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, and other emergency releases of pollutants and contaminants into the environment.

As the Casey Creek Mitigation Site is a full-delivery project, an EDR Radius Map Report with Geocheck was ordered for the site through Environmental Data Resources, Inc on September 24, 2021. The target property was not listed in any of the Federal, State, or Tribal environmental databases searched by the EDR. However, several sites were mapped within 0.25-0.5 miles of the project area, all with a lower relative elevation than the proposed project.

- Three Leaking Underground Storage Tank (LUST) incidents within 0.125 & 0.25 miles of the property – GRANTHAM SUPPLY TRUE VALUE HARDWARE and GRANTHAM SUPPLY & SUPERMARKET;
- One Underground Storage Tank (UST) within 0.25 miles of the property – DANNIE’S GAS & GROCERY;
- One State and Tribal Institutional Control (INST) within 0.5 miles of the property – GRANTHAM SUPPLY TRUE VALUE HARDWARE; and
- Two records in the Incident Management Database (IMD) within 0.5 miles of the property – GRANTHAM SUPPLY TRUE VALUE HARDWARE and CASEY’S 76 GROCERY.

The Executive Summary of the EDR report is included in the Appendix. The full report is available upon request.

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

The National Historic Preservation Act 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 take into account the effect of an undertaking on a property that is included in, or is eligible for inclusion in, the National Register of Historic Places.

A scoping letter was submitted to the State Historic Preservation Office (SHPO) requesting comment on the Casey Creek Mitigation Site on August 23, 2022. SHPO responded on September 1, 2022 and said they were “aware of no historic resources which would be affected by the project” and would have no further comment. All correspondence related to Section 106 is included in the Appendix.

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

These acts, collectively known 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 Casey Creek 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 Wildlands was included in the signed Option Agreement for the project properties. A copy of the relevant section of each of the Option Agreements are included in the Appendix.

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

Section 7 of the ESA 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 United States Fish and Wildlife Service (USFWS) Information for Planning and Consultation database (IPaC) list of endangered species for the site includes the following species: Red-cockaded Woodpecker (*Picoides borealis*), Neuse River Waterdog (*Necturus lewisi*), and the Carolina Madtom (*Noturus furiosus*). The USFWS does not currently list any Critical Habitat Designations for the Federally listed species within the project site. Results from the pedestrian survey conducted on August 16, 2022 indicated that the project area does not contain suitable habitat for any of the federally listed species.

USFWS responded to the public notice (SAW-2022-001239) on August 12, 2022 and does not have any objections to the activity and expects minimal adverse impacts to fish and wildlife resources. Please refer to the Appendix for all USFWS correspondence and the species conclusion table.

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

The FPPA requires that, before taking or approving any federal action that would result in 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 Casey Creek Mitigation Site includes the conversion of prime farmland. As such, Form AD-1006 was completed and submitted to the Natural Resources Conservation Service (NRCS) on September 12, 2022. The completed form and correspondence documenting its submittal is included in the Appendix.

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

The FWCA requires consultation with the USFWS and the appropriate state wildlife agency on projects that alter or modify a water body. Reports and recommendations prepared by these agencies document project effects on wildlife and identify measures that may be adopted to prevent loss or damage to wildlife resources.

Wildlands requested comment on the project from the North Carolina Wildlife Resources Commission (NCWRC) on October 7, 2022 and received correspondence from USFWS through the public notice advertisement (SAW-2022-001239). The USFWS and NCWRC do not have any concerns with the proposed mitigation project. All correspondence with the two agencies is 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.

Wildlands received correspondence from USFWS through the public notice advertisement (SAW-2022-001239) regarding MBTA. USFWS does not have any concern in regard to migratory birds associated with the proposed mitigation project. All correspondence with USFWS is included in the Appendix.

Casey Creek Mitigation Site  
Categorical Exclusion

**APPENDIX**

**Cotton Creek Mitigation Site**

US Hwy 13

Goldsboro, NC 27530

Inquiry Number: 6676512.2s

September 24, 2021

**The EDR Radius Map™ Report with GeoCheck®**



6 Armstrong Road, 4th floor  
Shelton, CT 06484  
Toll Free: 800.352.0050  
[www.edrnet.com](http://www.edrnet.com)

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***Thank you for your business.***  
 Please contact EDR at 1-800-352-0050  
 with any questions or comments.

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## EXECUTIVE SUMMARY

A search of available environmental records was conducted by Environmental Data Resources, Inc (EDR). The report was designed to assist parties seeking to meet the search requirements of EPA's Standards and Practices for All Appropriate Inquiries (40 CFR Part 312), the ASTM Standard Practice for Environmental Site Assessments (E 1527-13), the ASTM Standard Practice for Environmental Site Assessments for Forestland or Rural Property (E 2247-16), the ASTM Standard Practice for Limited Environmental Due Diligence: Transaction Screen Process (E 1528-14) or custom requirements developed for the evaluation of environmental risk associated with a parcel of real estate.

### TARGET PROPERTY INFORMATION

#### ADDRESS

US HWY 13  
GOLDSBORO, NC 27530

#### COORDINATES

Latitude (North): 35.2967260 - 35° 17' 48.21"  
Longitude (West): 78.1835440 - 78° 11' 0.75"  
Universal Transverse Mercator: Zone 17  
UTM X (Meters): 756115.6  
UTM Y (Meters): 3909390.2  
Elevation: 151 ft. above sea level

### USGS TOPOGRAPHIC MAP ASSOCIATED WITH TARGET PROPERTY

Target Property Map: 5947410 GRANTHAM, NC  
Version Date: 2013

### AERIAL PHOTOGRAPHY IN THIS REPORT

Portions of Photo from: 20141018  
Source: USDA



MAPPED SITES SUMMARY

Target Property Address:  
 US HWY 13  
 GOLDSBORO, NC 27530

Click on Map ID to see full detail.

MAP ID	SITE NAME	ADDRESS	DATABASE ACRONYMS	RELATIVE ELEVATION	DIST (ft. & mi.) DIRECTION
<a href="#">A1</a>	GRANTHAM SUPPLY TRUE	3396 US HWY 13 S.	LUST, IMD	Lower	593, 0.112, SSE
<a href="#">A2</a>	GRANTHAM TRUE VALUE	3396 U.S. HIGHWAY 13	LUST, INST CONTROL	Lower	703, 0.133, SE
<a href="#">A3</a>	GRANTHAM SUPPLY & SU	3388 US HWY 13 SOUTH	LUST	Lower	705, 0.134, SE
<a href="#">B4</a>	DANNIE'S GAS & GROCE	3590 US 13 SOUTH	UST	Lower	875, 0.166, SW
<a href="#">B5</a>	CASEY'S 76 GROCERY	3605 HWY 13 SOUTH	IMD	Lower	1076, 0.204, SW

# EXECUTIVE SUMMARY

## TARGET PROPERTY SEARCH RESULTS

The target property was not listed in any of the databases searched by EDR.

## DATABASES WITH NO MAPPED SITES

No mapped sites were found in EDR's search of available ("reasonably ascertainable ") government records either on the target property or within the search radius around the target property for the following databases:

## STANDARD ENVIRONMENTAL RECORDS

### ***Federal NPL site list***

NPL..... National Priority List  
Proposed NPL..... Proposed National Priority List Sites  
NPL LIENS..... Federal Superfund Liens

### ***Federal Delisted NPL site list***

Delisted NPL..... National Priority List Deletions

### ***Federal CERCLIS list***

FEDERAL FACILITY..... Federal Facility Site Information listing  
SEMS..... Superfund Enterprise Management System

### ***Federal CERCLIS NFRAP site list***

SEMS-ARCHIVE..... Superfund Enterprise Management System Archive

### ***Federal RCRA CORRACTS facilities list***

CORRACTS..... Corrective Action Report

### ***Federal RCRA non-CORRACTS TSD facilities list***

RCRA-TSDF..... RCRA - Treatment, Storage and Disposal

### ***Federal RCRA generators list***

RCRA-LQG..... RCRA - Large Quantity Generators  
RCRA-SQG..... RCRA - Small Quantity Generators  
RCRA-VSQG..... RCRA - Very Small Quantity Generators (Formerly Conditionally Exempt Small Quantity Generators)

### ***Federal institutional controls / engineering controls registries***

LUCIS..... Land Use Control Information System

## EXECUTIVE SUMMARY

US ENG CONTROLS..... Engineering Controls Sites List  
US INST CONTROLS..... Institutional Controls Sites List

### ***Federal ERNS list***

ERNS..... Emergency Response Notification System

### ***State- and tribal - equivalent NPL***

NC HSDS..... Hazardous Substance Disposal Site

### ***State- and tribal - equivalent CERCLIS***

SHWS..... Inactive Hazardous Sites Inventory

### ***State and tribal landfill and/or solid waste disposal site lists***

SWF/LF..... List of Solid Waste Facilities  
OLI..... Old Landfill Inventory  
DEBRIS..... Solid Waste Active Disaster Debris Sites Listing  
LCID..... Land-Clearing and Inert Debris (LCID) Landfill Notifications

### ***State and tribal leaking storage tank lists***

LAST..... Leaking Aboveground Storage Tanks  
INDIAN LUST..... Leaking Underground Storage Tanks on Indian Land  
LUST TRUST..... State Trust Fund Database

### ***State and tribal registered storage tank lists***

FEMA UST..... Underground Storage Tank Listing  
AST..... AST Database  
INDIAN UST..... Underground Storage Tanks on Indian Land

### ***State and tribal voluntary cleanup sites***

VCP..... Responsible Party Voluntary Action Sites  
INDIAN VCP..... Voluntary Cleanup Priority Listing

### ***State and tribal Brownfields sites***

BROWNFIELDS..... Brownfields Projects Inventory

## **ADDITIONAL ENVIRONMENTAL RECORDS**

### ***Local Brownfield lists***

US BROWNFIELDS..... A Listing of Brownfields Sites

### ***Local Lists of Landfill / Solid Waste Disposal Sites***

HIST LF..... Solid Waste Facility Listing  
SWRCY..... Recycling Center Listing  
INDIAN ODI..... Report on the Status of Open Dumps on Indian Lands

## EXECUTIVE SUMMARY

ODI..... Open Dump Inventory  
DEBRIS REGION 9..... Torres Martinez Reservation Illegal Dump Site Locations  
IHS OPEN DUMPS..... Open Dumps on Indian Land

### **Local Lists of Hazardous waste / Contaminated Sites**

US HIST CDL..... Delisted National Clandestine Laboratory Register  
US CDL..... National Clandestine Laboratory Register

### **Local Land Records**

LIENS 2..... CERCLA Lien Information

### **Records of Emergency Release Reports**

HMIRS..... Hazardous Materials Information Reporting System  
SPILLS..... Spills Incident Listing  
SPILLS 90..... SPILLS 90 data from FirstSearch  
SPILLS 80..... SPILLS 80 data from FirstSearch

### **Other Ascertainable Records**

RCRA NonGen / NLR..... RCRA - Non Generators / No Longer Regulated  
FUDS..... Formerly Used Defense Sites  
DOD..... Department of Defense Sites  
SCRD DRYCLEANERS..... State Coalition for Remediation of Drycleaners Listing  
US FIN ASSUR..... Financial Assurance Information  
EPA WATCH LIST..... EPA WATCH LIST  
2020 COR ACTION..... 2020 Corrective Action Program List  
TSCA..... Toxic Substances Control Act  
TRIS..... Toxic Chemical Release Inventory System  
SSTS..... Section 7 Tracking Systems  
ROD..... Records Of Decision  
RMP..... Risk Management Plans  
RAATS..... RCRA Administrative Action Tracking System  
PRP..... Potentially Responsible Parties  
PADS..... PCB Activity Database System  
ICIS..... Integrated Compliance Information System  
FTTS..... FIFRA/ TSCA Tracking System - FIFRA (Federal Insecticide, Fungicide, & Rodenticide Act)/TSCA (Toxic Substances Control Act)  
MLTS..... Material Licensing Tracking System  
COAL ASH DOE..... Steam-Electric Plant Operation Data  
COAL ASH EPA..... Coal Combustion Residues Surface Impoundments List  
PCB TRANSFORMER..... PCB Transformer Registration Database  
RADINFO..... Radiation Information Database  
HIST FTTS..... FIFRA/TSCA Tracking System Administrative Case Listing  
DOT OPS..... Incident and Accident Data  
CONSENT..... Superfund (CERCLA) Consent Decrees  
INDIAN RESERV..... Indian Reservations  
FUSRAP..... Formerly Utilized Sites Remedial Action Program  
UMTRA..... Uranium Mill Tailings Sites  
LEAD SMELTERS..... Lead Smelter Sites  
US AIRS..... Aerometric Information Retrieval System Facility Subsystem  
US MINES..... Mines Master Index File  
ABANDONED MINES..... Abandoned Mines

## EXECUTIVE SUMMARY

FINDS.....	Facility Index System/Facility Registry System
DOCKET HWC.....	Hazardous Waste Compliance Docket Listing
UXO.....	Unexploded Ordnance Sites
ECHO.....	Enforcement & Compliance History Information
FUELS PROGRAM.....	EPA Fuels Program Registered Listing
AIRS.....	Air Quality Permit Listing
ASBESTOS.....	ASBESTOS
COAL ASH.....	Coal Ash Disposal Sites
DRYCLEANERS.....	Drycleaning Sites
Financial Assurance.....	Financial Assurance Information Listing
NPDES.....	NPDES Facility Location Listing
UIC.....	Underground Injection Wells Listing
AOP.....	Animal Operation Permits Listing
MINES MRDS.....	Mineral Resources Data System
PCSRP.....	Petroleum-Contaminated Soil Remediation Permits
SEPT HAULERS.....	Permitted Septage Haulers Listing
CCB.....	Coal Ash Structural Fills (CCB) Listing

### EDR HIGH RISK HISTORICAL RECORDS

#### ***EDR Exclusive Records***

EDR MGP.....	EDR Proprietary Manufactured Gas Plants
EDR Hist Auto.....	EDR Exclusive Historical Auto Stations
EDR Hist Cleaner.....	EDR Exclusive Historical Cleaners

### EDR RECOVERED GOVERNMENT ARCHIVES

#### ***Exclusive Recovered Govt. Archives***

RGA HWS.....	Recovered Government Archive State Hazardous Waste Facilities List
RGA LF.....	Recovered Government Archive Solid Waste Facilities List
RGA LUST.....	Recovered Government Archive Leaking Underground Storage Tank

### SURROUNDING SITES: SEARCH RESULTS

Surrounding sites were identified in the following databases.

Elevations have been determined from the USGS Digital Elevation Model and should be evaluated on a relative (not an absolute) basis. Relative elevation information between sites of close proximity should be field verified. Sites with an elevation equal to or higher than the target property have been differentiated below from sites with an elevation lower than the target property. Page numbers and map identification numbers refer to the EDR Radius Map report where detailed data on individual sites can be reviewed.

Sites listed in ***bold italics*** are in multiple databases.

Unmappable (orphan) sites are not considered in the foregoing analysis.

### STANDARD ENVIRONMENTAL RECORDS

#### ***State and tribal leaking storage tank lists***

## EXECUTIVE SUMMARY

LUST: The Leaking Underground Storage Tank Incidents Management Database contains an inventory of reported leaking underground storage tank incidents. The data come from the Department of Environment, & Natural Resources' Incidents by Address.

A review of the LUST list, as provided by EDR, and dated 04/30/2021 has revealed that there are 3 LUST sites within approximately 0.5 miles of the target property.

<u>Lower Elevation</u>	<u>Address</u>	<u>Direction / Distance</u>	<u>Map ID</u>	<u>Page</u>
<b>GRANTHAM SUPPLY TRUE</b> Incident Phase: Closed Out Product Type: PETROLEUM Incident Number: 13426 Current Status: File Located in Archives	<b>3396 US HWY 13 S.</b>	<b>SSE 0 - 1/8 (0.112 mi.)</b>	<b>A1</b>	<b>8</b>
<b>GRANTHAM TRUE VALUE</b> Incident Phase: Closed Out Product Type: PETROLEUM Incident Number: 16371 Current Status: File Located in Archives	<b>3396 U.S. HIGHWAY 13</b>	<b>SE 1/8 - 1/4 (0.133 mi.)</b>	<b>A2</b>	<b>11</b>
<b>GRANTHAM SUPPLY &amp; SU</b> Incident Phase: Closed Out Product Type: PETROLEUM Incident Number: 47028 Current Status: File Located in House	<b>3388 US HWY 13 SOUTH</b>	<b>SE 1/8 - 1/4 (0.134 mi.)</b>	<b>A3</b>	<b>13</b>

### **State and tribal registered storage tank lists**

UST: The Underground Storage Tank database contains registered USTs. USTs are regulated under Subtitle I of the Resource Conservation and Recovery Act (RCRA). The data come from the Department of Environment & Natural Resources' Petroleum Underground Storage Tank Database.

A review of the UST list, as provided by EDR, and dated 04/30/2021 has revealed that there is 1 UST site within approximately 0.25 miles of the target property.

<u>Lower Elevation</u>	<u>Address</u>	<u>Direction / Distance</u>	<u>Map ID</u>	<u>Page</u>
<b>DANNIE'S GAS &amp; GROCE</b> Tank Status: Current Tank Status: Removed Facility Id: 00-0-0000027577	<b>3590 US 13 SOUTH</b>	<b>SW 1/8 - 1/4 (0.166 mi.)</b>	<b>B4</b>	<b>15</b>

### **State and tribal institutional control / engineering control registries**

INST CONTROL: No Further Action Sites With Land Use Restrictions Monitoring.

A review of the INST CONTROL list, as provided by EDR, and dated 09/04/2020 has revealed that there is 1 INST CONTROL site within approximately 0.5 miles of the target site property.

<u>Lower Elevation</u>	<u>Address</u>	<u>Direction / Distance</u>	<u>Map ID</u>	<u>Page</u>
<b>GRANTHAM TRUE VALUE</b>	<b>3396 U.S. HIGHWAY 13</b>	<b>SE 1/8 - 1/4 (0.133 mi.)</b>	<b>A2</b>	<b>11</b>

# EXECUTIVE SUMMARY

## ADDITIONAL ENVIRONMENTAL RECORDS

### ***Records of Emergency Release Reports***

IMD: Incident Management Database.

A review of the IMD list, as provided by EDR, and dated 07/30/2021 has revealed that there are 2 IMD sites within approximately 0.5 miles of the target property.

<u>Lower Elevation</u>	<u>Address</u>	<u>Direction / Distance</u>	<u>Map ID</u>	<u>Page</u>
<b>GRANTHAM SUPPLY TRUE</b> Facility Id: 13426	<b>3396 US HWY 13 S.</b>	<b>SSE 0 - 1/8 (0.112 mi.)</b>	<b>A1</b>	<b>8</b>
CASEY'S 76 GROCERY Facility Id: 00-0-0000003732	3605 HWY 13 SOUTH	SW 1/8 - 1/4 (0.204 mi.)	B5	18

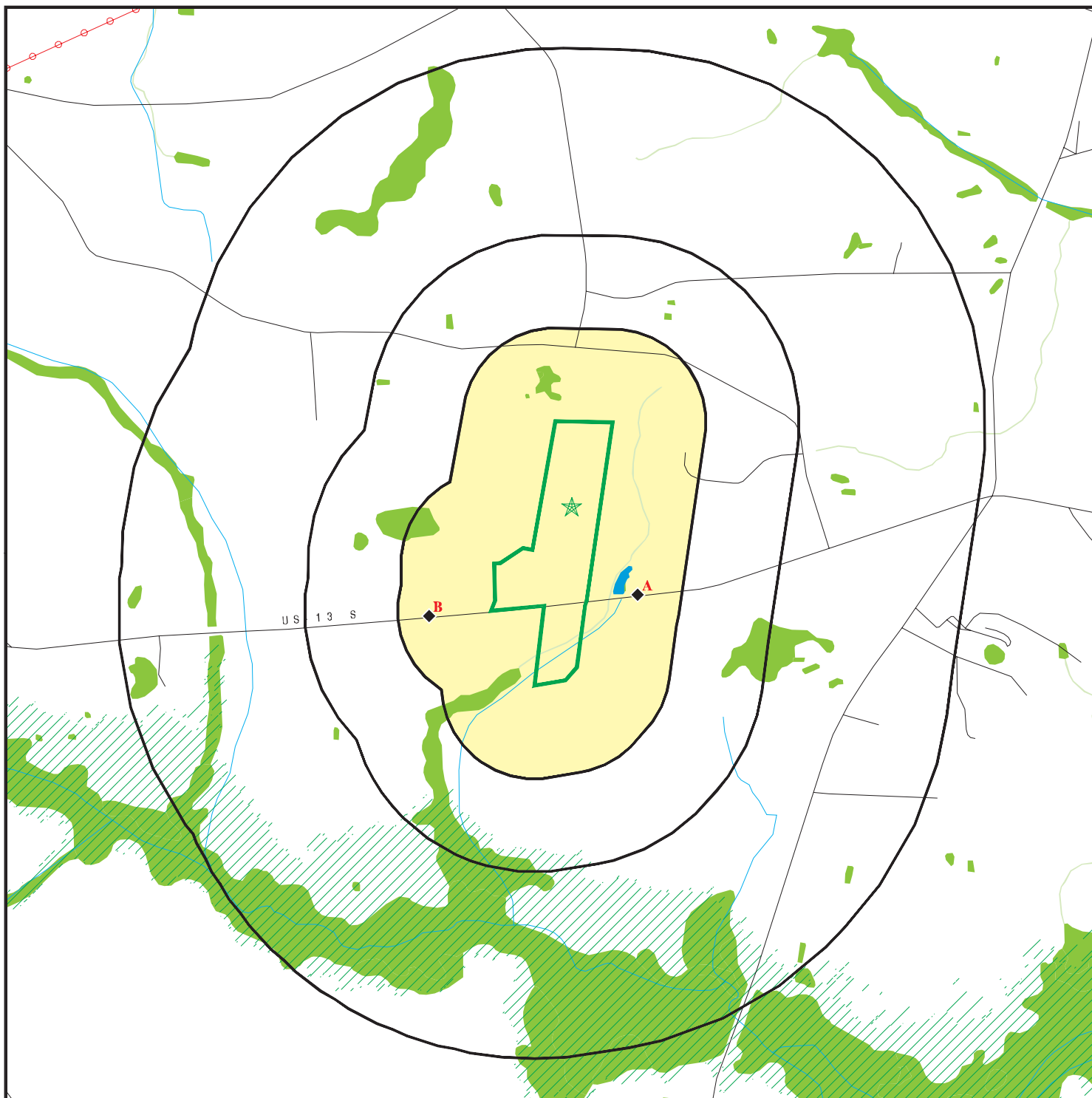
## EXECUTIVE SUMMARY

Due to poor or inadequate address information, the following sites were not mapped. Count: 5 records.

<u>Site Name</u>	<u>Database(s)</u>
SOLA ELECTRIC (HEVI-DUTY) (DOWZER	PRP
NC NATURAL GAS/GOLDSBORO CONSTRUCT	LUST
N.C. NATURAL GAS CORP.	LUST TRUST
STACKHOUSE, INC.	LUST TRUST
HIGHWAY 70 PHILLIPS 66	LUST TRUST



# OVERVIEW MAP - 6676512.2S



Target Property

Sites at elevations higher than or equal to the target property

Sites at elevations lower than the target property

Manufactured Gas Plants

National Priority List Sites

Dept. Defense Sites

Indian Reservations BIA

Power transmission lines

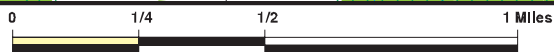
Special Flood Hazard Area (1%)

0.2% Annual Chance Flood Hazard

National Wetland Inventory

State Wetlands

Hazardous Substance Disposal Sites

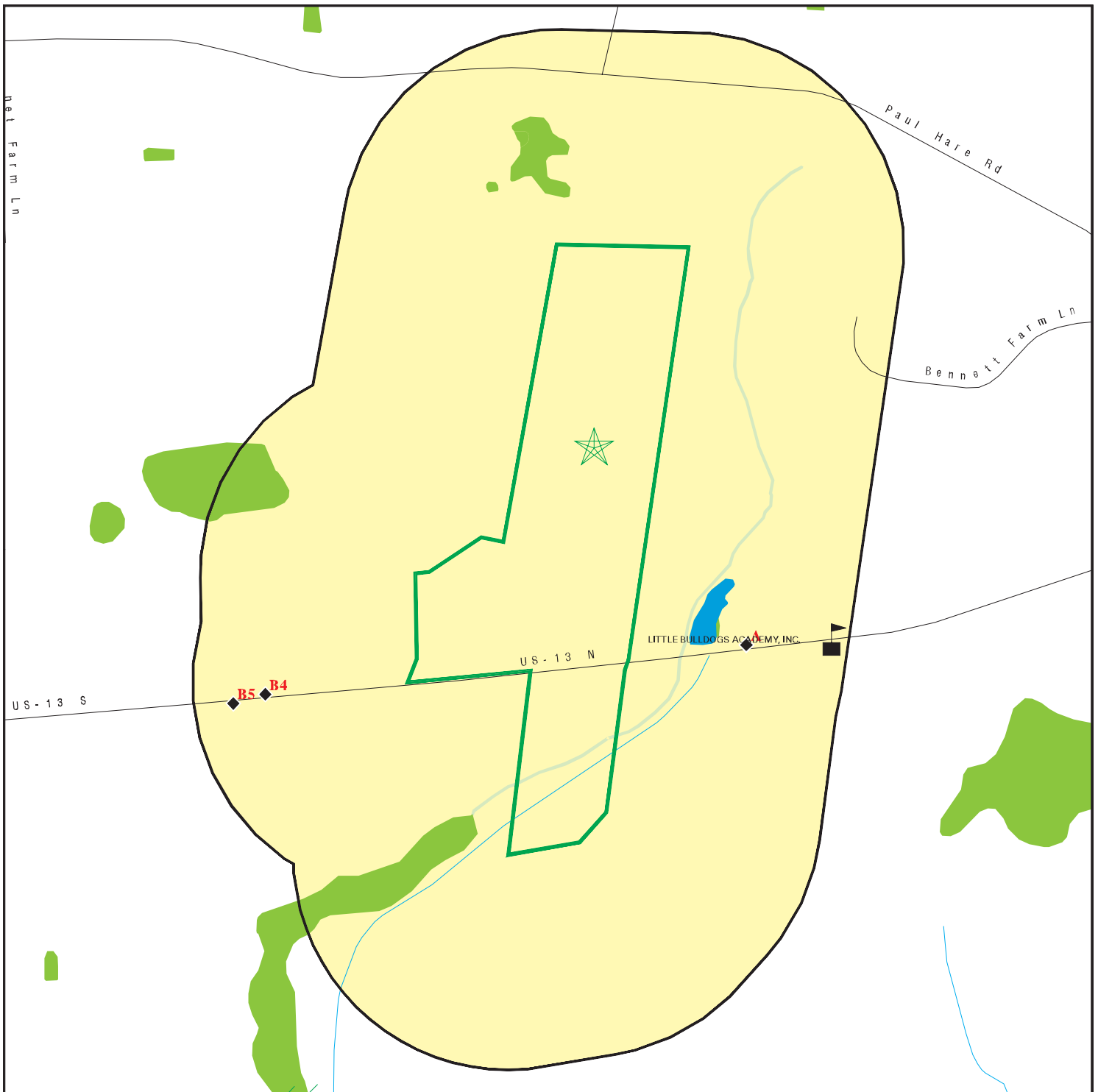









This report includes Interactive Map Layers to display and/or hide map information. The legend includes only those icons for the default map view.







SITE NAME: Cotton Creek Mitigation Site  
 ADDRESS: US Hwy 13  
 Goldsboro NC 27530  
 LAT/LONG: 35.296726 / 78.183544

CLIENT: Wildlands Eng, Inc.  
 CONTACT: Andrea Eckardt  
 INQUIRY #: 6676512.2s  
 DATE: September 24, 2021 9:39 am

# DETAIL MAP - 6676512.2S



-  Target Property
-  Sites at elevations higher than or equal to the target property
-  Sites at elevations lower than the target property
-  Manufactured Gas Plants
-  Sensitive Receptors
-  National Priority List Sites
-  Dept. Defense Sites

-  Indian Reservations BIA
-  Special Flood Hazard Area (1%)
-  0.2% Annual Chance Flood Hazard
-  National Wetland Inventory
-  State Wetlands
-  Hazardous Substance Disposal Sites

This report includes Interactive Map Layers to display and/or hide map information. The legend includes only those icons for the default map view.

<p><b>SITE NAME:</b> Cotton Creek Mitigation Site  <b>ADDRESS:</b> US Hwy 13          Goldsboro NC 27530  <b>LAT/LONG:</b> 35.296726 / 78.183544</p>	<p><b>CLIENT:</b> Wildlands Eng, Inc.  <b>CONTACT:</b> Andrea Eckardt  <b>INQUIRY #:</b> 6676512.2s  <b>DATE:</b> September 24, 2021 9:39 am</p>
--	--

## MAP FINDINGS SUMMARY

Database	Search Distance (Miles)	Target Property	< 1/8	1/8 - 1/4	1/4 - 1/2	1/2 - 1	> 1	Total Plotted
<b>STANDARD ENVIRONMENTAL RECORDS</b>								
<b><i>Federal NPL site list</i></b>								
NPL	1.000		0	0	0	0	NR	0
Proposed NPL	1.000		0	0	0	0	NR	0
NPL LIENS	1.000		0	0	0	0	NR	0
<b><i>Federal Delisted NPL site list</i></b>								
Delisted NPL	1.000		0	0	0	0	NR	0
<b><i>Federal CERCLIS list</i></b>								
FEDERAL FACILITY	0.500		0	0	0	NR	NR	0
SEMS	0.500		0	0	0	NR	NR	0
<b><i>Federal CERCLIS NFRAP site list</i></b>								
SEMS-ARCHIVE	0.500		0	0	0	NR	NR	0
<b><i>Federal RCRA CORRACTS facilities list</i></b>								
CORRACTS	1.000		0	0	0	0	NR	0
<b><i>Federal RCRA non-CORRACTS TSD facilities list</i></b>								
RCRA-TSDF	0.500		0	0	0	NR	NR	0
<b><i>Federal RCRA generators list</i></b>								
RCRA-LQG	0.250		0	0	NR	NR	NR	0
RCRA-SQG	0.250		0	0	NR	NR	NR	0
RCRA-VSQG	0.250		0	0	NR	NR	NR	0
<b><i>Federal institutional controls / engineering controls registries</i></b>								
LUCIS	0.500		0	0	0	NR	NR	0
US ENG CONTROLS	0.500		0	0	0	NR	NR	0
US INST CONTROLS	0.500		0	0	0	NR	NR	0
<b><i>Federal ERNS list</i></b>								
ERNS	TP		NR	NR	NR	NR	NR	0
<b><i>State- and tribal - equivalent NPL</i></b>								
NC HSDS	1.000		0	0	0	0	NR	0
<b><i>State- and tribal - equivalent CERCLIS</i></b>								
SHWS	1.000		0	0	0	0	NR	0
<b><i>State and tribal landfill and/or solid waste disposal site lists</i></b>								
SWF/LF	0.500		0	0	0	NR	NR	0
OLI	0.500		0	0	0	NR	NR	0
DEBRIS	0.500		0	0	0	NR	NR	0
LCID	0.500		0	0	0	NR	NR	0

## MAP FINDINGS SUMMARY

Database	Search Distance (Miles)	Target Property	< 1/8	1/8 - 1/4	1/4 - 1/2	1/2 - 1	> 1	Total Plotted
<b>State and tribal leaking storage tank lists</b>								
LUST	0.500		1	2	0	NR	NR	3
LAST	0.500		0	0	0	NR	NR	0
INDIAN LUST	0.500		0	0	0	NR	NR	0
LUST TRUST	0.500		0	0	0	NR	NR	0
<b>State and tribal registered storage tank lists</b>								
FEMA UST	0.250		0	0	NR	NR	NR	0
UST	0.250		0	1	NR	NR	NR	1
AST	0.250		0	0	NR	NR	NR	0
INDIAN UST	0.250		0	0	NR	NR	NR	0
<b>State and tribal institutional control / engineering control registries</b>								
INST CONTROL	0.500		0	1	0	NR	NR	1
<b>State and tribal voluntary cleanup sites</b>								
VCP	0.500		0	0	0	NR	NR	0
INDIAN VCP	0.500		0	0	0	NR	NR	0
<b>State and tribal Brownfields sites</b>								
BROWNFIELDS	0.500		0	0	0	NR	NR	0
<b><u>ADDITIONAL ENVIRONMENTAL RECORDS</u></b>								
<b>Local Brownfield lists</b>								
US BROWNFIELDS	0.500		0	0	0	NR	NR	0
<b>Local Lists of Landfill / Solid Waste Disposal Sites</b>								
HIST LF	0.500		0	0	0	NR	NR	0
SWRCY	0.500		0	0	0	NR	NR	0
INDIAN ODI	0.500		0	0	0	NR	NR	0
ODI	0.500		0	0	0	NR	NR	0
DEBRIS REGION 9	0.500		0	0	0	NR	NR	0
IHS OPEN DUMPS	0.500		0	0	0	NR	NR	0
<b>Local Lists of Hazardous waste / Contaminated Sites</b>								
US HIST CDL	TP		NR	NR	NR	NR	NR	0
US CDL	TP		NR	NR	NR	NR	NR	0
<b>Local Land Records</b>								
LIENS 2	TP		NR	NR	NR	NR	NR	0
<b>Records of Emergency Release Reports</b>								
HMIRS	TP		NR	NR	NR	NR	NR	0
SPILLS	TP		NR	NR	NR	NR	NR	0
IMD	0.500		1	1	0	NR	NR	2

## MAP FINDINGS SUMMARY

Database	Search Distance (Miles)	Target Property	< 1/8	1/8 - 1/4	1/4 - 1/2	1/2 - 1	> 1	Total Plotted
SPILLS 90	TP		NR	NR	NR	NR	NR	0
SPILLS 80	TP		NR	NR	NR	NR	NR	0
<b>Other Ascertainable Records</b>								
RCRA NonGen / NLR	0.250		0	0	NR	NR	NR	0
FUDS	1.000		0	0	0	0	NR	0
DOD	1.000		0	0	0	0	NR	0
SCRD DRYCLEANERS	0.500		0	0	0	NR	NR	0
US FIN ASSUR	TP		NR	NR	NR	NR	NR	0
EPA WATCH LIST	TP		NR	NR	NR	NR	NR	0
2020 COR ACTION	0.250		0	0	NR	NR	NR	0
TSCA	TP		NR	NR	NR	NR	NR	0
TRIS	TP		NR	NR	NR	NR	NR	0
SSTS	TP		NR	NR	NR	NR	NR	0
ROD	1.000		0	0	0	0	NR	0
RMP	TP		NR	NR	NR	NR	NR	0
RAATS	TP		NR	NR	NR	NR	NR	0
PRP	TP		NR	NR	NR	NR	NR	0
PADS	TP		NR	NR	NR	NR	NR	0
ICIS	TP		NR	NR	NR	NR	NR	0
FTTS	TP		NR	NR	NR	NR	NR	0
MLTS	TP		NR	NR	NR	NR	NR	0
COAL ASH DOE	TP		NR	NR	NR	NR	NR	0
COAL ASH EPA	0.500		0	0	0	NR	NR	0
PCB TRANSFORMER	TP		NR	NR	NR	NR	NR	0
RADINFO	TP		NR	NR	NR	NR	NR	0
HIST FTTS	TP		NR	NR	NR	NR	NR	0
DOT OPS	TP		NR	NR	NR	NR	NR	0
CONSENT	1.000		0	0	0	0	NR	0
INDIAN RESERV	1.000		0	0	0	0	NR	0
FUSRAP	1.000		0	0	0	0	NR	0
UMTRA	0.500		0	0	0	NR	NR	0
LEAD SMELTERS	TP		NR	NR	NR	NR	NR	0
US AIRS	TP		NR	NR	NR	NR	NR	0
US MINES	0.250		0	0	NR	NR	NR	0
ABANDONED MINES	0.250		0	0	NR	NR	NR	0
FINDS	TP		NR	NR	NR	NR	NR	0
DOCKET HWC	TP		NR	NR	NR	NR	NR	0
UXO	1.000		0	0	0	0	NR	0
ECHO	TP		NR	NR	NR	NR	NR	0
FUELS PROGRAM	0.250		0	0	NR	NR	NR	0
AIRS	TP		NR	NR	NR	NR	NR	0
ASBESTOS	TP		NR	NR	NR	NR	NR	0
COAL ASH	0.500		0	0	0	NR	NR	0
DRYCLEANERS	0.250		0	0	NR	NR	NR	0
Financial Assurance	TP		NR	NR	NR	NR	NR	0
NPDES	TP		NR	NR	NR	NR	NR	0
UIC	TP		NR	NR	NR	NR	NR	0
AOP	TP		NR	NR	NR	NR	NR	0
MINES MRDS	TP		NR	NR	NR	NR	NR	0
PCSRP	0.500		0	0	0	NR	NR	0

## MAP FINDINGS SUMMARY

Database	Search Distance (Miles)	Target Property	< 1/8	1/8 - 1/4	1/4 - 1/2	1/2 - 1	> 1	Total Plotted
SEPT HAULERS	TP		NR	NR	NR	NR	NR	0
CCB	0.500		0	0	0	NR	NR	0
<b><u>EDR HIGH RISK HISTORICAL RECORDS</u></b>								
<b><i>EDR Exclusive Records</i></b>								
EDR MGP	1.000		0	0	0	0	NR	0
EDR Hist Auto	0.125		0	NR	NR	NR	NR	0
EDR Hist Cleaner	0.125		0	NR	NR	NR	NR	0
<b><u>EDR RECOVERED GOVERNMENT ARCHIVES</u></b>								
<b><i>Exclusive Recovered Govt. Archives</i></b>								
RGA HWS	TP		NR	NR	NR	NR	NR	0
RGA LF	TP		NR	NR	NR	NR	NR	0
RGA LUST	TP		NR	NR	NR	NR	NR	0
- Totals --		0	2	5	0	0	0	7

**NOTES:**

TP = Target Property

NR = Not Requested at this Search Distance

Sites may be listed in more than one database

Map ID  
Direction  
Distance  
Elevation

MAP FINDINGS

Site

Database(s)

EDR ID Number  
EPA ID Number

A1  
SSE  
< 1/8  
0.112 mi.  
593 ft.

GRANTHAM SUPPLY TRUE VALUE H.  
3396 US HWY 13 S.  
GOLDSBORO, NC 27530  
Site 1 of 3 in cluster A

LUST S102868347  
IMD N/A

Relative:  
Lower  
Actual:  
145 ft.

LUST:  
Name: GRANTHAM SUPPLY TRUE VALUE H.  
Address: 3396 US HWY 13 S.  
City,State,Zip: GOLDSBORO, NC 27530  
Facility ID: 00-0-000  
UST Number: WA-1152  
Incident Number: 13426  
Contamination Type: Groundwater/Both  
Source Type: Leak-underground  
Product Type: PETROLEUM  
Date Reported: 02/23/1995  
Date Occur: 12/29/1994  
Cleanup: 12/29/1994  
Closure Request: Not reported  
Close Out: 02/23/1995  
Level Of Soil Cleanup Achieved: Residential  
Tank Regulated Status: REGULATED  
# Of Supply Wells: 0  
Commercial/NonCommercial UST Site: COMMERCIAL  
Risk Classification: L  
Risk Class Based On Review: L  
Corrective Action Plan Type: Not reported  
NOV Issue Date: Not reported  
NORR Issue Date: Not reported  
Site Priority: Not reported  
Phase Of LSA Req: Not reported  
Site Risk Reason: Not reported  
Land Use: Residential  
MTBE: No  
MTBE1: Yes  
Flag: No  
Flag1: No  
LUR Filed: Not reported  
Release Detection: 0  
Current Status: File Located in Archives  
RBCA GW: Cleanups to 2L.0202 standards  
PETOPT: 3  
RPL: False  
CD Num: 147  
Reel Num: 0  
RPOW: True  
RPOP: True  
Error Flag: 0  
Error Code: N  
Valid: False  
Lat/Long Decimal: 35.2972 -78.1652  
Testlat: Not reported  
Regional Officer Project Mgr: WRC  
Region: WAS  
Company: GRANTHAM SUPPLY TRUE VALUE H.  
Contact Person: JIM GRANTHAM  
Telephone: 9196892985  
RP Address: 3396 US HWY 13 S.

Map ID  
Direction  
Distance  
Elevation

MAP FINDINGS

Site

Database(s)

EDR ID Number  
EPA ID Number

**GRANTHAM SUPPLY TRUE VALUE H. (Continued)**

**S102868347**

RP City,St,Zip: GOLDSBORO, NC 27530  
RP County: WAYNE  
Comments: SOIL SAMPLE TAKEN DURING CLOSURE CONFIRMED MAJOR SOIL CONTAMINATION.  
NFA issued May 8, 2002and public notification receipts received  
6/4/02and 6/6/02  
5 Min Quad: Not reported  
PIRF:  
Facility Id: 13426  
Date Occurred: 12/29/1994  
Date Reported: 2/23/1995  
Description Of Incident: SOIL SAMPLE TAKEN DURING CLOSURE CONFIRMED MAJOR SOIL CONTAMINATION.  
Owner/Operator: JIM GRANTHAM  
Ownership: 4  
Operation Type: 6  
Type: 5  
Location: 1  
Site Priority: Not reported  
Priority Update: Not reported  
Wells Affected Y/N: Not reported  
Samples Include: 0  
7#5 Minute Quad: 3  
5 Minute Quad: 1  
Pirf/Min Soil: Not reported  
Release Code: Q330  
Source Code: Pirf  
Err Type: Not reported  
Cause: Not reported  
Source: Not reported  
Ust Number: Not reported  
  
Last Modified: 2/12/1999  
**Incident Phase: Closed Out**  
NOV Issued: 2/21/1995  
NORR Issued: Not reported  
45 Day Report: Not reported  
Public Meeting Held: Not reported  
Corrective Action Planned: Not reported  
SOC Signed: Not reported  
Reclassification Report: Not reported  
RS Designation: Not reported  
Closure Request Date: Not reported  
Close-out Report: 2/23/1995

[Click here to access the North Carolina DEQ records for this facility:](#)

**IMD:**

Facility ID: 13426  
Name: GRANTHAM SUPPLY TRUE VALUE H.  
Address: 3396 US HWY 13 S.  
City,State,Zip: GOLDSBORO, NC  
Date Occurred: 12/29/1994  
Submit Date: 2/23/1995  
Incident Desc: SOIL SAMPLE TAKEN DURING CLOSURE CONFIRMED MAJOR SOIL CONTAMINATION.  
Operator: JIM GRANTHAM  
UST ID: Not reported  
Incident ID: Not reported



Map ID  
 Direction  
 Distance  
 Elevation

MAP FINDINGS

Site

Database(s)

EDR ID Number  
 EPA ID Number

**GRANTHAM SUPPLY TRUE VALUE H. (Continued)**

**S102868347**

Initials of UST Regional Contact:	Not reported
Regional Office:	Not reported
Responsible Party/Company Name:	Not reported
Ownership:	4
Responsible Party Contact Name:	Not reported
Operation:	6
Responsible Party Mailing Address:	Not reported
Responsible Party City,State,Zip:	Not reported
Ownership:	Private
Operation Type:	Commercial
Responsible Party County:	Not reported
Source of Contamination:	GASOLINE/DIESEL/KEROSENE
Source:	3
Type:	3
Location:	1
Petroleum Type:	Not reported
Date Incident Reported:	Not reported
Whether Tank is Commercial or Non Commercial:	Not reported
Site Priority:	Not reported
Whether Tank is Regulated:	Not reported
Priority Update:	Not reported
Notice of Regulatory Requirement:	Not reported
Wells Affected:	Not reported
Notice of Violation:	Not reported
Phase 1 or Phase 2:	Not reported
Num Affected:	0
Site Priority:	Not reported
Type:	GASOLINE/DIESEL
Location:	Facility
Current Risk Condition:	Not reported
Sampled By:	3
Samples Include:	1
Initial reported risk of incident (never changes):	Not reported
7.5 Min Quad:	Not reported
5 Min Quad:	Q330
Intermediate Condition Present:	Not reported
Latitude:	35.29722222
Longitude:	-78.16527777
Use of Land, Industrial:	Not reported
Corrective Action Plan Selected - up to 5:	Not reported
RBCA:	Not reported
Date Close Review Requested From RP or Owner:	Not reported
Date Case Closed:	Not reported
Extent of Contamination:	Not reported
Number of Supply Wells Located on Property:	Not reported
MTBE in Well Y/N/U Yes, No or Unknown:	Not reported
Facility Phone Number:	Not reported
MTBE in Groundwater Y/N/U Yes, No or Unknown:	Not reported
Date Land Use Restriction Filed:	Not reported
Date Cleanup Initiated:	Not reported
Record Status:	Not reported
RBCA GW Codes:	Not reported
RBCA GW:	Not reported
Pollutant Type Present:	Not reported
Reference Number for Media Disk for Archived Record:	Not reported
RP Owner?:	Not reported
RP Operator?:	Not reported

Map ID  
 Direction  
 Distance  
 Elevation

MAP FINDINGS

Site

Database(s)

EDR ID Number  
 EPA ID Number

**GRANTHAM SUPPLY TRUE VALUE H. (Continued)**

**S102868347**

RP Landowner?: Not reported

Status:

Facility ID:	13426
Last Modified:	1999-02-12 00:00:00
Incident Phase:	CO
NOV Issued:	1995-02-21 00:00:00
NORR Issued:	Not reported
45 Day Report:	Not reported
Public Meeting Held:	Not reported
Corrective Action Planned:	Not reported
SOC Sighned:	Not reported
Reclassification Report:	Not reported
RS Designation:	Not reported
Closure Request Date:	Not reported
Close-out Report:	1995-02-23 00:00:00

**A2**  
**SE**  
**1/8-1/4**  
**0.133 mi.**  
**703 ft.**

**GRANTHAM TRUE VALUE HARDWARE**  
**3396 U.S. HIGHWAY 13 SOUTH**  
**GOLDSBORO, NC 27530**

**Site 2 of 3 in cluster A**

**LUST** **S111161149**  
**INST CONTROL** **N/A**

**Relative:**  
**Lower**  
**Actual:**  
**147 ft.**

LUST:

Name:	GRANTHAM TRUE VALUE HARDWARE
Address:	3396 U.S. HIGHWAY 13 SOUTH
City,State,Zip:	GOLDSBORO, NC 27530
Facility ID:	00-0-000
UST Number:	WA-27029
Incident Number:	16371
Contamination Type:	Groundwater/Both
Source Type:	Leak-underground
Product Type:	PETROLEUM
Date Reported:	07/19/1996
Date Occur:	07/19/1996
Cleanup:	07/19/1996
Closure Request:	Not reported
Close Out:	05/08/2002
Level Of Soil Cleanup Achieved:	Residential
Tank Regulated Status:	REGULATED
# Of Supply Wells:	0
Commercial/NonCommercial UST Site:	COMMERCIAL
Risk Classification:	L
Risk Class Based On Review:	L
Corrective Action Plan Type:	Not reported
NOV Issue Date:	Not reported
NORR Issue Date:	Not reported
Site Priority:	Not reported
Phase Of LSA Req:	Not reported
Site Risk Reason:	Not reported
Land Use:	Residential
MTBE:	No
MTBE1:	Yes
Flag:	No
Flag1:	No
LUR Filed:	04/26/2002
Release Detection:	0

Map ID  
Direction  
Distance  
Elevation

MAP FINDINGS

Site

Database(s)

EDR ID Number  
EPA ID Number

**GRANTHAM TRUE VALUE HARDWARE (Continued)**

**S111161149**

Current Status: File Located in Archives  
RBCA GW: Cleanups to alternate standards  
PETOPT: 3  
RPL: True  
CD Num: 570  
Reel Num: 0  
RPOW: True  
RPOP: True  
Error Flag: 0  
Error Code: N  
Valid: False  
Lat/Long Decimal: 35.2972 -78.1641  
Testlat: Not reported  
Regional Officer Project Mgr: RMB  
Region: WAS  
Company: GRANTHAM TRUE VALUE HARDWARE  
Contact Person: JIM GRANTHAM  
Telephone: Not reported  
RP Address: 3396 US HIGHWAY 13 SOUTH  
RP City,St,Zip: GOLDSBORO, NC 27530  
RP County: Not reported  
Comments: SENT FOR ARCHIVING MAY 2015;  
5 Min Quad: Not reported

**PIRF:**

Facility Id: 16371  
Date Occurred: 3/15/1996  
Date Reported: 10/11/1996  
Description Of Incident: FREE PRODUCT AND SOIL CONTAM. HAVE BEEN CONFIRMED ON-SITE.  
Owner/Operator: JAMES H. GRANTHAM  
Ownership: 4  
Operation Type: 6  
Type: 3  
Location: 1  
Site Priority: 160H  
Priority Update: 7/29/1999  
Wells Affected Y/N: N  
Samples Include: 0  
7#5 Minute Quad: 4  
5 Minute Quad: 1  
Pirf/Min Soil: Not reported  
Release Code: Q320  
Source Code: Pirf  
Err Type: Not reported  
Cause: Not reported  
Source: Not reported  
Ust Number: Not reported

Last Modified: 5/8/2002  
**Incident Phase: Closed Out**  
NOV Issued: Not reported  
NORR Issued: Not reported  
45 Day Report: Not reported  
Public Meeting Held: Not reported  
Corrective Action Planned: Not reported  
SOC Signed: Not reported  
Reclassification Report: Not reported  
RS Designation: Not reported

Map ID  
Direction  
Distance  
Elevation

MAP FINDINGS

Site

Database(s)

EDR ID Number  
EPA ID Number

**GRANTHAM TRUE VALUE HARDWARE (Continued)**

**S111161149**

Closure Request Date: Not reported  
Close-out Report: 5/8/2002

[Click here to access the North Carolina DEQ records for this facility:](#)

**INST CONTROL:**

Name: GRANTHAM TRUE VALUE HARDWARE  
Address: 3396 U.S. HIGHWAY 13 SOUTH  
City,State,Zip: GOLDSBORO, NC  
Project Number: WA-27029  
Object ID: 2557  
DWM Contact: Washington Regional Office (252) 946-6481  
DWM Program: Underground Storage Tank Section  
Project Status: No Further Action  
COC: Multi COC  
Contamination Source: UST System  
Received Date: 4/25/2002  
Restricted Media: Multi-Media  
Allowed Use: Media Restrictions Only  
Certification: None  
Plant Reception Date: Not reported  
Instrument Status: Effective  
Deed BK: Not reported  
Deed PG: Not reported  
Plat BK: Not reported  
Plat PG: Not reported  
Instrument: Notice and Restriction  
Deed: Not reported  
Deed Date: Recorded 4-25-2002  
Plat: Not reported  
Plat Date: Not reported  
X Coord: 2249394.4481  
Y Coord: 564168.81116

**A3**  
**SE**  
**1/8-1/4**  
**0.134 mi.**  
**705 ft.**

**GRANTHAM SUPPLY & SUPERMARKET**  
**3388 US HWY 13 SOUTH**  
**GOLDSBORO, NC 27530**

**LUST S126204874**  
**N/A**

**Site 3 of 3 in cluster A**

**Relative:**  
**Lower**  
**Actual:**  
**147 ft.**

**LUST:**

Name: GRANTHAM SUPPLY & SUPERMARKET  
Address: 3388 US HWY 13 SOUTH  
City,State,Zip: GOLDSBORO, NC 27530  
Facility ID: 00-0-000  
UST Number: WA-27712  
Incident Number: 47028  
Contamination Type: Groundwater/Both  
Source Type: Leak-underground  
Product Type: PETROLEUM  
Date Reported: 05/12/2020  
Date Occur: 04/17/2020  
Cleanup: 04/17/2020  
Closure Request: Not reported  
Close Out: 10/12/2020  
Level Of Soil Cleanup Achieved: Soil to Groundwater  
Tank Regulated Status: REGULATED

Map ID  
Direction  
Distance  
Elevation

MAP FINDINGS

Site

Database(s)

EDR ID Number  
EPA ID Number

**GRANTHAM SUPPLY & SUPERMARKET (Continued)**

**S126204874**

# Of Supply Wells: 0  
Commercial/NonCommercial UST Site: COMMERCIAL  
Risk Classification: U  
Risk Class Based On Review: L  
Corrective Action Plan Type: Not reported  
NOV Issue Date: Not reported  
NORR Issue Date: Not reported  
Site Priority: Not reported  
Phase Of LSA Req: 1  
Site Risk Reason: Not reported  
Land Use: Residential  
MTBE: No  
MTBE1: Unknown  
Flag: No  
Flag1: Not reported  
LUR Filed: 04/26/2002  
Release Detection: Not reported  
Current Status: File Located in House  
RBCA GW: Cleanups to alternate standards  
PETOPT: 3  
RPL: True  
CD Num: Not reported  
Reel Num: Not reported  
RPOW: True  
RPOP: True  
Error Flag: Not reported  
Error Code: N  
Valid: False  
Lat/Long Decimal: 35.2971 -78.1644  
Testlat: Not reported  
Regional Officer Project Mgr: JME  
Region: WAS  
Company: Grantham Supply & Supermarket  
Contact Person: Ted Grantham  
Telephone: 9199201613  
RP Address: 3396 US Hwy 13 S  
RP City,St,Zip: Goldsboro, NC 27530  
RP County: Not reported  
Comments: See earlier incidents at this site: 13426 and 16371. Hydrostatic test failed for gas UST spill bucket July 2018. Repaired Aug 2018. Site Check used existing MW for GW check in April 2020. Detected GW impacts, with benzene > 2x levels seen at 2002 LSA for Incident 16371 and other constituents not seen in 2002 (TAA ,TBA, etc.). Recorded as evidence of a new release. Survey documents Low risk. Closed via existing NRP (Book 1940, pages 507-510). CNFA sent 8/5/2020 with PN requirement.  
5 Min Quad: Not reported  
PIRF:  
Facility Id: 47028  
Date Occurred: Not reported  
Date Reported: Not reported  
Description Of Incident: Failed Gas UST spill bucket, GW Benzene 2x closure levels for 16371. New Release.  
Owner/Operator: Not reported  
Ownership: 4  
Operation Type: 6  
Type: 3

Map ID  
 Direction  
 Distance  
 Elevation

MAP FINDINGS

Site

Database(s)

EDR ID Number  
 EPA ID Number

**GRANTHAM SUPPLY & SUPERMARKET (Continued)**

**S126204874**

Location: 1  
 Site Priority: Not reported  
 Priority Update: Not reported  
 Wells Affected Y/N: N  
 Samples Include: Not reported  
 7#5 Minute Quad: Y  
 5 Minute Quad: Not reported  
 Pirf/Min Soil: Not reported  
 Release Code: Not reported  
 Source Code: Not reported  
 Err Type: 7  
 Cause: 9  
 Source: F  
 Ust Number: 2

Last Modified: 10/12/2020  
**Incident Phase: Closed Out**  
 NOV Issued: Not reported  
 NORR Issued: Not reported  
 45 Day Report: Not reported  
 Public Meeting Held: Not reported  
 Corrective Action Planned: Not reported  
 SOC Signed: Not reported  
 Reclassification Report: Not reported  
 RS Designation: Not reported  
 Closure Request Date: Not reported  
 Close-out Report: Not reported

[Click here to access the North Carolina DEQ records for this facility:](#)

**B4**  
**SW**  
 1/8-1/4  
 0.166 mi.  
 875 ft.

**DANNIE'S GAS & GROCERY**  
**3590 US 13 SOUTH**  
**GOLDSBORO, NC 27530**

**UST U001203672**  
**N/A**

**Site 1 of 2 in cluster B**

**Relative:**  
**Lower**  
**Actual:**  
**145 ft.**

UST:  
 Name: DANNIE'S GAS & GROCERY  
 Address: 3590 US 13 SOUTH  
 City,State,Zip: GOLDSBORO, NC 27530  
 Facility Id: 00-0-0000027577  
 Contact: DANNIE . FAIRCLOTH  
 Contact Address1: 3590 US 13 SOUTH  
 Contact Address2: Not reported  
 Contact City/State/Zip: GOLDSBORO, NC 27530  
 FIPS County Desc: Wayne  
 Latitude: 35.29504  
 Longitude: -78.17264

Tank Id: 1  
 Tank Status: Current  
 Installed Date: 09/23/1983  
 Perm Close Date: Not reported  
 Product Name: Gasoline, Gas Mix  
 Tank Capacity: 4000  
 Root Tank Id: Not reported  
 Main Tank: No  
 Compartment Tank: No

Map ID  
Direction  
Distance  
Elevation

MAP FINDINGS

Site

Database(s)

EDR ID Number  
EPA ID Number

**DANNIE'S GAS & GROCERY (Continued)**

**U001203672**

Manifold Tank: 0  
Commercial: Yes  
Regulated: Yes  
Other CP Tank: Not reported  
Overfill Protection Name: Auto Shutoff Device  
Spill Protection Name: Catchment Basin  
Leak Detection Name: Not reported  
Decode for TCONS\_KEY: Single Wall Steel  
Decode for PCONS\_KEY: Single Wall Steel  
Decode for PSYS\_KEY: Unknown

[Click here to access the North Carolina DEQ records for this facility:](#)

Tank Id: 2  
Tank Status: Current  
Installed Date: 09/23/1983  
Perm Close Date: Not reported  
Product Name: Gasoline, Gas Mix  
Tank Capacity: 4000  
Root Tank Id: Not reported  
Main Tank: No  
Compartment Tank: No  
Manifold Tank: 0  
Commercial: Yes  
Regulated: Yes  
Other CP Tank: Not reported  
Overfill Protection Name: Auto Shutoff Device  
Spill Protection Name: Catchment Basin  
Leak Detection Name: Not reported  
Decode for TCONS\_KEY: Single Wall Steel  
Decode for PCONS\_KEY: Single Wall Steel  
Decode for PSYS\_KEY: Unknown

[Click here to access the North Carolina DEQ records for this facility:](#)

Tank Id: 3  
Tank Status: Current  
Installed Date: 09/23/1983  
Perm Close Date: Not reported  
Product Name: Gasoline, Gas Mix  
Tank Capacity: 4000  
Root Tank Id: Not reported  
Main Tank: No  
Compartment Tank: No  
Manifold Tank: 0  
Commercial: Yes  
Regulated: Yes  
Other CP Tank: Not reported  
Overfill Protection Name: Auto Shutoff Device  
Spill Protection Name: Catchment Basin  
Leak Detection Name: Not reported  
Decode for TCONS\_KEY: Single Wall Steel  
Decode for PCONS\_KEY: Single Wall Steel  
Decode for PSYS\_KEY: Unknown

Map ID  
Direction  
Distance  
Elevation

MAP FINDINGS

Site

Database(s)

EDR ID Number  
EPA ID Number

**DANNIE'S GAS & GROCERY (Continued)**

**U001203672**

[Click here to access the North Carolina DEQ records for this facility:](#)

Tank Id: 4  
Tank Status: Current  
Installed Date: 09/23/1983  
Perm Close Date: Not reported  
Product Name: Gasoline, Gas Mix  
Tank Capacity: 4000  
Root Tank Id: Not reported  
Main Tank: No  
Compartment Tank: No  
Manifold Tank: 0  
Commercial: Yes  
Regulated: Yes  
Other CP Tank: Not reported  
Overfill Protection Name: Auto Shutoff Device  
Spill Protection Name: Catchment Basin  
Leak Detection Name: Not reported  
Decode for TCONS\_KEY: Single Wall Steel  
Decode for PCONS\_KEY: Single Wall Steel  
Decode for PSYS\_KEY: Unknown

[Click here to access the North Carolina DEQ records for this facility:](#)

Tank Id: 5  
Tank Status: Removed  
Installed Date: 09/23/1983  
Perm Close Date: 12/31/1990  
Product Name: Kerosene, Kero Mix  
Tank Capacity: 550  
Root Tank Id: Not reported  
Main Tank: No  
Compartment Tank: No  
Manifold Tank: Not reported  
Commercial: Yes  
Regulated: Yes  
Other CP Tank: Not reported  
Overfill Protection Name: Unknown  
Spill Protection Name: Unknown  
Leak Detection Name: Unknown  
Decode for TCONS\_KEY: Single Wall Steel  
Decode for PCONS\_KEY: Single Wall Steel  
Decode for PSYS\_KEY: Unknown

[Click here to access the North Carolina DEQ records for this facility:](#)

Tank Id: 6  
Tank Status: Current  
Installed Date: 09/23/1983  
Perm Close Date: Not reported  
Product Name: Diesel  
Tank Capacity: 4000  
Root Tank Id: Not reported  
Main Tank: No



Map ID  
 Direction  
 Distance  
 Elevation

MAP FINDINGS

Site

Database(s)

EDR ID Number  
 EPA ID Number

**DANNIE'S GAS & GROCERY (Continued)**

**U001203672**

Compartment Tank: No  
 Manifold Tank: 0  
 Commercial: Yes  
 Regulated: Yes  
 Other CP Tank: Not reported  
 Overfill Protection Name: Auto Shutoff Device  
 Spill Protection Name: Catchment Basin  
 Leak Detection Name: Not reported  
 Decode for TCONS\_KEY: Single Wall Steel  
 Decode for PCONS\_KEY: Single Wall Steel  
 Decode for PSYS\_KEY: Unknown

[Click here to access the North Carolina DEQ records for this facility:](#)

**B5**  
**SW**  
**1/8-1/4**  
**0.204 mi.**  
**1076 ft.**

**CASEY'S 76 GROCERY**  
**3605 HWY 13 SOUTH**  
**GRANTHAM, NC 27530**  
**Site 2 of 2 in cluster B**

**IMD S127487007**  
**N/A**

**Relative:**  
**Lower**  
**Actual:**  
**142 ft.**

IMD:  
 Facility ID: 00-0-0000003732  
 Name: CASEY'S 76 GROCERY  
 Address: 3605 HWY 13 SOUTH  
 City,State,Zip: GRANTHAM, NC 27530  
 Date Occurred: Not reported  
 Submit Date: Not reported  
 Incident Desc: Not reported  
 Operator: Not reported  
 UST ID: WA-25743  
 Incident ID: Not reported  
 Initials of UST Regional Contact: EDP  
 Regional Office: WAS  
 Responsible Party/Company Name: DUMAS OIL COMPANY  
 Ownership: Not reported  
 Responsible Party Contact Name: Not reported  
 Operation: Not reported  
 Responsible Party Mailing Address: 906 S GEORGE ST  
 Responsible Party City,State,Zip: GOLDSBORO, NC 27530  
 Ownership: Not reported  
 Operation Type: Not reported  
 Responsible Party County: Not reported  
 Source of Contamination: GASOLINE/DIESEL/KEROSENE  
 Source: 3  
 Type: Not reported  
 Location: Not reported  
 Petroleum Type: PETROLEUM  
 Date Incident Reported: 1993-10-25 00:00:00  
 Whether Tank is Commercial or Non Commercial: COMMERCIAL  
 Site Priority: Not reported  
 Whether Tank is Regulated: REGULATED  
 Priority Update: Not reported  
 Notice of Regulatory Requirement: Not reported  
 Wells Affected: Not reported  
 Notice of Violation: Not reported  
 Phase 1 or Phase 2: Not reported  
 Num Affected: Not reported  
 Site Priority: Not reported

Map ID  
Direction  
Distance  
Elevation

MAP FINDINGS

Site

Database(s)

EDR ID Number  
EPA ID Number

**CASEY'S 76 GROCERY (Continued)**

**S127487007**

Type:	Not reported
Location:	Not reported
Current Risk Condition:	Not reported
Sampled By:	Not reported
Samples Include:	Not reported
Initial reported risk of incident (never changes):	L
7.5 Min Quad:	Not reported
5 Min Quad:	Not reported
Intermediate Condition Present:	Not reported
Latitude:	0
Longitude:	0
Use of Land, Industrial:	Not reported
Corrective Action Plan Selected - up to 5:	Not reported
RBCA:	Not reported
Date Close Review Requested From RP or Owner:	Not reported
Date Case Closed:	1993-10-25 00:00:00
Extent of Contamination:	None
Number of Supply Wells Located on Property:	0
MTBE in Well Y/N/U Yes, No or Unknown:	0
Facility Phone Number:	8004865925
MTBE in Groundwater Y/N/U Yes, No or Unknown:	U
Date Land Use Restriction Filed:	Not reported
Date Cleanup Initiated:	Not reported
Record Status:	ARCHIVED RECORD
RBCA GW Codes:	Not reported
RBCA GW:	Not reported
Pollutant Type Present:	GASOLINE/DIESEL/KEROSENE
Reference Number for Media Disk for Archived Record:	69
RP Owner?:	True
RP Operator?:	True
RP Landowner?:	False



August 23, 2022

**Renee Gledhill-Earley**

State Historic Preservation Office

4617 Mail Service Center

Raleigh, NC 27699-4617

*Submitted via email: Environmental.Review@ncdcr.gov*

**Subject:** Casey Creek Mitigation Site  
Wayne County, North Carolina

Dear Ms. Gledhill-Earley,

Wildlands Engineering, Inc. requests review and comment on any possible issues that might emerge with respect to archaeological or cultural resources associated with a potential stream, buffer, and nutrient offset mitigation project on the Casey Creek Mitigation Site (Site) located in Wayne County, NC. The Site is located approximately one mile west of the Town of Grantham, NC. The project is funded by North Carolina Division of Mitigation Services (NCDMS). A Site Overview Map and a USGS Topographic Map showing the approximate project area are enclosed. The topographic figure was prepared from the Grantham 7.5-Minute USGS Topographic Quadrangle, and the Site is located at latitude 35.2946770, longitude -78.1833726.

The Casey Creek Mitigation Site is being developed to provide stream, buffer, and nutrient mitigation within the Neuse River Basin. The project will include the restoration of Casey Creek Reaches 2 and 3, Martha Branch, and Afton Branch. Casey Creek Reach 1 is slated for preservation. Site stressors include stream incision, active stream erosion including mass wasting, nutrient inputs from adjacent agricultural fields, lack of riparian buffers, and areas of limited to absent bedform diversity. The Site is located on four parcels that contain tributaries to Falling Creek. A large portion of the properties (over 40 acres) have been used for row crop production for decades. The remaining acreage is primarily wooded with a mix of pines and hardwoods. Currently, the agricultural fields are used to grow a rotation of corn and soybeans with an occasional rotation of peanuts, cotton, and sweet potatoes.

The major goals of the proposed stream, buffer, and nutrient offset mitigation project are to provide ecological and water quality enhancements to the Neuse River Basin while creating a functional riparian corridor at the Site level. The project design will avoid major adverse impacts to existing streams, wetland resources, and existing forested areas. This will be accomplished by restoring and enhancing native floodplain vegetation, creating stable stream banks, improving stream habitat, and protecting the Site in perpetuity through establishing a conservation easement.

There are no surveyed sites listed on the North Carolina State Historic Preservation Office (SHPO) national register of historic places within nor in close proximity to the Site. Two R5-rated managed areas (Unique Places to Save Easements) are located within one mile of the Site. No other architectural structures or archaeological artifacts have been observed or noted during preliminary surveys of the site for restoration purposes. We ask that you review the 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 extent of Site disturbance associated with this project.

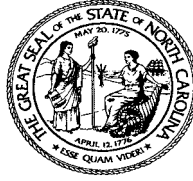
Sincerely,

**Tasha King**, Environmental Scientist

[tking@wildlandseng.com](mailto:tking@wildlandseng.com)

805.895.3304

Attachments: Figure 1 Overview Site Map, Figure 2 USGS Topographic Map



**North Carolina Department of Natural and Cultural Resources  
State Historic Preservation Office**

Ramona M. Bartos, Administrator

Governor Roy Cooper  
Secretary D. Reid Wilson

Office of Archives and History  
Deputy Secretary, Darin J. Waters, Ph.D.

September 1, 2022

Kim Isenhour  
Regulatory Division  
3331 Heritage Trade Drive, Suite 105  
Wake Forest, NC

[Kimberly.d.browning@usace.army.mil](mailto:Kimberly.d.browning@usace.army.mil)

Re: Casey Creek mitigation site, 35.2938, -78.1859, Wayne County, ER 22-2015

Dear Ms. Isenhour:

Thank you for your email of August 12, 2022, 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

cc: Tasha King, Wildlands Engineering

[tking@wildlandseng.com](mailto:tking@wildlandseng.com)

for the Trade Area is available, Buyer and Seller each agree to reimburse the other, as applicable, the amount of taxes owed based on the actual prorations within 30 days after the tax bill is presented to the other party.

**4.2 Default Prior to Closing; Remedies.**

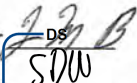
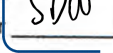
**4.2.1 Default by Seller.** If Closing does not occur because of Seller’s default, Buyer is, entitled to an immediate return of the Option Consideration and any other monies paid to Seller by Buyer, and shall have the right to pursue any other remedy available, including, but not limited, to specific performance.

**4.2.2 Default by Buyer; Liquidated Damages.** Buyer recognizes that the Mitigation Use Rights will be removed by Seller from the market during the term of the agreement. If the purchase of the Mitigation Use Rights is not consummated due to Buyer's default, the parties have determined and agreed that the actual amount of damages that would be suffered by Seller as a result of that default would be very difficult or impracticable to estimate on the date of this agreement. As a result, the parties agree that the Option Consideration as of the date of Buyer's default is sufficient to cover any estimated damages that may be incurred by Seller. For these reasons, the parties agree that if the purchase of the Mitigation Use Rights is not consummated because of Buyer’s default, Seller may retain the Option Consideration paid by Buyer as of the date of Buyer's default as its sole remedy, and Seller waives any and all right to seek other rights or remedies against Buyer, including without limitation, specific performance. Nothing stated in this section 4.2.2 precludes any action under any indemnification or defense provision in this agreement, nor for the award of attorney's fees and costs in conjunction with any action relating to this agreement.

**4.3 Brokers.** Buyer employs four North Carolina licensed real estate brokers, none of which have received a commission or finder’s fee in connection with this agreement. Buyer has not employed a broker or finder or incurred any liability for any brokerage fee, commission or finder’s fee in connection with this agreement.

**4.4 Notice.** All notices required by this agreement shall be in writing, shall be given only in accordance with the provisions of this Section, shall be addressed to the Parties in the manner stated below, and shall be conclusively deemed properly delivered: (a) upon receipt when hand delivered during normal business hours; (b) upon the day of delivery if the notice has been deposited in an authorized receptacle of the United States Postal Service as first-class, registered or certified mail, postage prepaid, with a return receipt requested; (c) one business day after the notice has been deposited with either FedEx or United Parcel Service to be delivered by overnight delivery; or (d) if sent by email, upon receipt of an acknowledgement email sent to the sender’s email address in which the party receiving the email notice acknowledges having received that email. An automatic “read receipt” is not acknowledgement for purposes of this section 4.4. The addresses of the parties to receive notices are as follows:

Seller: Johnnie Mangrum Brock  
536 Paul Hare Road  
Goldsboro, NC 27530  
Email: bedrockconst43@gmail.com

Seller:   
Buyer: 

Buyer: Wildlands Engineering, Inc.  
1430 S. Mint Street, Suite 104  
Charlotte, NC 28203  
Attention: Robert W. Bugg  
rbugg@wildlandseng.com

4.5 **Assignment.** Buyer has the right to assign this agreement without the consent of Seller. No assignment shall be effective unless the assignee has delivered to Seller a written assumption of Buyer's obligations under this agreement. Seller hereby releases Buyer from any obligations under this agreement arising after the effective date of any assignment of this agreement by Buyer.

4.6 **Value of Project Area; No Power of Eminent Domain.** In accordance with the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, Buyer hereby notifies Seller that: (i) Buyer believes that the fair market value of the Mitigation Values of the Project Area is an amount equal to the fair market value of the Trade Area; and (ii) Buyer does not have the power of eminent domain.

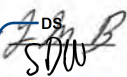

4.7 **Entire Agreement.** Each party acknowledges they are not relying on any statements made by the other party, other than in this agreement, regarding the subject matter of this agreement. Neither party will have a basis for bringing any claim for fraud in connection with any such statements.

4.8 **Additional Documents.** Before and after Closing, each party shall sign and deliver documents as needed and as requested by the other party to carry out the purpose of this agreement. This section survives Closing.

4.9 **Dispute Resolution.** In the event of any dispute, claim, question or disagreement arising out of or relating to this agreement, either party may invoke the Dispute Resolution provision of this section by notifying the other party in writing of the matter in dispute and of the party's intention to resolve the dispute under this section. The parties shall then attempt to resolve the dispute informally for a period of 15 calendar days from the date of the notice. The period of informal negotiations may be extended 15 calendar days by written agreement of the parties to the dispute. If the parties are unable to resolve the dispute through informal negotiation, any party may invoke formal dispute resolution through mediation. The parties will agree to mediate all disputes in good faith and shall agree on a North Carolina Superior Court Certified Mediator to mediate the dispute. The mediation process must commence within 60 days of the selection of a mediator and the costs of mediation shall be borne equally by both parties. If mediation fails to resolve the dispute between the parties, either party may seek judicial resolution of the dispute in a North Carolina Court.

4.10 **Attorneys' Fees.** If either party commences an action against the other to interpret or enforce any of the terms of this agreement or because of the breach by the other party of any of the terms of this agreement, the losing party shall pay to the prevailing party reasonable attorneys' fees, expenses, court costs, litigation costs and any other expenses incurred in connection with the prosecution or defense of such action, whether or not the action is prosecuted to a final judgment.

4.11 **Memorandum.** Concurrently with the signing of this agreement, Buyer and Seller agree to sign a Memorandum of Option which will be recorded against the Property in the Register of Deeds of the County stated in paragraph A.

Seller   
Buyer 

United States Postal Service as first-class, registered or certified mail, postage prepaid, with a return receipt requested; (c) one business day after the notice has been deposited with either FedEx or United Parcel Service to be delivered by overnight delivery; or (d) if sent by email, upon receipt of an acknowledgement email sent to the sender's email address in which the party receiving the email notice acknowledges having received that email. An automatic "read receipt" is not acknowledgement for purposes of this paragraph. The addresses of the parties to receive notices are as follows:

TO BUYER: Wildlands Engineering, Inc.  
1430 S. Mint Street, Suite 104  
Charlotte, North Carolina 28203  
Attention: Robert W. Bugg  
e-mail: rbugg@wildlandseng.com

TO SELLER: Martha C. Kornegay, Trustee  
4200 Country Club Circle  
Virginia Beach, VA 23455-4414

Notice of change of address shall be given by written notice in the manner described in this paragraph.

3.4 **Assignment.** Buyer has the right to assign this agreement without the consent of Seller. No assignment will be effective unless the assignee has delivered to Seller a written assumption of Buyer's obligations under this agreement. Seller hereby releases Buyer from any obligations under this agreement arising after the effective date of any assignment of this agreement by Buyer.


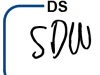
3.5 **Value of Fee Simple Area; No Power of Eminent Domain.** In accordance with the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, Buyer hereby notifies Seller that: (i) Buyer believes that the fair market value the Fee Simple Area is an amount equal to the Purchase Price; and (ii) Buyer does not have the power of eminent domain.

3.6 **Modification; Waiver.** No amendment of this agreement will be effective unless it is in writing and signed by the parties. No waiver of satisfaction of a condition or failure to comply with an obligation under this agreement will be effective unless it is in writing and signed by the party granting the waiver, and no such waiver will constitute a waiver of satisfaction of any other condition or failure to comply with any other obligation.

3.7 **Attorneys' Fees.** If either party commences an action against the other to interpret or enforce any of the terms of this agreement or because of the breach by the other party of any of the terms of this agreement, the losing party shall pay to the prevailing party reasonable attorneys' fees, expenses, court costs, litigation costs and any other expenses incurred in connection with the prosecution or defense of such action, whether or not the action is prosecuted to a final judgment.

3.8 **Memorandum of Option Agreement.** Concurrently with the signing of this agreement, Buyer and Seller agree to sign a Memorandum of Option which will be recorded against the Property in the Register of Deeds of the County stated in paragraph A.

3.9 **Tax Deferred Exchange.** If Seller desires to implement a tax-deferred exchange (the "Exchange") in connection with Buyer's purchase of the Fee Simple Area, the parties agree to cooperate in affecting the Exchange. Seller is responsible for all additional costs associated with the Exchange and Buyer shall not have any additional liability

Seller  Buyer 



**US Army Corps  
Of Engineers**  
Wilmington District

# PUBLIC NOTICE

Issue Date: August 12, 2022  
Comment Deadline: September 11, 2022  
Corps Action ID Number: SAW-2022-01239

The Wilmington District, Corps of Engineers (Corps) received an application from the North Carolina Division of Mitigation Services (DMS) seeking Department of the Army authorization to modify the In-Lieu Fee Instrument for the addition of a 24-acre site, known as Casey Creek Mitigation Site, which will be used to generate compensatory mitigation credits in Wayne County, North Carolina.

Specific plans and location information are described below and shown on the attached plans. This Public Notice and all attached plans are also available on the RIBITS Site at: <https://ribits.ops.usace.army.mil/ords/f?p=107:622:13369073933002::NO> Filter to the Wilmington District on the left hand side of the home page and select the Public Notices tab.

**Applicant:** N.C. Division of Mitigation Services  
Attn: Marc Recktenwald  
1652 Mail Service Center  
Raleigh, NC 27699

This public notice does not imply, on the part of the Corps of Engineers or other agencies, either favorable or unfavorable opinion of the work to be performed, but is issued to solicit comments regarding the factors on which final decisions will be based.

## Authority

The Corps evaluates this application and decides whether to issue, conditionally issue, or deny the proposed work pursuant to applicable procedures of the following Statutory Authorities:

- Section 404 of the Clean Water Act (33 U.S.C. 1344)
- Section 10 of the Rivers and Harbors Act of 1899 (33 U.S.C. 403)
- Section 103 of the Marine Protection, Research and Sanctuaries Act of 1972 (33 U.S.C. 1413)



## Location

### Location Description:

The Casey Creek Mitigation Site is in Wayne County approximately one mile west of the town of Grantham off US Highway 13 S. The project is located within Hydrologic Unit Code (HUC) 03020201170010 and is being submitted for mitigation credit in the Neuse River Basin Catalog Unit 03020201.

**Project Area (acres):** 24.0

**Nearest Town:** Grantham

**Nearest Waterway:** Kelley Creek

**River Basin:** Neuse River

**Latitude and Longitude:** 35.2938 °N, -78.1859 °W

**USGS Quad:** Grantham

## Existing Site Conditions

The proposed project is located on four parcels that contain tributaries to Falling Creek. A large portion of the properties (over 40 acres) has been used for row crop agriculture for decades. The remaining acreage is primarily wooded with a mix of pines and hardwoods. Currently, the agricultural fields are used to grow a rotation of corn and soybeans with an occasional rotation of peanuts, cotton, and sweet potatoes. Cattle were grazed in the fields south of US Hwy 13 until 1982. The fields are drained by drain tiles, perennial, and intermittent streams on the Site have clearly been channelized and relocated to increase crop production.

## Applicant's Stated Purpose

The purpose of the proposal is the modification of the Division of Mitigation Services In-Lieu-Fee Program Instrument to add an additional mitigation site to generate mitigation credits that may be used to provide compensatory mitigation for unavoidable impacts to streams associated with Department of the Army permit authorizations pursuant to Section 404 of the Clean Water Act.

## Project Description

The Casey Creek Mitigation Site proposes the restoration of 3,577 linear feet (LF) of stream and preservation of approximately 1,734 LF of stream. Stream restoration activities will include restoring appropriate dimension, pattern, and profile with Priority 1 and Priority 2 restoration where applicable. Stabilization structures will be installed, which will also provide habitat. Native riparian buffers will be established in excess of 50 feet on either side of each stream reach.

The sponsor has signed option agreements with the land owners to record a conservation easement on all land located within the site boundary. The easement will be conveyed to the State of North Carolina (NCDEQ Stewardship) who will serve as long-term manager for the mitigation property.

**Prospectus:**

This Public Notice document is available on the RIBITS web site at:

<https://ribits.usace.army.mil>

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.

This mitigation site may be considered one of a number of practicable alternatives available to applicants to compensate for unavoidable stream and wetland impacts associated with permits issued under the authority of Sections 404 and 401 of the Clean Water Act for projects located within the prescribed geographic service area.

Oversight of this mitigation proposal will be by a group of federal and state agency representatives collectively referred to as the Interagency Review Team (IRT). The IRT shall be chaired by the Wilmington District, U.S. Army Corps of Engineers and is comprised of representatives from the U.S. Environmental Protection Agency, U.S. Fish and Wildlife Service, N.C. Division of Water Resources, State Historic Preservation Office, NOAA, and the N.C. Wildlife Resources Commission.

The actual approval of the use of this mitigation site for a specific project is the decision of the Corps pursuant to Section 404 of the Clean Water Act. The Corps provides no guarantee that any particular individual or general permit will be granted authorization to use this stream compensatory mitigation site to compensate for unavoidable stream impacts associated with a proposed permit, even though mitigation from this site may be available.

**Essential Fish Habitat**

The Corps' determination is that the proposed project would not affect EFH or associated fisheries managed by the South Atlantic or Mid Atlantic Fishery Management Councils or the National Marine Fisheries Service.

- This notice initiates the Essential Fish Habitat (EFH) consultation requirements of the Magnuson-Stevens Fishery Conservation and Management Act. Implementation of the proposed project would impact (CHOOSE ALL THAT APPLY- marine substrate, estuarine substrate, water columns, emergent wetlands, submerged aquatic vegetation, artificial reefs, hardbottoms) (see project description) utilized by various life stages of the following species: coastal migratory pelagics and Atlantic highly migratory species. Our initial determination is that the proposed action would not have a substantial individual or cumulative adverse impact on EFH or fisheries managed by Fishery Management Councils and the National Marine Fisheries Service (NMFS). Our final determination relative to project impacts and the need for mitigation measures is subject to review by and coordination with the NMFS.
- The Corps will consult under the Magnuson-Stevens Act and will not make a permit decision until the consultation process is complete.

- The Corps has initiated consultation the Magnuson-Stevens Act and will not make a permit decision until the consultation process is complete.

## Cultural Resources

Pursuant to Section 106 of the National Historic Preservation Act of 1966, Appendix C of 33 CFR Part 325, and the 2005 Revised Interim Guidance for Implementing Appendix C, the District Engineer consulted district files and records and the latest published version of the National Register of Historic Places and initially determines that:

- Should historic properties, or properties eligible for inclusion in the National Register, be present within the Corps' permit area; the proposed activity requiring the DA permit (the undertaking) is a type of activity that will have no potential to cause an effect to an historic properties.
- No historic properties, nor properties eligible for inclusion in the National Register, are present within the Corps' permit area; therefore, there will be no historic properties affected. The Corps subsequently requests concurrence from the SHPO (or THPO).
- Properties ineligible for inclusion in the National Register are present within the Corps' permit area; there will be no historic properties affected by the proposed work. The Corps subsequently requests concurrence from the SHPO (or THPO).
- Historic properties, or properties eligible for inclusion in the National Register, are present within the Corps' permit area; however, the undertaking will have no adverse effect on these historic properties. The Corps subsequently requests concurrence from the SHPO (or THPO).
- Historic properties, or properties eligible for inclusion in the National Register, are present within the Corps' permit area; moreover, the undertaking may have an adverse effect on these historic properties. The Corps subsequently initiates consultation with the SHPO (or THPO).
- The proposed work takes place in an area known to have the potential for the presence of prehistoric and historic cultural resources; however, the area has not been formally surveyed for the presence of cultural resources. No sites eligible for inclusion in the National Register of Historic Places are known to be present in the vicinity of the proposed work. Additional work may be necessary to identify and assess any historic or prehistoric resources that may be present.

The District Engineer's final eligibility and effect determination will be based upon coordination with the SHPO and/or THPO, as appropriate and required, and with full consideration given to the proposed undertaking's potential direct and indirect effects on historic properties within the Corps-identified permit area.

## Endangered Species

Pursuant to the Endangered Species Act of 1973, the Corps reviewed the project area, examined all information provided by the applicant and consulted the latest North Carolina Natural Heritage Database. Based on available information:

- The Corps determines that the proposed project would not affect federally listed endangered or threatened species or their formally designated critical habitat.
- The Corps determines that the proposed project may affect federally listed endangered or threatened species or their formally designated critical habitat.
  - By copy of this public notice, the Corps initiates consultation under Section 7 of the ESA and will not make a permit decision until the consultation process is complete.
  - The Corps will consult under Section 7 of the ESA and will not make a permit decision until the consultation process is complete.
  - The Corps has initiated consultation under Section 7 of the ESA and will not make a permit decision until the consultation process is complete.
- The Corps determines that the proposed project may affect federally listed endangered or threatened species or their formally designated critical habitat. Consultation has been completed for this type of activity and the effects of the proposed activity have been evaluated and/or authorized by the National Marine Fisheries Service (NMFS) in the South Atlantic Regional Biological Opinion or its associated documents, including 7(a)(2) & 7(d) analyses and Critical Habitat assessments. A copy of this public notice will be sent to the NMFS.
- The Corps is not aware of the presence of species listed as threatened or endangered or their critical habitat formally designated pursuant to the Endangered Species Act of 1973 (ESA) within the project area. The Corps will make a final determination on the effects of the proposed project upon additional review of the project and completion of any necessary biological assessment and/or consultation with the U.S. Fish and Wildlife Service and/or National Marine Fisheries Service.

## Other Required Authorizations

The Corps forwards this notice and all applicable application materials to the appropriate State agencies for review.

**North Carolina Division of Water Resources (NCDWR):**

- The applicant did not provide or satisfy all the elements required for a complete 401 certification request. Therefore, the 401 Certification process has not started. The Corps will generally not make a final permit decision until the NCDWR issues, denies, or waives the state Certification as required by Section 401 of the Clean Water Act (PL 92-500).
- The Corps will generally not make a final permit decision until the NCDWR issues, denies, or waives the state Certification as required by Section 401 of the Clean Water Act (PL 92-500). The receipt of the application and this public notice, combined with the appropriate application fee, at the NCDWR Central Office in Raleigh constitutes initial receipt of an application for a 401 Certification. Unless NCDWR is granted a time review extension, a waiver will be deemed to occur if the NCDWR fails to act on this request for certification within 120 days of the date of this public notice. Additional information regarding the 401 Certification may be reviewed at the NCDWR Central Office, 401 and Buffer Permitting Unit, 512 North Salisbury Street, Raleigh, North Carolina 27604-2260. All persons desiring to make comments regarding the application for a 401 Certification should do so, in writing, to:

NCDWR Central Office  
Attention: Mr. Paul Wojowski, 401 and Buffer Permitting Unit  
(USPS mailing address): 1617 Mail Service Center, Raleigh, NC 27699-1617

Or,

(physical address): 512 North Salisbury Street, Raleigh, North Carolina 27604

**North Carolina Division of Coastal Management (NCDCM):**

- The application did not include a certification that the proposed work complies with and would be conducted in a manner that is consistent with the approved North Carolina Coastal Zone Management Program. Pursuant to 33 CFR 325.2 (b)(2) the Corps cannot issue a Department of Army (DA) permit for the proposed work until the applicant submits such a certification to the Corps and the NCDCM, and the NCDCM notifies the Corps that it concurs with the applicant's consistency certification. As the application did not include the consistency certification, the Corps will request, upon receipt, concurrence or objection from the NCDCM.
- Based upon all available information, the Corps determines that this application for a Department of Army (DA) permit does not involve an activity which would affect the coastal zone, which is defined by the Coastal Zone Management (CZM) Act (16 U.S.C. § 1453).

## **Evaluation**

The decision whether to issue a permit will be based on an evaluation of the probable impacts including cumulative impacts of the proposed activity on the public interest. That decision will reflect the national concern for both protection and utilization of important resources. The benefit which reasonably may be expected to accrue from the proposal must be balanced against its reasonably foreseeable detriments. All factors which may be relevant to the proposal will be considered including the cumulative effects thereof; among those are conservation, economics, aesthetics, general environmental concerns, wetlands, historic properties, fish and wildlife values, flood hazards, flood plain values (in accordance with Executive Order 11988), land use, navigation, shoreline erosion and accretion, recreation, water supply and conservation, water quality, energy needs, safety, food and fiber production, mineral needs, considerations of property ownership, and, in general, the needs and welfare of the people. For activities involving the discharge of dredged or fill materials in waters of the United States, the evaluation of the impact of the activity on the public interest will include application of the Environmental Protection Agency's 404(b)(1) guidelines.

## **Commenting Information**

The Corps of Engineers is soliciting comments from the public; Federal, State and local agencies and officials, including any consolidated State Viewpoint or written position of the Governor; Indian Tribes and other interested parties in order to consider and evaluate the impacts of this proposed activity. Any comments received will be considered by the Corps of Engineers to determine whether to issue, modify, condition, or deny a permit for this proposal. To make this decision, comments are used to assess impacts on endangered species, historic properties, water quality, general environmental effects and the other public interest factors listed above. Comments are used in the preparation of an Environmental Assessment (EA) and/or an Environmental Impact Statement (EIS) pursuant to the National Environmental Policy Act (NEPA). Comments are also used to determine the need for a public hearing and to determine the overall public interest of the proposed activity.

Any person may request, in writing, within the comment period specified in this notice, that a public hearing be held to consider the application. Requests for public hearings shall state, with particularity, the reasons for holding a public hearing. Requests for a public hearing will be granted, unless the District Engineer determines that the issues raised are insubstantial or there is otherwise no valid interest to be served by a hearing.

The Corps of Engineers, Wilmington District will receive written comments pertinent to the proposed work, as outlined above, until 5pm, September 11, 2022. Comments should be submitted to Kim (Browning) Isenhour, Regulatory Division, 3331 Heritage Trade Drive, Suite 105, Wake Forest, NC 27587 or , at (919) 946-5107. Comments may also be submitted to [Kimberly.d.browning@usace.army.mil](mailto:Kimberly.d.browning@usace.army.mil).

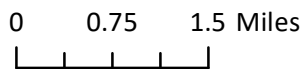
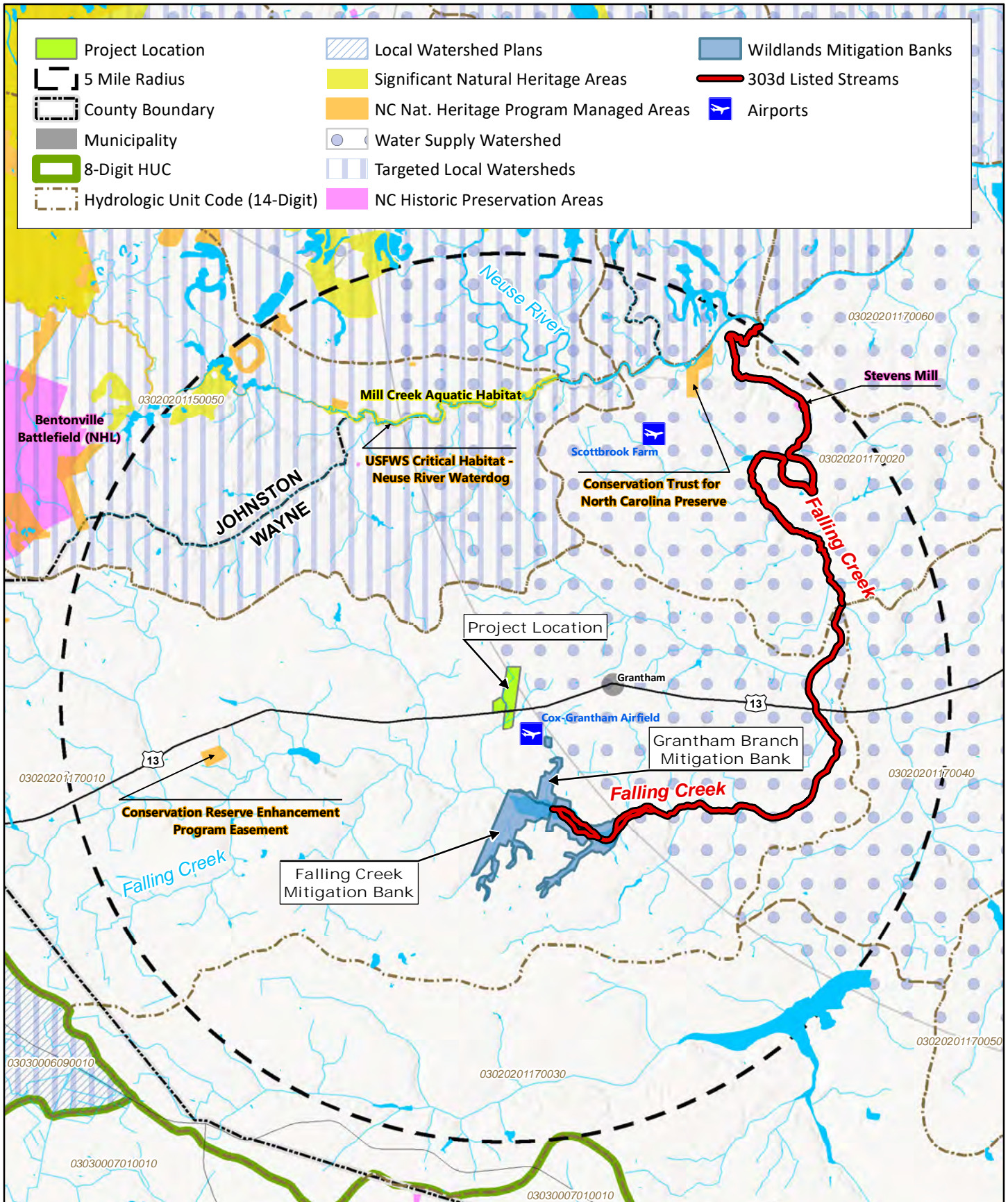
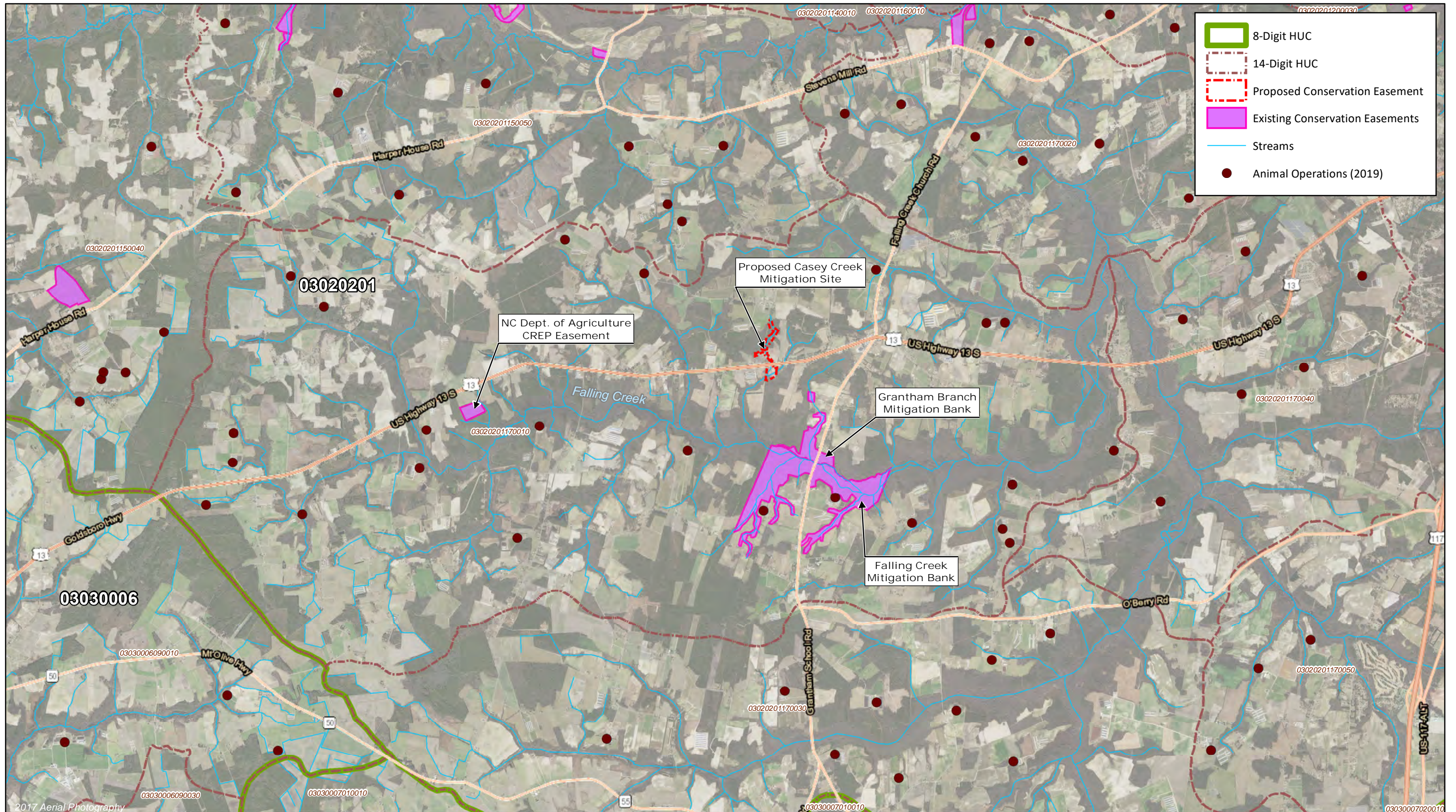
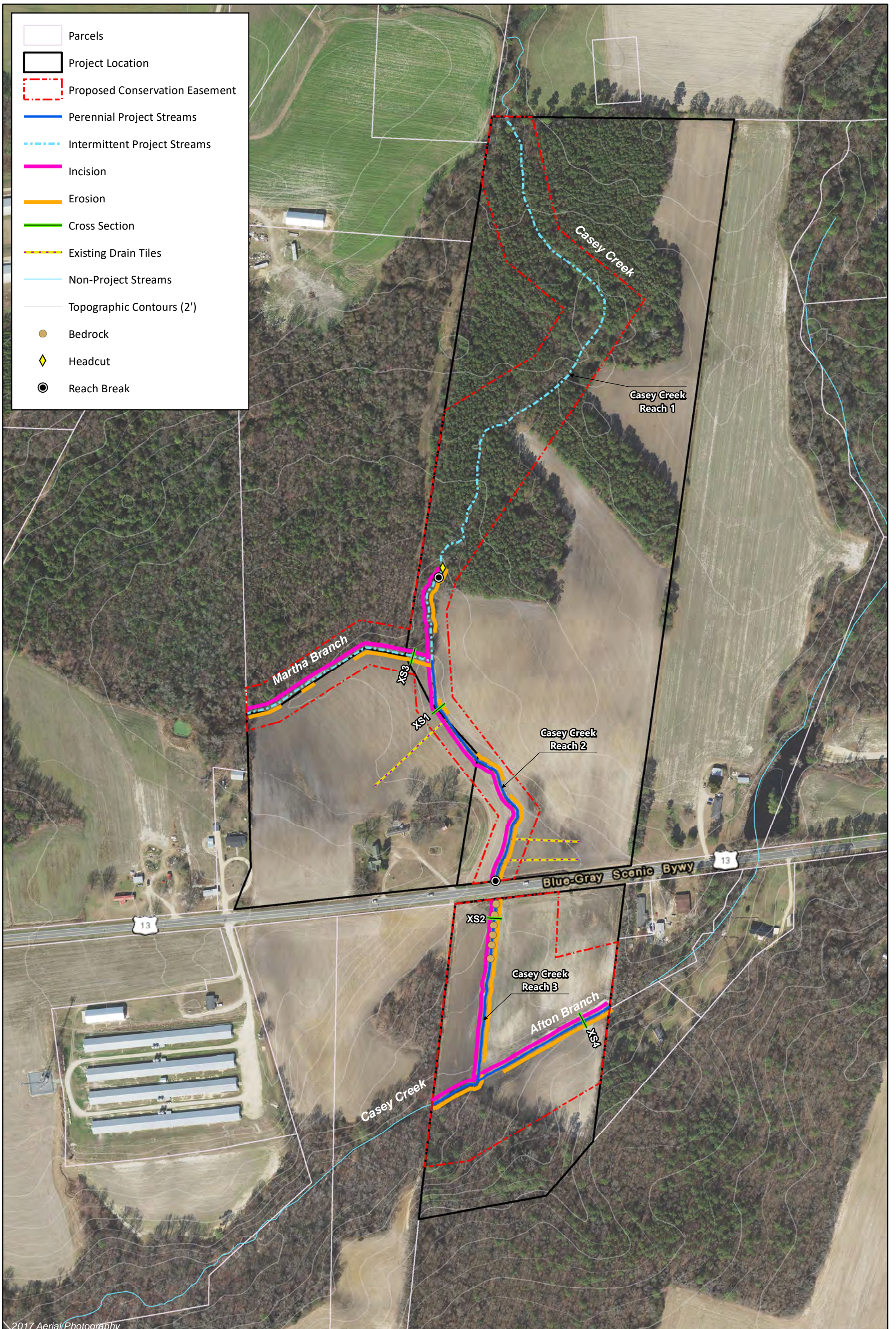


Figure 1a Vicinity Map  
Casey Creek Mitigation Site  
Neuse River Basin (03020201)







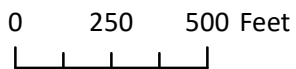
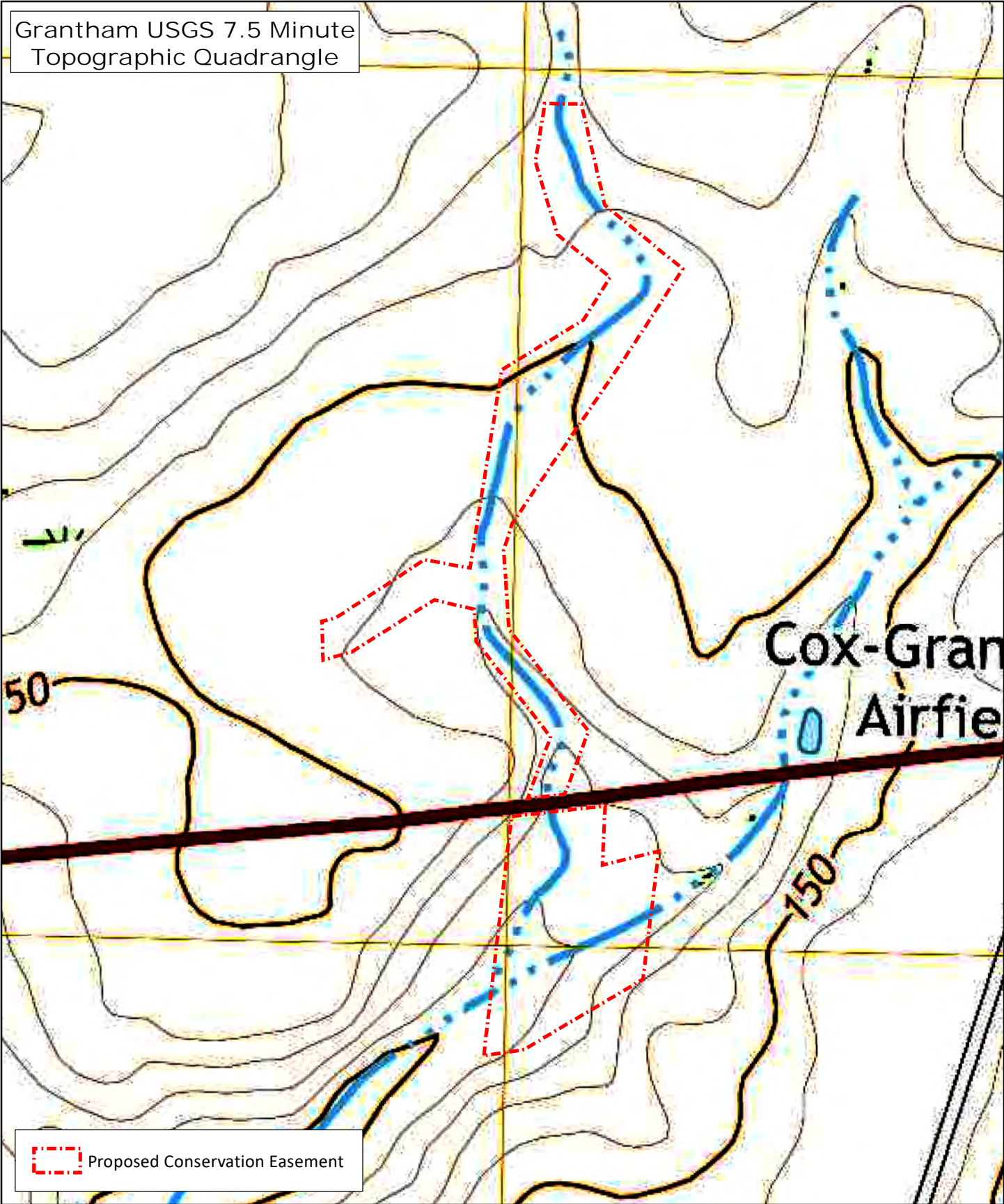
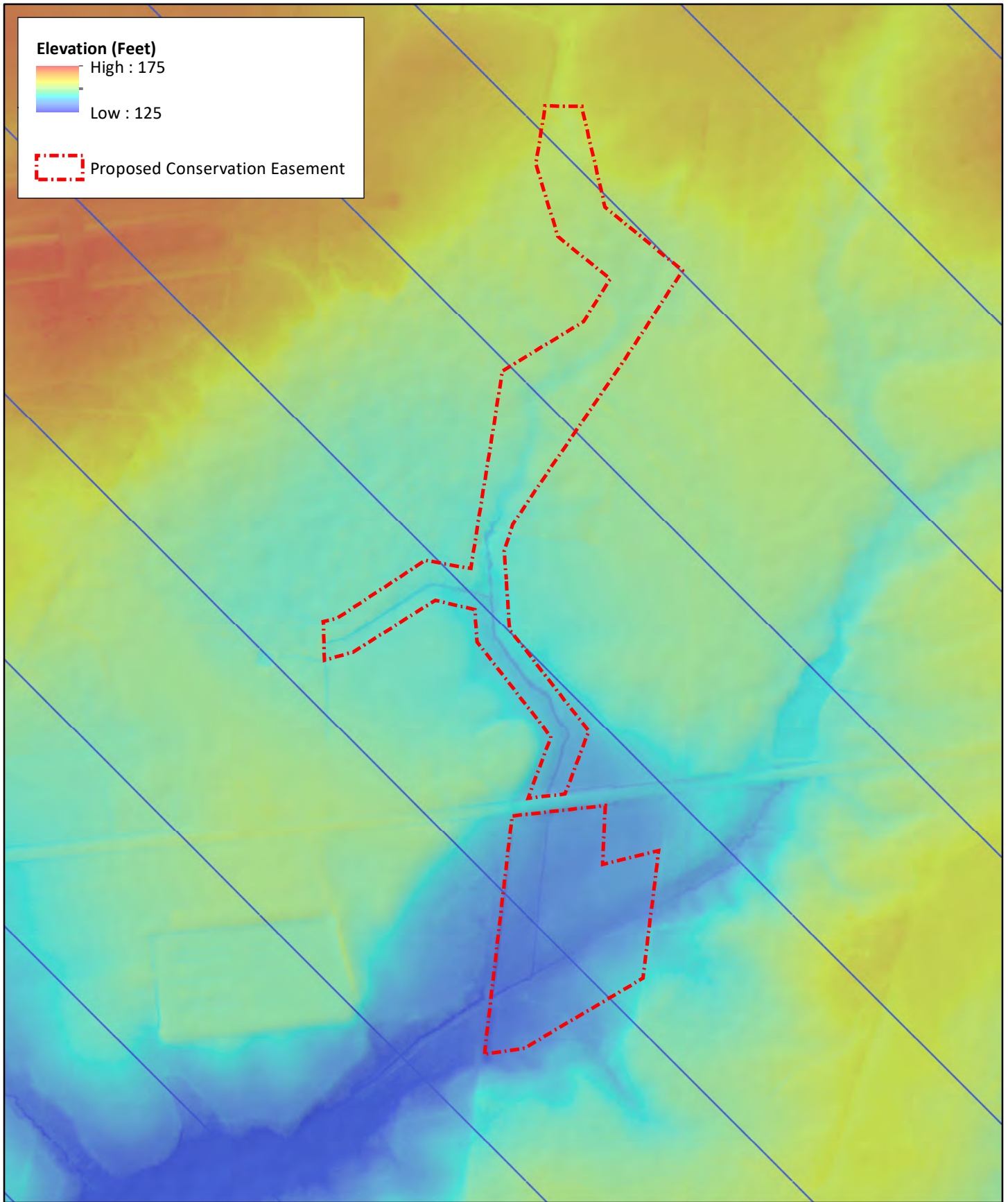


Figure 3 USGS Topographic Map  
Casey Creek Mitigation Site  
Neuse River Basin (03020201)



0 250 500 Feet



Figure 4 Lidar Map  
Casey Creek Mitigation Site  
Neuse River Basin (03020201)

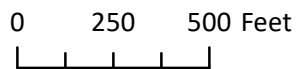
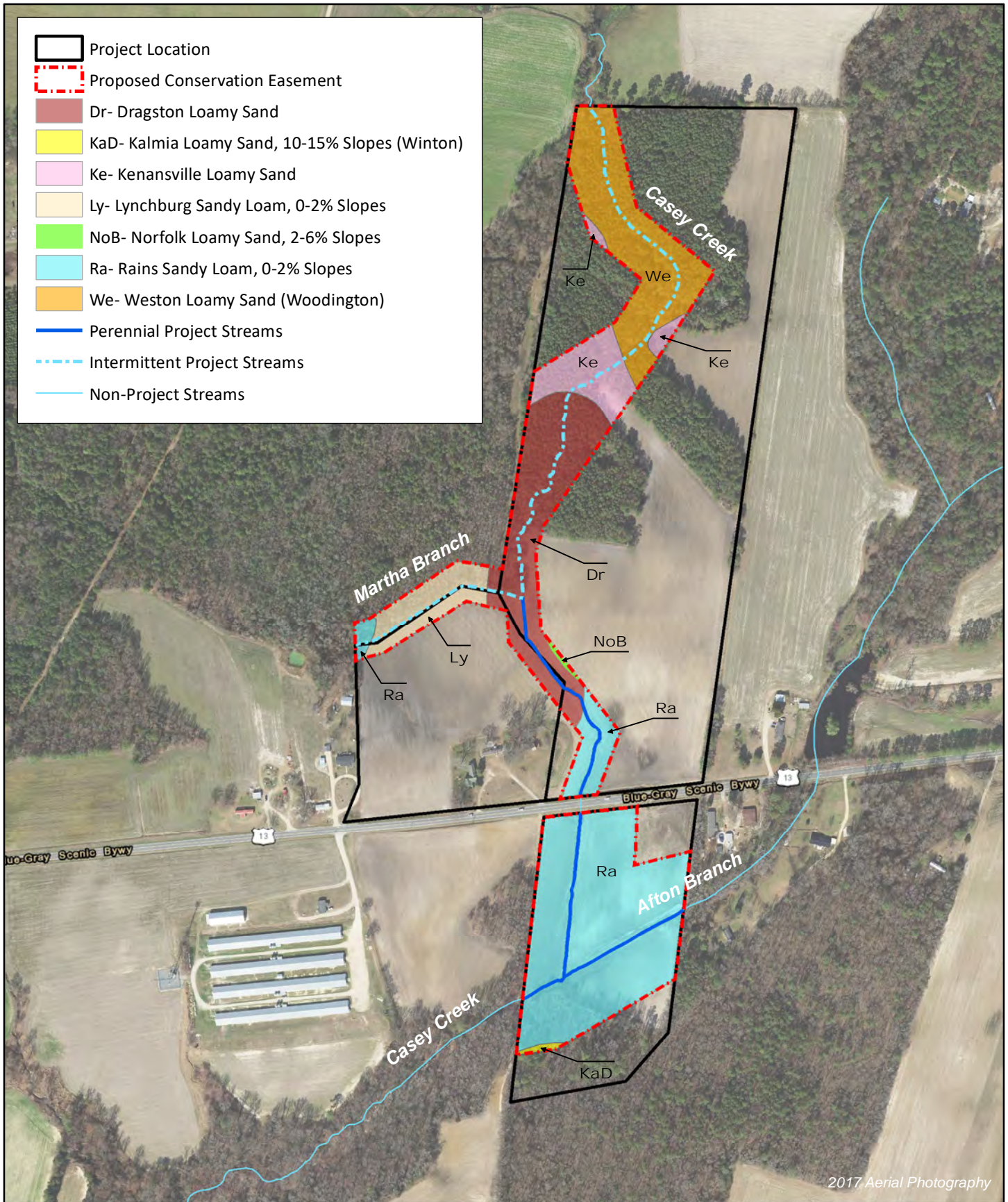
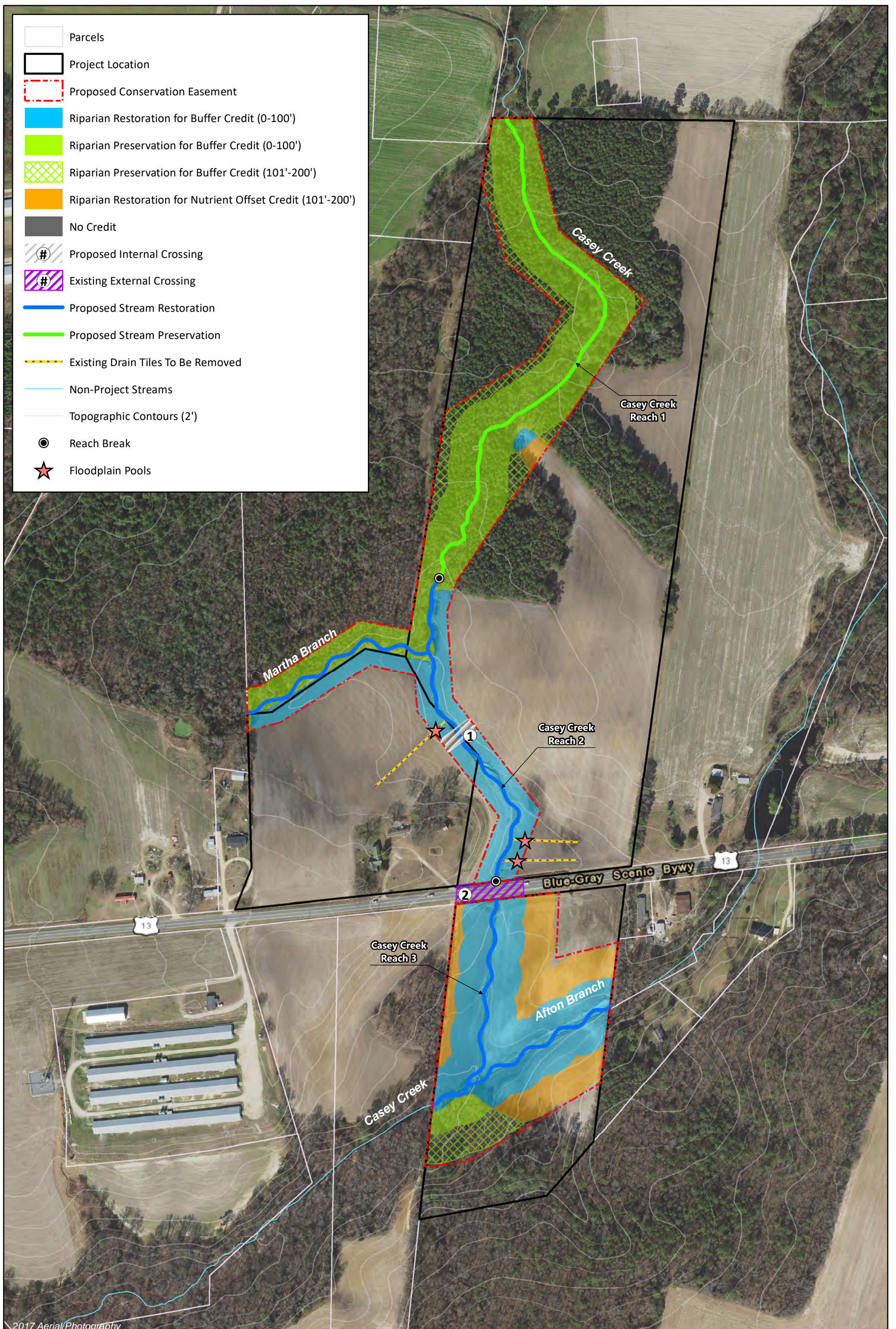


Figure 6a Soils Map  
Casey Creek Mitigation Site  
Neuse River Basin (03020201)



**Species Conclusions Table**

Project Name: Casey Creek Mitigation Site

Date: 08/29/2022

Species / Resource Name	Conclusion	ESA Section 7 / Eagle Act Determination	Notes / Documentation
Red-cockaded Woodpecker ( <i>Picoides borealis</i> )	No suitable habitat present	No effect	A field survey was conducted by Wildlands on August 16, 2022. No suitable habitat was found in the form of old pine cavity trees, open pine woodlands with little to no hardwoods, or pine savannahs. No critical habitat has been designated by USFWS for this species. Per NCNHP data explorer, no known element occurrences exist within a one-mile radius of the proposed project area, or within the project area.
Neuse River Waterdog ( <i>Necturus lewisi</i> )	No suitable habitat present	No effect	A field survey was conducted by Wildlands on August 16, 2022. The Neuse River Waterdog's required habitat of clean, flowing water characterized by high dissolved oxygen concentrations was not found on site. Per NCNHP data explorer, no known element occurrences exist within a one-mile radius of the proposed project area, or within the project area.
Carolina Madtom ( <i>Noturus furiosus</i> )	No suitable habitat present	No effect	A field survey was conducted by Wildlands on August 16, 2022. No suitable habitat was found in the project area. Due to incision and erosion present in much of the project streams, silt-free and stable substrate was not present. Per NCNHP data explorer, no known element occurrences exist within a one-mile radius of the proposed project area, or within the project area.
Bald Eagle ( <i>Haliaeetus leucocephalus</i> )	Unlikely to disturb nesting bald eagles.	No Eagle Act Permit Required	A field survey was conducted by Wildlands on August 16, 2022. No bald eagles were present or nesting on the site, and no suitable foraging or nesting habitat was found. The site is greater than 660 ft from the nearest, large body of water. Per NCNHP data explorer, no known element occurrences exist within a one-mile radius of the proposed project area, or within the project area.
Critical Habitat	No critical habitats present within the project area.		Final critical habitat is designated for the Neuse River Waterdog and the Carolina Madtom; however, critical habitat for these species is not found within the project area.

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.



08/29/2022

Rebecca Hogarth / Environmental Scientist

Date



# United States Department of the Interior

## FISH AND WILDLIFE SERVICE

Raleigh ES Field Office  
551-F Pylon Drive  
Raleigh, North Carolina 27606

August 12, 2022

Kim Isenhour  
Regulatory Division  
U.S. Army Corps of Engineers  
3331 Heritage Trade Drive, Suite 105  
Wake Forest, NC 27587

Re: Casey Creek Mitigation Site / SAW-2022-01239/ Wayne County

Dear Ms. Isenhour:

The U.S. Fish and Wildlife Service (Service) has reviewed the project advertised in the above referenced Public Notice. The project, as advertised, is expected to have minimal adverse impacts to fish and wildlife resources. Therefore, we have no objection to the activity as described in the permit application.

In accordance with the Endangered Species Act of 1973, as amended, (ESA) and based on the information provided, and other available information, it appears the action is not likely to adversely affect federally listed species or their critical habitat as defined by the ESA. We believe that the requirements of section 7 (a)(2) of the ESA have been satisfied for this project. Please remember that obligations under the ESA must be reconsidered if: (1) new information identifies impacts of this action that may affect listed species or critical habitat in a manner not previously considered; (2) this action is modified in a manner that was not considered in this review; or, (3) a new species is listed or critical habitat determined that may be affected by the identified action.

The Service appreciates the opportunity to review and provide comments on the proposed action. Should you have any questions regarding the project, please contact Kathy Matthews at [kathryn\\_matthews@fws.gov](mailto:kathryn_matthews@fws.gov).

Sincerely,

Pete Benjamin,  
Field Supervisor

cc (via email):  
EPA, Atlanta, GA  
NCWRC, Raleigh

**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:





Natural Resources  
Conservation Service

North Carolina  
State Office

4407 Bland Rd.  
Suite 117  
Raleigh  
North Carolina 27609  
Voice (919) 873-2132  
Fax (844) 325-2156

September 15, 2022

Kirsten Gimbert - Senior Environmental Scientist  
Wildlands Engineering, Inc.  
1430 S. Mint St, Suite 104  
Charlotte, NC 28203  
704.941.9093

Dear Kirsten Gimbert:

The following information is in response to your request soliciting comments regarding the Casey Creek Mitigation Site in Wayne 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 **does include** land classified as Prime Farmland. In accordance with the Code of Federal Regulations 7CFR 658, Farmland Protection Policy Act, the AD-1006 was initiated. NRCS has completed Parts II, IV, V of the form, and returned for completion by the requesting agency.

If you have any questions, please feel free to email me at [Ryan.Janway@usda.gov](mailto:Ryan.Janway@usda.gov).

Sincerely,

Ryan Janway  
Natural Resource Specialist

cc:

Andrew Faison, supervisory soil conservationist, NRCS, Goldsboro, NC  
Michael Jones, state soil scientist, Raleigh, NC

## Kirsten Gimbert

---

**From:** Kirsten Gimbert  
**Sent:** Friday, October 21, 2022 9:53 AM  
**To:** 'Janway, Ryan - FPAC-NRCS, RALEIGH, NC'  
**Cc:** Jones, Michael - NRCS, Raleigh, NC; Muzzy, Laura - FPAC-NRCS, RALEIGH, NC; Faison, Andrew - NRCS, Goldsboro, NC  
**Subject:** RE: Casey Creek Mitigation Site - FPPA Package  
**Attachments:** Casey Creek AD-1006 Form 10.21.2022.pdf

Ryan,

Please find attached the final AD-1006 Form for the Casey Creek Mitigation Site located in Wayne County, NC. Please let me know if you have any questions.

Sincerely,

**Kirsten Gimbert** | *Senior Environmental Scientist*  
M: 704.941.9093

---

**From:** Janway, Ryan - FPAC-NRCS, RALEIGH, NC <Ryan.Janway@usda.gov>  
**Sent:** Thursday, September 15, 2022 10:40 AM  
**To:** Kirsten Gimbert <kgimbert@wildlandseng.com>  
**Cc:** Jones, Michael - NRCS, Raleigh, NC <michael.jones3@usda.gov>; Muzzy, Laura - FPAC-NRCS, RALEIGH, NC <Laura.Muzzy@usda.gov>; Faison, Andrew - NRCS, Goldsboro, NC <andrew.faison@usda.gov>  
**Subject:** Casey Creek Mitigation Site - FPPA Package

Good morning Kirsten,

Thank you for your communication regarding the Casey Creek Mitigation Site in Wayne County, NC. I was assigned this FPPA request, please see the attached AD-1006 form and letter from NRCS.

Let me know if you have any questions,

**Ryan Janway**  
**USDA-NRCS**  
**Natural Resource Specialist**  
4407 Bland Rd  
Raleigh, NC 27609  
[Ryan.Janway@usda.gov](mailto:Ryan.Janway@usda.gov)

---

**From:** Kirsten Gimbert <[kgimbert@wildlandseng.com](mailto:kgimbert@wildlandseng.com)>  
**Sent:** Monday, September 12, 2022 3:32 PM  
**To:** Muzzy, Laura - FPAC-NRCS, RALEIGH, NC <[Laura.Muzzy@usda.gov](mailto:Laura.Muzzy@usda.gov)>  
**Subject:** [External Email]Casey Creek Mitigation Site - FPPA Package

Hi Laura,

Please find attached to this email information related to the FPPA for your review regarding the Casey Creek Mitigation Site located in Wayne County, NC. Please let me know if you have any questions or concerns.

Thank You,

**Kirsten Gimbert** | *Senior Environmental Scientist*

M: 704.941.9093

**Wildlands Engineering, Inc.**

1430 S. Mint St, Suite 104

Charlotte, NC 28203

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August 23, 2022

**Gabriela Garrison**

North Carolina Wildlife Resource Commission  
Eastern Piedmont Coordinator  
Sandhills Depot  
PO Box 149  
Hoffman, NC 28347

*Submitted via email: [gabriela.garrison@ncwildlife.org](mailto:gabriela.garrison@ncwildlife.org)*

**Subject:** Casey Creek Mitigation Site  
Wayne County, North Carolina

Dear Ms. Garrison,

Wildlands Engineering, Inc. requests review and comment on any possible issues that might emerge with respect to fish and wildlife issues associated with a potential stream, buffer, and nutrient offset mitigation project on the Casey Creek Mitigation Site (Site) located in Wayne County, NC. The Site is located approximately one mile west of the Town of Grantham, NC. The project is funded by North Carolina Division of Mitigation Services (NCDMS). A Site Overview Map and a USGS Topographic Map showing the approximate project area are enclosed. The topographic figure was prepared from the Grantham 7.5-Minute USGS Topographic Quadrangle, and the Site is located at latitude 35.2946770, longitude -78.1833726.

The Casey Creek Mitigation Site is being developed to provide stream, buffer, and nutrient mitigation within the Neuse River Basin. The project will include the restoration of Casey Creek Reaches 2 and 3, Martha Branch, and Afton Branch. Casey Creek Reach 1 is slated for preservation. The Site is located on four parcels that contain tributaries to Falling Creek. A large portion of the properties (over 40 acres) have been used for row crop production for decades. The remaining acreage is primarily wooded with a mix of pines and hardwoods. Currently, the agricultural fields are used to grow a rotation of corn and soybeans with an occasional rotation of peanuts, cotton, and sweet potatoes. Site stressors include stream incision, active stream erosion including mass wasting, nutrient inputs from adjacent agricultural fields, lack of riparian buffers, and areas of limited to absent bedform diversity.

The major goals of the proposed stream, buffer, and nutrient offset mitigation project are to provide ecological and water quality enhancements to the Neuse River Basin while creating a functional riparian corridor at the Site level. The project design will avoid major adverse impacts to existing streams, wetland resources, and existing forested areas. This will be accomplished by restoring and enhancing native floodplain vegetation, creating stable stream banks, improving stream habitat, and protecting the Site in perpetuity through establishing a conservation easement. Construction of this project will affect Jurisdictional Waters of the U.S. and require Section 404/401 permitting.

We thank you in advance for your timely response and cooperation. Please feel free to contact me with any questions that you may have concerning the extent of Site disturbance associated with this project.

Sincerely,

A handwritten signature in black ink that reads "Tasha King".

**Tasha King**, *Environmental Scientist*

[tking@wildlandseng.com](mailto:tking@wildlandseng.com)

805.895.3304

Attachments: Figure 1 Site Overview Map, Figure 2 USGS Topographic Map



## Tasha King

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**From:** Garrison, Gabriela <gabriela.garrison@ncwildlife.org>  
**Sent:** Friday, October 7, 2022 9:58 AM  
**To:** Tasha King  
**Subject:** RE: [External] Casey Creek Mitigation Site for Review - Follow Up

**Follow Up Flag:** Follow up  
**Flag Status:** Flagged

Hi Tasha,  
Apologies for the delay in response.  
We have no issue or concern with this project.  
Thank you,  
Gabriela

**Gabriela Garrison**  
Eastern Piedmont Habitat Conservation Coordinator

**NC Wildlife Resources Commission**  
Sandhills Depot, P.O. Box 149  
Hoffman, NC 28347  
Office and Cell: 910-409-7350  
[gabriela.garrison@ncwildlife.org](mailto:gabriela.garrison@ncwildlife.org)

[www.ncwildlife.org](http://www.ncwildlife.org)



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**From:** Tasha King <tking@wildlandseng.com>  
**Sent:** Thursday, October 6, 2022 7:45 AM  
**To:** Garrison, Gabriela <gabriela.garrison@ncwildlife.org>  
**Subject:** [External] Casey Creek Mitigation Site for Review - Follow Up

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

Good morning,

I am following up on the email I submitted below with attachment on August 23<sup>rd</sup> requesting comment on the Casey Creek Mitigation Site. Is there any other information you need us to provide for your review or a time when we should expect a reply?

We appreciate your time and assistance. Please feel free to contact us with any questions.

Kind regards,  
Tasha

.....

**Tasha King** | *Environmental Scientist*  
O: 919.851.9986 x116

**Wildlands Engineering, Inc.**  
312 W. Millbrook Rd, Suite 225  
Raleigh, NC 27609

---

**From:** Tasha King  
**Sent:** Tuesday, August 23, 2022 3:02 PM  
**To:** [gabriela.garrison@ncwildlife.org](mailto:gabriela.garrison@ncwildlife.org) <[gabriela.garrison@ncwildlife.org](mailto:gabriela.garrison@ncwildlife.org)>  
**Subject:** Casey Creek Mitigation Site for Review

Good afternoon,

Wildlands Engineering would like to request review and comment on Casey Creek Mitigation Site with regards to possible issues that might emerge with respect to fish and wildlife. Attached is a letter with more detailed information about the site and figures of the location.

Please feel free to contact me with any questions you may have. We appreciate your help in this matter.

Kind regards,  
Tasha

.....  
**Tasha King** | *Environmental Scientist*  
**O:** 919.851.9986 x116

**Wildlands Engineering, Inc.**  
312 W. Millbrook Rd, Suite 225  
Raleigh, NC 27609

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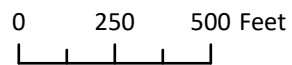
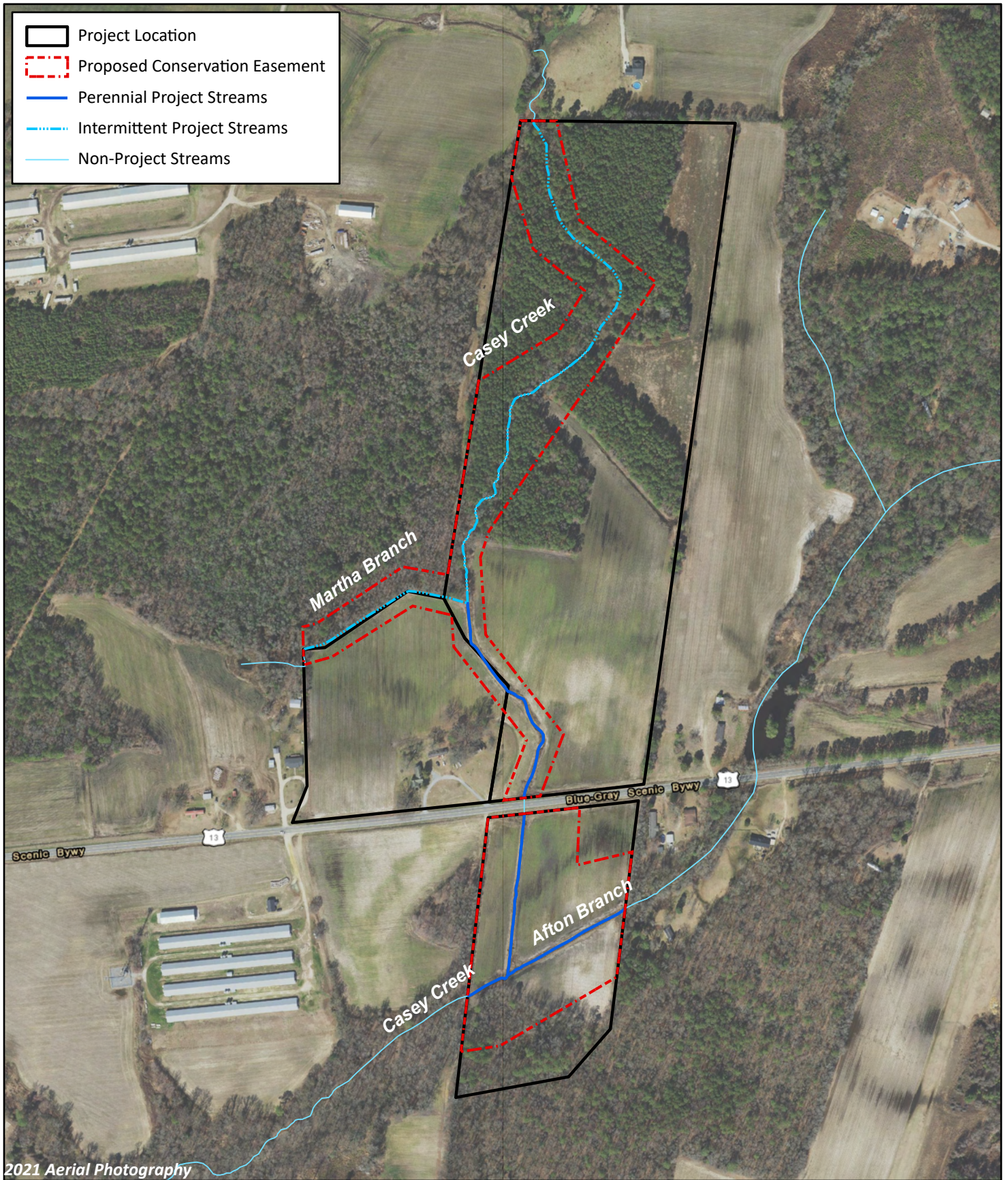


Figure 1 Site Overview Map  
Casey Creek Mitigation Site  
Neuse River Basin (03020201)

**Grantham USGS 7.5-Minute  
Topographic Quadrangle**

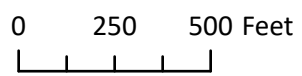
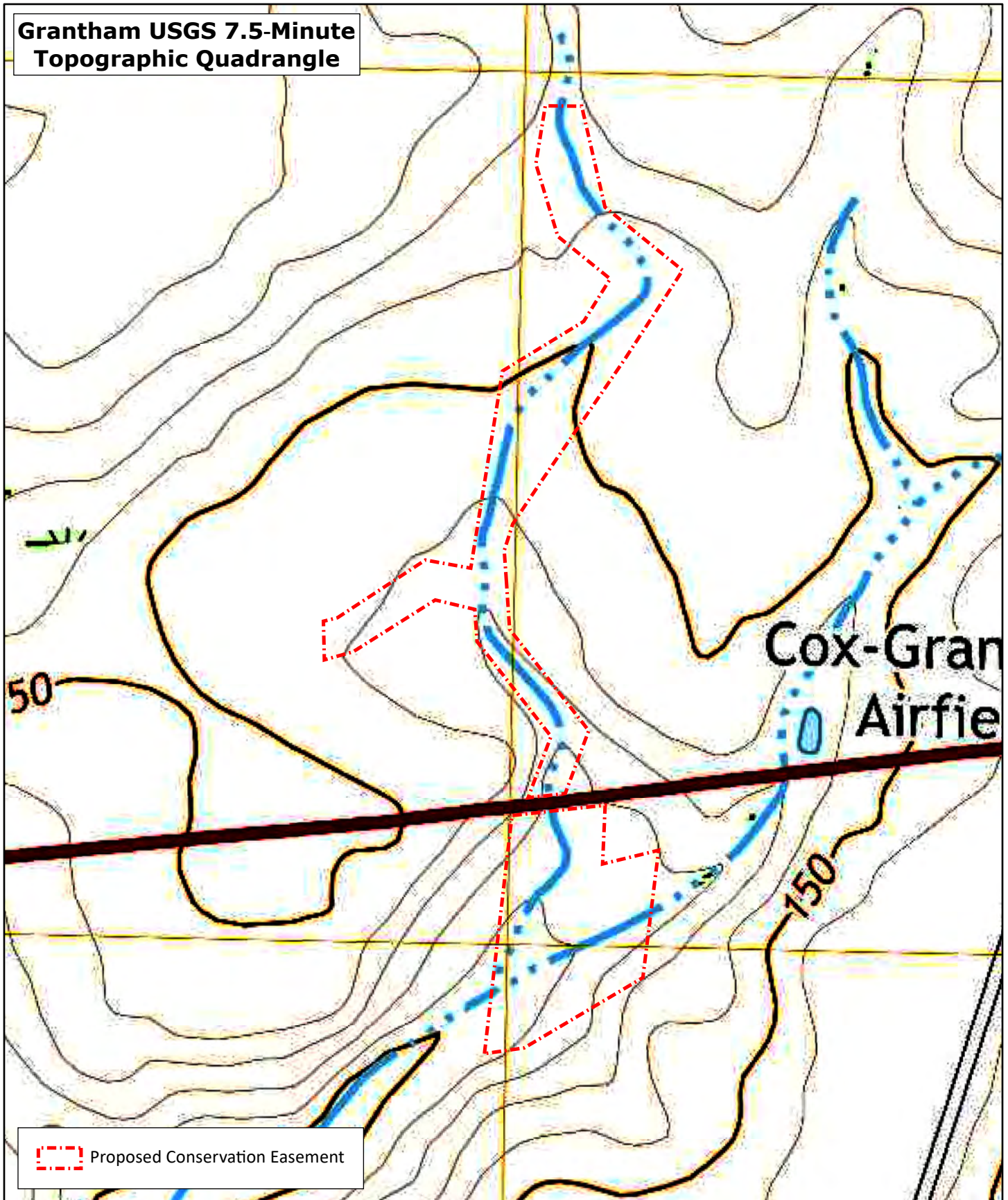


Figure 2 USGS Topographic Map  
Casey Creek Mitigation Site  
Neuse River Basin (03020201)





## 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: 2022-0069753  
Project Name: Casey Creek Mitigation Site

July 06, 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: 2022-0069753

Project Name: Casey Creek Mitigation Site

Project Type: Restoration / Enhancement of Waterbody

Project Description: Casey Creek is a stream and buffer mitigation site in Wayne County, NC.

Project Location:

The approximate location of the project can be viewed in Google Maps: <https://www.google.com/maps/@35.29160225,-78.18408811296098,14z>



Counties: Wayne County, North Carolina

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## ENDANGERED SPECIES ACT SPECIES

There is a total of 5 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
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

### AMPHIBIANS

NAME	STATUS
Neuse River Waterdog <i>Necturus lewisi</i> There is <b>final</b> critical habitat for this species. Your location does not overlap the critical habitat. Species profile: <a href="https://ecos.fws.gov/ecp/species/6772">https://ecos.fws.gov/ecp/species/6772</a>	Threatened

### FISHES

NAME	STATUS
Carolina Madtom <i>Noturus furiosus</i> There is <b>final</b> critical habitat for this species. Your location does not overlap the critical habitat. Species profile: <a href="https://ecos.fws.gov/ecp/species/528">https://ecos.fws.gov/ecp/species/528</a>	Endangered

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## 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

## 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
American Kestrel <i>Falco sparverius paulus</i> This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA <a href="https://ecos.fws.gov/ecp/species/9587">https://ecos.fws.gov/ecp/species/9587</a>	Breeds Apr 1 to Aug 31

## 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.

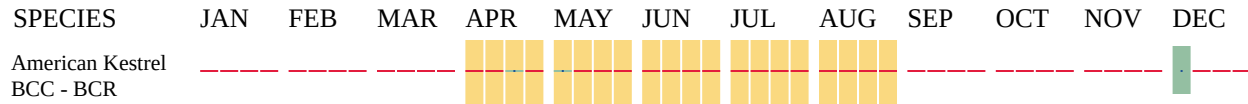
### Survey Timeframe

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.

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■ probability of presence   ■ breeding season   | survey effort   — no data

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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?**

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.

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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 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: Wildlands Engineering  
Name: Kaitlyn Hogarth  
Address: 312 West Millbrook Road  
Address Line 2: Suite 225  
City: Raleigh  
State: NC  
Zip: 27609  
Email: khogarth@wildlandseng.com  
Phone: 5409079432

## **LEAD AGENCY CONTACT INFORMATION**

Lead Agency: Department of Transportation

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## MEETING NOTES

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MEETING: IRT draft Mitigation Plan comments call  
**Casey Creek Mitigation Site**  
Neuse River Basin CU 03020201; Wayne County, NC  
USACE Action ID: SAW-2022-01239  
DWR# 20220664 v2

DATE: Wednesday, May 8, 2024

LOCATION: US Highway 13  
Grantham, NC

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### Attendees

Erin Davis, USACE	Todd Tugwell, USACE	Chris Roessler, Wildlands
Maria Polizzi, DWR	Jeremiah Dow, NCDMS	
Travis Wilson, WRC	John Hutton, Wildlands	

### Materials

- Wildlands Engineering Casey Creek Draft Mitigation Plan
- Wildlands Comment-Response Letter
- 90% Plan Sheets
- Mitigation Plan Concept Map

### Meeting Notes

The primary purpose of this meeting was to go over questions and concerns that remained after the IRT considered the draft mitigation plan comment-response letter. The three main topics were:

- Monitoring requirements
- Use of long riffles with larger rock
- Design for Casey Creek R3

For monitoring requirements, the IRT has developed some guidance for requiring minimal flow on intermittent channels. This requirement is on a case-by-case basis but would apply to Casey Creek. Erin Davis has provided the written documentation to Wildlands so it can be included in the final Mitigation Plan.

Also, the IRT suggested that Wildlands consider a crest gage on Afton Branch. John Hutton said we would install one since this isn't a resource-intensive requirement.

The IRT requested an explanation of why longer riffles with material that's coarser than what is observed in the existing channels is used. They would prefer a more natural approach that focuses on wood. John Hutton explained that in steeper sand bed systems like this, Wildlands has learned that using rock to provide grade

control is the safest approach to maintaining system stability. Reference reaches in the area rely on dense networks of tree roots that can't be created during construction. That requires several decades and the rock riffles will help it get there. Additionally, Wildlands expects that the riffles will embed with sand to some degree and that will provide a more natural appearance. Wildlands agreed to remove the chunky riffles from the plan set and replace them with native material riffles. The material used on site will be sourced from a combination of local pea gravel mines and an eastern Piedmont mitigation site. The pea gravel mines sometimes have larger waste material that would be good for the site. Absent that, rock mined from nearby mitigation sites will be used. This will be a mix of more native-appearing stone. Finally, it's possible a small amount of quarry-sourced class A & B rock will be used if that is not obtainable from the other sources; this would be to ensure suitable grade control. Wildlands will provide the IRT photos of stone selected for Casey Creek prior to construction commencement.

Also, John explained that riffle length is a function of the channel geometry, which is dependent on the drainage area and channel size.

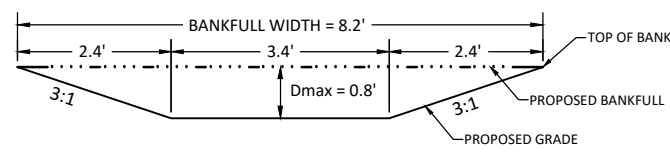
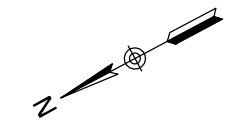
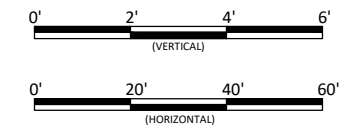
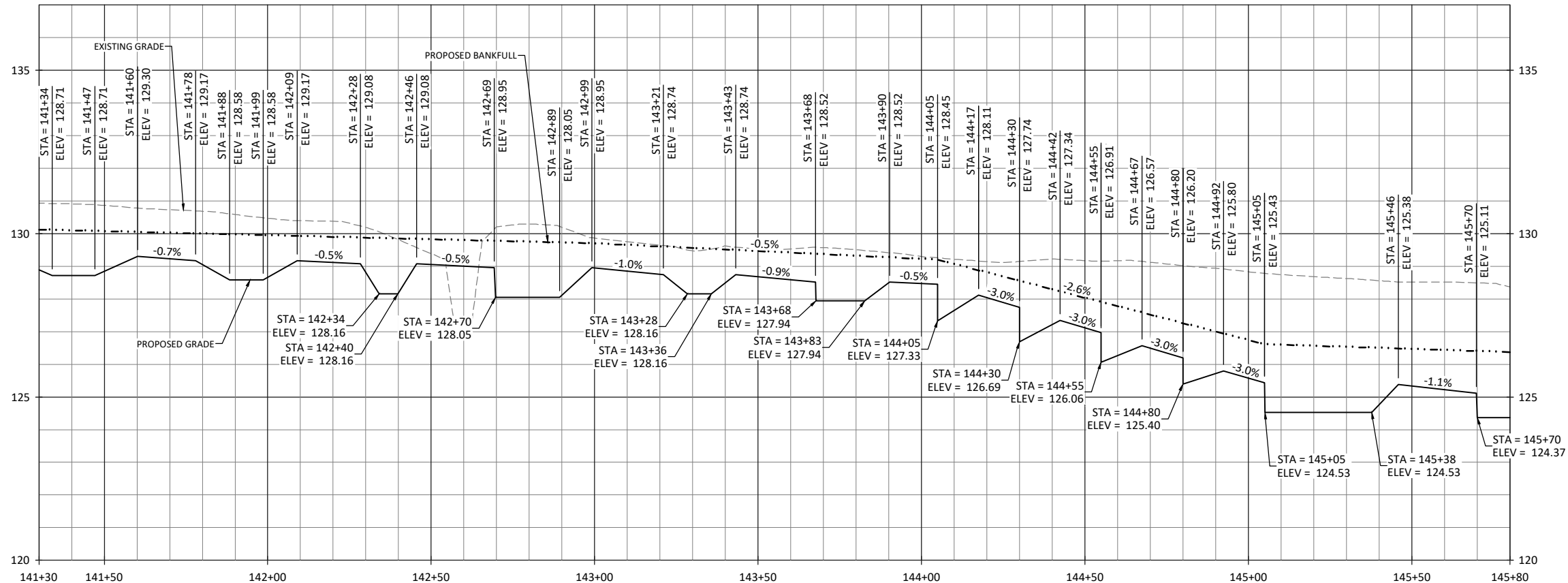
Last, Erin Davis communicated that the IRT has seen problems with log drop sequences such as used at the downstream end of Casey Creek Reach 3. As a result, she wondered if relying on more of a Priority 2 approach would be preferable. John agreed that the log drop sequence is cause for concern and Wildlands will replace that with a riffle-log drop sequence that spreads the 3 feet of drop over the riffles and logs. This will require fewer structures and be more stable. The combination of Priority 1.5 restoration just below Highway 13 and more like 350-400 feet of Priority 1 restoration, coupled with a more stable drop sequence makes the current profile likely to be acceptable.

Katie Merritt had questions about the pilot channel at the upper end of Martha Branch, the ditch leading into Casey Creek R2, the wetland on Casey Creek R1, and the ditch along western property boundary, south of Hwy 13. Wildlands described those areas to help Katie get a picture of what is present and planned. Wildlands plans to plant both of the ditches discussed (one entering R2 and one along property boundary that joins at project terminus).

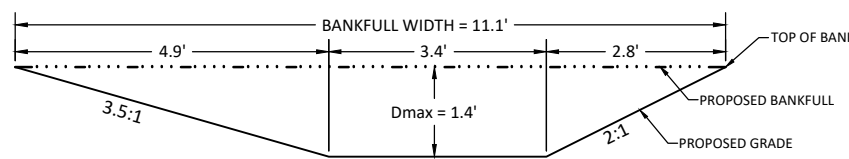
### **Next Steps**

Wildlands has revised the drop section on Casey Creek Reach 3 and the sheet for that is included below, as well as the previous version. The IRT will review this before Wildlands submits the final Mitigation Plan. The final MP will include some description of the use of stone and its sizing in sand bed systems with significant slope. It will also include a statement in the adaptive management section about how to manage future problems related to the Priority 2 drop and higher slopes in a sand bed system.

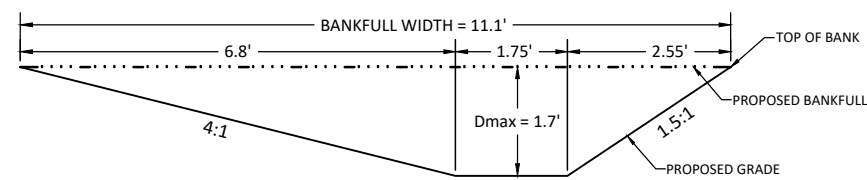




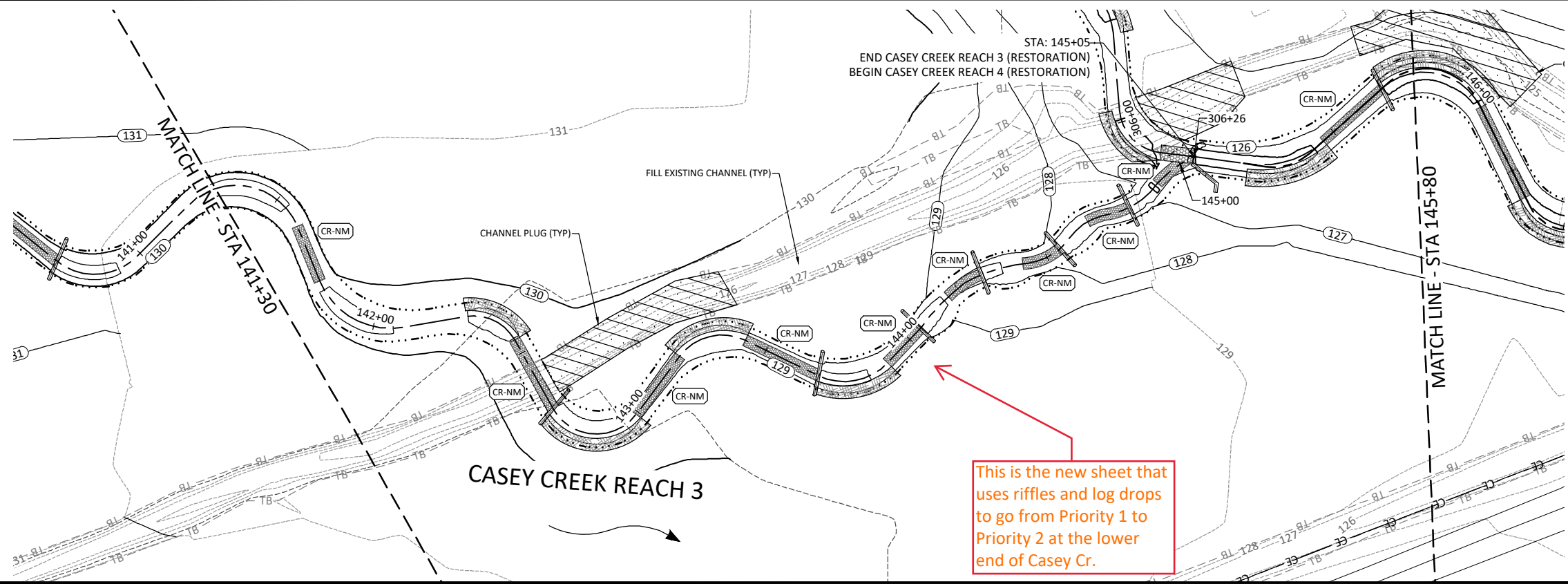
CASEY CREEK REACH 3  
TYPICAL SECTION: RIFFLE  
STA: 125+92 TO 145+05



CASEY CREEK REACH 3  
TYPICAL SECTION: STANDARD POOL  
STA: 125+92 TO 145+05



CASEY CREEK REACH 3  
TYPICAL SECTION: DEEP POOL WITH STRUCTURE  
STA: 125+92 TO 145+05



This is the new sheet that uses riffles and log drops to go from Priority 1 to Priority 2 at the lower end of Casey Cr.

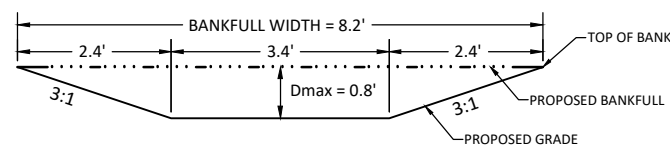
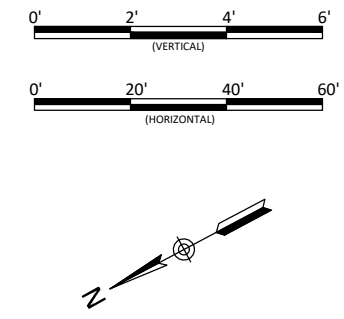
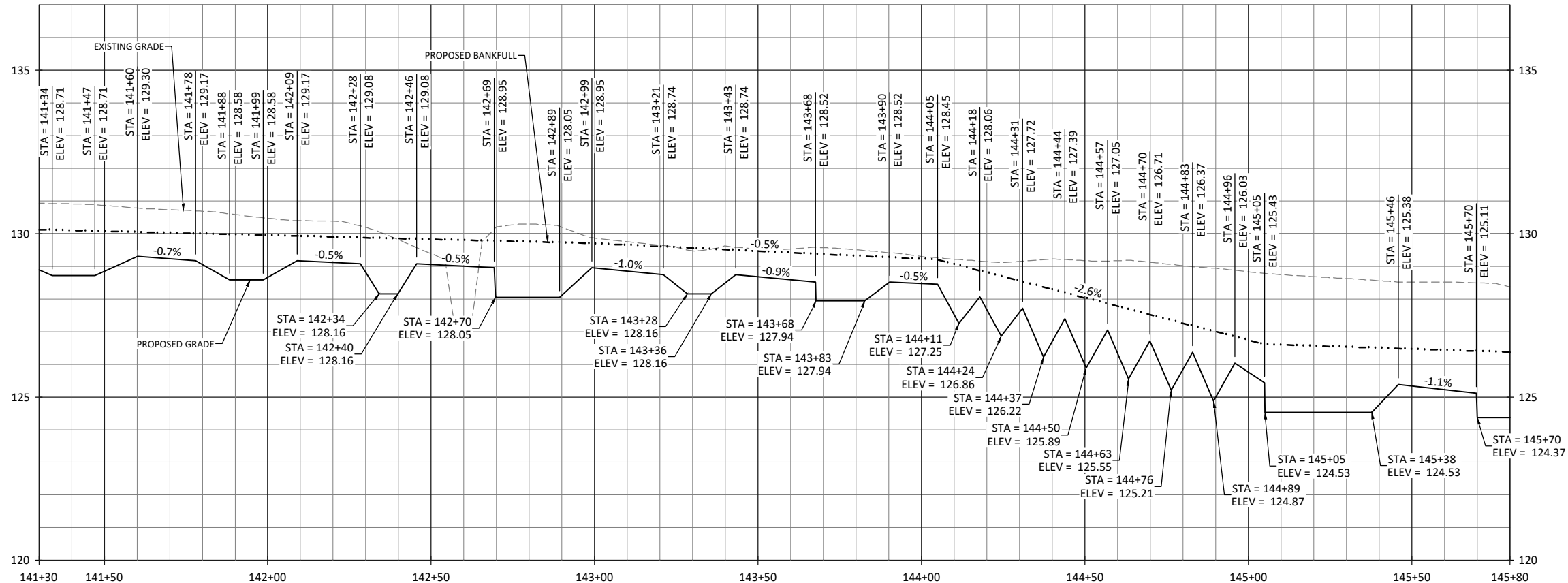
Casey Creek Mitigation Site  
Wayne County, North Carolina  
Casey Creek Reach 3 & 4  
Stream Plan & Profile

Revisions:

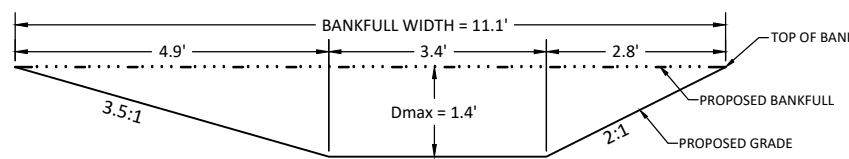

Date:	05.10.2024
Job Number:	02196
Project Engineer:	AA
Drawn By:	MK
Checked By:	CS

DRAFT

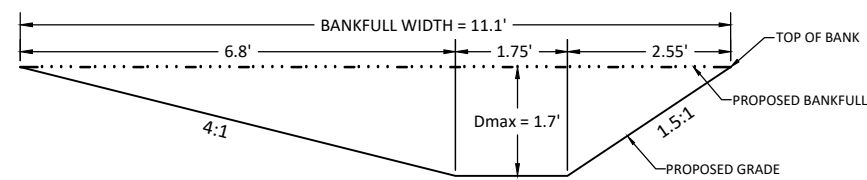




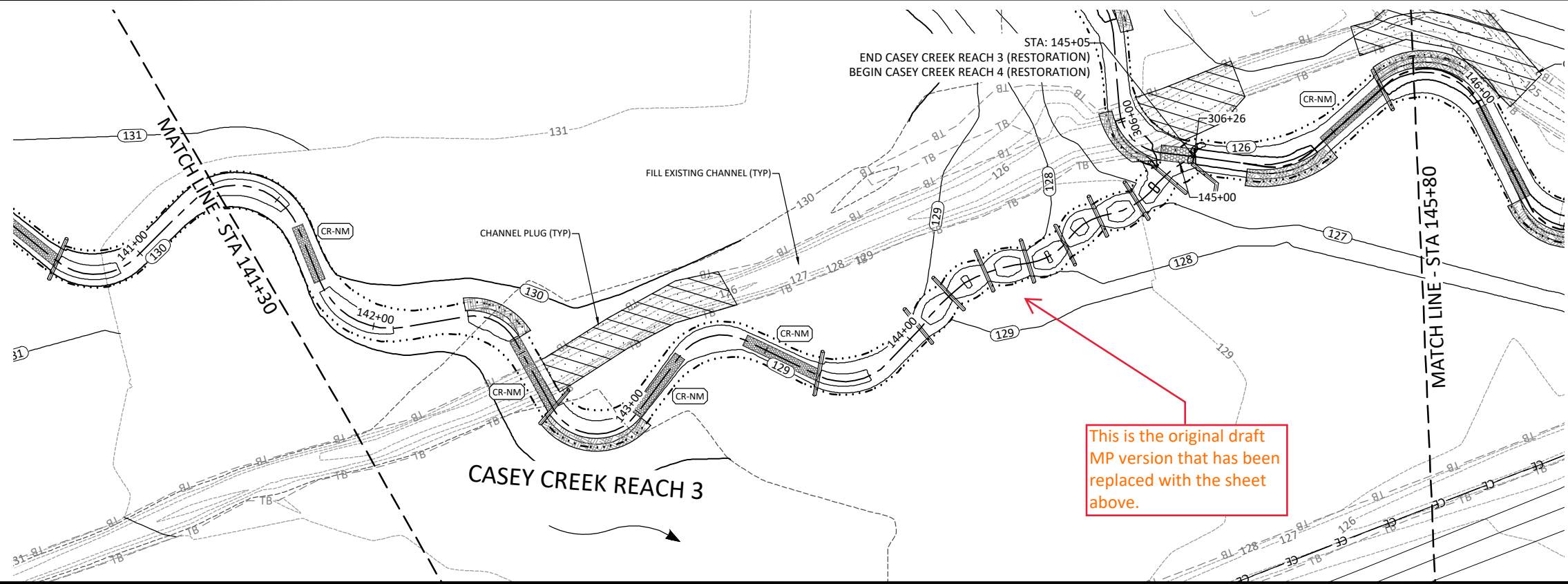
CASEY CREEK REACH 3  
TYPICAL SECTION: RIFFLE  
STA: 125+92 TO 145+05



CASEY CREEK REACH 3  
TYPICAL SECTION: STANDARD POOL  
STA: 125+92 TO 145+05



CASEY CREEK REACH 3  
TYPICAL SECTION: DEEP POOL WITH STRUCTURE  
STA: 125+92 TO 145+05



Casey Creek Mitigation Site  
Wayne County, North Carolina  
Casey Creek Reach 3 & 4  
Stream Plan & Profile

Revisions:


Date:	04.10.2024
Job Number:	02196
Project Engineer:	AA
Drawn By:	MK
Checked By:	CS

DRAFT

## **Appendix 7: Invasive Species Plan**

## Appendix 7 Invasive Vegetation Treatment Plan

A goal of this project is to treat and reduce the exotic species found on site. The presence and extents of invasive species will be monitored, and treatment of invasive species will continue as necessary throughout the life of the project to ensure project stability and success of the riparian and streambank vegetation. Regular site visits will be conducted to assess the condition of the finished project. The presence of invasive species on Casey Creek Mitigation Site is scarce throughout the majority of riparian buffers and increases in density along the eastern border of the wooded preservation areas in the northern portion of the project. The most prevalent species, Chinese privet (*Ligustrum sinense*), is scattered throughout this area and will require ongoing treatment.

Generally, the treatment plan shall follow the below guidelines in Table 1 for invasive species found on the site; however, the treatment may be changed based on professional judgement and resources. All invasive species treatments will be reported in each monitoring report.

**Table 1. Invasive Species Treatment Techniques**

Invasive Species	Recommended Treatment Technique
Chinese Privet ( <i>Ligustrum sinense</i> )	<p>Use a foliar treatment on seedlings (under 2' tall) using a 3% triclopyr, as the triethylamine salt, or 3% glyphosate plus 0.5% non-ionic surfactant solution.</p> <p>For stems too tall for foliar application and/or when safety to surrounding vegetation is desired, cut stems low to the ground and immediately treat cut surfaces with a 25-50% glyphosate or triclopyr, as the triethylamine salt, solution.</p> <p>For large diameter stems, apply stem injections or hack-and-squirt techniques using a 25-50% triclopyr, as the triethylamine salt, or glyphosate solution year-round, though early spring (March and April) may be less effective. An EZ-Ject tree injector can help reach the lower part of the main stem; otherwise, every branching trunk can be treated using the hack-and-squirt method.</p> <p>Basal bark applications are suitable for large diameter stems in upland areas and can be applied in the winter when the bark is dry and above freezing and below 85°F. Basal bark applications are not aquatic-safe and somewhat less effective on stems greater than 6" DBH. Apply full coverage of a chemical solution to the bottom 10"-18" of a stem using a 20-30% triclopyr ester solution or a 6-8% imazapyr solution in a carrier oil, such as basal oil or kerosene.</p>

Invasive species management will be conducted and monitored by Wildlands Engineering's Stewardship team with cooperation and assistance from the project engineer and environmental science teams. This management plan outlines timing and details of planned management actions throughout the length of the project along with an identification of species found on the project site. The management plan can be found below in Table 2.

**Table 2. Invasive Species Management Plan**

Treatment Season	Recommended Treatment Technique
During Construction	<ul style="list-style-type: none"> <li>Mechanically remove privet within the limits of disturbance as applicable.</li> <li>Manage privet treatment efforts on enhancement/preservation reaches.</li> </ul>
Summer/Spring 2025	<ul style="list-style-type: none"> <li>Monitor for emergence of invasive species</li> </ul>



Treatment Season	Recommended Treatment Technique
Fall/Winter 2025 - 2026	<ul style="list-style-type: none"> <li>• Monitor emergence of invasive species where previous invasive species populations existed before construction. Treat, as necessary.</li> </ul>
Summer 2026	<ul style="list-style-type: none"> <li>• Follow up treatment of invasive plants, as necessary.</li> </ul>
Winter 2026 - 2027	<ul style="list-style-type: none"> <li>• Follow up treatment of invasive plants, as necessary.</li> </ul>
Summer 2027	<ul style="list-style-type: none"> <li>• Follow up treatment of invasive plants, as necessary.</li> </ul>
Winter 2027 - 2028	<ul style="list-style-type: none"> <li>• Follow up treatment of invasive plants, as necessary.</li> </ul>
Summer 2028	<ul style="list-style-type: none"> <li>• Follow up treatment of invasive plants, as necessary.</li> </ul>
Winter 2028 - 2029	<ul style="list-style-type: none"> <li>• Follow up treatment of invasive plants, as necessary.</li> </ul>
Summer 2029	<ul style="list-style-type: none"> <li>• Follow up treatment of invasive plants, as necessary.</li> </ul>
Winter 2029 - 2030	<ul style="list-style-type: none"> <li>• Follow up treatment of invasive plants, as necessary.</li> </ul>
Summer 2030	<ul style="list-style-type: none"> <li>• Follow up treatment of invasive plants, as necessary.</li> </ul>
Winter 2030 - 2031	<ul style="list-style-type: none"> <li>• Follow up treatment of invasive plants, as necessary.</li> </ul>
Summer 2031	<ul style="list-style-type: none"> <li>• Follow up treatment of invasive plants, as necessary.</li> </ul>
Winter 2031	<ul style="list-style-type: none"> <li>• Follow up treatment of invasive plants, as necessary.</li> </ul>

## **Appendix 8: Maintenance Plan**

## Appendix 8 Maintenance Plan

The site shall be monitored on a regular basis and a physical inspection of the site shall 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:

**Table 1. 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 storm water and floodplain flows intercept the channel may also require maintenance to prevent bank erosion. If beaver become active on the site, Wildlands will contract with the USDA to trap the beaver and remove the dams.
Vegetation	Vegetation shall be maintained to ensure the health and vigor of the targeted community. Routine vegetation maintenance and repair activities may include supplemental planting, pruning, mulching, and fertilizing. Invasive plant species requiring treatment per the Invasive Species Treatment Plan (Appendix 7) shall be treated in accordance with that plan and with NC Department of Agriculture (NCDA) rules and regulations.
Site boundary	Site boundaries shall be identified in the field to ensure clear distinction between the mitigation site and adjacent properties. 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.



## **Appendix 9: Credit Release Schedule**

## Appendix 9 Credit Release Schedule and Supporting Information

All credit releases will be based on the total credit generated as reported by the as-built survey of the mitigation site. 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 Interagency Review Team (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 restart 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:

**Table A: Credit Release Schedule – Stream Credits**

Credit Release Milestone	Monitoring Year	Credit Release Activity	Interim Release	Total Released
1	0	Site Establishment	0%	0%
2	0	Completion of all initial physical and biological improvements made pursuant to the Mitigation Plan – see requirements below	30%	30%
3	1	Year 1 monitoring report demonstrates that channels are stable and interim performance standards have been met	10%	40%
4	2	Year 2 monitoring report demonstrates that channels are stable and interim performance standards have been met	10%	50%
5	3	Year 3 monitoring report demonstrates that channels are stable and interim performance standards have been met	10%	60%
6	4*	Year 4 monitoring report demonstrates that channels are stable and interim performance standards have been met	5%	65% (75%**)
7	5	Year 5 monitoring report demonstrates that channels are stable and interim performance standards have been met	10%	75% (85%**)
8	6*	Year 6 monitoring report demonstrates that channels are stable and interim performance standards have been met	5%	80% (90%**)
9	7	Year 7 monitoring report demonstrates that channels are stable and interim performance standards have been met	10%	90% (100%**)

\*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 NCIRT.

\*\*10% reserve of credits to be held back until the bankfull event performance standard has been met

### 1.1 Initial Allocation of Released Credits

For this NCDMS project, no initial release of credits is provided. To account for this, the 15% credit release typically associated with the site establishment is held until completion of all initial physical and biological improvements made pursuant to the Mitigation Plan. In order for NCDMS to receive the 30% release (shown in Tables A and B as Milestone 2), they must comply with the credit release requirements stated in Section IV(I)(3) of the approved NCDMS instrument.





## 1.2 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.

The following conditions apply to credit release schedules:

- a. A reserve of 10% of site's total stream credits will be release 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 is at the discretion of the NCIRT.
- b. After the second milestone, the credit releases are scheduled to occur on an annual basis, assuming that the annual monitoring report has been provided to the USACE in accordance with Section IV (General Monitoring Requirements) of this document, and that the monitoring report demonstrates that interim performance standards are being met and that no other concerns have been identified on-site during the visual monitoring. All credit releases require written approval from the USACE.
- c. The credits associated with the final credit release milestone will be released only upon a determination by the USACE, in consultation with the NCIRT, of functional success as defined in the Mitigation Plan.

As projects approach milestones associated with credit release, the 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 10: Financial Assurances**

## Appendix 10 Financial Assurances

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Pursuant to Section IV H and Appendix III of the Division of Mitigation Service's In-Lieu Fee Instrument dated July 28, 2010, the North Carolina Department of Environment and Natural Resources has provided the US Army Corps of Engineers Wilmington District with a formal commitment to fund projects to satisfy mitigation requirements assumed by DMS. This commitment provides financial assurance for all mitigation projects implemented by the program.



## **Appendix 11: Buffer Mitigation Plan**



# **NUTRIENT OFFSET & BUFFER MITIGATION PLAN**

**June 2024**

## **CASEY CREEK MITIGATION SITE**

Wayne County, NC

Neuse River Basin  
HUC 03020201

USACE Action ID: SAW-2022-01239  
NCDWR ID No. 20220664 v2

NCDEQ Contract No. 210201-01  
RFP#: 16-20210201 (Issued: 7/7/2021)  
DMS ID No. 100597

**PREPARED FOR:**



**NC Department of Environmental Quality  
Division of Mitigation Services**

1652 Mail Service Center  
Raleigh, NC 27699-1652



June 4, 2024

Nutrient Offset & Buffer Banking Coordinator  
North Carolina Department of Environmental Quality  
512 N. Salisbury Street, Raleigh, NC 27620

Attention: Katie Merritt

Subject: DWR Casey Creek Nutrient Offset and Buffer Mitigation Plan Comment Response  
Casey Creek Mitigation Site, Wayne County  
Neuse River Basin HUC 03020201  
DMS Project ID No. 100597/Contract No. 210201-01

Dear Ms. Merritt:

Wildlands Engineering, Inc. (Wildlands) has reviewed the Division of Water Resources (DWR) comments dated May 16th, 2024, for the draft Casey Creek Nutrient Offset and Buffer Mitigation Plan (Plan). We have made the necessary revisions to the draft documents and are submitting revised versions along with this letter. DWR's comments are provided below followed by Wildlands' responses in bold italics. Please note that there was an adjustment between the draft Plan submittal and the final Plan submittal to the Casey Creek stream design shortly upstream of its confluence with Afton Branch. This resulted in a slight change to the designed top of bank and, therefore, the proposed riparian buffer credits and nutrient offset credits. Updated figures and credit totals can be found within the final Plan.

1. Section 1.0

- a. clarify what is meant by "Site" here?

***The word "Site" was referring to the Casey Creek nutrient offset and riparian buffer mitigation project (Riparian Restoration Project). Rather than using the term "Site", the Plan now uses "Riparian Restoration Project" throughout to reference the Casey Creek nutrient offset and riparian buffer mitigation project.***

- b. throughout the Plan, there is inconsistency on what project is being referenced. there is usage of "Site", "Project", "riparian mitigation project", riparian buffer mitigation project, nutrient offset and buffer project, etc. address the inconsistencies. recommended to say "nutrient offset & buffer mitigation project (hereinafter referred to as "riparian restoration project") or something similar.

***The Plan now uses "Riparian Restoration Project" throughout to reference the Casey Creek nutrient offset and riparian buffer mitigation project.***

- c. Add the appendix that this plan is located within the stream plan

***The addition has been made.***

- d. DWR assumes based on maps and tables that the minimum width of 50' from top of banks is being achieved on all features across the whole site. however, it was noted in IRT comments from Maria w/ DWR commend 2 (d) that there is about 4% of riparian

buffers that are less than 50'? explain the discrepancy here and why the tables and figures don't represent areas less than 50.

Areas less than 50' are not convertible to nutrient offset and must be called out and differentiated from the other width categories in the credit table

***There are three areas where the minimum width of 50' from the top of banks is not being met: along Casey Creek upstream and downstream of US Highway 13, and along Ditch B, just after the feature enters the easement. These areas not being included within the draft Plan were an error. Thank you for bringing this to our attention. These areas are now called out in Figure 7 and included in Table 10. The area less than 50 feet along Ditch B is not included for credit while the areas less than 50 feet along Casey Creek are proposed for riparian buffer credit but are not listed as convertible to nutrient offset credit.***

- e. Acknowledge that this is a DMS project somewhere in Section 1.0 including the DMS ID#  
***Section 1.0 now states that the Riparian Restoration Project is a DMS project and includes the DMS ID#.***

- 2. Section 1.1 – is “project” referenced here different that the “riparian mitigation project” referenced in the second paragraph of section 1.1? explain and clarify the reference.

***No, “project” was referring to the Riparian Restoration Project. “Project” is now replaced with “Riparian Restoration Project”.***

- 3. Section 2.1 – in section 1.0 this is referred to as “riparian buffer mitigation project”.

***The project is now referred to as Riparian Restoration Project.***

- 4. Section 2.2

- a. This project was referred to on page 1 as “nutrient offset and buffer mitigation project” not “buffer mitigation and nutrient offset project”.

Be consistent throughout on the naming conventions (same as previous comment on page 1).

***The project is now referred to as Riparian Restoration Project throughout the Plan.***

- b. I don't mind the 14 digit HUC but it shouldn't be more than 12 digits represented in this table. We don't use the 14 digit HUC layer on our DWR GIS maps for the Neuse River Basin so I'm not sure how the 14 digit HUC was determined for this site. Either way, remove to include only the 12 digit.

***The fourteen-digit HUC was replaced with the twelve-digit HUC.***

- 5. Section 2.3

- a. This memo should be attached to the Plan in an appendix and then referenced accordingly.

***The memo has been added to Appendix E of the Plan and is referenced where applicable throughout the Plan.***

- b. Ditch B was determined to be viable for NOC in the field based on existing conditions. If Ditch B is going to be modified to carry water in a different direction than how it

currently carries water to Meeting Branch, then the ditch is no longer viable. Altering the connection of a ditch to the Stream on any project can kick a ditch out from viable for credits.

***Ditch B modifications will not change the flow direction. Ditch B will still be carrying water downstream to Martha Branch. To clarify this, text has been added to Section 4.1.***

6. Section 2.4 – Site? What is meant by “Site”?

***The word “Site” within the referenced sentence had been used to describe the Riparian Restoration Project. “Site” has now been replaced with “Riparian Restoration Project”.***

7. Section 4.1

- a. There were drain tiles called out on the viability letter. Explain how drain tiles will be removed and where they are located.

***There is only one known drain tile along Casey Creek. At the time of the site viability letter, Wildlands believed additional drain tiles might be along Casey Creek. This was due to conversations with the landowner, who indicated they did not know how many drain tiles were on-site. Wildlands performed multiple site assessments, during which we extensively searched for additional drain tiles. Only one drain tile was found during these visits. Additionally, the contracted land surveyor did not locate any additional drain tiles.***

***The drain tile is located along Casey Creek approximately 100 feet upstream of the Highway 13 crossing, within an area proposed for priority 2 restoration. Where floodplain grading occurs for priority 2 restoration, the tile will be excavated. The length of the drain tile past the conservation easement is unknown; therefore, Wildlands does not intend to excavate the entirety of the drain tile. If following excavation of the drain tile within the priority 2 area, a portion of the drain tile remains in the conservation easement, its outlet will be plugged with concrete and buried to ensure it does not carry concentrated flow into easement. If additional drain tiles are discovered along Casey Creek during construction, Wildlands will follow the same procedure.***

- b. Creation of an internal crossing needs to be referenced, is it culverted or a ford, any culvert removals?

***Section 4.1 has been updated to include the creation of the internal crossing along Casey Creek, which will be a culvert crossing.***

***An existing culvert located between the old borrow pit and the bottom of Casey Creek will be removed. Information on the culvert removal has been added to Section 4.1 and called out in Figure 7.***

- c. if the minimum widths are 50, which is implied by the credit table and corresponding figures, why does it cite 20' here? Explain and address accordingly as noted in previous comments about widths.

***There are three locations where the riparian width is less than 50 feet, directly upstream and downstream of US Highway 13 and where Ditch B enters the easement.***



***It was an error not to list these areas within the draft Plan. Details have been added to Section 9.0, Figure 7, and Table 10, which has been corrected to show these areas.***

- d. Include details on what is being used to fill the borrow pit, how big is the borrow pit, how is this area going to be stabilized, will there be stems planted in this borrow pit footprint?

***The portion of the old borrow pit that is within 50 feet from the top of bank of Casey Creek will be filled with material generated from earthwork related to stream mitigation activities. The existing size of the borrow pit is 0.07 acres. Once the portion of the old borrow pit is filled its size will be reduced to approximately 0.06 acres. Bare root stems will be planted where the old borrow pit will be filled. The area not filled will be cut out of riparian buffer credit and will not be planted. Additional details on work done within the old borrow pit have been added to Section 4.1.***

- e. Explain in Detail in Section 4.1 of this Plan, how Ditch B is being modified from its current condition and why (existing ditch depth, constructed ditch depth, existing width of ditch, constructed width of ditch, etc. The stream plan calls this area out as a "Coastal Plain Swale", but this reference is not used in this Plan. Why? Explain what a Coastal Plain Swale is.

Reference plan sheet 1.8 from the stream plan which shows the intended asbuilt design, add 1.8 to Appendix E and reference it accordingly in section 4.1. When DWR staff met with Wildlands at an IRT mtg recently, Wildlands explained that the ditch was not being modified to redirect flows away from the stream and is not being modified in a way that changes the ditch's existing top of bank locations or channel "length". This needs to be explained in detail in 4.1 (or add it's own section if needed).

Keep in mind that ditches must remain in their existing footprint from Viability letter to As-built in order to remain viable to generate nutrient offset credits. Therefore, in order for this ditch to generate nutrient offset credits, the EXISTING top of bank of Ditch B is required to be used to determine credits generated off Ditch B. This area cannot change at As-built. Wherever the Top of bank measurement is at Plan stage, even if top of bank changes slightly during construction of the Coastal Plain Swale, the credits cannot be larger than they were at Plan stage. Explain how this will be achieved and how it is represented in the table.

DWR is not opposed to the proposal of Ditch B to a Coastal Plain Swale. But without the specific details of how this is being achieved, DWR cannot approve the Plan

***Details have been added to Section 4.1 explaining how Ditch B is being converted to a coastal plain swale, a shallow feature that conveys baseflow. Converting the ditch to a coastal plain swale just upstream of Martha Branch will help stabilize the banks of the feature and will allow stormflow from Ditch B to better access the floodplain, thereby reducing velocity as water flows from Ditch B to Martha Branch. Not referencing the feature as a coastal plain swale in the Plan was an error. The feature is now referenced as a coastal plain swale throughout the Plan.***

***References to Plan Sheet 1.8 have been added to Section 4.1 and Plan Sheet 1.8 has been added to Appendix F within the Plan. Details regarding the coastal plain swale design have been added to Section 4.1.***

**The coastal plain swale will remain within the Ditch B existing footprint. The existing top of bank of Ditch B was used to calculate credits generated within the Plan and the existing top of bank of Ditch B will be used to calculate credits at as-built. A sentence stating this information has been added to Section 9.0. Since the existing top of bank of Ditch B was used to calculate nutrient offset credits in the Plan, its credit amount was included in the same row as the remainder of the Ditch B nutrient offset credits. The feature is shown separately in figures as a coastal plain swale to show where work is proposed on Ditch B; however, the top of bank depicted on figures is still the existing surveyed top of bank of Ditch B.**

8. Section 4.1

- a. There is a ditch coming into Casey Creek on the map (see Figure 7 for comments) and DWR did not see this ditch. Explain its existing hydrological connection (or not) to Casey Creek and what is being proposed on this ditch as part of the buffer and stream plans.

**No comments were seen on Figure 7 related to a ditch that was not assessed during the site viability visit. If the feature in reference is one called out on Figure 3, then it is not a ditch. On aerial imagery, there is a dark line bordering an area of existing forest running northwest that appears to potentially be a ditch. However, Wildlands investigated the area during the Plan development, and no ditch was found. The area might have been temporarily saturated when the aerial photograph was taken, making it appear as a ditch.**

**If the comment refers to Ditch C, existing conditions assessments indicate it likely occasionally carries storm flow to Casey Creek. Furthermore, its profile slopes toward Casey Creek; however, high accumulations of leaf litter and vegetation growth within the channel suggest infrequent flow. The feature will remain after construction and will be connected to Casey Creek so that stormflow can still be conveyed to Casey Creek through it. This feature is located within the stream construction plans at station 122+00, which is now included in Appendix F.**

- b. Bald cypress is not a hardwood species and doesn't meet the rule requirement of "hardwood trees". Remove from the table, or select this tree as being proposed to be planted but not counted towards performance criteria of stems per acre.

**Bald cypress is now proposed in the Plan to be included but not counted toward performance standards. Additionally, its percent composition was reduced from 10% to 3%. To accommodate this, the percent compositions of species that can be counted toward performance standards have been increased. This change is reflected in Table 8.**

- c. The composition of the species in this table is 100%, but the statement about only planting 8 species would not yield 100%. Include the 8 that Wildlands intends to plant if available (include their composition up to 100%) and include the remaining stems as "possible substitutions" indicating what the composition will be of each substitution in the case they are used for planting.

**Wildlands intends to plant each of the 15 species listed in Table 8. Alternate species have been added along with their intended compositions.**

- d. While DWR does appreciate the language regarding 15% will be the max composition of any one stem planted, and that none will be over 50%, this has been determined to not

fulfill the intent of a proposed planting plan. DWR needs to know the exact stems and # intended to plant shall all things work in your favor, and then any remaining stems desired to plant in case there is a need for substitutions. Modify text and table accordingly and corresponding plan sheet.

***Text that lists 15% as the max composition has been removed from Section 4.1. Wildlands intends to plant all 15 species with the compositions listed in Table 8. Plan sheet 3.1 has also been updated.***

- e. Figure 7 shows a small ag field where restoration for both buffer and nutrient offset along Casey Creek (see comment on figure 7) is being proposed. However, this area is not shown in Appendix E on plan sheet 3.2 as being proposed to be planted. Explain and address accordingly.

***The area in reference not included on Plan Sheet 3.2 was an oversight. Thank you for catching this. The area is now shown on Plan Sheet 3.2 as being planted.***

- 9. Section 5.0 – Site? Does this include the stream components too?

***DWR’s performance standards will only apply to the Riparian Restoration Project. “Site” was replaced with “Riparian Restoration Project” to clarify this.***

- 10. Section 5.1 – What is the Planted Area?

***The planted area that will be used to generate riparian buffer credits or nutrient offset credits is 12.0 acres. This area has been added to Section 5.1 as well as the formula used to determine the number of vegetation plots.***

- 11. Section 5.4 – How is data collected and reported in the Plan? Provide the tool being used to export data for reports.

***Data will be collected following the Carolina Vegetation Survey (CVS) Level 2 Protocol for Recording Vegetation. The CVS database will be used for data entry and to export tables for the baseline and annual monitoring reports. Text that details this has been added to Section 5.4.***

- 12. Section 9.0

- a. Do you mean Project? Site? Etc.??

***Within the referenced sentence, we were discussing the Riparian Restoration Project. “Nutrient offset and buffer mitigation site” has been replaced with “Riparian Restoration Project” in this sentence.***

- b. Add the appendix reference.

***The appendix reference was added.***

- c. Explain how much ft<sup>2</sup> is being deducted off each ditch for non-diffused flow. Show the calculation depicting how you got the total number in the project credit table of 2793

***From Ditch B, 813 square feet are deducted while 1,980 square feet are deducted from Ditch C for non-diffused flow. The calculation showing how these two values total 2,793 has been added to the Mitigation Plan. The individual non-diffuse flow deduction areas were calculated in GIS using the methodology specified in the Buffer Interpretation/Clarification Memo #2008-019 (i.e., 50 feet) measured along the ditch's centerline starting where the ditch enters the easement. From that point, a 60-degree***

**angle was formed that points landward and back toward the conservation easement. The area occupied by the resulting triangle was then removed from crediting. Additional text has been added to Section 9.0.**

- d. Acknowledge whether non-std buffers are being applied for the stream credits.

If there are any areas <50, they must be called out here.

**Text has been added to Section 9.0 stating that the Wilmington District Stream Buffer Credit Calculator for extra wide buffers is not being applied to the Casey Creek Stream Mitigation Site. Areas of riparian width less than 50 feet have been added to Section 9.0.**

13. Table 10

- a. Identify the ditches where this is being applied.

**The change has been made.**

- b. Add a separate row for the borrow pit footprint which was not in agricultural use and is not convertible to noc. Just viable for RBC.

**The change has been made.**

14. Table 11 – This should be table 10. The project credit table is not intended to be split into two tables, but represented as one table as a whole.

**Tables 10 and 11 have been combined and listed as one table, Table 10. Throughout the plan, references to Table 11 have been replaced with Table 10.**

15. Figure 3

- a. Locate drain tiles.

**The drain tile along Casey Creek has been added to Figure 3.**

- b. Is this a ditch? It was described in the stream plan sheets?

**The feature in reference is not a ditch. On aerial imagery, there is a dark line bordering an area of existing forest running northwest that appears to potentially be a ditch. However, Wildlands investigated the area during the Plan development, and no ditch was found. The area might have been temporarily saturated when the aerial photograph was taken, making it appear as a ditch. The feature was not called out on the stream plan sheets.**

- c. Call out any culverts that will be replaced or removed?

**Culverts that will be removed have been called out on Figure 3. No culvert replacements are proposed.**

- d. There is no figure labeled "Existing Conditions". Does this map portray existing conditions? If not, add another map that depicts existing conditions.

**Figure 3 portrays existing conditions and has been renamed "Existing Conditions Map" for clarity.**

16. Figure 7

- a. Is Ditch A in or out of the Easement boundary?

***Ditch A is partially within the easement boundary. Its origin is completely within the conservation easement; however, portions of its right side extend past the easement boundary. While Ditch A is cut out of riparian buffer and nutrient offset crediting, it will be planted where it exists within the easement area for purposes of the Casey Creek Stream Mitigation Site. Wildlands expects adequate stem survival within the feature.***

- b. The footprint of the borrow pit is not in agriculture and cannot be converted to nutrient offset as implied in the credits table but accurately depicted in this figure. Call out the borrow pit footprint in the project credit table and cite "no" for not convertible to NOC, and in Section 9.0

***The old borrow pit footprint has been added to Table 10 and is cited as not convertible to nutrient offset credit in Section 9.0.***

- c. Remove the Orange representing restoration for noc in this area. This area was not in agricultural landuses and are not viable for noc, only buffer. Update and modify the plan and tables accordingly.

***The orange polygon representing restoration for nutrient offset credit has been replaced with a blue polygon representing restoration for riparian buffer credits. The Plan and tables have been updated accordingly.***

17. Figure 9

- a. Are all these plots DWR only plots or are some or all of these plots also being shared with the USACE?

***All vegetation plots on Figure 9 will be used for both the Riparian Restoration Project and the USACE Casey Creek Stream Mitigation Site.***

- b. Call out this feature consistent with stream plan

***The feature in reference is not actually a ditch and is not referenced in the stream plan. Wildlands suspects DWR is confusing the feature with Ditch C, located on Plan Sheet 1.1 and at Station 122+00. Plan Sheet 1.1 has been added to Appendix F.***

18. Planting plan overview – this area is proposed for riparian restoration credits but is not proposed for planting. Explain and update accordingly in the Plan.

***The area not shown as planted on Plan Sheet 3.2 was an oversight. It is now shown as planted.***

Thanks very much for the Plan feedback via the comments. Please contact me at 540-907-9432 if you have any questions.

Sincerely,



Kaitlyn Hogarth  
Environmental Scientist

# MITIGATION PLAN

**Casey Creek Mitigation Site**  
Wayne County, NC  
NCDEQ Contract No. 210201-01  
DMS ID No. 100597

Neuse River Basin  
HUC 03020201

**PREPARED FOR:**

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

**PREPARED BY:**

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**This Mitigation Plan has been written in conformance with the requirements of the following:**

- 15A NCAC 02B .0295 Mitigation Program Requirements for Protection and Maintenance of Riparian Buffers.
- 15A NCAC 02B .0703, Nutrient Offset Credit Trading Rule, amended effective April 1, 2020

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

**Contributing Staff:**

Chris Roessler, *Project Manager*  
John Hutton, *Principal in Charge*  
Kaitlyn Hogarth, *Mitigation Plan Development*  
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# Nutrient Offset & Buffer Mitigation Plan

## Casey Creek Mitigation Site

### Neuse River Basin

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## **APPENDICES**

Appendix A	Current Land Use Photographs – June 29, 2023
Appendix B	Historical Aerials
Appendix C	On-Site Determination of Applicability to Neuse Riparian Buffer Rules – August 10, 2022 Site Viability for Buffer Mitigation and Nutrient Offset Letter – February 28, 2023
Appendix D	Categorical Exclusion – October 31, 2022, and Supporting Documentation
Appendix E	Buffer Interpretation/Clarification Memo #2008-019
Appendix F	Casey Creek Mitigation Site Excerpted Plan Sheets





# Nutrient Offset & Buffer Mitigation Plan

## Casey Creek Mitigation Site

Neuse River Basin

### 1.0 Project Introduction

The Casey Creek Mitigation Site is a North Carolina Department of Environmental Quality Division of Mitigation Services (DMS) nutrient offset and riparian buffer mitigation project, hereinafter referred to as “Riparian Restoration Project” (DMS ID No. 100597). The Riparian Restoration Project is designed and to be constructed in conjunction with the Casey Creek Stream Mitigation Project (USACE Action ID SAW-2022-01239, NCDWR ID No. 2022-0664 v2). Additionally, the Riparian Restoration Project shall be planned and designed according to the Nutrient Offset Trading Rule 15A NCAC 02B .0703 and the Buffer Mitigation Rule 15A NCAC 02B .0295. This Nutrient Offset and Buffer Mitigation Plan (Plan) is in Appendix 12 of the Casey Creek Stream Mitigation Plan.

The Riparian Restoration Project is in Wayne County, approximately one mile west of the town of Grantham (Figure 1). Directions are included in Figure 1. The Riparian Restoration Project creates a protected riparian area from top of bank out to a minimum of 20 feet and a maximum of 200 feet along three unnamed tributaries (Casey Creek, Martha Branch, and Afton Branch) and one ditch (Ditch B). The primary purpose of the Riparian Restoration Project is to provide riparian buffer mitigation credits and nutrient offset credits to compensate for unavoidable impacts in the Neuse River Basin 03020201 Hydrologic Unit Code (HUC) outside of the Falls Lake Watershed (Figure 2). The Riparian Restoration Project is located within the Neuse River Basin HUC 030202011700 and NCDWR Subbasin 03-04-12 in Wayne County.

#### 1.1 Site Description

The Riparian Restoration Project contains three unnamed tributaries (Casey Creek, Martha Branch, and Afton Branch), one project Ditch (Ditch B), and two non-project ditches (Ditches A and C). All project features flow to Casey Creek, which eventually flows to Falling Creek. Falling Creek flows into the Neuse River. Falling Creek is classified as Class C Nutrient Sensitive Waters (NSW).

This Riparian Restoration Project will reduce sediment and nutrient loading, provide and improve terrestrial and instream habitats, and improve stream and bank stability by restoring and preserving the riparian areas adjacent to mitigated streams. The Riparian Restoration Project is currently occupied by areas of row crop fields and existing forests. See Appendix A for June 2023 current land use photographs. Restoring and preserving the riparian area up to 200 feet from the streams will reduce nutrient and sediment inputs to the tributaries of Falling Creek and, subsequently, to the Neuse River. The restored floodplain areas will filter sediment during high rainfall events and provide cover and food for wildlife.

### 2.0 Mitigation Project Summary

#### 2.1 Project Goals

The primary goals of the proposed Riparian Restoration Project are to provide ecological and water quality enhancements to the Neuse River Basin by restoring and preserving the riparian area to create a functional riparian corridor. Specific enhancements to water quality and ecological processes are outlined below in Table 1.



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

Goals	Objectives
Decrease nutrient levels.	Nutrient input will be decreased by filtering runoff from surrounding agricultural fields through restored native vegetation. The off-site nutrient input will also be absorbed on-site by filtering flood flows through restored floodplain areas, where flood flows can disperse through native vegetation.
Decrease sediment input.	Sediment from off-site sources will be captured by deposition on restored floodplain areas where native vegetation will slow overland flow velocities.
Decrease water temperature and increase dissolved oxygen concentrations.	Planted riparian trees will shade the project features as they mature, reducing thermal pollution.
Create appropriate terrestrial habitat.	Riparian areas will be restored by treating invasive vegetation and planting native vegetation.
Permanently protect the project Site from harmful uses.	A conservation easement will be recorded on the Site.

**2.2 Existing Site Conditions**

The proposed Riparian Restoration Project includes approximately 25.1 acres of row crop agriculture and forest along Casey Creek, Martha Branch, Afton Branch, and the right bank of Ditch B. The easement boundary will extend from the top of bank to at least 20 feet along nearly all project streams and out to 200 feet where possible (Figure 3).

In general, project streams have minimal forested buffers with row crops planted to the top of bank. Casey Creek originates as an intermittent stream off the project property and becomes perennial near the confluence with Martha Branch. Mature forest borders Casey Creek until its confluence with Martha Branch. Below Martha Branch, row crops extend to the top of both banks. Martha Branch is an intermittent stream flowing east with row crops planted to the top of the right bank and a forested buffer greater than 200 feet on the left side. Afton Branch is a perennial stream that flows west to meet Casey Creek. Row crops are planted to the top of bank for the entirety of Afton Branch. The Site topography consists of gently sloped valleys.

In general, this area has maintained its rural farming character over the last 40 years with only minor changes in land cover (see historical aerials in Appendix B). The consistency in land use within the project watershed indicates that processes affecting hydrology, sediment supply, and nutrient and pollutant delivery have not varied widely over this period. With a lack of developmental pressure, watershed processes and stressors from outside the project limits are likely to remain consistent throughout the implementation, monitoring, and closeout of this project.



**Table 2: Buffer Project Attributes**

<b>Project Name</b>	Casey Creek Mitigation Site
<b>Hydrologic Unit Code</b>	030202011700
<b>River Basin</b>	Neuse
<b>Credit Service Area</b>	Outside of Falls Lake Watershed
<b>Geographic Location (Lat, Long)</b>	35°17'45.33"N, 78°11'06.29"W
<b>Site Protection Instrument (DB, PG)</b>	To be recorded
<b>Total Credits</b>	362,646.603 ft <sup>2</sup> riparian buffer and 9,079.292 lbs N offset
<b>Types of Credits</b>	Riparian Buffer Credits and Nutrient Offset Credits
<b>Plan Date</b>	June 2024
<b>Initial Planting Date</b>	December 2024
<b>Baseline Report Date</b>	April 2025
<b>MY1 Report Date</b>	December 2025
<b>MY2 Report Date</b>	December 2026
<b>MY3 Report Date</b>	December 2027
<b>MY4 Report Date</b>	December 2028
<b>MY5 Report Date</b>	December 2029

**2.3 Site Viability for Buffer Mitigation and Nutrient Offset Mitigation**

On June 2, 2022, NCDWR assessed the project streams and issued the official Stream Determination Letter on August 10, 2022. NCDWR also visited the project area onsite to determine viability for buffer mitigation and nutrient offset on November 2, 2022 and issued a site viability letter on February 28, 2023. NCDWR assessed five features during the November 2<sup>nd</sup> site visit, the results of which are shown in Table 3 below. The Buffer Interpretation/Clarification Memo #2008-019 applies to Ditch B and non-project Ditch C, where maintenance of diffuse flow into the conservation easement is unattainable (Appendix F). The reduction in credit from the memo being applied is documented in Table 10 below and Figure 7. There have been no changes to land use in the project area since NCDWR’s 2022 site visits. A copy of both the “On-Site (Stream Origin) Determination for Applicability to Neuse Buffer Rules” and the “Site Viability for Buffer Mitigation & Nutrient Offset” letters from NCDWR are included in Appendix C.

**Table 3: Project Features**

<b>Feature Name*</b>	<b>Classification</b>	<b>Buffer Credit Viable</b>	<b>Nutrient Offset Viable</b>
Casey Creek	Stream	Yes	Yes (non-forested areas only)
Martha Branch	Stream	Yes	Yes (non-forested areas only)
Afton Branch	Stream	Yes	Yes (non-forested areas only)
A	Roadside ditch	No	No
B	Ditch	No	Yes (right bank only)

\*Ditch C was not assessed during the November 2<sup>nd</sup> NCDWR Site Viability Visit and was not included in the project crediting

## 2.4 Alternative Mitigation

In addition to riparian restoration on subject streams, per the Buffer Mitigation Rules(15A NCAC 02B 0.0295 (o)), alternative mitigation is proposed for the Riparian Restoration Project in the form of riparian restoration on non-subject streams and riparian preservation of forested land on subject streams. The proposed project is in compliance in the following ways:

Riparian Restoration on Non-Subject Streams (15A NCAC 02B .0295 (o)(3)):

- The non-subject streams were confirmed as intermittent or perennial streams by Division staff certified per G.S. 143-214.25A using the Division publication, “Methodology for Identification of Intermittent and Perennial Streams and Their Origins (v.4.11, 2010)” (See Appendix C for the On-Site Determination for Applicability to the Neuse Buffer Rules letter).

Preservation on Subject Streams (15A NCAC 02B .0295 (o)(5):

- The buffer width is at least 30 feet from the stream (See Figure 8 for buffer zones).
- The area meets the requirements of 15A NCAC 02R 0.0403(c)(7), (8), and (11) with no known structures, infrastructure, hazardous substances, solid waste, or encumbrances within the mitigation boundary (See Section 2.21 and Appendix D for an EDR Radius Report summary).
- Mitigation credits for preservation are being requested on no more than 25% of the total area of buffer mitigation (See Table 10 for credit calculations).

## 2.5 Watershed Characterization

The Site is located within the HUC 03020201170010. All project features flow to Falling Creek, which is a tributary to the Neuse River. The Neuse River is classified as WS-IV and NSW by NCDWR. WS-IV waters are water supply waters used for drinking water, culinary, or food processing where a WS-I, II, or III classification is not feasible. These waters are also protected for Class C uses (recreational use, agriculture, fishing and fish consumption, and the maintenance of biological integrity for wildlife). The NSW designation applies to surface waters that are experiencing excessive growth of microscopic or macroscopic vegetation.

Topography, as indicated on the Grantham USGS 7.5-minute topographic quadrangle, shows gently sloped areas throughout the Site (Figure 4). Casey Creek and Afton Branch are depicted as streams on the USGS Topographic Map. Drainage areas were delineated using the USGS Stream Stats website and the North Carolina Floodplain Mapping Program’s 2014-2015 Light Detection and Ranging (LiDAR) data. Land uses draining to the project streams are primarily a combination of agricultural and forested land. The watershed areas and current land use around project streams are depicted in Figure 5, the current land use photographs in Appendix A, and are summarized in Table 4 below.

**Table 4: Drainage Areas and Associated Land Use**

Reach Name	Watershed Area (acres)	Land Use
Casey Creek	439	42% cultivated crops and hay; 44% forest; 3% shrubland; 9% developed; >1% grassland; >1% open water
Martha Branch	82	10% cultivated crops and hay; 76% forested; 3% shrubland; 10% developed
Afton Branch	210	38% cultivated crops and hay; 49% forested; 9% developed; 2% shrubland; >1% grassland; >1% open water



## 2.6 Soils

The proposed Site is mapped by the Wayne County Soil Survey. The project area soils are described below in Table 5. Casey Creek and Afton Branch are depicted as streams on the 1974 NRCS Soil Survey provided in Figure 6.

**Table 5: Project Soil Types and Descriptions**

Soil Name	Description
We- Weston loamy sand (Woodington)	Deep, coarse-loamy, poorly drained soil that occurs on gently rolling coastal plain uplands, flats, and stream terraces. Located along upper Casey Creek.
Ke - Kenansville loamy sand	Well drained, loamy, and deep soils formed of marine and fluvial sediment. Kenansville occurs on level and gently sloping coastal plain uplands and stream terraces. Located along upper Casey Creek.
Dr - Dragston loamy sand	Very deep, coarse-loamy, and somewhat poorly drained found on marine terraces. Located along the middle portion of Casey Creek.
NoB - Norfolk loamy sand	Well drained, fine-loamy and very deep soils located on coastal plain uplands and marine terraces. A very small area of Norfolk is located near the middle portion of Casey Creek.
Ly - Lynchburg sandy loam	Very deep, fine-loamy, and somewhat poorly drained soils occurring on coastal plain flats and marine terraces. Located along Martha Branch.
Ra - Rains sandy loam	Very deep, poorly drained, fine-loamy soils with a shallow, persistent water table occurring on coastal plain flats and depressions. Located along lower Casey Creek.

Source: Web Soil Survey <https://websoilsurvey.sc.egov.usda.gov/App/WebSoilSurvey.aspx>

## 2.7 Existing Vegetative Communities

The existing vegetation within the Riparian Restoration Project is primarily comprised of row crops and forest. Table 6 lists the species of existing vegetation across the project area. This is not an exhaustive list, but it gives an indication of the types of species growing in the area.

**Table 6: Existing Vegetation**

Species	Common Name	Species	Common Name
<i>Acer rubrum</i>	Red Maple	<i>Ligustrum sinense</i>	Chinese Privet
<i>Rhus copallinum</i>	Winged Sumac	<i>Liquidambar styraciflua</i>	Sweetgum
<i>Rubus occidentalis</i>	Blackberry	<i>Quercus phellos</i>	Willow Oak
<i>Pinus taeda</i>	Loblolly Pine	<i>Liriodendron tulipifera</i>	Tulip Poplar
<i>Nyssa sylvatica</i>	Swamp Tupelo	<i>Quercus alba</i>	White Oak
<i>Ilex opaca</i>	American Holly	<i>Salix nigra</i>	Black Willow

## 2.8 Threatened and Endangered Species

According to the Official Species List provided by the Raleigh Ecological Services Field Office of the U.S. Fish and Wildlife Service (USFWS), there are currently three federally protected species listed for the proposed Site: red-cockaded woodpecker (*Picoides borealis*), Neuse River waterdog (*Necturus lewisi*), and Carolina madtom (*Noturus furiosus*). Additionally, the tricolored bat (*Perimyotis subflavus*) (TCB) was proposed endangered on September 14, 2022, after initial assessments were completed. The TCB



was not included on the original IPaC species list in the Categorical Exclusion. On July 6, 2023 in anticipation of its formal listing, the species list was updated and is included in Appendix D.

USFWS did not object to the proposed activities in their response to the public notice (SAW-2022-001239) on August 12, 2022, and expected minimal adverse impacts to fish and wildlife resources. In a pedestrian survey conducted on August 16, 2022, no suitable habitat or individuals were observed for the listed threatened and endangered species. Additionally, NCWRC has no issue with the project as proposed.

After the initial T&E site evaluation was completed, the tricolored bat (*Perimyotis subflavus*) (TCB) was proposed for listing as a federally endangered species on September 14, 2022. The project area provides suitable summer habitat in the form of roost trees; however, the majority of the forested area is along the reach of stream proposed for preservation. No channel work will be done in the preservation area. Additionally, a culvert bisects the project as Casey Creek runs beneath US Highway 13, also known as the Blue-Gray Scenic Byway. Stream restoration will occur on both sides of the culvert, but the culvert itself will remain as is. Per the NHP data explorer, there are no known occurrences of the TCB within the project area or within 10-miles of the project area.

In anticipation of the final TCB ruling, Wildlands will commit to the tree-clearing moratoria (April 1 – October 14) during the TCB active season as recommended by USFWS. Wildlands will reinstate consultation with USFWS if the TCB is listed prior to completion of the project tree clearing. Results from pedestrian surveys and agency correspondence are located in Appendix D.

## **2.9 Cultural Resources**

There are no existing structures in the project area. The Riparian Restoration Project is not located near any sites listed on the National Register with the State Historic Preservation Office (SHPO). SHPO was contacted with a request for review and comment on August 23, 2022. SHPO responded on September 1, 2022, that they “are aware of no historic resources which would be affected by the project” and have no comment on the project as it is currently proposed. The SHPO request and response are included in Appendix D.

## **2.10 FEMA Floodplain Compliance**

The Riparian Restoration Project is represented on the Wayne County Flood Map 3720254600J. There is no mapped floodplain or floodway on the Site. Wildlands contacted the Wayne County floodplain administrator on April 13, 2023, and was told that a floodplain development permit would not be needed to meet local requirements. The project will be designed to avoid adverse floodplain impacts or hydrologic trespass on adjacent properties or local roadways.

## **2.11 Site Location, Site Constraints, and Access**

The project area is bisected by US Highway 13 and is accessible via the highway. The portion of the Riparian Restoration Project north of Highway 13 contains one internal culvert crossing, while the portion south of Highway 13 contains no crossings.

## **2.12 Other Environmental Conditions**

An EDR Radius Map Report with Geocheck was ordered for the Riparian Restoration Project through Environmental Data Resources, Inc. on September 24, 2021. Neither the target property nor the adjacent properties were listed in any of the Federal, State, or Tribal environmental databases searched



by EDR. No known or potentially hazardous waste sites were identified within or immediately adjacent to the project area. The Executive Summary of the EDR report is included in Appendix D.

### 3.0 Site Protection Instrument

The land required for the Riparian Restoration Project's planting, management, and stewardship includes portions of the parcels listed in Table 7. The property owners have signed an option agreement for the project area, and a Memorandum of Option has been recorded at the Wayne County Register of Deeds (DB 3671; PG 511-514, PG 515-518). The proposed conservation easement on this property has not yet been recorded.

**Table 7: Site Protection Instrument**

Landowner	PIN	County	Site Protection Instrument	Deed Book and Page Number	Acreage to be Protected
Martha Kornegay and Bernard Kornegay	2546335459 2546229607 2546314958	Wayne	Conservation Easement	To Be Recorded	24.0
Johnnie Mangrum Brock	2546248066	Wayne	Conservation Easement	To Be Recorded	1.1

### 4.0 Mitigation Work Plan

The project will restore and enhance agriculturally impacted land along three streams and one ditch to a protected riparian corridor, improving the area's ecological function. Figure 7 illustrates the nutrient offset credit areas, riparian buffer credit areas, and conceptual design; Figure 8 depicts the riparian zones and designated widths for the Site.

#### 4.1 Site Preparation

In general, riparian areas will either be restored or preserved with minimum widths of 20 feet from the tops of banks and maximum widths of 200 feet from the tops of banks. Much of the land within 200 feet from the top of the bank of the project features has either been cleared and maintained for row crop production or has remained forested. Areas slated for riparian restoration that are not impacted by the construction of the stream mitigation project will require little site preparation, including select herbicide treatments or limited mechanical clearing to remove undesirable underbrush and invasive species. Other easement areas will be graded per the IRT-approved Casey Creek Stream Mitigation Plan. Any haul roads or other areas of compacted soil within the easement boundary will be ripped before planting.

A drain tile empties into Casey Creek from the east side approximately 100 feet upstream from the Highway 13 culvert crossing within an area proposed for priority 2 restoration (Figure 3). Where floodplain grading occurs for priority 2 restoration, the tile will be excavated. The length of the drain tile past the conservation easement is not known; therefore, Wildlands does not intend to excavate the entirety of the drain tile. If, following excavation of the drain tile within the priority 2 area, a portion of the drain tile remains in the conservation easement, its outlet will be plugged with concrete and buried to ensure it does not carry concentrated flow into the easement. At the time of the site viability assessment, Wildlands believed multiple drain tiles might be feeding into Casey Creek. No other drain tiles were found during the site assessments performed by Wildlands or the existing conditions survey conducted by the contracted land surveyor. Wildlands, therefore, believes that only one drain tile exists. If additional drain tiles are discovered during construction, they will be removed to prevent



concentrated flow from entering the easement. An internal culvert crossing is proposed along Casey Creek (Figure 7).

An old borrow pit 0.07 acres in size that currently contains standing water is adjacent to the bottom of Casey Creek and will be filled within the first 50 feet from the top of bank of Casey Creek. This area of fill will be approximately 255 square feet. Fill material will be generated from earthwork related to the stream restoration activities. Once the portion of the old borrow pit has been filled, straw, seed, and coir matting will be applied to provide ground cover and prevent erosion. Lastly the filled area will be planted with bare root stems listed in Table 8 below. A culvert connecting the old borrow pit to Casey Creek will also be removed. The portion of the old borrow pit that is not being filled will remain an unplanted area of open water, which will be cut out of riparian buffer crediting.

A portion of Ditch B will be converted to a coastal plain swale containing a pilot channel. This will be done by grading the ditch’s banks at an 8:1 ratio and leaving a small channel with a maximum depth of 1.1 feet running through the swale to convey baseflow. The channel will be within the existing footprint of Ditch B. Grading at the 8:1 ratio will begin at the bankfull depth of the 1.1-foot-deep channel and extend until the existing floodplain elevation is met. The alignment of the coastal plain swale will match the existing alignment of Ditch B in this area, and the length of the feature will remain the same as the existing Ditch B. Flow will be carried from Ditch B through the pilot channel and to Martha Branch. This matches the existing flow path of Ditch B in this area. Plan sheet 1.8 from the Casey Creek Stream Mitigation Plan displays further design information for the coastal plain swale (Appendix F). Additional specifics of the stream mitigation project are in the Casey Creek Stream Mitigation Plan. Section 6.6 of the Casey Creek Stream Mitigation Plan contains information on grading. A 401 & 404 permit will be required for all stream restoration work and will be obtained before any work in the riparian areas or waters begins.

#### 4.2 Riparian Area Restoration Activities

Riparian area restoration will involve planting appropriate native tree species along the riparian corridor. Vegetation management and herbicide applications may be needed over the first few years of tree establishment in riparian restoration areas to prevent encroachment of undesirable species that may out-compete the planted native vegetation. Tree and shrub species planted across the riparian areas of the Site will include a mixture of the species listed in the Casey Creek Mitigation Site Planting Tables, located in Appendix F. The species planted within riparian restoration for nutrient offset credit or riparian buffer credit will include the species listed in Table 8. Bald cypress will not be counted toward performance standards. All activities associated with generating riparian buffer and nutrient offset credits will occur simultaneously with the stream mitigation activities and not before.

**Table 8: Selected Tree Species**

Species	Common Name	Composition	Forest Strata	Tree/Shrub
<i>Quercus alba</i>	White Oak	5%	Canopy	Tree
<i>Quercus michauxii</i>	Swamp Chestnut Oak	8%	Canopy	Tree
<i>Platanus occidentalis</i>	Sycamore	10%	Canopy	Tree
<i>Ulmus americana</i>	American Elm	6%	Canopy	Tree
<i>Magnolia virginiana</i>	Sweetbay Magnolia	10%	SubCanopy	Tree
<i>Populus deltoides</i>	Eastern Cottonwood	8%	Canopy	Tree
<i>Quercus nigra</i>	Water Oak	9%	Canopy	Tree





Species	Common Name	Composition	Forest Strata	Tree/Shrub
<i>Quercus phellos</i>	Willow Oak	9%	Canopy	Tree
<i>Taxodium distichum</i>	Bald Cypress	3%	Canopy	Tree
<i>Nyssa biflora</i>	Swamp Tupelo	5%	Canopy	Tree
<i>Acer negundo</i>	Boxelder	6%	SubCanopy	Tree
<i>Betula nigra</i>	River Birch	10%	Canopy	Tree
<i>Ulmus alata</i>	Winged Elm	5%	Canopy	Tree
<i>Morella cerifera</i>	Common Waxmyrtle	3%	SubCanopy	Shrub
<i>Hamamelis virginiana</i>	American Witch-hazel	3%	SubCanopy	Shrub
Possible Substitutions				
Species	Common Name	Composition	Forest Strata	Habit
<i>Diospyros virginiana</i>	Persimmon	10%	Canopy	Tree
<i>Quercus pagoda</i>	Cherrybark Oak	10%	Canopy	Tree
<i>Morus rubra</i>	Red Mulberry	10%	Subcanopy	Shrub

Trees and shrubs will be spaced at 7 feet by 12 feet during planting, which is equivalent to a stem density of 521 stems per acre and is sufficient to meet the performance standards outlined in the Rule 15A NCAC 02B .0295 of 260 planted trees and shrubs per acre at the end of five years. Stems will be well mixed prior to planting to ensure diversity of bare root species across the Site. Due to the nature of random mixing, some stems of the same species might be planted together in some areas. A regionally appropriate seed mix of warm season grasses and wildflowers will also be applied to provide temporary and permanent ground cover for soil stabilization and reduction of sediment loss during rain events in areas without existing herbaceous cover. The proposed planting area includes the areas identified as Riparian Restoration for Buffer Credits and Riparian Restoration for Nutrient Offset Credits on Figure 7. Planting is scheduled for December 2024.

### 4.3 Riparian Area Preservation Activities

There will be no site preparation work done in the riparian preservation areas under 15NCAC 02B .0295(o)(4) except as required in the Casey Creek Stream Mitigation Plan. The area of preservation credit within the Riparian Restoration Project is less than 25% of the total area of riparian buffer mitigation, as shown in Table 10. The preservation area will be protected in perpetuity under a conservation easement.

### 5.0 Performance Standards

The performance criteria for the Riparian Restoration Project will follow the approved performance criteria presented in the guidance documents outlined in RFP 16-20210201 and the Buffer Mitigation Rule (15A NCAC 02B .0295). Annual monitoring and semi-annual site visits will be conducted to assess the condition of the finished project. The buffer restoration project will be assigned specific performance criteria components for vegetation. Performance criteria will be evaluated throughout the five-year post-construction monitoring. An outline of the performance criteria components follows.



## 5.1 Vegetation

The final vegetative success criteria will be the survival of at least 260 stems per acre at the end of the fifth year of monitoring, with a minimum of four native hardwood trees and shrubs where no one species comprises more than 50 percent of stems. Vigor, height, species composition, and density will all be assessed. The extent of invasive species coverage will also be monitored and controlled as necessary throughout the required monitoring period.

Permanent vegetation monitoring plots will be installed and evaluated within the riparian restoration areas to measure the survival of the planted trees and shrubs. The plots will be randomly placed throughout the planted riparian areas. A total of 10 plots will be established within the riparian restoration areas, making up at least 2% of the planted area used to generate riparian buffer credits and nutrient offset credits (Figure 10). The size of individual quadrants will be 100 square meters. The equation used to calculate the number of plots needed is as follows:

$$12.0018 \text{ acres} \times 0.02 = 0.2400 \text{ acres}$$
$$0.2400 \text{ acres} / 0.0247 \text{ acres} = 9.7166 \text{ vegetation plots}$$

Vegetation assessments will be conducted and follow the DMS-approved protocol outlined in the DMS Monitoring Report Template (October 2020). A reference photo will be taken from the southwestern corner of each of the 7 plots. Photos will be taken from all photo points each monitoring year and provided in the annual reports. All planted stems will be marked with flagging tape and recorded.

## 5.2 Reference Photographs

Overview photographs will be taken within the project area once a year to visually document vegetation growth for five years following construction.

## 5.3 Visual Assessments

Visual assessments will be performed within the Site semi-annually during the five-year monitoring period. Problem areas with vegetative health will be noted (e.g., low stem density, vegetation mortality, invasive species, or encroachment). Areas of concern will be mapped and photographed, and a written description will be included in the annual report. Problem areas will be re-evaluated during each subsequent visual assessment. Should remedial actions be required, recommendations will be provided in the annual monitoring report.

## 5.4 Reporting Performance Criteria

Using the DMS Riparian Buffer and Nutrient Offset Buffer Baseline and Annual Monitoring Report Template version 2.0 (May 2017), a baseline monitoring document and as-built record drawings of the project will be developed for the constructed Site. Complete monitoring reports will be prepared in the fall of each monitoring year and submitted to DMS. Vegetation assessments will follow the Carolina Vegetation Survey (CVS) Level 2 Protocol for Recording Vegetation (Lee et al., 2008). The CVS database will also be used to generate vegetation tables for reports. Annual monitoring report documents will be based on the above referenced DMS Template (May 2017). The monitoring period will extend five years beyond the completion of construction or until performance criteria have been met.

## 5.5 Maintenance and Contingency Plans

Wildlands will develop necessary adaptive measures or implement appropriate remedial actions in the event that the Site or a specific component of the Site fails to achieve the success criteria outlined above. The project-specific monitoring plan developed during the design phase will identify an appropriate threshold for maintenance intervention based on the monitored items. Any actions



implemented will be designed to achieve the success criteria specified previously and will include a work schedule and updated monitoring criteria (if applicable).

## 6.0 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. 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.

### 6.1 Monitoring Components

Project monitoring components are listed in more detail in Table 9 and Figure 9.

**Table 9: Monitoring Components**

Parameter	Monitoring Feature	Quantity	Frequency
Vegetation	100 m <sup>2</sup> Plot	10	Annual
Visual Assessment		Y	Semi-Annual
Exotic and nuisance vegetation		Y	Semi-Annual
Project Boundary		Y	Semi-Annual
Reference Photos	Overview Photographs	Y	Annual

## 7.0 Long-Term Management

The Riparian Restoration Project will be transferred to the North Carolina Department of Environmental Quality (NCDEQ) Stewardship Program. This party shall serve as conservation easement holder and long-term steward for the property and will conduct periodic inspections of the Riparian Restoration Project 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 additional signage as needed to identify boundary markings. Internal easement crossings planned for the project area will be the responsibility of the landowner to maintain. The Site Protection Instrument can be found in Appendix D.

## 8.0 Adaptive Management Plan

Upon completion of construction, Wildlands will implement the post-construction monitoring defined in Section 6. Project maintenance will be performed during the monitoring years to address minor issues as necessary. If, during annual monitoring it is determined the Riparian Restoration Project's ability to achieve performance standards are jeopardized, Wildlands will notify the members of DMS/NCDWR and work with the DMS/NCDWR to develop contingency plans and remedial actions. Any actions implemented will be designed to achieve the success criteria specified previously and will include a work schedule and updated monitoring criteria (if applicable).



## 9.0 Credit Determination

Of the 25.1 acres protected under the conservation easement, the mitigation approach for 12.0 acres is riparian restoration. Of the 12.0 acres of restoration, 8.0 acres are proposed for riparian buffer credit and 4.0 acres are proposed for nutrient offset credit. Riparian buffer credits are also being generated from 2.7 acres of preservation. Preservation credit within the Riparian Restoration Project is equivalent to 25% of the total area of riparian buffer mitigation, as shown in Table 10.

The Buffer Interpretation/Clarification Memo #2008-019 applies to Ditches B and C where maintenance of diffuse flow into the easement is unattainable (Appendix E). Due to the non-diffuse flow deduction, 813 square feet and 1,980 square feet are being removed from credit along Ditch B and Ditch C, respectively. Together they total 2,793 square feet. These areas were calculated using the methodology specified in Appendix E. More specifically, 50 feet was measured along the centerline of the applicable ditch starting where the ditch enters the easement. From that point, a 60-degree angle was formed that points landward and back toward the conservation easement. The area occupied by the resulting triangle was then removed from crediting.

Other areas within the conservation easement where credit is not claimed include an internal crossing and areas where the riparian width exceeds 200 feet. There are three locations where the riparian width is less than 50 feet, which include directly upstream and downstream of US Highway 13, and where Ditch B enters the conservation easement. Areas less than 50 feet along Casey Creek are proposed for riparian buffer credit but are not convertible to nutrient offset credits. Where the riparian width is less than 50 feet along Ditch B, no credit is claimed. Where the old borrow pit is being filled and planted, riparian buffer credits are proposed; this area is not convertible to nutrient offset credit. The area of riparian restoration located between the old borrow pit and the conservation easement is also proposed for riparian buffer credits and is not convertible to nutrient offset credits. Along Ditch B where the feature is being graded to a coastal plain swale, the existing top of bank of the ditch was used to calculate proposed nutrient offset credits and will also be used at as-built to calculate nutrient offset credits. Further details on crediting can be found in Table 10 below. The Wilmington District Stream Buffer Credit Calculator for extra wide buffers is not being applied to the Casey Creek Stream Mitigation Site. All credit areas will be finalized in an As-Built Survey and will be submitted in the As-Built report.

The management objectives, mitigation type, and proposed amount of riparian buffer mitigation are presented in Table 10 below. The riparian buffer and nutrient offset credits will be derived from riparian areas adjacent to mitigated streams. Credits will be determined based on existing riparian conditions on the Parcel. Areas that are convertible to Nutrient Offset Credit or Riparian Buffer Credit are specified in Table 10 below. Credit conversions must be calculated using the guidance provided in the Clarified Procedures for Calculating Buffer Mitigation Credits and Nutrient Offset Credits letter issued by the NCDWR in 2019.



**Table 10: Casey Creek Mitigation Site – Project Credit Table**

Neuse 03020201 - Outside Falls Lake				Project Area											
19.16394				N Credit Conversion Ratio (ft <sup>2</sup> /pound)											
N/A				P Credit Conversion Ratio (ft <sup>2</sup> /pound)											
Credit Type	Location	Subject? (enter NO if ephemeral or ditch <sup>1</sup> )	Feature Type	Mitigation Activity	Min-Max Buffer Width (ft)	Feature Name	Total Area (ft <sup>2</sup> )	Total (Creditable) Area of Buffer Mitigation (ft <sup>2</sup> )	Initial Credit Ratio (x:1)	% Full Credit	Final Credit Ratio (x:1)	Convertible to Riparian Buffer?	Riparian Buffer Credits	Convertible to Nutrient Offset?	Delivered Nutrient Offset: N (lbs)
Buffer	Rural	Yes	I / P	Restoration	20-29	Casey Creek	1,510	1,510	1	75%	1.33333	Yes	1,132.503	No	—
Buffer	Rural	Yes	I / P	Restoration	0-50	Casey Creek	1,354	1,354	1	100%	1.00000	Yes	1,354.000	No	—
Buffer	Rural	Yes	I / P	Restoration	0-50	Casey Creek - Old Borrow Pit	255	255	1	100%	1.00000	Yes	255.000	No	—
Buffer	Rural	Yes	I / P	Restoration	0-100	Casey Creek, Afton Branch	313,750	313,750	1	100%	1.00000	Yes	313,750.000	Yes	16,371.894
Buffer	Rural	No	I / P	Restoration	0-100	Martha Branch	31,834	31,834	1	100%	1.00000	Yes	31,834.000	Yes	1,661.141
Nutrient Offset	Rural	Yes	I / P	Restoration	0-100	Casey Creek, Afton Branch	73,822	73,822	1	100%	1.00000	Yes	73,822.000	Yes	3,852.131
Nutrient Offset	Rural	Yes	I / P	Restoration	101-200	Casey Creek, Afton Branch	83,576	83,576	1	33%	3.03030	Yes	27,580.108	Yes	4,361.107
Nutrient Offset	Rural	No	Ditch	Restoration	0-100	Ditch B	16,597		1	100%		No	—	Yes	866.054
Buffer	Rural	Yes	I / P	Restoration	101-200	Casey Creek - Farm Path	100	100	1	33%	3.03030	Yes	33.000	No	—
Buffer	Rural	No	Ditch	Restoration	0-50	Non-Diffuse Flow Deduction - Ditch B, Ditch C	2,793		1	100%		No	—	No	—
<b>Totals (ft<sup>2</sup>):</b>							<b>525,591</b>	<b>506,201</b>					<b>449,760.610</b>	<b>27,112.327</b>	
<b>Total Buffer (ft<sup>2</sup>):</b>							<b>351,596</b>	<b>348,803</b>							
<b>Total Nutrient Offset (ft<sup>2</sup>):</b>							<b>173,995</b>	<b>N/A</b>							

<b>Total Ephemeral Area (ft<sup>2</sup>) for Credit:</b>	<b>0</b>	<b>0</b>
<b>Total Eligible Ephemeral Area (ft<sup>2</sup>):</b>	<b>117,199</b>	<b>0.0%</b>
<b>Total Eligible for Preservation (ft<sup>2</sup>):</b>	<b>117,199</b>	<b>25.0%</b>

**Enter Preservation Credits Below**

Credit Type	Location	Subject?	Feature Type	Mitigation Activity	Min-Max Buffer Width (ft)	Feature Name	Total Area (sf)	Total (Creditable) Area for Buffer Mitigation (ft <sup>2</sup> )	Initial Credit Ratio (x:1)	% Full Credit	Final Credit Ratio (x:1)	Riparian Buffer Credits
	Rural	Yes	I / P		0-100	Casey Creek	375,605	91,517	10	100%	10.00000	9,151.700
	Rural	No	I / P		0-100	Martha Branch	25,682	25,682	5	100%	5.00000	5,136.400
	Rural	Yes	I / P		101-200	Casey Creek	67,668	0	10	33%		—

<b>Preservation Area Subtotals (ft<sup>2</sup>):</b>	<b>468,955</b>	<b>117,199</b>
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<b>TOTAL AREA OF BUFFER MITIGATION (TABM)</b>			
<b>Mitigation Totals</b>		<b>Square Feet</b>	<b>Credits</b>
<b>Restoration:</b>		348,803	348,358.503
<b>Enhancement:</b>		0	0.000
<b>Preservation:</b>		117,199	14,288.100
<b>Total Riparian Buffer:</b>		466,002	362,646.603
<b>TOTAL NUTRIENT OFFSET MITIGATION</b>			
<b>Mitigation Totals</b>		<b>Square Feet</b>	<b>Credits</b>
<b>Nutrient Offset:</b>	<b>Nitrogen:</b>	173,995	9,079.292
	<b>Phosphorus:</b>		0.000

## 11.0 References

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## Figures

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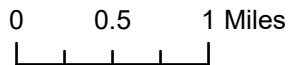
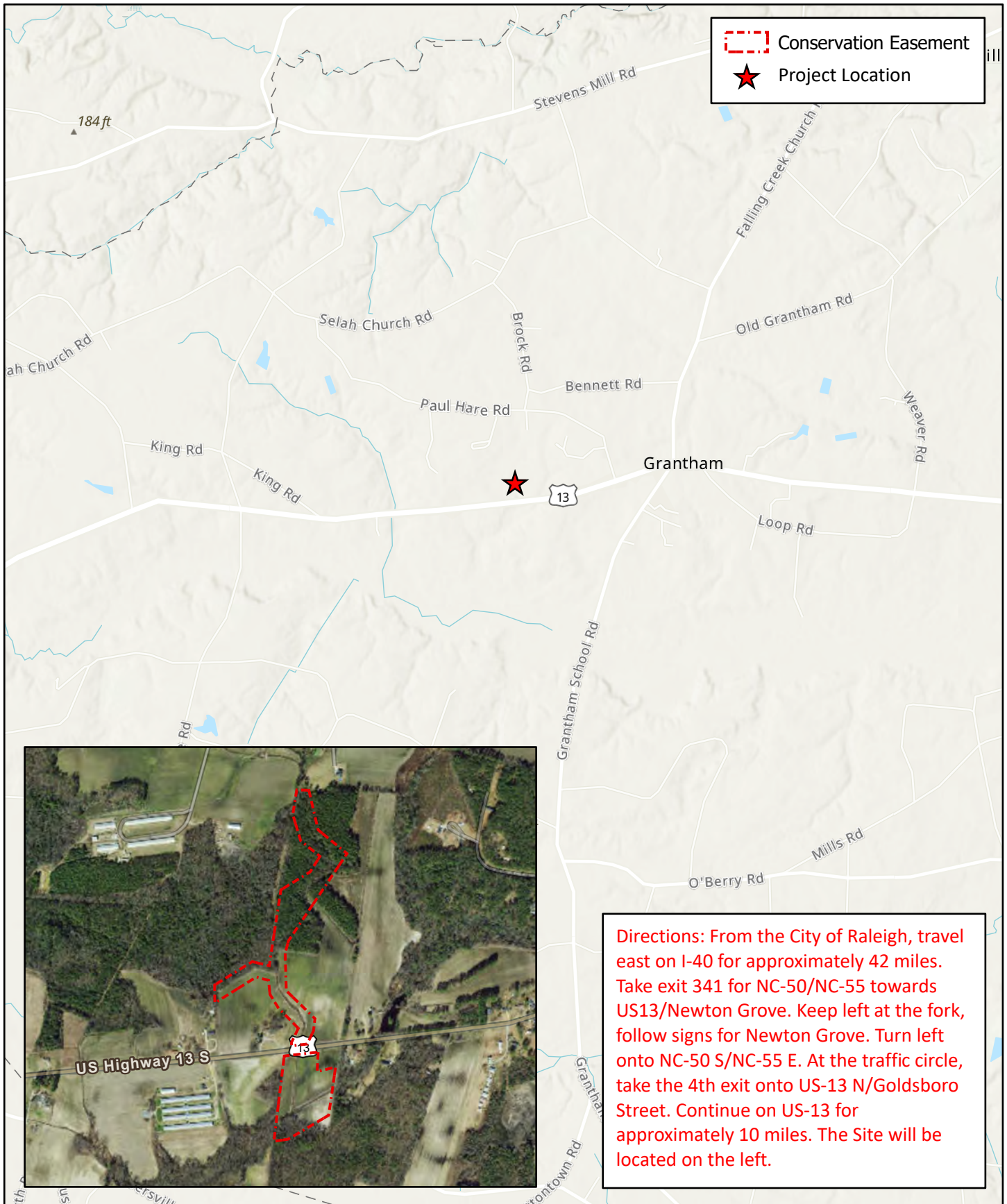


Figure 1. Vicinity Map  
Casey Creek Mitigation Site  
Nutrient Offset and Buffer Mitigation Plan  
Neuse River Basin (03020201)

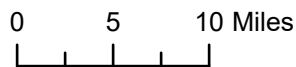
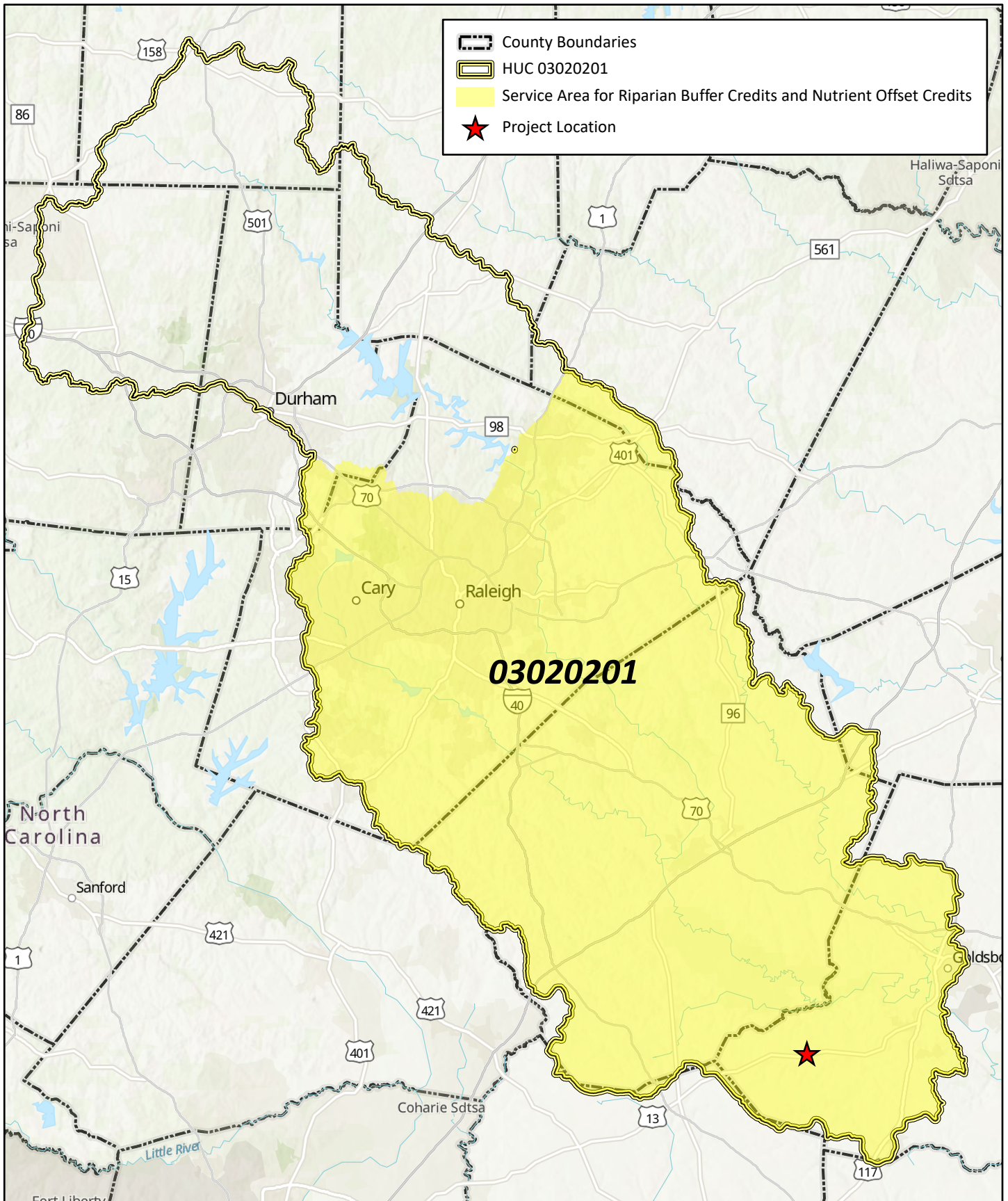


Figure 2. Credit Service Area Map  
Casey Creek Mitigation Site  
Nutrient Offset and Buffer Mitigation Plan  
Neuse River Basin (03020201)

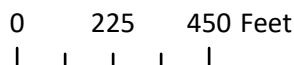
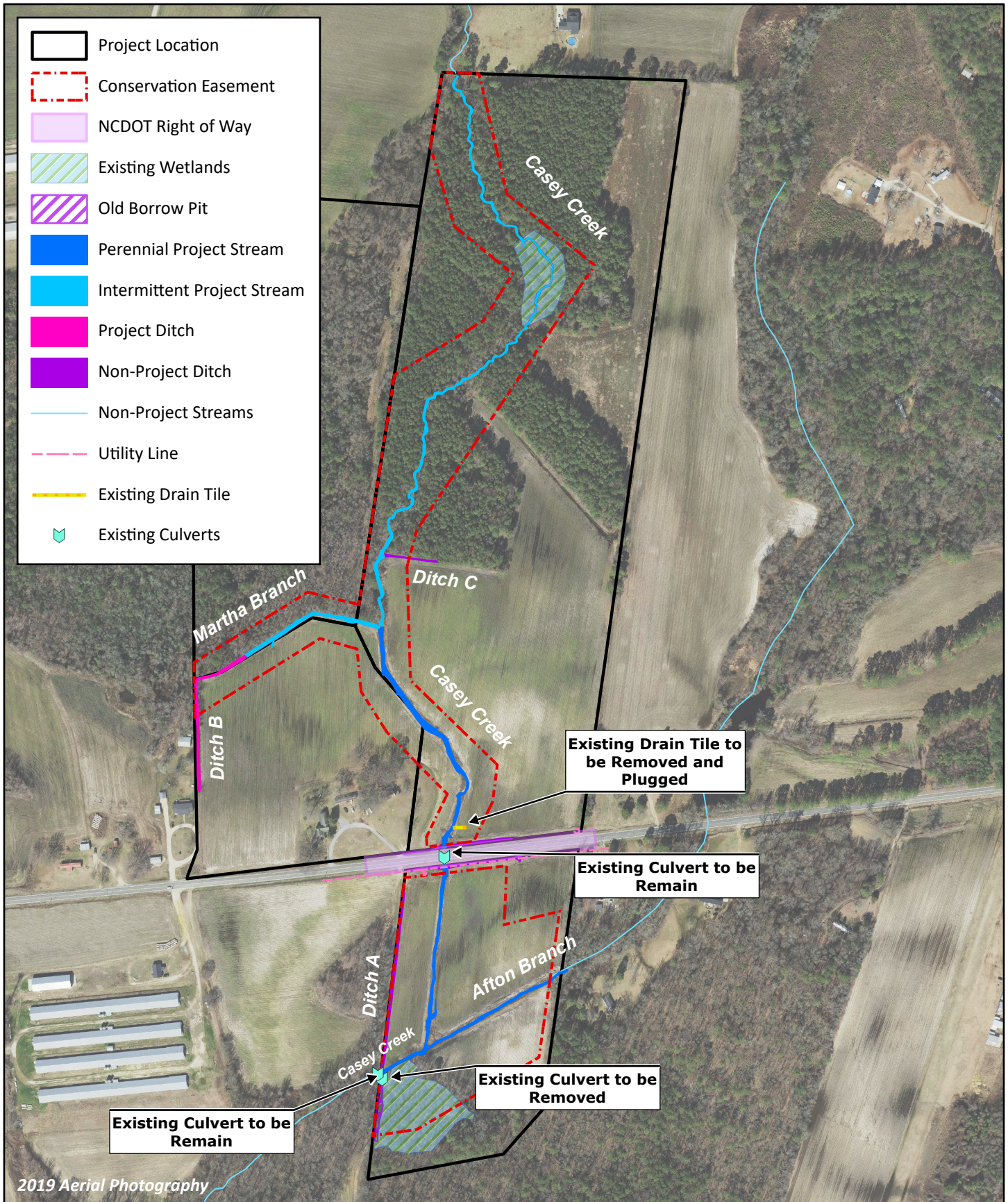
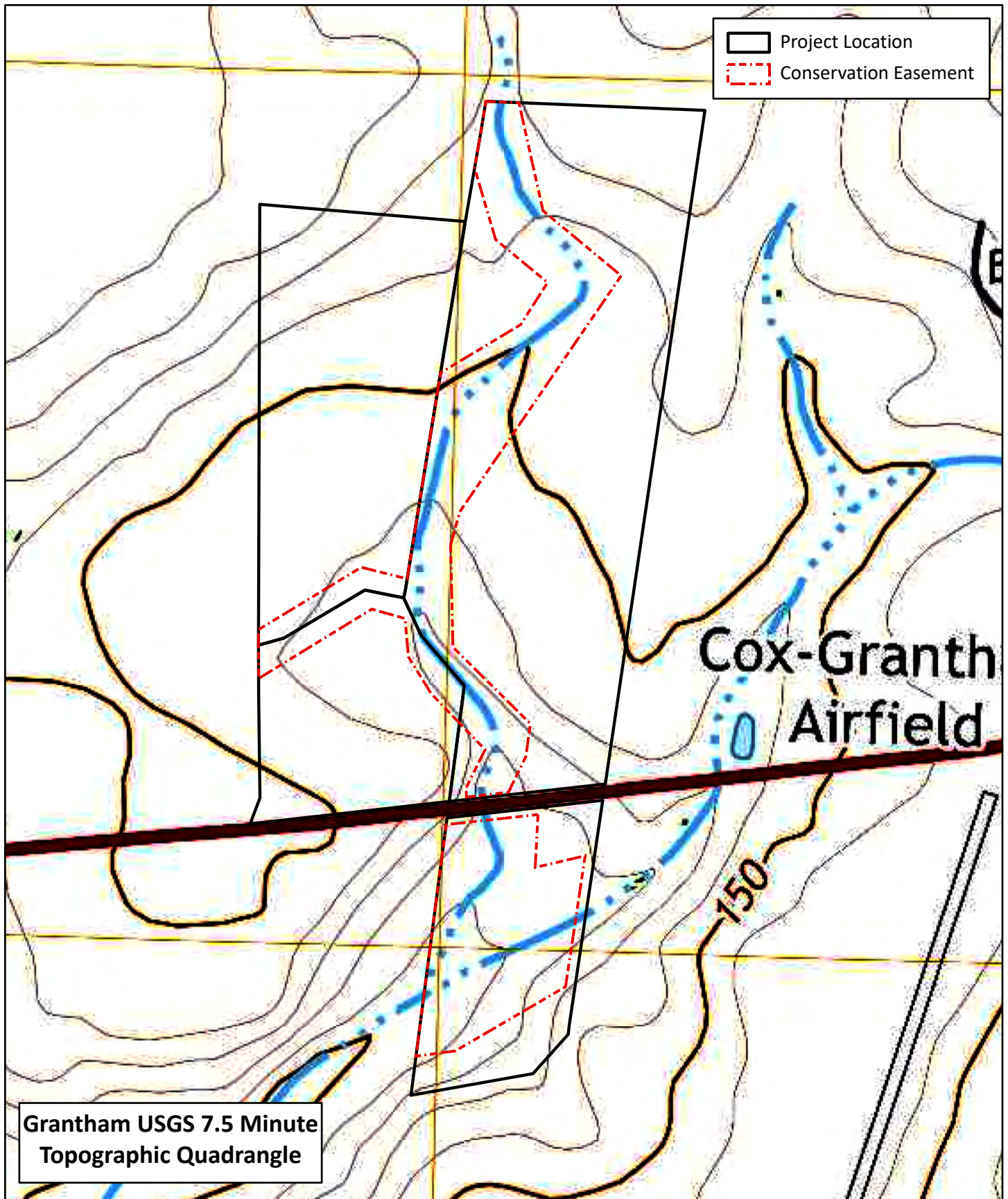


Figure 3 Existing Conditions Map  
 Casey Creek Mitigation Site  
 Nutrient Offset and Buffer Mitigation Plan  
 Neuse River Basin (03020201)



0 250 500 Feet



Figure 4. USGS Topographic Map  
Casey Creek Mitigation Site  
Nutrient Offset and Buffer Mitigation Plan  
Neuse River Basin (03020201)

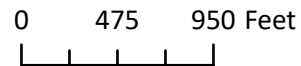
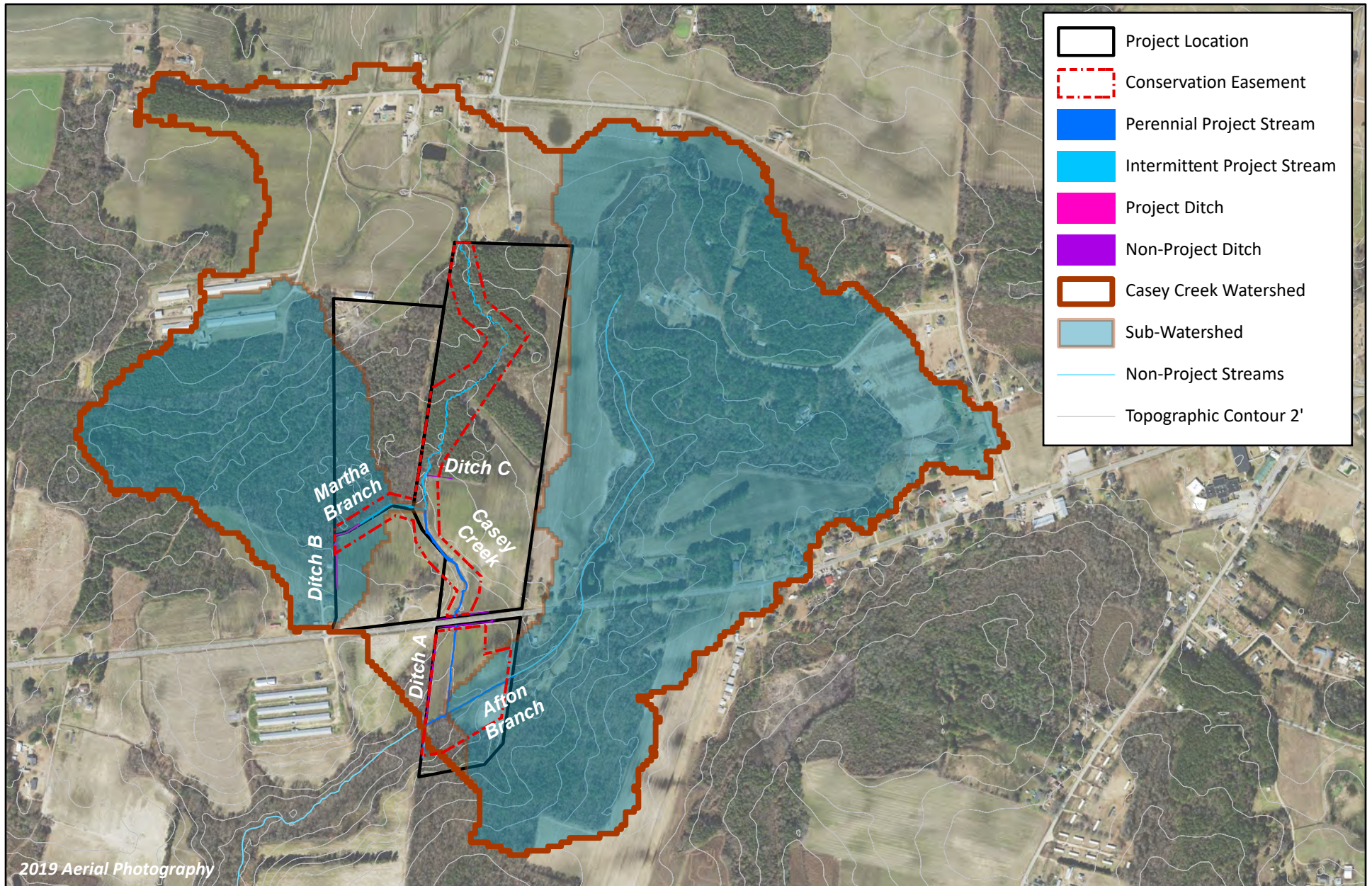


Figure 5 Watershed Map  
Casey Creek Mitigation Site  
Nutrient Offset and Buffer Mitigation Plan  
Neuse River Basin (03020201)

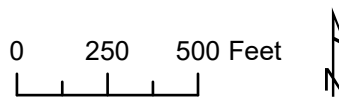
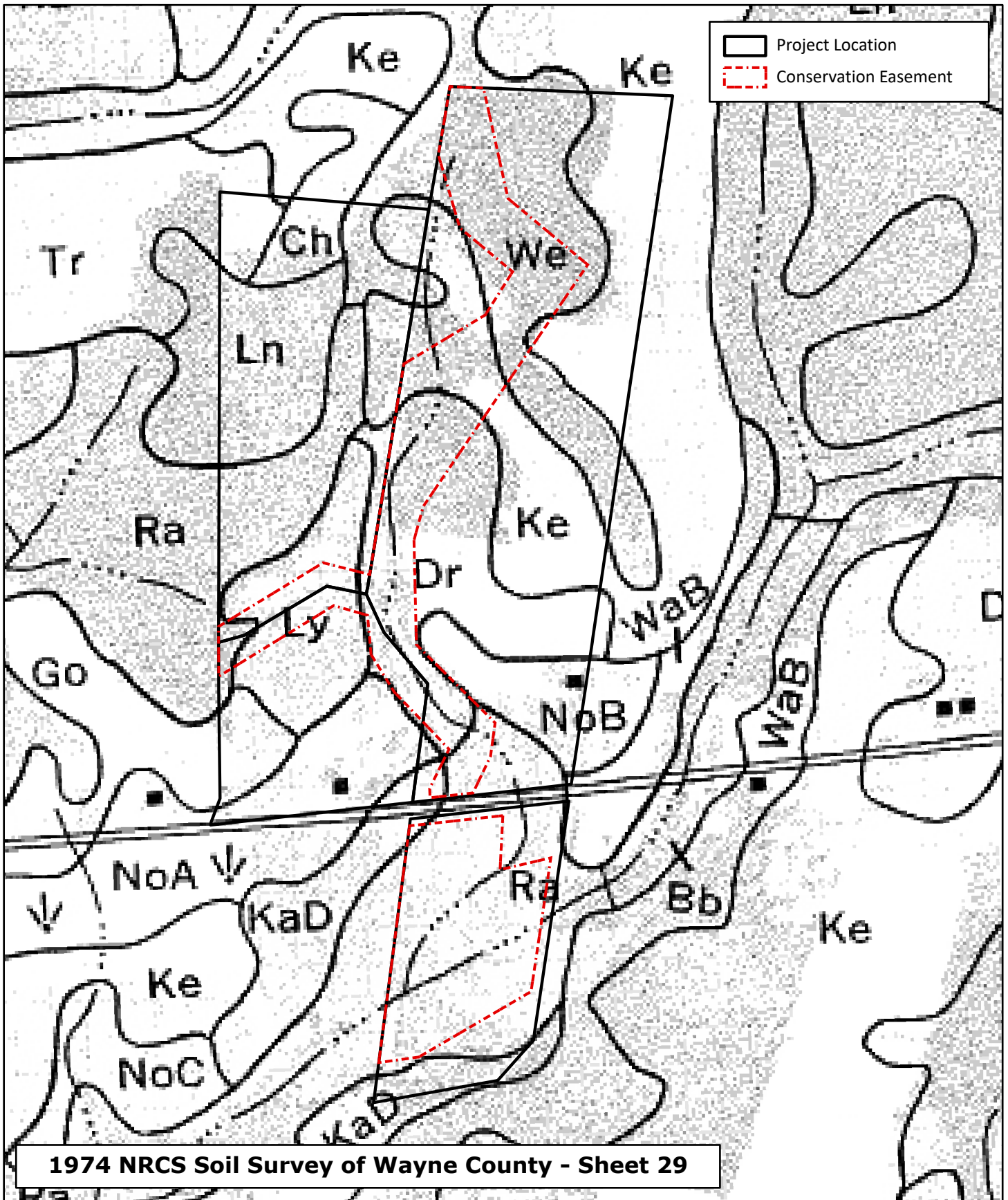


Figure 6. 1974 NRCS Soils Map  
 Casey Creek Mitigation Site  
 Nutrient Offset and Buffer Mitigation Plan  
 Neuse River Basin (03020201)

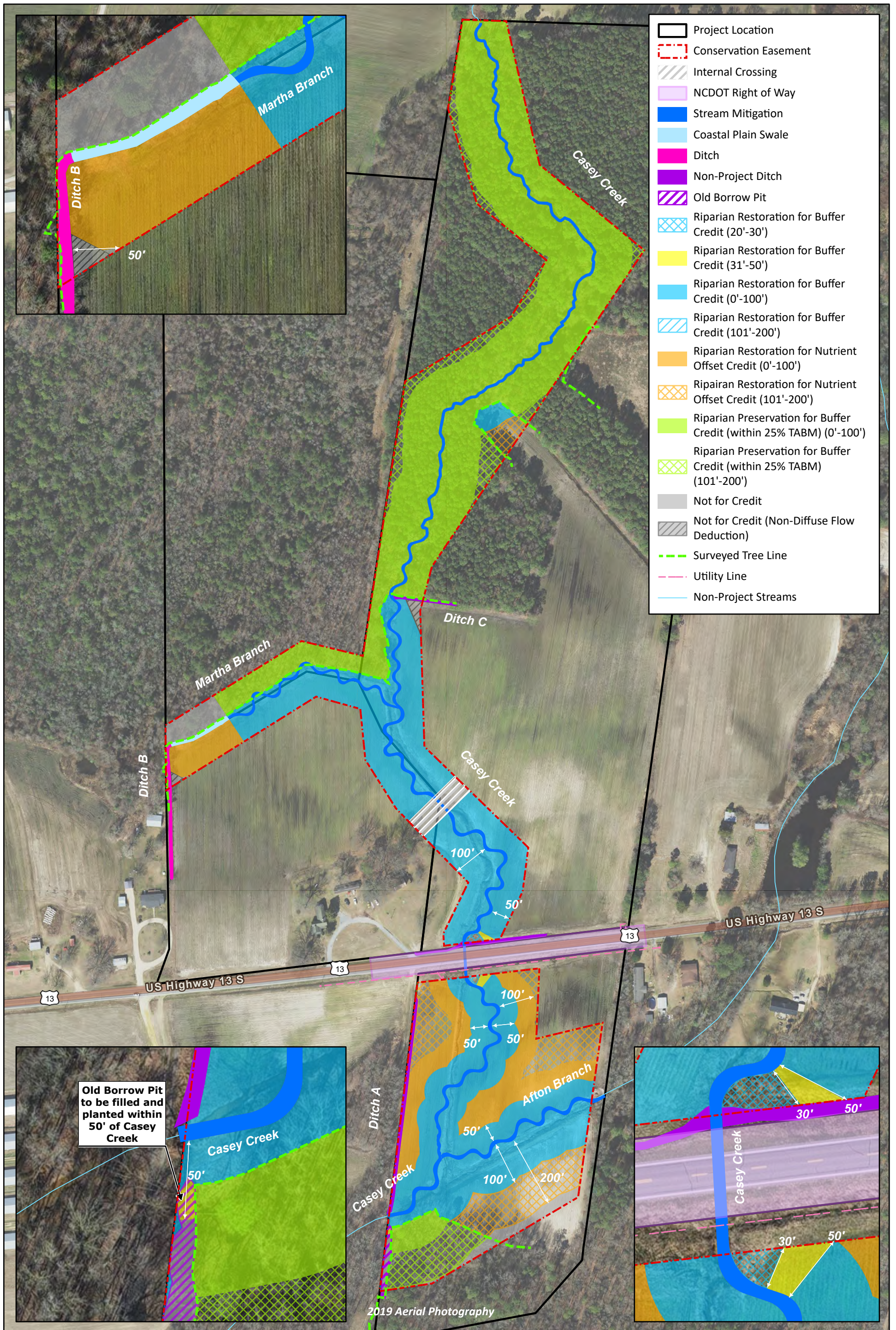
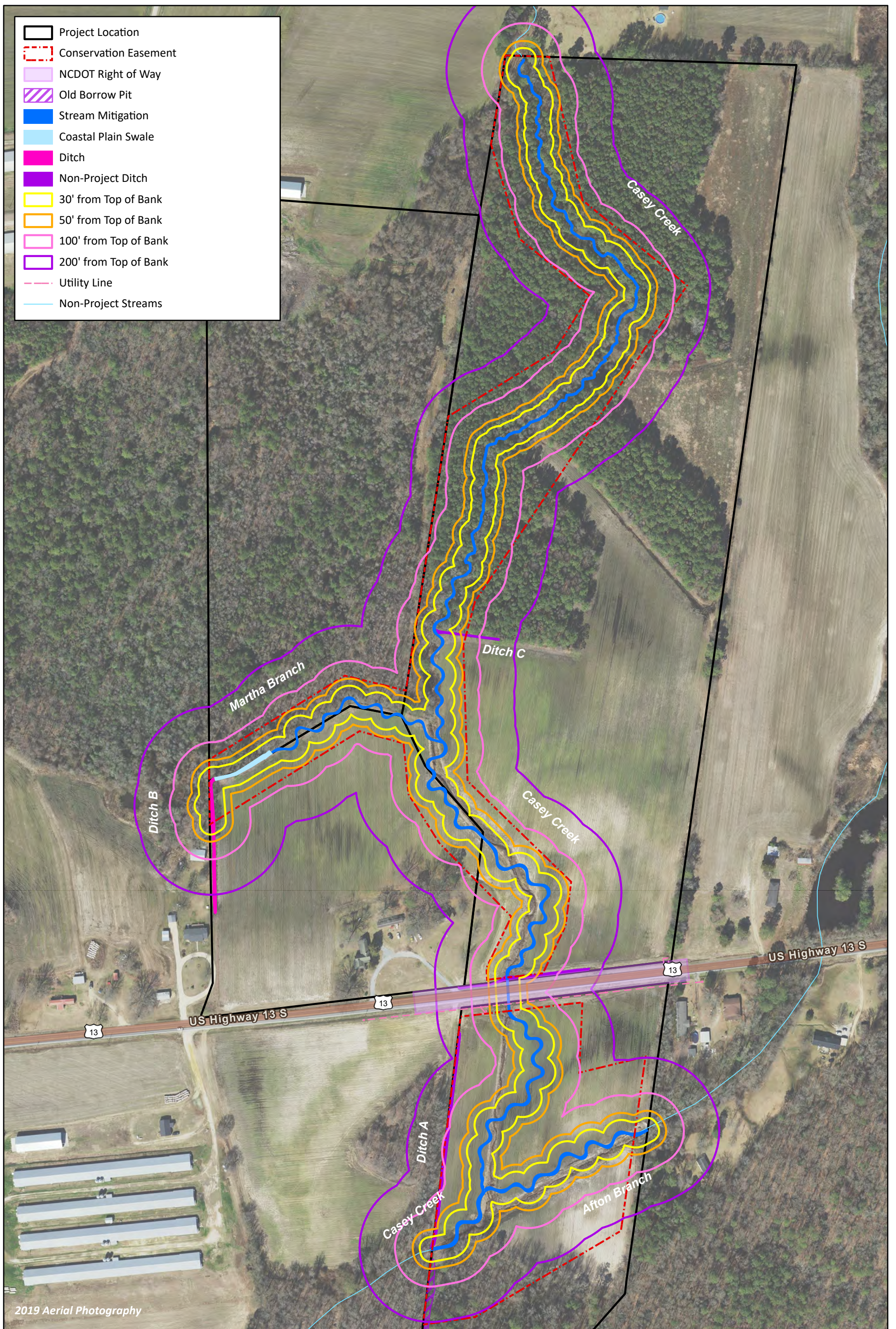
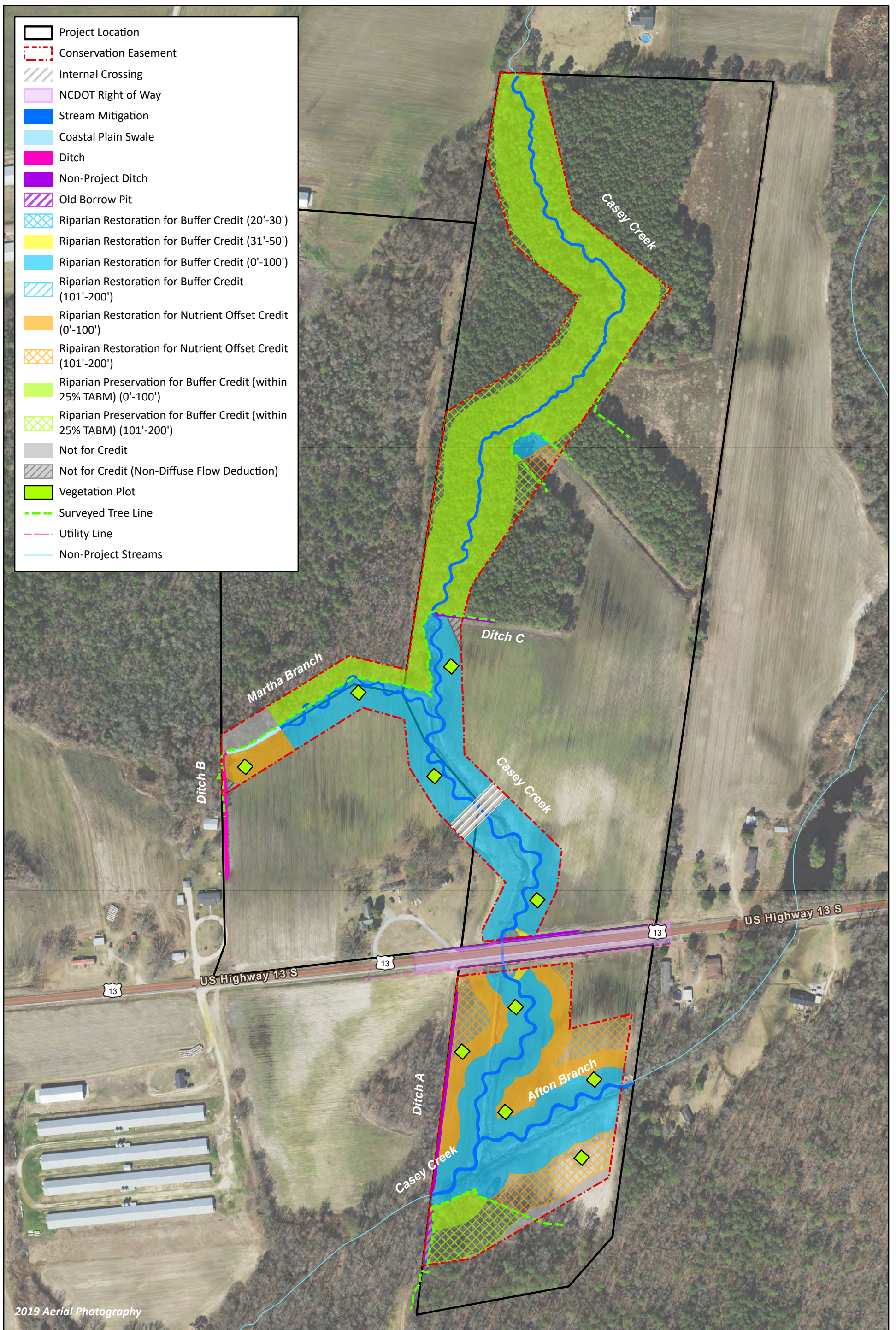


Figure 7. Buffer Mitigation and Nutrient Offset Concept Map  
Casey Creek Mitigation Site  
Nutrient Offset and Buffer Mitigation Plan  
Neuse River Basin (03020201)







**Appendix A:  
Current Land Use Photographs**

**CURRENT LAND USE PHOTOGRAPHS**  
**Casey Creek Mitigation Site**

Casey Creek



Reach 1 – Adjacent Riparian Area (06/29/2023)



Reach 1 – Adjacent Riparian Area (06/29/2023)



Reach 3 – Downstream (06/29/2023)



Reach 3 – Upstream (06/29/2023)



Reach 3 - Downstream (06/29/2023)



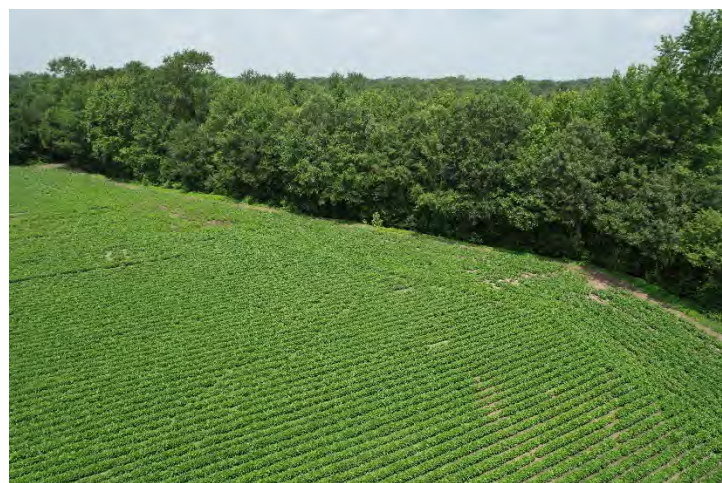
Reach 3 - Upstream (06/29/2023)



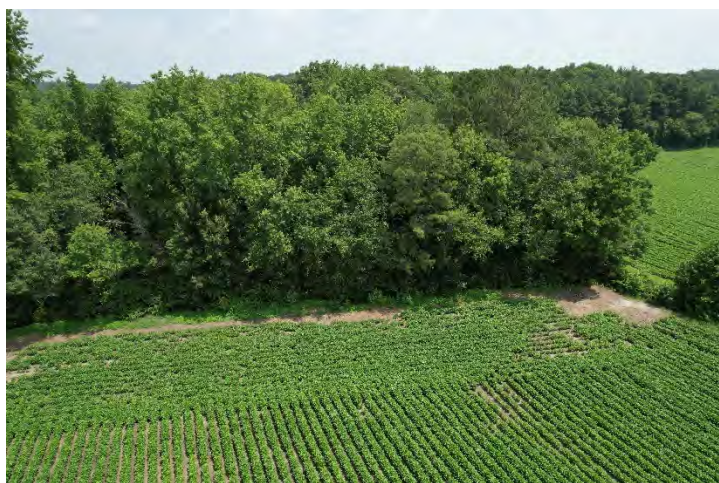


**Reach 4 (06/29/2023)**

**Martha Branch**



**(06/29/2023)**



**(06/29/2023)**

**Afton Branch**



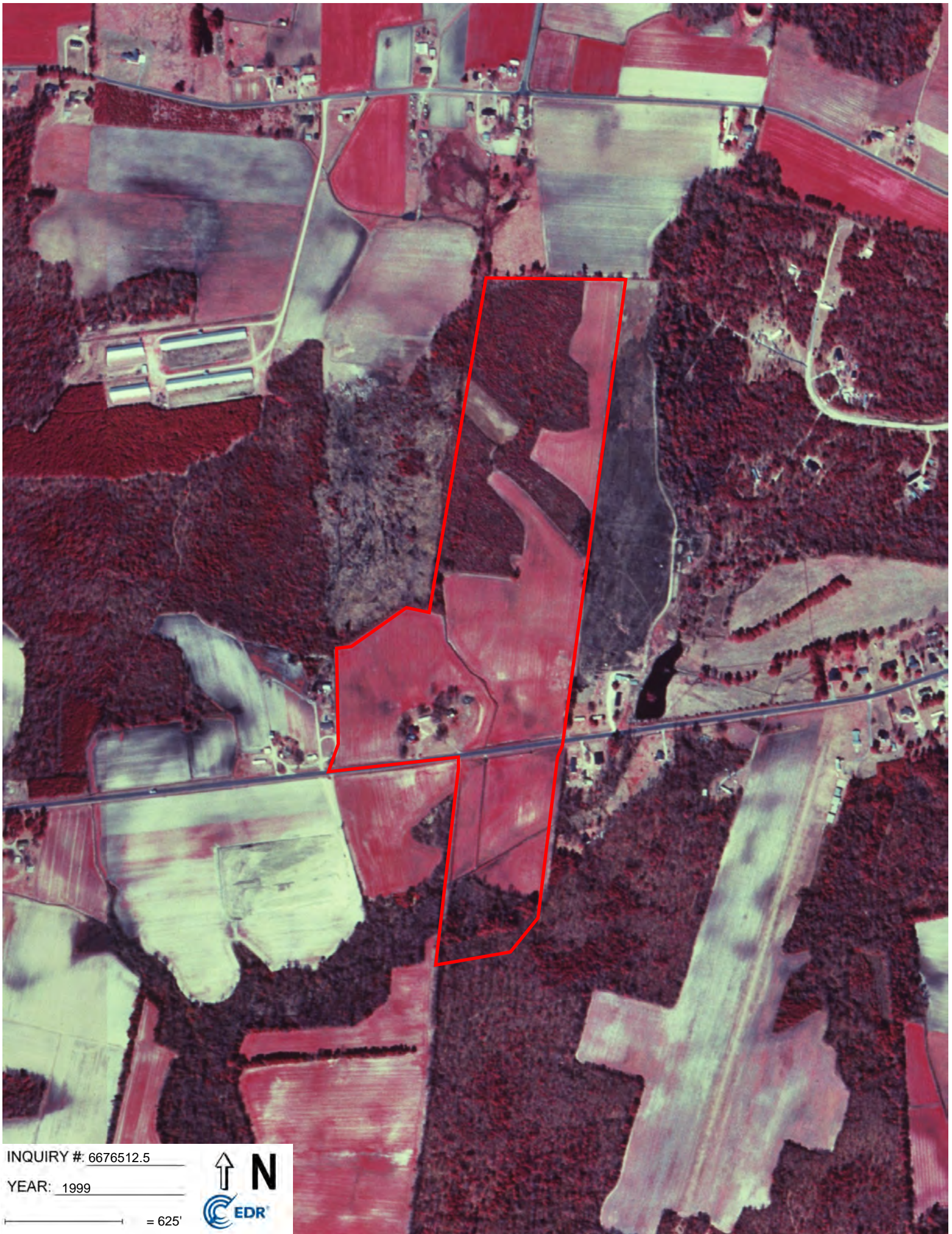
**(06/29/2023)**



**(06/29/2023)**



**Appendix B:  
Historical Aerials**



INQUIRY #: 6676512.5

YEAR: 1999

— = 625'





INQUIRY #: 6676512.5

YEAR: 1993

— = 625'







INQUIRY #: 6676512.5

YEAR: 1983

— = 625'





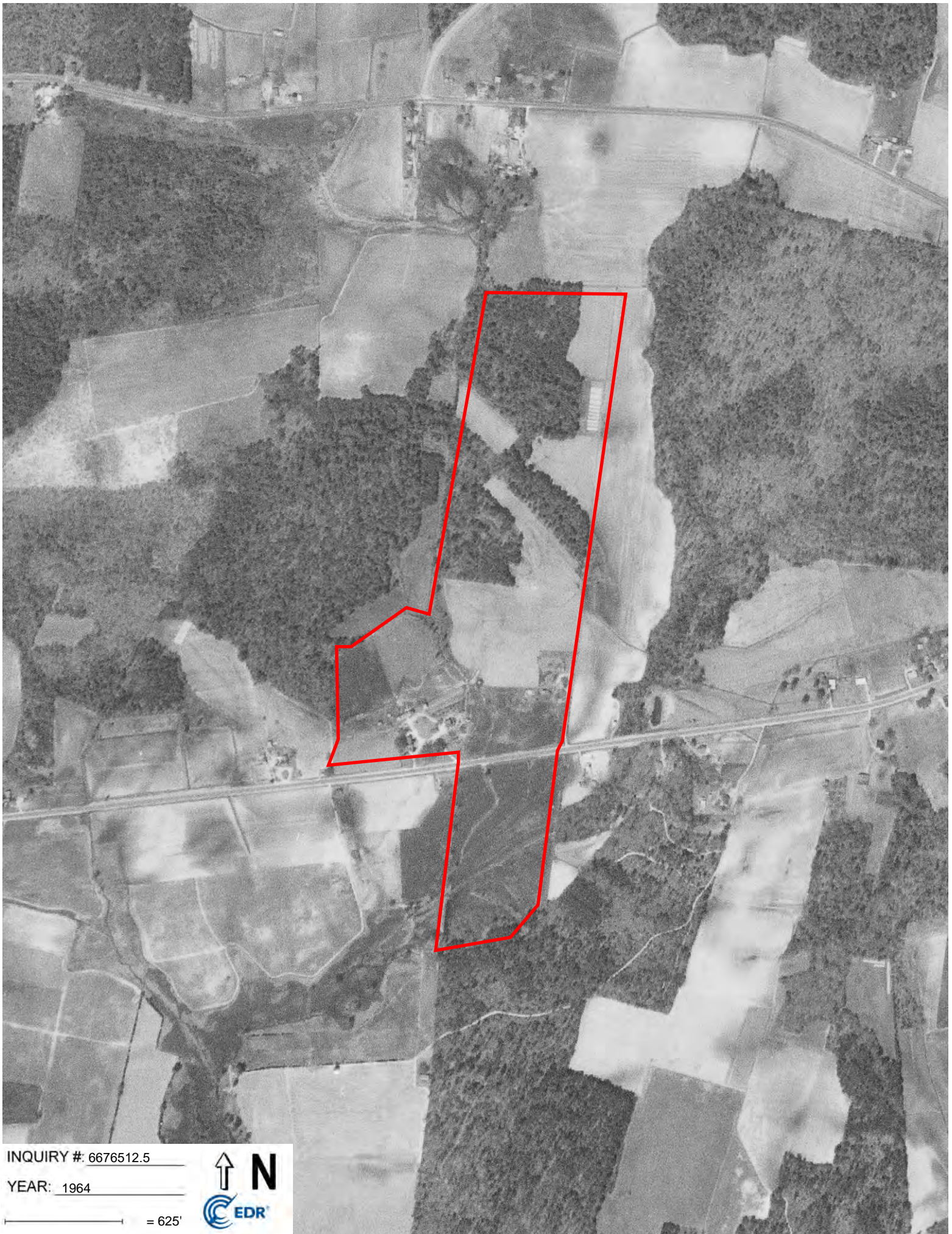
INQUIRY #: 6676512.5

YEAR: 1973

— = 625'



Subject boundary not shown because it exceeds image extent or image is not georeferenced.

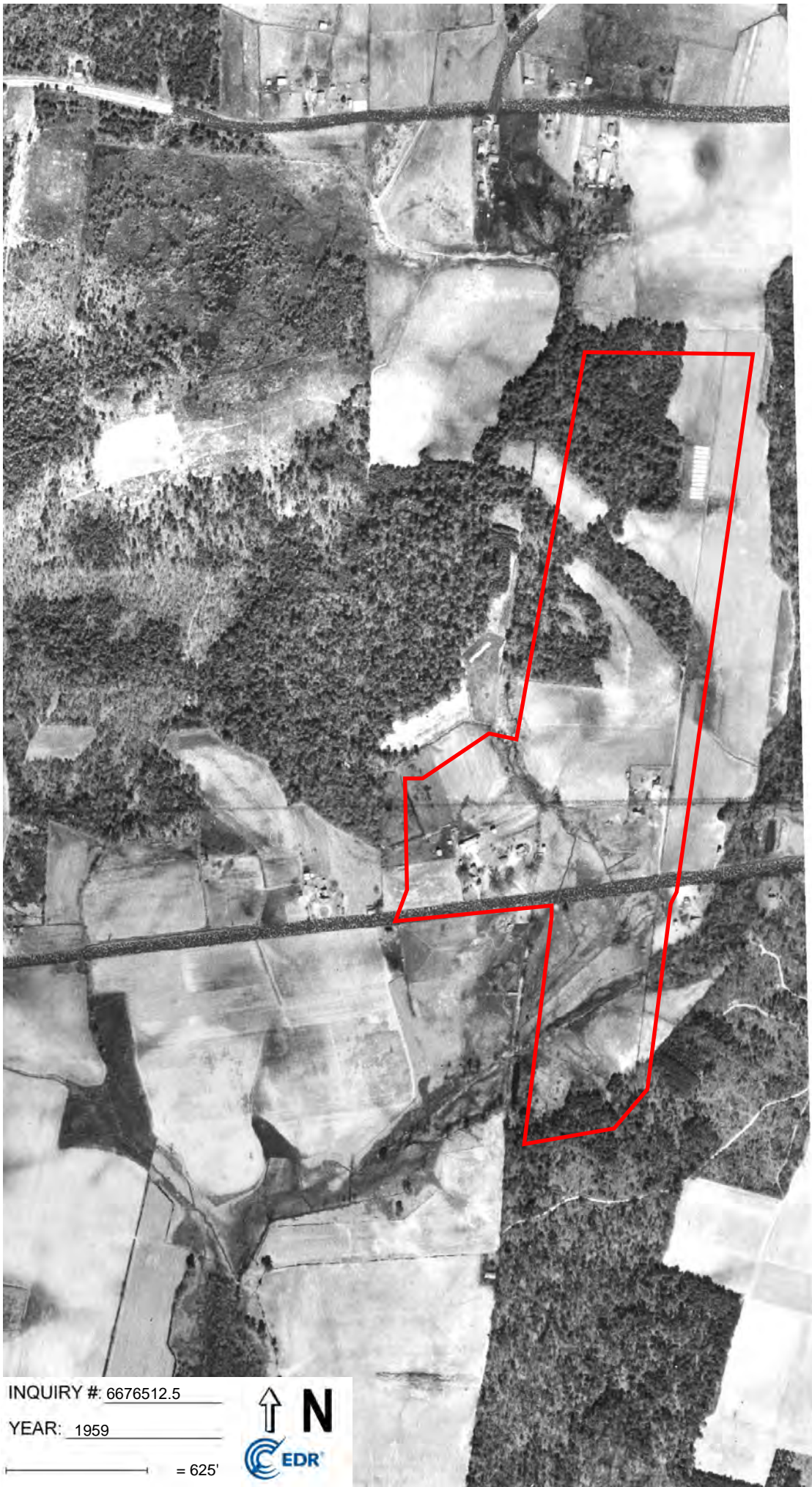


INQUIRY # 6676512.5

YEAR: 1964

— = 625'

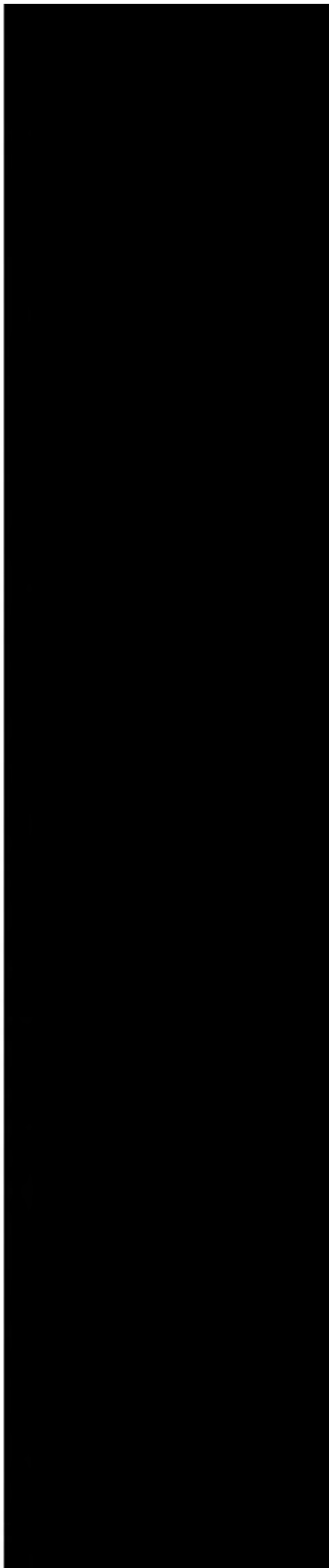




INQUIRY #: 6676512.5

YEAR: 1959

— = 625'



**Appendix C:**  
**On Site Determination of Applicability to Neuse Riparian Buffer Rules**  
**Site Viability for Buffer Mitigation and Nutrient Offset Letter**



ROY COOPER  
Governor

ELIZABETH S. BISER  
Secretary

RICHARD E. ROGERS, JR.  
Director

August 10, 2022

DWR Project #20220664  
Wayne County

Chris Roessler  
Wildlands Engineering, Inc.  
[croessler@wildlandseng.com](mailto:croessler@wildlandseng.com)

**Subject:** Determination for Applicability to the Neuse Buffer Rules 15A NCAC 02B .0714  
**Project Name:** Casey Creek Mitigation Project  
**Address:** 3890 US Hwy 13 South, Goldsboro, NC 27530  
**Location:** Lat., Long: 35.2934495, -78.1854881

Dear Mr. Roessler:

On June 2, 2022, Shelton Sullivan of the Division of Water Resources (DWR) conducted an on-site review of features located on the Casey Creek Mitigation Project site at the request of Wildlands Engineering, Inc. to determine the applicability of features on the site to the Neuse River Riparian Area Protection Rules, Title 15A North Carolina Administrative Code 02B .0714.

The enclosed map(s), provided by Wildlands Engineering, Inc., depict the feature(s) evaluated and this information is also summarized in the table below. Streams were evaluated for being ephemeral, at least intermittent, and for subjectivity to the Neuse River Riparian Area Protection Rules. Streams that are considered "Subject" have been located on the most recently published NRCS Soil Survey of Johnston County and/or the most recent copy of the USGS Topographic (at 1:24,000 scale) map(s), have been located on the ground at the site, and possess characteristics that qualify them to be at least intermittent streams. Features that are considered "Not Subject" have been determined to not be at least intermittent, not present on the property, or not depicted on the required maps.

**This determination only addresses the applicability to the buffer rules within the proposed project and property boundaries as presented by Wildlands Engineering, Inc. and does not approve any activity within buffers or within waters of the state. There may be other streams or features located on the property that appear or do not appear on the**



North Carolina Department of Environmental Quality | Division of Water Resources  
512 North Salisbury Street | 1617 Mail Service Center | Raleigh, North Carolina 27699-1617  
919.707.9000

**maps referenced above. Any of the features on the site may be considered jurisdictional according to the US Army Corps of Engineers and subject to the Clean Water Act.**

The following table addresses the features observed and rated during the DWR site visit.

Feature ID	Feature Type: stream (E, I, P, ), ditch, swale, wetland, other	Subject to Buffer Rules	Start @	Stop @	Depicted on Soil Survey	Depicted on USGS Topo
Martha Branch	Stream, at least I	No	Start Point as indicated on map	Continues downstream, along wood line and field to confluence with Casey Creek	No	No
Casey Creek	Stream, at least I	Yes	Starts at least at the northern property and easement boundary; See Map	Continues downstream, under Hwy. 13, and beyond the property and easement boundary	Yes	Yes
Afton Branch	Stream, at least I	Yes	Starts at least at the southeastern property and easement boundary; See Map	Confluence with Casey Creek	Yes	Yes

\* E: Ephemeral, I: Intermittent, P: Perennial

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

<i>If sending via U.S. Postal Service:</i>	<i>If sending via delivery service (UPS, FedEx, etc.)</i>
Paul Wojoski - DWR 401 & Buffer Permitting Branch Supervisor 1617 Mail Service Center Raleigh, NC 27699-1617	Paul Wojoski - DWR 401 & Buffer Permitting Branch Supervisor 512 N Salisbury St. Raleigh, NC 27604

This determination is final, and binding as detailed above unless an appeal is requested **within sixty (60) calendar days of the date of this letter.**

If you have any additional questions or require additional information, please contact Shelton Sullivan at [shelton.sullivan@ncdenr.gov](mailto:shelton.sullivan@ncdenr.gov) or 919-707-3636. This determination is subject to review as provided in G.S. 150B.

Sincerely,

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

Paul Wojoski, Supervisor  
401 & Buffer Permitting Branch

Attachments provided by Wildlands Engineering, Inc.: Site Map with DWR Labels, NRCS Soil Survey, USGS Topographical Map

cc: Martha Kornegay, 4200 Country Club Circle, Virginia Beach, VA 23455-4414  
Johnnie Mangrum Brock, [bedrockconst43@gmail.com](mailto:bedrockconst43@gmail.com)  
Carolyn Lanza, Wildlands Engineering, Inc., [clanza@wildlandseng.com](mailto:clanza@wildlandseng.com)  
401 & Buffer Permitting Branch Laserfiche File  
DWR Washington Regional Office

Filename: 20220664\_Casey Creek \_DWR\_StreamCalls\_8-10-22



### Casey Creek Stream Calls 6/2/22 Shelton Sullivan

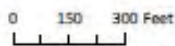
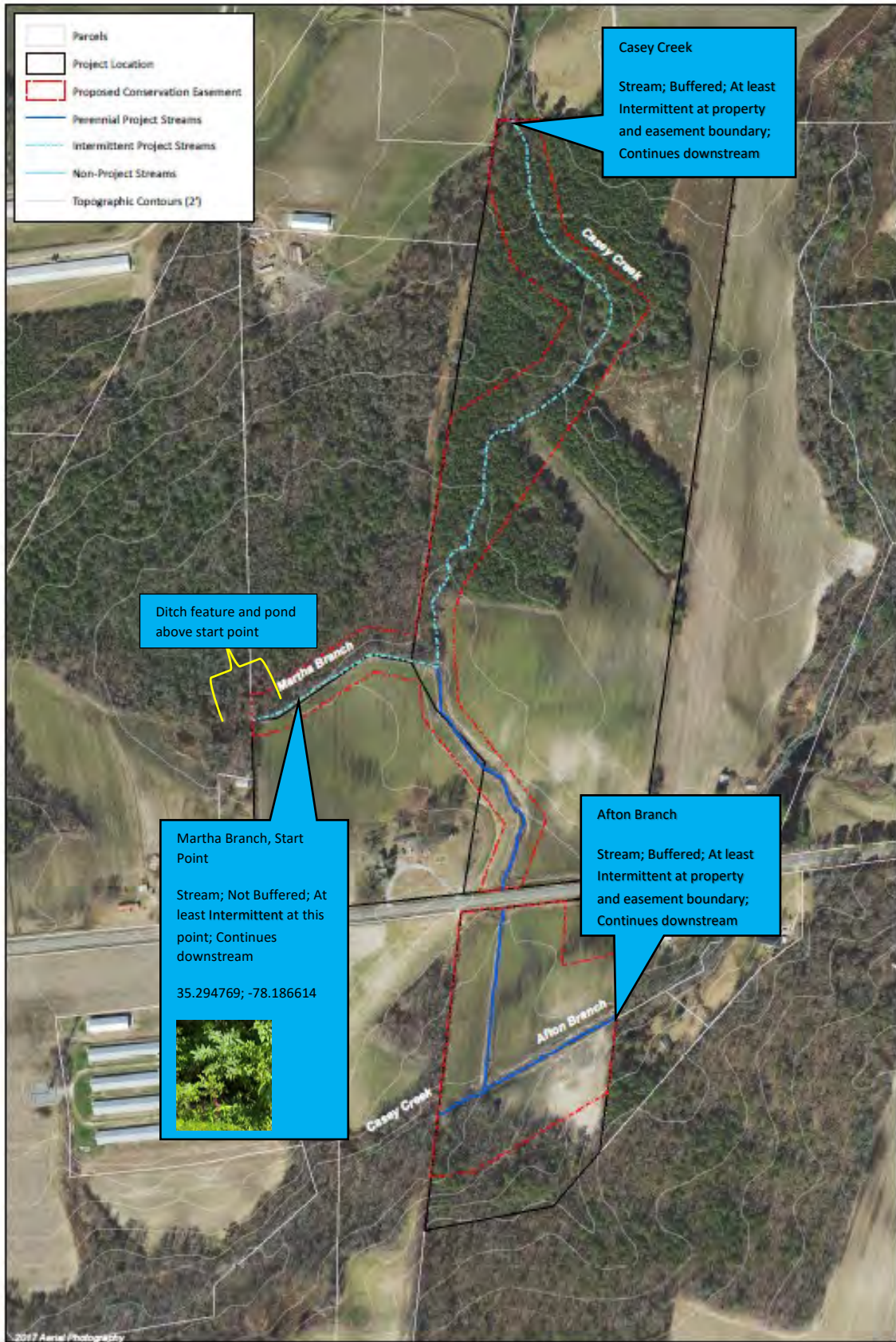
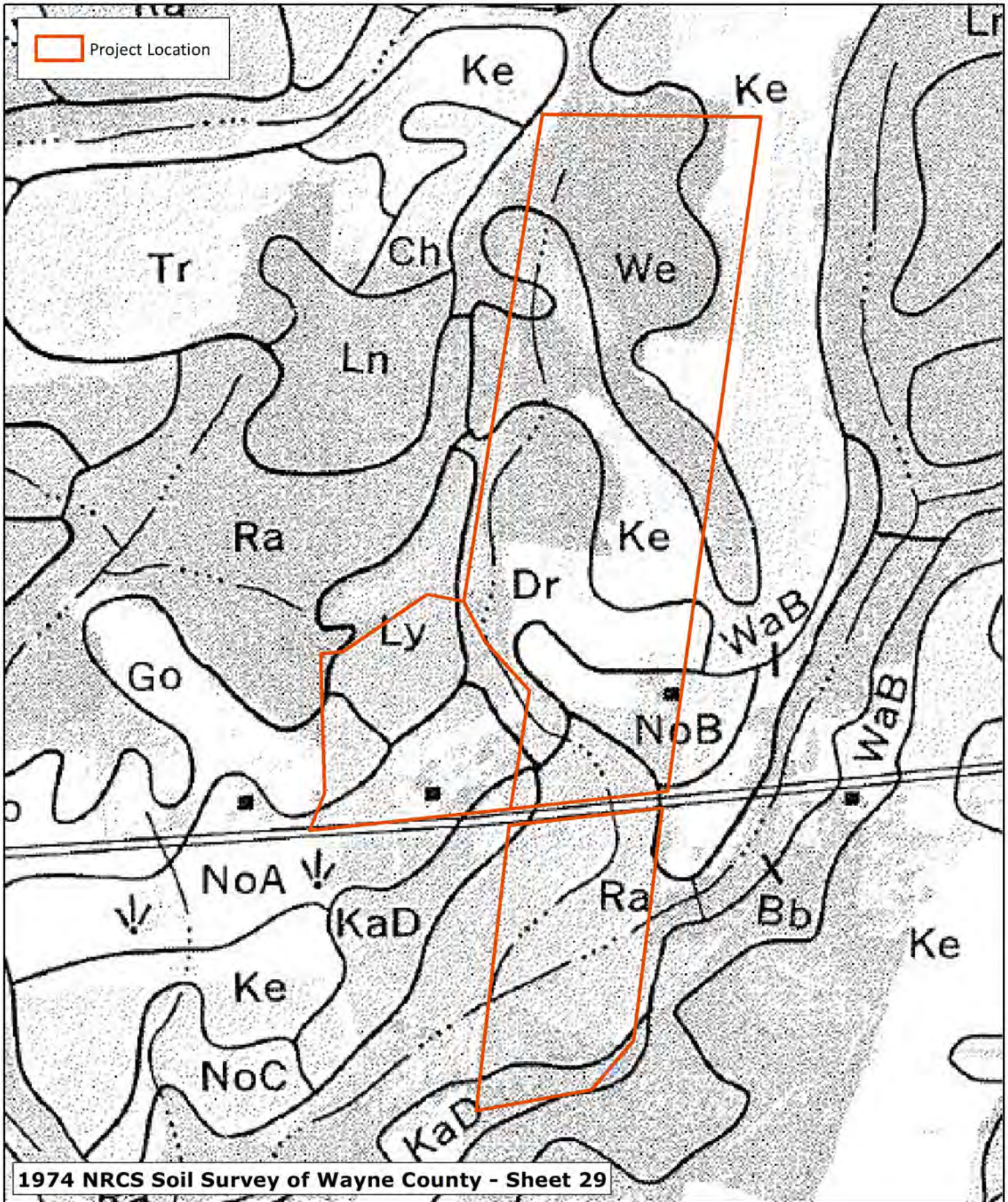


Figure 2 Site Map  
Casey Creek Mitigation Site  
Neuse River Basin (03020201)



0 250 500 Feet



Figure 6b 1974 NRCS Soil Survey Map  
Casey Creek Mitigation Site  
Neuse River Basin (03020201)

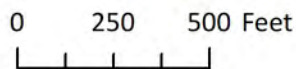
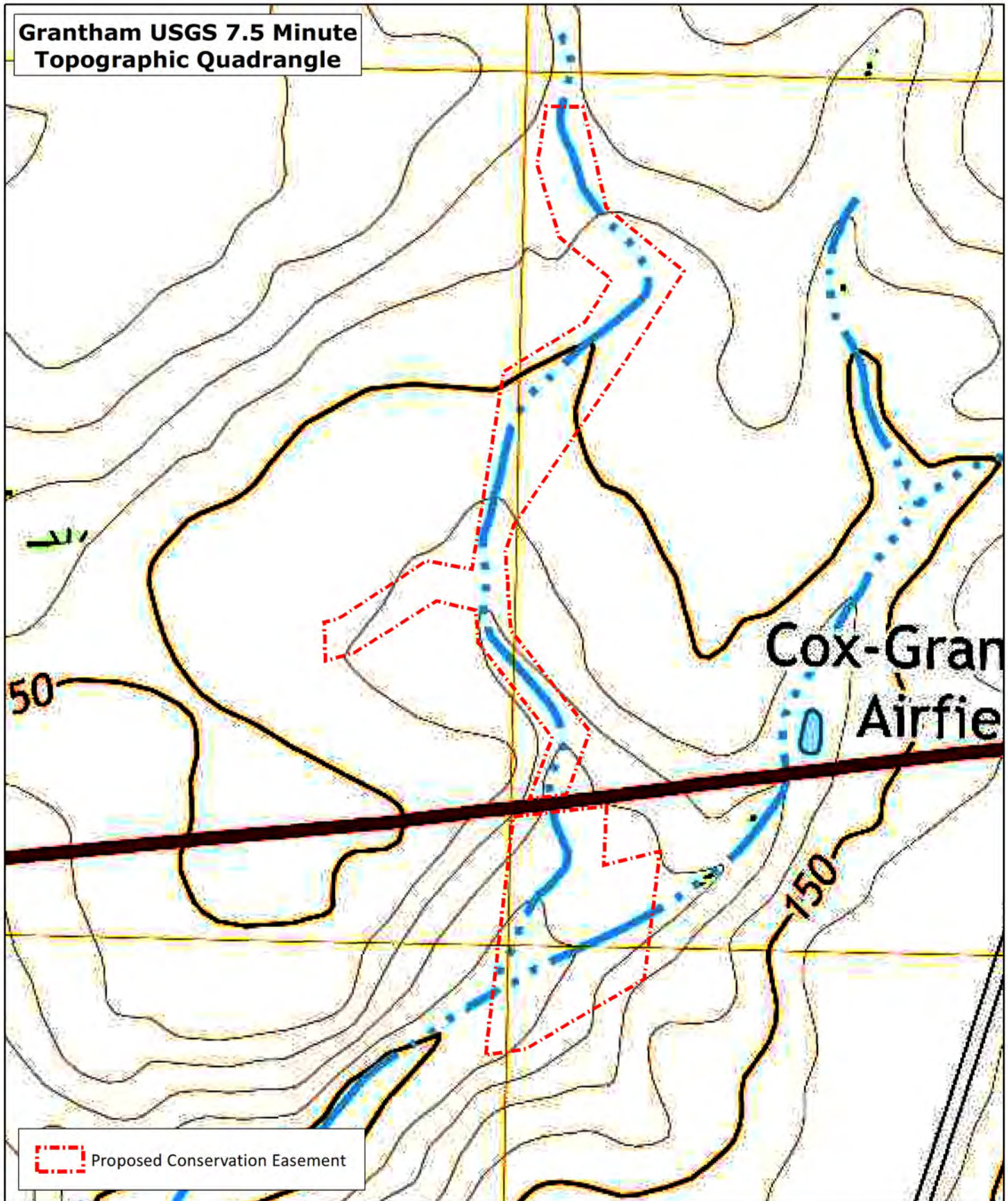


Figure 3 USGS Topographic Map  
Casey Creek Mitigation Site  
Neuse River Basin (03020201)

ROY COOPER  
Governor

ELIZABETH S. BISER  
Secretary

RICHARD E. ROGERS, JR.  
Director



NORTH CAROLINA  
Environmental Quality

February 28, 2023

Wildlands Engineering, LLC  
Attn: Chris Roessler  
(via electronic mail: [croessler@wildlandseng.com](mailto:croessler@wildlandseng.com) )

Re: Site Viability for Buffer Mitigation and Nutrient Offset – Casey Creek Site  
Near 35.293101, -78.184393 located near 3890 US Hwy 13S in Goldsboro, NC  
Neuse 03020201  
Wayne County

Dear Mr. Roessler,

On August 12, 2022, Katie Merritt, with the Division of Water Resources (DWR), received a request from you on behalf of Wildlands Engineering, LLC (Wildlands) for a site visit near the above-referenced site in the Neuse River Basin within the 8-digit Hydrologic Unit Code 03020201. The site visit was to determine the potential for nutrient offset and buffer mitigation within a proposed conservation easement boundary, which is more accurately depicted in the attached map labeled “Site Map” prepared by Wildlands. The proposed easement boundary on the Site Map, includes all riparian areas intended to be proposed as part of the mitigation site. This site is also being proposed as a stream mitigation site and therefore stream bank instability or presence of erosional rills within riparian areas were not addressed. On November 2, 2022, Ms. Merritt performed a site assessment of the subject site. Staff with Wildlands were also present.

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



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919.707.9000

<u>Feature</u>	<u>Classification onsite</u>	<u><sup>1</sup>Subject to Buffer Rule</u>	<u>Riparian Land uses adjacent to Feature (0-200')</u>	<u>Buffer Credit Viable</u>	<u><sup>3</sup>Nutrient Offset Viable At 2,273.02 lbs/acre</u>	<u><sup>4,5</sup>Mitigation Type Determination w/in riparian areas</u>
Casey Creek	Stream	Yes	Combination of non-forested agricultural fields and mature forest  3 Drain tiles are present within riparian areas	<sup>2</sup> Yes	Yes (non forested areas only)	Non-forested fields - <b>Restoration Site</b> per 15A NCAC 02B .0295 (n)  Forested areas - <b>Preservation Site</b> per 15A NCAC 02B .0295 (o)(5)  Drain tiles must be removed and/or relocated to be outside of the riparian restoration areas.  <i>No credits allowed within DOT right of way</i>
Martha Branch (see origin on map)	Stream	No	Combination of non-forested agricultural fields and mature forest	<sup>2</sup> Yes	Yes (non forested areas only)	Non-forested fields - <b>Restoration Site</b> per 15A NCAC 02B .0295 (n)  Forested areas - <b>Preservation Site</b> per 15A NCAC 02B .0295 (o)(4)
Afton Branch	Stream	Yes	Mostly non-forested agricultural fields with some mature forest below confluence w/ Casey Creek	<sup>2</sup> Yes	Yes (non forested areas only)	Non-forested fields - <b>Restoration Site</b> per 15A NCAC 02B .0295 (n)  Forested areas - <b>Preservation Site</b> per 15A NCAC 02B .0295 (o)(5)
A	Roadside ditch	No	Left side: Non-forested agriculture Right side: compacted farm road  bisects riparian restoration area along Casey Creek	No	No	N/A
B (see origin on map)	Ditch	No	Left bank: combination of maintained lawn and mature forest Right bank: Non-forested agricultural fields.	No	Yes (right bank only)	Non-forested fields - <b>Restoration Site</b> per 15A NCAC 02B .0295 (n)

<sup>1</sup>Subjectivity calls for the features were determined by DWR in correspondences dated August 10, 2022 (DWR# 2022-0664) using the 1:24,000 scale quadrangle topographic map prepared by USGS and the most recent printed version of the soil survey map prepared by the NRCS .

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

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

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

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

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

<sup>7</sup>The area described as an Enhancement Site was assessed and determined to comply with all of 15A NCAC 02B .0295(o)(6). Cattle exclusion fencing is required to be installed around the mitigation area to get buffer credit under this part of the rule.

Determinations provided in the table above were made using a proposed easement boundary showing proposed mitigation areas and features shown on the Site Map. The map representing the proposal for the site is attached to this letter and initialed by Ms. Merritt on February 28, 2023.

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

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

**This viability assessment will expire on February 28, 2025 or upon approval of a mitigation plan by the DWR, whichever comes first. This letter should be provided in any nutrient offset, buffer, stream or wetland mitigation plan for this Site.**

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

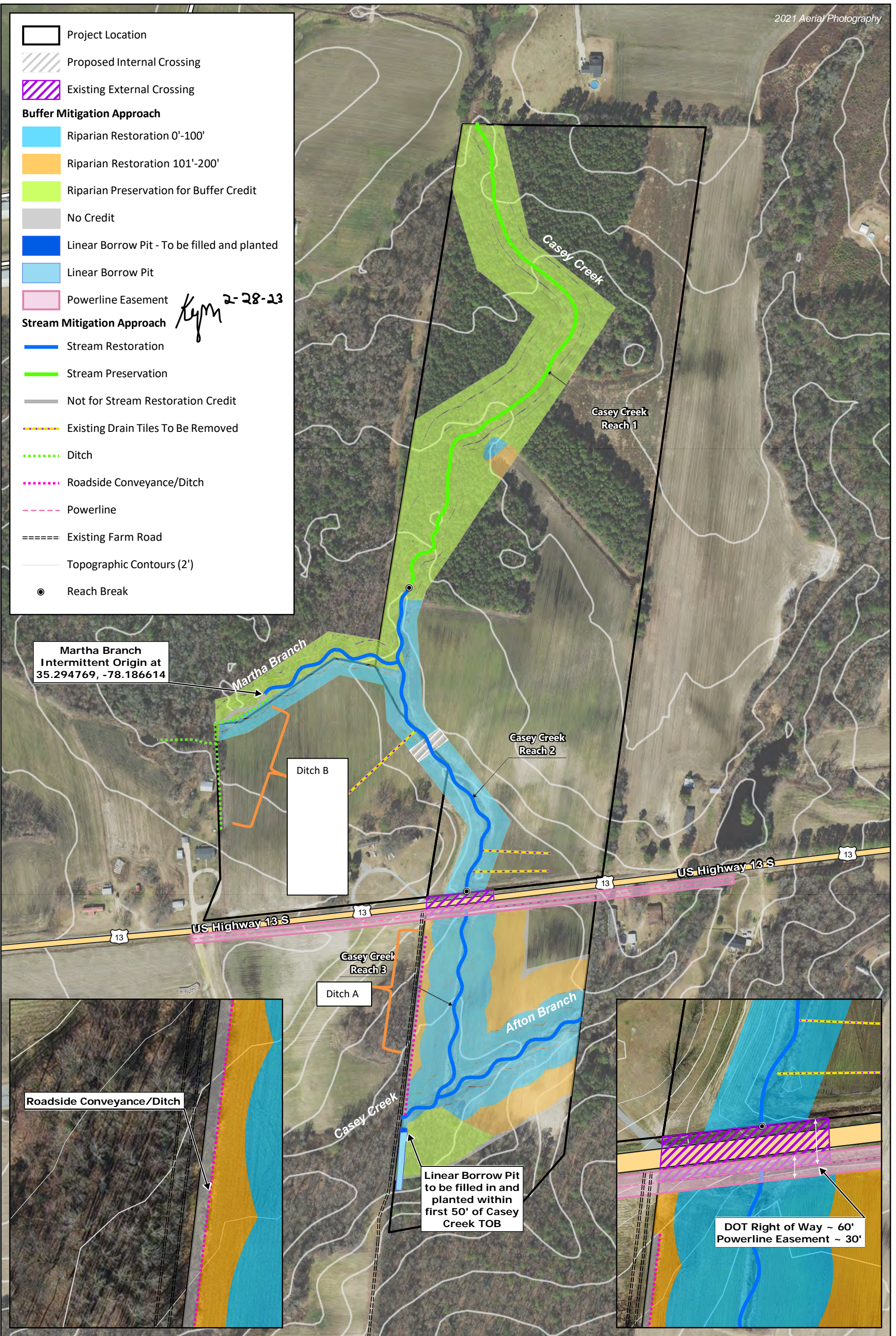
Sincerely,

DocuSigned by:  
  
A43C72700BD543E...

Katie Merritt, Acting Supervisor  
401 and Buffer Permitting Branch

Attachments: Site map

cc: File Copy (Katie Merritt)



**Appendix D:  
Categorical Exclusion  
(See Stream  
Mitigation Plan  
Appendix 6)**



**Appendix E:**  
**Buffer Interpretation/Clarification Memo #2008-019**



August 19, 2008  
Buffer Interpretation/Clarification #2008-019

## MEMORANDUM

**RE:** The Division of Water Quality's (DWQ's) stance on whether diffuse flow of stormwater through the newly restored buffers on mitigation sites should be a requirement. Diffuse flow is a requirement for buffer restoration or enhancement in the Neuse River Basin Buffer Rule 15A NCAC 02B.0242(9)(d)(iii), the Tar-Pamlico River Basin Buffer Rule 15A NCAC 02B.0260(9)(d)(iii), and the Catawba River Basin Buffer Rule 15A NCAC 02B.0244 (9)(d)(iii).

Diffuse flow is a requirement for all sites in a buffered basin for buffer mitigation and for sites providing nutrient offset credit as well.

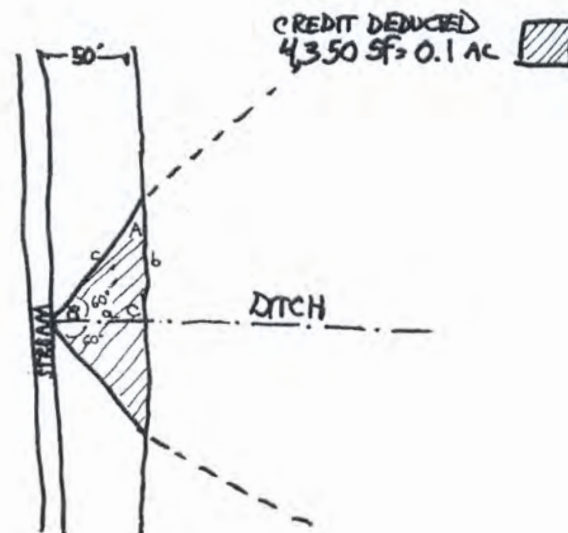
**Current Policy:** According to the Mitigation rules in the Neuse, Tar-Pamlico and Catawba buffer rules, a grading plan must be provided for buffer mitigation sites. In addition, those rules state that "The site shall be graded in a manner to ensure diffuse flow through the riparian buffer".

**Problem:** The question has been raised as to whether stormwater carried by lateral ditches that enter buffered streams should provide diffuse flow prior to that stormwater entering the restored buffers.

**Solution:** The Neuse, Tar-Pamlico and Catawba buffer rules with respect to buffer mitigation sites contain a very clear requirement that states that diffuse flow of stormwater must be maintained through the buffer. Unless otherwise approved by DWQ, all buffer mitigation sites must provide diffuse flow of stormwater from ditches and similar conveyances through the restored buffer.

Where such diffuse flow cannot be attained and where DWQ agrees that such treatment is not possible, deduction of buffer credit will be calculated as follows:

### SCENARIO 1



A, B and C are angles. a, b, and c are distances (lengths)

DWQ believes that using an immediate drainage area extending at a 60-degree angle from the point of discharge to the stream is a reasonable approach to the issue of determining the area which is not draining through the restored buffer. To calculate the area of buffer being "short-circuited" by the ditch, the area of the right triangles shown in the figure above must be determined.

$$a = 50'$$

$$A = 30^\circ$$

$$B = 60^\circ$$

$$b = a \cot A$$

$$b = 50 (1.732)$$

$$b = 86.6' (87')$$

The area to be excluded from credit would be the area of the two right triangles:

$$\text{Area} = (a \times b)/2$$

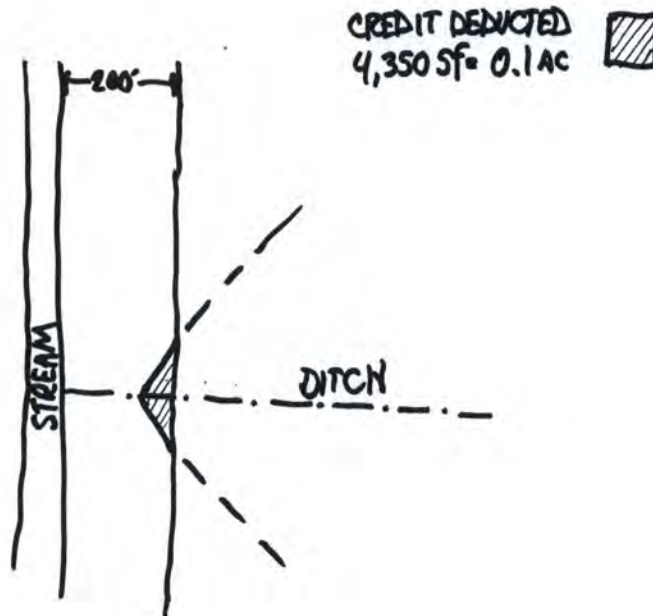
$$\text{Area} = (50 \text{ feet} \times 87 \text{ feet})/2$$

$$\text{Area} = 2,175 \text{ SF}$$

Total deducted area =  $2,175 \times 2 = 4,350 \text{ SF}$  or 0.1 acres.

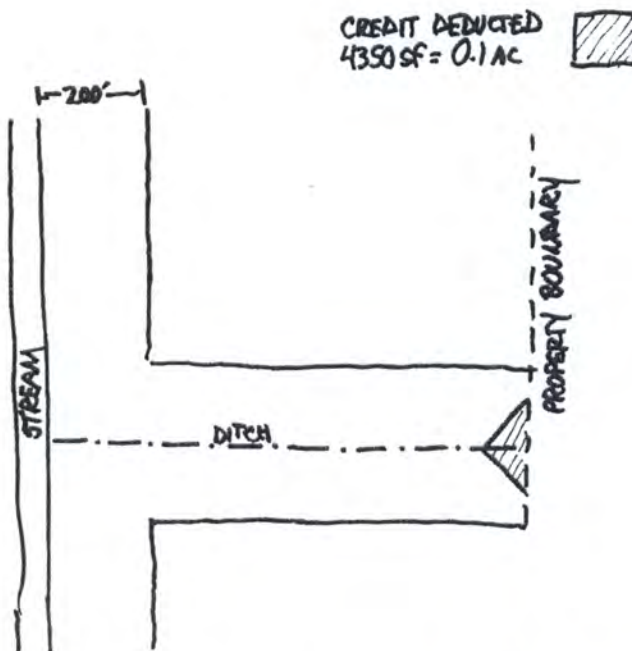
The example shown above assumes a buffer width of 50 feet from the top of bank (riparian buffer mitigation site). For nutrient offset sites, credit can be generated out to 200 feet from the top of bank. The policy applies to sites with larger buffers as follows:

## SCENARIO 2



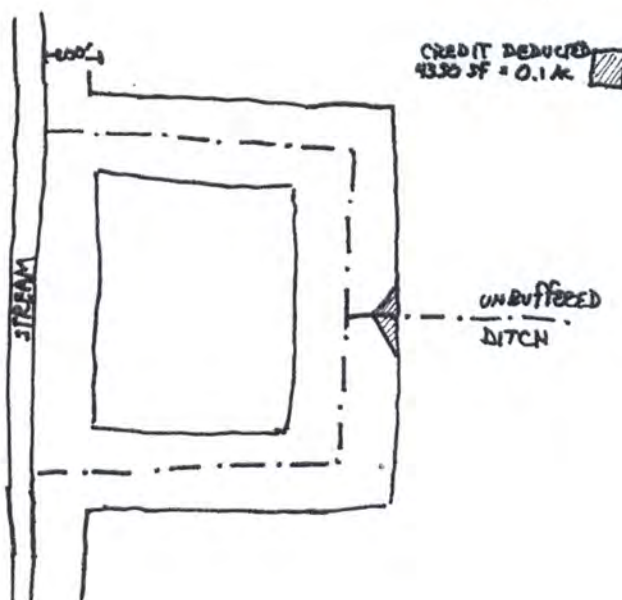
If a ditch leading to a buffered stream is buffered, then no credit is deducted from the stream buffer. If the upstream origin of the ditch is within the buffer, no credit is deducted. If the upstream origin of the ditch is not buffered (e.g. if the ditch begins upstream offsite), the credit deduction is applied to the most upstream portion of the ditch on the property.

**SCENARIO 3**



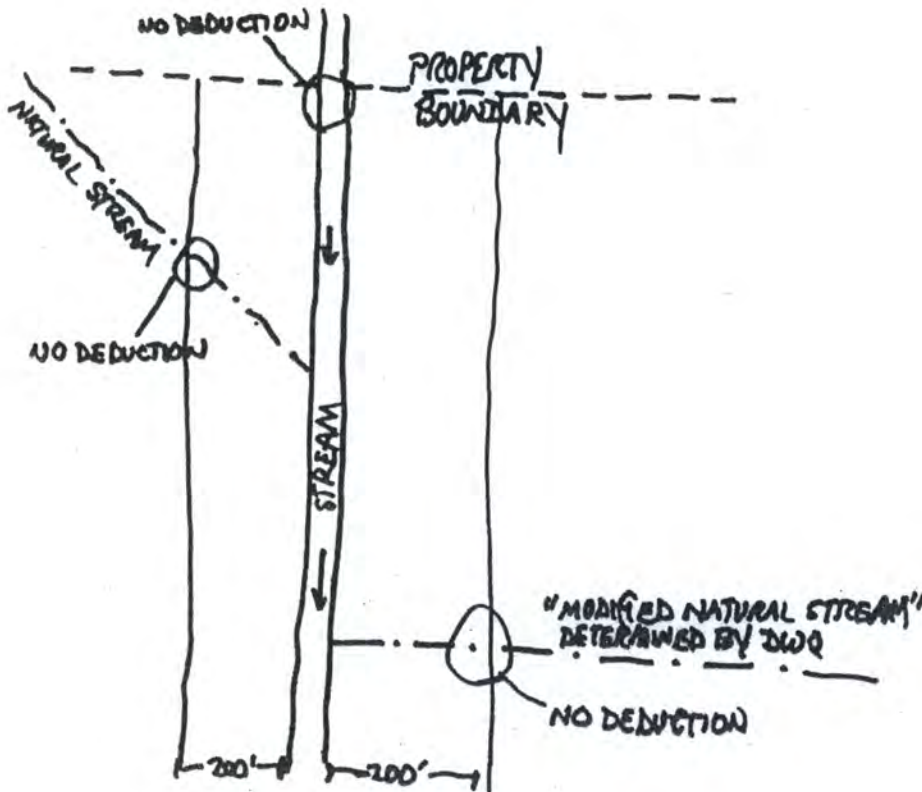
Where a network of interconnecting ditches occurs on a site, and all of the ditches are buffered, the only credit deduction would be at the point where an unbuffered ditch enters the project:

**SCENARIO 4**



Where a natural stream enters the project site, no deduction of credit will occur. Also, when a natural stream or a modified natural stream flow into a buffered stream, no deduction of credit will occur. The modified natural stream must be subject to the buffer rules, and must be verified to be a modified natural stream (as opposed to a ditch) through an on-site determination by DWQ personnel.

SCENARIO 5




For any additional questions or clarifications on this issue, please contact Eric Kulz or Amy Chapman at (919) 733-1786.

Signature: Matt Matthews Date: 8/19/2008


Signature: Pat Ross Date: 8/19/2008

**Appendix F:  
Casey Creek Mitigation Site Excerpted Plan  
Sheets**

Streambank Planting Zone 1						
Live Stakes						
Species	Common Name	Indiv. Spacing	Size	Stratum	Wetland Indicator Status	% of Stems
<i>Salix nigra</i>	Black Willow	3-6 ft.	0.5"-1.5" cal.	Canopy	OBL	40%
<i>Salix sericea</i>	Silky Willow	3-6 ft.	0.5"-1.5" cal.	Subcanopy	OBL	30%
<i>Cornus amomum</i>	Silky Dogwood	3-6 ft.	0.5"-1.5" cal.	Subcanopy	FACW	10%
<i>Cephalanthus occidentalis</i>	Buttonbush	3-6 ft.	0.5"-1.5" cal.	Shrub	OBL	10%
<i>Sambucus canadensis</i>	Elderberry	3-6 ft.	0.5"-1.5" cal.	Shrub	FACW	10%
Total						100%
Herbaceous Plugs						
Species	Common Name	Indiv. Spacing	Size	Stratum	Wetland Indicator Status	% of Plugs
<i>Juncus effusus</i>	Soft Rush	4 ft.	1.0"-2.0" plug	Herb	OBL	40%
<i>Carex lurida</i>	Lurid Sedge	4 ft.	1.0"-2.0" plug	Herb	OBL	20%
<i>Carex crinita</i>	Fringed Sedge	4 ft.	1.0"-2.0" plug	Herb	FACW	20%
<i>Scirpus cyperinus</i>	Woolgrass	4 ft.	1.0"-2.0" plug	Herb	OBL	15%
<i>Hibiscus moscheutos</i>	Crimson-Eyed Rosemallow	4 ft.	1.0"-2.0" plug	Herb	OBL	5%
Total						100%

 Casey Creek R3, Casey Creek R4, Afton Branch

Streambank Planting Zone 2						
Live Stakes						
Species	Common Name	Indiv. Spacing	Size	Stratum	Wetland Indicator Status	% of Stems
<i>Salix sericea</i>	Silky Willow	3-6 ft.	0.5"-1.5" cal.	Subcanopy	OBL	50%
<i>Cornus amomum</i>	Silky Dogwood	3-6 ft.	0.5"-1.5" cal.	Subcanopy	FACW	20%
<i>Cephalanthus occidentalis</i>	Buttonbush	3-6 ft.	0.5"-1.5" cal.	Shrub	OBL	15%
<i>Sambucus canadensis</i>	Elderberry	3-6 ft.	0.5"-1.5" cal.	Shrub	FACW	15%
Total						100%
Herbaceous Plugs						
Species	Common Name	Indiv. Spacing	Size	Stratum	Wetland Indicator Status	% of Plugs
<i>Juncus effusus</i>	Soft Rush	4 ft.	1.0"-2.0" plug	Herb	OBL	40%
<i>Carex lurida</i>	Lurid Sedge	4 ft.	1.0"-2.0" plug	Herb	OBL	20%
<i>Carex crinita</i>	Fringed Sedge	4 ft.	1.0"-2.0" plug	Herb	FACW	20%
<i>Carex lupulina</i>	Shallow Sedge	4 ft.	1.0"-2.0" plug	Herb	OBL	15%
<i>Hibiscus moscheutos</i>	Crimson-Eyed Rosemallow	4 ft.	1.0"-2.0" plug	Herb	OBL	5%
Total						100%

 Casey Creek R2, Martha Branch

Buffer Planting Zone						
Bare Root						
Species	Common Name	Indiv. Spacing	Caliper Size	Stratum	Wetland Indicator Status	% of Stems
<i>Quercus alba</i>	White Oak	7-12 ft.	0.25"-1.0"	Canopy	FACU	5%
<i>Quercus michauxii</i>	Swamp Chestnut Oak	7-12 ft.	0.25"-1.0"	Canopy	FACW	8%
<i>Platanus occidentalis</i>	Sycamore	7-12 ft.	0.25"-1.0"	Canopy	FACW	10%
<i>Ulmus americana</i>	American Elm	7-12 ft.	0.25"-1.0"	Canopy	FAC	6%
<i>Magnolia virginiana</i>	Sweetbay Magnolia	7-12 ft.	0.25"-1.0"	Subcanopy	FACW	10%
<i>Populus deltoides</i>	Eastern Cottonwood	7-12 ft.	0.25"-1.0"	Canopy	FAC	8%
<i>Quercus nigra</i>	Water Oak	7-12 ft.	0.25"-1.0"	Canopy	FAC	9%
<i>Quercus phellos</i>	Willow Oak	7-12 ft.	0.25"-1.0"	Canopy	FACW	9%
<i>Taxodium distichum</i>	Bald Cypress	7-12 ft.	0.25"-1.0"	Canopy	OBL	3%
<i>Nyssa biflora</i>	Swamp Tupelo	7-12 ft.	0.25"-1.0"	Canopy	OBL	5%
<i>Acer negundo</i>	Boxelder	7-12 ft.	0.25"-1.0"	Subcanopy	FAC	6%
<i>Betula nigra</i>	River Birch	7-12 ft.	0.25"-1.0"	Canopy	FACW	10%
<i>Ulmus alata</i>	Winged Elm	7-12 ft.	0.25"-1.0"	Canopy	FACU	5%
<i>Morella cerifera</i>	Common Waxmyrtle	7-12 ft.	0.25"-1.0"	Shrub	FAC	3%
<i>Hamamelis virginiana</i>	American Witch-hazel	7-12 ft.	0.25"-1.0"	Shrub	FACU	3%
Total						100%

\*Only canopy species will be included in the average height calculation  
 Preferred alternate species: Persimmon (*Diospyros virginiana*), Cherrypark oak (*Quercus pagoda*), Red mulberry (*Morus rubra*)



Temporary Seeding				
Pure Live Seed				
Approved Dates	Species Name	Common Name	Stratum	Density (lbs/acre)
August 15 - April 15	<i>Secale cereale</i>	Rye Grain	Herb	90
August 15 - April 15	<i>Avena sativa</i>	Winter Oats	Herb	30
April 15 - August 15	<i>Setaria italica</i>	German Millet	Herb	90
April 15 - August 15	<i>Fagopyrum esculentum</i>	Buckwheat	Herb	30
All Year	<i>Trifolium incarnatum</i>	Crimson Clover	Herb	5
All Year	<i>Trifolium repens</i>	Ladino Clover	Herb	5

Permanent Riparian Seeding					
Pure Live Seed (20 lbs/acre)					
Approved Dates	Species Name	Common Name	Stratum	Wetland Indicator Status	lbs/acre
All Year	<i>Elymus virginicus</i>	Virginia Wildrye	Herb	FAC	3.5
All Year	<i>Panicum virgatum</i>	Switchgrass	Herb	FAC	2.5
All Year	<i>Schizachyrium scoparium</i>	Little Bluestem	Herb	FACU	2.0
All Year	<i>Tripsacum dactyloides</i>	Eastern Gamagrass	Herb	FAC	0.5
All Year	<i>Dichanthelium clandestinum</i>	Deertongue	Herb	FACW	3.0
All Year	<i>Coleataenia anceps</i>	Beaked Panicgrass	Herb	FAC	0.25
All Year	<i>Sorghastrum nutans</i>	Indiangrass	Herb	FACU	1.5
All Year	<i>Juncus tenuis</i>	Path Rush	Herb	FAC	0.5
All Year	<i>Rudbeckia hirta</i>	Blackeyed Susan	Herb	FACU	1.25
All Year	<i>Bidens aristosa</i>	Bur Marigold	Herb	FACW	1.375
All Year	<i>Helianthus angustifolius</i>	Swamp Sunflower	Herb	FACW	0.5
All Year	<i>Coreopsis lanceolata</i>	Lanceleaf Coreopsis	Herb	UPL	1.375
All Year	<i>Chamaecrista fasciculata var. fasciculata</i>	Partridge Pea	Herb	FACU	1.50
All Year	<i>Chasmanthium laxum</i>	Slender Woodoats	Herb	FACW	0.250
Total					20.0

Permanent Seeding Outside Easement					
Approved Dates	Species Name	Common Name	Stratum	Density (lbs/acre)	Percentage
All Year	<i>Lolium arundinaceum</i>	Tall Fescue	Herb	10	100%
Total					100%



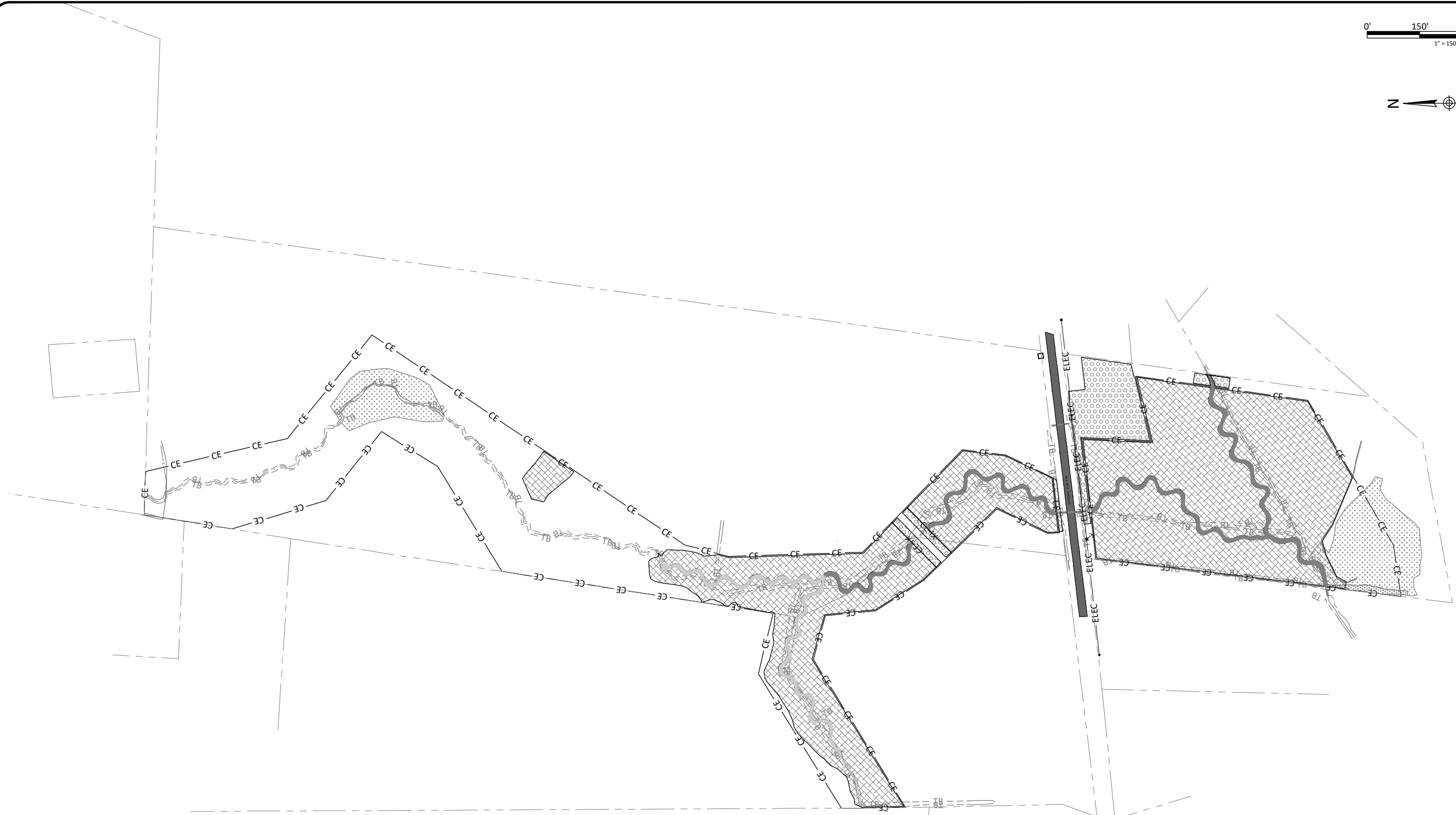
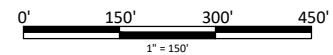
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Casey Creek Mitigation Site  
Wayne County, North Carolina

Planting Tables

Revisions:  
 Date: 05/28/2024  
 Job Number: 02196  
 Project Engineer: AA  
 Drawn By: MK  
 Checked By: CS

3.1



-  Streambank Planting Zone 1  
Casey Creek R3, Casey Creek R4, Afton Branch
-  Streambank Planting Zone 2  
Casey Creek R2, Martha Branch
-  Buffer Planting Zone
-  Permanent Seeding Outside Easement

Note: Non-hatched areas within easement are currently vegetated and will be planted as needed to achieve target density. Buffer planting will occur within the Limits of Disturbance.

### Casey Creek Mitigation Site Wayne County, North Carolina

#### Planting Plan Overview

Revisions:

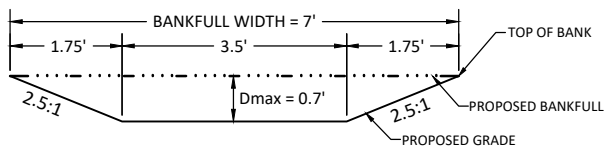
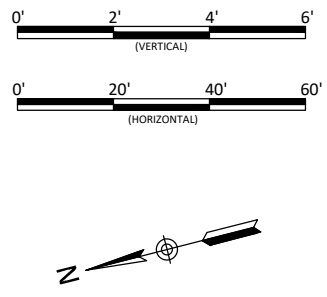
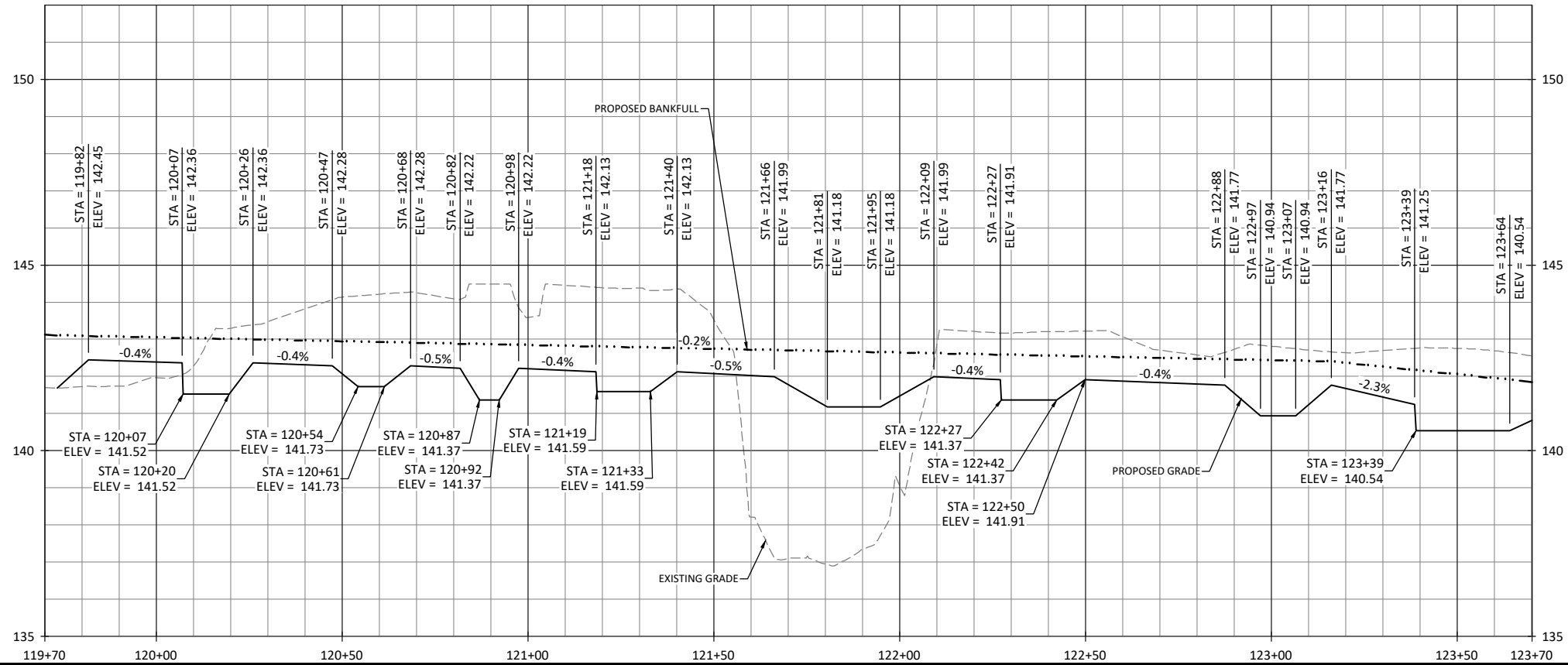

Date:	05.28.2024
Job Number:	02196
Project Engineer:	AA
Drawn By:	MK
Checked By:	CS

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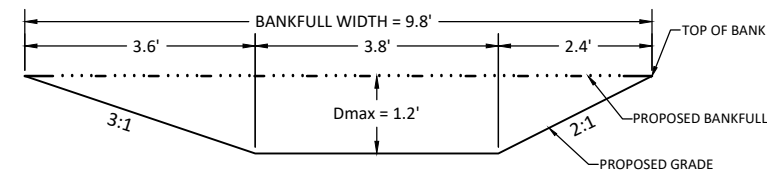
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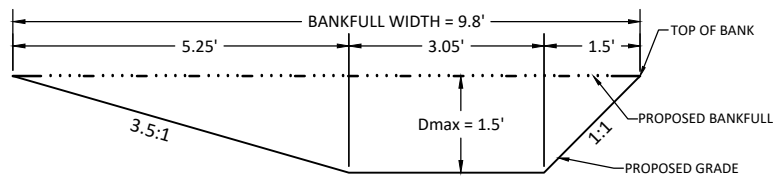




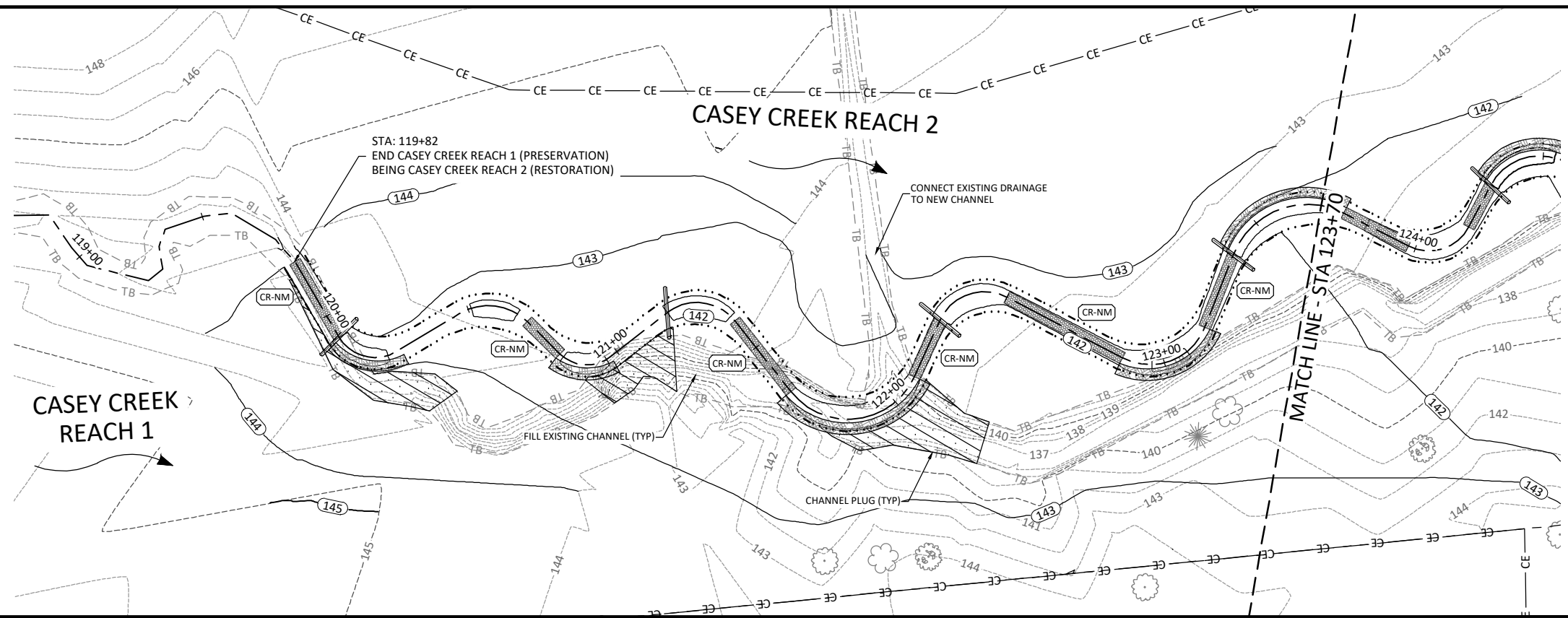
CASEY CREEK REACH 2  
TYPICAL SECTION: RIFFLE  
STA: 119+82 TO 125+92



CASEY CREEK REACH 2  
TYPICAL SECTION: STANDARD POOL  
STA: 119+82 TO 125+92



CASEY CREEK REACH 2  
TYPICAL SECTION: DEEP POOL WITH STRUCTURE  
STA: 119+82 TO 125+92

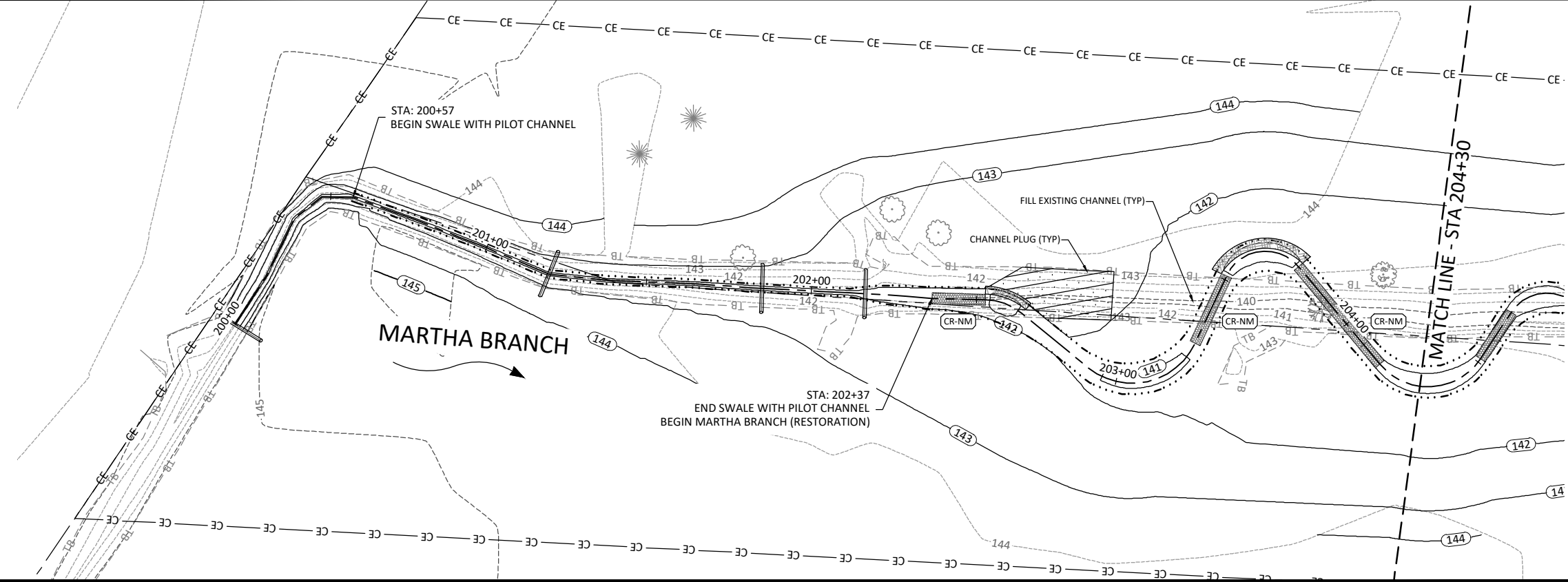
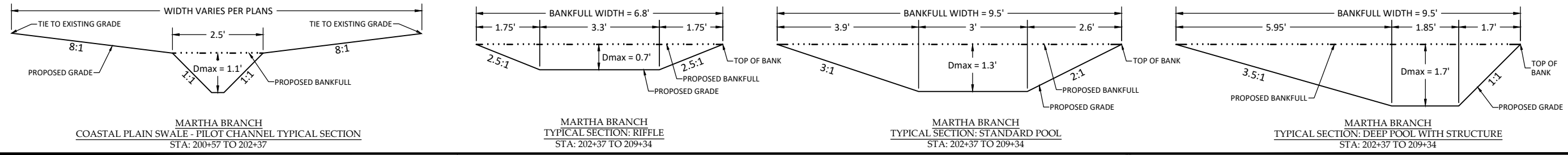
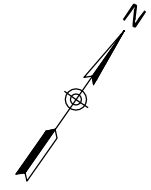
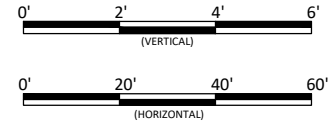
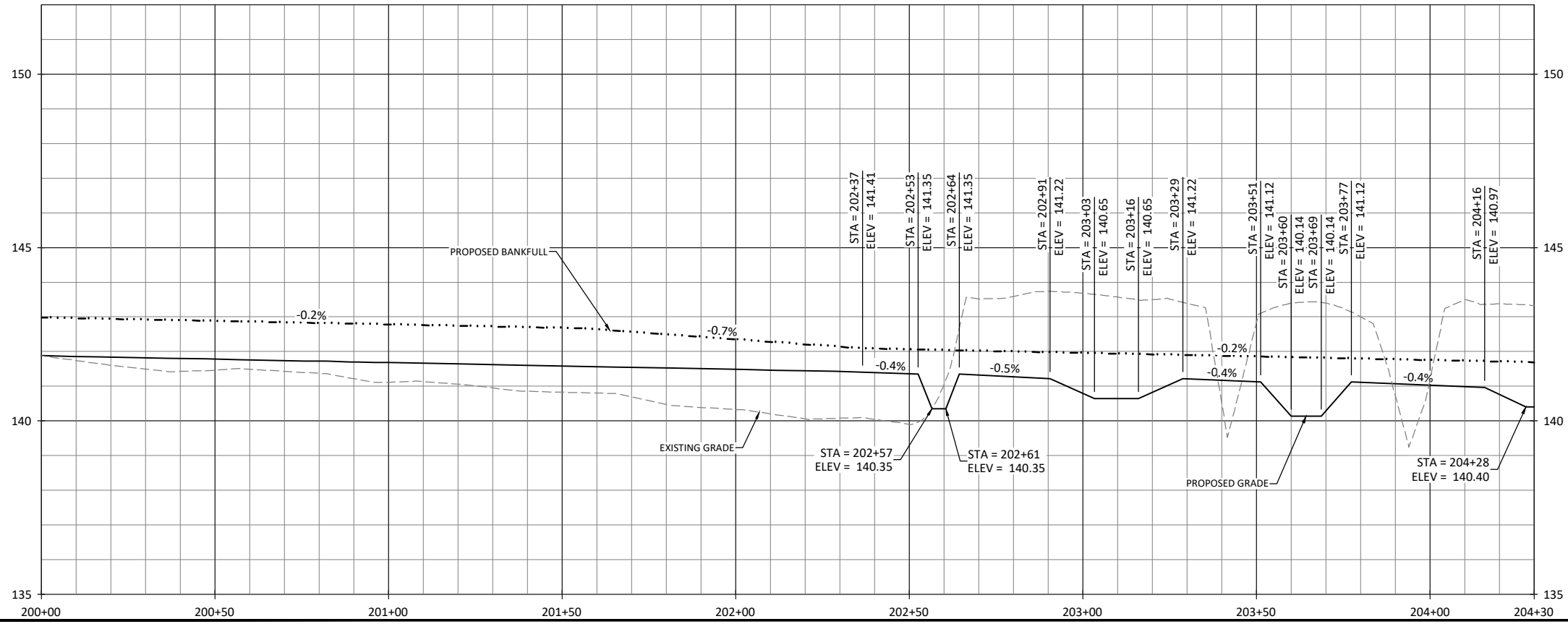


Casey Creek Mitigation Site  
Wayne County, North Carolina  
Casey Creek Reach 1 & 2  
Stream Plan & Profile

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Revisions	

Date:	05.28.2024
Job Number:	02196
Project Engineer:	AA
Drawn By:	MK
Checked By:	CS



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Casey Creek Mitigation Site  
Wayne County, North Carolina  
Martha Branch  
Stream Plan & Profile

Revisions

Date: 05.28.2024  
Job Number: 02196  
Project Engineer: AA  
Drawn By: MK  
Checked By: CS

## **Appendix 12: Design Plans**

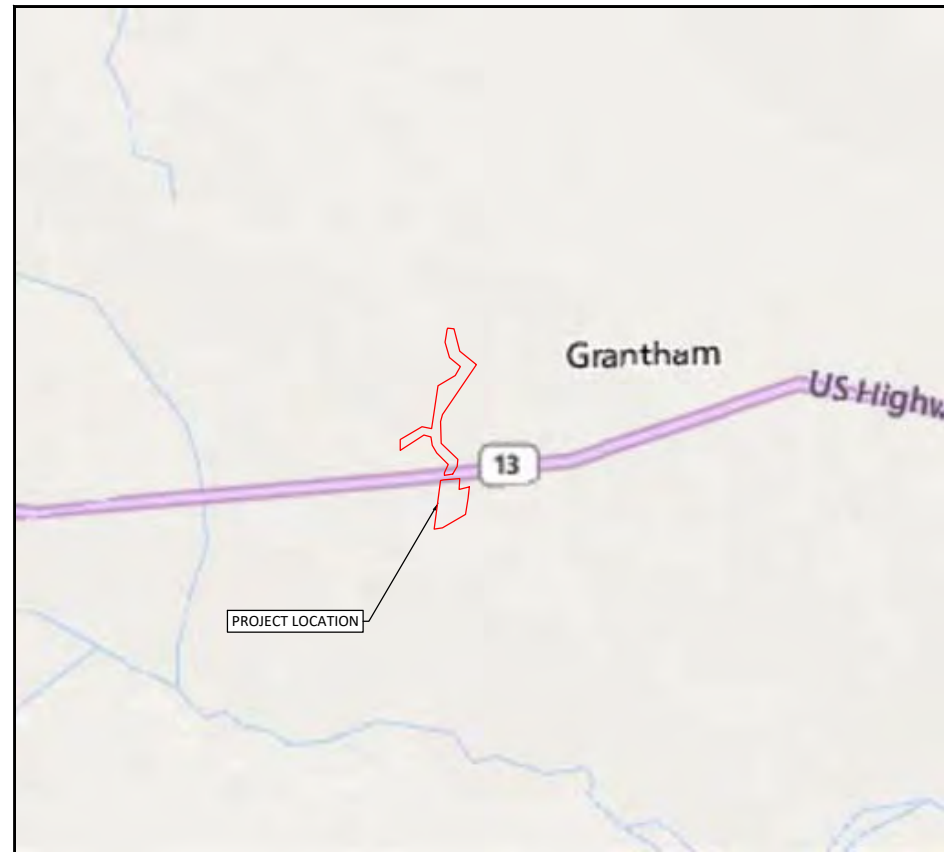
# Casey Creek Mitigation Site

for NCDEQ Division of Mitigation Services

Neuse River Basin 03020201

Wayne County, North Carolina

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Vicinity Map  
Not to Scale



**BEFORE YOU DIG!  
CALL 1-800-632-4949  
N.C. ONE-CALL CENTER  
IT'S THE LAW!**

**Final Plan Submittal  
May 28, 2024**

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### Project Directory

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 Angela Allen, PE, Project Engineer  
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USACE Action ID No: SAW-2022-01239  
NCDWR ID No: 202202664 v2

NCDEQ Contract No. 210201-01  
RFP#: 16-20210201 (Issued 7/7/2021)  
NCDMS ID No. 100597

Casey Creek Mitigation Site  
Wayne County, North Carolina

Title Sheet

Revisions


Date: 05.28.2024  
 Job Number: 02196  
 Project Engineer: AA  
 Drawn By: MK  
 Checked By: GS

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Sheet

# General Notes

- ALL EROSION AND SEDIMENT CONTROL PRACTICES SHALL COMPLY WITH THE NORTH CAROLINA EROSION AND SEDIMENT CONTROL PLANNING AND DESIGN MANUAL.
- CONTRACTOR WILL INSTALL PUMP-AROUND SYSTEMS TO DIVERT FLOW WHILE WORKING IN LIVE, FLOWING CHANNELS. THE CONTRACTOR SHALL OPERATE AND MAINTAIN THE PUMP-AROUND SYSTEM 24 HOURS A DAY UNTIL ALL DISTURBED AREAS ARE STABILIZED. THE DISTURBED AREA WITHIN THE PUMP AROUND MUST BE STABILIZED WITH TEMPORARY SEEDING, MULCH, AND EROSION CONTROL MATTING BY THE END OF EACH WORKDAY. CONTRACTOR SHALL NOT REMOVE PUMP-AROUND SYSTEMS AND ADVANCE TO THE NEXT WORK AREA UNTIL THE CURRENT WORK AREA IS COMPLETED AND STABILIZED.
- NO MATERIAL FROM THE OFF-LINE PROPOSED STREAM CHANNEL EXCAVATION MAY BE BACKFILLED INTO THE ADJACENT EXISTING STREAM CHANNEL UNTIL THE NEWLY CONSTRUCTED PROPOSED STREAM SECTION IS COMPLETED, STABILIZED, AND THE STREAM FLOW HAS BEEN DIVERTED INTO IT, NOT EVEN IF THAT SECTION OF OLD/ EXISTING STREAM IS BEING PUMPED.
- IN AREAS WITHOUT A PUMP-AROUND SYSTEM, CONTRACTOR SHALL DISTURB ONLY AS MUCH CHANNEL BANK AS CAN BE STABILIZED WITH TEMPORARY SEEDING, MULCH, AND A SOD MAT OR EROSION CONTROL MATTING BY THE END OF EACH WORKDAY.
- CLEARING AND GRUBBING ACTIVITIES SHALL NOT EXTEND MORE THAN 150 LINEAR FEET AHEAD OF IN-STREAM WORK.
- WHEN CROSSING AN ACTIVE SECTION OF NEW OR OLD STREAM CHANNEL, A TIMBER MAT SHALL BE INSTALLED ACCORDING TO THE DETAILS AND SPECIFICATIONS.
- ALL GRADED AREAS WITH SLOPES STEEPER THAN 3:1 WILL BE STABILIZED WITHIN SEVEN (7) WORKING DAYS. ALL OTHER AREAS WILL BE STABILIZED WITHIN FOURTEEN (14) WORKING DAYS.
- LOCATIONS FOR STAGING AND STOCKPILE AREAS AND TEMPORARY STREAM CROSSINGS HAVE BEEN PROVIDED ON THE PLANS. ADDITIONAL OR ALTERNATIVE STAGING AND/OR STOCKPILE AREAS AND STREAM CROSSINGS MAY BE USED BY THE CONTRACTOR PROVIDED THAT ALL PRACTICES COMPLY WITH THE NORTH CAROLINA EROSION AND SEDIMENT CONTROL PLANNING AND DESIGN MANUAL AND THAT THE AREAS ARE APPROVED BY THE ENGINEER PRIOR TO IMPLEMENTATION. SHORT-TERM STOCKPILE AREAS ARE THOSE THAT WILL REMAIN IN PLACE FOR A SHORT PERIOD OF TIME SO THAT THE DISTURBED AREA CAN BE STABILIZED WITHIN THE TIMEFRAMES IN ITEM #7 OF THE GENERAL NOTES. ADDITIONAL STOCKPILE AREAS AND OTHER SHORT-TERM STOCKPILES, STAGING AREAS, AND STREAM CROSSINGS NOT SHOWN ON THE PLANS WILL REQUIRE APPROVAL OF THE DIVISION OF ENERGY, MINERAL, AND LAND RESOURCES.
- VEGETATION ON-SITE TO BE USED AS TRANSPLANT MATERIAL (JUNCUS, SMALL TREES, AND SOD MATS) SHALL NOT BE DISTURBED UNTIL CONTRACTOR IS PREPARED TO INSTALL TRANSPLANTS.
- VARIOUS TYPES OF CONSTRUCTED RIFFLES ARE SPECIFIED ON THE PLANS. CONTRACTOR SHALL BUILD THE SPECIFIC TYPES OF CONSTRUCTED RIFFLES AT LOCATIONS SHOWN ON THE PLANS. CHANGES IN CONSTRUCTED RIFFLE TYPE MUST BE APPROVED BY THE ENGINEER.
- FERTILIZER AND SOIL AMENDMENTS ARE DISCUSSED IN THE PLANTING SPECIFICATIONS. LIME AND FERTILIZER MAY BE APPLIED TO ASSIST WITH GRASS ESTABLISHMENT IN SOME DISTURBED AREAS. THE LIMITS OF APPLICATION WILL BE DETERMINED BY THE ENGINEER IN THE FIELD.
- EXISTING FENCE LOCATED INSIDE THE CONSERVATION EASEMENT SHALL BE REMOVED DURING CONSTRUCTION.
- CONTRACTOR IS TO MAKE EVERY EFFORT TO AVOID DAMAGING OR REMOVING EXISTING TREES.
- UNDER NO CIRCUMSTANCES WILL THE CONTRACTOR EXCEED THE LIMITS OF DISTURBANCE AND/OR GO OUTSIDE OF TEMPORARY CONSTRUCTION ACCESS AREAS SHOWN ON THE PLANS.
- THE CONSTRUCTION SITE WILL BE ACCESSED FROM THE CONSTRUCTION ENTRANCES LOCATED OFF US HIGHWAY 13 AS SHOWN ON THE PLANS.

# Initial Site Preparation

- THE CONTRACTOR SHALL COORDINATE WITH THE ENGINEER TO SETUP A MEETING WITH NCDDEQ DIVISION OF ENERGY, MINERAL AND LAND RESOURCES REGIONAL OFFICE TO NOTIFY THEM OF THE START DATE AND SCHEDULE A PRE-CONSTRUCTION MEETING AT LEAST 48 HOURS PRIOR TO PROJECT ACTIVATION.
- CONTACT THE NORTH CAROLINA "ONE CALL" CENTER (1.800.632.4949) BEFORE ANY EXCAVATION.
- MOBILIZE EQUIPMENT AND MATERIALS TO THE SITE.
- IDENTIFY AND ESTABLISH CONSTRUCTION ENTRANCE, STAGING AND STOCKPILE AREAS, HAUL ROADS, SILT FENCE, TREE PROTECTION FENCING, SAFETY FENCING, ROCK SEDIMENT DAMS, AND TEMPORARY STREAM CROSSINGS AS INDICATED ON THE PLANS FOR WORK AREAS.
- ALL HAUL ROADS SHALL BE MONITORED FOR SEDIMENT LOSS DAILY. IN THE EVENT OF SEDIMENT LOSS, SILT FENCE OR OTHER ACCEPTABLE SEDIMENT AND EROSION CONTROL PRACTICES SHALL BE INSTALLED. SILT FENCE OUTLETS SHALL BE LOCATED AT POINTS OF LOW ELEVATION OR A MINIMUM SPACING OF 150 FT.
- SET UP TEMPORARY FACILITIES, LOCATE EQUIPMENT WITHIN THE STAGING AREA, AND STOCKPILE MATERIALS NEEDED FOR THE INITIAL STAGES OF CONSTRUCTION WITHIN THE STOCKPILE AREAS. INSTALL AND MAINTAIN AN ON-SITE RAIN GAUGE AND LOG BOOK TO RECORD RAINFALL AMOUNTS AND DATES. MAINTAIN AN APPROVED COPY OF THE ESC PLAN WITH PLACARD AND APPROVAL LETTER AND A COPY OF THE NPDES PERMIT WITH A MINIMUM OF 30 DAYS OF SELF-INSPECTION REPORTS ON SITE UNTIL PROJECT CLOSURE BY NCDDEQ.
- THE CONTRACTOR SHALL CONDUCT SELF-INSPECTIONS OF THE EROSION AND SEDIMENTATION CONTROL MEASURES AND COMPLETE THE COMBINED SELF-INSPECTION FORM FOUND ON THE DEMLR WEBSITE (DEMLR-CSW-MONITORING-FORM-REV-APRIL-1-2019.PDF) AS REQUIRED BY NCDDEQ PERMIT. RAINFALL RECORDS, COMPLETED SELF-INSPECTION FORMS, AND PERMITS SHOULD BE MAINTAINED ON SITE.
- MONITOR SITE FOR SEDIMENT LOSS AND INSPECT ALL EROSION CONTROL FEATURES AFTER EACH RAIN EVENT. MAINTAIN EROSION CONTROL FEATURES ACCORDING TO THE NORTH CAROLINA EROSION AND SEDIMENT CONTROL MANUAL.

# Construction Sequence

- EROSION AND SEDIMENT CONTROL (E&SC) PERMIT AND A CERTIFICATE OF COVERAGE (COC) MUST BE OBTAINED BEFORE LAND DISTURBING ACTIVITIES OCCUR. THE COC CAN BE OBTAINED BY FILLING OUT THE ELECTRONIC NOTICE OF INTENT (E-NOI) FORM AT DEQ.NC.GOV/NCG01. PLEASE NOTE, THE E-NOI FORM MAY ONLY BE FILLED OUT ONCE THE PLANS HAVE BEEN APPROVED. A COPY OF THE E&SC PERMIT, THE COC AND A HARD COPY OF THE PLANS MUST BE KEPT ON SITE, PREFERABLY IN A PERMIT BOX, AND ACCESSIBLE DURING INSPECTION. THE ENGINEER WILL PROVIDE THE CONTRACTOR WITH THE E&SC PERMIT AND COC PRIOR TO CONSTRUCTION.
- THIS PROJECT MAY BE CONSTRUCTED IN PHASES ACCORDING TO CONSTRUCTION ENTRANCES AND REGIONS OF THE SITE. CONTRACTOR SHALL NOT START CONSTRUCTION ON ONE PHASE AND MOVE TO ANOTHER PHASE BEFORE STABILIZING THE FIRST UNLESS A CREW IS CONTINUING TO WORK ON THE INITIAL PHASE.
- CONSTRUCTION SEQUENCING SHALL BE DETERMINED BY THE CONTRACTOR AND THE CONTRACTOR SHALL PROVIDE A SCHEDULE TO THE ENGINEER PRIOR TO COMMENCEMENT.
- PERFORM ANY NECESSARY CLEARING AND GRUBBING IN PHASES AS WORK PROGRESSES. STREAM BANK VEGETATION AND FLOODPLAIN VEGETATION IMMEDIATELY ADJACENT TO LIVE CHANNELS SHALL BE LEFT UNDISTURBED AS LONG AS POSSIBLE. REMOVE ALL NON-NATIVE AND INVASIVE VEGETATION PRIOR TO BEGINNING CHANNEL CONSTRUCTION.

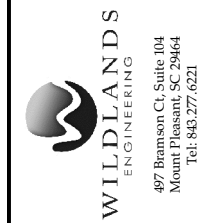
# Construction Demobilization

- REMOVE TEMPORARY STREAM CROSSINGS, STOCKPILE AREAS, AND EROSION AND SEDIMENT CONTROL DEVICES. NOTE: SITE STABILIZATION AND VEGETATION SHALL MEET THE REQUIREMENTS OF THE NORTH CAROLINA EROSION AND SEDIMENT CONTROL PLANNING AND DESIGN MANUAL PRIOR TO EROSION AND SEDIMENT CONTROL MEASURE REMOVAL.
- THE CONTRACTOR SHALL ENSURE THAT THE SITE IS FREE OF TRASH AND LEFTOVER MATERIALS PRIOR TO DEMOBILIZATION OF EQUIPMENT FROM THE SITE.
- COMPLETE THE REMOVAL OF ANY ADDITIONAL STOCKPILED MATERIAL FROM THE SITE.
- DEMOBILIZE GRADING EQUIPMENT FROM THE SITE.
- ALL ROCK AND OTHER STOCKPILED MATERIALS MUST BE REMOVED FROM THE LIMITS OF DISTURBANCE AND CONSERVATION EASEMENT UNLESS OTHERWISE DIRECTED BY THE ENGINEER.
- ALL AREAS OUTSIDE THE CONSERVATION EASEMENT SHALL BE RETURNED TO PRE-PROJECT CONDITION, EXCEPT FOR THE TWO CONSTRUCTION ENTRANCES LOCATED OFF US HIGHWAY 13. THESE SHALL REMAIN AS ACCESS POINTS AFTER CONSTRUCTION IS COMPLETE.
- SEED, MULCH, AND STABILIZE STAGING AREAS, STOCKPILE AREAS, HAUL ROADS, AND CONSTRUCTION ENTRANCES. PERMANENT SEEDING OUTSIDE EASEMENT SEED MIX IS TO BE APPLIED TO AREAS OF DISTURBANCE OUTSIDE OF THE CONSERVATION EASEMENT AND WHERE SHOWN ON THE PLANTING PLAN.
- NOTIFY DEMLR WHEN ALL CONSTRUCTION AND DEMOBILIZATION ACTIVITIES ARE COMPLETE.

# Soil Preparation

- RIPPING:
- HAUL ROADS, STAGING AREAS, AND ALL OTHER HARD PACKED GROUND OUTSIDE THE EASEMENT MUST BE RIPPED TO A DEPTH OF 15-IN WITH CHANNELS NO MORE THAN 3-FT APART.
  - BUFFER PLANTING ZONES MUST BE RIPPED TO AT LEAST A DEPTH OF 15-IN WITH CHANNELS 6-FT APART AND PARALLEL TO THE VALLEY.
- SOIL AMENDMENTS
- SOIL AMENDMENT MUST BE SPREAD ON ALL DISTURBED AREAS WITHIN THE EASEMENT PER THE RATES BELOW.
- ENTIRE PLANTED AREA ( PER ACRE)
- LIME - 2 TONS
- GREATER THAN 2-Ft CUT (PER ACRE)
- AZOMITE (GRANULAR) - 200 LBS  
CARBON PRO G - 400 LBS  
ORGANIC GRANULATED 2-4-3 FERTILIZER (HOLGANIX OR SIMILAR) - 100 LBS
- LESS THAN 2-Ft CUT AND FILL (PER ACRE)
- AZOMITE (GRANULAR) - 100 LBS  
CARBON PRO G - 200 LBS

HARVEST AND STOCKPILE TOPSOIL TO SPREAD ON GRADED AREAS WITHIN THE EASEMENT. TOPSOIL SHOULD BE SPREAD TO A DEPTH OF 4-IN AND 8-IN.



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Casey Creek Mitigation Site  
Wayne County, North Carolina

General Notes and Symbols

Date:	05-28-2024
Job Number:	02196
Project Engineer:	AA
Drawn By:	MK
Checked By:	CS

0.2

## Existing Features

- Existing Thalweg
- Existing Top of Bank
- Existing Property Line
- Existing Major Contour
- Existing Minor Contour
- Existing Overhead Electric
- Existing Fence
- Existing Culvert
- Existing Treeline
- Existing Road
- Existing Tree
- Existing Telephone Box
- Existing Wetland
- Existing Open Water Feature

## Proposed Features

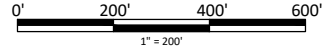
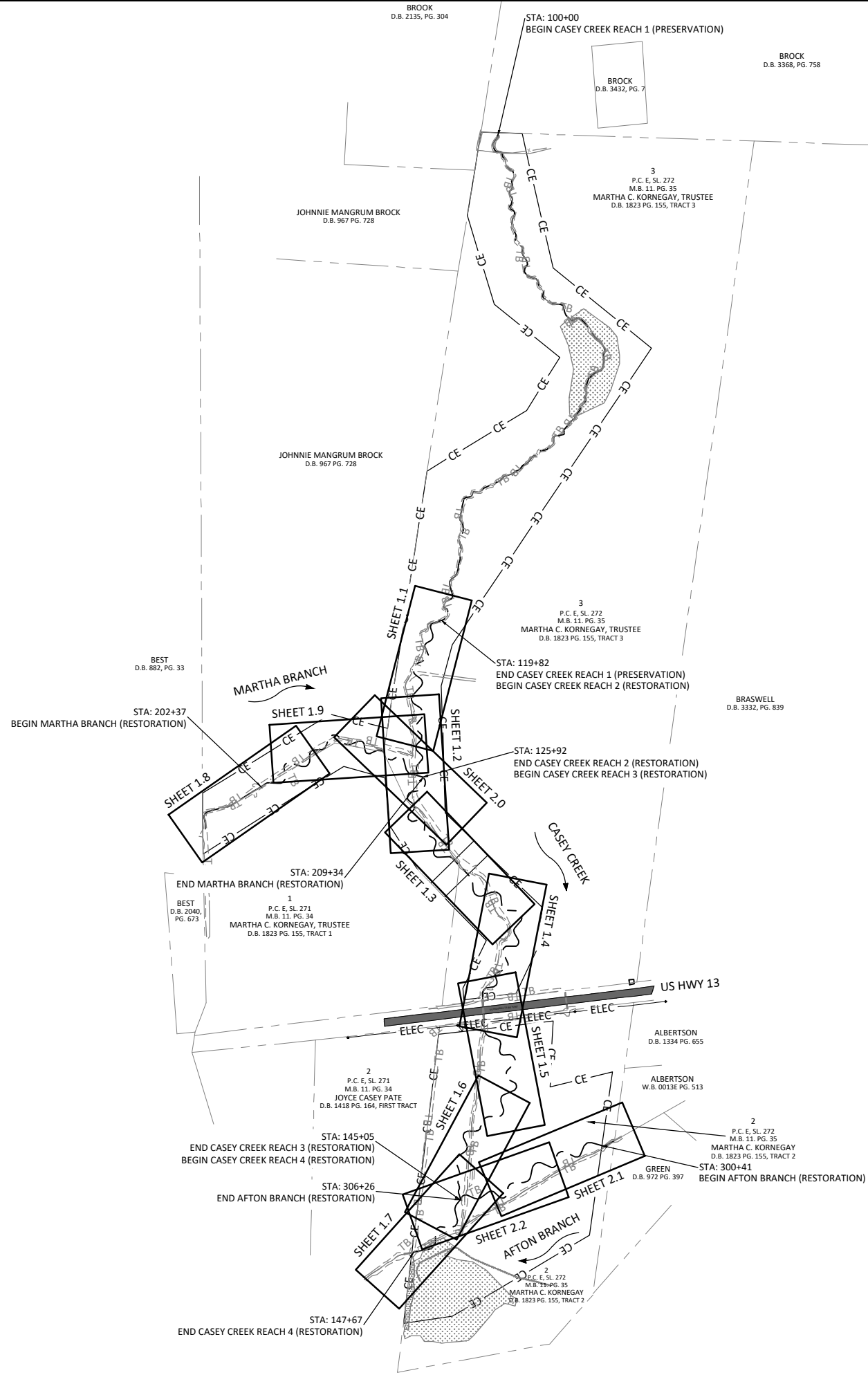
- Proposed Thalweg Alignment
- Proposed Bankfull
- Proposed Major Contour
- Proposed Minor Contour
- Proposed Conservation Easement
- Proposed Conservation Easement Internal Crossing
- Proposed Culvert

## Proposed Structures

- Proposed Constructed Riffles Per Plans
- Proposed Log J-Hook
- Proposed Log Sill
- Proposed Brush Toe
- Proposed Channel Plug
- Proposed Permanent Ford Crossing

## Erosion Control Features

- Proposed Tree Protection & Safety Fence
- Proposed Temporary Silt Fence
- Proposed Silt Fence Gravel Outlet
- Proposed Construction Entrance
- Proposed Temporary Stream Crossing - Timber Mat
- Proposed Straw Wattle
- Proposed Pump Around System
- Proposed Temporary Rock Sediment Dam
- Proposed Haul Road
- Proposed Stockpile/Staging Area
- Permanent Wetland Impact Area
- Temporary Wetland Impact Area
- Permanent Open Water Impact Area
- Permanent Stream Impact
- Existing Buffer Zone A
- Existing Buffer Zone B



Casey Creek Mitigation Site  
Wayne County, North Carolina

Project Overview

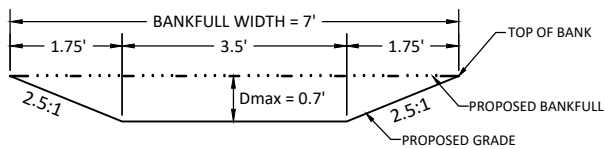
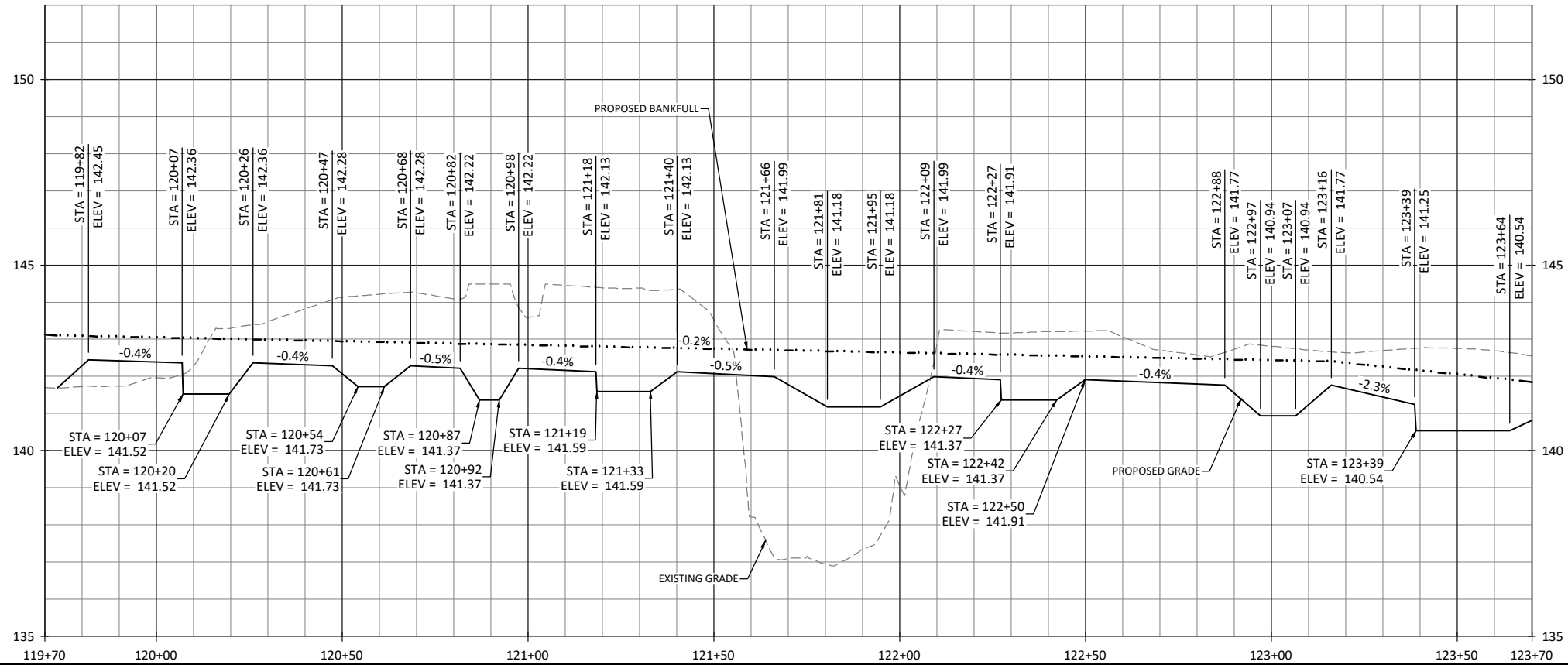
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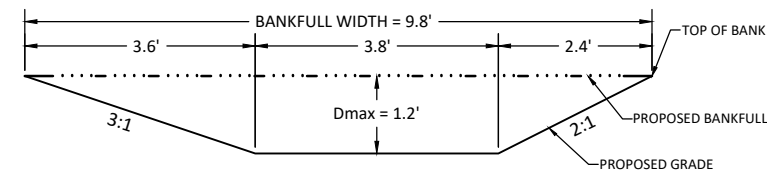
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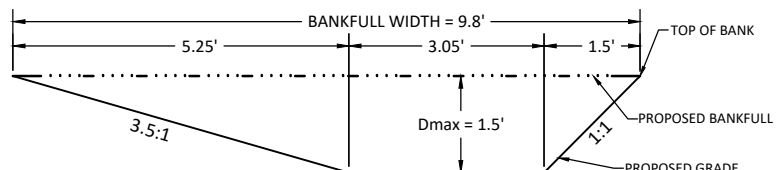
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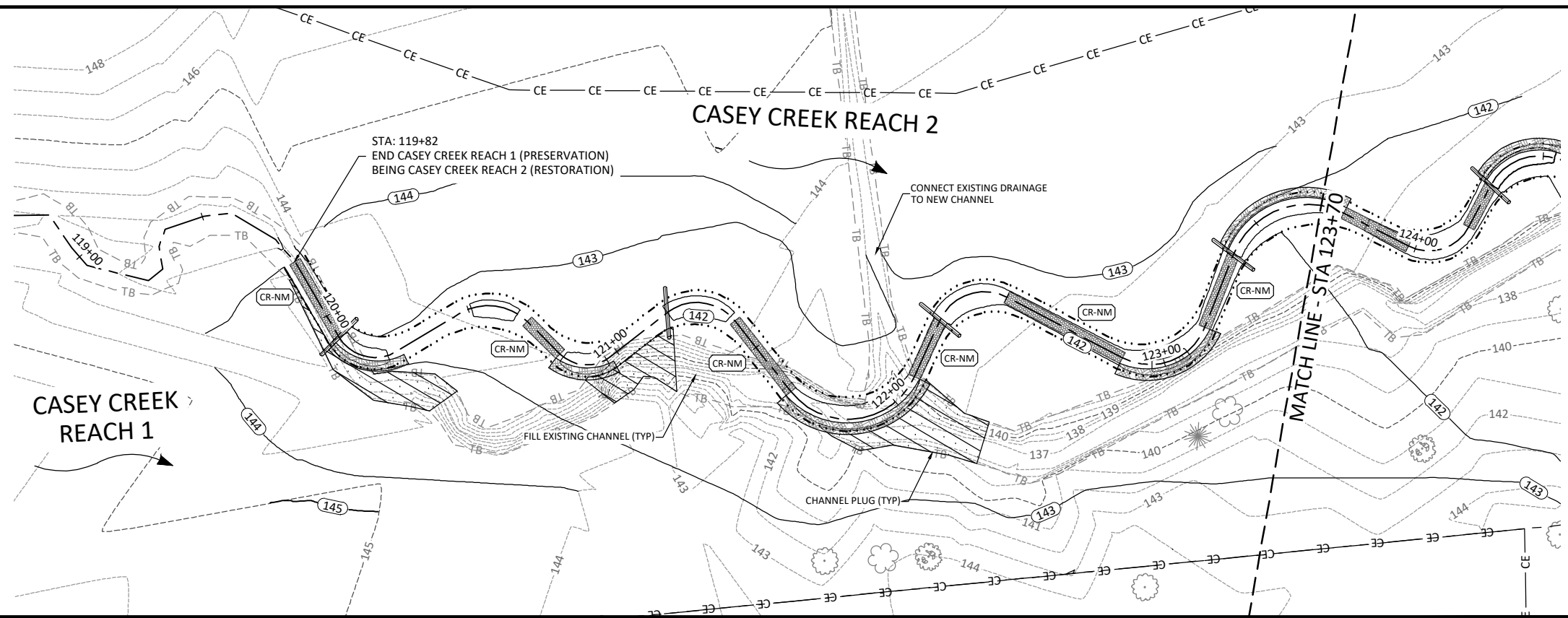
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TYPICAL SECTION: RIFFLE  
STA: 119+82 TO 125+92



CASEY CREEK REACH 2  
TYPICAL SECTION: STANDARD POOL  
STA: 119+82 TO 125+92



CASEY CREEK REACH 2  
TYPICAL SECTION: DEEP POOL WITH STRUCTURE  
STA: 119+82 TO 125+92



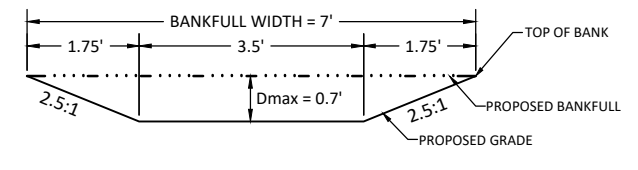
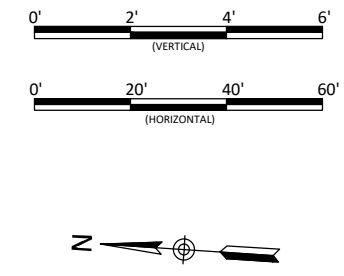
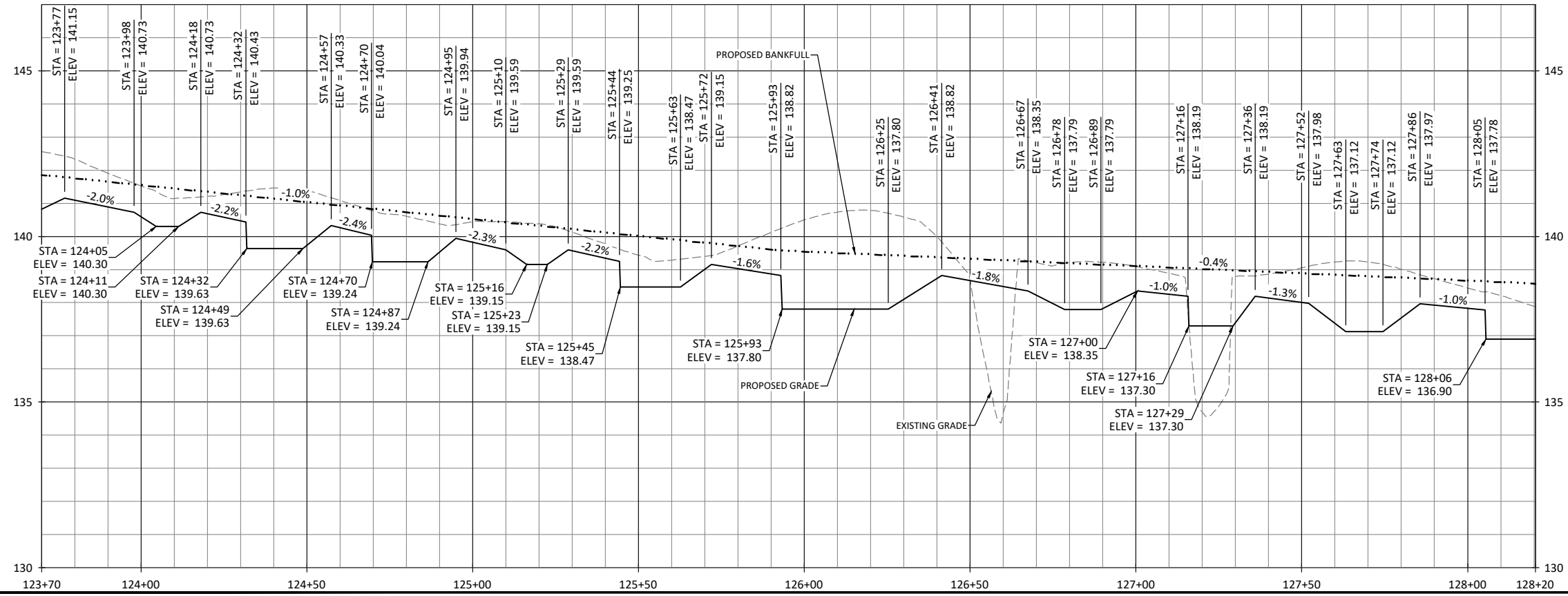
Casey Creek Mitigation Site  
Wayne County, North Carolina  
Casey Creek Reach 1 & 2  
Stream Plan & Profile

Revisions:

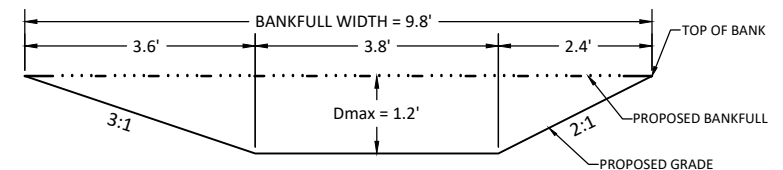

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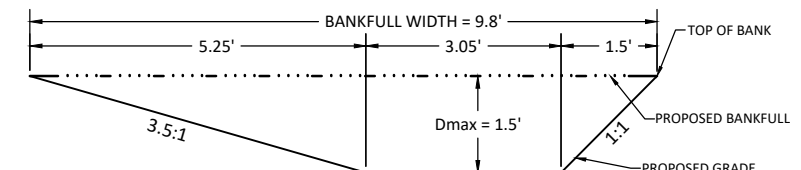
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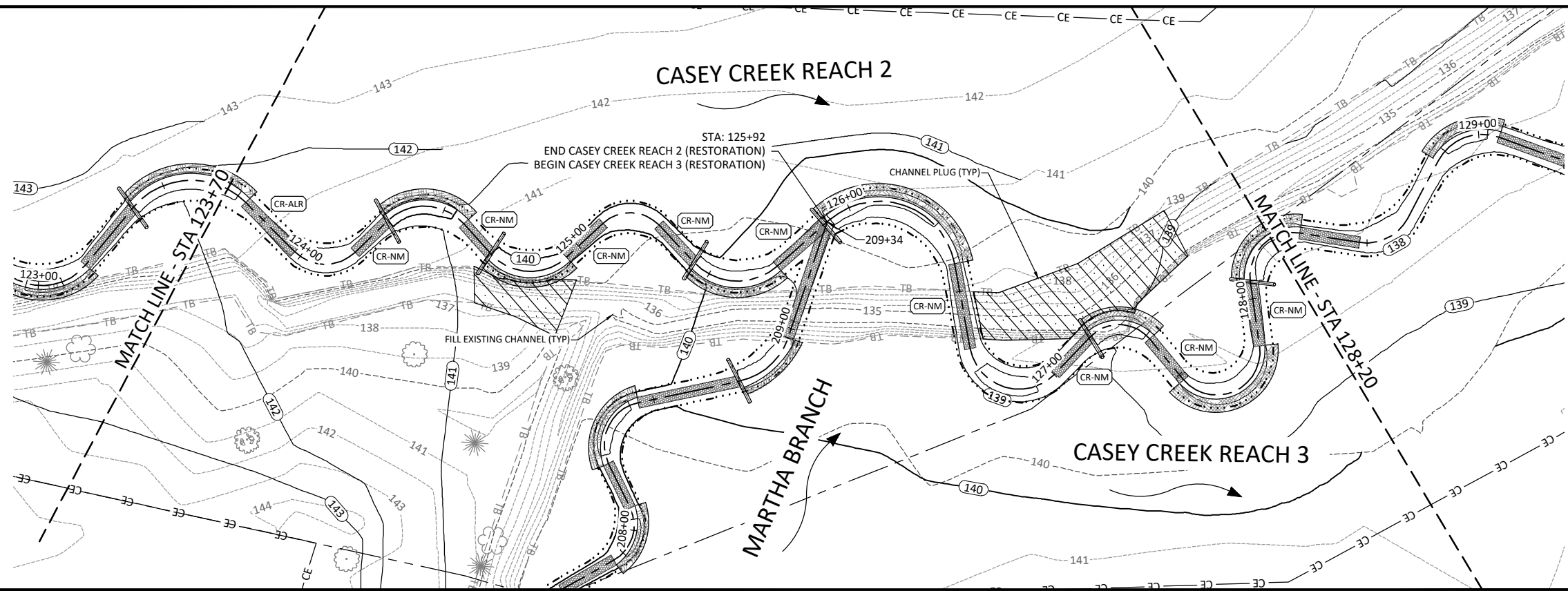
CASEY CREEK REACH 2  
TYPICAL SECTION: RIFFLE  
STA: 119+82 TO 125+92



CASEY CREEK REACH 2  
TYPICAL SECTION: STANDARD POOL  
STA: 119+82 TO 125+92



CASEY CREEK REACH 2  
TYPICAL SECTION: DEEP POOL WITH STRUCTURE  
STA: 119+82 TO 125+92



NOTE:  
1. REFER TO SHEET 1.3 FOR CASEY CREEK REACH 3 TYPICAL SECTION.

Casey Creek Mitigation Site  
Wayne County, North Carolina  
Casey Creek Reach 2 & 3  
Stream Plan & Profile

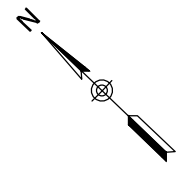
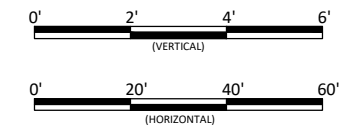
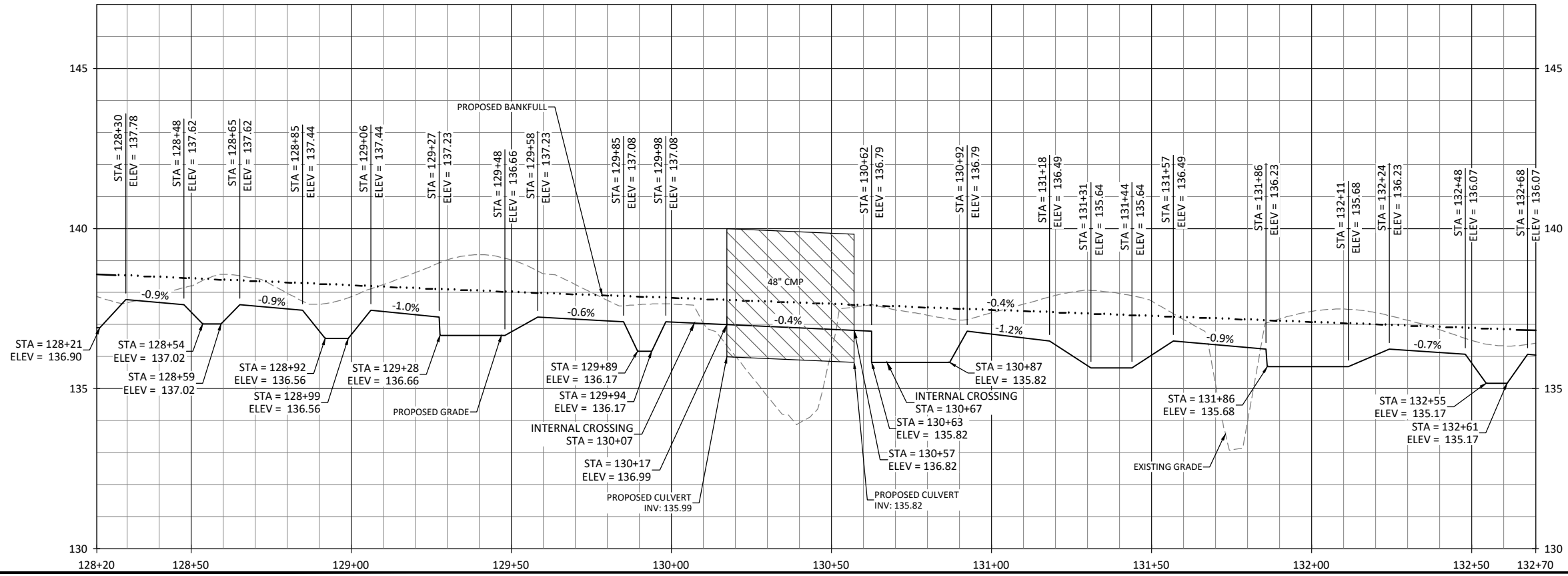


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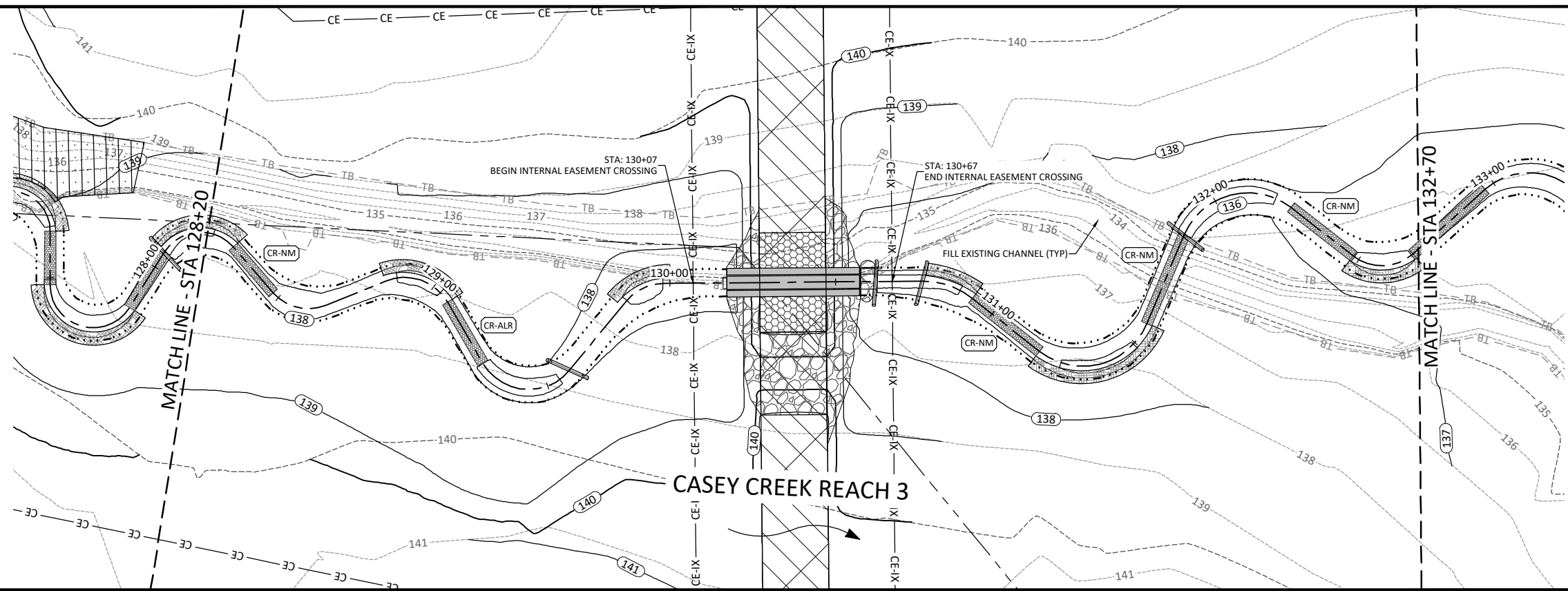
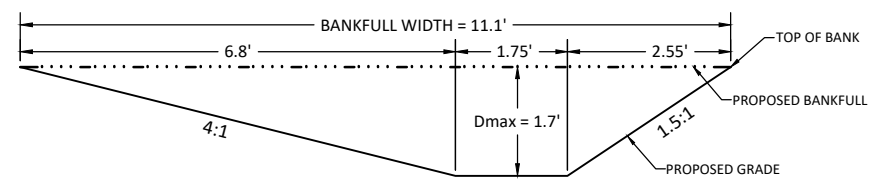
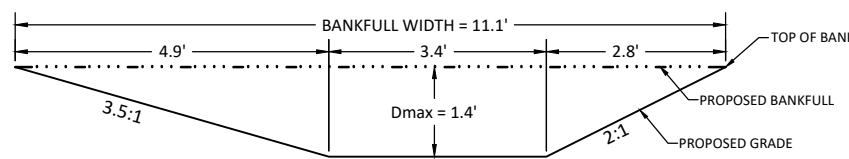
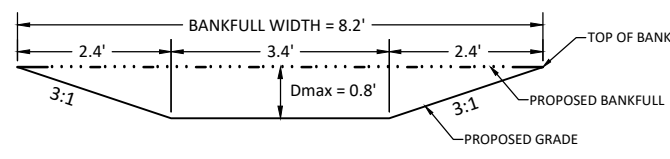
Revisions

Date: 05.28.2024  
Job Number: 02196  
Project Engineer: AA  
Drawn By: MK  
Checked By: CS





NOTE:  
 1. PROFILE INCLUDES ELEVATION FOR CENTRAL CULVERT PIPE ONLY. REFER TO DETAIL 1, SHEET 5.9 FOR ADDITIONAL CULVERT INFORMATION.  
 2. REFER TO DETAIL 1, SHEET 5.9 FOR GRADING EXTENTS OF THE INTERNAL EASEMENT CROSSING.

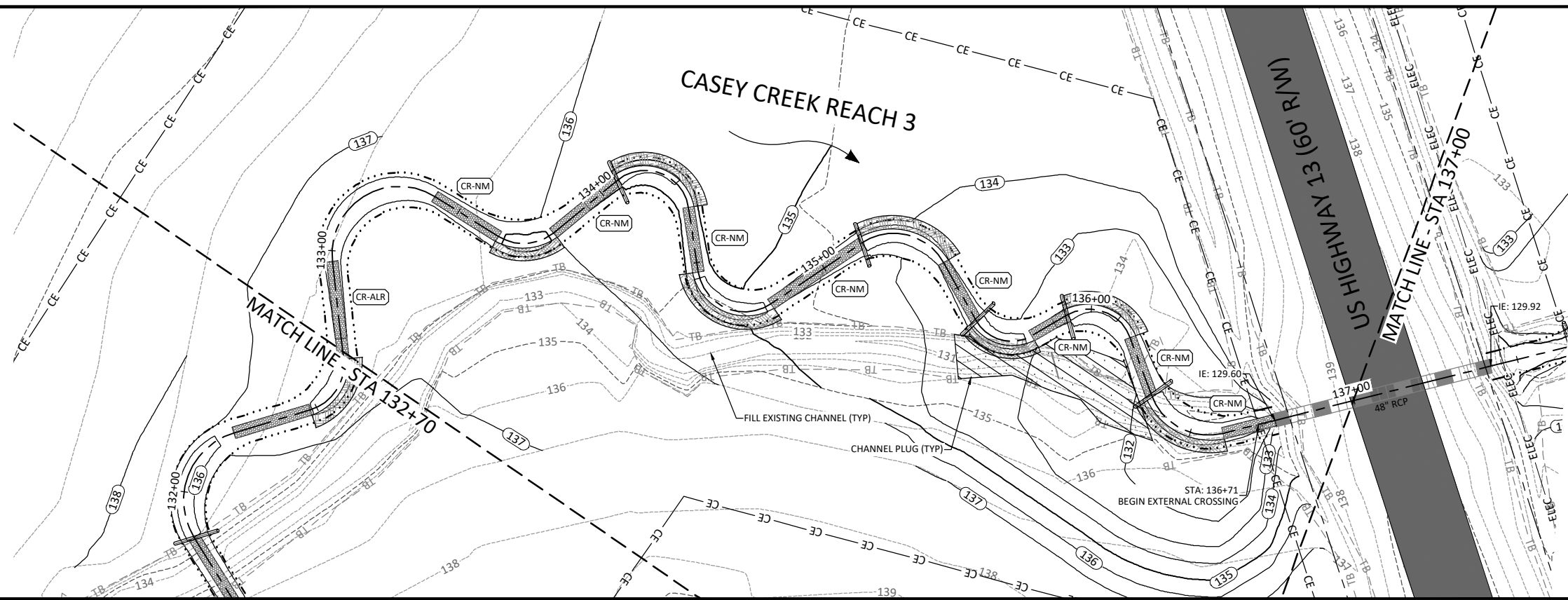
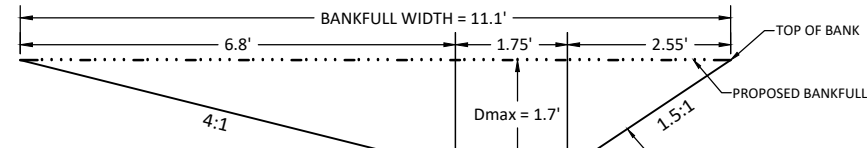
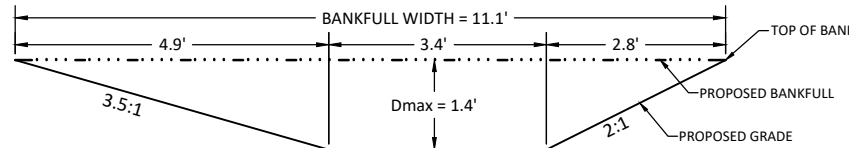
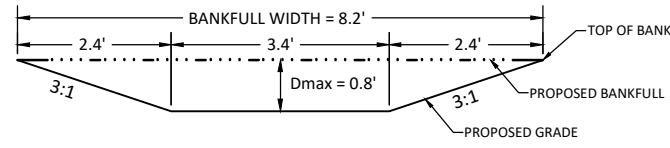
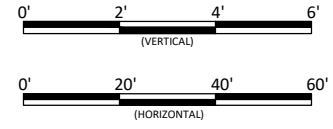
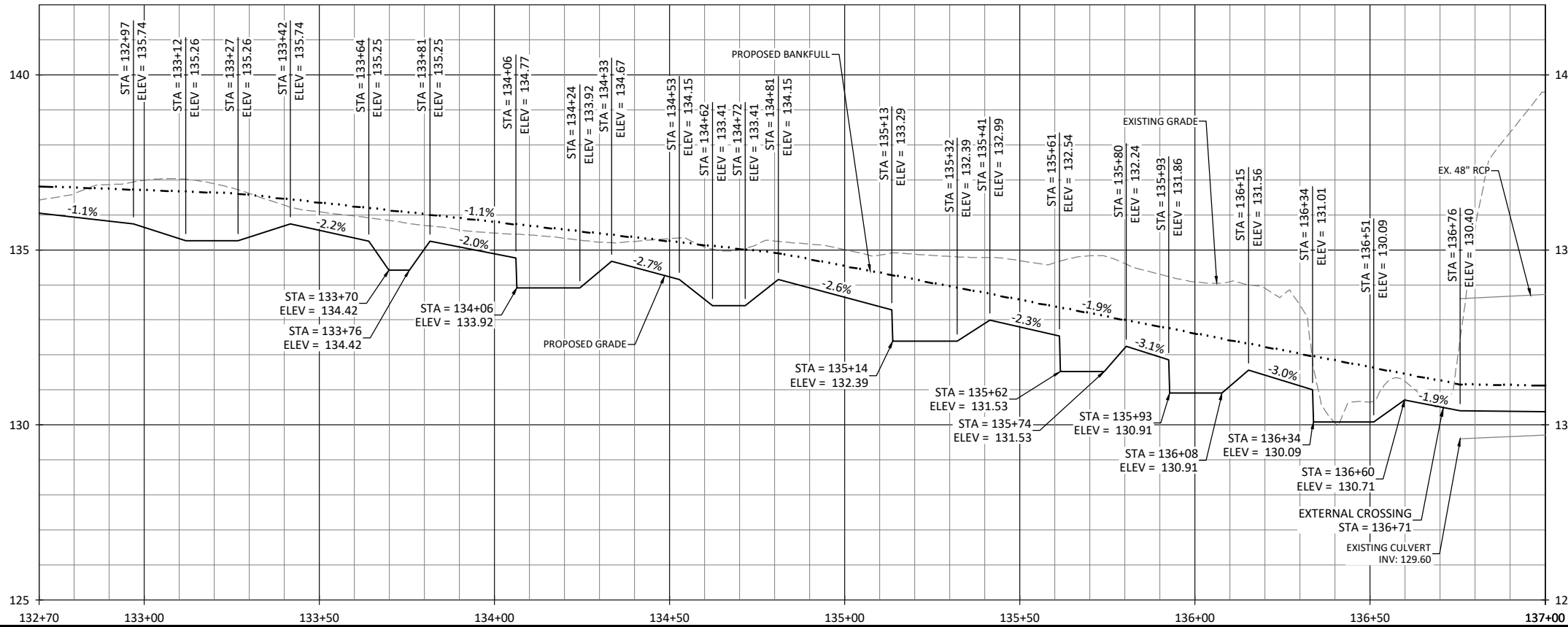


Casey Creek Mitigation Site  
 Wayne County, North Carolina  
 Casey Creek Reach 3  
 Stream Plan & Profile

Revisions:


Date: 05.28.2024  
 Job Number: 02196  
 Project Engineer: AA  
 Drawn By: MK  
 Checked By: CS

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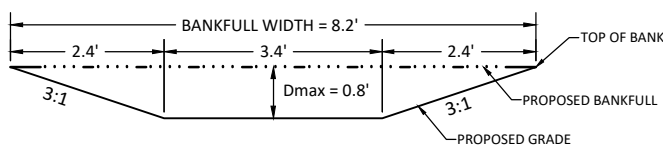
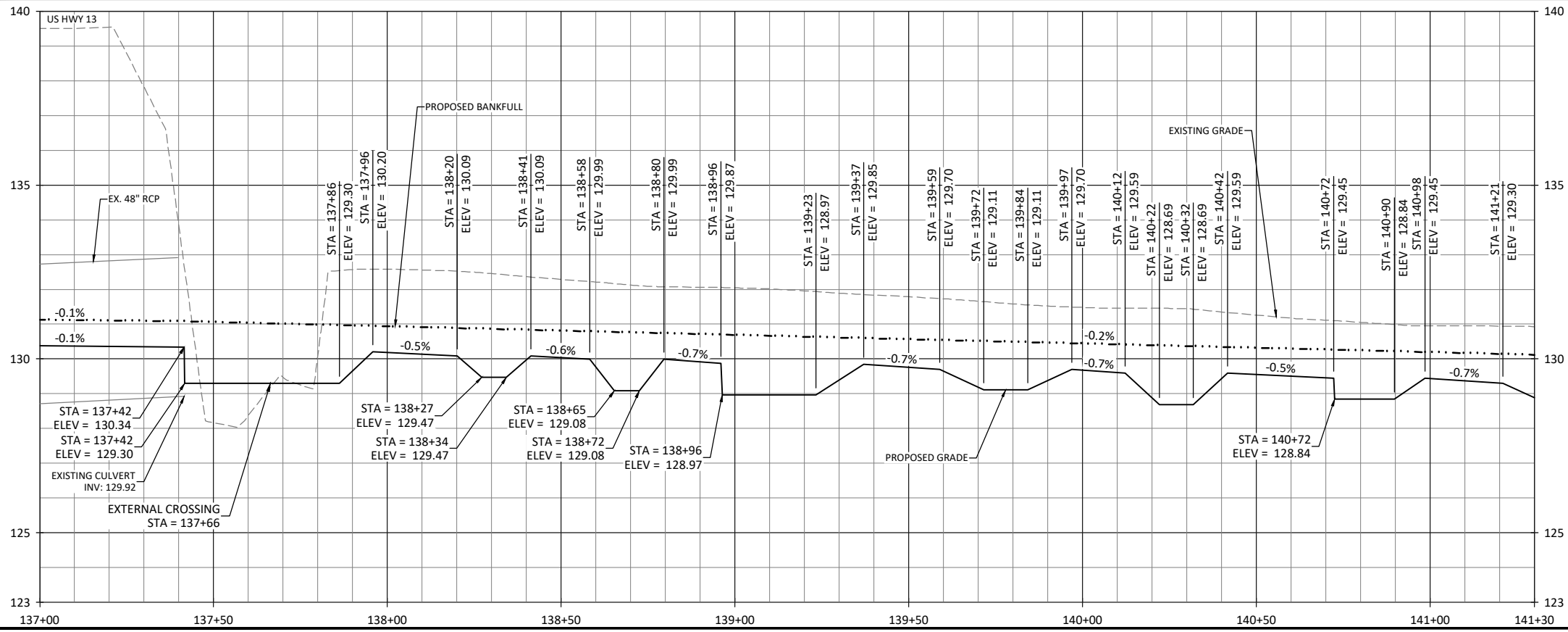
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Casey Creek Mitigation Site  
Wayne County, North Carolina  
Casey Creek Reach 3  
Stream Plan & Profile

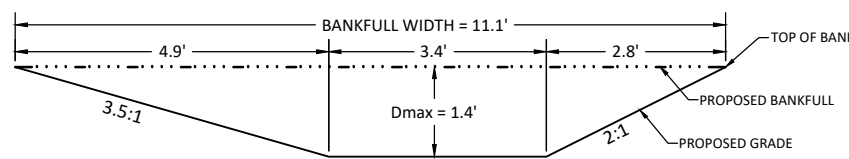
Revisions

Date: 05.28.2024  
Job Number: 02196  
Project Engineer: AA  
Drawn By: MK  
Checked By: CS

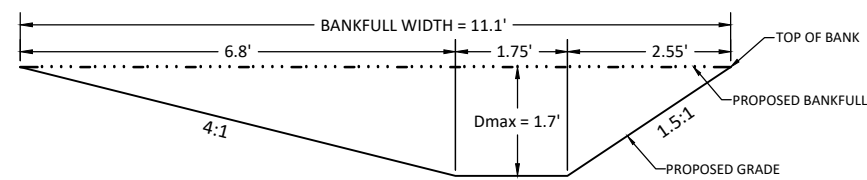
May 28, 2024



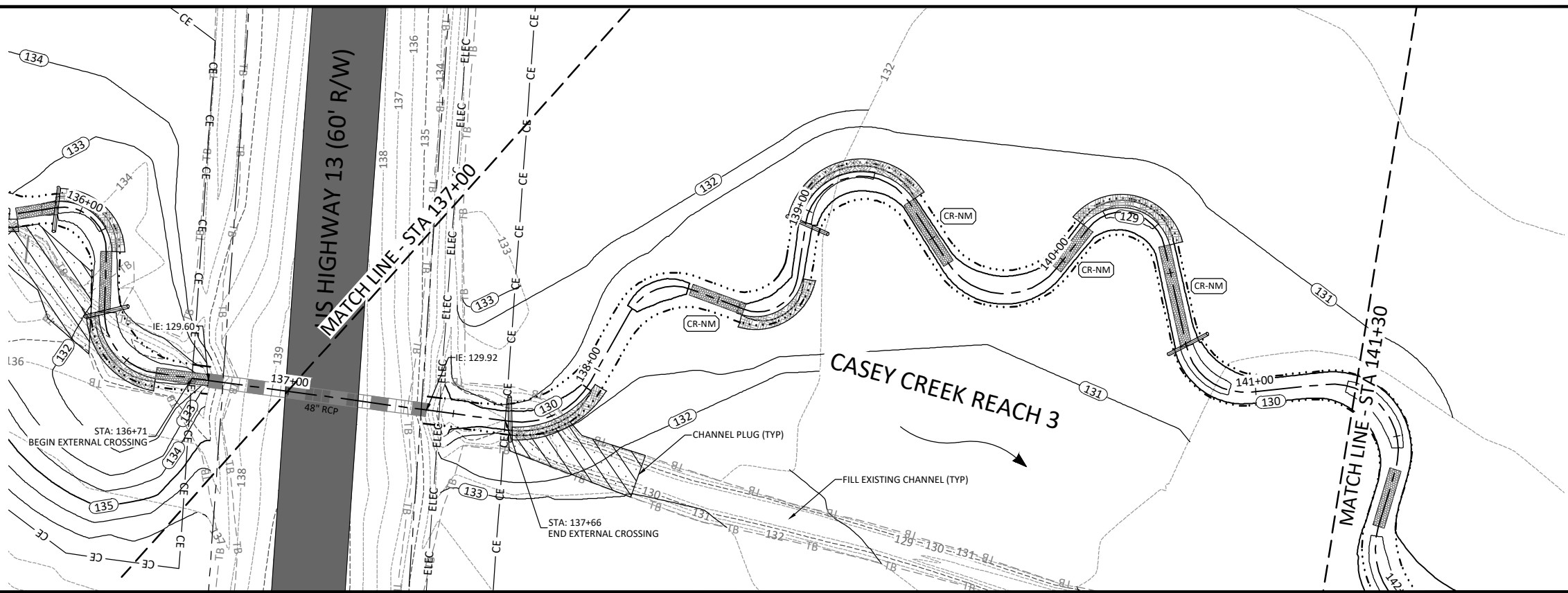
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STA: 125+92 TO 145+05



CASEY CREEK REACH 3  
TYPICAL SECTION: STANDARD POOL  
STA: 125+92 TO 145+05



CASEY CREEK REACH 3  
TYPICAL SECTION: DEEP POOL WITH STRUCTURE  
STA: 125+92 TO 145+05



Casey Creek Mitigation Site  
Wayne County, North Carolina  
Casey Creek Reach 3  
Stream Plan & Profile

Revisions	

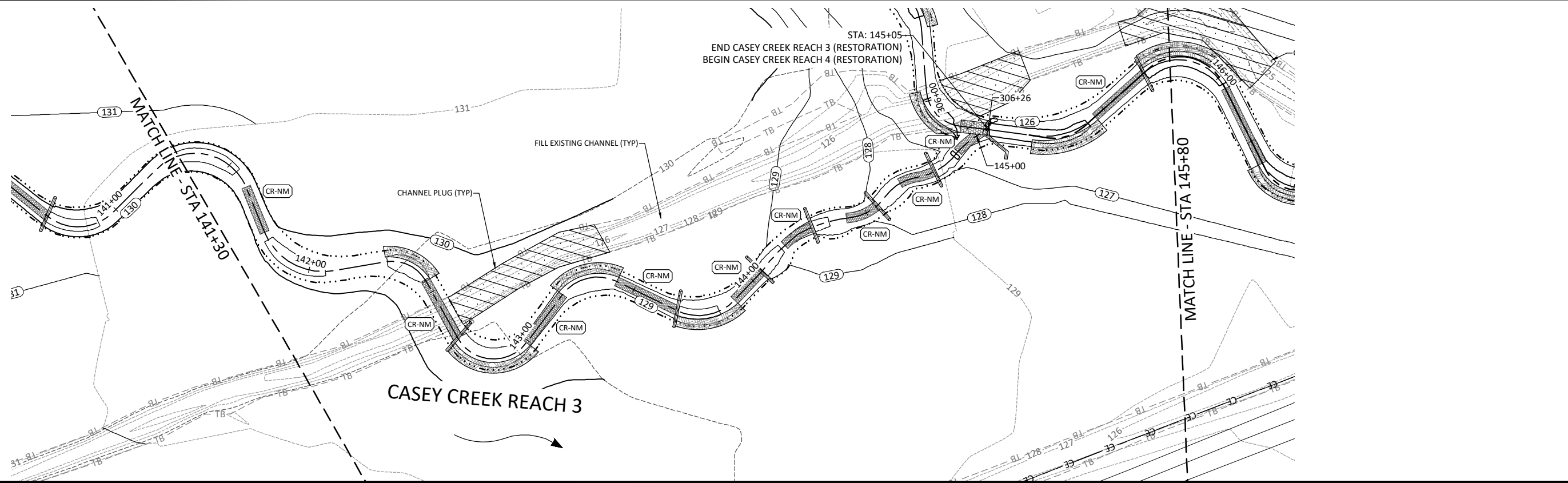
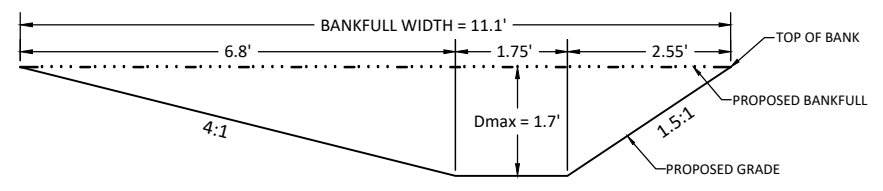
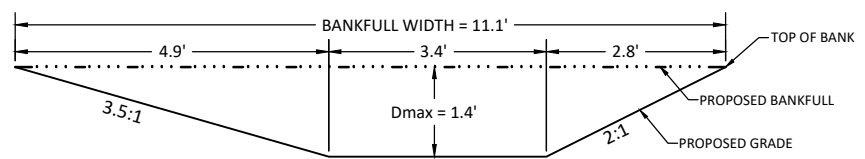
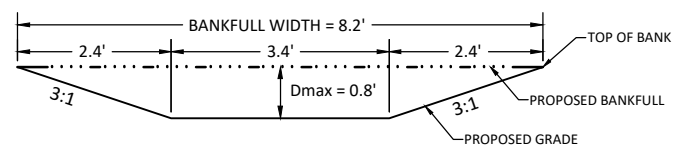
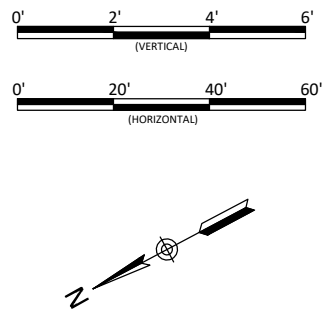
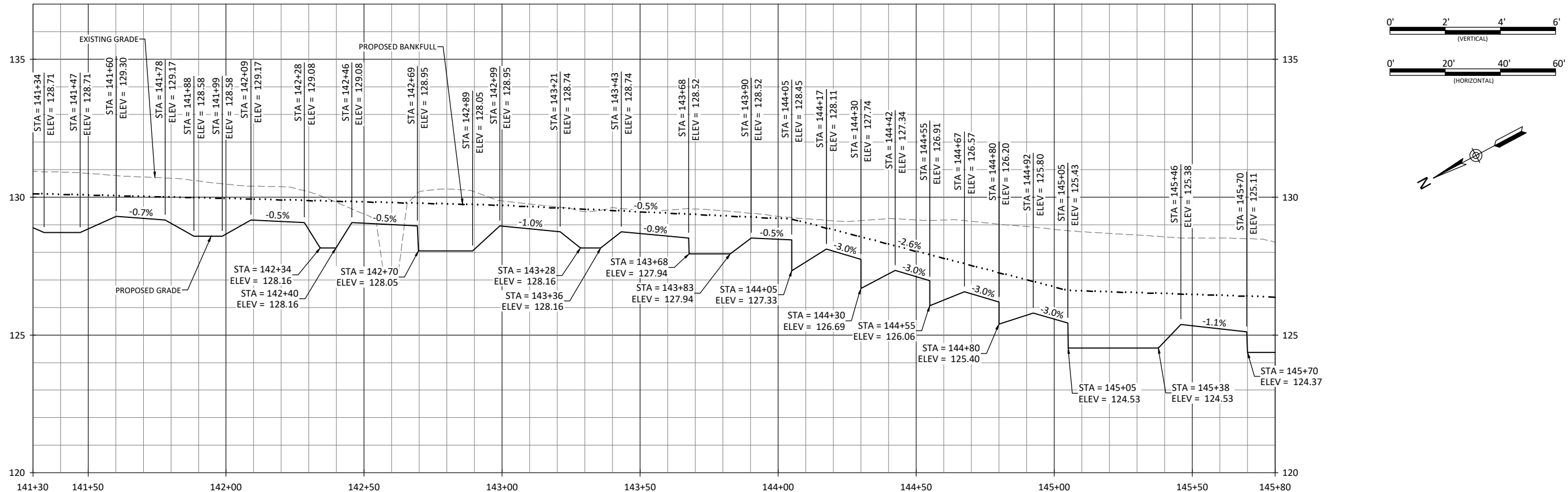
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Job Number:	02196
Project Engineer:	AA
Drawn By:	MK
Checked By:	CS

1.5

Sheet



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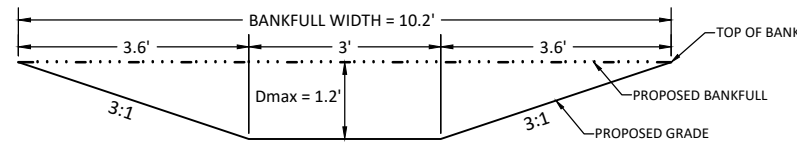
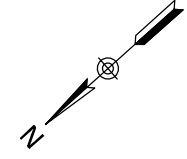
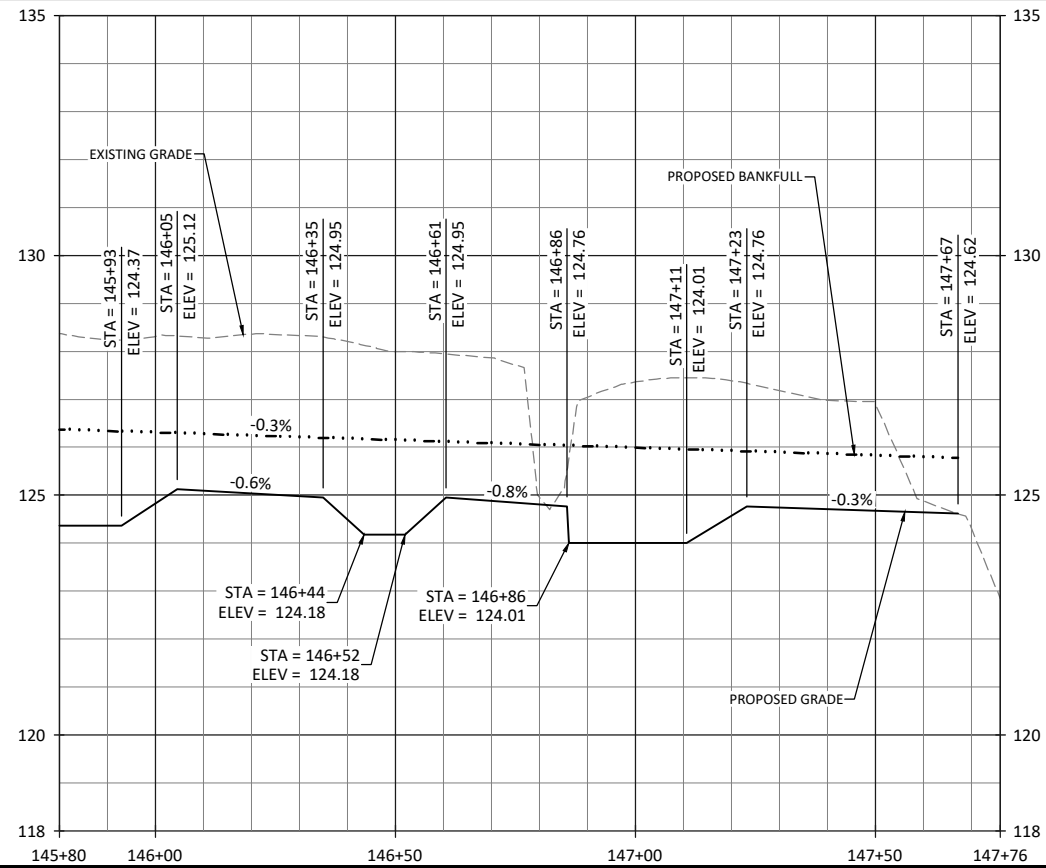


Casey Creek Mitigation Site  
Wayne County, North Carolina  
Casey Creek Reach 3 & 4  
Stream Plan & Profile

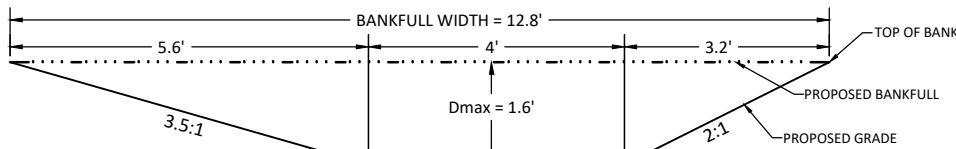
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Date:	05.28.2024
Job Number:	02196
Project Engineer:	AA
Drawn By:	MK
Checked By:	CS

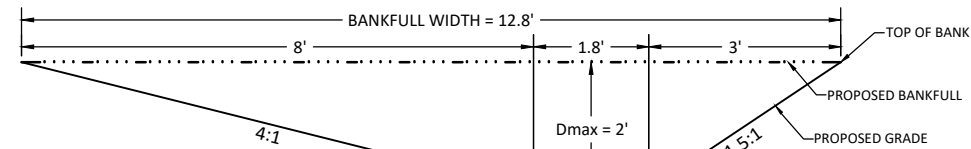
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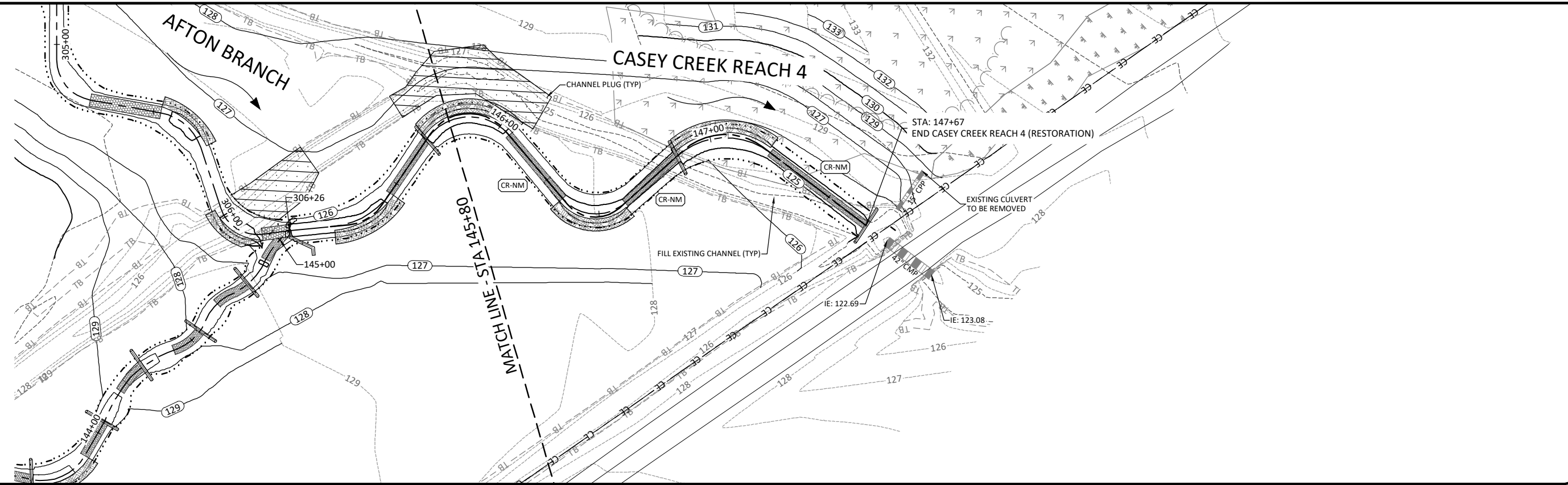
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STA: 145+05 TO 147+67



CASEY CREEK REACH 4  
TYPICAL SECTION: STANDARD POOL  
STA: 145+05 TO 147+67



CASEY CREEK REACH 4  
TYPICAL SECTION: DEEP POOL WITH STRUCTURE  
STA: 145+05 TO 147+67



Casey Creek Mitigation Site  
Wayne County, North Carolina

Casey Creek Reach 4  
Stream Plan & Profile

Revisions	

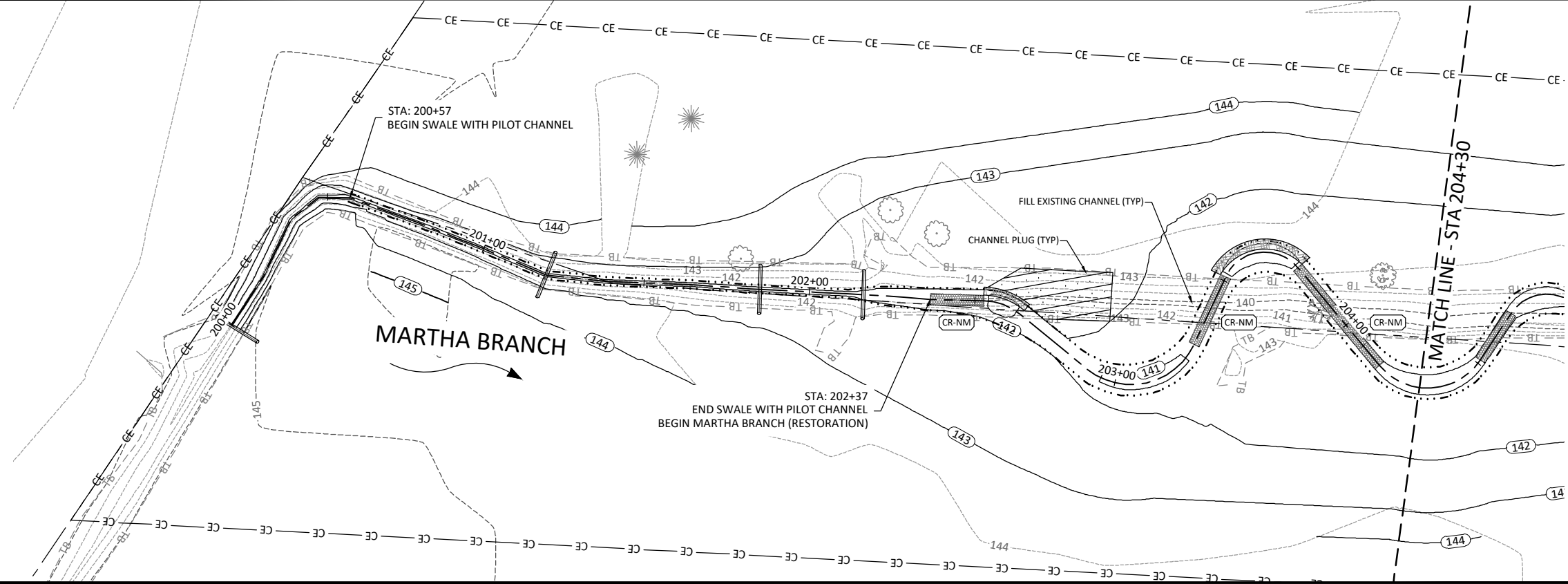
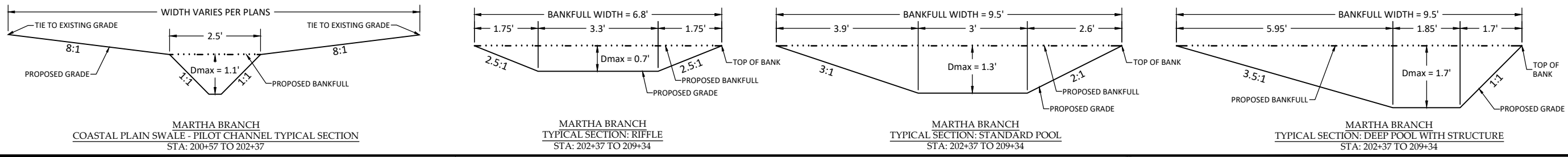
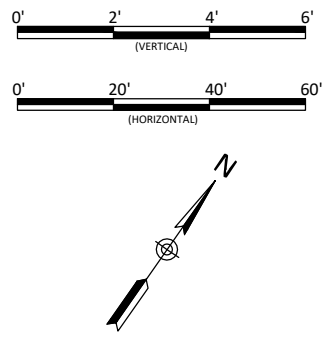
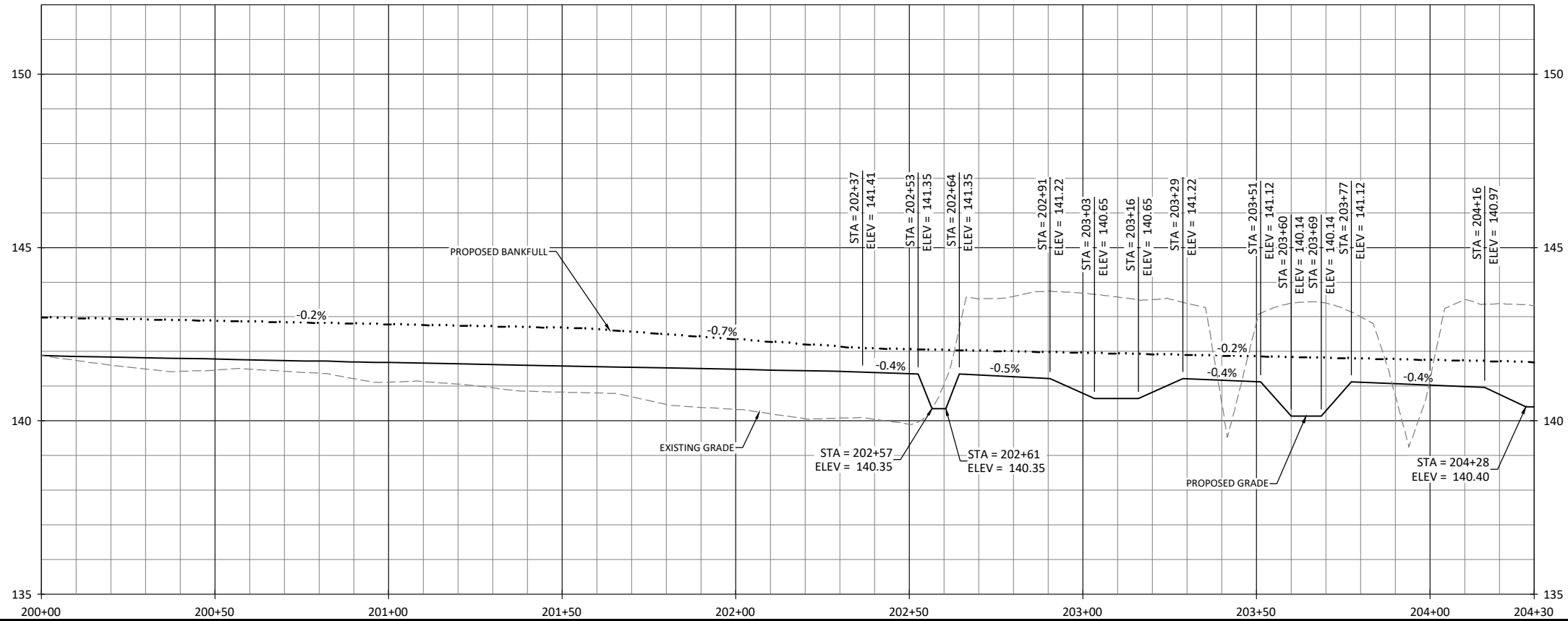
Date: 05.28.2024  
Job Number: 02196  
Project Engineer: AA  
Drawn By: MK  
Checked By: CS

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May 28, 2024

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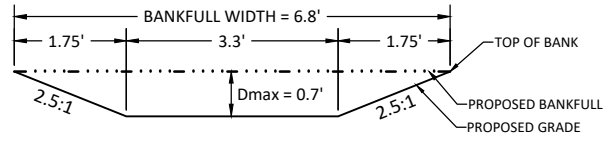
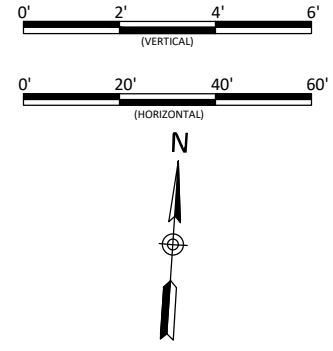
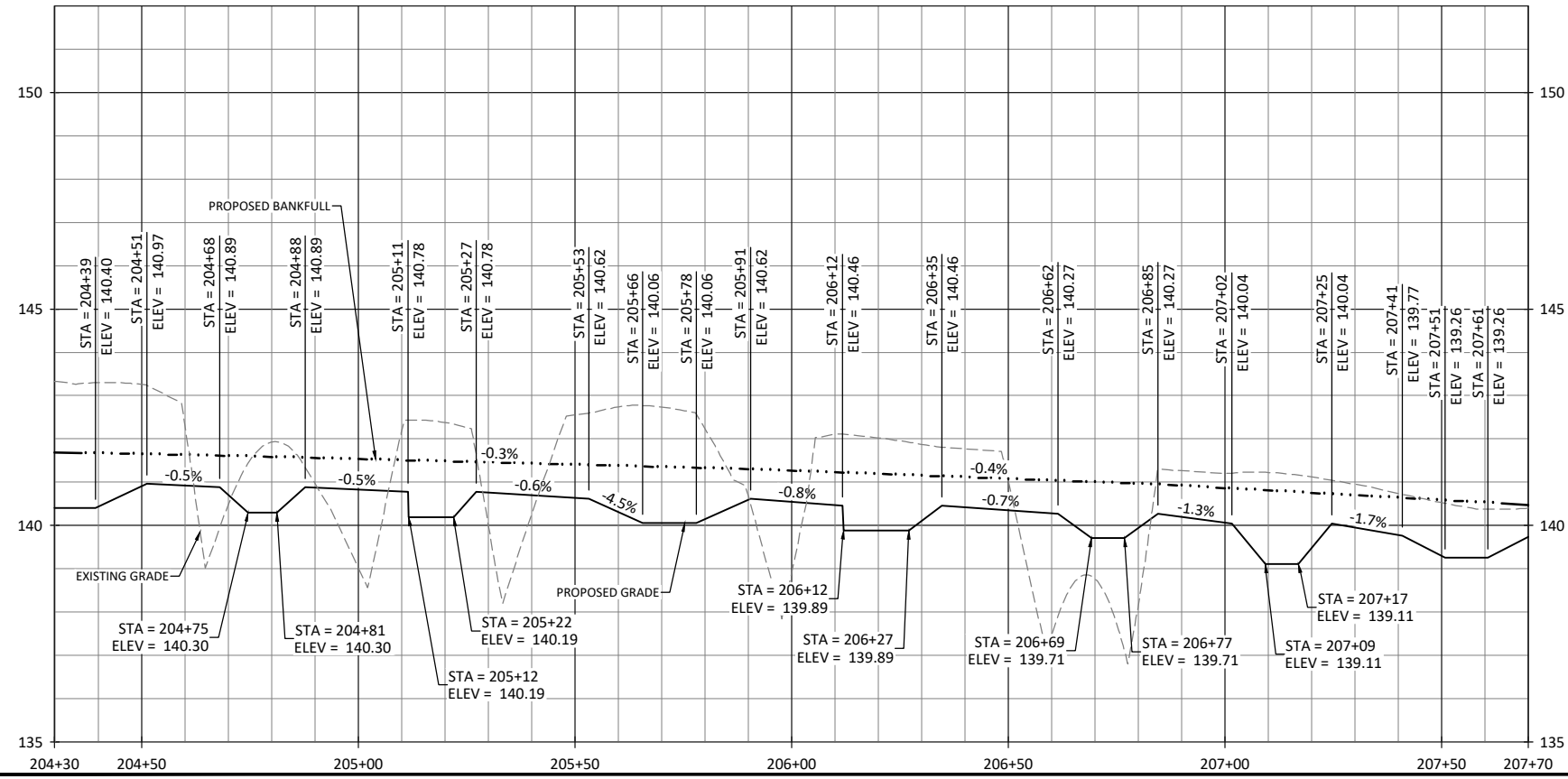
Casey Creek Mitigation Site  
Wayne County, North Carolina  
Martha Branch  
Stream Plan & Profile

Revisions:

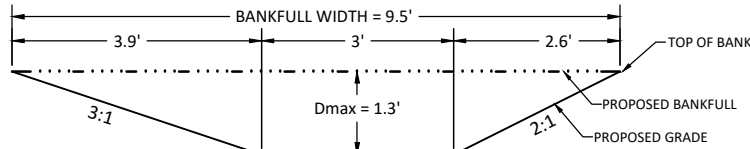

Date: 05.28.2024  
Job Number: 02196  
Project Engineer: AA  
Drawn By: MK  
Checked By: CS

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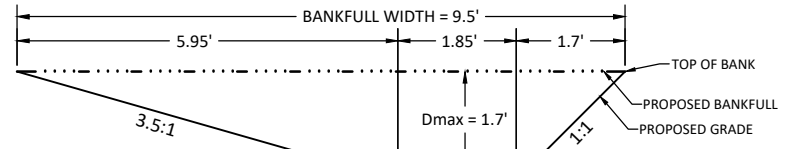
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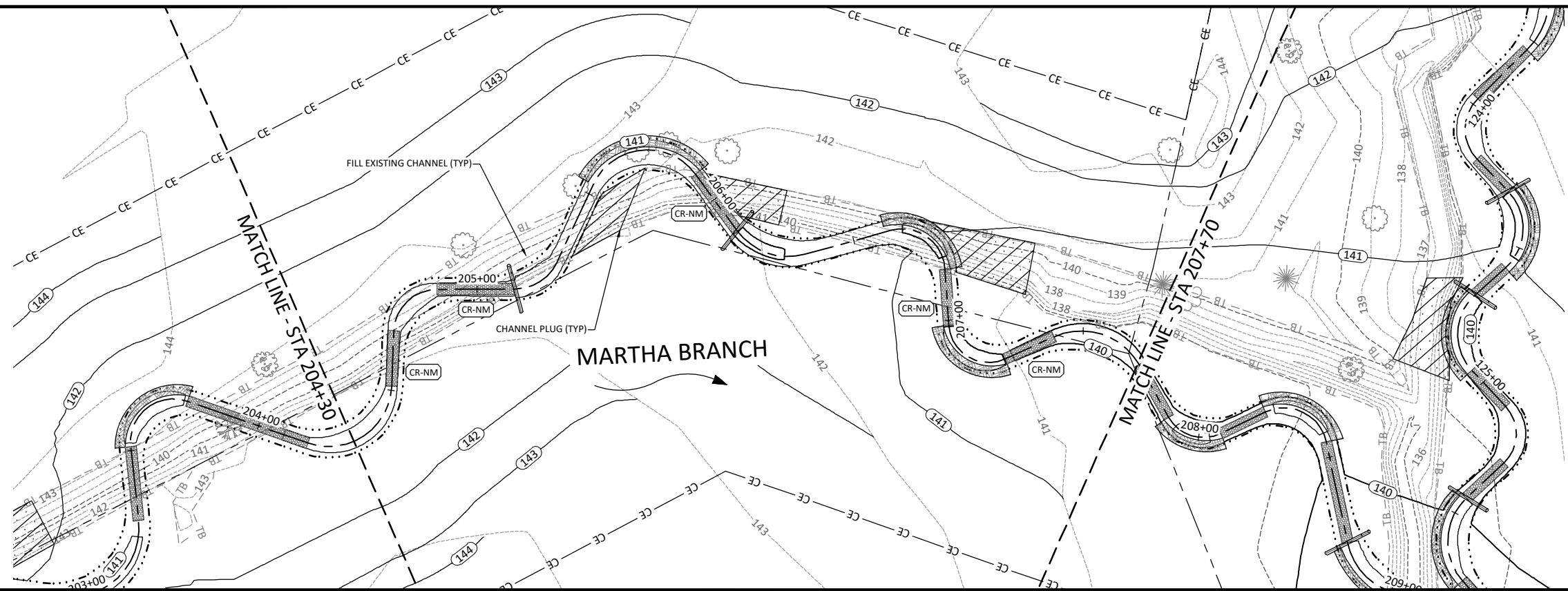
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STA: 202+37 TO 209+34



MARTHA BRANCH  
TYPICAL SECTION: STANDARD POOL  
STA: 202+37 TO 209+34



MARTHA BRANCH  
TYPICAL SECTION: DEEP POOL WITH STRUCTURE  
STA: 202+37 TO 209+34



Casey Creek Mitigation Site  
Wayne County, North Carolina  
Martha Branch  
Stream Plan & Profile

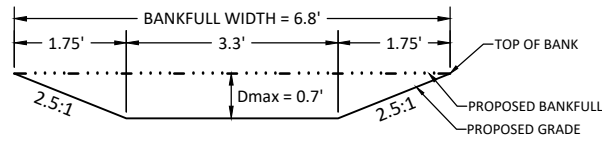
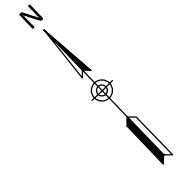
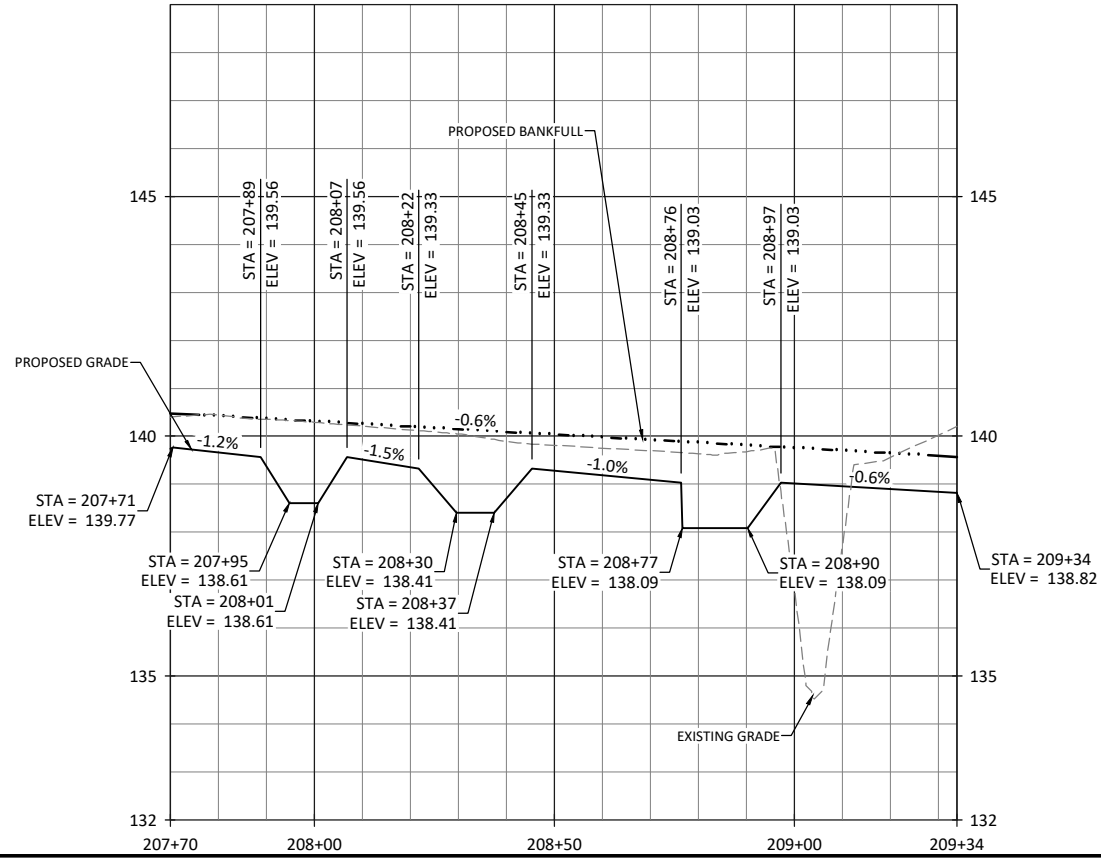


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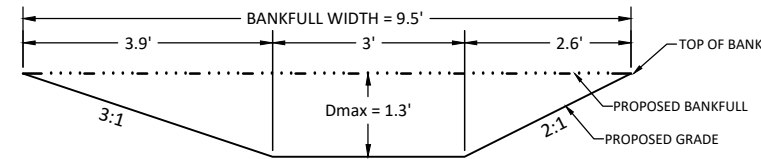
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Date:	05.28.2024
Job Number:	02196
Project Engineer:	AA
Drawn By:	MK
Checked By:	CS

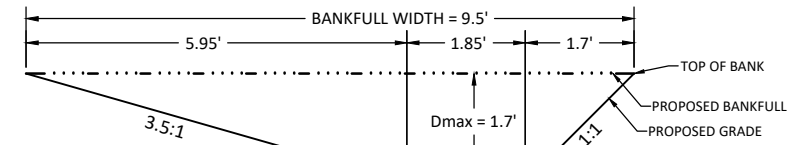
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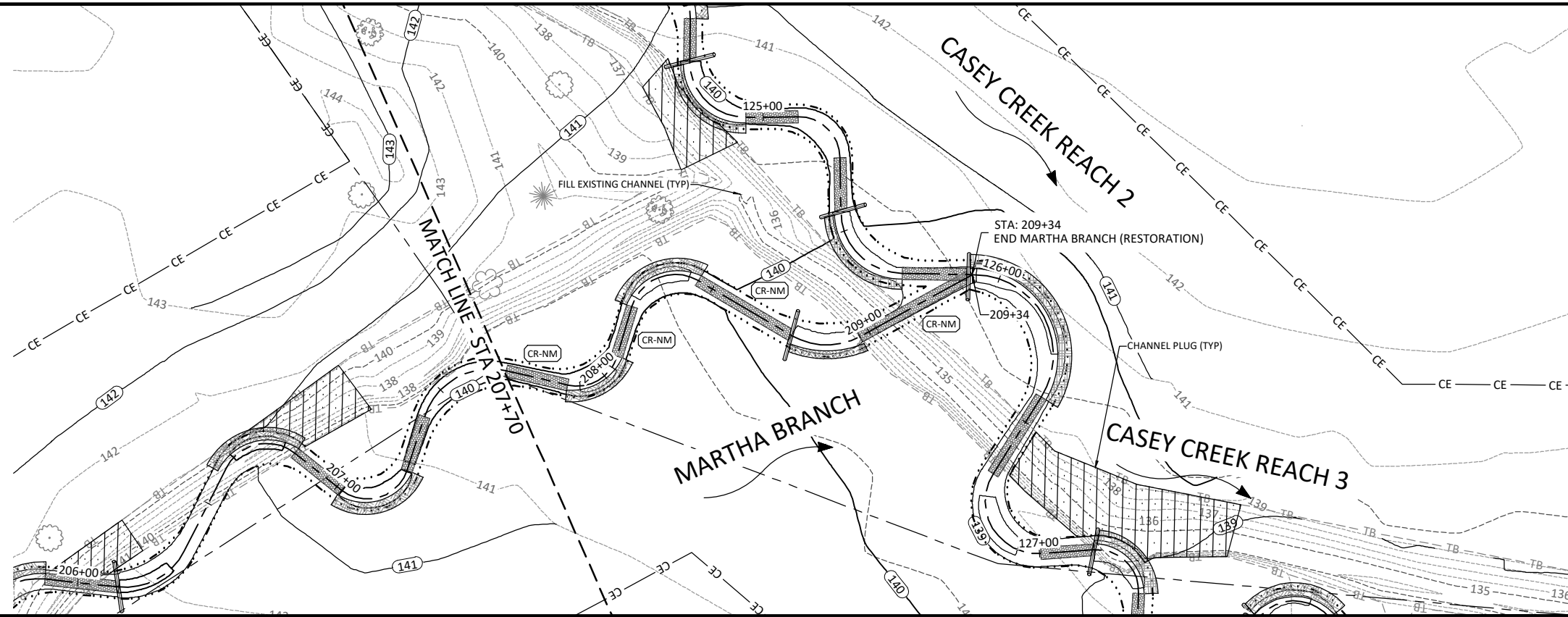
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STA: 202+37 TO 209+34



MARTHA BRANCH  
TYPICAL SECTION: STANDARD POOL  
STA: 202+37 TO 209+34



MARTHA BRANCH  
TYPICAL SECTION: DEEP POOL WITH STRUCTURE  
STA: 202+37 TO 209+34



Casey Creek Mitigation Site  
Wayne County, North Carolina  
Martha Branch  
Stream Plan & Profile



DRAFT

Revisions

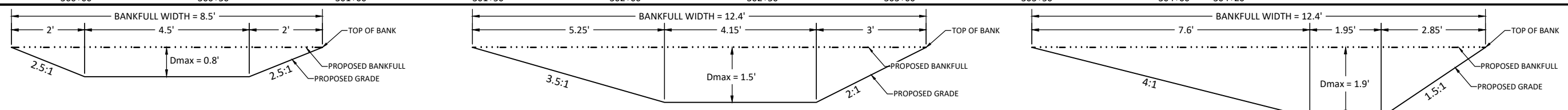
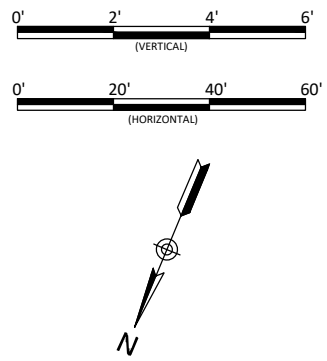
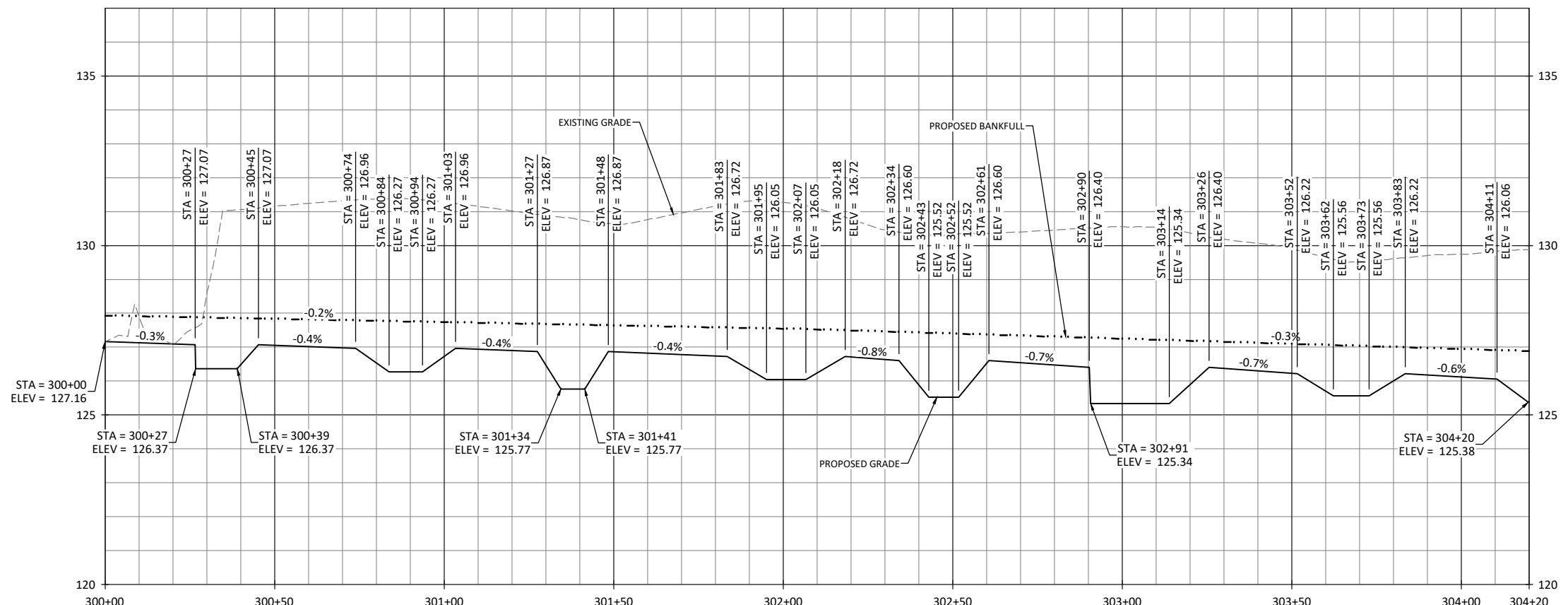
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Job Number:	02196
Project Engineer:	AA
Drawn By:	MK
Checked By:	CS

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May 28, 2024

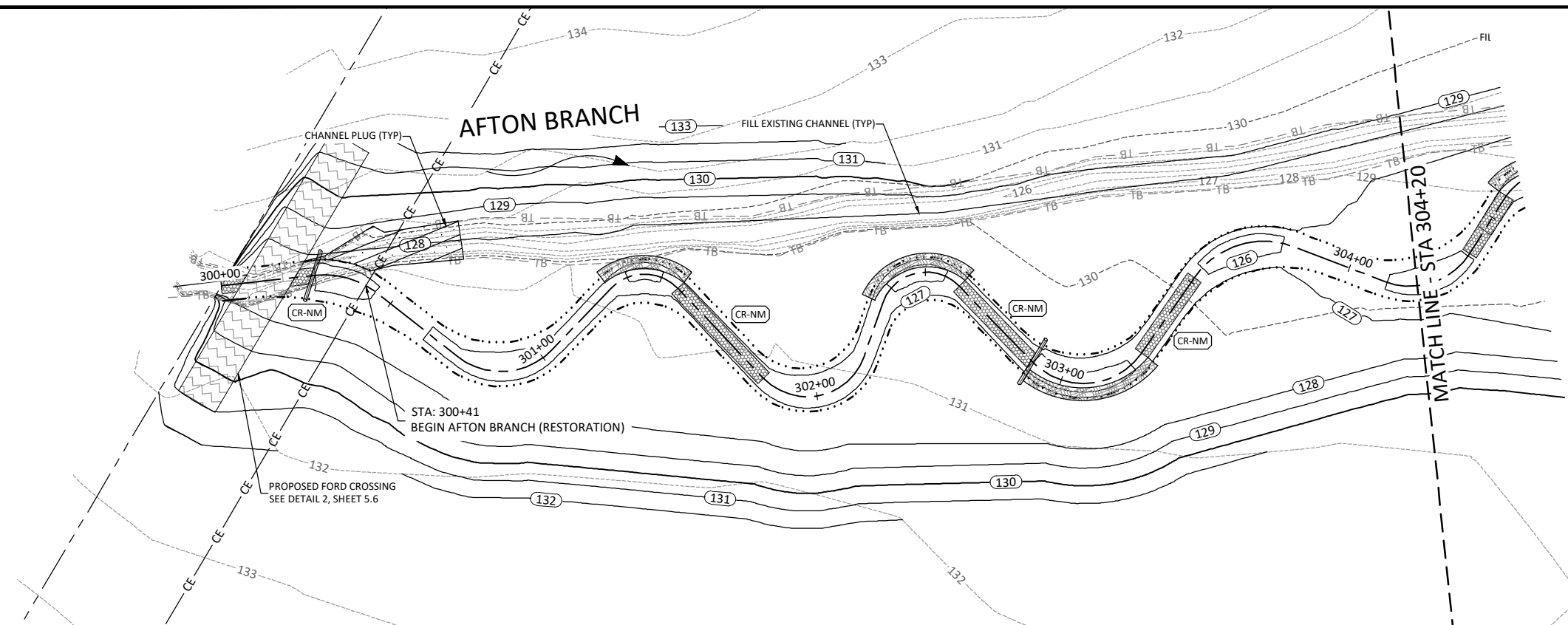
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AFTON BRANCH TYPICAL SECTION: STANDARD POOL STA: 300+41 TO 306+26

AFTON BRANCH TYPICAL SECTION: DEEP POOL WITH STRUCTURE STA: 300+41 TO 306+26



Casey Creek Mitigation Site  
Wayne County, North Carolina  
Afton Branch  
Stream Plan & Profile



DRAFT

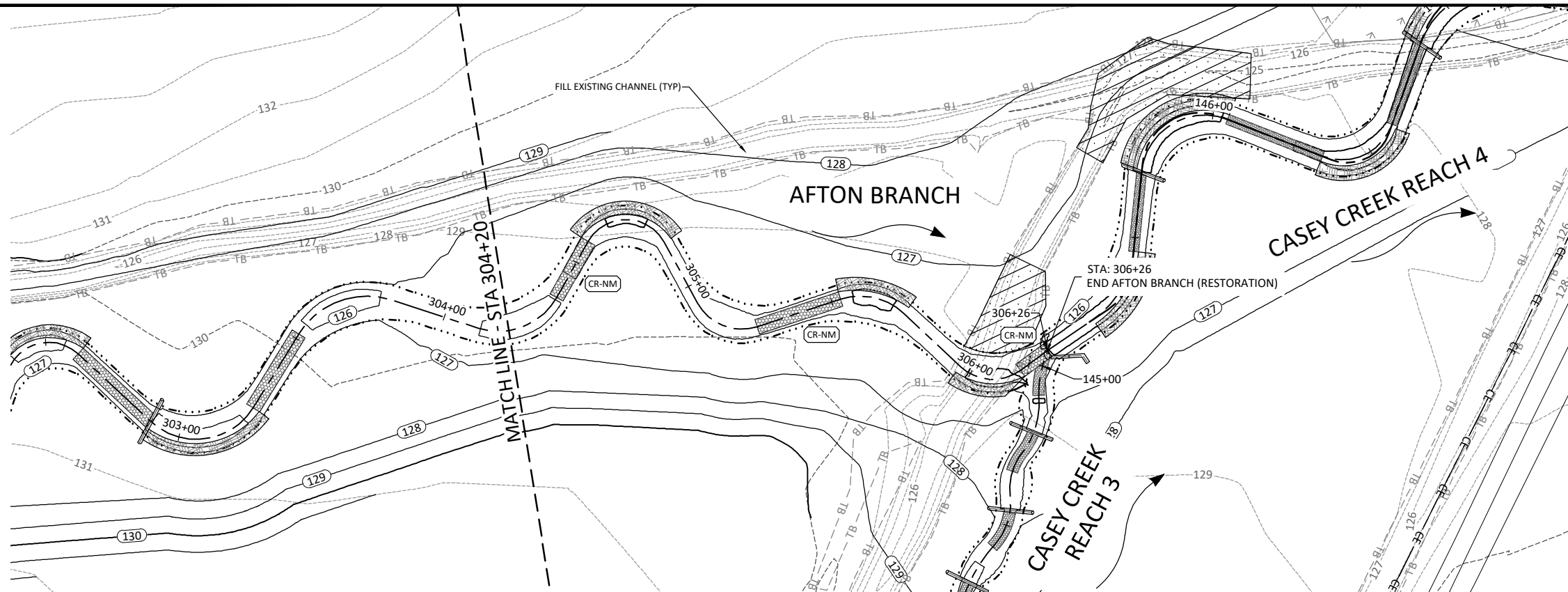
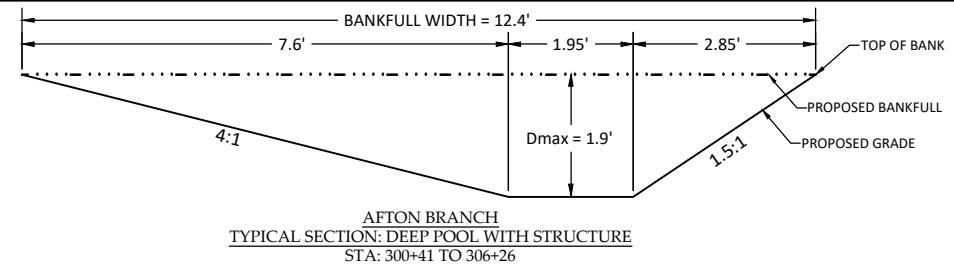
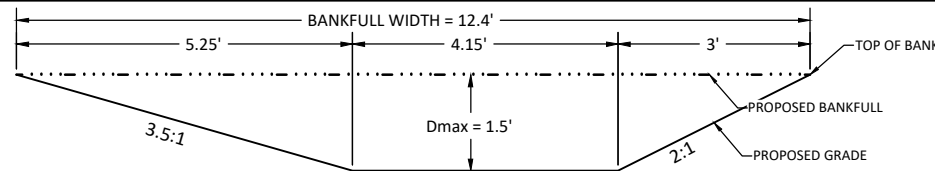
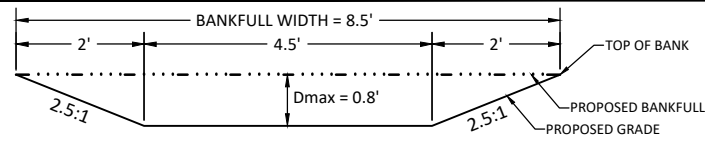
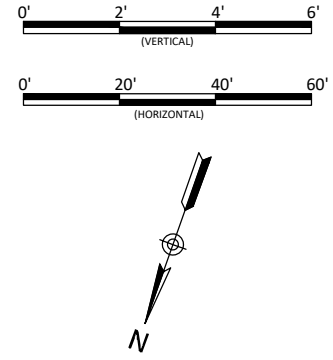
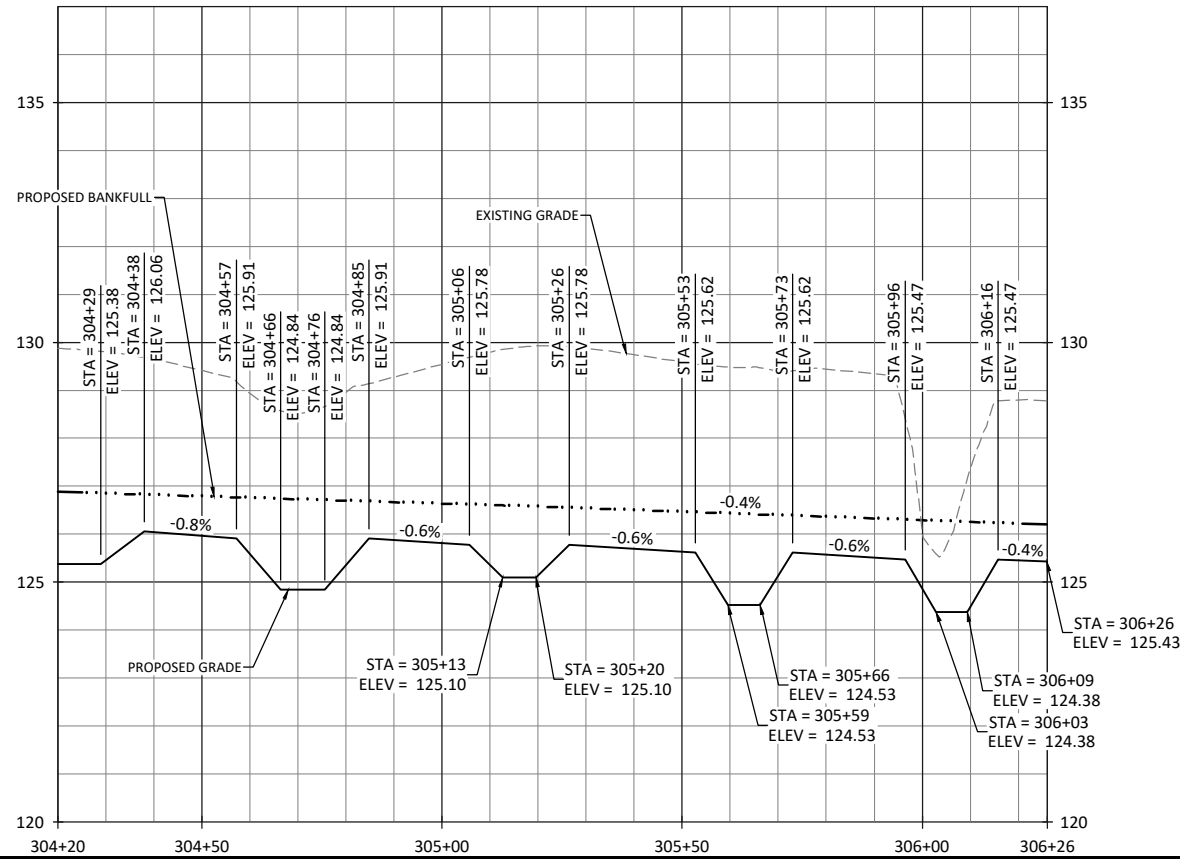
Revisions:

Date	By	Description

Date:	05.28.2024
Job Number:	02196
Project Engineer:	AA
Drawn By:	MK
Checked By:	CS

2.1

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Casey Creek Mitigation Site  
Wayne County, North Carolina


Afton Branch  
Stream Plan & Profile

Revisions:



Date:	05.28.2024
Job Number:	02196
Project Engineer:	AA
Drawn By:	MK
Checked By:	CS

**2.2**

Streambank Planting Zone 1						
Live Stakes						
Species	Common Name	Indiv. Spacing	Size	Stratum	Wetland Indicator Status	% of Stems
<i>Salix nigra</i>	Black Willow	3-6 ft.	0.5"-1.5" cal.	Canopy	OBL	40%
<i>Salix sericea</i>	Silky Willow	3-6 ft.	0.5"-1.5" cal.	Subcanopy	OBL	30%
<i>Cornus amomum</i>	Silky Dogwood	3-6 ft.	0.5"-1.5" cal.	Subcanopy	FACW	10%
<i>Cephalanthus occidentalis</i>	Buttonbush	3-6 ft.	0.5"-1.5" cal.	Shrub	OBL	10%
<i>Sambucus canadensis</i>	Elderberry	3-6 ft.	0.5"-1.5" cal.	Shrub	FACW	10%
<b>Total</b>						<b>100%</b>
Herbaceous Plugs						
Species	Common Name	Indiv. Spacing	Size	Stratum	Wetland Indicator Status	% of Plugs
<i>Juncus effusus</i>	Soft Rush	4 ft.	1.0"-2.0" plug	Herb	OBL	40%
<i>Carex lurida</i>	Lurid Sedge	4 ft.	1.0"-2.0" plug	Herb	OBL	20%
<i>Carex crinita</i>	Fringed Sedge	4 ft.	1.0"-2.0" plug	Herb	FACW	20%
<i>Scirpus cyperinus</i>	Woolgrass	4 ft.	1.0"-2.0" plug	Herb	OBL	15%
<i>Hibiscus moscheutos</i>	Crimson-Eyed Rosemallow	4 ft.	1.0"-2.0" plug	Herb	OBL	5%
<b>Total</b>						<b>100%</b>

 Casey Creek R3, Casey Creek R4, Afton Branch

Streambank Planting Zone 2						
Live Stakes						
Species	Common Name	Indiv. Spacing	Size	Stratum	Wetland Indicator Status	% of Stems
<i>Salix sericea</i>	Silky Willow	3-6 ft.	0.5"-1.5" cal.	Subcanopy	OBL	50%
<i>Cornus amomum</i>	Silky Dogwood	3-6 ft.	0.5"-1.5" cal.	Subcanopy	FACW	20%
<i>Cephalanthus occidentalis</i>	Buttonbush	3-6 ft.	0.5"-1.5" cal.	Shrub	OBL	15%
<i>Sambucus canadensis</i>	Elderberry	3-6 ft.	0.5"-1.5" cal.	Shrub	FACW	15%
<b>Total</b>						<b>100%</b>
Herbaceous Plugs						
Species	Common Name	Indiv. Spacing	Size	Stratum	Wetland Indicator Status	% of Plugs
<i>Juncus effusus</i>	Soft Rush	4 ft.	1.0"-2.0" plug	Herb	OBL	40%
<i>Carex lurida</i>	Lurid Sedge	4 ft.	1.0"-2.0" plug	Herb	OBL	20%
<i>Carex crinita</i>	Fringed Sedge	4 ft.	1.0"-2.0" plug	Herb	FACW	20%
<i>Carex lupulina</i>	Shallow Sedge	4 ft.	1.0"-2.0" plug	Herb	OBL	15%
<i>Hibiscus moscheutos</i>	Crimson-Eyed Rosemallow	4 ft.	1.0"-2.0" plug	Herb	OBL	5%
<b>Total</b>						<b>100%</b>

 Casey Creek R2, Martha Branch

Buffer Planting Zone						
Bare Root						
Species	Common Name	Indiv. Spacing	Caliper Size	Stratum	Wetland Indicator Status	% of Stems
<i>Quercus alba</i>	White Oak	7-12 ft.	0.25"-1.0"	Canopy	FACU	5%
<i>Quercus michauxii</i>	Swamp Chestnut Oak	7-12 ft.	0.25"-1.0"	Canopy	FACW	8%
<i>Platanus occidentalis</i>	Sycamore	7-12 ft.	0.25"-1.0"	Canopy	FACW	10%
<i>Ulmus americana</i>	American Elm	7-12 ft.	0.25"-1.0"	Canopy	FAC	6%
<i>Magnolia virginiana</i>	Sweetbay Magnolia	7-12 ft.	0.25"-1.0"	Subcanopy	FACW	10%
<i>Populus deltoides</i>	Eastern Cottonwood	7-12 ft.	0.25"-1.0"	Canopy	FAC	8%
<i>Quercus nigra</i>	Water Oak	7-12 ft.	0.25"-1.0"	Canopy	FAC	9%
<i>Quercus phellos</i>	Willow Oak	7-12 ft.	0.25"-1.0"	Canopy	FACW	9%
<i>Taxodium distichum</i>	Bald Cypress	7-12 ft.	0.25"-1.0"	Canopy	OBL	3%
<i>Nyssa biflora</i>	Swamp Tupelo	7-12 ft.	0.25"-1.0"	Canopy	OBL	5%
<i>Acer negundo</i>	Boxelder	7-12 ft.	0.25"-1.0"	Subcanopy	FAC	6%
<i>Betula nigra</i>	River Birch	7-12 ft.	0.25"-1.0"	Canopy	FACW	10%
<i>Ulmus alata</i>	Winged Elm	7-12 ft.	0.25"-1.0"	Canopy	FACU	5%
<i>Morella cerifera</i>	Common Waxmyrtle	7-12 ft.	0.25"-1.0"	Shrub	FAC	3%
<i>Hamamelis virginiana</i>	American Witch-hazel	7-12 ft.	0.25"-1.0"	Shrub	FACU	3%
<b>Total</b>						<b>100%</b>

\*Only canopy species will be included in the average height calculation

Preferred alternate species: Persimmon (*Diospyros virginiana*), Cherrypark oak (*Quercus pagoda*), Red mulberry (*Morus rubra*)



Temporary Seeding				
Pure Live Seed				
Approved Dates	Species Name	Common Name	Stratum	Density (lbs/acre)
August 15 - April 15	<i>Secale cereale</i>	Rye Grain	Herb	90
August 15 - April 15	<i>Avena sativa</i>	Winter Oats	Herb	30
April 15 - August 15	<i>Setaria italica</i>	German Millet	Herb	90
April 15 - August 15	<i>Fagopyrum esculentum</i>	Buckwheat	Herb	30
All Year	<i>Trifolium incarnatum</i>	Crimson Clover	Herb	5
All Year	<i>Trifolium repens</i>	Ladino Clover	Herb	5

Permanent Riparian Seeding					
Pure Live Seed (20 lbs/acre)					
Approved Dates	Species Name	Common Name	Stratum	Wetland Indicator Status	lbs/acre
All Year	<i>Elymus virginicus</i>	Virginia Wildrye	Herb	FAC	3.5
All Year	<i>Panicum virgatum</i>	Switchgrass	Herb	FAC	2.5
All Year	<i>Schizachyrium scoparium</i>	Little Bluestem	Herb	FACU	2.0
All Year	<i>Tripsacum dactyloides</i>	Eastern Gamagrass	Herb	FAC	0.5
All Year	<i>Dichanthelium clandestinum</i>	Deertongue	Herb	FACW	3.0
All Year	<i>Coleataenia anceps</i>	Beaked Panicgrass	Herb	FAC	0.25
All Year	<i>Sorghastrum nutans</i>	Indiangrass	Herb	FACU	1.5
All Year	<i>Juncus tenuis</i>	Path Rush	Herb	FAC	0.5
All Year	<i>Rudbeckia hirta</i>	Blackeyed Susan	Herb	FACU	1.25
All Year	<i>Bidens aristosa</i>	Bur Marigold	Herb	FACW	1.375
All Year	<i>Helianthus angustifolius</i>	Swamp Sunflower	Herb	FACW	0.5
All Year	<i>Coreopsis lanceolata</i>	Lanceleaf Coreopsis	Herb	UPL	1.375
All Year	<i>Chamaecrista fasciculata var. fasciculata</i>	Partridge Pea	Herb	FACU	1.50
All Year	<i>Chasmanthium laxum</i>	Slender Woodoats	Herb	FACW	0.250
<b>Total</b>					<b>20.0</b>

Permanent Seeding Outside Easement					
Approved Dates	Species Name	Common Name	Stratum	Density (lbs/acre)	Percentage
All Year	<i>Lolium arundinaceum</i>	Tall Fescue	Herb	10	100%
<b>Total</b>					<b>100%</b>



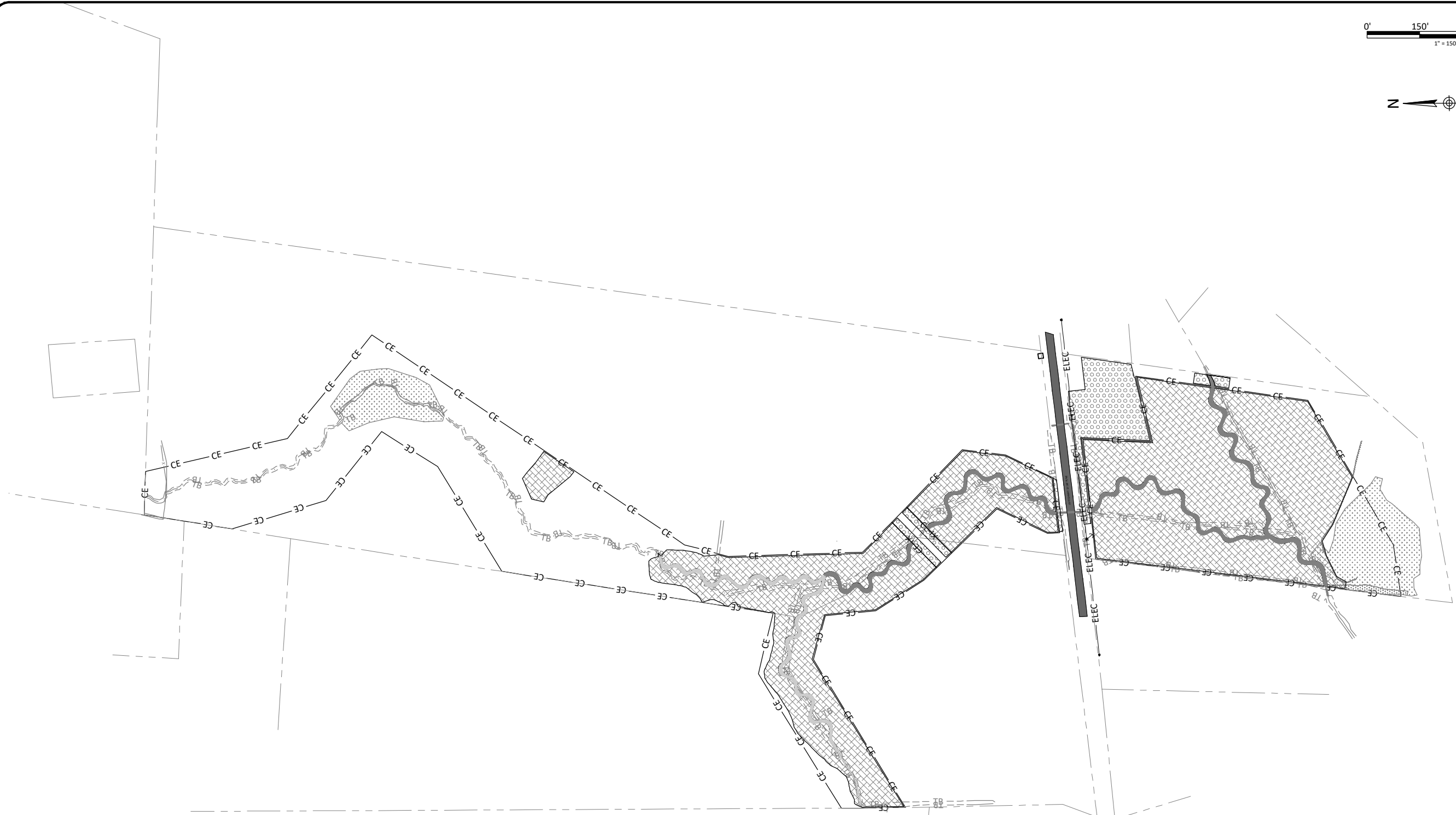
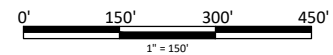
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Casey Creek Mitigation Site  
Wayne County, North Carolina

Planting Tables

Revisions:  
Date: 05.28.2024  
Job Number: 02196  
Project Engineer: AA  
Drawn By: MK  
Checked By: CS

3.1



-  Streambank Planting Zone 1  
Casey Creek R3, Casey Creek R4, Afton Branch
-  Streambank Planting Zone 2  
Casey Creek R2, Martha Branch
-  Buffer Planting Zone
-  Permanent Seeding Outside Easement

Note: Non-hatched areas within easement are currently vegetated and will be planted as needed to achieve target density. Buffer planting will occur within the Limits of Disturbance.

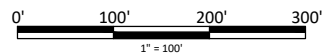
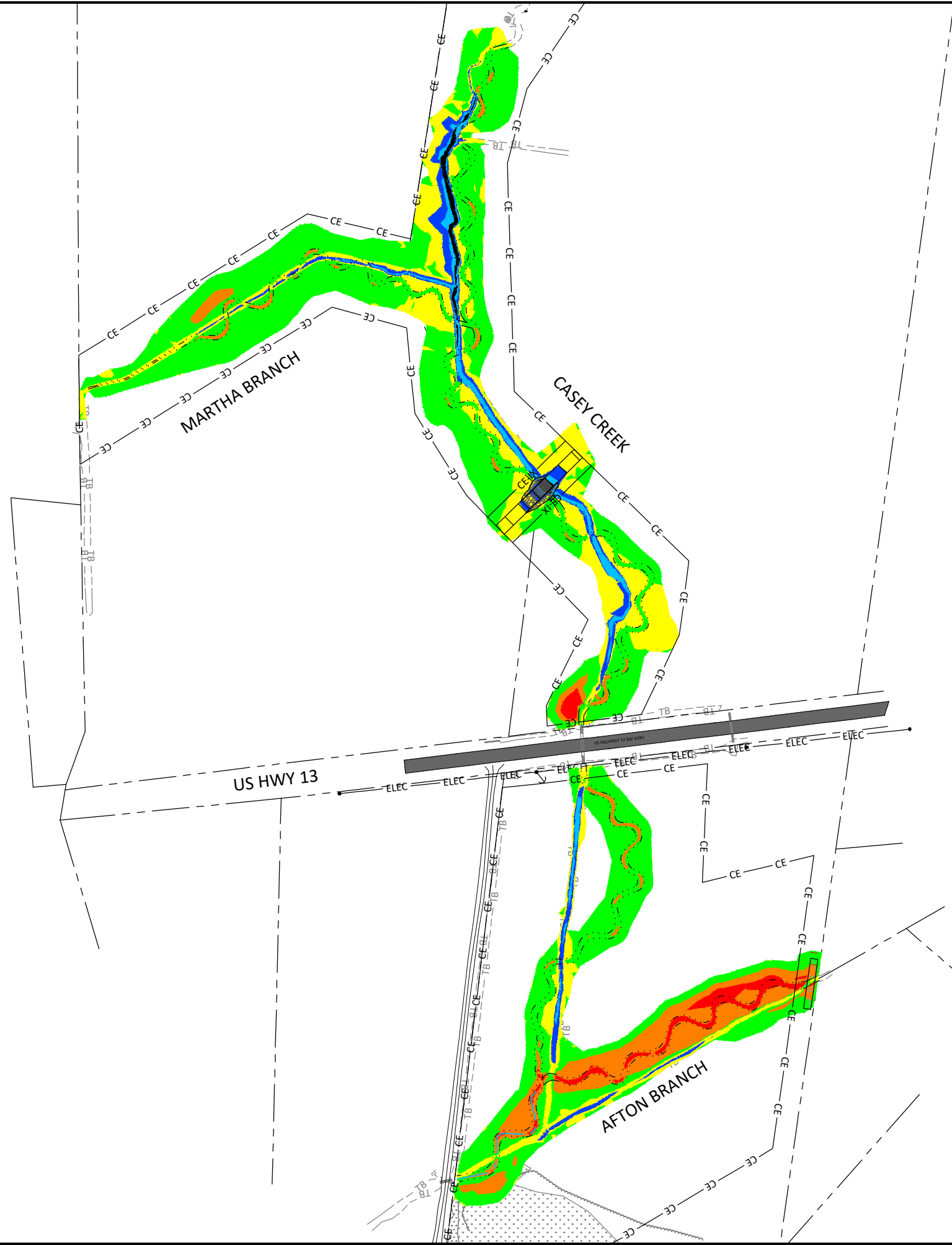
Casey Creek Mitigation Site  
Wayne County, North Carolina  
Planting Plan Overview

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Revisions:

Date:	05.28.2024
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3.2



**LEGEND**

- 5.3'-3.5' OF CUT
- 3.5'-2.0' OF CUT
- 2.0'-0.0' OF CUT
- 0.0'-2.0' OF FILL
- 2.0'-3.5' OF FILL
- 3.5'-5.0' OF FILL
- 5.0'-7.9' OF FILL

**ANTICIPATED SOIL AMENDMENTS (> 2.0' OF CUT)**

AMENDMENT	APPLICATION RATE	APPLICATION AREA	TOTAL AMOUNT
AZOMITE (GRANULAR)	200 LBS/ACRE	0.7 ACRES	140 LBS
CARBON PRO G	400 LBS/ACRE	0.7 ACRES	280 LBS
ORGANIC GRANULATED 2-4-3 FERTILIZER (HOLGANIX OR SIMILAR)	100 LBS/ACRE	0.7 ACRES	70 LBS

- NOTES:  
 1. APPLICATION AREA ESTIMATES DO NOT INCLUDE AREAS INSIDE THE PROPOSED CHANNEL.  
 2. LIME SHALL BE APPLIED TO THE ENTIRE PLANTING AREA AT A RATE OF 2 TONS PER ACRE.

**ANTICIPATED SOIL AMENDMENTS (< 2.0' OF CUT & FILL)**

AMENDMENT	APPLICATION RATE	APPLICATION AREA	TOTAL AMOUNT
AZOMITE (GRANULAR)	100 LBS/ACRE	7.2 ACRES	720 LBS
CARBON PRO G	200 LBS/ACRE	7.2 ACRES	1440 LBS

- NOTES:  
 1. APPLICATION AREA ESTIMATES DO NOT INCLUDE AREAS INSIDE THE PROPOSED CHANNEL.  
 2. LIME SHALL BE APPLIED TO THE ENTIRE PLANTING AREA AT A RATE OF 2 TONS PER ACRE.

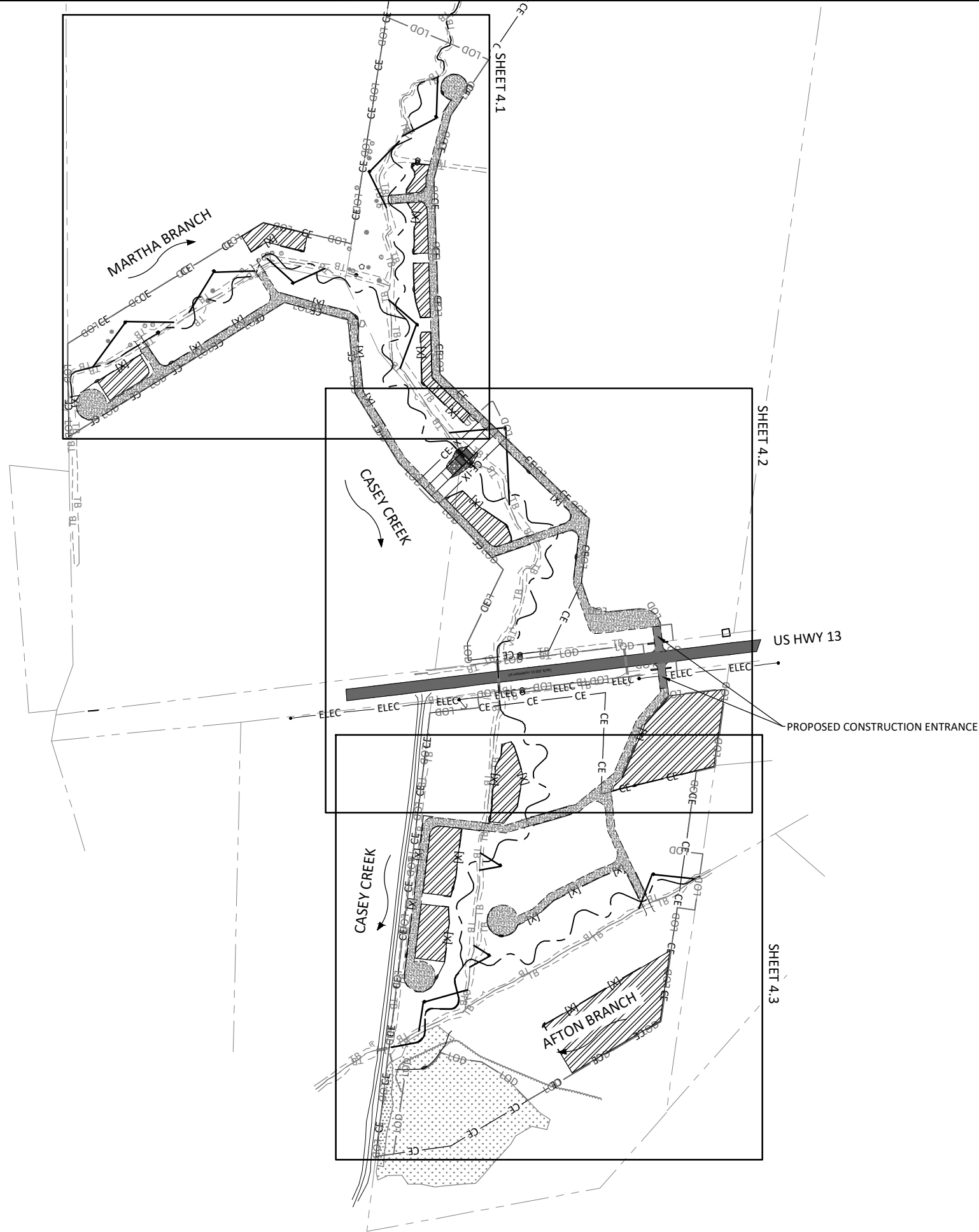
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Casey Creek Mitigation Site  
 Wayne County, North Carolina

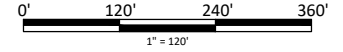
Planting Amendments Plan

Revisions:


Date:	05.28.2024
Job Number:	02196
Project Engineer:	AA
Drawn By:	MK
Checked By:	CS



### Erosion Control Features



- [X] Proposed Temporary Silt Fence  
See Detail 2, Sheet 5.4
- Proposed Temporary Silt Fence Gravel Outlet  
See Detail 3, Sheet 5.4
- Proposed Construction Entrance  
See Detail 1, Sheet 5.5
- Proposed Temporary Stream Crossing - Timber Mat  
See Detail 2, Sheet 5.5
- Proposed Temporary Rock Sediment Dam  
See Detail 4, Sheet 5.5
- Proposed Pump Around System  
See Detail 1, Sheet 5.6
- Proposed Haul Road
- Proposed Stockpile/Staging Area
- Proposed Limits of Disturbance (LOD)



**NOTE:**

THE CONSTRUCTION OF THE EARTHEN HAUL ROADS/ACCESS ROUTES ARE POTENTIAL ROUTES AND WILL NOT BE CONSTRUCTED IF NOT NEEDED.

GROUND STABILIZATION REQUIREMENTS PER NCGO1		
SITE AREA DESCRIPTION	STABILIZATION TIME FRAME	STABILIZATION TIME FRAME EXCEPTIONS
PERIMETER DIKES, SWALES, DITCHES & SLOPES	7 DAYS	NONE
HIGH QUALITY WATER (HQW) ZONES	7 DAYS	NONE
SLOPES STEEPER THAN 3:1	7 DAYS	IF SLOPES ARE 10:1 OR LESS IN LENGTH AND ARE NOT STEEPER THAN 2:1, 14 DAYS ARE ALLOWED
SLOPES FLATTER THAN 3:1	14 DAYS	7 DAYS FOR SLOPES > 50' IN LENGTH
ALL OTHER AREAS WITH SLOPES <4:1	14 DAYS	NONE (EXCEPT FOR PERIMETERS AND HQW)
EXTENSIONS OF TIME MAY BE APPROVED BY THE PERMITTING AUTHORITY BASED ON WEATHER OR SITE-SPECIFIC CONDITIONS THAT MAKE COMPLIANCE PRACTICABLE.		

EROSION CONTROL MEASURES SHALL BE INSPECTED ONCE PER 7 CALENDAR DAYS AND WITHIN 24 HOURS OF A RAINFALL EVENT GREATER THAN 1.0" PER 24 HOUR PERIOD. CORRECTIVE ACTIONS SHALL BE PERFORMED AS SOON AS POSSIBLE BEFORE THE NEXT STORM EVENT. RECORDS MUST BE KEPT ON-SITE AND AVAILABLE FOR REVIEW DURING CONSTRUCTION AND MUST BE MAINTAINED FOR 3 YEARS AND AVAILABLE UPON REQUEST. A RAIN GAUGE MUST BE INSTALLED AT THE SITE.

LIMIT OF DISTURBANCE = 17.40 ACRES

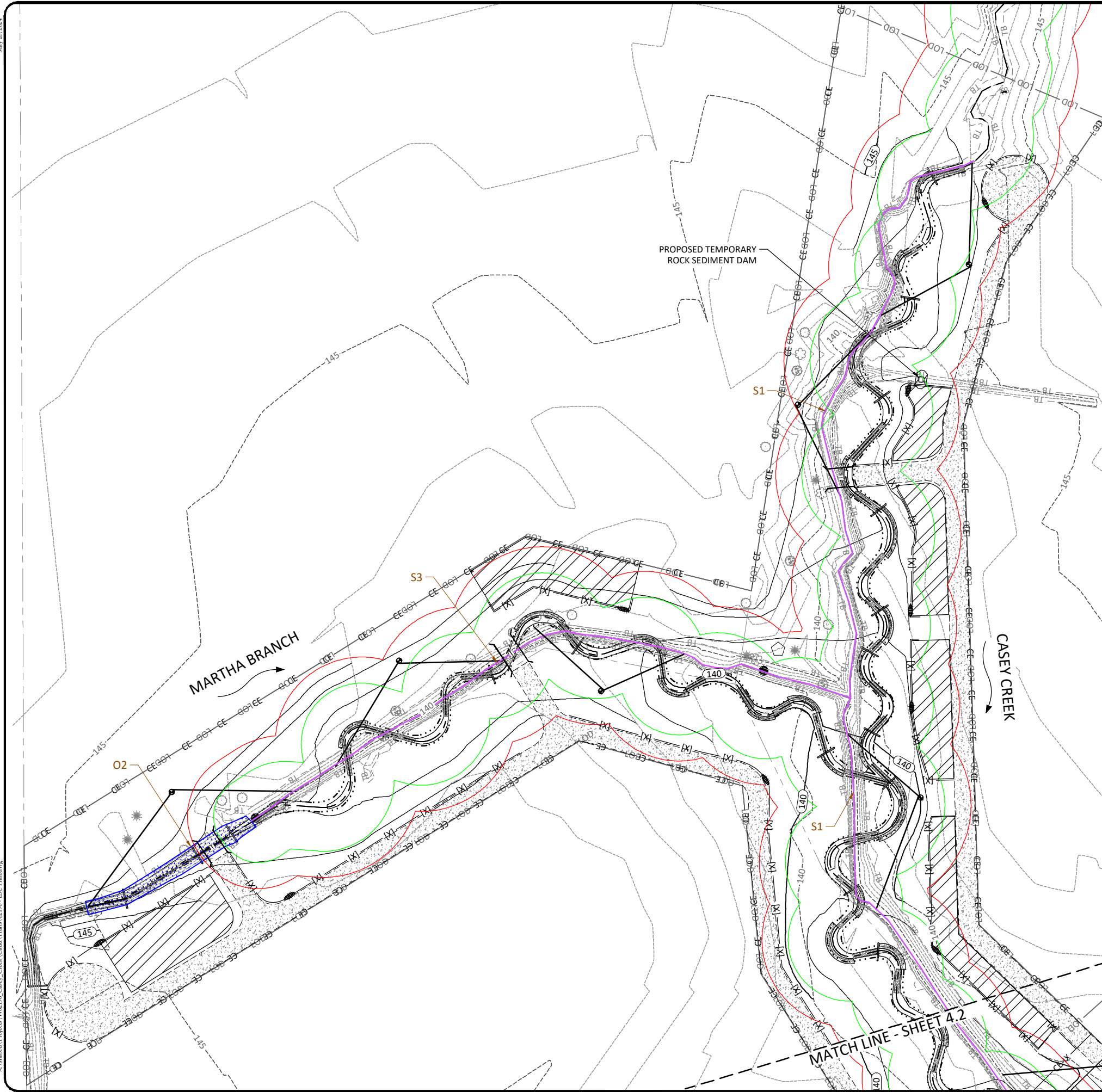
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Wayne County, North Carolina  
Erosion and Sediment Control Plan Overview

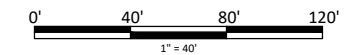
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4.0



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- Existing Buffer Zone A
- Existing Buffer Zone B

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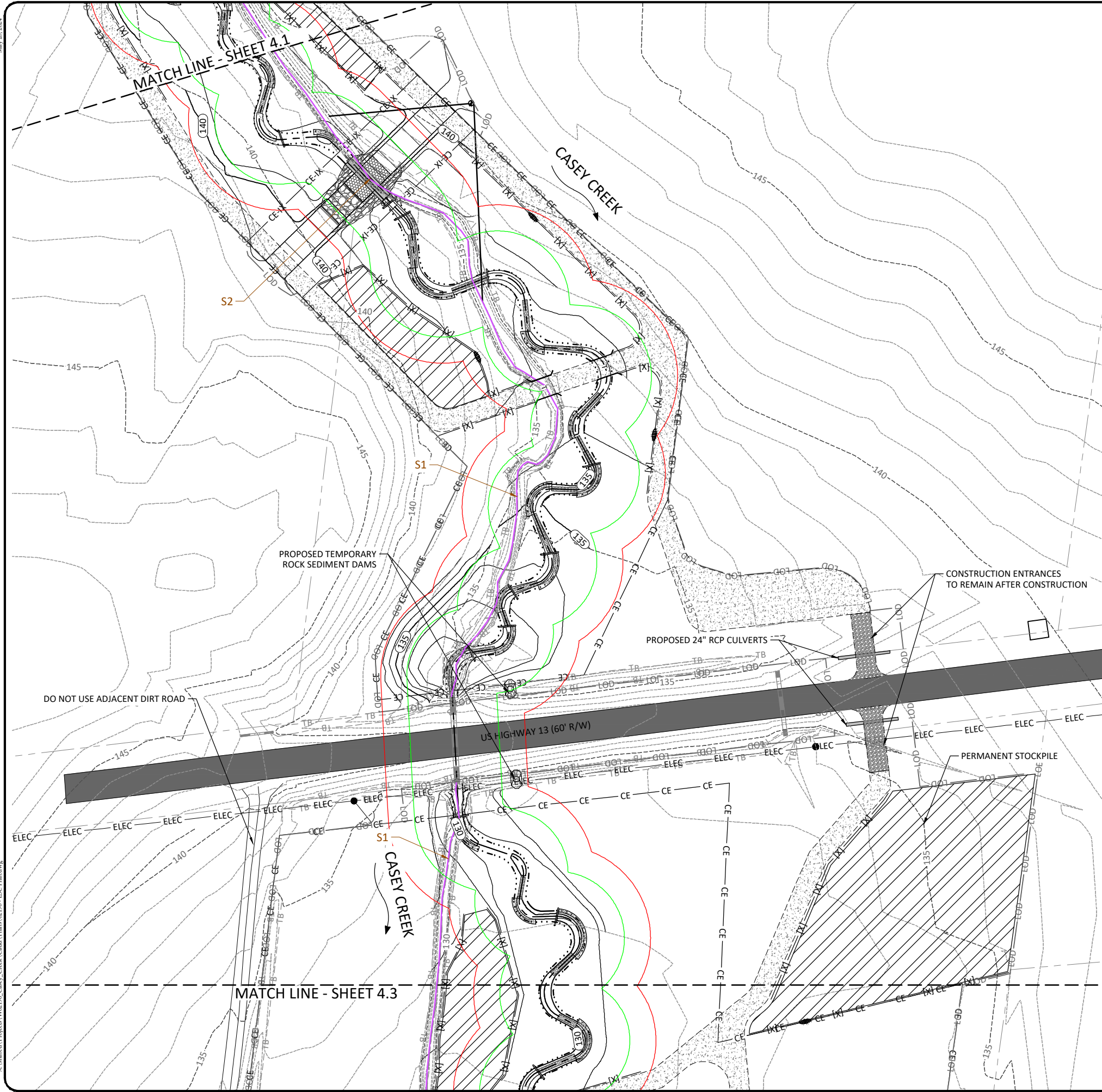
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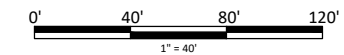
Casey Creek Mitigation Site  
Wayne County, North Carolina  
Erosion and Sediment Control Plan

Revisions

Date: 05.28.2024  
Job Number: 02196  
Project Engineer: AA  
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### Erosion Control Features



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- [Symbol] Permanent Open Water Impact Area
- [Symbol] Permanent Stream Impact
- [Symbol] Existing Buffer Zone A
- [Symbol] Existing Buffer Zone B

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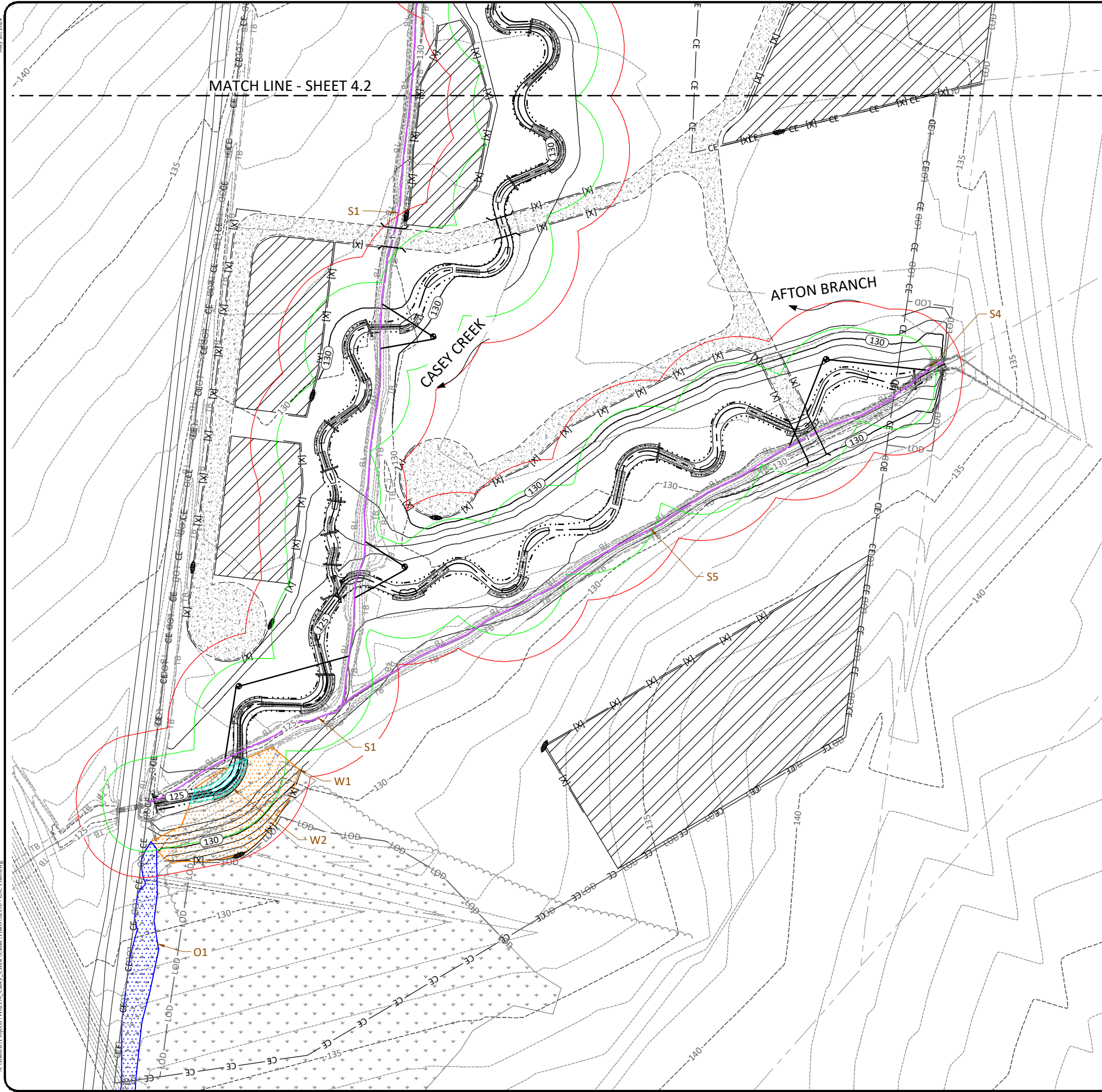
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Wayne County, North Carolina  
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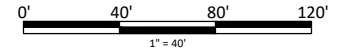
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### Erosion Control Features



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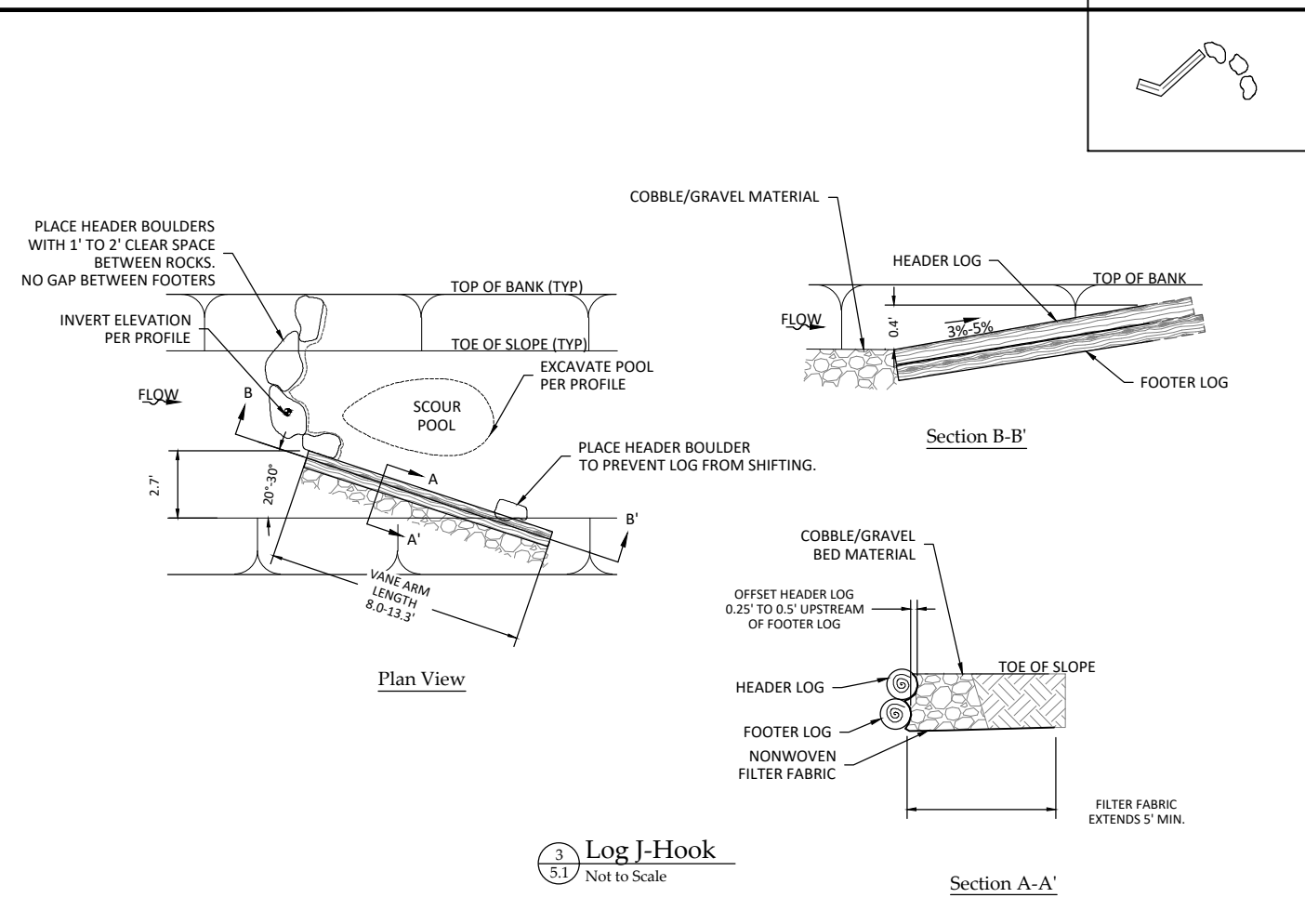
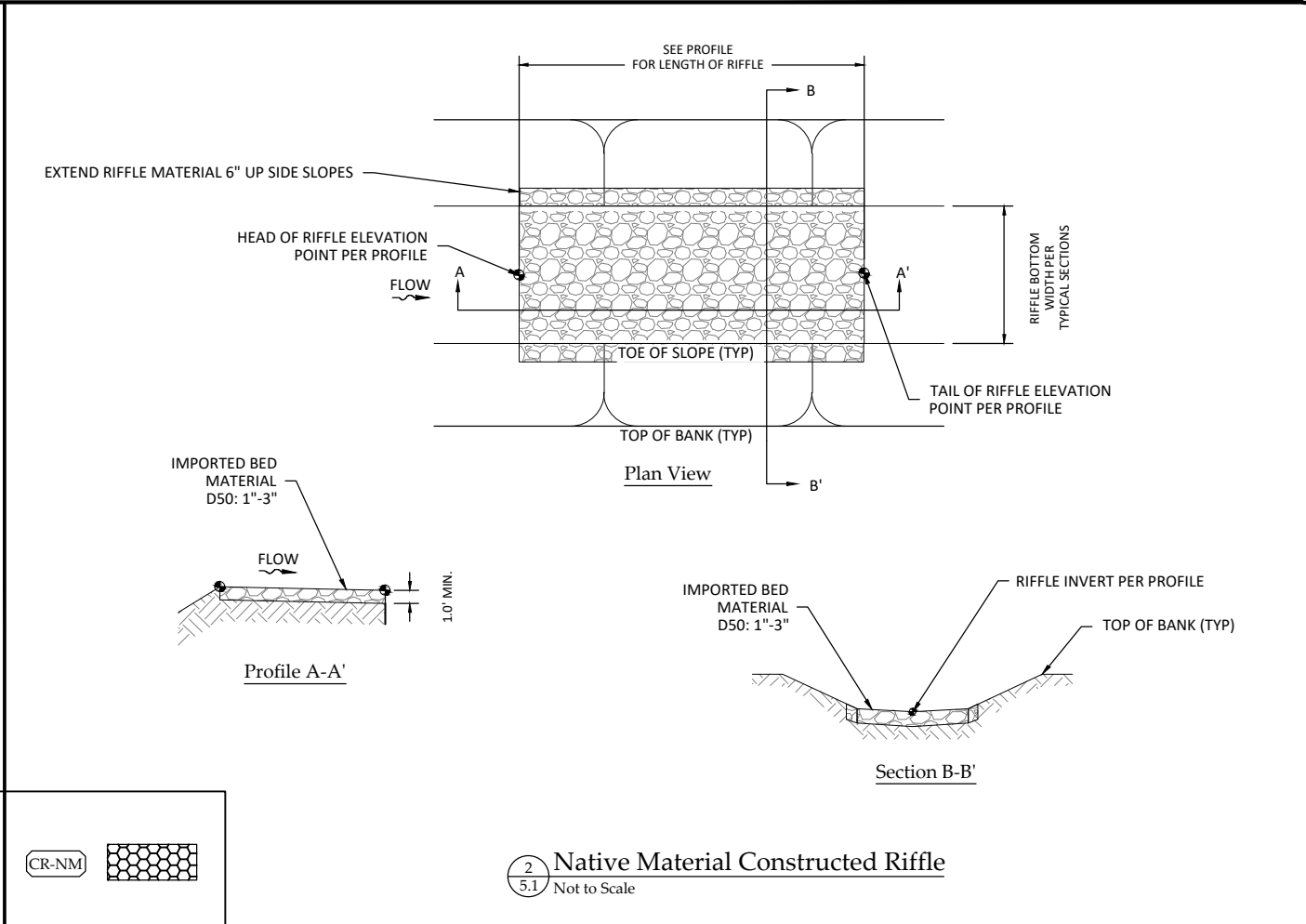
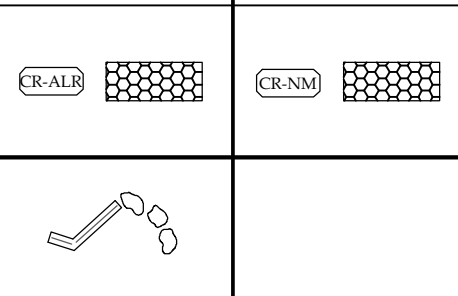
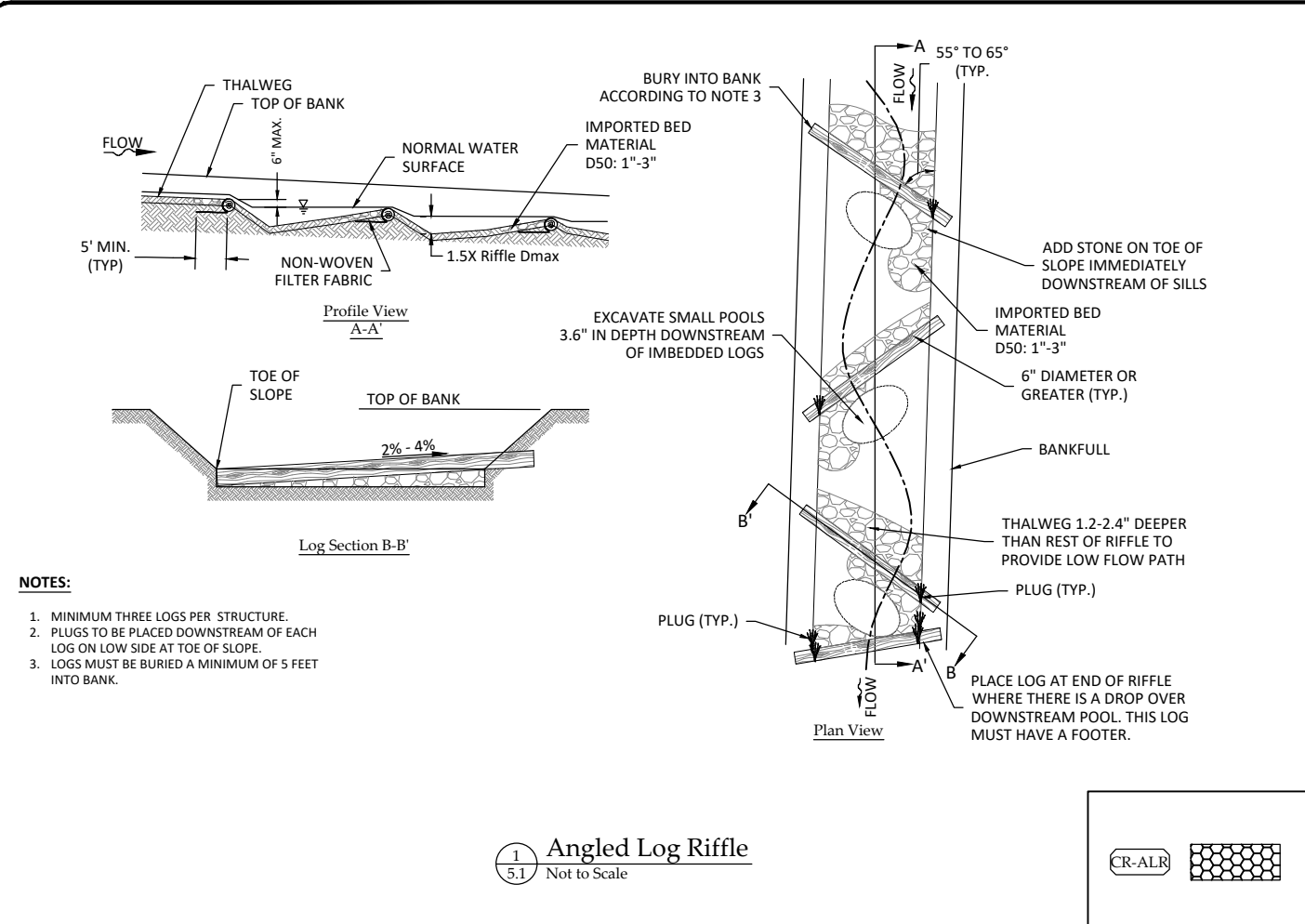
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 Wayne County, North Carolina  
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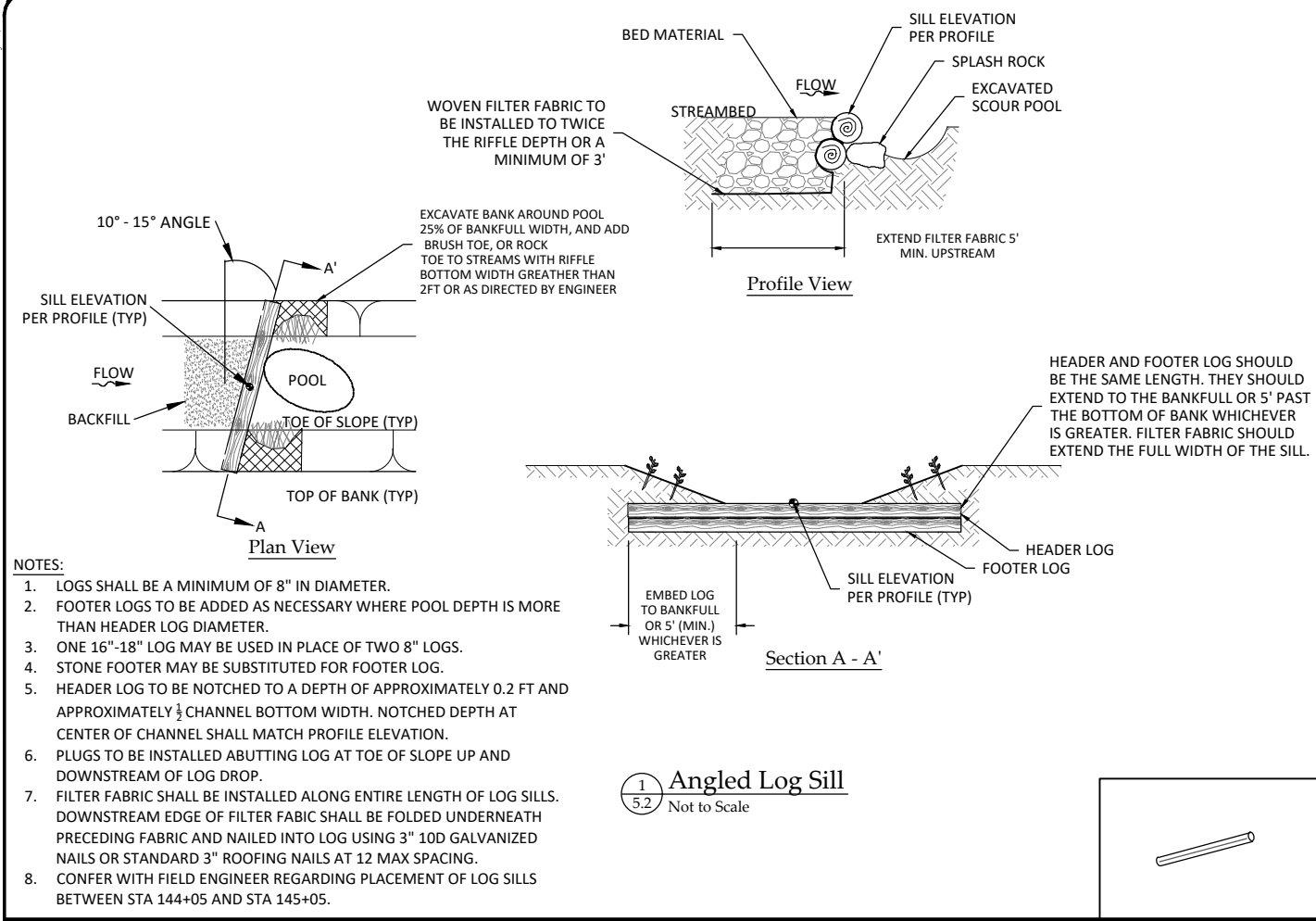
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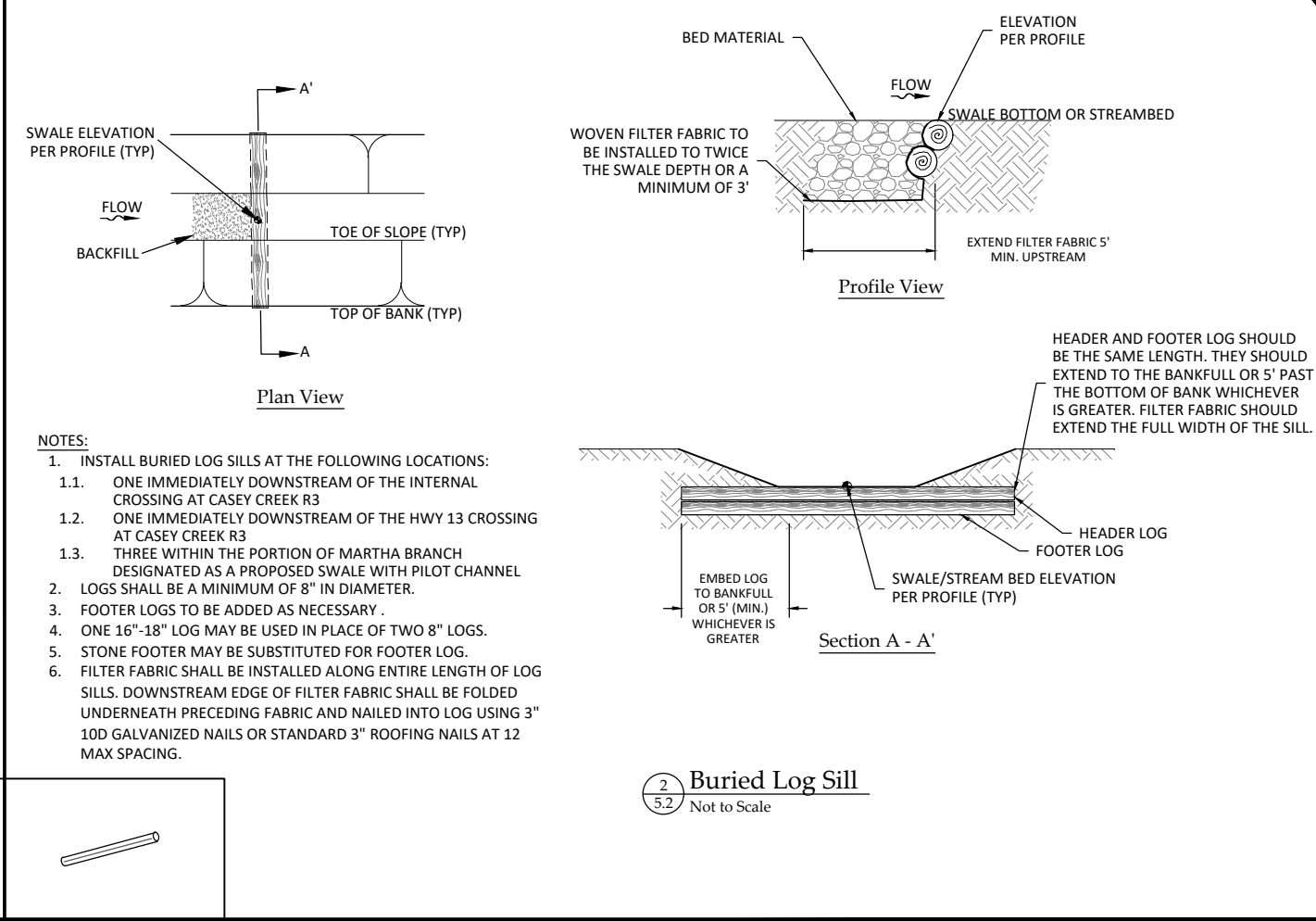
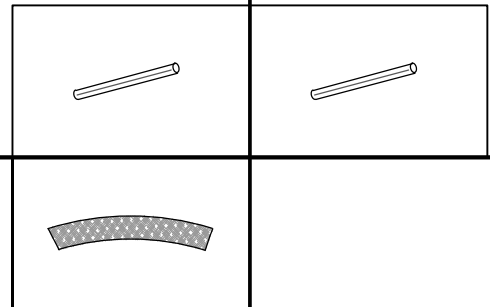


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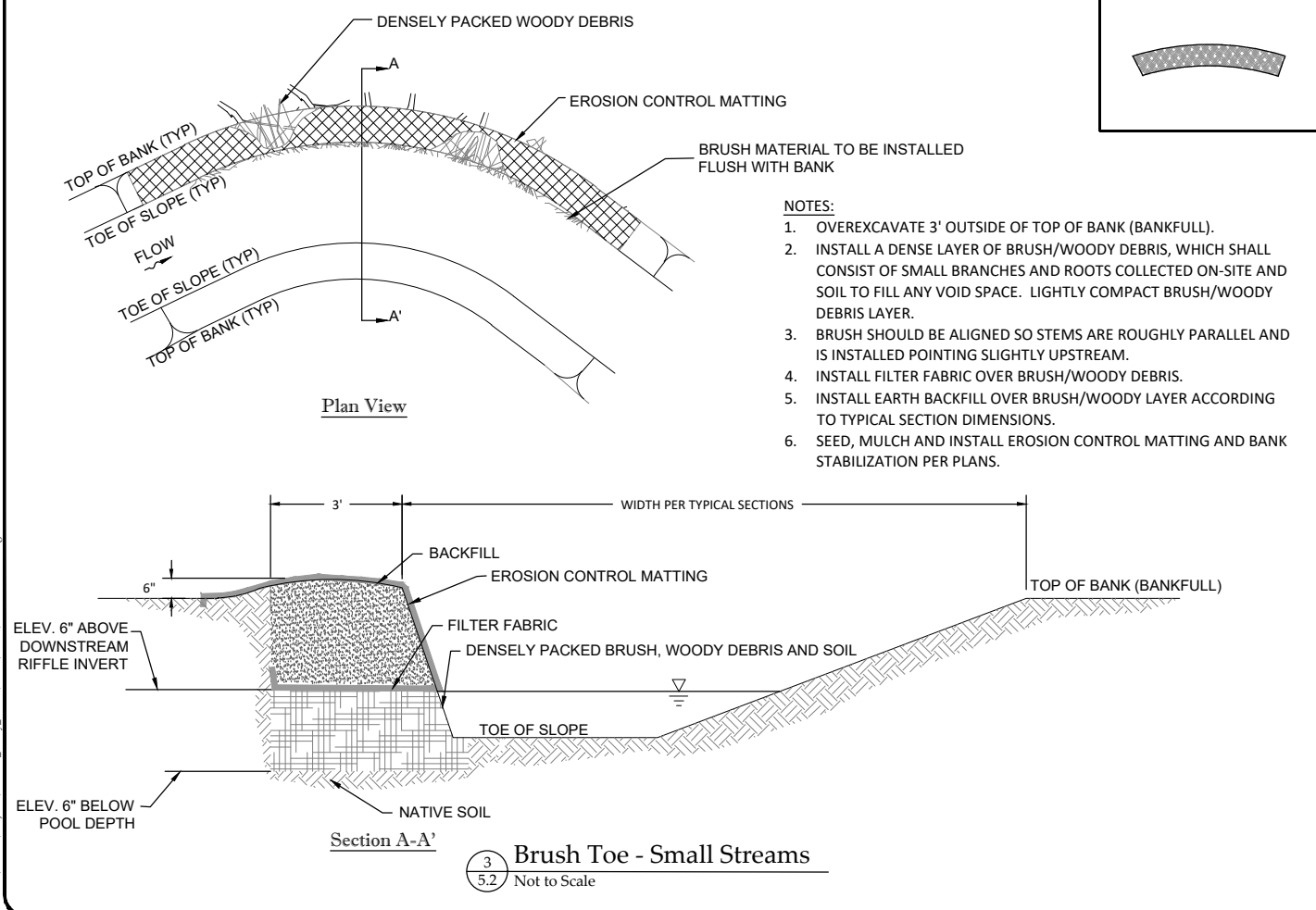
Date: 05.28.2024	Job Number: 02196	Project Engineer: AA	Drawn By: MK	Checked By: GS
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1 Angled Log Sill  
 5.2 Not to Scale



2 Buried Log Sill  
 5.2 Not to Scale



3 Brush Toe - Small Streams  
 5.2 Not to Scale

**RIFFLE MATERIAL TABLE - ALL RIFFLE TYPES**

REACH	BOTTOM WIDTH (FT)	RIFFLE THICKNESS (IN)	RIFFLE MATERIAL STONE SIZE EQUIVALENTS (% OF MATRIX)
Casey Creek Reach 2	3.5	12	70% Class A, 30% ABC
Casey Creek Reach 3	3.4	12	80% Class A, 20% ABC
Casey Creek Reach 4	3.0	12	40% Class A, 60% ABC
Martha Branch	3.3	12	20% Class A, 80% ABC
Afton Branch	4.5	12	20% Class A, 80% ABC

**NOTES:**  
 1. ALL RIFFLE MATERIAL SHALL BE COMPACTED IN LIFTS AT A THICKNESS NOT TO EXCEED DMAX.

**MINIMUM BOULDER DIMENSIONS**

DIMENSIONS	ALL REACHES
X (FT)	0.5
Y (FT)	1
Z (FT)	1.5

**MINIMUM LOG DIMENSIONS**

DIMENSIONS	ALL REACHES
DIAMETER (IN)	8

4 Material Tables  
 5.2 Not to Scale

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Casey Creek Mitigation Site  
 Wayne County, North Carolina

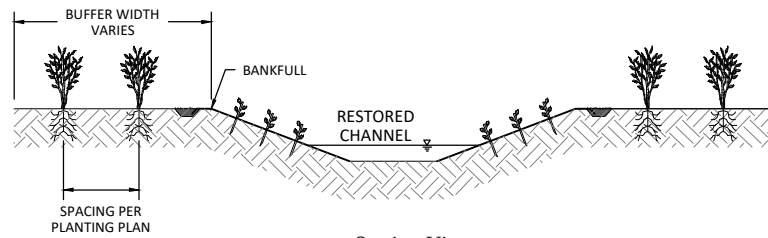
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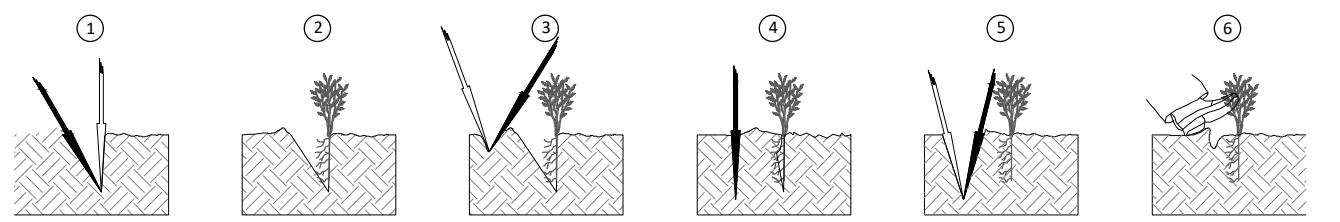
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Section View

**DIBBLE BAR**  
PLANTING BAR SHALL HAVE A BLADE WITH A TRIANGULAR CROSS-SECTION, AND SHALL BE 12 INCHES LONG, 4 INCHES WIDE AND 1 INCH THICK AT CENTER.

**ROOTING PRUNING**  
ALL ROOTS SHALL BE PRUNED TO AN APPROPRIATE LENGTH TO PREVENT J-ROOTING.



1. INSERT THE DIBBLE, OR SHOVEL, STRAIGHT DOWN INTO THE SOIL TO THE FULL DEPTH OF THE BLADE AND PULL BACK ON THE HANDLE TO OPEN THE PLANTING HOLE. (DO NOT ROCK THE SHOVEL BACK AND FORTH AS THIS CAUSES SOIL IN THE PLANTING HOLE TO BE COMPACTED, INHIBITING ROOT GROWTH.)

2. REMOVE THE DIBBLE, OR SHOVEL, AND PUSH THE SEEDLING ROOTS DEEP INTO THE PLANTING HOLE. PULL THE SEEDLING BACK UP TO THE CORRECT PLANTING DEPTH (THE ROOT COLLAR SHOULD BE 1 TO 3 INCHES BELOW THE SOIL SURFACE). GENTLY SHAKE THE SEEDLING TO ALLOW THE ROOTS TO STRAIGHTEN OUT. DO NOT TWIST OR SPIN THE SEEDLING OR LEAVE THE ROOTS J-ROOTED.

3. INSERT THE DIBBLE, OR SHOVEL, SEVERAL INCHES IN FRONT OF THE SEEDLING AND PUSH THE BLADE HALFWAY INTO THE SOIL. TWIST AND PUSH THE HANDLE FORWARD TO CLOSE THE TOP OF THE SLIT TO HOLD THE SEEDLING IN PLACE.

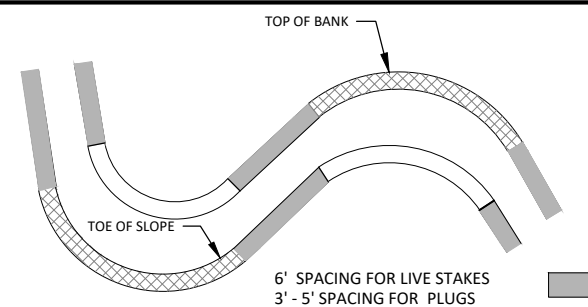
4. PUSH THE DIBBLE, OR SHOVEL, DOWN TO THE FULL DEPTH OF THE BLADE.

5. PULL BACK ON THE HANDLE TO CLOSE THE BOTTOM OF THE PLANTING HOLE. THEN PUSH FORWARD TO CLOSE THE TOP, ELIMINATING AIR POCKETS AROUND THE ROOT.

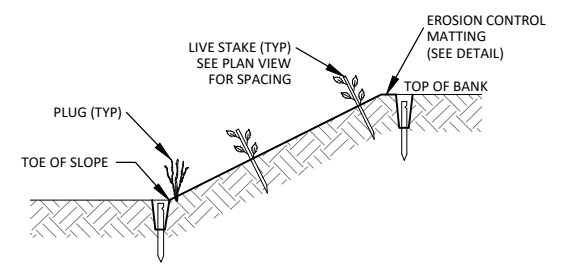
6. REMOVE THE DIBBLE, OR SHOVEL, AND CLOSE AND FIRM UP THE OPENING WITH YOUR HEEL. BE CAREFUL TO AVOID DAMAGING THE SEEDLING.

- NOTES:**
- ALL SOILS WITHIN THE BUFFER PLANTING AREA SHALL BE DISKED, AS REQUIRED, PRIOR TO PLANTING.
  - ALL PLANTS SHALL BE PROPERLY HANDLED PRIOR TO INSTALLATION TO INSURE SURVIVAL.

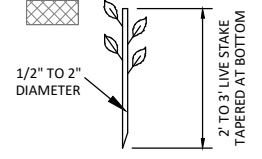
1 Bare Root Planting  
5.3 Not to Scale



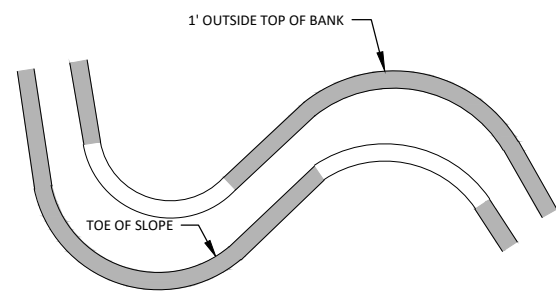
Plan View - Zone 1



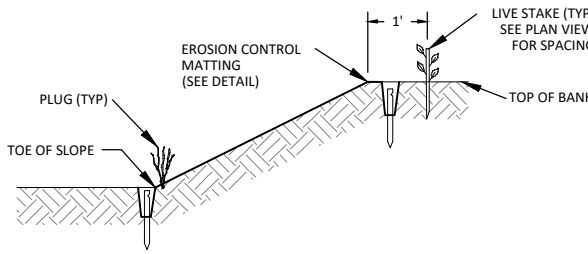
Section View - Zone 1



Live Stake Detail



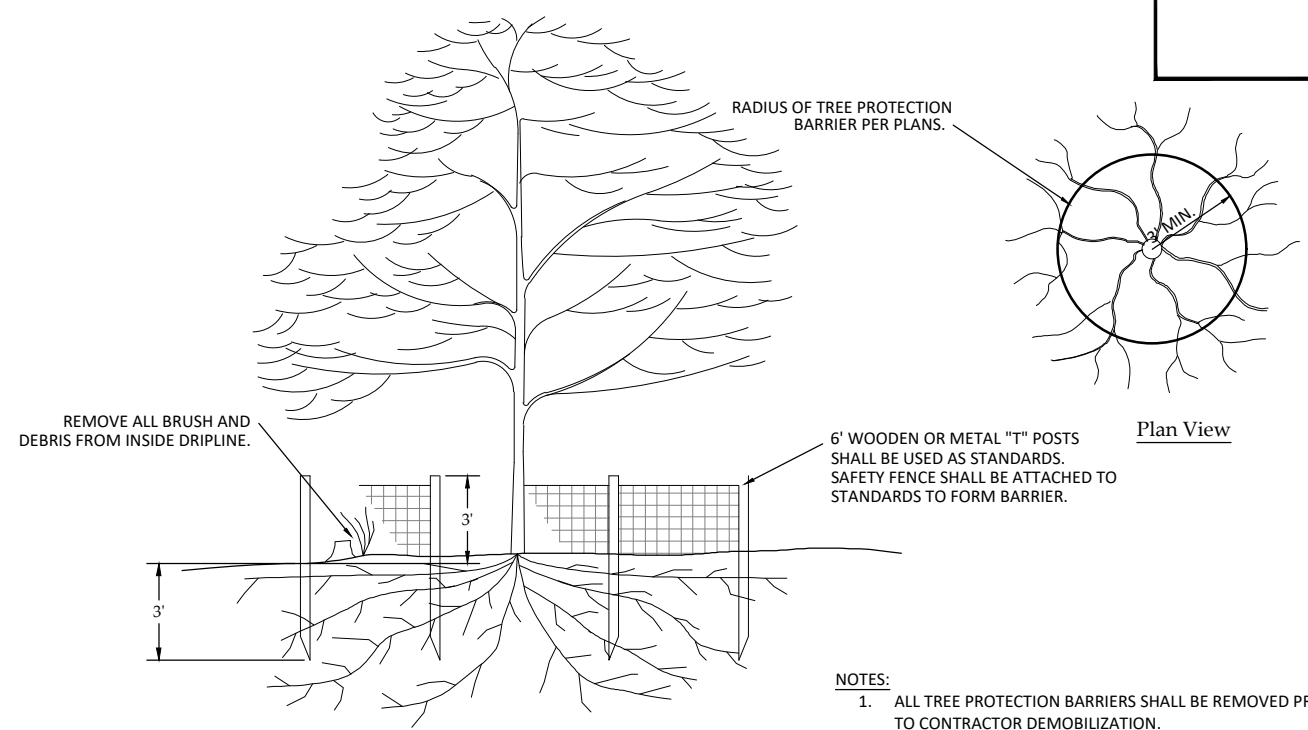
Plan View - Zone 2



Section View - Zone 2

- NOTE:**
- LIVE STAKES TO BE PLANTED IN AREAS AS SHOWN ON PLANS AND DIRECTED BY THE ENGINEER.
  - ZONE 1 CORRESPONDS TO PLANTING FOR CASEY CREEK R3, CASEY CREEK R4, AND AFTON BRANCH. ZONE 2 CORRESPONDS TO PLANTING FOR CASEY CREEK R2 AND MARTHA BRANCH.

2 Live Staking and Plugs  
5.3 Not to Scale



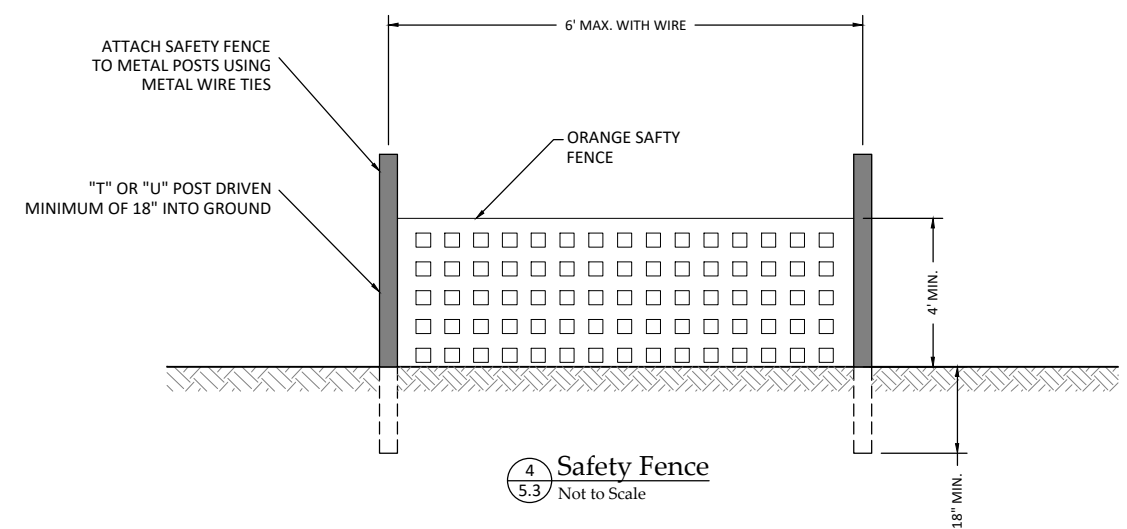
Plan View

Section View

- NOTES:**
- ALL TREE PROTECTION BARRIERS SHALL BE REMOVED PRIOR TO CONTRACTOR DEMOBILIZATION.
  - SEE PLANS FOR LOCATION OF ALL TREE PROTECTION BARRIERS.

3 Tree Protection  
5.3 Not to Scale

MATERIAL SPECIFICATIONS		
PHYSICAL PROPERTY	TESTS	REQUIREMENTS
MATERIAL	N/A	POLYETHYLENE
RECOMENDED COLOR	N/A	"INTERNATIONAL ORANGE"
TENSILE YIELD	ASTM D638	AVE. 2000 LBS. PER 4' WIDE
ULTIMATE TENSILE STRENGTH	ASTM D638	AVE. 2900 LBS. PER 4' WIDE
ELONGATION AT BREAK (%)	ASTM D638	GREATER THAN 1000%
CHEMICAL RESISTANCE	N/A	INERT TO MOST CHEMICALS AND ACIDS



4 Safety Fence  
5.3 Not to Scale

**DRAFT**

Casey Creek Mitigation Site  
Wayne County, North Carolina

Details

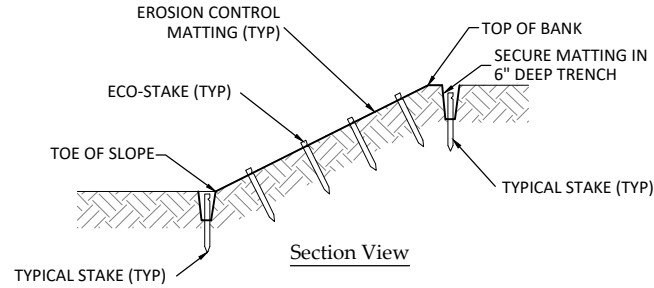
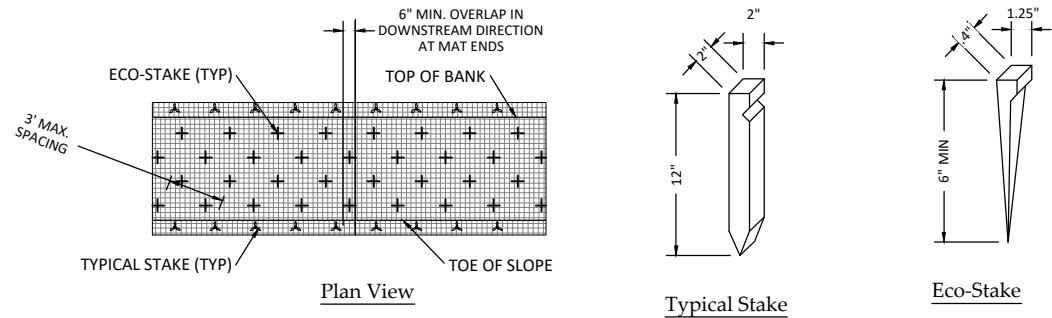
Revisions


Date: 05.28.2024  
Job Number: 02196  
Project Engineer: AA  
Drawn By: MK  
Checked By: GS

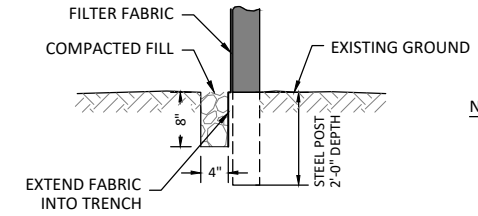
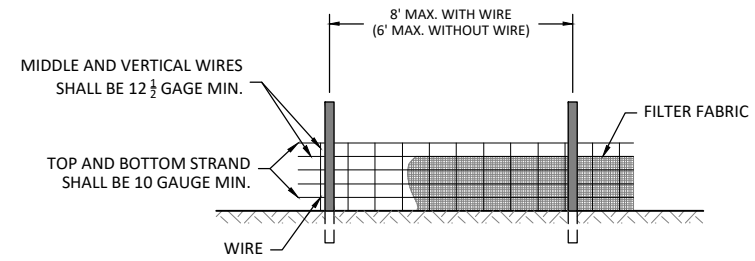
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Sheet

May 28, 2024  
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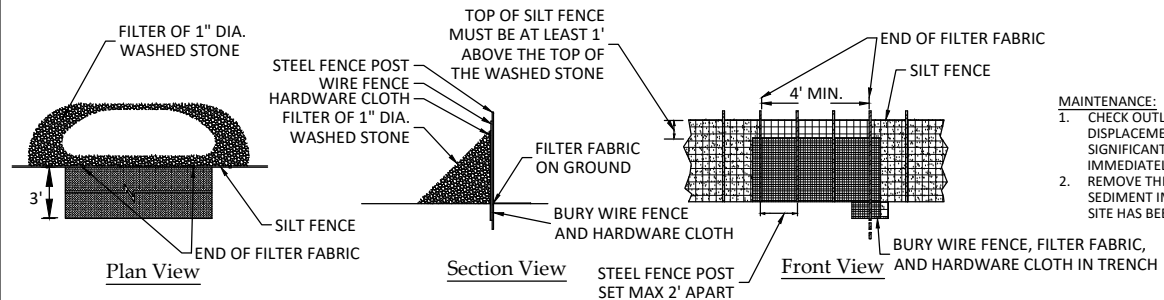
1  
5.4 Erosion Control Matting  
Not to Scale



**NOTES:**

1. USE WIRE A MINIMUM OF 32" IN WIDTH AND WITH A MINIMUM OF 6 LINES OF WIRES WITH 12" STAY SPACING.
2. USE FILTER FABRIC A MINIMUM OF 36" IN WIDTH AND FASTEN ADEQUATELY TO THE WIRES AS DIRECTED BY THE ENGINEER.
3. PROVIDE 5' STEEL POST OF THE SELF-FASTENER ANGLE STEEL TYPE. ANGLE STEEL TYPE.
4. INSPECT AFTER EACH RAIN EVENT AND MAINTAIN ACCORDING TO NCDEQ DESIGN MANUAL.
  - 4.1. SHOULD FABRIC COLLAPSE, TEAR, DECOMPOSE, OR BECOME INEFFECTIVE, REPLACE IMMEDIATELY. REMOVE SEDIMENT DEPOSITS AS NECESSARY TO PROVIDE ADEQUATE STORAGE VOLUME FOR THE NEXT RAIN AND TO REDUCE PRESSURE ON THE FENCE. TAKE CARE TO AVOID UNDERMINING THE FENCE DURING CLEAN OUT.
  - 4.2. REMOVE ALL FENCING MATERIALS AND UNSTABLE SEDIMENT DEPOSITS AND BRING TO GRADE AND STABILIZE IT AFTER THE CONTRIBUTING DRAINAGE AREA HAS BEEN PROPERLY STABILIZED.

2  
5.4 Temporary Silt Fence  
Not to Scale



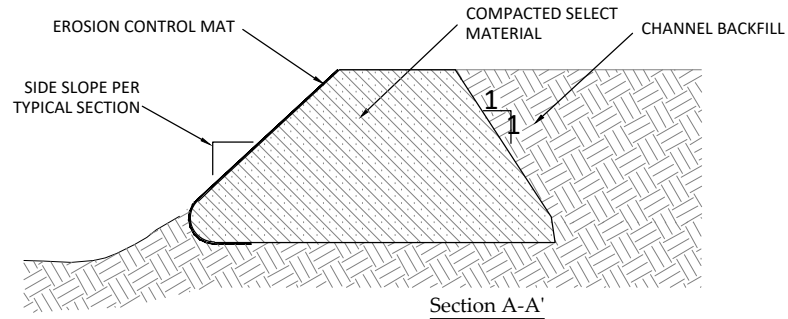
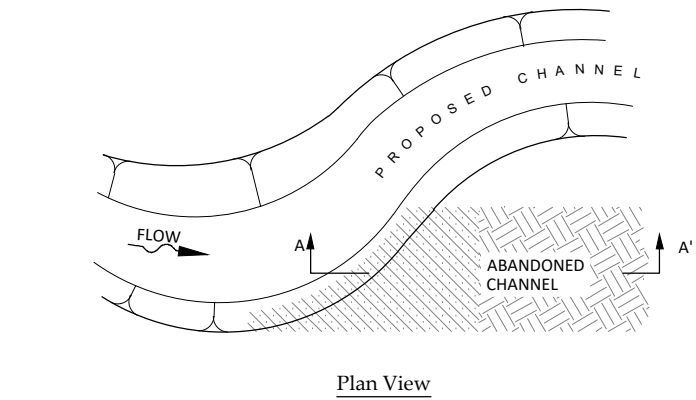
- MAINTENANCE:**
1. CHECK OUTLET FOR EROSION, PIPING, AND ROCK DISPLACEMENT WEEKLY AND AFTER EACH SIGNIFICANT RAINFALL AND REPAIR IMMEDIATELY.
  2. REMOVE THE STRUCTURE AND ANY UNSTABLE SEDIMENT IMMEDIATELY AFTER CONSTRUCTION SITE HAS BEEN PERMANENTLY STABILIZED.

**INSTALLATION:**  
REFER TO THE PLANS FOR LOCATIONS AND SPECIFICATIONS. DURING INSTALLATION OF THE SILT BARRIER OR SILT FENCE, INSPECT THE INSTALLATION TO DETERMINE IF OUTLETS ARE NEEDED ACCORDING TO THE CRITERIA SET FORTH IN THE SPECIFICATIONS FOR THE BARRIER AND FENCE. IF THERE ARE QUESTIONS OR PROBLEMS WITH THE LOCATION, EXTENT, OR METHOD OF INSTALLATION, CONTACT THE ENGINEER, ARCHITECT, OR RESPONSIBLE PERSONNEL ON THE SITE FOR ASSISTANCE. EROSION CONTROL PERSONNEL HAVE COPIES OF INSTRUCTIONS AND MAY HAVE PHOTOGRAPHS OF PROPERLY INSTALLED OUTLETS AS AN AID TO INSTALLATION.  
IF THE SILT FENCE OUTLET IS NOT INSTALLED CORRECTLY THE FIRST TIME, IT WILL HAVE TO BE REBUILT.  
DETERMINE THE EXACT LOCATION ON THE GROUND BEFORE COMPLETING INSTALLATION OF THE SILT FENCE, TAKING INTO CONSIDERATION:  
INSTALL THE OUTLET AT THE LOWEST POINT (S) IN THE BARRIER OR FENCE WHERE WATER WILL POND.  
INSTALL THE OUTLET WHERE IT IS ACCESSIBLE FOR INSTALLATION, MAINTENANCE, AND REMOVAL.  
**ALLOW AT LEAST:**  
15 FEET BETWEEN THE BARRIER OR FENCE AND SINGLE-STORY BUILDINGS.  
25 FEET FOR FORK LIFTS BETWEEN THE BARRIER OR FENCE AND MULTIPLE-STORY BUILDINGS.  
10 FEET BETWEEN THE BARRIER OR FENCE AND THE TOE OF FILL SLOPES.  
PLACE THE OUTLET SO THAT WATER FLOWING THROUGH IT WILL NOT CREATE AN EROSION HAZARD BELOW. AVOID STEEP SLOPES BELOW THE OUTLET AND AREAS WITHOUT PROTECTIVE VEGETATION. USE SLOPE DRAINS IF NECESSARY.  
DETERMINE THE LOCATION OF THE OUTLET: FOR A SILT BARRIER, WHEN THE TRENCH IS DUG TO BURY THE BOTTOM OF THE FABRIC BECAUSE THE BARRIER WILL BE OMITTED AT THE OUTLET; FOR A SILT FENCE, WHEN THE WIRE FENCE IS IN PLACE BECAUSE THE FILTER FABRIC WILL BE OMITTED AT THE OUTLET.  
REFER TO THE ILLUSTRATIONS OF THE OUTLET IN THE PLAN.  
CLEAR STUMPS AND ROOTS FROM THE LOCATION OF THE OUTLET. CLEAR ADEQUATE ACCESS FOR THE EQUIPMENT NEEDED FOR INSTALLATION, MAINTENANCE, AND REMOVAL.

**FOR A SILT BARRIER:**  
JUST BELOW THE GAP IN THE BARRIER, PLACE A LAYER OF FILTER FABRIC ON THE GROUND TO PROTECT THE SOIL FROM EROSION BY OUTFLOW FROM THE OUTLET; PLACE 6 INCHES OF THE UPPER EDGE IN THE TRENCH. STAKE THE REMAINING EDGES OF THE FABRIC TO HOLD IT IN PLACE.  
ALONG THE GAP WHERE THE OUTLET WILL GO, PLACE STEEL FENCE POSTS FOR STRENGTH. THE POSTS MUST BE A MAXIMUM OF 2 FEET APART AND DRIVEN INTO SOLID GROUND AT LEAST 18 INCHES.  
PLACE HARDWARE CLOTH (WELDED GALVANIZED SCREEN WITH SQUARE 1/4 - 1/2-INCH HOLES) ON THE UPHILL SIDE OF THE POSTS TO HOLD THE WASHED STONE IN PLACE. PUT 6 INCHES OF THE BOTTOM OF THE CLOTH IN THE TRENCH AND FASTEN IT TO THE POSTS WITH LENGTHS OF WIRE.  
BURY THE BOTTOM OF THE HARDWARE CLOTH AND THE UPPER EDGE OF THE FILTER FABRIC BELOW THE OUTLET IN THE TRENCH AND COMPACT THE FILL.  
PLACE A FILTER OF 1-INCH DIAMETER WASHED STONE ON THE UPHILL SIDE OF THE OUTLET. PILE THE STONE UP TO THE TOP OF THE HARDWARE CLOTH AND OVER THE JOINT BETWEEN THE OUTLET AND THE BARRIER.

**FOR A SILT FENCE:**  
JUST BELOW THE GAP IN THE BARRIER, PLACE A LAYER OF FILTER FABRIC ON THE GROUND TO PROTECT THE SOIL FROM EROSION BY OUTFLOW FROM THE OUTLET; PLACE 6 INCHES OF THE UPPER EDGE IN THE TRENCH. STAKE THE OTHER EDGES OF THE FABRIC TO HOLD IT IN PLACE.  
ALONG THE GAP WHERE THE OUTLET WILL GO, PLACE ADDITIONAL STEEL FENCE POSTS FOR STRENGTH. THE POSTS MUST BE A MAXIMUM OF 2 FEET APART AND DRIVEN INTO SOLID GROUND AT LEAST 18 INCHES.  
PLACE HARDWARE CLOTH (WELDED GALVANIZED SCREEN WITH SQUARE 1/4 - 1/2-INCH HOLES) ON THE UPHILL SIDE OF THE POSTS TO HOLD THE WASHED STONE IN PLACE. PUT 6 INCHES OF THE BOTTOM OF THE CLOTH IN THE TRENCH AND FASTEN IT TO THE POSTS WITH LENGTHS OF WIRE.  
BURY THE BOTTOM OF THE HARDWARE CLOTH, THE UPPER EDGE OF THE FILTER FABRIC BELOW THE OUTLET, AND THE WIRE FENCE IN THE TRENCH AND COMPACT THE FILL.  
PLACE A FILTER OF 1-INCH DIAMETER WASHED STONE ON THE UPHILL SIDE OF THE OUTLET. PILE THE STONE UP TO THE TOP OF THE HARDWARE CLOTH AND OVER THE JOINT BETWEEN THE OUTLET AND THE SILT FENCE.

3  
5.4 Temporary Silt Fence Gravel Outlet  
Not to Scale



4  
5.4 Channel Plug  
Not to Scale

**DRAFT**

Casey Creek Mitigation Site  
Wayne County, North Carolina

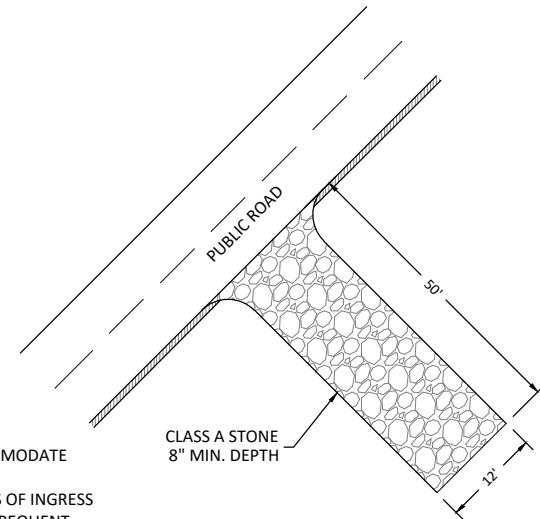
Details

Revisions

Date:	05.28.2024
Job Number:	02196
Project Engineer:	AA
Drawn By:	MK
Checked By:	GS

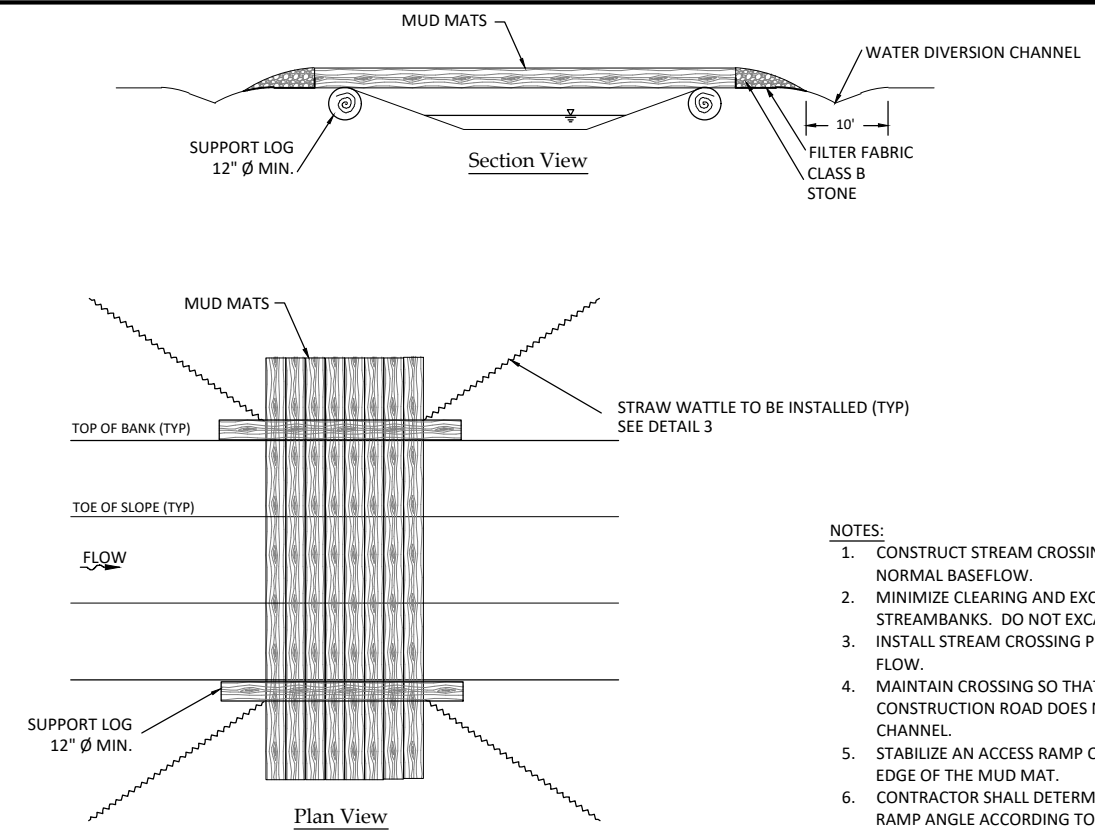
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Sheet



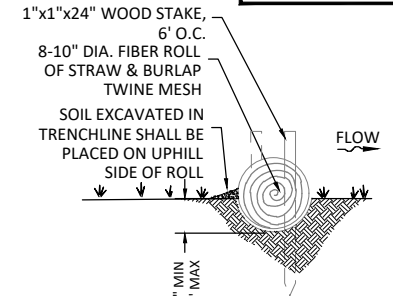
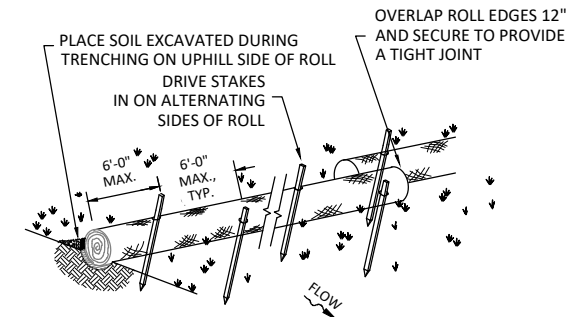
- NOTES:**
1. PROVIDE TURNING RADIUS SUFFICIENT TO ACCOMMODATE LARGE TRUCKS.
  5. LOCATE CONSTRUCTION ENTRANCE AT ALL POINTS OF INGRESS AND EGRESS UNTIL SITE IS STABILIZED. PROVIDE FREQUENT CHECKS OF THE DEVICE AND TIMELY MAINTENANCE.
  6. MUST BE MAINTAINED IN A CONDITION WHICH WILL PREVENT TRACKING OR DIRECT FLOW OF MUD ONTO STREETS. PERIODIC TOP DRESSING WITH STONE WILL BE NECESSARY.
  7. ANY MATERIAL TRACKED ONTO THE ROADWAY MUST BE CLEANED IMMEDIATELY.
  8. USE CLASS A STONE OR OTHER COARSE AGGREGATE APPROVED BY THE ENGINEER.
  9. PLACE FILTER FABRIC BENEATH STONE.
  10. AFTER EACH RAINFALL EVENT, INSPECT ANY STRUCTURE USED TO TRAP SEDIMENT AND CLEAN IT OUT AS NECESSARY. IMMEDIATELY REMOVE ALL OBJECTIONABLE MATERIALS SPILLED, WASHED, OR TRACKED ONTO PUBLIC ROADWAYS.
  11. REMOVE CONSTRUCTION ENTRANCE UPON COMPLETION OF THE PROJECT AND RETURN TO PRE-PROJECT GRADES, ELEVATIONS, AND CONDITIONS, UNLESS DIRECTED TO KEEP CONSTRUCTION ENTRANCE BY LAND OWNER OR ENGINEER.

**1**  
5.5 Construction Entrance  
Not to Scale



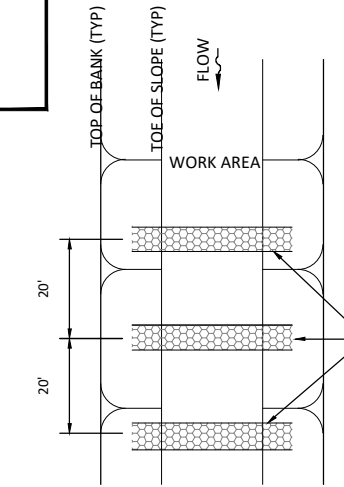
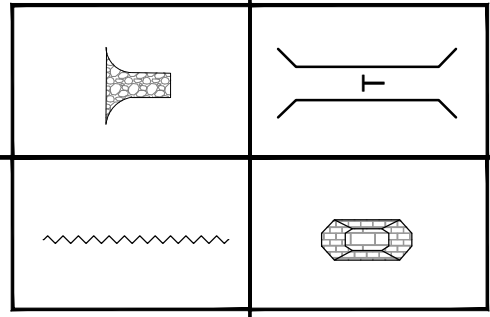
- NOTES:**
1. CONSTRUCT STREAM CROSSING WHEN FLOW IS AT NORMAL BASEFLOW.
  2. MINIMIZE CLEARING AND EXCAVATION OF STREAMBANKS. DO NOT EXCAVATE CHANNEL BOTTOM.
  3. INSTALL STREAM CROSSING PERPENDICULAR TO THE FLOW.
  4. MAINTAIN CROSSING SO THAT RUNOFF IN THE CONSTRUCTION ROAD DOES NOT ENTER EXISTING CHANNEL.
  5. STABILIZE AN ACCESS RAMP OF CLASS B STONE TO THE EDGE OF THE MUD MAT.
  6. CONTRACTOR SHALL DETERMINE AN APPROPRIATE RAMP ANGLE ACCORDING TO EQUIPMENT UTILIZED.
  7. CROSSINGS SHOULD BE MONITORED TO ASSURE CORRECT FUNCTIONING OF MATS, LOOKING FOR ANY DEFECTS OR STRUCTURAL PROBLEMS.
  8. CROSSINGS COVERED IN SOIL OR DEBRIS SHOULD BE CLEANED AND THE MATERIALS REMOVED AND DISPOSED OF IN A STABLE LOCATION.

**2**  
5.5 Temporary Stream Crossing - Timber Mat  
Not to Scale

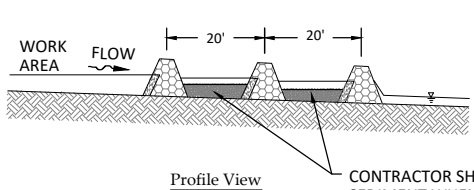


- NOTES:**
1. INSTALL FIBER ROLL ALONG CONTOUR. RUNOFF MUST NOT BE ALLOWED TO RUN UNDER OR AROUND ROLL.
  2. INSPECT STRAW WATTLES ON A REGULAR BASIS AND AFTER EACH RAINFALL EVENT.
  3. WATTLES SHOULD BE MAINTAINED TO ALLOW THE WATER TO FLOW THROUGH, REDUCE VELOCITY AND ALLOW SEDIMENTATION TO OCCUR.
  4. WATTLES SHOULD BE REPLACED IF FIBER BECOMES TOO SATURATED.
  5. STAKES SHOULD BE USED TO ANCHOR THE STRAW WATTLE TO THE GROUND TO PREVENT SCOURING AND WASHOUT.

**3**  
5.5 Straw Wattle  
Not to Scale

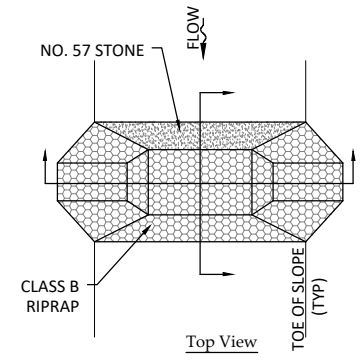


INSTALL AND MAINTAIN THREE CHECK DAMS LOCATED AS SHOWN ON THE PLANS

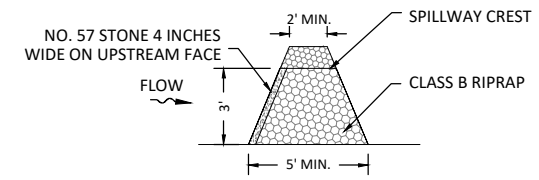


Profile View

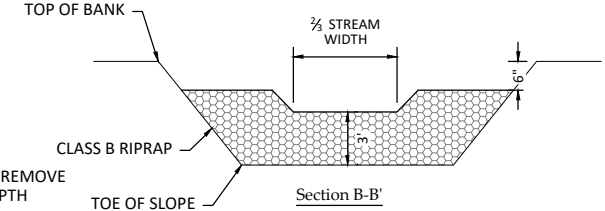
**4**  
5.5 Temporary Rock Sediment Dam  
Not to Scale



Top View



Section A-A'



Section B-B'

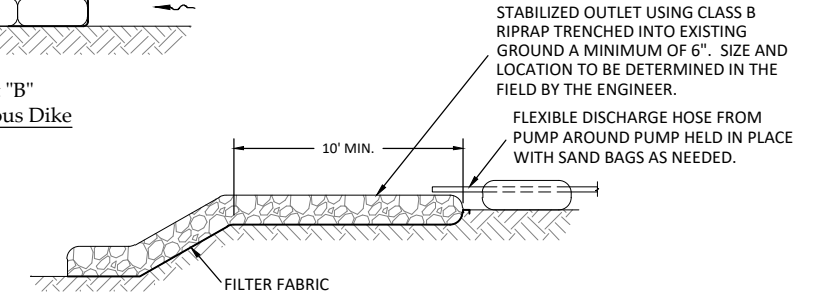
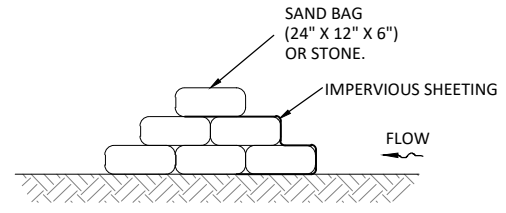
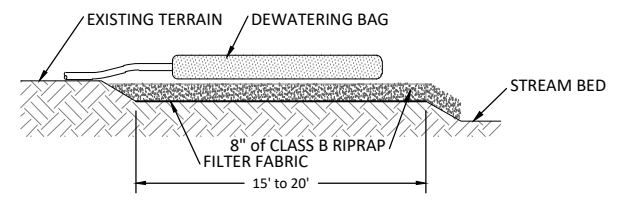
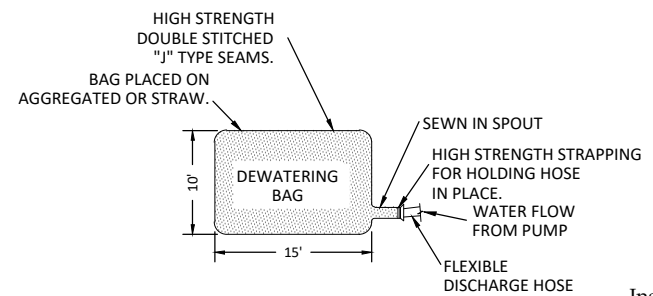
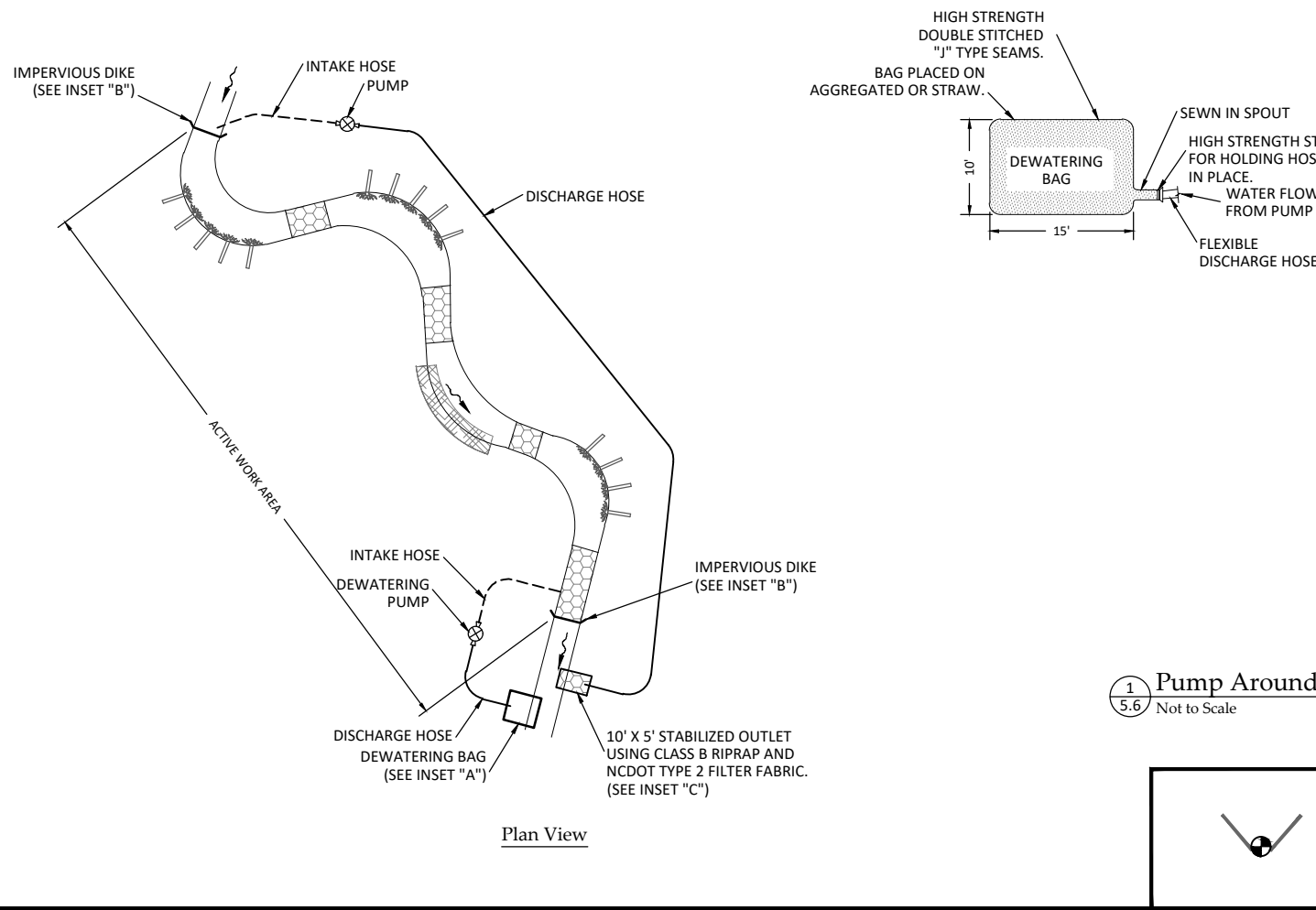
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Casey Creek Mitigation Site  
Wayne County, North Carolina

Details

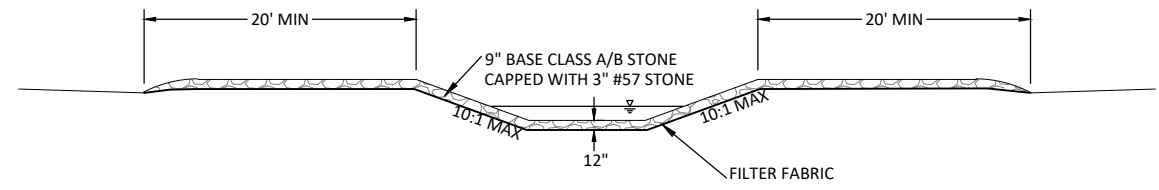
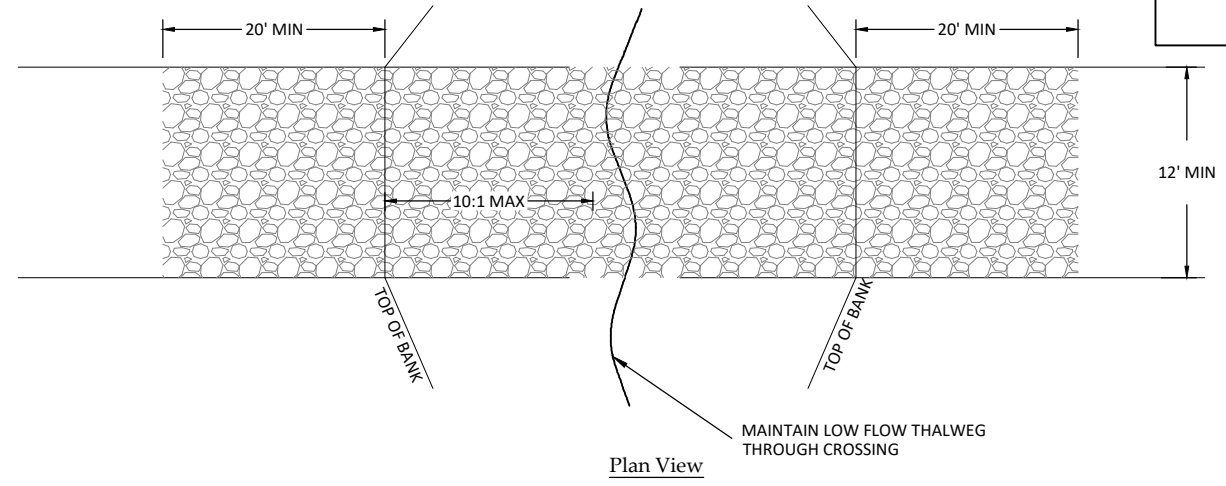
Revisions

Date: 05.28.2024  
Job Number: 02196  
Project Engineer: AA  
Drawn By: MK  
Checked By: GS



**1** Pump Around System  
5.6 Not to Scale

- NOTES:**
1. PROVIDE STABILIZED OUTLET TO STREAMBED.
  2. BAG ON FLAT GROUND OR STAKE AROUND IT TO PREVENT IT ROLLING DOWNHILL.



- NOTE:**
1. THE FORD CROSSING AT THE UP STREAM EXTENTS OF AFTON BRANCH SHALL BE SKEWED DUE TO PROPERTY BOUNDARY.

**2** Permanent Stream Crossing - Ford  
5.6 Not to Scale

**DRAFT**

Casey Creek Mitigation Site  
Wayne County, North Carolina

Details

Revisions

Date:	05.28.2024
Job Number:	02196
Project Engineer:	AA
Drawn By:	MK
Checked By:	CS

**5.6**

**GROUND STABILIZATION AND MATERIALS HANDLING PRACTICES FOR COMPLIANCE WITH THE NCG01 CONSTRUCTION GENERAL PERMIT**

Implementing the details and specifications on this plan sheet will result in the construction activity being considered compliant with the Ground Stabilization and Materials Handling sections of the NCG01 Construction General Permit (Sections E and F, respectively). The permittee shall comply with the Erosion and Sediment Control plan approved by the delegated authority having jurisdiction. All details and specifications shown on this sheet may not apply depending on site conditions and the delegated authority having jurisdiction.

**SECTION E: GROUND STABILIZATION**

Required Ground Stabilization Timeframes		
Site Area Description	Stabilize within this many calendar days after ceasing land disturbance	Timeframe variations
(a) Perimeter dikes, swales, ditches, and perimeter slopes	7	None
(b) High Quality Water (HQW) Zones	7	None
(c) Slopes steeper than 3:1	7	If slopes are 10' or less in length and are not steeper than 2:1, 14 days are allowed
(d) Slopes 3:1 to 4:1	14	-7 days for slopes greater than 50' in length and with slopes steeper than 4:1 -7 days for perimeter dikes, swales, ditches, perimeter slopes and HQW Zones -10 days for Falls Lake Watershed
(e) Areas with slopes flatter than 4:1	14	-7 days for perimeter dikes, swales, ditches, perimeter slopes and HQW Zones -10 days for Falls Lake Watershed unless there is zero slope

**Note:** After the permanent cessation of construction activities, any areas with temporary ground stabilization shall be converted to permanent ground stabilization as soon as practicable but in no case longer than 90 calendar days after the last land disturbing activity. Temporary ground stabilization shall be maintained in a manner to render the surface stable against accelerated erosion until permanent ground stabilization is achieved.

**GROUND STABILIZATION SPECIFICATION**

Stabilize the ground sufficiently so that rain will not dislodge the soil. Use one of the techniques in the table below:

Temporary Stabilization	Permanent Stabilization
<ul style="list-style-type: none"> <li>Temporary grass seed covered with straw or other mulches and tackifiers</li> <li>Hydroseeding</li> <li>Rolled erosion control products with or without temporary grass seed</li> <li>Appropriately applied straw or other mulch</li> <li>Plastic sheeting</li> </ul>	<ul style="list-style-type: none"> <li>Permanent grass seed covered with straw or other mulches and tackifiers</li> <li>Geotextile fabrics such as permanent soil reinforcement matting</li> <li>Hydroseeding</li> <li>Shrubs or other permanent plantings covered with mulch</li> <li>Uniform and evenly distributed ground cover sufficient to restrain erosion</li> <li>Structural methods such as concrete, asphalt or retaining walls</li> <li>Rolled erosion control products with grass seed</li> </ul>

**POLYACRYLAMIDES (PAMS) AND FLOCCULANTS**

- Select flocculants that are appropriate for the soils being exposed during construction, selecting from the *NC DWR List of Approved PAMS/Flocculants*.
- Apply flocculants at or before the inlets to Erosion and Sediment Control Measures.
- Apply flocculants at the concentrations specified in the *NC DWR List of Approved PAMS/Flocculants* and in accordance with the manufacturer's instructions.
- Provide ponding area for containment of treated Stormwater before discharging offsite.
- Store flocculants in leak-proof containers that are kept under storm-resistant cover or surrounded by secondary containment structures.

**EQUIPMENT AND VEHICLE MAINTENANCE**

- Maintain vehicles and equipment to prevent discharge of fluids.
- Provide drip pans under any stored equipment.
- Identify leaks and repair as soon as feasible, or remove leaking equipment from the project.
- Collect all spent fluids, store in separate containers and properly dispose as hazardous waste (recycle when possible).
- Remove leaking vehicles and construction equipment from service until the problem has been corrected.
- Bring used fuels, lubricants, coolants, hydraulic fluids and other petroleum products to a recycling or disposal center that handles these materials.

**LITTER, BUILDING MATERIAL AND LAND CLEARING WASTE**

- Never bury or burn waste. Place litter and debris in approved waste containers.
- Provide a sufficient number and size of waste containers (e.g dumpster, trash receptacle) on site to contain construction and domestic wastes.
- Locate waste containers at least 50 feet away from storm drain inlets and surface waters unless no other alternatives are reasonably available.
- Locate waste containers on areas that do not receive substantial amounts of runoff from upland areas and does not drain directly to a storm drain, stream or wetland.
- Cover waste containers at the end of each workday and before storm events or provide secondary containment. Repair or replace damaged waste containers.
- Anchor all lightweight items in waste containers during times of high winds.
- Empty waste containers as needed to prevent overflow. Clean up immediately if containers overflow.
- Dispose waste off-site at an approved disposal facility.
- On business days, clean up and dispose of waste in designated waste containers.

**PAINT AND OTHER LIQUID WASTE**

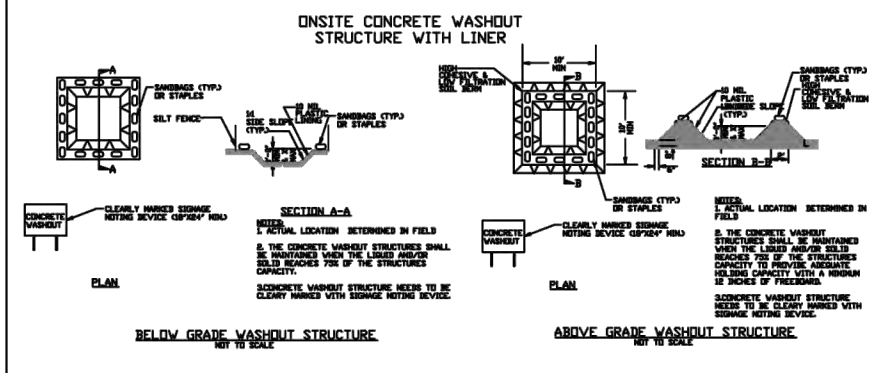
- Do not dump paint and other liquid waste into storm drains, streams or wetlands.
- Locate paint washouts at least 50 feet away from storm drain inlets and surface waters unless no other alternatives are reasonably available.
- Contain liquid wastes in a controlled area.
- Containment must be labeled, sized and placed appropriately for the needs of site.
- Prevent the discharge of soaps, solvents, detergents and other liquid wastes from construction sites.

**PORTABLE TOILETS**

- Install portable toilets on level ground, at least 50 feet away from storm drains, streams or wetlands unless there is no alternative reasonably available. If 50 foot offset is not attainable, provide relocation of portable toilet behind silt fence or place on a gravel pad and surround with sand bags.
- Provide staking or anchoring of portable toilets during periods of high winds or in high foot traffic areas.
- Monitor portable toilets for leaking and properly dispose of any leaked material. Utilize a licensed sanitary waste hauler to remove leaking portable toilets and replace with properly operating unit.

**EARTHEN STOCKPILE MANAGEMENT**

- Show stockpile locations on plans. Locate earthen-material stockpile areas at least 50 feet away from storm drain inlets, sediment basins, perimeter sediment controls and surface waters unless it can be shown no other alternatives are reasonably available.
- Protect stockpile with silt fence installed along toe of slope with a minimum offset of five feet from the toe of stockpile.
- Provide stable stone access point when feasible.
- Stabilize stockpile within the timeframes provided on this sheet and in accordance with the approved plan and any additional requirements. Soil stabilization is defined as vegetative, physical or chemical coverage techniques that will restrain accelerated erosion on disturbed soils for temporary or permanent control needs.



**CONCRETE WASHOUTS**

- Do not discharge concrete or cement slurry from the site.
- Dispose of, or recycle settled, hardened concrete residue in accordance with local and state solid waste regulations and at an approved facility.
- Manage washout from mortar mixers in accordance with the above item and in addition place the mixer and associated materials on impervious barrier and within lot perimeter silt fence.
- Install temporary concrete washouts per local requirements, where applicable. If an alternate method or product is to be used, contact your approval authority for review and approval. If local standard details are not available, use one of the two types of temporary concrete washouts provided on this detail.
- Do not use concrete washouts for dewatering or storing defective curb or sidewalk sections. Stormwater accumulated within the washout may not be pumped into or discharged to the storm drain system or receiving surface waters. Liquid waste must be pumped out and removed from project.
- Locate washouts at least 50 feet from storm drain inlets and surface waters unless it can be shown that no other alternatives are reasonably available. At a minimum, install protection of storm drain inlet(s) closest to the washout which could receive spills or overflow.
- Locate washouts in an easily accessible area, on level ground and install a stone entrance pad in front of the washout. Additional controls may be required by the approving authority.
- Install at least one sign directing concrete trucks to the washout within the project limits. Post signage on the washout itself to identify this location.
- Remove leavings from the washout when at approximately 75% capacity to limit overflow events. Replace the tarp, sand bags or other temporary structural components when no longer functional. When utilizing alternative or proprietary products, follow manufacturer's instructions.
- At the completion of the concrete work, remove remaining leavings and dispose of in an approved disposal facility. Fill pit, if applicable, and stabilize any disturbance caused by removal of washout.

**HERBICIDES, PESTICIDES AND RODENTICIDES**

- Store and apply herbicides, pesticides and rodenticides in accordance with label restrictions.
- Store herbicides, pesticides and rodenticides in their original containers with the label, which lists directions for use, ingredients and first aid steps in case of accidental poisoning.
- Do not store herbicides, pesticides and rodenticides in areas where flooding is possible or where they may spill or leak into wells, stormwater drains, ground water or surface water. If a spill occurs, clean area immediately.
- Do not stockpile these materials onsite.

**HAZARDOUS AND TOXIC WASTE**

- Create designated hazardous waste collection areas on-site.
- Place hazardous waste containers under cover or in secondary containment.
- Do not store hazardous chemicals, drums or bagged materials directly on the ground.



**NCG01 GROUND STABILIZATION AND MATERIALS HANDLING**

**EFFECTIVE: 04/01/19**



**DRAFT**

Casey Creek Mitigation Site  
Wayne County, North Carolina

Revisions

Date:	05.28.2024
Job Number:	02196
Project Engineer:	AA
Drawn By:	MK
Checked By:	CS

**5.7**



PART III SELF-INSPECTION, RECORDKEEPING AND REPORTING

SECTION A: SELF-INSPECTION

Self-inspections are required during normal business hours in accordance with the table below. When adverse weather or site conditions would cause the safety of the inspection personnel to be in jeopardy, the inspection may be delayed until the next business day on which it is safe to perform the inspection.

Table with 3 columns: Inspect, Frequency (during normal business hours), and Inspection records must include. Rows include rain gauge maintenance, E&SC Measures, stormwater discharge outfalls, perimeter of site, streams or wetlands onsite, and ground stabilization measures.

NOTE: The rain inspection resets the required 7 calendar day inspection requirement.

PART III SELF-INSPECTION, RECORDKEEPING AND REPORTING

SECTION B: RECORDKEEPING

1. E&SC Plan Documentation

The approved E&SC plan as well as any approved deviation shall be kept on the site. The approved E&SC plan must be kept up-to-date throughout the coverage under this permit.

Table with 2 columns: Item to Document and Documentation Requirements. Rows include E&SC measure installation, grading completion, ground cover, maintenance requirements, and corrective actions.

2. Additional Documentation to be Kept on Site

In addition to the E&SC plan documents above, the following items shall be kept on the site and available for inspectors at all times during normal business hours, unless the Division provides a site-specific exemption based on unique site conditions that make this requirement not practical:

- (a) This General Permit as well as the Certificate of Coverage, after it is received.
(b) Records of inspections made during the previous twelve months. The permittee shall record the required observations on the Inspection Record Form provided by the Division or a similar inspection form that includes all the required elements.

3. Documentation to be Retained for Three Years

All data used to complete the e-NOI and all inspection records shall be maintained for a period of three years after project completion and made available upon request. [40 CFR 122.41]

PART III SELF-INSPECTION, RECORDKEEPING AND REPORTING

SECTION C: REPORTING

1. Occurrences that Must be Reported

Permittees shall report the following occurrences:

- (a) Visible sediment deposition in a stream or wetland.
(b) Oil spills if:
- They are 25 gallons or more,
- They are less than 25 gallons but cannot be cleaned up within 24 hours,
- They cause sheen on surface waters (regardless of volume), or
- They are within 100 feet of surface waters (regardless of volume).
(c) Releases of hazardous substances in excess of reportable quantities under Section 311 of the Clean Water Act...
(d) Anticipated bypasses and unanticipated bypasses.
(e) Noncompliance with the conditions of this permit that may endanger health or the environment.

2. Reporting Timeframes and Other Requirements

After a permittee becomes aware of an occurrence that must be reported, he shall contact the appropriate Division regional office within the timeframes and in accordance with the other requirements listed below. Occurrences outside normal business hours may also be reported to the Department's Environmental Emergency Center personnel at (800) 858-0368.

Table with 2 columns: Occurrence and Reporting Timeframes (After Discovery) and Other Requirements. Rows include sediment deposition, oil spills, anticipated bypasses, unanticipated bypasses, and noncompliance.

PART II, SECTION G, ITEM (4) DRAW DOWN OF SEDIMENT BASINS FOR MAINTENANCE OR CLOSE OUT

Sediment basins and traps that receive runoff from drainage areas of one acre or more shall use outlet structures that withdraw water from the surface when these devices need to be drawn down for maintenance or close out unless this is infeasible.

- (a) The E&SC plan authority has been provided with documentation of the non-surface withdrawal and the specific time periods or conditions in which it will occur.
(b) The non-surface withdrawal has been reported as an anticipated bypass in accordance with Part III, Section C, Item (2)(c) and (d) of this permit,
(c) Dewatering discharges are treated with controls to minimize discharges of pollutants from stormwater that is removed from the sediment basin.
(d) Vegetated, upland areas of the sites or a properly designed stone pad is used to the extent feasible at the outlet of the dewatering treatment devices described in Item (c) above,
(e) Velocity dissipation devices such as check dams, sediment traps, and riprap are provided at the discharge points of all dewatering devices, and
(f) Sediment removed from the dewatering treatment devices described in Item (c) above is disposed of in a manner that does not cause deposition of sediment into waters of the United States.

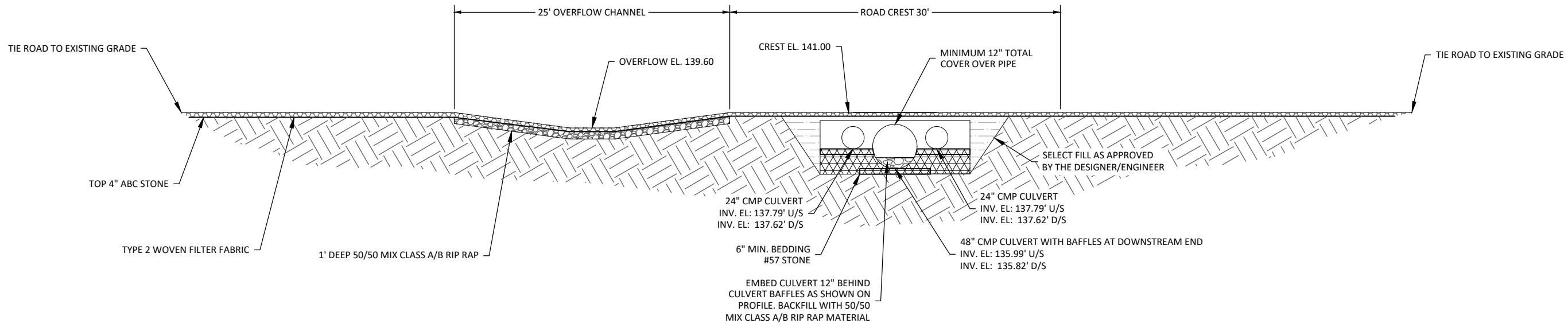
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Casey Creek Mitigation Site Wayne County, North Carolina

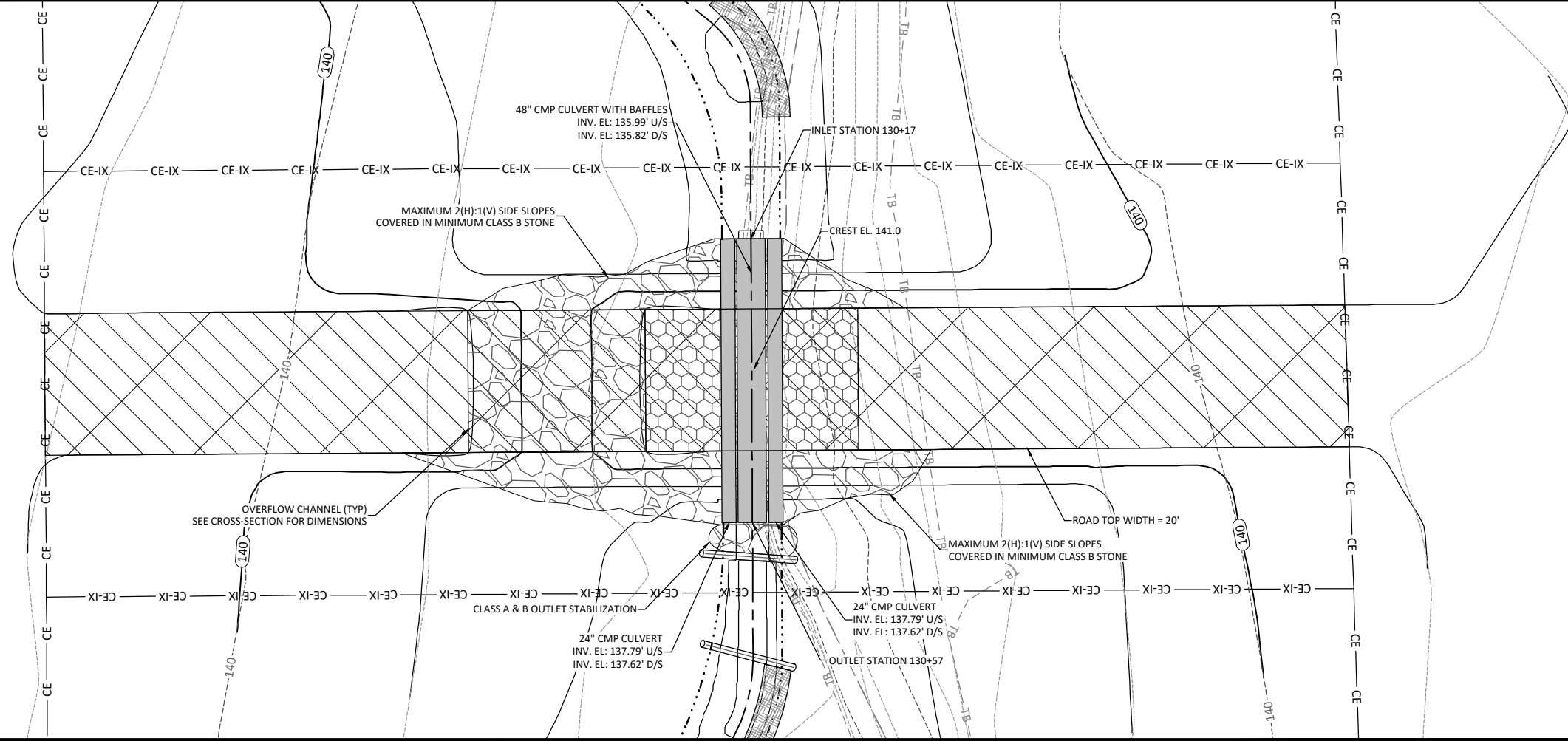
Details

Revisions table with columns for revision number, date, and description.

Date: 05.28.2024 Job Number: 02196 Project Engineer: AA Drawn By: MK Checked By: GS



1 Casey Creek - Internal Culvert Crossing  
5.9 Not to Scale



**DRAFT**

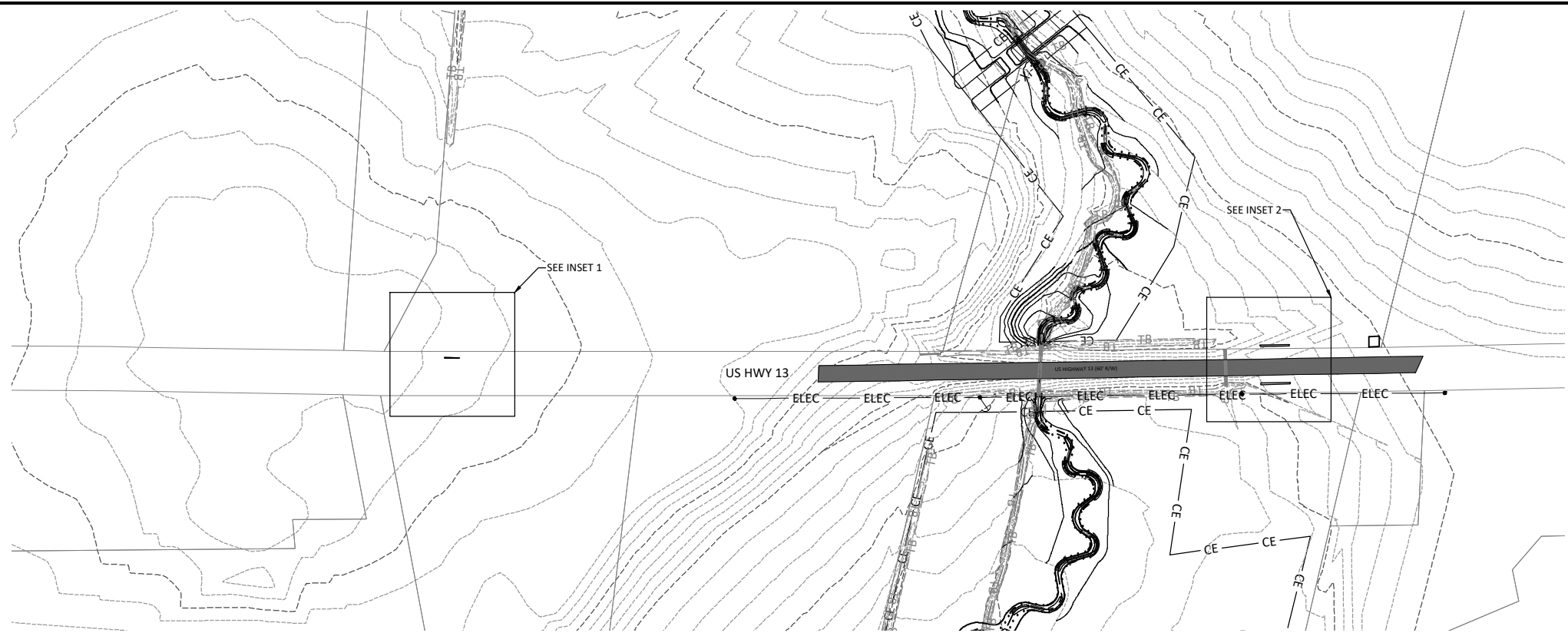
Casey Creek Mitigation Site  
Wayne County, North Carolina

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Date:	05.28.2024
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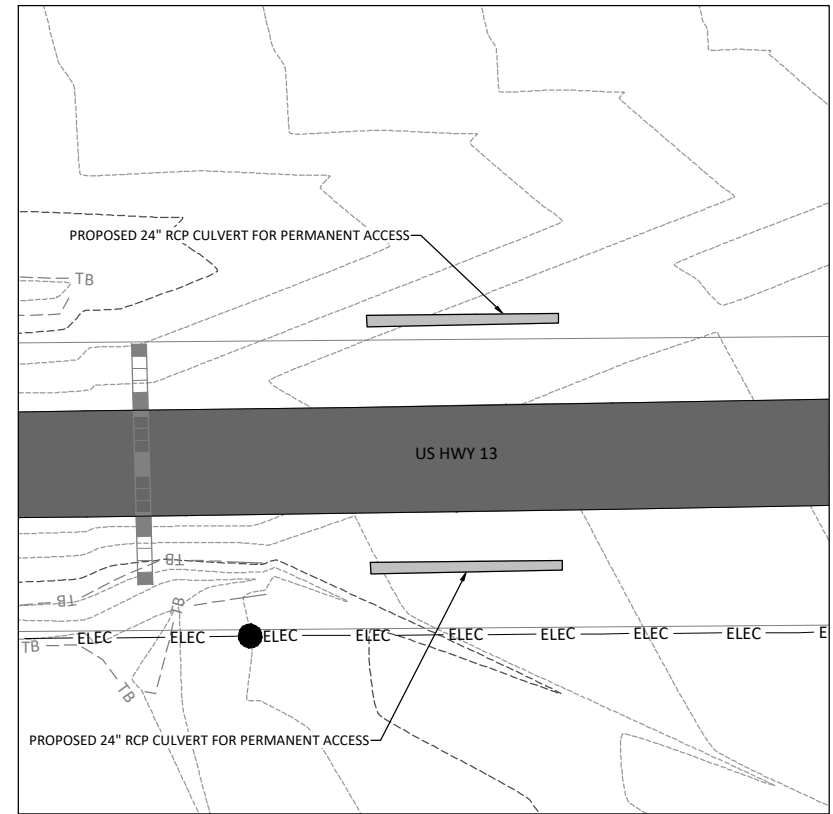
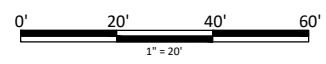
**5.9**



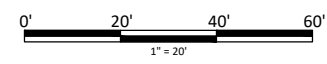
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5.10 Casey Creek - Proposed Culverts  
Not to Scale



INSET 1



INSET 2



Casey Creek Mitigation Site  
Wayne County, North Carolina

Details

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Revisions:


Date: 05.28.2024  
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5.10