FINAL MITIGATION PLAN
Bull Chute Stream and Riparian Wetland Mitigation Site
Randolph County, NC

Full Delivery Proposal to Provide Stream and Riparian Wetland Mitigation Credits for Cataloging Unit 03040103 of the Yadkin River Basin

DMS Project ID No. 100137

Full Delivery Contract No. 7878-01

USACE Action ID No. SAW-2020-00049

DWR Project No. 20200021

RFP #16-007878 (Issued: 5/6/2019)

Prepared for:

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

June 2021

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Clearwater Mitigation Solutions
604 Macon Place
Raleigh, North Carolina
Authorized Representative: Mr. Kevin Yates
Phone: 919-624-6901

CLEARWATER MITIGATION
SOLUTIONS

June 2021

"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
- NCDEQ Division of Mitigation Services Mitigation Plan Template and Guidance, June 2017

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

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

REPLY TO
ATTENTION OF:

May 13, 2021

Regulatory Division

Re: NCIRT Review and USACE Approval of the NCDMS Bull Chute Mitigation Site / Randolph Co./ SAW-2020-00049/ NCDMS Project # 100137

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 Bull Chute Draft Mitigation Plan, which closed on April 4, 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
Kevin Yates—Clearwater Mitigation Solutions, LLC

June 14, 2021

Mr. Matthew Reid
NCDEQ Division of Mitigation Services
Western DMS Field Office
5 Ravenscroft Drive, Suite 102
Asheville, NC 28801

Re: Bull Chute – Final Mitigation Plan (DMS Project No. 100137)
USACE AID SAW-2020-00049/ DWR Project No. 20200021
Response to IRT Comments

Dear Mr. Reid,

Please find below the response to comments on the Bull Chute Mitigation Plan provided by the IRT, dated April 27, 2021:

WRC Comments, Olivia Munzer:

1. Make sure plants are in the correct community type. For example, willow oak (FACW) may struggle in a Dry-Mesic Oak-Hickory Forest. According to Natural Communities of NC, oaks that you should consider for this community include chestnut oak, white oak, and northern or southern red oak.
   Re: Understood.

USACE Comments, Kim Browning:

1. The correct USACE ID for this project is SAW-2020-00049. Please correct the cover sheet.
   Re: The cover sheet has been updated with the correct USACE ID.
2. Appendix I: Please also include the wetland credit release schedule.
   Re: The wetland credit release schedule has been added to Appendix I.
3. Figure 6A, page 29 and Sheet E13: The marsh treatment BMP at the top of UT4B should not be located in an existing or proposed wetland. This applies to all treatment areas.
   Re: The marsh treatment area has been removed from the top of UT 4B. No other marsh treatment areas are located in wetland credit generating areas.
4. Figure 10: Please add veg plots to UT4 and UT3 to the areas where the historic dams were.
   Re: Vegetation plots were moved to the location of the historic dams in the upper reaches of UT3 and UT4.
5. Section 3.4: This section should be expanded to include a narrative with more detail of existing conditions and broken out to describe each reach separately. Photos of existing conditions would also be beneficial.
   Re: Several pages discussing the existing reaches, including photos, have been added to this section of the document.

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6. Section 3.5.3: This section should be expanded to describe those areas proposed for wetland enhancement, reestablishment and rehabilitation, to include existing vegetation, hydrology, invasives, etc.
   Re: A paragraph was added describing wetland vegetative communities, including invasive species identified at the Site.
7. Sections 4.2 & 8.7: The natural communities document used is the 3rd approximation (*Classification of the Natural Communities of NC*, Schafale and Weakley, 1990). There is a more recent document – the 4th approximation (*Guide to the Natural Communities of NC*, Schafale, 2012) that is more appropriate to use when identifying natural community types.
   Re: Vegetative communities have been referenced to Schafale 2012.
8. Tables 12A & 12B discuss the functional uplift potential and references NCSAM/WAM, including the water quality and habitat 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. It is appreciated that NCSAM/WAM was used to establish current conditions of the site and the potential for functional uplift.
   Re: Table 12C has been updated to depict goals and objectives that can be measured for success. Other functional uplift metrics are described as academically likely areas of functional uplift and are not tied to goals, monitoring, or success criteria.
9. Please include the site photographs that were included in the Categorical Exclusion document in the mitigation plan.
   Re: Site photographs from the Categorical Exclusion document had been included in the mitigation plan as Appendix M.
10. Section 7: Please include any correspondence with NC Wildlife Resource Commission in this section as well as in the Categorical Exclusion Documents.
    Re: A letter was sent to NCWRC as part of the CE document. No response from the NCWRC was received as part of the CE process.
11. Recommend that you add additional mid-story species to the planting list. Also, please include temporary and permanent seed mix.
    Re: Temporary and permanent seeding mix list has been added to plan sheet E02B.
12. Section 8: Significant disturbance from livestock grazing and cattle access to site streams is mentioned as a stressor; Livestock exclusion or removal from the property should be mentioned as part of the Design Approach and Mitigation Work Plan. As written, it's unclear how this will be achieved. Table 14 discusses livestock removal from the property, so it's unclear why fence/gates are being installed, as discussed in Section 8.8.
    Re: Livestock will be removed from the easement area using cattle exclusion fence, however, livestock use will continue in the surrounding pasture, outside the conservation easement. Gates will be installed at crossings to allow for controlled access from one pasture to another. Pedestrian gates will be installed for access to conduct monitoring.
13. Section 8.6: Is compaction from past agricultural use and livestock a concern?

Re: The site will be ripped and prepped prior to planting. We have added this statement into section 8.6.

14. Table 17: Please list the proposed growing season to justify using soil temperature and bud burst.
    Re: The following statement has been added to Table 17: "Growing season for the Site is to start no earlier than March 1 and will be verified by soil temperature and bud burst. The growing season will end November 13." Data is based on the NRCS growing season for Randolph County, NC. As our growing season is not a fixed date (ranging from March 1 until documentation of bud burst from two species and appropriate soil temperatures), it is not feasible to list a number of consecutive days to meet the 12 percent growing season success criteria.
15. Table 18:
    -The wetland hydrology performance standard should be measured annually.
    Re: "Measured annually" was added to the wetland hydrology standards section.
    -Any volunteer species on the approved planting list must be established for at least 2 years to count towards success and will be subject to the average height standard.
    Re: This statement was added to Table 18 vegetation success criteria.
    -30 consecutive days of surface flow is only applicable to intermittent streams and should be a minimum standard, not a goal.
    Re: This sentence has been changed to read as follows: "Continuous surface flow in intermittent streams must be documented each year for a minimum of 30 consecutive days."
16. Page 39: A discussion on potential future land use should be added to the Development/Logging section given that 60' wide crossings were planned for the intent of future subdivision development.
    Re: There is currently no planned development nor intent for future development by any of the land owners within the project area. The preference by the land owners is for the area surrounding the project to remain in pasture and current uses. The 60' wide crossings were put in place strictly for planning purposes to give the land owner flexibility in the future, to allow for potential utility lines and a roadway crossing, as the standard right of way width is 50-60 feet.

17. Section 9.2.2: It is unclear where ephemeral pools will be located and how many are planned. Ephemeral pools should be 8-14" depressions that dry up yearly so that predatory species cannot colonize, and should not be so numerous that trees do not grow in large areas of the buffer.
    Re: As this is a contingency item; therefore, we do not know the locations of ephemeral pools. The statement concerning depth and hydrology from above was added to this section to clarify ephemeral pool construction.

DWR Comments, Erin Davis:

1. Page 1, Section 1.3 – Please include a discussion of past/historic onsite and adjacent area land use.

Re: A paragraph was added to Section 1.3 to discuss past land use within and adjacent to the Site boundaries.

2. Page 7, Section 2 – This section mentions potential development trends and land use changes. Have local/regional agencies and/or planning documents been consulted? Are there any anticipated land use changes adjacent to the project site?
   Re: There are no anticipated land use changes proposed for the Site.
3. Page 11, Section 3.4 – Please provide more detail on existing stream conditions by reach. Including a few photos would be helpful for this review.
   Re: Several pages discussing the existing reaches, including photos, have been added to this section of the document.
4. Page 15, Section 3.5.3 – Approximately 3 acres of the project easement is not proposed for planting. Please identify existing dominant species in these areas. Please also include a list of invasive species observed onsite.
   Re: A paragraph was added describing wetland vegetative communities, including invasive species identified at the Site.
5. Page 26, Section 7 – DWR considers easement breaks as project constraints to be listed in this section as they fragment the project site and reduce the potential uplift.
   Re: Easement Breaks (Section 7.8) has been added to the document to discuss the potential reduction in functional uplift to the project.
6. Page 28, Section 8.1 – Please confirm that wetland reestablishment, rehabilitation and enhancement are considered primary activities designed to restore site streams.
   Re: Confirmed.
7. Page 29, Piped Channel Crossing – Did the landowner give a reason why four 60-ft crossings are needed? Are all crossings proposed for agriculture use?
   Re: There are 7 different parcels within the conservation easement boundary. While the crossings will be utilized to relocate cattle from one pasture to another, the crossings are required to allow the owners' access to their property, which would otherwise be landlocked, due to the conservation easement. There is currently no planned development nor intent for future development by any of the land owners within the project area. The preference by the land owners is for the area surrounding the project to remain in pasture and current uses. The 60' wide crossings were put in place strictly for planning purposes to give the land owner flexibility in the future, to allow for potential utility lines and a roadway crossing, as the standard right of way width is 50-60 feet.
8. Page 30, Table 14 – Descriptions for UT-2, UT4C, UT6 include conducting minor bank stabilization where necessary. However, these reaches are shown primarily outside of the proposed limit of disturbance lines on the design sheets. If work is proposed, even if not credit generating, please show for permitting purposes.
   Re: Limits of disturbance has bee adjusted to include these reaches.
9. Page 32, Section 8.7.1/Figure 9/ Sheet P01 – Please include a list of any temporary and permanent seed mixes proposed for application within the conservation easement.
   Re: Temporary and permanent seeding mix list has been added to plan sheet E02B and added to table 15, in section 8.7.1.

10. Page 34. Table 15 – DWR appreciates the inclusion of the RFE in Section 4.2; however, only tulip poplar and black willow have been included in the planting plan. Are more of the RFE species already present onsite.
    Re: Several of the RFE species are present onsite. Others are not available from planting suppliers (Beech, Holly, and Cedar). In addition, several are not allowed to be planted by the IRT (Maple and Sweetgum). The RFE has been used to type the community and may be used for approved volunteer species.
11. Page 37, Section 9.1 – Based on the drainage areas and IRT site walk observations, DWR has a general concern about stream flow duration for this project. Monitoring data for the areas we are most concerned with will be captured by the proposed surface flow gauge locations.
    Re: Annual stream flow data will be captured by surface flow gauges and presented in annual monitoring reports.
12. Page 37, Table 18 – Please clarify that the wetland hydrology is an annual success criterion.
    Re: Wetland hydrology is included as part of the annual success criterion.
13. Page 37, Section 9.2 – DWR appreciates the inclusion of this section. Please note that some of the listed actions will require IRT review as adaptive management and may need USACE/DWR permit authorizations.
    Re: A note has been added to Section 9.2 that reads as follows. "It should be noted that some aspects of adaptive management may require IRT review and USACE/DWR permit authorizations."
14. Page 39, Section 9.2.2 – As noted, IRT consultation and approval will be necessary if any future earthwork is proposed. Depending on the depth of proposed ephemeral pools, the credit ratio may change to reflect wetland creation.
    Re: A sentence has been added to Section 9.2.2 to read as follows. "IRT consultation and approval will be necessary if future earthwork is proposed. In addition, if the depth of ephemeral pools exceed 1 foot, the credit ratio may be changed to reflect wetland creation."
15. Page 40, Table 19 – Should the 30-day consecutive intermittent stream flow performance standard be included in the success criteria column?
    Re: The 30-day consecutive intermittent stream flow criteria has been added to Table 19.
16. Page 41, Section 10 – Please confirm whether the provider or DMS is the point of contact to notify the IRT of any site issues.
    Re: Section 10 has been changed to read as follows. "If the mitigation Site or a specific component of the Site fails to achieve the necessary performance standards as specified in the mitigation plan, the Sponsor shall notify the members of NCDMS and work with the IRT to develop contingency plans for remedial action."
17. Figures – Can the property boundaries please be shown on one of the included figures?
    Re: Property boundaries have been added to Figure 4A – Existing Conditions.
18. Figure 8B – Please make sure information provided in figures is consistent with design sheets (e.g. drop structure detail).

Re: Figure 8A, 8B, and 8C (Typical Details) have been removed from the document to reduce confusion between construction plans and the document.

19. Figure 8C, Reinforced Riffle Step – Please identify where this feature is proposed on the plan view drawings. Please specify stone size. And what necessitates stone placement to top of bank? DWR is concerned whether bank armoring is warranted.
    Re: Figure 8A, 8B, and 8C (Typical Details) have been removed from the document to reduce confusion between construction plans and the document.
20. Figure 10 – The scale of monitoring icons makes it a bit challenging to determine if they will be located entirely within or only partially within some of the wetland features. Please make sure that wetland enhancement credit areas are adequately represented with monitoring locations to support achievement of required success criteria.
    Re: Understood. Monitoring locations will be installed at agreed on and representative locations to ensure required success criteria.
21. Appendix B – In the future, DWR would like more detail included in the site soil investigation, including a map indicating all soil check locations. (Note that Appendix D did not include wetland determination forms with soil data.)
    Re: Understood.
22. Detail Sheets – Please add typical details for bare root & live stake plantings.
    Re: Detail has been added to plan sheet P01.
23. Sheet 02B, Marsh Treatment Area – Please provide the max. depth proposed for the deep pools. Please provide stone size and percent composition of riprap outlet, if an alternative non- hardened stabilized outlet is not feasible.
    Re: Marsh Treatment Detail has been revised to show requested information.
24. Sheet 02E, Floodplain Interceptor – DWR has seen a few very different details using this title. Please confirm that the hatched area represents only soil and matting material.
    Re: The hatched area represents only soil and matting material.
25. Sheet 05 – Add a callout for UT 2 "start enhancement II" station. Should the LOD lines along UT2 connect if the pipe/tile is proposed for removal?
    Re: Added 'End Enhancement II' label with station to profile on plan sheet 06. UT 2 is not shown on plan sheet 05. Limits of Disturbance (LOD) lines have been adjusted.
26. Sheet 08 – Are the bold dash lines parallel to sections of UT5 LOC lines?
    Re: Bold dashed lines have been adjusted/removed.
27. Sheet 21 – What is the minimum distance from proposed UT7 and UT3 bankfull lines to the easement line? Are any construction activities proposed outside of the project easement?
    Re: Bankfull lines for UT 7 are existing and are inside the easement line. UT 3 bankfull lines are also inside easement line, with min distance of 5' off from the easement line.
28. For clarification, please identify what is to be removed in callouts (e.g. drain tiles, pipes).
    Re: Call outs adjusted to identify item(s) to be removed.
29. Is the difference between the limit of construction and limit of disturbance lines where excavation is proposed? I noticed that there are callouts to fill existing channel sections located between these two lines, but not if the existing channel is within the LOC lines. Does this mean that existing channel within the LOC will automatically be backfilled? If there are any existing channel sections proposed to remain open, please add callouts.

Also, if surface roughening proposed for wetland areas located between the LOC and LOD Lines?
Re: The limits of construction are where the excavation/fill tie back into natural ground. The limits of disturbance includes areas that stream work may not be occurring (wetland restoration, existing storm pipe removal, marsh treatment). Existing stream channels that are hatched and labeled as 'Fill Existing Channel' are locations that the proposed stream project construction does not impact the existing channel due to realignment location and the existing channel needs to be filled.

30. DWR appreciates that proposed haul roads are primarily located outside the project easement.
Re: Understood.
31. There are no meander bend bank treatments proposed for stabilization or habitat (e.g. brush toe, boulder toe, vegetated/live lift). Are there any concerns about long-term bank stability? Is sufficient instream habitat enhancement expected from proposed step and vane structures?
Re: No bank stability issues are anticipated. We believe meander bend treatments lead to instability and that within two years adequate root mats, woody debris, and leaf matter develop naturally.
32. Lack of large woody debris was noted in Table 12C, DWR encourages adding LWD to stream and wetland project features for habitat enhancement.
Re: Understood. Large woody debris will be utilized for habitat enhancement.
33. DWR appreciates efforts made to enhance the project with the extension of the easement to include stream origins, existing wetlands, reach UT4C and multiple BMPs.
Re: Understood.

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. Table 1/Page 3: Due to the lack of proper riparian buffer width and that most of the channel appears to lie outside of the conservation easement, I recommend no credit for UT 7.
Re: UT 7 was not included as a credited area in the original plan, but was added at the recommendation of IRT members following a site visit.
2. Table 4/Page 7: The JD dated May 27, 2020 DA# (SAW-2020-00650) does not match the project DA# (SAW-2020-00049). Please provide a reason for this discrepancy.
Re: Internal errors with USACE Corps representatives conducting PJD verifications and Mitigation project managers are currently being resolved. The project DA# will be changed from the JD to the correct DA# of (SAW-2020-00049).

3. Table 6/Page 10: Can the sponsor provide an estimate of how much reduction (tons/year) in site erosion and sediment contribution will result from the mitigation activity?
   Re: Based on the Site assessment conducted and presented in Table 6, it is presumed that 88.4 tons/year of sediment will be reduced from mitigation activities.
4. Section 3.4/Page 11: Please include a narrative description of each existing stream broken down by reach as well as each wetland included within the project boundary. Recommend adding photos of each reach and wetland, as well as stressors (eroding and unstable banks, lack of riparian vegetation, livestock damage from trampling, equipment compaction, etc.) to aid in the analysis of the existing site conditions.
   Re: Several pages discussing the existing reaches, including photos, have been added to this section of the document.
5. Section 3.4.5/Page 14: The narrative here leads one to conclude that UT 4 is the discharge of the site, when it appears that UT 4 ties into UT 1 and then discharges from the site. Recommend adding the cumulative discharge with the combination of UT 1 and UT 4 drainages as they leave the site just below the confluence.
   Re: The discussion in question is simply stating the smallest tributary discharge and the largest tributary discharge.
6. Section 4.1.2/Page 17: Recommend specifically naming the Bull Chute Reference Reach as UT3B rather than the "wooded section of UT 3". This will clarify the reach in question.
   Re: The Bull Chute reference is named the "Bull Chute Reference". The description of the reference is simply to denote to the reader where the reference is located in reference to the Site.
7. Section 4.1.2.1/Page 18: Are bedrock steps present within UT 3B reference reach common to other streams in the Bull Chute site?
   Re: Yes, the reference reach is similar to other areas within the Site. Some reaches at the Site have less bedrock, which is why we measured two reference reaches to try and better characterize all situations that may occur within the project.
8. Section 4.2/Page 18: Recommend using Schafale 4th Approximation (2012) in addition to or to supersede Schafale and Weakley 1990 community description.
   Re: Vegetative communities have been referenced to Schafale 2012.
9. Table 12C/Page 25: Recommend changing "remove livestock from the property" to "excluding livestock from the conservation easement by fencing" to avoid ambiguity that the cattle will be removed from the adjacent pastures as a continued land use. Since cattle are expected to occupy the adjacent pastures, pollution sources will be reduced but not altogether eliminated from the streams and wetlands. Recommend adding fencing to the objectives since it is a vital component of livestock and equipment exclusion.
   Re: Table 12C has been changed to reflect more measurable goals, as requested by the USACE.
10. Section 7.0/Page 26: Recommend adding landowner constraints since there are currently 4 60-foot crossings proposed and some sections of streams are not being adequately contained within the conservation easement boundaries (UT 7, UT 3A).

These are specifically mentioned in Section 8.1.1 as piped channel crossings and easement breaks.
Re: An additional section (Section 7.8 Easement Breaks) has been added to the document.

11. Section 8.1.1/Page 29: Please provide justification for having 60-foot wide stream crossings and easement breaks. The gates are only 12 feet wide, so the extra width does not seem to be necessary especially if only being used for cattle.
    Re: There are 7 different parcels within the conservation easement boundary. While the crossings will be utilized to relocate cattle from one pasture to another, the crossings are required to allow the owners' access to their property, which would otherwise be landlocked, due to the conservation easement. There is currently no planned development nor intent for future development by any of the land owners within the project area. The preference by the land owners is for the area surrounding the project to remain in pasture and current uses. The 60' wide crossings were put in place strictly for planning purposes to give the land owner flexibility in the future, to allow for potential utility lines and a roadway crossing, as the standard right of way width is 50-60 feet.
12. Section 8.1.1/Page 29: The outfall of UT 1 is noted as the site discharge.
    Re: The lower reaches of UT 1 is the Site outfall.
13. Table 14/Page 30: Recommend breaking down the mitigation activities per individual reach as the approach varies especially with regard to UT 3. Priority 2 restoration is mentioned here and was not included in the previous narrative. Also recommend changing the "remove livestock from the property" language per the comment above (#9).
    Re: Table 14 has not been broken down into reach due to significant redundancy that would occur. The specific intent of Table 14 is to list mitigation actions in the reach and tie to functional gains outlined on the NCDMS score sheet. The table is not expected to provide a stream design outline (which is clearly depicted in figures and plans). Clarification of livestock exclusion from the easement with fencing has been incorporated into the table.
14. Section 8.7/Page 32: Schafale and Weakley 1990 is listed here and Schafale 2012 should also be used and/or cited as it appears in the references section.
    Re: Vegetative communities have been referenced to Schafale 2012.
15. Section 8.8/Page 35: Excellent description of fencing installation and location. This illustrates the need to be clear in the rest of the document that livestock will be fenced out and not "removed from property" as stressors to the site will continue and only offset by the 50+ foot buffer vegetation and lack of direct input. I concur with the recommended offset of 2 feet to allow for landowner maintenance.
    Re: Understood.
16. Table 18/Page 37: Recommend including the dates of the growing season listed in Table 17 and the number of consecutive days to meet the 12% of the growing season.
    Re: The following statement has been added to Tables 17 and 18: "Growing season for this site is to start no earlier than March 1 and range through November 13 as verified by soil temperature and bud burst." Data is based on the NRCS growing season for

Randolph County, NC. As our growing season is not a fixed date (ranging from March 1 until documentation of bud burst from two species and appropriate soil temperatures), it is not feasible to list a number of consecutive days to meet the 12 percent growing season success criteria.

17. Section 9.2.3/Page 39: Recommend adding a percentage of the planted acreage threshold, that if exceeded (20%), to notify the IRT for approval and subsequent remedial monitoring of vegetation.
    Re: As the IRT is notified annually of the vegetative success of a project, it is not necessary to trigger notification. Annual IRT site reviews and walkthroughs occur at each Site.
18. Figure 4B/LIDAR DEM MAP: Elevation legend is missing. Recommend adding existing wetlands to the map.
    Re: The elevation legend and existing wetlands have been added to the LiDAR figure.
19. Figure 6A/Restoration Plan: Recommend adding "no credit" to UT 7 description box.
    Re: UT 7 was added by the IRT during a Site walkthrough (not listed as a tributary during our initial planning). The reaches of UT 7 that are outside the conservation easement are not credit generating, and once the tributary enters the easement it is listed at a 5:1 credit ratio (instead of 2.5:1) as requested by the IRT. Therefore, we respectfully request the ability to keep 68 feet of enhancement (level II) at a 5:1 ratio for UT 7.
20. Sheet 21/Plan and Profile: Recommend changing "Enhancement III" to "Enhancement II" where it occurs. Recommend breaking UT 3 into Reaches UT 3A, B and C where appropriate.
    Re: Changed 'Enhancement III' to 'Enhancement II' on plan sheet 21. Plan and profile labels have been adjusted to UT 3A, UT 3B and UT 3C.
21. Sheet 22/Plan and Profile: Recommend changing "Enhancement III" to "Enhancement II" where it occurs.
    Re: Changed 'Enhancement III' to 'Enhancement II' on plan sheet 22.
22. EPA appreciates the approach of including the origins of UT 4C, UT 5, and UT 6 within the conservation easement even if no credit will be generated.
    Re: Understood.

Please do not hesitate to contact me with questions at 919-624-6901.

Sincerely,

Kevin Yates

TABLE OF CONTENTS

1.0 PROJECT INTRODUCTION 1

1.1 DIRECTIONS TO SITE 1
1.2 USGS HYDROLOGIC UNIT CODE AND NCDWR RIVER BASIN DESIGNATION 1
1.3 PHYSIOGRAPHY AND LAND USE 1
1.4 PROJECT COMPONENTS AND STRUCTURE 2

2.0 WATERSHED APPROACH AND SITE SELECTION 7

3.0 BASELINE AND EXISTING CONDITIONS 8

3.1 SOILS AND LAND FORM 8
3.2 SEDIMENT MODEL 9
3.3 NUTRIENT MODEL 10
3.4 PROJECT SITE STREAMS 11
3.4.1 Existing Conditions Survey 13
3.4.2 Channel Classification and Morphology 16
3.4.3 Channel Evolution 16
3.4.4 Valley Classification 16
3.4.5 Discharge 16
3.5 PROJECT SITE WETLANDS 16
3.5.1 Hydrological Characterization 17
3.5.2 Soil Characterization 17
3.5.3 Plant Community Characterization 17

4.0 REFERENCE STUDIES 18

4.1 REFERENCE STREAMS 18
4.1.1 Cedarock Park Reference Reach 18
4.1.1.1 Watershed Characterization 18
4.1.1.2 Channel Classification 18
4.1.1.3 Discharge 18
4.1.1.4 Channel Morphology 18
4.1.2 Bull Chute Reference Reach 19
4.1.2.1 Watershed Characterization 19
4.1.2.2 Channel Classification 19
4.1.2.3 Discharge 19
4.1.2.4 Channel Morphology 19
4.2 REFERENCE FOREST ECOSYSTEM 20

5.0 CHANNEL ASSESSMENTS 21

5.1 CHANNEL STABILITY ASSESSMENT 21
5.2 BANKFULL VERIFICATION 22

6.0 FUNCTIONAL UPLIFT AND PROJECT GOALS/OBJECTIVES 24

7.0 SITE DESIGN AND IMPLEMENTATION CONSTRAINTS 28

7.1 THREATENED & ENDANGERED SPECIES 28
7.2 CULTURAL RESOURCES 29
7.3 NORTH CAROLINA NATURAL HERITAGE ELEMENTS 29
7.4 FEMA 30
7.5 UTILITIES 30
7.6 AIR TRANSPORT FACILITIES 30
7.7 HYDROLOGIC TRESPASS 30
7.8 EASEMENT BREAKS 30

8.0 DESIGN APPROACH AND MITIGATION WORK PLAN 30

8.1 STREAM DESIGN 30
8.1.1 Stream Restoration 30
8.1.2 Stream Enhancement (Level I) 32
8.1.3 Stream Enhancement (Level II) 32
8.1.4 Stream Enhancement (Level II with and adjusted ratio) 32
8.2 INDIVIDUAL REACH DISCUSSIONS 32
8.3 WETLAND REESTABLISHMENT 34
8.4 WETLAND REHABILITATION 34
8.5 WETLAND ENHANCEMENT 34
8.6 SOIL RESTORATION 34
8.7 NATURAL PLANT COMMUNITY RESTORATION 34
8.7.1 Planting Plan 35
8.7.2 Nuisance Species Management 35
8.8 Fencing 37

9.0 MONITORING AND SUCCESS CRITERIA 37

9.1 SUCCESS CRITERIA 39
9.2 CONTINGENCY 39
9.2.1 Stream Contingency 39
9.2.2 Wetland Contingency 41
9.2.3 Vegetation Contingency 41
9.3 COMPATIBILITY WITH PROJECT GOALS 41

10.0 ADAPTIVE MANAGEMENT PLAN 43

11.0 LONG-TERM MANAGEMENT PLAN 43

12.0 REFERENCES 44

TABLES

Table 1. Project Components and Mitigation Credits 3
Table 2. Project Activity and Reporting History 5
Table 3. Project Contacts Table 5
Table 4. Project Attribute Table 5
Table 5. Web Soil Survey Soils Mapped within the Site 9
Table 6. BEHI and NBS Modeling Summary 10
Table 7. Essential Morphology Parameters 14
Table 8. Profile Description 17
Table 9. Reference Forest Ecosystem 20
Table 10. Stream Power (Ω) and Shear Stress (τ) Values 22
Table 11. Reference Reach Bankfull Discharge Analysis 23
Table 12A. NC SAM Summary 25
Table 12B. NC WAM Summary 26
Table 12C. Targeted Functions, Goals, Objectives, and Uplift Evaluation 27
Table 13. Threatened and Endangered Species 28
Table 14. Individual Reach Descriptions and Functional Uplift 32
Table 15. Planting Plan 36
Table 16. Monitoring Schedule 37
Table 17. Monitoring Summary 38
Table 18. Success Criteria 39
Table 19. Compatibility of Performance Criteria to Project Goals and Objectives 42

APPENDICES

Appendix A. Figures
- Figure 1. Site Location
- Figure 2. Hydrologic Unit Map
- Figure 3. Topography and Drainage Area
- Figure 4A. Existing Conditions and Soils
- Figure 4B. Lidar DEM Map
- Figure 5A. Cedarock Reference Reach Dimension, Pattern, and Profile
- Figure 5B. Bull Chute Reference Reach Dimension, Pattern, and Profile
- Figure 6. Restoration Plan
- Figures 6A-C. Restoration Plan
- Figure 7. Proposed Dimension, Pattern, and Profile
- Figure 8. Planting Plan
- Figure 9. Monitoring Plan

Appendix B. Existing Stream & Wetland Data
- Table B1. Bull Chute Morphological Stream Characteristics
- Existing Stream Cross-section Data
- NC SAM Forms
- NC WAM Forms
- NCDWQ Stream Forms
- BEHI/NBS Data
- Soil Boring Log

Appendix C. Flood Frequency Analysis Data
Appendix D. Jurisdictional Determination Information
Appendix E. Categorical Exclusion Document
Appendix F. FEMA Coordination and HEC-RAS Modeling Report
Appendix G. Financial Assurance
Appendix H. Site Protection Instrument
Appendix I. Credit Release Schedule
Appendix J. Maintenance Plan
Appendix K. IRT Site Visit Notes
Appendix L. Construction Plans
Appendix M. Site Photos

1.0 PROJECT INTRODUCTION

The Bull Chute Stream & Wetland Mitigation Site (hereafter referred to as the "Site") encompasses 31.7 acres of disturbed forest and livestock pasture along Unnamed Tributaries (UTs) to Caraway Creek. The Site is located in Randolph County, less than one-mile northwest of New Market and 4.5 miles northwest of Randleman. The property is situated just west of NC Highway 311 and south of Marlboro Church Road (Figures 1 and 2, Appendix A).

1.1 Directions to Site

Directions to the Site from Raleigh, North Carolina.

- Head west on US-64 for 57 miles
- Just before Asheboro, take a right onto E Presnell Street
- After 3.7 miles, turn right to merge onto I-73 North/I-74 West
- Follow I-74 West for 7.4 miles, then take exit 84 toward US-311 West
- Turn right and travel 1.9 miles, then turn left onto Marlboro Church Road
- After 0.9 mile, turn left onto Baker Farm Road
- The Site can be accessed for the end of this road, about 0.5 mile.
    - Site Latitude, Longitude
      35.8325ºN, 79.8879ºW (WGS84)

1.2 USGS Hydrologic Unit Code and NCDWR River Basin Designation

The Site is located within **Targeted Local Watershed** and **Local Watershed Plan Area** (Caraway Creek) 14-digit HUC (03040103050040) of the Yadkin River basin (Figure 2, Appendix A). Stream and wetland mitigation areas are located along UTs to Caraway Creek (North Carolina Division of Water Resources [NCDWR] subbasin number 03-07-09) [Figures 1 and 2, Appendix A]). UTs to Caraway Creek have been assigned Best Usage Classifications of C (NCDWR 2013). Caraway Creek is not listed on the final 2018 303d list (NCDEQ 2019).

1.3 Physiography and Land Use

The Site is located within the Southern Outer Piedmont ecoregion of the Piedmont Physiographic Province (Griffith et al. 2002). The ecoregion is characterized by dissected irregular plains, some rounded hills and ridges, and low to moderate gradient streams with cobble, gravel, and sandy substrates. Onsite elevations range from a high of 790 feet National Geodetic Vertical Datum (NGVD) at the upper reaches to a low of approximately 690 feet NGVD at the Site outfall (USGS Glenola, North Carolina 7.5-minute topographic quadrangle) (Figure 3, Appendix A).

The Site provides water quality functions to an approximately 0.34-square mile (218.5-acre) watershed at the outfall; Site tributary watershed sizes range from 0.01-0.19 square mile (5.4-120.9 acres) (Figure 3, Appendix A). The watershed is dominated by pasture, forest, and sparse residential development. Impervious surfaces account for less than 2 percent of the upstream watershed land surface.

The Site has been in essentially the same working condition since the early 1990s, with pastureland used for grazing and forest scattered throughout. The pond at the upper reaches of UT 2 was constructed in 1999; however, the pond never seemed to have filled entirely, except during the wettest years. No other appreciable changes (timbering or other construction activities) appear to have occurred within, or immediately adjacent to the Site boundaries.

Land use at the Site is characterized by disturbed forest and livestock pasture. Riparian zones are primarily composed of herbaceous vegetation that is sparse and disturbed due to livestock grazing, bush hogging, and regular land-management activities.

1.4 Project Components and Structure

The Site encompasses 31.7 acres of disturbed forest and livestock pasture along unnamed tributaries to Caraway Creek. In its current state, the Site includes 8720 linear feet of degraded stream channel (based on the approved PJD), 1.9 acres of degraded wetland, 3.6 acres of drained hydric soil (Figure 4, Appendix A).

Proposed restoration activities include the construction of meandering, E/C-type stream channel resulting in 6974 linear feet of Priority I stream restoration, 617 linear feet of stream enhancement (Level I), 833 linear feet of stream enhancement (Level II), 450 linear feet of stream enhancement (Level II with an adjusted ratio), 3.13 acres of riparian wetland re-establishment, 0.114 acres of riparian wetland rehabilitation , and 1.462 acre of riparian wetland enhancement (Table 1) (Figures 6A-6C, Appendix A).

Completed project activities, reporting history, completion dates, project contacts, and background information are summarized in Tables 1-4.

Table 1. Project Components and Mitigation Credits
Bull Chute Restoration Site

Project Segment	Existing Footage/ Acreage	Mitigation Plan Footage/ Acreage	Mitigation Category	Restoration Level	Mitigation Ratio	Mitigation Credits	Comment
UT 1 Reach A	173	173	Warm	EII	2.500	69.200	
UT 1 Reach B	468	468	Warm	EI	1.500	312.000	
UT 1 Reach C	68	68	Warm	EII	2.500	27.200	
UT 1 Reach D	149	149	Warm	EI	1.500	99.333	
UT 1 Reach E	2067	2164	Warm	R	1.000	2164.000	
UT 2	592	592	Warm	EII	2.500	236.800	
UT 3 Reach A	459	418	Warm	R	1.000	418.000	
UT 3 Reach B	306	306	Warm	EII*	7.500	40.800	
UT 3 Reach C	1056	1137	Warm	R	1.000	1137.000	
UT 4A	287	410	Warm	R	1.000	410.000	
UT 4B	179	295	Warm	R	1.000	295.000	
UT 4C	157	180	Warm	No Credit	0.000	0.000	
UT 4	2524	2482	Warm	R	1.000	2482.000	
UT 5A	37	37	Warm	No Credit	0.000	0.000	
UT 5B	23	38	Warm	R	1.000	38.000	
UT 6	121	121	Warm	No Credit	0.000	0.000	
UT 7	68	68	Warm	EII*	5.000	13.6000	
Wetland Reestablish	--	3.130	NA	Reestablish	1.000	3.130	
Wetland Rehabilitation	0.114	0.114	NA	Rehabilitation	1.500	0.076	
Wetland Enhancement	1.462	1.462	NA	Enhancement	2.000	0.731	

*Enhancement Level II with an adjusted ratio (based on IRT comment and review).

Restoration Level	Stream			Riparian Wetland		Non-riparian wetland	Coastal Marsh
	Warm	Cool	Cold	Riverine	Nonriverine		
Restoration	6944.000	--	--	--	--	--	--
Re-establishment	--	--	--	3.130	--	--	--
Rehabilitation	--	--	--	0.076	--	--	--
Enhancement	--	--	--	0.731	--	--	--
Enhancement I	411.333	--	--	--	--	--	--
Enhancement II	333.200	--	--	--	--	--	--
Enhancement II*	54.400	--	--	--	--	--	--
Preservation	--	--	--	--	--	--	--
Totals	**7742.933**	**--**	**--**	**3.937**	**--**	**--**	**--**

*Enhancement Level II with an adjusted ratio (based on IRT comment and review).

Table 2. Project Activity and Reporting History
Bull Chute Restoration Site

Activity or Deliverable	Data Collection Complete	Completion or Delivery
Technical Proposal (RFP No. 16-007878)	June 2019	August 2019
Institution Date (NCDMS Contract No. 7878-01)	--	November 13, 2019
Mitigation Plan	--	May 2021
Construction Plans	--	May 2021

Table 3. Project Contacts Table
Bull Chute Restoration Site

Full Delivery Provider	Clearwater Mitigation Solutions 604 Macon Place Raleigh, NC 27609 Kevin Yates 919-624-6901
Designer	Axiom Environmental, Inc. 218 Snow Avenue Raleigh, NC 27603 Grant Lewis 919-215-1693

Table 4. Project Attribute Table
Bull Chute Restoration Site

Project Information	
Project Name	Bull Chute Restoration Site
Project County	Randolph County, North Carolina
Project Area (acres)	31.7
Project Coordinates (latitude & latitude)	35.8325, -79.8879
Planted Area (acres)	28.5
Project Watershed Summary Information	
Physiographic Province	Southern Outer Piedmont
Project River Basin	Yadkin
USGS HUC for Project (14-digit)	03040103050040
NCDWR Sub-basin for Project	03-07-09
Project Drainage Area (acres)	218.5
Percentage of Project Drainage Area that is Impervious	<2%
CGIA Land Use Classification	Managed Herbaceous Cover & Hardwood Swamps

Table 4. Project Attribute Table
Bull Chute Restoration Site (continued)

Reach Summary Information									
Parameters	**UT 1**	**UT 2**	**UT 3**	**UT 4**	**UT 4A/B**	**UT 4C**	**UT 5**	**UT 6**	**UT 7**
Length of reach (linear feet)	3022	592	1861	2482	705	180	75	121	68
Valley Classification & Confinement (A = Alluvial and C = Confined)	A, C	A, C	A, C	A, C	A, C	A, C	A, C	A, C	A, C
Drainage Area (acres)	97.6	48.1	48.1	120.9	10.2/8.9	8.3	12.5	5.4	16.0
NCDWR Stream ID Score	22.5/ 31.5	20.5	25	35	21.5/21	19.5	22	17	23.5
Perennial, Intermittent, Ephemeral	Int/Per	Int	Int/Per	Per	Int	Int	Int	Int	Int
NCDWR Water Quality Classification	C								
Stream Thermal Regime	Warm								
Existing Morphological Description (Rosgen 1996)	G5	---	G5	Fg/G5	Eg/Cf5	---	---	---	---
Proposed Stream Classification (Rosgen 1996)	Ce 3/4	---	Ce 3/4	Ce 3/4	Ce 3/4	Ce 3/4	Ce 3/4	---	Ce 3/4
Existing Evolutionary Stage (Simon and Hupp 1986)	IV	IV	IV	IV	IV	III	III	III	III
Underlying Mapped Soils	Mecklenburg and Wynott-Enon complex								
Drainage Class	Well-drained								
Hydric Soil Status	Nonhydric								
Valley Slope	0.0217	0.0247	0.0259	0.0197	0.0370	0.0671	0.0500	0.0189	0.0208
FEMA Classification	NA	NA	NA	NA	NA	NA	NA	NA	NA
Native Vegetation Community	Piedmont Alluvial Forest and Dry-Mesic Oak Hickory Forest								
Watershed Land Use/Land Cover (Site)	6% forest, 93% agricultural land, <2% low density residential/impervious surface								
Watershed Land Use/Land Cover (Cedarock Reference Channel)	65% forest, 30% agricultural land, <5% low density residential/impervious surface								
Percent Composition of Exotic Invasive Vegetation	<5%								

Table 4. Project Attribute Table
Bull Chute Restoration Site (continued)

Wetland Summary Information			
Parameters	**Wetlands**		
Wetland acreage	3.130 acre drained & 1.576 acre degraded		
Wetland Type	Riparian riverine		
Mapped Soil Series	Mecklenburg, Wynott-Enon Complex, and field identified Wehadkee Variant		
Drainage Class	Well drained, Well drained, and Poorly drained		
Hydric Soil Status	Non-hydric, Non-hydric, and Hydric		
Source of Hydrology	Groundwater, stream overbank		
Hydrologic Impairment	Incised streams, compacted soils, livestock, ditches, drain tile		
Native Vegetation Community	Piedmont Alluvial Forest		
% Composition of Exotic Invasive Vegetation	<5%		
Restoration Method	Hydrologic, vegetative, livestock		
Enhancement Method	Vegetative, livestock		
Regulatory Considerations			
Regulation	**Applicable?**	**Resolved?**	**Supporting Documentation**
Waters of the United States-Section 401	Yes	Yes	JD Package (App D)
Waters of the United States-Section 404	Yes	Yes	JD Package (App D)
Endangered Species Act	Yes	Yes	CE Document (App E)
Historic Preservation Act	Yes	Yes	CE Document (App E)
Coastal Zone Management Act	No	--	NA
FEMA Floodplain Compliance	No	Yes	CE Document (App E)
Essential Fisheries Habitat	No	--	NA

2.0 WATERSHED APPROACH AND SITE SELECTION

Primary considerations for Site selection included the potential for improvement of water quality within a region of North Carolina under livestock/agricultural pressure. More specifically, considerations included: desired aquatic resource functions; hydrologic conditions; soil characteristics; aquatic habitat diversity; habitat connectivity; compatibility with adjacent land uses; reasonably foreseeable effects the mitigation project will have on ecologically important aquatic and terrestrial resources; and potential development trends and land use changes.

Currently, the proposed Site is characterized by disturbed forest and livestock pasture. A summary of existing Site characteristics in favor of proposed stream and wetland activities include the following.

- Streams and wetlands are accessible to livestock
- Stream banks are trampled by livestock
- Streams and wetlands have been cleared of forest vegetation
- Site receives nonpoint source inputs including agricultural chemicals and livestock waste
- Wetland soils have been compacted by livestock and agricultural equipment
- Wetland hydrology has been removed by stream channel entrenchment

In addition to the opportunity for ecological improvements at the Site, the use of the particular mitigation activities and methods proposed in the Design Approach & Mitigation Work Plan (Section 8.0) are expected to produce naturalized stream and wetland resources that will be ecologically self-sustaining, requiring minimal long-term management (Long-term Management Plan [Section 11.0]).

The *Lower Yadkin Pee-Dee River Basin Restoration Priorities* 2009 (RBRP) report (NCEEP 2009) documents restoration goals developed for the Yadkin River Basin. Specific HUC 03040103 watershed goals include:

- Continuation of watershed improvement efforts already ongoing.
- Protection of valuable wildlife resources.
- Improved management of stormwater runoff to these waters and mitigation of impacts resulting from urbanization in the area.
- Prioritizing restoration of water quality in identified impaired streams.

In addition, the Site is located within the *Upper Uwharrie Local Watershed Plan* area (NCEEP 2005), which includes the Caraway Creek watershed (HUC 03040103050040). This area includes streams that are degraded and/or threatened by development and existing uses, including urban land, agriculture, and silviculture. Goals within the Caraway Creek watershed include:

- Preserve active floodplains.
- Protect and enhance aquatic habitat.

The Site is located within a Targeted Local Watershed (TLW); however, it is not located in a Regional Watershed Plan (RWP) or Targeted Resource Area (TRA).

Site specific mitigation goals and objectives have been developed through the use of North Carolina Stream Assessment Method (NC SAM) and North Carolina Wetland Assessment Method (NC WAM) and are discussed further in Section 6.0 (Functional Uplift and Project Goals/Objectives).

3.0 BASELINE AND EXISTING CONDITIONS

3.1 Soils and Land Form

Soils that occur within the Site, according to the Web Soil Survey (USDA 2019) are described in the following table.

Table 5. Web Soil Survey Soils Mapped within the Site

Map Unit Symbol	Map Unit Name (Classification)	Hydric Status	Description
MaC, MeB2, MeC2	Mecklenburg loam and clay loam (*Ultic Hapludalfs*)	Non-hydric	This series consists of well-drained soils found on hillslopes on ridges. The parent material is saprolite derived from diorite and/or gabbro and/or diabase and/or gneiss. Depth to the seasonal high-water table is more than 80 inches. Depth to restrictive features is 40-60 inches to paralithic bedrock. Slopes are 2-15 percent.
WvB2, WvC2	Wynott-Enon complex (*Typic Hapludalfs-Ultic Hapludalfs*)	Non-hydric	This series consists of well-drained soils found on hillslopes on ridges. The parent material is saprolite derived from diorite and/or gabbro and/or diabase and/or gneiss. Depth to the seasonal high-water table and restrictive features is more than 80 inches. Slopes are 2-15 percent.

Existing wetlands and drained hydric soils were mapped by a licensed soil scientist (NC LSS # 1233) on July 29, 2019 as soils of the Wehadkee series (Figure 4, Appendix A); soil boring logs are included in Appendix B.

Although soils mapped by the NRCS are listed as non-hydric, map units are frequently lumped together is individual soil polygons are not sufficient in size. Hydric soils mapped at the Site are less than an acre in size (ranging from 0.02 to 0.94 acre), which is too small to be mapped on the scale of a soil survey. Hydric soils located on the Site exhibit F3 (Depleted Matrix). More detailed discussions of hydric soils are included in Section 3.5.2 Soil Characterization.

3.2 Sediment Model

Sediment load modeling was performed using methodologies outlined in *A Practical Method of Computing Streambank Erosion Rate* (Rosgen 2009) along with *Estimating Sediment Loads using the Bank Assessment of Non-point Sources Consequences of Sediment* (Rosgen 2011). These models provide a quantitative prediction of streambank erosions by calculating Bank Erosion Hazard Index (BEHI) and Near-Bank Stress (NBS) along each Site reach. The resulting BEHI and NBS values are then compared to streambank erodibility graphs prepared for North Carolina by the NC Stream Restoration Institute and NC Sea Grant.

Streambank characteristics involve measurements of bank height, angles, materials, presence of layers, rooting depth, rooting density, and percent of the bank protected by rocks, logs, roots, or vegetation. Site reaches have been measured for each BEHI and NBS characteristic and predicted lateral erosion rate, height, and length to calculate a cubic volume of sediment contributed by the reach each year. Data output is presented in Appendix B and results of the model are presented in the following table.

Table 6. BEHI and NBS Modeling Summary

Stream Reach	Proposed Mitigation Treatment	Predicted Sediment Contribution (tons/year)
UT 1	Restoration and Enhancement (Levels I, II, and II)	49.6
UT 2	Enhancement (Level II)	0.4
UT 3	Restoration and Enhancement (Level II)	7.4
UT 4	Restoration	29.5
UT4A	Restoration	0.6
UT4B	Restoration	0
UT4C	No Credit	0.8
UT 5	No Credit and Restoration	0
UT 6	No Credit	0
UT 7	Enhancement (Level II)	0
	Total Sediment Contribution (tons/year)	**88.4**

Based on this analysis, mitigation of Site streams will reduce streambank erosion and subsequent pollution of receiving waters.

3.3 Nutrient Model

Nutrient modeling was conducted using a method developed by NCDMS (NCDMS 2016) to determine nutrient and fecal coliform reductions from exclusion of livestock from the buffer.

The equation for nutrient reduction for this model includes the following:

TN reduction (lbs/yr) = 51.04 (lbs/ac/yr) x Area (ac)
TP reduction (lbs/yr) = 4.23 (lbs/ac/yr) x Area (ac)

Where:
TN – total nitrogen;
TP – total phosphorus; and
Area – total area of restored riparian buffers inside of livestock exclusion fences.

Equations for fecal coliform reduction for this model include the following.

Fecal coliform reduction (col) = 2.2×10^{11} (col/AU/day) x AU x 0.085

Where:
Col - quantities of Fecal Coliform bacteria
AU - animal unit (1000 lbs of livestock)

Assuming the entire 31.7-acre Site will have livestock removed/spray field applications ceased and stocking rates include approximately 50 cows residing on the farm, the NC DMS analysis calculates approximately 1618.0 lbs/yr of nitrogen, 134.1 lbs/yr of phosphorus, and 9.35×10^{11} col of fecal coliform/day will be reduced due to exclusion of livestock from the easement area.

3.4 Project Site Streams

Streams targeted for restoration include UTs to Caraway Creek, which have been cleared, moved to the edge of the floodplain, dredged and straightened, trampled by livestock, eroded vertically and laterally, and receive extensive sediment and nutrient inputs from livestock. Approximately 69 percent of the existing stream channel has been degraded contributing to sediment export from the Site resulting from mechanical processes from livestock hoof shear. In addition, streamside wetlands have been cleared and drained by channel downcutting, drain tile installation, and land uses. Current Site conditions have resulted in degraded water quality, a loss of aquatic habitat, reduced nutrient and sediment retention, and unstable channel characteristics (loss of horizontal flow vectors that maintain pools and an increase in erosive forces to channel bed and banks). Site restoration activities will restore riffle-pool morphology, aid in energy dissipation, increase aquatic habitat, stabilize channel banks, and greatly reduce sediment loss from channel banks.

Reach Descriptions

Individual reach descriptions are as follows.

UT 1

UT 1 initiates within the Site boundaries at a drain tile extending beneath agriculture pasture and extends downstream through various reaches. Despite the drain tile, soil probing did not locate hydric soils in the upstream pasture and the point of stream origin is located downstream in an incised wooded section of channel. The incised stream is heavily impacted by livestock and bank erosion is apparent throughout. The channel extends through the incised reach to a wooded reach of channel where dredging and straightening of the channel is apparent. As the channel descends the valley, the channel becomes incised and oversized and is accessible to livestock throughout.

The channel has a narrow fringe of successional vegetation primarily characterized by Chinese privet (*Ligustrum sinense*), black willow (*Salix nigra*), and blackberry *(Rhubus* sp.). UT 1 has three distinct reaches including the upstream incised reach, a dredged and straightened middle section, and the downstream incised reach. The entire stream is relatively incised and oversized as evidenced by a bank-height ratio averaging 2.8. The upstream reach has frequent eroding banks and a resultant gravel substrate.

UT 2

UT 2 is an intermittent stream (NCDWQ Form Score of 20.5) that originates at a small farm pond and extends through a short-wooded section, prior to crossing open pasture and joining with UT 1. The reach is relatively short (592 ft) in length. The lower half of the tributary is drained by tile located beneath the channel bed, presumably to keep the pasture passable by livestock and vehicles. Due to the small drainage area, the channel remains relatively stable and is therefore proposed for Enhancement (Level II).

UT 3

UT 3 originates within the Site boundaries at a headcut that the farmer has piled debris to deter further headcut migration through his pasture. The upper reaches of the channel are characterized by a narrow, deeply incised channel that runs through open pasture. The channel flows down to a relict pond that has been breached and livestock congregate, creating a mire. Below the mire, a stone grade control leads to a reference reach that has minor livestock disturbance but is relatively stable due to bedrock contact and mature, deep-rooted vegetation. Below the reference reach the channel has been dredged, straightened, and pushed to the margins of the floodplain. On the left bank is the "Bull Chute", where successional vegetations has taken hold, likely due to difficulties in accessing with bush hogging equipment. This area is relatively wet; however, remains drained by the incised channel. As the channel descends the valley, the channel flows into UT 4 and becomes very incised and oversized.

UT 4

UT 4 originates at three locations (UT4A, UT 4B, and UT 4C). These tributaries originate within, or immediately adjacent to the Site boundaries and have been ditched or manipulated. The tributaries converge and form UT 4 proper that drain to a historically impounded area with a perched pipe. Below the impounded area, the channel drains through wet floodplains with forest vegetation scattered along each bank. Livestock have access to the entire reach of UT 4 and the effects of livestock are evident

throughout. Below the confluence with UT 3, the channel becomes excessively incised and oversized, with bank-height-ratios exceeding 5.3. Like UT 1, a narrow fringe of successional vegetation has established adjacent to the channel that is largely composed of Chinese privet, red maple (*Acer rubrum*), dog fennel (*Eupatorium capillifolium*), and blackberry. Substrate is a mixture of cobble and sand.

UT 5 and 6

UT 5 and 6 are short reaches (75 and 121 feet, respectively) that are intermittent in nature (NCDWQ Form Score of 22 and 17, respectively). These tributaries were added during an IRT walkthrough of the Site and subsequently during a PJD review by the US Army Corps of Engineers. UT 5 occurs at the base of a small reentrant as surface flows cut down to the elevation of the receiving UT 1. UT 6 originates within the easement in a man-made ditch that captures spring-fed flow.

UT 7

UT 7 is short reach (68 feet) that is intermittent in nature (NCDWQ Form Score of 23.5). This tributary was added during an IRT walkthrough of the Site and subsequently during a PJD review by the US Army Corps of Engineers. UT 7 originates within the Site and begins as surface flows cut down to the elevation of the receiving UT 3.

3.4.1 Existing Conditions Survey

Site stream dimension, pattern, and profile were measured to characterize existing channel conditions. Locations of existing stream reaches are depicted in Figure 4A (Appendix A). Stream geometry measurements under existing conditions are summarized in Table 7 (Essential Morphology Parameters) and presented in detail in Table B1 (Appendix B).

Table 7. Essential Morphology Parameters

Parameter	Existing			Reference		Proposed		
	UT 1	UT 3	UT 4 Up	Cedarock Park	Bull Chute	UT 1	UT 3	UT 4 Up
Valley Width (ft)	14	9	11	18	43	100	75	75
Contributing Drainage Area (sq. mi.)	0.15	0.08	0.09	0.21	0.05	0.15	0.08	0.09
Channel/Reach Classification	G5	G5	Fg 5	Eb4	E4	Ce ¾	Ce ¾	Ce ¾
Design Discharge Width (ft)	5.6-16.0	3.3-7.1	5.0-10.4	8.1	5.4	9.2	7.2	7.8
Design Discharge Depth (ft)	0.4-1.1	0.5-1.1	0.4-0.9	0.8	0.5	0.7	0.5	0.6
Design Discharge Area (ft^2)	6.0	3.7	4.3	8.0	3.0	6.0	3.7	4.3
Design Discharge Velocity (ft/s)	3.8	3.7	3.7	3.6	3.5	3.8	3.7	3.7
Design Discharge (cfs)	22.9	13.7	16.1	28.8	10.5	22.9	13.7	16.1
Water Surface Slope	0.0211	0.0254	0.212	0.0258	0.0357	0.0189	0.0225	0.0196
Sinuosity	1.03	1.02	1.06	1.20	1.15	1.15	1.15	1.05
Width/Depth Ratio	5.1-40	3.0-14.2	5.6-26.0	10.1	10.9	14.0	14.0	14.0
Bank Height Ratio	1.3-5.0	1.5-4.0	2.5-5.4	1.0	1.0	1.0	1.0	1.0
Entrenchment Ratio	1.1-15.9	1.1-13.5	1.1-2.6	2.1	7.9	10.9	10.4	9.7
Substrate	Sand	Sand	Sand	Gravel	Gravel	Gravel/cobble	Gravel/cobble	Gravel/cobble

Table 7. Essential Morphology Parameters (continued)

Parameter	Existing			Reference		Proposed		
	UT 4 down	UT 4A	UT 4B	Cedarock Park	Bull Chute	UT 4 down	UT 4A	UT 4B
Valley Width (ft)	11	8	14	18	43	100	35	35
Contributing Drainage Area (sq. mi.)	0.19	0.02	0.1	0.21	0.05	0.19	0.02	0.01
Channel/Reach Classification	G5	Eg5	Cf5	Eb4	E4	Ce ¾	Ce ¾	Ce ¾
Design Discharge Width (ft)	7.8-10.0	2.3-4.5	3.1-6.9	8.1	5.4	9.8	4.3	4.3
Design Discharge Depth (ft)	0.7-0.9	0.3-0.5	0.2-0.4	0.8	0.5	0.7	0.3	0.3
Design Discharge Area (ft^2)	6.9	1.3	1.2	8.0	3.0	6.9	1.3	1.3
Design Discharge Velocity (ft/s)	3.9	3.3	3.6	3.6	3.5	3.9	3.3	3.3
Design Discharge (cfs)	26.7	4.3	4.3	28.8	10.5	26.7	4.3	4.3
Water Surface Slope	0.0165	0.0444	0.0359	0.0258	0.0357	0.0146	0.0336	0.0336
Sinuosity	1.02	1.02	1.03	1.20	1.15	1.15	1.15	1.15
Width/Depth Ratio	8.7-14.3	4.6-15.0	7.8-34.5	10.1	10.9	14.0	14.0	14.0
Bank Height Ratio	4.7-5.9	1.7-3.9	1.3-7.3	1.0	1.0	1.0	1.0	1.0
Entrenchment Ratio	1.1-1.4	1.3-3.6	1.3-5.8	2.1	7.9	10.2	8.2	8.2
Substrate	Sand	Sand	Sand	Gravel	Gravel	Gravel/cobble	Gravel/cobble	Gravel/cobble

3.4.2 Channel Classification and Morphology

Stream geometry and substrate data have been evaluated to classify existing stream conditions based on a classification utilizing fluvial geomorphic principles (Rosgen 1996). Existing Site reaches are classified as unstable G-, Fg-, Eg-, and Cf-type streams with variable sinuosity. Existing Site reaches are characterized by variable substrate; however, the streams are primarily characterized by sand dominated substrate as the result of channel impacts including livestock trampling, channel straightening, and riparian vegetation removal.

3.4.3 Channel Evolution

Site streams targeted for restoration have been channelized and are continually trampled by livestock resulting primarily in channels classified as degraded (Class III), and degraded and widened (Class IV) channels throughout the Site (Simon and Hupp 1986).

3.4.4 Valley Classification

Site Streams are characterized valley Type VIII (Rosgen 1996) which are identified by the presence of multiple river terraces positioned laterally along broad valleys with gentle, down-valley elevation relief. Alluvial terraces and floodplains are the predominant depositional landforms. Site valley slopes are typical for the Piedmont region and range from 0.0168 on the lower reaches of UT 4 and 0.0453 at the headwaters of UT 4A. Typical streams in this region include C- and E-type streams that are slightly entrenched, meandering channels with a riffle-pool sequence.

3.4.5 Discharge

This hydrophysiographic region is characterized by moderate rainfall with precipitation averaging approximately 45.5 inches per year (USDA 2006). Drainage basin sizes range from 0.01-square mile on UT 4B and 0.19 on the lower reaches of UT 4.

The Site's discharge is dominated by a combination of upstream basin catchment, groundwater flow, and precipitation. Based on indicators of bankfull at reference reaches and on-Site, the designed channel will equal the channel size indicated by Piedmont regional curves (Harman et al. 1999); this is discussed in Section 5.2 (Bankfull Verification). Based on bankfull studies, the bankfull discharge ranges from 4.1 cubic feet per second for UT 4B, and 26.7 cubic feet per second for the lower reaches of UT 4.

3.5 Project Site Wetlands

Jurisdictional wetlands/hydric soils within the Site were delineated in the field following guidelines set forth in the *Corps of Engineers Wetlands Delineation Manual* and subsequent regional supplements, and located using GPS technology with reported submeter accuracy (Environmental Laboratory 1987). A jurisdictional wetland delineation was completed and verbally approved by United States Army Corps of Engineers (USACE) representative James Lastinger. Written confirmation of the determination is included in Appendix D. Existing jurisdictional wetlands are depicted in blue cross hatch and drained hydric soils are depicted in black cross hatch on Figure 4A (Appendix A).

3.5.1 Hydrological Characterization

Construction activities are expected to reestablish approximately 3.130 acres of drained riparian hydric soils, rehabilitate 0.114 acre of riparian wetlands, and enhance 1.462 acres of cleared riparian wetlands. Areas of the Site targeted for riparian wetlands will receive hydrological inputs from periodic overbank flooding of restored tributaries, groundwater migration into wetlands, upland/stormwater runoff, and, to a lesser extent, direct precipitation. Hydrological impairment in drained soils has resulted from lateral draw-down of the water table adjacent to existing, incised stream channels and drain tile installation.

3.5.2 Soil Characterization

Detailed soil mapping conducted by a North Carolina Licensed Soil Scientist (NCLSS) in July 2019 indicate that the Site is currently underlain by hydric soils of the Wehadkee series (Figure 4, Appendix A). Soils have been disturbed by livestock grazing and cleared of vegetation within pastureland. These hydric soils have been effectively drained by stream channel incision, relocation of stream channels to the floodplain margins, and drain tile installation.

Onsite hydric soils are grey to gley in color and are compacted and pockmarked by livestock trampling. Livestock trampling, grazing, and clearing has resulted in an herbaceous vegetative community. Groundwater springs and surface runoff contribute hydrology to these areas, although the dominant hydrological influence is the lateral draw-down of the water table adjacent to incised stream channels or streams relocated to the floodplain margins. A detailed soil profile conducted by a NCLSS is as follows. Additional soil profiles are included in Appendix B and the location of the profiles are depicted on Figure 4 (Appendix A).

Table 8. Profile Description

Depth (inches)	Color	Texture
0 - 4	10 YR 4/3 10 YR 5/6 mottles	Loam
4 - 10	10 YR 5/2 10 YR 4/6 mottles	Loam
10 – 18	10 YR 6/2 10 YR 4/6 mottles	Silt loam
18+	10 YR 6/2 10 YR 4/6 mottles	Clay loam

3.5.3 Plant Community Characterization

Areas proposed for wetland restoration and enhancement are primarily vegetated by fescue and opportunistic herbaceous species with very little vegetative diversity. Wetland areas with a disturbed canopy include scattered trees of species such as American elm (*Ulmus americana*), hackberry (*Celtis laevigata*), and American sycamore (*Platanus occidentalis*). Wetland mitigation areas frequently have a significant stands invasive species such as Chinese privet (*Ligustrum sinense*), rose (*Rosa multiflora*), and princess tree (*Paulownia tomentosa*); however, most wetlands are open areas primarily characterized by grasses (*Festuca* sp.) planted for livestock grazing, sedges (*Cyperus echinatus*), and rushes (*Juncus effusus*).

4.0 REFERENCE STUDIES

4.1 REFERENCE STREAMS

Distinct bankfull indicators were present within the reference stream channels. In addition, dimension, pattern, and profile variables have not been altered or degraded, allowing for assistance with the proposed restoration reaches (Figure 5A-B, Appendix A).

4.1.1 Cedarock Park Reference Reach

4.1.1.1 Watershed Characterization

Cedarock Park is located in Alamance County, approximately 26 miles northeast of the Site. Alterations, development, and impervious surfaces within the watershed are minimal.

4.1.1.2 Channel Classification

Stream geometry and substrate data have been evaluated to classify the reference reach based on a classification utilizing fluvial geomorphic principles (Rosgen 1996). This classification stratifies streams into comparable groups based on pattern, dimension, profile, and substrate characteristics. The reference reach is characterized as a Eb-type, moderate sinuosity (1.20) channel with a gravel-dominated substrate. Eb-type streams are characterized as slightly to moderately entrenched, riffle-pool channels exhibiting a low to moderate width-depth ratio. Eb-type streams often occur in narrower valleys with moderately-developed alluvial floodplains.

4.1.1.3 Discharge

The reference stream has an approximately 0.21-square mile watershed and a bankfull discharge of 28.8 cubic feet per second based on bankfull indicators.

4.1.1.4 Channel Morphology

Stream cross-sections and profiles were measured along the reference stream (Figure 5A, Appendix A). The stream reach is transporting its sediment supply while maintaining stable dimension, pattern, and profile. Stream geometry measurements for the reference stream are summarized in the Morphological Stream Characteristics Table (Table B1, Appendix B).

Dimension: Data collected at the reference reach indicates a bankfull cross-sectional area of 8.0 square feet, a bankfull width of 8.1 feet, a bankfull depth of 0.8 feet, and a width-to-depth ratio of 10.1. Regional curves predict that the stream should exhibit a bankfull cross-sectional area of approximately 7.5 square feet for the approximate 0.21-square mile watershed (Harman et al. 1999), slightly lower than the 8.0-square feet displayed by channel bankfull indicators identified in the field, but within the range predicted by the curves. For a more detailed discussion on bankfull verification see Section 3.5 (Bankfull Verification).

The reference reach exhibits a bank-height ratio averaging 1.0, which is expected for a stable Eb-type channel. In addition, the width of the floodprone area is approximately 18 feet giving the channel an entrenchment ratio of 1.9 to 2.2.

Pattern: In-field measurements of the reference reach have yielded an average sinuosity of 1.2 (thalweg distance/straight-line distance). Other channel pattern attributes include an average pool-to-

pool spacing ratio (L_{p-p}/W_{bkf}) of 4.6, a meander wavelength ratio (L_m/W_{bkf}) of 8.4, and a radius of curvature ratio (R_c/W_{bkf}) of 2.0. These variables were measured within a stable, forested reach, which did not exhibit any indications of pattern instability such as shoot cutoffs, abandoned channels, or oxbows.

Profile: Based on elevational profile surveys, the reference reach is characterized by a valley slope of 0.0310 (rise/run). Ratios of the reference reach riffle, run, pool, and glide slopes to average water surface slope are 1.2, 1.37, 0, and 0.11, respectively.

Substrate: The channel is characterized by a channel substrate dominated by gravel-sized particles.

4.1.2 Bull Chute Reference Reach

4.1.2.1 Watershed Characterization

The Bull Chute reference reach is located within the Site boundaries in a wooded section of the UT 3. This reach does not exhibit extensive destabilization, largely due to bedrock inhibiting headcuts from migrating into the reach. The watershed is characterized by agriculture fields, similar to the expected, post project conditions.

4.1.2.2 Channel Classification

The reference reach is characterized as an E-type, moderately sinuous (1.15) channel with a gravel-dominated substrate. E-type streams are characterized as slightly entrenched, riffle-pool channels. In North Carolina, E-type streams often occur in narrow to wide valleys with well-developed alluvial floodplains (Valley Type VIII). E-type channels are typically considered stable; however, these streams are sensitive to upstream drainage basin changes and/or channel disturbance and may rapidly convert to other stream types.

4.1.2.3 Discharge

The reference stream has an approximately 0.05-square mile watershed and a bankfull discharge of 10.5 cubic feet per second based on bankfull indicators.

4.1.2.4 Channel Morphology

Stream cross-sections and profiles were measured along the reference stream (Figure 5B, Appendix A). The stream reach is transporting its sediment supply while maintaining stable dimension, pattern, and profile. Stream geometry measurements for the reference stream are summarized in the Morphological Stream Characteristics Table (Table B1, Appendix B).

Dimension: Data collected at the reference reach indicates a bankfull cross-sectional area of 3.0 square feet, a bankfull width of 5.4 feet, a bankfull depth of 0.5 feet, and a width-to-depth ratio of 10.9. Regional curves predict that the stream should exhibit a bankfull cross-sectional area of approximately 2.9 square feet for the approximate 0.05-square mile watershed (Harman et al. 1999), slightly below the 3.0-square feet displayed by channel bankfull indicators identified in the field. For a more detailed discussion on bankfull verification see Section 3.5 (Bankfull Verification).

The reference reach exhibits a bank-height ratio of 1.0, which is representative of a stable E-type channel. In addition, the width of the floodprone area is approximately 43 feet giving the channel an entrenchment ratio of 7.4 to 8.3, typical of a stable E-type channel.

Pattern: In-field measurements of the reference reach have yielded an average sinuosity of 1.15 (thalweg distance/straight-line distance). Other channel pattern attributes include an average pool-to-pool spacing ratio (L_{p-p}/W_{bkf}) of 3.3, a meander wavelength ratio (L_m/W_{bkf}) of 6.1, and a radius of curvature ratio (R_c/W_{bkf}) of 1.4. These variables were measured within a stable, forested reach, which did not exhibit any indications of pattern instability such as shoot cutoffs, abandoned channels, or oxbows.

Profile: Based on elevational profile surveys, the reference reach is characterized by a valley slope of 0.0411 (rise/run). Ratios of the reference reach riffle, run, pool, and glide slopes to average water surface slope are 0.61, 0.02, 0, and 0.58, respectively. Ratios of these facets are slightly skewed due to a number of debris jams and bedrock steps that were not included in these ratios.

Substrate: The channel is characterized by a channel substrate dominated by Gravel-sized particles.

4.2 Reference Forest Ecosystem

A Reference Forest Ecosystem (RFE) is a forested area on which to model restoration efforts at the Site in relation to soils and vegetation. RFEs should be ecologically stable climax communities and should be a representative model of the Site as it likely existed prior to human disturbances. Data describing plant community composition and structure should be collected at the RFEs and subsequently applied as reference data in an attempt to emulate a natural climax community.

The RFE for this project is located on the Randleman Reservoir. The RFE supports plant community and landform characteristics that restoration efforts will attempt to emulate. Tree and shrub species identified within the reference forest and outlined in Table 9 will be used, in addition to other relevant species in appropriate Schafale and Weakley (1990) and Shafale (2012) community descriptions.

Table 9. Reference Forest Ecosystem

Piedmont/Low Mountain Alluvial Forest
red maple (*Acer rubrum*)
hackberry (*Celtis laevigata*)
American beech (*Fagus grandifolia*)
American holly (*Ilex opaca*)
eastern red cedar (*Juniperus virginiana*)
sweetgum (*Liquidambar styraciflua*)
tulip poplar (*Liriodendron tulipifera*)
black cherry (*Prunus serotina*)
black willow (*Salix nigra*)

5.0 CHANNEL ASSESSMENTS

5.1 Channel Stability Assessment

Channel degradation or aggradation occurs when hydraulic forces exceed or do not approach the resisting forces in the channel. The amount of degradation or aggradation is a function of relative magnitude of these forces over time. The interaction of flow within the boundary of open channels is only imperfectly understood. Adequate analytical expressions describing this interaction have yet to be developed for conditions in natural channels. Thus, means of characterizing these processes rely heavily upon empirical formulas.

Traditional approaches for characterizing stability can be placed in one of two categories: 1) maximum permissible velocity and 2) tractive force, or stream power and shear stress. The former is advantageous in that velocity can be measured directly. Shear stress and stream power cannot be measured directly and must be computed from various flow parameters. However, stream power and shear stress are generally better measures of fluid force on the channel boundary than velocity.

Stream power and shear stress were estimated for 1) existing dredged and straightened reaches, 2) the reference reaches, and 3) proposed Site conditions. Important input values and output results (including stream power, shear stress, and per unit shear power and shear stress) are presented in the following table. Average stream velocity and bankfull discharge values were calculated for the existing Site stream reaches, the reference reach, and proposed conditions.

In order to maintain sediment transport functions of a stable stream system, the proposed channel should exhibit stream power and shear stress values so the channel is neither aggrading nor degrading. Results of the analysis indicate the proposed channel reaches are expected to maintain stream power as a function of width values of approximately 0.62-2.52 and shear stress values of approximately 0.15-0.58 (Table 10).

Table 10. Stream Power (Ω) and Shear Stress (τ) Values

	Bankfull Discharge (ft^3/s)	Water surface Slope (ft/ft)	Total Stream Power (Ω)	Ω/W	Hydraulic Radius	Shear Stress (τ)	Velocity (v)	τ v	τ_{max}
Existing Conditions									
UT 1	22.9	0.0076	10.86	**1.28**	4.55	**2.16**	0.51	1.10	3.23
UT 3	13.7	0.0052	4.45	**0.87**	2.31	**0.75**	0.91	0.68	1.12
UT 4-upstream	16.1	0.0212	21.30	**2.57**	2.79	**3.69**	0.61	2.24	5.54
UT 4-downstream	26.7	0.0165	27.49	**2.99**	6.40	**6.59**	0.39	2.55	9.89
UT 4A	1.3	0.0444	3.60	**1.09**	3.05	**8.45**	0.10	0.88	12.67
UT 4B	1.2	0.03359	2.52	**0.50**	2.89	**6.06**	0.07	0.45	9.10
Reference Conditions									
Cedarock	28.8	0.0258	46.37	**5.72**	0.82	**1.33**	3.60	4.78	6.67
Bull Chute-Ref	10.45	0.0357	23.28	**4.31**	0.47	**1.04**	3.48	3.64	1.57
Proposed Conditions									
UT 1	22.9	0.0075	10.72	**1.16**	0.57	**0.26**	3.82	1.01	0.40
UT 3	13.7	0.0052	4.45	**0.62**	0.45	**0.15**	3.70	0.54	0.22
UT 4-upstream	16.1	0.0196	19.69	**2.52**	0.48	**0.58**	3.74	2.19	0.88
UT 4-downstream	26.7	0.0146	24.32	**2.48**	0.62	**0.56**	3.87	2.17	0.84
UT 4A	4.3	0.0336	9.02	**2.10**	0.27	**0.56**	3.31	1.84	0.83
UT 4B	4.3	0.0336	9.02	**2.10**	0.27	**0.56**	3.31	1.84	0.83

Cedarock and Bull Chute reference reach values for stream power and shear stress are elevated due to steeper water surface slopes and low width to depth ratios. Existing, Site streams are characterized by a wide range of water surface slopes and varying degrees of degradation. In general, stream power values of existing streams are slightly elevated as compared to proposed values with the exception of UT4A & UT4B, which are low due to the small channel cross sectional area (note that total stream power/width are in line with acceptable ranges). Shear stress values of existing streams are significantly elevated as compared to proposed and reference reach values. Proposed stream power and shear stress values appear adequate to mobilize and transport sediment through the Site, without aggradation or erosion on proposed stream banks.

5.2 Bankfull Verification

Discharge estimates for the Site utilize an assumed definition of "bankfull" and the return interval associated with that bankfull discharge. For this study, the bankfull channel is defined as the channel dimensions designed to support the "channel forming" or "dominant" discharge (Gordon et al. 1992).

Based on available Piedmont regional curves, the predicted bankfull discharge for the reference reaches averages approximately 28.8 and 10.5 cubic feet per second (cfs) for Cedarock and Bull Chute, respectively (Harmen et al. 1999). The USGS regional regression equation for the

Piedmont region indicates that bankfull discharge for the reference reaches at a 1.3-1.5 year return interval average approximately 27-32 and 9-12 cfs, respectively (USGS 2006).

Field indicators of bankfull, primarily topographic breaks identified on the banks, and riffle cross-sections were utilized to obtain an average bankfull cross-sectional area for the reference reaches. The Piedmont regional curves were then utilized to plot the watershed area and discharge for the reference reach cross-sectional area. Field indicators of bankfull approximate an average discharge of 30.9 and 10.9 cfs, respectively for the reference reaches, which is 103 and 107 percent of that predicted by the regional curves; which is verified by the range approximated by the USGS regional regression equation.

Table 11 summarizes all methods analyzed for estimating bankfull discharge.

Table 11. Reference Reach Bankfull Discharge Analysis

Method	Watershed Area (square miles)	Return Interval (years)	Discharge (cfs)
Cedarock Reference Reach			
Piedmont Regional Curves (Harman et al. 1999)	0.21	1.3-1.5	28.8
Piedmont Regional Regression Model (USGS 2004)	0.21	1.3-1.5	27-32
Field Indicators of Bankfull	0.21	1.3-1.5	30.9
Bull Chute Reference Reach			
Piedmont Regional Curves (Harman et al. 1999)	0.05	1.3-1.5	10.5
Piedmont Regional Regression Model (USGS 2004)	0.05	1.3-1.5	9-12
Field Indicators of Bankfull	0.05	1.3-1.5	10.9

After consideration of the above analysis, it was determined that the Piedmont regional curves (Harman et al. 1999) accurately represent discharge and bankfull cross sectional area of Site streams. Therefore, Site discharge will be based on these regional curves. Specific design discharges for each reach are depicted in Table B1, in Appendix B.

6.0 FUNCTIONAL UPLIFT AND PROJECT GOALS/OBJECTIVES

The goals of the proposed Bull Chute Stream and Riparian Wetland Mitigation Site are to provide high quality compensatory mitigation for authorized stream and wetland impacts credited through the NC DMS in-lieu-fee program and occurring within the Yadkin River Hydrologic Unit Code (HUC) 03040103 and to address the watershed goals identified in the Lower Yadkin Pee-Dee River Basin Restoration Plan (RBRP) (NCEEP 2009). Specific HUC 03040103 watershed goals include:

- Continuation of watershed improvement efforts already ongoing.
- Protection of valuable wildlife resources.
- Improved management of stormwater runoff to these waters and mitigation of impacts resulting from urbanization in the area.
- Prioritizing restoration of water quality in identified impaired streams.

In addition, the Site is located within the Upper Uwharrie Local Watershed Plan area (NCEEP 2005), which includes the Caraway Creek watershed (HUC 03040103050040). This area includes streams that are degraded and/or threatened by development and existing uses, including urban land, agriculture, and silviculture. Goals within the Caraway Creek watershed include:

- Preserve active floodplains.
- Protect and enhance aquatic habitat.

The Site is located within a Targeted Local Watershed (TLW); however, it is not located in a Regional Watershed Plan (RWP) or Targeted Resource Area (TRA).

Site specific mitigation goals and objectives have been academically developed through the use of North Carolina Stream Assessment Method (NC SAM) and North Carolina Wetland Assessment Method (NC WAM) analyses of existing stream systems at the Site (NC SFAT 2015 and NC WFAT 2010). Site functional assessment data forms are available upon request; model output is included in Appendix B and is summarized in the following table. Metrics academically targeted to meet the Site's goals and objectives are depicted in bold, within Tables 12A and 12B, below.

Table 12A. NC SAM Summary

NC SAM Function Class Rating Summary	UT 1	UT 2	UT 3	UT 4	UT 5
(1) HYDROLOGY	**LOW**	**LOW**	MEDIUM	**LOW**	**LOW**
(2) Baseflow	MEDIUM	HIGH	MEDIUM	MEDIUM	**LOW**
(2) Flood Flow	**LOW**	**LOW**	MEDIUM	**LOW**	MEDIUM
(3) Streamside Area Attenuation	**LOW**	MEDIUM	MEDIUM	**LOW**	MEDIUM
(4) Floodplain Access	MEDIUM	HIGH	HIGH	MEDIUM	MEDIUM
(4) Wooded Riparian Buffer	**LOW**	**LOW**	**LOW**	**LOW**	MEDIUM
(4) Microtopography	**LOW**	**LOW**	**LOW**	**LOW**	**LOW**
(3) Stream Stability	**LOW**	**LOW**	MEDIUM	MEDIUM	MEDIUM
(4) Channel Stability	MEDIUM	MEDIUM	MEDIUM	MEDIUM	MEDIUM
(4) Sediment Transport	MEDIUM	**LOW**	MEDIUM	MEDIUM	MEDIUM
(4) Stream Geomorphology	**LOW**	MEDIUM	HIGH	MEDIUM	MEDIUM
(1) WATER QUALITY	**LOW**	**MEDIUM**	**LOW**	**LOW**	**LOW**
(2) Baseflow	MEDIUM	HIGH	MEDIUM	MEDIUM	**LOW**
(2) Stream-side Area Vegetation	MEDIUM	**LOW**	**LOW**	HIGH	HIGH
(3) Upland Pollutant Filtration	MEDIUM	**LOW**	**LOW**	HIGH	HIGH
(3) Thermoregulation	MEDIUM	MEDIUM	MEDIUM	MEDIUM	HIGH
(2) Indicators of Stressors	**YES**	**YES**	**YES**	**YES**	**YES**
(2) Aquatic Life Tolerance	**LOW**	HIGH	HIGH	**LOW**	Omitted
(1) HABITAT	**LOW**	**LOW**	MEDIUM	MEDIUM	**LOW**
(2) In-stream Habitat	MEDIUM	**LOW**	**LOW**	**LOW**	**LOW**
(3) Baseflow	MEDIUM	HIGH	MEDIUM	HIGH	**LOW**
(3) Substrate	MEDIUM	**LOW**	**LOW**	MEDIUM	MEDIUM
(3) Stream Stability	MEDIUM	MEDIUM	MEDIUM	MEDIUM	MEDIUM
(3) In-Stream Habitat	MEDIUM	**LOW**	**LOW**	MEDIUM	MEDIUM
(2) Stream-side Habitat	**LOW**	MEDIUM	HIGH	HIGH	HIGH
(3) Stream-side Habitat	**LOW**	MEDIUM	HIGH	**LOW**	HIGH
(3) Thermoregulation	**LOW**	MEDIUM	MEDIUM	**LOW**	HIGH
OVERALL	**LOW**	**LOW**	**LOW**	**LOW**	**LOW**

Based on NC SAM output, all three primary stream functional metrics (Hydrology, Water Quality and Habitat), as well as 20 sub-metrics are academically under-performing as exhibited by a LOW metric rating (see Figure 4, Appendix A for NC SAM data reaches). LOW performing metrics are to be academically targeted for functional uplift through mitigation activities, goals and objectives, as well as, monitoring and success criteria.

Table 12B. NC WAM Summary

NC WAM Sub-function Rating Summary	PQ
Wetland Type	Headwater Forest
(1) HYDROLOGY	**LOW**
(2) Surface Storage & Retention	**LOW**
(2) Sub-surface Storage & Retention	**LOW**
(1) WATER QUALITY	HIGH
(2) Pathogen change	HIGH
(2) Particulate Change	HIGH
(2) Soluble change	MEDIUM
(2) Physical Change	HIGH
(1) HABITAT	**LOW**
(2) Physical Structure	**LOW**
(2) Landscape Patch Structure	MEDIUM
(2) Vegetative Composition	**LOW**
OVERALL	**LOW**

Based on NC WAM output, two of the primary wetland functional metrics (Hydrology, Water Quality, and Habitat), as well as 4 sub-metrics are academically under-performing as exhibited by a LOW metric rating. LOW performing metrics are to be academically targeted for functional uplift through mitigation activities, goals and objectives, as well as, monitoring and success criteria.

Stream and wetland metrics targeted for functional uplift, tied to defined Site-specific project goals and objectives are presented in Table 12C, below.

Table 12C. Targeted Functions, Goals, Objectives, and Uplift Evaluation

Goal	Objective/Treatment	Likely Functional Uplift	Performance Criteria	Measurement	Cumulative Monitoring Results
Reconnect channels with floodplains and riparian wetlands to allow a natural flooding regime.	Reconstruct stream channels with appropriate bankfull dimensions and depth relative to the existing floodplain. Remove overburden to reconnect with adjacent wetlands.	Dispersion of high flows on the floodplain, increase in biogeochemical cycling within the system, and recharging of riparian wetlands.	Four bankfull events and within monitoring period.	3 Crest gauge (pressure transducers) on UT 1, UT 3, and UT 4.	To be determined
Improve stability of stream channels.	Construct stream channels that will maintain stable cross-sections, patterns, and profiles over time.	Reduction in sediment inputs from bank erosion, reduction of shear stress, and improved overall hydraulic function.	Bank height ratios remain below 1.2 over the monitoring period. Visual assessments showing progression towards stability.	26 Cross section surveys	To be determined
Restore and enhance native floodplain and streambank vegetation.	Plant native tree and understory species in riparian zones and plant appropriate species on streambanks.	Reduction in floodplain sediment inputs from runoff, increased bank stability, increased LWD and organic material in streams, increased	Survival rate of 320 stems per acre at MY3, 260 planted stems per acre at MY5, and 210 stems per acre at MY7.	21 veg plots	To be determined
Restore and enhance groundwater hydrology to drained or impacted hydric soil areas.	Reduce channel depth in incised stream reaches, remove drain tile, fill drainage ditches, and alleviate soil compaction from agriculture activities.	Particulate and pollution conversion, groundwater storage and reduced downstream flooding, habitat diversification, and vegetative composition conversion.	Groundwater saturation within 12 inches of the soil surface for 12 % of the growing season for reestablishment and improvement of hydrology in rehabilitation areas.	9 groundwater gauges	To be determined

Note: Soil temperature at the beginning of each monitoring period to verify the start of the growing season, groundwater and rain data for each monitoring period.

7.0 SITE DESIGN AND IMPLEMENTATION CONSTRAINTS

The presence of conditions or characteristics that have the potential to hinder restoration activities on the Site was evaluated. The evaluation focused primarily on the presence of hazardous materials, utilities and restrictive easements, rare/threatened/endangered species or critical habitats, and the potential for hydrologic trespass. Existing information regarding Site constraints was acquired and reviewed. In addition, any Site conditions that have the potential to restrict the restoration design and implementation were documented during the field investigation.

No known Site constraints, that may hinder proposed mitigation activities, were identified during field surveys. Potential constraints reviewed include the following.

7.1 Threatened & Endangered Species

Species with the federal classification of Endangered (E), Threatened (T), or Officially Proposed (P) for such listing are protected under the Endangered Species Act (ESA) of 1973, as amended, and the Bald and Golden Eagle Protection Act. The US Fish and Wildlife Service's website was reviewed to determine federally-protected species that are known to occur in Randolph County (Table 13).

Table 13. Threatened and Endangered Species

Species	Potential Habitat at Site	Biological Conclusion
Cape Fear shiner (*Notropis mekistocholas*) Endangered	No	No Effect
Schweinitz's sunflower (*Helianthus schweinitzii*) Endangered	No	No Effect

Cape Fear shiner (*Notropis mekistocholas*) Endangered
Biological conclusion: No Effect

The Cape Fear shiner is known only from the Cape Fear River watershed. In general, habitat occurs in streams with clean gravel, cobble, or boulder substrates. It is most often observed inhabiting slow pools, riffles, and slow runs associated with water willow (*Justicia americana*) beds, which it uses for cover. Juveniles can be found inhabiting slackwater, among large rock outcrops and in flooded side channels and pools. Spawning occurs May through June, when water temperatures reach 66 degrees Fahrenheit. The Site is located in the Yadkin River Basin; therefore, this project will have no effect on Cape Fear shiner.

Schweinitz's sunflower (*Helianthus schweinitzii*) Endangered
Biological conclusion: No Effect

Schweinitz's sunflower is found along roadside rights-of-way, maintained power lines and other utility rights-of-way, edges of thickets and old pastures, clearings and edges of upland oak-pine-hickory woods and Piedmont longleaf pine forests, and other sunny or semi-sunny habitats where disturbances (e.g., mowing, clearing, grazing, blow downs, storms, frequent fire) help create open or partially open areas for sunlight. It is intolerant of full shade and excessive competition from other vegetation. Schweinitz's sunflower occurs in a variety of soil series; it is generally found growing on shallow sandy soils with high gravel content. The Site is currently an active pasture subject to continuous grazing and cattle traffic, bushhogging, and land maintenance activities. The species has not been documented in the area, nor has there been Critical Habitat designated for the species. The post-construction condition of the Site may create appropriate habitat for Schweinitz's sunflower. Due to grazing impacts and active disturbance of the existing land use, habitat for Schweinitz's sunflower is currently lacking; therefore, this project will have no effect on Schweinitz's sunflower. In addition, construction will not occur prior to the active survey window (late August-frost); therefore, surveys will be completed prior to construction during the optimal survey window in the event of any Site condition changes.

7.2 Cultural Resources

The term "cultural resources" refers to prehistoric or historic archaeological sites, structures, or artifact deposits over 50 years old. "Significant" cultural resources are those that are eligible or potentially eligible for inclusion in the National Register of Historic Places. Evaluations of site significance are made with reference to the eligibility criteria of the National Register (36 CFR 60) and in consultation with the North Carolina State Historic Preservation Office (SHPO).

Field visits were conducted at the Site in the spring and summer of 2020 to ascertain the presence of structures or other features that may be eligible for inclusion on the National Register of Historic Places. No structures were identified within proposed easement boundaries; however, coordination with SHPO will occur prior to construction activities to determine if any significant cultural resources are present.

7.3 North Carolina Natural Heritage Elements

A search of the North Carolina Natural Heritage Program (NHP) database was conducted to identify areas within or around the Site that are already known to support rare species. According to NHP files, no federally or state-protected species are known to occur within the Site. One record of a federally-listed plant (Schweinitz's sunflower; listed as Endangered) has previously been identified within a one-mile radius of the Site (Appendix D). Additionally, two NC DMS Easements are located northeast of the Site and Randolph County open space is located southeast of the Site.

7.4 FEMA

Inspection of the FEMA Flood Insurance Rate Maps 3710773500J, Panel 7735, effective January 2, 2008, indicates that the project is not located within a flood area. Therefore, a "Conditional Letter of Map Revision" (CLOMR) is not necessary for this Site.

7.5 Utilities

No utilities are located on the Site.

7.6 Air Transport Facilities

No air transport facility is located within 5 miles of the Site.

7.7 Hydrologic Trespass

Given the sloping nature of the Site, relatively confined valleys within the conservation easement boundary, and the landowner's possession of land adjacent to and immediately upstream/downstream of the project boundary, the risk of hydrologic trespass is not expected.

7.8 Easement Breaks

Easement breaks were evaluated as a potential project constrain as they fragment the Site and reduce the potential functional uplift. This project includes 4 crossings (reduced from 6 crossings in the initial plan). Easement breaks are necessary due to landowner constraints; however, the location of the crossings, and reduction in the number of crossings has minimized the adverse effect. Therefore, easement breaks do not constitute a significant reduction of functional uplift at the Site and are not considered a project constraint.

8.0 DESIGN APPROACH AND MITIGATION WORK PLAN

8.1 Stream Design

Onsite streams targeted for restoration have endured significant disturbance from land use activities such as land clearing, livestock grazing, straightening and rerouting of channels, ditching within the floodplain, and other anthropogenic maintenance. Site streams will be restored to emulate historic conditions at the Site utilizing parameters from nearby, relatively undisturbed reference streams (see Section 4.1 Reference Streams).

Primary activities designed to restore Site streams include 1) stream restoration, 2) stream enhancement (Level I), 3) stream enhancement (Level II), 4) stream enhancement (Level II with and adjusted ratio), 5) wetland reestablishment, 6) wetland rehabilitation, 7) wetland enhancement, 8) erection of livestock exclusionary barriers, 9) construction of marsh treatment areas, and 10) vegetation planting (Figures 6A-6C, Appendix A).

8.1.1 Stream Restoration

Stream restoration efforts are designed to restore a stable stream that approximates hydrodynamics, stream geometry, and local microtopography relative to reference conditions.

Restoration at the Site will be Priority I restoration; therefore, bankfull elevations will be raised to meet the adjacent valley floodplain elevation. Stream restoration is expected to entail 1) channel excavation, 2) channel stabilization, 3) channel diversion, and 4) channel backfill.

In-stream Structures

In-stream structures will be used for grade control, habitat, and to elevate local water surface profiles in the channel, flattening the water energy slope or gradient and directing stream energy into the center of the channel and away from banks. The structures will consist of log cross-vanes or log j-hook vanes; however, at the discretion of the Engineer, rock cross-vanes or rock j-hook vanes may be substituted if dictated by field conditions.

Piped Channel Crossing

While the crossings will be utilized to relocate cattle from one pasture to another, the crossings are required to allow the owners' access to their property, which would otherwise be landlocked, due to the conservation easement. The 60' wide crossings were put in place strictly for planning purposes to give the land owner flexibility in the future, to allow for potential utility lines and a roadway crossing, as the standard right of way width is 50-60 feet. Piped channel crossings are located within breaks in the easement. To minimize the effects of that easement breaks may have upon the project, the uppermost crossing on UT 4 was removed leaving 4 crossings in 9176 linear feet of stream mitigation.

The crossings will be constructed with suitable sized pipes to allow for stormwater flows, with adjacent floodplain pipes to allow for overflow discharge onto the floodplain. Materials will include hydraulically stable rip-rap or suitable rock. The crossings will be large enough to handle anticipated vehicular traffic. Approach grades to the crossings will be at an approximate 10:1 slope and constructed of hard, scour-resistant crushed rock or other permeable material, which is free of fines.

Marsh Treatment Area

Five shallow wetland marsh treatment areas will be excavated in the floodplain to intercept surface waters draining through agricultural areas prior to discharging into Site tributaries. Marsh treatment areas are intended to improve the mitigation project and are not generating mitigation credit. The proposed marsh treatment area locations are depicted on Figures 6A-C (Appendix A) and will consist of shallow depressions that will provide treatment and attenuation of initial stormwater pulses. The outfall will be constructed of hydraulically stable rip-rap or other suitable material that will protect against headcut migration into the constructed depression. It is expected that the treatment area will fill with sediment and organic matter and will naturalize over time.

Drop Structure

A drop structure is proposed at the outfall of UT 1 as it discharges from the Site. The drop structure will be constructed as per the construction plans exhibited in Appendix L. The structure will be constructed to resist erosive forces associated with hydraulic drops proposed at the Site.

8.1.2 Stream Enhancement (Level I)

Stream enhancement (level I) will entail restoration of stream dimension, installation habitat and grade control structures, easement markers, and planting riparian buffers with native forest vegetation to facilitate stream recovery and prevent further degradation of the stream.

8.1.3 Stream Enhancement (Level II)

Stream enhancement (level II) will entail planting riparian buffers with native forest vegetation to facilitate stream recovery and prevent further degradation of the stream.

8.1.4 Stream Enhancement (Level II with and adjusted ratio)

Stream enhancement (Level II with an adjusted ratio) will occur on the upstream reaches of UT 3 and UT 7. These reaches are characterized by channels with mature riparian vegetation, good channel bed substrate, and little bank erosion. The reaches are not frequently accessed by livestock and are included into the project to protect the upstream and downstream ends of the project from future impacts. The upper reach of UT 3 is proposed at a mitigation ratio of 7.5:1 and the upper reach of UT 7 is proposed at a mitigation ratio of 5:1. UT 7 was added by the USACE during the PJD verification walkthrough. As this reach was previously fenced from livestock and the only mitigation treatment includes planting a portion of the easement, a 5:1 mitigation ratio has been proposed. Proposed mitigation ratios are based on IRT feedback during field reviews.

8.2 Individual Reach Discussions

Mitigation strategies proposed for each reach are presented below.

Table 14. Individual Reach Descriptions and Functional Uplift

Individual Reach	Mitigation Activities	Functional Uplift Provided for Identified Stressors
UT 1	• Remove existing drain tile upstream and create an ephemeral channel which will drain into a marsh treatment area. • Begin stepping the channel up in its existing location to initiate a mix of Enhancement Level I and II stream mitigation activities. • Move the channel across the floodplain using Priority 1 stream restoration on new location. • Reconnect overbank hydrology to rehydrate drained hydric soils and improve hydrology of existing wetlands. • Construct two piped crossings. • Exclude livestock from the conservation easement by fencing. • Plant a vegetative buffer within the entire floodplain. • Tie into existing downstream channel location with a drop structure.	• Non-functioning riparian buffer/wetland vegetation • Sediment • Nutrients • Fecal Coliform • Peak Flows • Ditching/Draining • Limited Bedform Diversity • Absence of Large Woody Debris
UT-2	• Remove small farm pond dam the upstream extent and install a marsh treatment area above the stream. • Remove drain tile from the floodplain and beneath the channel. • Conduct minor bank stabilization where necessary. • Exclude livestock from the conservation easement by fencing. • Treat invasive species. • Plant a vegetative buffer within the entire floodplain.	• Sediment • Nutrients • Fecal Coliform • Peak Flows • Artificial Barriers • Habitat Fragmentation
UT-3	• Initiate stream restoration in the upper reaches using a combination of P1 and P2 methods. • Remove relict dam on upstream reach.	• Non-functioning riparian buffer/wetland vegetation • Sediment

	• Tie the channel to UT 7 in a natural location. • Tie to the Enhancement Level II reach with a series of step-pool structures. • Conduct Enhancement II by fencing livestock and treating invasive species. • Install a piped stream crossing. • Move the channel across the floodplain using Priority 1 stream restoration on new location. • Reconnect overbank hydrology to rehydrate drained hydric soils and improve hydrology of existing wetlands. • Exclude livestock from the conservation easement by fencing. • Treat invasive species. • Plant a vegetative buffer within the entire floodplain.	• Nutrients • Fecal Coliform • Peak Flows • Artificial Barriers • Ditching/Draining • Habitat Fragmentation • Limited Bedform Diversity • Absence of Large Woody Debris
UT-4A	• Move the channel across the floodplain using Priority 1 stream restoration on new location. • Tie the channel to UT 44B in a natural location. • Exclude livestock from the conservation easement by fencing. • Plant a vegetative buffer within the entire floodplain.	• Non-functioning riparian buffer/wetland vegetation • Sediment • Nutrients • Fecal Coliform • Limited Bedform Diversity • Absence of Large Woody Debris
UT-4B	• Move the channel across the floodplain using Priority 1 stream restoration on new location. • Install a marsh treatment area in the upstream reaches. • Tie the channel to UT 4A in a natural location. • Exclude livestock from the conservation easement by fencing. • Plant a vegetative buffer within the entire floodplain.	• Non-functioning riparian buffer/wetland vegetation • Nutrients • Fecal Coliform • Limited Bedform Diversity • Absence of Large Woody Debris
UT-4C	• Install a marsh treatment area in the upper reaches. • Conduct minor bank stabilization where necessary. • Tie into UT 4 across a point bar/inner bend. • Exclude livestock from the conservation easement by fencing. • Treat invasive species. • Plant a vegetative buffer within the entire floodplain.	• Non-functioning riparian buffer/wetland vegetation • Sediment • Nutrients • Fecal Coliform
UT 4	• Move the channel across the floodplain using Priority 1 stream restoration on new location. • Reconnect overbank hydrology to rehydrate drained hydric soils and improve hydrology of existing wetlands. • Remove relict dam and perched culvert on upstream reach. • Tie the channel to UT 1 in a natural location. • Exclude livestock from the conservation easement by fencing. • Treat invasive species • Plant a vegetative buffer within the entire floodplain.	• Non-functioning riparian buffer/wetland vegetation • Sediment • Nutrients • Fecal Coliform • Peak Flows • Artificial Barriers • Ditching/Draining • Habitat Fragmentation • Limited Bedform Diversity • Absence of Large Woody Debris
UT 5	• Preserve channel. • Tie to UT 1 across a point bar/inner bend. • Cease spray field operations within easement. • Treat invasive species. • Plant a vegetative buffer where necessary.	• Sediment • Nutrients • Fecal Coliform
UT 6	• Conduct minor bank stabilization where necessary. • Exclude livestock from the conservation easement by fencing. • Treat invasive species. • Plant a vegetative buffer within the entire floodplain.	• Sediment • Nutrients • Fecal Coliform
UT 7	• Install a marsh treatment area in the upper reaches. • Preserve channel. • Tie to UT 3 across a point bar/inner bend. • Treat invasive species. • Plant a vegetative buffer where necessary.	• Sediment • Nutrients • Fecal Coliform

8.3 Wetland Reestablishment

Alternatives for wetland reestablishment are designed to restore a fully functioning wetland system, which will provide surface water storage, nutrient cycling, removal of imported elements and compounds, and will create a variety and abundance of wildlife habitat.

Portions of the Site underlain by hydric soils have been impacted by stream dredging, drain tile installation, vegetative clearing, agriculture plowing, and other land disturbances associated with land use management. Wetland reestablishment options should focus on the restoration of vegetative communities, restoration of stream corridors and historic groundwater tables, as well as the reestablishment of soil structure and microtopographic variations. These activities will result in the reestablishment of approximately 3.130 acres of jurisdictional riparian riverine wetlands.

8.4 Wetland Rehabilitation

Alternatives for wetland rehabilitation include removal of livestock and planting with native forest vegetation. A small pocket of wetland rehabilitation was identified during an IRT walkthrough of the Site and includes approximately 0.114 acre of highly cattle impacted wetland. Functional uplift in this area was deemed significant enough by the IRT to warrant wetland rehabilitation through the exclusion of livestock and planting of vegetation.

8.5 Wetland Enhancement

Alternatives for wetland enhancement include removal of livestock and planting with native forest vegetation. Wetland enhancement is proposed for areas delineated as jurisdictional that are impacted by a lack of vegetation and/or have livestock access. The lack of woody vegetation and impact by livestock results in the loss of function to these areas (see Section 6.0 Functioal Uplift and Project Goals/Objectives). Project activities will result in the enhancement of 1.462 acres of jurisdictional wetland.

8.6 Soil Restoration

Soil grading will occur during stream restoration activities. The site will also be ripped and prepped prior to planting. Topsoils will be stockpiled during construction activities and will be spread on the soil surface once critical subgrade has been established. The replaced topsoil will serve as a viable growing medium for community restoration to provide nutrients and aid in the survival of planted species.

8.7 Natural Plant Community Restoration

Restoration of floodplain forest and stream-side habitat allows for development and expansion of characteristic species across the landscape. Ecotonal changes between community types contribute to diversity and provide secondary benefits, such as enhanced feeding and nesting opportunities for mammals, birds, amphibians, and other wildlife. Reference Forest Ecosystem

(RFE) data, onsite observations, and community descriptions from *Classification of the Natural Communities of North Carolina* (Schafale and Weakley 1990) and Guide to the Natural Communities of North Carolina (Schafale 2012) were used to develop the primary plant community associations that will be promoted during community restoration activities.

8.7.1 Planting Plan

Stream-side trees and shrubs include species with high value for sediment stabilization, rapid growth rate, and the ability to withstand hydraulic forces associated with bankfull flow and overbank flood events. Stream-side trees and shrubs will be planted within 15 feet of the channel top of bank throughout the meander belt-width. Shrub elements will be planted along the reconstructed stream banks, concentrated along outer bends. Piedmont/Low Mountain Alluvial Forest (Schafale and Weakly 1990) or Piedmont Alluvial Forest (Schafale 2012) is the target community for Site floodplains and Dry-Mesic Oak-Hickory Forest is the target community for upland side-slopes.

Bare-root seedlings within the Piedmont/Low Mountain Alluvial and Dry-Mesic Oak-Hickory Forest will be planted at a density of approximately 680 stems per acre on 8-foot centers. Shrub species in the stream-side assemblage and Marsh Treatment Areas will be planted at a density of 2720 stems per acre on 4-foot centers.

The species proposed for Piedmont/Low Mountain Alluvial Forest includes species suitable for Piedmont floodplains, low areas, and wetlands. Therefore, a specific wetland planting zone is not proposed for this project. Wetland species in the planting list includes river birch, silky dogwood, tulip poplar, sycamore, water oak and willow oak. These species are suitable for planting in wetland zones.

Table 15 depicts the total number of stems and species distribution within each vegetation association (Figure 8, Appendix A). Planting will be performed between December 1 and March 15 to allow plants to stabilize during the dormant period and set root during the spring season. Also included, is a temporary and permanent seeding schedule below table 15.

8.7.2 Nuisance Species Management

Invasive plant species will be observed and controlled mechanically and/or chemically, as part of this project. Pasture grasses, fescue, cocklebur, etc. will be treated with Poast, an herbicide that does not affect broad leaf trees, prior to planting. Inspections for beaver and other potential nuisance species will occur throughout the course of the monitoring period. Appropriate actions may be taken to ameliorate any negative impacts regarding vegetation development and/or water management on an as-needed basis. The presences of nuisance species will be monitored over the course of the monitoring period. Appropriate actions will be taken to ameliorate any negative impacts regarding vegetation development and/or water management on an as-needed basis.

Table 15. Planting Plan

Vegetation Association	Wetland Indicator Status	Piedmont/ Low Mountain Alluvial Forest*		Dry-Mesic Oak-Hickory Forest*		Stream-side Assemblage**		TOTAL
Area (acres)		16.3		6.2		6.0		28.5
Species		# planted*	% of total	# planted*	% of total	# planted**	% of total	# planted
Tag alder (*Alnus serrulata*)	FACW	--	--	--	--	2448	15	2489
River birch (*Betula nigra*)	FACW	1663	15	--	--	2448	15	4111
Ironwood (*Carpinus caroliniana*)	FAC	--	--	843	20	--	--	843
Red bud (*Cercis canadensis*)	FACU	--	--	632	15	--	--	632
Silky dogwood (*Cornus amomum*)	FACW	1663	15	--	--	3264	20	4927
Persimmon (*Diospyros virginiana*)	FAC	--	--	422	10	--	--	422
Mockernut hickroy (*Carya tomentosa*)	UPL	--	--	211	5	--	--	211
Tulip poplar (*Liriodendron tulipifera*)	FAC	1663	15	--	--	--	--	1663
Sycamore (*Platanus occidentalis*)	FACW	2217	20	--	--	3264	20	5481
Black gum (*Nyssa sylvatica*)	FAC	--	--	632	15	--	--	632
Water oak (*Quercus nigra*)	FAC	2217	20	843	20	1632	10	4692
Willow oak (*Quercus phellos*)	FACW	1663	15	632	15	1632	10	3927
Black willow (*Salix nigra*)	OBL	--	--	--	--	1632	10	1632
	TOTAL	**11084**	**100**	**4216**	**100**	**16320**	**100**	**31620**

* Planted at a density of 680 stems/acre.
** Planted at a density of 2720 stems/acre.

Permanent Standard Native Mix : Redtop (10%), VA Wild Rye (15%) Switchgrass (15%), Eastern Gammagrass (5%), PA Smartweed (5%), Little Bluestem (5%), Soft Rush (5%), Bur Marigold (10%), Lance Leaved Tickseed (10%), Deertongue (10%), Big Bluestem (5%), Indiangrass (5%)

Temporary Herbaceous Seed Schedule

Common Name	Application Rate	Application Dates
Grain Rye[A]	130 lbs. per acre	Year – Round
Orchard Grass[B]	15 lbs. per acre	September – March
Brown Top Millet[A]	40 lbs. per acre	May - September
German Millet[B]	25 lbs. per acre	May - September

[A] Primarily utilized on disturbed or stockpiled areas.
[B] Primarily utilized near stream channels and streambanks.

8.8 Fencing

Livestock will be removed from the easement area using cattle exclusion fence, however, livestock use will continue in the surrounding pasture, outside the conservation easement. Gates will be installed at crossings to allow for controlled access from one pasture to another. Cattle exclusion fencing will be installed along the conservation easement boundary using 5-6-inch diameter treated post buried 2 feet, standing 5-6 feet above the ground surface, and woven wire fencing (5-ft high from ground surface) with a top strand of barbed wire. The easement boundary will be identified with standard Conservation Easement signs fastened to fence post as prescribed in the most recent NCDMS Boundary Marking Standards. Pedestrian access gates will be installed at the access easement location for monitoring and 1-2 pedestrian gates for each parcel owner in locations to be determined. 12-ft wide gates will be installed at each crossing location and 16-ft wide gates will be installed in appropriate locations (to be determined) to allow cattle to exit in case they were to breach the fence and enter the conservation easement.

The landowners do not wish to maintain behind the fence by spraying or mowing, however, Clearwater will request the fence be offset approximately 2-ft outside the conservation easement boundary, so the land owners could spray the fence edge without comprising desirable and planted vegetation. This offset would also preclude cattle grazing of planted stems through the fence.

9.0 MONITORING AND SUCCESS CRITERIA

Monitoring will be conducted by Axiom Environmental, Inc based on the schedule in Table 16. A summary of monitoring is outlined in Table 17 (Figure 9, Appendix A). Annual monitoring reports will be submitted to the NCDMS by Clearwater Mitigation Solutions no later than December 31 of each monitoring year data is collected.

Table 16. Monitoring Schedule

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

Table 17. Monitoring Summary

Stream Parameters				
Parameter	**Method**	**Schedule/Frequency**	**Number/Extent**	**Data Collected/Reported**
Stream Profile	Full longitudinal survey	As-built (unless otherwise required)	All restored stream channels	Graphic and tabular data.
Stream Dimension	Cross-sections	Years 1, 2, 3, 5, and 7	Total of 26 cross-sections on restored channels	Graphic and tabular data.
Channel Stability	Visual Assessments	Yearly	All restored stream channels	Areas of concern will be depicted on a plan view figure with a written assessment and photograph of the area included in the report.
	Additional Cross-sections	Yearly	Only if instability is documented during monitoring	Graphic and tabular data.
Stream Hydrology	Continuous monitoring surface water gauges and/or trail camera	Continuous recording through monitoring period	6 surface water gauges on UT 1, UT 2, UT 3, UT 4A, UT 4B, and UT 7	Surface water data for each monitoring period
Bankfull Events	Continuous monitoring surface water gauges and/or trail camera	Continuous recording through monitoring period	3 crest gauges on UT 1, UT 3, and UT 4	Surface water data for each monitoring period
	Visual/Physical Evidence	Continuous through monitoring period	Periodic Site visits throughout the year.	Visual evidence, photo documentation, and/or rain data.
Wetland Parameters				
Parameter	**Method**	**Schedule/Frequency**	**Number/Extent**	**Data Collected/Reported**
Wetland Restoration	Groundwater gauges	Years 1, 2, 3, 4, 5, 6, and 7 throughout the year with the growing season defined as March 1-October 22*	9 gauges spread throughout restored wetlands	Soil temperature at the beginning of each monitoring period to verify the start of the growing season**, groundwater and rain data for each monitoring period
Vegetation Parameters				
Parameter	**Method**	**Schedule/Frequency**	**Number/Extent**	**Data Collected/Reported**
Vegetation establishment and vigor	Permanent vegetation plots 0.0247 acre (100 square meters) in size; *CVS-EEP Protocol for Recording Vegetation, Version 4.2* (Lee et al. 2008)	As-built, Years 1, 2, 3, 5, and 7	21 plots spread across the Site	Species, height, planted vs. volunteer, stems/acre
	Annual random vegetation plots, 0.0247 acre (100 square meters) in size	As-built, Years 1, 2, 3, 5, and 7	10 plots randomly selected each year	Species and height

*The growing season will be verified by soil temperature and bud burst of more than one species (excluding Sambucus and red maple.)
**Growing season for the Site is to start no earlier than March 1 and will be verified by soil temperature and bud burst. The growing season will end November 13.

Note: Photo points will be taken at all cross sections and at vegetation plot origin points. In addition, photo points will be located at all culverts and crossings.

9.1 Success Criteria

Monitoring and success criteria for stream restoration should relate to project goals and objectives identified from on-site NC SAM and NC WAM data collection. From a mitigation perspective, several of the goals and objectives are assumed to be functionally elevated by restoration activities without direct measurement. Other goals and objectives will be considered successful upon achieving success criteria. The following summarizes Site annual success criteria.

Table 18. Success Criteria

Streams
• All streams must maintain an Ordinary High-Water Mark (OHWM), per RGL 05-05. • Continuous surface flow in intermittent streams must be documented each year for a minimum of 30 consecutive days. • Bank height ratio (BHR) cannot exceed 1.2 at any measured cross-section. • BHR at any measure riffle cross-section should not change by more than 10% from baseline condition during any given monitoring period. • The stream project shall remain stable and all other performance standards shall be met through four separate bankfull events, occurring in separate years, during the monitoring years 1-7.
Wetland Hydrology
• Saturation or inundation, measured annually, within the upper 12 inches of the soil surface for, at a minimum, 12 percent of the growing season*, during average climatic conditions.
Vegetation
• Within planted portions of the site, a minimum of 320 stems per acre must be present at year 3; a minimum of 260 stems per acre must be present at year 5; and a minimum of 210 stems per acre must be present at year 7. • Trees must average 7 feet in height at year 5, and 10 feet in height at year 7 in each plot. • Planted and volunteer stems are counted, provided they are included in the approved planting list for the site; natural recruits not on the planting list may be considered by the IRT on a case-by-case basis. • Any volunteer species on the approved planting list must be established for at least 2 years to count towards success and will be subject to the average height standard.

*Growing season for this site is to start no earlier than March 1 and range through November 13 as verified by soil temperature and bud burst

9.2 Contingency

In the event that stream success criteria are not fulfilled, a mechanism for contingency will be implemented. It should be noted that some aspects of adaptive management may require IRT review and USACE/DWR permit authorizations.

9.2.1 Stream Contingency

Stream contingency may include, but may not be limited to 1) structure repair and/or installation; 2) repair of dimension, pattern, and/or profile variables; and 3) bank stabilization. The method of contingency is expected to be dependent upon stream variables that are not in compliance with success criteria. Primary concerns, which may jeopardize stream success, include 1) structure failure, 2) headcut migration through the Site, and/or 3) bank erosion.

<u>Structure Failure</u>

In the event that structures are compromised the affected structure will be repaired, maintained, or replaced. Once the structure is repaired or replaced, it must function to stabilize adjacent stream banks and/or maintain grade control within the channel. Structures which remain intact, but exhibit flow around, beneath, or through the header/footer will be repaired by excavating a trench on the upstream side of the structure and reinstalling filter fabric in front of the pilings. Structures which have been compromised, resulting in shifting or collapse of a header/footer, will be removed and replaced with a structure suitable for Site flows.

Headcut Migration Through the Site

In the event that a headcut occurs within the Site (identified visually or through measurements [i.e. bank-height ratios exceeding 1.4]), provisions for impeding headcut migration and repairing damage caused by the headcut will be implemented. Headcut migration may be impeded through the installation of in-stream grade control structures (rip-rap sill and/or log cross-vane weir) and/or restoring stream geometry variables until channel stability is achieved. Channel repairs to stream geometry may include channel backfill with coarse material and stabilizing the material with erosion control matting, vegetative transplants, and/or willow stakes.

Bank Erosion

In the event that severe bank erosion occurs within the Site, resulting in incision, lateral instability, and/or elevated width-to-depth ratios locally or systemically, contingency measures to reduce bank erosion and width-to-depth ratio will be implemented. Bank erosion contingency measures may include the installation of log-vane weirs and/or other bank stabilization measures. If the resultant bank erosion induces shoot cutoffs or channel abandonment, a channel may be excavated to reduce shear stress to stable values.

Beaver and other Invasive Species

Indications of beaver establishment will be monitored throughout the 7-year monitoring period. If beaver are identified in the Site, the location of the dam will be depicted on CCPV mapping and the beaver will be trapped during the following fall/winter. Once beaver have been trapped, the dam will be removed. Removal of the dam is expected to occur by hand to minimized disturbance to the adjacent mitigation areas.

When invasive species controls are required by the IRT, species such as multiflora rose (*Rosa multiflora*), Russian olive (*Eleagnus angustifolium*), Chinese privet (*Ligustrum sinense*), and tree of heaven (*Ailanthus altissima*) will be treated by cutting and directly treating the stump with Garlon 4A (or other similar product) to minimize re-sprouting. Appropriate actions to ameliorate any negative impacts regarding vegetation development and/or water management will occur on an as-needed basis. Additional monitoring, or other contingency measures will be determined by consultation with the IRT.

Road/Culvert Maintenance

Observation of road crossings/culverts will occur during regular monitoring visits conducted at the Site. Culverts will be monitored primarily for blockage; however, if erosion is occurring it will

also be noted. Roadbeds, culverts, and crossings will be monitored for the seven-year monitoring period to ensure that no additional sediment deposition is occurring within the Site. Once the seven-year monitoring period has expired, maintenance of the crossing will be the responsibility of the landowner.

Development/Logging

There is currently no planned development nor intent for future development by any of the land owners within the project area. The preference by the land owners is for the area surrounding the project to remain in pasture and current uses. The 60' wide crossings were put in place strictly for planning purposes to give the land owner flexibility in the future, to allow for potential utility lines and a roadway crossing, as the standard right of way width is 50-60 feet.

Topographic re-entrants discharging into the conservation easement typically are directed into marsh treatment areas that treat the initial stormwater pulse to capture sediment and nutrients from adjacent runoff. These areas will naturalize over time into small wetland depressions. If the property adjacent to the Site is developed, or logged such that excessive sediment enters the Site, the marsh treatment area may be re-excavated to capture additional drainage effluent. Maintenance of the marsh treatment area is not expected to occur over an extended period of time; however, short term maintenance may occur until stabilization of the adjacent landscape features occurs.

9.2.2 Wetland Contingency

Hydrological contingency will require consultation with hydrologists and regulatory agencies if wetland hydrology enhancement is not achieved. Floodplain surface modifications, including construction of ephemeral pools, represent a likely mechanism to increase the floodplain area in support of jurisdictional wetlands. Ephemeral pools should be 8-14" depressions that dry up yearly so that predatory species cannot colonize, and should not be so numerous that trees do not grow in large areas of the buffer. Recommendations for contingency to establish wetland hydrology will be implemented and monitored until Hydrology Success Criteria are achieved.

9.2.3 Vegetation Contingency

If vegetation success criteria are not achieved, supplemental planting may be performed with tree species approved by regulatory agencies. Supplemental planting will be performed as needed until achievement of vegetation success criteria. IRT consultation and approval will be necessary if future earthwork is proposed. In addition, if the depth of ephemeral pools exceed 1 foot, the credit ratio may be changed to reflect wetland creation.

9.3 Compatibility with Project Goals

The following table outlines the compatibility of Site performance criteria described above to Site goals and objectives that will be utilized to evaluate if Site goals and objectives are achieved.

Table 19. Compatibility of Performance Criteria to Project Goals and Objectives

Goals	Objectives	Success Criteria
(1) HYDROLOGY		
• Minimize downstream flooding to the maximum extent possible.	• Construct new channel at historic floodplain elevation to restore overbank flows • Plant woody riparian buffer • Deep rip floodplain soils to reduce compaction and increase soil surface roughness • Protect riparian buffers with a perpetual conservation easement • Construct channels with proper pattern, dimension, and longitudinal profile	• BHR not to exceed 1.2 • Document four overbank events in separate monitoring years • Continuous intermittent surface flow for at least 30 days • Livestock excluded from the easement • Attain Wetland Hydrology Success Criteria • Attain Vegetation Success Criteria • Conservation Easement recorded
• Increase stream stability within the Site so that channels are neither aggrading nor degrading.	• Construct channels with proper pattern, dimension, and longitudinal profile • Remove livestock from the property • Construct stable channels with appropriate substrate • Upgrade existing piped channel crossings and install piped crossings at existing forded crossings • Stabilize stream banks • Plant woody riparian buffer	• Cross-section measurements indicate a stable channel with appropriate substrate • Visual documentation of stable channels and structures • BHR not to exceed 1.2 • < 10% change in BHR in any given year • Livestock excluded from the easement • Attain Vegetation Success Criteria
(1) WATER QUALITY		
• Remove direct nutrient and pollutant inputs from the Site and reduce contributions to downstream waters.	• Remove agricultural livestock and reduce agricultural land/inputs • Install marsh treatment areas • Plant woody riparian buffer • Restore/enhance jurisdictional wetlands adjacent to Site streams • Provide surface roughness and reduce compaction through deep ripping/plowing • Restore overbank flooding by constructing channels at historic floodplain elevation	• Livestock excluded from the easement • Attain Wetland Hydrology Success Criteria • Attain Vegetation Success Criteria
(1) HABITAT		
• Improve instream and stream-side habitat.	• Construct stable channels with appropriate substrate • Plant woody riparian buffer to provide organic matter and shade • Construct new channel at historic floodplain elevation to restore overbank flows • Protect riparian buffers with a perpetual conservation easement • Restore/enhance jurisdictional wetlands adjacent to Site streams • Stabilize stream banks • Install in-stream structures	• Cross-section measurement indicate a stable channel with appropriate substrate • Visual documentation of stable channels and in-stream structures. • Attain Wetland Hydrology Success Criteria • Attain Vegetation Success Criteria • Conservation Easement recorded

10.0 ADAPTIVE MANAGEMENT PLAN

If the mitigation Site or a specific component of the Site fails to achieve the necessary performance standards as specified in the mitigation plan, the Sponsor shall notify the members of NCDMS and work with the IRT to develop contingency plans for remedial action.

11.0 LONG-TERM MANAGEMENT PLAN

The Site will be transferred to the NCDEQ Stewardship Program. This party shall serve as conservation easement holder and long-term steward for the property and will conduct periodic inspection of the Site to ensure that restrictions required in the conservation easement are upheld. Funding will be supplied by the responsible party on a yearly basis until such time an endowment is established. The NCDEQ Stewardship Program is developing an endowment system within the non-reverting, interest-bearing Conservation Lands Conservation Fund Account. The use of funds from the Endowment Account will be governed by North Carolina General Statute GS 113A-232(d)(3). Interest gained by the endowment fund may be used for the purpose of stewardship, monitoring, stewardship administration, and land transaction costs, if applicable.

12.0 REFERENCES

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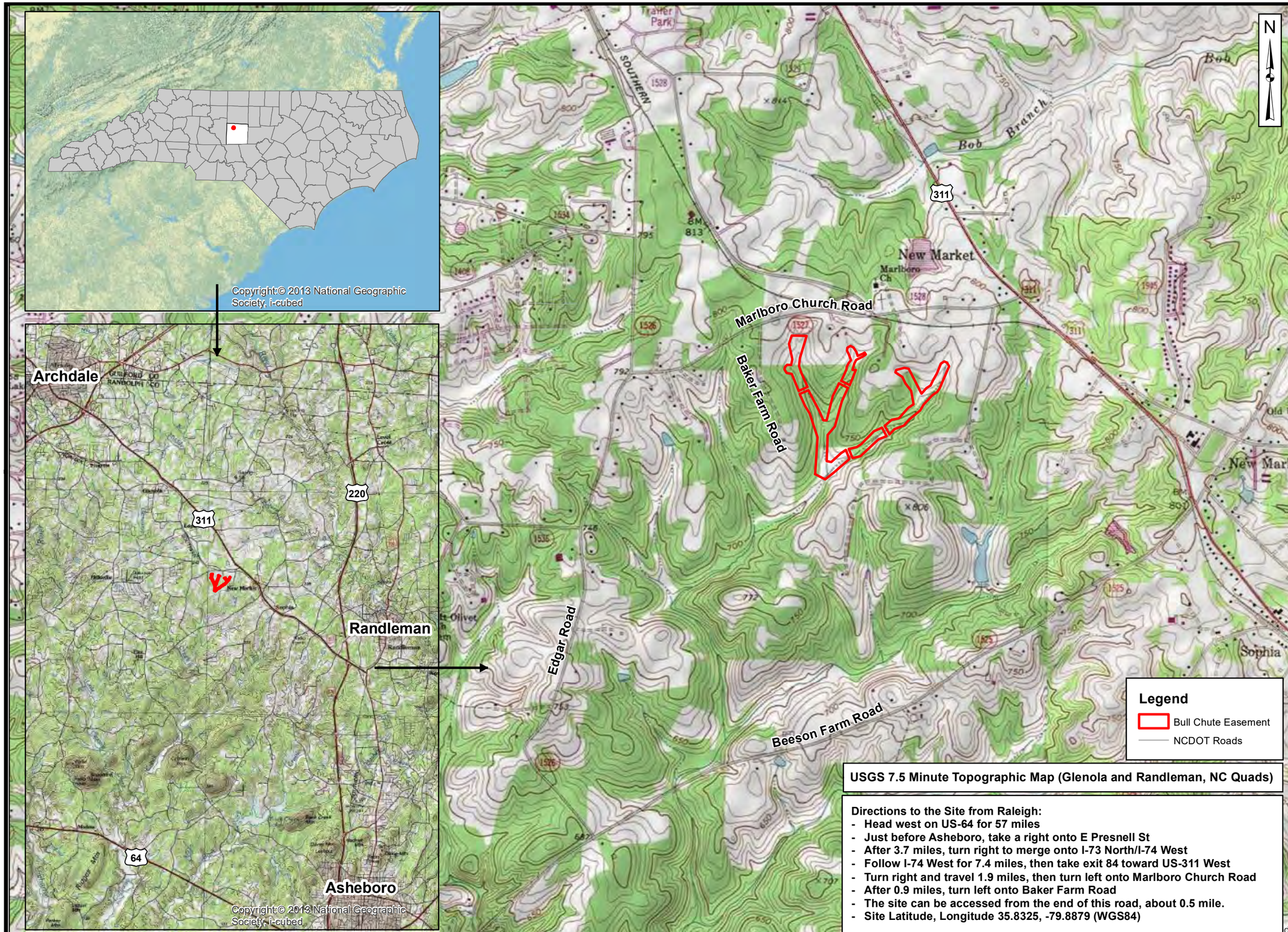
APPENDIX A
FIGURES

Figure 1. Site Location
Figure 2. Hydrologic Unit Map
Figure 3. Topography and Drainage Area
Figure 4A. Existing Conditions and Soils
Figure 4B. Lidar DEM Map
Figure 5A. Cedarock Reference Reach Dimension, Pattern, and Profile
Figure 5B. Bull Chute Reference Reach Dimension, Pattern, and Profile
Figure 6. Restoration Plan
Figures 6A-C. Restoration Plan
Figure 7. Proposed Dimension, Pattern, and Profile
Figure 8. Planting Plan
Figure 9. Monitoring Plan



USGS 7.5 Minute Topographic Map (Glenola and Randleman, NC Quads)

Directions to the Site from Raleigh:

- Head west on US-64 for 57 miles
- Just before Asheboro, take a right onto E Presnell St
- After 3.7 miles, turn right to merge onto I-73 North/I-74 West
- Follow I-74 West for 7.4 miles, then take exit 84 toward US-311 West
- Turn right and travel 1.9 miles, then turn left onto Marlboro Church Road
- After 0.9 miles, turn left onto Baker Farm Road
- The site can be accessed from the end of this road, about 0.5 mile.
- Site Latitude, Longitude 35.8325, -79.8879 (WGS84)

Axiom Environmental, Inc.

Prepared for:

CLEARWATER MITIGATION SOLUTIONS

Project:

BULL CHUTE MITIGATION SITE

Randolph County, NC

Title:

SITE LOCATION

Drawn by: KRJ

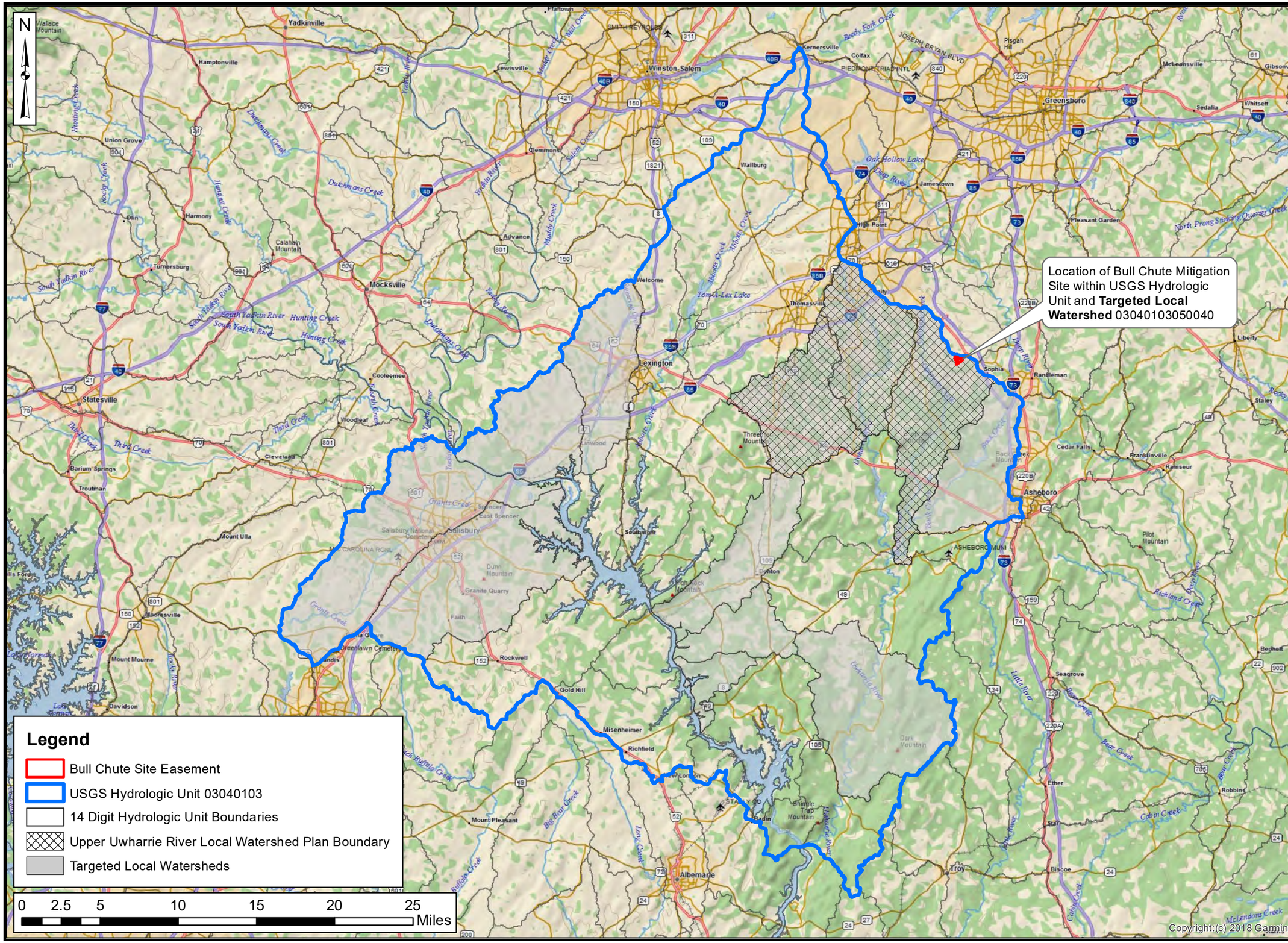
Date: FEB 2020

Scale: 1:20,000

Project No.: 20-006

FIGURE

1



Axiom Environmental, Inc.

Prepared for:

CLEARWATER MITIGATION SOLUTIONS

Project:

BULL CHUTE MITIGATION SITE

Randolph County, NC

Title:

HYDROLOGIC UNIT MAP

Drawn by: KRJ

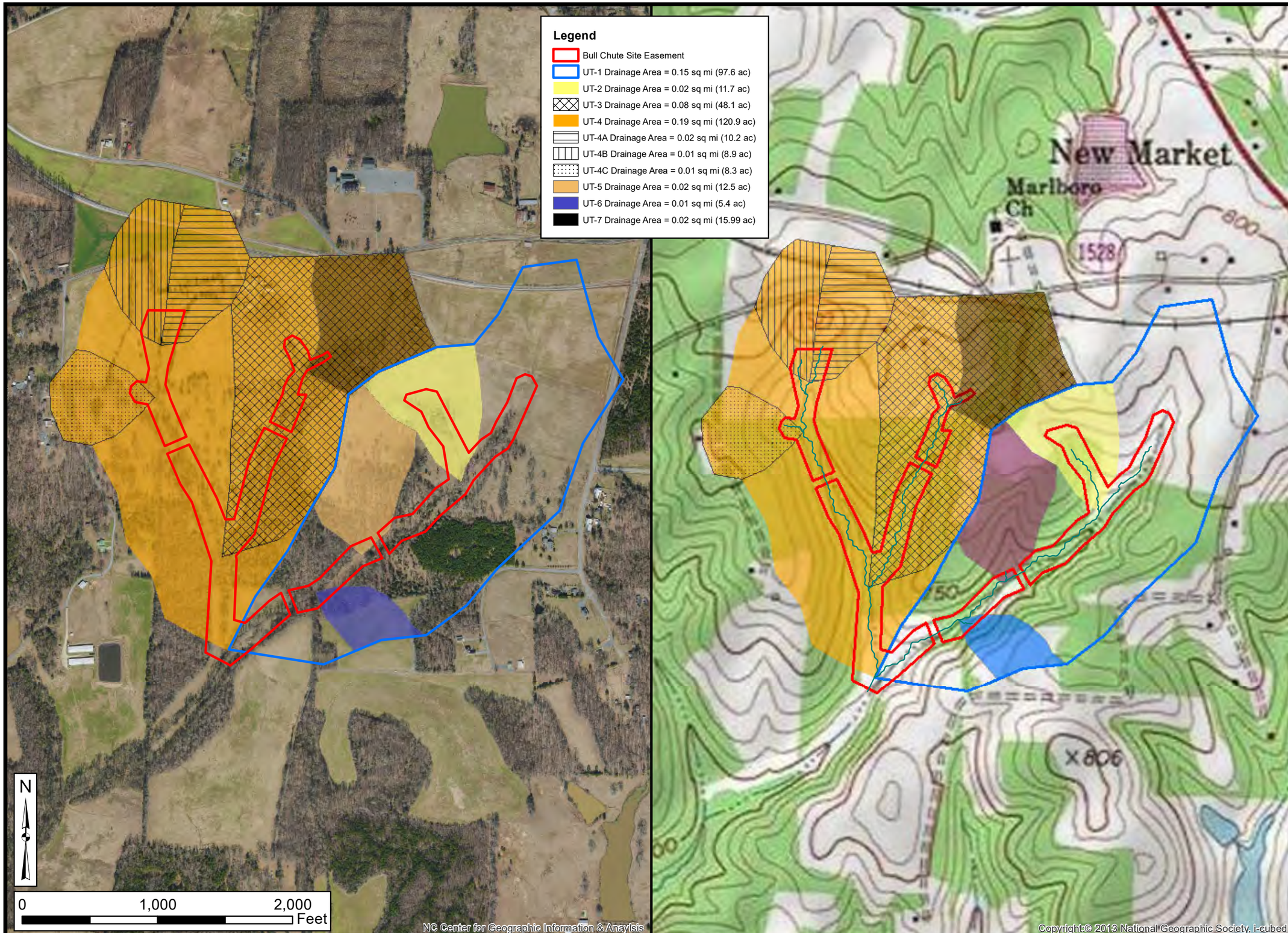
Date: FEB 2020

Scale: 1:370,000

Project No.: 20-006

FIGURE

2



Axiom Environmental, Inc.

Prepared for:

CLEARWATER MITIGATION SOLUTIONS

Project:

BULL CHUTE MITIGATION SITE

Randolph County, NC

Title:

TOPOGRAPHY AND DRAINAGE AREA

Drawn by: KRJ

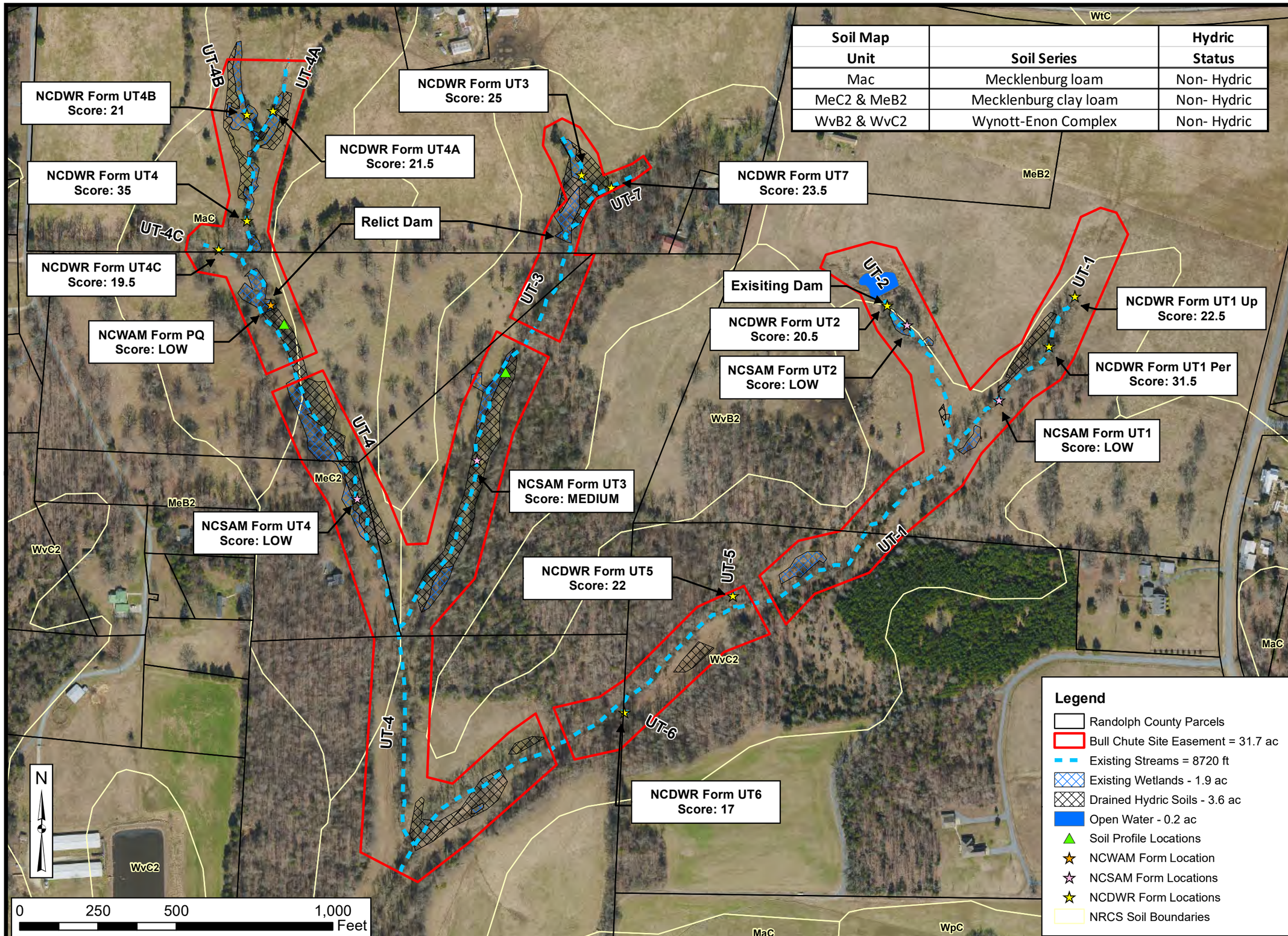
Date: FEB 2020

Scale: 1:8100

Project No.: 20-006

FIGURE

3



Soil Map Unit	Soil Series	Hydric Status
Mac	Mecklenburg loam	Non- Hydric
MeC2 & MeB2	Mecklenburg clay loam	Non- Hydric
WvB2 & WvC2	Wynott-Enon Complex	Non- Hydric

Axiom Environmental, Inc.

Prepared for:

CLEARWATER MITIGATION SOLUTIONS

Project:

BULL CHUTE MITIGATION SITE

Randolph County, NC

Title:

EXISTING CONDITIONS AND SOILS

Drawn by: KRJ

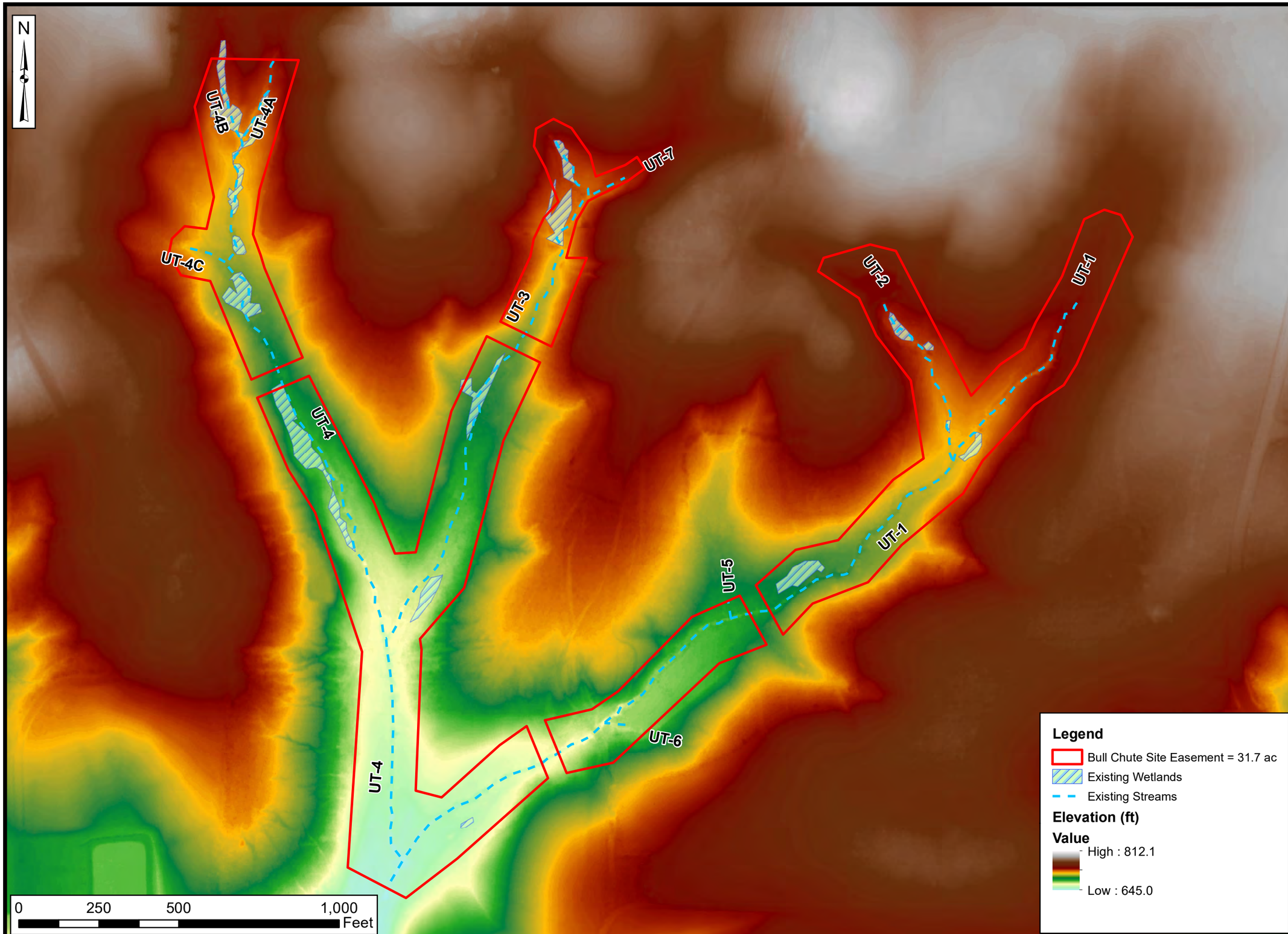
Date: FEB 2020

Scale: 1:3500

Project No.: 20-006

FIGURE

4A



Axiom Environmental, Inc.

Prepared for:

CLEARWATER MITIGATION SOLUTIONS

Project:

BULL CHUTE MITIGATION SITE

Randolph County, NC

Title:

LIDAR DEM MAP

Drawn by: KRJ

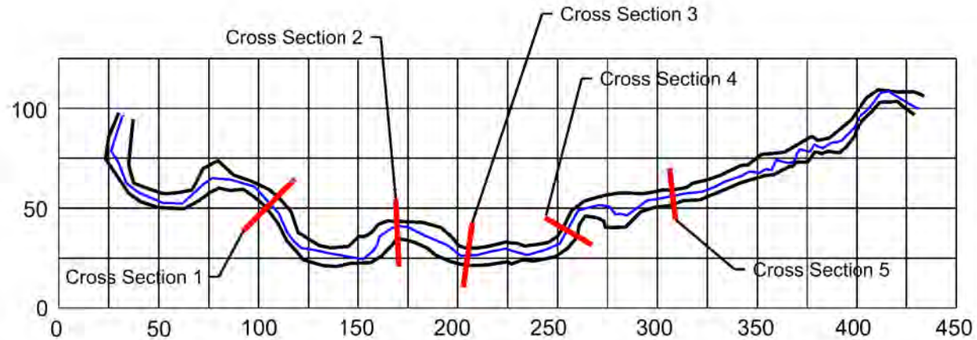
Date: AUG 2019

Scale: 1:5500

Project No.: 20-006

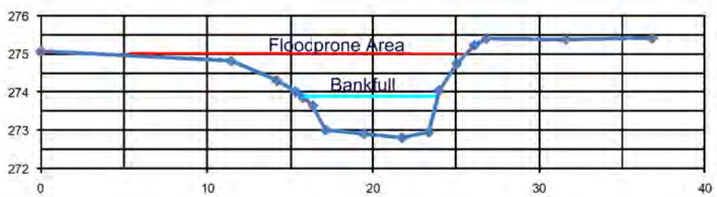
FIGURE

4B

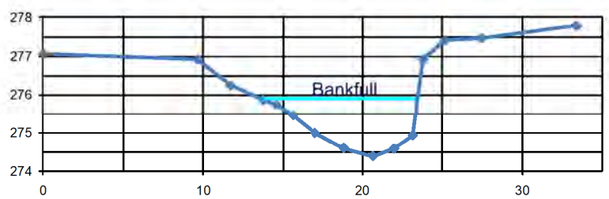


Reference Pattern
Lp-p = 37 (25 - 68) ft
Lm = 68 (44 - 116) ft
Wbelt = 23 (20 - 38) ft
Rc = 16 (11 - 27) ft
Lp-p/Wbkf = 4.6 (3.1 - 8.4)
Lm/Wbkf = 8.4 (5.5 - 14.3)
Wbelt/Wbkf = 2.8 (2.4 - 4.7)
Rc/Wbkf = 2.0 (1.4 - 3.3)
SIN = 1.20

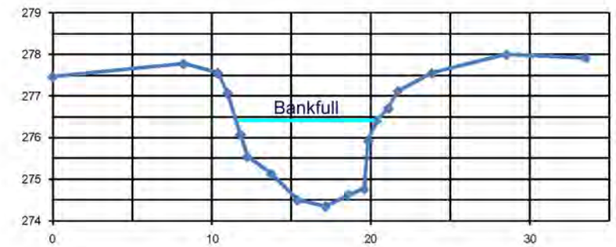
Pattern Legend
- Top of Bank
- Thalweg
- Cross Section



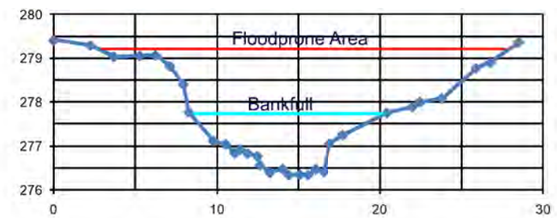
Cross Section 1 - Riffle
Abkf = 6.6 ft
Dave = 0.8 ft
Wbkf = 8.1 ft
Dmax = 1.1 ft
Bank Height = 2.0 ft
Bank Height Ratio = 1.8
W/D = 10.0
FPA = 18
ENT = 2.2
Stream Type = E



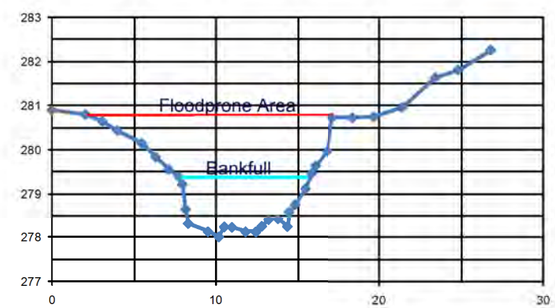
Cross Section 2 - Pool
Abkf = 9.0 ft
Wbkf = 9.7 ft
Dmax = 1.5 ft



Cross Section 3 - Pool
Abkf = 13.1 ft
Wbkf = 8.9 ft
Dmax = 2.1 ft

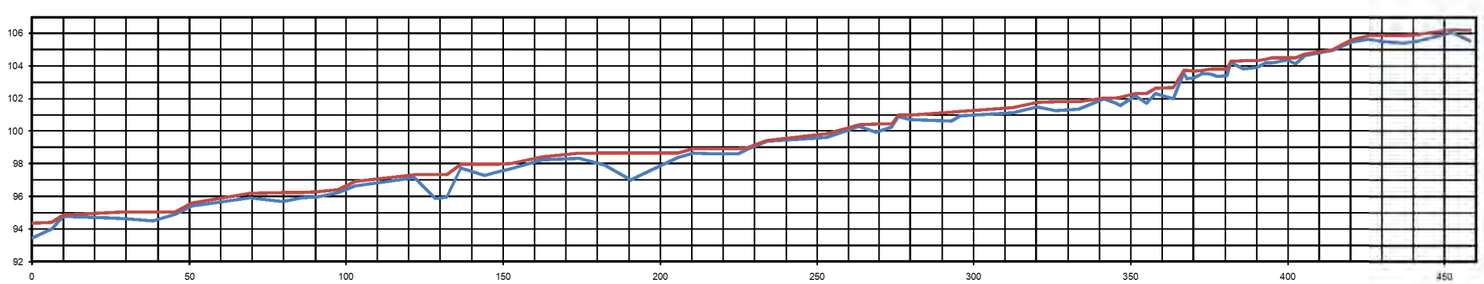


Cross Section 4 - Riffle
Abkf = 9.6 ft
Dave = 0.8 ft
Wbkf = 12.1 ft
Dmax = 1.4 ft
Bank Height = 1.4 ft
Bank Height Ratio = 1.0
W/D = 15.2
FPA = 25
ENT = 2.1
Stream Type = Eb



Cross Section 5 - Riffle
Abkf = 8.0 ft
Dave = 1.0 ft
Wbkf = 8.0 ft
Dmax = 1.4 ft
Bank Height = 1.4 ft
Bank Height Ratio = 1.0
W/D = 8.0
FPA = 15
ENT = 1.9
Stream Type = Eb

Cedarock Reference Reach



Profile (Reference Reach)
Save = 0.0258 rise/run
Svalley = 0.0310 rise/run
Sriffle = 0.0316 (0 - 0.0576) rise/run
Spool = 0.0007 (0 - 0.018) rise/run
Srun = 0.0353 (0 - 0.3565) rise/run
Sglide = 0.0029 (0 - 0.0431) rise/run

- Water Surface
- Channel Bed

Axiom Environmental, Inc.

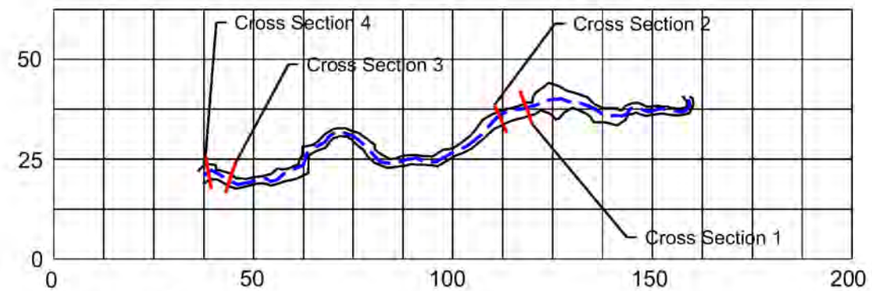
CLEARWATER MITIGATION SOLUTIONS

NOTES/REVISIONS

Project:
Bull Chute Mitigation Site
Randolph County
North Carolina

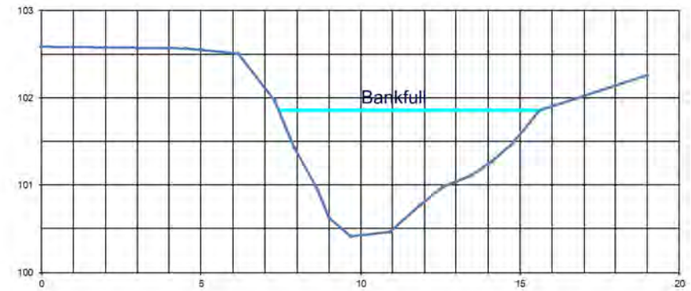
Title:
Cedarock Reference Reach Dimension, Pattern, and Profile

Scale: NA
Date: Aug 2020
Project No.: 20-006
FIGURE NO. 5A



Reference Pattern
Lp-p = 18 (9 - 40) ft
Lm = 33 (15 - 74) ft
Wbelt = 18 (10 - 23) ft
Rc = 8 (4 - 16) ft
Lp-p/Wbkf = 3.3 (1.6 - 7.5)
Lm/Wbkf = 6.1 (2.8 - 13.8)
Wbelt/Wbkf = 3.3 (1.9 - 4.3)
Rc/Wbkf = 1.4 (0.8 - 3.0)
SIN = 1.15

Pattern Legend
- Top of Bank
- Thalweg
- Cross Section



Cross Section 2 - Pool
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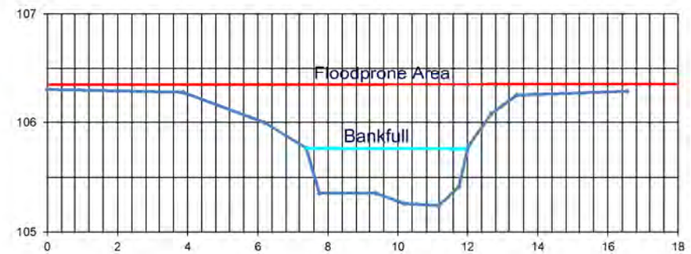
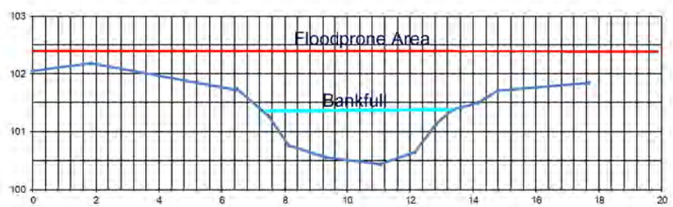
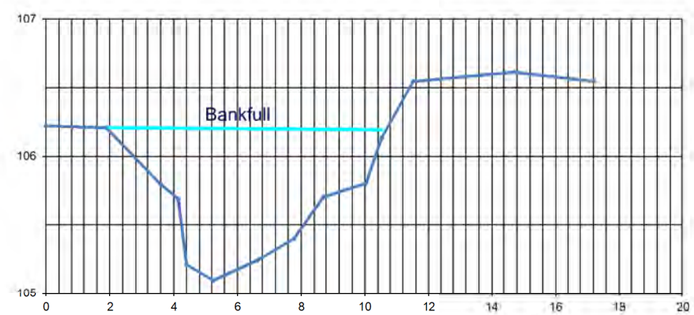
Wbkf = 8.2 ft
Dmax = 1.4 ft



Cross Section 3 - Riffle
Abkf = 2.0 ft
Dave = 0.4 ft
Wbkf = 4.7 ft
Dmax = 0.5 ft
Bank Height = 0.5 ft
Bank Height Ratio = 1.0
W/D = 11.1
FPA = 35
ENT = 7.5
Stream Type = E

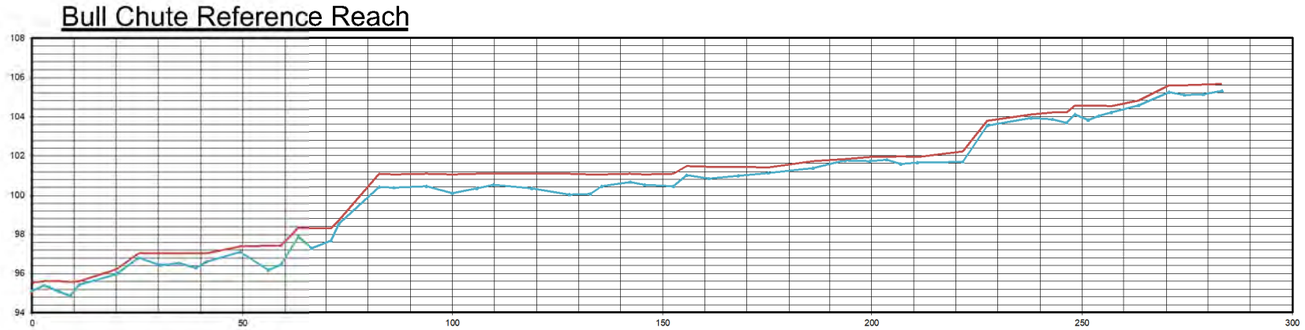


Cross Section 1 - Riffle
Abkf = 3.9 ft
Dave = 0.6 ft
Wbkf = 6.0 ft
Dmax = 0.9 ft
Bank Height = 0.9 ft
Bank Height Ratio = 1.0
W/D = 9.3
FPA = 50
ENT = 8.3
Stream Type = E



Cross Section 4 - Pool
Abkf = 5.5 ft
Wbkf = 9.2 ft
Dmax = 1.1 ft

Bull Chute Reference Reach



Profile (Reference Reach)
Save = 0.0357 rise/run
Svalley = 0.0411 rise/run
Sriffle = 0.0216 (0 - 0.1009) rise/run
Spool = 0.0007 (0 - 0.0059) rise/run
Srun = 0 (0 - 0.1708) rise/run
Sglide = 0.0210 (0 - 0.1520) rise/run

- Water Surface
- Channel Bed

Axiom Environmental, Inc.

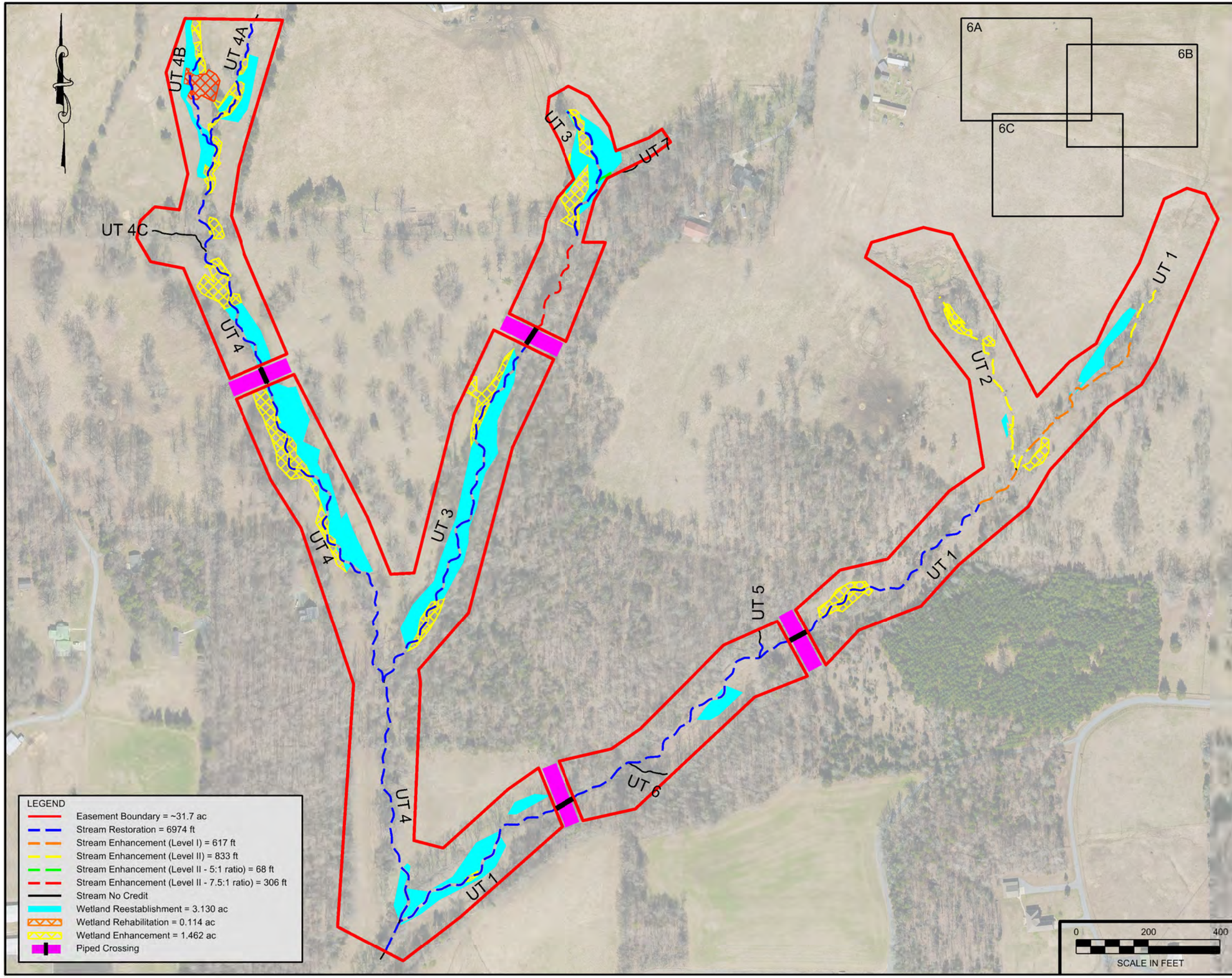
CLEARWATER MITIGATION SOLUTIONS

NOTES/REVISIONS

Project:
Bull Chute Mitigation Site
Randolph County
North Carolina

Title:
Bull Chute Reference Reach Dimension, Pattern, and Profile

Scale: NA
Date: Aug 2020
Project No.: 20-006
FIGURE NO. 5B



Axiom Environmental, Inc.

CLEARWATER
MITIGATION
SOLUTIONS

NOTES/REVISIONS

Project:

Bull Chute
Mitigation Site
Randolph County
North Carolina

Title:

Restoration
Plan

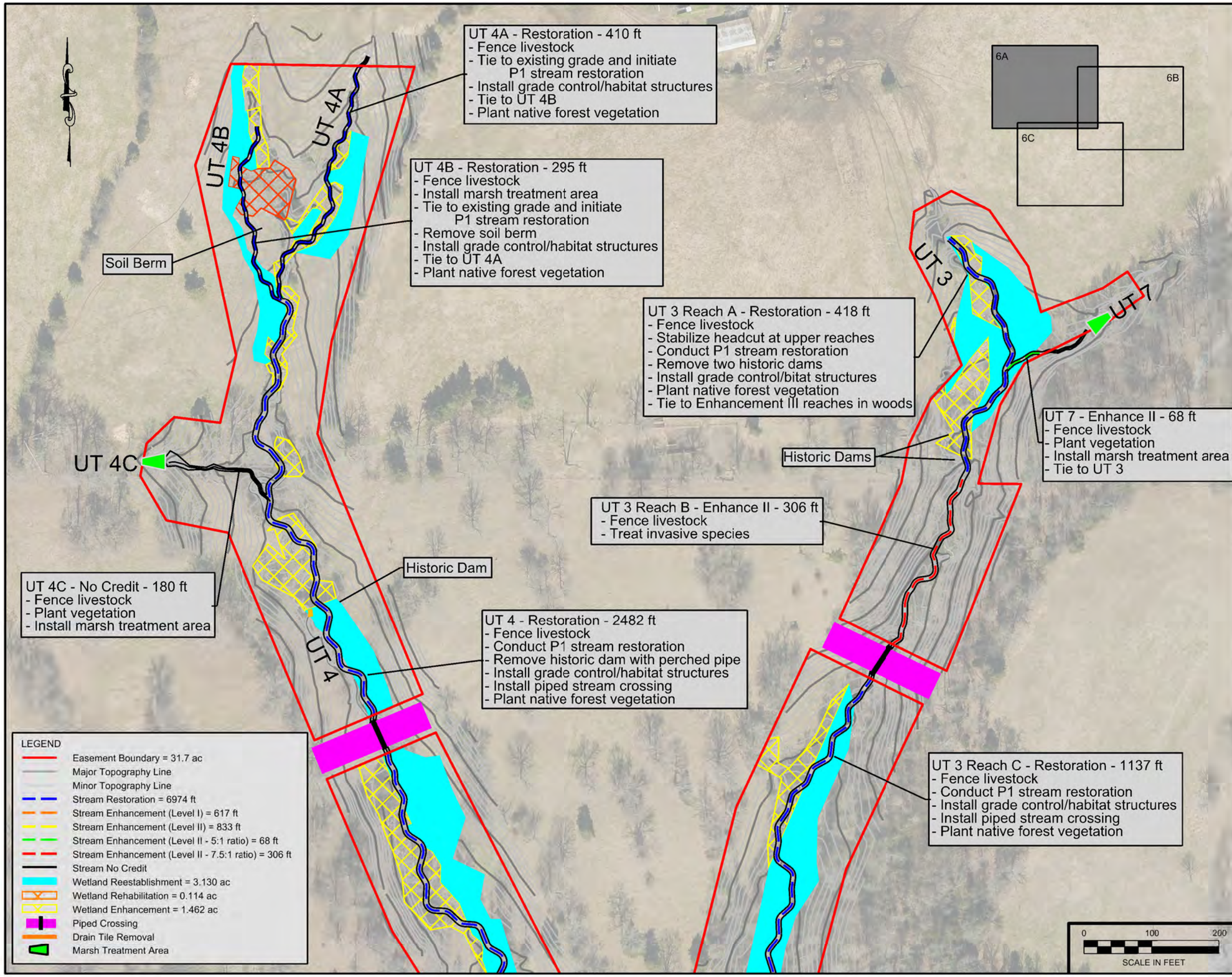
Scale: As Shown

Date: Aug 2020

Project No.: 20-006

FIGURE NO.

6



Axiom Environmental, Inc.

CLEARWATER MITIGATION SOLUTIONS

NOTES/REVISIONS

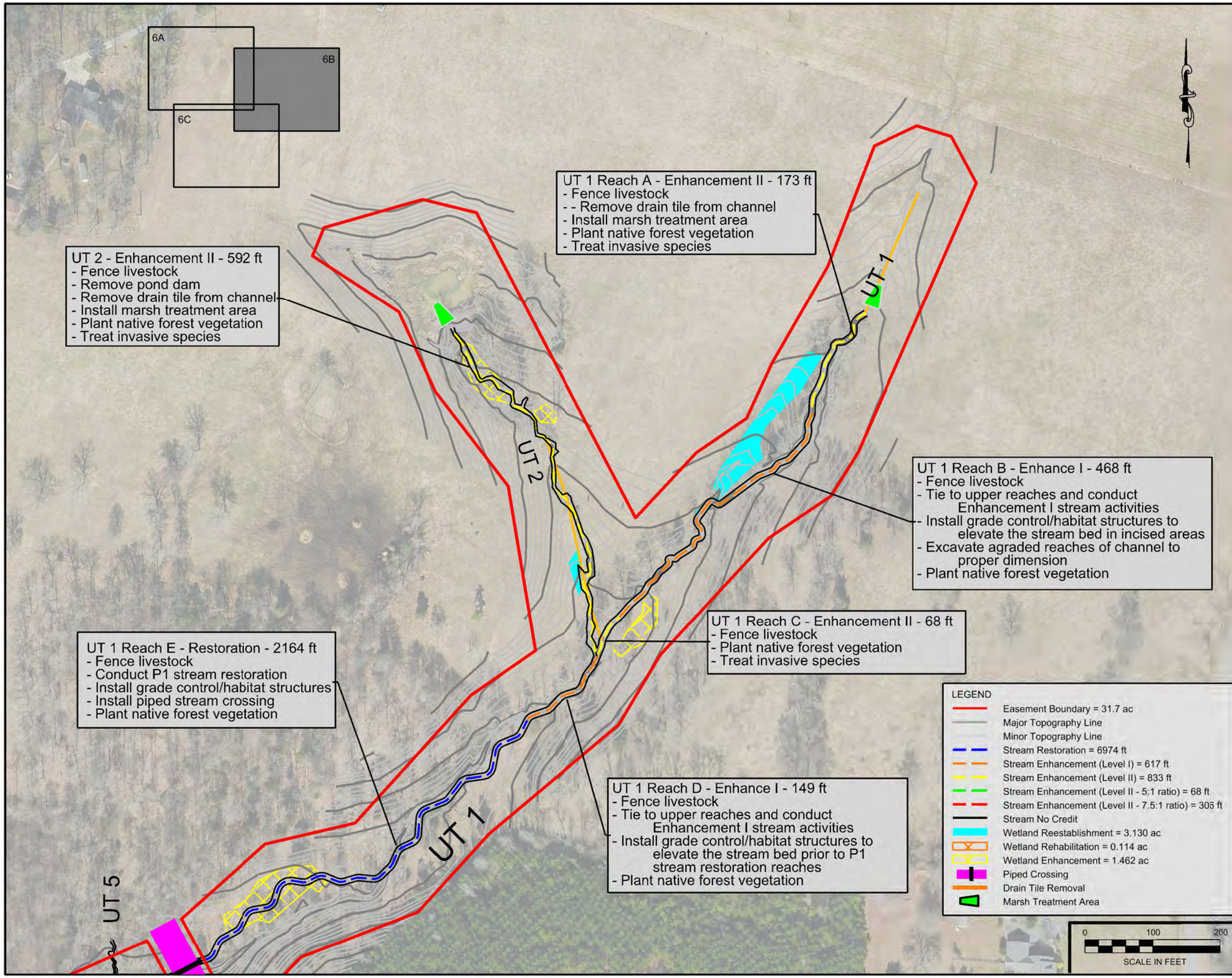
Project:

Bull Chute Mitigation Site
Randolph County
North Carolina

Title:

Restoration Plan

Scale: As Shown	FIGURE NO.
Date: Aug 2020	6A
Project No.: 20-006	



Axiom Environmental, Inc.

CLEARWATER MITIGATION SOLUTIONS

NOTES/REVISIONS

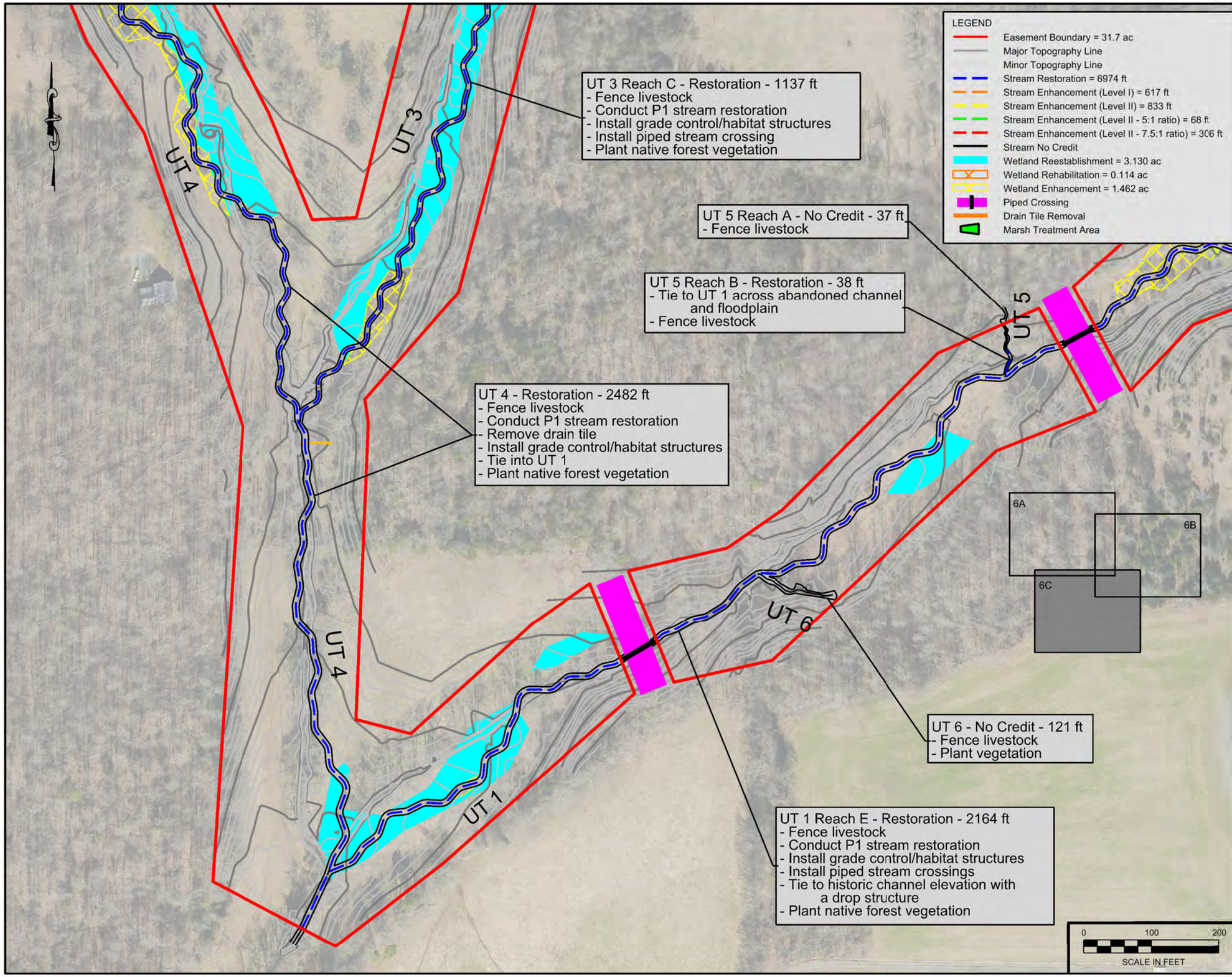
Project:

Bull Chute Mitigation Site
Randolph County
North Carolina

Title:

Restoration Plan

Scale: As Shown	FIGURE NO.
Date: Aug 2020	6B
Project No.: 20-006	



LEGEND

- Easement Boundary = 31.7 ac
- Major Topography Line
- Minor Topography Line
- Stream Restoration = 6974 ft
- Stream Enhancement (Level I) = 617 ft
- Stream Enhancement (Level II) = 833 ft
- Stream Enhancement (Level II - 5:1 ratio) = 68 ft
- Stream Enhancement (Level II - 7.5:1 ratio) = 306 ft
- Stream No Credit
- Wetland Reestablishment = 3.130 ac
- Wetland Rehabilitation = 0.114 ac
- Wetland Enhancement = 1.462 ac
- Piped Crossing
- Drain Tile Removal
- Marsh Treatment Area

Axiom Environmental, Inc.

CLEARWATER MITIGATION SOLUTIONS

NOTES/REVISIONS

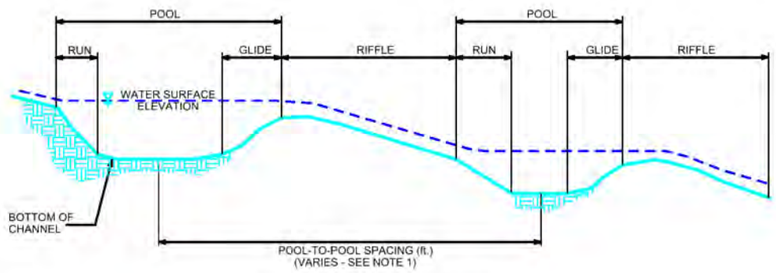
Project:

Bull Chute Mitigation Site
Randolph County
North Carolina

Title:

Restoration Plan

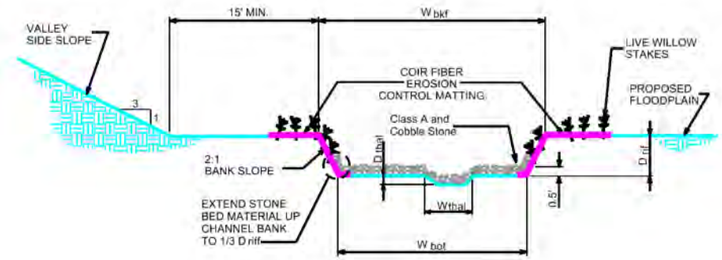
Scale: As Shown	FIGURE NO.
Date: Aug 2020	6C
Project No.: 20-006	



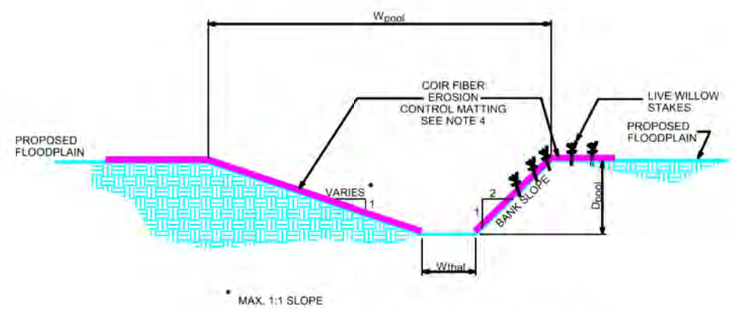
TYPICAL CHANNEL PROFILE

NOTES:

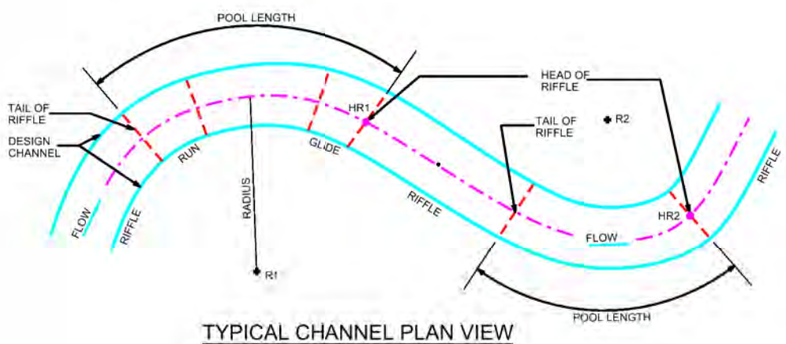
1. POOL-TO-POOL SPACING IS MEASURED FROM CENTER OF POOL BEND TO CENTER OF POOL BEND.



TYPICAL RIFFLE CROSS-SECTION



TYPICAL POOL CROSS-SECTION



TYPICAL CHANNEL PLAN VIEW

CHANNEL PLAN VIEW NOTES:

1. THE CONTRACTOR SHALL LAYOUT THE CHANNEL ALIGNMENT BY LOCATING THE RADII AND SCRIBING THE CENTER LINE FOR EACH POOL BEND. THE CONNECTING TANGENT SECTIONS SHALL COMPLETE THE LAYOUT OF THE CHANNEL.

2. FIELD ADJUSTMENTS OF THE ALIGNMENT MAY BE REQUIRED TO SAVE TREES OR AVOID OBSTACLES. THE STAKE-OUT SHALL BE APPROVED BY THE CONSTRUCTION MANAGER BEFORE CONSTRUCTION OF THE CHANNEL.

CHANNEL CONSTRUCTION NOTES:

1. MATERIAL EXCAVATED FROM CHANNEL AND FLOODPLAIN SHALL BE USED TO BACKFILL EXISTING CHANNEL.

2. BANK PROTECTION SHALL CONSIST OF NATURAL COIR FIBER MATTING.

3. THE CONTRACTOR SHALL SUPPLY BED MATERIAL FOR THE ENTIRE BED LENGTH OF EACH RIFFLE SECTION. THE BED MATERIAL SHALL CONSIST OF A MIX OF CLASS A AND SMALLER STONE.

CROSS-SECTION DIMENSIONS

REACH	Wbkf (ft.)	Wbot (ft.)	Driff (ft.)	Dthal (ft.)	Dpool (ft.)	Wpool (ft.)	Wthal (ft.)
UT 1	9.2	5.6	0.8	0.1	1.1	11.9	1.0
UT 3	7.2	4.4	0.6	0.1	0.9	9.4	1.0
UT 4 Upstream	7.8	5.0	0.6	0.1	0.9	10.1	1.0
UT 4 Downstream	9.8	6.2	0.8	0.1	1.2	12.8	1.0
UT 4A and 4B	4.3	2.7	0.3	0.1	0.5	5.5	1.0

Axiom Environmental, Inc.

CLEARWATER MITIGATION SOLUTIONS

NOTES/REVISIONS

Project:

Bull Chute Mitigation Site
Randolph County
North Carolina

Title:

PROPOSED DIMENSION, PATTERN, AND PROFILE

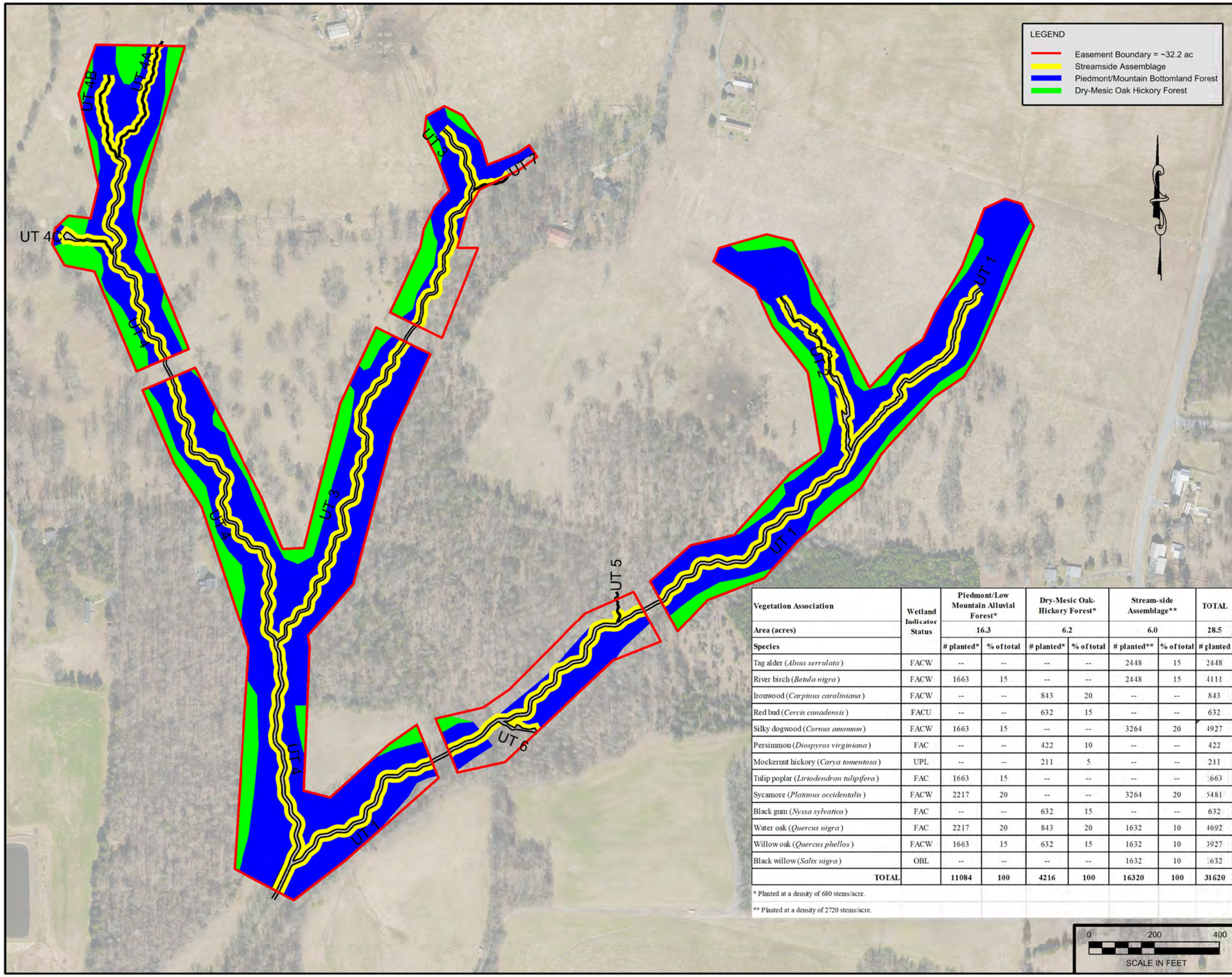
Scale: NA

Date: Aug 2020

Project No.: 20-006

FIGURE NO.

7



Vegetation Association	Wetland Indicator Status	Piedmont/Low Mountain Alluvial Forest*		Dry-Mesic Oak-Hickory Forest*		Stream-side Assemblage**		TOTAL
Area (acres)		16.3		6.2		6.0		28.5
Species		# planted*	% of total	# planted*	% of total	# planted**	% of total	# planted
Tag alder (*Alnus serrulata*)	FACW	--	--	--	--	2448	15	2448
River birch (*Betula nigra*)	FACW	1663	15	--	--	2448	15	4111
Ironwood (*Carpinus caroliniana*)	FACW	--	--	843	20	--	--	843
Red bud (*Cercis canadensis*)	FACU	--	--	632	15	--	--	632
Silky dogwood (*Cornus amomum*)	FACW	1663	15	--	--	3264	20	4927
Persimmon (*Diospyros virginiana*)	FAC	--	--	422	10	--	--	422
Mockernut hickory (*Carya tomentosa*)	UPL	--	--	211	5	--	--	211
Tulip poplar (*Liriodendron tulipifera*)	FAC	1663	15	--	--	--	--	1663
Sycamore (*Platanus occidentalis*)	FACW	2217	20	--	--	3264	20	5481
Black gum (*Nyssa sylvatica*)	FAC	--	--	632	15	--	--	632
Water oak (*Quercus nigra*)	FAC	2217	20	843	20	1632	10	4692
Willow oak (*Quercus phellos*)	FACW	1663	15	632	15	1632	10	3927
Black willow (*Salix nigra*)	OBL	--	--	--	--	1632	10	1632
TOTAL		11084	100	4216	100	16320	100	31620

* Planted at a density of 680 stems/acre.

** Planted at a density of 2720 stems/acre.

Axiom Environmental, Inc.

CLEARWATER MITIGATION SOLUTIONS

NOTES/REVISIONS

Project:

Bull Chute Mitigation Site
Randolph County
North Carolina

Title:

Planting Plan

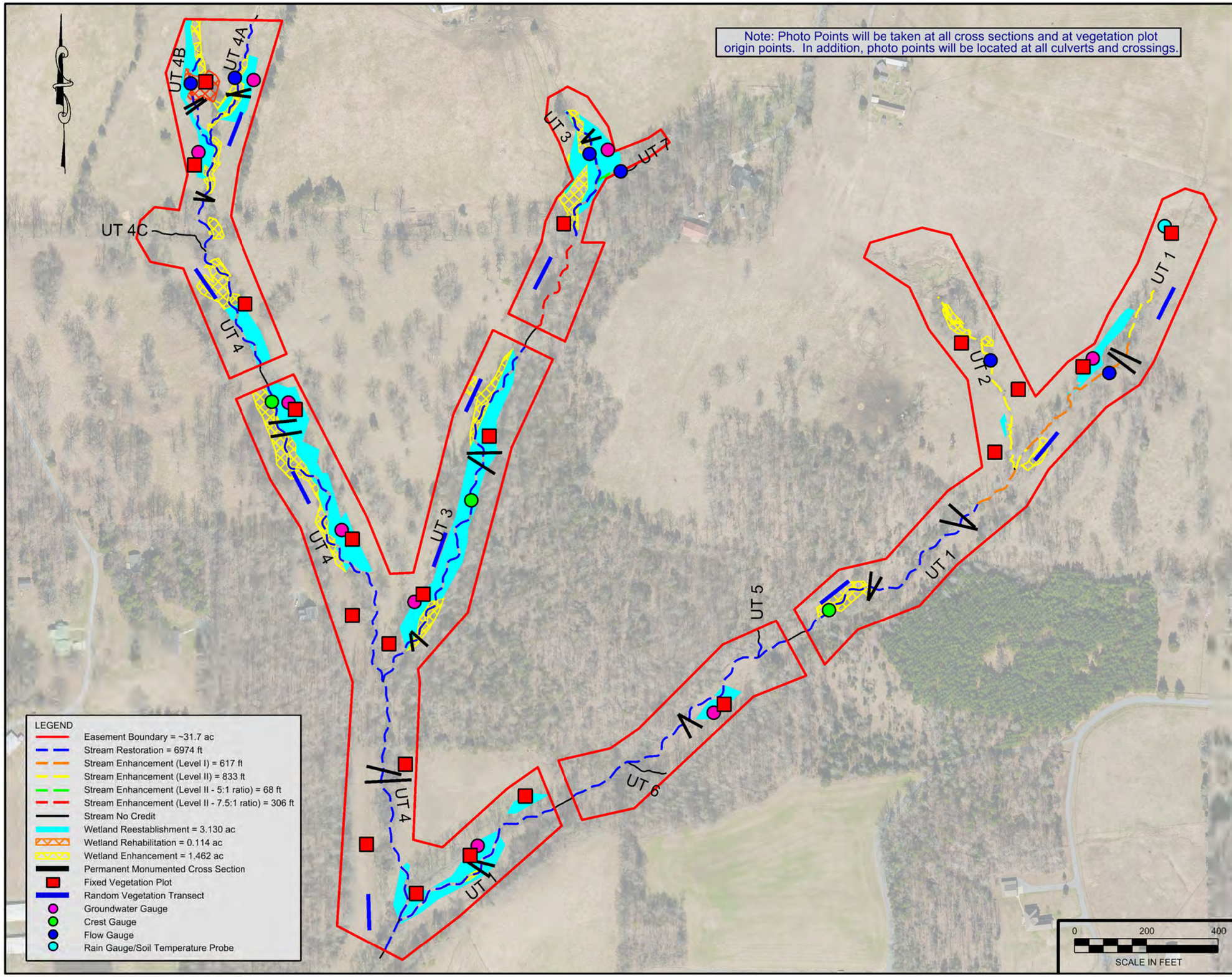
Scale: As Shown

Date: Aug 2020

Project No.: 20-006

FIGURE NO.

8



Axiom Environmental, Inc.

CLEARWATER MITIGATION SOLUTIONS

NOTES/REVISIONS

Project:

Bull Chute Mitigation Site
Randolph County
North Carolina

Title:

Monitoring Plan

Scale: As Shown

Date: Aug 2020

Project No.: 20-006

FIGURE NO.

9

Appendix B
Existing Stream & Wetland Data

Table B1. Bull Chute Morphological Stream Characteristics
Existing Stream Cross-section Data
NC SAM Forms
NC WAM Forms
NCDWQ Stream Forms
BEHI/NBS Data
Soil Boring Log

Table B1. Bull Chute Site Morphological Stream Characteristics

Variables	REFERENCE - CEDAROCK PARK	REFERENCE- BULL CHUTE	Existing (UT 1)	Proposed (UT 1)	Existing (UT 3)	Proposed (UT 3)
Stream Type	Eb 4	E 4	G 5	Ce 3/4	G 5	Ce 3/4
Drainage Area (mi^2)	0.21	0.05	0.15	0.15	0.08	0.08
Bankfull Discharge (cfs)	28.8	10.5	22.9	22.9	13.7	13.7
Dimension Variables						
Bankfull Cross-Sectional Area (A_{bkf})	8.0	3.0	6.0	6.0	3.7	3.7
Existing Cross-Sectional Area ($A_{existing}$)	8.0	2.0-3.9	8.4 - 81.7	6.0	8.1 - 21.9	3.7
Bankfull Width (W_{bkf})	Mean: 8.1 Range: 8.0 - 12.1	Mean: 5.4 Range: 4.7-6.0	Mean: 8.5 Range: 5.6 to 16.0	Mean: 9.2 Range: 8.5 to 9.8	Mean: 5.1 Range: 3.3 to 7.1	Mean: 7.2 Range: 6.7 to 7.7
Bankfull Mean Depth (D_{bkf})	Mean: 0.8 Range: 0.8 - 1.0	Mean: 0.5 Range: 0.4-0.6	Mean: 0.7 Range: 0.4 to 1.1	Mean: 0.7 Range: 0.6 to 0.7	Mean: 0.7 Range: 0.5 to 1.1	Mean: 0.5 Range: 0.5 to 0.6
Bankfull Maximum Depth (D_{max})	Mean: 1.4 Range: 1.1 - 1.4	Mean: 0.7 Range: 0.5-0.9	Mean: 1.1 Range: 0.6 to 1.4	Mean: 0.9 Range: 0.8 to 1.1	Mean: 1.0 Range: 0.8 to 1.7	Mean: 0.7 Range: 0.6 to 0.8
Pool Width (W_{pool})	Mean: 9.3 Range: 8.9 - 9.7	Mean: 8.7 Range: 8.2-9.2	No distinct repetitive pattern of riffles and pools due to staightening activities	Mean: 11.9 Range: 9.2 to 14.7	No distinct repetitive pattern of riffles and pools due to staightening activities	Mean: 9.4 Range: 7.2 to 11.5
Maximum Pool Depth (D_{pool})	Mean: 1.8 Range: 1.5 - 2.1	Mean: 1.3 Range: 1.1-1.4		Mean: 1.1 Range: 1.0 to 1.3		Mean: 0.9 Range: 0.8 to 1.0
Width of Floodprone Area (W_{fpa})	Mean: 18 Range: 15 - 25	Mean: 43.0 Range: 35-50	Mean: 14 Range: 10 to 100	Mean: 100 Range: 50 to 150	Mean: 9 Range: 7 to 50	Mean: 75 Range: 50 to 100
Dimension Ratios						
Entrenchment Ratio (W_{fpa}/W_{bkf})	Mean: 2.1 Range: 1.9 - 2.2	Mean: 7.9 Range: 7.4-8.3	Mean: 1.4 Range: 1.1 to 15.9	Mean: 10.9 Range: 5.9 to 15.3	Mean: 1.5 Range: 1.1 to 13.5	Mean: 10.4 Range: 7.5 to 13.0
Width / Depth Ratio (W_{bkf}/D_{bkf})	Mean: 10.1 Range: 8.0 - 15.1	Mean: 10.9 Range: 10-11.8	Mean: 12.1 Range: 5.1 to 40.0	Mean: 14.0 Range: 12.0 to 16.0	Mean: 7.3 Range: 3.0 to 14.2	Mean: 14.0 Range: 12.0 to 16.0
Max. D_{bkf} / D_{bkf} Ratio	Mean: 1.4 Range: 1.4 - 1.8	Mean: 1.4 Range: 1.3-1.5	Mean: 1.4 Range: 1.3 to 1.9	Mean: 1.3 Range: 1.2 to 1.5	Mean: 1.5 Range: 1.1 to 1.6	Mean: 1.3 Range: 1.2 to 1.5
Low Bank Height / Max. D_{bkf} Ratio	Mean: 1.0 Range: 1.0 - 1.8	Mean: 1.0 Range:	Mean: 2.8 Range: 1.3 to 5.0	Mean: 1.0 Range: 1.0 to 1.3	Mean: 2.5 Range: 1.5 to 4.0	Mean: 1.0 Range: 1.0 to 1.3
Maximum Pool Depth / Bankfull Mean Depth (D_{pool}/D_{bkf})	Mean: 1.9 Range: 0 - 2.1	Mean: 2.5 Range: 2.2-2.8	No distinct repetitive pattern of riffles and pools due to staightening activities	Mean: 1.7 Range: 1.5 to 2.0	No distinct repetitive pattern of riffles and pools due to staightening activities	Mean: 1.7 Range: 1.5 to 2.0
Pool Width / Bankfull Width (W_{pool}/W_{bkf})	Mean: 1.1 Range: 0 - 1.2	Mean: 1.6 Range: 1.5-1.7		Mean: 1.3 Range: 1.0 to 1.6		Mean: 1.3 Range: 1.0 to 1.6
Pool Area / Bankfull Cross Sectional Area	Mean: 1.4 Range: 0 - 1.6	Mean: 2.2 Range: 1.9-2.4		Mean: 1.4 Range: 1.1 to 1.6		Mean: 1.4 Range: 1.1 to 1.6

Variables	REFERENCE - CEDAROCK PARK	REFERENCE- BULL CHUTE	Existing (UT 1)	Proposed (UT 1)	Existing (UT 3)	Proposed (UT 3)
Pattern Variables						
Pool to Pool Spacing (L_{p-p})	Med: 37.2 Range: 25 - 69	Med: 17.6 Range: 8.7-40.2	No distinct repetitive pattern of riffles and pools due to staightening activities	Med: 36.7 Range: 27.5 to 55.0	No distinct repetitive pattern of riffles and pools due to staightening activities	Med: 28.8 Range: 21.6 to 57.6
Meander Length (L_m)	Med: 68.4 Range: 44 - 116	Med: 32.6 Range: 15-74		Med: 77.9 Range: 55.0 to 91.7		Med: 61.2 Range: 43.2 to 86.4
Belt Width (W_{belt})	Med: 22.8 Range: 20 - 38	Med: 17.5 Range: 9.9 - 23.2		Med: 18.3 Range: 13.7 to 27.5		Med: 14.4 Range: 10.8 to 21.6
Radius of Curvature (R_c)	Med: 16.5 Range: 11 - 27	Med: 7.5 Range: 4.1-16.0		Med: 27.5 Range: 18.3 to 45.8		Med: 21.6 Range: 14.4 to 36.0
Sinuosity (Sin)	1.20	1.15	1.03	1.15	1.02	1.15
Pattern Ratios						
Pool to Pool Spacing/ Bankfull Width (L_{p-p}/W_{bkf})	Med: 4.6 Range: 3.1 - 8.4	Med: 3.3 Range: 1.6-7.5	No distinct repetitive pattern of riffles and pools due to staightening activities	Med: 4.0 Range: 3.0 to 6.0	No distinct repetitive pattern of riffles and pools due to staightening activities	Med: 4.0 Range: 3.0 to 8.0
Meander Length/ Bankfull Width (L_m/W_{bkf})	Med: 8.4 Range: 5.5 - 14.3	Med: 6.1 Range: 2.8-13.8		Med: 8.5 Range: 6.0 to 10.0		Med: 8.5 Range: 6.0 to 12.0
Meander Width Ratio (W_{belt}/W_{bkf})	Med: 2.8 Range: 2.4 - 4.7	Med: 3.3 Range: 1.9-4.3		Med: 2.0 Range: 1.5 to 3.0		Med: 2.0 Range: 1.5 to 3.0
Radius of Curvature/ Bankfull Width (Rc/W_{bkf})	Med: 2.0 Range: 1.4 - 3.3	Med: 1.4 Range: 0.8-3.0		Med: 3.0 Range: 2.0 to 5.0		Med: 3.0 Range: 2.0 to 5.0
Profile Variables						
Average Water Surface Slope (S_{ave})	0.0258	0.0357	0.0211	0.0189	0.0254	0.0225
Valley Slope (S_{valley})	0.0310	0.0411	0.0217	0.0217	0.0259	0.0259
Riffle Slope (S_{riffle})	Mean: 0.0316 Range: 0.01 - 0.0576	Mean: 0.0216 Range: 0-0.1009	No distinct repetitive pattern of riffles and pools due to channel incision	Mean: 0.0302 Range: 0.0226 to 0.0340	No distinct repetitive pattern of riffles and pools due to channel incision	Mean: 0.0360 Range: 0.0270 to 0.0405
Pool Slope (S_{pool})	Mean: 0.0007 Range: 0 - 0.018	Mean: 0.0007 Range: 0-0.0059		Mean: 0.0019 Range: 0.0000 to 0.0132		Mean: 0.0023 Range: 0.0000 to 0.0158
Run Slope (S_{run})	Mean: 0.0353 Range: 0 - 0.3565	Mean: 0 Range: 0-0.1708		Mean: 0.0075 Range: 0.0000 to 0.0151		Mean: 0.0090 Range: 0.0000 to 0.0180
Glide Slope (S_{glide})	Mean: 0.0029 Range: 0 - 0.0431	Mean: 0.0210 Range: 0-0.1520		Mean: 0.0021 Range: 0.0000 to 0.0151		Mean: 0.0025 Range: 0.0000 to 0.0180
Profile Ratios						
Riffle Slope/ Water Surface Slope (S_{riffle}/S_{ave})	Mean: 1.2 Range: 0.39 - 2.23	Mean: 0.61 Range: 0-2.83	No distinct repetitive pattern of riffles and pools due to channel incision	Mean: 1.60 Range: 1.2 to 1.8	No distinct repetitive pattern of riffles and pools due to channel incision	Mean: 1.60 Range: 1.2 to 1.8
Pool Slope/Water Surface Slope (S_{pool}/S_{ave})	Mean: 0.0 Range: 0 - 0.70	Mean: 0.02 Range: 0-0.17		Mean: 0.10 Range: 0.0 to 0.7		Mean: 0.10 Range: 0.0 to 0.7
Run Slope/Water Surface Slope (S_{run}/S_{ave})	Mean: 1.37 Range: 0 - 13.82	Mean: 0.00 Range: 0-4.79		Mean: 0.40 Range: 0.0 to 0.8		Mean: 0.40 Range: 0.0 to 0.8
Glide Slope/Water Surface Slope (S_{glide}/S_{ave})	Mean: 0.11 Range: 0 - 1.67	Mean: 0.58 Range: 0-4.26		Mean: 0.11 Range: 0.0 to 0.8		Mean: 0.11 Range: 0.0 to 0.8

Table B1 continuted. Bull Chute Site Morphological Stream Characteristics

Variables	REFERENCE - CEDAROCK PARK	REFERENCE- BULL CHUTE	Existing (UT 4 upstream)	Proposed (UT 4 upstream)	Existing (UT 4 downstream)	Proposed (UT 4 downstream)
Stream Type	Eb 4	E 4	Fg 5	Ce 3/4	G 5	Ce 3/4
Drainage Area (mi^2)	0.21	0.05	0.09	0.09	0.19	0.19
Bankfull Discharge (cfs)	28.8	10.5	16.1	16.1	26.7	26.7
Dimension Variables						
Bankfull Cross-Sectional Area (A_{bkf})	8.0	3.0	4.3	4.3	6.9	6.9
Existing Cross-Sectional Area ($A_{existing}$)	8.0	2.0-3.9	15.2 - 37.8	4.3	59.5 - 78.6	6.9
Bankfull Width (W_{bkf})	Mean: 8.1 Range: 8.0 - 12.1	Mean: 5.4 Range: 4.7-6.0	Mean: 8.3 Range: 5.0 to 10.4	Mean: 7.8 Range: 7.2 to 8.3	Mean: 9.2 Range: 7.8 to 10.0	Mean: 9.8 Range: 9.1 to 10.5
Bankfull Mean Depth (D_{bkf})	Mean: 0.8 Range: 0.8 - 1.0	Mean: 0.5 Range: 0.4-0.6	Mean: 0.6 Range: 0.4 to 0.9	Mean: 0.6 Range: 0.5 to 0.6	Mean: 0.8 Range: 0.7 to 0.9	Mean: 0.7 Range: 0.7 to 0.8
Bankfull Maximum Depth (D_{max})	Mean: 1.4 Range: 1.1 - 1.4	Mean: 0.7 Range: 0.5-0.9	Mean: 1.1 Range: 0.5 to 1.2	Mean: 0.7 Range: 0.7 to 0.9	Mean: 1.0 Range: 0.9 to 1.1	Mean: 0.9 Range: 0.8 to 1.1
Pool Width (W_{pool})	Mean: 9.3 Range: 8.9 - 9.7	Mean: 8.7 Range: 8.2-9.2	No distinct repetitive pattern of riffles and pools due to staightening activities	Mean: 10.1 Range: 7.8 to 12.4	No distinct repetitive pattern of riffles and pools due to staightening activities	Mean: 12.8 Range: 9.8 to 15.7
Maximum Pool Depth (D_{pool})	Mean: 1.8 Range: 1.5 - 2.1	Mean: 1.3 Range: 1.1-1.4		Mean: 0.9 Range: 0.8 to 1.1		Mean: 1.2 Range: 1.1 to 1.4
Width of Floodprone Area (W_{fpa})	Mean: 18 Range: 15 - 25	Mean: 43.0 Range: 35-50	Mean: 11 Range: 6 to 24	Mean: 75 Range: 50 to 100	Mean: 11 Range: 9.0 to 14	Mean: 100 Range: 50 to 150
Dimension Ratios						
Entrenchment Ratio (W_{fpa}/W_{bkf})	Mean: 2.1 Range: 1.9 - 2.2	Mean: 7.9 Range: 7.4-8.3	Mean: 1.3 Range: 1.1 to 2.6	Mean: 9.7 Range: 7.0 to 12.1	Mean: 1.2 Range: 1.1 to 1.4	Mean: 10.2 Range: 5.5 to 14.3
Width / Depth Ratio (W_{bkf}/D_{bkf})	Mean: 10.1 Range: 8.0 - 15.1	Mean: 10.9 Range: 10-11.8	Mean: 15.4 Range: 5.6 to 26.0	Mean: 14.0 Range: 12.0 to 16.0	Mean: 12.3 Range: 8.7 to 14.3	Mean: 14.0 Range: 12.0 to 16.0
Max. D_{bkf} / D_{bkf} Ratio	Mean: 1.4 Range: 1.4 - 1.8	Mean: 1.4 Range: 1.3-1.5	Mean: 1.7 Range: 1.2 to 2.0	Mean: 1.3 Range: 1.2 to 1.5	Mean: 1.3 Range: 1.2 to 1.3	Mean: 1.3 Range: 1.2 to 1.5
Low Bank Height / Max. D_{bkf} Ratio	Mean: 1.0 Range: 1.0 - 1.8	Mean: 1.0 Range:	Mean: 3.1 Range: 2.5 to 5.4	Mean: 1.0 Range: 1.0 to 1.3	Mean: 5.3 Range: 4.7 to 5.9	Mean: 1.0 Range: 1.0 to 1.3
Maximum Pool Depth / Bankfull Mean Depth (D_{pool}/D_{bkf})	Mean: 1.9 Range: 0 - 2.1	Mean: 2.5 Range: 2.2-2.8	No distinct repetitive pattern of riffles and pools due to staightening activities	Mean: 1.7 Range: 1.5 to 2.0	No distinct repetitive pattern of riffles and pools due to staightening activities	Mean: 1.7 Range: 1.5 to 2.0
Pool Width / Bankfull Width (W_{pool}/W_{bkf})	Mean: 1.1 Range: 0 - 1.2	Mean: 1.6 Range: 1.5-1.7		Mean: 1.3 Range: 1.0 to 1.6		Mean: 1.3 Range: 1.0 to 1.6
Pool Area / Bankfull Cross Sectional Area	Mean: 1.4 Range: 0 - 1.6	Mean: 2.2 Range: 1.9-2.4		Mean: 1.4 Range: 1.1 to 1.6		Mean: 1.4 Range: 1.1 to 1.6

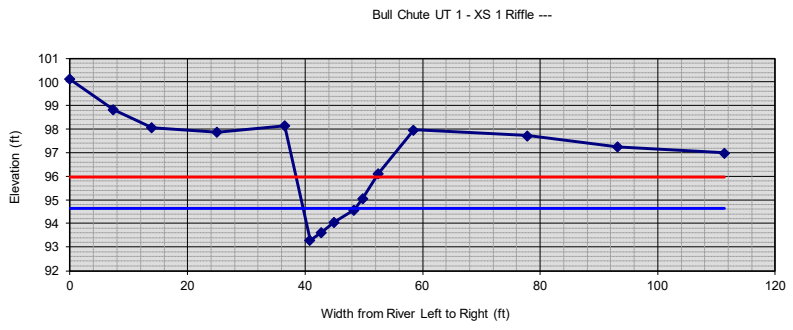
Variables	REFERENCE - CEDAROCK PARK	REFERENCE- BULL CHUTE	Existing (UT 4)	Proposed (UT 4)	Existing (UT 4A and 4B)	Proposed (UT 4A and 4B)
Pattern Variables						
Pool to Pool Spacing (L_{p-p})	Med: 37.2 Range: 25 - 69	Med: 17.6 Range: 8.7-40.2	No distinct repetitive pattern of riffles and pools due to staightening activities	Med: 31.0 Range: 23.3 to 62.1	No distinct repetitive pattern of riffles and pools due to staightening activities	Med: 39.3 Range: 29.5 to 78.6
Meander Length (L_m)	Med: 68.4 Range: 44 - 116	Med: 32.6 Range: 15-74		Med: 66.0 Range: 46.6 to 93.1		Med: 83.5 Range: 59.0 to 117.9
Belt Width (W_{belt})	Med: 22.8 Range: 20 - 38	Med: 17.5 Range: 9.9 - 23.2		Med: 15.5 Range: 11.6 to 23.3		Med: 19.7 Range: 14.7 to 29.5
Radius of Curvature (R_c)	Med: 16.5 Range: 11 - 27	Med: 7.5 Range: 4.1-16.0		Med: 23.3 Range: 15.5 to 38.8		Med: 29.5 Range: 19.7 to 49.1
Sinuosity (Sin)	1.20	1.15	1.06	1.15	1.02	1.15
Pattern Ratios						
Pool to Pool Spacing/ Bankfull Width (L_{p-p}/W_{bkf})	Med: 4.6 Range: 3.1 - 8.4	Med: 3.3 Range: 1.6-7.5	No distinct repetitive pattern of riffles and pools due to staightening activities	Med: 4.0 Range: 3.0 to 8.0	No distinct repetitive pattern of riffles and pools due to staightening activities	Med: 4.0 Range: 3.0 to 8.0
Meander Length/ Bankfull Width (L_m/W_{bkf})	Med: 8.4 Range: 5.5 - 14.3	Med: 6.1 Range: 2.8-13.8		Med: 8.5 Range: 6.0 to 12.0		Med: 8.5 Range: 6.0 to 12.0
Meander Width Ratio (W_{belt}/W_{bkf})	Med: 2.8 Range: 2.4 - 4.7	Med: 3.3 Range: 1.9-4.3		Med: 2.0 Range: 1.5 to 3.0		Med: 2.0 Range: 1.5 to 3.0
Radius of Curvature/ Bankfull Width (Rc/W_{bkf})	Med: 2.0 Range: 1.4 - 3.3	Med: 1.4 Range: 0.8-3.0		Med: 3.0 Range: 2.0 to 5.0		Med: 3.0 Range: 2.0 to 5.0
Profile Variables						
Average Water Surface Slope (S_{ave})	0.0258	0.0357	0.0212	0.0196	0.0165	0.0146
Valley Slope (S_{valley})	0.0310	0.0411	0.0225	0.0225	0.0168	0.0168
Riffle Slope (S_{riffle})	Mean: 0.0316 Range: 0.01 - 0.0576	Mean: 0.0216 Range: 0-0.1009	No distinct repetitive pattern of riffles and pools due to staightening activities	Mean: 0.0313 Range: 0.0235 to 0.0352	No distinct repetitive pattern of riffles and pools due to staightening activities	Mean: 0.0234 Range: 0.0175 to 0.0263
Pool Slope (S_{pool})	Mean: 0.0007 Range: 0 - 0.018	Mean: 0.0007 Range: 0-0.0059		Mean: 0.0020 Range: 0.0000 to 0.0137		Mean: 0.0015 Range: 0.0000 to 0.0102
Run Slope (S_{run})	Mean: 0.0353 Range: 0 - 0.3565	Mean: 0 Range: 0-0.1708		Mean: 0.0078 Range: 0.0000 to 0.0157		Mean: 0.0058 Range: 0.0000 to 0.0117
Glide Slope (S_{glide})	Mean: 0.0029 Range: 0 - 0.0431	Mean: 0.0210 Range: 0-0.1520		Mean: 0.0022 Range: 0.0000 to 0.0157		Mean: 0.0016 Range: 0.0000 to 0.0117
Profile Ratios						
Riffle Slope/ Water Surface Slope (S_{riffle}/S_{ave})	Mean: 1.2 Range: 0.39 - 2.23	Mean: 0.61 Range: 0-2.83	No distinct repetitive pattern of riffles and pools due to staightening activities	Mean: 1.60 Range: 1.2 to 1.8	No distinct repetitive pattern of riffles and pools due to staightening activities	Mean: 1.60 Range: 1.2 to 1.8
Pool Slope/Water Surface Slope (S_{pool}/S_{ave})	Mean: 0.0 Range: 0 - 0.70	Mean: 0.02 Range: 0-0.17		Mean: 0.10 Range: 0.0 to 0.7		Mean: 0.10 Range: 0.0 to 0.7
Run Slope/Water Surface Slope (S_{run}/S_{ave})	Mean: 1.37 Range: 0 - 13.82	Mean: 0.00 Range: 0-4.79		Mean: 0.40 Range: 0.0 to 0.8		Mean: 0.40 Range: 0.0 to 0.8
Glide Slope/Water Surface Slope (S_{glide}/S_{ave})	Mean: 0.11 Range: 0 - 1.67	Mean: 0.58 Range: 0-4.26		Mean: 0.11 Range: 0.0 to 0.8		Mean: 0.11 Range: 0.0 to 0.8

Table B1 continuted. Bull Chute Site Morphological Stream Characteristics

Variables	REFERENCE - CEDAROCK PARK	REFERENCE- BULL CHUTE	Existing (UT 4A)	Existing (UT 4B)	Proposed (UT 4A and 4B)
Stream Type	Eb 4	E 4	Eg 5	Cf 5	Ce 3/4
Drainage Area (mi^2)	0.21	0.05	0.02	0.01	0.02
Bankfull Discharge (cfs)	28.8	10.5	4.3	4.3	4.3
Dimension Variables					
Bankfull Cross-Sectional Area (A_{bkf})	8.0	3.0	1.3	1.2	1.3
Existing Cross-Sectional Area ($A_{existing}$)	8.0	2.0-3.9	2.7 - 22.3	2.1 - 30.3	1.3
Bankfull Width (W_{bkf})	Mean: 8.1 Range: 8.0 - 12.1	Mean: 5.4 Range: 4.7-6.0	Mean: 3.3 Range: 2.3 to 4.5	Mean: 5.0 Range: 3.1 to 6.9	Mean: 4.3 Range: 3.9 to 4.6
Bankfull Mean Depth (D_{bkf})	Mean: 0.8 Range: 0.8 - 1.0	Mean: 0.5 Range: 0.4-0.6	Mean: 0.4 Range: 0.3 to 0.5	Mean: 0.3 Range: 0.2 to 0.4	Mean: 0.3 Range: 0.3 to 0.3
Bankfull Maximum Depth (D_{max})	Mean: 1.4 Range: 1.1 - 1.4	Mean: 0.7 Range: 0.5-0.9	Mean: 0.6 Range: 0.6 to 0.9	Mean: 0.6 Range: 0.3 to 0.8	Mean: 0.4 Range: 0.4 to 0.5
Pool Width (W_{pool})	Mean: 9.3 Range: 8.9 - 9.7	Mean: 8.7 Range: 8.2-9.2	No distinct repetitive pattern of riffles and pools due to staightening activities	No distinct repetitive pattern of riffles and pools due to staightening activities	Mean: 5.5 Range: 4.3 to 6.8
Maximum Pool Depth (D_{pool})	Mean: 1.8 Range: 1.5 - 2.1	Mean: 1.3 Range: 1.1-1.4			Mean: 0.5 Range: 0.5 to 0.6
Width of Floodprone Area (W_{fpa})	Mean: 18 Range: 15 - 25	Mean: 43.0 Range: 35-50	Mean: 8 Range: 6 to 12	Mean: 14 Range: 9 to 18	Mean: 35 Range: 20 to 50
Dimension Ratios					
Entrenchment Ratio (W_{fpa}/W_{bkf})	Mean: 2.1 Range: 1.9 - 2.2	Mean: 7.9 Range: 7.4-8.3	Mean: 3.5 Range: 1.3 to 3.6	Mean: 3.6 Range: 1.3 to 5.8	Mean: 8.2 Range: 5.1 to 11.0
Width / Depth Ratio (W_{bkf}/D_{bkf})	Mean: 10.1 Range: 8.0 - 15.1	Mean: 10.9 Range: 10-11.8	Mean: 8.3 Range: 4.6 to 15.0	Mean: 21.1 Range: 7.8 to 34.5	Mean: 14.0 Range: 12.0 to 16.0
Max. D_{bkf} / D_{bkf} Ratio	Mean: 1.4 Range: 1.4 - 1.8	Mean: 1.4 Range: 1.3-1.5	Mean: 1.8 Range: 1.5 to 2.0	Mean: 1.8 Range: 1.5 to 2.0	Mean: 1.3 Range: 1.2 to 1.5
Low Bank Height / Max. D_{bkf} Ratio	Mean: 1.0 Range: 1.0 - 1.8	Mean: 1.0 Range:	Mean: 3.0 Range: 1.7 to 3.9	Mean: 4.3 Range: 1.3 to 7.3	Mean: 1.0 Range: 1.0 to 1.3
Maximum Pool Depth / Bankfull Mean Depth (D_{pool}/D_{bkf})	Mean: 1.9 Range: 0 - 2.1	Mean: 2.5 Range: 2.2-2.8	No distinct repetitive pattern of riffles and pools due to staightening activities	No distinct repetitive pattern of riffles and pools due to staightening activities	Mean: 1.7 Range: 1.5 to 2.0
Pool Width / Bankfull Width (W_{pool}/W_{bkf})	Mean: 1.1 Range: 0 - 1.2	Mean: 1.6 Range: 1.5-1.7			Mean: 1.3 Range: 1.0 to 1.6
Pool Area / Bankfull Cross Sectional Area	Mean: 1.4 Range: 0 - 1.6	Mean: 2.2 Range: 1.9-2.4			Mean: 1.4 Range: 1.1 to 1.6

Variables	REFERENCE - CEDAROCK PARK	REFERENCE- BULL CHUTE	Existing (UT 4)	Proposed (UT 4)	Existing (UT 4A and 4B)
Pattern Variables					
Pool to Pool Spacing (L_{p-p})	Med: 37.2 Range: 25 - 69	Med: 17.6 Range: 8.7-40.2	No distinct repetitive pattern of riffles and pools due to staightening activities	No distinct repetitive pattern of riffles and pools due to staightening activities	Med: 17.1 Range: 12.8 to 34.1
Meander Length (L_m)	Med: 68.4 Range: 44 - 116	Med: 32.6 Range: 15-74			Med: 36.3 Range: 25.6 to 51.2
Belt Width (W_{belt})	Med: 22.8 Range: 20 - 38	Med: 17.5 Range: 9.9 - 23.2			Med: 8.5 Range: 6.4 to 12.8
Radius of Curvature (R_c)	Med: 16.5 Range: 11 - 27	Med: 7.5 Range: 4.1-16.0			Med: 12.8 Range: 8.5 to 21.3
Sinuosity (Sin)	1.20	1.15	1.02	1.03	1.10
Pattern Ratios					
Pool to Pool Spacing/ Bankfull Width (L_{p-p}/W_{bkf})	Med: 4.6 Range: 3.1 - 8.4	Med: 3.3 Range: 1.6-7.5	No distinct repetitive pattern of riffles and pools due to staightening activities	No distinct repetitive pattern of riffles and pools due to staightening activities	Med: 4.0 Range: 3.0 to 8.0
Meander Length/ Bankfull Width (L_m/W_{bkf})	Med: 8.4 Range: 5.5 - 14.3	Med: 6.1 Range: 2.8-13.8			Med: 8.5 Range: 6.0 to 12.0
Meander Width Ratio (W_{belt}/W_{bkf})	Med: 2.8 Range: 2.4 - 4.7	Med: 3.3 Range: 1.9-4.3			Med: 2.0 Range: 1.5 to 3.0
Radius of Curvature/ Bankfull Width (Rc/W_{bkf})	Med: 2.0 Range: 1.4 - 3.3	Med: 1.4 Range: 0.8-3.0			Med: 3.0 Range: 2.0 to 5.0
Profile Variables					
Average Water Surface Slope (S_{ave})	0.0258	0.0357	0.0444	0.0359	0.0336
Valley Slope (S_{valley})	0.0310	0.0411	0.0453	0.0370	0.0370
Riffle Slope (S_{riffle})	Mean: 0.0316 Range: 0.01 - 0.0576	Mean: 0.0216 Range: 0-0.1009	No distinct repetitive pattern of riffles and pools due to staightening activities	No distinct repetitive pattern of riffles and pools due to staightening activities	Mean: 0.0538 Range: 0.0404 to 0.0605
Pool Slope (S_{pool})	Mean: 0.0007 Range: 0 - 0.018	Mean: 0.0007 Range: 0-0.0059			Mean: 0.0034 Range: 0.0000 to 0.0235
Run Slope (S_{run})	Mean: 0.0353 Range: 0 - 0.3565	Mean: 0 Range: 0-0.1708			Mean: 0.0135 Range: 0.0000 to 0.0269
Glide Slope (S_{glide})	Mean: 0.0029 Range: 0 - 0.0431	Mean: 0.0210 Range: 0-0.1520			Mean: 0.0037 Range: 0.0000 to 0.0269
Profile Ratios					
Riffle Slope/ Water Surface Slope (S_{riffle}/S_{ave})	Mean: 1.2 Range: 0.39 - 2.23	Mean: 0.61 Range: 0-2.83	No distinct repetitive pattern of riffles and pools due to staightening activities	No distinct repetitive pattern of riffles and pools due to staightening activities	Mean: 1.60 Range: 1.2 to 1.8
Pool Slope/Water Surface Slope (S_{pool}/S_{ave})	Mean: 0.0 Range: 0 - 0.70	Mean: 0.02 Range: 0-0.17			Mean: 0.10 Range: 0.0 to 0.7
Run Slope/Water Surface Slope (S_{run}/S_{ave})	Mean: 1.37 Range: 0 - 13.82	Mean: 0.00 Range: 0-4.79			Mean: 0.40 Range: 0.0 to 0.8
Glide Slope/Water Surface Slope (S_{glide}/S_{ave})	Mean: 0.11 Range: 0 - 1.67	Mean: 0.58 Range: 0-4.26			Mean: 0.11 Range: 0.0 to 0.8

Cross Section



section: **Bull Chute UT 1 - XS 1**

Riffle

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description: **Bull Chute UT 1 - XS 1**

height of instrument (ft): **200.00**

notes	omit pt.	distance (ft)	FS (ft)	elevation
	■	0	99.86433	100.1357
	■	7.434753	101.1703	98.82974
	■	13.93285	101.9359	98.06406
	■	25.03848	102.1254	97.87461
	■	36.53263	101.8592	98.14078
	■	40.83548	106.7076	93.29236
	■	42.81579	106.3789	93.62109
	■	44.99529	105.9372	94.06281
	■	48.34994	105.4202	94.57984
	■	49.84176	104.9305	95.06949
	■	52.43129	103.8837	96.11629
	■	58.47625	102.0256	97.97441
	■	77.81914	102.2729	97.72707
	■	93.2278	102.7525	97.24748
	■	111.3883	103.0091	96.99092

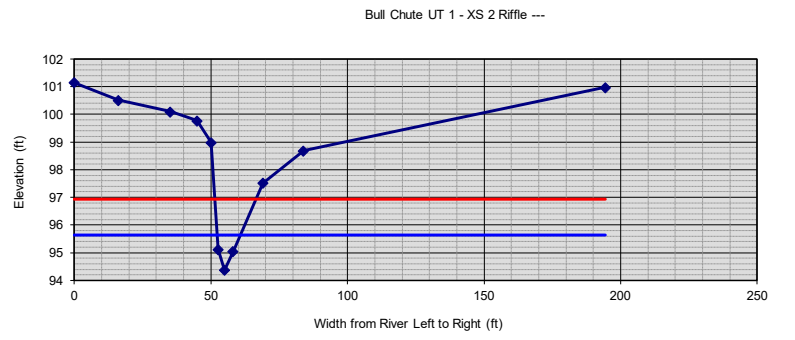
FS bankfull	FS top of bank	W fpa (ft)	channel slope (%)	Manning's "n"
105.36	102.03	12.0		
94.64	97.97			

dimensions			
6.0	x-section area	0.7	d mean
8.9	width	9.6	wet P
1.3	d max	0.6	hyd radi
4.7	bank ht	13.3	w/d ratio
12.0	W flood prone area	1.3	ent ratio

hydraulics	
0.0	velocity (ft/sec)
0.0	discharge rate, Q (cfs)
0.00	shear stress ((lbs/ft sq)
0.00	shear velocity (ft/sec)
0.000	unit stream power (lbs/ft/sec)
0.00	Froude number
0.0	friction factor u/u*
~~0.0~~	threshold grain size (mm)

check from channel material			
0	measured D84 (mm)		
0.0	relative roughness	0.0	fric. factor
0.000	Manning's n from channel material		

Cross Section



section: **Bull Chute UT 1 - XS 2**

Riffle

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description: **Bull Chute UT 1 - XS 2**

height of instrument (ft): **200.00**

notes	omit pt.	distance (ft)	FS (ft)	elevation
	■	0	98.84183	101.1582
	■	16.15096	99.49263	100.5074
	■	35.21919	99.89822	100.1018
	■	44.86328	100.2244	99.77555
	■	50.05353	101.0116	98.98843
	■	52.72716	104.8728	95.12723
	■	55.01678	105.6327	94.36732
	■	58.15818	104.9491	95.05093
	■	69.08921	102.4869	97.51313
	■	83.98545	101.3135	98.68646
	■	194.5383	99.02784	100.9722

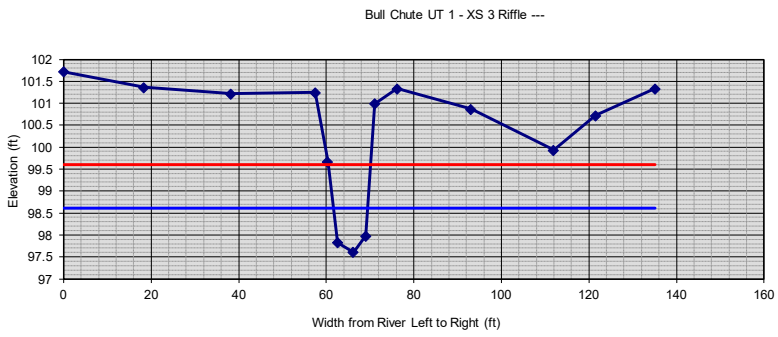
FS bankfull	FS top of bank	W fpa (ft)	channel slope (%)	Manning's "n"
104.34	101.31	14.0		
95.66	98.69			

dimensions			
6.0	x-section area	0.7	d mean
8.5	width	9.0	wet P
1.3	d max	0.7	hyd radi
4.3	bank ht	12.1	w/d ratio
14.0	W flood prone area	1.6	ent ratio

hydraulics	
0.0	velocity (ft/sec)
0.0	discharge rate, Q (cfs)
0.00	shear stress ((lbs/ft sq)
0.00	shear velocity (ft/sec)
0.000	unit stream power (lbs/ft/sec)
0.00	Froude number
0.0	friction factor u/u*
~~0.0~~	threshold grain size (mm)

check from channel material			
0	measured D84 (mm)		
0.0	relative roughness	0.0	fric. factor
0.000	Manning's n from channel material		

Cross Section



section: **Bull Chute UT 1 - XS 3**

Riffle

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description: **Bull Chute UT 1 - XS 3**

height of instrument (ft): **200.00**

notes	omit pt.	distance (ft)	FS (ft)	elevation
	■	0	98.28098	101.719
	■	18.37446	98.64135	101.3586
	■	38.25698	98.7866	101.2134
	■	57.45254	98.75569	101.2443
	■	60.35926	100.3339	99.66605
	■	62.59673	102.174	97.82599
	■	66.19007	102.3843	97.6157
	■	69.02695	102.0202	97.97979
	■	71.06163	99.01494	100.9851
	■	76.24644	98.66968	101.3303
	■	93.0605	99.13761	100.8624
	■	111.9521	100.0718	99.92824
	■	121.5673	99.28228	100.7177
	■	135.099	98.67108	101.3289

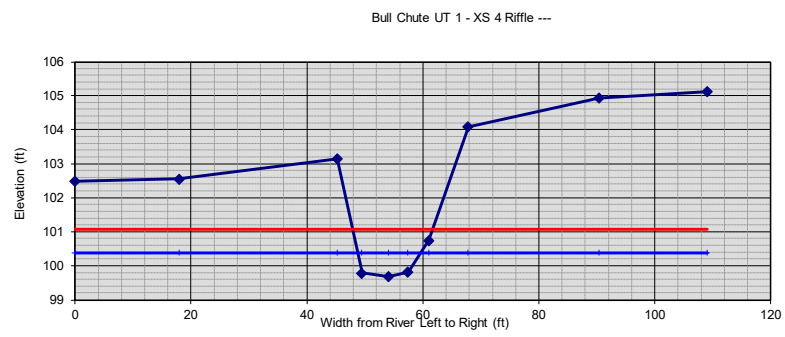
FS bankfull	FS top of bank	W fpa (ft)	channel slope (%)	Manning's "n"
101.39	99.02	10.0		
98.61	100.98			

dimensions			
6.0	x-section area	0.8	d mean
7.8	width	8.5	wet P
1.0	d max	0.7	hyd radi
3.4	bank ht	10.2	w/d ratio
10.0	W flood prone area	1.3	ent ratio

hydraulics	
0.0	velocity (ft/sec)
0.0	discharge rate, Q (cfs)
0.00	shear stress ((lbs/ft sq)
0.00	shear velocity (ft/sec)
0.000	unit stream power (lbs/ft/sec)
0.00	Froude number
0.0	friction factor u/u*
~~0.0~~	threshold grain size (mm)

check from channel material			
0	measured D84 (mm)		
0.0	relative roughness	0.0	fric. factor
0.000	Manning's n from channel material		

Cross Section



section: **Bull Chute UT 1 - XS 4**

Riffle

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description: **Bull Chute UT 1 - XS 4**

height of instrument (ft): **200.00**

notes	omit pt.	distance (ft)	FS (ft)	elevation
	■	0	97.51472	102.4853
	■	17.96628	97.44709	102.5529
	■	45.24283	96.85331	103.1467
	■	49.48936	100.211	99.78901
	■	54.11006	100.309	99.69101
	■	57.45298	100.1847	99.81527
	■	61.00376	99.24884	100.7512
	■	67.81536	95.91121	104.0888
	■	90.39231	95.06681	104.9332
	■	109.0533	94.86446	105.1355

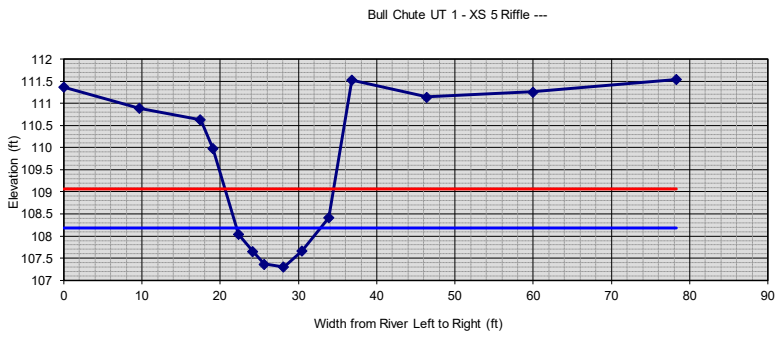
FS bankfull	FS top of bank	W fpa (ft)	channel slope (%)	Manning's "n"
99.61	96.85	13.0		
100.39	103.15			

dimensions			
6.0	x-section area	0.5	d mean
10.9	width	11.2	wet P
0.7	d max	0.5	hyd radi
3.5	bank ht	19.9	w/d ratio
13.0	W flood prone area	1.2	ent ratio

hydraulics	
0.0	velocity (ft/sec)
0.0	discharge rate, Q (cfs)
0.00	shear stress ((lbs/ft sq)
0.00	shear velocity (ft/sec)
0.000	unit stream power (lbs/ft/sec)
0.00	Froude number
0.0	friction factor u/u*
~~0.0~~	threshold grain size (mm)

check from channel material			
0	measured D84 (mm)		
0.0	relative roughness	0.0	fric. factor
0.000	Manning's n from channel material		

Cross Section



section: **Bull Chute UT 1 - XS 5**

Riffle

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description: **Bull Chute UT 1 - XS 5**

height of instrument (ft): **200.00**

notes	omit pt.	distance (ft)	FS (ft)	elevation
	■	0	88.6369	111.3631
	■	9.649853	89.11116	110.8888
	■	17.48251	89.36811	110.6319
	■	19.09062	90.02019	109.9798
	■	22.37783	91.95817	108.0418
	■	24.12587	92.34265	107.6574
	■	25.60424	92.63361	107.3664
	■	28.11639	92.6878	107.3122
	■	30.47299	92.33178	107.6682
	■	33.8825	91.5799	108.4201
	■	36.79887	88.47452	111.5255
	■	46.38968	88.85822	111.1418
	■	59.97281	88.73915	111.2608
	■	78.31348	88.45065	111.5494

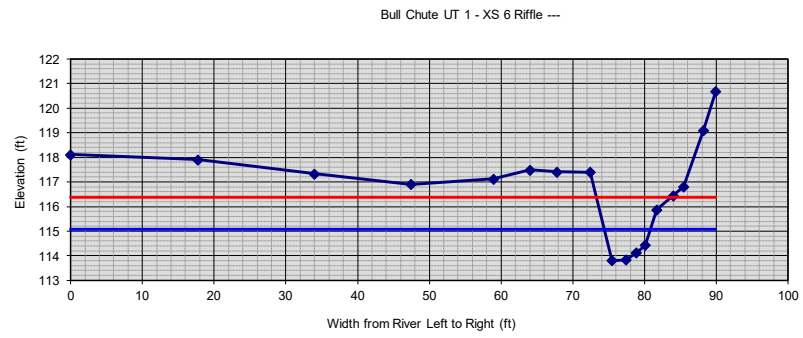
FS bankfull	FS top of bank	W fpa (ft)	channel slope (%)	Manning's "n"
91.81	89.37	13.0		
108.19	110.63			

dimensions			
6.0	x-section area	0.6	d mean
10.7	width	10.9	wet P
0.9	d max	0.6	hyd radi
3.3	bank ht	19.1	w/d ratio
13.0	W flood prone area	1.2	ent ratio

hydraulics	
0.0	velocity (ft/sec)
0.0	discharge rate, Q (cfs)
0.00	shear stress ((lbs/ft sq)
0.00	shear velocity (ft/sec)
0.000	unit stream power (lbs/ft/sec)
0.00	Froude number
0.0	friction factor u/u*
~~0.0~~	threshold grain size (mm)

check from channel material			
0	measured D84 (mm)		
0.0	relative roughness	0.0	fric. factor
0.000	Manning's n from channel material		

Cross Section



section: **Bull Chute UT 1 - XS 6**

Riffle

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description: **Bull Chute UT 1 - XS 6**

height of instrument (ft): **200.00**

notes	omit pt.	distance (ft)	FS (ft)	elevation
	■	0	81.87923	118.1208
	■	17.77692	82.0874	117.9126
	■	33.96971	82.66726	117.3327
	■	47.4549	83.08937	116.9106
	■	58.9406	82.87339	117.1266
	■	64.0261	82.51547	117.4845
	■	67.76278	82.5937	117.4063
	■	72.45269	82.60396	117.396
	■	75.49509	86.18541	113.8146
	■	77.42602	86.16716	113.8328
	■	78.89718	85.86155	114.1384
	■	80.10154	85.56484	114.4352
	■	81.7182	84.12358	115.8764
	■	84.00102	83.55206	116.4479
	■	85.42875	83.19194	116.8081
	■	88.22715	80.90108	119.0989
	■	89.89572	79.32794	120.6721

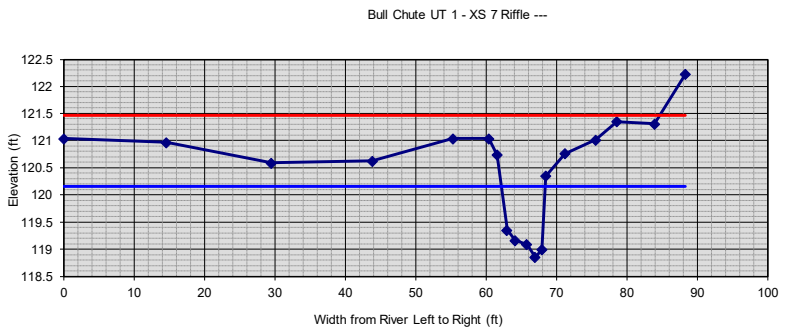
FS bankfull	FS top of bank	W fpa (ft)	channel slope (%)	Manning's "n"
84.9	82.6	10.0		
115.1	117.4			

dimensions			
6.0	x-section area	0.9	d mean
6.4	width	7.4	wet P
1.3	d max	0.8	hyd radi
3.6	bank ht	6.9	w/d ratio
10.0	W flood prone area	1.6	ent ratio

hydraulics	
0.0	velocity (ft/sec)
0.0	discharge rate, Q (cfs)
0.00	shear stress ((lbs/ft sq)
0.00	shear velocity (ft/sec)
0.000	unit stream power (lbs/ft/sec)
0.00	Froude number
0.0	friction factor u/u*
~~0.0~~	threshold grain size (mm)

check from channel material			
0	measured D84 (mm)		
0.0	relative roughness	0.0	fric. factor
0.000	Manning's n from channel material		

Cross Section



For additional cross sections make a copy of the "Dimension" worksheet.
To create a copy "right click" on the dimension tab below.

section:	Bull Chute UT 1 - XS 7
	Riffle

	---
description:	Bull Chute UT 1 - XS 7
height of instrument (ft):	200.00

notes	omit pt.	distance (ft)	FS (ft)	elevation
	■	0	78.96512	121.0349
	■	14.55706	79.03418	120.9658
	■	29.44043	79.40774	120.5923
	■	43.84557	79.37557	120.6244
	■	55.26888	78.96246	121.0375
	■	60.35815	78.964	121.036
	■	61.55967	79.26217	120.7378
	■	62.95511	80.64924	119.3508
	■	64.06238	80.83768	119.1623
	■	65.77165	80.9104	119.0896
	■	66.95228	81.14563	118.8544
	■	67.88077	81.00131	118.9987
	■	68.49233	79.65239	120.3476
	■	71.15966	79.24202	120.758
	■	75.51241	78.98456	121.0154
	■	78.57108	78.6512	121.3488
	■	83.89924	78.6915	121.3085
	■	88.24566	77.77061	122.2294
	■			
	■			
	■			
	■			
	■			
	■			
	■			
	■			
	■			

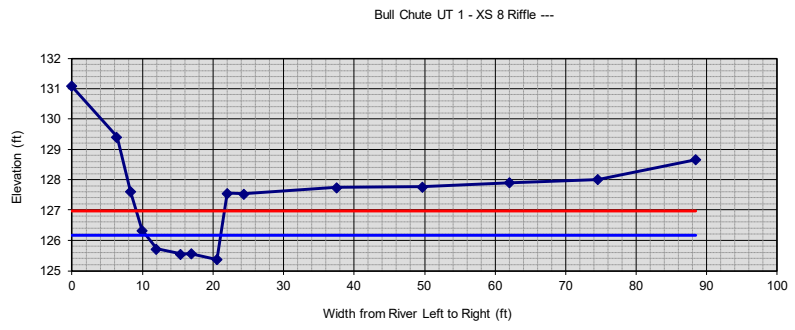
FS bankfull	FS top of bank	W fpa (ft)	channel slope (%)	Manning's "n"
79.84	78.96	100.0		
120.16	121.04			

dimensions			
6.0	x-section area	0.9	d mean
6.3	width	7.4	wet P
1.3	d max	0.8	hyd radi
2.2	bank ht	6.6	w/d ratio
100.0	W flood prone area	16.0	ent ratio

hydraulics	
0.0	velocity (ft/sec)
0.0	discharge rate, Q (cfs)
0.00	shear stress ((lbs/ft sq)
0.00	shear velocity (ft/sec)
0.000	unit stream power (lbs/ft/sec)
0.00	Froude number
0.0	friction factor u/u*
~~0.0~~	threshold grain size (mm)

check from channel material			
0	measured D84 (mm)		
0.0	relative roughness	0.0	fric. factor
0.000	Manning's n from channel material		

Cross Section



section: **Bull Chute UT 1 - XS 8**

Riffle

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description: **Bull Chute UT 1 - XS 8**

height of instrument (ft): **200.00**

notes	omit pt.	distance (ft)	FS (ft)	elevation
	■	0	68.89607	131.1039
	■	6.341491	70.59311	129.4069
	■	8.288657	72.39857	127.6014
	■	9.944066	73.67307	126.3269
	■	11.96907	74.28714	125.7129
	■	15.42304	74.44885	125.5511
	■	16.91278	74.4439	125.5561
	■	20.54996	74.62418	125.3758
	■	22.01707	72.44226	127.5577
	■	24.36601	72.46805	127.5319
	■	37.54542	72.25238	127.7476
	■	49.70337	72.23479	127.7652
	■	62.09259	72.09415	127.9058
	■	74.55548	71.99509	128.0049
	■	88.46535	71.3423	128.6577
	■			
	■			
	■			
	■			
	■			
	■			
	■			
	■			
	■			
	■			

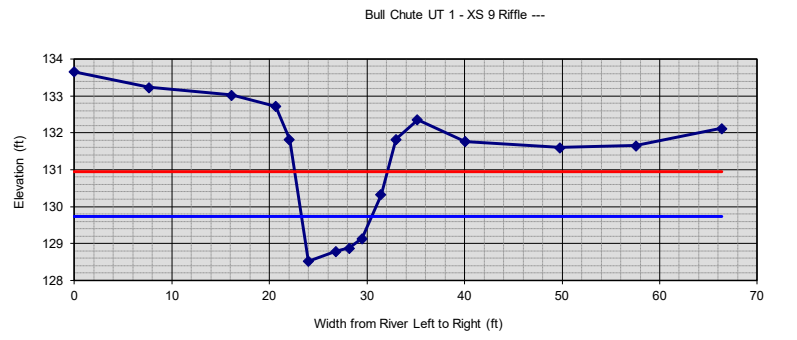
FS bankfull	FS top of bank	W fpa (ft)	channel slope (%)	Manning's "n"
73.82	72.44	13.0		
126.18	127.56			

dimensions			
6.0	x-section area	0.6	d mean
10.7	width	11.2	wet P
0.8	d max	0.5	hyd radi
2.2	bank ht	18.9	w/d ratio
13.0	W flood prone area	1.2	ent ratio

hydraulics	
0.0	velocity (ft/sec)
0.0	discharge rate, Q (cfs)
0.00	shear stress ((lbs/ft sq)
0.00	shear velocity (ft/sec)
0.000	unit stream power (lbs/ft/sec)
0.00	Froude number
0.0	friction factor u/u*
~~0.0~~	threshold grain size (mm)

check from channel material			
0	measured D84 (mm)		
0.0	relative roughness	0.0	fric. factor
0.000	Manning's n from channel material		

Cross Section



section: **Bull Chute UT 1 - XS 9**

Riffle

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description: **Bull Chute UT 1 - XS 9**

height of instrument (ft): **200**

notes	omit pt.	distance (ft)	FS (ft)	elevation
	■	0	66.33558	133.6644
	■	7.645103	66.76672	133.2333
	■	16.1073	66.9768	133.0232
	■	20.65964	67.27905	132.7209
	■	22.06226	68.17847	131.8215
	■	23.98562	71.47768	128.5223
	■	26.85086	71.20932	128.7907
	■	28.20697	71.12414	128.8759
	■	29.50237	70.85947	129.1405
	■	31.43359	69.67086	130.3291
	■	32.98504	68.17096	131.829
	■	35.18671	67.64492	132.3551
	■	40.08619	68.23501	131.765
	■	49.77042	68.39753	131.6025
	■	57.59032	68.34958	131.6504
	■	66.40233	67.87959	132.1204
	■			
	■			
	■			
	■			
	■			
	■			
	■			
	■			
	■			
	■			

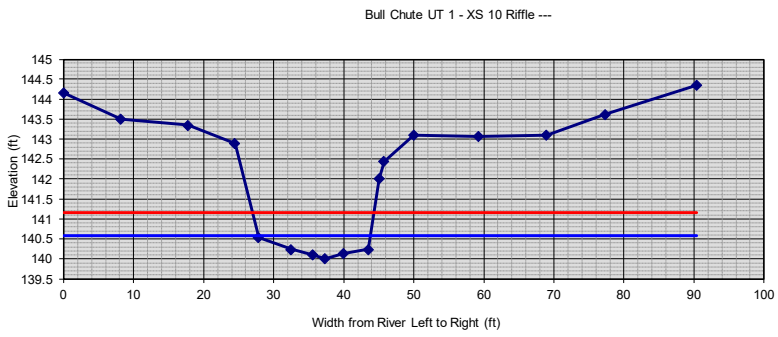
FS bankfull	FS top of bank	W fpa (ft)	channel slope (%)	Manning's "n"
70.26	68.17	10.0		
129.74	131.83			

dimensions			
6.0	x-section area	0.8	d mean
7.2	width	8.1	wet P
1.2	d max	0.7	hyd radi
3.3	bank ht	8.6	w/d ratio
10.0	W flood prone area	1.4	ent ratio

hydraulics	
0.0	velocity (ft/sec)
0.0	discharge rate, Q (cfs)
0.00	shear stress ((lbs/ft sq)
0.00	shear velocity (ft/sec)
0.000	unit stream power (lbs/ft/sec)
0.00	Froude number
0.0	friction factor u/u*
~~0.0~~	threshold grain size (mm)

check from channel material			
0	measured D84 (mm)		
0.0	relative roughness	0.0	fric. factor
0.000	Manning's n from channel material		

Cross Section



section: **Bull Chute UT 1 - XS 10**

Riffle

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description: **Bull Chute UT 1 - XS 10**

height of instrument (ft): **200.00**

notes	omit pt.	distance (ft)	FS (ft)	elevation
	■	0	55.84175	144.1583
	■	8.212533	56.49822	143.5018
	■	17.76542	56.65307	143.3469
	■	24.44732	57.10741	142.8926
	■	27.83238	59.45899	140.541
	■	32.49016	59.75648	140.2435
	■	35.55397	59.894	140.106
	■	37.34138	59.99376	140.0062
	■	39.93952	59.8598	140.1402
	■	43.51147	59.75621	140.2438
	■	45.04688	57.98558	142.0144
	■	45.74697	57.55758	142.4424
	■	49.98496	56.89646	143.1035
	■	59.23675	56.93063	143.0694
	■	68.95752	56.89874	143.1013
	■	77.3643	56.38004	143.62
	■	90.44307	55.65342	144.3466
	■			
	■			
	■			
	■			
	■			
	■			
	■			
	■			

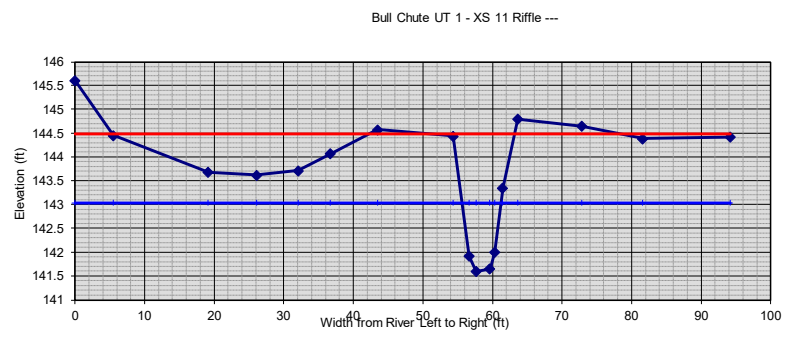
FS bankfull	FS top of bank	W fpa (ft)	channel slope (%)	Manning's "n"
59.41	57.11	17.0		
140.59	142.89			

dimensions			
6.0	x-section area	0.4	d mean
16.0	width	16.2	wet P
0.6	d max	0.4	hyd radi
2.9	bank ht	43.2	w/d ratio
17.0	W flood prone area	1.1	ent ratio

hydraulics	
0.0	velocity (ft/sec)
0.0	discharge rate, Q (cfs)
0.00	shear stress ((lbs/ft sq)
0.00	shear velocity (ft/sec)
0.000	unit stream power (lbs/ft/sec)
0.00	Froude number
0.0	friction factor u/u*
~~0.0~~	threshold grain size (mm)

check from channel material			
0	measured D84 (mm)		
0.0	relative roughness	0.0	fric. factor
0.000	Manning's n from channel material		

Cross Section



section: **Bull Chute UT 1 - XS 11**

Riffle

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description: **Bull Chute UT 1 - XS 11**

height of instrument (ft): **200.00**

notes	omit pt.	distance (ft)	FS (ft)	elevation
	■	0	54.38877	145.6112
	■	5.515769	55.54916	144.4508
	■	19.17962	56.31842	143.6816
	■	26.14344	56.38075	143.6193
	■	32.10372	56.29036	143.7096
	■	36.73521	55.92965	144.0704
	■	43.49221	55.43011	144.5699
	■	54.34464	55.56409	144.4359
	■	56.63121	58.07971	141.9203
	■	57.64565	58.40572	141.5943
	■	59.6343	58.34909	141.6509
	■	60.35214	58.00407	141.9959
	■	61.4706	56.64876	143.3512
	■	63.62057	55.20455	144.7954
	■	72.81529	55.35242	144.6476
	■	81.6249	55.61362	144.3864
	■	94.22064	55.57953	144.4205
	■			
	■			
	■			
	■			
	■			
	■			
	■			
	■			

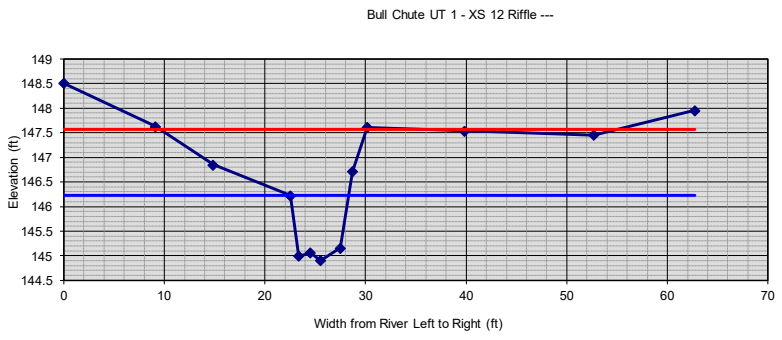
FS bankfull	FS top of bank	W fpa (ft)	channel slope (%)	Manning's "n"
56.96	55.56	50.0		
143.04	144.44			

dimensions			
6.0	x-section area	1.1	d mean
5.6	width	6.7	wet P
1.4	d max	0.9	hyd radi
2.8	bank ht	5.2	w/d ratio
50.0	W flood prone area	8.9	ent ratio

hydraulics	
0.0	velocity (ft/sec)
0.0	discharge rate, Q (cfs)
0.00	shear stress ((lbs/ft sq)
0.00	shear velocity (ft/sec)
0.000	unit stream power (lbs/ft/sec)
0.00	Froude number
0.0	friction factor u/u*
~~0.0~~	threshold grain size (mm)

check from channel material			
0	measured D84 (mm)		
0.0	relative roughness	0.0	fric. factor
0.000	Manning's n from channel material		

Cross Section



section: **Bull Chute UT 1 - XS 12**

Riffle

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description: **Bull Chute UT 1 - XS 12**

height of instrument (ft): **200.00**

notes	omit pt.	distance (ft)	FS (ft)	elevation
	■	0	51.48459	148.5154
	■	9.121426	52.37211	147.6279
	■	14.87191	53.15276	146.8472
	■	22.53836	53.77239	146.2276
	■	23.35931	55.00603	144.994
	■	24.53974	54.93675	145.0632
	■	25.54015	55.09848	144.9015
	■	27.5053	54.84244	145.1576
	■	28.71817	53.28868	146.7113
	■	30.18135	52.38877	147.6112
	■	39.81835	52.4635	147.5365
	■	52.70801	52.54742	147.4526
	■	62.74502	52.04608	147.9539
	■			
	■			
	■			
	■			
	■			
	■			
	■			
	■			
	■			
	■			
	■			

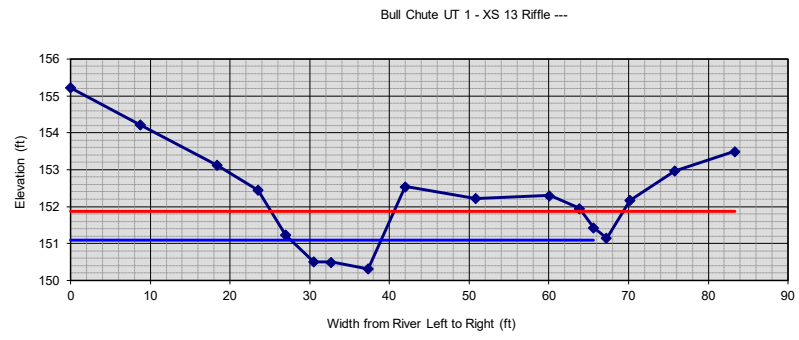
FS bankfull	FS top of bank	W fpa (ft)	channel slope (%)	Manning's "n"
53.76	52.39	20.0		
146.24	147.61			

dimensions			
6.0	x-section area	1.0	d mean
6.0	width	7.2	wet P
1.3	d max	0.8	hyd radi
2.7	bank ht	5.9	w/d ratio
20.0	W flood prone area	3.4	ent ratio

hydraulics	
0.0	velocity (ft/sec)
0.0	discharge rate, Q (cfs)
0.00	shear stress ((lbs/ft sq)
0.00	shear velocity (ft/sec)
0.000	unit stream power (lbs/ft/sec)
0.00	Froude number
0.0	friction factor u/u*
~~0.0~~	threshold grain size (mm)

check from channel material			
0	measured D84 (mm)		
0.0	relative roughness	0.0	fric. factor
0.000	Manning's n from channel material		

Cross Section



section: **Bull Chute UT 1 - XS 13**

Riffle

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description: **Bull Chute UT 1 - XS 13**

height of instrument (ft): **200.00**

notes	omit pt.	distance (ft)	FS (ft)	elevation
	■	0	44.77948	155.2205
	■	8.742666	45.78094	154.2191
	■	18.35636	46.87417	153.1258
	■	23.51458	47.55091	152.4491
	■	27.00507	48.76525	151.2347
	■	30.53097	49.49823	150.5018
	■	32.71609	49.50568	150.4943
	■	37.34535	49.67813	150.3219
	■	41.9741	47.45687	152.5431
	■	50.83356	47.77663	152.2234
	■	60.09811	47.70439	152.2956
	■	63.82204	48.04508	151.9549
	■	65.60161	48.56695	151.433
	☑	67.2378	48.8518	151.1482
	☑	70.18477	47.82868	152.1713
	☑	75.81484	47.02856	152.9714
	☑	83.33531	46.50477	153.4952
	■			
	■			
	■			
	■			
	■			
	■			
	■			
	■			
	■			
	■			
	■			

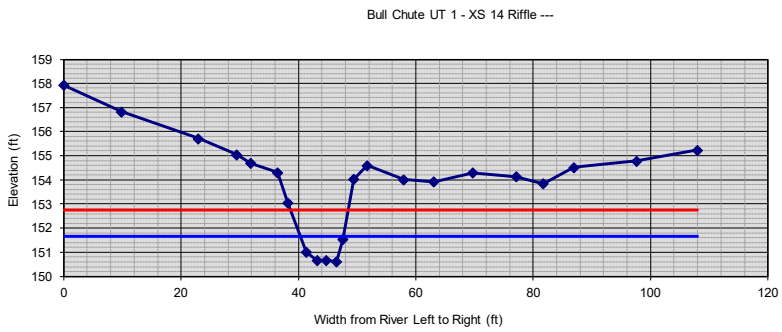
FS bankfull	FS top of bank	W fpa (ft)	channel slope (%)	Manning's "n"
48.90	47.46	16.0		
151.1	152.54			

dimensions			
6.0	x-section area	0.5	d mean
11.3	width	11.6	wet P
0.8	d max	0.5	hyd radi
2.2	bank ht	21.3	w/d ratio
16.0	W flood prone area	1.4	ent ratio

hydraulics	
0.0	velocity (ft/sec)
0.0	discharge rate, Q (cfs)
0.00	shear stress ((lbs/ft sq)
0.00	shear velocity (ft/sec)
0.000	unit stream power (lbs/ft/sec)
0.00	Froude number
0.0	friction factor u/u*
~~0.0~~	threshold grain size (mm)

check from channel material			
0	measured D84 (mm)		
0.0	relative roughness	0.0	fric. factor
0.000	Manning's n from channel material		

Cross Section



For additional cross sections make a copy of the "Dimension" worksheet.
To create a copy "right click" on the dimension tab below.

section: **Bull Chute UT 1 - XS 14**

Riffle

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description: **Bull Chute UT 1 - XS 14**

height of instrument (ft): **200.00**

notes	omit pt.	distance (ft)	FS (ft)	elevation
	■	0	42.08394	157.9161
	■	9.838516	43.17475	156.8253
	■	22.98876	44.29648	155.7035
	■	29.47209	44.9582	155.0418
	■	31.87132	45.31018	154.6898
	■	36.45194	45.69191	154.3081
	■	38.19107	46.95624	153.0438
	■	41.34154	48.99135	151.0086
	■	43.24549	49.33388	150.6661
	■	44.71888	49.32851	150.6715
	■	46.51406	49.39491	150.6051
	■	47.61111	48.46922	151.5308
	■	49.42612	45.97158	154.0284
	■	51.67807	45.40337	154.5966
	■	57.94287	45.98143	154.0186
	■	63.06729	46.08602	153.914
	■	69.75199	45.7077	154.2923
	■	77.12458	45.86619	154.1338
	■	81.69925	46.16451	153.8355
	■	86.97184	45.47737	154.5226
	■	97.6236	45.22484	154.7752
	■	107.9637	44.76435	155.2356
	■			
	■			
	■			

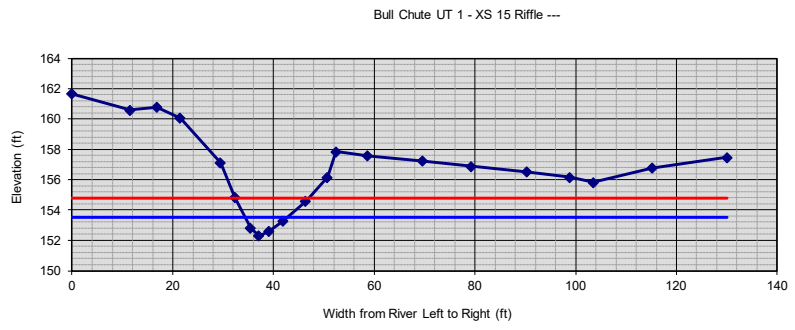
FS bankfull	FS top of bank	W fpa (ft)	channel slope (%)	Manning's "n"
48.32	45.97	10.0		
151.68	154.03			

dimensions			
6.0	x-section area	0.8	d mean
7.4	width	8.1	wet P
1.1	d max	0.7	hyd radi
3.4	bank ht	9.2	w/d ratio
10.0	W flood prone area	1.3	ent ratio

hydraulics	
0.0	velocity (ft/sec)
0.0	discharge rate, Q (cfs)
0.00	shear stress ((lbs/ft sq)
0.00	shear velocity (ft/sec)
0.000	unit stream power (lbs/ft/sec)
0.00	Froude number
0.0	friction factor u/u*
~~0.0~~	threshold grain size (mm)

check from channel material			
0	measured D84 (mm)		
0.0	relative roughness	0.0	fric. factor
0.000	Manning's n from channel material		

Cross Section



section: **Bull Chute UT 1 - XS 15**

Riffle

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description: **Bull Chute UT 1 - XS 15**

height of instrument (ft): **200.00**

notes	omit pt.	distance (ft)	FS (ft)	elevation
	■	0	38.30852	161.6915
	■	11.52202	39.40034	160.5997
	■	16.87658	39.21515	160.7849
	■	21.50825	39.94084	160.0592
	■	29.50747	42.8935	157.1065
	■	32.37046	45.1609	154.8391
	■	35.43757	47.18886	152.8111
	■	37.08982	47.7037	152.2963
	■	39.06045	47.41227	152.5877
	■	41.88045	46.73186	153.2681
	■	46.41739	45.42724	154.5728
	■	50.72393	43.8326	156.1674
	■	52.43082	42.15185	157.8482
	■	58.72546	42.42756	157.5724
	■	69.56362	42.7634	157.2366
	■	79.30563	43.12437	156.8756
	■	90.32206	43.48433	156.5157
	■	98.80874	43.84656	156.1534
	■	103.4792	44.17377	155.8262
	■	115.1763	43.22601	156.774
	■	130.0436	42.52107	157.4789
	■			
	■			
	■			
	■			

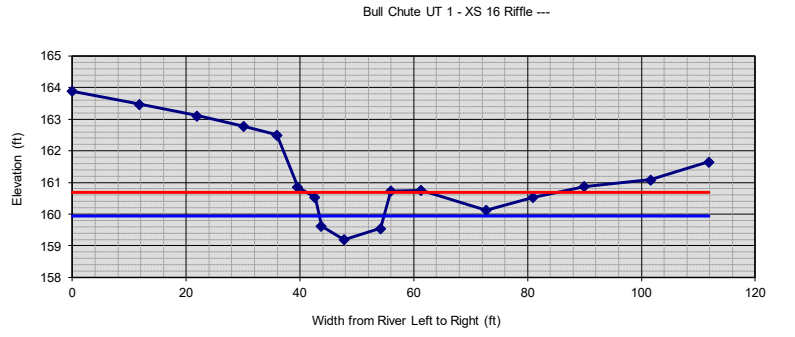
FS bankfull	FS top of bank	W fpa (ft)	channel slope (%)	Manning's "n"
46.46	42.15	14.0		
153.54	157.85			

dimensions			
6.0	x-section area	0.7	d mean
8.5	width	8.9	wet P
1.2	d max	0.7	hyd radi
5.6	bank ht	11.9	w/d ratio
14.0	W flood prone area	1.6	ent ratio

hydraulics	
0.0	velocity (ft/sec)
0.0	discharge rate, Q (cfs)
0.00	shear stress ((lbs/ft sq)
0.00	shear velocity (ft/sec)
0.000	unit stream power (lbs/ft/sec)
0.00	Froude number
0.0	friction factor u/u*
~~0.0~~	threshold grain size (mm)

check from channel material			
0	measured D84 (mm)		
0.0	relative roughness	0.0	fric. factor
0.000	Manning's n from channel material		

Cross Section



section: **Bull Chute UT 1 - XS 16**

Riffle

---

description: **Bull Chute UT 1 - XS 16**

height of instrument (ft): **200**

notes	omit pt.	distance (ft)	FS (ft)	elevation
	■	0	36.09721	163.9028
	■	11.81199	36.52069	163.4793
	■	21.98266	36.89242	163.1076
	■	30.19302	37.22187	162.7781
	■	35.94107	37.50064	162.4994
	■	39.60097	39.14117	160.8588
	■	42.64553	39.46653	160.5335
	■	43.79759	40.37825	159.6218
	■	47.78979	40.79786	159.2021
	■	54.18374	40.45186	159.5481
	■	55.999	39.26377	160.7362
	■	61.33668	39.24255	160.7575
	■	72.73473	39.87506	160.1249
	■	80.91621	39.46922	160.5308
	■	89.98247	39.12888	160.8711
	■	101.6295	38.91449	161.0855
	■	111.9335	38.34357	161.6564
	■			
	■			
	■			
	■			
	■			
	■			
	■			

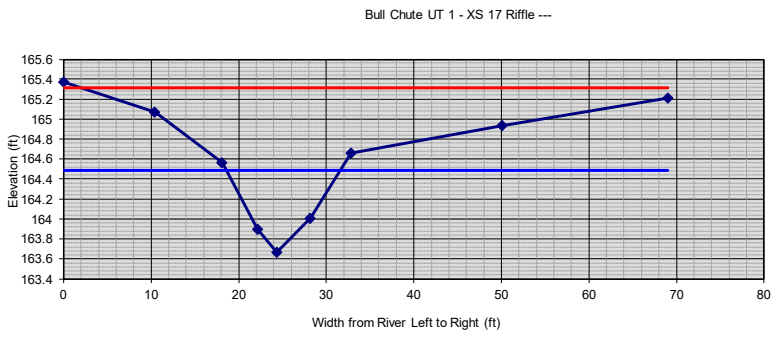
FS bankfull	FS top of bank	W fpa (ft)	channel slope (%)	Manning's "n"
40.05	39.26	14.0		
159.95	160.74			

dimensions			
6.0	x-section area	0.5	d mean
11.4	width	11.7	wet P
0.7	d max	0.5	hyd radi
1.5	bank ht	21.7	w/d ratio
14.0	W flood prone area	1.2	ent ratio

hydraulics	
0.0	velocity (ft/sec)
0.0	discharge rate, Q (cfs)
0.00	shear stress ((lbs/ft sq)
0.00	shear velocity (ft/sec)
0.000	unit stream power (lbs/ft/sec)
0.00	Froude number
0.0	friction factor u/u*
~~0.0~~	threshold grain size (mm)

check from channel material			
0	measured D84 (mm)		
0.0	relative roughness	0.0	fric. factor
0.000	Manning's n from channel material		

Cross Section



section: **Bull Chute UT 1 - XS 17**

Riffle

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description: **Bull Chute UT 1 - XS 17**

height of instrument (ft): **200.00**

notes	omit pt.	distance (ft)	FS (ft)	elevation
	■	0	34.62912	165.3709
	■	10.42874	34.92899	165.071
	■	18.09742	35.43485	164.5652
	■	22.14878	36.10234	163.8977
	■	24.37656	36.33291	163.6671
	■	28.19892	35.99064	164.0094
	■	32.84209	35.33933	164.6607
	■	50.12062	35.06254	164.9375
	■	69.00248	34.78829	165.2117

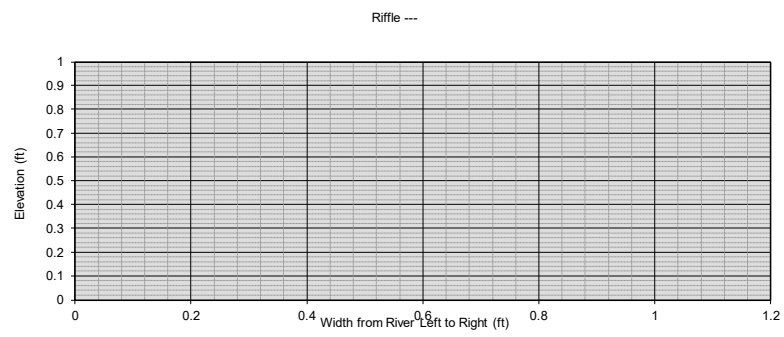
FS bankfull	FS top of bank	W fpa (ft)	channel slope (%)	Manning's "n"
35.51	35.34	70.0		
164.49	164.66			

dimensions			
6.0	x-section area	0.5	d mean
13.1	width	13.2	wet P
0.8	d max	0.5	hyd radi
1.0	bank ht	28.7	w/d ratio
70.0	W flood prone area	5.4	ent ratio

hydraulics	
0.0	velocity (ft/sec)
0.0	discharge rate, Q (cfs)
0.00	shear stress ((lbs/ft sq)
0.00	shear velocity (ft/sec)
0.000	unit stream power (lbs/ft/sec)
0.00	Froude number
0.0	friction factor u/u*
~~0.0~~	threshold grain size (mm)

check from channel material			
0	measured D84 (mm)		
0.0	relative roughness	0.0	fric. factor
0.000	Manning's n from channel material		

Cross Section



section:

Riffle

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description:

height of instrument (ft):

notes	omit pt.	distance (ft)	FS (ft)	elevation
	■			
	■			
	■			
	■			
	■			
	■			
	■			
	■			
	■			

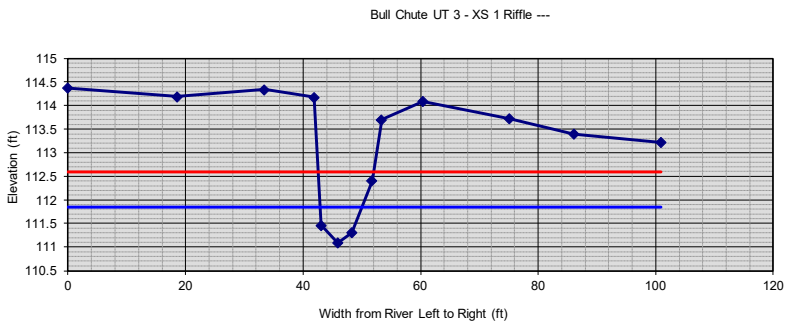
FS bankfull	FS top of bank	W fpa (ft)	channel slope (%)	Manning's "n"
0	---			

dimensions			
0.0	x-section area	0.0	d mean
0.0	width	0.0	wet P
0.0	d max	0.0	hyd radi
0.0	bank ht	0.0	w/d ratio
0.0	W flood prone area	0.0	ent ratio

hydraulics	
0.0	velocity (ft/sec)
0.0	discharge rate, Q (cfs)
0.00	shear stress ((lbs/ft sq)
0.00	shear velocity (ft/sec)
0.000	unit stream power (lbs/ft/sec)
0.00	Froude number
0.0	friction factor u/u*
~~0.0~~	threshold grain size (mm)

check from channel material			
0	measured D84 (mm)		
0.0	relative roughness	0.0	fric. factor
0.000	Manning's n from channel material		

Cross Section



section: **Bull Chute UT 3 - XS 1**

Riffle

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description: **Bull Chute UT 3 - XS 1**

height of instrument (ft): **200.00**

notes	omit pt.	distance (ft)	FS (ft)	elevation
	■	0	85.6177	114.3823
	■	18.5823	85.80669	114.1933
	■	33.45231	85.65673	114.3433
	■	41.87341	85.82414	114.1759
	■	43.11397	88.54137	111.4586
	■	45.94336	88.90435	111.0957
	■	48.31672	88.69623	111.3038
	■	51.74767	87.59403	112.406
	■	53.38169	86.29557	113.7044
	■	60.40838	85.90795	114.0921
	■	75.15613	86.27478	113.7252
	■	86.1031	86.60136	113.3986
	■	100.8949	86.77691	113.2231
	■			
	■			
	■			
	■			
	■			
	■			
	■			
	■			
	■			
	■			
	■			
	■			
	■			

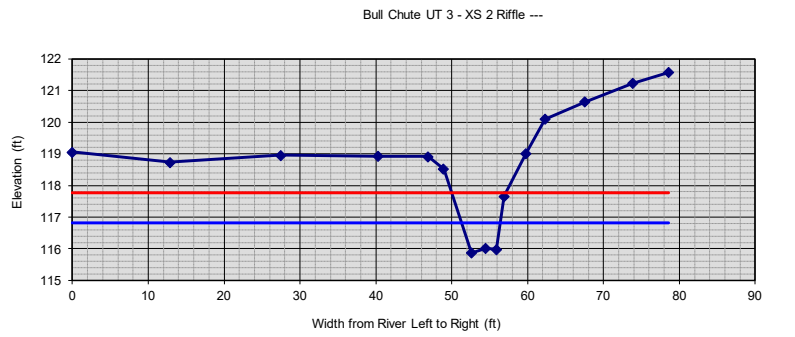
FS bankfull	FS top of bank	W fpa (ft)	channel slope (%)	Manning's "n"
88.15	86.3	8.0		
111.85	113.7			

dimensions			
3.7	x-section area	0.5	d mean
7.1	width	7.5	wet P
0.8	d max	0.5	hyd radi
2.6	bank ht	13.7	w/d ratio
8.0	W flood prone area	1.1	ent ratio

hydraulics	
0.0	velocity (ft/sec)
0.0	discharge rate, Q (cfs)
0.00	shear stress ((lbs/ft sq)
0.00	shear velocity (ft/sec)
0.000	unit stream power (lbs/ft/sec)
0.00	Froude number
0.0	friction factor u/u*
~~0.0~~	threshold grain size (mm)

check from channel material			
0	measured D84 (mm)		
0.0	relative roughness	0.0	fric. factor
0.000	Manning's n from channel material		

Cross Section



section: **Bull Chute UT 3 - XS 2**

Riffle

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description: **Bull Chute UT 3 - XS 2**

height of instrument (ft): **200.00**

notes	omit pt.	distance (ft)	FS (ft)	elevation
	■	0	80.93581	119.0642
	■	12.90011	81.26907	118.7309
	■	27.49642	81.04244	118.9576
	■	40.27433	81.06817	118.9318
	■	46.8802	81.07862	118.9214
	■	48.95753	81.47402	118.526
	■	52.62689	84.12276	115.8772
	■	54.47804	83.98516	116.0148
	■	55.92351	84.02081	115.9792
	■	56.89956	82.33476	117.6652
	■	59.80633	80.98726	119.0127
	■	62.34001	79.89792	120.1021
	■	67.58599	79.34746	120.6525
	■	73.89157	78.76842	121.2316
	■	78.57345	78.41514	121.5849
	■			
	■			
	■			
	■			
	■			
	■			
	■			
	■			
	■			
	■			
	■			
	■			
	■			

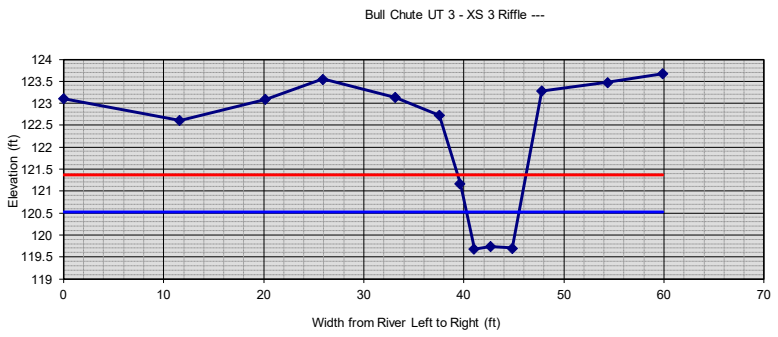
FS bankfull	FS top of bank	W fpa (ft)	channel slope (%)	Manning's "n"
83.17	81.47	7.0		
116.83	118.53			

dimensions			
3.7	x-section area	0.7	d mean
5.1	width	5.9	wet P
1.0	d max	0.6	hyd radi
2.7	bank ht	7.1	w/d ratio
7.0	W flood prone area	1.4	ent ratio

hydraulics	
0.0	velocity (ft/sec)
0.0	discharge rate, Q (cfs)
0.00	shear stress ((lbs/ft sq)
0.00	shear velocity (ft/sec)
0.000	unit stream power (lbs/ft/sec)
0.00	Froude number
0.0	friction factor u/u*
~~0.0~~	threshold grain size (mm)

check from channel material			
0	measured D84 (mm)		
0.0	relative roughness	0.0	fric. factor
0.000	Manning's n from channel material		

Cross Section



section: **Bull Chute UT 3 - XS 3**

Riffle

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description: **Bull Chute UT 3 - XS 3**

height of instrument (ft): **200.00**

notes	omit pt.	distance (ft)	FS (ft)	elevation
	■	0	76.89753	123.1025
	■	11.62432	77.395	122.605
	■	20.19287	76.9077	123.0923
	■	25.92355	76.4552	123.5448
	■	33.163	76.86931	123.1307
	■	37.57049	77.27332	122.7267
	■	39.63622	78.83212	121.1679
	■	41.05523	80.31835	119.6816
	■	42.68108	80.25867	119.7413
	■	44.85177	80.29719	119.7028
	■	47.78505	76.72285	123.2772
	■	54.40835	76.52512	123.4749
	■	59.90461	76.33187	123.6681
	■			
	■			
	■			
	■			
	■			
	■			
	■			
	■			
	■			
	■			
	■			
	■			

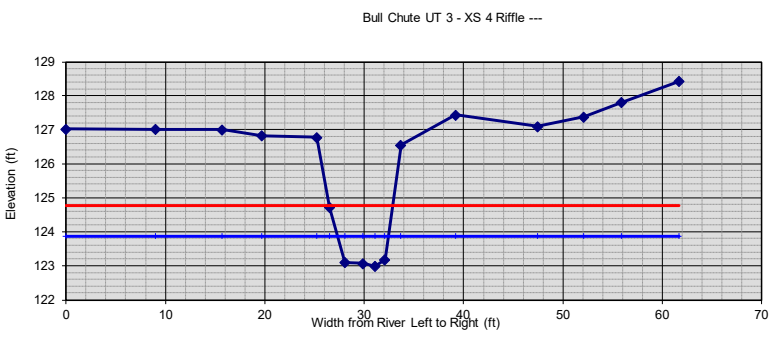
FS bankfull	FS top of bank	W fpa (ft)	channel slope (%)	Manning's "n"
79.47	77.27	7.0		
120.53	122.73			

dimensions			
3.7	x-section area	0.7	d mean
5.3	width	6.0	wet P
0.8	d max	0.6	hyd radi
3.0	bank ht	7.5	w/d ratio
7.0	W flood prone area	1.3	ent ratio

hydraulics	
0.0	velocity (ft/sec)
0.0	discharge rate, Q (cfs)
0.00	shear stress ((lbs/ft sq)
0.00	shear velocity (ft/sec)
0.000	unit stream power (lbs/ft/sec)
0.00	Froude number
0.0	friction factor u/u*
~~0.0~~	threshold grain size (mm)

check from channel material			
0	measured D84 (mm)		
0.0	relative roughness	0.0	fric. factor
0.000	Manning's n from channel material		

Cross Section



section: **Bull Chute UT 3 - XS 4**

Riffle

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description: **Bull Chute UT 3 - XS 4**

height of instrument (ft): **200.00**

notes	omit pt.	distance (ft)	FS (ft)	elevation
	■	0	72.98169	127.0183
	■	9.026083	72.99057	127.0094
	■	15.7047	73.00194	126.9981
	■	19.73258	73.17418	126.8258
	■	25.23794	73.22524	126.7748
	■	26.50774	75.28587	124.7141
	■	28.05746	76.89913	123.1009
	■	29.9093	76.92996	123.07
	■	31.08087	77.01717	122.9828
	■	32.0874	76.81972	123.1803
	■	33.70781	73.44875	126.5513
	■	39.18945	72.56842	127.4316
	■	47.44299	72.90113	127.0989
	■	52.11036	72.62329	127.3767
	■	55.86879	72.19742	127.8026
	■	61.69166	71.57468	128.4253
	■			
	■			
	■			
	■			
	■			
	■			
	■			
	■			
	■			
	■			
	■			
	■			

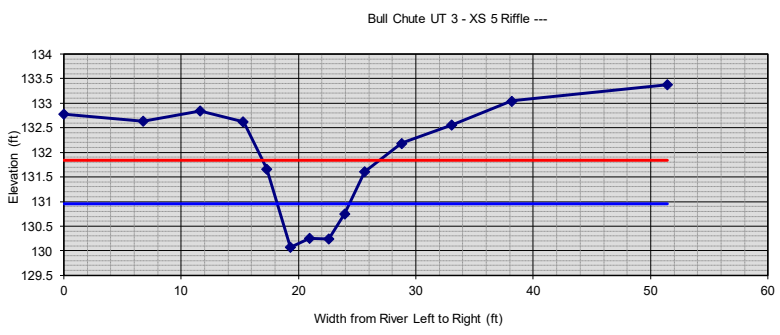
FS bankfull	FS top of bank	W fpa (ft)	channel slope (%)	Manning's "n"
76.12	73.45	7.0		
123.88	126.55			

dimensions			
3.7	x-section area	0.7	d mean
5.1	width	5.9	wet P
0.9	d max	0.6	hyd radi
3.6	bank ht	7.1	w/d ratio
7.0	W flood prone area	1.4	ent ratio

hydraulics	
0.0	velocity (ft/sec)
0.0	discharge rate, Q (cfs)
0.00	shear stress ((lbs/ft sq)
0.00	shear velocity (ft/sec)
0.000	unit stream power (lbs/ft/sec)
0.00	Froude number
0.0	friction factor u/u*
~~0.0~~	threshold grain size (mm)

check from channel material			
0	measured D84 (mm)		
0.0	relative roughness	0.0	fric. factor
0.000	Manning's n from channel material		

Cross Section



section: **Bull Chute UT 3 - XS 5**

Riffle

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description: **Bull Chute UT 3 - XS 5**

height of instrument (ft): **200.00**

notes	omit pt.	distance (ft)	FS (ft)	elevation
	■	0	67.22338	132.7766
	■	6.790503	67.36326	132.6367
	■	11.60792	67.15449	132.8455
	■	15.30532	67.37484	132.6252
	■	17.30525	68.33482	131.6652
	■	19.29522	69.92413	130.0759
	■	20.96579	69.74331	130.2567
	■	22.60114	69.75973	130.2403
	■	23.96867	69.24413	130.7559
	■	25.64437	68.39437	131.6056
	■	28.78358	67.81439	132.1856
	■	33.04533	67.44178	132.5582
	■	38.1949	66.95562	133.0444
	■	51.42621	66.61561	133.3844

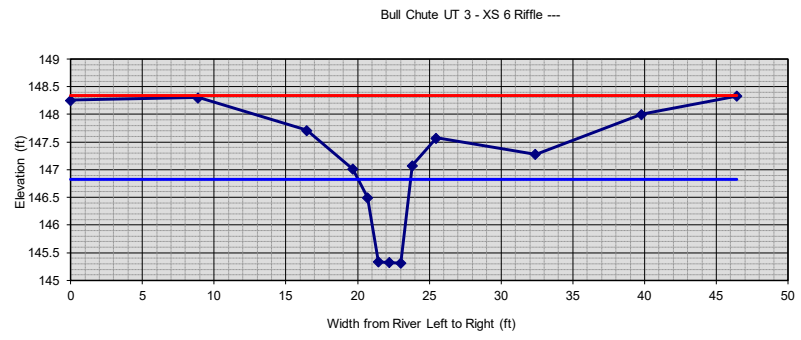
FS bankfull	FS top of bank	W fpa (ft)	channel slope (%)	Manning's "n"
69.04	67.8	10.0		
130.96	132.2			

dimensions			
3.7	x-section area	0.6	d mean
6.2	width	6.6	wet P
0.9	d max	0.5	hyd radi
2.1	bank ht	10.5	w/d ratio
10.0	W flood prone area	1.6	ent ratio

hydraulics	
0.0	velocity (ft/sec)
0.0	discharge rate, Q (cfs)
0.00	shear stress ((lbs/ft sq)
0.00	shear velocity (ft/sec)
0.000	unit stream power (lbs/ft/sec)
0.00	Froude number
0.0	friction factor u/u*
~~0.0~~	threshold grain size (mm)

check from channel material			
0	measured D84 (mm)		
0.0	relative roughness	0.0	fric. factor
0.000	Manning's n from channel material		

Cross Section



section: **Bull Chute UT 3 - XS 6**

Riffle

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description: **Bull Chute UT 3 - XS 6**

height of instrument (ft): **200.00**

notes	omit pt.	distance (ft)	FS (ft)	elevation
	■	0	51.74174	148.2583
	■	8.894556	51.69558	148.3044
	■	16.44736	52.28769	147.7123
	■	19.67025	52.9849	147.0151
	■	20.68121	53.50148	146.4985
	■	21.44341	54.66588	145.3341
	■	22.20953	54.6774	145.3226
	■	23.02767	54.68964	145.3104
	■	23.82556	52.92334	147.0767
	■	25.49305	52.42489	147.5751
	■	32.40064	52.72225	147.2777
	■	39.81074	51.99916	148.0008
	■	46.4508	51.67125	148.3287

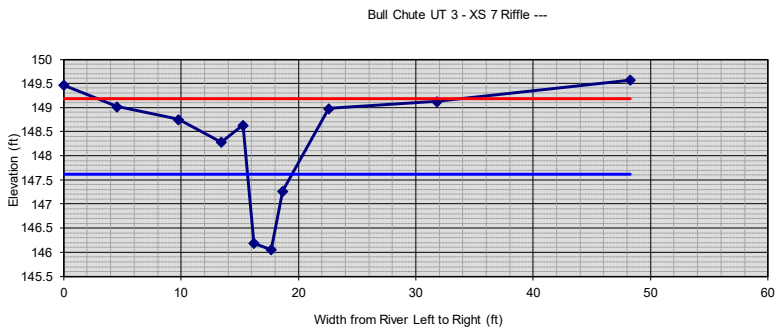
FS bankfull	FS top of bank	W fpa (ft)	channel slope (%)	Manning's "n"
53.17	52.4	50.0		
146.83	147.6			

dimensions			
3.7	x-section area	1.0	d mean
3.7	width	5.4	wet P
1.5	d max	0.7	hyd radi
2.3	bank ht	3.6	w/d ratio
50.0	W flood prone area	13.6	ent ratio

hydraulics	
0.0	velocity (ft/sec)
0.0	discharge rate, Q (cfs)
0.00	shear stress ((lbs/ft sq)
0.00	shear velocity (ft/sec)
0.000	unit stream power (lbs/ft/sec)
0.00	Froude number
0.0	friction factor u/u*
~~0.0~~	threshold grain size (mm)

check from channel material			
0	measured D84 (mm)		
0.0	relative roughness	0.0	fric. factor
0.000	Manning's n from channel material		

Cross Section



For additional cross sections make a copy of the "Dimension" worksheet.
To create a copy "right click" on the dimension tab below.

section: **Bull Chute UT 3 - XS 7**

Riffle

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description: **Bull Chute UT 3 - XS 7**

height of instrument (ft): **200.00**

notes	omit pt.	distance (ft)	FS (ft)	elevation
	☐	0	50.53865	149.4613
	☐	4.557507	50.98216	149.0178
	☐	9.789764	51.24785	148.7522
	☐	13.42703	51.71809	148.2819
	☐	15.27962	51.36697	148.633
	☐	16.20272	53.8091	146.1909
	☐	17.67477	53.94241	146.0576
	☐	18.67013	52.72884	147.2712
	☐	22.59648	51.02031	148.9797
	☐	31.81425	50.87565	149.1243
	☐	48.29506	50.42759	149.5724
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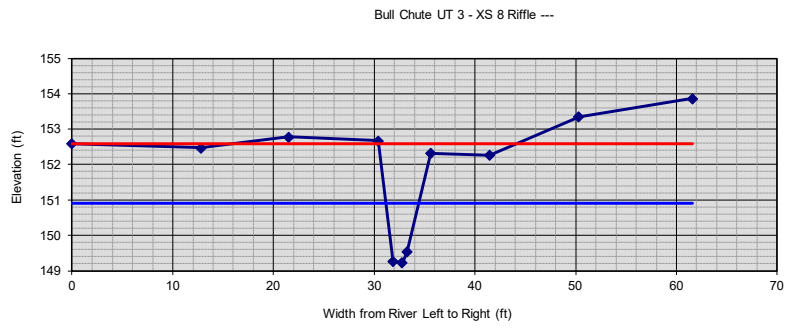
FS bankfull	FS top of bank	W fpa (ft)	channel slope (%)	Manning's "n"
52.38	51.37	30.0		
147.62	148.63			

dimensions			
3.7	x-section area	1.0	d mean
3.8	width	5.4	wet P
1.6	d max	0.7	hyd radi
2.6	bank ht	3.9	w/d ratio
30.0	W flood prone area	7.9	ent ratio

hydraulics	
0.0	velocity (ft/sec)
0.0	discharge rate, Q (cfs)
0.00	shear stress ((lbs/ft sq)
0.00	shear velocity (ft/sec)
0.000	unit stream power (lbs/ft/sec)
0.00	Froude number
0.0	friction factor u/u*
~~0.0~~	threshold grain size (mm)

check from channel material			
0	measured D84 (mm)		
0.0	relative roughness	0.0	fric. factor
0.000	Manning's n from channel material		

Cross Section



section: **Bull Chute UT 3 - XS 8**

Riffle

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description: **Bull Chute UT 3 - XS 8**

height of instrument (ft): **200.00**

notes	omit pt.	distance (ft)	FS (ft)	elevation
	■	0	47.41022	152.5898
	■	12.8496	47.52665	152.4734
	■	21.49537	47.2189	152.7811
	■	30.39272	47.33198	152.668
	■	31.85337	50.72719	149.2728
	■	32.80074	50.76731	149.2327
	■	33.27032	50.47173	149.5283
	■	35.60543	47.67633	152.3237
	■	41.46512	47.73083	152.2692
	■	50.32272	46.65162	153.3484
	■	61.63486	46.12849	153.8715
	■			
	■			
	■			
	■			
	■			
	■			
	■			
	■			
	■			
	■			
	■			
	■			
	■			

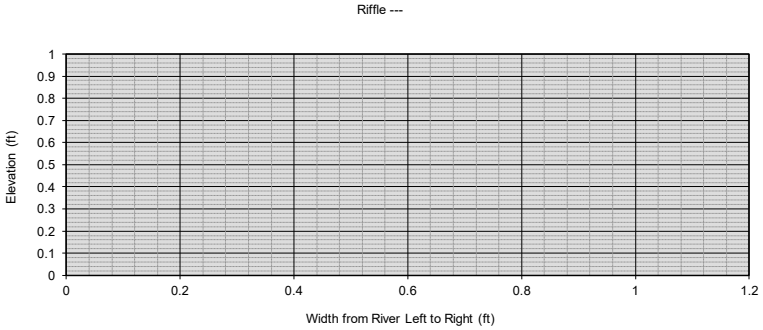
FS bankfull	FS top of bank	W fpa (ft)	channel slope (%)	Manning's "n"
49.09	47.68	14.0		
150.91	152.32			

dimensions			
3.7	x-section area	1.1	d mean
3.3	width	5.1	wet P
1.7	d max	0.7	hyd radi
3.1	bank ht	2.9	w/d ratio
14.0	W flood prone area	4.3	ent ratio

hydraulics	
0.0	velocity (ft/sec)
0.0	discharge rate, Q (cfs)
0.00	shear stress ((lbs/ft sq)
0.00	shear velocity (ft/sec)
0.000	unit stream power (lbs/ft/sec)
0.00	Froude number
0.0	friction factor u/u*
~~0.0~~	threshold grain size (mm)

check from channel material			
0	measured D84 (mm)		
0.0	relative roughness	0.0	fric. factor
0.000	Manning's n from channel material		

Cross Section



section:

Riffle

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description:

height of instrument (ft):

notes	omit pt.	distance (ft)	FS (ft)	elevation
	■			
	■			
	■			
	■			
	■			
	■			
	■			
	■			
	■			
	■			
	■			
	■			
	■			
	■			
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	■			
	■			
	■			
	■			
	■			
	■			
	■			

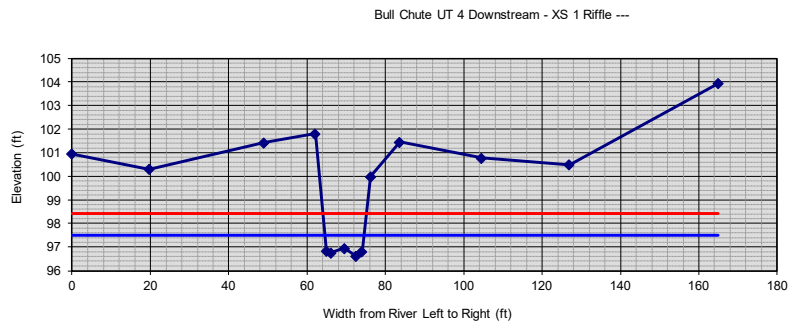
FS bankfull	FS top of bank	W fpa (ft)	channel slope (%)	Manning's "n"
0	---			

dimensions			
0.0	x-section area	0.0	d mean
0.0	width	0.0	wet P
0.0	d max	0.0	hyd radi
0.0	bank ht	0.0	w/d ratio
0.0	W flood prone area	0.0	ent ratio

hydraulics	
0.0	velocity (ft/sec)
0.0	discharge rate, Q (cfs)
0.00	shear stress ((lbs/ft sq)
0.00	shear velocity (ft/sec)
0.000	unit stream power (lbs/ft/sec)
0.00	Froude number
0.0	friction factor u/u*
~~0.0~~	threshold grain size (mm)

check from channel material			
0	measured D84 (mm)		
0.0	relative roughness	0.0	fric. factor
0.000	Manning's n from channel material		

Cross Section



section: **Bull Chute UT 4 Downstream - XS 1**

Riffle

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description: **Bull Chute UT 4 Downstream - XS 1**

height of instrument (ft): **200.00**

notes	omit pt.	distance (ft)	FS (ft)	elevation
	■	0	99.04836	100.9516
	■	19.71466	99.70398	100.296
	■	49.00785	98.57581	101.4242
	■	62.07675	98.1905	101.8095
	■	64.9085	103.163	96.83704
	■	66.07491	103.2443	96.7557
	■	69.49829	103.0559	96.94409
	■	72.57399	103.3974	96.60261
	■	74.04233	103.2028	96.79722
	■	76.21807	100.0161	99.98391
	■	83.63881	98.54537	101.4546
	■	104.5917	99.22441	100.7756
	■	126.9371	99.50491	100.4951
	■	165.0413	96.04424	103.9558
	■			
	■			
	■			
	■			
	■			
	■			
	■			
	■			
	■			
	■			
	■			

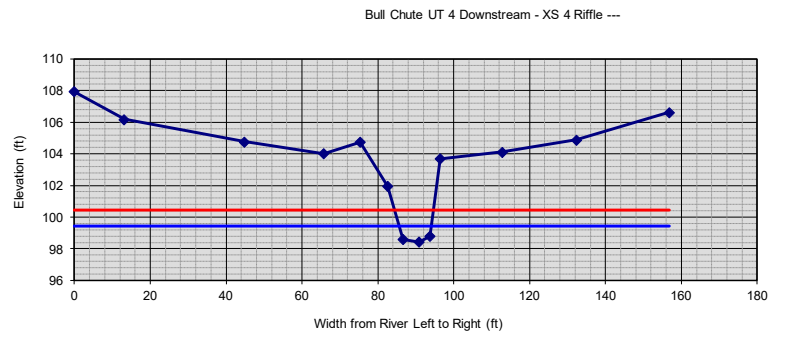
FS bankfull	FS top of bank	W fpa (ft)	channel slope (%)	Manning's "n"
102.48	98.55	11.0		
97.52	101.45			

dimensions			
6.9	x-section area	0.7	d mean
10.0	width	10.8	wet P
0.9	d max	0.6	hyd radi
4.8	bank ht	14.4	w/d ratio
11.0	W flood prone area	1.1	ent ratio

hydraulics	
0.0	velocity (ft/sec)
0.0	discharge rate, Q (cfs)
0.00	shear stress ((lbs/ft sq)
0.00	shear velocity (ft/sec)
0.000	unit stream power (lbs/ft/sec)
0.00	Froude number
0.0	friction factor u/u*
~~0.0~~	threshold grain size (mm)

check from channel material			
0	measured D84 (mm)		
0.0	relative roughness	0.0	fric. factor
0.000	Manning's n from channel material		

Cross Section



section: **Bull Chute UT 4 Downstream - XS 4**

Riffle

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description: **Bull Chute UT 4 Downstream - XS 4**

height of instrument (ft): **200.00**

notes	omit pt.	distance (ft)	FS (ft)	elevation
	■	0	92.0315	107.9685
	■	13.17676	93.82034	106.1797
	■	44.92824	95.23832	104.7617
	■	65.71261	95.9879	104.0121
	■	75.3362	95.26253	104.7375
	■	82.58144	98.04233	101.9577
	■	86.65217	101.4	98.59997
	■	90.90235	101.563	98.437
	■	93.73787	101.2064	98.79356
	■	96.50555	96.30622	103.6938
	■	112.8669	95.88791	104.1121
	■	132.4177	95.10799	104.892
	■	156.8915	93.37726	106.6227
	■			
	■			
	■			
	■			
	■			
	■			
	■			
	■			
	■			
	■			
	■			

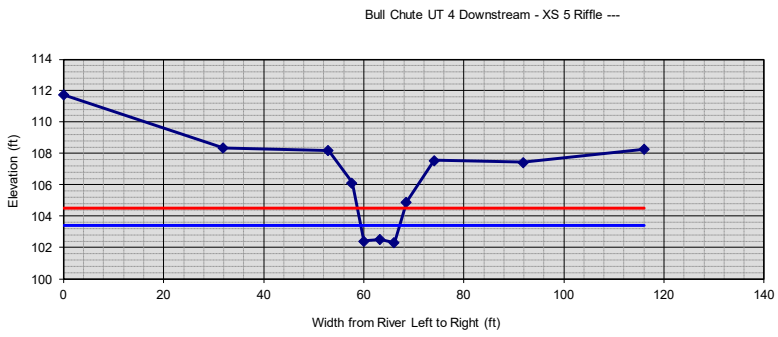
FS bankfull	FS top of bank	W fpa (ft)	channel slope (%)	Manning's "n"
100.55	96.31	11.0		
99.45	103.69			

dimensions			
6.9	x-section area	0.8	d mean
8.5	width	9.2	wet P
1.0	d max	0.7	hyd radi
5.3	bank ht	10.5	w/d ratio
11.0	W flood prone area	1.3	ent ratio

hydraulics	
0.0	velocity (ft/sec)
0.0	discharge rate, Q (cfs)
0.00	shear stress ((lbs/ft sq)
0.00	shear velocity (ft/sec)
0.000	unit stream power (lbs/ft/sec)
0.00	Froude number
0.0	friction factor u/u*
~~0.0~~	threshold grain size (mm)

check from channel material			
0	measured D84 (mm)		
0.0	relative roughness	0.0	fric. factor
0.000	Manning's n from channel material		

Cross Section



section: **Bull Chute UT 4 Downstream - XS 5**

Riffle

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description: **Bull Chute UT 4 Downstream - XS 5**

height of instrument (ft): **200.00**

notes	omit pt.	distance (ft)	FS (ft)	elevation
	■	0	88.27079	111.7292
	■	31.93291	91.64688	108.3531
	■	52.91096	91.82129	108.1787
	■	57.64226	93.87347	106.1265
	■	59.9981	97.58102	102.419
	■	63.30202	97.48887	102.5111
	■	66.1088	97.66248	102.3375
	■	68.52578	95.08932	104.9107
	■	74.08835	92.43682	107.5632
	■	91.93979	92.56103	107.439
	■	116.0283	91.72844	108.2716

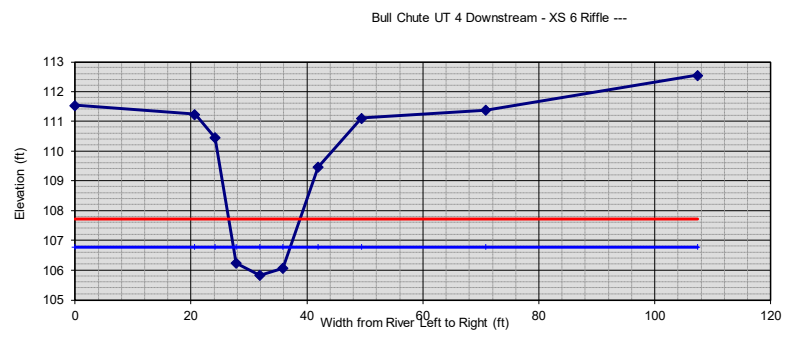
FS bankfull	FS top of bank	W fpa (ft)	channel slope (%)	Manning's "n"
96.57	92.44	9.0		
103.43	107.56			

dimensions			
6.9	x-section area	0.9	d mean
7.8	width	8.8	wet P
1.1	d max	0.8	hyd radi
5.2	bank ht	8.8	w/d ratio
9.0	W flood prone area	1.2	ent ratio

hydraulics	
0.0	velocity (ft/sec)
0.0	discharge rate, Q (cfs)
0.00	shear stress ((lbs/ft sq)
0.00	shear velocity (ft/sec)
0.000	unit stream power (lbs/ft/sec)
0.00	Froude number
0.0	friction factor u/u*
~~0.0~~	threshold grain size (mm)

check from channel material			
0	measured D84 (mm)		
0.0	relative roughness	0.0	fric. factor
0.000	Manning's n from channel material		

Cross Section



section: **Bull Chute UT 4 Downstream - XS 6**

Riffle

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description: **Bull Chute UT 4 Downstream - XS 6**

height of instrument (ft): **200.00**

notes	omit pt.	distance (ft)	FS (ft)	elevation
	■	0	88.46613	111.5339
	■	20.66957	88.76246	111.2375
	■	24.18229	89.55529	110.4447
	■	27.82428	93.76897	106.231
	■	31.85819	94.17362	105.8264
	■	35.86369	93.93404	106.066
	■	41.92435	90.5462	109.4538
	■	49.47482	88.8996	111.1004
	■	70.87076	88.62787	111.3721
	■	107.4621	87.44965	112.5504

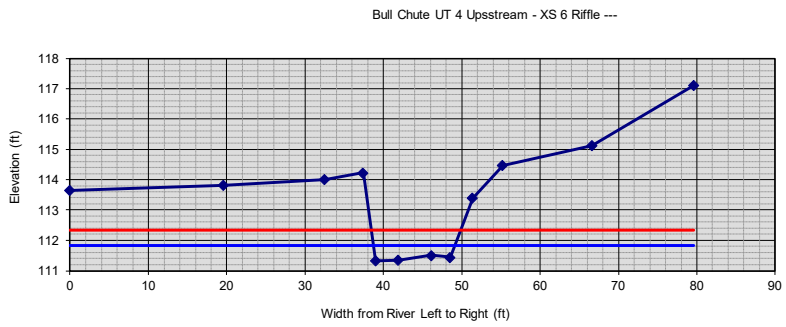
FS bankfull	FS top of bank	W fpa (ft)	channel slope (%)	Manning's "n"
93.23	88.9	14.0		
106.77	111.1			

dimensions			
6.9	x-section area	0.7	d mean
9.8	width	10.2	wet P
0.9	d max	0.7	hyd radi
5.3	bank ht	13.9	w/d ratio
14.0	W flood prone area	1.4	ent ratio

hydraulics	
0.0	velocity (ft/sec)
0.0	discharge rate, Q (cfs)
0.00	shear stress ((lbs/ft sq)
0.00	shear velocity (ft/sec)
0.000	unit stream power (lbs/ft/sec)
0.00	Froude number
0.0	friction factor u/u*
~~0.0~~	threshold grain size (mm)

check from channel material			
0	measured D84 (mm)		
0.0	relative roughness	0.0	fric. factor
0.000	Manning's n from channel material		

Cross Section



section: **Bull Chute UT 4 Upsstream - XS 6**

Riffle

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description: **Bull Chute UT 4 Upsstream - XS 6**

height of instrument (ft): **200.00**

notes	omit pt.	distance (ft)	FS (ft)	elevation
	■	0	86.35669	113.6433
	■	19.56536	86.18294	113.8171
	■	32.52971	85.99516	114.0048
	■	37.40465	85.7728	114.2272
	■	39.02179	88.66936	111.3306
	■	41.92695	88.64954	111.3505
	■	46.12903	88.49812	111.5019
	■	48.52481	88.55531	111.4447
	■	51.39541	86.60785	113.3922
	■	55.24294	85.53279	114.4672
	■	66.60512	84.86904	115.131
	■	79.6597	82.87955	117.1204

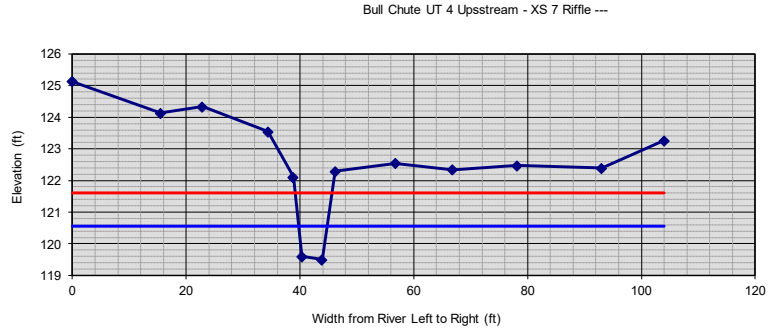
FS bankfull	FS top of bank	W fpa (ft)	channel slope (%)	Manning's "n"
88.16	85.77	12.0		
111.84	114.23			

dimensions			
4.3	x-section area	0.4	d mean
10.4	width	10.8	wet P
0.5	d max	0.4	hyd radi
2.9	bank ht	25.3	w/d ratio
12.0	W flood prone area	1.2	ent ratio

hydraulics	
0.0	velocity (ft/sec)
0.0	discharge rate, Q (cfs)
0.00	shear stress ((lbs/ft sq)
0.00	shear velocity (ft/sec)
0.000	unit stream power (lbs/ft/sec)
0.00	Froude number
0.0	friction factor u/u*
~~0.0~~	threshold grain size (mm)

check from channel material			
0	measured D84 (mm)		
0.0	relative roughness	0.0	fric. factor
0.000	Manning's n from channel material		

Cross Section



section: **Bull Chute UT 4 Upsstream - XS 7**

Riffle

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description: **Bull Chute UT 4 Upsstream - XS 7**

height of instrument (ft): **200.00**

notes	omit pt.	distance (ft)	FS (ft)	elevation
	■	0	74.86638	125.1336
	■	15.49274	75.86574	124.1343
	■	22.87529	75.66318	124.3368
	■	34.40065	76.45642	123.5436
	■	38.82022	77.89502	122.105
	■	40.33615	80.40234	119.5977
	■	43.87978	80.49757	119.5024
	■	46.22787	77.71005	122.2899
	■	56.79437	77.45593	122.5441
	■	66.85589	77.65684	122.3432
	■	78.14343	77.52744	122.4726
	■	93.05991	77.60557	122.3944
	■	104.0747	76.73565	123.2643

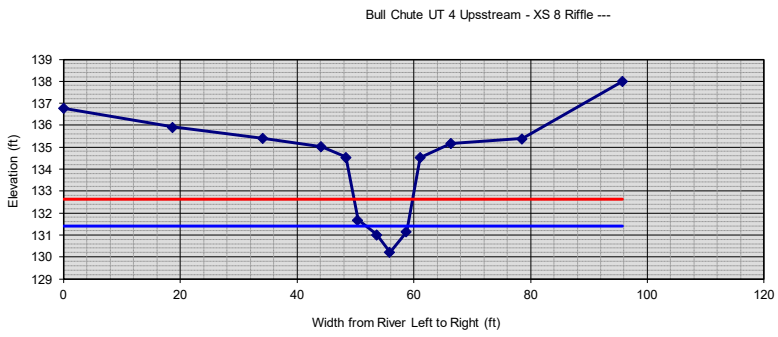
FS bankfull	FS top of bank	W fpa (ft)	channel slope (%)	Manning's "n"
79.44	77.71	5.5		
120.56	122.29			

dimensions			
4.3	x-section area	0.9	d mean
5.0	width	6.1	wet P
1.1	d max	0.7	hyd radi
2.8	bank ht	5.8	w/d ratio
5.5	W flood prone area	1.1	ent ratio

hydraulics	
0.0	velocity (ft/sec)
0.0	discharge rate, Q (cfs)
0.00	shear stress ((lbs/ft sq)
0.00	shear velocity (ft/sec)
0.000	unit stream power (lbs/ft/sec)
0.00	Froude number
0.0	friction factor u/u*
~~0.0~~	threshold grain size (mm)

check from channel material			
0	measured D84 (mm)		
0.0	relative roughness	0.0	fric. factor
0.000	Manning's n from channel material		

Cross Section



section: **Bull Chute UT 4 Upsstream - XS 8**

Riffle

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description: **Bull Chute UT 4 Upsstream - XS 8**

height of instrument (ft): **200.00**

notes	omit pt.	distance (ft)	FS (ft)	elevation
	■	0	63.23578	136.7642
	■	18.72894	64.08309	135.9169
	■	34.16178	64.59941	135.4006
	■	44.16699	64.98183	135.0182
	■	48.39907	65.45494	134.5451
	■	50.41952	68.31022	131.6898
	■	53.65922	68.97881	131.0212
	■	55.87201	69.76952	130.2305
	■	58.74266	68.8446	131.1554
	■	61.08952	65.47481	134.5252
	■	66.35683	64.83779	135.1622
	■	78.57598	64.61377	135.3862
	■	95.77127	61.9882	138.0118

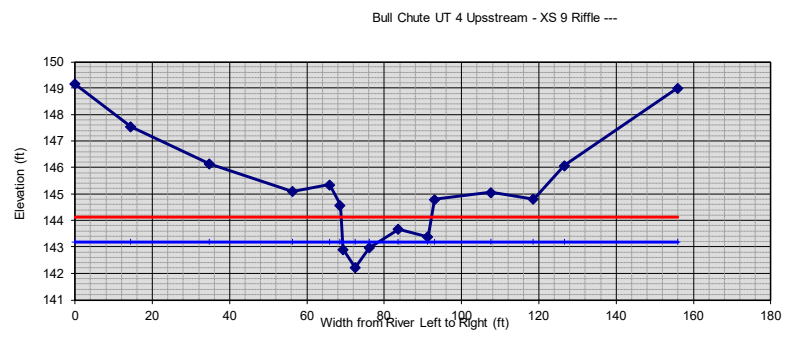
FS bankfull	FS top of bank	W fpa (ft)	channel slope (%)	Manning's "n"
68.57	65.48	10.0		
131.43	134.52			

dimensions			
4.3	x-section area	0.6	d mean
7.3	width	7.7	wet P
1.2	d max	0.6	hyd radi
4.3	bank ht	12.2	w/d ratio
10.0	W flood prone area	1.4	ent ratio

hydraulics	
0.0	velocity (ft/sec)
0.0	discharge rate, Q (cfs)
0.00	shear stress ((lbs/ft sq)
0.00	shear velocity (ft/sec)
0.000	unit stream power (lbs/ft/sec)
0.00	Froude number
0.0	friction factor u/u*
~~0.0~~	threshold grain size (mm)

check from channel material			
0	measured D84 (mm)		
0.0	relative roughness	0.0	fric. factor
0.000	Manning's n from channel material		

Cross Section



section: **Bull Chute UT 4 Upsstream - XS 9**

Riffle

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description: **Bull Chute UT 4 Upsstream - XS 9**

height of instrument (ft): **200.00**

notes	omit pt.	distance (ft)	FS (ft)	elevation
	■	0	50.83702	149.163
	■	14.4721	52.45896	147.541
	■	34.83038	53.86796	146.132
	■	56.30701	54.9079	145.0921
	■	65.88941	54.65134	145.3487
	■	68.61896	55.42697	144.573
	■	69.35207	57.0938	142.9062
	■	72.47739	57.77144	142.2286
	■	76.17856	57.03712	142.9629
	■	83.66882	56.3315	143.6685
	■	91.3007	56.62544	143.3746
	■	92.99499	55.21157	144.7884
	■	107.6621	54.9392	145.0608
	■	118.631	55.19149	144.8085
	■	126.6238	53.91752	146.0825
	■	156.0215	50.99427	149.0057

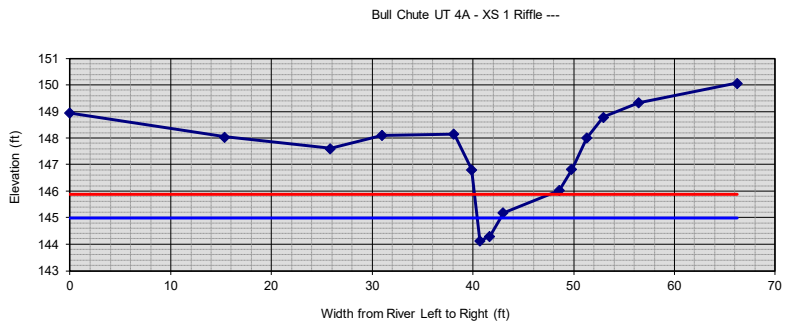
FS bankfull	FS top of bank	W fpa (ft)	channel slope (%)	Manning's "n"
56.82	55.21	24.0		
143.18	144.79			

dimensions			
4.3	x-section area	0.5	d mean
9.3	width	9.6	wet P
1.0	d max	0.5	hyd radi
2.6	bank ht	19.7	w/d ratio
24.0	W flood prone area	2.6	ent ratio

hydraulics	
0.0	velocity (ft/sec)
0.0	discharge rate, Q (cfs)
0.00	shear stress ((lbs/ft sq)
0.00	shear velocity (ft/sec)
0.000	unit stream power (lbs/ft/sec)
0.00	Froude number
0.0	friction factor u/u*
~~0.0~~	threshold grain size (mm)

check from channel material			
0	measured D84 (mm)		
0.0	relative roughness	0.0	fric. factor
0.000	Manning's n from channel material		

Cross Section



section: **Bull Chute UT 4A - XS 1**

Riffle

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description: **Bull Chute UT 4A - XS 1**

height of instrument (ft): **200.00**

notes	omit pt.	distance (ft)	FS (ft)	elevation
	■	0	51.05712	148.9429
	■	15.38128	51.95755	148.0425
	■	25.86658	52.39872	147.6013
	■	30.98652	51.90253	148.0975
	■	38.1341	51.84517	148.1548
	■	39.86728	53.19154	146.8085
	■	40.69348	55.87495	144.1251
	■	41.67356	55.69567	144.3043
	■	43.02081	54.81565	145.1843
	■	48.57848	53.9754	146.0246
	■	49.82567	53.17462	146.8254
	■	51.31204	51.99949	148.0005
	■	52.94389	51.20599	148.794
	■	56.45259	50.66983	149.3302
	■	66.25799	49.92524	150.0748
	■			
	■			
	■			
	■			
	■			
	■			
	■			
	■			
	■			
	■			

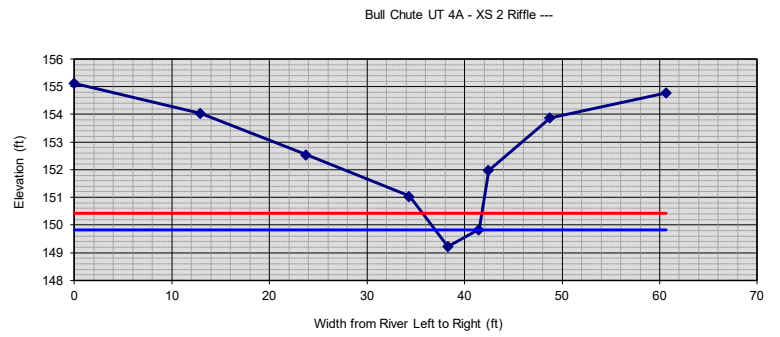
FS bankfull	FS top of bank	W fpa (ft)	channel slope (%)	Manning's "n"
55	52.4	8.0		
145	147.6			

dimensions			
1.3	x-section area	0.5	d mean
2.3	width	3.2	wet P
0.9	d max	0.4	hyd radi
3.5	bank ht	4.3	w/d ratio
8.0	W flood prone area	3.5	ent ratio

hydraulics	
0.0	velocity (ft/sec)
0.0	discharge rate, Q (cfs)
0.00	shear stress ((lbs/ft sq)
0.00	shear velocity (ft/sec)
0.000	unit stream power (lbs/ft/sec)
0.00	Froude number
0.0	friction factor u/u*
~~0.0~~	threshold grain size (mm)

check from channel material			
0	measured D84 (mm)		
0.0	relative roughness	0.0	fric. factor
0.000	Manning's n from channel material		

Cross Section



section: **Bull Chute UT 4A - XS 2**

Riffle

---

description: **Bull Chute UT 4A - XS 2**

height of instrument (ft): **200.00**

notes	omit pt.	distance (ft)	FS (ft)	elevation
	■	0	44.85983	155.1402
	■	12.93254	45.95599	154.044
	■	23.74048	47.45299	152.547
	■	34.33957	48.95151	151.0485
	■	38.29402	50.77286	149.2271
	■	41.48795	50.16349	149.8365
	■	42.45875	48.0164	151.9836
	■	48.77269	46.12574	153.8743
	■	60.67137	45.21959	154.7804
	■			
	■			
	■			
	■			
	■			
	■			
	■			
	■			
	■			
	■			
	■			
	■			
	■			
	■			

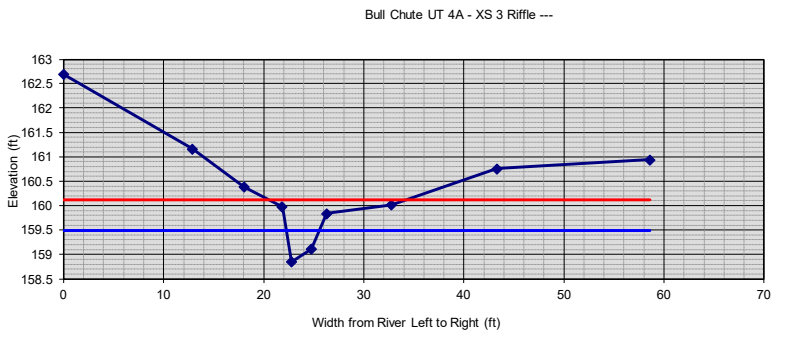
FS bankfull	FS top of bank	W fpa (ft)	channel slope (%)	Manning's "n"
50.17	48.95	6.0		
149.83	151.05			

dimensions			
1.3	x-section area	0.3	d mean
4.5	width	4.7	wet P
0.6	d max	0.3	hyd radi
1.8	bank ht	14.8	w/d ratio
6.0	W flood prone area	1.3	ent ratio

hydraulics	
0.0	velocity (ft/sec)
0.0	discharge rate, Q (cfs)
0.00	shear stress ((lbs/ft sq)
0.00	shear velocity (ft/sec)
0.000	unit stream power (lbs/ft/sec)
0.00	Froude number
0.0	friction factor u/u*
~~0.0~~	threshold grain size (mm)

check from channel material			
0	measured D84 (mm)		
0.0	relative roughness	0.0	fric. factor
0.000	Manning's n from channel material		

Cross Section



section: **Bull Chute UT 4A - XS 3**

Riffle

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description: **Bull Chute UT 4A - XS 3**

height of instrument (ft): **200.00**

notes	omit pt.	distance (ft)	FS (ft)	elevation
	■	0	37.3063	162.6937
	■	12.8795	38.83773	161.1623
	■	18.04763	39.61322	160.3868
	■	21.86461	40.02308	159.9769
	■	22.77461	41.14431	158.8557
	■	24.76802	40.88737	159.1126
	■	26.29002	40.16269	159.8373
	■	32.7672	39.98341	160.0166
	■	43.32438	39.24248	160.7575
	■	58.63798	39.05892	160.9411

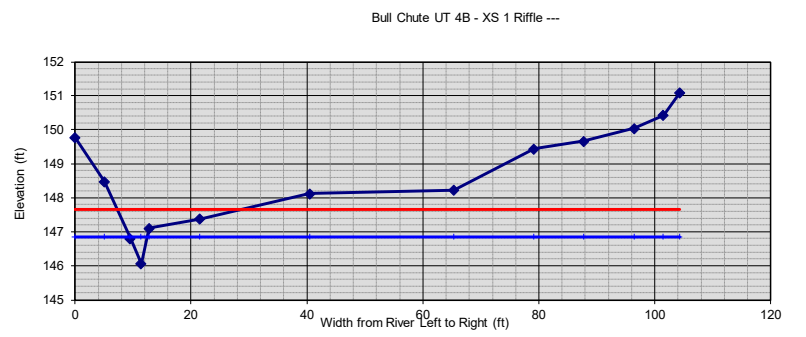
FS bankfull	FS top of bank	W fpa (ft)	channel slope (%)	Manning's "n"
40.51	40.16	12.0		
159.49	159.84			

dimensions			
1.3	x-section area	0.4	d mean
3.3	width	3.7	wet P
0.6	d max	0.4	hyd radi
1.0	bank ht	8.2	w/d ratio
12.0	W flood prone area	3.6	ent ratio

hydraulics	
0.0	velocity (ft/sec)
0.0	discharge rate, Q (cfs)
0.00	shear stress ((lbs/ft sq)
0.00	shear velocity (ft/sec)
0.000	unit stream power (lbs/ft/sec)
0.00	Froude number
0.0	friction factor u/u*
~~0.0~~	threshold grain size (mm)

check from channel material			
0	measured D84 (mm)		
0.0	relative roughness	0.0	fric. factor
0.000	Manning's n from channel material		

Cross Section



section: **Bull Chute UT 4B - XS 1**

Riffle

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description: **Bull Chute UT 4B - XS 1**

height of instrument (ft): **200.00**

notes	omit pt.	distance (ft)	FS (ft)	elevation
	■	0	50.22113	149.7789
	■	5.08686	51.52118	148.4788
	■	9.517549	53.1921	146.8079
	■	11.40354	53.93654	146.0635
	■	12.78137	52.89805	147.102
	■	21.5562	52.6183	147.3817
	■	40.51547	51.87856	148.1214
	■	65.36598	51.77419	148.2258
	■	79.18099	50.56149	149.4385
	■	87.75102	50.33991	149.6601
	■	96.43055	49.96374	150.0363
	■	101.5012	49.57258	150.4274
	■	104.2678	48.90457	151.0954

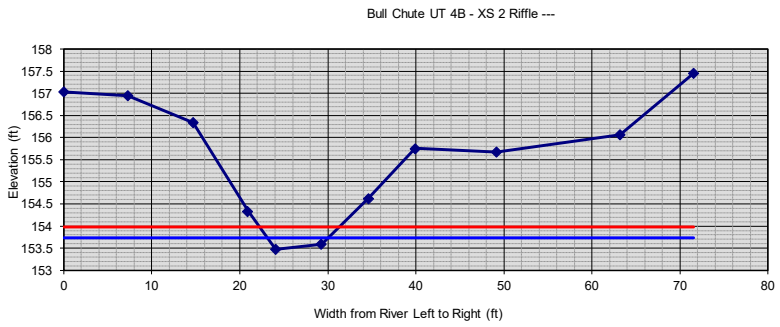
FS bankfull	FS top of bank	W fpa (ft)	channel slope (%)	Manning's "n"
53.14	52.9	18.0		
146.86	147.1			

dimensions			
1.2	x-section area	0.4	d mean
3.1	width	3.5	wet P
0.8	d max	0.4	hyd radi
1.0	bank ht	7.8	w/d ratio
18.0	W flood prone area	5.8	ent ratio

hydraulics	
0.0	velocity (ft/sec)
0.0	discharge rate, Q (cfs)
0.00	shear stress ((lbs/ft sq)
0.00	shear velocity (ft/sec)
0.000	unit stream power (lbs/ft/sec)
0.00	Froude number
0.0	friction factor u/u*
~~0.0~~	threshold grain size (mm)

check from channel material			
0	measured D84 (mm)		
0.0	relative roughness	0.0	fric. factor
0.000	Manning's n from channel material		

Cross Section



section: **Bull Chute UT 4B - XS 2**

Riffle

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description: **Bull Chute UT 4B - XS 2**

height of instrument (ft): **200.00**

notes	omit pt.	distance (ft)	FS (ft)	elevation
	■	0	42.96732	157.0327
	■	7.291237	43.05478	156.9452
	■	14.7016	43.66178	156.3382
	■	20.91665	45.66388	154.3361
	■	24.08435	46.51405	153.4859
	■	29.2808	46.40815	153.5919
	■	34.59703	45.37234	154.6277
	■	39.93025	44.24432	155.7557
	■	49.14318	44.32693	155.6731
	■	63.21905	43.93623	156.0638
	■	71.54002	42.54967	157.4503
	■			
	■			
	■			
	■			
	■			
	■			
	■			
	■			
	■			
	■			
	■			
	■			
	■			
	■			

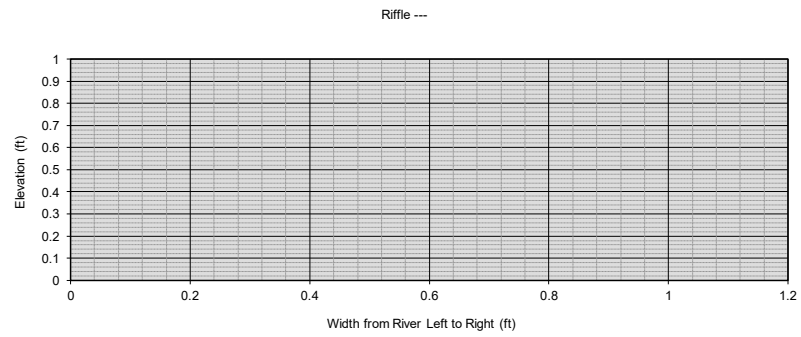
FS bankfull	FS top of bank	W fpa (ft)	channel slope (%)	Manning's "n"
46.26	44.33	9.0		
153.74	155.67			

dimensions			
1.2	x-section area	0.2	d mean
6.9	width	7.0	wet P
0.3	d max	0.2	hyd radi
2.2	bank ht	39.0	w/d ratio
9.0	W flood prone area	1.3	ent ratio

hydraulics	
0.0	velocity (ft/sec)
0.0	discharge rate, Q (cfs)
0.00	shear stress ((lbs/ft sq)
0.00	shear velocity (ft/sec)
0.000	unit stream power (lbs/ft/sec)
0.00	Froude number
0.0	friction factor u/u*
~~0.0~~	threshold grain size (mm)

check from channel material			
0	measured D84 (mm)		
0.0	relative roughness	0.0	fric. factor
0.000	Manning's n from channel material		

Cross Section



section:

Riffle

---

description:

height of instrument (ft):

notes	omit pt.	distance (ft)	FS (ft)	elevation
	■			
	■			
	■			
	■			
	■			
	■			
	■			
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	■			
	■			
	■			
	■			
	■			
	■			
	■			
	■			

FS bankfull	FS top of bank	W fpa (ft)	channel slope (%)	Manning's "n"
0	---			

dimensions			
0.0	x-section area	0.0	d mean
0.0	width	0.0	wet P
0.0	d max	0.0	hyd radi
0.0	bank ht	0.0	w/d ratio
0.0	W flood prone area	0.0	ent ratio

hydraulics	
0.0	velocity (ft/sec)
0.0	discharge rate, Q (cfs)
0.00	shear stress ((lbs/ft sq)
0.00	shear velocity (ft/sec)
0.000	unit stream power (lbs/ft/sec)
0.00	Froude number
0.0	friction factor u/u*
~~0.0~~	threshold grain size (mm)

check from channel material			
0	measured D84 (mm)		
0.0	relative roughness	0.0	fric. factor
0.000	Manning's n from channel material		

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): Redding UT-1 Perennial
2. Date of evaluation: 7/29/2019
3. Applicant/owner name: Clearwater Mitigation
4. Assessor name/organization: Jernigans/Radecki - Axiom
5. County: Randolph
6. Nearest named water body on USGS 7.5-minute quad: Caraway Creek
7. River basin: Yadkin
8. Site coordinates (decimal degrees, at lower end of assessment reach): 35.834847, -79.882256

STREAM INFORMATION: (depth and width can be approximations)

9. Site number (show on attached map): UT-1 Perennial
10. Length of assessment reach evaluated (feet): 150
11. Channel depth from bed (in riffle, if present) to top of bank (feet): 4-6 ☐Unable to assess channel depth.
12. Channel width at top of bank (feet): 8-10
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 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

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): Redding UT-2
2. Date of evaluation: 7/29/19
3. Applicant/owner name: Clearwater Mitigation
4. Assessor name/organization: Jernigan/Axiom
5. County: Randolph
6. Nearest named water body on USGS 7.5-minute quad: Caraway Creek
7. River basin: Yadkin-PeeDee
8. Site coordinates (decimal degrees, at lower end of assessment reach): 35.835467, -79.883273

STREAM INFORMATION: (depth and width can be approximations)

9. Site number (show on attached map): UT-2
10. Length of assessment reach evaluated (feet): 150
11. Channel depth from bed (in riffle, if present) to top of bank (feet): 1 ☐Unable to assess channel depth.
12. Channel width at top of bank (feet): 2
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	Redding UT-2	Date of Assessment	7/29/19
Stream Category	Pa1	Assessor Name/Organization	Jernigan/Axiom

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

Function Class Rating Summary	USACE/ All Streams	NCDWR Intermittent
(1) Hydrology	**LOW**	**LOW**
(2) Baseflow	**HIGH**	**HIGH**
(2) Flood Flow	**LOW**	**LOW**
(3) Streamside Area Attenuation	**MEDIUM**	**MEDIUM**
(4) Floodplain Access	**HIGH**	**HIGH**
(4) Wooded Riparian Buffer	**LOW**	**LOW**
(4) Microtopography	**LOW**	**LOW**
(3) Stream Stability	**LOW**	**LOW**
(4) Channel Stability	**MEDIUM**	**MEDIUM**
(4) Sediment Transport	**LOW**	**LOW**
(4) Stream Geomorphology	**MEDIUM**	**MEDIUM**
(2) Stream/Intertidal Zone Interaction	NA	NA
(2) Longitudinal Tidal Flow	NA	NA
(2) Tidal Marsh Stream Stability	NA	NA
(3) Tidal Marsh Channel Stability	NA	NA
(3) Tidal Marsh Stream Geomorphology	NA	NA
(1) Water Quality	**MEDIUM**	**MEDIUM**
(2) Baseflow	**HIGH**	**HIGH**
(2) Streamside Area Vegetation	**LOW**	**LOW**
(3) Upland Pollutant Filtration	**LOW**	**LOW**
(3) Thermoregulation	**MEDIUM**	**MEDIUM**
(2) Indicators of Stressors	**YES**	**YES**
(2) Aquatic Life Tolerance	**HIGH**	**NA**
(2) Intertidal Zone Filtration	NA	NA
(1) Habitat	**LOW**	**LOW**
(2) In-stream Habitat	**LOW**	**LOW**
(3) Baseflow	**HIGH**	**HIGH**
(3) Substrate	**LOW**	**LOW**
(3) Stream Stability	**MEDIUM**	**MEDIUM**
(3) In-stream Habitat	**LOW**	**LOW**
(2) Stream-side Habitat	**MEDIUM**	**MEDIUM**
(3) Stream-side Habitat	**MEDIUM**	**MEDIUM**
(3) Thermoregulation	**MEDIUM**	**MEDIUM**
(2) Tidal Marsh In-stream Habitat	NA	NA
(3) Flow Restriction	NA	NA
(3) Tidal Marsh Stream Stability	NA	NA
(4) Tidal Marsh Channel Stability	NA	NA
(4) Tidal Marsh Stream Geomorphology	NA	NA
(3) Tidal Marsh In-stream Habitat	NA	NA
(2) Intertidal Zone	NA	NA
Overall	**LOW**	**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): Redding-UT3
2. Date of evaluation: 7/29/2019
3. Applicant/owner name: Clearwater Mitigation
4. Assessor name/organization: Jernigans/Radecki - Axiom
5. County: Randolph
6. Nearest named water body on USGS 7.5-minute quad: Caraway Creek
7. River basin: Yadkin-PeeDee
8. Site coordinates (decimal degrees, at lower end of assessment reach): 35.834380, -79.887906

STREAM INFORMATION: (depth and width can be approximations)

9. Site number (show on attached map): UT-3
10. Length of assessment reach evaluated (feet): 100
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): 4-5
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:
Bufferd stream with pasture on either side with active cattle grazing. There are some scatted trees but species composition is largerly privet and other non-native species.

Draft NC SAM Stream Rating Sheet
Accompanies User Manual Version 2.1

Stream Site Name	Redding-UT3	Date of Assessment	7/29/2019
Stream Category	Pa1	Assessor Name/Organization	Jernigans/Radecki - Axiom

Notes of Field Assessment Form (Y/N)	YES
Presence of regulatory considerations (Y/N)	NO
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	**MEDIUM**	
(2) Baseflow	**MEDIUM**	
(2) Flood Flow	**MEDIUM**	
(3) Streamside Area Attenuation	**MEDIUM**	
(4) Floodplain Access	**HIGH**	
(4) Wooded Riparian Buffer	**LOW**	
(4) Microtopography	**LOW**	
(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	**MEDIUM**	
(2) Streamside Area Vegetation	**LOW**	
(3) Upland Pollutant Filtration	**LOW**	
(3) Thermoregulation	**MEDIUM**	
(2) Indicators of Stressors	**YES**	
(2) Aquatic Life Tolerance	**HIGH**	
(2) Intertidal Zone Filtration	NA	
(1) Habitat	**HIGH**	
(2) In-stream Habitat	**HIGH**	
(3) Baseflow	**MEDIUM**	
(3) Substrate	**MEDIUM**	
(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	**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): Redding-UT4
2. Date of evaluation: 7/29/2019
3. Applicant/owner name: Clearwater Mitigation
4. Assessor name/organization: Jernigans/Radecki - Axiom
5. County: Randolph
6. Nearest named water body on USGS 7.5-minute quad: Caraway Creek
7. River basin: Yadkin-PeeDee
8. Site coordinates (decimal degrees, at lower end of assessment reach): 35.833656, -79.889077

STREAM INFORMATION: (depth and width can be approximations)

9. Site number (show on attached map): UT-4
10. Length of assessment reach evaluated (feet): 100
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): 5-7
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 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:
Stream with 10ft wide buffer surrounded by pasture with active cow grazing. The majority of canopy cover is privit.

Draft NC SAM Stream Rating Sheet
Accompanies User Manual Version 2.1

Stream Site Name	Redding-UT4	Date of Assessment	7/29/2019
Stream Category	Pa1	Assessor Name/Organization	Jernigans/Radecki - Axiom

Notes of Field Assessment Form (Y/N)	NO
Presence of regulatory considerations (Y/N)	NO
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	**MEDIUM**	
(2) Flood Flow	**LOW**	
(3) Streamside Area Attenuation	**LOW**	
(4) Floodplain Access	**MEDIUM**	
(4) Wooded Riparian Buffer	**LOW**	
(4) Microtopography	**LOW**	
(3) Stream Stability	**MEDIUM**	
(4) Channel Stability	**MEDIUM**	
(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	**MEDIUM**	
(2) Streamside Area Vegetation	**HIGH**	
(3) Upland Pollutant Filtration	**HIGH**	
(3) Thermoregulation	**MEDIUM**	
(2) Indicators of Stressors	**YES**	
(2) Aquatic Life Tolerance	**LOW**	
(2) Intertidal Zone Filtration	NA	
(1) Habitat	**MEDIUM**	
(2) In-stream Habitat	**HIGH**	
(3) Baseflow	**MEDIUM**	
(3) Substrate	**MEDIUM**	
(3) Stream Stability	**MEDIUM**	
(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): Redding-UT5
2. Date of evaluation: 7/29/2019
3. Applicant/owner name: Clearwater Mitigation
4. Assessor name/organization: Jernigans/Radecki - Axiom
5. County: Randolph
6. Nearest named water body on USGS 7.5-minute quad: Caraway Creek
7. River basin: Yadkin-PeeDee
8. Site coordinates (decimal degrees, at lower end of assessment reach): 35.828026, -79.892973

STREAM INFORMATION: (depth and width can be approximations)

9. Site number (show on attached map): UT-5
10. Length of assessment reach evaluated (feet): 100
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): 8-10
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 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:
Wooded buffer alongside pasture with active cattle grazing.

Draft NC SAM Stream Rating Sheet
Accompanies User Manual Version 2.1

Stream Site Name	Redding-UT5	Date of Assessment	7/29/2019
Stream Category	Pa2	Assessor Name/Organization	Jernigans/Radecki - Axiom

Notes of Field Assessment Form (Y/N)	YES
Presence of regulatory considerations (Y/N)	NO
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	**LOW**	
(2) Flood Flow	**MEDIUM**	
(3) Streamside Area Attenuation	**MEDIUM**	
(4) Floodplain Access	**MEDIUM**	
(4) Wooded Riparian Buffer	**MEDIUM**	
(4) Microtopography	**LOW**	
(3) Stream Stability	**MEDIUM**	
(4) Channel Stability	**MEDIUM**	
(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	**LOW**	
(2) Streamside Area Vegetation	**HIGH**	
(3) Upland Pollutant Filtration	**HIGH**	
(3) Thermoregulation	**HIGH**	
(2) Indicators of Stressors	**YES**	
(2) Aquatic Life Tolerance	**OMITTED**	
(2) Intertidal Zone Filtration	NA	
(1) Habitat	**LOW**	
(2) In-stream Habitat	**LOW**	
(3) Baseflow	**LOW**	
(3) Substrate	**MEDIUM**	
(3) Stream Stability	**MEDIUM**	
(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	**LOW**	

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:
There is a thin wooded buffer less than 10ft wide that abuts pasture land with active cow grazing.

Draft NC SAM Stream Rating Sheet
Accompanies User Manual Version 2.1

Stream Site Name	Redding UT-1 Perennial	Date of Assessment	7/29/2019
Stream Category	Pa1	Assessor Name/Organization	Jernigans/Radecki - Axiom

Notes of Field Assessment Form (Y/N)	NO
Presence of regulatory considerations (Y/N)	NO
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	**MEDIUM**	
(2) Flood Flow	**LOW**	
(3) Streamside Area Attenuation	**LOW**	
(4) Floodplain Access	**MEDIUM**	
(4) Wooded Riparian Buffer	**LOW**	
(4) Microtopography	**LOW**	
(3) Stream Stability	**LOW**	
(4) Channel Stability	**MEDIUM**	
(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	**MEDIUM**	
(2) Streamside Area Vegetation	**MEDIUM**	
(3) Upland Pollutant Filtration	**MEDIUM**	
(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	**MEDIUM**	
(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 WAM FIELD ASSESSMENT RESULTS
Accompanies User Manual Version 5.0

USACE AID #		NCDWR#	
Project Name	Redding	Date of Evaluation	7/29/2019
Applicant/Owner Name	Clearwater Mitgation	Wetland Site Name	PQ
Wetland Type	Headwater Forest	Assessor Name/Organization	Jernigans/Radecki - Axiom
Level III Ecoregion	Piedmont	Nearest Named Water Body	Caraway Creek
River Basin	Yadkin-PeeDee	USGS 8-Digit Catalogue Unit	03040103
County	Randolph	NCDWR Region	Winston-Salem
☐ Yes ☒ No	Precipitation within 48 hrs?	Latitude/Longitude (deci-degrees)	35.835420, -79.889985

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

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

Is the assessment area intensively managed? ☒ Yes ☐ No

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

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

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

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

Is the assessment area on a coastal island? ☐ Yes ☒ No

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

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

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

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

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

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

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

Surf	Sub	
☐A	☐A	Water storage capacity and duration are not altered.
☐B	☐B	Water storage capacity or duration are altered, but not substantially (typically, not sufficient to change vegetation).
☒C	☒C	Water storage capacity or duration are substantially altered (typically, alteration sufficient to result in vegetation change) (examples: draining, flooding, soil compaction, filling, excessive sedimentation, underground utility lines).

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

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

	AA	WT	
3a.	☐A	☐A	Majority of wetland with depressions able to pond water > 1 deep
	☐B	☐B	Majority of wetland with depressions able to pond water 6 inches to 1 foot deep
	☒C	☒C	Majority of wetland with depressions able to pond water 3 to 6 inches deep
	☐D	☐D	Depressions able to pond water < 3 inches deep

3b. ☐A Evidence that maximum depth of inundation is greater than 2 feet
☐B Evidence that maximum depth of inundation is between 1 and 2 feet
☐C Evidence that maximum depth of inundation is less than 1 foot

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

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

4a. ☐A Sandy soil
☒B Loamy or clayey soils exhibiting redoximorphic features (concentrations, depletions, or rhizospheres)
☐C Loamy or clayey soils not exhibiting redoximorphic features
☐D Loamy or clayey gleyed soil
☐E Histosol or histic epipedon

4b. ☒A Soil ribbon < 1 inch
☐B Soil ribbon ≥ 1 inch

4c. ☒A No peat or muck presence
☐B A peat or muck presence

5. Discharge into Wetland – opportunity metric

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

Surf	Sub	
☐A	☒A	Little or no evidence of pollutants or discharges entering the assessment area
☒B	☐B	Noticeable evidence of pollutants or discharges entering the wetland and stressing, but not overwhelming the treatment capacity of the assessment area
☐C	☐C	Noticeable evidence of pollutants or discharges (pathogen, particulate, or soluble) entering the assessment area and potentially overwhelming the treatment capacity of the wetland (water discoloration, dead vegetation, excessive sedimentation, odor)

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

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

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

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

7a. Is assessment area within 50 feet of a tributary or other open water?
☒Yes ☐No If Yes, continue to 7b. If No, skip to Metric 8.
Wetland buffer need only be present on one side of the water body. Make buffer judgment based on the average width of wetland. Record a note if a portion of the buffer has been removed or disturbed.

7b. How much of the first 50 feet from the bank is wetland? (Wetland buffer need only be present on one side of the .water body. Make buffer judgment based on the average width of wetland. Record a note if a portion of the buffer has been removed or disturbed.)
☐A ≥ 50 feet
☒B From 30 to < 50 feet
☐C From 15 to < 30 feet
☐D From 5 to < 15 feet
☐E < 5 feet or buffer bypassed by ditches

7c. Tributary width. If the tributary is anastomosed, combine widths of channels/braids for a total width.
☒≤ 15-feet wide ☐> 15-feet wide ☐ Other open water (no tributary present)

7d. Do roots of assessment area vegetation extend into the bank of the tributary/open water?
☒Yes ☐No

7e. Is stream or other open water sheltered or exposed?
☒Sheltered – adjacent open water with width < 2500 feet and no regular boat traffic.
☐Exposed – adjacent open water with width ≥ 2500 feet or regular boat traffic.

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

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

WT	WC	
☐A	☐A	≥ 100 feet
☐B	☐B	From 80 to < 100 feet
☐C	☐C	From 50 to < 80 feet
☒D	☒D	From 40 to < 50 feet
☐E	☐E	From 30 to < 40 feet
☐F	☐F	From 15 to < 30 feet
☐G	☐G	From 5 to < 15 feet
☐H	☐H	< 5 feet

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

Answer for assessment area dominant landform.

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

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

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

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

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

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

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

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

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

13. Connectivity to Other Natural Areas – landscape condition metric

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

Well	Loosely	
☐A	☐A	≥ 500 acres
☐B	☐B	From 100 to < 500 acres
☐C	☐C	From 50 to < 100 acres
☐D	☒D	From 10 to < 50 acres
☒E	☐E	< 10 acres
☐F	☐F	Wetland type has a poor or no connection to other natural habitats

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

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

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

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

☒A 0
☐B 1 to 4
☐C 5 to 8

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

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

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

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

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

17a. Is vegetation present?

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

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

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

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

	AA	WT	
Canopy	☐A	☐A	Canopy closed, or nearly closed, with natural gaps associated with natural processes
	☒B	☒B	Canopy present, but opened more than natural gaps
	☐C	☐C	Canopy sparse or absent
Mid-Story	☒A	☒A	Dense mid-story/sapling layer
	☐B	☐B	Moderate density mid-story/sapling layer
	☐C	☐C	Mid-story/sapling layer sparse or absent
Shrub	☒A	☒A	Dense shrub layer
	☐B	☐B	Moderate density shrub layer
	☐C	☐C	Shrub layer sparse or absent
Herb	☐A	☐A	Dense herb layer
	☒B	☒B	Moderate density herb layer
	☐C	☐C	Herb layer sparse or absent

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

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

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

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

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

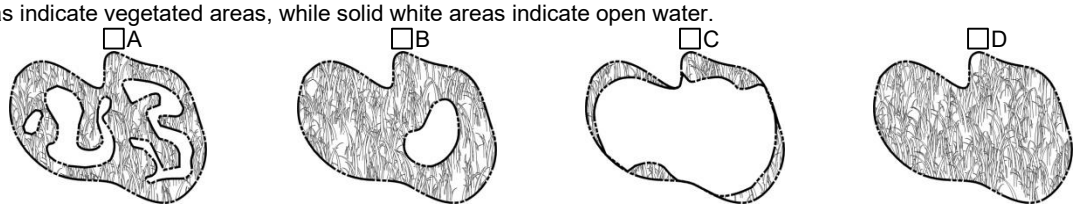
Include both natural debris and man-placed natural debris.

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

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

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

☐A ☐B ☐C ☐D



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

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

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

Notes

NC WAM Wetland Rating Sheet
Accompanies User Manual Version 5.0

Wetland Site Name	PQ	Date of Assessment	7/29/2019
Wetland Type	Headwater Forest	Assessor Name/Organization	Jernigans/Radecki - Axiom

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

Sub-function Rating Summary

Function	Sub-function	Metrics	Rating
Hydrology	Surface Storage and Retention	Condition	**LOW**
	Sub-surface Storage and Retention	Condition	**LOW**
Water Quality	Pathogen Change	Condition	**HIGH**
		Condition/Opportunity	**HIGH**
		Opportunity Presence (Y/N)	**YES**
	Particulate Change	Condition	**HIGH**
		Condition/Opportunity	NA
		Opportunity Presence (Y/N)	NA
	Soluble Change	Condition	**MEDIUM**
		Condition/Opportunity	**HIGH**
		Opportunity Presence (Y/N)	**YES**
	Physical Change	Condition	**HIGH**
		Condition/Opportunity	**HIGH**
		Opportunity Presence (Y/N)	**YES**
	Pollution Change	Condition	NA
		Condition/Opportunity	NA
		Opportunity Presence (Y/N)	NA
Habitat	Physical Structure	Condition	**LOW**
	Landscape Patch Structure	Condition	**MEDIUM**
	Vegetation Composition	Condition	**LOW**

Function Rating Summary

Function	Metrics	Rating
Hydrology	Condition	**LOW**
Water Quality	Condition	**HIGH**
	Condition/Opportunity	**HIGH**
	Opportunity Presence (Y/N)	**YES**
Habitat	Condition	**LOW**

Overall Wetland Rating **LOW**

NC DWQ Stream Identification Form Version 4.11

Perennial Origin

Date: 7-29-19	**Project/Site:** Redding VT-1	**Latitude:** 35.855077
Evaluator: Radecki / Jennings	**County:** Randolph	**Longitude:** -79.881952
Total Points: 31.5 *Stream is at least intermittent if ≥ 19 or perennial if ≥ 30**	**Stream Determination (circle one)** **Ephemeral Intermittent Perennial**	**Other** Glenola *e.g. Quad Name:*

A. Geomorphology (Subtotal = 19)	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 = 6.5)				
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 = 6)				
18. Fibrous roots in streambed	3	2	1	0
19. Rooted upland plants in streambed	3	2	1	0
20. Macrobenthos (note diversity and abundance)	0	1	2	3
21. Aquatic Mollusks	0	1	2	3
22. Fish	0	0.5	1	1.5
23. Crayfish	0	0.5	1	1.5
24. Amphibians	0	0.5	1	1.5
25. Algae	0	0.5	1	1.5
26. Wetland plants in streambed	FACW = 0.75; OBL = 1.5 Other = 0			

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

Notes:

Sketch:

NC DWQ Stream Identification Form Version 4.11

Date: 7-29-19	**Project/Site:** Redding UT-1	**Latitude:** 35.855701
Evaluator: Rabecca Jennings	**County:** Randolph	**Longitude:** -79.881468
Total Points: 22.5 *Stream is at least intermittent if ≥ 19 or perennial if ≥ 30**	**Stream Determination (circle one)** **Ephemeral Intermittent Perennial**	**Other** Glenola *e.g. Quad Name:*

A. Geomorphology (Subtotal = 13)	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 = 5.5)				
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 = 4)				
18. Fibrous roots in streambed	3	2	1	0
19. Rooted upland plants in streambed	3	2	1	0
20. Macrobenthos (note diversity and abundance)	0	1	2	3
21. Aquatic Mollusks	0	1	2	3
22. Fish	0	0.5	1	1.5
23. Crayfish	0	0.5	1	1.5
24. Amphibians	0	0.5	1	1.5
25. Algae	0	0.5	1	1.5
26. Wetland plants in streambed	FACW = 0.75; OBL = 1.5 Other = 0			

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

Notes:

Sketch:

NC DWQ Stream Identification Form Version 4.11

UT-2 top

Date: 7-29-19	**Project/Site:** Redding	**Latitude:** 35.835378
Evaluator: Jennifer Roberts	**County:** Randolph	**Longitude:** -79.885229
Total Points: *Stream is at least intermittent if ≥ 19 or perennial if ≥ 30** 20.5	**Stream Determination (circle one)** Ephemeral Intermittent Perennial	**Other** *e.g. Quad Name:* Glenola

A. Geomorphology (Subtotal = 10)	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 = 6.5)				
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 = 4)				
18. Fibrous roots in streambed	3	2	1	0
19. Rooted upland plants in streambed	3	2	1	0
20. Macrobenthos (note diversity and abundance)	0	1	2	3
21. Aquatic Mollusks	0	1	2	3
22. Fish	0	0.5	1	1.5
23. Crayfish	0	0.5	1	1.5
24. Amphibians	0	0.5	1	1.5
25. Algae	0	0.5	1	1.5
26. Wetland plants in streambed	FACW = 0.75; OBL = 1.5 Other = 0			

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

Notes:

Sketch:

UT 3 upper

NC DWQ Stream Identification Form Version 4.11

Date: 1/14/2021	**Project/Site:** Bull Chute	**Latitude:** 35.836749
Evaluator: WGL	**County:** Randolph	**Longitude:** -79.886793
Total Points: *Stream is at least intermittent if ≥ 19 or perennial if ≥ 30** 25	**Stream Determination (circle one)** Ephemeral Intermittent Perennial	**Other** Glenola *e.g. Quad Name:*

A. Geomorphology (Subtotal = 12.5)	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 = 6.5)				
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 = 6)				
18. Fibrous roots in streambed	3	2	1	0
19. Rooted upland plants in streambed	3	2	1	0
20. Macrobenthos (note diversity and abundance)	0	1	2	3
21. Aquatic Mollusks	0	1	2	3
22. Fish	0	0.5	1	1.5
23. Crayfish	0	0.5	1	1.5
24. Amphibians	0	0.5	1	1.5
25. Algae	0	0.5	1	1.5
26. Wetland plants in streambed	FACW = 0.75; OBL = 1.5 Other = 0			

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

Notes:

Sketch:

UT 4A

NC DWQ Stream Identification Form Version 4.11

Date: 1/14/2021	**Project/Site:** Bull chute	**Latitude:** 35.837291
Evaluator: WJZ	**County:** Randolph	**Longitude:** -79.890126
Total Points: *Stream is at least intermittent if ≥ 19 or perennial if ≥ 30** 21.5	**Stream Determination (circle one)** Ephemeral Intermittent Perennial	**Other** *e.g. Quad Name:* Glenola

A. Geomorphology (Subtotal = 8)	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 = 7.5)				
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 = 6)				
18. Fibrous roots in streambed	3	2	1	0
19. Rooted upland plants in streambed	3	2	1	0
20. Macrobenthos (note diversity and abundance)	0	1	2	3
21. Aquatic Mollusks	0	1	2	3
22. Fish	0	0.5	1	1.5
23. Crayfish	0	0.5	1	1.5
24. Amphibians	0	0.5	1	1.5
25. Algae	0	0.5	1	1.5
26. Wetland plants in streambed	FACW = 0.75; OBL = 1.5 Other = 0			

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

Notes:

Sketch:

UT 43

NC DWQ Stream Identification Form Version 4.11

Date: 1/14/2021	**Project/Site:** Bull chute	**Latitude:** 35.837255
Evaluator: WJZ	**County:** Randolph	**Longitude:** -79.890406
Total Points: *Stream is at least intermittent if ≥ 19 or perennial if ≥ 30** 21	**Stream Determination (circle one)** Ephemeral Intermittent Perennial	**Other** *e.g. Quad Name:* Glenola

A. Geomorphology (Subtotal = 6.5)	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 = 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 = 6)				
18. Fibrous roots in streambed	3	2	1	0
19. Rooted upland plants in streambed	3	2	1	0
20. Macrobenthos (note diversity and abundance)	0	1	2	3
21. Aquatic Mollusks	0	1	2	3
22. Fish	0	0.5	1	1.5
23. Crayfish	0	0.5	1	1.5
24. Amphibians	0	0.5	1	1.5
25. Algae	0	0.5	1	1.5
26. Wetland plants in streambed	FACW = 0.75; OBL = 1.5 Other = 0			

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

Notes:

Sketch:

UT 4C

NC DWQ Stream Identification Form Version 4.11

Date: 1/14/2021	Project/Site: Bull Chute	Latitude: 35.83607
Evaluator: WHZ	County: Randolph	Longitude: -79.890697
Total Points: *Stream is at least intermittent if ≥ 19 or perennial if ≥ 30** 19.5	Stream Determination (circle one) Ephemeral Intermittent Perennial	Other Glenola *e.g. Quad Name:*

A. Geomorphology (Subtotal = 7.5)	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 = 6)				
12. Presence of Baseflow	0	1	2	3
13. Iron oxidizing bacteria	0	1	2	3
14. Leaf litter	1.5	1	0.5	0
15. Sediment on plants or debris	0	0.5	1	1.5
16. Organic debris lines or piles	0	0.5	1	1.5
17. Soil-based evidence of high water table?	No = 0		Yes = 3	

C. Biology (Subtotal = 6)				
18. Fibrous roots in streambed	3	2	1	0
19. Rooted upland plants in streambed	3	2	1	0
20. Macrobenthos (note diversity and abundance)	0	1	2	3
21. Aquatic Mollusks	0	1	2	3
22. Fish	0	0.5	1	1.5
23. Crayfish	0	0.5	1	1.5
24. Amphibians	0	0.5	1	1.5
25. Algae	0	0.5	1	1.5
26. Wetland plants in streambed	FACW = 0.75; OBL = 1.5 Other = 0			

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

Notes:

Sketch:

UT - 4

NC DWQ Stream Identification Form Version 4.11

Date: 1/14/2021	**Project/Site:** Bull Chute	**Latitude:** 35.836326
Evaluator: WJ2	**County:** Randolph	**Longitude:** -79.890396
Total Points: *Stream is at least intermittent if ≥ 19 or perennial if ≥ 30** 35	**Stream Determination (circle one)** Ephemeral Intermittent Perennial	**Other** Glenola *e.g. Quad Name:*

A. Geomorphology (Subtotal = 20.5)	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 = 7.5)				
12. Presence of Baseflow	0	1	2	3
13. Iron oxidizing bacteria	0	1	2	3
14. Leaf litter	1.5	1	0.5	0
15. Sediment on plants or debris	0	0.5	1	1.5
16. Organic debris lines or piles	0	0.5	1	1.5
17. Soil-based evidence of high water table?	No = 0		Yes = 3	

C. Biology (Subtotal = 7.0)				
18. Fibrous roots in streambed	3	2	1	0
19. Rooted upland plants in streambed	3	2	1	0
20. Macrobenthos (note diversity and abundance)	0	1	2	3
21. Aquatic Mollusks	0	1	2	3
22. Fish	0	0.5	1	1.5
23. Crayfish	0	0.5	1	1.5
24. Amphibians	0	0.5	1	1.5
25. Algae	0	0.5	1	1.5
26. Wetland plants in streambed	FACW = 0.75; OBL = 1.5 Other = 0			

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

Notes:

Sketch:

UT 5

NC DWQ Stream Identification Form Version 4.11

Date: 1/14/2021	**Project/Site:** Bull chute	**Latitude:** 35.03308
Evaluator: WHJ	**County:** Randolph	**Longitude:** -79.885124
Total Points: *Stream is at least intermittent if ≥ 19 or perennial if ≥ 30** 22	**Stream Determination (circle one)** Ephemeral Intermittent Perennial	**Other** *e.g. Quad Name:* Glenola

A. Geomorphology (Subtotal = 10)	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 = 6)				
12. Presence of Baseflow	0	1	2	3
13. Iron oxidizing bacteria	0	1	2	3
14. Leaf litter	1.5	1	0.5	0
15. Sediment on plants or debris	0	0.5	1	1.5
16. Organic debris lines or piles	0	0.5	1	1.5
17. Soil-based evidence of high water table?	No = 0		Yes = 3	

C. Biology (Subtotal = 6)				
18. Fibrous roots in streambed	3	2	1	0
19. Rooted upland plants in streambed	3	2	1	0
20. Macrobenthos (note diversity and abundance)	0	1	2	3
21. Aquatic Mollusks	0	1	2	3
22. Fish	0	0.5	1	1.5
23. Crayfish	0	0.5	1	1.5
24. Amphibians	0	0.5	1	1.5
25. Algae	0	0.5	1	1.5
26. Wetland plants in streambed	FACW = 0.75; OBL = 1.5 Other = 0			

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

Notes:

Sketch:

UT6

NC DWQ Stream Identification Form Version 4.11

Date: 1/14/2021	Project/Site: Bull chute	Latitude: 35.832049
Evaluator: WHT	County: Randolph	Longitude: -79.886279
Total Points: *Stream is at least intermittent if ≥ 19 or perennial if ≥ 30** 17	Stream Determination (circle one) Ephemeral Intermittent Perennial	Other *e.g. Quad Name:* Glenola

A. Geomorphology (Subtotal = 4.5)	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 = 6.5)				
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 = 6)				
18. Fibrous roots in streambed	3	2	1	0
19. Rooted upland plants in streambed	3	2	1	0
20. Macrobenthos (note diversity and abundance)	0	1	2	3
21. Aquatic Mollusks	0	1	2	3
22. Fish	0	0.5	1	1.5
23. Crayfish	0	0.5	1	1.5
24. Amphibians	0	0.5	1	1.5
25. Algae	0	0.5	1	1.5
26. Wetland plants in streambed	FACW = 0.75; OBL = 1.5 Other = 0			

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

Notes:

Sketch: This stream was added by the IRT and USACE during the PJD verification walkthrough. This stream is non-credit generating.

ut 7

NC DWQ Stream Identification Form Version 4.11

Date: 1/14/2021	**Project/Site:** Bull chute	**Latitude:** 35.836642
Evaluator: WJ	**County:** Randolph	**Longitude:** -79.8 8647
Total Points: *Stream is at least intermittent if ≥ 19 or perennial if ≥ 30** 23.5	**Stream Determination (circle one)** Ephemeral Intermittent Perennial	**Other** *e.g. Quad Name:* Glenola

A. Geomorphology (Subtotal = 12)	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 = 0.5)				
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 = 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:

Sketch:

Site		**Bull Chute Mitigation Site**						
Stream		UT1				**Bank Length**	9470	
Observers		KRJ/AMR				**Date**	29-Jul-19	
	Station	**Bank**	**BEHI**	**NBS**	**Erosion Rate**	**Length**	**Bank Height**	**Erosion**
1	235	right	Low	Low	0	235	2	0.0
2	685	right	Low	Low	0	450	3	0.0
3	755	right	High	Low	0.1	70	4	28.0
4	825	right	Low	Low	0	70	2	0.0
5	1095	right	Mod	Low	0.02	270	4	21.6
6	1725	right	Low	Low	0	630	3	0.0
7	2000	right	Mod	Low	0.02	275	4	22.0
8	2050	right	High	High	0.2	50	5	50.0
9	2160	right	Mod	Low	0.02	110	4	8.8
10	2440	right	Low	Low	0	280	3	0.0
11	3110	right	Mod	Low	0.02	670	4	53.6
12	3170	right	High	Mod	0.15	60	4	36.0
13	3695	right	Mod	Low	0.02	525	4	42.0
14	3995	right	Low	Low	0	300	3	0.0
15	4095	right	Mod	Low	0.02	100	4	8.0
16	4180	right	Mod	Low	0.02	85	3	5.1
17	4420	right	Mod	Low	0.02	240	4	19.2
18	4555	right	High	Low	0.1	135	4	54.0
19	4735	right	High	High	0.2	180	5	180.0
20								
21	235	left	Low	Low	0	235	2	0.0
22	685	left	Low	Low	0	450	3	0.0
23	755	left	High	Low	0.1	70	4	28.0
24	825	left	Low	Low	0	70	2	0.0
25	1095	left	Mod	Low	0.02	270	4	21.6
26	1725	left	Low	Low	0	630	3	0.0
27	1925	left	Mod	Low	0.02	200	4	16.0
28	1965	left	High	High	0.2	40	4	32.0
29	2165	left	Mod	Low	0.02	200	4	16.0
30	2445	left	Low	Low	0	280	3	0.0
31	2875	left	Mod	Low	0.02	430	4	34.4
32	2945	left	High	Low	0.1	70	4	28.0
33	3695	left	Mod	Low	0.02	750	4	60.0
34	3995	left	Low	Low	0	300	3	0.0
35	4095	left	Mod	Low	0.02	100	4	8.0
36	4180	left	Mod	Low	0.02	85	3	5.1
37	4420	left	Mod	Low	0.02	240	4	19.2
38	4555	left	High	Low	0.1	135	4	54.0
39	4735	left	High	High	0.2	180	5	180.0
40								
Sum erosion sub-totals for each BEHI/NBS						Total Erosion (ft3/yr)		1030.6
Divide total erosion (ft3) by 27						Total Erosion (yd/yr)		38.2
Multiply Total erosion (yard3) by 1.3						Total Erosion (tons/yr)		49.6
Erosion per unit length						Total Erosion (Tons/yr/ft)		0.005

Site		**Bull Chute Mitigation Site**						
Stream		UT 2				**Bank Length**	1200	
Observers		KRJ/AMR				**Date**	29-Jul-19	
	Station	**Bank**	**BEHI**	**NBS**	**Erosion Rate**	**Length**	**Bank Height**	**Erosion**
1	370	right	Low	Low	0	370	1	0.0
2	600	right	Mod	Low	0.02	230	1	4.6
3								
4	370	left	Low	Low	0	370	1	0.0
5	600	left	Mod	Low	0.02	230	1	4.6
6								
7								
8								
9								
10								
11								
12								
13								
14								
15								
16								
17								
18								
19								
20								
Sum erosion sub-totals for each BEHI/NBS						Total Erosion (ft3/yr)		9.2
Divide total erosion (ft3) by 27						Total Erosion (yd/yr)		0.3
Multiply Total erosion (yard3) by 1.3						Total Erosion (tons/yr)		0.4
Erosion per unit length						Total Erosion (Tons/yr/ft)		0.000

Site		**Bull Chute Mitigation Site**						
Stream		UT 3				**Bank Length**	3660	
Observers		KRJ				**Date**	29-Jul-19	
	Station	**Bank**	**BEHI**	**NBS**	**Erosion Rate**	**Length**	**Bank Height**	**Erosion**
1	470	right	Mod	Low	0.02	470	2	18.8
2	605	right	Low	Low	0	135	1	0.0
3	855	right	Low	Low	0	250	2	0.0
4	1830	right	Mod	Low	0.02	975	3	58.5
5								
6								
7	470	left	Mod	Low	0.02	470	2	18.8
8	605	left	Low	Low	0	135	1	0.0
9	855	left	Low	Low	0	250	2	0.0
10	1830	left	Mod	Low	0.02	975	3	58.5
11								
12								
13								
14								
15								
16								
17								
18								
19								
20								
21								
22								
23								
24								
Sum erosion sub-totals for each BEHI/NBS						Total Erosion (ft3/yr)		154.6
Divide total erosion (ft3) by 27						Total Erosion (yd/yr)		5.7
Multiply Total erosion (yard3) by 1.3						Total Erosion (tons/yr)		7.4
Erosion per unit length						Total Erosion (Tons/yr/ft)		0.002

Site		**Bull Chute Mitigation Site**						
Stream		UT 4				**Bank Length**	4910	
Observers		KRJ				**Date**	29-Jul-19	
	Station	**Bank**	**BEHI**	**NBS**	**Erosion Rate**	**Length**	**Bank Height**	**Erosion**
1	390	left	Mod	Low	0.02	390	2	15.6
2	590	left	Mod	Low	0.02	200	3	12.0
3	710	left	Mod	Low	0.02	120	2	4.8
4	805	left	Low	Low	0	95	1	0.0
5	1175	left	Mod	Low	0.02	370	3	22.2
6	1415	left	Low	Low	0	240	3	0.0
7	1830	left	Mod	Low	0.02	415	4	33.2
8	2155	left	High	Low	0.1	325	6	195.0
9	2455	left	Mod	Low	0.02	300	4	24.0
10								
11	390	right	Mod	Low	0.02	390	2	15.6
12	590	right	Mod	Low	0.02	200	3	12.0
13	710	right	Mod	Low	0.02	120	2	4.8
14	805	right	Low	Low	0	95	1	0.0
15	1175	right	Mod	Low	0.02	370	3	22.2
16	1415	right	Low	Low	0	240	3	0.0
17	1830	right	Mod	Low	0.02	415	4	33.2
18	2155	right	High	Low	0.1	325	6	195.0
19	2455	right	Mod	Low	0.02	300	4	24
20								
21								
22								
23								
24								
Sum erosion sub-totals for each BEHI/NBS						Total Erosion (ft3/yr)		613.6
Divide total erosion (ft3) by 27						Total Erosion (yd/yr)		22.7
Multiply Total erosion (yard3) by 1.3						Total Erosion (tons/yr)		29.5
Erosion per unit length						Total Erosion (Tons/yr/ft)		0.006

Site		**Bull Chute Mitigation Site**						
Stream		UT 4A				**Bank Length**	320	
Observers		KRJ				**Date**	29-Jul-19	
	Station	**Bank**	**BEHI**	**NBS**	**Erosion Rate**	**Length**	**Bank Height**	**Erosion**
1	160	left	Mod	Low	0.02	160	2	6.4
2								
3	160	right	Mod	Low	0.02	160	2	6.4
4								
5								
6								
7								
8								
9								
10								
11								
12								
13								
14								
15								
16								
17								
18								
19								
20								
21								
22								
23								
24								
Sum erosion sub-totals for each BEHI/NBS						Total Erosion (ft3/yr)		12.8
Divide total erosion (ft3) by 27						Total Erosion (yd/yr)		0.5
Multiply Total erosion (yard3) by 1.3						Total Erosion (tons/yr)		0.6
Erosion per unit length						Total Erosion (Tons/yr/ft)		0.002

Site		**Bull Chute Mitigation Site**						
Stream		UT 4B				**Bank Length**	340	
Observers		KRJ				**Date**	29-Jul-19	
	Station	**Bank**	**BEHI**	**NBS**	**Erosion Rate**	**Length**	**Bank Height**	**Erosion**
1	170	left	Low	Low	0	170	2	0.0
2								
3	170	right	Low	Low	0	170	2	0.0
4								
5								
6								
7								
8								
9								
10								
11								
12								
13								
14								
15								
16								
17								
18								
19								
20								
21								
22								
23								
24								
Sum erosion sub-totals for each BEHI/NBS						Total Erosion (ft3/yr)		0.0
Divide total erosion (ft3) by 27						Total Erosion (yd/yr)		0.0
Multiply Total erosion (yard3) by 1.3						Total Erosion (tons/yr)		0.0
Erosion per unit length						Total Erosion (Tons/yr/ft)		0.000

Site		**Bull Chute Mitigation Site**						
Stream		UT 4C				**Bank Length**	270	
Observers		KRJ				**Date**	29-Jul-19	
	Station	**Bank**	**BEHI**	**NBS**	**Erosion Rate**	**Length**	**Bank Height**	**Erosion**
1	135	left	Mod	Low	0.02	135	3	8.1
2								
3	135	right	Mod	Low	0.02	135	3	8.1
4								
5								
6								
7								
8								
9								
10								
11								
12								
13								
14								
15								
16								
17								
18								
19								
20								
21								
22								
23								
24								
Sum erosion sub-totals for each BEHI/NBS						Total Erosion (ft3/yr)		16.2
Divide total erosion (ft3) by 27						Total Erosion (yd/yr)		0.6
Multiply Total erosion (yard3) by 1.3						Total Erosion (tons/yr)		0.8
Erosion per unit length						Total Erosion (Tons/yr/ft)		0.003

BEHI/NBS Summary

Stream Reach	Erosion Rate (tons/year)
UT 1	49.6
UT 2	0.4
UT 3	7.4
UT 4	29.5
UT 4A	0.6
UT 4B	0.0
UT 4C	0.8
UT 5	0.0
UT 6	0.0
UT 7	0.0
Total	**88.4**

AXIOM ENVIRONMENTAL, INC
218 Snow Avenue
Raleigh, North Carolina 27603
919-215-1693

Axiom Environmental, Inc.

SOIL BORING LOG

Date: 7/29/2019

Project/Site: Redding Property Mitigation Site

County, State: Randolph County, NC

Sampling Point/ Coordinates: **Soil Profile C (35.835018, -79.887593)**

Investigator: W. Grant Lewis

Soil Series: Wehadkee

Notes: Location is shown on Figure 4.

Depth (inches)	Matrix Color	Matrix %	Mottling Color	Mottling %	Mottling Type	Texture
0-2	2.5 Y 4/2	95	2.5 Y 5/6	5	c	loam
2-8	2.5 Y 4/2	85	2.5 Y 3/3	5	c	clay loam
			2.5 Y 5/6	10	c	
8-14	2.5 Y 6/3	70	2.5 Y 3/1	15	c	sandy loam
			2.5 Y 5/6	5	c	
			2.5 Y 6/1	5	c	
			2.5 Y 6/4	5	c	
			2.5 Y 5/4	5	c	
14+	gley 6/1	40	10 YR 3/4	10	c	loamy clay
	gley 5/1	30	10 YR 7/1	20	d	

c = concentration, d = depletion, rm = reduced matrix

North Carolina Licensed Soil Scientist

Number: 1233

Signature: W Grant Lewis

Name/Print: W. Grant Lewis

AXIOM ENVIRONMENTAL, INC
218 Snow Avenue
Raleigh, North Carolina 27603
919-215-1693

Axiom Environmental, Inc.

SOIL BORING LOG

Date: 7/29/2019

Project/Site: Redding Property Mitigation Site

County, State: Randolph County, NC

Sampling Point/ Coordinates: **Soil Profile D (35.835422, -79.889985)**

Investigator: W. Grant Lewis

Soil Series: Wehadkee

Notes: Location is shown on Figure 4.

Depth (inches)	Matrix Color	Matrix %	Mottling Color	Mottling %	Mottling Type	Texture
0-4	10 YR 5/3	100				silt loam
4-8	10 YR 5/3	95	10 YR 4/6	5	c	silt loam
8-12	10 YR 6/2	95	10 YR 4/6	5	c	silt loam
12-20	10 YR 6/2	90	10 YR 4/6	10	c	loam
20+	10 YR 6/2	80	10 YR 4/6	20	c	loam

c = concentration, d = depletion, rm = reduced matrix

North Carolina Licensed Soil Scientist

Number: 1233

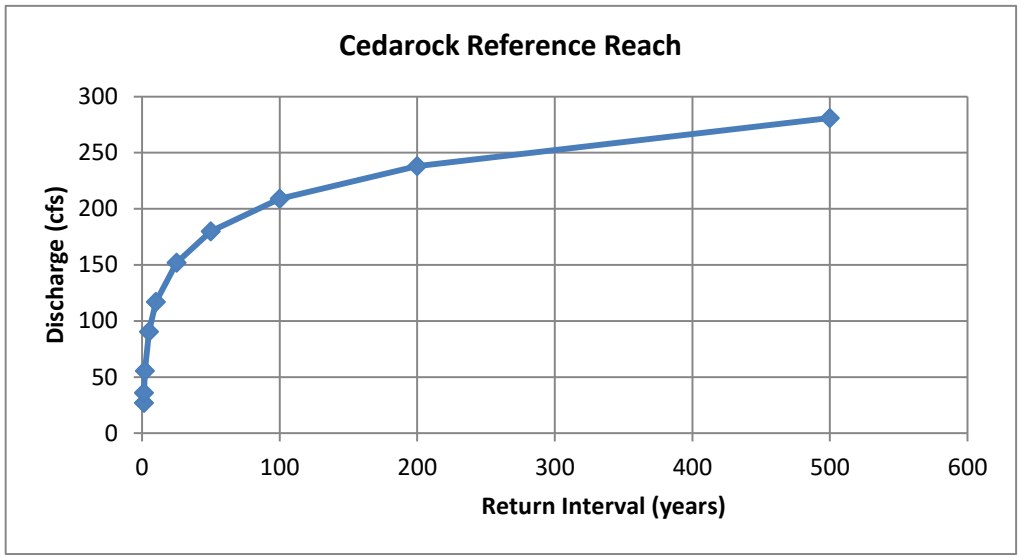
Signature: W Grant Lewis

Name/Print: W. Grant Lewis

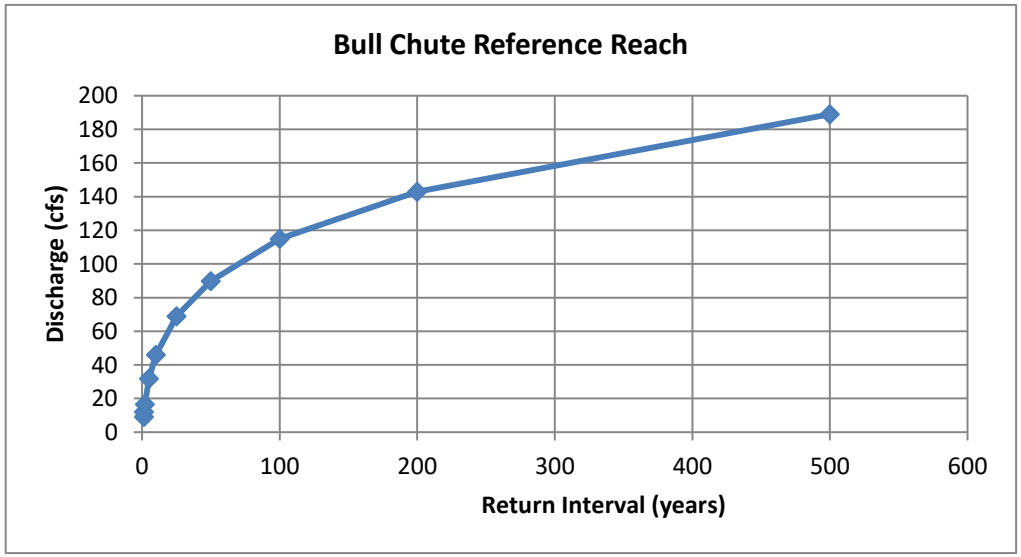
Appendix C
Flood Frequency Analysis Data

Reference Reaches
Flood Frequency Analaysis-Regional Regression Equation (USGS 2004)

Return Interval (years)	Discharge (cfs)
1.3	**27**
1.5	**36**
2	55.4
5	90.4
10	117
25	152
50	180
100	209
200	238
500	281



Return Interval (years)	Discharge (cfs)
1.3	**9**
1.5	**12**
2	16.5
5	31.8
10	46
25	68.9
50	89.8
100	115
200	143
500	189



Appendix D
Jurisdictional Determination Info

U.S. ARMY CORPS OF ENGINEERS
WILMINGTON DISTRICT

Action Id. **SAW-2020-00650** County: **Randolph** U.S.G.S. Quad: **NC- Glenola**

NOTIFICATION OF JURISDICTIONAL DETERMINATION

Requestor: **Axiom Environmental, Inc.**
Grant Lewis
Address: **218 Snow Avenue**
Raleigh, NC 27603
Telephone Number: **919-215-1693**
E-mail: **glewis@axionenvironmental.org**

Size (acres) **33**
Nearest Waterway **Caraway Creek**
USGS HUC **03040103**

Nearest Town **Sophia**
River Basin **Upper Pee Dee**
Coordinates Latitude: **35.8325**
Longitude: **-79.8879**

Location description: **The project site is approximately 33 acres located adjacent to Marlboro Church Road, near the town of Archdale, Randolph 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 dated **May 2020**. 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 **James Lastinger at 919-554-4884 ext 32 or James.C.Lastinger@usace.army.mil**.

C. Basis For Determination: Basis For Determination: See the preliminary jurisdictional determination form dated 05/27/2020.

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: James Lastinger

Date of JD: **05/27/2020** Expiration Date of JD: **Not applicable**

SAW-2020-00650

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:

Property Owner:	**Clearwater Mitigation Solutions**
	Kevin Yates
Address:	**604 Macon Place**
	Raleigh, NC
Telephone Number:	**919-642-6901**
E-mail:	**clearwatermitigation@gmail.com**

NOTIFICATION OF ADMINISTRATIVE APPEAL OPTIONS AND PROCESS AND REQUEST FOR APPEAL

Applicant: **Axiom Environmental, Inc., Grant Lewis**	File Number: **SAW-2020-00650**	Date: **05/27/2020**

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: James Lastinger** **Raleigh Regulatory Office** **U.S Army Corps of Engineers** **3331 Heritage Trade Drive, Suite 105** **Wake Forest, North Carolina 27587**	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: James Lastinger , 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

PRELIMINARY JURISDICTIONAL DETERMINATION (PJD) FORM

BACKGROUND INFORMATION

A. **REPORT COMPLETION DATE FOR PJD:** 05/27/2020
B. **NAME AND ADDRESS OF PERSON REQUESTING PJD:** Axiom Environmental, Inc., Grant Lewis, 218 Snow Avenue, Raleigh, NC 27603
C. **DISTRICT OFFICE, FILE NAME, AND NUMBER:** Wilmington District, Bull Chute site.Marlboro Church Road, SAW-2020-00650
D. **PROJECT LOCATION(S) AND BACKGROUND INFORMATION:** The project site is approximately 33 acres located adjacent to Marlboro Church Road, near the town of Archdale, Randolph County, North Carolina.

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

State: NC County: Randolph City: Sophia
Center coordinates of site (lat/long in degree decimal format): Latitude: 35.8325 Longitude: -79.8879

Universal Transverse Mercator:

Name of nearest waterbody: Caraway Creek

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

☐Office (Desk) Determination. Date:

☒Field Determination. Date(s): May 19, 2020

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. UT-1	35.835510	-79.881643	2983 feet	Non-wetland	Section 404
2. UT-2	35.835624	-79.883495	601 feet	Non-wetland	Section 404
3. UT-3	35.837089	-79.887018	1830 feet	Non-wetland	Section 404
4. UT-4	35.837026	-79.890294	2463 feet	Non-wetland	Section 404
5. UT-4A	35.837367	-79.890099	284 feet	Non-wetland	Section 404
6. UT-4B	35.837478	-79.890483	172 feet	Non-wetland	Section 404
7. UT-4C	35.836095	-79.890815	135 feet	Non-wetland	Section 404
8. UT-5	35.833104	-79.885126	53 feet	Non-wetland	Section 404
9. UT-6	35.832047	-79.886180	72 feet	Non-wetland	Section 404
10. UT-7	35.836732	-79.886262	127 feet	Non-wetland	Section 404

11. Wetland GG	35.833142	-79.888295	0.104 acre	wetland	Section 404
12. Wetland GH	35.834863	-79.887783	0.171 acre	wetland	Section 404
13. Wetland GK	35.835694	-79.890279	0.198 acre	wetland	Section 404
14. Wetland KA	35.834363	-79.889577	0.418 acre	wetland	Section 404
15. Wetland KB	35.836126	-79.890315	0.041 acre	wetland	Section 404
16. Wetland PF	35.831193	-79.887855	0.015 acre	wetland	Section 404
17. Wetland PI	35.833349	-79.884380	0.154 acre	wetland	Section 404
18. Wetland PJ	35.834452	-79.882562	0.057 acre	wetland	Section 404
19. Wetland PL	35.834640	-79.882829	0.008 acre	wetland	Section 404
20. Wetland PM	35.835315	-79.883041	0.014 acre	wetland	Section 404
21. Wetland PN	35.835465	-79.883347	0.065 acre	wetland	Section 404
22. Wetland WA	35.836610	-79.890346	0.075 acre	wetland	Section 404
23. Wetland WB	35.837304	-79.890395	0.328 acre	wetland	Section 404
24. Wetland WC	35.837371	-79.890060	0.019 acre	wetland	Section 404
25. Wetland WD	35.836403	-79.886945	0.181 acre	wetland	Section 404
26. Wetland WE	35.836876	-79.886884	0.080 acre	wetland	Section 404
27. Pond PA	35.835817	-79.883585	0.156 acre	wetland	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 are included in the administrative record and are appropriately cited:

☒ Maps, plans, plots or plat submitted by or on behalf of the PJD requestor:
Map: **attached dated may 2020**

☒ Data sheets prepared/submitted by or on behalf of the PJD requestor. Datasheets:

☒ 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: **Glenola Quad**

☒Natural Resources Conservation Service Soil Survey. Citation: **Web Soil Survey (online at http://websoilsurvey.nrcs.usda.gov), and Soil Survey of Randolph County (2006)**

☒National wetlands inventory map(s). Cite name: **USFWS NWI**

☐State/local wetland inventory map(s):_____

☒FEMA/FIRM maps: **NC FIRM maps**

☐100-year Floodplain Elevation is:_____ (National Geodetic Vertical Datum of 1929)

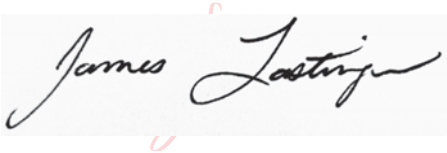
☒Photographs: ☒ Aerial (Name & Date): **NC One Map 2018**

or ☐ Other (Name & Date):

☐Previous determination(s). File no. and date of response letter:_____

☐Other information (please specify):

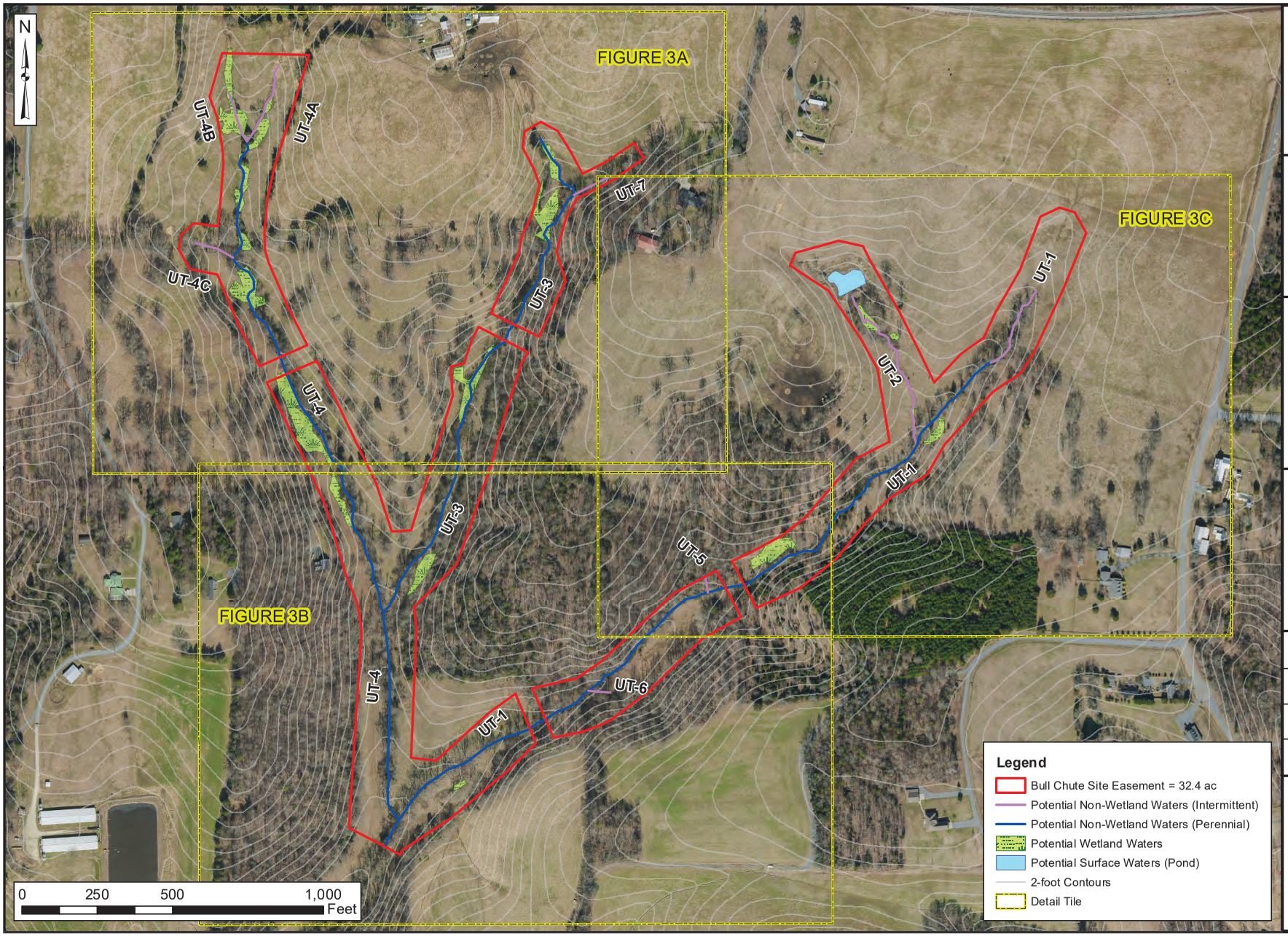
IMPORTANT NOTE: The information recorded on this form has not necessarily been verified by the Corps and should not be relied upon for later jurisdictional determinations.



_____
Signature and date of Regulatory staff member completing PJD
05/27/2020

_____
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.



Axiom Environmental, Inc.

Prepared for:

CLEARWATER MITIGATION SOLUTIONS

Project:

BULL CHUTE MITIGATION SITE

Randolph County, NC

Title:

INDEX TO JURISDICTIONAL FEATURES MAP

Drawn by: AEK

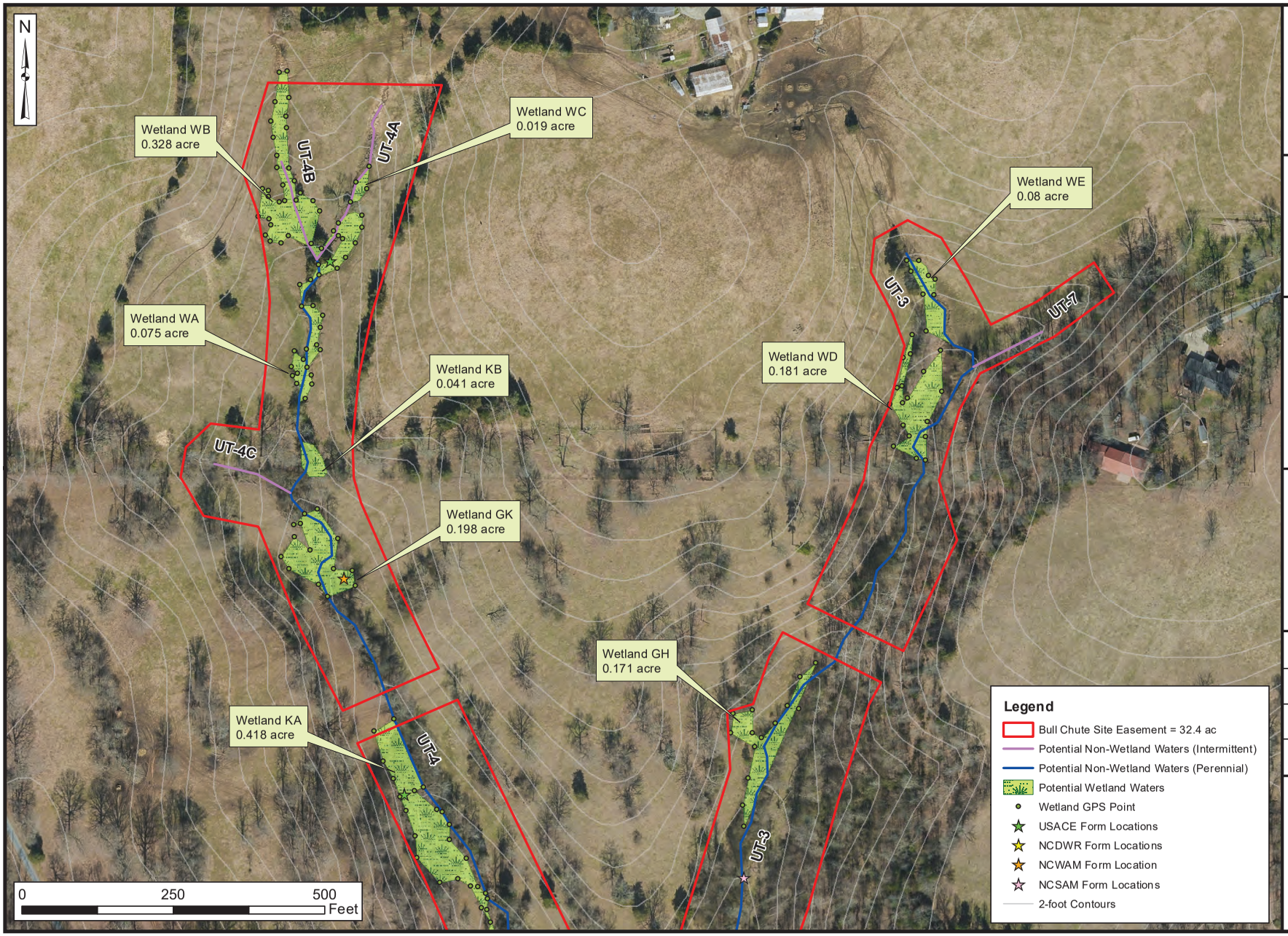
Date: MAY 2020

Scale: 1:3600

Project No.: 20-006

FIGURE

3



Axiom Environmental, Inc.

Prepared for:

CLEARWATER MITIGATION SOLUTIONS

BULL CHUTE MITIGATION SITE

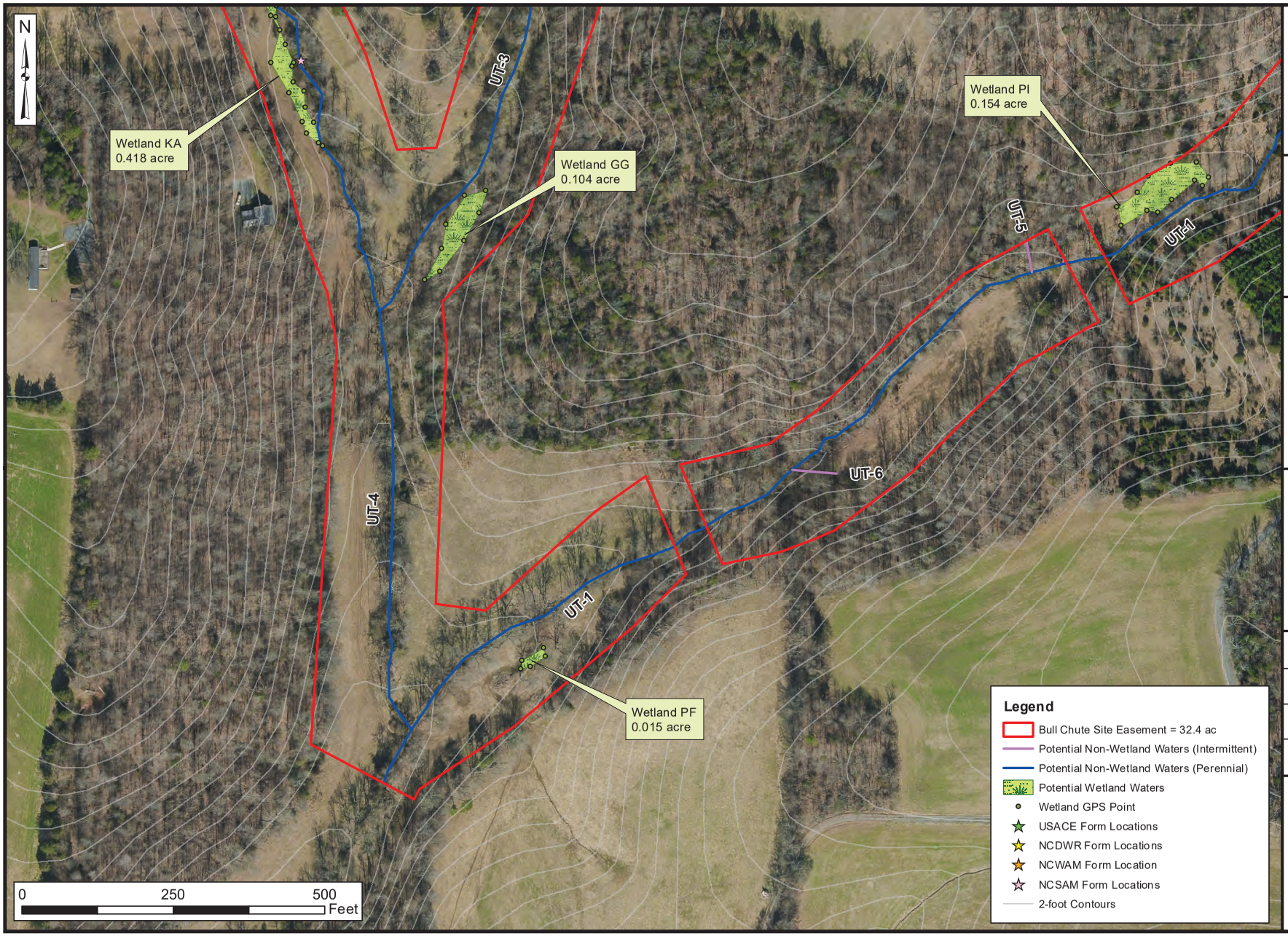
Randolph County, NC

POTENTIAL JURISDICTIONAL FEATURES

Drawn by:	AEK
Date:	MAY 2020
Scale:	1:1800
Project No.:	20-006

FIGURE

3A



Axiom Environmental, Inc.

Prepared for:

CLEARWATER MITIGATION SOLUTIONS

BULL CHUTE MITIGATION SITE

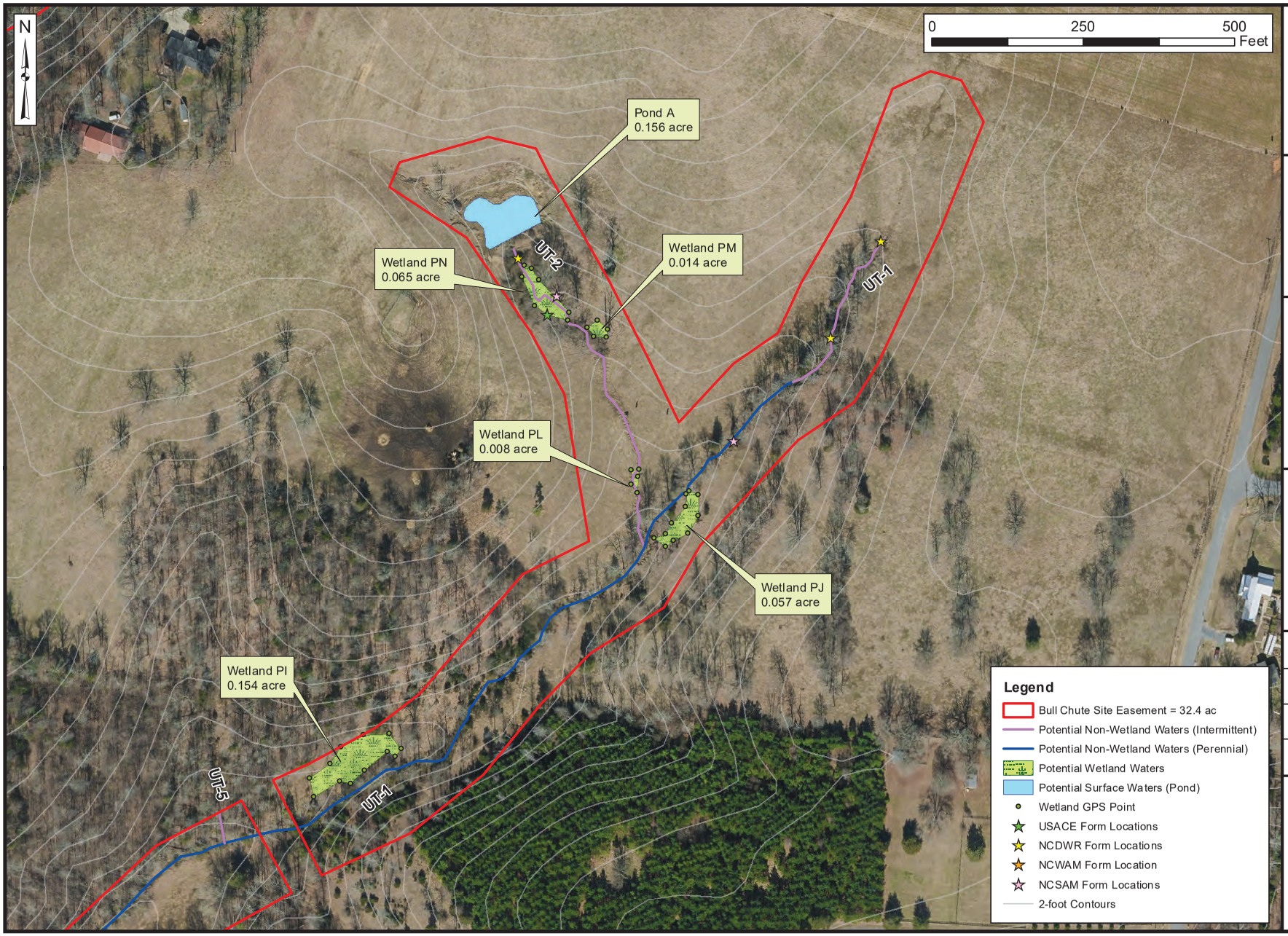
Randolph County, NC

POTENTIAL JURISDICTIONAL FEATURES

Drawn by:	AEK
Date:	MAR 2020
Scale:	1:1800
Project No.:	20-006

FIGURE

3B



Axiom Environmental, Inc.

Prepared for:

CLEARWATER MITIGATION SOLUTIONS

BULL CHUTE MITIGATION SITE

Randolph County, NC

POTENTIAL JURISDICTIONAL FEATURES

Drawn by:	AEK
Date:	MAR 2020
Scale:	1:1800
Project No.:	20-006

FIGURE

3C

Appendix E
Categorical Exclusion Document

NC DEPARTMENT OF
NATURAL AND CULTURAL RESOURCES

Roy Cooper, **Governor**
Susi Hamilton, **Secretary**
Walter Clark, **Director, Land and Water Stewardship**

NCNHDE-9898

August 1, 2019

Allison Keith
Axiom Environmental
218 Snow Ave
Raleigh, NC 27603
RE: Bull Chute; 19-008.01

Dear Allison Keith:

The North Carolina Natural Heritage Program (NCNHP) appreciates the opportunity to provide information about natural heritage resources for the project referenced above.

Based on the project area mapped with your request, a query of the NCNHP database indicates that there are no records for rare species, important natural communities, natural areas, and/or conservation/managed areas within the proposed project boundary. Please note that although there may be no documentation of natural heritage elements within the project boundary, it does not imply or confirm their absence; the area may not have been surveyed. The results of this query should not be substituted for field surveys where suitable habitat exists. In the event that rare species are found within the project area, please contact the NCNHP so that we may update our records.

The attached 'Potential Occurrences' table summarizes rare species and natural communities that have been documented within a one-mile radius of the property boundary. The proximity of these records suggests that these natural heritage elements may potentially be present in the project area if suitable habitat exists. Tables of natural areas and conservation/managed areas within a one-mile radius of the project area, if any, are also included in this report.

If a Federally-listed species is found within the project area or is indicated within a one-mile radius of the project area, the NCNHP recommends contacting the US Fish and Wildlife Service (USFWS) for guidance. Contact information for USFWS offices in North Carolina is found here: https://www.fws.gov/offices/Directory/ListOffices.cfm?statecode=37.

Please note that natural heritage element data are maintained for the purposes of conservation planning, project review, and scientific research, and are not intended for use as the primary criteria for regulatory decisions. Information provided by the NCNHP database may not be published without prior written notification to the NCNHP, and the NCNHP must be credited as an information source in these publications. Maps of NCNHP data may not be redistributed without permission.

The NC Natural Heritage Program may follow this letter with additional correspondence if a Dedicated Nature Preserve, Registered Heritage Area, Clean Water Management Trust Fund easement, or Federally-listed species are documented near the project area.

If you have questions regarding the information provided in this letter or need additional assistance, please contact Rodney A. Butler at rodney.butler@ncdcr.gov or 919-707-8603.

Sincerely,
NC Natural Heritage Program

Natural Heritage Element Occurrences, Natural Areas, and Managed Areas Within a One-mile Radius of the Project Area
Bull Chute
Project No. 19-008.01
August 1, 2019
NCNHDE-9898

Element Occurrences Documented Within a One-mile Radius of the Project Area

Taxonomic Group	EO ID	Scientific Name	Common Name	Last Observation Date	Element Occurrence Rank	Accuracy	Federal Status	State Status	Global Rank	State Rank
Vascular Plant	26003	Helianthus schweinitzii	Schweinitz's Sunflower	2017-08-31	Fi	3-Medium	Endangered	Endangered	G3	S3

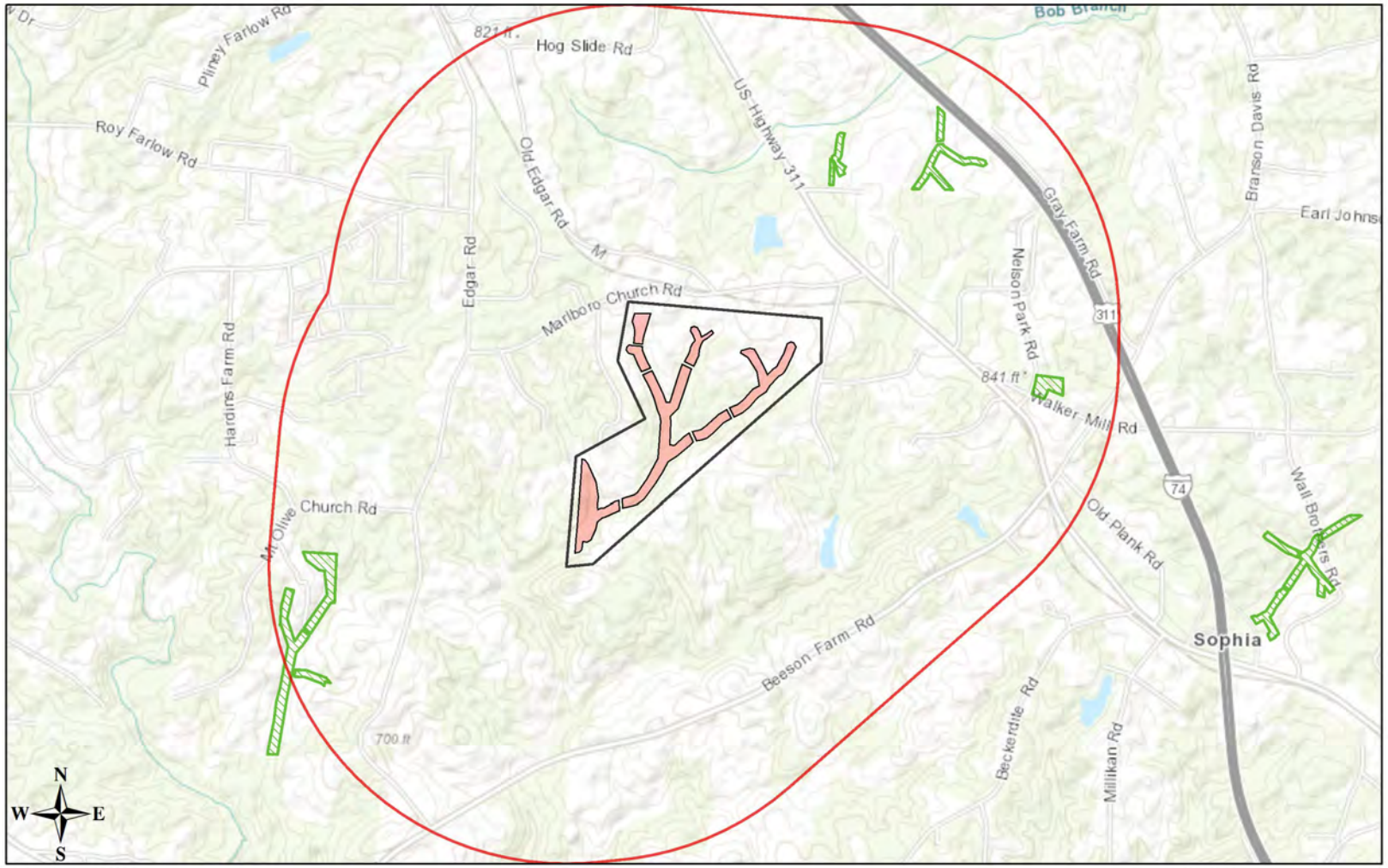
No Natural Areas are Documented Within a One-mile Radius of the Project Area

Managed Areas Documented Within a One-mile Radius of the Project Area

Managed Area Name	Owner	Owner Type
NC Division of Mitigation Services Easement	NC DEQ, Division of Mitigation Services	State
Randolph County Open Space	Randolph County: multiple local government	Local Government

Definitions and an explanation of status designations and codes can be found at https://ncnhde.natureserve.org/content/help. Data query generated on August 1, 2019; source: NCNHP, Q3 Jul 2019. Please resubmit your information request if more than one year elapses before project initiation as new information is continually added to the NCNHP database.

NCNHDE-9898: Bull Chute



August 1, 2019

Project Boundary

Buffered Project Boundary

Managed Area (MAREA)

1:29,302

0 0.25 0.5 1 mi

0 0.4 0.8 1.6 km

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

Appendix A

Categorical Exclusion Form for Division of Mitigation Services Projects
Version 2

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

Part 1: General Project Information	
Project Name:	Bull Chute Stream & Riparian Wetland Mitigation Site
County Name:	Randolph County
DMS Number:	100137
Project Sponsor:	Clearwater Mitigation Solutions
Project Contact Name:	Kevin Yates
Project Contact Address:	604 Macon Place, Raleigh, NC
Project Contact E-mail:	clearwatermitigation@gmail.com
DMS Project Manager:	Matthew Reid

Project Description

The Site is located within the Upper Uwharrie Local Watershed Plan area, which includes the Caraway Creek Targeted Local Watershed 03040103050040. This project is proposed to include approximately 6833 lf of stream restoration, 229 lf of stream enhancement (level I), 1426 lf of stream enhancement (level II), 270 lf of stream enhancement (level III), 2.4 acres of riparian wetland reestablishment,1.9 acres of riparian wetland rehabilitation, and 0.8 acre of riparian wetland enhancement. Site alterations include removing livestock, restoring streams and wetlands, and planting with native, woody vegetation.

For Official Use Only

Reviewed By:

May 29, 2020 — 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:

5-28-20 — 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 specie 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

EDR REPORT

Bull Chute
4126 Baker Farm Road
Sophia, NC 27350

Inquiry Number: 5975759.2s
February 18, 2020

The EDR Radius Map™ Report with GeoCheck®

6 Armstrong Road, 4th floor
Shelton, CT 06484
Toll Free: 800.352.0050
www.edrnet.com

TABLE OF CONTENTS

SECTION	PAGE
Executive Summary	ES1
Overview Map	2
Detail Map	3
Map Findings Summary	4
Map Findings	8
Orphan Summary	9
Government Records Searched/Data Currency Tracking	GR-1

GEOCHECK ADDENDUM

Physical Setting Source Addendum	A-1
Physical Setting Source Summary	A-2
Physical Setting SSURGO Soil Map	A-5
Physical Setting Source Map	A-11
Physical Setting Source Map Findings	A-13
Physical Setting Source Records Searched	PSGR-1

Thank you for your business.
Please contact EDR at 1-800-352-0050
with any questions or comments.

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EXECUTIVE SUMMARY

A search of available environmental records was conducted by Environmental Data Resources, Inc (EDR). The report was designed to assist parties seeking to meet the search requirements of EPA's Standards and Practices for All Appropriate Inquiries (40 CFR Part 312), the ASTM Standard Practice for Environmental Site Assessments (E 1527-13), the ASTM Standard Practice for Environmental Site Assessments for Forestland or Rural Property (E 2247-16), the ASTM Standard Practice for Limited Environmental Due Diligence: Transaction Screen Process (E 1528-14) or custom requirements developed for the evaluation of environmental risk associated with a parcel of real estate.

TARGET PROPERTY INFORMATION

ADDRESS

4126 BAKER FARM ROAD
SOPHIA, NC 27350

COORDINATES

Latitude (North):	35.8338210 - 35˚ 50' 1.75''
Longitude (West):	79.8882970 - 79˚ 53' 17.86''
Universal Tranverse Mercator:	Zone 17
UTM X (Meters):	600409.3
UTM Y (Meters):	3965887.2
Elevation:	756 ft. above sea level

USGS TOPOGRAPHIC MAP ASSOCIATED WITH TARGET PROPERTY

Target Property Map:	5945527 GLENOLA, NC
Version Date:	2013
East Map:	5945577 RANDLEMAN, NC
Version Date:	2013

AERIAL PHOTOGRAPHY IN THIS REPORT

Portions of Photo from:	20140827, 20140705
Source:	USDA

MAPPED SITES SUMMARY

Target Property Address:
4126 BAKER FARM ROAD
SOPHIA, NC 27350

Click on Map ID to see full detail.

MAP ID	SITE NAME	ADDRESS	DATABASE ACRONYMS	RELATIVE ELEVATION	DIST (ft. & mi.) DIRECTION

NO MAPPED SITES FOUND

EXECUTIVE SUMMARY

TARGET PROPERTY SEARCH RESULTS

The target property was not listed in any of the databases searched by EDR.

DATABASES WITH NO MAPPED SITES

No mapped sites were found in EDR's search of available ("reasonably ascertainable ") government records either on the target property or within the search radius around the target property for the following databases:

STANDARD ENVIRONMENTAL RECORDS

Federal NPL site list

NPL ..... National Priority List
Proposed NPL ..... Proposed National Priority List Sites
NPL LIENS ..... Federal Superfund Liens

Federal Delisted NPL site list

Delisted NPL ..... National Priority List Deletions

Federal CERCLIS list

FEDERAL FACILITY ..... Federal Facility Site Information listing
SEMS ..... Superfund Enterprise Management System

Federal CERCLIS NFRAP site list

SEMS-ARCHIVE ..... Superfund Enterprise Management System Archive

Federal RCRA CORRACTS facilities list

CORRACTS ..... Corrective Action Report

Federal RCRA non-CORRACTS TSD facilities list

RCRA-TSDF ..... RCRA - Treatment, Storage and Disposal

Federal RCRA generators list

RCRA-LQG ..... RCRA - Large Quantity Generators
RCRA-SQG ..... RCRA - Small Quantity Generators
RCRA-VSQG ..... RCRA - Very Small Quantity Generators (Formerly Conditionally Exempt Small Quantity Generators)

Federal institutional controls / engineering controls registries

LUCIS ..... Land Use Control Information System

EXECUTIVE SUMMARY

US ENG CONTROLS..... Engineering Controls Sites List
US INST CONTROL..... Sites with Institutional Controls

Federal ERNS list

ERNS..... Emergency Response Notification System

State- and tribal - equivalent NPL

NC HSDS..... Hazardous Substance Disposal Site

State- and tribal - equivalent CERCLIS

SHWS..... Inactive Hazardous Sites Inventory

State and tribal landfill and/or solid waste disposal site lists

SWF/LF..... List of Solid Waste Facilities
OLI..... Old Landfill Inventory
DEBRIS..... Solid Waste Active Disaster Debris Sites Listing
LCID..... Land-Clearing and Inert Debris (LCID) Landfill Notifications

State and tribal leaking storage tank lists

LAST..... Leaking Aboveground Storage Tanks
LUST..... Regional UST Database
INDIAN LUST..... Leaking Underground Storage Tanks on Indian Land
LUST TRUST..... State Trust Fund Database

State and tribal registered storage tank lists

FEMA UST..... Underground Storage Tank Listing
UST..... Petroleum Underground Storage Tank Database
AST..... AST Database
INDIAN UST..... Underground Storage Tanks on Indian Land

State and tribal institutional control / engineering control registries

INST CONTROL..... No Further Action Sites With Land Use Restrictions Monitoring

State and tribal voluntary cleanup sites

INDIAN VCP..... Voluntary Cleanup Priority Listing
VCP..... Responsible Party Voluntary Action Sites

State and tribal Brownfields sites

BROWNFIELDS..... Brownfields Projects Inventory

ADDITIONAL ENVIRONMENTAL RECORDS

Local Brownfield lists

US BROWNFIELDS..... A Listing of Brownfields Sites

EXECUTIVE SUMMARY

Local Lists of Landfill / Solid Waste Disposal Sites

SWRCY	Recycling Center Listing
HIST LF	Solid Waste Facility Listing
INDIAN ODI	Report on the Status of Open Dumps on Indian Lands
ODI	Open Dump Inventory
DEBRIS REGION 9	Torres Martinez Reservation Illegal Dump Site Locations
IHS OPEN DUMPS	Open Dumps on Indian Land

Local Lists of Hazardous waste / Contaminated Sites

US HIST CDL	Delisted National Clandestine Laboratory Register
US CDL	National Clandestine Laboratory Register

Local Land Records

LIENS 2	CERCLA Lien Information

Records of Emergency Release Reports

HMIRS	Hazardous Materials Information Reporting System
SPILLS	Spills Incident Listing
IMD	Incident Management Database
SPILLS 90	SPILLS 90 data from FirstSearch
SPILLS 80	SPILLS 80 data from FirstSearch

Other Ascertainable Records

RCRA NonGen / NLR	RCRA - Non Generators / No Longer Regulated
FUDS	Formerly Used Defense Sites
DOD	Department of Defense Sites
SCRD DRYCLEANERS	State Coalition for Remediation of Drycleaners Listing
US FIN ASSUR	Financial Assurance Information
EPA WATCH LIST	EPA WATCH LIST
2020 COR ACTION	2020 Corrective Action Program List
TSCA	Toxic Substances Control Act
TRIS	Toxic Chemical Release Inventory System
SSTS	Section 7 Tracking Systems
ROD	Records Of Decision
RMP	Risk Management Plans
RAATS	RCRA Administrative Action Tracking System
PRP	Potentially Responsible Parties
PADS	PCB Activity Database System
ICIS	Integrated Compliance Information System
FTTS	FIFRA/ TSCA Tracking System - FIFRA (Federal Insecticide, Fungicide, & Rodenticide Act)/TSCA (Toxic Substances Control Act)
MLTS	Material Licensing Tracking System
COAL ASH DOE	Steam-Electric Plant Operation Data
COAL ASH EPA	Coal Combustion Residues Surface Impoundments List
PCB TRANSFORMER	PCB Transformer Registration Database
RADINFO	Radiation Information Database
HIST FTTS	FIFRA/TSCA Tracking System Administrative Case Listing
DOT OPS	Incident and Accident Data
CONSENT	Superfund (CERCLA) Consent Decrees

EXECUTIVE SUMMARY

INDIAN RESERV..... Indian Reservations
FUSRAP..... Formerly Utilized Sites Remedial Action Program
UMTRA..... Uranium Mill Tailings Sites
LEAD SMELTERS..... Lead Smelter Sites
US AIRS..... Aerometric Information Retrieval System Facility Subsystem
US MINES..... Mines Master Index File
ABANDONED MINES..... Abandoned Mines
FINDS..... Facility Index System/Facility Registry System
ECHO..... Enforcement & Compliance History Information
UXO..... Unexploded Ordnance Sites
DOCKET HWC..... Hazardous Waste Compliance Docket Listing
FUELS PROGRAM..... EPA Fuels Program Registered Listing
AIRS..... Air Quality Permit Listing
ASBESTOS..... ASBESTOS
COAL ASH..... Coal Ash Disposal Sites
DRYCLEANERS..... Drycleaning Sites
Financial Assurance..... Financial Assurance Information Listing
NPDES..... NPDES Facility Location Listing
UIC..... Underground Injection Wells Listing
AOP..... Animal Operation Permits Listing
MINES MRDS..... Mineral Resources Data System
SEPT HAULERS..... Permitted Septage Haulers Listing
CCB..... Coal Ash Structural Fills (CCB) Listing
PCSRP..... Petroleum-Contaminated Soil Remediation Permits

EDR HIGH RISK HISTORICAL RECORDS

EDR Exclusive Records

EDR MGP..... EDR Proprietary Manufactured Gas Plants
EDR Hist Auto..... EDR Exclusive Historical Auto Stations
EDR Hist Cleaner..... EDR Exclusive Historical Cleaners

EDR RECOVERED GOVERNMENT ARCHIVES

Exclusive Recovered Govt. Archives

RGA HWS..... Recovered Government Archive State Hazardous Waste Facilities List
RGA LF..... Recovered Government Archive Solid Waste Facilities List
RGA LUST..... Recovered Government Archive Leaking Underground Storage Tank

SURROUNDING SITES: SEARCH RESULTS

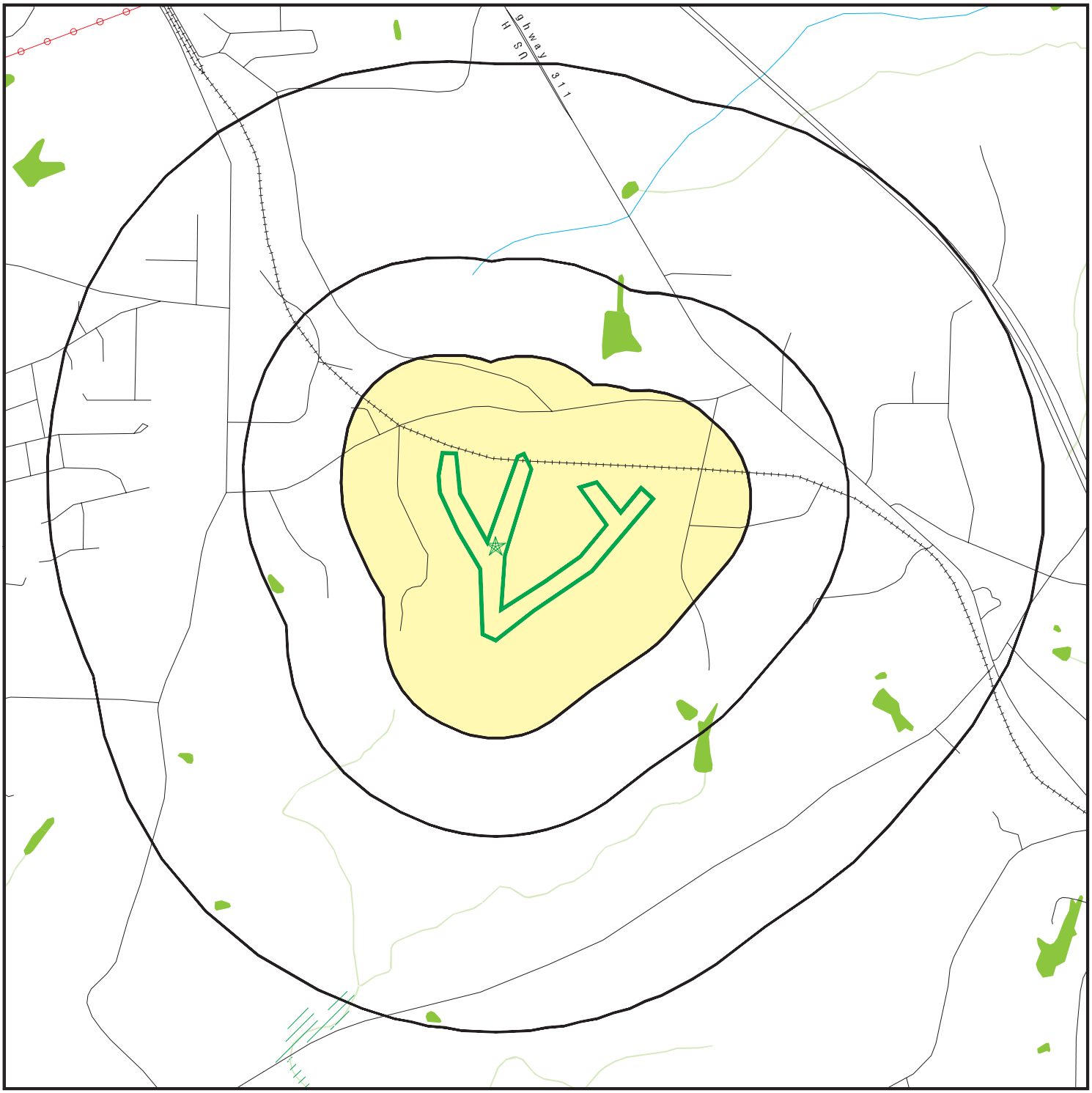
Surrounding sites were not identified.

Unmappable (orphan) sites are not considered in the foregoing analysis.

EXECUTIVE SUMMARY

There were no unmapped sites in this report.

OVERVIEW MAP - 5975759.2S



Target Property

Sites at elevations higher than or equal to the target property

Sites at elevations lower than the target property

Manufactured Gas Plants

National Priority List Sites

Dept. Defense Sites

0 1/4 1/2 1 Miles

Indian Reservations BIA

Power transmission lines

Special Flood Hazard Area (1%)

0.2% Annual Chance Flood Hazard

National Wetland Inventory

State Wetlands

Hazardous Substance Disposal Sites

N

This report includes Interactive Map Layers to display and/or hide map information. The legend includes only those icons for the default map view.

SITE NAME: Bull Chute	CLIENT: Axiom Environmental
ADDRESS: 4126 Baker Farm Road Sophia NC 27350	CONTACT: Kenan Jernigan
LAT/LONG: 35.833821 / 79.888297	INQUIRY #: 5975759.2s
	DATE: February 18, 2020 3:49 pm

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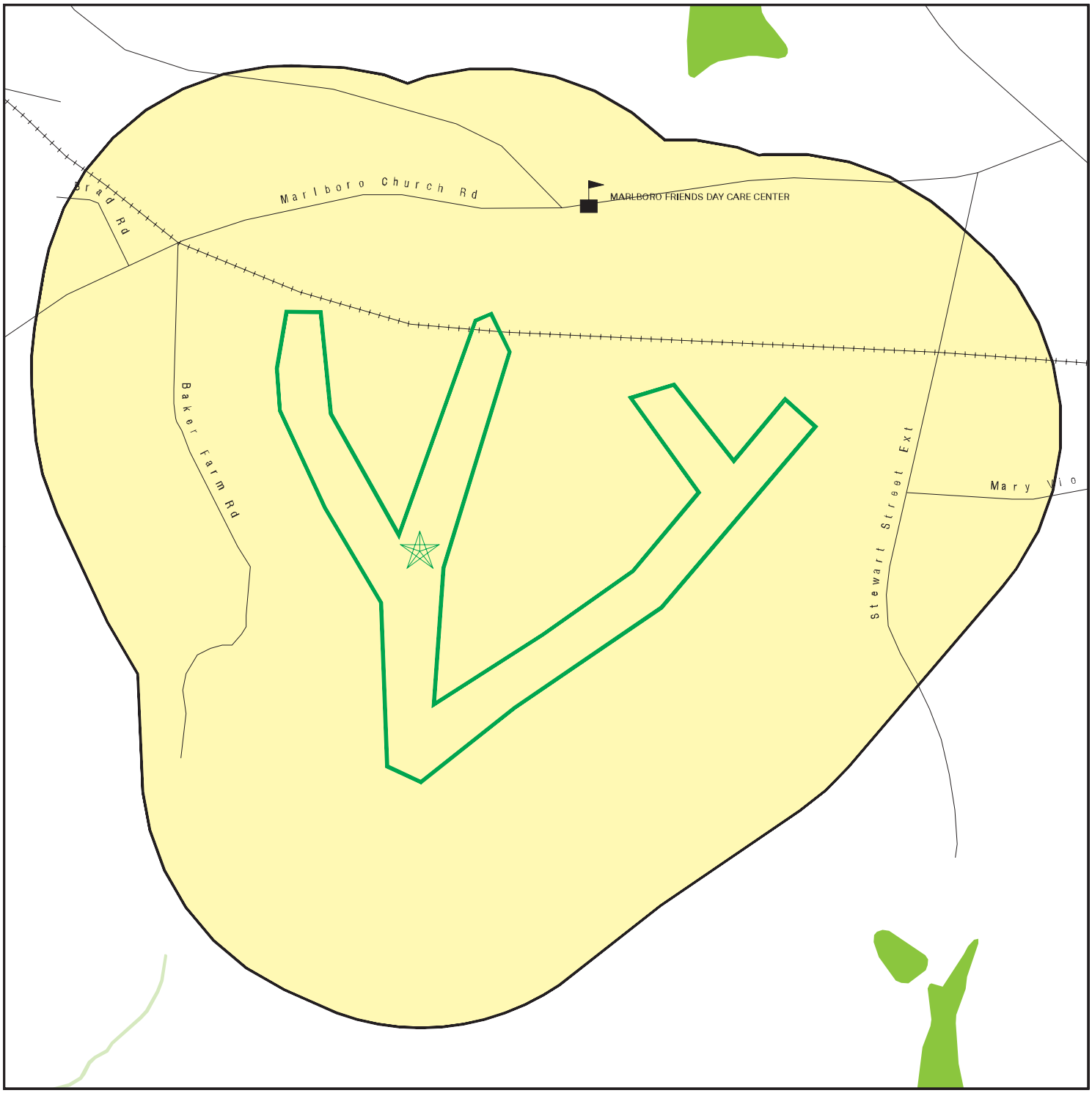
DETAIL MAP - 5975759.2S



Target Property

Sites at elevations higher than or equal to the target property

Sites at elevations lower than the target property

Manufactured Gas Plants

Sensitive Receptors

National Priority List Sites

Dept. Defense Sites

0 1/8 1/4 1/2 Miles

Indian Reservations BIA

National Wetland Inventory

State Wetlands

Hazardous Substance Disposal Sites

This report includes Interactive Map Layers to display and/or hide map information. The legend includes only those icons for the default map view.

SITE NAME: Bull Chute	CLIENT: Axiom Environmental
ADDRESS: 4126 Baker Farm Road Sophia NC 27350	CONTACT: Kenan Jernigan INQUIRY #: 5975759.2s
LAT/LONG: 35.833821 / 79.888297	DATE: February 18, 2020 3:50 pm

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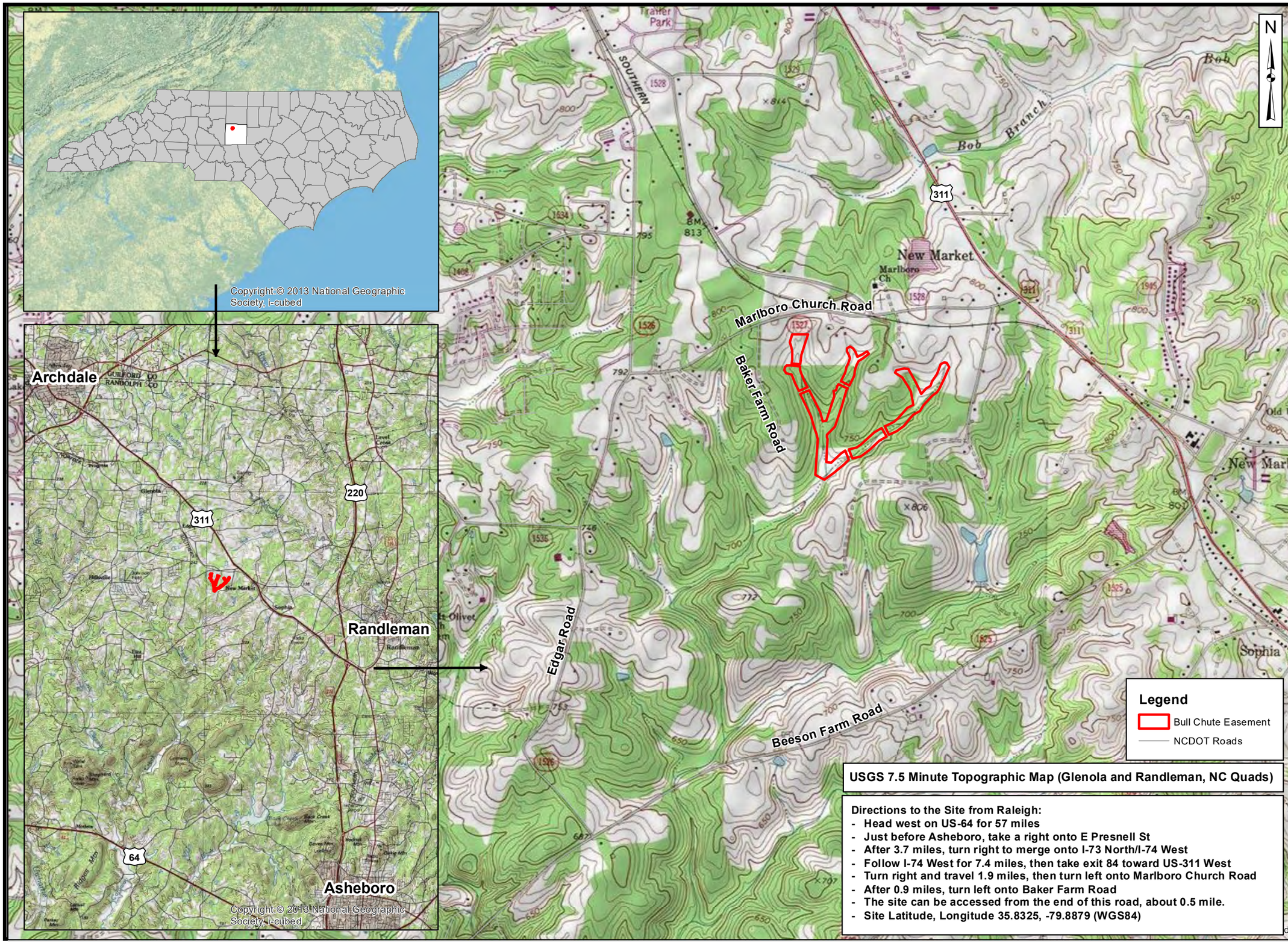
FIGURES



USGS 7.5 Minute Topographic Map (Glenola and Randleman, NC Quads)

Directions to the Site from Raleigh:

- Head west on US-64 for 57 miles
- Just before Asheboro, take a right onto E Presnell St
- After 3.7 miles, turn right to merge onto I-73 North/I-74 West
- Follow I-74 West for 7.4 miles, then take exit 84 toward US-311 West
- Turn right and travel 1.9 miles, then turn left onto Marlboro Church Road
- After 0.9 miles, turn left onto Baker Farm Road
- The site can be accessed from the end of this road, about 0.5 mile.
- Site Latitude, Longitude 35.8325, -79.8879 (WGS84)

Axiom Environmental, Inc.

Prepared for:

CLEARWATER MITIGATION SOLUTIONS

Project:

BULL CHUTE MITIGATION SITE

Randolph County, NC

Title:

SITE LOCATION

Drawn by: KRJ

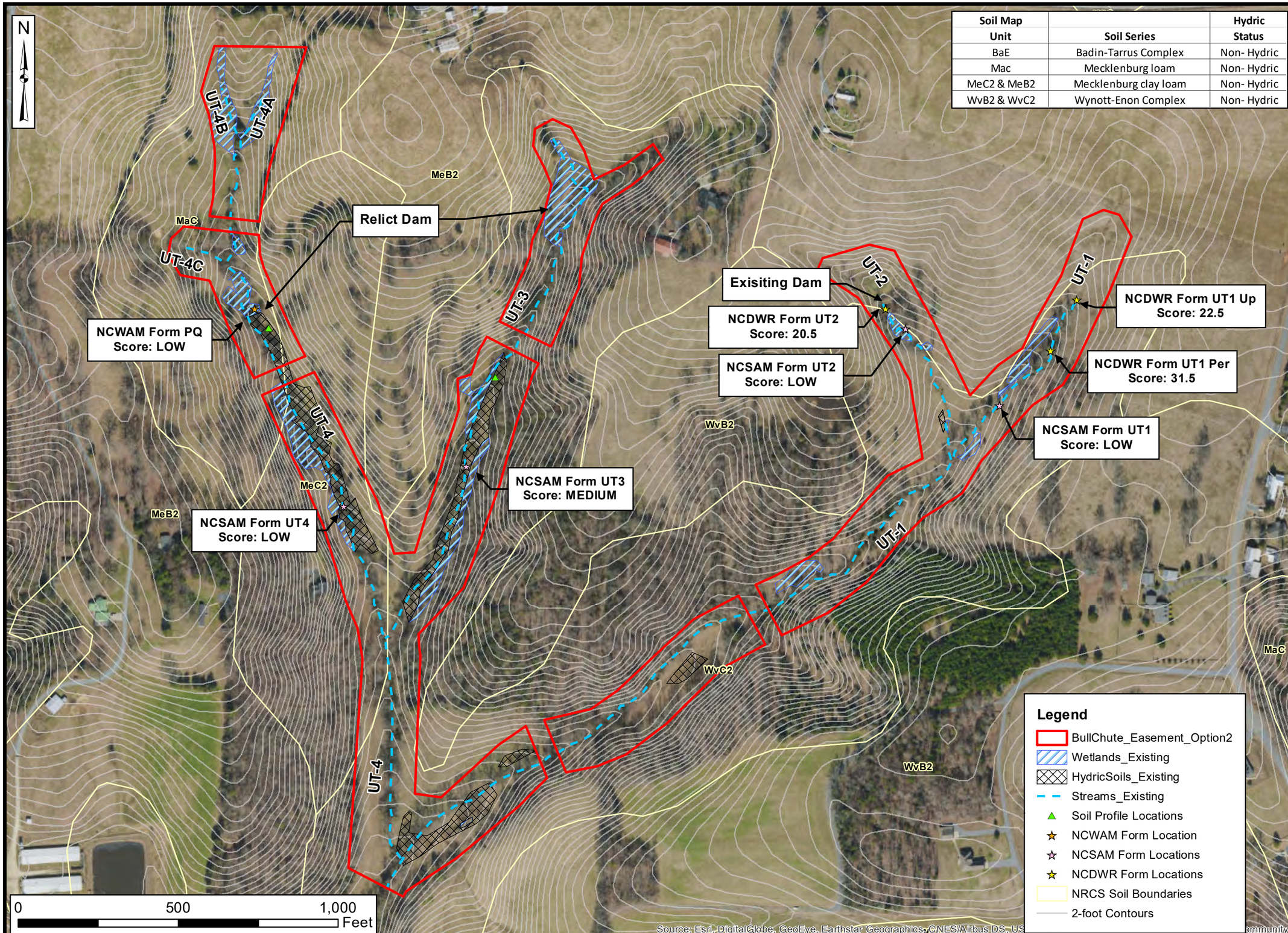
Date: AUG 2019

Scale: 1:20,000

Project No.: 19-008.01

FIGURE

1



Soil Map Unit	Soil Series	Hydric Status
BaE	Badin-Tarrus Complex	Non- Hydric
Mac	Mecklenburg loam	Non- Hydric
MeC2 & MeB2	Mecklenburg clay loam	Non- Hydric
WvB2 & WvC2	Wynott-Enon Complex	Non- Hydric

Axiom Environmental, Inc.

Prepared for:

CLEARWATER MITIGATION SOLUTIONS

Project:

BULL CHUTE MITIGATION SITE

Randolph County, NC

Title:

EXISTING CONDITIONS AND SOILS

Drawn by: KRJ

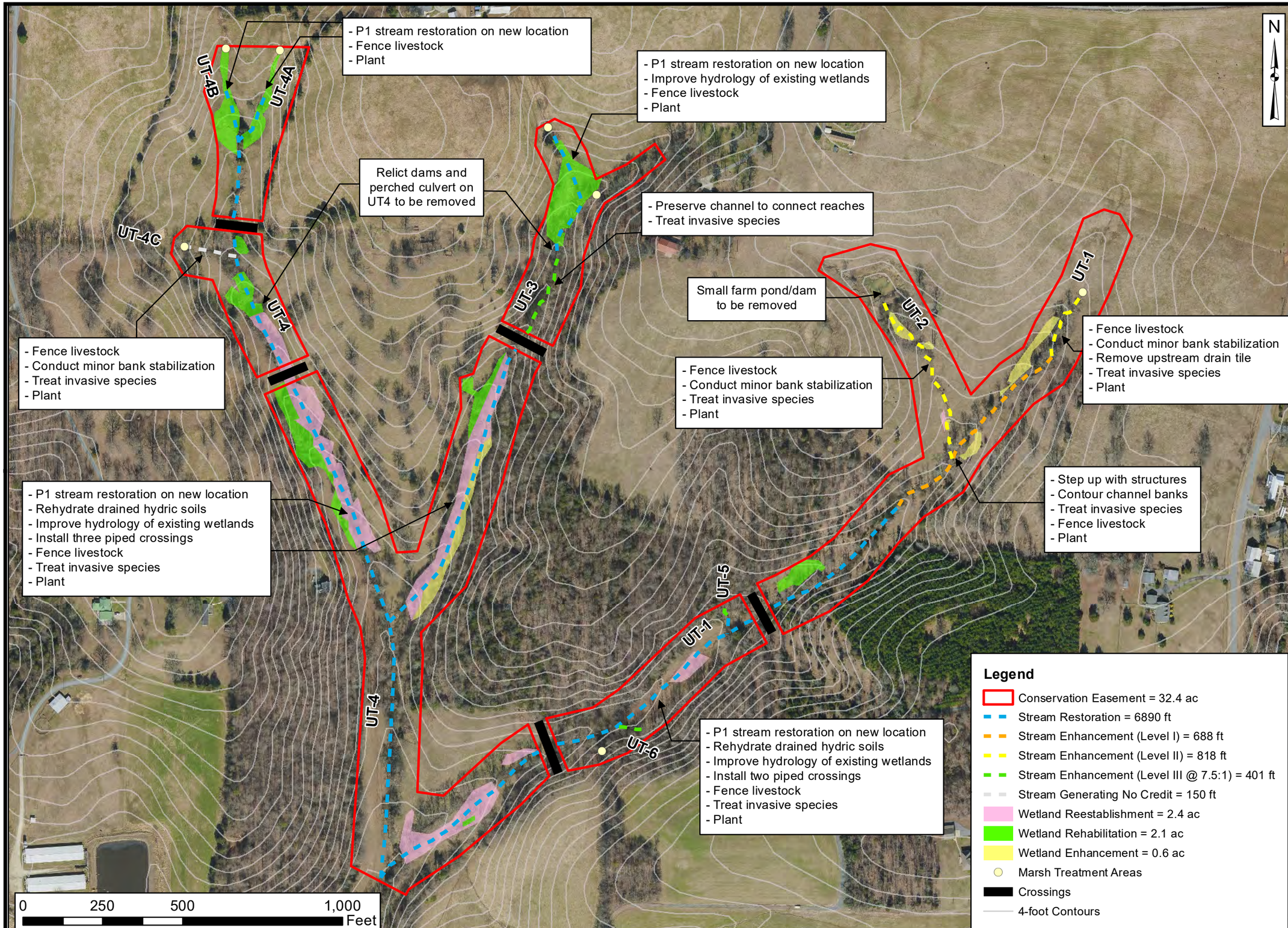
Date: AUG 2019

Scale: 1:5500

Project No.: 19-008.01

FIGURE

2



Axiom Environmental, Inc.

Prepared for:

CLEARWATER MITIGATION SOLUTIONS

Project:

BULL CHUTE MITIGATION SITE

Randolph County, NC

Title:

PROPOSED CONDITIONS

Drawn by: KRJ

Date: JAN 2020

Scale: 1:3500

Project No.: 19-008.01

FIGURE

3

NCWRC Correspondence

Axiom Environmental, Inc.

Axiom Environmental, Inc.

218 Snow Avenue, Raleigh, North Carolina 27603 919-215-1693

March 4, 2020

Shannon Deaton
Habitat Conservation Program Manager
North Carolina Wildlife Resources Commission 1701
Mail Service Center
Raleigh, NC 27699-1701

Re: Bull Chute Stream & Wetland Mitigation Site, Randolph County, NC

Dear Ms. Deaton:

The purpose of this letter is to request concurrence from the North Carolina Wildlife Recourse Commission concerning a stream and wetland restoration project located in Randolph County for the N.C. Division of Mitigation Services. The project will restore unnamed tributaries to Caraway Creek, in addition to the restoration of adjacent riparian wetlands in existing active pastureland. Please review and comment on any possible issues that might emerge with respect to the Fish and Wildlife Coordination Act from the potential mitigation project. Please find attached a USGS base map depicting the proposed project's 32.4-acre conservation easement boundary.

Bull Chute Stream & Wetland Mitigation Site has been identified for the purpose of providing in-kind mitigation for unavoidable impacts to streams and wetlands within watersheds of the Yadkin River Basin 03040103.

Thank you in advance for your timely response and cooperation. Please feel free to contact me with any questions associated with this project.

Sincerely,
AXIOM ENVIRONMENTAL, INC.

W Grant Lewis

Grant Lewis
President

Attachment:
Figure 1. Site Location

CORRESPONDENCE FROM

NC STATE HISTORIC PRESERVATION OFFICE

Axiom Environmental, Inc.

Axiom Environmental, Inc.

218 Snow Avenue, Raleigh, North Carolina 27603 919-215-1693

March 4, 2020

Renee Gledhill-Earley,
Environmental Review Coordinator
North Carolina State Historic Preservation Office
4617 Mail Service Center
Raleigh, NC 27699-4617
Submitted electronically to environmental.review@ncdcr.gov

Re: Bull Chute Stream & Wetland Mitigation Site, Randolph County, NC

Dear Renee,

The purpose of this letter is to request written concurrence from the State Historic Preservation Office (SHPO) for the Bull Chute Stream & Wetland Mitigation Site in Randolph County, a Full-Delivery project for the N.C. Division of Mitigation Services. Please review and comment on any possible issues that might emerge with respect to SHPO from a potential stream restoration project depicted on the attached mapping.

Project Name: Bull Chute Stream & Wetland Mitigation Site
Project Location: 4126 Baker Farm Road, Sophia, NC 27350 (35.8325ºN, 79.8879ºW)
Project Contact: Kevin Yates, Clearwater Mitigation Solutions, 604 Macon Place, Raleigh, NC 27604

Project Description: The project has been identified for the purpose of providing in-kind mitigation for unavoidable stream and wetland impacts. Permits will be obtained from the NC DWR and USACE to restore waters of the US as well as soil and erosion control permits. The project encompasses 32.8 acres of active pastureland. Approximately 8758 linear feet of stream and 5.1 acres of riparian wetland will be restored or enhanced as part of this project.

The term "cultural resources" refers to prehistoric or historic archaeological sites, structures, or artifact deposits over 50 years old. "Significant" cultural resources are those that are eligible or potentially eligible for inclusion in the National Register of Historic Places. Evaluations of site significance are made with reference to the eligibility criteria of the National Register (36 CFR 60) and in consultation with the North Carolina State Historic Preservation Office (SHPO).

Field visits were conducted between August 2019 and January 2020 to conduct evaluations for presence of structures or features that may be eligible for the National Register of Historic Places. No structures were identified within the Site boundaries that may be eligible for the National Register. In addition to field reviews for historically relevant structures, a records search was conducted of the online SHPO HPOWEB2.0 web application to determine if documented occurrences of historic structures or artifacts occur within, or adjacent to the Site. The SHPO identified no features within the Site boundaries or within a 1.0 mile radius of the Site. Typical SHPO coordination will occur prior to construction activities to determine if any significant cultural resources are present; however, no constraints are expected at this time. We thank you in advance for your timely response and cooperation. Please feel free to contact me with any questions that you may have concerning the extent of site disturbance associated with this project.

Sincerely,
AXIOM ENVIRONMENTAL, INC.

W Grant Lewis

Grant Lewis
President

Attachments: Figure 1. Site Location, Figure 2. Proposed Restoration, Site Photographs

North Carolina Department of Natural and Cultural Resources

State Historic Preservation Office

Ramona M. Bartos, Administrator

Governor Roy Cooper
Secretary Susi H. Hamilton

Office of Archives and History
Deputy Secretary Kevin Cherry

March 26, 2020

Corri Faquin
Axiom Environmental, Inc.
218 Snow Avenue
Raleigh, NC 27603

cfaquin@axiomenvironmental.org

Re: Bull Chute Stream & Wetland Mitigation, 4126 Baker Farm Road, Sophia, ER 20-0559

Dear Ms. Faquin:

Thank you for your email of March 4, 2020, concerning the above project.

We have conducted a review of the project and are aware of no historic resources which would be affected by the project. Therefore, we have no comment on the project as proposed.

The above comments are made pursuant to Section 106 of the National Historic Preservation Act and the Advisory Council on Historic Preservation's Regulations for Compliance with Section 106 codified at 36 CFR Part 800.

Thank you for your cooperation and consideration. If you have questions concerning the above comment, contact Renee Gledhill-Earley, environmental review coordinator, at 919-814-6579 or environmental.review@ncdcr.gov. In all future communication concerning this project, please cite the above referenced tracking number.

Sincerely,

Renee Gledhill-Earley

for Ramona Bartos, Deputy
State Historic Preservation Officer

FORM AD-1006 &

CORRESPONDENCE WITH

NATURAL RESOURCES CONSERVATION SERVICE

Axiom Environmental, Inc.

218 Snow Avenue, Raleigh, North Carolina 27603 919-215-1693

March 4, 2020

Milton Cortes
USDA Natural Resources Conservation Service
4407 Bland Road, Suite 117
Raleigh, NC 27609

Submitted electronically to milton.cortes@usda.gov

Re: Bull Chute Stream & Wetland Mitigation Site, Randolph County, NC

Dear Milton,

Clearwater Mitigation Solutions, of Raleigh, NC has been awarded a contract by DMS to provide 7583 Stream Mitigation Units and 4.1 Wetland Mitigation Units at the Bull Chute Stream & Wetland Mitigation Site, Randolph County, North Carolina.

One of the earliest tasks to be performed is completion of an environmental screening and preparation/submittal of a Categorical Exclusion (CE) document. This document is specifically required by the Federal Highway Administration (FHWA) to ensure compliance with various federal environmental laws and regulations. DMS must demonstrate that its projects comply with federal mandates as a precondition to FHWA reimbursement of compensatory mitigation costs borne by the North Carolina Department of Transportation to offset its projects' unavoidable impacts to streams and wetlands.

In order for the project to proceed, Clearwater Mitigation Solutions is obligated to coordinate with the NRCS to complete Form AD-1006 in compliance with the Farmland Protection Policy Act on behalf of the FHWA. The purpose of this letter is to request your assistance in completion of the Form.

Project Location & Description
The project site is located in Randolph County, less than one mile northwest of New Market and 4.5 miles northwest of Randleman. The Site is located within **Targeted Local Watershed** and **Local Watershed Plan Area** (Caraway Creek) 14-digit HUC (03040103050040) of the Yadkin River basin. Stream and wetland mitigation areas are located along unnamed tributaries (UTs) to Caraway Creek; current land use is active pastureland. Riparian zones are primarily composed of herbaceous vegetation that is sparse and disturbed due to livestock grazing, bush hogging, and regular land-management activities. The proposed conservation easement area contains approximately 32.8 acres.

The Bull Chute Mitigation Site is located within the Southern Outer Piedmont ecoregion of the Piedmont Physiographic Province. The ecoregion is characterized by dissected irregular plains, some rounded hills and ridges, and low to moderate gradient streams with cobble, gravel, and sandy substrates. Onsite elevations range from a high of 790 feet National Geodetic Vertical Datum (NGVD) at the upper reaches to a low of approximately 690 feet NGVD at the Site outfall (USGS Glenola, North Carolina 7.5-minute topographic quadrangle).

Site tributary watershed sizes range from 0.02-0.19 square miles (11-121 acres). The watershed is dominated by pasture, agricultural land, forest, and sparse residential property. Impervious surfaces account for less than 1 percent of the upstream watershed land surface.

Restoration Means & Methods
Stream restoration efforts are designed to restore a stable stream that approximates hydrodynamics, stream geometry, and local microtopography relative to reference conditions. Restoration at the Site will be Priority I restoration; therefore, bankfull elevations will be raised to meet the adjacent valley floodplain elevation.

Stream restoration is expected to entail 1) channel excavation, 2) spoil stockpiling, 3) channel stabilization, 4) channel diversion, and 5) channel backfill.

Stream enhancement will entail restoration of stream dimension, installation of easement markers, the removal of livestock, planting riparian buffers with native forest vegetation to facilitate stream recovery and prevent further degradation of the stream, and/or the removal of invasive species.

Alternatives for wetland reestablishment are designed to restore a fully functioning wetland system, which will provide surface water storage, nutrient cycling, removal of imported elements and compounds, and will create a variety and abundance of wildlife habitat.

Portions of the Site underlain by hydric soils have been impacted by stream degradation, ditching and dredging, vegetative clearing, livestock trampling, and other land disturbances associated with land use management. Wetland reestablishment options should focus on the restoration of vegetative communities, restoration of stream corridors and historic groundwater tables, and the reestablishment of soil structure and microtopographic variations.

Restoration of floodplain forest allows for development and expansion of characteristic species across the landscape. Ecotonal changes between community types contribute to diversity and provide secondary benefits, such as enhanced feeding and nesting opportunities for mammals, birds, amphibians, and other wildlife. Revegetating floodplains will provide overall system stability, shade, and wildlife habitat. In addition, viable riparian communities will improve system biogeochemical function by filtering pollutants from overland and shallow subsurface flows and providing organic materials to adjacent stream channels.

Variations in vegetative planting will occur based on topography and hydraulic condition of soils. Vegetative species composition will be based on RFEs, site-specific features, and community descriptions from *Classification of the Natural Communities of North Carolina* (Schafale and Weakley 1990). Community associations to be utilized include: 1) Piedmont/Low Mountain Alluvial Forest, 2) Dry-Mesic Oak-Hickory Forest and 3) Streamside Assemblage.

Bare-root seedlings within the Piedmont Alluvial Forest and Dry-Mesic Oak-Hickory Forest will be planted at a density of approximately 680 stems per acre on 8-foot centers, and in the stream-side assemblage at a density of approximately 2720 stems per acre on 4-foot centers. Planting will be performed between November 15 and March 15 to allow plants to stabilize during the dormant period and set root during the spring season.

Should you have any questions or if any additional information is needed to complete the Form, please feel free to contact me at (919) 215-1693.

Sincerely,
AXIOM ENVIRONMENTAL, INC.

W Grant Lewis

Grant Lewis
President

Attachments:
Figure 1. Site Location
Figure 2. Existing Conditions
Figure 3. Proposed Conditions
AD-1006 Form

From:	Corri Faquin
To:	Cortes, Milton - NRCS, Raleigh, NC
Subject:	RE: Bull Chute Form AD1006 shp
Date:	Saturday, March 28, 2020 7:20:00 AM
Attachments:	image001.png

Thank you!

Corri Faquin
AXIOM ENVIRONMENTAL, INC
218 Snow Avenue
Raleigh, NC 27603
919-414-2471
cfaquin@axiomenvironmental.org
axiomenvironmental.org

From: Cortes, Milton - NRCS, Raleigh, NC <milton.cortes@usda.gov>
Sent: Friday, March 27, 2020 7:19 PM
To: Corri Faquin <cfaquin@axiomenvironmental.org>
Cc: Armstrong, Odessa - NRCS, Raleigh, NC <odessa.armstrong@usda.gov>; Proctor, Channa - NRCS, Raleigh, NC <Channa.Proctor@usda.gov>
Subject: RE: Bull Chute Form AD1006 shp
Importance: High

Ok Corri;

Exactly what I needed.

Please find attached the FARMLAND CONVERSION IMPACT RATING evaluation for the 7583 Stream Mitigation Units and 4.1 Wetland Mitigation Units at the Bull Chute Stream & Wetland Mitigation Site, Randolph County, North Carolina.

If I can be of further assistance please let me know.

Best regards:

Milton Cortes
State Soil Scientist
Raleigh State Office
Natural Resources Conservation Service
United States Department of Agriculture
Office: 919-873-2171
Cell: 984-365-2201
Milton.Cortes@usda.gov

U.S. Department of Agriculture

FARMLAND CONVERSION IMPACT RATING

PART I *(To be completed by Federal Agency)*	Date Of Land Evaluation Request 2/24/20
Name of Project Bull Chute Mitigation Site	Federal Agency Involved Federal Highway Administration
Proposed Land Use Stream & Wetland Mitigation	County and State Randolph County, North Carolina
PART II *(To be completed by NRCS)*	Date Request Received By NRCS 03/27/2020 / Person Completing Form: Milton Cortes NC NRCS

Does the site contain Prime, Unique, Statewide or Local Important Farmland? *(If no, the FPPA does not apply - do not complete additional parts of this form)*	YES ☑ NO ☐	Acres Irrigated none	Average Farm Size 106 acres
Major Crop(s) CORN	Farmable Land In Govt. Jurisdiction Acres: 74.5 % 376,412 acres	Amount of Farmland As Defined in FPPA Acres: 68.6 % 356,923 acres	
Name of Land Evaluation System Used Randolph Co, NC LESA	Name of State or Local Site Assessment System N/A	Date Land Evaluation Returned by NRCS March 27, 2020 by eMail	

PART III *(To be completed by Federal Agency)*	Alternative Site Rating Site A	Site B	Site C	Site D
A. Total Acres To Be Converted Directly	32.3			
B. Total Acres To Be Converted Indirectly	0			
C. Total Acres In Site	32.3	0	0	0
PART IV *(To be completed by NRCS)* Land Evaluation Information				
A. Total Acres Prime And Unique Farmland	2.30			
B. Total Acres Statewide Important or Local Important Farmland	30.0			
C. Percentage Of Farmland in County Or Local Govt. Unit To Be Converted	0.0090			
D. Percentage Of Farmland in Govt. Jurisdiction With Same Or Higher Relative Value	74.5			
PART V (To be completed by NRCS) Land Evaluation Criterion Relative Value of Farmland To Be Converted (Scale of 0 to 100 Points)	59			

PART VI *(To be completed by Federal Agency)* Site Assessment Criteria *(Criteria are explained in 7 CFR 658.5 b. For Corridor project use form NRCS-CPA-106)*	**Maximum Points**	Site A	Site B	Site C	Site D
1. Area In Non-urban Use	(15)	15			
2. Perimeter In Non-urban Use	(10)	8			
3. Percent Of Site Being Farmed	(20)	15			
4. Protection Provided By State and Local Government	(20)	20			
5. Distance From Urban Built-up Area	(15)	15			
6. Distance To Urban Support Services	(15)	10			
7. Size Of Present Farm Unit Compared To Average	(10)	0			
8. Creation Of Non-farmable Farmland	(10)	0			
9. Availability Of Farm Support Services	(5)	3			
10. On-Farm Investments	(20)	10			
11. Effects Of Conversion On Farm Support Services	(10)	0			
12. Compatibility With Existing Agricultural Use	(10)	3			
TOTAL SITE ASSESSMENT POINTS	160	99	0	0	0
PART VII ***(To be completed by Federal Agency)***					
Relative Value Of Farmland *(From Part V)*	100	59	0	0	0
Total Site Assessment *(From Part VI above or local site assessment)*	160	99	0	0	0
TOTAL POINTS ***(Total of above 2 lines)***	260	158	0	0	0

Site Selected: Site A	Date Of Selection 04/17/20	Was A Local Site Assessment Used? YES ☐ NO ☑

Reason For Selection:

"Site A" is located within existing drainage ways within the farmland, and minimizes impacts to higher valued upland areas which contain higher quality soils for livestock pasture land and growing agricultural crops. Additionally, "Site A" meets the goals and intent of the proposed project. We believe "Site A" to be consistent with the Farmland Protection Policy Act (FPPA).

Name of Federal agency representative completing this form: Kevin Yates (Clearwater Mitigation Sol.) Date: 04/17/20

(See Instructions on reverse side) **Form AD-1006 (03-02)**

SPECIES CONCLUSION TABLE,

&

CORRESPONDENCE WITH

US FISH & WILDLIFE SERVICE

Axiom Environmental, Inc.

Axiom Environmental, Inc.

218 Snow Avenue, Raleigh, North Carolina 27603 919-215-1693

May 8, 2020

Kathy Matthews
Fish & Wildlife Biologist
US Fish & Wildlife Services
Raleigh Field Office
Submitted electronically to Kathryn_matthews@fws.gov

Re: Bull Chute Stream & Wetland Mitigation Site, Randolph County, NC
Federally Protected Species

Dear Ms. Matthews:

Clearwater Mitigation Solutions, of Raleigh, NC has been awarded a contract by DMS to provide 7583 Stream Mitigation Units and 4.1 Wetland Mitigation Units at the Bull Chute Stream & Wetland Mitigation Site, Randolph County, North Carolina.

One of the earliest tasks to be performed is completion of an environmental screening and preparation/submittal of a Categorical Exclusion (CE) document. This document is specifically required by the Federal Highway Administration (FHWA) to ensure compliance with various federal environmental laws and regulations. DMS must demonstrate that its projects comply with federal mandates as a precondition to FHWA reimbursement of compensatory mitigation costs borne by the North Carolina Department of Transportation to offset its projects' unavoidable impacts to streams and wetlands.

The last outstanding item for the CE and purpose of this letter is to request concurrence from the US Fish & Wildlife Service concerning federally protected species biological conclusions for the Bull Chute Stream & Wetland Mitigation Site. Please review and comment on any possible issues that might emerge with respect to the Fish and Wildlife Coordination Act from the potential mitigation project. This letter provides information about the project including the project location & description, the mitigation plan, and information concerning the presence of suitable habitat for listed species with biological conclusions. Please find attached a USGS map depicting the proposed project's conservation easement boundary.

Project Location & Description

The project site is located in Randolph County, less than one mile northwest of New Market and 4.5 miles northwest of Randleman. The Site is located within **Targeted Local Watershed** and **Local Watershed Plan Area** (Caraway Creek) 14-digit HUC (03040103050040) of the Yadkin River basin. Stream and wetland mitigation areas are located along unnamed tributaries (UTs) to Caraway Creek; current land use is active pastureland. Riparian zones are primarily composed of herbaceous vegetation that is sparse and disturbed due to livestock grazing, bush hogging, and regular land-management activities. The proposed conservation easement area contains approximately 32.8 acres.

The Bull Chute Mitigation Site is located within the Southern Outer Piedmont ecoregion of the Piedmont Physiographic Province. The ecoregion is characterized by dissected irregular plains, some rounded hills and ridges, and low to moderate gradient streams with cobble, gravel, and sandy substrates. Onsite elevations range from a high of 790 feet National Geodetic Vertical Datum (NGVD) at the upper reaches to a low of approximately 690 feet NGVD at the Site outfall (USGS Glenola, North Carolina 7.5-minute topographic quadrangle).

Site tributary watershed sizes range from 0.02-0.19 square miles (11-121 acres). The watershed is dominated by pasture, agricultural land, forest, and sparse residential property. Impervious surfaces account for less than 1 percent of the upstream watershed land surface.

Soils that occur within the Site, according to the *Web Soil Survey* (USDA 2019) are described in the following table.

Web Soil Survey Soils Mapped within the Site

Map Unit Symbol	Map Unit Name (Classification)	Hydric Status	Description
BaE	Badin-Tarrus complex (*Typic Hapludults-Typic Kanhapludults*)	Non-hydric	This series consists of well-drained soils found on hillslopes on ridges. The parent material is residuum weathered from metavolcanics and/or argillite. Depth to the seasonal high-water table and restrictive features is more than 80 inches. Slopes are 25-45 percent.
MaC, MeB2, MeC2	Mecklenburg loam and clay loam (*Ultic Hapludalfs*)	Non-hydric	This series consists of well-drained soils found on hillslopes on ridges. The parent material is saprolite derived from diorite and/or gabbro and/or diabase and/or gneiss. Depth to the seasonal high-water table is more than 80 inches. Depth to restrictive features is 40-60 inches to paralithic bedrock. Slopes are 2-15 percent.
WvB2, WvC2	Wynott-Enon complex (*Typic Hapludalfs-Ultic Hapludalfs*)	Non-hydric	This series consists of well-drained soils found on hillslopes on ridges. The parent material is saprolite derived from diorite and/or gabbro and/or diabase and/or gneiss. Depth to the seasonal high-water table and restrictive features is more than 80 inches. Slopes are 2-15 percent.

Existing wetlands and drained hydric soils were mapped by a licensed soil scientist (NC LSS # 1233) on July 29, 2019 as soils of the Wehadkee series

Mitigation Plan

Stream restoration efforts are designed to restore a stable stream that approximates hydrodynamics, stream geometry, and local microtopography relative to reference conditions. Restoration at the Site will be Priority I restoration; therefore, bankfull elevations will be raised to meet the adjacent valley floodplain elevation.

Stream restoration is expected to entail 1) channel excavation, 2) spoil stockpiling, 3) channel stabilization, 4) channel diversion, and 5) channel backfill.

Stream enhancement will entail restoration of stream dimension, installation of easement markers, the removal of livestock, planting riparian buffers with native forest vegetation to facilitate stream recovery and prevent further degradation of the stream, and/or the removal of invasive species.

Alternatives for wetland reestablishment are designed to restore a fully functioning wetland system, which will provide surface water storage, nutrient cycling, removal of imported elements and compounds, and will create a variety and abundance of wildlife habitat.

Portions of the Site underlain by hydric soils have been impacted by stream degradation, ditching and dredging, vegetative clearing, livestock trampling, and other land disturbances associated with land use management. Wetland reestablishment options should focus on the removal of livestock, restoration of vegetative communities, restoration of stream corridors and historic groundwater tables, and the reestablishment of soil structure and microtopographic variations.

Restoration of floodplain forest allows for development and expansion of characteristic species across the landscape. Ecotonal changes between community types contribute to diversity and provide secondary benefits, such as enhanced feeding and nesting opportunities for mammals, birds, amphibians, and other wildlife. Revegetating floodplains will provide overall system stability, shade, and wildlife habitat. In addition, viable riparian communities will improve system biogeochemical function by filtering pollutants from overland and shallow subsurface flows and providing organic materials to adjacent stream channels.

Variations in vegetative planting will occur based on topography and hydraulic condition of soils. Vegetative species composition will be based on RFEs, site-specific features, and community descriptions from *Classification of the Natural Communities of North Carolina* (Schafale and Weakley 1990). Community associations to be utilized include: 1) Piedmont/Low Mountain Alluvial Forest, 2) Dry-Mesic Oak-Hickory Forest and 3) Streamside Assemblage.

Bare-root seedlings within the Piedmont Alluvial Forest and Dry-Mesic Oak-Hickory Forest will be planted at a density of approximately 680 stems per acre on 8-foot centers, and in the stream-side assemblage at a density of approximately 2720 stems per acre on 4-foot centers. Planting will be performed between November 15 and March 15 to allow plants to stabilize during the dormant period and set root during the spring season.

NC Natural Heritage Program

A search of the NC Natural Heritage Program (NHP) database was conducted and no federally or state-protected species are known to occur within the Site. One record of Schweinitz's sunflower (*Helianthus schweinitzii*) has previously been identified within a one-mile radius of the Site (see attached).

Federally Protected Species

The US Fish and Wildlife Service's website was reviewed and two federally-protected species are known to occur in Randolph County. A habitat assessment and biological conclusion for each are provided below.

Cape Fear shiner (*Notropis mekistocholas*) Endangered
Biological conclusion: No Effect

The Cape Fear shiner is known only from the Cape Fear River watershed. In general, habitat occurs in streams with clean gravel, cobble, or boulder substrates. It is most often observed inhabiting slow pools, riffles, and slow runs associated with water willow (Justicia americana) beds, which it uses for cover. Juveniles can be found inhabiting slackwater, among large rock outcrops and in flooded side channels and pools. Spawning occurs May through June, when water temperatures reach 66 degrees Fahrenheit. The Site is located in the Yadkin River Basin; therefore, this project will have no effect on Cape Fear shiner.

Schweinitz's sunflower (*Helianthus schweinitzii*) Endangered
Biological conclusion: No Effect

Schweinitz's sunflower is found along roadside rights-of-way, maintained power lines and other utility rights-of-way, edges of thickets and old pastures, clearings and edges of upland oak-pine-hickory woods and Piedmont longleaf pine forests, and other sunny or semi-sunny habitats where disturbances (e.g., mowing, clearing, grazing, blow downs, storms, frequent fire) help create open or partially open areas for sunlight. It is intolerant of full shade and excessive competition from other vegetation. Schweinitz's sunflower occurs in a variety of soil series; it is generally found growing on shallow sandy soils with high gravel content. The Site is currently an active pasture subject to continuous grazing and cattle traffic, bushhogging, and land maintenance activities. The species has not been documented in the area, nor has there been Critical Habitat designated for the species. The post-construction condition of the Site may create appropriate habitat for Schweinitz's sunflower. Due to grazing impacts and active disturbance of the existing land use, habitat for Schweinitz's sunflower is currently lacking; therefore, this project will have no effect on Schweinitz's sunflower. In addition, construction will not occur prior to the active survey window (late August-frost); therefore, surveys will be completed prior to construction during the optimal survey window in the event of any Site condition changes.

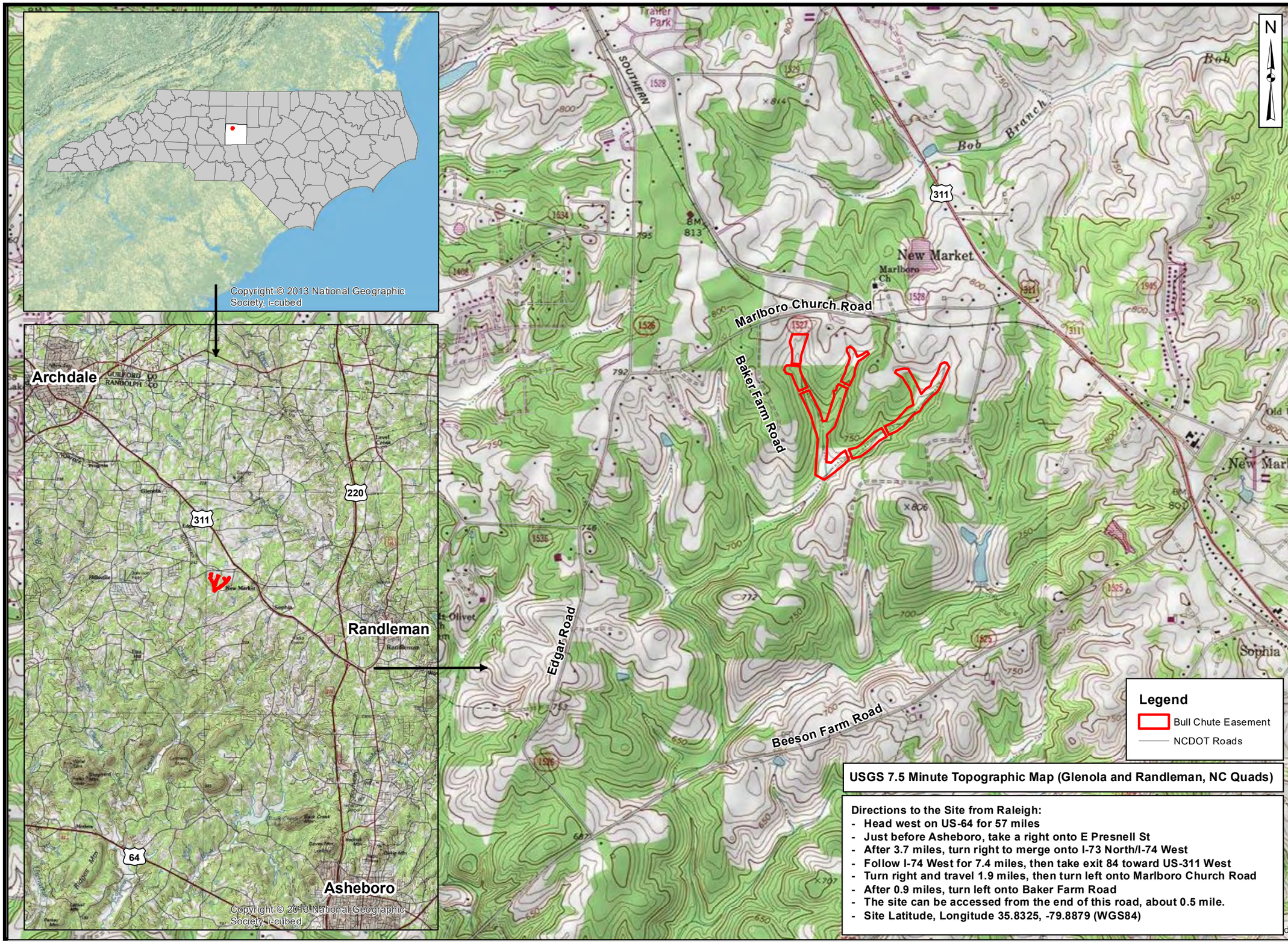
Should you have any questions or need any additional information, please feel free to contact me at (919) 215-1693.

Sincerely,
AXIOM ENVIRONMENTAL, INC.

W Grant Lewis

Grant Lewis
President/Senior Project Manager

Attachments:
Figure 1. Site Location
NCNHP Report



USGS 7.5 Minute Topographic Map (Glenola and Randleman, NC Quads)

Directions to the Site from Raleigh:

- Head west on US-64 for 57 miles
- Just before Asheboro, take a right onto E Presnell St
- After 3.7 miles, turn right to merge onto I-73 North/I-74 West
- Follow I-74 West for 7.4 miles, then take exit 84 toward US-311 West
- Turn right and travel 1.9 miles, then turn left onto Marlboro Church Road
- After 0.9 miles, turn left onto Baker Farm Road
- The site can be accessed from the end of this road, about 0.5 mile.
- Site Latitude, Longitude 35.8325, -79.8879 (WGS84)

Axiom Environmental, Inc.

Prepared for:

CLEARWATER MITIGATION SOLUTIONS

Project:

BULL CHUTE MITIGATION SITE

Randolph County, NC

Title:

SITE LOCATION

Drawn by: KRJ

Date: AUG 2019

Scale: 1:20,000

Project No.: 19-008.01

FIGURE

1

NC DEPARTMENT OF
NATURAL AND CULTURAL RESOURCES

Roy Cooper, **Governor**
Susi Hamilton, **Secretary**
Walter Clark, **Director, Land and Water Stewardship**

NCNHDE-9898

August 1, 2019

Allison Keith
Axiom Environmental
218 Snow Ave
Raleigh, NC 27603
RE: Bull Chute; 19-008.01

Dear Allison Keith:

The North Carolina Natural Heritage Program (NCNHP) appreciates the opportunity to provide information about natural heritage resources for the project referenced above.

Based on the project area mapped with your request, a query of the NCNHP database indicates that there are no records for rare species, important natural communities, natural areas, and/or conservation/managed areas within the proposed project boundary. Please note that although there may be no documentation of natural heritage elements within the project boundary, it does not imply or confirm their absence; the area may not have been surveyed. The results of this query should not be substituted for field surveys where suitable habitat exists. In the event that rare species are found within the project area, please contact the NCNHP so that we may update our records.

The attached 'Potential Occurrences' table summarizes rare species and natural communities that have been documented within a one-mile radius of the property boundary. The proximity of these records suggests that these natural heritage elements may potentially be present in the project area if suitable habitat exists. Tables of natural areas and conservation/managed areas within a one-mile radius of the project area, if any, are also included in this report.

If a Federally-listed species is found within the project area or is indicated within a one-mile radius of the project area, the NCNHP recommends contacting the US Fish and Wildlife Service (USFWS) for guidance. Contact information for USFWS offices in North Carolina is found here: https://www.fws.gov/offices/Directory/ListOffices.cfm?statecode=37.

Please note that natural heritage element data are maintained for the purposes of conservation planning, project review, and scientific research, and are not intended for use as the primary criteria for regulatory decisions. Information provided by the NCNHP database may not be published without prior written notification to the NCNHP, and the NCNHP must be credited as an information source in these publications. Maps of NCNHP data may not be redistributed without permission.

The NC Natural Heritage Program may follow this letter with additional correspondence if a Dedicated Nature Preserve, Registered Heritage Area, Clean Water Management Trust Fund easement, or Federally-listed species are documented near the project area.

If you have questions regarding the information provided in this letter or need additional assistance, please contact Rodney A. Butler at rodney.butler@ncdcr.gov or 919-707-8603.

Sincerely,
NC Natural Heritage Program

Natural Heritage Element Occurrences, Natural Areas, and Managed Areas Within a One-mile Radius of the Project Area
Bull Chute
Project No. 19-008.01
August 1, 2019
NCNHDE-9898

Element Occurrences Documented Within a One-mile Radius of the Project Area

Taxonomic Group	EO ID	Scientific Name	Common Name	Last Observation Date	Element Occurrence Rank	Accuracy	Federal Status	State Status	Global Rank	State Rank
Vascular Plant	26003	Helianthus schweinitzii	Schweinitz's Sunflower	2017-08-31	Fi	3-Medium	Endangered	Endangered	G3	S3

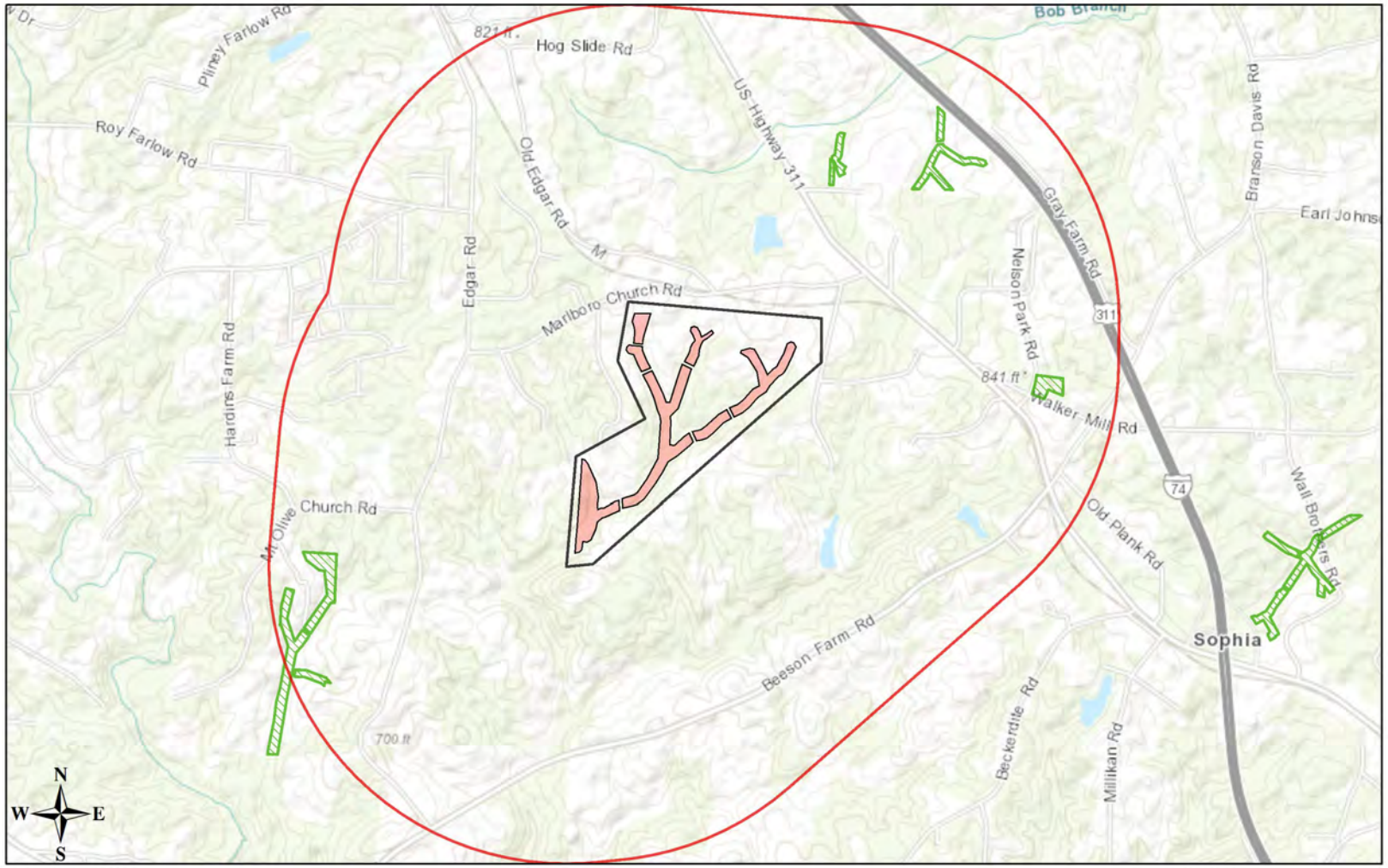
No Natural Areas are Documented Within a One-mile Radius of the Project Area

Managed Areas Documented Within a One-mile Radius of the Project Area

Managed Area Name	Owner	Owner Type
NC Division of Mitigation Services Easement	NC DEQ, Division of Mitigation Services	State
Randolph County Open Space	Randolph County: multiple local government	Local Government

Definitions and an explanation of status designations and codes can be found at https://ncnhde.natureserve.org/content/help. Data query generated on August 1, 2019; source: NCNHP, Q3 Jul 2019. Please resubmit your information request if more than one year elapses before project initiation as new information is continually added to the NCNHP database.

NCNHDE-9898: Bull Chute



August 1, 2019

Project Boundary

Buffered Project Boundary

Managed Area (MAREA)

1:29,302

0 0.25 0.5 1 mi

0 0.4 0.8 1.6 km

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

Corri Faquin

From: Matthews, Kathryn H <kathryn_matthews@fws.gov>
Sent: Wednesday, May 13, 2020 1:01 PM
To: Corri Faquin
Cc: Kevin Yates; Grant Lewis
Subject: Re: [EXTERNAL] Bull Chute Mitigation Site
Attachments: 20200406_LTRSNT_FWS_COE_NCDMSBullChuteMitigationSiteSAW-2020-00049.pdf

Hi Corri,

I sent a "no objection" letter to the Corps for this project on April 6. I've attached the letter.

I hope you are well,

Kathy Matthews
Fish and Wildlife Biologist
U.S. Fish and Wildlife Service
551-F Pylon Drive
Raleigh, NC 27606
919-856-4520, x. 27

From: Corri Faquin <cfaquin@axiomenvironmental.org>
Sent: Friday, May 8, 2020 1:31 PM
To: Matthews, Kathryn H <kathryn_matthews@fws.gov>
Cc: Kevin Yates <clearwatermitigation@gmail.com>; Grant Lewis <glewis@axiomenvironmental.org>
Subject: [EXTERNAL] Bull Chute Mitigation Site

Ms. Matthews
Clearwater Mitigation Solutions, of Raleigh, NC has been awarded a contract by DMS to provide 7583 Stream Mitigation Units and 4.1 Wetland Mitigation Units at the Bull Chute Stream & Wetland Mitigation Site, Randolph County, North Carolina. One of the earliest tasks to be performed is completion of an environmental screening and preparation/submittal of a Categorical Exclusion (CE) document. The last outstanding item for the CE and purpose of attached letter is to request concurrence from the US Fish & Wildlife Service concerning federally protected species biological conclusions for the Site.

Please let us know if you have any questions or if you would like any additional information.
Thank you,
Corri

Corri Faquin
AXIOM ENVIRONMENTAL, INC
218 Snow Avenue
Raleigh, NC 27603
919-414-2471
cfaquin@axiomenvironmental.org
axiomenvironmental.org

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Raleigh ES Field Office
551-F Pylon Drive
Raleigh, North Carolina 27606

April 6, 2020

Kim Browning
U.S. Army Corps of Engineers, Wilmington District
Mitigation Field Office
3331 Heritage Trade Drive, Suite 105
Wake Forest, NC 27587

Re: NCDMS Bull Chute Mitigation Site / SAW-2020-00049/ Randolph County

Dear Mrs. Browning:

The U.S. Fish and Wildlife Service (Service) has reviewed the project advertised in the above referenced Public Notice. The project, as advertised in the Public Notice, is expected to have minimal adverse impacts to fish and wildlife resources. Therefore, we have no objection to the activity as described in the permit application.

In accordance with the Endangered Species Act of 1973, as amended, (ESA) and based on the information provided, and other available information, it appears the action is not likely to adversely affect federally listed species or their critical habitat as defined by the ESA. We believe that the requirements of section 7 (a)(2) of the ESA have been satisfied for this project. Please remember that obligations under the ESA must be reconsidered if: (1) new information identifies impacts of this action that may affect listed species or critical habitat in a manner not previously considered; (2) this action is modified in a manner that was not considered in this review; or, (3) a new species is listed or critical habitat determined that may be affected by the identified action.

For your convenience a list of all federally protected endangered and threatened species in North Carolina is now available on our website at <http://www.fws.gov/raleigh>. Our web page contains a complete and updated list of federally protected species, and a list of federal species of concern known to occur in each county in North Carolina.

The Service appreciates the opportunity to review and provide comments on the proposed action. Should you have any questions regarding the project, please contact John Ellis at (919) 856-4520, extension 26.

Sincerely,

for Pete Benjamin,
Field Supervisor

cc: NMFS, Beaufort, NC
EPA, Atlanta, GA
WRC, Raleigh

LAND OWNER UNIFORM ACT
NOTIFICATION

CONSERVATION EASEMENT OPTION AGREEMENT

THIS CONSERVATION EASEMENT OPTION AGREEMENT, hereinafter referred to as ("the Option**")**, made and entered into this 25th day of July, 2019 by and between, Barry B. Spencer and Regina H. Spencer ,(the"**Grantor**"), **CLEARWATER MITIGATION SOLUTIONS, LLC** ("CMS"), a North Carolina Limited Liability Company whose primary address is 604 Macon Place, NC 27609 and its successors and assigns (the "**Grantee**").

WITNESSETH

WHEREAS, **Grantor** is the owner of certain real property located in Randolph County, containing 86.43 acres, more or less. The real property is more particularly described as follows: A tract or parcel of land identified in Deed Book 002260 Page No. 00218 and Parcel Identification Numbers (PIN), 7736611524, Randolph County Registry, (the "Property");and

WHEREAS, **Grantor** has agreed to convey to **Grantee**, an exclusive right and option to acquire conservation easement rights similar to those described in the Sample Deed of Conservation Easement attached hereto as Addendum A , containing 5.0 acres, more or less, as more particularly described on the attached Exhibit A (the "**Easement Area**"), over the Property in accordance with the terms of this Option; and

WHEREAS, **Grantee** is interested in acquiring the **Easement Area** in order to develop a stream restoration project ("Project") over the lands covered by the **Easement Area** in conjunction with requests for proposals issued under the North Carolina Division of Mitigation Services within the North Carolina Department of Environmental Quality ("DEQ")

WHEREAS, Lands and the rights to be acquired, within the **Easement Area**, are described as follows: Being a perpetual Conservation Easement that will permanently protect the restoration enhancement or preservation of property containing streams, wetlands, and riparian buffers, located on the Property, in Randolph County, North Carolina. The **Easement Area** encompasses acreage shown in Exhibit A attached.

WHEREAS, in accordance with the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, CMS hereby notifies Grantor that: (i) CMS believes the fair market value of the Easement is the purchase price, pursuant to Paragraph 4(a) together with the value of the environmental improvements to be made to the Easement by CMS in performing the Work on the Easement; and (ii) CMS does not possess the power of eminent domain;

NOW THEREFORE, in consideration of the sum of [redacted] (the "**Option Deposit**") and for other good and valuable consideration, the receipt and sufficiency of which is hereby acknowledged, the parties hereto agree as follows:

1. **OPTION PERIOD**. **Grantee** may exercise the Option by delivering to **Grantor** notice thereof prior to 5:00 p.m. on July 25th 2020 (the "O**riginal Option Period**"). This Option shall be exercised upon posting, by certified mail, fax or written notice to the **Grantor.** Exercise shall be deemed timely if such written notice is mailed on or before the date first set forth in this paragraph. Grantee shall have the right in its sole discretion, for additional consideration of [redacted] which shall be added to and become part of the total purchase and upon Grantee's delivery of notice to Grantor during the Original Option Period, to extend the Original Option Period until 5:00 p.m. on July 25th 2021 (the "**Extended Option Period**") (the Original Option Period and, if applicable, the Extended Option Period are collectively referred to herein as the "***Option Period***"). A Memorandum of Conservation Easement Option in the form attached as EXHIBIT B shall be executed by both parties simultaneously with this Option and recorded at Clearwater Mitigation Solutions, LLC sole discretion and expense in the county where the Property is located to provide record notice of this Option.

CONSERVATION EASEMENT OPTION AGREEMENT

THIS CONSERVATION EASEMENT OPTION AGREEMENT, hereinafter referred to as ("the Option**")**, made and entered into this 25th day of July , 2019 by and between, Curtis A. Redding (the"**Grantor**"), **CLEARWATER MITIGATION SOLUTIONS, LLC** ("CMS"), a North Carolina Limited Liability Company whose primary address is 604 Macon Place, NC 27609 and its successors and assigns (the "**Grantee**").

WITNESSETH

WHEREAS, **Grantor** is the owner of certain real property located in Randolph County, containing 20.94 acres, more or less. The real property is more particularly described as follows: A tract or parcel of land identified in Deed Book 001416 Page No. 0154 and Parcel Identification Numbers (PIN), 7735691887, Randolph County Registry, (the "Property");and

WHEREAS, **Grantor** has agreed to convey to **Grantee**, an exclusive right and option to acquire conservation easement rights similar to those described in the Sample Deed of Conservation Easement attached hereto as Addendum A , containing 3.40 acres, more or less, as more particularly described on the attached Exhibit A (the "**Easement Area**"), over the Property in accordance with the terms of this Option; and

WHEREAS, **Grantee** is interested in acquiring the **Easement Area** in order to develop a stream restoration project ("Project") over the lands covered by the **Easement Area** in conjunction with requests for proposals issued under the North Carolina Division of Mitigation Services within the North Carolina Department of Environmental Quality ("DEQ")

WHEREAS, Lands and the rights to be acquired, within the **Easement Area**, are described as follows: Being a perpetual Conservation Easement that will permanently protect the restoration enhancement or preservation of property containing streams, wetlands, and riparian buffers, located on the Property, in Randolph County, North Carolina. The **Easement Area** encompasses acreage shown in Exhibit A attached.

WHEREAS, in accordance with the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, CMS hereby notifies Grantor that: (i) CMS believes the fair market value of the Easement is the purchase price, pursuant to Paragraph 4(a) together with the value of the environmental improvements to be made to the Easement by CMS in performing the Work on the Easement; and (ii) CMS does not possess the power of eminent domain;

NOW THEREFORE, in consideration of the sum of [redacted] (the "**Option Deposit**") and for other good and valuable consideration, the receipt and sufficiency of which is hereby acknowledged, the parties hereto agree as follows:

1. **OPTION PERIOD**. **Grantee** may exercise the Option by delivering to **Grantor** notice thereof prior to 5:00 p.m. on July 25th 2020 (the "O**riginal Option Period**"). This Option shall be exercised upon posting, by certified mail, fax or written notice to the **Grantor.** Exercise shall be deemed timely if such written notice is mailed on or before the date first set forth in this paragraph. Grantee shall have the right in its sole discretion, for additional consideration of [redacted] which shall be added to and become part of the total purchase and upon Grantee's delivery of notice to Grantor during the Original Option Period, to extend the Original Option Period until 5:00 p.m. on July 25th 2021 (the "**Extended Option Period**") (the Original Option Period and, if applicable, the Extended Option Period are collectively referred to herein as the "***Option Period***"). A Memorandum of Conservation Easement Option in the form attached as EXHIBIT B shall be executed by both parties simultaneously with this Option and recorded at Clearwater Mitigation Solutions, LLC sole discretion and expense in the county where the Property is located to provide record notice of this Option.

CONSERVATION EASEMENT OPTION AGREEMENT

THIS CONSERVATION EASEMENT OPTION AGREEMENT, hereinafter referred to as ("the Option**")**, made and entered into this 25th day of July , 2019 by and between, David Lee Shipton and Beverly Shipton (the"**Grantor**"), **CLEARWATER MITIGATION SOLUTIONS, LLC** ("CMS"), a North Carolina Limited Liability Company whose primary address is 604 Macon Place, NC 27609 and its successors and assigns (the "**Grantee**").

WITNESSETH

WHEREAS, **Grantor** is the owner of certain real property located in Randolph County, containing 40.93 acres, more or less. The real property is more particularly described as follows: A tract or parcel of land identified in Deed Book 001713 Page No. 0504 and Parcel Identification Numbers (PIN), 7735882804, Randolph County Registry, (the "Property");and

WHEREAS, **Grantor** has agreed to convey to **Grantee**, an exclusive right and option to acquire conservation easement rights similar to those described in the Sample Deed of Conservation Easement attached hereto as Addendum A , containing 3.70 acres, more or less, as more particularly described on the attached Exhibit A (the "**Easement Area**"), over the Property in accordance with the terms of this Option; and

WHEREAS, **Grantee** is interested in acquiring the **Easement Area** in order to develop a stream restoration project ("Project") over the lands covered by the **Easement Area** in conjunction with requests for proposals issued under the North Carolina Division of Mitigation Services within the North Carolina Department of Environmental Quality ("DEQ")

WHEREAS, Lands and the rights to be acquired, within the **Easement Area**, are described as follows: Being a perpetual Conservation Easement that will permanently protect the restoration enhancement or preservation of property containing streams, wetlands, and riparian buffers, located on the Property, in Randolph County, North Carolina. The **Easement Area** encompasses acreage shown in Exhibit A attached.

WHEREAS, in accordance with the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, CMS hereby notifies Grantor that: (i) CMS believes the fair market value of the Easement is the purchase price, pursuant to Paragraph 4(a) together with the value of the environmental improvements to be made to the Easement by CMS in performing the Work on the Easement; and (ii) CMS does not possess the power of eminent domain;

NOW THEREFORE, in consideration of the sum of [redacted] (the "**Option Deposit**") and for other good and valuable consideration, the receipt and sufficiency of which is hereby acknowledged, the parties hereto agree as follows:

1. **OPTION PERIOD**. **Grantee** may exercise the Option by delivering to **Grantor** notice thereof prior to 5:00 p.m. on July 25th 2020 (the "O**riginal Option Period**"). This Option shall be exercised upon posting, by certified mail, fax or written notice to the **Grantor.** Exercise shall be deemed timely if such written notice is mailed on or before the date first set forth in this paragraph. Grantee shall have the right in its sole discretion, for additional consideration of [redacted] which shall be added to and become part of the total purchase and upon Grantee's delivery of notice to Grantor during the Original Option Period, to extend the Original Option Period until 5:00 p.m. on July 25th 2021 (the "**Extended Option Period**") (the Original Option Period and, if applicable, the Extended Option Period are collectively referred to herein as the "***Option Period***"). A Memorandum of Conservation Easement Option in the form attached as EXHIBIT B shall be executed by both parties simultaneously with this Option and recorded at Clearwater Mitigation Solutions, LLC sole discretion and expense in the county where the Property is located to provide record notice of this Option.

CONSERVATION EASEMENT OPTION AGREEMENT

THIS CONSERVATION EASEMENT OPTION AGREEMENT, hereinafter referred to as ("the Option**")**, made and entered into this 30th day of July , 2019 by and between, Susan Redding Jones and Bert Jones (the"**Grantor**"), **CLEARWATER MITIGATION SOLUTIONS, LLC** ("CMS"), a North Carolina Limited Liability Company whose primary address is 604 Macon Place, Raleigh, NC 27609 and its successors and assigns (the "**Grantee**").

WITNESSETH

WHEREAS, **Grantor** is the owner of certain real property located in Randolph County, containing 56.77 acres, more or less. The real property is more particularly described as follows: A tract or parcel of land identified in Deed Book 001856 Page No. 2359 and Parcel Identification Numbers (PIN), 7736807108, Randolph County Registry, (the "Property");and

WHEREAS, **Grantor** has agreed to convey to **Grantee**, an exclusive right and option to acquire conservation easement rights similar to those described in the Sample Deed of Conservation Easement attached hereto as Addendum A , containing 7.30 acres, more or less, as more particularly described on the attached Exhibit A (the "**Easement Area**"), over the Property in accordance with the terms of this Option; and

WHEREAS, **Grantee** is interested in acquiring the **Easement Area** in order to develop a stream restoration project ("Project") over the lands covered by the **Easement Area** in conjunction with requests for proposals issued under the North Carolina Division of Mitigation Services within the North Carolina Department of Environmental Quality ("DEQ")

WHEREAS, Lands and the rights to be acquired, within the **Easement Area**, are described as follows: Being a perpetual Conservation Easement that will permanently protect the restoration enhancement or preservation of property containing streams, wetlands, and riparian buffers, located on the Property, in Randolph County, North Carolina. The **Easement Area** encompasses acreage shown in Exhibit A attached.

WHEREAS, in accordance with the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, CMS hereby notifies Grantor that: (i) CMS believes the fair market value of the Easement is the purchase price, pursuant to Paragraph 4(a) together with the value of the environmental improvements to be made to the Easement by CMS in performing the Work on the Easement; and (ii) CMS does not possess the power of eminent domain;

NOW THEREFORE, in consideration of the sum of [redacted] (the "**Option Deposit**") and for other good and valuable consideration, the receipt and sufficiency of which is hereby acknowledged, the parties hereto agree as follows:

1. **OPTION PERIOD**. **Grantee** may exercise the Option by delivering to **Grantor** notice thereof prior to 5:00 p.m. on July 30th 2020 (the "O**riginal Option Period**"). This Option shall be exercised upon posting, by certified mail, fax or written notice to the **Grantor.** Exercise shall be deemed timely if such written notice is mailed on or before the date first set forth in this paragraph. Grantee shall have the right in its sole discretion, for additional consideration of [redacted] which shall be added to and become part of the total purchase and upon Grantee's delivery of notice to Grantor during the Original Option Period, to extend the Original Option Period until 5:00 p.m. on July 30th 2021 (the "**Extended Option Period**") (the Original Option Period and, if applicable, the Extended Option Period are collectively referred to herein as the "***Option Period***"). A Memorandum of Conservation Easement Option in the form attached as EXHIBIT B shall be executed by both parties simultaneously with this Option and recorded at Clearwater Mitigation Solutions, LLC sole discretion and expense in the county where the Property is located to provide record notice of this Option.

Appendix F
FEMA Coordination and HEC-RAS Modeling Report

From:	Grant Lewis
To:	"Eric.Martin@randolphcountync.gov"
Subject:	Bull Chute FEMA coordination
Date:	Tuesday, August 25, 2020 12:24:00 PM
Attachments:	FEMA.pdf

Hello Eric;

I am doing a stream and wetland restoration project in Randolph County and need to coordinate with
you all concerning floodplain mapping. The project is being conducted with the NC Division of Mitigation Services. Part of the due diligence is getting a DMS floodplain checklist signed by the local floodplain administrator. I looked on the Randolph County website and believe you are the proper person to coordinate with. If not, can you please forward this to the proper authority?

For my coordination, can you please review the attached information and sign/fill out the last page of the NCDMS floodplain checklist and return to my attention?

Thank you for your time.
Grant Lewis

Grant Lewis
Senior Project Manager
Axiom Environmental, Inc.
218 Snow Avenue
Raleigh, North Carolina 27603
glewis@axiomenvironmental.org
(919) 215-1693 (cell)

Axiom Environmental, Inc.

218 Snow Avenue, Raleigh, North Carolina 27603 919-215-1693

August 25, 2020

Eric Martin
Randolph County Deputy Zoning Administrator
204 E. Academy Street
Asheboro, NC 27203

Re: Bull Chute Stream and Wetland mitigation project
Randolph County **20-006**
FEMA Floodplain Requirements Checklist

Dear Mr. Martin:

The purpose of this letter is to request concurrence from the Randolph County concerning a stream and wetland restoration site located in Randolph County. The Site encompasses approximately 32.4 acres of agriculture land used for row crops along unnamed tributaries to Caraway Creek. Proposed activities at the Site include the restoration of perennial stream channels and riparian wetlands.

Stream reaches are depicted on the attached figures and lengths/priority are as follows:

Reach	**Length**	**Priority**
UT 1	3020	Restoration and Enhancement (Level I and II)
UT 2	590	Enhancement (Level II)
UT 3	1860	Restoration and Enhancement (Level III)
UT 4	2485	Restoration
UT 4A	410	Restoration
UT 4B	295	Restoration
UT 4C	180	Enhancement (Level II)
UT 5	80	Restoration and Enhancement (Level III)
UT 6	120	Enhancement (Level III)
UT 7	145	Enhancement (Level II)

FEMA mapping was reviewed to determine if the project is located in a FEMA study area (DFIRM panel number 7735). Based on existing floodplain mapping, Site tributaries and floodplains are characterized as a Zone X (minima flood risk). We request guidance from your organization as to how to mover forward with the project.

We thank you in advance for your timely response and cooperation. Please feel free to contact the below referenced NC DMS Project Manager with any questions that you may have concerning the extent of site disturbance associated with this project.

Yours truly,

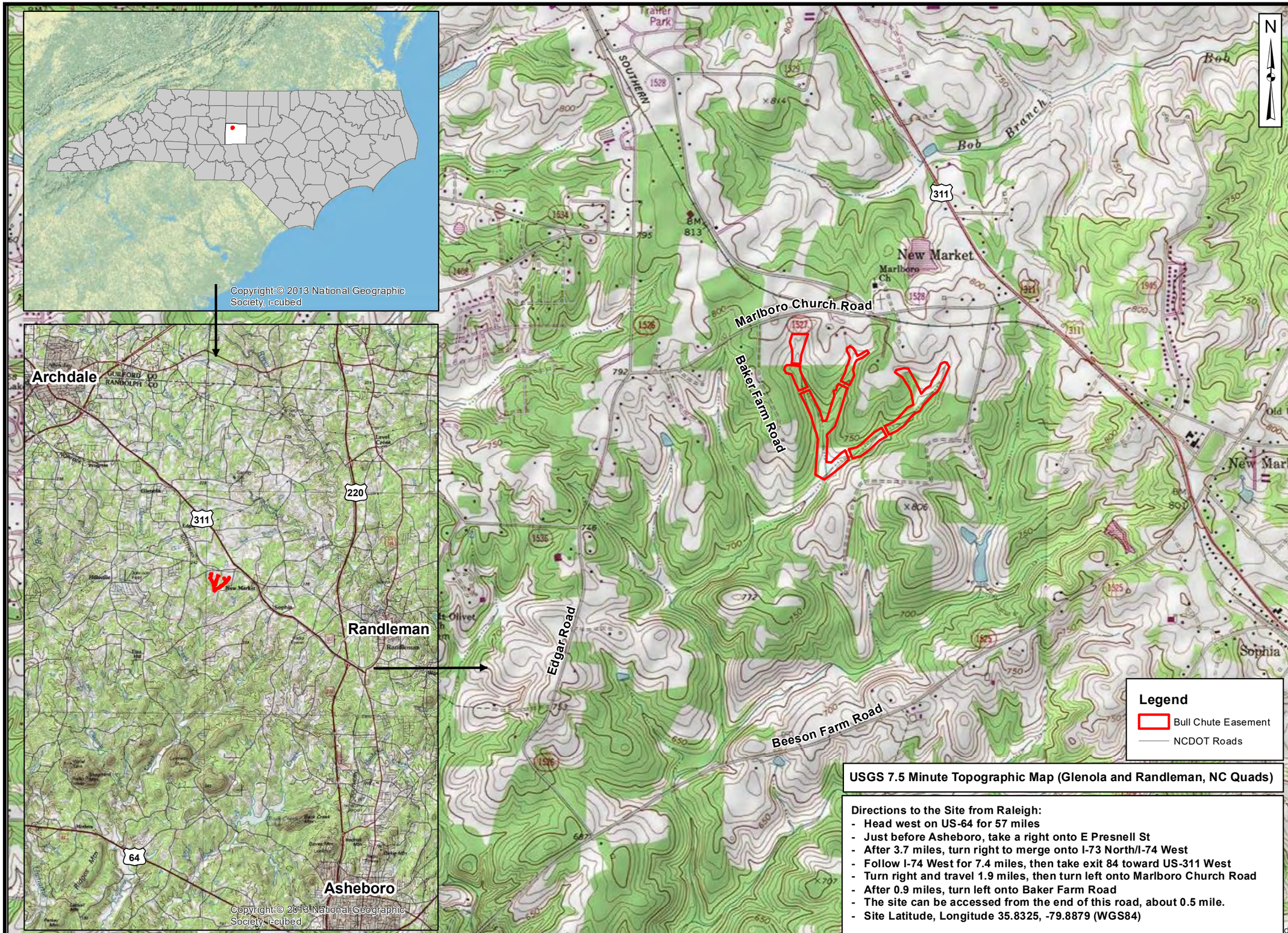
AXIOM ENVIRONMENTAL

W Grant Lewis

W. Grant Lewis
Senior Project Manager

Attachments

- Figure 1 Site Location
- Figure 2 Hydrologic Unit Map
- Figure 3 Topography and Drainage Area
- Figure 4 Existing Conditions
- Figure 5 LiDAR Mapping
- Figures 6A-6C Proposed Conditions
- EEP Floodplain Requirements Checklist



USGS 7.5 Minute Topographic Map (Glenola and Randleman, NC Quads)

Directions to the Site from Raleigh:

- Head west on US-64 for 57 miles
- Just before Asheboro, take a right onto E Presnell St
- After 3.7 miles, turn right to merge onto I-73 North/I-74 West
- Follow I-74 West for 7.4 miles, then take exit 84 toward US-311 West
- Turn right and travel 1.9 miles, then turn left onto Marlboro Church Road
- After 0.9 miles, turn left onto Baker Farm Road
- The site can be accessed from the end of this road, about 0.5 mile.
- Site Latitude, Longitude 35.8325, -79.8879 (WGS84)

Axiom Environmental, Inc.

Prepared for:

CLEARWATER MITIGATION SOLUTIONS

Project:

BULL CHUTE MITIGATION SITE

Randolph County, NC

Title:

SITE LOCATION

Drawn by: KRJ

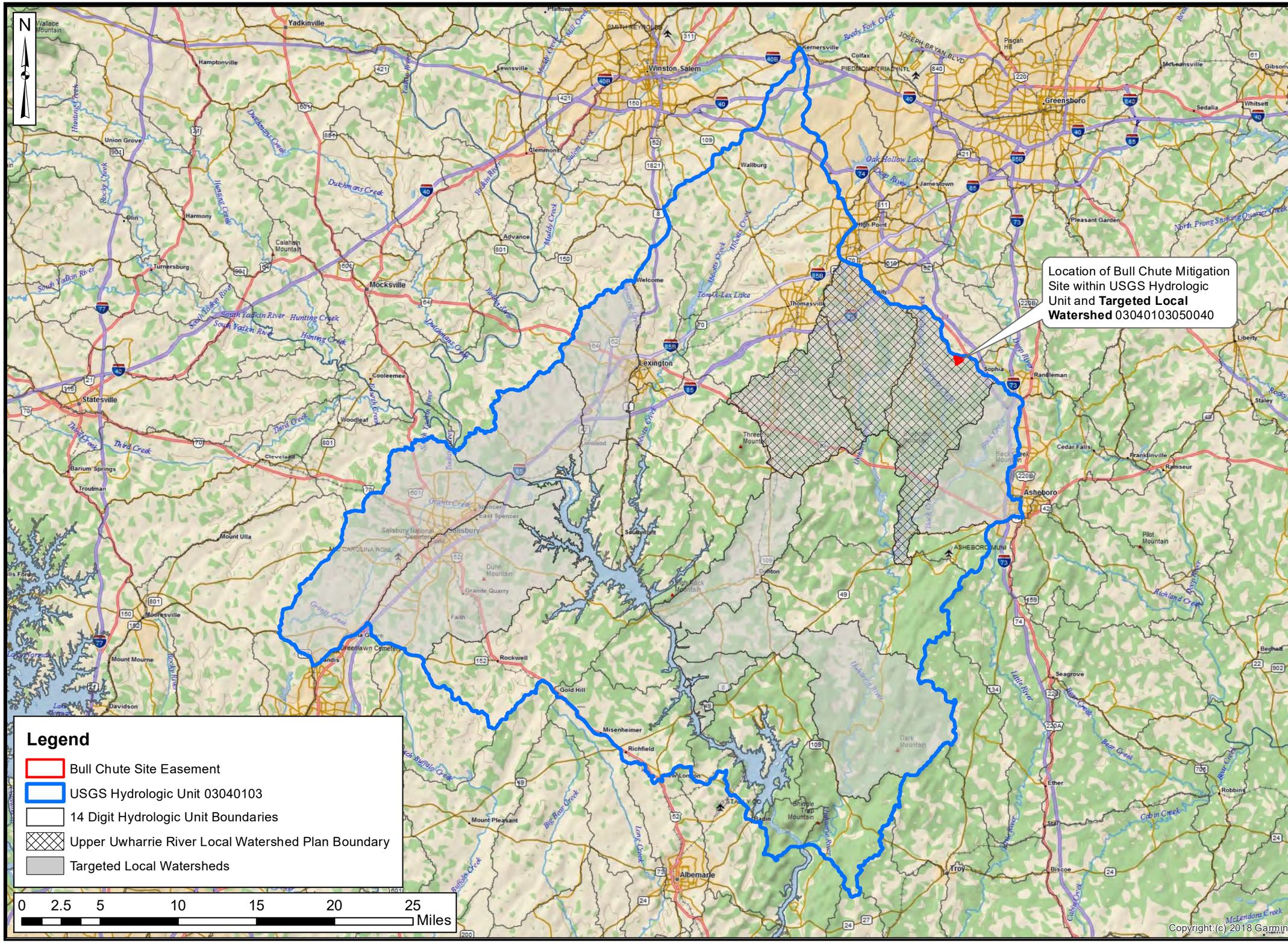
Date: FEB 2020

Scale: 1:20,000

Project No.: 20-006

FIGURE

1



Axiom Environmental, Inc.

Prepared for:

CLEARWATER MITIGATION SOLUTIONS

Project:

BULL CHUTE MITIGATION SITE

Randolph County, NC

Title:

HYDROLOGIC UNIT MAP

Drawn by: KRJ

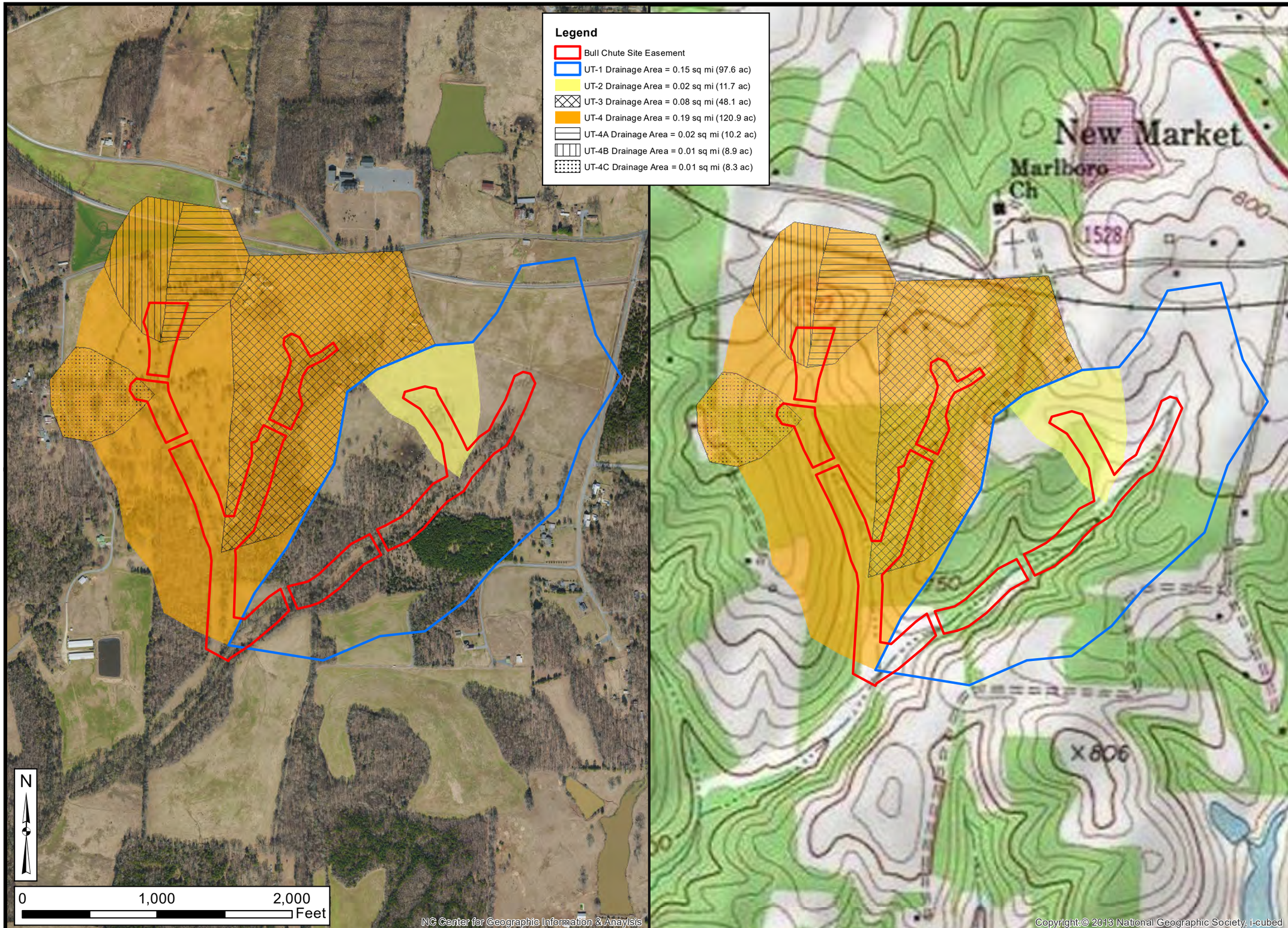
Date: FEB 2020

Scale: 1:370,000

Project No.: 20-006

FIGURE

2



Axiom Environmental, Inc.

Prepared for:

CLEARWATER MITIGATION SOLUTIONS

Project:

BULL CHUTE MITIGATION SITE

Randolph County, NC

Title:

TOPOGRAPHY AND DRAINAGE AREA

Drawn by: KRJ

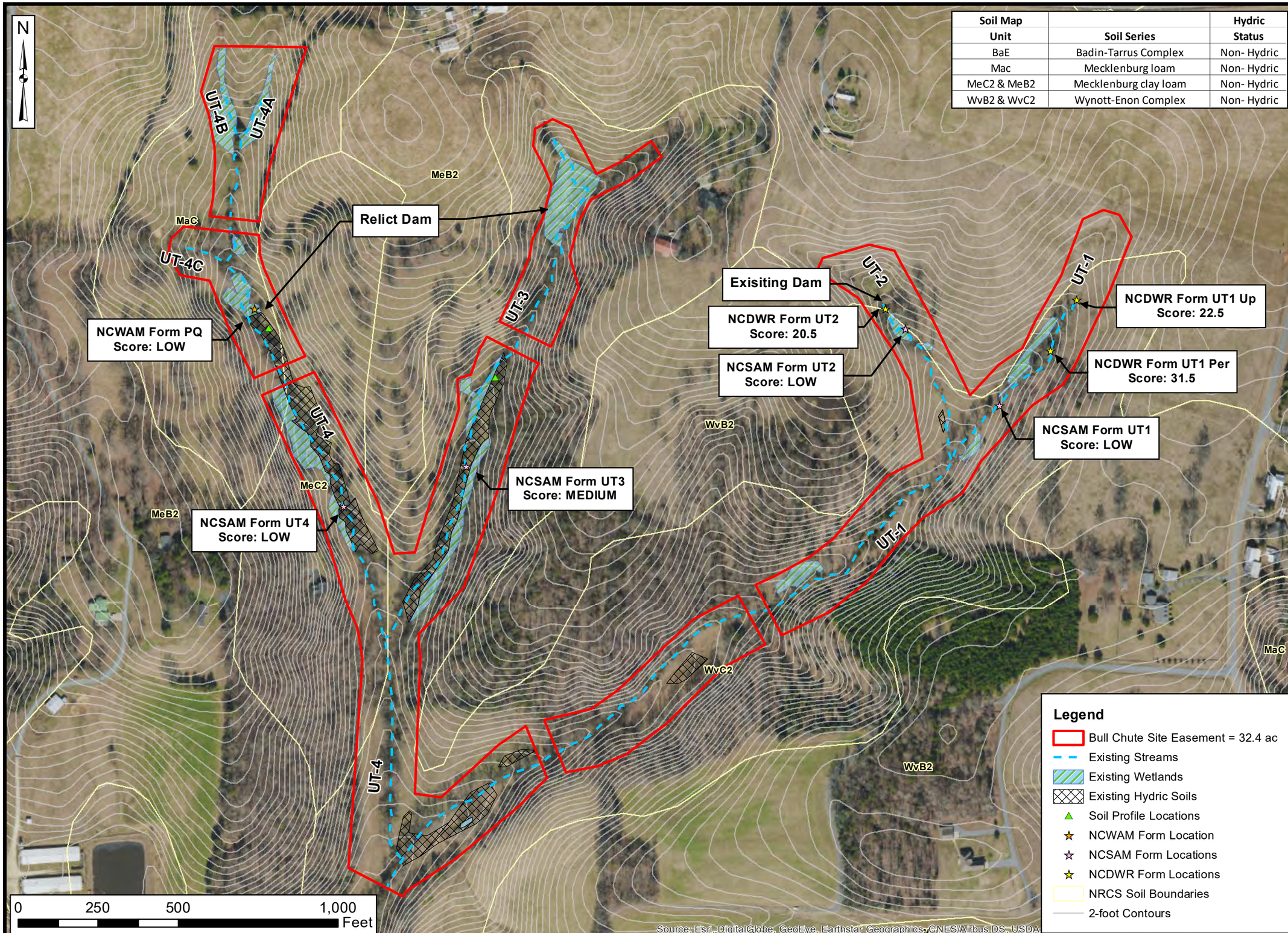
Date: FEB 2020

Scale: 1:8100

Project No.: 20-006

FIGURE

3



Soil Map Unit	Soil Series	Hydric Status
BaE	Badin-Tarrus Complex	Non- Hydric
Mac	Mecklenburg loam	Non- Hydric
MeC2 & MeB2	Mecklenburg clay loam	Non- Hydric
WvB2 & WvC2	Wynott-Enon Complex	Non- Hydric

Axiom Environmental, Inc.

Prepared for:

CLEARWATER MITIGATION SOLUTIONS

Project:

BULL CHUTE MITIGATION SITE

Randolph County, NC

Title:

EXISTING CONDITIONS AND SOILS

Drawn by: KRJ

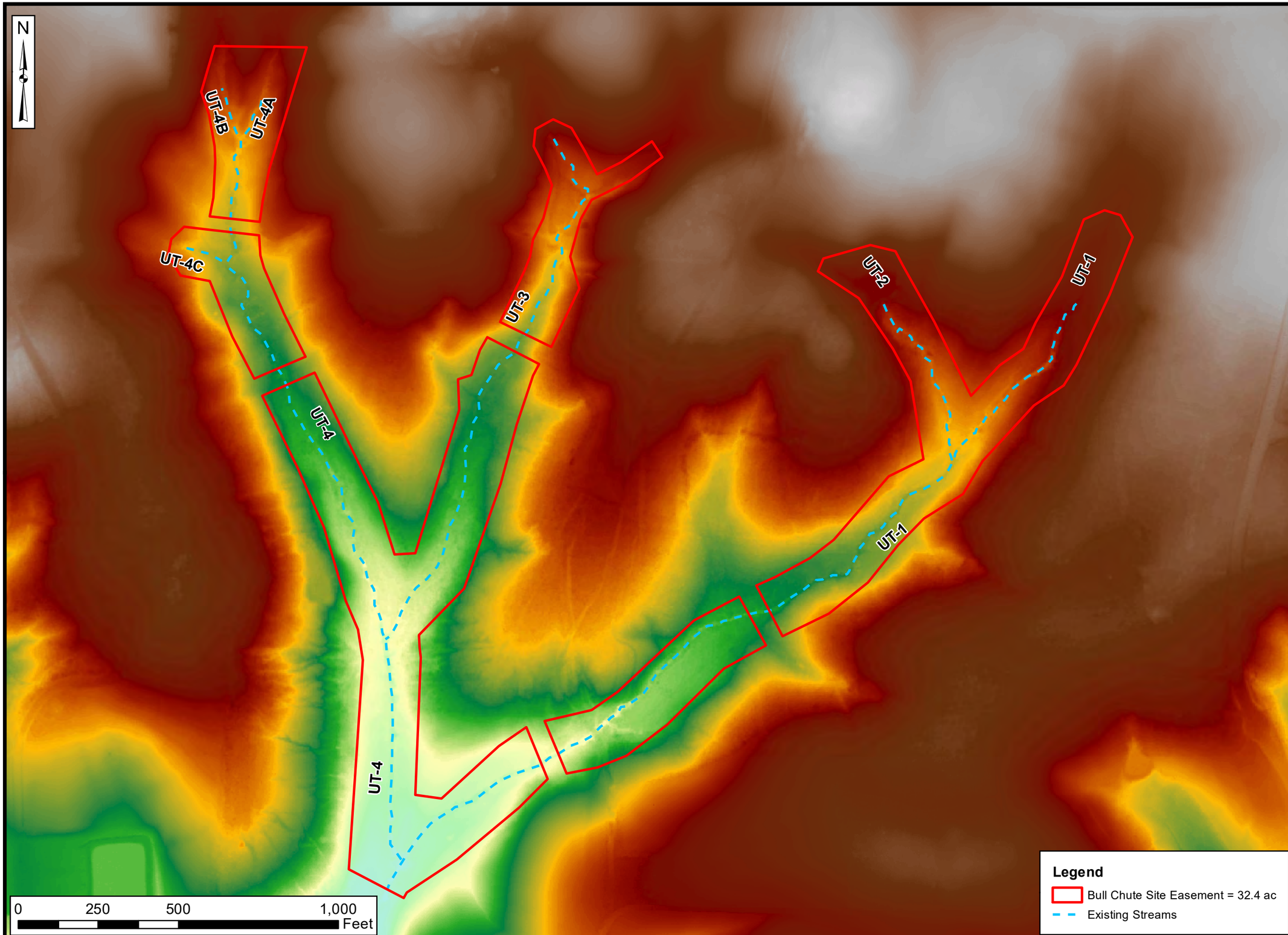
Date: FEB 2020

Scale: 1:3500

Project No.: 20-006

FIGURE

4



Axiom Environmental, Inc.

Prepared for:

CLEARWATER MITIGATION SOLUTIONS

Project:

BULL CHUTE MITIGATION SITE

Randolph County, NC

Title:

LIDAR DEM MAP

Drawn by: KRJ

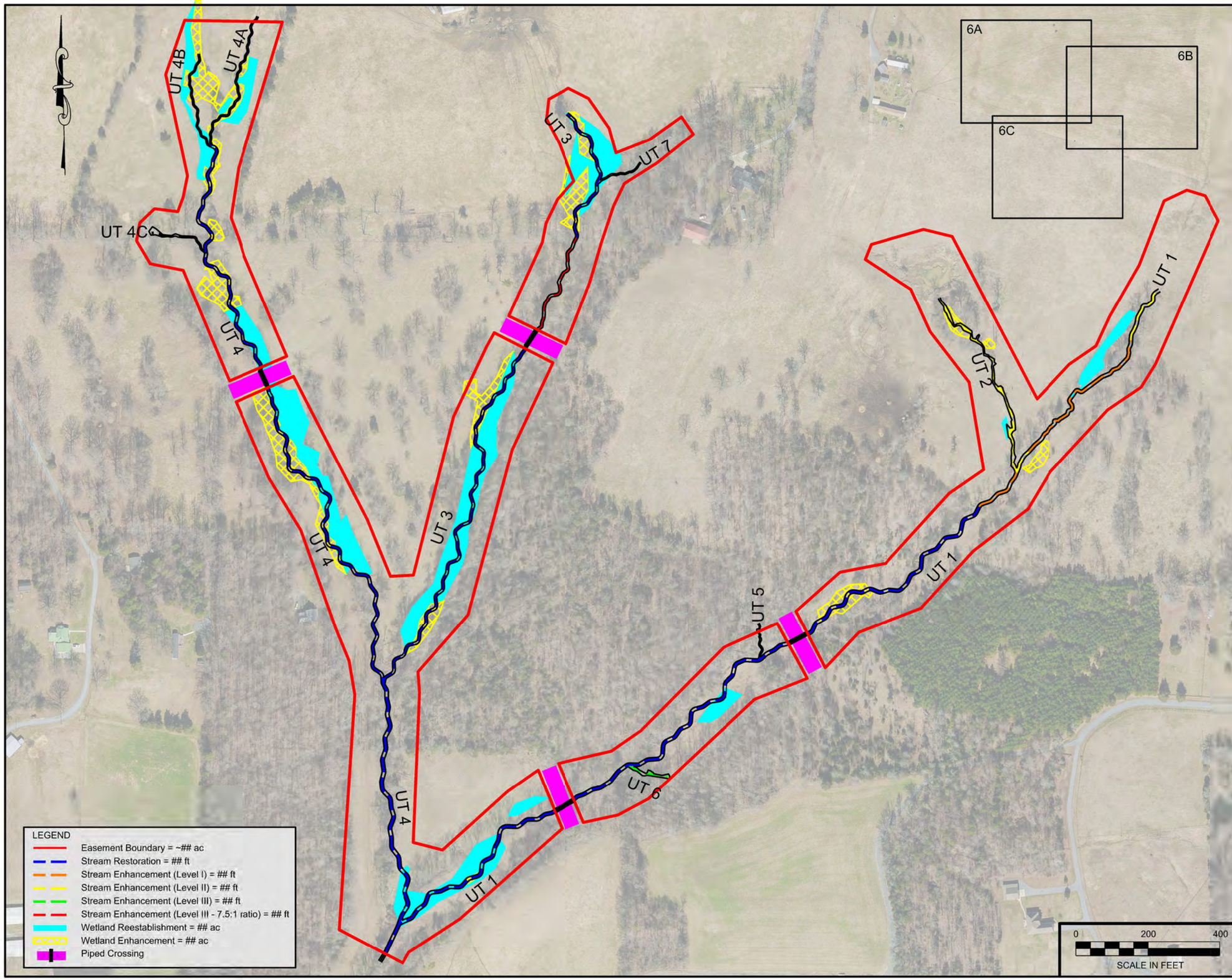
Date: AUG 2019

Scale: 1:5500

Project No.: 20-006

FIGURE

5



Axiom Environmental, Inc.

CLEARWATER
MITIGATION
SOLUTIONS

NOTES/REVISIONS

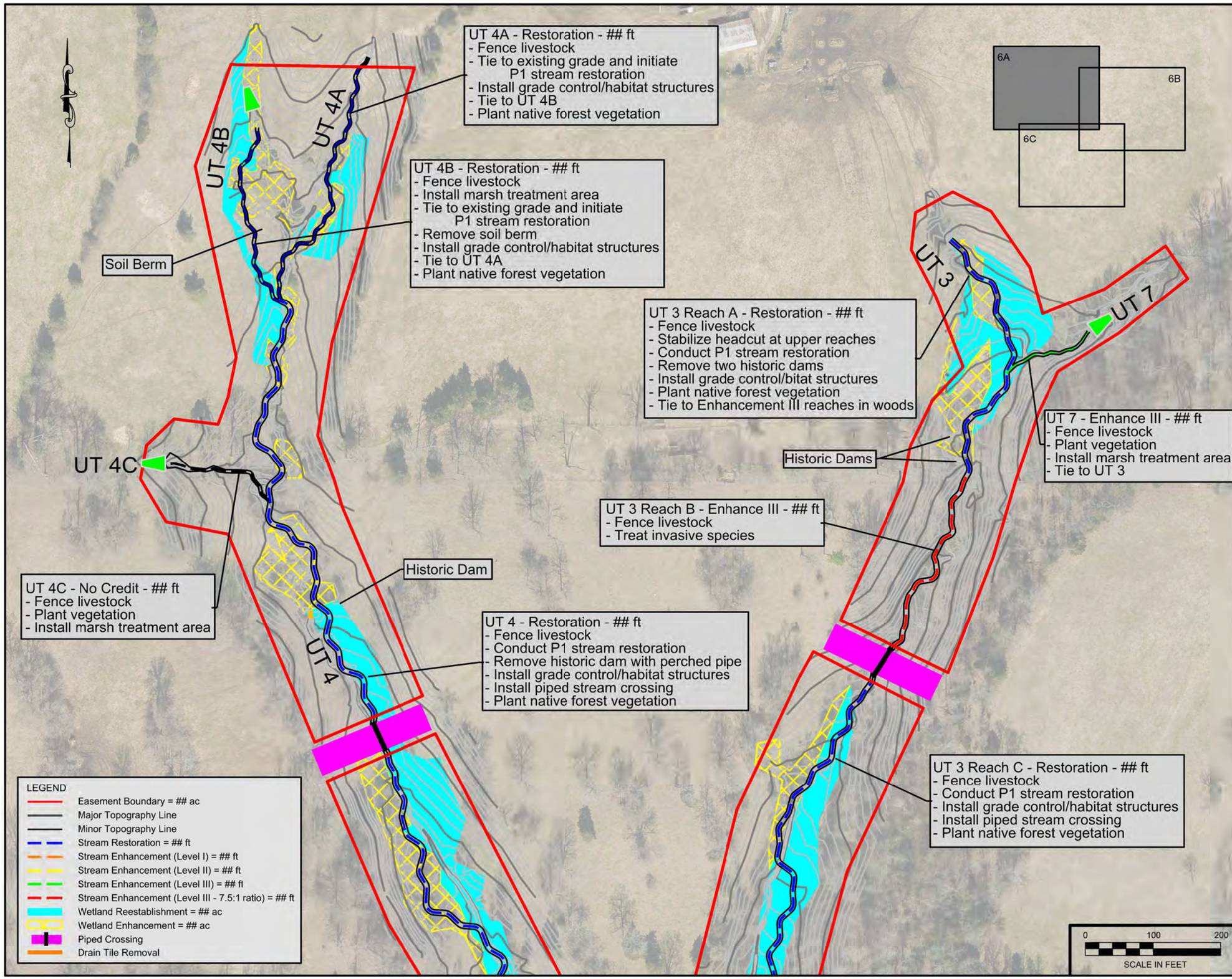
Project:

Bull Chute
Mitigation Site
Randolph County
North Carolina

Title:

Restoration
Plan

Scale: As Shown	FIGURE NO.
Date: Aug 2020	6
Project No.: 20-006	



Axiom Environmental, Inc.

CLEARWATER MITIGATION SOLUTIONS

NOTES/REVISIONS

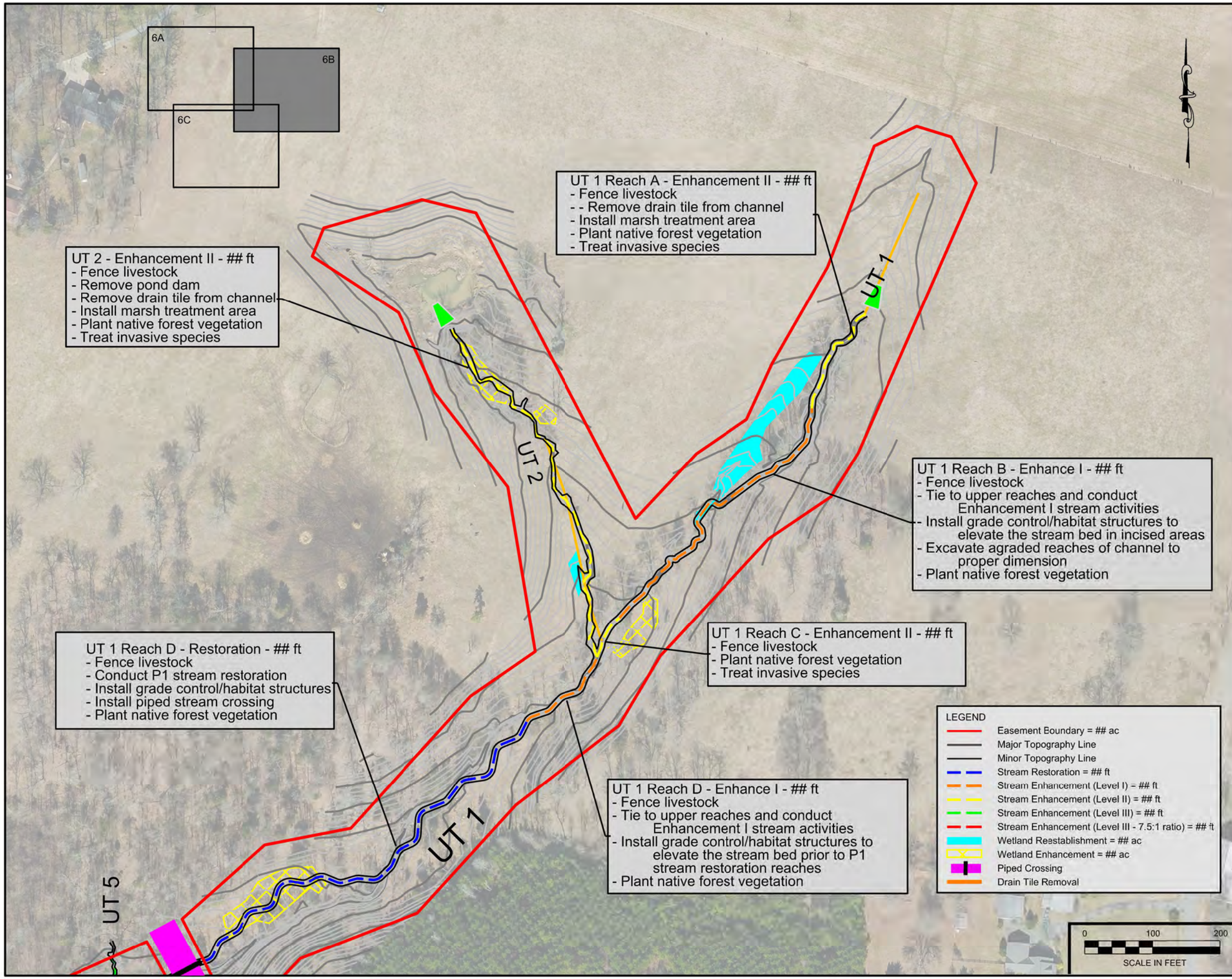
Project:

Bull Chute Mitigation Site
Randolph County
North Carolina

Title:

Restoration Plan

Scale: As Shown	FIGURE NO.
Date: Aug 2020	6A
Project No.: 20-006	



Axiom Environmental, Inc.

CLEARWATER MITIGATION SOLUTIONS

NOTES/REVISIONS

Project:

Bull Chute Mitigation Site
Randolph County
North Carolina

Title:

Restoration Plan

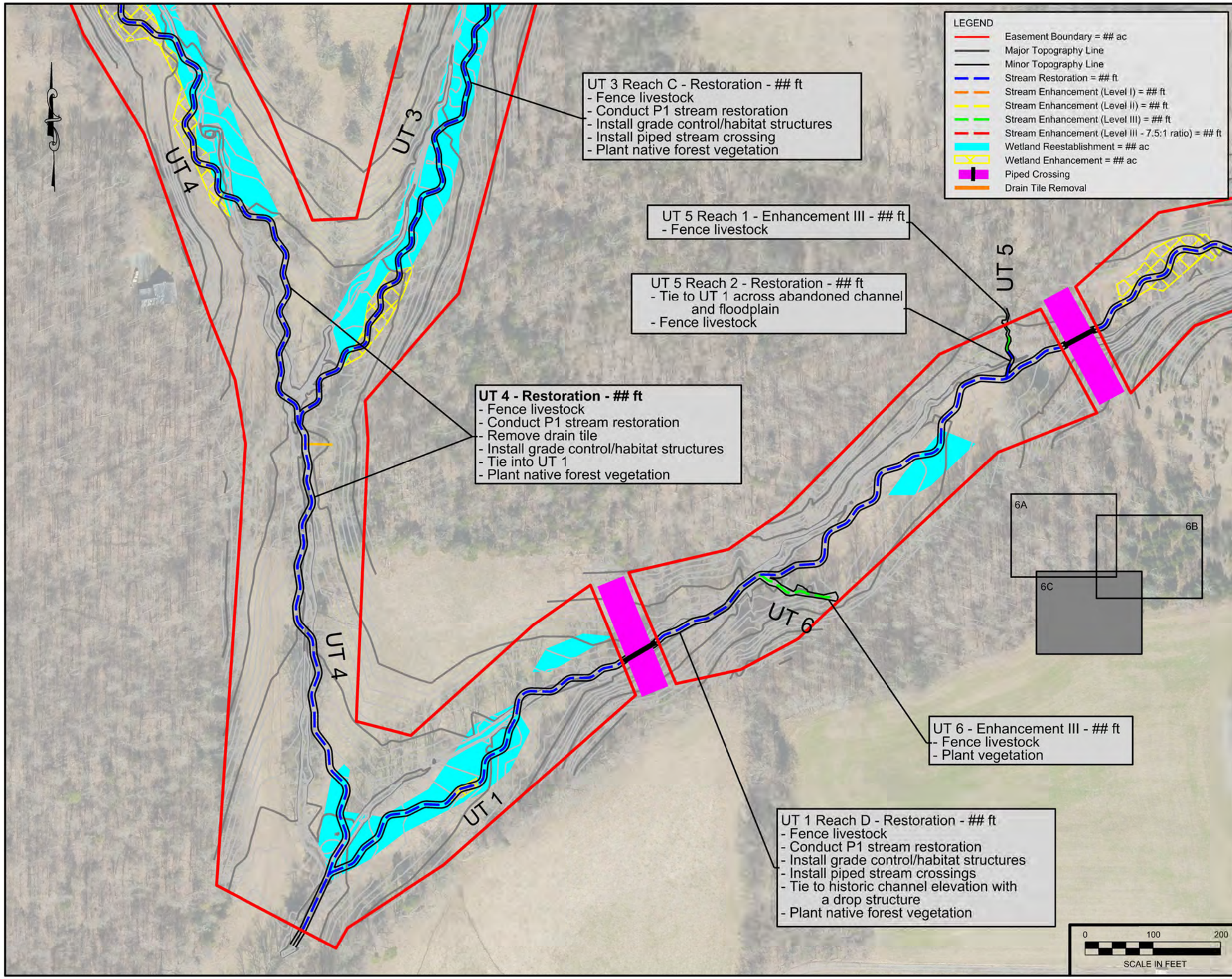
Scale: As Shown

Date: Aug 2020

Project No.: 20-006

FIGURE NO.

6B



Axiom Environmental, Inc.

CLEARWATER MITIGATION SOLUTIONS

NOTES/REVISIONS

Project:

Bull Chute Mitigation Site
Randolph County
North Carolina

Title:

Restoration Plan

Scale: As Shown	FIGURE NO.
Date: Aug 2020	6C
Project No.: 20-006	

EEP Floodplain Requirements Checklist

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

Project Location

Name of project:	Bull Chute Site
Name if stream or feature:	Unnamed Tributaries to Caraway Creek
County:	Randolph
Name of river basin:	Yadkin
Is project urban or rural?	Rural
Name of Jurisdictional municipality/county:	Sophia
DFIRM panel number for entire site:	7735
Consultant name:	Axiom Environmental, Inc.
Phone number:	919-215-1693
Address:	218 Snow Avenue Raleigh, NC 27603

Design Information

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

Summarize stream reaches or wetland areas according to their restoration priority.
(See Attached)

Example

Reach	Length	Priority
Example: Reach A	*1000*	*One (Restoration)*
Example: Reach B	*2000*	*Three (Enhancement)*

Floodplain Information

Is project located in a Special Flood Hazard Area (SFHA)?

○ Yes ◉ No

If project is located in a SFHA, check how it was determined:

☐ Redelineation

☐ Detailed Study

☐ Limited Detail Study

☐ Approximate Study

☑ Don't know

List flood zone designation: Zone X (Minimum Flood Risk)

Check if applies:

☐ AE Zone

○ Floodway

○ Non-Encroachment

◉ None

☐ A Zone

○ Local Setbacks Required

○ No Local Setbacks Required

If local setbacks are required, list how many feet:

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

○ Yes ◉ No

Land Acquisition (Check)

☐ State owned (fee simple)

☐ Conservation easment (Design Bid Build)

☑ Conservation Easement (Full Delivery Project)

Note: if the project property is state-owned, then all requirements should be addressed to the Department of Administration, State Construction Office (attn: Herbert Neily, (919) 807-4101)

Is community/county participating in the NFIP program?

◉ Yes ○ No

Note: if community is not participating, then all requirements should be addressed to NFIP (attn: State NFIP Engineer, (919) 715-8000

Name of Local Floodplain Administrator: Eric Martin
Phone Number: 336-318-6553

Floodplain Requirements

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

☐ No Action

☐ No Rise

☐ Letter of Map Revision

☐ Conditional Letter of Map Revision (CLOMR)

☐ Other Requirements

List other requirements:

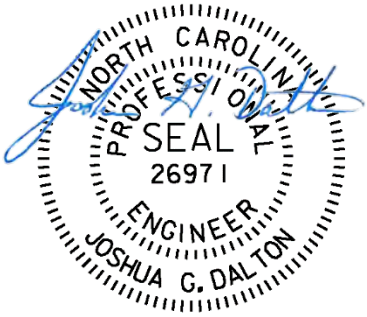
Comments:

Name: W. Grant Lewis Signature: _____

Title: President Date: _____

HEC-RAS MODELING REPORT

Bull Chute Mitigation Site
Randolph County, NC



10/26/2020

PREPARED BY:

SUNGATE DESIGN GROUP, P.A.
905 Jones Franklin Road
Raleigh, NC 27606
Engineering Firm License No. C-0890

HEC-RAS Model Report

The Bull Chute Mitigation Site is a stream and wetland restoration and enhancement project located on six unnamed tributaries to Caraway Creek in Randolph County, NC. The site is located in the Yadkin River Basin and the project site is not located within a FEMA study area. All cross sections of UT-1 were modeled and analyzed in HEC-RAS Version 5.0.7.

Channel shear stress, channel velocity, and Froude's number were used to identify areas that may be susceptible to channel degradation and erosion. MicroStation GEOPAK software was used to create a proposed .TIN file based on the stream restoration design. Cross sections were extracted from the .TIN file using GEOPAK software and imported in HEC-RAS. Cross Sections were taken from every head of riffle, end of riffle, and two locations in each pool within the studied areas. Existing ground survey data was collected by K2 Design Group, PA.

The 2-year, 10-year, and 100-year storm event discharges were calculated using the Rational Method. At most cross sections, the 2-year design discharges overtop the banks and are contained within the floodplain bench. Therefore, the 2-year design discharges were included in the analysis as bankfull flows. Manning's n values were estimated to be 0.035 within the channel and 0.085 for overbank areas during the period between construction and the end of the first full growing season, when a restored stream is most susceptible to failure. Five flow changes were used in the HEC-RAS model and the flow changes occur at each confluence and stream crossing along UT-1. Normal depth at the downstream section was used as the boundary condition for the storm profiles based on existing channel slope.

Results

The model was run without errors. The flow rates, velocities, shear stresses, and Froude numbers were analyzed by station in the table on the following page.

Design guidelines were referenced from USDA Wisconsin's "Engineering Field Handbook (EFH) – Part 650, Chapter 16: Streambank and Shoreline Protection, Companion Document 580-10: Allowable Velocity and Maximum Shear Stress." Under the heading 'Type of treatment', 'Gravel/Cobble (6-inch)' was selected as the criteria for allowable velocity and maximum shear stress. Data on Class A (8") was unable to be found, but maximum shear stress and allowable velocity increase as stone size increases. Therefore, using shear stress and velocities for Gravel/Cobble (6-inch), the design criteria is conservative. The maximum allowable velocity for channels with bed material comprised of cobble and class A-sized (2"-8") material, as is specified in the proposed design, is within the range of 4.0 to 7.5 ft/s. The maximum allowable shear stress is around 2.0 lb/ft^2. Weak hydraulic jumps occur at Froude numbers between 1.7 and 2.5. Discharges that produce values higher than these can become erosive and channel degradation can occur.

Based on these criteria, five locations were noted as having a higher risk of experiencing channel degradation and erosion (relative to other areas on the project). UT-1 maintains non-erosive shear stresses through the 2-year, 10-year, and 100-year storm events. A stream protection device was not proposed at station 2+80, where a weak hydraulic jump was indicated by the Froude number. UT-1 velocities stay within non-erosive range during the 2-year and 10-year storm events and at most stations during the 100-year storm event. Stations 30+55, 31+42, 31+43, and 31+69 exceed the allowable velocity during the 100-year storm event, but are within a proposed

drop structure. The analysis of UT-1 was conducted with the use of conservative Manning's n values from the period when construction occurs until the end of the first full growing season. As vegetation develops, velocities and shear stresses will decrease and resistance to erosion will increase as a result.

Storm Event	UT-1 Station	Q, CFS	V, FPS	τ, PSF	Fr	Protection Provided
2-yr	2+80	23	3.95	0.63	1.76	None
100-yr	30+55	280	7.96	1.86	0.95	Drop Structure
100-yr	31+42	280	7.86	1.77	0.97	Drop Structure
100-yr	31+43	280	7.92	1.72	0.97	Drop Structure
100-yr	31+69	280	7.85	1.61	0.99	Drop Structure

Conclusions

No significant risk of channel degradation, within the construction limits, is indicated by the results. Predicted velocities and shear stresses remain within acceptable limits for the 2-year storm through the 100-year storm at most cross sections. At locations where predicted velocities are above acceptable limits; a structure is proposed. As vegetation becomes established on the streambanks and floodplain in the first several growing seasons after construction, velocities will be slowed and resistance to erosion will increase. Based on these results, the proposed stream design is anticipated to remain stable during the 10-year design storm. Consideration should be given to Station 2+80 to protect the channel from energy dissipation caused by a weak hydraulic jump.

Appendix G
Financial Assurances

Per the NC DMS RFP #: 16-007878, Clearwater Mitigation Solutions will provide financial assurance in one of the following forms:

1) Performance Bonding – The Offeror must provide security in the form of acceptable performance bonds as described in the following paragraph to guarantee delivery of the maximum number of originally contracted Mitigation Units. The performance bonds must be obtained from a company licensed in North Carolina as shown in the Federal Treasury Listing of Approved Sureties (Circular 570). The maximum allowable amount provided by a surety may not exceed the "underwriting limitation" for the surety as identified in the Federal Treasury Listing. Although this RFP is a request for mitigation and not construction, the performance bonds shall follow the prescribed wording provided in N.C.G.S. § 44A-33. The Offeror must provide two performance bonds. The first bond must be for 100% of the total value of the contract and must be in effect and submitted with the Task 3 deliverable (see Section 8. SCOPE OF WORK – Task 3) before NC DMS will authorize payment for that deliverable. The bond must remain in effect until the Offeror has received written notification from the NC DMS that the requirements of Task 6 (submittal of baseline monitoring report) have been met. After the successful completion of Task 6, the bond can be retired, and a second bond must be substituted for the first. The second bond must be for 40% of the value of the contract, which covers the monitoring period. The Monitoring Phase Performance Bond can be reduced yearly concurrent with the payment schedule once the yearly deliverable is approved by NC DMS and credits are released by the IRT.

2) Letters of Credit- LOCs must be drawn from a reputable Bank identified by the FDIC as "Well Capitalized" or "Adequately Capitalized" and follow the submittal timing, contract amounts and schedules for reduction as those described above for the performance bonds. Evergreen or irrevocable Letters of Credit shall be required to provide a 120 day notice of cancellation, termination or non-renewal.

3) Casualty Insurance on underlying performance of Credits or Units of Restoration – Must follow the same submittal timing, contract amounts and reduction schedules as those described above in performance bonds. The insurance must contain the following information.
    a) The "NC DENR" must be named as the "Regulatory Body". NC DENR shall have the sole right to place a claim against the policy. NC DENR shall have the sole right and obligation as the responsible "regulatory body" to approve any claim settlement.
    b) Initial insurance must be for a 10 year period.

The process of evaluating these options is underway. Once obtained, Clearwater will provide digital and hard copies of the assurance of distribution to IRT members.

Policy Number: 210527WLM0034 UMR #: B1392BWI206054 Previous Policy Number: _____

NORTH CAROLINA FULL DELIVERY PROJECT INSURANCE POLICY DECLARATIONS

INSURER	UNDERWRITING OFFICE	PRODUCER
Underwriters at Lloyds of London	Alliant Americas – A Division of Alliant Insurance Services 6550 Rock Spring Drive, Suite 610 Bethesda, MD 20817 Contact Person: Barry Peters	Robert S. Spoth, President Ecosystems Insurance Associates, LLC 11602 Mohican Road Woodbridge, VA 22192 Phone Number: (703) 232-0258

CLAIMS MADE AND REPORTED COVERAGE

NOTICE: THIS IS A CLAIMS-MADE AND REPORTED POLICY. THIS POLICY HAS CERTAIN PROVISIONS AND REQUIREMENTS UNIQUE TO IT AND MAY BE DIFFERENT FROM OTHER POLICIES A "NAMED INSURED" MAY HAVE PURCHASED. FOR THERE TO BE COVERAGE UNDER THIS POLICY, A CLAIM MUST FIRST BE MADE AGAINST THE NAMED INSURED BY THE NORTH CAROLINA DEPARTMENT OF ENVIRONMENTAL QUALITY DIVISION OF MITIGATION SERVICES (NC DEQ DMS) AND REPORTED TO UNDERWRITERS DURING THE POLICY PERIOD. THIS POLICY INCLUDES NO DUTY TO DEFEND OR TO PAY DEFENSE COSTS.

PLEASE READ THE ENTIRE POLICY CAREFULLY

ITEM 1

Named Insured:	Clearwater Mitigation Solutions, LLC
Mailing Address:	604 Macon Place Raleigh, NC 27609

A.	Mitigation Project	Bull Chute Stream and Riparian Wetland Mitigation Site.
B.	Insured Property	The Bull Chute Stream and Riparian Wetland Mitigation Site (hereafter referred to as the "Site") encompasses 32.15 acres of disturbed forest and livestock pasture along Unnamed Tributaries (UTs) to Caraway Creek. The Site is located in Randolph County, less than one-mile northwest of New Market and 4.5 miles northwest of Randleman. The property is situated just west of NC Highway 311 and south of Marlboro Church Road (Mit. Plan-Figures 1 and 2, Appendix A). DMS Project No. 100137 DMS Full Delivery Contract No. 7878-01 RFP No. 16-007878

ITEM 2

Policy Period From: 05/27/2021 To: 05/27/2022
At 12:01 A.M. both dates at your mailing address shown above.

Policy # **210527WLM0034**

Clearwater Mitigation Solutions, LLC

Bull Chute Stream and Riparian Wetland Mitigation Site

Contract # 7878-01

This policy is in full compliance with North Carolina Insurance laws, rules and regulations.

Robert S Spoth

Digitally signed by Robert S Spoth
Date: 06/03/2021

Robert S. Spoth
President,
Ecosystems Insurance Associates, LLC
NC Dept. of Ins License # 636176

The Surplus Lines Agency is Alliant Insurance Services, Inc., P. O. box 120670, San Diego, CA 92112-0670. NC Surplus Lines License: 1000007170

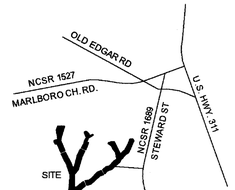
POLICY # **210527WLM0034**

Acknowledged:

June 4, 2021
Date

Kevin Yates
President
Clearwater Mitigation Solutions,LLC

Appendix H
Site Protection Instrument



VICINITY MAP (NTS)

DEED REFERENCE(S):

BEING A PORTION OF THE PROPERTIES RECORDED IN D.B. 1856, PG. 2359, D.B. 1713, PG. 504, D.B. 1447, PG. 980, D.B. 1187, PG. 2018, D.B. 1856, PG. 2361 & D.B. 2260, PG. 218 OF THE RANDOLPH COUNTY REGISTER OF DEEDS.

MAP REFERENCE(S):

P.B. 43, PG. 83
P.B. 73, PG. 59
P.B. 63, PG. 89
P.B 73, PG. 59
P.B. 41, PG. 62
P.B. 87, PG. 47

CERTIFICATE OF OWNERSHIP - PIN 7736807108 (SPO FILE No. 76-CY)

I (We), Susan Diane Redding Jones & Clarence H. Jones, Jr. hereby certify that I am (we are) the owners of the property identified by the Randolph County, North Carolina Parcel Identification Number(s) set forth above; that we hereby adopt this conservation easement plan and the terms and conditions contained hereon and grant and convey the easements herein with free consent. Further, we certify that the land as shown hereon is within the subdivision regulation jurisdiction of Randolph County, North Carolina.

4/5/21 Susan Diane Redding Jones
Date Susan Diane Redding Jones

4/5/21 Clarence H. Jones, Jr.
Date Clarence H. Jones, Jr.

STATE OF NORTH CAROLINA

COUNTY OF Randolph

I, Traci J McDaniel a Notary Public for the County and State aforesaid, do hereby certify that Christopher A. Redding and wife, Nicole L. Redding personally appeared before me this day and acknowledged the due execution of the foregoing document.

Witness my hand and official stamp or seal this 5 day of April, 2021.

TRACI J. McDANIEL
NOTARY PUBLIC
Randolph County, NC

Traci J McDaniel
Notary Signature

Traci J. McDaniel
Typed Notary Name

GENERAL NOTES:

NO HORIZONTAL CONTROL EXISTS WITHIN 2000 FEET.

NOTE: NO ABSTRACT OF TITLE, NOR TITLE COMMITMENT, OR RESULTS OF TITLE SEARCH WERE FURNISHED TO THE SURVEYOR. ALL DOCUMENTS OF RECORD REVIEWED ARE NOTED HEREON (SEE REFERENCES). THERE MAY EXIST OTHER DOCUMENTS OF RECORD THAT MAY AFFECT THIS SURVEYED PARCEL.

ALL DISTANCES SHOWN ARE HORIZONTAL GROUND DISTANCES.

THE PURPOSE OF THIS PLAT IS TO IDENTIFY THE LOCATION OF THE CONSERVATION EASEMENTS DEPICTED HEREIN, TO PROVIDE A BASIS FOR THE CONVEYANCE AND DEDICATION OF SAID CONSERVATION EASEMENTS AND TO PROVIDE ACCESS EASEMENTS OVER THE ASSOCIATED LANDS. THIS PLAT DOES NOT CREATE NEW PROPERTY LINES OR AFFECT ANY EXISTING PROPERTY LINES.

THE RIGHT(S) OF NON-EXCLUSIVE INGRESS, EGRESS, AND REGRESS OVER THE SUBJECT PROPERTY AND OVER ALL EXISTING PATHS/ROADS TRANSECTING THE PROPERTY ARE RESERVED BY THE GRANTOR(S) AND THE GRANTEE(S) OF THE CONSERVATION EASEMENT(S) AS SET FORTH HEREIN AND IN THE CONSERVATION EASEMENT DEEDS RECORDED IN CONNECTION WITH THIS CONSERVATION EASEMENT PLAT, INCLUDING BUT NOT LIMITED TO, ACCESS EASEMENTS 1 AND 2 DEPICTED ON THIS PLAT.

LEGEND:

ISS - IRON STAKE SET
ECM - EXISTING CONCRETE MARKER
EIP - EXISTING IRON PIPE
ERRR - EXISTING RAILROAD RAIL
PTI - PINCHED TOP IRON
EA - EXISTING AXLE
EDS - EXISTING DRIVE SHAFT
EMN - EXISTING MAG NAIL
CMP - CORRUGATED METAL PIPE
O.D. - OUTSIDE DIAMETER
RPS - RANGE POLE SET
EMN - EXISTING MAG NAIL
MNS - MAG NAIL SET
EIS - EXISTING IRON STAKE
EPP - EXISTING PUMP PIPE
PPS - PUMP PIPE SET
NMC - NON-MONUMENTED CORNER
R/W - RIGHT OF WAY
EOP - EDGE OF PAVEMENT
PB - PLAT BOOK
D.B. - DEED BOOK
PG. - PAGE
o - NON-MONUMENTED CORNER UNLESS OTHERWISE NOTED
No. 5 REBAR, 30" IN LENGTH FLUSH WITH GRADE WITH AN ALUMINUM 3 1/4" CAP INSCRIBED: "STATE OF NORTH CAROLINA CONSERVATION EASEMENT"
CONSERVATION EASEMENT LINE
TIE DOWN LINE
ADJOINER OR R/W LINE
ACCESS EASEMENT

BK 169 PG 5 (2)
This document presented and filed:
04/09/2021 09:23:55 AM
PLAT RECORDING
Fee $42.00
20118751
Randolph County North Carolina
Krista M. Lowe, Register of Deeds

CERTIFICATE OF OWNERSHIP - PIN 7735685225, 7735692334,7735698612, 7735691887 (SPO FILE NO. 76-CZ)

I, Curtis Alan Redding, single, hereby certify that I am the owner of the property identified by the Randolph County, North Carolina Parcel Identification Number(s) set forth above; that I hereby adopt this conservation easement plan and the terms and conditions contained hereon and grant and convey the easements herein with free consent. Further, I certify that the land as shown hereon is within the subdivision regulation jurisdiction of Randolph County, North Carolina.

4-5-21 Curtis Alan Redding
Date Curtis Alan Redding

STATE OF NORTH CAROLINA

COUNTY OF Randolph

I, Traci J McDaniel a Notary Public for the County and State aforesaid, do hereby certify that Curtis A. Redding, single personally appeared before me this day and acknowledged the due execution of the foregoing document.

Witness my hand and official stamp or seal this 5 day of April, 2021.

TRACI J. McDANIEL
NOTARY PUBLIC
Randolph County, NC

Traci J McDaniel
Notary Signature

Traci J. McDaniel
Typed Notary Name

STATE OF NORTH CAROLINA
COUNTY OF RANDOLPH

Filed for registration at_____ M._____ , 2021 in the Register of Deeds

Office. Recorded in P. B. _____ , PG._____

Register of Deeds By

STATE OF NORTH CAROLINA
COUNTY OF RANDOLPH

I, Eric J. Martin, Review Officer of Randolph County, certify that the map or plat to which this certification is affixed meets all statutory requirements for recording.

4/8/21 E J Martin
Date Review Officer

SURVEYORS CERTIFICATION(S)

Surveyor's disclaimer: No attempt was made to locate any cemeteries, wetlands, hazardous material sites, underground utilities or any other features above, or below ground other than those shown. However, no visible evidence of cemeteries or utilities, aboveground or otherwise, was observed by the undersigned (other than those shown).

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

I, John A. Rudolph, certify that this plat was drawn under my supervision from an actual survey made under my supervision (deed description recorded in Book SEE , Page REFS , etc.) (other); that the boundaries not surveyed are clearly indicated as drawn from information found in Book____, page____; that the ratio of precision or positional accuracy as calculated is 1/10,000+; that this plat was prepared in accordance with G.S. 47-30 as amended. Witness my original signature, license number and seal this 18th day of March, A.D., 2021.

SEAL OR STAMP
NORTH CAROLINA PROFESSIONAL SEAL L-4194 LAND SURVEYOR JOHN ASHLEY RUDOLPH

L-4194
Professional Land Surveyor License Number

RANDOLPH COUNTY, NORTH CAROLINA 1779

FIRM LICENSE No.: C-2111 K2 DESIGN GROUP, P.A. CORPORATE SEAL 2000 NORTH CAROLINA

LINE DATA ALONG THE CONSERVATION EASEMENT AREA 1

LINE	BEARING	DISTANCE
L1	N29°53'28"E	164.60'
L2	N21°08'58"E	191.27'
L3	N64°47'36"E	69.90'
L4	S72°53'50"E	53.13'
L5	S28°16'25"E	78.15'
L6	S23°40'36"W	434.49'
L7	S31°47'56"W	76.60'
L8	S55°56'21"W	111.59'
L9	S42°45'47"W	235.88'
L10	S30°45'00"W	119.69'
L11	S50°02'22"W	250.65'
L12	S42°20'32"W	156.49'
L13	S68°49'19"W	185.61'
L14	S43°28'56"W	134.13'
L15	N28°38'20"W	175.97'
L16	N48°16'11"E	165.72'
L17	N76°52'18"E	136.95'
L18	N42°13'10"E	254.45'
L19	N55°18'47"E	116.16'
L20	N09°24'45"W	246.81'
L21	N37°36'53"W	176.53'
L22	N24°30'12"W	129.51'
L23	N56°51'11"W	152.40'
L24	N22°06'34"E	44.97'
L25	N74°03'17"E	151.67'
L26	S76°11'06"E	81.79'
L27	S27°33'14"E	509.48'
L28	N42°59'51"E	131.74'
L29	N55°37'11"E	89.93'
L30	N24°43'03"E	90.30'

LINE DATA ALONG THE CONSERVATION EASEMENT AREA 2

LINE	BEARING	DISTANCE
L31	S28°38'20"E	174.32'
L32	S68°22'19"W	157.84'
L33	S46°54'42"W	454.30'
L34	S77°27'49"W	149.11'
L35	N22°15'09"W	178.25'
L36	N76°55'41"E	150.31'
L37	N55°21'33"E	96.12'
L38	N44°57'59"E	330.34'
L39	N65°56'31"E	163.24'

LINE DATA ALONG THE CONSERVATION EASEMENT AREA 3

LINE	BEARING	DISTANCE
L40	S22°15'09"E	176.05'
L41	S48°32'21"W	378.60'
L42	S52°21'01"W	201.34'
L43	N62°14'47"W	205.87'
L44	N03°40'19"E	678.23'
L45	N18°34'47"W	454.77'
L46	N32°13'58"W	157.65'
L47	N23°20'27"W	244.64'
L48	N66°53'25"E	175.40'
L49	S27°13'22"E	316.32'
L50	S27°13'22"E	130.76'
L51	S22°11'02"E	170.08'
L52	N87°08'15"E	65.19'
L53	N14°08'27"E	454.75'
L54	N25°11'24"E	190.24'
L55	N25°11'24"E	68.57'
L56	S63°53'15"E	28.72'
L57	S63°53'15"E	156.99'
L58	S25°04'59"W	269.20'
L59	S14°53'56"W	476.53'
L60	S41°07'46"W	210.77'
L61	S08°19'36"E	34.31'
L62	S02°21'38"W	440.46'
L63	S75°32'11"E	83.83'
L64	N47°54'02"E	242.90'
L65	N54°58'41"E	103.80'

LINE DATA ALONG THE CONSERVATION EASEMENT AREA 4

LINE	BEARING	DISTANCE
L66	N63°53'15"W	142.58'
L67	N63°53'15"W	34.33'
L68	N24°37'30"E	220.69'
L69	N11°14'55"E	58.46'
L70	N25°47'22"E	73.42'
L71	N42°11'43"E	68.24'
L72	N21°06'51"W	111.81'
L73	N27°42'39"W	77.66'
L74	N06°29'58"E	55.22'
L75	N60°53'02"E	62.80'
L76	S63°09'10"E	63.05'
L77	S34°37'27"E	100.93'
L78	S15°24'47"E	70.78'
L79	N68°28'23"E	98.70'
L80	N56°00'07"E	43.38'
L81	S33°49'20"E	43.37'
L82	S53°52'57"W	66.22'
L83	S63°24'51"W	137.50'
L84	S30°10'06"W	70.77'
L85	S15°37'41"W	120.88'
L86	S89°28'29"E	5.18'
L87	S89°27'49"E	58.24'
L88	S21°42'07"W	297.97'

LINE DATA ALONG THE CONSERVATION EASEMENT AREA 5

LINE	BEARING	DISTANCE
L89	S66°53'25"W	173.84'
L90	N22°42'38"W	333.34'
L91	N78°41'24"W	92.95'
L92	N30°19'15"W	76.05'
L93	N10°58'07"E	48.77'
L94	N46°14'43"E	56.48'
L95	S82°57'22"E	68.36'
L96	N13°17'28"E	102.52'
L97	N12°05'07"W	288.29'
L98	N19°17'33"E	158.88'
L99	N89°03'52"W	272.51'
L100	S16°47'09"W	423.61'
L101	S08°43'52"W	139.55'
L102	S20°23'06"E	69.21'
L103	S22°17'52"E	346.42'

LINE DATA ALONG THE CONSERVATION EASEMENT AREAS

LINE	BEARING	DISTANCE
L104	N85°26'04"W	198.70'
L105	N03°13'02"E	221.59'
L106	N89°14'45"E	91.94'
L107	N89°13'27"E	95.03'
L108	N48°03'06"E	320.28'
L109	S89°28'29"E	113.66'
L110	N48°03'06"E	32.21'
L111	N87°06'28"W	185.38'
L112	S89°28'29"E	286.70'
L113	N48°03'06"E	73.92'
L126	N14°04'37"W	570.92'

LINE DATA ALONG THE TIE DOWNS

LINE	BEARING	DISTANCE
L114	S53°52'57"W	170.44'
L115	S63°24'51"W	136.43'
L116	S30°10'06"W	68.64'
L117	S15°37'41"W	118.89'
L118	S57°25'15"W	60.14'
L119	N58°59'26"E	60.05'
L120	N71°57'48"E	60.16'
L121	N74°03'06"E	60.37'
L122	N35°20'44"E	60.79'
L123	N43°17'51"E	62.80'
L124	S18°55'15"E	60.16'
L125	S17°26'09"E	60.30'

COORDINATES ALONG CONSERVATION EASMENTS

CORNER	NORTHING	EASTING
1	760191.9220	1738602.1813
2	760334.6304	1738684.2125
3	760513.0158	1738753.2229
4	760542.7833	1738816.4629
5	760527.1583	1738867.2442
6	760458.3283	1738904.2646
7	760060.4116	1738729.7854
8	759995.3075	1738689.4208
9	759932.8075	1738596.9729
10	759759.6304	1738436.8167
11	759656.7658	1738375.6188
12	759495.7808	1738183.4952
13	759380.1165	1738078.0927
14	759313.0611	1737905.0170
15	759215.7413	1737812.7214
16	759370.1831	1737728.3808
17	759480.4926	1737852.0576
18	759511.5976	1737985.4238
19	759700.0340	1738156.4041
20	759766.1408	1738251.9208
21	760009.6304	1738211.5563
22	760149.4652	1738103.8121
23	760267.3127	1738050.0979
24	760350.6460	1737922.4938
25	760392.3127	1737939.4208
26	760433.9793	1738085.2542
27	760414.4481	1738164.6813
28	759962.7554	1738400.3583
29	760059.1095	1738490.2021
30	760109.8908	1738564.4208
31	759337.7988	1737677.7021
32	759184.8040	1737761.2524
33	759126.6290	1737614.5289
34	758816.2883	1737282.7570
35	758783.9223	1737137.2013
36	758948.8978	1737069.6993
37	758982.8943	1737216.1135
38	759037.5304	1737295.1930
39	759271.2498	1737528.6382
40	758930.2699	1737012.4930
41	758767.3359	1737079.1587
42	758516.6616	1736795.4321
43	758393.6762	1736636.0194
44	758489.5436	1736453.8329
45	759166.3808	1736497.2692
46	759597.4456	1736352.3701
47	759730.7999	1736268.2859
48	759955.4194	1736171.3594
49	760024.2642	1736332.6890
50	759742.9800	1736477.3904
51	759626.7080	1736537.2044
52	759469.2224	1736601.4217
53	759472.4776	1736666.5259
54	759913.4499	1736777.6249
55	760085.5949	1736858.5932
56	760147.6456	1736887.7787
57	760135.0047	1736913.5678
58	760065.9067	1737054.5368
59	759822.0969	1736940.4158
60	759361.5835	1736817.8931
61	759202.8263	1736679.2560
62	759168.8778	1736684.2247
63	758728.7883	1736666.0824
64	758707.8509	1736747.2550
65	758870.6981	1736927.4851
66	760115.4897	1737089.7030
67	760178.2436	1736961.6767
68	760193.3543	1736930.8488

NOTE: ONLY CORNER # 150 IS A TRUE NORTH CAROLINA STATE PLANE GRID COORDINATE. COORDINATES SHOWN ARE BASED ON GROUND DISTANCES TO MATCH PLAT. SEE DATUM DESCRIPTION, SHEET 1 OF 1

COORDINATES ALONG CONSERVATION EASMENTS

CORNER	NORTHING	EASTING
69	760393.9741	1737022.8052
70	760451.3070	1737034.2079
71	760517.4181	1737066.1523
72	760567.9737	1737111.9857
73	760672.2792	1737071.7079
74	760741.0292	1737035.5968
75	760795.8903	1737041.8468
76	760826.4459	1737096.7079
77	760797.9737	1737152.9579
78	760714.9178	1737210.3059
79	760646.6880	1737229.1163
80	760682.8798	1737320.9457
81	760707.1367	1737356.9109
82	760671.1030	1737381.0535
83	760632.0706	1737327.5608
84	760570.5331	1737204.5967
85	760509.3447	1737169.0297
86	760392.9318	1737136.4653
87	760392.8843	1737141.6440
88	760392.3391	1737199.8852
89	760081.1742	1736313.1811
90	760012.9444	1736153.2926
91	760320.4377	1736024.5988
92	760338.6668	1735933.4530
93	760404.3156	1735895.0588
94	760452.1953	1735904.3386
95	760491.2578	1735945.1372
96	760482.8745	1736012.9837
97	760582.6438	1736036.5516
98	760864.5468	1735976.1930
99	761014.5016	1736028.6845
100	761010.0522	1736301.1568
101	760604.4887	1736178.8195
102	760466.5585	1736157.6368
103	760401.6866	1736181.7432

NOTE: ONLY CORNER # 150 IS A TRUE NORTH CAROLINA STATE PLANE GRID COORDINATE. COORDINATES SHOWN ARE BASED ON GROUND DISTANCES TO MATCH PLAT. SEE DATUM DESCRIPTION, SHEET 1 OF 1

CERTIFICATE OF OWNERSHIP - PIN 7735882804 (SPO FILE No. 76-DA)

I (We), David Lee Shipton & Beverly Shipton, hereby certify that I am (we are) the owners of the property identified by the Randolph County, North Carolina Parcel Identification Number(s) set forth above; that we hereby adopt this conservation easement plan and the terms and conditions contained hereon and grant and convey the easements herein with free consent. Further, we certify that the land as shown hereon is within the subdivision regulation jurisdiction of Randolph County, North Carolina.

4-5-21 David Lee Shipton
Date David Lee Shipton

4-5-21 Beverly Shipton
Date Beverly Shipton

STATE OF NORTH CAROLINA

COUNTY OF Randolph

I, Traci J. McDaniel a Notary Public for the County and State aforesaid, do hereby certify that Christopher A. Redding and wife, Nicole L. Redding personally appeared before me this day and acknowledged the due execution of the foregoing document.

Witness my hand and official stamp or seal this 5 day of April, 2021.

Traci J McDaniel
Notary Signature

Traci J McDaniel
Typed Notary Name

TRACI J. McDANIEL
NOTARY PUBLIC
Randolph County, NC

CORNER #	CORNER DESCRIPTIONS: DESCRIPTION
1 THRU 86	No. 5 REBAR FLUSH WITH GRADE WITH AN ALUMINUM 3 1/4" CAP INSCRIBED: "STATE OF NORTH CAROLINA CONSERVATION EASEMENT"
87	No. 5 REBAR FLUSH WITH GRADE
88	No. 5 REBAR FLUSH WITH GRADE WITH AN ALUMINUM 3 1/4" CAP INSCRIBED: "STATE OF NORTH CAROLINA CONSERVATION EASEMENT"
88 THRU 105	No. 5 REBAR FLUSH WITH GRADE WITH AN ALUMINUM 3 1/4" CAP INSCRIBED: "STATE OF NORTH CAROLINA CONSERVATION EASEMENT"
150	No. 5 REBAR FLUSH WITH GRADE WITH YELLOW PLASTIC CAP SUITABLE FOR GPS
151	MAG NAIL FLUSH WITH GRADE
152	No. 3 REBAR WITH CAP 0.2' ABOVE GRADE
154 AND 155	No. 3 REBAR WITH CAP 0.3' ABOVE GRADE
156	T-FLAT IRON PIPE 0.8' ABOVE GRADE BY STONE
157	No. 3 REBAR WITH CAP 0.1' ABOVE GRADE
158	No. 5 REBAR, BENT
159	1.0" O.D. PINCHED-TOP IRON 0.3' ABOVE GRADE
160 THRU 162	No. 3 REBAR 0.3' ABOVE GRADE
163	No. 5 REBAR 0.1' ABOVE GRADE
164	STONE 0.3' ABOVE GRADE

✓ Gavin + Cox (p/u)

DATUM DESCRIPTION

THE LOCALIZED COORDINATE SYSTEM DEVELOPED FOR THIS PLAT IS BASED ON NORTH CAROLINA STATE PLANE COORDINATES ESTABLISHED BY USING THE ONLINE POSITIONING USER SERVICE (OPUS) PROVIDED BY THE NATIONAL GEODETIC SURVEY.

ISS 150 NC GRID COORDINATES NAD 83 (2011)
N=760,264.2078'
E=1,738,494.1838'

THE AVERAGE COMBINED GRID FACTOR USED ON THIS PLAT IS 0.99994318 (GROUND TO GRID). THE N.C. LAMBERT GRID BEARING AND LOCALIZED HORIZONTAL GROUND DISTANCE FROM ISS 150 TO ISS 1 IS S 56°12'16" E 129.96 FEET.

ALL LINEAR DIMENSIONS ARE LOCALIZED HORIZONTAL DISTANCES.

GEOID-2012B CONUS

GNSS RECEIVER - TOPCON HIPER V WITH MINIMUM TIME OF 2+ HOURS COMPLETED ON 05/08/20

THE FOLLOWING BASE STATIONS WERE USED:

PID	DESIGNATION	LATITUDE (m)	LONGITUDE (m)
DG5757	NCLE LEXINGTON CORS ARP	N354853.143	W0801346.202
DL6900	NCZO ASHEBORO 2 CORS ARP	N353749.384	W0794553.753
DN5840	NCSA NCSA SALISBURY CORS ARP	N354241.692	W0802555.995

FEMA FLOOD STATEMENT:

THE AREA REPRESENTED BY THIS PLAT IS NOT LOCATED IN A FLOOD HAZARD BOUNDARY ACCORDING TO FEMA MAP NUMBER(S) 3710773600J & 3710773500J ZONE(S): X, DATED: JANUARY 2, 2008.

SHEET 1 OF 2

CONSERVATION EASEMENT SURVEY
FOR THE STATE OF NORTH CAROLINA DEPARTMENT OF ENVIRONMENTAL QUALITY DIVISION OF MITIGATION SERVICES
DMS PROJECT ID No. 100137
SPO FILE NUMBERS: 76-CY, 76-CZ, 76-DA & 76-DB
BULL CHUTE SITE

OVER AND ACROSS A PORTION OF THE LANDS RECORDED IN D.B. 1856, PG. 2361 (PIN No. 7735685225), D.B. 1447, PG. 980 (PIN: 7735698612), D.B. 1416, PG. 154 (PIN: 7735691887) & D.B. 1187, PG. 2018 (PIN: 7735692334) OWNED BY CURTIS ALAN REDDING AND RECORDED IN D.B. 1856, PG. 2359 (PIN: 7736807108) OWNED BY SUSAN DIANE REDDING JONES, AND RECORDED IN D.B. 1713, PG. 504 (PIN: 7735882804) OWNED BY DAVID LEE SHIPTON, AND RECORDED IN D.B. 2260, PG. 218 (PIN: 7736611524) OWNED BY BARRY BRUCE SPENCER
NEW MARKET TOWNSHIP, RANDOLPH COUNTY, NORTH CAROLINA
(THE FIELD SURVEY TOOK PLACE DURING SEPTEMBER & OCTOBER 2020)

200 100 0 200 400 600
GRAPHIC SCALE 1" = 200'

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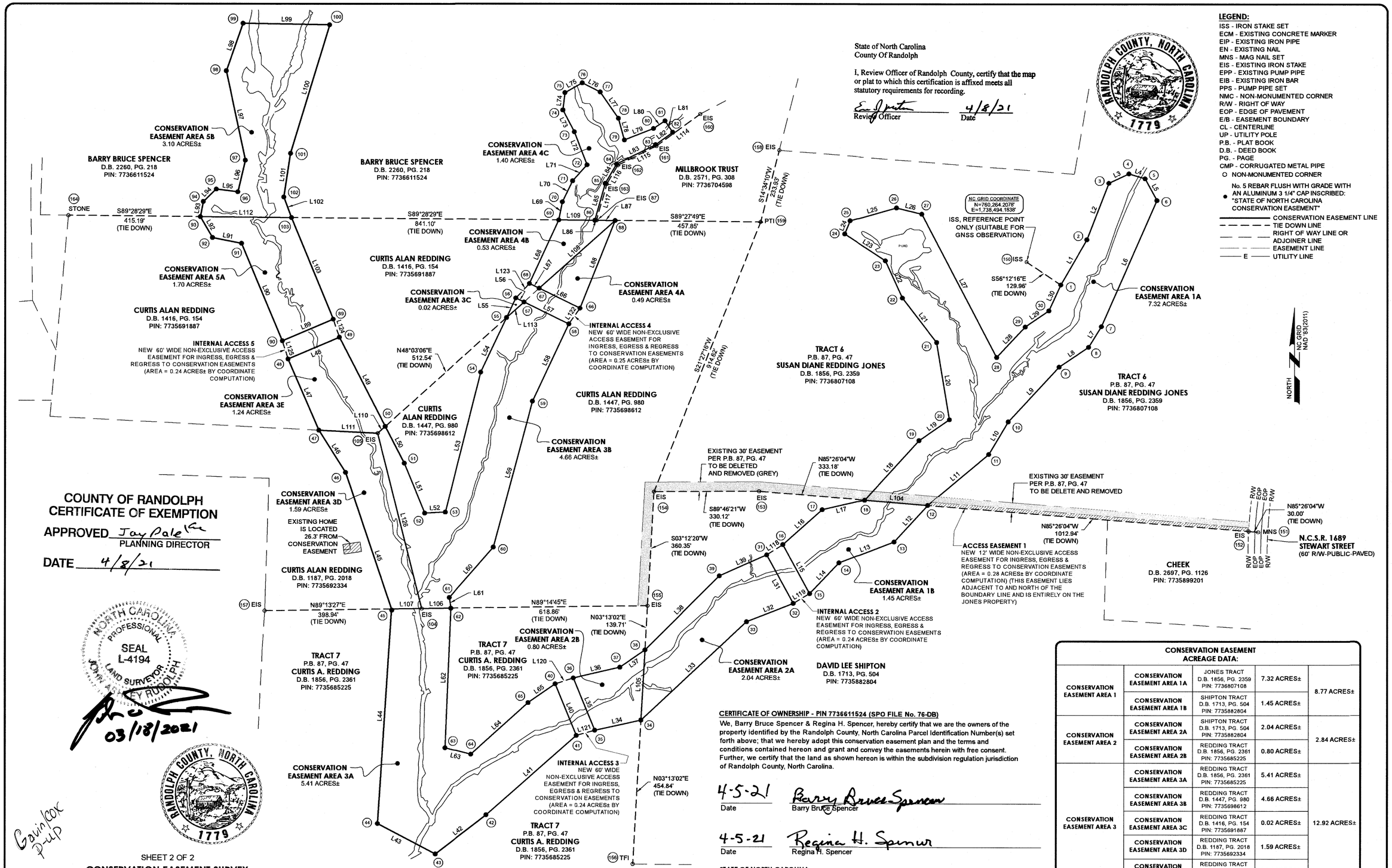
DRAWN BY:	FGR
DATE:	03/18/21
DWG. NO.:	CMC394MR19
SURVEYED BY:	J.A.R.

k2 design group
774 S. Beston Road
La Grange, NC 28551
252.582.3097
www.k2designgroup.com



State of North Carolina
County Of Randolph

I, Review Officer of Randolph County, certify that the map or plat to which this certification is affixed meets all statutory requirements for recording.

Review Officer _____ Date 4/8/21

RANDOLPH COUNTY, NORTH CAROLINA 1779

LEGEND:

ISS - IRON STAKE SET
ECM - EXISTING CONCRETE MARKER
EIP - EXISTING IRON PIPE
EN - EXISTING NAIL
MNS - MAG NAIL SET
EIS - EXISTING IRON STAKE
EPP - EXISTING PUMP PIPE
EIB - EXISTING IRON BAR
PPS - PUMP PIPE SET
NMC - NON-MONUMENTED CORNER
R/W - RIGHT OF WAY
EOP - EDGE OF PAVEMENT
E/B - EASEMENT BOUNDARY
CL - CENTERLINE
UP - UTILITY POLE
P.B. - PLAT BOOK
D.B. - DEED BOOK
PG. - PAGE
CMP - CORRUGATED METAL PIPE
O NON-MONUMENTED CORNER
● No. 5 REBAR FLUSH WITH GRADE WITH AN ALUMINUM 3 1/4" CAP INSCRIBED: "STATE OF NORTH CAROLINA CONSERVATION EASEMENT"
CONSERVATION EASEMENT LINE
TIE DOWN LINE
RIGHT OF WAY LINE OR ADJOINER LINE
EASEMENT LINE
E UTILITY LINE

COUNTY OF RANDOLPH CERTIFICATE OF EXEMPTION

APPROVED Jay Dale
PLANNING DIRECTOR

DATE 4/8/21

NORTH CAROLINA PROFESSIONAL SEAL L-4194 LAND SURVEYOR JOHN ASHLEY RUSDEN

03/18/2021

RANDOLPH COUNTY, NORTH CAROLINA 1779

Gavin Cox P-UP

SHEET 2 OF 2

CONSERVATION EASEMENT SURVEY
FOR THE STATE OF NORTH CAROLINA DEPARTMENT OF ENVIRONMENTAL QUALITY DIVISION OF MITIGATION SERVICES
DMS PROJECT ID No. 100137
SPO FILE NUMBERS: 76-CY, 76-CZ, 76-DA & 76-DB
BULL CHUTE SITE

OVER AND ACROSS A PORTION OF THE LANDS RECORDED IN D.B. 1856, PG. 2361 (PIN No. 7735685225), D.B. 1447, PG. 980 (PIN: 7735698612), D.B. 1416, PG. 154 (PIN: 7735691887) & D.B. 1187, PG. 2018 (PIN: 7735692334) OWNED BY CURTIS ALAN REDDING AND RECORDED IN D.B. 1856, PG. 2359 (PIN: 7736807108) OWNED BY SUSAN DIANE REDDING JONES, AND RECORDED IN D.B. 1713, PG. 504 (PIN: 7735882804) OWNED BY DAVID LEE SHIPTON, AND RECORDED IN D.B. 2260, PG. 218 (PIN: 7736611524) OWNED BY BARRY BRUCE SPENCER
NEW MARKET TOWNSHIP, RANDOLPH COUNTY, NORTH CAROLINA
(THE FIELD SURVEY TOOK PLACE DURING SEPTEMBER & OCTOBER 2020)

200 100 0 200 400 600
GRAPHIC SCALE 1" = 200'

STATE OF NORTH CAROLINA
COUNTY OF RANDOLPH

Filed for registration at_____ M._____, 2021 in the Register of Deeds

Office. Recorded in P.B. _____, PG_____.

_____ _____
Register of Deeds By

CERTIFICATE OF OWNERSHIP - PIN 7736611524 (SPO FILE No. 76-DB)

We, Barry Bruce Spencer & Regina H. Spencer, hereby certify that we are the owners of the property identified by the Randolph County, North Carolina Parcel Identification Number(s) set forth above; that we hereby adopt this conservation easement plan and the terms and conditions contained hereon and grant and convey the easements herein with free consent. Further, we certify that the land as shown hereon is within the subdivision regulation jurisdiction of Randolph County, North Carolina.

4-5-21 Barry Bruce Spencer
Date Barry Bruce Spencer

4-5-21 Regina H. Spencer
Date Regina H. Spencer

STATE OF NORTH CAROLINA

COUNTY OF Randolph

I, Traci J. McDaniel a Notary Public for the County and State aforesaid, do hereby certify that Christopher A. Redding and wife, Nicole L. Redding personally appeared before me this day and acknowledged the due execution of the foregoing document.

Witness my hand and official stamp or seal this 5 day of April, 2021.

TRACI J. McDANIEL
NOTARY PUBLIC
Randolph County, NC

Traci J. McDaniel
Notary Signature

Traci J. McDaniel
Typed Notary Name

CONSERVATION EASEMENT ACREAGE DATA:

CONSERVATION EASEMENT AREA 1	CONSERVATION EASEMENT AREA 1A	JONES TRACT D.B. 1856, PG. 2359 PIN: 7736807108	7.32 ACRES±	8.77 ACRES±
	CONSERVATION EASEMENT AREA 1B	SHIPTON TRACT D.B. 1713, PG. 504 PIN: 7735882804	1.45 ACRES±	
CONSERVATION EASEMENT AREA 2	CONSERVATION EASEMENT AREA 2A	SHIPTON TRACT D.B. 1713, PG. 504 PIN: 7735882804	2.04 ACRES±	2.84 ACRES±
	CONSERVATION EASEMENT AREA 2B	REDDING TRACT D.B. 1856, PG. 2361 PIN: 7735685225	0.80 ACRES±	
CONSERVATION EASEMENT AREA 3	CONSERVATION EASEMENT AREA 3A	REDDING TRACT D.B. 1856, PG. 2361 PIN: 7735685225	5.41 ACRES±	12.92 ACRES±
	CONSERVATION EASEMENT AREA 3B	REDDING TRACT D.B. 1447, PG. 980 PIN: 7735698612	4.66 ACRES±	
	CONSERVATION EASEMENT AREA 3C	REDDING TRACT D.B. 1416, PG. 154 PIN: 7735691887	0.02 ACRES±	
	CONSERVATION EASEMENT AREA 3D	REDDING TRACT D.B. 1187, PG. 2018 PIN: 7735692334	1.59 ACRES±	
	CONSERVATION EASEMENT AREA 3E	REDDING TRACT D.B. 1416, PG. 154 PIN: 7735691887	1.24 ACRES±	
CONSERVATION EASEMENT AREA 4	CONSERVATION EASEMENT AREA 4A	REDDING TRACT D.B. 1447, PG. 980 PIN: 7735698612	0.49 ACRES±	2.42 ACRES±
	CONSERVATION EASEMENT AREA 4B	REDDING TRACT D.B. 1416, PG. 154 PIN: 7735691887	0.53 ACRES±	
	CONSERVATION EASEMENT AREA 4C	SPENCER TRACT D.B. 2260, PG. 218 PIN: 7736611524	1.40 ACRES±	
CONSERVATION EASEMENT AREA 5	CONSERVATION EASEMENT AREA 5A	REDDING TRACT D.B. 1416, PG. 154 PIN: 7735691887	1.70 ACRES±	4.80 ACRES±
	CONSERVATION EASEMENT AREA 5B	SPENCER TRACT D.B. 2260, PG. 218 PIN: 7736611524	3.10 ACRES±	
TOTAL CONSERVATION EASEMENT EXCLUDING ALL ACCESS EASEMENTS BY COORDINATE COMPUTATION				31.75 ACRES±

BK 2748 PG 2288 (12)
This document presented and filed:
04/09/2021 11:27:24 AM
DEED
Fee $26.00 Excise Tax: $253.00
20118757
Randolph County North Carolina
Krista M. Lowe, Register of Deeds

STATE OF NORTH CAROLINA
VPW Gavin+Cox
R/S $253.00

RANDOLPH COUNTY

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

SPO File Number: 76-CY
DMS Project Number: 100137

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 25th day of February, 2021 , by Clarence H. Jones Jr. and Susan Redding Jones ("**Grantor**"), whose mailing address is 214 Scenic Oaks Drive, Reidsville, NC 27320, 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 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 Clearwater Mitigation Solutions, LLC, a North Carolina Limited Liability Company, 604 Macon Place, Raleigh, North Carolina, 27609 and the North Carolina Department of Environment and Natural Resources, to provide stream, wetland and/or buffer mitigation pursuant to the North Carolina Department of Environment and Natural Resources Purchase and Services Contract Number 7878-01.

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

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

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

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

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

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

WHEREAS, Grantor owns in fee simple certain real property situated, lying, and being in New Market Township, Randolph County, North Carolina (the "**Property**"), and being more particularly described as that certain parcel of land containing approximately 56.77 acres Parcel Identification Number (PIN) 7736807108 and being conveyed to the Grantor by deed as recorded in **Deed Book 1856 at Page 2359** of the Randolph 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 an unnamed tributary to Caraway 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:

Conservation Easement Area 1A containing a total of 7.32 **acres** as shown on the plats of survey entitled "Final Plat, Conservation Easement for North Carolina Division of Mitigation Services, Project Name: "Bull Chute Site", SPO File No.76-CY , DMS Site No. 100137, Property of Clarence H. Jones Jr. and Susan Redding Jones," dated 3\18, 2021 by K2 Design Group, PLS Number L-4194 and recorded in the Randolph County, North Carolina Register of Deeds at **Plat Book** 169 **Pages** 5-6.

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

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

I. DURATION OF EASEMENT

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

II. ACCESS EASEMENT

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

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III. GRANTOR RESERVED USES AND RESTRICTED ACTIVITIES

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

IV. GRANTEE RESERVED USES

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

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

_____ (Seal)
Clarence H. Jones Jr.

Susan Redding Jones (Seal)
Susan Redding Jones

NORTH CAROLINA
COUNTY OF

I, Sharon E Benfield, a Notary Public in and for the County and State aforesaid, do hereby certify that Clarence H. Jones, Jr + Susan Redding Jones, 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 25th day of February, 2021.

Sharon E Benfield
Notary Public

My commission expires: 06/30/21

SHARON E. BENFIELD
NOTARY
COMMISSION EXPIRES
06/30/21
PUBLIC
ROCKINGHAM COUNTY, NC

Exhibit A

CONSERVATION EASEMENT

BULL CHUTE SITE
RANDOLPH COUNTY

Conservation Easement Area 1A

All of the conservation easement 1A of the Bull Chute Site over a portion of the land of the Susan Diane Redding Jones & Clarence H. Jones (PIN: 7736807108), lying and being situated in New Market Township, Randolph County, North Carolina and particularly described as follows (all distances are ground distances unless otherwise noted):

Beginning at an iron stake (Point of Beginning) labeled as Point No. 12 and being the Southeastern most corner of the Conservation Easement Area 1A and being located South 22°00'52" West 828.86 feet from an iron stake with a blue cap (Point No. 150) with N.C. Grid Coordinates N=760,264.2078', E=1,738,494.1838' (NAD '83, 2011).

Thence from the Point of Beginning (Point No.12), North 85°26'04" West 198.70' to an iron stake; thence North 42°13'10" East 254.45' to an iron stake; thence North 55°18'47" East 116.16' to an iron stake; thence North 09°24'45" West 246.81' to an iron stake; thence North 37°36'53" West 176.53' to an iron stake; thence North 24°30'12" West 129.51' to an iron stake; thence North 56°51'11" West 152.40' to an iron stake; thence North 22°06'34" East 44.97' to an iron stake; thence North 74°03'17" East 151.67' to an iron stake; thence South 76°11'06" East 81.79' to an iron stake; thence South 27°33'14" East 509.48' to an iron stake; thence North 42°59'51" East 131.74' to an iron stake; thence North 55°37'11" East 89.93' to an iron stake; thence North 24°43'03" East 90.30' to an iron stake; thence North 29°53'28" East 164.60' to an iron stake; North 21°08'58" East 191.27' to an iron stake; thence North 64°47'36" East 69.90' to an iron stake; thence South 72°53'50" East 53.13' to an iron stake; thence South 28°16'25" East 78.15' to an iron stake; thence South 23°40'36" West 434.49' to an iron stake; thence South 31°47'56" West 76.60' to an iron stake; thence South 55°56'21" West 111.59' to an iron stake; thence South 42°45'47" West 235.88' to an iron stake; thence South 30°45'00" West 119.69' to an iron stake; thence South 50°02'22" West 250.65' to an iron stake, which is the Point of Beginning (Point No. 12), having an area of 7.32 acres.

Exhibit B

Access Easement

BULL CHUTE MITIGATION SITE
RANDOLPH COUNTY

Access Easement

All of the Access Easement described as a New 12' Wide Non-exclusive Access Easement for ingress, egress & regress to be conveyed to the State of North Carolina for the Bull Chute Site over a portion of the land of the Susan Diane Redding Jones & Clarence H. Jones (PIN: 7736807108), lying and being situated in New Market Township, Randolph County, North Carolina and particularly described as follows (all distances are ground distances unless otherwise noted):

Beginning at an iron stake (Point of Beginning) labeled as Point No. 152 and being the Southeastern most corner of the Southern line of the said Access Easement and being located on the Western right-of-way of N.C.S.R. 1689 and also being located South 39°27'53" East 1099.79 feet from an iron stake with a blue cap (Point No. 150) with N.C. Grid Coordinates N=760,264.2078', E=1,738,494.1838' (NAD '83, 2011).

Thence from the Point of Beginning (Point No. 152) along the southern edge of the said 12' access easement the following bearing and distance: North 85°26'04" West 1012.94 feet to an iron stake (Point No. 12), the Point of Ending of said easement, having a total area of 0.28 acres. Said easement is located North of the above described line and replaces a portion of an existing 30' access easement.

BK 2748 PG 2271 (14)
This document presented and filed:
04/09/2021 11:23:00 AM
DEED
Fee $26.00 Excise Tax: $574.00
20118755
Randolph County North Carolina
Krista M. Lowe, Register of Deeds

STATE OF NORTH CAROLINA
P/u Gavin & Cox
R/S $574.00

RANDOLPH COUNTY

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

SPO File Number: 76-CZ
DMS Project Number: 100137

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 5th day of April , 2021 , by Curtis A. Redding ("**Grantor**"), whose mailing address is 4126 Baker Farm Road, Sophia, NC 27350, 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 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 Clearwater Mitigation Solutions, LLC, a North Carolina Limited Liability Company, 604 Macon Place, Raleigh, North Carolina, 27609 and the North Carolina Department of Environment and Natural Resources, to provide stream, wetland and/or buffer mitigation pursuant to the North Carolina Department of Environment and Natural Resources Purchase and Services Contract Number 7878-01.

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

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

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

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

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

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

WHEREAS, Grantor owns in fee simple certain real property situated, lying, and being in New Market Township, Randolph County, North Carolina (the "**Property**"), and being more particularly described as certain four parcels of land:

1) Parcel Identification Number (PIN) 7735691887 containing approximately 20.61 acres and being conveyed to the Grantor by deed as recorded in **Deed Book 1416 at Page 154** of the Randolph County Registry, North Carolina; and
2) Parcel Identification Number (PIN) 7735692334 containing approximately 8.00 acres and being conveyed to the Grantor by deed as recorded in **Deed Book 1187 at Page 218** of the Randolph County Registry, North Carolina; and
3) Parcel Identification Number (PIN) 7735698612 containing approximately 20.94 acres and being conveyed to the Grantor by deed as recorded in **Deed Book 1447 at Page 980** of the Randolph County Registry, North Carolina; and
4) Parcel Identification Number (PIN) 7735685225 containing approximately 60.36 acres and being conveyed to the Grantor by deed as recorded in **Deed Book 1856 at Page 2361** of the Randolph County Registry, North Carolina.

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 an unnamed tributary to Caraway 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:

Conservation Easement Areas 2B, 3A, 3B, 3C, 3D, 3E, 4A, 4B, 5A containing a total of 16.44 **acres** as shown on the plats of survey entitled "Final Plat, Conservation Easement for North Carolina Division of Mitigation Services, Project Name: "Bull Chute Site", SPO File No.76-CZ , DMS Site No. 100137, Property of Curtis A. Redding," dated 3-18, 2021 by K2 Design Group, PLS Number L-4194 and recorded in the Randolph County, North Carolina Register of Deeds at **Plat Book** 169 **Pages** 5-6 .

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.

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 nonnative plants, trees and/or animal species by Grantor is prohibited.

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

IV. GRANTEE RESERVED USES

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

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

_____ (Seal)
Curtis A. Redding

NORTH CAROLINA
COUNTY OF

I, Traci J McDaniel, a Notary Public in and for the County and State aforesaid, do hereby certify that Curtis A Redding, 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 day of April 5th, 2021.

_____
Notary Public

My commission expires: 01-18-2025

TRACI J. McDANIEL NOTARY PUBLIC RANDOLPH COUNTY, NC

Exhibit A

CONSERVATION EASEMENT
BULL CHUTE SITE
RANDOLPH COUNTY

Conservation Easement Area 2B

All of the conservation easement 2B of the Bull Chute Site over a portion of the land of the Curtis A. Redding (D.B. 1856, PG. 2361), lying and being situated in New Market Township, Randolph County, North Carolina and particularly described as follows (all distances are ground distances unless otherwise noted):

Beginning at an iron stake (Point of Beginning) labeled as Point No. 38 and being the Northern most corner of the Conservation Easement Area 3A and being located South 44°20'46" West 1715.312 feet from an iron stake with a blue cap (Point No. 150) with N.C. Grid Coordinates N=760,264.2078', E=1,738,494.1838' (NAD '83, 2011).

Thence from the Point of Beginning (Point No. 38), South 03°13'02" West 221.59' to an iron stake; thence South 77°27'49" West 149.11' to an iron stake; thence North 22°15'09" West 178.25' to an iron stake; thence North 76°55'41" East 150.31' to an iron stake; thence North 55°21'33" East 96.12' to an iron stake, which is the Point of Beginning (Point No. 38), having an area of 0.80 acres.

Conservation Easement Area 3A

All of the conservation easement 3A of the Bull Chute Site over a portion of the land of the Curtis A. Redding (D.B. 1856, PG. 2361), lying and being situated in New Market Township, Randolph County, North Carolina and particularly described as follows (all distances are ground distances unless otherwise noted):

Beginning at an iron stake (Point of Beginning) labeled as Point No. 41 and being the Eastern most corner of the Conservation Easement Area 3A and being located South 43°23'24" West 2059.83 feet from an iron stake with a blue cap (Point No. 150) with N.C. Grid Coordinates N=760,264.2078', E=1,738,494.1838' (NAD '83, 2011).

Thence from the Point of Beginning (Point No.41), South 48°32'21" West 378.60' to an iron stake; thence South 52°21'01" West 201.34' to an iron stake; thence North 62°14'47" West 205.87' to an iron stake; thence North 03°40'19" East 678.23' to an iron stake; thence North 89°13'27" East 95.03' to an iron stake; thence North 89°14'45" East 91.94' to an iron stake; thence South 02°21'38" West 440.46' to an iron stake; thence South 75°32'11" East 83.83' to an iron stake; thence North 47°54'02" East 242.90' to an iron stake; thence North 54°58'41" East 103.80' to an iron stake; thence South 22°15'09" East 176.05' to an iron stake; which is the Point of Beginning (Point No. 41), having an area of 5.41 acres.

Conservation Easement Area 3B

All of the conservation easement 3B of the Bull Chute Site over a portion of the land of the Curtis Alan Redding (D.B. 1447, PG. 980), lying and being situated in New Market Township, Randolph County, North Carolina and particularly described as follows (all distances are ground distances unless otherwise noted):

Beginning at an iron stake (Point of Beginning) labeled as Point No. 62 and being the Southeastern most corner of the Conservation Easement Area 3B and being located South 58°49'08" West 2115.58 feet from an` iron stake with a blue cap (Point No. 150) with N.C. Grid Coordinates N=760,264.2078', E=1,738,494.1838' (NAD '83, 2011).

Thence from the Point of Beginning (Point No. 62), South 89°14'45" West 91.94' to an iron stake; thence North 14°04'37" West 570.92' to an iron stake; thence North 48°03'06" East 32.21' to an iron stake; thence South 27°13'22" East 130.76' to an iron stake; thence South 22°11'02" East 170.08' to an iron stake; thence North 87°08'15" East 65.19' to an iron stake; thence North 14°08'27" East 454.75' to an iron stake; thence North 25°11'24" East 190.24' to an iron stake; thence North 48°03'06" East 73.92' to an iron stake; thence South 63°53'15" East 156.99' to an iron stake; thence South 25°04'59" West 269.20' to an iron stake; thence South 14°53'56" West 476.53' to an iron stake; thence South 41°07'46" West 210.77' to an iron stake; thence South 08°19'36" East 34.31' to an iron stake, which is the Point of Beginning (Point No. 62), having an area of 4.66 acres.

Conservation Easement Area 3C

All of the conservation easement 3C of the Bull Chute Site over a portion of the land of the Curtis Alan Redding (D.B. 1416, PG. 154), lying and being situated in New Market Township, Randolph County, North Carolina and particularly described as follows (all distances are ground distances unless otherwise noted):

Beginning at an iron stake (Point of Beginning) labeled as Point No. 55 and being the Southern most corner of the Conservation Easement Area 3C and being located South 83°46'04" West 1645.31 feet from an iron stake with a blue cap (Point No. 150) with N.C. Grid Coordinates N=760,264.2078', E=1,738,494.1838' (NAD '83, 2011).

Thence from the Point of Beginning (Point No. 55), North 25°11'24" East 68.57' to an iron stake; thence South 63°53'15" East 28.72' to an iron stake; thence South 48°03'06" West 73.92' to an iron stake, which is the Point of Beginning (Point No. 55), having an area of 0.02 acres.

Conservation Easement Area 3D

All of the conservation easement 3D of the Bull Chute Site over a portion of the land of the Curtis Alan Redding (D.B. 1187, PG. 2018), lying and being situated in New Market Township, Randolph County, North Carolina and particularly described as follows (all distances are ground distances unless otherwise noted):

Beginning at an iron stake (Point of Beginning) labeled as Point No. 104 and being the Southeastern most corner of the Conservation Easement Area 3D and being located South 60°02'03" West 2195.36 feet from an iron stake with a blue cap (Point No. 150) with N.C. Grid Coordinates N=760,264.2078', E=1,738,494.1838' (NAD '83, 2011).

Thence from the Point of Beginning (Point No. 104), South 89°13'27" West 95.03' to an iron stake; thence North 18°34'47" West 454.77' to an iron stake; thence North 32°13'58" West 157.65' to an iron stake; thence South 87°06'28" East 185.38' to an iron stake; thence South 14°04'37" East 570.92' to an iron stake, which is the Point of Beginning (Point No. 104), having an area of 1.59 acres.

Conservation Easement Area 3E

All of the conservation easement 3E of the Bull Chute Site over a portion of the land of the Curtis Alan Redding (D.B. 1416, PG. 154) lying and being situated in New Market Township, Randolph County, North Carolina and particularly described as follows (all distances are ground distances unless otherwise noted):

Beginning at an iron stake (Point of Beginning) labeled as Point No. 50 and being the Southeastern most corner of the Conservation Easement Area 3E and being located South 75°30'34" West 2083.06 feet from an iron stake with a blue cap (Point No. 150) with N.C. Grid Coordinates N=760,264.2078', E=1,738,494.1838' (NAD '83, 2011).

Thence from the Point of Beginning (Point No. 50), South 48°03'06" West 32.21' to an iron stake; thence North 87°06'28" West 185.38' to an iron stake; thence North 23°20'27" West 244.64' to an iron stake; thence North 66°53'25" East 175.40' to an iron stake; thence South 27°13'22" East 316.32' to an iron stake, which is the Point of Beginning (Point No. 50), having an area of 1.24 acres.

Conservation Easement Area 4A

All of the conservation easement 4A of the Bull Chute Site over a portion of the land of the Curtis Alan Redding (D.B. 1447, PG. 980) lying and being situated in New Market Township, Randolph County, North Carolina and particularly described as follows (all distances are ground distances unless otherwise noted):

Beginning at an iron stake (Point of Beginning) labeled as Point No. 66 and being the Southeastern most corner of the Conservation Easement Area 4A and being located South 83°57'20" West 1412.33 feet from an iron stake with a blue cap (Point No. 150) with N.C. Grid Coordinates N=760,264.2078', E=1,738,494.1838' (NAD '83, 2011).

Thence from the Point of Beginning (Point No. 66), North 63°53'15" West 142.58' to an iron stake; thence North 48°03'06" East 320.28' to a non-monumented corner; thence South 21°42'07" West 297.97' to an iron stake, which is the Point of Beginning (Point No. 66), having an area of 0.49 acres.

Conservation Easement Area 4B

All of the conservation easement 4B of the Bull Chute Site over a portion of the land of the Curtis Alan Redding (D.B. 1416, PG. 154), lying and being situated in New Market Township, Randolph County, North Carolina and particularly described as follows (all distances are ground distances unless otherwise noted):

Beginning at an iron stake (Point of Beginning) labeled as Point No. 67 and being the Southeastern most corner of the Conservation Easement Area 4B and being located South 86°47'22" West 1534.92 feet from an iron stake with a blue cap (Point No. 150) with N.C. Grid Coordinates N=760,264.2078', E=1,738,494.1838' (NAD '83, 2011).

Thence from the Point of Beginning (Point No. 67), North 63°53'15" West 34.33' to an iron stake; thence North 24°37'30" East 220.69' to an iron stake; thence South 89°28'29" East 113.66' to an iron stake; thence South 89°28'29" East 5.18' to an iron stake; thence South 89°27'49" East 58.24' to a non-monumented corner thence South 48°03'06" West 320.28' to an iron stake, which is the Point of Beginning (Point No. 67), having an area of 0.53 acres.

Conservation Easement Area 5A

All of the conservation easement 5A of the Bull Chute Site over a portion of the land of the Curtis Alan Redding (D.B. 1416, PG. 154) lying and being situated in New Market Township, Randolph County, North Carolina and particularly described as follows (all distances are ground distances unless otherwise noted):

Beginning at an iron stake (Point of Beginning) labeled as Point No. 89 and being the Southeastern most corner of the Conservation Easement Area 5A and being located South 85°12'10" West 2188.67 feet from an iron stake with a blue cap (Point No. 150) with N.C. Grid Coordinates N=760,264.2078', E=1,738,494.1838' (NAD '83, 2011).

Thence from the Point of Beginning (Point No. 89), South 66°53'25" West 173.84' to an iron stake; thence North 22°42'38" West 333.34' to an iron stake; thence North 78°41'24" West 92.95' to an iron stake; thence North 30°19'15" West 76.05' to an iron stake; thence South 89°28'29" East 286.70' to an iron stake; thence South 22°17'52" East 346.42' to an iron stake, which is the Point of Beginning (Point No. 89), having an area of 1.70 acres.

BK 2748 PG 2311 (11)
This document presented and filed:
04/09/2021 11:27:26 AM
DEED
Fee $26.00 Excise Tax: $126.00
20118759
Randolph County North Carolina
Krista M. Lowe, Register of Deeds

STATE OF NORTH CAROLINA

R|S $126.00
✓ P|U Gavin + Cox

RANDOLPH COUNTY

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

SPO File Number: 76-DA
DMS Project Number: 100137

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 February 2021 , by David Lee Shipton and Beverly Shipton ("**Grantor**"), whose mailing address is 4329 Stewart Road, Sophia, NC 27350, 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 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 Clearwater Mitigation Solutions, LLC, a North Carolina Limited Liability Company, 604 Macon Place, Raleigh, North Carolina, 27609 and the North Carolina Department of Environment and Natural Resources, to provide stream, wetland and/or buffer mitigation pursuant to the North Carolina Department of Environment and Natural Resources Purchase and Services Contract Number 7878-01.

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

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

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

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

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

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

WHEREAS, Grantor owns in fee simple certain real property situated, lying, and being in New Market Township, Randolph County, North Carolina (the "**Property**"), and being more particularly described as that certain parcel of land containing approximately 40.93 acres Parcel Identification Number (PIN) 7735882804 and being conveyed to the Grantor by deed as recorded in **Deed Book 1713 at Page 504** of the Randolph 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 an unnamed tributary to Caraway 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:

Conservation Easement Areas 1B and 2A containing a total of 3.49 **acres** as shown on the plats of survey entitled "Final Plat, Conservation Easement for North Carolina Division of Mitigation Services, Project Name: "Bull Chute Site", SPO File No.76-DA , DMS Site No. 100137, Property of David Lee Shipton and Beverly Shipton," dated 3\18, 2021 by K2 Design Group, PLS Number L-4194 and recorded in the Randolph County, North Carolina Register of Deeds at **Plat Book** 169 **Pages** 5-6.

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.

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 nonnative plants, trees and/or animal species by Grantor is prohibited.

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

IV. GRANTEE RESERVED USES

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

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

_____ (Seal)
David Lee Shipton

_____ (Seal)
Beverly Shipton

NORTH CAROLINA
COUNTY OF

I, Traci J McDaniel, a Notary Public in and for the County and State aforesaid, do hereby certify that David Lee Shipton + Beverly Shipton 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 26 day of February, 2021

_____
Notary Public

My commission expires: 01-18-2025

TRACI J. McDANIEL
NOTARY PUBLIC
RAINSCOUNTY, NC

Exhibit A

CONSERVATION EASEMENT
BULL CHUTE SITE
RANDOLPH COUNTY

Conservation Easement Area 1B

All of the conservation easement 1B of the Bull Chute Site over a portion of the land of the David Lee Shipton (D.B. 1713, PG. 504), lying and being situated in New Market Township, Randolph County, North Carolina and particularly described as follows (all distances are ground distances unless otherwise noted):

Beginning at an iron stake (Point of Beginning) labeled as Point No. 12 and being the Northeastern most corner of the Conservation Easement Area 1B and being located South 22°00'52" West 828.86 feet from an iron stake with a blue cap (Point No. 150) with N.C. Grid Coordinates N=760,264.2078', E=1,738,494.1838' (NAD '83, 2011).

Thence from the Point of Beginning (Point No.12), South 42°20'32" West 156.49' to an iron stake; thence South 68°49'19" West 185.61' to an iron stake; thence South 43°28'56" West 134.13' to an iron stake; thence North 28°38'20" West 175.97' to an iron stake; thence North 48°16'11" East 165.72' to an iron stake; thence North 76°52'18" East 136.95' to an iron stake; thence South 85°26'04" East 198.70' to an iron stake, which is the Point of Beginning (Point No. 12), having an area of 1.45 acres.

Conservation Easement Area 2A

All of the conservation easement 2A of the Bull Chute Site over a portion of the land of the David Lee Shipton (D.B. 1713, PG. 504), lying and being situated in New Market Township, Randolph County, North Carolina and particularly described as follows (all distances are ground distances unless otherwise noted):

Beginning at an iron stake (Point of Beginning) labeled as Point No. 31 and being the Northern most corner of the Conservation Easement Area 2A and being located South 41°23'28" West 1234.86 feet from an iron stake with a blue cap (Point No. 150) with N.C. Grid Coordinates N=760,264.2078', E=1,738,494.1838' (NAD '83, 2011).

Thence from the Point of Beginning (Point No.31), South 28°38'20" East 174.32' to an iron stake; thence South 68°22'19" West 157.84' to an iron stake; thence South 46°54'42" West 454.30' to an iron stake; thence North 03°13'02" East 221.59' to an iron stake; thence North 44°57'59" East 330.34' to an iron stake; thence North 65°56'31" East 163.24' to an iron stake, which is the Point of Beginning (Point No. 31), having an area of 2.04 acres.

BK 2748 PG 2300 (11)
This document presented and filed:
04/09/2021 11:27:25 AM
DEED
Fee $26.00 Excise Tax: $170.00
20118758
Randolph County North Carolina
Krista M. Lowe, Register of Deeds

STATE OF NORTH CAROLINA

Pile Gavin & Cox
R/S # 170.00

RANDOLPH COUNTY

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

SPO File Number: 76-DB
DMS Project Number: 100137

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 This26th day of February, 2021 , by Barry B. Spencer and Regina H. Spencer ("**Grantor**"), whose mailing address is 2879 Marlboro Church Road, Sophia, NC 27350, 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 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 Clearwater Mitigation Solutions, LLC, a North Carolina Limited Liability Company, 604 Macon Place, Raleigh, North Carolina, 27609 and the North Carolina Department of Environment and Natural Resources, to provide stream, wetland and/or buffer mitigation pursuant to the North Carolina Department of Environment and Natural Resources Purchase and Services Contract Number 7878-01.

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

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

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

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

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

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

WHEREAS, Grantor owns in fee simple certain real property situated, lying, and being in New Market Township, Randolph County, North Carolina (the "**Property**"), and being more particularly described as that certain parcel of land containing approximately 86.43 acres Parcel Identification Number (PIN) 7736611524 and being conveyed to the Grantor by deed as recorded in **Deed Book 2260 at Page 218** of the Randolph 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 an unnamed tributary to Caraway 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:

Conservation Easement Areas 5B and 4 C containing a total of 4.50 **acres** as shown on the plats of survey entitled "Final Plat, Conservation Easement for North Carolina Division of Mitigation Services, Project Name: "Bull Chute Site", SPO File No. 76-DB , DMS Site No. 100137, Property of Barry B. Spencer and Regina H. Spencer," dated 3/18, 2021 by K2 Design Group, PLS Number L-4194 and recorded in the Randolph County, North Carolina Register of Deeds at **Plat Book** 169 **Pages** 5-6.

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.

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 nonnative plants, trees and/or animal species by Grantor is prohibited.

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

IV. GRANTEE RESERVED USES

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

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

Barry B. Spencer (Seal)
Barry B. Spencer

Regina H. Spencer (Seal)
Regina H. Spencer

NORTH CAROLINA
COUNTY OF Randolph

I, Traci J McDaniel, a Notary Public in and for the County and State aforesaid, do hereby certify that Barry B. Spencer & Regina H. Spencer 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 February, 2021

Traci J McDaniel
Notary Public

My commission expires: 01-18-2025

TRACI J. McDANIEL NOTARY PUBLIC RANDOLPH COUNTY, NC

Exhibit A

CONSERVATION EASEMENT
BULL CHUTE SITE
RANDOLPH COUNTY

Conservation Easement Area 4C

All of the conservation easement 4C of the Bull Chute Site over a portion of the land of the Berry Bruce Spencer (D.B. 2260, PG. 218), lying and being situated in New Market Township, Randolph County, North Carolina and particularly described as follows (all distances are ground distances unless otherwise noted):

Beginning at an iron stake (Point of Beginning) labeled as Point No. 86 and being the Southeastern most corner of the Conservation Easement Area 4C and being located North 84°35'03" West 1363.81 feet from an iron stake with a blue cap (Point No. 150) with N.C. Grid Coordinates N=760,264.2078', E=1,738,494.1838' (NAD '83, 2011).

Thence from the Point of Beginning (Point No. 86), North 89°28'29" West 113.66' to an iron stake; thence North 11°14'55" East 58.46' to an iron stake; thence North 25°47'22" East 73.42' to an iron stake; thence North 42°11'43" East 68.24' to an iron stake; thence North 21°06'51" West 111.81' to an iron stake; thence North 27°42'39" West 77.66' to an iron stake; thence North 06°29'58" East 55.22' to an iron stake; thence North 60°53'02" East 62.80' to an iron stake; thence South 63°09'10" East 63.05' to an iron stake; thence South 34°37'27" East 100.93' to an iron stake; thence South 15°24'47" East 70.78' to an iron stake; thence North 68°29'23" East 98.70' to an iron stake; thence North 56°00'07" East 43.38' to an iron stake; thence South 33°49'20" East 43.37' to an iron stake; thence South 53°52'57" West 66.22' to an iron stake; thence South 63°24'51" West 137.50' to an iron stake; thence South 30°10'06" West 70.77' to an iron stake; thence South 15°37'41" West 120.88' to an iron stake, which is the Point of Beginning (Point No. 86), having an area of 1.40 acres.

Conservation Easement Area 5B

All of the conservation easement 5B of the Bull Chute Site over a portion of the land of the Berry Bruce Spencer (D.B. 2260, PG. 218), lying and being situated in New Market Township, Randolph County, North Carolina and particularly described as follows (all distances are ground distances unless otherwise noted):

Beginning at an iron stake (Point of Beginning) labeled as Point No. 103 and being the Southeastern most corner of the Conservation Easement Area 5B and being located North 86°35'52" West 2316.52 feet from an iron stake with a blue cap (Point No. 150) with N.C. Grid Coordinates N=760,264.2078', E=1,738,494.1838' (NAD '83, 2011).

Thence from the Point of Beginning (Point No. 103), North 89°28'29" West 286.70' to an iron stake; thence North 10°58'07" East 48.77' to an iron stake; thence North 46°14'43" East 56.48' to an iron stake; thence South 82°57'22" East 68.36' to an iron stake; thence North 13°17'28" East 102.52' to an iron stake; thence North 12°05'07" West 288.29' to an iron stake; thence North 19°17'33" East 158.88' to an iron stake; thence South 89°03'52" East 272.51' to an iron stake; thence South 16°47'09" West 423.61' to an iron stake; thence South 08°43'52" West 139.55' to an iron stake; thence South 20°23'06" East 69.21' to an iron stake, which is the Point of Beginning (Point No. 103), having an area of 3.10 acres.

Appendix I
Credit Release Schedule

The schedules below list the updated credit release schedules for stream and wetland mitigation projects developed by bank and ILF sites in North Carolina:

Credit Release Schedule and Milestones for Wetlands					
Credit Release Milestone	Release Activity	Banks		ILF/NCDMS	
		Interim Release	Total Released	Interim Release	Total Released
1	Site Establishment (includes all required criteria stated above)	15%	15%	0%	0%
2	Completion of all initial physical and biological improvements made pursuant to the Mitigation Plan	15%	30%	30%	30%
3	Year 1 monitoring report demonstrates that interim performance standards have been met	10%	40%	10%	40%
4	Year 2 monitoring report demonstrates that interim performance standards have been met	10%	50%	10%	50%
5	Year 3 monitoring report demonstrates that interim performance standards have been met	15%	65%	15%	65%
6*	Year 4 monitoring report demonstrates that interim performance standards have been met	5%	70%	5%	70%
7	Year 5 monitoring report demonstrates that interim performance standards have been met	15%	85%	15%	85%
8*	Year 6 monitoring report demonstrates that interim performance standards have been met	5%	90%	5%	90%
9	Year 7 monitoring report demonstrates that performance standards have been met	10%	100%	10%	100%

*Please note that vegetation plot 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.

Credit Release Schedule and Milestones for Streams					
Credit Release Milestone	Release Activity	Banks		ILF/NCDMS	
		Interim Release	Total Released	Interim Release	Total Released
1	Site Establishment (includes all required criteria stated above)	15%	15%	0%	0%
2	Completion of all initial physical and biological improvements made pursuant to the Mitigation Plan	15%	30%	30%	30%
3	Year 1 monitoring report demonstrates that channels are stable and interim performance standards have been met	10%	40%	10%	40%
4	Year 2 monitoring report demonstrates that channels are stable and interim performance standards have been met	10%	50%	10%	50%
5	Year 3 monitoring report demonstrates that channels are stable and interim performance standards have been met	10%	60%	10%	60%
6*	Year 4 monitoring report demonstrates that channels are stable and interim performance standards have been met	5%	65% (75%**)	5%	65% (75%**)
7	Year 5 monitoring report demonstrates that channels are stable and interim performance standards have been met	10%	75% (85%**)	10%	75% (85%**)
8*	Year 6 monitoring report demonstrates that channels are stable and interim performance standards have been met	5%	80% (90%**)	5%	80% (90%**)
9	Year 7 monitoring report demonstrates that channels are stable, performance standards have been met	10%	90% (100%**)	10%	90% (100%**)

*Please note that vegetation data may not be required with monitoring reports submitted during these monitoring years unless otherwise required by the Mitigation Plan or directed by the NCIRT.

**10% reserve of credits to be held back until the bankfull event performance standard has been met.

Credit Release Schedule and Milestones for Streams					
Credit Release Milestone	Release Activity	Banks		ILF/NCDMS	
		Interim Release	Total Released	Interim Release	Total Released
1	Site Establishment (includes all required criteria stated above)	15%	15%	0%	0%
2	Completion of all initial physical and biological improvements made pursuant to the Mitigation Plan	15%	30%	30%	30%
3	Year 1 monitoring report demonstrates that channels are stable and interim performance standards have been met	10%	40%	10%	40%
4	Year 2 monitoring report demonstrates that channels are stable and interim performance standards have been met	10%	50%	10%	50%
5	Year 3 monitoring report demonstrates that channels are stable and interim performance standards have been met	10%	60%	10%	60%
6*	Year 4 monitoring report demonstrates that channels are stable and interim performance standards have been met	5%	65% (75%**)	5%	65% (75%**)
7	Year 5 monitoring report demonstrates that channels are stable and interim performance standards have been met	10%	75% (85%**)	10%	75% (85%**)
8*	Year 6 monitoring report demonstrates that channels are stable and interim performance standards have been met	5%	80% (90%**)	5%	80% (90%**)
9	Year 7 monitoring report demonstrates that channels are stable, performance standards have been met	10%	90% (100%**)	10%	90% (100%**)

*Please note that vegetation data may not be required with monitoring reports submitted during these monitoring years unless otherwise required by the Mitigation Plan or directed by the NCIRT.

**10% reserve of credits to be held back until the bankfull event performance standard has been met.

Appendix J
Maintenance Plan

Maintenance Plan

The Site shall be monitored on a regular basis and a physical inspection of the site shall be conducted a minimum of once per year throughout the post-construction monitoring period until performance standards are met. These site inspections may identify site components and features that require routine maintenance. Routine maintenance should be expected most often in the first two years following site construction and may include the following:

Component/Feature	**Maintenance through project close-out**
Stream	Routine channel maintenance and repair activities may include securing of loose coir matting and supplemental installations of live stakes and other target vegetation along the channel. Areas where stormwater and floodplain flows intercept the channel may also require maintenance to prevent bank failures and head-cutting.
Vegetation	Vegetation shall be maintained to ensure the health and vigor of the targeted plant community. Routine vegetation maintenance and repair activities may include supplemental planting, pruning, mulching, and fertilizing. Exotic invasive plant species shall be controlled by mechanical and/or chemical methods. Any vegetation control requiring herbicide application will be performed in accordance with NC Department of Agriculture (NCDA) rules and regulations.
Beaver	Beaver and associated dams are to be removed as they colonize and until the project is closed.
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.
Road Crossing	Road crossings within the site may be maintained only as allowed by Conservation Easement or existing easement, deed restrictions, rights of way, or corridor agreements.

Appendix K
IRT Site Visit Notes

January 27, 2020

MEETING MINUTES

BULL CHUTE - Post Contract IRT Site Visit

DWR Project No. 20200021; USACE ID # SAW-2020-00049
DMS# 100137
Site Visit Date: 01/21/2020

On January 21, 2020 the regulatory agencies, NCDMS staff, and members of the Clearwater Mitigation Solutions team convened, on-site, at 10am to review the 32.3 acre proposed Bull Chute DMS mitigation site. Below is a list of attendees and general site visit notes.

Attendees:

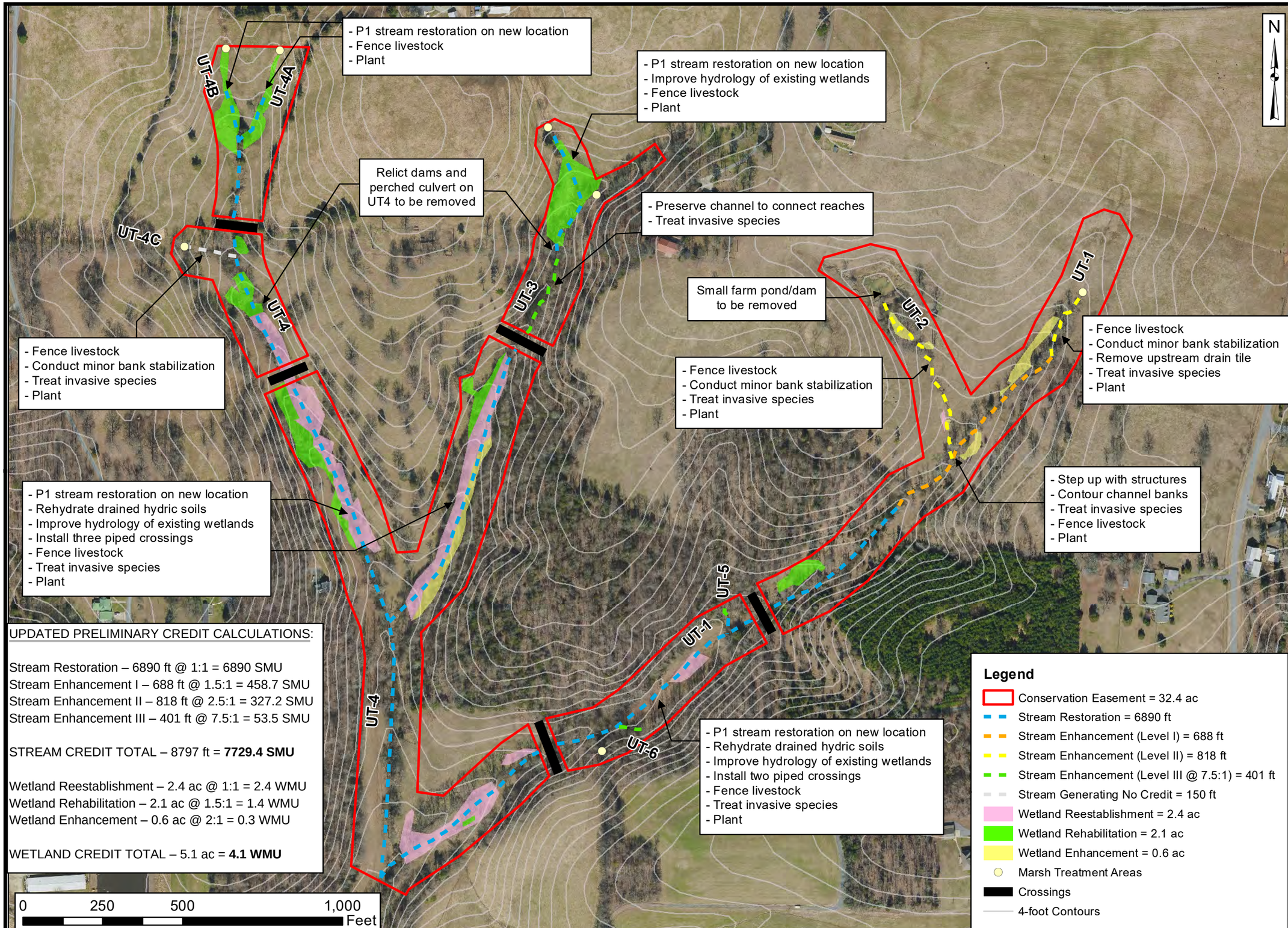
NC WRC	Travis Wilson
USACE	Todd Tugwell
USACE	Kim Browning
NCDWR	Mac Haupt
NCDWR	Erin Davis
NC DMS	Paul Wiesner
NC DMS	Matthew Reid
Clearwater	Kevin Yates
Axiom Env.	Grant Lewis
Axiom Env.	Kenan Jernigan

Site Visit Notes:

- The IRT will require flow gauges to be installed in the upper one third of each channel that exhibits questionable flow.
- The IRT expressed concern over the number of stream crossings/easement breaks within the project. The provider will work to remove as many crossings as possible. In addition, the IRT wanted some justification for 60-foot breaks in the easement at each crossing. This justification will be outlined in the detailed mitigation plan.
- The upper reaches of UT 1 were depicted as Enhancement (Level II) from the origination point to the convergence with UT 2. The IRT indicated that sections of UT 1 are more suited for Enhancement (Level 1) work and credit, particularly within incised portions of the channel. In addition, aggraded sections of the channel may be suitable for channel development through (Enhancement Level I) measures.
- A small tributary joined the right bank of UT 1 approximately halfway down the channel. This tributary will be included in the PJD review to determine jurisdiction and accounted for in detailed planning if necessary.
- Another small tributary joined the left bank of UT 1 approximately 500 ft down the channel from the aforementioned tributary. This tributary will also be included in the PJD review to determine jurisdiction and accounted for in detailed planning if necessary.
- The mitigation approach in lower reaches of UT 1 was discussed and generally agreed upon.
- UT 2 included the removal of a pond dam and Enhancement (Level II) throughout the entire reach. Although the IRT liked the approach to UT 2, concern over channel development, maintenance, and flow duration was indicated. The final approach to the reach shall be to notch or remove the dam, fence livestock, and plant the reach. This will eliminate pollutant discharges into Site. A flow gauge will be installed to ascertain flow duration within the reach.

- Wetland rehabilitation adjacent to UT 3 (Left Bank in the Bull Chute) are more suitable for Wetland Enhancement Credit due to the presence of vegetation.
- The mitigation approach in UT 3 mitigation was agreed upon by the IRT, with Stream Enhancement (Level III) being credited at 7.5:1 (rather than 10:1).
- The mitigation approach in UT 4 Mitigation was agreed upon by the IRT.
- UT 4C will be included in the project; however, will not be credit generating.
- Wetland enhancement at the upper reaches of UT 4 (between and adjacent to UT-4A and UT-4B) will be credited as wetland rehabilitation based on pollutant removal, livestock removal, and revegetation. The IRT deemed this wetland area to be sufficiently impacted to warrant wetland rehabilitation credit.
- The IRT asked that Clearwater confirm that all wetland assets were within the preliminary easement boundary. Several small portions that were depicted outside will be included in the final easement boundary. Only wetland areas that are included in the easement will generate credit.

Kevin Yates
Principal



UPDATED PRELIMINARY CREDIT CALCULATIONS:

Stream Restoration – 6890 ft @ 1:1 = 6890 SMU
Stream Enhancement I – 688 ft @ 1.5:1 = 458.7 SMU
Stream Enhancement II – 818 ft @ 2.5:1 = 327.2 SMU
Stream Enhancement III – 401 ft @ 7.5:1 = 53.5 SMU

STREAM CREDIT TOTAL – 8797 ft = **7729.4 SMU**

Wetland Reestablishment – 2.4 ac @ 1:1 = 2.4 WMU
Wetland Rehabilitation – 2.1 ac @ 1.5:1 = 1.4 WMU
Wetland Enhancement – 0.6 ac @ 2:1 = 0.3 WMU

WETLAND CREDIT TOTAL – 5.1 ac = **4.1 WMU**

Legend

- Conservation Easement = 32.4 ac
- Stream Restoration = 6890 ft
- Stream Enhancement (Level I) = 688 ft
- Stream Enhancement (Level II) = 818 ft
- Stream Enhancement (Level III @ 7.5:1) = 401 ft
- Stream Generating No Credit = 150 ft
- Wetland Reestablishment = 2.4 ac
- Wetland Rehabilitation = 2.1 ac
- Wetland Enhancement = 0.6 ac
- Marsh Treatment Areas
- Crossings
- 4-foot Contours

Axiom Environmental, Inc.

Prepared for:

CLEARWATER MITIGATION SOLUTIONS

DMS Project # 100137
DWR No. 20200021

BULL CHUTE MITIGATION SITE

Randolph County, NC

Title:

PROPOSED CONDITIONS

Drawn by: KRJ

Date: JAN 2020

Scale: 1:3500

Project No.: 19-008.01

FIGURE

A

Appendix L
Construction Plans

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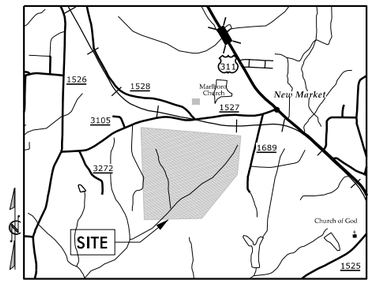
NC DEPARTMENT OF ENVIRONMENTAL QUALITY
DIVISION OF MITIGATION SERVICES
CONSTRUCTION PLANS
BULL CHUTE SITE

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	BULL CHUTE SITE	1	



VICINITY MAP
Not to Scale

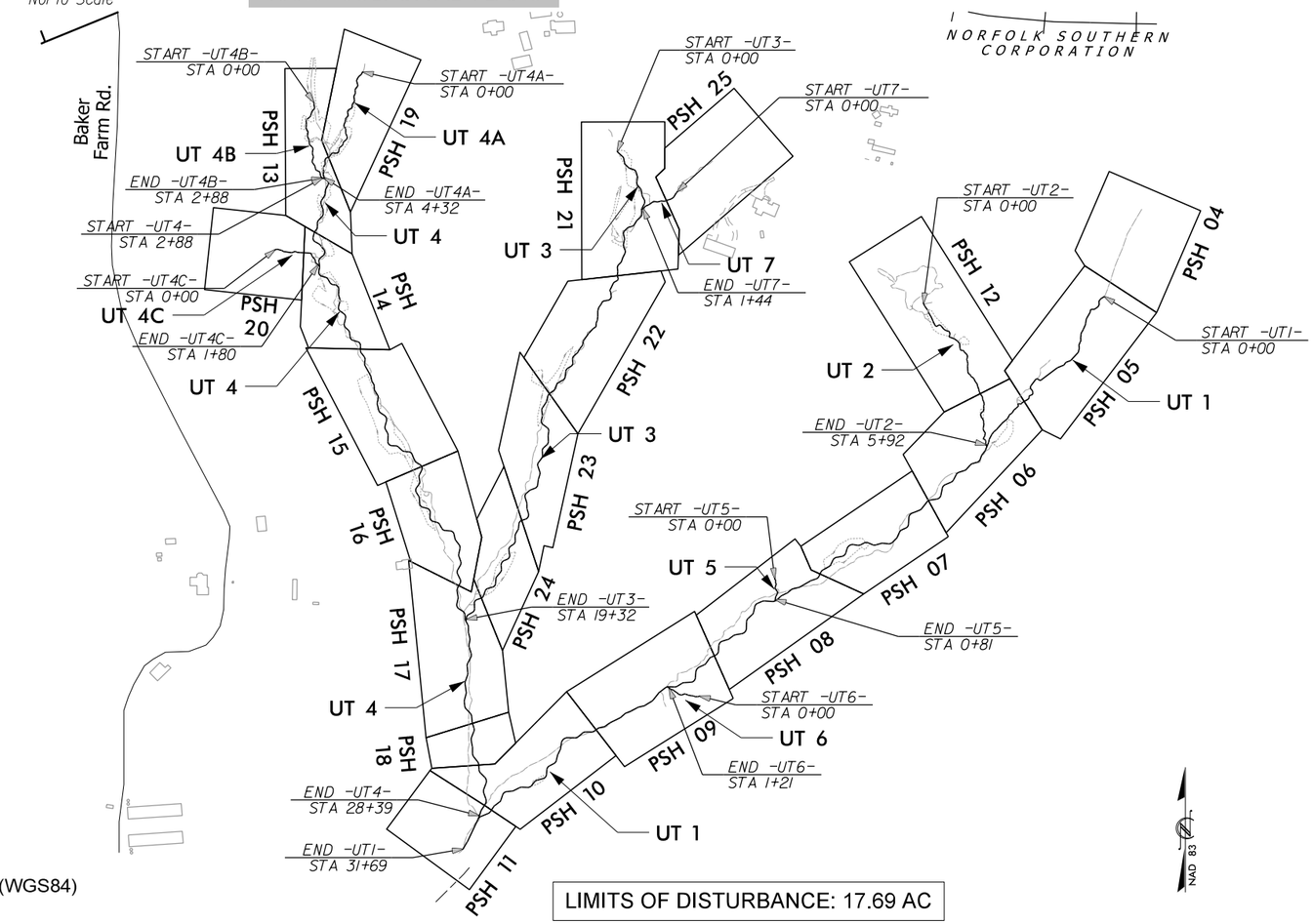
LOCATION: RANDOLPH COUNTY, NORTH CAROLINA

TYPE OF WORK: STREAM RESTORATION AND ENHANCEMENT (CLEARING, GRUBBING, GRADING, EROSION CONTROL AND PLANTING)

100% SUBMITTAL PLANS

INDEX OF SHEETS

SHEET NUMBER	SHEET
01	Title Sheet
01A	Symbology
02	Typicals
02A THRU 02E	Details
03	Control Points and Location Map
03A	Easement
04 THRU 25	Plan and Profile Sheets
E02 THRU E02E	Erosion Control Notes
E03 THRU E02D	Erosion Control Details
E02E	Haul Roads
E04 THRU E25	Erosion Control Plans
P01	Planting Plan



BULL CHUTE SITE

SITE #: 100137
YADKIN 03040105
RANDOLPH COUNTY
CONTRACT#: 7878-01
LATITUDE: 35.8325
LONGITUDE: -79.8879 (WGS84)

LIMITS OF DISTURBANCE: 17.69 AC

GRAPHIC SCALES

50 25 0 50 100
PLANS

50 25 0 50 100
PROFILE (HORIZONTAL)

10 5 0 10 5
PROFILE (VERTICAL)

PROPOSED LENGTH OF -UT 1- = 3169		PROPOSED LENGTH OF -UT 4B- = 288	
PROPOSED LENGTH OF -UT 2- = 592		PROPOSED LENGTH OF -UT 4C- = 180	
PROPOSED LENGTH OF -UT 3- = 1932		PROPOSED LENGTH OF -UT 5- = 81	
PROPOSED LENGTH OF -UT 4- = 2555		PROPOSED LENGTH OF -UT 6- = 121	
PROPOSED LENGTH OF -UT 4A- = 432		PROPOSED LENGTH OF -UT 7- = 144	
TOTAL STREAM LENGTHS (LF) = 9494			
RESTORATION LEVEL	STREAM (linear footage)	RIPARIAN WETLAND (acreage)	NONRIPARIAN WETLAND (acreage)
RESTORATION	6937	3.130 (Reestablishment)	0.000
ENHANCEMENT I	411	0.114 (Rehabilitation)	0.000
ENHANCEMENT II	333	1.4662 (Enhancement)	0.000
ENHANCEMENT III	50	0.000	0.000
TOTALS	7731	4.710	0.000

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GRANT LEWIS
PROJECT DESIGNER

CLEARWATER MITIGATION SOLUTIONS
Clearwater Mitigation Solutions
604 Macon Place
Raleigh, NC 27609
KEVIN YATES
SITE CONSTRUCTION MANAGER

Prepared in the Office of:
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TEL (919) 859-2243
ENG FIRM LICENSE NO. C-890
JOSHUA G. DALTON, P.E.
PROJECT ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 26971 ENGINEER JOSHUA G. DALTON

DocuSigned by: Joshua G. Dalton
1D89AD8C14994C3...

5/26/2021
DATE:

CONTRACT: BULL CHUTE SITE

SITE

09/08/95

5/26/2021
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jharvey

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CONVENTIONAL PLAN SHEET SYMBOLS

Note: Not to Scale **S.U.E. = Subsurface Utility Engineering*

BOUNDARIES AND PROPERTY:

- State Line
- County Line
- Township Line
- City Line
- Reservation Line
- Property Line
- Existing Iron Pin — EIP
- Computed Property Corner
- Property Monument — ECM
- Parcel/Sequence Number — 123
- Existing Fence Line
- Proposed Fence Gate
- Proposed Barbed Wire Fence
- Existing Wetland Boundary — WLB
- Proposed Wetland Boundary — WLB
- Existing Endangered Animal Boundary — EAB
- Existing Endangered Plant Boundary — EPB
- Existing Historic Property Boundary — HPB

BUILDINGS AND OTHER CULTURE:

- Gas Pump Vent or U/G Tank Cap
- Sign — S
- Well — W
- Small Mine
- Foundation
- Area Outline
- Cemetery
- Building
- School
- Church
- Dam

HYDROLOGY:

- Stream or Body of Water
- Hydro, Pool or Reservoir
- Jurisdictional Stream — JS
- Buffer Zone 1 — BZ 1
- Buffer Zone 2 — BZ 2
- Flow Arrow
- Disappearing Stream
- Spring
- Wetland
- Proposed Lateral, Tail, Head Ditch — FLOW

RIGHT OF WAY & PROJECT CONTROL:

- Secondary Horiz and Vert Control Point
- Primary Horiz Control Point
- Primary Horiz and Vert Control Point

- Exist Permanent Easment Pin and Cap
- New Permanent Easement Pin and Cap
- Vertical Benchmark
- Existing Right of Way Marker
- Existing Right of Way Line
- New Right of Way Line — RW
- New Right of Way Line with Pin and Cap — RW
- New Right of Way Line with Concrete or Granite R/W Marker — RW
- New Control of Access Line with Concrete C/A Marker — CA
- Existing Control of Access — CA
- New Control of Access — CA
- Existing Easement Line — E
- New Conservation Easement — CE
- New Temporary Drainage Easement — TDE
- New Permanent Drainage Easement — PDE
- New Permanent Drainage / Utility Easement — DUE
- New Permanent Utility Easement — PUE
- New Temporary Utility Easement — TUE
- New Aerial Utility Easement — AUE

ROADS AND RELATED FEATURES:

- Existing Edge of Pavement
- Existing Curb
- Proposed Slope Stakes Cut — C
- Proposed Slope Stakes Fill — F
- Proposed Curb Ramp — CR
- Existing Metal Guardrail
- Proposed Guardrail
- Existing Cable Guiderail
- Proposed Cable Guiderail
- Equality Symbol
- Pavement Removal

VEGETATION:

- Single Tree
- Single Shrub
- Hedge
- Woods Line
- Orchard
- Vineyard — Vineyard

EXISTING STRUCTURES:

MAJOR:

- Bridge, Tunnel or Box Culvert — CONC
- Bridge Wing Wall, Head Wall and End Wall — CONC WW

MINOR:

- Head and End Wall — CONC HW

- Pipe Culvert
- Footbridge
- Drainage Box: Catch Basin, DI or JB — CB
- Paved Ditch Gutter
- Storm Sewer Manhole — S
- Storm Sewer — S

UTILITIES:

POWER:

- Existing Power Pole
- Proposed Power Pole
- Existing Joint Use Pole
- Proposed Joint Use Pole
- Power Manhole — P
- Power Line Tower
- Power Transformer
- U/G Power Cable Hand Hole
- H-Frame Pole
- U/G Power Line LOS B (S.U.E.*) — P
- U/G Power Line LOS C (S.U.E.*) — P
- U/G Power Line LOS D (S.U.E.*) — P

TELEPHONE:

- Existing Telephone Pole

WATER:

- Water Manhole — W
- Water Meter
- Water Valve
- Water Hydrant
- U/G Water Line LOS B (S.U.E*) — W
- U/G Water Line LOS C (S.U.E*) — W
- U/G Water Line LOS D (S.U.E*) — W
- Above Ground Water Line — A/G Water

GAS:

- Gas Valve
- Gas Meter
- U/G Gas Line LOS B (S.U.E.*) — G
- U/G Gas Line LOS C (S.U.E.*) — G
- U/G Gas Line LOS D (S.U.E.*) — G
- Above Ground Gas Line — A/G Gas

SANITARY SEWER:

- Sanitary Sewer Manhole
- Sanitary Sewer Cleanout
- U/G Sanitary Sewer Line — SS
- Above Ground Sanitary Sewer — A/G Sanitary Sewer
- SS Forced Main Line LOS B (S.U.E.*) — FSS
- SS Forced Main Line LOS C (S.U.E.*) — FSS
- SS Forced Main Line LOS D (S.U.E.*) — FSS

MISCELLANEOUS:

- Utility Pole
- Utility Pole with Base
- Utility Located Object
- Utility Traffic Signal Box — S
- Utility Unknown U/G Line LOS B (S.U.E.*) — ?UTL
- U/G Tank; Water, Gas, Oil
- Underground Storage Tank, Approx. Loc. — UST
- A/G Tank; Water, Gas, Oil
- Geoenvironmental Boring
- U/G Test Hole LOS A (S.U.E.*)
- Abandoned According to Utility Records — AATUR
- End of Information — E.O.I.
- Riffle Rip Rap
- Log Vane
- Log Cross Vane
- Step Pool Structure — Begin / End
- Stream Plug
- Floodplain Interceptor
- Proposed Fence
- Limits of Disturbance — LOD

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ENG FIRM LICENSE NO. C-0910

Axiom Environmental, Inc.

BULL CHUTE
RANDOLPH COUNTY, NC

SYMBOLOGY

PROJECT # :
DRAWING NAME:
DATE: 2021
DRAWN BY: JRH
REVIEWED BY: JGD
REVISIONS:

SHEET NO. **01A**

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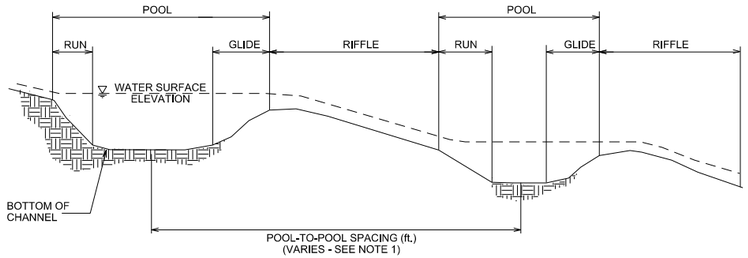
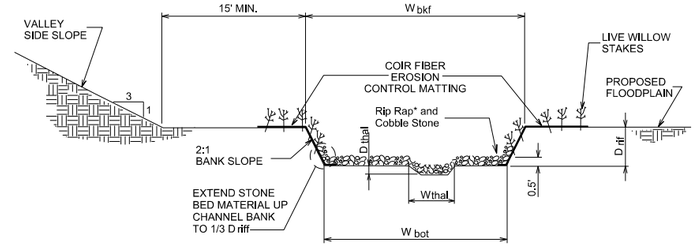


TYPICAL CHANNEL PROFILE

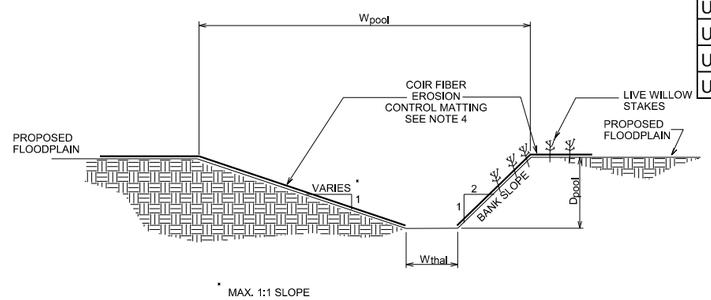
NOTES:

1. POOL-TO-POOL SPACING IS MEASURED FROM CENTER OF POOL BEND TO CENTER OF POOL BEND.

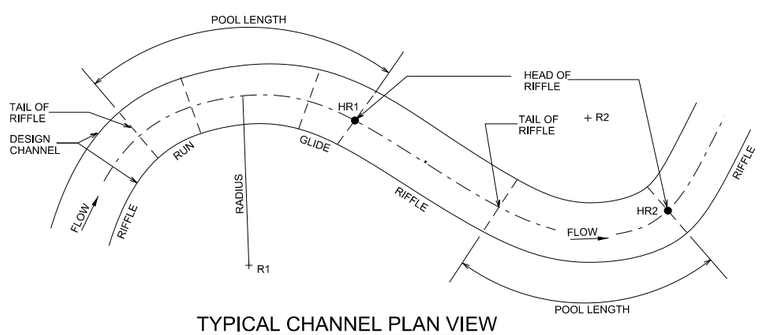


TYPICAL RIFFLE CROSS-SECTION

* Riffle Rip Rap			
Reach	Rip Rap CL 'B' %	Rip Rap CL 'A' %	Rip Rap Cobble %
UT1	30	30	40
UT3, UT3A	0	40	60
UT4 Up	30	30	40
UT4 Down	30	30	40
UT4A,UT4B, UT4C	0	40	60
UT 6	0	40	60



TYPICAL POOL CROSS-SECTION



TYPICAL CHANNEL PLAN VIEW

CHANNEL PLAN VIEW NOTES:

1. THE CONTRACTOR SHALL LAYOUT THE CHANNEL ALIGNMENT BY LOCATING THE RADII AND SCRIBING THE CENTER LINE FOR EACH POOL BEND. THE CONNECTING TANGENT SECTIONS SHALL COMPLETE THE LAYOUT OF THE CHANNEL.

2. FIELD ADJUSTMENTS OF THE ALIGNMENT MAY BE REQUIRED TO SAVE TREES OR AVOID OBSTACLES. THE STAKE-OUT SHALL BE APPROVED BY THE CONSTRUCTION MANAGER BEFORE CONSTRUCTION OF THE CHANNEL.

CHANNEL CONSTRUCTION NOTES:

1. MATERIAL EXCAVATED FROM CHANNEL AND FLOODPLAIN SHALL BE USED TO BACKFILL EXISTING CHANNEL.

2. BANK PROTECTION SHALL CONSIST OF NATURAL COIR FIBER MATTING.

3. THE CONTRACTOR SHALL SUPPLY BED MATERIAL FOR THE ENTIRE BED LENGTH OF EACH RIFFLE SECTION. THE BED MATERIAL SHALL CONSIST OF THE APPROXIMATE PERCENTAGE LISTED IN THE TABLE.

CROSS-SECTION DIMENSIONS							
REACH	Wbkf (ft.)	Wbot (ft.)	Driff (ft.)	Dthal (ft.)	Dpool (ft.)	Wpool (ft.)	Wthal (ft.)
UT 1	9.2	5.6	0.8	0.1	1.1	11.9	1.0
UT 3	7.2	4.4	0.6	0.1	0.9	9.4	1.0
UT 4 Upstream	7.8	5.0	0.6	0.1	0.9	10.1	1.0
UT 4 Downstream	9.8	6.2	0.8	0.1	1.2	12.8	1.0
UT 4A, UT 4B and UT 5	4.3	2.7	0.3	0.1	0.5	5.5	1.0

DocuSigned by:
Joshua G Dalton
1089AD8C14994C8...

NORTH CAROLINA PROFESSIONAL SEAL 26971 ENGINEER JOSHUA G. DALTON

5/26/2021

DATE:

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BULL CHUTE
RANDOLPH COUNTY, NC
TYPICALS

PROJECT # :
DRAWING NAME:
DATE: 2021
DRAWN BY: JRH
REVIEWED BY: JGD
REVISIONS:

SHEET NO. **02**

5/26/2021
Bull Chute_Rdy_psh_02.dgn
jrh-xeu

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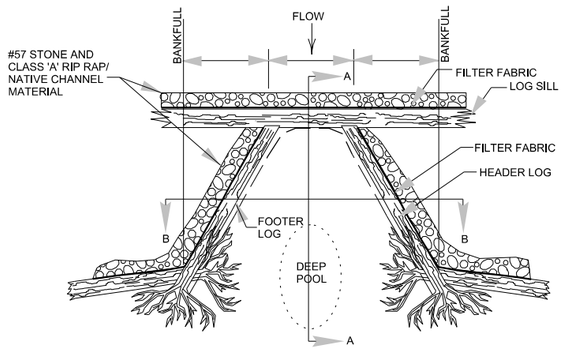
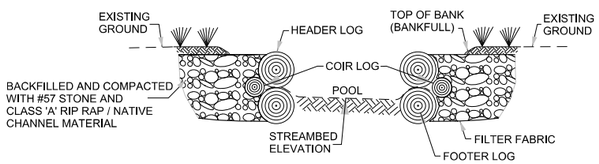
LOG CROSS VANE

SCALE:NTS

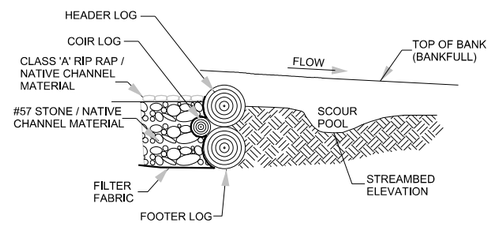
PLAN VIEW



NOTES:
1. HEADER AND FOOTER LOGS SHALL BE A MINIMUM OF 18" DIAMETER AND SHALL BE A HARDWOOD SPECIES. (FOOTER LOG MAY BE SUBSTITUTED WITH PINE)
2. A DOUBLE FOOTER LOG MAY BE REQUIRED IN SAND BED STREAMS.
3. ALL STONES ARE TO BE STRUCTURE STONES.
4. FILTER FABRIC SHALL BE PLACED ON THE UPSTREAM SIDE OF THE STRUCTURE TO PREVENT WASHOUT OF SEDIMENT THROUGH LOG GAPS. FILTER FABRIC SHALL EXTEND FROM THE BOTTOM OF THE FOOTER TO THE FINISHED GRADE ELEVATION AND SHALL BE PLACED THE ENTIRE LENGTH OF THE STRUCTURE.
5. PERPENDICULAR ROOTWAD LOGS ARE REQUIRED IF THE LOG VANE ARM DOES NOT HAVE A ROOTBALL TO TIE INTO THE BANK.



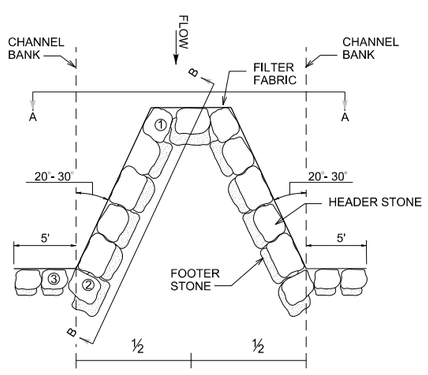
SECTION B-B



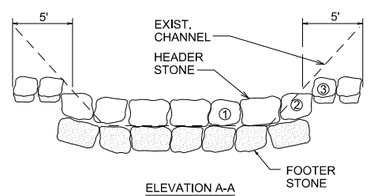
SECTION A-A

REACH	ARM LENGTH (FT.)	CHANNEL DEPTH (FT.)
UT 1 and 4 Downstream (sta 21+34)	9	0.8 - 1.1
UT 3 and 4 Upstream (sta 2+88)	7	0.6 - 0.9
UT 4A, UT 4B and UT 5	4	0.4 - 0.5

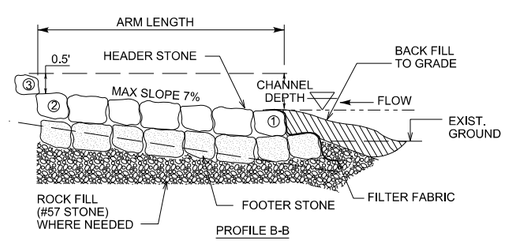
NOTE:
HEADER AND FOOTER STONES ARE LARGE, ANGULAR BOULDERS MEASURING A MINIMUM OF 24" ALONG THE SHORTEST DIMENSION.



PLAN VIEW

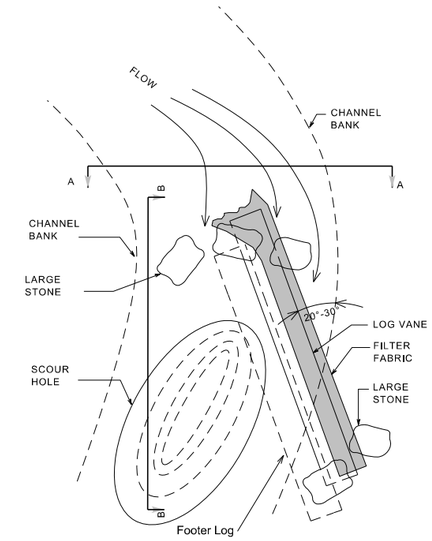


ELEVATION A-A



PROFILE B-B

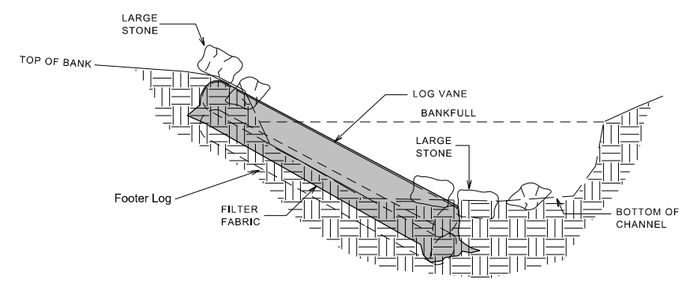
TYPICAL CROSS-VANE



NOTE:
FILTER FABRIC TOED IN AND DRAPED ON UPSTREAM SIDE OF LOG VANE PRIOR TO BACKFILL.

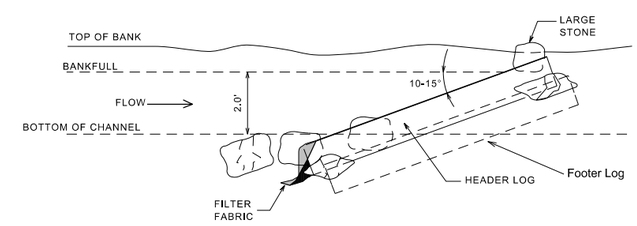
PLAN VIEW

SCALE: N.T.S.



CROSS-SECTION A-A

SCALE: N.T.S.



PROFILE B-B

SCALE: N.T.S.

NOTE:
FILTER FABRIC TOED IN AND DRAPED ON UPSTREAM SIDE OF LOG VANE PRIOR TO BACKFILL.

TYPICAL LOG VANE

DocuSigned by:
Joshua G. Dalton
1089AD8C14994C3...

NORTH CAROLINA PROFESSIONAL SEAL 26971 ENGINEER JOSHUA G. DALTON

5/26/2021

DATE:

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BULL CHUTE
RANDOLPH COUNTY, NC

DETAILS

PROJECT # :
DRAWING NAME:
DATE: 2021
DRAWN BY: JRH
REVIEWED BY: JGD
REVISIONS:

SHEET NO. **02A**

5/26/2021
Bull Chute_Rdy_psh_02a.dgn
Jon Rai

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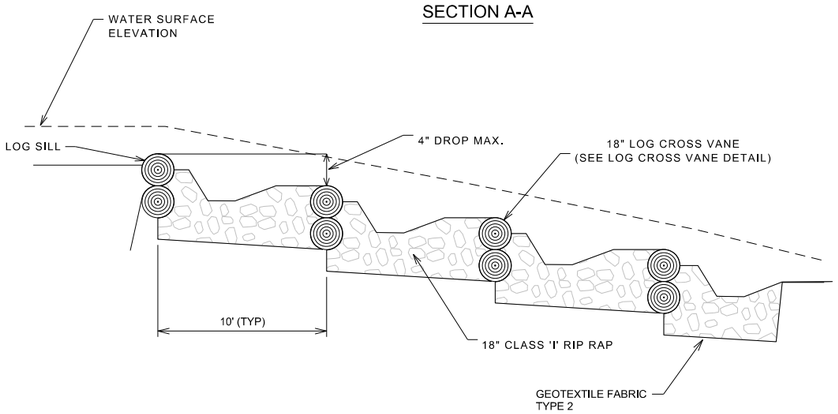
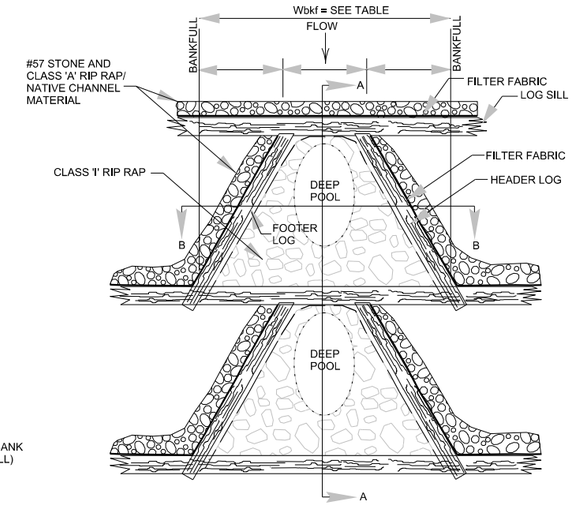
DROP STRUCTURE

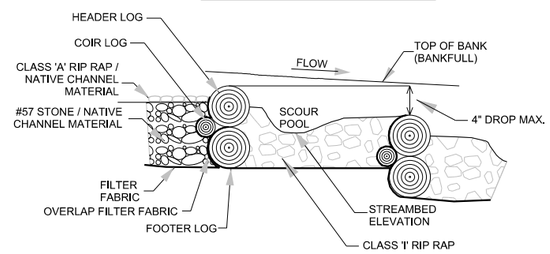
SECTION A-A



PLAN VIEW



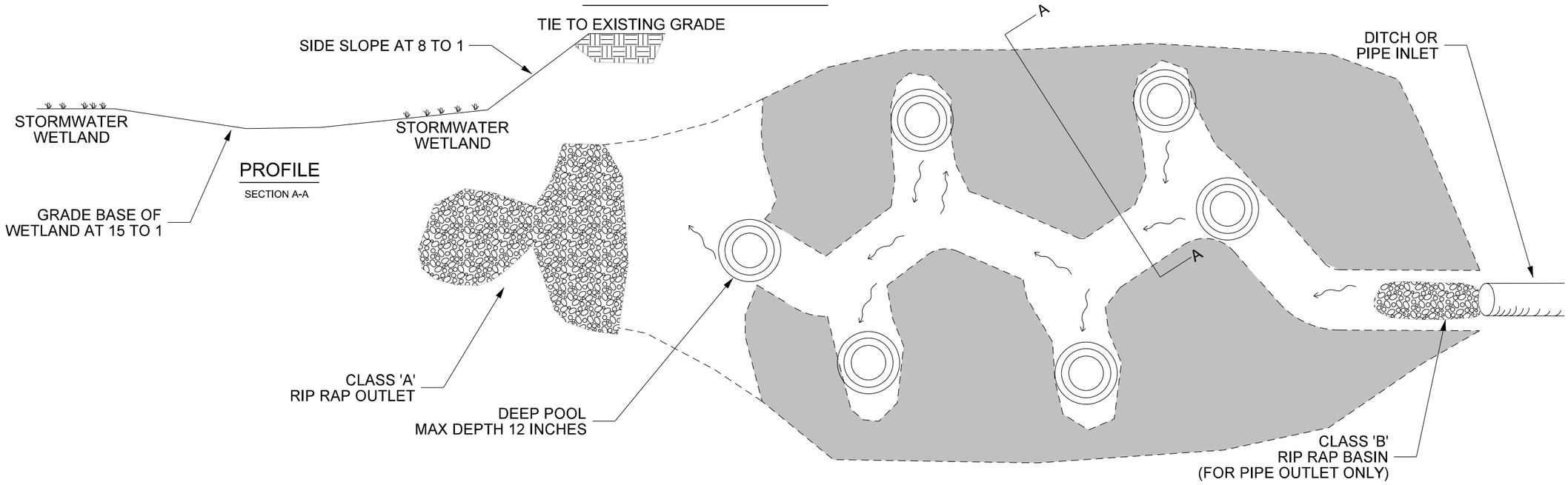
STEP POOL ENLARGEMENT



STRUCTURE NOTES:
1. FILL CLASS '1' RIP RAP VOIDS WITH CLASS 'A' RIP RAP/ #57 STONE/ NATIVE CHANNEL MATERIAL MIXTURE.

CROSS-SECTION DIMENSIONS		
REACH	Wbkf (ft.)	Distance between Drops
UT 1	9.2	10'
UT 3	7.2	3'
UT 2	6.7	10'

MARSH TREATMENT AREA



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1089AD8C14994C3...

NORTH CAROLINA PROFESSIONAL SEAL 26971 ENGINEER JOSHUA G. DALTON

5/26/2021

DATE:

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TEL (919) 859-2243
ENG FIRM LICENSE NO. C-890

Axiom Environmental, Inc.

BULL CHUTE
RANDOLPH COUNTY, NC

DETAILS

PROJECT # :
DRAWING NAME:
DATE: 2021
DRAWN BY: JRH
REVIEWED BY: JGD
REVISIONS:
SHEET NO. **02B**

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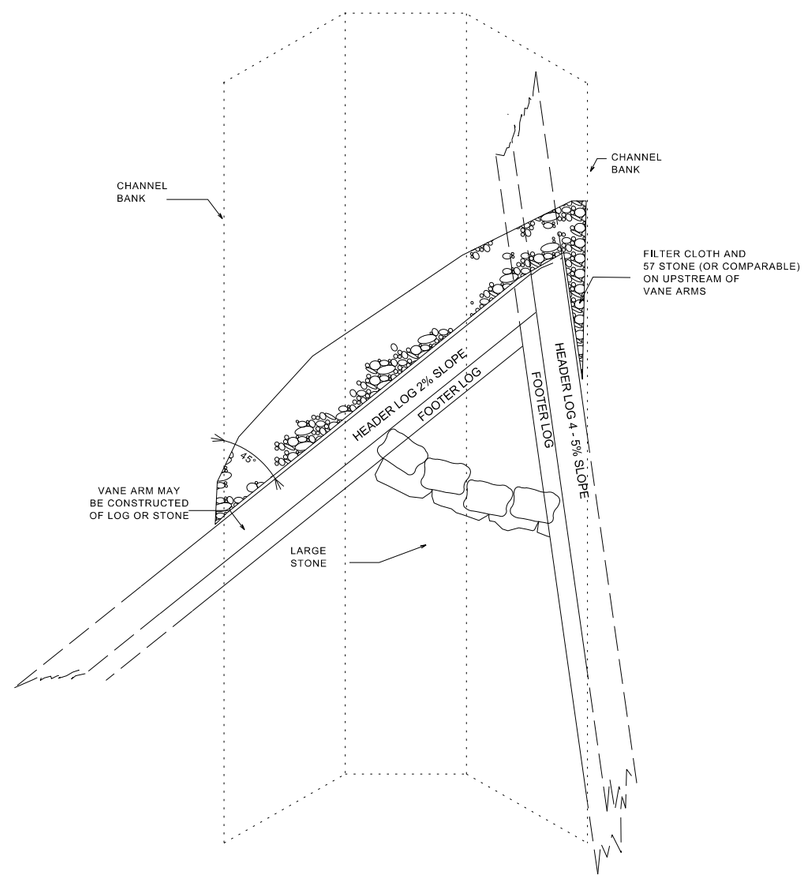
SILL STEP



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RANDOLPH COUNTY, NC

DETAILS

PROJECT # :

DRAWING NAME:

DATE: 2021

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REVISIONS:

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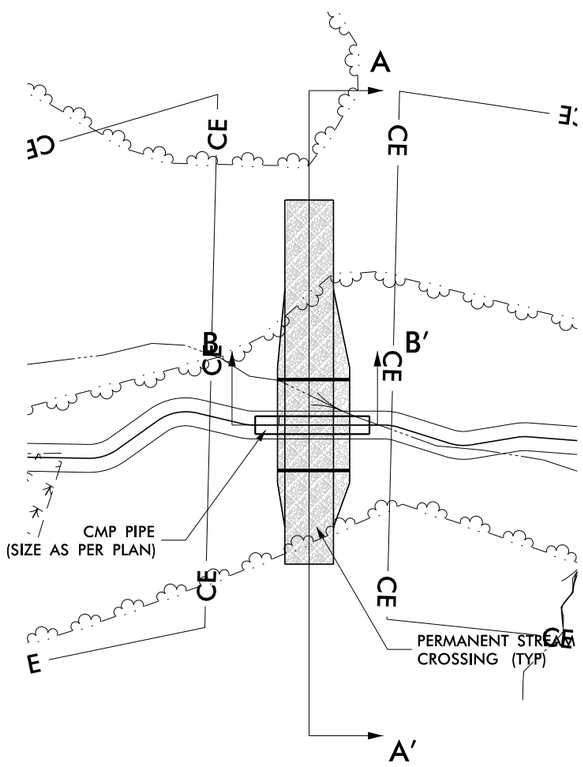
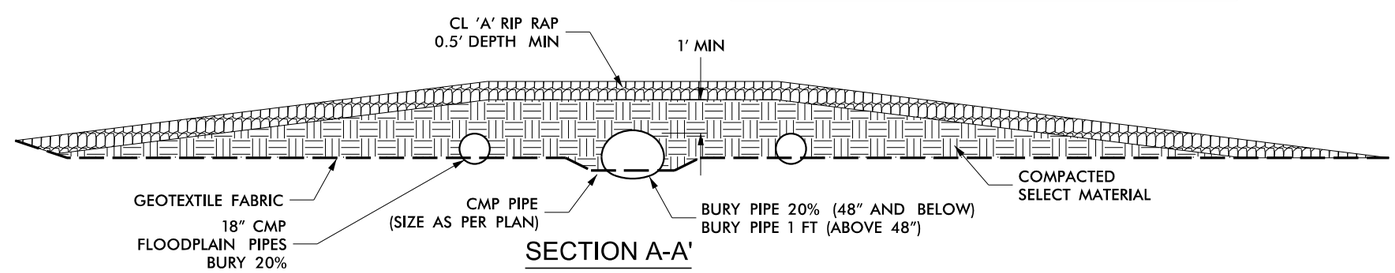
PERMANENT CROSSING

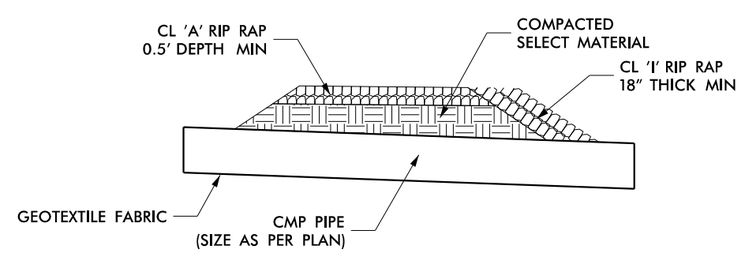
SCALE: N.T.S.



NOTES:
1) INSTALL PERMANENT CROSSING WHILE CONSTRUCTION LOCATION WITHIN STREAM HAS BEEN DEWATERED.
2) IF UNABLE TO INSTALL WHILE LOCATION IS DRY, PLACE MATTING ON EXPOSED SOILS.
3) INSTALL 18" CMP FLOODPLAIN PIPES IN FLOODPLAIN AS INDICATED ON PLANS.



SECTION A-A'



SECTION B-B'

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BULL CHUTE
RANDOLPH COUNTY, NC

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DATE: 2021
DRAWN BY: JRH
REVIEWED BY: JGD
REVISIONS:
SHEET NO. 02D

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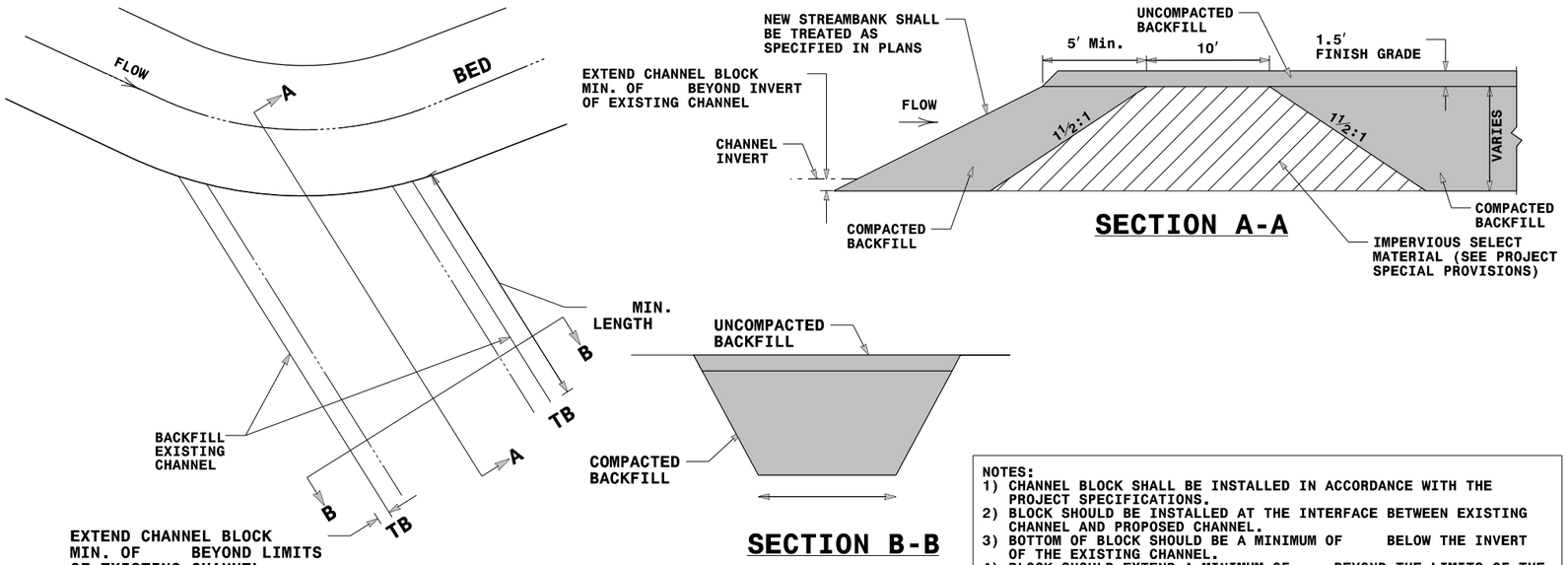
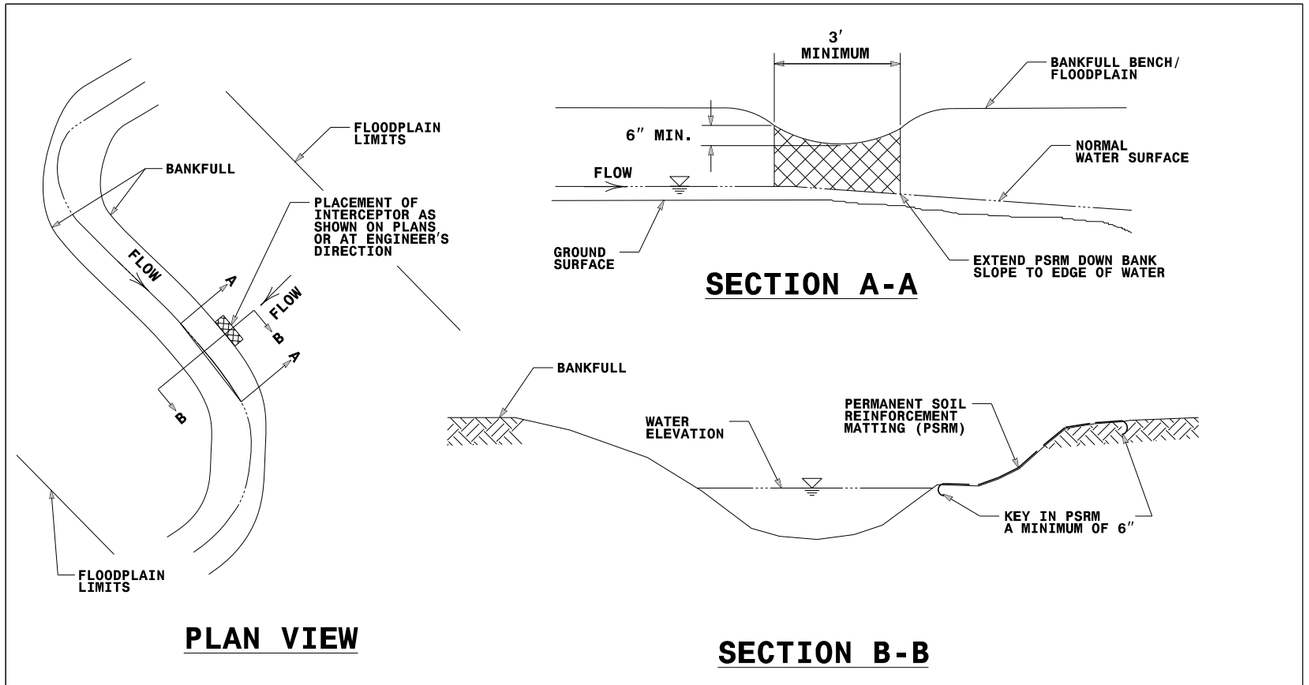


STREAM PLUG

NOT TO SCALE

NOTES:
1) CHANNEL BLOCK SHALL BE INSTALLED IN ACCORDANCE WITH THE PROJECT SPECIFICATIONS.
2) BLOCK SHOULD BE INSTALLED AT THE INTERFACE BETWEEN EXISTING CHANNEL AND PROPOSED CHANNEL.
3) BOTTOM OF BLOCK SHOULD BE A MINIMUM OF BELOW THE INVERT OF THE EXISTING CHANNEL.
4) BLOCK SHOULD EXTEND A MINIMUM OF BEYOND THE LIMITS OF THE EXISTING STREAM CHANNEL.
5) INSTALL EROSION CONTROL MATTING AND SEED IN ACCORDANCE WITH THE PROJECT SPECIFICATIONS IMMEDIATELY AFTER GRADING.
6) COMPACT BACKFILL TO EXTENT POSSIBLE OR AT THE DIRECTION OF THE ENGINEER.



FLOODPLAIN INTERCEPTOR DETAIL

NOT TO SCALE

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NORTH CAROLINA PROFESSIONAL SEAL 26971 ENGINEER JOSHUA G. DALTON

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BULL CHUTE
RANDOLPH COUNTY, NC

DETAILS

PROJECT # :
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DATE: 2021
DRAWN BY: JRH
REVIEWED BY: JGD
REVISIONS:

SHEET NO. 02E

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HORIZONTAL DATUM: NAD 83 (2011)
VERTICAL DATUM: NAVD 1988

SURVEY INFORMATION
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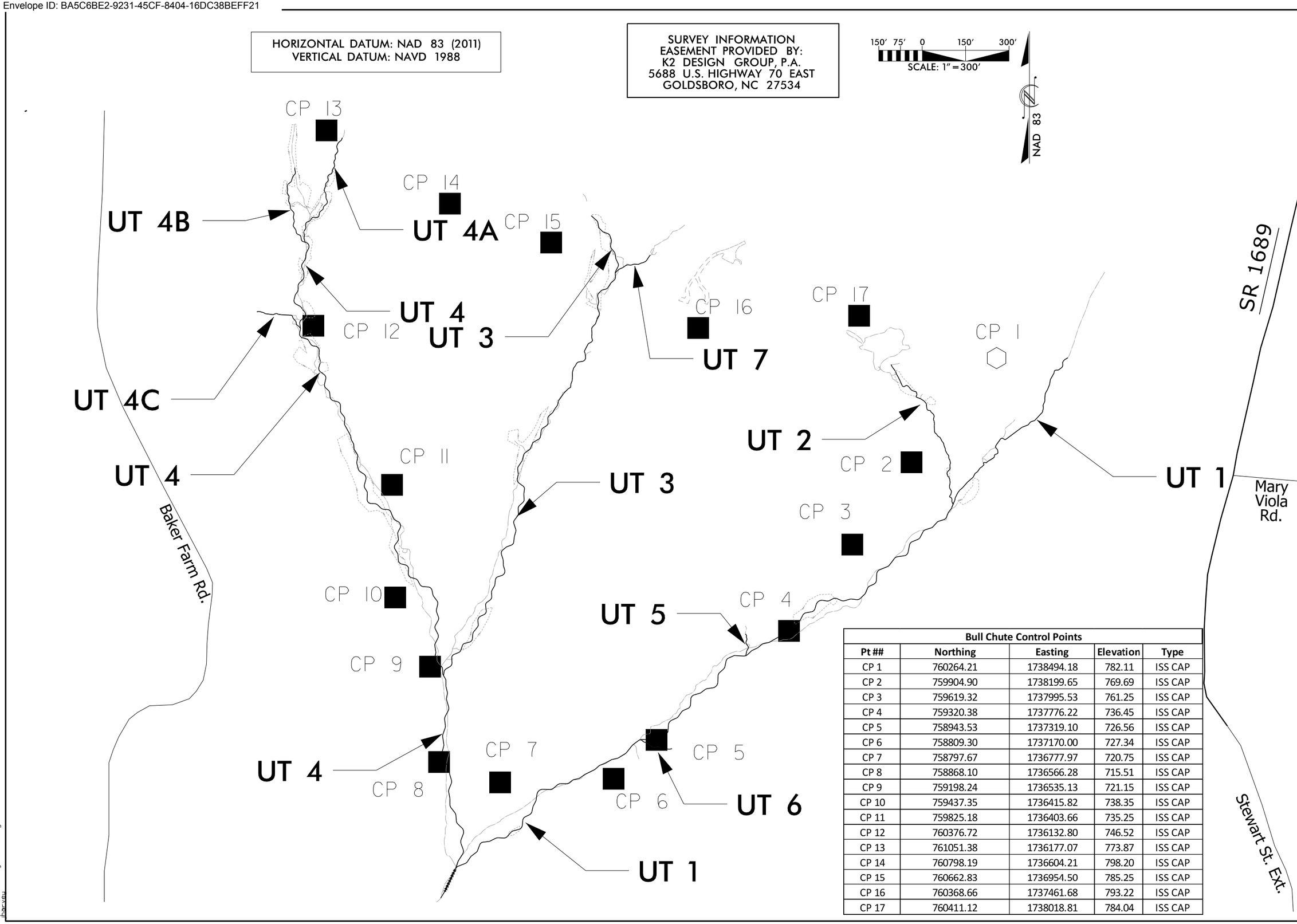
K2 DESIGN GROUP, P.A.
5688 U.S. HIGHWAY 70 EAST
GOLDSBORO, NC 27534



Bull Chute Control Points				
Pt ##	Northing	Easting	Elevation	Type
CP 1	760264.21	1738494.18	782.11	ISS CAP
CP 2	759904.90	1738199.65	769.69	ISS CAP
CP 3	759619.32	1737995.53	761.25	ISS CAP
CP 4	759320.38	1737776.22	736.45	ISS CAP
CP 5	758943.53	1737319.10	726.56	ISS CAP
CP 6	758809.30	1737170.00	727.34	ISS CAP
CP 7	758797.67	1736777.97	720.75	ISS CAP
CP 8	758868.10	1736566.28	715.51	ISS CAP
CP 9	759198.24	1736535.13	721.15	ISS CAP
CP 10	759437.35	1736415.82	738.35	ISS CAP
CP 11	759825.18	1736403.66	735.25	ISS CAP
CP 12	760376.72	1736132.80	746.52	ISS CAP
CP 13	761051.38	1736177.07	773.87	ISS CAP
CP 14	760798.19	1736604.21	798.20	ISS CAP
CP 15	760662.83	1736954.50	785.25	ISS CAP
CP 16	760368.66	1737461.68	793.22	ISS CAP
CP 17	760411.12	1738018.81	784.04	ISS CAP

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Axiom Environmental, Inc.

BULL CHUTE
RANDOLPH COUNTY, NC

CONTROL POINTS

PROJECT # :
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REVIEWED BY: JGD
REVISIONS:

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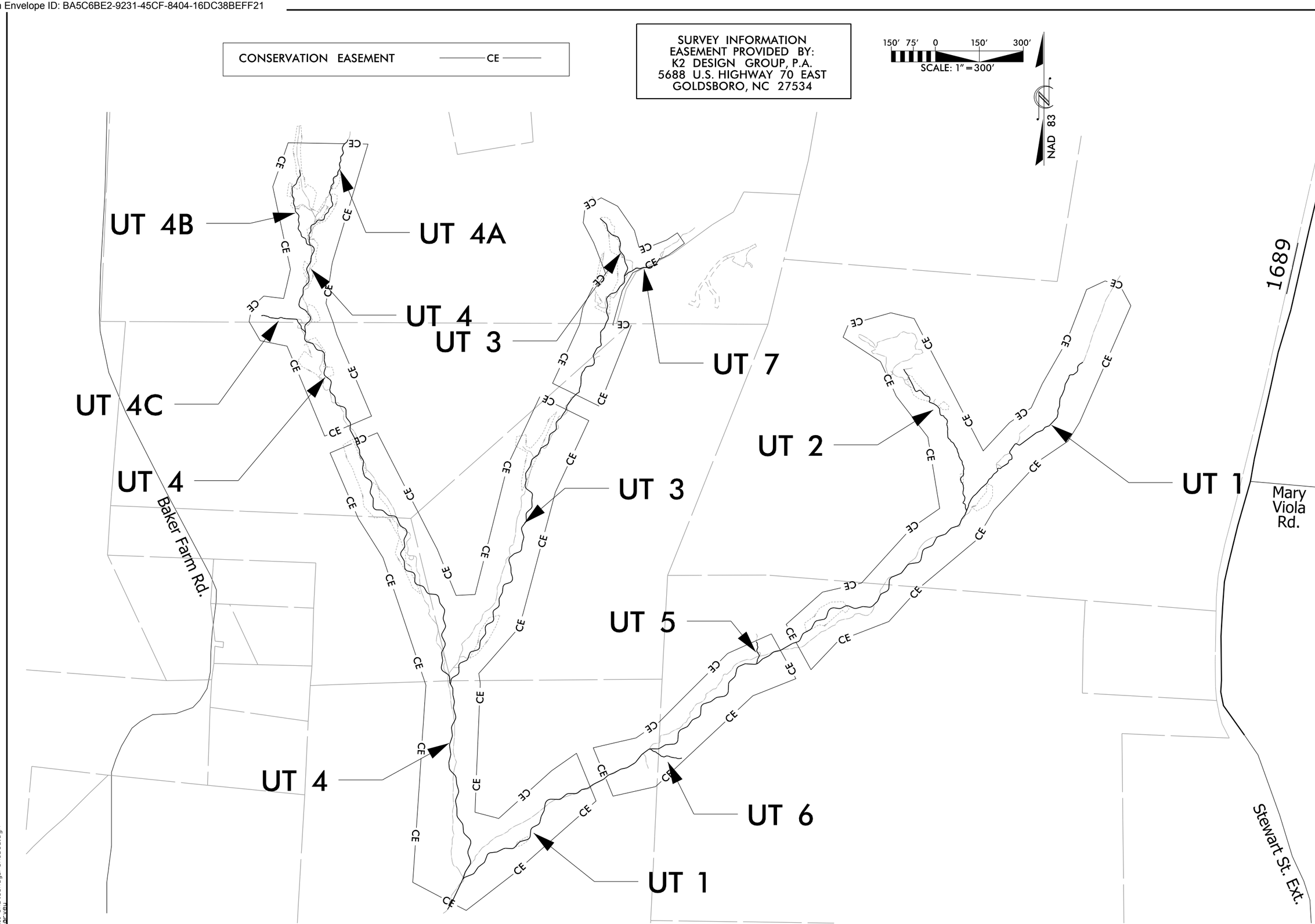

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Axiom Environmental, Inc.

BULL CHUTE
RANDOLPH COUNTY, NC

EASEMENT

PROJECT # :
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DATE: 2021
DRAWN BY: JRH
REVIEWED BY: JGD
REVISIONS:

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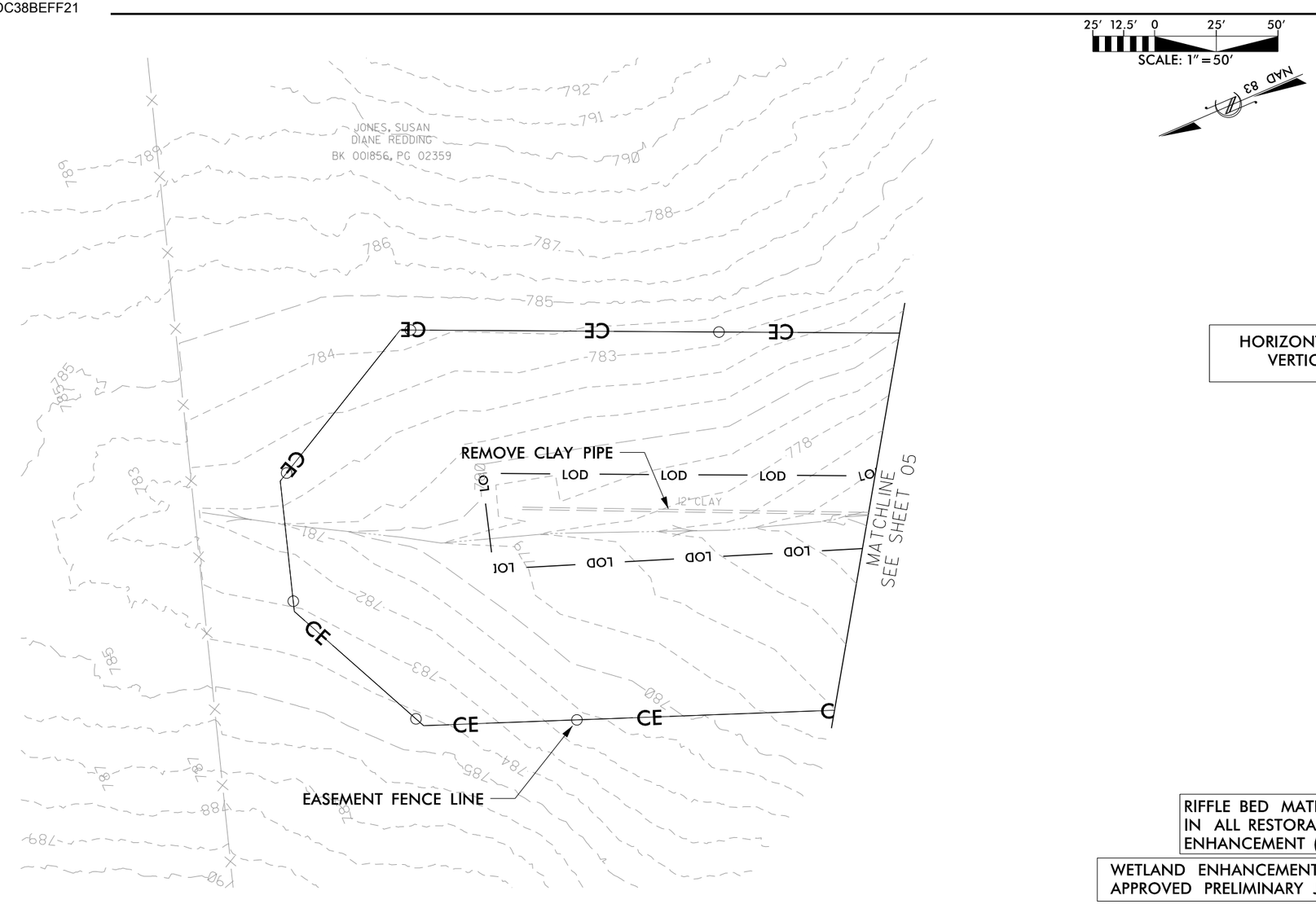

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Joshua G. Dalton
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NORTH CAROLINA PROFESSIONAL SEAL 26971 ENGINEER JOSHUA G. DALTON

5/26/2021

DATE:

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HORIZONTAL DATUM: NAD 83 (2011)
VERTICAL DATUM: NAVD 1988

RIFFLE BED MATERIAL IS REQUIRED IN ALL RESTORATION AND ENHANCEMENT (LEVEL I) REACHES

WETLAND ENHANCEMENT AREAS DERIVED FROM APPROVED PRELIMINARY JURISDICTIONAL DELINEATION

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Axiom Environmental, Inc.

BULL CHUTE
RANDOLPH COUNTY, NC

PLAN AND PROFILE

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REVIEWED BY: JGD
REVISIONS:

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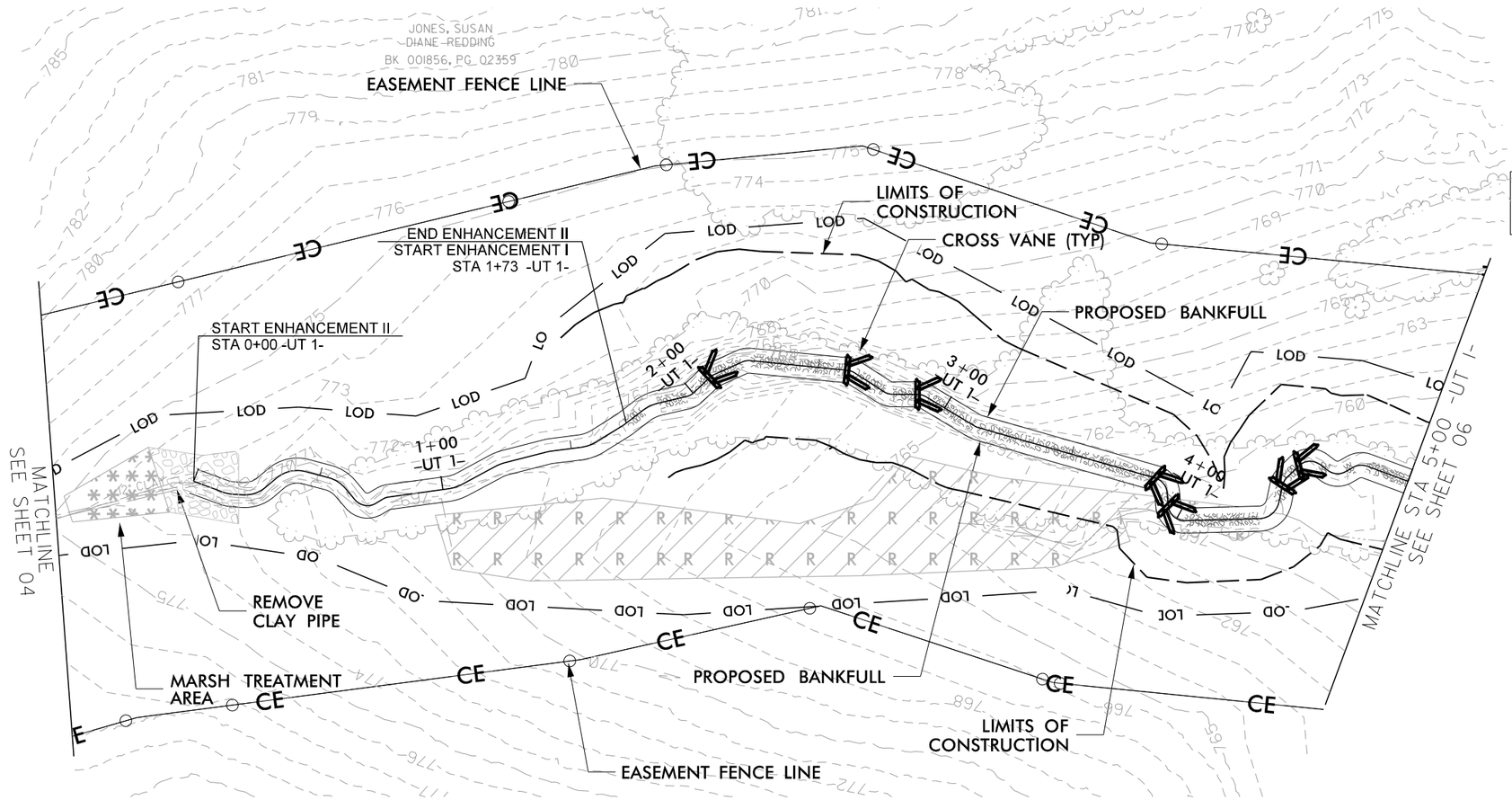
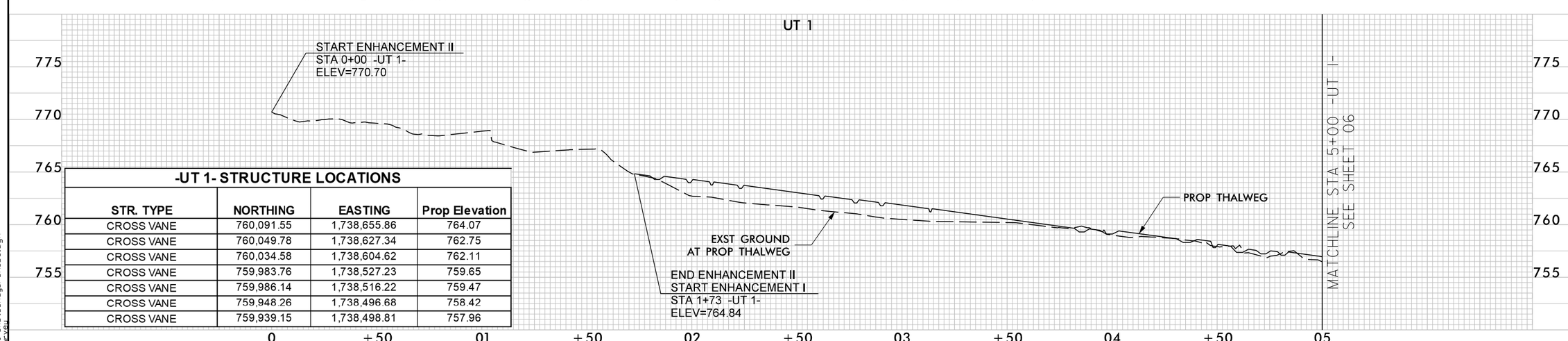
WETLAND ENHANCEMENT AREAS DERIVED FROM APPROVED PRELIMINARY JURISDICTIONAL DELINEATION

DENOTES MARSH TREATMENT

DENOTES WETLAND REESTABLISHMENT

25' 12.5' 0 25' 50'
SCALE: 1" = 50'
NAD 83





-UT 1- STRUCTURE LOCATIONS

STR. TYPE	NORTHING	EASTING	Prop Elevation
CROSS VANE	760,091.55	1,738,655.86	764.07
CROSS VANE	760,049.78	1,738,627.34	762.75
CROSS VANE	760,034.58	1,738,604.62	762.11
CROSS VANE	759,983.76	1,738,527.23	759.65
CROSS VANE	759,986.14	1,738,516.22	759.47
CROSS VANE	759,948.26	1,738,496.68	758.42
CROSS VANE	759,939.15	1,738,498.81	757.96

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Axiom Environmental, Inc.

BULL CHUTE
RANDOLPH COUNTY, NC

PLAN AND PROFILE

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REVISIONS:

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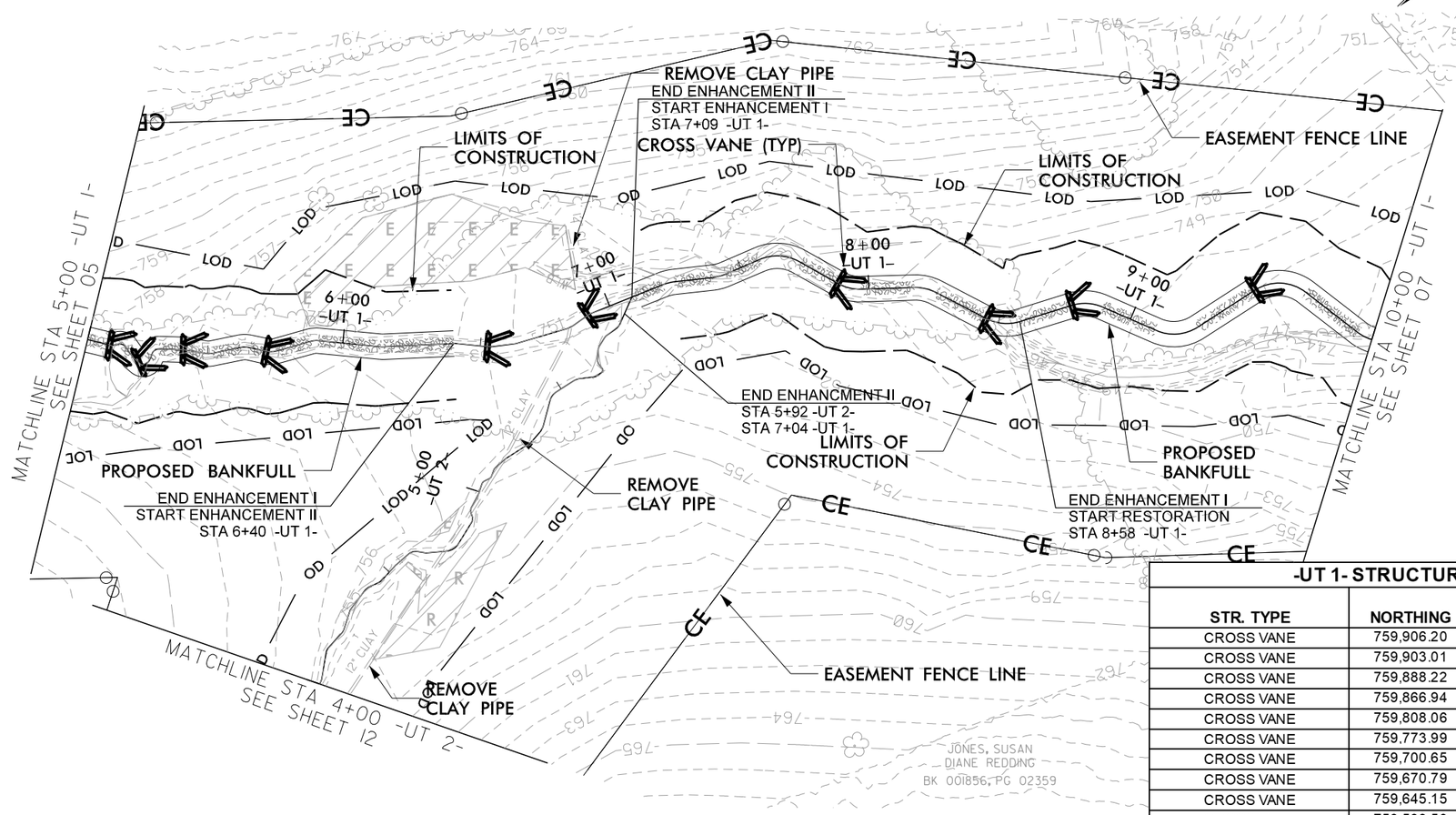
WETLAND ENHANCEMENT AREAS DERIVED FROM APPROVED PRELIMINARY JURISDICTIONAL DELINEATION

HORIZONTAL DATUM: NAD 83 (2011)
VERTICAL DATUM: NAVD 1988

SCALE: 1" = 50'

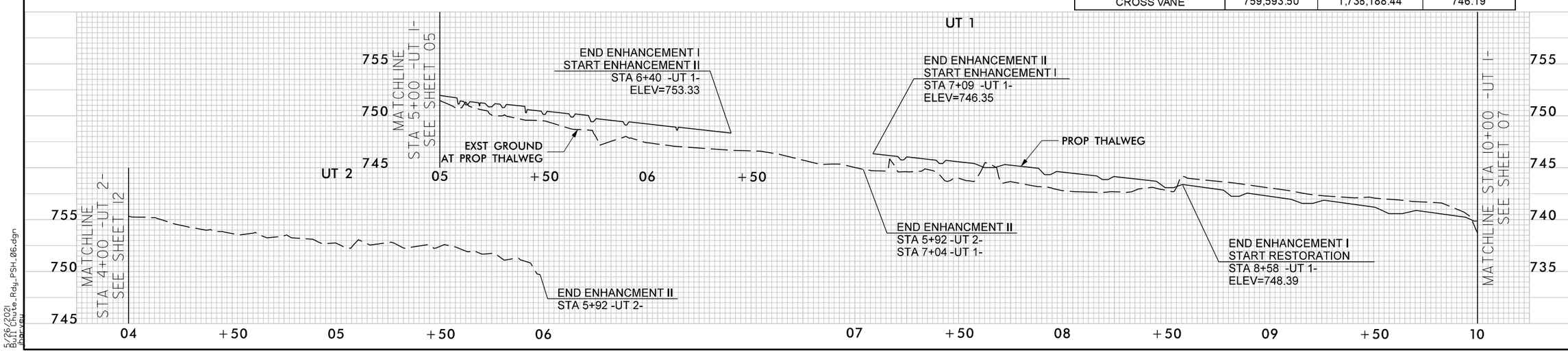
E E DENOTES WETLAND ENHANCEMENT

R R DENOTES WETLAND REESTABLISHMENT



-UT 1- STRUCTURE LOCATIONS

STR. TYPE	NORTHING	EASTING	Prop Elevation
CROSS VANE	759,906.20	1,738,462.97	756.73
CROSS VANE	759,903.01	1,738,451.12	756.20
CROSS VANE	759,888.22	1,738,443.24	755.90
CROSS VANE	759,866.94	1,738,421.87	755.03
CROSS VANE	759,808.06	1,738,367.26	753.07
CROSS VANE	759,773.99	1,738,350.14	752.00
CROSS VANE	759,700.65	1,738,295.33	749.94
CROSS VANE	759,670.79	1,738,248.75	748.69
CROSS VANE	759,645.15	1,738,230.62	747.85
CROSS VANE	759,593.50	1,738,188.44	746.19



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Axiom Environmental, Inc.

BULL CHUTE
RANDOLPH COUNTY, NC

PLAN AND PROFILE

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REVIEWED BY: JGD
REVISIONS:

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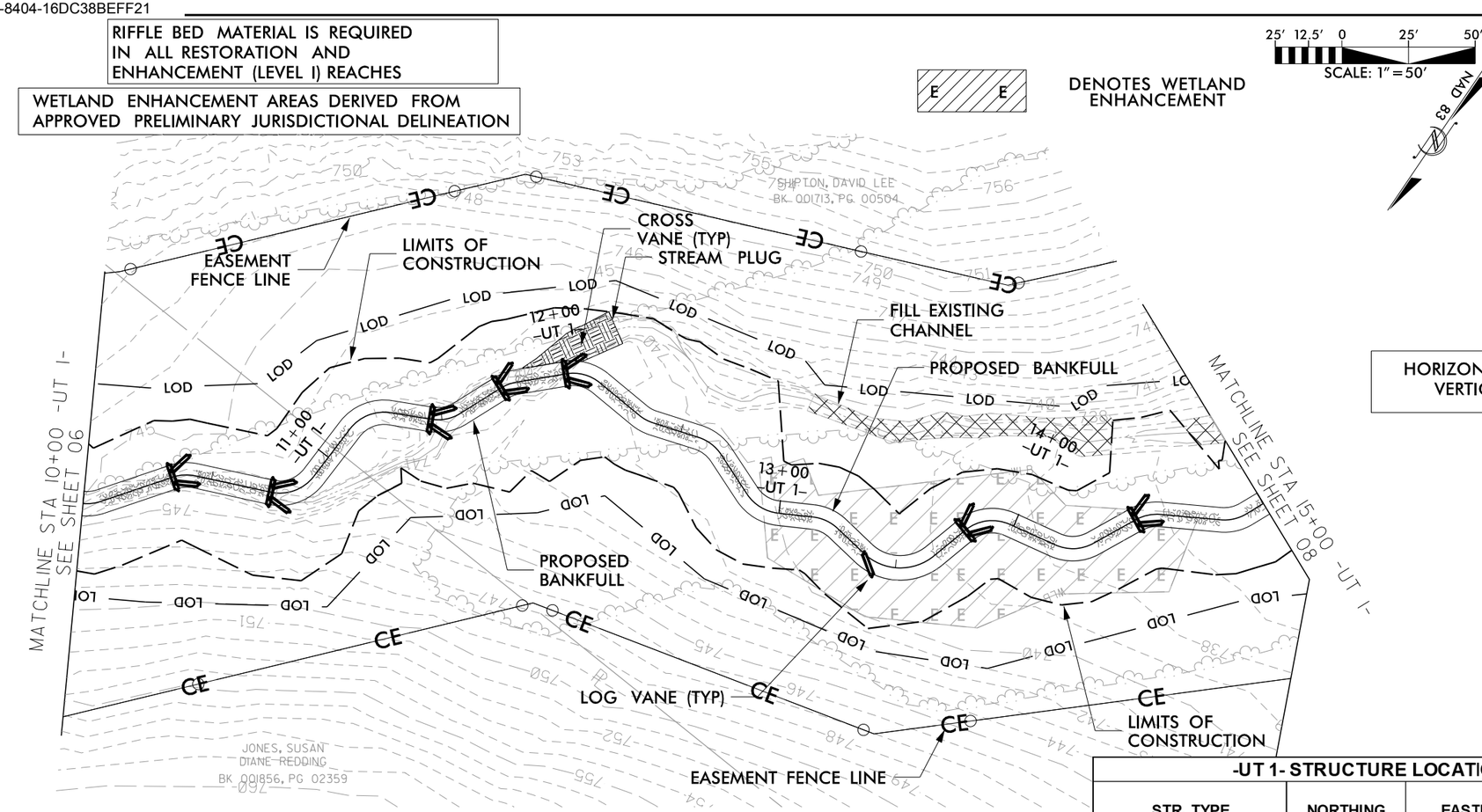

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5/26/2021

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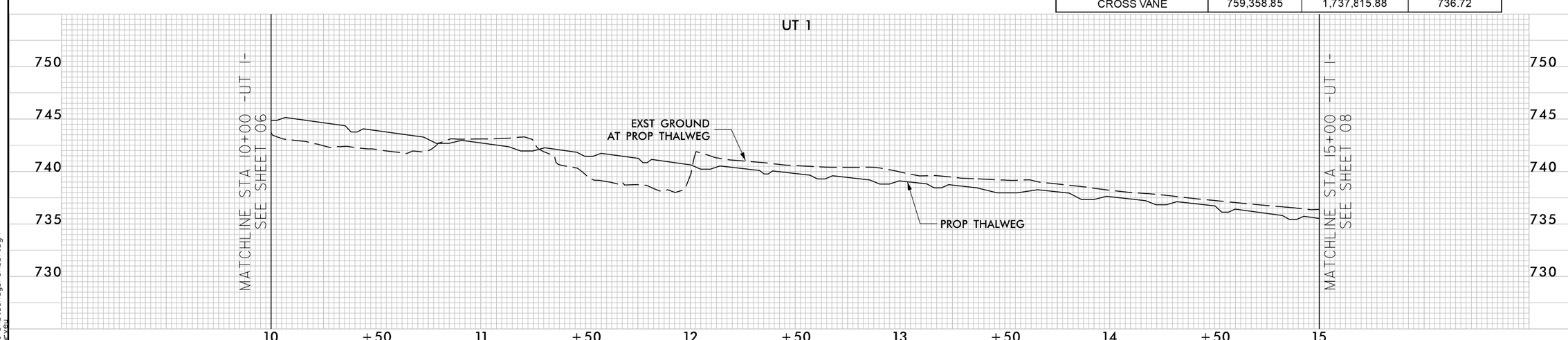
-UT 1- STRUCTURE LOCATIONS

STR. TYPE	NORTHING	EASTING	Prop Elevation
CROSS VANE	759,548.37	1,738,123.70	744.37
CROSS VANE	759,532.46	1,738,090.18	743.28
CROSS VANE	759,476.12	1,738,055.80	741.84
CROSS VANE	759,451.74	1,738,040.70	741.25
CROSS VANE	759,433.59	1,738,023.53	740.63
LOG VANE	759,426.58	1,737,893.32	738.45
CROSS VANE	759,398.10	1,737,866.61	737.94
CROSS VANE	759,358.85	1,737,815.88	736.72



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Axiom Environmental, Inc.

BULL CHUTE
RANDOLPH COUNTY, NC

PLAN AND PROFILE

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REVISIONS:

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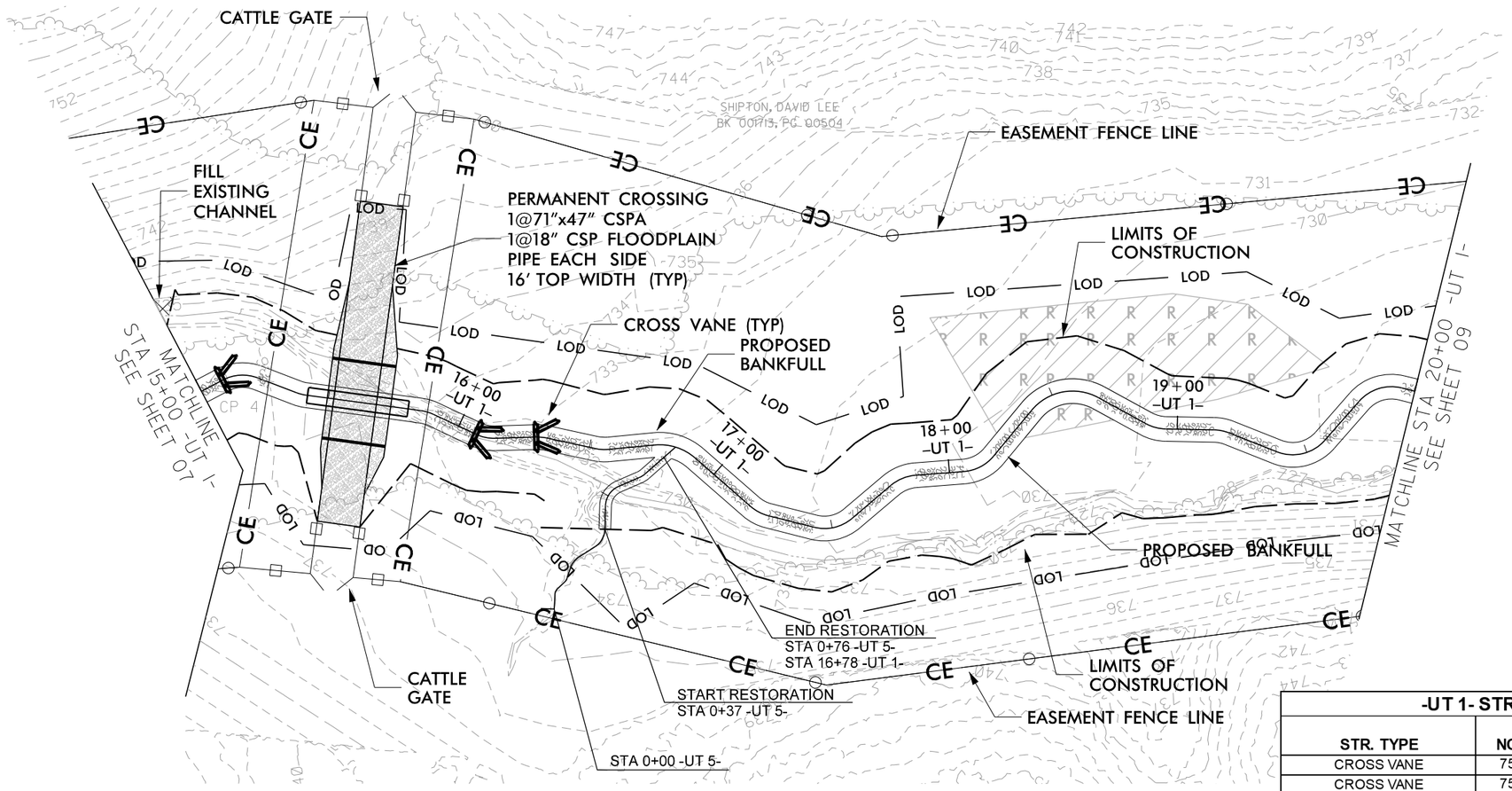
RIFFLE BED MATERIAL IS REQUIRED IN ALL RESTORATION AND ENHANCEMENT (LEVEL I) REACHES

WETLAND ENHANCEMENT AREAS DERIVED FROM APPROVED PRELIMINARY JURISDICTIONAL DELINEATION

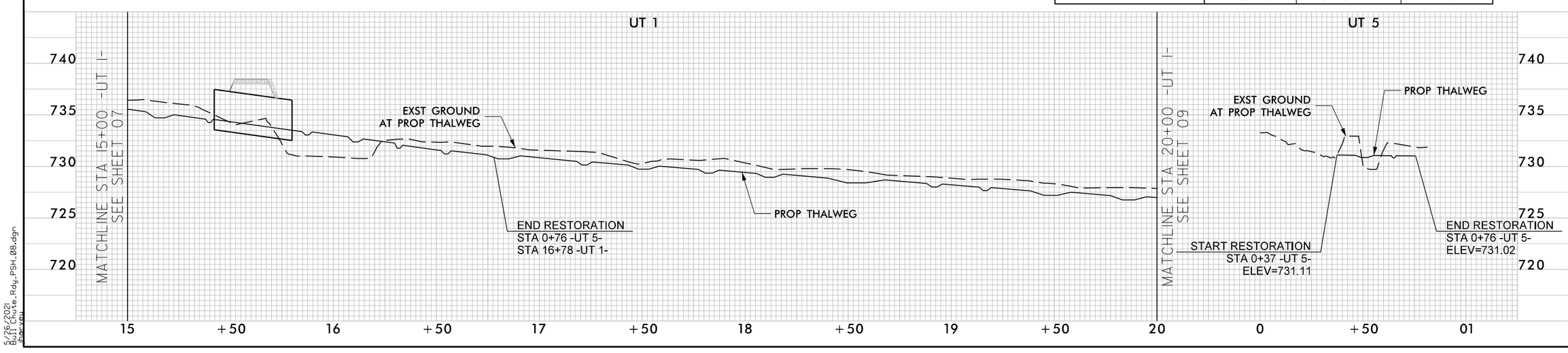
25′ 12.5′ 0 25′ 50′
SCALE: 1″ = 50′

R R DENOTES WETLAND REESTABLISHMENT

NAD 83



-UT 1- STRUCTURE LOCATIONS			
STR. TYPE	NORTHING	EASTING	Prop Elevation
CROSS VANE	759,318.86	1,737,775.95	735.28
CROSS VANE	759,277.20	1,737,689.03	732.84
CROSS VANE	759,264.29	1,737,670.60	732.23



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NORTH CAROLINA PROFESSIONAL SEAL 26971 ENGINEER JOSHUA G. DALTON

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BULL CHUTE
RANDOLPH COUNTY, NC

PLAN AND PROFILE

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REVIEWED BY: JGD
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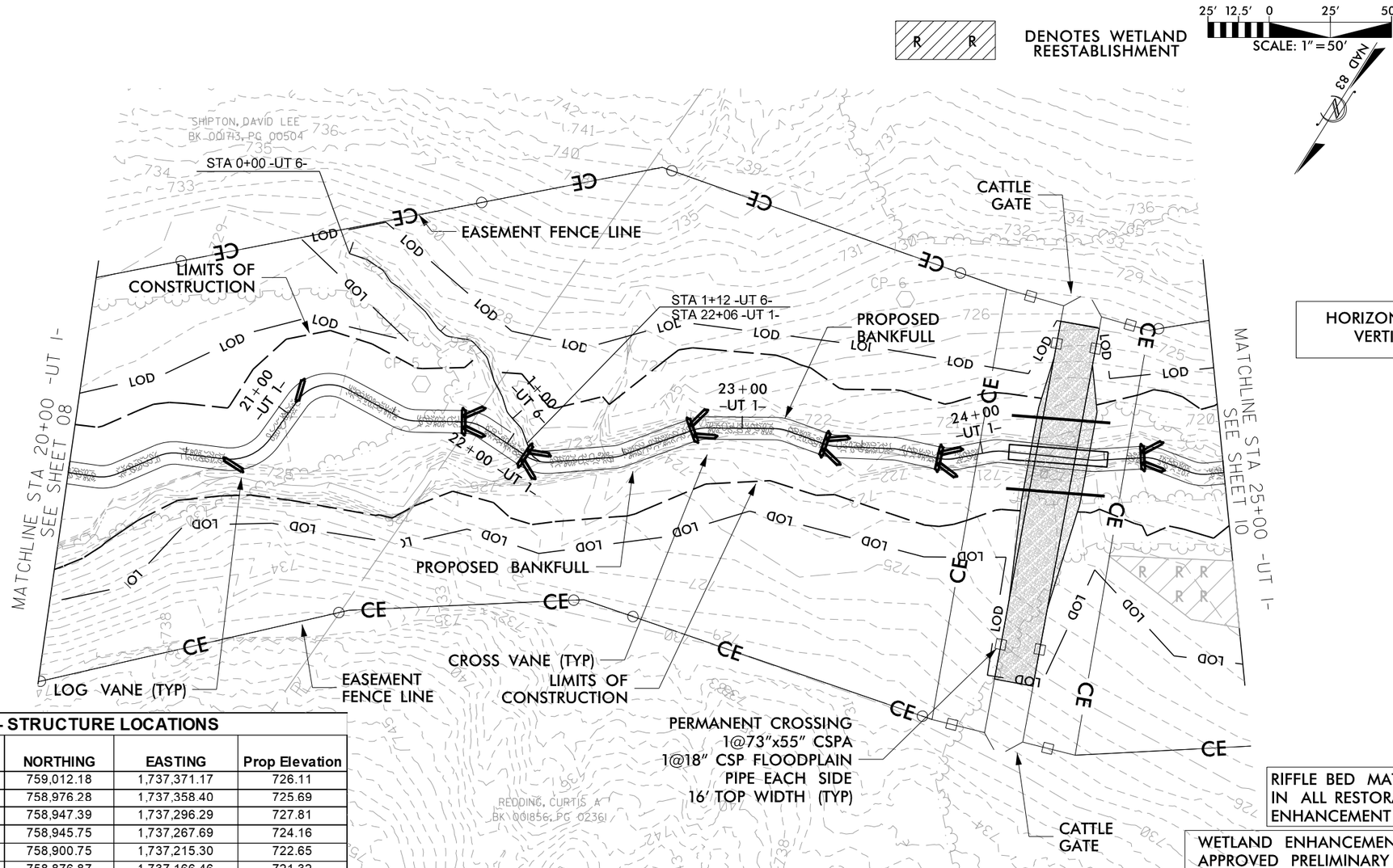
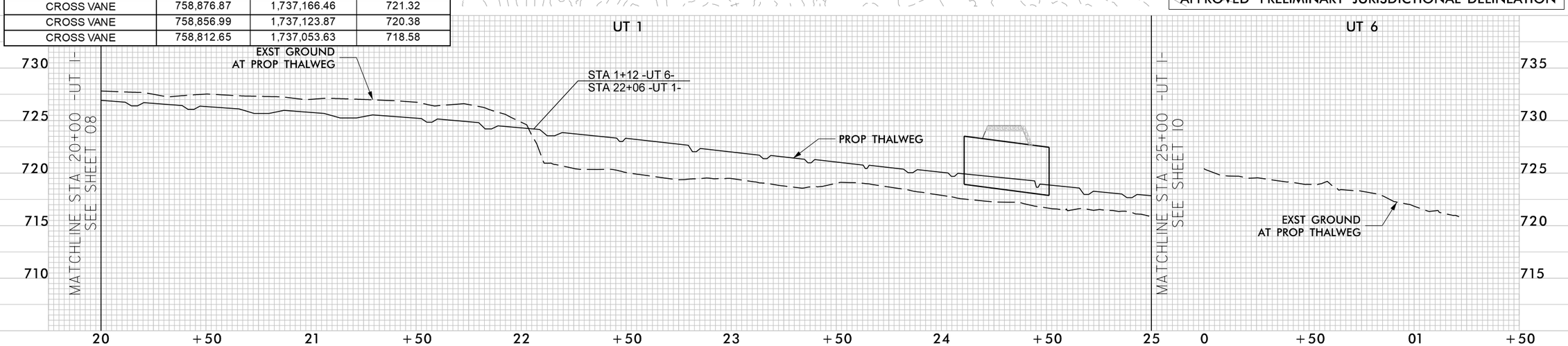


RIFFLE BED MATERIAL IS REQUIRED IN ALL RESTORATION AND ENHANCEMENT (LEVEL I) REACHES

WETLAND ENHANCEMENT AREAS DERIVED FROM APPROVED PRELIMINARY JURISDICTIONAL DELINEATION

-UT 1- STRUCTURE LOCATIONS			
STR. TYPE	NORTHING	EASTING	Prop Elevation
LOG VANE	759,012.18	1,737,371.17	726.11
LOG VANE	758,976.28	1,737,358.40	725.69
CROSS VANE	758,947.39	1,737,296.29	727.81
CROSS VANE	758,945.75	1,737,267.69	724.16
CROSS VANE	758,900.75	1,737,215.30	722.65
CROSS VANE	758,876.87	1,737,166.46	721.32
CROSS VANE	758,856.99	1,737,123.87	720.38
CROSS VANE	758,812.65	1,737,053.63	718.58



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Axiom Environmental, Inc.

BULL CHUTE
RANDOLPH COUNTY, NC

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REVISIONS:

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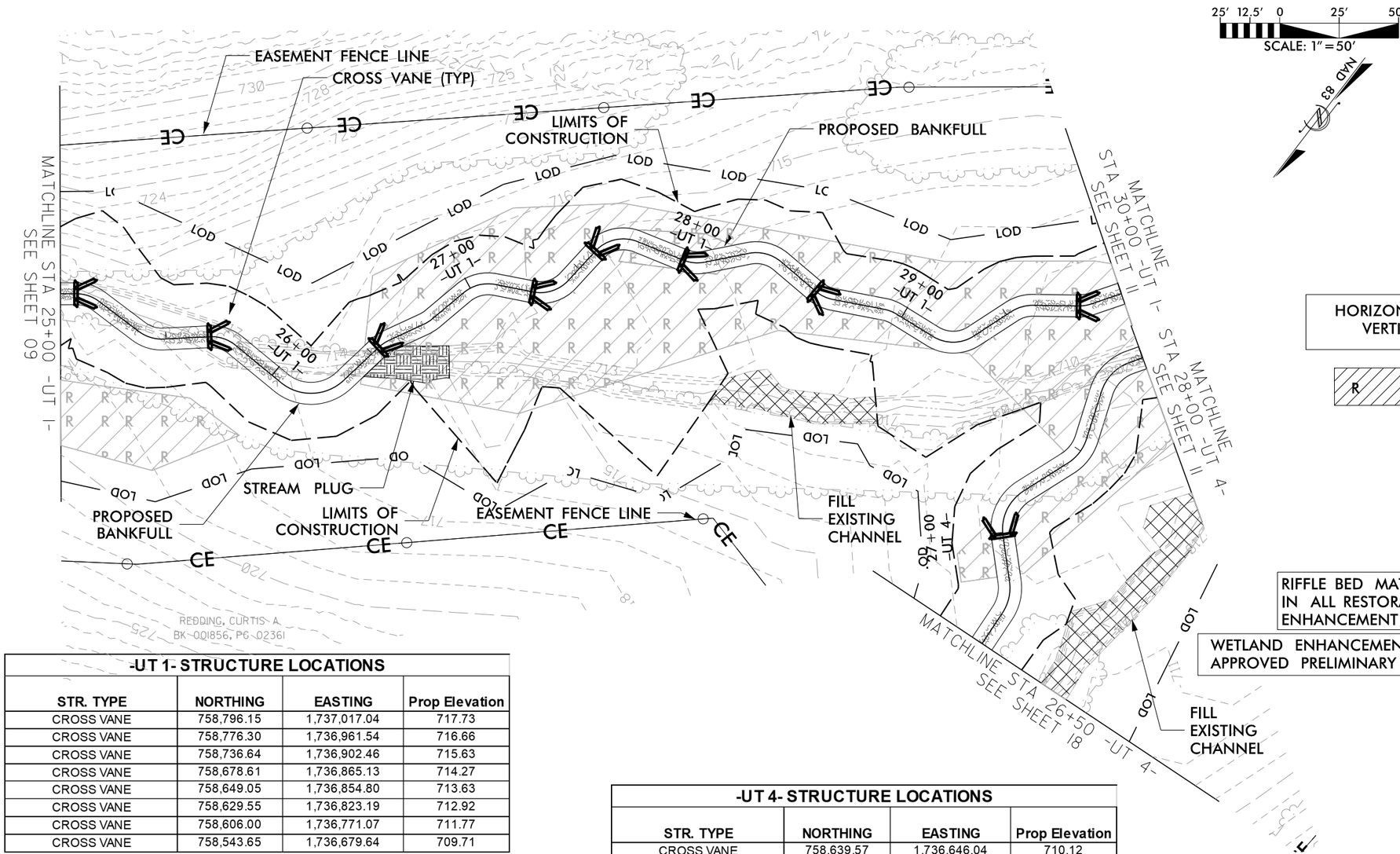

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SCALE: 1" = 50'
NAD 83

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R R DENOTES WETLAND REESTABLISHMENT

RIFFLE BED MATERIAL IS REQUIRED IN ALL RESTORATION AND ENHANCEMENT (LEVEL I) REACHES

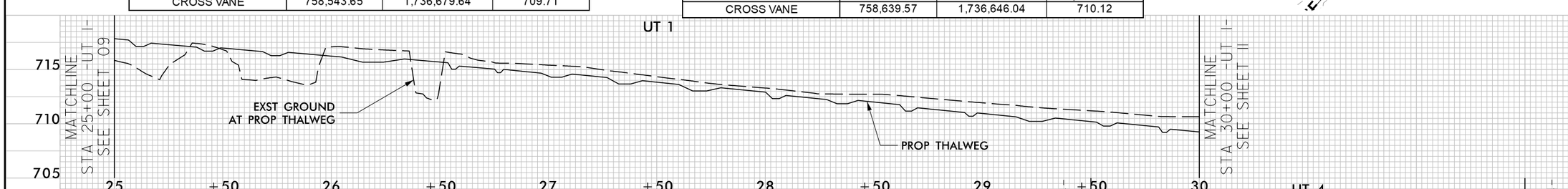
WETLAND ENHANCEMENT AREAS DERIVED FROM APPROVED PRELIMINARY JURISDICTIONAL DELINEATION

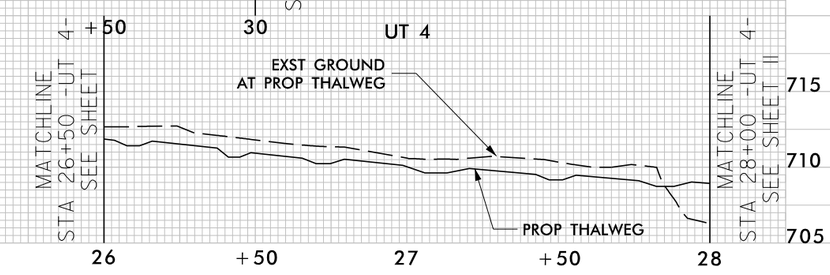
-UT 1- STRUCTURE LOCATIONS

STR. TYPE	NORTHING	EASTING	Prop Elevation
CROSS VANE	758,796.15	1,737,017.04	717.73
CROSS VANE	758,776.30	1,736,961.54	716.66
CROSS VANE	758,736.64	1,736,902.46	715.63
CROSS VANE	758,678.61	1,736,865.13	714.27
CROSS VANE	758,649.05	1,736,854.80	713.63
CROSS VANE	758,629.55	1,736,823.19	712.92
CROSS VANE	758,606.00	1,736,771.07	711.77
CROSS VANE	758,543.65	1,736,679.64	709.71

-UT 4- STRUCTURE LOCATIONS

STR. TYPE	NORTHING	EASTING	Prop Elevation
CROSS VANE	758,639.57	1,736,646.04	710.12





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Axiom Environmental, Inc.

BULL CHUTE
RANDOLPH COUNTY, NC

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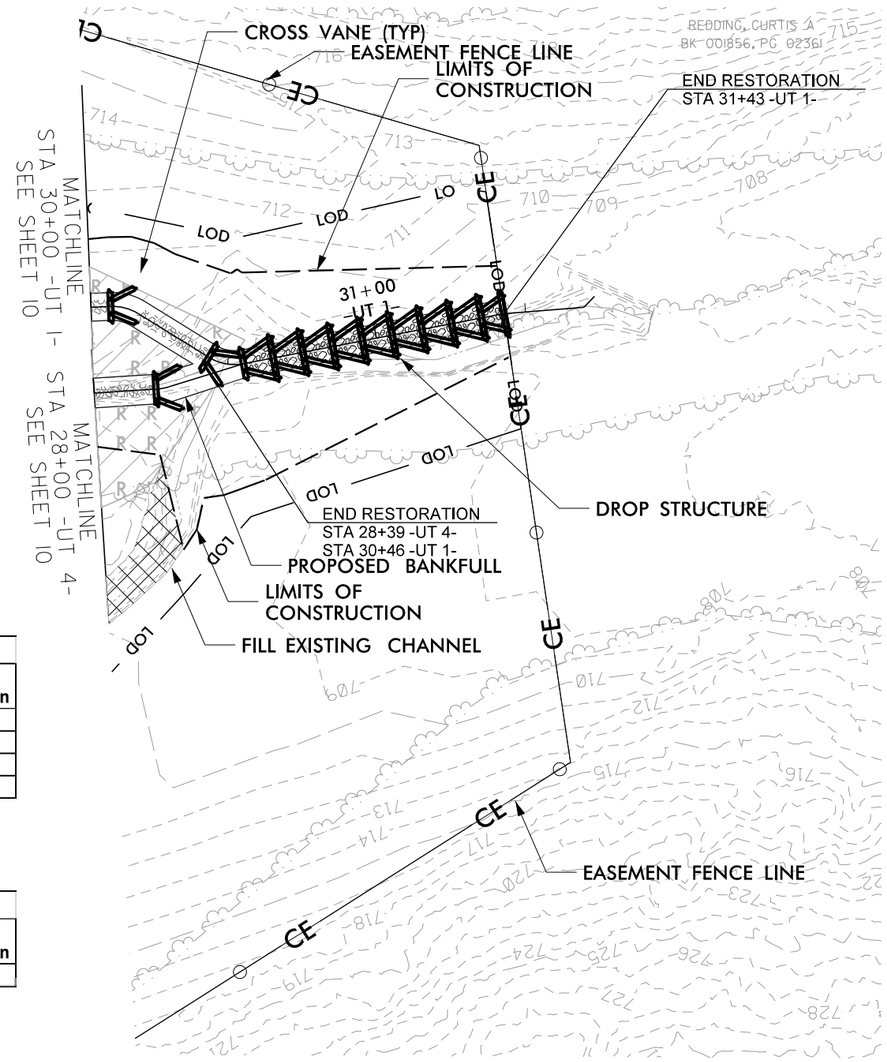

25' 12.5' 0 25' 50'
SCALE: 1" = 50'

NAD 83

R R DENOTES WETLAND REESTABLISHMENT

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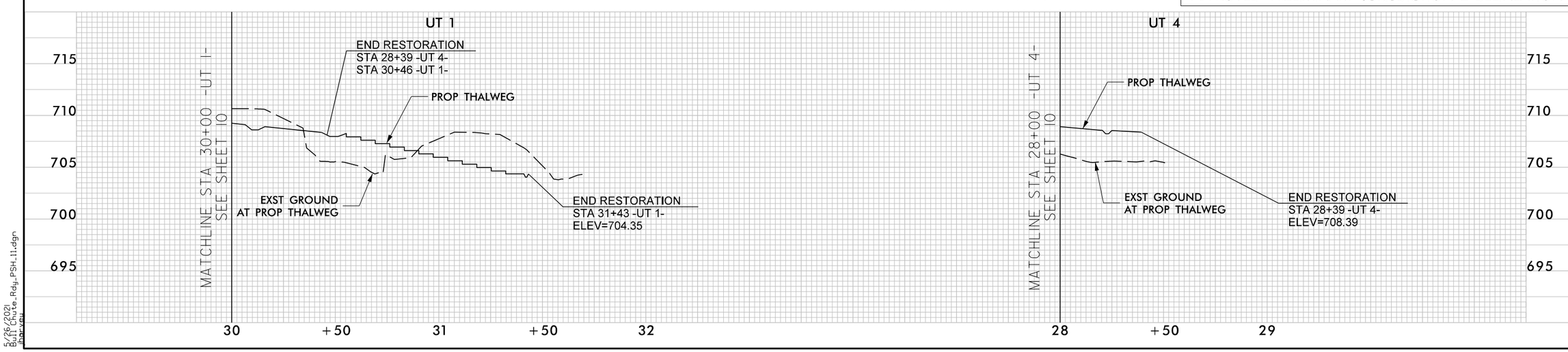
-UT 1- STRUCTURE LOCATIONS			
STR. TYPE	NORTHING	EASTING	Prop Elevation
CROSS VANE	758,523.24	1,736,664.87	709.12
CROSS VANE	758,506.99	1,736,632.20	708.37
DROP STRUCTURE	758,499.00	1,736,623.75	708.27
DROP STRUCTURE	758,419.84	1,736,586.29	704.36

-UT 4- STRUCTURE LOCATIONS			
STR. TYPE	NORTHING	EASTING	Prop Elevation
CROSS VANE	758,527.25	1,736,634.01	708.56

RIFFLE BED MATERIAL IS REQUIRED IN ALL RESTORATION AND ENHANCEMENT (LEVEL I) REACHES

WETLAND ENHANCEMENT AREAS DERIVED FROM APPROVED PRELIMINARY JURISDICTIONAL DELINEATION



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Axiom Environmental, Inc.

BULL CHUTE
RANDOLPH COUNTY, NC

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DENOTES MARSH TREATMENT

DENOTES WETLAND ENHANCEMENT

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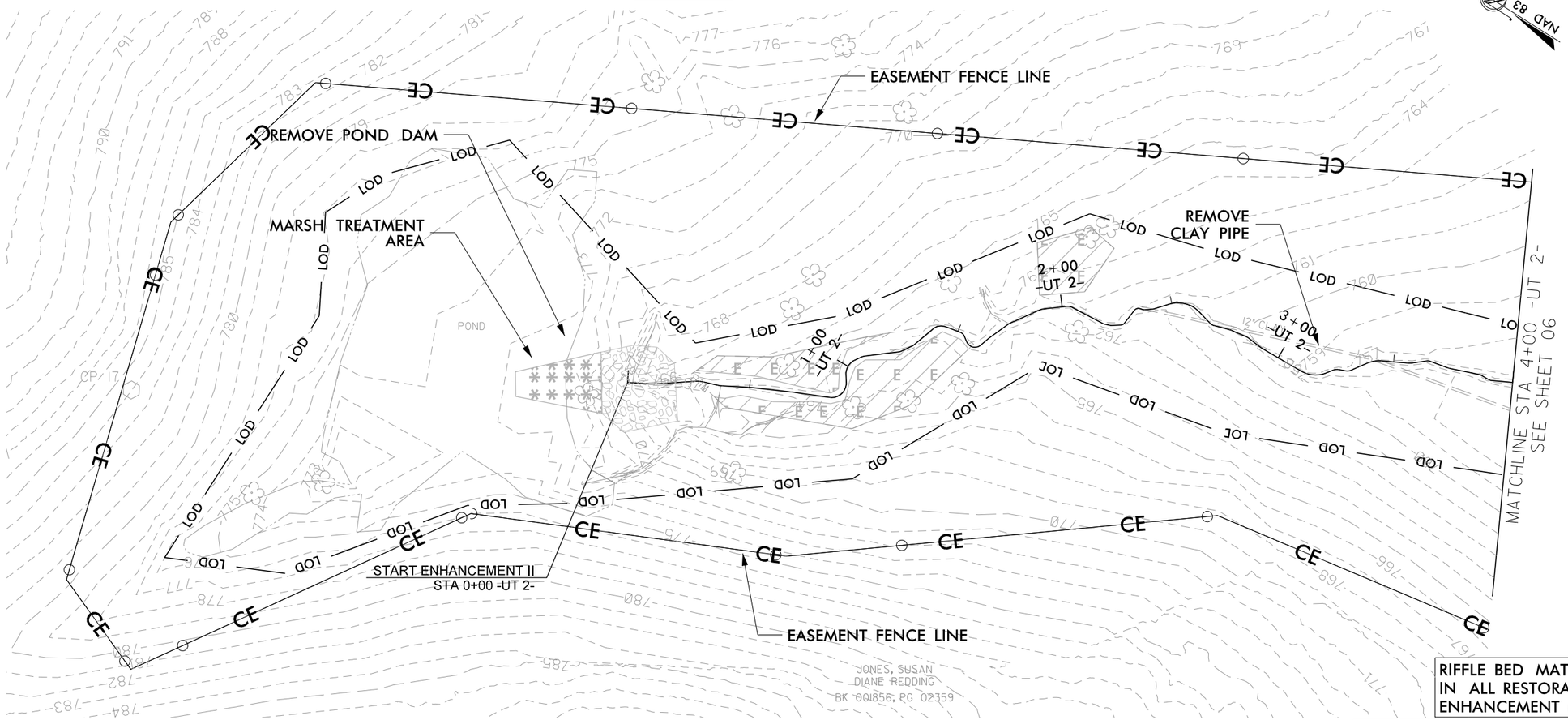
SCALE: 1" = 50'



RIFFLE BED MATERIAL IS REQUIRED IN ALL RESTORATION AND ENHANCEMENT (LEVEL I) REACHES

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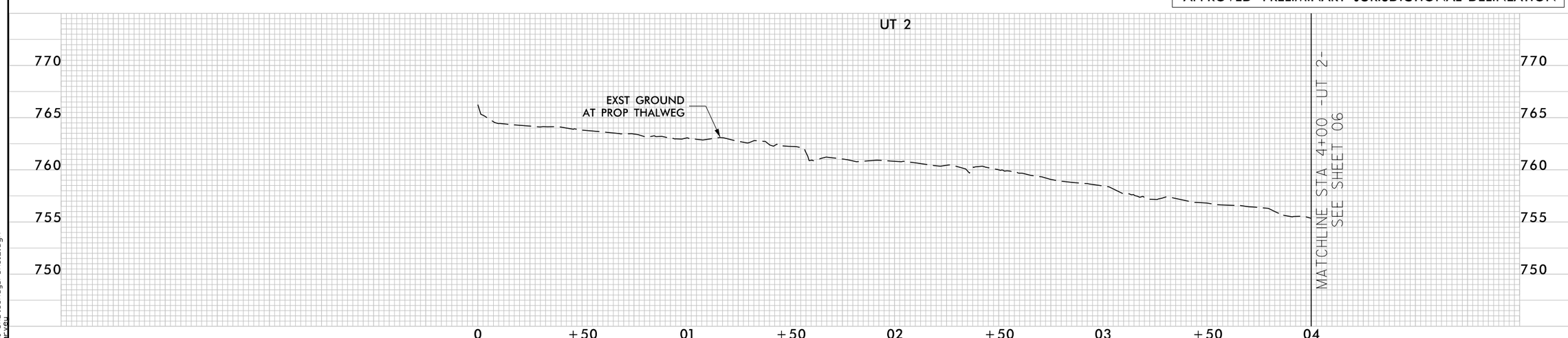

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-UT 4B- STRUCTURE LOCATIONS

STR. TYPE	NORTHING	EASTING	Prop Elevation
CROSS VANE	760,907.01	1,736,070.30	761.77
CROSS VANE	760,848.88	1,736,043.28	760.27
CROSS VANE	760,838.72	1,736,042.06	759.78
CROSS VANE	760,824.39	1,736,047.63	759.21
CROSS VANE	760,809.92	1,736,046.94	758.67
CROSS VANE	760,752.71	1,736,063.38	757.19
SILL STEP	760,739.66	1,736,066.18	756.60
CROSS VANE	760,725.04	1,736,063.02	755.78
SILL STEP	760,709.27	1,736,070.63	755.16
SILL STEP	760,697.97	1,736,073.60	754.41
SILL STEP	760,674.66	1,736,090.56	753.41

-UT 4- STRUCTURE LOCATIONS

STR. TYPE	NORTHING	EASTING	Prop Elevation
SILL STEP	760,663.18	1,736,107.94	752.57
CROSS VANE	760,612.01	1,736,106.18	751.28
CROSS VANE	760,590.48	1,736,094.17	750.80
CROSS VANE	760,545.86	1,736,099.74	749.96
CROSS VANE	760,501.69	1,736,079.94	749.09

25' 12.5' 0 25' 50'
SCALE: 1" = 50'
NAD 83

HORIZONTAL DATUM: NAD 83 (2011)
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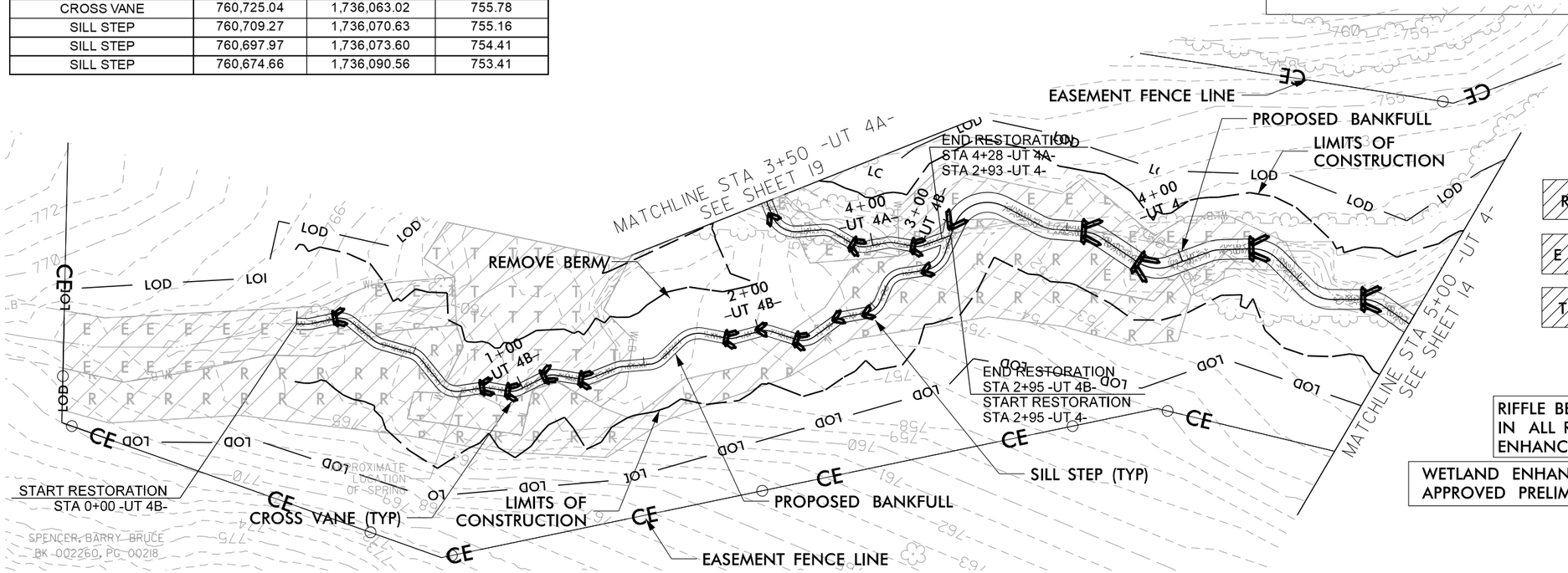


R R DENOTES WETLAND REESTABLISHMENT

E E DENOTES WETLAND ENHANCEMENT

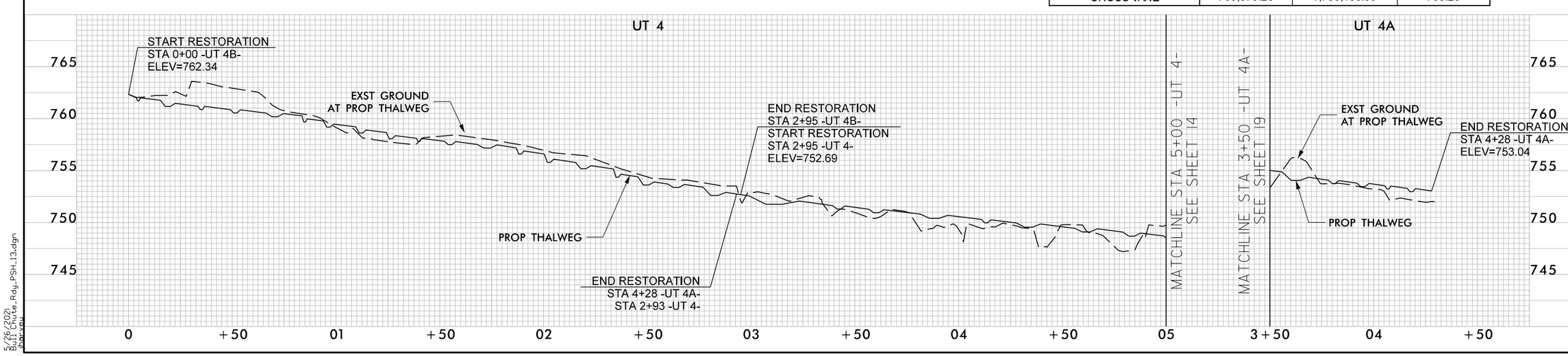
T T DENOTES WETLAND REHABILITATION

RIFFLE BED MATERIAL IS REQUIRED IN ALL RESTORATION AND ENHANCEMENT (LEVEL I) REACHES

WETLAND ENHANCEMENT AREAS DERIVED FROM APPROVED PRELIMINARY JURISDICTIONAL DELINEATION

-UT 4A- STRUCTURE LOCATIONS

STR. TYPE	NORTHING	EASTING	Prop Elevation
SILL STEP	760,734.86	1,736,111.78	754.86
CROSS VANE	760,703.01	1,736,100.80	753.79
CROSS VANE	760,679.25	1,736,100.09	753.29



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Axiom Environmental, Inc.

BULL CHUTE
RANDOLPH COUNTY, NC

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SCALE: 1" = 50'

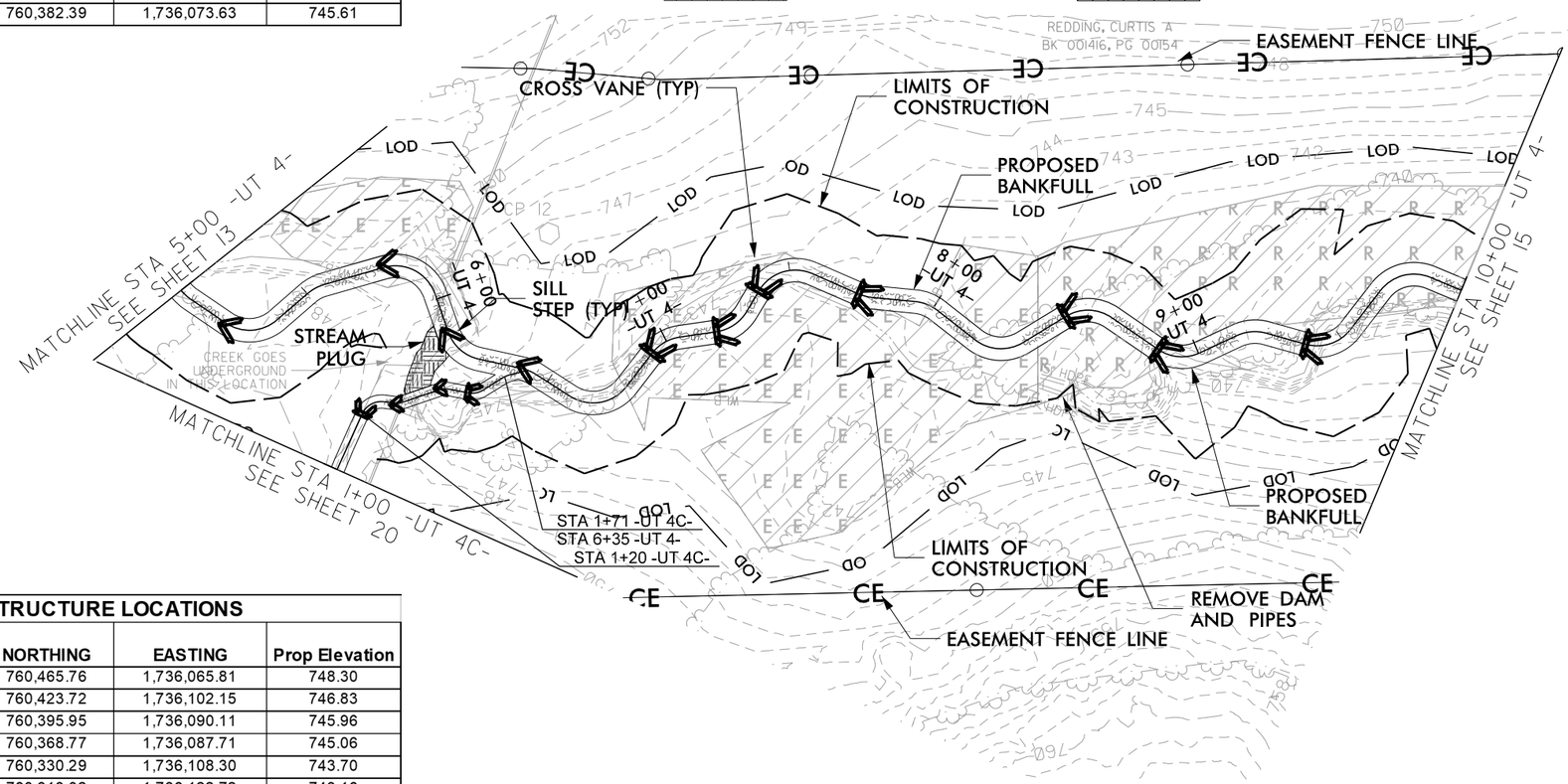
NAD 83

E E DENOTES WETLAND ENHANCEMENT

R R DENOTES WETLAND REESTABLISHMENT

-UT 4C- STRUCTURE LOCATIONS

STR. TYPE	NORTHING	EASTING	Prop Elevation
CROSS VANE	760,412.52	1,736,054.25	747.30
SILL STEP	760,404.05	1,736,061.52	747.16
SILL STEP	760,391.91	1,736,070.92	746.30
CROSS VANE	760,382.39	1,736,073.63	745.61



-UT 4- STRUCTURE LOCATIONS

STR. TYPE	NORTHING	EASTING	Prop Elevation
SILL STEP	760,465.76	1,736,065.81	748.30
SILL STEP	760,423.72	1,736,102.15	746.83
SILL STEP	760,395.95	1,736,090.11	745.96
SILL STEP	760,368.77	1,736,087.71	745.06
CROSS VANE	760,330.29	1,736,108.30	743.70
CROSS VANE	760,313.02	1,736,122.72	743.16
CROSS VANE	760,304.88	1,736,140.57	742.74
CROSS VANE	760,273.67	1,736,151.67	742.07
CROSS VANE	760,206.95	1,736,169.90	740.46
CROSS VANE	760,174.41	1,736,170.89	739.64
CROSS VANE	760,129.49	760,129.49	738.65

RIFFLE BED MATERIAL IS REQUIRED IN ALL RESTORATION AND ENHANCEMENT (LEVEL I) REACHES

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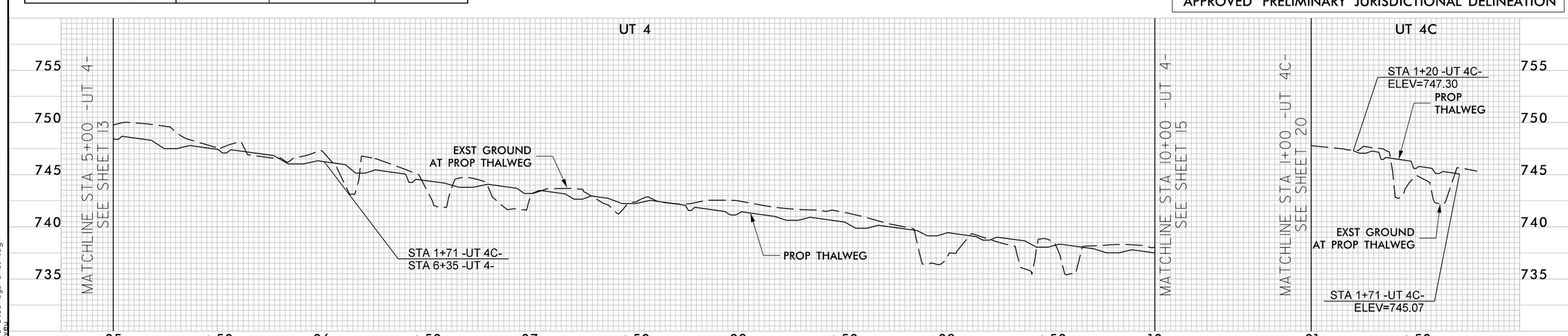

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BULL CHUTE
RANDOLPH COUNTY, NC

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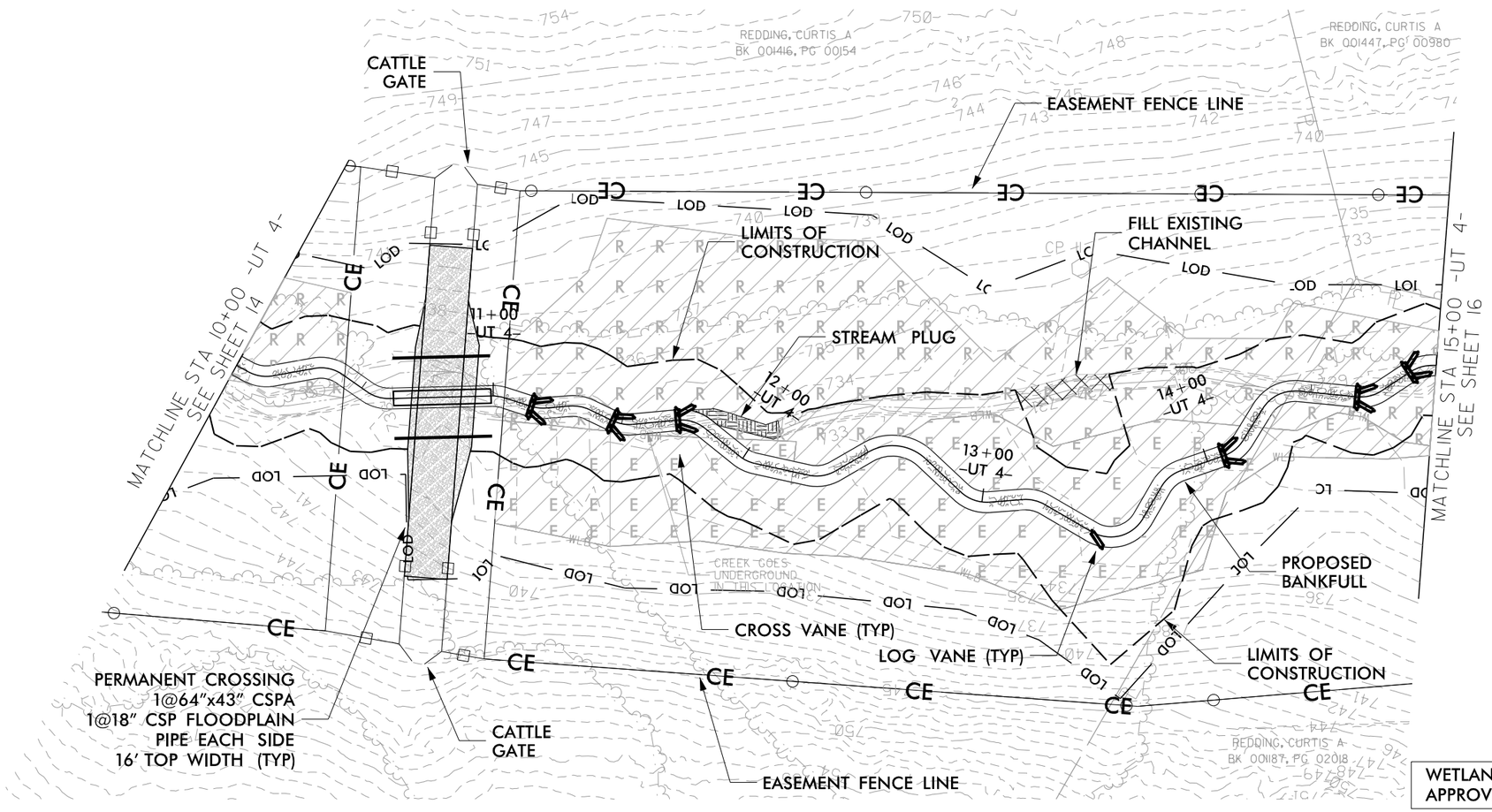
25' 12.5' 0 25' 50'
SCALE: 1" = 50'

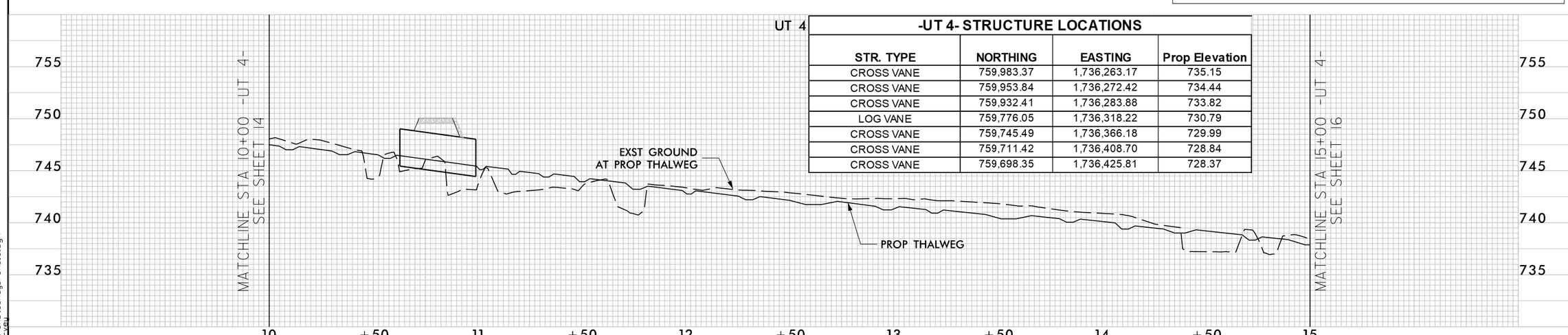
E E DENOTES WETLAND ENHANCEMENT

R R DENOTES WETLAND REESTABLISHMENT



RIFFLE BED MATERIAL IS REQUIRED IN ALL RESTORATION AND ENHANCEMENT (LEVEL I) REACHES

WETLAND ENHANCEMENT AREAS DERIVED FROM APPROVED PRELIMINARY JURISDICTIONAL DELINEATION



-UT 4- STRUCTURE LOCATIONS

STR. TYPE	NORTHING	EASTING	Prop Elevation
CROSS VANE	759,983.37	1,736,263.17	735.15
CROSS VANE	759,953.84	1,736,272.42	734.44
CROSS VANE	759,932.41	1,736,283.88	733.82
LOG VANE	759,776.05	1,736,318.22	730.79
CROSS VANE	759,745.49	1,736,366.18	729.99
CROSS VANE	759,711.42	1,736,408.70	728.84
CROSS VANE	759,698.35	1,736,425.81	728.37

DocuSigned by:
Joshua G. Dalton
1089AD8C14994C3...

NORTH CAROLINA PROFESSIONAL SEAL 26971 ENGINEER JOSHUA G. DALTON

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Axiom Environmental, Inc.

BULL CHUTE
RANDOLPH COUNTY, NC

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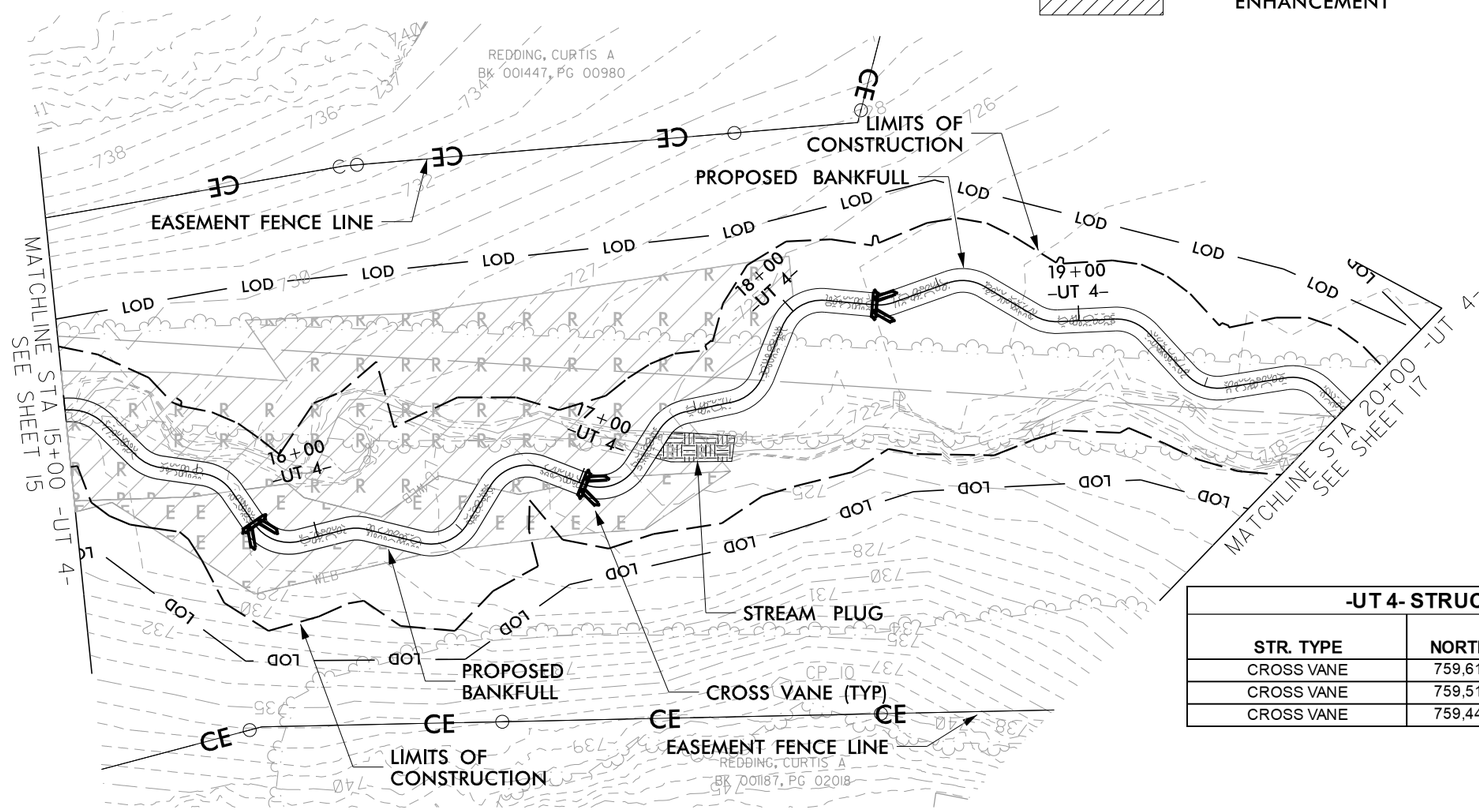
HORIZONTAL DATUM: NAD 83 (2011)
VERTICAL DATUM: NAVD 1988

25' 12.5' 0 25' 50'
SCALE: 1" = 50'

NAD 83

R R DENOTES WETLAND REESTABLISHMENT

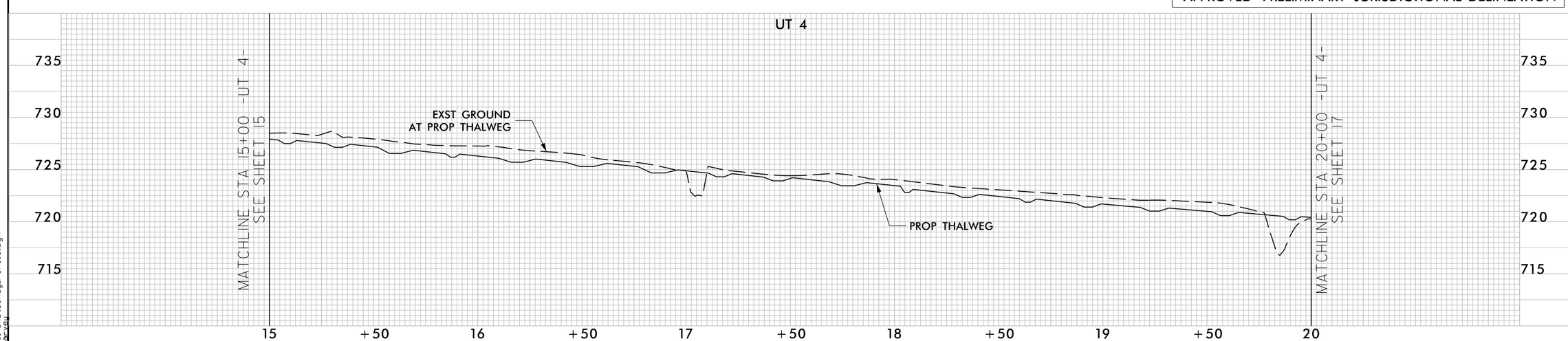
E E DENOTES WETLAND ENHANCEMENT



-UT 4- STRUCTURE LOCATIONS			
STR. TYPE	NORTHING	EASTING	Prop Elevation
CROSS VANE	759,619.83	1,736,415.50	727.16
CROSS VANE	759,519.80	1,736,460.50	725.28
CROSS VANE	759,445.98	1,736,545.63	723.40

RIFFLE BED MATERIAL IS REQUIRED IN ALL RESTORATION AND ENHANCEMENT (LEVEL I) REACHES

WETLAND ENHANCEMENT AREAS DERIVED FROM APPROVED PRELIMINARY JURISDICTIONAL DELINEATION



DocuSigned by:
Joshua G. Dalton
1089AD8C14994C3...

NORTH CAROLINA PROFESSIONAL SEAL 26971 ENGINEER JOSHUA G. DALTON

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DATE:

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SUNGATE DESIGN GROUP, P.A.
905 JONES FRANKLIN ROAD
RALEIGH, NORTH CAROLINA 27606
TEL (919) 859-2243
ENG FIRM LICENSE NO. C-890

Axiom Environmental, Inc.

BULL CHUTE
RANDOLPH COUNTY, NC

PLAN AND PROFILE

PROJECT # :
DRAWING NAME:
DATE: 2021
DRAWN BY: JRH
REVIEWED BY: JGD
REVISIONS:

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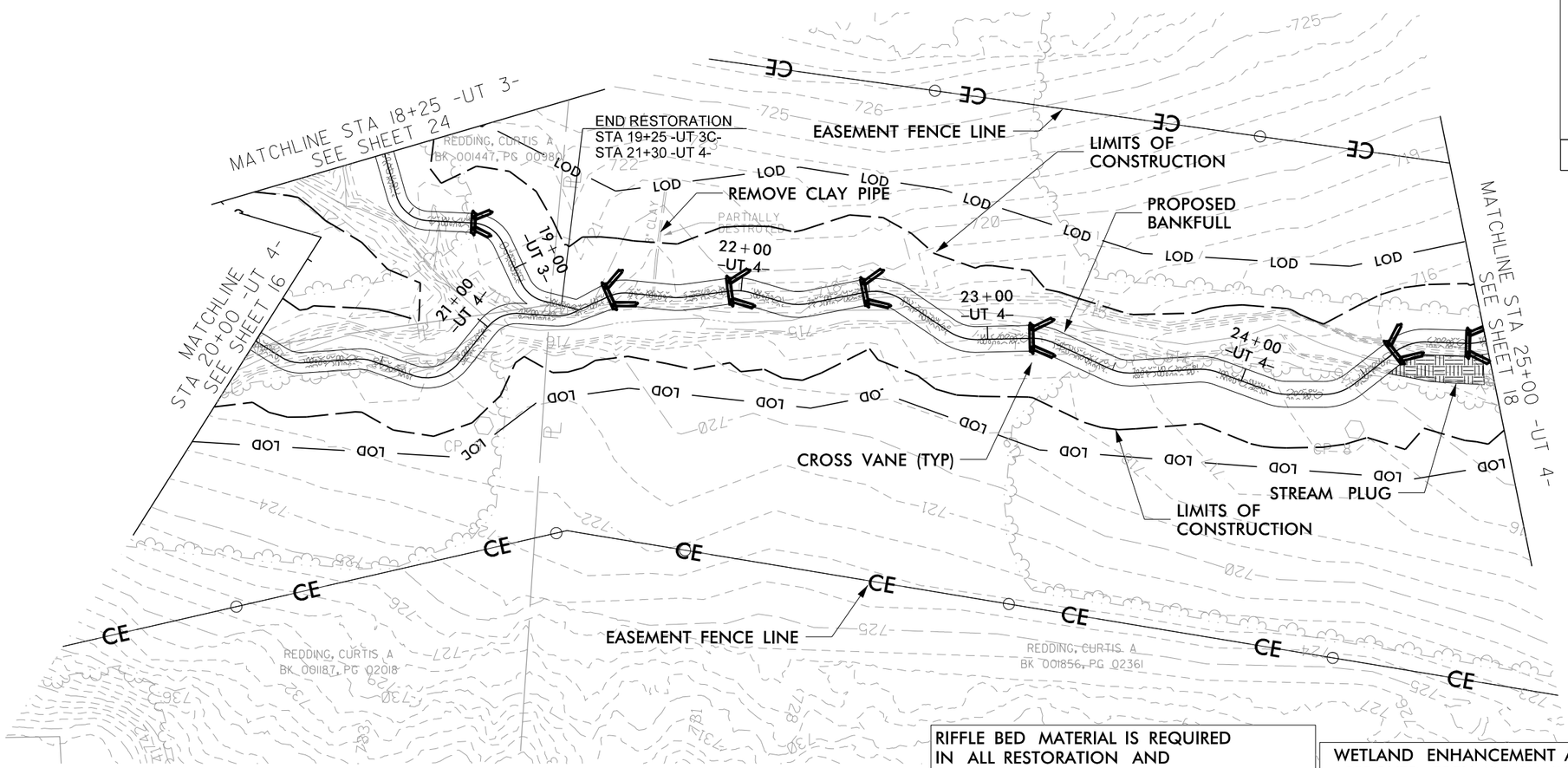
-UT 3C- STRUCTURE LOCATIONS			
STR. TYPE	NORTHING	EASTING	Prop Elevation
CROSS VANE	759,209.75	1,736,611.53	720.01

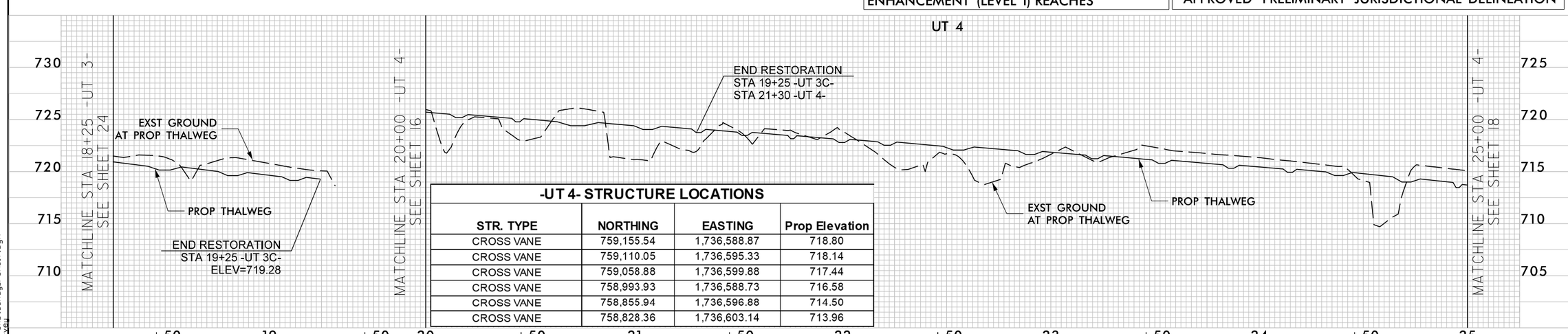
HORIZONTAL DATUM: NAD 83 (2011)
VERTICAL DATUM: NAVD 1988

25' 12.5' 0 25' 50'
SCALE: 1" = 50'
NAD 83



RIFFLE BED MATERIAL IS REQUIRED IN ALL RESTORATION AND ENHANCEMENT (LEVEL I) REACHES

WETLAND ENHANCEMENT AREAS DERIVED FROM APPROVED PRELIMINARY JURISDICTIONAL DELINEATION



-UT 4- STRUCTURE LOCATIONS			
STR. TYPE	NORTHING	EASTING	Prop Elevation
CROSS VANE	759,155.54	1,736,588.87	718.80
CROSS VANE	759,110.05	1,736,595.33	718.14
CROSS VANE	759,058.88	1,736,599.88	717.44
CROSS VANE	758,993.93	1,736,588.73	716.58
CROSS VANE	758,855.94	1,736,596.88	714.50
CROSS VANE	758,828.36	1,736,603.14	713.96

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Axiom Environmental, Inc.

BULL CHUTE
RANDOLPH COUNTY, NC

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DRAWN BY: JRH
REVIEWED BY: JGD
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VERTICAL DATUM: NAVD 1988

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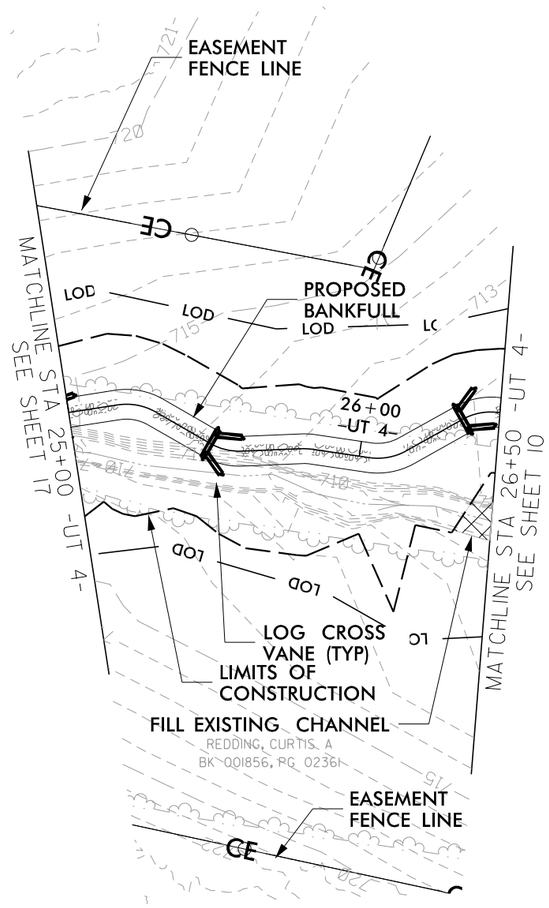
SCALE: 1" = 50'

NAD 83



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1089AD8C14994C3...

NORTH CAROLINA PROFESSIONAL SEAL 26971 ENGINEER JOSHUA G. DALTON

5/26/2021

DATE:

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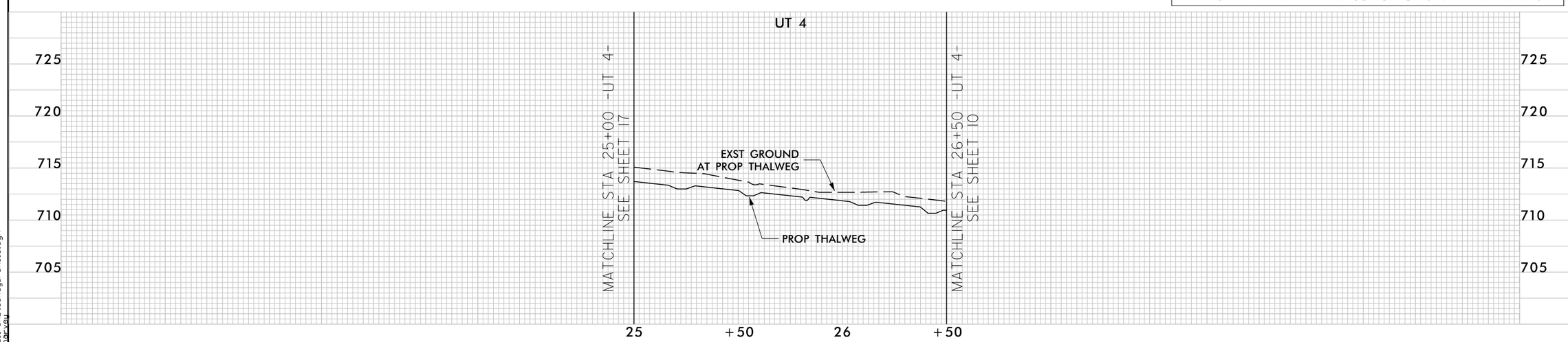
-UT 4- STRUCTURE LOCATIONS			
STR. TYPE	NORTHING	EASTING	Prop Elevation
CROSS VANE	758,773.81	1,736,601.36	712.84
CROSS VANE	758,692.57	1,736,621.45	711.26

RIFFLE BED MATERIAL IS REQUIRED IN ALL RESTORATION AND ENHANCEMENT (LEVEL I) REACHES

WETLAND ENHANCEMENT AREAS DERIVED FROM APPROVED PRELIMINARY JURISDICTIONAL DELINEATION



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BULL CHUTE
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RIFFLE BED MATERIAL IS REQUIRED IN ALL RESTORATION AND ENHANCEMENT (LEVEL I) REACHES

WETLAND ENHANCEMENT AREAS DERIVED FROM APPROVED PRELIMINARY JURISDICTIONAL DELINEATION

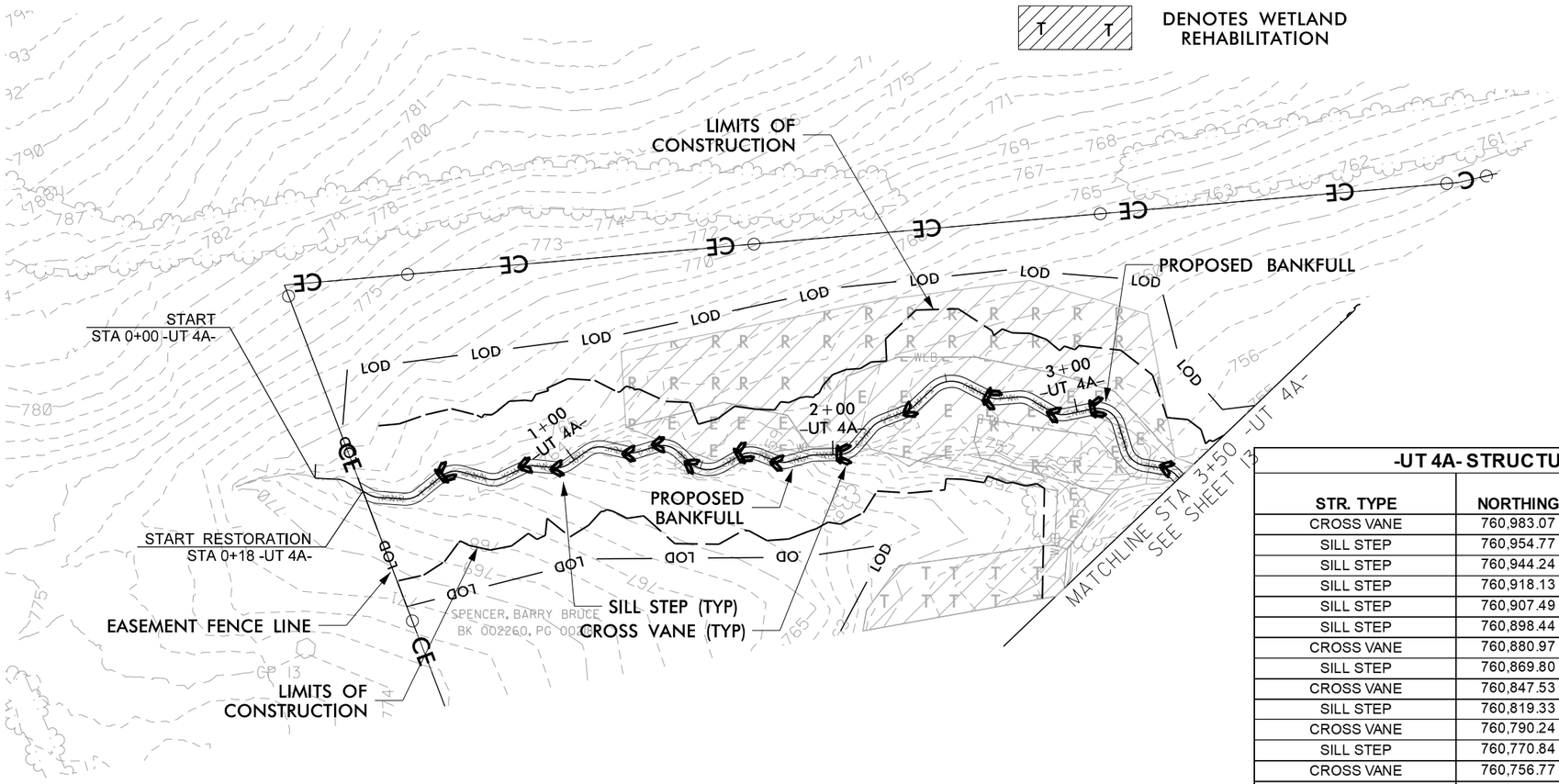
HORIZONTAL DATUM: NAD 83 (2011)
VERTICAL DATUM: NAVD 1988

R R — DENOTES WETLAND REESTABLISHMENT

E E — DENOTES WETLAND ENHANCEMENT

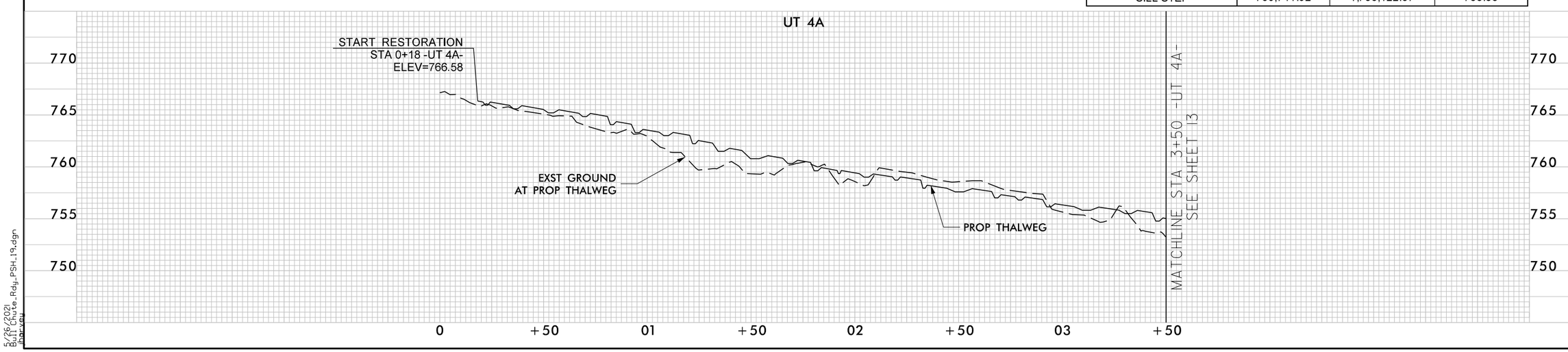
T T — DENOTES WETLAND REHABILITATION

25′ 12.5′ 0 25′ 50′
SCALE: 1″ = 50′
NAD 83



-UT 4A- STRUCTURE LOCATIONS

STR. TYPE	NORTHING	EASTING	Prop Elevation
CROSS VANE	760,983.07	1,736,216.46	765.54
SILL STEP	760,954.77	1,736,208.36	764.87
SILL STEP	760,944.24	1,736,204.22	764.11
SILL STEP	760,918.13	1,736,199.74	763.04
SILL STEP	760,907.49	1,736,197.75	762.30
SILL STEP	760,898.44	1,736,187.99	761.59
CROSS VANE	760,880.97	1,736,183.47	760.84
SILL STEP	760,869.80	1,736,177.10	760.43
CROSS VANE	760,847.53	1,736,170.65	759.30
SILL STEP	760,819.33	1,736,176.11	758.74
CROSS VANE	760,790.24	1,736,170.29	757.62
SILL STEP	760,770.84	1,736,156.55	756.85
CROSS VANE	760,756.77	1,736,152.03	756.17
SILL STEP	760,741.02	1,736,122.67	755.58



DocuSigned by:
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1089AD8C14994C3...

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5/26/2021

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BULL CHUTE
RANDOLPH COUNTY, NC

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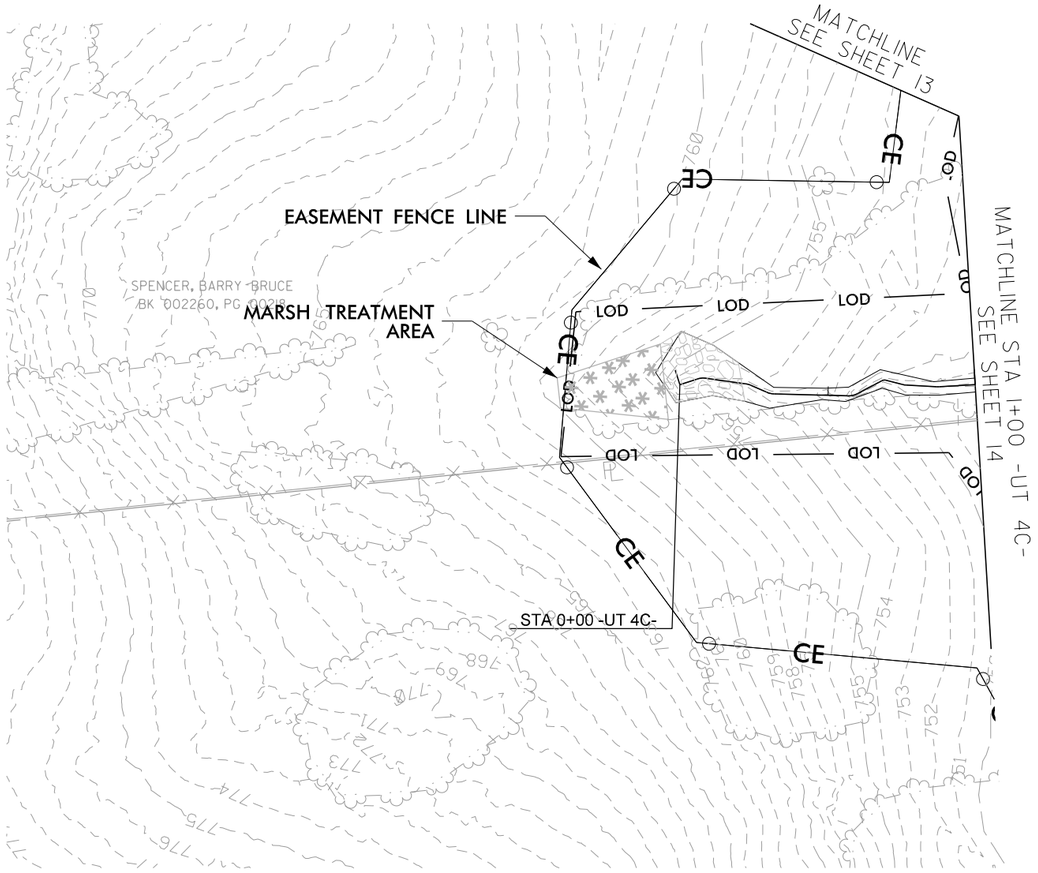
HORIZONTAL DATUM: NAD 83 (2011)
VERTICAL DATUM: NAVD 1988

25' 12.5' 0 25' 50'
SCALE: 1" = 50'

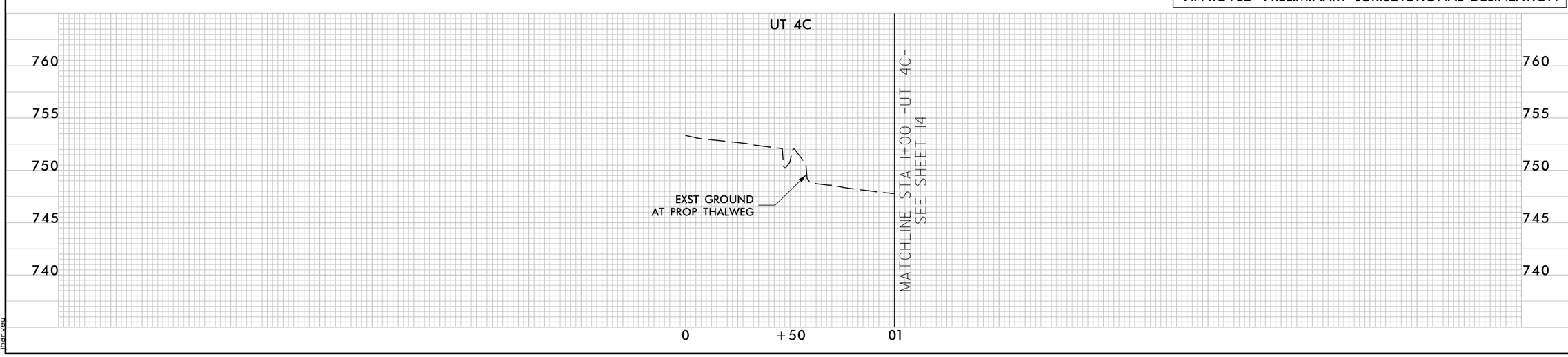
DENOTES MARSH TREATMENT

NAD 83



RIFFLE BED MATERIAL IS REQUIRED IN ALL RESTORATION AND ENHANCEMENT (LEVEL I) REACHES

WETLAND ENHANCEMENT AREAS DERIVED FROM APPROVED PRELIMINARY JURISDICTIONAL DELINEATION



DocuSigned by:
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5/26/2021

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BULL CHUTE
RANDOLPH COUNTY, NC

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jharvey

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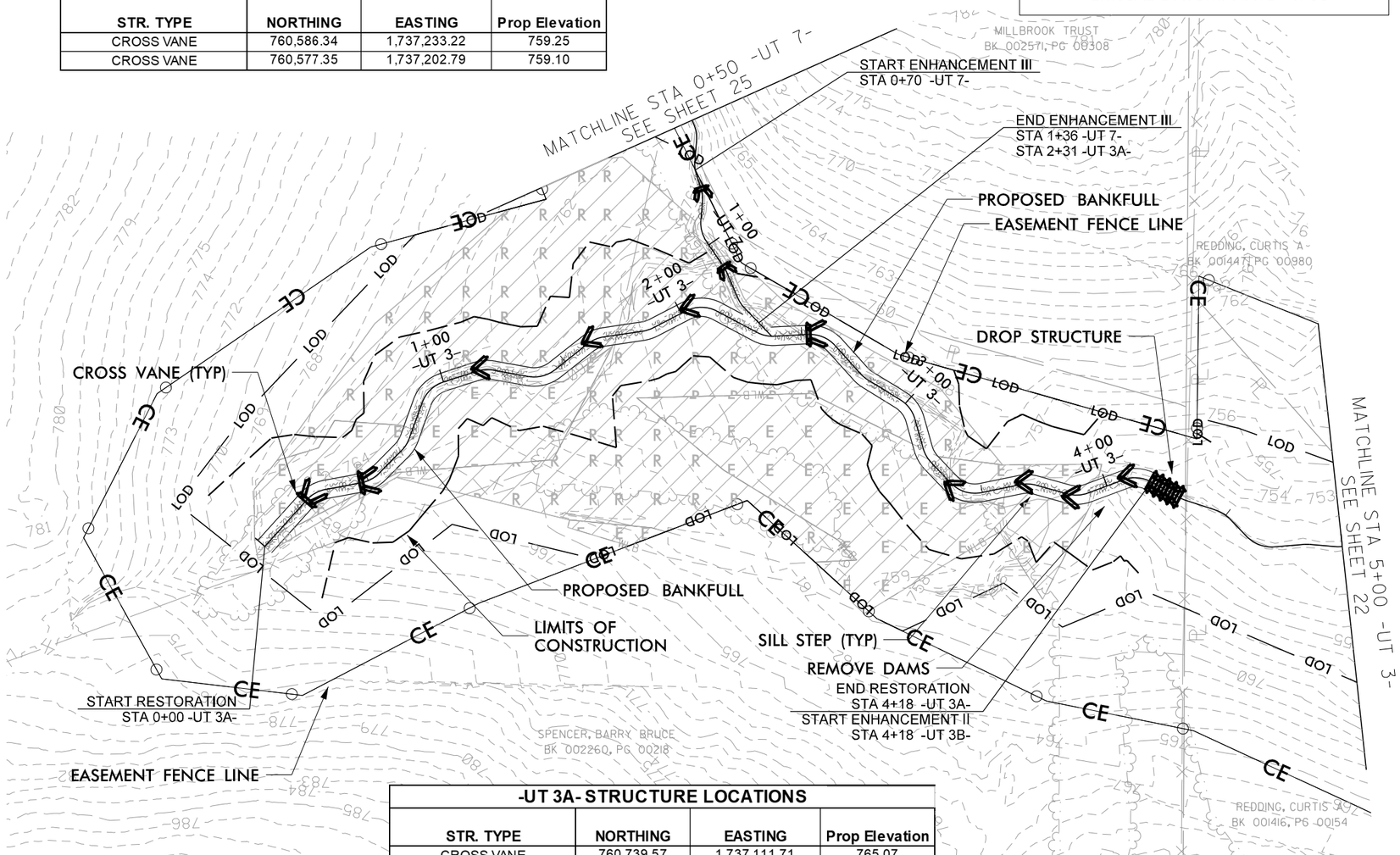
-UT 7- STRUCTURE LOCATIONS			
STR. TYPE	NORTHING	EASTING	Prop Elevation
CROSS VANE	760,586.34	1,737,233.22	759.25
CROSS VANE	760,577.35	1,737,202.79	759.10

HORIZONTAL DATUM: NAD 83 (2011)
VERTICAL DATUM: NAVD 1988

25' 12.5' 0 25' 50'
SCALE: 1" = 50'
NAD 83



R R DENOTES WETLAND REESTABLISHMENT

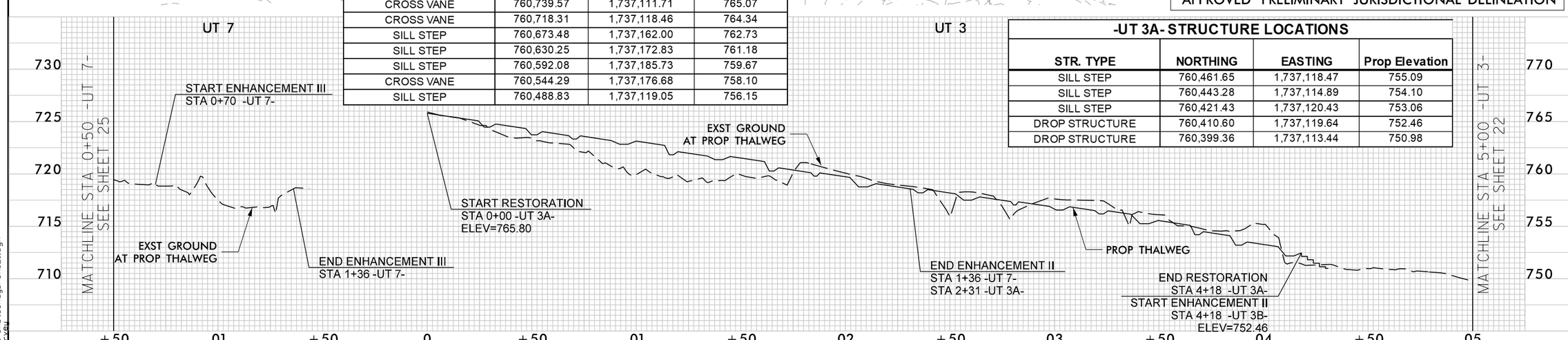
E E DENOTES WETLAND ENHANCEMENT

RIFFLE BED MATERIAL IS REQUIRED IN ALL RESTORATION AND ENHANCEMENT (LEVEL I) REACHES

WETLAND ENHANCEMENT AREAS DERIVED FROM APPROVED PRELIMINARY JURISDICTIONAL DELINEATION

-UT 3A- STRUCTURE LOCATIONS			
STR. TYPE	NORTHING	EASTING	Prop Elevation
CROSS VANE	760,739.57	1,737,111.71	765.07
CROSS VANE	760,718.31	1,737,118.46	764.34
SILL STEP	760,673.48	1,737,162.00	762.73
SILL STEP	760,630.25	1,737,172.83	761.18
SILL STEP	760,592.08	1,737,185.73	759.67
CROSS VANE	760,544.29	1,737,176.68	758.10
SILL STEP	760,488.83	1,737,119.05	756.15

-UT 3A- STRUCTURE LOCATIONS			
STR. TYPE	NORTHING	EASTING	Prop Elevation
SILL STEP	760,461.65	1,737,118.47	755.09
SILL STEP	760,443.28	1,737,114.89	754.10
SILL STEP	760,421.43	1,737,120.43	753.06
DROP STRUCTURE	760,410.60	1,737,119.64	752.46
DROP STRUCTURE	760,399.36	1,737,113.44	750.98



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5/26/2021
DATE:

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Axiom Environmental, Inc.

BULL CHUTE
RANDOLPH COUNTY, NC

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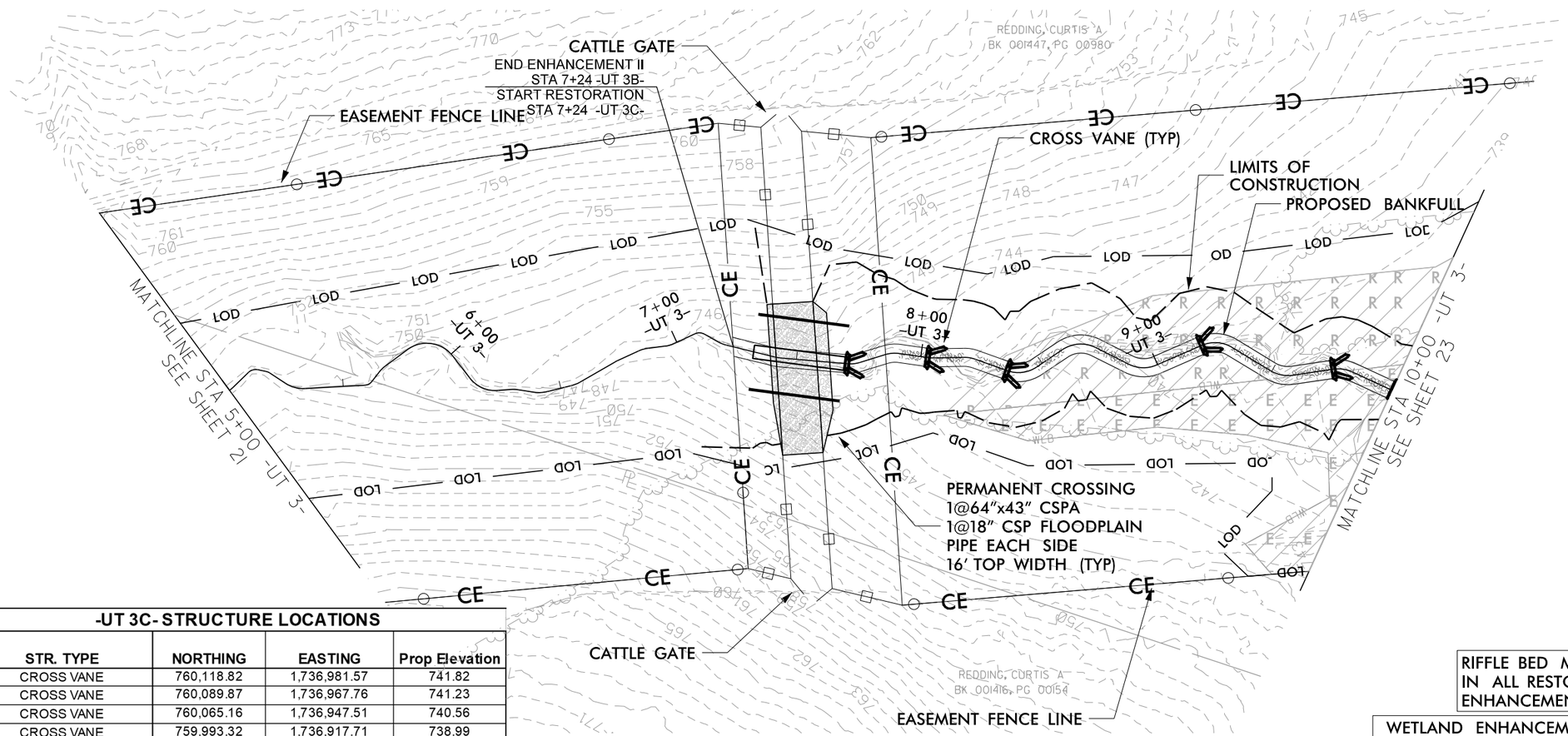
HORIZONTAL DATUM: NAD 83 (2011)
VERTICAL DATUM: NAVD 1988

SCALE: 1" = 50'

DENOTES WETLAND REESTABLISHMENT

DENOTES WETLAND ENHANCEMENT



-UT 3C- STRUCTURE LOCATIONS			
STR. TYPE	NORTHING	EASTING	Prop Elevation
CROSS VANE	760,118.82	1,736,981.57	741.82
CROSS VANE	760,089.87	1,736,967.76	741.23
CROSS VANE	760,065.16	1,736,947.51	740.56
CROSS VANE	759,993.32	1,736,917.71	738.99
CROSS VANE	759,952.90	1,736,883.49	737.79

RIFFLE BED MATERIAL IS REQUIRED IN ALL RESTORATION AND ENHANCEMENT (LEVEL I) REACHES

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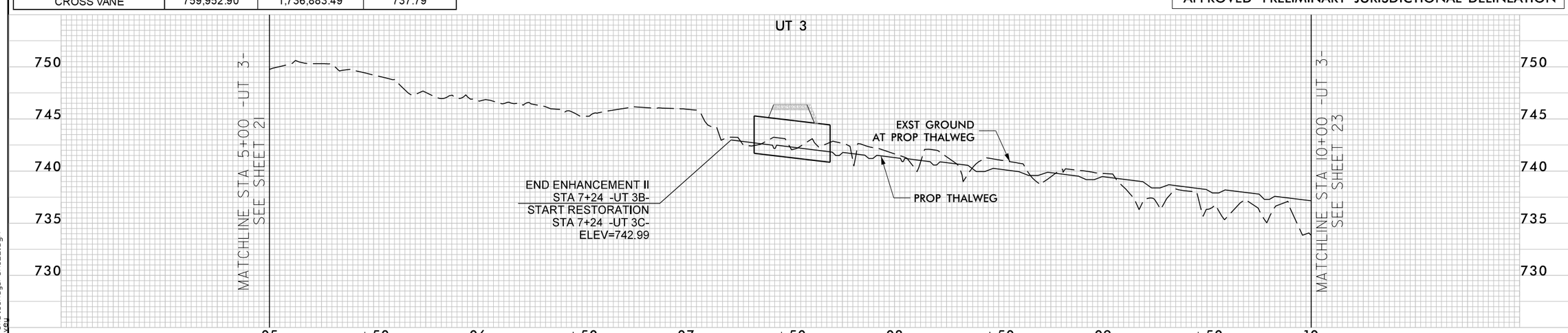

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Joshua G. Dalton
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NORTH CAROLINA PROFESSIONAL SEAL 26971 ENGINEER JOSHUA G. DALTON

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Axiom Environmental, Inc.

BULL CHUTE
RANDOLPH COUNTY, NC

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jharvey

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-UT 3C- STRUCTURE LOCATIONS			
STR. TYPE	NORTHING	EASTING	Prop Elevation
CROSS VANE	759,936.81	1,736,864.49	737.15
CROSS VANE	759,822.33	1,736,856.80	734.75
CROSS VANE	759,754.48	1,736,844.82	733.19
CROSS VANE	759,704.27	1,736,827.61	731.98
CROSS VANE	759,628.21	1,736,824.97	730.23
CROSS VANE	759,599.83	1,736,786.35	729.13
CROSS VANE	759,532.58	1,736,793.78	727.61

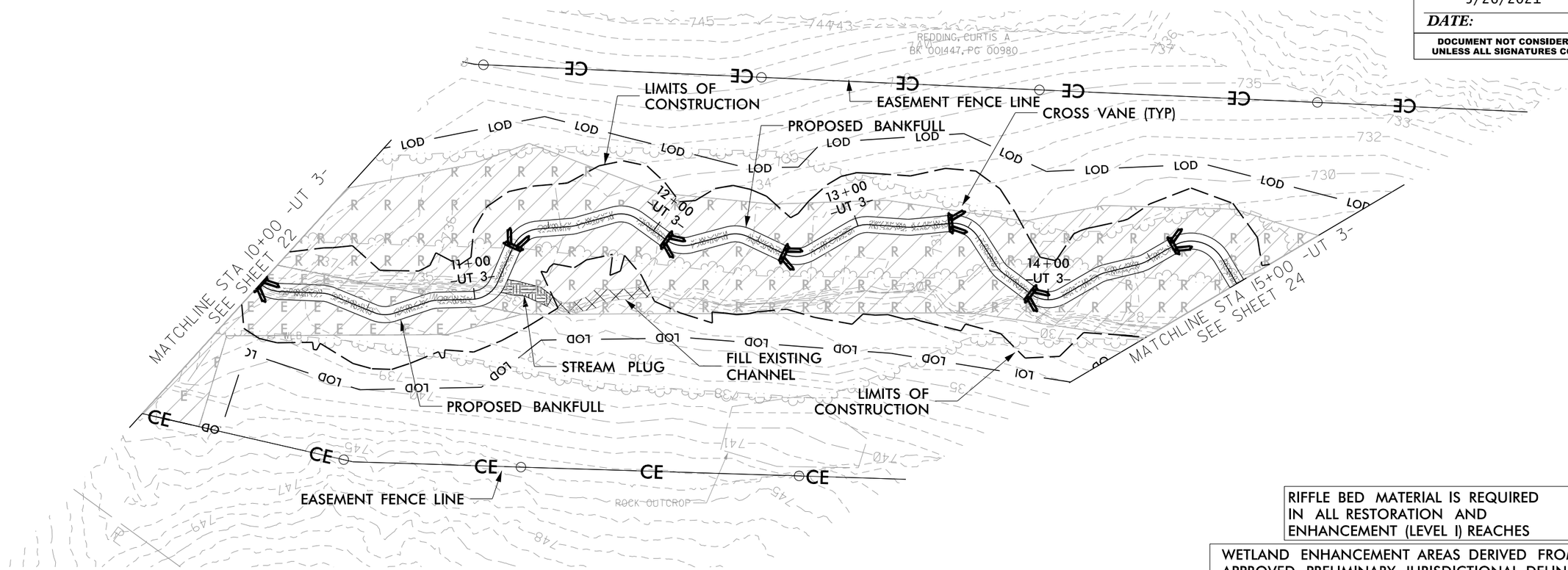
HORIZONTAL DATUM: NAD 83 (2011)
VERTICAL DATUM: NAVD 1988

25' 12.5' 0 25' 50'
SCALE: 1" = 50'

NAD 83

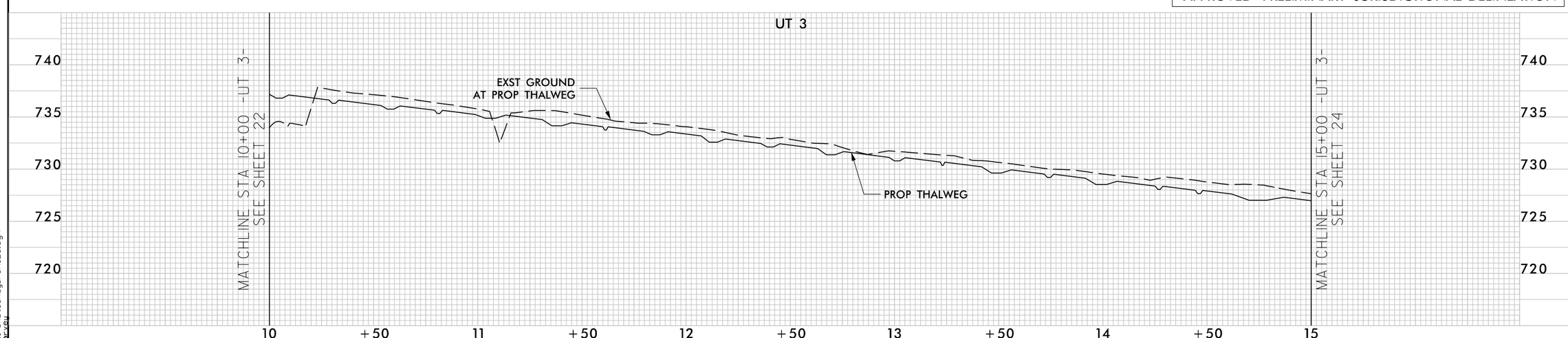
R R DENOTES WETLAND REESTABLISHMENT

E E DENOTES WETLAND ENHANCEMENT



RIFFLE BED MATERIAL IS REQUIRED IN ALL RESTORATION AND ENHANCEMENT (LEVEL I) REACHES

WETLAND ENHANCEMENT AREAS DERIVED FROM APPROVED PRELIMINARY JURISDICTIONAL DELINEATION



DocuSigned by:
Joshua G. Dalton
1089AD8C14994C3...

NORTH CAROLINA PROFESSIONAL SEAL 26971 ENGINEER JOSHUA G. DALTON

5/26/2021

DATE:

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Axiom Environmental, Inc.

BULL CHUTE
RANDOLPH COUNTY, NC

PLAN AND PROFILE

PROJECT # :
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DATE: 2021
DRAWN BY: JRH
REVIEWED BY: JGD
REVISIONS:

SHEET NO. 23

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jharvey

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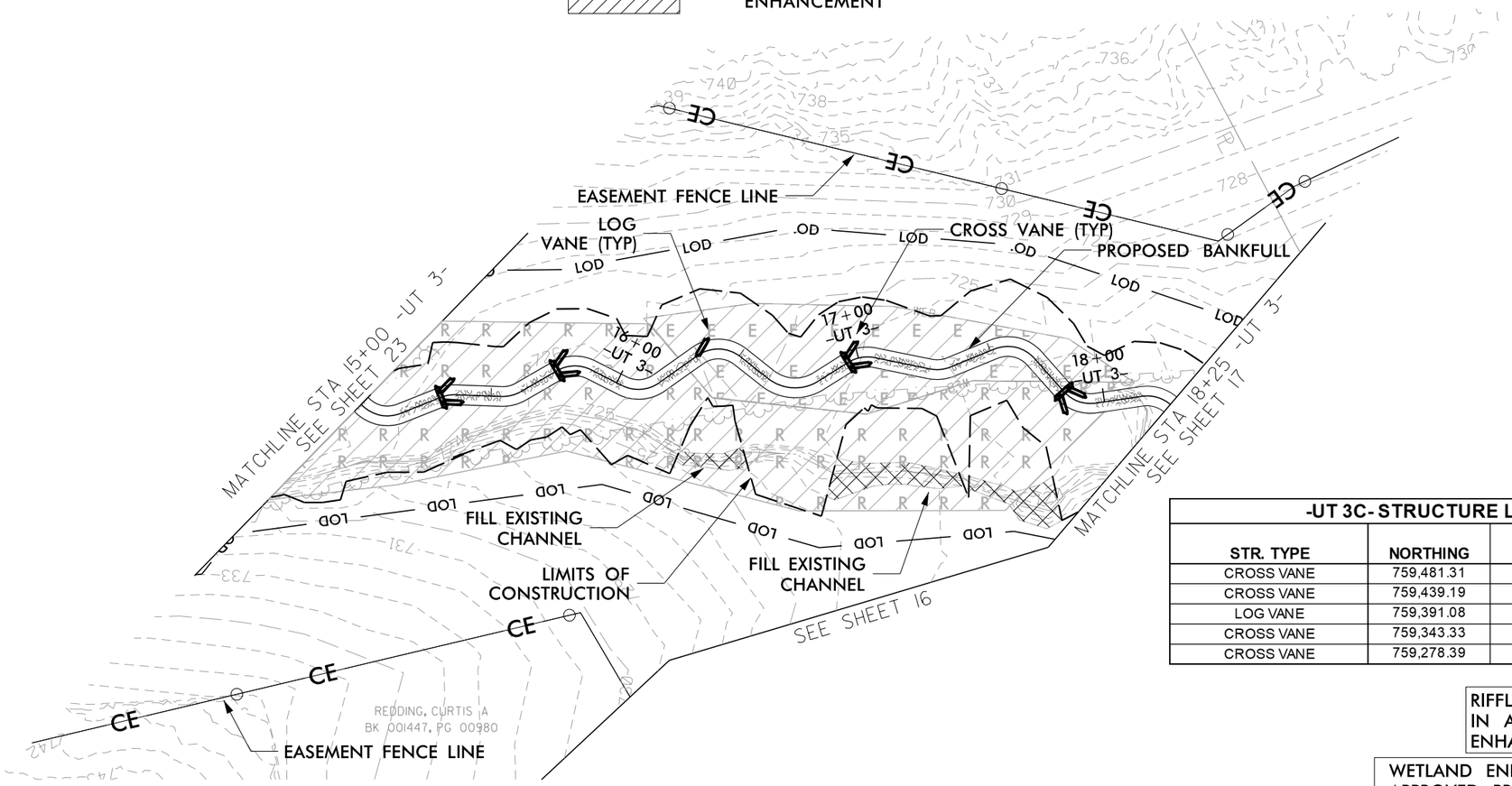
HORIZONTAL DATUM: NAD 83 (2011)
VERTICAL DATUM: NAVD 1988

25' 12.5' 0 25' 50'
SCALE: 1" = 50'

NAD 83

R R DENOTES WETLAND REESTABLISHMENT

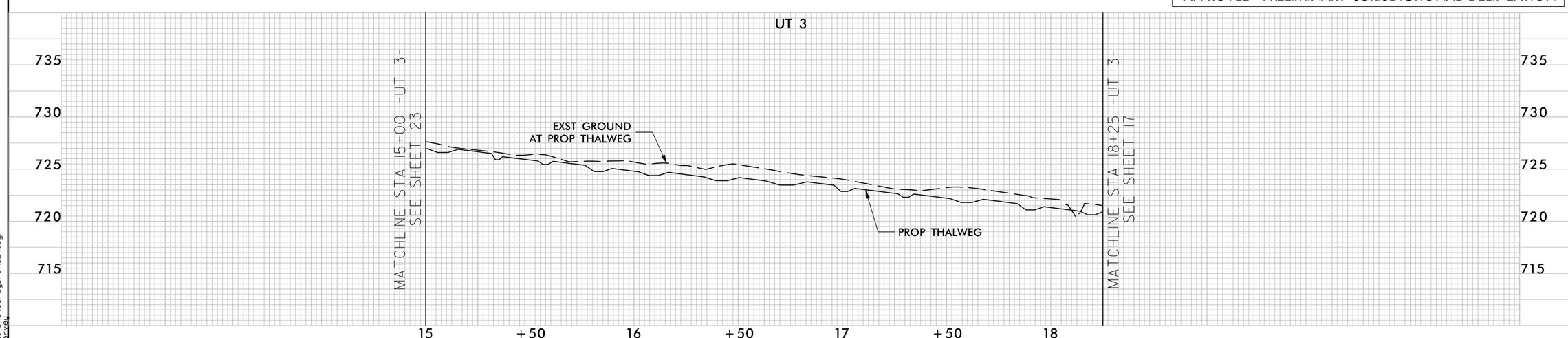
E E DENOTES WETLAND ENHANCEMENT



-UT 3C- STRUCTURE LOCATIONS			
STR. TYPE	NORTHING	EASTING	Prop Elevation
CROSS VANE	759,481.31	1,736,759.89	726.50
CROSS VANE	759,439.19	1,736,748.95	725.37
LOG VANE	759,391.08	1,736,730.12	724.25
CROSS VANE	759,343.33	1,736,702.44	723.46
CROSS VANE	759,278.39	1,736,656.57	721.70

RIFFLE BED MATERIAL IS REQUIRED IN ALL RESTORATION AND ENHANCEMENT (LEVEL I) REACHES

WETLAND ENHANCEMENT AREAS DERIVED FROM APPROVED PRELIMINARY JURISDICTIONAL DELINEATION



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Axiom Environmental, Inc.

BULL CHUTE
RANDOLPH COUNTY, NC

PLAN AND PROFILE

PROJECT # :
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DATE: 2021
DRAWN BY: JRH
REVIEWED BY: JGD
REVISIONS:

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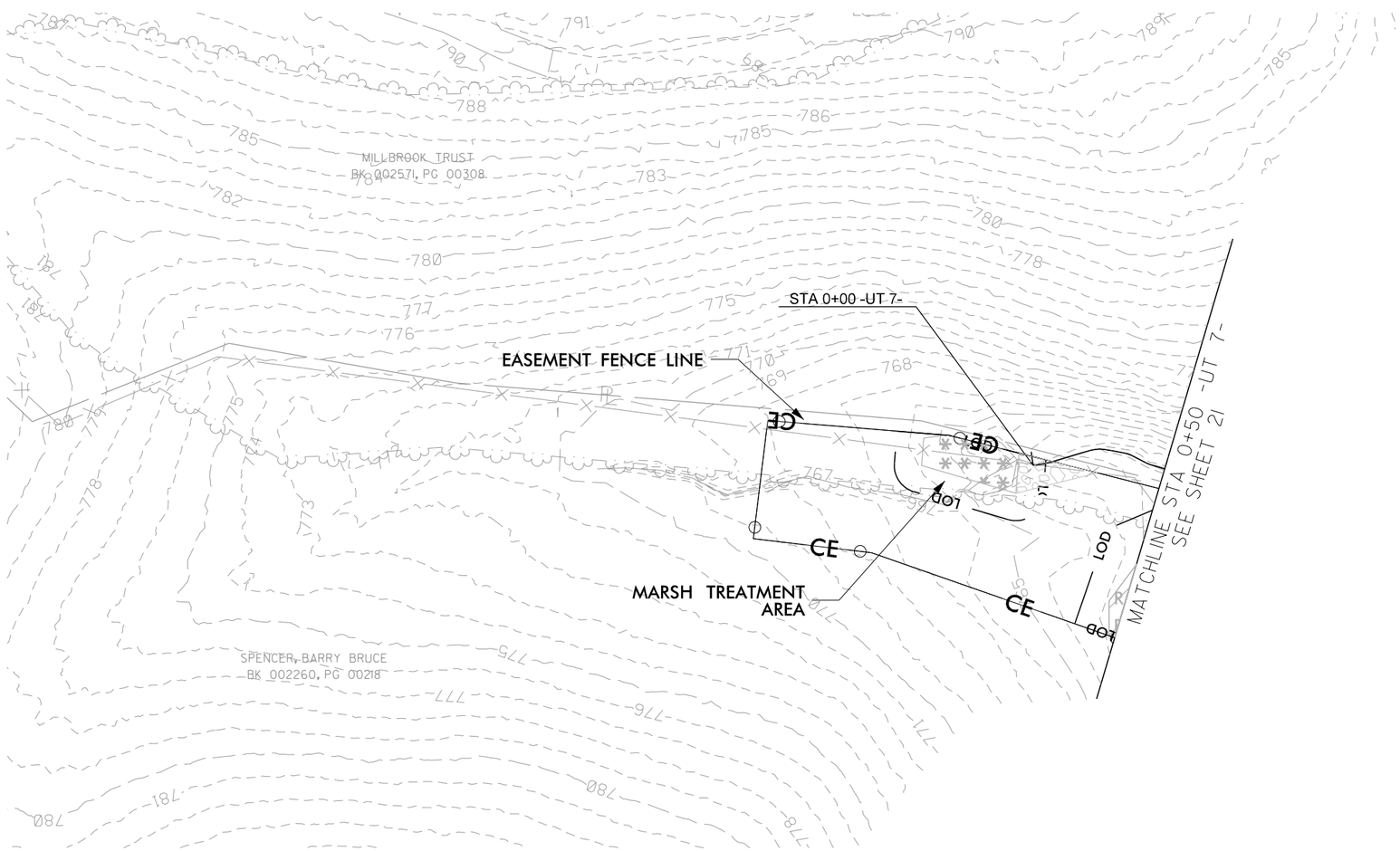
HORIZONTAL DATUM: NAD 83 (2011)
VERTICAL DATUM: NAVD 1988

25' 12.5' 0 25' 50'
SCALE: 1" = 50'

NAD 83



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DENOTES MARSH TREATMENT

DENOTES WETLAND REESTABLISHMENT

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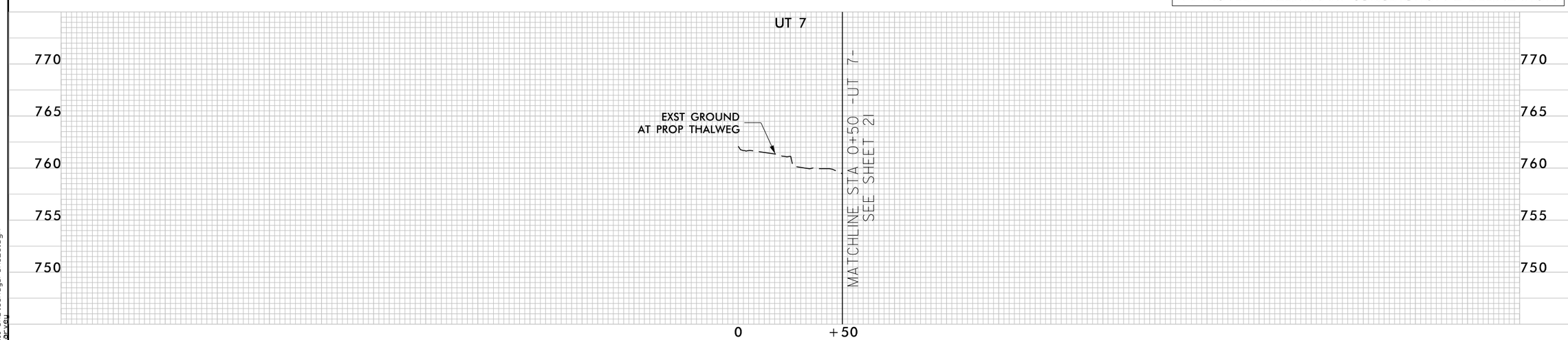

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PLAN AND PROFILE

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CONSTRUCTION SEQUENCE

Construction Notes:

1. Staging areas, stockpile areas, construction entrances and access roads will be identified and located according to the Erosion Control Plans and landowner agreements. Variances will be allowed assuming both the Contractor and Designer verbally agree.

2. A construction entrance (as shown on sheet E03E) from Baker Farm Road will be installed for access to UT1, UT2, UT3, UT4, UT4A, UT4B, UT4C, UT5, UT6 and UT7, as shown on the Erosion Control Plans.

3. The Contractor will install silt fencing, as noted on the Erosion Control Plans, at applicable staging and stockpile areas.

4. The proposed stream alignment and structure locations will be staked for each reach (UT1, UT2, UT3, UT4, UT4A, UT4B, UT4C, UT5, UT6 and UT7). Staking will be restricted to riffle elevations only in order to establish and maintain grade for the entire system. Pools will be excavated once structures are installed.

5. The Contractor will begin stockpiling materials in a designated staging area. General details associated with all sections include:

    a. Sediment bags will be used to filter the groundwater and placed within areas of newly excavated channel that are offline from the existing flow. These bags will be utilized as the contractor or designer deem necessary.
    b. Temporary and permanent seed mixes, including applicable mulching, will be applied to the streambanks and disturbed areas at the end of each working day as definable sections are completed. Erosion control matting will be installed on top of the seed and straw in accordance with the Erosion Control Construction Sequence.
    c. Excavated material that is stockpiled will follow erosion and sediment control guidelines as they relate to material storage and stockpiling.
    d. All remaining disturbed areas are to be seeded and covered according to the Erosion Control Construction Sequence.
    e. Riprap aprons will be constructed to impede any erosion of the channel and streambanks by the water diverted from the pump-around procedure.

6. Boulders and materials used for stream structures will be delivered through the primary construction entrance and stockpiled in the appropriate area.

7. This project will require pumping water around the channels during construction. Work will generally proceed from upstream to downstream.

8. Adjust haul roads and associated silt fence as necessary when permanent stream crossings are installed.

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Axiom Environmental, Inc.

BULL CHUTE
RANDOLPH COUNTY, NC

EROSION CONTROL NOTES

PROJECT # :
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Construction Sequence

1. The Contractor will excavate the proposed channel and modify portions of the existing channel based on riffle elevations in sections no greater than 300' in length at a time (except where longer sections are necessary to maintain constructability) in an upstream to downstream fashion. Impervious dikes will be installed upstream and downstream of the current work section before work on the section is initiated unless noted otherwise (see Table 1.-Working Sections below for suggested work section stations and progression). Water will be diverted around the current work section through the use of a pump and temporary flexible hose. The current work section will be dewatered using an additional pump and a sediment bag. Work sections that involve the construction of a confluence of two reaches may require the use of two pump-around operations. Structures will be installed according to the details presented in the Construction Plans. Excavate only a portion of the channel that can be completed and stabilized within the same day. All excavated material will be placed in an appropriate stockpile area. Pools will be established once structures and channel alignments have been completed locally. Permanent stream crossings will be installed while the working section containing the crossing has been dewatered.

   Grading of some portions of the proposed floodplain may need to be delayed until after work in subsequent sections has been completed, especially near confluences. Haul roads and temporary silt fence may also need to be removed before the proposed floodplain can be completed and/or unused existing channel can be filled.

Table 1. - Working Sections

Order of Progress	Pump Station #	Reach	Begin Station	End Station	Construction Notes
1	P-1	**UT1**	1+73	3+50	Perform UT1 enhancements.
2	P-2	**UT1**	3+50	6+40	
3	P-3	**UT1**	6+40	7+50	Operate pump stations P-3 and P-4 simultaneously to build confluence of UT1 and UT2. Perform UT2 enhancements.
4	P-4	**UT2**	5+50	5+92	
5	P-5	**UT1**	7+50	10+50	Perform UT1 enhancements.
6	P-6	**UT1**	10+50	13+50	
7	P-7	**UT1**	13+50	16+50	Construct stream crossing.
8	P-8	**UT1**	16+50	19+00	Operate pump stations P-8 and P-9 simultaneously to build confluence of UT1 and UT5.
9	P-9	**UT5**	0+37	0+76	
10	P-10	**UT1**	19+00	21+50	
11	P-11	**UT1**	21+50	23+00	Operate pump stations P-11 and P-12 simultaneously to build confluence of UT1 and UT6. No restoration on UT6.
12	P-12	**UT6**	0+75	1+12	
13	P-13	**UT1**	23+00	26+00	Construct stream crossing.
14	P-14	**UT1**	26+00	29+00	
15	P-15	**UT1**	29+00	30+00	
16	P-16	**UT4A**	0+18	2+00	
17	P-17	**UT4A**	2+00	4+00	
18	P-18	**UT4B**	0+00	2+50	
19	P-19	**UT4A**	4+00	4+28	Operate pump stations P-19 and P-20 simultaneously to build confluence of UT4 and UT4A. UT4B becomes UT4 at 2+88.
20	P-20	**UT4B**	2+50	2+88	
		UT4	2+88	5+50	
21	P-21	**UT4C**	1+50	1+71	Operate pump stations P-21 and P-22 simultaneously to build confluence UT4 and UT4C. No restoration on UT4C.
22	P-22	**UT4**	5+50	8+00	
23	P-23	**UT4**	8+00	10+00	
24	P-24	**UT4**	10+00	13+00	Construct stream crossing.
25	P-25	**UT4**	13+00	16+00	
26	P-26	**UT4**	16+00	19+00	
27	P-27	**UT4**	19+00	21+00	
28	P-28	**UT3**	0+00	2+00	
29	P-29	**UT7**	1+00	1+36	Operate pump stations P-29 and P-30 simultaneously to build confluence of UT3 and UT7. Perform UT3 and UT7 enhancements. Construct drop structure.
30	P-30	**UT3**	2+00	4+50	
31	P-31	**UT3**	6+00	9+00	Construct stream crossing. Perform UT3 enhancements.
32	P-32	**UT3**	9+00	12+00	
33	P-33	**UT3**	12+00	15+00	
34	P-34	**UT3**	15+00	18+00	
35	P-35	**UT3**	18+00	19+25	Operate pump stations P-35 and P-36 simultaneously to build confluence of UT3 and UT4.
36	P-36	**UT4**	21+00	22+00	
37	P-37	**UT4**	22+00	25+00	
38	P-38	**UT4**	25+00	28+00	
39	P-39	**UT4**	28+00	28+39	Operate pump stations P-39 and P-40 simultaneously to build confluence of UT1 and UT4. Construct drop structure.
36	P-40	**UT1**	30+00	31+43	

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NORTH CAROLINA PROFESSIONAL SEAL 26971 ENGINEER JOSHUA G. DALTON

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BULL CHUTE
RANDOLPH COUNTY, NC

EROSION CONTROL NOTES

PROJECT # :
DRAWING NAME:
DATE: 2021
DRAWN BY: JRH
REVIEWED BY: JGD
REVISIONS:

SHEET NO.
E02A

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JGD:JRH

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CONSTRUCTION SEQUENCE (CONTINUED)

1. Ponds shall be dewatered prior to dam removal using the following methods:

    a. For ponds with an outlet structure, open the outlet structure to dewater the pond at a rate that does not cause excessive erosion downstream of the dam.

    b. For ponds without an outlet structure or that require supplemental drawdown, use a pump and temporary flexible hose to dewater the pond into the downstream channel. A rip rap dissipation pad shall be used at the outlet of the temporary flexible hose. Dewater at a rate that does not cause excessive erosion downstream of the discharge point.

2. At the end of each working day, the Contractor will be responsible for the application of seed and straw, as applicable, to newly established streambanks and disturbed areas. Erosion control matting will be installed on top of the seed and straw in accordance with the Erosion Control Construction Sequence.

Post-Construction
After all channel work has been completed:

1. All remaining disturbed areas are to be seeded and mulched in accordance with the Erosion Control Construction Sequence.
2. Live staking can begin on all completed sections of channel (UT1, UT2, UT3, UT4, UT4A, UT4B, UT4C, UT5, UT6 and UT7) in accordance with the Planting Plans.
3. Once channel construction and seeding has been complete, bare-rooted seedlings will be installed.
4. All haul road locations to be restored to pre-construction conditions.

SOIL AMENDMENTS

In lieu of a soil test:

Fertilizer	10 – 10 -10 1000 lb./acre

Mulch

Small grain mulch must be applied at a rate of 2 tons/acre to all seeded areas.

TEMPORARY AND PERMAMENT SEEDING MIX

Standard Native Mix	
Redtop	10%
VA Wild Rye	15%
Switchgrass	15%
Eastern Gammagrass	5%
PA Smartweed	5%
Little Bluestem	5%
Soft Rush	5%
Bur Marigold	10%
Lance Leaved Tickseed	10%
Deertongue	10%
Big Bluestem	5%
Indiangrass	5%

SEEDING SCHEDULE

TEMPORARY HERBACEOUS SEED

Common Name	Scientific Name	Application Rate	Application Dates
Grain Rye [A]	*Secale cereale*	130 lbs. per acre (3 lbs. per 1,000 ft^2)	Year-round
Orchard Grass [B]	*Dactylis glomerata*	15 lbs per acre (0.35 lbs. per 1,000 ft^2)	September - March
Brown Top Millet [B]	*Panicum ramosum*	40 lbs. per acre (1.0 lbs. per 1,000 ft^2)	May – September
German Millet [B]	*Setaria italica*	25 lbs. per acre (0.5 lbs. per 1,000 ft^2)	May – September

[A] Primarily utilized on disturbed or stockpiled areas.
[B] Primarily utilized near stream channels and streambanks.

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BULL CHUTE
RANDOLPH COUNTY, NC
EROSION CONTROL NOTES

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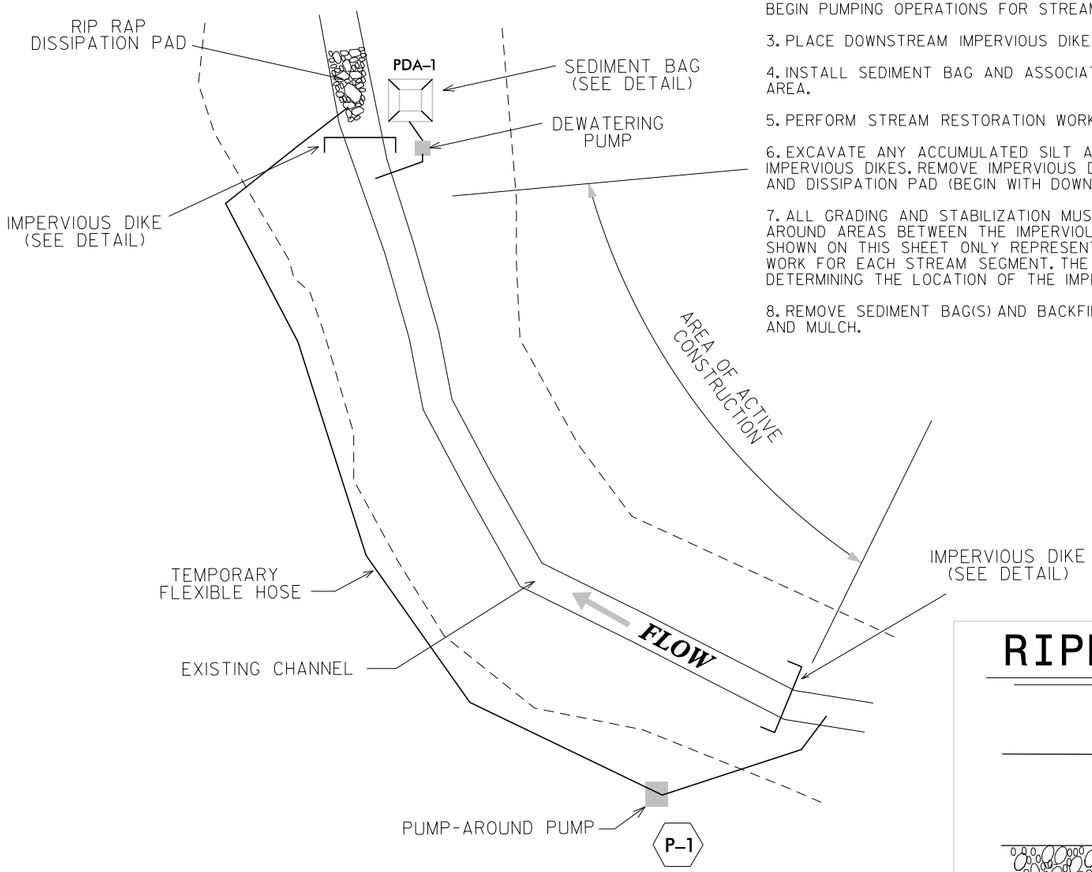


CONSTRUCTION SEQUENCE FOR TYPICAL PUMP-AROUND:

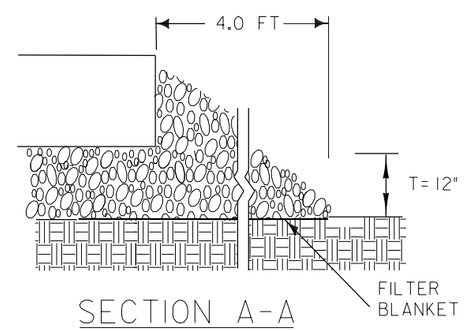
1. INSTALL UPSTREAM PUMP AND TEMPORARY FLEXIBLE HOSE.
2. PLACE UPSTREAM IMPERVIOUS DIKE, DOWNSTREAM RIP RAP DISSIPATION PAD, AND BEGIN PUMPING OPERATIONS FOR STREAM DIVERSION.
3. PLACE DOWNSTREAM IMPERVIOUS DIKE.
4. INSTALL SEDIMENT BAG AND ASSOCIATED PUMP. DEWATER THE ENTRAPPED AREA.
5. PERFORM STREAM RESTORATION WORK IN ACCORDANCE WITH THE PLANS.
6. EXCAVATE ANY ACCUMULATED SILT AND DEWATER BEFORE REMOVAL OF IMPERVIOUS DIKES. REMOVE IMPERVIOUS DIKES, PUMPS, TEMPORARY FLEXIBLE HOSE, AND DISSIPATION PAD (BEGIN WITH DOWNSTREAM IMPERVIOUS DIKE FIRST).
7. ALL GRADING AND STABILIZATION MUST BE COMPLETED WITHIN THE PUMP AROUND AREAS BETWEEN THE IMPERVIOUS DIKES. THE IMPERVIOUS LOCATIONS AS SHOWN ON THIS SHEET ONLY REPRESENT THE UPPER AND LOWER EXTENT OF WORK FOR EACH STREAM SEGMENT. THE CONTRACTOR IS RESPONSIBLE FOR DETERMINING THE LOCATION OF THE IMPERVIOUS DIKES.
8. REMOVE SEDIMENT BAG(S) AND BACKFILL. STABILIZE DISTURBED AREA WITH SEED AND MULCH.

NOTES:

1. ALL EXCAVATION SHALL BE PERFORMED IN ONLY DRY OR ISOLATED SECTIONS OF CHANNEL
2. IMPERVIOUS DIKES ARE TO BE USED TO ISOLATE WORK FROM STREAM FLOW WHEN NECESSARY
3. ALL GRADED STREAM BANKS SHALL BE SEEDED, MULCHED, AND MATTED AT THE END OF EACH WORKING DAY. ALL OTHER GRADED AREAS SHALL BE SEEDED IN ACCORDANCE WITH THE CONSTRUCTION DOCUMENTS.
4. MAINTENANCE OF STREAM FLOW OPERATIONS SHALL BE INCIDENTAL TO THE WORK, THIS INCLUDES POLYETHYLENE SHEETING, DIVERSION PIPES, PUMPS, AND HOSES.
5. PUMPS AND HOSES SHALL BE OF A SUFFICIENT SIZE AND NUMBER TO DEWATER THE WORK AREA.
6. RIP RAP DISSIPATION PAD TO BE INSTALLED DOWNSTREAM OF LOWER IMPERVIOUS DIKE

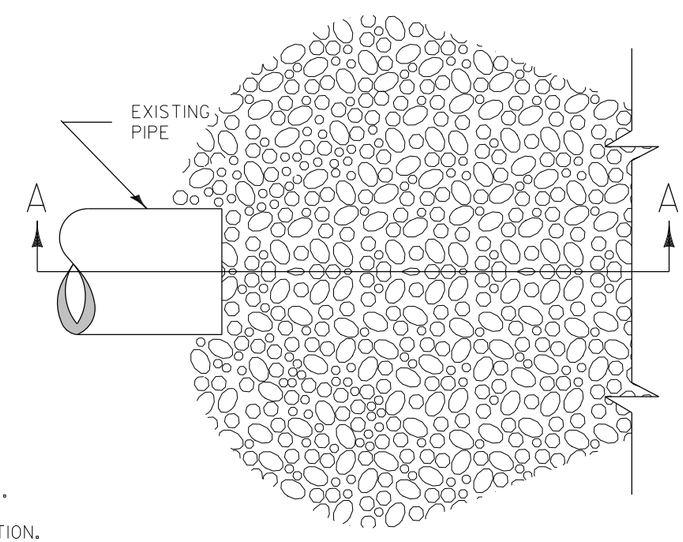
TYPICAL PUMP-AROUND OPERATION

RIPRAP DISSIPATION PAD



SECTION A-A

PLAN VIEW



NOTES:

1. La IS THE LENGTH OF THE RIPRAP APRON.
2. T = THICKNESS
3. IN A WELL-DEFINED CHANNEL EXTEND THE APRON UP THE CHANNEL BANKS TO THE TOP OF THE BANK.
4. A FILTER BLANKET OR FILTER FABRIC SHOULD BE INSTALLED BETWEEN THE RIPRAP AND SOIL FOUNDATION.

RIP RAP DISIPATION PAD SPECIFICATIONS

ASSUMED HOSE SIZE (IN)	PERMANENT (Y/N)	LENGTH La (FT)	WIDTH Wo (FT)	STONE SIZE d50 (IN)	STONE CLASS	THICKNESS (IN)
4"	N	4.0	1.0	3	A	12

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RANDOLPH COUNTY, NC

EROSION CONTROL DETAILS

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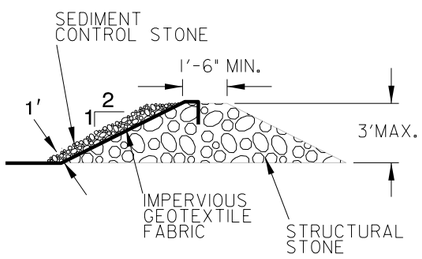
IMPERVIOUS DIKE



CROSS SECTION VIEW

NOTES:

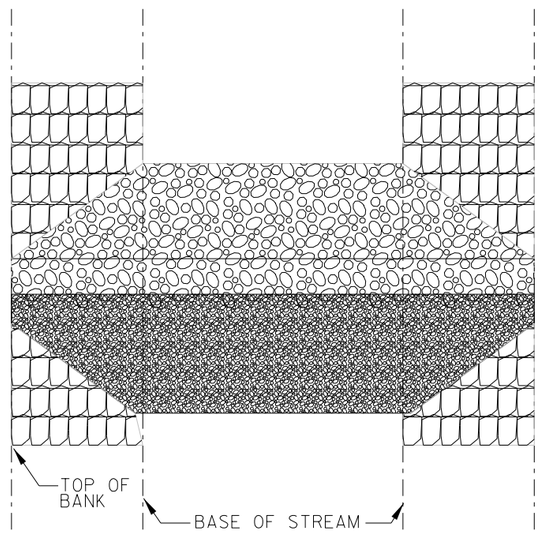
1. USE CLASS B STONE FOR STRUCTURAL STONE.

2. USE NO. 5 OR NO. 57 STONE FOR SEDIMENT CONTROL.

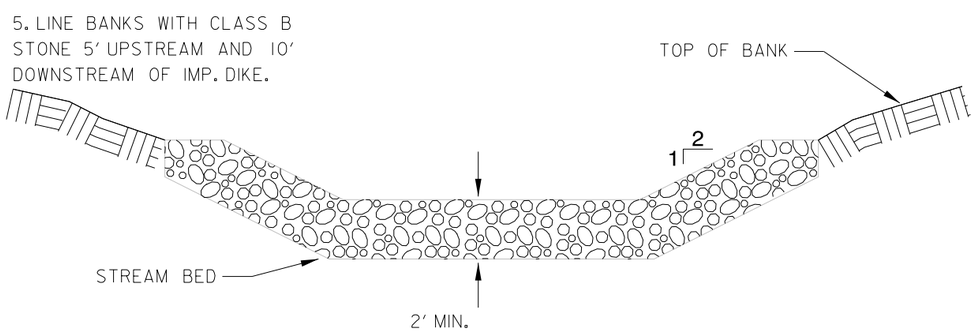
3. CONSTRUCT DAM A MAXIMUM OF 1 FT. ABOVE NORMAL FLOW DEPTH.

4. TOE IN IMPERVIOUS MATERIAL

5. LINE BANKS WITH CLASS B STONE 5' UPSTREAM AND 10' DOWNSTREAM OF IMP. DIKE.

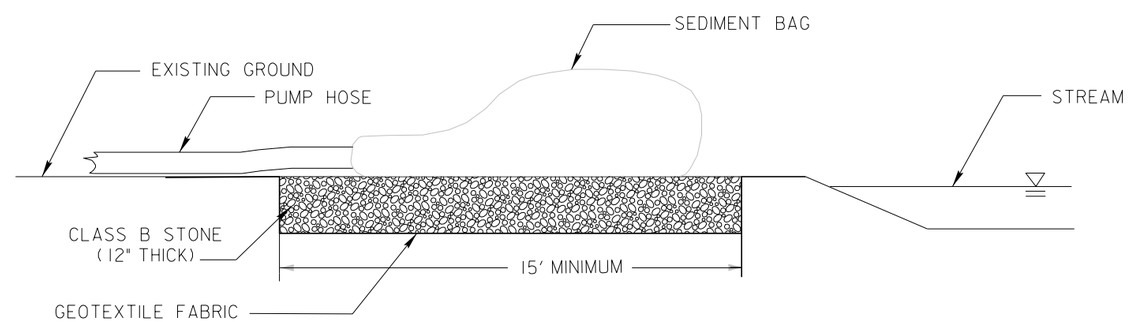


TOP VIEW



FRONT VIEW

SEDIMENT BAG



INSTALLATION:

1. INSTALL SEDIMENT BAG ON A SLOPE SO INCOMING WATER FLOWS DOWNHILL THROUGH BAG WITHOUT CREATING MORE EROSION. TO INCREASE THE EFFICIENCY OF FILTRATION, PLACE THE BAG ON A GRAVEL BED IN ORDER TO MAXIMIZE WATER FLOW THROUGH THE SURFACE AREA OF THE BAG.

2. BAG IS FULL WHEN IT NO LONGER CAN EFFICIENTLY FILTER SEDIMENT OR ALLOW WATER TO PASS AT A REASONABLE RATE. FLOW RATES WILL VARY DEPENDING ON THE SIZE OF SEDIMENT BAG, THE TYPE AND AMOUNT OF SEDIMENT DISCHARGED INTO THE BAG, THE TYPE OF GROUND, ROCK OR OTHER SUBSTANCE UNDER THE BAG AND THE DEGREE OF THE SLOPE ON WHICH THE BAG LIES. UNDER MOST CIRCUMSTANCES THE SEDIMENT BAG WILL ACCOMMODATE FLOW RATES OF 1100 GALLONS PER MINUTE. USE OF EXCESSIVE FLOW RATES OR OVERFILLING WITH SEDIMENT WILL CAUSE THE BAG TO RUPTURE OR FAILURE OF THE HOSE ATTACHMENT STRAPS.

3. DISPOSE OF SEDIMENT BAG AS DIRECTED BY THE SITE DESIGNER. IF ALLOWED, BAG MAY BE CUT OPEN AND THE CONTENTS SEEDED AFTER REMOVING VISIBLE FABRIC.

4. REFER TO DETAIL REGARDING GEOTEXTILE FABRIC ATTRIBUTES.

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BULL CHUTE
RANDOLPH COUNTY, NC

EROSION CONTROL DETAILS

PROJECT # :
DRAWING NAME:
DATE: 2021
DRAWN BY: JRH
REVIEWED BY: JGD
REVISIONS:

SHEET NO.
E03A

5/26/2021
Bull Chute_Rdy_PSH_E03a.dgn
jharvey

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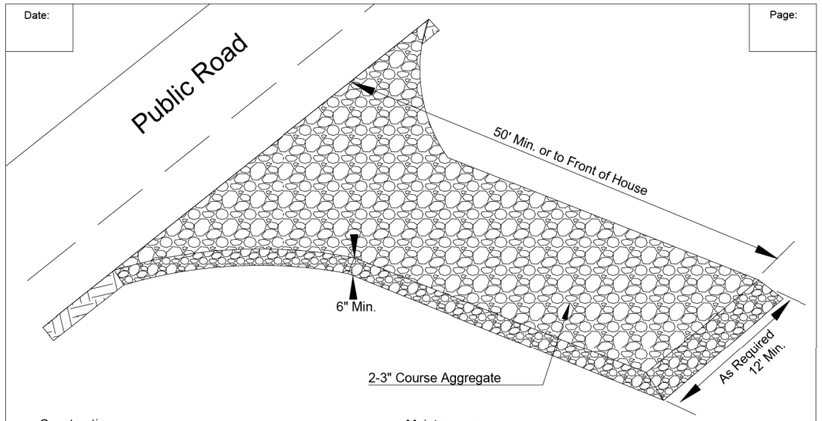
Date: Page:



Construction:
1. Clear the entrance and exit area of all vegetation, roots, and other objectionable material and properly grade it.
2. Place the gravel to the specific grade and dimensions shown on the plans, and smooth it.
3. Provide drainage to carry water to a sediment trap or other suitable outlet.
4. Use geotextile fabrics in order to improve stability of the foundation in locations subject to seepage or high water table.

Maintenance:
1. Per NCG-01 inspect at least once a week and after each 1 inch or greater rainfall; make any required repairs immediately.
2. Maintain the gravel pad in a condition to prevent mud or sediment from leaving the construction site. This may require periodic topdressing with 2 inch stone.
3. Immediately remove all objectionable materials spilled, washed or tracked onto public roadways.

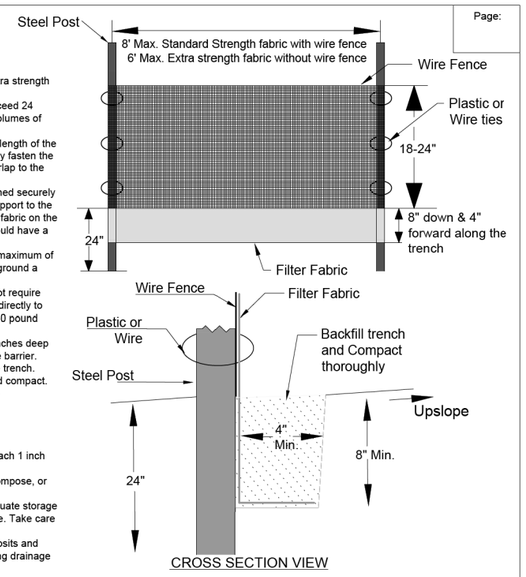
NORTH CAROLINA Environmental Quality
EFFECTIVE DATE: 11/12/2020

CONSTRUCTION ENTRANCE / EXIT

Date: Page:

Construction:
1. Construct the sediment barrier of standard strength or extra strength synthetic filter fabrics.
2. Ensure that the height of the sediment fence does not exceed 24 inches above the ground. (Higher fences may impound volumes of water sufficient to cause failure of the structure.)
3. Construct the filter fabric from a continuous roll cut to the length of the barrier to avoid joints. When joints are necessary, securely fasten the filter cloth only at a support post with 4 feet minimum overlap to the next post.
4. Support standard strength filter fabric by wire mesh fastened securely to the upslope side of the posts. Extend the wire mesh support to the bottom of the trench. Fasten the wire reinforcement, then fabric on the upslope side of the fence post. Wire or plastic zip ties should have a minimum 50 pound tensile strength.
5. When a wire mesh support fence is used, space posts a maximum of 8 feet apart. Supports should be driven securely into the ground a minimum of 24 inches.
6. Extra strength filter fabric with 6 feet post spacing does not require wire mesh support fence. Securely fasten the filter fabric directly to posts. Wire or plastic zip ties should have a minimum of 50 pound tensile strength.
7. Excavate the trench approximately 4 inches wide and 8 inches deep along the proposed line of the posts and upslope from the barrier.
8. Place 12 inches of fabric along the bottom and side of the trench.
9. Backfill the trench with soil placed over the filter fabric and compact. Thorough compaction of the backfill is critical to silt fence performance.
10. Do not attach filter fabric to existing trees.

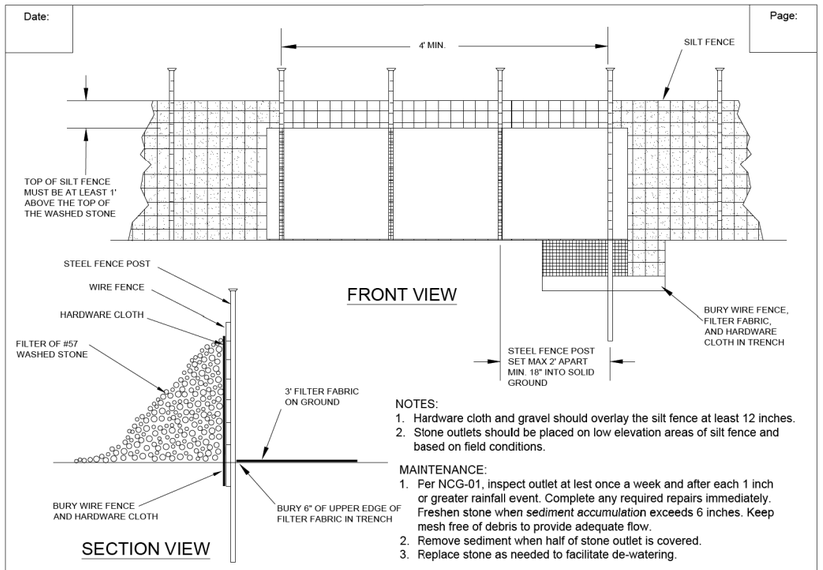
Maintenance:
1. Inspect sediment fences at least once a week and after each 1 inch rainfall. Make any required repairs immediately.
2. Should the fabric of a sediment fence collapse, tear, decompose, or become ineffective, replace it promptly.
3. Remove sediment deposits as necessary to provide adequate storage volume for the next rain and reduce pressure on the fence. Take care to avoid undermining the fence during cleanout.
4. Remove all fencing materials and unstable sediment deposits and bring the area to grade and stabilize it after the contributing drainage area has been properly stabilized.



NORTH CAROLINA Environmental Quality
EFFECTIVE DATE: 11/12/2020

SILT FENCE

Date: Page:



NOTES:
1. Hardware cloth and gravel should overlay the silt fence at least 12 inches.
2. Stone outlets should be placed on low elevation areas of silt fence and based on field conditions.

MAINTENANCE:
1. Fer NCG-01, inspect outlet at lest once a week and after each 1 inch or greater rainfall event. Complete any required repairs immediately. Freshen stone when *sediment accumulation* exceeds 6 inches. Keep mesh free of debris to provide adequate flow.
2. Remove sediment when half of stone outlet is covered.
3. Replace stone as needed to facilitate de-watering.

NORTH CAROLINA Environmental Quality
EFFECTIVE DATE: 11/12/2020

SILT FENCE OUTLET

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5/26/2021

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BULL CHUTE
RANDOLPH COUNTY, NC

EROSION CONTROL DETAILS

PROJECT # :
DRAWING NAME:
DATE: 2021
DRAWN BY: JRH
REVIEWED BY: JGD
REVISIONS:

SHEET NO.
E03B

5/26/2021
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jgarvey

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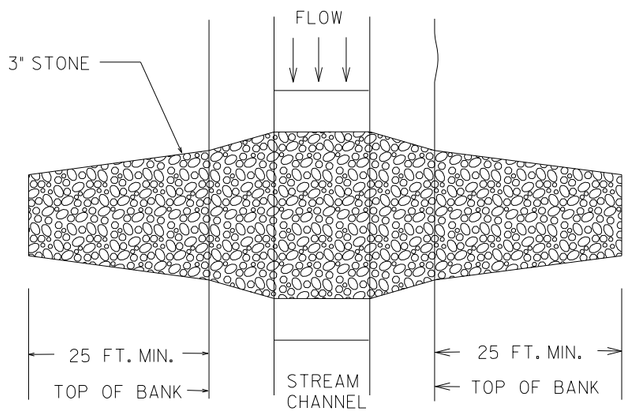
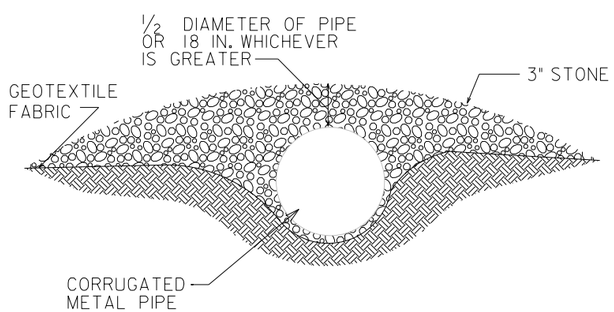
TEMPORARY CULVERTED STREAM CROSSING

NOTE: FOR USE IN EXISTING CHANNELS ONLY.
NOT FOR USE IN RESTORED STREAMS.

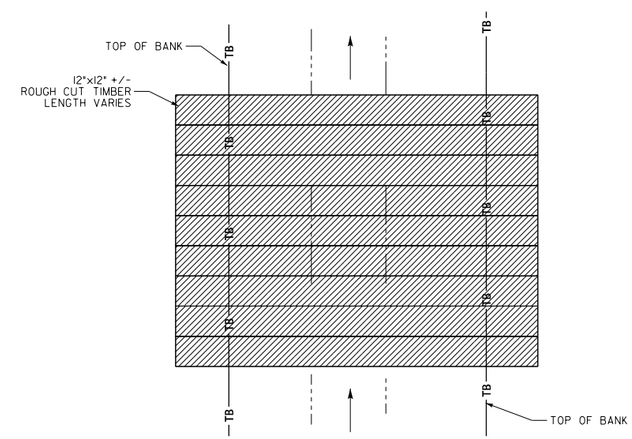


PLAN VIEW



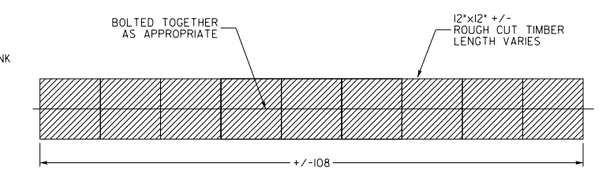
PROFILE VIEW

LOG MAT BRIDGE

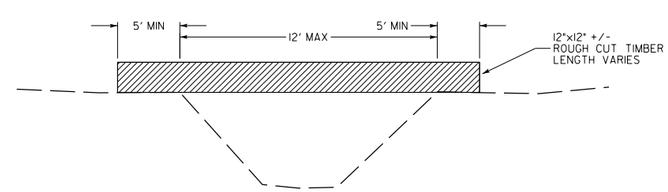


PLAN VIEW

NOTE:
DETAIL PROVIDED FOR INFORMATIONAL PURPOSES. USE OF LOG MAT BRIDGE IS AT CONTRACTORS DISCRETION.



SECTION THROUGH LOG MAT BRIDGE



CROSS SECTION VIEW

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NORTH CAROLINA PROFESSIONAL SEAL 26971 ENGINEER JOSHUA G. DALTON

5/26/2021

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BULL CHUTE
RANDOLPH COUNTY, NC

EROSION CONTROL DETAILS

PROJECT # :
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DATE: 2021
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REVIEWED BY: JGD
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jdarway

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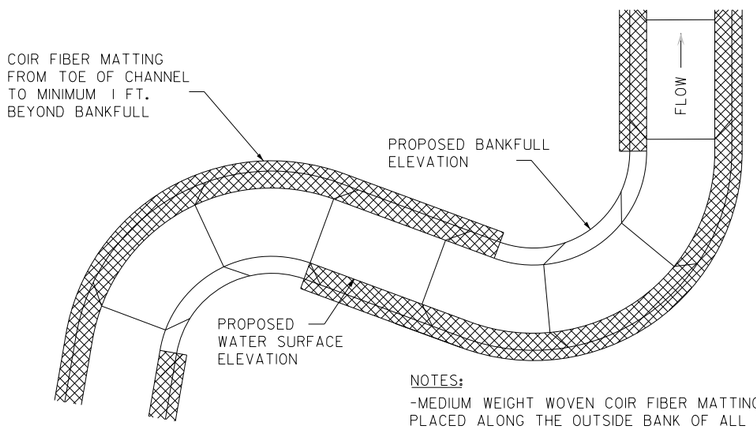
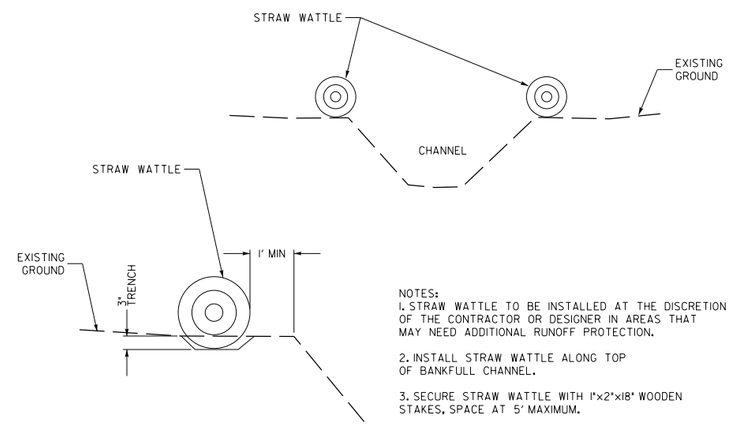
TYPICAL MATTING LOCATION



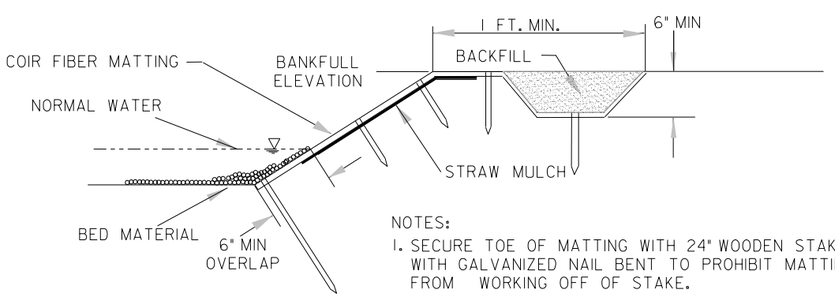
NOTES:
-MEDIUM WEIGHT WOVEN COIR FIBER MATTING SHALL BE PLACED ALONG THE OUTSIDE BANK OF ALL BENDS AND ALONG BOTH SIDES OFTHE CHANNEL IN TANGENT AREAS.
-FIELD ADJUSTMENTS TO MATTING LOCATION MAY BE MADE AT THE DESIGNERS OR CONTRACTORS DISCRETION AS NECESSARY.

STRAW WATTLE

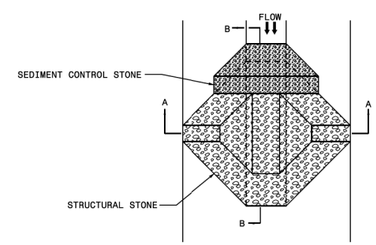


NOTES:
1. STRAW WATTLE TO BE INSTALLED AT THE DISCRETION OF THE CONTRACTOR OR DESIGNER IN AREAS THAT MAY NEED ADDITIONAL RUNOFF PROTECTION.
2. INSTALL STRAW WATTLE ALONG TOP OF BANKFULL CHANNEL.
3. SECURE STRAW WATTLE WITH 1"x2"x18" WOODEN STAKES, SPACE AT 5' MAXIMUM.
4. STRAW SHALL BE CERTIFIED WEED FREE.

COIR MATTING CROSS SECTION



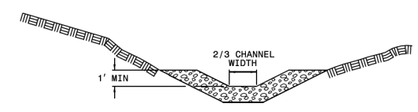
NOTES:
1. SECURE TOE OF MATTING WITH 24" WOODEN STAKES WITH GALVANIZED NAIL BENT TO PROHIBIT MATTING FROM WORKING OFF OF STAKE.
2. USE 12" WOODEN STAKES ON 5' CENTERS OR AS DIRECTED BY MANUFACTURER'S RECOMMENDATIONS.
3. MINIMUM 1' WIDE, 6" DEEP TRENCH OVER TOP OF BANK WITH MATTING LAID FLAT AND STAKED. TRENCH TO BE BACKFILLED WITH EXCAVATED MATERIAL.



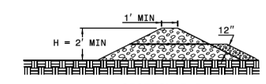
PLAN

NOTES

USE CLASS B EROSION CONTROL STONE FOR STRUCTURAL STONE.
USE NO. 5 OR NO. 57 STONE FOR SEDIMENT CONTROL STONE.



SECTION A-A



SECTION B-B

1-18 STATE OF NORTH CAROLINA DEPT. OF TRANSPORTATION DIVISION OF HIGHWAYS RALEIGH, N.C.

ROADWAY STANDARD DRAWING FOR
TEMPORARY ROCK SILT CHECK TYPE A

SHEET 1 OF 1
1633.01

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Joshua G. Dalton
1089AD8C14994C3...

NORTH CAROLINA PROFESSIONAL SEAL 26971 ENGINEER JOSHUA G. DALTON

5/26/2021

DATE:

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BULL CHUTE
RANDOLPH COUNTY, NC

EROSION CONTROL DETAILS

PROJECT # :
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DATE: 2021
DRAWN BY: JRH
REVIEWED BY: JGD
REVISIONS:

SHEET NO.
E03D

5/26/2021
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jharvey

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SURVEY INFORMATION
EASEMENT PROVIDED BY:
K2 DESIGN GROUP, P.A.
5688 U.S. HIGHWAY 70 EAST
GOLDSBORO, NC 27534

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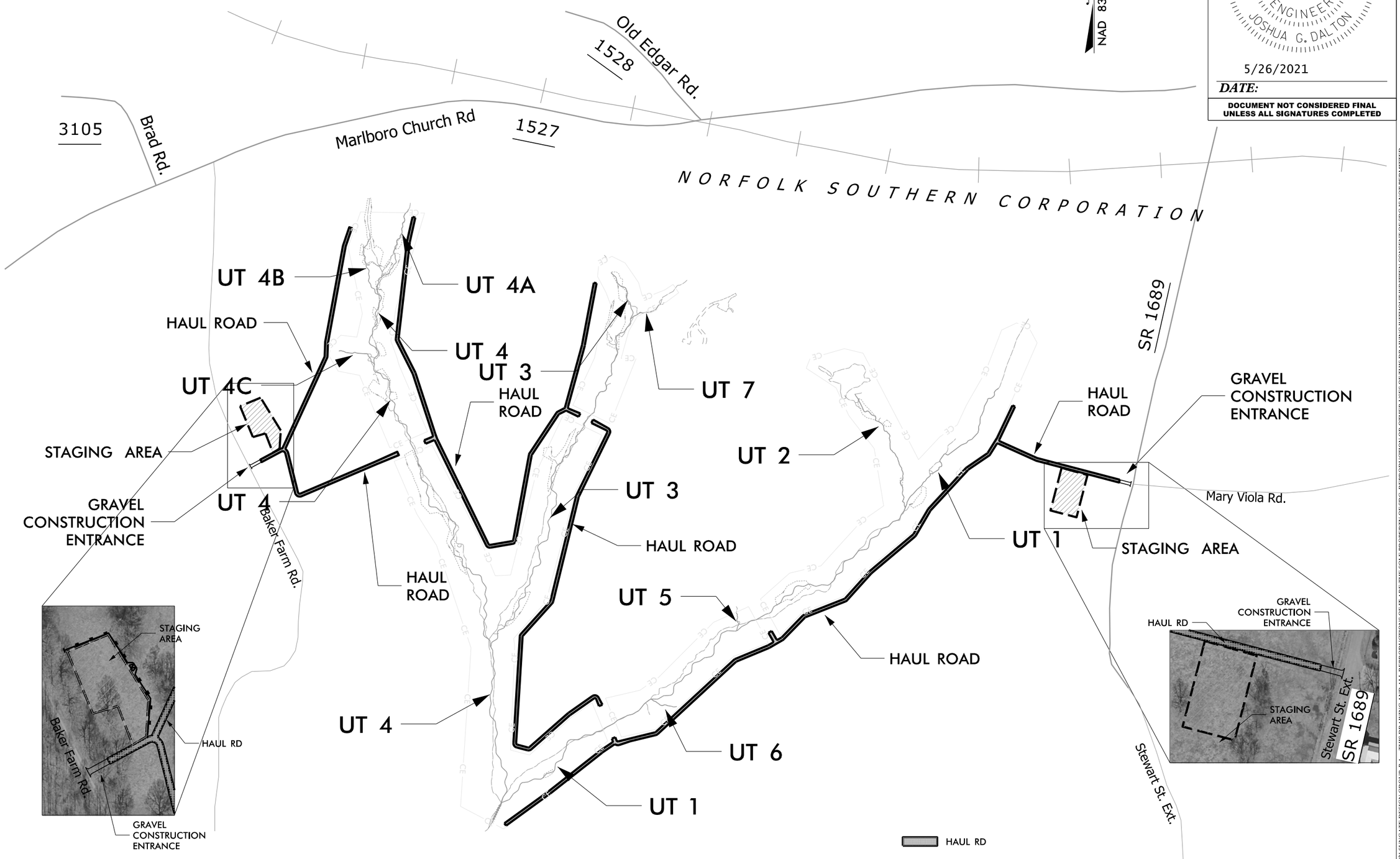
SCALE: 1" = 300'

NAD 83



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BULL CHUTE
RANDOLPH COUNTY, NC

HAUL ROADS

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jarvey

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— LOD —	LIMITS OF DISTURBANCE
	TEMPORARY SILT FENCE
	HAUL ROAD
	SPECIAL SEDIMENT CONTROL FENCE BREAK

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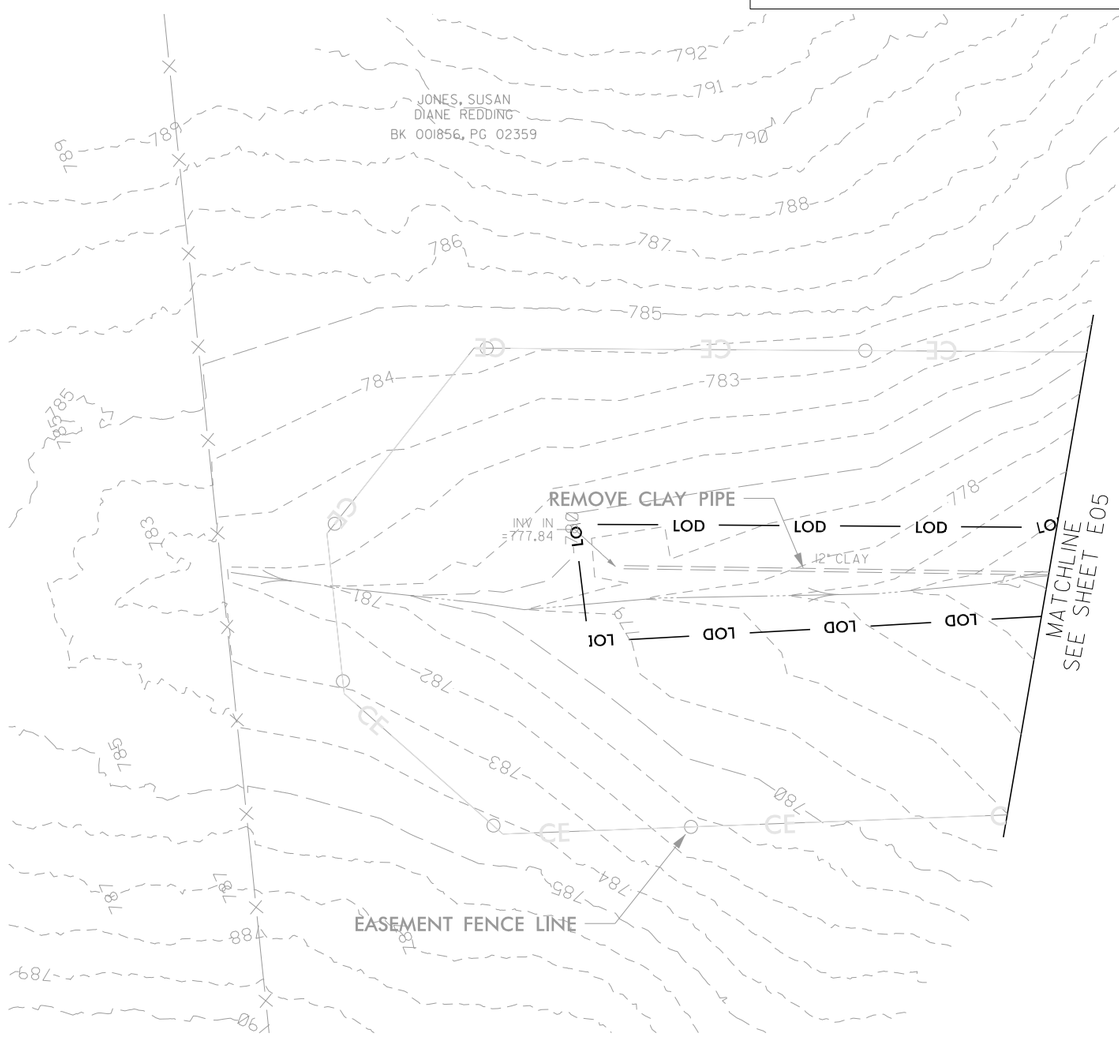
SCALE: 1" = 50'

NAD 83



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BULL CHUTE
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EROSION CONTROL

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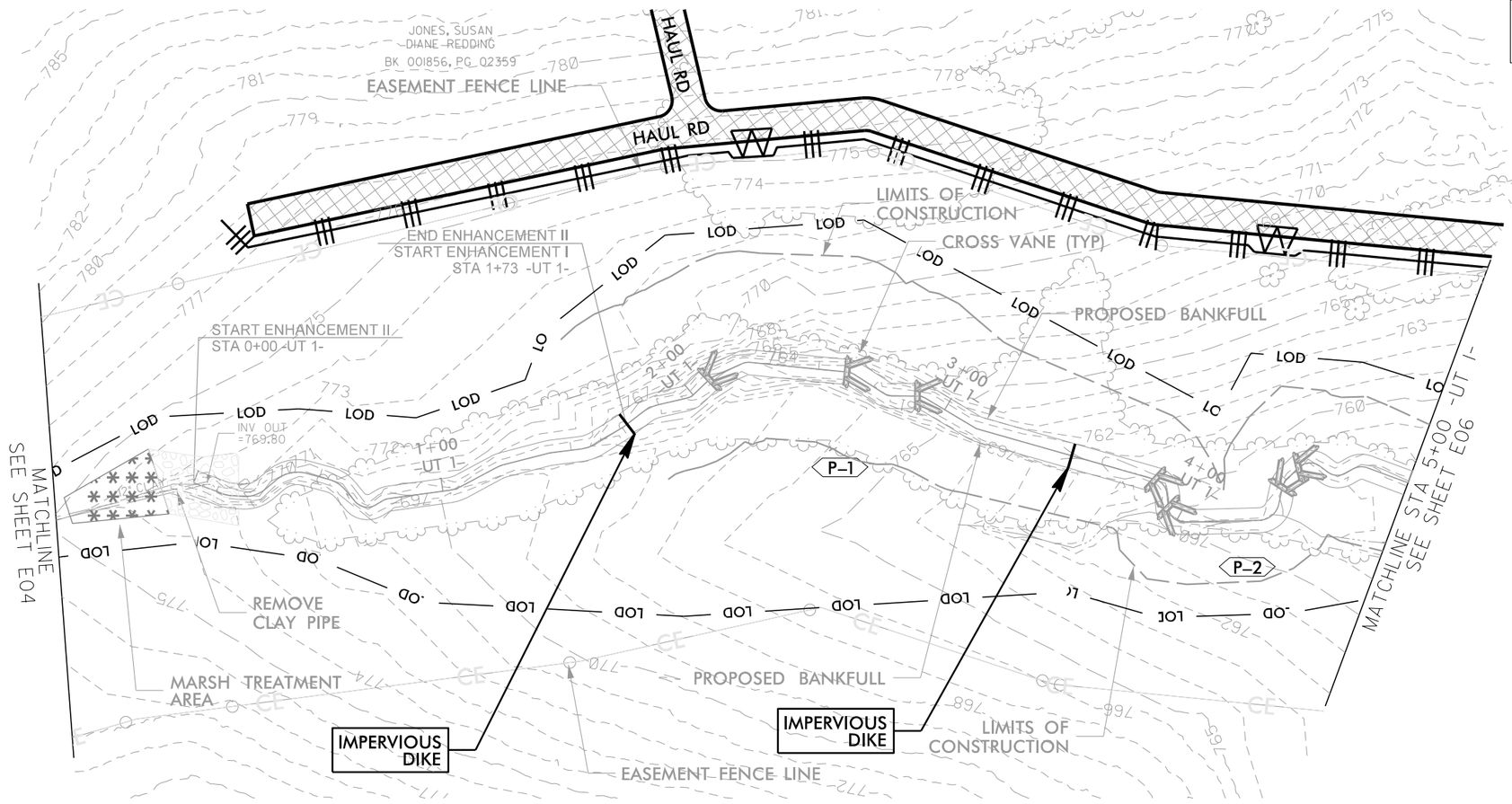
SCALE: 1" = 50'

— LOD —	LIMITS OF DISTURBANCE
	TEMPORARY SILT FENCE
	HAUL ROAD
	SPECIAL SEDIMENT CONTROL FENCE BREAK



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RANDOLPH COUNTY, NC

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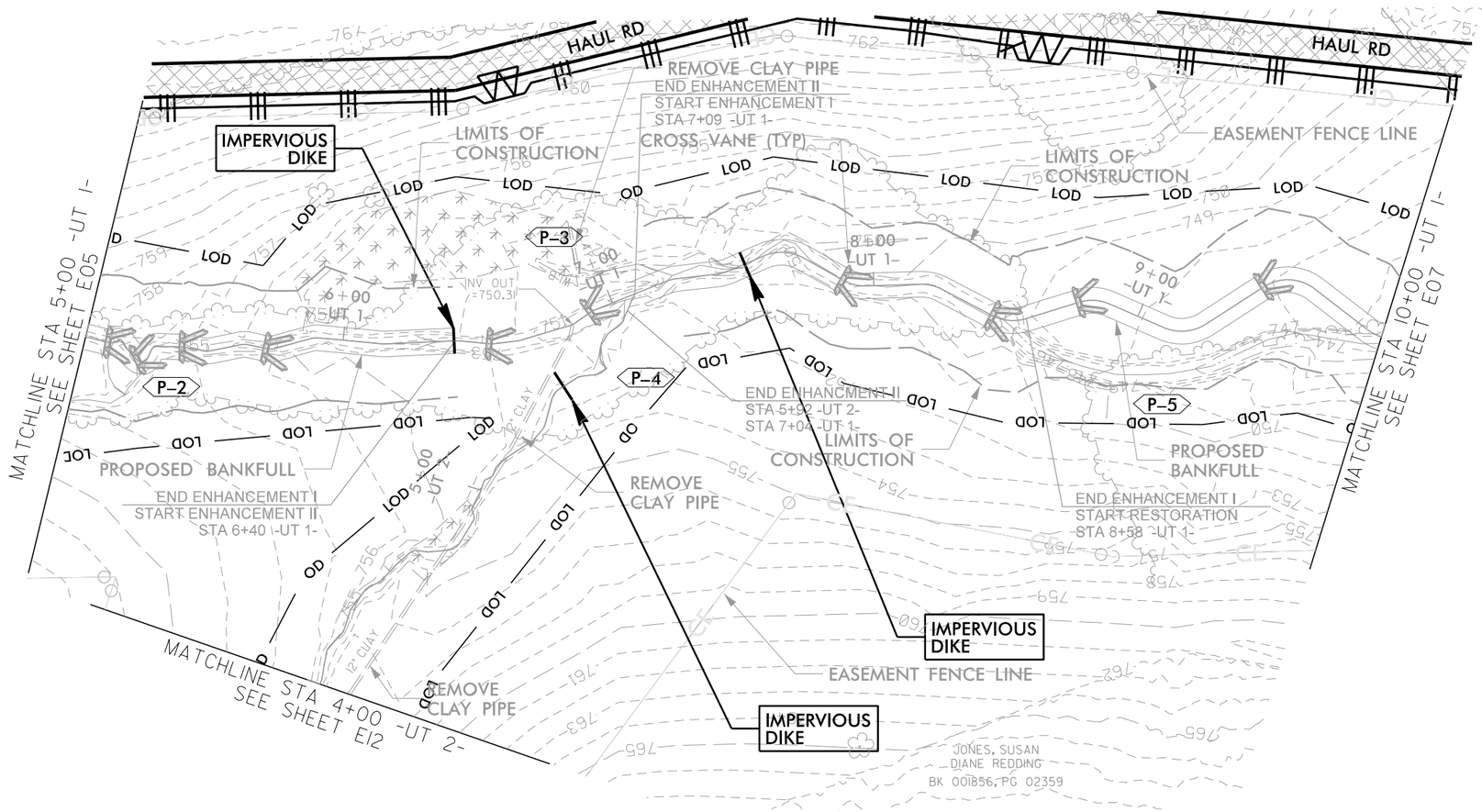
25' 12.5' 0 25' 50'
SCALE: 1" = 50'

NAD 83

— LOD —	LIMITS OF DISTURBANCE
	TEMPORARY SILT FENCE
	HAUL ROAD
	SPECIAL SEDIMENT CONTROL FENCE BREAK



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BULL CHUTE
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EROSION CONTROL

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	TEMPORARY SILT FENCE
	HAUL ROAD
	SPECIAL SEDIMENT CONTROL FENCE BREAK

25' 12.5' 0 25' 50'
SCALE: 1" = 50'
NAD 83

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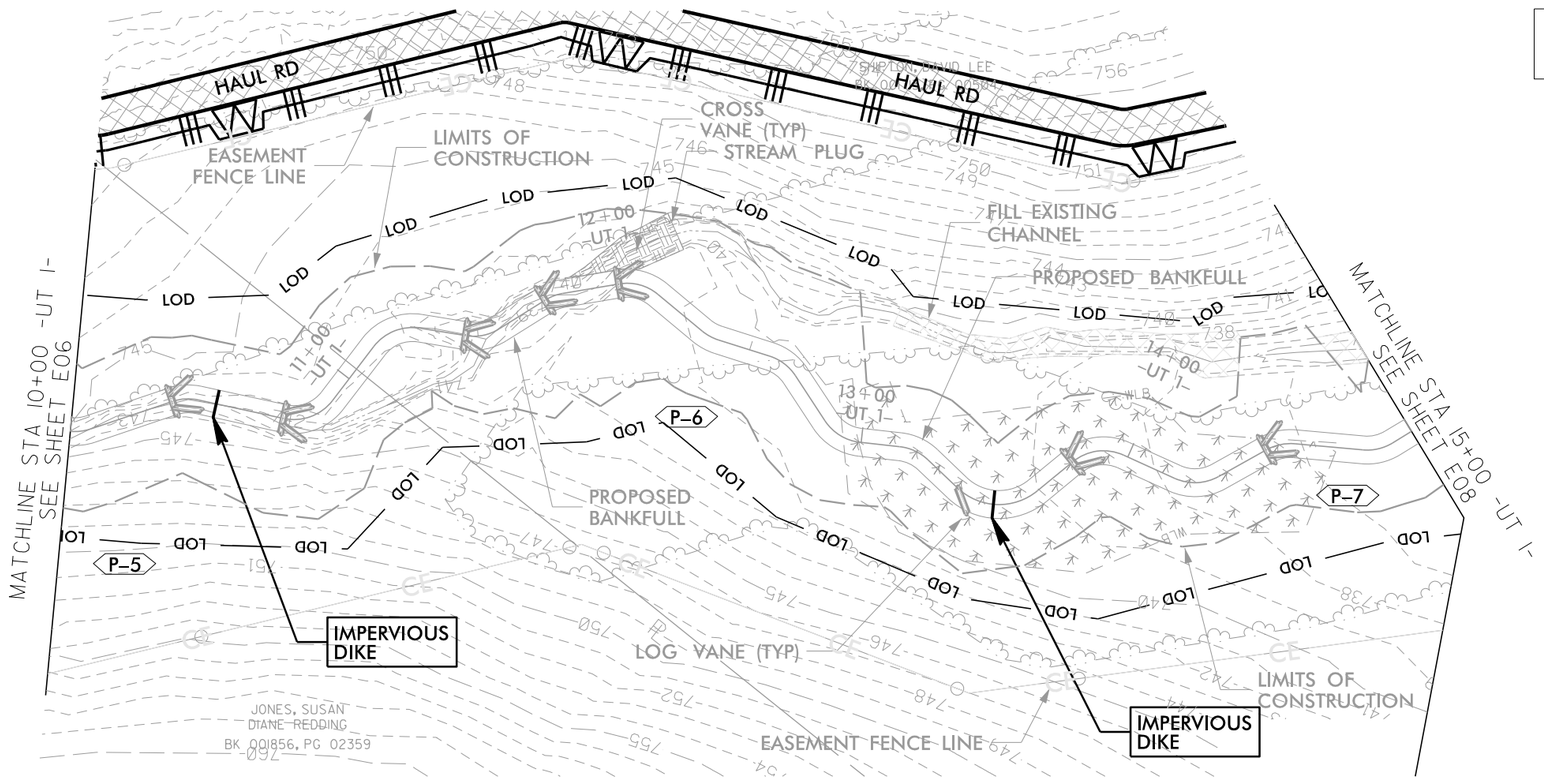

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EROSION CONTROL

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REVIEWED BY: JGD
REVISIONS:
SHEET NO. **E07**

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jharvey

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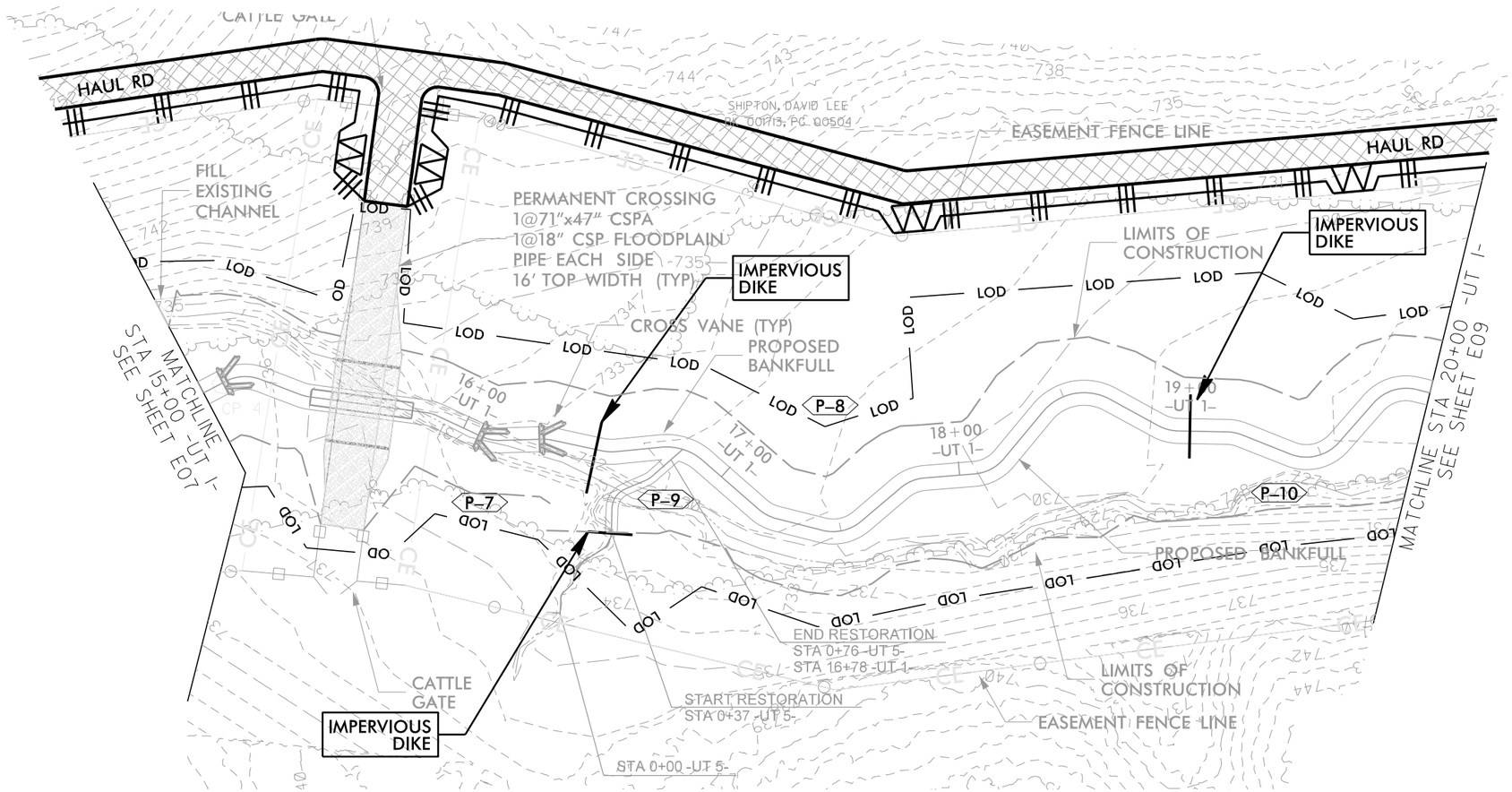
25' 12.5' 0 25' 50'
SCALE: 1" = 50'

NAD 83

— LOD —	LIMITS OF DISTURBANCE
	TEMPORARY SILT FENCE
	HAUL ROAD
	SPECIAL SEDIMENT CONTROL FENCE BREAK



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Joshua G. Dalton
1089AD8C14994C3...

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BULL CHUTE
RANDOLPH COUNTY, NC

EROSION CONTROL

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E08

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Jgd_vzu

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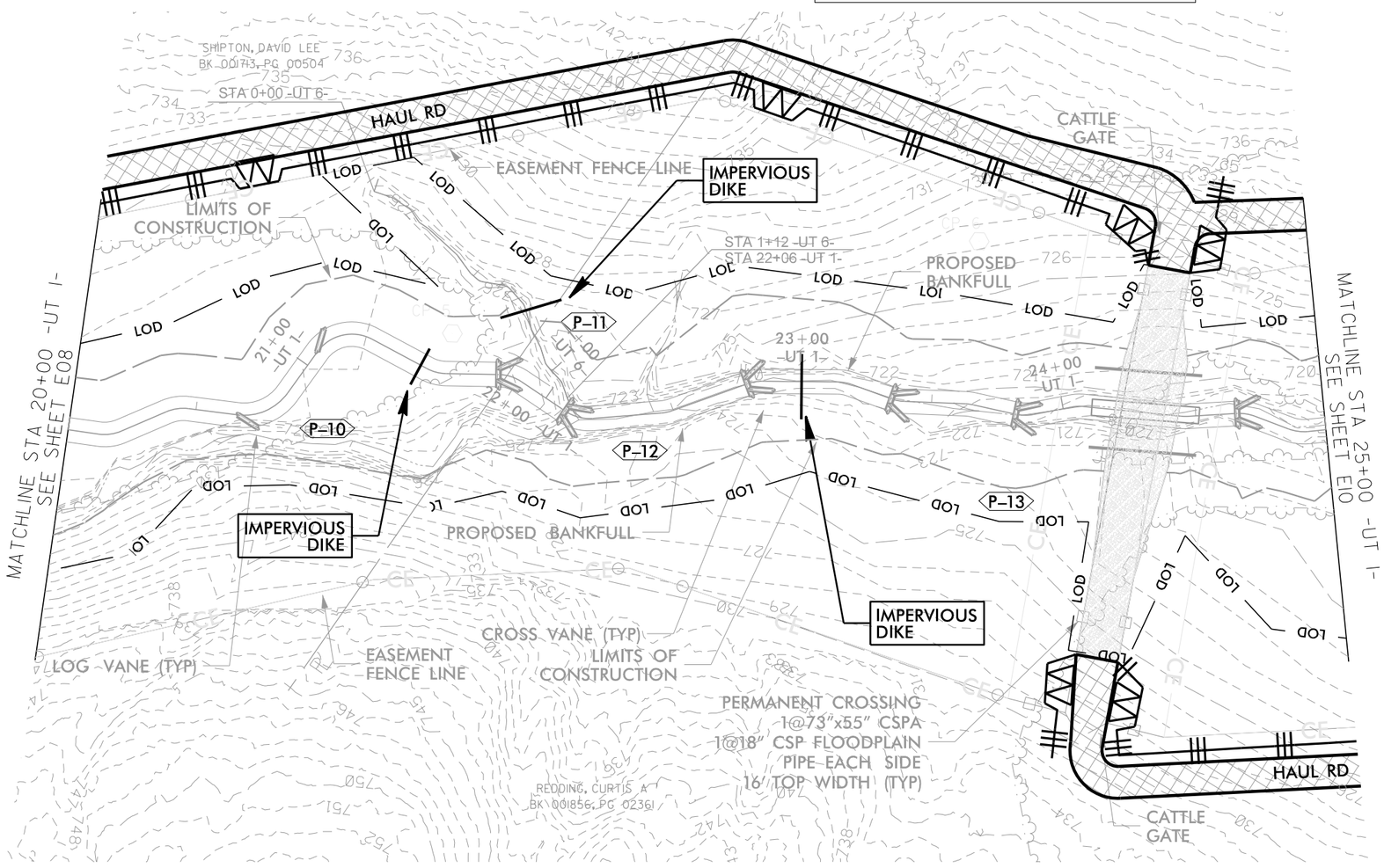
— LOD —	LIMITS OF DISTURBANCE
	TEMPORARY SILT FENCE
	HAUL ROAD
	SPECIAL SEDIMENT CONTROL FENCE BREAK

25' 12.5' 0 25' 50'
SCALE: 1" = 50'
NAD 83



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1089AD8C14994C3

NORTH CAROLINA PROFESSIONAL SEAL 26971 ENGINEER JOSHUA G. DALTON

5/26/2021

DATE:

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HORIZONTAL DATUM: NAD 83 (2011)
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BULL CHUTE
RANDOLPH COUNTY, NC

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REVISIONS:

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jharvey

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— LOD —	LIMITS OF DISTURBANCE
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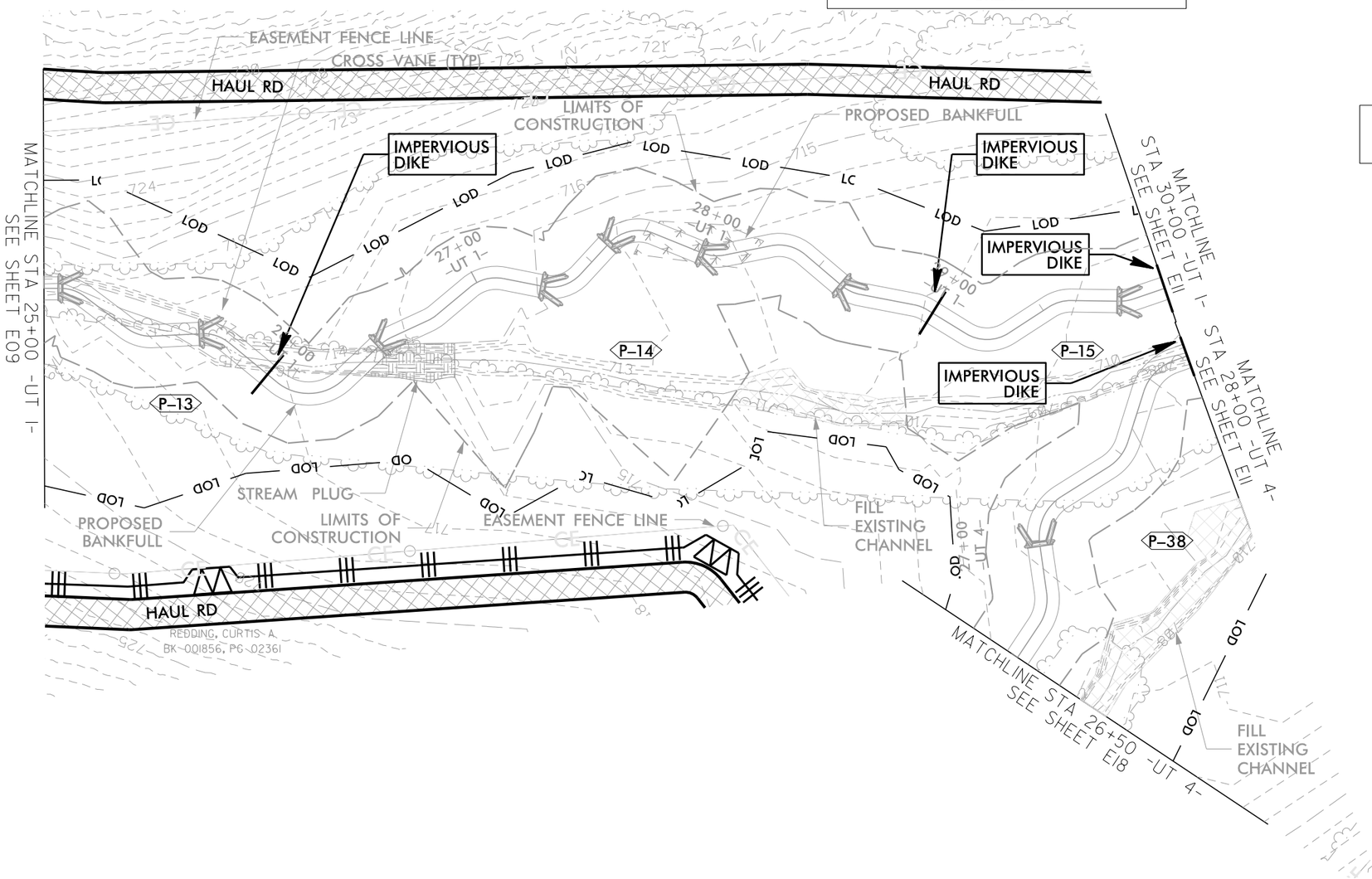
	HAUL ROAD
	SPECIAL SEDIMENT CONTROL FENCE BREAK

25' 12.5' 0 25' 50'
SCALE: 1" = 50'
NAD 83



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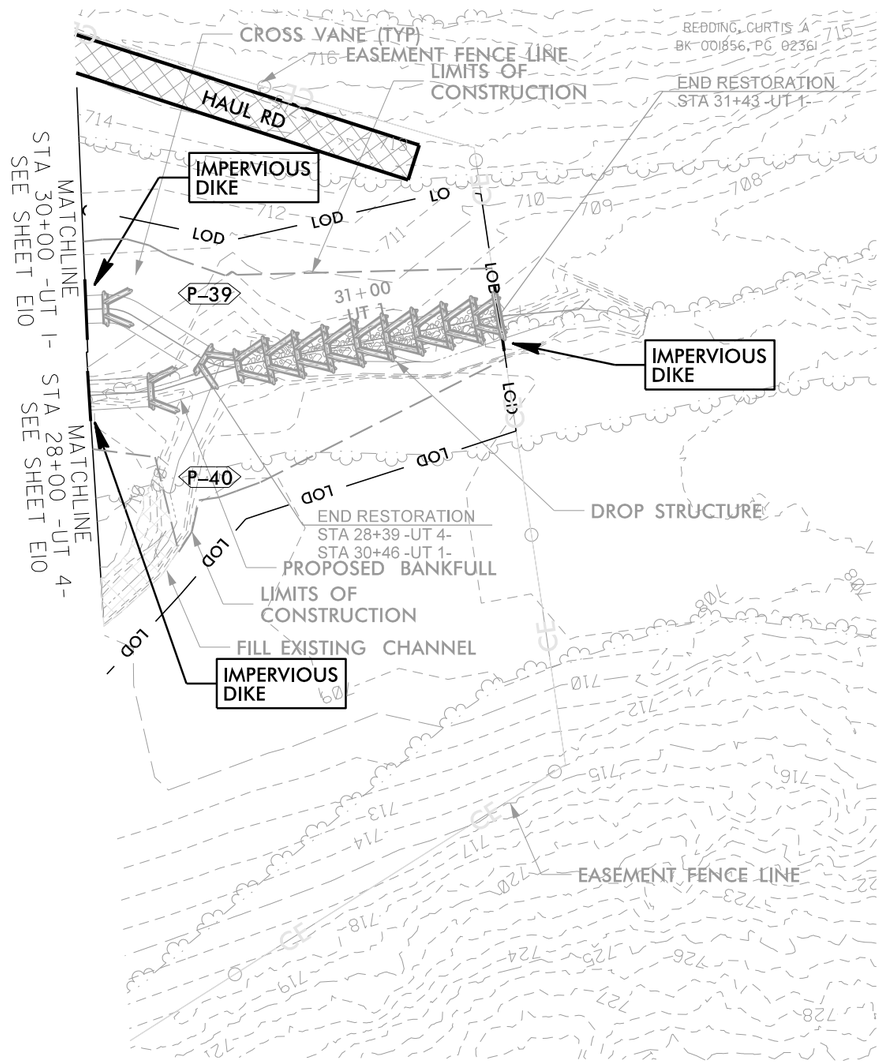

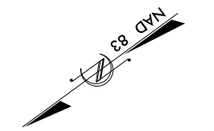

25' 12.5' 0 25' 50'
SCALE: 1" = 50'

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1089A58C14994C3...

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— LOD —	LIMITS OF DISTURBANCE
	TEMPORARY SILT FENCE
	HAUL ROAD
	SPECIAL SEDIMENT CONTROL FENCE BREAK

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RANDOLPH COUNTY, NC

EROSION CONTROL

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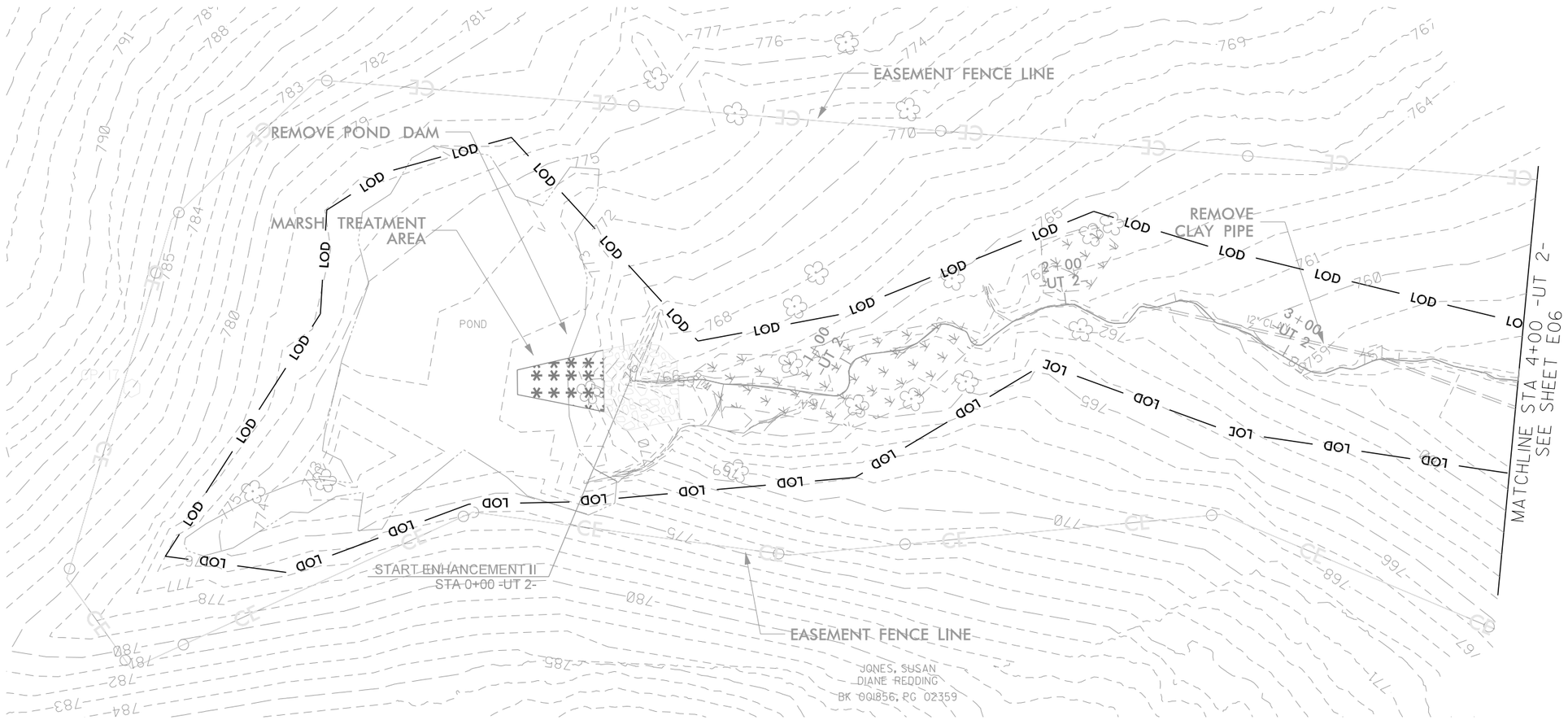
25' 12.5' 0 25' 50'
SCALE: 1" = 50'

— LOD —	LIMITS OF DISTURBANCE
	TEMPORARY SILT FENCE
	HAUL ROAD
	SPECIAL SEDIMENT CONTROL FENCE BREAK



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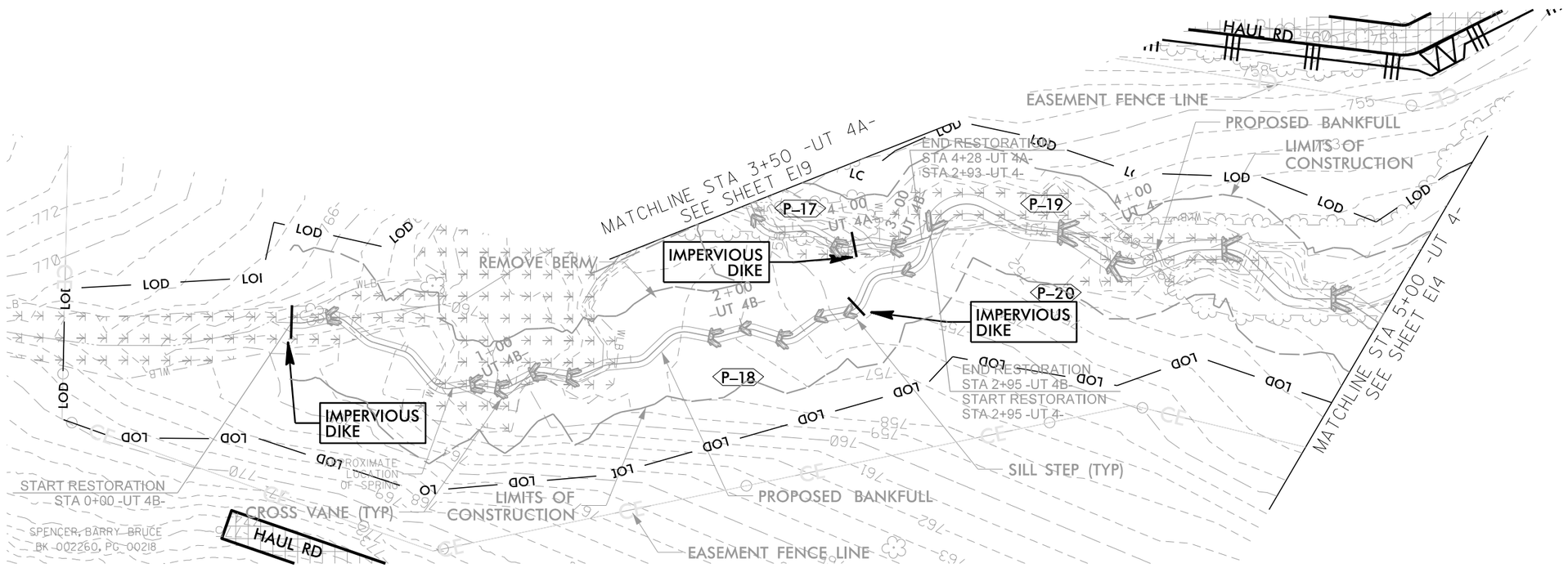
25' 12.5' 0 25' 50'
SCALE: 1" = 50'

NAD 83

— LOD —	LIMITS OF DISTURBANCE
	TEMPORARY SILT FENCE
	HAUL ROAD
	SPECIAL SEDIMENT CONTROL FENCE BREAK

HORIZONTAL DATUM: NAD 83 (2011)
VERTICAL DATUM: NAVD 1988



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NAD 83

— LOD —	LIMITS OF DISTURBANCE
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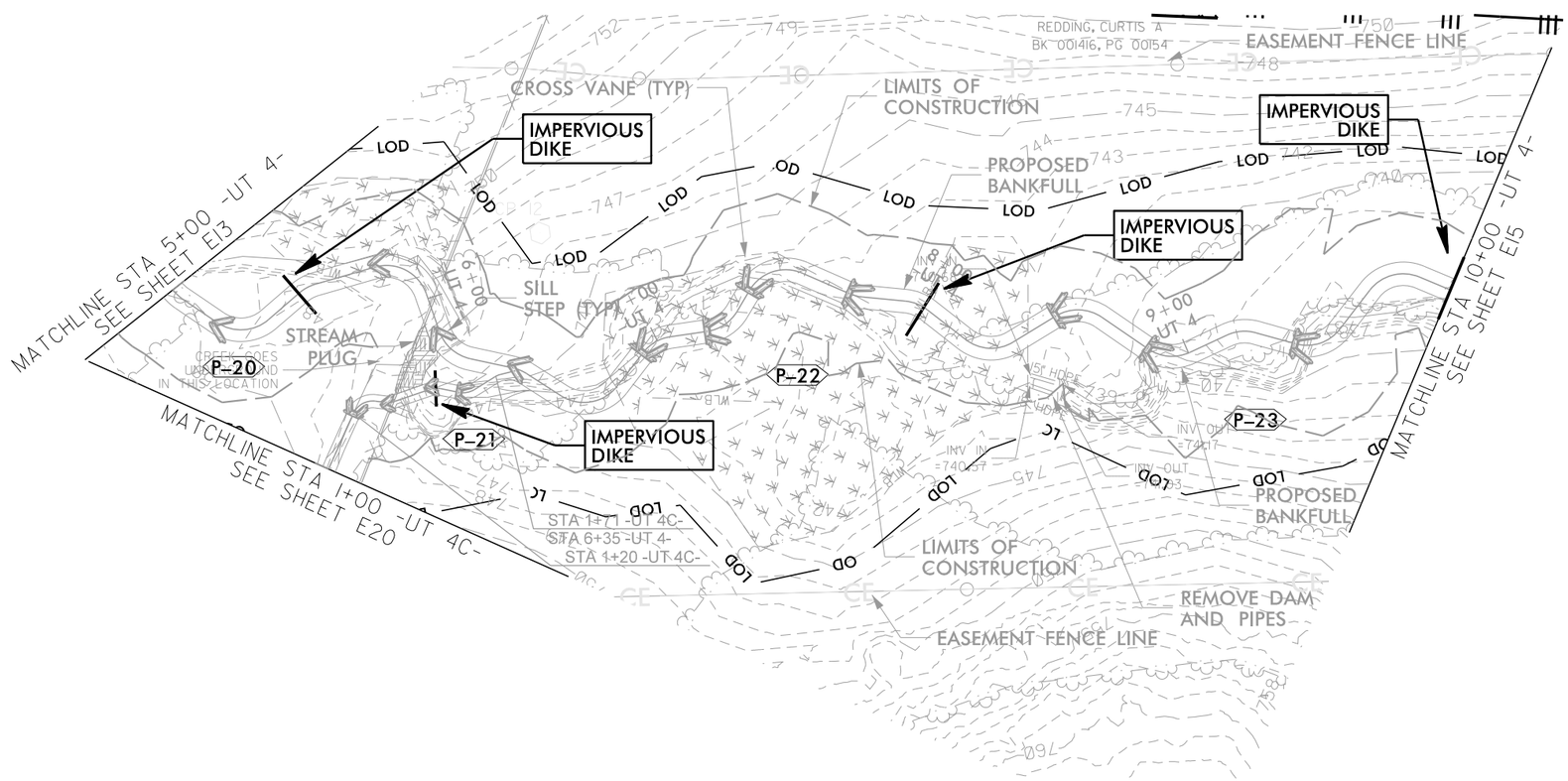

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NAD 83

— LOD —	LIMITS OF DISTURBANCE
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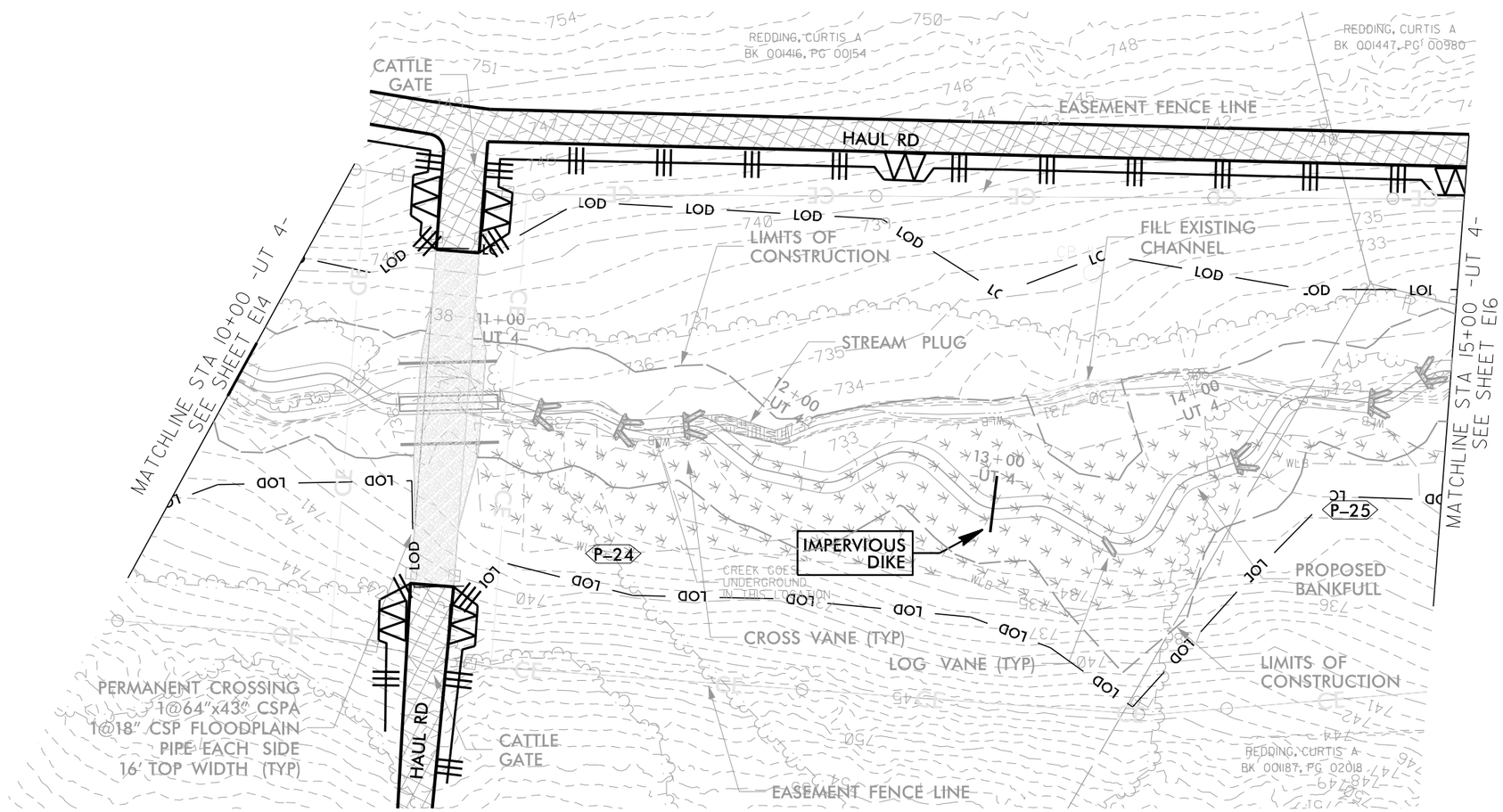

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NAD 83

— LOD —	LIMITS OF DISTURBANCE
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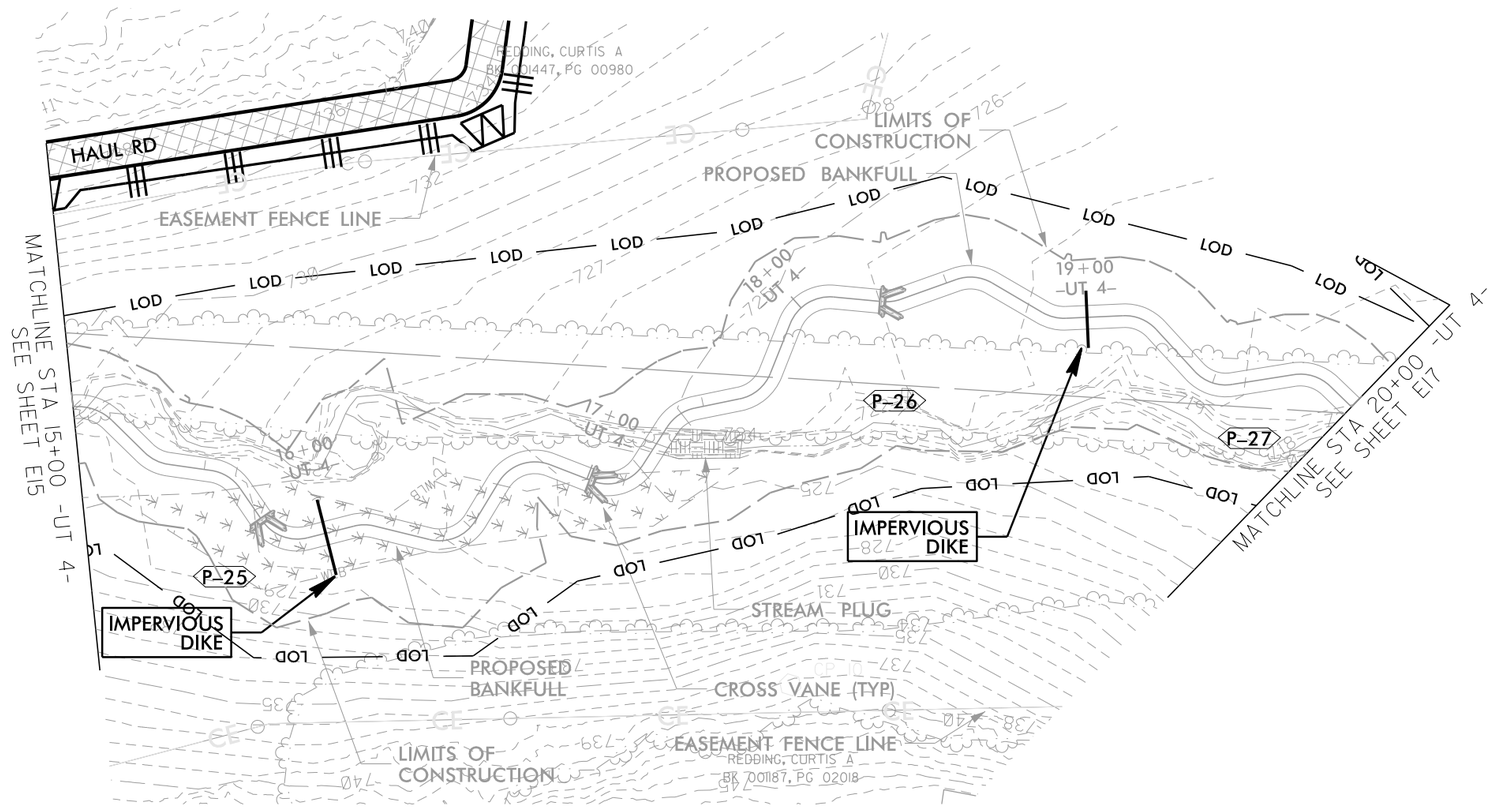

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— LOD —	LIMITS OF DISTURBANCE
	TEMPORARY SILT FENCE
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HORIZONTAL DATUM: NAD 83 (2011)
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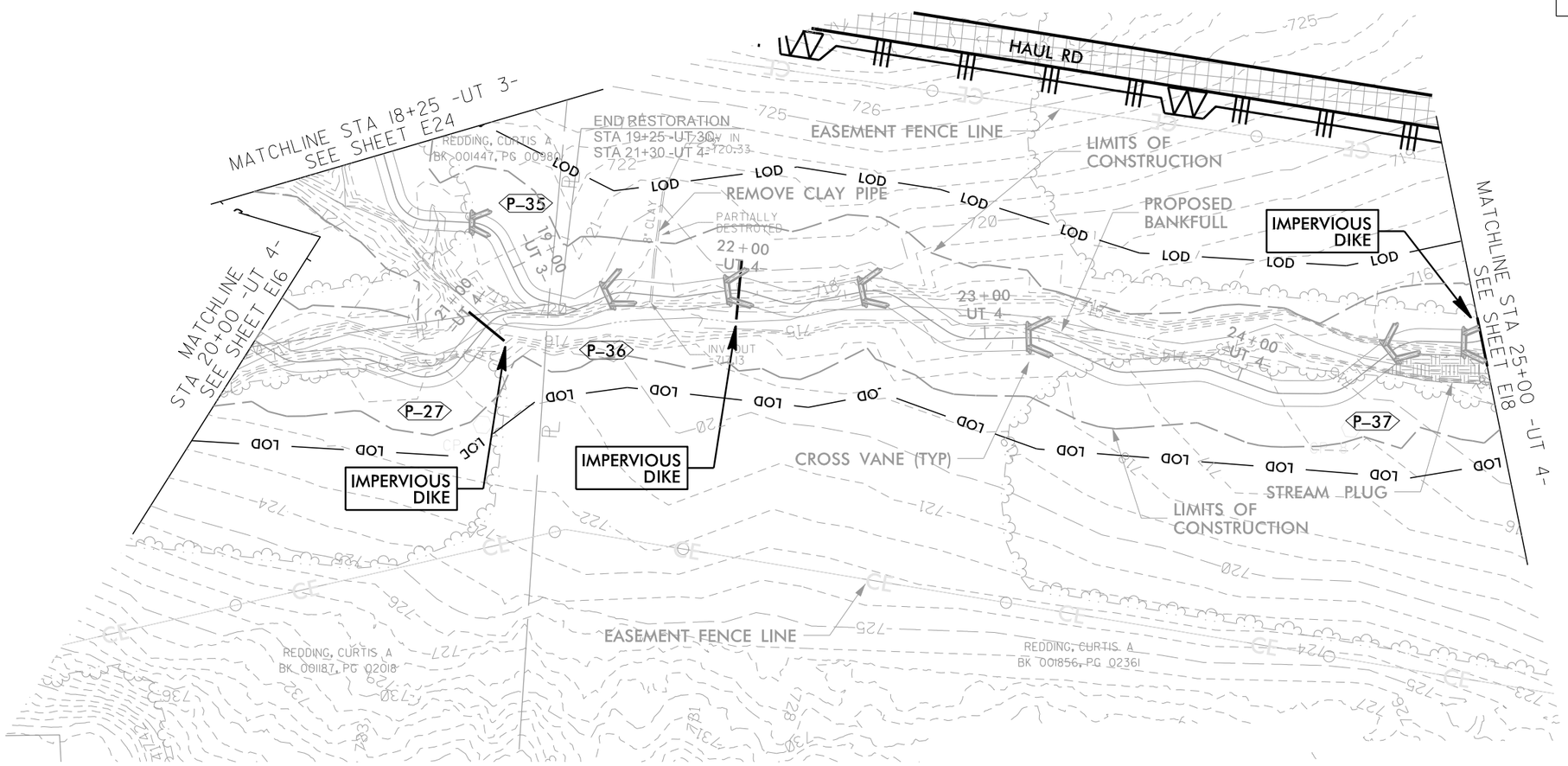
25' 12.5' 0 25' 50'
SCALE: 1" = 50'
NAD 83



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NAD 83

— LOD —	LIMITS OF DISTURBANCE
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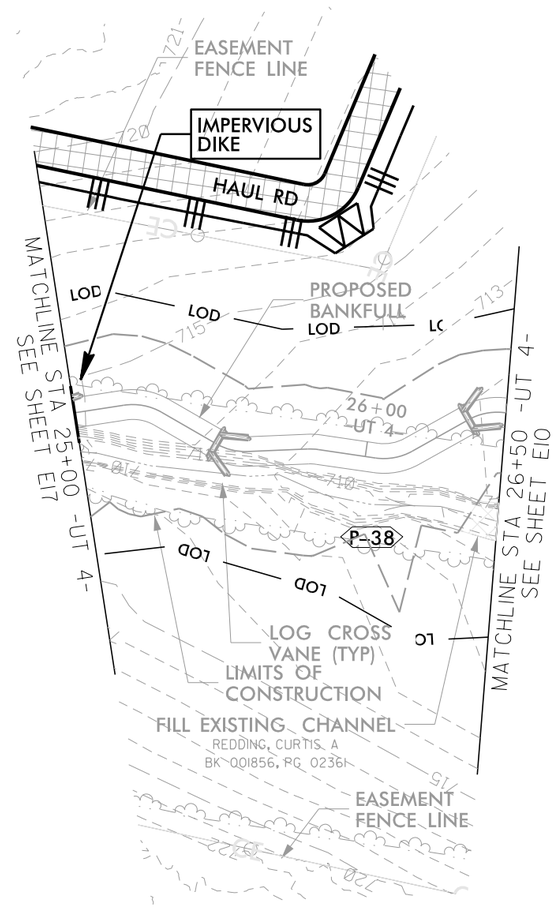

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jharvey

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25' 12.5' 0 25' 50'
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NAD 83

— LOD —	LIMITS OF DISTURBANCE
	TEMPORARY SILT FENCE
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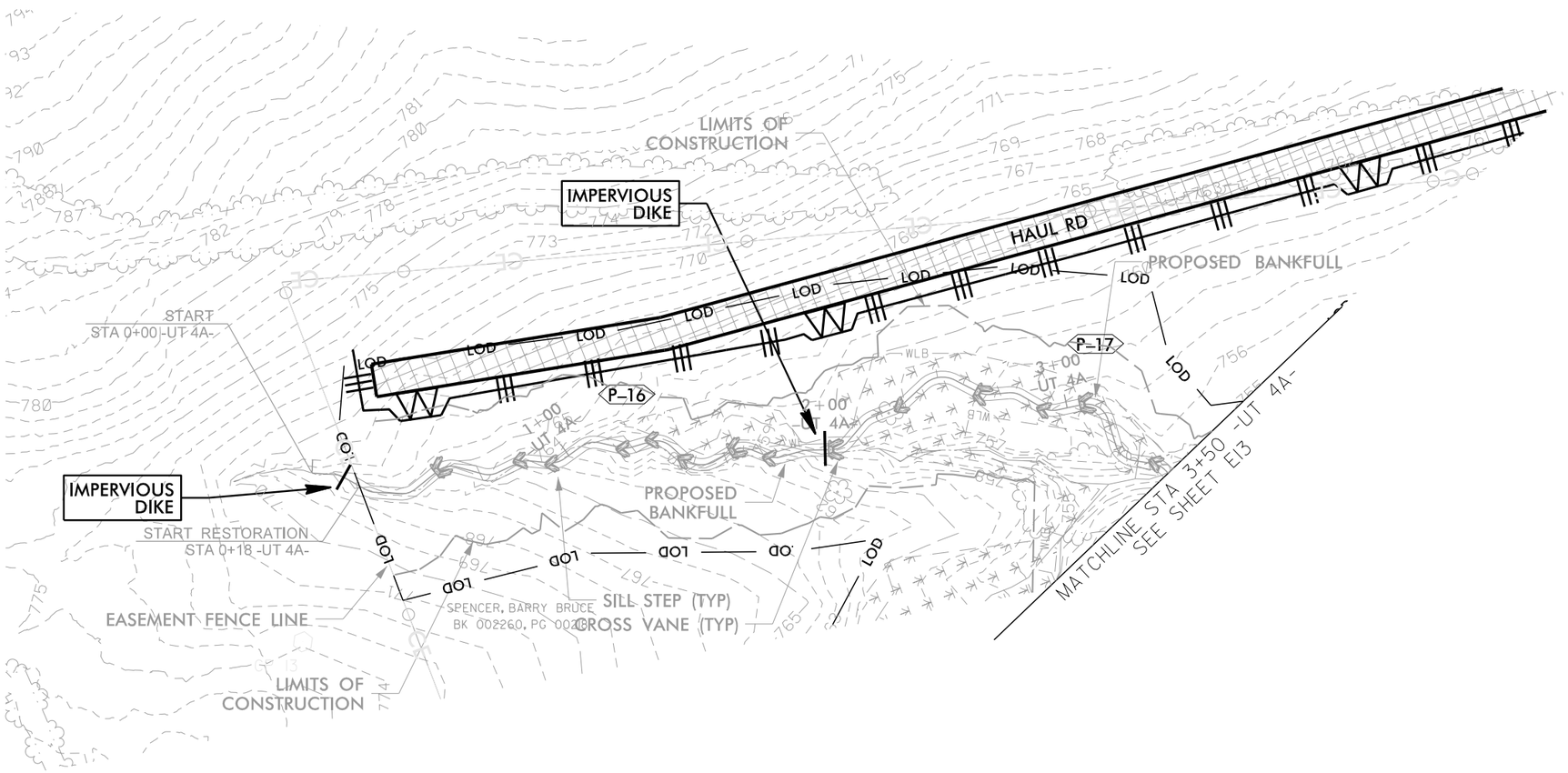

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NAD 83

— LOD —	LIMITS OF DISTURBANCE
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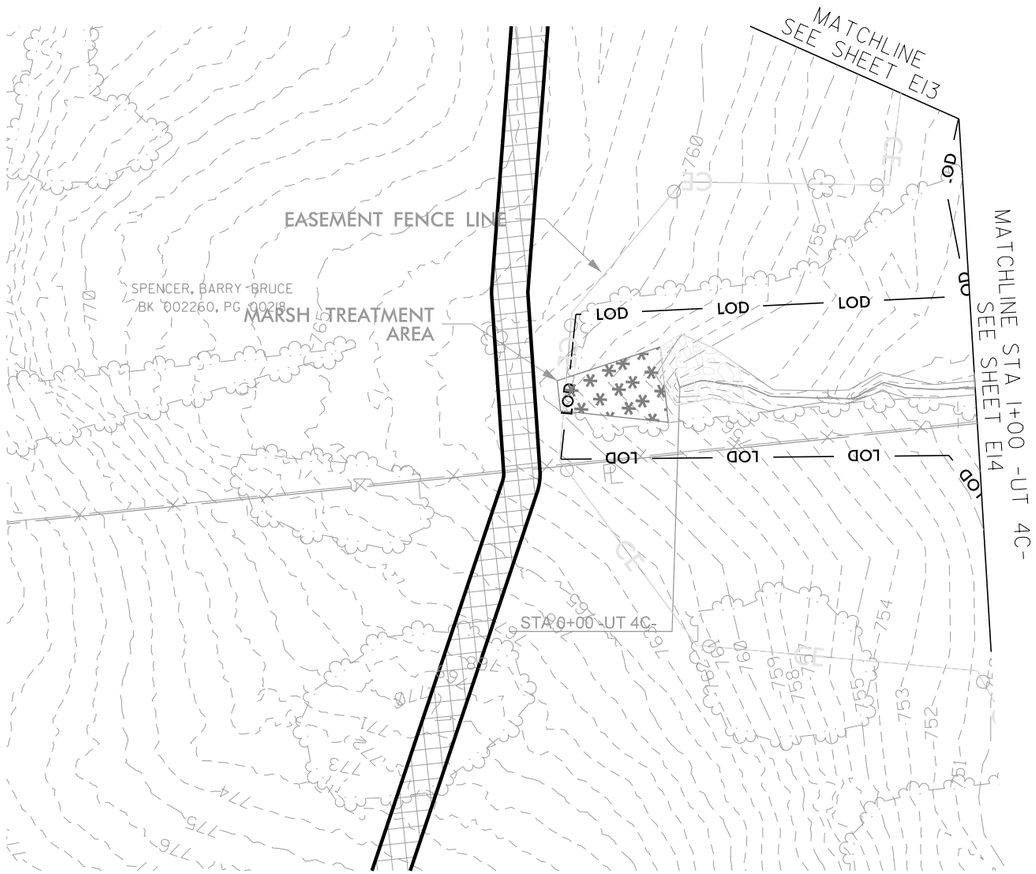

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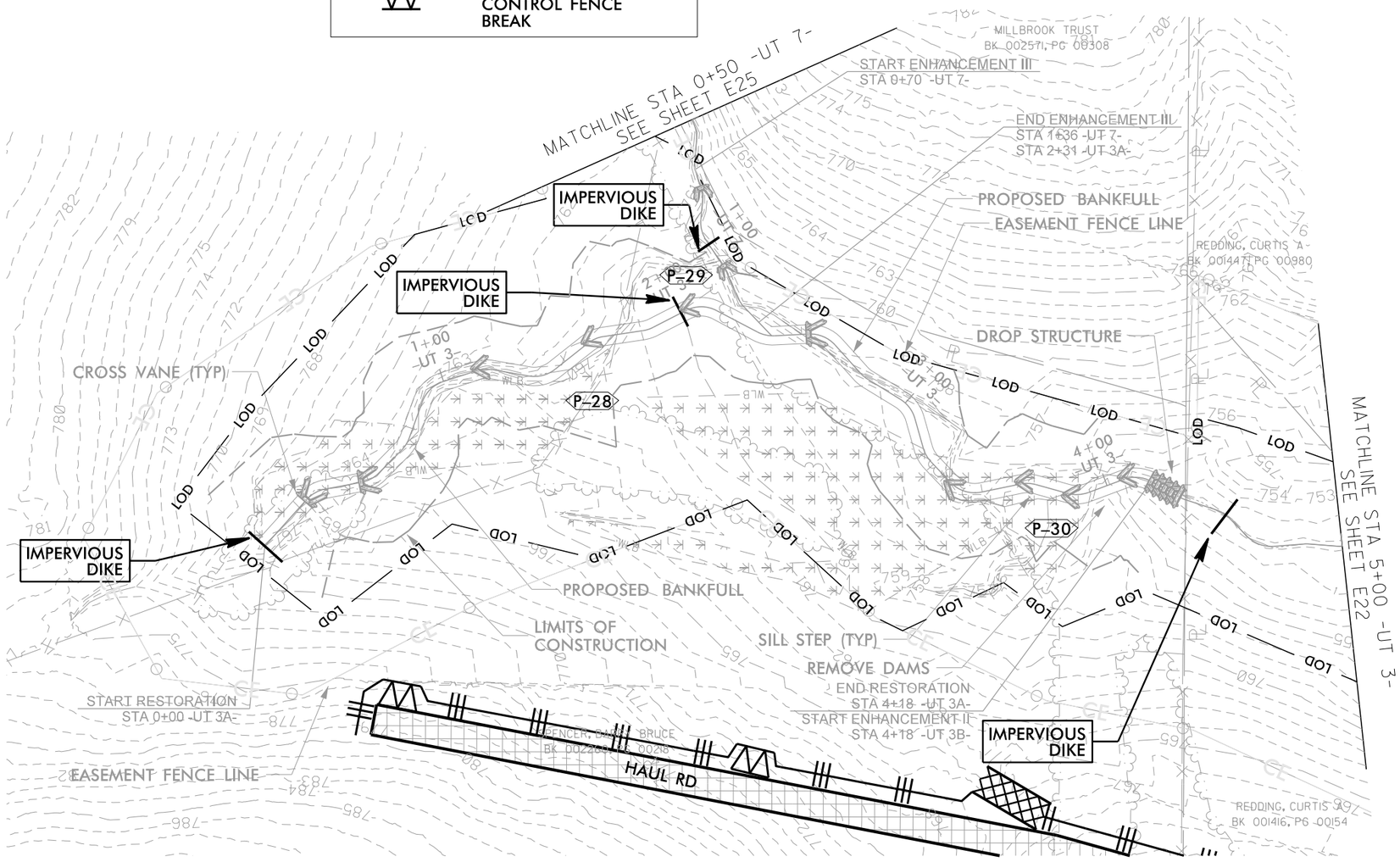

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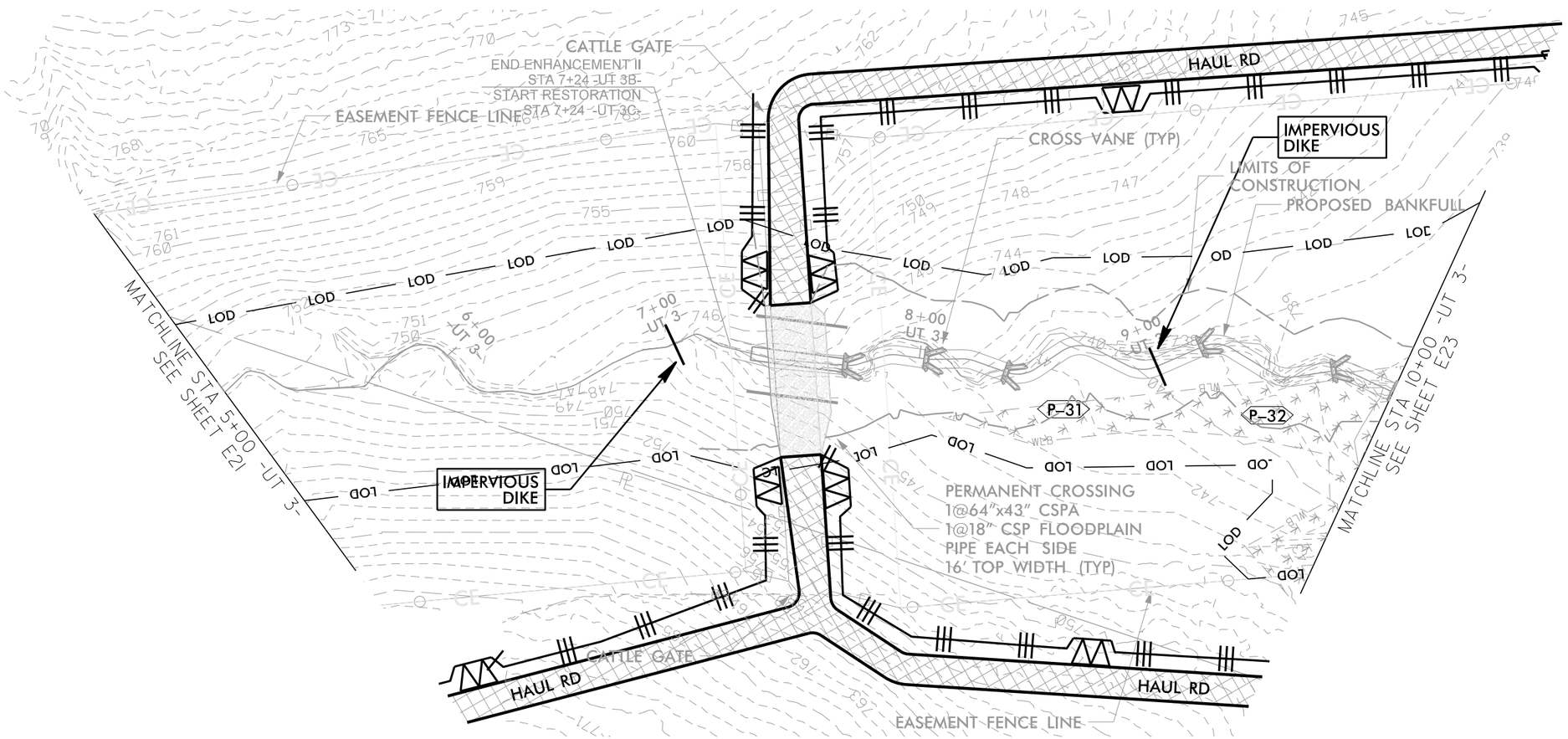
NAD 83

— LOD —	LIMITS OF DISTURBANCE
	TEMPORARY SILT FENCE
	HAUL ROAD
	SPECIAL SEDIMENT CONTROL FENCE BREAK



DocuSigned by:
Joshua G Dalton
1089AD8C14994C3...

NORTH CAROLINA PROFESSIONAL SEAL 26971 ENGINEER JOSHUA G. DALTON

5/26/2021

DATE:

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RALEIGH, NORTH CAROLINA 27606
TEL (919) 859-2243
ENG FIRM LICENSE NO. C-890

Axiom Environmental, Inc.

BULL CHUTE
RANDOLPH COUNTY, NC

EROSION CONTROL

PROJECT # :
DRAWING NAME:
DATE: 2021
DRAWN BY: JRH
REVIEWED BY: JGD
REVISIONS:

SHEET NO.
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Bull Chute_Rdy_PSH_E22.dgn
jharvey

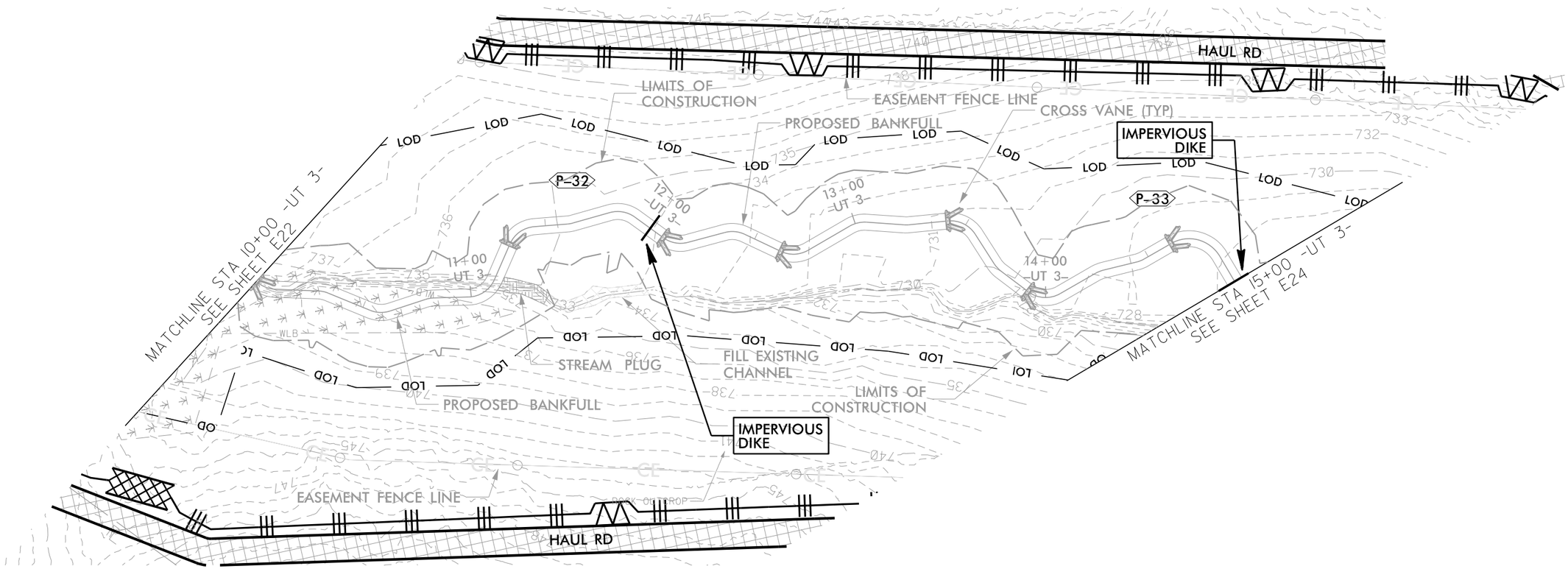
DocuSign Envelope ID: BA5C6BE2-9231-45CF-8404-16DC38BEFF21

HORIZONTAL DATUM: NAD 83 (2011)
VERTICAL DATUM: NAVD 1988

25' 12.5' 0 25' 50'
SCALE: 1" = 50'

NAD 83

— LOD —	LIMITS OF DISTURBANCE
	TEMPORARY SILT FENCE
	HAUL ROAD
	SPECIAL SEDIMENT CONTROL FENCE BREAK



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25' 12.5' 0 25' 50'
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	TEMPORARY SILT FENCE
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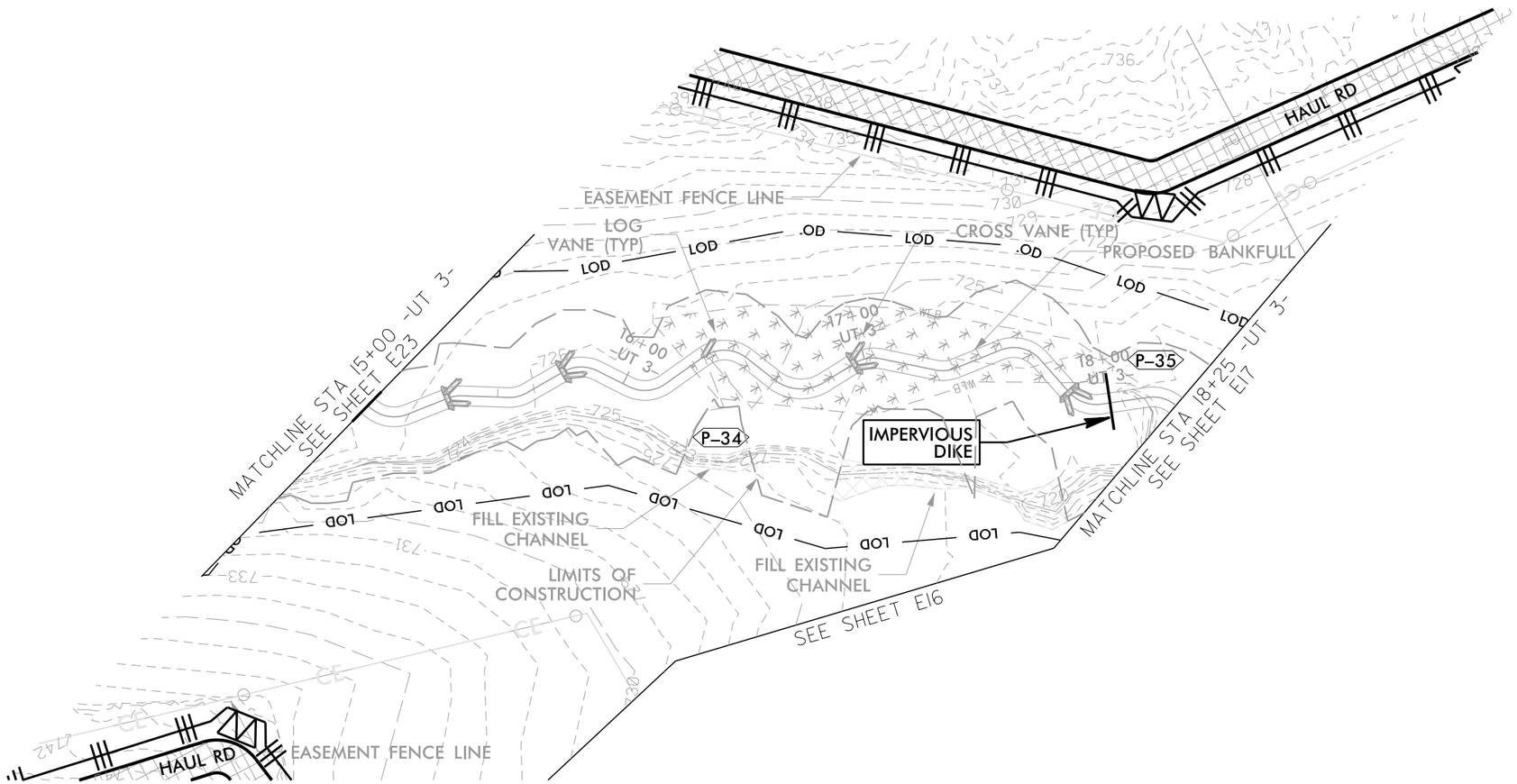

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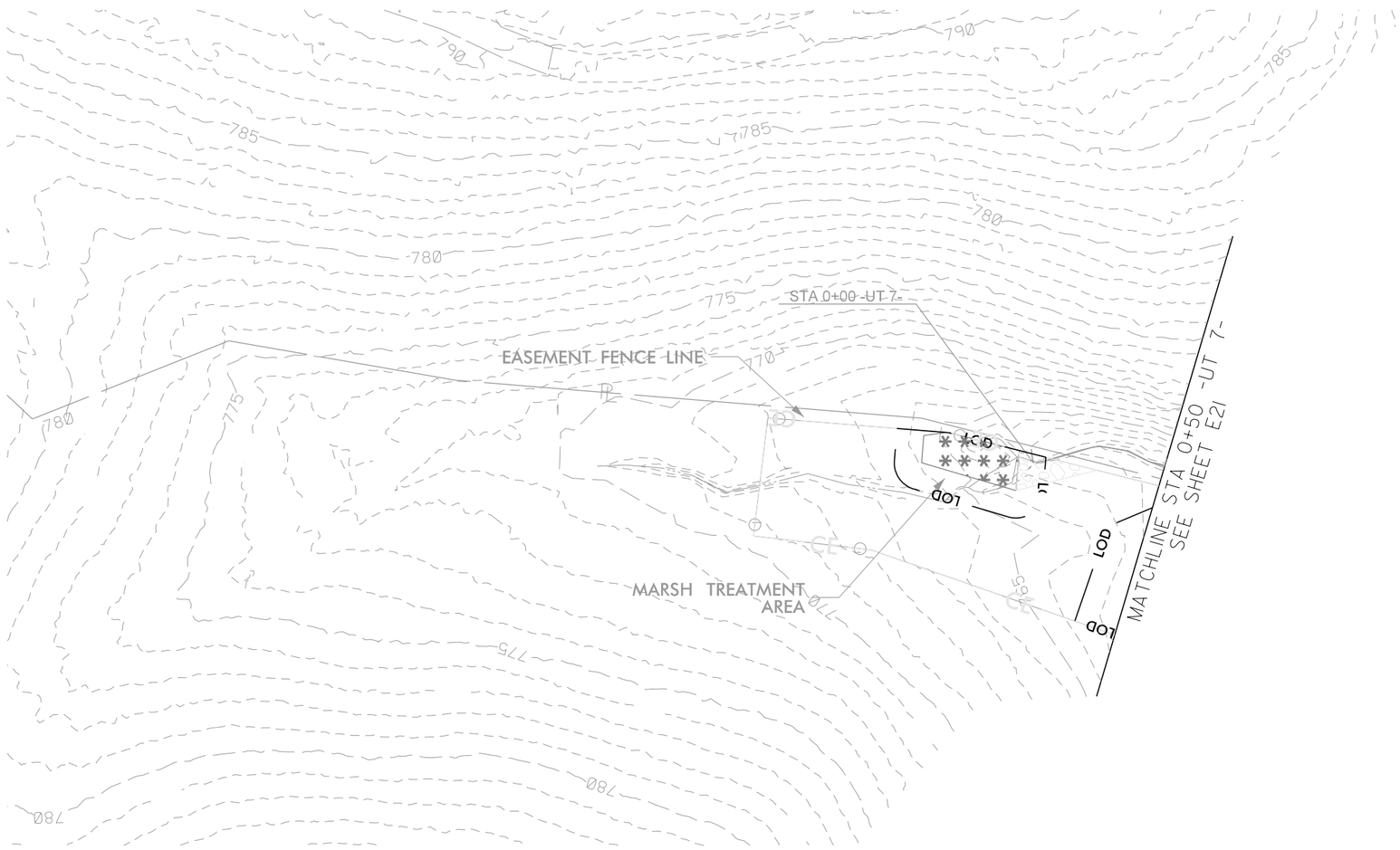
VERTICAL DATUM: NAVD 1988

25' 12.5' 0 25' 50'
SCALE: 1" = 50'

NAD 83



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	TEMPORARY SILT FENCE
	HAUL ROAD
	SPECIAL SEDIMENT CONTROL FENCE BREAK

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BULL CHUTE
RANDOLPH COUNTY, NC

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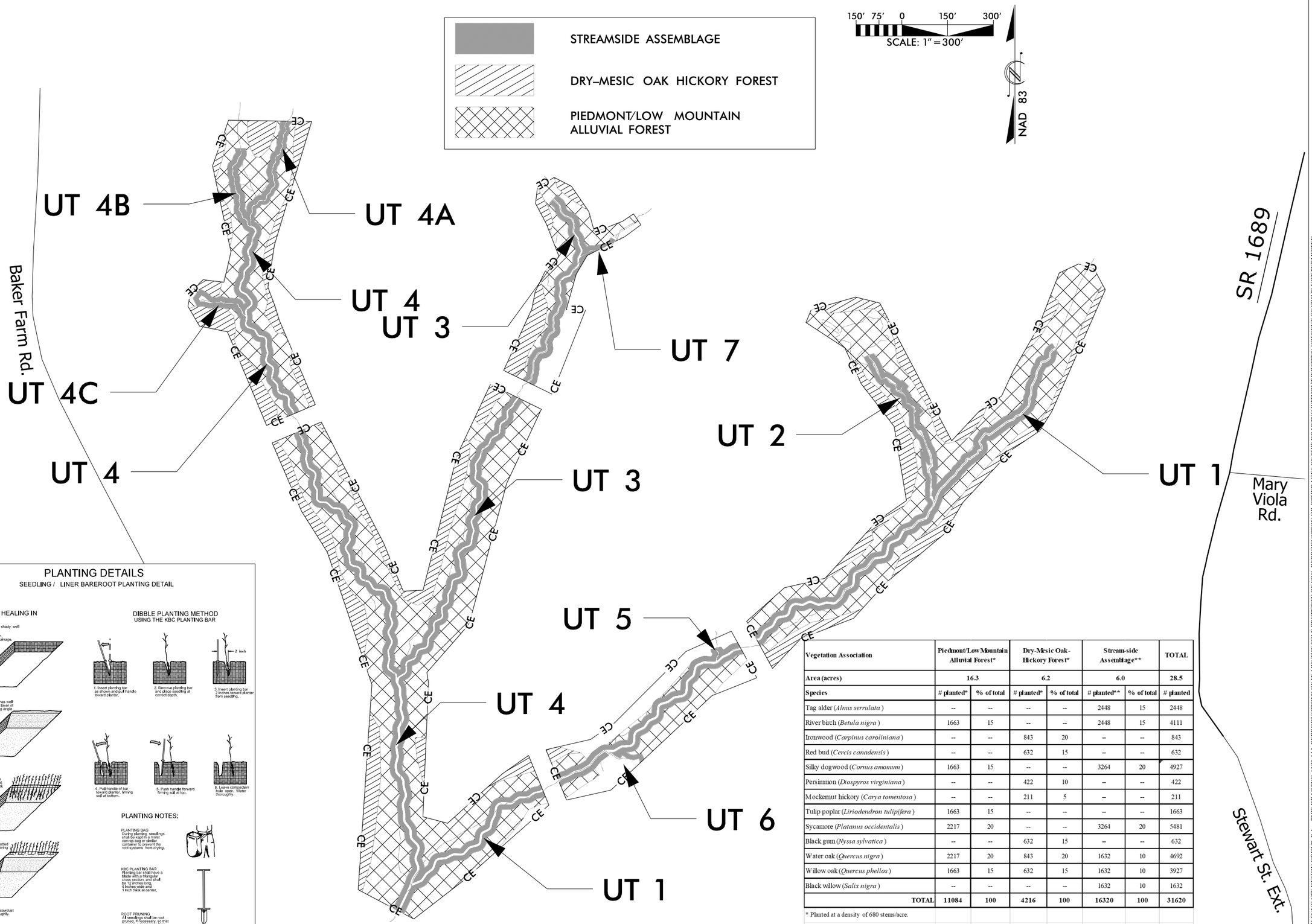

Vegetation Association	Piedmont/Low Mountain Alluvial Forest*		Dry-Mesic Oak-Hickory Forest*		Stream-side Assemblage**		TOTAL
Area (acres)	16.3		6.2		6.0		28.5
Species	# planted*	% of total	# planted*	% of total	# planted**	% of total	# planted
Tag alder (*Alnus serrulata*)	--	--	--	--	2448	15	2448
River birch (*Betula nigra*)	1663	15	--	--	2448	15	4111
Ironwood (*Carpinus caroliniana*)	--	--	843	20	--	--	843
Red bud (*Cercis canadensis*)	--	--	632	15	--	--	632
Silky dogwood (*Cornus amomum*)	1663	15	--	--	3264	20	4927
Persimmon (*Diospyros virginiana*)	--	--	422	10	--	--	422
Mockernut hickory (*Carya tomentosa*)	--	--	211	5	--	--	211
Tulip poplar (*Liriodendron tulipifera*)	1663	15	--	--	--	--	1663
Sycamore (*Platanus occidentalis*)	2217	20	--	--	3264	20	5481
Black gum (*Nyssa sylvatica*)	--	--	632	15	--	--	632
Water oak (*Quercus nigra*)	2217	20	843	20	1632	10	4692
Willow oak (*Quercus phellos*)	1663	15	632	15	1632	10	3927
Black willow (*Salix nigra*)	--	--	--	--	1632	10	1632
TOTAL	11084	100	4216	100	16320	100	31620

* Planted at a density of 680 stems/acre.

** Planted at a density of 2720 stems/acre.

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BULL CHUTE
RANDOLPH COUNTY, NC

PLANTING

PROJECT # :

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Appendix M
Site Photos

Bull Chute Stream & Wetland Mitigation Site: Site Photographs
Randolph County, NC

Bull Chute Stream & Wetland Mitigation Site: Site Photographs (continued)
Randolph County, NC