MITIGATION PLAN

Final

October 15, 2019

ALEXANDER FARM MITIGATION SITE

Alexander County, NC
NCDEQ Contract No. 7416
DMS Project No. 100048

Catawba River Basin
HUC 03050101

USACE Action ID No. SAW-2018-00451
RFP #: 16-007277

PREPARED FOR:

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

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

REPLY TO
ATTENTION OF:

CESAW-RG/Browning August 19, 2019

MEMORANDUM FOR RECORD

SUBJECT: Alexander Farm Mitigation Site - NCIRT Comments during 30-day Mitigation Plan Review

PURPOSE: The comments listed below were received during 30-day comment period in accordance with Section 332.8(g) of the 2008 Mitigation Rule in response to the Notice of NCDMS Mitigation Plan Review.

NCDMS Project Name: Alexander Site, Alexander County, NC

USACE AID#: SAW-2018-00451

NCDMS #: 100048

30-Day Comment Deadline: August 16, 2019

DWR Comments, Mac Haupt and Erin Davis:

1. DWR accepts the credit ratios proposed in the April 16, 2018 Memorandum.
2. There are numerous wetland areas on site and DWR would propose to Wildlands that they extend out the easement to contain rest of wetland "E" and all of wetland "P".
3. In addition, there are two areas where the designed stream is being built through wetlands and DWR requires a wetland gauge at the following locations:
    a. Design sheet 2.1.4 - station 116+00 stream right, and
    b. Design sheet 2.1.10 – station 142+25 stream right
4. DWR appreciates the work done on reach UT1A, Design Sheet 2.2.1, and the rock cascade on Design sheet 2.3.1.
5. Were drain tiles found at the downstream end on the left floodplain? And if so, were the drain tiles eliminated?

USACE Comments, Kim Browning:

1. The USACE ID for the cover page and page (i) is SAW-2018-00451.
2. It was noted that future logging adjacent to the preservation area is planned and that an additional 30'-50' buffer setback will be implemented to filter runoff. Please provide more information and analysis regarding potential future development and possible encroachment around the site (such as easement or culvert maintenance), and how you propose to address these concerns, and how they may affect the easement.
    a. Who will be responsible for the culvert maintenance? Please specify in LTM plan.
3. Section 5.3 and Table 7: There are several reaches of stream restoration proposed (1B, 4A, 4B) that will impact existing wetlands. Please describe how you will ensure that no functional loss/loss of waters occurs. Specifically, will the 0.17 acres of permanent impacts be recuperated adjacent to the newly raised

stream channel through Priority 1 restoration? Additionally, there appear to be several more wetlands shown on the JD Map that are not captured on Figure 9.
    a. It would be beneficial to add some coarse woody debris to the depressional areas and throughout the adjacent wetlands for habitat, and to help store sediment, increase water storage/infiltration, and absorb water energy during overbank events.
4. The IRT site walk indicated that several pockets of adjacent wetlands were present and should be included within the easement. It appears that there are a few small wetlands that are not included in the easement boundary, please explain, especially if cattle will have access to these areas and cause potential future runoff impacts to the buffer.
    a. The IRT also noted that wetland gauges should be installed to collet pre-data. Was this conducted? If so please explain and note on the monitoring map (figure 10).
5. Design Sheets: Regarding stream crediting, the USACE Mitigation Credit Calculation Memo released October 5, 2017, states "When existing stream length measurements are conducted for the purposes of determining credit during mitigation plan development (e.g., measuring existing enhancement or preservation reaches), the center of the wetted perimeter (using base flow conditions) should be used….For restoration reaches or any other approach where the stream will be built in a new location, credit amounts should be based on the center of the designed channel as shown in the plan sheet."
    a. It's difficult to discern at the scale shown, but for the restoration reaches downstream of the preservation reach, it appears that the thalweg was used. The restoration reaches should be based on the center of the newly designed channel, not on the thalweg as currently shown on the plan maps.
    b. Stream lengths and credit calculations should be revised based on the above.
6. It would be helpful to depict photo points/digital image stations on Figures 10. If the fixed cross-section locations are to be used, please describe that in the text.
7. Section 4.4 and 7.6.7: An agricultural BMP is planned within the easement; please describe any maintenance required, if applicable.
8. Please discuss how fescue will be treated in conjunction with buffer establishment.
9. Section 8.2: Please remove the statement regarding terminating veg monitoring if performance standards are met early. Monitoring should occur for 7 years. Also, please list the proposed planting timeframe in Section 7.7.
10. General comment: In the future, when NCSAM or other functional assessment methods are used, please describe the results summary in the text.
11. Appendix 5: It is beneficial to review the categorical exclusion documents prior to receiving the final mitigation plan. Please include an estimate of trees to be cleared in the PCN in relation to NLEB habitat.
12. Appendix 11: NCDMS has recently requested that all previously mentioned As-Built reports will now be referred to as Record Drawing. Please verify this with DMS and correct as advised.
13. ATV paths were mentioned in the text on UT1 Reach 3. I understand that the landowner was advised that these paths will not be accessible for ATV use, but will these paths remain and be maintained? If so, please describe, and depict on Figure 9/10.

Kim Browning
Mitigation Project Manager
Regulatory Division

October 10, 2019

Ms. Kim Browning
US Army Corps of Engineers – Wilmington District
3331 Heritage Trade Dr, Ste. 105
Wake Forest, NC 27587

RE: Alexander Farm Mitigation Site
Response to NCIRT Mitigation Plan Review Comments
USACE Action ID No. SAW-2018-00451

Dear Ms. Browning:

Wildlands Engineering, Inc. (Wildlands) has reviewed USACE's and NCDWR's comments on the Alexander Farm Mitigation Plan dated August 19, 2019. The following Wildlands responses to USACE's and NCDWR's comments are noted below.

NCDWR comments received by Wildlands on 08.19.2019

1. *DWR accepts the credit rations proposed in the April 16, 2018 Memorandum.*
2. *There are numerous wetland areas on site and DWR would propose to Wildlands that they extend out the easement to contain rest of wetland "E" and all of wetland "P".*

   Wildlands Response: The conservation easement was adjusted in these locations to include wetlands "E" and "P".
3. *In addition, there are two areas where the designed stream is being built through wetlands and DWR requires a wetland gauge at the following locations:*
   a. *Design sheet 2.1.4 – station 116+00 stream right, and*
   b. *Design sheet 2.1.0 – station 142+25 stream right*

   Wildlands Response: A wetland gauges were added to the monitoring plan in these locations. We do want to point out that since no wetland credits are being sought, no pre-construction data was collected for any wetlands. There will be no way to compare impact or uplift of these wetlands.
4. *DWR appreciates the work done on reach UT1A, Design Sheet 2.2.1, and the rock cascade on Design sheet 2.3.1*

   Wildlands Response: You're welcome.
5. *Were drain tiles found at the downstream end on the left floodplain? And if so, were the drain files eliminated?*

   Wildlands Response: Wildlands found no drain tiles during the existing conditions assessment and is currently not aware of any drain tiles located on the site.

USACE Comments received by Wildlands on 08.19.2019

1. *The USACE ID for the cover page and page (i) is SAW-2018-00451*

   Wildlands Response: The USACE Action ID number was added to the cover page and page (i) of the mitigation report. It was also added to the cover sheet of the plans.

2. *IT was noted that future logging adjacent to the preservation area is planned and that an additional 30'-50' buffer setback will be implemented to filter runoff. Please provide more information and analysis regarding potential future development and possible encroachment around the site (such as easement or culvert maintenance), and how propose to address these concerns, and how they may affect the easement.*

   Wildlands Response: Vernal pools are proposed within the easement at the concentrated runoff locations adjacent to the logging area. This will help capture sediment from logging operations. Wildlands will visit the site during logging operations to ensure they are staying within agreed setback limits and have installed proper BMPs. The landowner has stated multiple times that they intend to keep this land as a family farm indefinitely and have no plans for development.

   a. *Who will be responsible for the culvert maintenance? Please specify in LTM plan.*

      Wildlands Response: Wildlands will be responsible for culvert maintenance during the seven year monitoring period. After monitoring, the landowner will be responsible for culvert maintenance. The Long Term Management plan was revised to include this clarification.

3. *Section 5.3 and Table 7: There are several reaches of stream restoration proposed (1B, 4A, 4B) that will impact existing wetlands. Please describe how you will ensure that no functional loss/loss of waters occurs. Specifically, will the 0.17 acres of permanent impacts be recuperated adjacent to the newly raised stream channel through Priority 1 restoration? Additionally, there appear to be several more wetlands shown on the JD Map that are not captured on Figure 9.*

   a. *It would be beneficial to add some coarse woody debris to the depressional areas and throughout the adjacent wetlands for habitat, and to help store sediment increase water storage/infiltration and absorb water energy during overbank events.*

      Wildlands Response: The existing wetlands that will be impacted by stream restoration activities are currently impacted by cattle grazing and trampling. Priority 1 restoration will allow for the stream to be raised, which will raise the water table helping to restore or enhance the adjacent wetlands. Wildlands will take precautionary measures to protect the existing wetlands, including the installation of safety fence to establish grading limits adjacent to the wetlands. Wildlands will use the project's proposed stream flow pressure transducers or crest gauge to show that stream flooding is enhancing surface hydrology on the floodplain adjacent to project reaches. Figure 10 shows all the delineated wetlands that are shown on the JD Figure. The symbology was changed to make it more visible on the figure. A symbol for large woody debris was added to the plans and placed within the proposed vernal pools.

4. *The IRT site walk indicated that several pockets of adjacent wetlands were present and should be included within the easement. It appears that there are a few small wetlands that are not*

included in the easement boundary, please explain, especially if cattle will have access to these areas and cause potential future runoff impacts to the buffer.

Wildlands Response: The conservation easement was adjusted in two locations to include wetlands near the easement boundary.

a. *The IRT also noted that wetland gauges should be installed to collet pre-data. Was this conducted? If so please explain and note on the monitoring map (Figure 10).*

Wildlands Response: The comment during the IRT site walk was made assuming wetland credits would be claimed. Since the decision was made not to pursue wetland credits, pre-construction gage data was not required or collected.

5. *Design Sheets: Regarding stream crediting, the USACE Mitigation Credit Calculation Memo released October 5, 2017, states "When existing stream length measurements are conducted for the purpose of determining credit during mitigation plan development (e.g., measuring existing enhancement or preservation reaches), the center of the wetted perimeter (Using base flow conditions) should be used….For restoration reaches or any other approach where the stream will be built in a new location, credit amounts should be based on the center of the newly designed as shown in the plan sheet."*

    a. *It's difficult to discern at the scale shown, but for the restoration reaches downstream of the preservation reach it appears that the thalweg was used. The restoration reaches should be based on the center of the newly designed channel, not on the thalweg as currently shown on the plan maps.*

    b. *Stream lengths and credit calculations should be revised base on the above.*

    Wildlands Response: The design centerline was used to calculate credits for all restoration reaches per standard practice. The surveyed centerline was used to calculate credits on all enhancement reaches.

6. *It would be helpful to depict photo points/digital image stations on Figures 10. If the fixed cross-section locations are to be used, please describe that in the text.*

    Wildlands Response: Figure 10 has been updated to show approximate locations of fixed photo points for post-construction monitoring. These locations may be adjusted in the baseline monitoring report.

7. *Section 4.4 and 7.6.7: An agricultural BMP is planned within the easement; please describe any maintenance required, if applicable.*

    Wildlands Response: Maintenance requirements for the BMP were added to Appendix 8.

8. *Please discuss how fescue will be treated in conjunction with buffer establishment.*

    Wildlands Response: Detailed treatment of fescue was added to Appendix 6.

9. *Section 8.2: Please remove the statement regarding terminating veg monitoring if performance standards are met early. Monitoring should occur for 7 years. Also, please list the proposed planting timeframe in Section 7.7.*

    Wildlands Response: The early termination statement was removed from Section 8.2. A planting timeframe was added to Section 7.7.

10. *General comment: In the future, when NCSAM or other functional assessment methods are used, please describe the results summary in the text.*

    Wildlands Response: Wildlands will consider explaining the results from the NCSAM or other functional assessment methods and relating it functional uplift potential in future mitigation plans.

11. *Appendix 5: It is beneficial to review the categorical exclusion documents prior to receiving the final mitigation plan. Please include an estimate of trees to be cleared in the PCN in relation to NLEB habitat.*

    Wildlands Response: Wildlands will include the categorical exclusion documents along with the agency scoping letters with final NCIRT mitigation plan submittal. Based on the Northern Long-Eared Bad (NLEB) 4(d) Rule Streamlined Consultation Form, the estimated total acres of forest conversion from April 1 to October 31 is 3.6 acres. This acreage is included in the PCN.

12. *Appendix 11: NCDMS has recently requested that all previously mentioned As-Built reports will now be referred to as Record Drawing. Please verify this with DMS and correct as advised.*

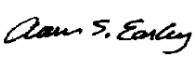
    Wildlands Response: In our recent experiences with DMS, the as-built report is now referred to as Baseline Monitoring Report and the as-built drawings are now referred to as Record Drawings. Appendix 11 was revised to reflect this nomenclature.

13. *ATV paths were mentioned in the text on UT1 Reach 3. I understand that the landowner was advised that these paths will not be accessible for ATV use, but will these paths remain and be maintained? If so, please describe, and depict on Figure 9/10.*

    Wildlands Response: Wildlands does not plan to maintain the paths along UT1 Reach 3.

Please contact me at 704-332-7754 if you have any questions.

Sincerely,



Aaron Earley, PE, CFM
Project Manager
aearley@wildlandseng.com

FINAL MITIGATION PLAN

ALEXANDER FARM MITIGATION SITE

Alexander County, NC
NCDEQ Contract No. 7416
DMS Project No. 100048
Catawba River Basin
HUC 03050101

USACE Action ID No. SAW-2018-00451

PREPARED FOR:

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

PREPARED BY:

Wildlands Engineering, Inc.
1430 South Mint Street, Suite 104
Charlotte, NC 28203
Phone: (704) 332-7754

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.

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APPENDICES

1.0 Introduction

The Alexander Farm Mitigation Site (Site) is in Alexander County approximately 6 miles west of Statesville and 15 miles northeast of Hickory (Figure 1). Unnamed tributaries to Elk Shoals Creek originate within the project limits, and will be restored, enhanced, and preserved as part of this project. Elk Shoals Creek drains to Lookout Shoals Lake on the Catawba River, the primary water supply for the City of Statesville. The Site is located within the Elk Shoals Creek targeted local watershed Hydrologic Unit Code (HUC) 03050101130010 and is being submitted for mitigation credit in the Upper Catawba Catalog Unit 03050101.

The Site is bisected by Elk Shoals Church Loop Road. UT1 originates within a small section of grazed woods in a moderately confined valley surrounded by open pasture. Approximately 600 feet downstream of the headwaters, the woods narrow to a band of mature trees along the top of bank as the valley widens. Continuing towards Elk Shoals Church Loop Road, trees are sporadically present as UT1 flows through open cattle pasture. Downstream of the Elk Shoals Church Loop Road culvert crossing, UT1 flows through a short section of forest for approximately 700 feet before re-entering open cattle pasture. The woods are fenced to exclude cattle. UT1 continues to flow south through the open pasture until it exits the Site, just upstream of the stream's confluence with Elk Shoals Creek. UT1A also originates within the Site limits in the southern pasture from the left floodplain of UT1. UT1A's valley is within the broad floodplain of UT1.

The streams throughout the Site are in various stages of impairment related to the current and historical agricultural uses. The project proposes to restore and preserve 6,940 existing linear feet of streams. A stormwater BMP will be established within the conservation easement to capture and treat the drainage from the adjacent pasture. The work proposed on the Site will provide 4,258 SMUs and will be protected in perpetuity by a 21-acre conservation easement. The Site Protection Instrument detailing the proposed terms and restrictions of the conservation easement is in Appendix 7.

A site walk was held on March 29, 2018 with DMS, IRT, and Wildlands in attendance. The minutes from this contracting meeting and the subsequent credit ratio discussion can be found in Appendix 11.

Table 1: Project Attribute Table Part 1

Project Information	
Project Name	Alexander Farm Mitigation Site
County	Alexander
Project Area (acres)	21
Project Coordinates (latitude and longitude)	35° 48' 42.36"N 81° 7' 14.46"W
Planted Acreage (acres of woody stems planted)	15

2.0 Watershed Approach and Site Selection

At its confluence with UT1, Elk Shoals Creek is defined in the 2014 North Carolina Integrated Report as Class WS-IV waters. Class WS-IV waters are protected for drinking, culinary, food processing, aquatic life, secondary recreation, and fresh water purposes, and are generally in highly developed watersheds. Elk Shoals Creek is listed as exceeding conditions for Fish Tissue Mercury, but a TMDL is in place (Category 4t). The Site streams are included in the 2009 Upper Catawba River Basin Restoration Priorities (RBRP). The RBRP lists specific watershed goals of restoring nutrient and sediment impaired waters to water supply reservoirs (including Lookout Shoals Lake), and implementing agricultural BMPs within heavily agricultural sub-watersheds, including the Elk Shoals Creek watershed.

The Catawba River Basin is also discussed in the 2015 North Carolina Wildlife Resource Commission's (NCWRC) Wildlife Action Plan (WAP). This report notes that riparian habitat loss, excessive sedimentation, and nutrient loading from poorly managed agricultural operations are widespread problems within the basin. The WAP discusses the importance of habitat conservation and restoration to address problems affecting non-game species.

Restoration of the Site streams will directly and indirectly address stressors identified in the RBRP and the WAP by excluding livestock, creating stable stream banks, restoring a forest in agriculturally maintained buffer areas, and preserving existing forested buffers. These actions will reduce fecal, nutrient, and sediment inputs to project streams, and ultimately to Elk Shoals Creek, as well as reconnect in-stream and terrestrial habitats on the Site. Restoration of the Site is directly in line with recommended management strategies outlined in the Upper Catawba River Basin RBRP. Approximately 21 acres of land will be placed under permanent conservation easement to protect the Site in perpetuity.

3.0 Baseline and Existing Conditions

The following sections describe the existing conditions of the Site, watershed, and watershed processes, including disturbance and response. A summary of watershed information is presented in Table 2 and Figure 3.

Table 2: Project Attribute Table Part 2

Project Watershed Summary Information	
Physiographic Province	Piedmont
Ecoregion	Northern Inner Piedmont
River Basin	Catawba River
USGS HUC (8 digit, 14 digit)	03050101, 03050101130010
NCDWR Sub-basin	03-08-32
Project Drainage Area (acres)	256 (UT1), 7.4 (UT1A)
Project Drainage Area Percentage of Impervious Area	1.13%
Hay/Pasture[1]	73%
Forest[1]	20%
Developed[1]	5%
Shrubland[1]	1%
Grassland [1]	1%

[1]Landuse data is for UT1 based on the 2011 NCLD Land Use Classification

3.1 Landscape Characteristics

3.1.1 Physiography and Topography

The Site is in the Inner Piedmont Belt of the Piedmont physiographic province. The Piedmont is characterized by gently rolling, well-rounded hills with long low ridges, with elevations ranging from 300 to 1500 feet above sea level. The Site topography and relief are typical for the region, as illustrated in Figure 4. The Site topography, as indicated on the Stony Point, NC USGS 7.5 topographic quadrangle, shows a gradually sloped valley running through the center of the Site. The Site upstream of Elk Shoals Church Loop Road is characterized by a moderate slope. The downstream end topography consists of a broad gently sloping floodplain to Elk Shoals Creek. The valley through the project transitions from a

moderately confined valley to a broad, alluvial floodplain at the downstream extents as it approaches Elk Shoals Creek.

3.1.2 Geology and Soils

The Site is located in the Cat Square terrane of the Piedmont physiographic province. The Cat Square terrane is composed of metamorphic rocks that have been intruded by younger granitic rocks. The underlying geology of the Site is mapped as Late Proterozoic-Cambrian (500 to 900 million years in age) amphibolite and biotite gneiss (CZab) and mica schist (CZms). The amphibolite and biotite gneiss unit is described as interlayered with minor layers or lenses of hornblende gneiss, metagabbro, mica schist, and granitic rock. The mica schist unit includes garnet, staurolite, kyanite, or sillimanite that occurs locally and interlayered with layers or lenses of quartz, calc-silicate rock, biotite gneiss, amphibolite, and phyllite rock.

The Site is mapped by the USDA Web Soil Survey for Alexander County. Site soils are described below in Table 3 and shown in Figure 5.

Table 3: Project Soil Types

Soil Name	Description
CoA - Codorus loam, 0 to 2 percent slopes, frequently flooded	This series consists of somewhat poorly drained soils, on nearly level floodplains and valleys with a slope of 0- 2%. These soils are subject to frequent flooding, and they have a loamy surface layer and subsoil. The parent material consists of loamy alluvium derived from igneous and metamorphic rock.
DaA - Dan River and Comus soils, 0 to 4 percent slopes, occasionally flooded	This series consists of 50% Dan River and 40% Comus soils on nearly level to gently sloping valleys and floodplains with a slope of 0-4%. Dan River soils are very deep and well drained. They have a loamy surface layer and loamy subsoil. Comus soils are very deep and well drained. They have a loamy surface layer and subsoil. These soils are subject to occasional flooding. The parent material consists of loamy and sandy alluvium derived from igneous and metamorphic rock.
FcD2 - Fairview sandy clay loam, 15 to 25 percent slopes, moderately eroded	These soils are located on ridges and low hills in the piedmont uplands. The profile consists of a sandy loam surface layer and clay to sandy loam subsoil. They are very deep soils that are well drained with slopes of 15-25%.
RdE - Rhodhiss sandy loam, 25 to 45 percent slopes	The series is a deep, well-drained soil found on hillslopes. The profile consists of sandy loam surface layer and sandy clay loam subsoil. The parent material is saprolite derived from granite and gneiss or schist.
YaB2 - Yadkin clay loam, 8 to 15 percent slopes	This series is a deep, well-drained soil found on hillslopes. The profile consists of a clay loam to clay surface layer and sandy clay subsoil. The parent material is old alluvium derived from granite and gneiss.

Source: *Soil Survey of Alexander County, North Carolina, USDA-NRCS, http://websoilsurvey.sc.egov.usda.gov/App/WebSoilSurvey.aspx*

The mapped soils are a combination of alluvium derived from igneous and metamorphic rock and saprolite residuum weathered from granite and gneiss or schist. On Site there are two sources of sediment to the project streams: agricultural fields and watershed stream bank erosion. The runoff from the agricultural fields contribute fine sediments while stream bank erosion contributes a mix of fines and small gravels. Bedrock was not observed in the channel during the existing conditions assessment work. The soils where the majority of the restoration work will be occurring (CoA and FcD2) characteristically have depths to bedrock 60-in or greater. Since the restoration channels will be raised to the valley bottom, bedrock is not anticipated to be a factor in restoration implementation.

3.2 Land Use/Land Cover

The current tenant farmer maintains a 175 head herd on the farm. He rotates the herd between the northern pasture in spring and summer and the southern pasture in fall and winter. Wildlands has visited the Site several times since 2010 and has confirmed this land management practice. The existing streams and pastures are presented in Figure 2.

Land use and cover, both past and present, were investigated throughout the Site and its watershed using historical aerials from 1956-2012 (Appendix 1). The most common historical and current land use in the watershed are forest and agricultural. One major change in land use occurred sometime between 1961-1976. The northern section of the stream, upstream of Elk Shoals Church Loop, was historically forested but cleared for pasture. Clearing also occurred on the adjacent wooded areas on the downstream extents of UT1. No other significant land use changes have occurred since these impacts. The extents of riparian buffers and agricultural land on Site have remained consistent over that time. There are no signs of impending land use changes or development pressure that would impact the project throughout the watershed. However, clearing of the forested areas adjacent to the downstream end of UT1 is set to occur in the future.

3.3 Existing Vegetation

Mature canopy species upstream of Elk Shoals Church Loop Road are primarily red maple (*Acer rubrum*), shagbark hickory (*Carya ovata*), sycamore (*Platanus occidentalis*), tulip poplar (*Liriodendron tulipifera*), and white oak (*Quercus alba*), with occasional black willow (*Salix nigra*). The understory layer consists of American holly (*Ilex opaca*), Chinese privet (*Ligustrum sinense*), Eastern red cedar (*Juniperus virginiana*), and tree of heaven (*Ailanthus altissima*). Herbaceous species include beefsteak plant (*Perilla frutescens*), common boneset (*Eupatorium perfoliatum*), dogfennel (*Eupatorium capillifolium*), Japanese stiltgrass (*Microstegium vimineum*), New York ironweed (*Vernonia noveboracensis*), pasture grasses (such as fescue and millet species), joe pye weed (*Eutrochium sp*.), pokeweed (*Phytolacca Americana*), and wingstem (*Verbesina alternifolia*).

Canopy species south of Elk Shoals Church Loop road include American beech (*Fagus grandifolia*), red maple, sycamore, and tulip poplar. Understory species include American holly, Chinese privet, and Russian olive (*Elaeagnus angustifolia*). The sparse herbaceous layer consists of Christmas fern (*Polystichum acrostichoides*), grapevine (*Vitis sp*.), and Japanese stiltgrass. The left floodplain and hillside through the remaining project area is dominated by pasture grasses and other herbaceous species with scattered trees. The narrow right floodplain is a mix of mature trees and dense herbaceous that quickly transition to the steep, forested right hillslope immediately adjacent to the project area. Canopy species in these areas are similar to those upstream of Elk Shoals Church Loop Road. Understory and sapling species include black cherry (*Prunus serotina*), black walnut (*Juglans nigra*), Eastern red cedar, flowering dogwood (*Cornus florida*), pawpaw (*Asimina triloba*), persimmon (*Diospryos virginana*), redbud (*Cercis canadensis*), river birch (*Betula nigra*), and sugarberry (*Celtis laevigata*). In addition to pasture grasses the dense herbaceous layer includes beefsteak plant, beggars tick (*Bidens frondosa*), Carolina elephant's foot (*Elephantopus carolinianus*), jewelweed (*Impatiens capensis*), New York ironweed, joe pye weed, pink knotweed (*Polygonum pennsylvanicum*), pokeweed, and wingstem.

Herbaceous vegetation consists of grazed fescue and other species including jewelweed, pink knotweed, and wingstem.

3.4 Project Resources

Wildlands investigated on-site jurisdictional waters of the United States (US) within the proposed project area. Potential jurisdictional areas were delineated using the US Army Corps of Engineers (USACE) Routine On-Site Determination Method. This method is defined by the 1987 Corps of Engineers Wetlands Delineation Manual and the subsequent Eastern Mountain and Piedmont Regional

Supplement. Streams were identified using North Carolina Department of Water Resources (NCDWR) Identification Forms. Jurisdictional waters of the US were surveyed for inclusion on plans and figures. Wetland determination forms representative of on-site jurisdictional areas as well as non-jurisdictional upland areas are included in Appendix 2.

The North Carolina Stream Assessment Method (NC SAM) evaluation was performed on each project reach. The rapid assessment methodology evaluates field conditions to generate qualitative function ratings (Low, Medium, High) for the overall reach relative to reference conditions for the specific stream type. Project reaches proposed for restoration scored as low functioning systems when compared to reference conditions due to impairment to one or more of the primary functions (habitat, hydrology, and water quality). Low-scoring functions are the result of channel instability, agricultural activities and managed buffers. Project reaches proposed for enhancement generally exhibited less instability relative to restoration reaches, however, reduced function was still evident. Enhancement reach overall ratings ranged from low to medium. NC SAM Field Assessment Forms and Rating Sheets are enclosed in Appendix 3.

The results of the on-site investigation include two jurisdictional stream channels (UT1 and UT1A) and 18 wetlands (A-R) as discussed below. Table 4 provides a summary of water resources within the project limits. Existing conditions are illustrated in Figure 2. Reach specific cross-sections and geomorphic summaries are provided in Appendix 4.

3.4.1 Project Streams

UT1 Reach 1A/1B

UT1 Reach 1 originates within the Site limits at a spring head. The valley is slightly confined and wooded with minimal understory. Cattle are present throughout the reach and wallow in the spring, resulting in trampled, muddy conditions. Just downstream of the wallow area, the stream drops over a headcut consisting of exposed soil and becomes incised with bank height ratios over 3. Downstream of the headcut, the stream widens, and cattle paths in and out of the channel are frequent. Fine sediments choke the bedform on this reach, with silted in pools and embedded riffles throughout. Approximately 100 feet upstream of the wood line, the bank heights decrease and the stream regains floodplain connectivity, but the stream is still scoured and impacted from cattle access. At the wood line, as UT1 enters the open pasture, the stream drops over a series of 4 bare clay soil headcuts in 200 feet, each approximately 3 feet high. The stream channel is incised and actively eroding, with bank vegetation falling into the channel. Bank heights gradually decrease going downstream until the stream is no longer incised. Although cattle activity is widespread, with numerous trails in and out of the channel and wallows throughout, the stream banks are well vegetated with annual species. The stream continues in this condition until approximately 200 feet upstream of the UT1 Reach 1/Reach 2 break, where the stream again is incised and eroded until it regains connectivity at the reach break.

Overall, UT1 Reach 1's condition is predominantly incised and disconnected from the floodplain, with short segments of floodplain connectivity. The bed is trampled and severely impacted by cattle; bedform diversity and habitat is very poor, primarily due to sedimentation and incision. UT1 Reach 1 may be classified as Simon Evolutionary Stage III.

UT1 Reach 2

UT1 Reach 2 is overwide and trampled but is well vegetated with herbaceous species. This reach drops over a few small 6-inch exposed clay soil headcuts and shows evidence of local erosion in these areas. Reach 2 appears to be in the Simon Evolutionary Stage V. As UT1 Reach 2 approaches the Elk Shoals Church Loop culvert and enters the woodline, the creek again alternates between areas of incision and floodplain connection. The bed is choked with fine sediments and is trampled, with several active cattle wallow areas. UT1 Reach 2 ends at the Elk Shoals Church Loop 48-inch culvert.

UT1 Reach 3

UT1 Reach 3 begins just downstream of the Elk Shoals Church Loop culvert. The valley is moderately confined and wooded, and the stream meanders through the valley bottom. This section of the farm is fenced to exclude cattle. UT1 Reach 3 is incised directly downstream of the culvert, but regains connectivity quickly with low, stable stream banks. Spot areas of scour are present thoughout the reach and are largely related to ATV paths which crisscross the stream. The stream bed is processing a heavy fine sediment load from the upstream bank erosion, but coarse substrate is visible through the fine sediment. Desirable aquatic habitat is present throughout the reach and includes undercut banks, root mats, leaf packs, and small debris jams. UT1 Reach 3 ends at a two- to three-foot exposed soil headcut, just upstream of an eroded meander into the valley toe.

UT1 Reach 4A/4B

UT1 Reach 4 is extensively eroded and incised within the wooded valley, with erosion present on both banks, transverse bars indicative of lateral instability, and sharp meander bends into valley walls. As the stream exits the wood line, the bank heights decrease, the channel narrows, flow deepens, and the stream banks are well vegetated with annual species. The floodplain is broad and alluvial down to the Elk Shoals Creek confluence. Approximately 350 feet downstream from the wood line, a large debris jam has formed at an old fence across the channel. The debris jam has captured fines and appears to function as grade control for the stable area directly upstream. Downstream of the jam is a three-foot exposed soil headcut, and the stream is highly sinuous, eroded, and incised for 100 feet.

Downstream of the instability associated with the debris jam and headcut, the stream is largely stable with little erosion. This reach of UT1 Reach 4 had raw eroding banks during site visits in 2010 and 2014, but the absence of cattle over the past two years has promoted vigorous regrowth of vegetation on the stream bank and riparian area. Bars present throughout the channel are vegetated with tall, herbaceous species giving the illusion of low, stable stream banks. Looking closer through the tall vegetation reveals that UT1 Reach 4 is still deeply incised and disconnected from the historic floodplain, despite the herbaceous regrowth. It is expected that the return of cattle will quickly destroy the stabilization of this reach.

UT1A

UT1A originates at a wetland seep within the project limits. The valley is broad and alluvial, but the stream is deeply incised and disconnected from the historic floodplain. Despite the incision, UT1A is stable with tall, herbaceous vegetation present throughout.

3.4.2 Project Wetlands

There are 18 wetlands located within or immediately adjacent to the project area (Wetlands A – R). Refer to Figure 2 for a figure depicting wetland locations. The wetland features are classified as headwater forest wetland types using the North Carolina Wetland Assessment Method (NCWAM) classification key and best professional judgement. The wetlands occur on the side slopes and floodplains that drain to on-site stream channels. The features exhibit one or more of the following wetland hydrology indicators: high water table, iron deposits, saturated within the upper 12 inches of the soil profile, and water-stained leaves. Soils within on-site wetlands have a low chroma (depleted) matrix and redoximorphic features. Common hydrophytic vegetation includes Asian spiderwort (*Murdannia keisak*), common rush (*Juncus effusus*), New York ironweed (*Vernonia noveboracensis*), Pennsylvania smartweed (*Persicaria pennsylvania*), and shallow sedge (*Carex lurida*). Wetland determination forms are provided in Appendix 2.

Table 4: Project Attribute Table

Stream Summary Information					
Parameter	**UT1 Reach 1A/1B**	**UT1 Reach 2**	**UT1 Reach 3**	**UT1 Reach 4A/4B**	**UT1A**
Length of Reach (LF)	1901	1324	732	2825	158
Valley Confinement	Confined	Unconfined	Moderately Confined	Unconfined	Unconfined
Drainage Area (acres)	71	117	141	256	7.4
Perennial, Intermittent, Ephemeral	Perennial	Perennial	Perennial	Perennial	Intermittent
NCDWR Water Quality Classification	WS-IV				
Stream Classification[1]	B4	B4	N/A	G4c	N/A
Evolutionary Stage (Simon and Rinaldi, 2006)[1]	III: Degradation	V: Aggradation & Widening	I/II: Sinuous & Channelized	IV: Degradation & Widening	III: Degradation
NC SAM Rating	Low	Low	High	Low	Medium
FEMA Classification	N/A	N/A	N/A	Zone AE	N/A

Wetland Summary Information				
Wetland Location	**A**	**B**	**C**	**D**
Size of Wetland (acres)	<0.01	<0.01	0.01	0.18
Wetland Type (non-riparian, riparianriverine or riparian non-riverine)	Riparian Non-Riverine			
Mapped Soil Series	Fairview	Fairview	Fairview	Fairview
Drainage Class	Well drained	Well drained	Well drained	Well drained
Soil Hydric Status	No	No	No	No
Source of Hydrology	Groundwater & overbank flooding	Groundwater & overbank flooding	Groundwater & overbank flooding	Groundwater & overbank flooding
Restoration or enhancement method (hydrologic, vegetative, etc.)	N/A	N/A	N/A	N/A
Wetland Location	**E**	**F**	**G**	**H**
Size of Wetland (acres)	0.36	0.02	<0.01	0.01
Wetland Type (non-riparian, riparian riverine or riparian non-riverine)	Riparian Non-Riverine			
Mapped Soil Series	Fairview	Fairview	Fairview	Fairview
Drainage Class	Well drained	Well drained	Well drained	Well drained
Soil Hydric Status	No	No	No	No
Source of Hydrology	Groundwater & overbank flooding	Groundwater & overbank flooding	Groundwater & overbank flooding	Groundwater & overbank flooding
Restoration or enhancement method (hydrologic, vegetative, etc.)	N/A	N/A	N/A	N/A
Wetland Location	**I**	**J**	**K**	**L**
Size of Wetland (acres)	0.05	0.62	<0.01	0.02

Wetland Type (non-riparian, riparian riverine or riparian non-riverine)	Riparian Non-Riverine			
Mapped Soil Series	Fairview	Fairview	Fairview	Fairview
Drainage Class	Well drained	Well drained	Well drained	Well drained
Soil Hydric Status	No	No	No	No
Source of Hydrology	Groundwater & overbank flooding	Groundwater & overbank flooding	Groundwater & overbank flooding	Groundwater & overbank flooding
Restoration or enhancement method (hydrologic, vegetative, etc.)	N/A	N/A	N/A	N/A
Wetland Location	**M**	**N**	**O**	**P**
Size of Wetland (acres)	0.01	0.25	0.01	0.06
Wetland Type (non-riparian, riparian riverine or riparian non-riverine)	Riparian Non-Riverine			
Mapped Soil Series	Fairview	Codorus	Yadkin	Codorus/ Yadkin
Drainage Class	Well drained	Somewhat poorly drained	Well drained	Somewhat poorly drained/ Well drained
Soil Hydric Status	No	No	No	No
Source of Hydrology	Groundwater & overbank flooding	Groundwater & overbank flooding	Groundwater	Groundwater
Restoration or enhancement method (hydrologic, vegetative, etc.)	N/A	N/A	N/A	N/A
Wetland Location	**Q**	**R**		
Size of Wetland (acres)	0.02	0.05		
Wetland Type (non-riparian, riparian riverine or riparian non-riverine)	Riparian Non-Riverine			
Mapped Soil Series	Codorus	Codorus/Dan River		
Drainage Class	Somewhat poorly drained	Somewhat poorly drained/ Well drained		
Soil Hydric Status	No	No		
Source of Hydrology	Groundwater & overbank flooding	Groundwater & overbank flooding		
Restoration or enhancement method (hydrologic, vegetative, etc.)	N/A	N/A		

[1.] The Rosgen classification system is for natural streams. These channels have been manipulated for agriculture purposes and, therefore may not fit the classification category exactly as described. Results of the classification are provided for illustrative purposes only.

4.0 Functional Uplift Potential

The potential for functional uplift is qualitatively described in this section using terminology from the Stream Functions Pyramid (Harman, 2012). The Stream Functions Pyramid describes a hierarchy of five stream functions, each of which supports the functions above it on the pyramid (and sometimes

reinforces those below it). The five functions in order from bottom to top are hydrology, hydraulics, geomorphology, physicochemical, and biology. Neither the Stream Functions Pyramid nor the Quantification Tool are proposed to determine success of the mitigation site.

4.1 Hydrology

Site hydrology has been altered by the deforestation of approximately 78% of the project watershed. Intensive management of the watershed for livestock has been the major watershed disturbance. These alterations in land cover typically result in reductions in rainfall interception and evapotranspiration which lead to increases in runoff and water yield (Dunne and Leopold, 1978). The primary result of these changes is an increase in both peak flows and base flows. The watershed has adjusted to its landcover changes and the hydrologic regime has stabilized. Based on observations in the watershed, landcover will continue to be dominated by agricultural activities and population growth in the rural area will continue to be low.

A stream restoration project performed at a specific site does not often result in uplift to hydrology (Harmon, 2012). Even though trees will be planted within the conservation easement, this will not significantly improve the rainfall-runoff relationship for the watershed. Therefore, there are no significant opportunities for this project to improve the hydrology function of the watershed.

4.2 Hydraulics

UT1 and UT1A are hydraulically impaired due to their lack of consistent floodplain connection (BHR = 2.0 – 6.4). Medium to large headcuts ranging from 0.5 to 3 feet tall are present throughout the channel. Uplift in hydraulic function will result from reconnecting the streams to the floodplain. Bankfull and high flow velocities, along with channel shear stresses, will be reduced. The channels will be designed to experience out of bank events at a recurrence interval typical of a naturally functioning stream system. All restoration reaches on the project will be constructed with a bank height ratio of 1.0 to 1.1. Changes in stream dimension and improvement of floodplain connectivity will raise the hydraulic function of the Site streams.

4.3 Channel Geomorphology

Years of anthropogenic manipulation and watershed impacts for agricultural practices have degraded the streams on Site. Approximately 81% of the length of restoration reaches are incised and 54% are actively eroding. Apart from UT1 Reach 3, which is slated for preservation, the riparian vegetation along much of the stream consists of grazed herbaceous cover with only sporadically mature trees. Bedform diversity and habitat is very poor due to sedimentation and incision. Much of the stream is choked with fine sediment due to the active erosion and cow wallows on the upstream extents of the project stream.

There is a significant opportunity to improve the geomorphologic function on the Site. Channel dimension will be stabilized on restoration reaches and the incision and bank erosion will be corrected. Aquatic habitat and large woody debris (LWD) will be added to the system through construction of in-stream log structures, bank revetments, and meander pools. A riparian buffer will be planted, resulting in the improved long-term geomorphic function of UT1 and UT1A.

4.4 Physicochemical

No water quality sampling has been conducted on the Site and there are no water quality monitoring stations within the project watershed. The 2009 Upper Catawba River Basin Restoration Priorities (RBRP) noted the importance of the implantation of agricultural BMPs within heavily agricultural sub-waters of TLWs, including Elk Shoals Creek.

Upon execution of the project, the exclusion of cattle within the Site provides a great potential to improve the physicochemical functioning of the streams. A storm water BMP will be installed within the proposed conservation easement at a point of concentrated agricultural input to reduce sediment,

nutrient, and fecal coliform inputs from an adjacent farm field. A riparian buffer will be established within the conservation easement, reducing runoff and erosion of nutrient-rich bank sediments and eventually providing stream shading resulting in reduced water temperatures. Water will flow over in-stream structures, providing aeration. The stream will be reconnected to its floodplain and adjacent floodplain wetlands to provide storage and treatment of overbank flows, and streambank erosion will be greatly reduced, eliminating a source of sediment and nutrients. Time and development of a mature canopy will be required to realize the extent of physicochemical functional lift. For these reasons, physicochemical improvements will not be explicitly monitored for success, although visual observations will be documented, and these observations are expected to show that the Site is trending towards improved function.

4.5 Biology

Since no data on the existing communities are available and biologic assessment is not proposed to evaluate the current level of biologic functioning, this function is not rated.

Despite the proposed stream and buffer improvements, the biological response may be slow until the physicochemical function is significantly improved. Since the long-term level of improvement is not expected to occur within the seven years of monitoring, the functional uplift potential will not be explicitly monitored. Improvements in biological activity of the Site will likely be noted during visual assessments of the project.

4.6 Overall Functional Uplift Potential

Overall, the Site has functional uplift potential consistent with goals outlined in the RBRP, from the improvement in potential habitat to the improvements in stream hydraulics that will be seen throughout the Site with the stream restoration and BMP installation, to the improvements in geomorphology that will come with restoring streams that are suited to the valley types throughout the Site. Physicochemical and biological improvements are a likely result of the project. However, there is no existing basis for classifying the existing condition of these functions and the likely improvements will occur gradually after construction.

4.7 Site Constraints to Functional Uplift

The existing road culvert on the easement break of Elk Shoals Loop could potentially affect the functional uplift of the project, but it is not likely it will have any affect on the project since the culvert is functioning and is relatively stable. There are no other known Site constraints that will affect the functional uplift of the project. The valley width on the Site will allow for the development of pattern and dimensions to restore stable, functioning streams and wetlands. The degree to which the physicochemical and biology functions can improve on the Site is limited by the watershed conditions beyond the conservation easement.

5.0 Regulatory Considerations

Table 5, below, is a summary of regulatory considerations for the Site. These considerations are expanded upon in Sections 5.1-5.3.

Table 5: Regulatory Considerations

Parameters	Applicable?	Resolved?	Supporting Docs?
Water of the United States - Section 404	Yes	No	PCN[1]
Water of the United States - Section 401	Yes	No	PCN[1]
Endangered Species Act	Yes	Yes	Appendix 5
Historic Preservation Act	Yes	Yes	Appendix 5

Parameters	Applicable?	Resolved?	Supporting Docs?
Coastal Zone Management Act	No	N/A	N/A
FEMA Floodplain Compliance	Yes	No	N/A[2]
Essential Fisheries Habitat	No	N/A	N/A

1. PCN to be provided to IRT with Final Mitigation Plan.
2. A floodplain development permit will be submitted to the local floodplain administrator.

5.1 Biological and Cultural Resources

5.1.1 Biological Resources

Wildlands searched the US Fish and Wildlife Service (USFWS) and NHP databases for federally listed threatened and endangered plant and animal species in Alexander County, NC. Currently, there are four species federally listed for this specific county, which include the bald eagle (*Haliaeetus leucocephalus*), the bog turtle (*Glyptemys muhlenbergii*), dwarf-flowered heartleaf (*Hexastylis naniflora*), and the northern long-eared bat (*Myotis septentrionalis*) (Table 6). A pedestrian survey conducted on September 7, 2017, indicated that the Site provides potential habitat for the bog turtle, dwarf-flowered heartleaf, and potential summer roosting for northern long-eared bat (NLEB), but no individuals were located at the time.

Table 6: Federally Protected Species in Alexander County, NC

Species	Federal Status	Habitat
Vascular Plant		
Dwarf-flowered heartleaf (*Hexastylis naniflora*)	Threatened	Along bluffs and adjacent slopes, in boggy areas next to streams and creek heads, and along the slopes of nearby hillsides and ravines.
Vertebrate		
Bald eagle (*Haliaeetus leucocephalus*)	Bald and Golden Eagle Protection Act	Near large open water bodies: lakes, marshes, seacoasts, and rivers
Bog turtle (*Glyptemys muhlenbergii*)	Threatened (Similarity of Appearance)	Inhabit open-canopy, herbaceous sedge meadows and fens, wet cow pastures, and shrub swamps bordered by wooded areas. Depend on wetland microhabitats for foraging, nesting, basking, hibernation, and shelter.
Northern long-eared bat (*Myotis septentrionalis*)	Threatened	Roost in 3" dbh dead and alive trees with exfoliating bark, crevices or hollows during summer months. Caves or mines during winter months.

Habitat information from the following website: https://www.fws.gov/raleigh/species/cntylist/alexander.html

Forested habitats containing trees at least 3-inch dbh in the project area provide suitable habitat for NLEB. Due to the decline of the NLEB population from the white-nose syndrome (WNS), the USFWS has issued the finalization of a special rule under section 4(d) of the ESA to addresses the effects of the NLEB resulting from purposeful and incidental take based on the occurrence of WNS. Because the project is located within a WNS zone and will include removal/clearing of trees, it is subject to the final 4(d) ruling. A review of the NCNHP records did not indicate any known NLEB populations within 2.0 mile of the study area; therefore, the project is eligible to use the NLEB 4(d) Rule Streamlined Consultation Form to meet regulatory requirements for section 7(a)(2) compliance 4(d) consultation.

A letter requesting comment from the USFWS was sent on February 16, 2018. No response from the USFWS was received within the 30-day response period. Therefore, the signing of the NLEB 4(d) Rule

Streamlined Consultation Form by the FHWA determines that this project may affect the NLEB, but that any resulting incidental take of the NLEB is not prohibited by the final 4(d) rule. A FHWA signed 4(d) consultation form and the correspondence associated with this determination are included in the Appendix.

5.1.2 Cultural Resources and Significant Natural Heritage Areas

Wildlands requested review and comment from the State Historic Preservation Office (SHPO) with respect to any archeological and architectural resources related to the Site on February 16, 2018. SHPO responded on March 22, 2018 and stated they were aware of "no historic resources which would be affected by the project" and would have no further comment. All correspondence is included in Appendix 5.

5.2 FEMA Floodplain Compliance and Hydrologic Trespass

The Site is represented on the Alexander County Unincorporated Areas Flood Insurance Rate Map Panel 3775J, with an effective date of 12/18/2007. Within the Site, Reach 4B is located within a Zone AE Special Flood Hazard Area (SFHA) regulatory floodplain associated with Elk Shoals Creek. None of the project streams are mapped under the regulatory authority of FEMA. Current Effective FEMA mapping for the Site is overlain with project streams on Figure 6. The stream and floodplain grading within the regulatory floodplain of Elk Shoals Creek will be designed to achieve a no-rise condition and a floodplain development permit will be obtained from the Alexander County floodplain administrator.

The proposed design associated with the Site has limited or no risk of potential hydrologic trespass since UT1 originates on-site. In addition, wide buffers adjacent to project streams are protected under conservation eliminating the risk to adjacent farm fields.

5.3 401/404

Impacts to existing wetlands will be minimized or avoided as much as possible. The project design will avoid impacting wetlands along relatively stable project reaches designated for Enhancement II or preservation. Approximately 0.32 acres of wetlands will be impacted due to realignment of stream channels and floodplain grading within narrow valleys of restoration reaches. A majority of proposed wetland impacts, approximately 0.30 acres, are in areas currently impacted by cattle grazing. Most existing wetlands will be improved by planting native vegetation and fencing out livestock. Project streams and wetlands will be protected in perpetuity under the conservation easement placed on the property. During construction safety fence will be installed to prevent unintended impacts on site wetlands outside the limits of disturbance. This will fencing be denoted in the final construction plans.

Table 7 estimates the anticipated impacts to wetland areas on this project. The Pre-Construction Notification, including this data, will be submitted to the IRT with the Final Mitigation Plan.

Table 7: Estimated Impacts to Project Wetlands

Wetland Feature	Classification	Acreage	Permanent (P) Impact		Temporary (T) Impact	
			Type of Activity	Impact Area (acres)	Type of Activity	Impact Area (acres)
A	Riparian Non-Riverine	0.01	Floodplain Grading	0.01	-	-
B		0.01	Floodplain Grading	0.01	-	-
C		0.01	Floodplain Grading	<0.01	-	-
D		0.18	Stream Realignment & Floodplain Grading	0.04	Floodplain Grading	0.03

Wetland Feature	Classification	Acreage	Permanent (P) Impact		Temporary (T) Impact	
			Type of Activity	Impact Area (acres)	Type of Activity	Impact Area (acres)
E		0.36	Stream Realignment & Floodplain Grading	0.05	Floodplain Grading	0.04
M		0.01	Stream Realignment	0.01	Floodplain Grading	0.01
N		0.25	Stream Realignment	0.03	Floodplain Grading	0.06
Q		0.02	Floodplain Grading	0.02	-	-
R		0.05	Stream Realignment	0.01	Floodplain Grading	0.01
			Total P Impact	**0.17**	**Total T Impact**	**0.15**

6.0 Mitigation Site Goals and Objectives

The project will improve stream functions as described in Section 4 through stream restoration and the conversion of maintained agricultural fields into riparian buffer within the Upper Catawba River Basin, while creating a functional riparian corridor at the site level. 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 9 of this report. The project goals and related objectives are described in Table 8.

Table 8: Mitigation Goals and Objectives

Goal	Objective	Expected Outcomes	Function Supported
Improve stream channel stability.	Restore stream channels that will maintain a stable pattern and profile considering the hydrologic and sediment inputs to the system, the landscape setting, and the watershed conditions. Create stable tie-in for tributary joining restored channel. Add bank revetments and in-stream structures to protect restored streams.	Reduce sediment inputs from bank erosion. Reduce shear stress on channel boundary. Support all stream functions above hydrology.	Hydraulic, Geomorphology, Physicochemical, Biology
Reconnect channels with historic floodplains.	Reconstruct stream channels with bankfull dimensions relative to the floodplain.	Allow more frequent flood flows to disperse on the floodplain and create overbank floodplain and depression storage for overland flow retention. Decrease direct runoff, increase infiltration. Support all stream functions above hydrology.	Hydraulic, Geomorphology, Physicochemical, Biology
Improve in-stream habitat.	Install habitat features such as constructed riffles, cover logs, and brush toes into restored streams. Add woody materials to channel beds. Construct pools of varying depth.	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	Hydraulic, Geomorphology, Physicochemical, Biology

Goal	Objective	Expected Outcomes	Function Supported
		complexity including LWD to the streams.	
Reduce sediment and fecal coliform and nutrient input from adjacent farm fields	Construct a step pool stormwater conveyance system to slow and treat runoff from farm field before entering Site streams.	Reduce agricultural and sediment inputs to the project, which will reduce likelihood of accumulated fines and excessive algal blooms from nutrients.	Hydrology, Hydraulic, Geomorphology, Physicochemical, Biology
Restore and enhance native floodplain and wetland vegetation.	Plant native tree and understory species in riparian zone where currently insufficient. Remove invasive species within the riparian corridor.	Reduce sediment inputs from bank erosion and runoff. Increase nutrient cycling and storage in floodplain. Provide riparian and wetland habitat. Add a source of LWD and organic material to stream. Support all stream functions.	Hydrology (local), Hydraulic, Geomorphology, Physicochemical, Biology
Exclude livestock from stream channels.	Exclude livestock from stream channels and riparian areas.	Reduce nutrient, sediment, and fecal coliform inputs. Protect restored aquatic habitat. Protect the site from encroachment from livestock. (permanent livestock exclusion)	Hydraulic, Geomorphic, Physicochemical, Biology
Permanently protect the project site from harmful uses.	Establish a conservation easement on the Site.	Protect Site from encroachment on the riparian corridor and direct impact to streams and wetlands. Support all stream functions.	Hydraulic, Geomorphic, Physicochemical, Biology

7.0 Design Approach and Mitigation Work Plan

7.1 Design Approach Overview

The design approach for this Site was developed to meet the goals and objectives described in Section 6 which were formulated based on the potential for uplift described in Section 4. The design is also intended to provide the expected outcomes in Section 6, 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, and also relies on empirical data and prior experiences and observations. Reference reaches were identified to serve as the basis for design parameters. Channels were sized based on design discharge hydrologic analysis which uses a combination of empirical and analytical data as described within this report. Designs were then verified and/or modified based on sediment transport analysis. These design approaches have been used on many successful Piedmont restoration projects and are appropriate for the goals and objectives of this Site.

7.2 Reference Streams

Reference streams provide geomorphic parameters of a stable system, which can be used to inform design of stable channels of similar stream types in similar landscapes and watersheds. Eight reference reaches were identified for this Site and used to support the design of streams of the Site (Figure 7). These reference reaches were chosen because of their similarities to the Site streams including drainage area, valley slope, morphology, and bed material. Geomorphic parameters for these reference reaches are summarized in Appendix 4. The references to be used for the specific streams are shown in Table 9. A description of each reference reach is included below.

Table 9: Stream Reference Data Used in Development of Design Parameters

	Design Stream	UT1			
	Reach	1A	1B	4A	4B
Reference Stream	Stream Type				
Agony Acres UT1	E4	X	X		
UT to Kelly Creek	B4/B4a	X	X		
UT to Austin Branch	B4a/A4	X	X		
Timber Tributary	B4	X	X		
UT to Lyle Creek	C5			X	X
UT to Varnals Creek	C4/E4			X	X
Walker Branch	E4			X	X
Box Creek	C4			X	X

7.2.1 Agony Acres UT1

Agony Acres reference reach (UT1 - Reach 3) is located in northeast Guildford County, NC. It was identified as a high quality preservation area on the Agony Acres Mitigation Site and was used as a reference reach for that project. Wildlands performed a detailed morphologic survey in March of 2013. The Agony Acres reference reach has a drainage area of 0.3 square miles and is classified as a Rosgen E4 stream type. This site was specifically chosen because the position of the Agony Acres reference reach in the landscape is similar to that of UT1 Reach 1A and Reach 1B.

7.2.2 UT to Kelly Branch

The UT to Kelly Branch reference reach is a small, steep, headwater channel located in the McDowell County. It has a drainage area of 0.08 square miles and is part of the Broad River Basin. The reach classifies as an B4 step-pool channel, but pool depths are negligible as they are filled with sediment from the leaching of an upstream, anthropogenic sediment source. Bankfull channel dimensions of riffle features were fairly uniform and consistent throughout the reach. The channel is sinuous for a high gradient system (sinuosity of 1.19), exhibiting a stable planform while maximizing the width of the valley where possible. Several long gravel/cobble riffles were observed at the site that cascaded into pools over rootmass, woody debris or a boulder step at the tail of riffle.

7.2.3 UT to Austin Branch

Located in Buncombe County on the West Range of the Biltmore property, this reference reach is drained by a small forested watershed (0.12 square miles) that empties into Austin Branch which flows directly into the French Broad River. Most of the watershed is wooded except for narrow patches of open, lightly used pastureland located around the upper periphery of the watershed. Surrounding plant communities included various mature hardwoods (white oak, tulip poplar) and understory shrubs (rhododendron, American holly). The channel exhibits a meander pool system with a channel slope of 4% and sinuosity of 1.2. This reach of UT to Austin Branch classifies as an A4/B4a type channel with a width to depth ratio of 8.8. Stream access to the floodplain is ample reporting an entrenchment ratio of

4.3. Habitats identified in UT to Austin Branch (downstream) include cobble riffles, boulder/cobble steps, plunge pools, and meander pools.

7.2.4 Timber Tributary

Timber Tributary Reference Reach is a B4 classified channel in the northern portion of the Yadkin River Basin. It has a drainage area of approximately 0.04 square miles. The stream meanders through confined valley surrounded by mature trees. The channel has a moderate slope of 3.2%, and a channel sinuosity of 1.12. This system supports varied habitats which included woody debris, rock riffles and meander pools.

7.2.5 UT to Lyle Creek

UT to Lyle Creek is a perennial stream flowing through the broad, flat floodplain of Lyle Creek. UT to Lyle's watershed is wooded, and the stream is fully connected to the floodplain with a bank height ratio of 1.0 and an entrenchment ratio of over 2.5. The width-to-depth ratio ranges from approximately 15 to 18, and the overall valley slope is approximately 0.8%. UT to Lyle Creek has a sinuosity of 1.1 and classifies as a straight, C5 stream channel. In-stream habitat features within this reach include shallow pools, woody debris, and small sections of tree roots.

7.2.6 UT to Varnals Creek

The UT to Varnals reference reach is located in south central Alamance County, NC near the Cane Creek Mountains. Wildlands visited UT to Varnals in September 2014 and visually confirmed that the land use is unchanged from reported conditions and that the stream is laterally and vertically stable. Wildlands conducted a detailed morphological survey in October 2014. UT to Varnals has a drainage area of 0.41 square miles and is classified as a Rosgen E4 stream type for the majority of the reach. UT to Varnals has a valley slope of 2.0% and a channel slope of 1.7%. The riffle pool sequences and spacing of grade control structures on UT to Varnals were used in the plan and profile development for these reaches where native bedrock control is lacking.

7.2.7 Walker Branch

The Walker Branch reference is located in Northeastern Rutherford County. The dataset was used as a reference stream for the Cane Creek Restoration prepared by Restoration Systems and Axiom Environmental in 2007. The drainage area is 0.29 square miles and the land use within the drainage area is a semi-mature forest. The Walker Branch reference site was classified as a C4/E4 stream type with a sinuosity of 1.4. The channel has a width to depth ratio ranging from 8.9 – 12.2 and an entrenchment ratio greater than 2.5. The reach has a valley slope of 2.6% while the channel slope is 1.5%. The bed material d_{50} for the reach is 27.8 mm.

7.2.8 Box Creek

The Box Creek reference reach site is part of the Broad River Basin located in Rutherford County and has a drainage area of 2.13 square miles. The entire watershed is forested, and the reference reach site is located approximately a quarter mile upstream from a large pond. The reach is characterized by short riffles, deep pools, and long shallow runs. This moderately sinuous reach (1.19) classifies as a C4 channel and has a high width/depth ratio of 21.9. This reach reported a bank height ratio of 1.5 but banks were typically stable due to a large extent of woody vegetation lining each bank, especially along the outer bends of a few tight meanders. In-stream habitat structures included undercut banks, woody debris, and coarse substrate from which fish have built several gravel piles for nesting.

7.3 Design Channel Morphological Parameters

Reference reaches were an important source of information to develop the cross-section, pattern, and profile design parameters for the restoration reaches. Ranges of pattern parameters were developed within the reference reach parameter ranges with some exceptions based on best professional

judgement and experience from previous projects. For example, radius of curvature ratio has been kept above 2.0 on all reaches. Wildlands has found this minimum ratio, and others, support stable geometry. Pool depths were designed to be a minimum of 1.2 times deeper than riffles to provide habitat variation. Cross-section parameters such as area, depth, and width were designed based on the design discharge, stable bank slopes, and width to depth ratios similar to reference conditions. Key morphological parameters for the restoration reaches are listed in Table 10 and Table 11. Complete morphological tables for existing, reference, and proposed conditions are included in Appendix 4.

Table 10: Summary of Morphological Parameters for UT1 Reach 1A and 1B

Parameter	Existing		References				Proposed	
	UT1 Reach 1A	UT1 Reach 1B	Agony Acres UT1	UT to Kelly Creek	UT to Austin Branch	Timber Tributary	UT1 Reach 1A	UT1 Reach 1B
Valley Width (ft)	20-45	20-45	---	---	---	---	20-45	20-45
Contributing Drainage Area (sq mi)	0.05	0.11	0.15	0.08	0.12	0.04	0.05	0.11
Channel/Reach Classification	---	B4	B3	B4/B4a	B4a/A4	B4	B4	B4
Discharge Width (ft)	---	5.7-7.2	11.1	7.9	6.2	8.9	6.9	8.2
Discharge Depth (ft)	---	0.6-0.7	0.7	0.7	0.7	0.5	0.5	0.6
Discharge Area (ft^2)	---	4.0-4.4	7.4	5.7	4.4	4.6	3.6	5
Discharge Velocity (ft/s)	---	5.5-5.8	4.9	5.9	6.2	3.7	4.5	5
Discharge (cfs)	---	23	36.5	23	27.3	17	15	23
Channel Slope (%)	---	3.46	4.9	3.0-6.5	4	3.34	3.40	3.40
Sinuosity	---	1.08	1.04	1.19	1.2	1.12	1.08	1.08
Width/Depth Ratio	---	8.5-12	16.6	10.9	8.8	17	14	15
Bank Height Ratio	---	5.9-6.4	1	2.5	1	1	1.0 – 1.1	1.0 – 1.1
Entrenchment Ratio	---	1.2	2.3	1.2	4.3	1.5	>2.9	>2.4
d16/ d35/ d50/ d84/ d95/ dip/ disp	---	1.22/ 11.15/13.63/45.00/ 81.25/256/---/---	2.0/12.9/50.6/1 68.1/2048.0/--- /---	---	---	0.49/3.5/6.5/48 /83/128/---/---	---	---

Table 11: Summary of Morphological Parameters for UT1 Reach 4A and 4B

Parameter	Existing		References				Proposed	
	UT1 Reach 4A	UT1 Reach 4B	UT to Lyle Creek	UT to Varnels Creek	Walker Branch	Box Creek	UT1 Reach 4A	UT1 Reach 4B
Valley Width (ft)	15-54	50-200+	---	---	---	---	25-200+	25-200+
Contributing Drainage Area (sq mi)	0.29	0.4	0.25	0.41	0.29	2.13	0.29	0.4
Channel/Reach Classification	G4c	G4c	C5	C4/E4	E4	C4	C4	C4
Discharge Width (ft)	8.3-15.0	8.2-8.6	7	9.3-10.5	11.5-12.3	23.5	11.5	12
Discharge Depth (ft)	1	1.2	0.5	1.1-1.2	0.77-0.99	1.2	0.9	0.9
Discharge Area (ft^2)	8.6-15.6	10.1-10.3	3.5-4.1	10.3-12.3	8.9-12.2	28.9	10.1	11.3
Discharge Velocity (ft/s)	6.5-3.6	3.9-4.0	4.7	4.4-5.2	3.8	3.4	3.5	3.9
Discharge (cfs)	31-54.6	40.1	18	54	40	99	32	40
Channel Slope (%)	1.04	1.04	0.4	1.7	1	0.84	0.93	0.93

Parameter	Existing		References				Proposed	
	UT1 Reach 4A	UT1 Reach 4B	UT to Lyle Creek	UT to Varnels Creek	Walker Branch	Box Creek	UT1 Reach 4A	UT1 Reach 4B
Sinuosity	1.14	1.14	1.1	1.2	1.4	1.33	1.2	1.2
Width/Depth Ratio	8.0-14.3	6.6-7.2	14.9-18.3	8.1-9.3	12.3-14.4	19.1	13	13
Bank Height Ratio	1-1.5	2.0-2.1	0.6-0.9	1	---	1.5	1.0 – 1.1	1.0 – 1.1
Entrenchment Ratio	1.8-3.6	1.0-1.1	5.7-6.4	5.7-10	2.5-2.7	3.3	>2.2	>2.2
d16/ d35/ d50/ d84/ d95/ dip/ disp	6.69/15.27/41.32/ 69.69/128/---/---	---	--- /0.1/0.2/0.5/ 4.0/8.0/---/---	2.9/9.2/15/56/ 88/256/---/---	---	4.1/11/22/50/ 78/---/---	---	---

7.4 Design Discharge Analysis

Multiple methods were used to develop bankfull discharge estimates for each of the project restoration reaches: the NC Rural Piedmont regional curve (Harman et al., 1999), NC Piedmont/Mountain regional curve (Walker, unpublished), a Wildlands regional USGS flood frequency analysis, a site-specific reference reach curve, existing bankfull indicators using Manning's equation, and data from previous successful design projects. The resulting values were compared, and best professional judgment was used to determine the specific design discharge for each restoration reach. Each of the methods is described below.

7.4.1 Regional Curve Data

Bankfull discharge was estimated using the published NC Rural Piedmont Curve (Harman et al., 1999) as well as the updated NRCS curve for rural Piedmont and mountain streams (Walker, unpublished) as shown on Figure 8.

7.4.2 Wildlands Regional USGS Rural Piedmont Calculator

Wildlands developed a regional flood frequency analysis tool that tailored the USGS 2009 publication *Magnitude and Frequency of Rural Floods in the Southeastern United States, through 2006* to the Piedmont of North Carolina. Of the 103 stations referenced in the publication, 23 were used in the development of the tool. To fill gaps in data, five additional stations were added by Wildlands to represent streams with drainage areas less than one square mile. The Hosking and Wallis homogeneity test was performed in R© to identify the most appropriate gages based on homogeneity (Hosking and Wallis, 1993). The gages used were:

- USGS 02096740 – Gun Branch near Alamance, NC (DA = 4.06 mi^2)
- USGS 02096846 – Cane Creek near Yadkin Grove, NC (DA = 7.54 mi^2)
- USGS 02097010 – Robeson Creek near Pittsboro, NC (DA = 1.71 mi^2)
- USGS 02101030 – Falls Creek near Bennett, NC (DA = 3.43 mi^2)
- USGS 0210166029 – Rocky River at SR1300 near Crutchfield Crossroads, NC (DA = 7.42 mi^2)

The data from these 28 gage stations were used to develop flood frequency curves for the 1.2-year and 1.5-year recurrence interval discharges. These relationships can be used to estimate discharge of those recurrence intervals for ungaged streams in the same hydrologic region and were solved for each project reach's discharge with the drainage area as the input. The discharge estimates are shown on Figure 8 as the USGS Rural Piedmont Calculator 1.2-yr Predictions.

7.4.3 Site Specific Reference Reach Curve

Eight reference reaches were identified for this project; four B-type channels and four C-type channels. Each reference reach was surveyed to develop information for analyzing drainage area-discharge relationships as well as development of design parameters. Stable cross-sectional dimensions and channel slopes were used to compute a bankfull discharge with the Manning's equation for each reference reach. The resulting discharge values were plotted with drainage area and compared the other discharge estimation methods.

7.4.4 Maximum Discharge (Manning's Equation)

A riffle cross-section was surveyed on each restoration reach on the Site. Due to the existing impairments throughout Site streams, bankfull indicators were weak and not considered reliable for estimating a bankfull discharge. Instead, Manning's equation was used to calculate a discharge associated with the top of banks for all project streams. Stream slope was calculated from the surveyed channel slope, and roughness was estimated using guidelines from Chow (1959).

7.4.5 Design Discharge Analysis Summary

The design discharges for each restoration project reach were developed so that the reconstructed channels will flood with the desired frequency. Results from each of the methods described above were evaluated and compared to the other methods. For this analysis the most emphasis was placed on the results from the regional flood frequency (1.2), piedmont regional curve, and reference reach curve. Because of the desire to achieve frequent floodplain interaction, design discharges were selected close to the lower end of the range of values produced by the estimation methods. Tables 12 gives a summary of the discharge analysis.

Table 12: Summary of Design Discharge Analysis

		UT1			
		Reach 1A	**Reach 1B**	**Reach 4A**	**Reach 4B**
DA (acres)		32	71	186	256
DA (sq. mi.)		0.05	0.11	0.29	0.40
NC Rural Piedmont Regional Curve (cfs)		10	18	36	46
Alan Walker Curve (cfs)		5	10	21	27
Wildlands Regional USGS Flood Frequency Analysis (cfs)	**1.2-year event**	9	15	31	40
	1.5-year event	13	23	45	57
Site Specific Reference Reach Curve		18	28	32	39
Selected Design Q (cfs)		12	20	32	40

7.5 Sediment Transport Analysis

To assess the magnitude of the bed load supply on the project streams, Wildlands performed a qualitative assessment of the sediment volume and sources in the project watershed through aerial photography and field reconnaissance.

On-site streams were visually inspected to qualitatively asses aggradation and degradation within the channels. At the site level, lack of pool habitat and an abundance of fine sediment in project reaches provides evidence that the current lack of riparian vegetation and disturbance in the floodplain from livestock is overloading the carrying capacity of the project streams and their ability to move on-site sediment. Additionally, observations of incised channels and actively eroding banks provide evidence the channels are actively degrading, due to incision and a lack of an established riparian buffer. Once the project is constructed, on-site sediment sources will be addressed by protecting streambanks, stabilizing concentrated flows, excluding livestock and stabilizing the riparian corridor with vegetation. The focus of sediment transport analysis for this design was to verify that the design channels will be stable over time and can pass sediment from the watershed.

7.5.1 Competence Analysis

Competence analyses were performed during design for each of the restoration reaches by comparing shear stress associated with the design bankfull discharge, proposed channel dimensions, and proposed channel slopes with the size distribution of the existing bed load. The analysis utilized standard equations based on a methodology using the Shields (1936) curve and Andrews (1984) equation described by Rosgen (2001). This analysis is used to verify that the design will move the bed load material supplied to the stream. The results of the analysis are shown in Table 13.

Table 13: Results of UT1 Competence Analysis

	UT1	
	Reach 1A/1B	**Reach 4A/4B**
Dbkf (ft)	0.50	0.90
Schan (ft/ft)	0.0370	0.0093
Bankfull Shear Stress, t (lb/sq ft)	1.21	0.49
Dmax Bar/Subpavement (mm)	76.2	50.8
Dcrit (ft)	0.30	0.45
Scrit (ft/ft)	0.02062	.00461
Movable particle size (mm)	175.0	90.3
Predicted Shear Stress to move Dmax	0.39	0.23

The initial competence analysis was based on the size material naturally found in the stream to mimic potential bed load. The results were used to inform further design of the reach. The excess shear throughout all existing Site streams influenced the design of rock and wood step structures to provide grade control and increase roughness within the channel. Riffles with larger materials, such as chunky riffles, were also integrated into the design as grade control. The proposed D_{50} and D_{100} for the constructed riffles on all stream reaches will be sized so that the reconstructed channels will not produce enough shear stress to entrain the largest particles in these structures. This will ensure a stable pavement while allowing for bed load material to be active within the system. It is important to note that while the proposed channel slope of Reach 4A/4B exceeds the critical slope, degradation will be avoided through grade control structures and properly sized stone in the riffles.

7.6 Project Implementation

7.6.1 Overview

The mitigation approaches proposed for the streams on the Site have been developed to achieve the potential for functional uplift relative to the existing conditions on the site (described in Section 4). The site plan includes elements of stream restoration, enhancement II, and preservation as described below. Figure 9 shows the approaches proposed for the project reaches.

Restoration reaches will be constructed as Priority 1 except where Priority 2 grading is needed to transition with existing grade elevations. Restoration reaches have been designed to create stable, functional stream channels based on reference reach parameters, design discharge analysis, and sediment transport analysis. Dimension, pattern and profile have been designed for all restoration reaches to provide a cross-sectional area sized for frequent overbank flows, a stable bed with variable bedforms, well-vegetated bank slopes, and improvements to aquatic habitat and water quality enabling biological life. Improved vertical and lateral stability will reduce stream channel erosion. Diverse bedforms will be established using in-stream structures appropriate for the geomorphic settings. These structures will provide grade control to prevent incision and serve as habitat features. Pools will have varied depths to increase habitat diversity and mimic natural streams.

For Enhancement II the dimension, pattern, and profile will remain the same, and mitigation activities will include localized bank stabilization and repairs in areas where damage is more significant. Mid channel bars will be excavated, and the existing alignment will be stabilized. Invasive vegetation will be treated by either excavation or herbicide. Cattle will also be excluded from the stream. The localized repairs, invasive treatment, and cattle exclusion will return the stream to a functional state, enhancing water quality and improving aquatic and terrestrial habitat along the reach.

Reaches that are stable and functioning will be preserved to protect them from future impacts from cattle, agricultural production, timbering and/or site development. Timbering is set to occur in the near future on the adjacent forested buffer along UT1 Reach 4. Timber limits are established approximately 30-ft – 50-ft outside of the conservation easement to provide additional wooded buffer. Vernal pools will be placed at discrete runoff locations within the conservation easement to provide additional protection from timbering practices. Preservation protection will protect against habitat degradation from these land disturbing activates.

In-stream structures for restoration reaches will include riffles, boulders sills, log sills, log j-hooks, log vanes, brush toe, geolifts and lunker logs. The structures will reinforce channel stability and serve as habitat features. Constructed riffles will be built from excavated on-site rock when possible. Quarry stone may be used if an on-site source cannot be found. Constructed riffles will incorporate woody material and logs, which will provide varied pore spaces within the riffles and benefit hyporheic exchange processes and habitat formation. The diverse range of constructed riffle types will provide grade control, habitat diversity and will create varied flow vectors. Log j-hooks and vanes will deflect flow vectors away from banks while adding to habitat diversity. Log and boulder sills will be used to allow for small grade drops across pools. At select outer meander bends, the channel banks will be constructed with brush toe revetments to reduce erosion potential, encourage pool maintenance, and provide varied pool habitat. Lunker logs will also be used in the meander bends to provide pool habitat variability and provided stream bank stability. Sod harvested on-site and/or coir fiber matting will be used to provide bank protection.

Each of the project reaches will be placed in a conservation easement to protect the project in perpetuity. Cattle will be excluded from the entire easement area. The streambanks and floodplains will be planted with native tree and shrub species to re-establish a wooded riparian buffer in areas that are currently lacking a buffer.

Wildlands is working with the landowners to install cattle watering systems at several location as part of the project implementation.

7.6.2 UT1 Reach 1A and 1B

UT1 Reach 1A and 1B will be improved through Priority 1 restoration. The channel will be raised to reconnect to the existing floodplain. In-stream structures will be added for stream stability, grade control and habitat variability. A native vegetative buffer will be established, and invasive multiflora rose and Japanese honeysuckle will be treated. Livestock will also be excluded from the project reach.

7.6.3 UT1 Reach 2

UT1 Reach 2 will be improved through an enhancement II approach. A native riparian buffer will be established, and invasive species will be treated. At one significant cattle wallow area, mid channel bars will be excavated, and the channel will be stabilized to create a single thread channel. Cattle will be excluded from the reach.

7.6.4 UT1 Reach 3

Reach 3 is slated for Preservation. The reach is currently stable and exhibits mature vegetation. The major stressor on this reach is from the fine sediment load from bank erosion upstream, however coarse substrate is visible through the fine sediment. Desirable aquatic habitat is present throughout the reach and includes undercut banks, root mats, leaf packs, and small debris jams. Stabilizing the upstream reaches will allow for this reach to remain stable and reduce the sediment load. Chinese privet will be removed along the reach.

7.6.5 UT1 Reach 4A and 4B

UT1 Reach 4A and 4B will be improved through a combination of Priority 1 and Priority 2 restoration. Priority 2 restoration will occur on the first 200 linear feet of the upstream tie-in and the last 100 feet of the downstream tie-in. The majority of the channel will be raised to connect to the existing floodplain. In-stream structures will be added for grade control, bank stability, and habitat creation. A buffer will be established along the reach and livestock will be excluded from the project reach. Invasive alligator weed, Chinese privet, and multiflora rose will be removed along the project reach.

7.6.6 UT1A

Enhancement II is slated for UT1A. While the channel will be raised to be connected to the existing floodplain, stream alignment will not be changed. A native vegetative buffer will be established, and invasive multiflora rose will be treated. Livestock will be excluded from the reach.

7.6.7 Step Pool Stormwater Conveyance (SPSC)

A step pool stormwater conveyance system will be constructed to treat storm flows within the ephemeral channel that confluences with UT1 Reach 4B. The step pool system will convey runoff from the adjacent pasture in a stable manner. Additional activities along this reach include cattle exclusion, treatment of invasive Chinese privet and multiflora rose, and the of replanting native vegetation.

7.7 Vegetation and Planting Plan

The objective of the planting plan is to establish, over time, a 50-foot riparian buffer composed of native tree species. This restored buffer will improve riparian and wetland habitat, help the restored streams remain stable, shade the streams, and provide a source of LWD and organic material to the streams.

Non-forested areas within the conservation easement will be planted with bare root tree species and permanent riparian seed mix. In shaded areas, existing canopy will be supplemented where necessary with additional bare root planting (trees and shrubs) to increase the density of woody species and seeded with riparian seed mix in disturbed areas. Proposed buffer plantings are generally early successional native vegetation which have been chosen to develop species diversity and are listed on Sheet 3.0 of the preliminary design plans located in Appendix 10. The specific species composition to be planted was selected based on the community type, observation of occurrence of species in riparian buffers adjacent to the Site, and best professional judgement on species establishment and anticipated Site conditions in the early years following project implementation. In addition, the stream banks will be planted with live stakes and the channel toe will be planted with multiple herbaceous species. Permanent herbaceous seed will be spread on streambanks, floodplain areas, and disturbed areas within the project easement. Planting will occur when earthwork is complete in March of 2020.

Invasive species within the riparian buffers will be treated at the time of construction. The extent of invasive species coverage will be monitored, mapped, and controlled as necessary throughout the required monitoring period.

7.8 Project Risk and Uncertainties

In general, this project has low risk. Due to the rural nature of the watershed, there is very little risk that changes in land use upstream in the project watershed would alter the hydrology or sediment supply enough to damage the project streams after construction.

Two easement breaks will be part of the Site: a new internal culvert crossing on UT1 Reach 1 and an external existing culvert crossing under Elk Shoals Church Loop road, between UT1 Reach 2 and Reach 3. Stone will be placed along the entrance and exit of the UT1 Reach 1 culvert to dissipate energy and provide stability. The existing culvert under Elk Shoals Church Loop appears stable and functioning.

8.0 Performance Standards

The stream performance standards for the project site will follow approved performance standards presented in the NC IRT Wilmington District Stream and Wetland Compensatory Mitigation Update (10/24/2016) and presented in the DMS Stream and Wetland Mitigation Plan Template and Guidance (June 2017). Annual monitoring and semi-annual site visits will be conducted to assess the condition of the finished project. Specific performance standard components are proposed for stream morphology, hydrology, and vegetation. Performance standards will be evaluated throughout the seven-year post-construction monitoring.

8.1 Streams

8.1.1 Dimension

Riffle cross-sections on the restoration reaches should be stable and should show little change in bankfull area, maximum depth ratio, and width-to-depth ratio. Per NC IRT guidance, bank height ratios shall not exceed 1.2 and entrenchment ratios shall be at least 1.4 for restored B channels and 2.2 for restored C channels to be considered stable. All riffle cross sections should fall within the parameters defined for channels of the appropriate stream type. If any changes do occur, these changes will be evaluated to assess whether the stream channel is showing signs of instability. Indicators of instability include a vertically incising thalweg or eroding channel banks. 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. Remedial action would not be taken if channel changes indicate a movement toward stability.

8.1.2 Pattern and Profile

Visual assessments and photo documentation should indicate that streams are remaining stable and do not indicate a trend toward vertical or lateral instability. Signs of instability may include bank scour, bank migration, and bed incision.

8.1.3 Substrate

Restoration reaches should show maintenance of coarser materials in the riffle features and smaller particles in the pool features. A reach-wide pebble count will be performed in each restoration reach each monitoring year for classification purposes. A pebble count will be performed at each surveyed riffle to characterize the pavement during the baseline monitoring only. Riffles may fine over the course of monitoring due to the stabilization of contributing watershed sediment sources.

8.1.4 Photo Documentation

Photographs should illustrate the Site's vegetation and morphological stability on an annual basis. Cross-section photos should demonstrate no excessive erosion or degradation of the banks. Longitudinal photos should indicate the absence of persistent of mid-channel bars or vertical incision. Grade control structures should remain stable. Deposition of sediment on the bank side of vane arms is preferable. Maintenance of scour pools on the channel side of vane arms is expected.

8.1.5 Bankfull Events

The occurrence of bankfull events will be documented throughout the monitoring period. Four bankfull flow events must be documented within the seven-year monitoring period. The four bankfull events must occur in separate years.

Bankfull events will be documented using photographs and either a crest gage or a pressure transducer, as appropriate for Site conditions. The selected measurement device will be installed in the stream within a surveyed riffle cross section. The device will be checked at each site visit to determine if a

bankfull event has occurred. Photographs will also be used to document the occurrence of debris lines and sediment deposition.

8.2 Vegetation

The final vegetative success criteria will be the survival of 210 planted stems per acre in the riparian corridors at the end of the required monitoring period (MY7). The interim measure of vegetative success for the site will be the survival of at least 320 native species stems per acre at the end of the third monitoring year (MY3) and at least 260 stems per acre at the end of the fifth year of monitoring (MY5). Planted vegetation must average 7 feet in height in each plot at the end of MY5 and 10 feet in height at Year 7. The extent of invasive species coverage will also be monitored and controlled as necessary throughout the required monitoring period.

Vegetation monitoring quadrants will be installed across the Site to measure the survival of the planted trees. The number of monitoring quadrants required, and frequency of monitoring will be based on the DMS monitoring guidance documents. Vegetation monitoring will occur between July 1st and leaf drop and will follow the CVS-EEP Protocol for Recording Vegetation (2008) or another DMS approved protocol.

8.3 Visual Assessments

Visual assessments should support the specific performance standards for each metric as described above.

9.0 Monitoring Plan

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

Using the DMS As-Built Baseline Monitoring Report Template (June 2017), a baseline monitoring document and as-built record drawings of the project will be developed following the planting completion and monitoring installation on the restored site. Monitoring reports will be prepared in the fall of each monitoring year and submitted to DMS by November 30. These reports will be based on the DMS Annual Monitoring Template (June 2017) and Closeout Report Template (June 2017). Full monitoring reports will be submitted to DMS in monitoring years 1, 2, 3, 5, and 7. Abbreviated monitoring reports will be submitted in monitoring years 4 and 6. The closeout monitoring period will extend seven years beyond completion of construction or until performance standards have been met.

Table 14, below, describes how the monitoring plan is set up to verify that project goals and objectives have been achieved.

Table 14: Monitoring Plan

Goal	Treatment	Performance Standards	Monitoring Metric	Outcome	Likely Functional Uplift
Improve stream channel stability.	Restore stream channels with bankfull channel dimension and pattern suited to the valley type.	Bank height ratios stay below 1.2. Visual assessments showing progression towards stability.	Cross-section monitoring and visual assessment.	Stable stream channels with bank height ratios below 1.2.	Reduction in sediment inputs from bank erosion, reduction of shear stress, and improved overall hydraulic function.
Reconnect channels with historic floodplains.	Reconstruct stream channels with bankfull dimensions relative to the floodplain. Restore stream plan form to promote development of mutually beneficial stream/wetland complex.	Stream profile and pattern must remain stable (note description of stability in Section 8.1).	Cross-section monitoring and visual assessment	Visual assessments indicate progression towards stability. Entrenchment ratios between 1.4 - 2.2 for restored B channels and greater than 2.2 for restored C channels. Bank height ratios remain below 1.2.	Dispersion of high flows on the floodplain, increase in biogeochemical cycling within the system, and recharging of riparian wetlands.
Improve in-stream habitat.	Install habitat features such as constructed riffles, cover logs, and brush toes into restored/enhanced streams. Add woody materials to channel beds. Construct pools of varying depth.	There is no required performance standard for this metric.	Visual assessment	The visual inspection of in-stream aquatic habitat would progress, showing increase complexity over time.	Increase in available habitat niches for macroinvertebrates and fish leading to an increase in biodiversity over time.
Reduce sediment and nutrient input from adjacent farm fields	Construct a step pool stormwater conveyance system to slow and treat runoff from farm fields before entering Site streams.	There is no required performance standard for this metric.	None	Stormwater conveyance BMP remain functional, trap sediment and treat agricultural runoff.	Reduction in floodplain sediment inputs from runoff, improved aquatic habitat and water quality.

Goal	Treatment	Performance Standards	Monitoring Metric	Outcome	Likely Functional Uplift
Restore and enhance native floodplain and wetland vegetation.	Plant native tree and understory species in open and shaded riparian areas where currently insufficient.	In planted open areas the survival of 210 planted stems per acre at MY7. Interim survival of at least 320 planted stems at MY3 and at least 260 planted stems per acre at MY5. Additionally, trees in each plot must average 7 feet in height by MY5 and 10 feet by MY7. No success criteria is associated with shaded area planting.	Permanent and mobile 100 square meter vegetation plots within planted open areas. Shaded areas planted will be visual assessed.	Planted open area stem densities will be at or above 210 planted stems per acre at MY7.	Reduction in floodplain sediment inputs from runoff, increased bank stability, increased LWD and organic material in streams, increased biogeochemical cycling in floodplain, and improved riparian habitat.
Exclude livestock from stream channels.	Exclude livestock from stream channels and riparian areas.	Prevent easement encroachment.	Visual assessment of fencing and signs of livestock encroachment.	Exclusion fencing to be maintained if livestock are present. Livestock are not permitted within the conservation easement area.	Reduction in pollutant inputs to streams including fecal coliform, nitrogen, and phosphorous.
Permanently protect the project site from harmful uses.	Establish a conservation easement on the Site.	Record and close conservation easement prior to implementation.	Visual assessment	Site remains protected by conservation easement in perpetuity.	Protection of the Site from encroachment into the conservation easement and direct impact to stream. Supports all functions.

9.1 Monitoring Components

Project monitoring components are listed in more detail in Table 15. Approximate locations of the proposed monitoring components are illustrated in Figure 10

Table 15: Monitoring Components

Parameter	Monitoring Feature	Quantity/Length by Reach							Frequency	Notes
		UT1 Reach 1A	UT1 Reach 1B	UT1 Reach 2	UT1 Reach 3	UT1 Reach 4A	UT1 Reach 4B	UT1A		
Dimension	Riffle Cross-sections	1	1	N/A	N/A	2	3	N/A	Year 1, 2, 3, 5, and 7	1
	Pool Cross-sections	1	1	N/A	N/A	2	3	N/A		
Pattern	Pattern	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	2
Profile	Longitudinal Profile	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
Substrate	Reach wide (RW) Pebble Count	1RW	1 RW	N/A	N/A	1 RW	1RW	N/A	Year 1, 2, 3, 5, and 7	3
Hydrology	Crest Gage (CG) and/or Transducer (SG)	1						N/A	Semi-Annual	4
Vegetation	CVS Level 2/Mobile Plots	12 (9 permanent, 3 mobile)							Year 1, 2, 3, 5, and 7	5
Visual Assessment		Y	Y	Y	Y	Y	Y	Y	Semi-Annual	
Exotic and nuisance vegetation									Semi-Annual	6
Project Boundary									Semi-Annual	7
Reference Photos	Photographs	30							Annual	

1. Cross-sections will be permanently marked with rebar to establish location. Surveys will include points measured at all breaks in slope, including top of bank, bankfull, edge of water, and thalweg.
2. Pattern and profile will be assessed visually during semi-annual site visits. Longitudinal profile will be collected during as-built baseline monitoring survey only, unless observations indicate widespread lack of vertical stability (greater than 10% of reach is affected) and profile survey is warranted in additional years to monitor adjustments or survey repair work.
3. Riffle 100-count substrate sampling will be collected during the baseline monitoring only. Substrate assessments in subsequent monitoring years will consist of reachwide substrate monitoring.
4. Crest gages and/or transducers will be inspected quarterly or semi-annually, evidence of bankfull events will be documented with a photo when possible. Transducers, if used, will be set to record stage once every 2 hours. The transducer will be inspected and downloaded semi-annually.
5. Both mobile and permanent vegetation plots will be utilized to evaluate the vegetation performance for the open areas planted. 2% of the open planted acreage will be monitored with permanent plots and mobile plots. Permanent vegetation monitoring plot assessments will follow CVS Level 2 protocols. Mobile vegetation monitoring plot assessments will document number of planted stems and species using a circular or 100 m^2 square/rectangular plot. Planted shaded areas will be visually assessed.
6. Locations of exotic and nuisance vegetation will be mapped
7. Locations of vegetation damage, boundary encroachments, etc. will be mapped.

10.0 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. 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 Statue GS 113A-232(d)(3). Interest gained by the endowment fund may be used for 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 future livestock or associated fencing or permanent crossing maintenance will be the responsibility of the owner of the underlying fee to maintain.

The Site Protection Instrument can be found in Appendix 7.

Table 16: 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 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 annual inspections 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.

11.0 Adaptive Management Plan

Upon completion of Site construction, Wildlands will implement the post-construction monitoring defined in Sections 8 and 9. Project maintenance will be performed during the monitoring years to address minor issues as necessary (Appendix 8). If, during annual monitoring it is determined the Site's ability to achieve Site performance standards are jeopardized, Wildlands will notify the members of the IRT and work with the IRT to develop contingency plans and remedial actions.

12.0 Determination of Credits

Mitigation credits presented in Table 17 are projections based upon the proposed design. Upon completion of the as-built survey, the project components and credits data will be revised if necessary with explanations of how and why any adjustments occurred. As-built stream linear footage will be based on surveyed stream center lines for credit calculations.

The requested stream restoration credit ratio of UT1 Reach 1A, 1B, and 2 is 2:1. While Reach 1A and 1B consist primarily of restoration and Reach 2 consists primarily of Enhancement II activities (spot repair, cattle exclusion, and buffer planting), Wildlands requests a ratio of 2:1 for the three reaches. This is due to the length of transition from full restoration to heavy enhancement upstream of the proposed culvert crossing and transitional channel stabilization downstream of the culvert crossing.

Preservation is requested at a ratio of 10:1 for UT1 Reach 3.

UT1 Reach 4A begins with a section that transitions from preservation to Priority 1 restoration. This transition section is request at a 2.5:1 ratio. The remainder of Reach 4A and the entire length of Reach 4B is restoration requested at a 1:1 ratio.

UT1A consists of Enhancement II. No credit is being requested for this reach since it primarily consists of adjusting the profile to tie into the raised UT1 elevation.

No credit is being requested for the storm water BMP.

Appendix 4 contains the IRT site meeting minutes and subsequent credit release memo that provides more details on how the credit ratios were developed.

Table 17: Project Asset Table

Mitigation Credits								
	Stream		Riparian Wetland		Non-Riparian Wetland		Riparian Buffer	
Type	R	RE	R	RE	R	RE	R	RE
Totals	4,186.3	71.8	N/A	N/A	N/A	N/A	N/A	N/A

Project Components							
Project Component or Reach ID	Existing Footage/ Acreage	Proposed Stationing Location	Approach (P1, P2, etc.)	Restoration (R) or Restoration Equivalent (RE)	Restoration Footage/ Acreage	Mitigation Ratio	Proposed Credit[1, 2]
UT1 Reach 1A	1,901	100+00 – 107+70	P1, P2	R	770	2[3]	385.0
UT1 Reach 1B		107+70 – 117+39	P1, P2	R	969	2[3]	484.5
UT1 Reach 2	1,324	117+90 – 130+50	Enhancement II	R	1,260	2[3]	630.0
UT1 Reach 3	732	131+10 – 138+28	Preservation	RE	718	10	71.8
UT1 Reach 4A	2,825	138+28 – 140+80	P2	R	252	2.5[4]	100.8
UT1 Reach 4A		140+80 – 150+00	P1	R	920	1	920.0
UT1 Reach 4B		150+00 – 166+66	P1, P2	R	1,666	1	1,666.0
UT1A	158	200+00 – 202+03	Enhancement II	R	203	-	0.0
				TOTAL	**6,758**		**4,258.1**

Component Summation					
Restoration Level	Proposed Stream (LF)	Riparian Wetland (Acres)	Non-Riparian Wetland (AC)	Buffer (sq.ft.)	Upland (AC)
Restoration	4,577	N/A	N/A	N/A	N/A
Enhancement II	1,463	N/A	N/A	N/A	N/A
Preservation	718	N/A	N/A	N/A	N/A

Notes:
1. No direct credit for BMP or UT1A.
2. Internal culvert crossing and external break excluded from stationing listed.
3. Although UT1 Reach 1A and 1B are primarily restoration and UT1 Reach 2 is primarily Enhancement II, a credit ratio of 2:1 is requested for all three reaches based on the Credit Memo in Appendix 11.
4. A credit ratio of 2.5:1 is requested for the transition length between preservation and full Priority 1 restoration.

13.0 References

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FIGURES

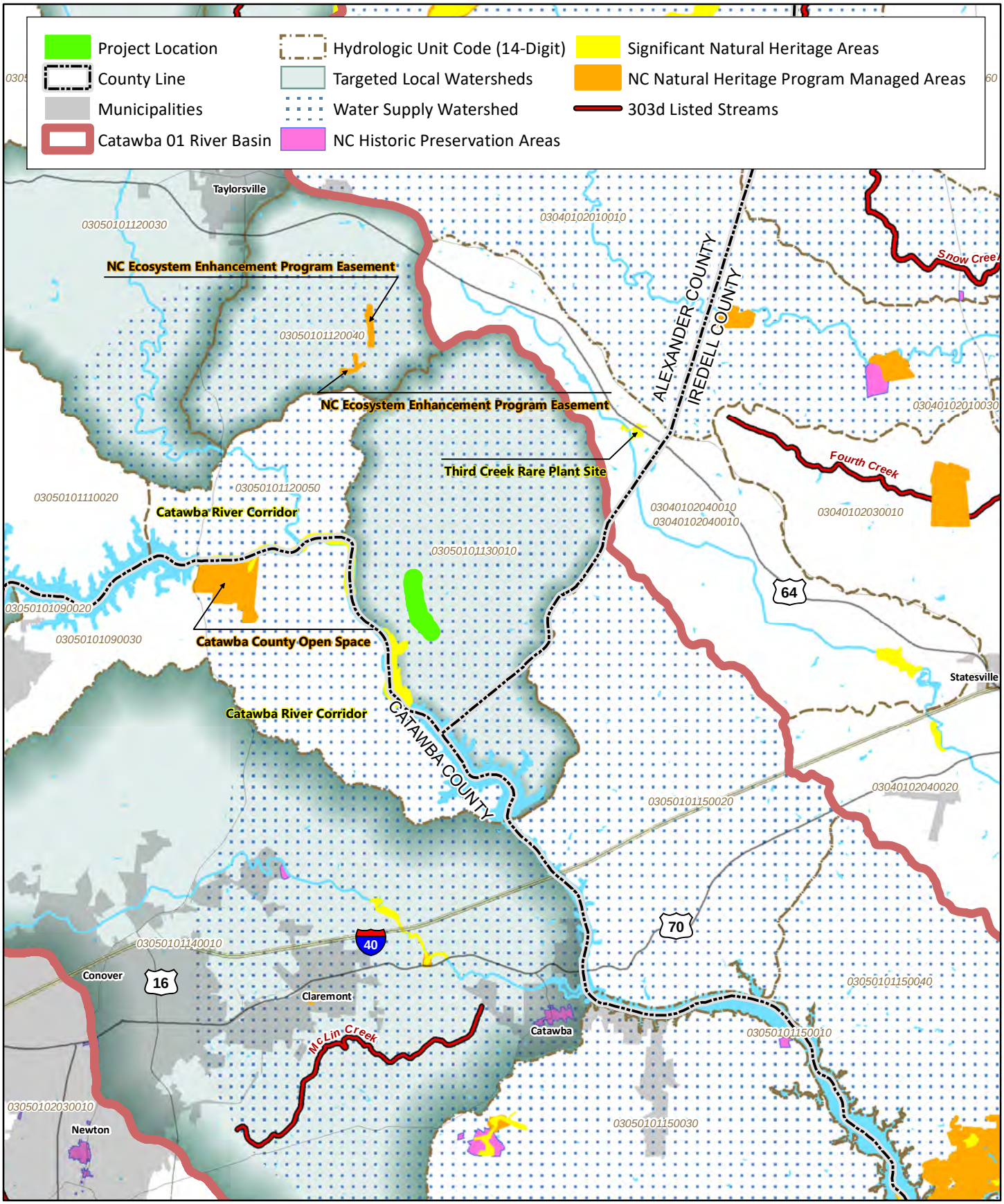

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Figure 1 Vicinity Map
Alexander Farm Mitigation Site
Catawba River Basin (03050101)

Alexander County, NC

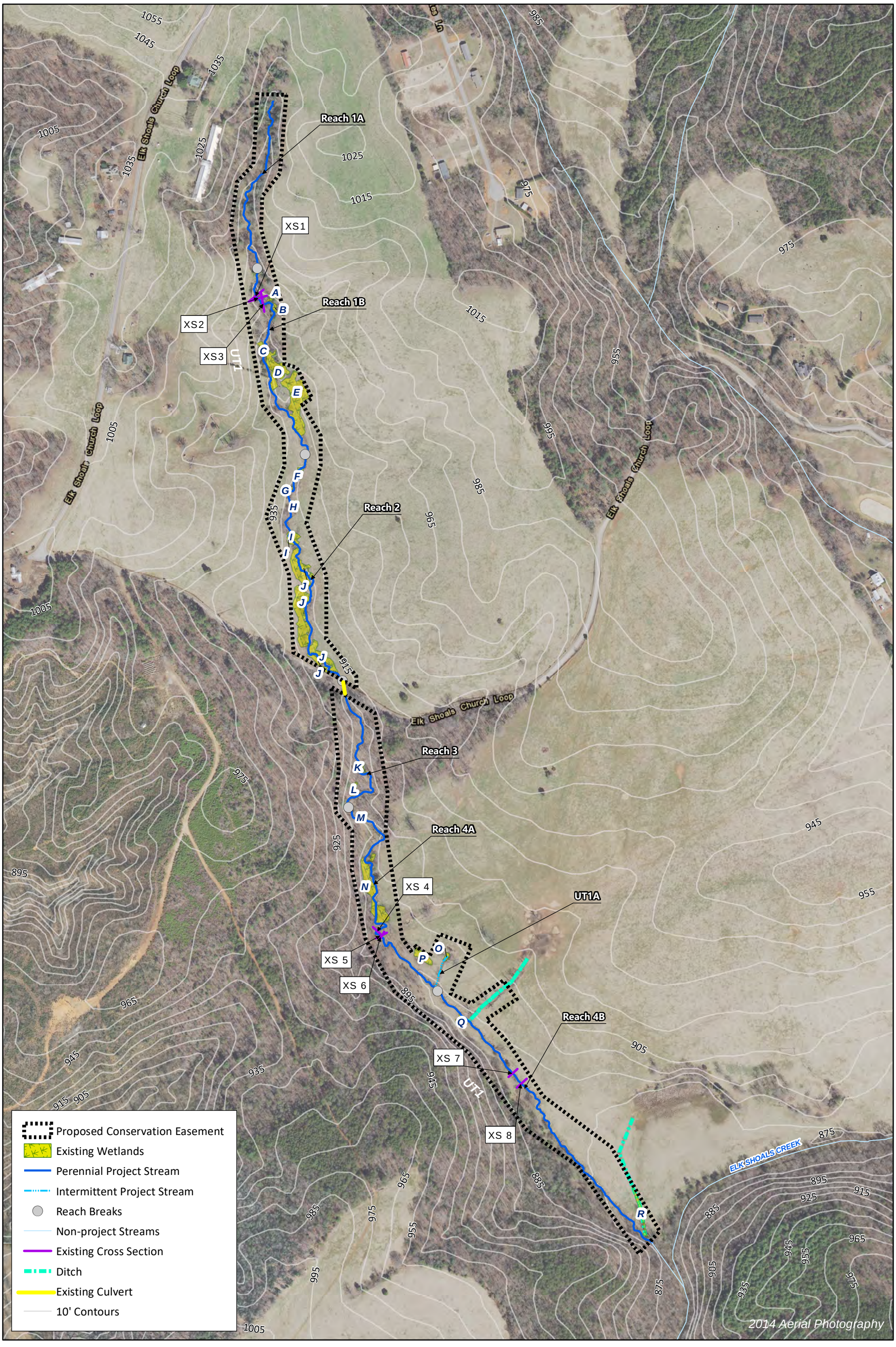

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Figure 2 Site Map
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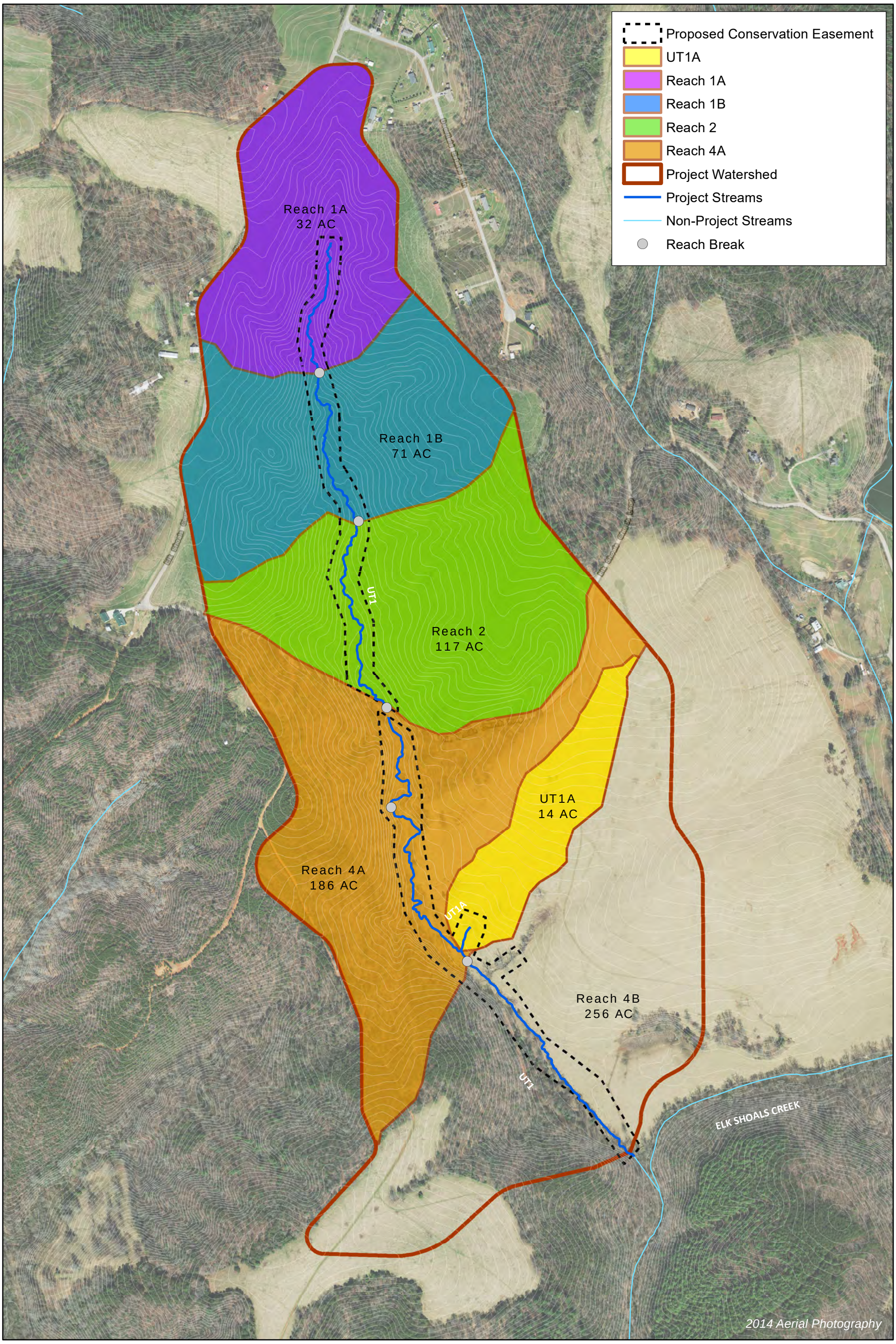

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Figure 3 Watershed Map
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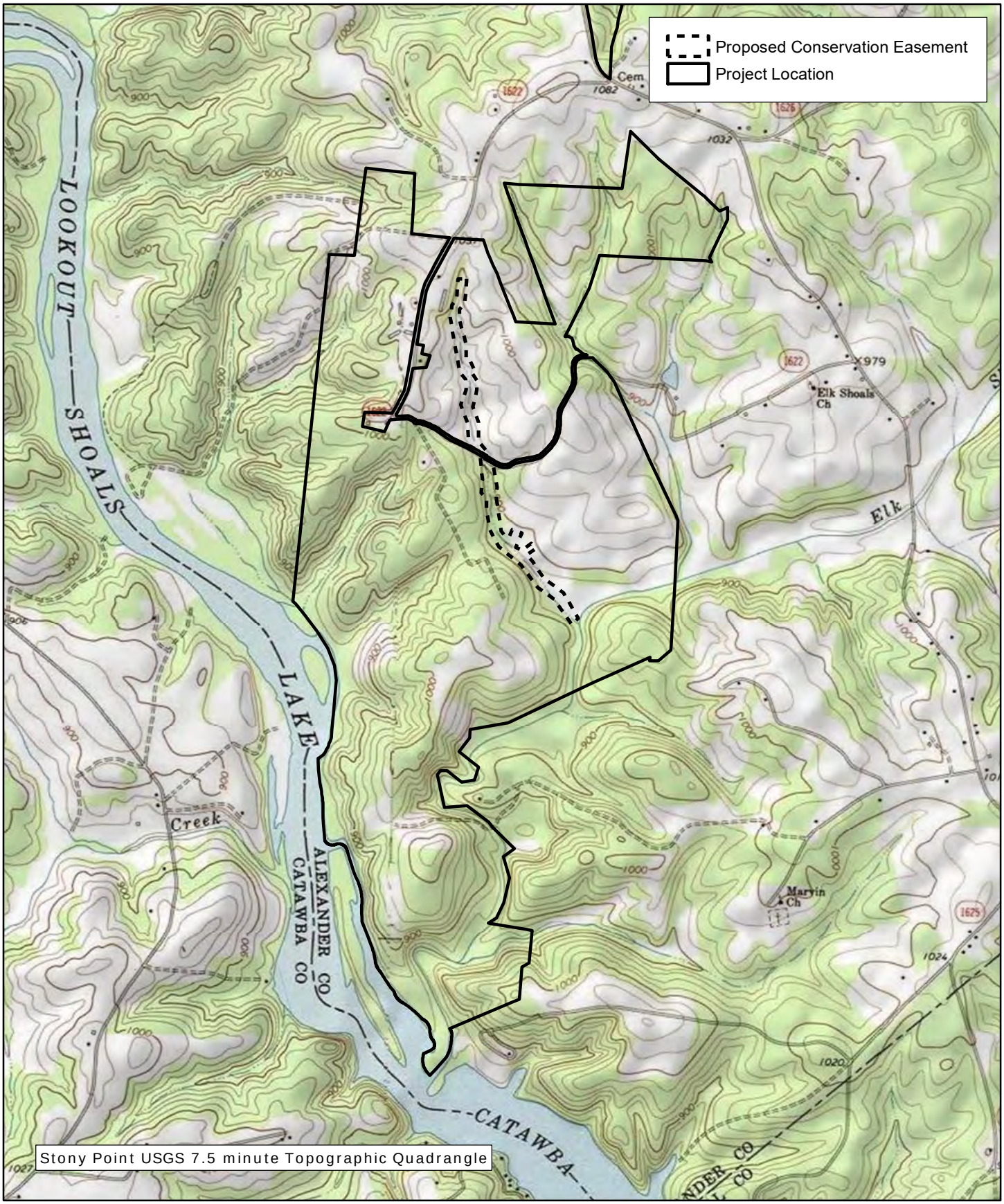

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Figure 4 USGS Topographic Map
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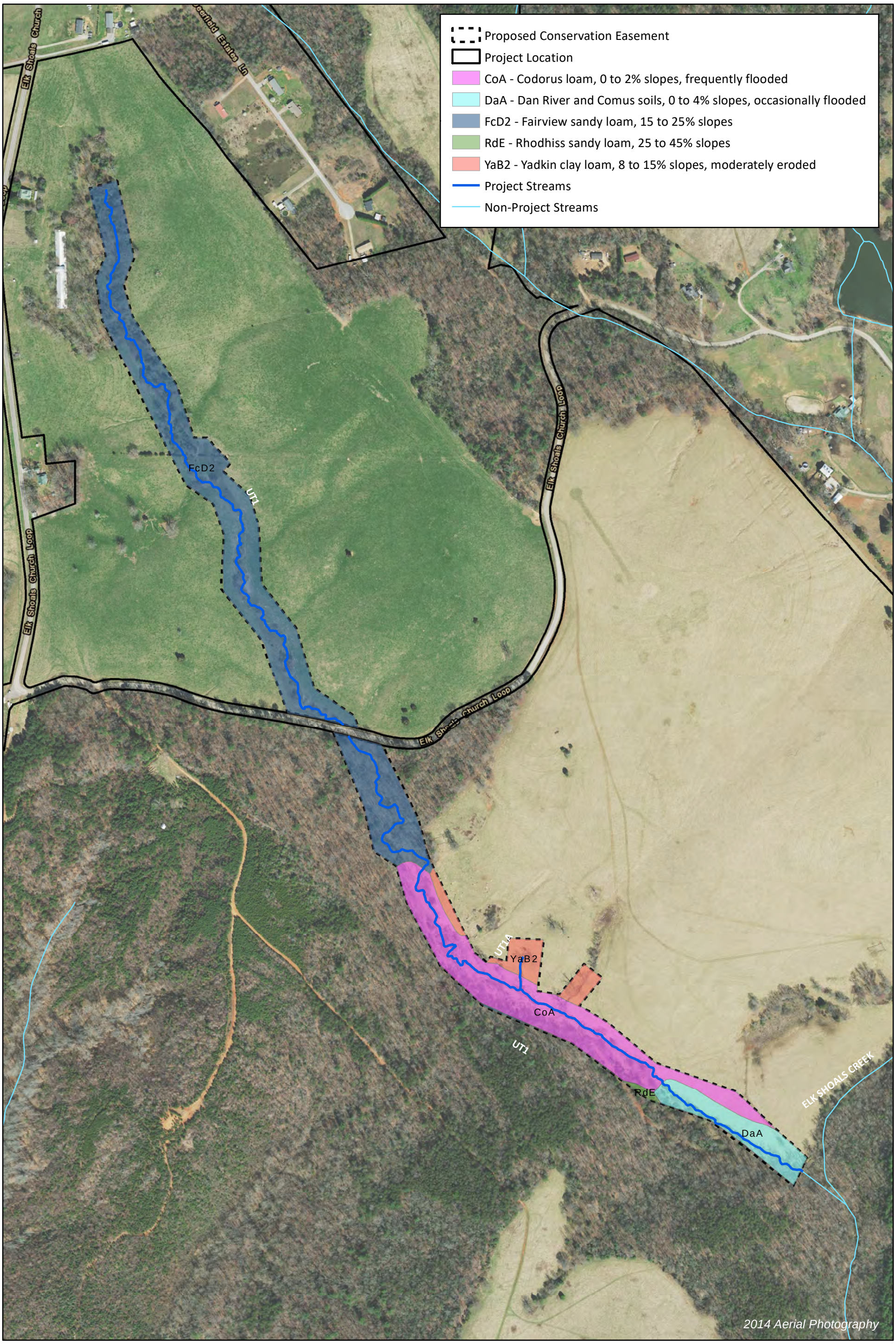

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Figure 5 Soils Map
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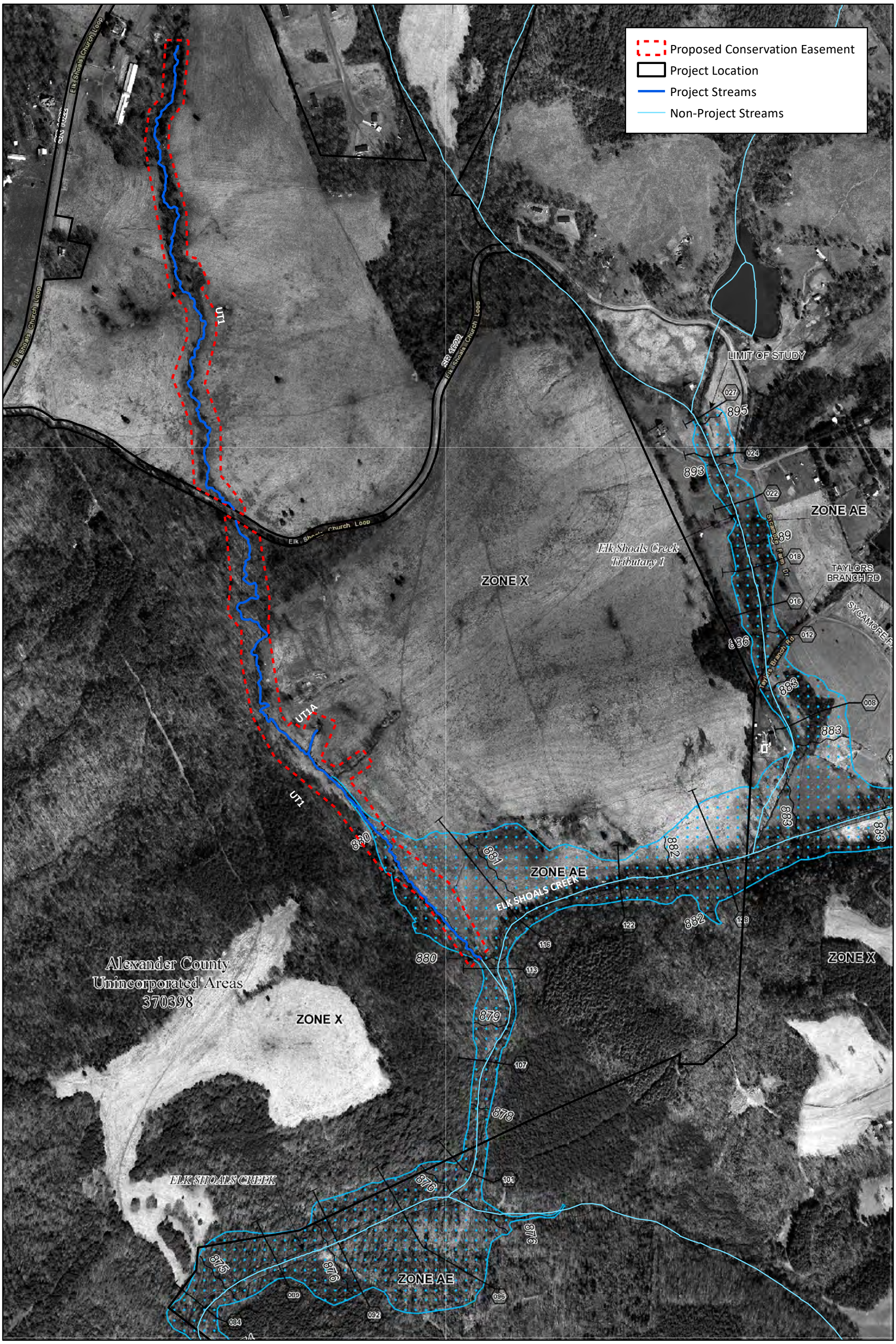

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Figure 6 FEMA Floodplain Map
Alexander Farm Mitigation Site
Catawba River Basin (03050101)

Alexander County, NC

Project Location
Reference Reach
County Boundaries

Timber Tributary
Agony Acres UT1
Alexander Farm
UT to Varnals Creek
UT to Kelly Branch
UT to Austin Branch US
UT to Lyle Creek
Box Creek
Walker Branch

WILDLANDS ENGINEERING

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Figure 7 Reference Reach Vicinity Map
Alexander Farm Mitigation Site
Catawba River Basin (03050101)

Alexander County, NC

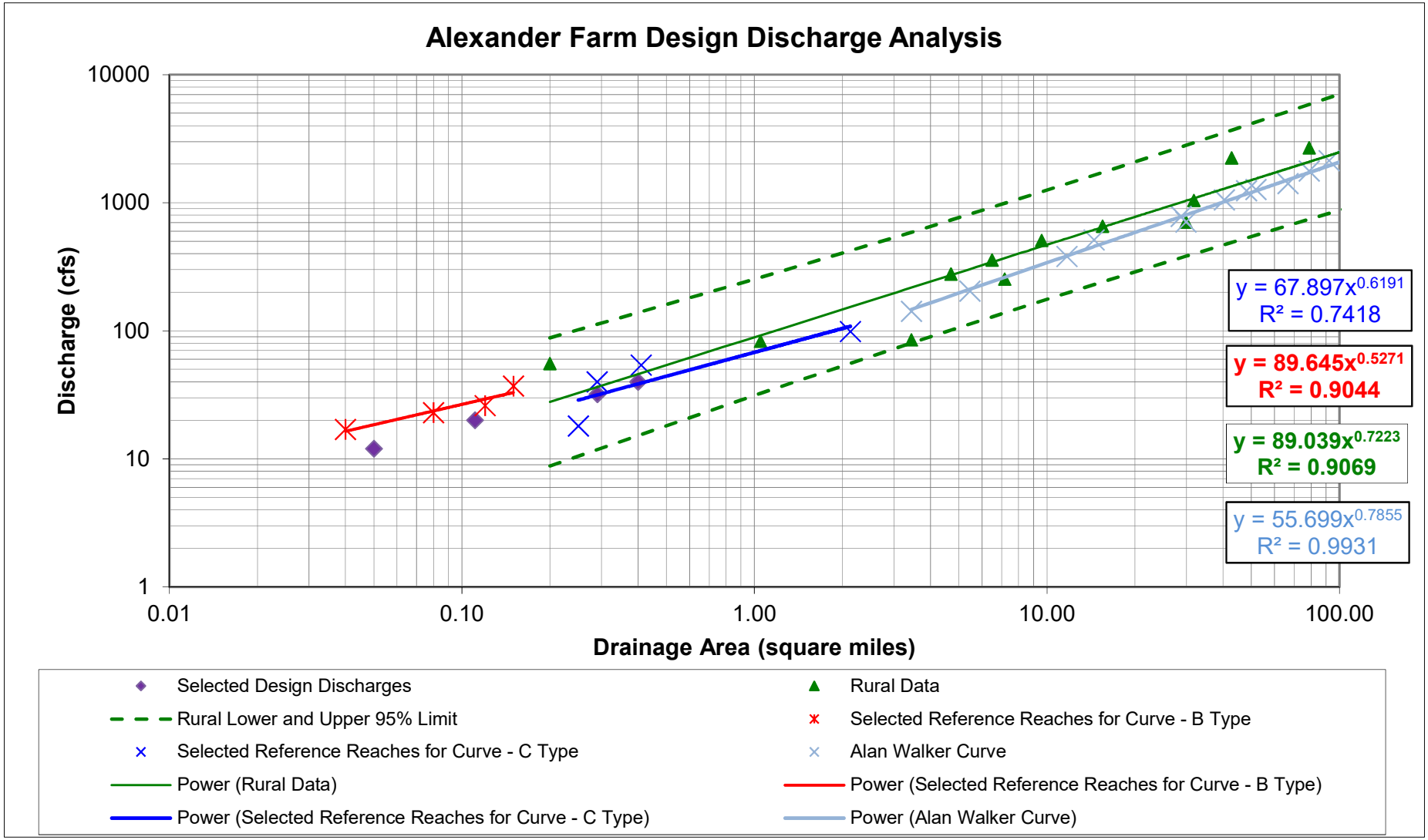

Figure 8
Design Discharge Analysis
Alexander Farm Mitigation Site
Catawba River Basin (03050101)

Alexander County, NC

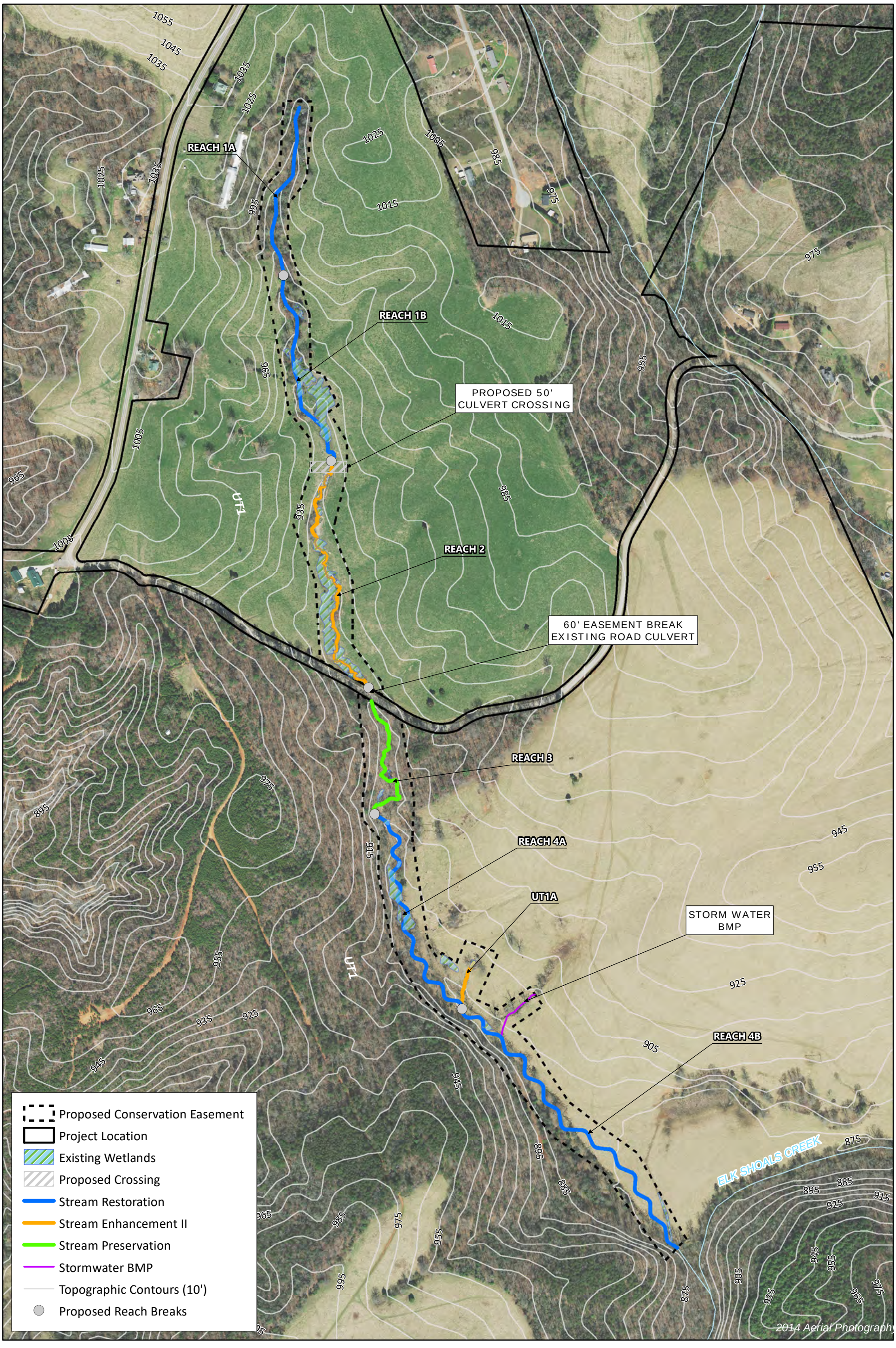

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Figure 9 Concept Design Map
Alexander Farm Mitigation Site
Catawba River Basin (03050101)

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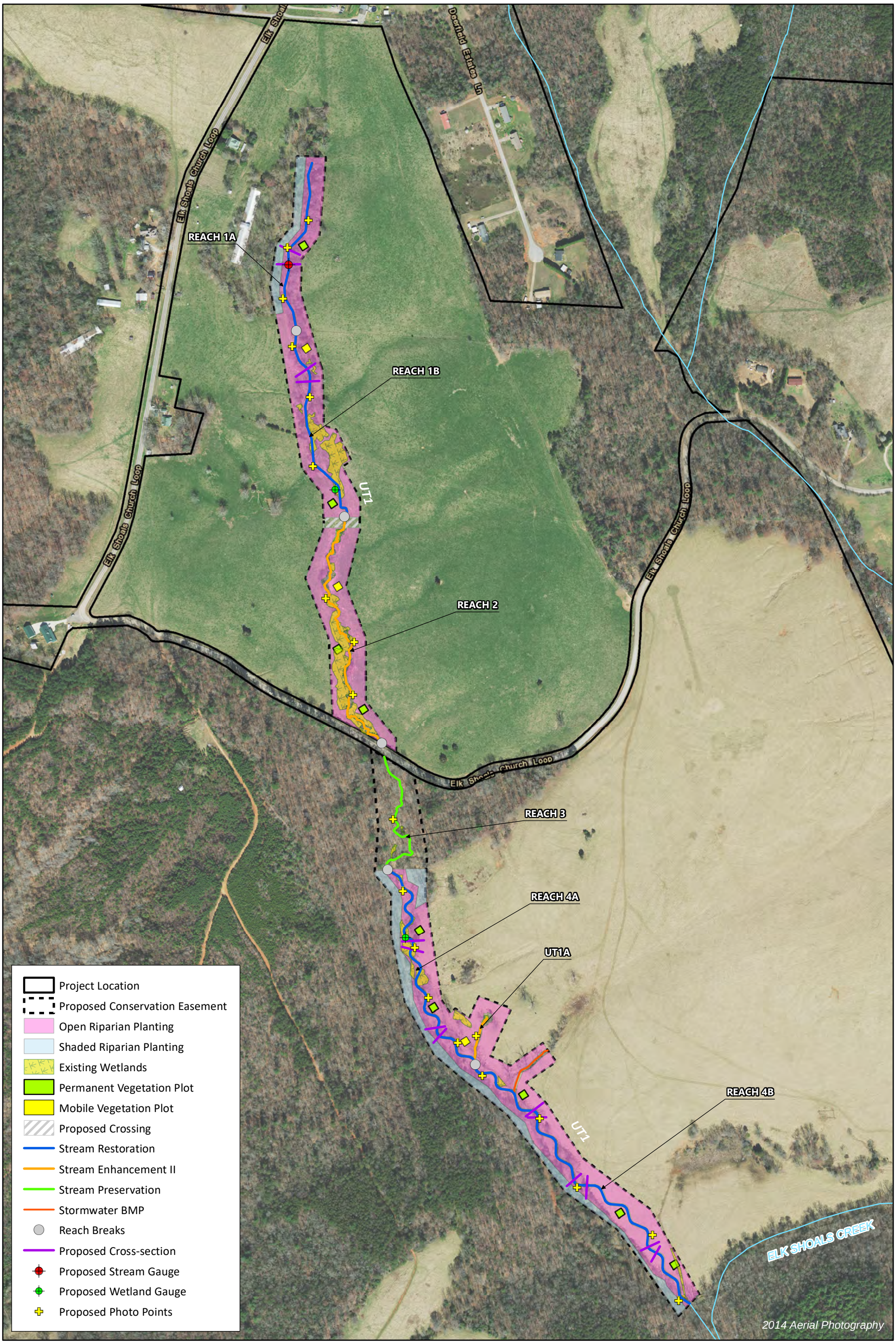

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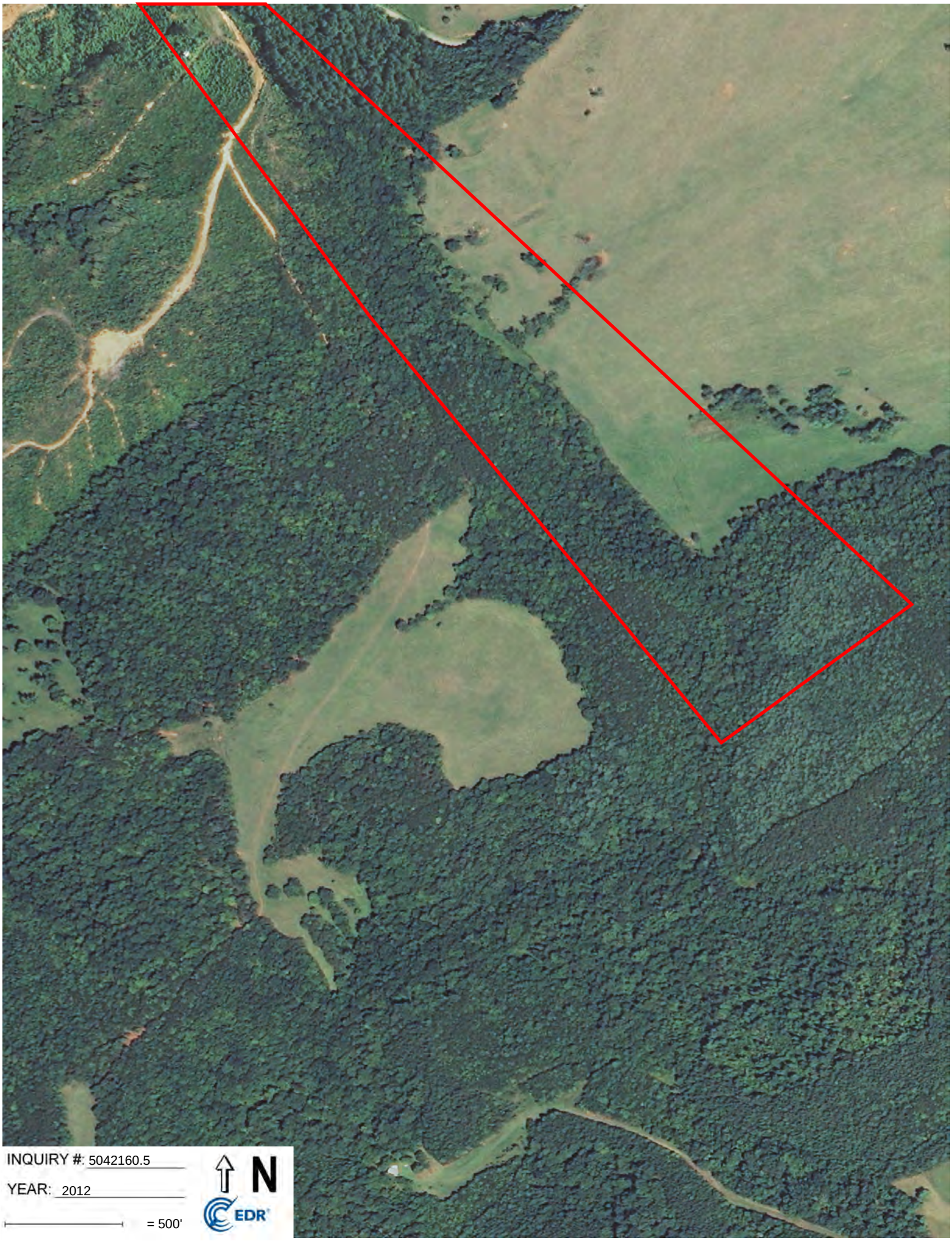
Figure 10 Monitoring Components Map
Alexander Farm Mitigation Site
Catawba River Basin (03050101)

Alexander County, NC

APPENDIX 1

Historic Aerial Photos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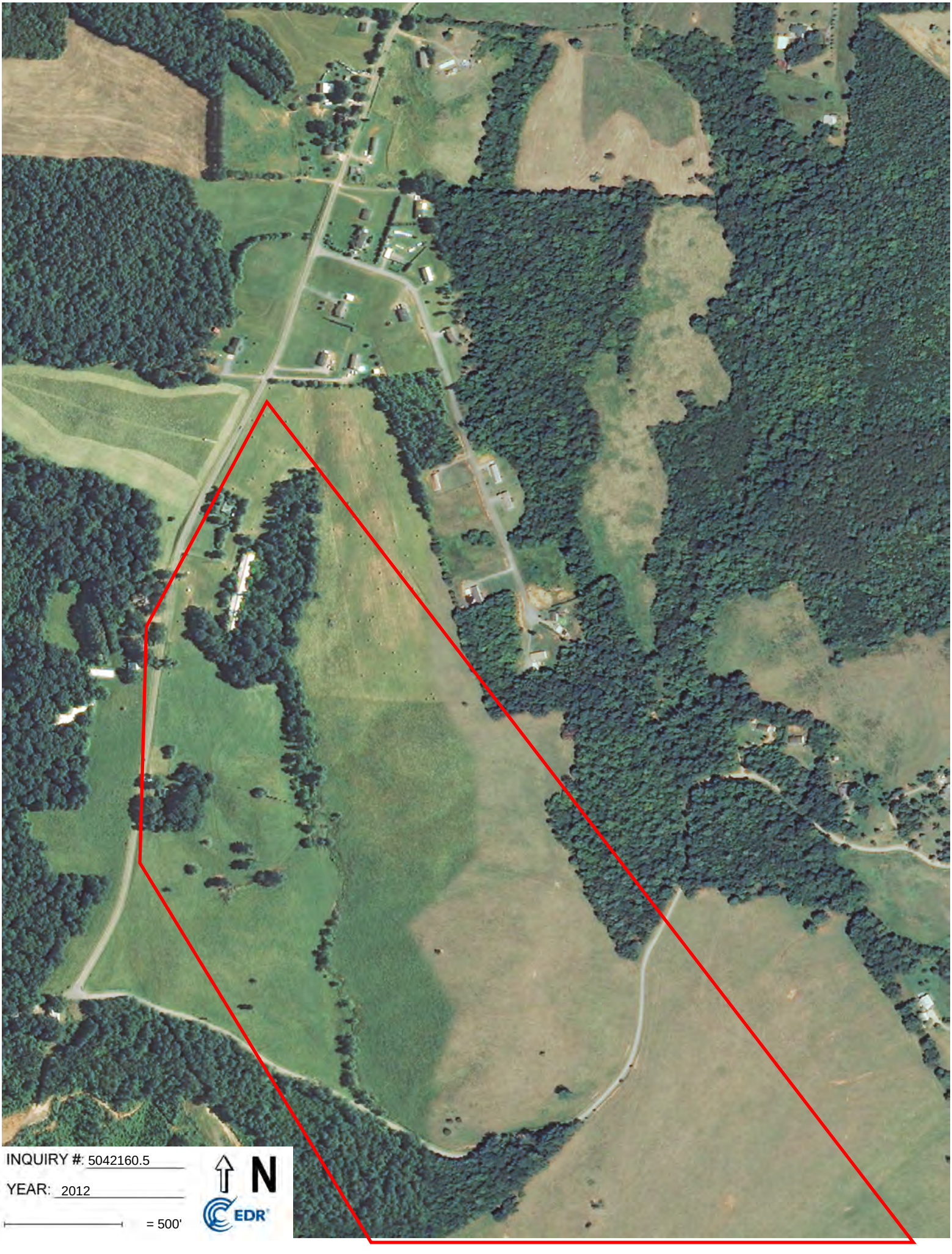
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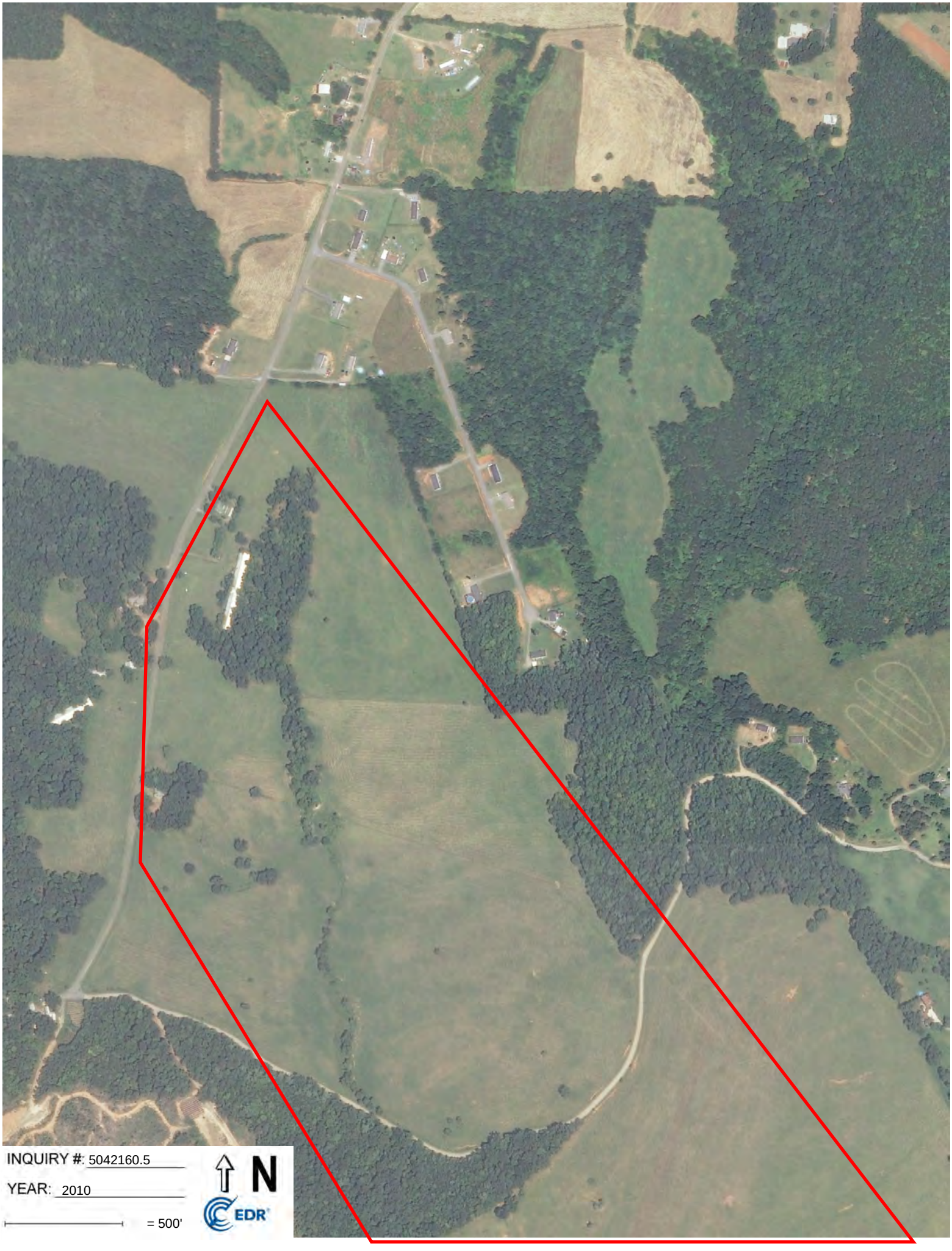
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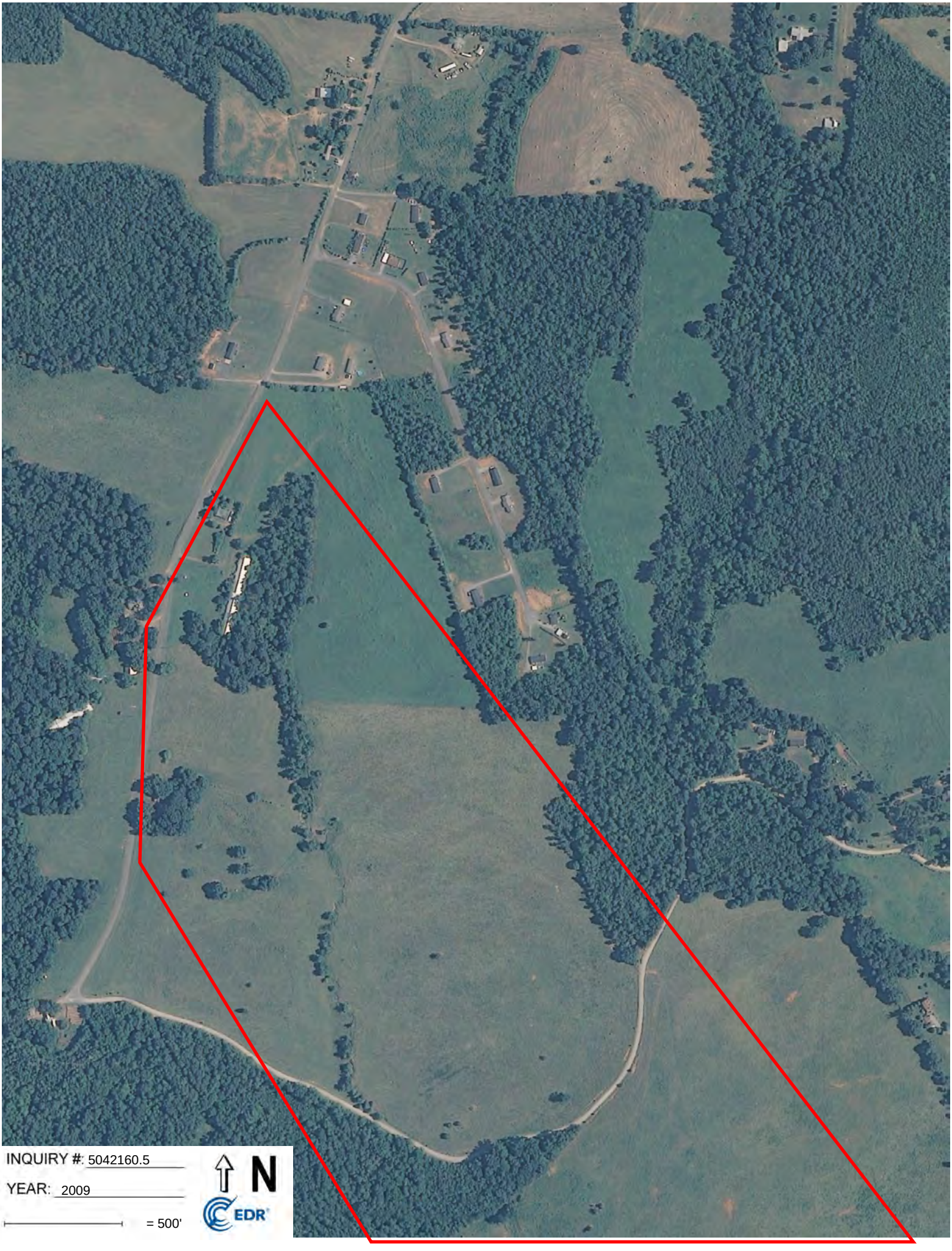
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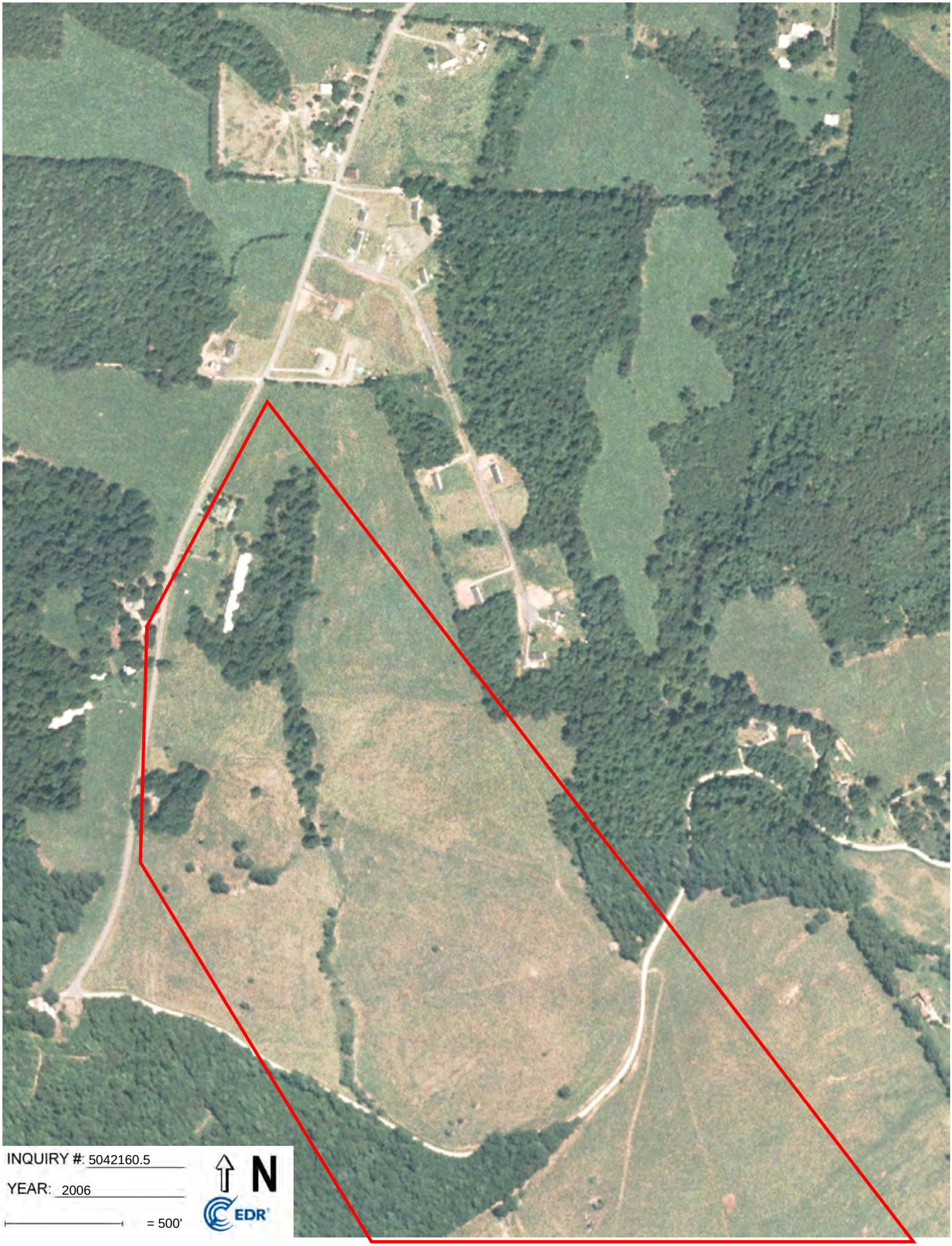
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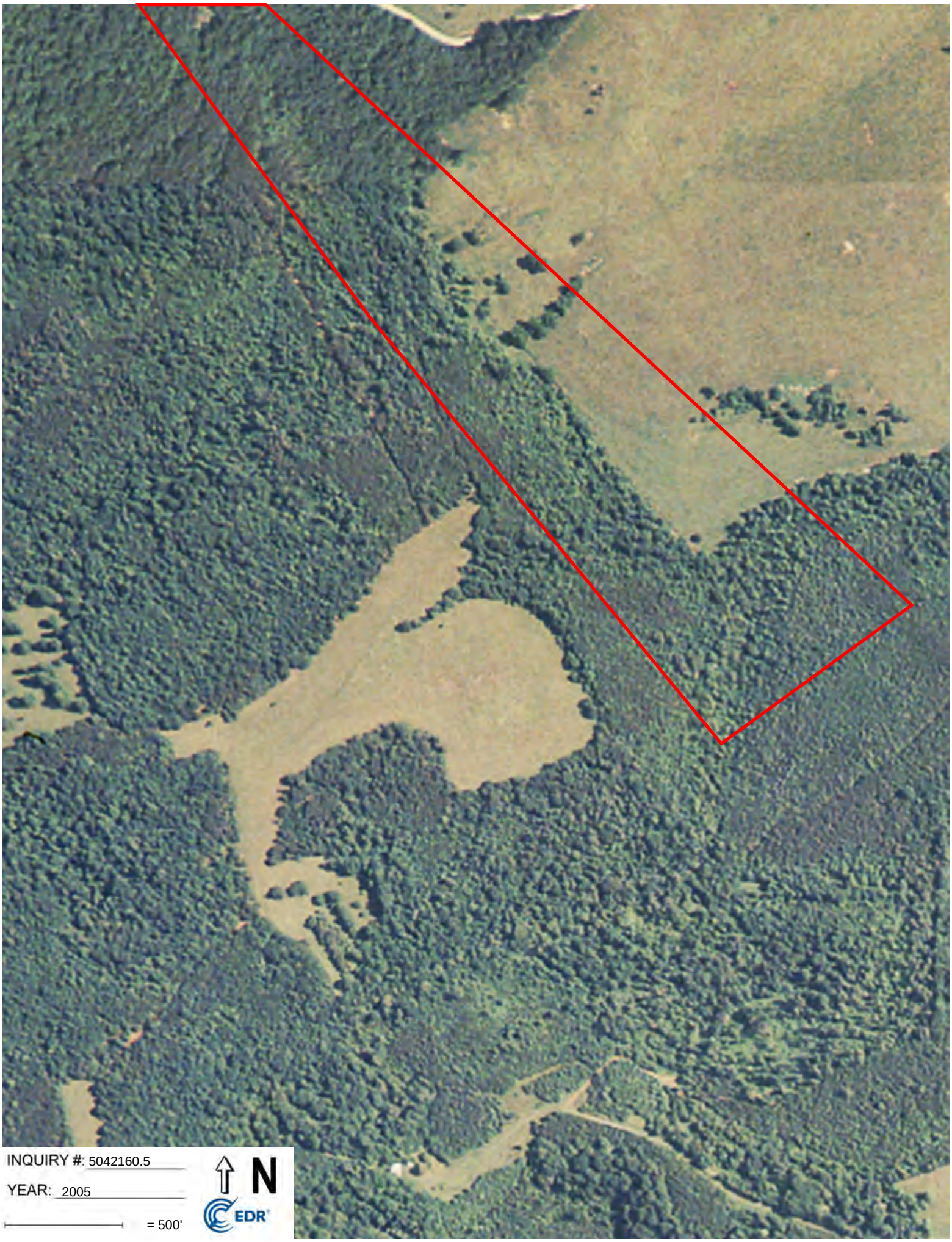
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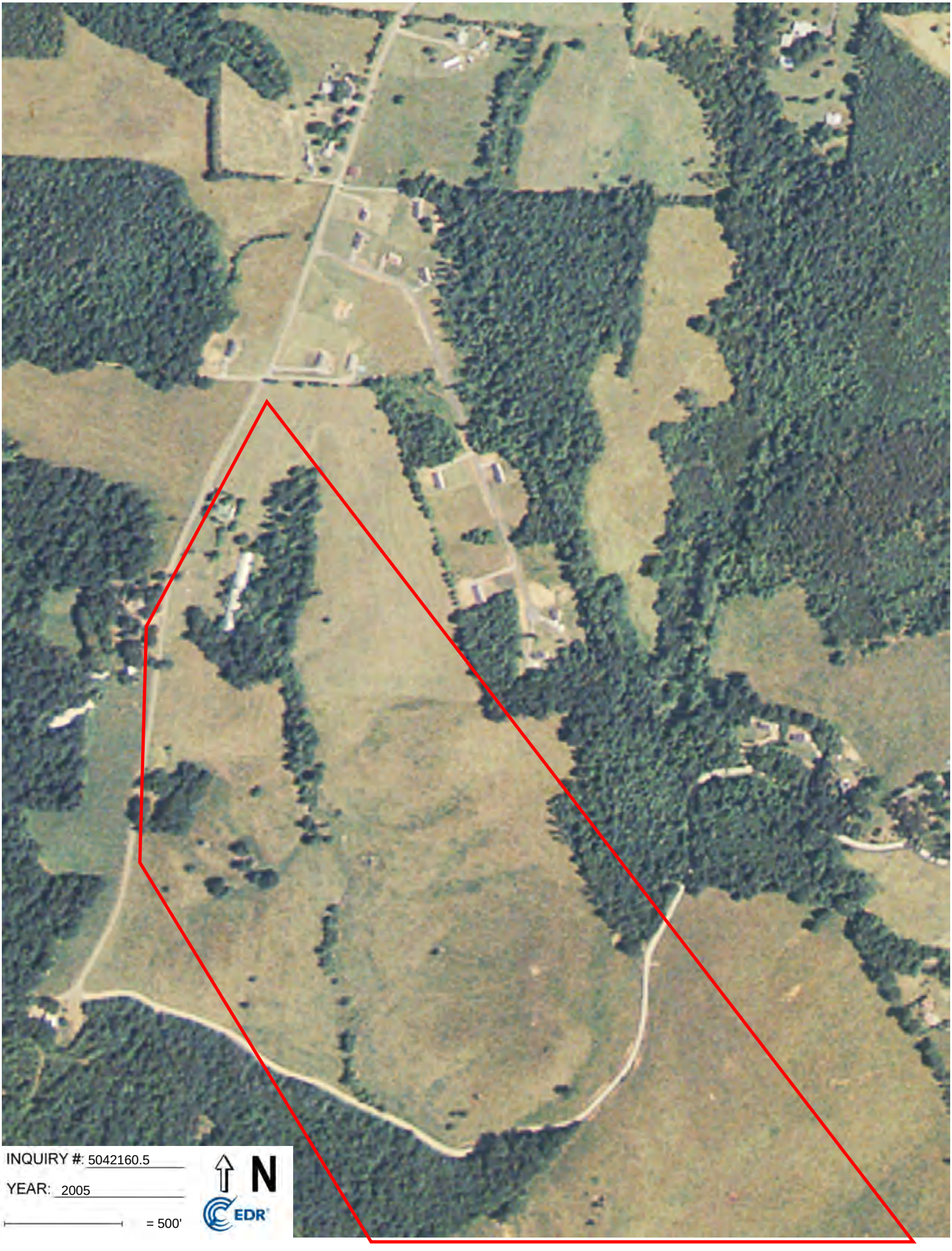
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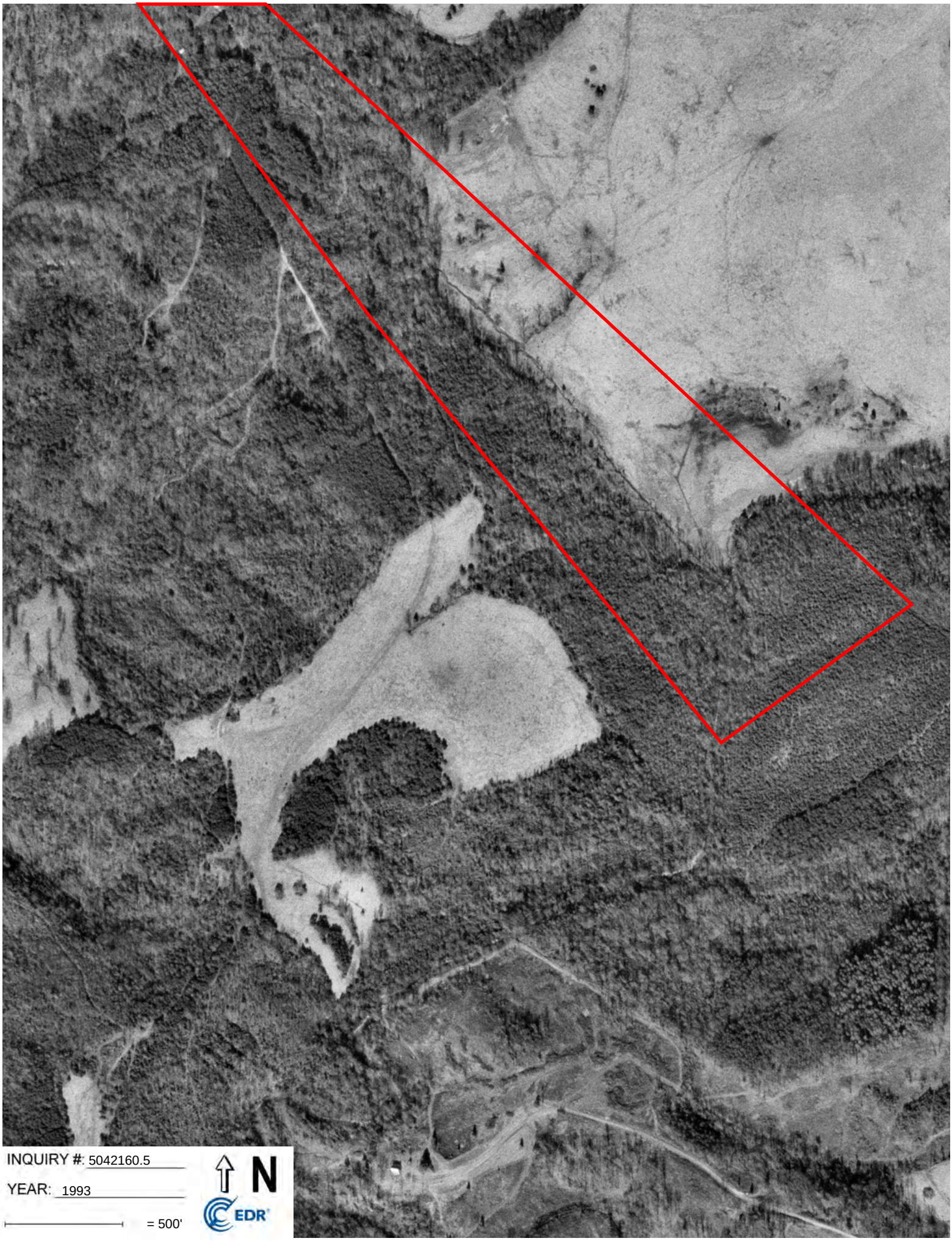
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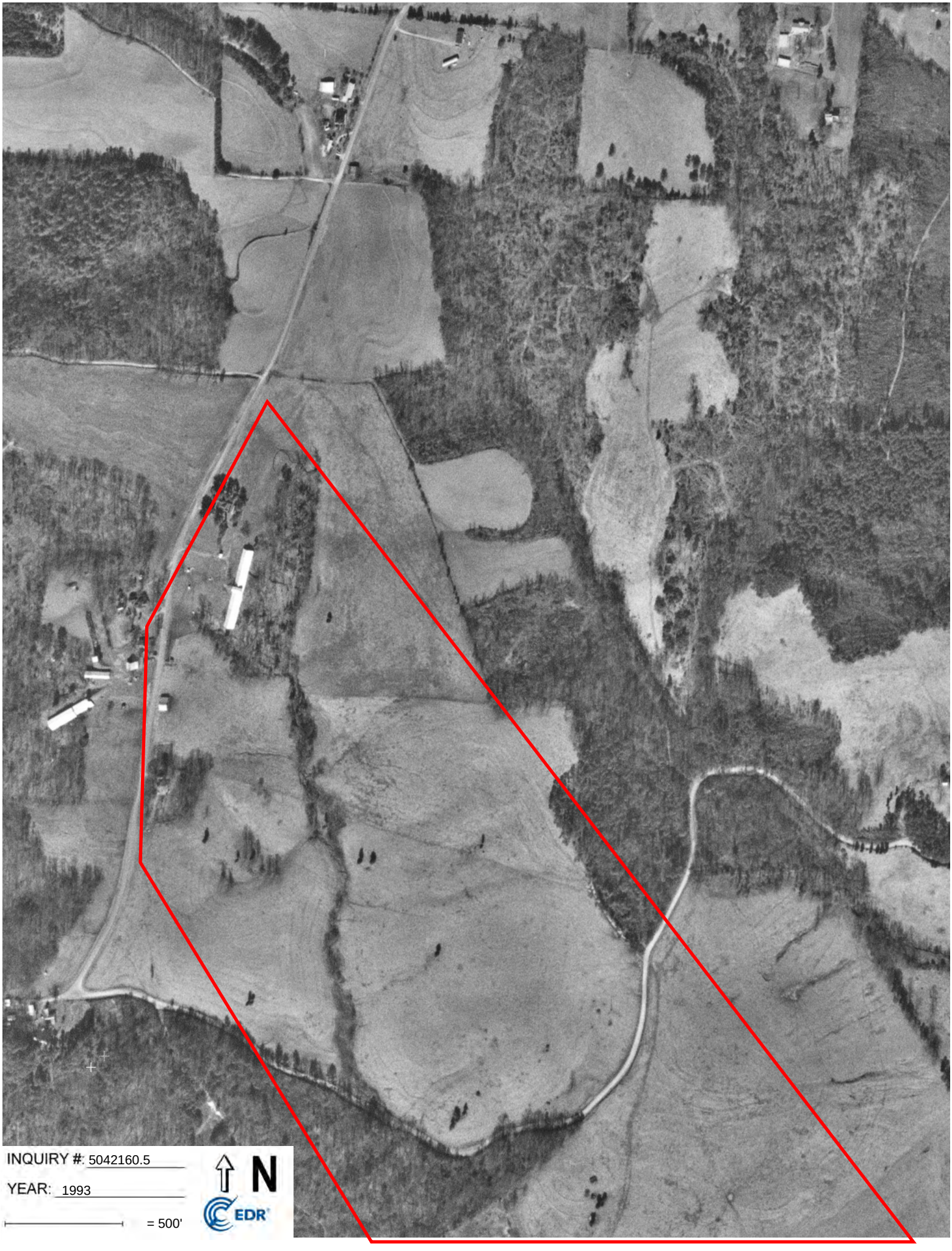
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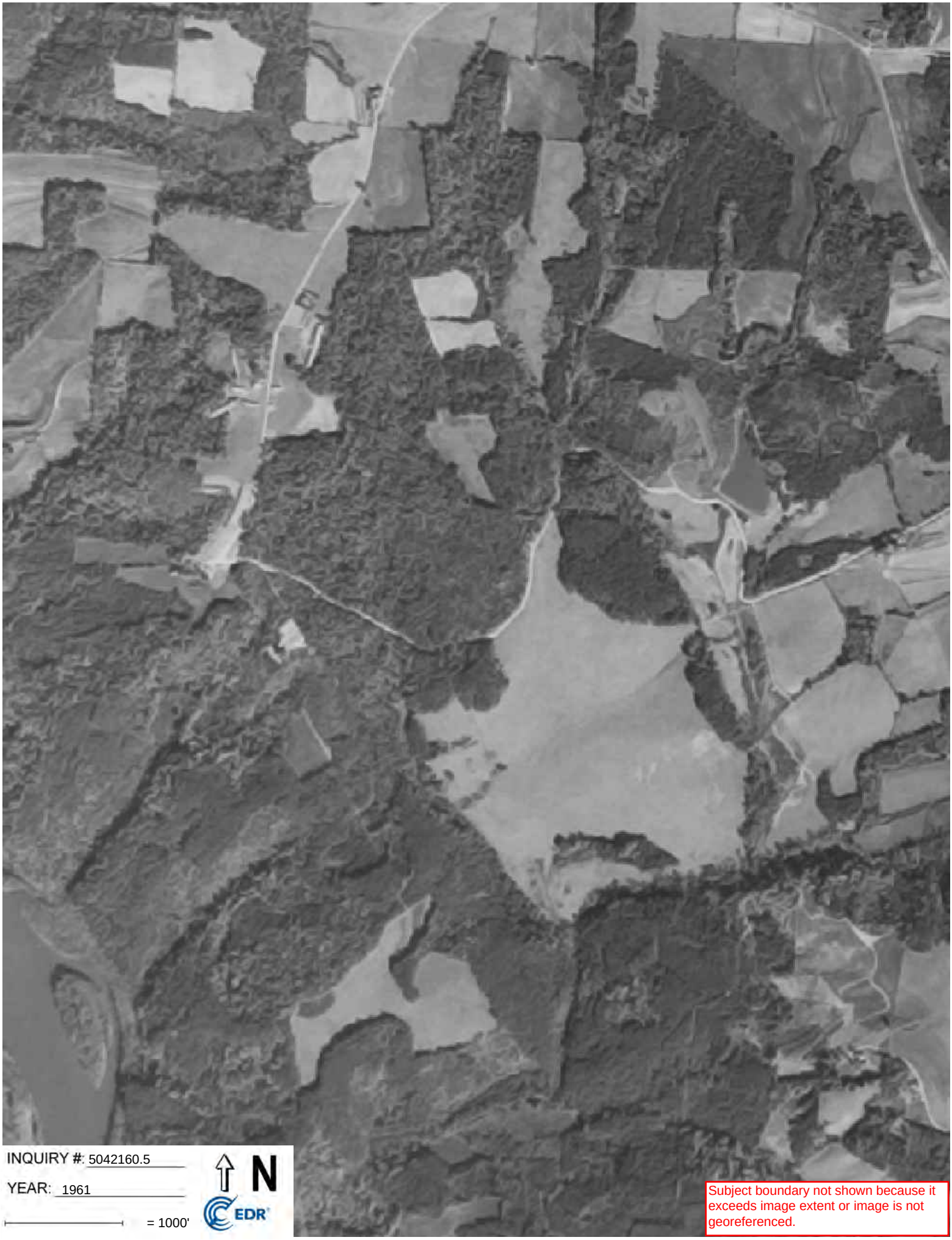

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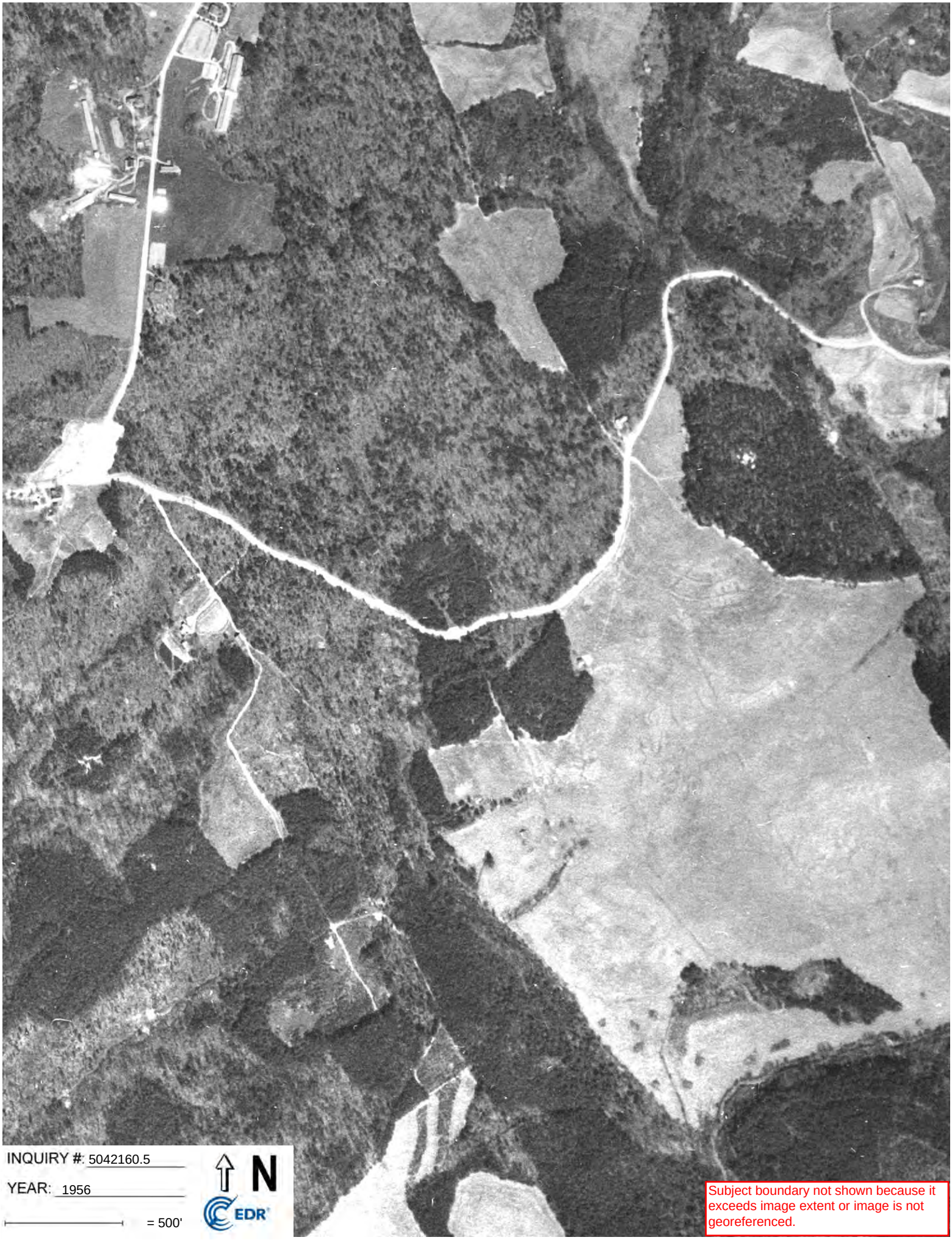
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APPENDIX 2

Preliminary Jurisdictional Determination

U.S. Army Corps of Engineers **WETLAND DETERMINATION DATA SHEET – Eastern Mountains and Piedmont Region** See ERDC/EL TR-07-24; the proponent agency is CECW-CO-R	***Requirement Control Symbol EXEMPT (Authority: AR 335-15, paragraph 5-2a)***

Project/Site: Alexander Farm Mitigation Site City/County: Stony Point/Alexander Sampling Date: 9/27/18

Applicant/Owner: Wildlands Engineering State: NC Sampling Point: Wetlands A, B, C - DP1

Investigator(s): I. Eckardt Section, Township, Range:

Landform (hillside, terrace, etc.): Floodplain Local relief (concave, convex, none): none Slope (%):

Subregion (LRR or MLRA): LRR P, MLRA 136 Lat: 35.816602 Long: -81.121834 Datum: NAD 83

Soil Map Unit Name: Fairview sandy loam, 15-25% slopes 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 X, Soil , or Hydrology significantly disturbed? Are "Normal Circumstances" present? Yes No X

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 X	No	**Is the Sampled Area within a Wetland?** **Yes** X **No**
Hydric Soil Present?	Yes X	No	
Wetland Hydrology Present?	Yes X	No	

Remarks:
Natural vegetative composition has been altered by cattle grazing.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- X Surface Water (A1)
- High Water Table (A2)
- Saturation (A3)
- Water Marks (B1)
- Sediment Deposits (B2)
- Drift Deposits (B3)
- Algal Mat or Crust (B4)
- X Iron Deposits (B5)
- Inundation Visible on Aerial Imagery (B7)
- Water-Stained Leaves (B9)
- Aquatic Fauna (B13)
- True Aquatic Plants (B14)
- Hydrogen Sulfide Odor (C1)
- Oxidized Rhizospheres on Living Roots (C3)
- Presence of Reduced Iron (C4)
- Recent Iron Reduction in Tilled Soils (C6)
- Thin Muck Surface (C7)
- Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- Surface Soil Cracks (B6)
- Sparsely Vegetated Concave Surface (B8)
- X Drainage Patterns (B10)
- Moss Trim Lines (B16)
- Dry-Season Water Table (C2)
- Crayfish Burrows (C8)
- Saturation Visible on Aerial Imagery (C9)
- Stunted or Stressed Plants (D1)
- Geomorphic Position (D2)
- Shallow Aquitard (D3)
- Microtopographic Relief (D4)
- X FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes X	No	Depth (inches): 1
Water Table Present?	Yes	No X	Depth (inches):
Saturation Present? (includes capillary fringe)	Yes X	No	Depth (inches): 4

Wetland Hydrology Present? **Yes** X **No**

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

Remarks:

VEGETATION (Four Strata) – Use scientific names of plants.

Sampling Point: Wetlands A, B, C - DP1

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
6.			
7.			
	=Total Cover		
50% of total cover:	20% of total cover:		
Sapling/Shrub Stratum (Plot size: 15)			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
	=Total Cover		
50% of total cover:	20% of total cover:		
Herb Stratum (Plot size: 5)			
1. *Murdannia keisak*	20	Yes	OBL
2. *Microstegium vimineum*	5	No	FAC
3. *Persicaria pensylvanica*	5	No	FACW
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	30 =Total Cover		
50% of total cover: 15	20% of total cover: 6		
Woody Vine Stratum (Plot size: 30)			
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: 1 (A)

Total Number of Dominant Species Across All Strata: 1 (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	20	x 1 =	20
FACW species	5	x 2 =	10
FAC species	5	x 3 =	15
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column Totals:	30 (A)		45 (B)

Prevalence Index = B/A = 1.50

Hydrophytic Vegetation Indicators:

- ___ 1 - Rapid Test for Hydrophytic Vegetation
- X 2 - Dominance Test is >50%
- X 3 - Prevalence Index is ≤3.0[1]
- ___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Four Vegetation Strata:

Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody Vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** X **No** ___

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL

Sampling Point: Wetlands A, B, C - DP1

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

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-6	10YR 4/2	98	7.5YR 4/6	2	C	PL/M	Sandy	Prominent redox concentrations
6-14	10YR 5/4	85	5YR 5/8	15	C	PL/M	Sandy	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10) **(LRR N)**
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- X Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7)
- ___ Polyvalue Below Surface (S8) **(MLRA 147, 148)**
- ___ Thin Dark Surface (S9) **(MLRA 147, 148)**
- ___ Loamy Mucky Mineral (F1) **(MLRA 136)**
- ___ Loamy Gleyed Matrix (F2)
- X Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Iron-Manganese Masses (F12) **(LRR N, MLRA 136)**
- ___ Umbric Surface (F13) **(MLRA 122, 136)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 148)**
- ___ Red Parent Material (F21) **(MLRA 127, 147, 148)**

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) **(MLRA 147)**
- ___ Coast Prairie Redox (A16) **(MLRA 147, 148)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 136, 147)**
- ___ Red Parent Material (F21) **(outside MLRA 127, 147, 148)**
- ___ Very Shallow Dark Surface (F22)
- ___ Other (Explain in Remarks)

[3]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:

U.S. Army Corps of Engineers
WETLAND DETERMINATION DATA SHEET – Eastern Mountains and Piedmont Region
See ERDC/EL TR-07-24; the proponent agency is CECW-CO-R

Requirement Control Symbol EXEMPT (Authority: AR 335-15, paragraph 5-2a)

Project/Site: Alexander Farm Mitigation Site City/County: Stony Point/Alexander Sampling Date: 9/27/18

Applicant/Owner: Wildlands Engineering State: NC Sampling Point: DP2 - Upland A, B, C

Investigator(s): I. Eckardt Section, Township, Range:

Landform (hillside, terrace, etc.): hillside Local relief (concave, convex, none): none Slope (%):

Subregion (LRR or MLRA): LRR P, MLRA 136 Lat: 35.816615 Long: -81.121721 Datum: NAD 83

Soil Map Unit Name: Fairview sandy loam 15-25% slopes 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 X, Soil , or Hydrology significantly disturbed? Are "Normal Circumstances" present? Yes No X

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	No X	**Is the Sampled Area within a Wetland?** **Yes** **No** X
Hydric Soil Present?	Yes	No X	
Wetland Hydrology Present?	Yes	No X	

Remarks:
Native vegetation has been altered by cattle grazing. Upland sampling point is located on hillside to the east of UT1.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- Surface Water (A1)
- High Water Table (A2)
- Saturation (A3)
- Water Marks (B1)
- Sediment Deposits (B2)
- Drift Deposits (B3)
- Algal Mat or Crust (B4)
- Iron Deposits (B5)
- Inundation Visible on Aerial Imagery (B7)
- Water-Stained Leaves (B9)
- Aquatic Fauna (B13)
- True Aquatic Plants (B14)
- Hydrogen Sulfide Odor (C1)
- Oxidized Rhizospheres on Living Roots (C3)
- Presence of Reduced Iron (C4)
- Recent Iron Reduction in Tilled Soils (C6)
- Thin Muck Surface (C7)
- Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- 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)
- Stunted or Stressed Plants (D1)
- Geomorphic Position (D2)
- Shallow Aquitard (D3)
- Microtopographic Relief (D4)
- FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes	No X	Depth (inches):
Water Table Present?	Yes	No X	Depth (inches):
Saturation Present? (includes capillary fringe)	Yes	No X	Depth (inches):

Wetland Hydrology Present? **Yes** **No** X

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

Remarks:
No hydrology indicators.

VEGETATION (Four Strata) – Use scientific names of plants. Sampling Point: DP2 - Upland A, B, C

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1. *Liriodendron tulipifera*	35	Yes	FACU
2.			
3.			
4.			
5.			
6.			
7.			
	35	=Total Cover	
50% of total cover: 18		20% of total cover: 7	
Sapling/Shrub Stratum (Plot size: 15)			
1. *Ilex opaca*	20	Yes	FACU
2. *Ligustrum sinense*	5	Yes	FACU
3.			
4.			
5.			
6.			
7.			
8.			
9.			
	25	=Total Cover	
50% of total cover: 13		20% of total cover: 5	
Herb Stratum (Plot size: 5)			
1. *Festuca rubra*	80	Yes	FACU
2. *Trifolium repens*	5	No	FACU
3. *Perilla frutescens*	2	No	FACU
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	87	=Total Cover	
50% of total cover: 44		20% of total cover: 18	
Woody Vine Stratum (Plot size: 30)			
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: 0 (A)

Total Number of Dominant Species Across All Strata: 4 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 0.0% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	0	x 2 =	0
FAC species	0	x 3 =	0
FACU species	147	x 4 =	588
UPL species	0	x 5 =	0
Column Totals:	147 (A)		588 (B)

Prevalence Index = B/A = 4.00

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

___ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Four Vegetation Strata:

Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody Vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** ___ **No** X

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL

Sampling Point: DP2 - Upland A, B, C

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

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-3	10YR 3/4	100					Loamy/Clayey	
3-14	10YR 5/8	100					Loamy/Clayey	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10) **(LRR N)**
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7)
- ___ Polyvalue Below Surface (S8) **(MLRA 147, 148)**
- ___ Thin Dark Surface (S9) **(MLRA 147, 148)**
- ___ Loamy Mucky Mineral (F1) **(MLRA 136)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Iron-Manganese Masses (F12) **(LRR N, MLRA 136)**
- ___ Umbric Surface (F13) **(MLRA 122, 136)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 148)**
- ___ Red Parent Material (F21) **(MLRA 127, 147, 148)**

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) **(MLRA 147)**
- ___ Coast Prairie Redox (A16) **(MLRA 147, 148)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 136, 147)**
- ___ Red Parent Material (F21) **(outside MLRA 127, 147, 148)**
- ___ Very Shallow Dark Surface (F22)
- ___ Other (Explain in Remarks)

[3]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:

No hydric soil indicators.

U.S. Army Corps of Engineers
WETLAND DETERMINATION DATA SHEET – Eastern Mountains and Piedmont Region
See ERDC/EL TR-07-24; the proponent agency is CECW-CO-R

Requirement Control Symbol EXEMPT (Authority: AR 335-15, paragraph 5-2a)

Project/Site: Alexander Farm Mitigation Site City/County: Stony Point/Alexander Sampling Date: 9/27/18

Applicant/Owner: Wildlands Engineering State: NC Sampling Point: DP3 - Wetlands D - I

Investigator(s): I. Eckardt Section, Township, Range:

Landform (hillside, terrace, etc.): Hillside Local relief (concave, convex, none): none Slope (%):

Subregion (LRR or MLRA): LRR P, MLRA 136 Lat: 35.815883 Long: -81.121777 Datum: NAD 83

Soil Map Unit Name: Fairview sandy loam, 15-25% 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 X, Soil , or Hydrology significantly disturbed? Are "Normal Circumstances" present? Yes No X

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 X	No	**Is the Sampled Area within a Wetland?** **Yes** X **No**
Hydric Soil Present?	Yes X	No	
Wetland Hydrology Present?	Yes X	No	

Remarks:
Sampling point is located in a hillside seep feature. Native vegetation has been altered by cattle grazing.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- Surface Water (A1)
- High Water Table (A2)
- X Saturation (A3)
- Water Marks (B1)
- Sediment Deposits (B2)
- Drift Deposits (B3)
- Algal Mat or Crust (B4)
- Iron Deposits (B5)
- Inundation Visible on Aerial Imagery (B7)
- X Water-Stained Leaves (B9)
- Aquatic Fauna (B13)
- True Aquatic Plants (B14)
- Hydrogen Sulfide Odor (C1)
- Oxidized Rhizospheres on Living Roots (C3)
- Presence of Reduced Iron (C4)
- Recent Iron Reduction in Tilled Soils (C6)
- Thin Muck Surface (C7)
- Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- 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)
- Stunted or Stressed Plants (D1)
- Geomorphic Position (D2)
- Shallow Aquitard (D3)
- Microtopographic Relief (D4)
- FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes	No X	Depth (inches):
Water Table Present?	Yes	No X	Depth (inches):
Saturation Present? (includes capillary fringe)	Yes X	No	Depth (inches): 10

Wetland Hydrology Present? **Yes** X **No**

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

Remarks:

VEGETATION (Four Strata) – Use scientific names of plants. Sampling Point: DP3 - Wetlands D - I

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1. *Nyssa sylvatica*	20	Yes	FAC
2. *Liriodendron tulipifera*	15	Yes	FACU
3. *Acer rubrum*	15	Yes	FAC
4.			
5.			
6.			
7.			
	50	=Total Cover	
50% of total cover: 25		20% of total cover:	10
Sapling/Shrub Stratum (Plot size: 15)			
1. *Ligustrum sinense*	10	Yes	FACU
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
	10	=Total Cover	
50% of total cover: 5		20% of total cover:	2
Herb Stratum (Plot size: 5)			
1. *Murdannia keisak*	40	Yes	OBL
2. *Persicaria pensylvanica*	15	Yes	FACW
3. *Vernonia noveboracensis*	5	No	FACW
4. *Juncus effusus*	10	No	FACW
5. *Carex lurida*	10	No	OBL
6.			
7.			
8.			
9.			
10.			
11.			
	80	=Total Cover	
50% of total cover: 40		20% of total cover:	16
Woody Vine Stratum (Plot size: 30)			
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: 4 (A)

Total Number of Dominant Species Across All Strata: 6 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 66.7% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	50	x 1 =	50
FACW species	30	x 2 =	60
FAC species	35	x 3 =	105
FACU species	25	x 4 =	100
UPL species	0	x 5 =	0
Column Totals:	140 (A)		315 (B)

Prevalence Index = B/A = 2.25

Hydrophytic Vegetation Indicators:

- ___ 1 - Rapid Test for Hydrophytic Vegetation
- X 2 - Dominance Test is >50%
- X 3 - Prevalence Index is ≤3.0[1]
- ___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Four Vegetation Strata:

Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody Vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** X **No** ___

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL

Sampling Point: DP3 - Wetlands D - I

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

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-3	10YR 3/1	90	5YR 3/4	10	C	PL/M	Loamy/Clayey	Prominent redox concentrations
3-10	10YR 4/1	95	7.5YR 4/6	5	C	PL	Loamy/Clayey	
10-14	5Y 4/1	90	7.5YR 4/6	10	C	PL/M	Loamy/Clayey	Prominent redox concentrations

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10) **(LRR N)**
- X Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7)
- ___ Polyvalue Below Surface (S8) **(MLRA 147, 148)**
- ___ Thin Dark Surface (S9) **(MLRA 147, 148)**
- ___ Loamy Mucky Mineral (F1) **(MLRA 136)**
- ___ Loamy Gleyed Matrix (F2)
- X Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Iron-Manganese Masses (F12) **(LRR N, MLRA 136)**
- ___ Umbric Surface (F13) **(MLRA 122, 136)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 148)**
- ___ Red Parent Material (F21) **(MLRA 127, 147, 148)**

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) **(MLRA 147)**
- ___ Coast Prairie Redox (A16) **(MLRA 147, 148)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 136, 147)**
- ___ Red Parent Material (F21) **(outside MLRA 127, 147, 148)**
- ___ Very Shallow Dark Surface (F22)
- ___ Other (Explain in Remarks)

[3]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:

U.S. Army Corps of Engineers **WETLAND DETERMINATION DATA SHEET – Eastern Mountains and Piedmont Region** See ERDC/EL TR-07-24; the proponent agency is CECW-CO-R	***Requirement Control Symbol EXEMPT (Authority: AR 335-15, paragraph 5-2a)***

Project/Site: Alexander Farm Mitigation Site City/County: Stony Point/Alexander Sampling Date: 9/27/18

Applicant/Owner: Wildlands Engineering State: NC Sampling Point: DP4 - Upland D - I

Investigator(s): I. Eckardt Section, Township, Range:

Landform (hillside, terrace, etc.): hillside Local relief (concave, convex, none): none Slope (%):

Subregion (LRR or MLRA): LRR P, MLRA 136 Lat: 35.815897 Long: -81.121664 Datum: NAD 83

Soil Map Unit Name: Fairview sandy loam, 15-25% slopes 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 X, Soil , or Hydrology significantly disturbed? Are "Normal Circumstances" present? Yes No X

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	No X	**Is the Sampled Area within a Wetland?** **Yes** **No** X
Hydric Soil Present?	Yes	No X	
Wetland Hydrology Present?	Yes	No X	

Remarks:
Sampling point located on a dry hillside adjacent to Wetland D. The sampling point is located in a grazed pasture where vegetation has been altered for agricultural purposes.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- Surface Water (A1)
- High Water Table (A2)
- Saturation (A3)
- Water Marks (B1)
- Sediment Deposits (B2)
- Drift Deposits (B3)
- Algal Mat or Crust (B4)
- Iron Deposits (B5)
- Inundation Visible on Aerial Imagery (B7)
- Water-Stained Leaves (B9)
- Aquatic Fauna (B13)
- True Aquatic Plants (B14)
- Hydrogen Sulfide Odor (C1)
- Oxidized Rhizospheres on Living Roots (C3)
- Presence of Reduced Iron (C4)
- Recent Iron Reduction in Tilled Soils (C6)
- Thin Muck Surface (C7)
- Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- 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)
- Stunted or Stressed Plants (D1)
- Geomorphic Position (D2)
- Shallow Aquitard (D3)
- Microtopographic Relief (D4)
- FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes	No X	Depth (inches):
Water Table Present?	Yes	No X	Depth (inches):
Saturation Present? (includes capillary fringe)	Yes	No X	Depth (inches):

Wetland Hydrology Present? **Yes** **No** X

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

Remarks:
No hydrology indicators present.

VEGETATION (Four Strata) – Use scientific names of plants.

Sampling Point: DP4 - Upland D - I

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1. *Acer rubrum*	25	Yes	FAC
2.			
3.			
4.			
5.			
6.			
7.			
	25	=Total Cover	

50% of total cover: 13 20% of total cover: 5

Sapling/Shrub Stratum (Plot size: 15)			
1. *Ligustrum sinense*	35	Yes	FACU
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
	35	=Total Cover	

50% of total cover: 18 20% of total cover: 7

Herb Stratum (Plot size: 5)			
1. *Festuca rubra*	70	Yes	FACU
2. *Verbesina alternifolia*	5	No	FAC
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	75	=Total Cover	

50% of total cover: 38 20% of total cover: 15

Woody Vine Stratum (Plot size: 30)			
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: 1 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 33.3% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	0	x 2 =	0
FAC species	30	x 3 =	90
FACU species	105	x 4 =	420
UPL species	0	x 5 =	0
Column Totals:	135 (A)		510 (B)

Prevalence Index = B/A = 3.78

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

___ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Four Vegetation Strata:

Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody Vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** ___ **No** X

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL

Sampling Point: DP4 - Upland D - I

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

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Redox Features Type[1]	Redox Features Loc[2]	Texture	Remarks
0-5	10YR 3/6	100					Loamy/Clayey	
5-14	7.5YR 4/6	100					Loamy/Clayey	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10) **(LRR N)**
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7)
- ___ Polyvalue Below Surface (S8) **(MLRA 147, 148)**
- ___ Thin Dark Surface (S9) **(MLRA 147, 148)**
- ___ Loamy Mucky Mineral (F1) **(MLRA 136)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Iron-Manganese Masses (F12) **(LRR N, MLRA 136)**
- ___ Umbric Surface (F13) **(MLRA 122, 136)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 148)**
- ___ Red Parent Material (F21) **(MLRA 127, 147, 148)**

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) **(MLRA 147)**
- ___ Coast Prairie Redox (A16) **(MLRA 147, 148)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 136, 147)**
- ___ Red Parent Material (F21) **(outside MLRA 127, 147, 148)**
- ___ Very Shallow Dark Surface (F22)
- ___ Other (Explain in Remarks)

[3]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:

No hydric soil indicators.

U.S. Army Corps of Engineers **WETLAND DETERMINATION DATA SHEET – Eastern Mountains and Piedmont Region** See ERDC/EL TR-07-24; the proponent agency is CECW-CO-R	***Requirement Control Symbol EXEMPT (Authority: AR 335-15, paragraph 5-2a)***

Project/Site: Alexander Farm Mitigation Site City/County: Stony Point/Alexander Sampling Date: 12/6/18

Applicant/Owner: Wildlands Engineering State: NC Sampling Point: Wetland J - DP 5

Investigator(s): C. Neaves Section, Township, Range:

Landform (hillside, terrace, etc.): Floodplain Local relief (concave, convex, none): None Slope (%): <2

Subregion (LRR or MLRA): LRR P, MLRA 136 Lat: 35.812771 Long: -81.121288 Datum: NAD 83

Soil Map Unit Name: Fairview sandy loam, 15-25% slopes 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 X, Soil , or Hydrology significantly disturbed? Are "Normal Circumstances" present? Yes No X

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 X	No	**Is the Sampled Area within a Wetland?** **Yes** X **No**
Hydric Soil Present?	Yes X	No	
Wetland Hydrology Present?	Yes X	No	

Remarks:
Sampling point is located within a saturated floodplain immediately adjacent to UT1. The sampling point is located in a grazed pasture where vegetation has been altered for agricultural purposes.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- X Surface Water (A1)
- X High Water Table (A2)
- X Saturation (A3)
- Water Marks (B1)
- Sediment Deposits (B2)
- Drift Deposits (B3)
- Algal Mat or Crust (B4)
- X Iron Deposits (B5)
- Inundation Visible on Aerial Imagery (B7)
- Water-Stained Leaves (B9)
- Aquatic Fauna (B13)
- True Aquatic Plants (B14)
- Hydrogen Sulfide Odor (C1)
- Oxidized Rhizospheres on Living Roots (C3)
- Presence of Reduced Iron (C4)
- Recent Iron Reduction in Tilled Soils (C6)
- Thin Muck Surface (C7)
- Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- 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)
- Stunted or Stressed Plants (D1)
- Geomorphic Position (D2)
- Shallow Aquitard (D3)
- Microtopographic Relief (D4)
- X FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes X	No	Depth (inches): 1
Water Table Present?	Yes X	No	Depth (inches): 0
Saturation Present? (includes capillary fringe)	Yes X	No	Depth (inches): 0

Wetland Hydrology Present? **Yes** X **No**

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

Remarks:

VEGETATION (Four Strata) – Use scientific names of plants.

Sampling Point: Wetland J - DP 5

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
6.			
7.			
	=Total Cover		
50% of total cover:	20% of total cover:		
Sapling/Shrub Stratum (Plot size: 15)			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
	=Total Cover		
50% of total cover:	20% of total cover:		
Herb Stratum (Plot size: 5)			
1. *Juncus effusus*	30	Yes	FACW
2. *Carex lurida*	20	Yes	OBL
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	50 =Total Cover		
50% of total cover: 25	20% of total cover: 10		
Woody Vine Stratum (Plot size: 30)			
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: 2 (A)

Total Number of Dominant Species Across All Strata: 2 (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	20	x 1 =	20
FACW species	30	x 2 =	60
FAC species	0	x 3 =	0
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column Totals:	50 (A)		80 (B)

Prevalence Index = B/A = 1.60

Hydrophytic Vegetation Indicators:

- ___ 1 - Rapid Test for Hydrophytic Vegetation
- X 2 - Dominance Test is >50%
- X 3 - Prevalence Index is ≤3.0[1]
- ___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Four Vegetation Strata:

Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody Vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** X **No** ___

Remarks: (Include photo numbers here or on a separate sheet.)
Vegetation impacted by cattle grazing.

SOIL

Sampling Point: Wetland J - DP 5

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

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-2	10YR 4/2	100					Loamy/Clayey	
2-12	10YR 4/1	90	10YR 5/6	10	C	M	Loamy/Clayey	Prominent redox concentrations

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10) **(LRR N)**
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7)
- ___ Polyvalue Below Surface (S8) **(MLRA 147, 148)**
- ___ Thin Dark Surface (S9) **(MLRA 147, 148)**
- ___ Loamy Mucky Mineral (F1) **(MLRA 136)**
- ___ Loamy Gleyed Matrix (F2)
- X Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Iron-Manganese Masses (F12) **(LRR N, MLRA 136)**
- ___ Umbric Surface (F13) **(MLRA 122, 136)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 148)**
- ___ Red Parent Material (F21) **(MLRA 127, 147, 148)**

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) **(MLRA 147)**
- ___ Coast Prairie Redox (A16) **(MLRA 147, 148)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 136, 147)**
- ___ Red Parent Material (F21) **(outside MLRA 127, 147, 148)**
- ___ Very Shallow Dark Surface (F22)
- ___ Other (Explain in Remarks)

[3]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:

U.S. Army Corps of Engineers
WETLAND DETERMINATION DATA SHEET – Eastern Mountains and Piedmont Region
See ERDC/EL TR-07-24; the proponent agency is CECW-CO-R

Requirement Control Symbol EXEMPT (Authority: AR 335-15, paragraph 5-2a)

Project/Site: Alexander Farm Mitigation Site City/County: Stony Point/Alexander Sampling Date: 12/8/18

Applicant/Owner: Wildlands Engineering State: NC Sampling Point: DP6 - Upland J

Investigator(s): I. Eckardt Section, Township, Range:

Landform (hillside, terrace, etc.): hillside Local relief (concave, convex, none): none Slope (%):

Subregion (LRR or MLRA): LRR P, MLRA 136 Lat: 35.812588 Long: -81.120956 Datum: NAD 83

Soil Map Unit Name: Fairview sandy loam (FcD2) 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 X, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes ____ No X

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 ____	No X	**Is the Sampled Area within a Wetland?** **Yes** ____ **No** X
Hydric Soil Present?	Yes ____	No X	
Wetland Hydrology Present?	Yes ____	No X	

Remarks:
Sampling point located on a dry hillside adjacent to Wetland J. The sampling point is located in a grazed pasture where vegetation has been altered for agricultural purposes.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ 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)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ Microtopographic Relief (D4)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ____	No X	Depth (inches): ____
Water Table Present?	Yes ____	No X	Depth (inches): ____
Saturation Present? (includes capillary fringe)	Yes ____	No X	Depth (inches): ____

Wetland Hydrology Present? **Yes** ____ **No** X

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

Remarks:
No wetland hydrology indicators present.

VEGETATION (Four Strata) – Use scientific names of plants.

Sampling Point: DP6 - Upland J

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
6.			
7.			
	=Total Cover		
50% of total cover:	20% of total cover:		
Sapling/Shrub Stratum (Plot size: 15)			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
	=Total Cover		
50% of total cover:	20% of total cover:		
Herb Stratum (Plot size: 5)			
1. *Festuca rubra*	80	Yes	FACU
2. *Trifolium repens*	15	No	FACU
3. *Solanum carolinense*	2	No	FACU
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	97 =Total Cover		
50% of total cover: 49	20% of total cover: 20		
Woody Vine Stratum (Plot size: 30)			
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: 0 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 0.0% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	0	x 2 =	0
FAC species	0	x 3 =	0
FACU species	97	x 4 =	388
UPL species	0	x 5 =	0
Column Totals:	97 (A)		388 (B)

Prevalence Index = B/A = 4.00

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

___ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Four Vegetation Strata:

Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody Vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** ___ **No** X

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL

Sampling Point: DP6 - Upland J

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

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-3	7.5YR 3/4	100					Loamy/Clayey	
3-14	5YR 4/6	100					Loamy/Clayey	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10) **(LRR N)**
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7)
- ___ Polyvalue Below Surface (S8) **(MLRA 147, 148)**
- ___ Thin Dark Surface (S9) **(MLRA 147, 148)**
- ___ Loamy Mucky Mineral (F1) **(MLRA 136)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Iron-Manganese Masses (F12) **(LRR N, MLRA 136)**
- ___ Umbric Surface (F13) **(MLRA 122, 136)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 148)**
- ___ Red Parent Material (F21) **(MLRA 127, 147, 148)**

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) **(MLRA 147)**
- ___ Coast Prairie Redox (A16) **(MLRA 147, 148)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 136, 147)**
- ___ Red Parent Material (F21) **(outside MLRA 127, 147, 148)**
- ___ Very Shallow Dark Surface (F22)
- ___ Other (Explain in Remarks)

[3]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:

No hydric soil indicators.

U.S. Army Corps of Engineers
WETLAND DETERMINATION DATA SHEET – Eastern Mountains and Piedmont Region
See ERDC/EL TR-07-24; the proponent agency is CECW-CO-R

Requirement Control Symbol EXEMPT (Authority: AR 335-15, paragraph 5-2a)

Project/Site: Alexander Farm Mitigation Site City/County: Stony Point/Alexander Sampling Date: 12/8/18

Applicant/Owner: Wildlands Engineering State: NC Sampling Point: DP7 - Wetland K & L

Investigator(s): C. Neaves Section, Township, Range:

Landform (hillside, terrace, etc.): Floodplain Local relief (concave, convex, none): concave Slope (%):

Subregion (LRR or MLRA): LRR P, MLRA 136 Lat: 35.810888 Long: -81.120254 Datum: NAD 83

Soil Map Unit Name: Fairview sandy loam, 15-25% slopes 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 X , 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 X	No	**Is the Sampled Area within a Wetland?** **Yes** X **No**
Hydric Soil Present?	Yes X	No	
Wetland Hydrology Present?	Yes X	No	

Remarks:
The sampling point is located in a small saturated depression in the left floodplain of UT1. Natural conditions including a mature canopy and saturation/ inudation appear to impede vegetation establishment.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- X Surface Water (A1)
- X High Water Table (A2)
- X Saturation (A3)
- Water Marks (B1)
- Sediment Deposits (B2)
- Drift Deposits (B3)
- Algal Mat or Crust (B4)
- Iron Deposits (B5)
- Inundation Visible on Aerial Imagery (B7)
- Water-Stained Leaves (B9)
- Aquatic Fauna (B13)
- True Aquatic Plants (B14)
- Hydrogen Sulfide Odor (C1)
- Oxidized Rhizospheres on Living Roots (C3)
- Presence of Reduced Iron (C4)
- Recent Iron Reduction in Tilled Soils (C6)
- Thin Muck Surface (C7)
- Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- Surface Soil Cracks (B6)
- X 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)
- Stunted or Stressed Plants (D1)
- Geomorphic Position (D2)
- Shallow Aquitard (D3)
- Microtopographic Relief (D4)
- FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes X	No	Depth (inches): 0
Water Table Present?	Yes X	No	Depth (inches): 0
Saturation Present? (includes capillary fringe)	Yes X	No	Depth (inches): 0

Wetland Hydrology Present? **Yes** X **No**

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

Remarks:

VEGETATION (Four Strata) – Use scientific names of plants.

Sampling Point: DP7 - Wetland K & L

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
6.			
7.			
	=Total Cover		
50% of total cover:	20% of total cover:		
Sapling/Shrub Stratum (Plot size: 15)			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
	=Total Cover		
50% of total cover:	20% of total cover:		
Herb Stratum (Plot size: 5)			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	=Total Cover		
50% of total cover:	20% of total cover:		
Woody Vine Stratum (Plot size: 30)			
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: _____ (A)

Total Number of Dominant Species Across All Strata: _____ (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: _____ (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species _____	x 1 = _____
FACW species _____	x 2 = _____
FAC species _____	x 3 = _____
FACU species _____	x 4 = _____
UPL species _____	x 5 = _____
Column Totals: _____ (A)	_____ (B)

Prevalence Index = B/A = _____

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

___ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

_X_ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Four Vegetation Strata:

Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody Vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** _X_ **No** ___

Remarks: (Include photo numbers here or on a separate sheet.)

The sampling point is located in a concave depression devoid vegetation. The area is located in a small depresssion near the toe of slope in the floodplain of UT1. The area is located under a mature forested canopy that exhibits saturated hydrology which may impede the establishment of vegetation. No vegetation presesnt within wetland boundary during the winter delineation.

SOIL

Sampling Point: DP7 - Wetland K & L

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

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-12	10YR 4/1	96	10YR 5/6	4	C	M	Loamy/Clayey	Prominent redox concentrations

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10) **(LRR N)**
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7)
- ___ Polyvalue Below Surface (S8) **(MLRA 147, 148)**
- ___ Thin Dark Surface (S9) **(MLRA 147, 148)**
- ___ Loamy Mucky Mineral (F1) **(MLRA 136)**
- ___ Loamy Gleyed Matrix (F2)
- X Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Iron-Manganese Masses (F12) **(LRR N, MLRA 136)**
- ___ Umbric Surface (F13) **(MLRA 122, 136)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 148)**
- ___ Red Parent Material (F21) **(MLRA 127, 147, 148)**

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) **(MLRA 147)**
- ___ Coast Prairie Redox (A16) **(MLRA 147, 148)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 136, 147)**
- ___ Red Parent Material (F21) **(outside MLRA 127, 147, 148)**
- ___ Very Shallow Dark Surface (F22)
- ___ Other (Explain in Remarks)

[3]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:

U.S. Army Corps of Engineers **WETLAND DETERMINATION DATA SHEET – Eastern Mountains and Piedmont Region** See ERDC/EL TR-07-24; the proponent agency is CECW-CO-R	***Requirement Control Symbol EXEMPT (Authority: AR 335-15, paragraph 5-2a)***

Project/Site: Alexander Farm Mitigation Site City/County: Stony Point/Alexander Sampling Date: 12/8/18

Applicant/Owner: Wildlands Engineering State: NC Sampling Point: DP9 - Upland K & L

Investigator(s): C. Neaves Section, Township, Range:

Landform (hillside, terrace, etc.): Floodplain Local relief (concave, convex, none): None Slope (%): 2%

Subregion (LRR or MLRA): LRR P, MLRA 136 Lat: 35.810994 Long: -81.120250 Datum: NAD 83

Soil Map Unit Name: Fairview sandy loam, 15-25% slopes 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 ____	No X	**Is the Sampled Area within a Wetland?** **Yes** ____ **No** X
Hydric Soil Present?	Yes ____	No X	
Wetland Hydrology Present?	Yes ____	No X	

Remarks:
Sampling point is located in the left floodplain of UT1 adjacent to Wetland K. The sampling point is within a relatively undisturbed forest.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ 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)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ Microtopographic Relief (D4)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ____	No X	Depth (inches): ____
Water Table Present?	Yes ____	No X	Depth (inches): ____
Saturation Present? (includes capillary fringe)	Yes ____	No X	Depth (inches): ____

Wetland Hydrology Present? **Yes** ____ **No** X

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

Remarks:
No hydrology indicators.

VEGETATION (Four Strata) – Use scientific names of plants. Sampling Point: DP9 - Upland K & L

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1. *Fagus grandifolia*	35	Yes	FACU
2. *Liriodendron tulipifera*	25	Yes	FACU
3. *Acer rubrum*	35	Yes	FAC
4.			
5.			
6.			
7.			
	95	=Total Cover	
50% of total cover: 48		20% of total cover: 19	
Sapling/Shrub Stratum (Plot size: 15)			
1. *Ilex opaca*	5	Yes	FACU
2. *Fagus grandifolia*	5	Yes	FACU
3.			
4.			
5.			
6.			
7.			
8.			
9.			
	10	=Total Cover	
50% of total cover: 5		20% of total cover: 2	
Herb Stratum (Plot size: 5)			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
		=Total Cover	
50% of total cover:		20% of total cover:	
Woody Vine Stratum (Plot size: 30)			
1. *Smilax rotundifolia*	2	No	FAC
2.			
3.			
4.			
5.			
	2	=Total Cover	
50% of total cover: 1		20% of total cover: 1	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 5 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 20.0% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	0	x 2 =	0
FAC species	37	x 3 =	111
FACU species	70	x 4 =	280
UPL species	0	x 5 =	0
Column Totals:	107 (A)		391 (B)

Prevalence Index = B/A = 3.65

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

___ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Four Vegetation Strata:

Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody Vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** ___ **No** X

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL

Sampling Point: DP9 - Upland K & L

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

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-4	5YR 4/3	100					Loamy/Clayey	
4-12	2.5YR 4/8	100					Loamy/Clayey	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10) **(LRR N)**
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7)
- ___ Polyvalue Below Surface (S8) **(MLRA 147, 148)**
- ___ Thin Dark Surface (S9) **(MLRA 147, 148)**
- ___ Loamy Mucky Mineral (F1) **(MLRA 136)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Iron-Manganese Masses (F12) **(LRR N, MLRA 136)**
- ___ Umbric Surface (F13) **(MLRA 122, 136)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 148)**
- ___ Red Parent Material (F21) **(MLRA 127, 147, 148)**

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) **(MLRA 147)**
- ___ Coast Prairie Redox (A16) **(MLRA 147, 148)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 136, 147)**
- ___ Red Parent Material (F21) **(outside MLRA 127, 147, 148)**
- ___ Very Shallow Dark Surface (F22)
- ___ Other (Explain in Remarks)

[3]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:

No hydric soil indicators.

U.S. Army Corps of Engineers **WETLAND DETERMINATION DATA SHEET – Eastern Mountains and Piedmont Region** See ERDC/EL TR-07-24; the proponent agency is CECW-CO-R	***Requirement Control Symbol EXEMPT (Authority: AR 335-15, paragraph 5-2a)***

Project/Site: Alexander Farm Mitigation Site City/County: Stony Point/Alexander Sampling Date: 12/8/18

Applicant/Owner: Wildlands Engineering State: NC Sampling Point: DP9 - Wetland N - Q

Investigator(s): C. Neaves Section, Township, Range:

Landform (hillside, terrace, etc.): Floodplain Local relief (concave, convex, none): Concave Slope (%): 0

Subregion (LRR or MLRA): LRR P, MLRA 136 Lat: 35.809634 Long: -81.120210 Datum:

Soil Map Unit Name: Codorus loam, 0-2% slopes NWI classification: NAD 83

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ____ No X (If no, explain in Remarks.)

Are Vegetation X, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes ____ No X

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 X	No ____	**Is the Sampled Area within a Wetland?** **Yes** X **No** ____
Hydric Soil Present?	Yes X	No ____	
Wetland Hydrology Present?	Yes X	No ____	

Remarks:
The sampling point is located in the right floodplain of UT1 in the lower half of the project. The sampling point is located in a grazed pasture where vegetation has been altered for agricultural purposes.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ____ Surface Water (A1)
- ____ High Water Table (A2)
- X Saturation (A3)
- ____ Water Marks (B1)
- ____ Sediment Deposits (B2)
- ____ Drift Deposits (B3)
- ____ Algal Mat or Crust (B4)
- ____ Iron Deposits (B5)
- ____ Inundation Visible on Aerial Imagery (B7)
- ____ Water-Stained Leaves (B9)
- ____ Aquatic Fauna (B13)
- ____ True Aquatic Plants (B14)
- ____ Hydrogen Sulfide Odor (C1)
- X Oxidized Rhizospheres on Living Roots (C3)
- ____ Presence of Reduced Iron (C4)
- ____ Recent Iron Reduction in Tilled Soils (C6)
- ____ Thin Muck Surface (C7)
- ____ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ____ 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)
- ____ Stunted or Stressed Plants (D1)
- ____ Geomorphic Position (D2)
- ____ Shallow Aquitard (D3)
- ____ Microtopographic Relief (D4)
- X FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ____	No X	Depth (inches): ____
Water Table Present?	Yes ____	No X	Depth (inches): ____
Saturation Present? (includes capillary fringe)	Yes X	No ____	Depth (inches): 0

Wetland Hydrology Present? **Yes** X **No** ____

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

Remarks:

VEGETATION (Four Strata) – Use scientific names of plants.

Sampling Point: DP9 - Wetland N - Q

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
6.			
7.			
	=Total Cover		
50% of total cover:	20% of total cover:		
Sapling/Shrub Stratum (Plot size: 15)			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
	=Total Cover		
50% of total cover:	20% of total cover:		
Herb Stratum (Plot size: 5)			
1. *Vernonia noveboracensis*	25	Yes	FACW
2. *Microstegium vimineum*	25	Yes	FAC
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	50 =Total Cover		
50% of total cover: 25	20% of total cover: 10		
Woody Vine Stratum (Plot size: 30)			
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: 2 (A)

Total Number of Dominant Species Across All Strata: 2 (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	0	x 1 =	0
FACW species	25	x 2 =	50
FAC species	25	x 3 =	75
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column Totals:	50 (A)		125 (B)

Prevalence Index = B/A = 2.50

Hydrophytic Vegetation Indicators:

- ___ 1 - Rapid Test for Hydrophytic Vegetation
- X 2 - Dominance Test is >50%
- X 3 - Prevalence Index is ≤3.0[1]
- ___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- X Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Four Vegetation Strata:

Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody Vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** X **No** ___

Remarks: (Include photo numbers here or on a separate sheet.)
Unable to identify the remaining 50 percent of herbacous cover due to the time of year. Area is within a grazed pasture with altered vegetation dominated by herbaceous species.

SOIL

Sampling Point: DP9 - Wetland N - Q

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

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-2	10YR 5/2	80	10YR 5/8	20	C	PL	Loamy/Clayey	Prominent redox concentrations
2-6	10YR 5/1	85	10YR 5/8	15	C	PL	Loamy/Clayey	Prominent redox concentrations
6-12	10YR 4/1	90	10YR 2/1	10	C	PL	Loamy/Clayey	Manganese Concentrations

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10) **(LRR N)**
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7)
- ___ Polyvalue Below Surface (S8) **(MLRA 147, 148)**
- ___ Thin Dark Surface (S9) **(MLRA 147, 148)**
- ___ Loamy Mucky Mineral (F1) **(MLRA 136)**
- ___ Loamy Gleyed Matrix (F2)
- X Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Iron-Manganese Masses (F12) **(LRR N, MLRA 136)**
- ___ Umbric Surface (F13) **(MLRA 122, 136)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 148)**
- ___ Red Parent Material (F21) **(MLRA 127, 147, 148)**

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) **(MLRA 147)**
- ___ Coast Prairie Redox (A16) **(MLRA 147, 148)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 136, 147)**
- ___ Red Parent Material (F21) **(outside MLRA 127, 147, 148)**
- ___ Very Shallow Dark Surface (F22)
- ___ Other (Explain in Remarks)

[3]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:

U.S. Army Corps of Engineers **WETLAND DETERMINATION DATA SHEET – Eastern Mountains and Piedmont Region** See ERDC/EL TR-07-24; the proponent agency is CECW-CO-R	***Requirement Control Symbol EXEMPT (Authority: AR 335-15, paragraph 5-2a)***

Project/Site: Alexander Farm Mitigation Site City/County: Stony Point/Alexander Sampling Date: 12/8/18

Applicant/Owner: Wildlands Engineering State: NC Sampling Point: DP10 - Upland N

Investigator(s): C. Neaves Section, Township, Range:

Landform (hillside, terrace, etc.): Floodplain Local relief (concave, convex, none): Concave Slope (%): 1

Subregion (LRR or MLRA): LRR P, MLRA 136 Lat: 35.809971 Long: -81.120180 Datum: NAD 83

Soil Map Unit Name: Codorus loam, 0-2% slopes 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 X, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes ____ No X

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 ____	No X	**Is the Sampled Area within a Wetland?** **Yes** ____ **No** X
Hydric Soil Present?	Yes ____	No X	
Wetland Hydrology Present?	Yes ____	No X	

Remarks:
The sampling point is located in the right floodplain of UT1 in the lower half of the project. The sampling point is located in a grazed pasture where vegetation has been altered for agricultural purposes. Unable to identify approximately 50 percent of vegetation at sampling location due to time of year.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ 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)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ Microtopographic Relief (D4)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ____	No X	Depth (inches): ____
Water Table Present?	Yes ____	No X	Depth (inches): ____
Saturation Present? (includes capillary fringe)	Yes ____	No X	Depth (inches): ____

Wetland Hydrology Present? **Yes** ____ **No** X

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

Remarks:
No hydrology indicators.

VEGETATION (Four Strata) – Use scientific names of plants. Sampling Point: DP10 - Upland N

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
6.			
7.			
	=Total Cover		
50% of total cover:	20% of total cover:		
Sapling/Shrub Stratum (Plot size: 15)			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
	=Total Cover		
50% of total cover:	20% of total cover:		
Herb Stratum (Plot size: 5)			
1. *Solidago*	50	Yes	
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	50 =Total Cover		
50% of total cover: 25	20% of total cover: 10		
Woody Vine Stratum (Plot size: 30)			
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: 0 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 0.0% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	0	x 2 =	0
FAC species	0	x 3 =	0
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column Totals:	0 (A)		0 (B)

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

___ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Four Vegetation Strata:

Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody Vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** ___ **No** ___

Remarks: (Include photo numbers here or on a separate sheet.)
Unable to identify approximately 50 percent of the vegetation due to dormant season at time of observation. Area is in a grazing pasture dominated by herbaceous vegetation.

SOIL

Sampling Point: DP10 - Upland N

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

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-2	10YR 2/2	100					Loamy/Clayey	
2-12	10YR 5/3	80	7.5YR 5/8	20	C	M	Loamy/Clayey	Prominent redox concentrations

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10) **(LRR N)**
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7)
- ___ Polyvalue Below Surface (S8) **(MLRA 147, 148)**
- ___ Thin Dark Surface (S9) **(MLRA 147, 148)**
- ___ Loamy Mucky Mineral (F1) **(MLRA 136)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Iron-Manganese Masses (F12) **(LRR N, MLRA 136)**
- ___ Umbric Surface (F13) **(MLRA 122, 136)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 148)**
- ___ Red Parent Material (F21) **(MLRA 127, 147, 148)**

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) **(MLRA 147)**
- ___ Coast Prairie Redox (A16) **(MLRA 147, 148)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 136, 147)**
- ___ Red Parent Material (F21) **(outside MLRA 127, 147, 148)**
- ___ Very Shallow Dark Surface (F22)
- ___ Other (Explain in Remarks)

[3]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:

Local relief is concave, but does not appear to pond water therefore failing to meet indicator F8.

U.S. Army Corps of Engineers
WETLAND DETERMINATION DATA SHEET – Eastern Mountains and Piedmont Region
See ERDC/EL TR-07-24; the proponent agency is CECW-CO-R

Requirement Control Symbol EXEMPT (Authority: AR 335-15, paragraph 5-2a)

Project/Site: Alexander Farm Mitigation Site City/County: Stony Point/Alexander Sampling Date: 12/8/18

Applicant/Owner: Wildlands Engineering State: NC Sampling Point: DP11 - Wetland R

Investigator(s): C. Neaves Section, Township, Range:

Landform (hillside, terrace, etc.): Floodplain Local relief (concave, convex, none): Concave Slope (%): 0

Subregion (LRR or MLRA): LRR P, MLRA 136 Lat: 35.806172 Long: -81.116267 Datum: NAD 83

Soil Map Unit Name: Dan River and Comus soils, 0-4% slopes 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 X, Soil X, or Hydrology X significantly disturbed? Are "Normal Circumstances" present? Yes ____ No X

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 X	No ____	**Is the Sampled Area within a Wetland?** **Yes** X **No** ____
Hydric Soil Present?	Yes X	No ____	
Wetland Hydrology Present?	Yes X	No ____	

Remarks:
Ditch within grazed pasture constructed to drain off-site wetland to UT1.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- X Surface Water (A1)
- X High Water Table (A2)
- X Saturation (A3)
- ____ Water Marks (B1)
- ____ Sediment Deposits (B2)
- ____ Drift Deposits (B3)
- ____ Algal Mat or Crust (B4)
- ____ Iron Deposits (B5)
- ____ Inundation Visible on Aerial Imagery (B7)
- ____ Water-Stained Leaves (B9)
- ____ Aquatic Fauna (B13)
- ____ True Aquatic Plants (B14)
- ____ Hydrogen Sulfide Odor (C1)
- X Oxidized Rhizospheres on Living Roots (C3)
- ____ Presence of Reduced Iron (C4)
- ____ Recent Iron Reduction in Tilled Soils (C6)
- ____ Thin Muck Surface (C7)
- ____ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ____ 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)
- ____ Stunted or Stressed Plants (D1)
- ____ Geomorphic Position (D2)
- ____ Shallow Aquitard (D3)
- ____ Microtopographic Relief (D4)
- X FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes X	No ____	Depth (inches): 0
Water Table Present?	Yes X	No ____	Depth (inches): 0
Saturation Present? (includes capillary fringe)	Yes X	No ____	Depth (inches): 0

Wetland Hydrology Present? **Yes** X **No** ____

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

Remarks:

VEGETATION (Four Strata) – Use scientific names of plants. Sampling Point: DP11 - Wetland R

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
6.			
7.			
	=Total Cover		
50% of total cover:	20% of total cover:		
Sapling/Shrub Stratum (Plot size: 15)			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
	=Total Cover		
50% of total cover:	20% of total cover:		
Herb Stratum (Plot size: 5)			
1. *Carex lurida*	95	Yes	OBL
2. *Vernonia noveboracensis*	5	No	FACW
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	100 =Total Cover		
50% of total cover: 50	20% of total cover: 20		
Woody Vine Stratum (Plot size: 30)			
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: 1 (A)

Total Number of Dominant Species Across All Strata: 1 (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	95	x 1 =	95
FACW species	5	x 2 =	10
FAC species	0	x 3 =	0
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column Totals:	100 (A)		105 (B)

Prevalence Index = B/A = 1.05

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

X 2 - Dominance Test is >50%

X 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Four Vegetation Strata:

Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody Vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** X **No** ___

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL

Sampling Point: DP11 - Wetland R

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

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-12	10YR 5/1	85	7.5YR 5/6	15	C	PL	Loamy/Clayey	Prominent redox concentrations

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10) **(LRR N)**
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7)
- ___ Polyvalue Below Surface (S8) **(MLRA 147, 148)**
- ___ Thin Dark Surface (S9) **(MLRA 147, 148)**
- ___ Loamy Mucky Mineral (F1) **(MLRA 136)**
- ___ Loamy Gleyed Matrix (F2)
- X Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Iron-Manganese Masses (F12) **(LRR N, MLRA 136)**
- ___ Umbric Surface (F13) **(MLRA 122, 136)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 148)**
- ___ Red Parent Material (F21) **(MLRA 127, 147, 148)**

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) **(MLRA 147)**
- ___ Coast Prairie Redox (A16) **(MLRA 147, 148)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 136, 147)**
- ___ Red Parent Material (F21) **(outside MLRA 127, 147, 148)**
- ___ Very Shallow Dark Surface (F22)
- ___ Other (Explain in Remarks)

[3]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:

U.S. Army Corps of Engineers
WETLAND DETERMINATION DATA SHEET – Eastern Mountains and Piedmont Region
See ERDC/EL TR-07-24; the proponent agency is CECW-CO-R

Requirement Control Symbol EXEMPT (Authority: AR 335-15, paragraph 5-2a)

Project/Site: Alexander Farm Mitigation Site City/County: Stony Point/Alexander Sampling Date: 12/8/18

Applicant/Owner: Wildlands Engineering State: NC Sampling Point: DP12 - Upland R

Investigator(s): I. Eckardt Section, Township, Range:

Landform (hillside, terrace, etc.): hillside Local relief (concave, convex, none): none Slope (%):

Subregion (LRR or MLRA): LRR P, MLRA 136 Lat: 35.805638 Long: -81.162180 Datum:

Soil Map Unit Name: Dan River and Comus soils, 0-4% slopes 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 X, Soil , or Hydrology significantly disturbed? Are "Normal Circumstances" present? Yes No X

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	No X	**Is the Sampled Area within a Wetland?** **Yes** **No** X
Hydric Soil Present?	Yes	No X	
Wetland Hydrology Present?	Yes	No X	

Remarks:
Sampling point located within the left floodplain of UT1 near the downstream limits of the assessment area. The sampling point is located in a grazed pasture where vegetation has been altered for agricultural purposes.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- Surface Water (A1)
- High Water Table (A2)
- Saturation (A3)
- Water Marks (B1)
- Sediment Deposits (B2)
- Drift Deposits (B3)
- Algal Mat or Crust (B4)
- Iron Deposits (B5)
- Inundation Visible on Aerial Imagery (B7)
- Water-Stained Leaves (B9)
- Aquatic Fauna (B13)
- True Aquatic Plants (B14)
- Hydrogen Sulfide Odor (C1)
- Oxidized Rhizospheres on Living Roots (C3)
- Presence of Reduced Iron (C4)
- Recent Iron Reduction in Tilled Soils (C6)
- Thin Muck Surface (C7)
- Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- 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)
- Stunted or Stressed Plants (D1)
- Geomorphic Position (D2)
- Shallow Aquitard (D3)
- Microtopographic Relief (D4)
- FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes	No X	Depth (inches):
Water Table Present?	Yes	No X	Depth (inches):
Saturation Present? (includes capillary fringe)	Yes	No X	Depth (inches):

Wetland Hydrology Present? **Yes** **No** X

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

Remarks:
No wetland hydrology indicators present.

VEGETATION (Four Strata) – Use scientific names of plants.

Sampling Point: DP12 - Upland R

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
6.			
7.			
	=Total Cover		
50% of total cover:	20% of total cover:		
Sapling/Shrub Stratum (Plot size: 15)			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
	=Total Cover		
50% of total cover:	20% of total cover:		
Herb Stratum (Plot size: 5)			
1. *Festuca rubra*	95	Yes	FACU
2. *Solanum carolinense*	5	No	FACU
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	100 =Total Cover		
50% of total cover: 50	20% of total cover: 20		
Woody Vine Stratum (Plot size: 30)			
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: 0 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 0.0% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	0	x 2 =	0
FAC species	0	x 3 =	0
FACU species	100	x 4 =	400
UPL species	0	x 5 =	0
Column Totals:	100 (A)		400 (B)

Prevalence Index = B/A = 4.00

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

___ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Four Vegetation Strata:

Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody Vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** ___ **No** X

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL

Sampling Point: DP12 - Upland R

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

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Redox Features Type[1]	Redox Features Loc[2]	Texture	Remarks
0-5	7.5YR 3/4	100					Loamy/Clayey	
5-14	5YR 4/6	100					Loamy/Clayey	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10) **(LRR N)**
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7)
- ___ Polyvalue Below Surface (S8) **(MLRA 147, 148)**
- ___ Thin Dark Surface (S9) **(MLRA 147, 148)**
- ___ Loamy Mucky Mineral (F1) **(MLRA 136)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Iron-Manganese Masses (F12) **(LRR N, MLRA 136)**
- ___ Umbric Surface (F13) **(MLRA 122, 136)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 148)**
- ___ Red Parent Material (F21) **(MLRA 127, 147, 148)**

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) **(MLRA 147)**
- ___ Coast Prairie Redox (A16) **(MLRA 147, 148)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 136, 147)**
- ___ Red Parent Material (F21) **(outside MLRA 127, 147, 148)**
- ___ Very Shallow Dark Surface (F22)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

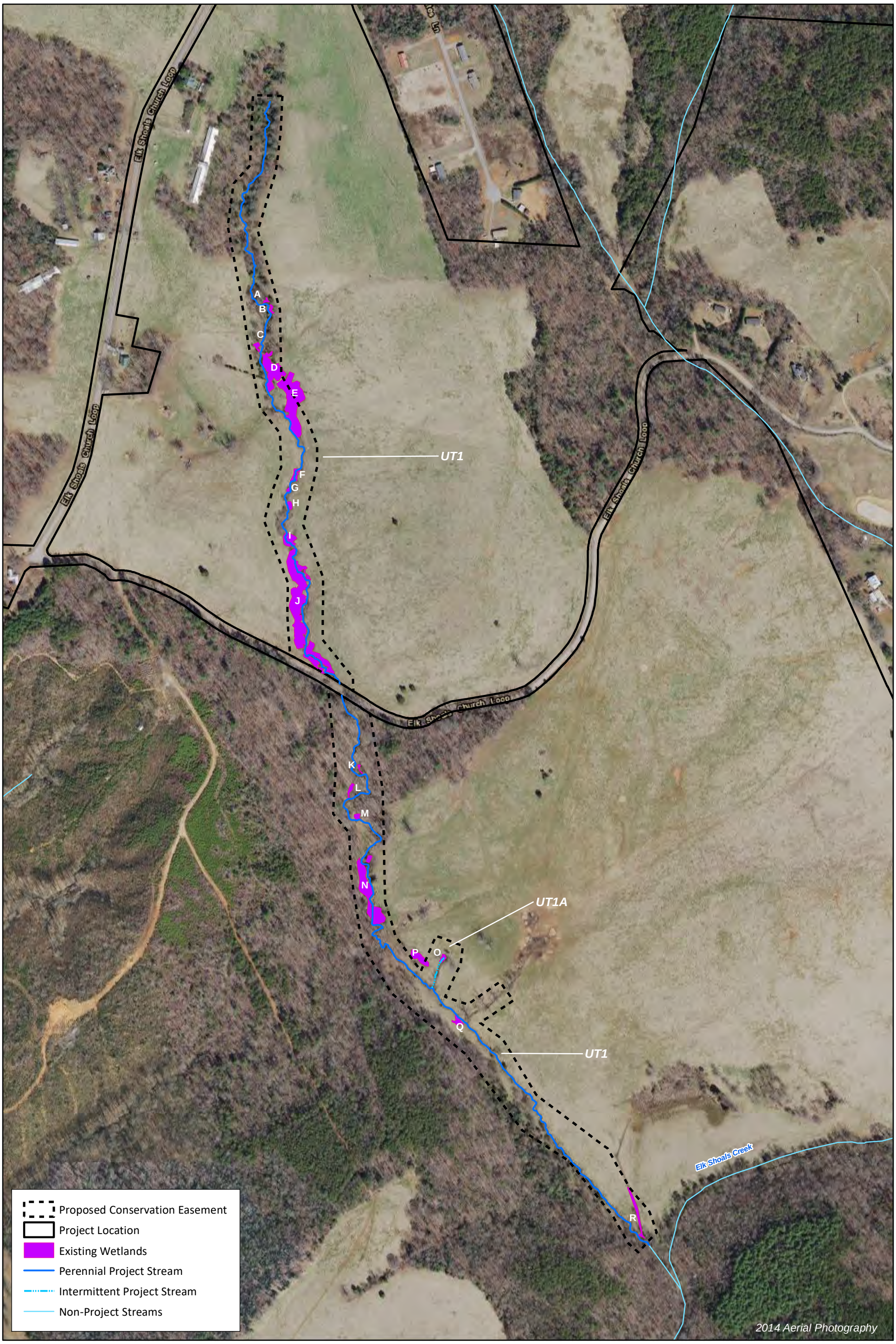
Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** ___ **No** X

Remarks:

No hydrologic soil indicators.



WILDLANDS ENGINEERING

0 400 800 Feet

N

Existing Wetlands Map
Alexander Farm Mitigation Site
Catawba River Basin (03050101)

Alexander County, NC

U.S. ARMY CORPS OF ENGINEERS
WILMINGTON DISTRICT

Action Id. **2018-00451** County: **Alexander** U.S.G.S. Quad: **NC- Stony Point**

NOTIFICATION OF JURISDICTIONAL DETERMINATION

Requestor: **Jennifer & Scott Combs, Polly & Henry Van Hoy**
Address: **10 Court Square**
Mocksville, NC 27028
Telephone Number: **704-332-7754 ext 108**

Size (acres) **20.3**
Nearest Waterway **Elk Shoals Creek**
USGS HUC **03050101**

Nearest Town **Stony Point**
River Basin **Catawba**
Coordinates Latitude: **35.812060**
Longitude: **-81.120889**

Location description: **The site is located at/near 795 Elk Shoals Church Loop Road, near Stony Point, NC.**

Indicate Which of the Following Apply:

A. Preliminary Determination

☒ There appear to be **waters, including wetlands** on the above described project area/property, that may be subject to Section 404 of the Clean Water Act (CWA)(33 USC § 1344) and/or Section 10 of the Rivers and Harbors Act (RHA) (33 USC § 403). The **waters, including wetlands** have been delineated, and the delineation has been verified by the Corps to be sufficiently accurate and reliable. The approximate boundaries of these waters are shown on the enclosed delineation map dated **7/3/2019**. Therefore this preliminary jurisdiction determination may be used in the permit evaluation process, including determining compensatory mitigation. For purposes of computation of impacts, compensatory mitigation requirements, and other resource protection measures, a permit decision made on the basis of a preliminary JD will treat all waters and wetlands that would be affected in any way by the permitted activity on the site as if they are jurisdictional waters of the U.S. This preliminary determination is not an appealable action under the Regulatory Program Administrative Appeal Process (Reference 33 CFR Part 331). However, you may request an approved JD, which is an appealable action, by contacting the Corps district for further instruction.

☐ There appear to be **waters, including wetlands** on the above described project area/property, that may be subject to Section 404 of the Clean Water Act (CWA)(33 USC § 1344) and/or Section 10 of the Rivers and Harbors Act (RHA) (33 USC § 403). However, since the **waters, including wetlands** have not been properly delineated, this preliminary jurisdiction determination may not be used in the permit evaluation process. Without a verified wetland delineation, this preliminary determination is merely an effective presumption of CWA/RHA jurisdiction over all of the **waters, including wetlands** at the project area, which is not sufficiently accurate and reliable to support an enforceable permit decision. We recommend that you have the **waters, including wetlands** on your project area/property delineated. As the Corps may not be able to accomplish this wetland delineation in a timely manner, you may wish to obtain a consultant to conduct a delineation that can be verified by the Corps.

B. Approved Determination

☐ There are Navigable Waters of the United States within the above described project area/property subject to the permit requirements of Section 10 of the Rivers and Harbors Act (RHA) (33 USC § 403) and Section 404 of the Clean Water Act (CWA)(33 USC § 1344). Unless there is a change in law or our published regulations, this determination may be relied upon for a period not to exceed five years from the date of this notification.

☐ There are **waters, including wetlands**on the above described project area/property subject to the permit requirements of Section 404 of the Clean Water Act (CWA) (33 USC § 1344). Unless there is a change in the law or our published regulations, this determination may be relied upon for a period not to exceed five years from the date of this notification.

☐ We recommend you have the **waters, including wetlands** on your project area/property delineated. As the Corps may not be able to accomplish this wetland delineation in a timely manner, you may wish to obtain a consultant to conduct a delineation that can be verified by the Corps.

☐ The **waters, including wetlands** on your project area/property have been delineated and the delineation has been verified by the Corps. The approximate boundaries of these waters are shown on the enclosed delineation map dated **DATE**. We strongly suggest you have this delineation surveyed. Upon completion, this survey should be reviewed and verified by the Corps. Once

verified, this survey will provide an accurate depiction of all areas subject to CWA jurisdiction on your property which, provided there is no change in the law or our published regulations, may be relied upon for a period not to exceed five years.

☐ The **waters, including wetlands** have been delineated and surveyed and are accurately depicted on the plat signed by the Corps Regulatory Official identified below on **DATE**. Unless there is a change in the law or our published regulations, this determination may be relied upon for a period not to exceed five years from the date of this notification.

☐ There are no waters of the U.S., to include wetlands, present on the above described project area/property which are subject to the permit requirements of Section 404 of the Clean Water Act (33 USC 1344). Unless there is a change in the law or our published regulations, this determination may be relied upon for a period not to exceed five years from the date of this notification.

☐ The property is located in one of the 20 Coastal Counties subject to regulation under the Coastal Area Management Act (CAMA). You should contact the Division of Coastal Management in **Morehead City, NC, at (252) 808-2808** to determine their requirements.

Placement of dredged or fill material within waters of the US, including wetlands, without a Department of the Army permit may constitute a violation of Section 301 of the Clean Water Act (33 USC § 1311). Placement of dredged or fill material, construction or placement of structures, or work within navigable waters of the United States without a Department of the Army permit may constitute a violation of Sections 9 and/or 10 of the Rivers and Harbors Act (33 USC § 401 and/or 403). If you have any questions regarding this determination and/or the Corps regulatory program, please contact **Amanda Jones** at **828-271-7980 ext. 4225** or **amanda.jones@usace.army.mil**.

C. Basis For Determination: See the preliminary jurisdictional determination form and maps (Figure 3) dated 07/03/2019.

D. Remarks: This determination applies to the assessment area outlined on the attached maps and in association with the development of a compensatory mitigation bank site known as Alexander Farm Mitigation Site.

E. Attention USDA Program Participants

This delineation/determination has been conducted to identify the limits of Corps' Clean Water Act jurisdiction for the particular site identified in this request. The delineation/determination 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 request a certified wetland determination from the local office of the Natural Resources Conservation Service, prior to starting work.

F. Appeals Information **(This information applies only to approved jurisdictional determinations as indicated in B. above)**

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

US Army Corps of Engineers
South Atlantic Division
Attn: Jason Steele, Review Officer
60 Forsyth Street SW, Room 10M15
Atlanta, Georgia 30303-8801

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

Corps Regulatory Official: FUEMMELER.AMANDA.JONES.1242835090 Digitally signed by FUEMMELER.AMANDA.JONES.1242835090 Date: 2019.07.03 13:19:55 -04'00'

Date of JD: **07/03/2019** Expiration Date of JD: **Not applicable**

2018-00451

The Wilmington District is committed to providing the highest level of support to the public. To help us ensure we continue to do so, please complete the Customer Satisfaction Survey located at http://corpsmapu.usace.army.mil/cm_apex/f?p=136:4:0

Copy furnished:

Agent:	**Wildlands Engineering**
	Ian Eckardt
Address:	**1430 S. Mint Street, Suite 104**
	Charlotte, NC 28203
Telephone Number:	**704-332-7754**
E-mail:	**ieckardt@wildlandseng.com**

NOTIFICATION OF ADMINISTRATIVE APPEAL OPTIONS AND PROCESS AND REQUEST FOR APPEAL

Applicant: **Jennifer & Scott Combs, Polly & Henry Van Hoy, Ian Eckardt**	File Number: **2018-00451**	Date: **07/03/2019**

Attached is:	See Section below
☐ INITIAL PROFFERED PERMIT (Standard Permit or Letter of permission)	A
☐ PROFFERED PERMIT (Standard Permit or Letter of permission)	B
☐ PERMIT DENIAL	C
☐ APPROVED JURISDICTIONAL DETERMINATION	D
☒ PRELIMINARY JURISDICTIONAL DETERMINATION	E

SECTION I - The following identifies your rights and options regarding an administrative appeal of the above decision. Additional information may be found at or http://www.usace.army.mil/Missions/CivilWorks/RegulatoryProgramandPermits.aspx or the Corps regulations at 33 CFR Part 331.

A: INITIAL PROFFERED PERMIT: You may accept or object to the permit.

- ACCEPT: If you received a Standard Permit, you may sign the permit document and return it to the district engineer for final authorization. If you received a Letter of Permission (LOP), you may accept the LOP and your work is authorized. Your signature on the Standard Permit or acceptance of the LOP means that you accept the permit in its entirety, and waive all rights to appeal the permit, including its terms and conditions, and approved jurisdictional determinations associated with the permit.
- OBJECT: If you object to the permit (Standard or LOP) because of certain terms and conditions therein, you may request that the permit be modified accordingly. You must complete Section II of this form and return the form to the district engineer. Your objections must be received by the district engineer within 60 days of the date of this notice, or you will forfeit your right to appeal the permit in the future. Upon receipt of your letter, the district engineer will evaluate your objections and may: (a) modify the permit to address all of your concerns, (b) modify the permit to address some of your objections, or (c) not modify the permit having determined that the permit should be issued as previously written. After evaluating your objections, the district engineer will send you a proffered permit for your reconsideration, as indicated in Section B below.

B: PROFFERED PERMIT: You may accept or appeal the permit

- ACCEPT: If you received a Standard Permit, you may sign the permit document and return it to the district engineer for final authorization. If you received a Letter of Permission (LOP), you may accept the LOP and your work is authorized. Your signature on the Standard Permit or acceptance of the LOP means that you accept the permit in its entirety, and waive all rights to appeal the permit, including its terms and conditions, and approved jurisdictional determinations associated with the permit.
- APPEAL: If you choose to decline the proffered permit (Standard or LOP) because of certain terms and conditions therein, you may appeal the declined permit under the Corps of Engineers Administrative Appeal Process by completing Section II of this form and sending the form to the division engineer. This form must be received by the division engineer within 60 days of the date of this notice.

C: PERMIT DENIAL: You may appeal the denial of a permit under the Corps of Engineers Administrative Appeal Process by completing Section II of this form and sending the form to the division engineer. This form must be received by the division engineer within 60 days of the date of this notice.

D: APPROVED JURISDICTIONAL DETERMINATION: You may accept or appeal the approved JD or provide new information.

- ACCEPT: You do not need to notify the Corps to accept an approved JD. Failure to notify the Corps within 60 days of the date of this notice, means that you accept the approved JD in its entirety, and waive all rights to appeal the approved JD.
- APPEAL: If you disagree with the approved JD, you may appeal the approved JD under the Corps of Engineers Administrative Appeal Process by completing Section II of this form and sending the form to the district engineer. This form must be received by the division engineer within 60 days of the date of this notice.

E: PRELIMINARY JURISDICTIONAL DETERMINATION: You do not need to respond to the Corps regarding the preliminary JD. The Preliminary JD is not appealable. If you wish, you may request an approved JD (which may be appealed), by contacting the Corps district for further instruction. Also you may provide new information for further consideration by the Corps to reevaluate the JD.

SECTION II - REQUEST FOR APPEAL or OBJECTIONS TO AN INITIAL PROFFERED PERMIT

REASONS FOR APPEAL OR OBJECTIONS: (Describe your reasons for appealing the decision or your objections to an initial proffered permit in clear concise statements. You may attach additional information to this form to clarify where your reasons or objections are addressed in the administrative record.)

ADDITIONAL INFORMATION: The appeal is limited to a review of the administrative record, the Corps memorandum for the record of the appeal conference or meeting, and any supplemental information that the review officer has determined is needed to clarify the administrative record. Neither the appellant nor the Corps may add new information or analyses to the record. However, you may provide additional information to clarify the location of information that is already in the administrative record.

POINT OF CONTACT FOR QUESTIONS OR INFORMATION:

If you have questions regarding this decision and/or the appeal process you may contact:	If you only have questions regarding the appeal process you may also contact:
District Engineer, Wilmington Regulatory Division **Attn: Amanda Jones** **Asheville Regulatory Office** **U.S Army Corps of Engineers** **151 Patton Avenue, Room 208** **Asheville, North Carolina 28801**	Mr. Jason Steele, Administrative Appeal Review Officer CESAD-PDO U.S. Army Corps of Engineers, South Atlantic Division 60 Forsyth Street, Room 10M15 Atlanta, Georgia 30303-8801 Phone: (404) 562-5137

RIGHT OF ENTRY: Your signature below grants the right of entry to Corps of Engineers personnel, and any government consultants, to conduct investigations of the project site during the course of the appeal process. You will be provided a 15 day notice of any site investigation, and will have the opportunity to participate in all site investigations.

_____ Signature of appellant or agent.	Date:	Telephone number:

For appeals on Initial Proffered Permits send this form to:

District Engineer, Wilmington Regulatory Division, **Attn: Amanda Jones, 69 Darlington Avenue, Wilmington, North Carolina 28403**

For Permit denials, Proffered Permits and Approved Jurisdictional Determinations send this form to:

Division Engineer, Commander, U.S. Army Engineer Division, South Atlantic, Attn: Mr. Jason Steele, Administrative Appeal Officer, CESAD-PDO, 60 Forsyth Street, Room 10M15, Atlanta, Georgia 30303-8801
Phone: (404) 562-5137

PRELIMINARY JURISDICTIONAL DETERMINATION (PJD) FORM

BACKGROUND INFORMATION

A. REPORT COMPLETION DATE FOR PJD: 07/03/19

B. NAME AND ADDRESS OF PERSON REQUESTING PJD: Wildlands Engineering Inc., Ian Eckardt, 1430 S. Mint Street, Suite 104,Charlotte, NC 28203

C. DISTRICT OFFICE, FILE NAME, AND NUMBER: Wilmington District, Alexander Farms Mitigation Site

D. PROJECT LOCATION(S) AND BACKGROUND INFORMATION: The project is a stream mitigation project which will provide in-kind mitigation for unavoidable stream impacts for the North Carolina Division of Mitigation Services (NCDMS). The project is located on a parcel located at 795 Elk Shoals Church Loop Road, Stony Point, NC 27028.

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

State: NC County: Alexander City: Stony Point
Center coordinates of site (lat/long in degree decimal format): Latitude: 35.812060 Longitude: -81.120889

Universal Transverse Mercator:

Name of nearest waterbody: Elk Shoals Creek

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

☐ Office (Desk) Determination. Date:
☒ Field Determination. Date(s): 9/27/18 – 9/28/18, 12/6/18 – 12/8/18, & 12/20/18

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 resources in review area (acreage and linear feet, if applicable	Type of aquatic resources (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)
1.) UT1	35.818249	-81.122099	6,805	non-wetland waters	Section 404
2.) UT1A	35.808313	-81.119009	153	non-wetland waters	Section 404
3.) Wetland A	35.816602	-81.121834	0.01	wetland waters	Section 404
4.) Wetland B	35.816505	-81.121763	0.01	wetland waters	Section 404
5.) Wetland C	35.816064	-81.121967	0.01	wetland waters	Section 404
6.) Wetland D	35.815883	-81.121777	0.18	wetland waters	Section 404
7.) Wetland E	35.815474	-81.121383	0.36	wetland waters	Section 404
8.) Wetland F	35.814481	-81.121317	0.02	wetland waters	Section 404

9.) Wetland G	35.814280	-81.121440	0.01	wetland waters	Section 404
10.) Wetland H	35.814095	-81.121403	0.01	wetland waters	Section 404
11.) Wetland I	35.813684	-81.121401	0.05	wetland waters	Section 404
12.) Wetland J	35.812771	-81.121288	0.62	wetland waters	Section 404
13.) Wetland K	35.810888	-81.120254	0.01	wetland waters	Section 404
14.) Wetland L	35.810610	-81.120401	0.02	wetland waters	Section 404
15.) Wetland M	35.810133	-81.120062	0.01	wetland waters	Section 404
16.) Wetland N	35.809634	-81.120210	0.25	wetland waters	Section 404
17.) Wetland O	35.808549	-81.118955	0.01	wetland waters	Section 404
18.) Wetland P	35.808581	-81.119351	0.06	wetland waters	Section 404
19.) Wetland Q	35.807763	-81.118693	0.02	wetland waters	Section 404
20.) Wetland R	35.806172	-81.116267	0.05	wetland waters	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: GIS figures including Vicinity, USGS Topographic, Delineation, & Soils.

☒ 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: 1:24,000 Scale, Stony Point Quad.

☒ Natural Resources Conservation Service Soil Survey. Citation: Alexander County 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): 2014 aerial photography Figures 3 - 4

or ☒ Other (Name & Date): Representative site photos.

☐ 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.

FUEMMELER.AMANDA.JONES.1242835090

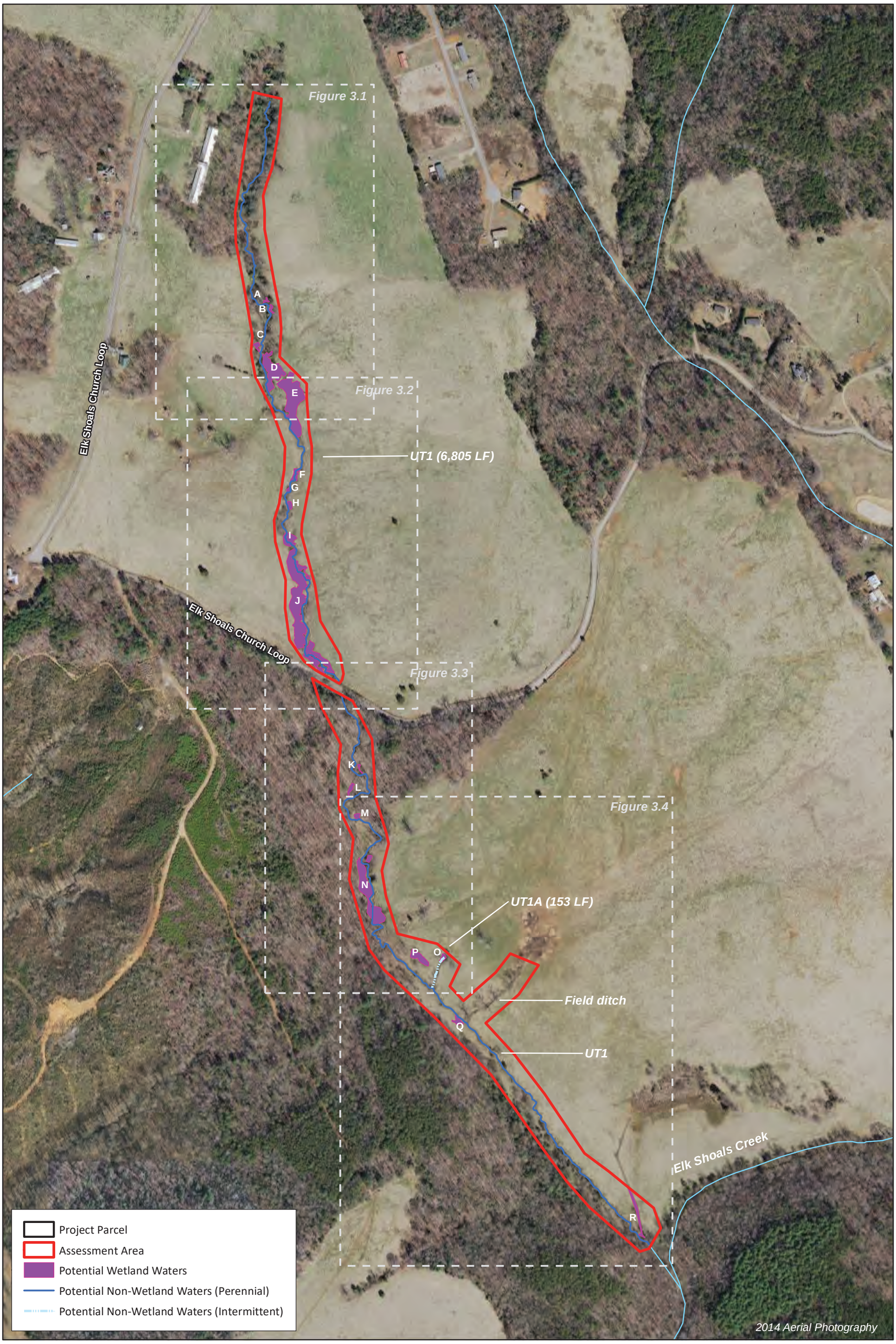
Digitally signed by FUEMMELER.AMANDA.JONES.1242835090
Date: 2019.07.03 13:21:49 -04'00'

Signature and date of Regulatory staff member completing PJD

2/27/19

Signature and date of person requesting PJD (REQUIRED, unless obtaining the signature is impracticable)[1]

[1] Districts may establish timeframes for requester to return signed PJD forms. If the requester 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.



WILDLANDS ENGINEERING

0 400 800 Feet

N

Figure 3: Delineation Map (Overall)
Alexander Farm Mitigation Site
Catawba River Basin (03050101

Alexander County, NC

07/03/19

WILDLANDS ENGINEERING

0 200 Feet

N

Figure 3.1: Delineation Map
Alexander Farm Mitigation Site
Catawba River Basin (03050101

Alexander County, NC

07/03/19

WILDLANDS ENGINEERING

0 200 Feet

N

Figure 3.2: Delineation Map
Alexander Farm Mitigation Site
Catawba River Basin (03050101

Alexander County, NC

07/03/19

WILDLANDS ENGINEERING

0 200 Feet

N

Figure 3.3: Delineation Map
Alexander Farm Mitigation Site
Catawba River Basin (03050101

Alexander County, NC

07/03/19

M (0.01 AC)
DP10
N
DP9
N (0.25 AC)
N
P (0.06 AC)
SCP 2
O (0.01 AC)
UT1A (153 LF)
Field Ditch
UT1 (6,805 LF)
Q (0.02 AC)
DP12
R (0.05 AC)
DP11
Project Parcel
Assessment Area
Potential Wetland Waters
Potential Non-Wetland Waters (Perennial)
Potential Non-Wetland Waters (Intermittent)
Stream Classification Points (SCP#)
Wetland/Upland Data Points (DP#)
2014 Aerial Photography

WILDLANDS ENGINEERING

0 300 Feet

N

Figure 3.4: Delineation Map
Alexander Farm Mitigation Site
Catawba River Basin (03050101

Alexander County, NC

07/03/19

APPENDIX 3

DWR and NCSAM Stream Identification Forms

NC DWQ Stream Identification Form Version 4.11

Date: 9/27/18	Project/Site: Alexander Farm	Latitude: 35.818249°N
Evaluator: J. Eckardt	County: Alexander	Longitude: -81.122099°W
Total Points: *Stream is at least intermittent if ≥ 19 or perennial if ≥ 30** 36	Stream Determination (circle one) Ephemeral Intermittent (Perennial)	Other UT1 *e.g. Quad Name:*

A. Geomorphology (Subtotal = 18)	Absent	Weak	Moderate	Strong
1[a]. 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	

[a] artificial ditches are not rated; see discussions in manual

B. Hydrology (Subtotal = 10)				
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 = 8)				
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:

Identification performed at upstream project limits of UT1 Reach 1.

NC DWQ Stream Identification Form Version 4.11

Date: 12/20/18	**Project/Site:** Alexander Farm Mitigation Site	**Latitude:** 35.808313°N
Evaluator: I. Eckardt	**County:** Alexander	**Longitude:** -81.119009°W
Total Points: *Stream is at least intermittent if ≥ 19 or perennial if ≥ 30** 25.75	**Stream Determination (circle one)** Ephemeral (Intermittent) Perennial	**Other** UT1A *e.g. Quad Name:*

A. Geomorphology (Subtotal = 9)	Absent	Weak	Moderate	Strong
1[a]. 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 small side benches	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 hillside/floodplain creculation	0	(0.5)	1	1.5
11. Second or greater order channel	(No = 0)		Yes = 3	

[a] artificial ditches are not rated; see discussions in manual

B. Hydrology (Subtotal = 9.5)				
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 = 7.25)				
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 - smartweed, jewelweed	(FACW = 0.75) OBL = 1.5 Other = 0			

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

Notes: Observed 3 midges and 1 caddisfly

Sketch:

Identification performed at upstream project limits of UT1A.

NC SAM FIELD ASSESSMENT FORM
Accompanies User Manual Version 2.1

USACE AID #: NCDWR #

INSTRUCTIONS: 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" section if supplementary measurements were performed. See the NC SAM User Manual for examples of additional measurements that may be relevant.
NOTE EVIDENCE OF STRESSORS AFFECTING THE ASSESSMENT AREA (do not need to be within the assessment area).

PROJECT/SITE INFORMATION:
1. Project name (if any): Alexander Farm
2. Date of evaluation: 9/27/2018
3. Applicant/owner name: Wildlands
4. Assessor name/organization: M. Caddell
5. County: Alexander
6. Nearest named water body on USGS 7.5-minute quad: Elk Shoals Creek
7. River basin: Catawba
8. Site coordinates (decimal degrees, at lower end of assessment reach): 35.814722 °N 81.121389 °W

STREAM INFORMATION: (depth and width can be approximations)
9. Site number (show on attached map): UT1 R1 Lower
10. Length of assessment reach evaluated (feet): 900
11. Channel depth from bed (in riffle, if present) to top of bank (feet): 3-8 ☐Unable to assess channel depth.
12. Channel width at top of bank (feet): 10-20'
13. Is assessment reach a swamp stream? ☐Yes ☒No
14. Feature type: ☒Perennial flow ☐Intermittent flow ☐Tidal Marsh Stream

STREAM CATEGORY INFORMATION:
15. NC SAM Zone: ☐Mountains (M) ☒Piedmont (P) ☐Inner Coastal Plain (I) ☐Outer Coastal Plain (O)
16. Estimated geomorphic valley shape (**skip for Tidal Marsh Stream**): ☐a (more sinuous stream, flatter valley slope) ☒b (less sinuous stream, steeper valley slope)
17. Watershed size: (**skip for Tidal Marsh Stream**) ☐Size 1 (< 0.1 mi²) ☒Size 2 (0.1 to < 0.5 mi²) ☐Size 3 (0.5 to < 5 mi²) ☐Size 4 (≥ 5 mi²)

ADDITIONAL INFORMATION:
18. Were regulatory considerations evaluated? ☒Yes ☐No If Yes, check all that apply to the assessment area.
- ☐Section 10 water
- ☐Classified Trout Waters
- ☒Water Supply Watershed (☐I ☐II ☐III ☒IV ☐V)
- ☐Essential Fish Habitat
- ☐Primary Nursery Area
- ☐High Quality Waters/Outstanding Resource Waters
- ☐Publicly owned property
- ☐NCDWR riparian buffer rule in effect
- ☐Nutrient Sensitive Waters
- ☐Anadromous fish
- ☐303(d) List
- ☐CAMA Area of Environmental Concern (AEC)
- ☐Documented presence of a federal and/or state listed protected species within the assessment area. List species:
- ☐Designated Critical Habitat (list species)

19. Are additional stream information/supplementary measurements included in "Notes/Sketch" section or attached? ☒Yes ☐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 (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])
☒C	☒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] or too much floodplain/intertidal zone access [examples: impoundments, intensive mosquito ditching]) or floodplain/intertidal zone unnaturally absent or assessment reach is a man-made feature on an interstream divide

very incised

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" 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 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 (including 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

Check for Tidal Marsh Streams Only
- ☐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.** 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	
☒	☐	☐	☐	☐	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?

UTI R1 Lower

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 (including water pennies)
☐	☐	Caddisfly larvae (Trichoptera [T])
☐	☐	Asian clam (*Corbicula*)
☐	☐	Crustacean (isopod/amphipod/crayfish/shrimp)
☐	☐	Damselfly and dragonfly larvae
☐	☐	Dipterans (true flies)
☐	☐	Mayfly larvae (Ephemeroptera [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 (Plecoptera [P])
☐	☐	Tipulid larvae (Cranefly)
☐	☐	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	
☐A	☐A	Little or no alteration to water storage capacity over a majority of the streamside area
☐B	☐B	Moderate alteration to water storage capacity over a majority of the streamside area
☒C	☒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	
☐A	☐A	Majority of streamside area with depressions able to pond water ≥ 6 inches deep
☐B	☐B	Majority of streamside area with depressions able to pond water 3 to 6 inches deep
☒C	☐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	
☐Y	☐Y	Are wetlands present in the streamside area?
☒N	☐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 that passes some flow during low-flow periods affecting assessment reach (ex: beaver dam, bottom-release dam)
☒D Evidence of bank seepage or sweating (iron oxidizing bacteria 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 the 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 LB	Vegetated RB	Wooded LB	Wooded RB	
☒A	☒A	☐A	☐A	≥ 100 feet wide or extends to the edge of the watershed
☐B	☐B	☐B	☐B	From 50 to < 100 feet wide
☐C	☐C	☐C	☐C	From 30 to < 50 feet wide
☐D	☐D	☒D	☒D	From 10 to < 30 feet wide
☐E	☐E	☐E	☐E	< 10 feet wide or 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	
☐A	☐A	Mature forest
☒B	☒B	Non-mature woody vegetation or modified vegetation structure
☐C	☐C	Herbaceous vegetation with or without a strip of trees < 10 feet wide
☐D	☐D	Maintained shrubs
☐E	☐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 LB	Abuts RB	< 30 feet LB	< 30 feet RB	30-50 feet LB	30-50 feet RB	
☐A	☐A	☐A	☐A	☐A	☐A	Row crops
☐B	☐B	☐B	☐B	☐B	☐B	Maintained turf
☐C	☐C	☐C	☐C	☐C	☐C	Pasture (no livestock)/commercial horticulture
☒D	☒D	☒D	☒D	☒D	☒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	
☐A	☐A	Medium to high stem density
☒B	☒B	Low stem density
☐C	☐C	No wooded riparian buffer or predominantly herbaceous species or 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	
☒A	☒A	The total length of buffer breaks is < 25 percent.
☐B	☐B	The total length of buffer breaks is between 25 and 50 percent.
☐C	☐C	The total length of buffer breaks is > 50 percent.

24. **Vegetative Composition – First 100 feet of 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	
☐A	☐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.
☐B	☐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 or communities with non-native invasive species present, but not dominant, over a large portion of the expected strata or communities missing understory but retaining canopy trees.
☒C	☒C	Vegetation is severely disturbed in terms of species diversity or proportions. Mature canopy is absent or communities with non-native invasive species dominant over a large portion of expected strata or communities composed of planted stands of non-characteristic species or communities inappropriately composed of a single species or no vegetation.

25. **Conductivity – assessment reach metric (skip for all Coastal Plain streams)**
25a. ☐Yes ☒No Was conductivity measurement recorded?

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:

herb	woody
-wingstem	-large privet
-clover	-maple -cedar
-grasses pasture	-hickory -DV
-multiflora	-Lt
-wood nettle	-black locust
-deer stalk	-holly
-dogfennel	-sycamore
-dandelion?	-[illegible]

-smart weed

x

NC SAM FIELD ASSESSMENT FORM
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USACE AID #: NCDWR #

INSTRUCTIONS: 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" section if supplementary measurements were performed. See the NC SAM User Manual for examples of additional measurements that may be relevant.

NOTE EVIDENCE OF STRESSORS AFFECTING THE ASSESSMENT AREA (do not need to be within the assessment area).

PROJECT/SITE INFORMATION:

1. Project name (if any): Alexander Farm
2. Date of evaluation:
3. Applicant/owner name: Wildlands
4. Assessor name/organization: M. Caddell
5. County: Alexander
6. Nearest named water body on USGS 7.5-minute quad: Elk Shoals Creek
7. River basin: Catawba
8. Site coordinates (decimal degrees, at lower end of assessment reach): 35.81714167°N 81.12194444°W

STREAM INFORMATION: (depth and width can be approximations)

9. Site number (show on attached map): UTR1 Upper
10. Length of assessment reach evaluated (feet): 700'
11. Channel depth from bed (in riffle, if present) to top of bank (feet): 5-8' ☐ Unable to assess channel depth.
12. Channel width at top of bank (feet): 3-6'
13. Is assessment reach a swamp stream? ☐ Yes ☒ No
14. Feature type: ☒ Perennial flow ☐ Intermittent flow ☐ Tidal Marsh Stream

STREAM CATEGORY INFORMATION:

15. NC SAM Zone: ☐ Mountains (M) ☒ Piedmont (P) ☐ Inner Coastal Plain (I) ☐ Outer Coastal Plain (O)
16. Estimated geomorphic valley shape (**skip for Tidal Marsh Stream**): ☐ a (more sinuous stream, flatter valley slope) ☒ b (less sinuous stream, steeper valley slope)
17. Watershed size: (**skip for Tidal Marsh Stream**) ☒ Size 1 (< 0.1 mi²) ☐ Size 2 (0.1 to < 0.5 mi²) ☐ Size 3 (0.5 to < 5 mi²) ☐ Size 4 (≥ 5 mi²)

ADDITIONAL INFORMATION:

18. Were regulatory considerations evaluated? ☑ Yes ☐ No If Yes, check all that apply to the assessment area.
- ☐ Section 10 water
- ☐ Classified Trout Waters
- ☑ Water Supply Watershed (☐ I ☐ II ☐ III ☑ IV ☐ V)
- ☐ Essential Fish Habitat
- ☐ Primary Nursery Area
- ☐ High Quality Waters/Outstanding Resource Waters
- ☐ Publicly owned property
- ☐ NCDWR riparian buffer rule in effect
- ☐ Nutrient Sensitive Waters
- ☐ Anadromous fish
- ☐ 303(d) List
- ☐ CAMA Area of Environmental Concern (AEC)
- ☐ Documented presence of a federal and/or state listed protected species within the assessment area. List species:
- ☐ Designated Critical Habitat (list species)

19. Are additional stream information/supplementary measurements included in "Notes/Sketch" section or attached? ☑ Yes ☐ 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 (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])
☒C	☐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

Very incised

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 <u>Excessive</u> sedimentation (burying of stream features or intertidal zone)
- ☐C Noticeable evidence of pollutant discharges entering the assessment reach <u>and</u> 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" 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 <u>and</u> no rainfall or rainfall not exceeding 1 inch within the last 48 hours
- ☐B Drought conditions <u>and</u> 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 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 (including 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

Check for Tidal Marsh Streams Only
- ☐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.** 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	
☒	☐	☐	☐	☐	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?

UT1 R1 lower

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 (including water pennies)
☐	☐	Caddisfly larvae (Trichoptera [T])
☐	☐	Asian clam (*Corbicula*)
☐	☐	Crustacean (isopod/amphipod/crayfish/shrimp)
☐	☐	Damselfly and dragonfly larvae
☐	☐	Dipterans (true flies)
☐	☐	Mayfly larvae (Ephemeroptera [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 (Plecoptera [P])
☐	☐	Tipulid larvae (Cranefly)
☐	☐	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	
☐A	☐A	Little or no alteration to water storage capacity over a majority of the streamside area
☐B	☐B	Moderate alteration to water storage capacity over a majority of the streamside area
☒C	☒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	
☐A	☐A	Majority of streamside area with depressions able to pond water ≥ 6 inches deep
☐B	☐B	Majority of streamside area with depressions able to pond water 3 to 6 inches deep
☐C	☐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	
☐Y	☐Y	Are wetlands present in the streamside area?
☒N	☒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 that passes some flow during low-flow periods affecting assessment reach (ex: beaver dam, bottom-release dam)
☒D	Evidence of bank seepage or sweating (iron oxidizing bacteria 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 the 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 LB	Vegetated RB	Wooded LB	Wooded RB	
☐A	☒A	☐A	☒A	≥ 100 feet wide or extends to the edge of the watershed
☐B	☐B	☐B	☐B	From 50 to < 100 feet wide
☐C	☐C	☐C	☐C	From 30 to < 50 feet wide
☐D	☐D	☒D	☐D	From 10 to < 30 feet wide
☐E	☐E	☐E	☐E	< 10 feet wide or 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	
☐A	☒A	Mature forest
☒B	☐B	Non-mature woody vegetation or modified vegetation structure
☐C	☐C	Herbaceous vegetation with or without a strip of trees < 10 feet wide
☐D	☐D	Maintained shrubs
☐E	☐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 LB	Abuts RB	< 30 feet LB	< 30 feet RB	30-50 feet LB	30-50 feet RB	
☐A	☐A	☐A	☐A	☐A	☐A	Row crops
☐B	☐B	☐B	☐B	☐B	☐B	Maintained turf
☐C	☐C	☐C	☐C	☐C	☐C	Pasture (no livestock)/commercial horticulture
☒D	☒D	☒D	☒D	☒D	☒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	
☐A	☒A	Medium to high stem density
☒B	☐B	Low stem density
☐C	☐C	No wooded riparian buffer or predominantly herbaceous species or 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	
☒A	☒A	The total length of buffer breaks is < 25 percent.
☐B	☐B	The total length of buffer breaks is between 25 and 50 percent.
☐C	☐C	The total length of buffer breaks is > 50 percent.

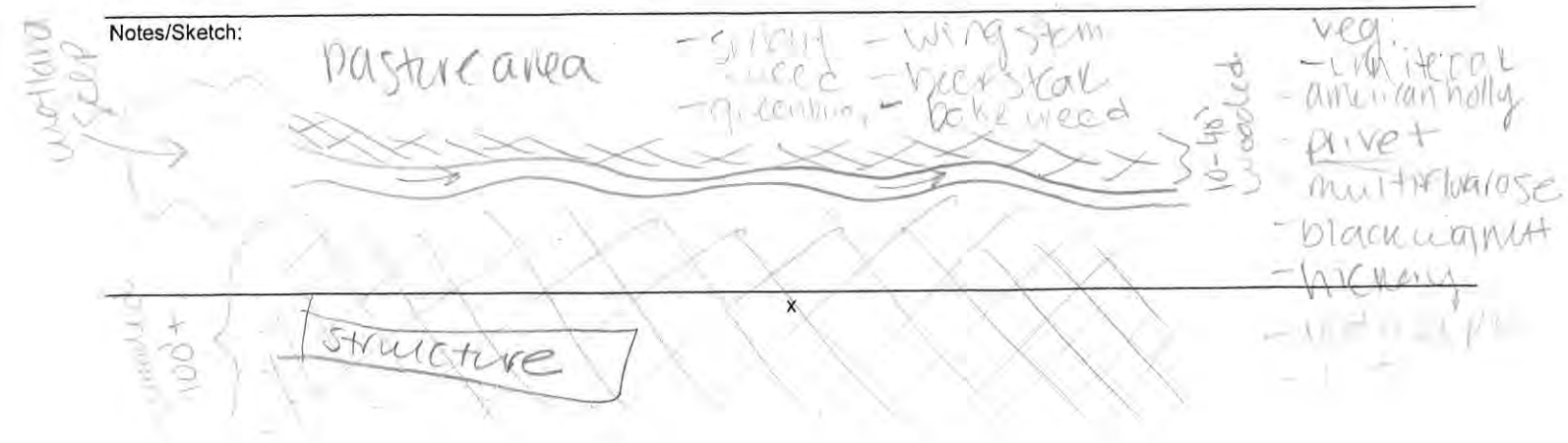
24. **Vegetative Composition – First 100 feet of streamside area metric (skip for Tidal Marsh Streams)**
Evaluate the dominant vegetation within 100 feet of each bank or to the edge of the watershed (whichever comes first) as it contributes to assessment reach habitat.

LB	RB	
☐A	☐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.
☐B	☐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 or communities with non-native invasive species present, but not dominant, over a large portion of the expected strata or communities missing understory but retaining canopy trees.
☒C	☒C	Vegetation is severely disturbed in terms of species diversity or proportions. Mature canopy is absent or communities with non-native invasive species dominant over a large portion of expected strata or communities composed of planted stands of non-characteristic species or communities inappropriately composed of a single species or no vegetation.

25. **Conductivity – assessment reach metric (skip for all Coastal Plain streams)**
25a. ☐Yes ☒No Was conductivity measurement recorded?

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:



NC SAM FIELD ASSESSMENT FORM
Accompanies User Manual Version 2.1

USACE AID #: NCDWR #

INSTRUCTIONS: 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" section if supplementary measurements were performed. See the NC SAM User Manual for examples of additional measurements that may be relevant.

NOTE EVIDENCE OF STRESSORS AFFECTING THE ASSESSMENT AREA (do not need to be within the assessment area).

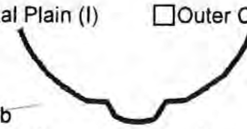
PROJECT/SITE INFORMATION:

1. Project name (if any): Alexander Farm
2. Date of evaluation: 9/27/2018
3. Applicant/owner name: Wildlands
4. Assessor name/organization: M. Caddell
5. County: Alexander
6. Nearest named water body on USGS 7.5-minute quad: Elk Shoals Creek
7. River basin: Catawba
8. Site coordinates (decimal degrees, at lower end of assessment reach): 31.81208056°N 81.12083333 W

STREAM INFORMATION: (depth and width can be approximations)

9. Site number (show on attached map): UT1 R2
10. Length of assessment reach evaluated (feet): 1360'
11. Channel depth from bed (in riffle, if present) to top of bank (feet): 2 - 4' ☐ Unable to assess channel depth.
12. Channel width at top of bank (feet): 4 - 10'
13. Is assessment reach a swamp stream? ☐ Yes ☒ No
14. Feature type: ☒ Perennial flow ☐ Intermittent flow ☐ Tidal Marsh Stream

STREAM CATEGORY INFORMATION:

15. NC SAM Zone: ☐ Mountains (M) ☒ Piedmont (P) ☐ Inner Coastal Plain (I) ☐ Outer Coastal Plain (O)
16. Estimated geomorphic valley shape (**skip for Tidal Marsh Stream**):
    ☐ a  (more sinuous stream, flatter valley slope)
    ☒ b  (less sinuous stream, steeper valley slope)
17. Watershed size: (**skip for Tidal Marsh Stream**) ☐ Size 1 (< 0.1 mi²) ☒ Size 2 (0.1 to < 0.5 mi²) ☐ Size 3 (0.5 to < 5 mi²) ☐ Size 4 (≥ 5 mi²)

ADDITIONAL INFORMATION:

18. Were regulatory considerations evaluated? ☒ Yes ☐ No If Yes, check all that apply to the assessment area.
    - ☐ Section 10 water
    - ☐ Classified Trout Waters
    - ☒ Water Supply Watershed (☐ I ☐ II ☐ III ☒ IV ☐ V)
    - ☐ Essential Fish Habitat
    - ☐ Primary Nursery Area
    - ☐ High Quality Waters/Outstanding Resource Waters
    - ☐ Publicly owned property
    - ☐ NCDWR riparian buffer rule in effect
    - ☐ Nutrient Sensitive Waters
    - ☐ Anadromous fish
    - ☐ 303(d) List
    - ☐ CAMA Area of Environmental Concern (AEC)
    - ☐ Documented presence of a federal and/or state listed protected species within the assessment area.
      List species:
    - ☐ Designated Critical Habitat (list species)
19. Are additional stream information/supplementary measurements included in "Notes/Sketch" section or attached? ☒ Yes ☐ 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 (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])
☐C	☐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] or too much floodplain/intertidal zone access [examples: impoundments, intensive mosquito ditching]) or floodplain/intertidal zone unnaturally absent or 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" 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 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 (including 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

Check for Tidal Marsh Streams Only
- ☐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.** 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	
☐	☐	☐	☐	☐	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?

UT1R2

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 (including water pennies)
☐	☐	Caddisfly larvae (Trichoptera [T])
☐	☐	Asian clam (*Corbicula*)
☐	☐	Crustacean (isopod/amphipod/crayfish/shrimp)
☐	☐	Damselfly and dragonfly larvae
☐	☐	Dipterans (true flies)
☐	☐	Mayfly larvae (Ephemeroptera [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 (Plecoptera [P])
☒	☐	Tipulid larvae (Cranefly)
☐	☐	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	
☐A	☐A	Little or no alteration to water storage capacity over a majority of the streamside area
☐B	☐B	Moderate alteration to water storage capacity over a majority of the streamside area
☒C	☐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	
☐A	☐A	Majority of streamside area with depressions able to pond water ≥ 6 inches deep
☐B	☐B	Majority of streamside area with depressions able to pond water 3 to 6 inches deep
☒C	☐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	
☒Y	☒Y	Are wetlands present in the streamside area?
☐N	☐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 that passes some flow during low-flow periods affecting assessment reach (ex: beaver dam, bottom-release dam)
☒D	Evidence of bank seepage or sweating (iron oxidizing bacteria 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 the 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 LB	Vegetated RB	Wooded LB	Wooded RB	
☒A	☒A	☐A	☐A	≥ 100 feet wide or extends to the edge of the watershed
☐B	☐B	☐B	☐B	From 50 to < 100 feet wide
☐C	☐C	☐C	☐C	From 30 to < 50 feet wide
☐D	☐D	☐D	☐D	From 10 to < 30 feet wide
☐E	☐E	☐E	☐E	< 10 feet wide or 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	
☐A	☐A	Mature forest
☐B	☐B	Non-mature woody vegetation or modified vegetation structure
☒C	☒C	Herbaceous vegetation with or without a strip of trees < 10 feet wide
☐D	☐D	Maintained shrubs
☐E	☐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 LB	Abuts RB	< 30 feet LB	< 30 feet RB	30-50 feet LB	30-50 feet RB	
☐A	☐A	☐A	☐A	☐A	☐A	Row crops
☐B	☐B	☐B	☐B	☐B	☐B	Maintained turf
☐C	☐C	☐C	☐C	☐C	☐C	Pasture (no livestock)/commercial horticulture
☐D	☒D	☒D	☒D	☒D	☐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	
☐A	☐A	Medium to high stem density
☐B	☐B	Low stem density
☐C	☒C	No wooded riparian buffer or predominantly herbaceous species or 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	
☒A	☒A	The total length of buffer breaks is < 25 percent.
☐B	☐B	The total length of buffer breaks is between 25 and 50 percent.
☐C	☐C	The total length of buffer breaks is > 50 percent.

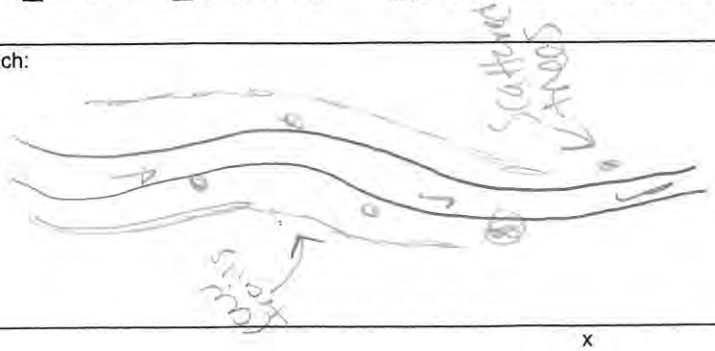
24. **Vegetative Composition – First 100 feet of streamside area metric (skip for Tidal Marsh Streams)**
Evaluate the dominant vegetation within 100 feet of each bank or to the edge of the watershed (whichever comes first) as it contributes to assessment reach habitat.

LB	RB	
☐A	☐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.
☐B	☐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 or communities with non-native invasive species present, but not dominant, over a large portion of the expected strata or communities missing understory but retaining canopy trees.
☒C	☒C	Vegetation is severely disturbed in terms of species diversity or proportions. Mature canopy is absent or communities with non-native invasive species dominant over a large portion of expected strata or communities composed of planted stands of non-characteristic species or communities inappropriately composed of a single species or no vegetation.

25. **Conductivity – assessment reach metric (skip for all Coastal Plain streams)**
25a. ☐Yes ☒No Was conductivity measurement recorded?

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:



NC SAM FIELD ASSESSMENT FORM
Accompanies User Manual Version 2.1

USACE AID #: NCDWR #

INSTRUCTIONS: 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" section if supplementary measurements were performed. See the NC SAM User Manual for examples of additional measurements that may be relevant.

NOTE EVIDENCE OF STRESSORS AFFECTING THE ASSESSMENT AREA (do not need to be within the assessment area).

PROJECT/SITE INFORMATION:

1. Project name (if any): Alexander Farm
2. Date of evaluation: 9/27/2018
3. Applicant/owner name: Wildlands
4. Assessor name/organization: M. Caddell
5. County: Alexander
6. Nearest named water body on USGS 7.5-minute quad: Elk Shoals Creek
7. River basin: Catawba
8. Site coordinates (decimal degrees, at lower end of assessment reach): 35.81033333°N 81.12083333°W

STREAM INFORMATION: (depth and width can be approximations)

9. Site number (show on attached map): UT1R3
10. Length of assessment reach evaluated (feet): 600'
11. Channel depth from bed (in riffle, if present) to top of bank (feet): 2-5' ☐Unable to assess channel depth.
12. Channel width at top of bank (feet): 6-12'
13. Is assessment reach a swamp stream? ☐Yes ☒No
14. Feature type: ☒Perennial flow ☐Intermittent flow ☐Tidal Marsh Stream

STREAM CATEGORY INFORMATION:

15. NC SAM Zone: ☐Mountains (M) ☒Piedmont (P) ☐Inner Coastal Plain (I) ☐Outer Coastal Plain (O)
16. Estimated geomorphic valley shape (**skip for Tidal Marsh Stream**): ☒a (more sinuous stream, flatter valley slope) ☐b (less sinuous stream, steeper valley slope)
17. Watershed size: (**skip for Tidal Marsh Stream**) ☐Size 1 (< 0.1 mi²) ☒Size 2 (0.1 to < 0.5 mi²) ☐Size 3 (0.5 to < 5 mi²) ☐Size 4 (≥ 5 mi²)

ADDITIONAL INFORMATION:

18. Were regulatory considerations evaluated? ☒Yes ☐No If Yes, check all that apply to the assessment area.
- ☐Section 10 water
- ☐Classified Trout Waters
- ☒Water Supply Watershed (☐I ☐II ☐III ☒IV ☐V)
- ☐Essential Fish Habitat
- ☐Primary Nursery Area
- ☐High Quality Waters/Outstanding Resource Waters
- ☐Publicly owned property
- ☐NCDWR riparian buffer rule in effect
- ☐Nutrient Sensitive Waters
- ☐Anadromous fish
- ☐303(d) List
- ☐CAMA Area of Environmental Concern (AEC)
- ☐Documented presence of a federal and/or state listed protected species within the assessment area. List species:
- ☐Designated Critical Habitat (list species)

19. Are additional stream information/supplementary measurements included in "Notes/Sketch" section or attached? ☒Yes ☐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 (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])
☐C	☐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] or too much floodplain/intertidal zone access [examples: impoundments, intensive mosquito ditching]) or floodplain/intertidal zone unnaturally absent or 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" 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 (Livestock upstream)

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 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 (including 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

Check for Tidal Marsh Streams Only
- ☐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.** 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	
☒	☐	☐	☐	☐	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?

UTR3

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 (including water pennies)
☐	☐	Caddisfly larvae (Trichoptera [T])
☐	☐	Asian clam (*Corbicula*)
☐	☒	Crustacean (isopod/amphipod/crayfish/shrimp)
☐	☒	Damselfly and dragonfly larvae
☐	☐	Dipterans (true flies)
☐	☐	Mayfly larvae (Ephemeroptera [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 (Plecoptera [P])
☐	☐	Tipulid larvae (Cranefly)
☐	☐	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	
☒A	☒A	Little or no alteration to water storage capacity over a majority of the streamside area
☐B	☐B	Moderate alteration to water storage capacity over a majority of the streamside area
☐C	☐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	
☐A	☐A	Majority of streamside area with depressions able to pond water ≥ 6 inches deep
☒B	☒B	Majority of streamside area with depressions able to pond water 3 to 6 inches deep
☐C	☐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	
☐Y	☐Y	Are wetlands present in the streamside area?
☒N	☒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 <u>and</u> 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 that passes some flow during low-flow periods affecting assessment reach (ex: beaver dam, bottom-release dam)
- ☒D Evidence of bank seepage or sweating (iron oxidizing bacteria 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 the 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	
☒A	☒A	☒A	☒A	≥ 100 feet wide or extends to the edge of the watershed
☐B	☐B	☐B	☐B	From 50 to < 100 feet wide
☐C	☐C	☐C	☐C	From 30 to < 50 feet wide
☐D	☐D	☐D	☐D	From 10 to < 30 feet wide
☐E	☐E	☐E	☐E	< 10 feet wide or 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	
☒A	☒A	Mature forest
☐B	☐B	Non-mature woody vegetation or modified vegetation structure
☐C	☐C	Herbaceous vegetation with or without a strip of trees < 10 feet wide
☐D	☐D	Maintained shrubs
☐E	☐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	
☐A	☐A	☐A	☐A	☐A	☐A	Row crops
☐B	☐B	☐B	☐B	☐B	☐B	Maintained turf
☐C	☐C	☐C	☐C	☐C	☐C	Pasture (no livestock)/commercial horticulture
☐D	☐D	☐D	☐D	☐D	☐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	
☒A	☒A	Medium to high stem density
☐B	☐B	Low stem density
☐C	☐C	No wooded riparian buffer or predominantly herbaceous species or 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	
☒A	☒A	The total length of buffer breaks is < 25 percent.
☐B	☐B	The total length of buffer breaks is between 25 and 50 percent.
☐C	☐C	The total length of buffer breaks is > 50 percent.

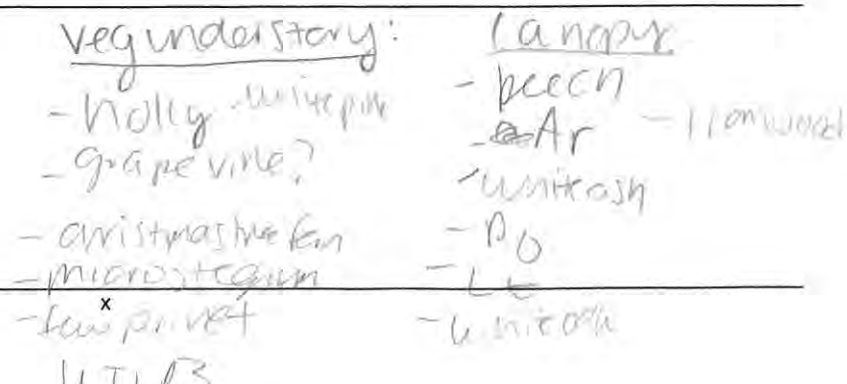
24. Vegetative Composition – First 100 feet of streamside area metric (skip for Tidal Marsh Streams)
Evaluate the dominant vegetation within 100 feet of each bank or to the edge of the watershed (whichever comes first) as it contributes to assessment reach habitat.

LB	RB	
☒A	☒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.
☐B	☐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 or communities with non-native invasive species present, but not dominant, over a large portion of the expected strata or communities missing understory but retaining canopy trees.
☐C	☐C	Vegetation is severely disturbed in terms of species diversity or proportions. Mature canopy is absent or communities with non-native invasive species dominant over a large portion of expected strata or communities composed of planted stands of non-characteristic species or communities inappropriately composed of a single species or no vegetation.

25. Conductivity – assessment reach metric (skip for all Coastal Plain streams)
25a. ☐Yes ☒No Was conductivity measurement recorded?

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:



NC SAM FIELD ASSESSMENT FORM
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USACE AID #: NCDWR #

INSTRUCTIONS: 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" section if supplementary measurements were performed. See the NC SAM User Manual for examples of additional measurements that may be relevant.

NOTE EVIDENCE OF STRESSORS AFFECTING THE ASSESSMENT AREA (do not need to be within the assessment area).

PROJECT/SITE INFORMATION:

1. Project name (if any): AlexanderFarm
2. Date of evaluation: 9/27/2018
3. Applicant/owner name: Wildlands
4. Assessor name/organization: M. Caddell
5. County: Alexander
6. Nearest named water body on USGS 7.5-minute quad: ElkShoalsCreek
7. River basin: Catawba
8. Site coordinates (decimal degrees, at lower end of assessment reach): 35.80518333 81.11583333

STREAM INFORMATION: (depth and width can be approximations)

9. Site number (show on attached map): UNT24
10. Length of assessment reach evaluated (feet): 2900'
11. Channel depth from bed (in riffle, if present) to top of bank (feet): 6-10' ☐Unable to assess channel depth.
12. Channel width at top of bank (feet): 6-10' 13. Is assessment reach a swamp stream? ☐Yes ☒No
14. Feature type: ☒Perennial flow ☐Intermittent flow ☐Tidal Marsh Stream

STREAM CATEGORY INFORMATION:

15. NC SAM Zone: ☐Mountains (M) ☒Piedmont (P) ☐Inner Coastal Plain (I) ☐Outer Coastal Plain (O)
16. Estimated geomorphic valley shape (**skip for Tidal Marsh Stream**): ☒a (more sinuous stream, flatter valley slope) ☐b (less sinuous stream, steeper valley slope)
17. Watershed size: (**skip for Tidal Marsh Stream**) ☐Size 1 (< 0.1 mi²) ☒Size 2 (0.1 to < 0.5 mi²) ☐Size 3 (0.5 to < 5 mi²) ☐Size 4 (≥ 5 mi²)

ADDITIONAL INFORMATION:

18. Were regulatory considerations evaluated? ☑Yes ☐No If Yes, check all that apply to the assessment area.
- ☐Section 10 water
- ☐Classified Trout Waters
- ☑Water Supply Watershed (☐I ☐II ☐III ☑IV ☐V)
- ☐Essential Fish Habitat
- ☐Primary Nursery Area
- ☐High Quality Waters/Outstanding Resource Waters
- ☐Publicly owned property
- ☐NCDWR riparian buffer rule in effect
- ☐Nutrient Sensitive Waters
- ☐Anadromous fish
- ☐303(d) List
- ☐CAMA Area of Environmental Concern (AEC)
- ☐Documented presence of a federal and/or state listed protected species within the assessment area. List species:
- ☐Designated Critical Habitat (list species)

19. Are additional stream information/supplementary measurements included in "Notes/Sketch" section or attached? ☑Yes ☐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 (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])
☒C	☐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] or too much floodplain/intertidal zone access [examples: impoundments, intensive mosquito ditching]) or floodplain/intertidal zone unnaturally absent or 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" 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

Livestock access?

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 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)**

		Check for Tidal Marsh Streams Only	
☒A	Multiple aquatic macrophytes and aquatic mosses (including liverworts, lichens, and algal mats)	☐F	5% oysters or other natural hard bottoms
☒B	Multiple sticks and/or leaf packs and/or emergent vegetation	☐G	Submerged aquatic vegetation
☐C	Multiple snags and logs (including lap trees)	☐H	Low-tide refugia (pools)
☒D	5% undercut banks and/or root mats and/or roots in banks extend to the normal wetted perimeter	☐I	Sand bottom
☐E	Little or no habitat	☐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.** 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	
☒	☐	☐	☐	☐	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?

UT1R4

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 (including water pennies)
☒	☐	Caddisfly larvae (Trichoptera [T])
☐	☐	Asian clam (*Corbicula*)
☐	☐	Crustacean (isopod/amphipod/crayfish/shrimp)
☐	☐	Damselfly and dragonfly larvae
☐	☐	Dipterans (true flies)
☐	☐	Mayfly larvae (Ephemeroptera [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 (Plecoptera [P])
☐	☐	Tipulid larvae (Cranefly)
☐	☐	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	
☐A	☐A	Little or no alteration to water storage capacity over a majority of the streamside area
☐B	☐B	Moderate alteration to water storage capacity over a majority of the streamside area
☐C	☒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	
☐A	☐A	Majority of streamside area with depressions able to pond water ≥ 6 inches deep
☐B	☐B	Majority of streamside area with depressions able to pond water 3 to 6 inches deep
☒C	☒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	
☒Y	☐Y	Are wetlands present in the streamside area?
☐N	☐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 that passes some flow during low-flow periods affecting assessment reach (ex: beaver dam, bottom-release dam)
- ☒D Evidence of bank seepage or sweating (iron oxidizing bacteria 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 the 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	
☒A	☒A	☐A	☐A	≥ 100 feet wide or extends to the edge of the watershed
☐B	☐B	☐B	☐B	From 50 to < 100 feet wide
☐C	☐C	☐C	☐C	From 30 to < 50 feet wide
☐D	☐D	☐D	☒D	From 10 to < 30 feet wide
☐E	☐E	☒E	☐E	< 10 feet wide or 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	
☐A	☒A	Mature forest
☐B	☐B	Non-mature woody vegetation or modified vegetation structure
☒C	☐C	Herbaceous vegetation with or without a strip of trees < 10 feet wide
☐D	☐D	Maintained shrubs
☐E	☐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	
☐A	☐A	☐A	☐A	☐A	☐A	Row crops
☐B	☐B	☐B	☐B	☐B	☐B	Maintained turf
☒C	☐C	☒C	☐C	☒C	☐C	Pasture (no livestock)/commercial horticulture
☐D	☒D	☐D	☐D	☐D	☐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	
☐A	☒A	Medium to high stem density
☐B	☐B	Low stem density
☒C	☐C	No wooded riparian buffer or predominantly herbaceous species or 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	
☒A	☐A	The total length of buffer breaks is < 25 percent.
☐B	☐B	The total length of buffer breaks is between 25 and 50 percent.
☐C	☐C	The total length of buffer breaks is > 50 percent.

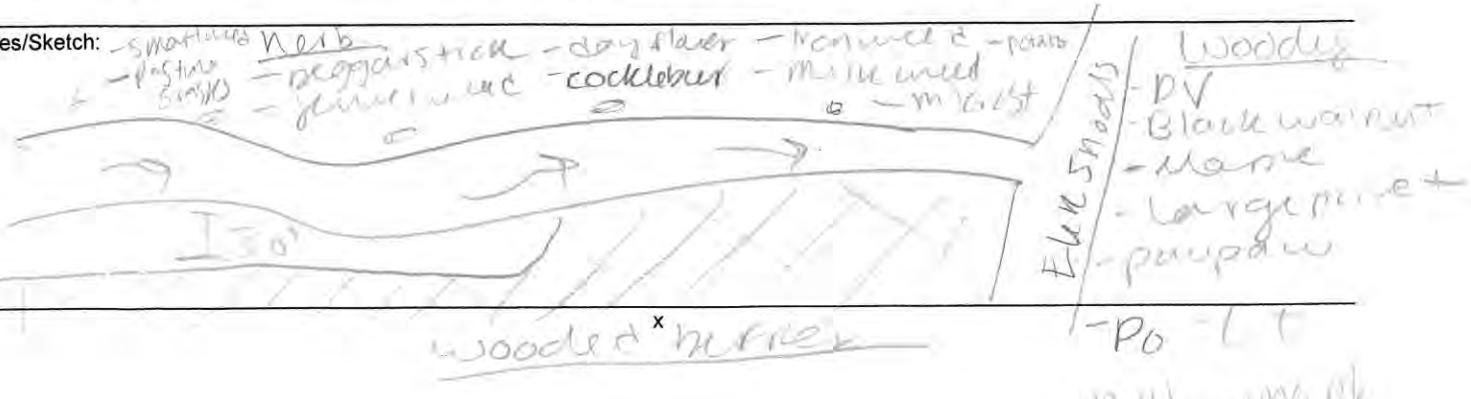
24. Vegetative Composition – First 100 feet of streamside area metric (skip for Tidal Marsh Streams)
Evaluate the dominant vegetation within 100 feet of each bank or to the edge of the watershed (whichever comes first) as it contributes to assessment reach habitat.

LB	RB	
☐A	☒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.
☐B	☐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 or communities with non-native invasive species present, but not dominant, over a large portion of the expected strata or communities missing understory but retaining canopy trees.
☒C	☐C	Vegetation is severely disturbed in terms of species diversity or proportions. Mature canopy is absent or communities with non-native invasive species dominant over a large portion of expected strata or communities composed of planted stands of non-characteristic species or communities inappropriately composed of a single species or no vegetation.

25. Conductivity – assessment reach metric (skip for all Coastal Plain streams)
25a. ☐Yes ☒No Was conductivity measurement recorded?

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:



NC SAM FIELD ASSESSMENT FORM
Accompanies User Manual Version 2.1

USACE AID #: NCDWR #

INSTRUCTIONS: 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" section if supplementary measurements were performed. See the NC SAM User Manual for examples of additional measurements that may be relevant.

NOTE EVIDENCE OF STRESSORS AFFECTING THE ASSESSMENT AREA (do not need to be within the assessment area).

PROJECT/SITE INFORMATION:

1. Project name (if any): Alexander Farm
2. Date of evaluation: 9/27/2018
3. Applicant/owner name: Wildlands
4. Assessor name/organization: M. Caddell
5. County: Alexander
6. Nearest named water body on USGS 7.5-minute quad: Elk Shoals Creek
7. River basin: Catawba
8. Site coordinates (decimal degrees, at lower end of assessment reach): 35.80820833°N, 81.11916667°W

STREAM INFORMATION: (depth and width can be approximations)

9. Site number (show on attached map): UT 1a
10. Length of assessment reach evaluated (feet): 200'
11. Channel depth from bed (in riffle, if present) to top of bank (feet): 3-6' ☐Unable to assess channel depth.
12. Channel width at top of bank (feet): 2-3'
13. Is assessment reach a swamp stream? ☐Yes ☒No
14. Feature type: ☐Perennial flow ☒Intermittent flow ☐Tidal Marsh Stream

STREAM CATEGORY INFORMATION:

15. NC SAM Zone: ☐Mountains (M) ☒Piedmont (P) ☐Inner Coastal Plain (I) ☐Outer Coastal Plain (O)
16. Estimated geomorphic valley shape (**skip for Tidal Marsh Stream**): ☒a (more sinuous stream, flatter valley slope) ☐b (less sinuous stream, steeper valley slope)
17. Watershed size: (**skip for Tidal Marsh Stream**) ☐Size 1 (< 0.1 mi²) ☐Size 2 (0.1 to < 0.5 mi²) ☐Size 3 (0.5 to < 5 mi²) ☐Size 4 (≥ 5 mi²)

ADDITIONAL INFORMATION:

18. Were regulatory considerations evaluated? ☑Yes ☐No If Yes, check all that apply to the assessment area.
    - ☐Section 10 water
    - ☐Classified Trout Waters
    - ☑Water Supply Watershed (☐I ☐II ☐III ☑IV ☐V)
    - ☐Essential Fish Habitat
    - ☐Primary Nursery Area
    - ☐High Quality Waters/Outstanding Resource Waters
    - ☐Publicly owned property
    - ☐NCDWR riparian buffer rule in effect
    - ☐Nutrient Sensitive Waters
    - ☐Anadromous fish
    - ☐303(d) List
    - ☐CAMA Area of Environmental Concern (AEC)
    - ☐Documented presence of a federal and/or state listed protected species within the assessment area. List species:
    - ☐Designated Critical Habitat (list species)
19. Are additional stream information/supplementary measurements included in "Notes/Sketch" section or attached? ☒Yes ☐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 (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])
☐C	☐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] or too much floodplain/intertidal zone access [examples: impoundments, intensive mosquito ditching]) or floodplain/intertidal zone unnaturally absent or 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" 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 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 (including 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

Check for Tidal Marsh Streams Only

☐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.** 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	
☐	☐	☐	☐	☐	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?

MT1A

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 (including water pennies)
☑	☐	Caddisfly larvae (Trichoptera [T])
☐	☐	Asian clam (*Corbicula*)
☐	☐	Crustacean (isopod/amphipod/crayfish/shrimp)
☐	☐	Damselfly and dragonfly larvae
☐	☐	Dipterans (true flies)
☐	☐	Mayfly larvae (Ephemeroptera [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 (Plecoptera [P])
☑	☐	Tipulid larvae (Cranefly)
☐	☐	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	
☑A	☑A	Little or no alteration to water storage capacity over a majority of the streamside area
☐B	☐B	Moderate alteration to water storage capacity over a majority of the streamside area
☐C	☐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	
☐A	☐A	Majority of streamside area with depressions able to pond water ≥ 6 inches deep
☐B	☐B	Majority of streamside area with depressions able to pond water 3 to 6 inches deep
☐C	☐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	
☐Y	☐Y	Are wetlands present in the streamside area?
☑N	☑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 that passes some flow during low-flow periods affecting assessment reach (ex: beaver dam, bottom-release dam)
- ☐D Evidence of bank seepage or sweating (iron oxidizing bacteria 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 the 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 LB	Vegetated RB	Wooded LB	Wooded RB	
☒A	☒A	☐A	☐A	≥ 100 feet wide <u>or</u> extends to the edge of the watershed
☐B	☐B	☐B	☐B	From 50 to < 100 feet wide
☐C	☐C	☐C	☐C	From 30 to < 50 feet wide
☐D	☐D	☐D	☐D	From 10 to < 30 feet wide
☐E	☐E	☒E	☒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	
☐A	☐A	Mature forest
☐B	☐B	Non-mature woody vegetation <u>or</u> modified vegetation structure
☒C	☒C	Herbaceous vegetation with or without a strip of trees < 10 feet wide
☐D	☐D	Maintained shrubs
☐E	☐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 LB	Abuts RB	< 30 feet LB	< 30 feet RB	30-50 feet LB	30-50 feet RB	
☐A	☐A	☐A	☐A	☐A	☐A	Row crops
☐B	☐B	☐B	☐B	☐B	☐B	Maintained turf
☒C	☒C	☒C	☒C	☒C	☒C	Pasture (no livestock)/commercial horticulture
☐D	☐D	☐D	☐D	☐D	☐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	
☐A	☐A	Medium to high stem density
☒B	☒B	Low stem density
☐C	☐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	
☒A	☒A	The total length of buffer breaks is < 25 percent.
☐B	☐B	The total length of buffer breaks is between 25 and 50 percent.
☐C	☐C	The total length of buffer breaks is > 50 percent.

24. Vegetative Composition – First 100 feet of 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	
☐A	☐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.
☐B	☐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.
☒C	☒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?

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:

veg
- beggar stick - black walnut
- cocklebur - tearthumb
- smartweed - jewelweed
- boneset - aster

---

x
- black walnut

APPENDIX 4

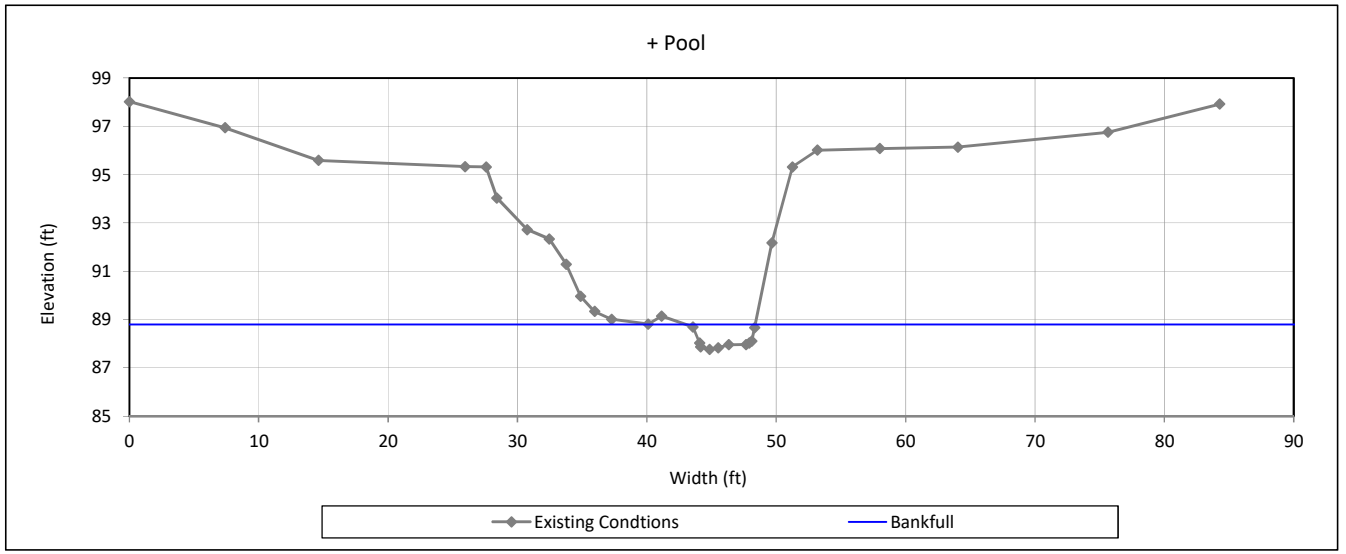
Supplementary Design Information

(Existing Conditions, Reference Reach, Design Conditions)

Existing Conditions Geomorphic Parameters								
Parameter	**Notation**	**Units**	**UT1 Reach 1A/1B**		**UT1 Reach 4A**		**UT1 Reach 4B**	
			min	**max**	**min**	**max**	**min**	**max**
stream type			B4		C4c		G4c	
drainage area	DA	sq mi	0.05/0.11		0.29		0.40	
bankfull cross-sectional area	A_{bkf}	SF	4	4.4	8.6	8.8	10.1	10.3
avg velocity during bankfull event	v_{bkf}	fps	5.5	5.8	3.4	3.8	3.9	4
width at bankfull	w_{bkf}	feet	5.8	7.2	6	9.1	8.2	8.6
maximum depth at bankfull	d_{max}	feet	0.8	0.9	1.9	2	2	2.1
mean depth at bankfull	d_{bkf}	feet	0.6	0.7	1.0	1.4	1.2	1.2
bankfull width to depth ratio	w_{bkf}/d_{bkf}		8.5	12	9.4	4.1	6.6	7.2
low bank height		feet	4.5	5.9	1.9	4.2	4.1	4.4
bank height ratio	BHR		5.9	6.4	1.0	2.1	2.0	2.1
floodprone area width	w_{fpa}	feet	7.2	9.0	24.4	54.0	8.1	9.7
entrenchment ratio	ER		1.2	1.2	3.0	9.1	1.0	1.1
max pool depth at bankfull	d_{pool}	feet	1		2.1		N/A[2]	
pool depth ratio	d_{pool}/d_{bkf}		1.4		1.1		N/A[2]	
pool width at bankfull	w_{pool}	feet	5.4		6.6		N/A[2]	
pool width ratio	w_{pool}/w_{bkf}		0.9		1.1		N/A[2]	
Bkf pool cross-sectional area	A_{pool}	SF	4		8.9		N/A[2]	
pool area ratio	A_{pool}/A_{bkf}		1.00		1.0		N/A[2]	
pool-pool spacing	p-p	feet	8	24	11	19	N/A[2]	
pool-pool spacing ratio	$p\text{-}p/W_{bkf}$		1.3	3.8	1.0	1.9	N/A[2]	
valley slope	S_{valley}	feet/foot	0.0370		0.0130		0.0130	
channel slope	$S_{channel}$	feet/foot	0.0340		0.0080		0.0080	
sinuosity	K		1.14		1.13		1.13	
belt width	w_{blt}	feet	N/A[1]	N/A[1]	9.0	99.0	9.0	99.0
meander width ratio	w_{blt}/w_{bkf}		N/A[1]	N/A[1]	1.5	10.9	1.1	11.5
meander length	L_m	feet	N/A[1]	N/A[1]	58.0	201.0	58.0	201.0
meander length ratio	L_m/w_{bkf}		N/A[1]	N/A[1]	9.7	22.1	7.1	23.4
linear wavelength	LW		N/A[1]	N/A[1]	112.0	309.0	112.0	309.0
linear wavelength ratio	LW/w_{bkf}		N/A[1]	N/A[1]	18.7	34.0	13.7	35.9
radius of curvature	R_c	feet	N/A[1]	N/A[1]	27.0	65.0	27.0	65.0
radius of curvature ratio	R_c/ w_{bkf}		N/A[1]	N/A[1]	4.5	7.1	3.3	7.6
N/A[1] - Pattern data not applicable for B-type streams.								
N/A[2] - Pool section not present in field.								

Cross-Section Plots Alexander Farm
Mitigation Site NCDMS Project No. 100048
Existing Conditions - 2018

Cross-Section XS 1 - UT1 Reach 1B



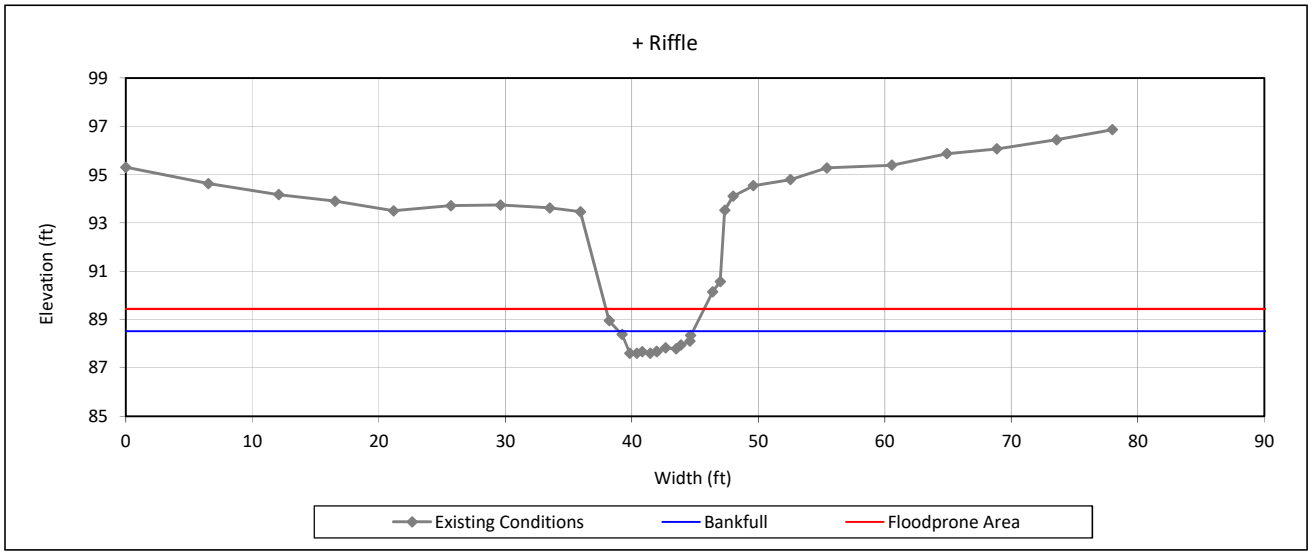
Bankfull Dimensions	
4.0	x-section area (ft.sq.)
5.3	width (ft)
0.7	mean depth (ft)
1.0	max depth (ft)
6.2	wetted perimeter (ft)
0.6	hydraulic radius (ft)
7.2	width-depth ratio

Survey Date: 09/2018
Field Crew: Wildlands Engineering

View Downstream

Cross-Section Plots Alexander Farm
Mitigation Site NCDMS Project No.
100048 **Existing Conditions - 2018**

Cross-Section XS 2 - UT1 Reach 1B



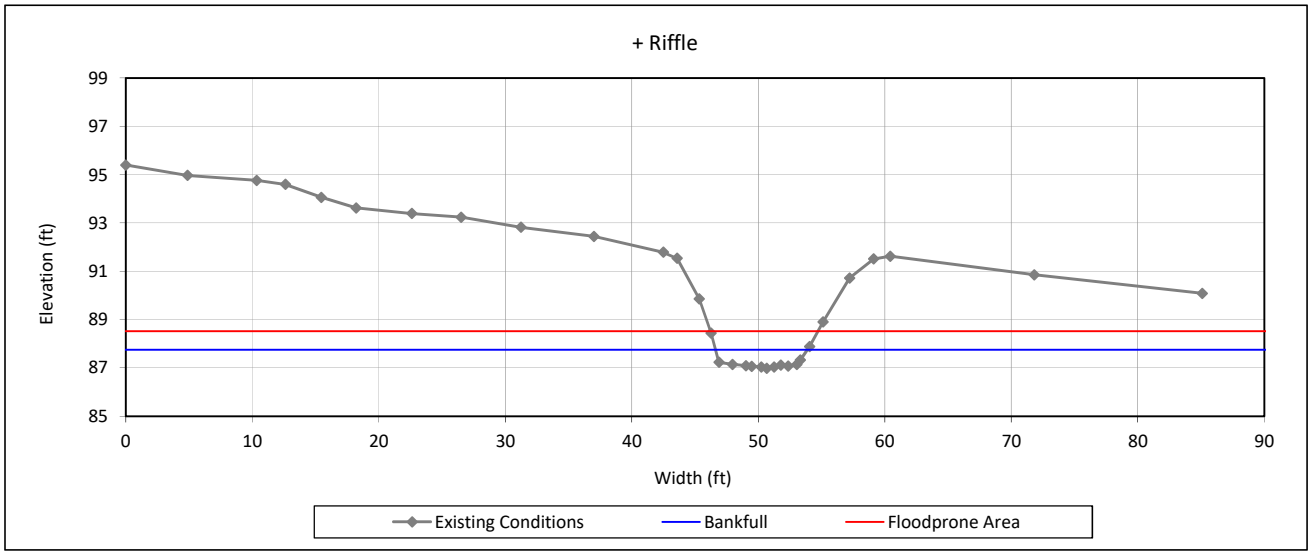
Bankfull Dimensions	
4.0	x-section area (ft.sq.)
5.8	width (ft)
0.7	mean depth (ft)
0.9	max depth (ft)
6.6	wetted perimeter (ft)
0.6	hydraulic radius (ft)
8.5	width-depth ratio
7.4	W flood prone area (ft)
1.3	entrenchment ratio
6.4	low bank height ratio

Survey Date: 08/2018
Field Crew: Wildlands Engineering

View Downstream

Cross-Section Plots Alexander Farm
Mitigation Site NCDMS Project No.
100048 **Existing Conditions - 2018**

Cross-Section XS 3 - UT1 Reach 1B



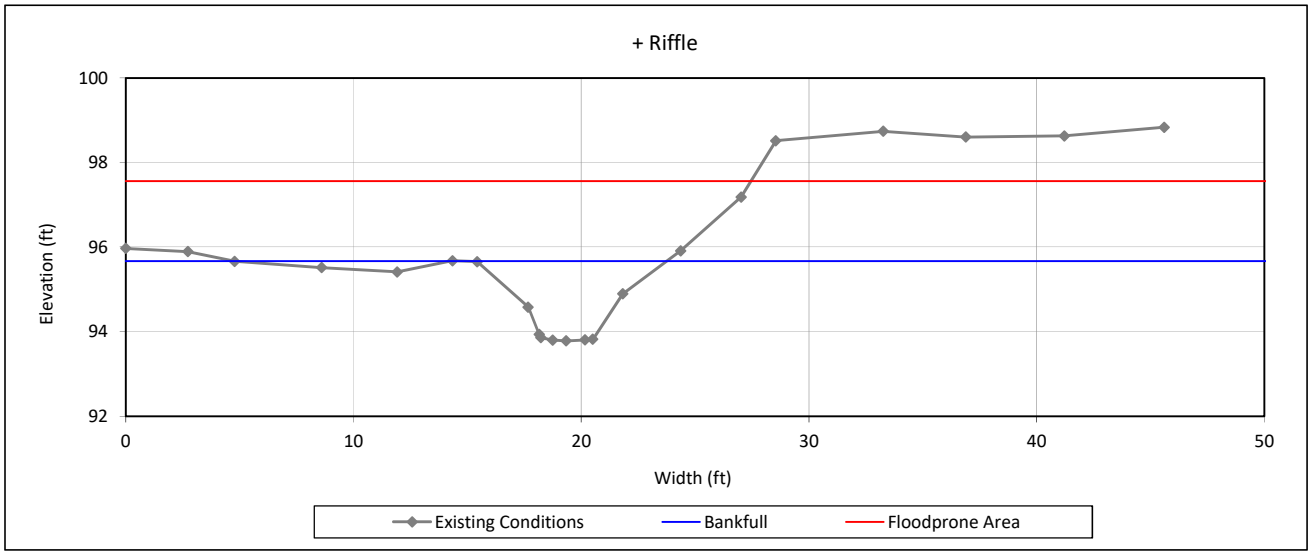
Bankfull Dimensions	
4.4	x-section area (ft.sq.)
7.2	width (ft)
0.6	mean depth (ft)
0.8	max depth (ft)
7.8	wetted perimeter (ft)
0.6	hydraulic radius (ft)
12.0	width-depth ratio
8.2	W flood prone area (ft)
1.1	entrenchment ratio
5.9	low bank height ratio

Survey Date: 08/2018
Field Crew: Wildlands Engineering

View Downstream

Cross-Section Plots Alexander Farm
Mitigation Site NCDMS Project No.
100048 **Existing Conditions - 2018**

Cross-Section XS 4 - UT1 Reach 4A



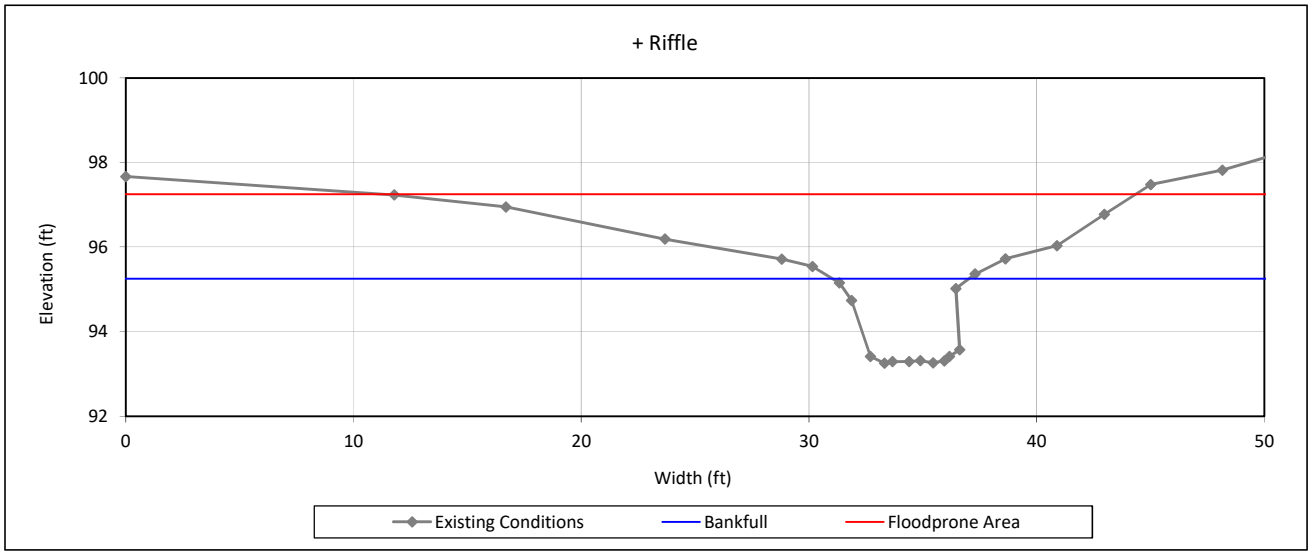
Bankfull Dimensions	
8.8	x-section area (ft.sq.)
9.1	width (ft)
1.0	mean depth (ft)
1.9	max depth (ft)
10.3	wetted perimeter (ft)
0.9	hydraulic radius (ft)
9.4	width-depth ratio
27.4	W flood prone area (ft)
3.0	entrenchment ratio
1.0	low bank height ratio

Survey Date: 08/2018
Field Crew: Wildlands Engineering

View Downstream

Cross-Section Plots Alexander Farm
Mitigation Site NCDMS Project No.
100048 **Existing Conditions - 2018**

Cross-Section XS 5 - UT1 Reach 4A



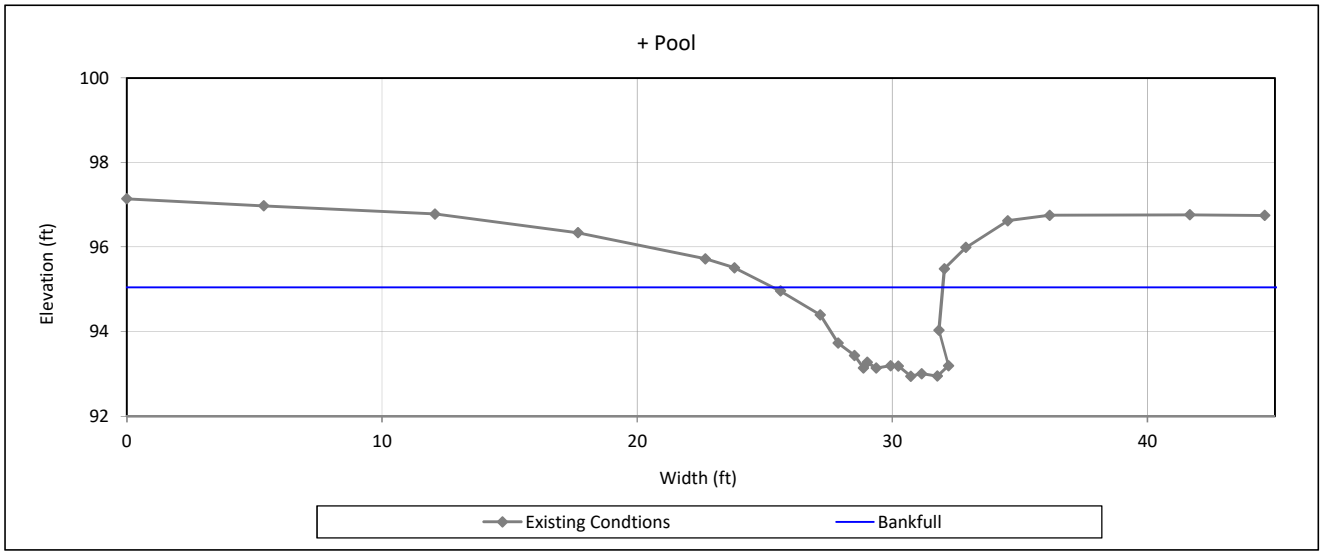
Bankfull Dimensions	
8.6	x-section area (ft.sq.)
6.0	width (ft)
1.4	mean depth (ft)
2.0	max depth (ft)
8.6	wetted perimeter (ft)
1.0	hydraulic radius (ft)
4.1	width-depth ratio
54.0	W flood prone area (ft)
9.1	entrenchment ratio
2.1	low bank height ratio

Survey Date: 08/2018
Field Crew: Wildlands Engineering

View Downstream

Cross-Section Plots Alexander Farm
Mitigation Site NCDMS Project No.
100048 **Existing Conditions - 2018**

Cross-Section XS 6 - UT1 Reach 4A



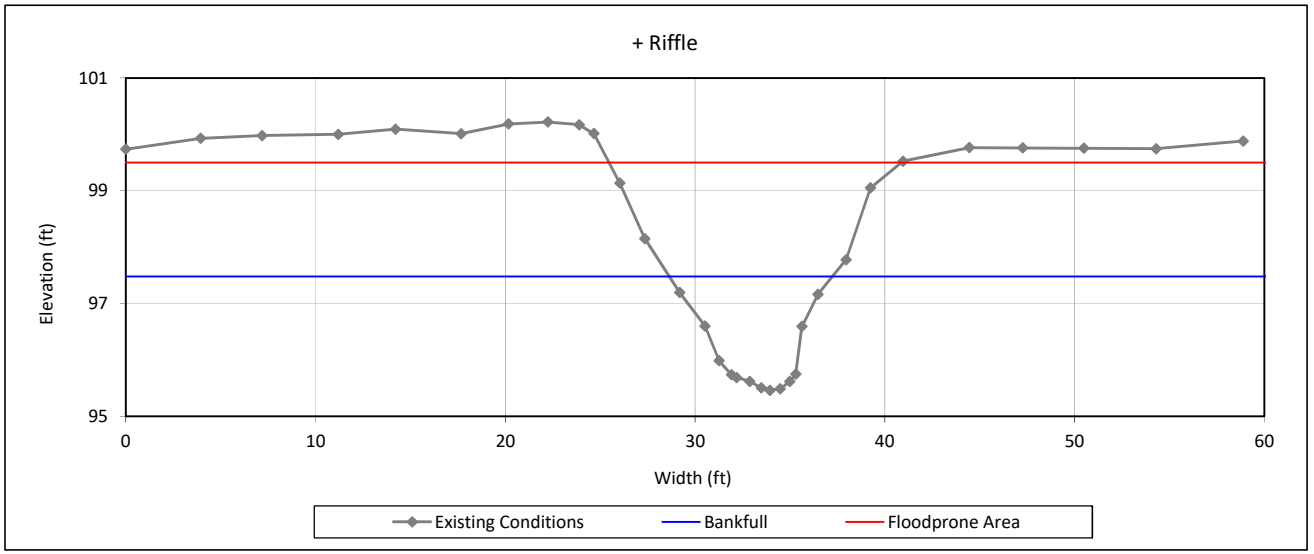
Bankfull Dimensions	
8.9	x-section area (ft.sq.)
6.6	width (ft)
1.3	mean depth (ft)
2.1	max depth (ft)
9.6	wetted perimeter (ft)
0.9	hydraulic radius (ft)
5.0	width-depth ratio

Survey Date: 09/2018
Field Crew: Wildlands Engineering

View Downstream

Cross-Section Plots Alexander Farm
Mitigation Site NCDMS Project No.
100048 **Existing Conditions - 2018**

Cross-Section XS 7 - UT1 Reach 4B



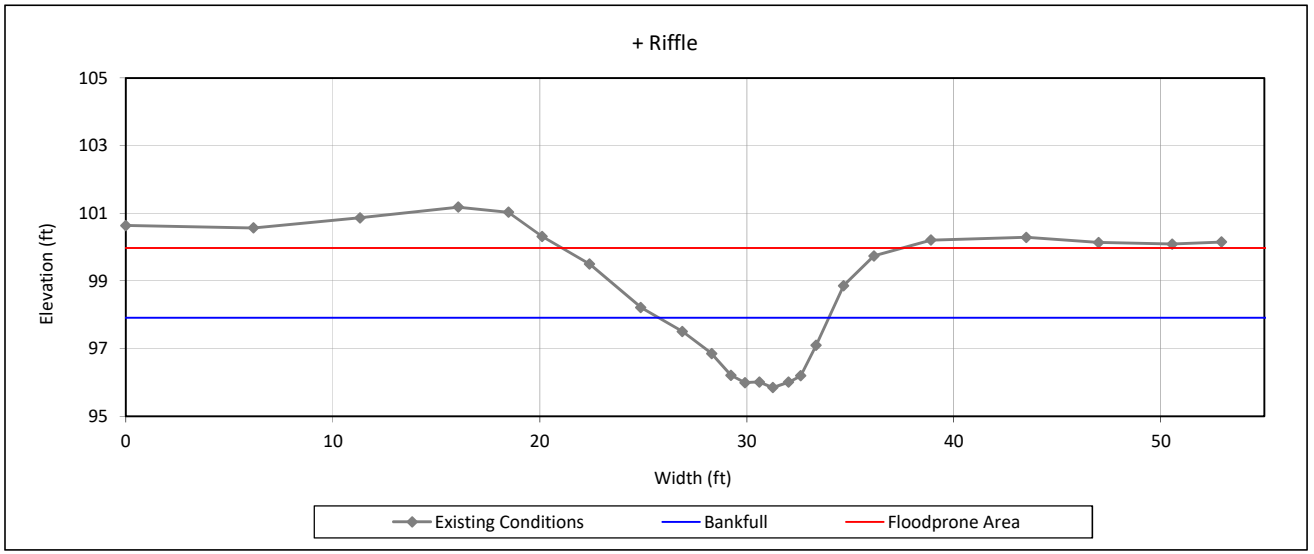
Bankfull Dimensions	
10.3	x-section area (ft.sq.)
8.6	width (ft)
1.2	mean depth (ft)
2.0	max depth (ft)
10.0	wetted perimeter (ft)
1.0	hydraulic radius (ft)
7.2	width-depth ratio
15.4	W flood prone area (ft)
1.8	entrenchment ratio
2.0	low bank height ratio

Survey Date: 09/2018
Field Crew: Wildlands Engineering

View Downstream

Cross-Section Plots Alexander Farm
Mitigation Site NCDMS Project No.
100048 **Existing Conditions - 2018**

Cross-Section XS 8 - UT1 Reach 4B

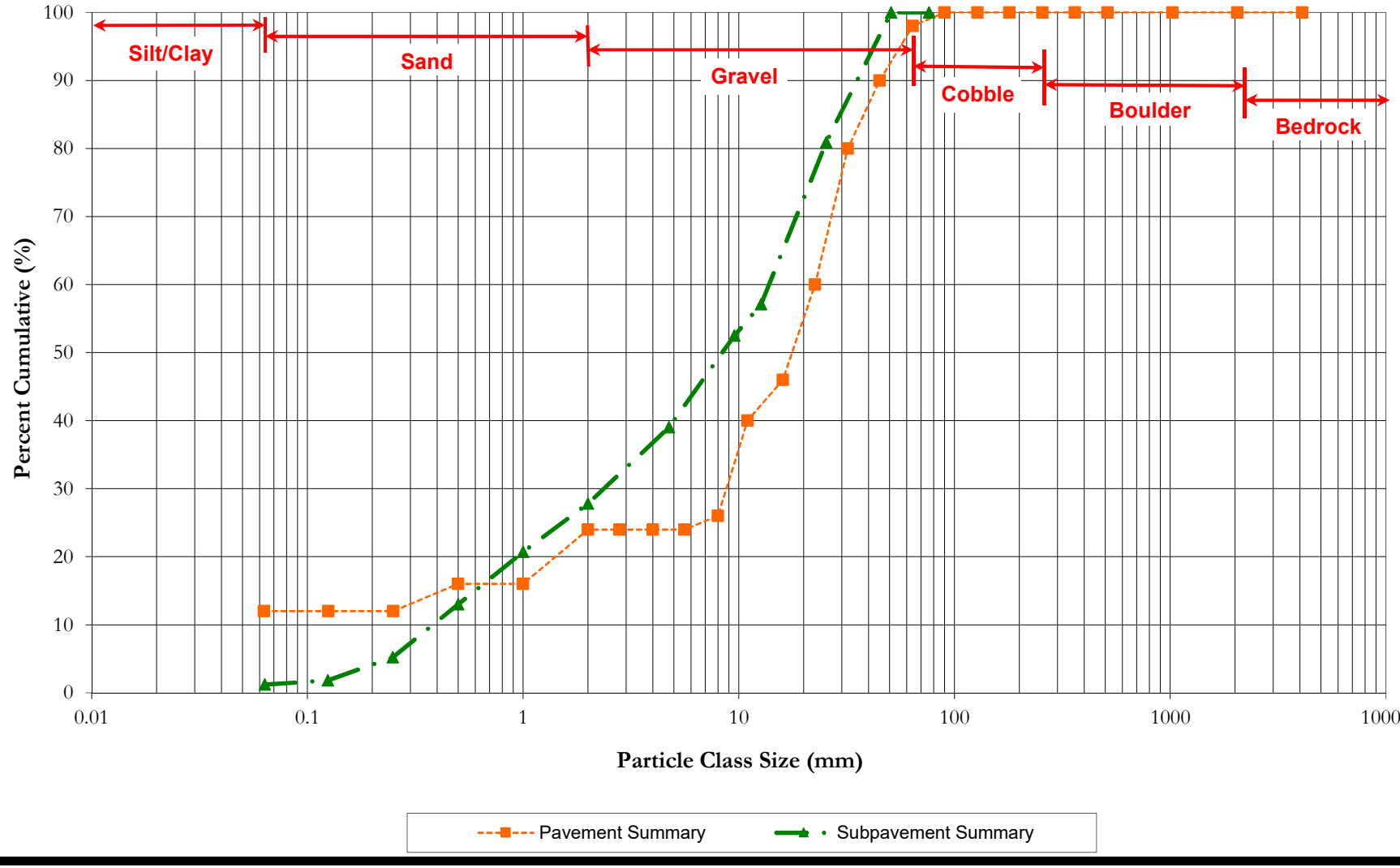


Bankfull Dimensions	
10.1	x-section area (ft.sq.)
8.2	width (ft)
1.2	mean depth (ft)
2.1	max depth (ft)
9.6	wetted perimeter (ft)
1.1	hydraulic radius (ft)
6.6	width-depth ratio
16.5	W flood prone area (ft)
2.0	entrenchment ratio
2.1	low bank height ratio

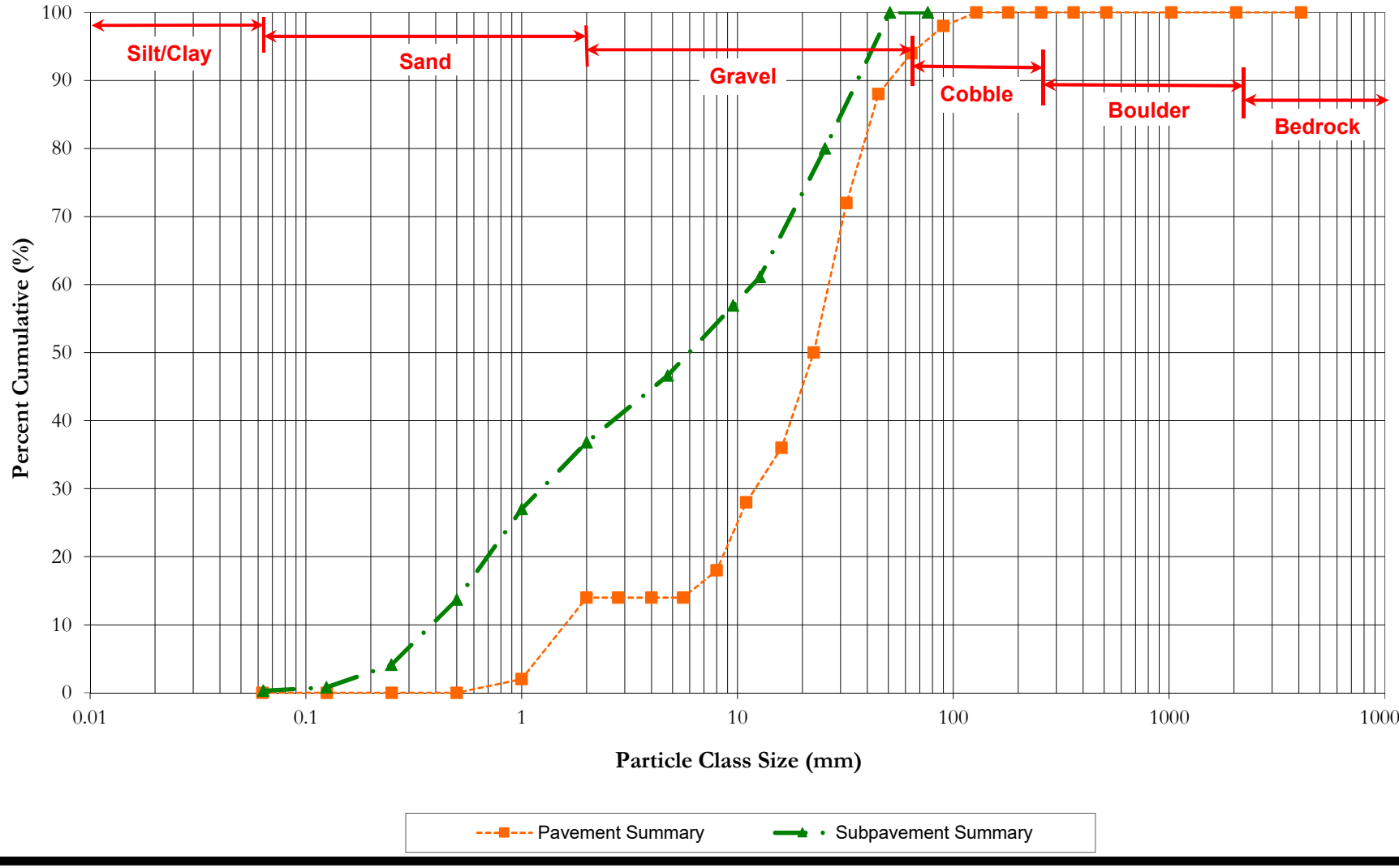
Survey Date: 09/2018
Field Crew: Wildlands Engineering

View Downstream

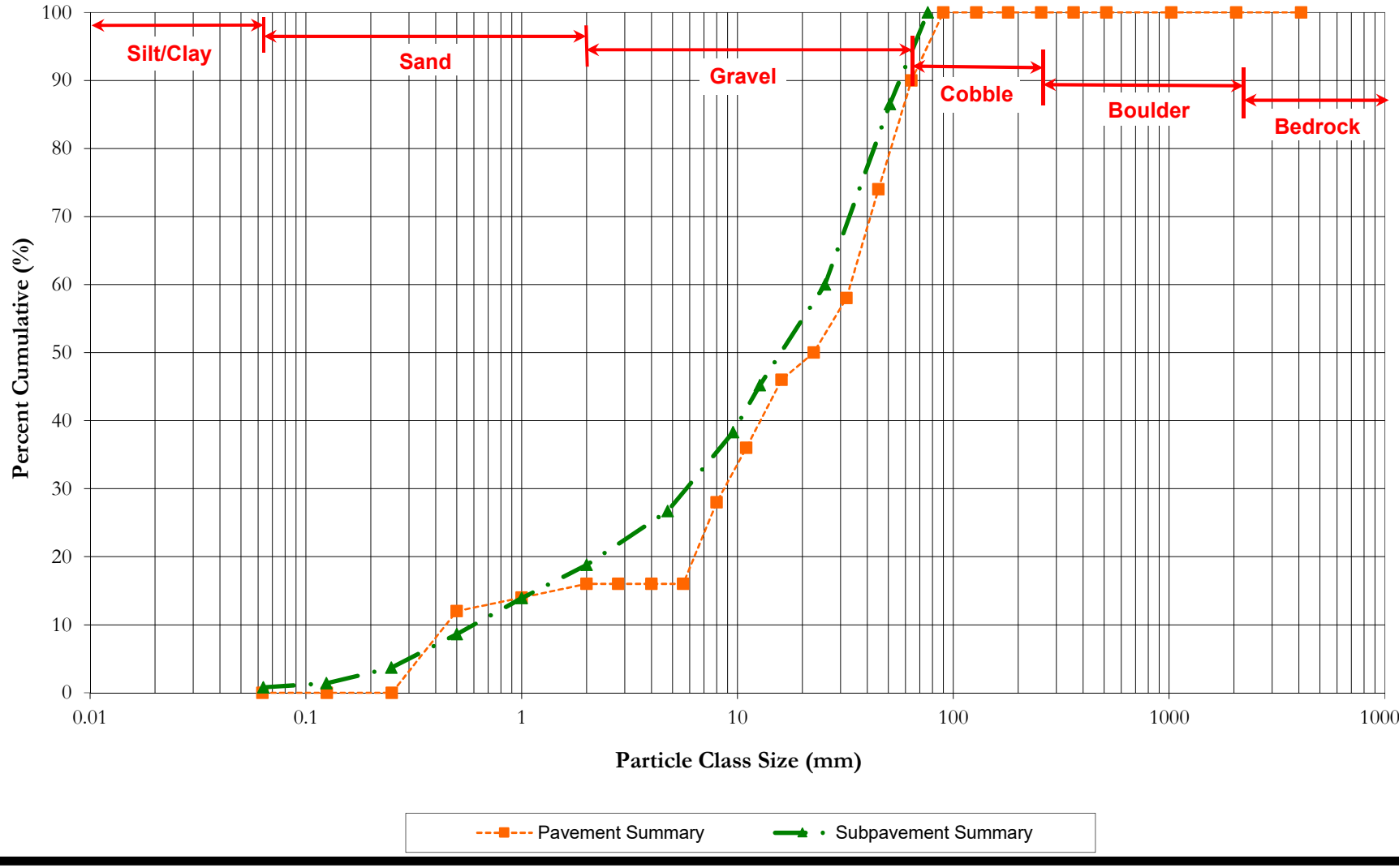
UT1 Reach 4 - XS 5
Pavement-Subpavement Particle Distribution



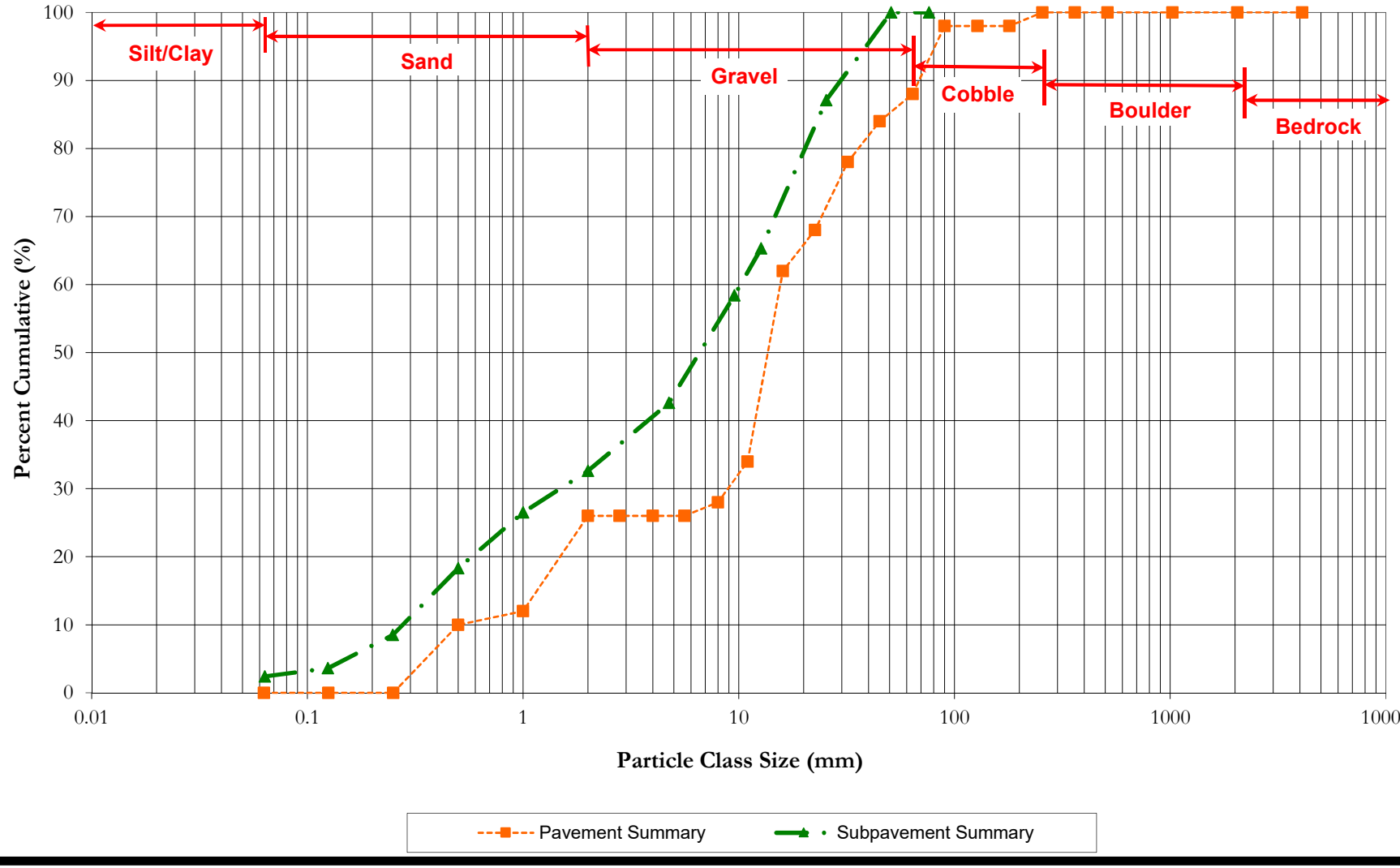
UT1 Reach 4 - XS 4
Pavement-Subpavement Particle Distribution



UT1 Reach 1 - XS 3
Pavement-Subpavement Particle Distribution



UT1 Reach 1 - XS 2
Pavement-Subpavement Particle Distribution



Reference Reach Geomorphic Parameters																				
	Notation	***Units***	**Agony Acres UT1**		**UT to Kelly Creek**		**UT to Austin Branch**		**Timber Tributary**		**UT to Lyle Creek**		**UT to Varnels Creek**		**Walker Branch**		**Box Creek**	
			min	**max**	**min**	**max**	**min**	**max**	**min**	**max**	**min**	**max**	**min**	**max**	**Min**	**Max**	**min**	**max**
stream type			B3		B4/B4a		Slightly entrenched B4a or A4		B4		C5		C4/E4		E4		C4	
drainage area	DA	*sq mi*	0.15		0.08		0.12		0.04		0.25		0.41		0.29		2.13	
design discharge	Q	*cfs*	37		23		27		17		18		54		40		99	
bankfull cross-sectional area	A_{bkf}	*SF*	7.4		5.74		4.4		4.6		3.5	4.1	10.3	12.3	8.9	12.2	28.9	
average velocity during bankfull event	v_{bkf}	*fps*	4.9		5.9		6.2		3.7		4.7		4.4	5.2	3.8		3.4	
Cross-Section																		
width at bankfull	w_{bkf}	*feet*	11.1		7.91		6.2		8.9		7		9.3	10.5	11.5	12.3	23.5	
maximum depth at bankfull	d_{max}	*feet*	1		1.13		1.2		0.7		1.0	1.1	1.5	1.7	1.2	1.6	1.92	
mean depth at bankfull	d_{bkf}	*feet*	0.7		0.73		0.7		0.5		0.47		1.1	1.2	0.8	1.0	1.23	
bankfull width to depth ratio	w_{bkf}/d_{bkf}		16.6		10.9		8.8		17		15	18	8.1	9.3	12.3	14.4	19.1	
depth ratio	d_{max}/d_{bkf}	*feet*	1.00		1.30		1.71		1.40		2.10	2.30	1.4	1.4	---		3.6	
bank height ratio	BHR		1		2.47		1		1		1	1	1.0	1.0	---		1.5	
floodprone area width	w_{fpa}	*feet*	25		9.1		26.6		13.6		45	49	60.0	100.0	31		76.3	
entrenchment ratio	ER		2.3		1.15		4.3		1.5		6	6	5.7	10.0	2.5	2.7	3.3	
Slope																		
valley slope	S_{valley}	*feet/ foot*	0.050		0.049		0.048		0.041		0.009		0.020		0.030		2.250	
channel slope	S_{chnl}	*feet/ foot*	0.049		0.03 - 0.065		0.040		0.033		0.004		0.017		0.010		0.840	
Profile																		
riffle slope	S_{riffle}	*feet/ foot*	---		---		0.025	0.073	0.020	0.150	0.006	0.060	0.024	0.057	0.0	0.1	0.6	
riffle slope ratio	S_{riffle}/S_{chnl}		---		---		0.6	1.8	0.7	4.5	1.4	14.9	1.4	3.4	1.3	4.7	0.8	
pool slope	S_p	*feet/ foot*	---		---		0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0	
pool slope ratio	S_p/S_{chnl}		---		---		0.0	0.4	0.0	2.5	0.0	0.3	0.0	0.9	0.0	0.7	1.2	
pool-to-pool spacing	L_{p-p}	*feet*	---		---		14	31	6	49	15	28	7.8	82.2	27.0	73.0	28.8	
pool spacing ratio	L_{p-p}/w_{bkf}		---		---		2	5	1	6	2	4	0.5	5.6	2.3	6.1	1.2	
pool cross-sectional area	A_{pool}	*SF*	9.8		---		9.4		---		4		22.0	22.7	11.9		49.9	
pool area ratio	A_{pool}/A_{bkf}		1.3		---		2.1		---		1.0	1.1	1.8	1.9	1.0	1.3	1.7	
maximum pool depth	d_{pool}	*feet*	1.6		---		1.7		---		1.34		2.5	2.6	1.8	2.3	4.4	
pool depth ratio	d_{pool}/d_{bkf}		2.3		---		2.4		---		2.9		3.0	3.1	2.3		3.6	
pool width at bankfull	w_{pool}	*feet*	8.5		---		8.8		---		6.1		15.1	18.6	8.5		18.8	
pool width ratio	w_{pool}/w_{bkf}		0.8		---		1.4		---		0.8		1.0	1.3	0.7		0.8	
Pattern																		
sinuosity	K		1.04		1.0		1.2		1.12		1.1		1.2		1.4		1.3	
belt width	w_{blt}	feet	---		18	34	---		---		21		15	45	102		62.0	87.8
meander width ratio	w_{blt}/w_{bkf}		---		---		---		---		2	3	1	3	8.3	8.9	2.6	3.7
linear wavelength (formerly meander length)	L_m	feet	---		27	94	---		---		39	44	16	47	45.0	81.0	38.8	76.2
linear wavelength ratio (formerly meander length ratio)	L_m/w_{bkf}		---		---		---		---		5.1	7.0	1.1	3.2	3.9	6.6	1.7	3.2
meander length		feet	---		---		---		---		---		--		---		---	
meander length ratio			---		---		---		---		---		--		---		---	
radius of curvature	R_c	feet	---		8	26	---		---		19	32	8	47	23.0	38.0	7.5	38.1
radius of curvature ratio	R_c/w_{bkf}		---		---		---		---		2.7	3.7	0.6	3.2	2.0	3.1	0.3	1.6
Particle Size Distribution from Reach-wide Pebble Count																		
d50 Description			---		---		---		---		Very Coarse Sand		---		Coarse Gravel		---	
	d_{16}	mm	2.0		N/A		11		0.49		---		2.9		0.6		4.1	
	d_{35}	mm	12.9		N/A		42		3.5		0.1		9.2		12.2		11	
	d_{50}	mm	50.6		N/A		59		6.5		0.2		15		27.8		22	
	d_{84}	mm	168.1		N/A		130		48		0.5		56		74.5		50	
	d_{95}	mm	2048.0		N/A		170		83		4		88		128		78	
	d_{100}	mm	>2048		N/A		256		128		8		256		>2048		---	

Proposed Geomorphic Parameters														
	Notation	***Units***	**UT1 Reach 1A**			**UT1 Reach 1B**			**UT1 Reach 4A**			**UT1 Reach 4B**		
			Typical Section Values	**Min**	**Max**	**Typical Section Values**	**Min**	**Max**	**Typical Section Values**	**Min**	**Max**	**Typical Section Values**	**Min**	**Max**
stream type			B4			B4			C4			C4		
drainage area	DA	*sq mi*	0.05			0.11			0.29			0.4		
design discharge	Q	*cfs*	12			20			32			40		
bankfull cross-sectional area	A_{bkf}	*SF*	3.0			4.3			10.1			11.3		
average velocity during bankfull event	v_{bkf}	*fps*	4.1			4.5			3.5			3.9		
Cross-Section														
width at bankfull	w_{bkf}	*feet*	6.5			8.0			11.5			12.0		
maximum depth at bankfull	d_{max}	*feet*	-	0.6	0.7	-	0.6	0.8	-	1.1	1.3	-	1.1	1.4
mean depth at bankfull	d_{bkf}	*feet*	-	0.5		-	0.5		-	0.9		-	0.9	
bankfull width to depth ratio	w_{bkf}/d_{bkf}		-	14		-	15		-	13		-	13	
max depth ratio	d_{max}/d_{bkf}	*feet*	-	1.2	1.5	-	1.2	1.5	-	1.2	1.5	-	1.2	1.5
bank height ratio	BHR		-	1.0	1.1	-	1.0	1.1	-	1.0	1.1	-	1.0	1.1
floodprone area width	w_{fpa}	*feet*	-	9	14	-	11	18	-	25	58	-	26	60
entrenchment ratio	ER		-	1.4	2.2	-	1.4	2.2	-	2.2	5.0	-	2.2	5.0
Slope														
valley slope	S_{valley}	*feet/ foot*	0.0370			0.0370			0.0130			0.0150		
channel slope	S_{chnl}	*feet/ foot*	0.0362			0.0362			0.0093			0.0093		
Profile														
riffle slope	S_{riffle}	*feet/ foot*	-	0.009	0.052	-	0.018	0.049	-	0.002	0.024	-	0.002	0.026
riffle slope ratio	S_{riffle}/S_{chnl}		-	0.25	1.4	-	0.5	1.4	-	0.2	2.58	-	0.2	2.8
pool slope	S_p	*feet/ foot*	-	0.000	0.014	-	0.000	0.014	-	0.000	0.003	-	0.000	0.004
pool slope ratio	S_p/S_{chnl}		-	0.00	0.40	-	0.00	0.40	-	0.00	0.30	-	0.00	0.30
pool-to-pool spacing	L_{p-p}	*feet*	-	7.0	33.0	-	8	40	-	26.0	81.0	-	28.0	84.0
pool spacing ratio	L_{p-p}/w_{bkf}		-	1.0	5.0	-	1.0	5.0	-	2.3	7.0	-	2.3	7.0
pool cross-sectional area	A_{pool}	*SF*	-	6.1	9.1	-	8.6	13.0	-	15.1	30.2	-	16.9	33.8
pool area ratio	A_{pool}/A_{bkf}		-	2.0	3.0	-	2.0	3.0	-	1.5	3.0	-	1.5	3.0
maximum pool depth	d_{pool}	*feet*	-	0.9	1.4	-	1.1	1.6	-	1.8	2.6	-	1.9	2.8
pool depth ratio	d_{pool}/d_{bkf}		-	2.0	3.0	-	2.0	3.0	-	2.0	3.0	-	2.0	3.0
pool width at bankfull	w_{pool}	*feet*	-	7.2	9.8	-	8.8	12.0	-	11.5	17.3	-	12.0	18.0
pool width ratio	w_{pool}/w_{bkf}		-	1.1	1.5	-	1.1	1.5	-	1.0	1.5	-	1.0	1.5
Pattern														
sinuosity	K		1.03			1.03			1.11			1.11		
belt width	w_{blt}	*feet*	N/A			N/A			-	23.0	92	-	24.0	96
meander width ratio	w_{blt}/w_{bkf}		N/A			N/A			-	2	8	-	2	8
linear wavelength (formerly meander length)	LW	*feet*	N/A			N/A			-	58	161	-	60	168
linear wavelength ratio (formerly meander length ratio)	LW/w_{bkf}		N/A			N/A			-	5.0	14.0	-	5.0	14.0
meander length	L_m	*feet*	N/A			N/A			-	58	161	-	60	168
meander length ratio	L_m/W_{bkf}		N/A			N/A			-	5.0	14.0	-	5.0	14.0
radius of curvature	R_c	*feet*	N/A			N/A			-	23.0	35.0	-	24.0	36.0
radius of curvature ratio	R_c/ w_{bkf}		N/A			N/A			-	2.0	3.0	-	2.0	3.0

WILDLANDS
ENGINEERING

MEETING NOTES

MEETING:	Post-Contract IRT Site Walk **ALEXANDER FARM Mitigation Site** Catawba 03050101; Alexander County, NC DEQ Contract No. 7416 DMS Project No. 100048 Wildlands Project No. 005-02169
DATE:	Thursday, March 29, 2018
LOCATION:	Elk Shoals Church Loop Stony Point, NC

Attendees

Steve Kichefski, USACE	Harry Tsomides, DMS	Mac Haupt, DWR
Olivia Munzer, WRC	Kirsten Ullman, DMS	Shawn Wilkerson, Wildlands
Todd Bowers, EPA	Alan Johnson, DWR	Christine Blackwelder, Wildlands
Paul Wiesner, DMS	Ori Tuvia, DWR	

Materials

- Wildlands Engineering Technical Proposal dated 9/21/2017 in response to DMS RFP 16-007277

Meeting Notes

The meeting began at 1 pm. Shawn presented an overview of the project at the parking location. From there, the group walked upstream to the headwaters of UT1, retraced steps and reviewed UT1 downstream of the road, UT1A, and the potential wetland area in the left floodplain at the downstream site extents. The meeting concluded at 3:30 PM.

1. **Overall project comments**
   - Bald eagle is listed for Alexander County. No bald eagle nest noticed in vicinity, nor is there a record adjacent to the site.
   - Alexander family house (historical) located near the site.
   - Olivia recommends that no trees are cleared during bat maternity roosting period (June/July).
2. **Potential Wetland Credit Areas**

   Steve noted that if wetlands are included in the project, he or William Elliott (USACE) will do a more thorough review of the site when they return for the jurisdictional determination.

- **Upstream of road**
  - There are a few wetland pockets in the right floodplain just upstream of the road, and several more in the left floodplain upstream of the proposed stream crossing.
  - Steve asked that wetland pockets be encompassed by the easement, even if not for credit.
- **Downstream of road**
  - If needed, the area in the left floodplain that is currently ditched has potential for wetland credits.
  - Discussion about the need to drop a well into any wetland proposed for restoration credit to begin pre-construction data collection asap.

3. **Stream Restoration**

- **Upstream of the road**
  - The group walked up to the head of UT1. Cattle have been rotated out of this pasture and are in the pasture downstream of the road.
  - The start of UT1 is a large cattle wallow area. Shawn discussed that Wildlands may install a BMP to treat concentrated agricultural runoff above the reach.
  - Mac noted the soils at the head of UT1 and that this area may have been a wetland before the headcut advanced through and formed a stream channel.
  - Several members of the group noted that UT1 here has a lot of side seeps and noted areas of channel recovery from the absence of cattle over the last few months. One area of UT1 here just upstream of a headcut has very low banks and the group discussed tying design into this area. Shawn noted the planar bed and lack of habitat but did agree that Wildlands may utilize good areas of existing channel in the restoration design.
  - Continuing downstream, Olivia expressed concern over how close the proposed crossing is to the existing left floodplain wetland. The valley walls are relatively steep near the proposed crossing, and Wildlands will likely shift this crossing further downstream to where crossing will be easier for the farmer, which should also address any wetland concerns.
  - The crossing shown in the proposal marks a transition from restoration upstream to enhancement 2 downstream, although the group agreed that there isn't a clearly defined transition point in the field. The proposed enhancement 2 section will require some areas of restoration or enhancement I, and some of the restoration area may be fine with a lighter touch.
  - Overall, upstream of the road, the group discussed restoration at 1:1 credit from the head of the channel down to the existing fence line, and enhancement 2 at 2:1 credit from the fence line to the road. This would shorten the proposed restoration footage in this area by approximately 400 feet.
- **Downstream of the road**
  - Within the woods, the group generally agreed with a preservation approach. At the headcut which marked the proposed transition from preservation to restoration, the group agreed that a transitional length of enhancement 2 was appropriate. This transitional length will continue until the stream enters the active cattle pasture, where the approach will switch to restoration down to the end of the project.

- The restoration downstream of the road was presented in the proposal at 1.5:1 credit due to the amount of floodplain vegetation which had established in absence of the cattle over the last two years. The group noted the extreme difference in the floodplain vegetation and channel condition since the cattle have been rotated back into the field, and that the reach is worthy of traditional 1:1 crediting.
- Olivia noted underground flow from the left floodplain near the downstream project extent. These may be drain tiles from the field. Wildlands will review this more carefully during the existing conditions assessment.

These meeting minutes were prepared by Christine Blackwelder and reviewed by Shawn Wilkerson on April 13, 2018, and represent the authors' interpretation of events. Olivia Munzer comments (May 7, 2018) were incorporated on May 15, 2018. These minutes are now final.

WILDLANDS
ENGINEERING

MEMO

REGARDING: Credit Ratios
ALEXANDER FARM Mitigation Site
Catawba 03050101; Alexander County, NC
DEQ Contract No. 7416
DMS Project No. 100048
Wildlands Project No. 005-02169

DATE: Monday, April 16, 2018

In the September 26, 2017, Technical Proposal for the Alexander Farm Mitigation Site, Wildlands presented various credit ratios for UT1 upstream and downstream of Elk Shoals Church Loop road based on the channel conditions at the time of the proposal. This memo reflects changes to the proposed credit ratios in response to discussion during the IRT field walk of the site on March 29, 2018.

Upstream of the road

The stream crossing shown in the proposal marked the proposed transition from restoration at 1:1 credit to enhancement 2 at 2.5:1 credit; however, during the IRT field walk, the group agreed that there isn't a clearly defined transition point in the field. The proposed enhancement 2 section will require some areas of restoration or enhancement I, and some of the restoration area may be fine with a lighter touch.

The IRT group discussed restoration at 1:1 credit from the head of the channel down to the existing fence line (which crosses the channel upstream of the stream crossing), and enhancement 2 at 2:1 credit from the fence line to the road. This would shorten the restoration footage presented in the proposal in this area by approximately 400 feet.

After the meeting, Wildlands reviewed the contracted credit requirements, and given the large area of transition from restoration to enhancement 2 upstream of the road, Wildlands will likely propose the entire area upstream of the road as enhancement 2 at 2:1 credit in the mitigation plan and apply the appropriate level of intervention needed throughout the reach.

Downstream of the road

Within the woods, the IRT group generally agreed with the preservation approach presented in the proposal. At the headcut which marked the proposed transition from preservation to restoration, the group agreed that a transitional length of enhancement 2 was appropriate. This transitional length will continue until the stream enters the active cattle pasture, where the approach will switch to restoration down to the end of the project.

The Alexander Farm tenant farmer rotates his 175-head herd between the pasture upstream of the road in spring and summer and the downstream of the road in fall and winter. Wildlands visited the Site several times between 2010 and 2015 and confirmed this land management practice. Over the 2 years prior to submittal of the proposal, however, the tenant farmer kept the herd upstream of the road to allow for fencing repair and

replacement downstream of the road. During this time, he cut hay downstream of the road, but allowed the riparian area to grow with annuals. During the proposal process, the farmer told Wildlands that his repairs would soon be complete and he would then move the herd downstream of the road. Despite incision throughout the channel length, Wildlands proposed a lower credit ratio of 1.5:1 for restoration downstream of the road to acknowledge the reach's heavy herbaceous cover due to the absence of recent cattle activity.

The farmer completed his fencing repairs after the proposal was submitted and moved his herd downstream of the road. During the IRT site walk on March 29, 2018, the IRT group noted that all the riparian vegetation was gone and impacted by cattle. IRT members, Wildlands, and DMS all felt that the restoration activities proposed downstream of the road were now creditable at a 1:1 ratio. Wildlands proposes this section of restoration at 1:1 credit.

Please see the attached figure which illustrates the proposed shift in credit ratios. All proposed credit ratios will be fully justified in the mitigation plan.

PROPOSED BMP

UT1 REACH 1

PROPOSED 50'
CULVERT CROSSING

UT1 REACH 2

50' EASEMENT BREAK

UT1 REACH 3

UT1A

AGRICULTURAL
BMP

UT1 REACH 4

ELK SHOALS CREEK

Elk Shoals Church Loop

Project Location
Proposed Conservation Easement
Internal Crossing (50')
Proposal Reach Breaks
Restoration (1:1)
Enhancement II (2:1)
Enhancement II (2.5:1)
Enhancement II (No Credit)
Preservation (10:1)
Agricultural BMP (No Credit)
10' Contours
Non-Project Streams

2014 Aerial Photography

WILDLANDS ENGINEERING

0 200 400 Feet

N

IRT Credit Memo
Alexander Farm Mitigation Site
Catawba River Basin (03050101)

Alexander County, NC

APPENDIX 5

Categorical Exclusion and Resource Agency Correspondence

Categorical Exclusion Summary

June 25, 2018

ALEXANDER FARM MITIGATION SITE

Alexander County, NC
DEQ Contract No. 7416
DMSP ID No. 100048

Catawba River Basin
HUC 03050101

PREPARED FOR:

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

CATEGORICAL EXCLUSION SUMMARY

ALEXANDER FARM MITIGATION SITE
Alexander County, NC
DEQ Contract No. 7416
DMSP ID No. 100048

Catawba River Basin
HUC 03050101

PREPARED FOR:

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

PREPARED BY:

Wildlands Engineering, Inc.
1430 S. Mint Street, Suite 104
Charlotte, NC 28203
Phone: 704-332-7754

June 25, 2018

ALEXANDER FARM MITIGATION SITE
Categorical Exclusion Summary

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1.0 INTRODUCTION

The Alexander Farm Mitigation Site (Site) is in Alexander County approximately 13 miles west of Statesville and 15 miles northeast of Hickory (Figure 1).

Unnamed tributaries to Elk Shoals Creek originate within the project limits, and will be restored, enhanced, and preserved as part of this project. Elk Shoals Creek drains to Lookout Shoals Lake on the Catawba River, the primary water supply for the City of Statesville. The Site is located within the Elk Shoals Creek targeted local watershed Hydrologic Unit Code (HUC) 03050101130010 and is being submitted for mitigation credit in the Upper Catawba Catalog Unit 03050101.

2.0 PROJECT BACKGROUND

At its confluence with UT1, Elk Shoals Creek is defined in the 2014 North Carolina Integrated Report as Class WS-IV waters. Class WS-IV waters are protected for drinking, culinary, food processing, aquatic life, secondary recreation, and fresh water purposes, and are generally in highly developed watersheds. Elk Shoals Creek is listed as exceeding conditions for Fish Tissue Mercury, but a TMDL is in place (Category 4t). The Site streams are included in the 2009 Upper Catawba River Basin Restoration Priorities (RBRP). The RBRP lists specific watershed goals of restoring nutrient and sediment impaired waters to water supply reservoirs (including Lookout Shoals Lake), and implementing agricultural BMPs within heavily agricultural sub-watersheds, including the Elk Shoals Creek watershed.

The Catawba River Basin is also discussed in the 2015 North Carolina Wildlife Resource Commission's (NCWRC) Wildlife Action Plan (WAP). This report notes that riparian habitat loss, excessive sedimentation, and nutrient loading from poorly managed agricultural and development operations are widespread problems within the basin. The WAP discusses the importance of habitat conservation and restoration to address current problems affecting species and habitats.

Alexander Farm Mitigation Site

Restoration of the Site streams will directly and indirectly address stressors identified in the RBRP and the NCWRC WAP by excluding livestock, creating stable stream banks, restoring a forest in agriculturally maintained buffer areas, and preserving existing forested buffers. These actions will reduce fecal, nutrient, and sediment inputs to project streams, and ultimately to the Elk Shoals Creek and Lookout Shoals Lake, as well as reconnect instream and terrestrial habitats on the Site. Restoration of the Site is directly in line with recommended management strategies outlined in the Upper Catawba River Basin RBRP. Approximately 18.2 acres of land will be placed under permanent conservation easement to protect the Site in perpetuity.

3.0 PROJECT GOALS AND OBJECTIVES

The major goals of the proposed stream mitigation project are to provide ecological and water quality enhancements to the Upper Catawba River Basin while creating a functional riparian corridor at the site level.

Specific enhancements to water quality and ecological processes are outlined in Table 1.

Table 1 Ecological and Water Quality Goals of the Mitigation Project

Goal	Objective	CU-Wide and RBRP Objectives Supported
Exclude livestock from stream channels.	Install livestock fencing as needed to exclude livestock from stream channels and riparian areas.	Reduce nutrient, sediment, and fecal coliform inputs; Protect restored aquatic habitat; Implement agricultural BMPs (permanent livestock exclusion).
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 in-stream structures to protect restored/ enhanced streams.	Reduce sediment and nutrient inputs; restore aquatic habitat.
Improve instream habitat.	Install habitat features such as constructed steps, cover logs, and brush toes on restored reaches. Add woody materials to channel beds. Construct pools of varying depth.	Restore degraded aquatic habitat.
Restore and enhance native floodplain vegetation.	Convert active cattle pasture to forested riparian buffers along all Site streams, which will slow and treat runoff from adjacent pasture before entering streams. Protect and enhance existing forested riparian buffers. Treat invasive species.	Reduce nutrient, sediment, and fecal coliform inputs.
Permanently protect the project site from harmful uses.	Establish a conservation easement on the Site. Exclude livestock from Site streams.	Protect aquatic habitat; Protect water supply waters; Reduce nutrient, sediment, and fecal coliform inputs; Implement agricultural BMPs (permanent livestock exclusion).

4.0 CATEGORICAL EXCLUSION SUMMARY

The *Categorical Exclusion Form for Division of Mitigation Services Projects Version 1.4* is included in the Appendix. Below is an explanation of the federal laws that were applicable to the Alexander Farm Mitigation Project as well as a summary of their potential impacts.

4.1 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 Alexander Farm 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 06, 2017. The target property was not listed in any of the Federal, State, or Tribal environmental databases searched by the EDR. One registered Solid Waste Facility/Landfill Site (SWF/LF), a supplier of portable restrooms, was found approximately 0.5 miles of the target property. The assessment revealed no evidence of any "recognized environmental conditions" in connection with the target property. The Executive Summary of the EDR report is included in the Appendix. The full report is available upon request.

4.2 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.

Wildlands Engineering, Inc. (Wildlands) requested review and comment from the State Historic Preservation Office (SHPO) with respect to any archeological and architectural resources related to the Alexander Farm Mitigation Site on February 16, 2018. SHPO responded on March 22, 2018 and stated 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.

4.3 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.

Alexander Farm 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 property. A copy of the relevant section of the Option Agreements is included in the Appendix.

4.4 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 Alexander County listed endangered species includes the Northern long-eared bat (NLEB) (Myotis septentrionalis), and the Dwarf-flowered heartleaf (Hexastylis naniflora). The USFWS does not currently list any Critical Habitat Designations for the Federally-listed species within Alexander County nor are there any known occurrences of the NLEB documented within the County. The project site is over thirty miles from the nearest known 12-digit Hydrologic Unit Code with known hibernaculum and/or maternity sites for the NLEB.

Pedestrian surveys conducted on September 7, 2017, indicated that the Site provides suitable habitat for dwarf-flowered heartleaf and potential summer roosting for NLEB, but no individuals were located at the time. We recognize the pedestrian survey was done outside the USFWS recommended time frame for the dwarf-flowered heartleaf but are confident that the plant species is not present on the site based on existing site conditions. Even though the site provides suitable habitat, cattle have complete access to the site and the species of concern would be trampled or eaten. Due to the presence of suitable habitat but absence of the species on the site, Wildlands has determined that the project will have "no effect" on the dwarf-flowered heartleaf.

In North Carolina, the NLEB occurs in the mountains, with scattered records in the Piedmont and coastal plain. In western North Carolina, NLEB spend winter hibernating in caves and mines. Since this species is not known to be a long-distance migrant, and caves and subterranean mines are extremely rare in eastern North Carolina, it is uncertain whether or where NLEB hibernate in eastern NC. During the summer, NLEB roost singly or in colonies underneath bark, in cavities, or in crevices of both live and

dead trees (typically ≥3 inches dbh). This bat also been found, rarely, roosting in structures like barns and sheds, under eaves of buildings, behind window shutters, in bridges, and in bat houses. Pregnant females give birth from late May to late July. Foraging occurs on forested hillsides and ridges, and occasionally over forest clearings, over water, and along tree-lined corridors. Mature forests may be an important habitat type for foraging.

Forested habitats containing trees at least 3-inch dbh in the project area provide suitable habitat for NLEB. Due to the decline of the NLEB population from the WNS, the USFWS has issued the finalization of a special rule under section 4(d) of the ESA to addresses the effects to the NLEB resulting from purposeful and incidental take based on the occurrence of WNS. Because the project is located within a WNS zone and will include the removal/clearing of trees, it is subject to the final 4(d) ruling. As previously stated, a review of NCNHP records did not indicate any known NLEB populations within 2.0 mile of the study area; therefore, the project is eligible to use the NLEB 4(d) Rule Streamlined Consultation Form to meet regulatory requirements for section 7(a)(2) compliance 4(d) consultation.

To meet regulatory requirements, a letter requesting comment from the USFWS was sent on February 16, 2018. No response from the USFWS was received within the 30-day response period. Therefore, the signing of the NLEB 4(d) Rule Streamlined Consultation Form by the FHWA determines that this project may affect the NLEB, but that any resulting incidental take of the NLEB is not prohibited by the final 4(d) rule. A FHWA signed 4(d) consultation form and the correspondence associated with this determination are included in the Appendix.

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

4.6 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.

The Alexander Farm Mitigation Site includes stream restoration. Wildlands requested comment on the project from both the USFWS and the North Carolina Wildlife Resources Commission (NCWRC) on February 16, 2018. NCWRC responded on March 13, 2018 and recommended riparian buffer be reestablished as wide as possible. USFWS has not responded at this time. All correspondence with the two agencies is included in the Appendix.

4.7 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 requested comment on the Alexander Farm Mitigation Site from the USFWS regarding migratory birds on February 16, 2018. The USFWS has not responded at this time. All correspondence with USFWS is included in the Appendix.

5.0 CONCLUSION

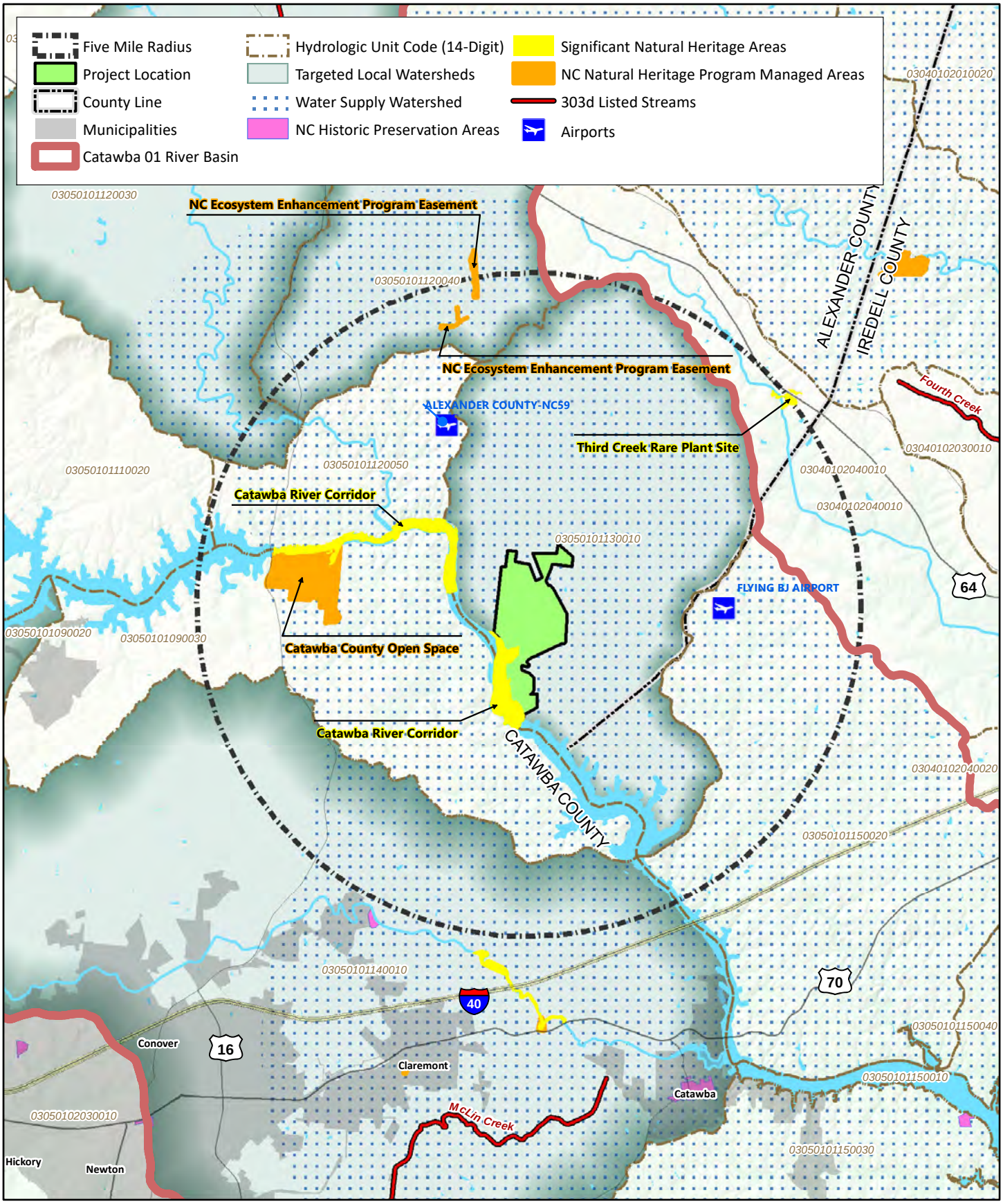
No significant impacts from the Alexander Farm Mitigation Project were identified during the development of the Categorical Exclusion.

6.0 REFERENCES

North Carolina Division of Mitigation Services. 2009. Upper Catawba River Basin Restoration Priorities.

North Carolina Wildlife Resources Commission. 2015. North Carolina Wildlife Action Plan. Raleigh, NC.

FIGURES

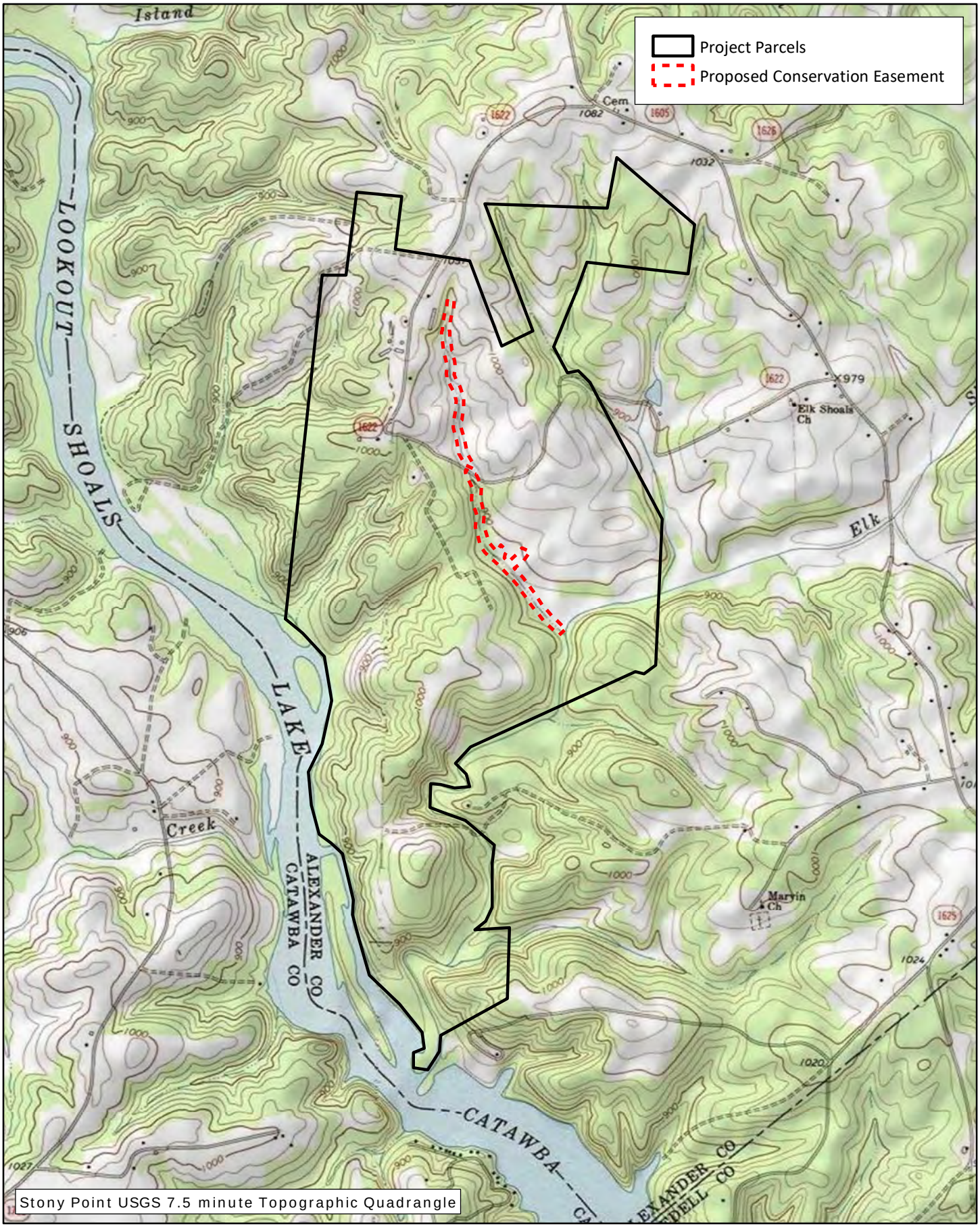


WILDLANDS ENGINEERING

0 1 2 Miles

N

Figure 1 Vicinity Map
Alexander Farm Mitigation Site
Catawba River Basin (03050101)
Alexander County, NC

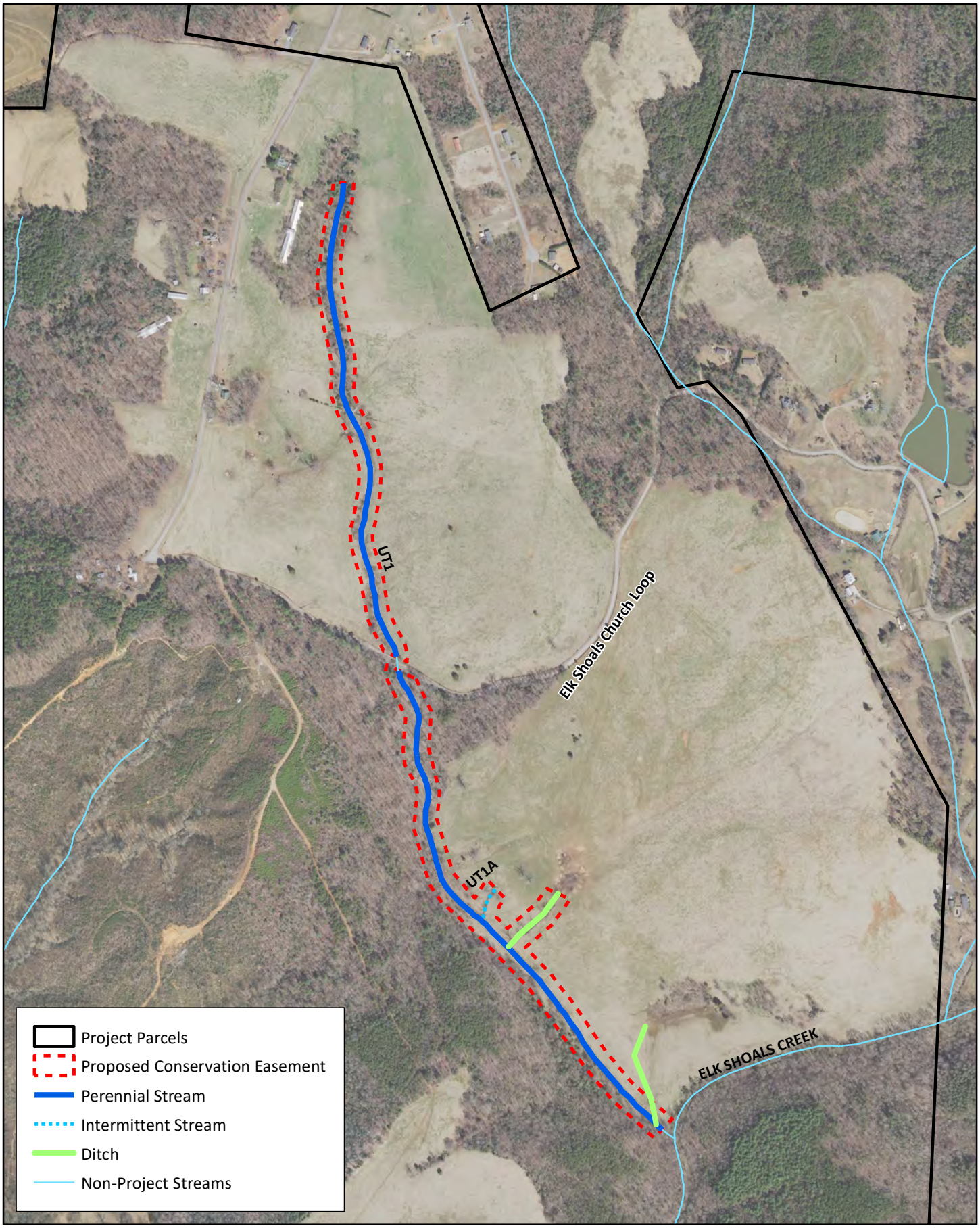


WILDLANDS ENGINEERING

0 1,000 2,000 Feet

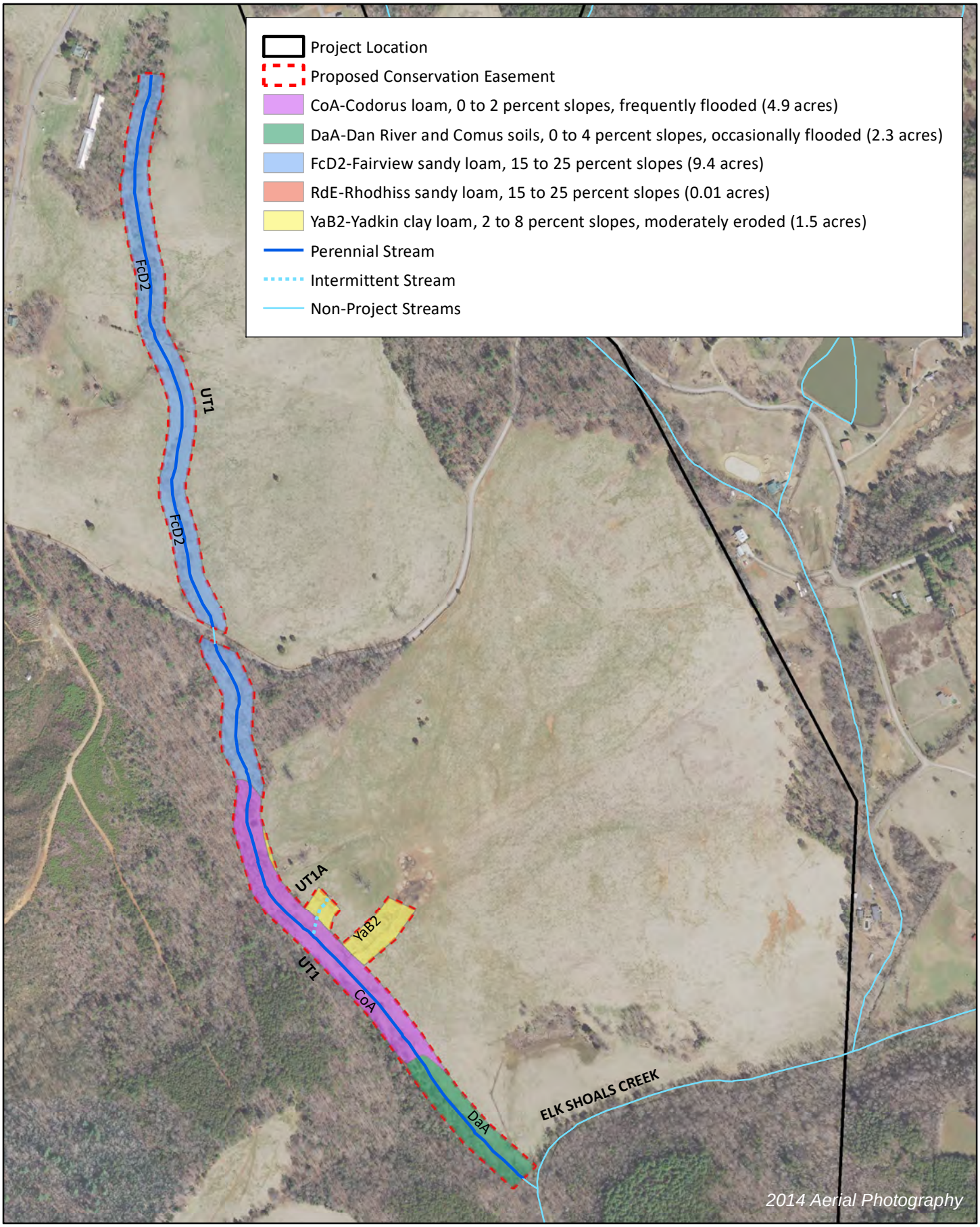
N

Figure 2 USGS Topographic Map
Alexander Farm Mitigation Site
Catawba River Basin (03050101)
Alexander County, NC



WILDLANDS ENGINEERING

Figure 3 Site Map
Alexander Farm Mitigation Site
Catawba River Basin (03050101)
Alexander County, NC



WILDLANDS ENGINEERING

0 300 600 Feet

N

Figure 4 Soils Map
Alexander Farm Mitigation Site
Catawba River Basin (03050101)
Alexander County, NC

APPENDIX

Categorical Exclusion Form for Ecosystem Enhancement Program Projects
Version 1.4

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

Part 1: General Project Information	
Project Name:	Alexander Farm Mitigation Site
County Name:	Alexander County
EEP Number:	100048
Project Sponsor:	Wildlands Engineering, Inc.
Project Contact Name:	Andrea S. Eckardt
Project Contact Address:	1430 South Mint Street, Suite 104, Charlotte, NC 28203
Project Contact E-mail:	aeckardt@wildlandseng.com
EEP Project Manager:	Harry Tsomides

Project Description

The Alexander Farm Mitigation Site is a stream mitigation project located approximately 13 miles west of Statesville and 15 miles northeast of Hickory in Alexander County, NC. The project includes 2 unnamed tributaries to Elk Shoals Creek for a total of more than 6,500 linear feet of stream. The site has historically and is currently being used for cattle pasture. The project will provide stream and wetland mitigation units to the Division of Mitigation Services in the Catawba River Basin (03050101).

For Official Use Only

Reviewed By:

6/28/2018
Date

Harry Tsomides
EEP Project Manager

Conditional Approved By:

Date

For Division Administrator
FHWA

☐ **Check this box if there are outstanding issues**

Final Approval By:

7-9-18
Date

For Division Administrator
FHWA

Part 2: All Projects Regulation/Question	Response
Coastal Zone Management Act (CZMA)	
1. Is the project located in a CAMA county?	☐ Yes ☑ No
2. Does the project involve ground-disturbing activities within a CAMA Area of Environmental Concern (AEC)?	☐ Yes ☐ No ☑ N/A
3. Has a CAMA permit been secured?	☐ Yes ☐ No ☑ N/A
4. Has NCDCM agreed that the project is consistent with the NC Coastal Management Program?	☐ Yes ☐ No ☑ N/A
Comprehensive Environmental Response, Compensation and Liability Act (CERCLA)	
1. Is this a "full-delivery" project?	☑ Yes ☐ No
2. Has the zoning/land use of the subject property and adjacent properties ever been designated as commercial or industrial?	☐ Yes ☑ No ☐ 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?	☐ Yes ☑ No ☐ 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?	☐ Yes ☐ No ☑ N/A
5. As a result of a Phase II Site Assessment, are there known or potential hazardous waste sites within the project area?	☐ Yes ☐ No ☑ N/A
6. Is there an approved hazardous mitigation plan?	☐ Yes ☐ No ☑ N/A
National Historic Preservation Act (Section 106)	
1. Are there properties listed on, or eligible for listing on, the National Register of Historic Places in the project area?	☐ Yes ☑ No
2. Does the project affect such properties and does the SHPO/THPO concur?	☐ Yes ☐ No ☑ N/A
3. If the effects are adverse, have they been resolved?	☐ Yes ☐ No ☑ N/A
Uniform Relocation Assistance and Real Property Acquisition Policies Act (Uniform Act)	
1. Is this a "full-delivery" project?	☑ Yes ☐ No
2. Does the project require the acquisition of real estate?	☑ Yes ☐ No ☐ N/A
3. Was the property acquisition completed prior to the intent to use federal funds?	☐ Yes ☑ No ☐ 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?	☑ Yes ☐ No ☐ N/A

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

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

Alexander Farm Mitigation Site
795 Elk Shoals Church Loop
Stony Point, NC 28678

Inquiry Number: 5042160.2s
September 06, 2017

The EDR Radius Map™ Report with GeoCheck®

6 Armstrong Road, 4th floor
Shelton, CT 06484
Toll Free: 800.352.0050
www.edrnet.com

TABLE OF CONTENTS

Thank you for your business.
Please contact EDR at 1-800-352-0050
with any questions or comments.

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) or custom requirements developed for the evaluation of environmental risk associated with a parcel of real estate.

TARGET PROPERTY INFORMATION

ADDRESS

795 ELK SHOALS CHURCH LOOP
STONY POINT, NC 28678

COORDINATES

Latitude (North):	35.8113720 - 35° 48' 40.93''
Longitude (West):	81.1197420 - 81° 7' 11.07''
Universal Tranverse Mercator:	Zone 17
UTM X (Meters):	489182.0
UTM Y (Meters):	3962833.8
Elevation:	929 ft. above sea level

USGS TOPOGRAPHIC MAP ASSOCIATED WITH TARGET PROPERTY

Target Property Map:	5947899 STONY POINT, NC
Version Date:	2013
West Map:	5947907 MILLERSVILLE, NC
Version Date:	2013

AERIAL PHOTOGRAPHY IN THIS REPORT

Portions of Photo from:	20140524
Source:	USDA

MAPPED SITES SUMMARY

Target Property Address:
795 ELK SHOALS CHURCH LOOP
STONY POINT, NC 28678

Click on Map ID to see full detail.

MAP ID	SITE NAME	ADDRESS	DATABASE ACRONYMS	RELATIVE ELEVATION	DIST (ft. & mi.) DIRECTION
1	HASKINS PORTABLES	432 ELK SHOALS CHURC	SWF/LF	Higher	1346, 0.255, North

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-CESQG ---------- RCRA - Conditionally Exempt Small Quantity Generator

Federal institutional controls / engineering controls registries

LUCIS ---------- Land Use Control Information System
US ENG CONTROLS ---------- Engineering Controls Sites List

US INST CONTROL..... Sites with Institutional Controls

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

OLI..... Old Landfill Inventory

State and tribal leaking storage tank lists

LAST..... Leaking Aboveground Storage Tanks
LUST..... Regional UST Database
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
UST..... Petroleum Underground Storage Tank Database
AST..... AST Database
INDIAN UST..... Underground Storage Tanks on Indian Land

State and tribal institutional control / engineering control registries

INST CONTROL..... No Further Action Sites With Land Use Restrictions Monitoring

State and tribal voluntary cleanup sites

INDIAN VCP..... Voluntary Cleanup Priority Listing
VCP..... Responsible Party Voluntary Action Sites

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

SWRCY..... Recycling Center Listing

HIST LF	Solid Waste Facility Listing
INDIAN ODI	Report on the Status of Open Dumps on Indian Lands
DEBRIS REGION 9	Torres Martinez Reservation Illegal Dump Site Locations
ODI	Open Dump Inventory
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
IMD	Incident Management Database
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
FINDS ---------- Facility Index System/Facility Registry System
DOCKET HWC ---------- Hazardous Waste Compliance Docket Listing
ECHO ---------- Enforcement & Compliance History Information
UXO ---------- Unexploded Ordnance Sites
FUELS PROGRAM ---------- EPA Fuels Program Registered Listing
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

EDR HIGH RISK HISTORICAL RECORDS

EDR Exclusive Records

EDR MGP ---------- EDR Proprietary Manufactured Gas Plants
EDR Hist Auto ---------- EDR Exclusive Historic Gas Stations
EDR Hist Cleaner ---------- EDR Exclusive Historic Dry 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 landfill and/or solid waste disposal site lists

SWF/LF: The Solid Waste Facilities/Landfill Sites records typically contain an inventory of solid waste disposal facilities or landfills in a particular state. The data come from the Department of Environment & Natural Resources' List of Solid Waste Facility Contacts in Alpha Order.

A review of the SWF/LF list, as provided by EDR, and dated 11/17/2016 has revealed that there is 1

EXECUTIVE SUMMARY

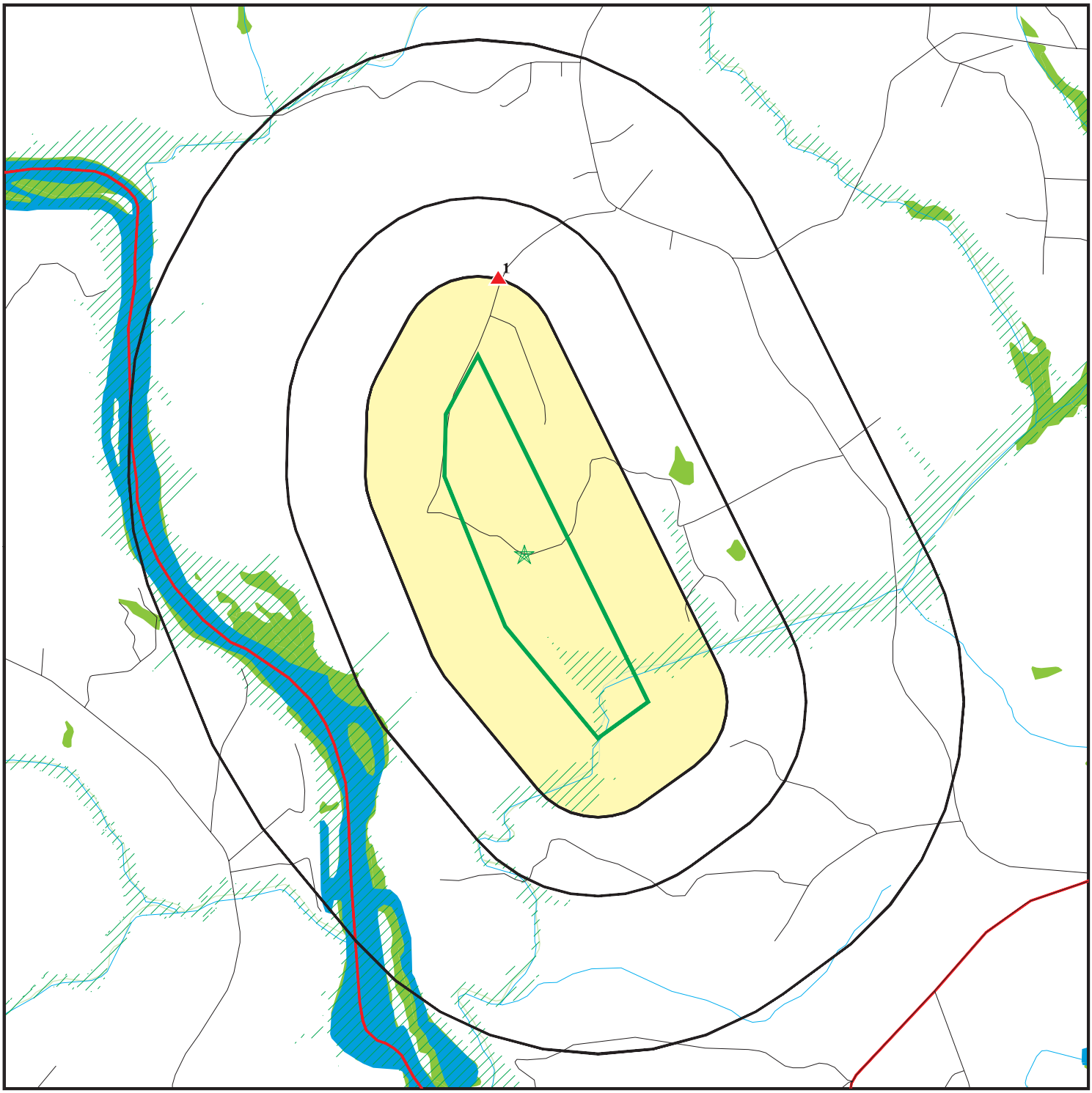
SWF/LF site within approximately 0.5 miles of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
HASKINS PORTABLES Facility Status: Open Permit Num: NCS-00807	432 ELK SHOALS CHURC	N 1/4 - 1/2 (0.255 mi.)	1	8

EXECUTIVE SUMMARY

There were no unmapped sites in this report.

OVERVIEW MAP - 5042160.2S

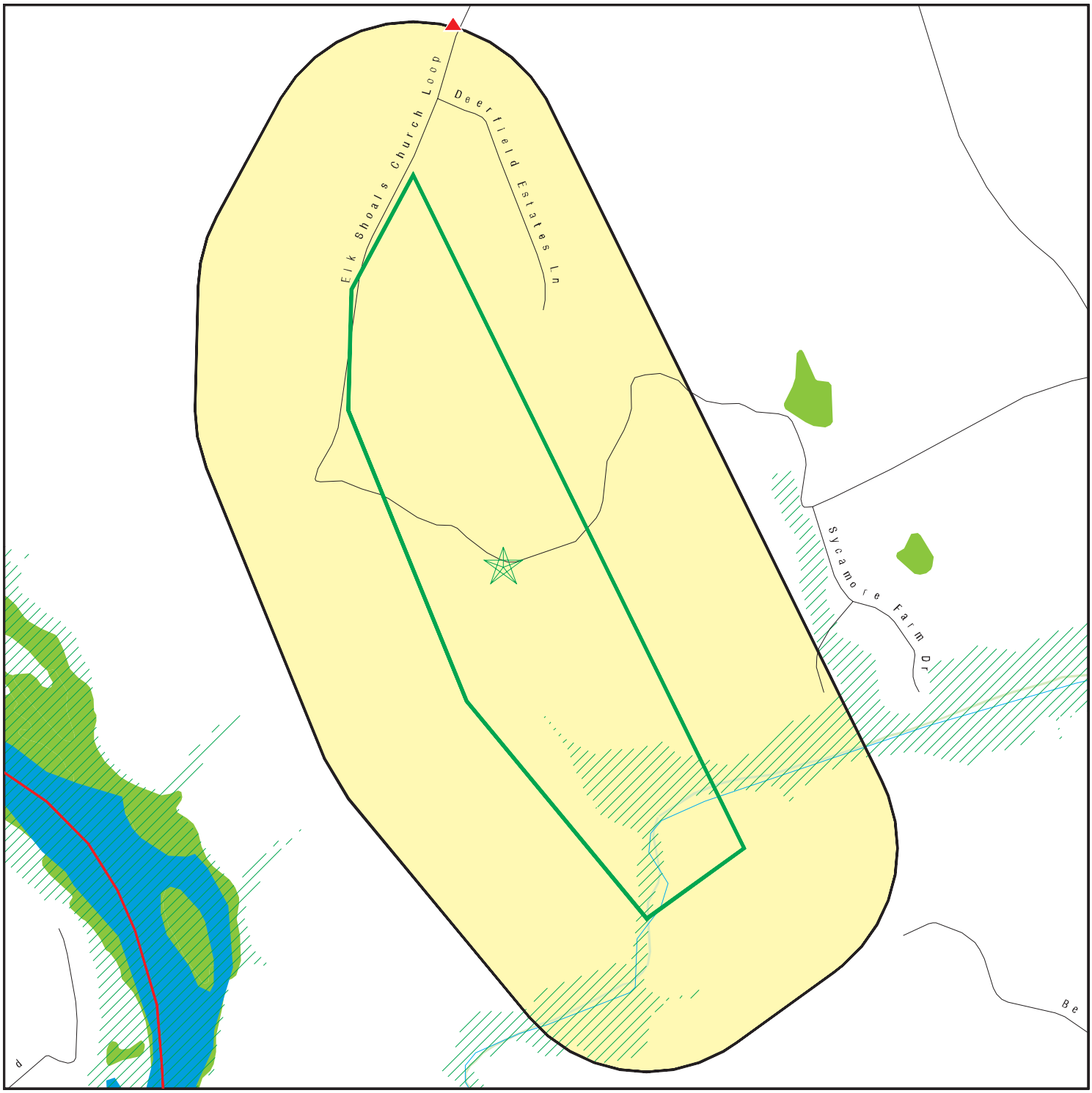


- Target Property
- Sites at elevations higher than or equal to the target property
- Sites at elevations lower than the target property
- Manufactured Gas Plants
- National Priority List Sites
- Dept. Defense Sites
- Indian Reservations BIA
- County Boundary
- 100-year flood zone
- 500-year flood zone
- National Wetland Inventory
- State Wetlands
- Upgradient Area
- 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:	Alexander Farm Mitigation Site	CLIENT:	Wildlands Eng, Inc.
ADDRESS:	795 Elk Shoals Church Loop Stony Point NC 28678	CONTACT:	Andrea Eckardt
LAT/LONG:	35.811372 / 81.119742	INQUIRY #:	5042160.2s
		DATE:	September 06, 2017 1:52 pm

DETAIL MAP - 5042160.2S



- 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

0 1/8 1/4 1/2 Miles

- Indian Reservations BIA
- County Boundary
- 100-year flood zone
- 500-year flood zone
- 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:	Alexander Farm Mitigation Site	CLIENT:	Wildlands Eng, Inc.
ADDRESS:	795 Elk Shoals Church Loop Stony Point NC 28678	CONTACT:	Andrea Eckardt
LAT/LONG:	35.811372 / 81.119742	INQUIRY #:	5042160.2s
		DATE:	September 06, 2017 1:55 pm

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
STANDARD ENVIRONMENTAL RECORDS								
Federal NPL site list								
NPL	1.000		0	0	0	0	NR	0
Proposed NPL	1.000		0	0	0	0	NR	0
NPL LIENS	0.001		0	NR	NR	NR	NR	0
Federal Delisted NPL site list								
Delisted NPL	1.000		0	0	0	0	NR	0
Federal CERCLIS list								
FEDERAL FACILITY	0.500		0	0	0	NR	NR	0
SEMS	0.500		0	0	0	NR	NR	0
Federal CERCLIS NFRAP site list								
SEMS-ARCHIVE	0.500		0	0	0	NR	NR	0
Federal RCRA CORRACTS facilities list								
CORRACTS	1.000		0	0	0	0	NR	0
Federal RCRA non-CORRACTS TSD facilities list								
RCRA-TSDF	0.500		0	0	0	NR	NR	0
Federal RCRA generators list								
RCRA-LQG	0.250		0	0	NR	NR	NR	0
RCRA-SQG	0.250		0	0	NR	NR	NR	0
RCRA-CESQG	0.250		0	0	NR	NR	NR	0
Federal institutional controls / engineering controls registries								
LUCIS	0.500		0	0	0	NR	NR	0
US ENG CONTROLS	0.500		0	0	0	NR	NR	0
US INST CONTROL	0.500		0	0	0	NR	NR	0
Federal ERNS list								
ERNS	0.001		0	NR	NR	NR	NR	0
State- and tribal - equivalent NPL								
NC HSDS	1.000		0	0	0	0	NR	0
State- and tribal - equivalent CERCLIS								
SHWS	1.000		0	0	0	0	NR	0
State and tribal landfill and/or solid waste disposal site lists								
SWF/LF	0.500		0	0	1	NR	NR	1
OLI	0.500		0	0	0	NR	NR	0
State and tribal leaking storage tank lists								
LAST	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
LUST	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
State and tribal registered storage tank lists								
FEMA UST	0.250		0	0	NR	NR	NR	0
UST	0.250		0	0	NR	NR	NR	0
AST	0.250		0	0	NR	NR	NR	0
INDIAN UST	0.250		0	0	NR	NR	NR	0
State and tribal institutional control / engineering control registries								
INST CONTROL	0.500		0	0	0	NR	NR	0
State and tribal voluntary cleanup sites								
INDIAN VCP	0.500		0	0	0	NR	NR	0
VCP	0.500		0	0	0	NR	NR	0
State and tribal Brownfields sites								
BROWNFIELDS	0.500		0	0	0	NR	NR	0
ADDITIONAL ENVIRONMENTAL RECORDS								
Local Brownfield lists								
US BROWNFIELDS	0.500		0	0	0	NR	NR	0
Local Lists of Landfill / Solid Waste Disposal Sites								
SWRCY	0.500		0	0	0	NR	NR	0
HIST LF	0.500		0	0	0	NR	NR	0
INDIAN ODI	0.500		0	0	0	NR	NR	0
DEBRIS REGION 9	0.500		0	0	0	NR	NR	0
ODI	0.500		0	0	0	NR	NR	0
IHS OPEN DUMPS	0.500		0	0	0	NR	NR	0
Local Lists of Hazardous waste / Contaminated Sites								
US HIST CDL	0.001		0	NR	NR	NR	NR	0
US CDL	0.001		0	NR	NR	NR	NR	0
Local Land Records								
LIENS 2	0.001		0	NR	NR	NR	NR	0
Records of Emergency Release Reports								
HMIRS	0.001		0	NR	NR	NR	NR	0
SPILLS	0.001		0	NR	NR	NR	NR	0
IMD	0.500		0	0	0	NR	NR	0
SPILLS 90	0.001		0	NR	NR	NR	NR	0
SPILLS 80	0.001		0	NR	NR	NR	NR	0
Other Ascertainable Records								
RCRA NonGen / NLR	0.250		0	0	NR	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
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	0.001		0	NR	NR	NR	NR	0
EPA WATCH LIST	0.001		0	NR	NR	NR	NR	0
2020 COR ACTION	0.250		0	0	NR	NR	NR	0
TSCA	0.001		0	NR	NR	NR	NR	0
TRIS	0.001		0	NR	NR	NR	NR	0
SSTS	0.001		0	NR	NR	NR	NR	0
ROD	1.000		0	0	0	0	NR	0
RMP	0.001		0	NR	NR	NR	NR	0
RAATS	0.001		0	NR	NR	NR	NR	0
PRP	0.001		0	NR	NR	NR	NR	0
PADS	0.001		0	NR	NR	NR	NR	0
ICIS	0.001		0	NR	NR	NR	NR	0
FTTS	0.001		0	NR	NR	NR	NR	0
MLTS	0.001		0	NR	NR	NR	NR	0
COAL ASH DOE	0.001		0	NR	NR	NR	NR	0
COAL ASH EPA	0.500		0	0	0	NR	NR	0
PCB TRANSFORMER	0.001		0	NR	NR	NR	NR	0
RADINFO	0.001		0	NR	NR	NR	NR	0
HIST FTTS	0.001		0	NR	NR	NR	NR	0
DOT OPS	0.001		0	NR	NR	NR	NR	0
CONSENT	1.000		0	0	0	0	NR	0
INDIAN RESERV	0.001		0	NR	NR	NR	NR	0
FUSRAP	1.000		0	0	0	0	NR	0
UMTRA	0.500		0	0	0	NR	NR	0
LEAD SMELTERS	0.001		0	NR	NR	NR	NR	0
US AIRS	0.001		0	NR	NR	NR	NR	0
US MINES	0.250		0	0	NR	NR	NR	0
ABANDONED MINES	0.001		0	NR	NR	NR	NR	0
FINDS	0.001		0	NR	NR	NR	NR	0
DOCKET HWC	0.001		0	NR	NR	NR	NR	0
ECHO	0.001		0	NR	NR	NR	NR	0
UXO	1.000		0	0	0	0	NR	0
FUELS PROGRAM	0.250		0	0	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	0.001		0	NR	NR	NR	NR	0
NPDES	0.001		0	NR	NR	NR	NR	0
UIC	0.001		0	NR	NR	NR	NR	0

EDR HIGH RISK HISTORICAL RECORDS

EDR Exclusive Records

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

EDR RECOVERED GOVERNMENT ARCHIVES

Exclusive Recovered Govt. Archives

RGA HWS	0.001		0	NR	NR	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
RGA LF	0.001		0	NR	NR	NR	NR	0
RGA LUST	0.001		0	NR	NR	NR	NR	0
- Totals --		0	0	0	1	0	0	1

NOTES:

TP = Target Property

NR = Not Requested at this Search Distance

Sites may be listed in more than one database

1
North
1/4-1/2
0.255 mi.
1346 ft.

HASKINS PORTABLES
432 ELK SHOALS CHURCH LOOP
STONY POINT, NC

SWF/LF **S109163744**
N/A

Relative:
Higher

Actual:
1075 ft.

LF:

Permit Num:	NCS-00807
Waste:	Septage
Activity:	Hauler
Contact Name:	Jeremiah Haskins
Contact Telephone:	7045859846
Facility Status:	Open

Count: 0 records.

ORPHAN SUMMARY

City	EDR ID	Site Name	Site Address	Zip	Database(s)
		NO SITES FOUND			

WILDLANDS
ENGINEERING

February 16, 2018

Renee Gledhill-Earley
State Historic Preservation Office
4617 Mail Service Center
Raleigh, NC 27699-4617

Subject: Alexander Farm Mitigation Site
Alexander 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 the Alexander Farm Mitigation Site. A Site Map and USGS Topographic Map with approximate project areas are enclosed. The topographic figure was prepared from the Stony Point, 7.5-Minute USGS Topographic Quadrangle.

The Alexander Farm Mitigation Site is being developed to provide in-kind mitigation for unavoidable stream channel impacts. This project will include stream restoration to unnamed tributaries which all flow to Elk Shoals Creek. Several sections of channel have been identified as significantly degraded. The site has been disturbed due to agricultural use, including cattle that have full access to the stream. Historically, the site has been in agricultural production (cattle, poultry, and timber) for the last 70 years. Furthermore, no archeological artifacts have been observed or noted during preliminary surveys of the site for restoration purposes.

We ask that you review this site based on the attached information to determine the presence of any historic properties.

We thank you in advance for your timely response and cooperation. Please feel free to contact us with any questions that you may have concerning the project.

Sincerely,

Mimi Caddell
Environmental Scientist

Attachment:
Figure 1 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 Susi H. Hamilton

Office of Archives and History
Deputy Secretary Kevin Cherry

March 22, 2018

Mimi Caddell
Wildlands Engineering
140 South Mint Street, Suite 104
Charlotte, NC 28203

Re: Alexander Farm Mitigation Site, Alexander County, ER 18-0421

Dear Ms. Caddell:

Thank you for your letter of February 16, 2018, concerning the above project.

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 919-807-6579 or environmental.review@ncdcr.gov. In all future communication concerning this project, please cite the above referenced tracking number.

Sincerely,

Renee Gledhill-Earley

for Ramona M. Bartos

TO OPTIONOR: Mr. Hank Van Hoy
10 Court Square
Mocksville, NC 27028-2415
Telephone: (336) 751-2171
Facsimile: (336) 751-1773
Email: hvh@mvhlaw.com

Notice of change of address shall be given by written notice in the manner described in this Paragraph.

3.3 Assignment. Optionee shall have the right to assign this Agreement without the consent of Optionor. No assignment shall be effective, however, unless the assignee has delivered to Optionor a written assumption of Optionee's obligations under this Agreement. Optionor hereby releases Optionee from any obligations under this Agreement arising after the effective date of any assignment of this Agreement by Optionee.

3.4 Value of Conservation Easement; No Power of Eminent Domain. in accordance with the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, Optionee hereby notifies Optionor that: (i) Optionee believes that the fair market value of the Conservation Easement is an amount equal to the Purchase Price; and (ii) Optionee does not have the power of eminent domain.

3.5 Waivers. No waiver of any breach of any covenant or provision herein contained shall be deemed a waiver of any preceding or succeeding breach thereof, or of any other covenant or provision herein contained.

3.6 Survival of Obligations. Notwithstanding any provision of this Agreement, the covenants, representations, warranties, hold harmless, defense and indemnification obligations made by each party herein shall survive the Closing.

3.7 Successors and Assigns. This Agreement shall be binding upon and shall inure to the benefit of the successors and assigns of the parties hereto.

3.8 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 hereof, the losing party shall pay to the prevailing party reasonable attorneys' fees, costs and expenses and court costs and other costs of action incurred in connection with the prosecution or defense of such action, whether or not the action is prosecuted to a final judgment.

3.9 Landowner Authorization. Concurrently with the execution of this Agreement, Optionee shall execute a "**Landowner Authorization Form**" which Optionor will provide to the NC Division of Mitigation Services to grant them permission to visit the Property as a part of their review and approval of Optionor's proposal for a stream restoration project on the Property.

3.10 Memorandum of Option. Concurrently with the execution of this Agreement, Optionee and Optionor shall execute and have notarized a **"Memorandum of Agreement"** which Optionor shall record against the Property in the Official Records of Alexander County within five (5) days after the Effective Date of this Agreement. If Optionee does not pay the Extension Consideration as described in paragraph 1.5, Optionor shall record a cancelation of the Memorandum with in five business days.

3.11 Exclusivity. Optionor intends to submit a proposal for the full delivery of stream restoration credits on the Property to the NC Division of Mitigation Services. Optionor's proposal for stream restoration credits on the

WILDLANDS
ENGINEERING

February 16, 2018

Marella Buncick
US Fish and Wildlife Service
Asheville Field Office
160 Zillicoa Street
Asheville, NC 28801

Subject: Alexander Farm Mitigation Site
Alexander County, North Carolina

Dear Ms. Buncick,

Wildlands Engineering, Inc. requests review and comment on any possible issues that might emerge with respect to endangered species, migratory birds, or other trust resources associated with the proposed Alexander Farm Mitigation Site. A USGS Topographic Map and an Overview Site Map showing the approximate project area are enclosed. The topographic figure was prepared from the Stony Point, 7.5-Minute USGS Topographic Quadrangle.

The Alexander Farm Mitigation Site is being developed to provide in-kind mitigation for unavoidable stream channel impacts. This project will include stream restoration to unnamed tributaries which all flow to Elk Shoals Creek. Several sections of channel have been identified as significantly degraded. The site has been disturbed due to agricultural use, including cattle that have full access to the stream.

According to your website (https://www.fws.gov/raleigh/species/cntylist/alexander.html) the threatened or endangered species for Alexander County are: the Bog turtle (*Glyptemys muhlenbergii*), the Northern long-eared bat (*Myotis septentrionalis*), and the Dwarf-flowered heartleaf (*Hexastylis naniflora*). If we have not heard from you in 30 days, we will assume that you do not have any comments regarding associated laws and that you do not have any information relevant to this project at the current time.

We thank you in advance for your timely response and cooperation. Please feel free to contact us with any questions that you may have concerning this project.

Sincerely,

Mimi Caddell

Mimi Caddell
Environmental Scientist

Attachment:
Figure 1 Site Map
Figure 2 USGS Topographic Map

Andrea Eckardt

From: Brew, Donnie (FHWA) <Donnie.Brew@dot.gov>
Sent: Wednesday, April 18, 2018 9:22 AM
To: Marella_Buncick@fws.gov
Cc: Andrea Eckardt; harry.tsomides@ncdenr.gov
Subject: Alexander Farm Mit Proj_NLEB 4(d) rule consultation
Attachments: NLEB Streamlined Consultation Form-Alexander Farm signed.pdf; Alexander-USGS Map.pdf; Alexander-Site Map.pdf; Alexander-Vicinity Map.pdf

Good morning Marella,

The purpose of this message is to notify your office that FHWA will use the streamlined consultation framework for the Alexander Farm Mitigation Site in Alexander County, NC.

Attached is a completed NLEB 4(d) Rule Streamlined Consultation form, in addition site maps/figures.

Thank you and have a great day,

Donnie

Notifying the Service Under the Framework

Northern Long-Eared Bat 4(d) Rule Streamlined Consultation Form

Federal agencies (or designated non-federal representatives) should use the Northern Long-Eared Bat 4(d) Rule Streamlined Consultation form to notify the Service of their project and meet the requirements of the framework.

Northern Long-Eared Bat 4(d) Rule Streamlined Consultation Form (Word document)

Information requested in the Northern Long-Eared Bat 4(d) Rule Streamlined Consultation Form serves to

(1) notify the field office that an action agency will use the streamlined framework;

(2) describe the project with sufficient detail to support the required determination; and

(3) enable the USFWS to track effects and determine if reinitiation of consultation for the 4(d) rule is required. This form requests the minimum amount of information required for the Service to be able to track this information.

Providing information in the Streamlined Consultation Form does not address section 7(a)(2) compliance for any other listed species.

Donnie Brew
Preconstruction & Environment Engineer
Federal Highway Administration

310 New Bern Ave, Suite 410
Raleigh, NC 27601
donnie.brew@dot.gov
919-747-7017

Please consider the environment before printing this email.

Northern Long-Eared Bat 4(d) Rule Streamlined Consultation Form

Federal agencies should use this form for the optional streamlined consultation framework for the northern long-eared bat (NLEB). This framework allows federal agencies to rely upon the U.S. Fish and Wildlife Service's (USFWS) January 5, 2016, intra-Service Programmatic Biological Opinion (BO) on the final 4(d) rule for the NLEB for section 7(a)(2) compliance by: (1) notifying the USFWS that an action agency will use the streamlined framework; (2) describing the project with sufficient detail to support the required determination; and (3) enabling the USFWS to track effects and determine if reinitiation of consultation is required per 50 CFR 402.16.

This form is not necessary if an agency determines that a proposed action will have no effect to the NLEB or if the USFWS has concurred in writing with an agency's determination that a proposed action may affect, but is not likely to adversely affect the NLEB (i.e., the standard informal consultation process). Actions that may cause prohibited incidental take require separate formal consultation. Providing this information does not address section 7(a)(2) compliance for any other listed species.

Information to Determine 4(d) Rule Compliance:	**YES**	**NO**
1. Does the project occur wholly outside of the WNS Zone[1]?	☐	☒
2. Have you contacted the appropriate agency[2] to determine if your project is near known hibernacula or maternity roost trees?	☒	☐
3. Could the project disturb hibernating NLEBs in a known hibernaculum?	☐	☒
4. Could the project alter the entrance or interior environment of a known hibernaculum?	☐	☒
5. Does the project remove any trees within 0.25 miles of a known hibernaculum at any time of year?	☐	☒
6. Would the project cut or destroy known occupied maternity roost trees, or any other trees within a 150-foot radius from the maternity roost tree from June 1 through July 31.	☐	☒

You are eligible to use this form if you have answered yes to question #1 **or** yes to question #2 **and** no to questions 3, 4, 5 and 6. The remainder of the form will be used by the USFWS to track our assumptions in the BO.

Agency and Applicant[3] (Name, Email, Phone No.): Donnie Brew, Federal Highway Administration, donnie.brew@dot.gov, 919-747-7017 and Wildlands Engineering, Inc., aeckardt@wildlandseng.com; 704-332-7754 ext. 101

Project Name: Alexander Farm Mitigation Site

Project Location (include coordinates if known): Approximately 13 miles west of Statesville and 15 miles northeast of Hickory in Alexander County (downstream project coordinates: 35.805270, -81.115713)

Basic Project Description (provide narrative below or attach additional information): The project will include restoration, enhancement, and preservation of two unnamed tributaries to Elk Shoals Creek (UT1 and UT1A) which flow to Lookout Shoals Lake on the Catawba River. Approximately 4,420 linear feet of stream restoration, 1,509 linear feet of stream enhancement, and 600 linear feet of stream

[1] http://www.fws.gov/midwest/endangered/mammals/nleb/pdf/WNSZone.pdf
[2] See http://www.fws.gov/midwest/endangered/mammals/nleb/nhisites.html
[3] If applicable - only needed for federal actions with applicants (e.g., for a permit, etc.) who are party to the consultation.

preservation. The site has been disturbed due to agricultural use, including cattle that have full access to the stream. The project will provide stream mitigation units to the Division of Mitigation Services in the Catawba River Basin (03050101).

General Project Information	YES	NO
Does the project occur within 0.25 miles of a known hibernaculum?	☐	☒
Does the project occur within 150 feet of a known maternity roost tree?	☐	☒
Does the project include forest conversion[4]? (if yes, report acreage below)	☒	☐
Estimated total acres of forest conversion	3.6 acres	
If known, estimated acres[5] of forest conversion from April 1 to October 31	3.6 acres	
If known, estimated acres of forest conversion from June 1 to July 31[6]	0	
Does the project include timber harvest? (if yes, report acreage below)	☐	☒
Estimated total acres of timber harvest		
If known, estimated acres of timber harvest from April 1 to October 31		
If known, estimated acres of timber harvest from June 1 to July 31		
Does the project include prescribed fire? (if yes, report acreage below)	☐	☒
Estimated total acres of prescribed fire		
If known, estimated acres of prescribed fire from April 1 to October 31		
If known, estimated acres of prescribed fire from June 1 to July 31		
Does the project install new wind turbines? (if yes, report capacity in MW below)	☐	☒
Estimated wind capacity (MW)		

Agency Determination:

By signing this form, the action agency determines that this project may affect the NLEB, but that any resulting incidental take of the NLEB is not prohibited by the final 4(d) rule.

If the USFWS does not respond within 30 days from submittal of this form, the action agency may presume that its determination is informed by the best available information and that its project responsibilities under 7(a)(2) with respect to the NLEB are fulfilled through the USFWS January 5, 2016, Programmatic BO. The action agency will update this determination annually for multi-year activities.

The action agency understands that the USFWS presumes that all activities are implemented as described herein. The action agency will promptly report any departures from the described activities to the appropriate USFWS Field Office. The action agency will provide the appropriate USFWS Field Office with the results of any surveys conducted for the NLEB. Involved parties will promptly notify the appropriate USFWS Field Office upon finding a dead, injured, or sick NLEB.

Signature: _____ Date Submitted: 4-18-18

[4] Any activity that temporarily or permanently removes suitable forested habitat, including, but not limited to, tree removal from development, energy production and transmission, mining, agriculture, etc. (see page 48 of the BO).
[5] If the project removes less than 10 trees and the acreage is unknown, report the acreage as less than 0.1 acre.
[6] If the activity includes tree clearing in June and July, also include those acreage in April to October.

From:	Cortes, Milton - NRCS, Raleigh, NC
To:	Mimi Caddell
Subject:	RE: AD1006 Form Request - Alexander Farms Mitigation Site - Alexander County, NC
Date:	Wednesday, April 18, 2018 4:50:12 PM
Attachments:	image001.png Letter_Farm_Mitigation_Alexander.pdf AD1006_Farm_Mitigation_Alexander.pdf
Importance:	High

Hi Mimi

Please find attached the Farmland Conversion Impact Rating evaluation for Alexander Farms Mitigation Site - Alexander County, NC

If we can be of further assistance, please, let us know.

Cordially:

Milton Cortes
Acting State Soil Scientist
Natural Resources Conservation Service
4407 Bland Rd, Suite 117
Raleigh, NC 27609
Phone: 919-873-2171
milton.cortes@nc.usda.gov

From: Mimi Caddell [mailto:mcaddell@wildlandseng.com]
Sent: Wednesday, April 11, 2018 9:04 AM
To: Cortes, Milton - NRCS, Raleigh, NC <Milton.Cortes@nc.usda.gov>
Subject: AD1006 Form Request - Alexander Farms Mitigation Site - Alexander County, NC

Hi Milton,

I have a request for a completed AD1006 form for a NCDENR Division of Mitigation Services stream restoration project (Alexander Farms Mitigation Site) located in Alexander County, NC. Attached is a Vicinity Map and Soils Map in addition to the AD1006 form with Parts I and III filled out. The soil breakdown acreage is included in the legend of the Soils Map.

Please let me know if you need anymore information.

Thank you,

Mimi Caddell | *Environmental Scientist*
704.332.7754 x121

Wildlands Engineering, Inc.
1430 S. Mint St, Suite 104

United States Department of Agriculture

Natural Resources
Conservation Service

North Carolina
State Office

4407 Bland Road
Suite 117
Raleigh, NC 27609
Voice 919-873-2171
Fax 844-325-6833

April 18, 2018

Mimi Caddell
Environmental Scientist
Wildlands Engineering, Inc.
1430 S. Mint St, Suite 104
Charlotte, NC 28203

Subject: Alexander Farms Mitigation Site - Stream Restoration - Alexander County, NC

Dear Mimi Caddell:

The following guidance is provided for your information.

Projects are subject to the Farmland Protection Policy Act (FPPA) requirements if they may irreversibly convert farmland (directly or indirectly) to non-agricultural use and are completed by a federal agency or with assistance from a federal agency. Farmland means prime or unique farmlands as defined in section 1540(c)(1) of the FPPA or farmland that is determined by the appropriate state or unit of local government agency or agencies with concurrence of the Secretary of Agriculture to be farmland of statewide local importance.

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 forestland, pastureland, cropland, or other land, but not water or urban built-up land.

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 United States Geological Survey (USGS) topographical maps, or as urban-built-up on the United States Department of Agriculture (USDA) Important Farmland Maps.

The area in question meets one or more of the above criteria for Farmland. Farmland area will be affected or converted. Enclosed is the Farmland Conversion Impact Rating form AD1006 with PARTS II, IV and V completed by NRCS. The corresponding agency will need to complete the evaluation, according to the Code of Federal Regulation 7CFR 658, Farmland Protection Policy Act.

If you have any questions, please contact us at 919-873-2171 or by email: milton.cortes@nc.usda.gov.

Again, thank you for writing. If we can be of further assistance, please do not hesitate to contact us.

Sincerely,

Milton Cortes

Milton Cortes
Acting State Soil Scientist

U.S. Department of Agriculture

FARMLAND CONVERSION IMPACT RATING

PART I *(To be completed by Federal Agency)*	Date Of Land Evaluation Request 4/11/18
Name Of Project Alexander Farm Mitigation Site	Federal Agency Involved Federal Highway Administration
Proposed Land Use Stream Restoration	County And State Alexander County, North Carolina
PART II *(To be completed by NRCS)*	Date Request Received By NRCS 4/11/18

Does the site contain prime, unique, statewide or local important farmland? *(If no, the FPPA does not apply -- do not complete additional parts of this form).*	Yes ☑	No ☐	Acres Irrigated none	Average Farm Size 88 acres
Major Crop(s) CORN	Farmable Land In Govt. Jurisdiction Acres: 240,623	% 86	Amount Of Farmland As Defined in FPPA Acres: 179,301	% 64
Name Of Land Evaluation System Used Alexander Co. NC LESA	Name Of Local Site Assessment System N/A		Date Land Evaluation Returned By NRCS April 18, 2018 eMail	

PART III *(To be completed by Federal Agency)*	Alternative Site Rating Site A	Site B	Site C	Site D
A. Total Acres To Be Converted Directly	18.2			
B. Total Acres To Be Converted Indirectly				
C. Total Acres In Site	18.2	0.0	0.0	0.0
PART IV *(To be completed by NRCS)* Land Evaluation Information				
A. Total Acres Prime And Unique Farmland	8.7			
B. Total Acres Statewide And Local Important Farmland	9.4			
C. Percentage Of Farmland In County Or Local Govt. Unit To Be Converted	0.0425			
D. Percentage Of Farmland In Govt. Jurisdiction With Same Or Higher Relative Value	22.5			
PART V *(To be completed by NRCS)* Land Evaluation Criterion Relative Value Of Farmland To Be Converted *(Scale of 0 to 100 Points)*	38	0	0	0

PART VI *(To be completed by Federal Agency)* Site Assessment Criteria *(These criteria are explained in 7 CFR 658.5(b)*	Maximum Points				
1. Area In Nonurban Use	15	15			
2. Perimeter In Nonurban Use	10	10			
3. Percent Of Site Being Farmed	20	10			
4. Protection Provided By State And Local Government	20	20			
5. Distance From Urban Builtup Area	15	15			
6. Distance To Urban Support Services	15	15			
7. Size Of Present Farm Unit Compared To Average	10	10			
8. Creation Of Nonfarmable Farmland	10	0			
9. Availability Of Farm Support Services	5	5			
10. On-Farm Investments	20	5			
11. Effects Of Conversion On Farm Support Services	10	0			
12. Compatibility With Existing Agricultural Use	10	0			
TOTAL SITE ASSESSMENT POINTS	160	105	0	0	0
PART VII *(To be completed by Federal Agency)*					
Relative Value Of Farmland *(From Part V)*	100	38	0	0	0
Total Site Assessment *(From Part VI above or a local site assessment)*	160	105	0	0	0
TOTAL POINTS *(Total of above 2 lines)*	260	143	0	0	0

Site Selected:	Date Of Selection	Was A Local Site Assessment Used? Yes ☐ No ☐

Reason For Selection:

(See Instructions on reverse side)

This form was electronically produced by National Production Services Staff

Clear Form

Form AD-1006 (10-83)

WILDLANDS
ENGINEERING

February 16, 2018

Shannon Deaton
North Carolina Wildlife Resource Commission
Division of Inland Fisheries
1721 Mail Service Center
Raleigh, NC 27699

Subject: Alexander Farm Mitigation Site
Alexander County, North Carolina

Dear Ms. Deaton,

Wildlands Engineering, Inc. requests review and comment on any possible issues that might emerge with respect to fish and wildlife issues associated with the proposed Alexander Farm Mitigation Site. A USGS Topographic Map and an Overview Site Map showing the approximate project area are enclosed. The topographic figure was prepared from the Stony Point, 7.5-Minute USGS Topographic Quadrangle.

The Alexander Farm Mitigation Site is being developed to provide in-kind mitigation for unavoidable stream channel impacts. This project will include stream restoration to unnamed tributaries which all flow to Elk Shoals Creek. Several sections of channel have been identified as significantly degraded. The site has been disturbed due to agricultural use, including cattle that have full access to the stream.

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 this project.

Sincerely,

Mimi Caddell

Mimi Caddell
Environmental Scientist

Attachment:
Figure 1 Site Map
Figure 2 USGS Topographic Map

North Carolina Wildlife Resources Commission

Gordon Myers, Executive Director

13 March 2018

Ms. Mimi Caddell
Wildlands Engineering, Inc.
1430 South Mint Street, Suite 104
Charlotte, North Carolina 28203

Subject: Environmental Review
Alexander Farm Mitigation Site
Alexander County, North Carolina

Dear Ms. Caddell,

Biologists with the North Carolina Wildlife Resource Commission (NCWRC) received your request on 23 February 2018. Comments are provided in accordance with provisions of the Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S.C. 661-667e) and North Carolina General Statutes (G.S. 113-131 et seq.).

The federal species of concern and state significantly rare Carolina foothills crayfish (*Cambarus johni*), and the state and federally threatened northern long-eared bat (*Myotis septentrionalis*) and dwarf-flowered heartleaf (*Hexastylis naniflora*) are listed as having potential to occur at the site if habitat is present. We have no records of rare, threatened, or endangered species within or near the mitigation site, although the lack of records from the project area does not imply or confirm the absence of federal or state protected species. Based upon the information provided to NCWRC, it is unlikely that mitigation will adversely affect any federal or state-listed species. However, we recommend leaving snags and mature trees or if necessary, remove tees outside the maternity roosting season for bats (May 15 – August 15).

We recommend that riparian buffers that are to be reestablished be as wide as possible, given site constraints and landowner needs. NCWRC generally recommends a woody buffer of 100 feet on perennial streams to maximize the benefits of buffers, including bank stability, stream shading, treatment of overland runoff, and wildlife habitat.

Stream restoration projects often improve water quality and aquatic habitat. Establishing native, forested buffers in riparian areas will help protect water quality, improve aquatic and terrestrial habitats, and provide a travel corridor for wildlife species. Provided measures are taken to minimize erosion and sedimentation from construction/restoration activities, we do not anticipate the project to result in significant adverse impacts to aquatic and terrestrial wildlife resources.

Mailing Address: Habitat Conservation • 1721 Mail Service Center • Raleigh, NC 27699-1721
Telephone: (919) 707-0220 • **Fax:** (919) 707-0028

13 March 2018
Alexander Farm Mitigation Site
Alexander County

Thank you for the opportunity to review this proposed project. If I can be of additional assistance, please call (336) 290-0056 or email olivia.munzer@ncwildlife.org.

Sincerely,

Olivia Munzer
Western Piedmont Habitat Conservation Coordinator
Habitat Conservation Program

APPENDIX 6

Invasive Species Plan

Appendix 6 Invasive Species Plan

Annual monitoring and semi-annual site visits will be conducted to assess the condition of the finished project. These site inspections may identify the presence of invasive vegetation. If, during the monitoring period, invasive species threaten the survivability of planted woody vegetation in an area that exceeds 1% of the planted easement acreage, the invasive species shall be treated. Smaller areas may be treated at the discretion of the project engineer and biologist, if deemed in the best interest of the Site. Generally, the treatment plan shall follow the below guidelines in Table 1 for common invasive species found in riparian areas; however, the treatment may be changed based on the professional judgement of the project engineer and biologist. For invasive species not listed in the below table that threaten the survivability of the planted woody vegetation, Wildlands shall notify DMS of the invasive species observed and the plan for treatment prior to treating the species. All invasive species treatment will be reported in the following year's monitoring plan.

Table 1. Invasive Species Treatment – *Alexander Farm Mitigation Site*

Invasive Species	Recommended Removal Technique
Japanese Honeysuckle (*Lonicera japonica*)	Small infestations of *L. japonica* can be pulled by hand. Monitor to remove any re-sprouts. Care should be taken to bag and remove the plants, including mature fruits to prevent re-establishment. Large infestations of *L. japonica* will usually require a combination of cut stump and foliar herbicide treatments. Where vines have grown into the tree canopy, cut each stem as close to the ground as possible. Treat the freshly cut surface of the rooted stem with a 25 percent solution of glyphosate or triclopyr. Remove the twining vines to prevent them from girdling and killing desirable vegetation. Groundcovers of *L. japonica* can be treated with a foliar solution of 2 percent glyphosate or triclopyr plus a 0.5 percent non-ionic surfactant to thoroughly wet all the leaves.
Chinese Privet (*Ligustrum sinense*)	Thoroughly wet all leaves with one of the following herbicides in water with a surfactant: a glyphosate herbicide as a 3-percent solution (12 ounces per 3-gallon mix) in the late fall or early winter when safety to surrounding vegetation is desired, or elsewhere, Arsenal AC* as a 1-percent solution (4 ounces per 3-gallon mix). Backpack mist blowers can broadcast glyphosate as a 3-percent solution (12 ounces per 3-gallon mix) or Escort XP* at 1 ounce per acre (0.2 dry ounces per 3-gallon mix and 10 gallons per acre) during winter for safety to dormant hardwoods. Summer applications of glyphosate may not be as effective as other times and require a higher percent solution. The best time for Arsenal AC* and Escort XP* is summer to fall. For stems too tall for foliar sprays and when safety to surrounding vegetation is desired, apply a basal spray of Garlon 4 as a 20-percent solution (5 pints per 3-gallon mix) in a labeled basal oil product, vegetable oil or mineral oil with a penetrant, or fuel oil or diesel fuel (where permitted); or undiluted Pathfinder II. Elsewhere, apply Stalker* as a 6- to 9-percent solution (1.5 to 2 pints per 3-gallon mix) in a labeled basal oil product, vegetable oil or mineral oil with a penetrant, or fuel oil or diesel fuel (where permitted) to young bark as a basal spray making certain to treat all stems in a clump; or cut and immediately treat the stump tops with Arsenal AC* as a 5-percent solution (20 ounces per 3-gallon mix) or Velpar L* as a 10-percent solution in water (1 quart per 3-gallon mix) with a surfactant. When safety to surrounding vegetation is desired, immediately treat stump tops and sides with Garlon 3A or with a glyphosate herbicide as a 20-percent solution (5 pints per 3-gallon mix) in water with a surfactant. ORTHO Brush-B-Gon and Enforcer Brush Killer are effective undiluted for treating cut-stumps and available in retail garden stores (safe to surrounding plants). For large stems, make stem injections using Arsenal AC* or when safety to surrounding vegetation is desired, Garlon 3A or a glyphosate herbicide using dilutions and cut-spacings specified on the herbicide label

Invasive Species	Recommended Removal Technique
	(anytime except March and April). An EZ-Ject tree injector can help to reach the lower part of the main stem; otherwise, every branching trunk must be hack-and-squirt injected.
Tree of Heaven (*Ailanthus altissima*)	Foliar Spray Method: This method should be considered for large thickets of seedlings and small saplings where risk to nontarget species is minimal. Air temperature should be above 65°F to ensure absorption of herbicides. Glyphosate: Apply a 2% solution of glyphosate or triclopyr and water plus a 0.5% non-ionic surfactant to thoroughly wet all leaves. Use a low pressure and coarse spray pattern to reduce spray drift damage to non-target species. Glyphosate is a non-selective systemic herbicide that may kill non-target partially-sprayed plants. Cut Stump Method: This control method should be considered when treating individual trees or where the presence of desirable species precludes foliar application. Stump treatments can be used if the ground is not frozen. Triclopyr: Horizontally cut stems at or near ground level. Immediately apply a 25% solution of triclopyr and water to the cut stump making sure to cover the outer 20% of the stump. Hack and Squirt and Stem Injection Methods: To effectively treat larger saplings to mature trees using the hack and squirt methods, make cuts to the cambium spaced 1" apart and arranged horizontally around the stem. Immediately apply a 50% solution of triclopyr or 25% solution of glyphosate into the cuts. An EZ-Ject tree injector or other similar tool can be used to treat saplings to mature trees. These treatments should occur from mid-late summer to late fall.
Princess Tree (*Paulownia tomentosa*)	Foliar Spray Method: This method should be considered for large thickets of paulownia seedlings where risk to non-target species is minimal. Air temperature should be above 65°F to ensure absorption of herbicides. Glyphosate: Apply a 2% solution of glyphosate and water plus a 0.5% non-ionic surfactant to thoroughly wet all leaves. Use a low pressure and coarse spray pattern to reduce spray drift damage to non-target species. Glyphosate is a non-selective systemic herbicide that may kill non-target partially-sprayed plants. Triclopyr: Apply a 2% solution of triclopyr and water plus a 0.5% non-ionic sur-factant to thoroughly wet all leaves. Use a low pressure and coarse spray pattern to reduce spray drift damage to non-target species. Triclopyr is a selective herbicide for broadleaf species. In areas where desirable grasses are growing under or around paulownia, triclopyr can be used without non-target damage. Cut Stump Method: This control method should be considered when treating individual trees or where the presence of desirable species precludes foliar application. Stump treatments can be used if the ground is not frozen. Glyphosate: Horizontally cut stems at or near ground level. Immediately apply a 25% solution of glyphosate and water to the cut stump making sure to cover the outer 50% of the stump. Triclopyr: Horizontally cut stems at or near ground level. Immediately apply a 50% solution of triclopyr and water to the cut stump making sure to cover the outer 20% of the stump. Hack and Squirt and Stem Injection Methods: To effectively treat larger saplings to mature trees using the hack and squirt methods, make cuts to the cambium spaced 1" apart and arranged horizontally around the stem. Immediately apply a 50% solution of triclopyr or 25% solution of glyphosate into the cuts. An EZ-Ject tree injector or other similar tool can be used to treat saplings to mature trees. These treatments should occur from mid-late summer to late fall. https://www.se-eppc.org/manual/princess.html

Invasive Species	Recommended Removal Technique
Multiflora Rose (*Rosa multiflora*)	Foliar Spray Method: Apply MSM at 1 ounce per acre between April and June. May to October apply a 4% solution of glyphosate and water plus a 0.5% non-ionic surfactant to thoroughly wet all leaves. Use a low pressure and coarse spray pattern to reduce spray drift damage to non-target species. Glyphosate is a non-selective systemic herbicide that may kill non-target partially-sprayed plants. Cut Stump Method: This control method should be considered when treating individual stems or where the presence of desirable species precludes foliar application. Stump treatments can be used if the ground is not frozen. Glyphosate: Horizontally cut stems at or near ground level. Immediately apply a 20% solution of glyphosate and water to the cut stump making sure to cover the outer 50% of the stump.
Alligatorweed (*Alternanthera philoxeroides*)	Two herbicide treatments with a 2 percent solution of glyphosate plus a surfactant (formulations approved for aquatic sites), 1 in the spring and 1 in the fall, have shown to be most effective for the initial treatment of alligatorweed. When the weed is reduced to a maintenance level, only annual treatments should be required.
Fescue (*Festuca*)	Areas of dense pasture grass that will not be disturbed by grading will be treated with the goal of replacing it with native herbaceous cover. This will be accomplished using a broadcast application of herbicide to kill the pasture grass. Following the pasture grass mortality, the areas will be disked or cultivated in a similar way to provide better soil contact for the seed. These areas will be seeded using an appropriate temporary grain and the permanent native mix used on the rest of the project.

APPENDIX 7

Site Protection Instrument

Appendix 7 Site Protection Instrument

The land required for construction, management, and stewardship of this mitigation project includes portions of the parcels listed in Table 1. All parcels are optioned for 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 – *Alexander Farm Mitigation Site*

Current Landowner	PIN	County	Under Option to Purchase by Wildlands?	Memorandum of Option/Temporary Access and Conservation Easement Deed Book (DB) and Page Number (PG)	Acreage to be Protected
Jennifer A. Combs, Scottie A. Combs, Polly A. Van Hoy, Henry P Van Hoy, II	0010480	Alexander	Yes	Book 602 Page 493-499	

*Agreement for temporary construction easement

The conservation easement template that will be used for recordation is included in this appendix. 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.

Type: ESMT
Recorded: 10/3/2019 3:27:02 PM
Fee Amt: $26.00 Page 1 of 15
Alexander, NC
Scott H. Hines Register of Deeds
File#

BK 620 PG 1577 - 1591

STATE OF NORTH CAROLINA

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

ALEXANDER COUNTY

SPO File Numbers: 02-U
DMS Project Number: 100048

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

THIS DEED OF CONSERVATION EASEMENT AND RIGHT OF ACCESS, made this 2 day of October, 2019, by **Jennifer A. Combs and spouse Scottie A. Combs and Polly (Pauline) A. Van Hoy and spouse Henry P. Van Hoy II**, ("**Grantor**"), whose mailing address is **10 Court Square, Mocksville, NC 27028-2415** to the State of North Carolina, ("**Grantee**"), whose mailing address is State of North Carolina, Department of Administration, State Property Office, 1321 Mail Service Center, Raleigh, NC 27699-1321. The designations of Grantor and Grantee as used herein shall include said parties, their heirs, successors, and assigns, and shall include singular, plural, masculine, feminine, or neuter as required by context.

WITNESSETH:

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

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WHEREAS, this Conservation Easement from Grantor to Grantee has been negotiated, arranged and provided for as a condition of a full delivery contract between **Wildlands Engineering, Inc.** and the North Carolina Department of Environmental Quality, to provide stream, wetland and/or buffer mitigation pursuant to the North Carolina Department of Environment and Natural Resources Purchase and Services Contract Number **7416**.

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

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

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

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

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

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

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WHEREAS, Grantor owns in fee simple certain real properties situated, lying, and being in Millers Township, Alexander County, North Carolina (the "**Property**"), and being more particularly described as that certain parcel of land containing approximately **1072.68** acres and being conveyed to the Grantor by deed as recorded in **Deed Book 0551, Pages 1132, 1141, 1149, 1159, 1169** and corrected at **Deed Book 0570, Paged 1972, 1982, 1990, 2000, 2010** of the Alexander County Registry, North Carolina; and

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

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

The Conservation Easement Area consists of the following:

Easement Areas A and B containing a total of 21.93 acres as shown on the plats of survey entitled "Conservation Easement Survey for the State of North Carolina NCDEQ: Division of Mitigation Services, Alexander Farm Mitigation Site, SPO File No. 02-U, DMS Site ID No. 10048, Property of Jennifer A. Palmer Combs and Pauline (Polly) A. Van Hoy, dated 9/19/2019 Elisabeth G. Turner (License # L-4440) and recorded in the Alexander County, North Carolina Register of Deeds at Plat Book 16, Page 185+186.

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

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

I. DURATION OF EASEMENT

Pursuant to law, including the above referenced statutes, this Conservation Easement and Right of Access shall be perpetual and it shall run with, and be a continuing restriction upon the

use of, the Property, and it shall be enforceable by the Grantee against the Grantor and against Grantor's heirs, successors and assigns, personal representatives, agents, lessees, and licensees.

II. ACCESS EASEMENT

Grantor hereby grants and conveys unto Grantee, its employees, agents, successors and assigns, a perpetual, non-exclusive easement for ingress and egress over and upon the Property at all reasonable times and at such location as practically necessary to access the Conservation Easement Area for the purposes set forth herein ("Access Easement"). This grant of easement shall not vest any rights in the public and shall not be construed as a public dedication of the Access Easement. Grantor covenants, represents and warrants that it is the sole owner of and is seized of the Property in fee simple and has the right to grant and convey this Access Easement.

III. GRANTOR RESERVED USES AND RESTRICTED ACTIVITIES

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

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

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

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

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

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

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

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

H. Roads and Trails. There shall be no construction or maintenance of new roads, trails, walkways, or paving in the Conservation Easement except within a Crossing Area as shown on the recorded survey plat. All existing roads, trails and crossings within the Conservation Easement Area shall be shown on the recorded survey plat.

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

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

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

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

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

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

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

P. Crossing Areas. "Grantor reserves the right to the Internal Crossing Areas as shown on the "Conservation Easement Survey for the State of North Carolina NCDEQ: Division of Mitigation Services, Alexander Farm Mitigation Site, SPO File No. 02-U, DMS Site ID No. 10048, Property of Jennifer A. Palmer Combs and Pauline (Polly) A. Van Hoy, dated 9/19/2019 (Elisabeth G. Turner, PLS #L-4440) and recorded in the Alexander County, North Carolina Register of Deeds at Plat Book 16 Page 185 & 186 for the following purposes:

- Motorized vehicle crossing;
- Utility crossings to include overhead and buried electrical, water lines and sewer lines;
- Cattle crossing so long as fencing across a culvert in the Crossing Area prevents cattle access to the stream, or a ford crossing is kept gated and cattle are only present in the stream only under supervision while rotating cattle between pastures; and/or
- Installation, maintenance, or replacement of a culvert or ford crossing.

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

IV. GRANTEE RESERVED USES

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

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

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

D. Fences. Conservation Easements are purchased to protect the investments by the State (Grantee) in natural resources. Livestock within conservations easements damages the investment and can result in reductions in natural resource value and mitigation credits which would cause financial harm to the State. Therefore, Landowners (Grantor) with livestock are required to restrict

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livestock access to the Conservation Easement area. Repeated failure to do so may result in the State (Grantee) repairing or installing livestock exclusion devices (fences) within the conservation area for the purpose of restricting livestock access. In such cases, the landowner (Grantor) must provide access to the State (Grantee) to make repairs.

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

V. ENFORCEMENT AND REMEDIES

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

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

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

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

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

VI. MISCELLANEOUS

A. This instrument sets forth the entire agreement of the parties with respect to the Conservation Easement and supersedes all prior discussions, negotiations, understandings or agreements relating to the Conservation Easement. If any provision is found to be invalid, the remainder of the provisions of the Conservation Easement, and the application of such provision to persons or circumstances other than those as to which it is found to be invalid, shall not be affected thereby.

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

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

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

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

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

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

and

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

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

VII. QUIET ENJOYMENT

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

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

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

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

_____ (SEAL)
Jennifer A. Combs

_____ (SEAL)
Scottie A. Combs

_____ (SEAL)
Polly A. Van Hoy (aka Pauline A. Van Hoy)

_____ (SEAL)
Henry P. Van Hoy II

NORTH CAROLINA
COUNTY OF Alexander

I, Harris Nye, a Notary Public in and for the County and State aforesaid, do hereby certify that Jennifer A. Combs, Grantor, personally appeared before me this day and acknowledged the execution of the foregoing instrument.

IN WITNESS WHEREOF, I have hereunto set my hand and Notary Seal this the 2nd day of October, 2019.

Harris Nye
NOTARY PUBLIC
Mecklenburg County, NC

Notary Public

My commission expires:

7-7-2024

NORTH CAROLINA
COUNTY OF Alexander

I, Harris Nye, a Notary Public in and for the County and State aforesaid, do hereby certify that Scottie A. Combs, Grantor, personally appeared before me this day and acknowledged the execution of the foregoing instrument.

IN WITNESS WHEREOF, I have hereunto set my hand and Notary Seal this the 2nd day of October, 2019.

Harris Nye
NOTARY
PUBLIC
Mecklenburg County, NC

Notary Public

My commission expires:

7-7-2024

NORTH CAROLINA
COUNTY OF Davie

I, Harris Nye, a Notary Public in and for the County and State aforesaid, do hereby certify that Polly A. Van Hay, Grantor, personally appeared before me this day and acknowledged the execution of the foregoing instrument.

IN WITNESS WHEREOF, I have hereunto set my hand and Notary Seal this the 2nd day of October, 2017.

Notary Public

Harris Nye NOTARY PUBLIC Mecklenburg County, NC

My commission expires:

7-7-2024

NORTH CAROLINA
COUNTY OF Davie

I, Harris Nye, a Notary Public in and for the County and State aforesaid, do hereby certify that Henry P. Van Hay II, Grantor, personally appeared before me this day and acknowledged the execution of the foregoing instrument.

IN WITNESS WHEREOF, I have hereunto set my hand and Notary Seal this the 2nd day of October, 2017.

Notary Public

Harris Nye NOTARY PUBLIC Mecklenburg County, NC

My commission expires:

7-7-2024

EXHIBIT A

A Conservation Easement for The State of North Carolina.
NCDEQ: Division of Mitigation Services.
"Alexander Farms Mitigation Site"
Property of: Jennifer A. Palmer Combs and Pauline (Polly) A. Van Hoy
SPO FILE NO. 02-U DMS SITE ID NO. 100048

Descriptions for Conservation Easement for the State of North Carolina, Division of Mitigation Services, Alexander Farm Mitigation Site on the property of Jennifer A. (Palmer) Combs and Pauline (Polly) A. Van Hoy (see Deed Book 0551, Pages 1132, 1141, 1149, 1159, 1169 and corrected at Deed Book 0570, Paged 1972, 1982, 1990, 2000, 2010) located in Millers Township, Alexander County, North Carolina. All references to the Alexander County Register of Deed.

PIN: 3775-04-8774 Parcel ID: 0010480

CE Area "A"

Beginning at a 5/8" rebar with aluminum cap set (CE corner #1) on the North margin of Elk Shoals Church Loop (NCSR 1622) having a 60' right-of-way (see Deed Book 83, Pg. 375 & 379) on the property of Jennifer A. (Palmer) Combs and Pauline (Polly) A. Van Hoy (see Deed Book 570, Pg. 1972 & Pg. 2000), said rebar being located S 34°13'46" W 251.97' from Site Control Point #1 (rebar with plastic cap) having NC Grid Coordinates [NAD83(2011)] N= 757,492.429 USft, E= 1,341,231.300 USft;
thence, from the point of Beginning, with a new line, N 03°16'03" W a distance of 344.90' to a rebar with aluminum cap set;
thence N 21°26'07" W a distance of 281.94' to a rebar with aluminum cap set;
thence N 20°05'14" E a distance of 241.37' to a rebar with aluminum cap set;
thence N 01°55'34" W a distance of 152.95' to a rebar with aluminum cap set;
thence N 38°24'45" W a distance of 149.63' to a rebar with aluminum cap set;
thence N 09°53'50" W a distance of 824.43' to a rebar with aluminum cap set;
thence N 07°52'44" E a distance of 194.01' to a rebar with aluminum cap set;
thence N 42°08'23" E a distance of 109.78' to a rebar with aluminum cap set;
thence N 03°18'56" E a distance of 314.02' to a rebar with aluminum cap set;
thence S 88°45'30" E a distance of 129.55' to a rebar with aluminum cap set;
thence S 04°40'43" W a distance of 354.13' to a rebar with aluminum cap set;
thence S 37°41'37" W a distance of 130.17' to a rebar with aluminum cap set;
thence S 01°44'31" W a distance of 149.22' to a rebar with aluminum cap set;
thence S 15°42'03" E a distance of 367.77' to a rebar with aluminum cap set;
thence S 01°12'52" E a distance of 250.27' to a rebar with aluminum cap set;
thence S 74°12'57" E a distance of 57.36' to a rebar with aluminum cap set;
thence S 26°27'42" E a distance of 153.16' to a rebar with aluminum cap set;
thence S 55°02'59" W a distance of 50.85' to a rebar with aluminum cap set;
thence S 30°06'17" E a distance of 161.22' to a rebar with aluminum cap set;
thence S 00°27'16" W a distance of 84.72' to a rebar with aluminum cap set;

Book: 620 Page: 1577 Page 14 of 15

thence S 00°24'38" E a distance of 49.98' to a rebar with aluminum cap set;
thence S 13°43'07" W a distance of 267.74' to a rebar with aluminum cap set;
thence S 21°01'52" E a distance of 249.84' to a rebar with aluminum cap set;
thence S 00°15'41" W a distance of 283.00' to a rebar with aluminum cap set;
thence S 38°35'24" E a distance of 216.82' to a rebar with aluminum cap set;
thence S 02°01'56" E a distance of 56.69' to a rebar with aluminum cap set on the North side of Elk Shoals Church Loop;
thence, along the northern margin of the road, N 59°28'34" W a distance of 330.37' to the point of Beginning;
containing 9.45 acres, more or less, and shown as Area "A" on a plat prepared by Turner Land Surveying, PLLC (P-0702) of Swannanoa, NC, entitled "Conservation Easement for the State of North Carolina, Division of Mitigation Services, Alexander Farm Mitigation Site" dated September 19, 2019 and recorded in Plat Book 16, Page 185 & 186 of the Alexander County Register of Deeds.

CE Area "B"

Beginning at a 5/8" rebar with aluminum cap set (CE corner #29) on the South margin of Elk Shoals Church Loop (NCSR 1622) having a 60' right-of-way (see Deed Book 83, Pg. 375 & 379) on the property of Jennifer A. (Palmer) Combs and Pauline (Polly) A. Van Hoy (see Deed Book 570, Pg. 1972 & Pg. 2000), said rebar being located S 24°30'51" E 543.51' from Site Control Point #1 (rebar with plastic cap) having NC Grid Coordinates [NAD83(2011)] N= 757,492.429 USft, E= 1,341,231.300 USft;
thence, from the point of Beginning, with a new line, S 09°08'12" E a distance of 354.13' to a rebar with aluminum cap set;
thence S 02°59'52" W a distance of 168.05' to a rebar with aluminum cap set;
thence S 08°42'22" E a distance of 491.22' to a rebar with aluminum cap set;
thence S 35°46'31" E a distance of 67.74' to a rebar with aluminum cap set;
thence S 57°18'35" E a distance of 147.34 to a rebar with aluminum cap set;
thence N 23°17'19" E a distance of 107.69' to a rebar with aluminum cap set;
thence S 69°25'45" E a distance of 154.27' to a rebar with aluminum cap set;
thence S 23°47'08" W a distance of 232.04' to a rebar with aluminum cap set;
thence S 64°49'27" E a distance of 101.28' to a rebar with aluminum cap set;
thence N 54°59'16" E a distance of 177.30' to a rebar with aluminum cap set;
thence S 35°22'05" E a distance of 103.20' to a rebar with aluminum cap set;
thence S 56°17'31" W a distance of 162.80' to a rebar with aluminum cap set;
thence S 42°45'00" E a distance of 143.65' to a rebar with aluminum cap set;
thence S 33°11'36" E a distance of 283.86' to a rebar with aluminum cap set;
thence S 53°06'01" E a distance of 383.77' to a rebar with aluminum cap set;
thence S 29°55'40" E a distance of 436.92' to a rebar with aluminum cap set;
thence S 43°02'44" W a distance of 137.38' to a rebar with aluminum cap set;
thence N 34°58'07" W a distance of 479.77' to a rebar with aluminum cap set;
thence N 54°35'09" W a distance of 286.85' to a rebar with aluminum cap set;
thence N 36°39'43" W a distance of 426.75' to a rebar with aluminum cap set;
thence N 50°34'47" W a distance of 430.97' to a rebar with aluminum cap set;
thence N 28°58'47" W a distance of 271.73' to a rebar with aluminum cap set;
thence N 11°01'43" W a distance of 314.61' to a rebar with aluminum cap set;

thence N 00°29'15" E a distance of 173.97' to a rebar with aluminum cap set;
thence N 40°34'21" W a distance of 117.98' to a rebar with aluminum cap set;
thence N 04°35'44" E a distance of 202.14' to a rebar with aluminum cap set;
thence N 05°24'03" W a distance of 348.61' to a rebar with aluminum cap set on the South side of Elk Shoals Church Loop;
thence, along the southern margin of the road, S 59°28'34" E a distance of 227.27' to the point of Beginning;
containing 12.48 acres, more or less, and shown as Area "B" on a plat prepared by Turner Land Surveying, PLLC (P-0702) of Swannanoa, NC, entitled "Conservation Easement for the State of North Carolina, Division of Mitigation Services, Alexander Farm Mitigation Site" dated September 19, 2019 and recorded in Plat Book 16, Page 185 & 186 of the Alexander County Register of Deeds.

APPENDIX 8

Maintenance Plan

Appendix 8 Maintenance Plan

The site shall be visited semi-annually 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 – *Alexander Farm Mitigation Site*

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 – these shall be conducted where success criteria are threatened or at the discretion of the Designer. Areas where storm water and floodplain flows intercept the channel may also require maintenance to prevent bank failures and head-cutting. Beaver activity will be monitored and beaver dams on project streams will typically be removed, at the discretion of the Designer, during the monitoring period to allow for bank stabilization and stream development outside of this type of influence.
BMP	Routine BMP maintenance and repair activities may include chinking of BMP structures to prevent piping and securing of loose coir matting.
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. Exotic invasive plant species requiring treatment per the Invasive Species Treatment Plan (Appendix 6) 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

Financial Assurance

Appendix 9 Financial Assurances

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.

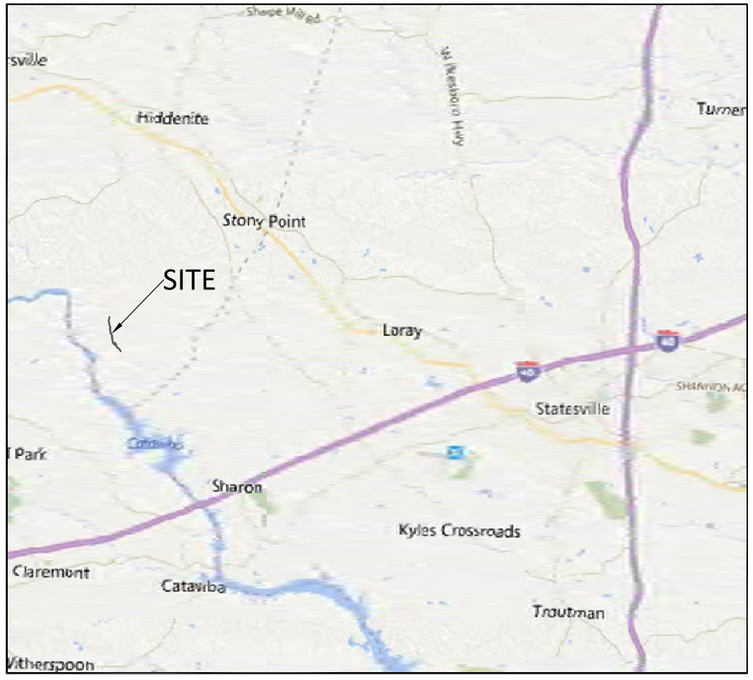
APPENDIX 10

Preliminary Construction Plans

October 10, 2019

Alexander Farm Mitigation Site

Alexander County, North Carolina
Catawba River Basin 03050101
for
NCDEQ
Division of Mitigation Services



Vicinity Map
Not to Scale

Environmental Quality

BEFORE YOU DIG!
CALL 1-800-632-4949
N.C. ONE-CALL CENTER
IT'S THE LAW!

PRELIMINARY PLANS
ISSUED WITH FINAL MITIGATION PLAN
OCTOBER 9, 2019

Sheet Index

Project Directory

Engineering:
Wildlands Engineering, Inc
License No. F-0831
1430 South Mint Street
Suite 104
Charlotte, NC 28203
Aaron Earley, PE
704-332-7754

Surveying:
Turner Land Surveying, PLLC
P.O. Box 148
Swannanoa, NC 28778
Lissa Turner, PLS
919-827-0745

Owner:
NC DEQ - Division of
Mitigation Services
5 Ravenscroft Dr, Ste. 102
Asheville, NC 28801
Harry Tsomides
828-545-7057

DMS Project No. 100048
USACE ID No. SAW-2018-00451

WILDLANDS ENGINEERING
1430 S. Mint Street, Ste 104
Charlotte, NC 28203
Tel: 704.332.7754
Fax: 704.332.3306
Firm License No. F-0831

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Alexander Farm Mitigation Site
Alexander County, North Carolina
Title Sheet

Revisions:

Date: 10.9.2019
Job Number: 005-02169
Project Engineer: ASE
Drawn By: JMS
Checked By: EPN

Sheet 0.1

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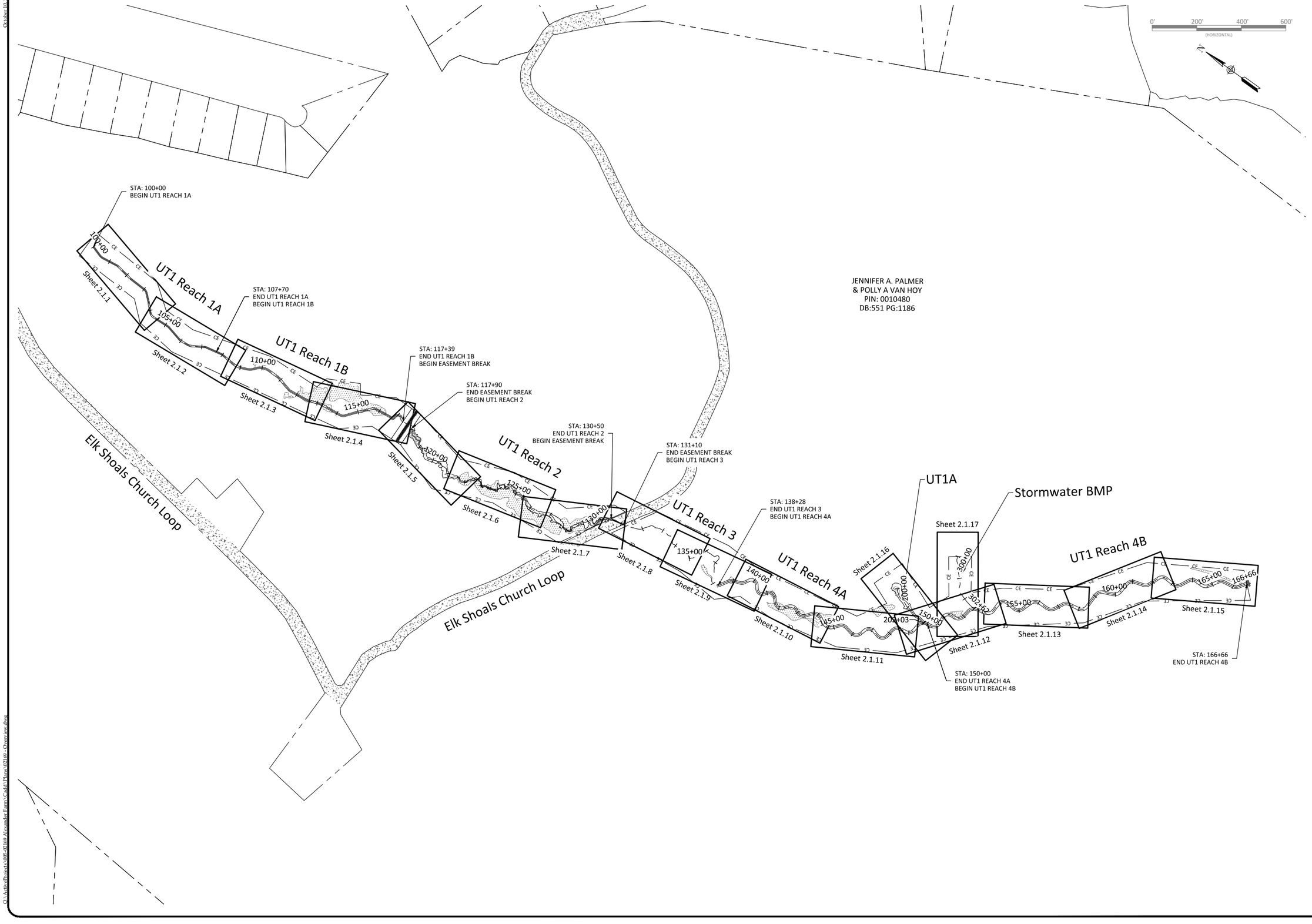
October 10, 2019



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Fax: 704.332.3306
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Alexander Farm Mitigation Site
Alexander County, North Carolina

Project Overview

Revisions:

Date:	10.9.2019
Job Number:	005-02169
Project Engineer:	ASE
Drawn By:	JMS
Checked By:	EPN

Sheet 0.2

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October 10, 2019

General Construction Notes for All Reaches

1. All erosion and sediment control practices shall comply with the North Carolina Erosion and Sediment Control Planning and Design Manual.
2. 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 the disturbed area is stabilized. The disturbed area within the pump around must be stabilized with temporary seeding, mulch, and erosion control matting by the end of each work day. Contractor shall not remove pump-around systems and advance to the next work area until the current work area is completed and stabilized.
3. In areas without a pump-around system, Contractor shall disturb only as much channel bank as can be stabilized with temporary seeding, mulch, and erosion control matting by the end of each work day.
4. Clearing and grubbing activities on active channels shall not extend more than 150 linear feet ahead of in-stream work.
5. When crossing an active section of new or old stream channel, a Timber Mat temporary stream crossing shall be installed according to the details and specifications.
6. All graded areas with slopes steeper than 3:1 will be stabilized within seven (7) working days. All other areas will be stabilized within 14 working days.with slopes steeper than 3:1 will be stabilized within seven (7) working days. All other areas will be stabilized within 14 working
7. 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 the areas are within the limits of disturbance, all practices comply with the North Carolina Erosion and Sediment Control Planning and Design Manual, and that the Designer approves the areas prior to implementation.
8. 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 Designer.
9. Contractor is to make every effort to avoid damaging or removing existing trees shown to remain outside the limits of disturbance.
10. Under no circumstances will the Contractor exceed the limits of disturbance as shown on the Plans.
11. Any off-site borrow and waste required for this project must come from a site with an approved erosion control plan, a site regulated under the Mining Act of 1971, or a landfill regulated by the Division of Solid Waste Management.
12. Trash/debris from demolition activities or generated by any activities on site must be disposed of at a facility regulated by the Division of Solid Waste Management or per Division of Solid Waste Management or Division of Water Resources Rules and Regulations.

Initial Site Preparation

1. Contact North Carolina "One Call" Center (811) before any excavation.
2. Contact Division of Energy, Mineral and Land Resources (336-776-9654) before any work begins on the project and notify them of the start date.
3. Mobilize equipment and materials to the Site.
4. Identify and establish construction entrance, staging and stockpile areas, haul roads, silt fence, tree protection fencing, safety fencing, and temporary stream crossings as indicated on the Plans for work areas.
5. 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, such as straw wattles, shall be installed. Silt fence outlets shall be located at points of low elevation or a minimum spacing of 150 ft.
6. Set up temporary facilities, locate equipment within the staging area, and stockpile materials needed for the initial stages of construction within the stockpile area(s).
7. Install and maintain an onsite rain gauge and log book to record the rainfall amounts and dates. Complete the self-inspection as required by NCDEQ and NCG01 permit.

Stream and Wetland Construction

8. Perform any necessary clearing and grubbing in phases as work progresses. Bank vegetation and vegetation immediately adjacent to live channels shall be left undisturbed as long as possible. Remove all non-native and invasive vegetation prior to beginning the channel construction.
9. Construction of all channels are to be done in the dry. Construction should generally progress from upstream to downstream to prevent sediment runoff from upstream construction affecting completed downstream reaches. Use a pump around as shown on the plans and discussed in the General Notes.
10. Where feasible, more than one offline section may be constructed concurrently. Offline sections shall be tied online sequentially from downstream to upstream.
11. As work progresses, remove and stockpile the top three inches of soil from the active grading area. Stockpiled topsoil shall be kept separate for onsite replacement prior to floodplain seeding.
12. Construct the proposed stream channel to the grade specified in the cross-sections and profile. Transfer coarse material from abandoned channel riffles to new channel riffles utilizing a pump-around when doing so.
13. Install in-stream structures (e.g. riffles, log and rock sills, log and rock vanes) and in-bank bioengineering such as brush toe and sod mats after channel grading is completed according to details and specifications.
14. Sod mats may be used in lieu of coir fiber matting, where available, to stabilize all stream banks on site at the discretion of the Designer. Coir fiber matting may be used where sod mats are not available or if coir fiber matting is preferred at the discretion of the Designer.
15. Seed (with specified temporary and permanent seed mix) and straw mulch areas where the coir fiber matting is to be installed.
16. Install coir fiber matting according to plans and specifications.
17. Grade the adjacent floodplain areas according to grades shown on the plan.
18. Backfill abandoned channel sections with stockpiled soil according to the grades shown on the Plans. Non-native and invasive vegetation (e.g. Chinese privet and multiflora rose) shall be removed from the existing channel prior to backfilling. Vegetation on abandoned channel banks shall be removed prior to the backfilling of abandoned channels to ensure flow paths are blocked and backfill can be compacted.
19. Prepare floodplain for seeding by applying stockpiled topsoil to the floodplain between bankfull elevation and the grading limits, ripping, and raking/smoothing. Seed with specified temporary and permanent seed mix and mulch any areas within the conservation easement that have not been graded shall be treated according to the planting plan.
20. If at any time circumstances should arise where water has been turned into the new channel and additional work must be done on the floodplain, erosion control devices will be installed to protect the new channel from sedimentation.
21. Once all phases of channel and floodplain construction are complete, prepare the floodplain areas for planting per the specifications.
22. Install live stakes and herbaceous plugs along the stream banks according to the plans and specifications.

Construction Demobilization

23. Remove temporary stream crossings.
24. The Contractor shall ensure that the site is free of trash and leftover materials prior to demobilization of equipment from the site.
25. Complete the removal of any additional stockpiled material from the site.
26. Demobilize grading equipment from the site.
27. All rock and other stockpiled materials must be removed from the limits of disturbance and conservation easement. All areas outside the conservation easement shall be returned to pre-project conditions or better.
28. Rip, Seed, mulch, and stabilize staging areas, stockpile areas, haul roads, and construction entrances. Pasture seed mix is to be applied to areas of disturbance outside of the conservation easement. Staging areas and hauls roads which have been compacted due to heavy equipment traffic must be ripped and/or disked to depth of 8" at a minimum.

Existing Features

- Existing Property Line
- Existing Major Contour (5' Interval) (100)
- Existing Minor Contour
- Existing Fence
- Existing FEMA Floodplain (FEMA FP)
- Existing Storm Pipe
- Existing Bridge
- Existing Wetland
- Existing Road
- Existing Treeline
- Existing Tree

Proposed Features

- Proposed Conservation Easement (CE)
- Proposed Stream Crossing (CE-XS)
- Proposed Temporary Construction Easement (TCE)
- Proposed Thalweg Alignment (10+00)
- Proposed Bankfull
- Proposed Major Contour (5' Interval) (100)
- Proposed Minor Contour
- Proposed Safety Fence (SAF) See Detail 2, Sheet 5.3
- Proposed Silt Fence ([X]) See Detail 4, Sheet 5.5
- Proposed Limits of Disturbance (LOD)
- Proposed Haul Road
- Proposed Temporary Rock Sediment Dam See Detail 2, Sheet 5.7
- Proposed Silt Fence Outlet See Detail 2, Sheet 5.5

Proposed Structures

- Proposed Various Constructed Riffles Sheet 5.0 and 5.1
- Proposed Brush Toe See Sheet 5.4
- Proposed Vernal Pool See Detail 1, Sheet 5.3
- Proposed Channel Plug See Detail 2, Sheet 5.3
- Proposed Vegetated Soil Lift See Detail 1, Sheet 5.2
- Proposed Channel Excavation/ Debris Removal

Proposed Structures

- Proposed Angled Log Sill See Detail 2 Sheet 5.2
- Proposed Lunker Log See Detail 2, Sheet 5.1
- Proposed Log J-Hook See Detail 4, Sheet 5.1
- Proposed Log Vane See Detail 4, Sheet 5.2
- Proposed Rock Sill See Detail 3, Sheet 5.2
- Proposed Permanent Crossing See Detail 3, Sheet 5.6
- Proposed Temporary Crossing See Detail 3, Sheet 5.5
- Proposed Temporary Construction Entrance See Detail 1, Sheet 5.6
- Proposed Coarse Woody Debris See Detail 1, Sheet 5.3

Project Notes:

Topographic survey was completed by Turner Land Surveying in October 2018.
Parcel boundary survey was completed by Turner Land Surveying in January 2019.

Topographic data outside proposed conservation easement supplemented with Lidar data from 2016.

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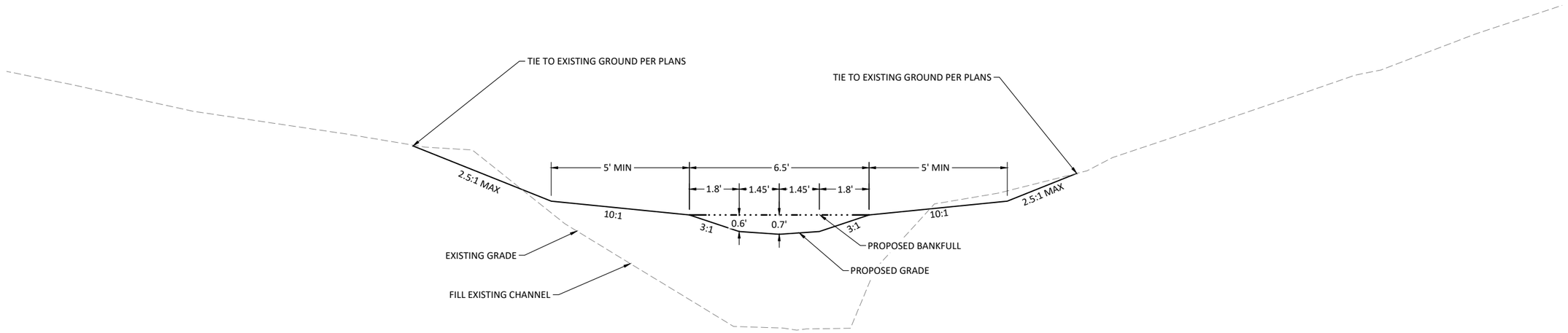
Alexander Farm Mitigation Site
Alexander County, North Carolina
General Notes & Symbols

Revisions:

Date: 10.9.2019
Job Number: 005-02169
Project Engineer: ASE
Drawn By: DAS
Checked By: EPN

Sheet 0.3



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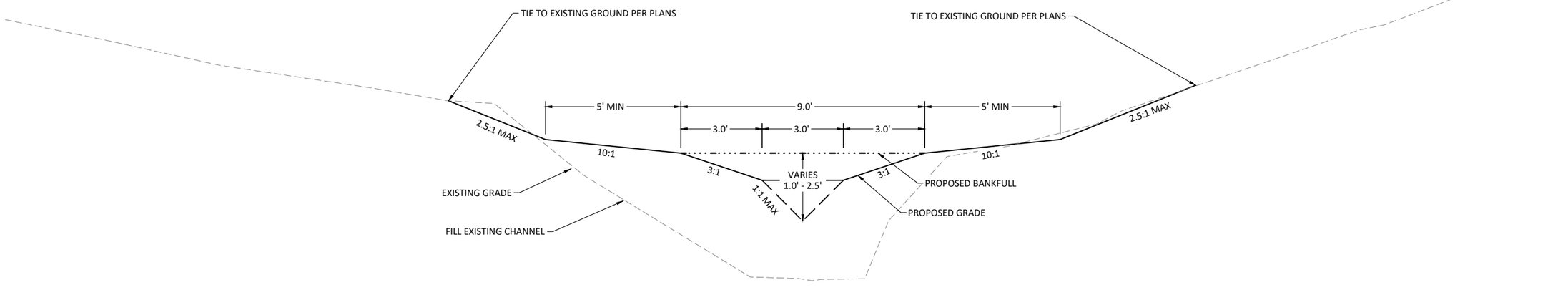
STA: 100+00 - 107+70



UT1 Reach 1A - Pool
STA: 100+00 - 107+70

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Alexander Farm Mitigation Site
Alexander County, North Carolina

UT1 Reach 1A
Typical Sections

Revisions:

Date: 10.9.2019
Job Number: 005-02169
Project Engineer: ASE
Drawn By: JMS
Checked By: EPN

Sheet 1.1

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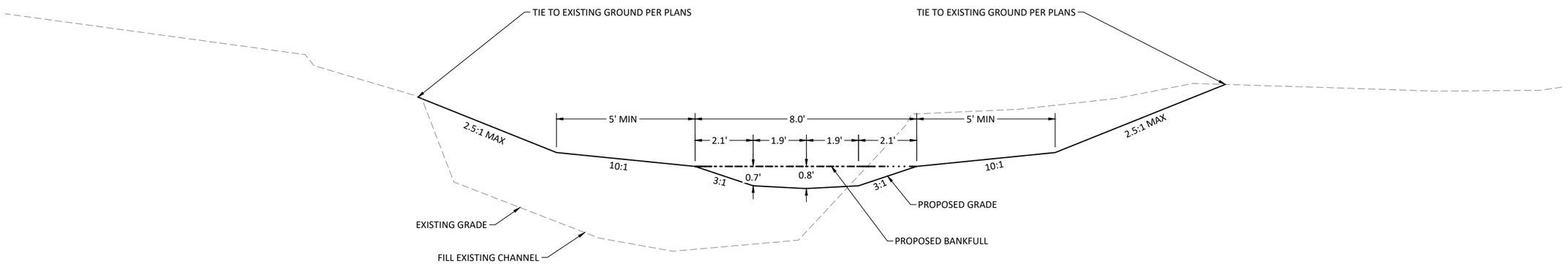
October 10, 2019



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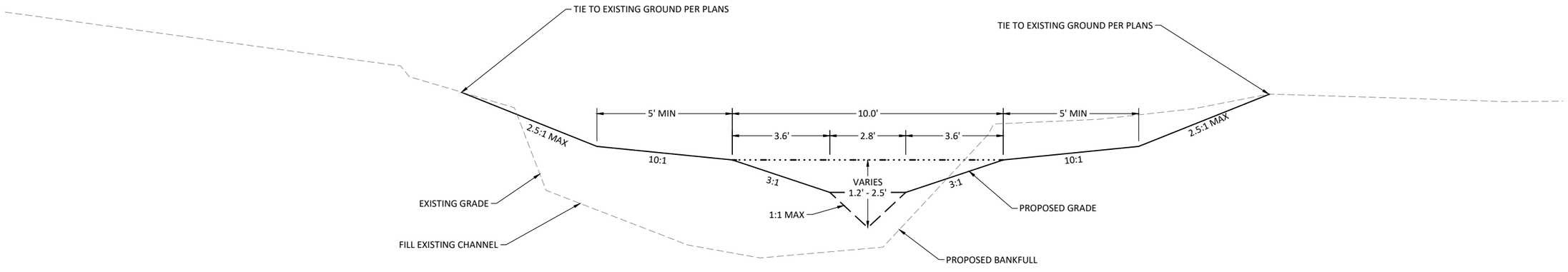
STA: 107+70 - 117+39



UT1 Reach 1B - Pool
STA: 107+70 - 117+39

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Alexander Farm Mitigation Site
Alexander County, North Carolina

UT1 Reach 1B
Typical Sections

Revisions:

Date: 10.9.2019
Job Number: 005-02169
Project Engineer: ASE
Drawn By: JMS
Checked By: EPN

Sheet 1.2

October 10, 2019

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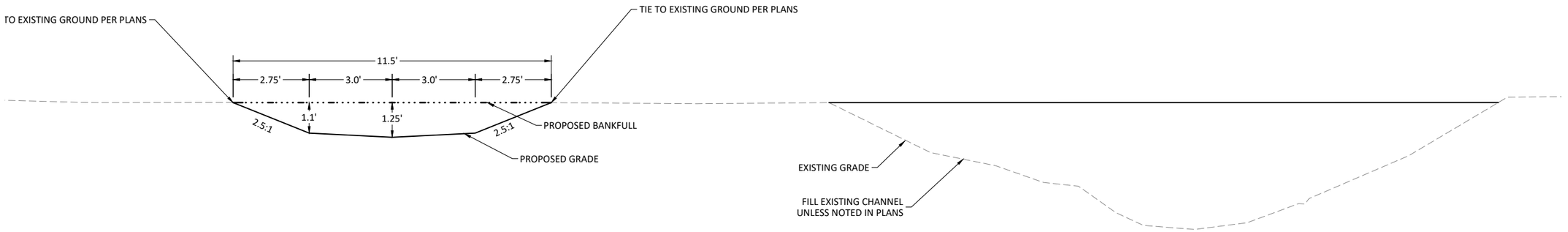
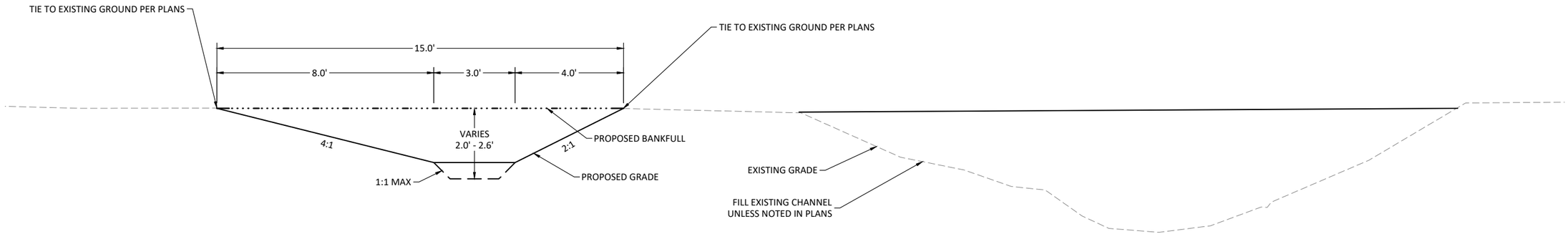


UT1 Reach 4A - Riffle
STA: 138+28 - 150+00



UT1 Reach 4A - Pool
STA: 138+28 - 150+00

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Alexander Farm Mitigation Site
Alexander County, North Carolina

UT1 Reach 4A
Typical Sections

Revisions:

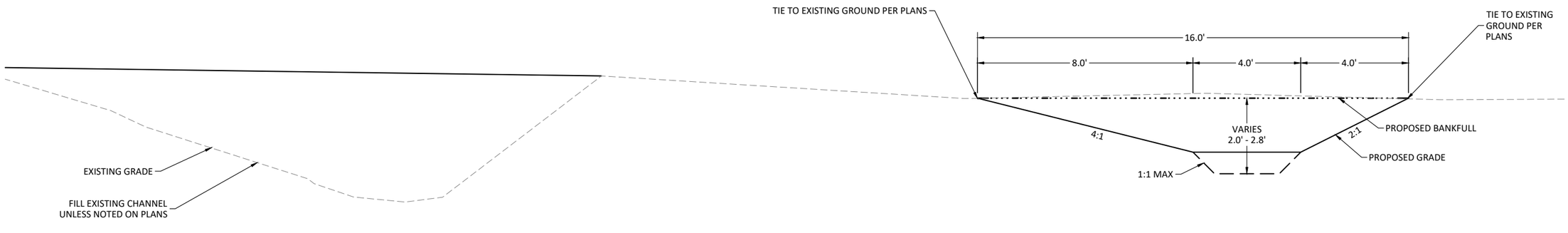
Date: 10.9.2019
Job Number: 005-02169
Project Engineer: ASE
Drawn By: JMS
Checked By: EPN

Sheet 1.3

O:\Active Projects\005-02169 Alexander Farm\Cad\Plans\02169 -Typical Sections.dwg

October 10, 2019

UT1 Reach 4B - Riffle
STA: 150+00 - 166+66



UT1 Reach 4B - Pool
STA: 150+00 - 166+66

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Alexander Farm Mitigation Site
Alexander County, North Carolina

UT1 Reach 4B
Typical Sections

Revisions:

Date: 10.9.2019
Job Number: 005-02169
Project Engineer: ASE
Drawn By: JMS
Checked By: EPN

Sheet 1.4

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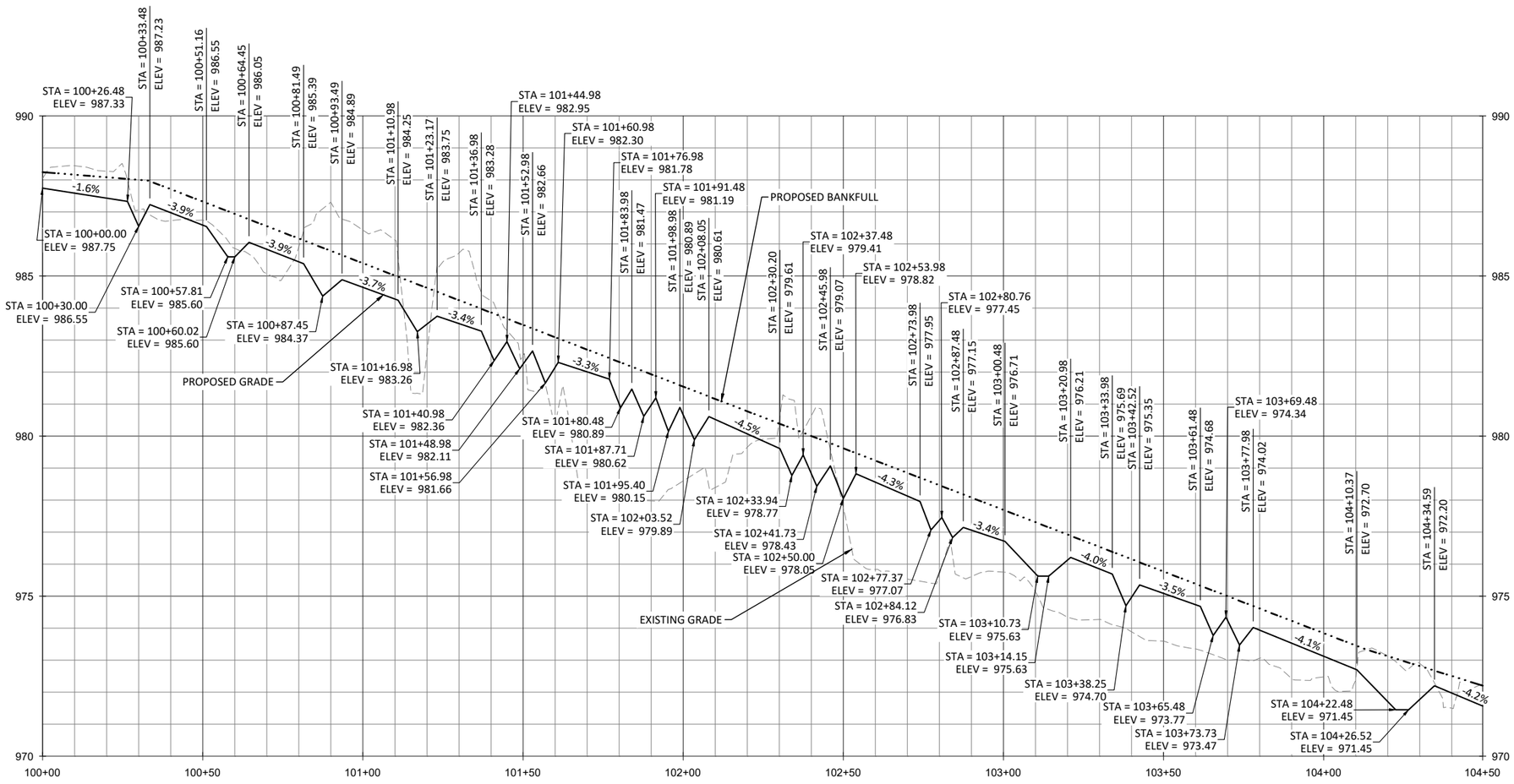
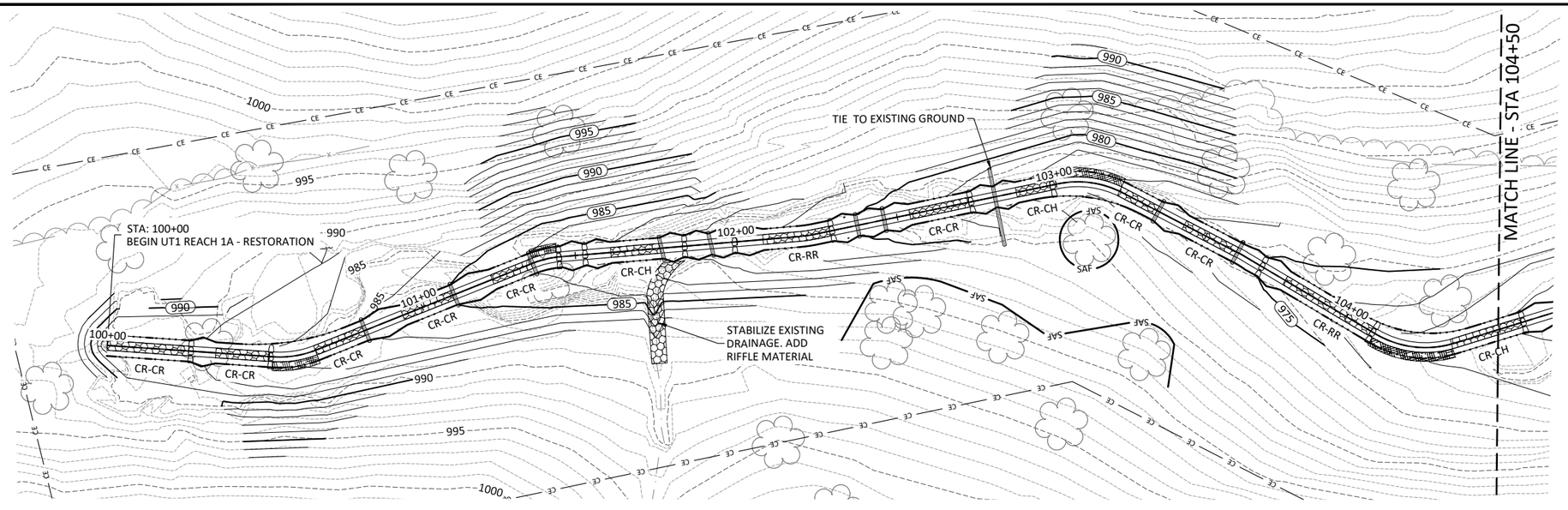
October 10, 2019

October 10, 2019





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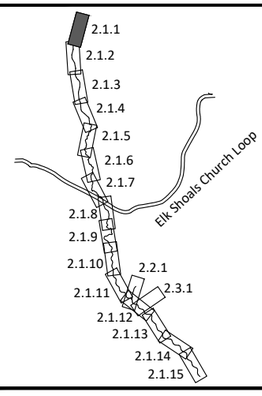

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Alexander Farm Mitigation Site
Alexander County, North Carolina

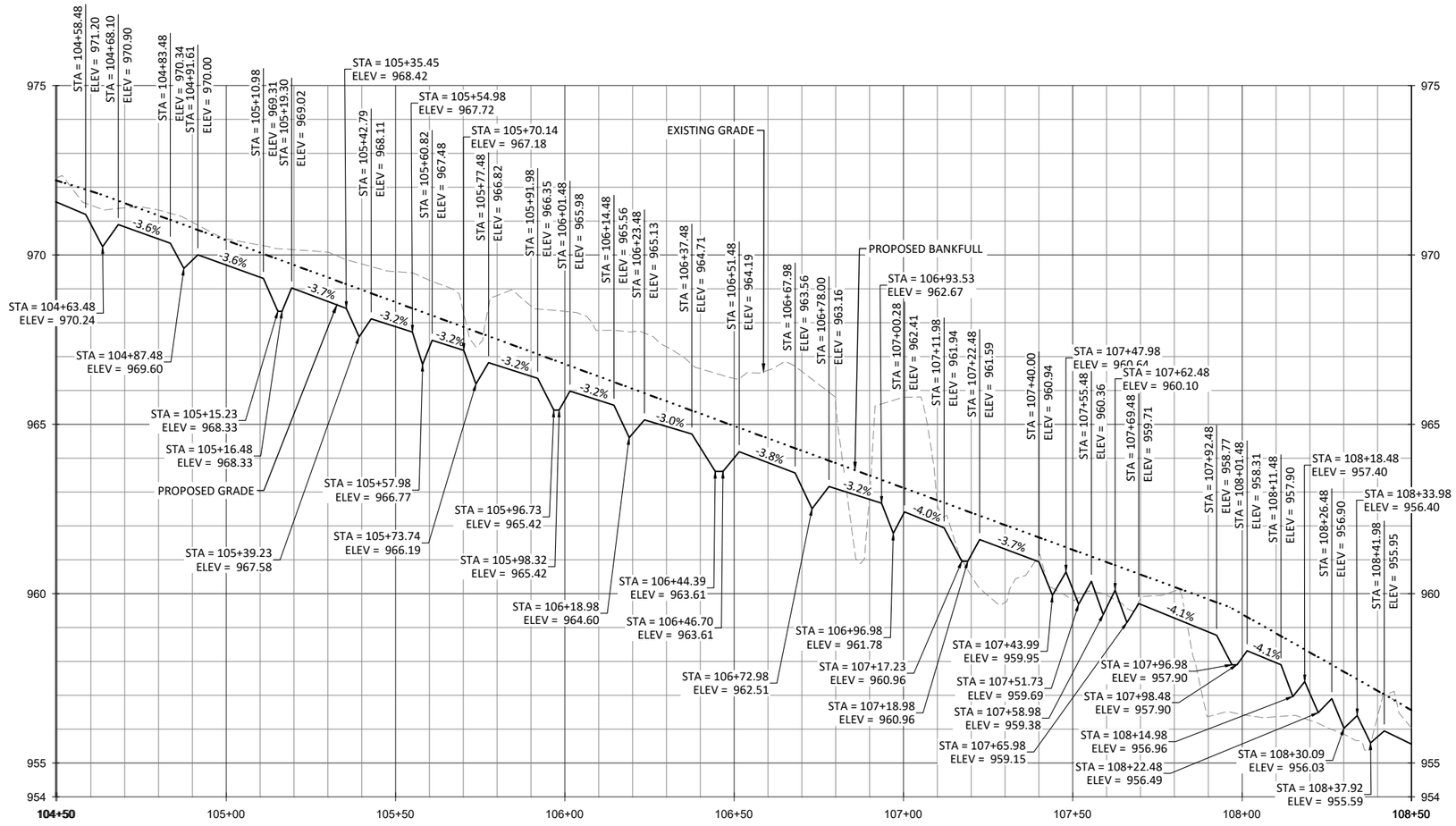
UT1 Reach 1A
Stream Plan and Profile

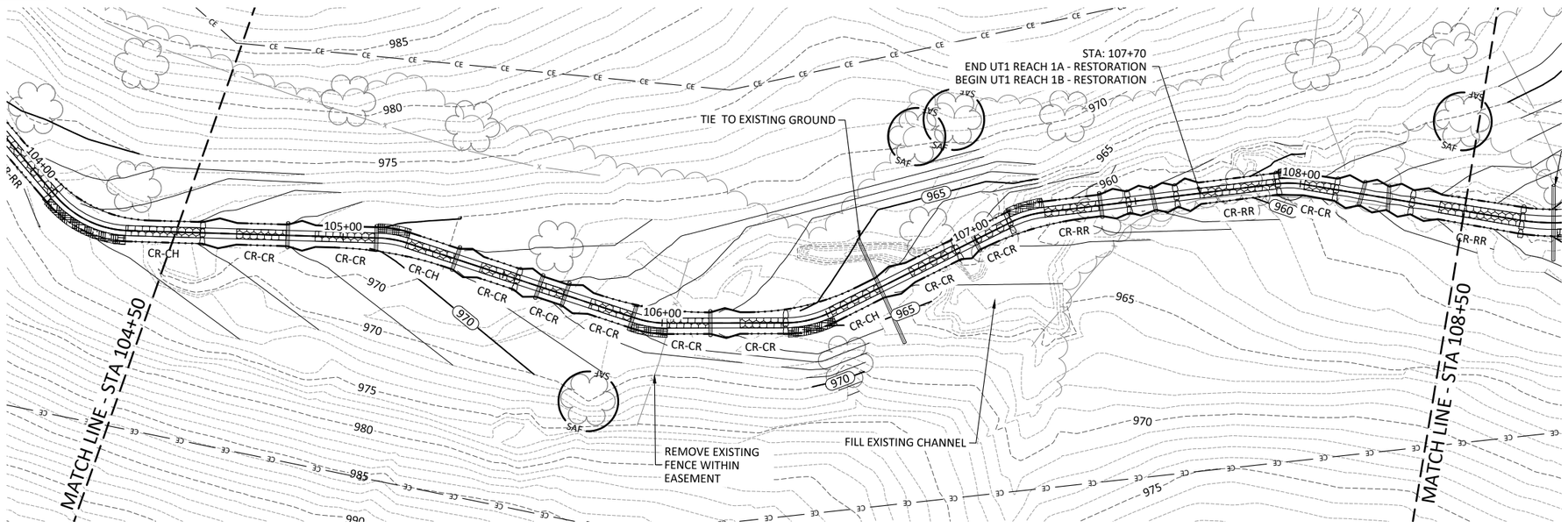
Revisions:

Date:	10.9.2019
Job Number:	005-02169
Project Engineer:	ASE
Drawn By:	JMS
Checked By:	EPN

Sheet 2.1.1

October 10, 2019





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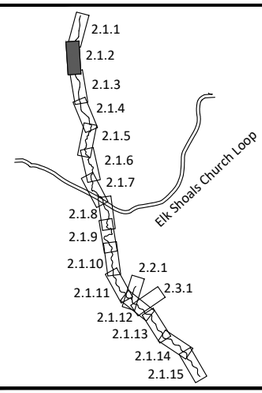

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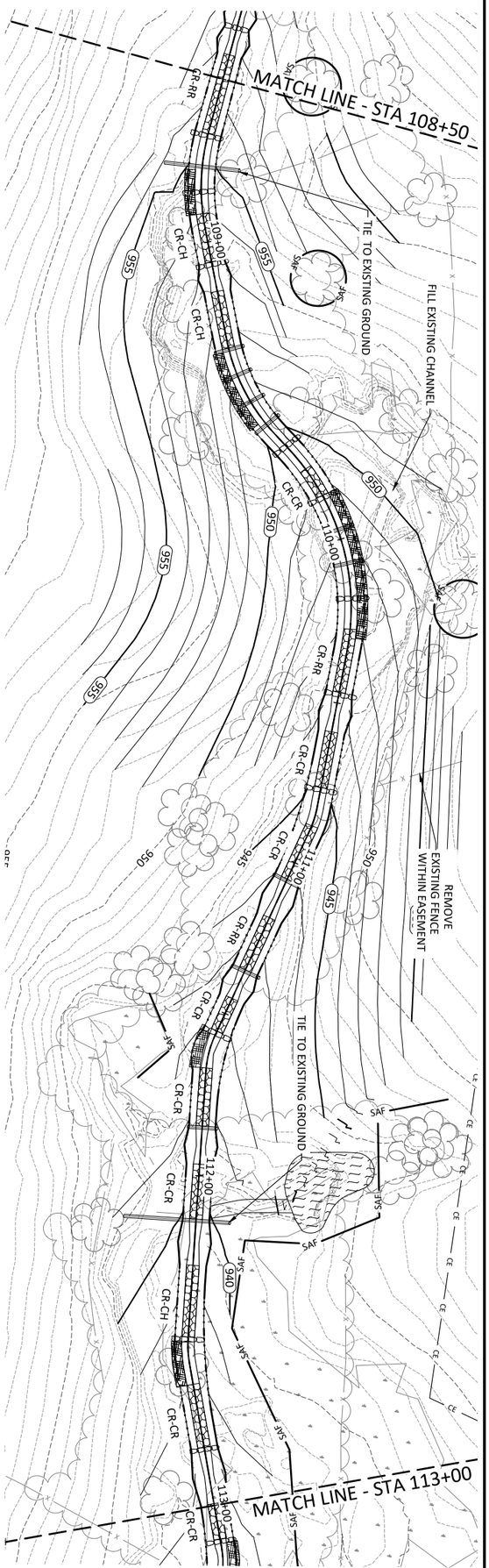
Alexander Farm Mitigation Site
Alexander County, North Carolina

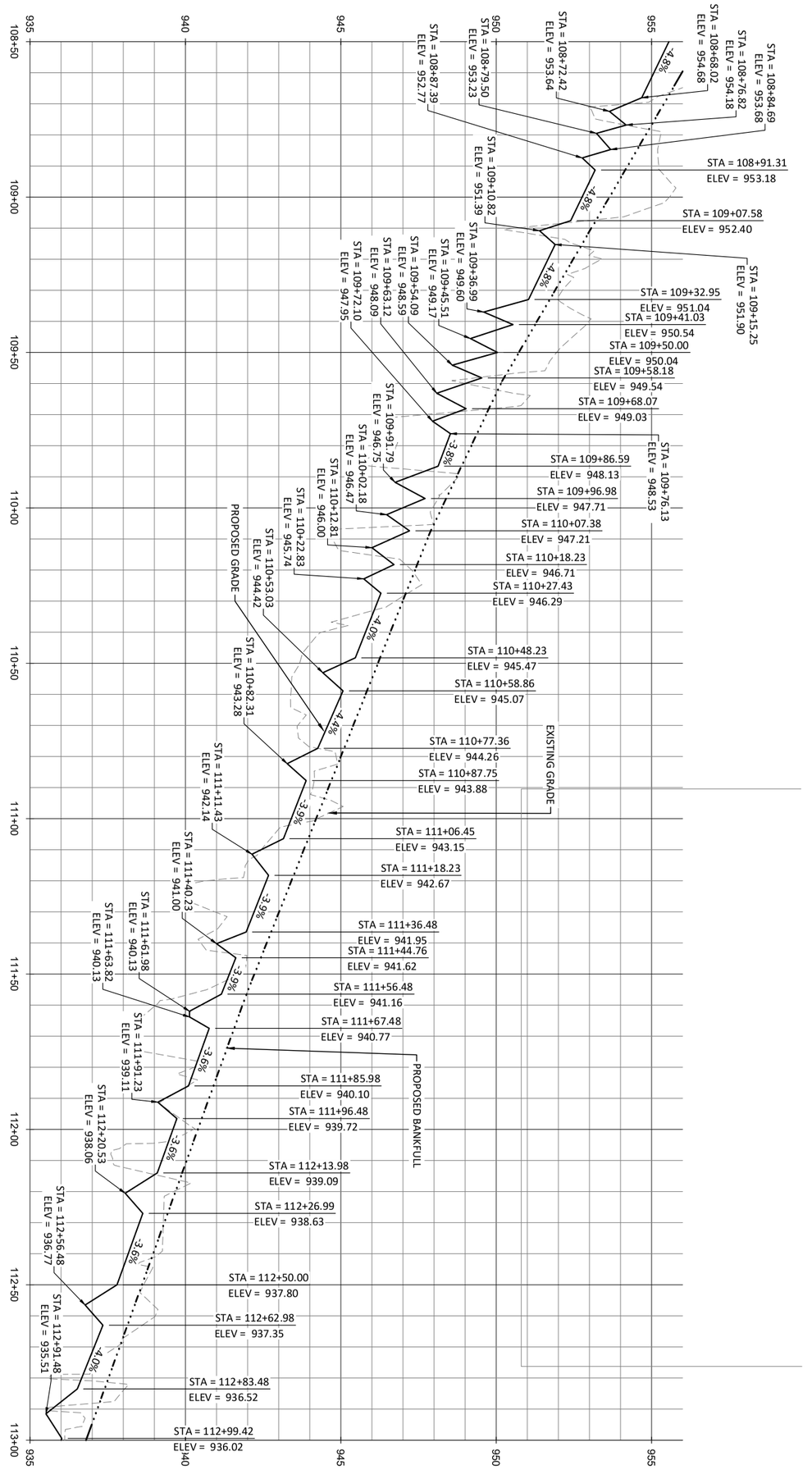
UT1 Reach 1A & 1B
Stream Plan and Profile

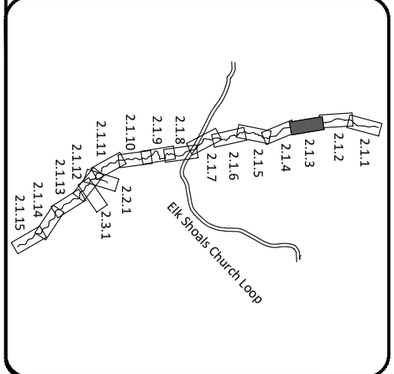
Revisions:

Date:	10.9.2019
Job Number:	005-02169
Project Engineer:	ASE
Drawn By:	JMS
Checked By:	EPN

Sheet 2.1.2







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0' 20' 40' 60' (HORIZONTAL)

0' 2' 4' 6' (VERTICAL)

Date:	10.9.2019
Job Number:	005-02169
Project Engineer:	ASE
Drawn By:	JMS
Checked By:	EPN

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Alexander Farm Mitigation Site
Alexander County, North Carolina

UT1 Reach 1B
Stream Plan and Profile

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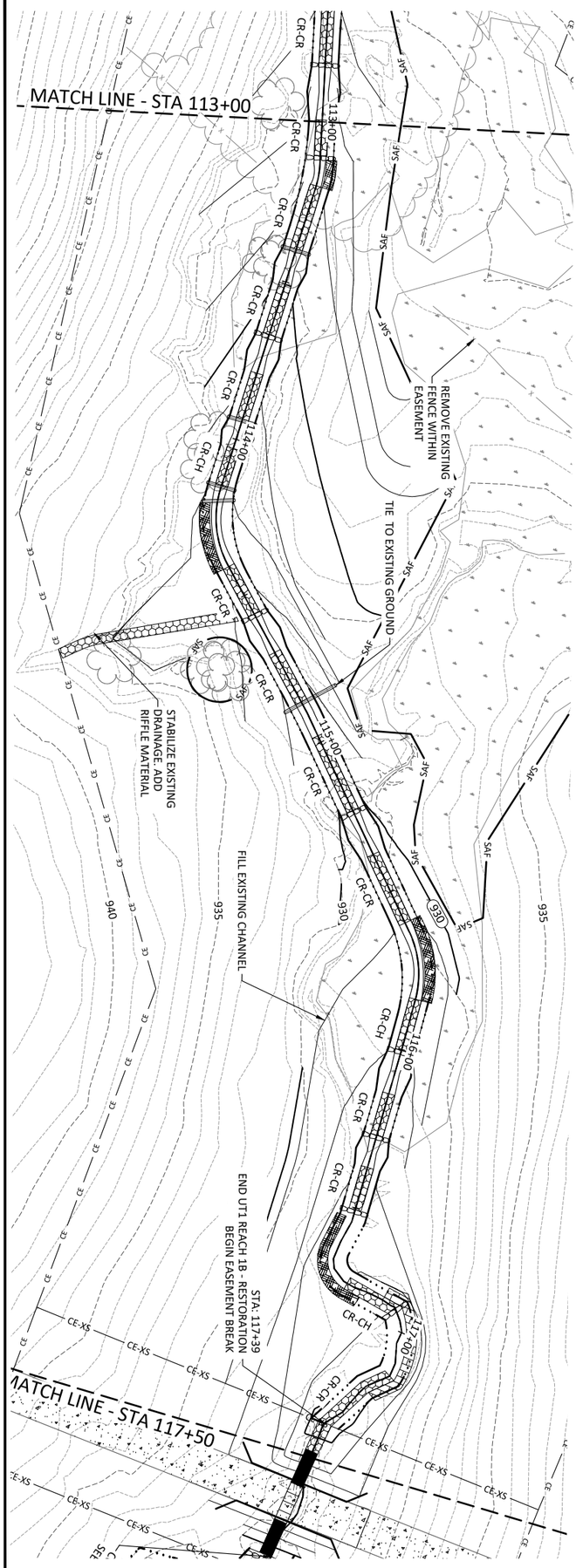

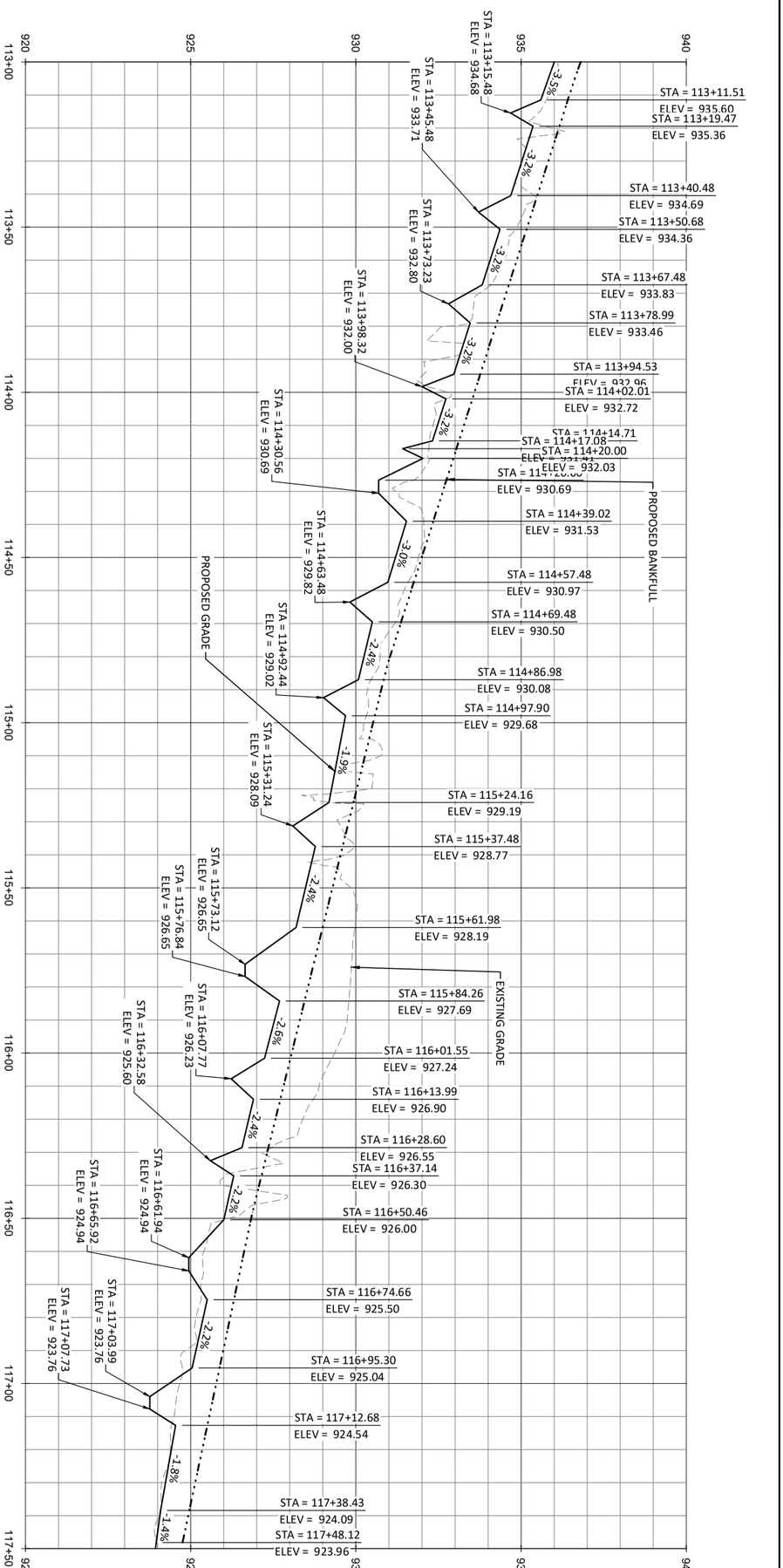

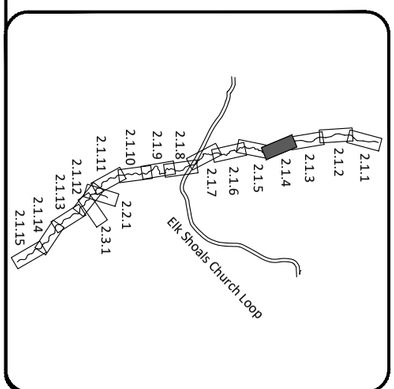

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Date:	10.9.2019
Job Number:	005-02169
Project Engineer:	ASE
Drawn By:	JMS
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Alexander Farm Mitigation Site
Alexander County, North Carolina

UT1 Reach 1B
Stream Plan and Profile

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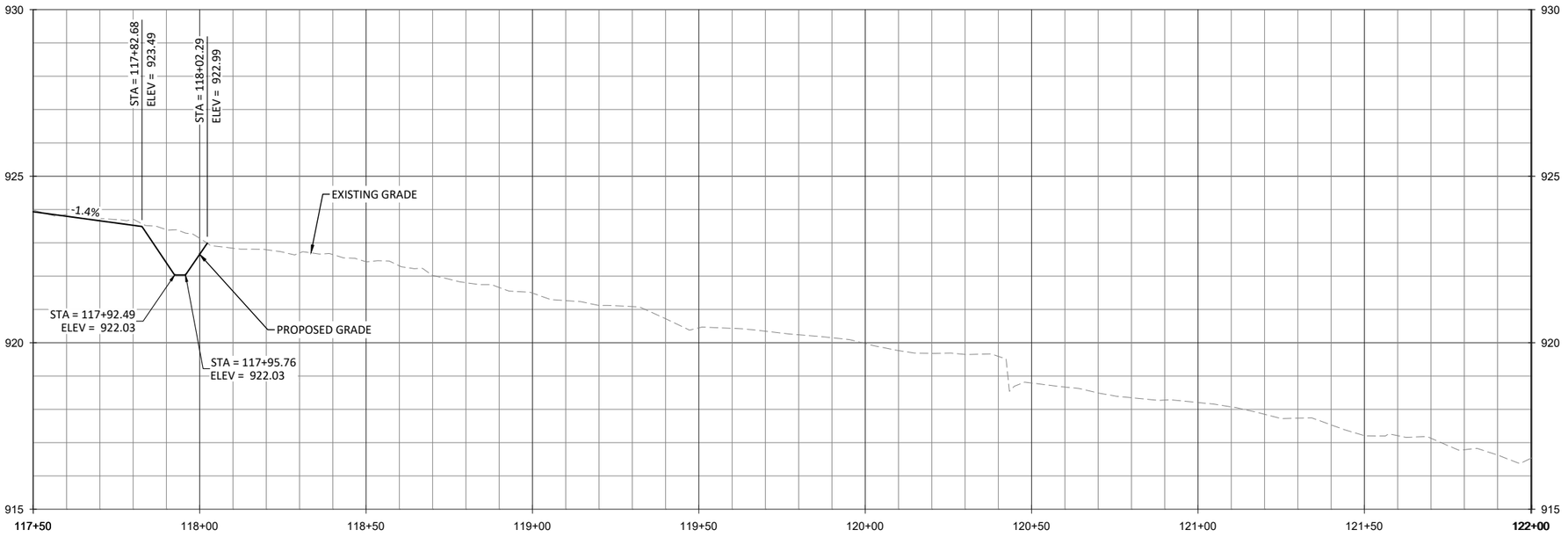
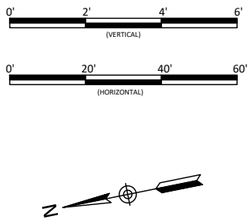
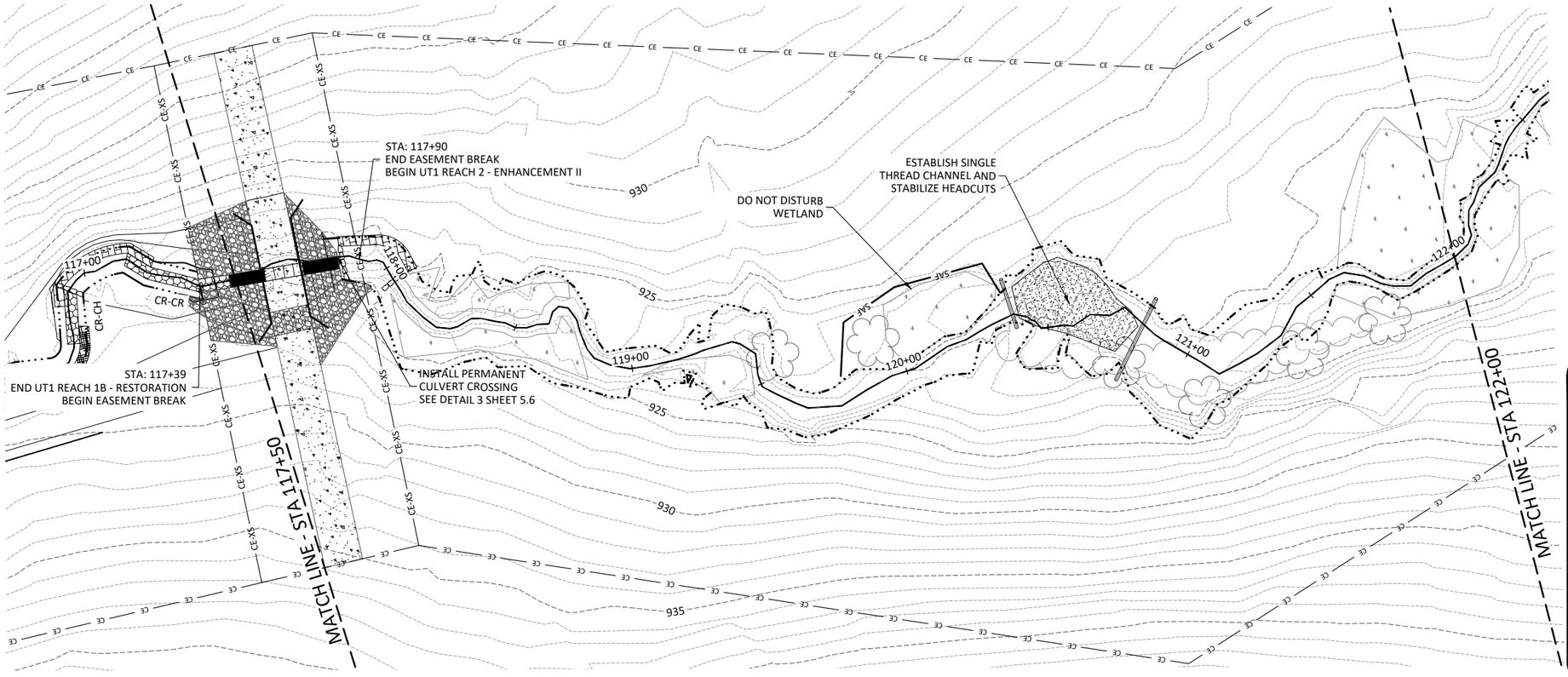




ENHANCEMENT II TREATMENTS

1. EXCLUDE CATTLE
2. TREAT INVASIVE VEGETATION
3. PROVIDE SUPPLEMENTAL PLANTING



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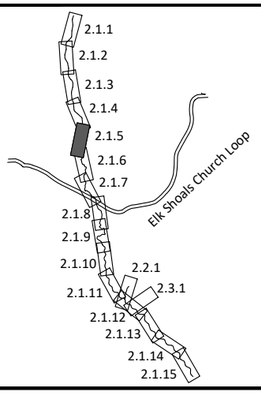

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UT1 Reach 2
Stream Plan and Profile

Revisions:

Date:	10.9.2019
Job Number:	005-02169
Project Engineer:	ASE
Drawn By:	JMS
Checked By:	EPN

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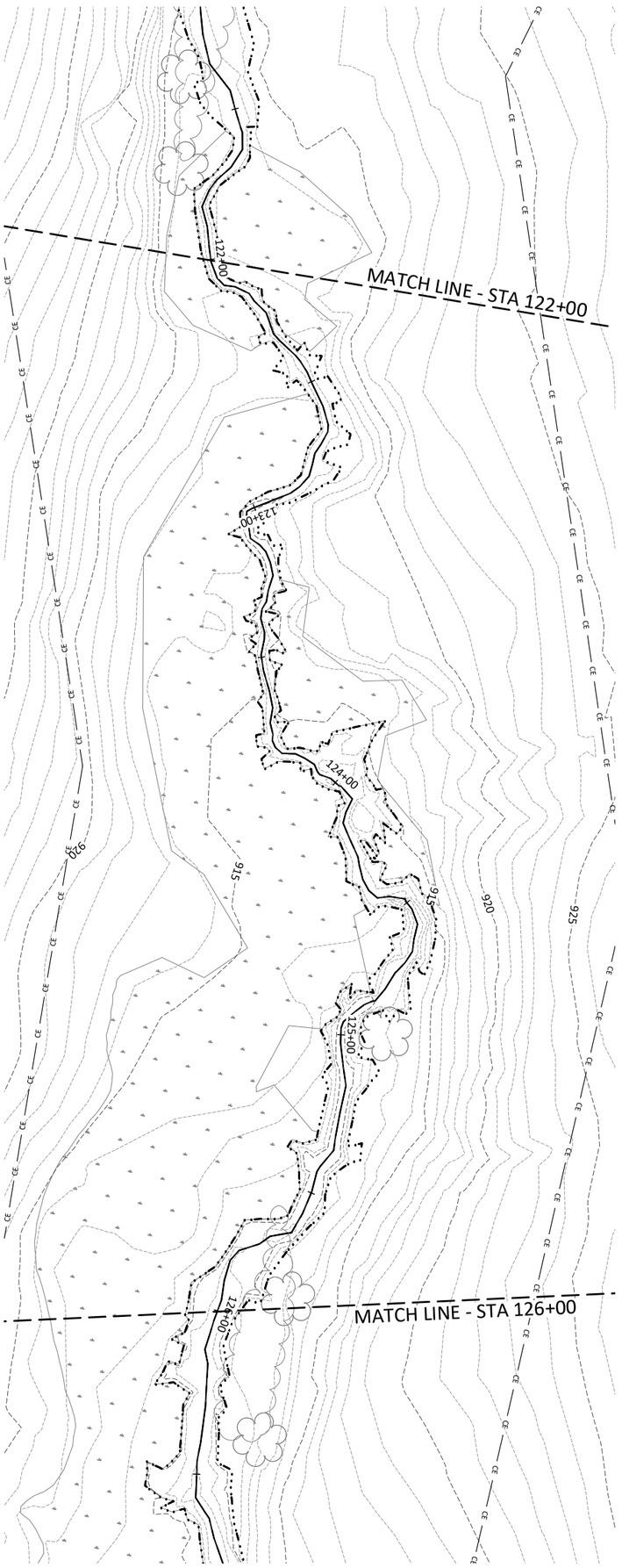

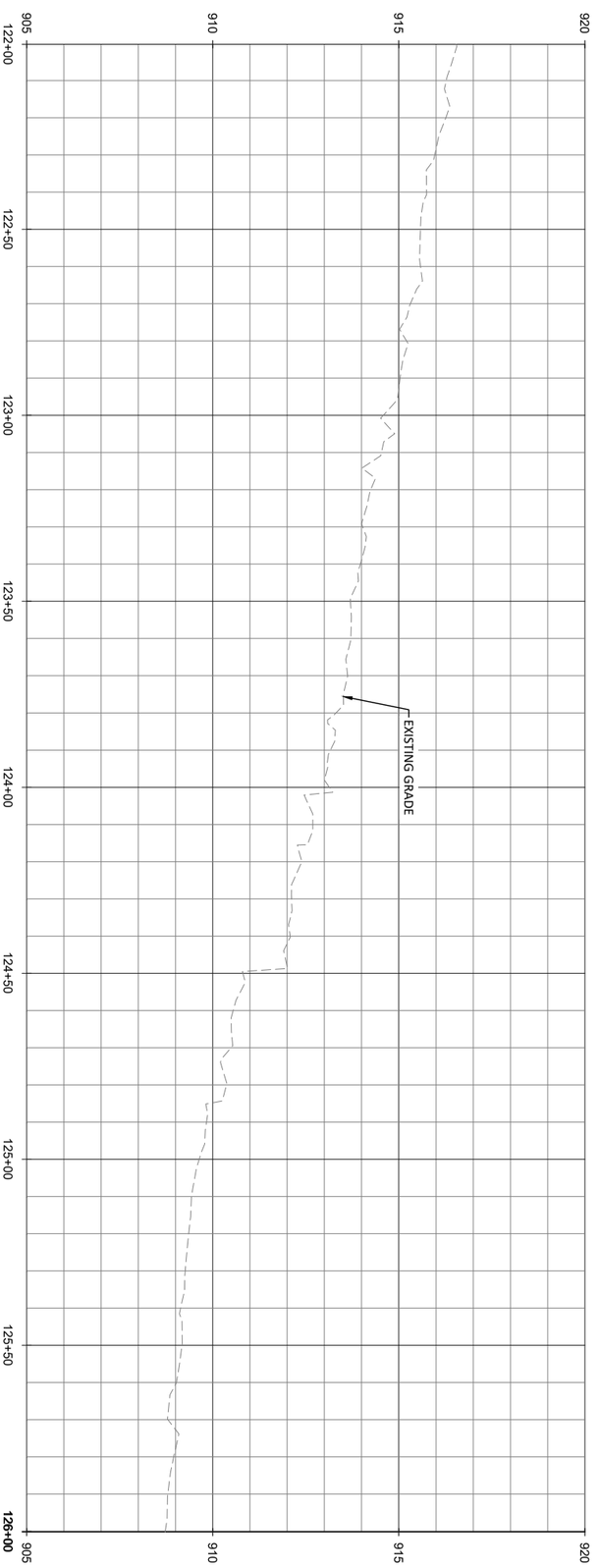

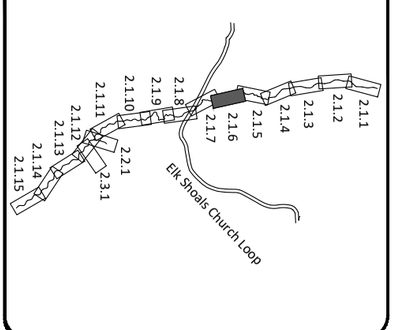

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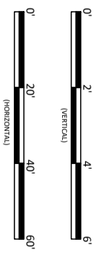
ENHANCEMENT II TREATMENTS

1. EXCLUDE CATTLE
2. TREAT INVASIVE VEGETATION
3. PROVIDE SUPPLEMENTAL PLANTING



Date:	10.9.2019
Job Number:	005-02169
Project Engineer:	ASE
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Alexander Farm Mitigation Site
Alexander County, North Carolina

UT1 Reach 2
Stream Plan and Profile

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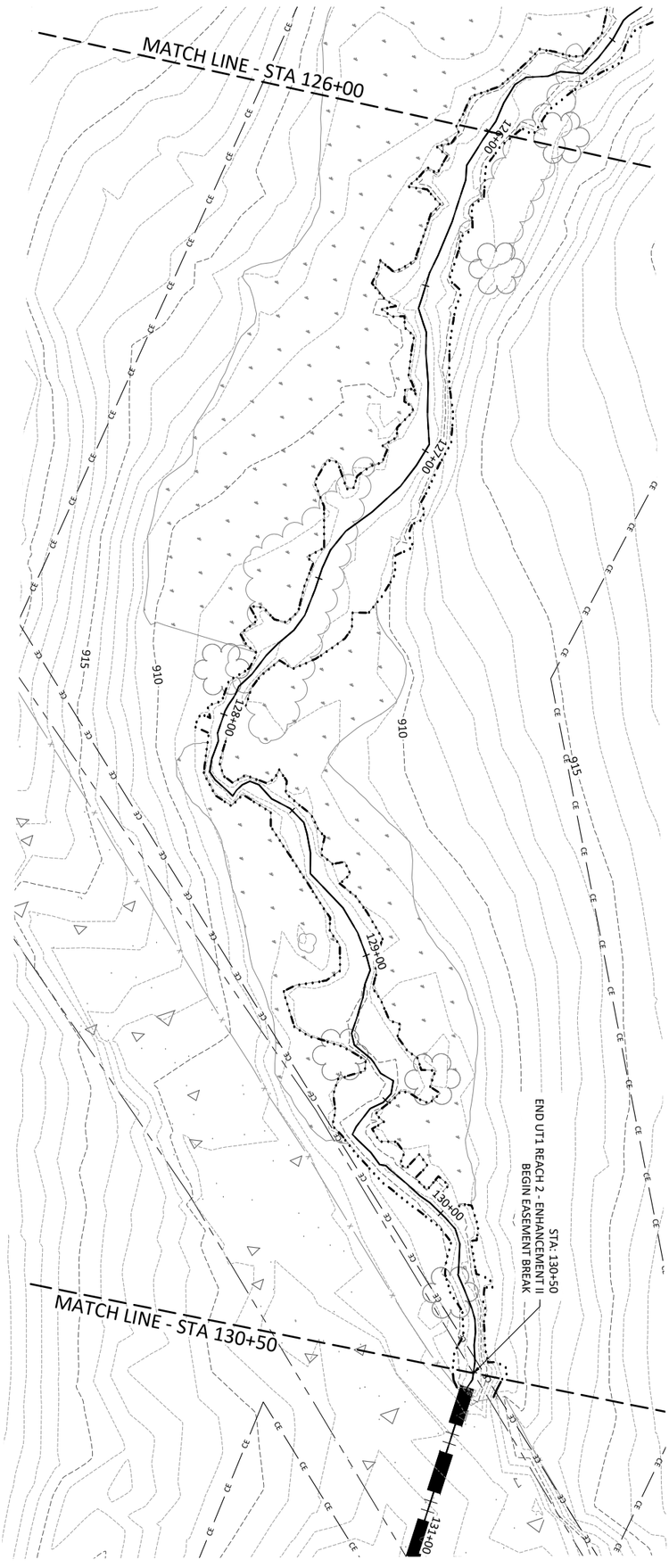
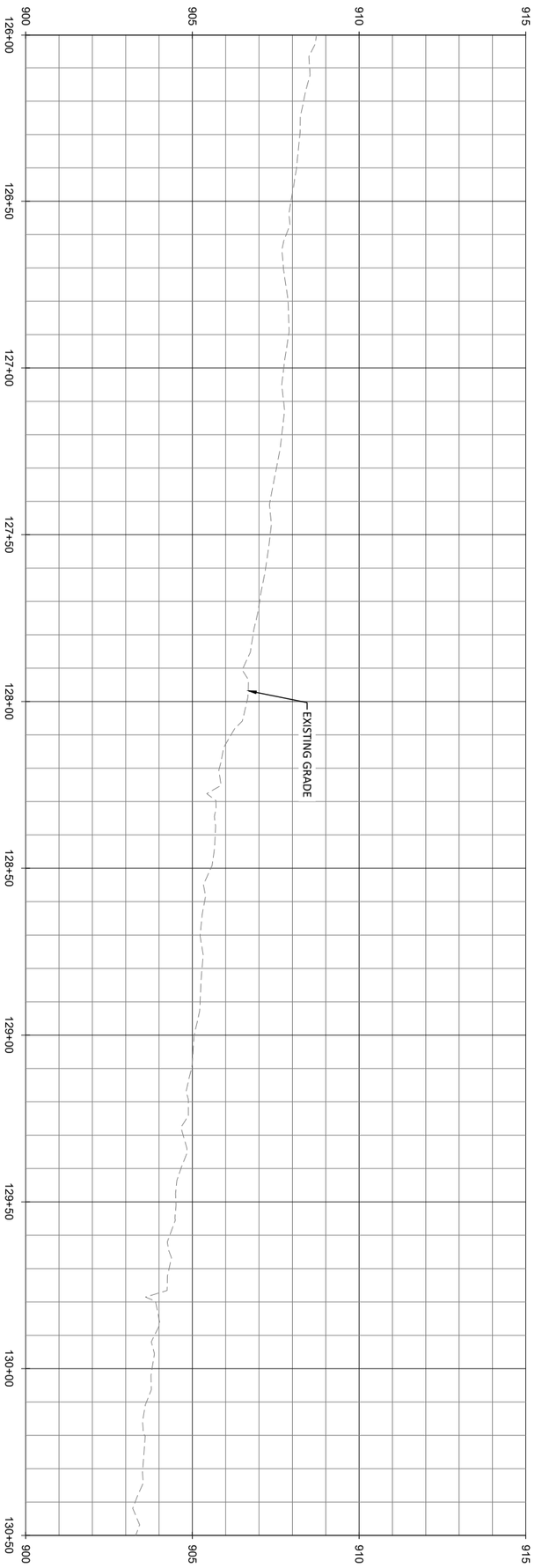
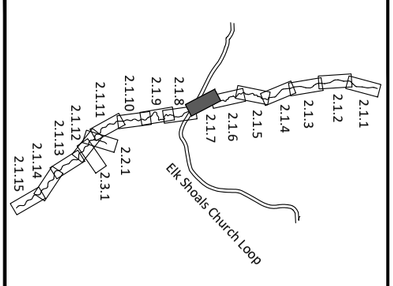




ENHANCEMENT II TREATMENTS

1. EXCLUDE CATTLE
2. TREAT INVASIVE VEGETATION
3. PROVIDE SUPPLEMENTAL PLANTING



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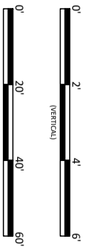

Date:	10.9.2019
Job Number:	005-02169
Project Engineer:	ASE
Drawn By:	JMS
Checked By:	EPN

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Alexander Farm Mitigation Site
Alexander County, North Carolina

UT1 Reach 2
Stream Plan and Profile

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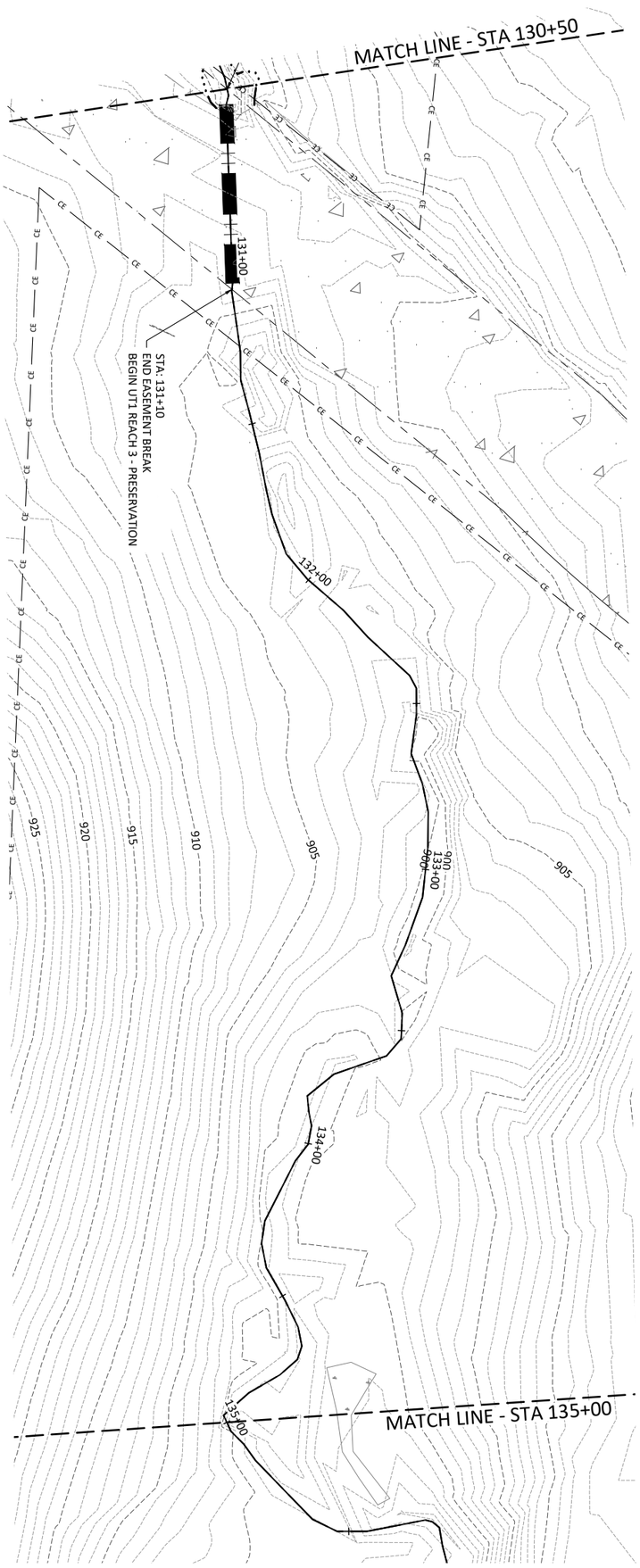

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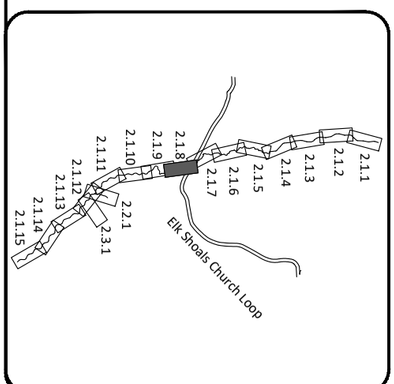

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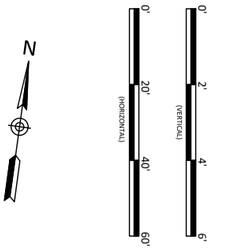

Date:	10.9.2019
Job Number:	005-02169
Project Engineer:	ASE
Drawn By:	JMS
Checked By:	EPN

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Revisions:

Alexander Farm Mitigation Site
Alexander County, North Carolina

UT1 Reach 3
Stream Plan and Profile

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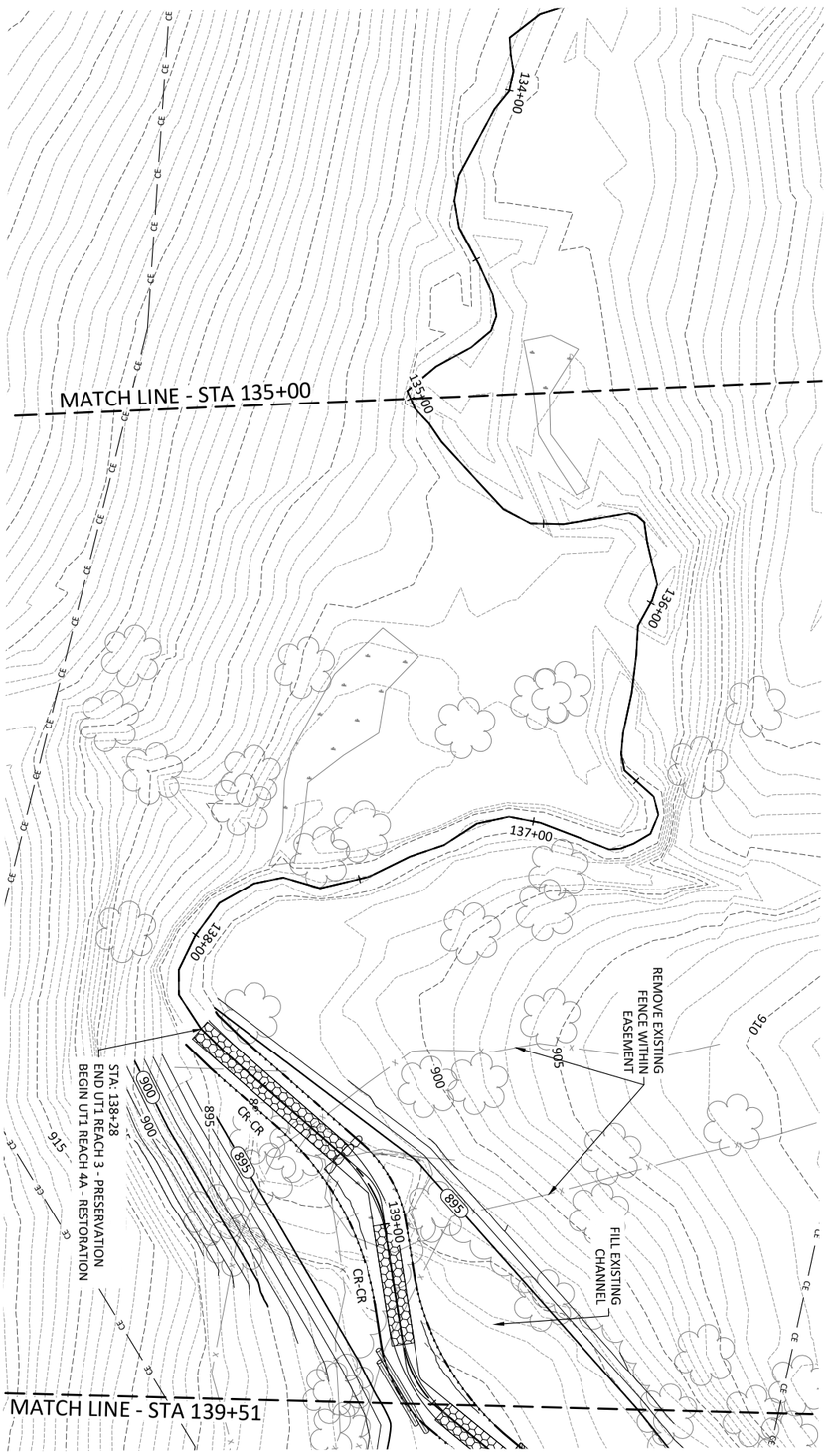

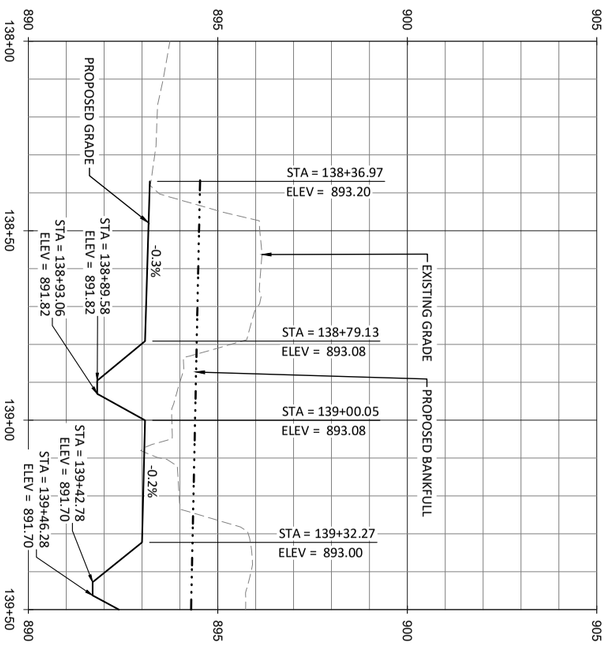

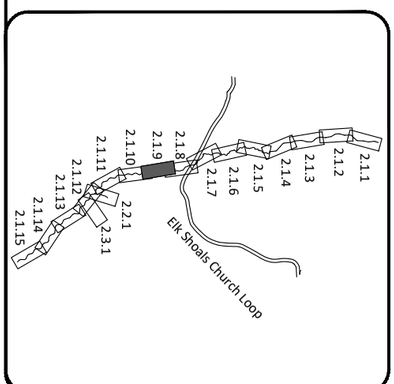

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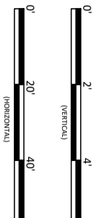

Date:	10.9.2019
Job Number:	005-02169
Project Engineer:	ASE
Drawn By:	JMS
Checked By:	EPN

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Sheet

Alexander Farm Mitigation Site
Alexander County, North Carolina

UT1 Reach 3 & 4A
Stream Plan and Profile

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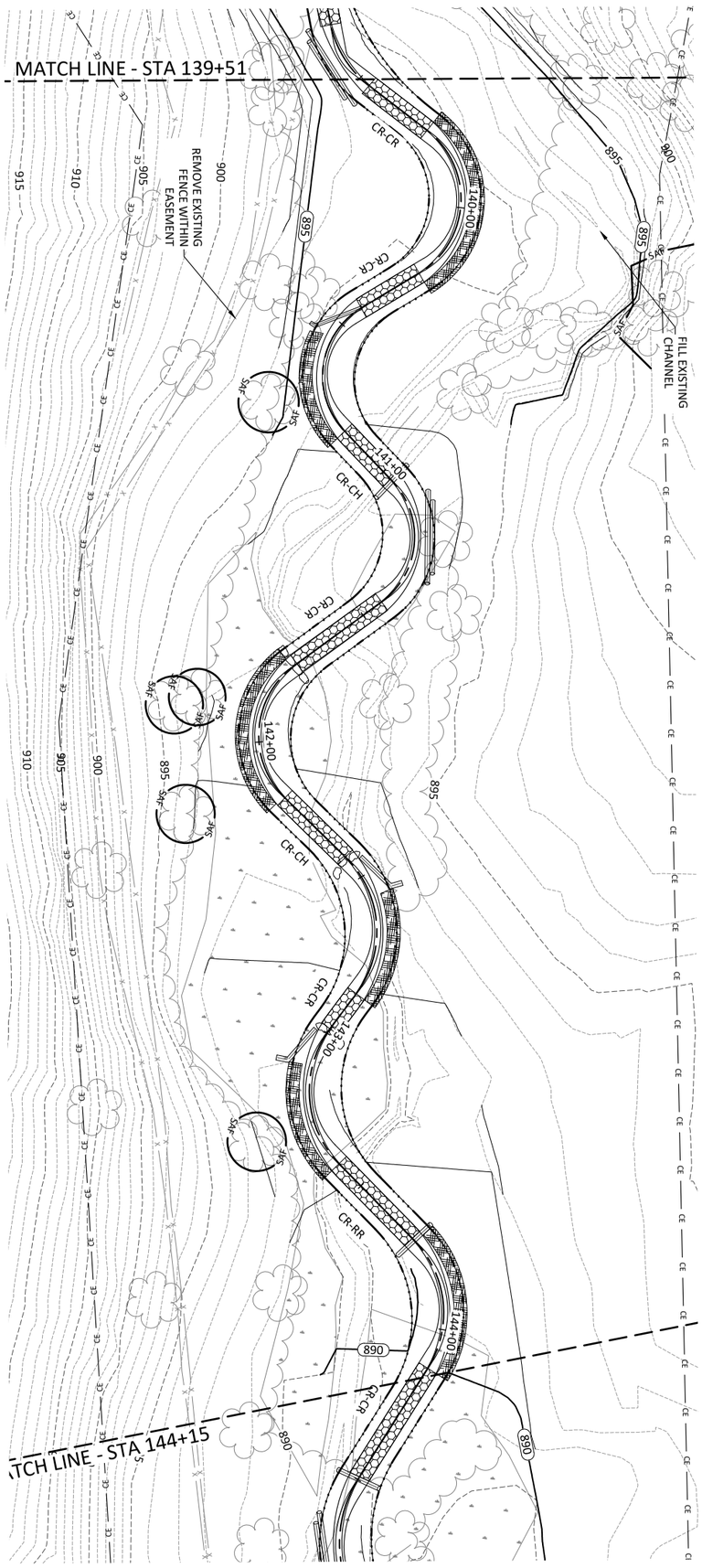

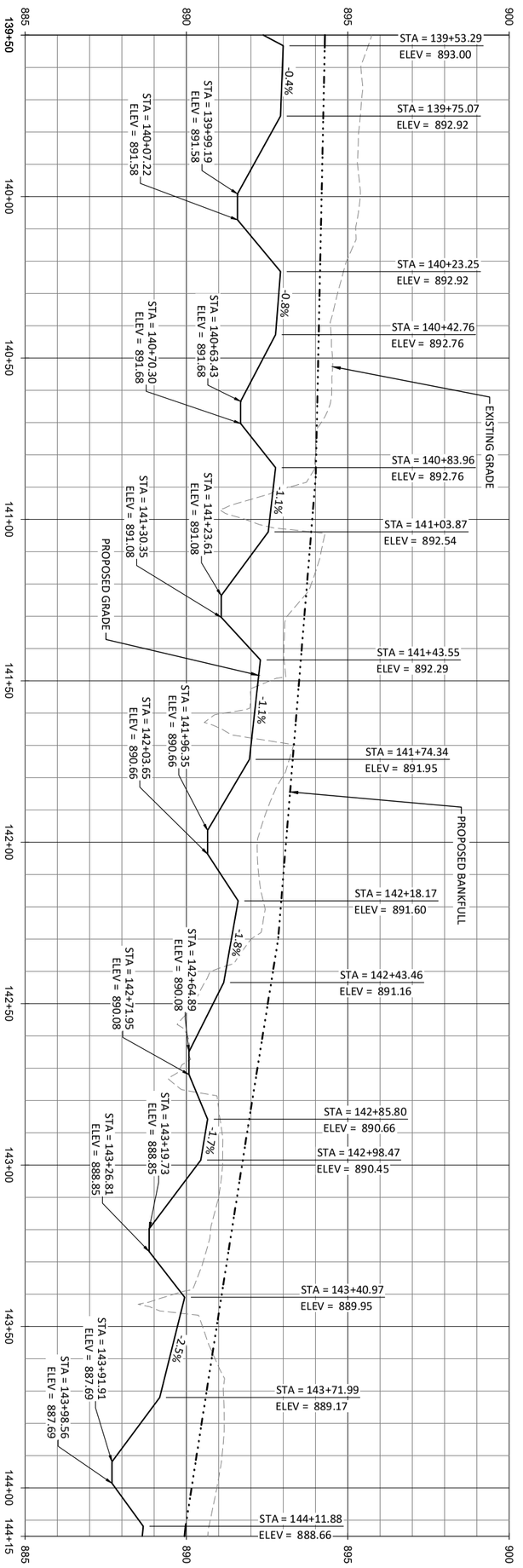

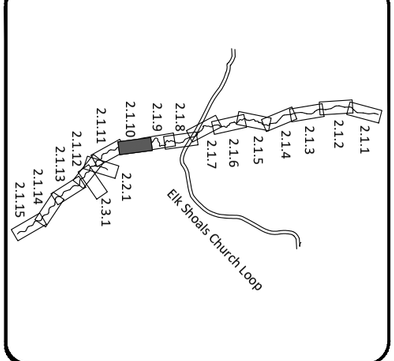

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N

0' 20' 40' 60' (HORIZONTAL)

0' 2' 4' 6' (VERTICAL)

Date:	10.9.2019
Job Number:	005-02169
Project Engineer:	ASE
Drawn By:	JMS
Checked By:	EPN

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Revisions:

Alexander Farm Mitigation Site
Alexander County, North Carolina

UT1 Reach 4A
Stream Plan and Profile

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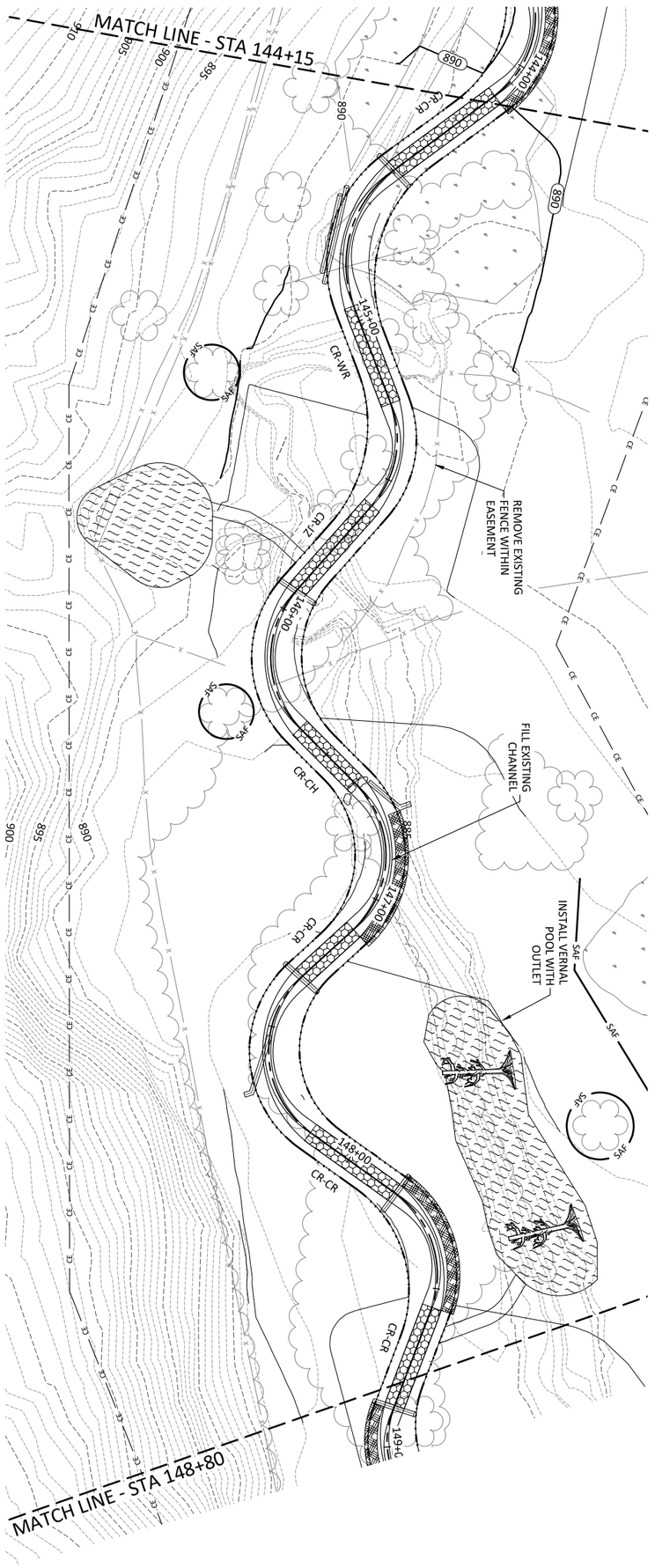

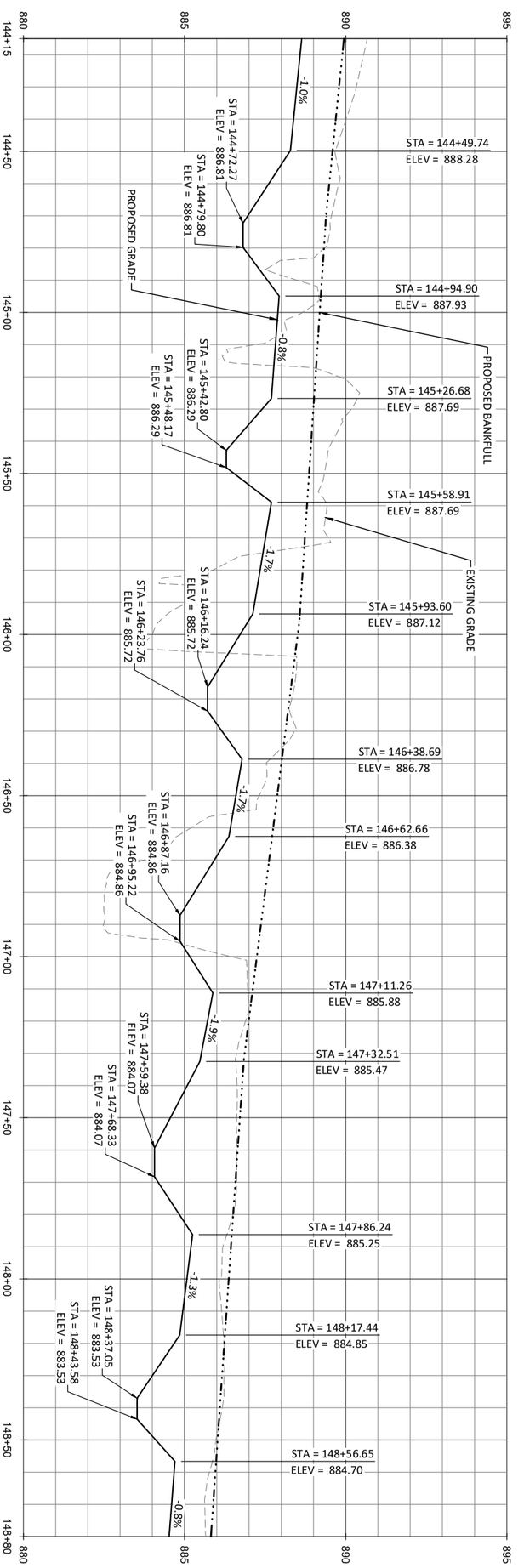

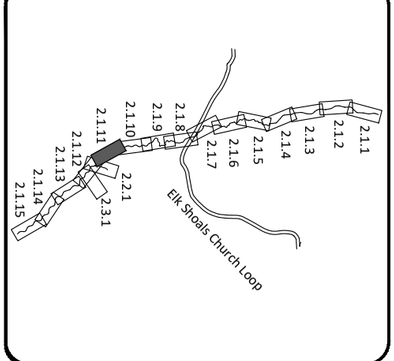

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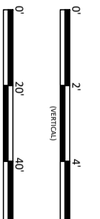

Date:	10.9.2019
Job Number:	005-02169
Project Engineer:	ASE
Drawn By:	JMS
Checked By:	EPN

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Sheet

Alexander Farm Mitigation Site
Alexander County, North Carolina

UT1 Reach 4A
Stream Plan and Profile

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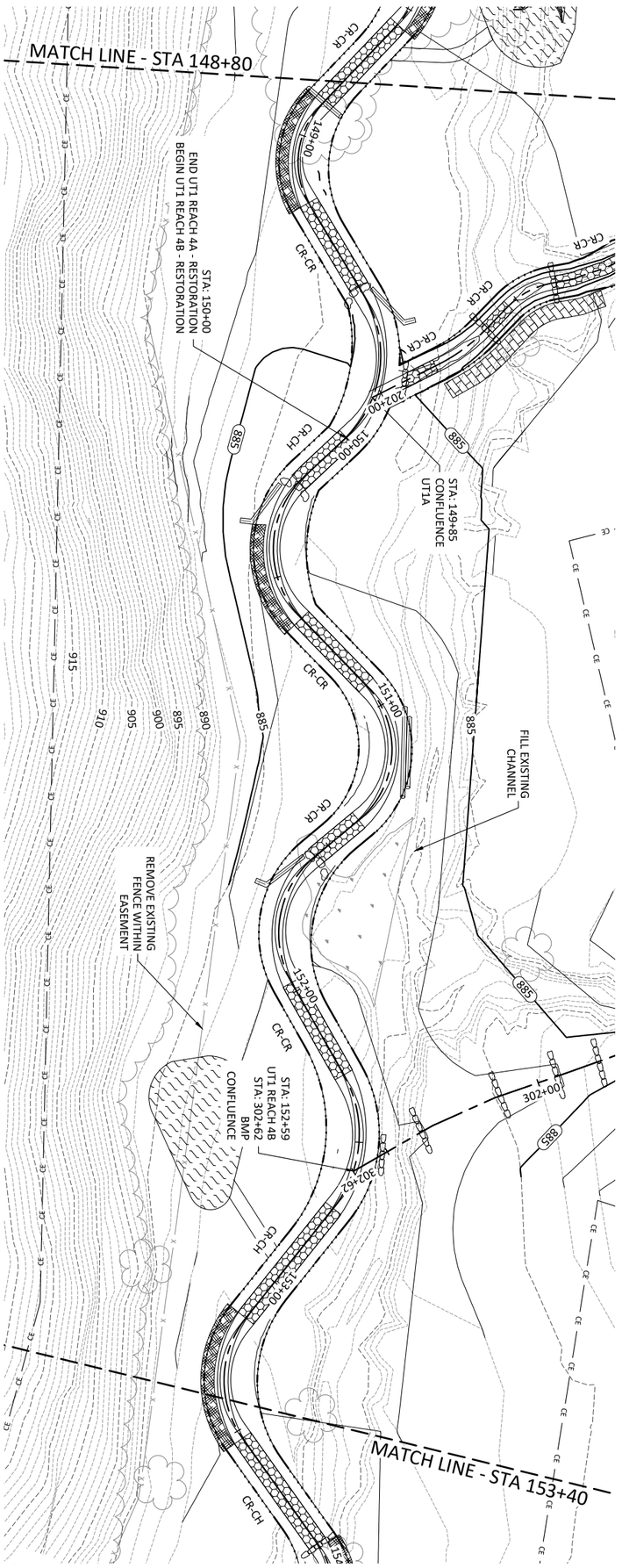

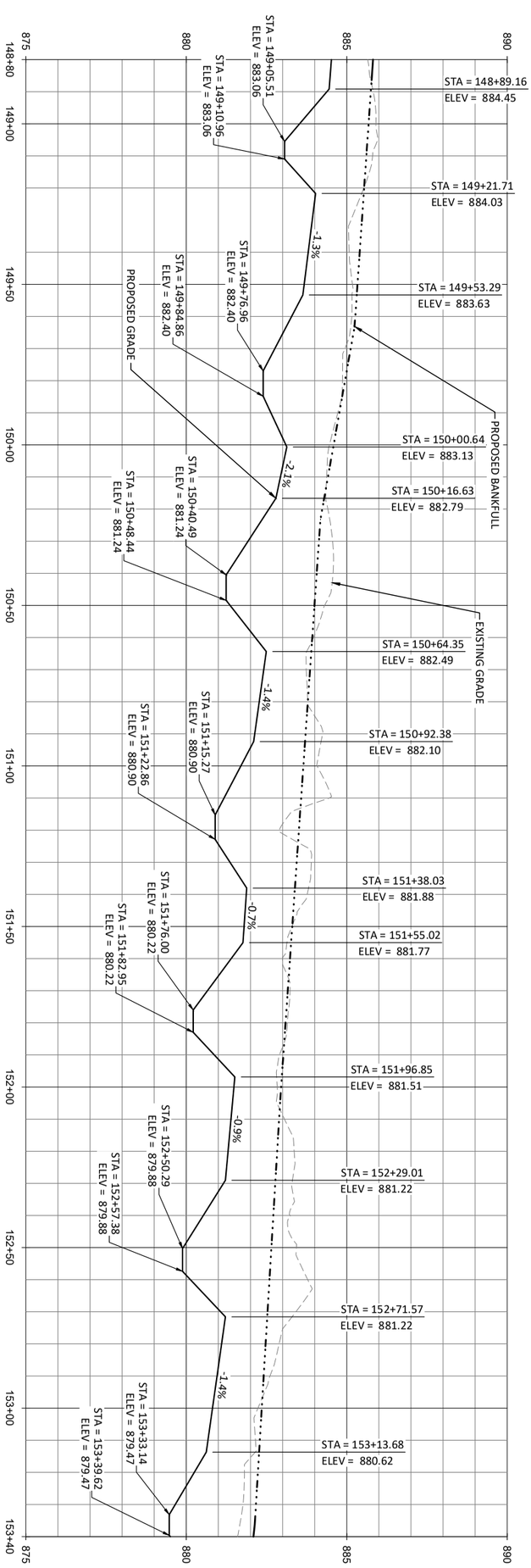

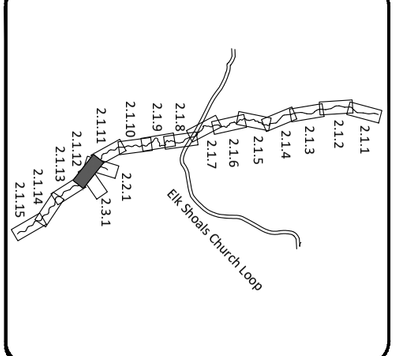

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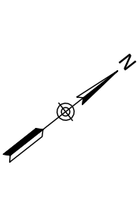

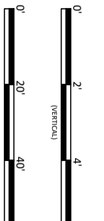

Date:	10.9.2019
Job Number:	005-02169
Project Engineer:	ASE
Drawn By:	JMS
Checked By:	EPN

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Alexander Farm Mitigation Site
Alexander County, North Carolina

UT1 Reach 4A & 4B
Stream Plan and Profile

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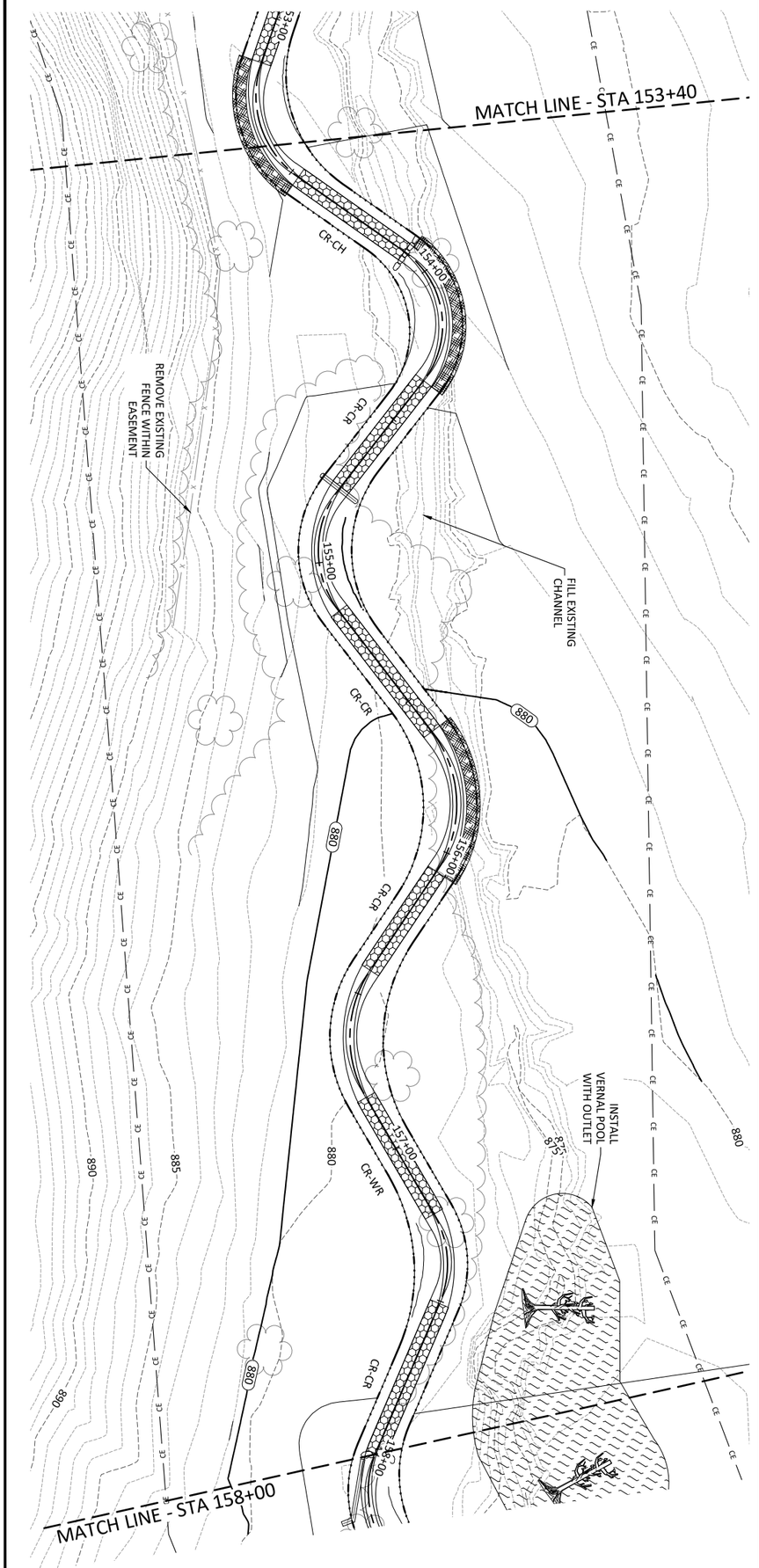

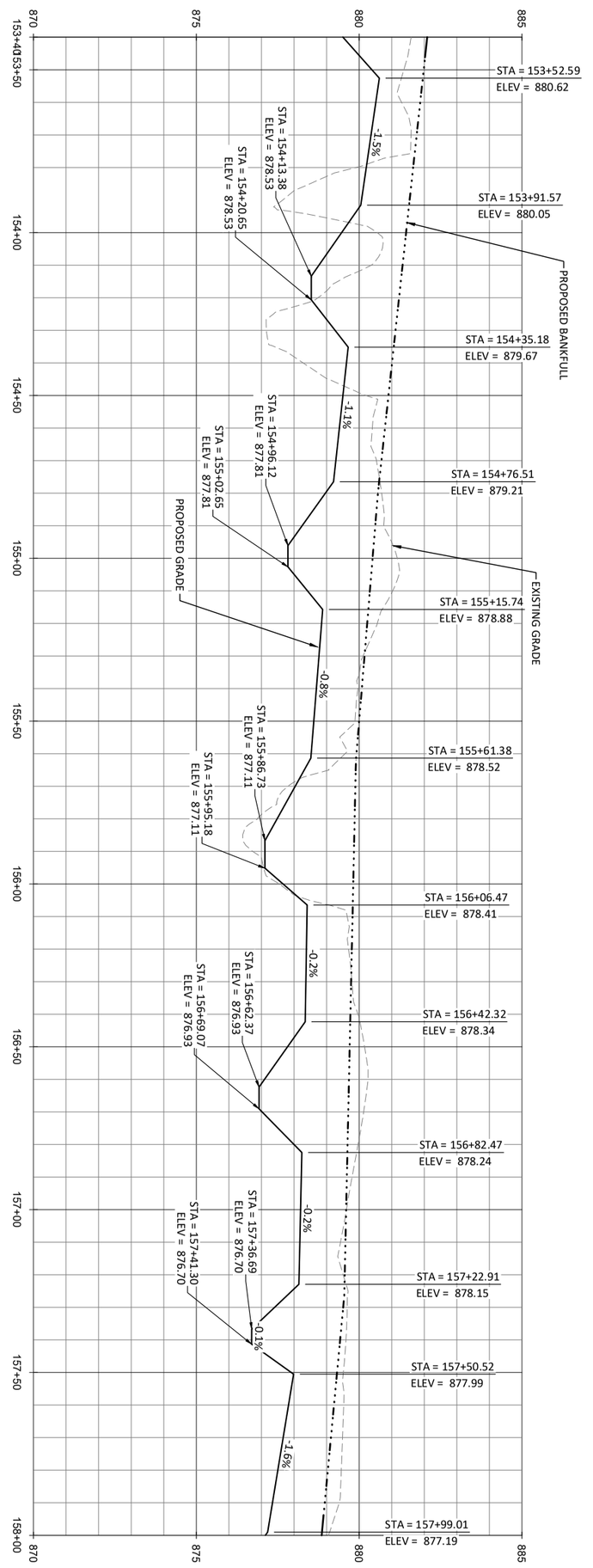

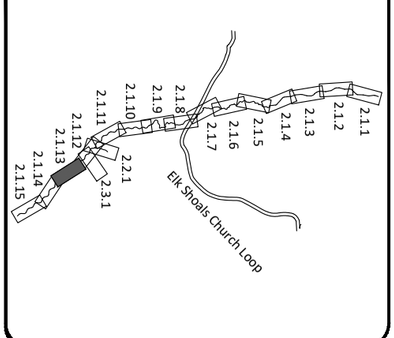

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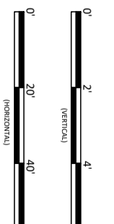

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Alexander Farm Mitigation Site
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UT1 Reach 4B
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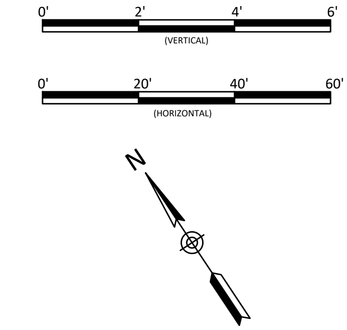

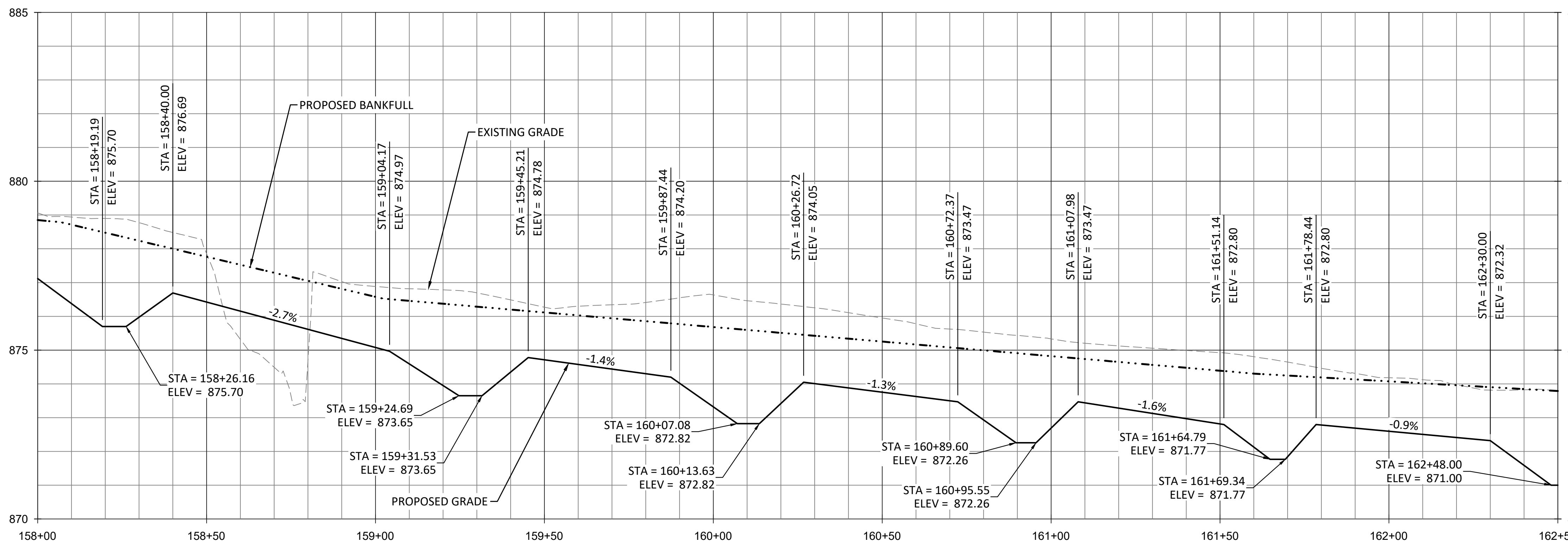

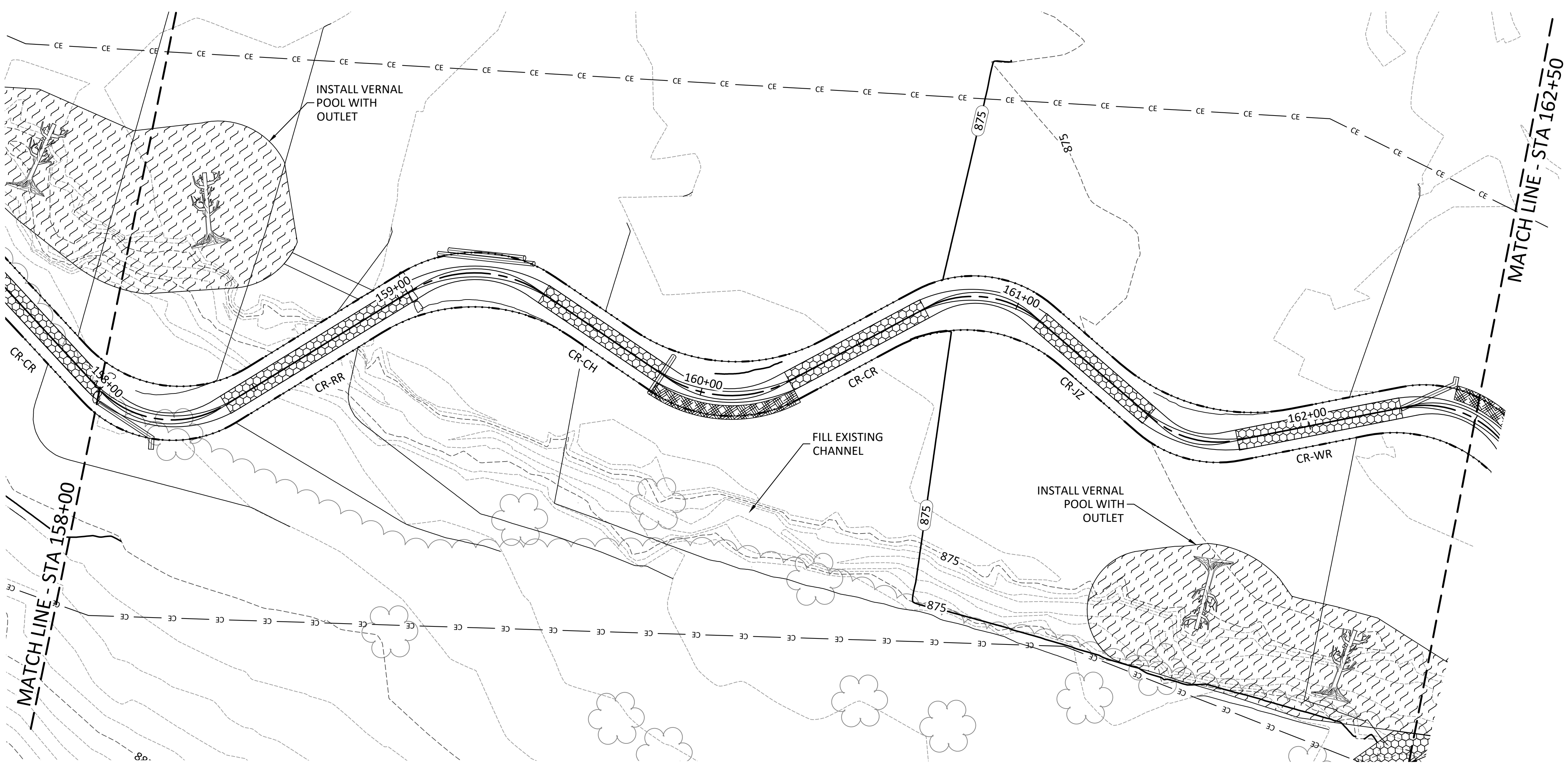

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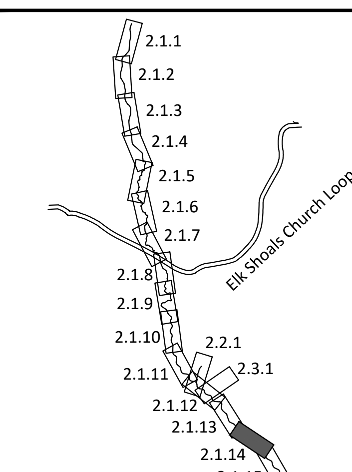

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UT1 Reach 4B
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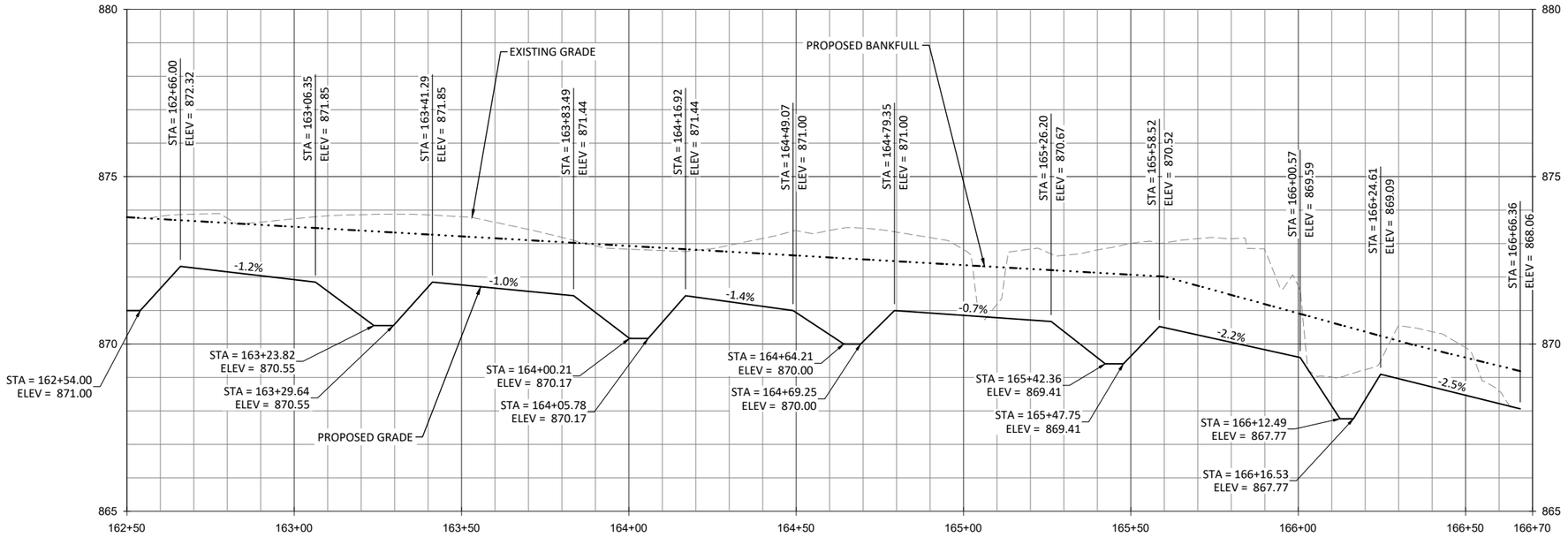
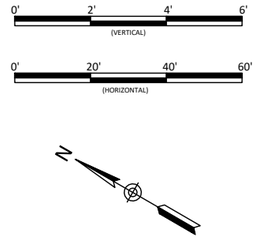
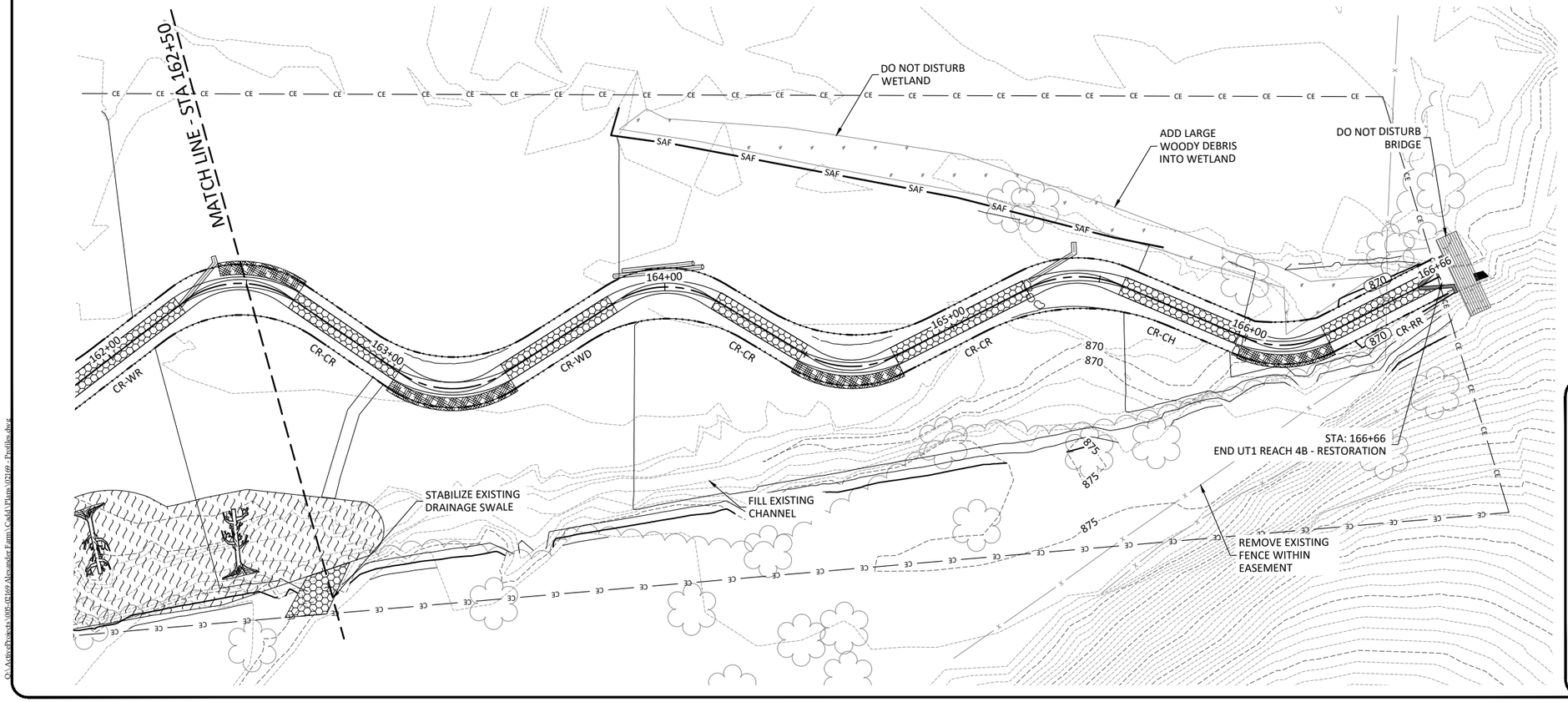
October 10, 2019







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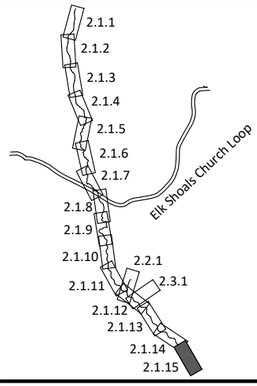

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UT1 Reach 4B
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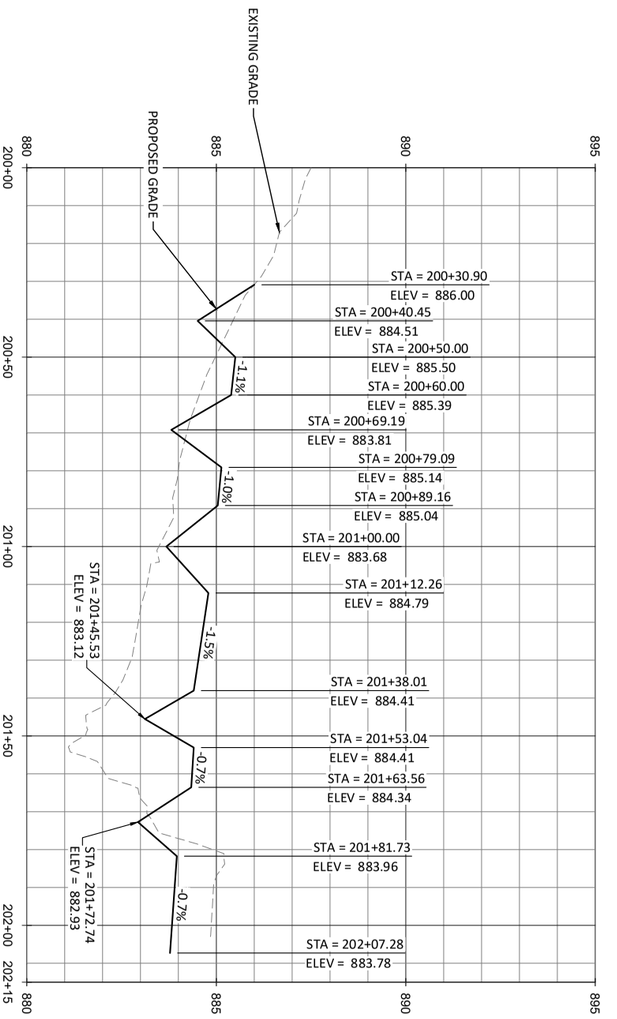

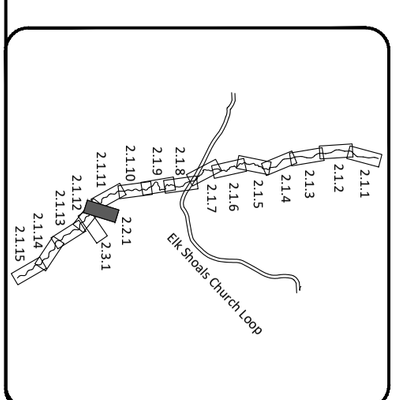

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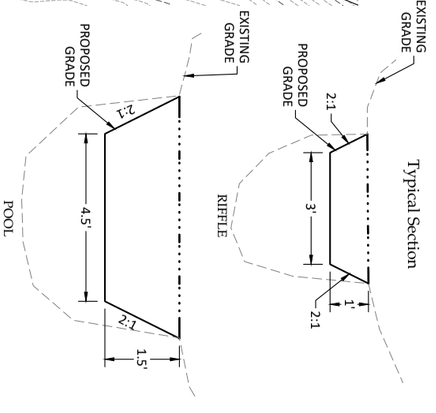

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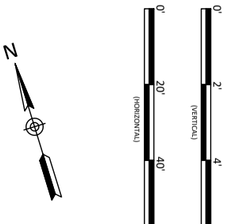

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Job Number:	005-02169
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Alexander Farm Mitigation Site
Alexander County, North Carolina

UT1A
Stream Plan and Profile

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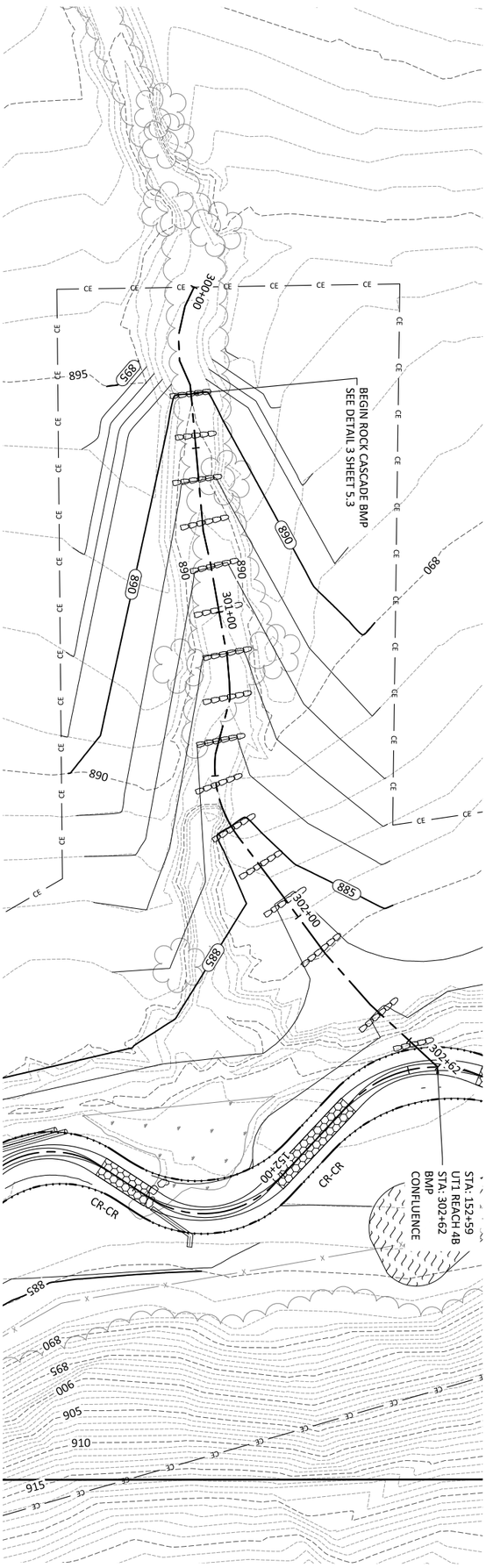

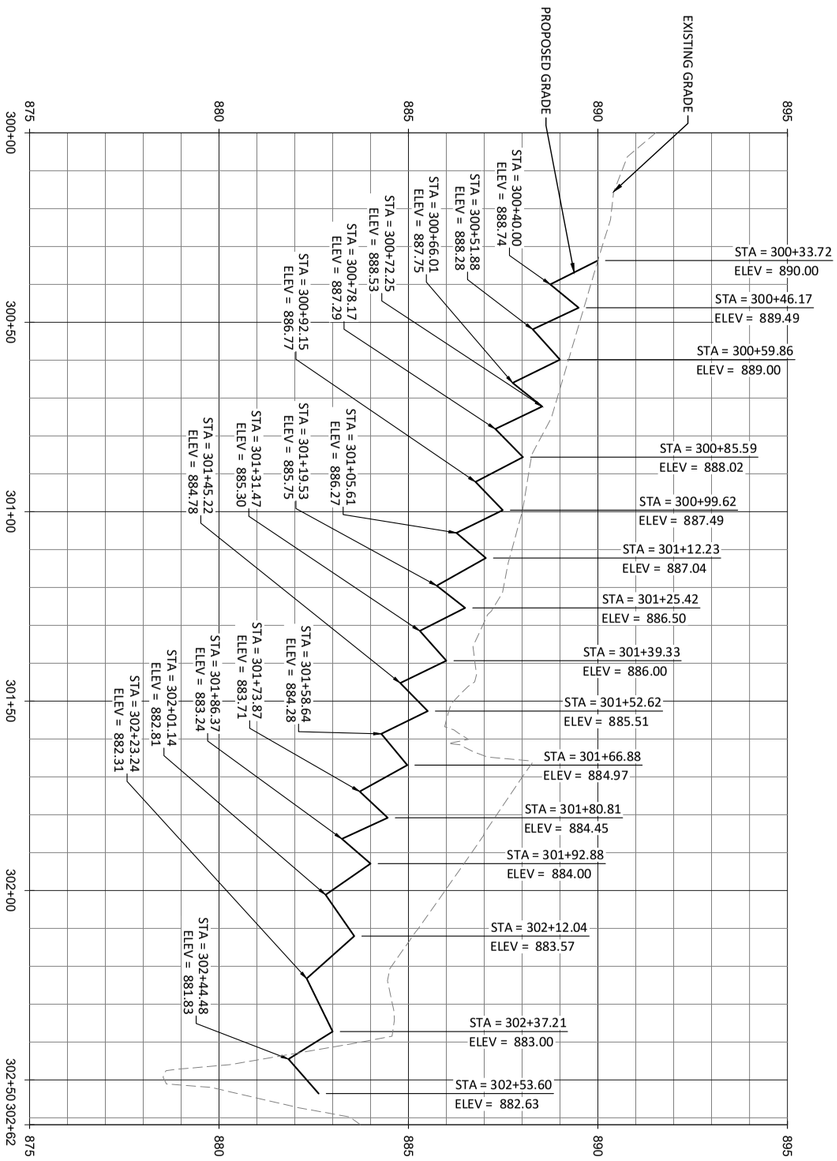

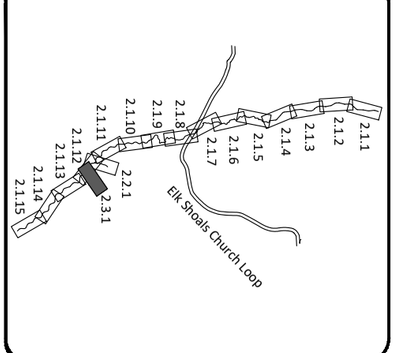

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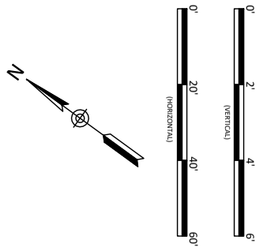

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Alexander Farm Mitigation Site
Alexander County, North Carolina

BMP
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October 10, 2019

Streambank Planting Zone						
Live Stakes and Herbaceous Plugs						
Species	**Common Name**	**Max Spacing**	**Indiv. Spacing**	**Min. Size**	**Stratum**	**# of Stems**
Physocarpus opulifolius	Ninebark	8 ft.	2-8 ft.	0.5”-1.5” cal.	Shrub	20%
Cornus ammomum	Silky Dogwood	8 ft.	2-8 ft.	0.5”-1.5” cal.	Shrub	40%
Salix sericea	Silky Willow	8 ft.	2-8 ft.	0.5”-1.5” cal.	Shrub	40%
Juncus effusus	Common Rush	5 ft.	4-6 ft.	1.0”- 2.0” plug	Herb	N/A
Carex alata	Broadwing Sedge	5 ft.	4-6 ft.	1.0”- 2.0” plug	Herb	N/A
						100%

See detail 3, sheet 5.7

All streambank and buffer planting zones within easement.

Permanent Riparian Seeding				
Pure Live Seed (20 lbs/ acre)				
Approved Date	**Species Name**	**Common Name**	**Stratum**	**Density (lbs/acre)**
All Year	*Panicum rigidulum*	Redtop Panicgrass	Herb	2.0
All Year	*Agrostis Hyemalis*	Winter Bentgrass	Herb	2.0
All Year	*Rudbeckia hirta*	Blackeyed Susan	Herb	1.0
All Year	*Coreopsis lanceolata*	Lanceleaf Coreopsis	Herb	1.0
All Year	*Carex vulpinoidea*	Fox Sedge	Herb	3.0
All Year	*Panicum clandestinum*	Deertongue	Herb	3.0
All Year	*Elymus virginicus*	Virginia Wildrye	Herb	3.0
All Year	*Bidens aristosa*	Bur-Marigold	Herb	1.2
All Year	*Helianthus angustifolius*	Swamp Sunflower	Herb	0.8
All Year	*Panicum virgatum*	Switchgrass	Herb	1.0
All Year	*Sorghastrum nutans*	Indiangrass	Herb	2.0

Open/Graded Buffer Planting Zone						
Bare Root						
Species	**Common Name**	**Max Spacing**	**Indiv. Spacing**	**Min. Caliper Size**	**Stratum**	**# of Stems**
Acer negundo	Box Elder	12 ft.	6-12 ft.	0.25”-1.0”	Canopy	20%
Quercus phellos	Willow Oak	12 ft.	6-12 ft.	0.25”-1.0”	Canopy	15%
Platanus occidentalis	Sycamore	12 ft.	6-12 ft.	0.25”-1.0”	Canopy	15%
Betula nigra	River Birch	12 ft.	6-12 ft.	0.25”-1.0”	Canopy	15%
Quercus pagoda	Cherrybark Oak	12 ft.	6-12 ft.	0.25”-1.0”	Canopy	15%
Quercus michauxii	Swamp Chestnut Oak	12 ft.	6-12 ft.	0.25”-1.0”	Canopy	20%
						100%

All disturbed areas.

Temporary Seeding			
Scientific Name	**Common Name**	**Application Dates**	**Application Rate**
Secale cereale	*Rye Grain*	October 1 - March 31	120 lb/acre
Panicum ramosum	*Browntop Millet*	April 1 - June 30	45 lb/acre
Pennisetum glaucum	*Pearl Headed Millet*	July 1 - September 30	20 lb/acre

Shaded Areas Bare Roots - Buffer Planting As Needed to Increase Density		
Species	**Common name**	**# of stems**
Platanus occidentalis	**Sycamore**	**18%**
Fraxinus pennsylvanicum	Green Ash	18%
Betula nigra	River Birch	10%
Liriodendron tulipifera	Tulip Poplar	10%
Quercus michauxii	Swamp Chestnut Oak	10%
Carpinus caroliniana	Ironwood	5%
Diospyros virginiana	Persimmon	5%
Quercus pagoda	Cherrybark Oak	5%
Acer saccharinum	Silver Maple	5%
Nyssa sylvatica	Black Gum	5%
Callicarpa americana	Beautyberry	5%
Euonymus americanus	American Strawberry Bush	1%
Calycanthus floridus	Sweetshrub	1%
Magnolia virginiana	Sweetbay Magnolia	1%
Hamamelis virginiana	Witch-Hazel	1%
		100%

All disturbed pasture areas outside easement.

Pasture Seeding				
Approved Date	**Species Name**	**Stratum**	**Common Name**	**Density (lbs/acre)**
All Year	*Festuca arundinacea*	Herb	Tall Fescue	80
All Year	*Trifolium repens*	Herb	White Clover	8

Vernal Pool Planting Zone						
Herbaceous Plugs						
Species	**Common Name**	**Max Spacing**	**Indiv. Spacing**	**Min. Size**	**Stratum**	**# of Stems**
Calamagrostis canadensis	*Bluejoint Grass*	5 ft.	3-5 ft.	1.0”- 2.0” plug	Herb	30%
Carex alata	*Broadwing Sedge*	5 ft.	3-5 ft.	1.0”- 2.0” plug	Herb	35%
Juncus effusus	*Common Rush*	5 ft.	3-5 ft.	1.0”- 2.0” plug	Herb	35%
						100%

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Plant List
Planting Plan

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Sheet 3.0

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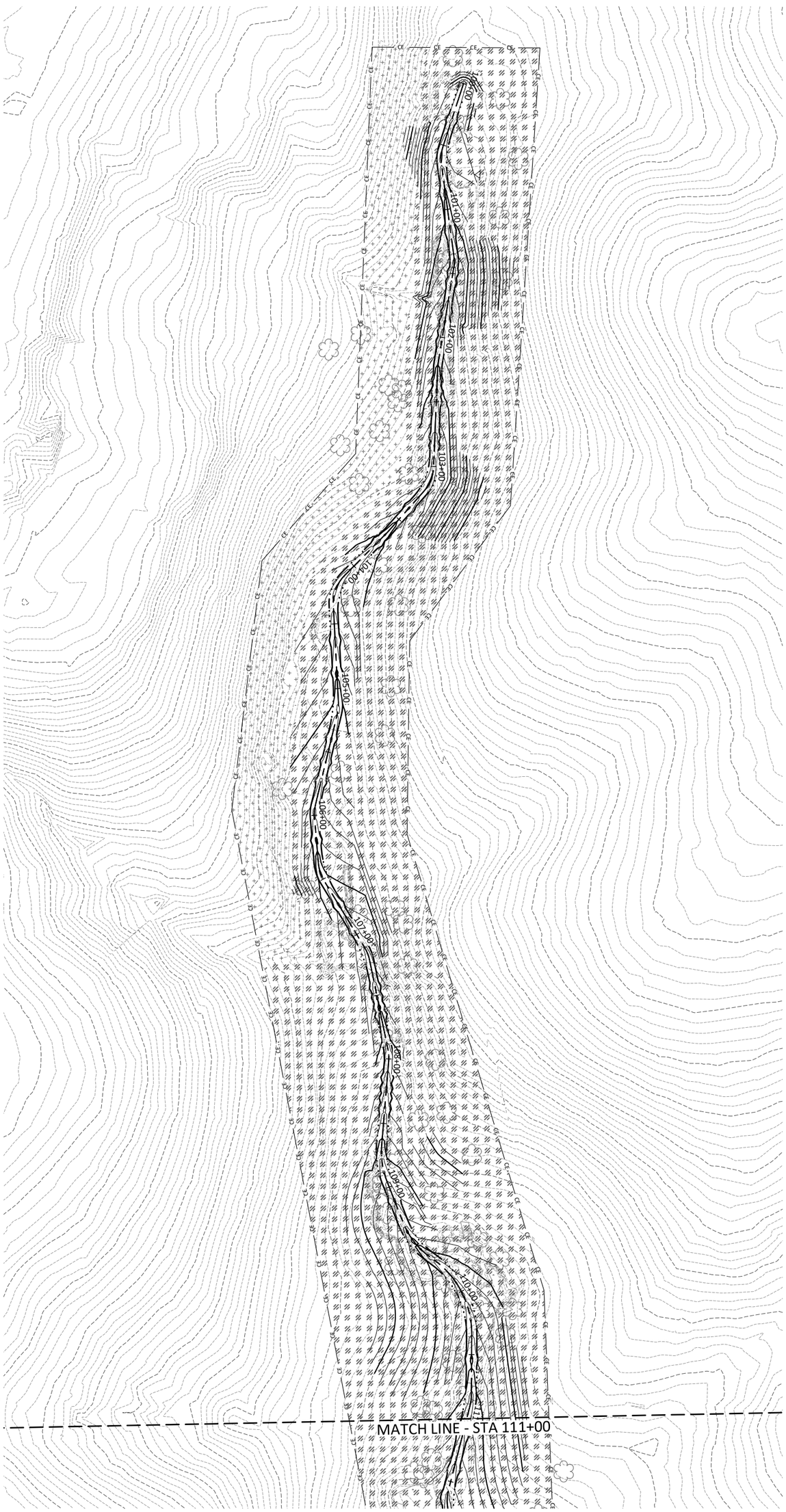

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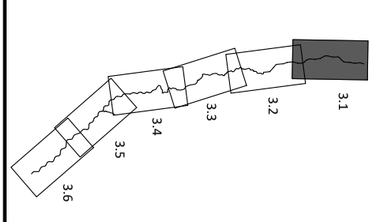

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UT1 Reach 1A & 1B
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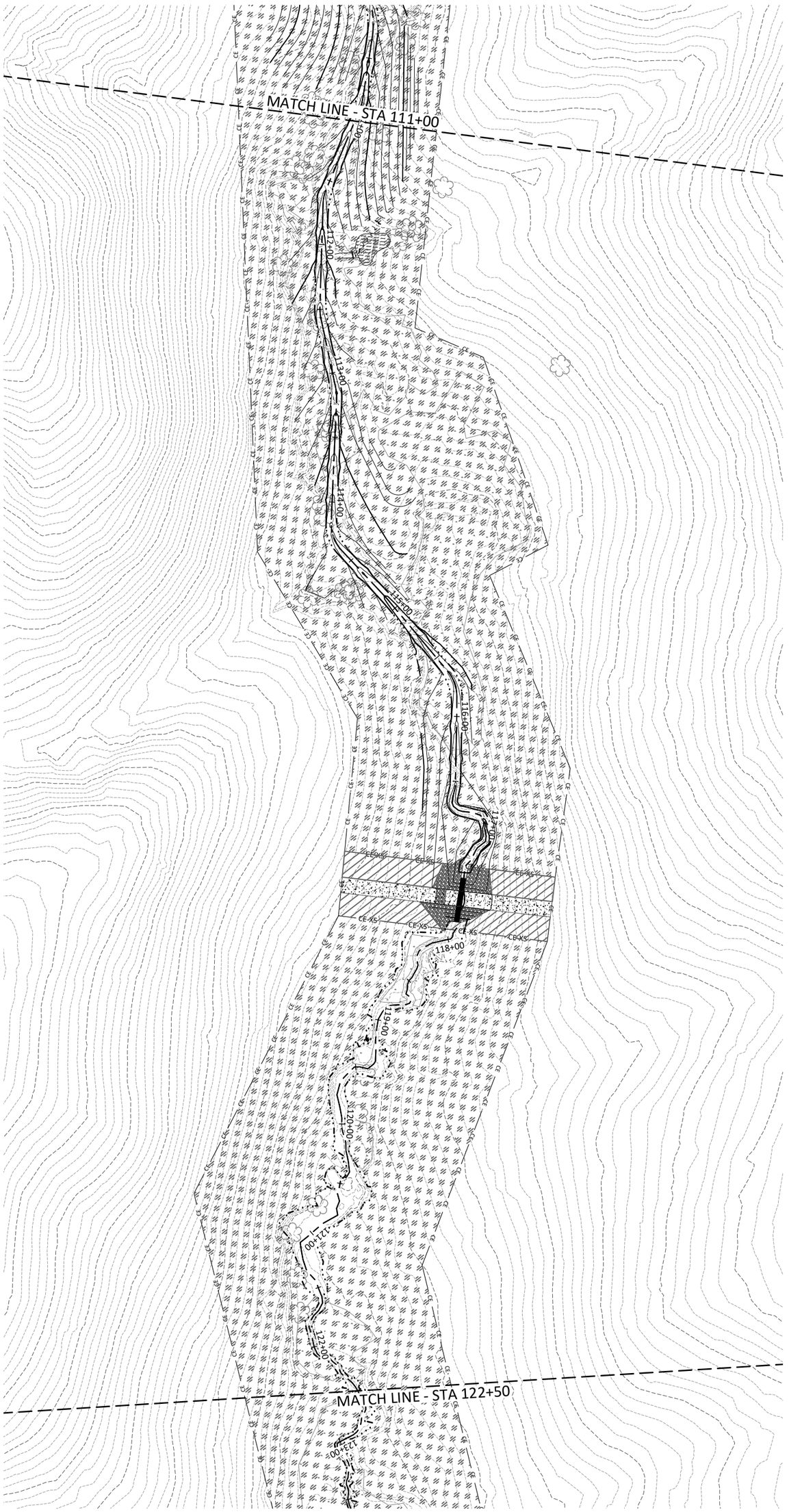

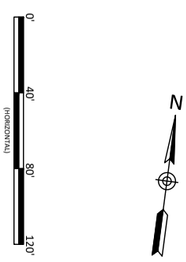

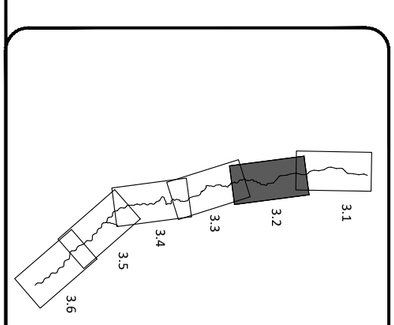

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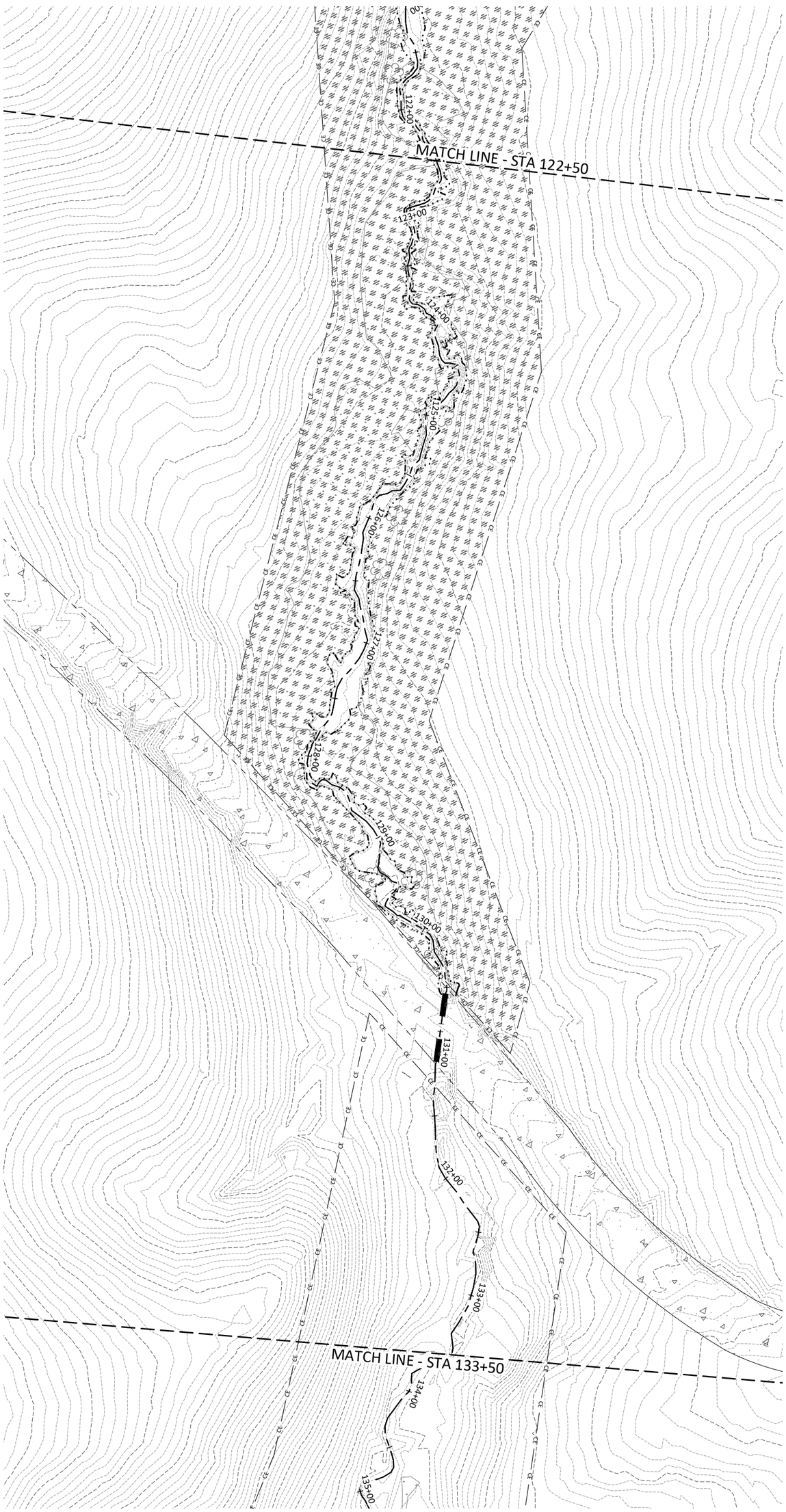

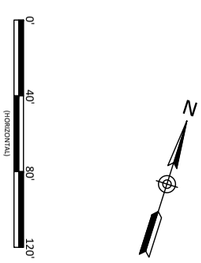

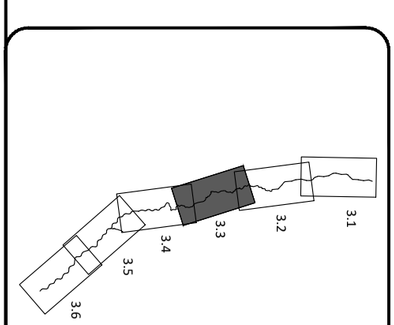

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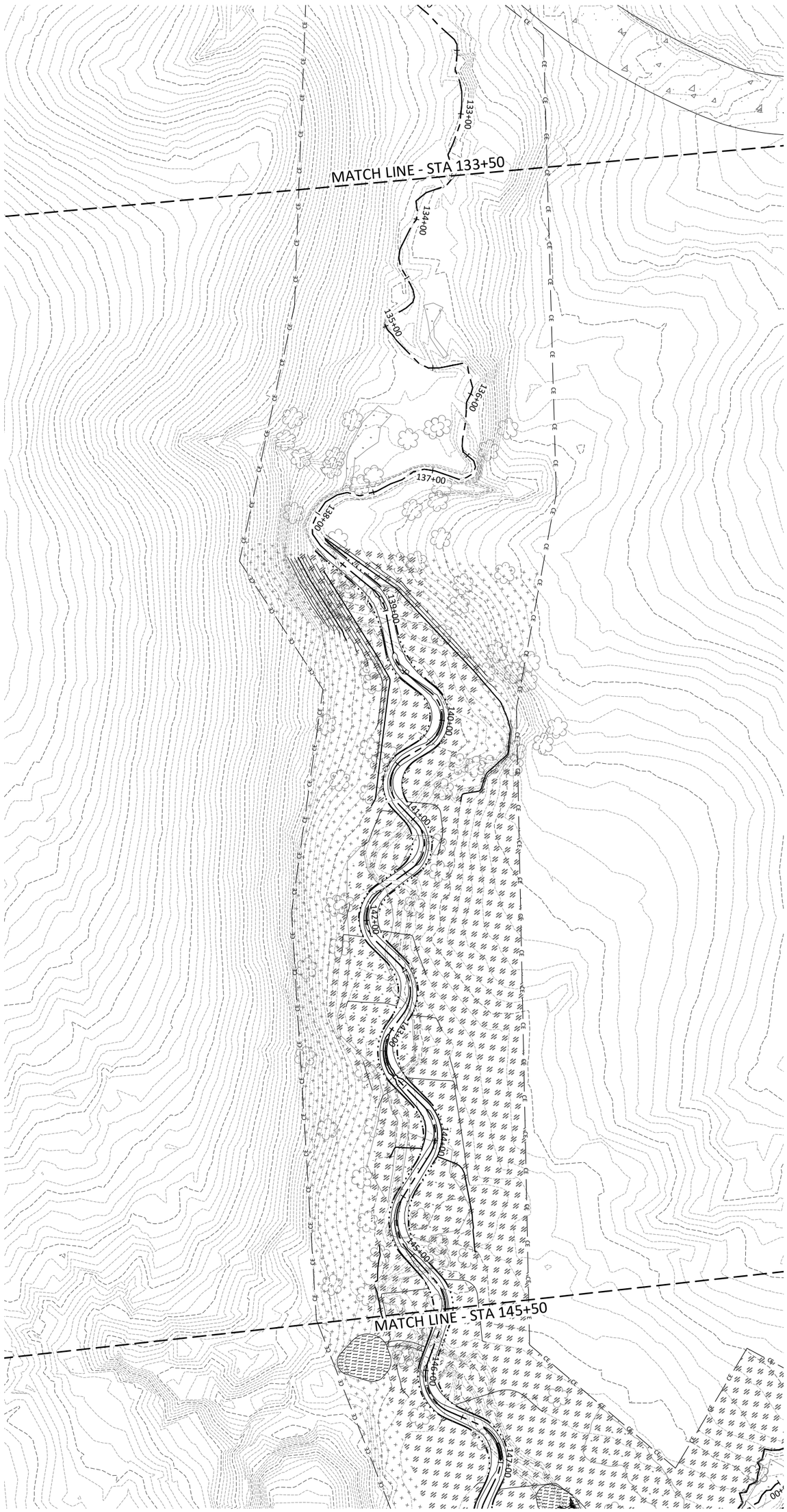

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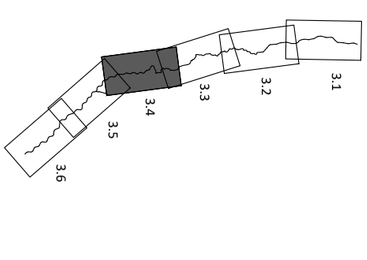

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Alexander Farm Mitigation Site
Alexander County, North Carolina

UT1 Reach 3 & 4A
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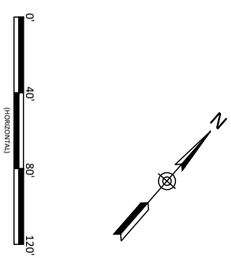

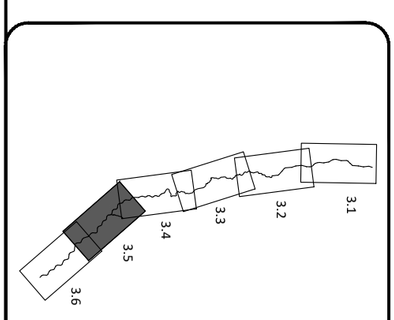

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Date:	08.19.2019
Job Number:	005-02169
Project Engineer:	ASE
Drawn By:	JMS
Checked By:	EPN

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Sheet

Revisions:

Alexander Farm Mitigation Site
Alexander County, North Carolina

UT1 Reach 4A, 4B & UT1A
Planting Plan

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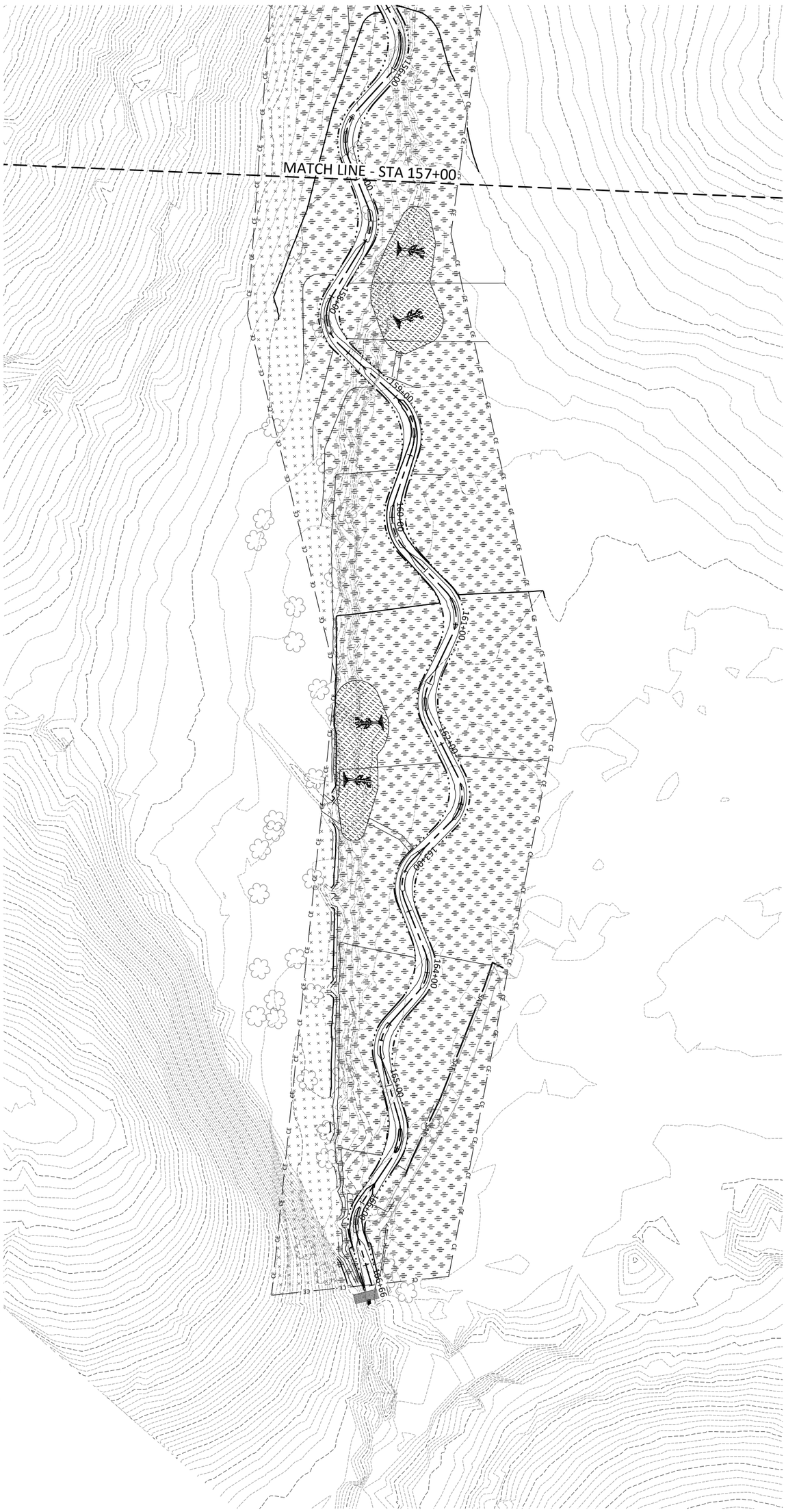

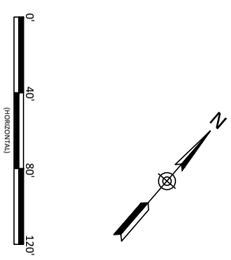

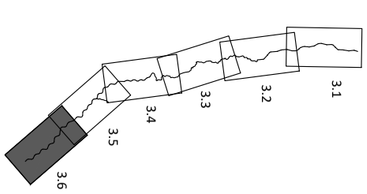

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Checked By:	EPN

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Revisions:

Alexander Farm Mitigation Site
Alexander County, North Carolina

UT1 Reach 4B
Planting Plan

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Date:	10.9.2019
Job Number:	005-02169
Project Engineer:	ASE
Drawn By:	JMS
Checked By:	EPN

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Revisions:

Alexander Farm Mitigation Site
Alexander County, North Carolina

Overview

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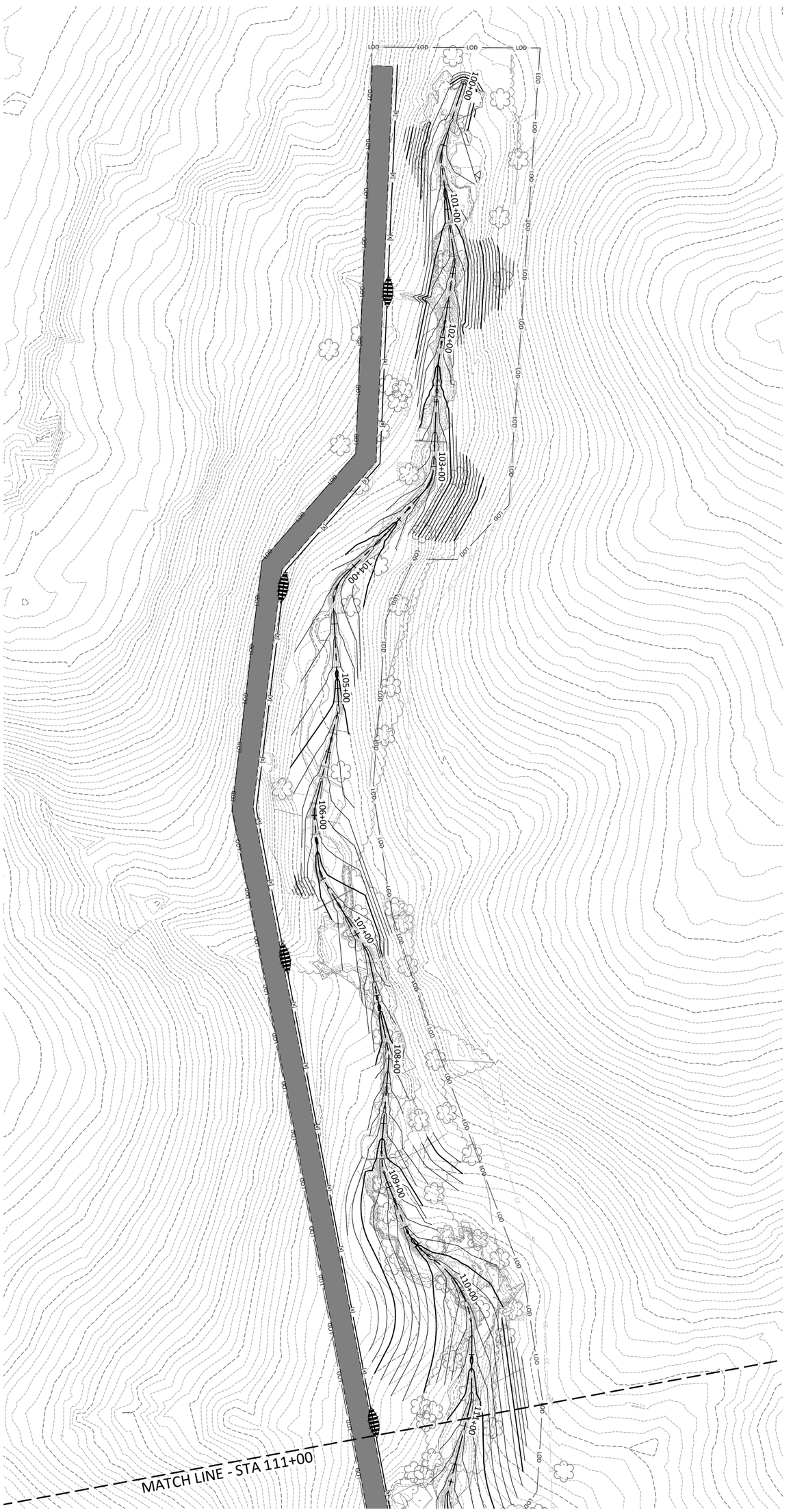
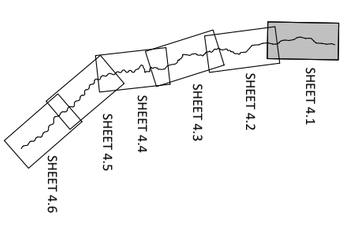


0 40' 80' 120'
HORIZONTAL

N



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Date:	10.9.2019
Job Number:	005-02169
Project Engineer:	ASE
Drawn By:	JMS
Checked By:	EPN

Revisions:

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Alexander Farm Mitigation Site
Alexander County, North Carolina

UT1
Erosion and Sediment Control

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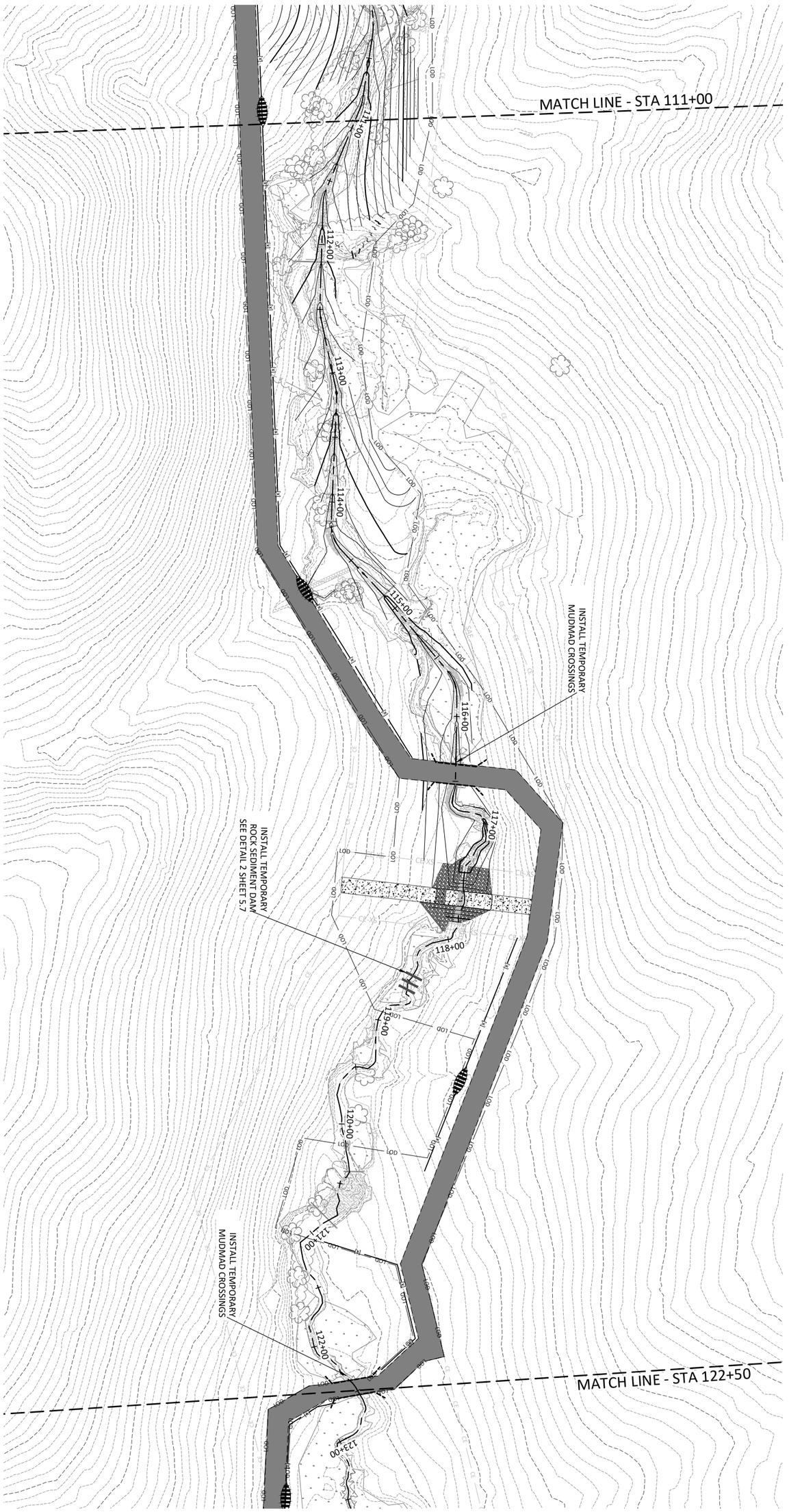

0 40' 80' 120'
HORIZONTAL

N

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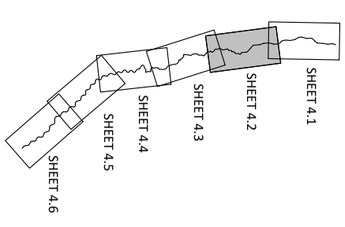

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Job Number:	005-02169
Project Engineer:	ASE
Drawn By:	JMS
Checked By:	EPN

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Sheet

Revisions:

Alexander Farm Mitigation Site
Alexander County, North Carolina

UT1
Erosion and Sediment Control

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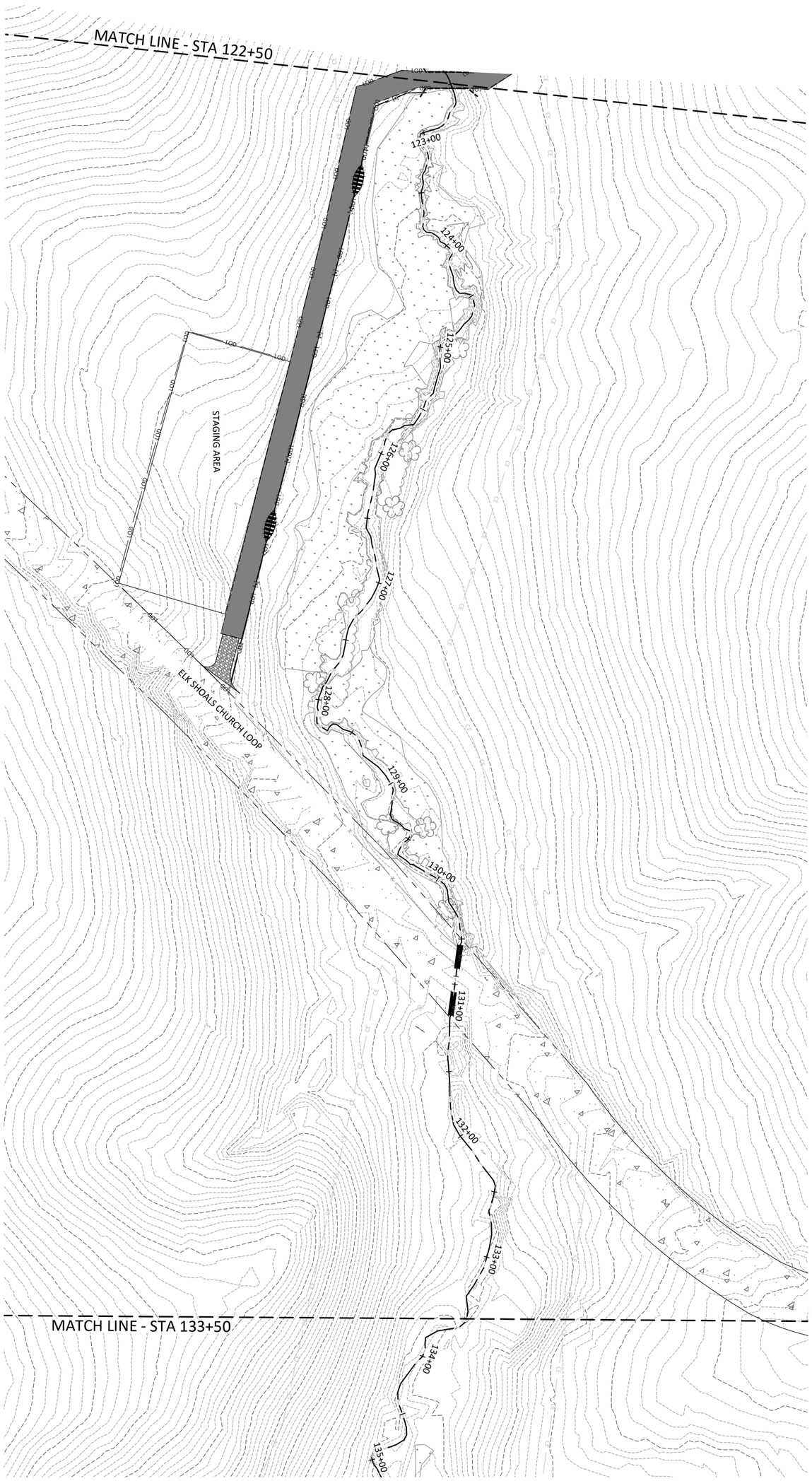

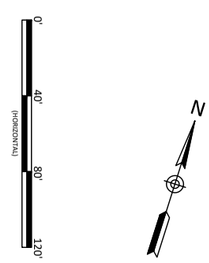

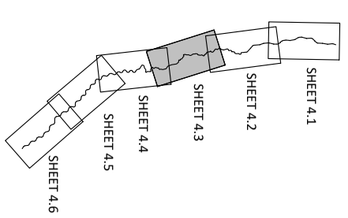

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Project Engineer:	ASE
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Alexander Farm Mitigation Site
Alexander County, North Carolina

UT1
Erosion and Sediment Control

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Alexander Farm Mitigation Site
Alexander County, North Carolina

UT1
Erosion and Sediment Control

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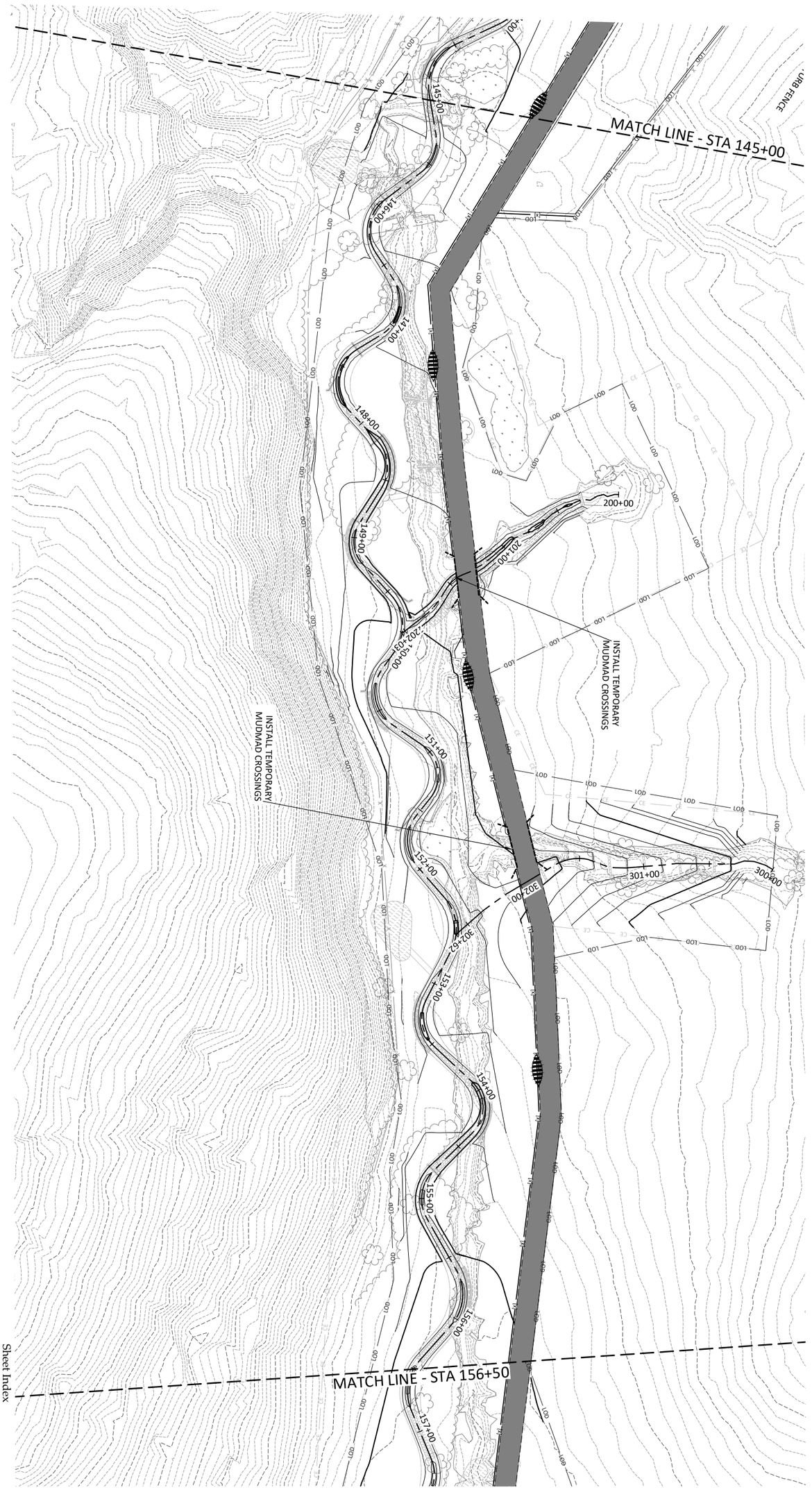

0 40' 80' 120'
HORIZONTAL

N

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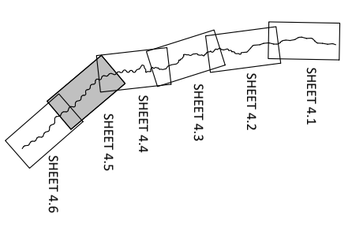

Date:	10.9.2019
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Alexander Farm Mitigation Site
Alexander County, North Carolina

UT1
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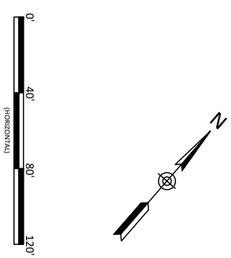

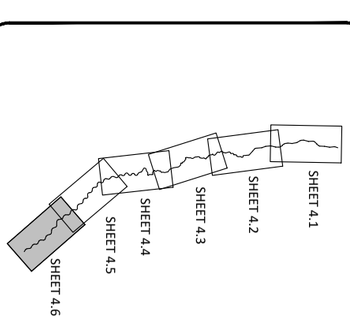

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Alexander Farm Mitigation Site
Alexander County, North Carolina

UT1
Erosion and Sediment Control

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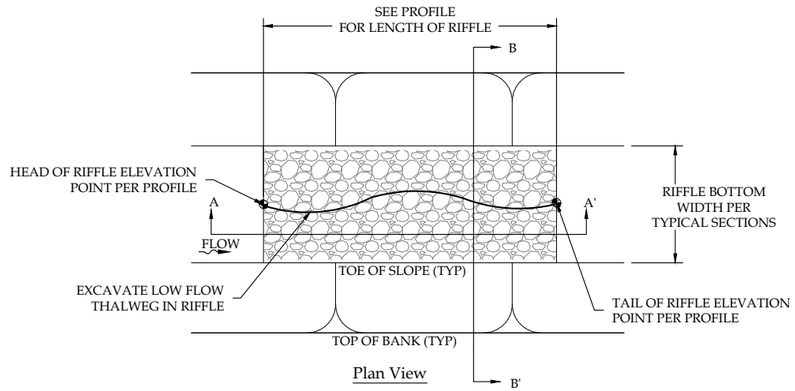
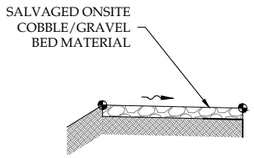
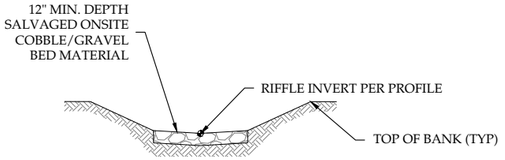
March 7, 2012



Plan View



Profile A-A'

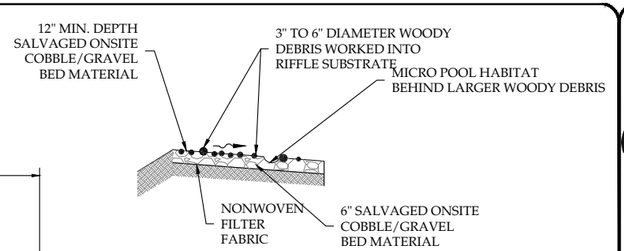


Section B-B'

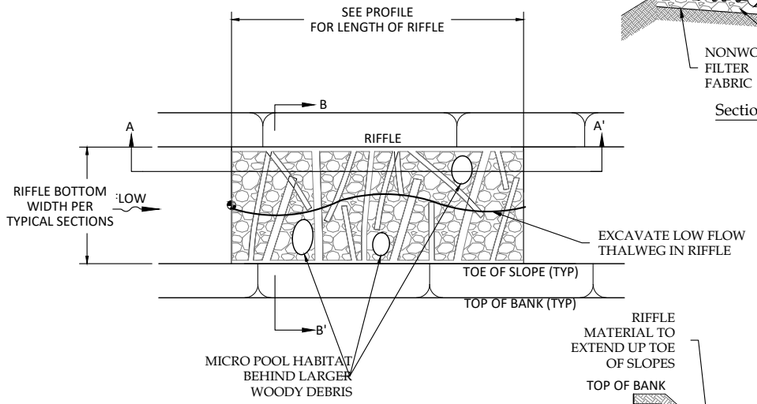
1 / 5.0 Constructed Riffle
Not to Scale

NOTES:

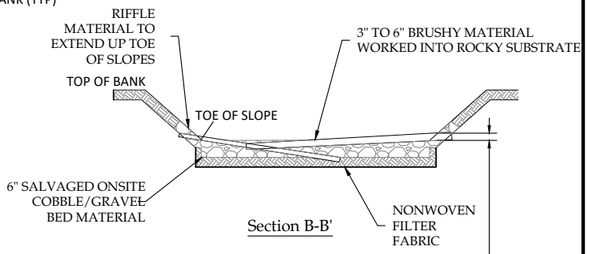
- FILTER FABRIC TO EXTEND 5' UPSTREAM FROM TAIL OF RIFFLE.
- SEE DETAIL 4, SHEET 5.8 FOR SIZING.



Section A-A'



Plan View



Section B-B'

NOTES:

- FILTER FABRIC TO EXTEND 5' UPSTREAM FROM TAIL OF RIFFLE.
- SEE DETAIL 4, SHEET 5.8 FOR SIZING.

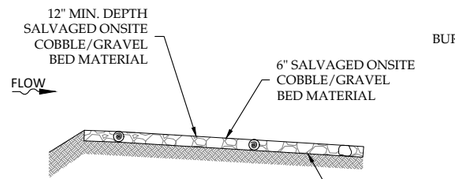
2 / 5.0 Woody Riffle
Not to Scale

CR-CR

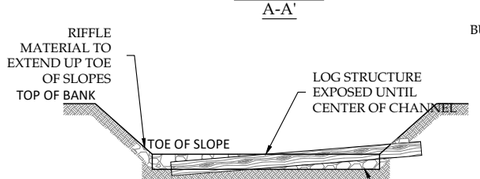
CR-WR

CR-JZ

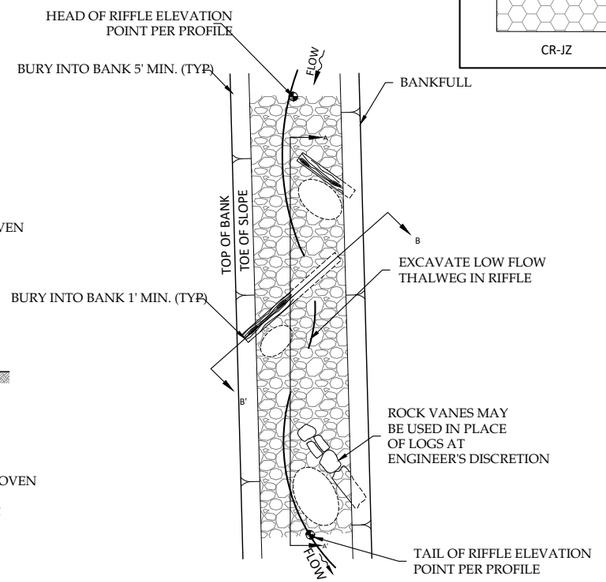
CR-CH



Profile View
A-A'



Log Section
B-B'

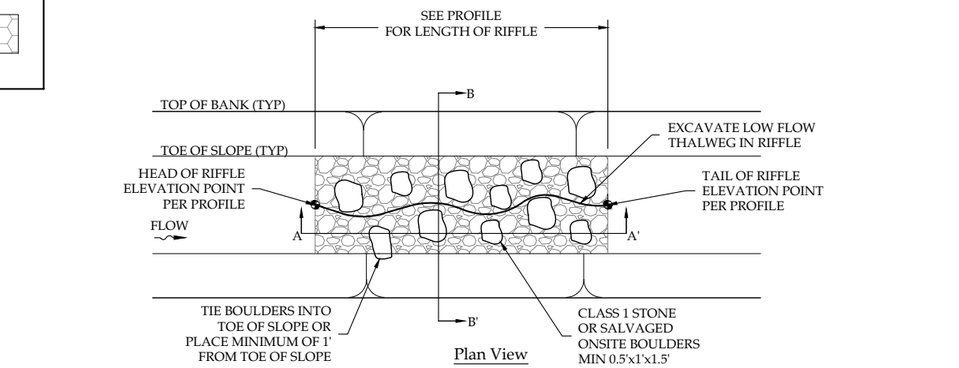


Plan View

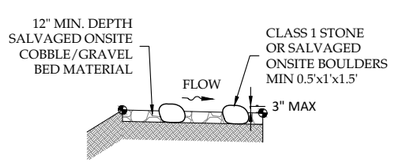
3 / 5.0 Jazz Riffle Structure
Not to Scale

NOTES:

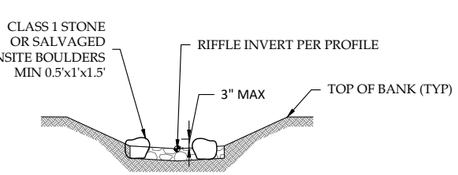
- STRUCTURES SHOULD VARY IN SIZE AND TYPE WITHIN EACH RIFFLE.
- ROCK TO BE USED IN PLACE OF LOGS ON ALL UT1 REACH 1A AND 1B. ROCK MAY BE SUBSTITUTED FOR LOGS AT ENGINEER'S DISCRETION ON ALL OTHER REACHES.
- FILTER FABRIC TO EXTEND 5' UPSTREAM FROM TAIL OF RIFFLE.
- SEE DETAIL 4, SHEET 5.8 FOR SIZING.



Plan View



Section A-A'



Section B-B'

NOTES:

- FILTER FABRIC TO EXTEND 5' UPSTREAM FROM TAIL OF RIFFLE.
- SEE DETAIL 4, SHEET 5.8 FOR SIZING.

4 / 5.0 Chunky Riffle
Not to Scale

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Details

Revisions:

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Job Number: 005-02169
Project Engineer: ASE
Drawn By: JMS
Checked By: EPN

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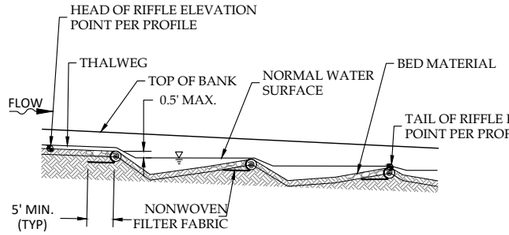
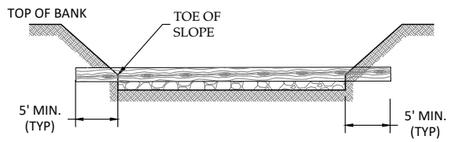
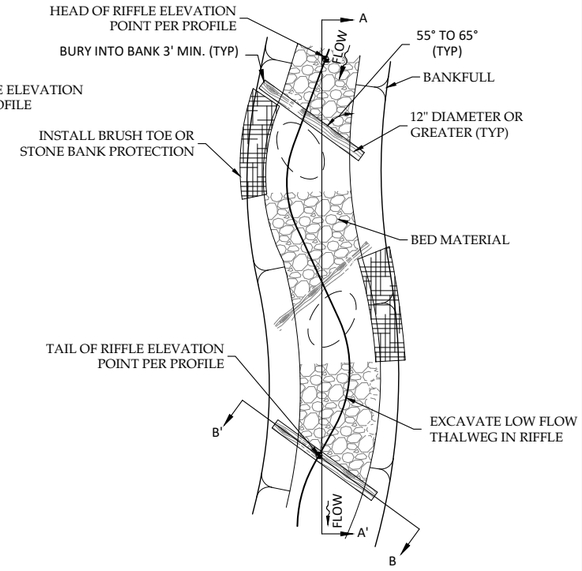
March 7, 2012



Profile View
A-A'



Log Section
B-B'

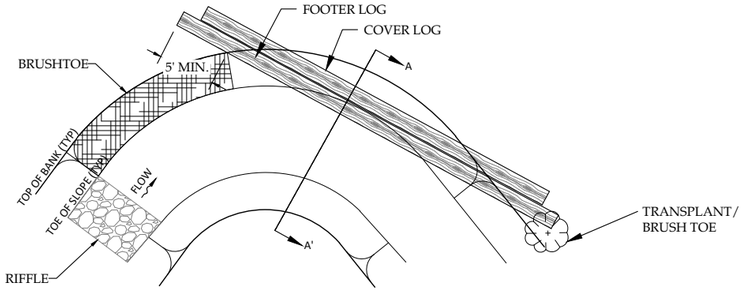


Plan View

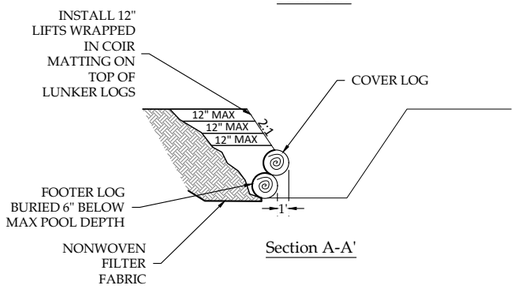
NOTE:

1. BOULDER MATERIAL CAN BE SUBSTITUTED IN PLACE OF ANGLED LOGS WITH APPROVAL OF ENGINEER.
2. SEE DETAIL 4, SHEET 5.8 FOR SIZING.

1/5.1 Rock and Roll Riffle
Not to Scale



Plan View

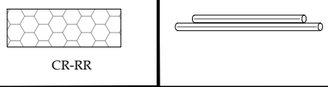


Section A-A'

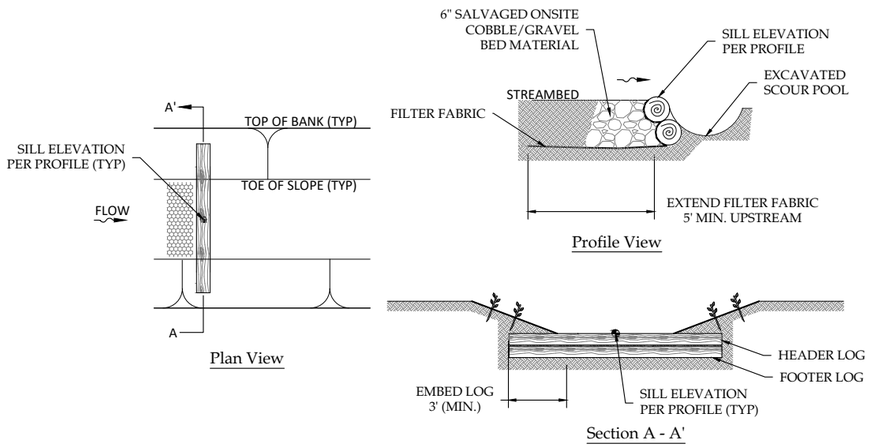
2/5.1 Lunker Log
Not to Scale

NOTE:

1. SEE DETAIL 4, SHEET 5.8 FOR SIZING.



CR-RR



Plan View

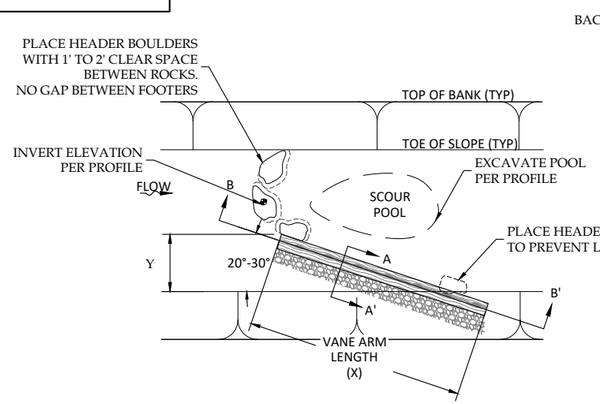
Profile View

Section A - A'

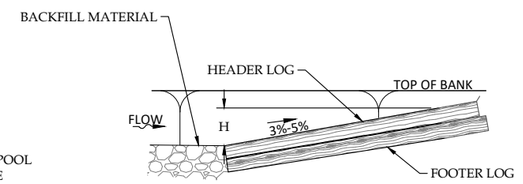
3/5.1 Log Sill
Not to Scale

NOTE:

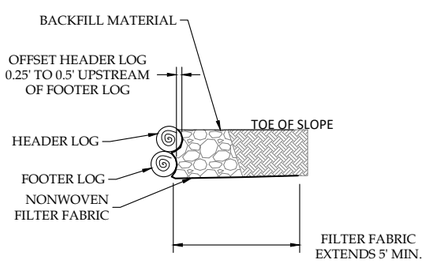
1. ONE LOG MAY BE USED (NO FOOTER) IF DIAMETER IS AT LEAST 18".
2. SEE DETAIL 4, SHEET 5.8 FOR SIZING.



Plan View



Section B-B'



Section A-A'

4/5.1 Log J-Hook
Not to Scale

NOTES:

1. BACKFILL MATERIAL SHALL BE A WELL-GRADED MIX OF STONE: DMIN = 2" DMAX = 12" D50 = 6"
2. SEE DETAIL 4, SHEET 5.8 FOR SIZING.

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Alexander County, North Carolina
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Date: 10.9.2019
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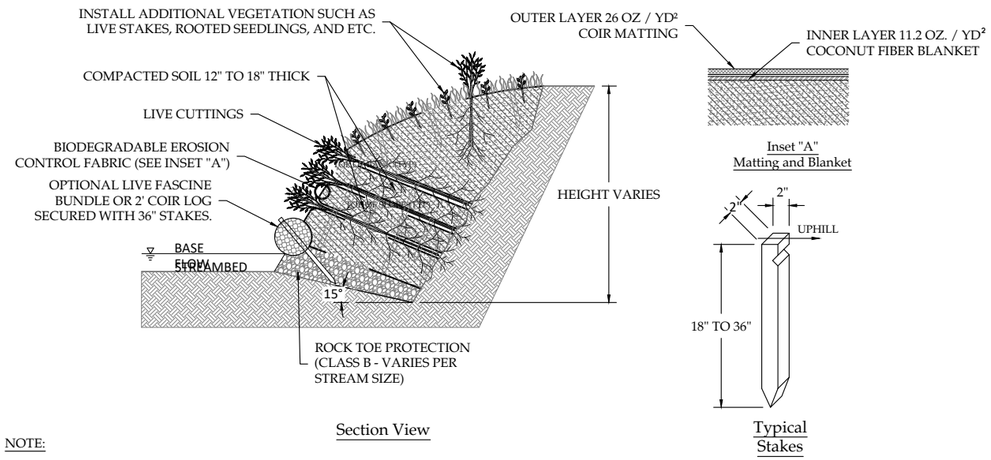
Drawn By: JMS
Checked By: EPN

Sheet 5.1

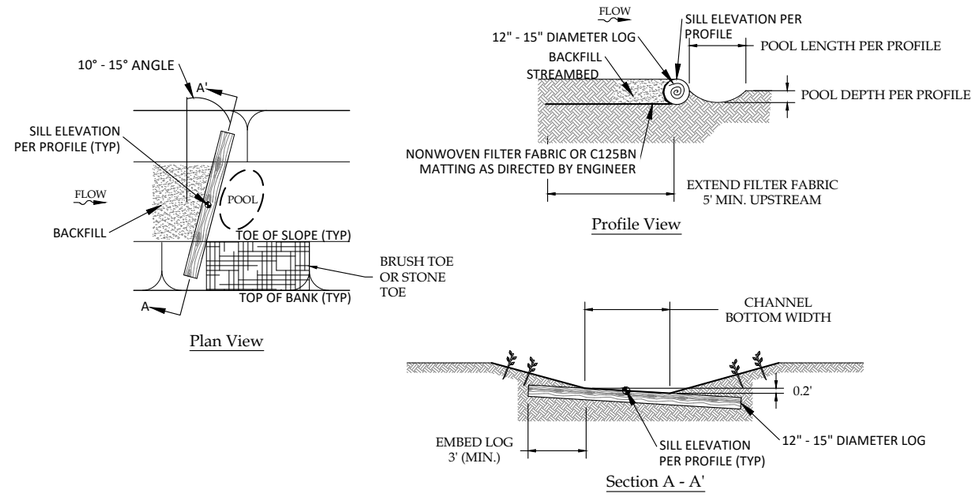
March 7, 2012



NOTE:

1. ROOTED/LEAFED CONDITION OF THE LIVING PLANT MATERIAL IS NOT REPRESENTATIVE OF THE TIME OF INSTALLATION.
2. BOTTOM OF FIRST COMPACTED EARTH LIFT TO BE PLACED 6" ABOVE NORMAL BASEFLOW.
3. NUMBER OF COMPACTED EARTH LIFTS TO VARY DEPENDING ON DESIGN TOP OF BANK HEIGHT.

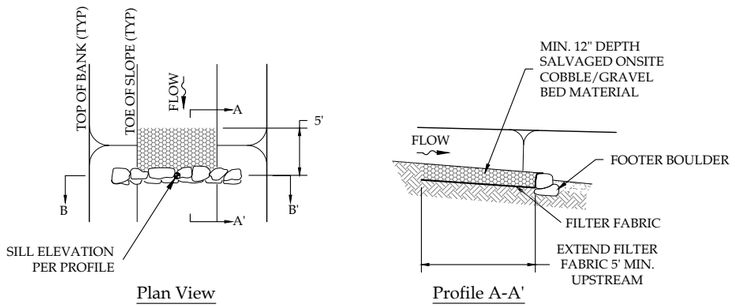
1/5.2 Vegetated Soil Lift
Not to Scale

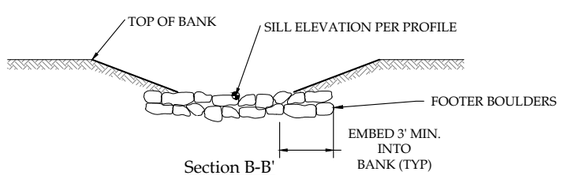


2/5.2 Angled Log Drop
Not to Scale

NOTE:

1. SEE DETAIL 4, SHEET 5.8 FOR SIZING.

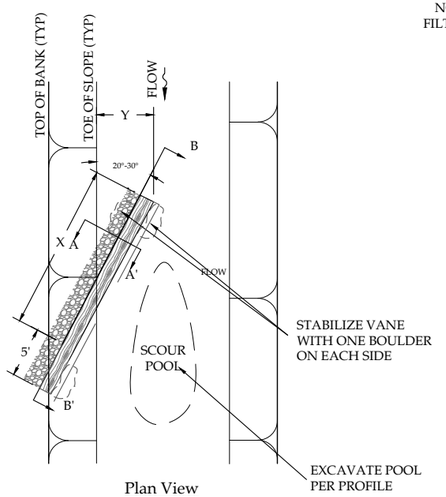


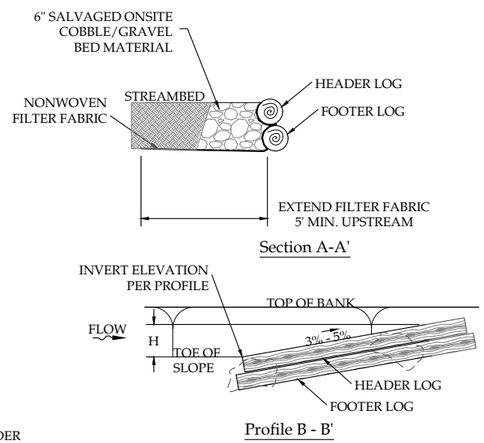


3/5.2 Rock Sill
Not to Scale

NOTE:

1. SEE DETAIL 4, SHEET 5.8 FOR SIZING.





4/5.2 Log Vane
Not to Scale

NOTE:

1. SEE DETAIL 4, SHEET 5.8 FOR SIZING.

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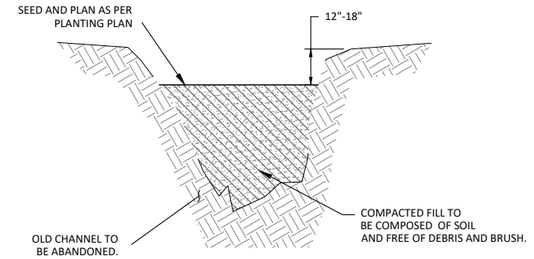
Alexander Farm Mitigation Site
Alexander County, North Carolina
Details

Revisions:

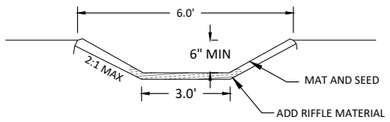
Date: 10/9/2019
Job Number: 905-02169
Project Engineer: ASE
Drawn By: JMS
Checked By: EPN

Sheet 5.2

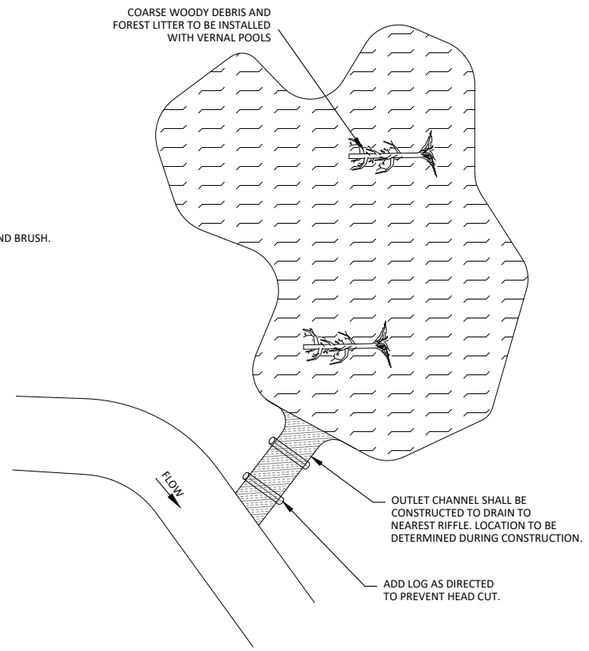
March 7, 2012



Vernal Pool Section

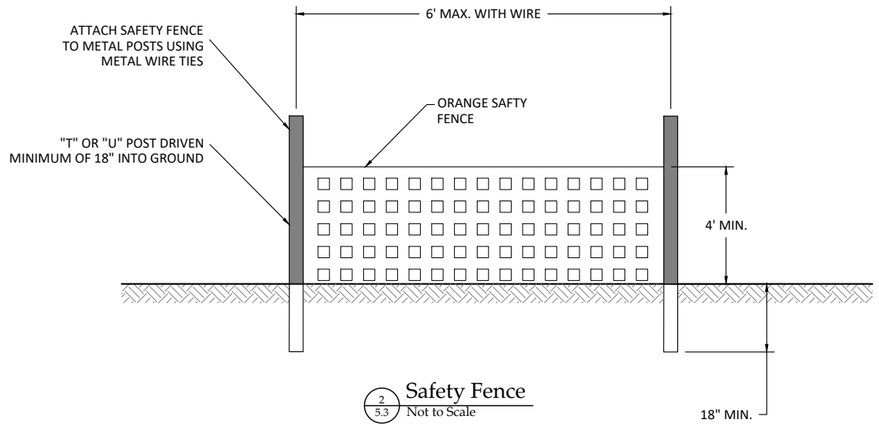


Outlet Channel Section

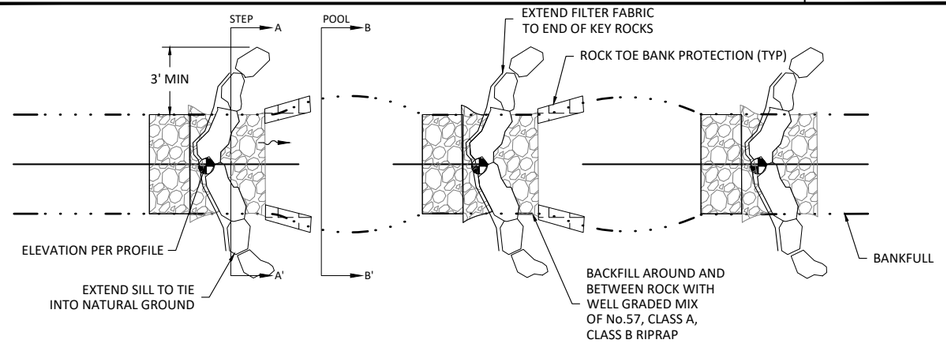


1/5.3 Vernal Pool
Not to Scale

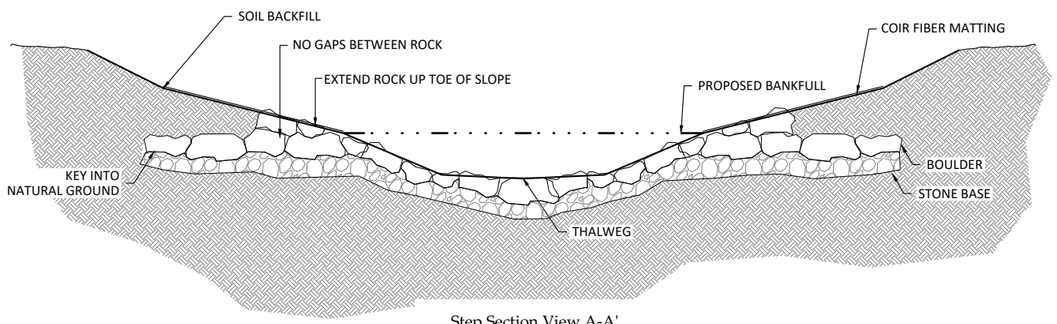
MATERIAL SPECIFICATIONS		
PHYSICAL PROPERTY	TESTS	REQUIREMENTS
MATERIAL	N/A	POLYETHYLENE
RECOMENDED COLOR	N/A	"INTERNATIONAL ORANGE"
TENSILE YIELD	ASTM D638	AVE. 2000 LBS. PER 4' WIDE
ULTIMATE TENSILE STRENGTH	ASTM D638	AVE. 2900 LBS. PER 4' WIDE
ELONGATION AT BREAK (%)	ASTM D638	GREATER THAN 1000%
CHEMICAL RESISTANCE	N/A	INERT TO MOST CHEMICALS AND ACIDS



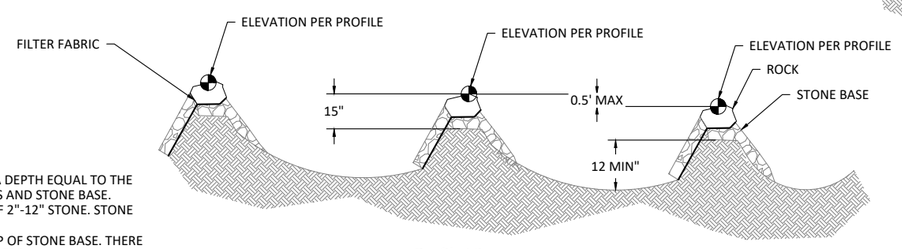
2/5.3 Safety Fence
Not to Scale



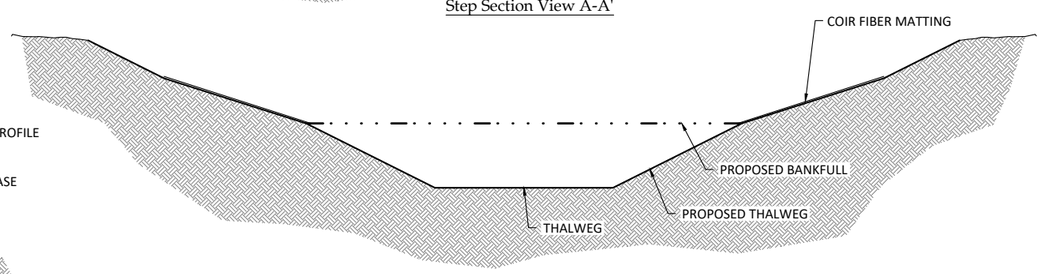
Plan Veiw



Step Section View A-A'



Profile View



Pool Section View B-B'

NOTES:

1. OVER-EXCAVATE CHANNEL BED TO A DEPTH EQUAL TO THE TOTAL THICKNESS OF THE BOULDERS AND STONE BASE.
2. STONE BASE SHALL BE A MIXTURE OF 2"-12" STONE. STONE BASE DEPTH SHALL BE 15".
3. PLACE BOULDERS IN TRENCH ON TOP OF STONE BASE. THERE SHALL BE NO GAPS BETWEEN BOULDERS.
4. MINIMUM SIZE FOR BOULDERS SHALL BE 2' x 2' x 1'.
5. PLACE BACKFILL MATERIAL BEHIND THE ROCKS AND FILTER FABRIC.
6. FILTER FABRIC TO EXTEND 5'.
7. PLACE COARSE BACKFILL BEHIND ROCKS AND FILTER FABRIC ENSURING THAT ANY VOIDS BETWEEN THE ROCKS ARE FILLED.

3/5.3 Rock Cascade with Pools
Not to Scale

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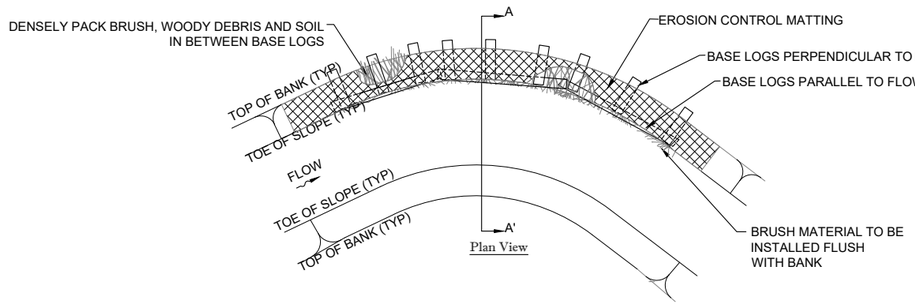
Alexander County, North Carolina
Details

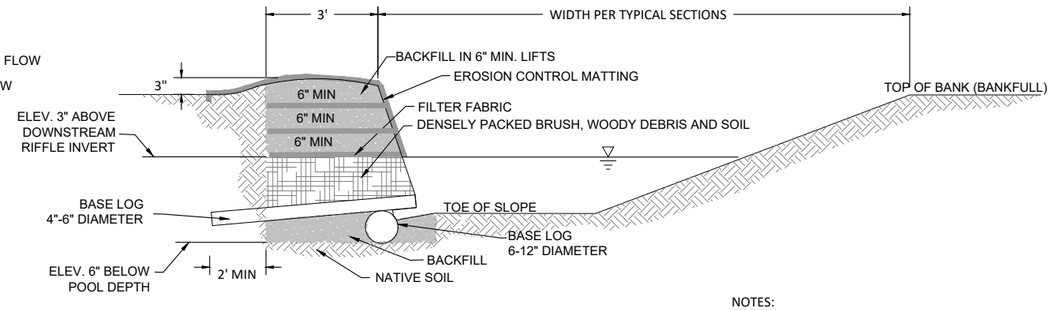
Revisions:

Date: 10/9/2019
Job Number: 685-02164
Project Engineer: ASE
Drawn By: JMS
Checked By: EPN

Sheet 5.3



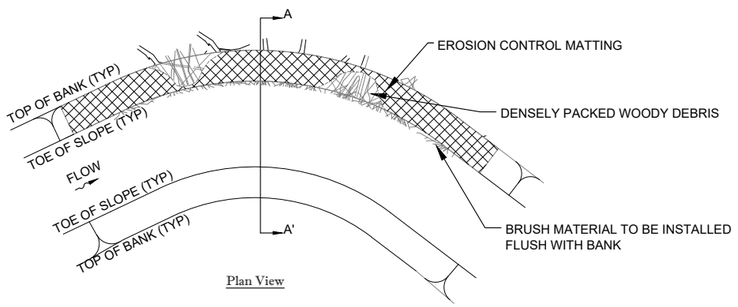
Plan View



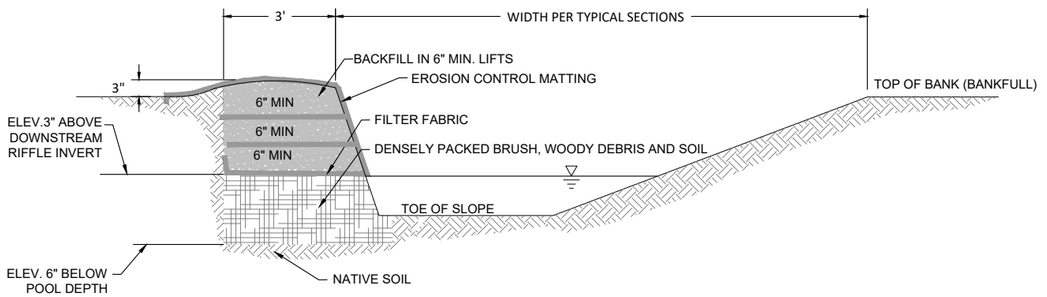
Section A-A'

NOTES:
1. OVEREXCAVATE 3' OUTSIDE OF TOP OF BANK (BANKFULL).
2. INSTALL BASE LOGS PARALLEL TO FLOW AT TOE OF SLOPE. DIAMETER 6"-12".
3. INSTALL BASE LOGS PERPENDICULAR TO FLOW AT INTERVALS ALONG BANK, RESTING ON TOP OF PARALLEL BASE LOGS. BASE LOGS SHALL BE 6"-12" DIAMETER.
4. INSTALL A DENSE LAYER OF BRUSH/WOODY DEBRIS, WHICH SHALL CONSIST OF SMALL BRANCHES AND ROOTS COLLECTED ON-SITE AND SOIL TO FILL ANY VOID SPACE. LIGHTLY COMPACT BRUSH/WOODY DEBRIS LAYER.
5. BRUSH SHOULD BE ALIGNED SO STEMS ARE ROUGHLY PARALLEL AND IS INSTALLED POINTING SLIGHTLY UPSTREAM.
6. INSTALL FILTER FABRIC OVER BRUSH/WOODY DEBRIS.
7. INSTALL EARTH BACKFILL OVER BRUSH/WOODY LAYER ACCORDING TO TYPICAL SECTION DIMENSIONS.
8. SEED, MULCH AND INSTALL EROSION CONTROL MATTING AND BANK STABILIZATION PER PLANS.

1/5.4 Brush Toe - UT1 Reach 4A & 4B
Not to Scale



Plan View



Section A-A'

NOTES:
1. OVEREXCAVATE 3' OUTSIDE OF TOP OF BANK (BANKFULL).
2. INSTALL A DENSE LAYER OF BRUSH/WOODY DEBRIS, WHICH SHALL CONSIST OF SMALL BRANCHES AND ROOTS COLLECTED ON-SITE AND SOIL TO FILL ANY VOID SPACE. LIGHTLY COMPACT BRUSH/WOODY DEBRIS LAYER.
3. BRUSH SHOULD BE ALIGNED SO STEMS ARE ROUGHLY PARALLEL AND IS INSTALLED POINTING SLIGHTLY UPSTREAM.
4. INSTALL FILTER FABRIC OVER BRUSH/WOODY DEBRIS.
5. INSTALL EARTH BACKFILL OVER BRUSH/WOODY LAYER ACCORDING TO TYPICAL SECTION DIMENSIONS.
6. SEED, MULCH AND INSTALL EROSION CONTROL MATTING AND BANK STABILIZATION PER PLANS.

2/5.4 Brush Toe - UT1 Reach 1A & 1B
Not to Scale

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Alexander County, North Carolina

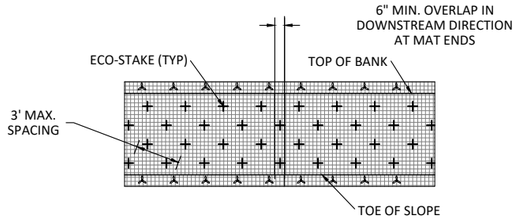
Details

Revisions:

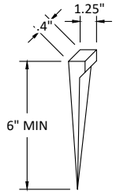
Date: 10/2/2019
Job Number: 005-02169
Project Engineer: ASE
Drawn By: JMS
Checked By: EPN

Sheet 5.4

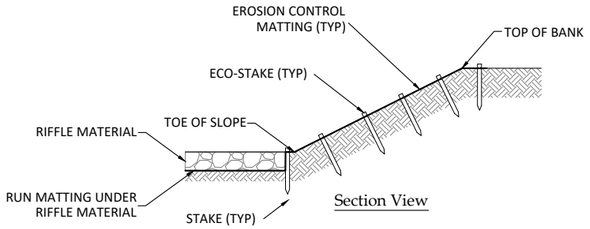
March 7, 2012



Plan View

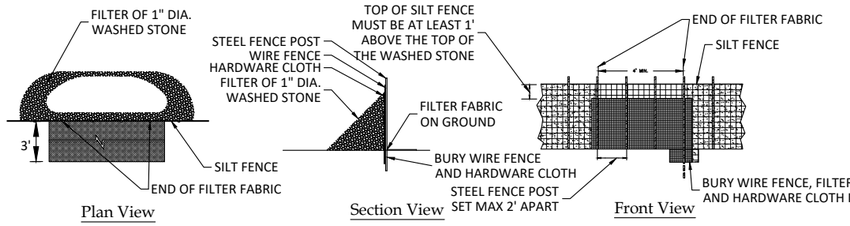


Eco-Stake



Section View

1 / 5.5 Erosion Control Matting
Not to Scale

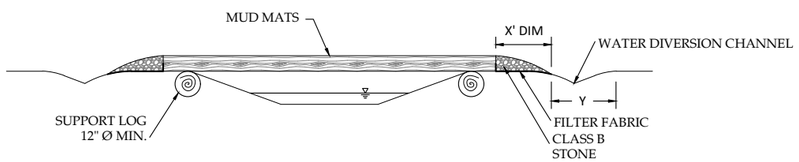


INSTALLATION:
REFER TO THE PLANS FOR LOCATIONS AND SPECIFICATIONS. DURING INSTALLATION OF THE SILT BARRIER OR SILT FENCE, INSPECT THE INSTALLATION TO DETERMINE IF OUTLETS ARE NEEDED ACCORDING TO THE CRITERIA SET FORTH IN THE SPECIFICATIONS FOR THE BARRIER AND FENCE. IF THERE ARE QUESTIONS OR PROBLEMS 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.

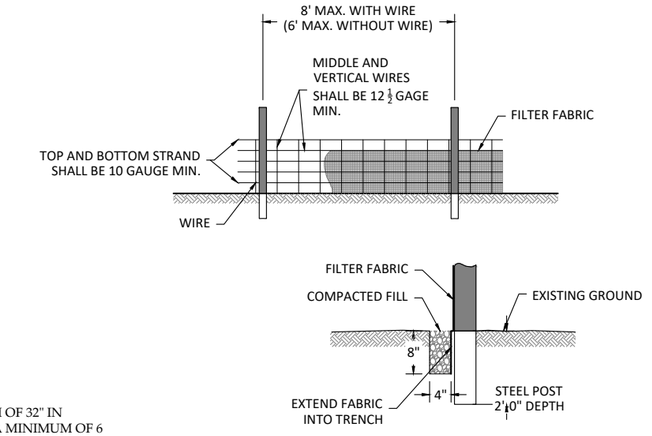
2 / 5.5 Temporary Silt Fence Gravel Outlet
Not to Scale



NOTE:

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.

3 / 5.5 Temporary Stream Crossing - Mud Mat
Not to Scale



NOTES:

1. USE WIRE A MINIUM 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 / 5.5 Silt Fence
Not to Scale

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Alexander County, North Carolina
Details

Revisions:

Date: 10.9.2019
Job Number: 053-02164
Project Engineer: ASE
Drawn By: JMS
Checked By: EFN

Sheet 5.5

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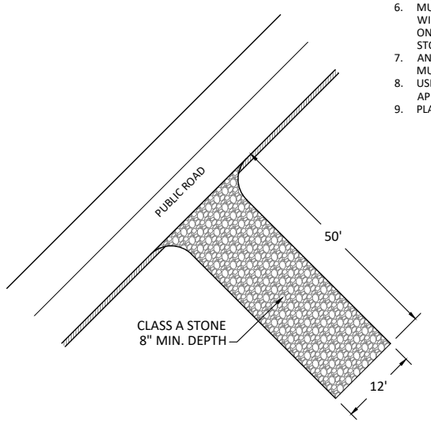
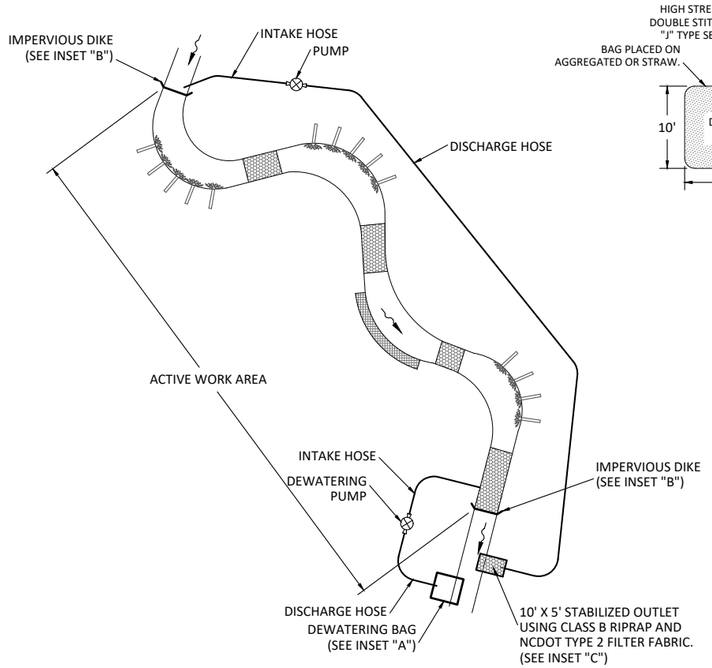
March 7, 2012

NOTES:

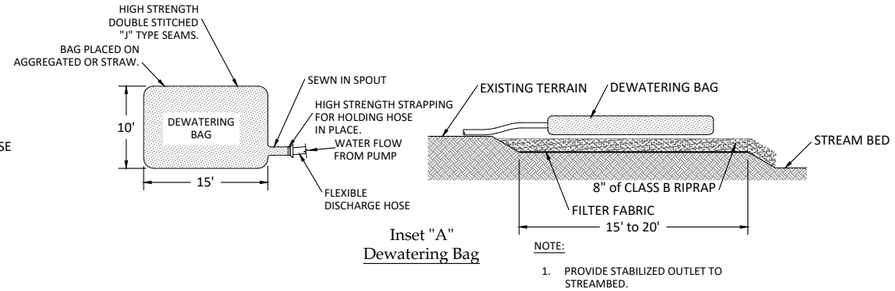
1. PROVIDE TURNING RADIUS SUFFICIENT TO ACCOMMODATE LARGE TRUCKS.
5. LOCATE CONSTRUCTION ENTRANCE AT ALL POINTS OF INGRESS AND EGRESS UNTIL SITE IS STABILIZED. PROVIDE FREQUENT CHECKS OF THE DEVICE AND TIMELY MAINTENANCE.
6. MUST BE MAINTAINED IN A CONDITION WHICH WILL PREVENT TRACKING OR DIRECT FLOW 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.



1/5.6 Construction Entrance
Not to Scale



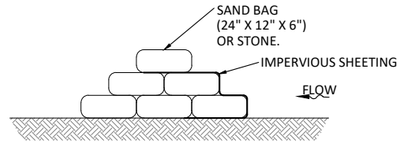
Plan View



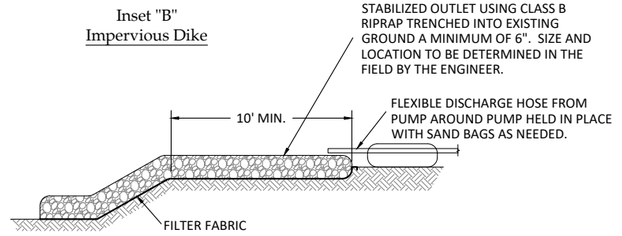
Inset "A"
Dewatering Bag

NOTE:

1. PROVIDE STABILIZED OUTLET TO STREAMBED.

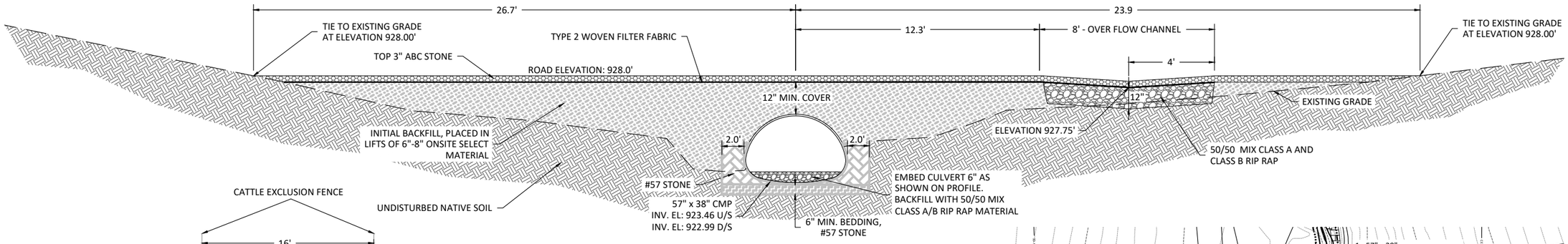


Inset "B"
Impervious Dike

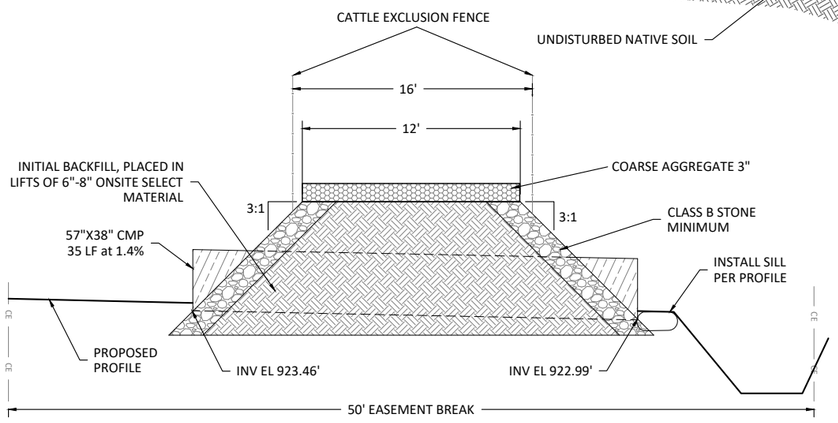


Inset "C"
Stabilized Outlet

2/5.6 Pump Around System
Not to Scale

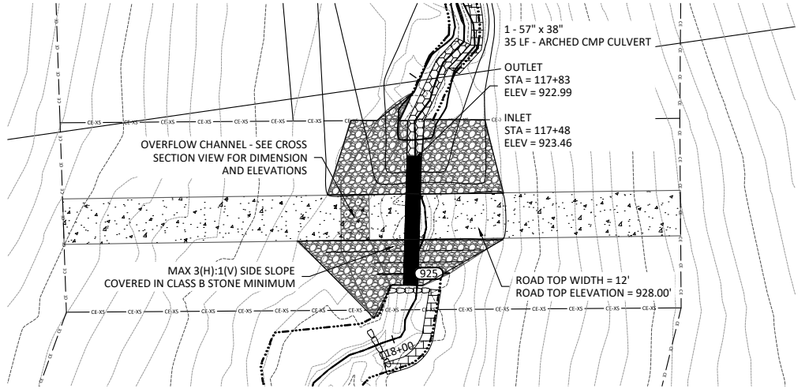


CROSS SECTION VIEW AT CENTER OF ROAD



PROFILE VIEW OF CULVERT CROSSING

3/5.6 Permanent Culvert Crossing
Not to Scale



PLAN VIEW OF CULVERT CROSSING

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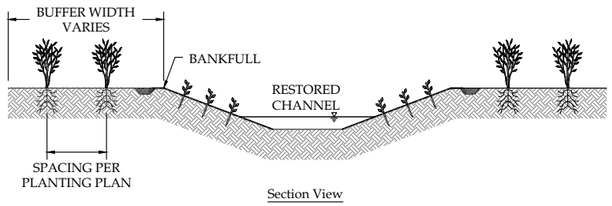
Revisions:

Date: 10.9.2019
Job Number: 005-02169
Project Engineer: ASE
Drawn By: JMS
Checked By: EPN

Sheet 5.6

Q:\Active Projects\005-02169 Alexander Farm\Civil\Plans\02169 - Details.dwg

March 7, 2012



Section View

DIBBLE BAR

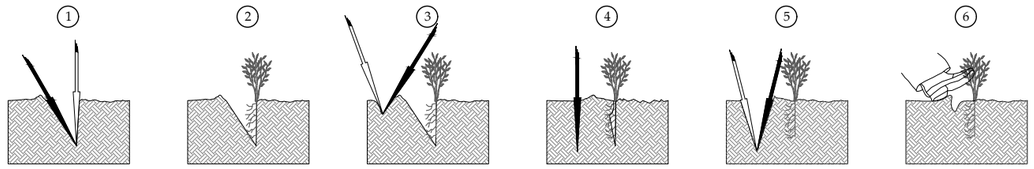
PLANTING BAR SHALL HAVE A BLADE WITH A TRIANGULAR CROSS-SECTION, AND SHALL BE 12 INCHES LONG, 4 INCHES WIDE AND 1 INCH THICK AT CENTER.

ROOTING PRUNING

ALL ROOTS SHALL BE PRUNED TO AN APPORIATE LENGTH TO PREVENT J-ROOTING.

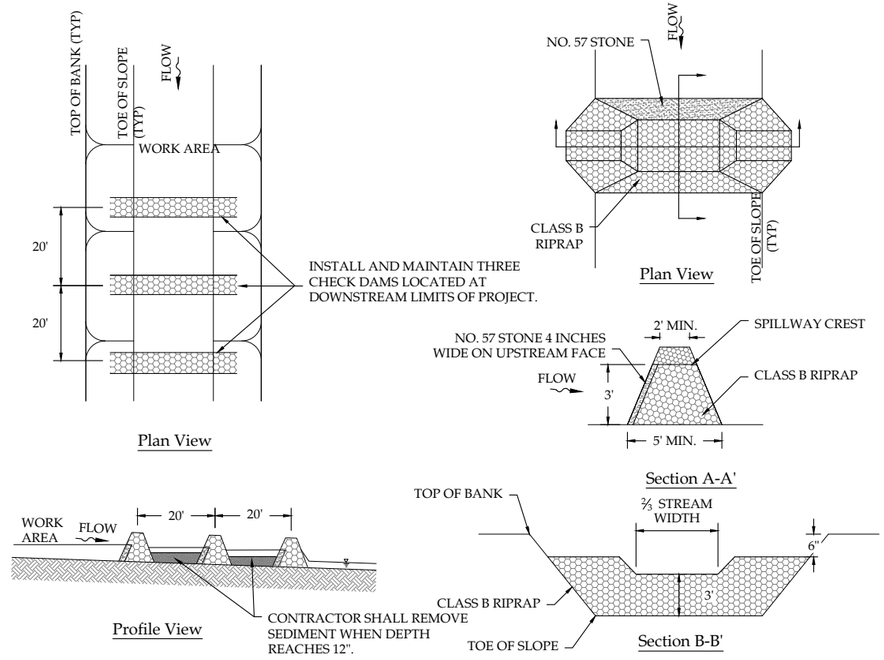
NOTES:

1. ALL SOILS WITHIN THE BUFFER PLANTING AREA SHALL BE DISKED, AS REQUIRED, PRIOR TO PLANTING.
2. ALL PLANTS SHALL BE PROPERLY HANDLED PRIOR TO INSTALLATION TO INSURE SURVIVAL.

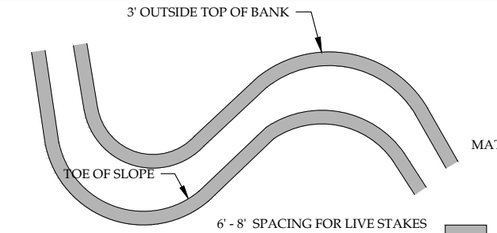


1. INSERT THE DIBBLE, OR SHOVEL, STRAIGHT DOWN INTO THE SOIL TO THE FULL DEPTH OF THE BLADE AND PULL BACK ON THE HANDLE TO OPEN THE PLANTING HOLE. (DO NOT ROCK THE SHOVEL BACK AND FORTH AS THIS CAUSES SOIL IN THE PLANTING HOLE TO BE COMPACTED, INHIBITING ROOT GROWTH.
2. REMOVE THE DIBBLE, OR SHOVEL, 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 HOLD. 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.

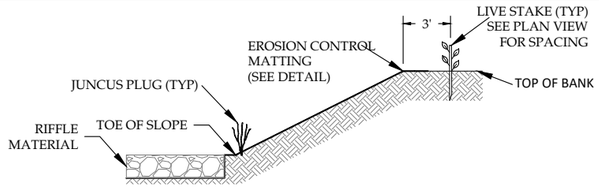
1/5.7 Bare Root Planting
Not to Scale



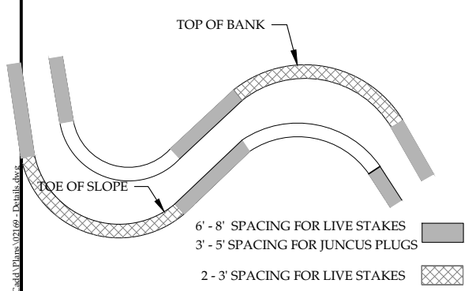
2/5.7 Temporary Rock Sediment Dam
Not to Scale



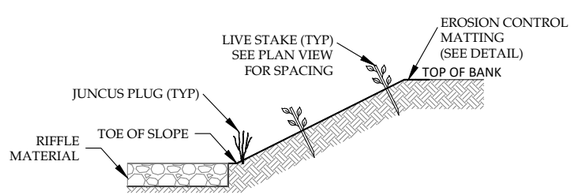
Plan View - UT1 Reach 1A, 1B, 2 & UT1A



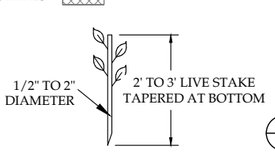
Section View - UT1 Reach 1A, 1B, 2 & UT1A



Plan View - UT1 Reach 4A & 4B



Section View - UT1 Reach 4A & 4B

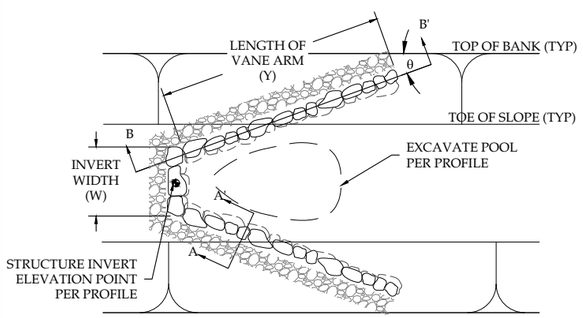


Live Stake Detail

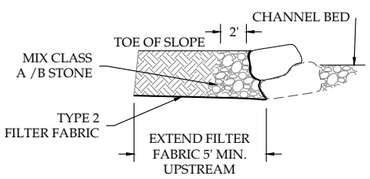
NOTE:

1. LIVE STAKES TO BE PLANTED IN AREAS AS SHOWN ON DETAIL AND DIRECTED BY THE ENGINEER.

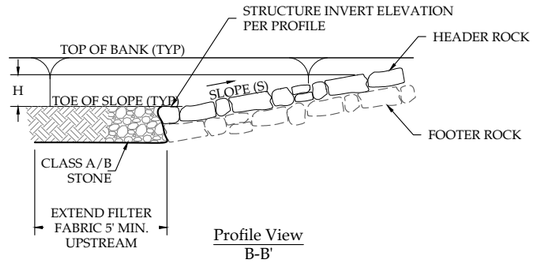
3/5.7 Streambank Planting
Not to Scale



Plan View



Section A-A'



Profile View
B-B'

4/5.7 Rock Cross Vane
Not to Scale

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Tel: 704.332.7754
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Firm License No. F-0831

PRELIMINARY DO NOT USE FOR CONSTRUCTION

Alexander Farm Mitigation Site
Alexander County, North Carolina
Details

Revisions:

Date: 10/9/2019
Job Number: 105-02169
Project Engineer: ASE
Drawn By: JMS
Checked By: EPN

Sheet 5.7

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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
• Temporary grass seed covered with straw or other mulches and tackifiers • Hydroseeding • Rolled erosion control products with or without temporary grass seed • Appropriately applied straw or other mulch • Plastic sheeting	• Permanent grass seed covered with straw or other mulches and tackifiers • Geotextile fabrics such as permanent soil reinforcement matting • Hydroseeding • Shrubs or other permanent plantings covered with mulch • Uniform and evenly distributed ground cover sufficient to restrain erosion • Structural methods such as concrete, asphalt or retaining walls • Rolled erosion control products with grass seed

POLYACRYLAMIDES (PAMS) AND FLOCCULANTS

1. Select flocculants that are appropriate for the soils being exposed during construction, selecting from the *NC DWR List of Approved PAMS/Flocculants*.
2. Apply flocculants at or before the inlets to Erosion and Sediment Control Measures.
3. Apply flocculants at the concentrations specified in the *NC DWR List of Approved PAMS/Flocculants* and in accordance with the manufacturer's instructions.
4. Provide ponding area for containment of treated Stormwater before discharging offsite.
5. Store flocculants in leak-proof containers that are kept under storm-resistant cover or surrounded by secondary containment structures.

EQUIPMENT AND VEHICLE MAINTENANCE

1. Maintain vehicles and equipment to prevent discharge of fluids.
2. Provide drip pans under any stored equipment.
3. Identify leaks and repair as soon as feasible, or remove leaking equipment from the project.
4. Collect all spent fluids, store in separate containers and properly dispose as hazardous waste (recycle when possible).
5. Remove leaking vehicles and construction equipment from service until the problem has been corrected.
6. 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

1. Never bury or burn waste. Place litter and debris in approved waste containers.
2. Provide a sufficient number and size of waste containers (e.g dumpster, trash receptacle) on site to contain construction and domestic wastes.
3. Locate waste containers at least 50 feet away from storm drain inlets and surface waters unless no other alternatives are reasonably available.
4. 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.
5. Cover waste containers at the end of each workday and before storm events or provide secondary containment. Repair or replace damaged waste containers.
6. Anchor all lightweight items in waste containers during times of high winds.
7. Empty waste containers as needed to prevent overflow. Clean up immediately if containers overflow.
8. Dispose waste off-site at an approved disposal facility.
9. On business days, clean up and dispose of waste in designated waste containers.

PAINT AND OTHER LIQUID WASTE

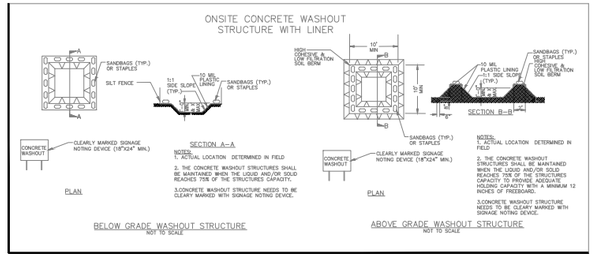
1. Do not dump paint and other liquid waste into storm drains, streams or wetlands.
2. Locate paint washouts at least 50 feet away from storm drain inlets and surface waters unless no other alternatives are reasonably available.
3. Contain liquid wastes in a controlled area.
4. Containment must be labeled, sized and placed appropriately for the needs of site.
5. Prevent the discharge of soaps, solvents, detergents and other liquid wastes from construction sites.

PORTABLE TOILETS

1. 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.
2. Provide staking or anchoring of portable toilets during periods of high winds or in high foot traffic areas.
3. 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

1. 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.
2. Protect stockpile with silt fence installed along toe of slope with a minimum offset of five feet from the toe of stockpile.
3. Provide stable stone access point when feasible.
4. 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

1. Do not discharge concrete or cement slurry from the site.
2. Dispose of, or recycle settled, hardened concrete residue in accordance with local and state solid waste regulations and at an approved facility.
3. 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.
4. 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.
5. 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.
6. 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.
7. 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.
8. 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.
9. 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.
10. 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

1. Store and apply herbicides, pesticides and rodenticides in accordance with label restrictions.
2. 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.
3. 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.
4. Do not stockpile these materials onsite.

HAZARDOUS AND TOXIC WASTE

1. Create designated hazardous waste collection areas on-site.
2. Place hazardous waste containers under cover or in secondary containment.
3. Do not store hazardous chemicals, drums or bagged materials directly on the ground.

NCG01 GROUND STABILIZATION AND MATERIALS HANDLING

EFFECTIVE: 04/01/19

1/5.9 Ground Stabilization and Materials Handling
Not to Scale

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PRELIMINARY DO NOT USE FOR CONSTRUCTION

Alexander Farm Mitigation Site
Alexander County, North Carolina
Details

Revisions:

Date: 10/2/2019
Job Number: 105-02169
Project Engineer: ASE
Drawn By: JMS
Checked By: EPN

Sheet 5.9

March 7, 2012

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. In addition, when a storm event of equal to or greater than 1.0 inch occurs outside of normal business hours, the self-inspection shall be performed upon the commencement of the next business day. Any time when inspections were delayed shall be noted in the Inspection Record.

Inspect	Frequency (during normal business hours)	Inspection records must include:
(1) Rain gauge maintained in good working order	Daily	Daily rainfall amounts. If no daily rain gauge observations are made during weekend or holiday periods, and no individual-day rainfall information is available, record the cumulative rain measurement for those un-attended days (and this will determine if a site inspection is needed). Days on which no rainfall occurred shall be recorded as "zero." The permittee may use another rain-monitoring device approved by the Division.
(2) E&SC Measures	At least once per 7 calendar days and within 24 hours of a rain even: ≥ 1.0 inch in 24 hours	1. Identification of the measures inspected, 2. Date and time of the inspection, 3. Name of the person performing the inspection, 4. Indication of whether the measures were operating properly, 5. Description of maintenance needs for the measure, 6. Description, evidence, and date of corrective actions taken.
(3) Stormwater discharge outfalls (SDOs)	At least once per 7 calendar days and within 24 hours of a rain even: ≥ 1.0 inch in 24 hours	1. Identification of the discharge outfalls inspected, 2. Date and time of the inspection, 3. Name of the person performing the inspection, 4. Evidence of indicators of stormwater pollution such as oil sheen, floating or suspended solids or discoloration, 5. Indication of visible sediment leaving the site, 6. Description, evidence, and date of corrective actions taken.
(4) Perimeter of site	At least once per 7 calendar days and within 24 hours of a rain even: ≥ 1.0 inch in 24 hours	If visible sedimentation is found outside site limits, then a record of the following shall be made: 1. Actions taken to clean up or stabilize the sediment that has left the site limits, 2. Description, evidence, and date of corrective actions taken, and 3. An explanation as to the actions taken to control future releases.
(5) Streams or wetlands onsite or offsite (where accessible)	At least once per 7 calendar days and within 24 hours of a rain even: ≥ 1.0 inch in 24 hours	If the stream or wetland has increased visible sedimentation or a stream has visible increased turbidity from the construction activity, then a record of the following shall be made: 1. Description, evidence and date of corrective actions taken, and 2. Records of the required reports to the appropriate Division Regional Office per Part III, Section C, Item (2)(a) of this permit of this permit.
(6) Ground stabilization measures	After each phase of grading	1. The phase of grading (installation of perimeter E&SC measures, clearing and grubbing, installation of storm drainage facilities, completion of all land-disturbing activity, construction or redevelopment, permanent ground cover). 2. Documentation that the required ground stabilization measures have been provided within the required timeframe or an assurance that they will be provided as soon as possible.

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. The following items pertaining to the E&SC plan shall be documented in the manner described:

Item to Document	Documentation Requirements
(a) Each E&SC Measure has been installed and does not significantly deviate from the locations, dimensions and relative elevations shown on the approved E&SC Plan.	Initial and date each E&SC Measure on a copy of the approved E&SC Plan or complete, date and sign an inspection report that lists each E&SC Measure shown on the approved E&SC Plan. This documentation is required upon the initial installation of the E&SC Measures or if the E&SC Measures are modified after initial installation.
(b) A phase of grading has been completed.	Initial and date a copy of the approved E&SC Plan or complete, date and sign an inspection report to indicate completion of the construction phase.
(c) Ground cover is located and installed in accordance with the approved E&SC Plan.	Initial and date a copy of the approved E&SC Plan or complete, date and sign an inspection report to indicate compliance with approved ground cover specifications.
(d) The maintenance and repair requirements for all E&SC Measures have been performed.	Complete, date and sign an inspection report.
(e) Corrective actions have been taken to E&SC Measures.	Initial and date a copy of the approved E&SC Plan or complete, date and sign an inspection report to indicate the completion of the corrective action.

2. Additional Documentation

In addition to the E&SC Plan documents above, the following items shall be kept on the site and available for agency 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 30 days. 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. Use of electronically-available records in lieu of the required paper copies will be allowed if shown to provide equal access and utility as the hard-copy records.

(c) All data used to complete the Notice of Intent and older 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).

(a) Releases of hazardous substances in excess of reportable quantities under Section 311 of the Clean Water Act (Ref: 40 CFR 110.3 and 40 CFR 117.3) or Section 102 of CERCLA (Ref: 40 CFR 302.4) or G.S. 143-215.85.

(b) Anticipated bypasses and unanticipated bypasses.

(c) 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 Division's Emergency Response personnel at (800) 662-7956, (800) 858-0368 or (919) 733-3300.

Occurrence	Reporting Timeframes (After Discovery) and Other Requirements
(a) Visible sediment deposition in a stream or wetland.	• ***Within 24 hours***, an oral or electronic notification. • ***Within 7 calendar days***, a report that contains a description of the sediment and actions taken to address the cause of the deposition. Division staff may waive the requirement for a written report on a case-by-case basis. • If the stream is named on the NC 303(d) list as impaired for sediment-related causes, the permittee may be required to perform additional monitoring, inspections or apply more stringent practices if staff determine that additional requirements are needed to assure compliance with the federal or state impaired-waters conditions.
(b) Oil spills and release of hazardous substances per Item 1(b)-(c) above	• ***Within 24 hours***, an oral or electronic notification. The notification shall include information about the date, time, nature, volume and location of the spill or release.
(c) Anticipated bypasses [40 CFR 122.41(m)(3)]	• ***A report at least ten days before the date of the bypass, if possible***. The report shall include an evaluation of the anticipated quality and effect of the bypass.
(d) Unanticipated bypasses [40 CFR 122.41(m)(3)]	• ***Within 24 hours***, an oral or electronic notification. • ***Within 7 calendar days,*** a report that includes an evaluation of the quality and effect of the bypass.
(e) Noncompliance with the conditions of this permit that may endanger health or the environment[40 CFR 122.41(l)(7)]	• ***Within 24 hours***, an oral or electronic notification. • ***Within 7 calendar days***, a report that contains a description of the noncompliance, and its causes; the period of noncompliance, including exact dates and times, and if the noncompliance has not been corrected, the anticipated time noncompliance is expected to continue; and steps taken or planned to reduce, eliminate, and prevent reoccurrence of the noncompliance. [40 CFR 122.41(l)(6). • Division staff may waive the requirement for a written report on a case-by-case basis.

NCG01 SELF-INSPECTION, RECORDKEEPING AND REPORTING

EFFECTIVE: 04/01/19

1/5.10 Self-inspection, Recordkeeping and Reporting
Not to Scale

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Fax: 704.332.3306
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PRELIMINARY DO NOT USE FOR CONSTRUCTION

Alexander Farm Mitigation Site
Alexander County, North Carolina
Details

Revisions:

Date: 10.9.2019
Job Number: 005-02169
Project Engineer: ASE
Drawn By: JMS
Checked By: EPN

Sheet 5.10

APPENDIX 11

Crediting Release Schedule and Supporting Information

WILDLANDS
ENGINEERING

MEMO

REGARDING: Credit Ratios
ALEXANDER FARM Mitigation Site
Catawba 03050101; Alexander County, NC
DEQ Contract No. 7416
DMS Project No. 100048
Wildlands Project No. 005-02169

DATE: Monday, April 16, 2018

In the September 26, 2017, Technical Proposal for the Alexander Farm Mitigation Site, Wildlands presented various credit ratios for UT1 upstream and downstream of Elk Shoals Church Loop road based on the channel conditions at the time of the proposal. This memo reflects changes to the proposed credit ratios in response to discussion during the IRT field walk of the site on March 29, 2018.

Upstream of the road

The stream crossing shown in the proposal marked the proposed transition from restoration at 1:1 credit to enhancement 2 at 2.5:1 credit; however, during the IRT field walk, the group agreed that there isn't a clearly defined transition point in the field. The proposed enhancement 2 section will require some areas of restoration or enhancement I, and some of the restoration area may be fine with a lighter touch.

The IRT group discussed restoration at 1:1 credit from the head of the channel down to the existing fence line (which crosses the channel upstream of the stream crossing), and enhancement 2 at 2:1 credit from the fence line to the road. This would shorten the restoration footage presented in the proposal in this area by approximately 400 feet.

After the meeting, Wildlands reviewed the contracted credit requirements, and given the large area of transition from restoration to enhancement 2 upstream of the road, Wildlands will likely propose the entire area upstream of the road as enhancement 2 at 2:1 credit in the mitigation plan and apply the appropriate level of intervention needed throughout the reach.

Downstream of the road

Within the woods, the IRT group generally agreed with the preservation approach presented in the proposal. At the headcut which marked the proposed transition from preservation to restoration, the group agreed that a transitional length of enhancement 2 was appropriate. This transitional length will continue until the stream enters the active cattle pasture, where the approach will switch to restoration down to the end of the project.

The Alexander Farm tenant farmer rotates his 175-head herd between the pasture upstream of the road in spring and summer and the downstream of the road in fall and winter. Wildlands visited the Site several times between 2010 and 2015 and confirmed this land management practice. Over the 2 years prior to submittal of the proposal, however, the tenant farmer kept the herd upstream of the road to allow for fencing repair and

replacement downstream of the road. During this time, he cut hay downstream of the road, but allowed the riparian area to grow with annuals. During the proposal process, the farmer told Wildlands that his repairs would soon be complete and he would then move the herd downstream of the road. Despite incision throughout the channel length, Wildlands proposed a lower credit ratio of 1.5:1 for restoration downstream of the road to acknowledge the reach's heavy herbaceous cover due to the absence of recent cattle activity.

The farmer completed his fencing repairs after the proposal was submitted and moved his herd downstream of the road. During the IRT site walk on March 29, 2018, the IRT group noted that all the riparian vegetation was gone and impacted by cattle. IRT members, Wildlands, and DMS all felt that the restoration activities proposed downstream of the road were now creditable at a 1:1 ratio. Wildlands proposes this section of restoration at 1:1 credit.

Please see the attached figure which illustrates the proposed shift in credit ratios. All proposed credit ratios will be fully justified in the mitigation plan.

PROPOSED BMP

UT1 REACH 1

PROPOSED 50'
CULVERT CROSSING

UT1 REACH 2

50' EASEMENT BREAK

UT1 REACH 3

UT1A

AGRICULTURAL
BMP

UT1 REACH 4

ELK SHOALS CREEK

Elk Shoals Church Loop

Project Location
Proposed Conservation Easement
Internal Crossing (50')
Proposal Reach Breaks
Restoration (1:1)
Enhancement II (2:1)
Enhancement II (2.5:1)
Enhancement II (No Credit)
Preservation (10:1)
Agricultural BMP (No Credit)
10' Contours
Non-Project Streams

2014 Aerial Photography

WILDLANDS ENGINEERING

0 200 400 Feet

N

IRT Credit Memo
Alexander Farm Mitigation Site
Catawba River Basin (03050101)

Alexander County, NC

WILDLANDS
ENGINEERING

MEETING NOTES

MEETING:	Post-Contract IRT Site Walk **ALEXANDER FARM Mitigation Site** Catawba 03050101; Alexander County, NC DEQ Contract No. 7416 DMS Project No. 100048 Wildlands Project No. 005-02169
DATE:	Thursday, March 29, 2018
LOCATION:	Elk Shoals Church Loop Stony Point, NC

Attendees

Steve Kichefski, USACE	Harry Tsomides, DMS	Mac Haupt, DWR
Olivia Munzer, WRC	Kirsten Ullman, DMS	Shawn Wilkerson, Wildlands
Todd Bowers, EPA	Alan Johnson, DWR	Christine Blackwelder, Wildlands
Paul Wiesner, DMS	Ori Tuvia, DWR	

Materials

- Wildlands Engineering Technical Proposal dated 9/21/2017 in response to DMS RFP 16-007277

Meeting Notes

The meeting began at 1 pm. Shawn presented an overview of the project at the parking location. From there, the group walked upstream to the headwaters of UT1, retraced steps and reviewed UT1 downstream of the road, UT1A, and the potential wetland area in the left floodplain at the downstream site extents. The meeting concluded at 3:30 PM.

1. **Overall project comments**
   - Bald eagle is listed for Alexander County. No bald eagle nest noticed in vicinity, nor is there a record adjacent to the site.
   - Alexander family house (historical) located near the site.
   - Olivia recommends that no trees are cleared during bat maternity roosting period (June/July).
2. **Potential Wetland Credit Areas**

   Steve noted that if wetlands are included in the project, he or William Elliott (USACE) will do a more thorough review of the site when they return for the jurisdictional determination.

- **Upstream of road**
  - There are a few wetland pockets in the right floodplain just upstream of the road, and several more in the left floodplain upstream of the proposed stream crossing.
  - Steve asked that wetland pockets be encompassed by the easement, even if not for credit.
- **Downstream of road**
  - If needed, the area in the left floodplain that is currently ditched has potential for wetland credits.
  - Discussion about the need to drop a well into any wetland proposed for restoration credit to begin pre-construction data collection asap.

3. **Stream Restoration**

- **Upstream of the road**
  - The group walked up to the head of UT1. Cattle have been rotated out of this pasture and are in the pasture downstream of the road.
  - The start of UT1 is a large cattle wallow area. Shawn discussed that Wildlands may install a BMP to treat concentrated agricultural runoff above the reach.
  - Mac noted the soils at the head of UT1 and that this area may have been a wetland before the headcut advanced through and formed a stream channel.
  - Several members of the group noted that UT1 here has a lot of side seeps and noted areas of channel recovery from the absence of cattle over the last few months. One area of UT1 here just upstream of a headcut has very low banks and the group discussed tying design into this area. Shawn noted the planar bed and lack of habitat but did agree that Wildlands may utilize good areas of existing channel in the restoration design.
  - Continuing downstream, Olivia expressed concern over how close the proposed crossing is to the existing left floodplain wetland. The valley walls are relatively steep near the proposed crossing, and Wildlands will likely shift this crossing further downstream to where crossing will be easier for the farmer, which should also address any wetland concerns.
  - The crossing shown in the proposal marks a transition from restoration upstream to enhancement 2 downstream, although the group agreed that there isn't a clearly defined transition point in the field. The proposed enhancement 2 section will require some areas of restoration or enhancement I, and some of the restoration area may be fine with a lighter touch.
  - Overall, upstream of the road, the group discussed restoration at 1:1 credit from the head of the channel down to the existing fence line, and enhancement 2 at 2:1 credit from the fence line to the road. This would shorten the proposed restoration footage in this area by approximately 400 feet.
- **Downstream of the road**
  - Within the woods, the group generally agreed with a preservation approach. At the headcut which marked the proposed transition from preservation to restoration, the group agreed that a transitional length of enhancement 2 was appropriate. This transitional length will continue until the stream enters the active cattle pasture, where the approach will switch to restoration down to the end of the project.

- The restoration downstream of the road was presented in the proposal at 1.5:1 credit due to the amount of floodplain vegetation which had established in absence of the cattle over the last two years. The group noted the extreme difference in the floodplain vegetation and channel condition since the cattle have been rotated back into the field, and that the reach is worthy of traditional 1:1 crediting.
- Olivia noted underground flow from the left floodplain near the downstream project extent. These may be drain tiles from the field. Wildlands will review this more carefully during the existing conditions assessment.

These meeting minutes were prepared by Christine Blackwelder and reviewed by Shawn Wilkerson on April 13, 2018, and represent the authors' interpretation of events. Olivia Munzer comments (May 7, 2018) were incorporated on May 15, 2018. These minutes are now final.

Appendix 11 - Credit Release Schedule and Supporting Information

All credit releases will be based on the total credit generated as reported in the approved final mitigation plan, unless there are significant discrepancies, in which case an addendum will be proposed to the IRT. 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 following conditions apply to the credit release schedules:

A. A reserve of 10% of a site's total stream credits will be released after four bankfull events have occurred, in separate years, provided the channel is stable and all other performance standards are met. In the event that less than four bankfull events occur during the monitoring period, release of these reserve credits is at the discretion of the NCIRT.

B. For mitigation banks, implementation of the approved Mitigation Plan must be initiated no later than the first full growing season after the date of the first credit transaction (credit sale).

C. 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 the General Monitoring Requirements, 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.

D. 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.

The schedules below list the updated credit release schedules for stream and wetland mitigation projects developed by bank and ILF sites in North Carolina:

Table A: Stream Credit Release Schedule

Credit Release Schedule and Milestones for Streams			
Credit Release Milestone	**Release Activity**	**ILF/NCDMS**	
		Interim Release	**Total Released**
2*	Completion of all initial physical and biological improvements made pursuant to the Mitigation Plan	30%	30%
3	Year 1 monitoring report demonstrates that channels are stable and interim performance standards have been met	10%	40%
4	Year 2 monitoring report demonstrates that channels are stable and interim performance standards have been met	10%	50%
5	Year 3 monitoring report demonstrates that channels are stable and interim performance standards have been met	10%	60%
6**	Year 4 monitoring report demonstrates that channels are stable and interim performance standards have been met	5%	65% (75%***)
7	Year 5 monitoring report demonstrates that channels are stable and interim performance standards have been met	10%	75% (85%***)
8**	Year 6 monitoring report demonstrates that channels are stable and interim performance standards have been met	5%	80% (90%***)
9	Year 7 monitoring report demonstrates that channels are stable, performance standards have been met	10%	90% (100%***)

*For ILF sites (including all NCDMS projects), no initial release of credits (Milestone 1) is provided because ILF programs utilized advance credits, so no initial release is necessary to help fund site construction. To account for this, the 15% credit release associated with the first milestone (bank establishment) is held until the second milestone, so that the total credits release at the second milestone is 30%. In order for NCDMS to receive the 30% release (shown in the schedules as Milestone 2), they must comply with the credit release requirements stated in Section IV(I)(3) of the approved NCDMS Instrument.

**Please note that vegetation data may not be required with monitoring reports submitted during these monitoring years unless otherwise required by the Mitigation Plan or directed by the NCIRT.

***10% reserve of credits to be held back until the bankfull event performance standard has been met.

APPENDIX 12

Floodplain Checklist

EEP Floodplain Requirements Checklist

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

Project Location

Name of project:	Alexander Farm Mitigation Site
Name if stream or feature:	Elk Shoals Creek
County:	Alexander County
Name of river basin:	Catawba
Is project urban or rural?	Rural
Name of Jurisdictional municipality/county:	Alexander County
DFIRM panel number for entire site:	3775
Consultant name:	Wildlands Engineering
Phone number:	704-332-7754
Address:	1430 S. Mint Street, Suite 104 Charlotte, NC 28203

Design Information

Provide a general description of project (one paragraph). Include project limits on a reference orthophotograph at a scale of 1" = 500".
Summarize stream reaches or wetland areas according to their restoration priority.

Wildlands Engineering, Inc. (Wildlands) is completing a full-delivery project for the North Carolina Division of Mitigation Services (DMS) to restore, enhance, or preserve 6,758 linear feet (LF) of perennial streams in Alexander County, NC. The project streams are summarized below.

Reach	**Length**
Unnamed Tributary (UT1)	6.,555 LF
Unnamed Tributary (UT1A)	203 LF

UT1 does not have a designated Special Flood Hazard Area (SFHA), but lies within the mapped SFHA Zone AE of Elk Shoals Creek on Alexander County Flood Insurance Rate Map Panel 3775. Base flood elevations have been defined but non-encroachment limits have not been established.

Floodplain Information

Is project located in a Special Flood Hazard Area (SFHA)?

(•) Yes ( ) No

If project is located in a SFHA, check how it was determined:

- [ ] Redelineation
- [ ] Detailed Study
- [x] Limited Detail Study
- [ ] Approximate Study
- [ ] Don't know

List flood zone designation:

Check if applies:

- [x] AE Zone
  - ( ) Floodway
  - (•) Non-Encroachment
  - ( ) None
- [ ] A Zone

○ Local Setbacks Required

○ No Local Setbacks Required

If local setbacks are required, list how many feet:

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

○ Yes ◉ No

Land Acquisition (Check)

☐ State owned (fee simple)

☐ Conservation easment (Design Bid Build)

☑ Conservation Easement (Full Delivery Project)

Note: if the project property is state-owned, then all requirements should be addressed to the Department of Administration, State Construction Office (attn: Herbert Neily, (919) 807-4101)

Is community/county participating in the NFIP program?

◉ Yes ○ No

Note: if community is not participating, then all requirements should be addressed to NFIP (attn: State NFIP Engineer, (919) 715-8000)

Name of Local Floodplain Administrator: Mr. Jon Pilkenton
Phone Number: 828.632.1000

Floodplain Requirements

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

☐ No Action

☑ No Rise

☐ Letter of Map Revision

☐ Conditional Letter of Map Revision

☐ Other Requirements

List other requirements: Local floodplain development permit application to be filed with no-impact certification and flood impact assessment report.

Comments:

Name: Aaron Earley, PE, CFM Signature:

Title: Senior Water Resources Engineer Date: 05/30/2019