

MITIGATION PLAN
Final Report for IRT

June 4, 2021

HUNTSMAN MITIGATION SITE
Wilkes County, NC

Yadkin River Basin
HUC 03040102

USACE Action ID No. SAW-2019-00836
NCDWR ID No. 20190866

NCDEQ Contract No. 7891
RFP#: 16-007728 (Issued: 11/13/2018)
DMS ID No. 100123

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.

Contributing Staff:

Aaron Earley, PE, CFM *Project Manager*
Shawn Wilkerson, *Principal in Charge*
Ian Eckardt, PWS, *Wetland Delineations*
Christine Blackwelder, *Mitigation Plan Development*
Aaron Earley, PE, CFM, *Stream and BMP Design*
Haley Cook, *Designer*
Jesse Kelley, *Construction Documents*
Emily Reinicker, PE, CFM, *Lead Quality Assurance*

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

REPLY TO
ATTENTION OF:

April 7, 2021

Regulatory Division

Re: NCIRT Review and USACE Approval of the NCDMS Huntsman Mitigation Site / Wilkes Co./ SAW-2019-00836/ NCDMS Project # 100123

Mr. Tim Baumgartner
North Carolina Division of Mitigation Services
1652 Mail Service Center
Raleigh, NC 27699-1652

Dear Mr. Baumgartner:

The purpose of this letter is to provide the North Carolina Division of Mitigation Services (NCDMS) with all comments generated by the North Carolina Interagency Review Team (NCIRT) during the 30-day comment period for the Huntsman Draft Mitigation Plan, which closed on March 19, 2021. These comments are attached for your review.

Based on our review of these comments, we have determined that no major concerns have been identified with the Draft Mitigation Plan, which is considered approved with this correspondence. However, several minor issues were identified, as described in the attached comment memo, which must be addressed in the Final Mitigation Plan.

The Final Mitigation Plan is to be submitted with the Preconstruction Notification (PCN) Application for Nationwide permit approval of the project along with a copy of this letter. Issues identified above must be addressed in the Final Mitigation Plan. All changes made to the Final Mitigation Plan should be summarized in an errata sheet included at the beginning of the document. If it is determined that the project does not require a Department of the Army permit, you must still provide a copy of the Final Mitigation Plan, along with a copy of this letter, to the USACE Mitigation Office at least 30 days in advance of beginning construction of the project. Please note that this approval does not preclude the inclusion of permit conditions in the permit authorization for the project, particularly if issues mentioned above are not satisfactorily addressed. Additionally, this letter provides initial approval for the Mitigation Plan, but this does not guarantee that the project will generate the requested amount of mitigation credit. As you are aware, unforeseen issues may arise during construction or monitoring of the project that may require maintenance or reconstruction that may lead to reduced credit.

Thank you for your prompt attention to this matter, and if you have any questions regarding this letter, the mitigation plan review process, or the requirements of the Mitigation Rule, please call me at 919-554-4884, ext 60.

Sincerely,

Kim Browning
Mitigation Project Manager
for Ronnie Smith, Deputy Chief
USACE Regulatory Division

Enclosures

Electronic Copies Furnished:

NCIRT Distribution List
Matthew Reid, Paul Wiesner—NCDMS
Aaron Earley, Shawn Wilkerson—WEI

June 4, 2021

Ms. Kimberly Browning
Mitigation Project Manager
United States Army Corps of Engineers
69 Darlington Avenue
Wilmington, NC 28403-1343

Subject: Mitigation Plan Report and Construction Plans
Huntsman Mitigation Site, Wilkes County
Yadkin River Basin – CU# 03040102
DMS Project ID #100123
USACE #SAW-2019-00836

Dear Ms. Browning:

Thank you for your March 23, 2021 comment letter for the Huntsman Mitigation Site draft mitigation report and plans. We have made the necessary revisions to the draft documents and we are submitting revised versions of the documents along with this letter. Below we provide your comments followed by our responses in bold italics.

WRC Comments, Andrea Leslie:

1) The planting plan includes silver maple, which generally is found on very large alluvial systems (see https://auth1.dpr.ncparks.gov/flora/plant_list.php). We recommend eliminating this species from the planting plan.
   a) Silver maple has been removed from the planting plan.
2) There are separate planting lists for shaded riparian buffer zone and open riparian buffer zone. The maps provided show only a small portion of the site on UT 2 would be planted with the shaded zone list. The shaded list has 7 subcanopy species, and the open list has 2 species, both of which would be only planted in the wetter portions of the site.
   a) ***Please see response to Comment 3, below.***
3) We would like to see greater emphasis on shrub/subcanopy species across the site – can some of the species specified for the shaded zone be brought into more of the site? Can American beech also be brought in as component across the site?
   a) ***The open riparian buffer planting zone now includes six subcanopy and shrub species, which comprise 35% of planted stems. American beech is now included on both the open and shaded planting lists. Please see the revised plans.***
4) Persimmon and sourwood are to be planted on the wetter portions of the site; this doesn't make sense for these species, which are usually found in dry areas.
   a) The designation "to be planted in wetter portions of the site" has been removed from Persimmon and Sourwood.
5) It appears that the plan doesn't address issues with aquatic organism passage with the culvert on Ingle Hollow Road, which is unfortunate. Is there any way that Wildlands could address this, and if

not, can the plan describe why this cannot be addressed?

a) ***The NCDOT culvert under Ingle Hollow Road has an existing concrete drop inlet and perched outlet pipe, which prevents aquatic passage. Wildlands' design replaces the existing concrete drop inlet with a concrete headwall and lowers the upstream UT1 profile so the new stream bed ties directly into the open culvert. Downstream of the pipe, the stream bed will be raised to back water into the pipe. These steps are anticipated to correct the aquatic passage barrier created by the existing Ingle Hollow Road drop inlet and perched outlet. Additional notes have been added to the plan. A sill was added downstream of the rock outlet plunge pool, setting the elevation to submerge the pipe outlet six inches.***

USACE Comments, Kim Browning:

1) Figure 9: The legend shows a stream gauge but I cannot locate it on the map.
   a) ***All streams proposed for work are perennial, so no stream gages are proposed. The legend has been corrected.***
2) Figure 9: Please place a veg plot north of North Little Hunting Creek Reach 2, south of Ingle Hollow Road, in the steeper area near the road (the FcC2 soils)—random is fine.
   a) ***An additional veg plot was added in the requested area. Please see the updated Figure 9 and Table 26.***
3) Design Sheet 4: There is a Note under the Open Riparian Buffer Planting Zone that indicates that optional transplants to be used at Engineer's discretion. If this occurs and the transplant species differ from those on the approved planting list, please red-line this as a change to the planting plan on the As-Built. You may contact WRC/USACE for species appropriateness.
   a) ***The note has been removed since transplants are not expected on this site. Wildlands understands that the IRT would like to be notified if substitutions become necessary during planting. If this occurs, we will coordinate with WRC/USACE via email. The As-Built Record Drawings will reflect any deviations from the approved planting list.***
4) Sections 3.5 & 6.8: With four crossings, plus a road crossing, this site is somewhat fragmented. It would have been preferable to co-locate the two crossings on North Little Hunting Creek. Additionally, I have concerns about the utility crossing on UT1 with the unconsolidated pond bottom. Were efforts made to relocate this utility line along Ingle Hollow Road?
   a) ***As the driveway crossing is a private road that frequently carries large machinery and the landowner voiced concerns about vertical and horizontal clearance, the utility crossing along North Little Hunting Creek could not be moved to that location. The internal crossing on UT1 was placed at the utility easement to reduce fragmentation. The old pond bottom at the UT1 crossing will be filled as shown via the proposed topography. Wildlands does not anticipate issues related to old pond sediments at this crossing.***
5) UT2: Please describe future land use activities by the landowner in the drained pond bed south of the poultry houses. It is understood that this area will be planted in pasture grass; However, there is concern that future agricultural activities in the unconsolidated pond bed, adjacent to the conservation easement, may affect the project negatively.

a) ***UT1 is located on the northern portion of the site adjacent to the drained pond beds and poultry houses. The UT1 stream profile is designed with bankfull at the existing pond bed elevation. The old pond bottom outside of the easement will be backfilled with stable soil and revegetated. . Existing agricultural usage is expected to continue on surrounding private land outside of the conservation easement.***

6) I appreciate all the detail and photo documentation in Sections 3.1, 3.2 and 3.4.

   a) ***Wildlands appreciates your acknowledgement.***

   a) Are the chicken houses actively used? If so, does the landowner spread the chicken litter on the pastures? It would be beneficial to include information regarding the nutrient management of the site, and any current spreading setbacks. Will there be a risk of runoff from the chicken houses entering the buffer since it's such a narrow area?

      i) ***The chicken houses are not actively in use. The landowner required that the edge of the conservation easement be set back 25 feet from the chicken houses. Given the minimum 30 foot riparian buffer, the stream banks are at least 55 feet from the chicken houses, and often further. The conservation easement will be graded and vegetated to encourage diffuse, overland flow and is anticipated to reduce potential impacts from the surrounding land use.***

2) Appendix 11: Please show the different buffer width zones in different colors on the Buffer Credit Calculation Map. For example, 30-50' in red, 50-75' in yellow, 75-100' in green, etc. Typically, it's easier to compare two maps, one showing the ideal buffers, and one showing actual buffers. Additionally, please confirm that the internal crossings were deducted as a credit loss; It's difficult to tell with the map provided.

   a) ***Please find a revised figure in Appendix 11. Wildlands confirms the internal crossings were deducted as a credit loss.***

3) Section 5.0 & Table 11: I appreciate the wording of the goals and objectives in this section; However, Table 15 discusses the functions supported, including the physiochemical and biological uplift. These are benefits that are presumed and will not be measured by monitoring. Unless you intend to demonstrate actual uplift in these areas, I recommend that this section be reworded that uplift in these areas is implied. Additionally, the culvert on Ingle Hollow Rd appears to be an impediment to aquatic species migration, which is stated as an expected outcome in the section discussing improving instream habitat.

   a) ***Additional information about the implications of physiochemical and biological uplift was added to Section 5.0.***

   b) ***The inlet to the Ingle Hollow Road culvert will be retrofitted. Please see the response to WRC Comment 5.***

4) Section 6.6: Thank you for the detail in the section regarding stream design implementation. I would encourage this level of detail in future projects.

   a) ***Wildlands appreciates your acknowledgement.***

5) Stream relocation is estimated to impact existing wetlands within the easement. Though it is anticipated that the total wetland acreage will likely increase as a result of stream restoration, the Corps must still ensure that there is no net loss of wetlands as a result of ecological restoration. If

you do not plan to install wetland gauges and monitor hydrology, please plan to reverify the extent of jurisdiction at the end of the monitoring period to document that wetland acreage was not lost.

a) ***Wildlands will reverify the extent of jurisdiction in MY7. A statement indicating this has been added to the end of Section 4.3.***

6) The Corps agrees with EPA's comments below regarding the Piedmont references for both stream design and planting plan development. Given that this site is located in the Piedmont physiographic region, and has been designed as such, the vegetative performance standard for height success criteria would be more appropriate as 7 feet at MY5 and 10 feet at MY7.

a) ***Wildlands acknowledges your above considerations. Wildlands provided the required vegetative performance standard for Wilkes County as outlined in the governing rules and regulations (Wilmington District 2003 Stream Mitigation Guidelines and the October 24, 2016 Stream and Wetland Compensatory Mitigation Update).***

7) Unfortunately, the designation as a mountain county and the Piedmont physiographic region were not discussed at the IRT site visit in 2019, and we realize that the easement boundaries, and associated buffer widths, have already been determined at this stage of the plan development; However, we agree that wider buffers on portions of this site would have been beneficial.

a) ***Wildlands agrees that wider buffers always offer greater protection but appreciates the above considerations.***

EPA Comments, Todd Bowers:

Note: It is understood that site visits have been made by IRT members during the development of site feasibility to provide mitigation credit. In that regard, I feel it necessary to denote that I have not been on-site during this process and that my comments may reflect a lack of on-site observation and evaluation.

1) Overall, in regard to riparian buffers throughout this site: I am disappointed to see such thin vegetated riparian buffers in many locations on this site. The sponsor has developed a plan that is, I believe, erroneously based on mountain topography, habitat, and physiographic region. This site, while located in a county deemed as "Mountain" per the 2016 Wilmington District Mitigation Banking Guidance, does not display any characteristics of a mountain stream. All characteristics of this site are piedmont in scope such as slope, topography, forest community type, elevation and stream thermal regime (warm). The site sits well within the elevation of a normal piedmont location (<1,500') and has gently sloping, rolling topography. The sponsor has used piedmont references to both design the streams and develop the planting plan towards a Piedmont Bottomland or Piedmont Alluvial Forest community. The sponsor states clearly that this site is located in the Piedmont physiographic region and does not provide any information that would lead one to conclude that this site has any characteristics of a mountain location. Based on the information provided, I can only conclude that the sponsor has approached the site development as a mountain stream based solely on the name of the county, Wilkes. While Wilkes is considered a "mountain" county, the application of mountain stream performance criteria should not be based solely on the county name. Other supporting information based on ecological characteristics should be provided to conclude that this site qualifies as a mountain stream, which I believe this

site does not. If the sponsor can provide more compelling information to the IRT as to why this site should be considered a mountain site, then I encourage them to do so; otherwise a piedmont approach is deemed most suitable.

a) ***While Wildlands agrees that wider buffers always offer greater protection, we have provided the required buffer widths as outlined in the governing rules and regulations (Wilmington District 2003 Stream Mitigation Guidelines and the October 24, 2016 Stream and Wetland Compensatory Mitigation Update). Our option agreements were set for a minimum 30-foot buffers based on this guidance during the proposal stage of the project. The easements for the site are recorded with a minimum 30-foot buffers presented in the plans and have encompassed approximately the maximum acreage agreed upon in the option agreement.***

b) ***The topography of the site varies from steep to gentle as typical in mountain counties, with stream slopes ranging from 11% to 0.5%. While we were able to locate several steep streams nearby as reference reaches, the larger stream systems in flat valleys we reviewed had all been manipulated. In our experience, C-type reference streams in mountain valleys are near impossible to find due to the scarcity of flat land in this region and the propensity of farmers to take advantage of the wide, alluvial floodplains. Because of this, we supplemented our mountain C reference reach with several others located within the Piedmont and the foothills. Wildlands notes that our design approach is consistent with our proposal and addresses comments/concerns discussed with IRT on the July 24, 2019 site walk .***

2) Section 3.1/Page 2: Based on the conclusion above and information provided by the sponsor I have to stress that the suitable approach, as far as appropriate buffer widths and the corresponding conservation easement size, should be based on piedmont, not mountain, performance standards.

   a) ***Wildlands acknowledges your above considerations. Please see the response to EPA Comment 1 for additional discussion.***

3) Section 3.1/Page 2: Continued livestock operations ("actively grazed pasture") as adjacent land use justifies a wider riparian buffer to treat diffuse overland runoff for fecal coliform, nutrients, and sediment.

   a) ***Livestock operations on adjacent land were considered and practices are provided in addition to riparian buffer establishment to address concentrated overland runoff. Wildlands expanded the conservation easement to include wetlands at the head of Barn Branch, Trapper Tributary, and Rifle Tributary. We expanded the conservation easement upstream of the jurisdictional start on Old Bus Branch and will construct a BMP there to address concentrated pasture runoff. We are also providing a BMP at the head of Rifle Tributary. Finally, we negotiated a restrictive covenant with the landowner to address a potential point source at the upstream project limits on North Little Hunting Creek. Please see the response to EPA Comment 1 for additional discussion on buffer width.***

4) Table 2/Page 3: Sponsor clearly indicates this a piedmont site based on the physiographic province and ecoregion.

   a) ***Wildlands confirms the information in Table 2/Page 3 and acknowledges your above considerations. Please see the response to EPA Comment 1 for additional discussion on buffer width.***

5) Section 3.4/Page 12: Recommend addition of "to treat diffuse overland non-point source fecal coliform, nutrients and sediment from adjacent livestock pastures" to the need for planting a riparian buffer.

   a) Additional language was added to Section 3.4/Page 12: "… and diffuse overland non-point source pollutants from adjacent land use."

6) Section 3.5/Page 12: If the site valley width allows for the appropriate pattern and dimensions to restore stable functioning streams, then it seems logical to assume that a wider, appropriately sized riparian buffer can also be designed; with the exception being around the poultry house adjacent to UT1.

   a) Wildlands acknowledges your above considerations. Please see the response to EPA Comment 1 for additional discussion on buffer width.

7) Table 11/Page 15: Recommend adding some language to address a goal of treatment of diffuse overland agricultural runoff.

   a) Table 11 has been revised.

8) Section 6.7/Page 30: Recommend planting a riparian buffer of 50 feet based on the designed stream beltwidth rather than top-of-bank approach for reasons stated above.

   a) Wildlands acknowledges your above considerations. Please see the response to EPA Comment 1 for additional discussion.

9) Section 6.7/Page 30: Recommend adding a citation (Shafale 2012) for the referenced vegetated community types.

   a) ***The citation has been added to Section 6.7.***

10) Section 6.7/Page 30: Recommend anticipated bare root seedling planting density (680 stems/acre?).

   a) Recommended planting density was increased to a minimum of 680 stems per acre on the Planting Plan. Please see plan sheet 4.0 for updated spacing.

11) Section 6.7/Page 30: Recommend citing the source for the dormant season planting dates of October 28 to April 7. I recommend setting an earlier planting date (March 15) to ensure the dormant period is achieved and that 180-days will be available before the MY1 data on vegetation is gathered in the fall.

   a) Wildlands adjusted the dormant season dates based on the NOAA WETS data provided for Wilkes County. Please see adjustments in Section 6.7. We anticipate planting this project in January or February, based on the construction schedule.

12) I recommend that the sponsor develop a site plan that has minimum riparian buffer widths no less than 50 feet based on the stream meander belt width (not top of bank) per the 2016 Guidance. This will allow for natural variation in long-term stream migration within an appropriately sized buffer and easement boundary.

   a) Wildlands acknowledges your above considerations. Please see the response to EPA Comment 1 for additional discussion on buffer width.

Wildlands Engineering, Inc. • phone 704-332-7754 • fax 704-332-3306 • 1430 S. Mint Street, # 104 • Charlotte, NC 28203

13) Table 24/Page 32: Recommend using the Piedmont vegetation performance standard of success of 8 feet at MY5 and 10 feet at MY7 as this is not a mountain site.

    a) ***Wildlands acknowledges your above considerations. The Huntsman Site is located within Wilkes County; therefore, Wildlands provided the required vegetative performance standard of success of 6 feet at MY5 and 8 feet at MY7 as outlined in the governing rules and regulations (Wilmington District 2003 Stream Mitigation Guidelines and the October 24, 2016 Stream and Wetland Compensatory Mitigation Update).***

14) Section 11/Page 36: The restrictive covenant excluding cattle along North Hunting Creek upstream of the site is an excellent benefit and was noted.

    a) ***Wildlands appreciates your acknowledgement.***

15) Section 11/Page 36: The sponsor has calculated additional stream credit based on exceeding the 30-foot buffer width from top-of-bank. While this would normally be appropriate in a mountain setting with adjacent forested land use, the continued presence of livestock adjacent to the site should be cause for consideration of a wider 50-foot buffer with additional credit not provided until buffer widths exceed 75 feet from the normal wetted perimeter for piedmont streams per the 2016 Guidance.

    a) ***The additional buffer credit is primarily north of North Little Hunting Creek and will provide buffer protection against Ingle Hollow Road runoff and non-point-source pollutants. The proposed area will not only treat runoff but will contribute natural habitat in an area dominated by agriculture and residential homes. Including this area within the conservation easement will also ensure that it will not be converted to pasture in the future. The additional buffer credit is based off the initial buffer widths set during the proposal. Please see the response to EPA Comment 1 for additional discussion on buffer width.***

16) Table 28/Page 37: Recommend calculating credit gain and loss based on piedmont stream criteria.

    a) ***Wildlands acknowledges your above considerations. Please see the response to EPA Comment 1 for additional discussion on buffer width.***

17) Appendix 11: Recommend recalculating the buffer credit gains and losses based on a piedmont stream rather than a mountain stream. I understand that based on the conservation easement currently in place, the sponsor will likely lose some stream credit following corrected buffer width calculations.

    a) ***Wildlands acknowledges your above considerations. Please see the response to EPA Comment 1 for additional discussion on buffer width.***

18) The inclusion of LiDAR imagery would have been particularly useful especially with regard to UT2 and its proposed restored location.

    a) ***The topographic map has been updated with LiDAR contours. Please refer to Plan Sheets 2.3.1 – 2.3.4 for detailed topography along UT2.***

DWR Comments, Erin Davis:

1) DWR appreciated all of DMS' comments and WEI's responses. Overall, we're pleased with level of

detail provided in the plan, including the summary tables and discussion of past and future watershed conditions, project risks and uncertainties, soil restoration, invasive treatments, etc.

a) ***Wildlands appreciates your acknowledgement.***

2) Page 12, Section 3.5 – DWR would just note that vegetative maintenance within the two utility corridor areas could affect potential functional uplift.

a) ***Wildlands acknowledges your above consideration and has added a statement to Section 3.5.***

3) Page 27, Section 6.6 – In general the proposed bench widths are narrower than DWR would like to see across the proposed C4 reaches. While the design constraints are noted, this is a concern for long term bank stabilization as well as maximization of the system's functional uplift.

a) ***Due to the tie-ins, existing driveway bridge, and tie-out, bench widths varied along North Little Hunting Creek. Wildlands designed the gentle valley and channel transitions along North Little Hunting Creek to increase long-term hydraulic stability and encourage proper sediment transport. Valley and structural constraints on UT1 were considered and a new valley with an appropriate floodplain width was designed to increase long-term stability. Wildlands does expect proposed functional uplift and does not anticipate bank stabilization issues.***

4) Page 30, Section 6.7 – DWR maintains that March 15th should be the planting target end date, but we would not request a postponement of MY1 monitoring if planting is completed by the proposed April 7th dormant season end date.

a) ***We have adjusted the dormant season dates based on current WETS data. Please see response to EPA Comment 11. As stated above, based on our current construction timeline, we anticipate being well within the planting window.***

5) Page 31, Section 6.8 – Why is the landowner installing additional fencing? Will this occur during project construction? Are the areas called out on the fencing plan?

a) ***The fencing is ultimately the landowner's property and responsibility, and some landowners chose to complete the initial fencing installation themselves instead of having Wildlands manage the installation. We will coordinate with the landowner to ensure that the fencing is installed before livestock are returned to adjacent pastures, or that cattle are permanently removed from the Site before we uninstall temporary livestock exclusion fencing installed during construction.***

6) Page 37, Table 28 – Why is there a reduction in stream footage for Trapper Tributary?

a) ***Figures and tables were updated to reflect the final JD verified length along Trapper Tributary. Stream footage is expected to remain consistent throughout the project.***

7) Figure 8 – It appears that the easement area along the floodplain south of North Little Hunting Creek (more so along Reach 2) was reduced from what was shown in the technical proposal. Please provide an explanation. With an approx. 2 sq. mile drainage area, the additional floodplain protection would have enhanced the functional uplift along the reach. Ideally, the easement would have captured the floodplain out to the FEMA line shown on Sheet 3.1.

a) ***Wildlands acknowledges your above considerations. The proposed easement follows the same approximate alignments as shown in Figures 2 and 6 of the Technical Proposal***

package. Limits in the proposal were set based on estimates of the existing stream location and floodplain topography, where final easement limits are based on accurate survey data.

8) Figure 9 – DWR requests one additional permanent veg plot in the floodplain north of North Little Hunting Creek Reach 2.

   a) An additional veg plot was added in the requested area. Please see the updated Figure 9 and Table 26.

9) Figures – Inclusion of a LiDAR figure would be helpful for this project review.

   a) The topographic map (Figure 3) has been updated to show LiDAR contours. Please refer to Plan Sheets 2.3.1 – 2.3.4 for detailed topography along UT2.

10) DWR appreciates efforts made to enhance the proposed project, including capturing some stream origins and wetlands, expanding some buffer areas, collocating crossings and making most internal to the CE, adding BMPs, removing drain tiles and intercepting with ephemeral pools, and adding the restrictive covenant area connected to the site. Really DWR's biggest concern with the long term success of the project is the minimum buffer widths along UT1 and south side of North Little Huntington Creek.

   a) Wildlands appreciates your acknowledgement. Wildlands believes the buffers proposed will result in long term project success. Please see our response to EPA Comment 1 and DWR Comment 3 for additional discussion regarding your considerations.

11) Sheet 4.0 – Sourwood has the wetland planting asterisk but also has an Upland indicator status. Please double check. Also, American hornbeam has an FAC indicator status.

   a) DWR encourages integrating some of the subcanopy and shrub species listed in the shaded planting zone table into the larger site planting area. If not during the initial effort, then perhaps as part of a supplemental planting effort during monitoring period.

      i) Wildlands revised the Planting Plan to incorporate more subcanopy and shrub species and revised associated indicator statuses as applicable. Please see the response to WRC Comments 1 through 3 for additional discussion.

12) Sheet 6.5 – Just an educational inquiry, why are base logs incorporated into the brush toe for the smaller tributaries but not North Little Huntington Creek?

   a) Details on sheet 6.5 were updated to reflect base logs solely on the large stream brush toe (North Little Hunting Creek). Base logs would not be expected to benefit brush toe on smaller tributaries.

Please contact me at 704-332-7754 extension 100 if you have any questions.

Thank you,

Shawn Wilkerson
President

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TABLES

FIGURES

APPENDICES

1.0 Introduction

The Huntsman Mitigation Site (Site) is located in Wilkes County approximately 5 miles south of Ronda and 8 miles southwest of Jonesville (Figure 1). The Site is located within the North Little Hunting Creek targeted local watershed (TLW) Hydrologic Unit Code (HUC) 03040102020030 and will provide warm stream credits in the South Yadkin 03040102 (Yadkin 02) Cataloging Unit (CU).

The Site is in agriculture and is bisected by Ingle Hollow Road. Site streams, as presented in Figure 2, are in various stages of degradation due to the existing agricultural land. The project will restore and enhance 4,945 existing linear feet of streams and will treat concentrated agricultural runoff with best management practices (BMPs). An 18.4-acre conservation easement will protect the Site in perpetuity and the work will generate 5,816.953 warm stream credits in the Yadkin River basin. The Site Protection Instrument detailing the terms and restrictions of the conservation easement is in Appendix 1.

Table 1: Project Attribute Table Part 1

Project Information	
Project Name	**Huntsman Mitigation Site**
County	**Wilkes**
Project Area (acres)	**18.4**
Project Coordinates (latitude and longitude)	**36° 8' 26.48"N 80° 55' 55.88"W**
Planted Acreage (acres of woody stems planted)	**16.8**

2.0 Basin Characterization and Site Selection

The Yadkin 02 river basin is rural and dominated by forest (49%) and agriculture (42%), with only 9% of the land developed. In general, stream degradation and water quality issues within the Yadkin 02 are primarily linked to agricultural stressors.

Several North Carolina agencies have conservation and watershed planning documents that outline stream and water quality conditions in the Yadkin 02 and goals for improving noted deficiencies. The Division of Water Resources (DWR) developed the 2008 Yadkin-Pee Dee River Basinwide Water Quality Plan which notes common watershed stressors such as naturally erodible soils, erosion from agriculture/pasture/logging, and poor riparian buffer vegetation. Degraded stream conditions such as moderate to severe stream bank erosion, stream channelization, and stream sedimentation are discussed. The Division of Mitigation Services (DMS) developed the 2009 Upper Yadkin Pee-Dee River Basin Restoration Priorities (RBRP) document which identifies a pattern of habitat degradation across the Yadkin 02. North Little Hunting Creek is specifically noted for degraded habitat and the RBRP attributes this to the agricultural operations in its watershed. The RBRP presents broad basin water quality and restoration goals, including:

- restoring water quality and aquatic habitat in impaired streams;
- protecting high-resource value waters;
- continuing existing watershed restoration and protection efforts in the basin;
- implementing new stream, buffer, and wetland restoration, enhancement, and preservation projects within TLWs;
- improving stormwater management in urban areas; and
- implementing agricultural BMPs to limit sediment, nutrients, and fecal coliform to streams.

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

The Site was selected to fulfill DMS's mitigation need due to its ability to directly and indirectly address stressors identified in the RBRP and the WAP by excluding livestock, creating stable stream banks, restoring a forest in agriculturally maintained buffer areas, and implementing BMPs. These actions will reduce fecal, nutrient, and sediment inputs to North Little Hunting Creek, and ultimately to Hunting Creek and South Yadkin River, as well as reconnect instream and terrestrial habitats on the Site. Restoration of the Site aligns with recommended management strategies outlined in the RBRP.

3.0 Baseline and Existing Conditions

3.1 Watershed Conditions

The Site watershed (Table 2 and Figure 4) is in the central portion of the Yadkin 02. It is situated in the rural countryside in Wilkes County between Yadkinville and Wilkesboro, NC.

The Site is located on the western edge of the North Inner Piedmont ecoregion. The Piedmont is characterized by gently rolling, well-rounded hills with long low ridges, with elevations ranging anywhere from 300 to 1,500 feet above sea level. The Site topography and relief are typical for the region, as illustrated in Figure 3. Generally, within the Site limits, North Little Hunting Creek's valley is unconfined and alluvial, while UT1 and UT2 begin in somewhat confined, steep valleys that widen and flatten in slope as they approach North Little Hunting Creek.

North Little Hunting Creek originates offsite to the west in the steep, forested Brushy Mountains. Most of North Little Hunting Creek's watershed is within the eastern blue ridge foothill ecoregion. The stream gradually widens and flattens in slope as is travels downstream out of the mountains, flowing through several agricultural parcels before entering the Site. UT1 originates within the Site limits north of Ingle Hollow Road and flows through three ponds and buried piping before crossing under Ingle Hollow Road to join North Little Hunting Creek. Land use in UT1's watershed includes agricultural fields and chicken houses. UT2 begins in steep woods offsite, entering the Site from the south and joining North Little Hunting Creek within the project area. Old Bus Branch, Rifle Tributary, Trapper Tributary, and Barn Branch all originate within the Site limits and are tributaries to UT2. Within the Site limits, North Little Hunting Creek, UT2, and the UT2 tributaries all flow through actively grazed pastures.

The Site and its watershed are not within a Wilkes County zoning development district. The Wilkes County Growth Management Plan (2014) predicts that the land use within the Site's watershed will remain rural over the next ten years with no pockets of development predicted. A review of historic aerials (Appendix 1) from 1945 to 2020 shows that onsite streams have remained in the same approximate landscape position for the past 65 years with the same adjacent land use, with the following exceptions:

- North Little Hunting Creek
    - The stream has gentle sinuosity in the 1950 aerial but by the 1976 aerial North Little Hunting Creek is straighter and is crossed by a driveway bridge just downstream of the UT1 confluence.
- UT1
    - The riparian buffer was wooded with pasture or hay beyond in 1950.
    - Pond 3 and a chicken house were constructed along UT1 between 1950 and 1963.
    - The upstream watershed to UT1 is logged in 1963 with logging roads and a less dense tree stand visible in the aerial.
    - The embankments for Ponds 1 and 2 were built after 1976.
- UT2
    - The riparian buffer was converted to pasture between 1963 and 1976.
    - In 1976, lower UT2 is aligned straight out to North Little Hunting Creek.

North Little Hunting Creek and its tributaries are classified as Water Supply III (WS-III) waters. WS-III waters are a water supply source for drinking, culinary, or food processing purposes. WS-III waters are also protected for Class C uses, such as infrequent or unorganized wading and boating events, fishing and fish consumption, wildlife, aquatic life, and agriculture.

Table 2: Project Attribute Table Part 2

Project Watershed Summary Information							
Physiographic Province	Piedmont						
Ecoregion	Northern Inner Piedmont						
River Basin	Yadkin River						
USGS HUC (8 digit, 14 digit)	03040102, 03040102020030						
NCDWR Sub-basin	03-07-06						
NCDWR Water Quality Classification	WS-III						
Stream Thermal Regime	Warm						
	North Little Hunting Creek	**UT1**	**UT2**	**Rifle Tributary**	**Trapper Tributary**	**Old Bus Branch**	**Barn Branch**
Drainage Area (acres)	1,274	70	43	12	1.9	5.2	10
2011 NLCD Land Use Classification							
Forest	74%	2%	57%				
Agricultural	22%	91%	37%				
Grassland	0%	0%	6%				
Shrubland	2%	0%	0%				
Developed	1%	5%	0%				
Open Water	1%	2%	0%				
% Impervious	0.23%	3%	0%				

Notes: Land Use Source – National Land Cover Database 2011 (NLCD 2011), Multi-Resolution Land Characteristics (MRLC) consortium, https://www.mrlc.gov/data and visual assessment of the 2020 aerial.

3.2 Landscape Characteristics

The Site is in the Cat Square terrane of the Piedmont physiographic province which is composed of deformed metamorphic rocks that have been intruded by younger granitic rocks. The underlying geology of the Site is mapped as biotite gneiss and schist (CZbg) and metamorphosed granitic rock (OCg) from the late Proterozoic to Cambrian Period (500 to 900 million years in age).

North Little Hunting Creek's riffles consist of somewhat angular gravels and cobbles embedded by fines, likely generated from eroding banks both onsite and from the upstream agricultural parcels. A gravel-cobble layer is visible in cut banks along North Little Hunting Creek at an approximate depth of 24 to 30 inches, which may be the historic stream bed elevation. Bedrock is exposed in the bed of North Little Hunting Creek upstream of the UT1 confluence, as depicted in Figure 2. It is likely that the stream has downcut but this incision was halted by the bedrock layer. The bedrock depth is several feet deeper than the proposed restoration design and therefore is not expected to interfere with construction.

The fines deposited within the channel include mica, which indicates erodible soils. The presence of erodible soils influenced the stream design, particularly in the slope of the stream banks, which have been laid back to encourage vegetation establishment. The predominant floodplain soils on site are described in Table 3 below and depicted in Figure 5.

Table 3: Project Soil Types

Soil Name	Slopes	Description
CoA – Codorus Loam	0 to 2% slopes, frequently flooded	This series consists of somewhat poorly drained, nearly level soils on floodplains on the Piedmont. This soil has low runoff, high permeability, and floods frequently.
FaD – Fairview Sandy Loam	15 to 25% slopes	This series consists of moderately steep, well drained soils on side slopes and ridges on the Piedmont. The permeability is moderate. This soil is moderately suited for woodland and poorly suited for field crops due to the slope and hazard of erosion.
FcC2 – Fairview Sandy Clay Loam	8 to 15% slopes, moderately eroded	This series consists of well drained soils on side slopes and ridgetops on the Piedmont. This soil has moderate permeability and low surface runoff.
UdC – Udorthents-Urban Land Complex	1 to 15% slopes	This series consists of gently to strongly sloping areas of Udorthents and Urban land combined to one mapping unit. Udorthents consists of soil that has been cut or filled during grading, and Urban land consists of areas where soils are covered by impervious surfaces such as concrete, asphalt, etc.

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

Much of the Site, including North Little Hunting Creek, lower UT2, Barn Branch, Old Bus Branch, Rifle Tributary, and Trapper Tributary, are dominated by pasture grasses such as fescue (*Festuca* spp.) with scattered trees along the top of bank and adjacent floodplain. Canopy species within these areas are primarily black cherry (*Prunus serotina*), black walnut (*Juglans nigra*), box elder (*Acer negundo*), red maple (*Acer rubrum*), river birch (*Betula nigra*), sycamore (*Platanus occidentalis*), tree-of-heaven (*Ailanthus altissima*), tulip poplar (*Liriodendron tulipifera*), and white oak (*Quercus alba*). Shrub species are primarily Chinese privet (*Ligustrum sinense*), multiflora rose (*Rosa multiflora*), and pockets of blackberry (*Rubus* sp.). In addition to pasture grasses, other herbaceous species include beefsteak plant (*Perilla frutescens*), chickweed (*Stellaria media*), dogfennel (*Eupatorium capillifolium*), Japanese honeysuckle (*Lonicera japonica*), Japanese stiltgrass (*Microstegium vimineum*), and wild garlic (*Allium vineale*). Asters (*Aster* spp.), sedges (*Carex* spp.), and soft rush (*Juncus effusus*) are present in wetter areas around hillside seeps.

UT1 and upper UT2 have a predominantly wooded buffer. Canopy species in these areas include American beech (*Fagus grandifolia*), black cherry, black willow (*Salix nigra*), box elder (*Acer negundo*), red maple, river birch, sycamore, and tree-of-heaven. The shrub layer is primarily Chinese privet with clusters of blackberry and pasture rose. Herbaceous species within these wooded areas include chickweed, greenbriar (*Smilax rotundifolia*), Japanese honeysuckle, and Japanese stiltgrass. Fescue and goldenrod (*Solidago* sp.) are present on the edge of these wooded areas.

3.3 Project Resources

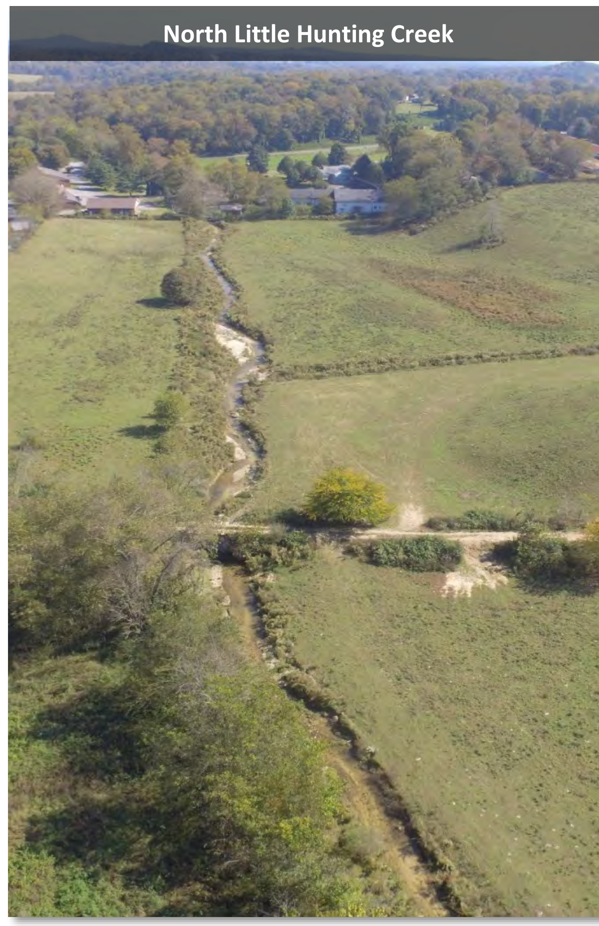
3.3.1 Existing Streams

In February 2019 and March 2020, Wildlands investigated on-site jurisdictional streams within the proposed project area. All Site streams scored as perennial. Jurisdictional stream features are shown on Figure 2 and supporting documentation is provided in Appendices 2 and 3.

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

<ins>*North Little Hunting Creek*</ins>

North Little Hunting Creek flows east onto the Site from an abutting agricultural parcel. Within the Site limits, cattle have access to the stream and its buffer, although a fence approximately 20 feet off the left top of bank prevents cattle from accessing much of the left floodplain and valley. The pasture is heavily grazed and the stream banks are devoid of stabilizing vegetation. As a result, stream banks are severely eroded and undergoing rotational failure. The stream bed substrate is cobbles and gravels embedded with fines. Instream habitat is limited to riffles, runs, and shallow pools with very little woody debris, leaf packs, or root mats. Although badly eroded, the stream is not deeply incised due to intermittent bedrock outcrops.



North Little Hunting Creek flows under a driveway bridge downstream of the UT1 confluence. Downstream of the bridge, North Little Hunting Creek widens and mid channel bars, lateral bars, and point bars are present.

North Little Hunting Creek is classified as a moderately to slightly entrenched Rosgen G4 channel. The stream is straight and incised, but has some floodplain access available during storms.

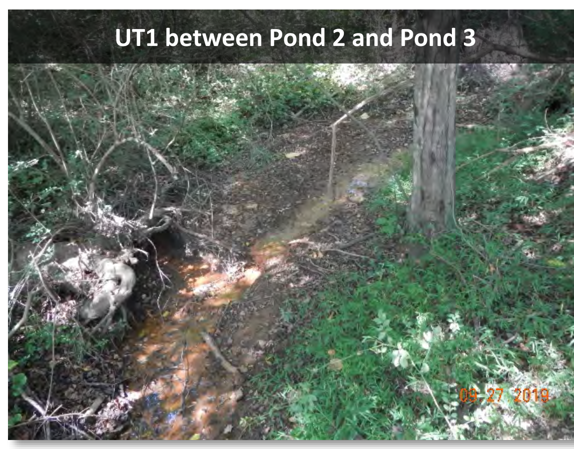
In the southwest corner of the property, a long, linear stream/wetland feature drains through the pasture to North Little Hunting Creek. Cattle frequently wallow in this feature.

Table 4: North Little Hunting Creek Attribute Table

Reach Summary Information	
Parameters	**North Little Hunting Creek**
Length of Reach (Linear Feet)	1,646
Valley confinement (Confined, moderately confined, unconfined)	Unconfined
Drainage area (acres)	1,274
Perennial, Intermittent, Ephemeral	Perennial
NCSAM Score/Stream Function	Low
Width to Depth Ratio (ft/ft)	7.5-10.3
Bank Height Ratio (ft/ft)	2.0-2.3
Gradient (ft/ft)	0.0073
Reachwide d50 (mm)	15 Medium Gravel
Stream Classification (Existing and Proposed)	Existing: G4 Proposed: C4
Evolutionary Trend	IV to V
FEMA Zone Classification	Zone AE

<u>*UT1*</u>

UT1 is a first order tributary to North Little Hunting Creek. UT1 originates onsite within Pond 1 as depicted on Figure 2. Pond 1's principal spillway pipe is clogged and the pool water level is often at the top of the dam elevation with water spilling over a low point in the embankment. Pond 1's old emergency spillway, which is in poor condition and is actively breaching, is also often engaged and flowing. The Pond 1 embankment flow and the emergency spillway flow rejoin at the base of the dam to enter backwater and wetlands associated with Pond 2. While Pond 2's principal spillway pipe is functional, the emergency spillway also frequently engages. Pond 2's dam shows evidence of recent overtopping with debris lines at the top of the dam and the normal pool at the top of the embankment. Pond 2's dam is badly eroding, with sheer, exposed clay slopes. There is a 2- to 3-foot drop from the end of the principal spillway pipe to the downstream UT1 channel. Downstream of Pond 2, UT1 flows through a wooded buffer, has low banks, low slope, and varied habitat including snags, roots mats, pools, and leaf packs. UT1 here classifies as a high width to depth ratio Rosgen C4 type channel. The stream continues in this condition for approximately 150 LF before it enters an approximate 300 LF length of buried pipe adjacent to the chicken coops. The pipe outlets to the backwater of Pond 3. Pond 3 has evidence of beaver activity around its edges. UT1 exits Pond 3 through the emergency spillway and over a series of 3 active headcuts totaling 10 feet in drop. UT1 has high, eroded banks through the headcuts and is at imminent risk of dam breach.


UT1 between Pond 2 and Pond 3

UT1 flows into a grated drop inlet to a culvert under Ingle Hollow Road. The culvert outlet is perched slightly above the downstream bed elevation. The culvert is in good condition and appropriately sized for the watershed, but the drop inlet and perched outlet are barriers to aquatic species migration. Downstream of the road, slope increases. UT1 is incised and disconnected from the floodplain, although a low bench is forming. UT1 here classifies as a Rosgen B4 channel. The channel is dominated by algal growth and lacks woody debris. Instream habitat consists of riffles and pools with some coarse substrate. UT1 gains access to a narrow floodplain just upstream of its confluence with North Little Hunting Creek.

Table 5: UT1 Attribute Table

Reach Summary Information	
Parameters	**UT1**
Length of Reach (Linear Feet)	996
Valley confinement (Confined, moderately confined, unconfined)	Moderately confined
Drainage area (acres)	70
Perennial, Intermittent, Ephemeral	Perennial
NCSAM Score/Stream Function	Medium/Low[1]
NCDWR Water Quality Classification	WS-III
Width to Depth Ratio (ft/ft)	12.7 - 19.1
Bank Height Ratio (ft/ft)	1.0-1.8
Gradient (ft/ft)	0.0296
Reachwide d50 (mm)	27 Coarse Gravel
Stream Classification (Existing and Proposed)	Existing: C4/B4 Proposed: B4a/C4b/C4
Evolutionary Trend	II (piped and impounded) - III
FEMA Zone Classification	X

1: The medium NCSAM rating applies the section of open UT1 channel between Pond 2 and 3, before UT1 enters the pipe. The low NCSAM rating applies to UT1 downstream of Pond 3.


UT1 – headcut below Pond 3

UT2

UT2 is another first order tributary to North Little Hunting Creek. The stream enters the Site from a wooded upstream parcel. The stream channel slope is steep with steep, wooded valley walls. Although cattle have full access to the stream, fallen trees across the channel appear to discourage access into the upstream extents of the valley.

The stream bedform is stable with habitat such as stable cobble/gravel riffles, micropools, leaf packs, and woody debris. Approximately 150 LF upstream of an existing farm road crossing, the stream is confined against the left valley wall and cattle impacts increase. UT2's valley begins to widen as it approaches the crossing. Just downstream of the crossing, UT2 begins to drop over headcuts and becomes incised and disconnected from the floodplain. UT2 regains connection to the valley downstream but loses bedform due to extreme cattle trampling. The stream becomes anastomosed due to trampling before dropping over a 3-foot headcut at its confluence with Rifle Tributary. The stream continues to be incised with areas of active erosion and drops over several


UT2 – incised upstream, cattle wallow downstream

more headcuts before appearing to stabilize vertically within the incised gully. Here there is some stream bank erosion present, but the main impairment is the channel incision and confinement. As UT2's valley begins to widen and decrease in slope, erosion becomes more predominant. Downstream of UT2's confluence with Barn Branch, the stream is ditched straight out to North Little Hunting Creek. Within this section, UT2 has no bedform diversity and is a long, silted-in run. There is no woody debris present within the stream channel and is completely lacking riparian buffer. Cattle graze directly up to the stream, and the only areas where UT2 regains floodplain connectivity is where the cattle have trampled the banks for access.

Table 6: UT2 Attribute Table

Reach Summary Information	
Parameters	**UT2**
Length of Reach (Linear Feet)	1,707
Valley confinement (Confined, moderately confined, unconfined)	Confined to Unconfined
Drainage area (acres)	43
Perennial, Intermittent, Ephemeral	Perennial
NCSAM Score/Stream Function	High/Low[1]
NCDWR Water Quality Classification	WS-III
Width to Depth Ratio (ft/ft)	2.9-4.7
Bank Height Ratio (ft/ft)	2.3-2.8
Gradient (ft/ft)	0.0791, 0.0254
Reachwide d50 (mm)	Silt/Clay, 0.9
Stream Classification (Existing and Proposed)	Existing: A6, E5b Proposed: B5a, B5, C5
Evolutionary Trend	III – degradation
FEMA Zone Classification	X, AE

1: The high NCSAM rating applies to the upstream most 150 LF of UT2. The low NCSAM rating applies to the rest of UT2.

Barn Branch

Barn Branch begins at a cattle wallow in a wetland seep. The watershed draining to the stream includes a broad, erodible, sloped pasture area. Barn Branch classifies as an B5a-type channel but is incised throughout its length. The stream is actively eroding in only one area which suggests that the fine sediments embedding the stream substrate are from the upstream pasture erosion. Available habitats include some root mats and riffles with shallow pools.

Barn Branch

Table 7: Barn Branch Attribute Table

Reach Summary Information	
Parameters	**Barn Branch**
Length of Reach (Linear Feet)	247
Valley confinement (Confined, moderately confined, unconfined)	Moderately Confined
Drainage area (acres)	10
Perennial, Intermittent, Ephemeral	Perennial
NCSAM Score/Stream Function	Low
NCDWR Water Quality Classification	WS-III
Width to Depth Ratio (ft/ft)	4.3
Bank Height Ratio (ft/ft)	2.5
Gradient (ft/ft)	0.0435
Reachwide d50 (mm)	0.1
Stream Classification (Existing and Proposed)	Existing: B5a Proposed: B5a
Evolutionary Trend	IV – degradation and widening
FEMA Zone Classification	X

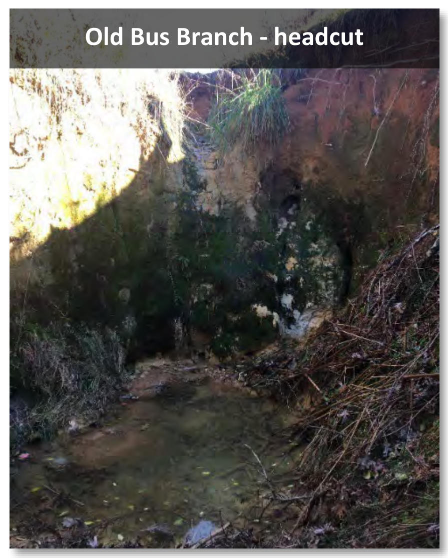
Old Bus Branch

Old Bus Branch originates onsite as a perennial tributary at 10- to 15-foot headcut. Upstream of the headcut, an eroded, ephemeral swale feeds the stream. Multiple trees have fallen into the headcut, including a large tree with a massive root system which has buried the stream and resulted in subsurface flow. Downstream of the large tree, Old Bus Branch continues to be incised and eroded to its confluence with UT2. Instream habitat is limited to small gravel riffles and root mats from the large tree.

Table 8: Old Bus Branch Attribute Table

Reach Summary Information	
Parameters	**Old Bus Branch**
Length of Reach (Linear Feet)	90
Valley confinement (Confined, moderately confined, unconfined)	Confined
Drainage area (acres)	5.2
Perennial, Intermittent, Ephemeral	Perennial
NCSAM Score/Stream Function	Low/Low
NCDWR Water Quality Classification	WS-III
Width to Depth Ratio (ft/ft)	4.9
Bank Height Ratio (ft/ft)	6.3
Gradient (ft/ft)	0.0284[1]
Reachwide d50 (mm)	0.1 Very Fine Sand
Stream Classification (Existing and Proposed)	Existing: G5 Proposed: A5
Evolutionary Trend	III-IV
FEMA Zone Classification	X

1: Old Bus Branch's existing conditions longitudinal profile slope was 0.0284 ft/ft. Old Bus Branch's valley slope is 0.1070 ft/ft.



Trapper Tributary and Rifle Tributary

Rifle Tributary and Trapper Tributary are two perennial streams that flow north to join UT2. Rifle Tributary originates at a headcut. The stream is incised for a distance, then trampled by cattle. Trapper Tributary originates from a wetland seep and is severely trampled by cattle until its confluence with Rifle Tributary. Both streams drop over a large headcut at their confluence. Rifle Tributary is incised downstream of the headcut and continues to be incised to its confluence with UT2.

Table 9: Trapper Tributary and Rifle Tributary Attribute Table

Reach Summary Information		
Parameters	**Trapper Tributary**	**Rifle Tributary**
Length of Reach (Linear Feet)	**41**	**193**
Valley confinement (Confined, moderately confined, unconfined)	**Moderately Confined**	**Moderately Confined**
Drainage area (acres)	**1.9**	**12**
Perennial, Intermittent, Ephemeral	**Perennial**	**Perennial**
NCSAM Score/Stream Function	**Medium**	**Low**
NCDWR Water Quality Classification	**WS-III**	**WS-III**
Width to Depth Ratio (ft/ft)	**NC**	**NC**
Bank Height Ratio (ft/ft)	**NC**	**NC**
Gradient (ft/ft)	**NC**	**NC**
Reachwide d50 (mm)	**NC**	**NC**
Stream Classification (Existing and Proposed)	**NC**	**NC**
Evolutionary Trend	**IV-V**	**III - IV**
FEMA Zone Classification	**X**	**X**

NC: Not classified - geomorphic assessments only performed on streams to be restored.

3.3.2 Existing Wetlands

Wildlands delineated wetland waters of the US within and immediately adjacent to the proposed project easement using the USACE Routine On-Site Determination method presented in the 1987 Corps of Engineers delineation manual and the subsequent Regional Supplement for the Eastern Mountain and Piedmont Region. The Preliminary Jurisdictional Determination (pJD) package was submitted in September 2020 and approved in February 2021. See Appendix 2 for the approved pJD.

A total of 16 existing jurisdictional wetland features (Wetlands A-P) and four open waters (Pond 1-4) were documented within the assessment area (Figure 2). On-site wetland features exhibit indicators of wetland hydrology, hydrophytic vegetation, and hydric soils. Primary and secondary indicators of wetland hydrology observed in existing wetlands include algal mats or crust, high water table, iron deposits, oxidized rhizospheres on living roots, saturation, saturation visible on aerial imagery, surface water, sparsely vegetated concave surface, drainage patterns, a positive FAC-Neutral test, and water-stained leaves. Dominant vegetation species within wetlands include American elm (*Ulmus americana*), black willow, honey locust (*Gleditsia triacanthos*), common boneset (*Eupatorium perfoliatum*), common rush, creeping buttercup (*Ranunculus repens*), duck-potato (*Sagittaria latifolia*), green ash (*Fraxinus pennsylvanica*), Pennsylvania smartweed (*Polygonum pensylvanicum*), red maple, rice cut grass (*Leersia oryzoides*), river birch, shallow sedge (*Carex lurida*), and jewelweed (*Impatiens capensis*). Soils within on-site wetlands exhibit one of the following hydric soil indicators: depleted matrix, depleted below a dark surface, redox dark surface, or umbric surface.

3.4 Overall Functional Uplift Potential

The primary stressors on site are incision and entrenchment from channelization, livestock access, impoundment and piping, and a lack of riparian buffers. These stressors led to low NCSAM scores on all reaches proposed for restoration. Without intervention, North Little Hunting Creek, UT2 and its tributaries will continue to erode, contributing more sediment and embedding habitat in the water supply watershed. UT1, while currently predominantly impounded and piped, has a high risk of dam failure with headcuts advancing on the dam. Water and sediment trapped behind the dam could mobilize, potentially flooding Ingle Hollow Road, resulting in stream aggradation and subsequent erosion downstream. In its current condition, UT1 does not function as a stream.

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

- Restoring degraded stream channels to reduce erosion and connecting these streams to a floodplain to improve hydrologic connectivity.
- Removing stream impoundments on and daylighting buried/piped sections of UT1.
- Eliminating bank erosion and associated pollutants.
- Planting riparian buffers to shade streams, help stabilize stream banks, promote woody debris in system, and diffuse overland non-point source pollutants from adjacent land use.
- Fencing out livestock.
- Protecting the Site with a conservation easement.

These project components are described in Section 5 in terms of goals, objectives, and outcomes for the project and in greater detail in Section 6 as the project site mitigation plan.

3.5 Site Constraints to Functional Uplift

The internal easement breaks may slightly affect the functional uplift potential of the project as they fragment the conservation corridor; however, livestock will only be permitted within the internal breaks during supervised pasture rotation events. Vegetative maintenance along the two internal easement breaks for utilities may cause some intermittent fragmentation, but maintenance is expected to be infrequent. The valley width on the Site allows for the development of appropriate pattern and dimensions to restore stable, functioning streams. The degree to which the physicochemical and biology functions can improve on the Site is limited by the watershed conditions beyond the project limits, upstream water quality, and the presence of source communities upstream and downstream of the Site.

4.0 Regulatory Considerations

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

Table 10: Regulatory Considerations Attribute Table

Regulatory Considerations			
Parameters	**Applicable?**	**Resolved?**	**Supporting Docs?**
Water of the United States - Section 404	Yes	No	PCN[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
Coastal Zone Management Act	No	N/A	N/A
FEMA Floodplain Compliance	Yes	No[2]	N/A
Essential Fisheries Habitat	No	N/A	N/A

1: PJD approved by USACE on 2/2/21. PCN to be provided to IRT with Final Mitigation Plan.

2: Floodplain permit will be coordinated with Wilkes County local floodplain administrator.

4.1 Biological and Cultural Resources

A Categorical Exclusion for the Site was approved on October 25, 2019. This document included investigation into the presence of threatened and endangered species on Site protected under The Endangered Species Act of 1973, as well as any historical resources protected under The National Historic Preservation Act of 1966.

One federally threated or endangered species, the northern long-eared bat (NLEB), is listed for Wilkes County, NC. Wildlands requested review and comment by the US Fish and Wildlife Service on any possible issues that might emerge with respect to endangered species, migratory, or other trust resources. No response was received within the 45-day response period. The Federal Highway Administration (FHWA) signed the NLEB 4(d) Streamlined Consultation Form determining that the project may affect the NLEB, but that any resulting incidental take of the NLEB is not prohibited by the final 4(d) rule. Approximately 3.6 acres of trees will be cleared during the construction of the project.

The conclusion for cultural resources per the Categorical Exclusion research and response by the State Historic Preservation Office is that there are no historic resources that would be affected by this project. The signed Categorical Exclusion checklist and summary are provided in Appendix 5. A complete copy of the Categorical Exclusion document, including additional information and regulatory communications, is available upon request.

4.2 FEMA Floodplain Compliance and Hydrologic Trespass

The Site is represented on the Wilkes County Flood Insurance Rate Map Panel 4826, with an effective date of March 2, 2009. A portion of the Site is within a Special Flood Hazard Area (SFHA) regulatory floodplain. A limited detail study has been completed for North Little Hunting Creek, from the downstream project extents up through Reach 2 only. Wildlands determined that the changes along North Little Hunting Creek and the adjacent floodplain would result in no rise to the regulatory floodplain and received a floodplain development permit from Wilkes County on February 3, 2021.

The proposed design associated with the Site has little risk of potential hydrologic trespass upstream of North Little Hunting Creek since the proposed thalweg elevation matches the existing thalweg elevation at the upstream tie-in point. Appropriate floodplain width will be excavated as part of the full restoration along North Little Hunting Creek.

4.3 401/404

Some wetlands and open waters adjacent to existing streams will be impacted during realignment of the stream channel, site grading, and construction access. Removal of impoundments and stream and valley restoration of UT1 will permanently impact Ponds 1, 2, and 3. Wetlands on the Site that are within the conservation easement and outside of the limits of disturbance will be flagged with safety fence during construction to prevent unintended impacts. This will be denoted in the final construction plans. The Pre-Construction Notification, including this data, will be submitted to the IRT with the Final Mitigation Plan. Wildlands will reverify the extent of jurisdiction in Monitoring Year 7 (MY7) for the purpose of confirming no net loss of wetlands as a result of ecological restoration.

5.0 Mitigation Site Goals and Objectives

The project will improve stream functions through removal of stream impoundments and piping, exclusion of livestock, conversion of pasture and agricultural fields to riparian buffer, and through restoring streams throughout the entire Site. Within the project limits, North Little Hunting Creek will be reconnected to its floodplain, and tributaries will no longer be impeded by dams or biologically disconnected by headcuts and perched piping.

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

Table 11: Mitigation Goals and Objectives

Goal	Objective	Expected Outcomes	Function Supported
Exclude livestock from stream channels and buffers.	Install livestock fencing as needed to exclude livestock from stream channels and riparian areas or remove livestock from adjacent fields.	Reduce direct fecal coliform and nutrient inputs to the Site streams. Eliminate hoof shear on the stream bed and banks, which will reduce stream bank erosion and fine sediments in the stream channel. Eliminate cattle trampling of existing wetlands and grazing in riparian buffers.	Geomorphology, Physicochemical, Biology *
Restore and enhance native floodplain vegetation.	Convert active cattle pasture to forested riparian buffers along all Site streams, which will slow and treat sediment laden runoff from adjacent pastures and fields before entering streams. Protect and enhance existing forested riparian buffers. Treat invasive species.	Significantly reduce sediment inputs from pasture runoff. Reduce floodplain velocities and increase retention of flood flows on the floodplain in headwater stream systems, decreasing direct runoff and increasing storage and nutrient cycling within the watershed. Increase shading of stream channels, which will increase dissolved oxygen concentrations. Provide a source of LWD and organic material to Site streams for continued habitat. Support all stream functions.	Hydrology, Hydraulic, Geomorphology, Physicochemical, Biology *

Goal	Objective	Expected Outcomes	Function Supported
Improve the stability of stream channels.	Reconstruct stream channels slated for restoration with stable dimensions and appropriate depth relative to the existing floodplain. Add bank revetments and instream structures to protect restored/ enhanced streams.	Reduce sediment inputs from bank erosion. Increase floodplain engagement, decreasing runoff and increasing infiltration. Decrease instream shear stresses. Decrease erosion along dam and pipe outlets. Diversify available habitats.	Hydraulic, Geomorphology, Physicochemical, Biology *
Improve instream habitat.	Install habitat features such as constructed steps, cover logs, and brush toes on restored reaches. Add woody materials/ LWD to channel beds. Construct pools of varying depth.	Increase and diversify available habitats for macroinvertebrates, fish, and amphibians. Promote aquatic species migration and recolonization from refugia, leading to colonization and increase in biodiversity over time. Add complexity including LWD to the streams.	Geomorphology, Physicochemical, Biology *
Diffuse concentrated agricultural runoff.	Install stormwater BMPs in areas of concentrated agricultural runoff to diffuse and provide vegetated infiltration for runoff before it enters the stream channel.	Reduce agricultural and sediment inputs to the project, which will reduce likelihood of accumulated fines and excessive algal blooms from nutrients.	Physicochemical, Biology *
Permanently protect the project site from harmful uses.	Establish a conservation easement on the Site. Exclude livestock from Site streams, remove impoundments and daylight streams, and remove fields from the riparian buffer. Establish a restrictive covenant that excludes livestock from a linear stream/wetland feature entering North Little Hunting Creek near the southwestern property boundary.	Protect Site from encroachment on the riparian corridor and direct impact to streams and wetlands. Support all stream functions.	Hydrology, Hydraulic, Geomorphic, Physicochemical, Biology *

*Physiochemical and biological uplift is implied based on historical evidence that riparian buffers and stream stabilization reduce fine sediment erosion and provide overland diffused treatment of non-point source nutrients along agricultural streams. Physicochemical and biologic uplift are not quantified and will not be specifically reported post-construction.

6.0 Design Approach and Mitigation Work Plan

6.1 Design Approach Overview

The design approach for this Site was developed to meet the goals and objectives described in Section 5 which were formulated based on the potential for uplift described in Section 3.4. The design is also intended to provide the expected outcomes in Section 5, though these are not tied to performance criteria.

The project streams proposed for restoration on the Site will be reconnected with an active floodplain and the channels will be reconstructed with stable dimension, pattern, and profile that will transport the water and sediment delivered to the system. North of Ingle Hollow Road, the ponds and piped barriers on UT1 will be removed, and continuous flow will be restored to the system. South of Ingle Hollow Road, North Little Hunting Creek, UT2 Reaches 2 and 3, Old Bus Branch, and Barn Branch will be raised to create connectivity with the floodplain. The riparian buffer and existing wetlands will be planted with native tree species. Instream structures will be constructed in the channels to help maintain stable channel morphology and improve and diversify aquatic habitat. The entire project area will be protected in perpetuity by a conservation easement.

The design approach for this Site utilizes a combination of analog and analytical approaches for stream restoration, and also relies on empirical data and prior experiences and observations. Reference reaches and reference wetlands 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 Mountain and Piedmont restoration projects and are appropriate for the goals and objectives for this Site.

Table 12: Stream Stressors and Restoration Approach

Design Reach	Primary Stressors/Impairments	Approach	Mitigation Activities
North Little Hunting Creek Reaches 1 and 2	Severe erosion and cattle trampling, channelization, incision, lack of buffer	R	Restoring dimension, pattern, and profile, planting buffers, excluding cattle, protecting with conservation easement
UT1 Reach 1	Impoundments (Ponds 1, 2, 3), buried stream, eroding embankments, active headcuts	R	Removing dams, daylighting channel, restoring dimension, pattern, and profile, planting buffers, protecting with conservation easement
UT1 Reaches 2/3	Channelization, incision, sparse/narrow buffers	R	Restoring dimension, pattern, and profile, replanting buffers, protecting with conservation easement
UT2 Reach 1	Cattle access, confined against left valley wall and low bedform diversity near crossing	EII	Restoring dimension, pattern, and profile to correct valley wall confinement and bedform diversity on a portion of Reach 1 (located upstream of crossing). Buffer planting/supplemental buffer planting, cattle exclusion, and protecting with conservation easement for the entire reach.
UT2 Reach 2	Cattle access, channelization, cattle trampling, incision, poor buffers	R	Restoring dimension, pattern, and profile, planting buffers, excluding cattle, protecting with conservation easement
UT2 Reach 3/4	Cattle access, channelized in unnatural alignment, incision, poor buffers	R	Restoring dimension, pattern, and profile to follow fall of valley, planting buffers, excluding cattle, protecting with conservation easement
Old Bus Branch	Severe incision and erosion, active headcuts, cattle access in buffers, poor buffers	R	Restoring dimension, pattern, and profile, planting buffers, excluding cattle, BMP installation, protecting with conservation easement
Barn Branch	Cattle access, channelization, incision, poor buffers	R	Restoring dimension, pattern, and profile, planting buffers, excluding cattle, protecting with conservation easement
Trapper Tributary	Cattle access, headcut	EII	Fencing out cattle, stabilizing headcut, supplemental buffer planting, protecting with conservation easement

Rifle Tributary	Cattle access, incision	EII	Fencing out cattle, planting buffers, BMP installation, protecting with conservation easement

6.2 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. Twelve reference reaches were identified for this Site and used to support the design of streams on the Site (Figure 6). These reference reaches were chosen because of their similarities to the Site streams including drainage area, valley slope, morphology, and bed material. Due to the variety of slopes and project stream types present on the Site, the distribution of reference reaches is wide, throughout North Carolina's mountains, foothills, and piedmont. Geomorphic parameters for most of these reference reaches are summarized in Appendix 4. The references to be used for the specific streams are shown in Table 13 along with a description of the reach.

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

Reference Stream	Stream Type	Landscape Position	Chosen For	Used For	Used on Streams
Box Creek	C4	Broad, alluvial valley, low slope.	Channel dimensions, landscape position, habitat structures, pattern, slope	Q, Dimension, Pattern, Profile	North Little Hunting Creek
UT to Catawba Creek River Reach 1	E5	Connects adjacent steep wooded valleys to the wide and flat Catawba River floodplain. Low slope, alluvial valley, flowing into steeper reach	Sand bed with well-established pools, bedform diversity, and similar valley slope	Q, Dimension, Pattern, Profile	North Little Hunting Creek
UT to Catawba Creek River Reach 2	E3b/C3 b	Connects the wide and flat Catawba River floodplain to the invert of the Catawba River. Stable E channel with varying slopes	Good bedform diversity, well-established pools, and steeper riffles. Varied habitat features with examples of woody debris structures.	Q, Dimension, Profile, Pattern	North Little Hunting Creek, UT1
Foust Upstream	C4	Low slope through a mature forest	Bedform Diversity and bank stability through less meadered pattern	Q, Profile (through confined sections)	North Little Hunting Creek

Reference Stream	Stream Type	Landscape Position	Chosen For	Used For	Used on Streams
UT to South Fork Fishing Creek	B5a	Small, locally steep, confined valley	Steep, small channel with minimal drainage area. Natural rock structures, steps, and pools in confined banks	Q, Dimension, Pattern, Profile	UT1, Old Bus Branch, Barn Branch
Ironwood Tributary	A5a+	Headwater, steep step-like system with small drainage area.	Steep channel slope with high sinuosity through a step-pool system. Bank stability surrounded by heavy canopy	Q, Dimension, Pattern, Profile	UT1, Old Bus Branch, Barn Branch
UT to Gap Branch	Sightly Entrenched B4a or A4	Confined valley with alluvial bottom and high slopes.	Channel slope with varied habitat	Q, Dimension, Pattern, Profile	UT1
Tiber Tributary	B4	Confined valley and alluvial confluence with larger stream.	Moderate channel slope in a confined valley with sinuosity and varied habitat	Pattern, Profile	UT1, UT2
Shew Tributary	B5a	Headwater, steep step-like system in a confined valley with a small drainage area.	Steep slopes with sinuosity and cascade-pool sequences over drops	Q, Dimension, Pattern, Profile	UT1, Old Bus Branch
UT to Kelly Branch	B4/B4a	Headwater, small, steep channel	Steep channel slope with high sinuosity through a cascade-pool sequences over drops. Bank stability surrounded by heavy canopy	Q, Dimension, Pattern, Profile	UT1, Barn Branch
Henry Fork UT1 Upstream	B4/B4a	Headwater, small, steep channel	Channel slope with varied habitat	Pattern, Profile	UT2, Barn Branch
Agony Acres UT1 Reach 3	B4	Headwater, small, steep channel	Channel slope with varied habitat	Pattern, Profile	UT2, Barn Branch

6.3 Design Discharge Analysis

Multiple methods were used to estimate bankfull discharges for restoration reaches including regional curve data (Harman et al. 2000 and Walker, unpublished), a site-specific reference reach curve, existing top of bank (maximum discharge) estimates using Manning’s equation, and data from previous successful design projects. The methods were compared, and a design discharge was selected based on the results of the different methods. Slightly larger design discharges relative to drainage areas were established for the small tributaries to drive designs of slightly larger channels for these reaches. This will help prevent filling and clogging of channels with vegetation after construction. Results of each method and the final design discharges are shown in Tables 14 and 15 and illustrated in Figure 7.

Table 14: Summary of Design Bankfull Discharge Analysis

	North Little Hunting Creek		UT1		
	Reach 1	Reach 2	Reach 1	Reach 2	Reach 3
DA (acres)	1148	1274	30	67	70
DA (sq. mi.)	1.79	1.99	0.05	0.10	0.11
NC Mountain Regional Curve (cfs)	146	159	10	17	19
Alan Walker Curve (cfs)	88	96	5	9	10
Site Specific Reference Reach Curve	99	105	13	19	20
Max Q – Existing Site Streams, top of low bank (cfs)	700	357	60	60	278
Final Design Q (cfs)	100	110	7	10	11

Table 15: Summary of Design Bankfull Discharge Analysis

	UT2			Barn Branch	Old Bus Branch
	Reach 1	Reach 2	Reaches 3 and 4		
DA (acres)	9	29	43	10	5
DA (sq. mi.)	0.01	0.05	0.07	0.02	0.01
NC Mountain Regional Curve (cfs)	4	10	13	4	3
Alan Walker Curve (cfs)	2	5	7	2	1
Site Specific Reference Reach Curve	6	12	15	7	5
Max Q – Existing Site Streams, top of low bank (cfs)	150	150	105	195	1,263
Final Design Q (cfs)	6	7	9	6	4

6.4 Design Channel Morphological Parameters

Reference reach data and designer experience were used to develop design morphologic parameters for each of the restoration reaches. Key morphological parameters are summarized in Tables 16-21. Complete design morphological parameters are included in Appendix 4.

Table 16: Summary of Design Morphologic Parameters for North Little Hunting Creek and UT2 Reach 4

Parameter	Existing Parameters		Reference Parameters				Proposed Parameters		
	North Little Hunting Creek	UT2 Reach 4	Box Creek	UT to Catawba Reach 1	UT to Catawba Reach 2	Foust Upstream	North Little Hunting Creek Reach 1	North Little Hunting Creek Reach 2	UT2 Reach 4
Contributing Drainage Area (acres)	1274	43	1363.2	1024	1024	896	1148	1274	43
Channel/Reach Classification	G4	E5b	C4	E5	E3b/C3b	C4	C4	C4	C5
Design Discharge Width (ft)	12.4-16.3	3.0	7.9	9.7-12.4	12.3	18.5-19.4	22.0	23.0	8.4
Design Discharge Depth (ft)	1.6-1.7	1.1	1.2	1.2-1.4	1.1	1.2-1.3	1.3	1.4	0.5
Design Discharge Area (ft^2)	20.6-25.8	3.2	28.9	11.4-17.5	13.2	23.9-24.1	29.4	31.4	4.5
Design Discharge Velocity (ft/s)	5.0-5.1	5.8	3.0	5.54	6.06	4	3.1	3.7	2.0
Design Discharge (cfs)	100-110	9	95	80	80	95	100	110	9
Channel Slope (ft/ft)	0.0073	0.0254	0.0084	0.005	0.027	0.009	0.0049	0.0066	0.0070
Sinuosity	1.07	1.11	1.33	1.1	1.1	-	1.3	1.2	1.3
Width/Depth Ratio	7.5-10.3	2.9	19.1	8.1-8.9	11.5	14.3-15.7	16.4	16.9	15.8
Bank Height Ratio	2.0-2.3	2.3	1.5	1-1.4	1-1.26	1	1.0-1.1	1.0-1.1	1.0-1.1
Entrenchment Ratio	1.4-2.7	3.2	3.3	5.4-6.4	4.31	2.9-5.3	>2.2	>2.2	>2.2
d50 (mm) reachwide	15	0.9	-	1.8	75.9	61	-		-

Table 17: Summary of Design Morphologic Parameters for UT1 Reach 1

Parameter	Existing Parameters	Reference Parameters			Proposed Parameters	
	UT1	UT to Kelly Branch	Timber Trib R1	UT to Gap Branch	UT1 Reach 1	
Contributing Drainage Area (acres)	30-70	51.2	25.6	26	30	
Channel/Reach Classification	E4 (straight/incised)/C4	B4/B4a	B4	B4a/A4	C4	B4a
Design Discharge Width (ft)	10.2-13.7	7.9	8.9	6.2	5.7	4.5
Design Discharge Depth (ft)	0.7-0.8	0.7	0.5	0.6	0.4	0.3
Design Discharge Area (ft^2)	8.2-9.8	5.7	4.6	3.8	2.3	1.5
Design Discharge Velocity (ft/s)	5.8-5.9	5.9	3.7	5	2.8	4.3
Design Discharge (cfs)	7-11	23	17	18.7	7	
Channel Slope (ft/ft)	0.0296	0.030-0.065	0.0334	0.0680	0.0190	0.0595
Sinuosity	1.1	1.0	1.1	-	1.3	1.1
Width/Depth Ratio	12.7-19.1	10.9	17.0	10.1	13.9	13.5
Bank Height Ratio	1.0-1.8	2.5	1.0	1.0	1.0-1.2	1.0-1.2
Entrenchment Ratio	2.2-2.5	1.2	1.5	3.4	>2.2	>1.4
d50 (mm)	27	-	6.5	19	-	-

Table 18: Summary of Design Morphologic Parameters for UT1 Reach 2 and 3

Parameter	Existing Parameters	Reference Parameters			Proposed Parameters	
	UT1	UT to Catawba Reach 2	Timber Trib R1	Agony Acres	UT1 Reach 2	UT1 Reach 3
Contributing Drainage Area (acres)	30-70	1024	25.6	96	67	70
Channel/Reach Classification	E4 (straight/incised)/C4	E3b/C3b	B4	B4	C4b	C4b
Design Discharge Width (ft)	10.2-13.7	12.3	8.9	11.1	6.2	6.6
Design Discharge Depth (ft)	0.7-0.8	1.1	0.5	0.7	0.6	0.5
Design Discharge Area (ft^2)	8.2-9.8	13.2	4.6	7.4	2.6	3.0
Design Discharge Velocity (ft/s)	5.8-5.9	6.06	3.7	4.9	4.1	3.8
Design Discharge (cfs)	7-11	80	17	37	10	11
Channel Slope (ft/ft)	0.0296	0.027	0.0334	0.0490	0.0380	0.0310
Sinuosity	1.1	1.1	1.1	1.04	1.2	1.12
Width/Depth Ratio	12.7-19.1	11.5	17	16.6	14.6	14.3
Bank Height Ratio	1.0-1.8	1-1.26	1	1.0	1.0-1.2	1.0-1.2
Entrenchment Ratio	2.2-2.5	4.31	1.5	2.3	>2.2	>2.2
d50 (mm)	27	75.9	6.5	51	-	-

Table 19: Summary of Design Morphologic Parameters for UT2 Reach 2 and Barn Branch

Parameter	Existing Parameters		Reference Parameters					Proposed Parameters	
	UT2 Reach 2	Barn Branch	UT to Kelly Branch	Shrew Trib A	Ironwood Tributary	Timber Trib R1	UT to Gap Branch	UT2 Reach 2	Barn Branch
Contributing Drainage Area (acres)	29	10	51.2	12.8	19	25.6	26	29	10
Channel/Reach Classification	A6	B5a	B4/B4a	B5a	A5a+	B4	B4a/A4	B5a	B5a
Design Discharge Width (ft)	3.5	3.8	7.9	3.6	5.0	8.9	6.2	5.0	4.3
Design Discharge Depth (ft)	0.8	0.9	0.7	0.5	0.6	0.5	0.6	0.3	0.3
Design Discharge Area (ft^2)	2.6	3.3	5.7	1.1	2.7	4.6	3.8	1.6	1.4
Design Discharge Velocity (ft/s)	9.2	6.4	5.9	3.3	4.9	3.7	5.0	5.0	3.9
Design Discharge (cfs)	7	6	23	3.5	13	17	18.7	7	6
Channel Slope (ft/ft)	0.0791	0.0435	0.030-0.065	0.0634	0.1139	0.0334	0.0680	0.0830	0.0520
Sinuosity	1.08	1.04	1.0	1.1	1.19	1.1	-	1.07	1.09
Width/Depth Ratio	4.7	4.3	10.9	12.1	9.1	17	10.1	15.4	13.2
Bank Height Ratio	2.8	2.5	2.5	1	1.3	1	1.0	1.0-1.2	1.0-1.2
Entrenchment Ratio	1.3	2.5	1.2	2.1	2.1	1.5	3.4	>1.4	>1.4
d50 (mm)	0.9	0.1	-	2	0.91	6.5	19	-	-

Table 20: Summary of Design Morphologic Parameters for UT2 Reach 3

Parameter	Existing Parameters	Reference Parameters					Proposed Parameters
	UT2 Reach 3	UT to Gap Branch	Henry Fork UT1	UT to Kelly Branch	Timber Trib R1	Agony Acres	UT2 Reach 3
Contributing Drainage Area (acres)	43	26	32	51.2	25.6	96	43
Channel/Reach Classification	E5b	B4a/A4	Ba/B4a	B4/B4a	B4	B4	B5
Design Discharge Width (ft)	3	6.2	3.2	7.9	8.9	11.1	6.6
Design Discharge Depth (ft)	1.1	0.6	0.5	0.7	0.5	0.7	0.4
Design Discharge Area (ft^2)	3.2	3.8	1.9-3.6	5.7	4.6	7.4	2.6
Design Discharge Velocity (ft/s)	5.9	5	5.4	5.9	3.7	4.9	3.4
Design Discharge (cfs)	9	18.7	8.2	23	17	37	9
Channel Slope (ft/ft)	0.0254	0.0680	0.04	0.030-0.065	0.0334	0.0490	0.03
Sinuosity	1.11	-	1.1	1.0	1.1	1.04	1.11
Width/Depth Ratio	2.9	10.1	5.2-16.4	10.9	17	16.6	17.1
Bank Height Ratio	2.3	1.0	1.0-1.3	2.5	1	1.0	1.0-1.2
Entrenchment Ratio	3.2	3.4	1.7-2	1.2	1.5	2.3	>1.4
d50 (mm)	0.9	19	51	-	6.5	51	-

Table 21: Summary of Design Morphologic Parameters for Old Bus Branch

Parameter	Existing Parameters	Reference Parameters			Proposed Parameters
	Old Bus Branch	UT to South Fork Fishing Creek	Shrew Trib A	Ironwood Tributary	Old Bus Branch
Contributing Drainage Area (acres)	5	0.02	12.8	19	5
Channel/Reach Classification	G5	B5a	B5a	A5a+	A5
Design Discharge Width (ft)	4.1	4.1	3.6	5	3.0
Design Discharge Depth (ft)	0.8	0.4	0.5	0.6	0.3
Design Discharge Area (ft^2)	3.4	1.8	1.1	2.7	0.9
Design Discharge Velocity (ft/s)	4.8	4.1	3.3	4.9	4.7
Design Discharge (cfs)	4	8	3.5	13	4
Channel Slope (ft/ft)	0.0284	0.0815	0.0634	0.1139	0.0900
Sinuosity	1.1	1.3	1.1	1.19	1.03
Width/Depth Ratio	4.9	9.3	12.1	9.1	10.3
Bank Height Ratio	6.3	1	1	1.3	1.0-1.2
Entrenchment Ratio	1.7	1.7	2.1	2.1	>1.4
d50 (mm)	0.1	3.6	2	0.91	-

6.5 Sediment Transport Analysis

A qualitative assessment of sediment supply and sources in the project watershed was performed using visual inspection near the Site boundaries and a review of current and historic aerial photos higher in the watershed.

The Site captures the headwaters of UT1, Old Bus Branch, Rifle Tributary, Trapper Tributary, and Barn Branch. The watersheds to these streams are agricultural with some woods and land use is not expected to change in the near future. Agricultural disturbance may provide a source of fine sediments to the easement over time; however, it is expected that the vegetated buffers and BMPs designed to intercept concentrated flow paths will filter most fine sediments contributed by these watersheds. A competence analysis performed for the restoration reaches showed that the bankfull design for these streams is competent to move material much larger than that observed to transport into the Site (Table 22). To create stability and control grade in these enhancement and restoration reaches, in situ material will be supplemented from the following sources: harvested material from existing channels where applicable, appropriately sized onsite rock deposits, and with supplemental imported quarry stone, as necessary. The mobile particle size from the competence results will be used to inform grade control structure sizing. The final plans and specifications will specify that both the size and mixture of materials is conducive to the formation of stable and diverse bedforms. Reseeding streams with existing streambed material will also be performed to encourage migration of native aquatic organisms to the new system.

UT2 was reviewed near the upstream Site boundaries, but full watershed access was not possible due to private property restrictions. UT2's bed material upstream of the Site consists of a mix of alluvial material from upstream processing and transport, and colluvial deposits from hillslope material that have contributed both immobile and mobile sediment to the stream systems. These small boulder, cobble, gravel, and finer materials form riffles, cascades, and step grade control features within the steep step-pool stream. Stream banks are stable, and the watershed area above the Site is less than 10 acres and forested. Large, coarse sediment bars were not observed near the Site boundary or along UT2 and onsite sedimentation was primarily fine-grained and concentrated near cattle wallows. A competence analysis performed for UT2 showed that the bankfull design can transport material larger than the observed incoming sediments (Table 22), so UT2 will be supplemented with appropriately sized material to form low-mobility grade control features typical of step-pool channels.

Similar to UT2, North Little Hunting Creek was reviewed near the upstream Site boundary, but full access to the watershed and stream was not possible due to private property restrictions. Above the Site, North Little Hunting Creek's bed consists of alluvially transported cobbles, gravels, and fines. North Little Hunting Creek's watershed is mostly forested except for a few agricultural parcels upstream. Stream banks on the agricultural parcel directly upstream of the Site are fenced from livestock and appear low and stable. Within the Site limits, North Little Hunting Creek's cut banks reveal a buried gravel/cobble layer, and depositional features suggest a source of both fine and coarse sediments from the watershed. It is likely that North Little Hunting Creek has areas of instability higher in the watershed that will supply the Site post-construction.

Coarse sediment source observed in cut bank on North Little Hunting Creek

A well-developed gravel/cobble bar sample and several subpavement samples were collected on North Little Hunting Creek to understand the distribution of sediment transported during a bankfull storm event. A competence analysis performed showed that the design channel is competent to transport the largest materials delivered by the watershed during bankfull storms. Intermittent grade control structures will be incorporated to the design to protect against degradation during larger storm events, and incoming fine sediment will be addressed by stream bank stabilization, connecting the stream to a floodplain, and excavating wide point bars where fine sediment can deposit.

Table 22: Results of Competence Analysis

	North Little Hunting Creek		UT1				UT2			Old Bus Branch	Barn Branch
	Reach 1	Reach 2	Reach 1-A	Reach 1-B	Reach 2	Reach 3	Reach 2	Reach 3	Reach 4		
Abkf (sq ft)	29.4	31.4	1.5	2.3	2.6	3.0	1.6	2.6	4.5	0.9	1.4
Wbkf (ft)	22.0	23.0	4.5	5.7	6.2	6.6	5.0	6.6	8.4	3.0	3.0
Dbkf (ft)	1.3	1.4	0.5	0.6	0.6	0.5	0.3	0.4	0.5	0.3	0.3
Schan (ft/ft)	0.00486	0.00658	0.0595	0.019	0.038	0.031	0.083	0.03	0.007	0.09	0.052
Bankfull Velocity (fps)	3.1	3.7	4.3	2.8	4.0	3.4	5.0	3.4	2.0	4.7	3.9
Bankfull Shear Stress, t (lb/sq ft)	0.4	0.5	1.2	0.5	1.0	0.7	1.6	0.7	0.3	1.4	1.0
Movable particle size Shields/Rosgen (mm)	30/77	41/97	94/173	36/87	76/150	51/113	130/219	54/118	21/61	109/193	79/154
Largest particle from bar/ subpavement sample (mm)	76.2	76.2	82.6	82.6	82.6	82.6	54.4	50.3	50.3	53.8	18

6.6 Stream Design Implementation

Due to the heavy agricultural use of the land and the degraded stream conditions, Wildlands' approach to improving the streams on the Site focuses on widespread restoration with enhancement II proposed on the few headwater reaches that are not as extensively affected by livestock. The tributaries south of Ingle Hollow Road are steep, and a combination of Priority 1 and Priority 2 restoration was necessary given the slope of the valley sidewalls and the depth of the existing streams. On North Little Hunting Creek, the stream will be raised and a floodplain bench will be constructed, representing a blend of a Priority 1 and Priority 2 approach, due to the existing FEMA floodplain elevations as well as the existing driveway bridge elevation. UT1 will have all impoundments and piped sections of channel removed, allowing for full restoration of the stream. Livestock will be excluded from the entire conservation easement as part of the project, and the landowner will install cattle watering systems post-construction as part of the project implementation.

Meandering Priority 2 design sections have been designed with an outer bench that is approximately half the designed bankfull riffle width. Bench corridors are designed straight down valley and do not meander with the top of the bank. A 3:1 bench to existing ground tie out slope is used along Priority 2 corridors, with brief areas of 2:1 tie out slope where the design transitions from old to new channel. Prior to excavation of Priority 2 benches, topsoil will be stripped and stockpiled for replacement on the new bench. Soil amendments may be incorporated into benches if determined necessary during construction.

Figure 8 illustrates the concept design; below are descriptions of the designs for each reach.

6.6.1 North Little Hunting Creek

North Little Hunting Creek will be built as a C type stream with the broad, alluvial floodplain. The driveway bridge at the Reach 1/Reach 2 break will remain, and due to the need to meet elevations at the upstream and downstream ties as well as midreach, North Little Hunting Creek's design raises the channel bed slightly while also excavating the floodplain. Due to the erosive soils observed onsite, North Little Hunting Creek's banks have been designed with a minimum 3.5:1 side slope. Assorted riffles built from wood and stone, brush toe bank protection, and vanes are strategically placed to diversify the bedform and provide stability as the site revegetates. Drain tiles entering North Little Hunting Creek from the right floodplain will be excavated within the conservation easement. If the drain tiles extend beyond the conservation easement, an ephemeral pool will be placed at the outlet of the drain tiles within the easement to capture and still the flow.

6.6.2 UT1

Due to the extensive manipulation of UT1 with three impoundments and a long section of buried/piped channel, UT1's restoration will be earthwork intensive. Restoration of the valley first while balancing earthwork influenced the design of this stream.

UT1 Reach 1 begins at the stream's jurisdictional origin and continues to the proposed stream crossing. UT1 Reach 1's design alternates between lower sloped C-type design with meandering pattern, generally through Pond 1, Pond 2, and Pond 3's beds, and steeper Ba-type design through the embankments. Two sets of UT1 Reach 1 typical riffle and pool cross sections are provided for these two alternating design approaches. Where UT1 is buried in pipe, the location of the existing chicken houses in the left floodplain functions as a design boundary. A landowner-required 30-foot offset from the edge of the chicken houses defined the left valley grading limits while the existing valley defined the right valley grading limits. Wildlands' design will daylight UT1 onto a broad, Priority 2 valley floor six to eight feet below the existing ground elevation. At the end of the chicken houses, UT1 will drop down in a steep Ba-type design to meet the existing bed elevation of Pond 3.

UT1 Reach 1 continues from the backwater of Pond 3 to Ingle Hollow Road. The design incorporates a moderately sloped, meandering Cb-type channel. Outside of UT1 Reach 1's valley, Pond 3 will be filled and graded to restore usable fields for the landowner. A culvert crossing will be installed at the end of UT1 Reach 1 under the existing overhead utility easement.

Removal of the ponds will involve dewatering the normal pool first, either through pumping, dam notching, or a combination thereof. Unconsolidated sediments in the dewatered pond bottoms deemed unsuitable for construction will be excavated and spread in a designated splay area to dry. Suitable fill may be imported if needed. Stream construction will begin after ponds are fully dewatered and the dams notched to prevent ponding.

UT1 Reach 2 begins just downstream of the culvert crossing and continues through the Pond 3 embankment. UT1 Reach 2 steepens slightly as a step-pool type channel. The grated drop inlet leading to the culvert under Ingle Hollow Road will be removed. Headwalls will be constructed around the existing Ingle Hollow Road culvert to allow UT1 Reach 2 to freely flow into the culvert.

UT1 Reach 3 begins at the outlet of the Ingle Hollow Road culvert and ends at the confluence with North Little Hunting Creek. The stream is designed as a meandering Cb-type stream and joins North Little Hunting Creek at a riffle just upstream of the existing driveway bridge. The stream will be raised slightly to meet the existing outlet of the culvert, allowing for aquatic species passage.

On lower sloped C- and Cb-type streams, assorted riffles built from wood and stone, brush toe bank protection, and vanes have been incorporated into the design to diversify available habitat and provide stability as the site revegetates. Within the steep Ba-type sections, rock step-pools and boulder cascades are strategically placed to stabilize very steep sections of channel.

6.6.3 UT2

UT2 Reach 1 begins at the upstream property boundary and ends at the proposed culvert crossing. For the first 150 LF, UT2 Reach 1 will be enhanced with supplemental planting and livestock exclusion only. Just downstream of this, UT2 Reach 1 becomes confined along the left valley wall and is extensively impacted by cattle trampling. UT2 Reach 1's alignment will be relocated to the center of the valley and stabilized as a step pool channel, contiguous with the downstream design. A bankfull bench will be constructed here to provide storage for any incoming sediments from upstream.

UT2 Reach 2 begins downstream of the proposed culvert crossing and continues to the stream's confluence with Rifle Tributary where the valley slope changes. UT2 Reach 2 is designed as a Ba-type channel that dissipates energy over drop structures such as rock step-pools and boulder cascades. After the Rifle Tributary confluence, the valley slope decreases considerably, and UT2 Reach 3 is designed as a B-type channel. Reach 3's alignment follows the existing channel bed, then shifts into the left floodplain to preserve specimen trees on the existing stream bank. Downstream of the specimen trees, the stream valley narrows and the proposed alignment again follows the approximate existing channel. As the valley widens, UT2 Reach 3's design alignment shifts right to follow the low point in the valley. UT2 Reach 3 ends where the stream enters the broad North Little Hunting Creek floodplain. UT2 Reach 4's design transitions to a low sloped, C-type stream which meanders across the North Little Hunting Creek floodplain to join the main channel at a riffle.

UT2 Reach 4 will have a diverse array of constructed wood and stone riffles installed in addition to brush toe bank protection in bends. The upper reaches of UT2 will have rock step-pools and boulder cascades strategically placed to stabilize very steep sections of channel and will have an array of riffle and pool structures as well to diversify habitats.

6.6.4 Barn Branch

Barn Branch begins at the base of a hillslope wetland seep. The channel is designed as a steep, Ba-type channel with gentle pattern that moves out into the right floodplain to the existing low point of the valley. Barn Branch flows through an existing wetland before joining UT2. The design incorporates rock and log steps, steep riffles, and rock cascades to stabilize this steep system while providing habitat. Brush toe will be incorporated into one large meander bend where Barn Branch turns to join UT2. The conservation easement extends over 120 feet upstream of Barn Branch's jurisdictional start and encompasses an existing wetland. By expanding the conservation easement, the existing wetland will be protected from disturbance and can help capture and provide some treatment for the upstream eroding pastureland.

6.6.5 Old Bus Branch

Old Bus Branch's existing valley is a deep, actively eroding gully, which drove design to focus first on valley restoration. The design of Old Bus Branch focused on restoring a valley bottom with a smooth and even slope and creating stable valley side slopes. From there, Old Bus Branch's design followed the newly designed valley as a Ba-type channel. The stream alignment shifts to the right of the existing gully at the upstream extent, then moves back into the old alignment as the stream approaches the UT2 confluence. Structures in Old Bus Branch will alternate between rock step pools and rock cascades to stabilize the system while providing habitat. A step pool stormwater conveyance BMP will be constructed upstream of the jurisdictional start of Old Bus Branch to address the eroded, ephemeral swale and capture and treat runoff and flow from the adjacent pasture. This structure is anticipated to fill with sediment and vegetation over time and transition to a stable, vegetated swale; no long-term maintenance is proposed after stabilization.

6.6.6 Rifle and Trapper Tributary

Rifle and Trapper Tributaries are enhancement II reaches, but in-channel work will be performed to address localized instabilities. Riffle Tributary drops over active headcuts as it incises to join UT2. Instream structures are proposed on Rifle Tributary to arrest the headcuts, and localized bank sloping and stabilization will be completed to address localized erosion. Rifle Tributary also will be extended to meet the new location of UT2 within their valley. A small headcut at the end of Trapper Tributary will be treated with a log sill structure. Both streams will have livestock excluded, and a pocket wetland BMP will be installed upslope of jurisdictional features on Rifle Tributary to capture and treat runoff and flow from the adjacent pasture. This wetland BMP is expected to slowly accumulate with vegetation and pasture runoff and transition to a vegetative buffer over time with no long-term maintenance after stabilization.

6.7 Vegetation, Planting Plan, and Land Management

Non-forested areas within the conservation easement will be planted, which includes additional buffer areas beyond the minimum requirement of 30 feet from top of bank. Riparian buffers will be planted with a mix of early successional and climax native vegetation chosen to develop a forested riparian zone. 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. The Piedmont Bottomland Forest and Piedmont Alluvial Forest community types were used as references for creating the site planting plan (Schafale, 2012). Many of the selected species are representative of these community types although a few additional early successional species were included to help climax species establish. Species chosen for the planting plan are listed in the draft plans located in Appendix 12.

The riparian buffer will be planted with bare root seedlings. Areas proposed for riparian buffer planting that are outside the limits of disturbance but deemed to be compacted will be subsoil plowed prior to planting. 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. Bare root seedlings and live stakes will be planted in the dormant season, defined as having a 50 percent probability of 28°F or higher by the AgACIS WETS table for Wilkes County as November 1 through April 9.

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

6.8 Utilities, Stream Crossings, and Site Access

Table 23 summarizes the proposed crossings on the Site. All crossings are included in the easement and are existing utility or stream crossings except for the easement break at Ingle Hollow Road.

Two overhead utility easements overlap the project easement; one on UT1 Reach 1 and one on North Little Hunting Creek Reach 1, as shown in Table 23. The UT1 utility crossing is collocated with the proposed culvert crossing while the North Little Hunting Creek utility crossing does not have an associated stream bed crossing.

The UT1 and UT2 culvert crossings will be fenced with 5-strand barbed wire and gated. The culvert pipes will be buried 6 to 12 inches to allow for a natural stream bed through the crossing, promoting fish passage and aquatic habitat continuity. The North Little Hunting Creek crossing will be gated but does not require cross fencing. The maintenance of the crossings will be the responsibility of the landowner once the project is closed by the NCIRT and transferred to NCDEQ stewardship.

Fencing will be installed to prevent livestock access to the proposed easement or livestock will be removed from the Site. Any livestock, associated fencing, or permanent crossings will be the responsibility the owner of the underlying fee to maintain. The easement area can be accessed for construction, monitoring, and long-term stewardship from Ingle Hollow Road.

Table 23: Crossings Summary

Reach	Crossing Location (STA)	Crossing Type	Within Conservation Easement?
North Little Hunting Creek Reach 1	103+11 – 103+43	Utility only/no stream bed crossing or livestock access	Yes
North Little Hunting Creek Reach 2	107+92 – 108+52	Gated bridge for vehicular access only	Yes
UT1 Reach 1	214+33 – 214+84	Utility and fenced culvert crossing – no livestock access to stream	Yes
UT1 Reach 2	217+37 – 218+04	External culvert crossing for public DOT road	No
UT2 Reach 1	303+00 – 303+50	Fenced culvert crossing – no livestock access to stream	Yes

6.9 Project Risk and Uncertainties

In general, this project is low risk. The landowners live in the immediate area and are active on the property. They will be able to repair damaged fences and/or remove stray livestock from the easement quickly. Upon completion of construction, easement will be delineated with fence, witness posts, and signage as outlined in NC DMS's 2018 guidance document to discourage accidental encroachment.

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

The potential for future urban development in these watersheds is quite low due to the rural nature of the project. The Site captures the UT1 headwaters and much of the UT2 headwater drainage features, and thus controls the majority of those riparian land use. Much of the North Little Hunting Creek watershed is within the Brushy Mountains, and although assessed in the NC NHP database for biodiversity and wildlife habitat, the portion of the Brushy Mountains that drain to the site are not in conservation. The highest potential risk to land use change in the North Little Hunting Creek watershed is the potential for logging. Logging may increase peak flows and sediment to North Little Hunting Creek. This risk has been mitigated by providing wide floodplain access and low sloped point bars to provide fine sediment storage areas within the design.

All stream and wetland projects have some risk for beaver colonization. There is evidence of current/past beaver activity on UT1 around Pond 3. After the removal of Pond 3, the area will be watched for beaver activity. If beaver persist on UT1 or move into other project areas, Wildlands will follow the Maintenance Plan (Appendix 9) to address the issue. Similarly, should utility/roadway maintenance work occur in the future and encroach within the conservation easement, Wildlands will follow the Maintenance Plan to repair disturbed signage or damaged stream areas. Wildlands has minimized this risk by setting the external easement break at Ingle Hollow Road outside of the right-of-way.

7.0 Performance Standards

The stream performance standards for the project will follow approved performance standards presented in the DMS Mitigation Plan Template (Version 2.3, June 2017), the Annual Monitoring Template (June 2017), and the Wilmington District Stream and Wetland Compensatory Mitigation Update issued October 2016 by the USACE and NCIRT. Annual monitoring and routine site visits will be conducted by a qualified scientist to assess the condition of the finished project. Specific performance standards that apply to this project are those described in the 2016 Compensatory Mitigation Update including Vegetation (Section V, B, Items 1 through 3) and Stream Channel Stability and Stream Hydrology Performance Standards (Section VI, B, Items 1 through 7). Performance standards summaries are listed in Table 24.

Table 24: Summary of Performance Standards

Parameter	Monitoring Feature	Performance Standard
STREAM SPECIFIC PERFOMANCE STANDARDS[1, 2]		
Dimension	Cross-Section Survey	BHR <1.2; ER >2.2 for C/E channels BHR <1.2; ER >1.4 for A/B channels
Pattern and Profile	Visual Assessment	Should indicate stream stability
Substrate	Pebble Counts	Coarser material in riffles; finer particles in pools
Photo Documentation	• Cross-Section Photos • Photo Points	No excessive erosion or degradation of banks Stable grade control
Hydrology	Pressure Transducer	• Four bankfull events during the 7-year period; in separate years
SITE PERFOMANCE STANDARDS		
Vegetation	Vegetation Plots	MY3 success criteria: 320 planted stems per acre MY5 success criteria: 260 planted stems per acre, average of 6 feet in height in each plot MY7 success criteria: 210 planted stems per acre, average of 8 feet in height in each plot
Visual Assessment	CCPV Maps	Signs of encroachment, instability, and invasive species

1: BHR = bank height ratio, ER = entrenchment ratio, MY = monitoring year
2: The tributaries are designed to incise as they approach the main streams, so this would not be considered a trend towards instability. Riffles may fine over the course of monitoring on North Little Hunting Creek due to the stabilization of contributing watershed sediment sources.

8.0 Long-Term Management Plan

The Site will be transferred to the North Carolina Department of Environmental Quality (NCDEQ) Stewardship Program. This party shall serve as conservation easement holder and long-term steward for the property and will conduct periodic inspection of the Site to ensure that restrictions required in the conservation easement are upheld. Funding will be supplied by the responsible party on a yearly basis until such time an endowment is established. The NCDEQ Stewardship Program is developing an endowment system within the non-reverting, interest-bearing Conservation Lands Conservation Fund Account. The use of funds from the Endowment Account will be governed by North Carolina General

Statue GS 113A-232(d)(3). Interest gained by the endowment fund may be used for the purpose of stewardship, monitoring, stewardship administration, and land transaction costs, if applicable.

The Stewardship Program will periodically install signage as needed to identify boundary markings as needed. Any livestock or associated fencing or permanent crossings will be the responsibility the owner of the underlying fee to maintain.

The Site Protection Instrument can be found in Appendix 8.

Table 25: Long-term Management Plan

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

9.0 Monitoring Plan

Project monitoring components are listed in more detail in Table 26 and 27. Approximate locations of the proposed vegetation plots, photo points, and cross sections are illustrated in Figure 9.

Table 26: Monitoring Components

<table>
<tr><th rowspan="2">Parameter</th><th rowspan="2">Monitoring Feature</th><th colspan="7">Quantity/Length by Reach</th><th>Frequency</th><th>Notes</th></tr>
<tr><th>NLHC Reach 1</th><th>NLHC Reach 2</th><th>UT1 Reach 1</th><th>UT1 Reach 2</th><th>UT1 Reach 3</th><th>Old Bus Branch</th><th>Barn Branch</th><th></th><th></th></tr>
<tr><td rowspan="2">Dimension</td><td>Riffle Cross-sections</td><td>1</td><td>1</td><td>2</td><td>1</td><td>1</td><td>1</td><td>1</td><td rowspan="2">Year 1, 2, 3, 5, and 7</td><td rowspan="2">1</td></tr>
<tr><td>Pool Cross-sections</td><td>1</td><td>1</td><td>1</td><td>1</td><td>0</td><td>0</td><td>0</td></tr>
<tr><td>Pattern</td><td>Pattern</td><td>N/A</td><td>N/A</td><td>N/A</td><td>N/A</td><td>N/A</td><td>N/A</td><td>N/A</td><td>N/A</td><td rowspan="2">2</td></tr>
<tr><td>Profile</td><td>Longitudinal Profile</td><td>N/A</td><td>N/A</td><td>N/A</td><td>N/A</td><td>N/A</td><td>N/A</td><td>N/A</td><td>N/A</td></tr>
<tr><td>Substrate</td><td>Reach wide (RW) Pebble Count</td><td>1 RW</td><td>1 RW</td><td>1 RW</td><td>1 RW</td><td>1 RW</td><td>1 RW</td><td>1 RW</td><td>Year 1, 2, 3, 5, and 7</td><td>3</td></tr>
<tr><td>Hydrology</td><td>Crest Gage (CG) and/or Stream Gage (SG)</td><td colspan="2">1 CG</td><td colspan="3">1 CG</td><td>N/A</td><td>N/A</td><td>Semi-Annual</td><td>4</td></tr>
<tr><td>Vegetation</td><td>CVS Level 2/Mobile Plots (Permanent/Mobile)</td><td colspan="7">11
(8/3)</td><td>Year 1, 2, 3, 5, and 7</td><td>5</td></tr>
<tr><td>Visual Assessment</td><td></td><td>Y</td><td>Y</td><td>Y</td><td>Y</td><td>Y</td><td>Y</td><td>Y</td><td>Semi-Annual</td><td></td></tr>
<tr><td>Exotic and nuisance vegetation</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>Semi-Annual</td><td>6</td></tr>
<tr><td>Project Boundary</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>Semi-Annual</td><td>7</td></tr>
<tr><td>Reference Photos</td><td>Photographs</td><td>2</td><td>3</td><td>3</td><td>2</td><td>1</td><td>1</td><td>1</td><td>Annual</td><td></td></tr>
</table>

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 stream gages will be monitored using automated pressure transducers. Transducers will set to record bank full events at least twice a day and stream flow at least every 3 hours and will be inspected quarterly or semi-annually. Evidence of bankfull and stream flow events will be documented with a photo when possible.
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 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 m2 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.

Table 27: Monitoring Components

Parameter	Monitoring Feature	Quantity/Length by Reach						Frequency	Notes
		UT2 Reach 1	UT2 Reach 2	UT2 Reach 3	UT2 Reach 4	Rifle Tributary	Trapper Tributary		
Dimension	Riffle Cross-sections	N/A	1	1	1	N/A	N/A	Year 1, 2, 3, 5, and 7	1
	Pool Cross-sections	N/A	0	1	0	N/A	N/A		
Pattern	Pattern	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	
Substrate	Reach wide (RW) Pebble Count	1 RW	1 RW	1 RW	1 RW	N/A	N/A	Year 1, 2, 3, 5, and 7	3
Hydrology	Crest Gage (CG) and/or Stream Gage (SG)	1 CG				N/A	N/A	Semi-Annual	4
Vegetation	CVS Level 2/Mobile Plots (Permanent/Mobile)	5 (4/1)						Year 1, 2, 3, 5, and 7	5
Visual Assessment		Y	Y	Y	Y	Y	Y	Semi-Annual	
Exotic and nuisance vegetation								Semi-Annual	6
Project Boundary								Semi-Annual	7
Reference Photos	Photographs	2	2	2	2	1	1	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 stream gages will be monitored using automated pressure transducers. Transducers will set to record bank full events at least twice a day and stream flow at least every 3 hours and will be inspected quarterly or semi-annually. Evidence of bankfull and stream flow events will be documented with a photo when possible.
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 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 m2 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 Adaptive Management Plan

Upon completion of Site construction, Wildlands will implement the post-construction monitoring defined in Sections 7 and 8. Project maintenance will be performed during the monitoring years to address minor issues as necessary (Appendix 9). If during annual monitoring it is determined the Site's ability to achieve Site performance standards are jeopardized in any other way, Wildlands and DMS will notify the members of the IRT and work with the IRT to develop contingency plans and remedial actions.

11.0 Determination of Credits

Mitigation credits presented in Table 28 are projections based upon the proposed design.

The credit ratios proposed for the Site have been developed in consultation with the Interagency Review Team (IRT) as summarized in the IRT contracting meeting minutes dated July 24, 2019. This correspondence is included in Appendix 6.

1. The requested stream restoration credit ratio is 1:1 for mitigation activities that include reconstruction of the channels to a stable form and connection of the channels to the adjacent floodplain.
2. Enhancement II is proposed at 2.5:1 credit to reflect cattle exclusion and buffer planting as needed. Cattle activity appears infrequent in the upper extent UT2 Reach 1 due to its steep valley, but the ratio is justified because the downstream most 150 LF of UT2 Reach 1 will receive restoration-type treatment. Rifle Tributary and Trapper Tributary are small, seep-driven streams that flow through a heavily vegetated wetland. Rifle Tributary has several headcuts that are advancing up from UT2 that will be stabilized as part of this work.
3. No direct credit is sought for the BMPs upslope of Rifle Tributary and Old Bus Branch to treat concentrated agricultural runoff. No direct credit is sought for the restrictive covenant excluding cattle from a linear stream/wetland feature leading to North Hunting Creek near the southwestern property boundary. Cattle will likely be excluded from this feature with fencing.

Buffers proposed throughout the Site meet the minimum required 30-foot standard width for Mountain streams, and in most cases, far exceed it. A detailed buffer credit calculation using the USACE Wilmington District Stream Buffer Credit Calculator (updated January 19, 2018) was completed to calculate credit increases based on buffer widths which exceed the 30-foot minimum. To complete these calculations in GIS, the proposed bankfull/top of bank lines were offset to create concentric, ideal buffer zones, up to 150 feet from bankfull. The ideal buffer zone area was compared to the actual area within the creditable portion of the conservation easement, and these areas added to the calculator. Buffer zones are illustrated in a figure in Appendix 11. Appendix 11 also contains the Stream Buffer Credit Calculator output and the credit release schedule.

Table 28: Project Asset Table

Project Components							
Project Component or Reach ID	**Existing Footage/ Acreage**	**Restoration Footage/ Acreage**	**Mitigation Category**	**Restoration Level**	**Priority Level**	**Mitigation Ratio**	**Proposed Credit[1, 2]**
North Little Hunting Creek Reach 1	1,646	722.905	Warm	R	P2	1	722.905
North Little Hunting Creek Reach 2		1,027.718				1	1,027.718
UT1 Reach 1	996	1,432.561	Warm	R	P2	1	1,432.561
UT1 Reach 2		244.166		R	P2	1	244.166
UT1 Reach 3		217.715		R	P2	1	217.715
UT2 Reach 1	1,707	299.853	Warm	EII	P1, P2	2.5	119.941
UT2 Reach 2		286.763		R	P1, P2	1	286.763
UT2 Reach 3		568.949		R	P1, P2	1	568.949
UT2 Reach 4		522.002		R	P1, P2	1	522.002
Barn Branch	247	287.612	Warm	R	P1, P2	1	287.612
Old Bus Branch	90	87.471	Warm	R	P1, P2	1	87.471
Rifle Tributary	193	252.855	Warm	EII	N/A	2.5	101.142
Trapper Tributary	41	40.718	Warm	EII	N/A	2.5	16.287
Net credit gain for buffers wider than 30-feet[3]							181.720

Project Credits							
Restoration Level	**Stream**			**Riparian Wetland**		**Non-Rip**	**Coastal**
	Warm	**Cool**	**Cold**	**Riverine**	**Non-Riv**	**Wetland**	**Marsh**
Restoration	**5,397.863**						
Re-establishment							
Rehabilitation							
Enhancement							
Enhancement I							
Enhancement II	**237.370**						
Creation							
Preservation							
Credit Gain: Buffers >30-feet[3]	**181.720**						
Totals	**5,816.953**						

Notes: 1. Crossing lengths have been removed from restoration footage.
2. No direct credit for BMPs.
3. Detailed calculations for credits gained for buffers wider than 30-feet included in Appendix 11.

12.0 References

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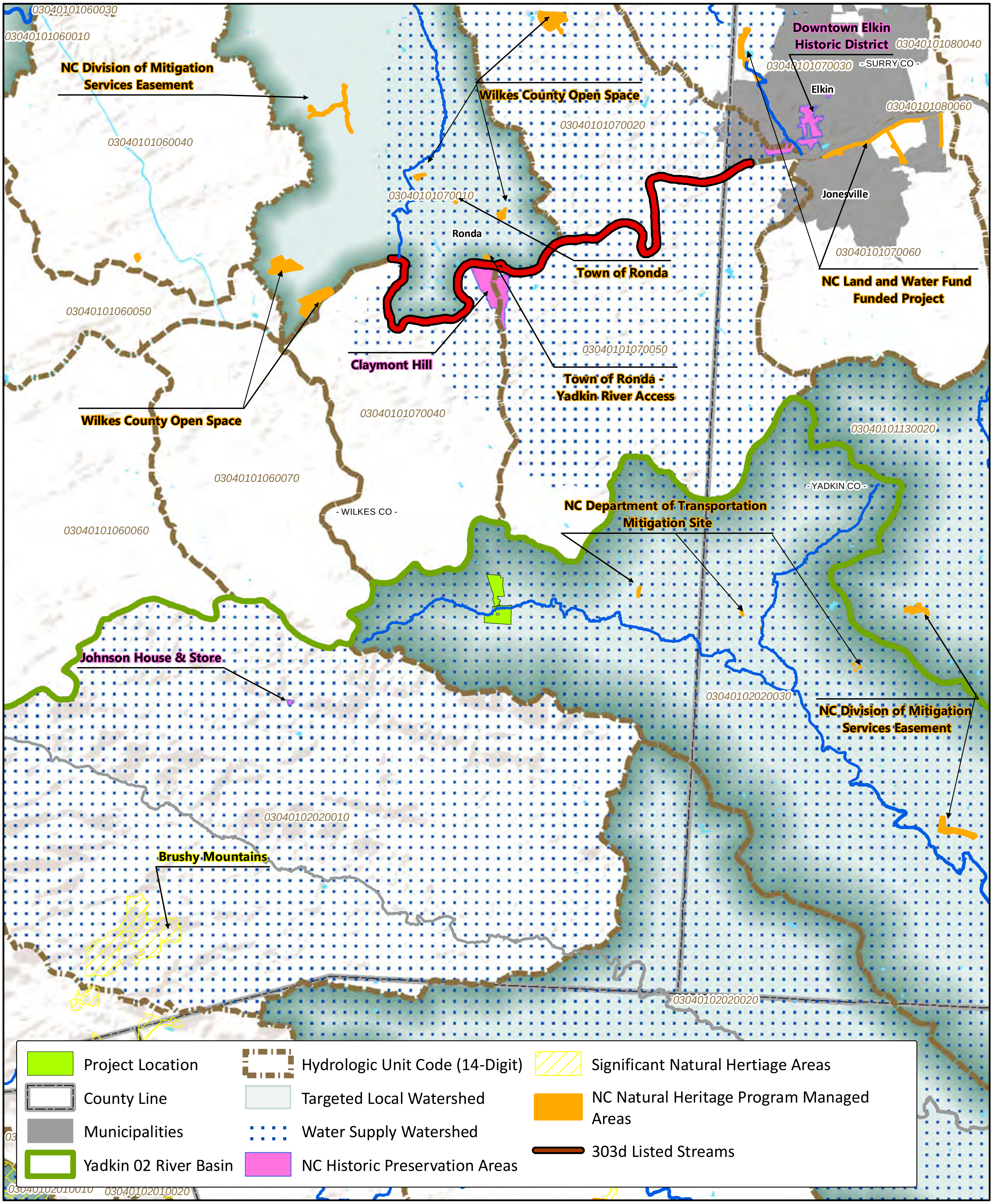
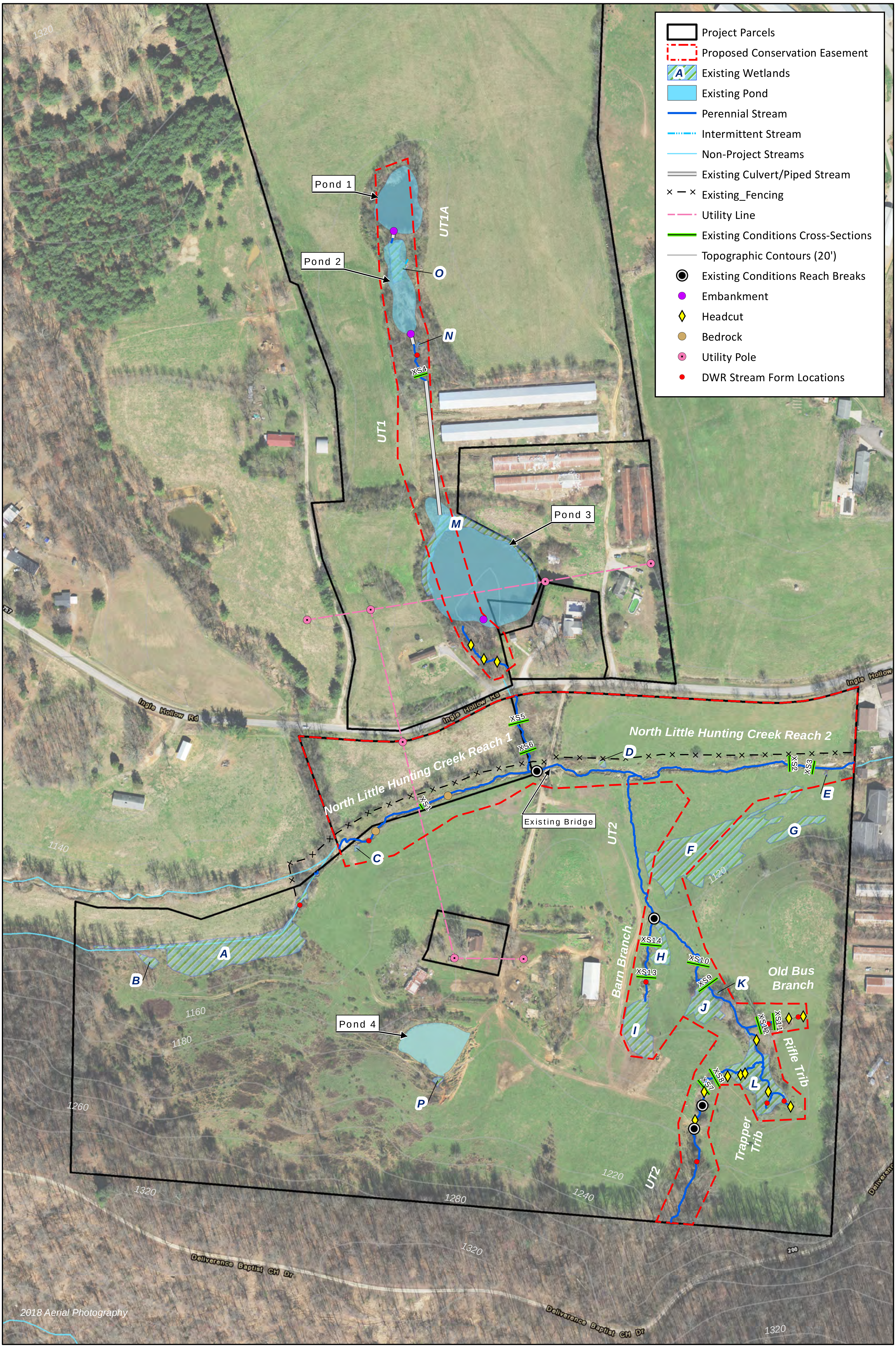
FIGURES



WILDLANDS ENGINEERING

Figure 1 Vicinity Map
Huntsman Mitigation Site
Yadkin River Basin (03040102)

Wilkes County, NC



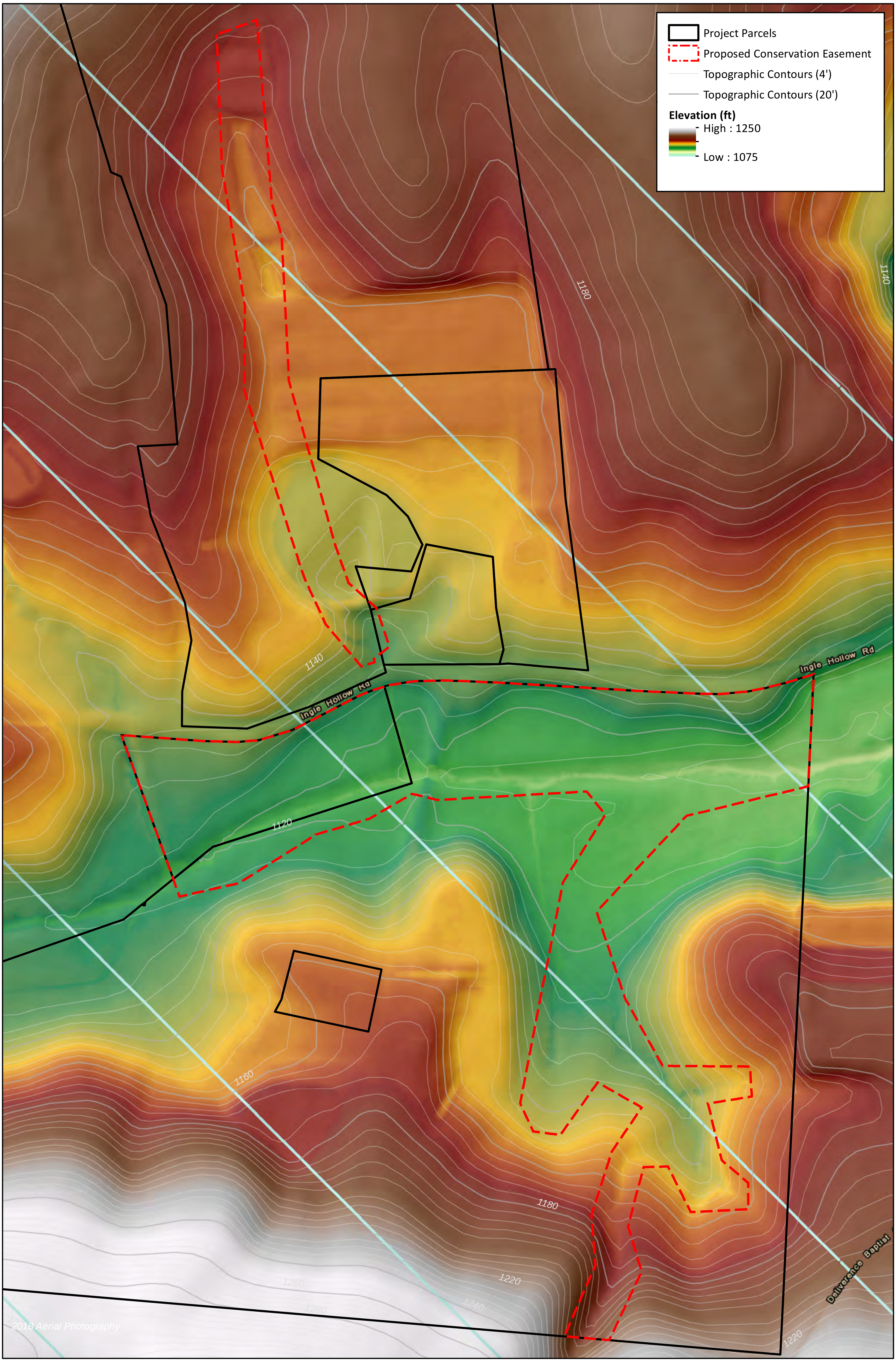
WILDLANDS ENGINEERING

0 250 500 Feet

N

Figure 2 Site Map
Huntsman Mitigation Site
Yadkin River Basin (03040102)

Wilkes County, NC



WILDLANDS ENGINEERING

Figure 3 Topo Map
Huntsman Mitigation Site
Yadkin River Basin (03040102)

Wilkes County, NC

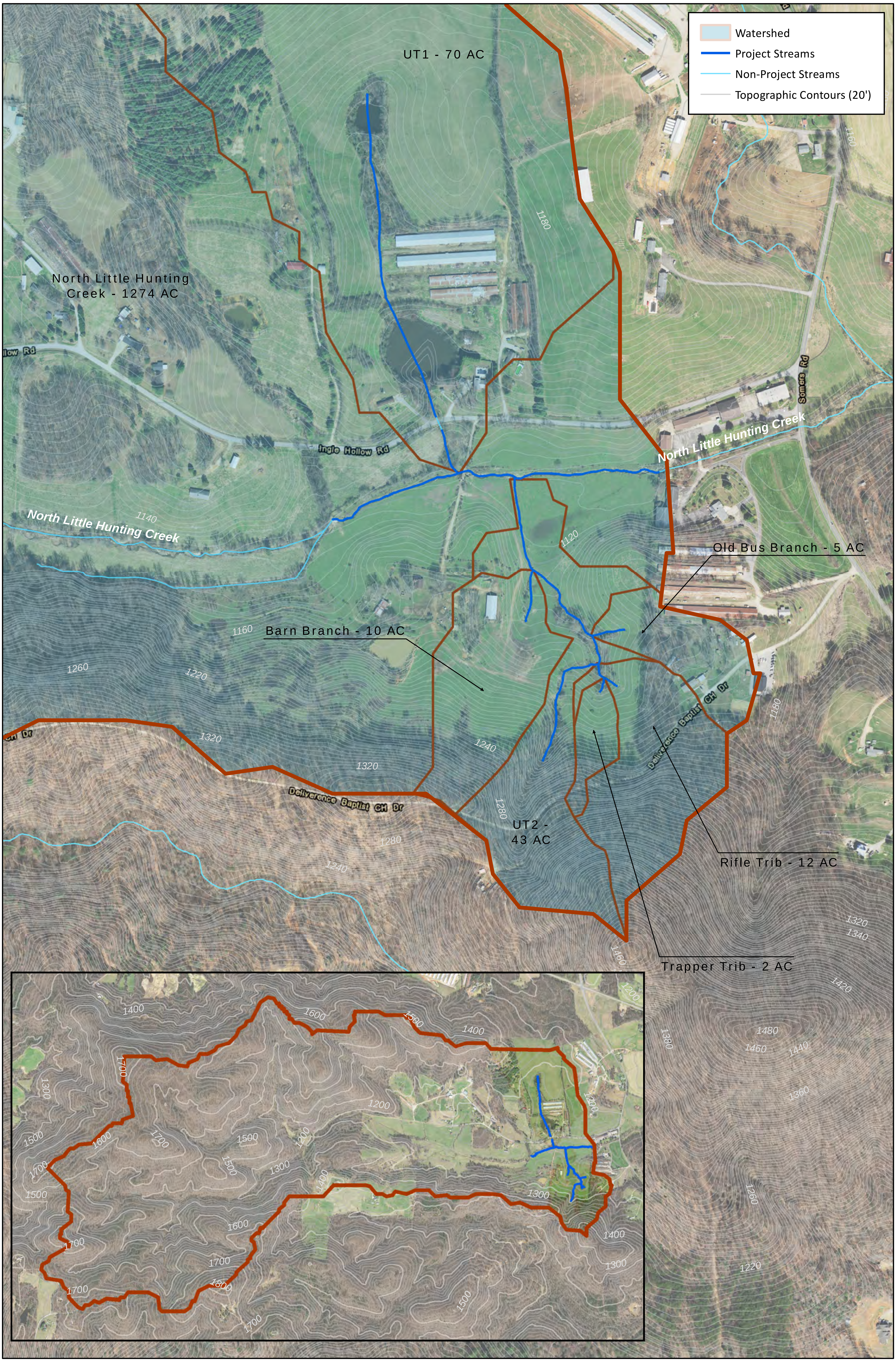
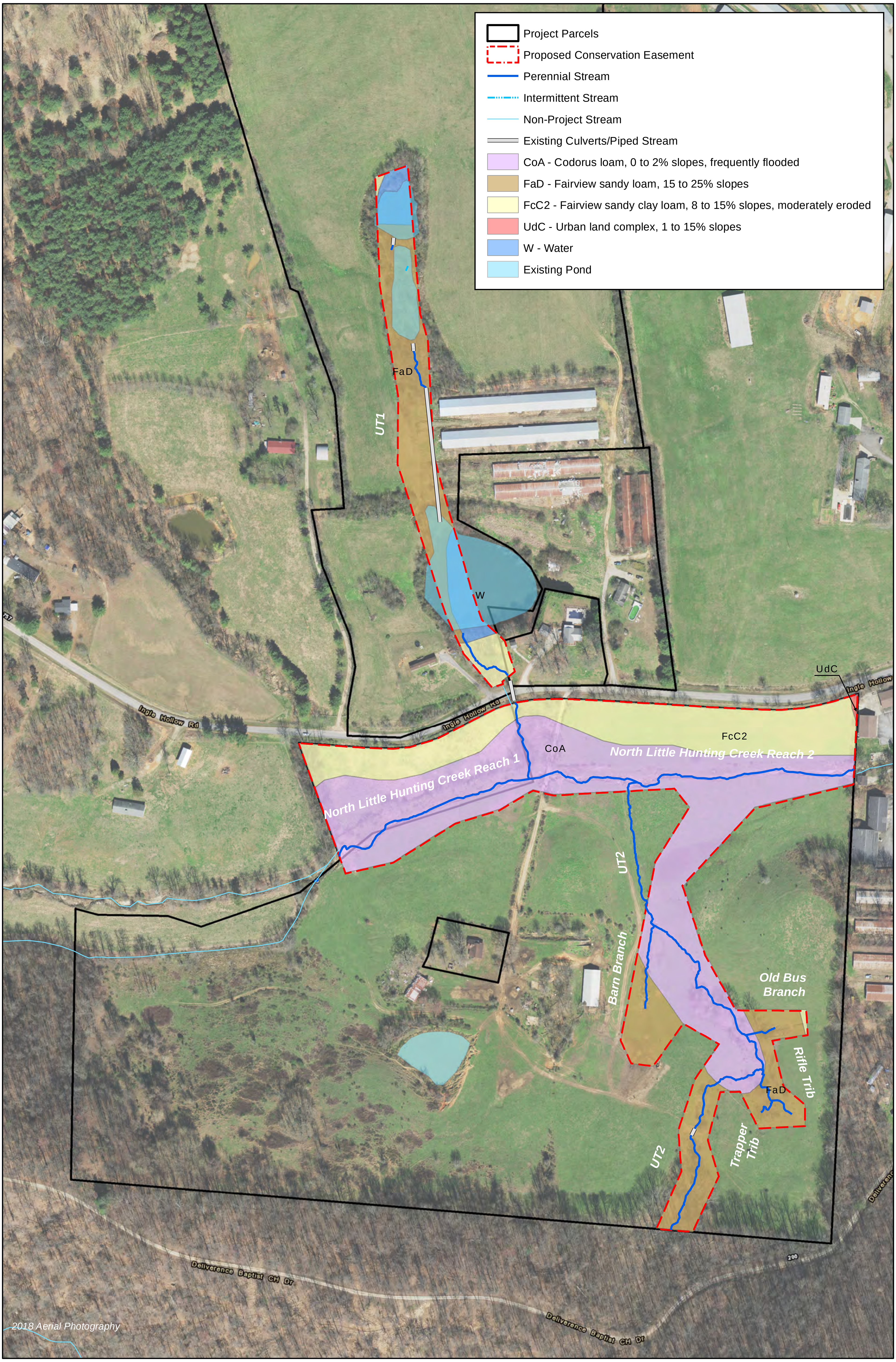


Figure 4 Watershed Map
Huntsman Mitigation Site
Yadkin River Basin (03040102)

Wilkes County, NC

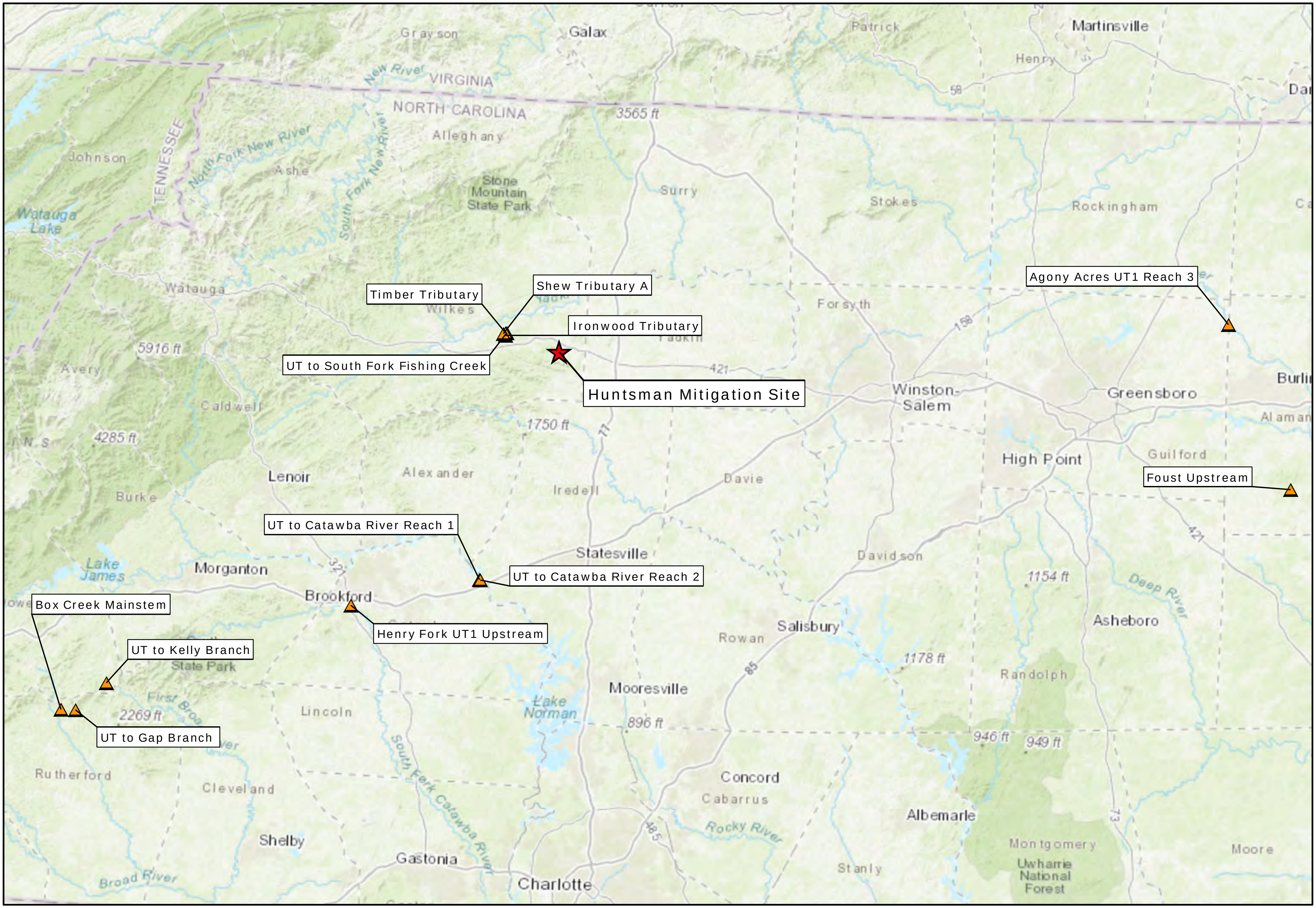
WILDLANDS ENGINEERING



WILDLANDS ENGINEERING

Figure 5 Soils Map
Huntsman Mitigation Site
Yadkin River Basin (03040102)

Wilkes County, NC



WILDLANDS ENGINEERING

Figure 6 Reference Reach Map
Huntsman Mitigation Site
Yadkin River Basin (03040102)

Wilkes County, NC

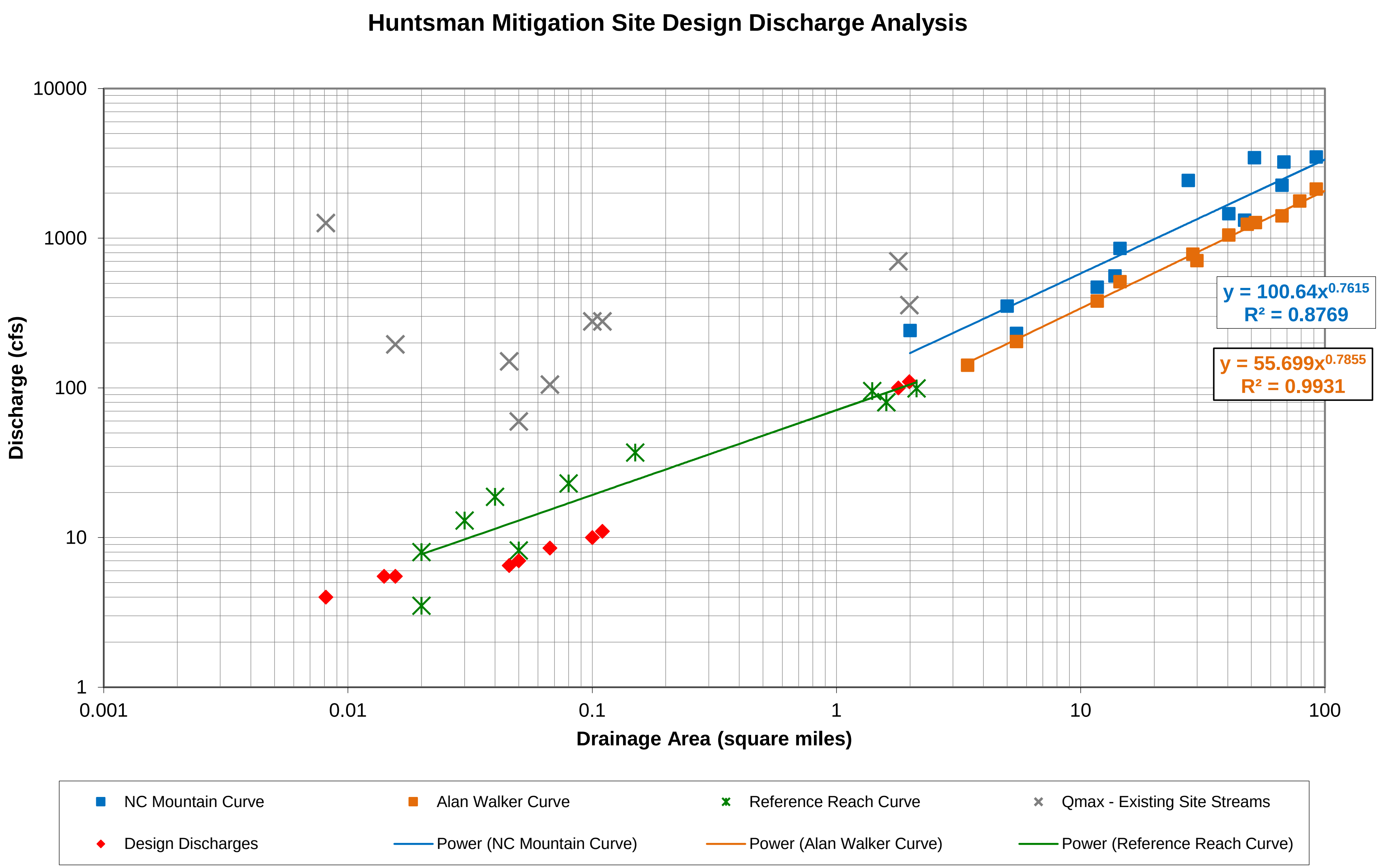
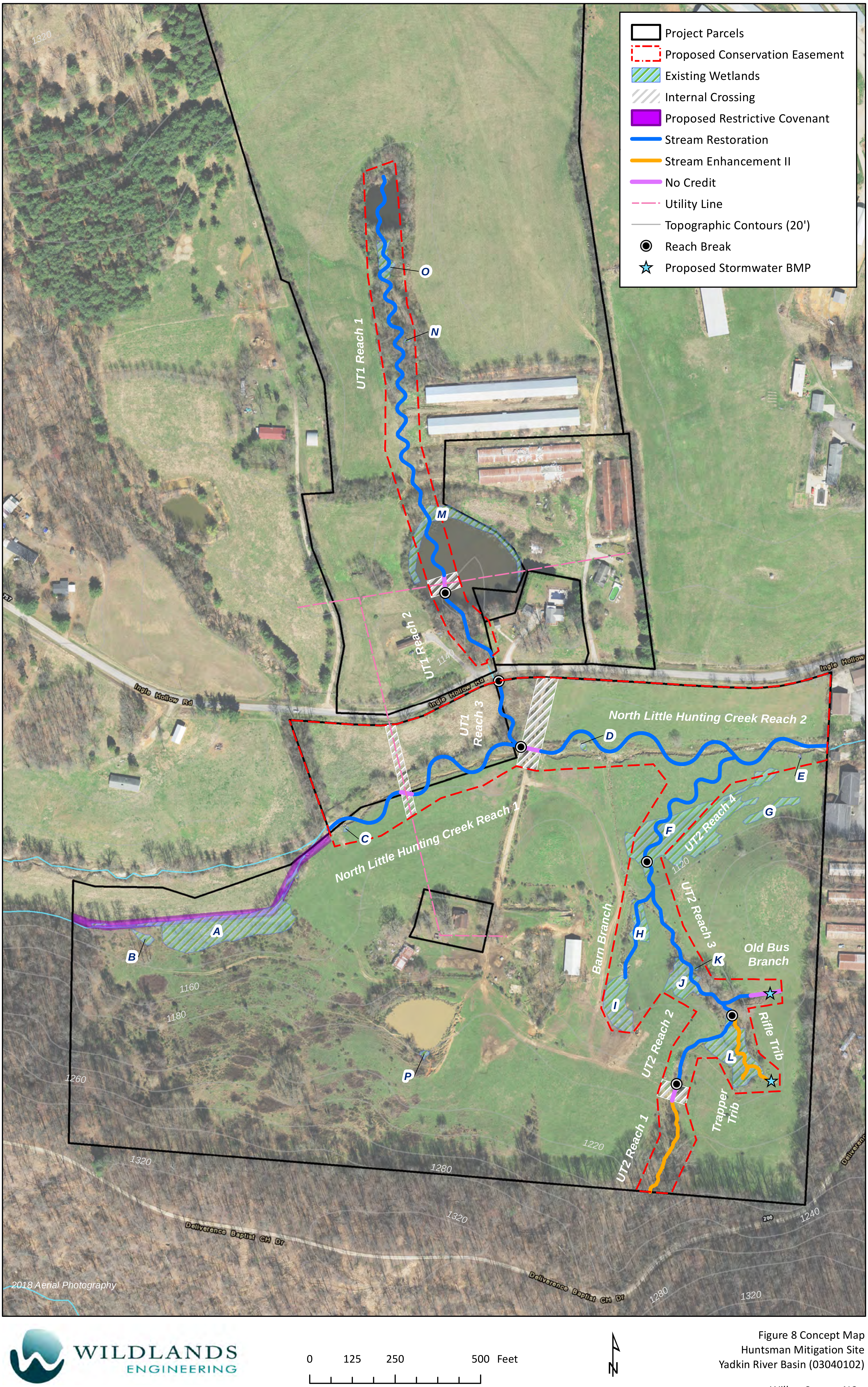


Figure 7 Design Discharge Analysis
Huntsman Mitigation Site
Yadkin Basin (03040102)

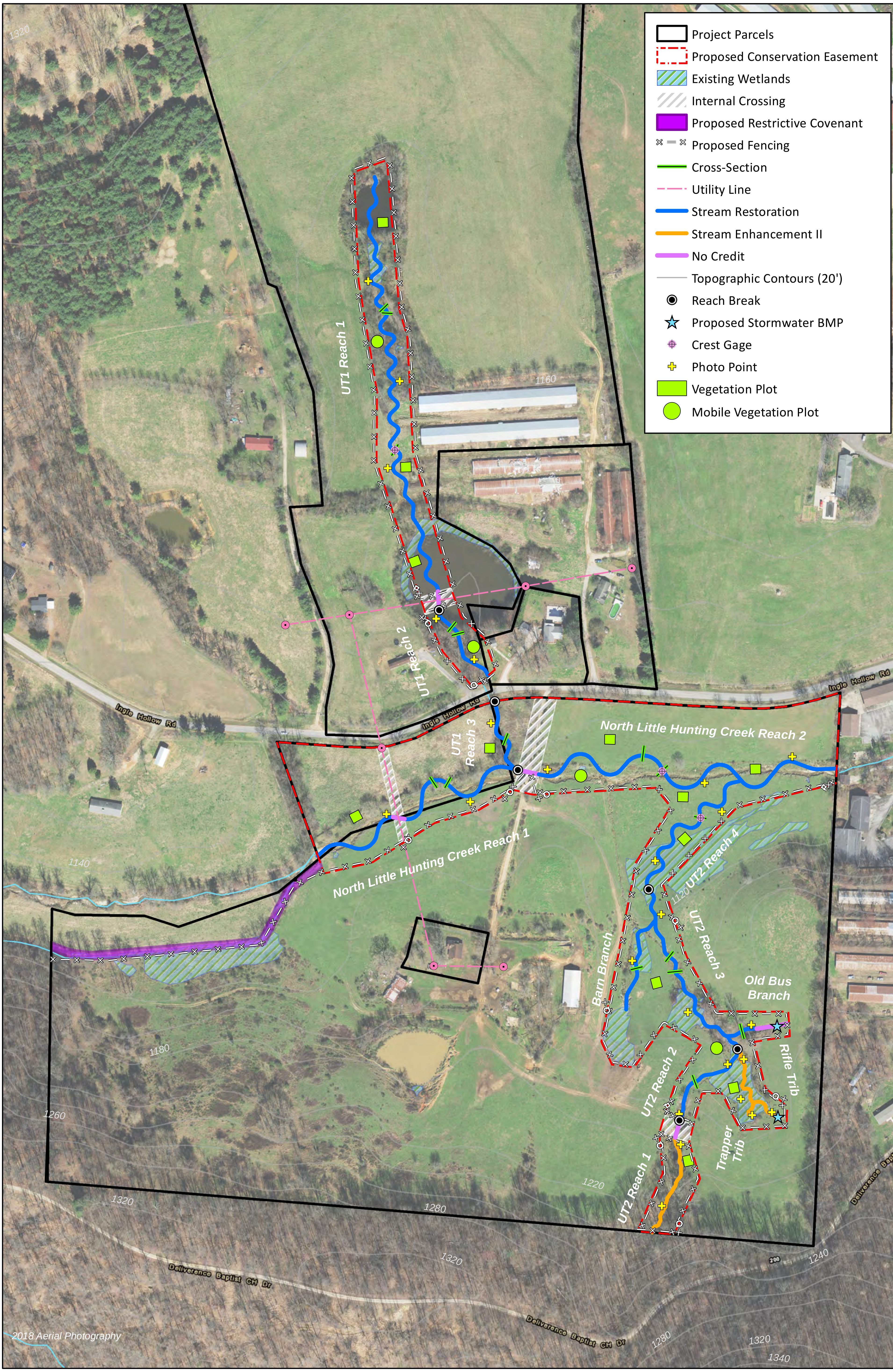
Wilkes County, NC



WILDLANDS ENGINEERING

Figure 8 Concept Map
Huntsman Mitigation Site
Yadkin River Basin (03040102)

Wilkes County, NC



WILDLANDS ENGINEERING

0 100 200 Feet

N

Figure 9 Monitoring Map
Huntsman Mitigation Site
Yadkin River Basin (03040102)

Wilkes County, NC

APPENDIX 1 – Historic Aerial Photos


INQUIRY #: 5562675.5
YEAR: 2016
= 500'
N
EDR


INQUIRY #: 5562675.5
YEAR: 2012
= 500'
N
EDR


INQUIRY #: 5562675.5
YEAR: 2009
= 500'
N
EDR

INQUIRY #: 5562675.5

YEAR: 2006

= 500'

N

INQUIRY #: 5562675.5

YEAR: 1993

= 500'

N

EDR

INQUIRY #: 5562675.5

YEAR: 1976

= 500'

N

EDR

INQUIRY #: 5562675.5

YEAR: 1963

= 500'

N

EDR


INQUIRY #: 5562675.5
YEAR: 1950
= 500'
N
EDR

APPENDIX 2 – Preliminary Jurisdictional Determination

U.S. ARMY CORPS OF ENGINEERS
WILMINGTON DISTRICT

Action Id. **SAW-2019-00836** County: **Wilkes** U.S.G.S. Quad: **NC- Ronda**

NOTIFICATION OF JURISDICTIONAL DETERMINATION

Requestor:	**Wildlands Engineering, Inc.**
	Ian Eckardt
Address:	**1430 Mint Street, #104**
	Charlotte, NC 28203
Telephone Number:	**704-332-7754 x108**
E-mail:	**ieckardt@wildlandseng.com**

Size (acres)	**61.8**	Nearest Town	**Ronda**
Nearest Waterway	**North Little Hunting Creek**	River Basin	**Upper Pee Dee**
USGS HUC	**03040102**	Coordinates	Latitude: **36.1407**
			Longitude: **-80.9321**

Location description: **The project area is located at 444 Ingle Hollow Road in Rhonda, Wilkes County, North Carolina.**

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 received via email on **1/26/2021**. 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 **Steve Kichefski at 828-271-7980 ext. 4234 or steven.l.kichefski@usace.army.mil**.

C. Basis For Determination: Basis For Determination: See the preliminary jurisdictional determination form dated 2/2/2021.

D. Remarks: None.

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: Phillip Shannin, 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: ____

Date of JD: **2/2/2021** Expiration Date of JD: **Not applicable**

SAW-2019-00836
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 (via email):

Property owner:	**Jerry A. & Debra Lynn Johnson**
Address:	**360 Ingle Hollow Road**
	Ronda, NC 28670

Erin Davis (NCDWR)

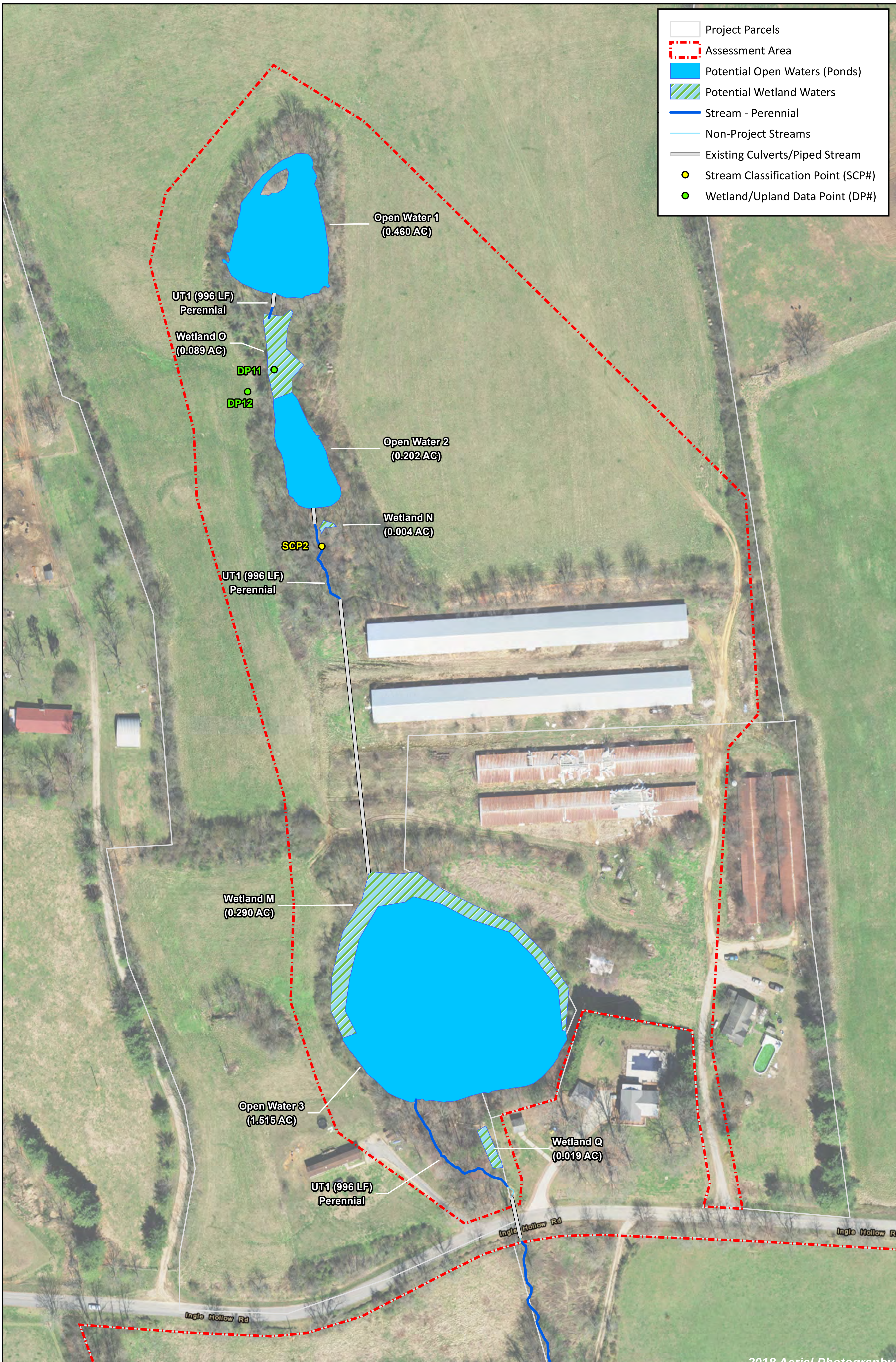
0 325 650 Feet

N

WILDLANDS ENGINEERING

Figure 3.0 Delineation Map (Overview)
Huntsman Mitigation Site
Yadkin River Basin (03040102)

Wilkes County, NC



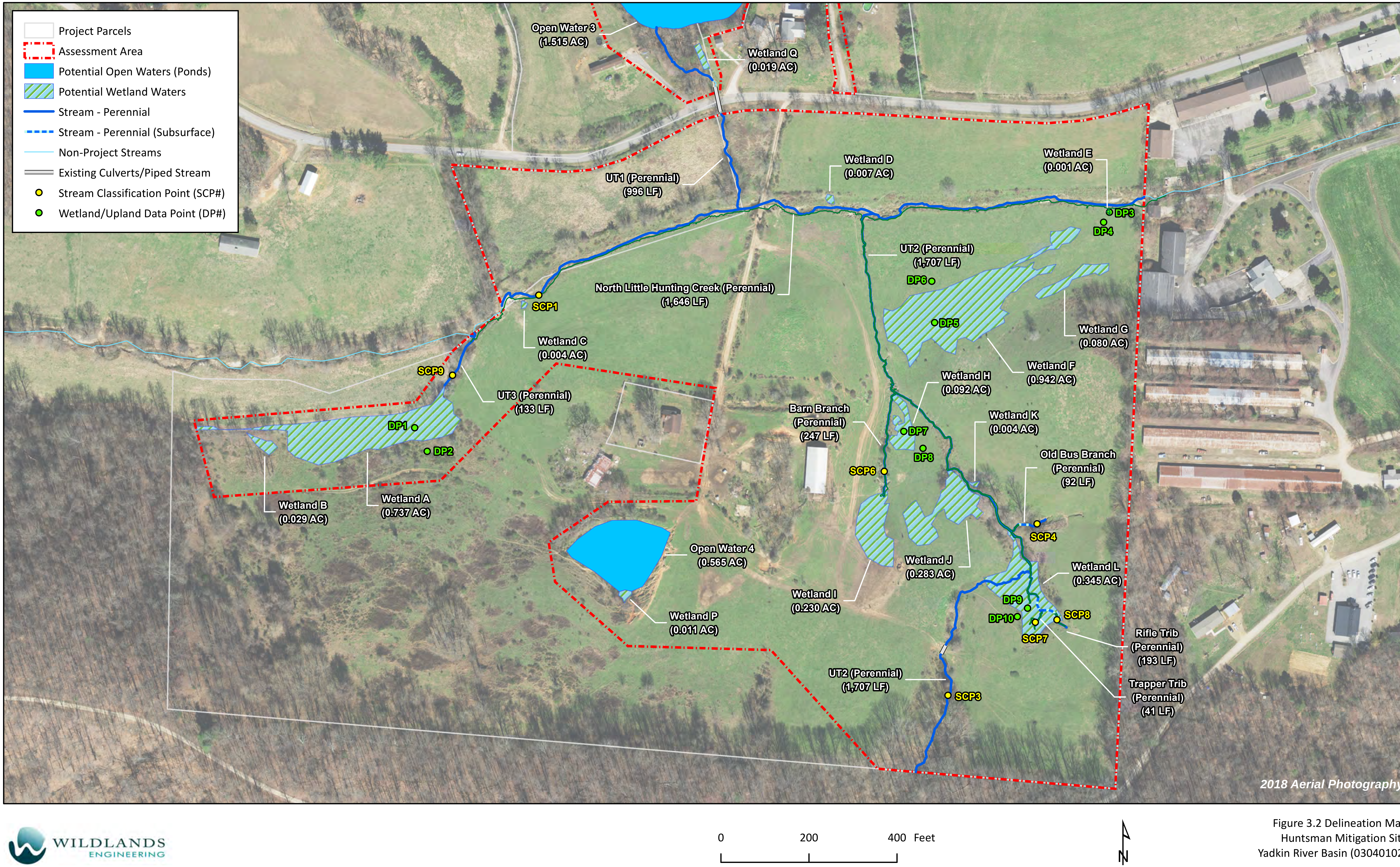
WILDLANDS ENGINEERING

0 125 250 Feet

N

Figure 3.1 Delineation Map
Huntsman Mitigation Site
Yadkin River Basin (03040102)

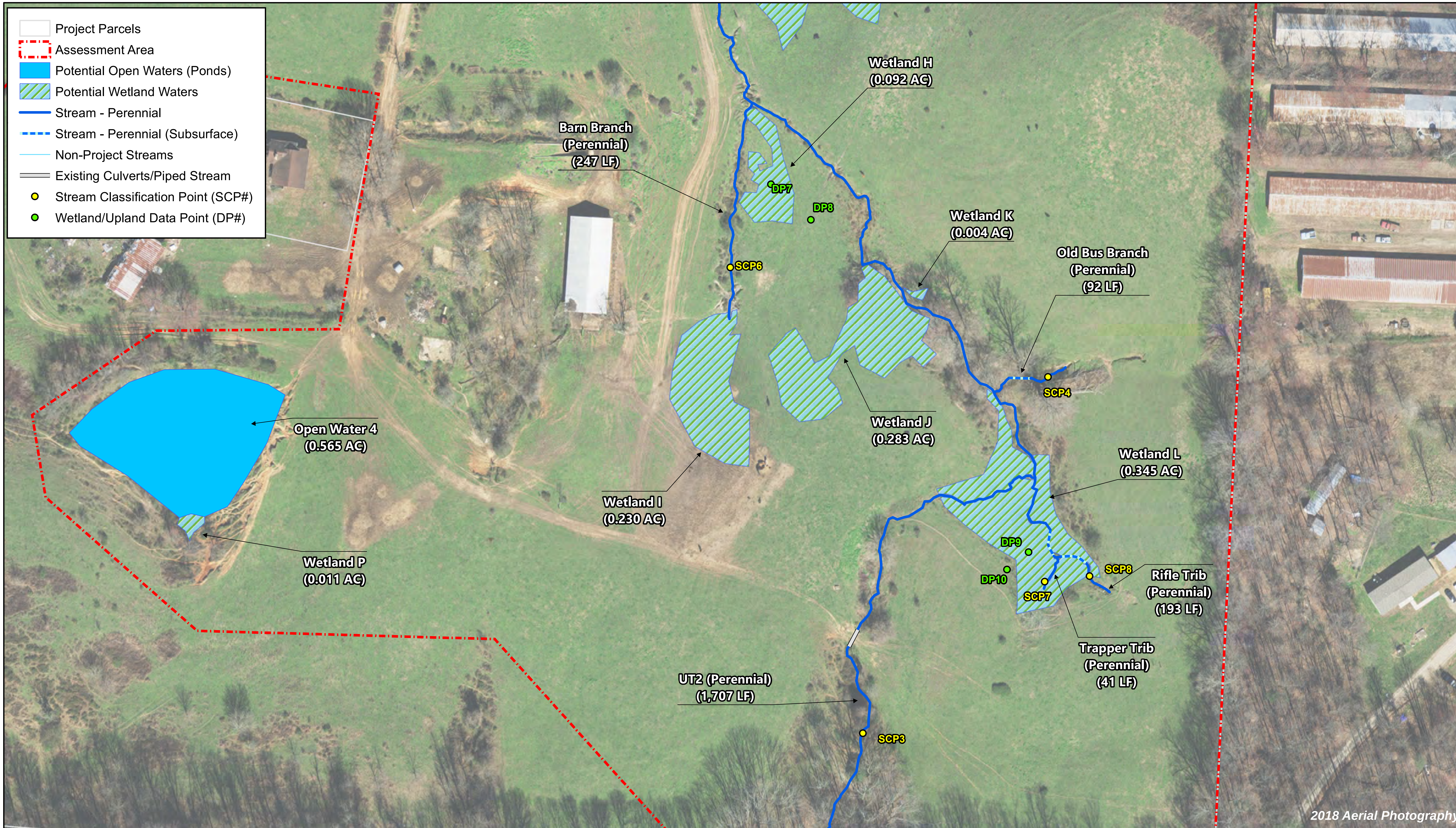
Wilkes County, NC



WILDLANDS
ENGINEERING

Figure 3.2 Delineation Map
Huntsman Mitigation Site
Yadkin River Basin (03040102)

Wilkes County, NC



WILDLANDS ENGINEERING

Figure 3.3 Delineation Map
Huntsman Mitigation Site
Yadkin River Basin (03040102)

Wilkes County, NC

PRELIMINARY JURISDICTIONAL DETERMINATION (PJD) FORM

BACKGROUND INFORMATION

A. REPORT COMPLETION DATE FOR PJD: 9/10/2020

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

C. DISTRICT OFFICE, FILE NAME, AND NUMBER: Wilmington District, Huntsman Mitigation Site, SAW-2019-00836

D. PROJECT LOCATION(S) AND BACKGROUND INFORMATION: 444 Ingle Hollow Road, Ronda, NC, 28670. The Huntsman Mitigation Site is being developed to provide in-kind mitigation for unavoidable stream channel impacts for the North Carolina Department of Environmental Quality Division of Mitigation Services.

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

State: North Carolina County: Wilkes City: Ronda
Center coordinates of site (lat/long in degree decimal format): Latitude: 36.140676 Longitude: -80.932077

Universal Transverse Mercator: UTM 17

Name of nearest waterbody: North Little Hunting Creek

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

☐ Office (Desk) Determination. Date:

☒ Field Determination. Date(s): 2/14/19, 5/7/20, 5/11/20, and 6/1/20

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.) North Little Hunting Creek	36.139411	-80.933936	1,646 LF	Non-wetland waters	Section 404
2.) UT1	36.143198	-80.933564	996 LF	Non-wetland waters	Section 404
4.) UT2	36.136964	-80.930729	1,707 LF	Non-wetland waters	Section 404
4.) UT3	36.138900	-80.934588	133 LF	Non-wetland waters	Section 404
5.) Barn Branch	36.138354	-80.931253	247 LF	Non-wetland waters	Section 404
6.) Old Bus Branch	36.138044	-80.930070	92 LF	Non-wetland waters	Section 404
7.) Rifle Trib	36.137449	-80.929902	193 LF	Non-wetland waters	Section 404
8.) Trapper Trib	36.137430	-80.930068	41 LF	Non-wetland waters	Section 404
9.) Wetland A	36.138569	-80.934872	0.737 AC	Wetland waters	Section 404
10.) Wetland B	36.138445	-80.936027	0.029 AC	Wetland waters	Section 404

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)
11.) Wetland C	36.139350	-80.934052	0.004 AC	Wetland waters	Section 404
12.) Wetland D	36.140045	-80.931711	0.007 AC	Wetland waters	Section 404
13.) Wetland E	36.139997	-80.929560	0.001 AC	Wetland waters	Section 404
14.) Wetland F	36.139288	-80.930889	0.942 AC	Wetland waters	Section 404
15.) Wetland G	36.139578	-80.929832	0.080 AC	Wetland waters	Section 404
16.) Wetland H	36.138606	-80.931109	0.092 AC	Wetland waters	Section 404
17.) Wetland I	36.137984	-80.931317	0.230 AC	Wetland waters	Section 404
18.) Wetland J	36.138182	-80.930686	0.283 AC	Wetland waters	Section 404
19.) Wetland K	36.138286	-80.930558	0.004 AC	Wetland waters	Section 404
20.) Wetland L	36.137517	-80.930130	0.345 AC	Wetland waters	Section 404
21.) Wetland M	36.141729	-80.933077	0.290 AC	Wetland waters	Section 404
22.) Wetland N	36.143277	-80.933545	0.004 AC	Wetland waters	Section 404
23.) Wetland O	36.143867	-80.933805	0.089 AC	Wetland waters	Section 404
24.) Wetland P	36.137553	-80.933230	0.011 AC	Wetland waters	Section 404
25.) Wetland Q	36.140913	-80.932717	0.019 AC	Wetland waters	Section 404
26.) Open Water 1	36.144399	-80.933791	0.460 AC	Open waters	Section 404
27.) Open Water 2	36.143549	-80.933651	0.202 AC	Open waters	Section 404
28.) Open Water 3	36.141468	-80.932909	1.515 AC	Open waters	Section 404
29.) Open Water 4	36.137807	-80.933275	0.565 AC	Open 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 Ronda quadrangle

☒ Natural Resources Conservation Service Soil Survey. Citation: NRCS Web Soils Survey Website

☐ 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): 2018 aerial on GIS figures with submittal.

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

☐ 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.

Ian Eckardt **1/28/2021**

Signature and date of Regulatory staff member completing PJD
DATE

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.

NOTIFICATION OF ADMINISTRATIVE APPEAL OPTIONS AND PROCESS AND REQUEST FOR APPEAL

Applicant: **Wildlands Engineering, Inc., Ian Eckardt**	File Number: **SAW-2019-00836**	Date: **2/2/2021**

	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: **District Engineer, Wilmington Regulatory Division** **Attn: Steve Kichefski** **Asheville Regulatory Office** **U.S Army Corps of Engineers** **151 Patton Avenue, Room 208** **Asheville, North Carolina 28801**	If you only have questions regarding the appeal process you may also contact: Mr. Phillip Shannin, 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: Steve Kichefski, 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. Phillip Shannin, Administrative Appeal Officer, CESAD-PDO, 60 Forsyth Street, Room 10M15, Atlanta, Georgia 30303-8801
Phone: (404) 562-5137

APPENDIX 3 – DWR and NCSAM Identification Forms

SCP1

NC DWQ Stream Identification Form Version 4.11

Date: 2/14/19	Project/Site: Huntsman	Latitude: 36.139411
Evaluator: I. Eckardt	County: Wilkes	Longitude: -80.933936
Total Points: 43.5 *Stream is at least intermittent if ≥ 19 or perennial if ≥ 30**	Stream Determination (circle one) Ephemeral Intermittent Perennial	Other North Little Hunting Creek *e.g. Quad Name:*

A. Geomorphology (Subtotal = 22.5)	Absent	Weak	Moderate	Strong
1ª. 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 = 8.5)				
12. Presence of Baseflow	0	1	2	3
13. Iron oxidizing bacteria	0	1	2	3
14. Leaf litter	1.5	1	0.5	0
15. Sediment on plants or debris	0	0.5	1	1.5
16. Organic debris lines or piles	0	0.5	1	1.5
17. Soil-based evidence of high water table?	No = 0		Yes = 3	

C. Biology (Subtotal = 12.5)				
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: Observed 10+ right handed snails, 6 caddiflies, 1 stonefly, & 1 black fly larva.

Sketch:

SCP2

NC DWQ Stream Identification Form Version 4.11

Date: 2/14/19	Project/Site: Huntsman	Latitude: 36.143198
Evaluator: I. Eckardt	County: Wilkes	Longitude: -80.933564
Total Points: 33 Stream is at least intermittent if ≥ 19 or perennial if ≥ 30*	Stream Determination (circle one) Ephemeral Intermittent Perennial	Other UTI (open channel below Pond 2) e.g. Quad Name:

A. Geomorphology (Subtotal = 14)	Absent	Weak	Moderate	Strong
1ª 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 = 10.5)				
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 = 8.5)				
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: Assessed most upstream open channel section of UTI in between Pond 2 and piped section. Area has a moderate amount of iron oxidizing bacteria. Lower ⅓ of assessment reach is backwatered from lower pipe. Reach has a few benches however a majority of valley is filled with berms & hummocky spoil piles common. Leaf pack are the main benthic habitat. Very little coarse substrate and few root mats.

Sketch:

SCP3

NC DWQ Stream Identification Form Version 4.11

Date: 2-14-19	Project/Site: Huntsman	Latitude: 36.136964
Evaluator: I. Eckardt	County: Wilkes	Longitude: -80.930729
Total Points: 35 *Stream is at least intermittent if ≥ 19 or perennial if ≥ 30**	Stream Determination (circle one) Ephemeral Intermittent Perennial	Other UT2 - upstream end *e.g. Quad Name:*

A. Geomorphology (Subtotal = 18.5)	Absent	Weak	Moderate	Strong
1ᵃ. 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 = 8)	Absent	Weak	Moderate	Strong
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 = 8.5)	Absent	Weak	Moderate	Strong
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: Observed 2 hellgrammites, 1 pickerel frog, and 2 salamanders.

Sketch:

SCP4

NC DWQ Stream Identification Form Version 4.11

Date: 2-14-19	Project/Site: Huntsman	Latitude: 36.138044
Evaluator: I. Eckardt	County: Wilkes	Longitude: -80.930070
Total Points: Stream is at least intermittent if ≥ 19 or perennial if ≥ 30* 30.5	Stream Determination (circle one) Ephemeral Intermittent Perennial	Other Old Bus Branch (below 10' headcut) e.g. Quad Name:

A. Geomorphology (Subtotal = 13)	Absent	Weak	Moderate	Strong
1ª 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 = 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 = 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: Observed 1 caddisfly and 1 salamander. The reach is highly incised below a 10-15' headcut. Fallen trees and incision make assessment difficult.

Sketch:

SCP6

NC DWQ Stream Identification Form Version 4.11

Date: 2-14-19	Project/Site: Huntsman	Latitude: 36.138354
Evaluator: I. Eckardt	County: Wilkes	Longitude: -80.931253
Total Points: *Stream is at least intermittent if ≥ 19 or perennial if ≥ 30** 31.5	Stream Determination (circle one) Ephemeral Intermittent Perennial	Other *e.g. Quad Name:* Barn Branch

A. Geomorphology (Subtotal = 12)	Absent	Weak	Moderate	Strong
1ª 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 = 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 = 10)				
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: Observed 1 aquatic worm, 1 right handed snail, 1 crayfish, & 3 salamanders. Channel originates at a seep discharge.

Sketch:

SCP7

NC DWQ Stream Identification Form Version 4.11

Date: 2-14-19	Project/Site: Huntsman	Latitude: 36.137430
Evaluator: I. Eckardt	County: Wilkes	Longitude: -80.930068
Total Points: 32.5 *Stream is at least intermittent if ≥ 19 or perennial if ≥ 30**	Stream Determination (circle one) Ephemeral Intermittent Perennial	Other Trapper Trib. *e.g. Quad Name:*

A. Geomorphology (Subtotal = 14)	Absent	Weak	Moderate	Strong
1ª 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 = 10.5)				
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 = 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) 1 aquatic worm	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 1 salamander	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: Reach originates a hillside seep and is surrounded by a wetland seep.

Sketch:

SCP8

NC DWQ Stream Identification Form Version 4.11

Date: 2-14-19	Project/Site: Huntsman	Latitude: 36.137449
Evaluator: I. Eckardt	County: Wilkes	Longitude: -80.929902
Total Points: *Stream is at least intermittent if ≥ 19 or perennial if ≥ 30** 32.75	Stream Determination (~~circle one~~) Ephemeral Intermittent Perennial	Other Rifle Trib *e.g. Quad Name:*

A. Geomorphology (Subtotal = 16)	Absent	Weak	Moderate	Strong
1ª 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 = 9)	Absent	Weak	Moderate	Strong
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 = 7.75)	Absent	Weak	Moderate	Strong
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 1 salamander	0	0.5	1	1.5
25. Algae	0	0.5	1	1.5
26. Wetland plants in streambed	Sedges → FACW = 0.75; OBL = 1.5 Other = 0			

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

Notes: Channel originates at a headcut with a seeping hillside crenulation. Iron oxidizing bacteria and algal growth present in and adjacent to channel.

Sketch:

SCP9

NC DWQ Stream Identification Form Version 4.11

Date: 12/10/20	Project/Site: Huntsman	Latitude: 36.138900
Evaluator: I. Eckardt	County: Wilkes	Longitude: – 80.934588
Total Points: 30 *Stream is at least intermittent if ≥ 19 or perennial if ≥ 30**	**Stream Determination (circle one)** Ephemeral Intermittent Perennial	Other UT3 - channelized downstream end of wetland A. *e.g. Quad Name:*

A. Geomorphology (Subtotal = ________)	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 = ________)				
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 = ________)				
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 none			

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

Notes: Observed one cranefly and trace of amphibian egg sac.

Sketch:

NC SAM FIELD ASSESSMENT RESULTS
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/Sketch" 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): Huntsman - NLHC (above Bridge) 2. Date of evaluation: 5/11/2020
3. Applicant/owner name: Wildlands Engineering 4. Assessor name/organization: M. Caddell
5. County: Wilkes 6. Nearest named water body
7. River basin: Yadkin on USGS 7.5-minute quad: North Little Hunting Creek
8. Site coordinates (decimal degrees, at lower end of assessment reach): 36.13998,-80.93236

STREAM INFORMATION: (depth and width can be approximations)
9. Site number (show on attached map): NLHC (above Bridge) 10. Length of assessment reach evaluated (feet): ~600'
11. Channel depth from bed (in riffle, if present) to top of bank (feet): 3-4 ☐Unable to assess channel depth.
12. Channel width at top of bank (feet): 15' 13. Is assessment reach a swamp steam? ☐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 mi^2) ☐Size 2 (0.1 to < 0.5 mi^2) ☒Size 3 (0.5 to < 5 mi^2) ☐Size 4 (≥ 5 mi^2)

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/Sketch” section.
- ☒F Livestock with access to stream or intertidal zone
- ☐G Excessive algae in stream or intertidal zone
- ☐H Degraded marsh vegetation in the intertidal zone (removal, burning, regular mowing, destruction, etc)
- ☐I Other: ____________________ (explain in “Notes/Sketch” section)
- ☐J Little to no stressors

8. **Recent Weather – watershed metric (skip for Tidal Marsh Streams)**
For Size 1 or 2 streams, D1 drought or higher is considered a drought; for Size 3 or 4 streams, D2 drought or higher is considered a drought.
- ☐A Drought conditions and no rainfall or rainfall not exceeding 1 inch within the last 48 hours
- ☐B Drought conditions and rainfall exceeding 1 inch within the last 48 hours
- ☒C No drought conditions

9. **Large or Dangerous Stream – assessment reach metric**
☐Yes ☒No Is stream is too large or dangerous to assess? If Yes, skip to Metric 13 (Streamside Area Ground Surface Condition).

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

10b. **Check all that occur** (occurs if > 5% coverage of assessment reach) **(skip for Size 4 Coastal Plain streams)**
- ☐A Multiple aquatic macrophytes and aquatic mosses (include liverworts, lichens, and algal mats)
- ☒B Multiple sticks and/or leaf packs and/or emergent vegetation
- ☐C Multiple snags and logs (including lap trees)
- ☒D 5% undercut banks and/or root mats and/or roots in banks extend to the normal wetted perimeter
- ☐E Little or no habitat

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 (skip for Size 4 Coastal Plain streams and Tidal Marsh Streams)**. Not Present (NP) = absent, Rare (R) = present but ≤ 10%, Common (C) = > 10-40%, Abundant (A) = > 40-70%, Predominant (P) = > 70%. Cumulative percentages should not exceed 100% for each assessment reach.

NP	R	C	A	P	
☒	☐	☐	☐	☐	Bedrock/saprolite
☐	☐	☒	☐	☐	Boulder (256 – 4096 mm)
☐	☐	☒	☐	☐	Cobble (64 – 256 mm)
☐	☐	☐	☒	☐	Gravel (2 – 64 mm)
☐	☐	☐	☒	☐	Sand (.062 – 2 mm)
☐	☒	☐	☐	☐	Silt/clay (< 0.062 mm)
☐	☒	☐	☐	☐	Detritus
☐	☒	☐	☐	☐	Artificial (rip-rap, concrete, etc.)

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

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

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

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

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

13. Streamside Area Ground Surface Condition – streamside area metric (skip for Tidal Marsh Streams and B valley types)
Consider for the Left Bank (LB) and the Right Bank (RB). Consider storage capacity with regard to both overbank flow and upland runoff.

LB	RB	
☐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 passing flow during low-flow periods within the assessment area (beaver dam, leaky dam, bottom-release dam, weir)
- ☒D Evidence of bank seepage or sweating (iron in water indicates seepage)
- ☒E Stream bed or bank soil reduced (dig through deposited sediment if present)
- ☐F None of the above

17. Baseflow Detractors – assessment area metric (skip for Tidal Marsh Streams)
Check all that apply.

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

18. Shading – assessment reach metric (skip for Tidal Marsh Streams)
Consider aspect. Consider "leaf-on" condition.

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

19. Buffer Width – streamside area metric (skip for Tidal Marsh Streams)
Consider "vegetated buffer" and "wooded buffer" separately for left bank (LB) and right bank (RB) starting at the top of bank out to the first break.

Vegetated 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 – 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?
If No, select one of the following reasons. ☐No Water ☐Other: ______________________________

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

Notes/Sketch:

Draft NC SAM Stream Rating Sheet
Accompanies User Manual Version 2.1

Stream Site Name	Huntsman - NLHC (above Bridge)	Date of Assessment	5/11/2020
Stream Category	Ma3	Assessor Name/Organization	M. Caddell

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

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

NC SAM FIELD ASSESSMENT RESULTS
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/Sketch" 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): Huntsman - NLHC (Below Bridge)
2. Date of evaluation: 5/11/2020
3. Applicant/owner name: Wildlands
4. Assessor name/organization: M. Caddell
5. County: Wilkes
6. Nearest named water body on USGS 7.5-minute quad: North Little Hunting Creek
7. River basin: Yadkin
8. Site coordinates (decimal degrees, at lower end of assessment reach): 36.14005, -80.92934

STREAM INFORMATION: (depth and width can be approximations)

9. Site number (show on attached map): NLHC Below Bridge
10. Length of assessment reach evaluated (feet): ~850'
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): 15-20'
13. Is assessment reach a swamp steam? ☐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 mi^2) ☐Size 2 (0.1 to < 0.5 mi^2) ☒Size 3 (0.5 to < 5 mi^2) ☐Size 4 (≥ 5 mi^2)

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 <u>or</u> fill to the point of obstructing flow <u>or</u> a channel choked with aquatic macrophytes <u>or</u> ponded water <u>or</u> 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/Sketch" section.
☒F Livestock with access to stream or intertidal zone
☐G Excessive algae in stream or intertidal zone
☐H Degraded marsh vegetation in the intertidal zone (removal, burning, regular mowing, destruction, etc)
☐I Other: ____________________ (explain in "Notes/Sketch" section)
☐J Little to no stressors

8. Recent Weather – watershed metric (skip for Tidal Marsh Streams)
For Size 1 or 2 streams, D1 drought or higher is considered a drought; for Size 3 or 4 streams, D2 drought or higher is considered a drought.

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

9. Large or Dangerous Stream – assessment reach metric
☐Yes ☒No Is stream is too large or dangerous to assess? If Yes, skip to Metric 13 (Streamside Area Ground Surface Condition).

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

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

☐A Multiple aquatic macrophytes and aquatic mosses (include liverworts, lichens, and algal mats)
☒B Multiple sticks and/or leaf packs and/or emergent vegetation
☐C Multiple snags and logs (including lap trees)
☒D 5% undercut banks and/or root mats and/or roots in banks extend to the normal wetted perimeter
☐E Little or no habitat

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 (skip for Size 4 Coastal Plain streams and Tidal Marsh Streams)**. Not Present (NP) = absent, Rare (R) = present but ≤ 10%, Common (C) = > 10-40%, Abundant (A) = > 40-70%, Predominant (P) = > 70%. Cumulative percentages should not exceed 100% for each assessment reach.

NP	R	C	A	P	
☒	☐	☐	☐	☐	Bedrock/saprolite
☐	☐	☒	☐	☐	Boulder (256 – 4096 mm)
☐	☐	☒	☐	☐	Cobble (64 – 256 mm)
☐	☐	☐	☒	☐	Gravel (2 – 64 mm)
☐	☐	☐	☒	☐	Sand (.062 – 2 mm)
☐	☒	☐	☐	☐	Silt/clay (< 0.062 mm)
☐	☒	☐	☐	☐	Detritus
☐	☒	☐	☐	☐	Artificial (rip-rap, concrete, etc.)

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

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

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

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

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

13. Streamside Area Ground Surface Condition – streamside area metric (skip for Tidal Marsh Streams and B valley types)
Consider for the Left Bank (LB) and the Right Bank (RB). Consider storage capacity with regard to both overbank flow and upland runoff.

LB	RB	
☐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 passing flow during low-flow periods within the assessment area (beaver dam, leaky dam, bottom-release dam, weir)
☒D Evidence of bank seepage or sweating (iron in water indicates seepage)
☒E Stream bed or bank soil reduced (dig through deposited sediment if present)
☐F None of the above

17. Baseflow Detractors – assessment area metric (skip for Tidal Marsh Streams)
Check all that apply.

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

18. Shading – assessment reach metric (skip for Tidal Marsh Streams)
Consider aspect. Consider "leaf-on" condition.

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

19. Buffer Width – streamside area metric (skip for Tidal Marsh Streams)
Consider "vegetated buffer" and "wooded buffer" separately for left bank (LB) and right bank (RB) starting at the top of bank out to the first break.

Vegetated 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 – 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?
If No, select one of the following reasons. ☐No Water ☐Other: ______________________________

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

Notes/Sketch:

Draft NC SAM Stream Rating Sheet
Accompanies User Manual Version 2.1

Stream Site Name	Huntsman - NLHC (Below Bridge)	Date of Assessment	5/11/2020
Stream Category	Ma3	Assessor Name/Organization	M. Caddell

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

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

NC SAM FIELD ASSESSMENT RESULTS
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/Sketch" 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): Huntsman - UT1 Reach 1
2. Date of evaluation: 5/11/2020
3. Applicant/owner name: Wildlands
4. Assessor name/organization: I. Eckardt/ WEI
5. County: Wilkes
6. Nearest named water body on USGS 7.5-minute quad: North Fork Hunting Creek
7. River basin: Yadkin
8. Site coordinates (decimal degrees, at lower end of assessment reach):

STREAM INFORMATION: (depth and width can be approximations)

9. Site number (show on attached map): UT1R1
10. Length of assessment reach evaluated (feet): ~100'
11. Channel depth from bed (in riffle, if present) to top of bank (feet): 0.5-1' ☐Unable to assess channel depth.
12. Channel width at top of bank (feet): 3-5'
13. Is assessment reach a swamp steam? ☐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 mi^2) ☐Size 2 (0.1 to < 0.5 mi^2) ☐Size 3 (0.5 to < 5 mi^2) ☐Size 4 (≥ 5 mi^2)

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/Sketch" section.
☐F Livestock with access to stream or intertidal zone
☐G Excessive algae in stream or intertidal zone
☐H Degraded marsh vegetation in the intertidal zone (removal, burning, regular mowing, destruction, etc)
☒I Other: ____________________ (explain in "Notes/Sketch" section)
☐J Little to no stressors

8. **Recent Weather – watershed metric (skip for Tidal Marsh Streams)**
For Size 1 or 2 streams, D1 drought or higher is considered a drought; for Size 3 or 4 streams, D2 drought or higher is considered a drought.

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

9. **Large or Dangerous Stream – assessment reach metric**
☐Yes ☒No Is stream is too large or dangerous to assess? If Yes, skip to Metric 13 (Streamside Area Ground Surface Condition).

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

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

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

☒A Multiple aquatic macrophytes and aquatic mosses (include liverworts, lichens, and algal mats)
☒B Multiple sticks and/or leaf packs and/or emergent vegetation
☐C Multiple snags and logs (including lap trees)
☐D 5% undercut banks and/or root mats and/or roots in banks extend to the normal wetted perimeter
☐E Little or no habitat

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 (skip for Size 4 Coastal Plain streams and Tidal Marsh Streams)**. Not Present (NP) = absent, Rare (R) = present but $\leq$ 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? (**skip for Size 4 Coastal Plain streams and Tidal Marsh Streams**)

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

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

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

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

13. Streamside Area Ground Surface Condition – streamside area metric (skip for Tidal Marsh Streams and B valley types)
Consider for the Left Bank (LB) and the Right Bank (RB). Consider storage capacity with regard to both overbank flow and upland runoff.

LB	RB	
☐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 passing flow during low-flow periods within the assessment area (beaver dam, leaky dam, bottom-release dam, weir)
☒D Evidence of bank seepage or sweating (iron in water indicates seepage)
☒E Stream bed or bank soil reduced (dig through deposited sediment if present)
☐F None of the above

17. Baseflow Detractors – assessment area metric (skip for Tidal Marsh Streams)
Check all that apply.

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

18. Shading – assessment reach metric (skip for Tidal Marsh Streams)
Consider aspect. Consider "leaf-on" condition.

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

19. **Buffer Width – streamside area metric (skip for Tidal Marsh Streams)**
Consider "vegetated buffer" and "wooded buffer" separately for left bank (LB) and right bank (RB) starting at the top of bank out to the first break.

Vegetated 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 – 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?
If No, select one of the following reasons. ☐No Water ☐Other: ______________________________

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

Notes/Sketch:
Assessment reach is downstream of pond 2 before it becomes a piped stream.

Draft NC SAM Stream Rating Sheet
Accompanies User Manual Version 2.1

Stream Site Name	Huntsman - UT1 Reach 1	Date of Assessment	5/11/2020
Stream Category	Pb1	Assessor Name/Organization	I. Eckardt/ WEI

Notes of Field Assessment Form (Y/N)	YES
Presence of regulatory considerations (Y/N)	YES
Additional stream information/supplementary measurements included (Y/N)	YES
NC SAM feature type (perennial, intermittent, Tidal Marsh Stream)	Perennial

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

NC SAM FIELD ASSESSMENT RESULTS
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/Sketch" 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): Huntsman - UT1 Reach 2 (above Rd) 2. Date of evaluation: 5/11/2020
3. Applicant/owner name: Wildlands 4. Assessor name/organization: M. Caddell
5. County: Wilkes 6. Nearest named water body
7. River basin: Yadkin on USGS 7.5-minute quad: North Little Hunting Creek
8. Site coordinates (decimal degrees, at lower end of assessment reach): 36.14068, -80.93269

STREAM INFORMATION: (depth and width can be approximations)

9. Site number (show on attached map): UT1 Reach 2 (above Rd) 10. Length of assessment reach evaluated (feet): ~175'
11. Channel depth from bed (in riffle, if present) to top of bank (feet): 2-7' ☐Unable to assess channel depth.
12. Channel width at top of bank (feet): 10-15' 13. Is assessment reach a swamp steam? ☐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 mi^2) ☐Size 2 (0.1 to < 0.5 mi^2) ☐Size 3 (0.5 to < 5 mi^2) ☐Size 4 (≥ 5 mi^2)

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/Sketch” section.
- ☐F Livestock with access to stream or intertidal zone
- ☐G Excessive algae in stream or intertidal zone
- ☐H Degraded marsh vegetation in the intertidal zone (removal, burning, regular mowing, destruction, etc)
- ☐I Other: ____________________ (explain in “Notes/Sketch” section)
- ☒J Little to no stressors

8. **Recent Weather – watershed metric (skip for Tidal Marsh Streams)**
For Size 1 or 2 streams, D1 drought or higher is considered a drought; for Size 3 or 4 streams, D2 drought or higher is considered a drought.
- ☐A Drought conditions and no rainfall or rainfall not exceeding 1 inch within the last 48 hours
- ☐B Drought conditions and rainfall exceeding 1 inch within the last 48 hours
- ☒C No drought conditions

9. **Large or Dangerous Stream – assessment reach metric**
☐Yes ☒No Is stream is too large or dangerous to assess? If Yes, skip to Metric 13 (Streamside Area Ground Surface Condition).

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

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

10b. **Check all that occur** (occurs if > 5% coverage of assessment reach) **(skip for Size 4 Coastal Plain streams)**
- ☒A Multiple aquatic macrophytes and aquatic mosses (include liverworts, lichens, and algal mats)
- ☒B Multiple sticks and/or leaf packs and/or emergent vegetation
- ☐C Multiple snags and logs (including lap trees)
- ☒D 5% undercut banks and/or root mats and/or roots in banks extend to the normal wetted perimeter
- ☐E Little or no habitat

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 (skip for Size 4 Coastal Plain streams and Tidal Marsh Streams)**. Not Present (NP) = absent, Rare (R) = present but ≤ 10%, Common (C) = > 10-40%, Abundant (A) = > 40-70%, Predominant (P) = > 70%. Cumulative percentages should not exceed 100% for each assessment reach.

NP	R	C	A	P	
☒	☐	☐	☐	☐	Bedrock/saprolite
☐	☒	☐	☐	☐	Boulder (256 – 4096 mm)
☐	☒	☐	☐	☐	Cobble (64 – 256 mm)
☐	☐	☐	☒	☐	Gravel (2 – 64 mm)
☐	☐	☒	☐	☐	Sand (.062 – 2 mm)
☐	☐	☐	☒	☐	Silt/clay (< 0.062 mm)
☐	☒	☐	☐	☐	Detritus
☐	☒	☐	☐	☐	Artificial (rip-rap, concrete, etc.)

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

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

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

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

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

13. Streamside Area Ground Surface Condition – streamside area metric (skip for Tidal Marsh Streams and B valley types)
Consider for the Left Bank (LB) and the Right Bank (RB). Consider storage capacity with regard to both overbank flow and upland runoff.

LB	RB	
☐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 passing flow during low-flow periods within the assessment area (beaver dam, leaky dam, bottom-release dam, weir)
- ☒D Evidence of bank seepage or sweating (iron in water indicates seepage)
- ☒E Stream bed or bank soil reduced (dig through deposited sediment if present)
- ☐F None of the above

17. Baseflow Detractors – assessment area metric (skip for Tidal Marsh Streams)
Check all that apply.

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

18. Shading – assessment reach metric (skip for Tidal Marsh Streams)
Consider aspect. Consider "leaf-on" condition.

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

19. Buffer Width – streamside area metric (skip for Tidal Marsh Streams)
Consider "vegetated buffer" and "wooded buffer" separately for left bank (LB) and right bank (RB) starting at the top of bank out to the first break.

Vegetated 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 – 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?
If No, select one of the following reasons. ☐No Water ☐Other: ______________________________

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

Notes/Sketch:
Assessment reach is downstream of pond 3 and above Ingle Hollow Road.

Draft NC SAM Stream Rating Sheet
Accompanies User Manual Version 2.1

Stream Site Name	Huntsman - UT1 Reach 2 (above Rd)	Date of Assessment	5/11/2020
Stream Category	Mb1	Assessor Name/Organization	M. Caddell

Notes of Field Assessment Form (Y/N)	YES
Presence of regulatory considerations (Y/N)	YES
Additional stream information/supplementary measurements included (Y/N)	YES
NC SAM feature type (perennial, intermittent, Tidal Marsh Stream)	Perennial

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

NC SAM FIELD ASSESSMENT RESULTS
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/Sketch" 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): Huntsman - UT1 Reach 2 below Rd
2. Date of evaluation: 5/11/2020
3. Applicant/owner name: Wildlands
4. Assessor name/organization: M. Caddell
5. County: Wilkes
6. Nearest named water body on USGS 7.5-minute quad: North Little Hunting Creek
7. River basin: Yadkin
8. Site coordinates (decimal degrees, at lower end of assessment reach): 36.14000, -80.93233

STREAM INFORMATION: (depth and width can be approximations)

9. Site number (show on attached map): UT1 Reach 2(Below Rd)
10. Length of assessment reach evaluated (feet): ~200'
11. Channel depth from bed (in riffle, if present) to top of bank (feet): 3-4' ☐Unable to assess channel depth.
12. Channel width at top of bank (feet): 4-8'
13. Is assessment reach a swamp steam? ☐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 mi^2) ☐Size 2 (0.1 to < 0.5 mi^2) ☐Size 3 (0.5 to < 5 mi^2) ☐Size 4 (≥ 5 mi^2)

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

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/Sketch” section.
☐F Livestock with access to stream or intertidal zone
☐G Excessive algae in stream or intertidal zone
☐H Degraded marsh vegetation in the intertidal zone (removal, burning, regular mowing, destruction, etc)
☐I Other: ____________________ (explain in “Notes/Sketch” section)
☒J Little to no stressors

8. **Recent Weather – watershed metric (skip for Tidal Marsh Streams)**
For Size 1 or 2 streams, D1 drought or higher is considered a drought; for Size 3 or 4 streams, D2 drought or higher is considered a drought.

☐A Drought conditions <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 is too large or dangerous to assess? If Yes, skip to Metric 13 (Streamside Area Ground Surface Condition).

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

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

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

☒A Multiple aquatic macrophytes and aquatic mosses (include liverworts, lichens, and algal mats)
☒B Multiple sticks and/or leaf packs and/or emergent vegetation
☐C Multiple snags and logs (including lap trees)
☐D 5% undercut banks and/or root mats and/or roots in banks extend to the normal wetted perimeter
☐E Little or no habitat

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 (skip for Size 4 Coastal Plain streams and Tidal Marsh Streams)**. Not Present (NP) = absent, Rare (R) = present but $\leq$ 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? (**skip for Size 4 Coastal Plain streams and Tidal Marsh Streams**)

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

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

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

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

13. Streamside Area Ground Surface Condition – streamside area metric (skip for Tidal Marsh Streams and B valley types)
Consider for the Left Bank (LB) and the Right Bank (RB). Consider storage capacity with regard to both overbank flow and upland runoff.

LB	RB	
☐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 passing flow during low-flow periods within the assessment area (beaver dam, leaky dam, bottom-release dam, weir)
☒D Evidence of bank seepage or sweating (iron in water indicates seepage)
☒E Stream bed or bank soil reduced (dig through deposited sediment if present)
☐F None of the above

17. Baseflow Detractors – assessment area metric (skip for Tidal Marsh Streams)
Check all that apply.

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

18. Shading – assessment reach metric (skip for Tidal Marsh Streams)
Consider aspect. Consider "leaf-on" condition.

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

19. Buffer Width – streamside area metric (skip for Tidal Marsh Streams)
Consider "vegetated buffer" and "wooded buffer" separately for left bank (LB) and right bank (RB) starting at the top of bank out to the first break.

Vegetated		Wooded		
LB	RB	LB	RB	
☒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		< 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 <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 – 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?
If No, select one of the following reasons. ☐No Water ☐Other: ____________________

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

Notes/Sketch:
Assessment reach is downstream of Ingle Hollow Road.

Draft NC SAM Stream Rating Sheet
Accompanies User Manual Version 2.1

Stream Site Name	Huntsman - UT1 Reach 2 below Rd	Date of Assessment	5/11/2020
Stream Category	Ma1	Assessor Name/Organization	M. Caddell

Notes of Field Assessment Form (Y/N)	YES
Presence of regulatory considerations (Y/N)	YES
Additional stream information/supplementary measurements included (Y/N)	YES
NC SAM feature type (perennial, intermittent, Tidal Marsh Stream)	Perennial

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

NC SAM FIELD ASSESSMENT RESULTS
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/Sketch" 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): Huntsman - UT2 Reach 1
2. Date of evaluation: 5/11/2020
3. Applicant/owner name: Wildlands
4. Assessor name/organization: M. Caddell
5. County: Wilkes
6. Nearest named water body on USGS 7.5-minute quad: North Little Hunting Creek
7. River basin: Yadkin
8. Site coordinates (decimal degrees, at lower end of assessment reach): 36.13729, -80.93073

STREAM INFORMATION: (depth and width can be approximations)

9. Site number (show on attached map): UT2 Reach 1
10. Length of assessment reach evaluated (feet): ~300'
11. Channel depth from bed (in riffle, if present) to top of bank (feet): 2-3' ☐Unable to assess channel depth.
12. Channel width at top of bank (feet): 8-12'
13. Is assessment reach a swamp steam? ☐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 mi^2) ☐Size 2 (0.1 to < 0.5 mi^2) ☐Size 3 (0.5 to < 5 mi^2) ☐Size 4 (≥ 5 mi^2)

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 <u>or</u> fill to the point of obstructing flow <u>or</u> a channel choked with aquatic macrophytes <u>or</u> ponded water <u>or</u> 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

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/Sketch" section.
- ☒F Livestock with access to stream or intertidal zone
- ☐G Excessive algae in stream or intertidal zone
- ☐H Degraded marsh vegetation in the intertidal zone (removal, burning, regular mowing, destruction, etc)
- ☐I Other: ______________________ (explain in "Notes/Sketch" section)
- ☐J Little to no stressors

8. Recent Weather – watershed metric (skip for Tidal Marsh Streams)
For Size 1 or 2 streams, D1 drought or higher is considered a drought; for Size 3 or 4 streams, D2 drought or higher is considered a drought.

- ☐A Drought conditions <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 is too large or dangerous to assess? If Yes, skip to Metric 13 (Streamside Area Ground Surface Condition).

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

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

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

- ☒A Multiple aquatic macrophytes and aquatic mosses (include liverworts, lichens, and algal mats)
- ☒B Multiple sticks and/or leaf packs and/or emergent vegetation
- ☒C Multiple snags and logs (including lap trees)
- ☒D 5% undercut banks and/or root mats and/or roots in banks extend to the normal wetted perimeter
- ☐E Little or no habitat

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 (skip for Size 4 Coastal Plain streams and Tidal Marsh Streams)**. Not Present (NP) = absent, Rare (R) = present but ≤ 10%, Common (C) = > 10-40%, Abundant (A) = > 40-70%, Predominant (P) = > 70%. Cumulative percentages should not exceed 100% for each assessment reach.

NP	R	C	A	P	
☒	☐	☐	☐	☐	Bedrock/saprolite
☐	☒	☐	☐	☐	Boulder (256 – 4096 mm)
☐	☐	☒	☐	☐	Cobble (64 – 256 mm)
☐	☐	☐	☒	☐	Gravel (2 – 64 mm)
☐	☐	☒	☐	☐	Sand (.062 – 2 mm)
☐	☒	☐	☐	☐	Silt/clay (< 0.062 mm)
☐	☒	☐	☐	☐	Detritus
☐	☒	☐	☐	☐	Artificial (rip-rap, concrete, etc.)

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

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

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

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

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

13. Streamside Area Ground Surface Condition – streamside area metric (skip for Tidal Marsh Streams and B valley types)
Consider for the Left Bank (LB) and the Right Bank (RB). Consider storage capacity with regard to both overbank flow and upland runoff.

LB	RB	
☐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 passing flow during low-flow periods within the assessment area (beaver dam, leaky dam, bottom-release dam, weir)
☒D Evidence of bank seepage or sweating (iron in water indicates seepage)
☒E Stream bed or bank soil reduced (dig through deposited sediment if present)
☐F None of the above

17. Baseflow Detractors – assessment area metric (skip for Tidal Marsh Streams)
Check all that apply.

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

18. Shading – assessment reach metric (skip for Tidal Marsh Streams)
Consider aspect. Consider “leaf-on” condition.

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

19. Buffer Width – streamside area metric (skip for Tidal Marsh Streams)
Consider "vegetated buffer" and "wooded buffer" separately for left bank (LB) and right bank (RB) starting at the top of bank out to the first break.

Vegetated 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 – 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?
If No, select one of the following reasons. ☐No Water ☐Other: ______________________________

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

Notes/Sketch:

Draft NC SAM Stream Rating Sheet
Accompanies User Manual Version 2.1

Stream Site Name	Huntsman - UT2 Reach 1	Date of Assessment	5/11/2020
Stream Category	Mb1	Assessor Name/Organization	M. Caddell

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

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

NC SAM FIELD ASSESSMENT RESULTS
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/Sketch" 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): Huntsman - UT2 Reach 2
2. Date of evaluation: 5/11/2020
3. Applicant/owner name: Wildlands
4. Assessor name/organization: M. Caddell
5. County: Wilkes
6. Nearest named water body on USGS 7.5-minute quad: North Little Hunting Creek
7. River basin: Yadkin
8. Site coordinates (decimal degrees, at lower end of assessment reach): 36.13770, -80.93015

STREAM INFORMATION: (depth and width can be approximations)

9. Site number (show on attached map): UT2 Reach 2
10. Length of assessment reach evaluated (feet): ~250'
11. Channel depth from bed (in riffle, if present) to top of bank (feet): 1-2' ☐Unable to assess channel depth.
12. Channel width at top of bank (feet): 3-6'
13. Is assessment reach a swamp steam? ☐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 mi^2) ☐Size 2 (0.1 to < 0.5 mi^2) ☐Size 3 (0.5 to < 5 mi^2) ☐Size 4 (≥ 5 mi^2)

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

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/Sketch” section.
- ☒F Livestock with access to stream or intertidal zone
- ☐G Excessive algae in stream or intertidal zone
- ☐H Degraded marsh vegetation in the intertidal zone (removal, burning, regular mowing, destruction, etc)
- ☐I Other: ____________________ (explain in “Notes/Sketch” section)
- ☐J Little to no stressors

8. Recent Weather – watershed metric (skip for Tidal Marsh Streams)
For Size 1 or 2 streams, D1 drought or higher is considered a drought; for Size 3 or 4 streams, D2 drought or higher is considered a drought.
- ☐A Drought conditions <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 is too large or dangerous to assess? If Yes, skip to Metric 13 (Streamside Area Ground Surface Condition).

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

10b. **Check all that occur** (occurs if > 5% coverage of assessment reach) **(skip for Size 4 Coastal Plain streams)**
- ☐A Multiple aquatic macrophytes and aquatic mosses (include liverworts, lichens, and algal mats)
- ☒B Multiple sticks and/or leaf packs and/or emergent vegetation
- ☐C Multiple snags and logs (including lap trees)
- ☒D 5% undercut banks and/or root mats and/or roots in banks extend to the normal wetted perimeter
- ☐E Little or no habitat

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 (skip for Size 4 Coastal Plain streams and Tidal Marsh Streams)**. Not Present (NP) = absent, Rare (R) = present but ≤ 10%, Common (C) = > 10-40%, Abundant (A) = > 40-70%, Predominant (P) = > 70%. Cumulative percentages should not exceed 100% for each assessment reach.

NP	R	C	A	P	
☒	☐	☐	☐	☐	Bedrock/saprolite
☐	☒	☐	☐	☐	Boulder (256 – 4096 mm)
☐	☐	☒	☐	☐	Cobble (64 – 256 mm)
☐	☐	☒	☐	☐	Gravel (2 – 64 mm)
☐	☐	☐	☒	☐	Sand (.062 – 2 mm)
☐	☐	☐	☒	☐	Silt/clay (< 0.062 mm)
☐	☒	☐	☐	☐	Detritus
☐	☒	☐	☐	☐	Artificial (rip-rap, concrete, etc.)

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

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

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

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

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

13. Streamside Area Ground Surface Condition – streamside area metric (skip for Tidal Marsh Streams and B valley types)
Consider for the Left Bank (LB) and the Right Bank (RB). Consider storage capacity with regard to both overbank flow and upland runoff.

LB	RB	
☐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 passing flow during low-flow periods within the assessment area (beaver dam, leaky dam, bottom-release dam, weir)
- ☒D Evidence of bank seepage or sweating (iron in water indicates seepage)
- ☒E Stream bed or bank soil reduced (dig through deposited sediment if present)
- ☐F None of the above

17. Baseflow Detractors – assessment area metric (skip for Tidal Marsh Streams)
Check all that apply.

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

18. Shading – assessment reach metric (skip for Tidal Marsh Streams)
Consider aspect. Consider “leaf-on” condition.

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

19. Buffer Width – streamside area metric (skip for Tidal Marsh Streams)
Consider "vegetated buffer" and "wooded buffer" separately for left bank (LB) and right bank (RB) starting at the top of bank out to the first break.

Vegetated 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 – 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?
If No, select one of the following reasons. ☐No Water ☐Other: ____________________

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

Notes/Sketch:
Assessment reach begins at existing culvert and ends at the confluence with Rifle Trib.

Draft NC SAM Stream Rating Sheet
Accompanies User Manual Version 2.1

Stream Site Name	Huntsman - UT2 Reach 2	Date of Assessment	5/11/2020
Stream Category	Mb1	Assessor Name/Organization	M. Caddell

Notes of Field Assessment Form (Y/N)	YES
Presence of regulatory considerations (Y/N)	YES
Additional stream information/supplementary measurements included (Y/N)	YES
NC SAM feature type (perennial, intermittent, Tidal Marsh Stream)	Perennial

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

NC SAM FIELD ASSESSMENT RESULTS
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/Sketch" 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): Huntsman - UT2 Reach 3 Upper & Reach 4 — 2. Date of evaluation: 5/11/2020
3. Applicant/owner name: Wildlands — 4. Assessor name/organization: M. Caddell
5. County: Wilkes — 6. Nearest named water body on USGS 7.5-minute quad: North Little Hunting Creek
7. River basin: Yadkin
8. Site coordinates (decimal degrees, at lower end of assessment reach): 36.13992, -80.93145

STREAM INFORMATION: (depth and width can be approximations)

9. Site number (show on attached map): UT2 Reach 3 Upper & Reach 4 — 10. Length of assessment reach evaluated (feet): ~650'
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): 4-7' — 13. Is assessment reach a swamp steam? ☐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 mi^2) ☐Size 2 (0.1 to < 0.5 mi^2) ☐Size 3 (0.5 to < 5 mi^2) ☐Size 4 (≥ 5 mi^2)

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 <u>or</u> fill to the point of obstructing flow <u>or</u> a channel choked with aquatic macrophytes <u>or</u> ponded water <u>or</u> 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

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/Sketch” section.
- ☒F Livestock with access to stream or intertidal zone
- ☐G Excessive algae in stream or intertidal zone
- ☐H Degraded marsh vegetation in the intertidal zone (removal, burning, regular mowing, destruction, etc)
- ☐I Other: ____________________ (explain in “Notes/Sketch” section)
- ☐J Little to no stressors

8. Recent Weather – watershed metric (skip for Tidal Marsh Streams)
For Size 1 or 2 streams, D1 drought or higher is considered a drought; for Size 3 or 4 streams, D2 drought or higher is considered a drought.

- ☐A Drought conditions <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 is too large or dangerous to assess? If Yes, skip to Metric 13 (Streamside Area Ground Surface Condition).

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

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

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

- ☐A Multiple aquatic macrophytes and aquatic mosses (include liverworts, lichens, and algal mats)
- ☒B Multiple sticks and/or leaf packs and/or emergent vegetation
- ☒C Multiple snags and logs (including lap trees)
- ☒D 5% undercut banks and/or root mats and/or roots in banks extend to the normal wetted perimeter
- ☐E Little or no habitat

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 (skip for Size 4 Coastal Plain streams and Tidal Marsh Streams)**. Not Present (NP) = absent, Rare (R) = present but ≤ 10%, Common (C) = > 10-40%, Abundant (A) = > 40-70%, Predominant (P) = > 70%. Cumulative percentages should not exceed 100% for each assessment reach.

NP	R	C	A	P	
☒	☐	☐	☐	☐	Bedrock/saprolite
☐	☒	☐	☐	☐	Boulder (256 – 4096 mm)
☐	☒	☐	☐	☐	Cobble (64 – 256 mm)
☐	☐	☒	☐	☐	Gravel (2 – 64 mm)
☐	☐	☐	☒	☐	Sand (.062 – 2 mm)
☐	☐	☒	☐	☐	Silt/clay (< 0.062 mm)
☐	☒	☐	☐	☐	Detritus
☐	☒	☐	☐	☐	Artificial (rip-rap, concrete, etc.)

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

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

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

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

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

13. Streamside Area Ground Surface Condition – streamside area metric (skip for Tidal Marsh Streams and B valley types)
Consider for the Left Bank (LB) and the Right Bank (RB). Consider storage capacity with regard to both overbank flow and upland runoff.

LB	RB	
☐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 passing flow during low-flow periods within the assessment area (beaver dam, leaky dam, bottom-release dam, weir)
- ☒D Evidence of bank seepage or sweating (iron in water indicates seepage)
- ☒E Stream bed or bank soil reduced (dig through deposited sediment if present)
- ☐F None of the above

17. Baseflow Detractors – assessment area metric (skip for Tidal Marsh Streams)
Check all that apply.

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

18. Shading – assessment reach metric (skip for Tidal Marsh Streams)
Consider aspect. Consider "leaf-on" condition.

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

19. Buffer Width – streamside area metric (skip for Tidal Marsh Streams)
Consider "vegetated buffer" and "wooded buffer" separately for left bank (LB) and right bank (RB) starting at the top of bank out to the first break.

Vegetated 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 – 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?
If No, select one of the following reasons. ☐No Water ☐Other: ______________________________

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

Notes/Sketch:
Assessment reach begins along Reach 3 where the existing wooded buffer ends and continues until the confluence with North Little Hunting Creek.

Draft NC SAM Stream Rating Sheet
Accompanies User Manual Version 2.1

Stream Site Name	Huntsman - UT2 Reach 3 Upper & Reach 4	Date of Assessment	5/11/2020
Stream Category	Ma1	Assessor Name/Organization	M. Caddell

Notes of Field Assessment Form (Y/N)	YES
Presence of regulatory considerations (Y/N)	YES
Additional stream information/supplementary measurements included (Y/N)	YES
NC SAM feature type (perennial, intermittent, Tidal Marsh Stream)	Perennial

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

NC SAM FIELD ASSESSMENT RESULTS
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/Sketch" 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): Huntsman - UT2 R2 Lower
2. Date of evaluation: 5/11/2020
3. Applicant/owner name: Wildlands
4. Assessor name/organization: M. Caddell
5. County: Wilkes
6. Nearest named water body on USGS 7.5-minute quad: North Little Hunting Creek
7. River basin: Yadkin
8. Site coordinates (decimal degrees, at lower end of assessment reach): 36.13841, -80.93071

STREAM INFORMATION: (depth and width can be approximations)

9. Site number (show on attached map): UT2R2 Lower
10. Length of assessment reach evaluated (feet): ~350'
11. Channel depth from bed (in riffle, if present) to top of bank (feet): 3-5' ☐Unable to assess channel depth.
12. Channel width at top of bank (feet): 8-12'
13. Is assessment reach a swamp steam? ☐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 <u>or</u> fill to the point of obstructing flow <u>or</u> a channel choked with aquatic macrophytes <u>or</u> ponded water <u>or</u> 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

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/Sketch” section.
- ☒F Livestock with access to stream or intertidal zone
- ☐G Excessive algae in stream or intertidal zone
- ☐H Degraded marsh vegetation in the intertidal zone (removal, burning, regular mowing, destruction, etc)
- ☐I Other: ____________________ (explain in “Notes/Sketch” section)
- ☐J Little to no stressors

8. Recent Weather – watershed metric (skip for Tidal Marsh Streams)
For Size 1 or 2 streams, D1 drought or higher is considered a drought; for Size 3 or 4 streams, D2 drought or higher is considered a drought.

- ☐A Drought conditions <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 is too large or dangerous to assess? If Yes, skip to Metric 13 (Streamside Area Ground Surface Condition).

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

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

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

- ☒A Multiple aquatic macrophytes and aquatic mosses (include liverworts, lichens, and algal mats)
- ☒B Multiple sticks and/or leaf packs and/or emergent vegetation
- ☒C Multiple snags and logs (including lap trees)
- ☒D 5% undercut banks and/or root mats and/or roots in banks extend to the normal wetted perimeter
- ☐E Little or no habitat

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 (skip for Size 4 Coastal Plain streams and Tidal Marsh Streams)**. Not Present (NP) = absent, Rare (R) = present but ≤ 10%, Common (C) = > 10-40%, Abundant (A) = > 40-70%, Predominant (P) = > 70%. Cumulative percentages should not exceed 100% for each assessment reach.

NP	R	C	A	P	
☒	☐	☐	☐	☐	Bedrock/saprolite
☐	☒	☐	☐	☐	Boulder (256 – 4096 mm)
☐	☒	☐	☐	☐	Cobble (64 – 256 mm)
☐	☐	☒	☐	☐	Gravel (2 – 64 mm)
☐	☐	☐	☒	☐	Sand (.062 – 2 mm)
☐	☒	☐	☐	☐	Silt/clay (< 0.062 mm)
☐	☒	☐	☐	☐	Detritus
☐	☒	☐	☐	☐	Artificial (rip-rap, concrete, etc.)

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

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

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

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

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

13. Streamside Area Ground Surface Condition – streamside area metric (skip for Tidal Marsh Streams and B valley types)
Consider for the Left Bank (LB) and the Right Bank (RB). Consider storage capacity with regard to both overbank flow and upland runoff.

LB	RB	
☐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 passing flow during low-flow periods within the assessment area (beaver dam, leaky dam, bottom-release dam, weir)
- ☒D Evidence of bank seepage or sweating (iron in water indicates seepage)
- ☒E Stream bed or bank soil reduced (dig through deposited sediment if present)
- ☐F None of the above

17. Baseflow Detractors – assessment area metric (skip for Tidal Marsh Streams)
Check all that apply.

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

18. Shading – assessment reach metric (skip for Tidal Marsh Streams)
Consider aspect. Consider "leaf-on" condition.

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

19. Buffer Width – streamside area metric (skip for Tidal Marsh Streams)
Consider "vegetated buffer" and "wooded buffer" separately for left bank (LB) and right bank (RB) starting at the top of bank out to the first break.

Vegetated 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 – 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?
If No, select one of the following reasons. ☐No Water ☐Other: ______________________

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

Notes/Sketch:
Assessment reach begins at the confluence with Rifle trib and continues about 200 LF downstream of Old Bus Branch until the existing tree buffer ends.

Draft NC SAM Stream Rating Sheet
Accompanies User Manual Version 2.1

Stream Site Name	Huntsman - UT2 R2 Lower	Date of Assessment	5/11/2020
Stream Category	Mb1	Assessor Name/Organization	M. Caddell

Notes of Field Assessment Form (Y/N)	YES
Presence of regulatory considerations (Y/N)	YES
Additional stream information/supplementary measurements included (Y/N)	YES
NC SAM feature type (perennial, intermittent, Tidal Marsh Stream)	Perennial

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

NC SAM FIELD ASSESSMENT RESULTS
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/Sketch" 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): Huntsman - Barn Branch
2. Date of evaluation: 5/11/2020
3. Applicant/owner name: Wildlands
4. Assessor name/organization: M. Caddell
5. County: Wilkes
6. Nearest named water body on USGS 7.5-minute quad: North Little Hunting Creek
7. River basin: Yadkin
8. Site coordinates (decimal degrees, at lower end of assessment reach): 36.13881, -80.93116

STREAM INFORMATION: (depth and width can be approximations)

9. Site number (show on attached map): Barn Branch
10. Length of assessment reach evaluated (feet): ~230'
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): 5-8'
13. Is assessment reach a swamp steam? ☐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 <u>or</u> fill to the point of obstructing flow <u>or</u> a channel choked with aquatic macrophytes <u>or</u> ponded water <u>or</u> 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/Sketch" section.
- ☒F Livestock with access to stream or intertidal zone
- ☐G Excessive algae in stream or intertidal zone
- ☐H Degraded marsh vegetation in the intertidal zone (removal, burning, regular mowing, destruction, etc)
- ☐I Other: ____________________ (explain in "Notes/Sketch" section)
- ☐J Little to no stressors

8. **Recent Weather – watershed metric (skip for Tidal Marsh Streams)**
For Size 1 or 2 streams, D1 drought or higher is considered a drought; for Size 3 or 4 streams, D2 drought or higher is considered a drought.
- ☐A Drought conditions and no rainfall or rainfall not exceeding 1 inch within the last 48 hours
- ☐B Drought conditions and rainfall exceeding 1 inch within the last 48 hours
- ☒C No drought conditions

9. **Large or Dangerous Stream – assessment reach metric**
☐Yes ☒No Is stream is too large or dangerous to assess? If Yes, skip to Metric 13 (Streamside Area Ground Surface Condition).

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

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

10b. **Check all that occur** (occurs if > 5% coverage of assessment reach) **(skip for Size 4 Coastal Plain streams)**
- ☒A Multiple aquatic macrophytes and aquatic mosses (include liverworts, lichens, and algal mats)
- ☒B Multiple sticks and/or leaf packs and/or emergent vegetation
- ☐C Multiple snags and logs (including lap trees)
- ☒D 5% undercut banks and/or root mats and/or roots in banks extend to the normal wetted perimeter
- ☐E Little or no habitat

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 (skip for Size 4 Coastal Plain streams and Tidal Marsh Streams)**. Not Present (NP) = absent, Rare (R) = present but ≤ 10%, Common (C) = > 10-40%, Abundant (A) = > 40-70%, Predominant (P) = > 70%. Cumulative percentages should not exceed 100% for each assessment reach.

NP	R	C	A	P	
☒	☐	☐	☐	☐	Bedrock/saprolite
☐	☒	☐	☐	☐	Boulder (256 – 4096 mm)
☐	☒	☐	☐	☐	Cobble (64 – 256 mm)
☐	☐	☒	☐	☐	Gravel (2 – 64 mm)
☐	☐	☐	☒	☐	Sand (.062 – 2 mm)
☐	☐	☒	☐	☐	Silt/clay (< 0.062 mm)
☐	☒	☐	☐	☐	Detritus
☐	☒	☐	☐	☐	Artificial (rip-rap, concrete, etc.)

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

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

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

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

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

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

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

LB	RB	
☐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 passing flow during low-flow periods within the assessment area (beaver dam, leaky dam, bottom-release dam, weir)
☒D Evidence of bank seepage or sweating (iron in water indicates seepage)
☒E Stream bed or bank soil reduced (dig through deposited sediment if present)
☐F None of the above

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

Check all that apply.

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

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

Consider aspect. Consider "leaf-on" condition.

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

19. Buffer Width – streamside area metric (skip for Tidal Marsh Streams)
Consider "vegetated buffer" and "wooded buffer" separately for left bank (LB) and right bank (RB) starting at the top of bank out to the first break.

Vegetated 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 – 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?
If No, select one of the following reasons. ☐No Water ☐Other: ________________

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

Notes/Sketch:

Draft NC SAM Stream Rating Sheet
Accompanies User Manual Version 2.1

Stream Site Name	Huntsman - Barn Branch	Date of Assessment	5/11/2020
Stream Category	Mb1	Assessor Name/Organization	M. Caddell

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

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

NC SAM FIELD ASSESSMENT RESULTS
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/Sketch" 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): Huntsman - Old Bus Branch
2. Date of evaluation: 5/11/2020
3. Applicant/owner name: Wildlands
4. Assessor name/organization: M. Caddell
5. County: Wilkes
6. Nearest named water body on USGS 7.5-minute quad: North Little Hunting Creek
7. River basin: Yadkin
8. Site coordinates (decimal degrees, at lower end of assessment reach): 36.13802, -80.93024

STREAM INFORMATION: (depth and width can be approximations)

9. Site number (show on attached map): Old Bus Branch
10. Length of assessment reach evaluated (feet): ~100'
11. Channel depth from bed (in riffle, if present) to top of bank (feet): 5-10' ☐Unable to assess channel depth.
12. Channel width at top of bank (feet): 10'
13. Is assessment reach a swamp steam? ☐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 mi^2) ☐Size 2 (0.1 to < 0.5 mi^2) ☐Size 3 (0.5 to < 5 mi^2) ☐Size 4 (≥ 5 mi^2)

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 <u>or</u> fill to the point of obstructing flow <u>or</u> a channel choked with aquatic macrophytes <u>or</u> ponded water <u>or</u> 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

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/Sketch” section.
☒F Livestock with access to stream or intertidal zone
☐G Excessive algae in stream or intertidal zone
☐H Degraded marsh vegetation in the intertidal zone (removal, burning, regular mowing, destruction, etc)
☐I Other: ____________________ (explain in “Notes/Sketch” section)
☐J Little to no stressors

8. **Recent Weather – watershed metric (skip for Tidal Marsh Streams)**
For Size 1 or 2 streams, D1 drought or higher is considered a drought; for Size 3 or 4 streams, D2 drought or higher is considered a drought.
☐A Drought conditions <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 is too large or dangerous to assess? If Yes, skip to Metric 13 (Streamside Area Ground Surface Condition).

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

10b. **Check all that occur** (occurs if > 5% coverage of assessment reach) **(skip for Size 4 Coastal Plain streams)**
☒A Multiple aquatic macrophytes and aquatic mosses (include liverworts, lichens, and algal mats)
☒B Multiple sticks and/or leaf packs and/or emergent vegetation
☐C Multiple snags and logs (including lap trees)
☐D 5% undercut banks and/or root mats and/or roots in banks extend to the normal wetted perimeter
☐E Little or no habitat

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 (skip for Size 4 Coastal Plain streams and Tidal Marsh Streams)**. Not Present (NP) = absent, Rare (R) = present but ≤ 10%, Common (C) = > 10-40%, Abundant (A) = > 40-70%, Predominant (P) = > 70%. Cumulative percentages should not exceed 100% for each assessment reach.

NP	R	C	A	P	
☒	☐	☐	☐	☐	Bedrock/saprolite
☐	☒	☐	☐	☐	Boulder (256 – 4096 mm)
☐	☒	☐	☐	☐	Cobble (64 – 256 mm)
☐	☐	☒	☐	☐	Gravel (2 – 64 mm)
☐	☐	☐	☒	☐	Sand (.062 – 2 mm)
☐	☐	☒	☐	☐	Silt/clay (< 0.062 mm)
☐	☒	☐	☐	☐	Detritus
☐	☒	☐	☐	☐	Artificial (rip-rap, concrete, etc.)

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

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

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

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

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

13. Streamside Area Ground Surface Condition – streamside area metric (skip for Tidal Marsh Streams and B valley types)
Consider for the Left Bank (LB) and the Right Bank (RB). Consider storage capacity with regard to both overbank flow and upland runoff.

LB	RB	
☐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 passing flow during low-flow periods within the assessment area (beaver dam, leaky dam, bottom-release dam, weir)
☒D Evidence of bank seepage or sweating (iron in water indicates seepage)
☒E Stream bed or bank soil reduced (dig through deposited sediment if present)
☐F None of the above

17. Baseflow Detractors – assessment area metric (skip for Tidal Marsh Streams)
Check all that apply.

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

18. Shading – assessment reach metric (skip for Tidal Marsh Streams)
Consider aspect. Consider "leaf-on" condition.

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

19. Buffer Width – streamside area metric (skip for Tidal Marsh Streams)
Consider "vegetated buffer" and "wooded buffer" separately for left bank (LB) and right bank (RB) starting at the top of bank out to the first break.

Vegetated 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 – 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?
If No, select one of the following reasons. ☐No Water ☐Other: ______________________________

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

Notes/Sketch:

Draft NC SAM Stream Rating Sheet
Accompanies User Manual Version 2.1

Stream Site Name	Huntsman - Old Bus Branch	Date of Assessment	5/11/2020
Stream Category	Mb1	Assessor Name/Organization	M. Caddell

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

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

NC SAM FIELD ASSESSMENT RESULTS
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/Sketch" 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): Huntsman - Rifle Trib
2. Date of evaluation: 5/11/2020
3. Applicant/owner name: Wildlands
4. Assessor name/organization: M. Caddell
5. County: Wilkes
6. Nearest named water body on USGS 7.5-minute quad: North Little Hunting Creek
7. River basin: Yadkin
8. Site coordinates (decimal degrees, at lower end of assessment reach): 36.13766, -80.93014

STREAM INFORMATION: (depth and width can be approximations)

9. Site number (show on attached map): Rifle Trib
10. Length of assessment reach evaluated (feet): ~150'
11. Channel depth from bed (in riffle, if present) to top of bank (feet): 1-3' ☐Unable to assess channel depth.
12. Channel width at top of bank (feet): 2-5'
13. Is assessment reach a swamp steam? ☐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 mi^2) ☐Size 2 (0.1 to < 0.5 mi^2) ☐Size 3 (0.5 to < 5 mi^2) ☐Size 4 (≥ 5 mi^2)

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/Sketch" section.
- ☒F Livestock with access to stream or intertidal zone
- ☐G Excessive algae in stream or intertidal zone
- ☐H Degraded marsh vegetation in the intertidal zone (removal, burning, regular mowing, destruction, etc)
- ☐I Other: ____________________ (explain in "Notes/Sketch" section)
- ☐J Little to no stressors

8. Recent Weather – watershed metric (skip for Tidal Marsh Streams)
For Size 1 or 2 streams, D1 drought or higher is considered a drought; for Size 3 or 4 streams, D2 drought or higher is considered a drought.

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

9. Large or Dangerous Stream – assessment reach metric
☐Yes ☒No Is stream is too large or dangerous to assess? If Yes, skip to Metric 13 (Streamside Area Ground Surface Condition).

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

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

- ☒A Multiple aquatic macrophytes and aquatic mosses (include liverworts, lichens, and algal mats)
- ☒B Multiple sticks and/or leaf packs and/or emergent vegetation
- ☐C Multiple snags and logs (including lap trees)
- ☐D 5% undercut banks and/or root mats and/or roots in banks extend to the normal wetted perimeter
- ☐E Little or no habitat

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 (skip for Size 4 Coastal Plain streams and Tidal Marsh Streams)**. Not Present (NP) = absent, Rare (R) = present but ≤ 10%, Common (C) = > 10-40%, Abundant (A) = > 40-70%, Predominant (P) = > 70%. Cumulative percentages should not exceed 100% for each assessment reach.

NP	R	C	A	P	
☒	☐	☐	☐	☐	Bedrock/saprolite
☒	☐	☐	☐	☐	Boulder (256 – 4096 mm)
☐	☒	☐	☐	☐	Cobble (64 – 256 mm)
☐	☐	☒	☐	☐	Gravel (2 – 64 mm)
☐	☐	☐	☒	☐	Sand (.062 – 2 mm)
☐	☐	☒	☐	☐	Silt/clay (< 0.062 mm)
☐	☒	☐	☐	☐	Detritus
☐	☒	☐	☐	☐	Artificial (rip-rap, concrete, etc.)

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

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

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

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

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

13. Streamside Area Ground Surface Condition – streamside area metric (skip for Tidal Marsh Streams and B valley types)
Consider for the Left Bank (LB) and the Right Bank (RB). Consider storage capacity with regard to both overbank flow and upland runoff.

LB	RB	
☐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 passing flow during low-flow periods within the assessment area (beaver dam, leaky dam, bottom-release dam, weir)
☒D Evidence of bank seepage or sweating (iron in water indicates seepage)
☒E Stream bed or bank soil reduced (dig through deposited sediment if present)
☐F None of the above

17. Baseflow Detractors – assessment area metric (skip for Tidal Marsh Streams)
Check all that apply.

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

18. Shading – assessment reach metric (skip for Tidal Marsh Streams)
Consider aspect. Consider "leaf-on" condition.

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

19. **Buffer Width – streamside area metric (skip for Tidal Marsh Streams)**
Consider "vegetated buffer" and "wooded buffer" separately for left bank (LB) and right bank (RB) starting at the top of bank out to the first break.

Vegetated 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 – 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?
If No, select one of the following reasons. ☐No Water ☐Other: ______________________________

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

Notes/Sketch:

Draft NC SAM Stream Rating Sheet
Accompanies User Manual Version 2.1

Stream Site Name	Huntsman - Rifle Trib	Date of Assessment	5/11/2020
Stream Category	Mb1	Assessor Name/Organization	M. Caddell

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

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

NC SAM FIELD ASSESSMENT RESULTS
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/Sketch" 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): Huntsman - Trapper Trib
2. Date of evaluation: 5/11/2020
3. Applicant/owner name: Wildlands
4. Assessor name/organization: M. Caddell
5. County: Wilkes
6. Nearest named water body on USGS 7.5-minute quad: North Little Hunting Creek
7. River basin: Yadkin
8. Site coordinates (decimal degrees, at lower end of assessment reach): 36.13750, -80.93007

STREAM INFORMATION: (depth and width can be approximations)

9. Site number (show on attached map): Trapper Trib
10. Length of assessment reach evaluated (feet): ~75'
11. Channel depth from bed (in riffle, if present) to top of bank (feet): 1-2' ☐Unable to assess channel depth.
12. Channel width at top of bank (feet): 2-4'
13. Is assessment reach a swamp steam? ☐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 mi^2) ☐Size 2 (0.1 to < 0.5 mi^2) ☐Size 3 (0.5 to < 5 mi^2) ☐Size 4 (≥ 5 mi^2)

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

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/Sketch” section.
☒F Livestock with access to stream or intertidal zone
☐G Excessive algae in stream or intertidal zone
☐H Degraded marsh vegetation in the intertidal zone (removal, burning, regular mowing, destruction, etc)
☐I Other: ____________________ (explain in “Notes/Sketch” section)
☐J Little to no stressors

8. Recent Weather – watershed metric (skip for Tidal Marsh Streams)
For Size 1 or 2 streams, D1 drought or higher is considered a drought; for Size 3 or 4 streams, D2 drought or higher is considered a drought.

☐A Drought conditions <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 is too large or dangerous to assess? If Yes, skip to Metric 13 (Streamside Area Ground Surface Condition).

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

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

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

☒A Multiple aquatic macrophytes and aquatic mosses (include liverworts, lichens, and algal mats)
☒B Multiple sticks and/or leaf packs and/or emergent vegetation
☐C Multiple snags and logs (including lap trees)
☒D 5% undercut banks and/or root mats and/or roots in banks extend to the normal wetted perimeter
☐E Little or no habitat

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 (skip for Size 4 Coastal Plain streams and Tidal Marsh Streams)**. Not Present (NP) = absent, Rare (R) = present but ≤ 10%, Common (C) = > 10-40%, Abundant (A) = > 40-70%, Predominant (P) = > 70%. Cumulative percentages should not exceed 100% for each assessment reach.

NP	R	C	A	P	
☐	☐	☐	☐	☐	Bedrock/saprolite
☐	☐	☐	☐	☐	Boulder (256 – 4096 mm)
☐	☐	☐	☐	☐	Cobble (64 – 256 mm)
☐	☐	☐	☐	☐	Gravel (2 – 64 mm)
☐	☐	☐	☐	☐	Sand (.062 – 2 mm)
☐	☐	☐	☐	☐	Silt/clay (< 0.062 mm)
☐	☐	☐	☐	☐	Detritus
☐	☐	☐	☐	☐	Artificial (rip-rap, concrete, etc.)

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

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

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

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

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

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

13. Streamside Area Ground Surface Condition – streamside area metric (skip for Tidal Marsh Streams and B valley types)
Consider for the Left Bank (LB) and the Right Bank (RB). Consider storage capacity with regard to both overbank flow and upland runoff.

LB RB
☐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 passing flow during low-flow periods within the assessment area (beaver dam, leaky dam, bottom-release dam, weir)
☒D Evidence of bank seepage or sweating (iron in water indicates seepage)
☒E Stream bed or bank soil reduced (dig through deposited sediment if present)
☐F None of the above

17. Baseflow Detractors – assessment area metric (skip for Tidal Marsh Streams)
Check all that apply.

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

18. Shading – assessment reach metric (skip for Tidal Marsh Streams)
Consider aspect. Consider “leaf-on” condition.

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

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

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

Vegetated 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 – 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?
If No, select one of the following reasons. ☐No Water ☐Other: ______________________________

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

Notes/Sketch:

Draft NC SAM Stream Rating Sheet
Accompanies User Manual Version 2.1

Stream Site Name	Huntsman - Trapper Trib	Date of Assessment	5/11/2020
Stream Category	Mb1	Assessor Name/Organization	M. Caddell

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

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

APPENDIX 4 – Supplementary Design Information

Existing Conditions Geomorphic Parameters														
Parameter	Notation	Units	North Little Hunting Creek		UT1		UT2 R2		UT2 R3		Old Bus Branch		Barn Branch	
			min	max	min	max	min	max	min	max	min	max	min	max
stream type			G4		E4 (straight/incised)/C4		A6		E5b		G5		B5a	
drainage area	DA	sq mi	1.99		0.10		0.04		0.07		0.01		0.02	
bankfull cross-sectional area	A_{bkf}	SF	20.6	25.8	9.8	8.2	2.6		3.2		3.4		3.3	
avg velocity during bankfull event	v_{bkf}	fps	5.0	5.1	5.8	5.9	9.2		5.8		4.8		6.4	
width at bankfull	w_{bkf}	feet	12.4	16.3	13.7	10.2	3.5		3.0		4.1		3.8	
maximum depth at bankfull	d_{max}	feet	2.1	2.3	1.3	1.7	1.0		1.4		1.2		1.2	
mean depth at bankfull	d_{bkf}	feet	1.6	1.7	0.7	0.8	0.8		1.1		0.8		0.9	
bankfull width to depth ratio	w_{bkf}/d_{bkf}		7.5	10.3	12.7	19.1	4.7		2.9		4.9		4.3	
low bank height		feet	4.2	5.3	1.3	3.1	2.8		3.3		7.5		3.1	
bank height ratio	BHR		2.0	2.3	1.0	1.8	2.8		2.3		6.3		2.5	
floodprone area width	w_{fpa}	feet	17	44	35	23	5		10		7		9	
entrenchment ratio	ER		1.4	2.7	2.2	2.5	1.3		3.2		1.7		2.5	
max pool depth at bankfull	d_{pool}	feet	2.4		1.9		1.093		2.5		1.5		1.3	
pool depth ratio	d_{pool}/d_{bkf}		1.5	1.5	2.4	2.7	1.5		2.4		1.8		1.5	
pool width at bankfull	w_{pool}	feet	14.0		6.7		3.5		5.0		4.9		9.1	
pool width ratio	w_{pool}/w_{bkf}		0.9	1.1	0.5	0.7	1.0		1.6		1.2		2.4	
Bkf pool cross-sectional area	A_{pool}	SF	20.2		10.7		2.3		7.5		4.9		7.1	
pool area ratio	A_{pool}/A_{bkf}		0.8	1.0	1.1	1.3	0.9		2.3		1.4		2.2	
pool-pool spacing	p-p	feet	56	228	5	36	3	19	15	50	4	19	3	24
pool-pool spacing ratio	$p\text{-}p/W_{bkf}$		4.5	14.0	0.4	3.5	0.9	5.4	5.1	16.4	1.0	4.6	0.7	6.4
valley slope	S_{valley}	feet/foot	0.0058	0.0089	0.0246		0.0917		0.0353		0.1070		0.0590	
channel slope	$S_{channel}$	feet/foot	0.0073		0.0296		0.0791		0.0254		0.0284		0.0435	
sinuosity	K		1.07		1.06		1.08		1.11		1.10		1.04	
belt width	w_{blt}	feet	25		8		N/A		N/A		N/A		N/A	
meander width ratio	w_{blt}/w_{bkf}		1.5	2.0	0.6	0.8	N/A		N/A		N/A		N/A	
meander length	L_m	feet	70		40		N/A		N/A		N/A		N/A	
meander length ratio	L_m/w_{bkf}		4.3	5.6	2.9	3.9	N/A		N/A		N/A		N/A	
linear wavelength	LW		55		26		N/A		N/A		N/A		N/A	
linear wavelength ratio	LW/w_{bkf}		3.4	4.4	1.9	2.5	N/A		N/A		N/A		N/A	
radius of curvature	R_c	feet	54		25		N/A		N/A		N/A		N/A	
radius of curvature ratio	R_c/ w_{bkf}		3.3	4.4	1.8	2.4	N/A		N/A		N/A		N/A	
d50 reachwide		mm	15		27		Silt/Clay		0.9		0.1		0.1	
d50 riffle		mm	22	54	35		7		12		10		0.3	

N/A - Channelized stream channel with limited pattern and bed form profile variability.

Reference Reach Geomorphic Parameters																										
	Notation	Units	Box Creek		UT to Catawba River Reach 1		Foust Upstream		UT to Catawba River Reach 2		UT to South Fork Fishing Creek		Ironwood Tributary		UT to Gap Branch		Timber Trib Mid-Reach		Shew Ridge Tributary A		UT to Kelly Branch		Henry Fork UT1 Upstream		Agony Acres UT1 Reach 3	
			min	max	min	max	min	max	min	max	min	max	min	max	min	max	min	max	min	max	min	max	min	max	min	max
stream type			C4		E5		C4		E3b/C3b		B5a		A5a+		Sightly Entrenched B4a or A4		B4		B5a		B4/B4a		B4/B4a		B4	
drainage area	DA	*sq mi*	2.1		1.6		1.4		1.6		0.02		0.03		0.04		0.04		0.02		0.08		0.05		0.15	
design discharge	Q	*cfs*	95		80		95.2		80		8.00		13		18.7		17		3.50		23		8.2		37	
bankfull cross-sectional area	A_{bkf}	*SF*	28.9		11.4	17.5	23.9	24.1	13.2		1.8		2.7		3.8		4.6		27.6	11.1	5.74		1.9	3.6	7.4	
average velocity during bankfull event	v_{bkf}	*fps*	3.0		5.54		4		6.06		4.1		4.9		5.0		3.7		3.3		5.9		5.4		4.9	
Cross-Section																										
width at bankfull	w_{bkf}	*feet*	23.5		9.7	12.4	18.5	19.4	12.3		4.1		5		6.2		8.9		3.6		7.91		3.2		11.1	
maximum depth at bankfull	d_{max}	*feet*	1.92		1.7		1.8	2.1	1.73		0.7		0.8		1		0.7		0.5		1.13		0.7	0.8	1	
mean depth at bankfull	d_{bkf}	*feet*	1.23		1.2	1.4	1.2	1.3	1.07		0.4		0.6		0.6		0.5		0.3		0.73		0.5		0.7	
bankfull width to depth ratio	w_{bkf}/d_{bkf}		19.1		8.1	8.9	14.3	15.7	11.5		9.3		9.1		10.1		17		12.1		10.9		5.2	16.4	16.6	
depth ratio	d_{max}/d_{bkf}	*feet*	1.7		1.2	1.4	1.4	1.7	1.62		1.8		0.2		1.7		1.4		1.67		1.3		1.3	1.5	1	
bank height ratio	BHR		1.5		0.9	1.4	---	---	0.77	1.26	1		1.3		1		1		1		2.47		1	1.3	1	
floodprone area width	w_{fpa}	*feet*	76.3		52	79	55	101.2	53		7		10.3		20.9		13.6		7.5		9.1		6.3	13.3	25	
entrenchment ratio	ER		3.3		5.36	6.37	2.9	5.3	4.31		1.7		2.1		3.4		1.5		2.1		1.15		2	1.7	2.3	
Slope																										
valley slope	S_{valley}	*feet/ foot*	0.023		0.011		---		0.029		0.1025		0.1135		---		0.0406		0.0647		0.049		0.044		0.05	
channel slope	S_{chnl}	*feet/ foot*	0.008		0.005		0.009		0.027		0.0815		0.1139		0.068		0.0334		0.0634		0.03	0.065	0.04		0.049	
Profile																										
riffle slope	S_{riffle}	*feet/ foot*	0.010	0.08	0.01	0.06	---	---	0.01	0.35	0.024	0.2	0.034	0.28	0.01	0.14	0.02	0.15	0.03	0.11	N/A		0.05	0.07	---	
riffle slope ratio	S_{riffle}/S_{chnl}		1.2	9.5	2.5	13.3	---	---	0.5	12.8	0.29	2.45	0.30	2.46	0.16	2.06	0.69	4.49	0.47	1.74	N/A		1.3	1.8	---	
pool slope	S_p	*feet/ foot*	0.0000	0.0008	0.001	0.003	---	---	0.002	0.022	0	0.17	0	0.21	0.00	0.06	0	0.082	0.03	0.06	N/A		0	0.016	---	
pool slope ratio	S_p/S_{chnl}		0.00	0.10	0.3	0.7	---	---	0.1	0.8	0	2.09	0	1.84	0.06	0.90	0	2.46	0.44	0.93	N/A		0	0.4	---	
pool-to-pool spacing	L_{p-p}	*feet*	28.8	88.5	31	60	---	---	19.3	46.4	6.3	32	3.1	30.6	18.4	26.8	6	49.4	20.9	45.1	N/A		14.1	24.9	---	
pool spacing ratio	L_{p-p}/w_{bkf}		1.2	3.8	2.8	5.4	---	---	1.6	3.8	1.5	7.8	0.6	6.1	2.99	4.35	0.7	5.6	5.81	12.53	N/A		2.6	4.6	---	
pool cross-sectional area	A_{pool}	*SF*	49.9		18.1		29.2	34.9	N/A1		---		---		7.10		---		---		N/A		---		9.8	
pool area ratio	A_{pool}/A_{bkf}		1.73		1	1.6	1.2	1.5	N/A1		---		---		1.89		---		---		N/A		---		1.3	
maximum pool depth	d_{pool}	*feet*	4.39		2.5		2.5	2.9	N/A1		---		---		1.55		---		---		N/A		1.5		1.6	
pool depth ratio	d_{pool}/d_{bkf}		3.6		1.8	2.1	1.9	2.3	N/A1		---		---		2.54		---		---		N/A		2.6		2.3	
pool width at bankfull	w_{pool}	*feet*	18.8		10.4		15.3	20.5	N/A1		---		---		6.10		---		---		N/A		---		8.5	
pool width ratio	w_{pool}/w_{bkf}		0.8		0.8	1.1	0.8	1.1	N/A1		---		---		0.99		---		---		N/A		---		0.8	
Pattern																										
sinuosity	K		1.33		1.1		---		1.1		1.3		1.19		---		1.12		1.1		1		1.1		1.04	
belt width	w_{blt}	feet	62.0	87.8	55		---	---	23		---		---		---		---		---		18.0	34.0	---		---	
meander width ratio	w_{blt}/w_{bkf}		2.6	3.7	4.4	5.7	---	---	1.8		---		---		---		---		---				---		---	
linear wavelength (formerly meander length)	L_m	feet	38.8	76.2	65	107	---	---	52	79	---		---		---		---		---		27.0	94.0	---		---	
linear wavelength ratio (formerly meander length ratio)	L_m/w_{bkf}		1.70	3.20	6.7	8.6	---	---	4.2	6.4	---		---		---		---		---				---		---	
meander length		feet	23.00	38.1	---	---	---	---	---	---	---		---		---		---		---				---		---	
meander length ratio			1.0	1.6	---	---	---	---	---	---	---		---		---		---		---				---		---	
radius of curvature	R_c	feet			31	56	---	---	29	52	---		---		---		---		---		8.0	26.0	---		---	
radius of curvature ratio	R_c/w_{bkf}				2.8	5.1	---	---	2.4	4.2	---		---		---		---		---				---		---	
Particle Size Distribution from Reach-wide Pebble Count																										
d50 Description					Very Coarse Sand		Small Cobble		Small Cobble		---		Coarse Sand		---				Very Fine Gravel				Coarse Gravel		---	
	d_{16}	mm			0.3		9.6		0.5		0.09		0.26		0.97		0.49		0.14				0.4		2	
	d_{35}	mm			0.4		37		29.8		0.44		0.5		8		3.5		0.57				8.0		12.9	
	d_{50}	mm			1.8		61		75.9		3.60		0.91		19.02		6.5		2				19.0		50.6	
	d_{84}	mm			12.8		130		170.8		22.6		19		102.3		48		42				102.3		168.1	
	d_{95}	mm			25.2		1100		332		2896.3		97		256		83		94				256.0		2048	
	d_{100}	mm			90		---		2048		>2048		128		>2048		128		256.0				>2048		>2048	

N/A[1] - Pool cross section not surveyed for this reach.

Proposed Geomorphic Parameters

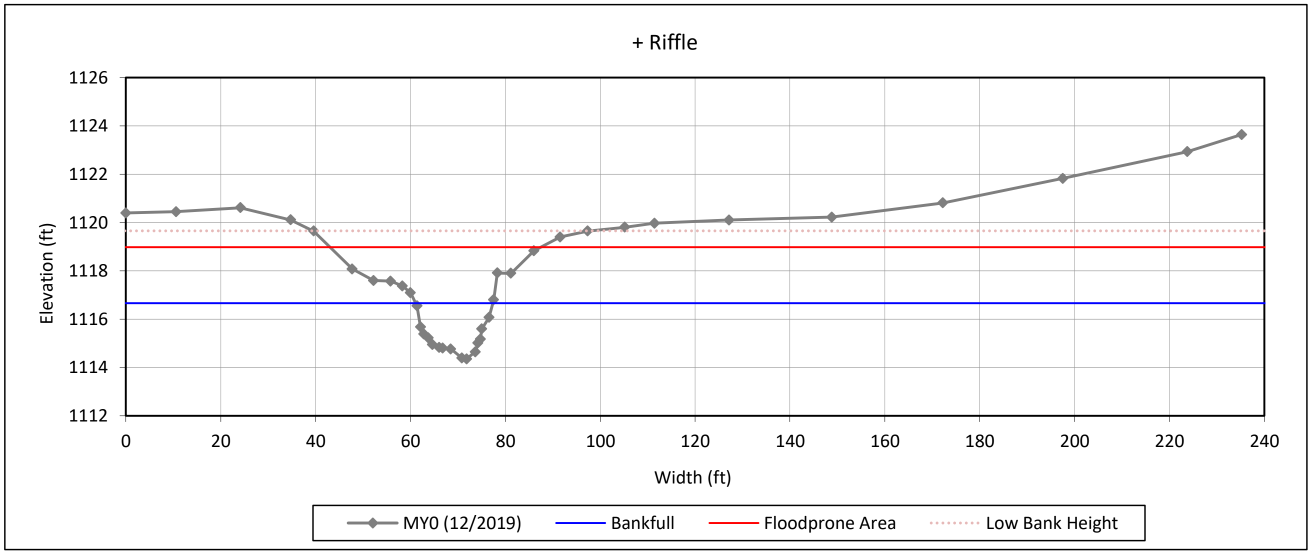
			North Little Hunting Creek				UT1								UT2						Barn Branch		Old Bus Branch	
			Reach 1		Reach 2		Reach 1 (low slope)		Reach 1 (high slope)		Reach 2		Reach 3		Reach 2		Reach 3		Reach 4					
	Notation	Units	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
stream type			C4		C4		C4		B4a		C4b		C4b		B5a		B5		C5		B5a		A5	
drainage area	DA	*sq mi*	1.79		1.99		0.05				0.10		0.11		0.05		0.07		0.07		0.02		0.01	
design discharge	Q	*cfs*	100		110		7				10		11		7		9		9		6		4	
bankfull cross-sectional area	A_{bkf}	*SF*	29.2		31.1		2.3		1.5		2.6		3.0		1.6		2.6		4.5		1.4		0.9	
average velocity during bankfull event	v_{bkf}	*fps*	3.1		3.6		2.8		4.3		4.0		3.4		5.0		3.4		2.0		3.9		4.7	
Cross-Section																								
width at bankfull	w_{bkf}	*feet*	22.0		23.0		5.7		4.5		6.2		6.6		5.0		6.6		8.4		4.3		3.0	
maximum depth at bankfull	d_{max}	*feet*	2.0		2.0		0.6		0.5		0.6		0.8		0.5		0.5		0.8		0.5		0.5	
mean depth at bankfull	d_{bkf}	*feet*	1.3		1.4		0.4		0.3		0.4		0.5		0.3		0.4		0.5		0.3		0.3	
bankfull width to depth ratio	w_{bkf}/d_{bkf}		16.6		17.0		13.9		13.5		14.6		14.3		15.4		17.1		15.8		13.2		10.3	
max depth ratio	d_{max}/d_{bkf}	*feet*	1.5		1.5		1.5		1.5		1.4		1.7		1.5		1.3		1.5		1.5		1.7	
bank height ratio	BHR		1.0	1.1	1.0	1.1	1.0	1.1	1.0	1.1	1.0	1.1	1.0	1.1	1.0	1.1	1.0	1.1	1.0	1.1	1.0	1.1	1.0	1.1
floodprone area width	w_{fpa}	*feet*	48	220	51	230	13	57	10	45	11	25	12	26	7	12	9	16	18	84	6	10	4	7
entrenchment ratio	ER		2.2	10.0	2.2	10.0	2.2	10.0	2.2	10.0	1.8	4.0	1.8	4.0	1.4	2.4	1.4	2.4	2.2	10.0	1.4	2.4	1.4	2.4
Slope																								
valley slope	S_{valley}	*feet/ foot*	0.0057		0.0057		0.0182		0.0621		0.0332		0.0246		0.0917		0.0353		0.0121		0.0590		0.1070	
channel slope	S_{chnl}	*feet/ foot*	0.0049		0.0066		0.0190		0.0594		0.0380		0.0241		0.0830		0.0300		0.0070		0.0520		0.0900	
Profile																								
riffle slope	S_{riffle}	*feet/ foot*	0.0063	0.0170	0.0086	0.0230	0.0247	0.0665	0.0772	0.2079	0.0494	0.3800	0.0313	0.2410	0.1079	0.8300	0.0390	0.3000	0.0091	0.0245	0.0260	0.1560	0.0450	0.2700
riffle slope ratio	S_{riffle}/S_{chnl}		1.3	3.5	1.3	3.5	1.3	3.5	1.3	3.5	1.3	10.0	1.3	10.0	1.3	10.0	1.3	10.0	1.3	3.5	0.5	3.0	0.5	3.0
pool slope	S_p	*feet/ foot*	0.0000	0.0039	0.0000	0.0053	0.0304	0.0456	0.0950	0.1426	0.1824	0.2128	0.0000	0.0193	0.0000	0.0664	0.0000	0.0240	0.0000	0.0056	0.0000	0.0416	0.0000	0.0720
pool slope ratio	S_p/S_{chnl}		0.0	0.8	0.0	0.8	1.6	2.4	1.6	2.4	4.8	5.6	0.0	0.8	0.0	0.8	0.0	0.8	0.0	0.8	0.0	0.8	0.0	0.8
pool-to-pool spacing	L_{p-p}	*feet*	66	110	69	115	17	29	14	23	12	31	13	33	3	33	3	43	25	42	2	28	2	20
pool spacing ratio	L_{p-p}/w_{bkf}		3.0	5.0	3.0	5.0	3.0	5.0	3.0	5.0	2.0	5.0	2.0	5.0	0.5	6.5	0.5	6.5	3.0	5.0	0.5	6.5	0.5	6.5
pool cross-sectional area	A_{pool}	*SF*					6.9		4.6		7.4		8.6		5.5		9.0		11.7		3.6		2.0	
pool area ratio	A_{pool}/A_{bkf}		#VALUE!		#VALUE!		2.9		3.0		2.8		2.8		3.4		3.5		2.6		2.6		2.3	
maximum pool depth	d_{pool}	*feet*	2.7	5.3	2.7	5.4	0.8	1.6	0.7	1.3	0.9	1.7	0.9	1.8	0.7	1.3	0.8	1.5	1.1	2.1	0.7	1.3	0.6	1.2
pool depth ratio	d_{pool}/d_{bkf}		2.0	4.0	2.0	4.0	2.0	4.0	2.0	4.0	2.0	4.0	2.0	4.0	2.0	4.0	2.0	4.0	2.0	4.0	2.0	4.0	2.0	4.0
pool width at bankfull	w_{pool}	*feet*	32.0		32.0		8.2		6.5		8.7		9.5		7.5		9.6		11.0		6.0		4.0	
pool width ratio	w_{pool}/w_{bkf}		1.5		1.4		1.4		1.4		1.4		1.4		1.5		1.5		1.3		1.4		1.3	
Pattern																								
sinuosity	K		1.29		1.21		1.28		1.07		1.23		1.12		1.07		1.11		1.30		1.09		1.03	
belt width	w_{blt}	*feet*	77	125	81	131	20	32	N/A		11	35	12	38	N/A		N/A		29	48	N/A		N/A	
meander width ratio	w_{blt}/w_{bkf}		3.5	5.7	3.5	5.7	3.5	5.7	N/A		1.8	5.7	1.8	5.7	N/A		N/A		3.5	5.7	N/A		N/A	
linear wavelength (formerly meander length)	LW	*feet*	37	189	39	198	10	49	N/A		11	53	11	57	N/A		N/A		14	72	N/A		N/A	
linear wavelength ratio (formerly meander length ratio)	LW/w_{bkf}		1.7	8.6	1.7	8.6	1.7	8.6	N/A		1.7	8.6	1.7	8.6	N/A		N/A		1.7	8.6	N/A		N/A	
meander length	L_m	*feet*	110	264	115	276	29	68	N/A		31	74	33	79	N/A		N/A		42	101	N/A		N/A	
meander length ratio	L_m/W_{bkf}		5	12	5	12	5	12	N/A		5	12	5	12	N/A		N/A		5	12	N/A		N/A	
radius of curvature	R_c	*feet*	40	77	41	81	10	20	N/A		11	22	12	23	N/A		N/A		15	29	N/A		N/A	
radius of curvature ratio	R_c/w_{bkf}		1.8	3.5	1.8	3.5	1.8	3.5	N/A		1.8	3.5	1.8	3.5	N/A		N/A		1.8	3.5	N/A		N/A	

N/A - Does not apply to B, Ba, A type channels

Cross-Section Plots

Huntsman Mitigation Site
NCDMS Project No. 100123
Existing Conditions - 2019

Cross-Section 1 - North Little Hunting Creek



Bankfull Dimensions	
25.8	x-section area (ft.sq.)
16.3	width (ft)
1.6	mean depth (ft)
2.3	max depth (ft)
17.5	wetted perimeter (ft)
1.5	hydraulic radius (ft)
10.3	width-depth ratio
44.3	W flood prone area (ft)
2.7	entrenchment ratio
2.3	low bank height ratio

Survey Date: 12/2019
Field Crew: Wildlands Engineering

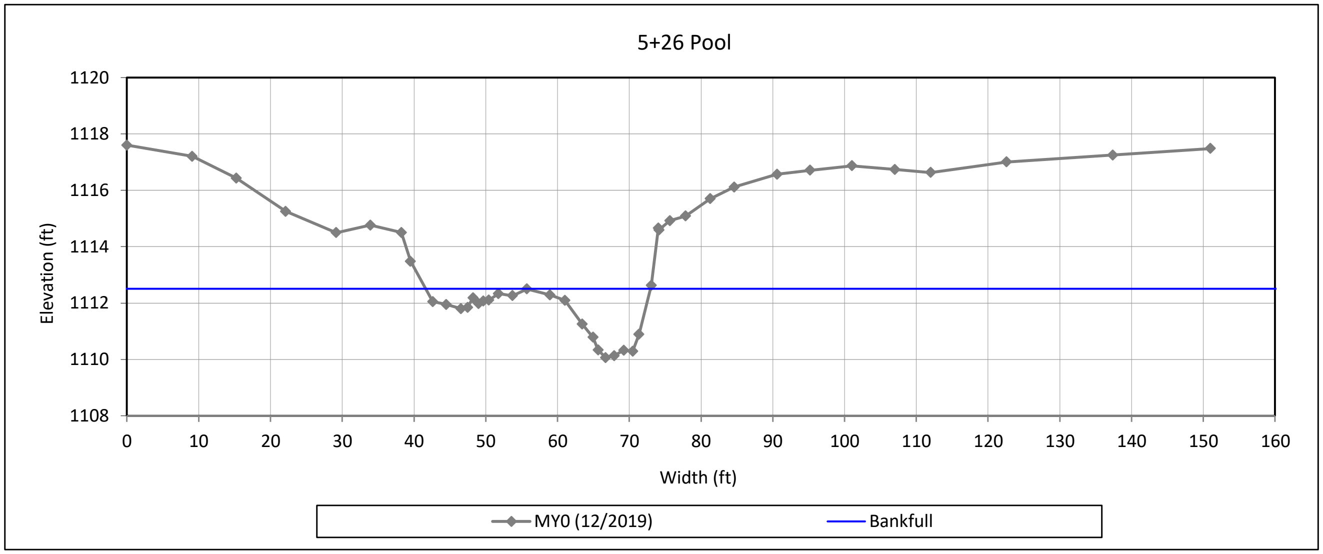
View Upstream

View Downstream

Cross-Section Plots

Huntsman Mitigation Site
NCDMS Project No. 100123
Existing Conditions - 2019

Cross-Section 2 - North Little Hunting Creek



Bankfull Dimensions

20.2	x-section area (ft.sq.)
14.0	width (ft)
1.4	mean depth (ft)
2.4	max depth (ft)
15.3	wetted perimeter (ft)
1.3	hydraulic radius (ft)
9.7	width-depth ratio

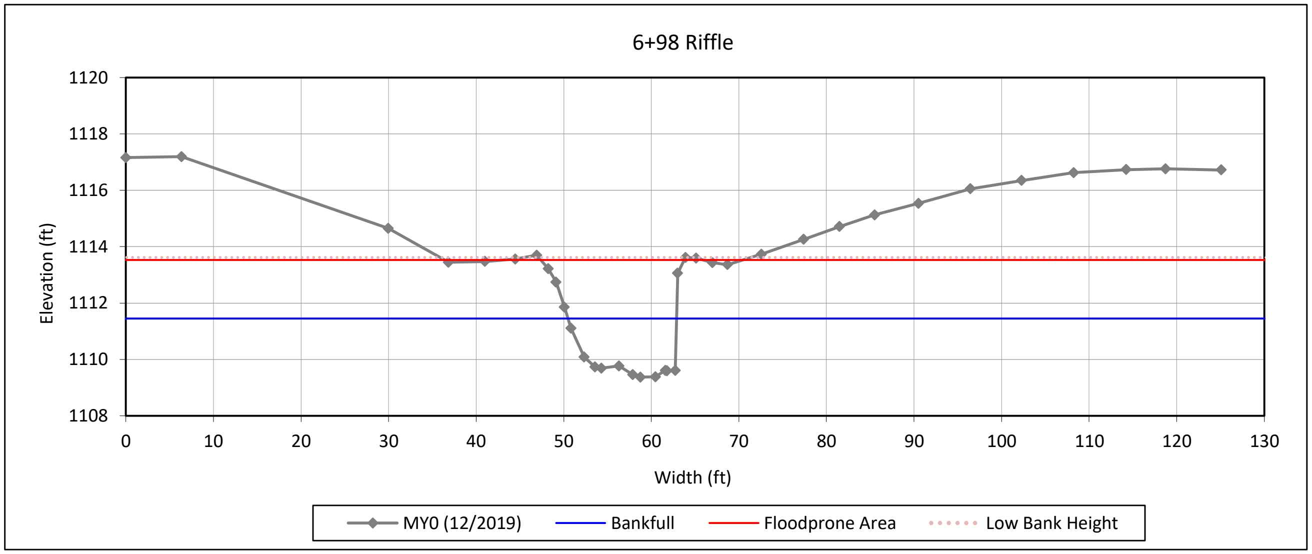
Survey Date: 12/2019
Field Crew: Wildlands Engineering

View Downstream

Cross-Section Plots

Huntsman Mitigation Site
NCDMS Project No. 100123
Existing Conditions - 2019

Cross-Section 3 - North Little Hunting Creek



Bankfull Dimensions	
20.6	x-section area (ft.sq.)
12.4	width (ft)
1.7	mean depth (ft)
2.1	max depth (ft)
14.7	wetted perimeter (ft)
1.4	hydraulic radius (ft)
7.5	width-depth ratio
17.0	W flood prone area (ft)
1.4	entrenchment ratio
2.0	low bank height ratio

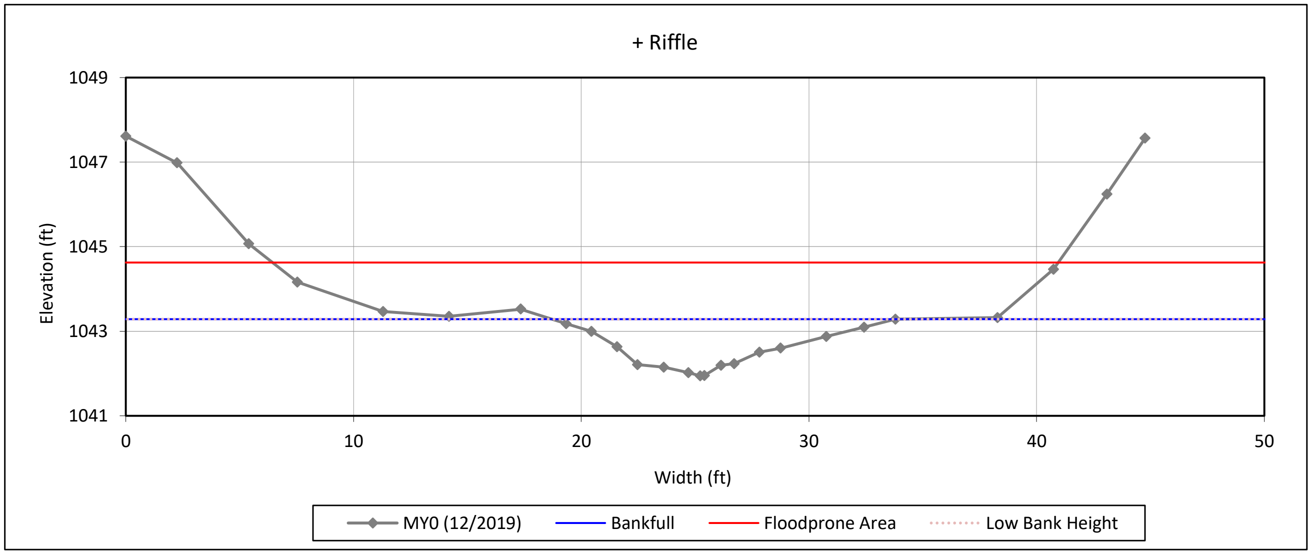
Survey Date: 12/2019
Field Crew: Wildlands Engineering

View Upstream

View Downstream

Cross-Section Plots
Huntsman Mitigation Site
NCDMS Project No. 100123
Existing Conditions - 2019

Cross-Section 4 - UT1



Bankfull Dimensions	
9.8	x-section area (ft.sq.)
13.7	width (ft)
0.7	mean depth (ft)
1.3	max depth (ft)
14.0	wetted perimeter (ft)
0.7	hydraulic radius (ft)
19.1	width-depth ratio
34.5	W flood prone area (ft)
2.5	entrenchment ratio
1.0	low bank height ratio

Survey Date: 12/2019
Field Crew: Wildlands Engineering

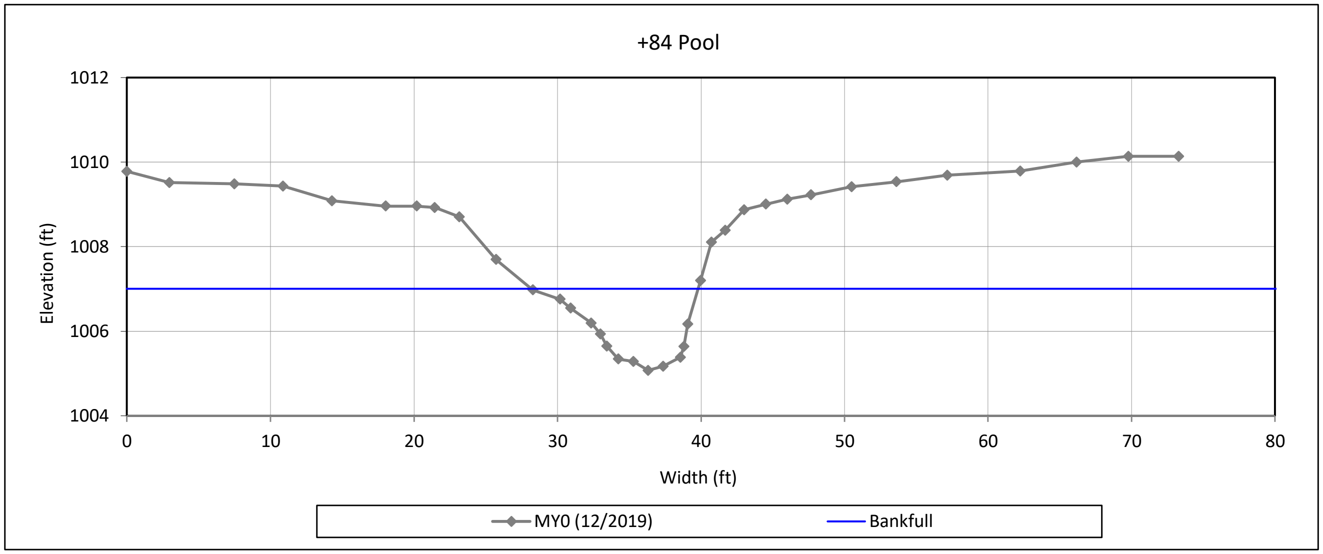

Left Bank


Right Bank


View Downstream

Cross-Section Plots
Huntsman Mitigation Site
NCDMS Project No. 100123
Existing Conditions - 2019

Cross-Section 5 - UT1



Bankfull Dimensions	
10.7	x-section area (ft.sq.)
6.7	width (ft)
1.6	mean depth (ft)
1.9	max depth (ft)
7.4	wetted perimeter (ft)
1.4	hydraulic radius (ft)
4.2	width-depth ratio


Left Bank


Right Bank

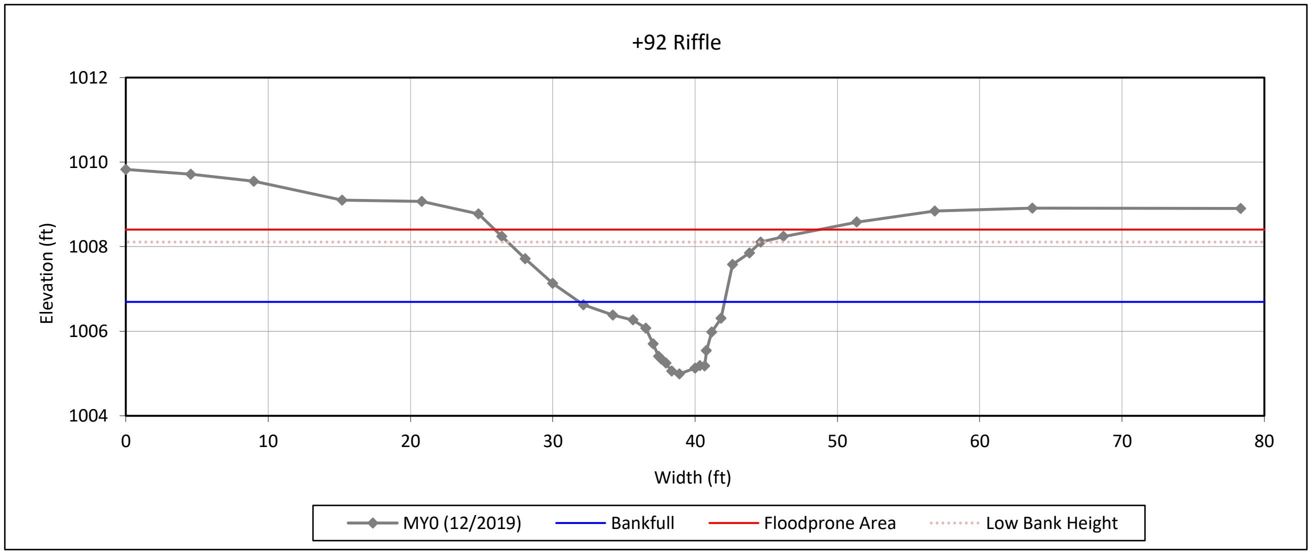

View Downstream

Survey Date: 12/2019
Field Crew: Wildlands Engineering

Cross-Section Plots

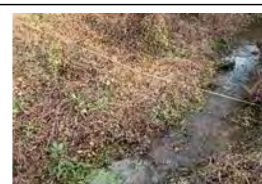
Huntsman Mitigation Site
NCDMS Project No. 100123
Existing Conditions - 2019

Cross-Section 6 - UT1



Bankfull Dimensions	
8.2	x-section area (ft.sq.)
10.2	width (ft)
0.8	mean depth (ft)
1.7	max depth (ft)
11.3	wetted perimeter (ft)
0.7	hydraulic radius (ft)
12.7	width-depth ratio
22.7	W flood prone area (ft)
2.2	entrenchment ratio
1.8	low bank height ratio

Survey Date: 12/2019
Field Crew: Wildlands Engineering

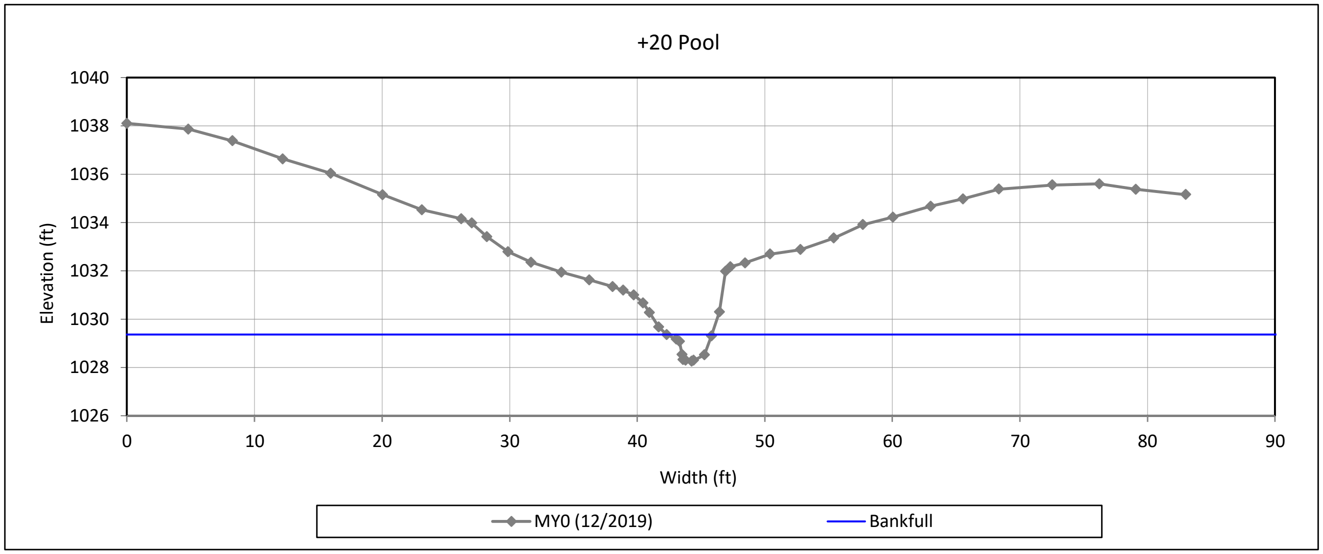

Left Bank


Right Bank


View Downstream

Cross-Section Plots
Huntsman Mitigation Site
NCDMS Project No. 100123
Existing Conditions - 2019

Cross-Section 7 - UT2 R2



Bankfull Dimensions	
2.3	x-section area (ft.sq.)
3.5	width (ft)
0.6	mean depth (ft)
1.1	max depth (ft)
4.5	wetted perimeter (ft)
0.5	hydraulic radius (ft)
5.4	width-depth ratio


Left Bank

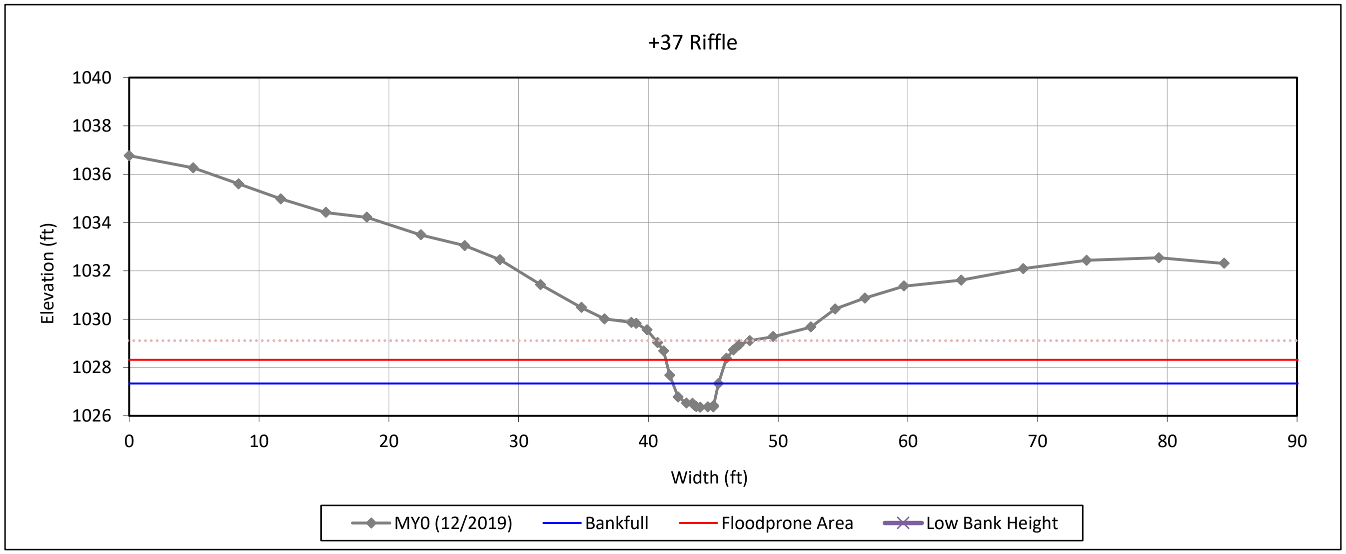

Right Bank


View Downstream

Survey Date: 12/2019
Field Crew: Wildlands Engineering

Cross-Section Plots
Huntsman Mitigation Site
NCDMS Project No. 100123
Existing Conditions - 2019

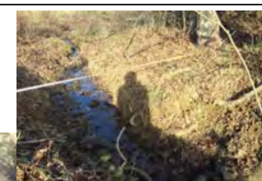
Cross-Section 8 - UT2 R2



Bankfull Dimensions	
2.6	x-section area (ft.sq.)
3.5	width (ft)
0.8	mean depth (ft)
1.0	max depth (ft)
4.5	wetted perimeter (ft)
0.6	hydraulic radius (ft)
4.7	width-depth ratio
4.6	W flood prone area (ft)
1.3	entrenchment ratio
2.8	low bank height ratio

Survey Date: 12/2019
Field Crew: Wildlands Engineering

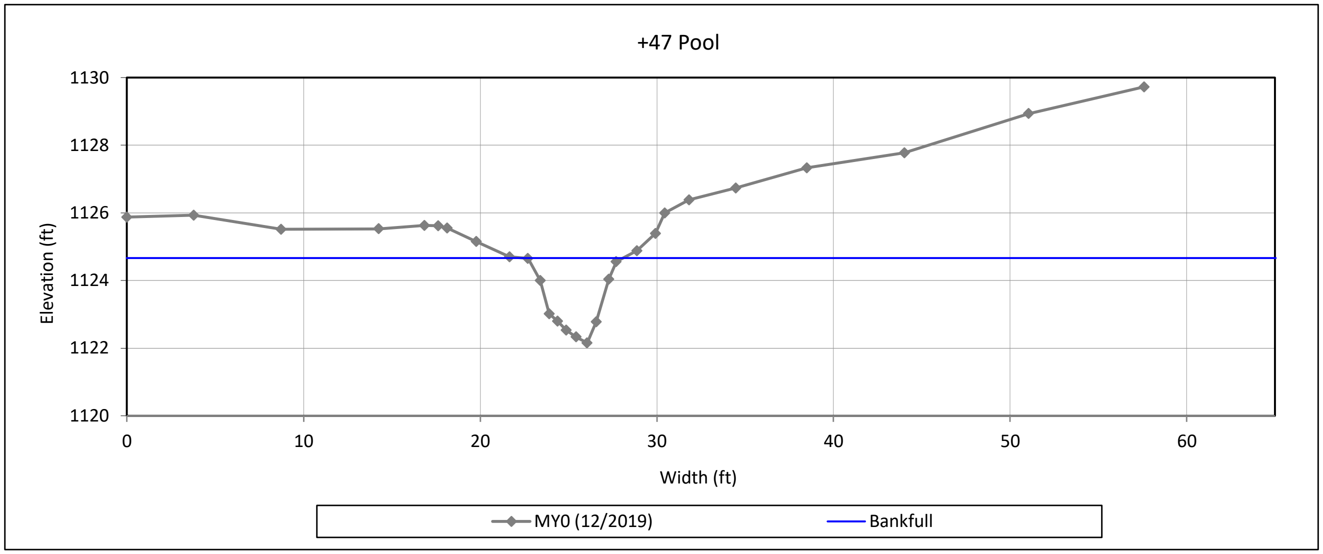

Left Bank


Right Bank


View Downstream

Cross-Section Plots
Huntsman Mitigation Site
NCDMS Project No. 100123
Existing Conditions - 2019

Cross-Section 9 - UT2 R3



Bankfull Dimensions	
7.5	x-section area (ft.sq.)
5.0	width (ft)
1.5	mean depth (ft)
2.5	max depth (ft)
7.3	wetted perimeter (ft)
1.0	hydraulic radius (ft)
3.3	width-depth ratio

Survey Date: 12/2019
Field Crew: Wildlands Engineering

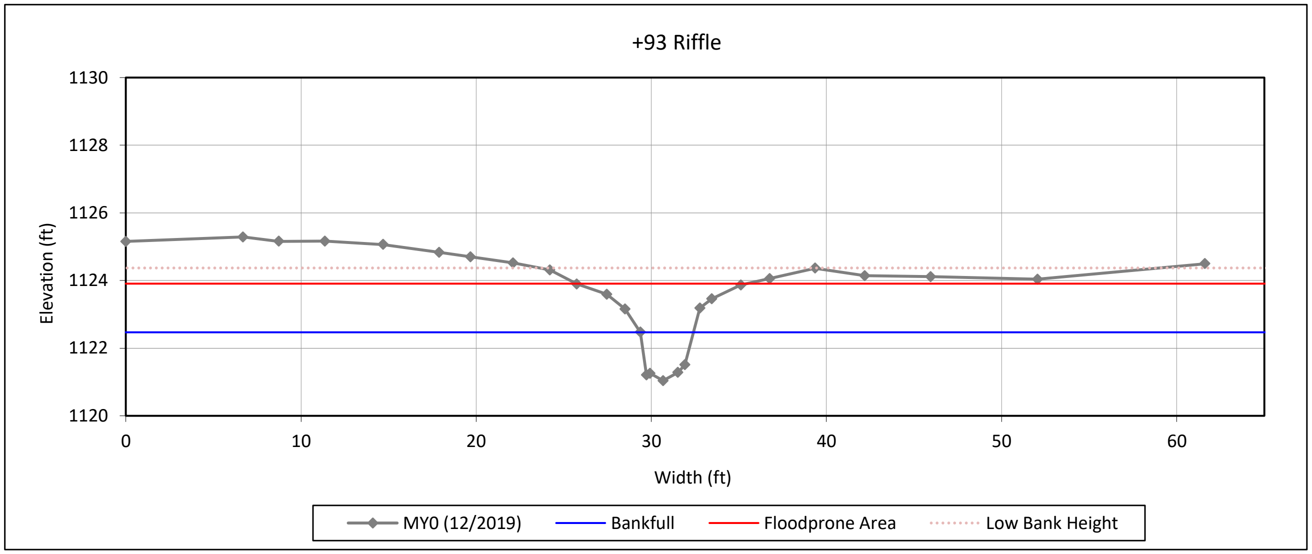

Left Bank


View Towards Left bank


View Upstream

Cross-Section Plots
Huntsman Mitigation Site
NCDMS Project No. 100123
Existing Conditions - 2019

Cross-Section 10 - UT2 R3



Bankfull Dimensions	
3.2	x-section area (ft.sq.)
3.0	width (ft)
1.1	mean depth (ft)
1.4	max depth (ft)
4.7	wetted perimeter (ft)
0.7	hydraulic radius (ft)
2.9	width-depth ratio
9.6	W flood prone area (ft)
3.2	entrenchment ratio
2.3	low bank height ratio

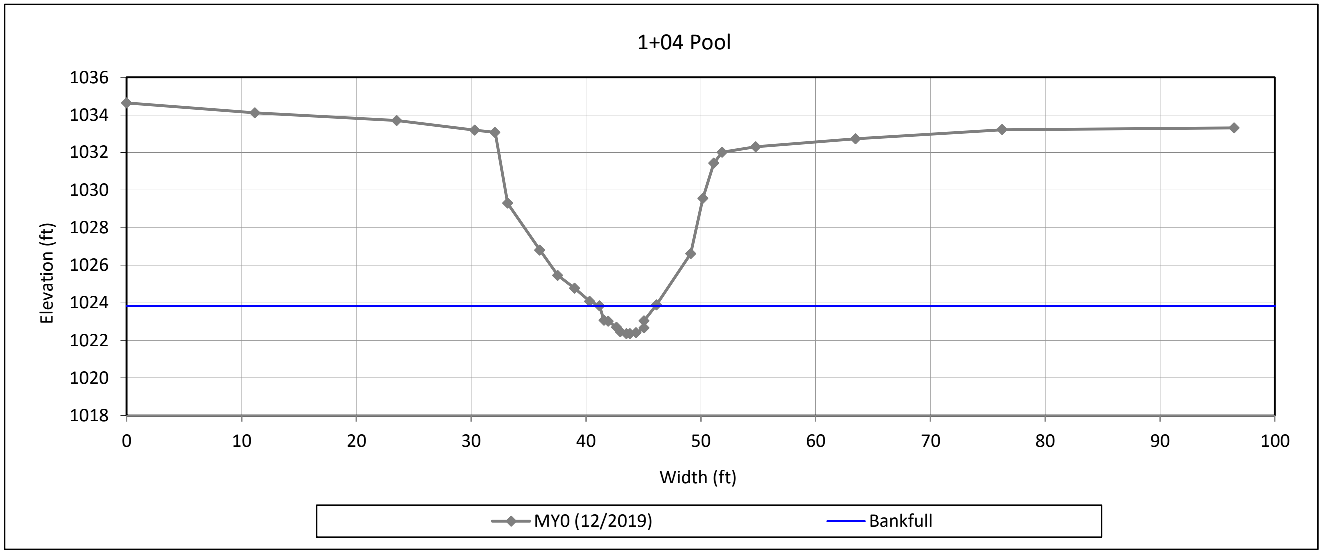
Survey Date: 12/2019
Field Crew: Wildlands Engineering

View Upstream

View Downstream

Cross-Section Plots
Huntsman Mitigation Site
NCDMS Project No. 100123
Existing Conditions - 2019

Cross-Section 11 - Old Bus Branch



Bankfull Dimensions	
4.9	x-section area (ft.sq.)
4.9	width (ft)
1.0	mean depth (ft)
1.5	max depth (ft)
6.3	wetted perimeter (ft)
0.8	hydraulic radius (ft)
4.9	width-depth ratio


Left Bank

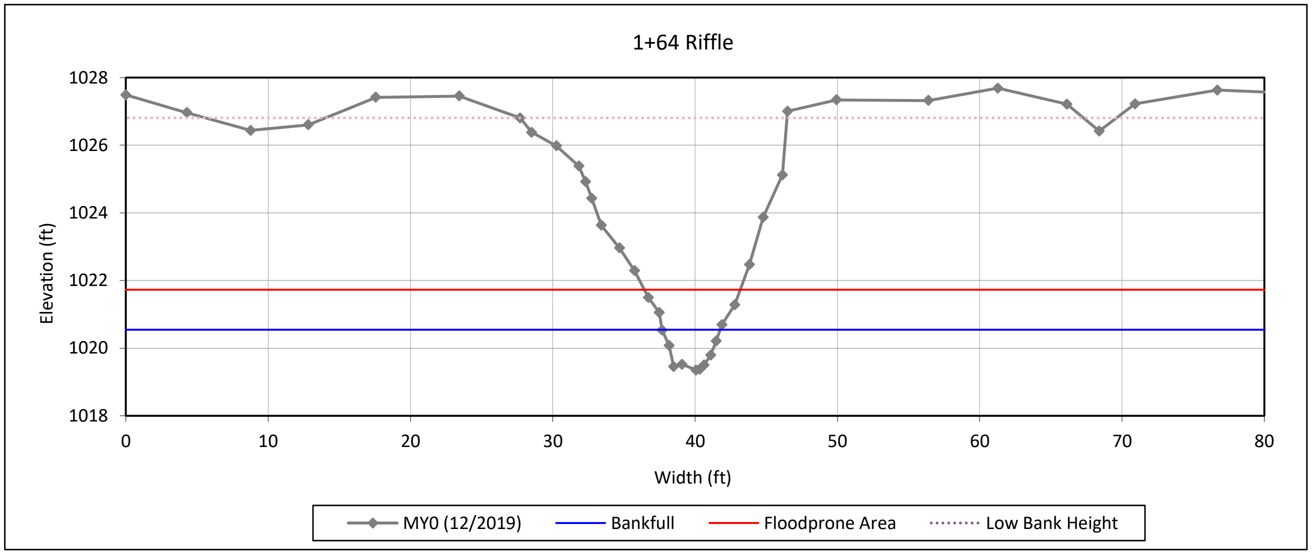

Right Bank


View Downstream

Survey Date: 12/2019
Field Crew: Wildlands Engineering

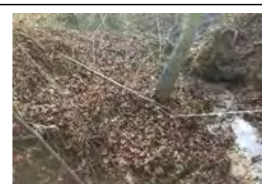
Cross-Section Plots
Huntsman Mitigation Site
NCDMS Project No. 100123
Existing Conditions - 2019

Cross-Section 12 - Old Bus Branch



Bankfull Dimensions	
3.4	x-section area (ft.sq.)
4.1	width (ft)
0.8	mean depth (ft)
1.2	max depth (ft)
5.1	wetted perimeter (ft)
0.7	hydraulic radius (ft)
4.9	width-depth ratio
6.8	W flood prone area (ft)
1.7	entrenchment ratio
6.3	low bank height ratio

Survey Date: 12/2019
Field Crew: Wildlands Engineering


Left Bank

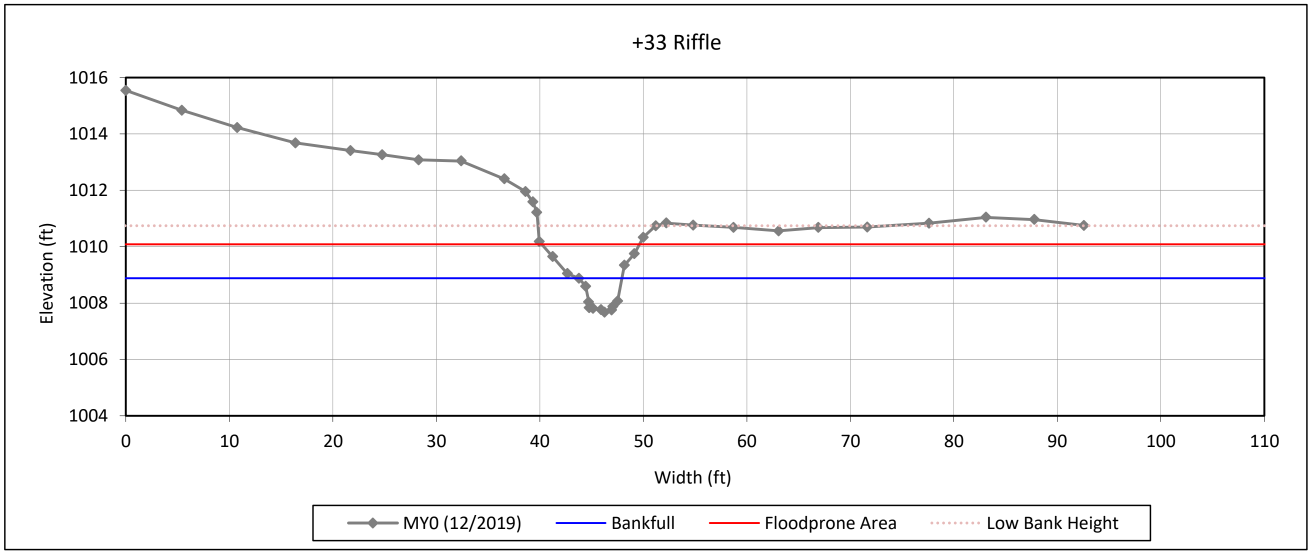

Right Bank


View Downstream

Cross-Section Plots

Huntsman Mitigation Site
NCDMS Project No. 100123
Existing Conditions - 2019

Cross-Section 13 - Barn Branch



Bankfull Dimensions	
3.3	x-section area (ft.sq.)
3.8	width (ft)
0.9	mean depth (ft)
1.2	max depth (ft)
4.4	wetted perimeter (ft)
0.7	hydraulic radius (ft)
4.3	width-depth ratio
9.4	W flood prone area (ft)
2.5	entrenchment ratio
2.5	low bank height ratio

Survey Date: 12/2019
Field Crew: Wildlands Engineering


Left Bank

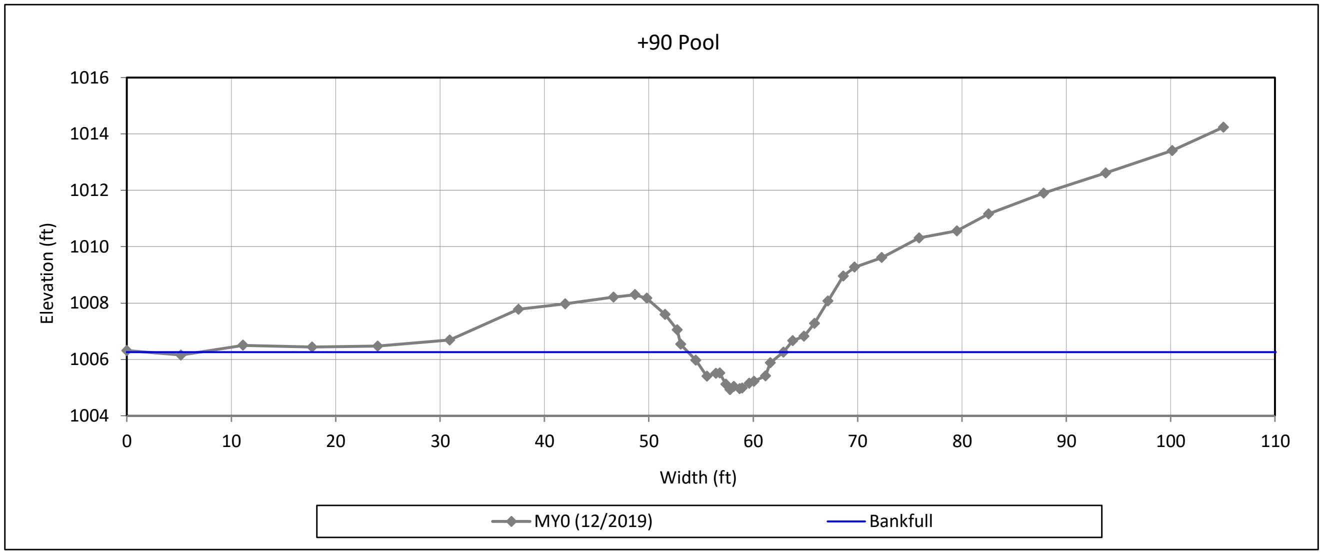

Right Bank


View Downstream

Cross-Section Plots

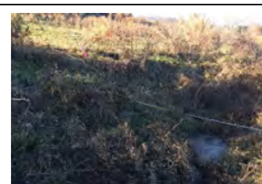
Huntsman Mitigation Site
NCDMS Project No. 100123
Existing Conditions - 2019

Cross-Section 14 - Barn Branch



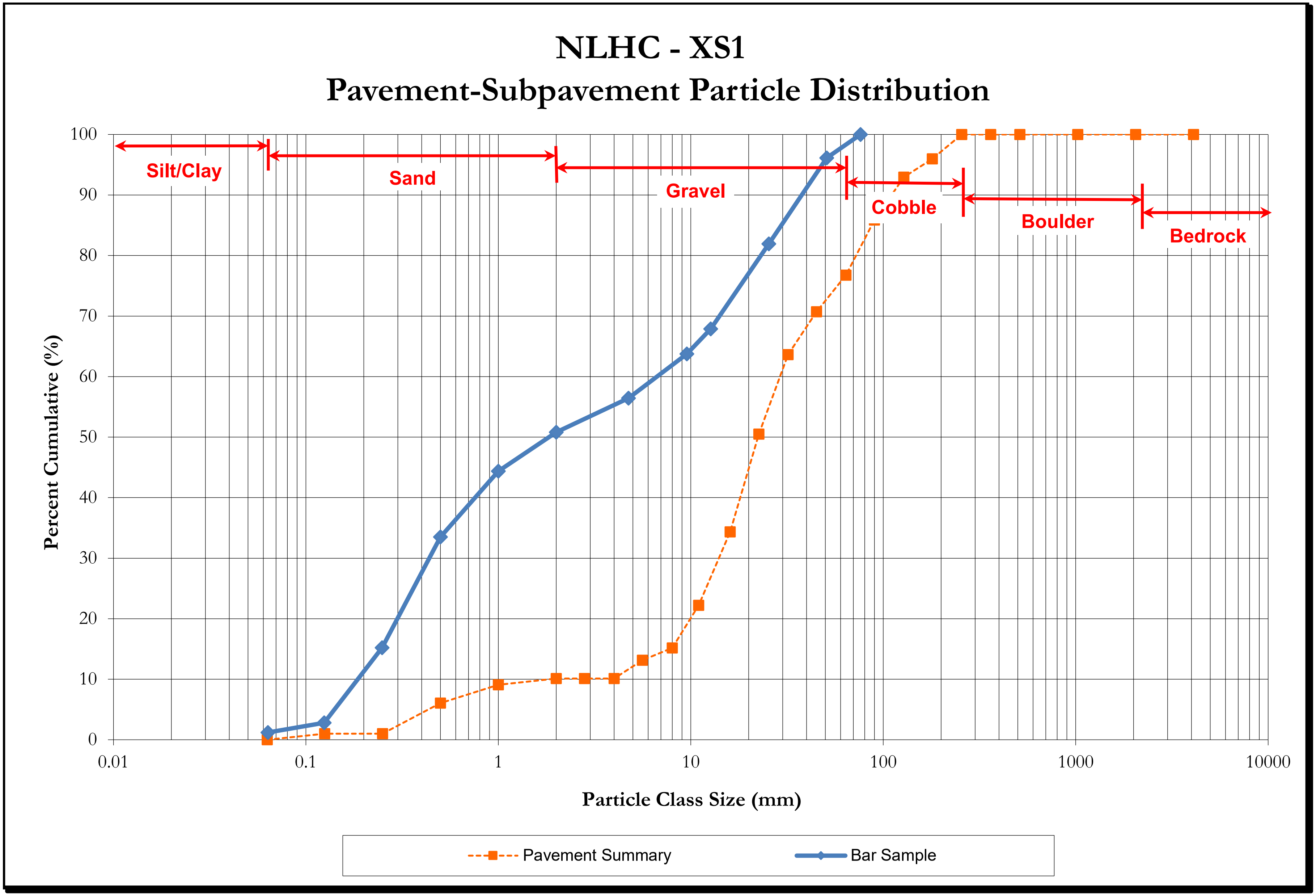
Bankfull Dimensions	
7.1	x-section area (ft.sq.)
9.1	width (ft)
0.8	mean depth (ft)
1.3	max depth (ft)
9.8	wetted perimeter (ft)
0.7	hydraulic radius (ft)
11.8	width-depth ratio

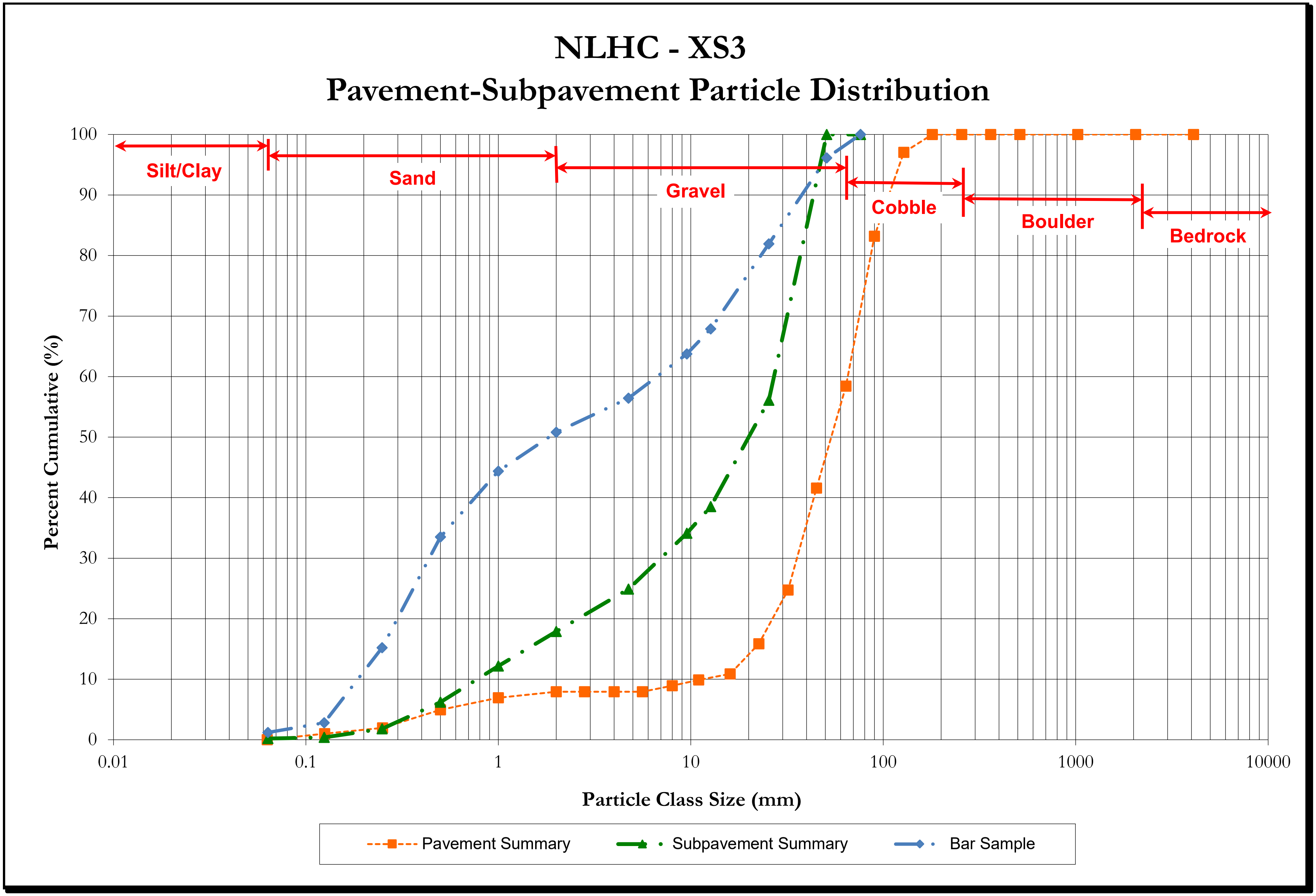
Survey Date: 12/2019
Field Crew: Wildlands Engineering


Left Bank

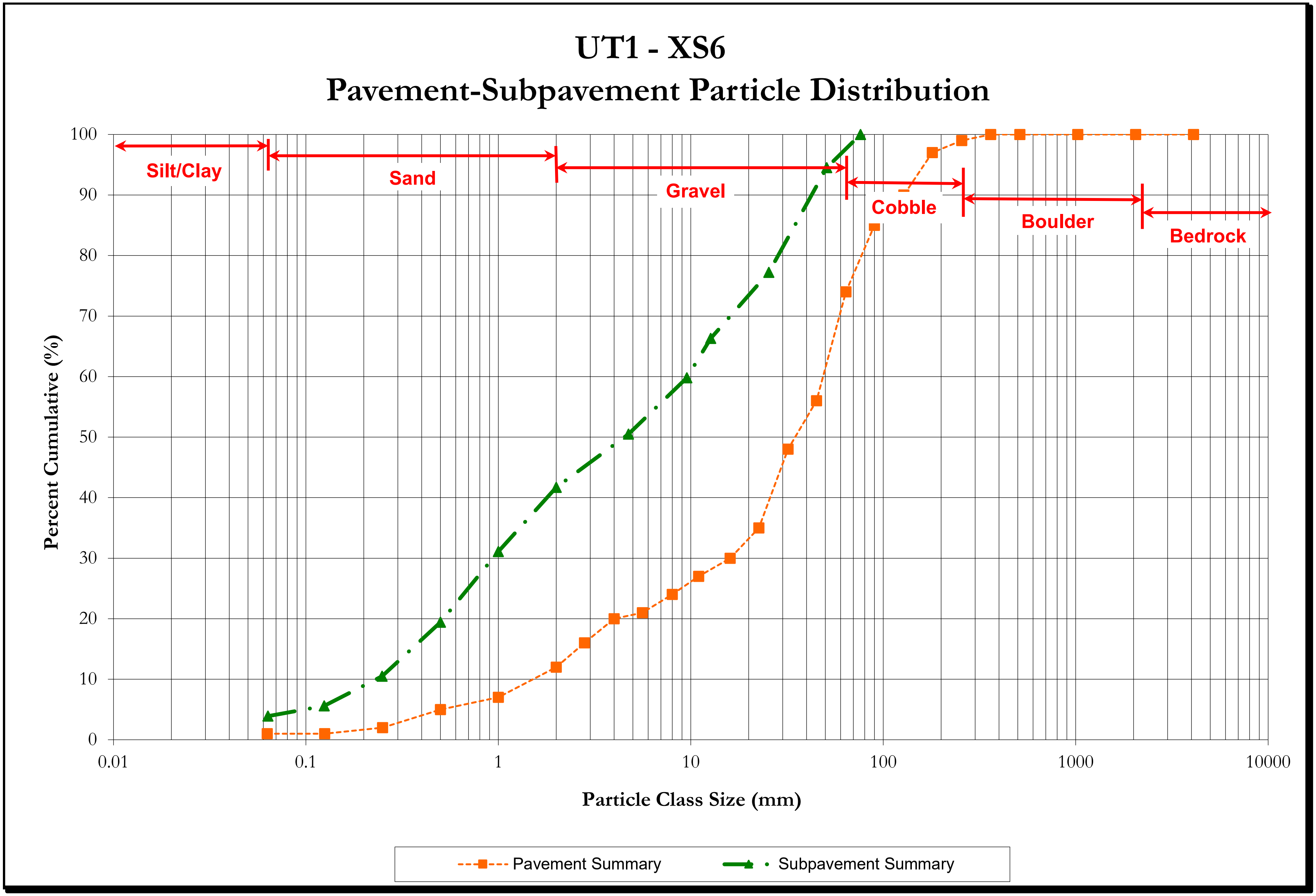

Right Bank

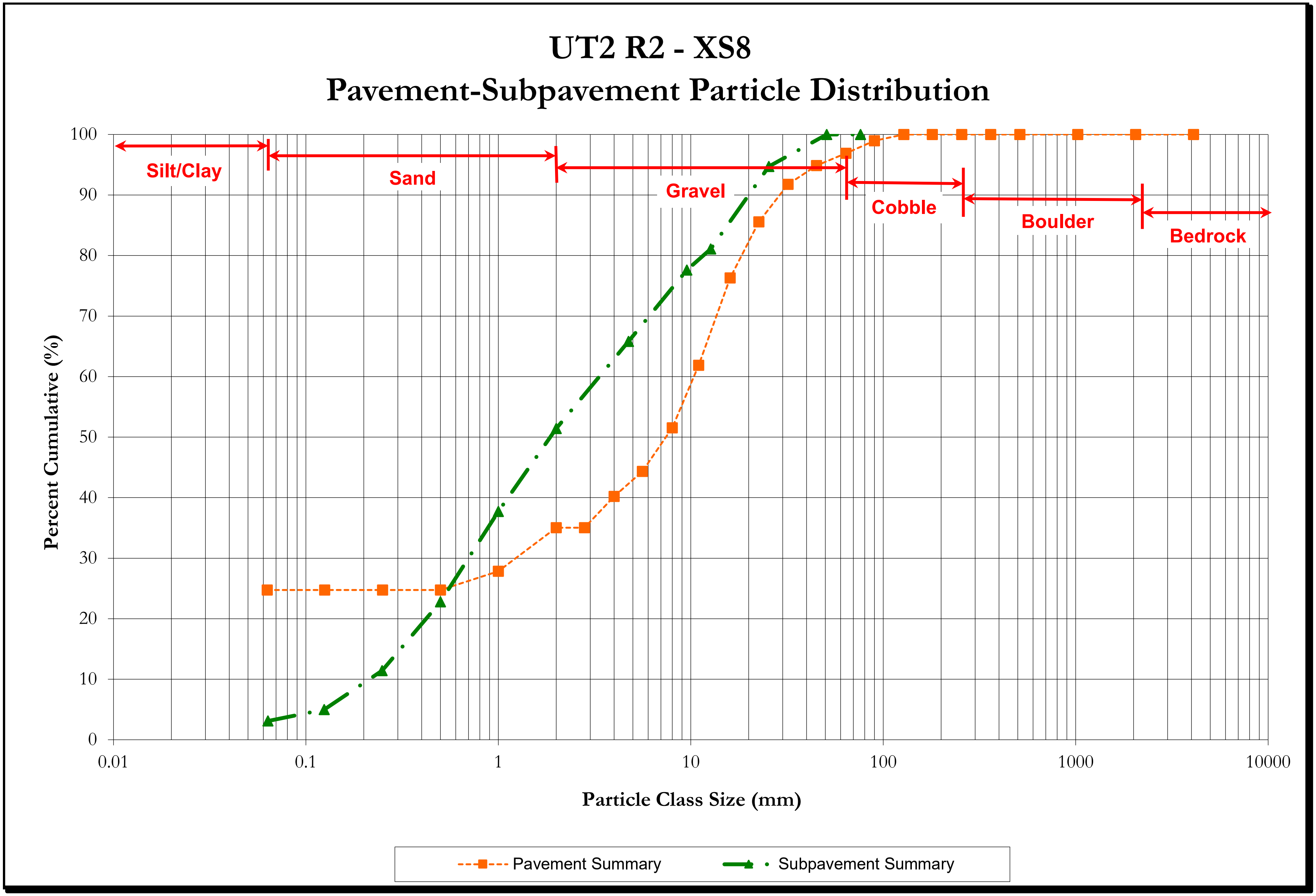

View Downstream


NLHC - XS1
Pavement-Subpavement Particle Distribution
Percent Cumulative (%)
0
10
20
30
40
50
60
70
80
90
100
Silt/Clay
Sand
Gravel
Cobble
Boulder
Bedrock
0.01
0.1
1
10
100
1000
10000
Particle Class Size (mm)
Pavement Summary
Bar Sample

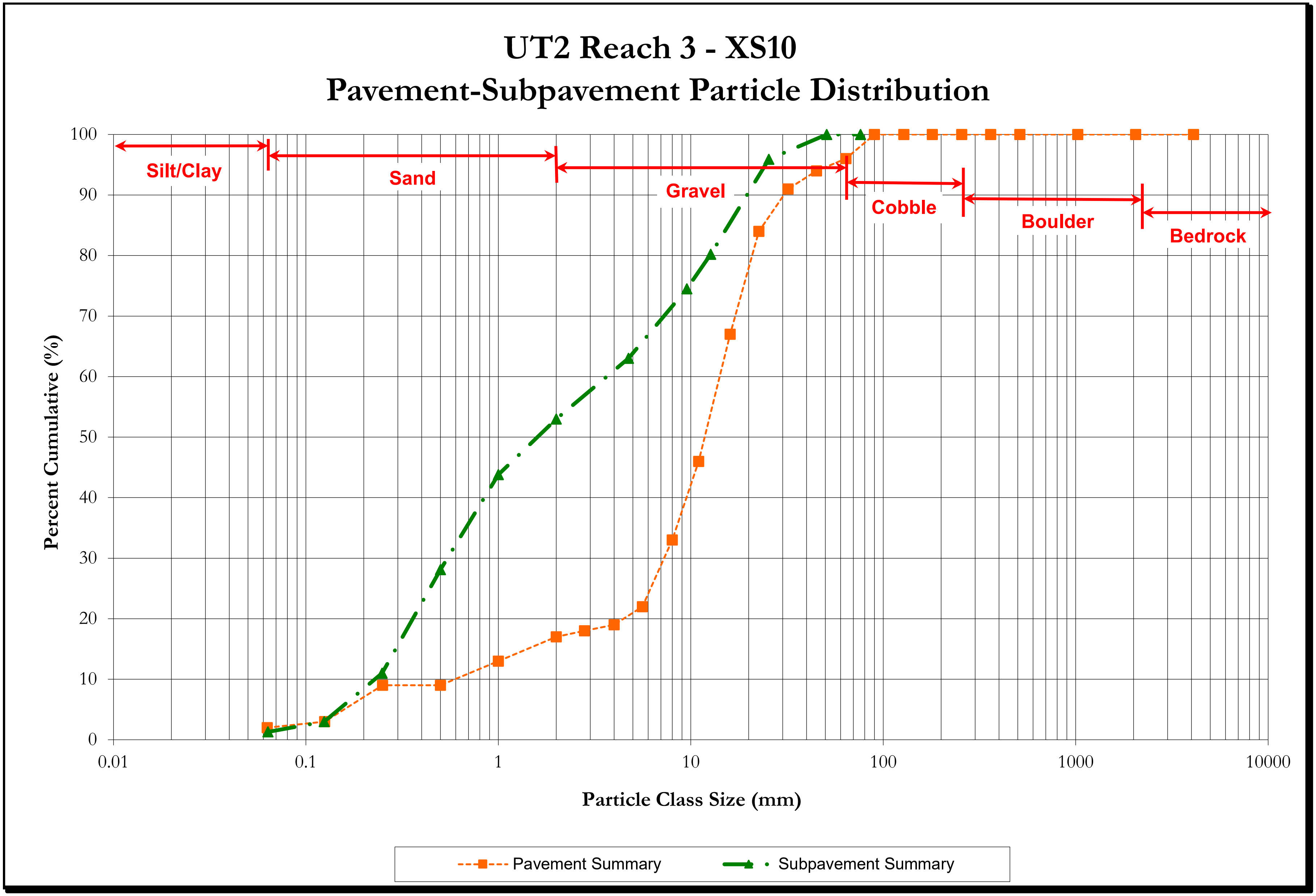


NLHC - XS3
Pavement-Subpavement Particle Distribution
Percent Cumulative (%)
0
10
20
30
40
50
60
70
80
90
100
Silt/Clay
Sand
Gravel
Cobble
Boulder
Bedrock
0.01
0.1
1
10
100
1000
10000
Particle Class Size (mm)
Pavement Summary
Subpavement Summary
Bar Sample

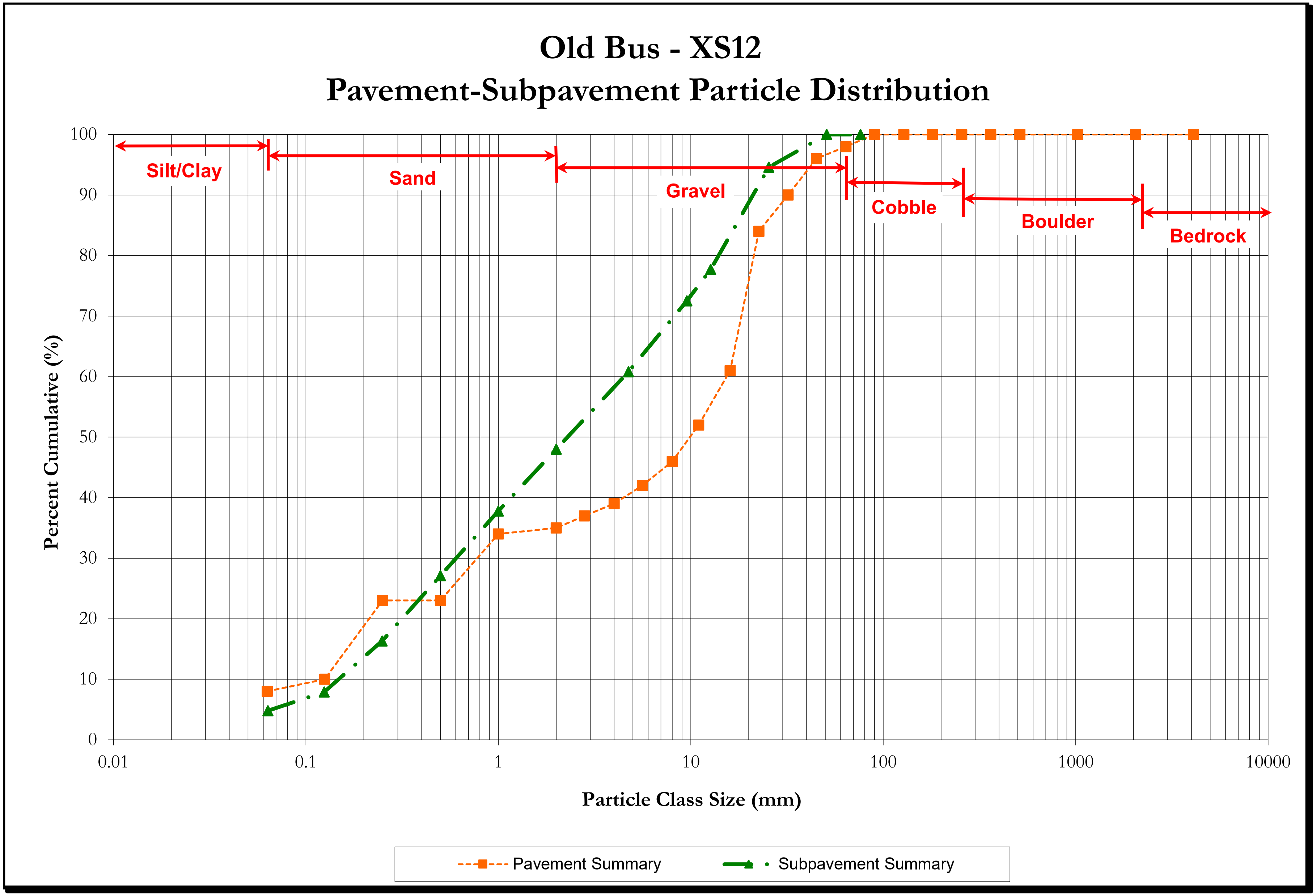

UT1 - XS6
Pavement-Subpavement Particle Distribution
Percent Cumulative (%)
100
90
80
70
60
50
40
30
20
10
0
0.01
0.1
1
10
100
1000
10000
Particle Class Size (mm)
Silt/Clay
Sand
Gravel
Cobble
Boulder
Bedrock
Pavement Summary
Subpavement Summary



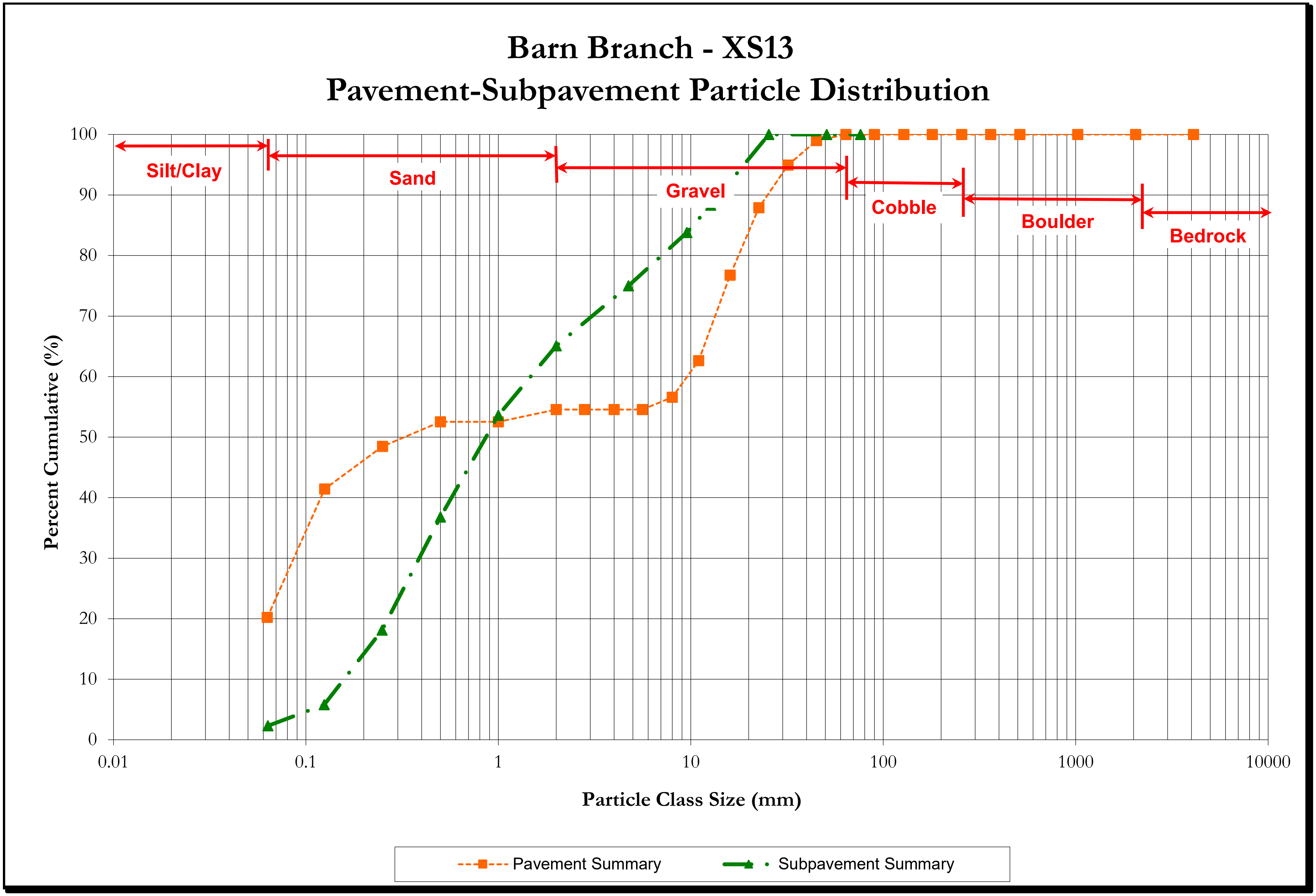
UT2 R2 - XS8
Pavement-Subpavement Particle Distribution
Percent Cumulative (%)
0
10
20
30
40
50
60
70
80
90
100
0.01
0.1
1
10
100
1000
10000
Particle Class Size (mm)
Silt/Clay
Sand
Gravel
Cobble
Boulder
Bedrock
Pavement Summary
Subpavement Summary

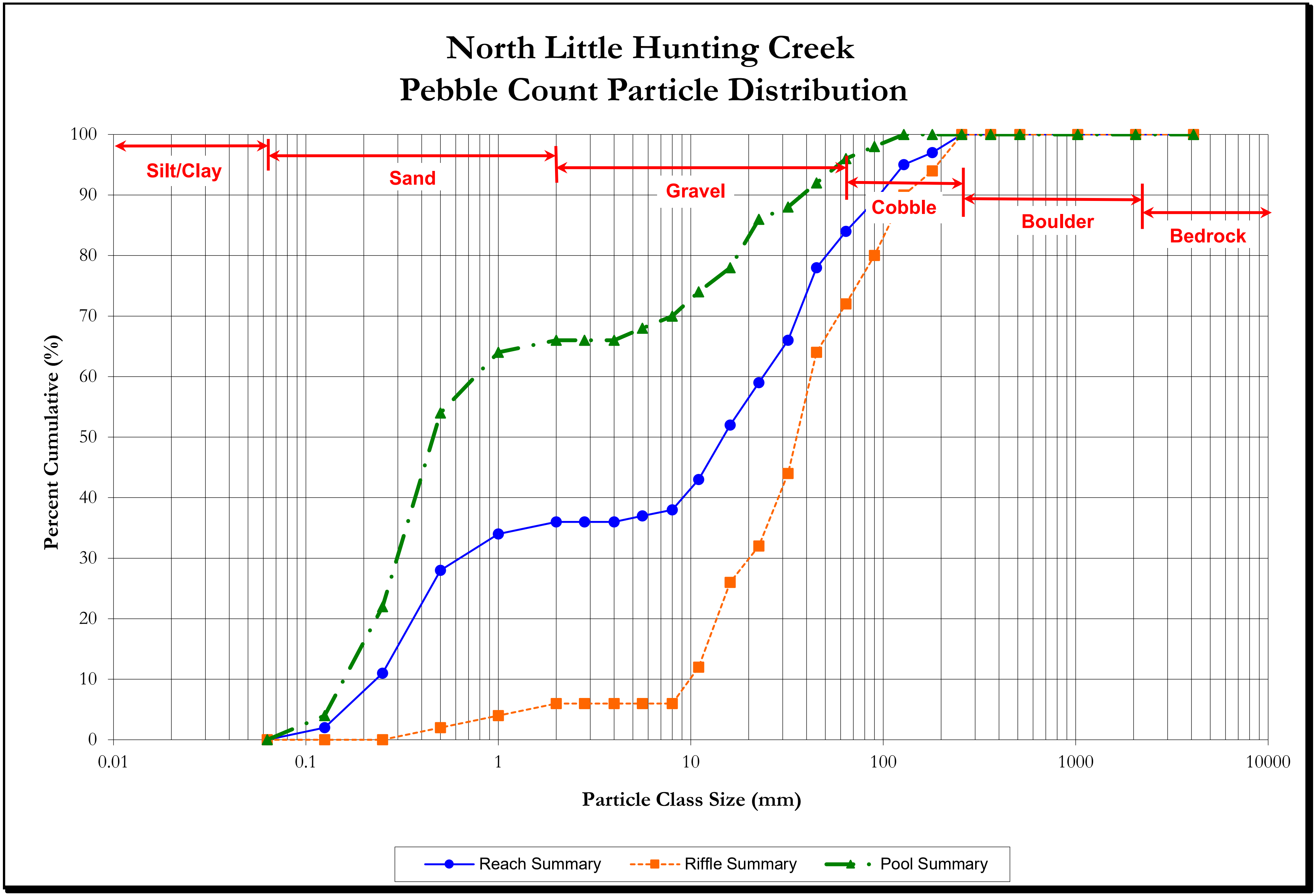


UT2 Reach 3 - XS10
Pavement-Subpavement Particle Distribution
Percent Cumulative (%)
Particle Class Size (mm)
Silt/Clay
Sand
Gravel
Cobble
Boulder
Bedrock
0
10
20
30
40
50
60
70
80
90
100
0.01
0.1
1
10
100
1000
10000
Pavement Summary
Subpavement Summary

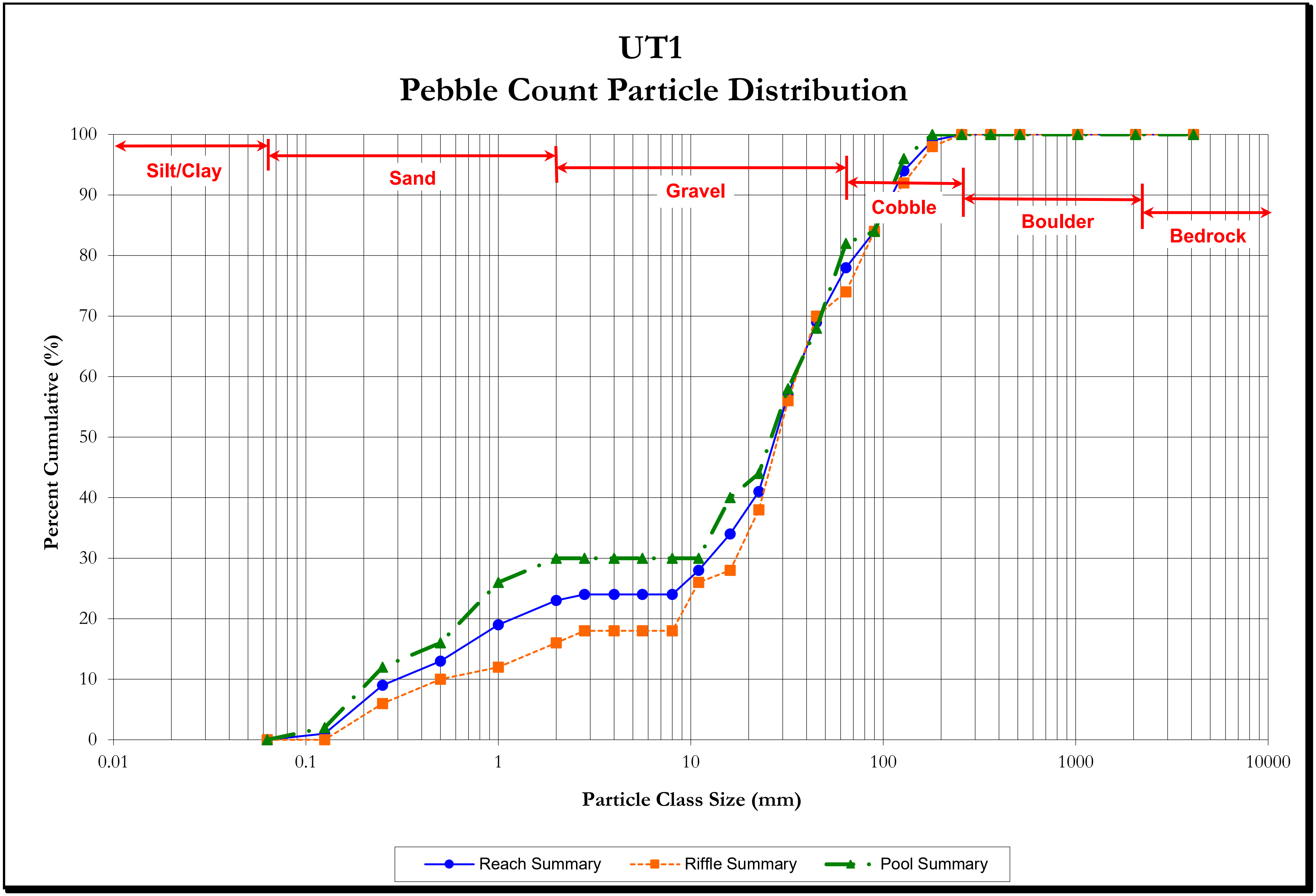


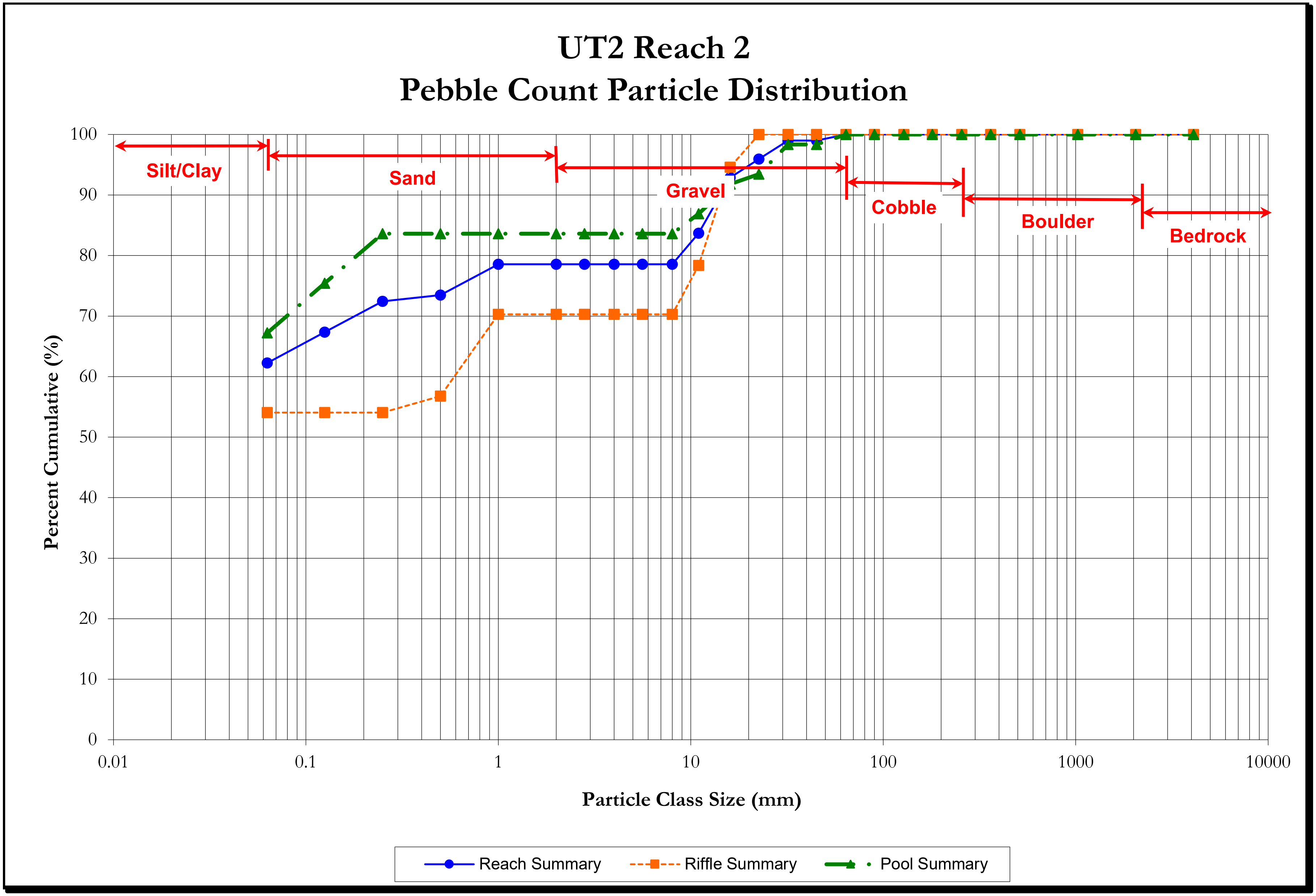
Old Bus - XS12
Pavement-Subpavement Particle Distribution
Percent Cumulative (%)
0
10
20
30
40
50
60
70
80
90
100
0.01
0.1
1
10
100
1000
10000
Particle Class Size (mm)
Silt/Clay
Sand
Gravel
Cobble
Boulder
Bedrock
Pavement Summary
Subpavement Summary


Barn Branch - XS13
Pavement-Subpavement Particle Distribution
Percent Cumulative (%)
Particle Class Size (mm)
Silt/Clay
Sand
Gravel
Cobble
Boulder
Bedrock
100
90
80
70
60
50
40
30
20
10
0
0.01
0.1
1
10
100
1000
10000
Pavement Summary
Subpavement Summary



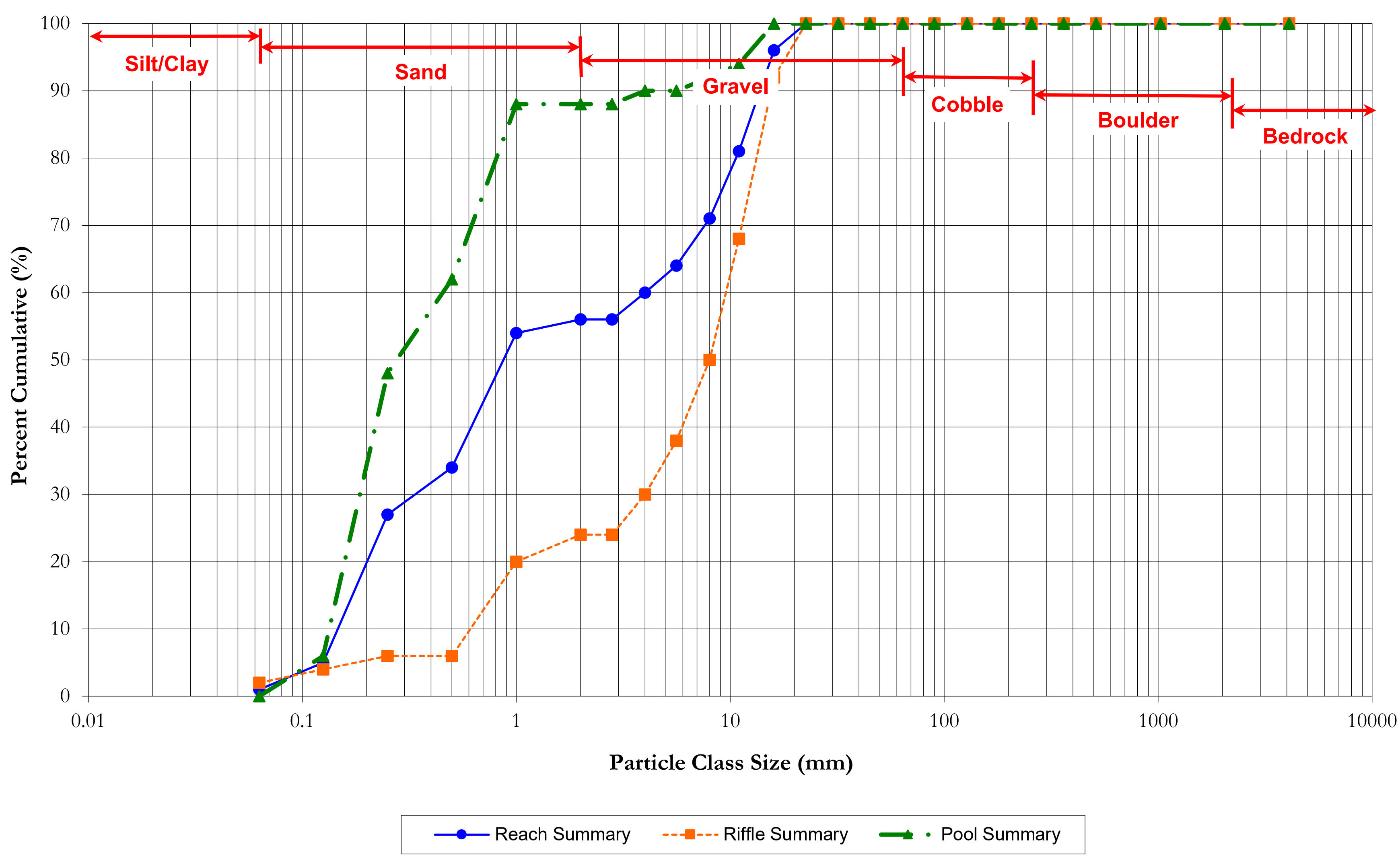
North Little Hunting Creek
Pebble Count Particle Distribution
Silt/Clay
Sand
Gravel
Cobble
Boulder
Bedrock
Percent Cumulative (%)
100
90
80
70
60
50
40
30
20
10
0
0.01
0.1
1
10
100
1000
10000
Particle Class Size (mm)
Reach Summary
Riffle Summary
Pool Summary

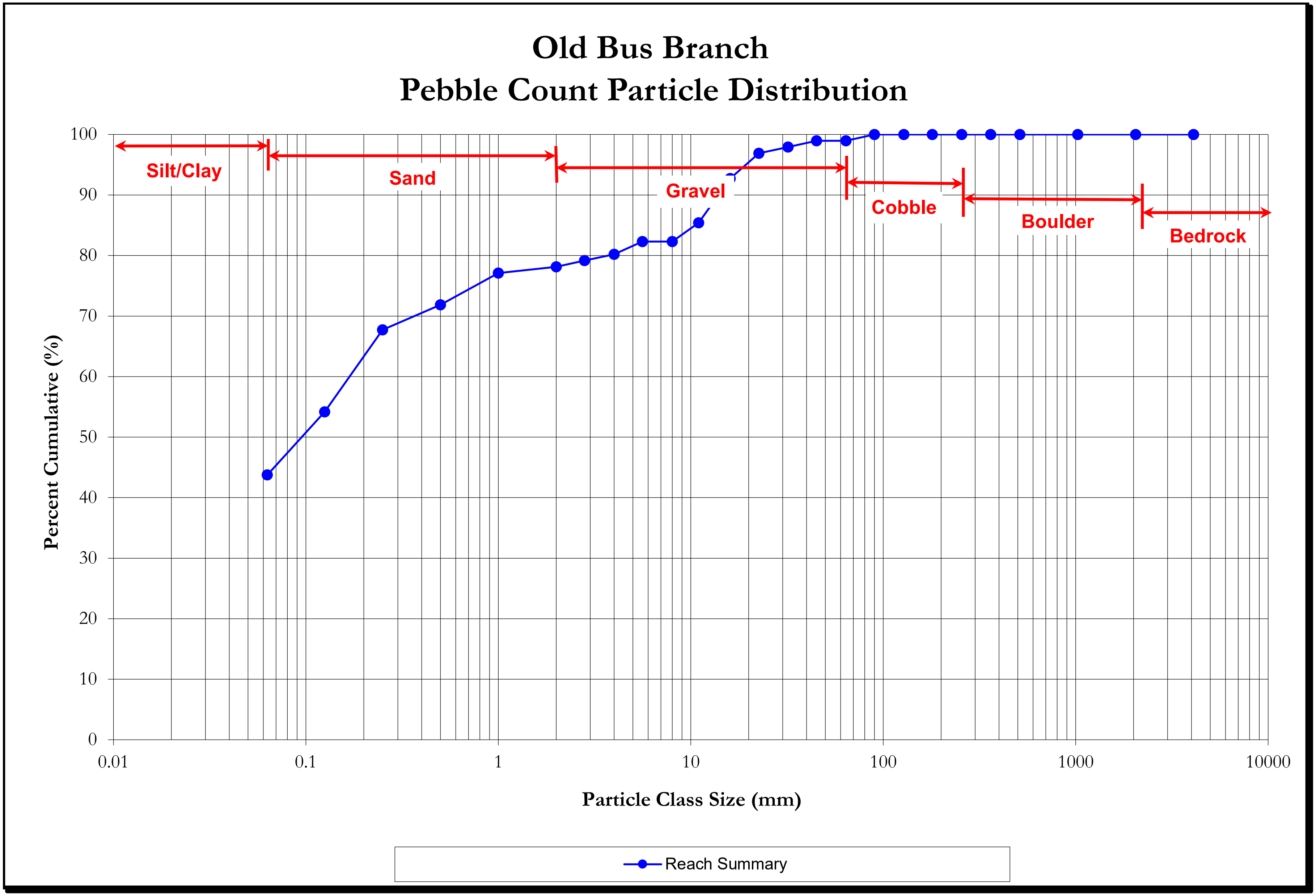

UT1
Pebble Count Particle Distribution
Silt/Clay
Sand
Gravel
Cobble
Boulder
Bedrock
Percent Cumulative (%)
100
90
80
70
60
50
40
30
20
10
0
0.01
0.1
1
10
100
1000
10000
Particle Class Size (mm)
Reach Summary
Riffle Summary
Pool Summary



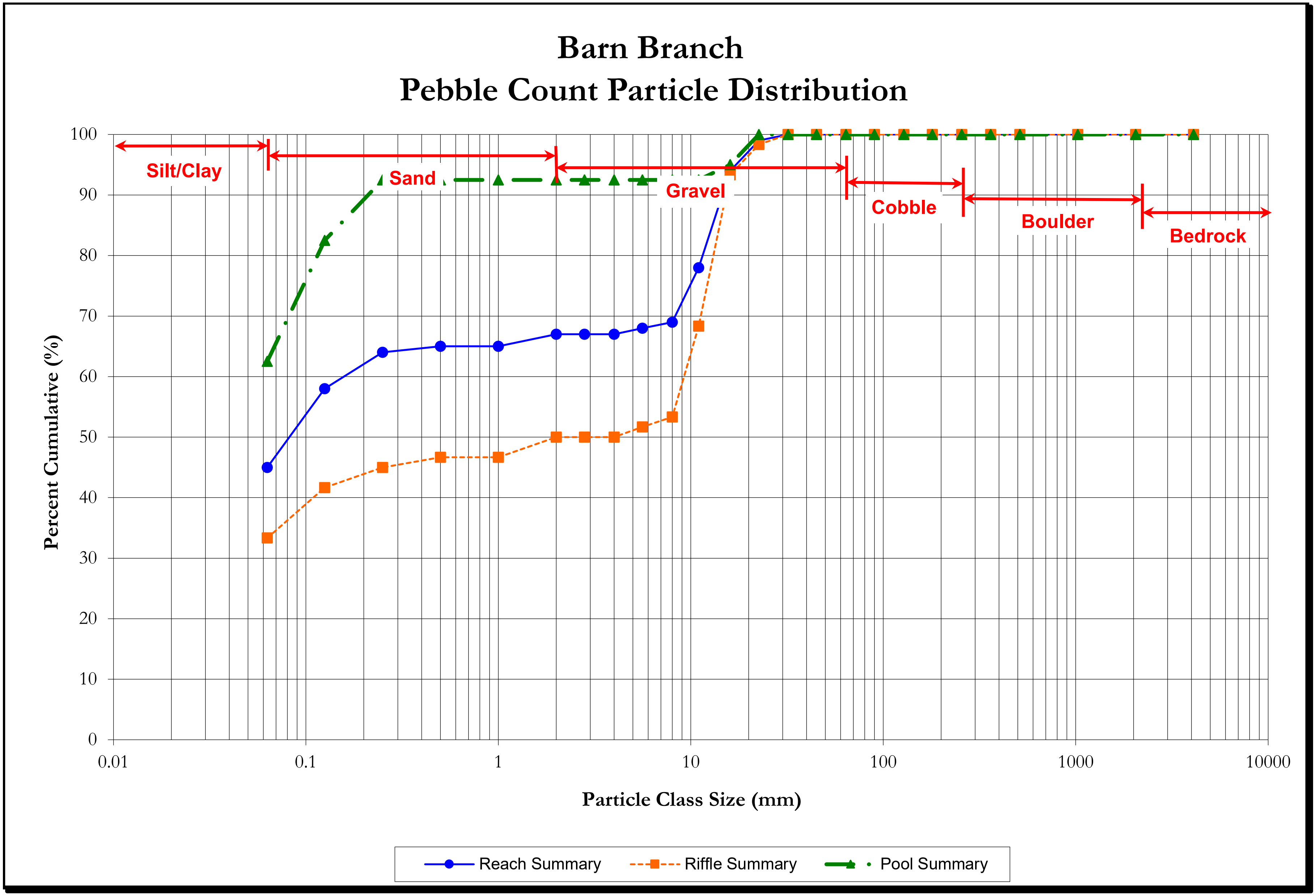
UT2 Reach 2
Pebble Count Particle Distribution
Percent Cumulative (%)
Particle Class Size (mm)
Silt/Clay
Sand
Gravel
Cobble
Boulder
Bedrock
0
10
20
30
40
50
60
70
80
90
100
0.01
0.1
1
10
100
1000
10000
Reach Summary
Riffle Summary
Pool Summary

UT2 Reach 3
Pebble Count Particle Distribution





Old Bus Branch
Pebble Count Particle Distribution
Percent Cumulative (%)
100
90
80
70
60
50
40
30
20
10
0
0.01
0.1
1
10
100
1000
10000
Particle Class Size (mm)
Silt/Clay
Sand
Gravel
Cobble
Boulder
Bedrock
Reach Summary



Barn Branch
Pebble Count Particle Distribution
Percent Cumulative (%)
Particle Class Size (mm)
Silt/Clay
Sand
Gravel
Cobble
Boulder
Bedrock
0
10
20
30
40
50
60
70
80
90
100
0.01
0.1
1
10
100
1000
10000
Reach Summary
Riffle Summary
Pool Summary

APPENDIX 5 – Categorical Exclusion Checklist and Summary

Categorical Exclusion Form for Ecosystem Enhancement Program Projects
Version 2

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

Part 1: General Project Information	
Project Name:	Huntsman Mitigation Site
County Name:	Wilkes County
DMS Number:	100123
Project Sponsor:	Wildlands Engineering, Inc.
Project Contact Name:	Kirsten Gimbert
Project Contact Address:	1430 S. Mint Street, Suite 104, Charlotte, NC 28203
Project Contact E-mail:	kgimbert@wildlandseng.com
DMS Project Manager:	Matthew Reid

Project Description

This project includes stream restoration and enhancement as well as establishing stormwater Best Management Practices (BMPs). Currently, the streams are extensively impacted by agricultural management, including cattle grazing and crop production. Project goals to provide ecological and water quality enhancements in the Yadkin River Basin will be obtained by removing livestock access from stream channels, restoring and enhancing native floodplain vegetation, creating stable stream banks, improving stream habitat, treating concentrated agricultural runoff with BMPs and protecting the site in perpetuity through establishing a conservation easement.

For Official Use Only

Reviewed By:

10-25-2019 — Matthew Reid

Date — **DMS Project Manager**

Conditional Approved By:

Date — **For Division Administrator FHWA**

☐ **Check this box if there are outstanding issues**

Final Approval By:

10-25-19 — Donald W. Brew

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

Huntsman Mitigation Site
Categorical Exclusion

SUMMARY

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

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

As the Huntsman 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 February 14, 2019. Neither the target property nor the adjacent properties were listed in any of the Federal, State, or Tribal environmental databases searched by the EDR. While one site was identified within 0.5 mile from the target property in the EDR Radius Map Report having a LUST (leaking underground storage tank) and an incident management database (IMD), the site is located downstream from the target property. Overall, 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 if needed.

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.

The State Historic Preservation Office (SHPO) responded to a scoping letter requesting comment on the Huntsman Mitigation Site on August 27, 2019. SHPO 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.

Uniform Relocation Assistance and Real Property Acquisition Policies Act (Uniform Act)

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

The Huntsman 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 Agreements for the project properties. A copy of the relevant section of each of the Option Agreements are included in the Appendix.

American Indian Religious Freedom Act (AIRFA)

The American Indian Religious Freedom Act provides for the protection and preservation of places of religious importance to American Indians, Eskimos, and Native Hawaiians.

NCDMS requested review and comment from the Cherokee Nation Tribal Historic Preservation Office (THPO), Eastern Band of Cherokee Indians THPO, and the United Keetoowah Band of Cherokee THPO with respect to any archeological or religious resources related to the Huntsman Mitigation Site on August 26, 2019. At this time, NCDMS has not received a response from the aforementioned tribes.

All correspondence related to AIRFA is included in the Appendix.

Endangered Species Act (ESA)

Section 7 of the ESA requires federal agencies, in consultation with and with the assistance of the Secretary of the Interior or of Commerce, as appropriate, to ensure that actions they authorize, fund or carry out are not likely to jeopardize the continued existence of threatened or endangered species or result in the destruction or adverse modification of critical habitat for these species.

According to your Information for Planning and Consultation database (IPaC), the threatened or endangered species listed within the project area located in Wilkes County, NC consists of one species: the northern long-eared bat (NLEB) (Myotis septentrionalis). 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 United States Fish and Wildlife Service (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. 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. The completed NLEB 4(d) Consultation Form was submitted to the USFWS by the Federal Highway Administration (FHWA) on August 27, 2019.

A scoping letter requesting comment from the USFWS was sent on August 21, 2019. No response from the USFWS was received within the 45-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.

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 Huntsman 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.

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 North Carolina Wildlife Resources Commission (NCWRC) responded to a scoping letter requesting comment on the Huntsman Mitigation Site on September 27, 2019. NCWRC stated that project activities do not need to be avoided during a trout moratorium. NCWRC recommended that riparian buffers be re-established using a woody buffer of approximately 100 feet on perennial streams to maximize the benefits of buffers, including bank stability, stream shading, treatment of overland runoff, and wildlife habitat. All project streams included in the Huntsman Mitigation Site will have adequate riparian buffers. No known records of state or federally-listed rare, threatened, or endangered species within or near the project area were provided. All correspondence with the two agencies is included in the appendix.

Migratory Bird Treaty Act (MBTA)

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

Wildlands requested comment on the Huntsman Mitigation Site from the USFWS in regard to migratory birds on August 21, 2019. The USFWS has not responded at this time. All correspondence with USFWS is included in the Appendix.

APPENDIX 6 – IRT Communications

MEETING NOTES

MEETING:	Post-Contract IRT Site Walk **HUNTSMAN Mitigation Site** Yadkin 03040102; Wilkes County, NC DEQ Contract No. 7891 DMS Project No. 100123 Wildlands Project No. 005-02183
DATE:	Wednesday, July 24, 2019
LOCATION:	Ingle Hollow Road New Castle, NC

Attendees

Todd Tugwell, USACE
Kim Browning, USACE
Paul Wiesner, DMS
Matthew Reid, DMS
Kirsten Ullman, DMS
Periann Russel, DMS
Erin Davis, DWR
Mac Haupt, DWR
Shawn Wilkerson, Wildlands
Christine Blackwelder, Wildlands
Daniel Johnson, Wildlands

Materials

- Wildlands Engineering Technical Proposal dated 3/6/2019 in response to DMS RFP 16-007728

Meeting Notes

The meeting began at 12:30 pm. Shawn presented an overview of the project at the parking location. From there, the group walked across Little Hunting Creek to the headwaters of UT2, retraced steps and reviewed the piped portion of UT1 and Pond 3. The meeting concluded at 2:00 PM.

1. **Overall comments**
   - Todd asked if the project team would pursue additional credits for wide buffers via the GIS buffer tool. He encouraged the team to run the tool since the project captures headwater drainages on UT1 and much of UT2 and provides wide buffers on Little Hunting Creek.
   - The project does not currently include wetlands for credit. Todd mentioned that the JD will be important for quantifying existing resources on the site, and that it is likely that there will be a net gain of wetlands.
   - Kim noted that it would be helpful to receive any available information on onsite culverts in advance of site visits in the future.
2. **Little Hunting Creek**
   - Little Hunting Creek has a drainage area of 2 square miles. The stream has eroded banks but is not deeply incised due to bedrock, which will facilitate a Priority 1 design.

- Group agreed that restoration is appropriate on Little Hunting Creek.
- Shawn explained that a restrictive covenant will be used to exclude cattle from a ditch joining Little Hunting Creek at the upstream property boundary. IRT saw this as favorable and supportive to the project.

3. Old Bus Branch

- Shawn walked through the I/P calls made in February during our proposal investigation. The intermittent stream call began at the 3-foot headcut and perennial began at the bottom of the 10-foot headcut. The group agreed the JD will be important for this tributary, and that stabilization of the headcuts with a BMP would be beneficial if the stream is not jurisdictional up to those points. Wildlands agreed.
- The IRT members requested that Wildlands include a note regarding this discussion in the Mitigation Plan so that this reach and the proposed design approach can be reviewed at that time.

4. Trapper and Rifle Tributaries

- These two streams flow through wet, headwater seep areas. IRT would prefer to see Enhancement 2 of these tributaries, to include excluding cattle and treating invasives.
- Wildlands foresees the need to install several log sills on Rifle Tributary to prevent headcutting into the wetland complex.

5. UT2

- The group reviewed UT2. At the upstream extent of UT2 within the Enhancement 2 section of stream, Todd suggested the alignment be pulled off the left toe of slope for approximately 50 LF where there is some stream bank erosion. This additional effort, combined with the channel work proposed upstream of the culvert crossing, would be worthy of 2.5:1 credit as opposed to the 3:1 credit presented in the proposal.
- The group agreed that restoration of UT2 was appropriate given the incision and erosion observed downstream of the culvert crossing and the obvious ditching within the floodplain of Little Hunting Creek.
- Kim asked if Wildlands was concerned with loss of hydrology when UT2 is raised. Shawn said that there have been no site indications to date that hydrology would be lost, and that the stream has had strong flow during all site visits.

6. Barn Branch

- The disturbed feeding lot area upstream of Barn Branch appears to be a wetland now. Todd suggested eliminating the BMP proposed here and widening the conservation easement to protect the headwater wetland instead.

7. UT1 (upstream of road)

- The group reviewed the drop structure at the road crossing. There are three culverts contributing flow within the drop structure (one from the north, two from the east) and one which outlets under Ingle Hollow Road. UT1 currently drops in the top of the structure through a grate.

  - Group asked if this culvert and drop structure will be revised. Revising the culvert is not part of the restoration plan. The structure is likely within the DOT right of way, but we won't know for sure until the survey is complete.
  - The culvert from the north and one from the east were flowing. Wildlands does not currently know where the culvert flow originates from.
- Pond 3 has large headcuts totaling over 10 feet in height approaching the dam. The wetted width of the pond is approximately 300 feet. Erin expressed concern that removing the dam could result in functional loss of open water habitat and that the buffer won't extend to the original wetted pond width. The group asked how the pond bottom will be restored. Wildlands needs to complete a topographic survey of the embankment and pond bottom to inform the design, but it is likely that the excavated pond embankment material will be used to rebuild the approximate original valley in the old pond 3 pond bed. Shawn reminded group that advancing headcuts will eventually result in dam failure, and loss of the normal pool is inevitable.
- UT1 is buried within 300 LF of pipe upstream of pond 3. The group reviewed the pipe inlet. Mac commented that the restoration of UT1 will require major earth moving. Wildlands is aware and Periann commented that the project scored well because of the removal of barriers.
- Group requested inclusion of a good discussion of existing condition topographic/soil surveys done along UT1 and the design decisions made regarding stream and valley restoration in the mitigation plan.
- Shawn suggested that a design memo may need to be developed in advance of the mitigation plan for the area to ensure that the IRT is on board with design decisions on this reach. Substantial changes to proposed buffer widths or pond removal considered as an impact would need to be considered before the project is too far along. Wildlands will discuss this further with DMS.

These meeting minutes were prepared by Christine Blackwelder on July 25, 2019, and reviewed by Shawn Wilkerson on July 31, 2019, and represent the authors' interpretation of events. Please report and discrepancies or corrections within 5 business days of receipt of these minutes.

APPENDIX 7 – Invasive Species Plan

Appendix 7 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 – *Huntsman Mitigation Site*

Invasive Species	Recommended Removal Technique
Multiflora Rose *(Rosa multiflora)*	Foliar treatment of large populations with 4% glyphosate solution. Cut stump treatment is time consuming, though effective. Treat in spring/summer. Biocontrol using viral pathogen of rose-rosette disease transmitted by European Rose Chalcid wasp is an option. Rose-rosette disease is also vectored by native mites.
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

Invasive Species	Recommended Removal Technique
	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 (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.
Mimosa (*Albizia julibrissin)*	Trees: Make stem injections using Arsenal AC* or when safety to surrounding vegetation is desired, Garlon 3A or Milestone in dilutions as specified on the herbicide label (anytime except March and April). For felled trees, apply the herbicides to stump tops immediately after cutting. 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). Saplings: Apply a basal spray to young bark using 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, kerosene, or diesel fuel (where permitted). Resprouts and seedlings: Thoroughly wet all leaves with one of the following herbicides in water with a surfactant: From June to August, either Escort XP at 1 ounce per acre (0.2 ounces per 3-gallon mix) plus a glyphosate herbicide as a 2-percent solution addition (8 ounces per 3-gallon mix) or Milestone VM Plus at 6 to 9 pints per acre (1.5 to 3 pints per 3-gallon mix and 10 gallons per acre). From July to September, Transline* † or Milestone as a 0.25-percent solution plus Garlon 3A as a 4-percent solution (1 ounce plus 5 ounces per 3-gallon mix).
Chinese Yam (*Dioscorea polystachya*)	Thoroughly wet all leaves with one of the following herbicides in water with a surfactant before aerial bulbils form: Garlon 3A or Garlon 4 as a 2-percent solution (8 ounces per 3-gallon mix). Chinese yam bulbils will take up the herbicide; the other species must be collected and destroyed (not composted). For safety to surrounding plants, cut climbing plants just above the soil surface and immediately treat the freshly cut stem with Garlon 3A in a 50-percent solution (6 quarts in a 3-gallon mix).
Oriental Bittersweet (*Celastrus orbiculatus*)	Thoroughly wet all leaves with one of the following herbicides in water with a surfactant (July to October): Garlon 4, Garlon 3A, or a glyphosate herbicide as a 3-percent solution (12 ounces per 3-gallon mix). For stems too tall for foliar sprays, to control vines less than 1-inch diameter, apply Garlon 4 as a 20-percent solution (5 pints per 3-gallon mix) in a labeled basal oil product or vegetable oil. Or cut large stems and immediately treat the cut surfaces with one of the following herbicides in water with a surfactant: Garlon 4 or a glyphosate herbicide as a 25-percent solution (32 ounces per 1-gallon mix). ORTHO Brush-B-Gon and Enforcer Brush Killer are effective for treating cutstumps and readily available in retail garden stores (safe to surrounding plants). Winter applications are effective. For large vines, make stem injections using Garlon 3A, or a glyphosate herbicide using dilutions and cut-spacings specified on the herbicide label (anytime except March and April). The EZ-Ject tree injector assists in reaching through entanglements to treat, and the glyphosate shells have been found effective in winter.

Invasive Species	Recommended Removal Technique
Callery Pear (*Pyrus calleryana*)	Trees: For stems too tall for foliar sprays, cut large stems and immediately treat the stump tops with Garlon 3A or a glyphosate herbicide as a 25- to 50-percent solution (2 to 6 quarts per 3-gallon mix). Saplings: Apply 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. Seedlings. Thoroughly wet all leaves with one of the following herbicides in water with a surfactant: a glyphosate herbicide or Garlon 3A as a 2-percent solution (8 ounces per 3-gallon mix).
Tree of Heaven (*Ailanthus altissima*)	Large trees: Make stem injections and then apply Garlon 3A when safety to surrounding vegetation is desired, or Pathway* or Arsenal AC* in dilutions and cut-spacings specified on the herbicide label (midsummer best, late winter somewhat less effective). For felled trees, apply the herbicides to stem and stump tops immediately after cutting. Saplings: Apply as basal sprays in mixed in a labeled basal oil product, vegetable oil or mineral oil with a penetrant, or fuel oil or diesel fuel (where permitted) using Garlon 4 as a 20-percent solution (5 pints per 3-gallon mix) when safety to surrounding vegetation is Seedlings and saplings: Thoroughly wet all leaves with one of the following herbicides in water with a surfactant (July to October): Garlon 4 as a 1- to 2-percent solution (4 to 8 ounces per 3-gallon mix) or Garlon 3A as a 2-percent solution (8 ounces per 3-gallon mix).

APPENDIX 8 – Site Protection Instrument

Appendix 8 Site Protection Instrument

The land required for construction, management, and stewardship of this mitigation project includes portions of the Johnson family parcels listed in Table 1. Wildlands Engineering, Inc. (Wildlands). recorded a conservation easement on the parcels to encompass the streams being restored and enhanced along with their corresponding buffers. Wildlands' agreement with the Johnsons also includes a restrictive covenant on a ditch/wetland feature which joins North Little Hunting Creek in the southwest corner of the project. The restrictive covenant will prevent cattle access to the drainage feature.

Table 1: Site Protection Instrument – *Huntsman Mitigation Site*

Property Owner	Parcel ID Number	County	Conservation Easement Deed Book (DB) and Page Number (PG)	Protected Acreage
Jerry A. and Debra Lynn Johnson	4827-87-1278, 4827-96-5044, 4827-84-8574, 4827-95-0384	Wilkes	Deed Book 1331, Page 128	18.4

The recorded conservation easement 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.

FILED
WILKES COUNTY
MISTY M. SMITHEY
REGISTER OF DEEDS

FILED	May 27, 2021
AT	09:02:55 am
BOOK	**01331**
PAGE	**0128**
INSTRUMENT #	**04301**
EXCISE TAX	**$400.00**

HBC James

STATE OF NORTH CAROLINA

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

Stamps: $400.00

WILKES COUNTY

SPO File Numbers: 97-BK
DMS Project Number: 100123

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 26th day of MAY, 2021, by **Jerry A. Johnson and wife, Debra G. Johnson** ("**Grantor**"), whose mailing address is **360 Ingle Hollow Road, Ronda, NC 28670** to the State of North Carolina, ("**Grantee**"), whose mailing address is State of North Carolina, Department of Administration, State Property Office, 1321 Mail Service Center, Raleigh, NC 27699-1321. The designations of Grantor and Grantee as used herein shall include said parties, their heirs, successors, and assigns, and shall include singular, plural, masculine, feminine, or neuter as required by context.

WITNESSETH:

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

WHEREAS, this Conservation Easement from Grantor to Grantee has been negotiated, arranged and provided for as a condition of a full delivery contract between **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 **7891**.

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

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

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

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

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

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

WHEREAS, Grantor owns in fee simple certain real properties situated, lying, and being in Newcastle Township, Wilkes County, North Carolina (the "**Property**"), and being more particularly described as those certain parcels of land containing approximately 106 acres and being conveyed to the Grantor by deeds recorded in **Deed Book 668, Page 110, Deed Book 1330, Page 66, and Deed Book 653, Page 160** of the Wilkes 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 North Little Hunting 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:

Total conservation Easement Area containing a total of 18.434 acres (CE Area A = 3.404 acres, CE Area B = 3.216 acre, and CE Area C = 11.814 acres) as shown on the plats of survey entitled "Conservation Easement Survey for: The State of North Carolina, Division of Mitigation Services, SPO File No. 97-BK, DMS Project # 100123, PROJECT: HUNTSMAN SITE", plat dated May 13, 2021 prepared by Turner Land Surveying and recorded in the Wilkes County, North Carolina Register of Deeds at **Plat Book** 12, **Page** 382-384

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.

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.

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, Division of Mitigation Services, SPO File No. 97-BK, DMS Project No. 100123", and recorded in the Wilkes County, North Carolina Register of Deeds at **Plat Book** 12 **Page** 382-384 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 livestock access to the Conservation Easement area. Repeated failure to do so may result in the

State (Grantee) repairing or installing livestock exclusion devices (fences) within the conservation area for the purpose of restricting livestock access. In such cases, the landowner (Grantor) must provide access to the State (Grantee) to make repairs.

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

V. ENFORCEMENT AND REMEDIES

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

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

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

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

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

VI. MISCELLANEOUS

A. This instrument sets forth the entire agreement of the parties with respect to the Conservation Easement and supersedes all prior discussions, negotiations, understandings or agreements relating to the Conservation Easement. If any provision is found to be invalid, the remainder of the provisions of the Conservation Easement, and the application of such provision to persons or circumstances other than those as to which it is found to be invalid, shall not be affected thereby.

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

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

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

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

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

Division of Mitigation Services Program Manager

NC State Property Office
1321 Mail Service Center
Raleigh, NC 27699-1321

and

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

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

VII. QUIET ENJOYMENT

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

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

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

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

Jerry A Johnson (SEAL)
JERRY A. JOHNSON

Debra G. Johnson (SEAL)
DEBRA G. JOHNSON

NORTH CAROLINA
COUNTY OF Wilkes

I, Stephanie P. Wilser, a Notary Public in and for the County and State aforesaid, do hereby certify that **Jerry A. Johnson and wife, Debra J. Johnson**, 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 26th day of May, 2021.

STEPHANIE P. WILSER
NOTARY
PUBLIC
WILKES COUNTY, N.C.

Stephanie P. Wilser
Notary Public

My commission expires:

4/18/2026

EXHIBIT A

Descriptions for Conservation Easement for the State of North Carolina, Division of Mitigation Services, Huntsman Site, SPO File No. 97-BK, DMS Project # 100123, located in Newcastle Township, Wilkes County, North Carolina.

All references to the Wilkes County Register of Deeds office.

PIN: 4827-97-1278, PID: 1301039 (Jerry A. Johnson and Debra Lynn Johnson)
CE "A"
Beginning at an existing 3/8" rebar in concrete (CE corner #17), said rebar a corner of Jerry A. Johnson and Debra Lynn Johnson (now or formerly, see Deed Book 668, Pg. 110 and Deed Book 1330, Pg. 66), said rebar being located N 20°11'16" W 639.34' from Site Control Point TLS#2 (rebar with plastic cap) having NC Grid Coordinates [NAD83(2011)] N= 875,194.25 USft, E= 1,429,559.23 USft;
thence, from the point of Beginning, with the common line, N 73°47'14" E a distance of 13.78' to a rebar with aluminum cap set, said rebar the northwest corner of S. Mark Cass and Michelle R. Cass (now or formerly, see Deed Book 723, Pg. 524 and deed Book 1330, Pg. 66);
thence, with the common line, S 18°32'34" E a distance of 92.88' to a rebar with aluminum cap set; thence S 51°41'04" E a distance of 45.70' to a rebar with aluminum cap set, passing an iron pipe at 23.98'; thence S 16°06'36" E a distance of 7.50' to a rebar with aluminum cap set in the northern right-of-way of Ingle Hollow Road (NCSR #2434); thence, with the right-of-way, S 72°11'12" W a distance of 32.22' to a rebar with aluminum cap set; thence, leaving said right-of-way, N 40°09'27" W a distance of 126.02' to a rebar with aluminum cap set;
thence N 24°49'35" W a distance of 116.21' to a rebar with aluminum cap set;
thence N 18°17'35" W a distance of 50.00' to a rebar with aluminum cap set;
thence N 17°43'14" W a distance of 401.82' to a rebar with aluminum cap set;
thence N 00°24'56" E a distance of 193.41' to a rebar with aluminum cap set;
thence N 09°24'37" W a distance of 317.65' to a rebar with aluminum cap set;
thence N 02°22'55" W a distance of 307.44' to a rebar with aluminum cap set;
thence N 69°58'02" E a distance of 98.03' to a rebar with aluminum cap set;
thence S 04°45'03" E a distance of 422.51' to a rebar with aluminum cap set;
thence S 16°38'11" E a distance of 75.78' to a rebar with aluminum cap set;
thence S 02°55'25" E a distance of 333.03' to a rebar with aluminum cap set;
thence S 15°47'03" E a distance of 390.22' to a rebar with aluminum cap set;
thence S 19°09'15" E a distance of 50.01' to a rebar with aluminum cap set;
thence S 19°20'45" E a distance of 40.90' to a rebar with aluminum cap set;
thence S 47°45'22" E a distance of 58.22' to a point on the common line of Cass and Johnson;
thence, with the common line, S 19°12'49" E a distance of 24.58' to the point of Beginning;
containing 3.404 acres, more or less, and shown as CE "A" on a plat prepared by Turner Land Surveying, PLLC (P-0702) of Swannanoa, NC, entitled "Conservation Easement Plat for the State of North Carolina, Division of Mitigation Services, Project Name: Huntsman" dated May 13, 2021 and recorded in **Plat Book** 12, **Page** 382-384 of the Wilkes County Register of Deeds.

PIN: 4827-95-4754, PID: 1300337 (Jerry A. Johnson and Debra Lynn Johnson)
CE "B"
Beginning at rebar with aluminum cap set (CE corner #28) in the southern right-of-way of Ingle Hollow Road (NCSR #2434), said rebar being the northwest corner of Jerry Alan Johnson and Debra G. Johnson (now or formerly, see Deed Book 653, Pg. 160, Parcel A), also being the northeast corner of Jerry Alan Johnson and Debra G. Johnson (now or formerly, see Deed Book 653, Pg. 160, Parcel B), said rebar being located N 24°01'29" W 464.60' from Site Control Point TLS#2 (rebar with plastic cap) having NC Grid Coordinates [NAD83(2011)] N= 875,194.25 USft, E= 1,429,559.23 USft;
thence, from the point of Beginning, with the common line, with a small branch, S 15°48'29" E a distance of 230.00' to a point at the intersection with a big branch;
thence, with said big branch, S 72°16'58" W a distance of 478.50' to a point;
thence S 50°53'47" W a distance of 116.50' to a rebar with aluminum cap set on southwest corner of Johnson and southeast corner of William Jody Gray (now or formerly, see Deed Book 1087, Pg. 105); thence, with the common line of Johnson and Gray, N 19°48'37" W a distance of 350.00' to a rebar with aluminum cap set in the southern right-of-way of Ingle Hollow Road;
thence, with the right-of-way, S 86°01'12" E a distance of 137.12' to a rebar with aluminum cap set;
thence N 87°56'34" E a distance of 143.31' to a rebar with aluminum cap set;
thence N 84°57'58" E a distance of 30.34' to a rebar with aluminum cap set;
thence N 73°51'24" E a distance of 83.92' to a point;
thence N 62°51'14" E a distance of 76.38' to a rebar with aluminum cap set;
thence N 62°35'10" E a distance of 92.02' to a rebar with aluminum cap set;
thence N 66°19'24" E a distance of 25.54' to a point;
thence N 72°10'41" E a distance of 40.21' to the point of Beginning;
containing 3.216 acres, more or less, and shown as CE "B" on a plat prepared by Turner Land Surveying, PLLC (P-0702) of Swannanoa, NC, entitled "Conservation Easement Plat for the State of North Carolina, Division of Mitigation Services, Project Name: Huntsman" dated May 13, 2021 and recorded in **Plat Book** 12 **, Page** 382-384 of the Wilkes County Register of Deeds.

PIN: 4827-95-0384, PID: 1300318 (Jerry Alan Johnson and Debra G. Johnson)
CE "C"
Beginning at rebar with aluminum cap set (CE corner #28) in the southern right-of-way of Ingle Hollow Road (NCSR #2434), said rebar being the northwest corner of Jerry Alan Johnson and Debra G. Johnson (now or formerly, see Deed Book 653, Pg. 160, Parcel A), also being the northeast corner of Jerry Alan Johnson and Debra G. Johnson (now or formerly, see Deed Book 653, Pg. 160, Parcel B), said rebar being located N 24°01'29" W 464.60' from Site Control Point TLS#2 (rebar with plastic cap) having NC Grid Coordinates [NAD83(2011)] N= 875,194.25 USft, E= 1,429,559.23 USft; thence, from the point of Beginning, with the right-of-way, N 79°45'45" E a distance of 67.37' to a point;
thence N 88°13'10" E a distance of 58.31' to a rebar with aluminum cap set;
thence S 88°51'42" E a distance of 61.41' to a rebar with aluminum cap set;
thence S 86°57'19" E a distance of 189.91' to a rebar with aluminum cap set;
thence S 86°32'19" E a distance of 190.02' to a rebar with aluminum cap set;

thence S 87°13'47" E a distance of 144.91' to a point, passing a rebar with aluminum cap set at 53.43';
thence S 88°49°34" E a distance of 56.81' to a point;
thence N 84°32'08"E a distance of 66.52' to a point;
thence N 78°57'24"E to a distance of 42'.25 to a rebar with aluminum cap set;
thence N 75°28'36" to a distance of 45.57' to a point;
thence N 71°50'16" E a distance of 67.76' to an existing ½" rebar, said rebar being the northeast corner of Jerry Alan Johnson et ux. and the northwest corner of Flossie Ellen Johnson (now or formerly, deed not found);
thence, leaving said right-of-way, with the common line, S 02°48'20" W a distance of 258.35' to a rebar with aluminum cap set, passing the centerline of a big branch at 214.59';
thence, leaving said common line, S 76°20'17" W a distance of 287.01' to a rebar with aluminum cap set;
thence S 43°10'28" W a distance of 300.57' to a rebar with aluminum cap set;
thence S 18°08'11" E a distance of 208.40' to a rebar with aluminum cap set;
thence S 29°08'27" E a distance of 177.38' to a rebar with aluminum cap set;
thence S 89°32'58" E a distance of 199.90' to a rebar with aluminum cap set;
thence S 03°35'16" E a distance of 68.64' to a rebar with aluminum cap set;
thence S 80°57'29" W a distance of 101.82' to a rebar with aluminum cap set;
thence S 13°39'20" E a distance of 133.82' to a rebar with aluminum cap set;
thence S 49°41'16" E a distance of 79.93' to a rebar with aluminum cap set;
thence S 00°06'07" W a distance of 60.11' to a rebar with aluminum cap set;
thence S 87°08'12" W a distance of 132.25' to a rebar with aluminum cap set;
thence N 26°26'49" W a distance of 116.24' to a rebar with aluminum cap set;
thence S 88°38'57" W a distance of 55.63' to a rebar with aluminum cap set;
thence S 15°09'52" W a distance of 90.73' to a rebar with aluminum cap set;
thence S 13°53'20" W a distance of 50.12' to a rebar with aluminum cap set;
thence S 16°49'20" E a distance of 107.31' to a rebar with aluminum cap set;
thence S 25°13'54" W a distance of 173.51' to a rebar with aluminum cap set;
thence N 85°11'40" W a distance of 103.37' to a rebar with aluminum cap set;
thence N 23°35'13" E a distance of 177.96' to a rebar with aluminum cap set;
thence N 04°34'34" W a distance of 115.22' to a rebar with aluminum cap set;
thence N 17°55'44" E a distance of 50.00' to a rebar with aluminum cap set;
thence N 17°47'50" E a distance of 102.82' to a rebar with aluminum cap set;
thence N 34°15'27" E a distance of 121.34' to a rebar with aluminum cap set;
thence N 60°16'40" W a distance of 116.26' to a rebar with aluminum cap set;
thence S 35°16'24" W a distance of 147.52' to a rebar with aluminum cap set;
thence N 82°46'06" W a distance of 62.76' to a rebar with aluminum cap set;
thence N 24°52'44" W a distance of 71.66' to a rebar with aluminum cap set;
thence N 10°59'21" E a distance of 514.19' to a rebar with aluminum cap set;
thence N 31°56'23" E a distance of 183.38' to a rebar with aluminum cap set;
thence N 38°49'55" W a distance of 67.90' to a rebar with aluminum cap set;
thence S 86°45'15" W a distance of 342.52' to a rebar with aluminum cap set;
thence N 76°34'30" W a distance of 60.00' to a rebar with aluminum cap set;
thence S 59°35'22" W a distance of 111.37' to a rebar with aluminum cap set;
thence S 73°19'39" W a distance of 129.54' to a rebar with aluminum cap set;

thence S 57°46'39" W a distance of 85.07' to a rebar with aluminum cap set;
thence S 57°46'39" W a distance of 31.69' to a rebar with aluminum cap set;
thence S 57°46'39" W a distance of 90.95' to a rebar with aluminum cap set;
thence S 77°12'17" W a distance of 139.26' to a rebar with aluminum cap set;
thence N 19°51'01" W a distance of 42.86' to a rebar with aluminum cap set at a big branch and being southwest corner of Johnson and southeast corner of William Jody Gray (now or formerly, See Deed Book 1087, Pg. 105);
thence, with the common line and the big branch, N 50°53'47" E a distance of 116.50' to a point;
thence N 72°16'58" E a distance of 478.50' to a point at the intersection with a small branch;
thence, with the small branch, N 15°48'29" W a distance of 230.00' to the point of Beginning;
containing 11.814 acres, more or less, and shown as CE "C" on a plat prepared by Turner Land Surveying, PLLC (P-0702) of Swannanoa, NC, entitled "Conservation Easement Plat for the State of North Carolina, Division of Mitigation Services, Project Name: Huntsman" dated May 13, 2021 and recorded in **Plat Book** 12, **Page** 382-384 of the Wilkes County Register of Deeds.

APPENDIX 9 – Maintenance Plan

Appendix 9 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 – *Huntsman 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.
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 7) shall be treated in accordance with that plan and with NC Department of Agriculture (NCDA) rules and regulations.
BMPs	BMPs are expected to vegetate over time and transition to vegetative filter strips. BMPs will not be maintained after close out.
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 10 – Financial Assurance

Appendix 10 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 11 – Credit Calculations and Release Schedule

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 schedule below lists 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.

Wilmington District Stream Buffer Credit Calculator

Site Name:	Huntsman Mitigation Site
USACE Action ID:	SAW-2019-00836
NCDWR Project Number:	
Sponsor:	NC Division of Mitigation Services
County:	Wilkes
Minimum Required Buffer Width[1]:	30

Mitigation Type	**Mitigation Ratio Multiplier[2]**	**Creditable Stream Length[3]**	**Baseline Stream Credit**
Restoration (1:1)	1	5397.863	5397.86
Enhancement I (1.5:1)	1.5	0	
Enhancement II (2.5:1)	2.5	593.425	237.37
Preservation (5:1)	5		
Other (7.5:1)	7.5		
Other (10:1)	10		
Custom Ratio 1			
Custom Ratio 2			
Custom Ratio 3			
Custom Ratio 4			
Custom Ratio 5			
Totals		**5991.29**	**5635.23**

	Buffer Width Zone (feet from Ordinary High Water Mark)								
Buffer Zones	**less than 15 feet**	**>15 to 20 feet**	**>20 to 25 feet**	**>25 to 30 feet**	**>30 to 50 feet**	**>50 to 75 feet**	**>75 to 100 feet**	**>100 to 125 feet**	**>125 to 150 feet**
Max Possible Buffer (square feet)[4]	179738.64	59912.88	59912.88	59912.88	239651.52	299564.4	299564.4	299564.4	299564.4
Ideal Buffer (square feet)[5]	184209.54	60808.08	59883.73	58844.39	227807.52	275119.12	268951.69	263880.82	260831.43
Actual Buffer (square feet)[6]	174204.05	56978.54	55771.33	54398.07	142718.00	63963.55	46314.03	38464.63	29192.87
Zone Multiplier	50%	20%	15%	15%	9%	7%	6%	5%	3%
Buffer Credit Equivalent	2817.62	1127.05	845.28	845.28	507.17	394.47	338.11	281.76	169.06
Percent of Ideal Buffer	95%	94%	93%	92%	63%	23%	17%	15%	11%
Credit Adjustment	-153.04	-70.98	-58.05	-63.87	317.74	91.71	58.22	41.07	18.92

Total Baseline Credit	**Credit Loss in Required Buffer**	**Credit Gain for Additional Buffer**	**Net Change in Credit from Buffers**	**Total Credit**
5635.23	**-345.94**	**527.66**	**181.72**	**5816.96**

[1]Minimum standard buffer width measured from the top of bank (50 feet in piedmont and coastal plain counties or 30 feet in mountain counties)

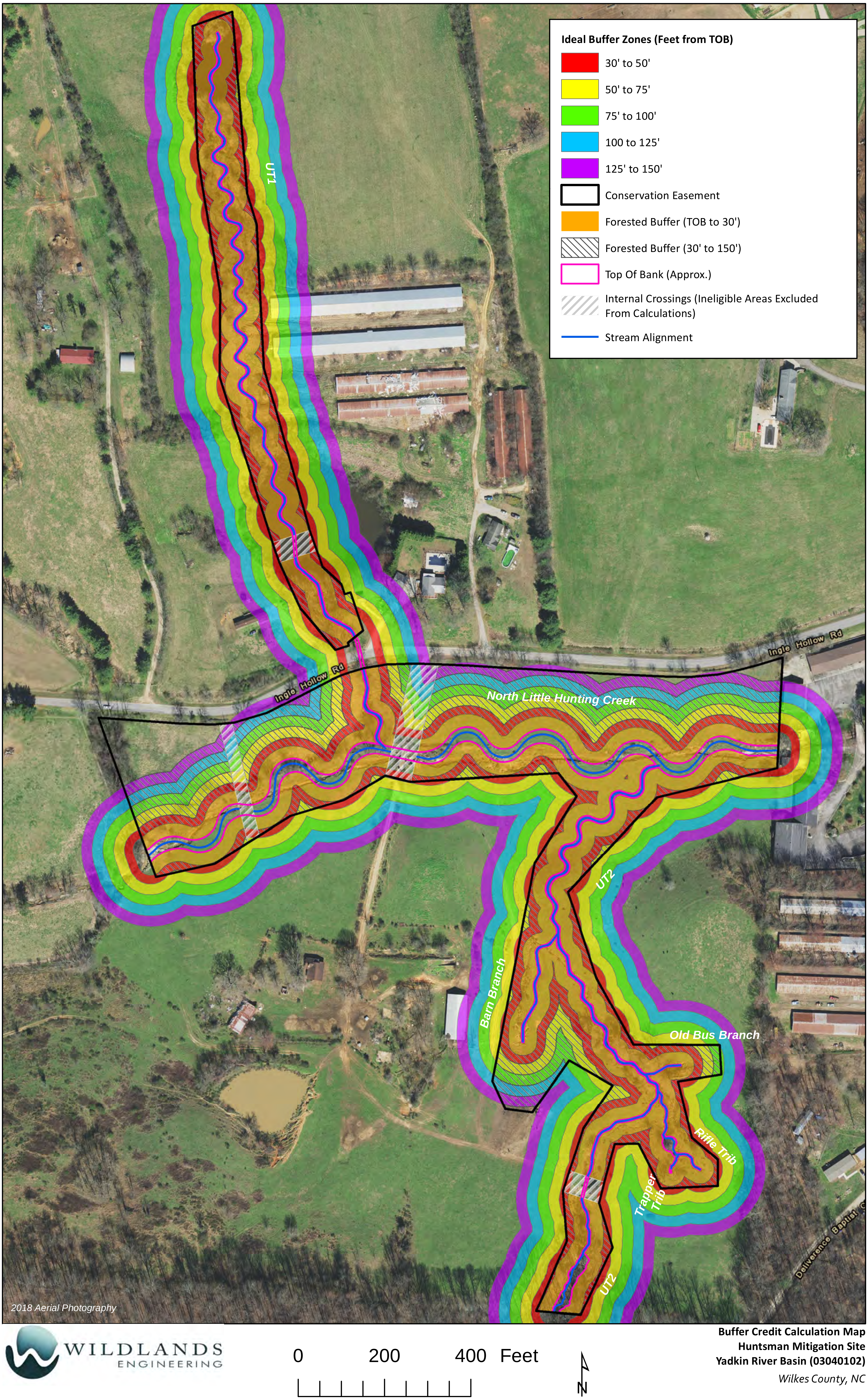
[2]Use the Custom Ratio fields to enter non-standard ratios, which are equal to the number of feet in the feet-to-credit mitigation ratio (e.g., for a perservation ratio of 8 feet to 1 credit, the multiplier would be 8

[3]Equal to the number of feet of stream in each Mitigation Type. If stream reaches are not creditable, they should be excluded from this measurement, even if they fall within the easement

[4]This amount is the maximum buffer area possible based on the linear footage of stream length if channel were perfectly straight with full buffer width. This number is not used in calculations, but is provided as a reference.

[5]Maximum potential size (in square feet) of each buffer zone measured around all creditable stream reaches, calculated using GIS, including areas outside of the easement. The inner zone (0-15') should be measured from the top of the OHWM or the edge of the average stream width if OHWM is not known. Non-creditable stream reaches within the easement should be removed prior to calculating this area wtih GIS.

[6]Square feet in each buffer zone, as measured by GIS, excluding non-forested areas, all other credit type (e.g., wetland, nutrient offset, buffer), easement exceptions, open water, areas failing to meet the vegetation performance standard, etc. Additional credit is given to 150 feet in buffer width, so areas within the easement that are more than 150 feet from creditable streams should not be included in this measurement. Non-creditable stream reaches within the easement should be removed prior to calculating this area wtih GIS



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Buffer Credit Calculation Map
Huntsman Mitigation Site
Yadkin River Basin (03040102)
Wilkes County, NC

APPENDIX 12 – Preliminary Plans

Huntsman Stream Mitigation Site

Wilkes County, North Carolina
Yadkin River Basin 03040102
for
NCDEQ
Division of Mitigation Services

Vicinity Map
Not to Scale

N

Environmental Quality

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DRAFT FINAL PLANS
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JUNE 4, 2021

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
P.O. Box 148
Swannanoa, NC 28778
David S. Turner, PLS
919-827-0745

Owner:
Matthew Reid
NCDEQ
Division of Mitigation Services
1652 Mail Service Center
Raleigh, NC 27699

DMS ID No. 100123
NCDEQ Contract No. 7891
USACE Action ID No. SAW-2019-00836

WILDLANDS ENGINEERING
1430 South Mint Street, Suite 104
Charlotte, NC 28203
Tel: 704.332.7754
License No. F-0831

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Huntsman Stream Mitigation Site
Wilkes County, North Carolina

Title Sheet

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Job Number: 005-02183
Project Engineer: ASE
Drawn By: HCC
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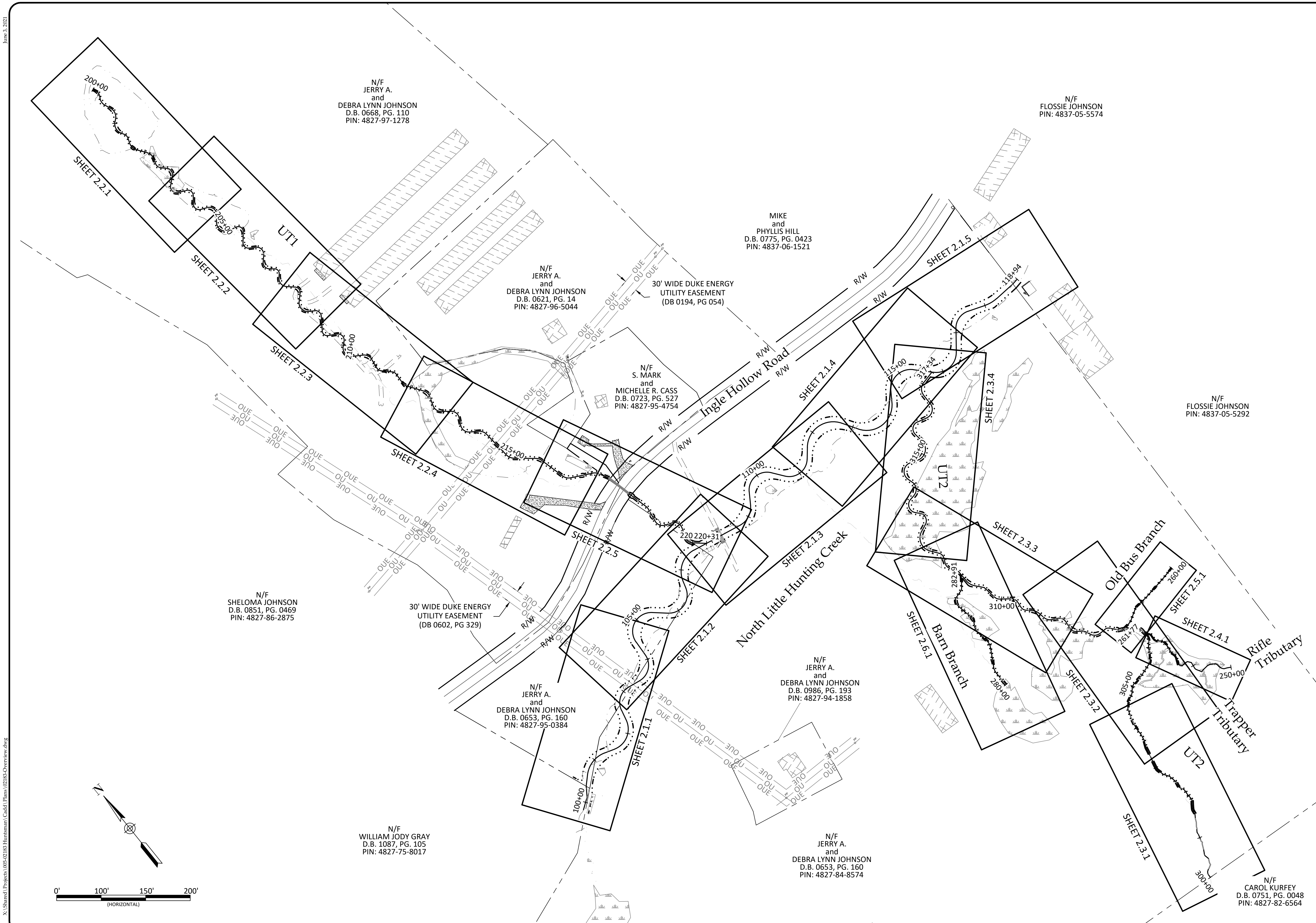

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Huntsman Stream Mitigation Site
Wilkes County, North Carolina

Project Overview

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Date: JUNE 4, 2021
Job Number: 005-02183
Project Engineer: ASE
Drawn By: HCC
Checked By: CDB

Sheet 0.2

June 3, 2021

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Construction Notes

GENERAL NOTES

1. ALL SEDIMENT AND EROSION CONTROL PRACTICES SHALL COMPLY WITH THE NORTH CAROLINA EROSION AND SEDIMENT CONTROL PLANNING AND DESIGN MANUAL.
2. 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 WORKDAY.
3. CONTRACTOR WILL INSTALL PUMP-AROUND SYSTEMS TO DIVERT FLOW WHILE WORKING IN LIVE, FLOWING CHANNELS. CONTRACTOR SHALL NOT REMOVE PUMP-AROUND SYSTEMS AND ADVANCE TO THE NEXT WORK AREA UNTIL THE CURRENT WORK AREA IS COMPLETED AND STABILIZED. IF FLOW IS NOT SUFFICIENT AT THE TIME OF CONSTRUCTION TO CAUSE SEDIMENTATION TO DOWNSTREAM WATERS, PUMP-AROUND OPERATIONS WILL NOT BE REQUIRED. IN THESE CASES, ROCK SILT CHECK DAMS WILL BE INSTALLED NEAR THE DOWNSTREAM EXTENT OF THE WORK AREA FOR THE CURRENT PHASE. CONTRACTOR SHALL TAKE MEASURES NECESSARY TO ENSURE THAT STORM FLOWS DO NOT DAMAGE WORK AREAS OR CREATE SEDIMENTATION OF AQUATIC HABITAT.
4. LOCATIONS FOR STAGING, STOCKPILE AREAS, AND STREAM CROSSINGS HAVE BEEN PROVIDED. ADDITIONAL OR ALTERNATIVE STAGING AND/OR STOCKPILE AREAS AND STREAM CROSSINGS MAY BE UTILIZED BY THE CONTRACTOR PROVIDED THAT ALL PRACTICES COMPLY WITH THE NORTH CAROLINA EROSION AND SEDIMENT CONTROL PLANNING AND DESIGN MANUAL, THAT THE AREAS ARE LOCATED WITHIN THE PERMITTED LIMITS OF DISTURBANCE, AND THAT THE AREAS ARE APPROVED BY ENGINEER PRIOR TO IMPLEMENTATION.
5. THE ENGINEER WILL FIELD WALK THE SITE WITH THE CONTRACTOR PRIOR TO WORK BEGINNING AND FIELD FLAG VEGETATION TO BE USED AS TRANSPLANT MATERIAL. VEGETATION TO BE USED AS TRANSPLANT MATERIAL (JUNCUS, ALDERS, SMALL TREES, AND SOD MATS) SHALL NOT BE DISTURBED UNTIL CONTRACTOR IS PREPARED TO INSTALL TRANSPLANTS.
6. WHEN CROSSING AN ACTIVE SECTION OF NEW OR OLD STREAM CHANNEL, A TEMPORARY STREAM CROSSING SHALL BE INSTALLED ACCORDING TO THE DETAILS AND SPECIFICATIONS.
7. CONTRACTOR IS TO MAKE EVERY EFFORT TO AVOID DAMAGING OR REMOVING EXISTING TREES SHOWN TO REMAIN INSIDE AND OUTSIDE THE LIMITS OF DISTURBANCE.
8. CONTRACTOR SHALL NOT EXCEED THE LIMITS OF DISTURBANCE SHOWN ON THE PLANS.
9. 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 WORKDAY.
10. CONTRACTOR WILL INSTALL PUMP-AROUND SYSTEMS TO DIVERT FLOW WHILE WORKING IN LIVE, FLOWING CHANNELS. CONTRACTOR SHALL NOT REMOVE PUMP-AROUND SYSTEMS AND ADVANCE TO THE NEXT WORK AREA UNTIL THE CURRENT WORK AREA IS COMPLETED AND STABILIZED (SEEDED, MULCHED, AND COIR FIBER MATTED).
11. CONTRACTOR SHALL NOT DISTURB MORE ACTIVE STREAM CHANNEL THAN CAN BE STABILIZED BY THE END OF THE DAY. A 24-HOUR PUMP AROUND SYSTEM IS REQUIRED IF IN-STREAM CONSTRUCTION IS NOT COMPLETED AND STABILIZED BY THE END OF THE WORK DAY.
12. PERFORM ANY NECESSARY CLEARING AND GRUBBING IN PHASES AS WORK PROGRESSES. CLEARING AND GRUBBING ACTIVITIES SHALL NOT EXTEND MORE THAN 150 LINEAR FEET AHEAD OF IN-STREAM WORK. BANK VEGETATION AND VEGETATION IMMEDIATELY ADJACENT TO LIVE CHANNELS SHALL BE LEFT UNDISTURBED AS LONG AS POSSIBLE.
13. 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.
14. VARIOUS TYPES OF CONSTRUCTED RIFFLES AND CASCADES ARE SPECIFIED ON THE PLANS. CONTRACTOR WILL BUILD THE SPECIFIC TYPES OF CONSTRUCTED RIFFLES AND CASCADES AT LOCATIONS SHOWN ON THE PLANS. CHANGES IN TYPE OR RIFFLE OR CASCADE MUST BE APPROVED BY THE ENGINEER.
15. POND SLUDGE AND ORGANIC DEBRIS FROM THE EXCAVATION OF THE EXISTING PONDS ON UT1 REACHES 1 AND 2 WILL BE HARVESTED, STOCKPILED, DRIED, AND REAPPLIED ON-SITE WHENEVER POSSIBLE.
16. TOPSOIL WILL BE HARVESTED, STOCKPILED, AND REAPPLIED TO THE EXTENT THAT IT IS ENCOUNTERED.
17. SOIL AMENDMENTS WILL BE APPLIED TO ASSIST WITH GRASS ESTABLISHMENT AND TREE GROWTH IN SOME OR ALL DISTURBED AREAS. THE LIMITS OF APPLICATIONS WILL BE DETERMINED BY THE ENGINEER AND SHOULD BE APPROVED BEFORE RE-APPLICATION OF TOPSOIL.

Existing Features

- Existing Property Line
- 100 — Existing Major Contour (5' Interval)
- Existing Minor Contour
- TB — Existing Top of Bank
- Existing Edge of Water
- OU — Existing Overhead Utility Line
- OUE — Existing Overhead Utility Easement
- PP — Existing Utility Pole
- X — Existing Fence
- Existing Storm Pipe
- Existing Building
- Existing Wetland
- Existing Farm Road
- Existing Rip Rap
- Existing Bedrock
- Existing Tree
- Existing Tree Line
- FEMA — Existing FEMA Floodway

Topographic Survey completed by Turner Mapping and Surveying in March 2020. Parcel Boundary survey completed by Turner Mapping and Surveying in March 2020.

Types of Constructed Riffles used at certain locations may be modified at Engineer's Discretion.

Proposed Features

- CE — Proposed Conservation Easement
- CE-IX — Proposed Stream Crossing
- TCE — Proposed Temporary Construction Easement
- Proposed Thalweg Alignment
- Proposed Bankfull
- 100 — Proposed Major Contour (5' Interval)
- Proposed Minor Contour

Proposed Structures

- Proposed Angled Log Drop
  See Detail 2, Sheet 6.2
- Proposed Log J-hook
  See Detail 2, Sheet 6.2
- Proposed Log Vane
  See Detail 4, Sheet 6.3
- Proposed Rock Sill
  See Detail 2, Sheet 6.3
- Proposed Rock J-Hook
  See Detail 3, Sheet 6.2

Proposed Structures

- Proposed Various Constructed Riffles
  See Sheet 6.1
- Proposed Rock Cascade with Pools
  See Detail 1, Sheet 6.2
- Proposed Brush Toe
  See Sheet 6.5
- Proposed Vegetated Soil Lift
  See Detail 1, Sheet 6.3
- Proposed Rock Protection
  See Detail 2, Sheet 6.3
- Proposed BMP with Rock Weir Outlet
  See Detail 2, Sheet 6.7
- Proposed BMP - Rock Cascade with Pools
  See Detail 3, Sheet 6.4
- Proposed Culvert Crossing
  To Be Revised with Final Plans, Sheet 6.6
- Proposed Debris Removal
- Proposed Additional Grading

Erosion Control Features

- LOD — Limits of Disturbance
- [X] — Silt Fence
  See Detail 2, Sheet 6.8
- SAF — Safety Fence
  See Detail 3, Sheet 6.9
- Haul Road
- Temporary Construction Entrance
  See Detail 1, Sheet 6.9
- Temporary Stream Crossing
  See Detail 3, Sheet 6.8
- Temporary Rock Sediment Dam
  See Detail 4, Sheet 6.5
- Silt Fence Gravel Outlet
  See Detail 5, Sheet 6.5
- Pump Around System
  See Detail 2, Sheet 6.9

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Charlotte, NC 28203
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License No. F-0831

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Huntsman Stream Mitigation Site
Wilkes County, North Carolina

General Notes and Symbols

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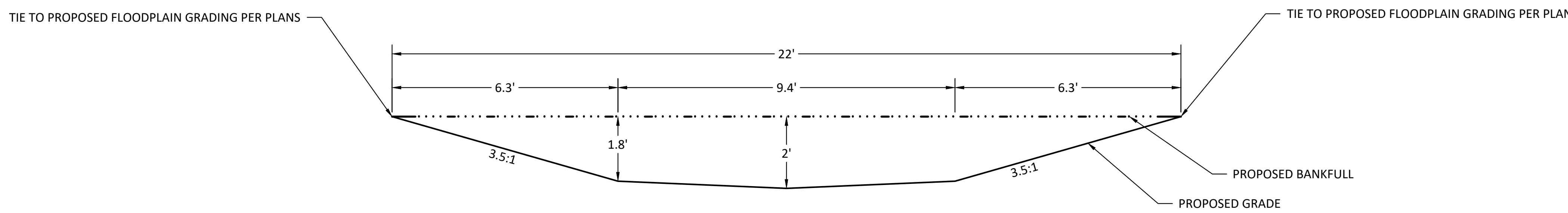
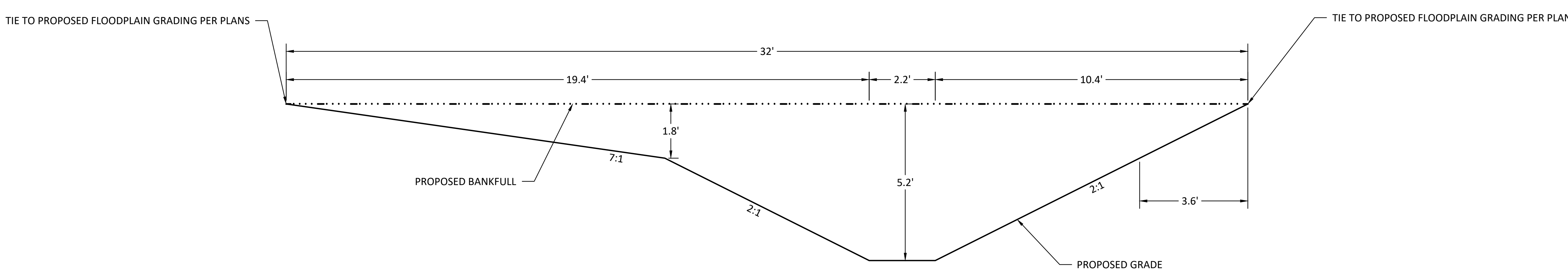
Job Number:	005-02183
Project Engineer:	ASE
Drawn By:	HCC
Checked By:	CDB

Sheet 0.3



North Little Hunting Creek Reach 1 - Riffle
STA: 100+37 - 107+87
Not to Scale



North Little Hunting Creek Reach 1 - Pool
STA: 100+37 - 107+87
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North Little Hunting Creek
Typical Sections

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Drawn By:	HCC
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1.1.1

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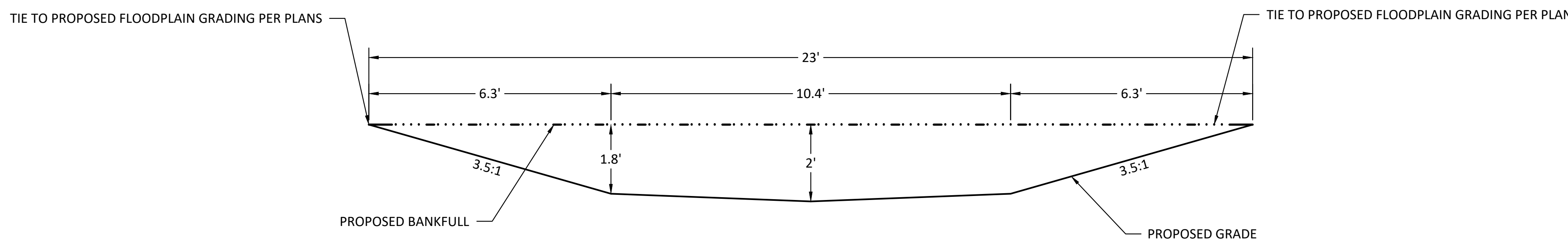

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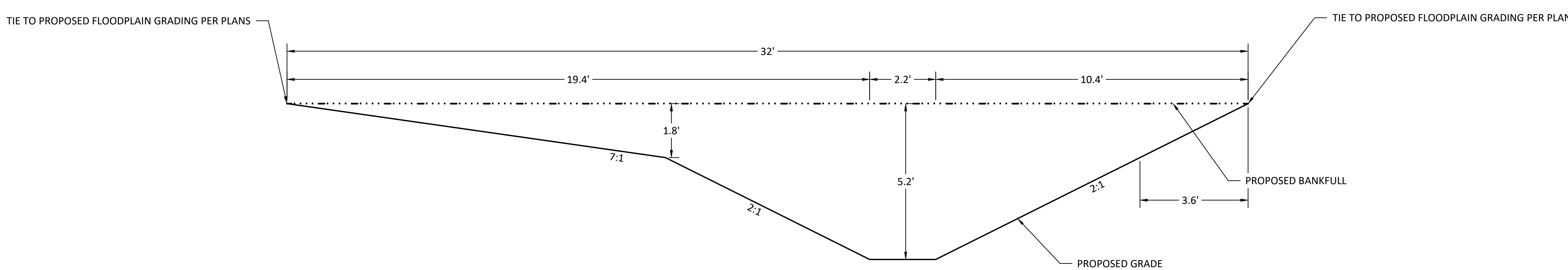
STA: 107+87 - 118+80



North Little Hunting Creek Reach 2 - Pool
STA: 107+87 - 118+80

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Huntsman Stream Mitigation Site
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North Little Hunting Creek Reach 2
Typical Sections

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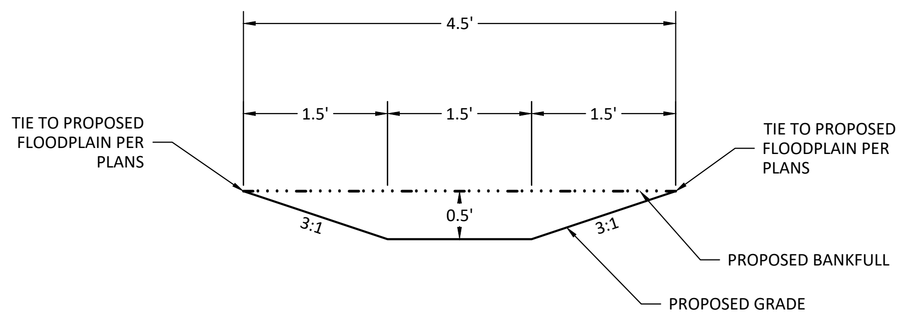
Sheet 1.1.2



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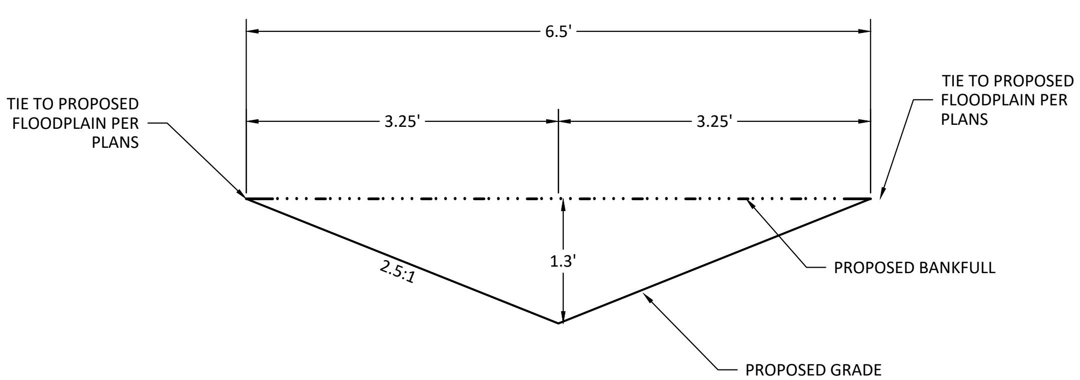
STA: 200+00 - 200+27
STA: 201+20 - 202+24
STA: 211+10 - 212+00



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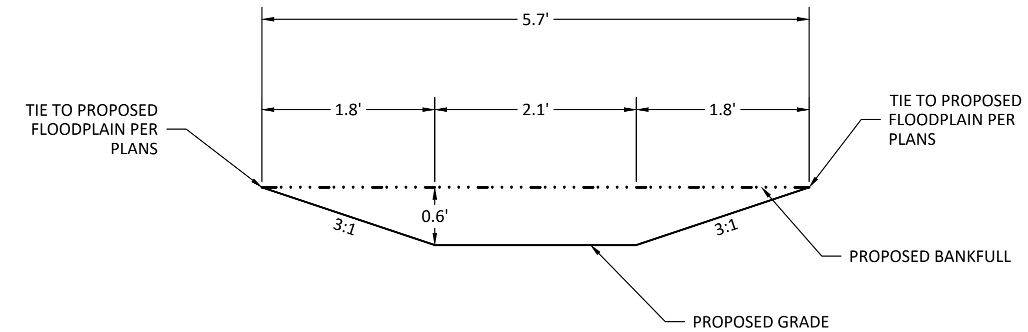
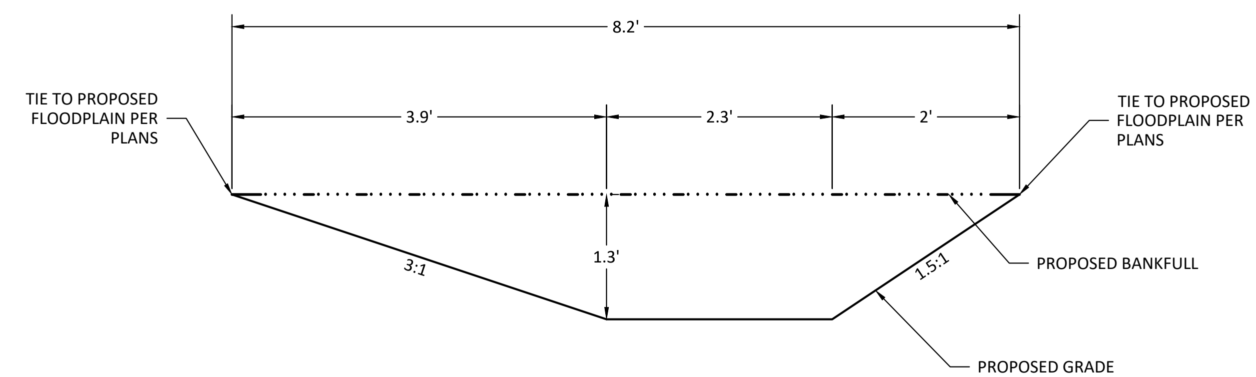
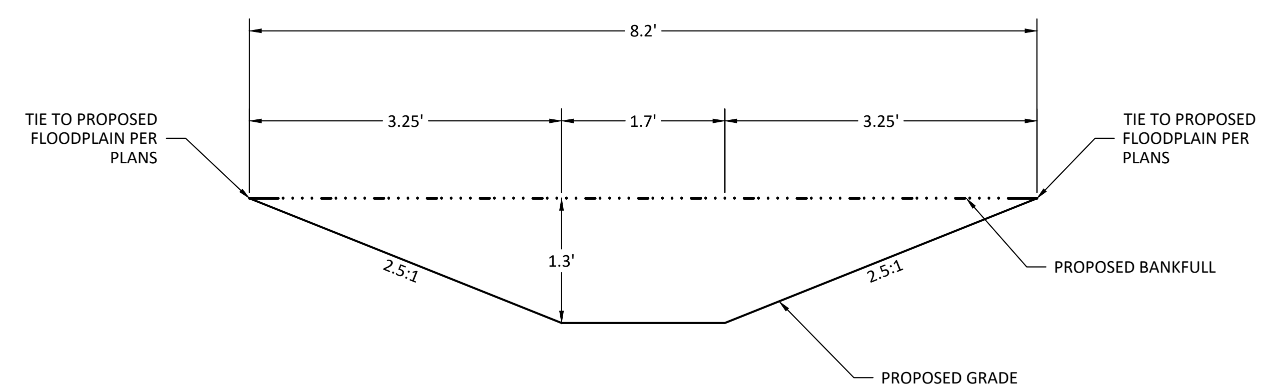
STA: 201+20 - 202+24
STA: 211+10 - 212+00



UT1 Typical B - Riffle
STA: 200+27 - 201+20
STA: 202+24 - 211+10
STA: 212+00 - 214+84



UT1 Typical B - Meander Pool
STA: 200+27 - 201+20
STA: 202+24 - 211+10
STA: 212+00 - 214+84



UT1 Typical B - In-line Pool
STA: 200+27 - 201+20
STA: 202+24 - 211+10
STA: 212+00 - 214+84

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UT1 Reach 1
Typical Sections

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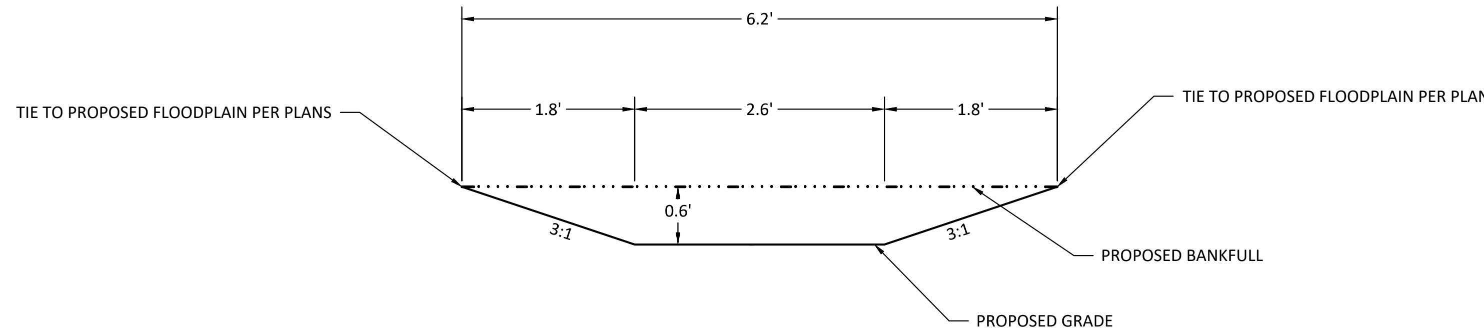
Sheet 1.2.1



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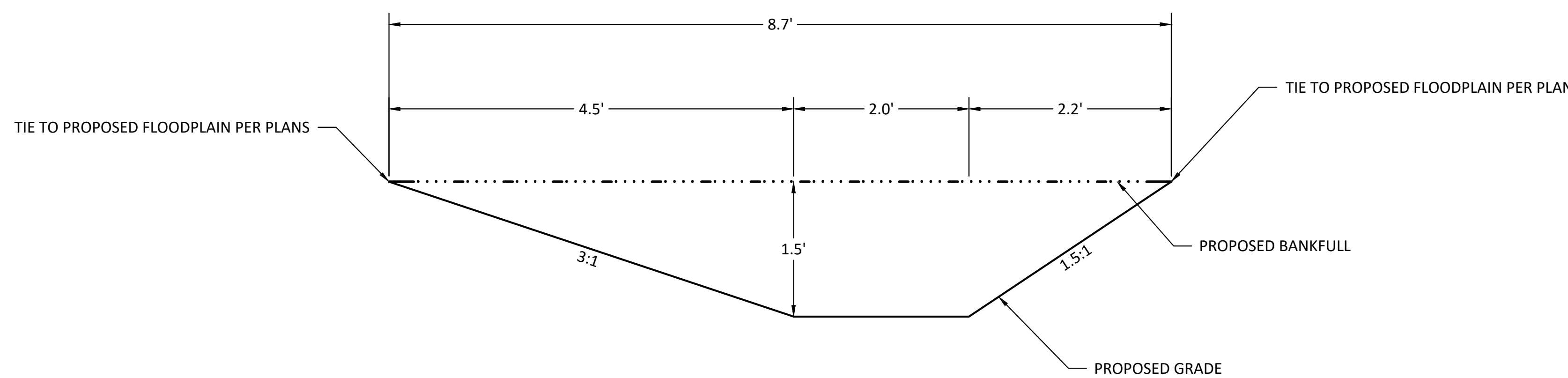
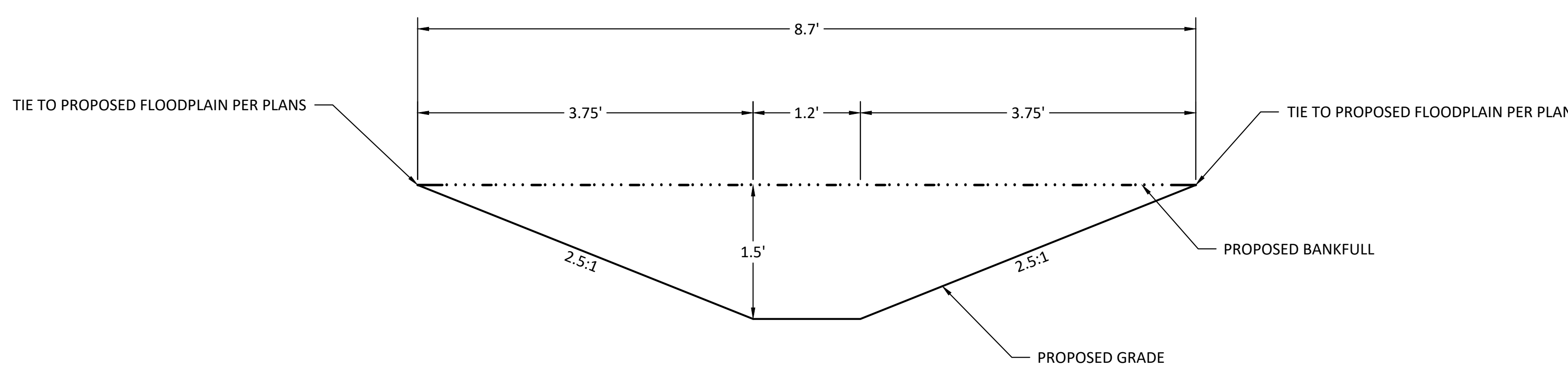
STA: 214+84 - 217+40



UT1 Reach 2 - Meander Pool
STA: 214+84 - 217+40



UT1 Reach 2 - In-line Pool
STA: 214+84 - 217+40

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Huntsman Stream Mitigation Site
Wilkes County, North Carolina

UT1 Reach 2
Typical Sections

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Job Number: 005-02183
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Checked By: CDB

Sheet 1.2.2

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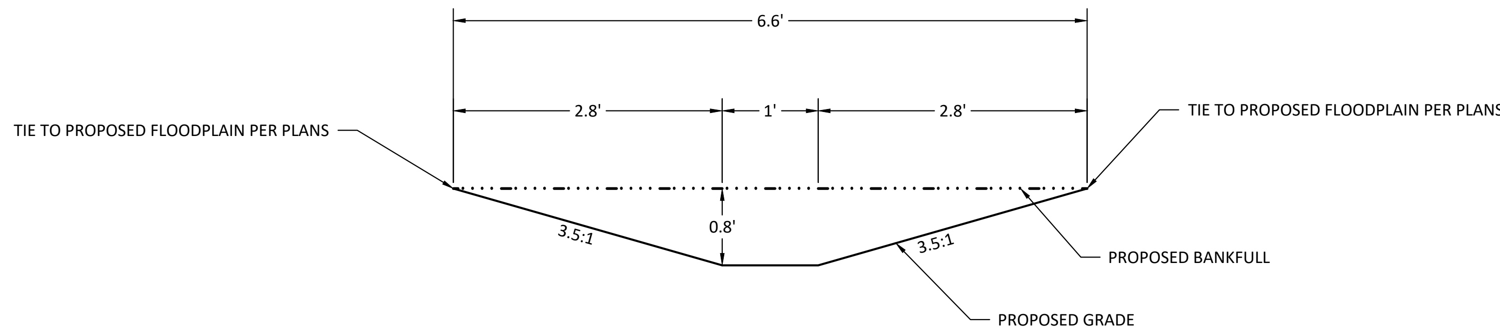
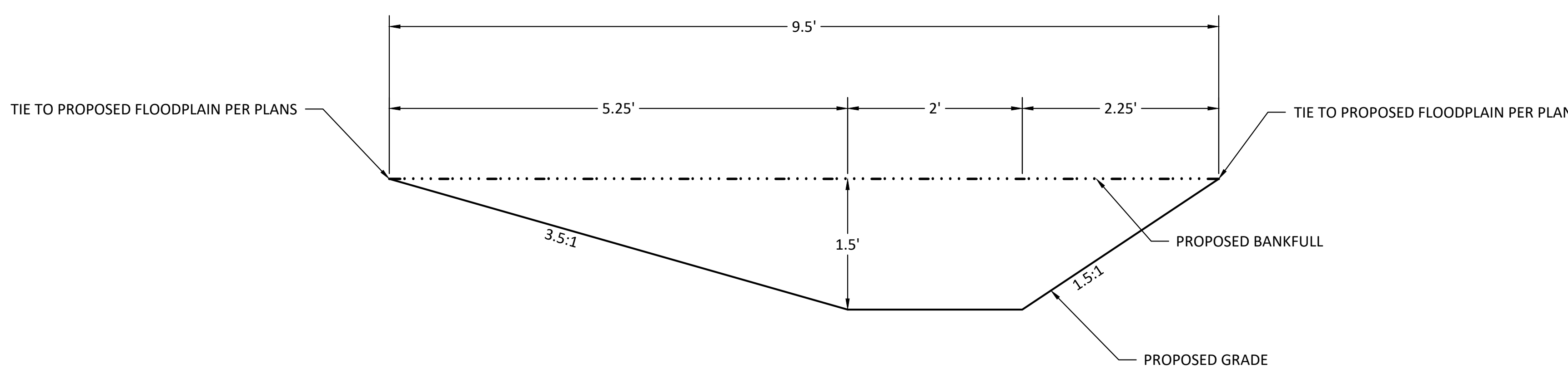
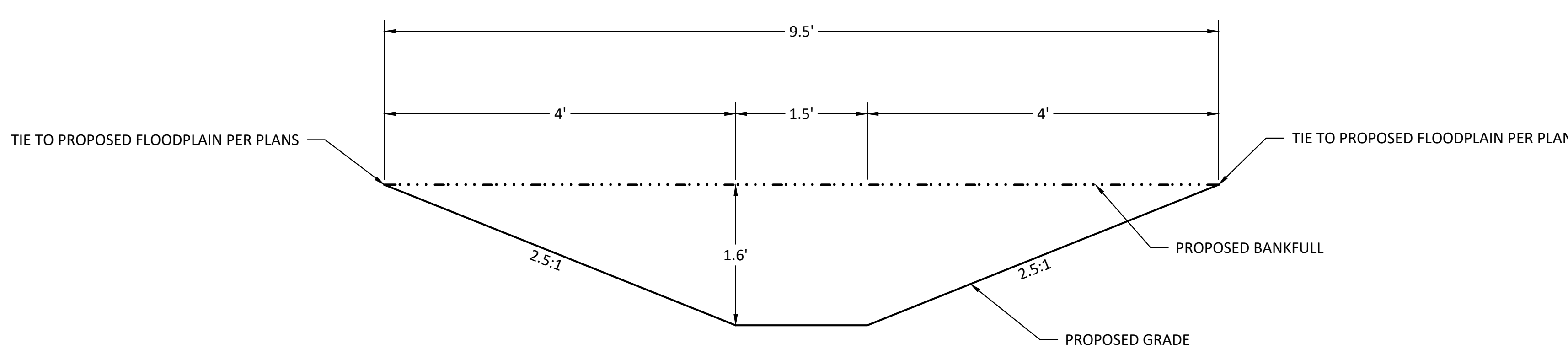


UT1 Reach 3 - Riffle
STA: 217+98 - 220+21



UT1 Reach 3 - Meander Pool
STA: 217+98 - 220+21



UT1 Reach 3 - In-line Pool
STA: 218+62 - 220+89

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Huntsman Stream Mitigation Site
Wilkes County, North Carolina

UT1 Reach 3
Typical Sections

Revisions:

Date: JUNE 4, 2021
Job Number: 005-02183
Project Engineer: ASE
Drawn By: HCC
Checked By: CDB

Sheet 1.2.3

June 3, 2021

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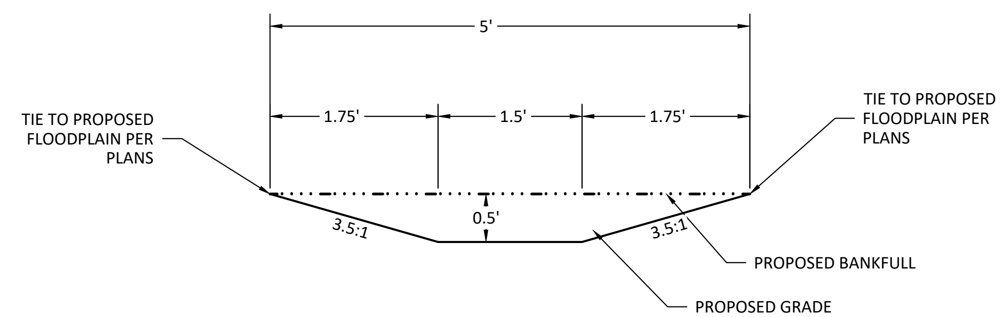
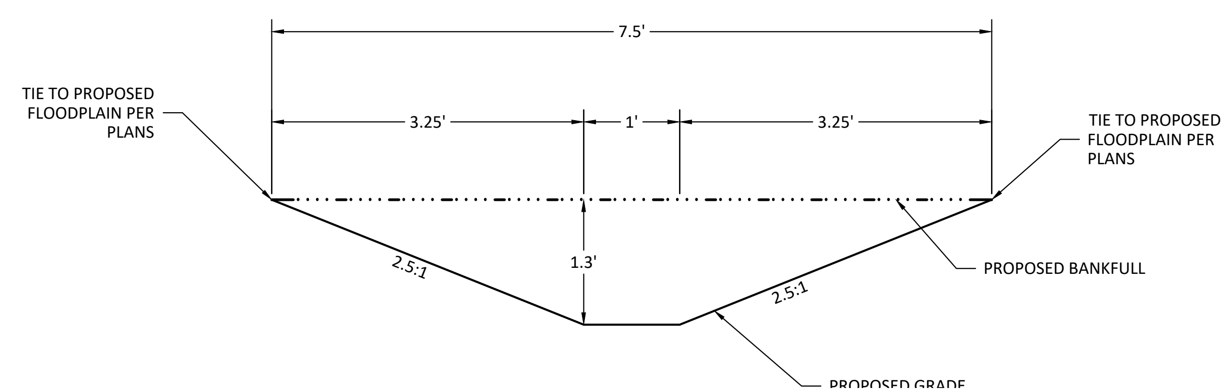


UT2 Reach 2 - Riffle
STA: 303+50 - 306+37



UT2 Reach 2 - In-line Pool
STA: 303+50 - 306+37

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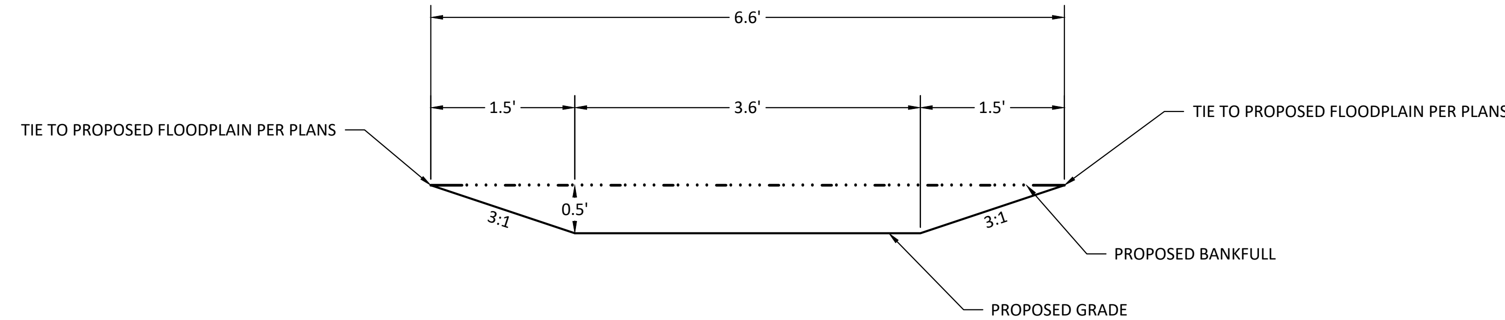
Huntsman Stream Mitigation Site
Wilkes County, North Carolina

UT2 Reach 2
Typical Sections

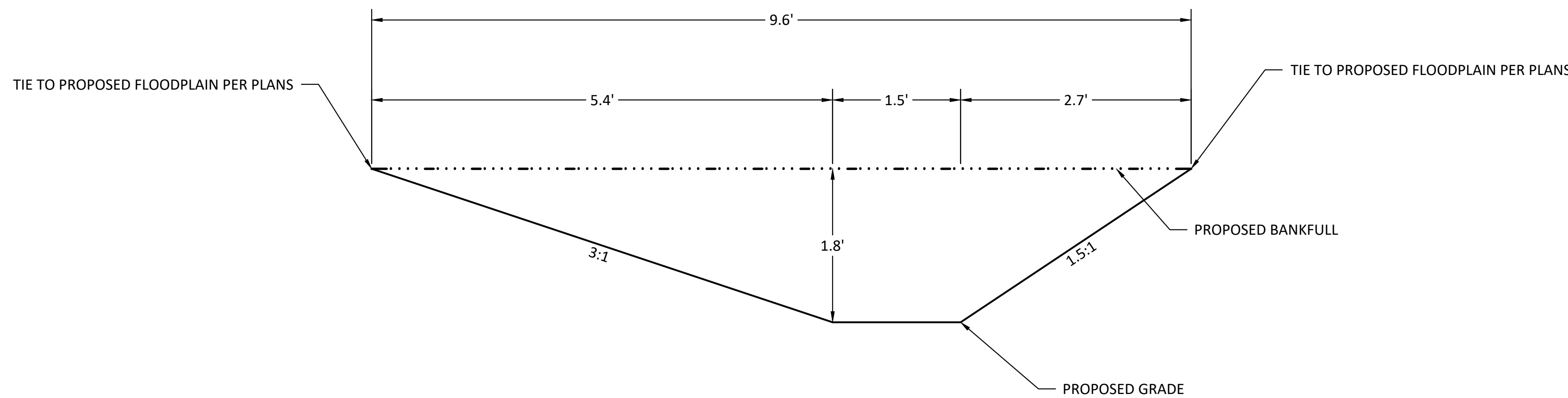
Revisions:

Date: JUNE 4, 2021
Job Number: 005-02183
Project Engineer: ASE
Drawn By: HCC
Checked By: CDB

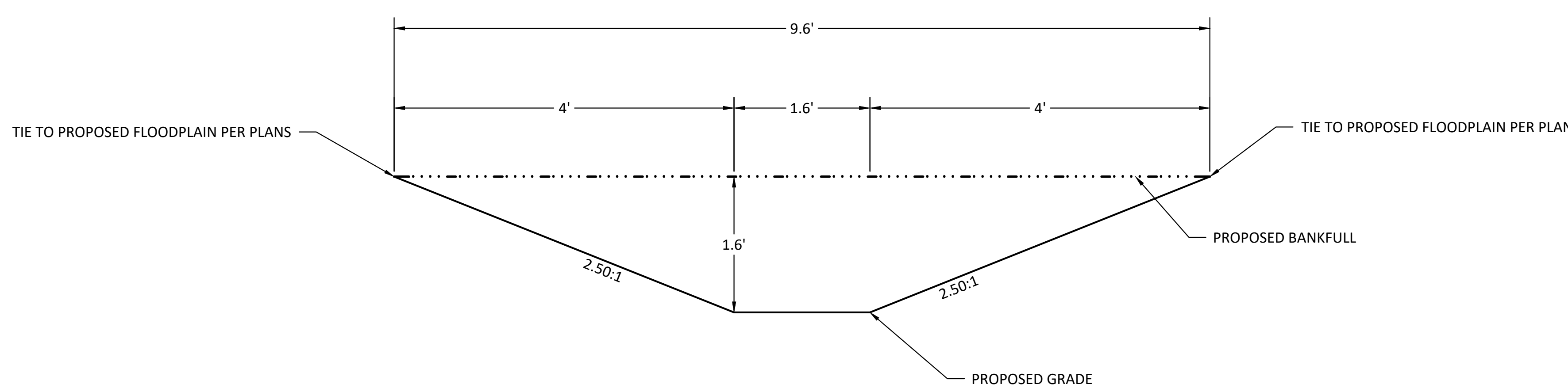
Sheet 1.3.1



UT2 Reach 3 - Riffle
STA: 306+37 - 312+06



UT2 Reach 3 - Meander Pool
STA: 306+37 - 312+06



UT2 Reach 3 - In-line Pool
STA: 306+37 - 312+06

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Huntsman Stream Mitigation Site
Wilkes County, North Carolina

UT2 Reach 3
Typical Sections

Revisions:

Date:	JUNE 4, 2021
Job Number:	005-02183
Project Engineer:	ASE
Drawn By:	HCC
Checked By:	CDB

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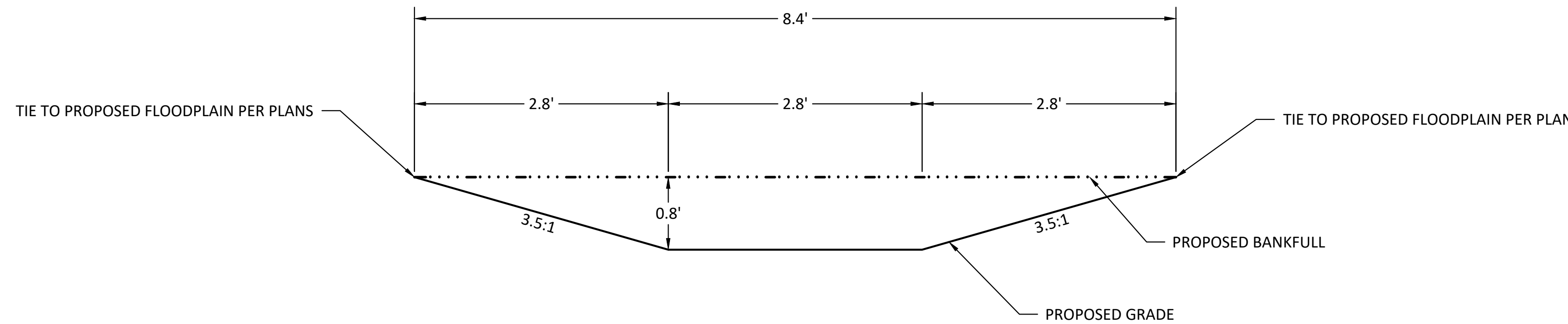
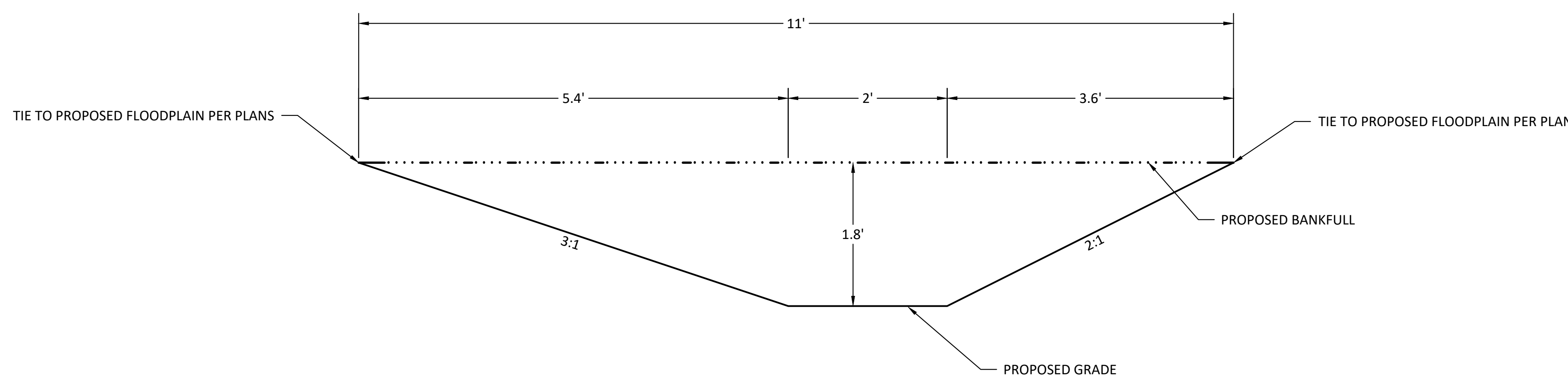


UT2 Reach 4 - Riffle
STA: 312+06 - 317+28



UT2 Reach 4 - Meander Pool
STA: 312+06 - 317+28

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Huntsman Stream Mitigation Site
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UT2 Reach 4
Typical Sections

Revisions:

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Drawn By:	HCC
Checked By:	CDB

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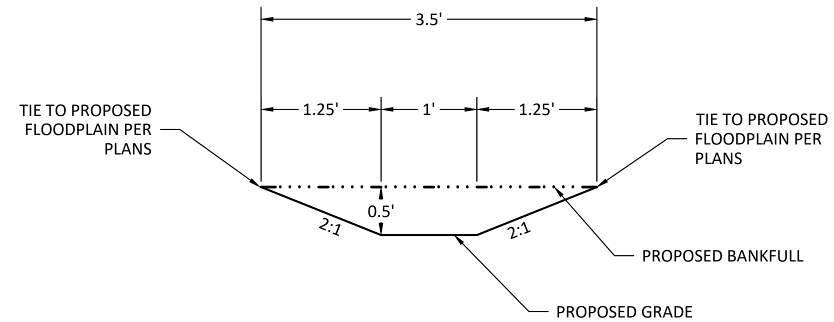
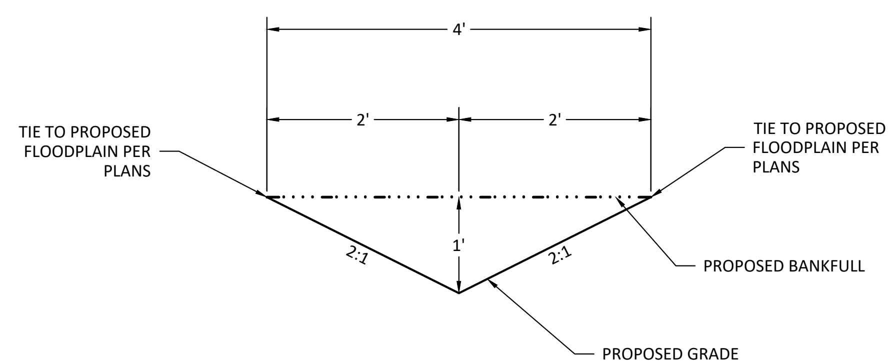


Old Bus Branch - Riffle
STA: 260+00 - 261+77



Old Bus Branch - In-line Pool
STA: 260+00 - 261+77

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Huntsman Stream Mitigation Site
Wilkes County, North Carolina

Old Bus Branch
Typical Sections

Revisions:

Date: JUNE 4, 2021
Job Number: 005-02183
Project Engineer: ASE
Drawn By: HCC
Checked By: CDB

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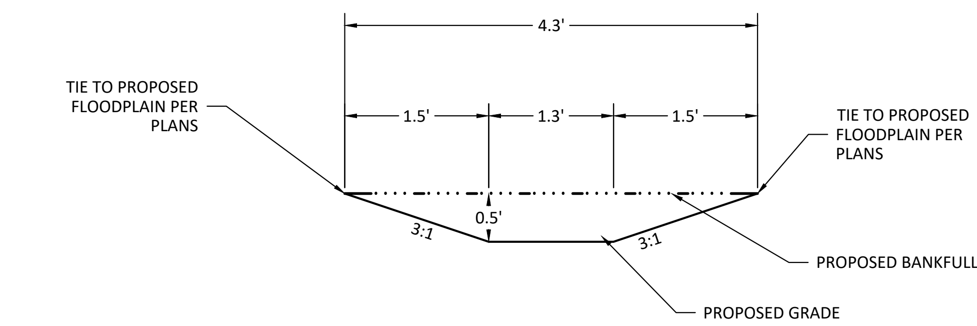
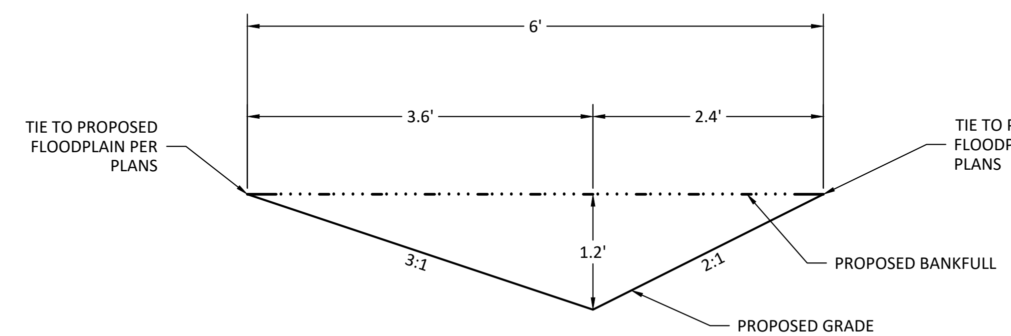
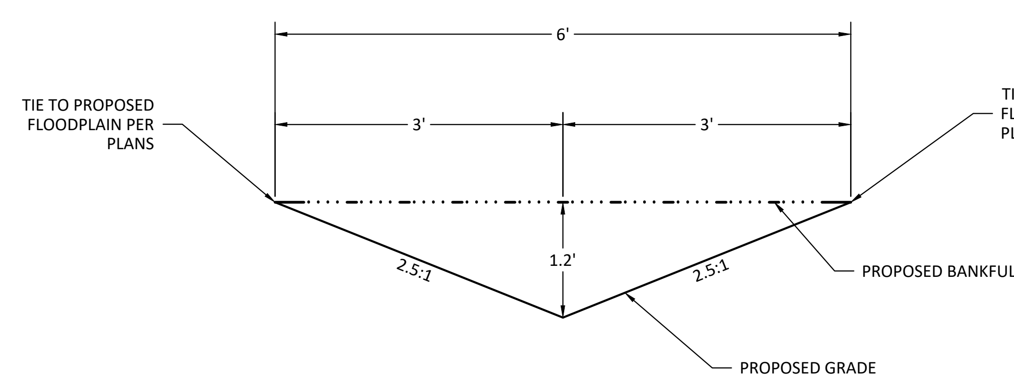


Barn Branch - Riffle
STA: 280+00 - 282+91



Barn Branch - Meander Pool
STA: 280+00 - 282+91



Barn Branch - In-line Pool
STA: 280+00 - 282+91

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Huntsman Stream Mitigation Site
Wilkes County, North Carolina

Barn Branch
Typical Sections

Revisions:

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Drawn By: HCC
Checked By: CDB

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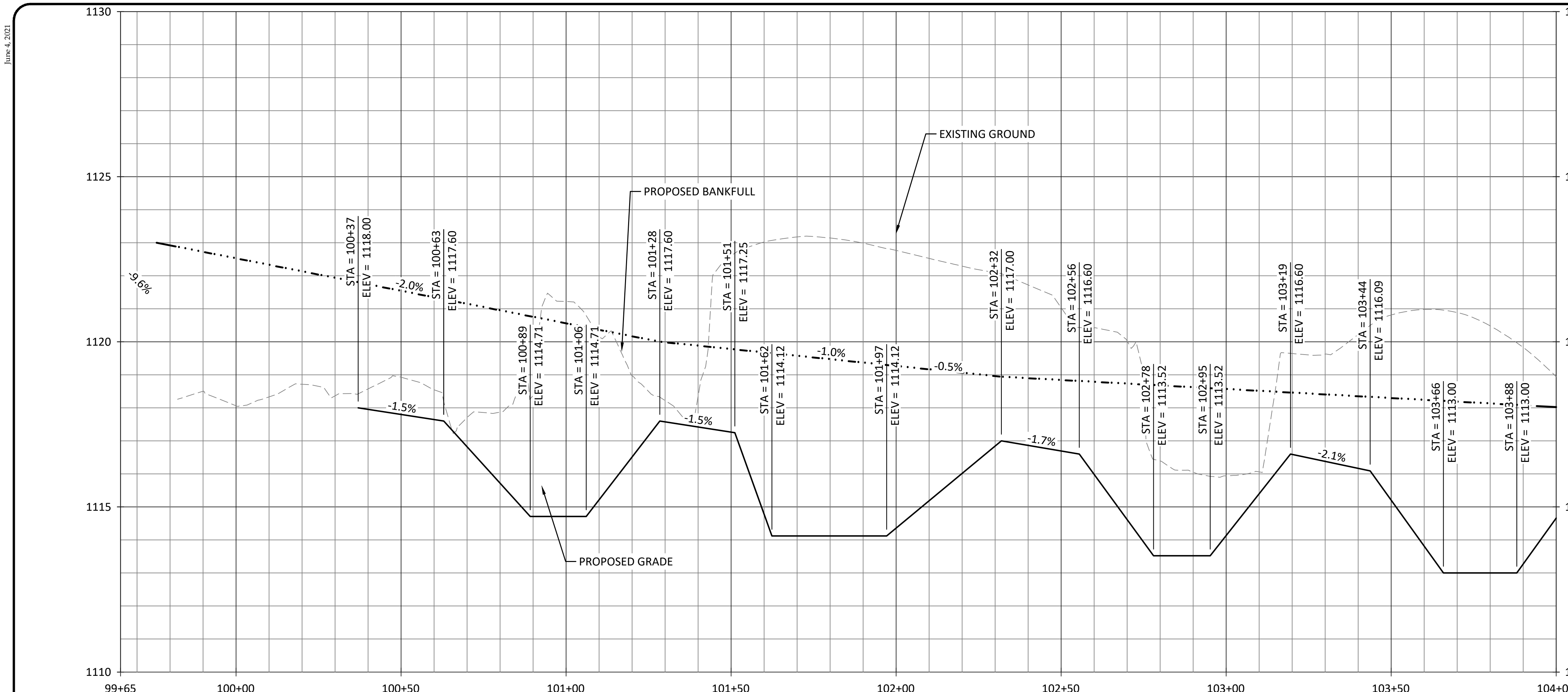

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(VERTICAL)

0' 20' 40' 60'
(HORIZONTAL)

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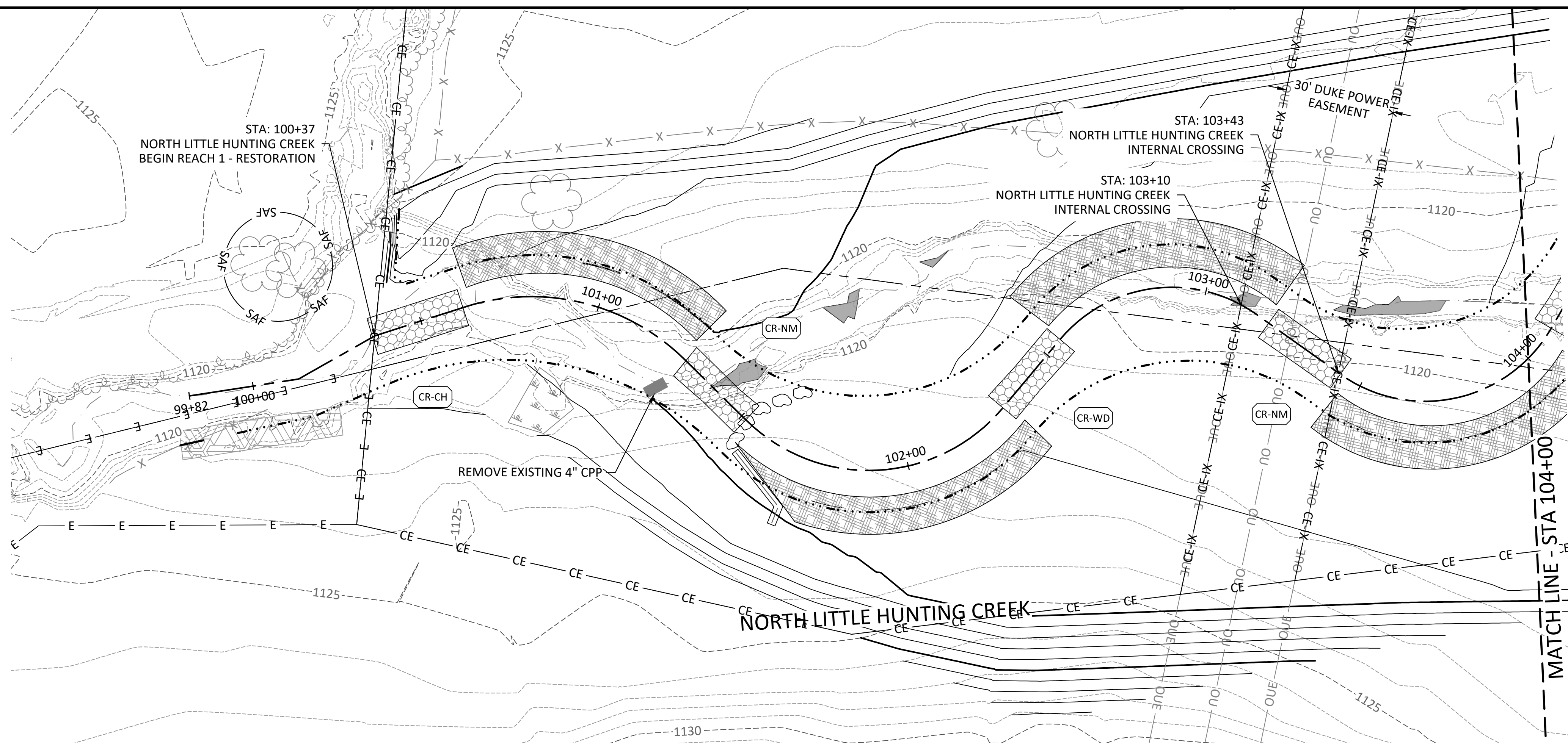

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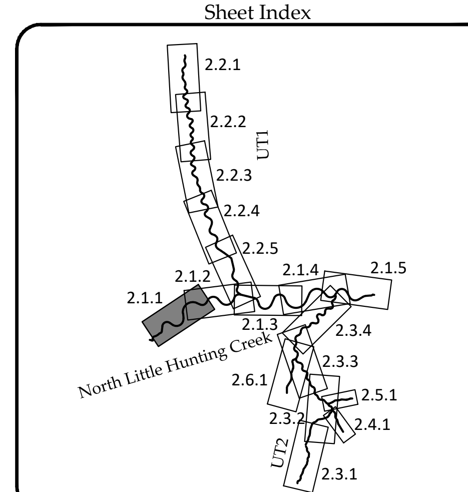

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Huntsman Stream Mitigation Site
Wilkes County, North Carolina

North Little Hunting Creek
Stream Plan and Profile

Revisions:

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Checked By:	CDB

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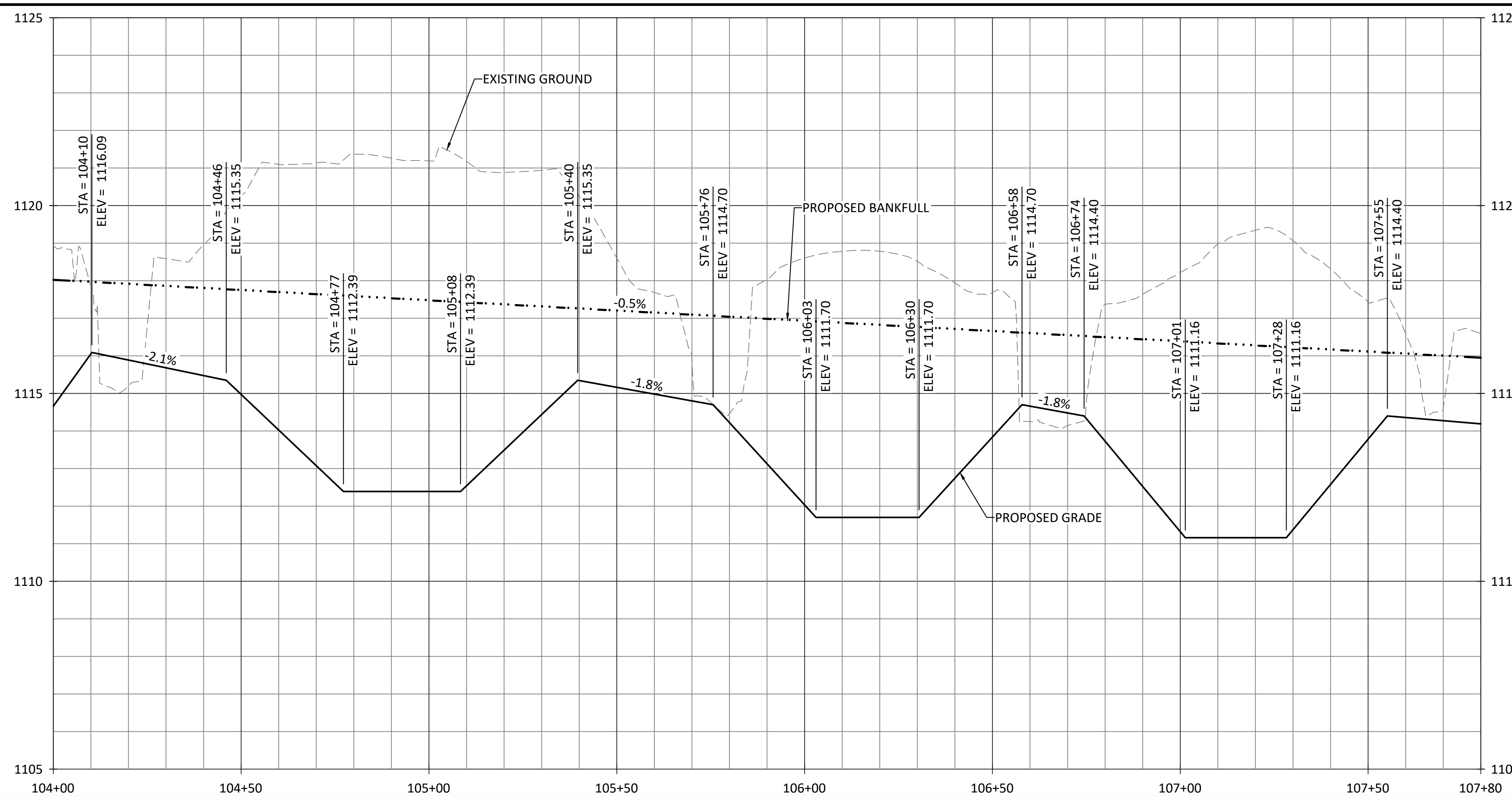

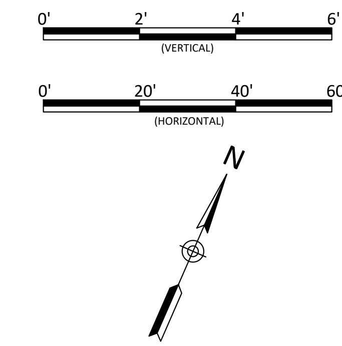

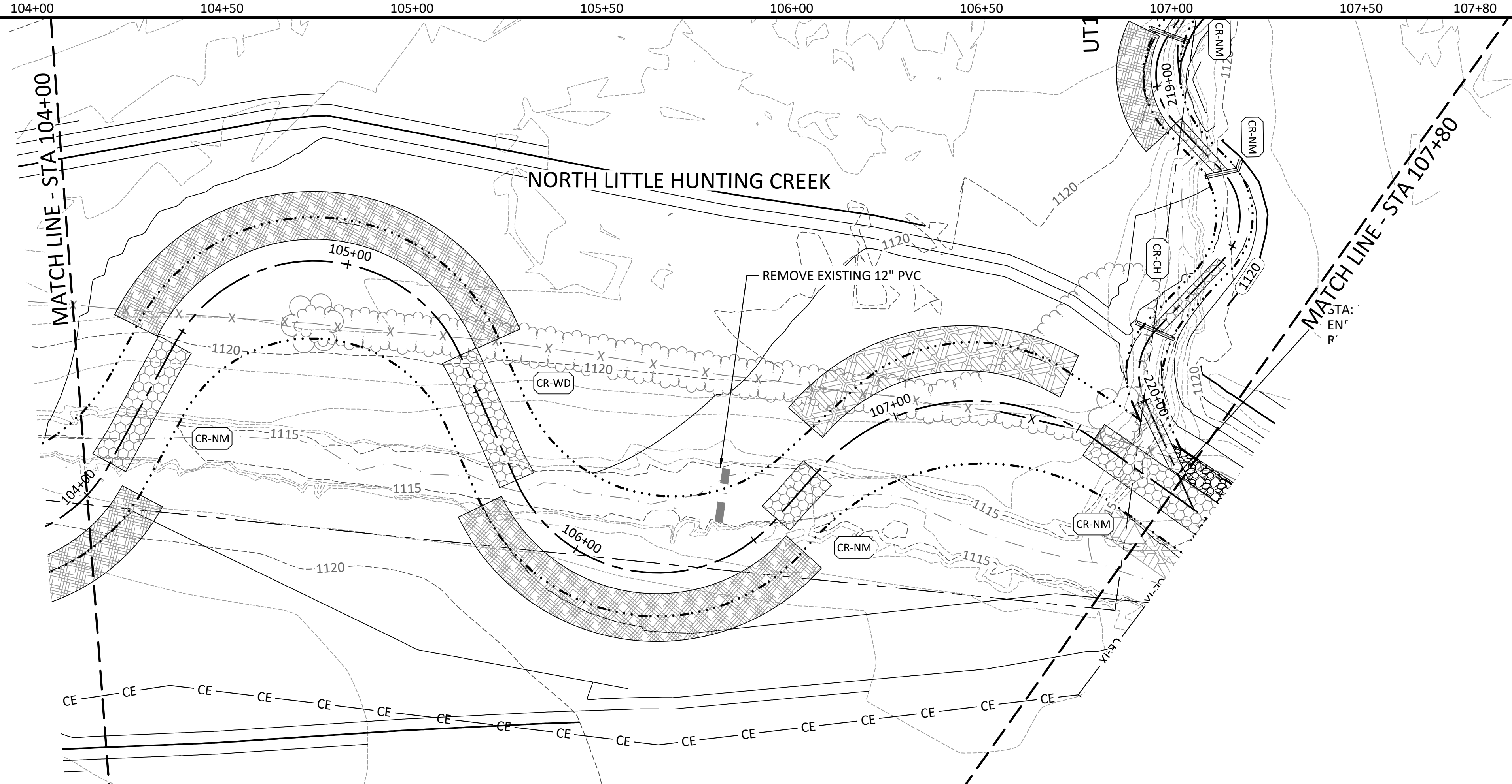

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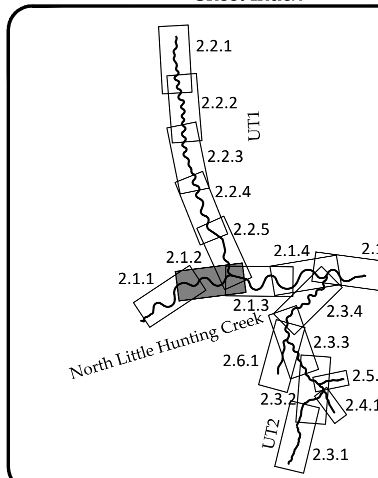

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Huntsman Stream Mitigation Site
Wilkes County, North Carolina

North Little Hunting Creek
Stream Plan and Profile

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Drawn By:	HCC
Checked By:	CDB

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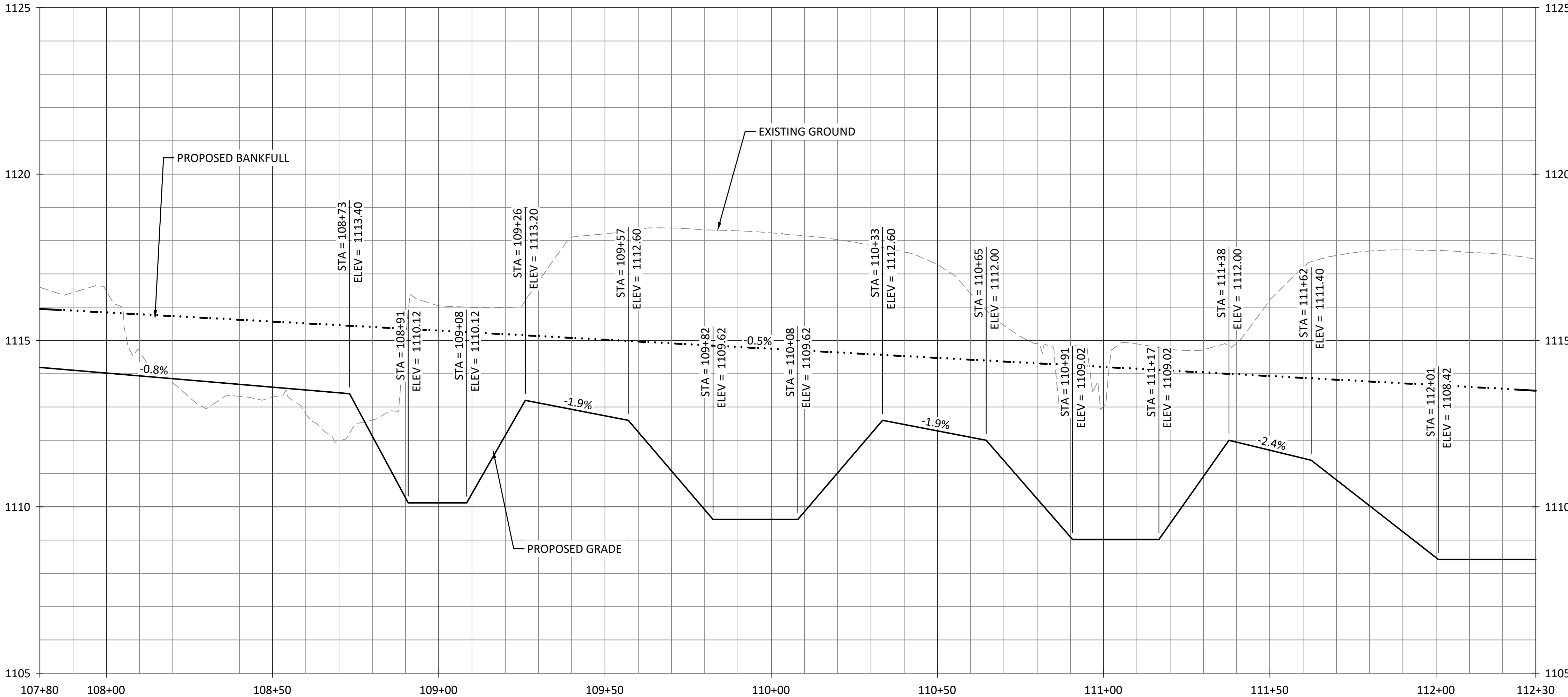

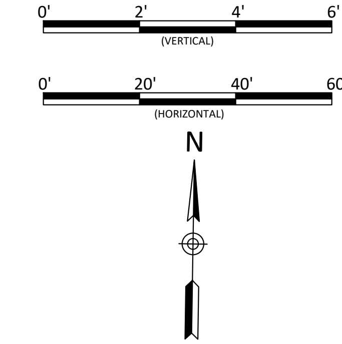

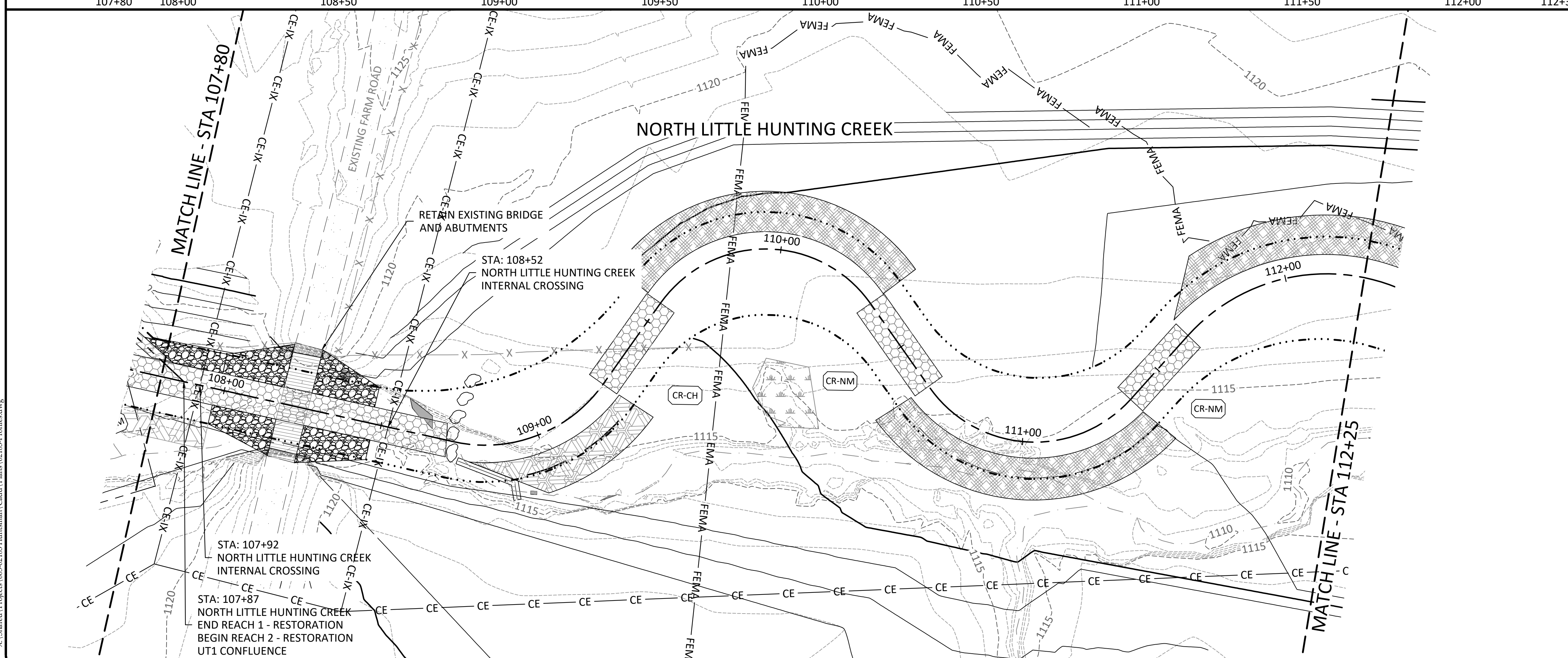

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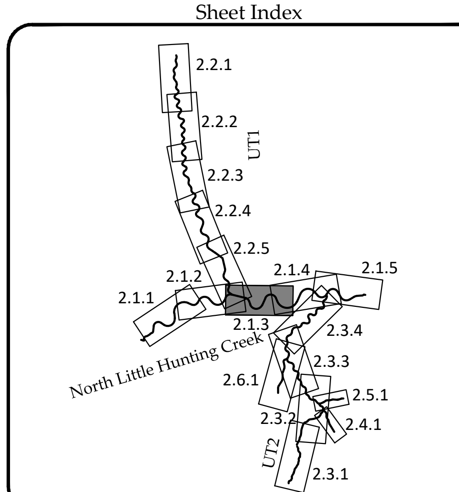

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Huntsman Stream Mitigation Site
Wilkes County, North Carolina

North Little Hunting Creek
Stream Plan and Profile

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Date:	JUNE 4, 2021
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Project Engineer:	ASE
Drawn By:	HCC
Checked By:	CDB

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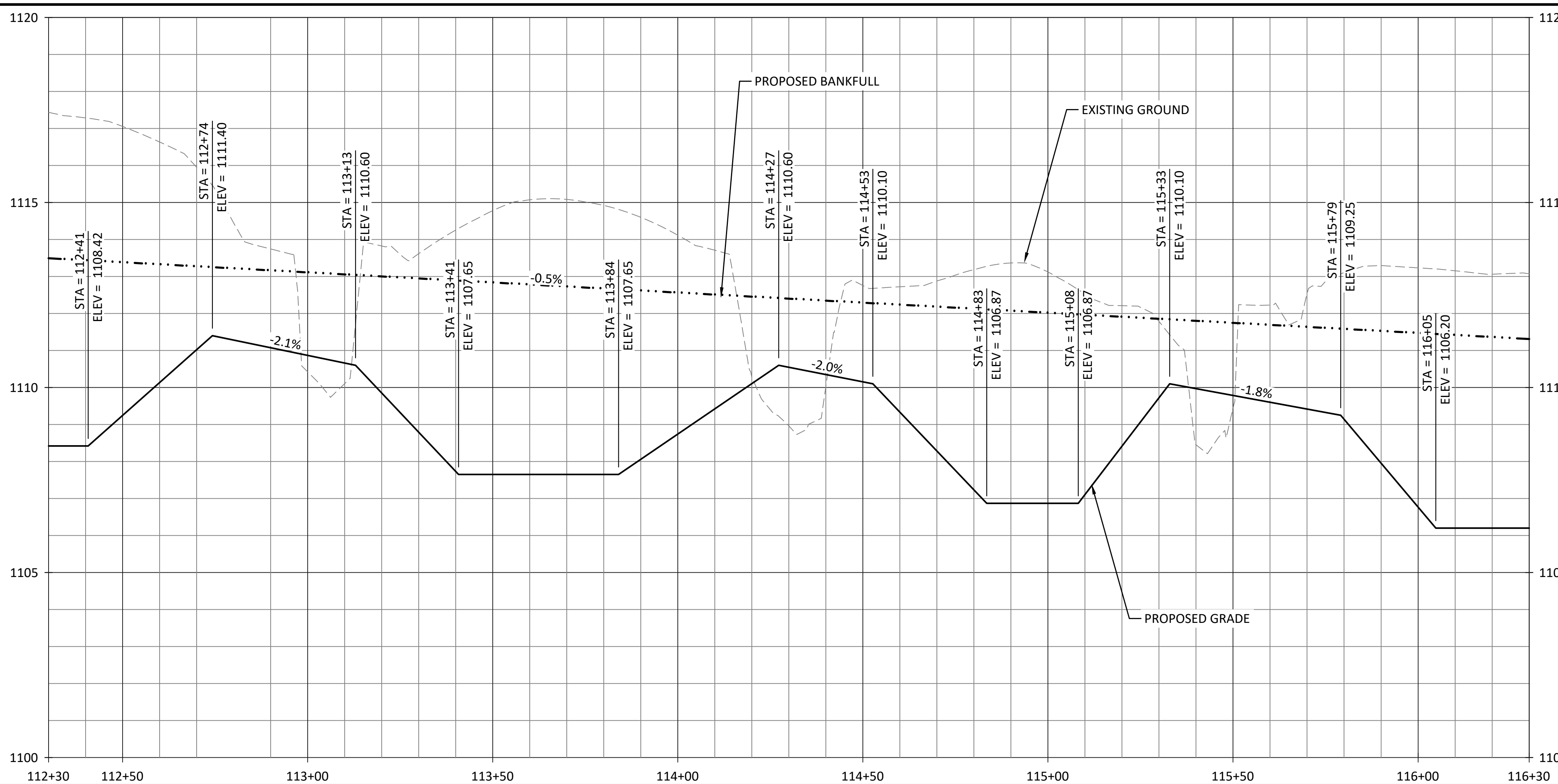

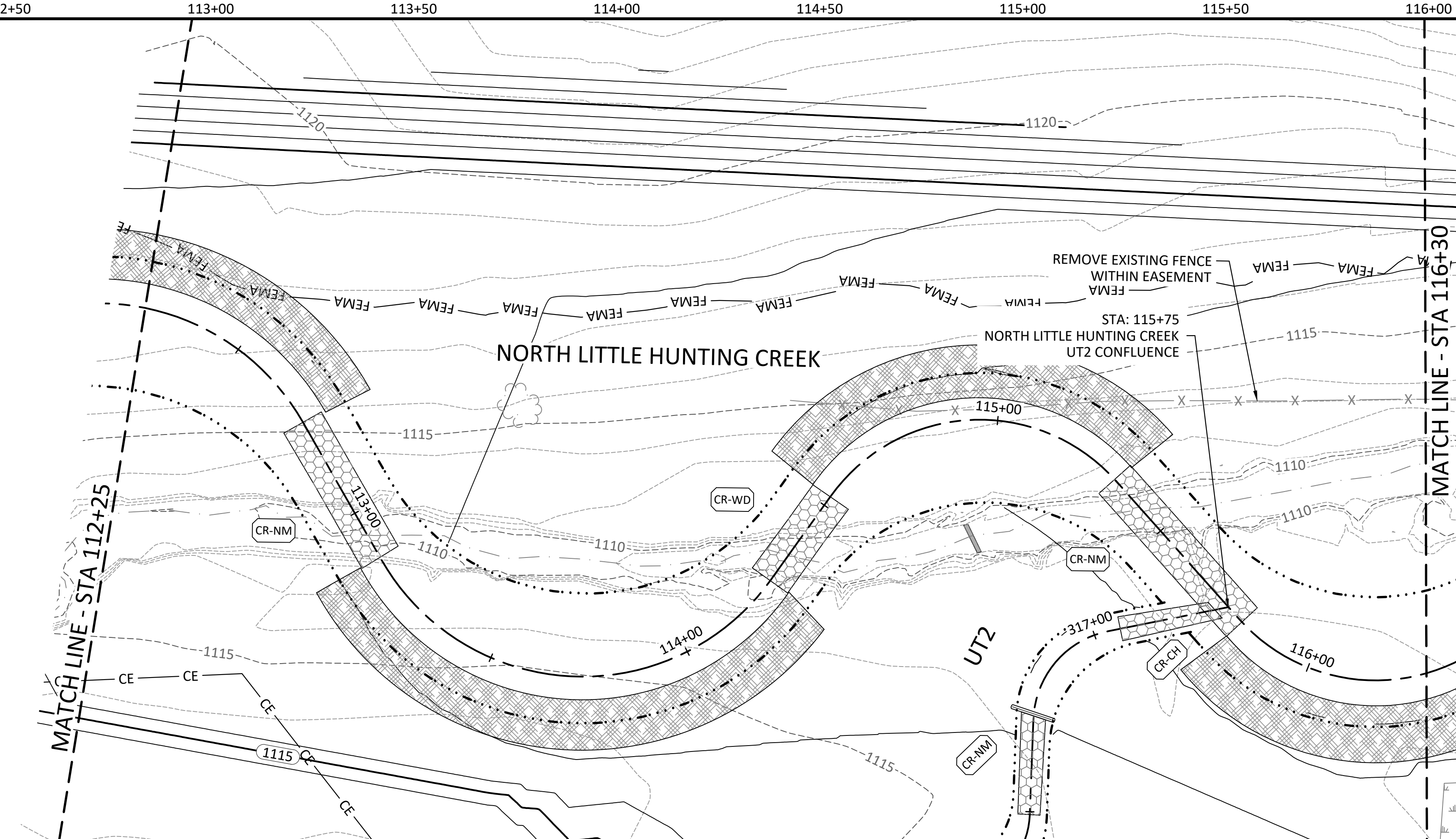

0' 2' 4' 6' (VERTICAL)

0' 20' 40' 60' (HORIZONTAL)

N

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Huntsman Stream Mitigation Site
Wilkes County, North Carolina

North Little Hunting Creek
Stream Plan and Profile

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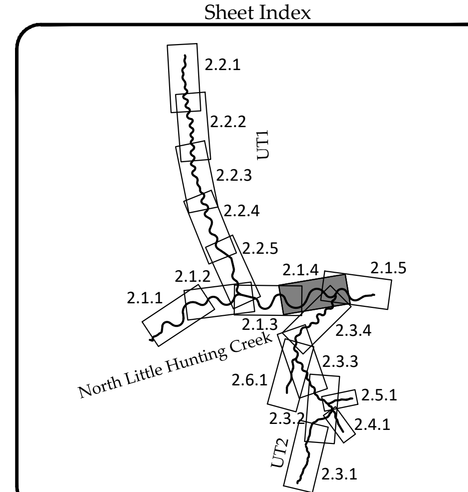

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Drawn By:	HCC
Checked By:	CDB

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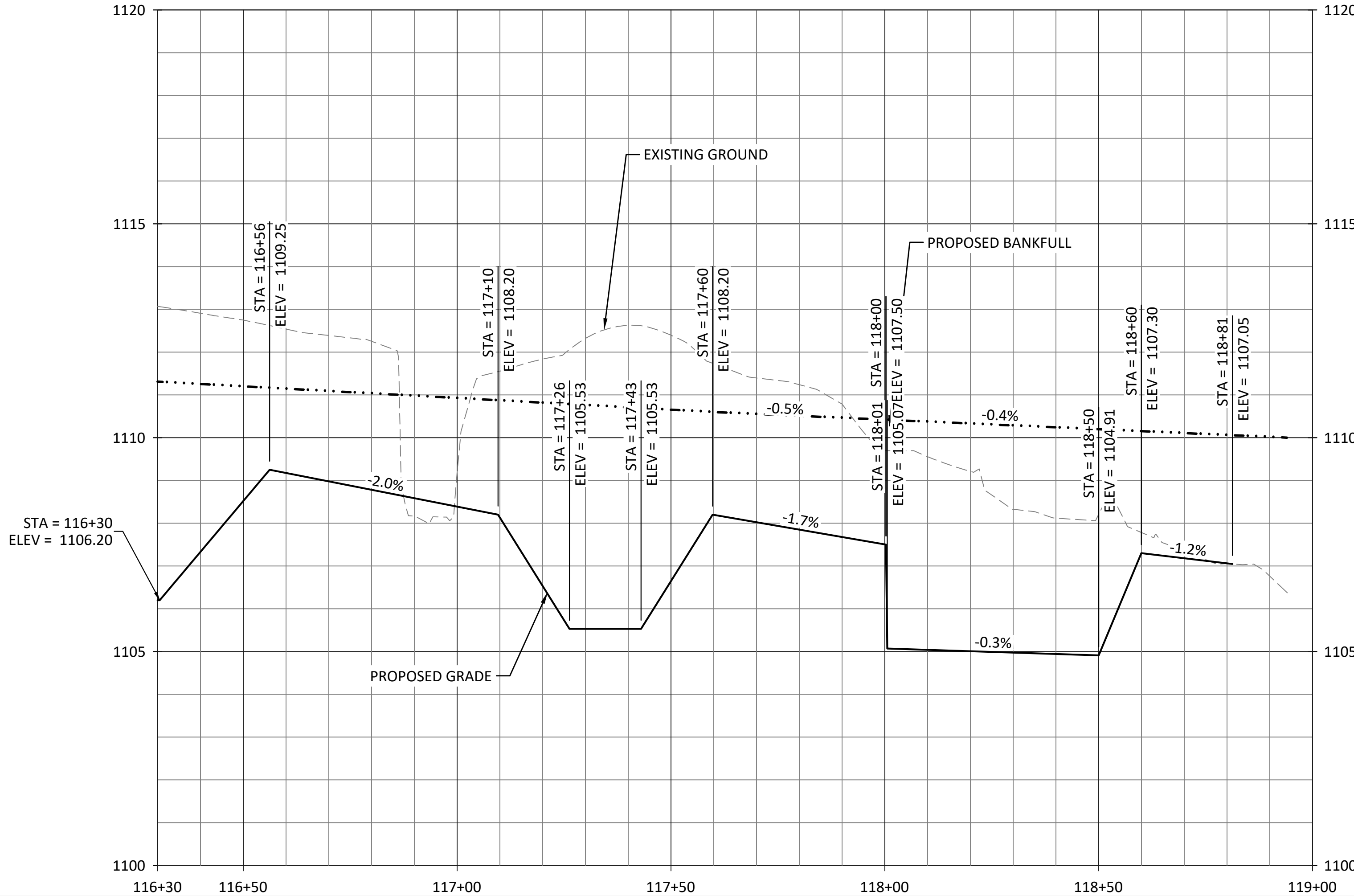

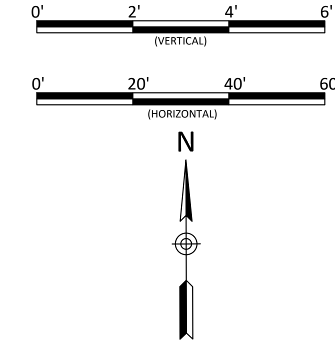

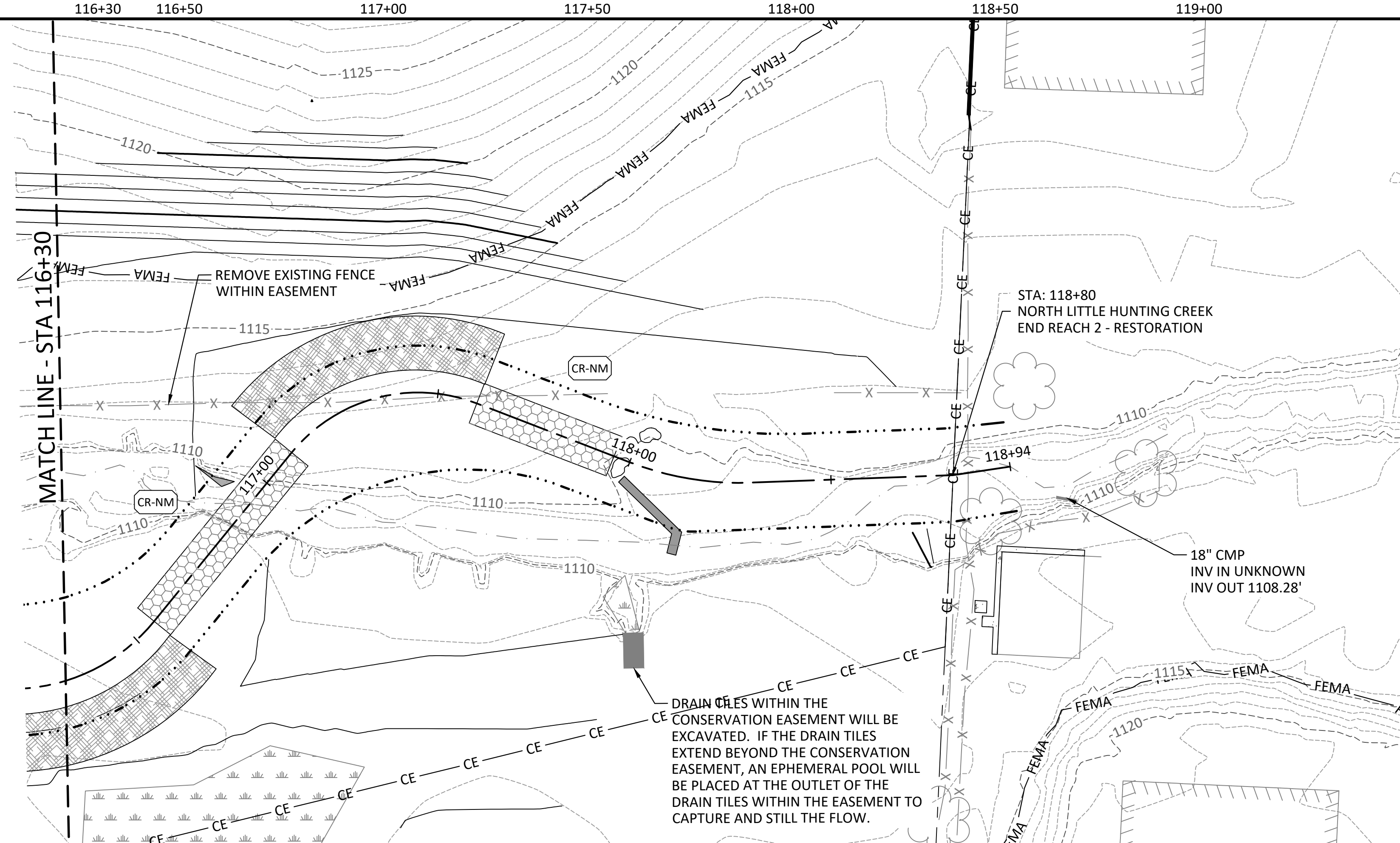

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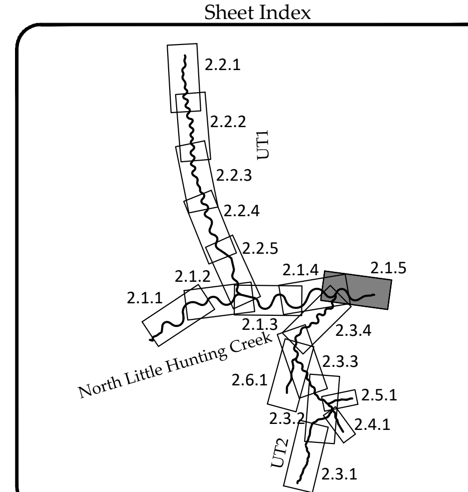

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Huntsman Stream Mitigation Site
Wilkes County, North Carolina

North Little Hunting Creek
Stream Plan and Profile

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Drawn By:	HCC
Checked By:	CDB

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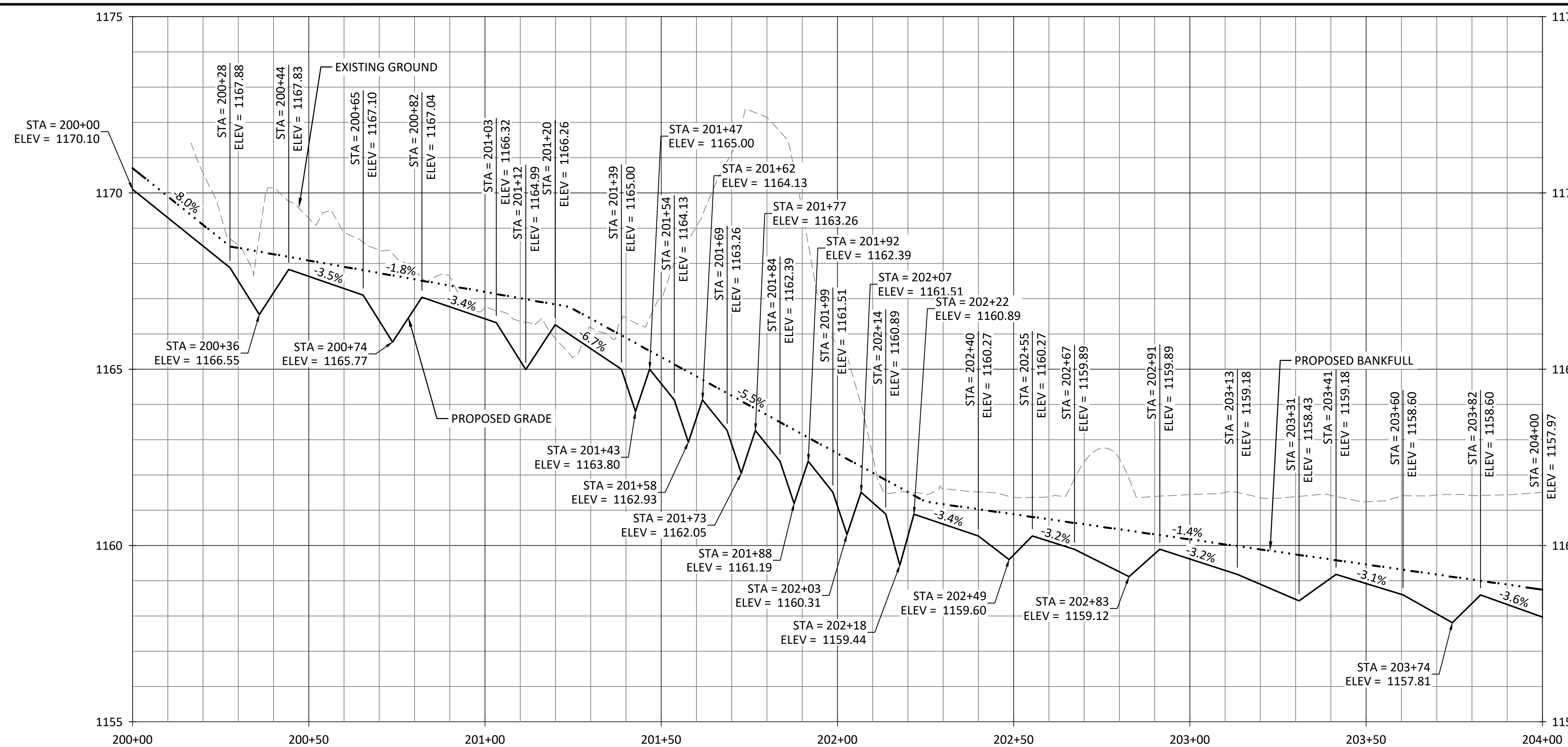

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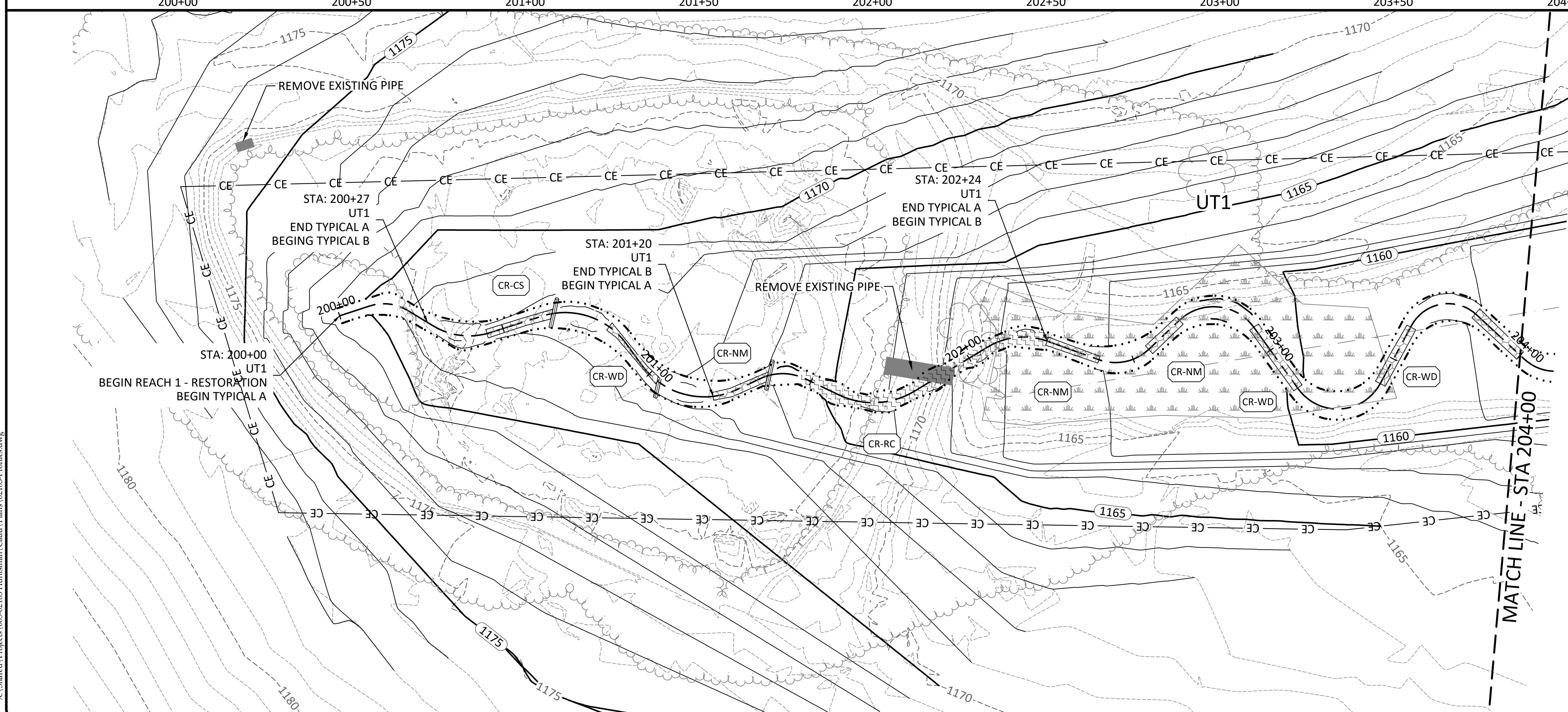
0' 20' 40' 60' (HORIZONTAL)



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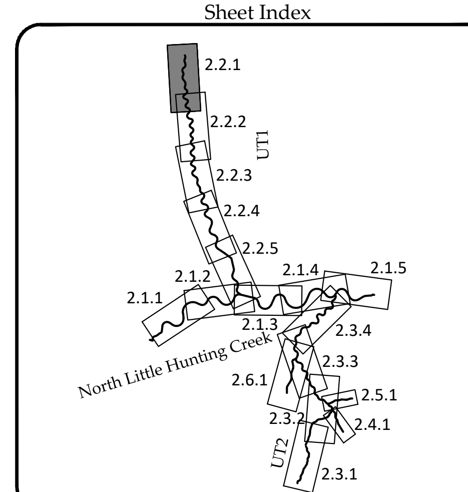

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Huntsman Stream Mitigation Site
Wilkes County, North Carolina

UT1
Stream Plan and Profile

Revisions:

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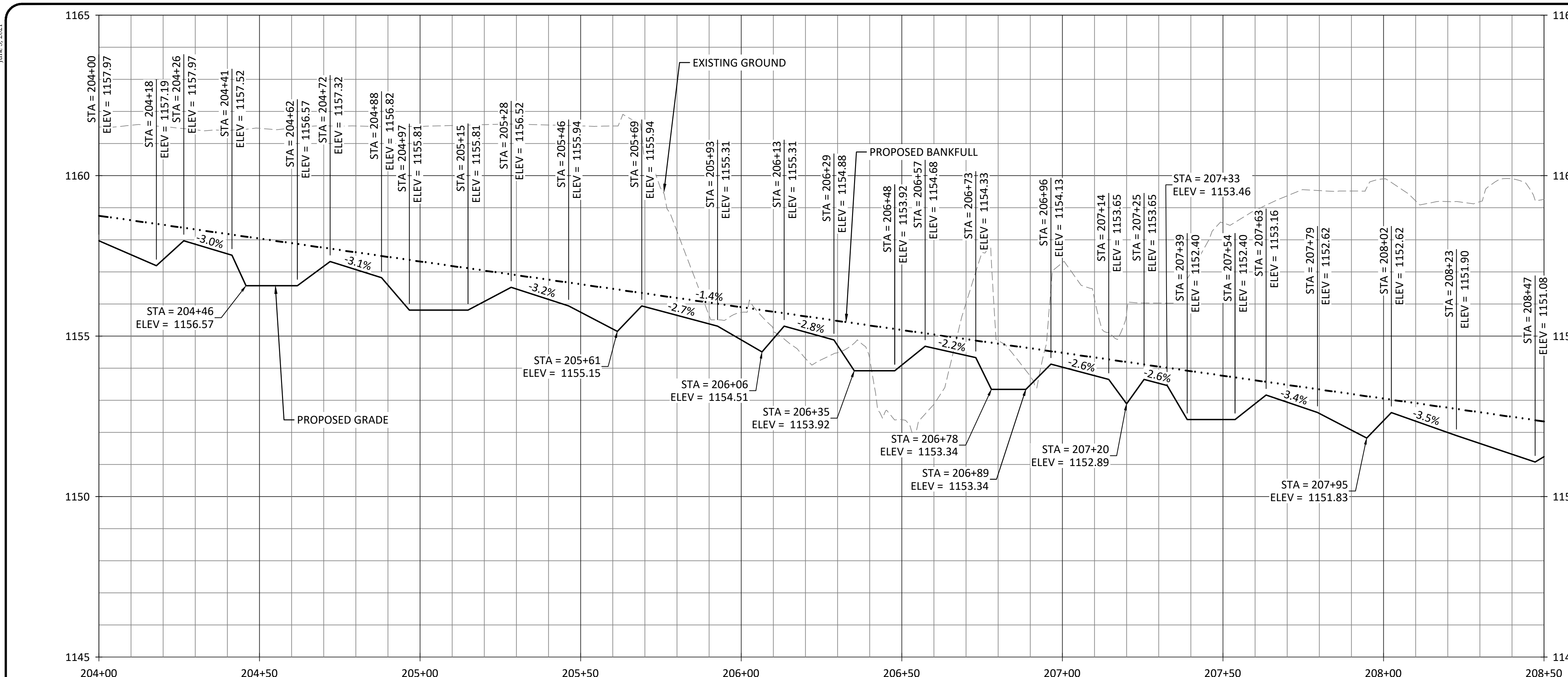

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(HORIZONTAL)

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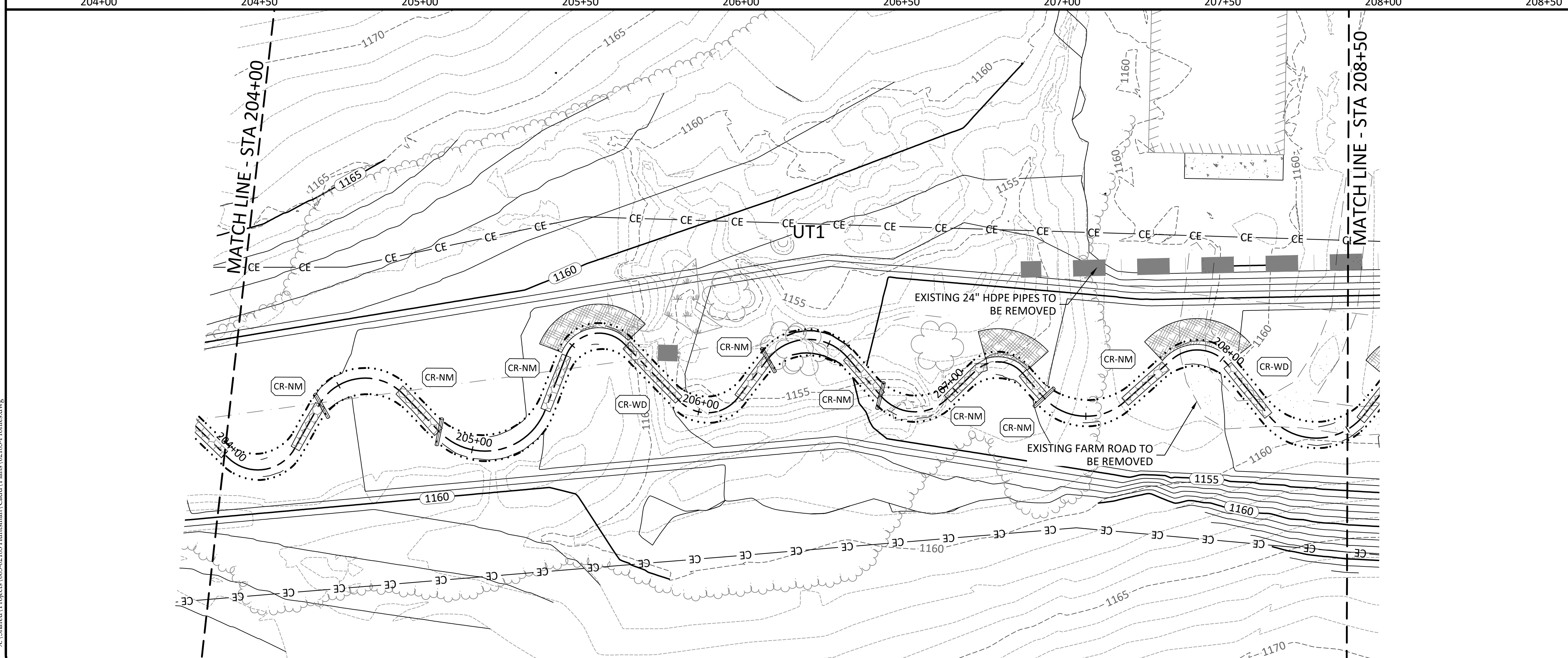

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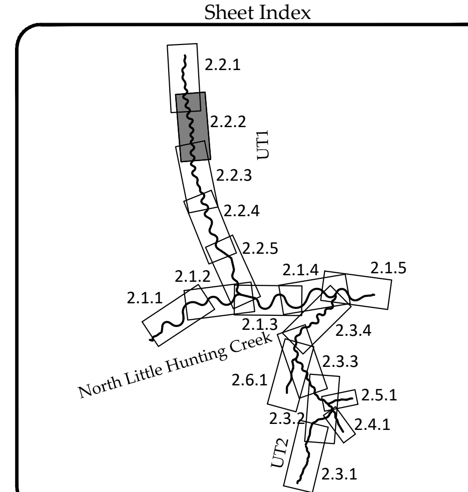

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Huntsman Stream Mitigation Site
Wilkes County, North Carolina

UT1
Stream Plan and Profile

Revisions:

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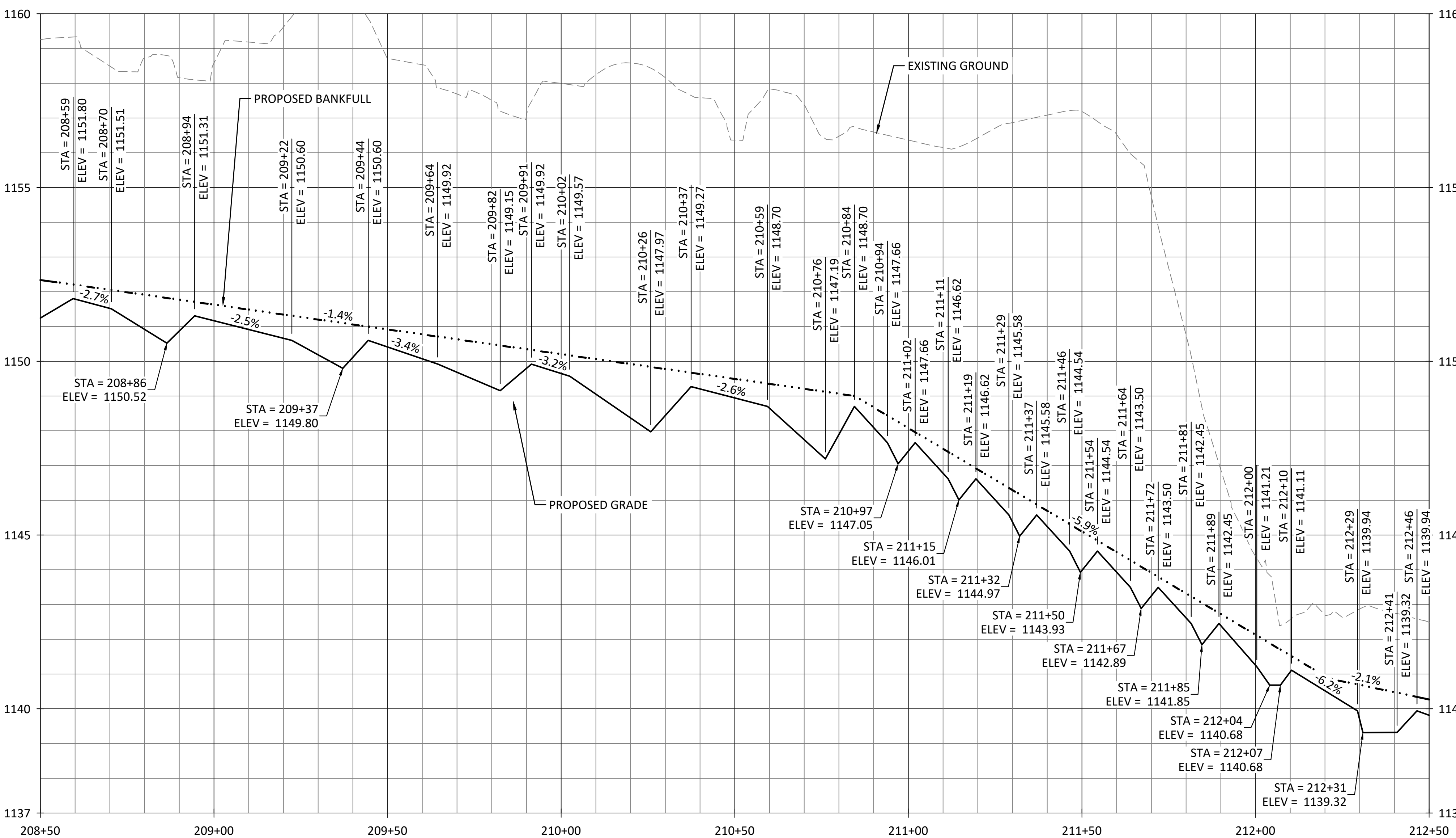

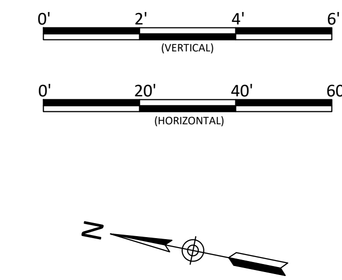

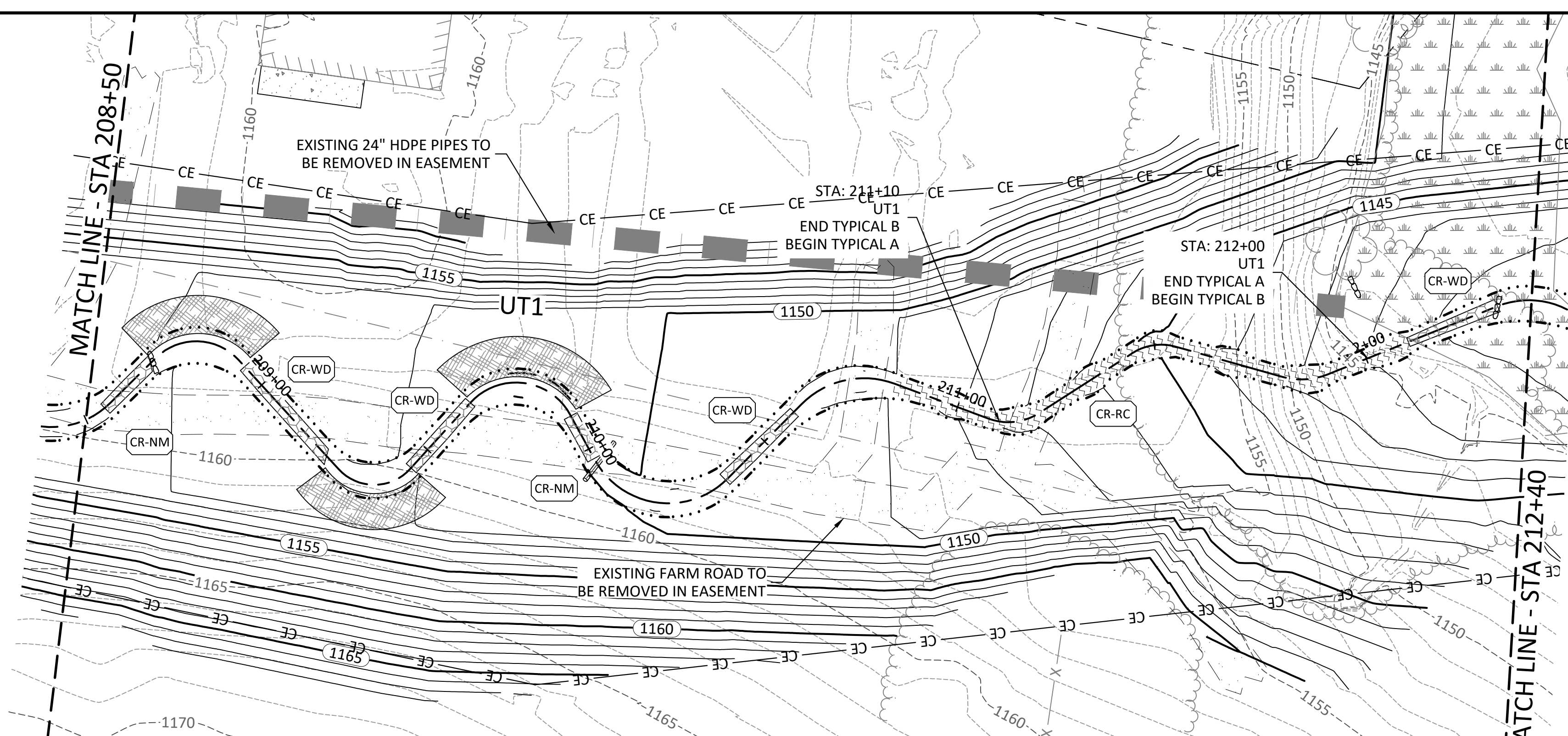

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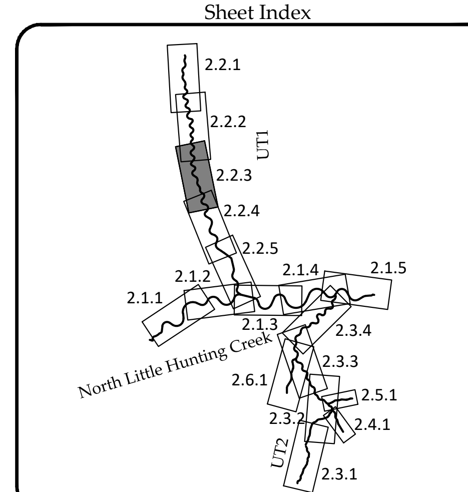

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Huntsman Stream Mitigation Site
Wilkes County, North Carolina

UT1
Stream Plan and Profile

Revisions:

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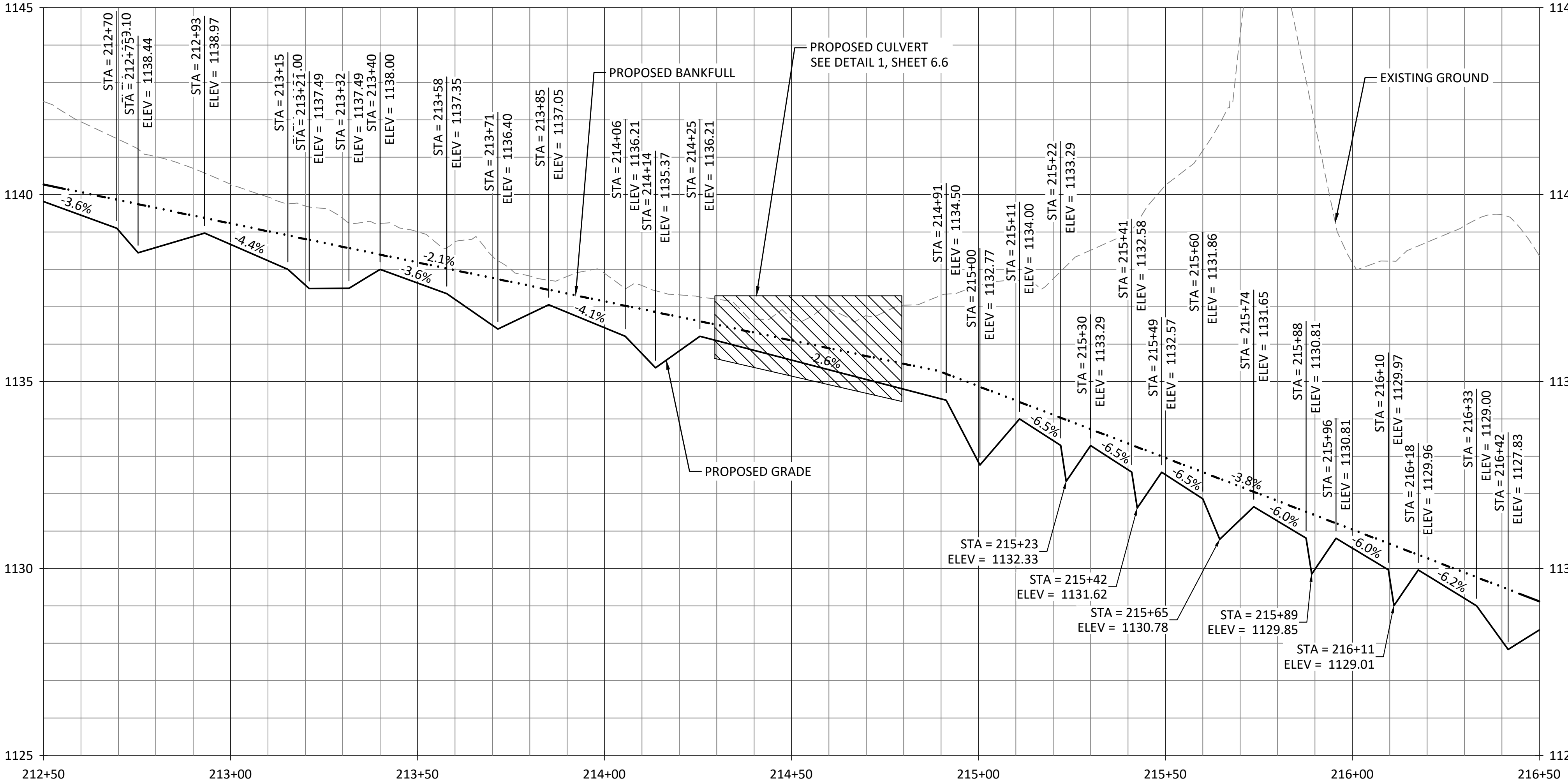

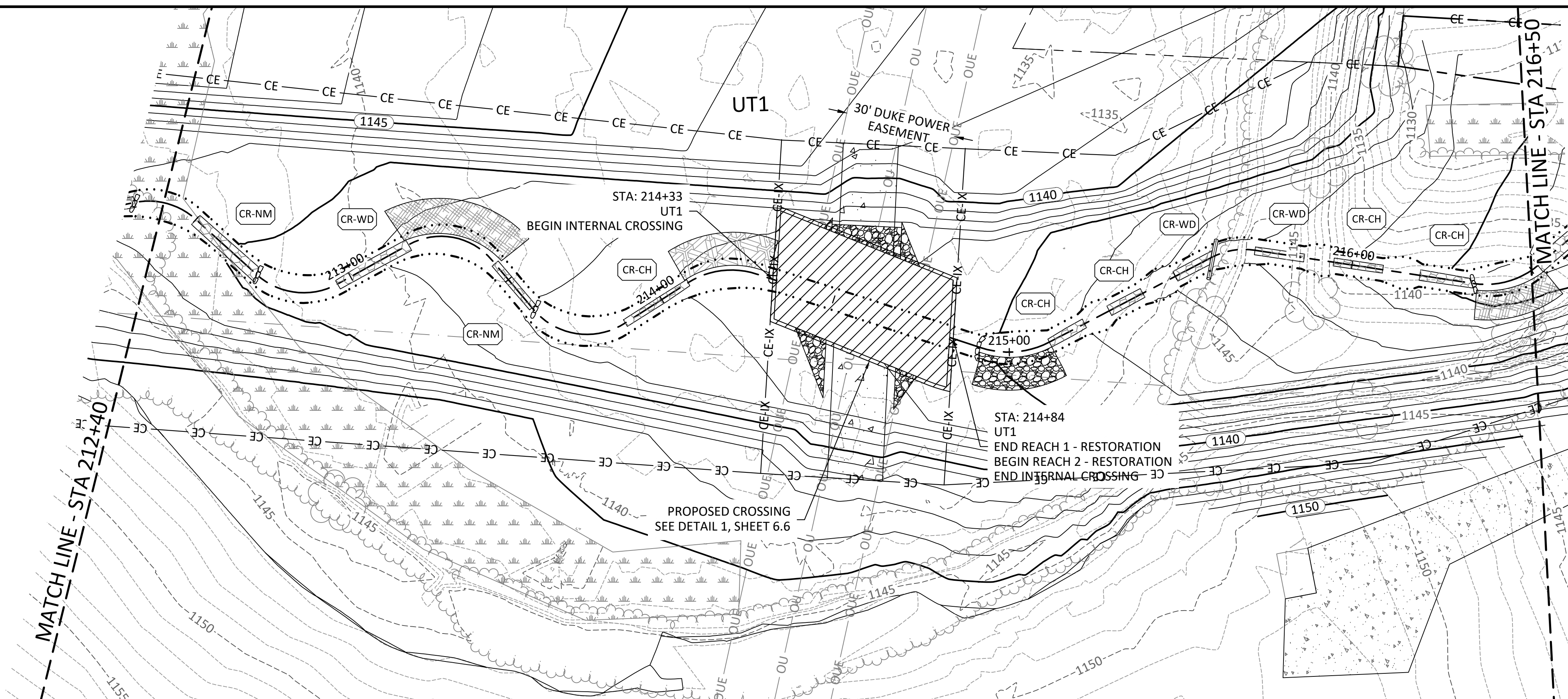

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(VERTICAL)

0' 20' 40' 60'
(HORIZONTAL)

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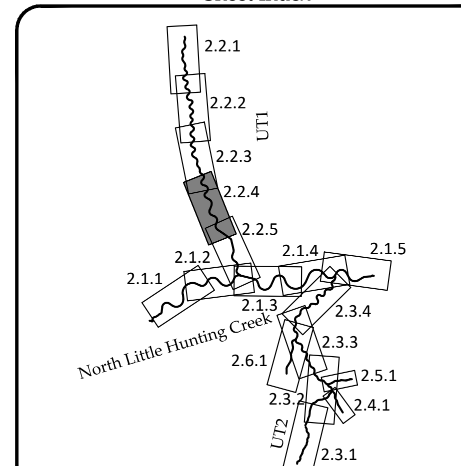

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Huntsman Stream Mitigation Site
Wilkes County, North Carolina

UT1
Stream Plan and Profile

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June 3, 2021

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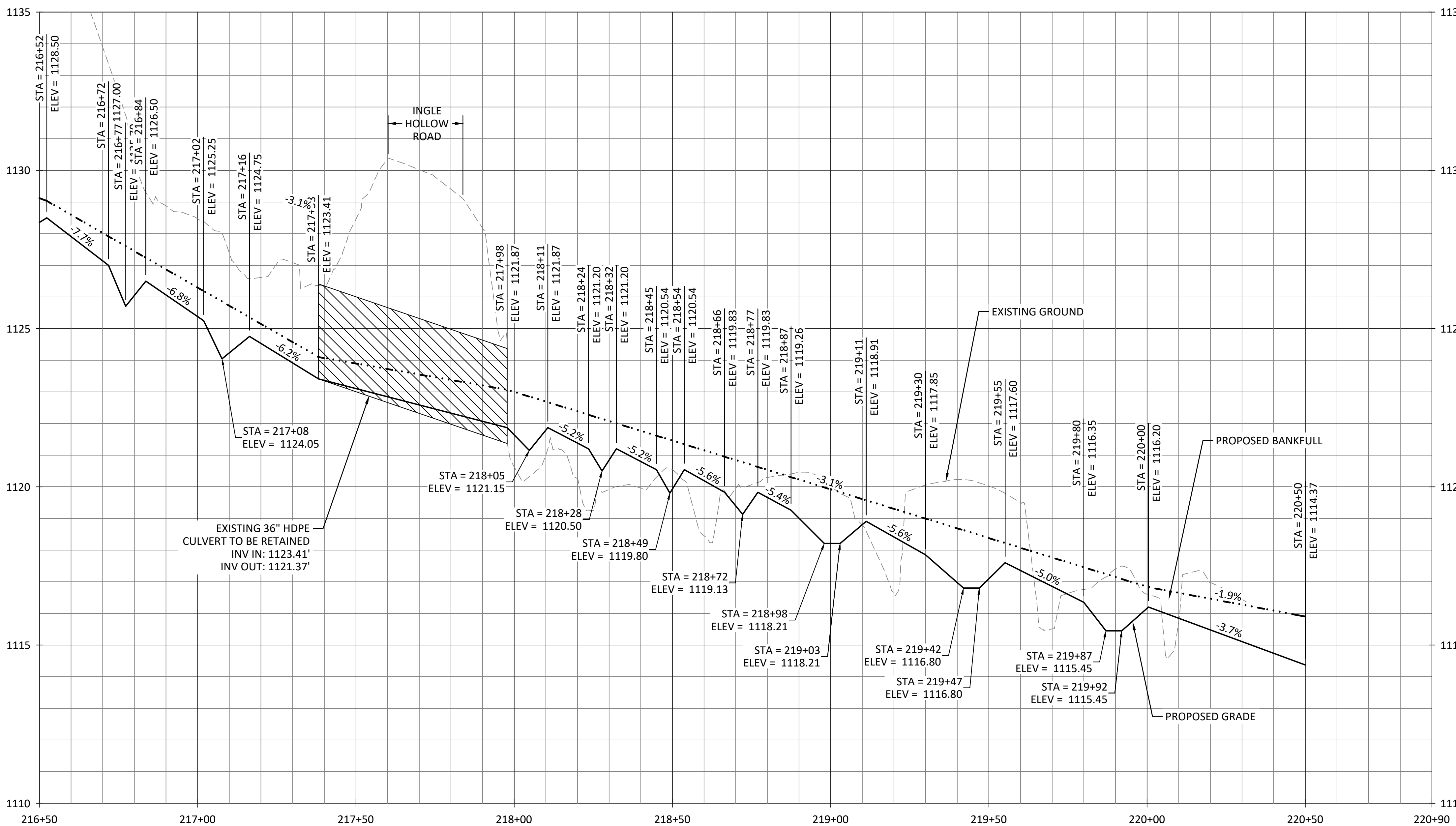
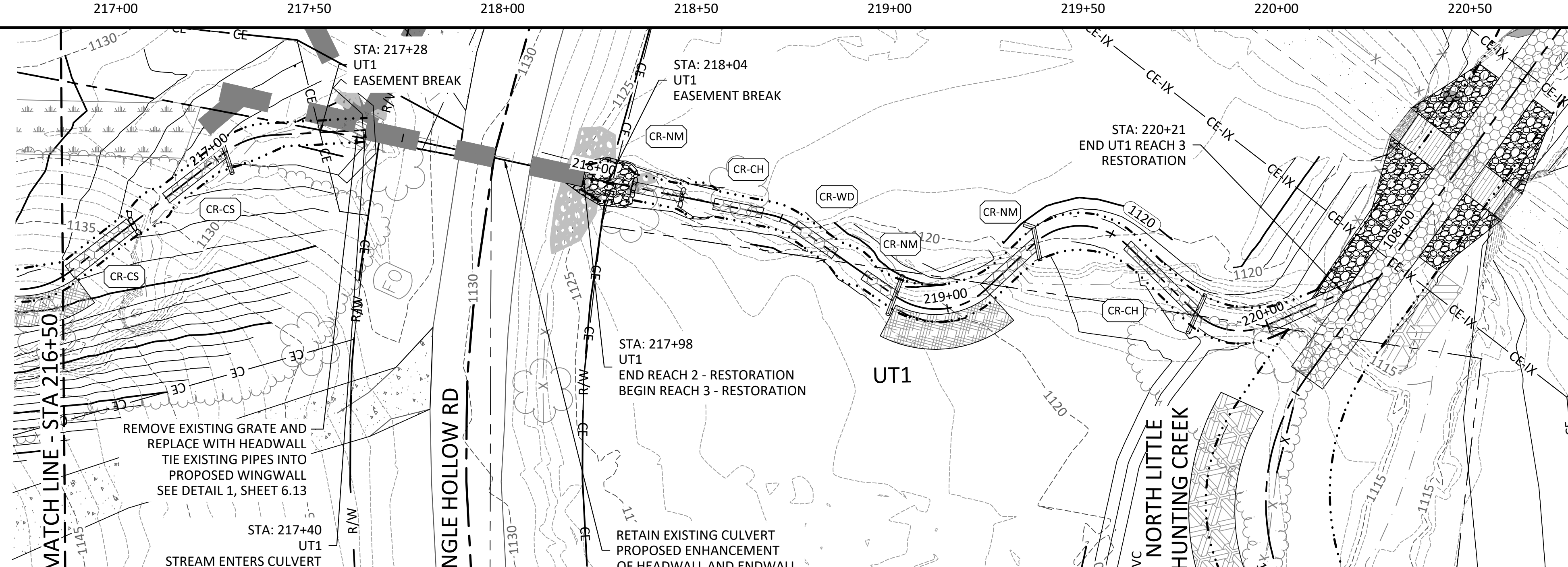
(VERTICAL)

0' 20' 40' 60'
(HORIZONTAL)





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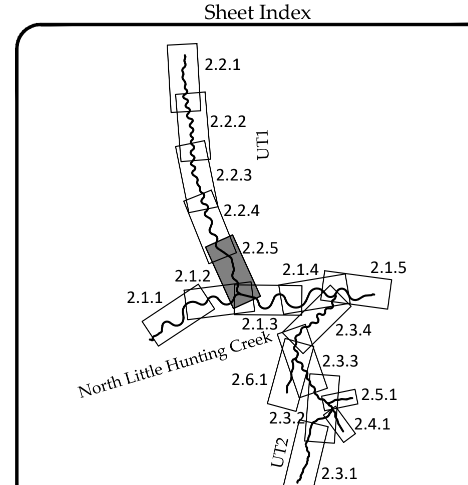

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Huntsman Stream Mitigation Site
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UT1
Stream Plan and Profile

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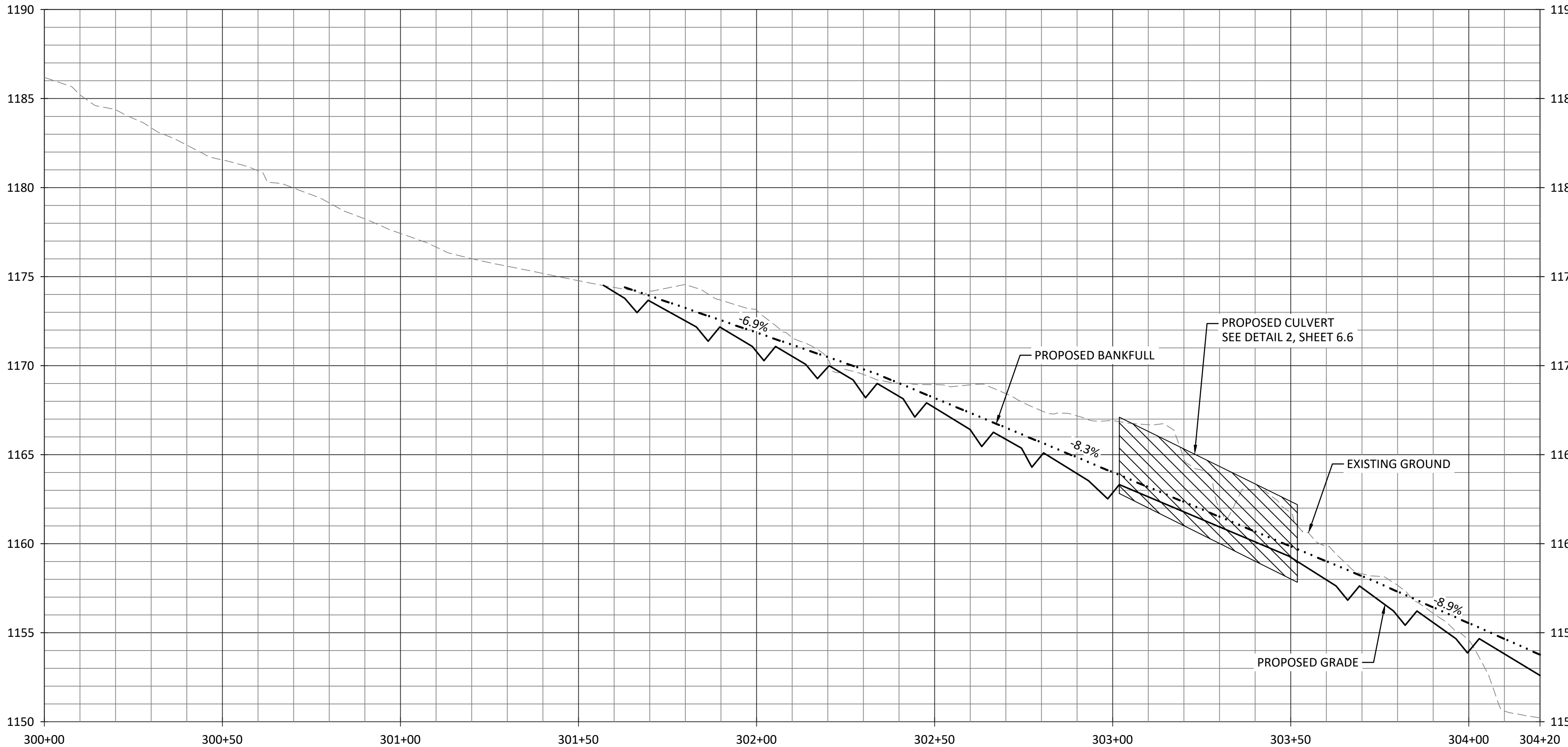

STATION	ELEVATION	DESCRIPTION
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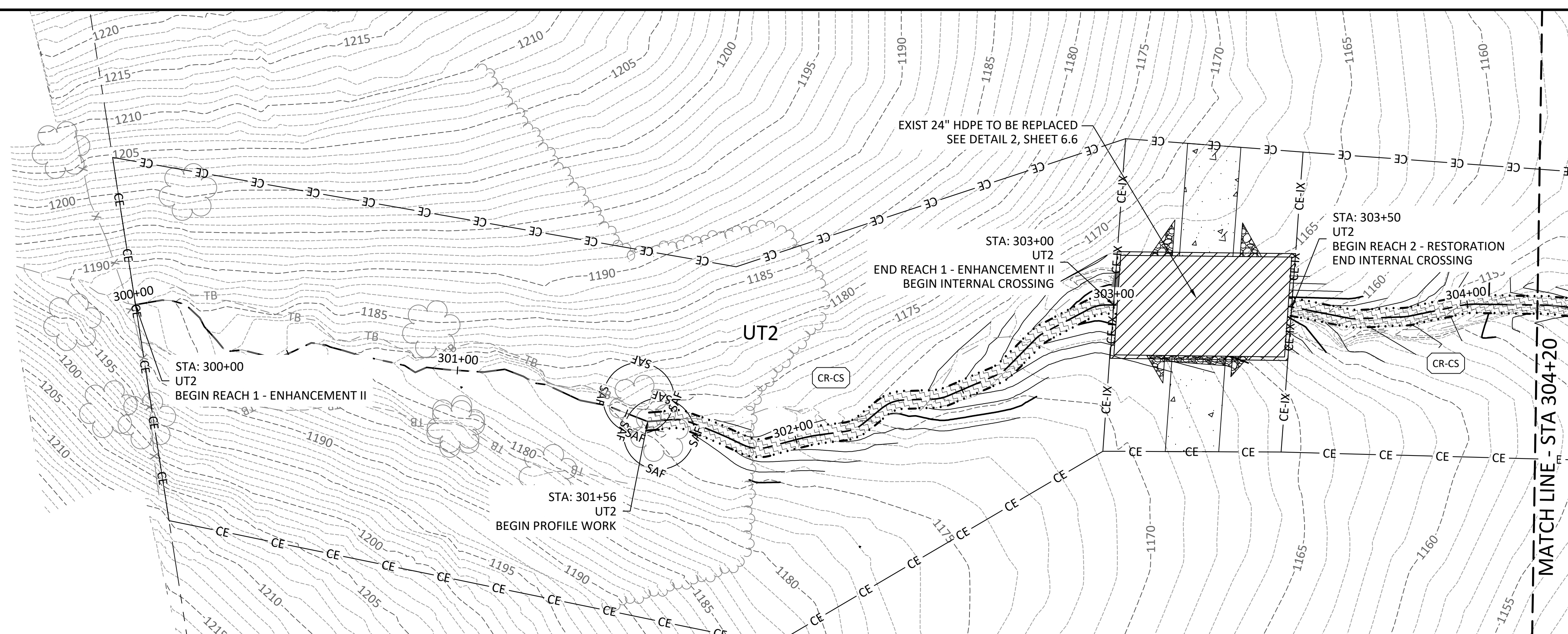
301+63	1173.78	TAIL OF RIFFLE
301+66	1172.98	POOL
301+70	1173.67	HEAD OF RIFFLE
301+83	1172.17	TAIL OF RIFFLE
301+86	1171.37	POOL
301+90	1172.17	HEAD OF RIFFLE
301+99	1171.08	TAIL OF RIFFLE
302+02	1170.28	POOL
302+05	1171.08	HEAD OF RIFFLE
302+14	1170.07	TAIL OF RIFFLE
302+17	1169.27	POOL
302+20	1170	HEAD OF RIFFLE
302+27	1169.2	TAIL OF RIFFLE
302+31	1168.2	POOL
302+34	1169	HEAD OF RIFFLE
302+41	1168.14	TAIL OF RIFFLE
302+44	1167.11	POOL
302+48	1167.91	HEAD OF RIFFLE
302+60	1166.41	TAIL OF RIFFLE
302+63	1165.46	POOL
302+67	1166.26	HEAD OF RIFFLE
302+74	1165.37	TAIL OF RIFFLE
302+77	1164.3	POOL
302+81	1165.1	HEAD OF RIFFLE
302+93	1163.54	TAIL OF RIFFLE
302+99	1162.52	POOL
303+02	1163.32	HEAD OF RIFFLE
303+45	1159	TAIL OF RIFFLE
303+49	1158.2	POOL
303+52	1159	HEAD OF RIFFLE
303+63	1157.63	TAIL OF RIFFLE
303+66	1156.83	POOL
303+69	1157.63	HEAD OF RIFFLE
303+79	1156.22	TAIL OF RIFFLE
303+82	1155.42	POOL
303+85	1156.22	HEAD OF RIFFLE
303+96	1154.67	TAIL OF RIFFLE
304+00	1153.87	POOL
304+03	1154.67	HEAD OF RIFFLE

0' 4' 8' 12' (VERTICAL)

0' 20' 40' 60' (HORIZONTAL)



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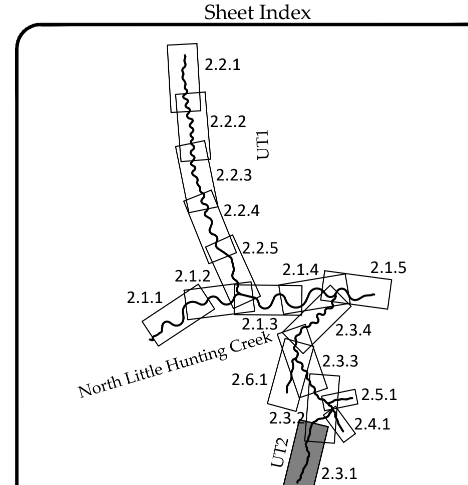

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Huntsman Stream Mitigation Site
Wilkes County, North Carolina

UT2
Stream Plan and Profile

Revisions:

Date:	JUNE 4, 2021
Job Number:	005-02183
Project Engineer:	ASE
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2.3.1
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June 3, 2021

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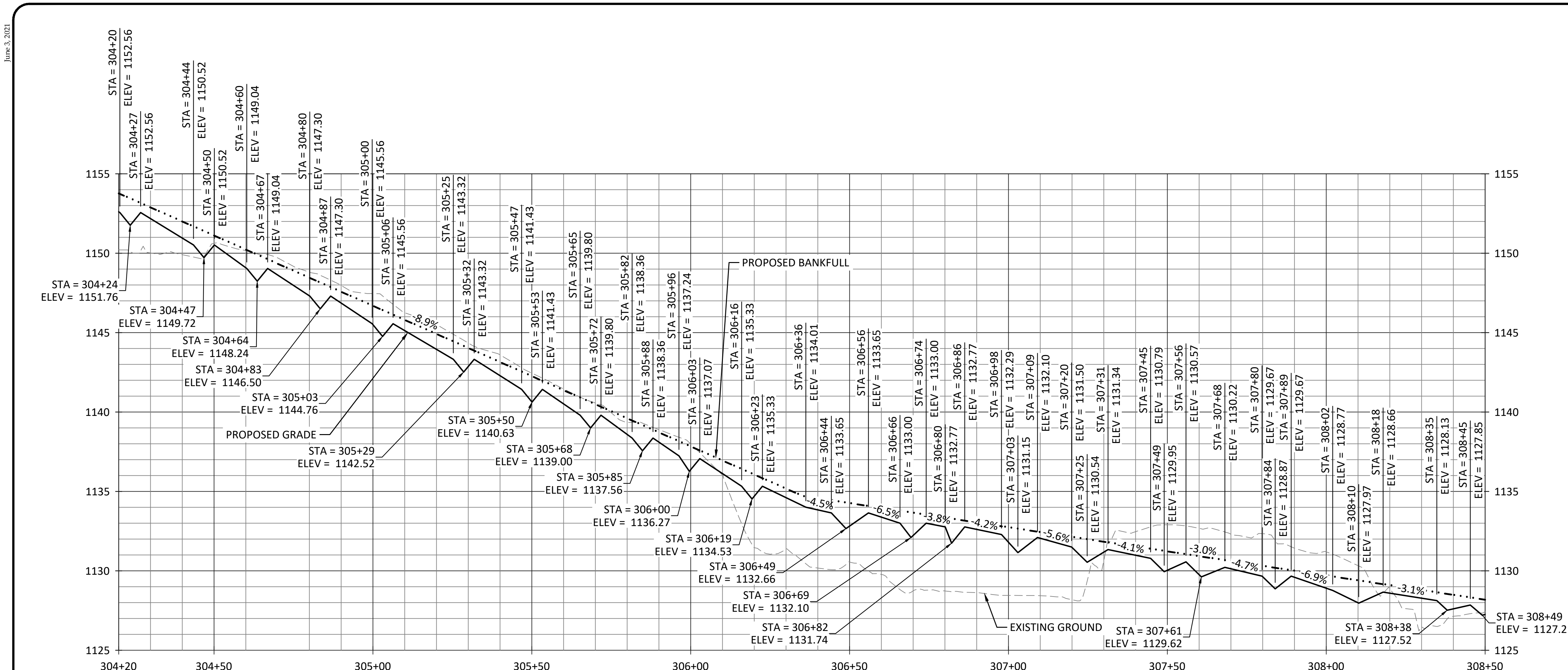

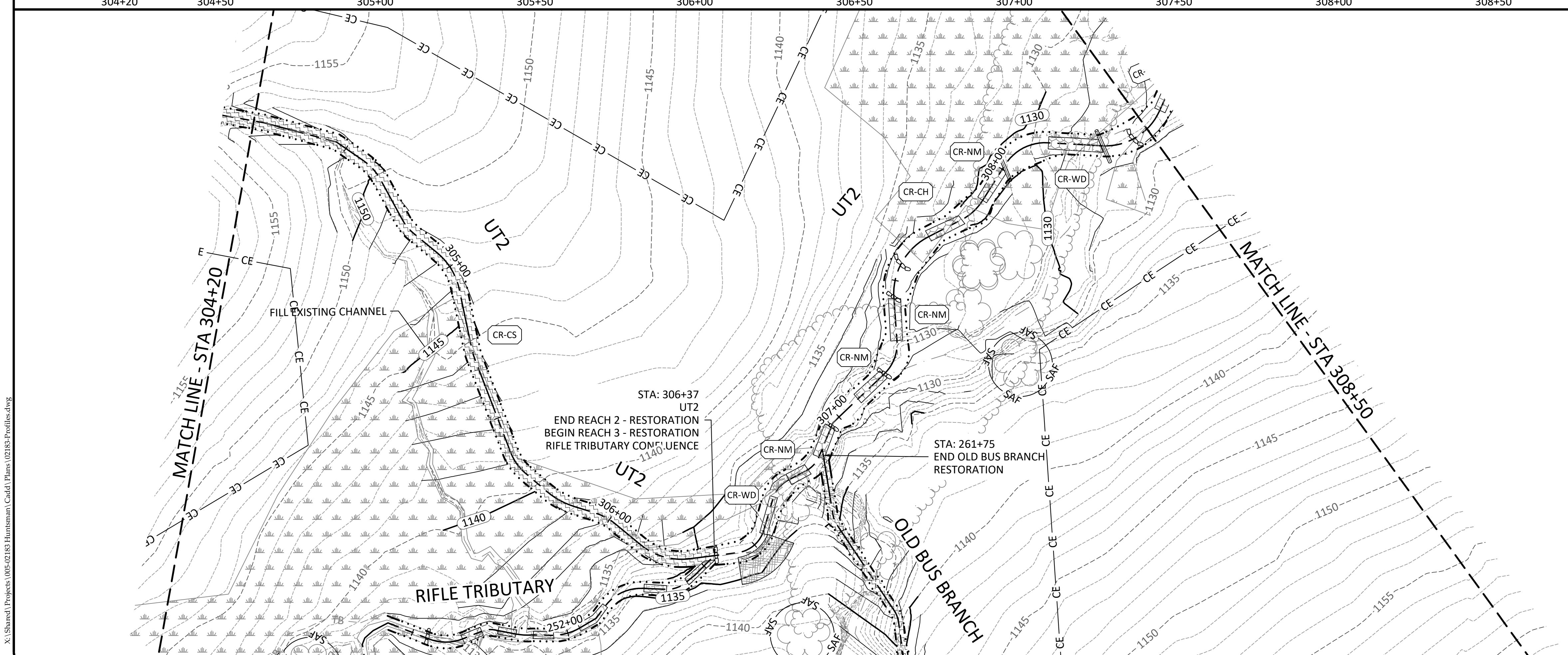

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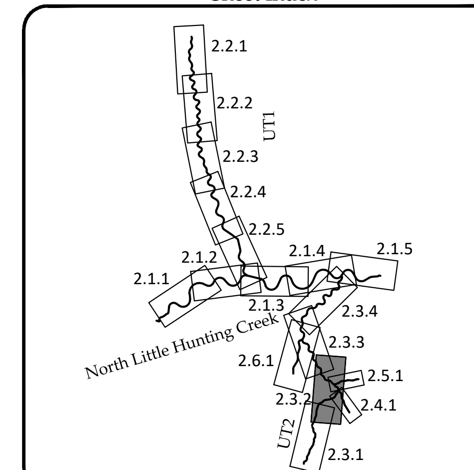

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UT2
Stream Plan and Profile

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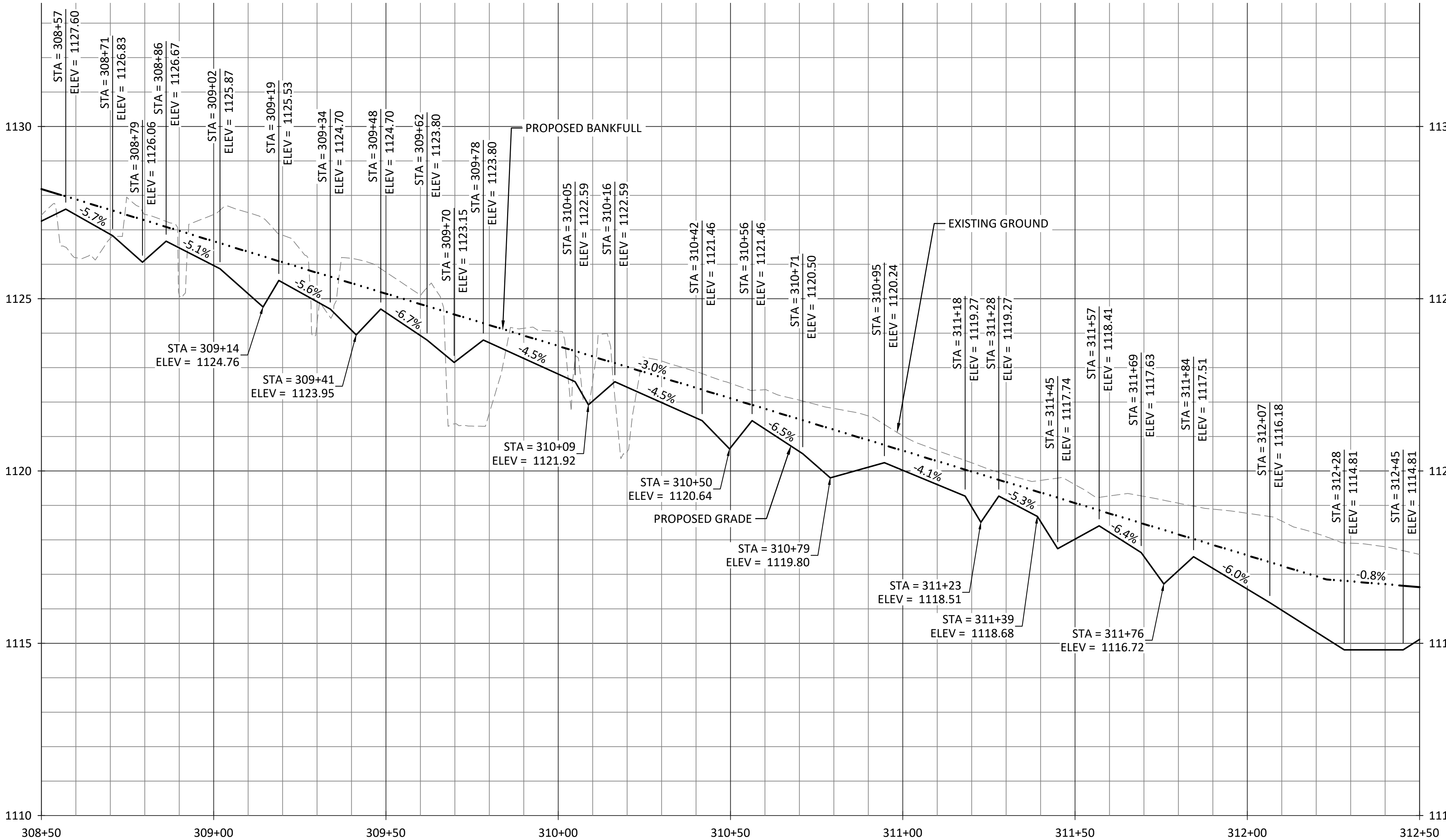

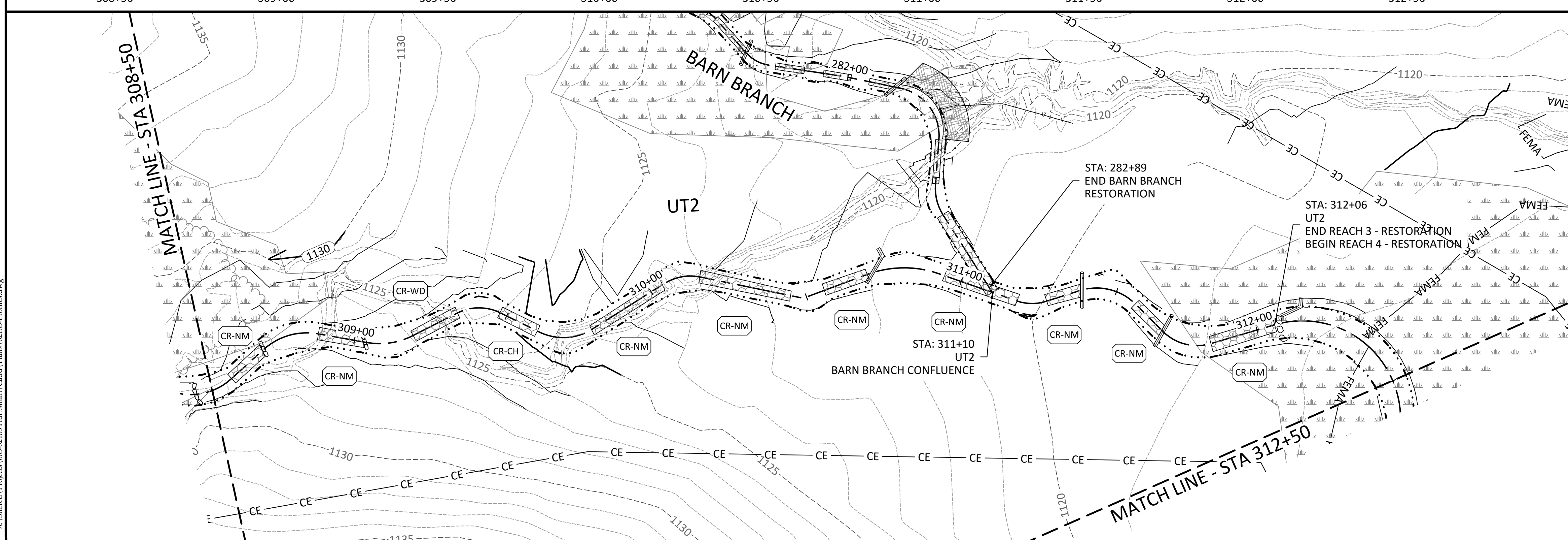

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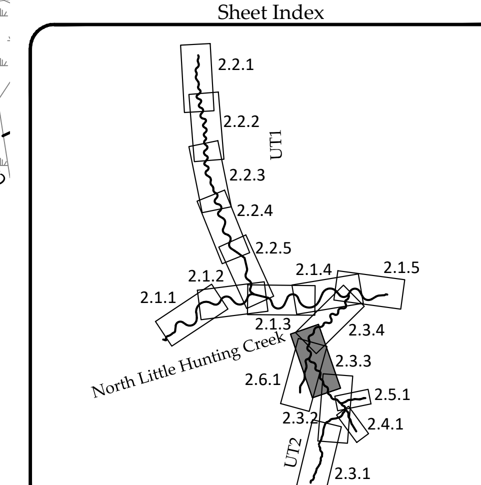

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Huntsman Stream Mitigation Site
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UT2
Stream Plan and Profile

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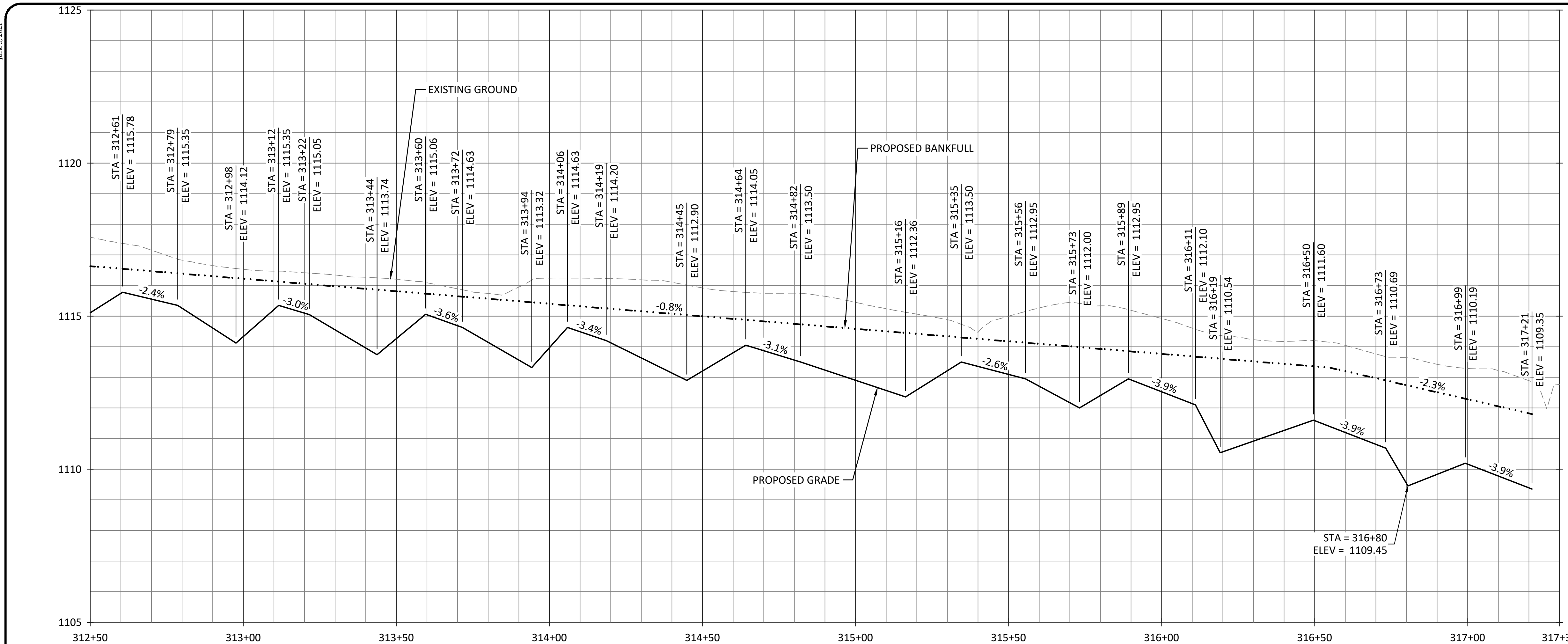

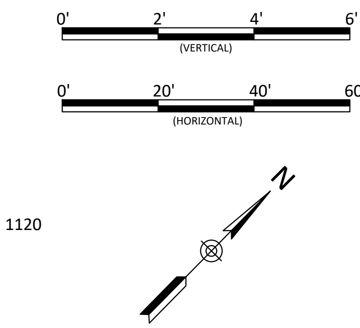

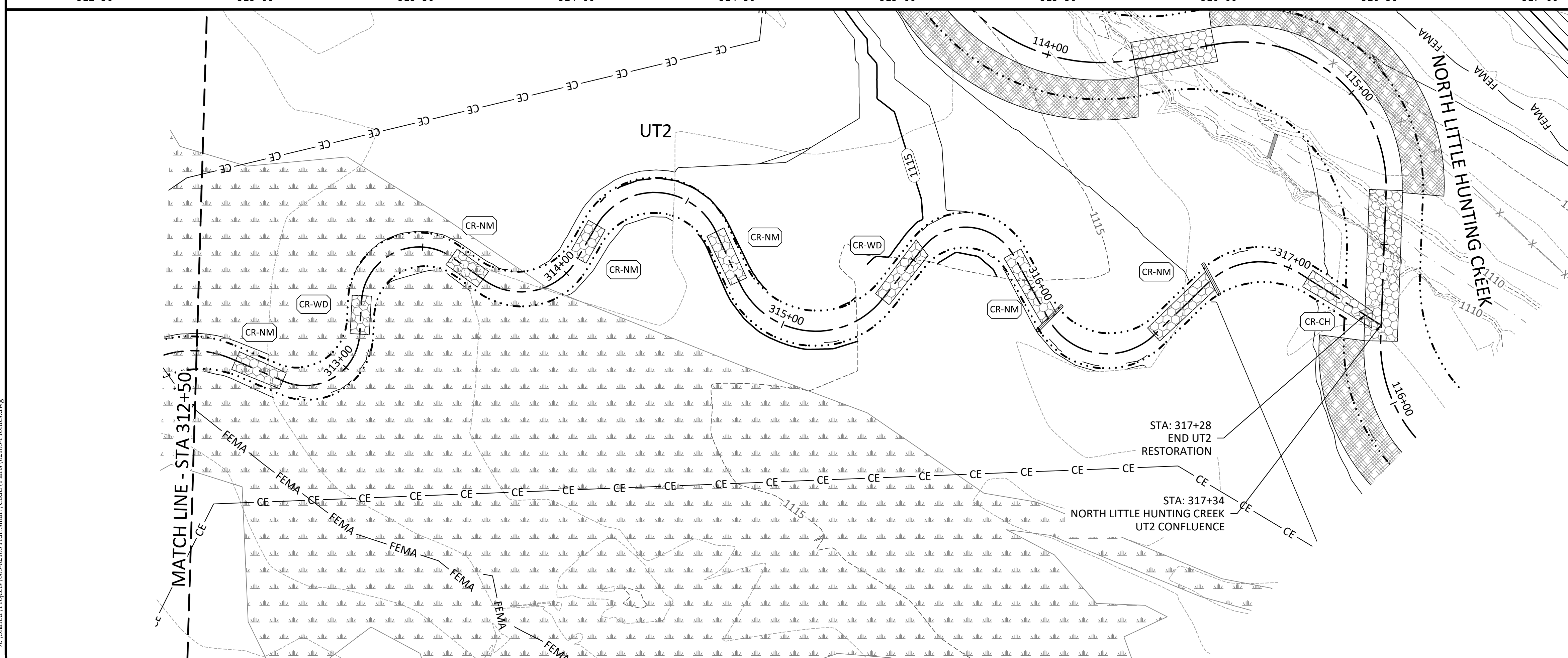

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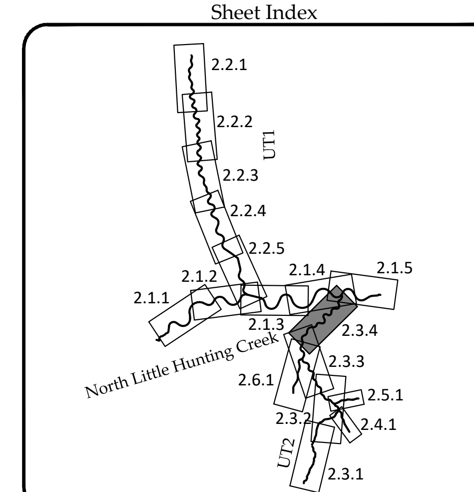

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Huntsman Stream Mitigation Site
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UT2
Stream Plan and Profile

Revisions:

Date:	JUNE 4, 2021
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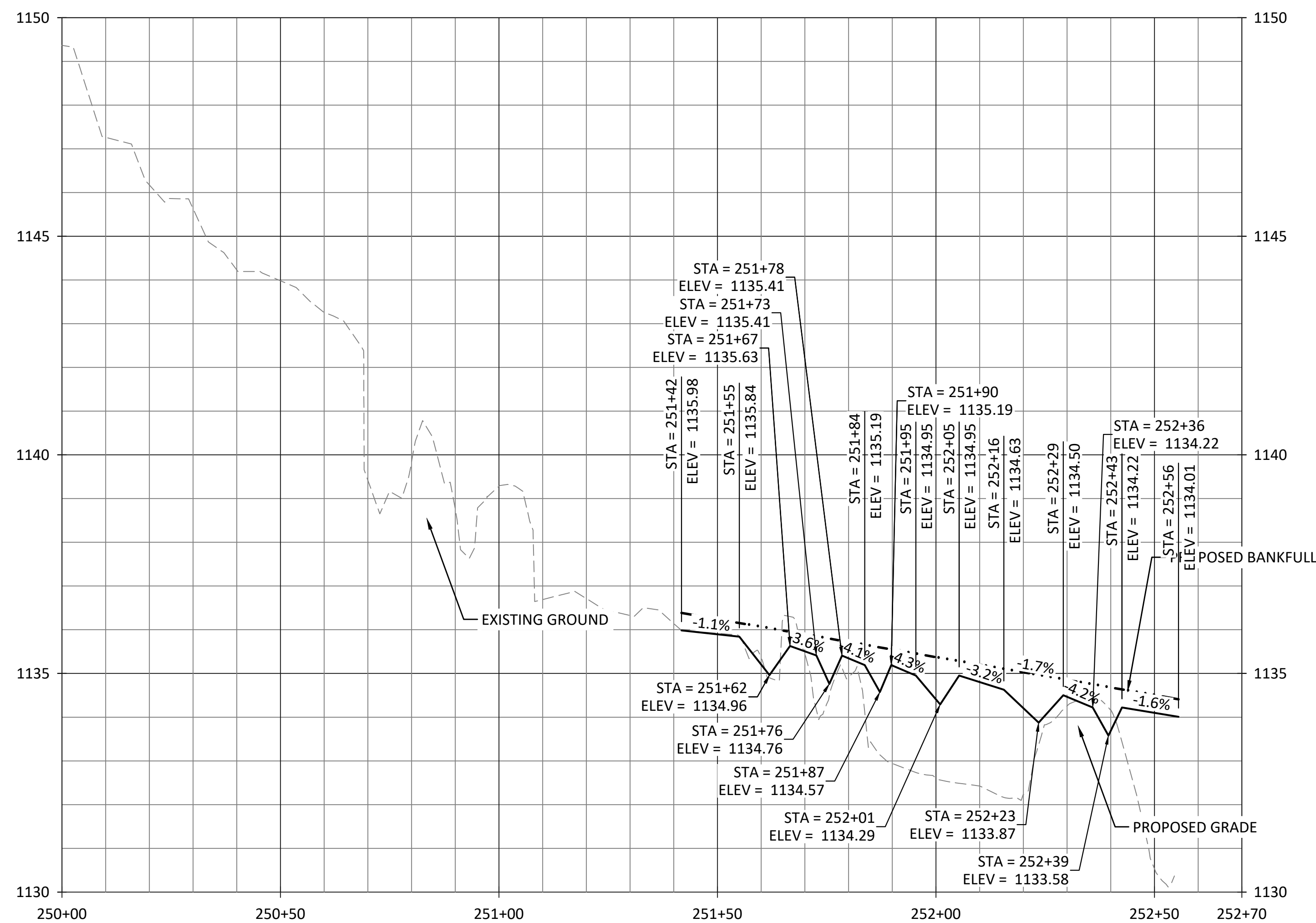

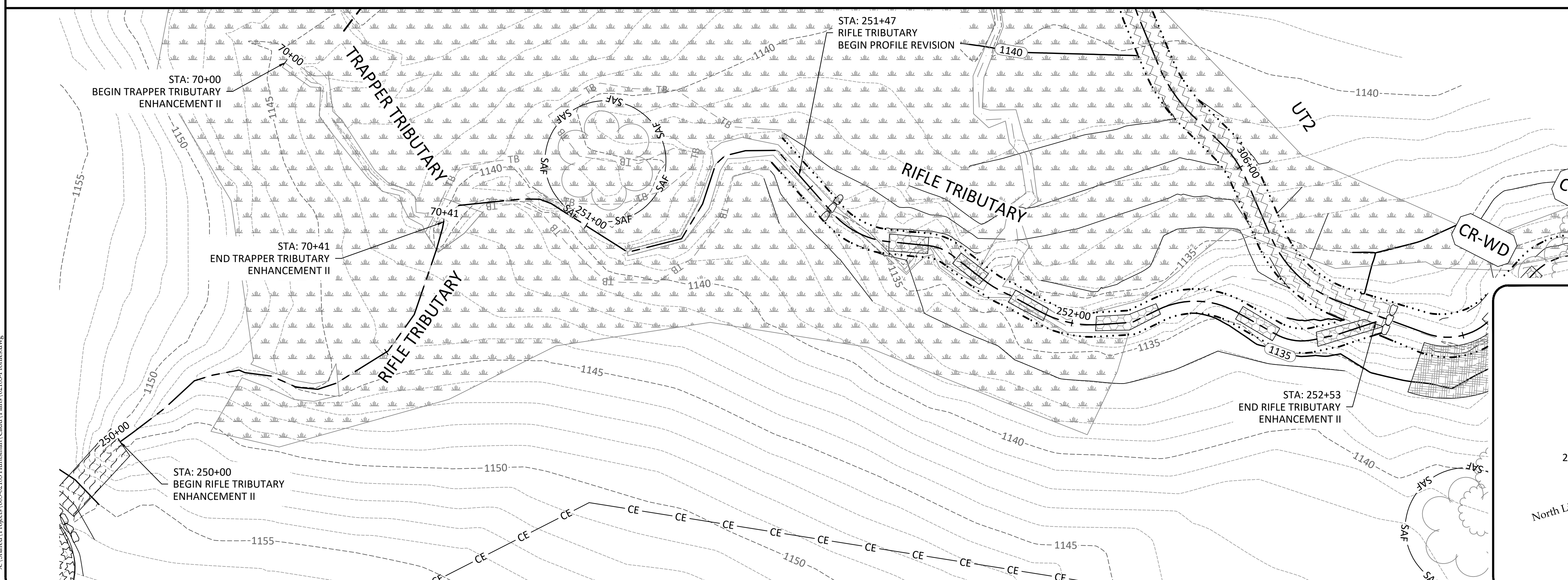

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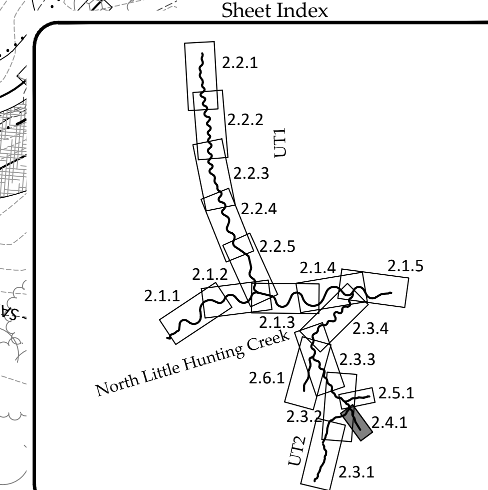

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Huntsman Stream Mitigation Site
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Rifle Tributary
Stream Plan and Profile

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Sheet 2.4.1

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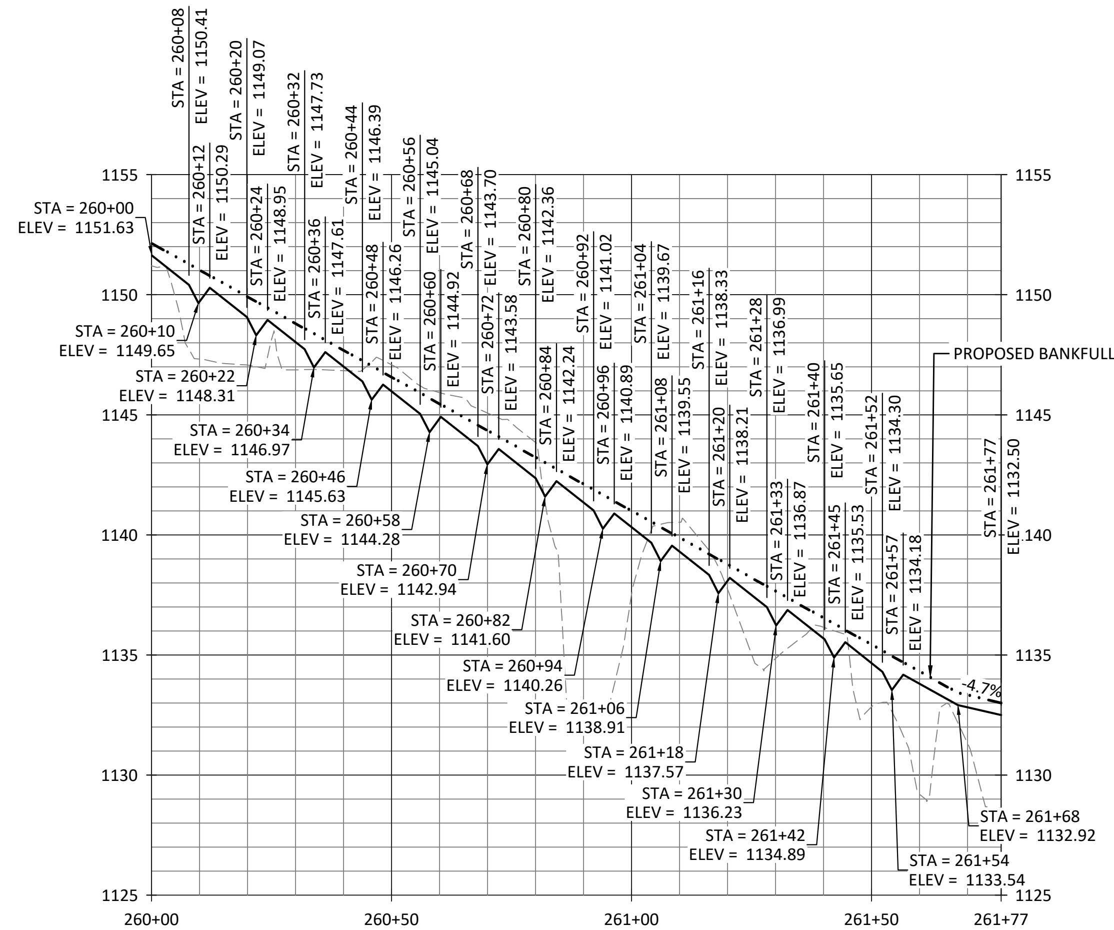

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0' 10' 20' 30' (HORIZONTAL)

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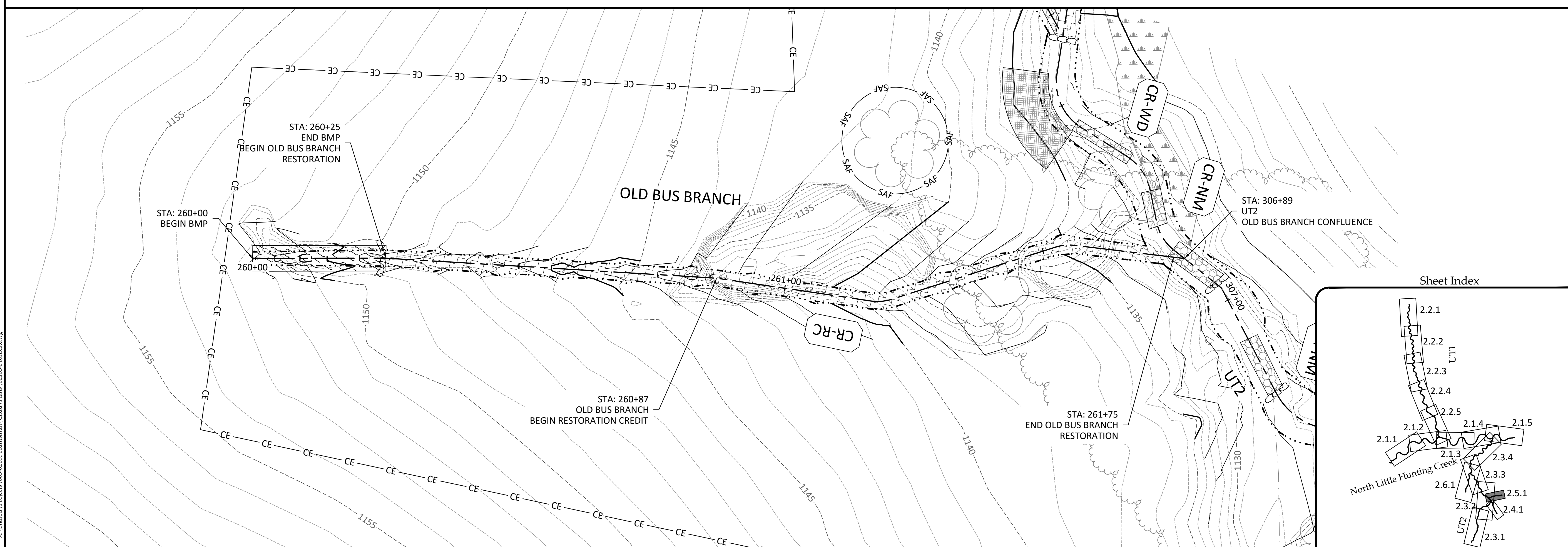

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Huntsman Stream Mitigation Site
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Old Bus Branch
Stream Plan and Profile

Revisions:

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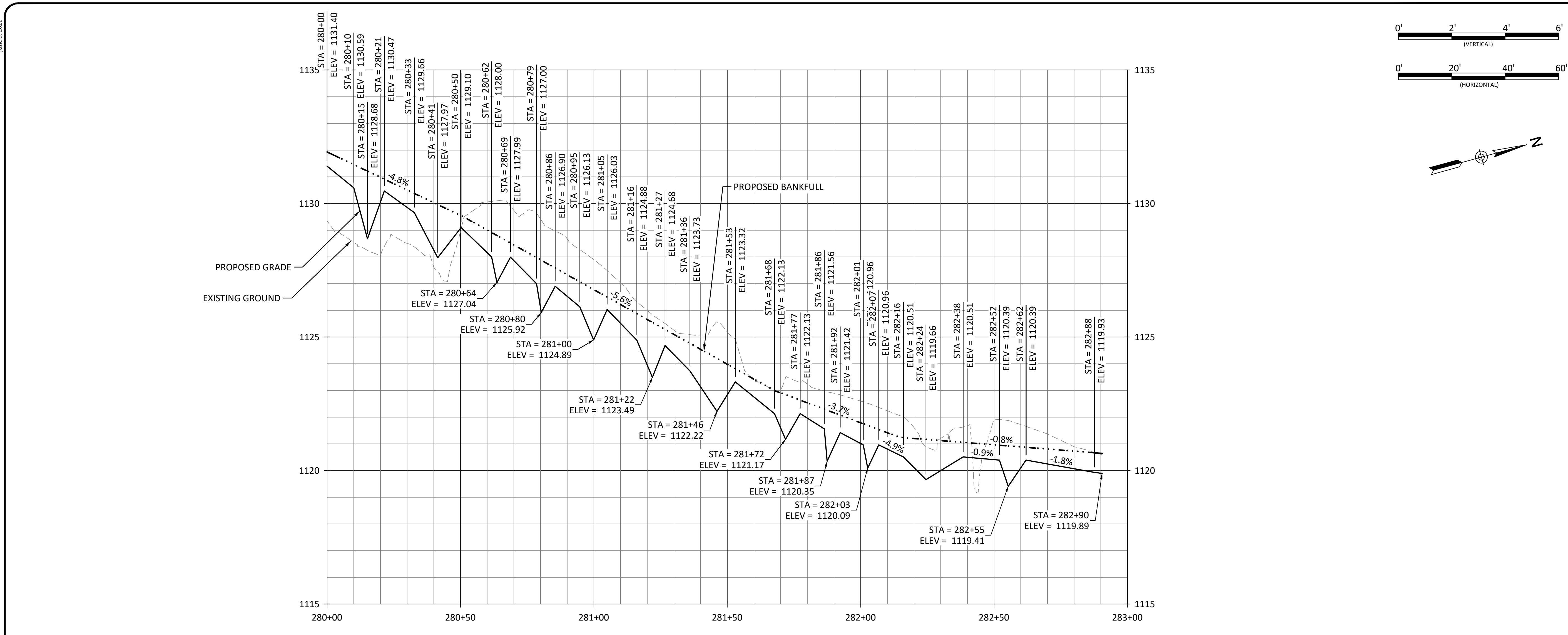
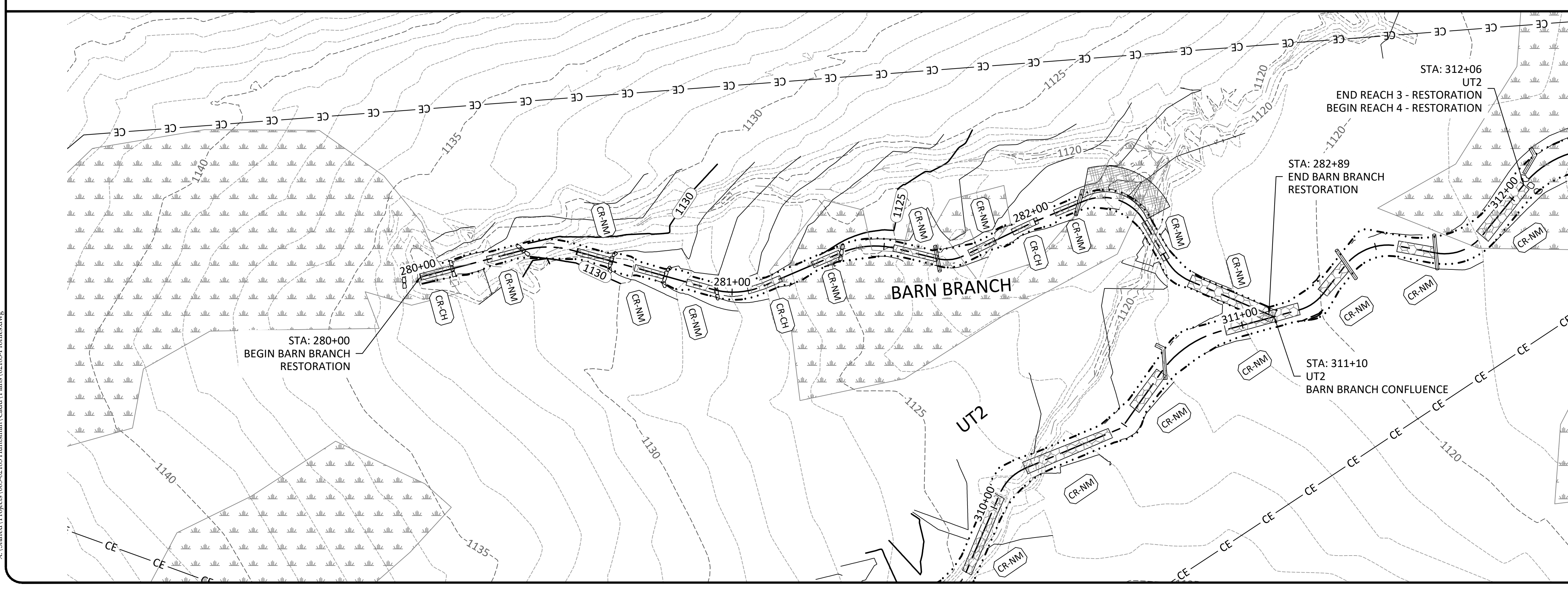
Sheet 2.5.1

June 3, 2021





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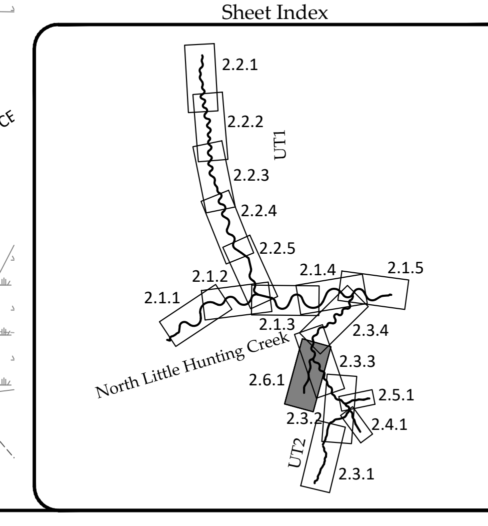

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Huntsman Stream Mitigation Site
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Barn Branch
Stream Plan and Profile

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Sheet 2.6.1

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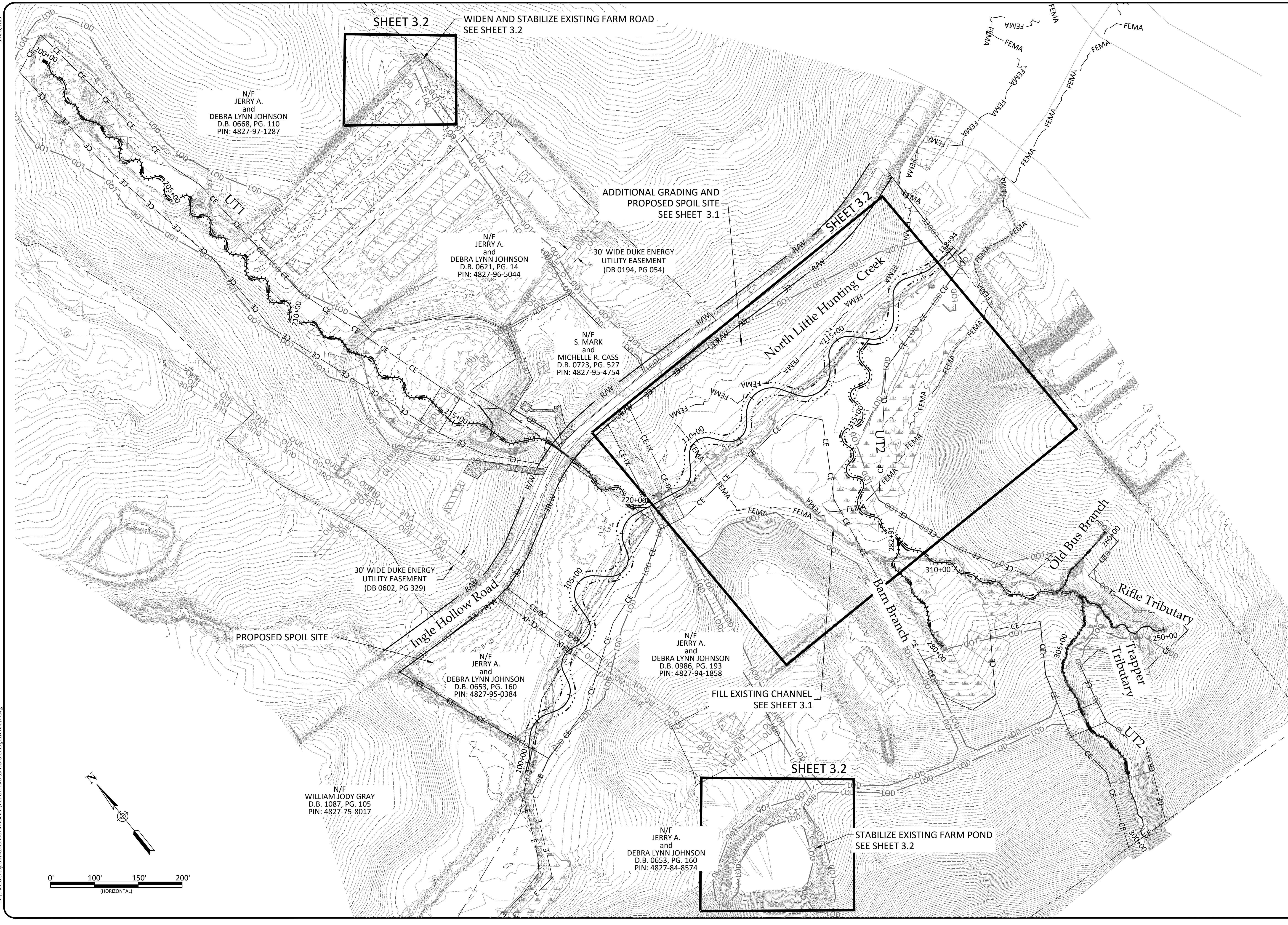

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Huntsman Stream Mitigation Site
Wilkes County, North Carolina

Grading Overview

Revisions:

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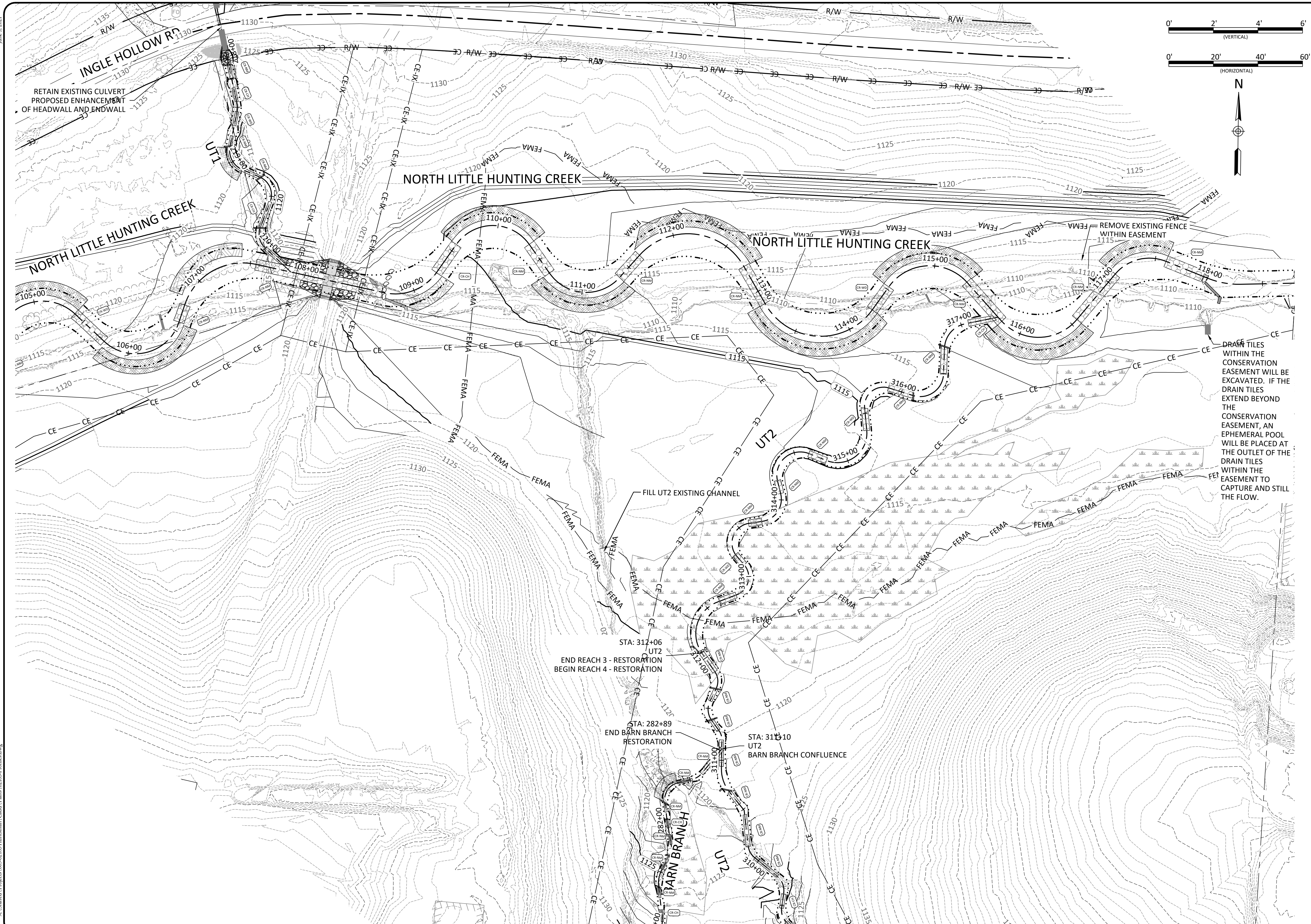

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Huntsman Stream Mitigation Site
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North Little Hunting Creek & UT2
Additional Grading

Revisions:

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Sheet 3.1

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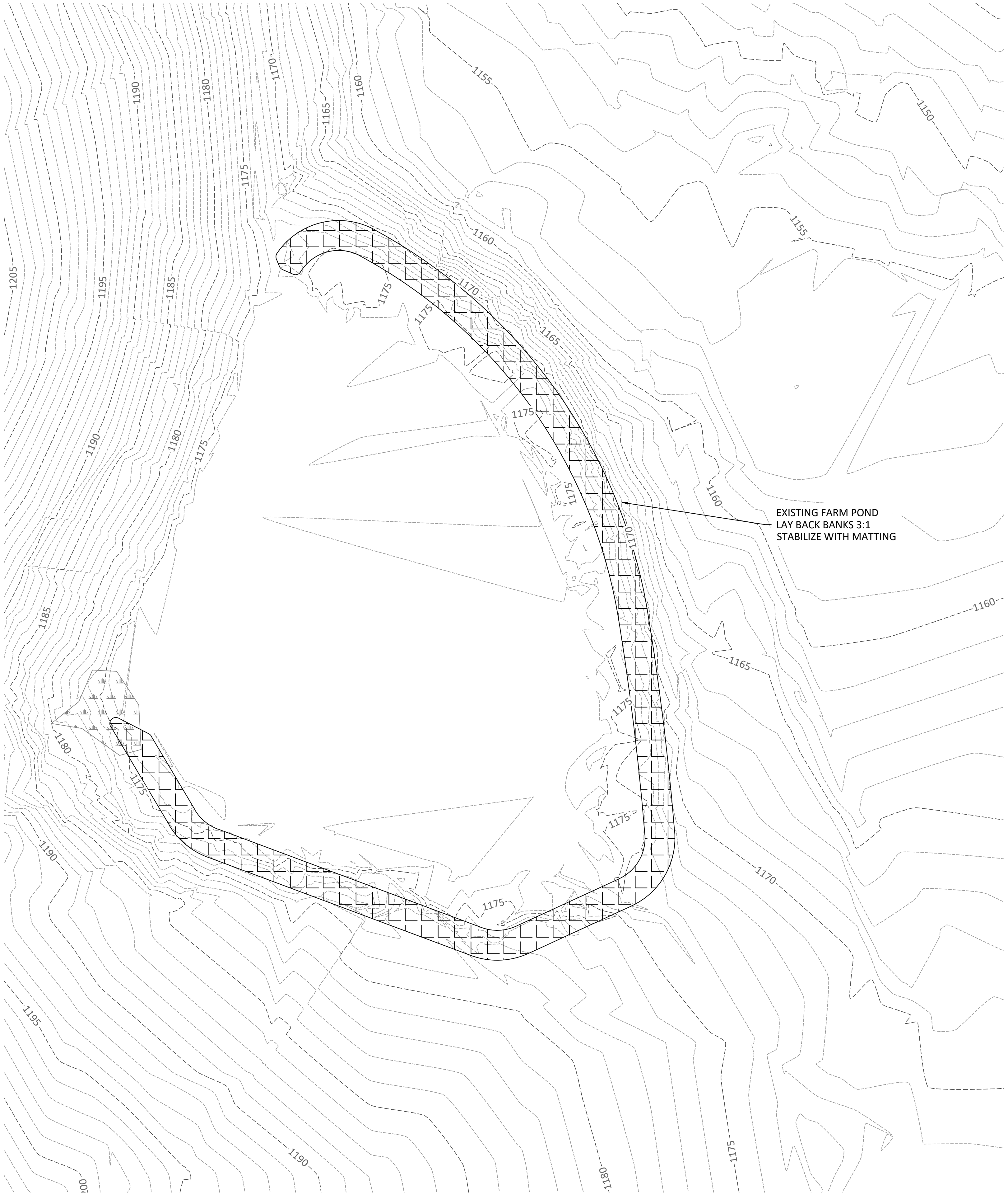

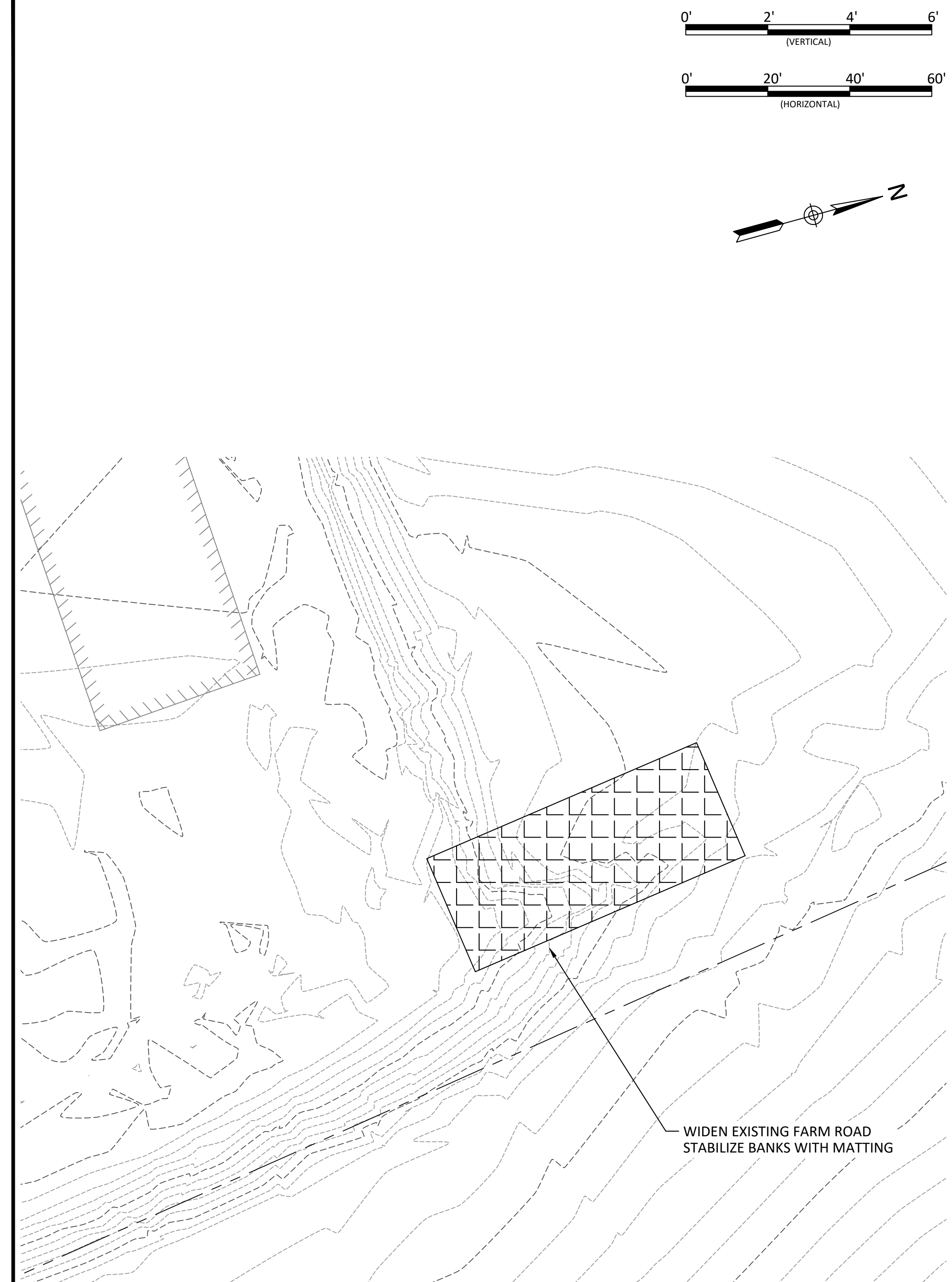

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Huntsman Stream Mitigation Site
Wilkes County, North Carolina

Farm Pond
Additional Grading

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Sheet 3.2

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Open Riparian Buffer Planting Zone

Planted Area: 15.8 acres

Buffer Planting Zone						
Open/Graded Bare Roots						
Species	Common Name	Indiv. Spacing	Min. Caliper Size	Stratum**	# of Stems	Wetland Indicator Status
*Platanus occidentalis**	Sycamore	6-8 ft.	0.25" - 1.0"	Canopy	15%	FACW
*Betula nigra**	River birch	6-8 ft.	0.25" - 1.0"	Canopy	15%	FACW
Nyssa sylvatica	Black gum	6-8 ft.	0.25" - 1.0"	Canopy	5%	FAC
Fagus grandifolia	American beech	6-8 ft.	0.25" - 1.0"	Canopy	5%	FACU
Quercus rubra	Northern red oak	6-8 ft.	0.25" - 1.0"	Canopy	5%	FACU
*Ulmus americana**	American elm	6-8 ft.	0.25" - 1.0"	Canopy	5%	FACW
Ulmus rubra	Slippery elm	6-8 ft.	0.25" - 1.0"	Subcanopy	5%	FAC
*Acer negundo**	Boxelder	6-8 ft.	0.25" - 1.0"	Subcanopy	10%	FAC
Cornus florida	Flowering dogwood	6-8 ft.	0.25" - 1.0"	Subcanopy	5%	FACU
Diospyros virginiana	Persimmon	6-8 ft.	0.25" - 1.0"	Canopy	10%	FAC
*Calycanthus floridus**	Sweetshrub	6-8 ft.	0.25" - 1.0"	Shrub	5%	FACU
Lindera benzoin	Spicebush	6-8 ft.	0.25" - 1.0"	Shrub	5%	FAC
Asimina triloba	Pawpaw	6-8 ft.	0.25" - 1.0"	Shrub	5%	FAC
Quercus alba	White oak	6-8 ft.	0.25" - 1.0"	Canopy	5%	FACU
*Species to be planted in wetter portions of the site					100%	
** Only canopy species are subject to monitoring height requirements.						

Shaded Riparian Buffer Planting Zone

Planted Area: 0.2 acres

Buffer Planting Zone						
Shaded Bare Roots						
Species	Common Name	Indiv. Spacing	Min. Caliper Size	Stratum**	# of Stems	Wetland Indicator Status
Platanus occidentalis	Sycamore	6-8 ft.	0.25" - 1.0"	Canopy	15%	FACW
Betula nigra	River birch	6-8 ft.	0.25" - 1.0"	Canopy	15%	FACW
Liriodendron tulipifera	Tulip poplar	6-8 ft.	0.25" - 1.0"	Canopy	2%	FACU
Carpinus caroliniana	American hornbeam	6-8 ft.	0.25" - 1.0"	Subcanopy	5%	FAC
Diospyros virginiana	Persimmon	6-8 ft.	0.25" - 1.0"	Canopy	5%	FAC
Nyssa sylvatica	Black gum	6-8 ft.	0.25" - 1.0"	Canopy	10%	FAC
Euonymus americana	American strawberry bush	6-8 ft.	0.25" - 1.0"	Shrub	3%	FAC
Calycanthus floridus	Sweetshrub	6-8 ft.	0.25" - 1.0"	Shrub	5%	FACU
Hamamelis virginiana	Witch hazel	6-8 ft.	0.25" - 1.0"	Shrub	5%	FACU
Quercus rubra	Northern red oak	6-8 ft.	0.25" - 1.0"	Canopy	10%	FACU
Fagus grandifolia	American beech	6-8 ft.	0.25" - 1.0"	Canopy	5%	FACU
Quercus alba	White oak	6-8 ft.	0.25" - 1.0"	Canopy	10%	FACU
Lindera benzoin	Spicebush	6-8 ft.	0.25" - 1.0"	Shrub	5%	FAC
Cornus florida	Flowering dogwood	6-8 ft.	0.25" - 1.0"	Subcanopy	5%	FACU
** Only canopy species are subject to monitoring height requirements.					100%	

Permanent Seeding

Note:
Permanent Riparian seeding in all disturbed areas within Conservation Easement

Buffer Planting Zone				
Riparian Seed Mix				
Species	Common Name	Stratum	Density (lbs/acre)	Wetland Indicator Status
Panicum rigidulum	Redtop Panicgrass	Herb	1	FACW
Chasmanthium latifolium	River Oats	Herb	1	FACU
Elymus virginicus	Virginia Wild Rye	Herb	3	FACW
Dichanthelium clandestinum	Deertongue	Herb	3	FAC
Sorghastrum nutans	Indiangrass	Herb	3	FACU
Schizachyrium scoparium	Little Bluestem	Herb	2	FACU
Panicum virgatum	Switchgrass	Herb	1	FAC
Rudbeckia hirta	Blackeyed Susan	Herb	1	FACU
Bidens aristosa	Showy Tickseed Sunflower	Herb	1	FACW
Helianthus angustifolius	Narrowleaf Sunflower	Herb	0.6	FACW
Coreopsis lanceolata	Lanceleaf Coreopsis	Herb	1	FACU
Chamaecrista fasciculata	Partridge Pea	Herb	1	FACU
Heliopsis helianthoides var. helianthoides	Oxeye Sunflower	Herb	1	FACU
Juncus tenuis	Path Rush	Herb	0.4	FAC
	Total		20	

Streambank Planting Zone

See Detail 3, Sheet 6.5 for Live Staking instructions on streambanks.

Buffer Planting Zone						
Streambank Planting						
Species	Common Name	Indiv. Spacing	Min. Caliper Size	Stratum	# of Stems	Wetland Indicator Status
Streams > 8' Bankfull Width						
Salix nigra	Black Willow	2-8 ft	0.5"-1.5" cal	Shrub	25%	OBL
Cornus amomum	Silky Dogwood	2-8 ft	0.5"-1.5" cal	Shrub	20%	FACW
Salix sericea	Silky Willow	2-8 ft	0.5"-1.5" cal	Shrub	25%	OBL
Physocarpus opulifolius	Ninebark	2-8 ft	0.5"-1.5" cal	Shrub	15%	FACW
Sambucus canadensis	Elderberrry	2-8 ft	0.5"-1.5" cal	Shrub	15%	
Streams < 8' Bankfull Width						
Cornus amomum	Silky Dogwood	2-8 ft	0.5"-1.5" cal	Shrub	25%	FACW
Salix sericea	Silky Willow	2-8 ft	0.5"-1.5" cal	Shrub	35%	OBL
Physocarpus opulifolius	Ninebark	2-8 ft	0.5"-1.5" cal	Shrub	10%	FACW
Sambucus canadensis	Elderberrry	2-8 ft	0.5"-1.5" cal	Shrub	15%	FAC
Alnus serrulata	Tag Alder	2-8 ft	0.5"-1.5" cal	Shrub	15%	OBL
Plugs						
Juncus effusus	Common Rush	3-5 ft	1.0"-2.0" plug	Herb	40%	FACW
Carex lupulina	Hop Sedge	3-5 ft	1.0"-2.0" plug	Herb	15%	OBL
Scirpus cyperinus	Woolgrass	3-5 ft	1.0"-2.0" plug	Herb	15%	FACW
Carex crinita	Fringed Sedge	3-5 ft	1.0"-2.0" plug	Herb	15%	OBL
Carex lurida	Lurid Sedge	3-5 ft	1.0"-2.0" plug	Herb	15%	OBL

Temporary Seeding		
Approved Date		
Jan 1 - May 1	Winter Oats (Avena Sativa)	55
	Rye Grain (Secale cereale)	120
	Ladino Clover (Trifolium repens)	5
	Medium Red Clover (Trillium pretense)	5
	SoluCal Humic Plus	200
	Neem Seed Meal	200
	Fertoz 0-20-0	200
	Straw Mulch	4000
May 1 - Aug 15	German Millet (Setaria italica)	40
	Buckwheat (Fagopyrum esculentum)	40
	SoluCal Humic Plus	200
	Fertoz 0-20-0	200
	Neem Seed Meal	200
	Straw Mulch	4000
Aug 15 - Dec 30	Winter Oats (Avena Sativa)	55
	Medium Red Clover (Trillium pretense)	5
	Ladino Clover (Trifolium repens)	5
	Neem Seed Meal	200
	SoluCal Humic Plus	200
	Fertoz 0-20-0	200
	Straw Mulch	4000

Pasture Seeding

Disturbed areas outside easement.

Planted Area: 9.1 acres

Pasture Seeding			
Pure Live Seeding (50 lbs/acre)			
Species Name	Common Name	Density (lbs/acre)	Wetland Indicator Status
Dactylis glomerata	Orchard Grass	33	FACU
Trifolium pratense	Medium Red Cover	5	FACU
Trifolium repens	White Ladino Cover	5	FACU
Poa pratensis	Kentucky Bluegrass	7	FACU

Total Planted Area: 25.1 acres

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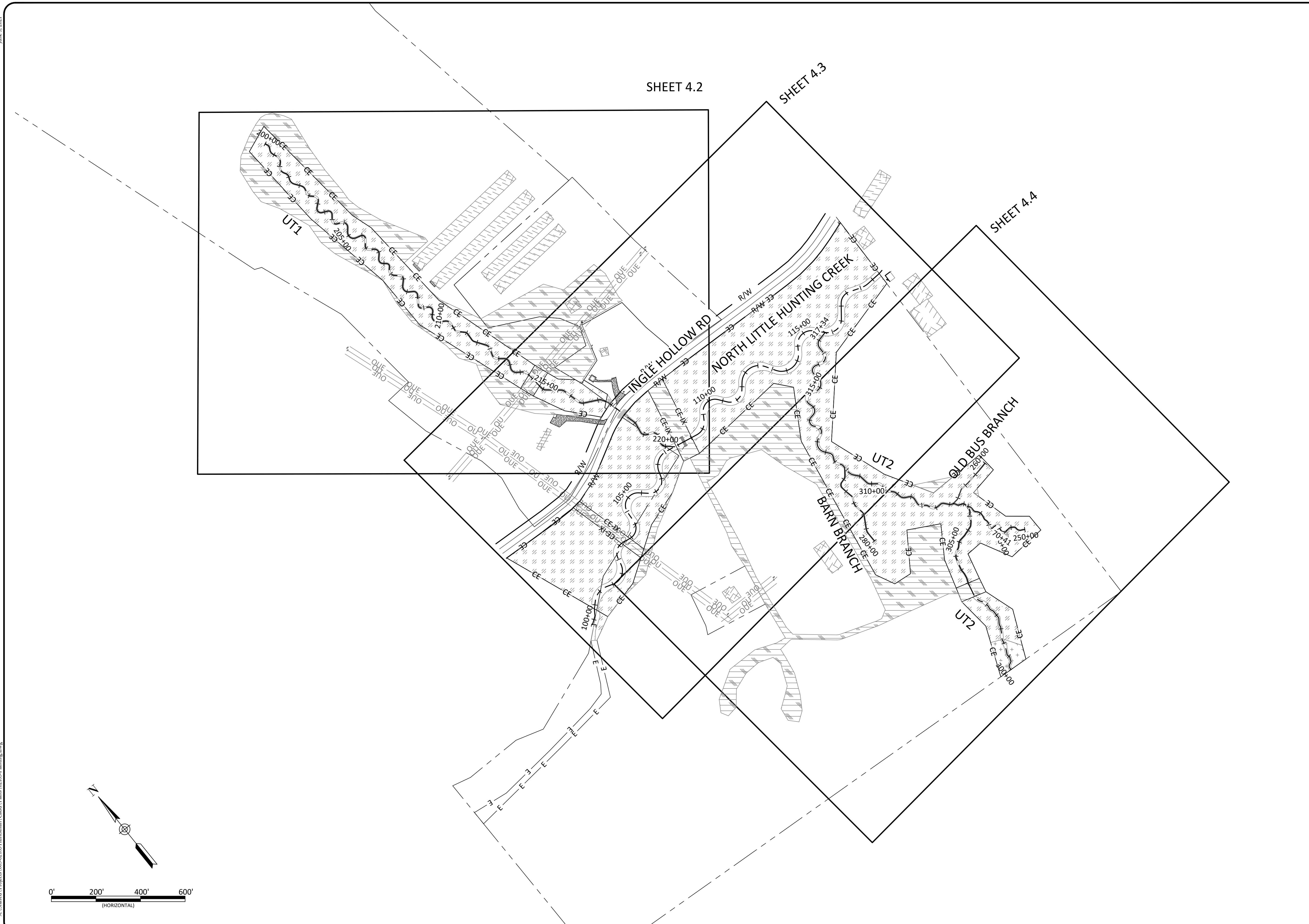
Huntsman Stream Mitigation Site
Wilkes County, North Carolina

Plant Lists
Planting Plan

Revisions:

Date: JUNE 4, 2021
Job Number: 005-02183
Project Engineer: ASE
Drawn By: HCC
Checked By: CDB

Sheet 4.0



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Huntsman Stream Mitigation Site
Wilkes County, North Carolina

Planting Overview
Planting Plan

Revisions:

Date:	JUNE 4, 2021
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Project Engineer:	ASE
Drawn By:	HCC
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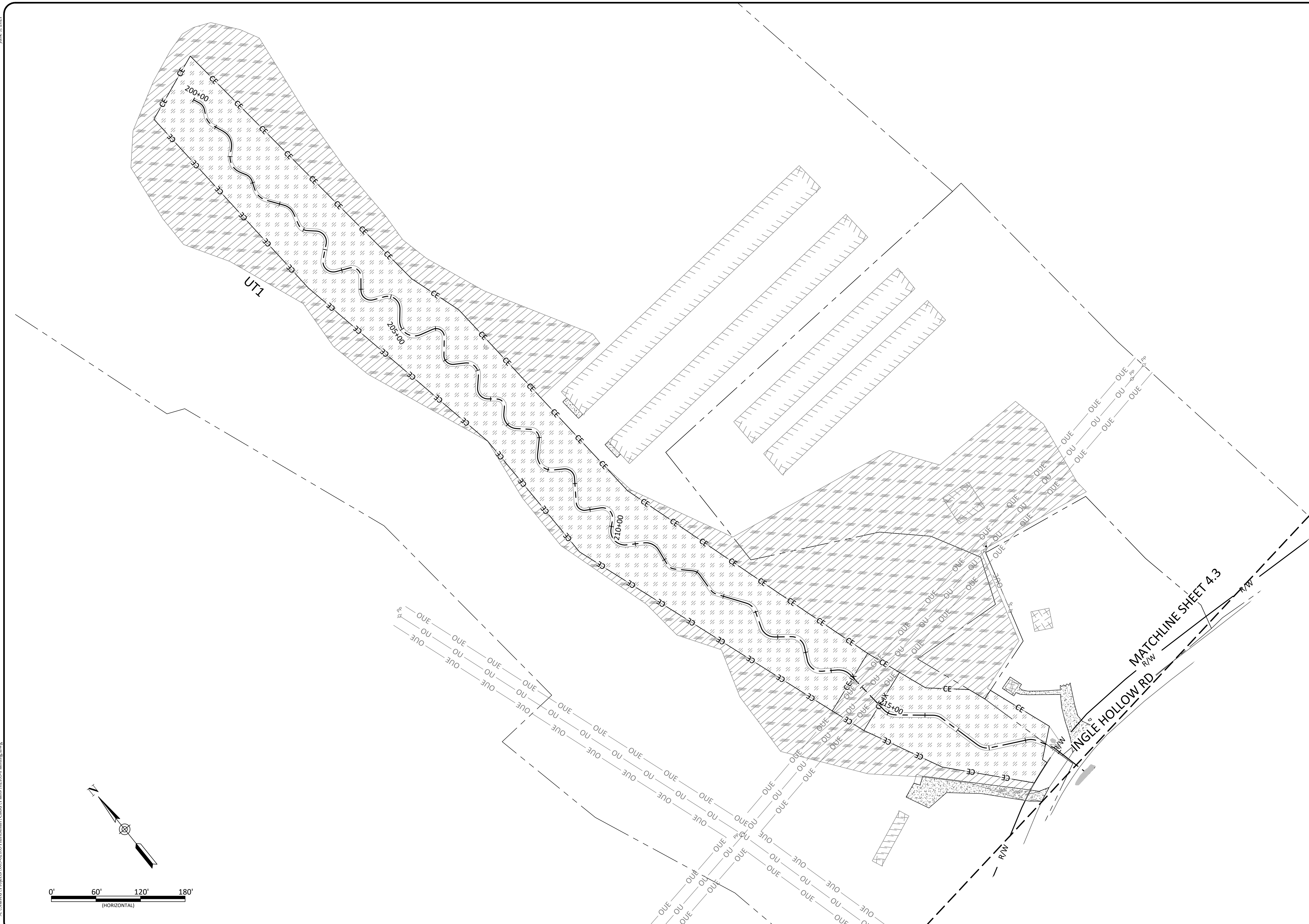
Sheet 4.1

June 3, 2021



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Huntsman Stream Mitigation Site
Wilkes County, North Carolina

UT1
Planting Plan

Revisions:

Date:	JUNE 4, 2021
Job Number:	005-02183
Project Engineer:	ASE
Drawn By:	HCC
Checked By:	CDB

Sheet 4.2

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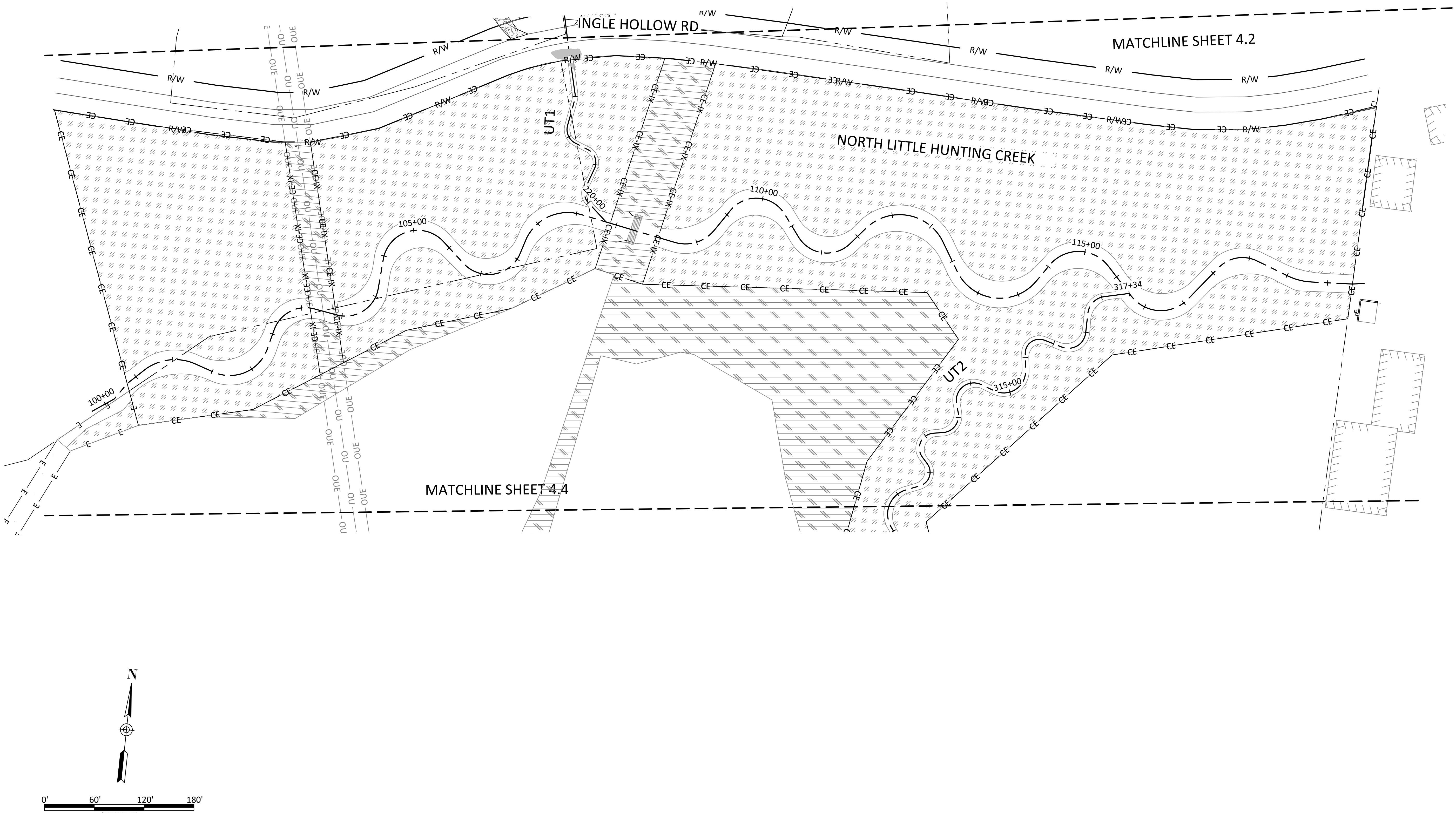

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Huntsman Stream Mitigation Site
Wilkes County, North Carolina

North Little Hunting Creek
Planting Plan

Revisions:

Date:	JUNE 4, 2021
Job Number:	005-02183
Project Engineer:	ASE
Drawn By:	HCC
Checked By:	CDB

Sheet 4.3

June 3, 2021

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Huntsman Stream Mitigation Site
Wilkes County, North Carolina

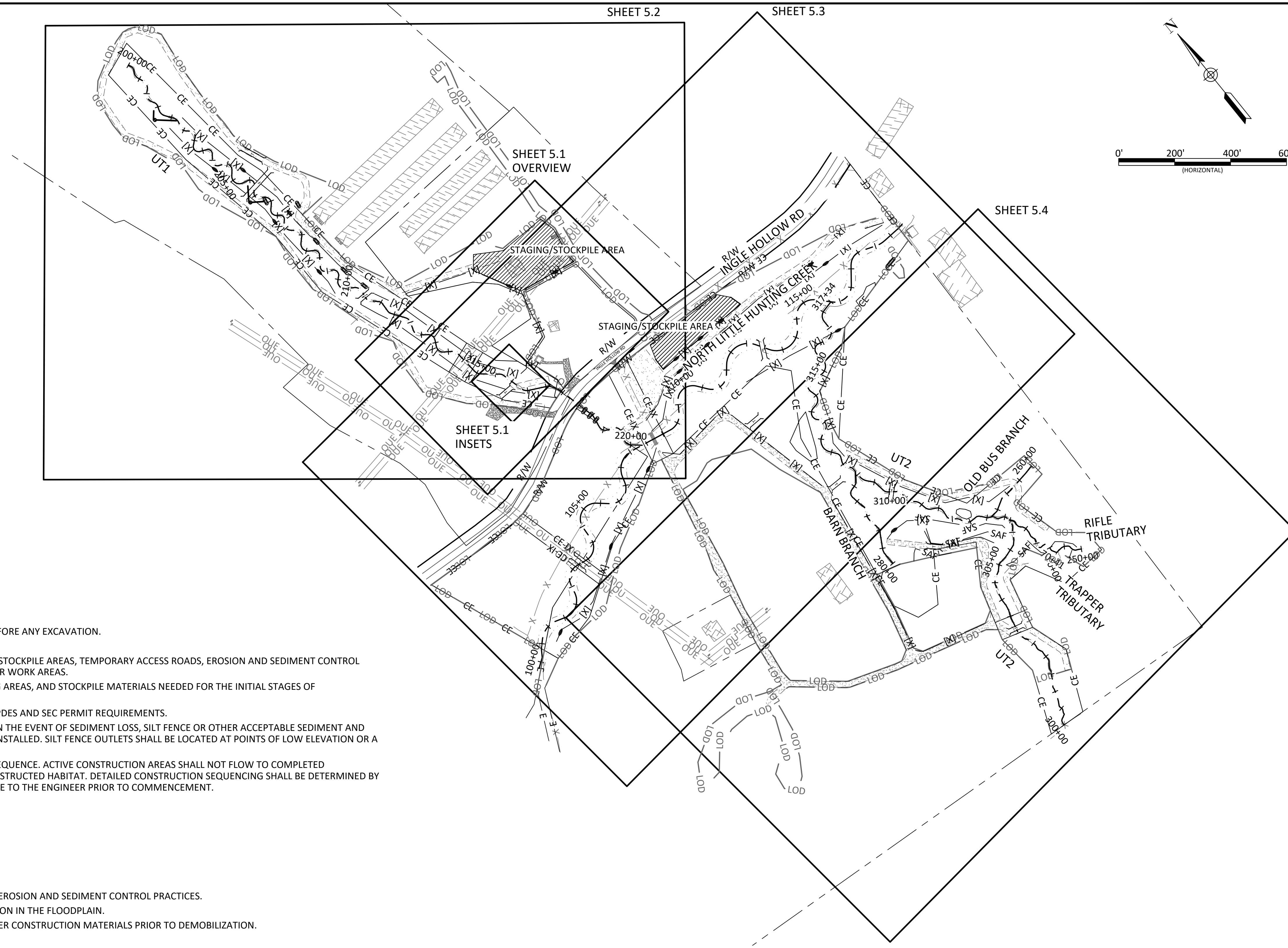
UT2
Planting Plan

Date:	JUNE 4, 2021
Job Number:	005-02183
Project Engineer:	ASE
Drawn By:	HCC
Checked By:	CDB

Revisions:

Sheet 4.4

24-Hour Erosion Control Contact:
Aaron Earley, PE
Wildlands Engineering, Inc.
1430 S. Mint Street, Suite 104
Charlotte, NC 28203
704-819-0848
Limits of Disturbance: 24.8 acres
Project ID: TBD



INITIAL SITE PREPARATION

1. CONTACT NORTH CAROLINA "ONE CALL" CENTER (1.800.632.4949) BEFORE ANY EXCAVATION.
2. MOBILIZE EQUIPMENT AND MATERIALS TO THE SITE.
3. IDENTIFY AND ESTABLISH CONSTRUCTION ENTRANCES, STAGING AND STOCKPILE AREAS, TEMPORARY ACCESS ROADS, EROSION AND SEDIMENT CONTROL PRACTICES, AND STREAM CROSSINGS AS INDICATED ON THE PLANS FOR WORK AREAS.
4. SET UP TEMPORARY FACILITIES, LOCATE EQUIPMENT WITHIN STAGING AREAS, AND STOCKPILE MATERIALS NEEDED FOR THE INITIAL STAGES OF CONSTRUCTION WITHIN STOCKPILE AREA(S).
5. INSTALL AND MAINTAIN ONSITE RAIN GAUGE AND LOG BOOKS FOR NPDES AND SEC PERMIT REQUIREMENTS.
6. 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.
7. CONSTRUCTION SHALL PROGRESS FOLLOWING THE CONSTRUCTION SEQUENCE. ACTIVE CONSTRUCTION AREAS SHALL NOT FLOW TO COMPLETED CONSTRUCTION AREAS TO PREVENT SEDIMENTATION OF RECENT CONSTRUCTED HABITAT. DETAILED CONSTRUCTION SEQUENCING SHALL BE DETERMINED BY THE CONTRACTOR AND THE CONTRACTOR SHALL PROVIDE A SCHEDULE TO THE ENGINEER PRIOR TO COMMENCEMENT.

CONSTRUCTION DEMOBILIZATION

1. REMOVE TEMPORARY STREAM CROSSINGS, STOCKPILE AREAS, AND EROSION AND SEDIMENT CONTROL PRACTICES.
2. APPLY TEMPORARY AND PERMANENT SEED, MULCH, AND VEGETATION IN THE FLOODPLAIN.
3. ENSURE THAT THE SITE IS FREE OF TRASH, DEBRIS, AND ANY LEFTOVER CONSTRUCTION MATERIALS PRIOR TO DEMOBILIZATION.
4. DEMOBILIZE GRADING EQUIPMENT FROM THE SITE.
5. 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.
6. 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 AS SPECIFIED IN THE PROJECT SPECIFICATIONS AND ON THE PROPOSED PLANTING PLAN. 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 AND STOCKPILED NATIVE TOPSOIL SHALL BE APPLIED.
7. SEED, MULCH AND STABILIZE STAGING AREAS AND STOCKPILE AREAS.
8. DEMOBILIZE ALL EQUIPMENT, OFFICES, BUILDINGS, AND OTHER FACILITIES ASSEMBLED ON THE SITE.

PREVENT OVERLAND SEDIMENT FROM REACHING EXISTING/PROPOSED STREAM. ADD ADEQUATE MEASURES (E.G. STRAW WATTLES/SILT FENCE) AS NEEDED.

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Huntsman Stream Mitigation Site
Wilkes County, North Carolina

Erosion Control Overview
Erosion and Sediment Control Plan

Revisions:

Date:	JUNE 4, 2021
Job Number:	005-02183
Project Engineer:	ASE
Drawn By:	HCC
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Sheet 5.0

June 3, 2021

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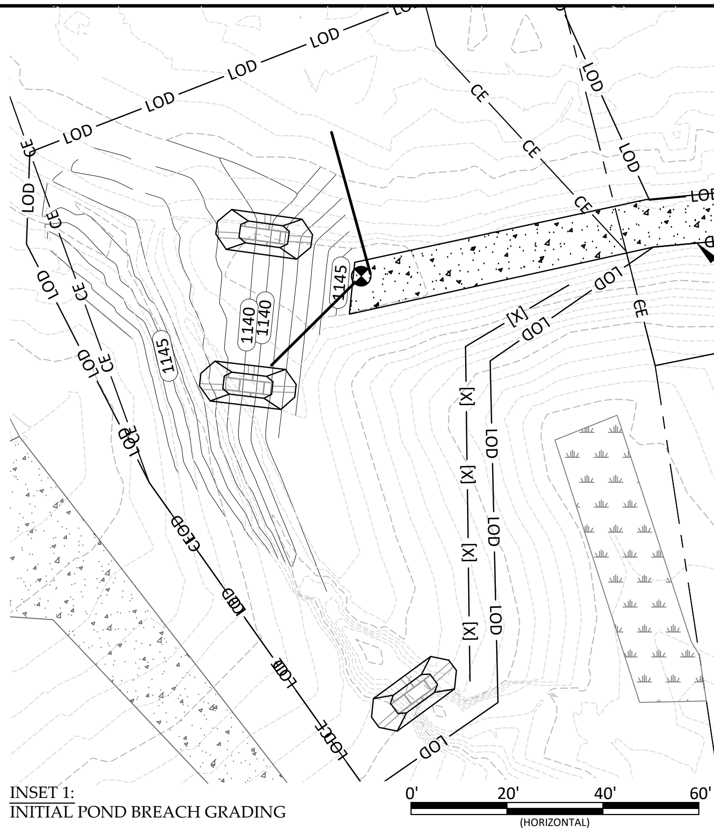
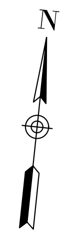
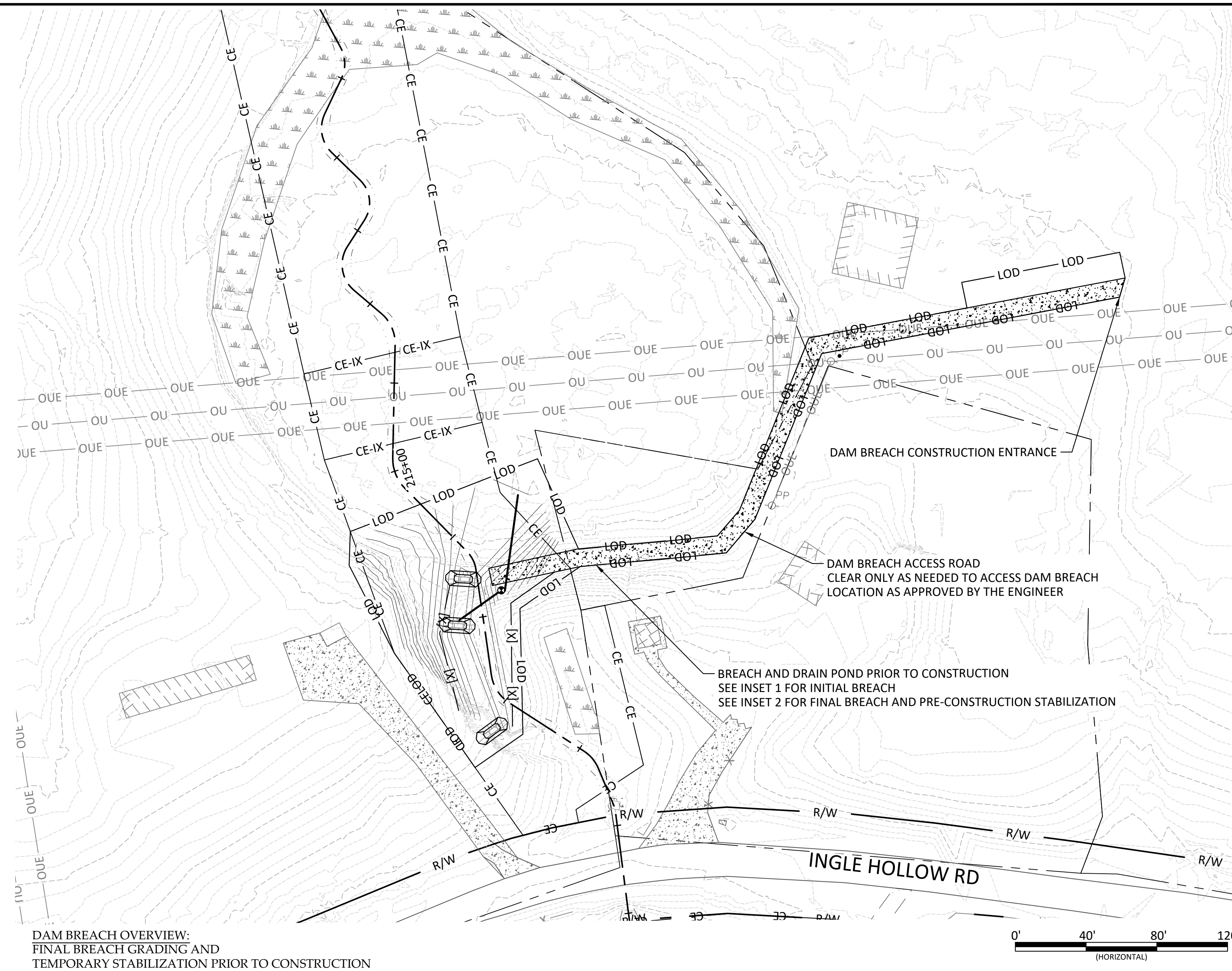
June 3, 2021

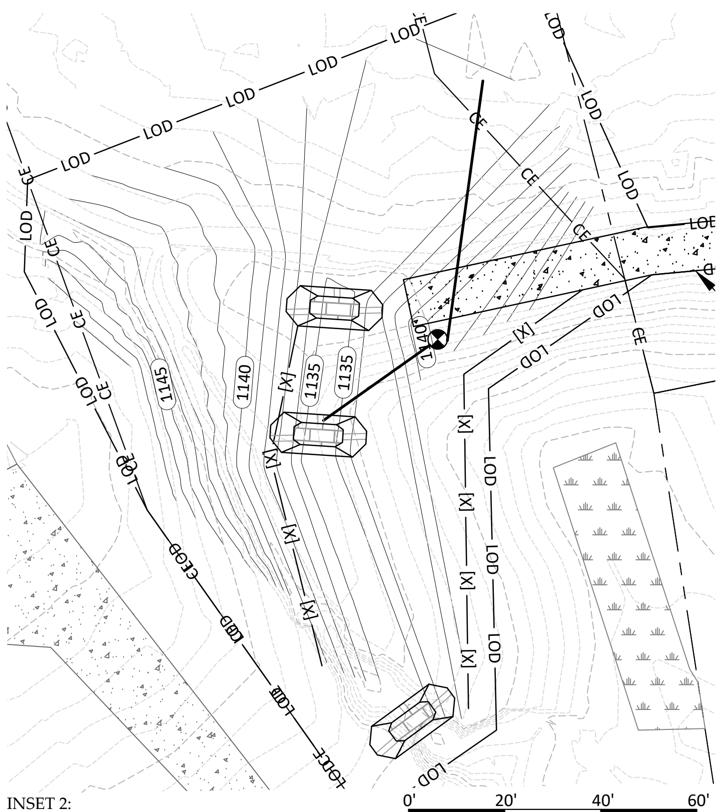


INSET 1:
INITIAL POND BREACH GRADING





DAM BREACH OVERVIEW:
FINAL BREACH GRADING AND
TEMPORARY STABILIZATION PRIOR TO CONSTRUCTION



INSET 2:
FINAL BREACH AND
TEMPORARY STREAM GRADING PRIOR TO CONSTRUCTION

CONSTRUCTION SEQUENCE
PHASE 1 - DAM BREACH

1. CONTRACTOR SHALL PREPARE FOR STREAM WORK BY FIRST BREACHING POND 3 ALONG UT1. THE POND SHALL BE DEWATERED IN SUCH A MANNER TO PREVENT DOWNSTREAM SEDIMENTATION.
2. PERFORM ANY NECESSARY CLEARING AND GRUBBING IN DESIGNATED AREAS AS WORK PROGRESSES. BANK VEGETATION AND VEGETATION IMMEDIATELY ADJACENT TO LIVE CHANNELS SHALL BE LEFT UNDISTURBED AS LONG AS POSSIBLE.
3. INSTALL TEMPORARY ROCK DAMS AT THE POND OUTLET. ROCK DAM SHALL BE INSTALLED 12" ABOVE PROPOSED GRADE ON INSET 1 TO FILTER POND MATERIAL.
4. INSTALL SILT FENCE AND ROCK DAMS DOWNSTREAM OF DAM.
5. DEWATER POND PRIOR TO BREACHING USING PUMPS OR SIPHONS AS SHOWN IN INSET 1 AND 2. PUMP AROUND SYSTEM SHALL BE INSTALLED PER THE PLANS. ALTERNATE DEWATERING METHODS SHALL BE PRE-APPROVED BY THE ENGINEER.
6. BREACHING SHALL COMMENCE ONCE THE POND IS DEWATERED. INSTALL PUMP AROUND SYSTEM TO DIVERT UT1 FLOW AROUND THE ACTIVE WORK AREA.
7. EXCAVATE THE DAM EMBANKMENT TO THE GRADES SHOWN IN INSET 1. STABLE SLOPES (2:1 MIN) SHALL BE MAINTAINED AT ALL TIMES THROUGHOUT THE BREACHING PROCESS.
5. RE-INSTALL SILT FENCE AND ROCK DAMS DOWNSTREAM OF DAM.
7. APPLY TEMPORARY SEED AND MULCH ON DISTURBED AND EXPOSED POND BED AREAS.
5. EXCAVATE THE DAM EMBANKMENT TO THE GRADES SHOWN IN INSET 2. STABLE SLOPES (2:1 MIN) SHALL BE MAINTAINED AT ALL TIMES THROUGHOUT THE BREACHING PROCESS.
5. INSTALL TEMPORARY ROCK DAMS AT THE POND OUTLET. ROCK DAM SHALL BE INSTALLED 12" ABOVE PROPOSED GRADE ON INSET 2 TO FILTER POND MATERIAL.
6. EXCAVATED DAM EMBANKMENT MATERIAL SHALL BE STOCKPILED UNTIL DRY AND /OR REMOVED FROM THE SITE. POND BED SILT SHALL BE EXCAVATED AND SPREAD ON ADJACENT FIELD AS DIRECTED BY THE ENGINEER AND LANDOWNER. ENSURE SILT FENCE IS INSTALLED AND FUNCTIONAL AT TOE OF SLOPE AND BELOW ADJACENT FIELD AND ANY STOCKPILE LOCATIONS. REPLACE AND REPAIR SILT FENCE AS NECESSARY PER THE PLANS.
7. APPLY TEMPORARY SEED AND MULCH ON DISTURBED AND EXPOSED POND BED AREAS.
8. THE TEMPORARY PROPOSED CHANNEL SHALL BE EXCAVATED AND BUILT WITH SUITABLE MATERIAL FROM THE DAM EMBANKMENT. STABILIZE TEMPORARY CHANNEL WITH COIR MATTING.
9. MAINTAIN THE TEMPORARY CHANNEL UNTIL THE PROPOSED FLOODPLAIN AND STREAM CHANNEL IS CONSTRUCTED ON-LINE.
10. ANY REMAINING POND SLUDGE WILL BE STOCKPILED AND STABILIZED WITH SEED AND MULCH PRIOR TO BEGINNING IN-CHANNEL WORK ON THE REMAINDER OF THE SITE.
11. REMOVE SILT FENCE AND ROCK DAMS DOWNSTREAM OF DAM.

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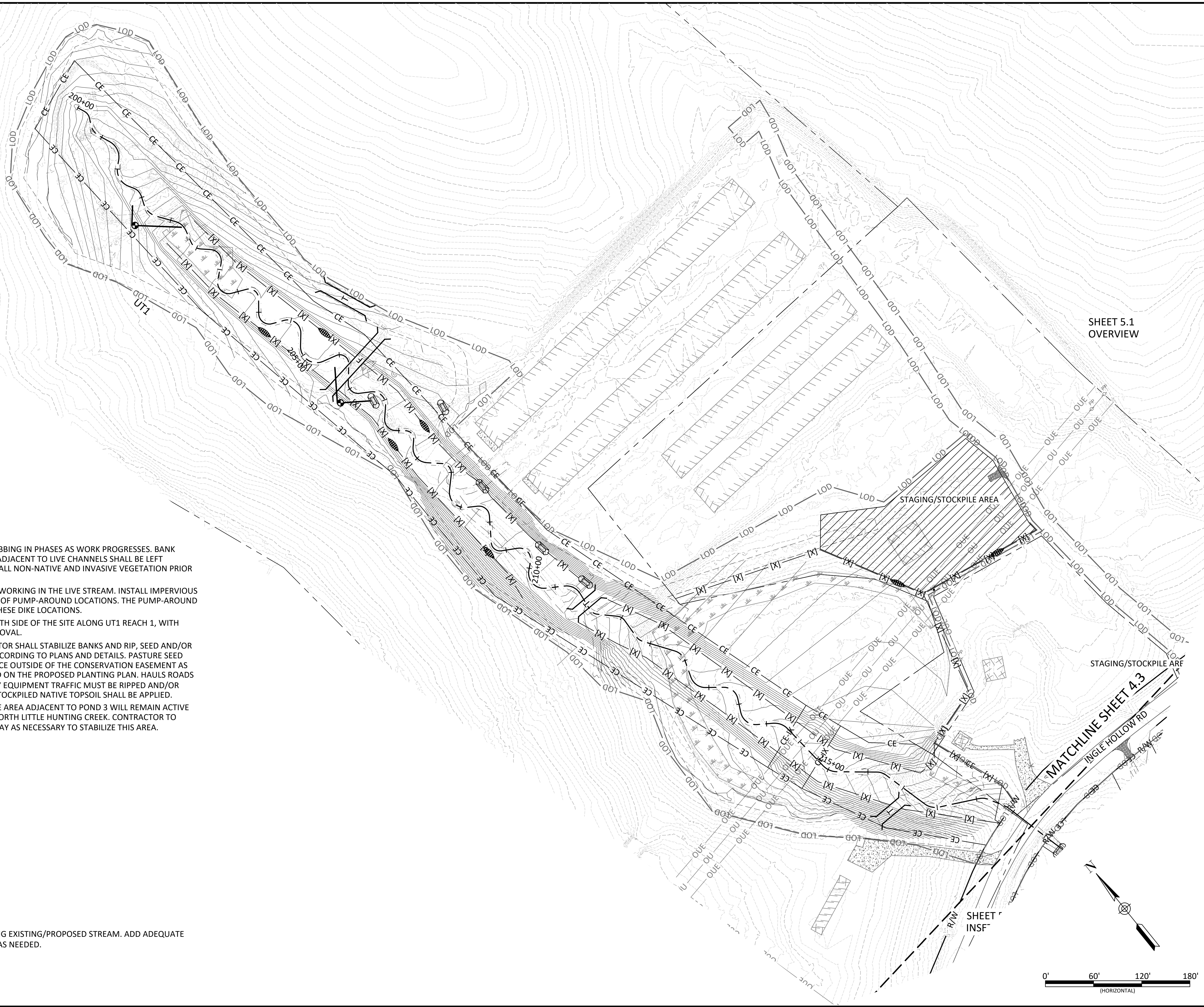
Huntsman Stream Mitigation Site
Wilkes County, North Carolina

PHASE 1 - Dam Breach
Erosion and Sediment Control Plan

Revisions:

Date: JUNE 4, 2021
Job Number: 005-02183
Project Engineer: ASE
Drawn By: HCC
Checked By: CDB

Sheet
5.1



CONSTRUCTION SEQUENCE:
PHASE 2 - NORTH OF INGLE HOLLOW ROAD

1. 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 CHANNEL CONSTRUCTION.
2. A PUMP-AROUND SYSTEM IS REQUIRED WHEN WORKING IN THE LIVE STREAM. INSTALL IMPERVIOUS DIKES AT UPSTREAM AND DOWNSTREAM ENDS OF PUMP-AROUND LOCATIONS. THE PUMP-AROUND OPERATION SHALL BE PERFORMED BETWEEN THESE DIKE LOCATIONS.
3. CONTRACTOR SHALL BEGIN WORK ON THE NORTH SIDE OF THE SITE ALONG UT1 REACH 1, WITH FLOODPLAIN GRADING AND EXISTING PIPE REMOVAL.
4. ONCE UT1 HAS BEEN CONSTRUCTED, CONTRACTOR SHALL STABILIZE BANKS AND RIP, SEED AND/OR SOD, MAT, AND MULCH FLOODPLAIN AREAS ACCORDING TO PLANS AND DETAILS. PASTURE SEED MIX IS TO BE APPLIED TO AREAS OF DISTURBANCE OUTSIDE OF THE CONSERVATION EASEMENT AS SPECIFIED IN THE PROJECT SPECIFICATIONS AND ON THE PROPOSED PLANTING PLAN. HAULS ROADS WHICH HAVE BEEN COMPACTED DUE TO HEAVY EQUIPMENT TRAFFIC MUST BE RIPPED AND/OR DISKED TO DEPTH OF 8" AT A MINIMUM AND STOCKPILED NATIVE TOPSOIL SHALL BE APPLIED.
5. THE CONSTRUCTION ENTRANCE AND STOCKPILE AREA ADJACENT TO POND 3 WILL REMAIN ACTIVE FOR ADDITIONAL GRADING AND SPOIL FROM NORTH LITTLE HUNTING CREEK. CONTRACTOR TO ADJUST SILT FENCE AND TEMPORARY SEED/STRAY AS NECESSARY TO STABILIZE THIS AREA.

PREVENT OVERLAND SEDIMENT FROM REACHING EXISTING/PROPOSED STREAM. ADD ADEQUATE MEASURES (E.G. STRAW WATTLES/SILT FENCE) AS NEEDED.

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Huntsman Stream Mitigation Site
Wilkes County, North Carolina

PHASE 2 - UT1
Erosion and Sediment Control Plan

Revisions:

Date:	JUNE 4, 2021
Job Number:	005-02183
Project Engineer:	ASE
Drawn By:	HCC
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Sheet 5.2

June 3, 2021
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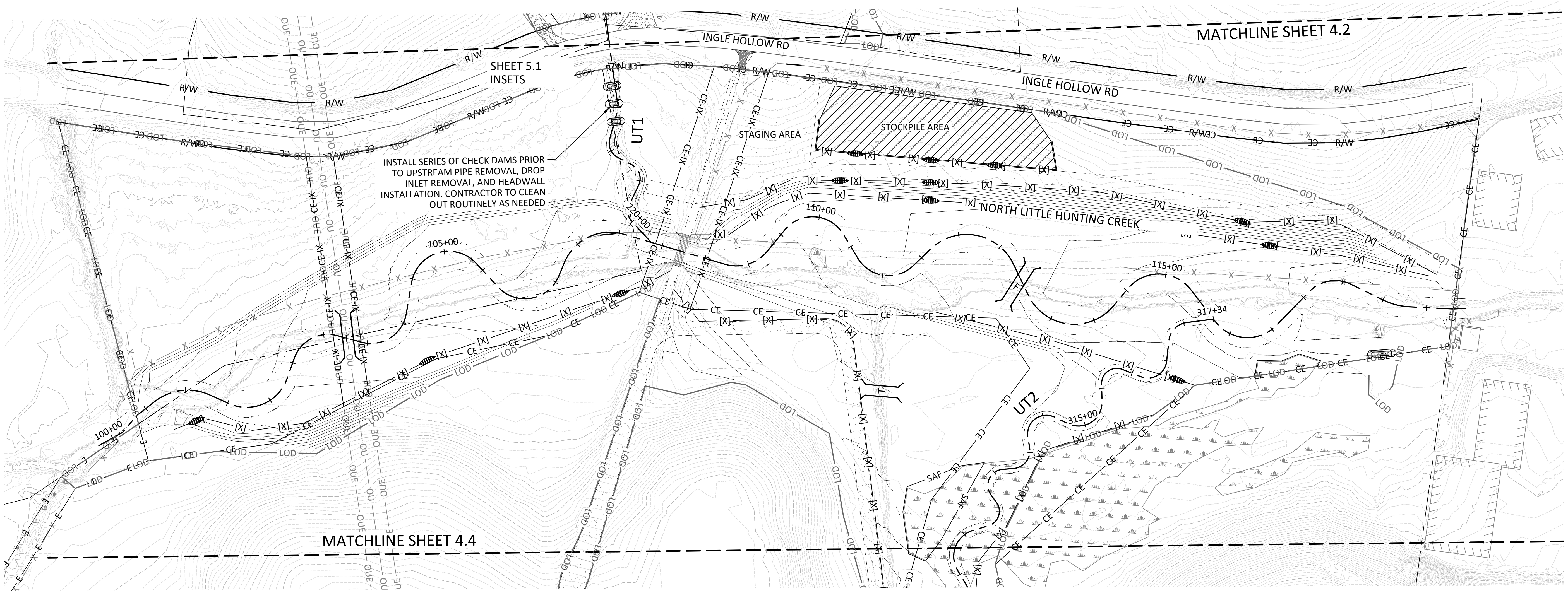
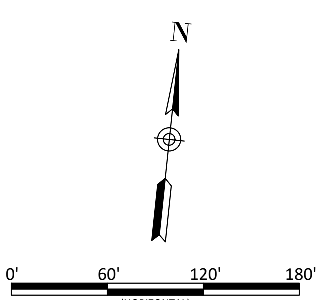


CONSTRUCTION SEQUENCE:
PHASE 2 - SOUTH OF INGLE HOLLOW ROAD

1. CONTRACTOR SHALL BEGIN WORK ON THE SOUTH SIDE OF THE SITE ALONG NORTH LITTLE HUNTING CREEK REACH 1. STOCKPILE SUITABLE FLOODPLAIN MATERIAL FOR GRADING ALONG UT2 REACH 2, RIFLE TRIBUTARY, UT2 REACH 3, OLD BUS BRANCH, BARN BRANCH, AND THE ADDITIONAL GRADING AREAS AS DIRECTED BY THE ENGINEER AND THE LANDOWNER.
2. PERFORM EXCAVATION AND IN-CHANNEL GRADING ON TRIBUTARIES WORKING UPSTREAM TO DOWNSTREAM ALONG UT2. OFFLINE SECTIONS MAY BE CONSTRUCTED CONCURRENTLY.
3. AS WORK PROGRESSES, REMOVE AND STOCKPILE THE TOP THREE INCHES OF SOIL FROM THE ACTIVE GRADING AREA. STOCKPILED TOPSOIL SHALL BE KEPT SEPARATE, OUT OF THE FEMA FLOODPLAIN, FOR ONSITE REPLACEMENT PRIOR TO FLOODPLAIN SEEDING.
4. 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.
5. WHERE FEASIBLE, MORE THAN ONE OFFLINE SECTION MAY BE CONSTRUCTED CONCURRENTLY. OFFLINE SECTIONS SHALL BE TIED ONLINE SEQUENTIALLY FROM UPSTREAM TO DOWNSTREAM.
6. SEED AND/OR SOD, MAT, AND MULCH BANKS AND FLOODPLAIN AREAS ACCORDING TO PLANS AND DETAILS.
7. ONCE DISTURBED AREAS AND EXPOSED SLOPES ARE STABILIZED, REMOVE PUMP-AROUND SYSTEM, IF USED, AND PROGRESS TO THE NEXT PHASE.
8. BACKFILL ABANDONED CHANNEL SECTIONS WITH STOCKPILED SOIL. ALL NON-NATIVE, INVASIVE SPECIES SHALL BE TREATED AND/OR REMOVED FROM THE OLD CHANNEL PRIOR TO BACKFILLING.
9. SEED AND MULCH OR SOD ANY BACKFILL SECTIONS BEFORE PROCEEDING TO NEXT PHASE.
10. ONCE ALL PHASES OF CHANNEL, FLOODPLAIN, AND WETLAND CONSTRUCTION ARE COMPLETE, PREPARE THE FLOODPLAIN FOR PLANTING PER THE SPECIFICATIONS.

PREVENT OVERLAND SEDIMENT FROM REACHING EXISTING/PROPOSED STREAM. ADD ADEQUATE MEASURES (E.G. STRAW WATTLES/SILT FENCE) AS NEEDED.



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Huntsman Stream Mitigation Site
Wilkes County, North Carolina

PHASE 2 - North Little Hunting Creek Erosion and Sediment Control Plan

Revisions:

Date:	JUNE 4, 2021
Job Number:	005-02183
Project Engineer:	ASE
Drawn By:	HCC
Checked By:	CDB

Sheet 5.3

June 3, 2021

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PREVENT OVERLAND SEDIMENT FROM REACHING EXISTING/PROPOSED STREAM. ADD ADEQUATE MEASURES (E.G. STRAW WATTLES/SILT FENCE) AS NEEDED.

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Huntsman Stream Mitigation Site
Wilkes County, North Carolina

PHASE 2 - UT2
Erosion and Sediment Control Plan

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Date:	JUNE 4, 2021
Job Number:	005-02183
Project Engineer:	ASE
Drawn By:	HCC
Checked By:	CDB

Sheet 5.4

June 3, 2021

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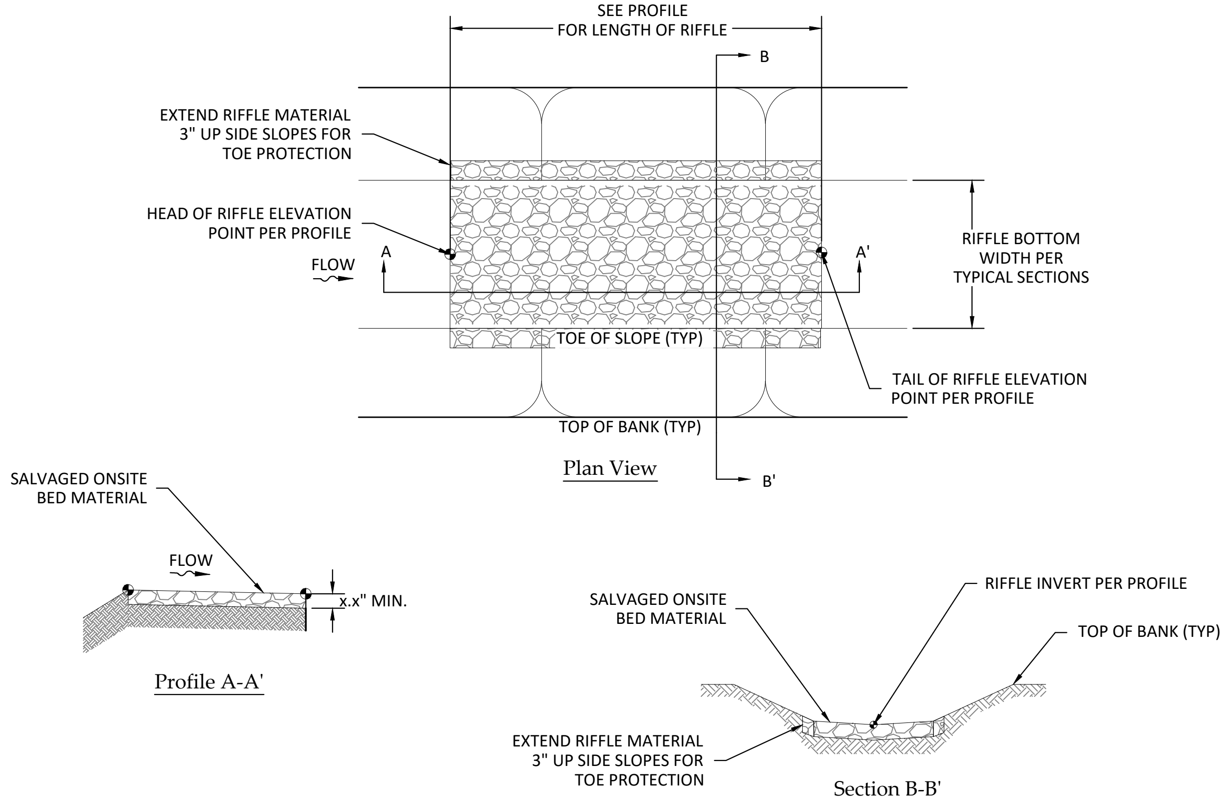
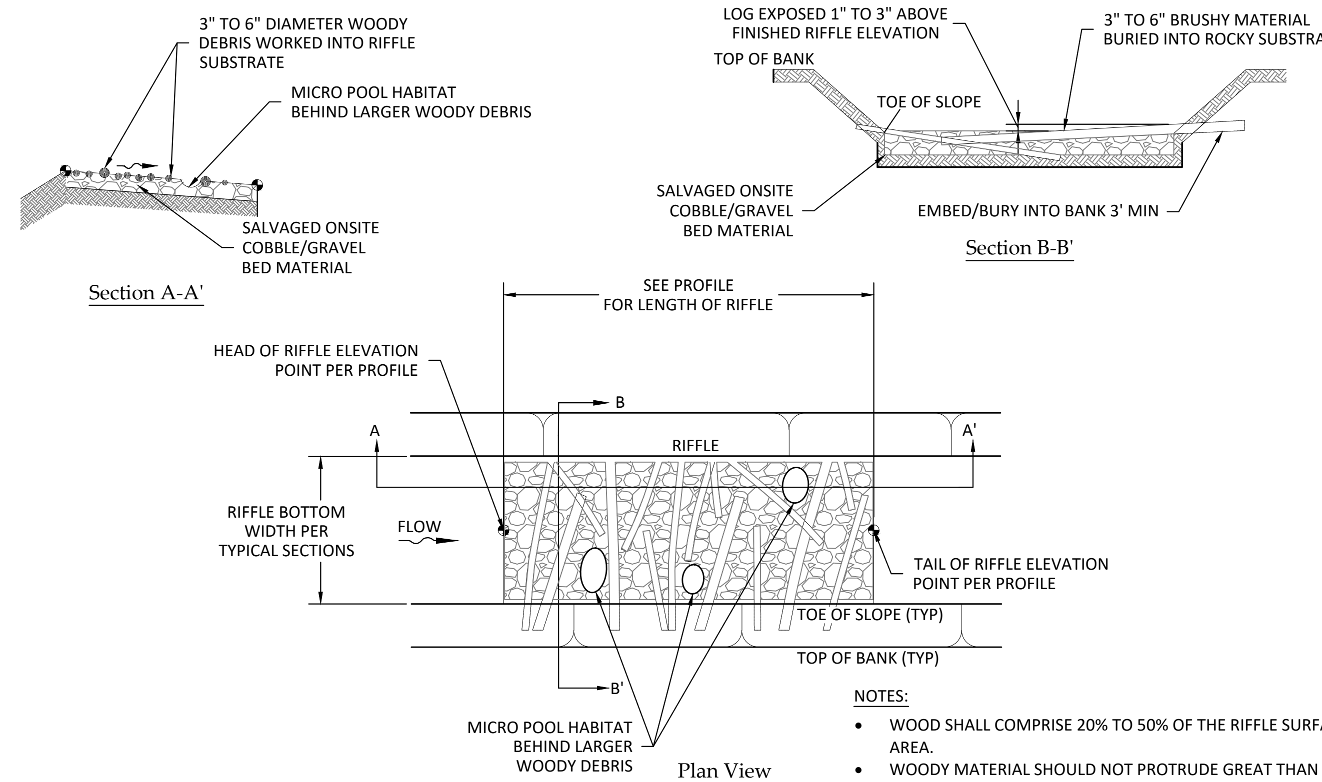


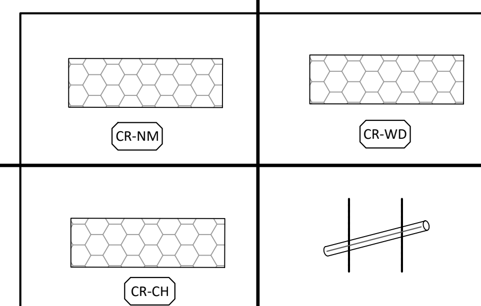
NOTE:
- IF NECESSARY, SALVAGED ONSITE ROCK MAY BE SUBSTITUTED WITH QUARRY ROCK OF SIMILAR SIZE.
- SEE STRUCTURE SIZING IN DETAIL 3, SHEET 6.4 FOR BED MATERIAL SIZING.

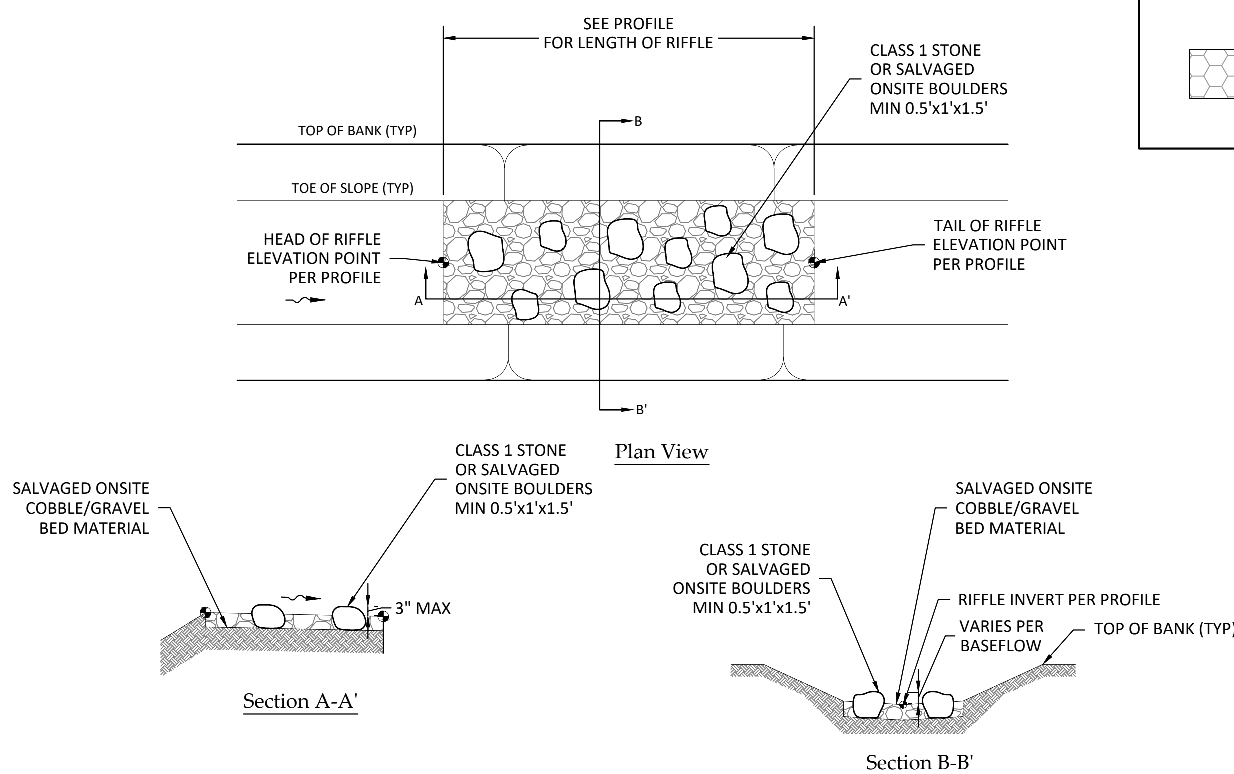
1/6.1 Native Material Constructed Riffle
Not to Scale



NOTES:
- WOOD SHALL COMPRISE 20% TO 50% OF THE RIFFLE SURFACE AREA.
- WOODY MATERIAL SHOULD NOT PROTRUDE GREAT THAN 3" ABOVE RIFFLE BED.
- BRUSH SHOULD BE PLACED PERPENDICULAR TO CHANNEL AT UP TO A 15% ANGLE DOWNSTREAM.
- IF NECESSARY, SALVAGED ONSITE ROCK MAY BE SUBSTITUTED WITH QUARRY ROCK OF SIMILAR SIZE.
- BRUSH CUTTERS OR OTHER DEVICE MUST BE USED TO ENSURE PROTRUSION LIMITED TO TOLERANCE NOTED ABOVE.
- SEE STRUCTURE SIZING IN DETAIL 3, SHEET 6.4 FOR BED MATERIAL SIZING.

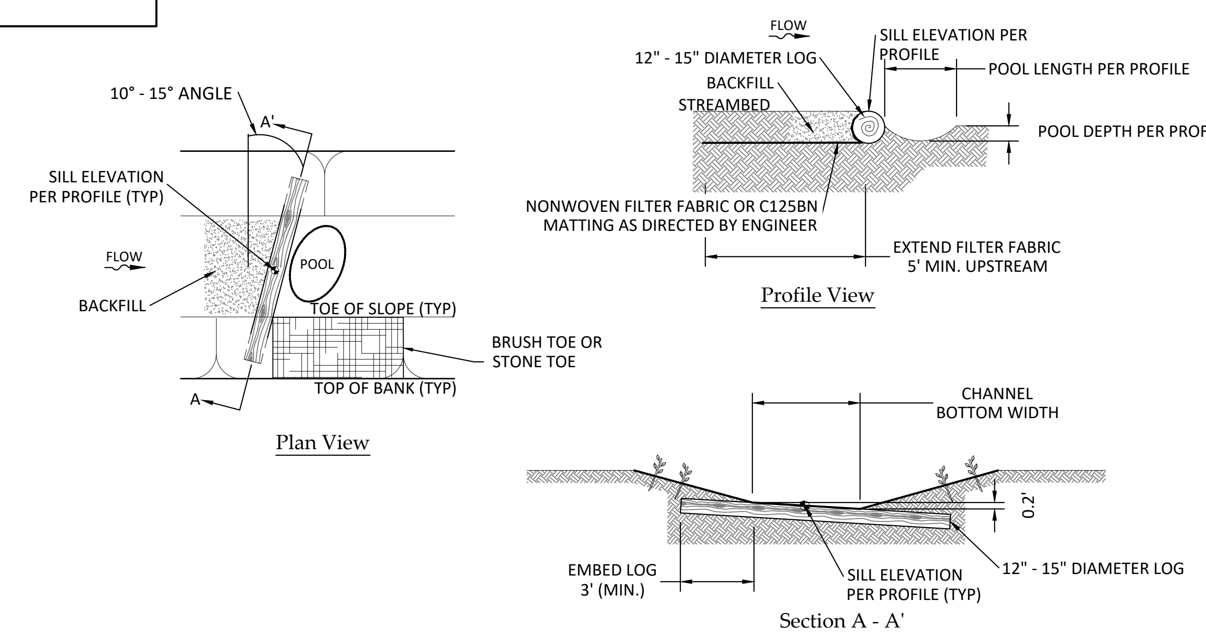
2/6.1 Woody Riffle
Not to Scale





3/6.1 Chunky Riffle
Not to Scale

NOTE:
- IF NECESSARY, SALVAGED ONSITE ROCK MAY BE SUBSTITUTED WITH QUARRY ROCK OF SIMILAR SIZE.



4/6.1 Angled Log Drop
Not to Scale

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Huntsman Stream Mitigation Site
Wilkes County, North Carolina

Details

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Date:	JUNE 4, 2021
Job Number:	005-02183
Project Engineer:	ASE
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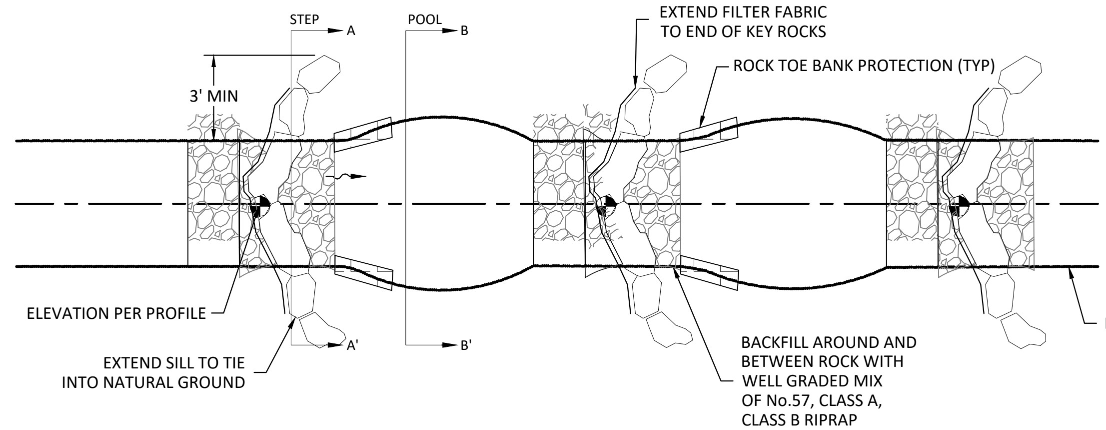
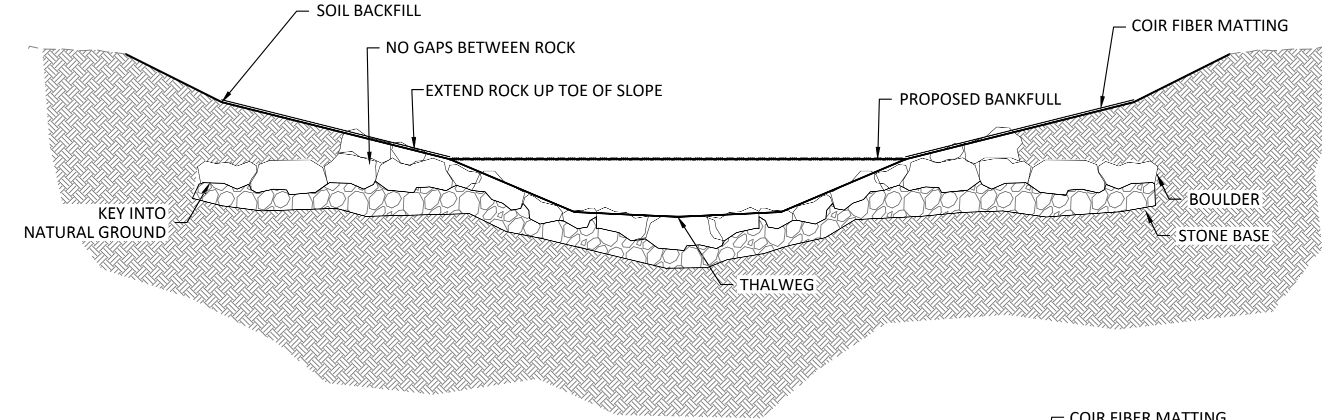
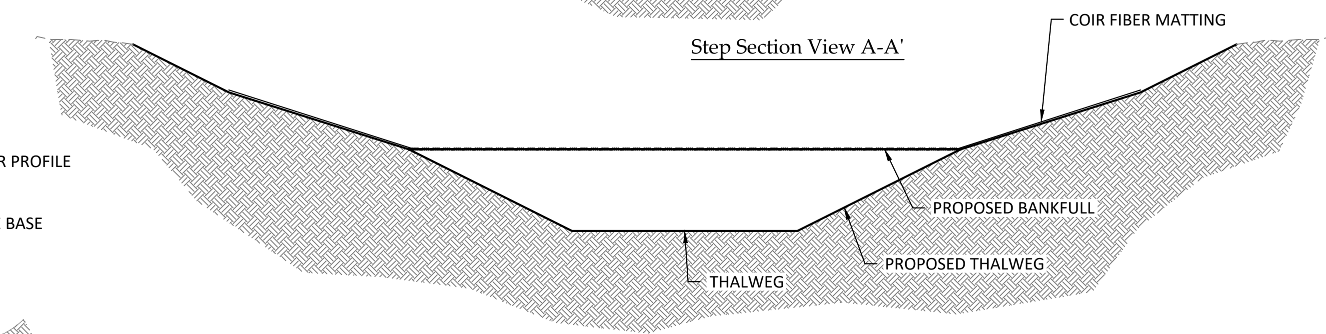
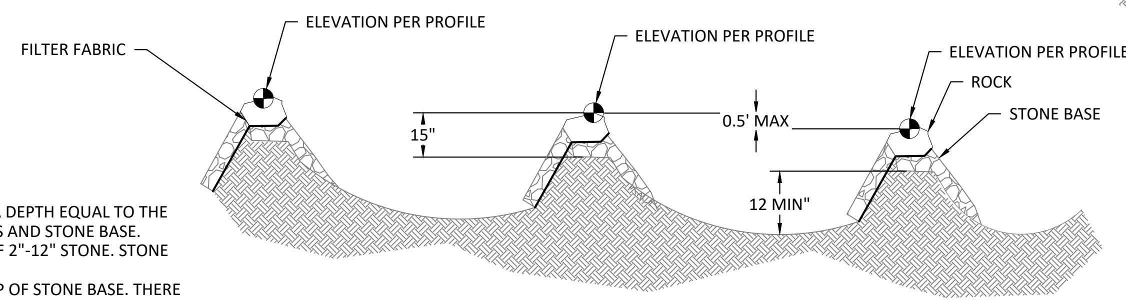


Plan Veiw



Step Section View A-A'



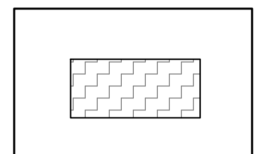


Profile View

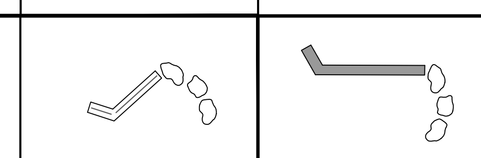
Pool Section View B-B'

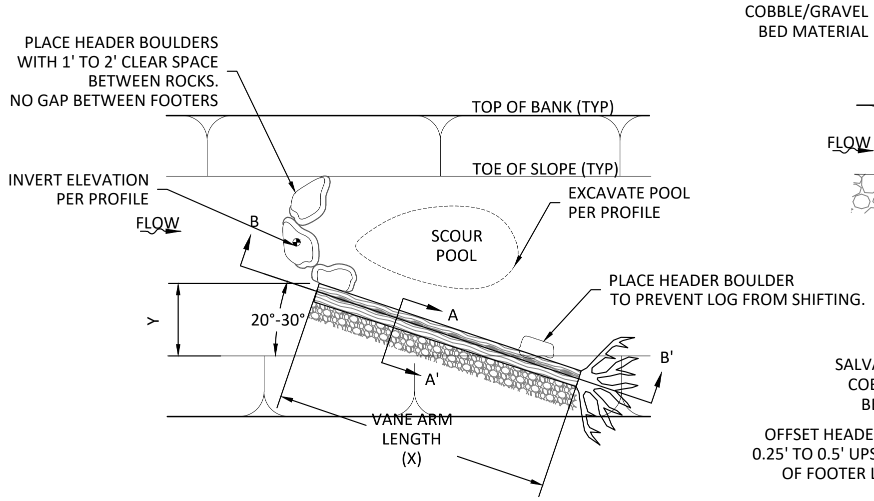
NOTES:

- OVER-EXCAVATE CHANNEL BED TO A DEPTH EQUAL TO THE TOTAL THICKNESS OF THE BOULDERS AND STONE BASE.
- STONE BASE SHALL BE A MIXTURE OF 2"-12" STONE. STONE BASE DEPTH SHALL BE 15".
- PLACE BOULDERS IN TRENCH ON TOP OF STONE BASE. THERE SHALL BE NO GAPS BETWEEN BOULDERS.
- MINIMUM SIZE FOR BOULDERS SHALL BE 2' x 2' x 1'.
- PLACE BACKFILL MATERIAL BEHIND THE ROCKS AND FILTER FABRIC.
- FILTER FABRIC TO EXTEND 5'.
- PLACE COARSE BACKFILL BEHIND ROCKS AND FILTER FABRIC ENSURING THAT ANY VOIDS BETWEEN THE ROCKS ARE FILLED.

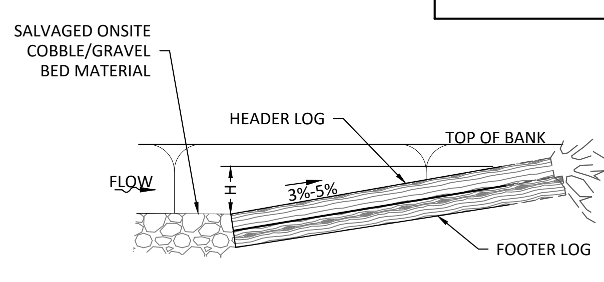


1 / 6.2 Rock Cascade with Pools
Not to Scale

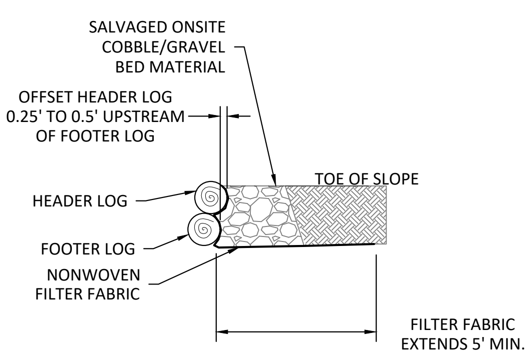




Plan View



Section B-B'

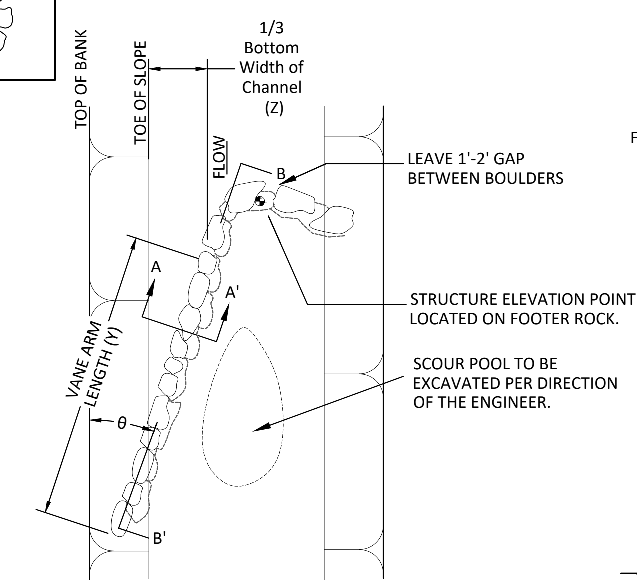


2 / 6.2 Log J-Hook
Not to Scale

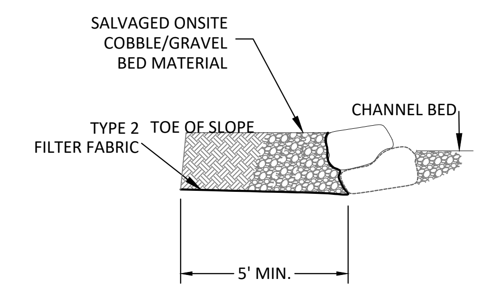
Section A-A'

NOTES:

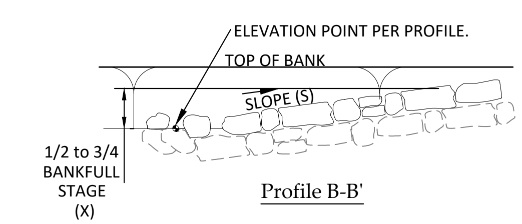
- SEE STRUCTURE SIZING IN DETAIL 3, SHEET 6.4 FOR BED MATERIAL, BOULDER, AND LOG SIZING.



Plan View



Section A-A'



Profile B-B'

3 / 6.2 Boulder J-Hook
Not to Scale

NOTES:

- SEE STRUCTURE SIZING IN DETAIL 3, SHEET 6.4 FOR BED MATERIAL, BOULDER, AND LOG SIZING.

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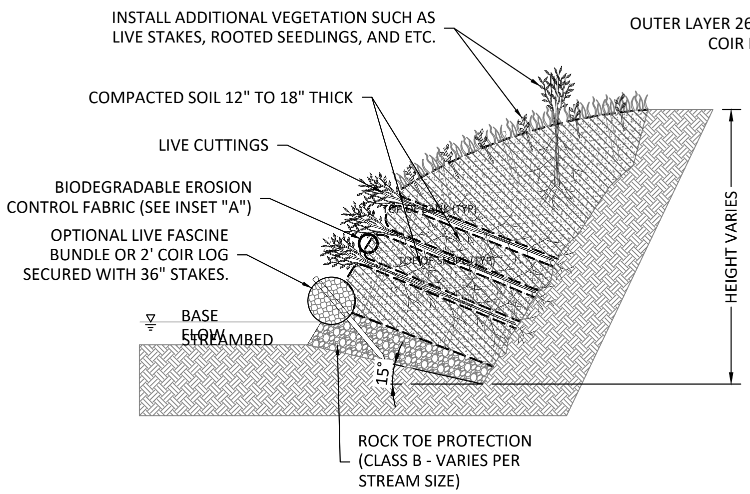
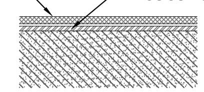
Checked By:	CDB

Sheet

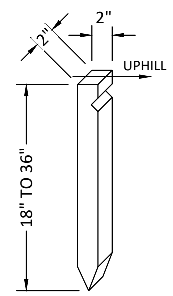
6.2



Section View



Inset "A"
Matting and Blanket

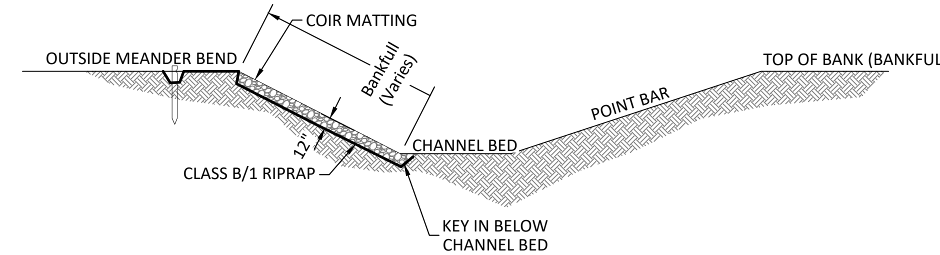


Typical Stakes

NOTES:

- ROOTED/LEAFED CONDITION OF THE LIVING PLANT MATERIAL IS NOT REPRESENTATIVE OF THE TIME OF INSTALLATION.
- BOTTOM OF FIRST COMPACTED EARTH LIFT TO BE PLACED 6" ABOVE NORMAL BASEFLOW.
- NUMBER OF COMPACTED EARTH LIFTS TO VARY DEPENDING ON DESIGN TOP OF BANK HEIGHT.

1/6.3 Vegetated Soil Lift
Not to Scale

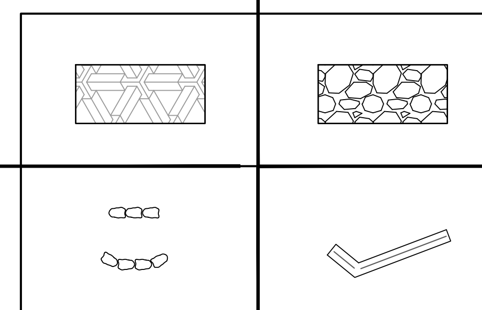


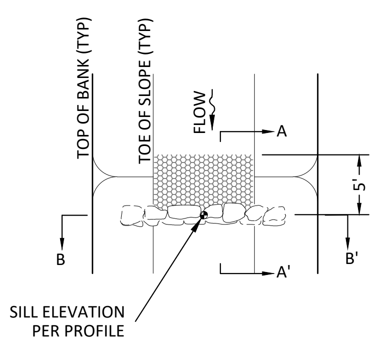
Section View

NOTES:

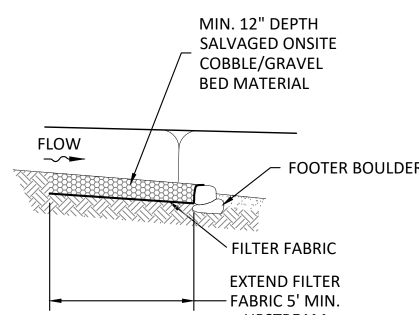
1. VOID SPACES SHOULD BE HAND CHINKED.

2/6.3 Rock Protection
Not to Scale

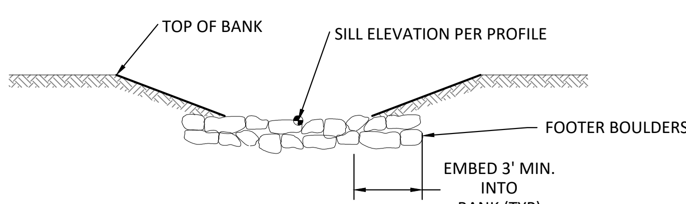




Plan View

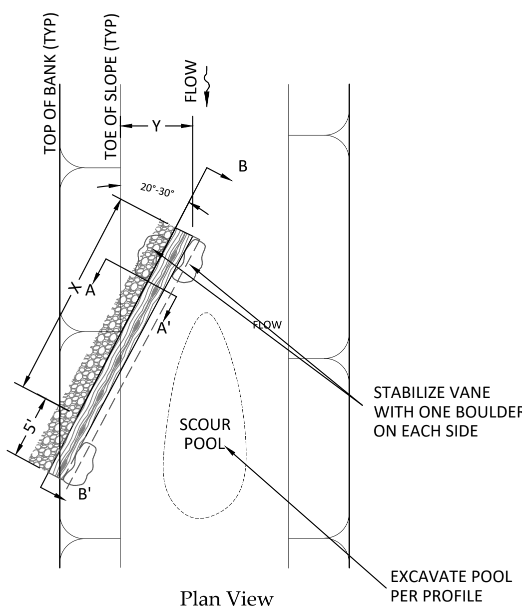


Profile A-A'

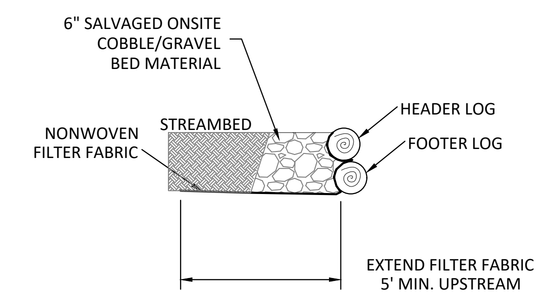


Section B-B'

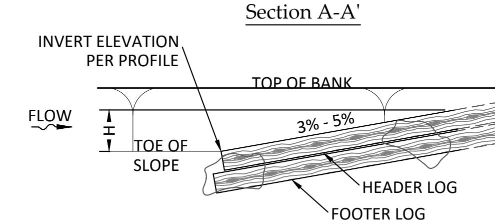
3/6.3 Rock Sill
Not to Scale



Plan View



Section A-A'



Profile B - B'

4/6.3 Log Vane
Not to Scale

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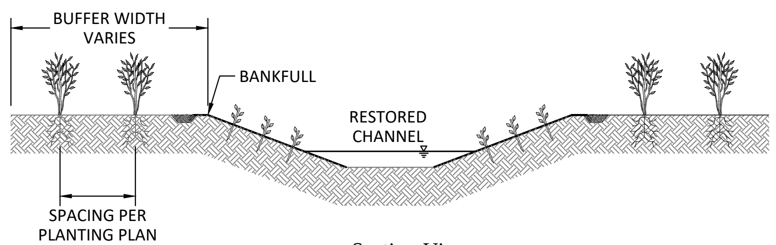
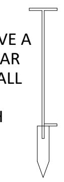


Section View

DIBBLE BAR

PLANTING BAR SHALL HAVE A BLADE WITH A TRIANGULAR CROSS-SECTION, AND SHALL BE 12 INCHES LONG, 4 INCHES WIDE AND 1 INCH THICK AT CENTER.

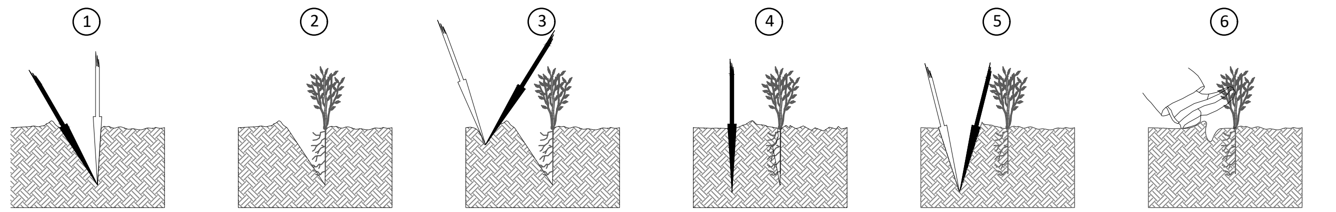


ROOTING PRUNING

ALL ROOTS SHALL BE PRUNED TO AN APPORIATE LENGTH TO PREVENT J-ROOTING.

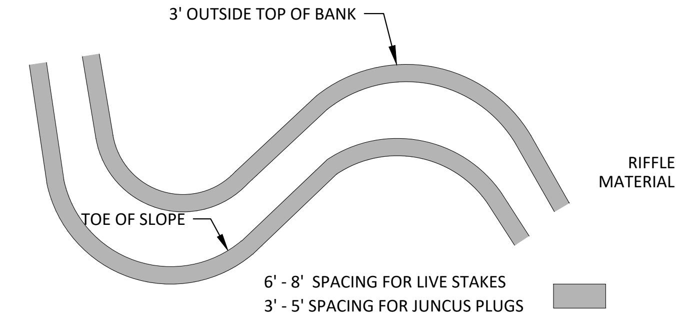
NOTES:

- ALL SOILS WITHIN THE BUFFER PLANTING AREA SHALL BE DISKED, AS REQUIRED, PRIOR TO PLANTING.
- ALL PLANTS SHALL BE PROPERLY HANDLED PRIOR TO INSTALLATION TO INSURE SURVIVAL.

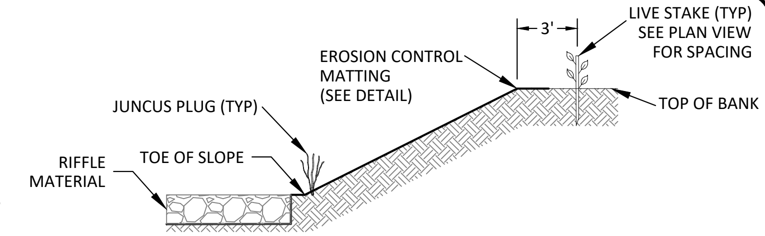


1. INSERT THE DIBBLE, OR SHOVEL, STRAIGHT DOWN INTO THE SOIL TO THE FULL DEPTH OF THE BLADE AND PULL BACK ON THE HANDLE TO OPEN THE PLANTING HOLE. (DO NOT ROCK THE SHOVEL BACK AND FORTH AS THIS CAUSES SOIL IN THE PLANTING HOLE TO BE COMPACTED, INHIBITING ROOT GROWTH.
2. REMOVE THE DIBBLE, OR SHOVEL, 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.

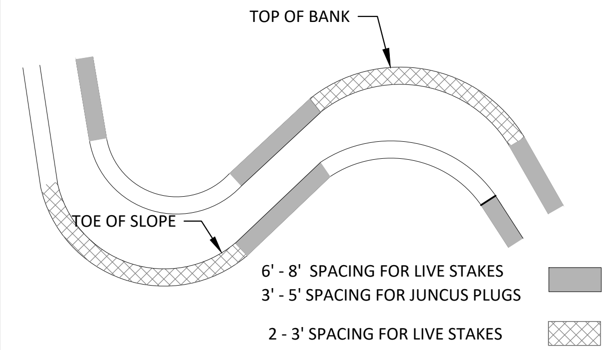
1/6.4 Bare Root Planting
Not to Scale



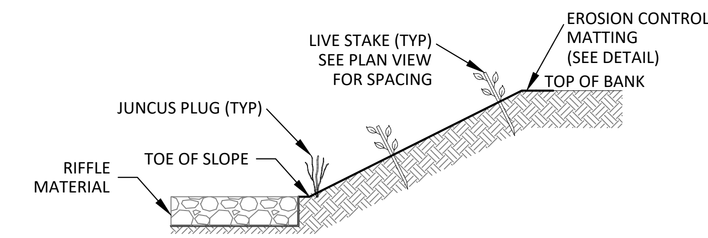
Plan View - UT1, UT2, Barn Branch, Old Bus Tributary, and Rifle Tributary



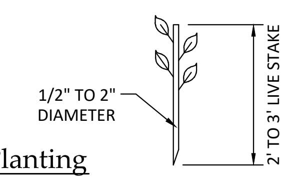
Section View - UT1, UT2, Barn Branch, Old Bus Tributary, and Rifle Tributary



Plan View - North Little Hunting Creek



Section View - North Little Hunting Creek



Live Stake Detail

NOTE:

- LIVE STAKES TO BE PLANTED IN AREAS AS SHOWN ON DETAIL AND DIRECTED BY THE ENGINEER.

2/6.4 Streambank Planting
Not to Scale

TO BE INCLUDED WITH FINAL PLANS

3/6.4 Structure Sizing
Not to Scale

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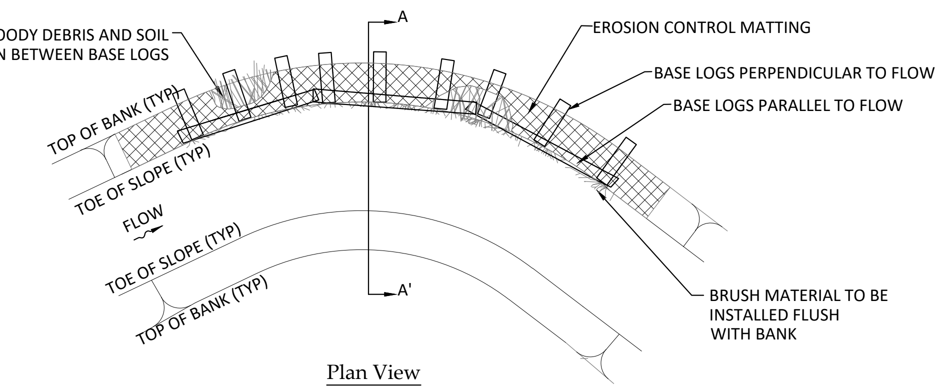
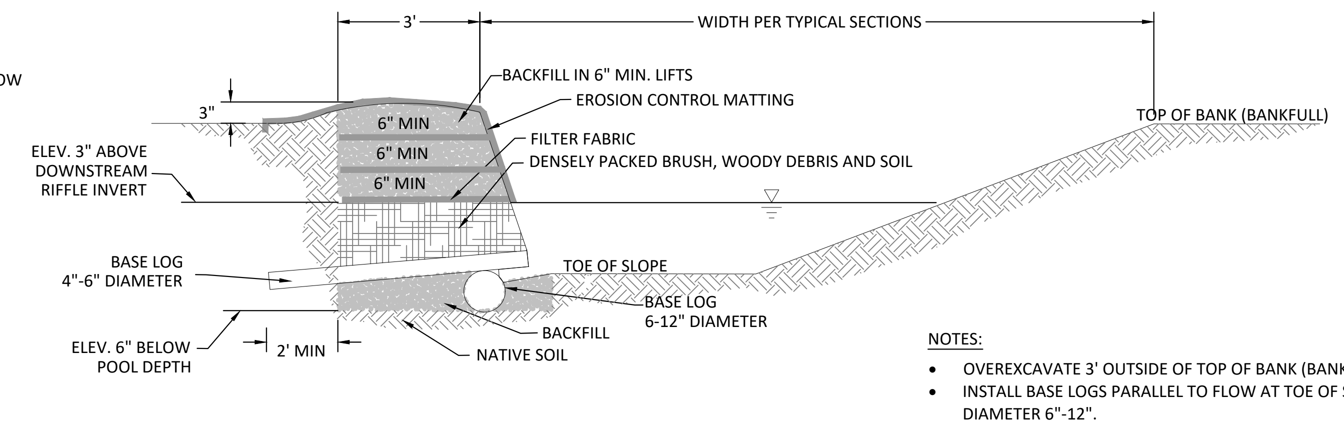


Plan View



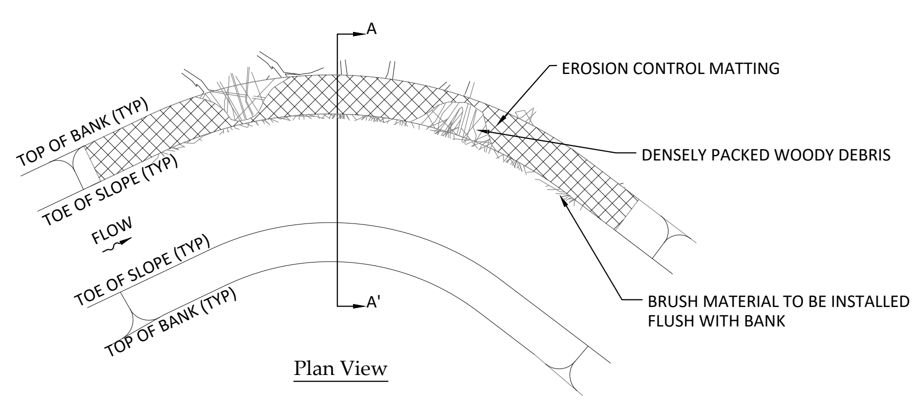
Section A-A'

NOTES:

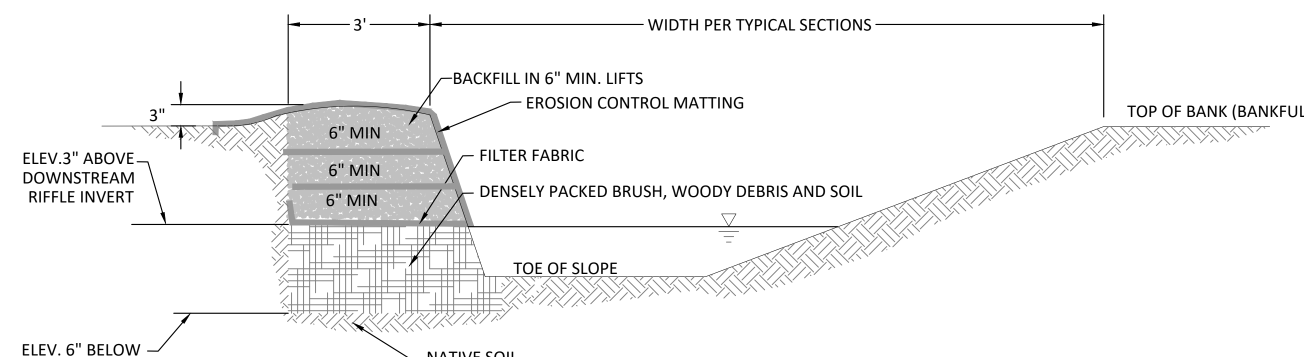
- OVEREXCAVATE 3' OUTSIDE OF TOP OF BANK (BANKFULL).
- INSTALL BASE LOGS PARALLEL TO FLOW AT TOE OF SLOPE. DIAMETER 6"-12".
- INSTALL BASE LOGS PERPENDICULAR TO FLOW AT INTERVALS ALONG BANK, RESTING ON TOP OF PARALLEL BASE LOGS. BASE LOGS SHALL BE 6"-12" DIAMETER.
- INSTALL A DENSE LAYER OF BRUSH/WOODY 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.
- BRUSH SHOULD BE ALIGNED SO STEMS ARE ROUGHLY PARALLEL AND IS INSTALLED POINTING SLIGHTLY UPSTREAM.
- INSTALL FILTER FABRIC OVER BRUSH/WOODY DEBRIS.
- INSTALL EARTH BACKFILL OVER BRUSH/WOODY LAYER ACCORDING TO TYPICAL SECTION DIMENSIONS.
- SEED, MULCH AND INSTALL EROSION CONTROL MATTING AND BANK STABILIZATION PER PLANS.

Plan View

1 / 6.5 **Brush Toe -** North Little Hunting Creek
Not to Scale



Plan View



Section A-A'

NOTES:

- OVEREXCAVATE 3' OUTSIDE OF TOP OF BANK (BANKFULL).
- 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.
- BRUSH SHOULD BE ALIGNED SO STEMS ARE ROUGHLY PARALLEL AND IS INSTALLED POINTING SLIGHTLY UPSTREAM.
- INSTALL FILTER FABRIC OVER BRUSH/WOODY DEBRIS.
- INSTALL EARTH BACKFILL OVER BRUSH/WOODY LAYER ACCORDING TO TYPICAL SECTION DIMENSIONS.
- SEED, MULCH AND INSTALL EROSION CONTROL MATTING AND BANK STABILIZATION PER PLANS.

2 / 6.5 **Brush Toe -** UT1, UT2, Barn Branch, Old Bus Tributary, and Rifle Tributary
Not to Scale

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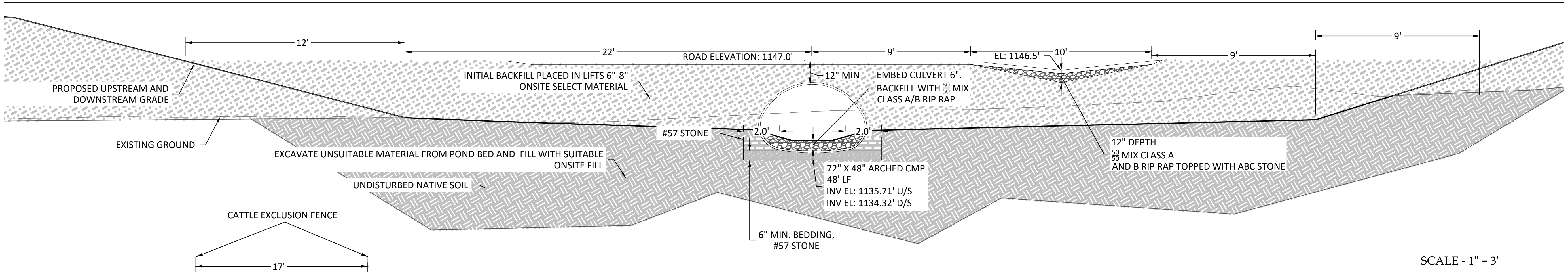
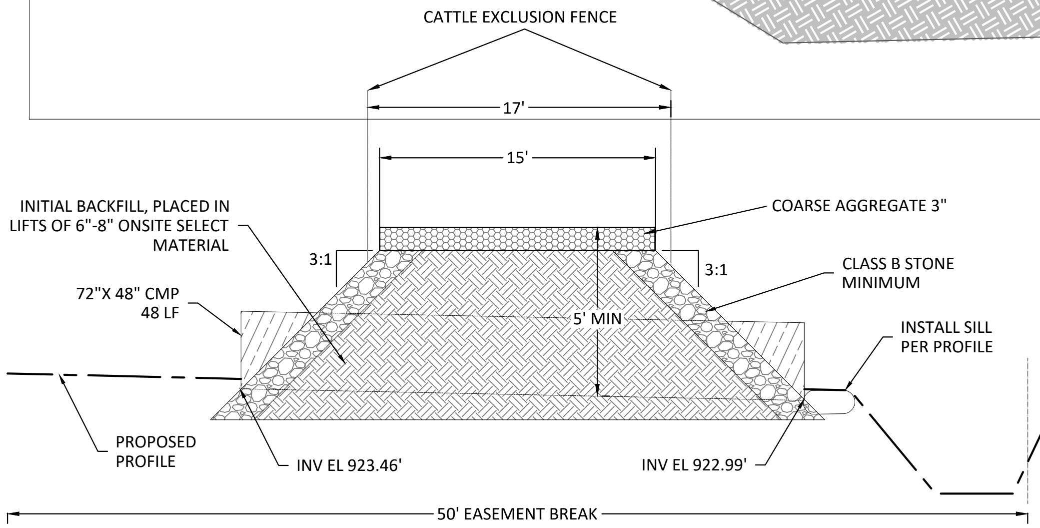
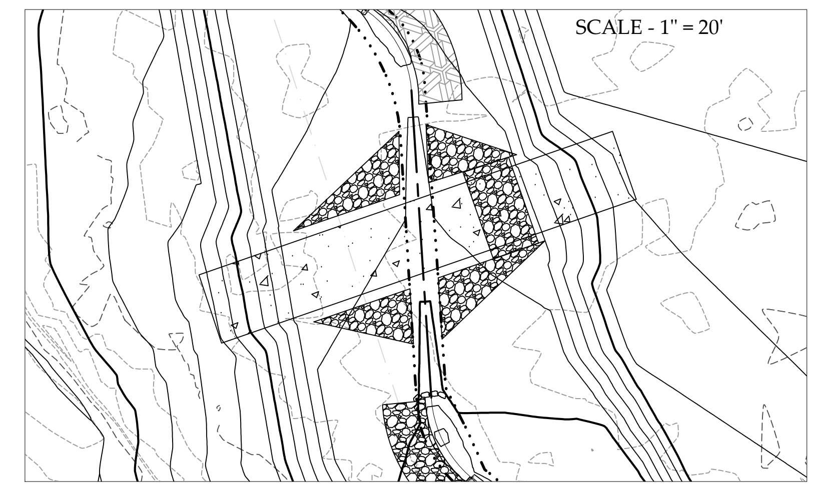


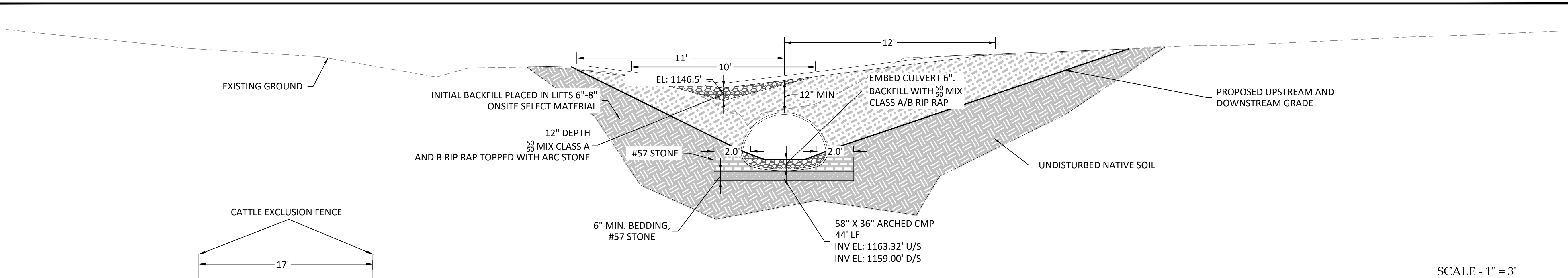
Cross Section View at Center of Road



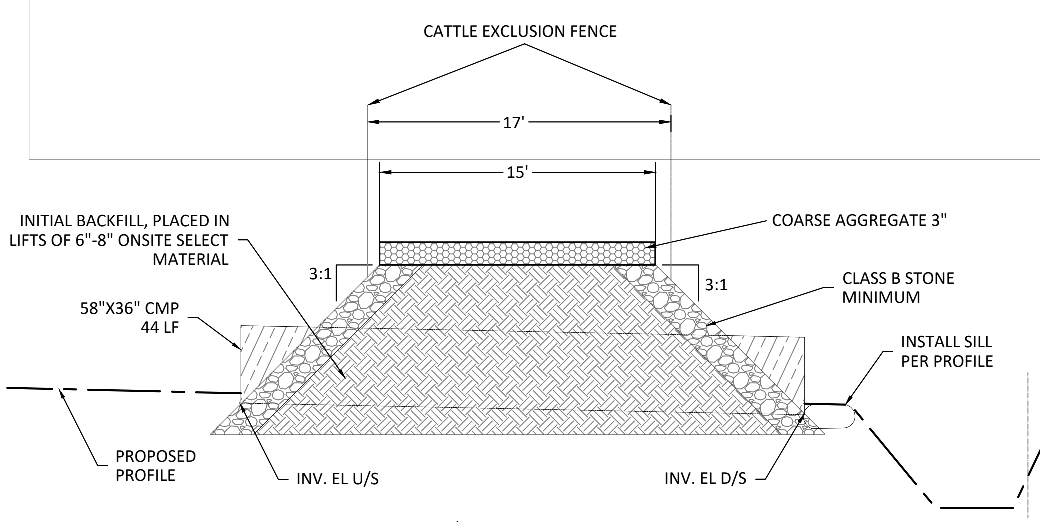
Profile View of Culvert Crossing



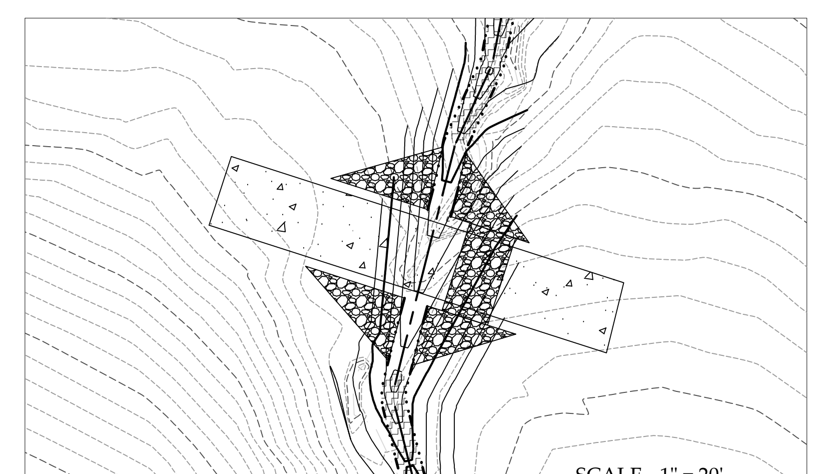
1
6.6
Permanent Culvert Crossing-UT1
Not to Scale



Cross Section View at Existing Crossing



Profile View of Culvert Crossing



2
6.6
Permanent Culvert Crossing-UT2
Not to Scale

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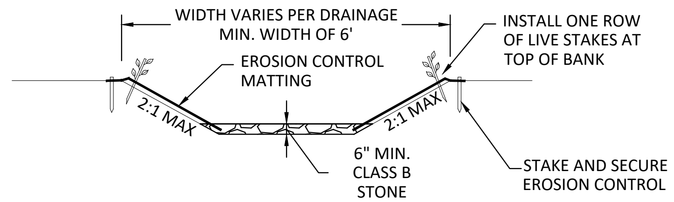
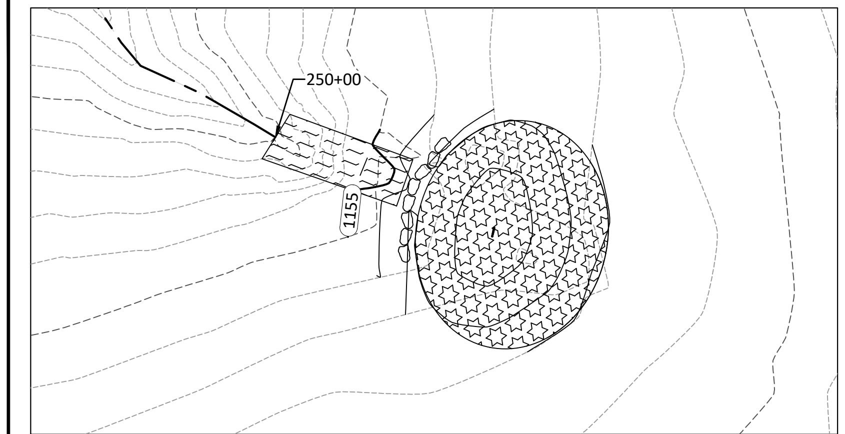


Section View

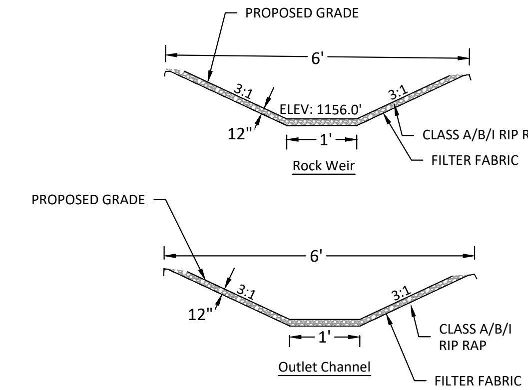
NOTES:

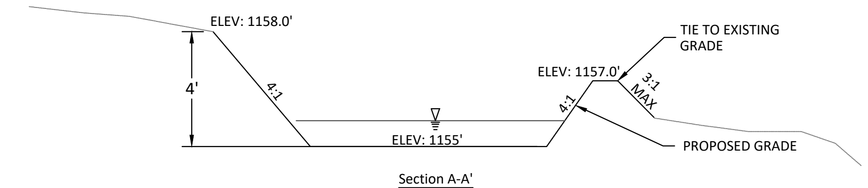
- POSITVE DRAINAGE TO BE MAINTAINED FOR FLOODPLAIN DRAINAGES.
- OUTLET CHANNEL TO BE SEEDED AND MATTED WITH EROSION CONTROL MATTING.
- GRADE CONTROL STRUCTURES INSTALLED PER PLAN.
- PROPOSED GRADING IN DRAINAGES PER PLAN.

1/6.7 Outlet Stabilization
Not to Scale



Profile View



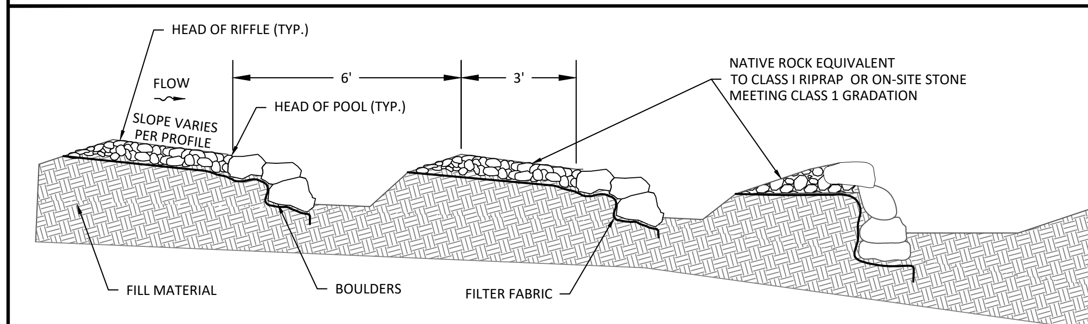


Section A-A'

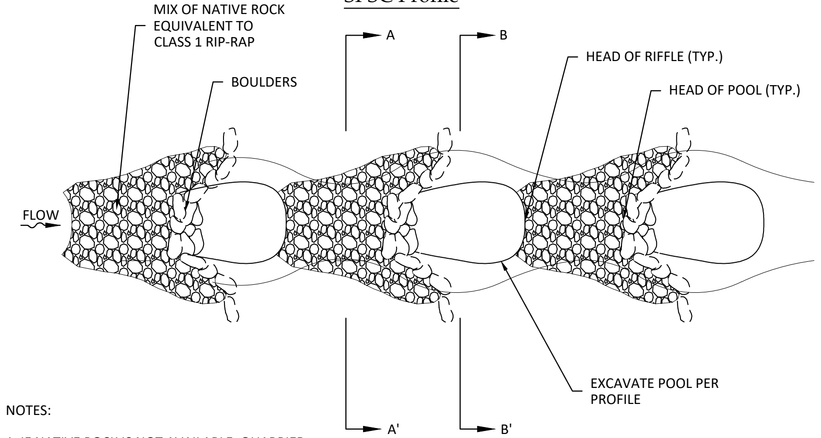
NOTES:

- 1. IF NATIVE ROCK IS NOT AVAILABLE, QUARRIED ROCK MAY BE SUBSTITUTED IN THE SAME SIZES.
- 2. ALL SMALLER ROCK SHALL BE HETEROGENEOUS AND WELL MIXED.
- 3. BOULDERS SHOULD HAVE A MINIMUM DIMENSION OF 2' x 2' x 1'.

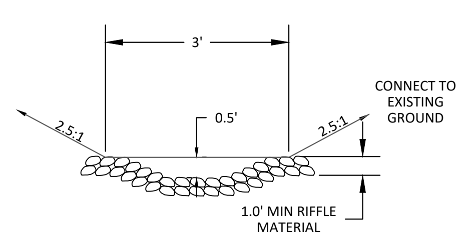
2/6.7 Proposed BMP with Rock Weir Outlet - Rifle Tributary
Not to Scale



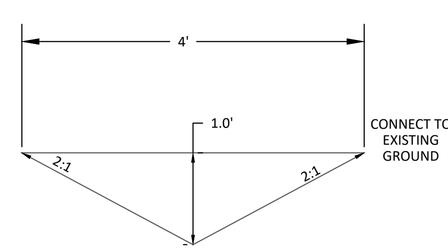
SPSC Profile



SPSC Plan View



Section A-A'



Section B-B'

NOTES:

1. IF NATIVE ROCK IS NOT AVAILABLE, QUARRIED ROCK MAY BE SUBSTITUTED IN THE SAME SIZES.

2. ALL SMALLER ROCK SHALL BE HETEROGENEOUS AND WELL MIXED.

3. BOULDERS SHOULD HAVE A MINIMUM DIMENSION OF 2' x 2' x 1'.

3/6.7 Step-Pool Stormwater Conveyance (SPSC)
Not to Scale

Vane Arm Dimensions

	North Little Hunting Creek	UT1 Reaches 1-2	UT1 Reach 3	UT2 Reach 2	UT2 Reach 3	UT2 Reach 4	Old Bus Branch	Old Barn Branch
W (FT)	7.7	1.9	2.2	1.7	2.2	2.8	1.2	1.4
H (FT)	1.0	0.3	0.4	0.3	0.3	0.4	0.3	0.3
X (FT)	31.7	7.6	9.8	6.9	8.0	11.4	4.5	5.9
Θ (Degree)	25°	25°	25°	25°	25°	25°	25°	25°
S (%)	3.2%	3.9%	4.1%	3.6%	3.1%	3.5%	5.5%	4.2%

4/6.7 Outlet Stabilization
Not to Scale

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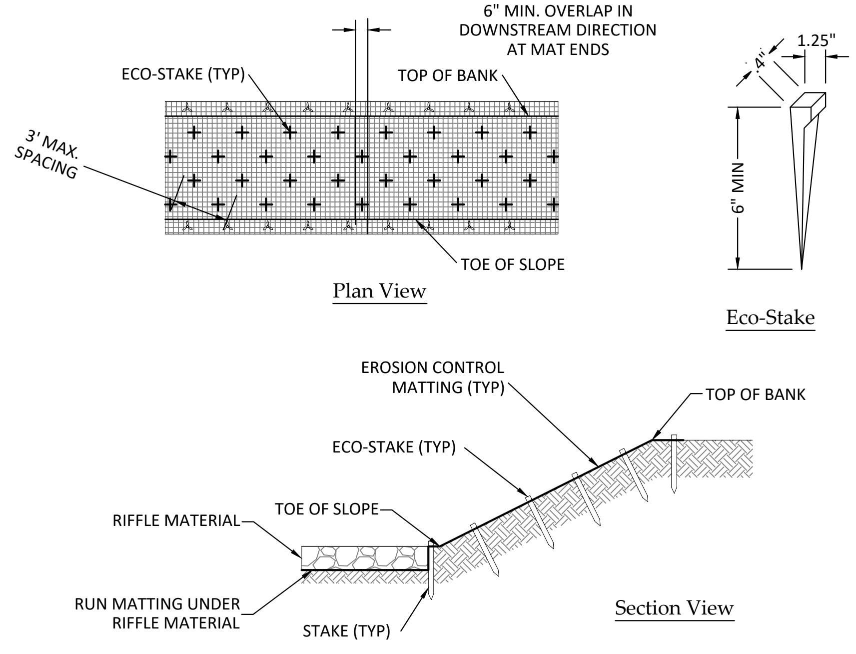
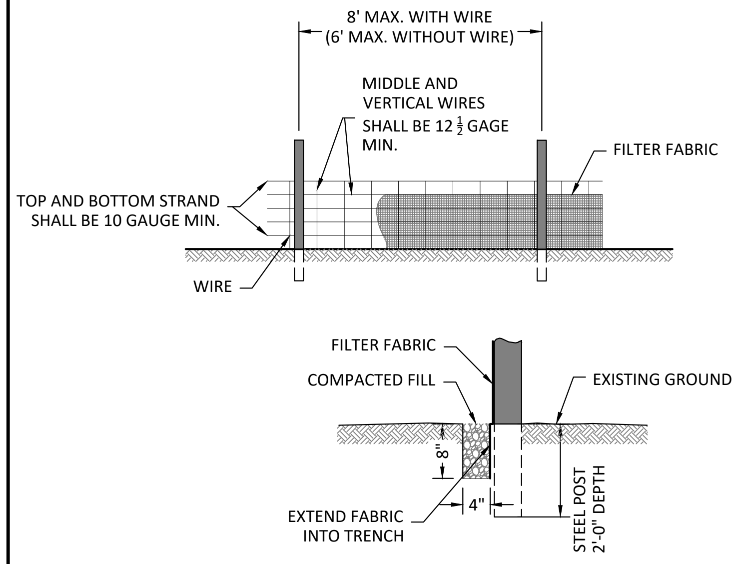
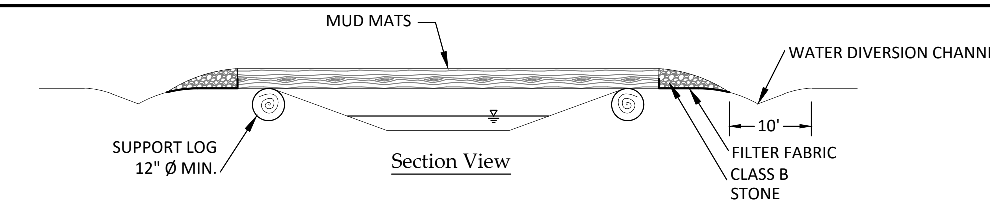


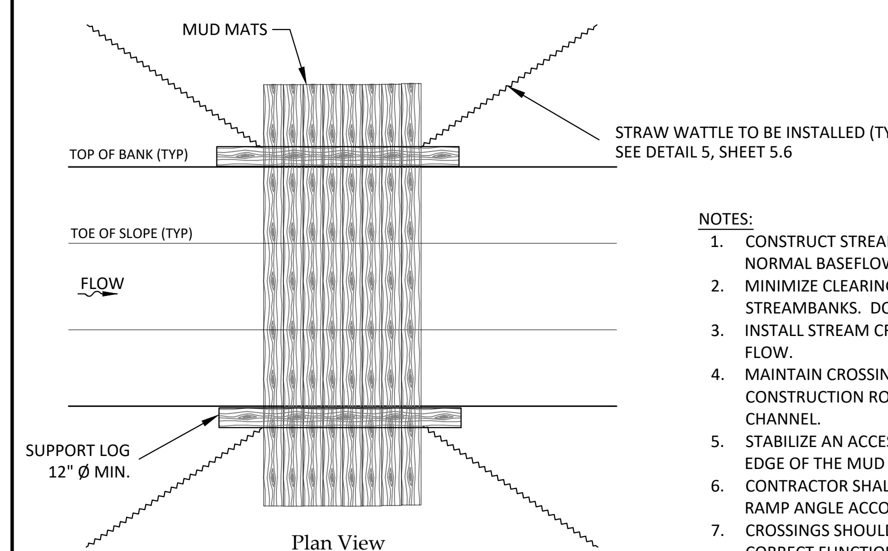
1 / 6.8 **Erosion Control Matting**
Not to Scale



NOTES:
1. USE WIRE A MINIMUM OF 32" IN WIDTH AND WITH A MINIMUM OF 6 LINES OF WIRES WITH 12" STAY SPACING.
2. USE FILTER FABRIC A MINIMUM OF 36" IN WIDTH AND FASTEN ADEQUATELY TO THE WIRES AS DIRECTED BY THE ENGINEER.
3. PROVIDE 5' STEEL POST OF THE SELF-FASTENER ANGLE STEEL TYPE. ANGLE STEEL TYPE.
4. MAINTAIN THE SILT FENCE UNTIL THE PROJECT IS ACCEPTED OR UNTIL THE FENCE IS REMOVED.
5. REMOVE AND REPLACE DETERIORATED OR INEFFECTIVE FILTER FABRIC.
6. REMOVE AND DISPOSE OF SILT ACCUMULATIONS IS DIRECTED BY THE ENGINEER.

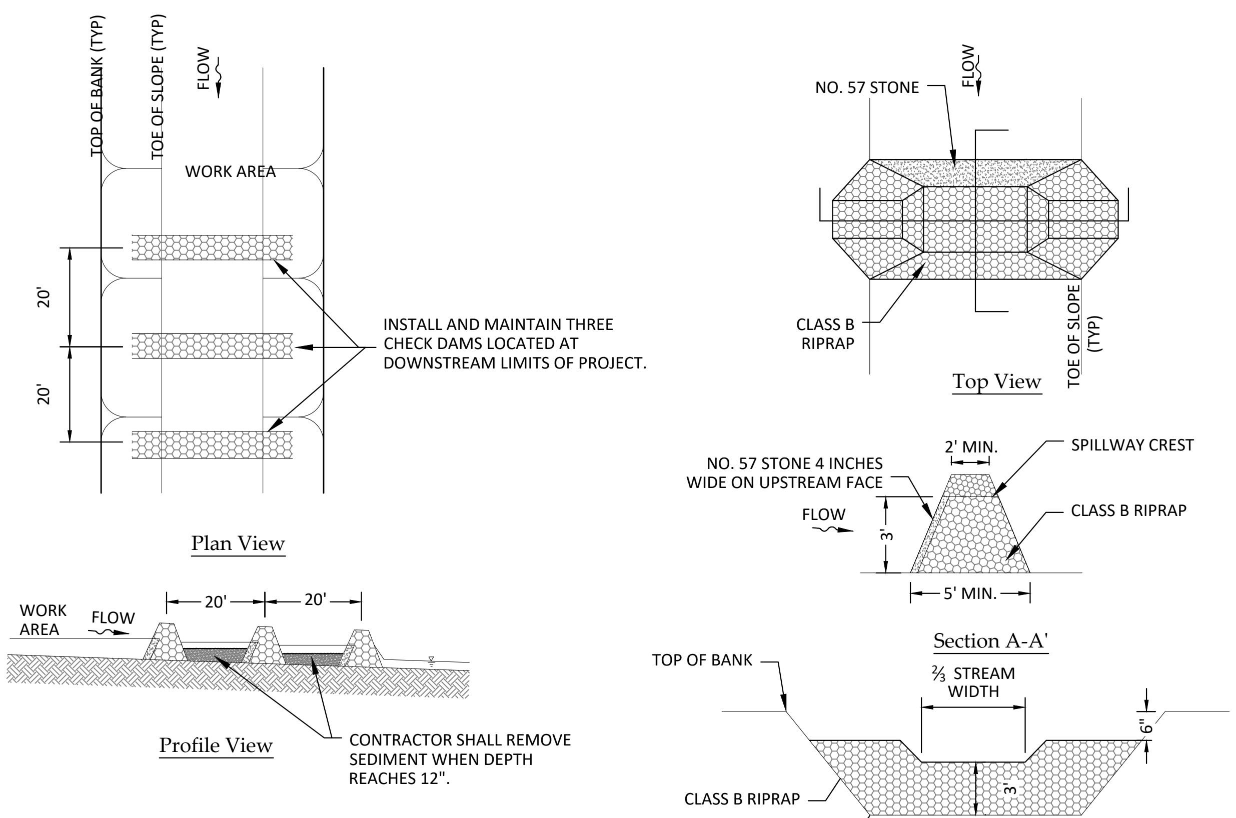
2 / 6.8 **Silt Fence**
Not to Scale





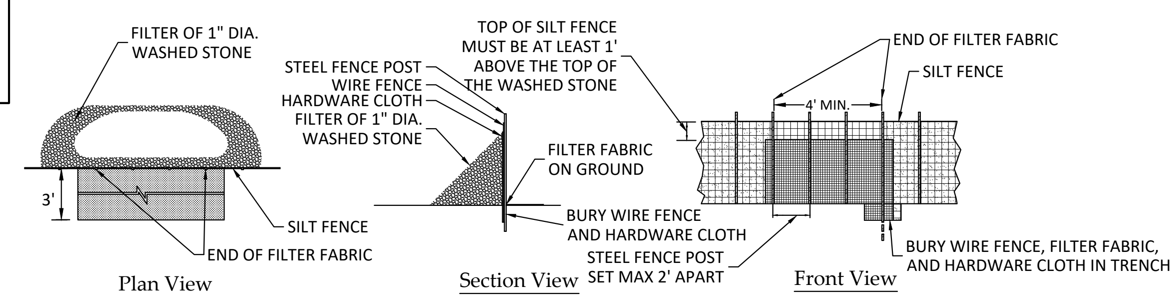
NOTES:
1. CONSTRUCT STREAM CROSSING WHEN FLOW IS AT NORMAL BASEFLOW.
2. MINIMIZE CLEARING AND EXCAVATION OF STREAMBANKS. DO NOT EXCAVATE CHANNEL BOTTOM.
3. INSTALL STREAM CROSSING PERPENDICULAR TO THE FLOW.
4. MAINTAIN CROSSING SO THAT RUNOFF IN THE CONSTRUCTION ROAD DOES NOT ENTER EXISTING CHANNEL.
5. STABILIZE AN ACCESS RAMP OF CLASS B STONE TO THE EDGE OF THE MUD MAT.
6. CONTRACTOR SHALL DETERMINE AN APPROPRIATE RAMP ANGLE ACCORDING TO EQUIPMENT UTILIZED.
7. CROSSINGS SHOULD BE MONITORED TO ASSURE CORRECT FUNCTIONING OF MATS, LOOKING FOR ANY DEFECTS OR STRUCTURAL PROBLEMS.
8. CROSSINGS COVERED IN SOIL OR DEBRIS SHOULD BE CLEANED AND THE MATERIALS REMOVED AND DISPOSED OF IN A STABLE LOCATION.

3 / 6.8 **Temporary Stream Crossing - Timber**
Not to Scale



NOTES:
1. INSPECTION SHOULD OCCUR AFTER EACH RAIN EVENT.
2. SEDIMENT SHALL BE REMOVED WHEN SILT ACCUMULATES TO ONE-HALF THE HEIGHT OF THE WEIR.
3. STONE SHALL BE REPLACED/REBUILT WHEN DEVICE IS DAMAGED OR WATER NO LONGER DRAINS.

4 / 6.8 **Temporary Rock Sediment Dam**
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.

5 / 6.8 **Temporary Silt Fence Gravel Outlet**
Not to Scale

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Charlotte, NC 28203
Tel: 704.332.7754
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Huntsman Stream Mitigation Site
Wilkes County, North Carolina

Details

Revisions:

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Project Engineer:	ASE
Drawn By:	HCC
Checked By:	CDB

Sheet 6.8

June 3, 2021

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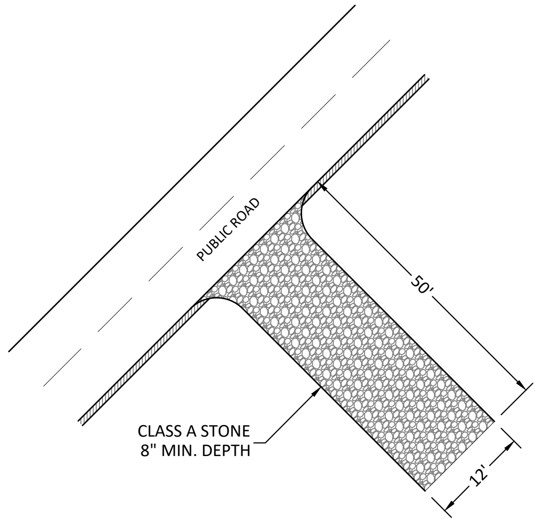
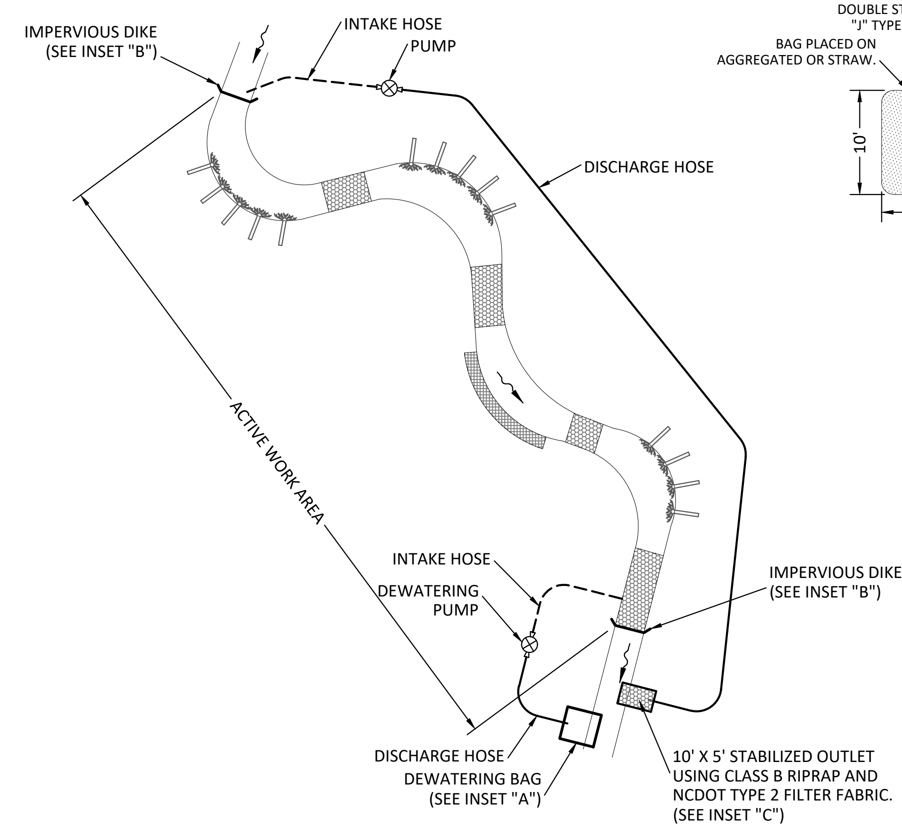


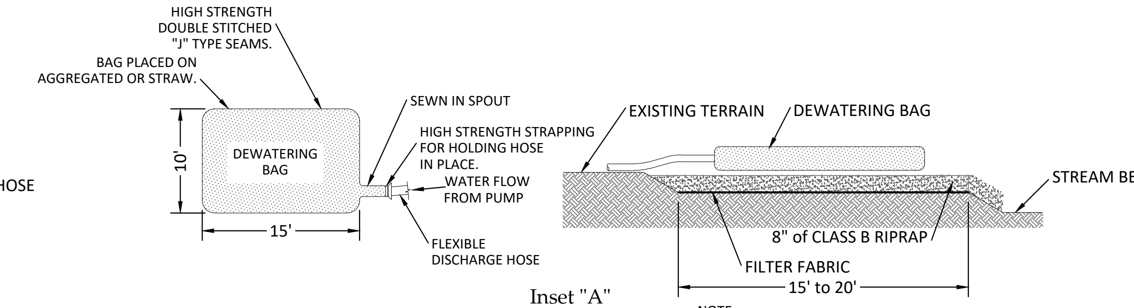
NOTES:

- PROVIDE TURNING RADIUS SUFFICIENT TO ACCOMMODATE LARGE TRUCKS.
- LOCATE CONSTRUCTION ENTRANCE AT ALL POINTS OF INGRESS AND EGRESS UNTIL SITE IS STABILIZED. PROVIDE FREQUENT CHECKS OF THE DEVICE AND TIMELY MAINTENANCE.
- 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.
- ANY MATERIAL TRACKED ONTO THE ROADWAY MUST BE CLEANED IMMEDIATELY.
- USE CLASS A STONE OR OTHER COARSE AGGREGATE APPROVED BY THE ENGINEER.
- PLACE FILTER FABRIC BENEATH STONE.

1 / 6.9 Construction Entrance
Not to Scale



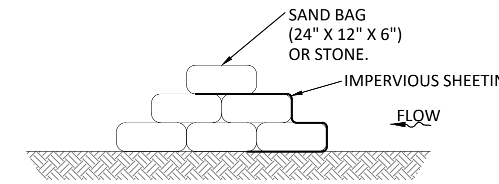
Plan View



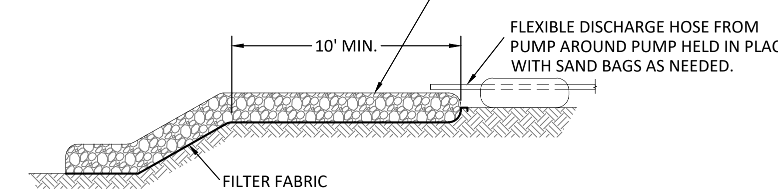
Inset "A"
Dewatering Bag

NOTE:

1. PROVIDE STABILIZED OUTLET TO STREAMBED.



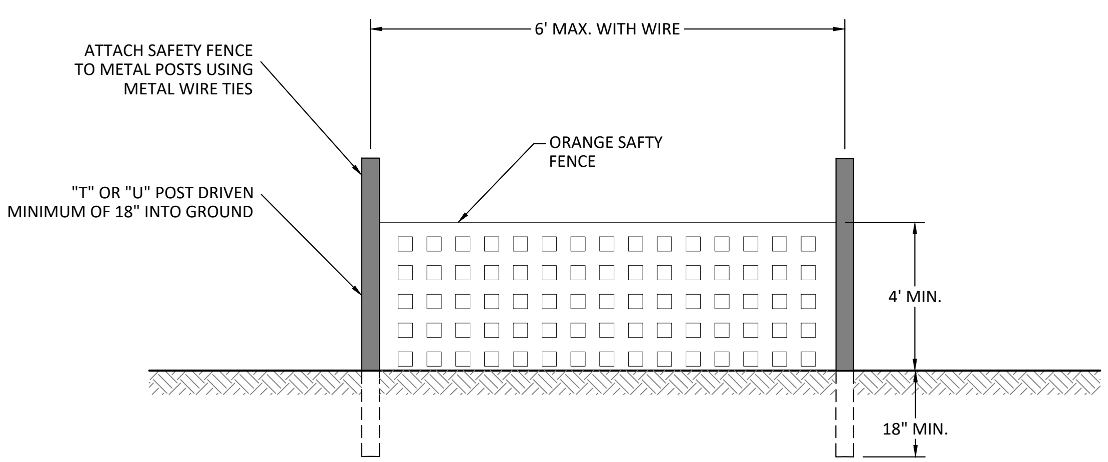
Inset "B"
Impervious Dike



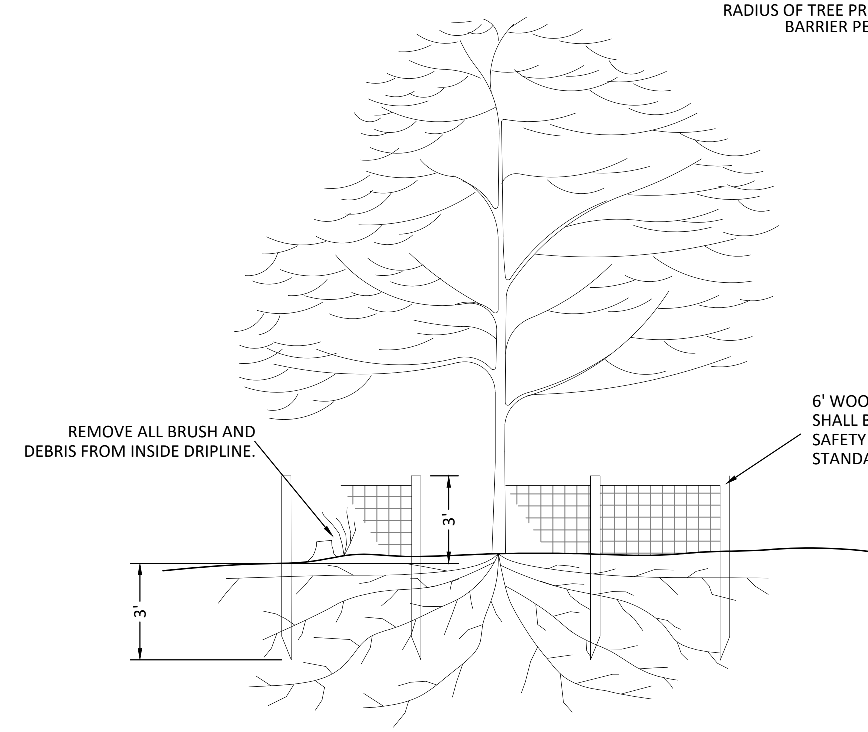
Inset "C"
Stabilized Outlet

2 / 6.9 Pump Around System
Not to Scale

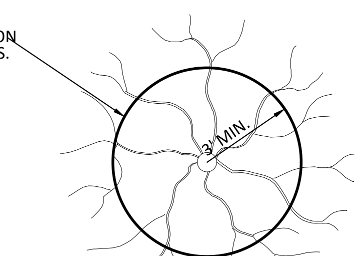
MATERIAL SPECIFICATIONS		
PHYSICAL PROPERTY	TESTS	REQUIREMENTS
MATERIAL	N/A	POLYETHYLENE
RECOMENDED COLOR	N/A	"INTERNATIONAL ORANGE"
TENSILE YIELD	ASTM D638	AVE. 2000 LBS. PER 4' WIDE
ULTIMATE TENSILE STRENGTH	ASTM D638	AVE. 2900 LBS. PER 4' WIDE
ELONGATION AT BREAK (%)	ASTM D638	GREATER THAN 1000%
CHEMICAL RESISTANCE	N/A	INERT TO MOST CHEMICALS AND ACIDS



3 / 6.9 Safety Fence
Not to Scale



Section View



Plan View

NOTES:

- ALL TREE PROTECTION BARRIERS SHALL BE REMOVED PRIOR TO CONTRACTOR DEMOBILIZATION.
- SEE PLANS FOR LOCATION OF ALL TREE PROTECTION BARRIERS.

4 / 6.9 Tree Protection
Not to Scale

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Drawn By: HCC
Checked By: CDB

6.9
Sheet

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

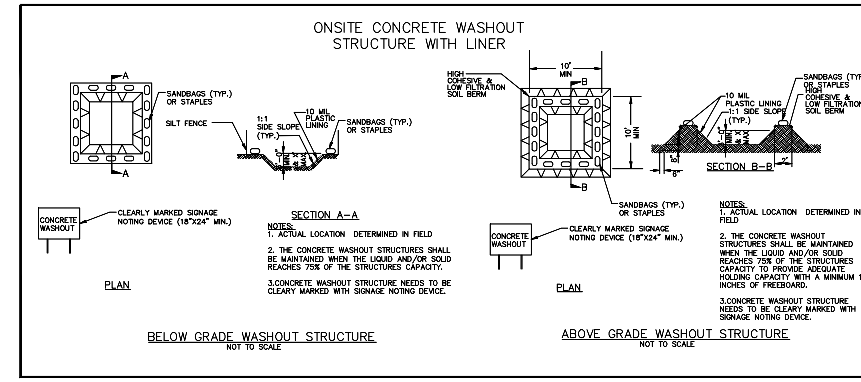
1. Do not dump paint and other liquid waste into storm drains, streams or wetlands.
2. Locate paint washouts at least 50 feet away from storm drain inlets and surface waters unless no other alternatives are reasonably available.
3. Contain liquid wastes in a controlled area.
4. Containment must be labeled, 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

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1430 South Mint Street, Suite 104
Charlotte, NC 28203
Tel: 704.332.7754
License No. F-0831

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Sheet 6.10

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 unattended 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 event ≥ 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 event ≥ 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 event ≥ 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 event ≥ 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.
(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 kept on site and available for inspection at all times during normal business hours.

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 to be Kept on Site

In addition to the E&SC plan documents above, the following items shall be kept on the site and available for inspectors at all times during normal business hours, unless the Division provides a site-specific exemption based on unique site conditions that make this requirement not practical:

(a) This General Permit as well as the Certificate of Coverage, after it is received.

(b) Records of inspections made during the previous twelve months. The permittee shall record the required observations on the Inspection Record Form provided by the Division or a similar inspection form that includes all the required elements. 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.

3. Documentation to be Retained for Three Years

All data used to complete the e-NOI and all inspection records shall be maintained for a period of three years after project completion and made available upon request. [40 CFR 122.41]

PART III
SELF-INSPECTION, RECORDKEEPING AND REPORTING

SECTION C: REPORTING

1. Occurrences that Must be Reported

Permittees shall report the following occurrences:

(a) Visible sediment deposition in a stream or wetland.

(b) Oil spills if:

- They are 25 gallons or more,
- They are less than 25 gallons but cannot be cleaned up within 24 hours,
- They cause sheen on surface waters (regardless of volume), or
- They are within 100 feet of surface waters (regardless of volume).

(c) Releases of hazardous substances in excess of reportable quantities under Section 311 of the Clean Water Act (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.

(d) Anticipated bypasses and unanticipated bypasses.

(e) Noncompliance with the conditions of this permit that may endanger health or the environment.

2. Reporting Timeframes and Other Requirements

After a permittee becomes aware of an occurrence that must be reported, he shall contact the appropriate Division regional office within the timeframes and in accordance with the other requirements listed below. Occurrences outside normal business hours may also be reported to the Department's Environmental Emergency Center personnel at (800) 858-0368.

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.

PART II, SECTION G, ITEM (4)
DRAW DOWN OF SEDIMENT BASINS FOR MAINTENANCE OR CLOSE OUT

Sediment basins and traps that receive runoff from drainage areas of one acre or more shall use outlet structures that withdraw water from the surface when these devices need to be drawn down for maintenance or close out unless this is infeasible. The circumstances in which it is not feasible to withdraw water from the surface shall be rare (for example, times with extended cold weather). Non-surface withdrawals from sediment basins shall be allowed only when all of the following criteria have been met:

(a) The E&SC plan authority has been provided with documentation of the non-surface withdrawal and the specific time periods or conditions in which it will occur. The non-surface withdrawal shall not commence until the E&SC plan authority has approved these items,
(b) The non-surface withdrawal has been reported as an anticipated bypass in accordance with Part III, Section C, Item (2)(c) and (d) of this permit,
(c) Dewatering discharges are treated with controls to minimize discharges of pollutants from stormwater that is removed from the sediment basin. Examples of appropriate controls include properly sited, designed and maintained dewatering tanks, weir tanks, and filtration systems,
(d) Vegetated, upland areas of the sites or a properly designed stone pad is used to the extent feasible at the outlet of the dewatering treatment devices described in Item (c) above,
(e) Velocity dissipation devices such as check dams, sediment traps, and riprap are provided at the discharge points of all dewatering devices, and
(f) Sediment removed from the dewatering treatment devices described in Item (c) above is disposed of in a manner that does not cause deposition of sediment into waters of the United States.

NCG01 SELF-INSPECTION, RECORDKEEPING AND REPORTING

EFFECTIVE: 04/01/19

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Charlotte, NC 28203
Tel: 704.332.7754
License No. F-0831

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Huntsman Stream Mitigation Site
Wilkes County, North Carolina

Details

Date: JUNE 4, 2021
Job Number: 005-02183
Project Engineer: ASE
Drawn By: HCC
Checked By: CDB
Revisions:

Sheet 6.11

June 3, 2021
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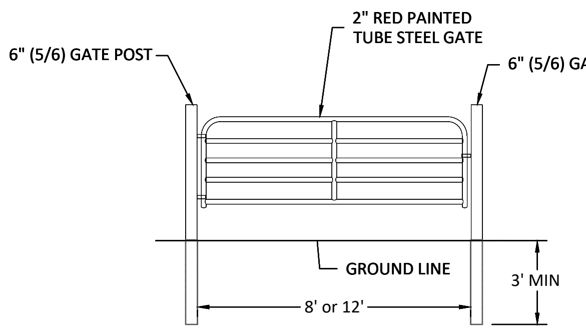
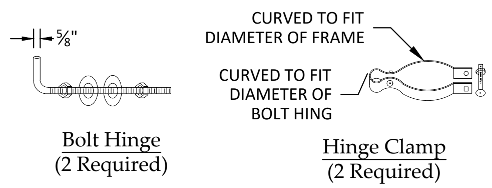


Access Gate



Bolt Hinge (2 Required)

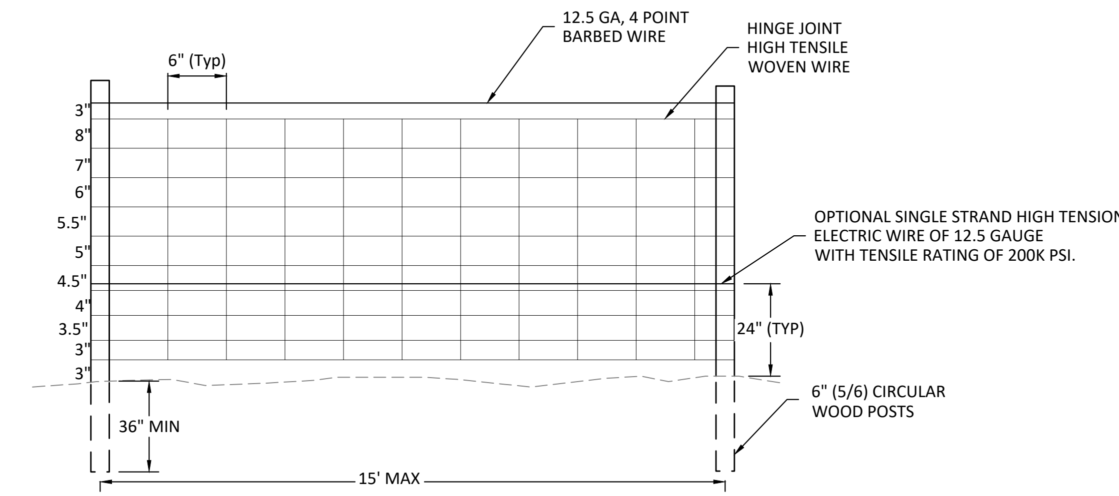
Hinge Clamp (2 Required)

Hinge Assembly

NOTES:

1. DIMENSIONS SHOWN ARE THE DIAMETER OF ROUND POSTS AND BRACES.
2. NOTCH BRACE POSTS 1" MINIMUM FOR HORIZONTAL BRACES. PLACE TWO GALVANIZED 12d OR THREE GALVANIZED 10d NAILS AT EACH END OF ALL BRACES.
3. PLACE THE BRACE WIRE AROUND THE POST. DRAW ALL BRACE WIRE TAUT BY RATCHETING BETWEEN EACH POST.
4. INSTALL THE FENCE FACING THE PROPERTY OWNER EXCEPT THAT ON HORIZONTAL CURVES GREATER THAN THREE DEGREES (3°) INSTALL THE FENCE TO PULL AGAINST ALL POSTS.
5. USE LATCH DEVICE APPROVED BY THE ENGINEER. HINGE ASSEMBLY AS SHOWN IS SUGGESTED. SUBSTITUTION MAY BE SUBJECT TO APPROVAL BY THE ENGINEER. USED 2" PAINTED STEEL PIPE FOR GATE FRAME EXCEPT AS SHOWN HERE.
6. ANY COMBINATION OF GATE AND FENCE TYPE MEETING THE APPROVAL OF THE ENGINEER IS ACCEPTABLE AND IS NOT LIMITED TO THE EXAMPLES SHOWN HEREON.

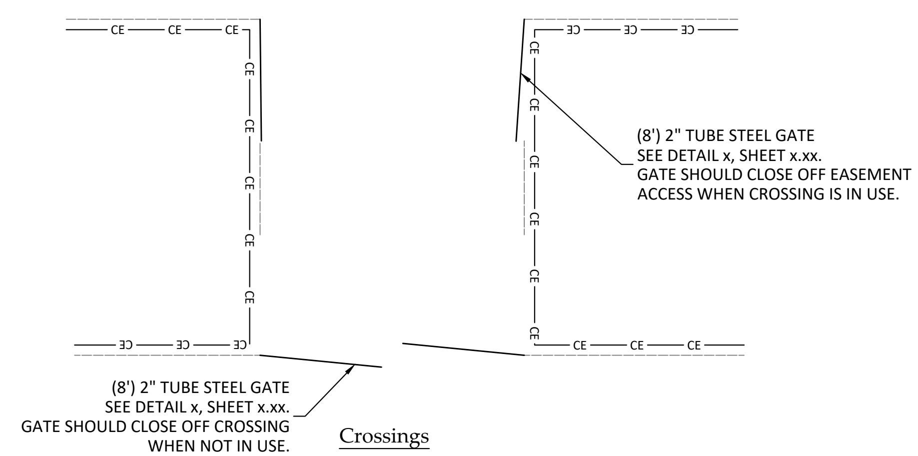
1 / 6.12 Tubesteel Gate
Not to Scale



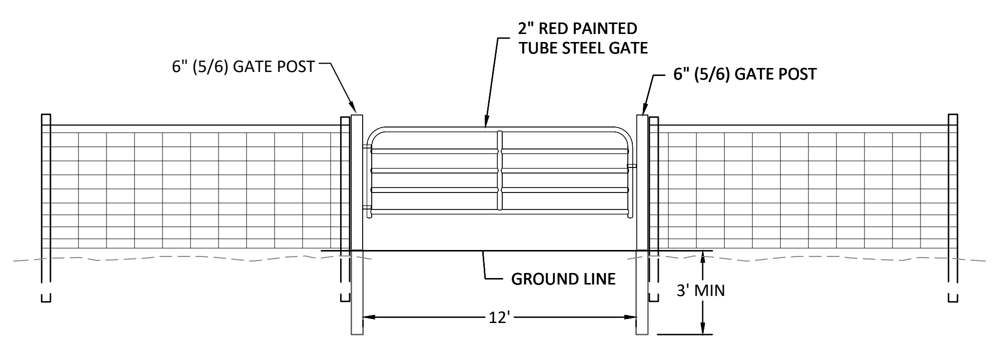
NOTES:

1. THE FENCE SHALL MEET CLASSIFICATION FOR HINGE JOINT HIGH TENSILE WOVEN WIRE.
2. A SINGLE STRAND HIGH TENSION ELECTRIC WIRE OF 12.5 GAUGE WITH A TENSILE RATING OF 200K PSI SHALL BE INSTALLED 24 INCHES ABOVE THE GROUND ON THE LIVESTOCK SIDE OF THE FENCE.
3. MAXIMUM SPACING BETWEEN LINE POSTS SHALL BE 15 FEET ON CENTER AND SET AT LEAST 30 INCHES INTO THE GROUND.
4. LINE POSTS SHALL BE 6" (5/6) CIRCULAR WOOD POSTS.
5. BRACE POSTS SHALL BE 6" (5/6) CIRCULAR WOOD POSTS AND SET 36" IN THE GROUND.
6. ALL CORNERS, FENCE LINE ENDS, AND GATE OPENINGS REQUIRE DOUBLE H BRACE ASSEMBLIES. STRAIGHT LINE FENCE SHALL BE 660 FEET MAXIMUM SPACING. STRAIGHT FENCE SPANS 330 FEET OR LESS SHALL USE SINGLE H BRACE ASSEMBLIES.
7. REFER TO THE SPECIFICATIONS FOR MORE INFORMATION ON FENCING.

2 / 6.12 Woven Wire Fence
Not to Scale

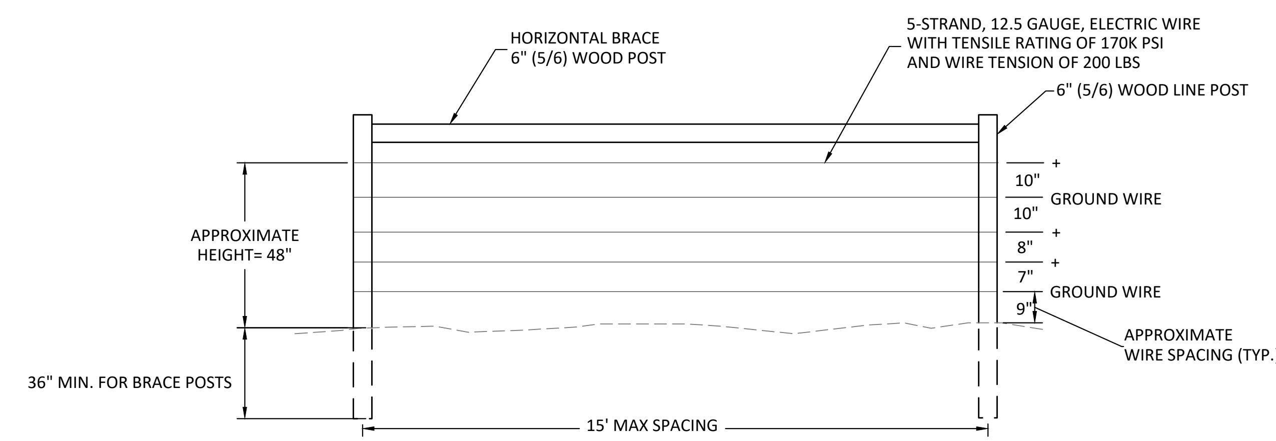


Crossings



In-Line Gate

3 / 6.12 Gate Layouts
Not to Scale



NOTES:

1. THE FENCE SHALL BE BUILT ACCORDING TO THE NRCS SPECIFICATION 382 FOR 5-STRAND ELECTRIC WIRE HIGH TENSILE FENCE. (March 2014)
2. WIRE SHALL BE 12.5 GAUGE, CLASS 3 GALVANIZED ZINC (ASTM-116 STANDARD) WITH 170,000 PSI TENSILE STRENGTH. WIRE SHALL BE INSTALLED ON THE LIVESTOCK SIDE OF THE FENCE.
3. LINE POSTS SHALL BE 6" (5/6) PRESSURE TREATED WOOD WITH A MAXIMUM SPACING OF 15 FEET AND A MINIMUM POST HEIGHT OF 68".
4. BRACE POSTS SHALL BE 6" (5/6) PRESSURE TREATED WOOD AND SET 36" INTO THE GROUND. HORIZONTAL BRACE POSTS SHALL BE 6" (5/6) PRESSURE TREATED WOOD. BRACING SHALL BE ACCORDING TO THE TABLE BELOW:

PULL DISTANCE	END/CORNER/GATE BRACE SPECIFICATION	INLINE BRACE SPECIFICATION
< 660 FEET	SINGLE H OR SINGLE DIAGONAL ASSEMBLY	NOT REQUIRED
660 - 2,000 FEET	SINGLE H OR SINGLE DIAGONAL ASSEMBLY	SINGLE H OR SINGLE DIAGONAL ASSEMBLY
> 2,000 FEET	DOUBLE H OR DOUBLE DIAGONAL ASSEMBLY	SINGLE H OR SINGLE DIAGONAL ASSEMBLY

5. REFER TO THE SPECIFICATIONS FOR MORE INFORMATION ON FENCING.

4 / 6.12 High Tensile Electric Wire Fence
Not to Scale

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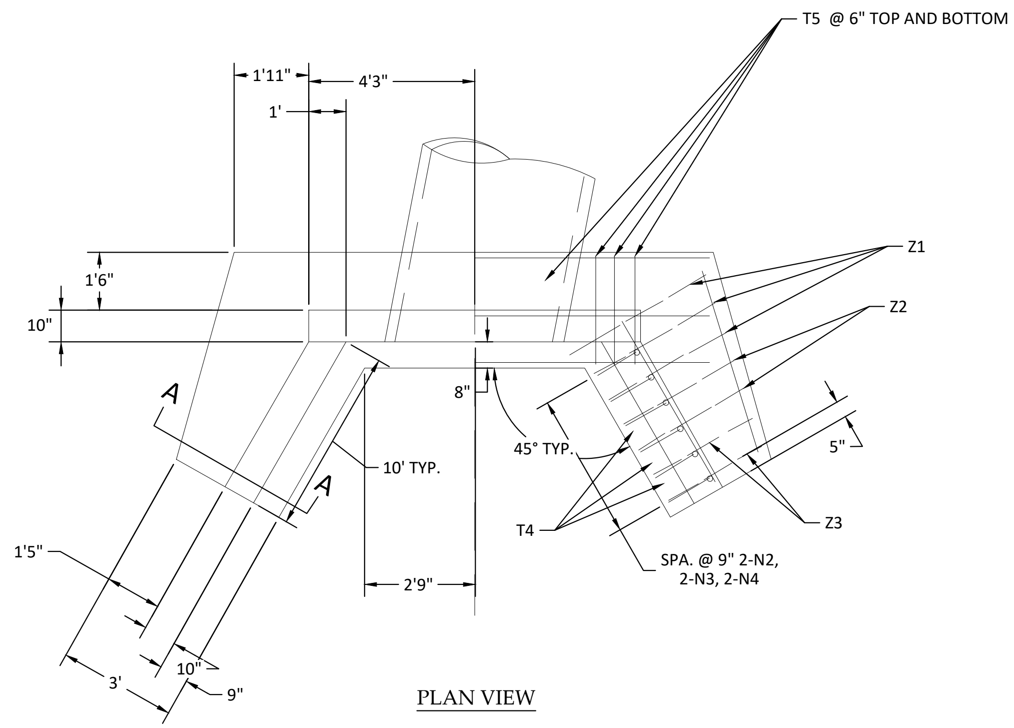
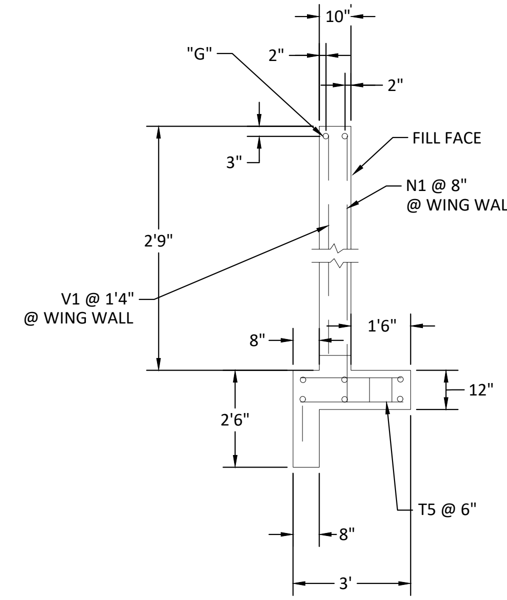
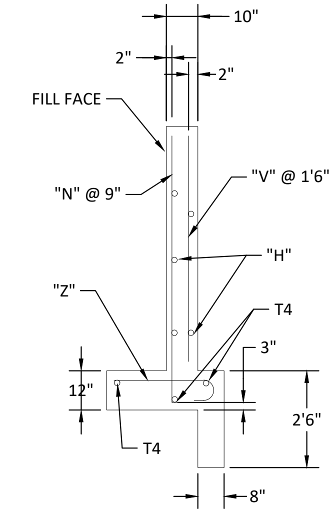


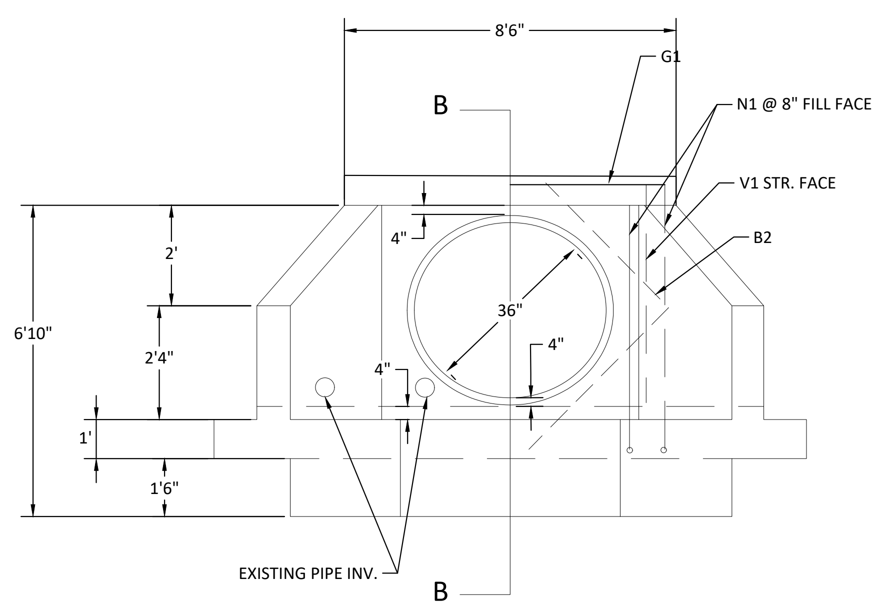
PLAN VIEW



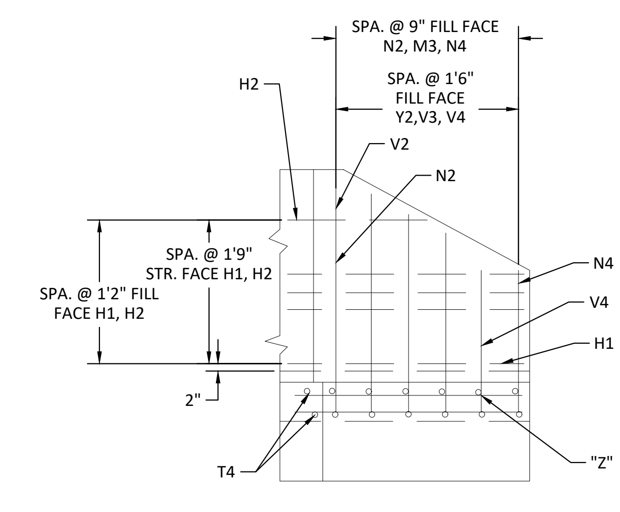
SECTION BB



SECTION AA



ELEVATION



WING ELEVATION

BILL OF MATERIAL FOR ENDWALL		
REINF. STEEL		
BAR	SIZE	LENGTH
B1	#4	5'-6"
B2	#4	4'-6"
G1	#4	8'-2"
H1	#4	5'-6"
H2	#4	3'-6"
N1	#4	7'-11"
N2	#4	6'-7"
N3	#4	5'-8"
N4	#4	4'-9"
T1	#4	11'-10"
T4	#4	5'-3"
T5	#4	2'-6"
V1	#4	5'-9"
V2	#4	4'-10"
V3	#4	3'-11"
V4	#4	3'-1"
Z1	#4	3'-11"
Z2	#4	3-6"
Z3	#4	3'-1"

1/6.13 Reinforced Concrete Endwall
Not to Scale

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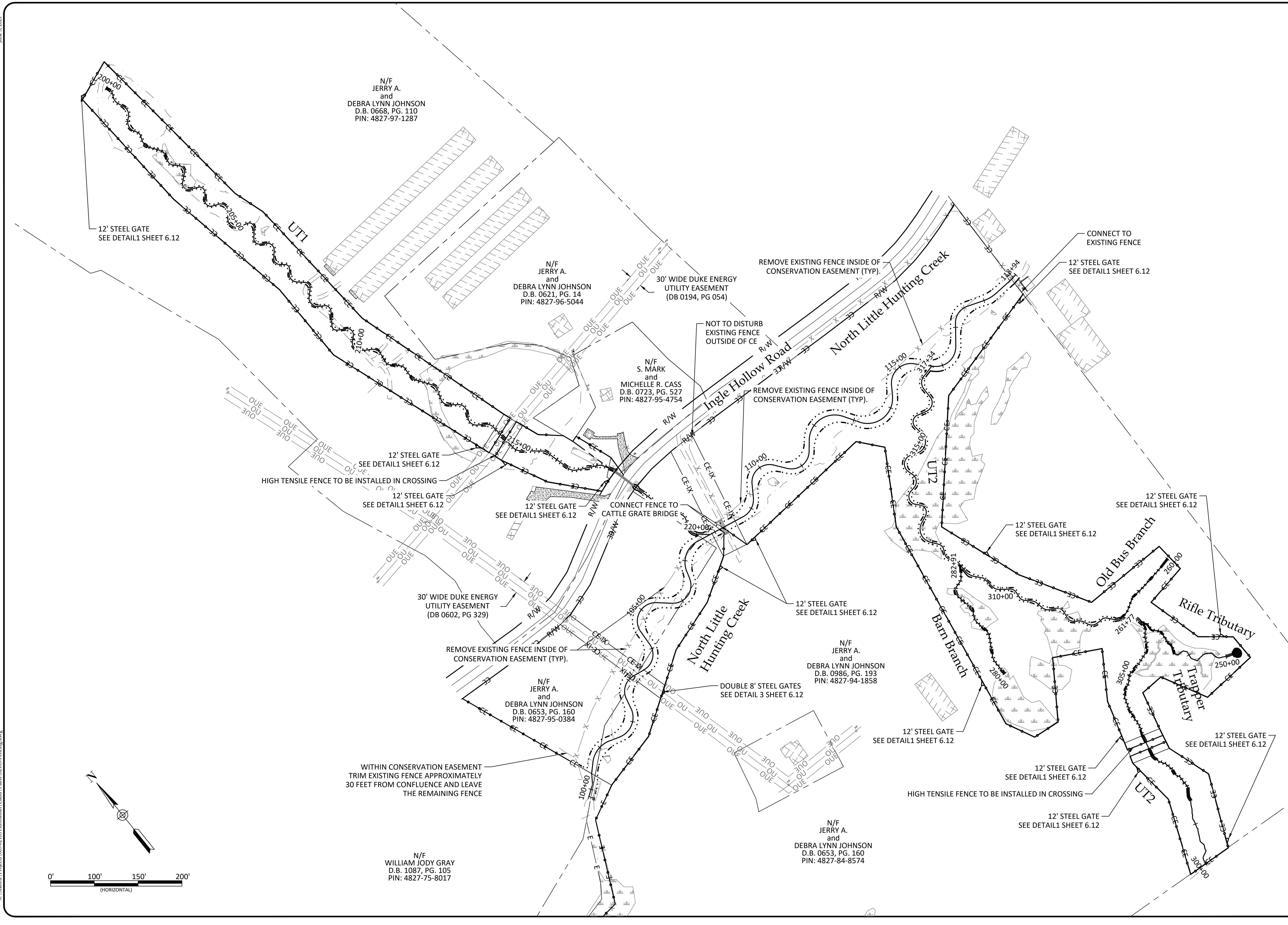

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Fencing Overview

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