FINAL MITIGATION PLAN

Bandys Farm Stream and Wetland Mitigation Project

Catawba County, North Carolina

NCDEQ Contract No. 210102-01
DMS ID No. 100594
USACE Action ID No. SAW-2021-02609
NCDEQ DWR ID: 20211630V.1
RFP No. 16-20210102 (Issued 5/14/2021)

Catawba River Basin
HUC 03050101

Prepared for:

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

August 18, 2023

FINAL MITIGATION PLAN

Bandys Farm Stream and Wetland Mitigation Project
Catawba County, North Carolina

NCDEQ Contract No. 210102-01
DMS ID No. 100594
USACE Action ID No. SAW-2021-02609
NCDEQ DWR ID: 20211630V.1

Catawba River Basin
HUC 03050101

Prepared for:

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

Prepared by:

Ecosystem Planning & Restoration, PLLC
204 Stone Ridge Blvd.
Asheville, NC 28804

Contributing Staff:

Kevin Tweedy, PE
Jake Byers, PE
Scott King, LSS
Russell Myers
Jordan Cocanower, EI

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

REPLY TO
ATTENTION OF:

July 26, 2023

Regulatory Division

Re: NCIRT Review and USACE Approval of the NCDMS Bandys Farm Mitigation Site / Catawba County

USACE ID: SAW-2021-02609
NCDMS Project # 100594
NCDWR # 20211630 v.1

Paul Wiesner
North Carolina Division of Mitigation Services
5 Ravenscroft Drive, Suite 102
Asheville, NC 28801

Dear Mr. Wiesner:

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 Bandys Farm Draft Mitigation Plan, which closed on May 11, 2023. 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 contact me at steven.l.kichefski@usace.army.mil, or (828) 933-8032.

Sincerely,

Steve Kichefski

Mitigation Project Manager
for Todd Tugwell, Mitigation Branch Chief USACE
Regulatory Division

Enclosures

Electronic Copies Furnished:

NCIRT Distribution List

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

REPLY TO
ATTENTION OF:

June 20, 2023

CESAW-RG/Kichefski

MEMORANDUM FOR RECORD

SUBJECT: NCDMS Bandys Farm Mitigation Site - NCIRT Comments during 30-day Mitigation Plan Review, Catawba County, NC

PURPOSE: The comments listed below were received from the NCIRT during the 30-day comment period in accordance with Section 332.8(d)(7) of the 2008 Mitigation Rule.

USACE AID#: SAW-2021-02609 30-Day Comment Deadline: May 11, 2023
DWR #: 20211630 v.1

Mac Haupt, NCDWR:

1. Thanks to Harry Tsomides for his review of the draft mitigation plan and to EPR for their response to comments.
2. Section 1.0- Introduction- DWR has some concerns regarding the grading that will take place in the wetland as mentioned in the fourth paragraph.
3. Section 1.2- Stream Crossings- DWR likes seeing the removal of crossings on UT1 and UT1A.
4. Section 2.0- Watershed Approach- DWR likes seeing project site selection near other restoration projects and especially this one being immediately adjacent to the North Fork Mountain Creek Mitigation Site.
5. Section 7.1- Stream Restoration Design Approach- DWR likes the stabilization plan for the gully above both UT1 and UT1A.
    a. In addition, DWR likes seeing a 75 foot buffer width (above the 50 foot minimum).
    b. There are a number of times when the document mentions flow in the discussions of both UT1 and UT1A, as well as UT3 and UT3A. DWR has seen the Monitoring Plan (Figure 10A and 10B) and appreciates the number and placement of the flow gauges, however; there will be a

recommendation of flow duration in the Performance Standard section that will exceed what is proposed.

6. Section 8- Performance Standards- DWR requires the continuous flow be 90 days at any time during the year.
7. Section 8.3- DWR likes the wetland hydroperiod of 12-16% during the growing season. In addition, DWR appreciates that gauges were put out in the existing and proposed wetlands before construction. While some gauges are showing significant hydroperiods now, that will be taken into account once the project has completed its monitoring phase and the results compared to the pre-construction data.
8. Figure 2B- In the existing conditions map, is UT3A a wetland or a stream?
9. Appendix 3- My question to #8 was answered, however; Figure 1 shows a UT4, what happened to this reach?
10. Appendix 4- DWR likes sees the wetland gauge data.
    a. In addition, DWR likes the Hydric Soil report, in particular Figure 4 which shows the location of the borings. In the future, DWR would like to see a more profiles listed or a table that gives the Hydric Soil Indicator for each boring.
11. Design sheets: general comments-
    a. There will be a lot of structures built for this project. Moreover, the stream channels being Rosgen B-type channels and even one small A-type stream have more slope, and increased slope in stream restoration channels increases the chance for stream destabilization if structures are not installed properly. DWR hopes that there will be an experienced engineer on site for much of the construction, especially early on to make sure the construction crews are installing structures as per design specifications.
    b. With a lot of structures, there will be a lot of stone utilized for construction. DWR requests that the engineer seek to use on-site material to place in the stream, instead of Class A type rip rap whenever possible.
    c. In general, DWR liked the organization and presentation of the design sheets, with one exception. DWR likes to see the profile under the stream design plan . In addition, the scale of the profile needs to be easily read.
12. Design sheets 8 & 9- what will be the depth of grading that will be done in this area relative to the current elevation of the wetlands? Also, DWR requires that the placement of the wetland gauges in this area be stream right at stations 20+00 and 23+00.

13. Design sheet 12- DWR request that the wetland gauge be placed stream right at station 38+00.

14. Design sheet 13- does the stream credit start at station 10+00?

15. Design sheet 19- on this sheet DWR believes there is a crenulation present where UT4 is present on the Jurisdictional Determination, is this a stream or a wetland?? Goes back to the question of #6…

16. Design sheet 48- it was difficult to determine with certainty how much grading will occur in the region of UT2 stations 18+75 to 24+00. It appears that at least a foot if not more will be graded. If that is the case then the wetland reestablishment area may need to be reclassified.

Olivia Munzer, NCWRC:

1. Pg. 7 under existing veg: Italicize Solanum carolinensis
2. Figure 2A – there is a band of pink dots (invasive species symbol) across the top 1/4th of the figure. Is this accurate?
3. On Sheets 31-33 Vegetation and Fencing Plan, you have permanent non-riparian seed mix to be planted within the crossing. Although using fescue/bluegrass mix for reseeding construction areas away from conservation easement (such as haul roads), it is not recommended at the crossing, whether internal or external. Fescue and other non-native species can be aggressive and may outcompete any riparian vegetation planted adjacent to the reseeded area.

Erin Davis, USACE:

1. Section 7.1 – As noted in the IRT site visit meeting minutes, steep slope stability is a concern when priority 2 restoration is proposed within a confined valley. Please elaborate on proposed sediment and erosion control measures and potential adaptative management actions.
2. Section 7.3 – A wetland reference site was requested by the IRT during the site walk. What efforts were made to identify a local wetland reference area?
3. Section 7.3 – Based on the GW4 (28.6%) and GW6 (29.5%) groundwater data for 2022, it appears that wetland enhancement at 2:1 would be a more appropriate approach for the proposed W2 credit area. Enhancement credit would better correlate with the potential moderate functional uplift from existing conditions in both vegetation (with thinning and supplemental planting) and hydrology (with breach berm, spot fill, roughening and debris jams).
4. Section 8.3 – Additional volunteers may count towards vegetative success if approved by the IRT on a case-by-case basis. Due the mortality risk, volunteer ash species should not be included in the count towards vegetative success.
5. Figure 10A – Please swap the veg plot type for the two plots along the UT2 wetland area (i.e., temp to fixed and fixed to temp) so there is a permanent representative veg monitoring station for the W1 credit area. Also, please make sure to capture

representative areas of priority 2 bench cuts and valley slopes in veg plot data, as these conditions can be challenging for vegetation establishment.

6. Appendix 4 – The groundwater well preliminary hydroperiod summaries table 2022 data does not match the information provided on the individual well graph pages. Please update.
7. Sheet 1A #13 – How will haul roads and staging areas soil compaction be addressed?
8. Sheet 2G includes a detail of a base flow ditch. Is this conveyance feature proposed on this project? If so, where?
9. Sheet 5 (and corresponding Sheet 45) – It appears during design the UT2 confluence with NFMC shifted further east and downstream compared to the proposal concept map, which has resulted in the UT2 priority 2 bench cutting into the adjacent wetland credit area (UT2 approx. Sta. 42+75 to 44+50). Typically, wetland credit areas proposed to be graded greater than 12 inches are considered wetland creation (3:1). Sheet 45 appears to show a 1–2-foot cut in the UT2 bench area overlapping proposed wetland credit. Please calculate and show the proposed wetland credit area to be graded greater than 12 inches. Additionally, is the concern that the priority 2 stream restoration could have a drainage effect on the adjacent wetland credit area. Please provide more information to address this concern (e.g., modeling).
10. Sheets 8 & 9 (and corresponding Sheets 47 & 48) – UT2 appears to transition from priority 2 to priority 1 restoration for the channel section along the proposed wetland reestablishment area (Sta. 18+50 to 24+50), correct? Is any grading greater than 12 inches proposed within the wetland credit area?
11. General Design – I agree with DWR that proper installation of stream structures within proposed B-type channels is important to minimize potential channel instability.
12. General Design – Please confirm the old channel areas will be backfilled to match surrounding grade.

Sincerely,

Steve Kichefski

Steve Kichefski

Project Manager
USACE Regulatory Division

Electronic Copies Furnished:

NCIRT Distribution List

Ecosystem Planning and Restoration, LLC
204 Stone Ridge Blvd.
Asheville, NC 28804
www.eprusa.net

Mr. Steve Kichefski
Regulatory Project Manager
U.S. Army Corps of Engineers, Wilmington District, Asheville Field Office
151 Patton Avenue, Suite 208
Asheville, NC 28801
(828)-271-7980 Ext. 4234
(828)-933-8032 cell

August 15, 2023

RE: Response to IRT Comments to Final Draft Mitigation Plan
Bandys Farm Stream and Wetland Mitigation Site
Catawba River Basin – CU 03050101– Catawba County
NCDEQ Contract No. 210102-01
DMS ID No. 100594
USACE Action ID No. SAW-2021-02609
NCDEQ DWR ID: 20211630V.1
RFP No. 16-20210102 (Issued 5/14/2021)

Mr. Kichefski,

Ecosystem Planning and Restoration (EPR) has reviewed the comments on the Final Draft Mitigation Plan provided on June 20, 2023. The comments have been addressed as described below and the Final Mitigation Plan and all electronic deliverables have been revised in response to this review.

<u>Mac Haupt, NCDWR:</u>

1. Thanks to Harry Tsomides for his review of the draft mitigation plan and to EPR for their response to comments. **Response: Thanks to Harry for a fast turnaround on his comments.**

2. Section 1.0- Introduction- DWR has some concerns regarding the grading that will take place in the wetland as mentioned in the fourth paragraph. **Response: The grading mentioned in this wetland re-establishment practice section is referring to the grading and tillage as part of the general wetland surface roughening (see detail on Plan Sheet 2L), which will function to break up the compacted upper soil layers caused by years of use in agriculture as well as improving surface storage. The words grading and tillage have been removed for clarity and replaced with roughening of the wetland surface. All other grading in and around the proposed wetlands are discussed in more detail in several of the responses below.**

3. Section 1.2- Stream Crossings- DWR likes seeing the removal of crossings on UT1 and UT1A. **Response: We appreciate the positive feedback.**

4. Section 2.0- Watershed Approach- DWR likes seeing project site selection near other restoration projects and especially this one being immediately adjacent to the North Fork Mountain Creek Mitigation Site. **Response: We were pleased to find a site meeting longstanding DMS goals as well.**

5. Section 7.1- Stream Restoration Design Approach- DWR likes the stabilization plan for the gully above both UT1 and UT1A. **Response: We appreciate the positive feedback.**

a. In addition, DWR likes seeing a 75 foot buffer width (above the 50 foot minimum). **Response: We appreciate the feedback.**

b. There are a number of times when the document mentions flow in the discussions of both UT1 and UT1A, as well as UT3 and UT3A. DWR has seen the Monitoring Plan (Figure 10A and 10B) and appreciates the number and placement of the flow gauges, however; there will be a recommendation of flow duration in the Performance Standard section that will exceed what is proposed. **Response: See response below to comment #6.**

6. Section 8- Performance Standards- DWR requires the continuous flow be 90 days at any time during the year. **Response: EPR expects and will strive to meet a 90-day continuous flow regime on all gauged reaches but will maintain the 30-day flow performance standard per the USACE's 2016 mitigation guidance, which has been referenced throughout the project from site selection to final design.**

7. Section 8.3- DWR likes the wetland hydroperiod of 12-16% during the growing season. In addition, DWR appreciates that gauges were put out in the existing and proposed wetlands before construction. While some gauges are showing significant hydroperiods now, that will be taken into account once the project has completed its monitoring phase and the results compared to the pre-construction data. **Response: Thank you. With this final version of the mitigation plan, we have included more pre-construction data including the early spring period in 2023 for comparison during the monitoring phase. Despite a couple of the wells showing moderate hydroperiods now (please see revised values as explained below to USACE comment #3), we are confident that the wetlands will demonstrate an increase in hydroperiods.**

8. Figure 2B- In the existing conditions map, is UT3A a wetland or a stream? **Response: UT3A is a small stream running through wetland area W-C as confirmed in the field by Corps staff during the PJD process.**

9. Appendix 3- My question to #8 was answered, however; Figure 1 shows a UT4, what happened to this reach? **Response: UT4 was also identified as a small stream running through wetland area W-C by the Corps during the PJD process. However, it is not being utilized for any crediting purposes and so it is not always shown or discussed in every section of the plan. However, the stream ends at a sinkhole on the floodplain where it flows underground, discharging at a degraded, collapsed section of the left bank of NFMC. This hole will be plugged and the collapsed bank will all be re-built and stabilized, allowing the**

hydrology to discharge into wetland W-C instead of quickly running off into NFMC (as shown on plan sheet 5).

10. Appendix 4- DWR likes sees the wetland gauge data. **Response: We appreciate the feedback and have included more data with the final plan.**

a. In addition, DWR likes the Hydric Soil report, in particular Figure 4 which shows the location of the borings. In the future, DWR would like to see a more profiles listed or a table that gives the Hydric Soil Indicator for each boring. **Response: EPR will request that information be provided in future hydric soil reports.**

11. Design sheets: general comments-

a. There will be a lot of structures built for this project. Moreover, the stream channels being Rosgen B-type channels and even one small A-type stream have more slope, and increased slope in stream restoration channels increases the chance for stream destabilization if structures are not installed properly. DWR hopes that there will be an experienced engineer on site for much of the construction, especially early on to make sure the construction crews are installing structures as per design specifications. **Response: All the contractors invited to the onsite construction bid meeting are very experienced and have longstanding relationships with EPR. Experienced EPR staff will be on-site during construction and will ensure that all structures are built correctly per the design plans and that they remain stable and functioning throughout the monitoring phase.**

b. With a lot of structures, there will be a lot of stone utilized for construction. DWR requests that the engineer seek to use on-site material to place in the stream, instead of Class A type rip rap whenever possible. **Response: Existing on-site bed material will be used wherever possible.**

c. In general, DWR liked the organization and presentation of the design sheets, with one exception. DWR likes to see the profile under the stream design plan. In addition, the scale of the profile needs to be easily read. **Response: The profile graphs were reviewed for accuracy and to ensure all scales and labels are clearly visible and that none overlap with each other any longer. The arrangement where the profiles are shown separate from the plan view sheets is because including the profiles on the plan view sheets decreased the sheet area to show the plan view at a readable and usable scale and would have required many more sheets. EPR typically prefers the plan view and profiles be shown on the same page as well, but it did not make sense for this project.**

12. Design sheets 8 & 9- what will be the depth of grading that will be done in this area relative to the current elevation of the wetlands? Also, DWR requires that the placement of the wetland gauges in this area be stream right at stations 20+00 and 23+00. **Response: As noted below in the response to USACE comment 10, all grading within this wetland will be limited to a maximum of 12". The proposed monitoring gauge locations currently appear to match very closely with the required stationing at 20+00 and 23+00. EPR will ensure they are placed at these locations.**

ECOSYSTEM PLANNING & EPR RESTORATION

Ecosystem Planning and Restoration, LLC
204 Stone Ridge Blvd.
Asheville, NC 28804
www.eprusa.net

13. Design sheet 12- DWR request that the wetland gauge be placed stream right at station 38+00. **Response: The proposed well location had been placed in the middle of the wetland, very close to where the background well is located at ~Station 37+75, but we have moved it down to be more in line with Station 38+00.**

14. Design sheet 13- does the stream credit start at station 10+00? **Response: Yes, the credited portion of Reach UT1 begins at Station 10+00, as noted at the UT1 'begin construction' call-out box.**

15. Design sheet 19- on this sheet DWR believes there is a crenulation present where UT4 is present on the Jurisdictional Determination, is this a stream or a wetland? Goes back to the question of #9. **Response: UT4 is a stream as explained in response to question #9.**

16. Design sheet 48- it was difficult to determine with certainty how much grading will occur in the region of UT2 stations 18+75 to 24+00. It appears that at least a foot if not more will be graded. If that is the case then the wetland reestablishment area may need to be reclassified. **Response: Please see the detailed response to USACE's comment #9.**

Olivia Munzer, NCWRC:

1. Pg. 7 under existing veg: Italicize *Solanum carolinensis.* **Response: Text was corrected.**

2. Figure 2A – there is a band of pink dots (invasive species symbol) across the top 1/4th of the figure. Is this accurate? **Response: That is some type of odd output error from GIS or Adobe. We apologize for not seeing that previously and have corrected that figure in this final version of the report. It is most certainly *not* meant to represent invasive species, just an unfortunate coincidence in similarity.**

3. On Sheets 31-33 Vegetation and Fencing Plan, you have permanent non-riparian seed mix to be planted within the crossing. Although using fescue/bluegrass mix for reseeding construction areas away from conservation easement (such as haul roads), it is not recommended at the crossing, whether internal or external. Fescue and other non-native species can be aggressive and may outcompete any riparian vegetation planted adjacent to the reseeded area. **Response: This was an oversight on our part and the permanent non-riparian mix has been removed from the plans within these crossing areas.**

Erin Davis, USACE:

1. Section 7.1 – As noted in the IRT site visit meeting minutes, steep slope stability is a concern when priority 2 restoration is proposed within a confined valley. Please elaborate on proposed sediment and erosion control measures and potential adaptative management actions. **Response: Cut slopes along the back of benching in confined valleys (as with UT1 and UT1A) will be kept at a 3:1 slope to connect back to existing ground. Additionally, small berms and stabilized conveyance channels will prevent stormwater from running over the excavated terrace slopes which will help to reduce/prevent rilling and provide time for the side slopes to vegetate. During construction, areas of concentrated runoff that are or could cause**

erosional issues will be noted and addressed with additional grading, coir fiber mattings, and vegetation as needed.

2. Section 7.3 – A wetland reference site was requested by the IRT during the site walk. What efforts were made to identify a local wetland reference area? **Response: EPR did use three reference wetlands from within the same ecoregion from nearby counties around Lake Norman, though we did not ultimately cite them in the report. They were identified using the NCDWR Wetland Project Summary interactive map. These sites were noted for their high-quality vegetation component and the list of tree and shrub species from the state database at each site was reviewed and used to confirm and refine our wetland plant selection. There is a substantial overlap between the reference wetland species and our proposed planted list. The text in Section 7.4 was revised to include a discussion of these reference wetlands and the summary site and species information is included in Appendix 4.**

3. Section 7.3 – Based on the GW4 (28.6%) and GW6 (29.5%) groundwater data for 2022, it appears that wetland enhancement at 2:1 would be a more appropriate approach for the proposed W2 credit area. Enhancement credit would better correlate with the potential moderate functional uplift from existing conditions in both vegetation (with thinning and supplemental planting) and hydrology (with breach berm, spot fill, roughening and debris jams). **Response: It appears that an error in the groundwater gauge spreadsheet formulas resulted in incorrect data being presented with the graphs. It showed the largest hydroperiods found throughout the entire year, not just within the growing season. The hydroperiod summary table had been created separately and presents the correct data. The 2022 hydroperiods you cite above were actually 15.8% for GW4 and 18.7% for GW6. The more recent data for 2023 shows hydroperiods of 7.5% and 27% for those wells. This was during a very wet late spring, with April rainfall exceeding 1" above the 70% historic value and during a time when the groundwater levels are usually falling. This area does have reasonable existing hydrology, but EPR is still confident that those hydroperiods can be significantly improved. It should also be noted that GW6 was deliberately placed in the visibly wettest area within W-C along the toe of slope by an apparent seep as we were trying to determine the greatest potential hydroperiod. GW4 is located in a more representative looking area. EPR is confident that the proposed design will increase the hydrology of the existing wetland and restore the hydrology to the adjacent reestablishment wetland areas. The thinning effort will result in a significant removal of the smaller sweetgums (which dominate the area) and the understory, shrub, and herbaceous layers will be restored, each of which having been substantially impacted by the presence of livestock who clearly congregate throughout this area for extended periods. As such, the rehabilitation approach for the improvements to both the hydrology and vegetation, along with the exclusion of livestock and surface roughening, is still appropriate.**

4. Section 8.2 – Additional volunteers may count towards vegetative success if approved by the IRT on a case-by-case basis. Due the mortality risk, volunteer ash species should not be included in the count towards vegetative success. **Response: The text in this section was revised to include these statements.**

Ecosystem Planning and Restoration, LLC
204 Stone Ridge Blvd.
Asheville, NC 28804
www.eprusa.net

5. Figure 10A – Please swap the veg plot type for the two plots along the UT2 wetland area (i.e., temp to fixed and fixed to temp) so there is a permanent representative veg monitoring station for the W1 credit area. Also, please make sure to capture representative areas of priority 2 bench cuts and valley slopes in veg plot data, as these conditions can be challenging for vegetation establishment. **Response: The veg plot types in that wetland area along UT2 have been swapped as requested. EPR will ensure that areas such as bench cuts will be represented during vegetation plot establishment.**

6. Appendix 4 – The groundwater well preliminary hydroperiod summaries table 2022 data does not match the information provided on the individual well graph pages. Please update. **Response: As noted above in Comment 3, the percentages shown on the individual graphs were incorrectly calculated. It is actually the summary table that is accurate. Again, our apologies for the confusion.**

7. Sheet 1A #13 – How will haul roads and staging areas soil compaction be addressed? **Response: Haul roads and staging areas will be ripped and/or disked as needed, then amended, seeded, and covered with straw as per the Phase 5 Project Demobilization task list shown on Sheet 1C.**

8. Sheet 2G includes a detail of a base flow ditch. Is this conveyance feature proposed on this project? If so, where? **Response: This feature will be used at the very top of UT1 along the steepest section of cut side slopes beside the rock step pool feature (Sheet 13). They will act to intercept overland flow prior to flowing over the terrace slope cut area and divert it into a stable riffle about 100-ft downstream in a flatter section of the reach. They are quite shallow (6” depth) and will vegetate over time.**

9. Sheet 5 (and corresponding Sheet 45) – It appears during design the UT2 confluence with NFMC shifted further east and downstream compared to the proposal concept map, which has resulted in the UT2 priority 2 bench cutting into the adjacent wetland credit area (UT2 approx. Sta. 42+75 to 44+50). Typically, wetland credit areas proposed to be graded greater than 12 inches are considered wetland creation (3:1). Sheet 45 appears to show a 1–2-foot cut in the UT2 bench area overlapping proposed wetland credit. Please calculate and show the proposed wetland credit area to be graded greater than 12 inches. Additionally, is the concern that the priority 2 stream restoration could have a drainage effect on the adjacent wetland credit area. Please provide more information to address this concern (e.g., modeling). **Response: During the design phase, reach UT2 was realigned to better follow the natural contours within the floodplain (revealed during the topographic survey) and to preserve a few very large trees. The lowermost section of UT2 drops in elevation to meet NFMC and as such, necessitates a bench for stability and to provide access to a floodplain. And though the deeper cutting occurs at the very end of the reach (downstream of the wetland area), most of the cut areas of concern in the wetland are within the 1-2 ft depth cited in your comment. However, the total area of wetland affected by the cutting is only 0.07 acres of the total 2.70 acres of proposed credited wetland area in this location (just 2.6%) and just 1.8% of the total proposed credited wetland area. EPR has minimized the depth and width of the bench cutting in this location as much as possible while still maintaining reach stability. Reach UT2 will still be raised from the existing condition along this wetland which should help raise groundwater to the area. Additionally, there will be some adjacent grading outside of the wetland along a portion of the confining hillside to the left of lower**

UT2 (as shown on Sheet 45) where it is still P1 to connect overbank flows to the wetland area. Currently, the wetlands receive no overbank flow from the incised UT2 channel which is located ~100 ft farther away from its proposed location. The surface roughening proposed throughout the wetland will also help it hold hydrology for much longer periods. Small drainage patterns that have been established by and/or exacerbated by cattle will also be eliminated during the roughening as well. Finally, the program 'Lateral Effect' was used to help assess the degree to which the new channel will impact the wetland. The program estimates the lateral extent (width) that a ditch will impact an adjacent jurisdictional wetland. It was used here to estimate the expected impact of the cut stream and bench (substituting for the ditch) on the existing wetland. It was run twice, once for the stream channel itself and again for the benching, since they are different depths of cut. The output says the stream channel itself will affect the wetland for a lateral distance of ~5-ft as measured from the channel edge, which is still within the adjacent benching. Whereas the shallower bench cut is estimated to affect the wetland for a lateral distance of ~4-ft, which would be within the terrace sloping area as we connect back into existing ground. Admittedly, the model wasn't expressly intended for this type of application, but it does provide some useful data that the proposed stream will have negligible impacts on the adjacent wetland area.

As a result of the above, EPR has confidence this wetland will show improved hydrology during the monitoring period, even alongside this cut area. To confirm hydrology has not been impacted, we have added an additional proposed monitoring well to be located within the wetland reestablishment area (see Figure 10B) as per a discussion with DWR on 7/25/23 (Mac Haupt and Maria Polizzi). This new well will be located fairly closely to another well within the reestablishment area, which is itself located in the same spot as the pre-construction background well, thus providing excellent data for comparative purposes throughout the monitoring phase.

10. Sheets 8 & 9 (and corresponding Sheets 47 & 48) – UT2 appears to transition from priority 2 to priority 1 restoration for the channel section along the proposed wetland reestablishment area (Sta. 18+50 to 24+50), correct? Is any grading greater than 12 inches proposed within the wetland credit area? **Response: That is correct, UT2 is Priority 1 through this section of the project along the proposed wetland reestablishment, though there is some benching to be cut at the top and bottom where it ties into Priority 2 sections. However, no grading greater than 12" is proposed here within the wetland areas.**

11. General Design – I agree with DWR that proper installation of stream structures within proposed B-type channels is important to minimize potential channel instability. **Response: We will certainly ensure that the in-stream structures are installed correctly.**

12. General Design – Please confirm the old channel areas will be backfilled to match surrounding grade. **Response: We can confirm that the old channels will be backfilled up to the surrounding grade.**

Ecosystem Planning and Restoration, LLC
204 Stone Ridge Blvd.
Asheville, NC 28804
www.eprusa.net

If you have any questions regarding this response, please do not hesitate to contact me at jbyers@eprusa.net or 828-989-5592.

Sincerely,

Jake Byers, PE

EXECUTIVE SUMMARY

The Bandys Farm Stream and Wetland Mitigation Project (Project, Site) is located within the Mountain Creek subwatershed of the Catawba River Basin Hydrologic Unit Code (HUC) 03050101. The Site falls within a NC Department of Environmental Quality (NCDEQ), Division of Mitigation Services (NCDMS) Targeted Resource Area (TRA; Catchment ID 9753528). The Site is not located within an NCDMS Local Watershed Planning (LWP) Area nor a Targeted Local Watershed (TLW). The Project is in Catawba County approximately 5 miles south of the town of Catawba and will include the restoration of streams and riparian wetlands adversely affected by agricultural use. The restoration of these features, as well as their placement within a permanent conservation easement, will ensure they are protected from future growth and development in the Catawba basin. The proposed work presented in this mitigation plan will also tie into an existing NCDMS mitigation project (North Fork Mountain Mitigation Site).

The Project involves the enhancement of a section of North Fork Mountain Creek (NFMC), the restoration of five unnamed headwater tributaries to NFMC (UT1, UT1A, UT2, UT3, and UT3A), and the restoration of adjacent riparian wetlands, all of which have been adversely affected by past channelization and incision, livestock access, and loss of riparian buffers. Restoration practices will utilize a mix of Priority Levels I and II to relocate and raise the stream bed elevations where possible as well as construct floodplain benches to reconnect the streams to an active floodplain along the fall of the valley, thereby restoring flow dynamics and a functioning stream system. Restoration activities proposed as part of the Project are expected to improve the water quality of receiving waters and improve habitat for biota.

The proposed mitigation activities for the Bandys Farm Stream and Wetland Mitigation Project will provide 7,522.530 Warm Stream Mitigation Credits (SMCs) as well as 3.190 Riparian Wetland Mitigation Credits (WMCs). These features will be protected within a 31.9-acre conservation easement.

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

- Federal rule for compensatory mitigation project sites as described in the Federal Register Title 33 Navigation and Navigable Waters Volume 3 Chapter 2 Section § 332.8 paragraphs (c)(2) through (c)(14).

- NCDEQ Division of Mitigation Services In-Lieu Fee Instrument signed and dated July 28, 2010

These documents govern NCDEQ Division of Mitigation Services (DMS) operations and procedures for the delivery of compensatory mitigation.

Table of Contents

LIST OF FIGURES

LIST OF TABLES

LIST OF APPENDICES

1.0 PROJECT INTRODUCTION

Ecosystem Planning and Restoration, PLLC (EPR) was contracted with the North Carolina Department of Environmental Quality (NCDEQ) Division of Mitigation Services (DMS) October 21, 2021 to provide stream and riparian wetland mitigation credits in the Catawba River Basin Hydrologic Unit Code (HUC) 03050101, through the Bandys Farm Stream and Wetland Mitigation Project (Project, Site), under RFP #16-20210102. The Project is located in Catawba County off of Buffalo Shoals Road (SR 1003), approximately 5 miles south of the town of Catawba (Figure 1). The Project is located within the DMS Targeted Resource Area (TRA) catchment ID 9753528, which is listed for all three functional categories of habitat, hydrology, and water quality (Figure 3a). The Project is in the Piedmont Level III Ecoregion and the Southern Outer Piedmont (45b) level IV Ecoregion, both as defined by the United States (US) Environmental Protection Agency (EPA).

The Bandys Farm Stream and Wetland Mitigation Project involves the restoration of five unnamed tributaries to North Fork Mountain Creek (NFMC), the enhancement of a section of NFMC itself, and the restoration of adjacent riparian wetlands. All of these have been impacted by past channelization and incision, livestock access, and loss of riparian buffers. Additionally, the project will adjoin both the upstream and downstream limits of an existing DMS project, the North Fork Mountain Creek Mitigation Site located along lower UT1 and NFMC.

The design approach for restoration will involve both raising the streambeds of the Project streams and either reconnecting them with active floodplains along the fall of the valley whenever practical (Priority 1) or excavating a floodplain at a lower elevation (Priority 2), either of which will restore flow dynamics and contribute to a healthy stream and wetland system. Stream enhancement practices will include the addition of in-stream structures, bank stabilization, livestock exclusion, and riparian buffer plantings.

The Project will also involve the re-establishment and rehabilitation of riparian wetlands that have been impacted by historic livestock access and agricultural conversion, and drained primarily through stream channelization and subsequent incision, as well as some ditching and drainage modifications. Raising the streambeds of the Project streams and reconnecting them with active floodplains will restore and enhance wetland hydrology. Wetland re-establishment practices will also involve roughening the wetland surface to remove historic livestock soil compaction (restoring natural wetland topography and increasing surface storage) as well as establishing native wetland vegetation. Rehabilitation practices on existing jurisdictional wetlands will involve removing drainage features that are negatively impacting hydrology, increasing overbank flooding and surface storage, and establishing native wetland woody vegetation. Buffers of a minimum 75-ft width will be established along the entire restored stream and riparian wetland system, and all work will be protected by a permanent conservation easement.

Site mitigation activities will provide a total of 7,522.530 Warm SMCs and 3.190 Riparian WMCs within a 31.9-acre permanent conservation easement, and will include the following:

- Restoration of 6,710 linear feet of stream channel that has been straightened and channelized for agricultural purposes;
- Enhancement of 1,315 linear feet of stream channel that has been degraded by adjacent agricultural use, including livestock access;
- Restoration (Wetland Reestablishment and Rehabilitation) of 3.879 acres of Riparian Wetlands along the historic UT2 and NFMC floodplains; and
- Restoration of riparian buffers a minimum of 75 feet in width or wider along all the stream reaches, generating additional stream credits for the project.

Table 1. General Project Information

General Project Information	
Project Name	Bandys Farm Stream and Wetland Mitigation Project
County	Catawba
Project Conservation Easement Area (acres)	31.9
Project Coordinates (latitude and longitude)	35.629112 N, -81.080591W
Planted Acreage (acres of woody stems to be planted)	29.8

1.1 Property Ownership and Boundary

The Project will consist of a 31.9-acre permanent conservation easement located within two parcels; a 379.2-acre parcel owned by Bandys Farm LLC and a 68.8-acre parcel owned by Tony E. & Amy S. Huffman. The easement deed and survey plat documents were reviewed and approved by both NCDMS and the State Property Office (SPO) prior to being recorded. The easement will ultimately be held by the State of North Carolina. The easement and survey documents were recorded at the Catawba County Register of Deeds on April 6, 2023 and a copy of the recorded plat is provided in Appendix 1.

1.2 Stream Crossings

As part of the Project an existing culvert stream crossing on UT1A will be removed and a ford crossing on lower UT1 will be removed. Additionally, two existing pipe culvert stream crossings located outside the conservation easement along UT2 will be improved to allow the landowner access to adjacent pastures (Figure 2). The lower crossing will be converted to a rock ford crossing, while the upper crossing will have its existing culvert replaced with a new pipe with two additional floodplain pipes, each appropriately sized for stability and aquatic organism passage.

1.3 Utilities

There are no underground or overhead utilities within the proposed conservation easement boundary.

1.4 Site Access

All portions of the conservation easement are accessible via state-maintained Buffalo Shoals Road, which will provide perpetual Project access.

2.0 WATERSHED APPROACH AND SITE SELECTION

The Bandys Farm Project is located within the subwatershed 03050101-150030 of the Catawba River Basin (Figure 3a), as well as within the DMS Targeted Resource Area (TRA) catchment ID 9753528, which is listed for all three functional categories of habitat, hydrology, and water quality. Additionally, DMS' 2007 *Catawba River Basin Restoration Priorities* (RBRP) report (amended March 2013), states that a main goal of the lower Catawba basin is the protection of critical water supply reservoirs and their riparian areas, specifically citing Lake Norman. The Project is located within a designated Water Supply Watershed Level IV and is only ~3.5 miles upstream of Lake Norman (NFMC flows directly into it). Thus, the project will help meet a direct DMS planning goal by improving and protecting water quality to the reservoir.

The NC Division of Water Resources' (formerly Division of Water Quality) *2010 Catawba River Basinwide Water Quality Plan* (DWR 2010) identifies several stressors that DWR monitors in streams within in the Headwaters Subbasin portion of the watershed including: turbidity, low pH, metals, dissolved oxygen, temperature, and fecal coliform bacteria. The Project will directly address most of those stressors by stabilizing stream banks (thus reducing erosion and subsequent stream sedimentation and turbidity), fencing livestock out of streams (reducing fecal coliform), restoring riparian buffers (helping filter pollutants and ultimately providing a shading canopy), and constructing in-stream structures and improving riffle/pool bed form (helping oxygenate the water). For the smaller 10-digit HUC in which the project is located, the report specifically mentions that protecting Lake Norman is an important basin priority, even discussing historic fish kills on the lake.

In addition, the restoration and protection of the streams as part of the project will assist in providing a geographical connection with surrounding conservation features such as the adjacent North Fork Mountain Creek Mitigation Site, the nearby Lyle Creek and Wike Property Mitigation Sites, as well as nearby Natural Areas such as Murray's Mill, Catawba Land Conservancy easements, and the Terrapin Creek Corridor (Figure 4).

Thus, the implementation of the Bandys Farm Project will directly and/or indirectly address many of the priority stressors and targeted objectives identified in the watershed planning documents discussed above and will permanently protect the entire project area within a conservation easement. Therefore, the proposed project location and restoration approaches align well with the overall watershed goals outlined by DMS and DWR.

These watershed planning goals are further reflected in the overall Project goals and objectives outlined in Section 6.0 of this report.

3.0 BASELINE AND EXISTING CONDITIONS

The Project is in a rural area of southeastern Catawba County. All the streams for the Site are classified as having a warm-water thermal regime. Land use within the 2.19 mi^2 Project watershed consists predominately of agricultural and forested land with some significant developed area as well (including 1.1% impervious surface). The Site itself has been clearly impacted by agricultural practices, by past stream channelization, and by the substantial loss of riparian buffers. An analysis of historical imagery of the area indicates that much of the Site was cleared and channelized prior to 1950 (Figure 5a) with the exception of UT1 and UT1A. However, by 1976 the Site had been cleared even further with additional stream channelization evident (Figure 5b). The Site has remained in a similar condition since that time with only the large wetland area at the bottom of the Project having been allowed to revegetate into woodland. These impacts present a significant opportunity for water quality and ecosystem improvements through the implementation of this Project.

All Project watersheds were delineated using the online USGS StreamStats program and were verified based on field observations and site-specific topographic survey data. A Project watershed summary is provided below in Table 2.

Table 2. Project Watershed Summary Information

Project Watershed Summary Information	
Physiographic Province	Piedmont
Level III, IV Ecoregions	Piedmont, 45b Southern Outer Piedmont
River Basin	Catawba
USGS Hydrologic Units 8-digit, 12-digit	03050101, 030501011201
DWR Sub-basin	03-08-32
Project Drainage Area (acres)	1,398.7
Land Use Classifications*	51% agricultural use, 36% forested, 7.3% developed land, 2.8% shrub, and 1.9% grass/herbaceous
Impervious Surface	1.1% impervious
Thermal Regime	Warm

*From the USGS National Land Cover Dataset (NLCD)

3.1 Geology and Soils

The Project lies within the Piedmont physiographic province and the Piedmont Level III Ecoregion, which is generally characterized as an erosional terrain. Further, the Project is within the Southern Outer Piedmont Level IV EPA Ecoregion, which is typified by dissected irregular plains with few low rounded hills and ridges with deep, well-drained soils and low to moderate gradient streams. The area gets a mean annual precipitation of 44-56 inches and is in the Thermic soil temperature regime. Common land uses include pine plantations; hay, cattle, dairy, and poultry production; and urban development.

Geologically, the Project is divided with the western portion (UT1, UT1A, and upper UT2) being found within the Inner Piedmont Belt, while the eastern portion (lower UT2, UT3, UT3A, and NFMC) is within the Kings Mountain Belt. This region of the Inner Piedmont Belt is part of the Mica-schist Formation consisting of metamorphic rock with lenses and layers of quartz schist, micaceous quartzite, calc-silicate rock, biotite gneiss, amphibolite, and phyllite. This region of the Kings Mountain Belt consists of the Blacksburg Formation described as metamorphic rock with sericite schist, phyllite with sericite quartzite, banded marble, amphibolite, and minor calc-silicate rock also present (NCGS 1985).

The mapped soils in the Project area are predominantly Chewacla loams along UT2 and the North Fork Mountain Creek floodplain (to include UT3 and UT3A) and Madison-Bethlehem Complex soils along UT1 and UT1A (Figure 6). A complex consists of two or more soils found in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the two soils found in a complex are generally similar in all areas mapped as such. Chewacla soils are commonly found in floodplains throughout the piedmont and are considered hydric by the NRCS for Catawba County for known inclusions of Wehadkee sandy loam in the wetter, lower-lying areas. Madison and Bethlehem soils are also commonly found throughout the piedmont along upland slopes. More detailed NRCS soil descriptions are provided below in Table 3.

Table 3. Project Soil Types and Descriptions

Soil Name	Description	Hydric Status
Chewacla	Chewacla loams are very deep, somewhat poorly drained soils commonly found along floodplains of the piedmont and coastal plain river valleys. These soils have high available water capacity and have a wide range of expected flood frequencies and durations. Taxonomic Class: Fine-loamy, mixed, active, thermic Fluvaquentic Dystrudepts	Hydric (for inclusions)
Madison	Madison gravelly sandy loams are very deep, well drained soils located on gentle to steep upland slopes in the piedmont. Madison soils are not expected to be subject to flooding or ponding. Taxonomic Class: Fine, kaolinitic, thermic Typic Kanhapludults	Non-hydric
Bethlehem	Bethlehem gravelly sandy clay loams are moderately deep, well drained soils located along ridgetops and upland slopes in the upper piedmont. Bethlehem soils are not expected to be subject to flooding or ponding. Taxonomic Class: Fine, kaolinitic, thermic Typic Kanhapludults	Non-hydric

To further investigate soil conditions on the Site, George Lankford LLC was contracted to conduct on-site hydric soil investigations to determine the presence or absence of hydric soils within the proposed Project area, and to evaluate the Site soils for wetland mitigation potential. On-site investigations, consisting of 107 hand-turned auger borings, were conducted in May 2022 by George Lankford, LSS. Each boring was classified based on soil characteristics indicating hydric or non-hydric status. The findings indicated the presence of hydric soils within the Project area, most notably within portions of the floodplain along UT2 and NFMC. The results of this hydric soils investigation (full report provided in Appendix 4) were used to develop the wetland re-establishment and rehabilitation boundaries presented in this report and shown on Figure 11.

3.2 Existing Vegetation

The majority of the Project is comprised of active livestock pasture, consisting predominately of fescue grass (*Festuca spp*.) but also with other common field species such as horsenettle (*Solanum carolinense*), goldenrod (*Solidago spp.*), white clover (*Trifolium repens*), milkweed (*Asclepias syriaca*), dogfennel (*Eupatorium capillifolium*), and broomsedge (*Andropogon virginicus*). The wooded portions of the Site, mainly consisting of a narrow buffer along the streams, are a mix of species including sweetgum (*Liquidambar styraciflua)*, black walnut (*Juglans nigra*), red maple (*Acer rubrum),* tulip poplar (*Liriodendron tulipifera*), tag alder (*Alnus serrulata*), sycamore (*Platanus occidentalis*), and sourwood (*Oxydendrum arboreum*). The forested wetland area at the bottom of the Project along the left bank of NFMC is dominated by sweetgum (*Liquidambar styraciflua*) with some red maple (*Acer rubrum*), tag alder (*Alnus serrulata*), and sycamore (*Platanus occidentalis*). The presence of livestock has clearly impacted the existing vegetation throughout the Site, particularly to the understory shrub and herbaceous plant communities.

Invasive species were also observed on the Site, mostly consisting of Chinese privet (*Ligustrum sinense*) and multiflora rose (*Rosa multiflora*), most notably found all along UT2 and upper UT1 but also found scattered throughout the Project. A few tree-of-heaven *(Ailanthus altissima,)* trees were also observed along UT1. Photographs of the Site can be found in Appendix 2.

3.3 Project Jurisdictional Resources

EPR conducted investigations for jurisdictional Waters of the US in July 2021 and again in March and April of 2022. Wetlands were delineated using the 1987 USACE Wetland Delineation Manual with the Eastern Mountains and Piedmont Regional Supplement and were further evaluated using the NC Wetland Assessment Method (NCWAM). The flow durations for every reach were assessed using the NCDEQ DWR Stream Identification Form Version 4.11. The NCWAM rating sheets and wetland delineation forms are found in Appendix 3 while the NCSAM and DWR stream forms are found in Appendix 5. Summary Tables 4 and 5 below describe the stream and wetland resources for the Project.

A Preliminary Jurisdictional Determination (PJD) package was submitted to the USACE on July 14, 2022 and a site visit was conducted on August 25, 2022 to review and confirm the aquatic resources. The meeting was attended by Krysta Stygar (USACE) and Jake Byers (EPR). The final notification of PJD dated September 14, 2022 is provided in Appendix 3.

Table 4. Stream Resource Summary Information

Reach	UT1	UT1A	UT2	UT3	UT3A	NFMC
Pre-Project Length (ft)	1,722	1,199	3,547	318	81	1,522
Post-Project Length[1] (ft)	1,688.9	1,211.3	3,379.7	290.0	140.4	1,315.7
Drainage area[2] (acres)	76.9	44.8	272.9	120.5	8.3	1,398.7
Drainage area (sq. mi.)	0.12	0.07	0.43	0.18	0.013	2.19
Valley slope (ft/ft)	0.0445	0.0363	0.0163	0.0442	0.0125	0.0113
Valley confinement	Confined	Confined	Moderately Confined	Moderately Confined	Unconfined	Unconfined
DWR Stream Form Score and Flow Status	Upper: 25.0-28.75 (intermittent) Lower: 32.75 (perennial)	22.75 (intermittent)	35.5 (perennial)	19.5 (intermittent)	23.5* (intermittent)	>30 (perennial)
DWR Water Quality Classifications	WS-IV	WS-IV	WS-IV	WS-IV	WS-IV	WS-IV
Rosgen Classification of Existing Condition	E4b	B4	B4c	B4	B4	B4c
Rosgen Classification of Proposed Condition	B4	B4	B4c	B4	B4c	B4c
Simon Evolutionary Stage	III – Degrading	III – Degrading	III – Degradation	III – Degrading	III – Degrading	II – Degradation and Widening

[1] Reach lengths provided are located within the Conservation Easement, with all breaks removed.
[2] Watershed drainage areas based on USGS StreamStats analysis as well as from topographic and LiDAR information at the downstream end of each reach.
*Although rated as intermittent in the DWR form, EPR staff believe the spring-fed reach is likely perennial and have observed flow throughout the year.

Table 5. Wetland Resource Summary Information

Wetland	WA	WB	WC	WD	WE
Pre-Project Size (Acres)	0.047	0.053	1.980	0.185	0.017
Post-Project Size (Acres)	0.047	0.053	1.922	0.144	0.017
Wetland Type (riparian or non-riparian)	Riparian	Riparian	Riparian	Riparian	Riparian
Predominant Mapped Soil Series	Madison-Bethlehem complex	Chewacla	Chewacla	Chewacla	Chewacla
Soil Hydric Status	Non-Hydric	Hydric (for inclusions)	Hydric (for inclusions)	Hydric (for inclusions)	Hydric (for inclusions)

4.0 FUNCTIONAL UPLIFT

Based on field evaluations and the proposed mitigation practices described in this document, functional ratings were developed for the existing and proposed conditions of the Project stream (Table 6), following the methodology and definitions described in Harman, et al., 2012. This information is provided to assist in communicating Project goals and objectives related to functional lift but is not proposed for use in setting performance standards. Performance standards are specifically discussed in Section 8 and follow guidance provided by the NCDEQ DMS and USACE Wilmington District.

In their current condition, the Project reaches and wetland areas are substantially degraded. Of the impairments present on the Site, historic livestock access to the streams and current agricultural practices are the most severe, resulting in direct input of nutrients and coliform, channel instability and erosion, lack of bedform diversity, and degraded riparian vegetation. Functional uplift will come from restoring the Project streams to stable, functioning conditions, restoring appropriate stream form, improving and expanding adjacent floodplain wetlands, and permanently restoring natural riparian vegetation along all Project stream reaches and riparian wetlands. In-stream structures will ensure channel stability and improve aquatic habitats. The use of primarily log and wood structures will further enhance aquatic habitat. Restored riparian buffers will provide woody debris and detritus for aquatic organisms. Restored buffers will also provide shade, reduce water temperatures, and increase dissolved oxygen concentrations, which should all benefit aquatic life and help to re-establish diverse aquatic and terrestrial habitats that are appropriate for the ecoregion and landscape setting.

Table 6. Summary of Existing and Proposed Functional Ratings for the Project Reaches

Functional Category	Reach UT1		Reach UT1A		Reach UT2	
	Existing	Proposed	Existing	Proposed	Existing	Proposed
Hydrology [1]	FAR	FAR	FAR	FAR	FAR	FAR
Hydraulics [2]	NF	F	NF	F	NF	F
Geomorphology [3]	NF	F	NF	F	NF	F
Physicochemical [4]	NF	FAR	NF	FAR	NF	FAR
Biology [5]	FAR	FAR	FAR	FAR	FAR	FAR
Functional Category	Reach UT3		UT3A		NFMC	
	Existing	Proposed	Existing	Proposed	Existing	Proposed
Hydrology [1]	FAR	FAR	FAR	FAR	FAR	FAR
Hydraulics [2]	NF	F	NF	F	NF	F
Geomorphology [3]	NF	F	NF	F	FAR	F
Physicochemical [4]	NF	FAR	NF	FAR	NF	FAR
Biology [5]	FAR	FAR	FAR	FAR	FAR	FAR

Note 1: Hydrology – All reaches are listed as Functioning At-Risk (FAR) in their existing and proposed conditions, due to modified surrounding agricultural landscapes, as well as the potential for future development within the watershed.

Note 2: Hydraulics – All reaches are incised and entrenched to some degree and are no longer connected to their adjacent floodplains and are therefore listed as Not Functioning (NF) in their existing condition.

Note 3: Geomorphology – All reaches exhibit channel instability, lack large woody debris and woody riparian buffers, and are therefore listed as either Not Functioning (NF) or Functioning-At-Risk (FAR) in their current condition.

Note 4: Physicochemical – While no water quality sampling data have been collected, water quality is assumed to be impaired and Not Functioning (NF) due primarily to cattle access and loss of riparian buffers. Restoration practices will exclude cattle from streams and restore functional buffers along all stream reaches of sufficient width to provide water quality improvements.

Note 5: Biology – Preliminary observations of aquatic life indicate the presence of fish and macrobenthic life in each of the Project reaches, although benthic communities appear to be impaired, and are therefore considered Functioning At-Risk (FAR). Restoration practices will restore appropriate habitats, reduce sediment and nutrient loads, exclude cattle from streams, and provide increased shading and organic material inputs; however, it is unlikely that fully functioning conditions will be restored due to watershed stressors.

For comparison, the existing functional conditions were also assessed for each Project reach using the NC Stream Assessment Method (NCSAM; SFAT 2015) for all three functional classes. Table 7 below shows the NCSAM functional ratings Summary, while the rating sheets are provided in Appendix 5.

Table 7. Summary of NCSAM Stream Functional Ratings for Existing Conditions

	Project Reach					
	UT1	UT1A	UT2	UT3	UT3A	NFMC
Hydrology	Low	Low	Low	Low	Low	Medium
Water Quality	Medium	Low	Low	High	Medium	High
Habitat	Low	Low	Medium	Medium	Low	High
Overall	**Low**	**Low**	**Low**	**Medium**	**Low**	**High**

The areas proposed for wetland restoration have had their natural hydrology clearly impacted due to the channelization, relocation, and/or incision of their adjacent streams, thus lowering their groundwater tables and reducing overbank events. These areas also do not support appropriate wetland vegetation communities due to livestock impact and conversion to pasture. Functional uplift will come through the restoration of wetland hydrology by: 1) relocating the adjacent stream channel and raising the bed elevation; 2) designing for appropriate stream channel form and overbank events as would be typical for piedmont stream systems; and/or 3) removing drainage paths and re-routing or diffusing concentrated stormwater flow currently diverted away from the wetlands. Native woody and herbaceous vegetation will also be planted to restore a full wetland vegetation community and to provide a functional riparian buffer.

Table 8 summarizes the NC Wetland Assessment Method (NCWAM) functional ratings (NC WFAT 2010) for all of the existing wetlands on Site, categorized as either headwater forest or bottomland hardwood forest in the methodology. Wetlands C and D are proposed for rehabilitation credit, while wetlands A, B, and E will be planted and protected. The complete NCWAM rating sheets are provided in Appendix 3.

Table 8. Summary of NCWAM Wetland Functional Ratings for Existing Conditions

	Existing Wetland Functional Ratings			
	W-A	**W-B**	**W-C & W-E**	**W-D**
Hydrology	Low	Low	Medium	Low
Water Quality	Low	Low	High	Low
Habitat	Low	Low	Low	Low
Overall	**Low**	**Low**	**Medium**	**Low**

5.0 REGULATORY CONSIDERATIONS

Regulatory considerations for the Site are shown in Table 9 and are described in the following sections.

Table 9. Summary of Regulatory Considerations

Regulatory Parameter	Applicable?	Resolved?	Supporting Docs.
Waters of the United States - Section 401/404	Yes	Yes	Appendix 3
Endangered Species Act	Yes	Yes	Appendix 6
National Historic Preservation Act	Yes	Yes	Appendix 6
Coastal Zone Management Act (CZMA or CAMA)	No	N/A	N/A
FEMA Floodplain Compliance	No	N/A	N/A
Essential Fisheries Habitat	No	N/A	N/A

5.1 401/404

The proposed mitigation design will avoid or minimize all disturbance or impacts to the existing stream and wetland features during project construction wherever practicable. Due to the inherent nature of the project, a complete avoidance of all impacts to jurisdictional features is not possible. Stream channel impacts will be due to restoration or enhancement activities including the relocation of the restored channels to their historic alignments. There will be some small areas of unavoidable, permanent impacts to the existing wetlands onsite due to realignment of channel features, as well as temporary impacts during project construction. The latter impacts are considered temporary in nature since the area will be replanted and allowed to reforest. However, it is expected that restoration activities will ultimately result in an uplift to overall wetland function on the Site. The existing wetland conditions were assessed using NCWAM and were found to be low to medium functioning (see Table 8 in Section 4.0 of this report for more details). A PJD package was submitted to USACE on July 14, 2022 and a Notification of Jurisdictional Determination was approved on September 14, 2022. A copy of the Pre-Construction Notification (PCN) will be provided with the Final version of the Mitigation Plan, which will include figures detailing the exact locations and sizes of temporary and permanent impacts. Construction activities will be conducted under a Nationwide Permit #27, Aquatic Habitat Restoration, Enhancement, and Establishment Activities with the submittal and approval of the PCN.

5.2 Categorical Exclusion for Biological and Historical Resources

A Categorical Exclusion (CatEx) document for the Bandys Farm Stream and Wetland Restoration Project was approved by the Federal Highway Administration (FHWA) on April 12, 2022 and is provided in Appendix 6. The CatEx document investigates the presence of threatened and endangered species as well as any other natural, cultural, or historical resources that may occur within the Site.

5.2.1 Biological Resources

The Endangered Species Act (ESA) of 1973, as amended (16 U.S.C 1531 et seq.), defines protection for species with the Federal Classification of Threatened (T) or Endangered (E). An "Endangered Species" is defined as "any species which is in danger of extinction throughout all or a significant portion of its range" and a "Threatened Species" is defined as "any species which is likely to become an Endangered Species within the foreseeable future throughout all or a significant portion of its range" (16 U.S.C 1532).

EPR submitted a project review certification letter to the US Fish and Wildlife Service (USFWS) Asheville field office on December 20, 2021 regarding the Project's potential impacts to threatened or endangered species. A response letter dated January 6, 2022 was received from the field office that included a list of federally designated species for the project (see Table 10) along with general comments and survey recommendations. Similarly, the NC Wildlife Resources Commission (WRC) was notified about the project and a letter dated January 19, 2022 was received back that included additional project comments and recommendations along with a field survey request for the state significantly rare prairie trillium (*Trillium recurvatum*).

In accordance with these recommendations, EPR conducted a field survey within the recommended windows for both the dwarf-flowered heartleaf and prairie trillium on March 30, 2022 and found no indication that those species were present on the Site. Additionally, a field survey for the Schweinitz's sunflower was conducted on August 25, 2022 and found no indication that this species is present on site either. In fact, the only open-field habitat preferred by Schweinitz's sunflower that is present on the Site has been heavily impacted as managed livestock pasture and thus is unlikely to support this flower. Since the initial coordination with USFWS, EPR has received a follow-up coordination letter (dated October 3, 2022) to confirm our assessments. Copies of all agency coordination letters can be found in Appendix 6.

Table 10. Federally Listed Threatened or Endangered Species

Scientific Name	Common Name	Federal Status	Habitat Present	Biological Conclusion
Myotis septentrionalis	Northern Long-eared Bat	T	Yes	4d Rule Compliant
Glyptemys muhlenbergii	Bog Turtle	T S/A	No	Not Required
Helianthus schweinitzii	Schweinitz's Sunflower	E	Yes	NLAA
Hexastylis naniflora	Dwarf-flowered heartleaf	T	Yes	NLAA

NLAA = "may affect, not likely to adversely affect"

The Northern Long-Eared Bat (NLEB) 4(d) Streamlined Consultation Form was approved by the FHWA on December 17, 2021 and was sent to USFWS. The original response letter acknowledged the applicability of the 4(d) rule for the NLEB for this project, and the follow-up letter confirmed that it is still applicable. This was notable as the NLEB has been scheduled to be listed as Endangered and the initial discussions with USFWS indicated that it would no longer be allowed to be considered under the 4(d) rule. However, the USFWS ultimately revised the consultation range for the NLEB and the project is no longer within its 'action area'.

5.2.2 Historical Resources

The CatEx document investigates the occurrence of any historical resources protected under The National Historic Preservation Act (NHPA) of 1966. The NHPA, as amended (16 U.S.C. 470), defines the policy of historic preservation to protect, restore, and reuse districts, sites, structures, and objects significant in American history, architecture, and culture. Section 106 of the NHPA mandates that federal agencies account for the effect of an undertaking on any property that is included in, or is eligible for inclusion in, the National Register of Historic Places.

A letter from the State Historic Preservation Office (SHPO) dated January 19, 2022 indicates no historic resources would be affected. Due to their conclusion, SHPO did not have any further comments on the Project as proposed.

5.3 FEMA Floodplain Compliance and Hydrologic Trespass

Upon review of the Federal Emergency Management Agency's (FEMA) National Flood Insurance Program's Digital Flood Insurance Rate Mapping (DFIRM) Panel 3710368800J, effective January 5, 2007, the Site is located in an area of minimal flood hazard (Zone X as shown in Figure 8). Therefore, under the current regulations, work associated with this Project is not anticipated to require coordination with FEMA or the local floodplain administrator or to require a Letter of Map Revision (LOMR) to revise the floodplain mapping for the Site.

UT1, UT1a, and UT3a are all reaches where there is no upstream stream length to trespass upon. UT3 will remain at it's current bed elevation and begins at the point of jurisdiction. Floodplain will be excavated providing additional storage which will lower upstream flood levels. The work proposed on NFMC including isolated bank grading and instream structures will have no impacts on flood water elevations upstream. The bed elevation is slowly being raised along UT2 from the top of the reach to tie into the historic floodplain. Wide bankfull benches will be excavated to provide significant floodplain access and floodwater storage along this length. Hydrologic trespass is not a concern for this project.

6.0 MITIGATION PROJECT GOALS AND OBJECTIVES

While the ultimate goal of the Project is to restore a self-sustaining stream and riparian wetland system, more specific Project goals and objectives were developed and are provided below in Table 11. The listed goals are statements about intended project accomplishments and are consistent with the identified watershed priorities as outlined in the Watershed Approach and Site Selection discussion in Section 2. By comparison, the objectives are intended to be specific, measurable, and represent direct steps towards accomplishing the associated goal. The project objectives will have performance standards and success criteria associated with them as described later in Section 8 of this report and will be evaluated throughout the monitoring phase of the project.

Table 11. Goals and Objectives for the Bandys Farm Mitigation Project

Goals	Objectives
Nutrient Reductions	▪ Restore and protect riparian buffers to filter runoff. ▪ Increased riparian wetland acreage and functions. ▪ Decrease nutrient inputs from runoff. ▪ Exclude livestock from project streams and buffers.
Sediment Reductions	▪ Stabilize stream channels and other areas of erosion on the Project Site. ▪ Restore and protect riparian buffers to filter runoff. ▪ Decrease sediment inputs from runoff.
Reduce Fecal Coliform Inputs	▪ Exclude livestock from project streams and buffers. ▪ Restore and protect riparian buffers to filter runoff.
Improve Aquatic Habitats	▪ Restore appropriate bed form diversity and use in-stream structures to provide appropriate habitat. ▪ Restore riparian buffer vegetation to provide organic matter and shade.
Restore Wetland Habitat	▪ Restore high water table conditions. ▪ Plant native wetland species that are appropriate for the system. ▪ Protect restored habitat with a perpetual conservation easement.
Restore Wetland Hydrology	▪ Reconnect channelized streams to their historic floodplains where possible and restore overbank flooding. ▪ Restore natural microtopography to increase surface storage and decrease runoff.
Restore Terrestrial Habitat	▪ Restoration and permanent protection of forested buffers in riparian, wetland, and upland areas.

The performance standards associated with these goals and objectives are covered in Section 8.0 of this report.

7.0 DESIGN APPROACH AND MITIGATION WORK PLAN

The Project involves the enhancement of one section of North Fork Mountain Creek (NFMC), the restoration of five unnamed tributaries to NFMC (UT1, UT1A, UT2, UT3, and UT3A) as well as the reestablishment or rehabilitation of three areas of associated riparian wetlands. Each stream consists of only one design reach, and each was determined to be at least intermittent and was confirmed as jurisdictional by the USACE. The specific design approach selected for each reach is described in the sections below along with tables detailing the existing, reference, and proposed morphological characteristics for each. The construction plan sheets (Appendix 7) detail the design alignments, channel sizing, plan form geometries, slopes, in-stream structures, and elevations of all pertinent features. The overall project work plan is included in the plan sheets and provides a detailed description of proposed construction timing and sequencing, specific in-stream structure and other construction element designs, as well as a description of all grading and planting activities.

Both the NC Rural Piedmont regional curve (Harman et al, 1999) and the NC Rural Mountain and Piedmont regional curve (Walker, unpublished) were used to help verify bankfull elevations, cross-sectional areas, and discharges during the project stream assessments, as well as to assist in determining design stream dimensions. Table 12 below shows the complete results of that analysis. Additionally, reach discharge was estimated using other methods including Friction Factor/Relative Roughness Ratio, Manning's 'n' from Friction Factor and Roughness, and by Manning's 'n' from Stream Type.

Table 12. Regional Curve Analysis by Reach

	UT1	UT1A	UT2	UT3	UT3A	NFMC
Drainage Area (mi^2)	0.046	0.070	0.430	0.180	0.013	2.18
NC Rural Mountain and Piedmont (Walker)						
Discharge (cfs)	4.9	6.8	28.5	14.4	2.0	102.3
Cross-Sectional Area (ft^2)	2.5	3.4	11.0	6.2	1.2	31.9
Width (ft)	5.6	6.5	12.7	9.2	3.7	23.2
Depth (ft)	0.5	0.5	0.9	0.7	0.3	1.4
NC Rural Piedmont (Harman et al.)						
Discharge (cfs)	9.7	13.1	48.5	25.9	4.3	156.3
Cross-Sectional Area (ft^2)	2.6	3.5	12.1	6.7	1.2	36.5
Width (ft)	3.2	3.8	8.3	5.7	1.9	16.6
Depth (ft)	0.6	0.6	1.2	0.9	0.4	1.9

Ultimately, the selected project reach design parameters did not rely upon a single reference reach but were based on surveys of reference reaches conducted in the past, the extensive NCDOT database, published reference reach data, and design criteria and monitoring data from past successful restoration projects performed throughout the Piedmont region of North Carolina. Reference data compiled and presented by Lowther (2008) for similar stream types, drainage areas, and slopes located within the Southern Outer Piedmont of North Carolina were also reviewed to evaluate appropriate ranges of design parameters (to include sinuosity, pattern data, width/depth ratios, etc.).

Since the ranges provided by these analyses were quite wide, EPR further evaluated the reference information against past completed stream restoration projects that have performed well and have been tested by significant storm events. EPR staff have several relevant, successful projects that were restored over 15 years ago and have remained stable. These include the Hanging Rock Creek Site in Avery County, Michell River – Darnell Site in Surry County, the Mitchell River – Kraft Site in Surry County, and the Mitchell River – Boyd Woods Site in Surry County. Each of these past projects have comparable drainage areas and channel features to the design stream reaches on Bandys Farm and have been in place for over 15 years.

7.1 Stream Restoration Design Approach

Reach UT1

Reach UT1 begins at a seep/spring feature at the top of a narrow valley in the northwest portion of the property and flows southeast, ending shortly after its confluence with UT1A at the upstream boundary of the existing DMS North Fork Mountain Creek Mitigation Site. Above the top of the reach is an unstable, eroding gully with a head-cut directing stormwater flow into the channel. Its adjacent riparian area has been largely cleared for pasture though there is a very narrow buffer consisting of a single line of trees and shrubs found along its banks for some of its length. Livestock have access to the entirety of the reach. The E-type channel is fairly steep (3.8%) and deeply incised throughout its length (BHR ~4.5) with long sections of laterally unstable banks, approximately 50% of which are actively eroding. Towards the bottom of the reach there are two sections of exposed bedrock in the channel bed, one each above and below the confluence with UT1A. Although the reach was rated as an intermittent stream it has demonstrated consistent, if seasonally low, flow throughout its length starting from its spring origin point. EPR is confident it will demonstrate adequate flow post-construction, documented using in-stream flow gauges as detailed below in Sections 8.1 and 9.1.

A Priority II Restoration approach to build a B-type channel was selected for this reach. The valley is too narrow and the reach too incised for a Priority I approach. Instead, the stream will be restored using a riffle-step-pool bed morphology utilizing numerous in-stream structures to increase bedform diversity, habitat, and stability. Structures will include rock J-hooks, rock steps, rock cross vanes, log vanes, log rollers, and constructed riffles. Toe-wood with geolifts will be used to stabilize select stream banks and provide organic matter and refugia to the stream. Additionally, a bankfull bench will be excavated along the reach to provide a floodplain and all currently eroding banks will be stabilized. Table 13a below provides the existing and proposed design parameters for the reach.

Above the top of the reach, the eroding gully will be stabilized by constructing a step-pool channel to convey the stormwater flow entering the system in a stable manner. Riparian buffers with a minimum 75-ft width will be planted along the reach, consisting of a range of native species appropriate to the designated planting zones as described below in Section 7.4. A conservation easement will protect all of the stream and buffer features and it notably extends approximately 150-ft up above the credited section of reach to encompass and protect the constructed step-pool stormwater conveyance system as well. As part of project work for this reach, an existing ford crossing located below the confluence with UT1A will be removed. The bottom of this reach connects into an older closed-out DMS project (the North Fork Mountain Creek Mitigation Site). The existing fence line crossing over the stream from the top of that project will be removed so that there will be no fence to inhibit wildlife passage or interfere with floodwaters within the newly adjacent conservation easements.

Table 13a. Stream Morphology Table for UT1

Parameter	Existing Condition	Reference	Proposed
Contributing Drainage Area (acres/mi^2)	29.4 / 0.046		29.4 / 0.046
Channel/Reach Classification	E4b	B4	B4
Bankfull Width (ft)	4.9		5.7
Bankfull Mean Depth (ft)	0.52		0.5
Bankfull Area (ft^2)	2.5		2.6
Bankfull Velocity (ft/s)	1.9	4.0 – 6.0	1.9
Bankfull Discharge (cfs)	4.9		4.9
Channel Slope	0.0379		0.0379
Sinuosity	1.09	1.1 – 1.2	1.07
Width/Depth Ratio	9.5	12 - 18	12.5
Bank Height Ratio	4.4	1.0	1.0
Entrenchment Ratio	2.9		>1.4

Reach UT1A

Similar to UT1, Reach UT1A begins at a seep/spring feature at the top of a narrow valley in the northwest portion of the property and flows southeast, ending at its confluence with UT1. Above the top of the reach is an unstable, eroding gully with a head-cut directing stormwater flow into the channel. Its adjacent riparian area has been almost completely cleared for pasture and livestock have access to the entirety of the reach. The B-type channel is fairly steep (3.5%) and deeply incised throughout its length (BHR ~3.5) with long sections of laterally unstable banks, approximately 50% of which are actively eroding. Similar to UT1, reach UT1A was rated as an intermittent stream but has demonstrated consistent, if seasonally low, flow throughout its length starting from its spring origin point. EPR is confident it will demonstrate adequate flow post-construction using in-stream flow gauges as detailed below in Sections 8.1 and 9.1.

A Priority II Restoration approach to build a B-type channel was selected for this reach. The valley is too narrow and the reach too incised for a Priority I approach. Instead, the stream will be restored using a riffle-step-pool bed morphology utilizing numerous in-stream structures to increase bedform diversity, habitat, and stability. Structures will include rock J-hooks, rock steps, rock cross vanes, log vanes, log rollers, and constructed riffles. Toe-wood with geolifts will be used to stabilize select stream banks and provide organic matter and refugia to the stream. Additionally, a bankfull bench will be excavated along the reach to provide a floodplain and all currently eroding banks will be stabilized. Table 13b below provides the existing and proposed design parameters for the reach.

Above the top of the reach, the eroding gully will be stabilized by constructing a step-pool channel to convey the stormwater flow entering the system in a stable manner. Riparian buffers with a minimum 75-ft width will be planted along the reach, consisting of a range of native species appropriate to the designated planting zones as described below in Section 7.4. A conservation easement will protect all of the stream and buffer features and it notably extends approximately 100-ft up above the credited section of reach to encompass and protect the constructed step-pool stormwater conveyance system as well. As part of project work here, an existing pipe crossing located near the bottom of the reach will be removed, daylighting approximately 25-ft of stream. Additionally, a gully full of old farm debris is located on the left bank of UT1A at Station 15+00 (see Plan Sheet 18), which despite the debris does provide some volume of concentrated stormwater flow to the reach. As such, the debris will be removed from the gully, which will then be partially filled in, and a rock outlet BMP will be installed at the bottom. Bank sloping and stabilization will be conducted in the lower section of the repaired gully as necessary.

Table 13b. Stream Morphology Table for UT1A

Parameter	Existing Condition	Reference	Proposed
Contributing Drainage Area (acres/mi^2)	44.7 / 0.069		44.7 / 0.069
Channel/Reach Classification	B4	B4	B4
Bankfull Width (ft)	3.3		5.7
Bankfull Depth (ft)	0.78		0.5
Bankfull Area (ft^2)	2.6		2.6
Bankfull Velocity (ft/s)	2.8	4.0 – 6.0	2.8
Discharge (cfs)	7.3		7.3
Channel Slope	0.0347		0.0327
Sinuosity	1.03	1.1 – 1.2	1.02
Width/Depth Ratio	4.2	12 – 18	12.5
Bank Height Ratio	3.5		1.0
Entrenchment Ratio	2.20		>1.4

Reach UT2

Reach UT2 flows south onto the project and continues for approximately 3,500 feet to its confluence with NFMC. Its adjacent riparian area has been largely cleared for pasture though there is a very narrow buffer consisting of a single line of trees and shrubs found along its banks for much of its length. However, there are two areas of mature forest present in the buffer in the middle and lowermost sections of the reach. The forested area in the middle was noted by the IRT during the post-contract field visit. They requested that a restoration approach in this section be mindful of disturbance (see approach description below), particularly with respect to protecting existing trees. Livestock have access to the entirety of UT2 and there are two culvert crossings present here. The Bc-type channel has a slope of 1.4% and is deeply incised throughout its length (BHR ~4.0) with long sections of laterally unstable banks, approximately 60% of which are actively eroding.

A combination Priority I and II Restoration approach was selected for this reach to rebuild a Bc-type channel. The channel will be raised and relocated but constraints along its length prohibit the complete implementation of Priority I in its entirety. Namely, the existing deep stream incision, the two required crossings that must be replaced, and an incised receiving stream (NFMC) at the bottom, all while maintaining appropriate slopes for sediment transport. Nevertheless, UT2 will have its stream bed raised throughout the reach and will provide access to the historic floodplain where possible. Where Priority 1 restoration is not possible, bankfull benches will be excavated to provide floodplain access. UT2 will be aligned through the center of the valley. Table 13c below provides the existing and design parameters for the reach.

As noted above, the IRT requested a lighter touch be used on UT2 within the wooded area in roughly the middle section of the reach. As such, benching widths were restricted in this section and were focused more on the left bank (which is less steep and so requires less disturbance) to reduce impacts to adjacent trees.

Towards the bottom of UT2 at the end of the final segment of Priority 1 (and before the channel begins to drop elevation to tie-in to NFMC), grading will be conducted along the left floodplain along the adjacent hillslope, to allow out-of-bank flows from UT2 to access the wetland reestablishment and rehabilitation areas on the left floodplain of NFMC. This will provide additional hydrology to these areas to help ensure restoration success. Currently, the wetlands here receive no overbank flow from the incised UT2 channel which is located ~100 ft farther away from its proposed location.

Numerous in-stream structures will be installed throughout the reach to create a much improved riffle/pool channel morphology and to increase bedform diversity. Structures will include log J-hooks, log rollers, rock cross vanes, log vanes, and both woody and constructed riffles. Toe-wood with geolifts will be used to stabilize banks and provide additional organic matter and refugia to the stream. A riparian buffer of a minimum 75-ft width will be planted along the reach, consisting of a range of native species appropriate to the designated planting zones as described below in Section 7.4. As part of construction activities, two existing pipe crossings will be replaced; one with a rock ford crossing and one with a correctly-sized culvert with adjacent floodplain pipes.

Table 13c. Stream Morphology Table for UT2

Parameter	Existing Condition	Reference	Proposed
Contributing Drainage Area (acres/mi^2)	272 / 0.43		272 / 0.43
Channel/Reach Classification	B4c	B4c	B4c
Bankfull Width (ft)	9.1 – 11.7		11.8
Bankfull Depth (ft)	0.7 – 1.0		0.9
Bankfull Area (ft^2)	8.6 – 8.7		10.0

Bankfull Velocity (ft/s)	4.0 – 4.1	4.0 – 6.0	3.5
Discharge (cfs)	35		35
Channel Slope	0.0144		0.0152
Sinuosity	1.16	1.1 – 1.8	1.09
Width/Depth Ratio	9.5 – 15.8	12 – 18	14.0
Bank Height Ratio	3.9 – 4.1	1.0 – 1.0	1.0
Entrenchment Ratio	1.96 – 2.03		>3.0
d16 / d35 / d50 / d84 / d95 / dip / disp (mm)	0.8/7.2/13.3/35.9/57.7		

Reach UT3

Reach UT3 enters the project on the left bank of NFMC at the bottom of the reach flowing from the adjacent pasture to the north. It flows southwest across the NFMC floodplain making a sharp left turn and running parallel to NFMC for almost 100 feet before tying into NFMC. UT3 has likely been straightened in the past. The B-type channel has a slope of 2.6% and is deeply incised throughout its length (BHR ~4.5) with long sections of laterally unstable banks, approximately 70% of which are actively eroding. Livestock have access to the entirety of the reach. Its adjacent riparian area was cleared in the past as observed from aerial photos and though a significant portion of the buffer has returned to forest, obvious impacts still remain. Notably, a lack of a substantial understory and low species diversity consisting mostly of typical secondary growth species (e.g. sweetgum, loblolly pine, red maple, etc). Although the reach was rated as an intermittent stream it has demonstrated consistent flow during the project assessment phase and EPR is confident it will demonstrate adequate flow post-construction using an in-stream flow gauge as detailed in Sections 8.1 and 9.1.

A Priority II Restoration approach to rebuild a B-type channel was selected for this reach. The stream will be realigned within the floodplain to eliminate the existing sharp turns currently present and which are causing bank erosion. In-stream structures will be installed to create a riffle-step-pool channel morphology with improved bedform diversity. Structures will include rock J-hooks, rock steps, rock cross vanes, and constructed riffles. A bankfull bench will be excavated along the reach to improve floodplain connectivity, and all eroding banks will be stabilized. Table 13d below provides the existing and design parameters for the reach.

Construction for UT3 will begin approximately 50-ft above the credited section to stabilize a headcut and eroding section of upstream channel. A riparian buffer of a minimum 75-ft width will be planted along the reach, and it notably extends approximately 55-ft up above the credited section of reach to encompass and protect this stabilization work as well. The buffer will be planted with a range of native species appropriate to the designated planting zones as described below in Section 7.4.

Table 13d. Stream Morphology Table for UT3

Parameter	Existing Condition	Reference	Proposed
Contributing Drainage Area (acres/mi^2)	114 / 0.18		114 / 0.18
Channel/Reach Classification	B4	B4	B4
Bankfull Width (ft)	5.9		6.7

Bankfull Depth (ft)	0.6		0.5
Bankfull Area (ft^2)	3.5		3.5
Bankfull Velocity (ft/s)	4.4	4.0 – 6.0	4.4
Discharge (cfs)	15.4		15.4
Channel Slope	0.0261		0.0237
Sinuosity	1.18		1.09
Width/Depth Ratio	10.1	12 – 18	13.0
Bank Height Ratio	4.5	1.0 – 1.1	1.0
Entrenchment Ratio	1.56		>1.4
d16 / d35 / d50 / d84 / d95 / dip / disp (mm)	0.5/7.1/17.7/46.8/76.8		

Reach UT3A

Reach UT3A begins at a spring head just below a headcut in the left floodplain of NFMC. It's a straight, short section of overly wide channel that has been heavily impacted by livestock. Initially this B-type channel is fairly shallow but it quickly drops sharply at a 4.8% slope and becomes deeply incised as it cuts down to connect into the nearby incised UT3. The banks are notably bare, becoming more laterally unstable as the reach gets more incised. Its adjacent riparian area was cleared in the past as observed from aerial photos and though a significant portion of the buffer has returned to forest, obvious impacts still remain. Notably, a lack of a substantial understory (likely due to livestock) and a narrow range of species. Although the reach was rated as an intermittent stream by the DWR form, it has demonstrated consistent flow from the springhead during the project assessment phase. EPR believes the reach is likely perennial and is confident it will demonstrate adequate flow post-construction using an in-stream flow gauge as detailed below in Sections 8.1 and 9.1.

A Priority I Restoration approach will be implemented for the channel. The headcut above the reach will be sloped back and stabilized. The bed elevation will be raised in the upstream half of the channel and a constructed riffle will be built in this section. The downstream half of the channel will be a step-pool design consisting of a series of rock steps with short sections of pools and riffles. This will allow for the stable drop of elevation as it connects back into UT3 as well as for the reconnection to the floodplain. The reach will also be extended by approximately 60-ft to connect into the new UT3 alignment. The channel dimensions will be rebuilt to narrow the width and all newly built banks will be stabilized and vegetated to prevent further erosion. A riparian buffer of a minimum 75-ft width will be planted along the reach, consisting of a range of native species appropriate to the designated planting zones as described below in Section 7.4.

Table 13e. Stream Morphology Table for UT3A

Parameter	Existing Condition	Reference	Proposed
Contributing Drainage Area (acres/mi^2)	8.3 / 0.013		8.3 / 0.013
Channel/Reach Classification	B4	B4	B4c
Bankfull Width (ft)	6.0		3.5

Bankfull Depth (ft)	1.5 – 4.0		0.4
Bankfull Area (ft^2)	18.5		1.5
Bankfull Velocity (ft/s)	0.11	4.0 – 6.0	1.3
Discharge (cfs)	2		2
Channel Slope	0.0476		0.0310
Sinuosity	1.03		1.10
Width/Depth Ratio	4.0	12 – 18	8.0
Bank Height Ratio	3.0	1.0 – 1.1	1.0
Entrenchment Ratio	1.8		>1.4

Reach NFMC

The NFMC reach begins at a crossing just below the easement of the existing adjacent restoration project (the North Fork Mountain Creek Mitigation Site) and flows east-southeast, ending shortly after its confluence with UT3. This B-type channel has a slope of approximately 1% and is incised throughout its length (BHR ~2.4) with sections of laterally unstable banks, approximately 30% of which are actively eroding. Livestock have access to the entirety of the reach. Its adjacent riparian area was cleared in the past as observed from aerial photos, though a significant portion of the buffer has returned to forest. However, a lack of a substantial understory and a narrow species selection consisting mostly of typical secondary growth species, particularly in the left floodplain. This floodplain area also encompasses a large wetland (W-C).

An Enhancement Level II approach was selected to improve this Bc-type stream. Enhancement efforts will focus on stabilizing eroding sections of streambank, inclusion of bioengineering to protect streambanks, and installation of in-stream structures to help protect banks and to improve bed form diversity and habitat. Additionally, sections of berm along the left bank will be removed or breached to improve overbank flooding into the adjacent riparian wetlands. Table 13e below provides the existing and design parameters for the reach. A riparian buffer of a minimum 75-ft width will be planted along the reach, consisting of a range of native species appropriate to the designated planting zones as described below in Section 7.4.

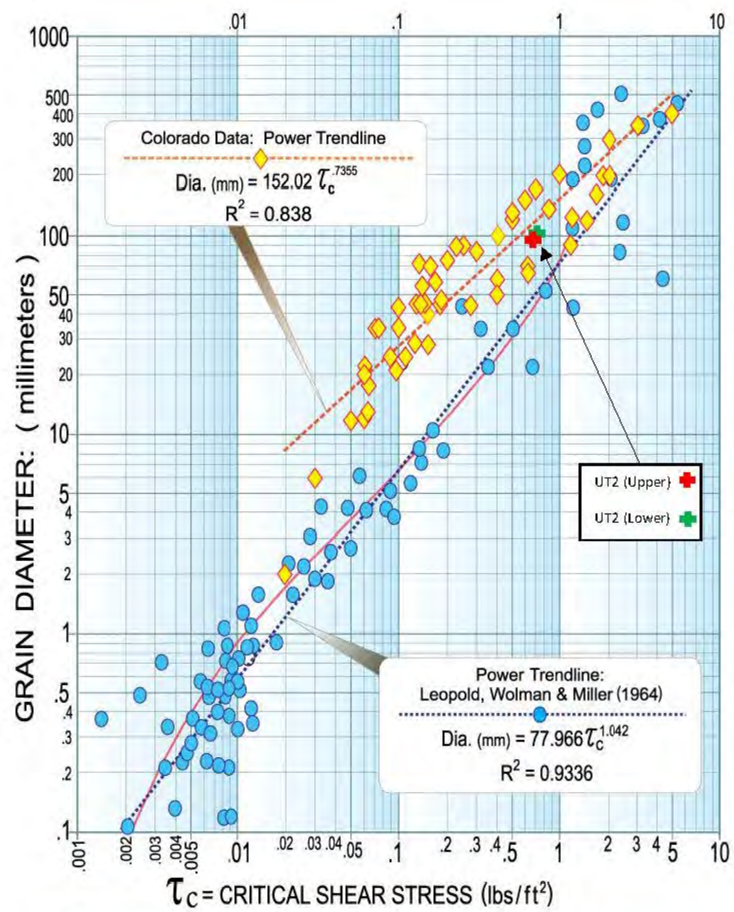
Table 13f. Stream Morphology Table for NFMC

Parameter	Existing Condition	Reference	Proposed
Contributing Drainage Area (acres/mi^2)	1,398 / 2.18		1,398 / 2.18
Channel/Reach Classification	B4c	B4c	B4c
Bankfull Width (ft)	15.0 – 17.7		19.3
Bankfull Depth (ft)	1.7 – 2.0		1.6
Bankfull Area (ft^2)	30.0 – 31.0		31.0
Bankfull Velocity (ft/s)	4.4 – 4.5	4.0 – 6.0	4.4
Discharge (cfs)	135		135
Channel Slope	0.0099		0.0099

Sinuosity	1.08		1.08
Width/Depth Ratio	7.5 – 10.1	4.0 – 6.0	12.0
d16 / d35 / d50 / d84 / d95 / dip / disp (mm)	3.7/25.7/55.1/120.4/165.8		

7.2 Sediment Transport Analyses

A formal sediment competence analysis using the methodologies presented in WARSSS (2006) was performed on both the upper and lower portions of Reach UT2 to ensure that the restoration design creates a stable channel that does not aggrade or degrade over time. This dimensional shear stress methodology uses the design geometry and profile parameters to estimate a design shear stress value, which are used with the measured subpavement particle sizes and compared with published curves. As can be seen from the graph shown here, the design shear stress values plotted against the measured D100 subpavement values match quite well for the Modified Shield's/CO Curve data, lending confidence that the stream will be able to move the existing bed load that is currently supplied (and which will be harvested and reused in the new channel wherever practicable).



Laboratory and field data on critical shear stress required to initiate movement of grains (Leopold, Wolman, & Miller, 1964). The solid line is the Shields curve of *the threshold of motion*; transposed from the Θ versus R_g form into the present form, in which critical shear stress is plotted as a function of grain diameter.

Additional predicted values needed to entrain the measured D100 of the subpavement samples were also generated for shear stress, channel slope, and channel depth as shown in Table 14 below. The design values for UT2 fall somewhere in between the two predictive models, also lending confidence that the new channel can move the available reach sediment supply.

Table 14. Sediment Competence Analysis		
Parameter	**UT2 (Upper)**	**UT2 (Lower)**
Design Slope (ft/ft)	0.0152	
Design Mean Depth (ft)	0.9	

Design Dimensional Shear (lbs./sq-ft)	0.70	
Largest Movable Particle (mm) (Mod. Shield's Curve/CO Data)	117	
Largest Movable Particle (mm) (Shield's Curve)	54	
D50 Pebble Count (mm)	13.2	15.2
D50 Subpavement (mm)	11.3	17.5
D100 Subpavement (mm)	95.0	100.0
Predicted Shear Stress to move D100 (lbs./sq-ft) (Mod. Shield's Curve/CO Data)	0.53	0.57
Predicted Shear Stress to move D100 (lbs./sq-ft) (Shield's Curve)	1.21	1.27
Predicted mean depth to move D100 (ft) (Mod. Shield's Curve/CO Data)	0.56	0.60
Predicted mean depth to move D100 (ft) (Shield's Curve)	1.27	1.34
Predicted slope to move D100 (ft/ft) (Mod. Shield's Curve/CO Data)	0.0099	0.0107
Predicted slope to move D100 (ft/ft) (Shield's Curve)	0.0228	0.0239

For the other, much smaller, largely spring-fed tributaries (UT1, UT1A, UT3, UT3A) the current sediment supply is almost entirely from localized erosion, which will be significantly reduced through bed and bank stabilization. The remaining post-construction sediment supplied to these reaches is expected to be small and easily transported downstream. Structures included along these reaches are designed to be immobile which will provide long term grade control along these sediment supply limited streams. As such, these reaches should remain stable post-construction and neither aggrade nor degrade over time.

The enhancement reach NFMC will have a few sections of steep, eroding bank cut back and stabilized to reduce sediment loss to the stream. However, the majority of the reach will not have its dimensions significantly altered and the proposed slope will match the existing slope. Enhancement efforts are not expected to have any change to its sediment transport ability. As the existing sediment supply to the reach is currently being adequately transported through the system, it is fully expected to continue to do so post-construction.

7.3 Wetland Restoration

The wetland mitigation component of the Project consists of two approaches: restoration by re-establishment and restoration by rehabilitation, each conducted in accordance with the Federal Mitigation Rule (33CFR Part 332.2/40 CFR 230.92) as described in DWR's wetland mitigation consistency guidance memo (DWR 2013). The goal of wetland re-establishment is to restore natural historic functions in areas where evidence of hydric soil conditions are present but appropriate wetland hydrology and vegetation are not, thus resulting in a gain to both wetland resource area and in wetland functions. This restoration approach will not be conducted within existing jurisdictional wetlands but within areas of delineated hydric soils based on the detailed soil analysis and a hydric soil delineation conducted by George Lankford, LSS (Appendix 4). The main area of hydric soil proposed for re-establishment is located in the left floodplain in the middle portion of UT2 (where the new channel will be relocated), while the remaining areas are found along the edges of the existing wetland W-C.

The goal of wetland restoration through rehabilitation is to restore or greatly improve most, if not all, of the historic natural functions to a heavily degraded, but still jurisdictional wetland resource. The areas proposed for this approach (wetlands W-C and W-D) were determined to be jurisdictional by the USACE (Appendix 3), but are degraded with clear impacts to both the hydrology and vegetation resource functions. These wetlands are adjacent to incised streams, have drainages located through them, and have been greatly impacted by the presence of livestock. The rehabilitation approach will ultimately result in significant improvements to both the wetland hydrology and vegetation functions but will not result in any gain in wetland resource area.

Several activities will be employed to restore on-site wetlands:

- Relocating and reconnecting adjacent stream channels to their relic floodplains through Priority I stream restoration, most notably for sections of UT2 to improve hydrology in areas of wetland reestablishment and for the rehabilitation of wetlands W-C and W-D
- Thinning the existing sweetgum trees <6" in diameter in wetland W-C
- Planting native wetland species in the wetlands
- Removing invasive species from the wetlands
- Exclude livestock from wetlands
- Remove existing surface drainageways from wetlands through filling and roughening
- Plugging the sinkhole drain causing subsurface bypass flow from W-C into NFMC through a section of its collapsed left bank, thus keeping the hydrology within the wetland
- Raise the elevation of the existing stream UT3A (which functions as an outlet to the adjacent wetland W-C) and stabilize the eroding rill located immediately above it
- Grading (outside of the wetland areas) to create a floodwater overflow connection from lower UT2 into the floodplain surrounding rehabilitation area W-C and the adjoining wetland reestablishment areas (as described previously in the UT2 portion of Section 7.1)
- Soil surface roughening within wetlands prior to planting to improve retention of hydrology and to remove shallow drainage patterns created and exacerbated by cattle
- Permanently protect wetlands within a conservation easement

As a result of these measures, significant hydrologic lift will occur within the proposed wetland areas, raising the local water table and restoring wetland hydrology to drained hydric soils or improving the hydrology in existing wetlands. Additionally, an appropriate native wetland vegetation community will be established throughout these areas. Thus, the stated goals of the wetland reestablishment and rehabilitation as detailed above will be fulfilled.

7.4 Vegetation and Planting Plan

The riparian areas along the project reaches and wetlands would naturally be comprised of species more consistent with those found in the Piedmont Headwater Stream Forest and Piedmont Alluvial Forest communities (Schafale 2012), as well as the Southern Piedmont Small Floodplain and Riparian Forest (CES202.323, NatureServe) community. The wetland areas would likely include species found within a Piedmont Bottomland Forest (Schafale, 2012), while some sections of buffer found along the drier, upper slopes of the tributaries would contain more upland species as found in the Mesic Mixed Hardwood Forest (Schafale 2012) or Southern Piedmont Mesic Forest (CEGL008465, NatureServe) communities. Additionally, three reference wetlands areas within the same ecoregion from nearby counties around Lake Norman were identified using the NCDWR Wetland Project Summary interactive map. These sites were noted for their high quality vegetation component and the list of tree and shrub species present at each site was reviewed and used to confirm and refine our wetland plant selection (see Appendix 4 for site descriptions).

The native species selected for establishment at the Site represent a range of growth rates and varying tolerances to shade and moisture as appropriate for their planting location. These range of characteristics were selected to ensure that good vegetation cover establishes over the Site and include upland, wetland, and general riparian area planting zones. The species lists by planting zone, site preparation, planting density, planting methods, and materials are all detailed in the design plan sheets (Sheet 3A) included in Appendix 7. Vegetation will be planted during the dormant season (November 15 – March 15). Additionally, any areas of fescue within the easement that are not removed during earthwork activities will be sprayed with herbicide during the construction phase.

There is a notable exception to the planting plan for the existing forested area on the left floodplain of NFMC at the bottom of the project (in and around wetland W-C). This area consists largely of mature sweetgums. EPR had originally proposed to remove them but during the post-contract site meeting on 3/9/22, the IRT stated their preference was to thin these areas by only removing the smaller sweetgums (<6” diameter) and then to only plant with shrub and understory species. As such, a separate wetland planting zone was created for this area consisting of a more diverse range of shrub and understory species, which will only be supplementally planted at a lower density of 200 stems/ac (see plan sheets in Appendix 7).

The presence of invasive species vegetation primarily consists of areas of Chinese privet and multiflora rose as noted previously in Section 3.2. During construction, these and any other invasives species found will be treated using mechanical and/or chemical methods. An invasive species vegetation treatment plan to be used throughout the monitoring phase is also included in Appendix 8.

7.5 Project Risks and Uncertainties

Listed below are identified Project risks and uncertainties that have been evaluated in the development of design plans for the Site, along with methods that have been/will be used to address these concerns. The overall project risk for the Site is considered low.

- Land use development: There is potential for increased land development around the Site in the future that could lead to additional runoff and changes to watershed hydrology. A review of the NCDOT's State Transportation Improvement Program (STIP) for 2020-2029 revealed that there are no planned improvement projects located anywhere within the Project watershed for that time period. Substantial changes to the surrounding area are not expected as the watershed is not likely to experience a significant increase in development in the future based on previous land use changes over time, and the area is most likely to remain predominantly rural.

    - Methods to Address: The Project area has seen little development in recent years and it is unlikely that development will threaten the Site in the foreseeable future. However, restoration of the Site to reconnect streams to their floodplains will reduce the likelihood of future degradation from watershed changes, as increased flows will spread over a wider floodplain. Given the Site's position in the watershed and the surrounding topography, the risk of channel instability is low once vegetation has been established.

- Easement Encroachment: There is potential for landowner encroachment into the permanent conservation easement, including livestock access, mowing, culvert maintenance, etc.

    - Methods to Address: EPR has had considerable discussions with the landowner regarding the Project requirements and limitations of easement access and is confident that the landowner fully understands and will maintain the easement protections. The easement boundaries will be clearly marked per DMS requirements and fencing will be installed in exclude livestock from the Project reaches. Any encroachments that do occur during the monitoring phase will be remedied by EPR.

- Drought and Floods: There is potential for extreme climatic conditions during the monitoring period of the Project.

    - Methods to Address: EPR will apply adaptive management techniques as necessary to meet the site performance criteria. Such measures may include vegetation replanting, channel or structure damage repair, irrigation, soil amendments, etc. If adaptive management activities are significant, additional monitoring may be required by the IRT.

Beavers: While there is no evidence of beaver activity currently present on the Site, there is the potential for beavers to move onto the project during the monitoring phase.

- Methods to Address: EPR will take appropriate steps to remove the beaver from the project during the monitoring phase and repair any damage they may have caused.

- Hydrologic Trespass: There is potential for the stream and wetland restoration to create conditions under which hydrologic trespass to upstream landowners and/or the adjacent farm fields could occur.

  - Hydrologic trespass is an unlikely issue for the project and is not considered to be a reasonable project risk. Stream floodplains and adjacent wetlands are somewhat confined with adjacent valley topography. The conservation easement encompasses the flatter areas and also adjacent uplands so restored wetlands should not trespass outside of the easement boundary. Further, none of restored reaches will be backing water up beyond the project boundaries. UT1, UT1a, and UT3a are all reaches where there is no upstream stream length to trespass upon. UT3 will remain at it's current bed elevation and begins at the point of jurisdiction. Floodplain will be excavated providing additional storage which will lower upstream flood levels. The work proposed on NFMC including isolated bank grading and instream structures will have no impacts on flood water elevations upstream. The bed elevation is slowly being raised along UT2 from the top of the reach to tie into the historic floodplain. Wide bankfull benches will be excavated to provide significant floodplain access and floodwater storage along this length. All these factors indicate that there should be no concern with hydrologic trespass.

8.0 PERFORMANCE STANDARDS

Performance criteria outlined in the *North Carolina Department of Environmental Quality Division of Mitigation Services Stream and Wetland Mitigation Plan Template and Guidance* (June 2017), and *US Army Corps of Engineers – Wilmington District Public Notice, Federal Public Notice: Notification of Issuance of Guidance for Compensatory Stream and Wetland Mitigation Conducted for Wilmington District* (October 24, 2016), will be followed and are briefly outlined below. Detailed monitoring information can be found in Section 9.0.

8.1 Restored Stream Channels

The required performance criteria for restored stream channels, per USACE Guidance are summarized briefly below:

- All streams must maintain an Ordinary High-Water Mark (OHWM), per RGL 05-05.
- Continuous surface flow must be documented each year for at least 30 consecutive days for intermittent channels.
- Bank height ratio (BHR) cannot exceed 1.2 for all measured riffle cross-sections on a given reach.
- Entrenchment ratio (ER) must be above 2.2 for all measured riffle cross-sections for C and E stream types and above 1.4 for B stream types.
- BHR and ER should not change by more than 10% in any given year for all measured riffle cross-sections on a given reach.

- Must document occurrence of at least 4 bankfull events in separate years during the monitoring period.

8.2 Riparian and Wetland Vegetation

The required performance criteria for planted riparian and wetland vegetation, per USACE Guidance are summarized below:

- Within the 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. However, certain native species do not typically grow to these heights in 7 years and will be excluded from the height performance standard. For this project, that will include the understory/shrub species and the oak species.
- Planted and volunteer stems may be counted, provided they are included in the approved planting list for the Site. Additional volunteers may be counted if approved by the IRT on a case-by-case basis. However, no green ash volunteers may be counted towards success criteria.
- Any single species can only account for 50% of the required stems per monitoring plot.
- Vegetation must be planted, and plots established, at least 180 days prior to the initiation of the first year of monitoring.

Additionally, as described in Section 7.4 above, the large wetland area (W-C) at the bottom of the project that is currently forested with mature sweetgums will only be supplementally planted with shrub and understory species at a reduced density of 200 stems/ac. As such, a corresponding reduced success criteria is proposed for this area of a minimum of 100 stems/ac present at Year 3, a minimum of 80 stems/ac present at Year 5, and a minimum of 65 stems/ac present at Year 7. Only the supplementally planted stems will be counted towards these success numbers, though additional volunteers may be counted towards the success criteria with IRT approval.

Invasive species vegetation will be treated using a combination of chemical and/or mechanical methods. Treatment will continue throughout the Project monitoring period. The complete Invasive Species Control Plan can be found in Appendix 8.

8.3 Wetlands

All restored wetland areas within the Project easement are proposed to have consistent monitoring and success criteria, including an appropriate wetland hydroperiod and vegetation indicative of a jurisdictional wetland as defined by USACE guidelines. Per the 2016 USACE Guidance, Wehadkee soils, which represent the hydric inclusion present within the mapped Chewacla soils in the wetland areas of the Project, have a hydroperiod of 12-16%. As such, a minimum hydroperiod performance standard of 12% will be applied to all wetland restoration areas proposed for reestablishment.

Additionally, those existing wetland areas proposed for rehabilitation will show an improvement from their average pre-construction hydroperiods.

Both the existing wetlands for rehabilitation and hydric soils for reestablishment are currently being monitored using groundwater wells and this background data including individual well graphs and a hydroperiod summary table are presented in Appendix 4. The most recent data through late-June 2023 is included for those. Post-construction, the wetland restoration areas will be monitored by continuously recording groundwater gauges and the resulting hydroperiods will be presented in annual monitoring reports. Any areas that do not exhibit sufficient hydroperiod and/or hydric soil indicators at the completion of the monitoring phase may be removed for use in the final determination of wetland mitigation credits in consultation with the IRT.

8.4 Compatibility with Project Goals

The required performance criteria described above, while following regulatory and DMS guidance, allow evaluation of whether the Project goals have been met after the Site improvements have been completed. In Table 15, the Project objectives are listed, along with the performance criteria that will allow documentation of whether these objectives have been achieved. Fulfillment of these objectives will allow the Project to achieve the goals outlined in Section 6.0.

Table 15. Project Objectives and Associated Performance Criteria

Objective	Performance Criteria
Restore and project riparian buffers to filter runoff.	• Vegetation success criteria of 260 native stems/acre in Year 5 and 210 native stems/acre in Year 7.
Increased riparian wetland acreage and functions.	• Document wetland performance criteria, with a minimum hydroperiod of 12%.
Decrease nutrient inputs from surface runoff.	• Vegetation success criteria of 260 native stems/acre in Year 5 and 210 native stems/acre in Year 7. • Recordation of a conservation easement meeting DMS and SPO guidelines.
Stabilize stream channels and other areas of erosion on the Project Site.	• Geomorphic cross sections indicate stable channels over the monitoring period. • Visual documentation of reduced erosion and increased vegetative cover during annual monitoring.
Decrease sediment inputs from surface runoff.	• Vegetation success criteria of 260 native stems/acre in Year 5 and 210 native stems/acre in Year 7.

	• Recordation of a conservation easement meeting DMS and SPO guidelines.
Exclude livestock from project streams and buffers.	• Recordation and protection of a conservation easement meeting NCDMS and SPO guidelines.
Restore appropriate bed form diversity and in-stream structures to provide appropriate habitat.	• Geomorphic cross sections indicate stable channels over the monitoring period. • Visual documentation of in-stream structure stability during annual monitoring.
Restore riparian buffer vegetation to provide organic matter and shade.	• Vegetation success criteria of 260 native stems/acre in Year 5 and 210 native stems/acre in Year 7. • Recordation of a conservation easement meeting DMS and SPO guidelines.
Restore high water table conditions.	• Document wetland performance criteria, with a minimum hydroperiod of 12%.
Plant native wetland species that are appropriate for the system.	• Vegetation success criteria of 260 native stems/acre in Year 5 and 210 native stems/acre in Year 7.
Protect restored habitat with a perpetual conservation easement.	• Recordation and protection of a conservation easement meeting NCDMS and SPO guidelines.
Remove stream channelization and restore overbank flooding.	• Geomorphic cross sections indicate stable channels for appropriate stream type over the monitoring period. • Document 4 overbanks events in separate years for each restored reach over the monitoring period.
Restore natural microtopography to increase surface storage and decrease runoff.	• Document wetland performance criteria, with a minimum hydroperiod of 12%.
Restoration of riparian buffers.	• Vegetation success criteria of 260 native stems/acre in Year 5 and 210 native stems/acre in Year 7.

9.0 MONITORING PLAN

The monitoring plan for the Site will follow the guidance outlined in the *North Carolina Department of Environmental Quality Division of Mitigation Services Stream and Wetland Mitigation Plan Template and Guidance* (June 2017), and *US Army Corps of Engineers – Wilmington District Public*

Notice, Federal Public Notice: Notification of Issuance of Guidance for Compensatory Stream and Wetland Mitigation Conducted for Wilmington District (October 24, 2016). Monitoring data collected on the Site will include reference photos, vegetation analyses, channel stability analyses, wetland groundwater levels, and reach flow durations as well as any other data specifically required by permit conditions. Annual monitoring will be conducted for a period of seven years. Annual monitoring reports will be submitted to DMS by EPR no later than November 30 of each monitoring year.

After Project construction is completed, an as-built survey will be conducted, and record drawings will be developed, to document the baseline conditions. The as-built survey will be completed following the guidance provided in the *DMS As-Built Survey Requirements* (October 2020) and the record drawings will be developed as required by the *Record Drawings Format, Data, and Content Requirements* (October 2020). The as-built survey will be conducted within 60 days after Project implementation is completed (following monitoring device installation) to document the recently constructed features and conditions of the Site.

Annual monitoring data, including the As-built Baseline (Monitoring Year 0) Monitoring Report, will be reported using the NCDEQ DMS *Annual Monitoring Report Format, Data Requirements, and Content Guidance* (October 2020). The monitoring report shall provide a project data chronology that will facilitate an understanding of project status and trends, population of DMS databases for analysis, and assist in decision making regarding project close-out.

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

9.1 Stream Monitoring

Stream monitoring will include monitoring of the hydrologic and geomorphic functions within each of the Project reaches. All of the monitored parameters, methods, schedule/frequency, and their numbers/extent are summarized below in Table 16. Monitoring parameters follow the referenced DMS and USACE guidance. The proposed approximate locations of monitoring cross sections and stream gauges are shown in Figure 10.

Table 16. Stream Monitoring Summary

Parameter	Method	Schedule/ Frequency	Number/ Extent
Stream Profile	Full longitudinal survey	As-built only (unless otherwise required)	All restored stream reaches
Stream Dimension*	Cross sections	Years 1, 2, 3, 5, and 7	UT1 (3), UT1A (3), UT2 (9), UT3 (1), UT3A (1), and NFMC (2)
Channel Stability	Visual Assessment	Yearly	All restored and enhanced stream channels

Parameter	Method	Schedule/ Frequency	Number/ Extent
	Additional Cross sections	Yearly	Only if instability is documented during monitoring
Stream Hydrology	Pressure transducers, Photos of flood indicators	Continuous recording through monitoring period	UT1 (x2), UT1A (x2), UT2 (x1), UT3 (x1), and UT3A (x1)
OHWM	Visual assessment and documentation of indicators outlined in RGL 05-05	Yearly	All restored stream channels

*Parameters for stream dimension to be measured as described in the 2018 DMS Standard Measurement of the BHR monitoring parameter technical workgroup memo.

9.2 Wetland Monitoring

Groundwater monitoring gauges will be installed to take measurements after hydrological modifications are performed at the Site. Hydrological sampling will continue throughout the growing season. As requested by the IRT during the field visit, monitoring gauges will be installed as close to where the pre-construction gauges were located as practicable. The Hickory FAA Airport weather station (COOP #314020) in Catawba County is located approximately 19 miles northwest of the Site. As reported in the AgACIS (Agricultural Applied Climate Information System) database for this station from 1991-2021, the generated WETS table (Appendix 4) lists the growing season for the Site as 241 days in length and beginning on March 18 and ending on November 14, using the 50% probability data for a temperature of 28 F or higher (http://arcgis.rcc-acis.org/?fips=37023). This station was used as there are no other weather stations in the county with the required 30 years of data to establish a WETS table. These growing season dates correspond very closely with the ones listed in the USDA Soil Survey of Catawba County (USDA 1975) of March 23 to November 15, which were based on old data from the 1940's through 1960's from an unnamed station near Hickory. The WETS table also reports the average annual rainfall for the area as 46.84 inches along with the monthly historic averages. This data will be used to compare with the collected on-site rain gauge data to determine departures from normal rainfall amounts throughout the project.

All of the wetland monitored parameters, methods, schedule/frequency, and their numbers/extent are summarized below in Table 17. The proposed locations for groundwater gauges are shown in Figure 10.

Table 17. Wetland Monitoring Summary

Parameter	Method	Schedule/ Frequency	Number/ Extent	Data Collected
Wetland Restoration	Groundwater wells, Rain gauge	Continuous recording throughout each growing season	9 total wells: 3 in existing wetlands (rehabilitation) and 6 in restored wetlands (reestablishment), and 1 rain gauge	Groundwater depth and rainfall data

9.3 Riparian and Wetland Vegetation Monitoring

Vegetation monitoring will evaluate the establishment of planted and volunteer vegetation across the Site. Monitored parameters, methods, schedule/frequency, and extent are summarized below in Table 18. Monitoring parameters follow USACE guidance but will also allow monitoring of parameters to document site performance related to the Project goals listed in Section 6.0.

Table 18. Riparian and Wetland Vegetation Monitoring Summary

<table>
<tr><th>Parameter</th><th>Method</th><th>Schedule/ Frequency</th><th>Number/ Extent</th><th>Data Collected</th></tr>
<tr><td rowspan="2">Vegetation establishment and vigor</td><td>Permanent vegetation plots, 0.02 acre in size (minimum)</td><td rowspan="2">As-built, Years 1, 2, 3, 5, and 7

Between July 1st and leaf drop</td><td>11 plots, spread across Site</td><td>Species, height, location, planted vs. volunteer, and age.</td></tr>
<tr><td>Annual random vegetation plots, 0.02 acre in size (minimum)</td><td>10 plots, randomly selected each year</td><td>Species and height.</td></tr>
</table>

During quantitative vegetation sampling, sample plots (100 square meters, or 0.02 acre, each) will be installed within the Site as per guidelines established under the *Annual Monitoring Report Format, Data Requirements, and Content Guidance* (October 2020). Visual observations of the establishment of shrub and herbaceous species will also be documented by photograph. The proposed locations of permanent vegetation plots are shown in Figure 10.

9.4 Visual Assessment Monitoring

A visual assessment of the entire project will be conducted on an annual basis. The culmination of this data will be presented in the Current Condition Plan View (CCPV) with supporting documentation outlined by *Annual Monitoring Report Format, Data Requirements, and Content Guidance* (October 2020). This assessment includes annual photos of all vegetation plots (permanent and random), all monitored cross sections, all monitoring gauges (stream and wetland), culvert conditions (both upstream and downstream views), and stream station photo points. Moreover, problem areas of vegetation, stream banks, in-stream structures, and channel migration will also be documented with photos. The Conservation Easement boundary will also be assessed annually to check for easement integrity across the project; to discover any encroachments, missing markers, adequate signage, fence breaks, etc. After DMS's review of the documentation, additional monitoring protocols may be required to ensure project success can be achieved.

10.0 ADAPTIVE MANANGEMENT PLAN

In the event the mitigation site or a specific component of the mitigation site fails to achieve the necessary performance standards as specified in the mitigation plan, EPR will notify DMS and will assist DMS in working with the IRT to develop contingency plans and remedial actions.

A maintenance plan is provided in Appendix 9, summarizing the types of issues that may arise during monitoring and how those issues would be addressed.

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

The Stewardship Program will periodically install replacement or supplemental signage to identify boundary markings, as needed. Permanent crossings will be the responsibility of the landowner of the underlying fee to maintain.

12.0 DETERMINATION OF MITIGATION CREDITS

Mitigation credits and quantities data are presented in Tables 19a and 19b and are projections based upon the mitigation design. Upon completion of site construction, the Project components and credit data will be adjusted, if necessary, to be consistent with the as-built condition, and any changes will be described in the As-built/Baseline Monitoring Report. The Project proposes to provide stream mitigation credits derived from stream restoration and enhancement activities as detailed below in Tables 19a and 19b. and shown Figure 11. Additionally, stream riparian buffers of a minimum 75-feet have been restored along the Project reaches for a total of 31.9 protected acres within the conservation easement. These wider buffers result in additional stream mitigation credits using the IRT's buffer tool (updated 1/19/2018) as shown below in Tables 19a and 19b. The detailed Buffer Tool output files and maps are included in Appendix 4. The Project also proposes to provide wetland mitigation credits derived from riparian wetland restoration (both reestablishment and rehabilitation) as detailed below in Tables 19a and 19b and shown in Figure 11. Credit release schedules and conditions for both stream and wetland credits can be found in Appendix 10.

Table 19a. Bandys Farm Stream and Wetland Mitigation Project Quantities and Credits

Project Segment	Original Mitigation Plan Ft/Ac	As-Built Ft/Ac	Original Mitigation Plan Category	Original Restoration Level	Original Mitigation Ratio (X:1)	Mitigation Credits
Streams						
UT1	1,688.9	-	Warm	R	1.0	1,688.900
UT1A	1,211.3	-	Warm	R	1.0	1,211.300
UT2	3,379.7	-	Warm	R	1.0	3,379.700
UT3	290.0	-	Warm	R	1.0	290.000
UT3A	140.4	-	Warm	R	1.0	140.400
NFMC	1,315.7	-	Warm	E2	2.5	526.280
					Sub-Total:	7,236.580
					Additional Stream Credits from Buffer Tool:	285.950
					Total:	**7,522.530**
Wetlands						
Reestablishment (W1)	1.813	-	-	REE	1.0	1.813
Rehabilitation (W2)	2.066	-	-	RH	1.5	1.377
					Total:	**3.190**

- EPR is under contract with the Division of Mitigation Services to provide 7,515 Stream Mitigation Credits and 2.630 Wetland Mitigation Credits. Any additional credits beyond those contracted amounts will not be realized by EPR.

Table 19b. Bandys Farm Stream and Wetland Mitigation Project Credits Summary

Restoration Level	Stream			Riparian	Non-Riparian	Coastal
	Warm	Cool	Cold	Wetland	Wetland	Marsh
Restoration	6,710.300					
Re-establishment				1.813		
Rehabilitation				1.377		
Enhancement						
Enhancement I						
Enhancement II	526.280					
Creation						
Preservation						
Totals	**7,236.580**			**3.190**		

Total Base SMUs	7,236.580
Credit Loss in Required Buffer	-216.460
Credit Gain in Additional Buffer	502.410
Net Change in Credit from Buffers	285.950
Total Adjusted SMUs*	**7,522.530**
Total Wetland Credit	**3.190**

*Credit Adjustment for Non-standard Buffer Width calculation using Wilmington District Stream Buffer Credit Calculator (Updated 1/19/2018)

13.0 FINANCIAL ASSURANCES

A statement regarding the financial assurances for the Project can be found in Appendix 11.

14.0 IRT POST-CONTRACT MEETING

Representatives of the USACE, NCDEQ DWR, NCDEQ DMS, and EPR attended the IRT Post-Contract (on-site) meeting for the Bandys Farm Stream and Wetland Mitigation Project on March 9, 2022. The meeting minutes were distributed on March 14, 2022 and can be found in Appendix 12.

15.0 REFERENCES

Griffith, G.E., Omernik, J.M., Comstock, J.A., Schafale, M.P., McNab, W.H., Lenat, D.R., MacPherson, T.F., Glover, J.B., and Shelburne, V.B. 2002. Ecoregions of North Carolina and South Carolina, (color poster with map, descriptive text, summary tables, and photographs): Reston, Virginia, U.S. Geological Survey (map scale 1:1,500,000).

Harman, W., R. Starr, M. Carter, K. Tweedy, M. Clemmons, K. Suggs, C. Miller. 2012. A function-based framework for developing stream assessments, restoration goals, performance standards and standard operating procedures. US Environmental Protection Agency, Office of Wetlands, Oceans, and Watersheds, Washington, DC

NatureServe. 2022. NatureServe Explorer web application. NatureServe, Arlington, Virginia. Available at https://explorer.natureserve.org/ (Accessed 7/6/22)

National Oceanic and Atmospheric Association (NOAA). 2022. Agricultural Applied Climate Information System (AgACIS) for Catawba County. WETS Station Hickory FAA Airport (Station ID 314020 Coop). (http://agacis.rcc-acis.org/?fips=37023)

North Carolina Department of Environmental Quality Division of Mitigation Services. 2017. Stream and Wetland Mitigation Plan Template and Guidance (June 2017).

North Carolina Division of Mitigation Services (DMS). 2007. Catawba River Basin Restoration Priorities. Amended 2013.

North Carolina Division of Water Resources. 2010. Methodology for Identification of Intermittent and Perennial Streams and Their Origins (Version 4.11). Effective Date: September 1, 2010.

North Carolina Division of Water Resources. 2013. Memorandum: Consistency between Federal and State Wetland Mitigation Requirements. July 30, 2013.

North Carolina Division of Water Resources. Wetland Project Summaries Wetland Quality/Function Assessment Interactive Map (https://www.ncwetlands.org/research/wetland-project-summaries/)

North Carolina Stream Functional Assessment Team. 2015. North Carolina Stream Assessment Method. V2.1, September 2015.

North Carolina Wetland Functional Assessment Team. 2016. North Carolina Wetland Assessment Method. V5, February 2016.

North Carolina Wildlife Resources Commission. 2015. North Carolina Wildlife Action Plan.

Raleigh, NC. Online version of the NC Wildlife Action Plan: http://www.ncwildlife.org/plan.aspx

North Carolina Geological Survey, 1985. Geologic Map of North Carolina. Raleigh, North Carolina Department of Natural Resources and Community Development, Geological Survey Section. Scale 1:500,000.

Schafale, M.P. and A.S. Weakley. 1990. Classification of the Natural Communities of North Carolina: Third Approximation. North Carolina Natural Heritage Program, Division of Parks and Recreation, North Carolina Department of Environment, Health, and Natural Resources. Raleigh, North Carolina.

Schafale, M.P. 2012. Guide to the Natural Communities of North Carolina, Fourth Approximation. North Carolina Natural Heritage Program, North Carolina Department of Environment and Natural Resources.

US Army Corps of Engineers, Wilmington District. 2016. Public Notice, Federal Public Notice: Notification of Issuance of Guidance for Compensatory Stream and Wetland Mitigation Conducted for Wilmington District (October 24, 2016).

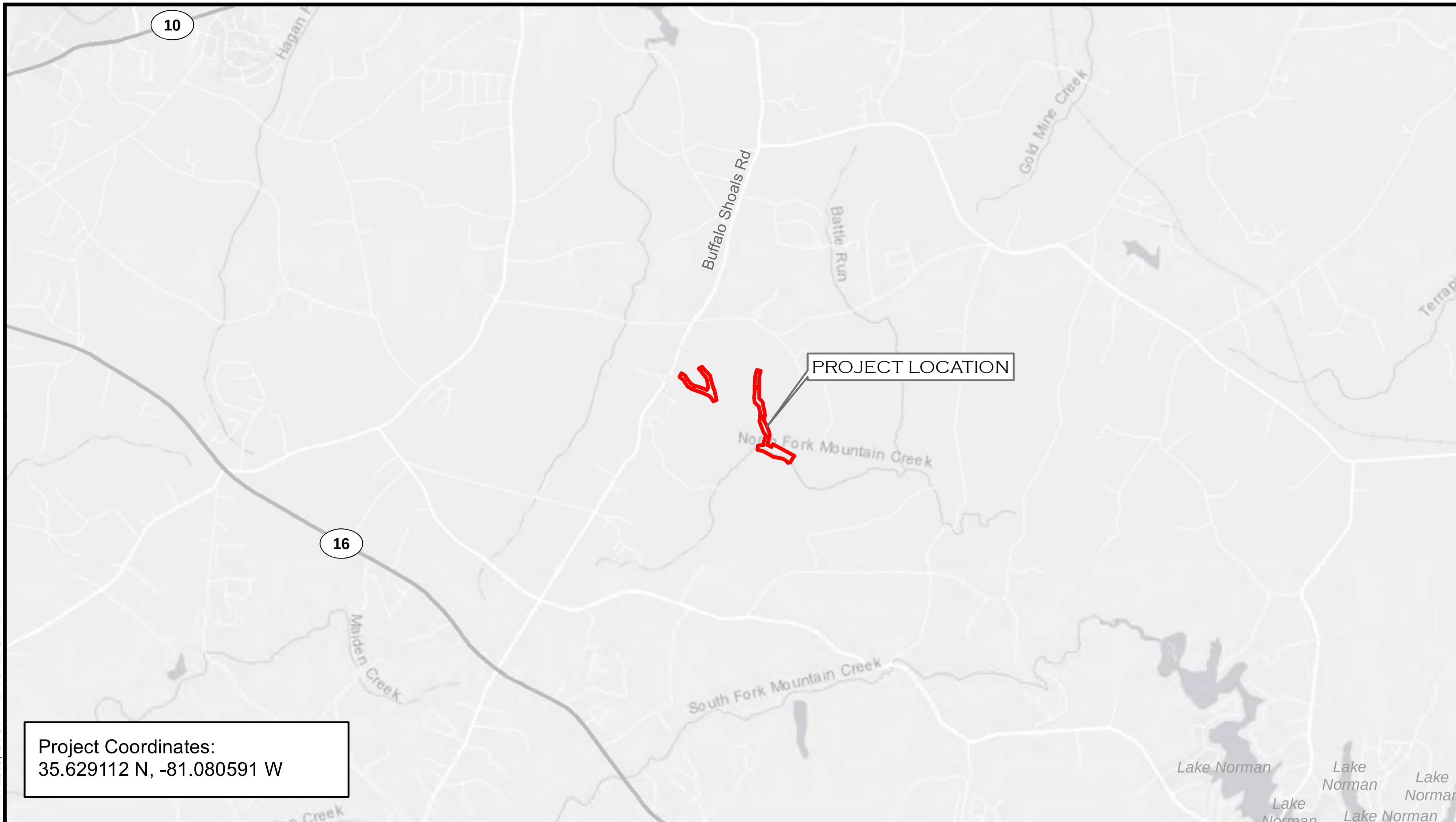
US Army Corps of Engineers. 2012. Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Eastern Mountains and Piedmont Region (Version 2.0), ed. J. F. Berkowitz, J. S. Wakeley, R. W. Lichvar, and C. V. Noble. ERDC/EL TR-12-9. Vicksburg, MS: US Army Engineer Research and Development Center.

US Department of Agriculture. National Resources Conservation Service (NRCS). Web Soil Survey. Available online at: http://websoilsurvey.sc.egov.usda.gov/

US Geological Survey. 2012. The StreamStats web program for North Carolina. Available online at: https://water.usgs.gov/osw/streamstats/north_carolina.html.

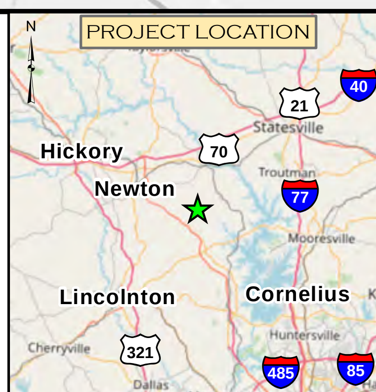
WRP Technical Note VN-RS-4.1. 1997. Species Match Ensures Conversion of Wet Agricultural Fields to Bottomland Hardwood Wetlands.

Figures



Project Coordinates:
35.629112 N, -81.080591 W

Conservation Easement



Bandys Farm
Stream and Wetland Mitigation Project
Vicinity Map
Catawba County, NC

Prepared By:
Ecosystem Planning & Restoration

N

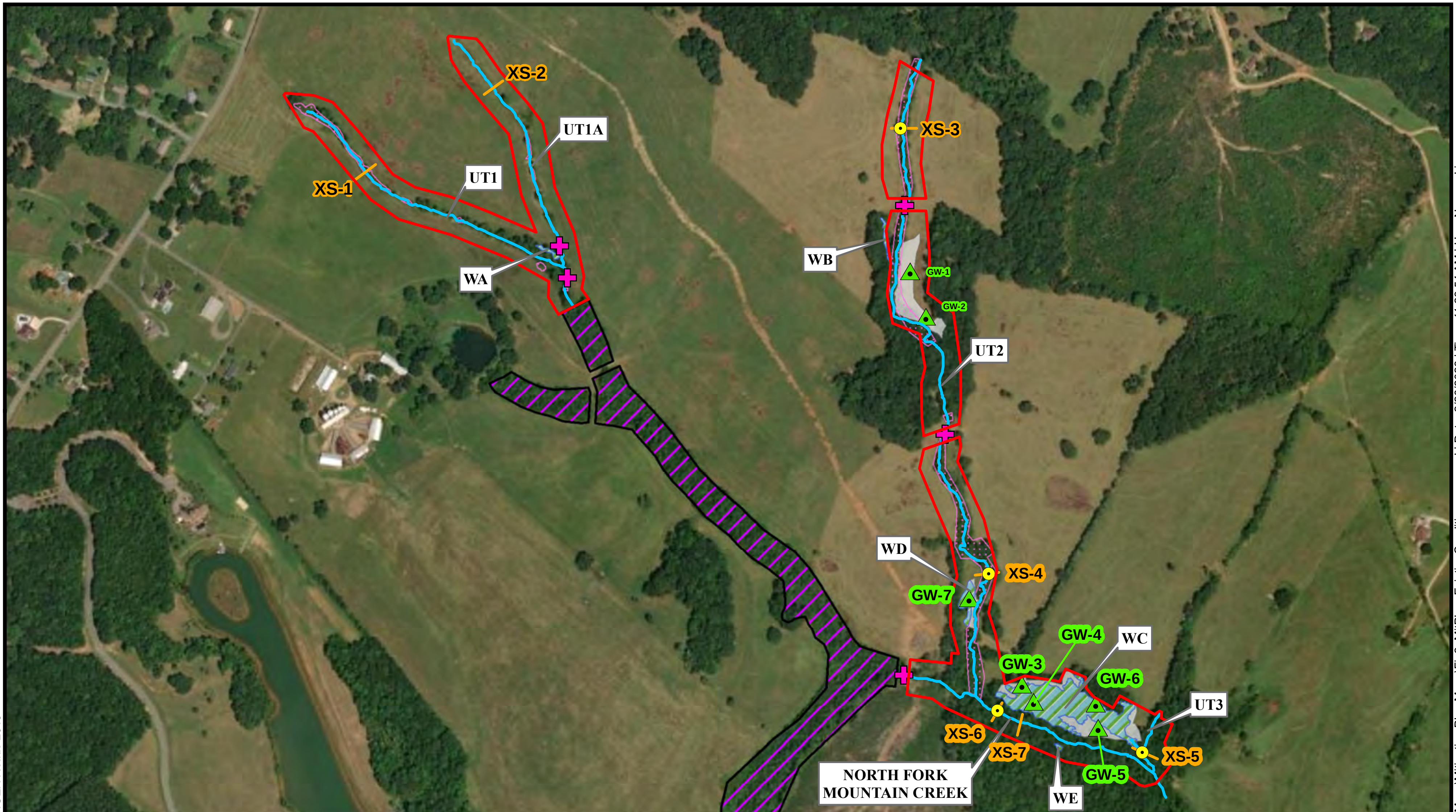
0 0.5 1 Miles
1:63,360

FIGURE 1

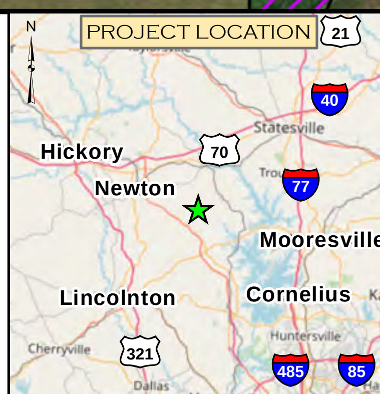
DATE:
July 2022

Sources: ESRI Gray Canvas; Open Street Map; TIGER Roads 2015; USGS NHD Streams/Water Bodies

Path: R:\Projects\ASH0018_NCDMS_Bandys_Farm\GIS\Maps\Mitigation Plan Maps\Fig1_MitPlan_VicinityMap.mxd | Date: 7/5/2022 | Time: 3:01:59 PM | User Name: sking



- Conservation Easement
- Vehicle Crossings
- Pebble Count Locations
- Cross Sections
- Project Reaches
- Groundwater Wells
- Jurisdictional Wetlands
- Invasive Species
- Hydric Soil
- North Fork Mountain Creek Mitigation Site



Bandys Farm
Stream and Wetland Mitigation Project
Existing Conditions Map
Catawba County, NC

Prepared By:

Ecosystem Planning & Restoration

N

0 200 400 Feet

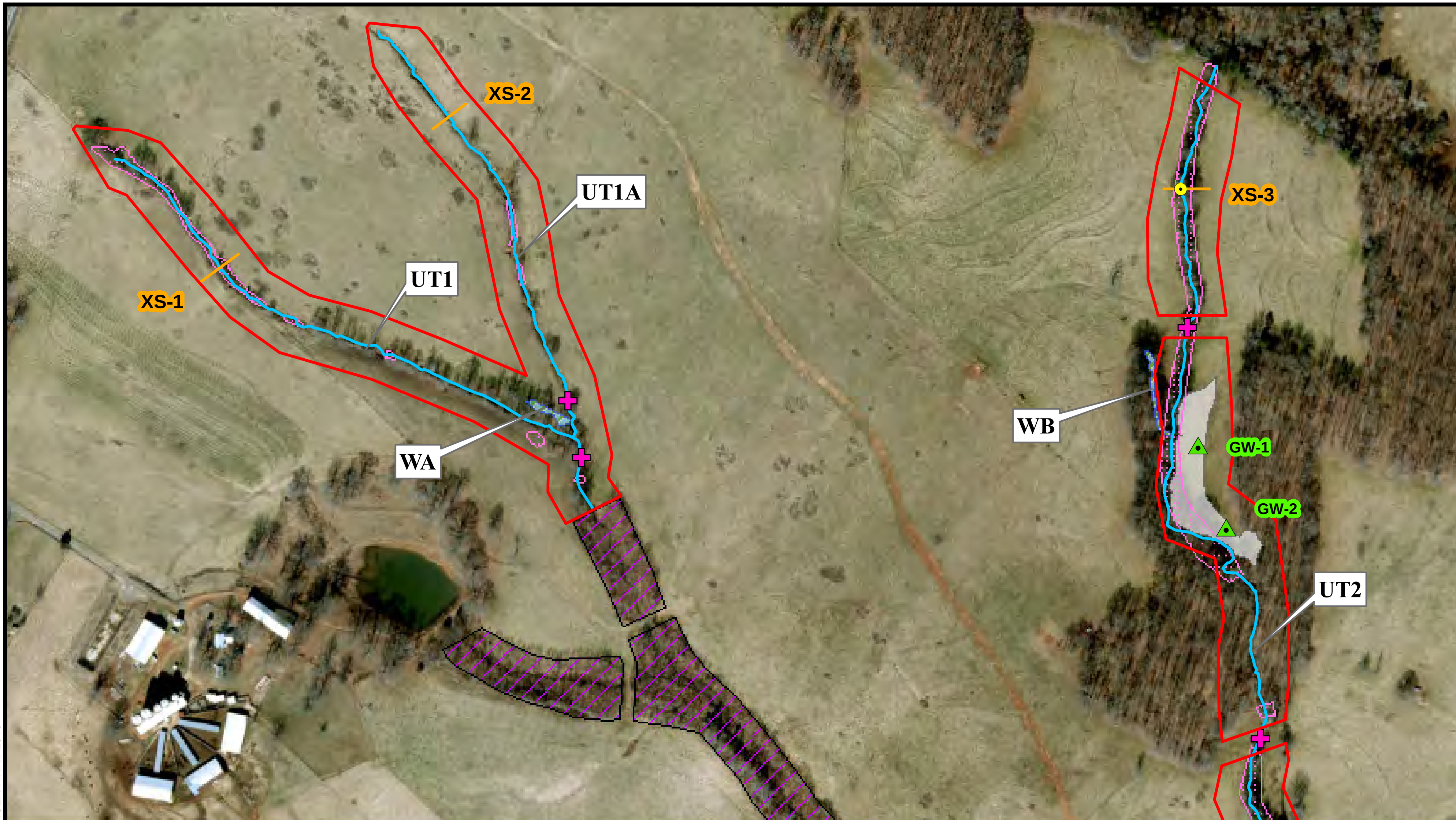
1:8,000

FIGURE 2
Overview

DATE:
February 2023

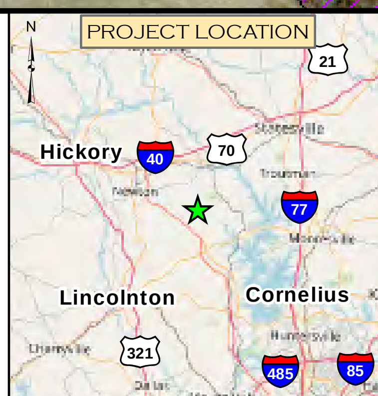
Sources: ESRI Aerial Imagery 2020; Open Street Map; TIGER Roads 2015

Path: A:\Projects\ASH0018_NCDMS_Bandys_Farm\GIS\Maps\Mitigation Plan Maps\Fig2_MitPlan_ExistingConditions_rev.mxd | Date: 2/20/2023 | Time: 11:23:54 AM | User Name: sking



- Conservation Easement
- Vehicle Crossings
- Pebble Count Locations
- Cross Sections
- Project Reaches
- Groundwater Wells
- Jurisdictional Wetlands
- Invasive Species
- Hydric Soil
- North Fork Mountain Creek Mitigation Site

PROJECT LOCATION



BANDYS FARM
STREAM AND WETLAND MITIGATION PROJECT
EXISTING CONDITIONS MAP
CATAWBA COUNTY, NC

PREPARED BY:

EPR Ecosystem Planning & Restoration

N

0 200 400 Feet

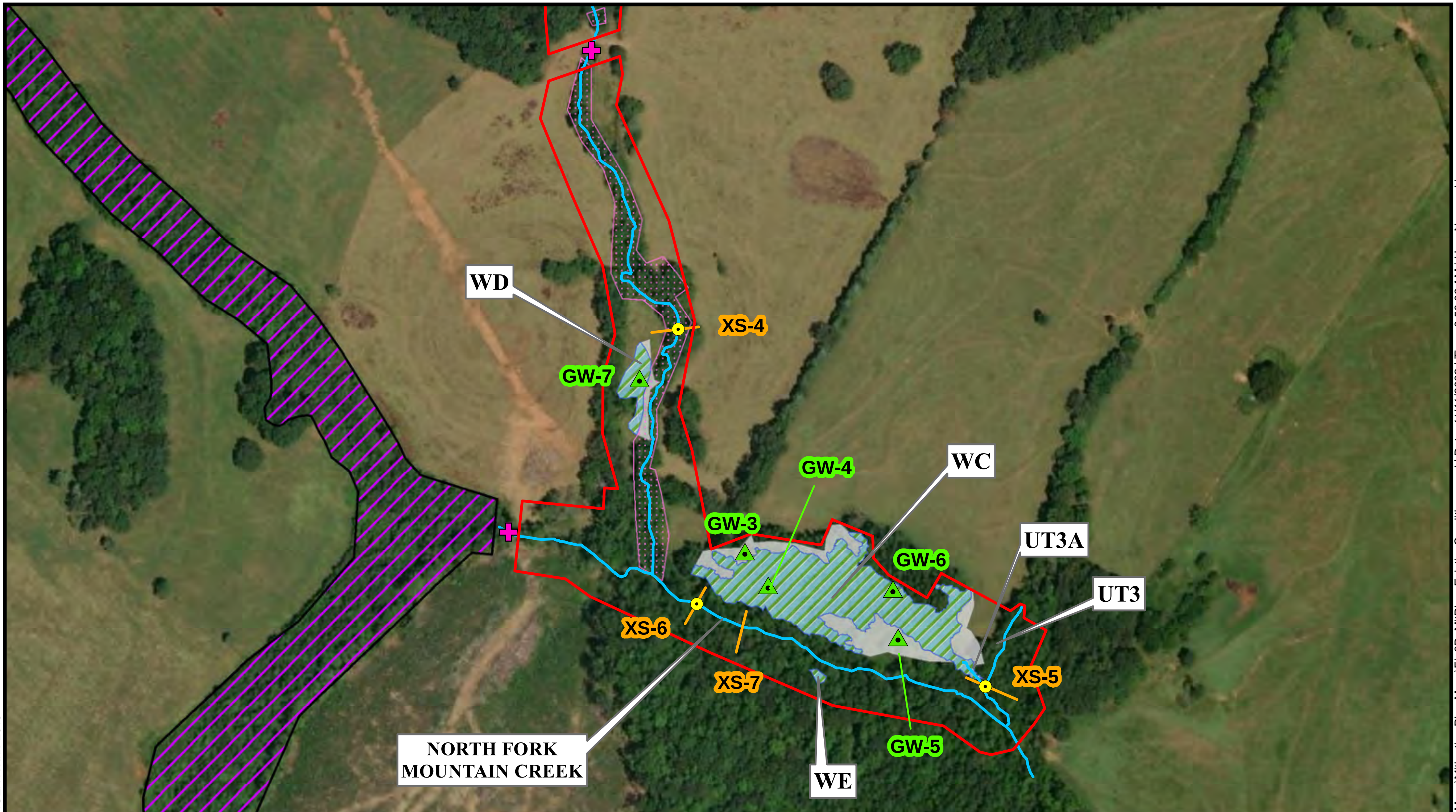
1:4,500

FIGURE 2A

DATE:
JUNE 2023

Sources: ESRI Aerial Imagery 2020; Open Street Map: TIGER Roads 2015

Path: A:\Projects\ASH0018_NCDMS_Bandys_Farm\GIS\Maps\Mitigation Plan Maps\Fig2A_MitPlan_ExistingConditions.mxd | Date: 6/21/2023 | Time: 2:33:41 PM | User Name: sking



Conservation Easement
Vehicle Crossings
Pebble Count Locations
Cross Sections
Project Reaches
Groundwater Wells
Jurisdictional Wetlands
Invasive Species
Hydric Soil
North Fork Mountain Creek Mitigation Site

Bandys Farm
Stream and Wetland Mitigation Project
Existing Conditions Map
Catawba County, NC

Prepared By:
Ecosystem Planning & Restoration

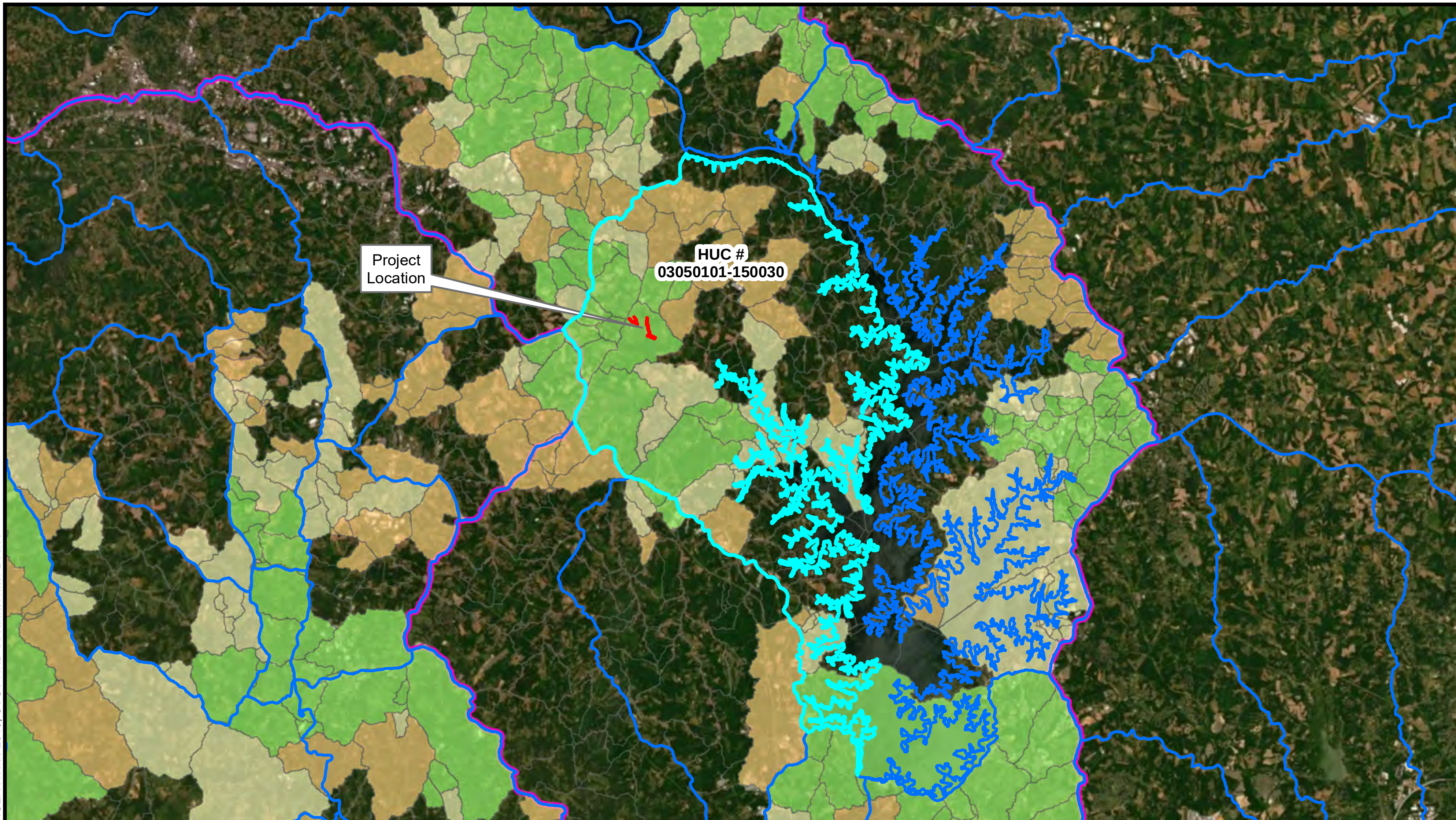
N
0 200 400 Feet
1:4,000

FIGURE 2B

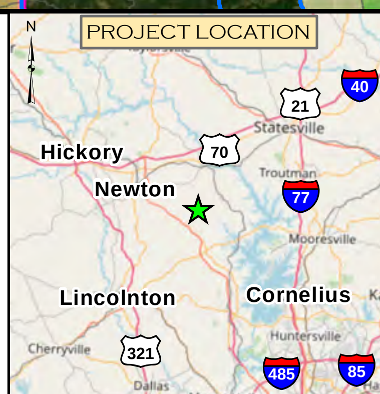
DATE:
November 2022

Sources: ESRI Aerial Imagery 2020; Open Street Map; TIGER Roads 2015

Path: R:\Projects\ASH0018_NCDMS_Bandys_Farm\GIS\Maps\Mitigation Plan Maps\Fig2B_MitPlan_ExistingConditions.mxd | Date: 11/11/2022 | Time: 8:56:06 AM | User Name: sking



Conservation Easement
14-Digit HUC Boundaries
Targeted Resource Area (TRA) Boundaries
(Number of Functional Categories met by TRA)
0
1
2
3
Catawba-01 Boundary



Bandys Farm
Stream and Wetland Mitigation Project
Watershed Map: Hydrologic Units
Catawba County, NC

Prepared By:
Ecosystem Planning & Restoration

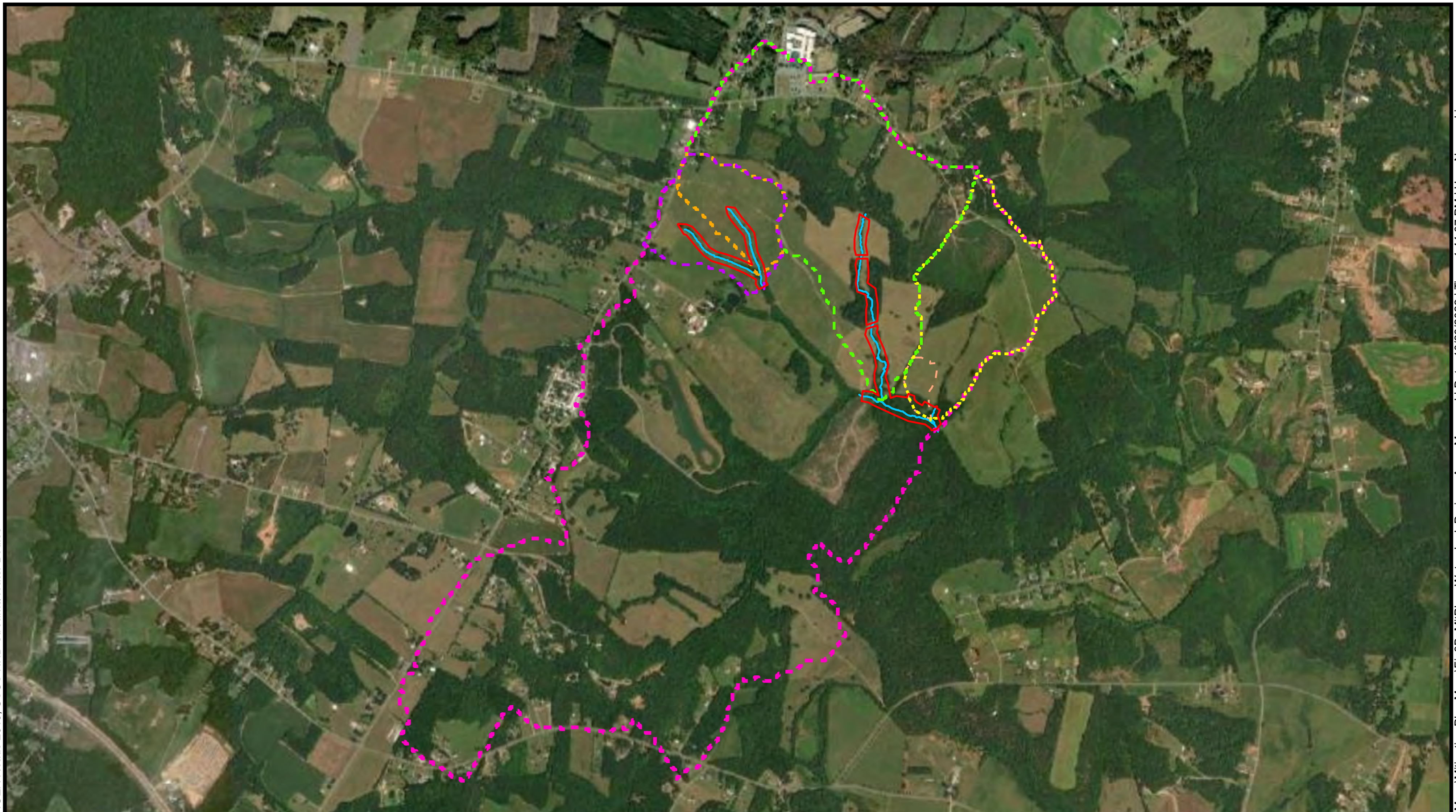
N
0 2 4 Miles
1:272,745

FIGURE 3a

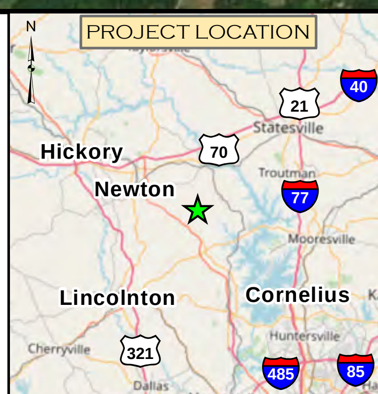
DATE:
September 2022

Sources: ESRI Aerial Imagery 2020; Open Street Map; TIGER Roads 2015; USGS NHD Streams/Water Bodies

Path: R:\Projects\ASH0018_NCDMS_Bandys_Farm\GIS\Maps\Mitigation Plan Maps\Fig3A_MitPlan_Watershed_HydrologicUnit_Map.mxd | Date: 9/26/2022 | Time: 12:46:52 PM | User Name: sking



Conservation Easement
UT1 (76.9 ac)
UT1A (44.8 ac)
UT2 (272.9 ac)
UT3 (120.5 ac)
UT3A (8.0 ac)
North Fork Mtn Creek (1,398 ac)
Project Reaches



Bandys Farm
Stream and Wetland Mitigation Project
Watershed Map: Reach Drainage Areas
Catawba County, NC

Prepared By:

Ecosystem Planning & Restoration

N

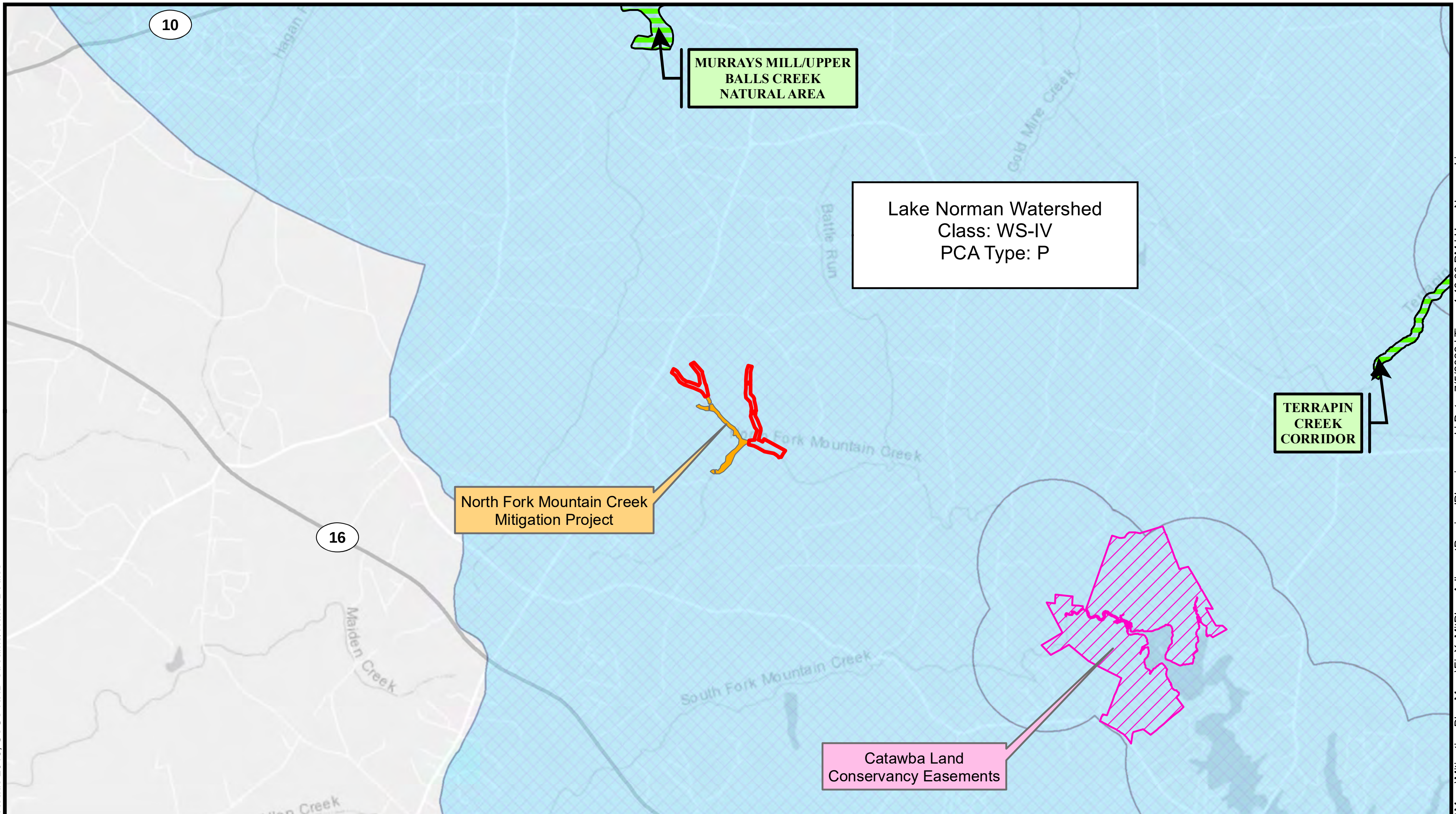
0 0.2 0.4 Miles
1:27,106

FIGURE 3B

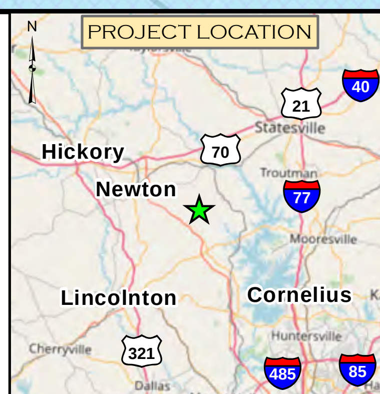
DATE:
October 2022

Sources: ESRI Aerial Imagery 2020; Open Street Map; TIGER Roads 2015; USGS NHD Streams/Water Bodies

Path: R:\Projects\ASH0018_NCDMS_Bandys_Farm\GIS\Maps\Mitigation Plan Maps\Fig3B_MitPlan_Watershed_DrainageArea_Map.mxd | Date: 10/28/2022 | Time: 1:44:07 PM | User Name: sking



- Conservation Easement
- Significant Natural Heritage Areas
- Catawba Land Conservancy Easements
- Mitigation Projects
- Water Supply Watersheds



BANDYS FARM
STREAM AND WETLAND MITIGATION PROJECT
ADJACENT AND PROXIMAL PLANNING ELEMENTS
CATAWBA COUNTY, NC

PREPARED BY:

ECOSYSTEM PLANNING & RESTORATION

N

0 0.5 1 Miles
1:63,360

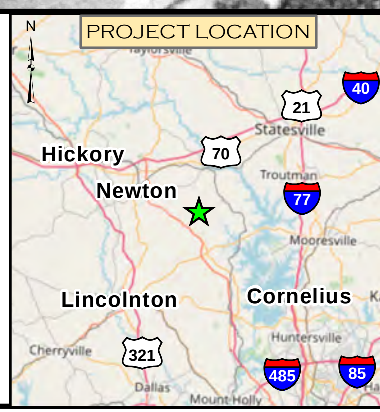
FIGURE 4

DATE:
JULY 2022

Sources: ESRI Gray Canvas; Open Street Map; TIGER Roads 2015; USGS NHD Streams/Water Bodies

Path: R:\Projects\ASH0018_NCDMS_Bandys_Farm\GIS\Maps\Mitigation Plan Maps\FigX_MitPlan_AdjacentProximalPlanning.mxd | Date: 7/5/2022 | Time: 4:46:03 PM | User Name: sking

Conservation Easement



Bandys Farm
Stream and Wetland Mitigation Project
1950 Historical Aerial Photo Map
Catawba County, NC

Prepared By:

Ecosystem Planning & Restoration

N

0 325 650 Feet

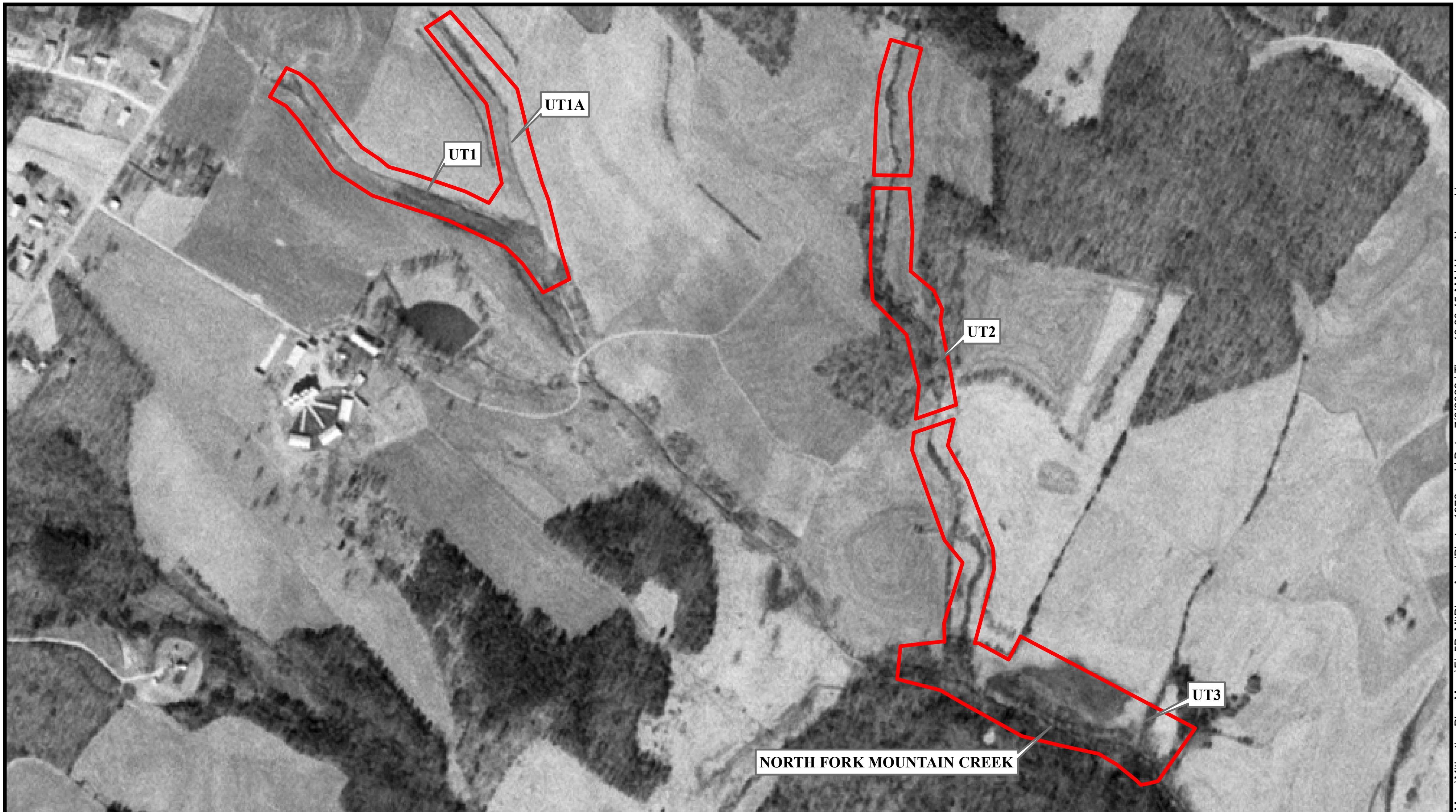
1:7,800

FIGURE 5A

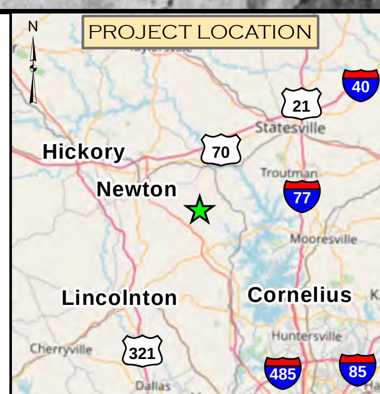
DATE:
July 2022

Sources: Army Map Service 1950 Aerial; Open Street Map;

Path: R:\Projects\ASH0018_NCDMS_Bandys_Farm\GIS\Maps\Mitigation Plan Maps\Fig5A_MitPlan_AerialPhoto_1950.mxd | Date: 7/6/2022 | Time: 10:00:17 AM | User Name: sking



Conservation Easement



Bandys Farm
Stream and Wetland Mitigation Project
1976 Historical Aerial Photo Map
Catawba County, NC

Prepared By:

Ecosystem Planning & Restoration

N

0 325 650 Feet

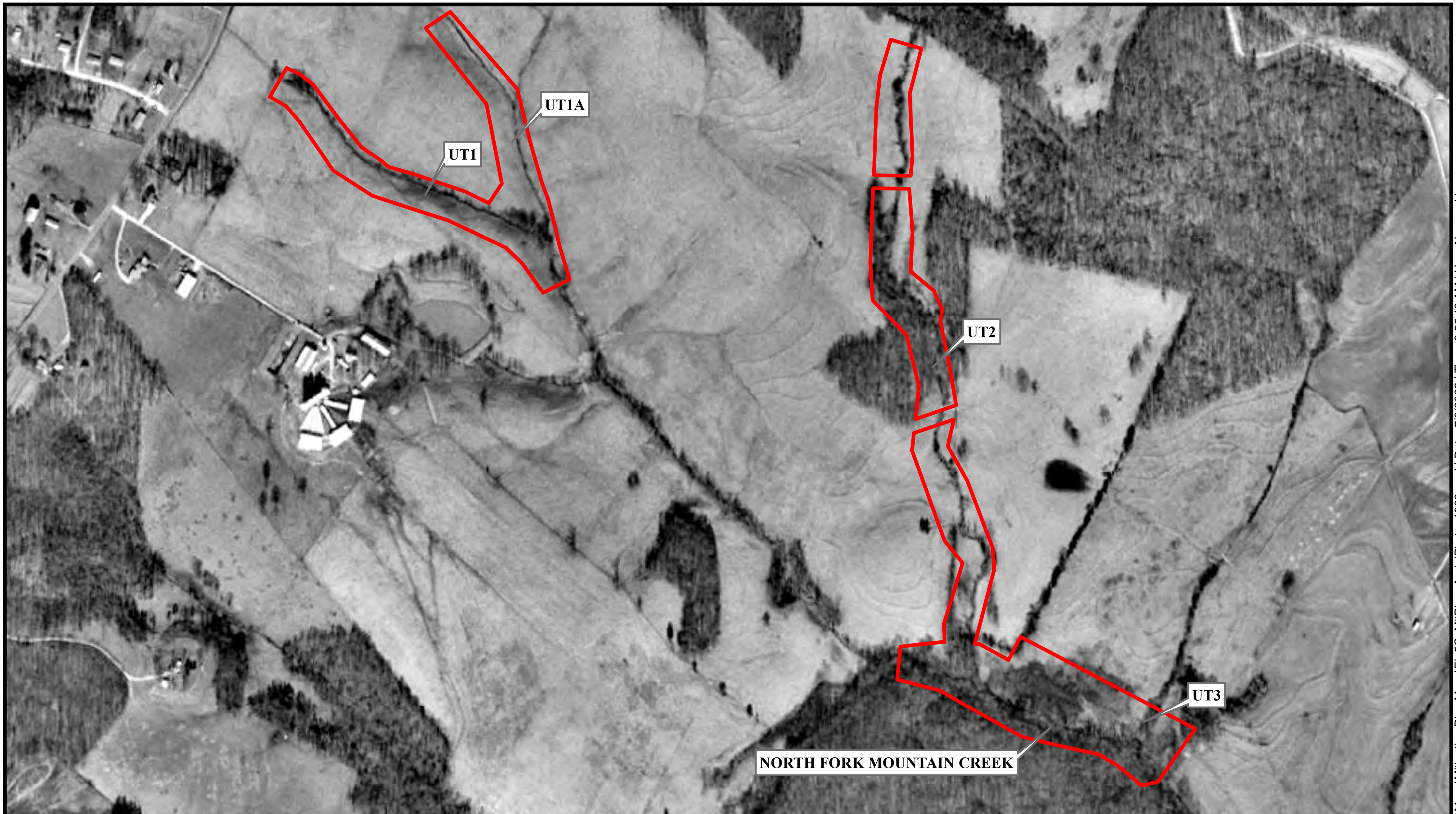
1:7,800

FIGURE 5B

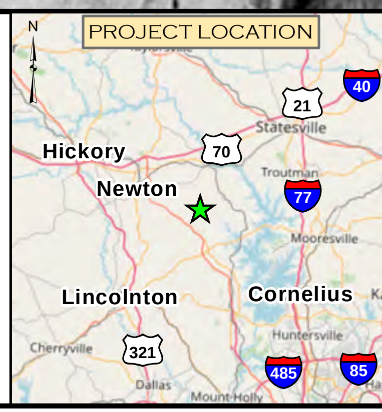
DATE:
July 2022

Sources: USGS 1976 Aerial; Open Street Map;

Path: R:\Projects\ASH0018_NCDMS_Bandys_Farm\GIS\Maps\Mitigation Plan Maps\Fig5B_MitPlan_AerialPhoto_1976.mxd | Date: 7/6/2022 | Time: 10:00:45 AM | User Name: sking



Conservation Easement



Bandys Farm
Stream and Wetland Mitigation Project
1993 Historical Aerial Photo Map
Catawba County, NC

Prepared By:

Ecosystem Planning & Restoration

N

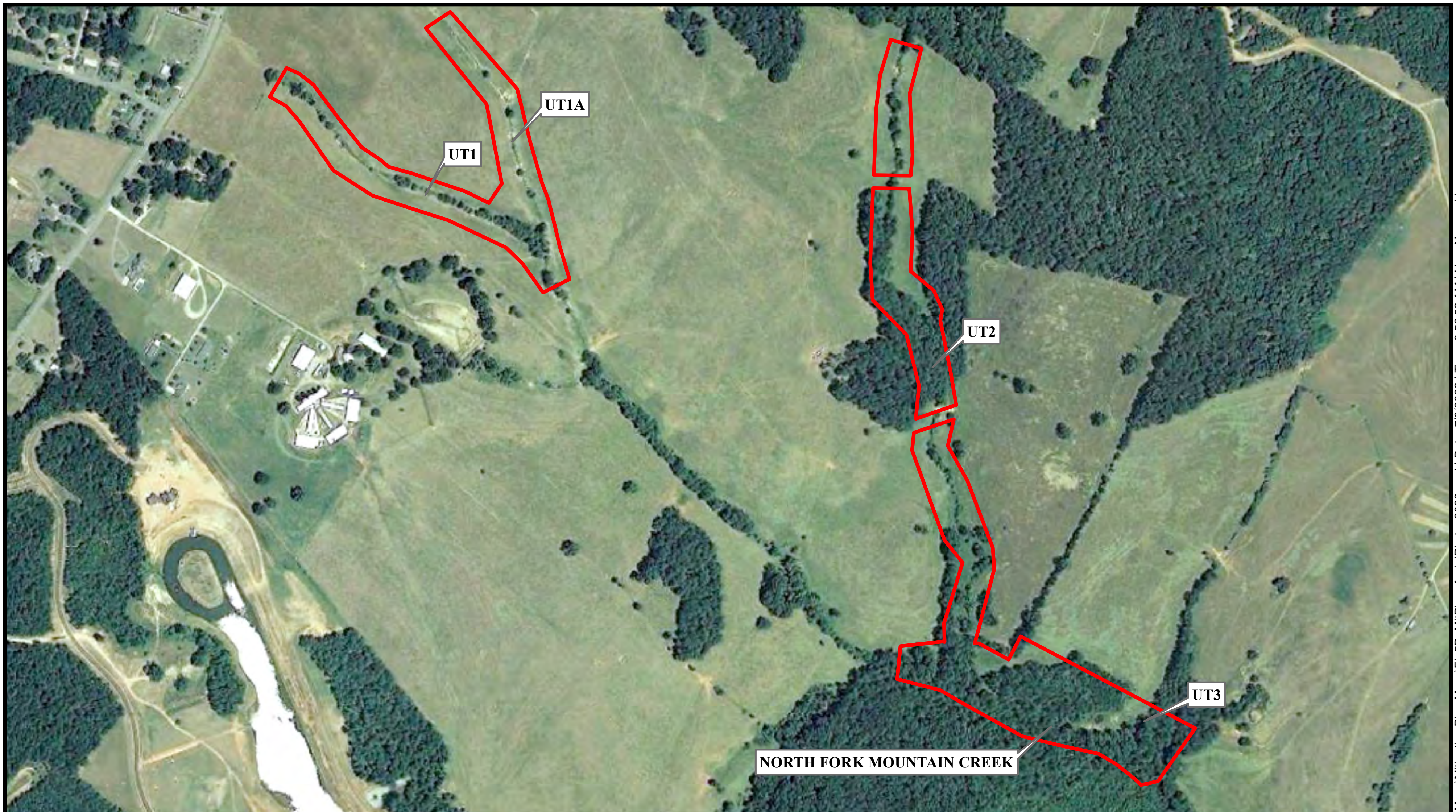
0 325 650 Feet
1:7,800

FIGURE 5C

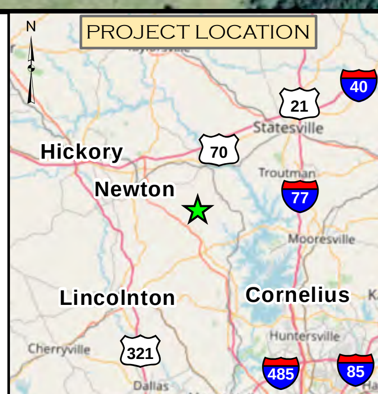
DATE:
July 2022

Sources: USGS 1993 Aerial; Open Street Map:

Path: R:\Projects\ASH0018_NCDMS_Bandys_Farm\GIS\Maps\Mitigation Plan Maps\Fig5C_MitPlan_AerialPhoto_1993.mxd | Date: 7/6/2022 | Time: 9:55:43 AM | User Name: sking



Conservation Easement



Bandys Farm
Stream and Wetland Mitigation Project
2008 Historical Aerial Photo Map
Catawba County, NC

Prepared By:

Ecosystem Planning & Restoration

N

0 325 650 Feet

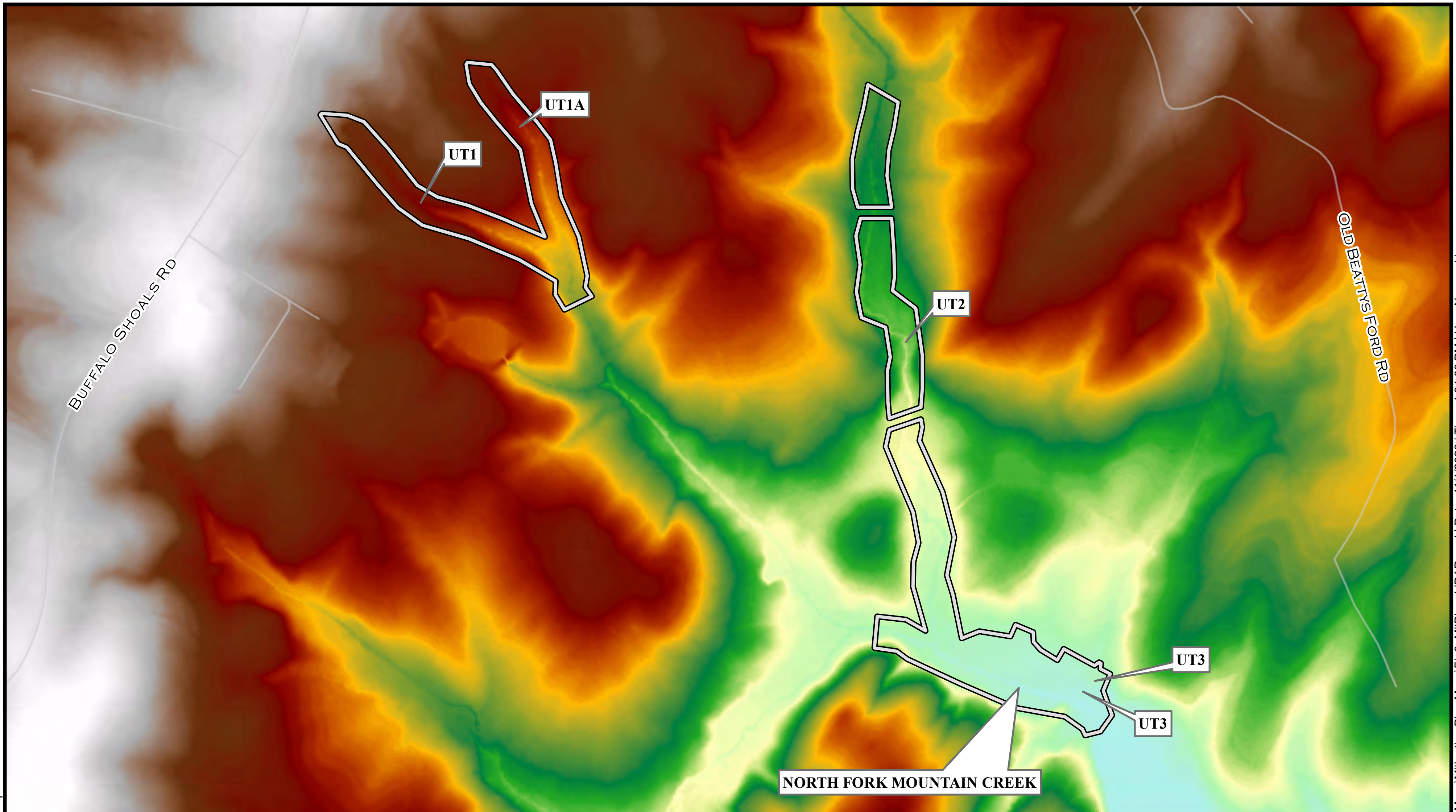
1:7,800

FIGURE 5D

DATE:
July 2022

Sources: USDA FSA 2008 Aerial; Open Street Map;

Path: R:\Projects\ASH0018_NCDMS_Bandys_Farm\GIS\Maps\Mitigation Plan Maps\Fig5D_MitPlan_AerialPhoto_2008.mxd | Date: 7/6/2022 | Time: 9:56:52 AM | User Name: sking

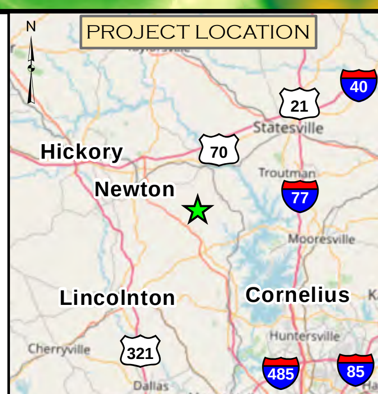


CONSERVATION EASEMENT

ELEVATION (METERS)

HIGH : 320.101

LOW : 258.78



BANDYS FARM
STREAM AND WETLAND MITIGATION PROJECT
LIDAR MAP

CATAWBA COUNTY, NC

PREPARED BY:

ECOSYSTEM PLANNING & RESTORATION

N

0 375 750 Feet

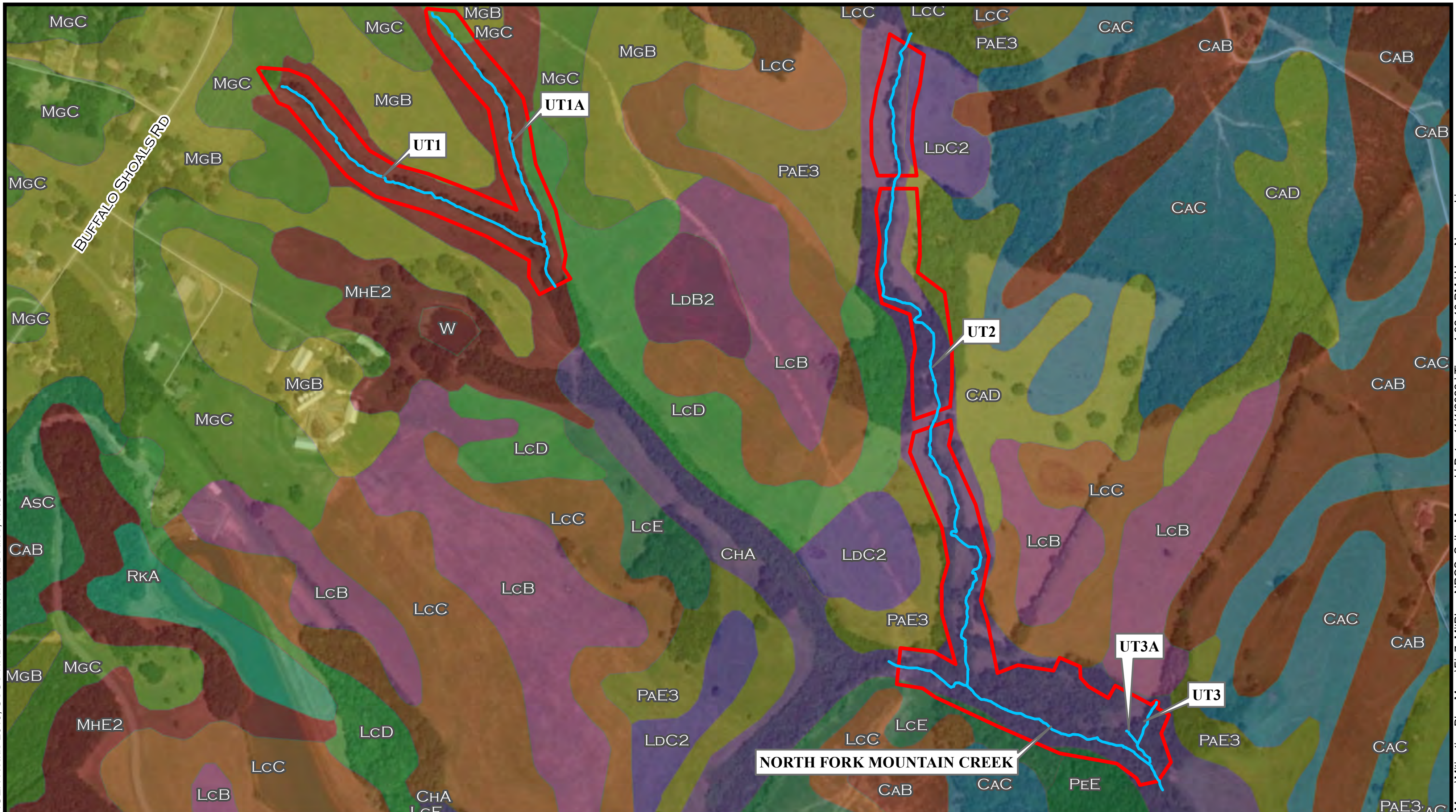
1:9,000

FIGURE 6

DATE:
NOVEMBER 2022

Sources: National Elevation Dataset (3m); Open Street Map

Path: R:\Projects\ASH0018_NCDMS_Bandys_Farm\GIS\Maps\Mitigation Plan Maps\Fig6_MitPlan_LiDAR.mxd | Date: 11/1/2022 | Time: 1:34:03 PM | User Name: sking



Project Streams

Conservation Easement

ASC - Appling sandy loam, 6 to 10 percent slopes

CAB - Cecil sandy loam, 2 to 6 percent slopes

CAC - Cecil sandy loam, 6 to 10 percent slopes

CAD - Cecil sandy loam, 10 to 15 percent slopes

CHA - Chewacla loam, 0 to 2 percent slopes, frequently flooded

LCB - Lloyd loam, 2 to 6 percent slopes

LCC - Lloyd loam, 6 to 10 percent slopes

LCD - Lloyd loam, 10 to 15 percent slopes

LCE - Lloyd loam, 15 to 25 percent slopes

LDB2 - Lloyd clay loam, 2 to 6 percent slopes, moderately eroded

LDC2 - Lloyd clay loam, 6 to 10 percent slopes, moderately eroded

MGB - Madison gravelly sandy loam, 2 to 6 percent slopes

MGC - Madison gravelly sandy loam, 6 to 10 percent slopes

MHE2 - Madison-Bethlehem complex, 10 to 25 percent slopes, moderately eroded

PAE3 - Pacolet clay loam, 10 to 25 percent slopes, severely eroded

PEE - Pacolet soils, 10 to 25 percent slopes

RKA - Roanoke loam, 0 to 2 percent slopes, occasionally flooded

W - Water

Bandys Farm
Stream and Wetland Mitigation Project
NRCS Soils Map
Catawba County, NC

Prepared By:

Ecosystem Planning & Restoration

N

0 250 500 Feet

1:7,800

FIGURE 7

DATE: November 2022

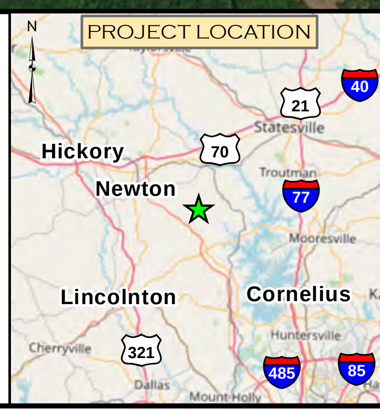
Sources: ESRI Aerial Imagery 2020; Open Street Map; TIGER Roads 2015; USGS NHD Streams/Water Bodies; NRCS Soils

Path: R:\Projects\ASH0018_NCDMS_Bandys_Farm\GIS\Maps\Mitigation Plan Maps\Fig7_MitPlan_NRCS_Soils_Map.mxd | Date: 11/1/2022 | Time: 1:32:18 PM | User Name: sking

Conservation Easement

FEMA Floodplain Zone

AE (1% annual chance)



Bandys Farm
Stream and Wetland Mitigation Project
FEMA Floodplain Map
Catawba County, NC

Prepared By:

Ecosystem Planning & Restoration

N

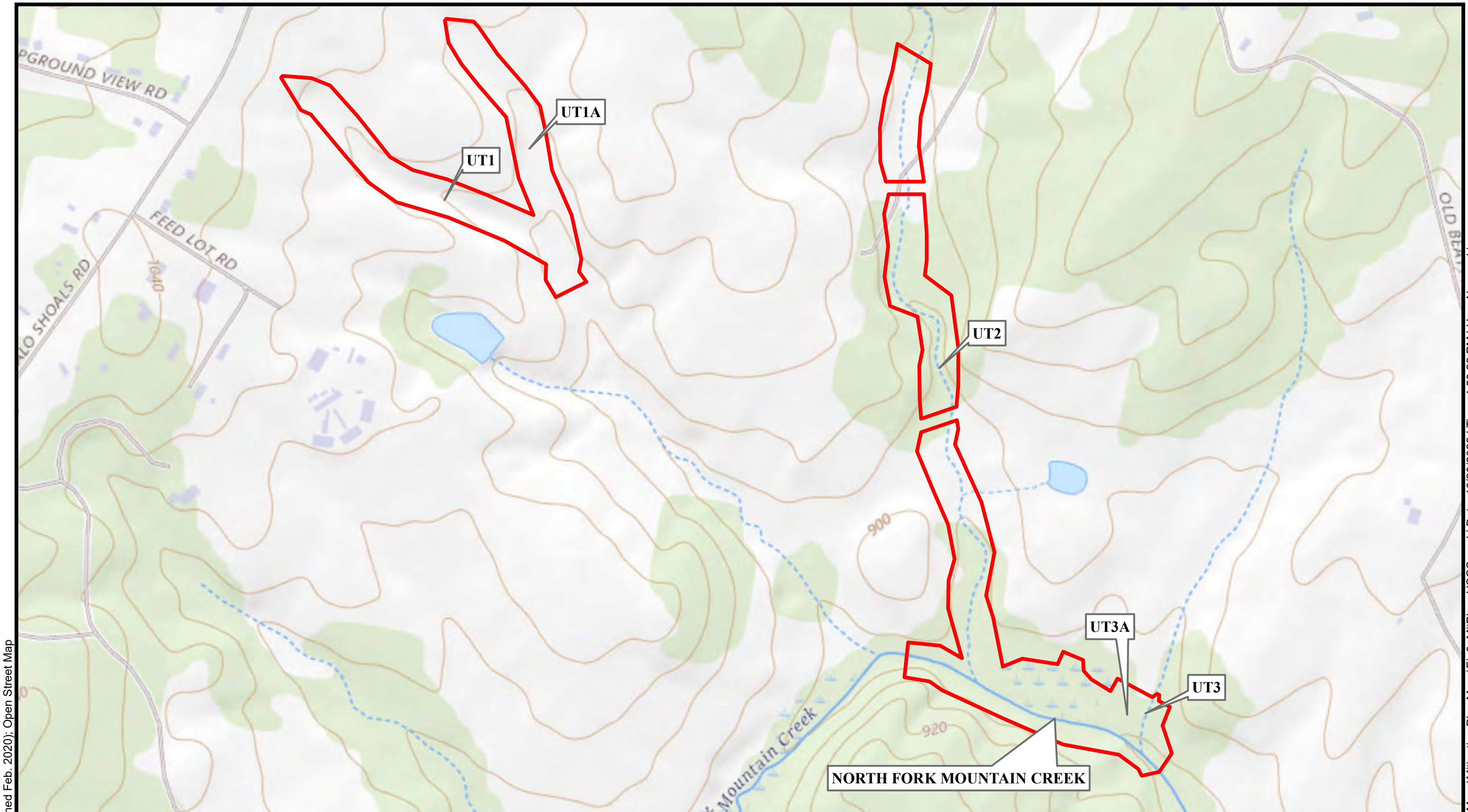
0 500 1,000 Feet
1:12,000

FIGURE 8

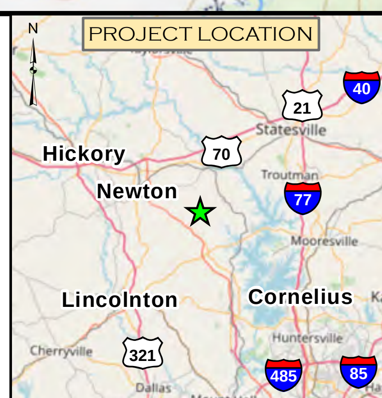
DATE:
July 2022

Sources: ESRI Aerial Imagery 2020; Open Street Map; TIGER Roads 2015; FEMA Floodplain Data

Path: R:\Projects\ASH0018_NCDMS_Bandys_Farm\GIS\Maps\Mitigation Plan Maps\Fig8_MitPlan_FEMA.mxd | Date: 7/6/2022 | Time: 10:08:01 AM | User Name: sking



Conservation Easement



Bandys Farm
Stream and Wetland Mitigation Project
USGS Topographic Map (Catawba Quad)
Catawba County, NC

Prepared By:

Ecosystem Planning & Restoration

N

0 250 500 Feet

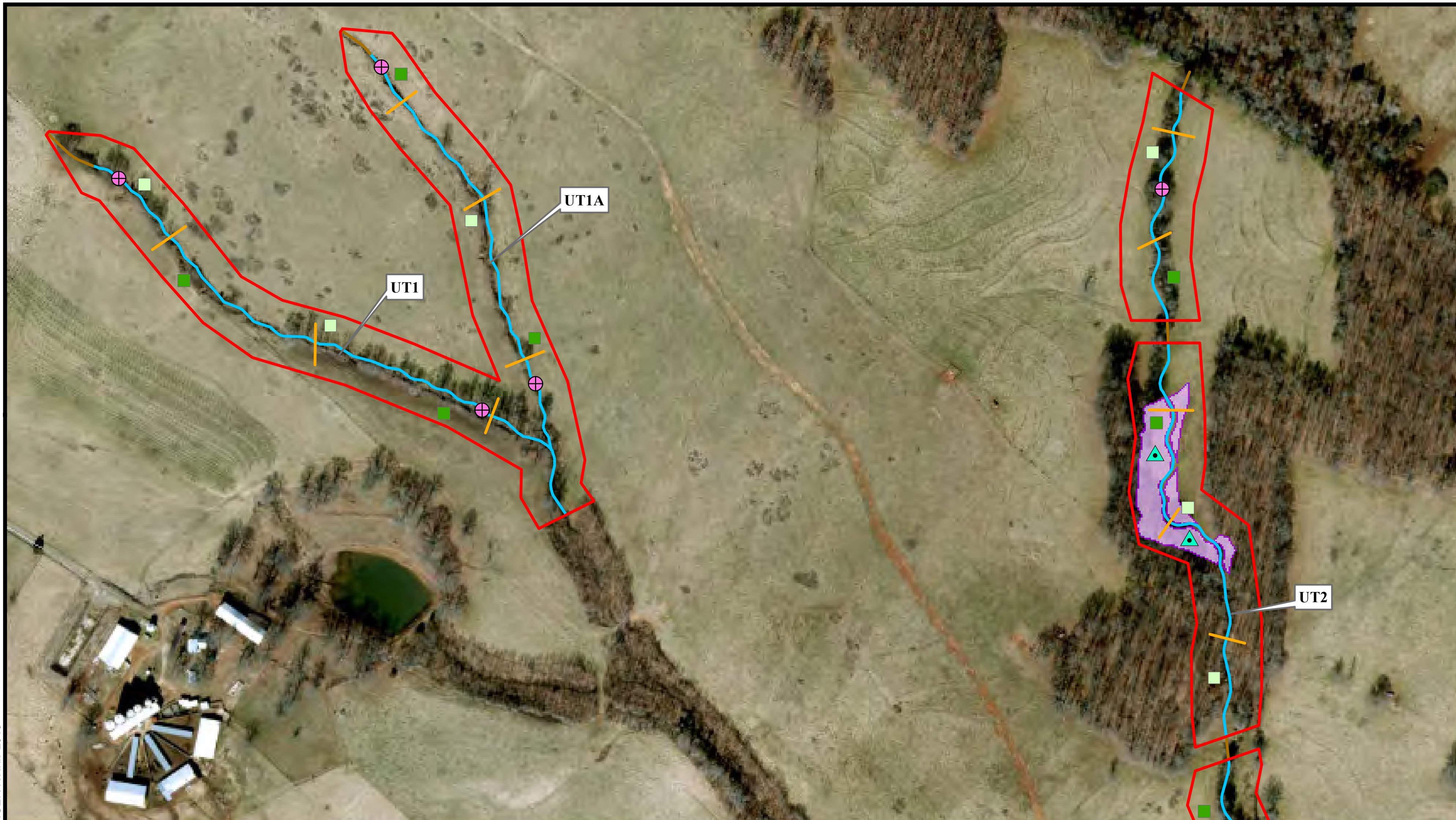
1:8,000

FIGURE 9

DATE:
October 2022

Sources: USGS Topographic Web Service (Data Refreshed Feb. 2020); Open Street Map

Path: R:\Projects\ASH0018_NCDMS_Bandys_Farm\GIS\Maps\Mitigation Plan Maps\Fig9_MitPlan_USGS.mxd | Date: 10/28/2022 | Time: 1:50:22 PM | User Name: sking



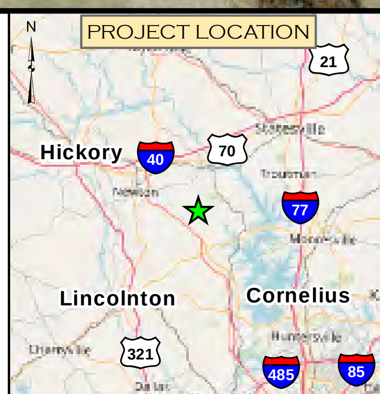
Conservation Easement
Cross-Sections

Veg Plots by Type

Fixed
Temp
Groundwater Monitoring Wells
In-Stream Flow Gauges

Project Streams by Mitigation Type

Restoration
Enhancement Level II
Not for Credit
Wetland Reestablishment (W1)
Wetland Rehabilitation (W2)



Bandys Farm
Stream and Wetland Mitigation Project
Proposed Monitoring Features
Catawba County, NC

Prepared By:

Ecosystem Planning & Restoration

N

0 200 400 Feet

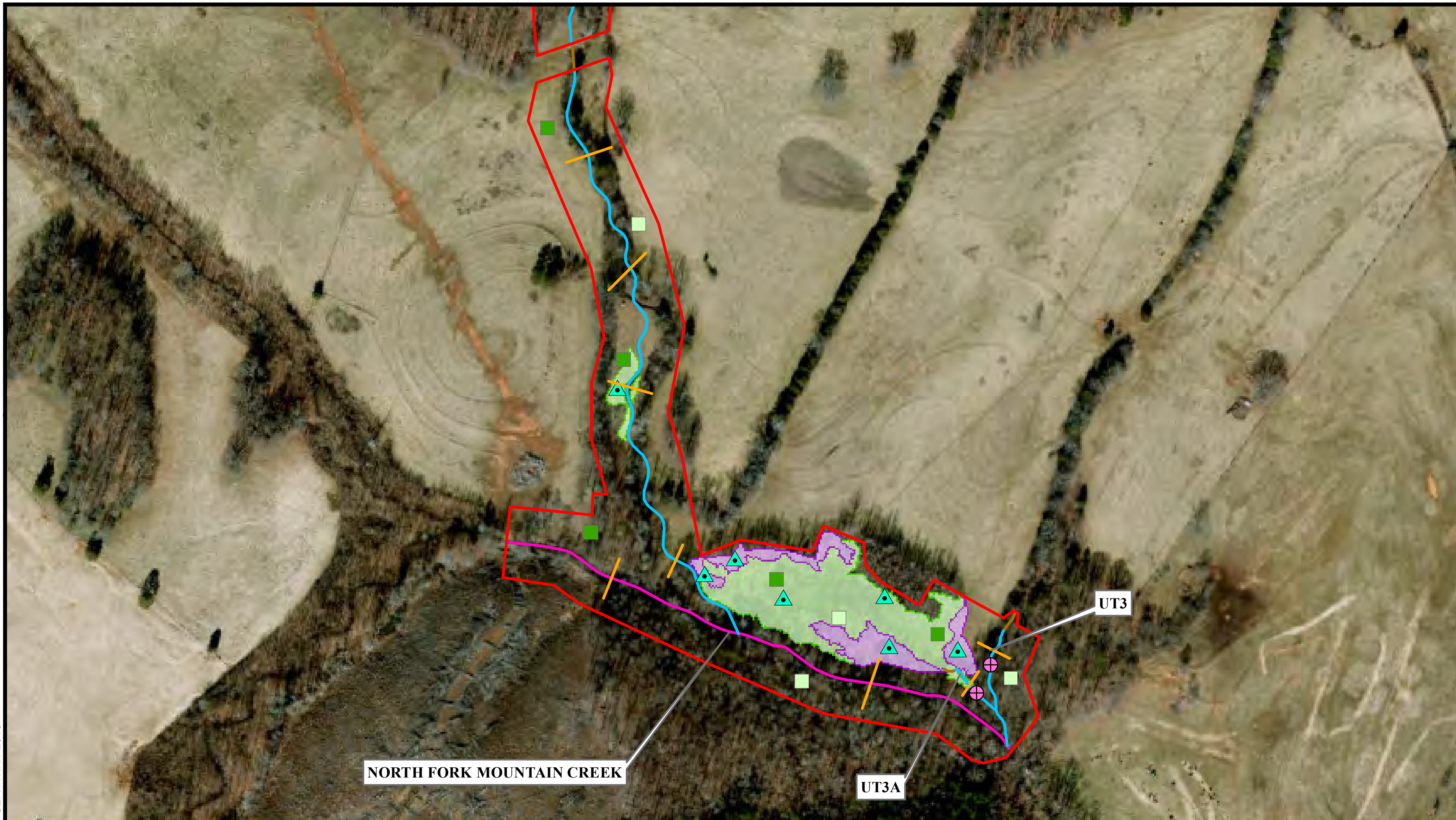
1:4,500

FIGURE 10A

DATE:
June 2023

Sources: ESRI Aerial Imagery 2020; Open Street Map; TIGER Roads 2015

Path: A:\Projects\ASH0018_NCDMS_Bandys_Farm\GIS\Maps\Mitigation Plan Maps\Fig10A_MitPlan_ProposedMonitoringFeatures.mxd | Date: 6/22/2023 | Time: 1:50:12 PM | User Name: sking



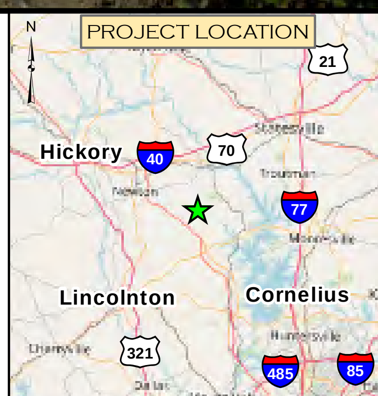
Conservation Easement
Cross-Sections

Veg Plots by Type

Fixed
Temp
Groundwater Monitoring Wells
In-Stream Flow Gauges

Project Streams by Mitigation Type

Restoration
Enhancement 2
Non-Credit
Wetland Reestablishment (W1)
Wetland Rehabilitation (W2)



Bandys Farm
Stream and Wetland Mitigation Project
Proposed Monitoring Features
Catawba County, NC

Prepared By:

Ecosystem Planning & Restoration

N

0 200 400 Feet

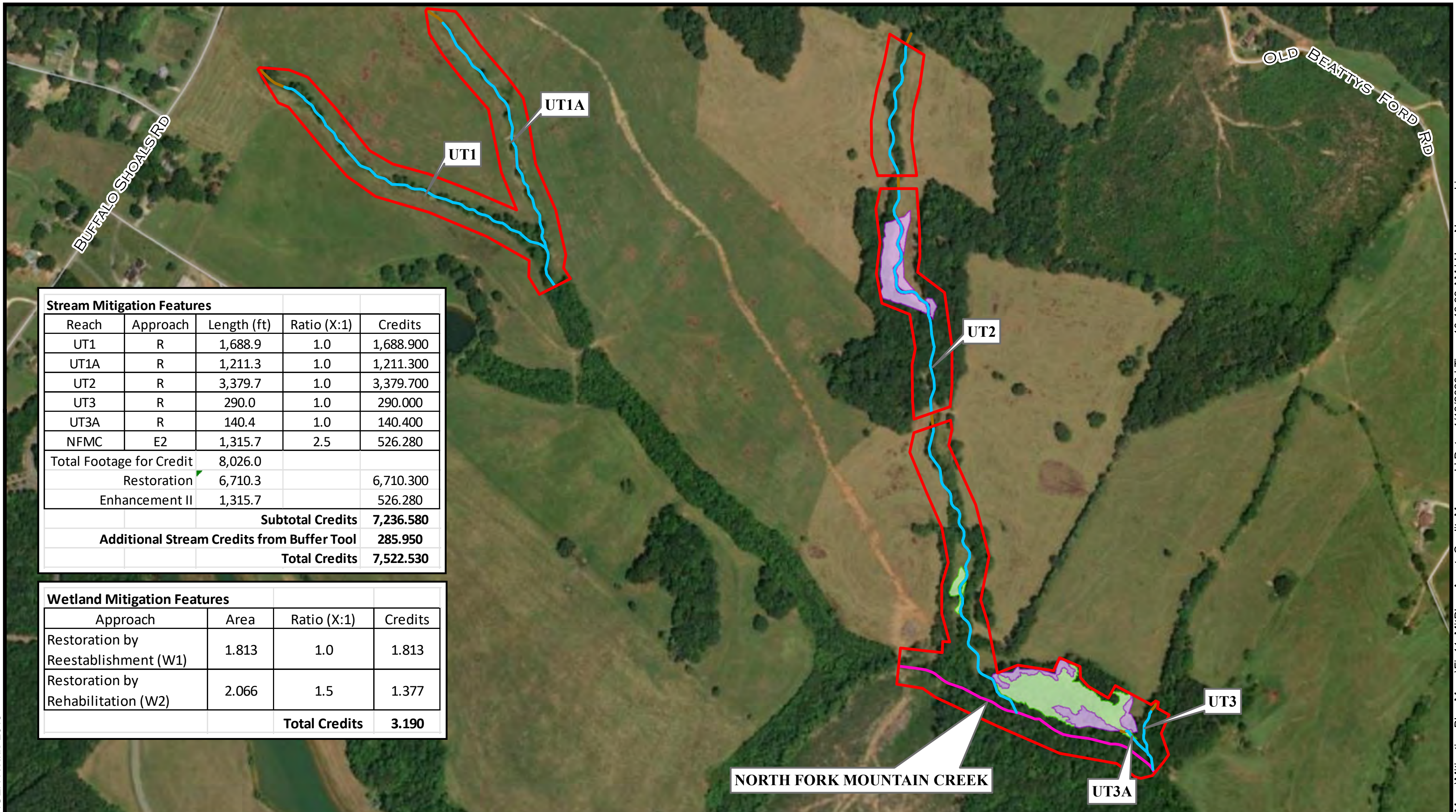
1:4,000

FIGURE 10B

DATE: July 2023

Sources: ESRI Aerial Imagery 2020; Open Street Map; TIGER Roads 2015

Path: A:\Projects\ASH0018_NCDMS_Bandys_Farm\GIS\Maps\Mitigation Plan Maps\Fig10B_MitPlan_ProposedMonitoringFeatures.mxd | Date: 7/25/2023 | Time: 12:22:27 PM | User Name: sking



Stream Mitigation Features

Reach	Approach	Length (ft)	Ratio (X:1)	Credits
UT1	R	1,688.9	1.0	1,688.900
UT1A	R	1,211.3	1.0	1,211.300
UT2	R	3,379.7	1.0	3,379.700
UT3	R	290.0	1.0	290.000
UT3A	R	140.4	1.0	140.400
NFMC	E2	1,315.7	2.5	526.280
Total Footage for Credit		8,026.0		
	Restoration	6,710.3		6,710.300
	Enhancement II	1,315.7		526.280
			Subtotal Credits	7,236.580
			Additional Stream Credits from Buffer Tool	285.950
			Total Credits	7,522.530

Wetland Mitigation Features

Approach	Area	Ratio (X:1)	Credits
Restoration by Reestablishment (W1)	1.813	1.0	1.813
Restoration by Rehabilitation (W2)	2.066	1.5	1.377
		Total Credits	3.190

Conservation Easement

Project Streams by Mitigation Type

- Restoration
- Enhancement 2
- Non-Credit
- Wetland Reestablishment (W1)
- Wetland Rehabilitation (W2)

Bandys Farm
Stream and Wetland Mitigation Project
Asset and Credit Map
Catawba County, NC

Prepared By:

Ecosystem Planning & Restoration

N

0 250 500 Feet

1:7,800

FIGURE 11

DATE:
January 2023

Sources: ESRI Aerial Imagery 2020; Open Street Map; TIGER Roads 2015

Path: A:\Projects\ASH0018_NCDMS_Bandys_Farm\GIS\Maps\Mitigation Plan Maps\Fig11_MitPlan_Asset_Credit_Map.mxd | Date: 1/18/2023 | Time: 10:48:33 AM | User Name: sking

Appendix 1

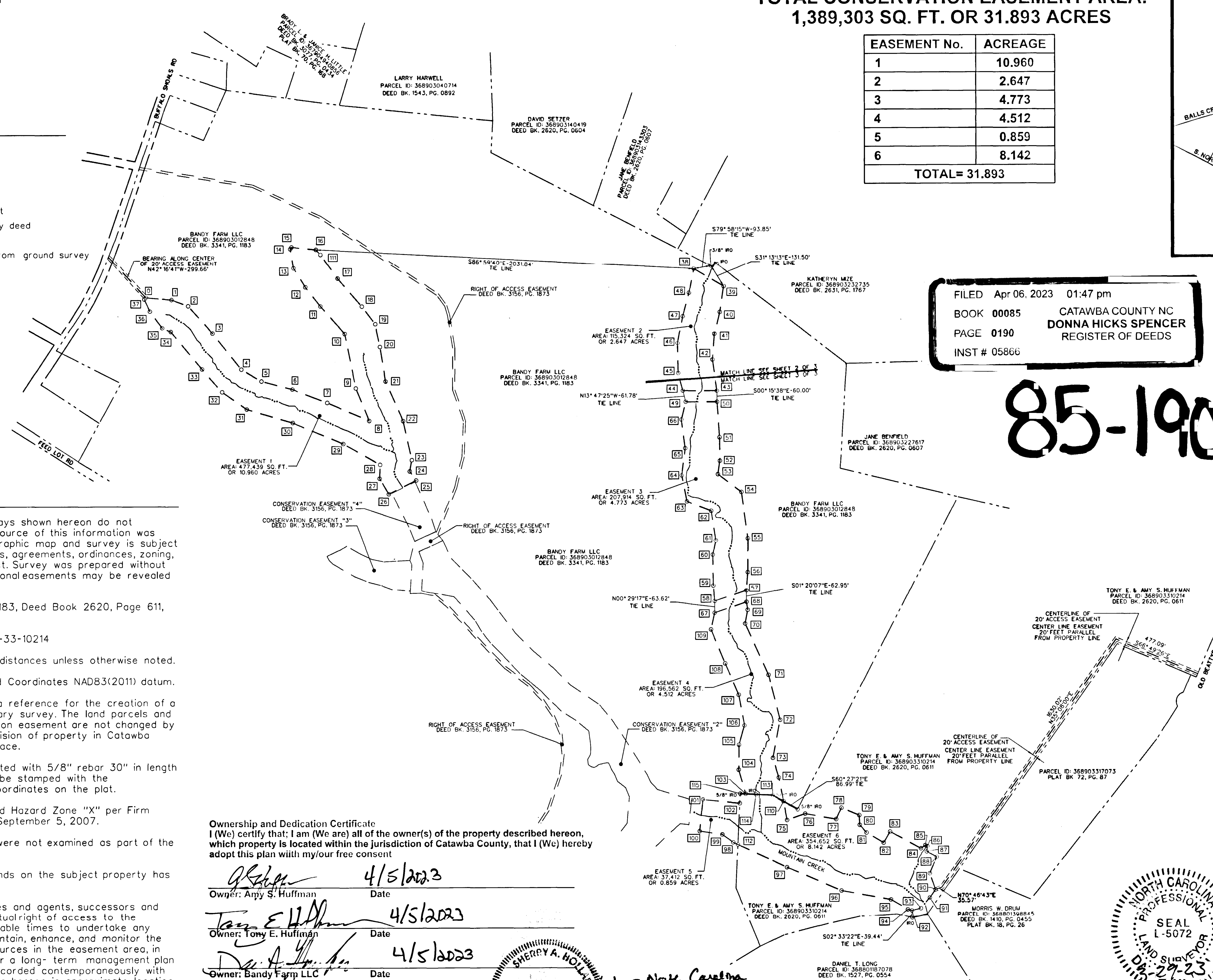
400' 200' 0' 400' 800'
SCALE: 1 INCH = 400 FEET

GRID

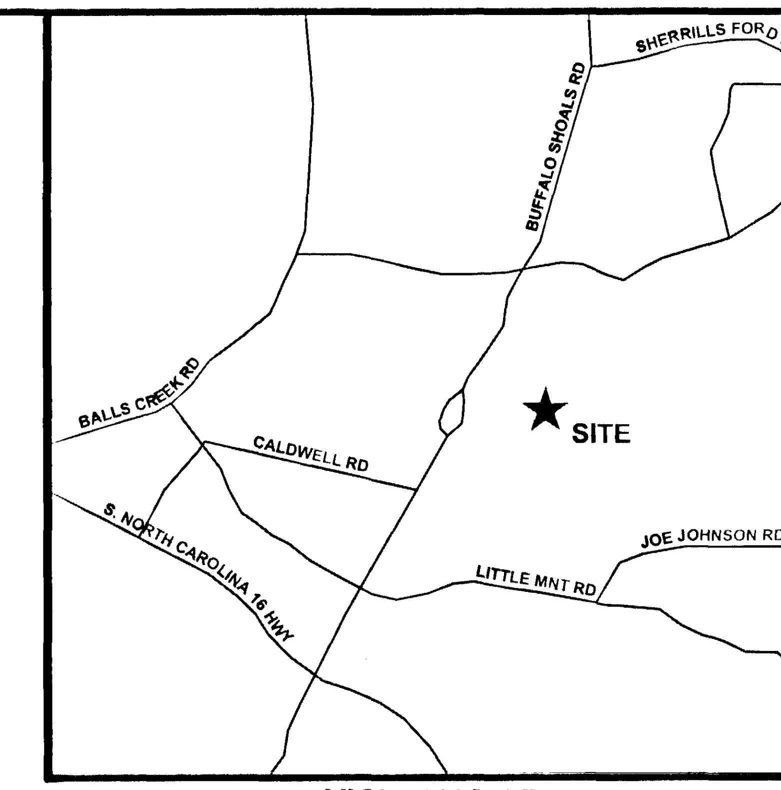
N

TOTAL CONSERVATION EASEMENT AREA: 1,389,303 SQ. FT. OR 31.893 ACRES

EASEMENT No.	ACREAGE
1	10.960
2	2.647
3	4.773
4	4.512
5	0.859
6	8.142
TOTAL= 31.893	



VICINITY MAP
NOT TO SCALE



LEGEND

- IRO ○ Iron Rod Found
- IPO ○ Iron Pipe Found
- Woods Edge
- Fence
- Conservation Easement
- Property line shown by deed
- Right-of-way
- Property line shown from ground survey
- Stream

FILED Apr 06, 2023 01:47 pm
BOOK 00085
PAGE 0190
INST # 05866
CATAWBA COUNTY NC
DONNA HICKS SPENCER
REGISTER OF DEEDS

85-190

NOTES:

1. Boundary lines, easements, and right-of-ways shown hereon do not represent a current boundary survey. The source of this information was taken from the deed of record. This topographic map and survey is subject to any right-of-ways, easements, restrictions, agreements, ordinances, zoning, and any other mattes of title that may exist. Survey was prepared without the benefit of a title commitment and additional easements may be revealed by a current title search.

2. Deed Reference: Deed Book 3341, Page 1183, Deed Book 2620, Page 611, Catawba County Registry.

3. Tax Parcel 3689-03-01-2848 & 3689-90-33-10214

4. All distances shown are horizontal ground distances unless otherwise noted.

5. The basis of bearings is NCGS State Grid Coordinates NAD83(2011) datum.

6. The purpose of this plat is to serve as a reference for the creation of a conservation easement. This is not a boundary survey. The land parcels and their boundaries affected by this conservation easement are not changed by this plat. This plat does not create a subdivision of property in Catawba County. No transfer of property is taking place.

7. Conservation Easement corners monumented with 5/8" rebar 30" in length with 3-1/4" aluminum caps. Each cap shall be stamped with the corresponding number from the table of coordinates on the plat.

8. Subject property is located in FEMA Flood Hazard Zone "X" per Firm Map# 3710367900J & 3710368800J dated: September 5, 2007.

9. Environmental and subsurface conditions were not examined as part of the survey.

10. The existence or non-existence of wetlands on the subject property has not been determined by this survey.

11. The State of North Carolina, its employees and agents, successors and assigns, are granted and conveyed a perpetual right of access to the easement area over the property at reasonable times to undertake any activities to restore, construct, manage, maintain, enhance, and monitor the stream, wetland and any other riparian resources in the easement area, in accordance with the restoration activities or a long- term management plan as described in Section III-A of the deed recorded contemporaneously with this plat. Preferred access routes are shown hereon in approximate location.

12. Bandy property subject to right-of-way of Buffalo Shoals Road (State Road 1003).

13. Any existing farm roads or fencing within the conservation easement will be removed and no longer used.

Ownership and Dedication Certificate
I (We) certify that; I am (We are) all of the owner(s) of the property described hereon, which property is located within the jurisdiction of Catawba County, that I (We) hereby adopt this plan with my/our free consent

Owner: Amy S. Huffman — Date 4/5/2023
Owner: Tony E. Huffman — Date 4/5/2023
Owner: Bandy Farm LLC — Date 4/5/2023

SHERRY A. HOLLAR
Notary Public
Catawba County
NORTH CAROLINA

State of North Carolina
County of Catawba.
I, Sherry A. Hollar, Notary Public for Catawba County, North Carolina, do hereby Certify that Amy S. Huffman and husband, Tony E. Huffman and Ivan A. Hunsucker, Manager of Bandy Farm, LLC, a North Carolina limited liability company, personally appeared before me this day and acknowledged the due execution of the foregoing instrument.
This 5th day of April, 2023
Sherry A Hollar
My commission expires: 3/11/28

State of North Carolina County of Catawba
Filed for registration this_________day of____________________, 2022
at_______ .m. and duly recorded in the office of Register of Deeds of Catawba County, NC.

By:______________________________________

Approval certificate for Exempt from Subdivision Plat
I certify that to the best of my ability I have determined that the plat shown hereon is exempt from Catawba County Subdivision regulations.

Director of Planning or Designee — Date 4/6/23

Review Officer Certificate
State of North Carolina, County of Catawba I, Madison Whisnant **, Review Officer of Catawba County, certify that the map or plat to which this certification is affixed meets all statutory requirements for recording.**

Review Officer — Date 4/6/23

RECORDED IN PLAT BOOK_______, PAGE ______

Bandys Farm Stream and Wetland Mitigation Project

I, David Brian Hill, certify that this project was completed under my direct and responsible charge from an actual survey made under my supervision; that this Ground survey was performed at the 95 percent confidence level to meet Federal Geographic Data Committee Standards; that this survey was performed to meet the requirements for a topographic/planimetric survey to the accuracy of Class "A", and that the original data was obtained on March 14, 2022; that the survey was completed on March 25, 2022 and all coordinates are based on NAD 83(2011).

This survey was done under my responsible charge in compliance with the Standards of Practice for Land Surveying (21-56.1600).

That the ratio of precision as calculated was 1:10,000 (unadjusted) and that the global navigation satellite system (GNSS) was used to set site control and the following information was used:

GNSS POSITIONING MEDADATA:
Positional Accuracy: Hz Prec. 0.03 Vt Prec. 0.08
Type of GPS Field Procedure: NC GNSS RTK
Dates of survey: March 14 March 25, 2022
Datum/Epoch: NAD83(2011) NAVD 1988 / 2010
Published/Fixed-Control use: VRS
Geoid Model: Geoid2009 (Ellip GRS80)
Combined Grid Factor: No Scale Factor applied
Units: US Survey Feet

Surveyors Certificate of Survey and Accuracy

I David Brian Hill, certify that this map was drawn under my supervision from an actual survey made under my supervision from deed description(s) recorded in Book 3341, page 1183 and Book 2620, page 611); that the boundaries not surveyed are clearly indicated as drawn from information found as referenced; that the ratio of precision as calculated is 1: 10,000; that the GPS portion of this project was to perform a grid tie to the NC State Plane coordinate system and information used is shown and noted hereon; that this plat was prepared in accordance with G.S. 47-30 as amended.

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.

Withness my original signature, License Number and Seal this 29th Day of March, 2023.

NORTH CAROLINA PROFESSIONAL SEAL L-5072 LAND SURVEYOR
DB 3-29-23

Surveyor David Brian Hill PLS# L-5072

SHEET 1 OF 3

FINAL PLAT CONSERVATION EASEMENT FOR

STATE OF NORTH CAROLINA, DIVISION OF MITIGATION SERVICES
BANDY'S FARM STREAM AND WETLAND MITIGATION PROJECT

BANDY FARM LLC (SPO FILE # 18-LA-48, DMS PROJECT #100594)
TONY E. & AMY S. HUFFMAN(SPO FILE # 18-LA-49, DMS PROJECT #100594)

CALDWELL & MOUNTAIN CREEK TOWNSHIP
CATAWBA COUNTY, NORTH CAROLINA

BARGE
DESIGN SOLUTIONS
Four Sheridan Square // Suite 100 // Kingsport, Tennessee 37660
PHONE (423) 247-5525 // FAX (423) 247-6233
North Carolina License No. F-1034

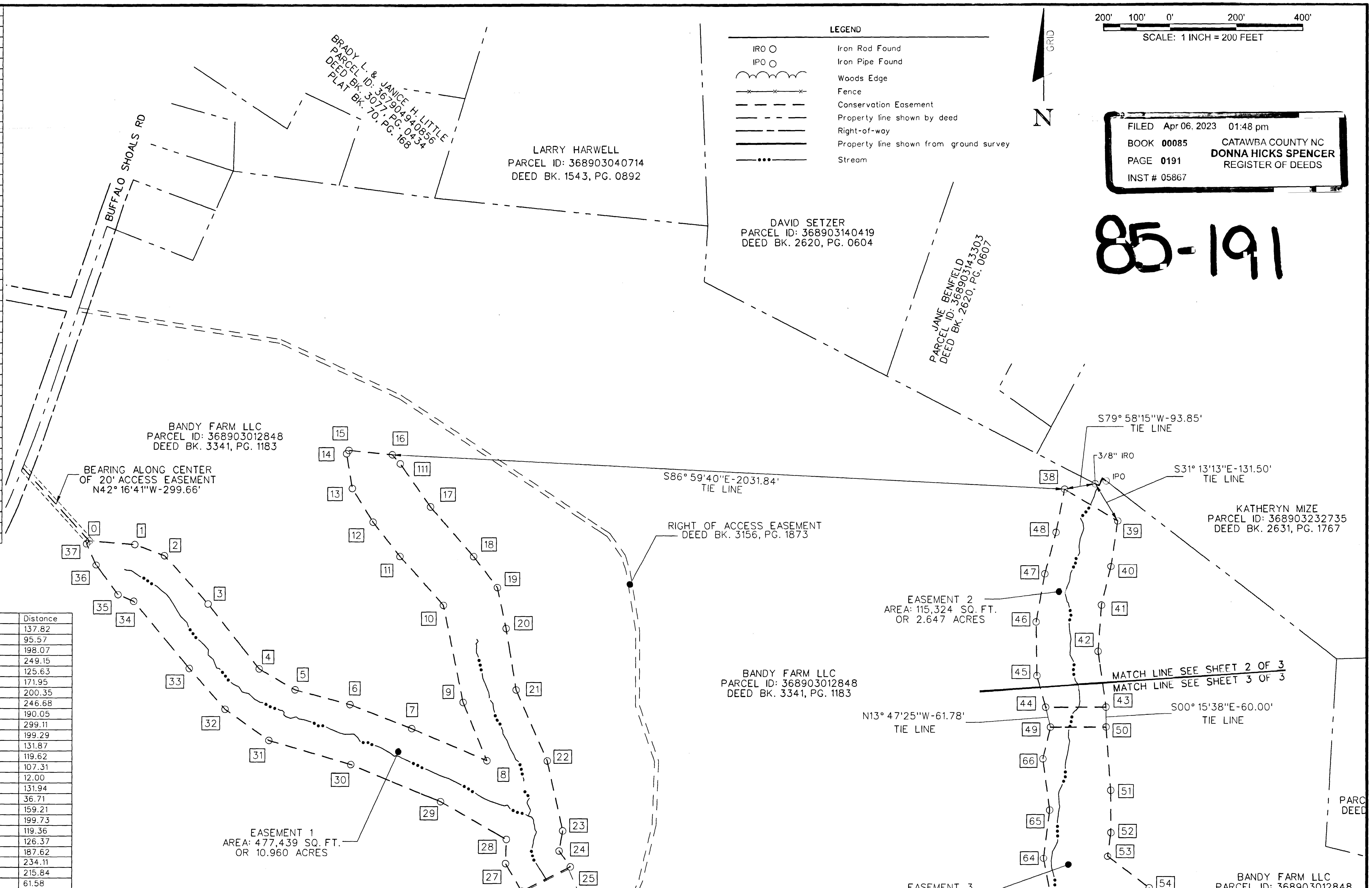
Prepared For:
Ecosystems Planning and Restoration, LLC
17575 N. Eldridge Parkway, Building C
Houston, TX 77060

DRAWN BY: DBH
DATE: 03-08-2023
REVISED: 03-29-2023
FILE NO. 37251-05

F:\37\37251\3725105\04_CAD\SURV\Plot\3725105vsp_EasementExhibit_SHT1.dgn

FILED Apr 06, 2023 01:48 pm
BOOK 00085
PAGE 0191
INST # 05867
CATAWBA COUNTY NC
DONNA HICKS SPENCER
REGISTER OF DEEDS

85-191



Point	North	East
0	693264.91	1378471.54
1	693253.78	1378608.91
2	693220.03	1378698.32
3	693072.26	1378830.22
4	692876.94	1378984.89
5	692813.86	1379093.54
6	692769.38	1379259.63
7	692696.77	1379446.36
8	692599.54	1379673.07
9	692775.43	1379601.07
10	693068.52	1379541.38
11	693218.23	1379409.83
12	693322.11	1379328.60
13	693423.63	1379265.33
14	693529.51	1379247.83
15	693539.32	1379254.74
16	693526.38	1379386.04
17	693368.38	1379501.61
18	693217.29	1379632.24
19	693121.81	1379703.87
20	692998.29	1379730.53
21	692813.15	1379760.92
22	692598.90	1379855.30
23	692388.10	1379901.66
24	692327.45	1379890.96
25	692277.96	1379924.94
26	692205.11	1379778.41
27	692287.88	1379729.64
28	692362.36	1379731.98
29	692476.49	1379533.13
30	692588.41	1379262.29
31	692661.26	1379014.52
32	692755.06	1378881.88
33	692878.03	1378773.63
34	693080.42	1378605.84
35	693100.45	1378558.48
36	693190.98	1378492.31
37	693256.23	1378463.25
38	693419.85	1381415.08
39	693323.74	1381575.66
40	693184.87	1381555.36
41	693067.27	1381526.78
42	692927.91	1381516.58
43	692759.91	1381540.49
44	692759.95	1381358.26
45	692855.10	1381331.68
46	693017.08	1381329.32
47	693162.28	1381355.66
48	693289.50	1381389.48
111	693498.69	1379410.13

EASEMENT 1

From	To	Direction	Distance
0	1	S 85° 22' 05" E	137.82
1	2	S 69° 19' 18" E	95.57
2	3	S 41° 45' 12" E	198.07
3	4	S 38° 22' 23" E	249.15
4	5	S 59° 51' 47" E	125.63
5	6	S 75° 00' 33" E	171.95
6	7	S 68° 44' 57" E	200.35
7	8	S 66° 47' 19" E	246.68
8	9	N 22° 15' 41" W	190.05
9	10	N 11° 30' 46" W	299.11
10	11	N 41° 18' 16" W	199.29
11	12	N 38° 01' 29" W	131.87
12	13	N 31° 55' 52" W	119.62
13	14	N 09° 23' 06" W	107.31
14	15	N 35° 08' 40" E	12.00
15	16	S 84° 22' 20" E	131.94
16	111	S 41° 01' 24" E	36.71
111	17	S 35° 04' 13" E	159.21
17	18	S 40° 50' 47" E	199.73
18	19	S 36° 52' 37" E	119.36
19	20	S 12° 10' 43" E	126.37
20	21	S 09° 19' 17" E	187.62
21	22	S 23° 46' 33" E	234.11
22	23	S 12° 24' 06" E	215.84
23	24	S 10° 00' 12" W	61.58
24	25	S 34° 28' 15" E	60.03
25	26	S 63° 34' 02" W	163.64
26	27	N 30° 30' 35" W	96.07
27	28	N 01° 48' 09" E	74.52
28	29	N 60° 08' 40" W	229.28
29	30	N 67° 32' 58" W	293.05
30	31	N 73° 36' 54" W	258.26
31	32	N 54° 44' 01" W	162.46
32	33	N 41° 21' 21" W	163.83
33	34	N 39° 39' 37" W	262.90
34	35	N 67° 04' 32" W	51.42
35	36	N 36° 10' 00" W	112.14
36	37	N 24° 00' 07" W	71.42
37	0	N 43° 41' 42" E	12.00

EASEMENT 2

From	To	Direction	Distance
38	39	S 59° 05' 55" E	187.14
39	40	S 08° 19' 12" W	140.35
40	41	S 13° 39' 34" W	121.02
41	42	S 04° 11' 12" W	139.73
42	43	S 08° 06' 02" E	169.69
43	44	N 89° 59' 17" W	182.23
44	45	N 15° 36' 33" W	98.79
45	46	N 00° 50' 05" W	161.99
46	47	N 10° 16' 51" E	147.57
47	48	N 14° 53' 15" E	131.64
48	38	N 11° 06' 51" E	132.83

EASEMENT 3

From	To	Direction	Distance
49	50	S 89° 59' 17" E	167.77
50	51	S 04° 11' 40" E	191.91
51	52	S 00° 23' 33" E	127.29
52	53	S 07° 56' 51" W	72.71
53	54	S 52° 50' 54" E	158.09
54	55	S 07° 47' 05" E	253.92
55	56	S 00° 02' 31" E	182.00
56	57	S 04° 38' 14" W	100.38
57	58	S 71° 03' 25" W	178.69
58	59	N 05° 32' 58" W	85.73
59	60	N 00° 47' 27" W	167.96
60	61	N 11° 52' 32" E	77.65
61	62	N 08° 45' 39" W	161.93
62	63	N 68° 29' 26" W	139.76
63	64	N 11° 03' 53" W	143.26
64	65	N 07° 07' 16" E	147.39
65	66	N 07° 35' 40" W	155.99
66	49	N 13° 34' 21" E	98.56

TOTAL CONSERVATION EASEMENT AREA: 1,389,303 SQ. FT. OR 31.893 ACRES

NOTES:

1. SEE SHEET 1 OF 3 FOR NOTES

Withness my original signature, License Number and Seal this 29th Day of March, 2023.

David Brian Hill

Surveyor David Brian Hill PLS# L-5072

NORTH CAROLINA PROFESSIONAL SEAL L-5072 LAND SURVEYOR DAVID B. HILL

3-29-23

SHEET 2 OF 3

BARGE DESIGN SOLUTIONS
Four Sheridan Square // Suite 100 // Kingsport, Tennessee 37660
PHONE (423) 247-5525 // FAX (423) 247-6233
North Carolina License No. F-1034

FINAL PLAT CONSERVATION EASEMENT FOR

STATE OF NORTH CAROLINA, DIVISION OF MITIGATION SERVICES
BANDY'S FARM STREAM AND WETLAND MITIGATION PROJECT

BANDY FARM LLC (SPO FILE # 18-LA-48, DMS PROJECT #100594)
TONY E. & AMY S. HUFFMAN(SPO FILE # 18-LA-49, DMS PROJECT #100594)

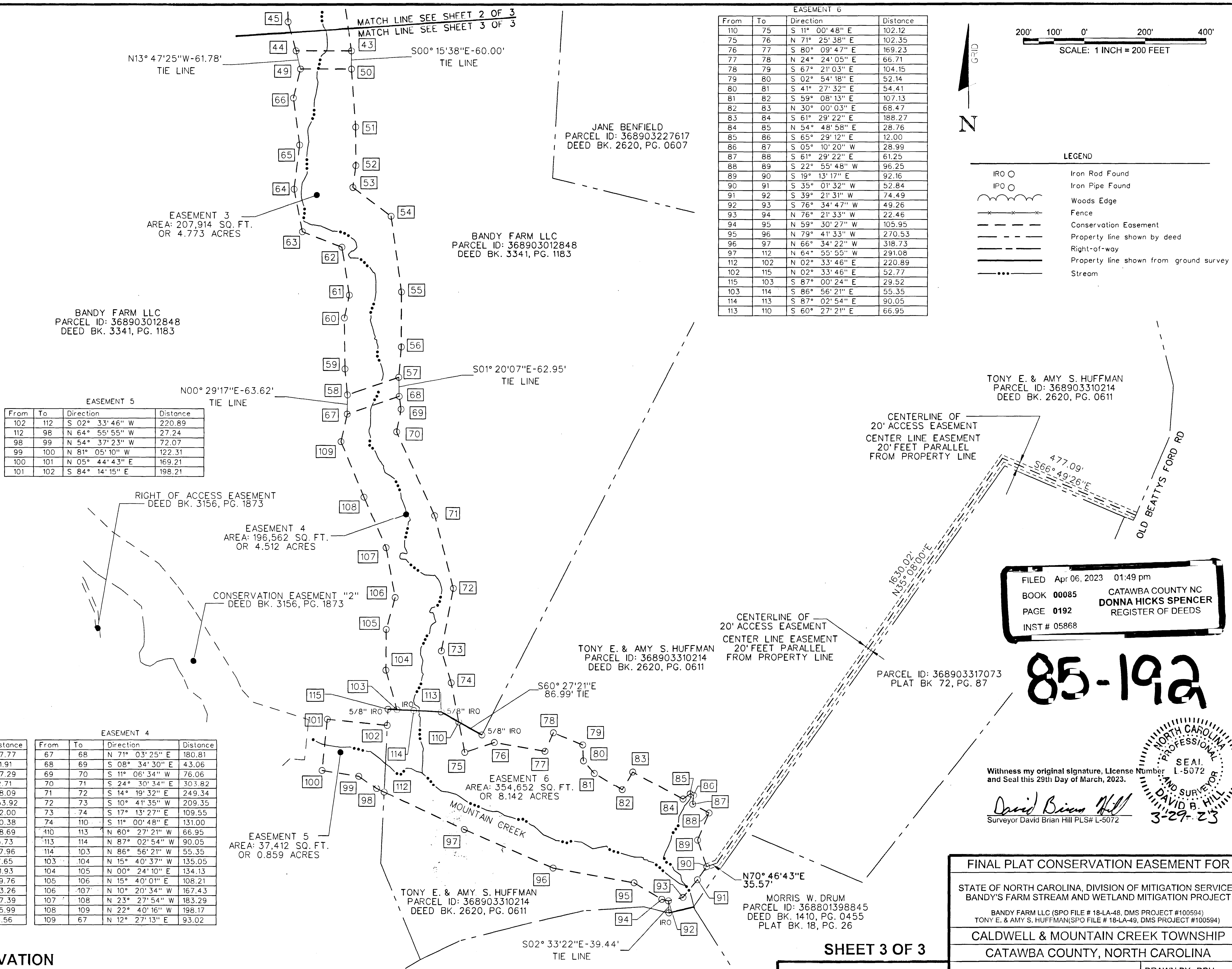
CALDWELL & MOUNTAIN CREEK TOWNSHIP

CATAWBA COUNTY, NORTH CAROLINA

Prepared For:
Ecosystems Planning and Restoration, LLC
17575 N. Eldridge Parkway, Building C
Houston, TX 77060

DRAWN BY: DBH
DATE: 03-08-2023
REVISED: 03-29-2023
FILE NO. 37251-05

F:\37\37251\3725105\04_CAD\SURV\Plot\3725105vsp_EasementExhibit_SHT2.dgn



Point	North	East
43	692759.91	1381540.49
44	692759.95	1381358.26
45	692855.10	1381331.68
46	693017.08	1381329.32
47	693162.28	1381355.66
48	693289.50	1381389.48
49	692699.95	1381372.99
50	692699.91	1381540.76
51	692508.52	1381554.80
52	692381.23	1381555.67
53	692309.22	1381545.61
54	692213.75	1381671.62
55	691962.17	1381706.01
56	691780.17	1381706.14
57	691680.12	1381698.03
58	691622.11	1381529.02
59	691707.44	1381520.73
60	691875.39	1381518.41
61	691951.38	1381534.39
62	692111.42	1381509.73
63	692162.66	1381379.70
64	692303.26	1381352.20
65	692449.52	1381370.48
66	692604.15	1381349.86
67	691558.49	1381528.48
68	691617.19	1381699.50
69	691574.61	1381705.92
70	691499.97	1381691.26
71	691223.53	1381817.30
72	690981.94	1381878.99
73	690776.23	1381840.15
74	690671.60	1381872.59
75	690442.77	1381917.12
76	690475.37	1382014.14
77	690446.46	1382180.89
78	690507.21	1382208.45
79	690467.10	1382304.57
80	690415.03	1382307.21
81	690374.25	1382343.23
82	690319.30	1382435.19
83	690378.60	1382469.42
84	690288.73	1382634.86
85	690305.31	1382658.37
86	690300.33	1382669.28
87	690271.46	1382666.67
88	690242.22	1382720.49
89	690153.57	1382682.99
90	690066.55	1382713.33
91	690023.28	1382683.01
92	689965.69	1382635.77
93	689954.25	1382587.86
94	689959.55	1382566.04
95	690013.31	1382474.74
96	690061.72	1382208.57
97	690188.44	1381916.12
98	690323.31	1381627.78
99	690365.04	1381569.01
100	690383.99	1381448.18
101	690552.34	1381465.12
102	690532.44	1381662.33
103	690583.62	1381694.17
104	690713.65	1381657.68
105	690847.77	1381658.62
106	690951.96	1381687.84
107	691116.67	1381657.78
108	691284.80	1381584.80
109	691467.66	1381508.42
110	690543.01	1381897.61
111	693498.69	1379410.13
112	690311.77	1381652.45
113	690576.03	1381839.37
114	690580.66	1381749.44
115	690585.16	1381664.69

EASEMENT 3

From	To	Direction	Distance
49	50	S 89° 59' 17" E	167.77
50	51	S 04° 11' 40" E	191.91
51	52	S 00° 23' 33" E	127.29
52	53	S 07° 56' 51" W	72.71
53	54	S 52° 50' 54" E	158.09
54	55	S 07° 47' 05" E	253.92
55	56	S 00° 02' 31" E	182.00
56	57	S 04° 38' 14" W	100.38
57	58	S 71° 03' 25" W	178.69
58	59	N 05° 32' 58" W	85.73
59	60	N 00° 47' 27" W	167.96
60	61	N 11° 52' 32" E	77.65
61	62	N 08° 45' 39" W	161.93
62	63	N 68° 29' 26" W	139.76
63	64	N 11° 03' 53" W	143.26
64	65	N 07° 07' 16" E	147.39
65	66	N 07° 35' 40" W	155.99
66	49	N 13° 34' 21" E	98.56

EASEMENT 4

From	To	Direction	Distance
67	68	N 71° 03' 25" E	180.81
68	69	S 08° 34' 30" E	43.06
69	70	S 11° 06' 34" W	76.06
70	71	S 24° 30' 34" E	303.82
71	72	S 14° 19' 32" E	249.34
72	73	S 10° 41' 35" W	209.35
73	74	S 17° 13' 27" E	109.55
74	110	S 11° 00' 48" E	131.00
110	113	N 60° 27' 21" W	66.95
113	114	N 87° 02' 54" W	90.05
114	103	N 86° 56' 21" W	55.35
103	104	N 15° 40' 37" W	135.05
104	105	N 00° 24' 10" E	134.13
105	106	N 15° 40' 01" E	108.21
106	107	N 10° 20' 34" W	167.43
107	108	N 23° 27' 54" W	183.29
108	109	N 22° 40' 16" W	198.17
109	67	N 12° 27' 13" E	93.02

EASEMENT 5

From	To	Direction	Distance
102	112	S 02° 33' 46" W	220.89
112	98	N 64° 55' 55" W	27.24
98	99	N 54° 37' 23" W	72.07
99	100	N 81° 05' 10" W	122.31
100	101	N 05° 44' 43" E	169.21
101	102	S 84° 14' 15" E	198.21

EASEMENT 6

From	To	Direction	Distance
110	75	S 11° 00' 48" E	102.12
75	76	N 71° 25' 38" E	102.35
76	77	S 80° 09' 47" E	169.23
77	78	N 24° 24' 05" E	66.71
78	79	S 67° 21' 03" E	104.15
79	80	S 02° 54' 18" E	52.14
80	81	S 41° 27' 32" E	54.41
81	82	S 59° 08' 13" E	107.13
82	83	N 30° 00' 03" E	68.47
83	84	S 61° 29' 22" E	188.27
84	85	N 54° 48' 58" E	28.76
85	86	S 65° 29' 12" E	12.00
86	87	S 05° 10' 20" W	28.99
87	88	S 61° 29' 22" E	61.25
88	89	S 22° 55' 48" W	96.25
89	90	S 19° 13' 17" E	92.16
90	91	S 35° 01' 32" W	52.84
91	92	S 39° 21' 31" W	74.49
92	93	S 76° 34' 47" W	49.26
93	94	N 76° 21' 33" W	22.46
94	95	N 59° 30' 27" W	105.95
95	96	N 79° 41' 33" W	270.53
96	97	N 66° 34' 22" W	318.73
97	112	N 64° 55' 55" W	291.08
112	102	N 02° 33' 46" E	220.89
102	115	N 02° 33' 46" E	52.77
115	103	S 87° 00' 24" E	29.52
103	114	S 86° 56' 21" E	55.35
114	113	S 87° 02' 54" E	90.05
113	110	S 60° 27' 21" E	66.95

TOTAL CONSERVATION EASEMENT AREA: 1,389,303 SQ. FT. OR 31.893 ACRES

FILED Apr 06, 2023 01:49 pm
BOOK 00085
PAGE 0192
INST # 05868
CATAWBA COUNTY NC
DONNA HICKS SPENCER
REGISTER OF DEEDS

85-192

Withness my original signature, License Number L-5072 and Seal this 29th Day of March, 2023.

David Brian Hill

Surveyor David Brian Hill PLS# L-5072

NORTH CAROLINA PROFESSIONAL SEAL L-5072 LAND SURVEYOR DAVID B. HILL

3-29-23

NOTES:

1. SEE SHEET 1 OF 3 FOR NOTES

SHEET 3 OF 3

BARGE DESIGN SOLUTIONS
Four Sheridan Square // Suite 100 // Kingsport, Tennessee 37660
PHONE (423) 247-5525 // FAX (423) 247-6233

FINAL PLAT CONSERVATION EASEMENT FOR

STATE OF NORTH CAROLINA, DIVISION OF MITIGATION SERVICES
BANDY'S FARM STREAM AND WETLAND MITIGATION PROJECT

BANDY FARM LLC (SPO FILE # 18-LA-48, DMS PROJECT #100594)
TONY E. & AMY S. HUFFMAN(SPO FILE # 18-LA-49, DMS PROJECT #100594)

CALDWELL & MOUNTAIN CREEK TOWNSHIP

CATAWBA COUNTY, NORTH CAROLINA

Prepared For:
Ecosystems Planning and Restoration, LLC
17575 N. Eldridge Parkway, Building C
Houston, TX 77060

DRAWN BY: DBH

DATE: 03-08-2023

REVISED: 03-29-2023

FILE NO. 37251-05

F:\37\37251\3725105\04_CAD\SURV\Plot\3725105vsp_EasementExhibit_SHT3.dgn

Appendix 2

Bandys Farm Stream and Wetland Mitigation Project
Site Condition Photographs (taken 8/4/21 except as noted)


Reach UT1 (Top / Origin of reach)


Reach UT1 (Upper)


Reach UT1 (Upper)


Reach UT1 (rock knickpoint in middle section)


Reach UT1 (Lower)


Reach UT1 (Lower)

Ecosystem Planning & Restoration

Bandys Farm Stream and Wetland Mitigation Project
Site Condition Photographs (taken 8/4/21 except as noted)

UT1A (Upper)

UT1A (Upper)

UT1A (Middle)

UT1A (Middle)

UT1A (Lower)

UT1A (Lower)

ECOSYSTEM PLANNING & RESTORATION

Bandys Farm Stream and Wetland Mitigation Project
Site Condition Photographs (taken 8/4/21 except as noted)

UT2 (Upper)

UT2 (Upper)

UT2 (Upper)

UT2 (Upper)

UT2 (Middle)

UT2 (Middle)

Bandys Farm Stream and Wetland Mitigation Project
Site Condition Photographs (taken 8/4/21 except as noted)

UT2 (Middle)

UT2 (Middle)

UT2 (Lower)

UT2 (Lower)

UT2 (Lower)

UT2 (at confluence with NFMC)

Bandys Farm Stream and Wetland Mitigation Project
Site Condition Photographs (taken 8/4/21 except as noted)


UT3 (Upper)


UT3 (Middle)


UT3 (Upper), photo 7/30/21


UT3 (Middle), photo 7/30/21


UT3 (Middle), photo 7/30/21


UT3 (Lower section at XS-7), photo 7/30/21

Bandys Farm Stream and Wetland Mitigation Project
Site Condition Photographs (taken 8/4/21 except as noted)

North Fork Mountain Creek (NFMC), Upper

NFMC (Upper)

NFMC (Middle)

NFMC (Middle)

NFMC (Middle)

NFMC (Lower)

Bandys Farm Stream and Wetland Mitigation Project
Site Condition Photographs (taken 8/4/21 except as noted)


NFMC (Lower)


NFMC (Lower)


UT3A (Top), photo 7/30/21


UT3A (Bottom), photo 7/15/22

ECOSYSTEM PLANNING & RESTORATION

Bandys Farm Stream and Wetland Mitigation Project
Site Condition Photographs (taken 3/31/22 except as noted)


Wetland WA (wet swale on UT1)


Wetland WB (wet swale on UT2)


Wetland WC (wet depression on NFMC)


Wetland WC (wet depression on NFMC)
Photo: 7/30/21


Wetland WC (wet depression on NFMC)
Photo: 7/30/21


Wetland WD (wet depression on UT2)

Appendix 3

U.S. ARMY CORPS OF ENGINEERS
WILMINGTON DISTRICT

Action Id. **SAW-2021-02609** County: **Catawba** U.S.G.S. Quad: **NC-Catawba**

NOTIFICATION OF JURISDICTIONAL DETERMINATION

Requestor: **Bandy Farm LLC**
FIRST LAST
Address: **3216 John Daniel Dr NE**
Conover, NC 28613

Size (acres) **31.5**
Nearest Waterway **North Fork Mountain Creek**
USGS HUC **03050101**
Nearest Town **Drums Crossroads**
River Basin **Santee**
Coordinates Latitude: **35.634841**
Longitude: **-81.087618**

Location description: **Project location is physically located at 4880 Feed lot Road, near Drums Crossroads, Catawba County, North Carolina. PIN(s): 368903012848, 368903310214**

Indicate Which of the Following Apply:

A. Preliminary Determination

☒ There appear to be **waters** 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** 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 **8/1/2022**. 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** 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** 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** at the project area, which is not sufficiently accurate and reliable to support an enforceable permit decision. We recommend that you have the **waters** 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** 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** 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** 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** 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 **Krystynka B Stygar at 252-545-0507 or krystynka.b.stygar@usace.army.mil**.

C. Basis For Determination: Based on information submitted by the applicant and available to the U.S. Army Corps of Engineers, the project area exhibits criteria for waters of the U.S. as defined in 33 CFR 328, Regulatory Guidance Letter 05-05, the 1987 Wetland Delineation Manual, and/or the Regional Supplement to the 1987 Manual: Eastern Piedmont and Mountains v2.0. See the preliminary jurisdictional determination form dated 9/14/2022.

D. Remarks: *See approximate aquatic resources on map, "Bandy's Farm – August 2022"*

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)

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

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

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: Krysta Stygar ______________________________

Date of JD: **9/14/2022**   Expiration Date of JD: **Not applicable**

SAW-2021-02609

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

Copy furnished:

Agent:	**EPR USA**
	Scott King
Address:	**204 Stone Ridge Blvd**
	Asheville, NC 28804
Telephone Number:	**919-219-6339**
E-mail:	**sking@eprusa.net**

Property Owner:	**COMPANY NAME**
	Amy Setzer Huffman
Address:	**1241 Caleb Setzer Road**
	Newton, NC 28658

NOTIFICATION OF ADMINISTRATIVE APPEAL OPTIONS AND PROCESS AND REQUEST FOR APPEAL

Applicant: **Bandy Farm LLC**, FIRST LAST	File Number: **SAW-2021-02609**	Date: **9/14/2022**

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: Krystynka B Stygar** **Charlotte Regulatory Office** **U.S Army Corps of Engineers** **8430 University Executive Park Drive, Suite 615** **Charlotte, North Carolina 28262**	If you only have questions regarding the appeal process you may also contact: MR. PHILIP A. SHANNIN ADMINISTRATIVE APPEAL REVIEW OFFICER CESAD-PDS-O 60 FORSYTH STREET SOUTHWEST, FLOOR M9 ATLANTA, GEORGIA 30303-8803 PHONE: (404) 562-5136; FAX (404) 562-5138 EMAIL: PHILIP.A.SHANNIN@USACE.ARMY.MIL

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: Krystynka B Stygar, 8430 University Executive Park Drive, Suite 615, Charlotte, North Carolina 28262

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. Philip 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: 07/21/2022

B. NAME AND ADDRESS OF PERSON REQUESTING PJD: Bandy Farm LLC, **FIRST LAST**, 3216 John Daniel Dr NE, Conover, NC 28613

C. DISTRICT OFFICE, FILE NAME, AND NUMBER: Wilmington District, Bandys Farm LLC, SAW-2021-02609

D. PROJECT LOCATION(S) AND BACKGROUND INFORMATION: Project location is physically located at 4880 Feed lot Road, near Drums Crossroads, Catawba County, North Carolina. PIN(s): 368903012848, 368903310214

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

State: NC County: Catawba City: Drums Crossroads
Center coordinates of site (lat/long in degree decimal format): Latitude: 35.634841 Longitude: -81.087618

Universal Transverse Mercator:

Name of nearest waterbody: North Fork Mountain Creek

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

☐ Office (Desk) Determination. Date:

☒ Field Determination. Date(s): August 25, 2022

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)
NFMC	35.628727	-81.079595	1522 LF	Non-wetland waters	Section 404
UT 1	35.635313	-81.089344	1724 LF	Non-wetland waters	Section 404
UT 1A	35.636300	-81.087999	1272 LF	Non-wetland waters	Section 404
UT 2	35.633292	-81.081272	3547 LF	Non-wetland waters	Section 404
UT 3	35.628533	-81.077834	342 LF	Non-wetland waters	Section 404
UT 3A	35.628504	-81.077985	81 LF	Non-wetland waters	Section 404
UT 4	35.629085	-81.078948	185 LF	Non-wetland waters	Section 404
W-A	35.634841	-81.087618	0.0479 acres	Wetland	Section 404
W-B	35.635112	-81.082199	0.0539 acres	Wetland	Section 404
W-C	35.628996	-81.079099	1.98 acres	Wetland	Section 404
W-D	35.630366	-81.080757	0.1852 acres	Wetland	Section 404
W-E	35.628469	-81.079242	0.0178 acres	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: **EPR USA for Bandy's Farm LLC**

☒ 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: **USGS Web service**

☒ Natural Resources Conservation Service Soil Survey. Citation: **Web Soil Survey**

☐ National wetlands inventory map(s). Cite name:

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

☒ FEMA/FIRM maps: **FEMA web service**

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

☒ Photographs: ☒ Aerial (Name & Date): **1950,1976,1993,2008,(NCOneMap)**

or ☐ Other (Name & Date):

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

☒ Other information (please specify): **LidAR, Site Visit conducted 08/25/2022**

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.

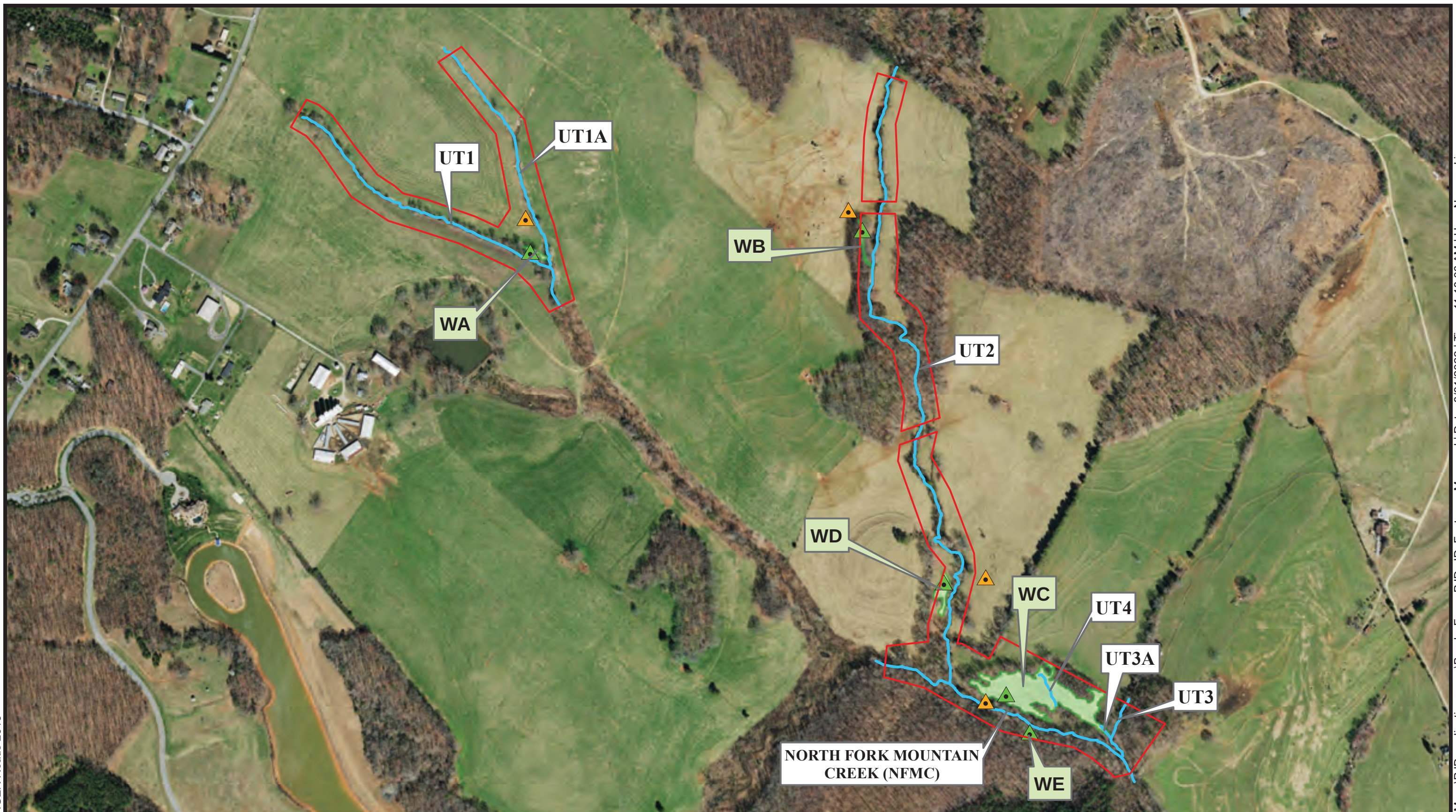
Krysta Stygar

Signature and date of Regulatory staff member completing PJD
9/14/2022

Scott King 9/15/2022

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.



Project Area (31.5 Acres)

Data Points

- Wetland
- Upland
- Jurisdictional Streams
- Jurisdictional Wetlands

Bandys Farm
Stream and Wetland Mitigation Project
Jurisdictional Features Map
Catawba County, NC

Prepared By:

Ecosystem Planning & Restoration

N

0 340 680 Feet

1:8,250

FIGURE 1

DATE:
August 2022

Sources: ESRI Aerial Imagery 2020: Open Street Map: TIGER Roads 2015

Path: R:\Projects\ASH0018_NCDMS_Bandys_Farm\GIS\Maps\PJD application maps\BandysFarm_PJD_JD_Features_Map.mxd | Date: 8/31/2022 | Time: 11:18:36 AM | User Name: sking

(W-A)

WETLAND DETERMINATION DATA FORM – Eastern Mountains and Piedmont Region

Project/Site: Bardy's Farm City/County: Catawba Sampling Date: 3/29/22

Applicant/Owner: ______ State: NC Sampling Point: W-A

Investigator(s): RM Section, Township, Range: Catawba

Landform (hillslope, terrace, etc.): Toe of slope Local relief (concave, convex, none): concave Slope (%): 2-5%

Subregion (LRR or MLRA): P-136 Lat: 35.634862 Long: -81.087726 Datum: NAD83

Soil Map Unit Name: Madison Bethlehem Complex NWI classification: N/A

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

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

Are Vegetation ___, Soil ___, or Hydrology ___ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X	No ___
Hydric Soil Present?	Yes X	No ___
Wetland Hydrology Present?	Yes X	No ___

Is the Sampled Area within a Wetland? Yes ___ No ___

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

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

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

Secondary Indicators (minimum of two required)

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

Field Observations:

Surface Water Present?	Yes ✓	No ___	Depth (inches): 0
Water Table Present?	Yes ✓	No ___	Depth (inches): 12
Saturation Present? (includes capillary fringe)	Yes ___	No ___	Depth (inches): ___

Wetland Hydrology Present? Yes X No ___

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

Remarks: X Groundwater seep draining to UT1A, hydrology impacted by cattle

VEGETATION (Four Strata) – Use scientific names of plants. Sampling Point: WA

Tree Stratum (Plot size: ______)	Absolute % Cover	Dominant Species?	Indicator Status
1. White oak (Quercus Nigra)	5%	N	FAC
2. Red Maple (Acer rubrum)	20%	Y	FAC
3. Sweetgum (Liquidambar Styraciflua)	5%	N	FAC
4. Tulip poplar (Liriodendron tulipifera)	10%	Y	FACU
5.			
6.			
7.			
	40 = Total Cover		
50% of total cover: 20	20% of total cover: 8		

Sapling/Shrub Stratum (Plot size: ______)	Absolute % Cover	Dominant Species?	Indicator Status
1. N/A			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
	____ = Total Cover		
50% of total cover: ____	20% of total cover: ____		

Herb Stratum (Plot size: ______)	Absolute % Cover	Dominant Species?	Indicator Status
1. Juncus	10%	Y	FACW
2. Carex sp.	5%	Y	OBL
3. Fescue	10%	Y	FAC
4. Other grasses - photos			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	25 = Total Cover		
50% of total cover: 12.5	20% of total cover: 5		

Woody Vine Stratum (Plot size: ______)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
	____ = Total Cover		
50% of total cover: ____	20% of total cover: ____		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 4 (A)

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

Percent of Dominant Species That Are OBL, FACW, or FAC: 80 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species	5	x 1 = 5
FACW species	10	x 2 = 20
FAC species	40	x 3 = 120
FACU species	10	x 4 = 40
UPL species		x 5 =
Column Totals:	65 (A)	185 (B)

Prevalence Index = B/A = 2.85

Hydrophytic Vegetation Indicators:

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

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

Definitions of Four Vegetation Strata:

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

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

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

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

Hydrophytic Vegetation Present? Yes X No ____

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

- Vegetation heavily impacted by cattle, grazed

SOIL

Sampling Point: W-A

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

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-8	10 YR 3/3	100	N/A				Sandy loam	sandy inclusions
8-12	10 YR 4/3	60					loamy sand	
	10 YR 5/2	35%	5YR 4/4	5%				
12-18	10YR 3/1	95%	2.5YR 3/6	5%			Sandy loam	

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

Hydric Soil Indicators:

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

Indicators for Problematic Hydric Soils[3]:

- [ ] 2 cm Muck (A10) **(MLRA 147)**
- [ ] Coast Prairie Redox (A16) **(MLRA 147, 148)**
- [ ] Piedmont Floodplain Soils (F19) **(MLRA 136, 147)**
- [ ] Very Shallow Dark Surface (TF12)
- [ ] Other (Explain in Remarks)

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

Restrictive Layer (if observed):

Type: ______

Depth (inches): ______

Hydric Soil Present? Yes ✓ No ____

Remarks:

*Dark, sandy soil, impacted by cattle.

WETLAND DETERMINATION DATA FORM – Eastern Mountains and Piedmont Region

Project/Site: Brandy's Farm City/County: Catawba Sampling Date: 3/29/22

Applicant/Owner: ______ State: NC Sampling Point: UP-A

Investigator(s): RM Section, Township, Range: Catawba

Landform (hillslope, terrace, etc.): hillslope Local relief (concave, convex, none): Convex Slope (%): 10-25

Subregion (LRR or MLRA): P-136 Lat: 35.635319 Long: -81.087815 Datum: NAD 83

Soil Map Unit Name: Madison Bethlehem Complex NWI classification: N/A

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

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

Are Vegetation ______, Soil ______, or Hydrology ______ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

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

Remarks: Hillslope pasture, no trees. Dominated by fescue.

HYDROLOGY

Wetland Hydrology Indicators:

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

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

Secondary Indicators (minimum of two required)

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

Field Observations:

Surface Water Present? Yes ______ No ______ Depth (inches): ______

Water Table Present? Yes ______ No ______ Depth (inches): ______

Saturation Present? (includes capillary fringe) Yes ______ No ______ Depth (inches): ______

Wetland Hydrology Present? Yes ______ No X

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

Remarks:

VEGETATION (Four Strata) – Use scientific names of plants. Sampling Point: UP-A

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

Dominance Test worksheet:

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

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

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

Prevalence Index worksheet:

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

Prevalence Index = B/A = ______

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

___ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

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

___ Problematic Hydrophytic Vegetation[1] (Explain)

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

Definitions of Four Vegetation Strata:

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

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

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

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

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

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

UP-A

SOIL

Sampling Point: UP-A

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

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-12	5 YR, 4/6	85					Silty loam	
0-12	5 YR, 4/3	15					silty loam	

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

Hydric Soil Indicators:

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

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) **(MLRA 147)**
- ___ Coast Prairie Redox (A16) **(MLRA 147, 148)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 136, 147)**
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

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

Restrictive Layer (if observed):

Type: ____________

Depth (inches): ____________

Hydric Soil Present? Yes ______ No X

Remarks:

WETLAND DETERMINATION DATA FORM – Eastern Mountains and Piedmont Region

Project/Site: Bandys City/County: Catawba Sampling Date: 3/29/22

Applicant/Owner: ____ State: NC Sampling Point: WB

Investigator(s): RM Section, Township, Range: Catawba

Landform (hillslope, terrace, etc.): Toe of slope, Ditch Local relief (concave, convex, none): Concave Slope (%): 1-2%

Subregion (LRR or MLRA): P-136 Lat: 35.635253 Long: -81.082208 Datum: NAD83

Soil Map Unit Name: Chewacla loam NWI classification: N/A

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

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

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

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

Remarks: US section is a round depression at the toe of slope fed by groundwater. DS section is man-made linear wetland ditch that flows to stream.

HYDROLOGY

Wetland Hydrology Indicators:

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

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

Secondary Indicators (minimum of two required)

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

Field Observations:

Surface Water Present? Yes X No ____ Depth (inches): ____

Water Table Present? Yes X No ____ Depth (inches): ____

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

Wetland Hydrology Present? Yes X No ____

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

Remarks:

VEGETATION (Four Strata) – Use scientific names of plants. Sampling Point: WB

Tree Stratum (Plot size: ______)	Absolute % Cover	Dominant Species?	Indicator Status
1. Box elder (Acer Negundo)	5	N	FAC
2. White oak (Quercus nigra)	5	N	FAC
3. Red Maple (Acer rubrum)	15	Y	FAC
4. Tulip poplar (Liriodendron tulipfera)	10	Y	FACU
5.			
6.			
7.			
	35	= Total Cover	
50% of total cover: 17.5	20% of total cover: 7		

Sapling/Shrub Stratum (Plot size: ______)	Absolute % Cover	Dominant Species?	Indicator Status
1. Multiflora rose (Rosa multiflora)	20	Y	FACU
2. Chinese privet (Ligustrum sinense)	15	Y	FACU
3. Elderberry (Sambucus nigra)	5	N	FAC
4. Swamp rose (Rosa palustris)	10	Y	OBL
5. Green brier / Smilax (Smilax rotundifolia)			FAC
6.			
7.			
8.			
9.			
		= Total Cover	
50% of total cover: 25	20% of total cover: 10		

Herb Stratum (Plot size: ______)	Absolute % Cover	Dominant Species?	Indicator Status
1. Carex	20	Y	OBL
2. Jewelweed	10	Y	FACW
3. Juncus effusus	10	Y	FACW
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	40	= Total Cover	
50% of total cover: 20	20% of total cover: 8		

Woody Vine Stratum (Plot size: ______)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
		= Total Cover	
50% of total cover:	20% of total cover:		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 5 (A)

Total Number of Dominant Species Across All Strata: 8 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 62.5 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	30	x 1 =	30
FACW species	20	x 2 =	40
FAC species	30	x 3 =	90
FACU species	45	x 4 =	180
UPL species		x 5 =	
Column Totals:	125 (A)		340 (B)

Prevalence Index = B/A = 2.72

Hydrophytic Vegetation Indicators:

X 1 - Rapid Test for Hydrophytic Vegetation

X 2 - Dominance Test is >50%

X 3 - Prevalence Index is ≤3.0[1]

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

__ Problematic Hydrophytic Vegetation[1] (Explain)

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

Definitions of Four Vegetation Strata:

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

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

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

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

Hydrophytic Vegetation Present? Yes X No ______

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

SOIL

Sampling Point: WB

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

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-8	5YR 4/2	85	2.5YR 4/6	15			Silty loam	
8-16	5YR 4/1	95	5YR 5/8	5			clay loam	

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

Hydric Soil Indicators:

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

Indicators for Problematic Hydric Soils[3]:

- ☐ 2 cm Muck (A10) **(MLRA 147)**
- ☐ Coast Prairie Redox (A16) **(MLRA 147, 148)**
- ☐ Piedmont Floodplain Soils (F19) **(MLRA 136, 147)**
- ☐ Very Shallow Dark Surface (TF12)
- ☐ Other (Explain in Remarks)

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

Restrictive Layer (if observed):

Type: ______

Depth (inches): ______

Hydric Soil Present? Yes ✓ No ______

Remarks: saturated soil, water standing at surface

WETLAND DETERMINATION DATA FORM – Eastern Mountains and Piedmont Region

Project/Site: Bandy's Farm City/County: Catawba Sampling Date: 3/29/22

Applicant/Owner: ______ State: NC Sampling Point: UP-B

Investigator(s): RAA Section, Township, Range: Catawba

Landform (hillslope, terrace, etc.): hillslope Local relief (concave, convex, none): Convex Slope (%): 10-25

Subregion (LRR or MLRA): P-136 Lat: 35.635519 Long: -81.082449 Datum: NAD 83

Soil Map Unit Name: Pacolet Clay loam NWI classification: N/A

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

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

Are Vegetation ___, Soil ___, or Hydrology ___ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

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

Remarks: No trees, just fescue, Active pasture hillslope

HYDROLOGY

Wetland Hydrology Indicators:

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

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

Secondary Indicators (minimum of two required)

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

Field Observations:

Surface Water Present? Yes ___ No ___ Depth (inches): ___

Water Table Present? Yes ___ No ___ Depth (inches): ___

Saturation Present? (includes capillary fringe) Yes ___ No ___ Depth (inches): ___

Wetland Hydrology Present? Yes ___ No X

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

Remarks:

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

Sampling Point: UP-B

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

Dominance Test worksheet:

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

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

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

Prevalence Index worksheet:

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

Prevalence Index = B/A = ______

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

___ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

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

___ Problematic Hydrophytic Vegetation[1] (Explain)

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

Definitions of Four Vegetation Strata:

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

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

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

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

Hydrophytic Vegetation Present? Yes ______ No ______

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

SOIL

Sampling Point: UP-13

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

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
12	2.5 YR, 4/6	100					Silty Clay	

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

Hydric Soil Indicators:

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

Indicators for Problematic Hydric Soils[3]:

___ 2 cm Muck (A10) **(MLRA 147)**
___ Coast Prairie Redox (A16) **(MLRA 147, 148)**
___ Piedmont Floodplain Soils (F19) **(MLRA 136, 147)**
___ Very Shallow Dark Surface (TF12)
___ Other (Explain in Remarks)

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

Restrictive Layer (if observed):

Type: ___

Depth (inches): ___

Hydric Soil Present? Yes ___ No X

Remarks:

WETLAND DETERMINATION DATA FORM – Eastern Mountains and Piedmont Region

Project/Site: Bandy's City/County: Catawba Co. Sampling Date: 4/5/22

Applicant/Owner: ______ State: NC Sampling Point: WC (WET)

Investigator(s): T. Barrett Section, Township, Range: Catawba

Landform (hillslope, terrace, etc.): floodplain Local relief (concave, convex, none): concave Slope (%): 0

Subregion (LRR or MLRA): P-136 Lat: 35.628993 Long: -81.07966 Datum: ______

Soil Map Unit Name: ______ NWI classification: Freshwater forested / Shrub wetland

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

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

Are Vegetation N, Soil N, or Hydrology N naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes X No ___	Is the Sampled Area within a Wetland?	Yes X No ___
Hydric Soil Present? Yes X No ___		
Wetland Hydrology Present? Yes X No ___		

Remarks:
Cattle access has reduced herbaceous veg and impacted soils through compaction, trampling

HYDROLOGY

Wetland Hydrology Indicators:

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

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

check

Secondary Indicators (minimum of two required)

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

Field Observations:

Surface Water Present? Yes ___ No X Depth (inches): —

Water Table Present? Yes X No ___ Depth (inches): 12

Saturation Present? (includes capillary fringe) Yes X No ___ Depth (inches): 0

Wetland Hydrology Present? Yes ✓ No ___

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

Remarks:

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

Sampling Point: WC

Tree Stratum (Plot size: 30')	Absolute % Cover	Dominant Species?	Indicator Status
1. Sweetgum (Liquidambar styraciflua)	40	Y	FAC
2. Red maple (Acer rubrum)	40	Y	FAC
3. Tag alder (Alnus serrulata)	20	Y	OBL
4.			
5.			
6.			
7.			
	100 = Total Cover		
50% of total cover: 50	20% of total cover: 20		

Sapling/Shrub Stratum (Plot size: 30')	Absolute % Cover	Dominant Species?	Indicator Status
1. Tag alder	5	Y	OBL
2. E. Red cedar	2	N	FACU
3.			
4.			
5.			
6.			
7.			
8.			
9.			
	7 = Total Cover		
50% of total cover: 3.5	20% of total cover: 1.4		

Herb Stratum (Plot size: 30')	Absolute % Cover	Dominant Species?	Indicator Status
1. Multiflora rose	10	Y	FACU
2. Soft rush, J. effusus	5	N	FACW
3. Carex spp.	25	Y	OBL
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	40 = Total Cover		
50% of total cover: 20	20% of total cover: 8		

Woody Vine Stratum (Plot size: 30')	Absolute % Cover	Dominant Species?	Indicator Status
1. N/A			
2.			
3.			
4.			
5.			
	= Total Cover		
50% of total cover:	20% of total cover:		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 5 (A)

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

Percent of Dominant Species That Are OBL, FACW, or FAC: 83 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species	50	x 1 = 50
FACW species	5	x 2 = 10
FAC species	80	x 3 = 240
FACU species	12	x 4 = 48
UPL species		x 5 =
Column Totals:	147 (A)	348 (B)

Prevalence Index = B/A = 2.37

Hydrophytic Vegetation Indicators:

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

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

Definitions of Four Vegetation Strata:

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

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

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

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

Hydrophytic Vegetation Present? Yes X No ___

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

Vegetation has been grazed on by cattle. Species are not easy identifiable

SOIL Sampling Point: WC (WET)

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

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-6	10YR 3/1	80	10YR 4/4	20	C	M/PL	SiCL	oxid. root channels
6-12	10YR 4/2	70	7.5YR 5/6	30	C	M	CL	

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

Hydric Soil Indicators:

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

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) **(MLRA 147)**
- ___ Coast Prairie Redox (A16) **(MLRA 147, 148)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 136, 147)**
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

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

Restrictive Layer (if observed):

Type: ____________

Depth (inches): ____________

Hydric Soil Present? Yes ______ No ______

Remarks:

SiCL - Silty Clay loam

CL - Clay loam

Soil pic @ 158 pm

Wetland pics 2 @ 159 pm

WETLAND DETERMINATION DATA FORM – Eastern Mountains and Piedmont Region

Project/Site: Bandy's City/County: Catawba Sampling Date: 4/5/22

Applicant/Owner: EPR State: NC Sampling Point: WC/WE (Upland)

Investigator(s): T. Barrett Section, Township, Range: Catawba

Landform (hillslope, terrace, etc.): Levee Local relief (concave, convex, none): Convex Slope (%): 1

Subregion (LRR or MLRA): P - 136 Lat: 35.628892 Long: -81.079993 Datum: NAD83

Soil Map Unit Name: Chewacla loam NWI classification: Upland

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

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

Are Vegetation N, Soil N, or Hydrology N naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ___ No X	Is the Sampled Area within a Wetland?	Yes ___ No X
Hydric Soil Present?	Yes ___ No X		
Wetland Hydrology Present?	Yes ___ No X		

Remarks:
Area between stream and WC
Use form as upland for WE also
See notes for WE wetland (cattle influence)

HYDROLOGY

Wetland Hydrology Indicators:

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

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

Secondary Indicators (minimum of two required)

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

Field Observations:

Surface Water Present? Yes ___ No X Depth (inches): ___

Water Table Present? Yes ___ No X Depth (inches): ___

Saturation Present? (includes capillary fringe) Yes ___ No X Depth (inches): ___

Wetland Hydrology Present? Yes ___ No X

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

Remarks:

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

Sampling Point: WC/WE Up

Tree Stratum (Plot size: 30')	Absolute % Cover	Dominant Species?	Indicator Status
1. Sweetgum (Liquidambar styraciflua)	40	Y	FAC
2. Tulip poplar (Liriodendron tulipifera)	10	N	FACU
3. Tag alder (Alnus serrulata)	5	N	OBL
4. Red cedar (Juniperus virginiana)	10	N	FACU
5. Walnut	25	Y	FACU
6.			
7.			
	90 = Total Cover		
50% of total cover: 45	20% of total cover: 18		

Sapling/Shrub Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1. Spice bush	15	Y	FAC
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
	15 = Total Cover		
50% of total cover: 7.5	20% of total cover: 3		

Herb Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1. Chickweed (Stellaria media)	75	Y	UPL
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	75 = Total Cover		
50% of total cover: 37.5	20% of total cover: 15		

Woody Vine Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
	= Total Cover		
50% of total cover:	20% of total cover:		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

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

Percent of Dominant Species That Are OBL, FACW, or FAC: 50 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species	5	x 1 = 5
FACW species	0	x 2 = 0
FAC species	55	x 3 = 165
FACU species	45	x 4 = 180
UPL species	75	x 5 = 375
Column Totals:	(A)	(B)

Prevalence Index = B/A = 3.47

Hydrophytic Vegetation Indicators:

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

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

Definitions of Four Vegetation Strata:

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

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

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

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

Hydrophytic Vegetation Present? Yes ___ No X

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

SOIL Sampling Point: WC/WE UP

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

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-16	7.5YR 4/6	100	—				Silt loam	

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

Hydric Soil Indicators:

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

Indicators for Problematic Hydric Soils[3]:

__ 2 cm Muck (A10) **(MLRA 147)**
__ Coast Prairie Redox (A16) **(MLRA 147, 148)**
__ Piedmont Floodplain Soils (F19) **(MLRA 136, 147)**
__ Very Shallow Dark Surface (TF12)
__ Other (Explain in Remarks)

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

Restrictive Layer (if observed):
Type: ________
Depth (inches): ________

Hydric Soil Present? Yes ____ No X

Remarks:

WETLAND DETERMINATION DATA FORM – Eastern Mountains and Piedmont Region

Project/Site: Bandys City/County: Catawba Sampling Date: 3/29/22

Applicant/Owner: ______ State: NC Sampling Point: WD

Investigator(s): RM Section, Township, Range: Catawba

Landform (hillslope, terrace, etc.): Toe of slope, riparian Local relief (concave, convex, none): concave Slope (%): <1%

Subregion (LRR or MLRA): P-136 Lat: 35.630488 Long: -81.080728 Datum: NAD83

Soil Map Unit Name: Chewacla loam NWI classification: N/A

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

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

Are Vegetation ___, Soil ___, or Hydrology ___ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

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

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

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

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

Secondary Indicators (minimum of two required)

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

Field Observations:

Surface Water Present?	Yes ___	No X	Depth (inches): ___	
Water Table Present?	Yes X	No ___	Depth (inches): 13"	
Saturation Present? (includes capillary fringe)	Yes X	No ___	Depth (inches): 6"	**Wetland Hydrology Present? Yes X No ___**

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

Remarks:
Water table ~1.1' below ground

US Army Corps of Engineers Eastern Mountains and Piedmont – Version 2.0

VEGETATION (Four Strata) – Use scientific names of plants. Sampling Point: WD

Tree Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1. Platanus Occidentalis	10	Y	FACW
2. Diospyros Virginiana	10	Y	FAC
3. Sugarberry	2	N	FACW
4. Sweetgum (Liquidambar styraciflua)	2	N	FAC
5.			
6.			
7.			
	24	= Total Cover	
50% of total cover: 12	20% of total cover: 4.8		

Sapling/Shrub Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1. Multiflora rose (Rosa multiflora)	5	Y	FACU
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
	5	= Total Cover	
50% of total cover: 2.5	20% of total cover: 1		

Herb Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1. Fescue	10	N	FAC
2. Juncus effusus	25%	Y	FACW
3. Carex sp.	25%	Y	OBL
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	60	= Total Cover	
50% of total cover: 30	20% of total cover: 12		

Woody Vine Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
		= Total Cover	
50% of total cover:	20% of total cover:		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 4 (A)

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

Percent of Dominant Species That Are OBL, FACW, or FAC: 80 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species	25	x 1 = 25
FACW species	37	x 2 = 74
FAC species	22	x 3 = 66
FACU species	5	x 4 = 20
UPL species		x 5 =
Column Totals:	89 (A)	184 (B)

Prevalence Index = B/A = 2.07

Hydrophytic Vegetation Indicators:

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

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

Definitions of Four Vegetation Strata:

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

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

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

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

Hydrophytic Vegetation Present? Yes X No ____

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

SOIL Sampling Point: WD

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

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-10"	7.5YR 3/1	95%	2.5YR 3/6	5%			Silty loam	
10-16"	7.5YR 4/1	85%	5YR 4/6	15%			Clay loam	

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

Hydric Soil Indicators:

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

Indicators for Problematic Hydric Soils[3]:

- ☐ 2 cm Muck (A10) **(MLRA 147)**
- ☐ Coast Prairie Redox (A16) **(MLRA 147, 148)**
- ☐ Piedmont Floodplain Soils (F19) **(MLRA 136, 147)**
- ☐ Very Shallow Dark Surface (TF12)
- ☐ Other (Explain in Remarks)

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

Restrictive Layer (if observed):

Type: ______

Depth (inches): ______

Hydric Soil Present? Yes X No ______

Remarks: Hydric soil present at surface, consistent down to 16"

WETLAND DETERMINATION DATA FORM – Eastern Mountains and Piedmont Region

Project/Site: Bordy's Farm City/County: Catawba Sampling Date: 3/29/22

Applicant/Owner: ______ State: NC Sampling Point: UP-D

Investigator(s): RM Section, Township, Range: Catawba

Landform (hillslope, terrace, etc.): hillslope Local relief (concave, convex, none): Convex Slope (%): 6-10

Subregion (LRR or MLRA): P-136 Lat: 35.630571 Long: -81.080035 Datum: NAD83

Soil Map Unit Name: Lloyd loam NWI classification: ______

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

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

Are Vegetation ______, Soil ______, or Hydrology ______ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ______ No X	Is the Sampled Area within a Wetland? Yes ______ No X
Hydric Soil Present?	Yes ______ No X	
Wetland Hydrology Present?	Yes ______ No X	

Remarks: Grazed pasture hillslope, no hydric soils, no trees, just fescue pasture grass. Soil not saturated, dry.

HYDROLOGY

Wetland Hydrology Indicators:

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

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

Secondary Indicators (minimum of two required)

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

Field Observations:

Surface Water Present? Yes _____ No _____ Depth (inches): _________

Water Table Present? Yes _____ No _____ Depth (inches): _________

Saturation Present? (includes capillary fringe) Yes _____ No _____ Depth (inches): _________

Wetland Hydrology Present? Yes ______ No ______

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

Remarks:

VEGETATION (Four Strata) – Use scientific names of plants. Sampling Point:__________

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

Dominance Test worksheet:

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

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

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

Prevalence Index worksheet:

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

Prevalence Index = B/A = ______

Hydrophytic Vegetation Indicators:

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

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

Definitions of Four Vegetation Strata:

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

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

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

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

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

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

SOIL

Sampling Point: ________

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

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-12	7YR, 4/4	100					loam	

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

Hydric Soil Indicators:

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

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) **(MLRA 147)**
- ___ Coast Prairie Redox (A16) **(MLRA 147, 148)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 136, 147)**
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

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

Restrictive Layer (if observed):

Type: ____________________

Depth (inches): ____________________

Hydric Soil Present? Yes ______ No X

Remarks:

WETLAND DETERMINATION DATA FORM – Eastern Mountains and Piedmont Region

Project/Site: Bandys City/County: Catawba Sampling Date: 4/5/22

Applicant/Owner: ______ State: NC Sampling Point: WE (WET)

Investigator(s): RM, TB Section, Township, Range: Catawba

Landform (hillslope, terrace, etc.): Riparian toe of slope Local relief (concave, convex, none): concave - slightly Slope (%): ______

Subregion (LRR or MLRA): P-136 Lat: 35.62848 Long: -81.079248 Datum: NAD83

Soil Map Unit Name: Chewacla loam NWI classification: N/A

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

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

Are Vegetation ______, Soil ______, or Hydrology ______ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X	No ______
Hydric Soil Present?	Yes X	No ______
Wetland Hydrology Present?	Yes X	No ______

Is the Sampled Area within a Wetland? Yes X No ______

Remarks:

center of wetland

HYDROLOGY

Wetland Hydrology Indicators:

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

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

Secondary Indicators (minimum of two required)

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

Field Observations:

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

Wetland Hydrology Present? Yes X No ______

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

Remarks:

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

Sampling Point: WE

Tree Stratum (Plot size: 30')	Absolute % Cover	Dominant Species?	Indicator Status
1. tulip poplar (Liriodendron tulipifera)	30	Y	FACU
2. Red Maple (Acer rubrum)	40	Y	FAC
3. American beech (Fagus grandifolia)	10	N	FACU
4. Sweetgum (Liquidambar styraciflua)	10	N	FACU
5.			
6.			
7.			
	90 = Total Cover		
50% of total cover: 45	20% of total cover: 18		

Sapling/Shrub Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1. Red Maple	5	Y	FAC
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
	5 = Total Cover		
50% of total cover: 2.5	20% of total cover: 1		

Herb Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1. Giant Cane (Arundinaria gigantea)	60	Y	FACW
2. Southern lady fern (athyrium asplenioides)	20	N	FAC
3. Christmas fern (Polystichum acrostichoides)	20	N	FACU
4. Netted chain fern (Woodwardia areolata)	5	N	FACW
5. Carex sp.		N	OBL
6. Chinese privet. (Ligustrum sinense)		N	FACU
7.			
8.			
9.			
10.			
11.			
	105 = Total Cover		
50% of total cover: 52.5	20% of total cover: 21		

Woody Vine Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1. Grape/muscadine	5	Y	FAC
2.			
3.			
4.			
5.			
	5 = Total Cover		
50% of total cover: 2.5	20% of total cover: 1		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 3 (A)

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

Percent of Dominant Species That Are OBL, FACW, or FAC: 75 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species	0	x 1 = 0
FACW species	65	x 2 = 130
FAC species	70	x 3 = 210
FACU species	70	x 4 = 280
UPL species		x 5 =
Column Totals:	205 (A)	620 (B)

Prevalence Index = B/A = 3.02

Hydrophytic Vegetation Indicators:

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

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

Definitions of Four Vegetation Strata:

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

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

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

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

Hydrophytic Vegetation Present? Yes X No ____

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

SOIL

Sampling Point: WE

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

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-6	10YR-4/2	90	7.5YR 4/6	10	C		Silty clay loam	Oxidized roots
6-7	10YR 5/4	80	7.5YR 5/8	20			Silty clay loam	
7-12	7.5YR 3/1	80	7.5YR 4/6	20	C		Silty clay loam	oxidized root channels

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

Hydric Soil Indicators:

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

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) **(MLRA 147)**
- ___ Coast Prairie Redox (A16) **(MLRA 147, 148)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 136, 147)**
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

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

Restrictive Layer (if observed):

Type: ______

Depth (inches): ______

Hydric Soil Present? Yes X No ___

Remarks:

W-A

NC WAM WETLAND ASSESSMENT FORM
Accompanies User Manual Version 5

USACE AID#: NCDWR #:

Project Name	Bandy's Farm	Date of Evaluation	
Applicant/Owner Name		Wetland Site Name	Wetland A
Wetland Type	Headwater Forest	Assessor Name/Organization	Ecosystem Planning and Restoration
Level III Ecoregion	Piedmont	Nearest Named Water Body	North Fork Mountain Creek
River Basin	Catawba	USGS 8-Digit Catalogue Unit	
County	Catawba	NCDWR Region	Mooresville
○ Yes ◉ No	Precipitation within 48 hrs?	Latitude/Longitude (deci-degrees)	

Evidence of stressors affecting the assessment area (may not be within the assessment area)
Please circle and/or make note on last page if evidence of stressors is apparent. Consider departure from reference, if appropriate, in recent past (for instance, approximately 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 of 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 for each group below. 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 foot 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 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 <u>and</u> within the watershed draining to the assessment area (5M), and within 2 miles <u>and</u> within the watershed draining to the assessment area (2M). Effective riparian buffers are considered to be 50 feet wide in the Coastal Plain and Piedmont ecoregions and 30 feet wide in the Blue Ridge Mountains ecoregion.

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 <u>or</u> hydrologic alterations that prevent dainage <u>and/or</u> overbank flow from affectio 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.

7b. How much of the first 50 feet from the bank is weltand? (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 <u>or</u> 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 tributary or other open water sheltered or exposed?
◉ Sheltered – adjacent open water with width < 2500 feet <u>and</u> no regular boat traffic.
◯ Exposed – adjacent open water with width ≥ 2500 feet <u>or</u> 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. 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 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 evaluates whether the wetland is well connected (Well) and/or loosely connected (Loosely) to the landscape patch, the contiguous metric 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, fields (pasture open and agriculture), or 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 directiions? 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 <u>and</u> 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 <u>and</u> overland flow are severely altered in the assessment area.

Notes

NC WAM Wetland Rating Sheet
Accompanies User Manual Version 5.0

Wetland Site Name: Wetland A — Date:
Wetland Type: Bottomland Hardwood Forest — Assessor Name/Organization: ystem Planning and Restc

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

Sub-function Rating Summary

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

Function Rating Summary

Function	Metrics/Notes	Rating
Hydrology	Condition	**LOW**
Water Quality	Condition	**LOW**
	Condition/Opportunity	**LOW**
	Opportunity Presence? (Y/N)	**NO**
Habitat	Condition	**LOW**

Overall Wetland Rating **LOW**

W-B

NC WAM WETLAND ASSESSMENT FORM
Accompanies User Manual Version 5

USACE AID#:		NCDWR #:	
Project Name	Bandy's Farm	Date of Evaluation	
Applicant/Owner Name		Wetland Site Name	Wetland B
Wetland Type	Bottomland Hardwood Forest	Assessor Name/Organization	EPR: Ecosystem Planning and Restorat
Level III Ecoregion	Piedmont	Nearest Named Water Body	North Fork Mountain Creek
River Basin	Catawba	USGS 8-Digit Catalogue Unit	
County	Catawba	NCDWR Region	Mooresville
○ Yes ◉ No	Precipitation within 48 hrs?	Latitude/Longitude (deci-degrees)	

Evidence of stressors affecting the assessment area (may not be within the assessment area)
Please circle and/or make note on last page if evidence of stressors is apparent. Consider departure from reference, if appropriate, in recent past (for instance, approximately 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 of 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 for each group below. 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 foot 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 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). Effective riparian buffers are considered to be 50 feet wide in the Coastal Plain and Piedmont ecoregions and 30 feet wide in the Blue Ridge Mountains ecoregion.

WS	5M	2M	
[ ] A	[ ] A	[ ] A	≥ 10% impervious surfaces
[x] B	[x] B	[x] B	Confined animal operations (or other local, concentrated source of pollutants)
[x] C	[x] C	[x] C	≥ 20% coverage of pasture
[ ] D	[ ] D	[ ] D	≥ 20% coverage of agricultural land (regularly plowed land)
[x] E	[x] E	[x] E	≥ 20% coverage of maintained grass/herb
[x] F	[x] F	[x] F	≥ 20% coverage of clear-cut land
[x] G	[x] G	[x] 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 dainage and/or overbank flow from affectio 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.

7b. How much of the first 50 feet from the bank is weltand? (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 tributary 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. 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 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 evaluates whether the wetland is well connected (Well) and/or loosely connected (Loosely) to the landscape patch, the contiguous metric 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, fields (pasture open and agriculture), or 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 directiions? 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.

Stratum	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 <u>and</u> 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 <u>and</u> overland flow are severely altered in the assessment area.

Notes

NC WAM Wetland Rating Sheet
Accompanies User Manual Version 5.0

Wetland Site Name	Wetland B	Date	
Wetland Type	Bottomland Hardwood Forest	Assessor Name/Organization	osystem Planning and Re

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

Sub-function Rating Summary

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

Function Rating Summary

Function	Metrics/Notes	Rating
Hydrology	Condition	**LOW**
Water Quality	Condition	**LOW**
	Condition/Opportunity	**LOW**
	Opportunity Presence? (Y/N)	**NO**
Habitat	Condition	**LOW**

Overall Wetland Rating **LOW**

W-C and W-E

NC WAM WETLAND ASSESSMENT FORM
Accompanies User Manual Version 5

USACE AID#: NCDWR #:

Project Name	Bandy's Farm	Date of Evaluation	
Applicant/Owner Name		Wetland Site Name	Wetlands C and E
Wetland Type	Bottomland Hardwood Forest	Assessor Name/Organization	Ecosystem Planning and Restoration
Level III Ecoregion	Piedmont	Nearest Named Water Body	North Fork Mountain Creek
River Basin	Catawba	USGS 8-Digit Catalogue Unit	
County	Catawba	NCDWR Region	Mooresville
( ) Yes (•) No	Precipitation within 48 hrs?	Latitude/Longitude (deci-degrees)	

Evidence of stressors affecting the assessment area (may not be within the assessment area)
Please circle and/or make note on last page if evidence of stressors is apparent. Consider departure from reference, if appropriate, in recent past (for instance, approximately 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 of 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 for each group below. 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 foot 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 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). Effective riparian buffers are considered to be 50 feet wide in the Coastal Plain and Piedmont ecoregions and 30 feet wide in the Blue Ridge Mountains ecoregion.

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 dainage and/or overbank flow from affectio 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.

7b. How much of the first 50 feet from the bank is weltand? (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 tributary 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. 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 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 evaluates whether the wetland is well connected (Well) and/or loosely connected (Loosely) to the landscape patch, the contiguous metric 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, fields (pasture open and agriculture), or 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 directiions? 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 <u>and</u> 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 <u>and</u> overland flow are severely altered in the assessment area.

Notes

NC WAM Wetland Rating Sheet
Accompanies User Manual Version 5.0

Wetland Site Name: Wetland C
Date:
Wetland Type: Bottomland Hardwood Forest
Assessor Name/Organization: ystem Planning and Restc

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

Sub-function Rating Summary

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

Function Rating Summary

Function	Metrics/Notes	Rating
Hydrology	Condition	**MEDIUM**
Water Quality	Condition	**HIGH**
	Condition/Opportunity	**HIGH**
	Opportunity Presence? (Y/N)	**NO**
Habitat	Condition	**LOW**

Overall Wetland Rating **MEDIUM**

W-D

NC WAM WETLAND ASSESSMENT FORM
Accompanies User Manual Version 5

USACE AID#:		NCDWR #:	
Project Name	Bandy's Farm	Date of Evaluation	
Applicant/Owner Name		Wetland Site Name	Wetland D
Wetland Type	Bottomland Hardwood Forest	Assessor Name/Organization	EPR: Ecosystem Planning and Restorat
Level III Ecoregion	Piedmont	Nearest Named Water Body	North Fork Mountain Creek
River Basin	Catawba	USGS 8-Digit Catalogue Unit	
County	Catawba	NCDWR Region	Mooresville
○ Yes ◉ No	Precipitation within 48 hrs?	Latitude/Longitude (deci-degrees)	

Evidence of stressors affecting the assessment area (may not be within the assessment area)
Please circle and/or make note on last page if evidence of stressors is apparent. Consider departure from reference, if appropriate, in recent past (for instance, approximately 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 of 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 for each group below. 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 foot 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 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). Effective riparian buffers are considered to be 50 feet wide in the Coastal Plain and Piedmont ecoregions and 30 feet wide in the Blue Ridge Mountains ecoregion.

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 dainage and/or overbank flow from affectio 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.

7b. How much of the first 50 feet from the bank is weltand? (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 tributary 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. 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 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 evaluates whether the wetland is well connected (Well) and/or loosely connected (Loosely) to the landscape patch, the contiguous metric 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, fields (pasture open and agriculture), or 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 directiions? 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	Wetland D	Date	
Wetland Type	Bottomland Hardwood Forest	Assessor Name/Organization	osystem Planning and Re

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

Sub-function Rating Summary

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

Function Rating Summary

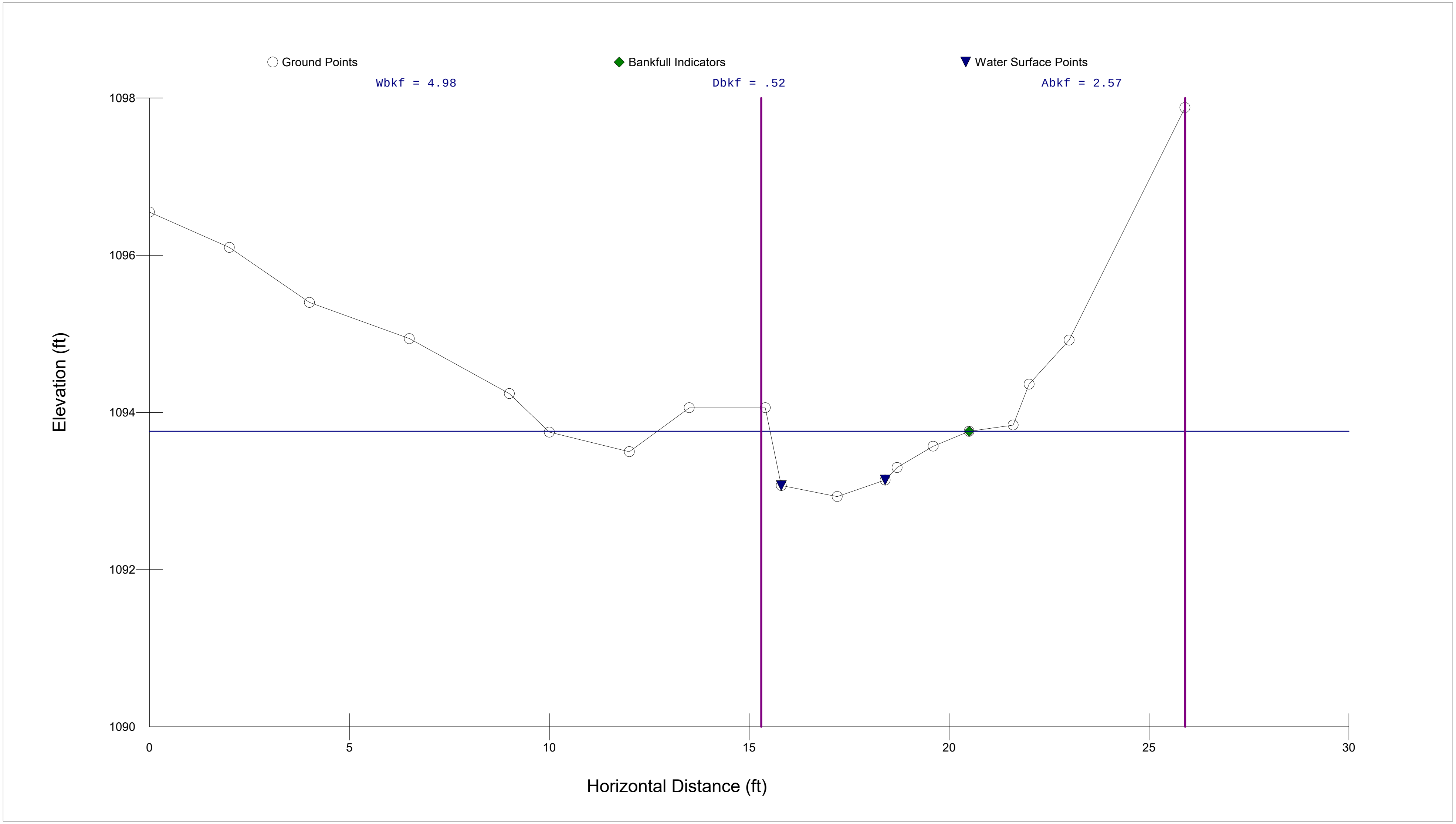
Function	Metrics/Notes	Rating
Hydrology	Condition	**LOW**
Water Quality	Condition	**LOW**
	Condition/Opportunity	**LOW**
	Opportunity Presence? (Y/N)	**NO**
Habitat	Condition	**LOW**

Overall Wetland Rating **LOW**

Appendix 4

Cross-Section Graphs and Data

XS-1 (Reach UT1)



RIVERMORPH CROSS SECTION SUMMARY

River Name: Bandys- Design Survey
Reach Name: UT1
Cross Section Name: XS1
Survey Date: 03/31/2022

Cross Section Data Entry

BM Elevation: 1000 ft
Backsight Rod Reading: 100 ft

TAPE	FS	ELEV	NOTE
0	3.45	1096.55	
2	3.9	1096.1	
4	4.6	1095.4	
6.5	5.06	1094.94	
9	5.76	1094.24	
10	6.25	1093.75	
12	6.5	1093.5	
13.5	5.94	1094.06	
15.4	5.94	1094.06	
15.8	6.93	1093.07	lew
17.2	7.07	1092.93	twg
18.4	6.86	1093.14	rew
18.7	6.7	1093.3	
19.6	6.43	1093.57	
20.5	6.24	1093.76	bkf
21.6	6.16	1093.84	field bkf
22	5.64	1094.36	
23	5.08	1094.92	
25.9	2.12	1097.88	

Cross Sectional Geometry

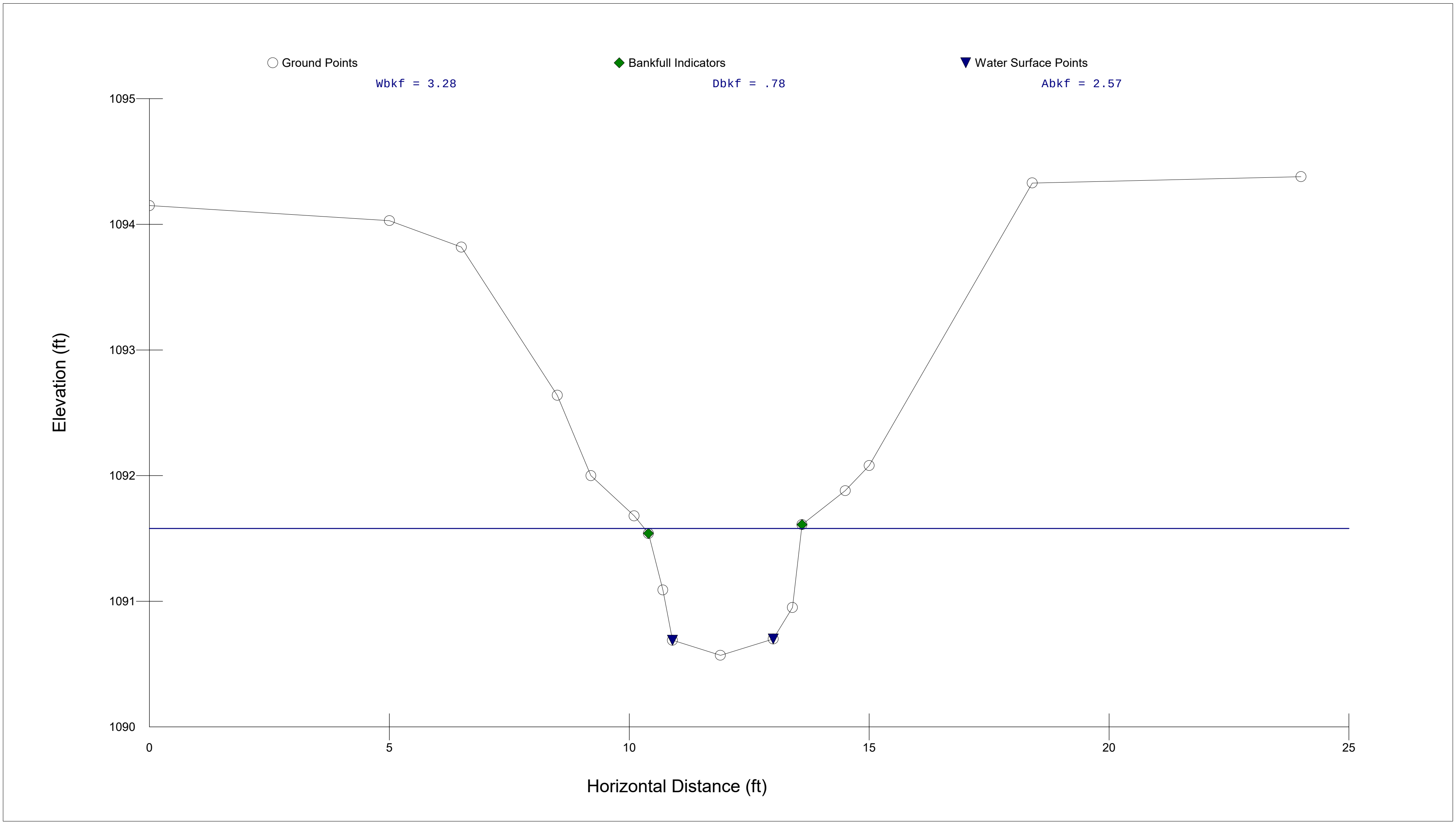
	Channel	Left	Right
Floodprone Elevation (ft)	1094.59	1094.59	1094.59
Bankfull Elevation (ft)	1093.76	1093.76	1093.76
Floodprone Width (ft)	14.66	-----	-----
Bankfull Width (ft)	4.98	3.02	1.96
Entrenchment Ratio	2.94	-----	-----
Mean Depth (ft)	0.52	0.7	0.23
Maximum Depth (ft)	0.83	0.83	0.55
Width/Depth Ratio	9.58	4.32	8.52
Bankfull Area (sq ft)	2.57	2.11	0.46
Wetted Perimeter (ft)	5.57	4.07	2.59
Hydraulic Radius (ft)	0.46	0.52	0.18
Begin BKF Station	15.52	15.52	18.54
End BKF Station	20.5	18.54	20.5

Entrainment Calculations

Entrainment Formula: Rosgen Modified Shields Curve

	Channel	Left Side	Right Side
Slope	0	0	0
Shear Stress (lb/sq ft)			

XS-2 (Reach UT1A)



RIVERMORPH CROSS SECTION SUMMARY

River Name: Bandys- Design Survey
Reach Name: UT1a
Cross Section Name: XS2
Survey Date: 03/31/2022

Cross Section Data Entry

BM Elevation: 1000 ft
Backsight Rod Reading: 100 ft

TAPE	FS	ELEV	NOTE
0	5.85	1094.15	
5	5.97	1094.03	
6.5	6.18	1093.82	
8.5	7.36	1092.64	
9.2	8	1092	
10.1	8.32	1091.68	
10.4	8.46	1091.54	bkf
10.7	8.91	1091.09	
10.9	9.31	1090.69	lew
11.9	9.43	1090.57	twg
13	9.3	1090.7	rew
13.4	9.05	1090.95	
13.6	8.39	1091.61	bkf
14.5	8.12	1091.88	
15	7.92	1092.08	
18.4	5.67	1094.33	
24	5.62	1094.38	

Cross Sectional Geometry

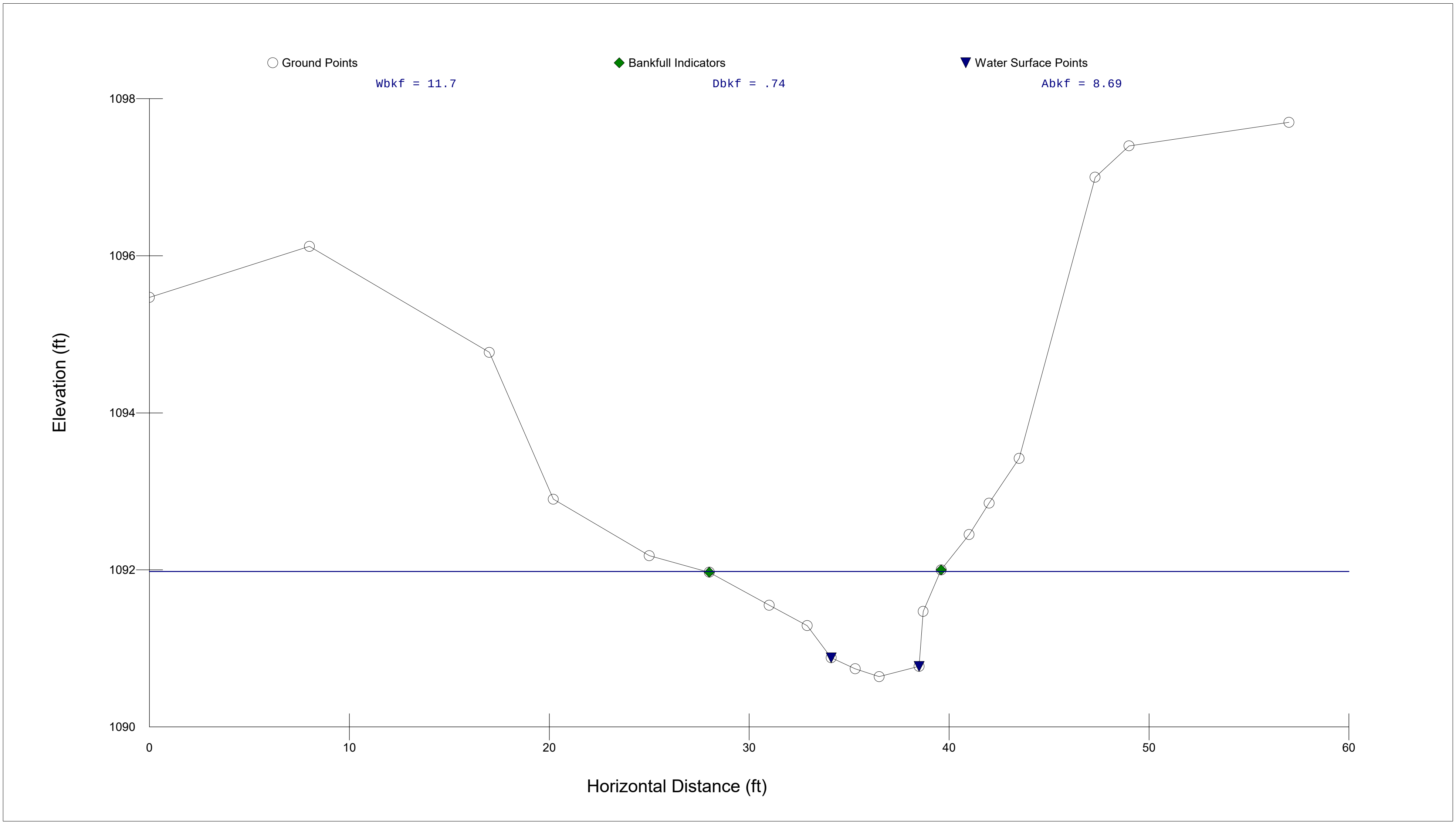
	Channel	Left	Right
Floodprone Elevation (ft)	1092.59	1092.59	1092.59
Bankfull Elevation (ft)	1091.58	1091.58	1091.58
Floodprone Width (ft)	7.22	-----	-----
Bankfull Width (ft)	3.28	1.68	1.6
Entrenchment Ratio	2.2	-----	-----
Mean Depth (ft)	0.78	0.75	0.82
Maximum Depth (ft)	1.01	1.01	1
Width/Depth Ratio	4.21	2.23	1.95
Bankfull Area (sq ft)	2.57	1.26	1.31
Wetted Perimeter (ft)	4.33	3.18	3.15
Hydraulic Radius (ft)	0.59	0.4	0.42
Begin BKF Station	10.31	10.31	11.99
End BKF Station	13.59	11.99	13.59

Entrainment Calculations

Entrainment Formula: Rosgen Modified Shields Curve

	Channel	Left Side	Right Side
Slope	0	0	0
Shear Stress (lb/sq ft)			
Movable Particle (mm)			

XS-3 (Upper UT2)



RIVERMORPH CROSS SECTION SUMMARY

River Name: Bandys- Design Survey
Reach Name: UT2
Cross Section Name: XS3
Survey Date: 03/31/2022

Cross Section Data Entry

BM Elevation: 1000 ft
Backsight Rod Reading: 100 ft

TAPE	FS	ELEV	NOTE
0	4.53	1095.47	
8	3.88	1096.12	
17	5.23	1094.77	
20.2	7.1	1092.9	
25	7.82	1092.18	
28	8.03	1091.97	bkf
31	8.45	1091.55	
32.9	8.71	1091.29	
34.1	9.12	1090.88	lew
35.3	9.26	1090.74	
36.5	9.36	1090.64	twg
38.5	9.23	1090.77	rew
38.7	8.53	1091.47	
39.6	8	1092	bkf
41	7.55	1092.45	
42	7.15	1092.85	
43.5	6.58	1093.42	
47.3	3	1097	
49	2.6	1097.4	
57	2.3	1097.7	

Cross Sectional Geometry

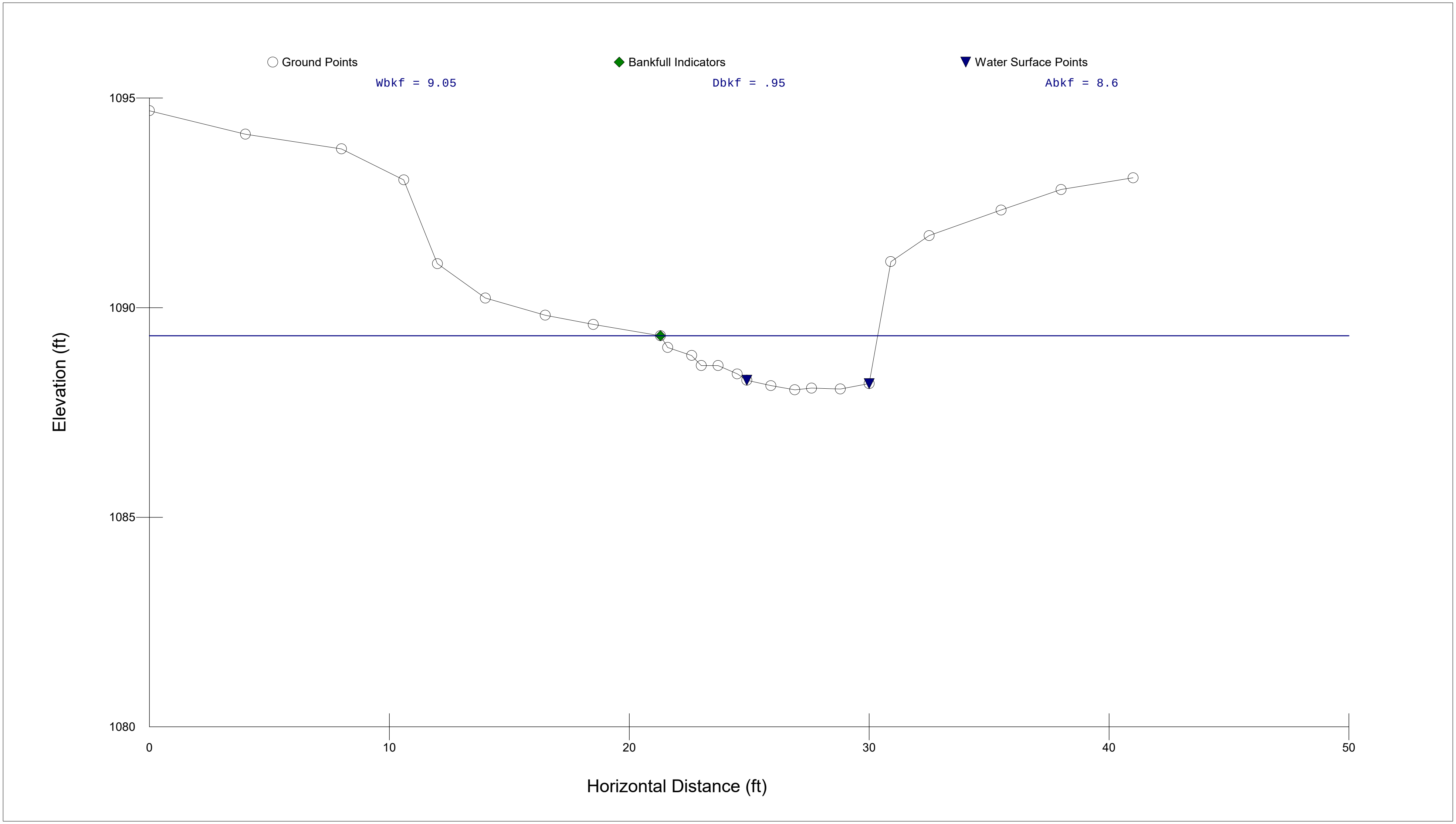
	Channel	Left	Right
Floodprone Elevation (ft)	1093.32	1093.32	1093.32
Bankfull Elevation (ft)	1091.98	1091.98	1091.98
Floodprone Width (ft)	23.76	-----	-----
Bankfull Width (ft)	11.71	5.91	5.8
Entrenchment Ratio	2.03	-----	-----
Mean Depth (ft)	0.74	0.42	1.08
Maximum Depth (ft)	1.34	0.99	1.34
Width/Depth Ratio	15.82	14.24	5.37
Bankfull Area (sq ft)	8.69	2.45	6.24
Wetted Perimeter (ft)	12.51	7	7.49
Hydraulic Radius (ft)	0.7	0.35	0.83
Begin BKF Station	27.86	27.86	33.77
End BKF Station	39.57	33.77	39.57

Entrainment Calculations

Entrainment Formula: Rosgen Modified Shields Curve

	Channel	Left Side	Right Side
Slope	0	0	0

XS-4 (Lower UT2)



RIVERMORPH CROSS SECTION SUMMARY

River Name: Bandys- Design Survey
Reach Name: UT2
Cross Section Name: XS4 DS
Survey Date: 04/06/2022

Cross Section Data Entry

BM Elevation: 1000 ft
Backsight Rod Reading: 100 ft

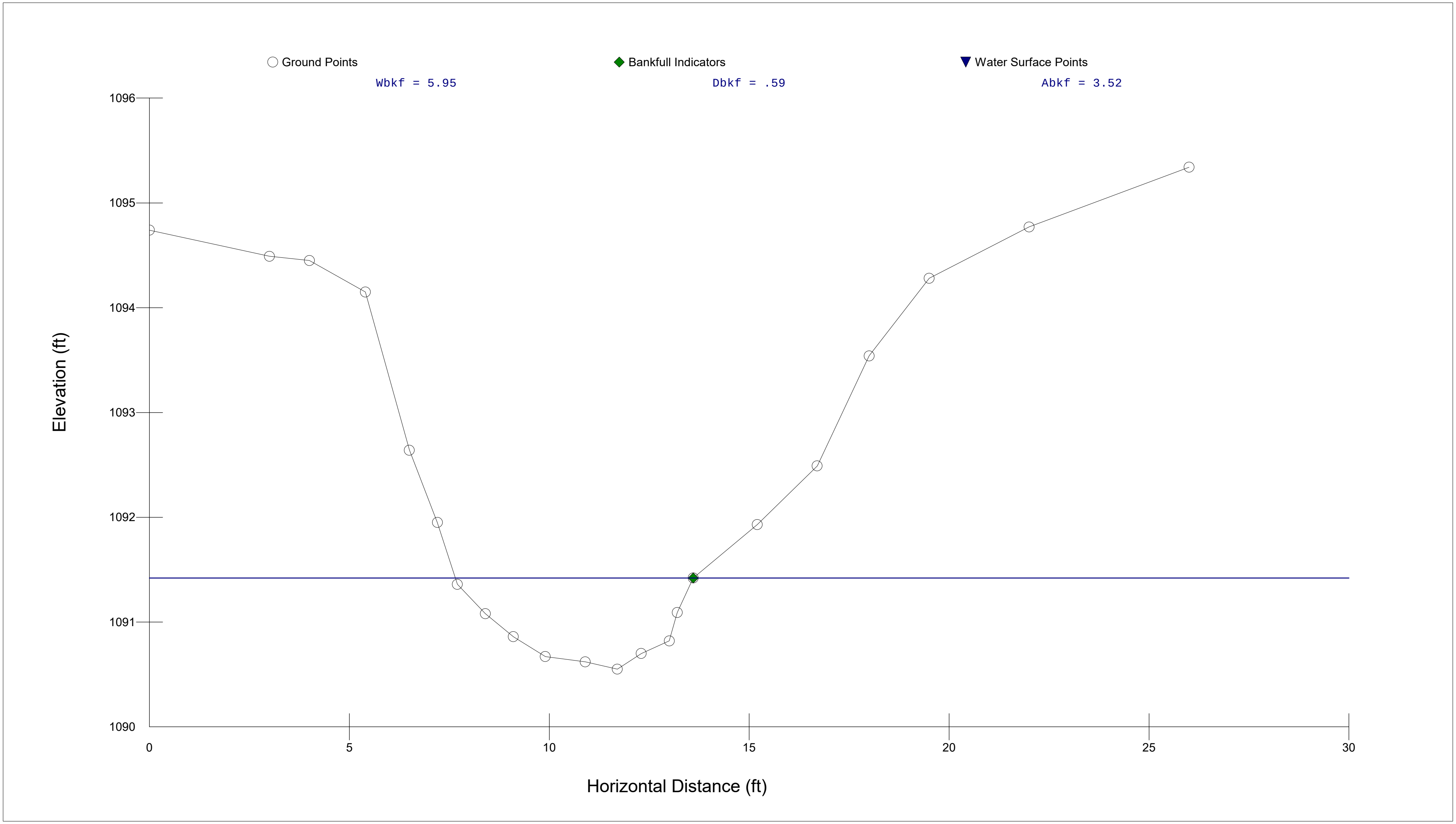
TAPE	FS	ELEV	NOTE
0	5.3	1094.7	
4	5.86	1094.14	
8	6.21	1093.79	
10.6	6.95	1093.05	
12	8.95	1091.05	
14	9.77	1090.23	
16.5	10.18	1089.82	
18.5	10.4	1089.6	
21.3	10.67	1089.33	bkf
21.6	10.95	1089.05	
22.6	11.14	1088.86	
23	11.38	1088.62	
23.7	11.38	1088.62	
24.5	11.58	1088.42	
24.9	11.73	1088.27	lew
25.9	11.86	1088.14	
26.9	11.96	1088.04	twg
27.6	11.92	1088.08	
28.8	11.94	1088.06	
30	11.81	1088.19	rew
30.9	8.9	1091.1	
32.5	8.28	1091.72	
35.5	7.67	1092.33	
38	7.18	1092.82	
41	6.9	1093.1	

Cross Sectional Geometry

	Channel	Left	Right
Floodprone Elevation (ft)	1090.62	1090.62	1090.62
Bankfull Elevation (ft)	1089.33	1089.33	1089.33
Floodprone Width (ft)	17.7	-----	-----
Bankfull Width (ft)	9.05	4.53	4.52
Entrenchment Ratio	1.96	-----	-----
Mean Depth (ft)	0.95	0.71	1.19
Maximum Depth (ft)	1.29	1.18	1.29
Width/Depth Ratio	9.53	6.35	3.8
Bankfull Area (sq ft)	8.6	3.23	5.37
Wetted Perimeter (ft)	10.16	5.97	6.56
Hydraulic Radius (ft)	0.85	0.54	0.82
Begin BKF Station	21.3	21.3	25.83
End BKF Station	30.35	25.83	30.35

Entrainment Calculations

XS-5 (Reach UT3)



RIVERMORPH CROSS SECTION SUMMARY

River Name: Bandys- Design Survey
Reach Name: UT3
Cross Section Name: XS5
Survey Date: 04/06/2022

Cross Section Data Entry

BM Elevation: 1000 ft
Backsight Rod Reading: 100 ft

TAPE	FS	ELEV	NOTE
0	5.26	1094.74	lpin
3	5.51	1094.49	
4	5.55	1094.45	
5.4	5.85	1094.15	
6.5	7.36	1092.64	
7.2	8.05	1091.95	
7.7	8.64	1091.36	field bkf
8.4	8.92	1091.08	
9.1	9.14	1090.86	lch
9.9	9.33	1090.67	
10.9	9.38	1090.62	
11.7	9.45	1090.55	twg
12.3	9.3	1090.7	
13	9.18	1090.82	rch
13.2	8.91	1091.09	
13.6	8.58	1091.42	bkf
15.2	8.07	1091.93	
16.7	7.51	1092.49	
18	6.46	1093.54	
19.5	5.72	1094.28	
22	5.23	1094.77	
26	4.66	1095.34	

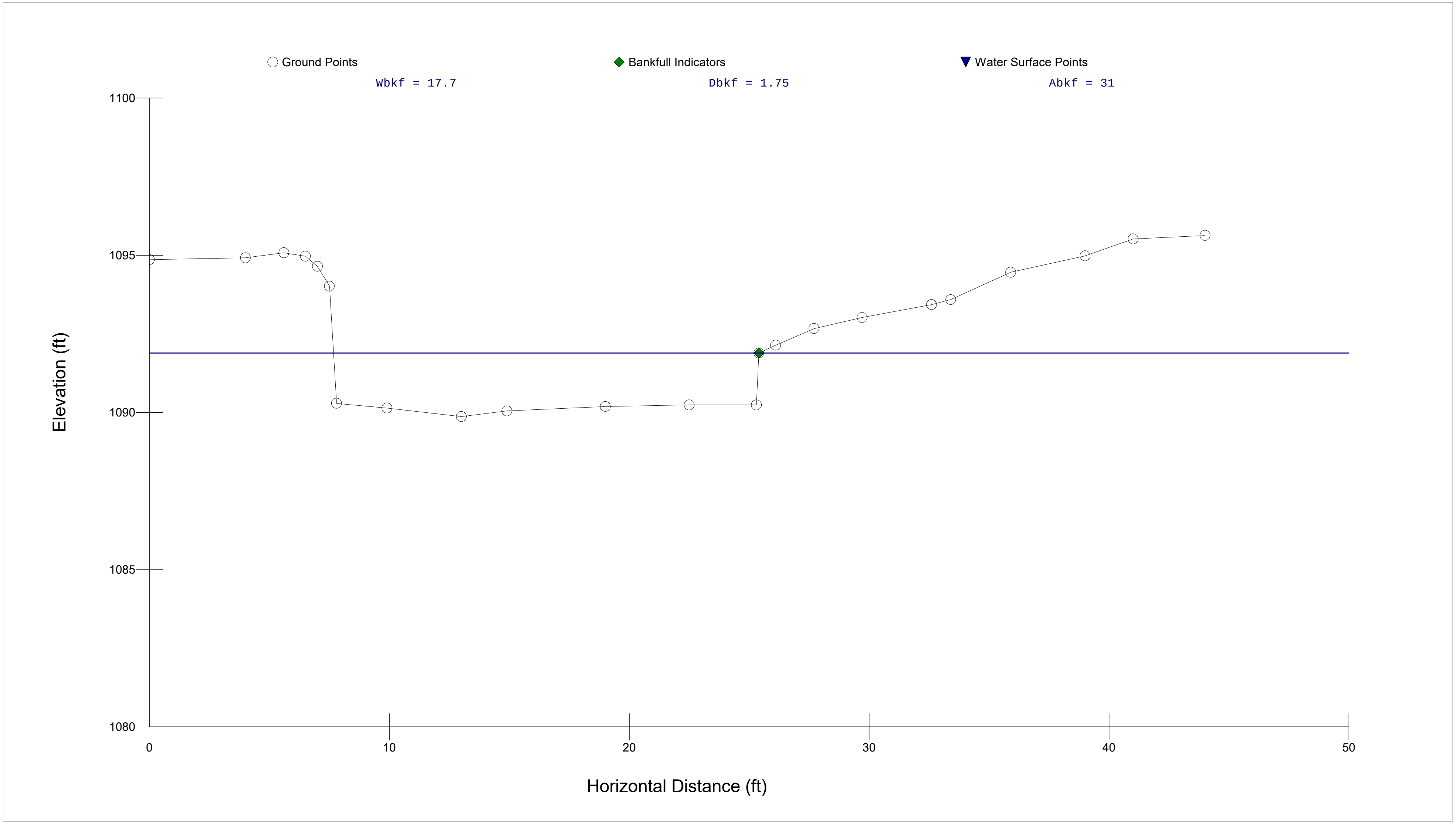
Cross Sectional Geometry

	Channel	Left	Right
Floodprone Elevation (ft)	1092.29	1092.29	1092.29
Bankfull Elevation (ft)	1091.42	1091.42	1091.42
Floodprone Width (ft)	9.31	-----	-----
Bankfull Width (ft)	5.95	2.97	2.98
Entrenchment Ratio	1.56	-----	-----
Mean Depth (ft)	0.59	0.52	0.67
Maximum Depth (ft)	0.87	0.79	0.87
Width/Depth Ratio	10.08	5.75	4.45
Bankfull Area (sq ft)	3.52	1.53	1.99
Wetted Perimeter (ft)	6.38	3.9	4.05
Hydraulic Radius (ft)	0.55	0.39	0.49
Begin BKF Station	7.65	7.65	10.62
End BKF Station	13.6	10.62	13.6

Entrainment Calculations

Entrainment Formula: Rosgen Modified Shields Curve

XS-6 (Upper NFMC)



RIVERMORPH CROSS SECTION SUMMARY

River Name: Bandys- Design Survey
Reach Name: NFMC
Cross Section Name: XS6 US
Survey Date: 04/06/2022

Cross Section Data Entry

BM Elevation: 1000 ft
Backsight Rod Reading: 100 ft

TAPE	FS	ELEV	NOTE
0	5.14	1094.86	lpin
4	5.08	1094.92	
5.6	4.92	1095.08	
6.5	5.03	1094.97	
7	5.35	1094.65	
7.5	5.98	1094.02	
7.8	9.71	1090.29	
9.9	9.86	1090.14	
13	10.13	1089.87	twg
14.9	9.95	1090.05	
19	9.81	1090.19	
22.5	9.76	1090.24	
25.3	9.76	1090.24	rec
25.4	8.11	1091.89	BKF
26.1	7.86	1092.14	fieldbkf
27.7	7.33	1092.67	
29.7	6.98	1093.02	
32.6	6.57	1093.43	
33.4	6.41	1093.59	
35.9	5.54	1094.46	
39	5.02	1094.98	
41	4.48	1095.52	
44	4.37	1095.63	rpin

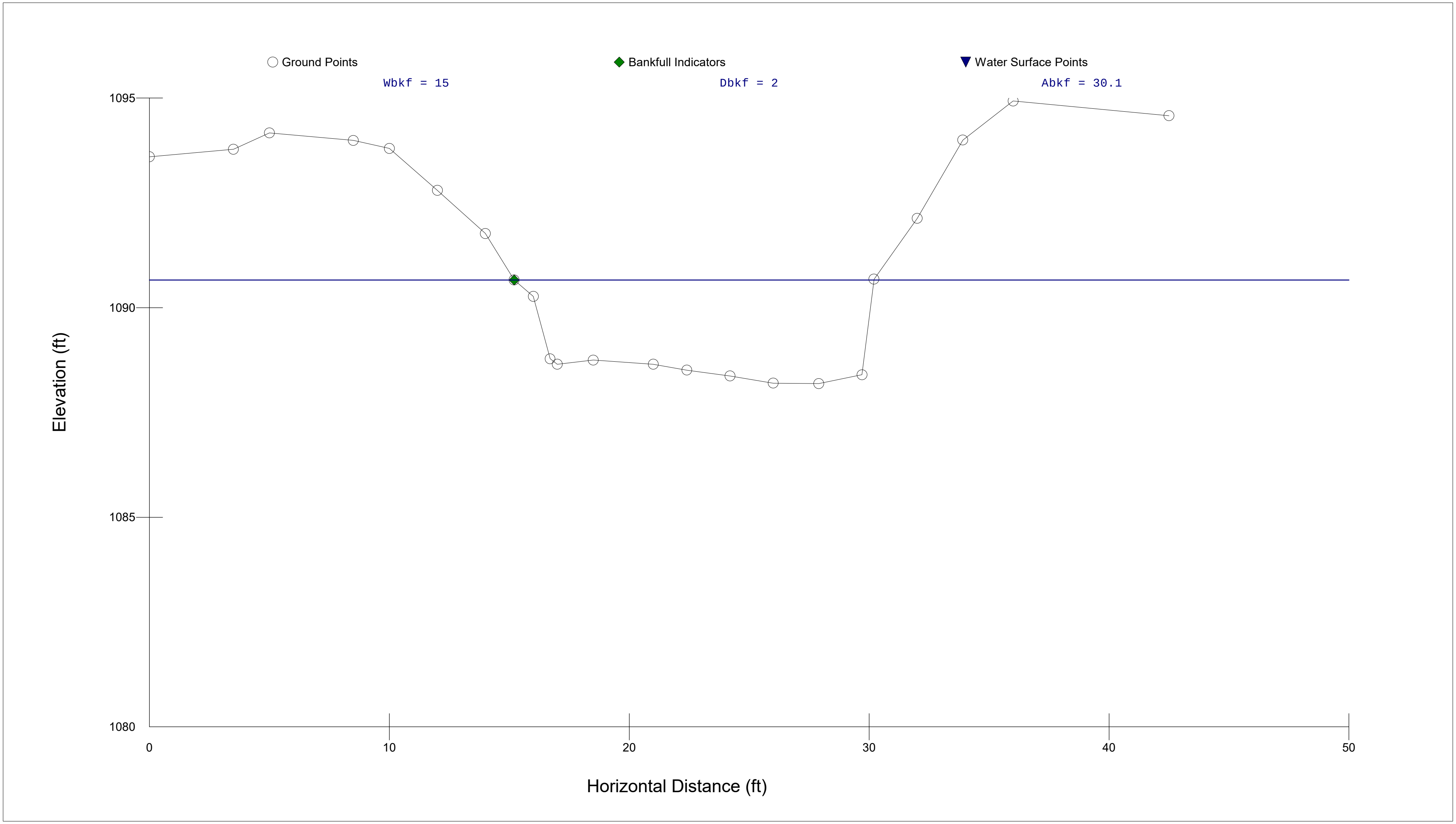
Cross Sectional Geometry

	Channel	Left	Right
Floodprone Elevation (ft)	1093.91	1093.91	1093.91
Bankfull Elevation (ft)	1091.89	1091.89	1091.89
Floodprone Width (ft)	26.81	-----	-----
Bankfull Width (ft)	17.73	9.21	8.52
Entrenchment Ratio	1.51	-----	-----
Mean Depth (ft)	1.75	1.81	1.67
Maximum Depth (ft)	2.02	2.02	1.77
Width/Depth Ratio	10.13	5.08	5.1
Bankfull Area (sq ft)	30.95	16.71	14.25
Wetted Perimeter (ft)	20.79	12.48	11.85
Hydraulic Radius (ft)	1.49	1.34	1.2
Begin BKF Station	7.67	7.67	16.88
End BKF Station	25.4	16.88	25.4

Entrainment Calculations

Entrainment Formula: Rosgen Modified Shields Curve

XS-7 (Middle NFMC)



RIVERMORPH CROSS SECTION SUMMARY

River Name: Bandys- Design Survey
Reach Name: NFMC
Cross Section Name: XS7 DS
Survey Date: 04/06/2022

Cross Section Data Entry

BM Elevation: 1000 ft
Backsight Rod Reading: 100 ft

TAPE	FS	ELEV	NOTE
0	6.4	1093.6	
3.5	6.22	1093.78	
5	5.83	1094.17	
8.5	6.01	1093.99	
10	6.2	1093.8	
12	7.2	1092.8	
14	8.23	1091.77	
15.2	9.34	1090.66	BKF
16	9.73	1090.27	fieldbkf
16.7	11.22	1088.78	lch
17	11.35	1088.65	
18.5	11.25	1088.75	
21	11.35	1088.65	
22.4	11.49	1088.51	
24.2	11.63	1088.37	
26	11.8	1088.2	
27.9	11.81	1088.19	twg
29.7	11.6	1088.4	rch
30.2	9.32	1090.68	
32	7.87	1092.13	
33.9	6	1094	
36	5.07	1094.93	
42.5	5.42	1094.58	

Cross Sectional Geometry

	Channel	Left	Right
Floodprone Elevation (ft)	1093.13	1093.13	1093.13
Bankfull Elevation (ft)	1090.66	1090.66	1090.66
Floodprone Width (ft)	21.68	-----	-----
Bankfull Width (ft)	15	7.86	7.14
Entrenchment Ratio	1.45	-----	-----
Mean Depth (ft)	2	1.75	2.29
Maximum Depth (ft)	2.47	2.2	2.47
Width/Depth Ratio	7.5	4.5	3.12
Bankfull Area (sq ft)	30.06	13.72	16.34
Wetted Perimeter (ft)	17.91	11.14	11.18
Hydraulic Radius (ft)	1.68	1.23	1.46
Begin BKF Station	15.2	15.2	23.06
End BKF Station	30.2	23.06	30.2

Entrainment Calculations

Entrainment Formula: Rosgen Modified Shields Curve

Particle Size / Sediment Data

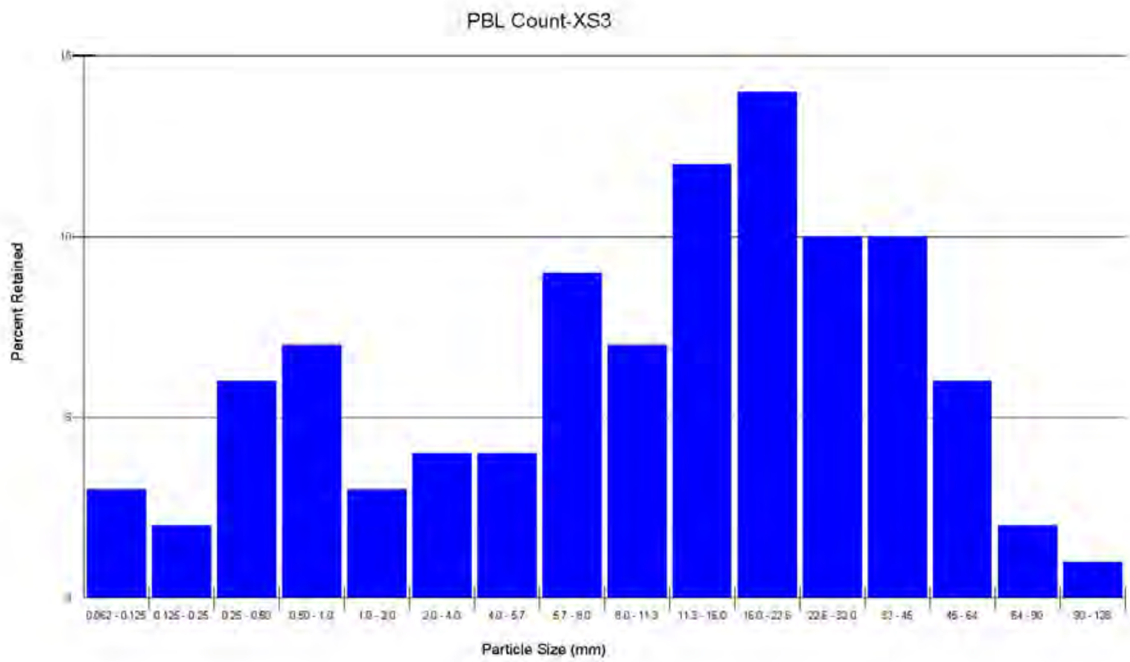
RIVERMORPH PARTICLE SUMMARY

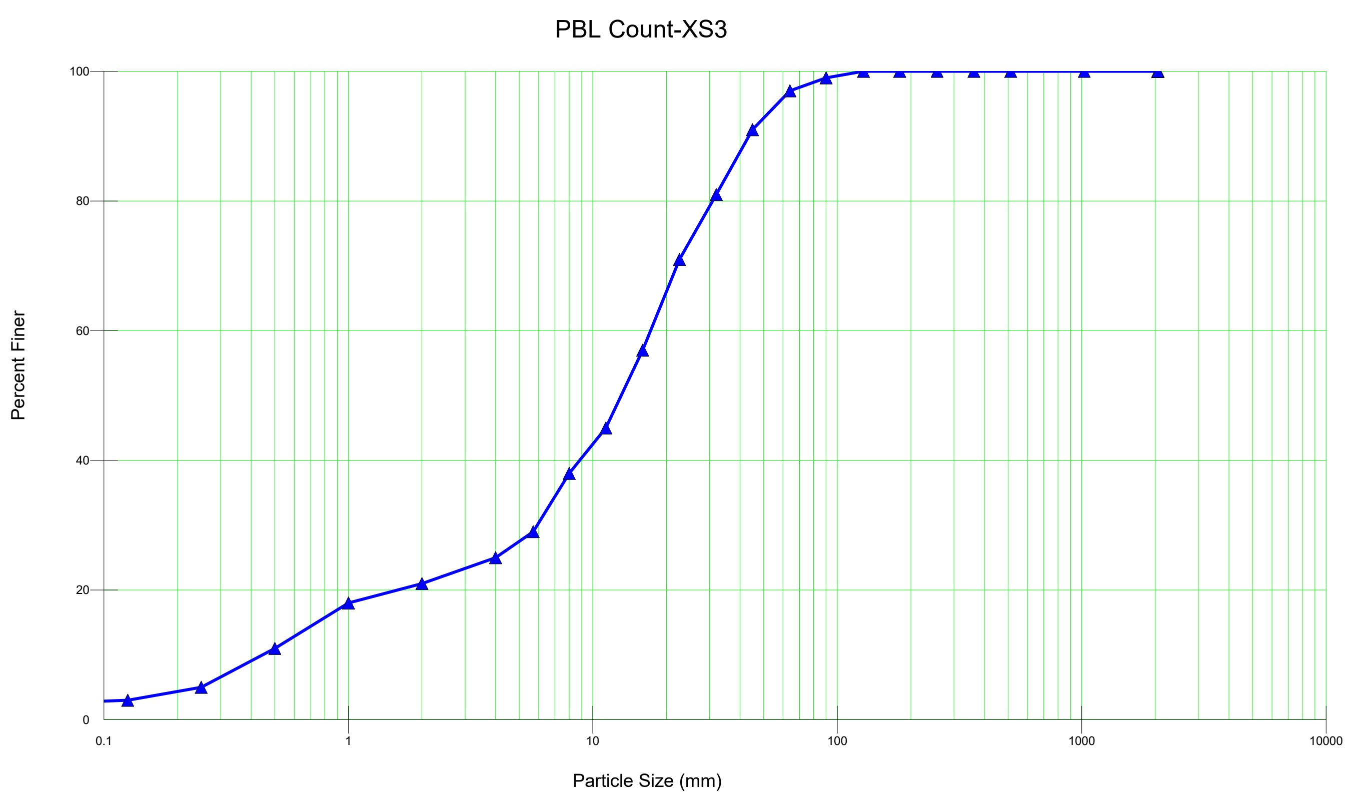
River Name: Bandys Farm
Reach Name: UT2 Upper
Sample Name: PBL Count @ XS-3
Survey Date: 03/31/2022

Size (mm)	TOT #	ITEM %	CUM %
0 - 0.062	0	0.00	0.00
0.062 - 0.125	3	3.00	3.00
0.125 - 0.25	2	2.00	5.00
0.25 - 0.50	6	6.00	11.00
0.50 - 1.0	7	7.00	18.00
1.0 - 2.0	3	3.00	21.00
2.0 - 4.0	4	4.00	25.00
4.0 - 5.7	4	4.00	29.00
5.7 - 8.0	9	9.00	38.00
8.0 - 11.3	7	7.00	45.00
11.3 - 16.0	12	12.00	57.00
16.0 - 22.6	14	14.00	71.00
22.6 - 32.0	10	10.00	81.00
32 - 45	10	10.00	91.00
45 - 64	6	6.00	97.00
64 - 90	2	2.00	99.00
90 - 128	1	1.00	100.00
128 - 180	0	0.00	100.00
180 - 256	0	0.00	100.00
256 - 362	0	0.00	100.00
362 - 512	0	0.00	100.00
512 - 1024	0	0.00	100.00
1024 - 2048	0	0.00	100.00
Bedrock	0	0.00	100.00

D16 (mm)	0.86
D35 (mm)	7.23
D50 (mm)	13.26
D84 (mm)	35.9
D95 (mm)	57.67
D100 (mm)	128
Silt/Clay (%)	0
Sand (%)	21
Gravel (%)	76
Cobble (%)	3
Boulder (%)	0
Bedrock (%)	0

Total Particles = 100.


PBL Count-XS3
Percent Retained
Particle Size (mm)


PBL Count-XS3
Percent Finer
Particle Size (mm)
0
20
40
60
80
100
0.1
1
10
100
1000
10000

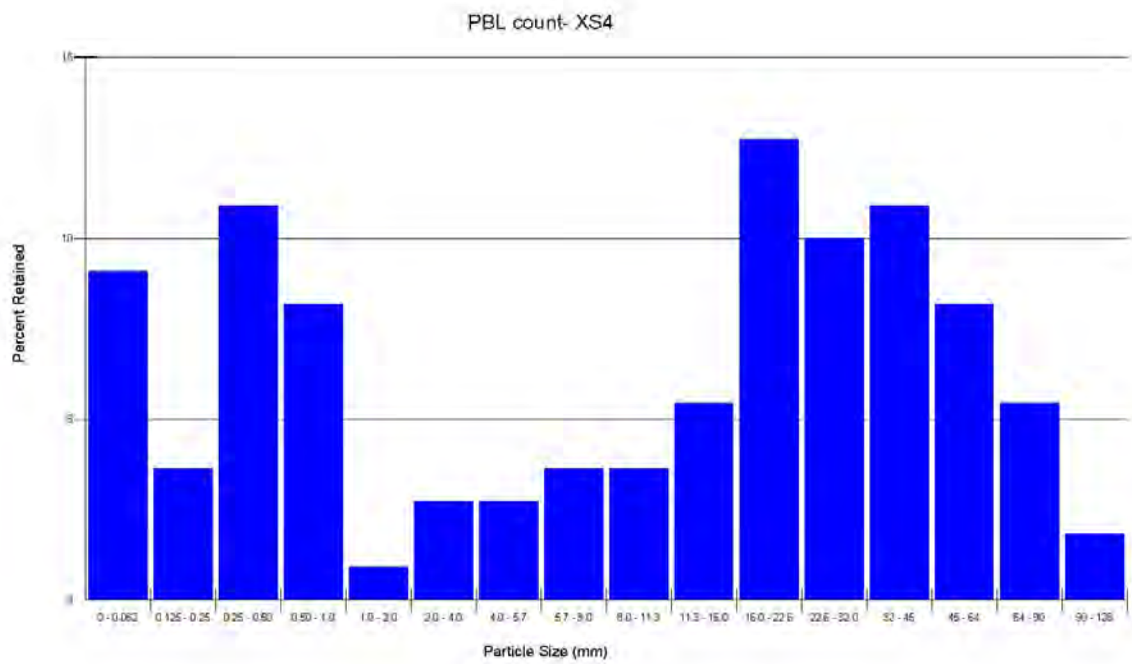
RIVERMORPH PARTICLE SUMMARY

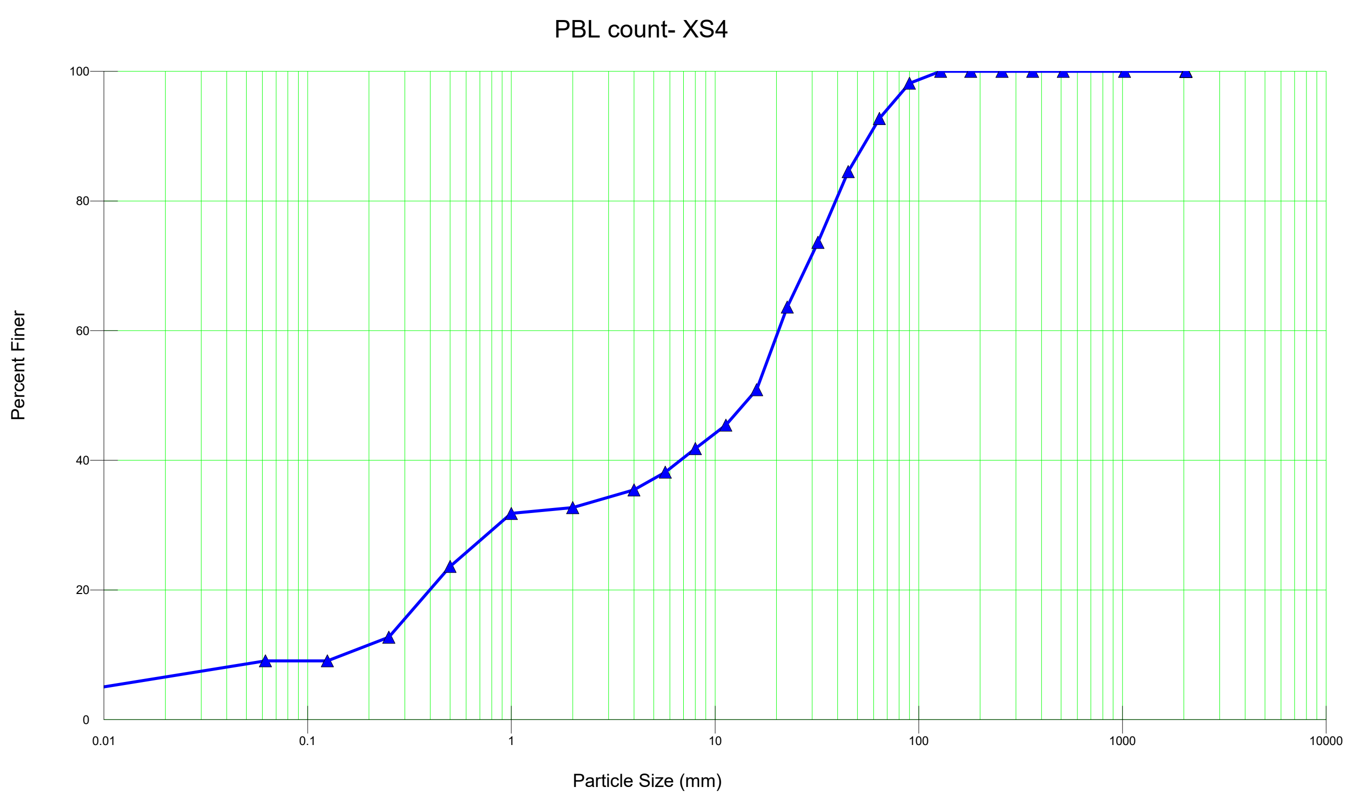
River Name: Bandys Farm
Reach Name: Reach UT2 Lower
Sample Name: PBL count @ XS-4
Survey Date: 04/14/2022

Size (mm)	TOT #	ITEM %	CUM %
0 - 0.062	10	9.09	9.09
0.062 - 0.125	0	0.00	9.09
0.125 - 0.25	4	3.64	12.73
0.25 - 0.50	12	10.91	23.64
0.50 - 1.0	9	8.18	31.82
1.0 - 2.0	1	0.91	32.73
2.0 - 4.0	3	2.73	35.45
4.0 - 5.7	3	2.73	38.18
5.7 - 8.0	4	3.64	41.82
8.0 - 11.3	4	3.64	45.45
11.3 - 16.0	6	5.45	50.91
16.0 - 22.6	14	12.73	63.64
22.6 - 32.0	11	10.00	73.64
32 - 45	12	10.91	84.55
45 - 64	9	8.18	92.73
64 - 90	6	5.45	98.18
90 - 128	2	1.82	100.00
128 - 180	0	0.00	100.00
180 - 256	0	0.00	100.00
256 - 362	0	0.00	100.00
362 - 512	0	0.00	100.00
512 - 1024	0	0.00	100.00
1024 - 2048	0	0.00	100.00
Bedrock	0	0.00	100.00

D16 (mm)	0.32
D35 (mm)	3.67
D50 (mm)	15.22
D84 (mm)	44.34
D95 (mm)	74.83
D100 (mm)	128
Silt/Clay (%)	9.09
Sand (%)	23.64
Gravel (%)	60
Cobble (%)	7.27
Boulder (%)	0
Bedrock (%)	0

Total Particles = 110.


PBL count- XS4
Percent Retained
0 - 0.062
0.125 - 0.25
0.25 - 0.50
0.50 - 1.0
1.0 - 2.0
2.0 - 4.0
4.0 - 5.7
5.7 - 8.0
8.0 - 11.3
11.3 - 16.0
16.0 - 22.6
22.6 - 32.0
32 - 45
45 - 64
64 - 90
90 - 128
Particle Size (mm)


PBL count- XS4
Percent Finer
0
20
40
60
80
100
0.01
0.1
1
10
100
1000
10000
Particle Size (mm)

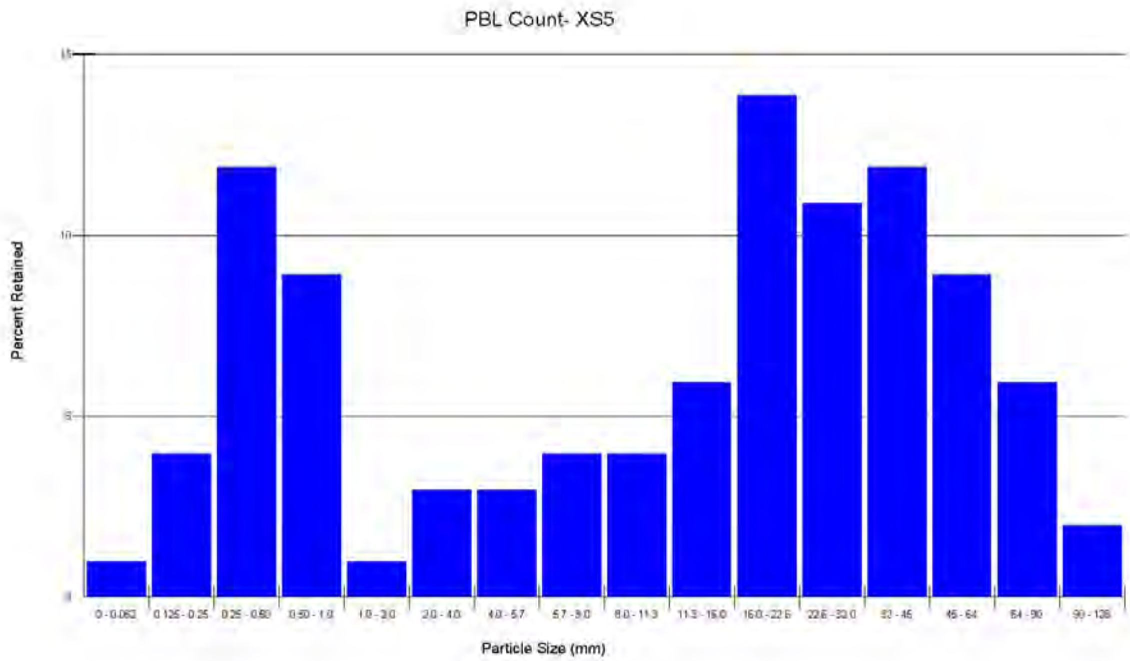
RIVERMORPH PARTICLE SUMMARY

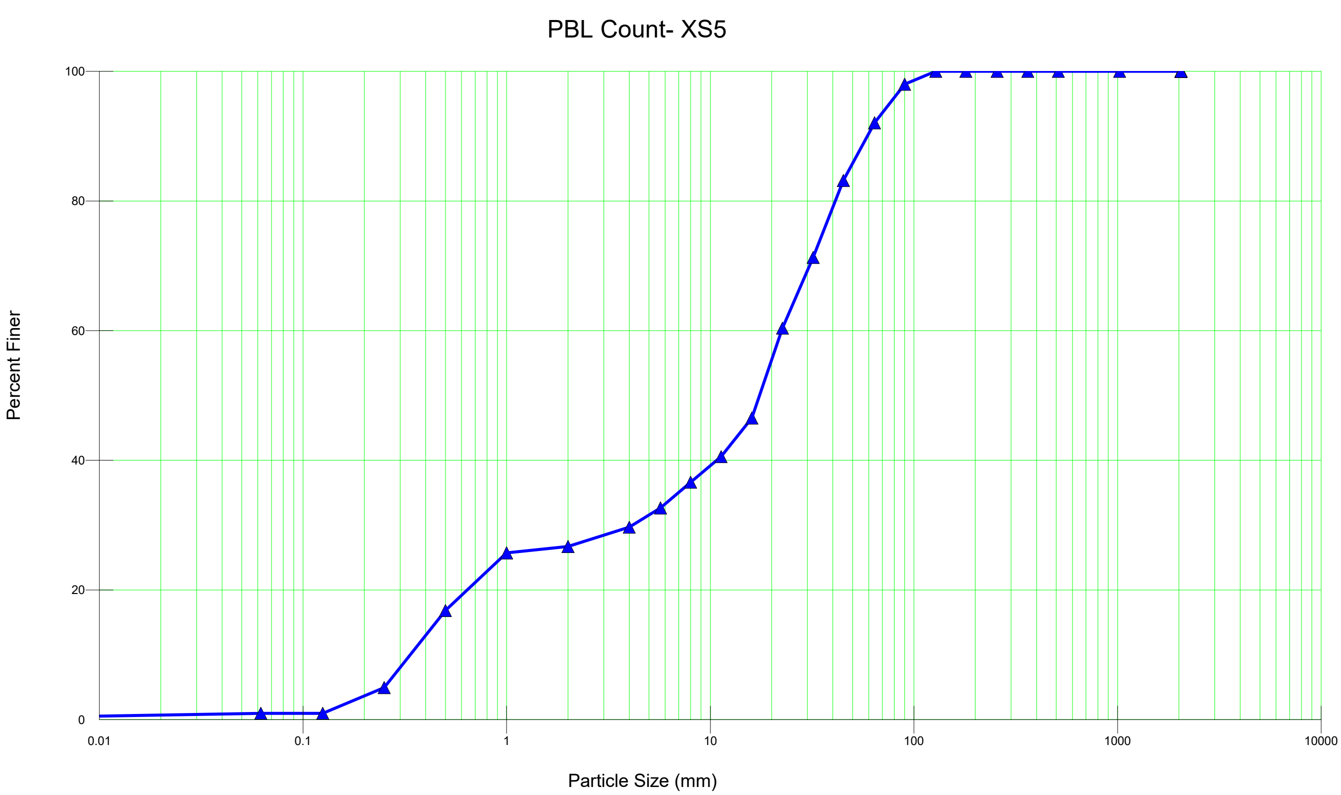
River Name: Bandys- Design Survey
Reach Name: UT3
Sample Name: PBL Count- XS5
Survey Date: 03/31/2022

Size (mm)	TOT #	ITEM %	CUM %
0 - 0.062	1	0.99	0.99
0.062 - 0.125	0	0.00	0.99
0.125 - 0.25	4	3.96	4.95
0.25 - 0.50	12	11.88	16.83
0.50 - 1.0	9	8.91	25.74
1.0 - 2.0	1	0.99	26.73
2.0 - 4.0	3	2.97	29.70
4.0 - 5.7	3	2.97	32.67
5.7 - 8.0	4	3.96	36.63
8.0 - 11.3	4	3.96	40.59
11.3 - 16.0	6	5.94	46.53
16.0 - 22.6	14	13.86	60.40
22.6 - 32.0	11	10.89	71.29
32 - 45	12	11.88	83.17
45 - 64	9	8.91	92.08
64 - 90	6	5.94	98.02
90 - 128	2	1.98	100.00
128 - 180	0	0.00	100.00
180 - 256	0	0.00	100.00
256 - 362	0	0.00	100.00
362 - 512	0	0.00	100.00
512 - 1024	0	0.00	100.00
1024 - 2048	0	0.00	100.00
Bedrock	0	0.00	100.00

D16 (mm)	0.48
D35 (mm)	7.05
D50 (mm)	17.65
D84 (mm)	46.77
D95 (mm)	76.78
D100 (mm)	128
Silt/Clay (%)	0.99
Sand (%)	25.74
Gravel (%)	65.35
Cobble (%)	7.92
Boulder (%)	0
Bedrock (%)	0

Total Particles = 101.


PBL Count- XS5
Percent Retained
15
10
5
0
0 - 0.062
0.125 - 0.25
0.25 - 0.50
0.50 - 1.0
1.0 - 2.0
2.0 - 4.0
4.0 - 5.7
5.7 - 8.0
8.0 - 11.3
11.3 - 16.0
16.0 - 22.6
22.6 - 32.0
32 - 45
45 - 64
64 - 90
90 - 128
Particle Size (mm)


PBL Count- XS5
Percent Finer
100
80
60
40
20
0
0.01
0.1
1
10
100
1000
10000
Particle Size (mm)

RIVERMORPH PARTICLE SUMMARY

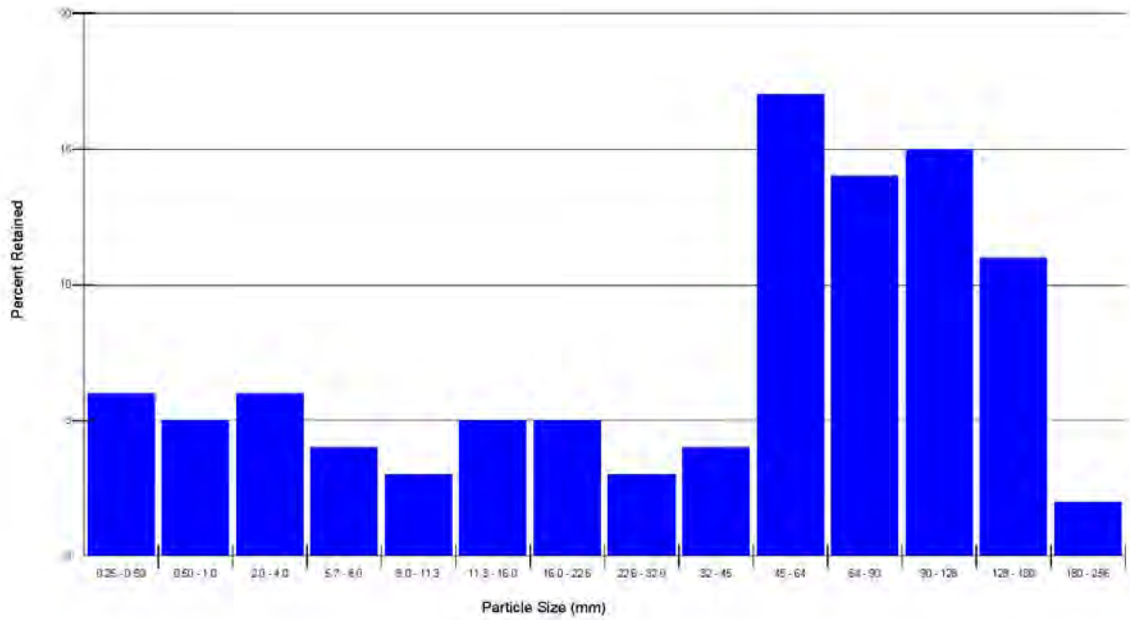
River Name: Bandys Farm
Reach Name: NFMC
Sample Name: NFMC XS-6 PBL Count
Survey Date: 04/06/2022

Size (mm)	TOT #	ITEM %	CUM %
0 - 0.062	0	0.00	0.00
0.062 - 0.125	0	0.00	0.00
0.125 - 0.25	0	0.00	0.00
0.25 - 0.50	6	6.00	6.00
0.50 - 1.0	5	5.00	11.00
1.0 - 2.0	0	0.00	11.00
2.0 - 4.0	6	6.00	17.00
4.0 - 5.7	0	0.00	17.00
5.7 - 8.0	4	4.00	21.00
8.0 - 11.3	3	3.00	24.00
11.3 - 16.0	5	5.00	29.00
16.0 - 22.6	5	5.00	34.00
22.6 - 32.0	3	3.00	37.00
32 - 45	4	4.00	41.00
45 - 64	17	17.00	58.00
64 - 90	14	14.00	72.00
90 - 128	15	15.00	87.00
128 - 180	11	11.00	98.00
180 - 256	2	2.00	100.00
256 - 362	0	0.00	100.00
362 - 512	0	0.00	100.00
512 - 1024	0	0.00	100.00
1024 - 2048	0	0.00	100.00
Bedrock	0	0.00	100.00

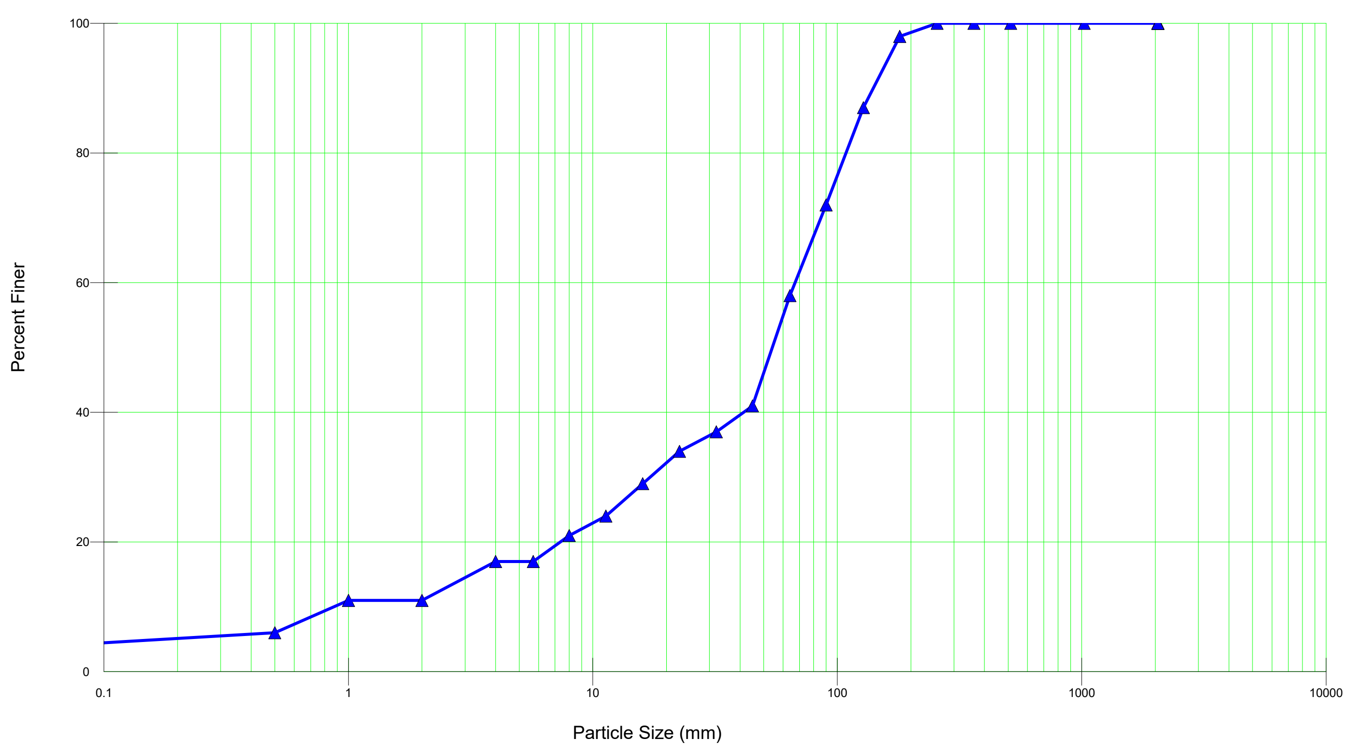
D16 (mm)	3.67
D35 (mm)	25.73
D50 (mm)	55.06
D84 (mm)	120.4
D95 (mm)	165.82
D100 (mm)	256
Silt/Clay (%)	0
Sand (%)	11
Gravel (%)	47
Cobble (%)	42
Boulder (%)	0
Bedrock (%)	0

Total Particles = 100.

NFMC XS-6 PBL Count

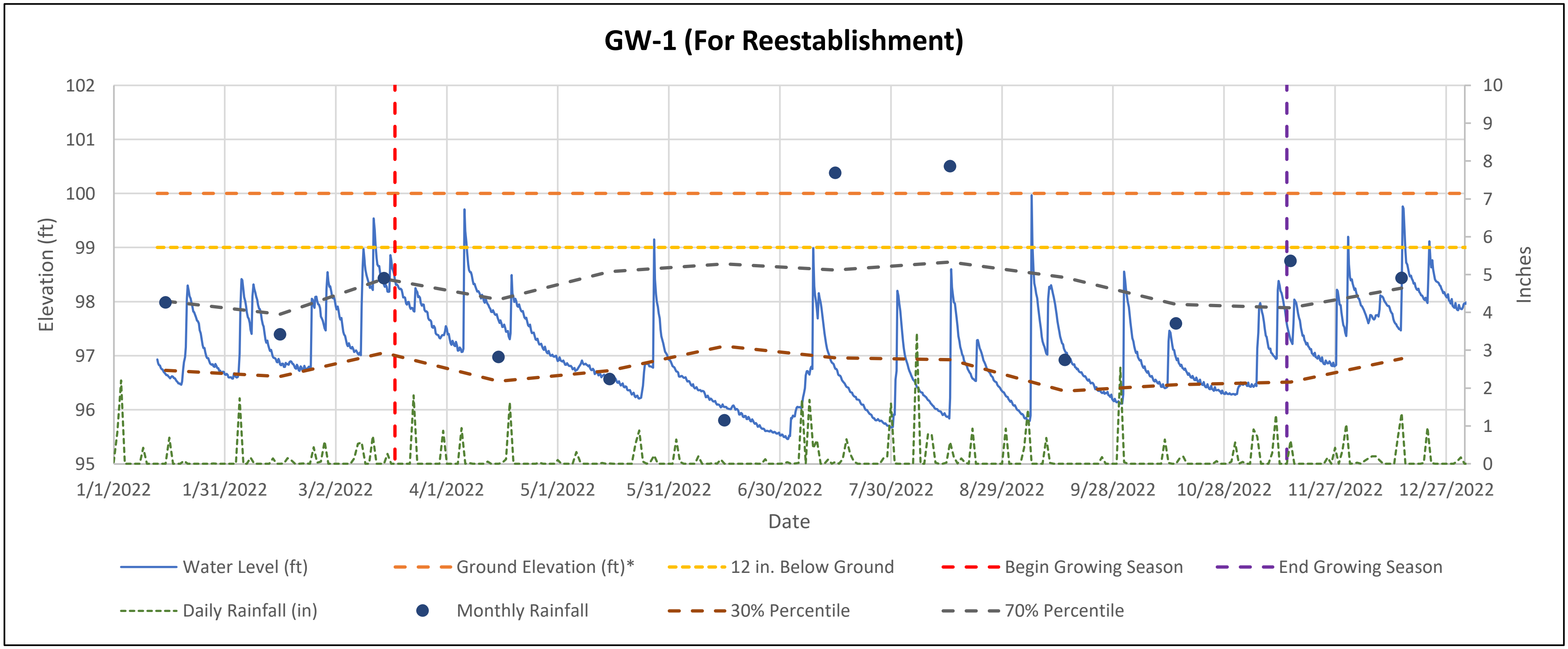


NFMC XS-6 PBL Count



Groundwater Well Graphs

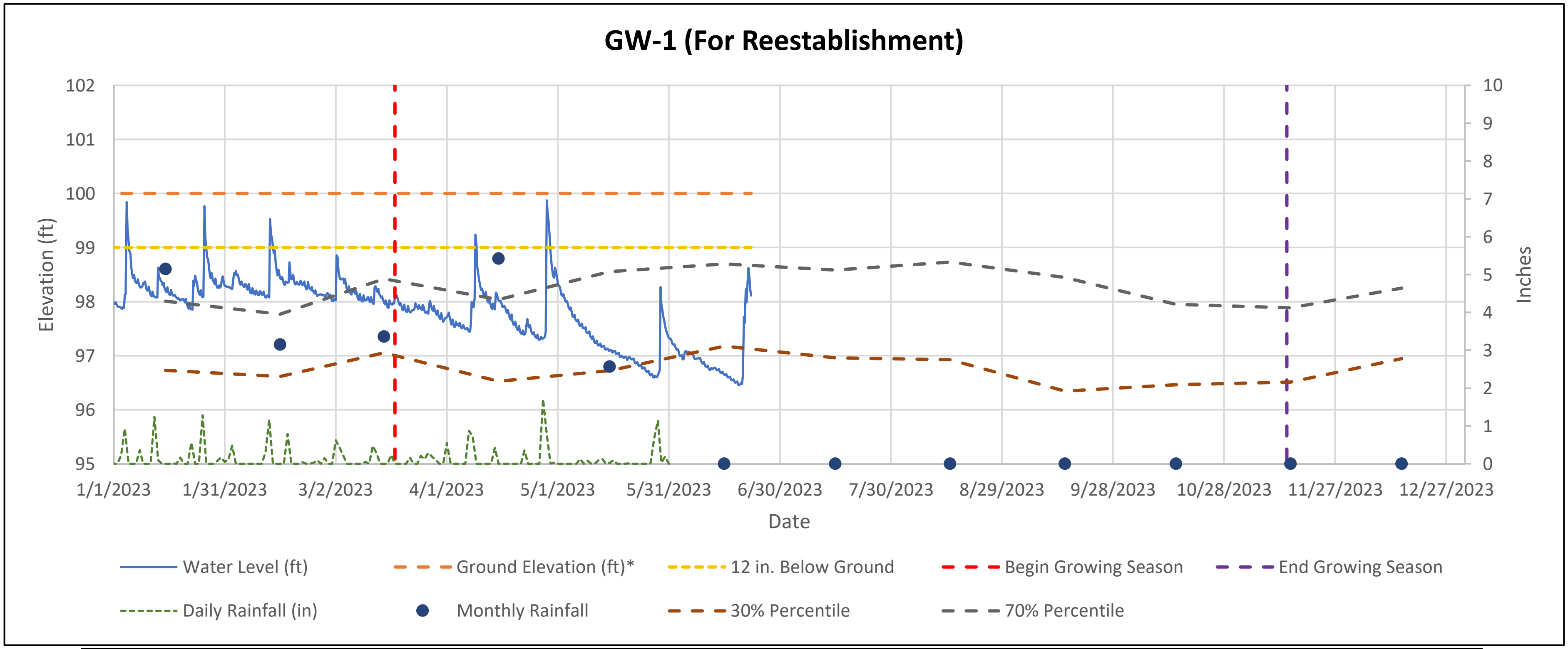
Bandys Farm
2022 Groundwater Data



Site Info (2022)	
Site	Bandys Farm
Begin Date	1/12/2022
End Date	12/31/2022
Total Days of Well Data	353

Growing Season Information (2022)		
Site		Bandys Farm
Gauge ID		GW-1 (For Reestablishment)
Serial #		20833858
Growing Season Start Date		3/18/2022
Growing Season End Date		11/14/2022
Total Growing Season Days		241
NRCS Soil Series		Chewacla loam
12.0%	Growing Season (Days)	29
Most Consecutive Successful Days Within Growing Season		2
Percent of Growing Season with Consecutive Successful Days		0.8%
Average Water Level Elevation During Growing Season (ft)		96.61
Total Cumulative Successful Days Within Growing Season		4

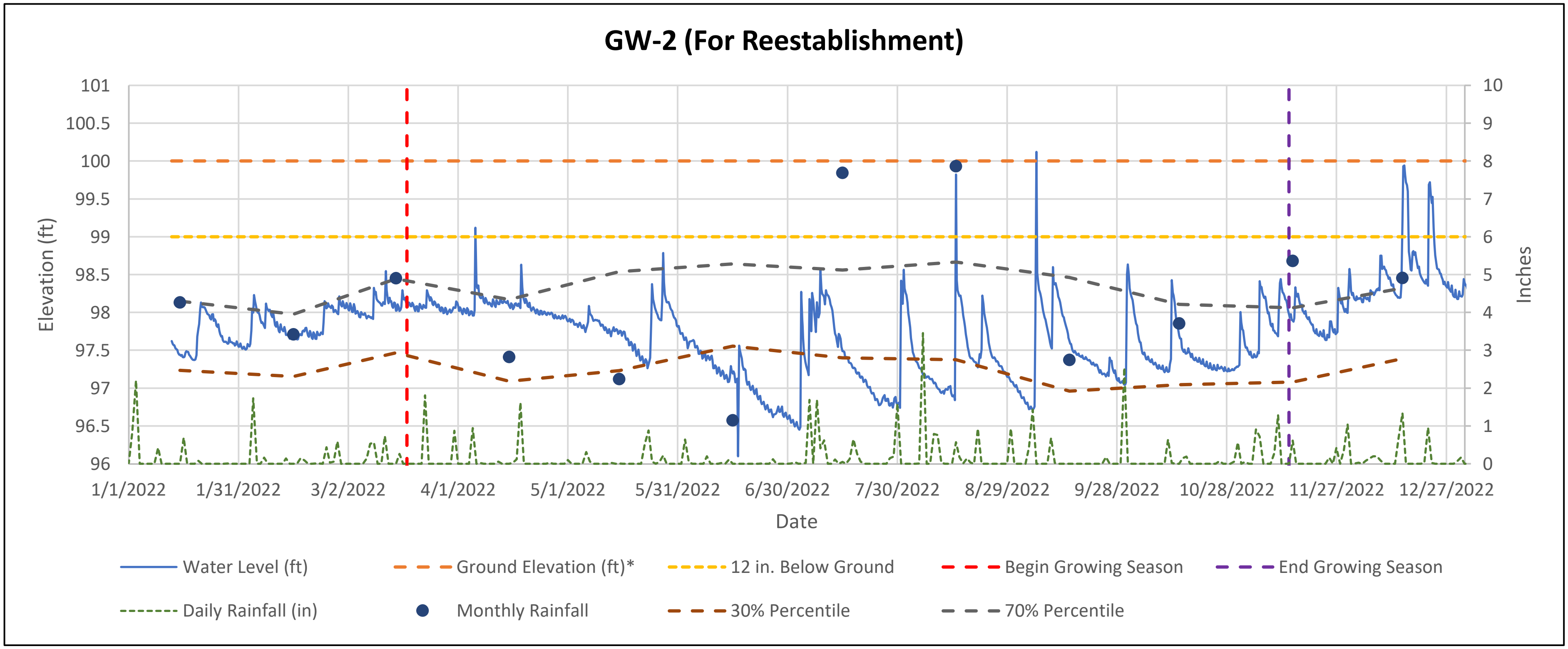
Bandys Farm
2023 Groundwater Data



Site Info (2023)	
Site	Bandys Farm
Begin Date	1/1/2023
End Date	6/22/2023
Total Days of Well Data	172

Growing Season Information (2023)		
Site		Bandys Farm
Gauge ID		GW-1 (For Reestablishment)
Serial #		20833858
Growing Season Start Date		3/18/2023
Growing Season End Date		11/14/2023
Total Growing Season Days		241
NRCS Soil Series		Chewacla loam
12.0%	Growing Season (Days)	29
Most Consecutive Successful Days Within Growing Season		2
Percent of Growing Season with Consecutive Successful Days		0.8%
Average Water Level Elevation During Growing Season (ft)		97.46
Total Cumulative Successful Days Within Growing Season		3

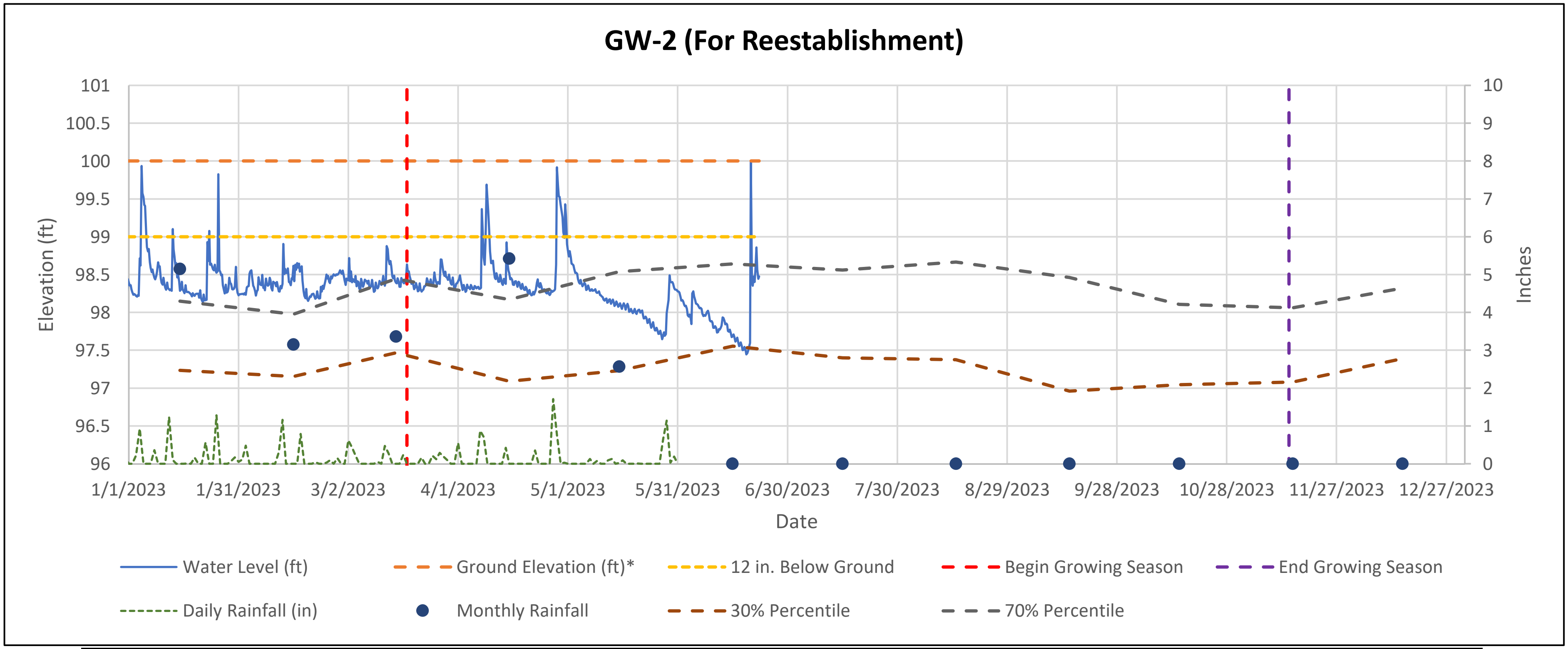
Bandys Farm
2022 Groundwater Data



Site Info (2022)	
Site	Bandys Farm
Begin Date	1/12/2022
End Date	12/31/2022
Total Days of Well Data	353

Growing Season Information (2022)		
Site		Bandys Farm
Gauge ID		GW-2 (For Reestablishment)
Serial #		20796984
Growing Season Start Date		3/18/2022
Growing Season End Date		11/14/2022
Total Growing Season Days		241
NRCS Soil Series		Chewacla loam
12.0%	Growing Season (Days)	29
Most Consecutive Successful Days Within Growing Season		1
Percent of Growing Season with Consecutive Successful Days		0.4%
Average Water Elevation During Growing Season (ft)		97.48
Total Cumulative Successful Days Within Growing Season		3

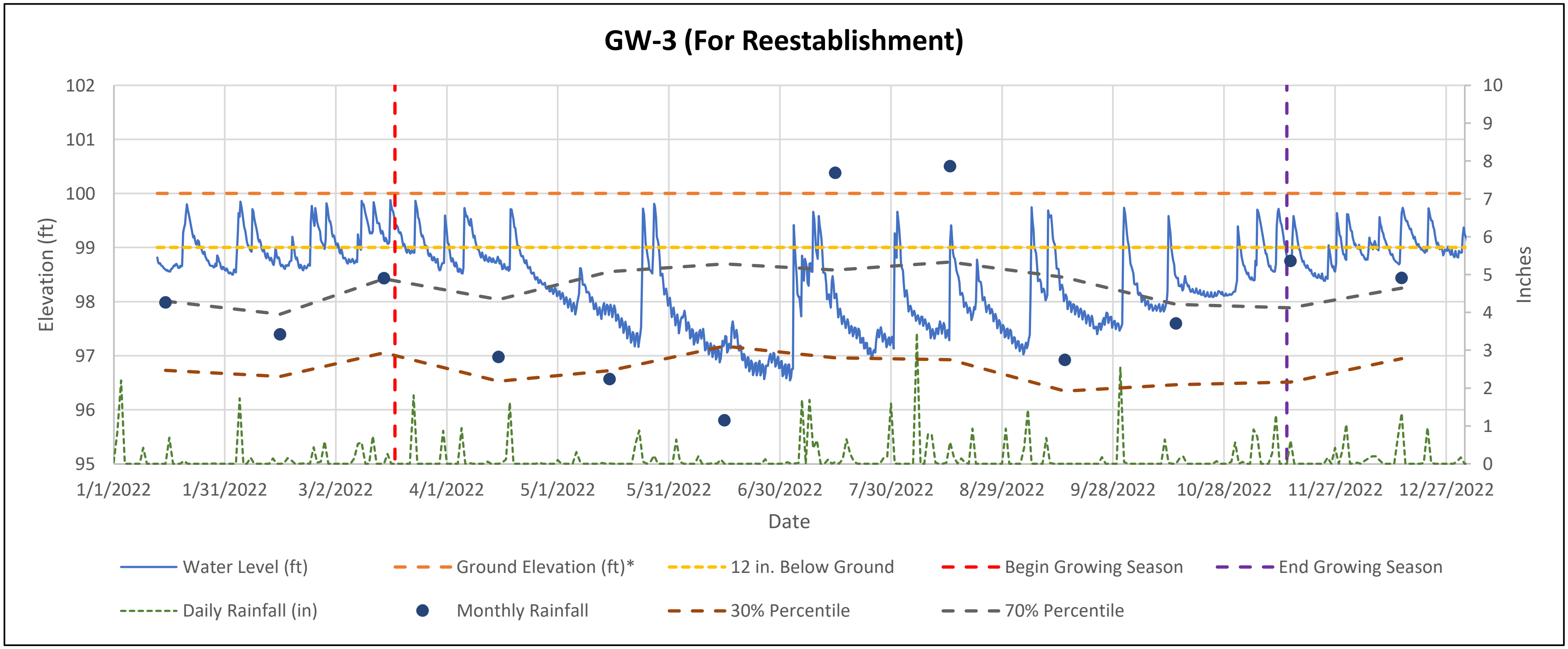
Bandys Farm
2023 Groundwater Data



Site Info (2023)	
Site	Bandys Farm
Begin Date	1/1/2023
End Date	6/22/2023
Total Days of Well Data	172

Growing Season Information (2023)		
Site		Bandys Farm
Gauge ID		GW-2 (For Reestablishment)
Serial #		20796984
Growing Season Start Date		3/18/2023
Growing Season End Date		11/14/2023
Total Growing Season Days		241
NRCS Soil Series		Chewacla loam
12.0%	Growing Season (Days)	29
Most Consecutive Successful Days Within Growing Season		3
Percent of Growing Season with Consecutive Successful Days		1.2%
Average Water Level Elevation During Growing Season (ft)		98.26
Total Cumulative Successful Days Within Growing Season		7

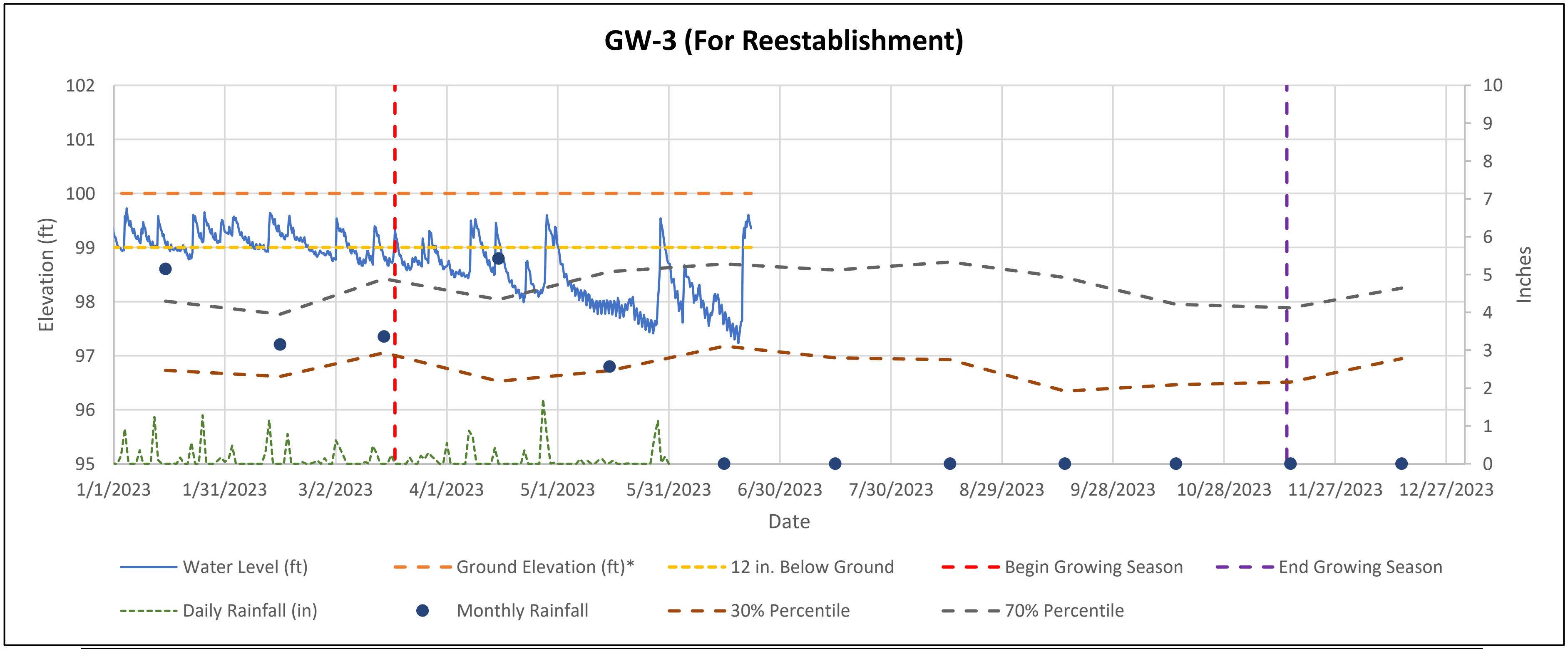
Bandys Farm
2022 Groundwater Data



Site Info (2022)	
Site	Bandys Farm
Begin Date	1/12/2022
End Date	12/31/2022
Total Days of Well Data	353

Growing Season Information (2022)		
Site		Bandys Farm
Gauge ID		GW-3 (For Reestablishment)
Serial #		20833860
Growing Season Start Date		3/18/2022
Growing Season End Date		11/14/2022
Total Growing Season Days		241
NRCS Soil Series		Chewacla loam
12.0%	Growing Season (Days)	29
Most Consecutive Successful Days Within Growing Season		5
Percent of Growing Season with Consecutive Successful Days		2.1%
Average Water Level Elevation During Growing Season (ft)		98.11
Total Cumulative Successful Days Within Growing Season		43

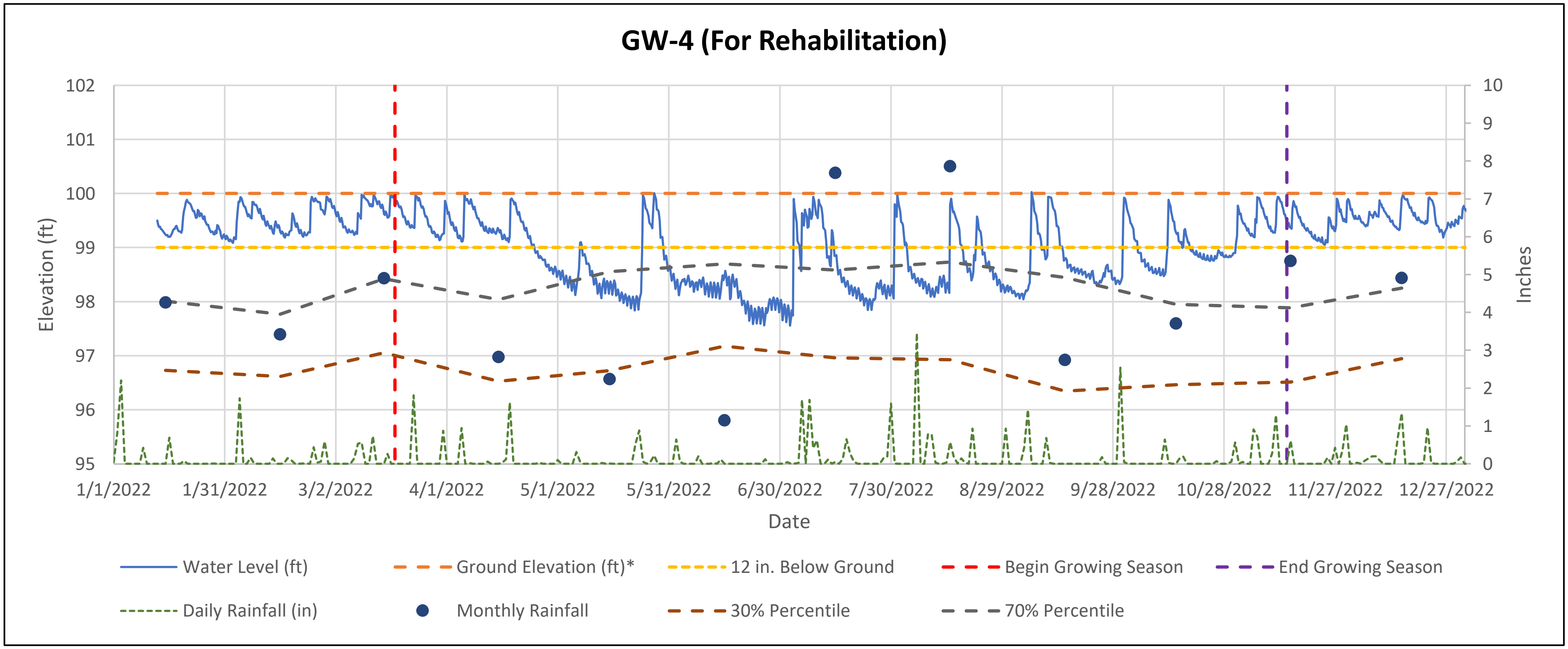
Bandys Farm
2023 Groundwater Data



Site Info (2023)	
Site	Bandys Farm
Begin Date	1/1/2023
End Date	6/22/2023
Total Days of Well Data	172

Growing Season Information (2023)		
Site		Bandys Farm
Gauge ID		GW-3 (For Reestablishment)
Serial #		20833860
Growing Season Start Date		3/18/2023
Growing Season End Date		11/14/2023
Total Growing Season Days		241
NRCS Soil Series		Chewacla loam
12.0%	Growing Season (Days)	29
Most Consecutive Successful Days Within Growing Season		5
Percent of Growing Season with Consecutive Successful Days		2.1%
Average Water Level Elevation During Growing Season (ft)		98.38
Total Cumulative Successful Days Within Growing Season		21

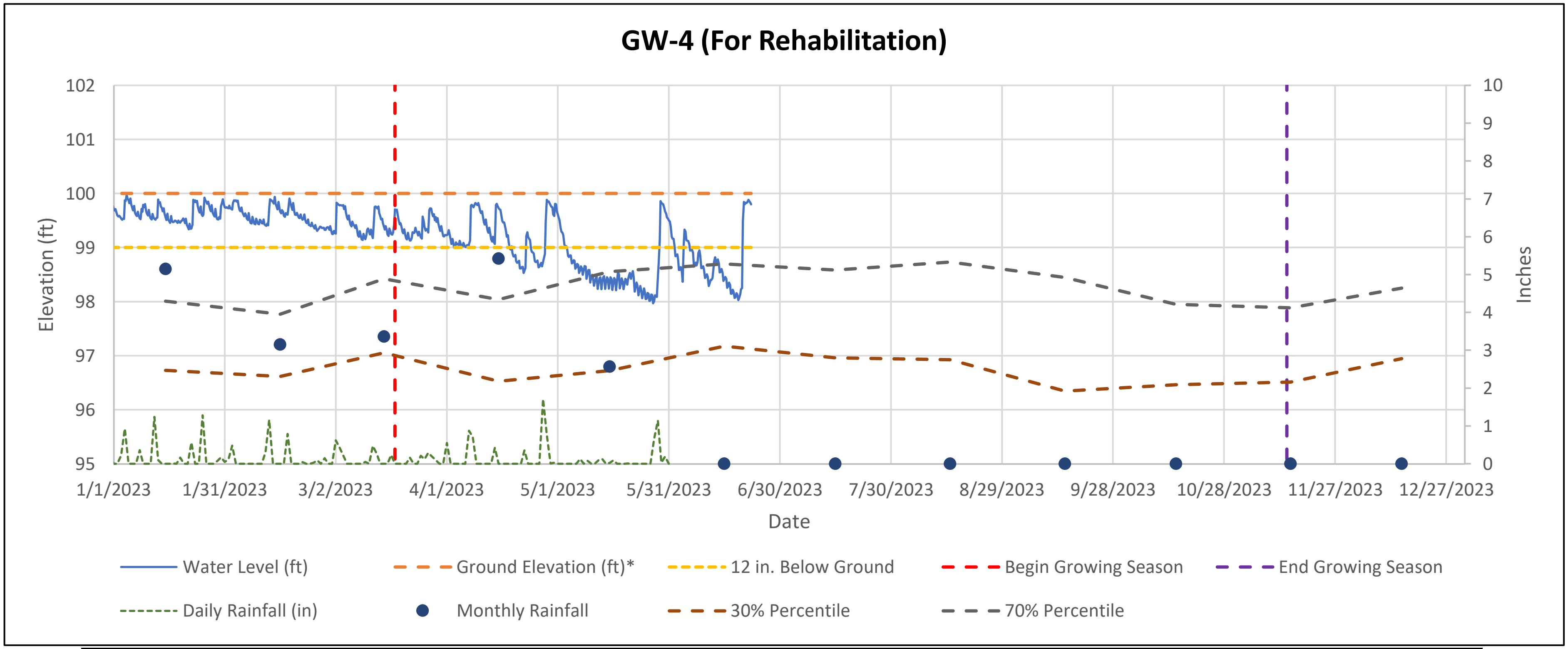
Bandys Farm
2022 Groundwater Data



Site Info (2022)	
Site	Bandys Farm
Begin Date	1/13/2022
End Date	12/31/2022
Total Days of Well Data	352

Growing Season Information (2022)		
Site		Bandys Farm
Gauge ID		GW-4 (For Rehabilitation)
Serial #		20833859
Growing Season Start Date		3/18/2022
Growing Season End Date		11/14/2022
Total Growing Season Days		241
NRCS Soil Series		Chewacla loam
12.0%	Growing Season (Days)	29
Most Consecutive Successful Days Within Growing Season		38
Percent of Growing Season with Consecutive Successful Days		15.8%
Average Water Level Elevation During Growing Season (ft)		98.82
Total Cumulative Successful Days Within Growing Season		101

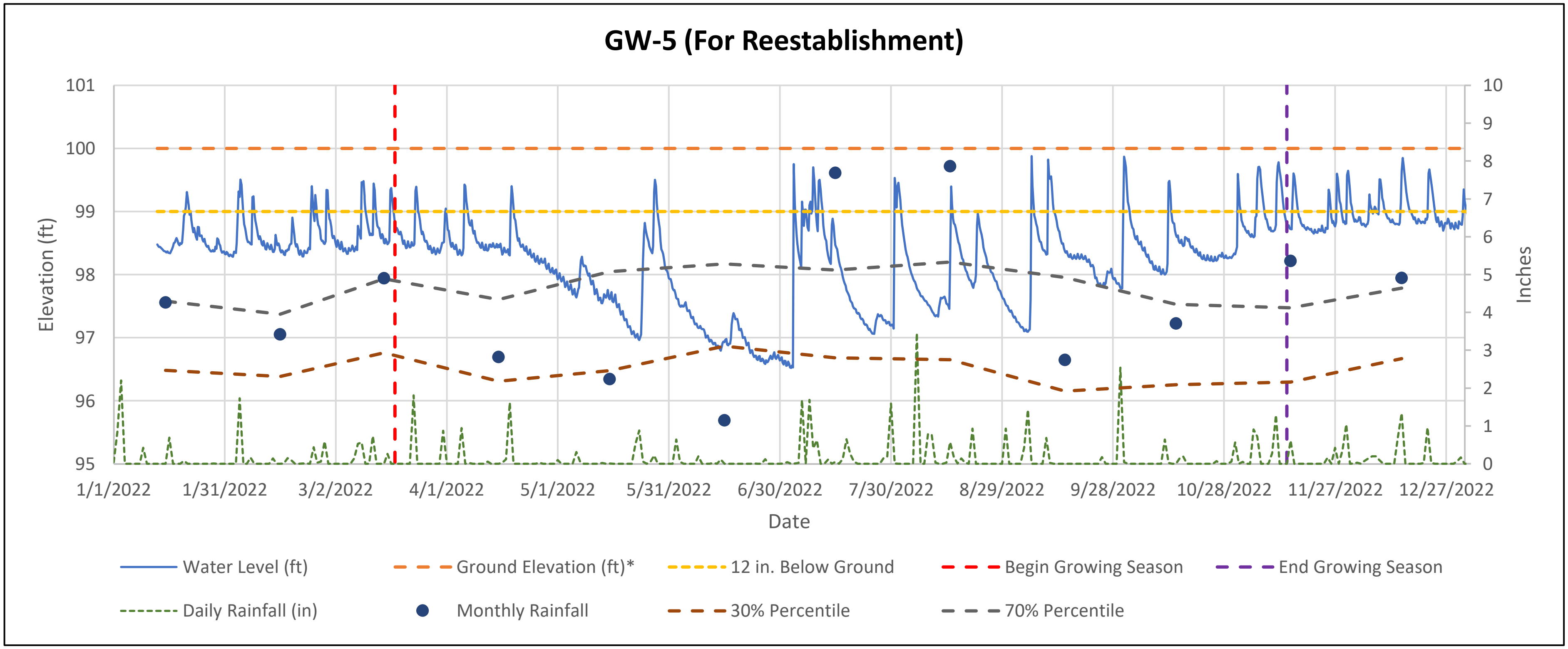
Bandys Farm
2023 Groundwater Data



Site Info (2023)	
Site	Bandys Farm
Begin Date	1/1/2023
End Date	6/22/2023
Total Days of Well Data	172

Growing Season Information (2023)		
Site		Bandys Farm
Gauge ID		GW-4 (For Rehabilitation)
Serial #		20833859
Growing Season Start Date		3/18/2023
Growing Season End Date		11/14/2023
Total Growing Season Days		241
NRCS Soil Series		Chewacla loam
12.0%	Growing Season (Days)	29
Most Consecutive Successful Days Within Growing Season		18
Percent of Growing Season with Consecutive Successful Days		7.5%
Average Water Level Elevation During Growing Season (ft)		98.94
Total Cumulative Successful Days Within Growing Season		51

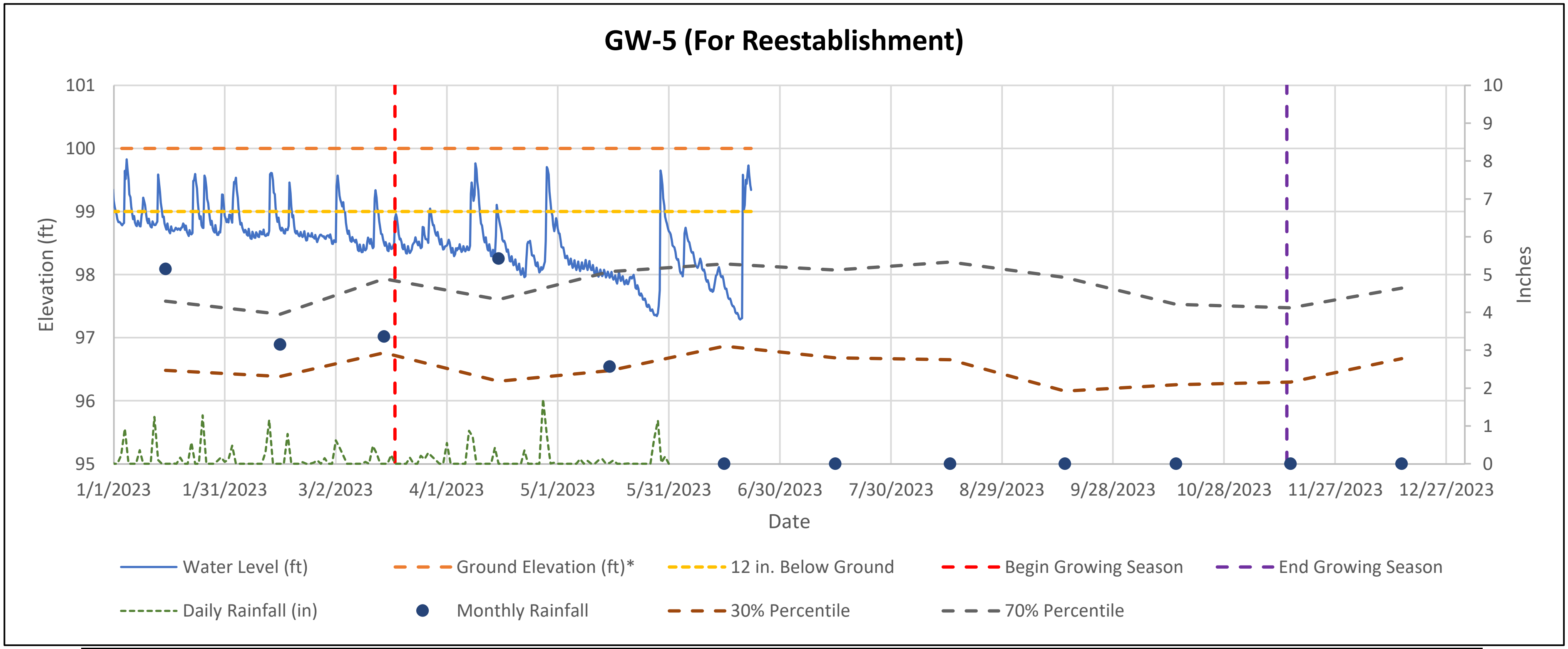
Bandys Farm
2022 Groundwater Data



Site Info (2022)	
Site	Bandys Farm
Begin Date	1/12/2022
End Date	12/31/2022
Total Days of Well Data	353

Growing Season Information (2022)		
Site		Bandys Farm
Gauge ID		GW-5 (For Reestablishment)
Serial #		20234986
Growing Season Start Date		3/18/2022
Growing Season End Date		11/14/2022
Total Growing Season Days		241
NRCS Soil Series		Chewacla loam
12.0%	Growing Season (Days)	29
Most Consecutive Successful Days Within Growing Season		6
Percent of Growing Season with Consecutive Successful Days		2.5%
Average Water Level Elevation During Growing Season (ft)		98.08
Total Cumulative Successful Days Within Growing Season		34

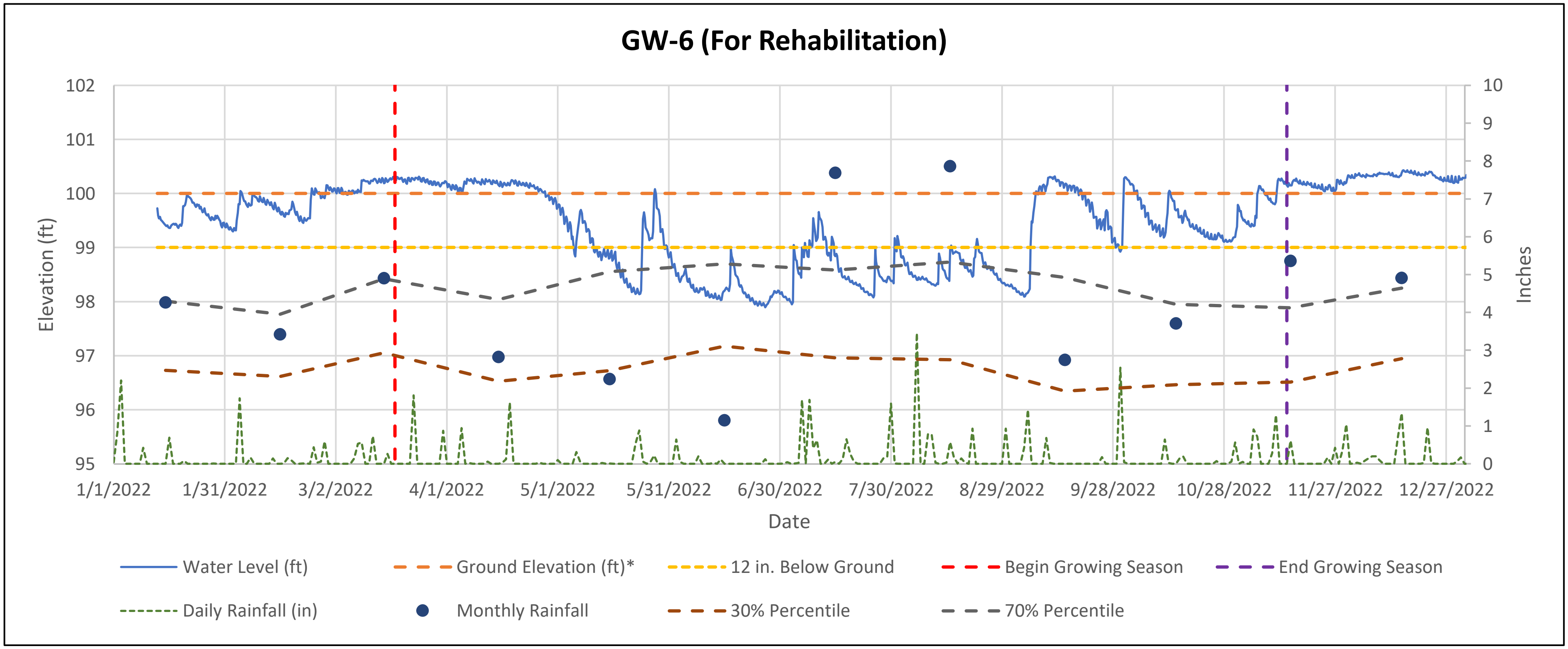
Bandys Farm
2023 Groundwater Data



Site Info (2023)	
Site	Bandys Farm
Begin Date	1/1/2023
End Date	6/22/2023
Total Days of Well Data	172

Growing Season Information (2023)		
Site		Bandys Farm
Gauge ID		GW-5 (For Reestablishment)
Serial #		20234986
Growing Season Start Date		3/18/2023
Growing Season End Date		11/14/2023
Total Growing Season Days		241
NRCS Soil Series		Chewacla loam
12.0%	Growing Season (Days)	29
Most Consecutive Successful Days Within Growing Season		3
Percent of Growing Season with Consecutive Successful Days		1.2%
Average Water Level Elevation During Growing Season (ft)		98.30
Total Cumulative Successful Days Within Growing Season		12

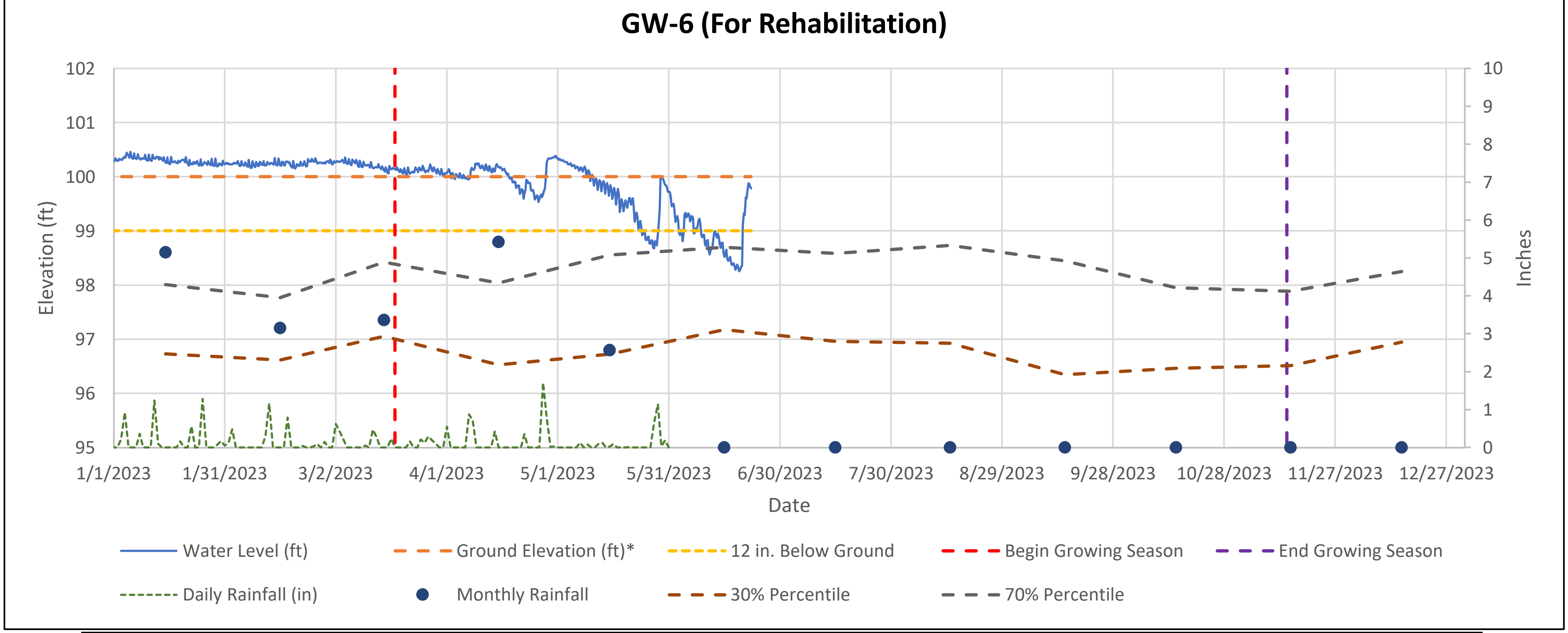
Bandys Farm
2022 Groundwater Data



Site Info (2022)	
Site	Bandys Farm
Begin Date	1/12/2022
End Date	12/31/2022
Total Days of Well Data	353

Growing Season Information (2022)		
Site		Bandys Farm
Gauge ID		GW-6 (For Rehabilitation)
Serial #		21247983
Growing Season Start Date		3/18/2022
Growing Season End Date		11/14/2022
Total Growing Season Days		241
NRCS Soil Series		Chewacla loam
12.0%	Growing Season (Days)	29
Most Consecutive Successful Days Within Growing Season		45
Percent of Growing Season with Consecutive Successful Days		18.7%
Average Water Level Elevation During Growing Season (ft)		99.20
Total Cumulative Successful Days Within Growing Season		143

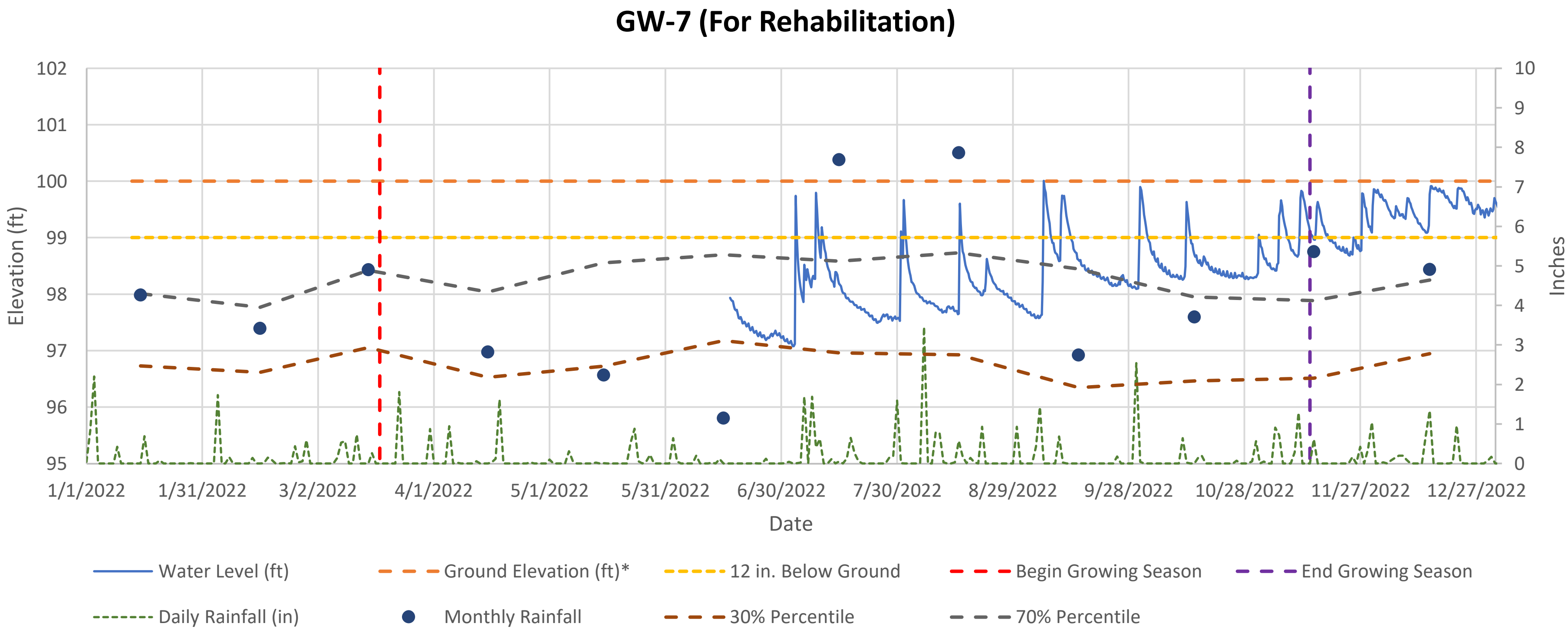
Bandys Farm
2023 Groundwater Data



Site Info (2023)	
Site	Bandys Farm
Begin Date	1/1/2023
End Date	6/22/2023
Total Days of Well Data	172

Growing Season Information (2023)		
Site		Bandys Farm
Gauge ID		GW-6 (For Rehabilitation)
Serial #		21247983
Growing Season Start Date		3/18/2023
Growing Season End Date		11/14/2023
Total Growing Season Days		241
NRCS Soil Series		Chewacla loam
12.0%	Growing Season (Days)	29
Most Consecutive Successful Days Within Growing Season		67
Percent of Growing Season with Consecutive Successful Days		27.8%
Average Water Level Elevation During Growing Season (ft)		99.68
Total Cumulative Successful Days Within Growing Season		83

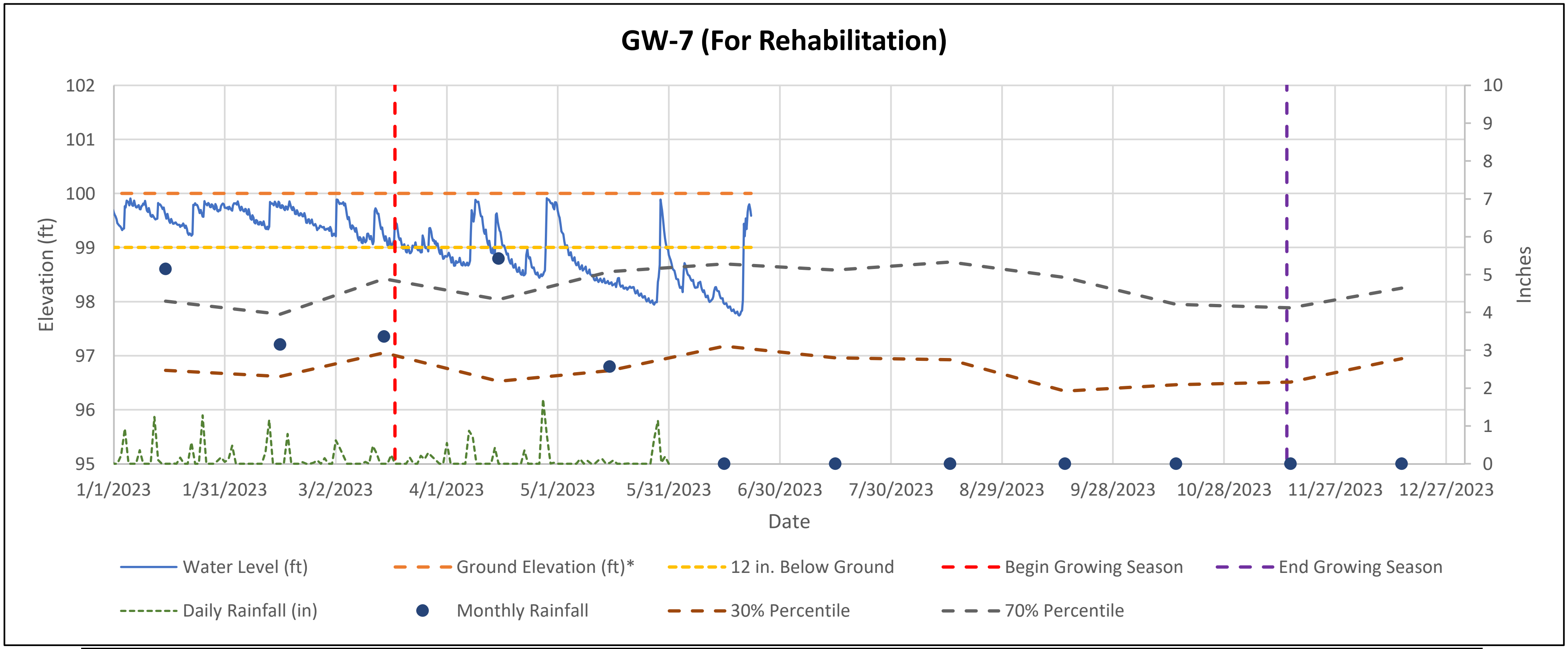
Bandys Farm
2022 Groundwater Data



Site Info (2022)	
Site	Bandys Farm
Begin Date	6/16/2022
End Date	12/31/2022
Total Days of Well Data	198

Growing Season Information (2022)		
Site		Bandys Farm
Gauge ID		GW-7 (For Rehabilitation)
Serial #		21248589
Growing Season Start Date		3/18/2022
Growing Season End Date		11/14/2022
Total Growing Season Days		241
NRCS Soil Series		Chewacla loam
12.0%	Growing Season (Days)	29
Most Consecutive Successful Days Within Growing Season		4
Percent of Growing Season with Consecutive Successful Days		1.7%
Average Water Level Elevation During Growing Season (ft)		61.40
Total Cumulative Successful Days Within Growing Season		24

Bandys Farm
2023 Groundwater Data



Site Info (2023)	
Site	Bandys Farm
Begin Date	1/1/2023
End Date	6/22/2023
Total Days of Well Data	172

Growing Season Information (2023)		
Site		Bandys Farm
Gauge ID		GW-7 (For Rehabilitation)
Serial #		21248589
Growing Season Start Date		3/18/2023
Growing Season End Date		11/14/2023
Total Growing Season Days		241
NRCS Soil Series		Chewacla loam
12.0%	Growing Season (Days)	29
Most Consecutive Successful Days Within Growing Season		11
Percent of Growing Season with Consecutive Successful Days		4.6%
Average Water Level Elevation During Growing Season (ft)		98.71
Total Cumulative Successful Days Within Growing Season		34

Bandys Farm Pre-Construction Groundwater Well Hydroperiod Summaries

Gauge Name	Gauge Location	Wetland Mitigation Type	2022 Hydroperiod	2023 Hydroperiod
GW-1	Hydric Soil (Non-wetland)	Re-Establishment	0.8%	0.8%
GW-2	Hydric Soil (Non-wetland)	Re-Establishment	0.4%	1.2%
GW-3	Hydric Soil (Non-wetland)	Re-Establishment	2.1%	2.1%
GW-4	Wetland C	Rehabilitation	15.8%	7.5%
GW-5	Hydric Soil (Non-wetland)	Re-Establishment	2.5%	1.2%
GW-6	Wetland C	Rehabilitation	18.7%	27.8%
GW-7	Wetland D	Rehabilitation	1.7%	4.6%

Hydric Soils Report

FINAL
Detailed Hydric Soils Study
Bandys Farm Mitigation Site
Catawba County NC

Prepared for:

Jake Byers
Ecosystem Planning and Restoration, LLC
559 Jones Franklin Road, Suite 150
Raleigh, NC 27606

Prepared by:

George K Lankford Soil Scientist, LSS #1223
George K Lankford, LLC
238 Shady Grove Rd
Pittsboro, NC 27312

July 2022 Soil Scientist Seal

This report describes the results of the soil evaluation performed at the Bandys Farm Mitigation Site in Catawba County, NC. Any subsequent transfer of the report by the user shall be made by transferring the complete report, including figures, maps, appendices, all attachments and disclaimers.

Study Objectives and Scope

The purpose of the study was to delineate the extent of riparian hydric soils potentially suitable for hydrologic restoration and mitigation for Ecosystem Planning and Restoration, LLC (EPR) at the Bandys Farm mitigation site. The potential for hydrologic restoration of hydric soil is evaluated considering both historic and existing land use, current conditions, and the potential for creating a hydroperiod suitable for its landscape setting and soils.

This report presents an evaluation of the subject property based upon a detailed field investigation for the purpose of confirming the presence of and delineating the extent of hydric soil. This report describes these findings, conclusions, and recommendation for wetland reestablishment at the Bandys Farm Mitigation Site. The site is assessed for the suitability of soils for wetland mitigation. The observations and opinions stated in this report reflect conditions apparent on the subject property at the time of the site evaluation. My findings, opinions, conclusions, and recommendations are based on observed soil morphology, drainage patterns, site conditions, professional experience, and boundaries of the property as evident in the field.

Project Information and Background

The site is located in Catawba County approximately 14 miles north east of Lincolnton, NC and east of Buffalo Shoals Road (SR 1003). The area to be evaluated is along North Fork Mountain Creek and an unnamed tributary to North Fork Mountain Creek (Figure 1). Additional unnamed tributaries are present within the project boundary, but were not evaluated for this detailed report. The land use of the contributing watershed community is rural with agricultural farmland and areas of undeveloped forest land (Figure 2). The delineation of drained hydric soil was performed by a licensed Soil Scientist (George Lankford, LSS #1223). The jurisdictional wetlands within the project boundary were delineated by EPR staff.

NRCS Soil Mapping

The Natural Resource Conservation Service (NRCS) Soil Survey provides county data that can be used in general planning for farms and larger areas. The survey provides maps with soils shown as map units and a brief description for each of the major soil types along with their characteristics. Mapping units are areas of soil having similarly defined soil properties, physical characteristics, and similar management criteria based upon these properties and characteristics. The NRCS map units across a site are useful for general planning, but the larger scale at which they are mapped includes smaller areas of dissimilar soils not discernable without a detailed site evaluation.

A map unit can be made up of either a single major soil type (consociation) and miscellaneous minor components, or it can be made up of two or more soil series that are not mapped separately (complex). Soil map units are identified by the major component soil series and a phase (such as slope class and/or eroded). A complex consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas, at a particular location the specific properties must be evaluated to determine its specific limitations. Most map units also contain inclusions of dissimilar soil and provides approximate ratios for major soil types and significant inclusions. Mapping units describe the potential soil types and ranges of soils characteristics that may be found within a landscape or landscape position. Due to mapping scale, map units do not describe all of the soil in the unit, but provide general information of the soils likely to be found. A map unit often correlates closely with soils observed at a location, but have limitations because soils represent the natural conditions and gradients and are influenced by geology, slope, and importantly, past land management practices. These soil properties provide a useful background for interpreting soil properties that may be encountered at the site and are the starting point for this soil evaluation. Determining soil characteristics at a specific location requires an actual site evaluation.

At the Bandys Farm Mitigation Project, the NRCS soil survey indicates two primary map units within the drainages at the project site. On the floodplain of North Fork Mountain Creek and the adjacent drainage ways, a *Chewacla loam* (ChA) unit is mapped. The smaller tributaries are within typically upland unit of a *Madison-Bethlehem complex* (MhE2) where the small drainage features are not large enough to map separately. Made up of two separate soil series, this complex occurs on moderately steep slopes and is moderately eroded. Other upland soil units within the watershed also have moderately eroded or severely eroded phases. The upland soil of a watershed influences the alluvial soils along the streams, both in nutrient availability and textural ranges. The erodibility influences thickness of soil layers deposited within the floodplains.

The *Chewacla* soil is an alluvial floodplain soils formed in deposition of erosional material derived upland soils of the contributing watershed. It is somewhat poorly drained with the natural ground water table elevation expected to be between 6 inches and 24 inches below the ground surface for much of the year. The map unit commonly small inclusions of *Wehadkee* and *Riverview* soils. The *Riverview* soils are well drained and the *Wehadkee* soils are poorly drained with the water table between 0 and 12 inches for a significant portion of the growing season. Drainage capacity of the most limiting layers of these soils is moderately high to high, providing adequate internal drainage ditches and allow drainage modifications to be effective. Due to natural wetness, these soils are usually drained for agricultural use. The *Chewacla* and *Riverview* are not classified as hydric by the NRCS, but the *Wehadkee* is classified as hydric.

The *Madison-Bethlehem complex* is found higher in the watershed along the narrow drainage and in the headwaters of the smaller tributaries. It is well drained with slopes ranging from 10 to 25 percent. The *Bethlehem* component is shallow to bedrock, limiting the amount of infiltration and influencing runoff. Combined with the steeper slopes, this soil presents a number of issues with runoff and has a higher potential for soil loss, as identified by the moderately eroded phase given to this map unit.

The surrounding upland map units along the upper slopes and ridges consists of multiple series that are well drained. Slope classes ranging from 2 to 10 percent and large inclusions of poorly drained of hydric soils are not expected or are too small to map at this scale. Only potential inclusions of *Wehadkee* soil within the *Chewacla* map unit are classified as hydric by the NRCS. Soils use in this area are limited mostly by slope and the clayey subsoil with low lying areas often limited by wetness. Soil properties and general characteristics of these mapping units are summarized in Table 1.

Project Approach

The approach for potential mitigation is to restore a natural hydroperiod to a drained or partially drained hydric soil and to reestablish the biological functions common to natural wetland systems. A restored hydrology should sustain hydroperiods appropriate for the landscape and the available hydrology sources. Areas of this site retain adequate hydrology that may be classified as a jurisdictional wetland (Figure 2). An official concurrence with the Corps of Engineers is being sought to verify the jurisdictional resources. The hydric soils outside of the wetland are suitable for reestablishment due to lack of adequate hydrology. This evaluation focuses on the potential to use practical technical solutions to support reestablishment of natural hydrology.

Table 1. NRCS Soil Map Units at the Bandys Farm Mitigation Project*

<table>
<tr><th>Series</th><th>Taxonomic Class</th><th>Drainage Class</th><th>Hydric (Hydric Rating)</th><th>Landscape setting (down across)</th></tr>
<tr><td colspan="5">Chewacla loam, 0 to 2 percent slopes, frequently flooded (ChA) (Consociation) Prime farmland if drained
Parent material - loamy alluvium derived from igneous and metamorphic rock
Depth to water table – 6 to 24 inches
Flooding – frequent to none Ponding - none</td></tr>
<tr><td>Chewacla (90%)</td><td>Fluvaquentic Dystrudepts</td><td>somewhat poorly</td><td>No (B/D)</td><td rowspan="3">linear - linear</td></tr>
<tr><td>Wehadkee (5%)</td><td>Fluvaquentic Endoaquepts</td><td>poorly</td><td>Yes (B/D)</td></tr>
<tr><td>Riverview (5%)</td><td>Fluventic Dystrudepts</td><td>well</td><td>No (B)</td></tr>
<tr><td colspan="5">Madison-Bethlehem complex, 10 to 25 percent slopes, moderately eroded (MhE2) (Complex) Not Prime farmland
Parent material - residuum weathered from mica schist and/or other micaceous metamorphic rock
Depth to water table – more than 80 inches
Flooding – none Ponding - none</td></tr>
<tr><td>Madison (48%)</td><td rowspan="2">Typic Kanhapludults</td><td>well</td><td>No (B)</td><td rowspan="2">linear - convex</td></tr>
<tr><td>Bethlehem (45%)</td><td>well</td><td>No (C)</td></tr>
<tr><td colspan="5">Pacolet clay loam, 10 to 15 percent slopes (PaE3) (Consociation) Not Prime Farmland
Parent material - saprolite derived from granite and gneiss and/or schist
Depth to water table – greater than 80 inches
Flooding – none Ponding - none</td></tr>
<tr><td>Pacolet (85%)</td><td>Typic Kanhapludults</td><td>well</td><td>No (B)</td><td>linear - convex</td></tr>
<tr><td colspan="5">Madison gravelly sandy loam, 6 to 10 percent slopes (MgC) (Consociation) Farmland of Statewide Importance
Parent material - residuum weathered from mica schist and/or other micaceous metamorphic rock
Depth to water table – more than 80 inches
Flooding – none Ponding - none</td></tr>
<tr><td>Madison (100%)</td><td>Typic Kanhapludults</td><td>well</td><td>No (B)</td><td>linear - convex</td></tr>
<tr><td colspan="5">Lloyd loam, 2 to 6 percent slopes (LcB) (Consociation) Prime Farmland
Parent material - saprolite derived from diorite and/or gabbro and/or diabase and/or gneiss
Depth to water table – more than 80 inches
Flooding – none Ponding - none</td></tr>
<tr><td>Lloyd (90%)</td><td>Rhodic Kanhapludults</td><td>well</td><td>No (B)</td><td>linear - convex</td></tr>
</table>

*Highlighted soil series is classified as hydric.
Source-NRCS Web Soil Survey (2021 August)

The potential for hydrologic restoration assumes an appropriate design and ability to construct site modifications necessary to restore adequate hydrology. Practical modifications suggested generally take advantage of available natural hydrology patterns and may include, but are not limited to surface drainage modifications such as plugging drainage ditches, removal of fill materials, and microtopographic alteration such as surface roughening or enhancing existing depressions. Recommendation for wetland re-establishment follows the Principles of Wetland Restoration (USEPA 2000) that promote successful development of a functioning wetland community by restoring ecological integrity through reestablishment of natural structure and function. Soils were evaluated on the potential for hydrologic restoration and identified limitations for this use.

Methodology

The detailed hydric soil investigation for the Bandys Farm Site was completed in May of 2022. A series of approximately 107 hand auger soil borings were performed across the site to described and verify the presence and estimate the extent of hydric soil (Figure 2). These boring observations do not contain adequate detail for classifying these soils to a series. Soils were evaluated using morphologic characteristics to determine hydric indicators and evaluate current hydrology and using criteria based on "*Field Indicators of Hydric Soils in the United States*" (USDA, NRCS, 2018, Version 8.2). Relict morphology follows Vepraskas (1994). Hydric soil indicators used are valid for the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Eastern Mountains and Piedmont Region Version 2.0* within Major Land Resource Area (MLRA) 136 (Southern Piedmont) and Land Resource Region (LRR) P- South Atlantic and Gulf Slope Cash Crops, Forest, and Livestock Region. A hydroperiod success criteria is proposed based upon Corps mitigation guidelines (US Army Corps of Engineers 2016) along with specific site conditions where appropriate.

Soil boring locations examined during the field evaluation were approximately located using the Terrain Navigator Pro smart phone application by Trimble and figures were produced from the same software. Hydric soil boundary points were located with a Trimble R-1 unit using submeter GNSS (Global Navigation Satellite System). All boundaries shown are based on the detailed field evaluation. The wetland areas were previously delineated and mapped by EPR staff. The drained hydric soil boundaries were tied to these existing boundaries or to other surveyed features such as stream banks. For this evaluation, the wetlands were only briefly examined and determined to have hydric soils with conditions that appear to meet the criteria for jurisdictional wetlands.

Hand auger soil borings were used to evaluate and described current soil characteristics and determine the extent of soil suitable for reestablishment, rehabilitation, and enhancement. Hydric indicators typically occur within the upper 12 inches, but some borings extended to greater than 30 inches in depth to assess hydrology status and to identify potential areas of fill. The current hydrologic condition was evaluated by an assessment of the existing drainage modifications (both anthropogenic and natural), the visible pattern and presentation of soil color and mottles, existing vegetation, and the current water table where observed. In some areas, borings are placed beyond the proposed project boundaries to evaluate the wider range of site conditions. Representative profiles are described to document the range of characteristics observed (Appendix A).

Where the site has been altered, the presence of hydric soil indicators does not assume current hydrology. Potential restoration areas are determined by the presence of hydric indicators, including soils that appear to exhibit relict or historic hydric indicators found where drainage, tillage or other modifications have altered the historic condition. Constraints on stream restoration may limit the extent of potential hydrologic restoration shown. Removal of extensive fill material is not necessary or recommended at the Bandys Farm site. General conditions and representative soil patterns were noted. Selected photographs of soils and the landscape are shown in Appendix B. The discussion describes relevant soil characteristics, current hydrology interpretations, and land management impacts. Observed modifications that may affect potential hydrologic restoration are also noted.

Results and Discussion

Landscape Setting

This project site is within the Southern Outer Piedmont (45b) ecoregion of the Piedmont physiographic region. This ecoregion is mostly low hills with fairly broad ridgetops and short side slopes. Soil have deep saprolite, are well drained, and mostly dark red, firm, clayey subsoils. Geology of the project and watershed are metamorphic rock are comprised of various schists. Much of the schist consists of flakey minerals and plated structures that readily splitting along planes into thin flexible layers. These schists tend to be physically and structurally weak, readily forming layers that likely contributing to a deep saprolite. Larger amounts of a fine-grained crystals are present. These rocks are the parent material that local soil formed. They are often rich in potassium, iron, and magnesium, influencing available soil nutrients.

This site lies along the floodplain North Fork Mountain Creek and smaller unnamed tributaries. Land use in the contributing watershed consists of pasture, scattered forest lands, residential homes and paved parking areas for the local high school. Dominant land use within the watershed, including the project area, is primarily livestock grazing (Figure 2).

There are four streams within the project, North Fork Mountain Creek and three unnamed tributaries (UT1, UT2, and UT3). North Fork Mountain Creek is a larger third order channel flowing eastward through the project, eventually draining into Lake Norman. The tributary (UT1) to the west flows through an existing mitigation project before entering into North Fork Mountain Creek. The soil in this area was not evaluated for this detailed investigation. The portion of the project evaluated includes the floodplain and toe of slope along North Fork Mountain Creek, UT2 and UT3 (Figure 2).

Site Conditions

The areas of hydric soil are located along approximately 1,000 linear feet of floodplain along the left bank of North Fork Mountain Creek and in two areas along UT2 where the floodplain widens. The tributary UT2, enters the floodplain of North Fork Mountain Creek at the upstream end. Along UT2 there are two areas of hydric soil within the project and contains two hydric soil units. The UT3 enters North Fork Mountain Creek at the eastern and most downstream end of the project. The tributary UT2 is incised with steep banks and ongoing bank erosion due to livestock access. North Fork Mountain Creek appears only moderately incised with a mature woody buffer. Livestock and land use modification have severely impacted the floodplain along North Fork Mountain Creek.

Two areas of hydric soil (drained HS1, HS2 and wetland WB) are located along UT2. Below the confluence of UT2 and North Fork Mountain Creek is a larger, existing, degraded wetland (WA) surrounded by three areas of drained hydric soil (HS3, HS4, and HS5). These hydric soil map units and their landscape are described below.

Hydric Soil HS1

This drained hydric soil unit lies within a nearly level widening of the floodplain of UT2 and within an active pasture. Historically, the stream was centrally located, but has been relocated to the right side of the floodplain. The old stream bed has been filled and the surface smoothed to improve surface drainage. Older tillage practices with a turning plow tend to mechanically move soils down slope, bringing upland soil directly onto the floodplain. The current stream is incised and has a narrow, wooded buffer along the left bank with a larger forested buffer on the right bank adjacent to the steep hill slope. The downstream portion of this soil unit ends above a valley constriction with bedrock exposed along the slopes and within the channel.

Soils

The hydric soils here generally have a dark sandy loam or loam surface layer with bright mottles in the upper 10 inches. The soil above the hydric indicators was deepest near the stream, progressively becoming thinner across the floodplain to the left side of the floodplain. This is most likely from deposition and formation of a low levee combined with the stream relocation from the lowest elevation. The surface throughout this hydric soil unit appears to have been disturbed in to past, possibly from tillage and currently from livestock grazing. Coarser soils are underlain by finer textured loams.

throughout these loamy soils a moderate permeability is expected that may allow drainage to the incised stream. The redder surface soils reflect the iron rich geologic material of the watershed that has been deposited. Within the hydric soil, the depleted matrix is common. In a few areas where drainage is better, the depleted matrix appears to have become “stained” through an influx of iron rich water, changing the depleted matrix color slightly, but having a similar pattern of mottles is present as the adjacent hydric soil. Found within the appropriate landscape this condition is interpreted as a relict hydric soil. Along the left toe of slope a buried black layer is present indicating a long hydroperiod once was present within a depressional backwater landscape.

Within this map unit the common hydric indicators observed is the F3-Depeleted Matrix. The current incision of the stream prevents regular overbank flooding and the floodplain surface has been contoured to capture and divert surface flow through the middle with a shallow swale. Surface flows exit at the downstream end of the field where active bank erosion is present. Small areas of fill were observed along the downstream field edge and across the floodplain at two other locations. The fill at the field edge was likely for agricultural purposes, but the other two areas are undetermined.

The observed range of characteristics across this site area similar to a *Wehadkee* soil, the expected inclusion of the *Chewacla* map unit. The buried, black, surfaces are likely where historic backwater depressions were once located. The noted disturbances would have destroyed other typical indicators found in this landscape.

Wetland W2 and Hydric Soil HS2

This hydric soil unit lies within a pasture along UT2 downstream of HS1. It consists of a degraded wetland along the toe of slope with drained hydric soil along the incised stream. The stream does not appear to have been relocated although some dredging may have occurred. The discharge along the gentle toe of slope currently drives hydrology. The low levee along the channel defines a low, swale like landform between the toe of slope that drains parallel to the stream flow before entering the channel. This levee may have been excavated from the stream. Soils along the levee have a shallow, loamy layer up to 12 inches deep over hydric indicators.

Soils

Soils are loamy with a dark surface throughout most of this map unit. Redoximorphic concentrations are common within the upper 10 inches and is underlain by a depleted matrix with dark brown mottles. Lower elevations exhibited a buried black layer. The observed range of characteristics across this site area similar to a *Wehadkee* soil, the expected inclusion of the *Chewacla* map unit. The black, buried surfaces is similar to a buried *Wehadkee* and likely a historic backwater depression was once present.

Current hydrology is from the slope discharge occurring along the upper boundary of this wetland. The loamy soils appear to have a moderately high permeability susceptible to drainage and the incised channel is lowering the local groundwater. The central swale intercepts surface water to flow directly into the stream. Historically, this area was most likely a much larger wetland that extended across the stream.

Wetland W1 and Hydric soil HS3, HS4, and HS5

This forested floodplain wetland lies along the left bank parallel to North Fork Mountain Creek. Behind a narrow levee separating it from North Fork Mountain Creek is a low lying, linear, depressional landscape feature. The hydric soil extends upstream nearly to the current confluence with UT2 and the lower extent of this wetland ending downstream at UT3. The channel of North Fork Mountain Creek appears to currently be stable with mature trees although a significant bank failure has occurred. On the left bank livestock have access up to the top of bank where fencing follows the top of bank. The wetland is surrounded by three small, drained hydric soil units impacted by drainage from active erosional features. Livestock have churned the soil surface throughout, severely impacting the surface soils and accelerating erosion. Although forested, many of the trees are primarily sweet gum, not a typical species of this type of wetland.

Seepage and groundwater discharge is occurring along the toe of slope. Two significant erosion features have formed that are intercepting and lowering local groundwater discharge. Although some ditching may have occurred in the past, livestock appear to have created a deep erosional gully that is head cutting through the center of this wetland. Beginning at a two-foot head cut, this gully concentrates outflow across the floodplain wetland to North Fork Mountain Creek. Draining toward North Fork Mountain Creek, half way across the wetland, the significant flow infiltrates down into a sandy subsoil. This inflow appears to exit at North Fork Mountain Creek within the slump. This gully is lowering local groundwater throughout the wetland through directly intercepting groundwater.

To the east near the downstream end of the wetland a second erosional gully has formed and is head cutting up slope through the wetland. It enters a straight channel that roughly parallels North Fork Mountain Creek, merging with UT3 where it enters North Fork Mountain Creek. Portions of this gully appear to have been channelized due to its straightened, uniform nature. There appears to be an area of fill upslope from this head cut, possibly from the earthwork to drain the wetland.

Both gullies have become incised and are progressing due to livestock access. The sandy textured underlying material is eroding from beneath tree roots that are currently slowing their progress. The head cuts have steep banks up to two feet high around a discharge point where significant amounts are flowing. The groundwater surrounding these headcuts has been lowered by at least two feet.

Prior to these features forming, the water table was at or just above the surface of the wetland throughout this area. It was likely a mosaic of permanently inundated and saturated soil surrounded by areas that were seasonally saturated. Historically, the UT2 most likely also provided supplemental hydrology to this wetland with a high ground water surrounding the stream and during high flow events.
Areas at the edges of this wetland have lost hydrology due to the lowering of the water table. This appears to have been accelerated within the last decade.

Soils

Soils are loamy with a dark surface throughout most of this map unit with redoximorphic concentrations common within the upper 10 inches. It is underlain by a depleted matrix with dark brown mottles. Lower elevations exhibited a buried black layer. The observed range of characteristics across this site area similar to a *Wehadkee* soil. Much of this wetland was likely a historic backwater depression.

Current hydrology is from slope discharge occurring along the toe of slope and concentrated within the erosional gullies. The loamy soils appear to have a moderately high permeability susceptible to drainage and the gullies are lowering the local groundwater.

Within this map unit a number of hydric indicators are found, including A12-Thick Dark Surface, F3-Depleted Matrix, F6-Redox Dark Surface, and F8-Redox Depressions. These indicate a relatively long hydroperiod with numerous depressional features despite the land use and modifications present.
The soil evaluation found the *F3-Depleted Matrix* hydric indicator throughout most of these hydric soil units. Based on observed land use and drainage modification, additional indicators that includes *A12-Thick Dark Surface*, *F6 Redox Dark Surface*, and *F8-Redox Depressions* were likely common prior to surface smoothing, filling of depressions, and tillage that would have destroyed these indicators. Areas having relict features are still observed in some areas.

Prior to land use modification of surface smoothing, filling of depressions, livestock, and tillage that would have destroyed some indicators, it is likely that the *A12-Thick Dark Surface*, *F6 Redox Dark Surface*, and *F8-Redox Depressions* indicators were likely common throughout this site.

Current Hydrologic Alterations

Current conditions suggest the some of the hydric soils at this site has been partially, or completely drained through land use modifications. Observed hydrologic alterations impacting local groundwater include ditches, erosion gullies, incised stream channels, and surface contouring to improve drainage. The loamy textured soils have a moderate to high permeability that is susceptible to lowering the water table. The incised channels are limited in overbank flooding events and rapid removal of surface water in the floodplain limits infiltration. Livestock have churned the surfaces, creating surficial compaction that also limits infiltration.

Recommendations

Hydrology for the drained hydric soils and the partially drained wetland along UT2 will rely on raising the stream bed and allowing these streams to frequently inundate the adjacent floodplain. Plugging of ditches and erosional features will allow the groundwater elevations to rise. Finer texture surface soils are prone to compaction and where vegetation allows, ripping of the upper 12 inches is recommended. This will decompact the surface and can provide surface roughening. The decompaction of soils, added surface roughness, and potential enhancement of depressional areas will improved retention and longer hydroperiods will maintain the wetlands. Natural hydrology that has been impacts at this site appears to have been a high water table, either from the stream bed or from groundwater discharge.

Functional Uplift from Hydric Soil Reestablishment

The watershed is primarily agricultural with potential sediments, nutrients, and pollutants entering North Fork Mountain Creek and its tributaries. The stream and wetland reestablishment proposed will raise local groundwater, restoring a more natural hydrologic cycle to the floodplains with an associated functional uplift. The is a high potential to restore the natural biological processes and chemical transformations found in floodplain wetland soils.

Successful hydrologic restoration at this site will provide numerous functional uplifts related to soils and water quality. These include, reestablishment of natural oxidation-reduction cycling, improved nutrient and chemical transformations (especially nitrates), and potential immobilization of phosphorus. With establishment of an appropriate wetland vegetative community, potential benefits include lower soil temperatures, increased organic carbon sequestration, and greater diversity of beneficial microbial and fungal populations important for soil health. Healthy microbial populations in wetlands provide the important biochemical transformations of complex organic substances such as ammonia, molecular nitrogen, nitrite and nitrate. Large scale benefits are peak flood control, increased and diverse wildlife habitat, and connectivity of the natural aquatic communities along North Fork Mountain Creek and its tributaries.

Summary Observations

The Bandys Creek project is located within suitable landscape positions alongside streams. Land within the project is currently utilized for livestock grazing impacting soil and stream stability. Surface smoothing and stream relocation have increased runoff rates and impacted groundwater hydrology. Removal of shallow depression and surface roughness allows faster runoff and limits potential infiltration.

The NRCS soil mapping shows the potential for of hydric soils to occur within the floodplains. Soils observed across the floodplain are similar to the range of characteristics corresponding to the NRCS *Chewacla* mapping unit. The hydric *Wehadkee* inclusions occur in depressions and backwater landscapes. The loamy soils found across this site are susceptible to the observed drainage modifications.

Three areas of hydric soil were delineated and mapped where all or portions have effectively been drained and hydrology has been impacted by land use modifications. There are two hydric soil map units along UT2. The upstream hydric soil (HS1) historically had hydrology from a high water table and overbank flooding with floodplain storage. This area has lost hydrology due to relocation and incision of the stream with surface drainage modifications to limit infiltration of runoff. The current F3 hydric indicator suggest this area is a recharge wetland that is dependent upon stream hydrology and runoff.

Downstream on UT2 the map unit consists of a degraded wetland with effective drainage adjacent to the incised stream (W2 and HS2). Groundwater discharge provides hydrology to this wetland along the toe of slope, draining toward UT2. The surface and lateral flows move downslope into a gentle swale that parallels the stream before draining into the channel. The slightly elevated levee/berm along the stream exhibits some fill or deposition and the loamy soils drain rapidly. Surface modifications include some smoothing to promote runoff and the swale. The levee may also be the result of enhancing the swale and possible dredging of the channel prior to it current incised state.

The third hydric soil map unit lies along North Form Creek below the confluence with UT2. The area lies behind a low levee that created a linear depressional landscape along the toe of slope. There is significant groundwater discharge observed within two active erosional features that are head cutting upslope. The head cuts have lowered the local groundwater throughout the wetland with three surrounding areas of drained hydric soil.

The most common hydric soil indicators observed are the *F3-Depleted Matrix*. The *F6-Redox Dark Surfaces* and *F8-Redox Depressions* are also present within the wetlands with the wettest areas exhibited an *A12-Thick Dark Surface*. These indicators suggest historic hydrology across many areas of this site was wet for long periods of the growing season. Natural hydrology appears to have been a high groundwater across the floodplain due to frequent overbank flooding with significant groundwater discharge along the toe of slope. Currently, overbank flooding is limited and groundwater discharge is being intercepted by erosional features.

Summary Recommendations

Recommendations

This site has high potential to restore a more natural hydrology to these landscapes by providing opportunities for *Wetland Reestablishment* and *Wetland Rehabilitation*. Practical methods of hydrologic restoration and enhancement to soils at this site depend upon successfully relocating and raising the stream bed on UT2 to reestablish a high ground water table. Along North Fork Mountain Creek modifications include plugging/filling the erosional features, stabilization of the stream banks, and reestablishing depressional stability and surface roughness. The exclusion of livestock will help maintain stability of stream banks and protect soil surfaces. Although no significant areas of fill were identified, minor areas with fill, spoil, or deposition should be removed. The wetland and stream design should promote storage of hydrology inputs. Once stream construction has been completed, the establishment of a more natural, rough surface with small storage depressions, and planting an appropriate vegetative community should be performed throughout the floodplain and wetlands.

The surface soils are compacted from livestock and where vegetation allows, ripping to a depth of at least 12 inches is recommended. Ripping near larger trees that are to be kept is not recommended. Ripping to this depth will decompact the surface, potentially improve soil structure, and provide some surface roughening. The decompaction of soils, added surface roughness, and potential enhancement of depressional areas will improved retention and result in longer hydroperiods.

The use of all heavy equipment and construction schedules should be limited to dryer periods or the use of tracked equipment to limit loss of soil structure, especially within wetlands. Livestock compact and destroy structure within the surface horizons, resulting in low infiltration and increase erosion. A Where woody vegetation is currently absent or is removed, shallow ripping to 12 inches along the contours after final construction is strongly suggested to improve infiltration and improve planting survival.

Due to the current drainage modifications and the sandy soil subsoil horizons, it may take up to a year for portions of the site to become completely saturated and reach the target hydroperiods, depending on final construction timing and rainfall (assuming at least average seasonal rainfall and over bank flow frequency).

Conclusions

At the Bandys Farm mitigation site, the topographic setting and presence of hydric soil is appropriate for a successful hydrologic mitigation project. The hydric soil indicators observed across this floodplain reflect historically wet conditions. Stream restoration should raise the local water table and provide opportunities for more frequent or naturally occurring overbank flooding events to support wetland hydrology. This project can restore lost and degraded aquatic resources to provide functional uplift, establish natural habitat, and support connectivity across the larger North Fork Mountain Creek watershed.

Given the observed soil characteristics and presence of hydric soil indicators within a favorable landscape position, this site is suitable for hydrologic wetland reestablishment of degraded aquatic resources. Based upon this detailed study of soils and current conditions observed at this site, this appears to be a site with appropriate conditions for *Wetland Reestablishment* and *Wetland Rehabilitation*.

This report describes the results of the soil evaluation performed at the Bandys Farm Mitigation Site in Catawba County, NC. Any subsequent transfer of the report by the user shall be made by transferring the complete report, including figures, maps, appendices, all attachments and disclaimers.

References

NTCHS. 2003. Technical Note 13: Altered Hydric Soils. Deliberation of: National Technical Committee for Hydric Soils.

Soil Survey Staff, Natural Resources Conservation Service, United States Department of Agriculture. *Web Soil Survey*. Available online at the following link: https://websoilsurvey.sc.egov.usda.gov/. Accessed [June/2022].

US Army Corps of Engineers. 2016. *Wilmington District Stream and Wetland Compensatory Mitigation Update*. North Carolina Interagency Review Team - October 24, 2016. SAW-2013-00668-PN http://www.saw.usace.army.mil/Missions/RegulatoryPermitProgram/

U.S. Army Corps of Engineers. 2012. *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Eastern Mountains and Piedmont Region Version 2.0*, ed. J. F. Berkowitz, J. S. Wakeley, R. W. Lichvar, C. V. Noble. ERDC/EL TR-12-9. Vicksburg, MS: U.S. Army Engineer Research and Development Center.

USDA 1985. United States Department of Agriculture (USDA), Soil Conservation Service (SCS). *Soil Survey of Catawba County North Carolina*. October 1975)

United States Department of Agriculture, Natural Resources Conservation Service. 2018. *Field Indicators of Hydric Soils in the United States*, Version 8.2. L.M. Vasilas, G.W. Hurt, and J.F. Berkowitz (eds.). USDA, NRCS, in cooperation with the National Technical Committee for Hydric Soils

Vepraskas, M. J. 1994. *Redoximorphic Features for Identifying Aquic Conditions*. Tech. Bulletin 301. North Carolina Ag. Research Service, North Carolina State Univ., Raleigh, North Carolina.

USEPA. 2000. Principles for the Ecological Restoration of Aquatic Resources. EPA841-F-00-003. Office of Water (4501F). United States Environmental Protection Agency. Washington, DC. 4 pp. (https://www.epa.gov/wetlands/principles-wetland-restoration).

USEPA. 2002. *Ecoregions of North Carolina.* G. E. Griffith et. al. EPA, USDA, NRCS Regional collaborative. Available online at https://www.epa.gov/eco-research/level-iii-and-iv-ecoregions-state. August 31, 2002.

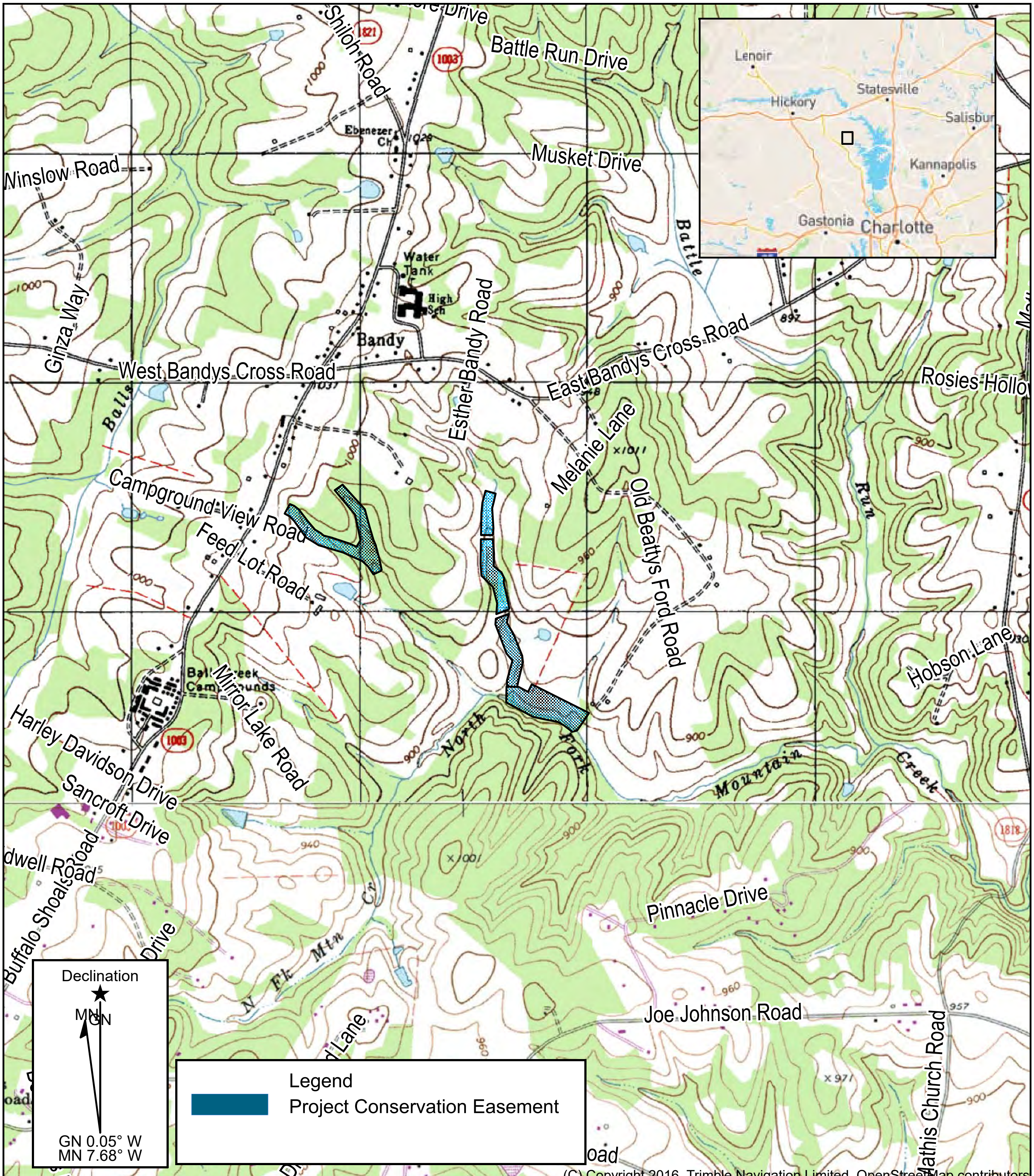
FIGURES

APPENDICES

Appendix A Soil Boring Log

Appendix B Photos

Appendix C NRCS Web Soil Survey Report



Map Name: CATAWBA
Scale: 1 inch = 2,000 ft.

Figure 1. USGS Vicinity Map
Bandys Farm Stream and Wetland Mitigation Project
Catawba County, NC

SCALE 1:24000

0 1000 2000 3000 4000
Feet

0.0 0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9
Miles

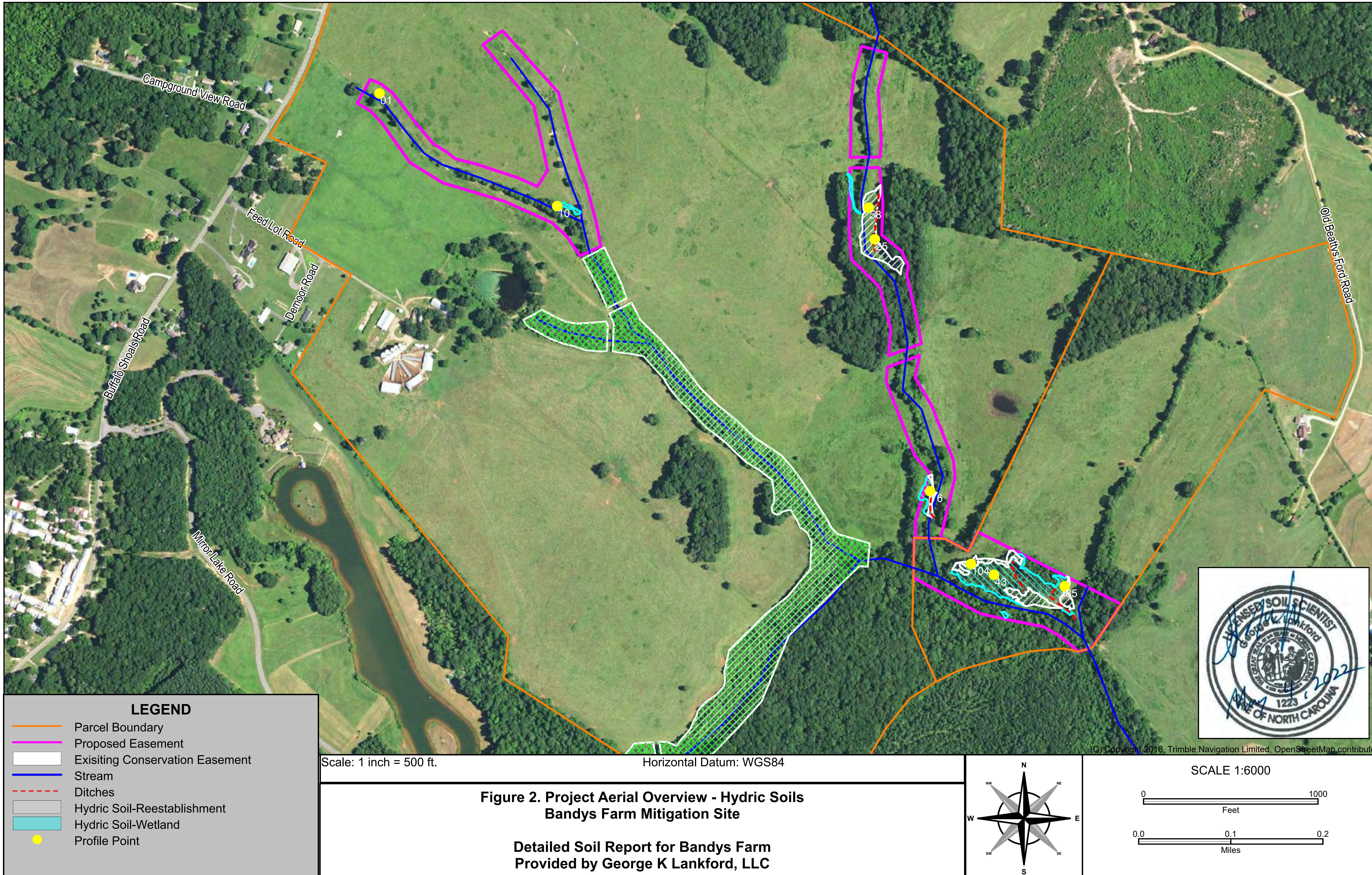
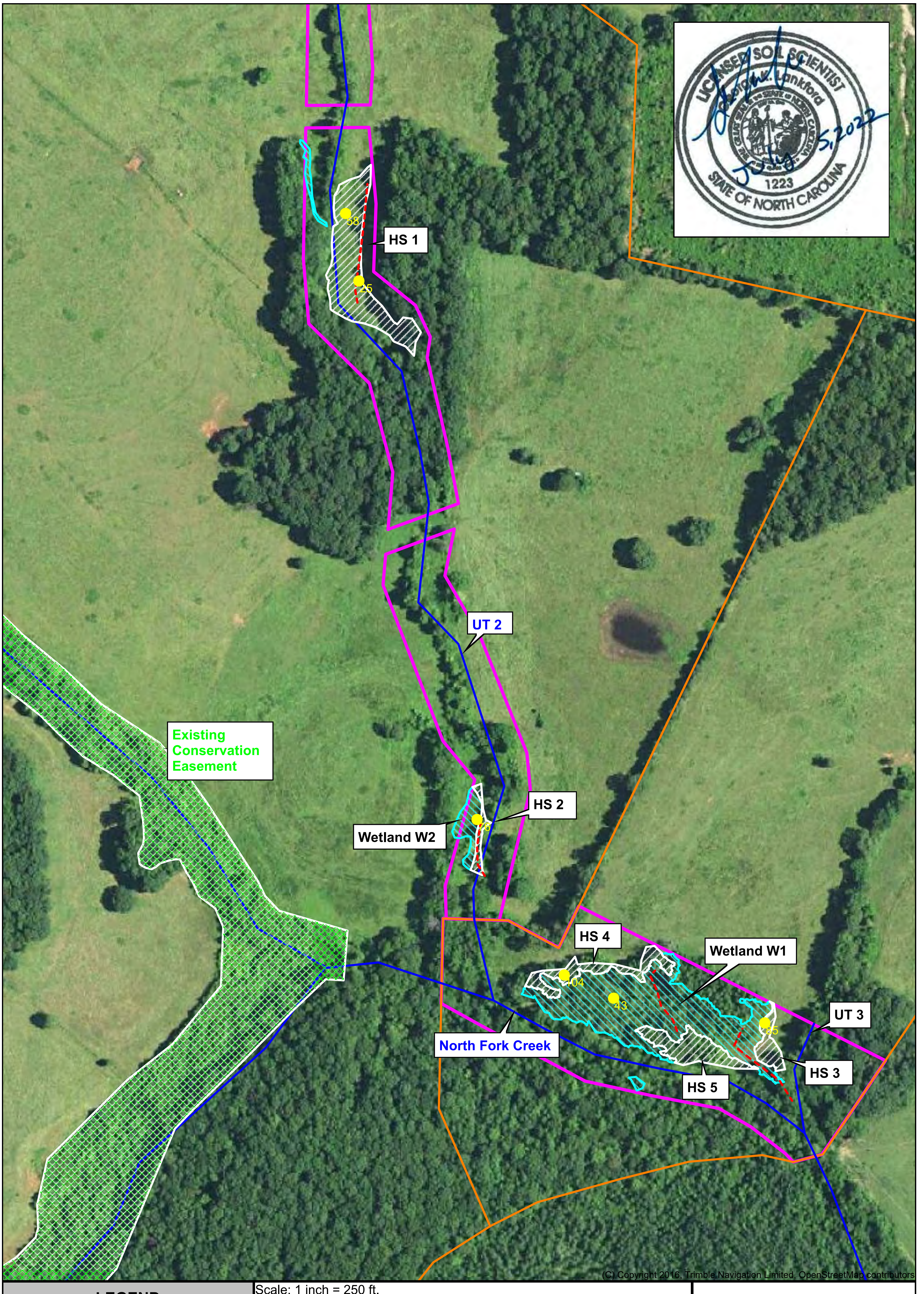


Figure 2. Project Aerial Overview - Hydric Soils
Bandys Farm Mitigation Site

Detailed Soil Report for Bandys Farm
Provided by George K Lankford, LLC



LEGEND

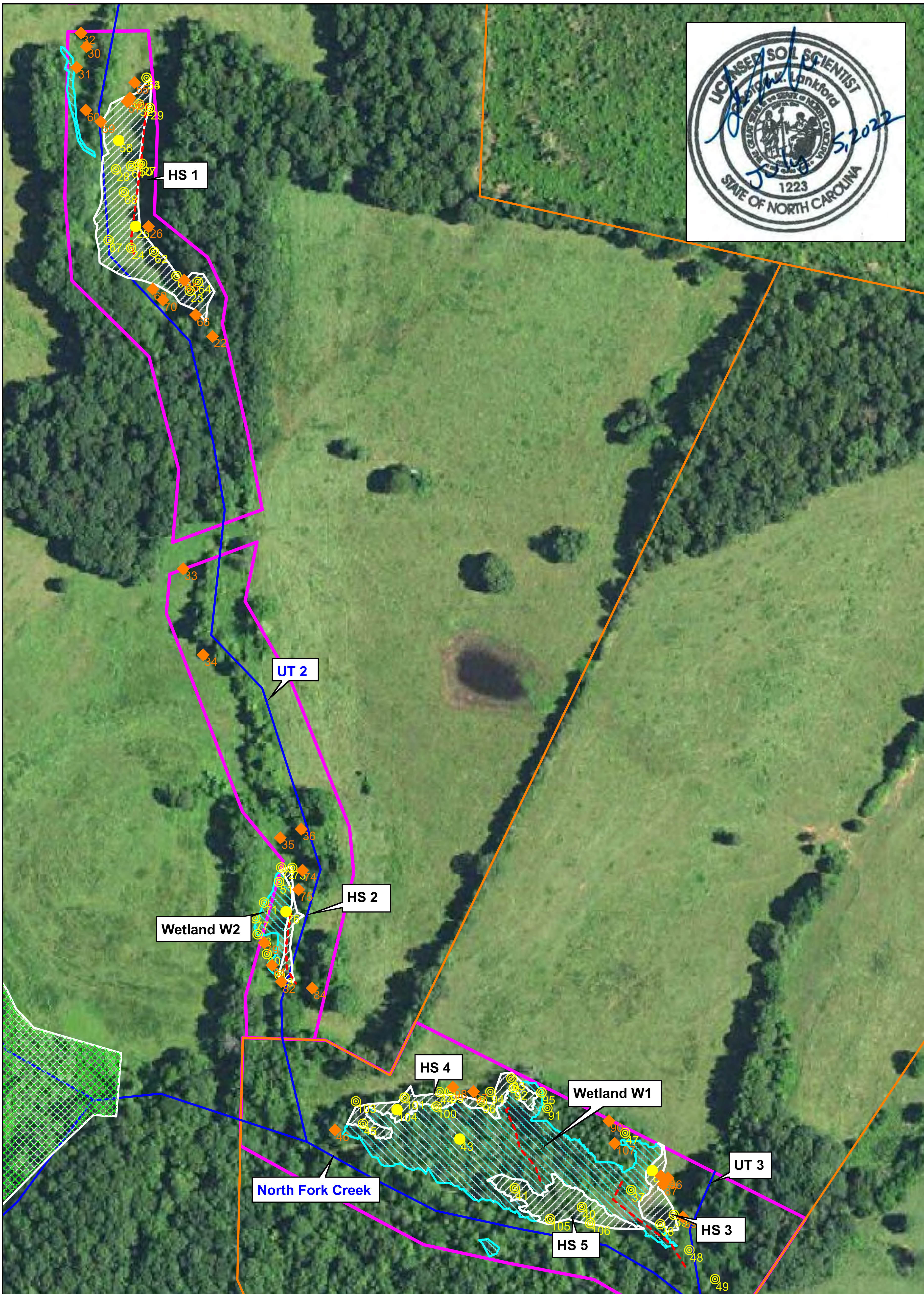
- Proposed Easement
- Map Unit - Hydric Soil
- Map Unit - Potential Wetland
- Drainage Feature
- Soil Profile Point
- Hydric Point
- NonHydric Point

Scale: 1 inch = 250 ft.
Horizontal Datum: WGS84

SCALE 1:3000

0 100 200 300 400 500
Feet

Figure 3. Hydric Soils Map Units
Bandys Farm Stream and Wetland Mitigation Project



LEGEND

- Proposed Easement
- Map Unit - Hydric Soil
- Map Unit - Potential Wetland
- Drainage Feature
- Soil Boring - Profile Point
- Soil Boring - Hydric Point
- Soil Boring - NonHydric Point

Scale: 1 inch = 200 ft.
Horizontal Datum: WGS84

SCALE 1:2400

0 100 200 300 400
Feet

Figure 4. Soil Boring Points
Bandys Farm Stream and Wetland Mitigation Project

Appendix A

Bandys Farm Mitigation Site, Catawba County NC

Soil Boring Descriptions

Representative Soil Profiles at the Bandys Farm Mitigation Site (Sorted by map unit)

Depth (inches)	Color		Mottle Percentage (Location*)	Texture**	Notes
	Matrix	Mottle			
SB 25 (HS1) August 2, 2021			Hydric Indicators WT Not observed > 29" *F3-Depleted Matrix*		
0-4	5 YR 4/2	5 YR 4/4	15% (PL)	SL	
4-13	5 YR 4/2	5 YR 4/6	10% (PL)	SL	
13-21	5 YR 4/1	5 YR 4/6	20% (PL)	SCL	
21-29	BP 5/1	5 YR 4/4	15% (PL)	SCL	buried surface *relict indicator – F2-*
SB 58 (HS1) May 26, 2022			Hydric Indicators WT Not observed *F3-Depleted Matrix*		
0-4	7.5 YR 3/4			L	
4-10	7.5 YR 4/3	7.5 YR 4/6		SL	*-relict indicator - F3*
10-18	7.5 YR 4/2	5 YR 4/8	15% (PL)	L	
18-26	7.5 YR 5/1	7.5 YR 3/3 7.5 YR 2.5/2	15% (PL) 10% (PL)	CL	mottles are moderately hard Mn-Fe nodules
SB 76 (HS2) May 26, 2022			Hydric Indicators WT Not observed (saturated at -21) *A12-Thick Dark Surface* *F6-Redox Dark Surface* *F13-Umbric Surface*		
0-6	7.5 YR 3/1	7.5 YR 3/3	7% (PL)	SL	
6-12	7.5 YR 3/1	7.5 YR 2.5/3	10% (PL)	SL	
12-20	N 1/-	7.5 YR 3/4	5% (PL)	SL	buried surface *relict indicator - F2*
20-23	7.5 YR 4/1	7.5 YR 4/6	15% (PL)	SL	gravel ~15%
SB 85 (HS3) May 26, 2022			Hydric Indicators WT -34" *F6-Redox Dark Surface* (buried)		
0-10	5 YR 4/4			SL	appears to be fill
10-16	N 2.5/-	7.5 YR 4/1	15% (PL)	L	buried surface
16-36	7.5 YR 3/1	7.5 YR 3/4	20% (PL)	SCL	
SB 104 (HS4) May 26, 2022			Hydric Indicators WT -18" *F3-Depleted Matrix* *F8-Redox Depressions*		
0-5	7.5 YR 4/2	7.5 YR 4/6	15% (PL)	SL	
5-16	7.5 YR 4/3	7.5 YR 4/6	25% (PL)	SCL	moderately restrictive
16-26	N 2.5/1	7.5 YR 4/4	20% (PL)	CL	buried surface *-relict indicators F2 and F13*

Appendix A

Bandys Farm Mitigation Site, Catawba County NC
Soil Boring Descriptions

Representative Soil Profiles at the Bandys Farm Mitigation Site (Sorted by map unit)

Depth (inches)	Color		Mottle Percentage (Location*)	Texture**	Notes
	Matrix	Mottle			
SB 43 (W-1) **August 2, 2021**			Hydric Indicators WT at -31' *A12-Thick Dark Surface* *F6 Redox Dark Surface*		
0-6	5 YR 3/1	5 YR 4/6	25% (PL)	SL	
6-18	5 YR 3/1			SL	
18-33	5 YR 3/2			SL	
33-37	5 YR 2.5/1	5 YR 3/2	35% (PL)	SL	

»Indicators valid for NRCS Land Resource Region 136 (Southern Piedmont) and Land Resource Region P.
WT = observed apparent water table
*PL =pore lining, M = matrix, UCSG = uncoated sand grains
**Texture (follows USDA textural classification)
S = sand, L = loam, Si = silt, C = clay
f = fine, c = coarse (textural modifiers for sandy soils)

Soil Scientist Seal

Appendix B
Bandys Farm Mitigation Bank Site – Catawba County, NC
Photo Log

June 2022

1. Hydric profile in the HS1 map unit. Meets the *F3-Depleted Matrix* Indicator. SB#58.

2. Landscape along floodplain of UT2 facing upstream. SB#58.

June 2022

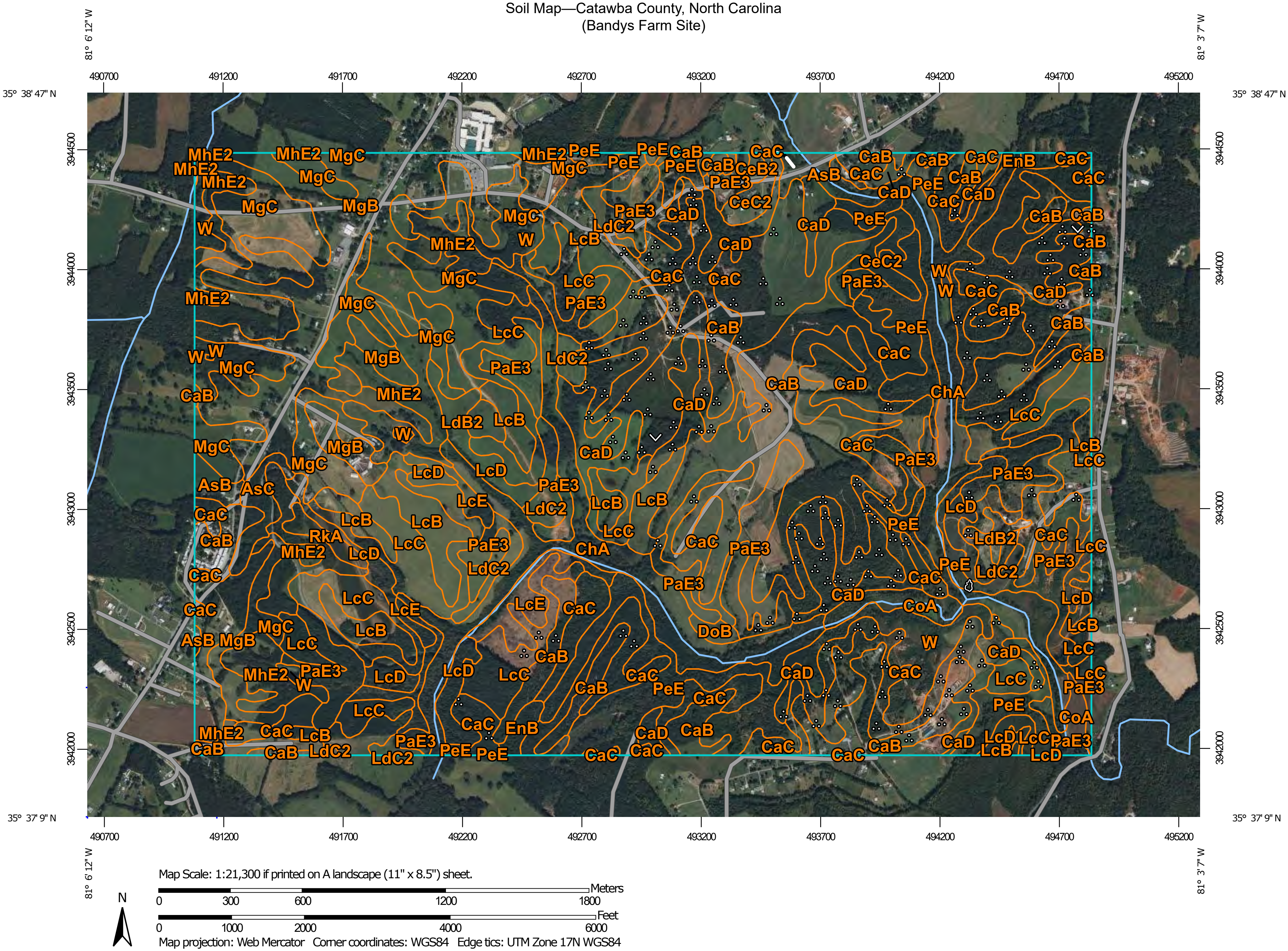
3. Hydric profile in HS3 map unit. Meets the *F6 Redox Dark Surface* indicator. SB#85.

4. Elevated landscape above wetland. SB#85.

5. Hydric profile in the HS4 map unit. Meets *F3-Depleted Matrix* and *F6 Redox Dark Surface* indicators. SB#104.

6. Depressional landscape above wetland. Across wetland is North Fork Creek. SB#104.

Soil Map—Catawba County, North Carolina
(Bandys Farm Site)



MAP LEGEND

Area of Interest (AOI)

- Area of Interest (AOI)

Soils

- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features

- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features

- Streams and Canals

Transportation

- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background

- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:15,800.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Catawba County, North Carolina
Survey Area Data: Version 22, Jan 21, 2022

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Oct 2, 2020—Mar 20, 2021

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
AsB	Appling sandy loam, 2 to 6 percent slopes	9.0	0.4%
AsC	Appling sandy loam, 6 to 10 percent slopes	11.2	0.5%
CaB	Cecil sandy loam, 2 to 6 percent slopes	248.6	10.6%
CaC	Cecil sandy loam, 6 to 10 percent slopes	424.9	18.1%
CaD	Cecil sandy loam, 10 to 15 percent slopes	176.4	7.5%
CeB2	Cecil clay loam, 2 to 6 percent slopes, moderately eroded	2.0	0.1%
CeC2	Cecil clay loam, 6 to 10 percent slopes, moderately eroded	18.3	0.8%
ChA	Chewacla loam, 0 to 2 percent slopes, frequently flooded	177.4	7.6%
CoA	Congaree loam, 0 to 2 percent slopes, frequently flooded	20.0	0.9%
DoB	Dorian fine sandy loam, 0 to 6 percent slopes, rarely flooded	3.6	0.2%
EnB	Enon fine sandy loam, 2 to 6 percent slopes	7.2	0.3%
LcB	Lloyd loam, 2 to 6 percent slopes	118.4	5.1%
LcC	Lloyd loam, 6 to 10 percent slopes	172.0	7.3%
LcD	Lloyd loam, 10 to 15 percent slopes	63.1	2.7%
LcE	Lloyd loam, 15 to 25 percent slopes	27.9	1.2%
LdB2	Lloyd clay loam, 2 to 6 percent slopes, moderately eroded	9.8	0.4%
LdC2	Lloyd clay loam, 6 to 10 percent slopes, moderately eroded	36.6	1.6%
MgB	Madison gravelly sandy loam, 2 to 6 percent slopes	214.1	9.1%
MgC	Madison gravelly sandy loam, 6 to 10 percent slopes	197.0	8.4%
MhE2	Madison-Bethlehem complex, 10 to 25 percent slopes, moderately eroded	89.3	3.8%

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
PaE3	Pacolet clay loam, 10 to 25 percent slopes, severely eroded	122.6	5.2%
PeE	Pacolet soils, 10 to 25 percent slopes	180.5	7.7%
RkA	Roanoke loam, 0 to 2 percent slopes, occasionally flooded	6.3	0.3%
W	Water	4.9	0.2%
Totals for Area of Interest		**2,341.5**	**100.0%**

IRT Buffer Tool

Wilmington District Stream Buffer Credit Calculator

Site Name:	Bandys Farm Mitigation Project
USACE Action ID:	SAW-2021-02609
NCDWR Project Number:	20211630V.1
Sponsor:	DMS
County:	Catawba
Minimum Required Buffer Width[1]:	50

Mitigation Type	Mitigation Ratio Multiplier[2]	Creditable Stream Length[3]	Baseline Stream Credit
Restoration (1:1)	1	6710.3	6710.30
Enhancement I (1.5:1)	1.5		
Enhancement II (2.5:1)	2.5	1315.7	526.28
Preservation (5:1)	5		
Other (7.5:1)	7.5		
Other (10:1)	10		
Custom Ratio 1			
Custom Ratio 2			
Custom Ratio 3			
Custom Ratio 4			
Custom Ratio 5			
Totals		**8026.00**	**7236.58**

Buffer Width Zone (feet from Ordinary High Water Mark)

Buffer Zones	less than 15 feet	>15 to 20 feet	>20 to 25 feet	>25 to 30 feet	>30 to 35 feet	>35 to 40 feet	>40 to 45 feet	>45 to 50 feet	>50 to 75 feet	>75 to 100 feet	>100 to 125 feet	>125 to 150 feet
Max Possible Buffer (square feet)[4]	240780	80260	80260	80260	80260	80260	80260	80260	401300	401300	401300	401300
Ideal Buffer (square feet)[5]	243558	80495	80266	80448	79941	79682	79343	78747	392157	391669	392203	
Actual Buffer (square feet)[6]	239489	77945	77158	76775	76354	75964	75281	74312	336775	70634	2888	
Zone Multiplier	50%	10%	10%	10%	5%	5%	5%	5%	7%	5%	4%	4%
Buffer Credit Equivalent	3618.29	723.66	723.66	723.66	361.83	361.83	361.83	361.83	506.56	361.83	289.46	289.46
Percent of Ideal Buffer	98%	97%	96%	95%	96%	95%	95%	94%	86%	18%	1%	
Credit Adjustment	-60.45	-22.92	-28.02	-33.04	-16.24	-16.88	-18.52	-20.38	435.02	65.25	2.13	

Total Baseline Credit	Credit Loss in Required Buffer	Credit Gain for Additional Buffer	Net Change in Credit from Buffers	Total Credit
7236.58	**-216.46**	**502.41**	**285.95**	**7522.53**

[1]Minimum standard buffer width measured from the top of bank (50 feet in piedmont and coastal plain counties or 30 feet in mountain counties)

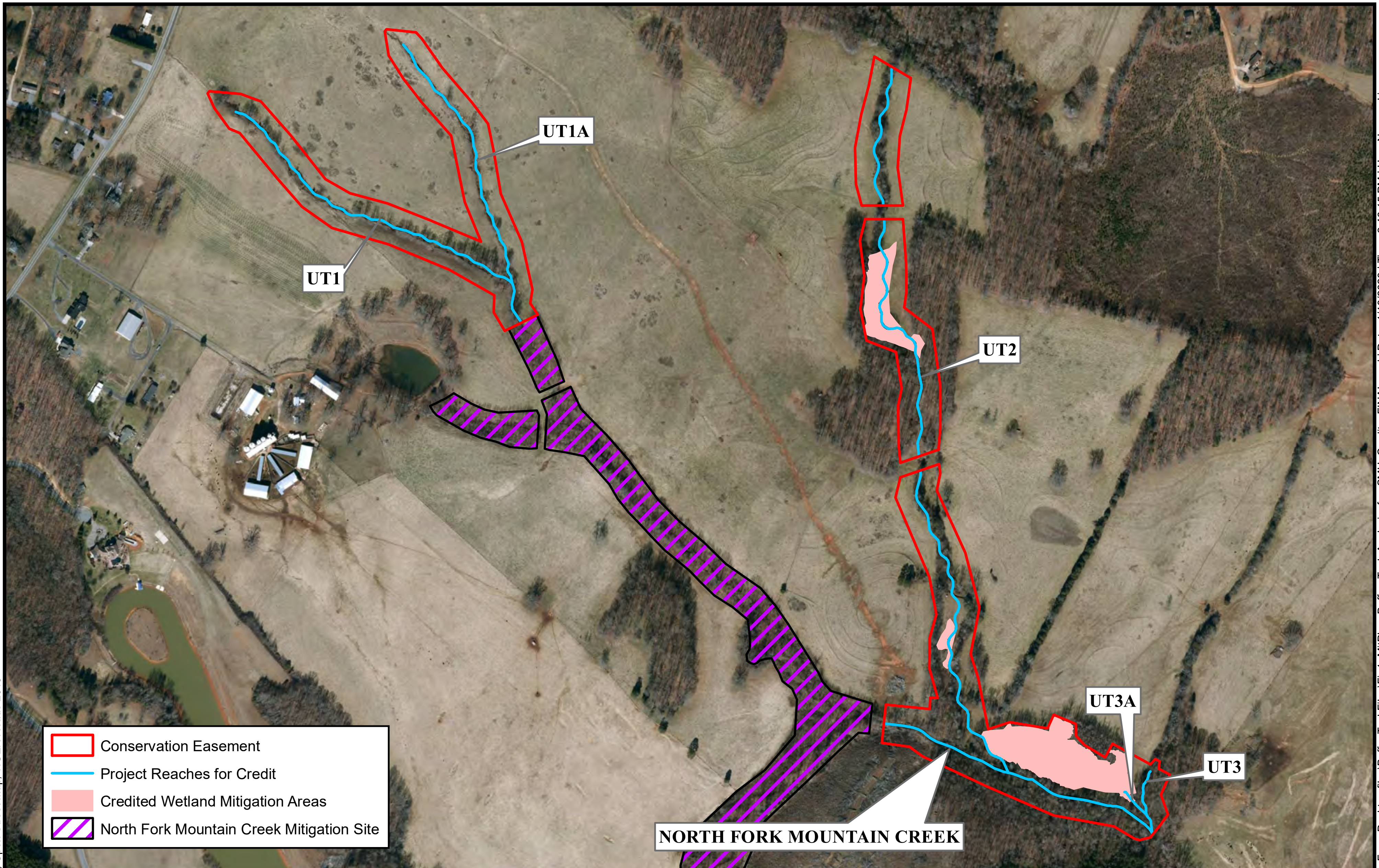
[2]Use the Custom Ratio fields to enter non-standard ratios, which are equal to the number of feet in the feet-to-credit mitigation ratio (e.g., for a perservation ratio of 8 feet to 1 credit, the multiplier would be 8).

[3]Equal to the number of feet of stream in each Mitigation Type. If stream reaches are not creditable, they should be excluded from this measurement, even if they fall within the easement.

[4]This amount is the maximum buffer area possible based on the linear footage of stream length if channel were perfectly straight with full buffer width. This number is not used in calculations, but is provided as a reference.

[5]Maximum potential size (in square feet) of each buffer zone measured around all creditable stream reaches, calculated using GIS, including areas outside of the easement. The inner zone (0-15') should be measured from the top of the OHWM or the edge of the average stream width if OHWM is not known. Non-creditable stream reaches within the easement should be removed prior to calculating this area wtih GIS.

[6]Square feet in each buffer zone, as measured by GIS, excluding non-forested areas, all other credit type (e.g., wetland, nutrient offset, buffer), easement exceptions, open water, areas failing to meet the vegetation performance standard, etc. Additional credit is given to 150 feet in buffer width, so areas within the easement that are more than 150 feet from creditable streams should not be included in this measurement. Non-creditable stream reaches within the easement should be removed prior to calculating this area wtih GIS.



0 400 800
Feet

N

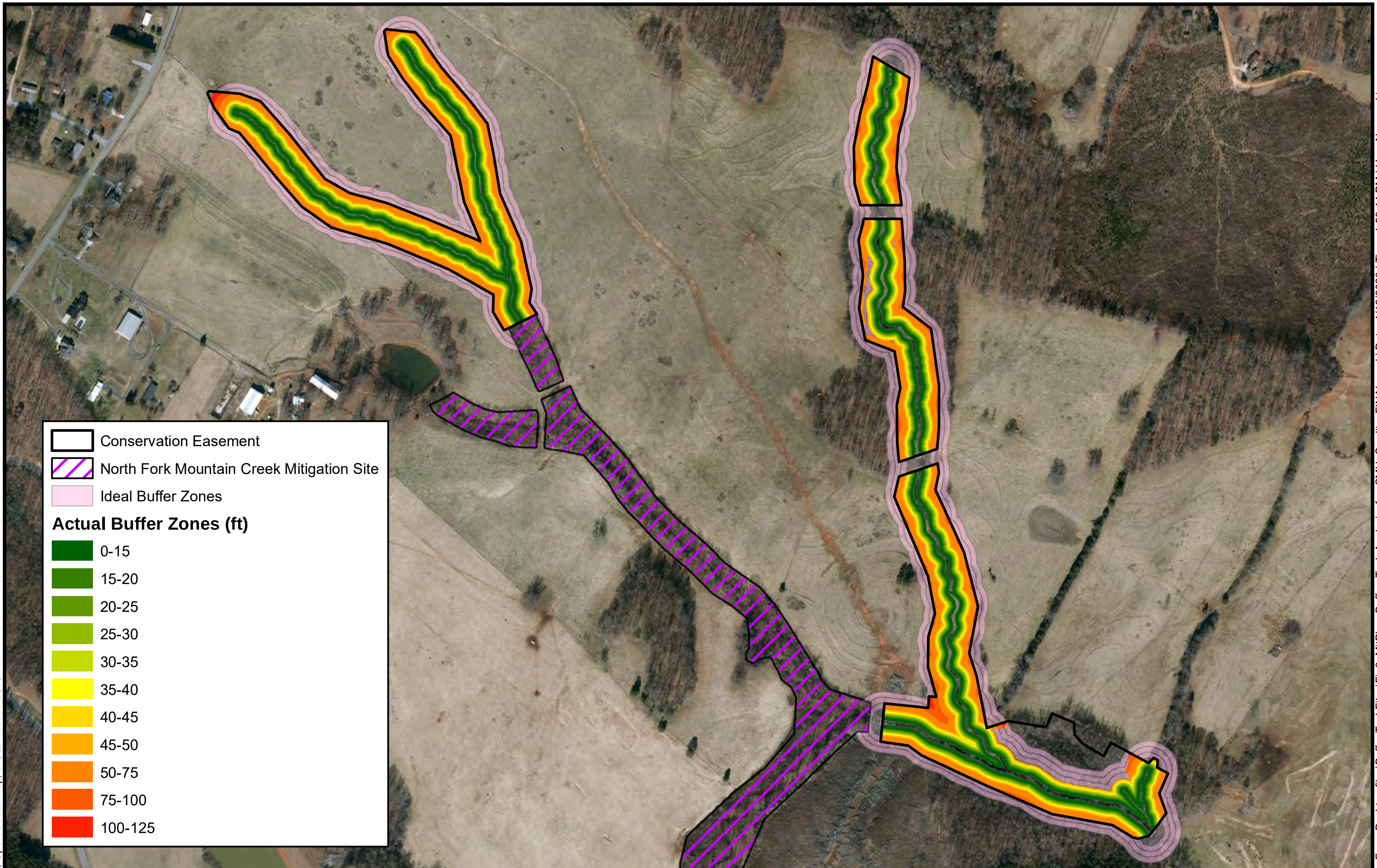
Bandys Farm
Stream and Wetland Mitigation Project
Figure 1: IRT Buffer Tool Project Features
Catawba County, NC

Ecosystem Planning & Restoration
EPR

DATE:
January 2023

Sources: ESRI Aerial Imagery 2020; Open Street Map; TIGER Roads 2015

Path: C:\Users\sking\Desktop\Bandys Farm Desktop files\Buffer Tool Files\Fig1_MitPlan_Buffer_Tool_Analysis_for_SMU_Credits_FINAL.mxd | Date: 1/18/2023 | Time: 2:46:15 PM | User Name: sking



0 400 800
Feet

N

BANDYS FARM
STREAM AND WETLAND MITIGATION PROJECT

FIGURE 2: RIPARIAN BUFFER ZONES

CATAWBA COUNTY, NC

ECOSYSTEM PLANNING & RESTORATION

DATE:
JANUARY 2023

Sources: ESRI Aerial Imagery 2020; Open Street Map; TIGER Roads 2015

Path: C:\Users\sking\Desktop\Bandys Farm Desktop files\Buffer Tool Files\Fig2_MitPlan_Buffer_Tool_Analysis_for_SMU_Credits_FINAL.mxd | Date: 1/18/2023 | Time: 1:59:44 PM | User Name: sking

WETS Table Data

WETS Table

WETS Station: HICKORY FAA AIRPORT, NC								
Requested years: 1991 - 2021								
Month	Avg Max Temp	Avg Min Temp	Avg Mean Temp	Avg Precip	30% chance precip less than	30% chance precip more than	Avg number days precip 0.10 or more	Avg Snowfall
Jan	49.7	30.3	40.0	3.73	2.65	4.41	7	-
Feb	53.7	32.8	43.3	3.19	2.34	3.76	6	-
Mar	61.2	39.6	50.4	4.20	3.03	4.95	7	-
Apr	70.5	47.6	59.1	4.10	2.72	4.92	7	-
May	77.9	56.2	67.1	3.84	2.44	4.63	7	-
Jun	84.9	64.4	74.7	4.26	2.65	5.15	7	-
Jul	88.0	68.1	78.0	4.27	2.66	5.16	7	-
Aug	86.4	67.0	76.7	4.66	2.83	5.65	7	-
Sep	80.4	60.9	70.7	3.76	2.00	4.59	6	-
Oct	71.1	49.2	60.2	3.50	2.02	4.23	4	-
Nov	60.7	38.7	49.7	3.56	2.12	4.32	5	-
Dec	52.5	33.1	42.8	3.76	2.68	4.44	6	-
Annual:					40.34	51.74		
Average	69.8	49.0	59.4	-	-	-	-	-
Total	-	-	-	46.84			76	-

GROWING SEASON DATES			
Years with missing data:	24 deg = 2	28 deg = 2	32 deg = 2
Years with no occurrence:	24 deg = 0	28 deg = 0	32 deg = 0
Data years used:	24 deg = 29	28 deg = 29	32 deg = 29
Probability	24 F or higher	28 F or higher	32 F or higher
50 percent *	3/2 to 12/4: 277 days	3/18 to 11/14: 241 days	3/31 to 10/31: 214 days
70 percent *	2/25 to 12/10: 288 days	3/13 to 11/19: 251 days	3/27 to 11/4: 222 days
* Percent chance of the growing season occurring between the Beginning and Ending dates.			

Growing Season dates used for 50% at 28 F

STATS TABLE - total precipitation (inches)													
Yr	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annl
1949	3.56	4.25	3.25	4.33	2.84	3.56	6.72	11.84	2.82	4.59	1.06	1.91	50.73
1950	2.69	1.98	6.05	1.45	3.66	5.56	1.46	2.96	4.35	3.45	0.91	3.73	38.25
1951	1.45	3.61	4.24	4.22	0.21	5.75	7.22	2.35	1.96	1.11	2.19	5.73	40.04
1952	3.79	4.37	8.73	3.36	2.66	3.05	0.98	8.73	0.57	1.35	1.88	3.17	42.64
1953	3.80	5.29	5.89	2.20	1.26	4.85	3.53	4.65	6.04	0.57	1.17	5.26	44.51
1954	7.89	3.06	5.11	1.10	5.43	1.53	2.09	2.12	0.48	1.47	3.27	3.82	37.37
1955	0.91	4.32	2.82	4.64	4.75	4.37	5.48	2.90	3.72	2.84	1.49	0.61	38.85
1956	1.39	6.51	3.58	6.39	2.51	1.65	5.64	3.89	6.61	3.97	1.47	3.84	47.45
1957	5.03	5.81	2.56	5.70	4.97	11.74	M4.27	M1.07	10.	2.	6.	3.	63.

Reference Wetland Vegetation
Data Summary Tables

Reference Wetland Sites Vegetation Summaries

Wetland Site ID: 1098 (Rowan County)
Wetland Type: Bottomland Hardwood Forest (Drainage Area 26.2 mi^2)

Common Name:	Taxon Name:	Average Coverage %
Green Ash	*Fraxinus pennyslvanica (Weakley)*	21.6
Tulip Poplar	*Liriodendron tulipifera*	20.0
American Sycamore	*Platanus occidentalis*	20.0
Northern Red Oak	*Quercus rubra*	15.0
Pawpaw	*Asimina triloba*	51.4
Boxelder Maple	*Acer Negundo*	5.6
Red Maple	*Acer Rubrum*	12.6
Tree of heavan	*Ailanthus altissma*	5.0
Mockernut Hickory	*Carya alba*	0.4
Sugar Berry	*Celtis laevigata*	0.1
Common persimmon	*Diospyros virginiana*	15.0
American Beech	*Fagus Grandifolia*	1.0
Possumhaw	*Ilex decidua*	2.0
Eastern Black Walnut	*Juglans nigra*	10.1
Sweetgum	*Liquidambdar styraciflua*	2.0
Willow Oak	*Quercus phellos*	0.1

Wetland Site ID: NC12-21 (Iredell County)
Wetland Type: Headwater Forest (Drainage Area 0.71 mi^2)

Common Name:	Taxon Name:	Average Coverage %
Silky Dogwood	*Cornus amomum*	3.0
Common Persimmon	*Diospyros virginia*	3.0
Green Ash	*Fracinus pennsylvanica (weakly)*	21.0
Eastern Red Cedar	*Juniperis virginiana*	7.0
Sweetgum	*Liquidambar stracila*	8.0
Tulip Poplar	*Liriodendron Tulipifera*	1.1
Black Tupelo	*Nyssa sylvatica*	0.1
American Sycamore	*Platanus occidentalis*	92.0
Black Cherry	*Prunus serotina*	0.1
Overcup Oak	*Quercus lyrata*	60.0
Swamp Chesnut Oak	*Quercus michauxii*	2.0
Water Oak	*Quercus nigra*	1.0
Cherry brk Oak	*Quercus pagoda*	41.0
Willow Oak	*Quercus phellos*	0.2
Black Willow	*Salix nigra*	2.3
Winged Elm	*Ulmus alata*	3.1
American Elm	*Ulmus americana*	3.1

Wetland Site ID: NC12-37 (Rowan County)		
Wetland Type: Headwater Forest (Drainage Area 0.13 mi^2)		
Common Name:	**Taxon Name:**	**Average Coverage %**
Boxelder Maple	*Acer Negundo*	40.8
Red Maple	*Acer Rubrum*	44.5
Smooth Alder	*Alnus serrulata*	3.0
Sugarberry	*Celtis laevigata*	0.1
Hackberry	*Celtis occidentalis*	0.1
Silky Dogwood	*Cornus amomum*	27.1
Common Persimmon	*Diospyros virginiana*	7.2
Green Ash	*Fraxinus pennsylvanica (Weakley)*	34.2
Eastern Black Walnut	*Juglans nigra*	0.1
Sweetgum	*Liquidambar styraciflua*	18.1
Tulip Poplar	*Liriodendron tulipifera*	18.0
Overcup Oak	*Quercus lyrata*	31.3
Cherry bark Oak	*Quercus pagoda*	13.0
Swamp Spanish Oak	*Quercus palustris*	7.2
Willow Oak	*Quercus phellos*	0.4
Black Willow	*Salix nigra*	25.6
American Elderberry	*Sambucus canadensis*	4.0
Winged Elm	*Ulmus alata*	1.0
American Elm	*Ulmus americana*	0.1

Note: All three reference wetlands are located within the Ecoregion 45b (Southern Outer Piedmont)

Appendix 5

- UT1 -
top

NC DWQ Stream Identification Form Version 4.11

Date: 7/30/21	**Project/Site:** Bardy Farm	**Latitude:** 35.636621
Evaluator: T. Barrett / J. Cocanower	**County:** Catawba	**Longitude:** -81.091477
Total Points: *Stream is at least intermittent if ≥ 19 or perennial if ≥ 30** 25.0	**Stream Determination (circle one)** Ephemeral Intermittent Perennial	**Other** *e.g. Quad Name:* Catawba

A. Geomorphology (Subtotal = 13.5)	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 = 7.0)				
12. Presence of Baseflow	0	1	2	3
13. Iron oxidizing bacteria	0	1	2	3
14. Leaf litter	1.5	1	0.5	0
15. Sediment on plants or debris	0	0.5	1	1.5
16. Organic debris lines or piles	0	0.5	1	1.5
17. Soil-based evidence of high water table?	No = 0		Yes = 3	

C. Biology (Subtotal = 4.5)				
18. Fibrous roots in streambed	3	2	1	0
19. Rooted upland plants in streambed	3	2	1	0
20. 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: No macrobenthos noted
Form completed near top of reach, below large headcut
Limited riparian buffer
Vegetation extends 5-10' on each side of top of banks
* Incised, entrenched channel
Chinese privet (dominant) and multiflora rose throughout upper section.

BM = Sand, small gravel, bedrock (medium density)

- UT1 -
Middle

NC DWQ Stream Identification Form Version 4.11

Date: 7/30/21	**Project/Site:** Bandy Farm	**Latitude:** 35.63521
Evaluator: T. Barrett / J. Cocanower	**County:** Catawba	**Longitude:** - 81.088972
Total Points: *Stream is at least intermittent if ≥ 19 or perennial if ≥ 30** 28.75	**Stream Determination (circle one)** **Ephemeral Intermittent Perennial**	**Other** Catawba *e.g. Quad Name:*

A. Geomorphology (Subtotal = 15.5)	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 = 5.0)				
12. Presence of Baseflow	0	1	2	3
13. Iron oxidizing bacteria	0	1	2	3
14. Leaf litter	1.5	1	0.5	0
15. Sediment on plants or debris	0	0.5	1	1.5
16. Organic debris lines or piles	0	0.5	1	1.5
17. Soil-based evidence of high water table?	No = 0		Yes = 3	

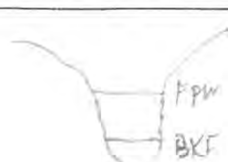
C. Biology (Subtotal = 7.75)				
18. Fibrous roots in streambed	3	2	1	0
19. Rooted upland plants in streambed	3	2	1	0
20. Macrobenthos (note diversity and abundance)	0	1	2	3
21. Aquatic Mollusks	0	1	2	3
22. Fish	0	0.5	1	1.5
23. Crayfish	0	0.5	1	1.5
24. Amphibians	0	0.5	1	1.5
25. Algae	0	0.5	1	1.5
26. 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: Midges and water striders were only macrobenthos noted. 2 frogs.
Scattered trees on lower end, highly denuded understory
Incised, entrenched. Form completed about 3/4 of way down reach.
Scattered invasives (C. privet, M. rose, Tree-of-heaven)

BM = Sand, small gravel, bedrock



- UT1 -

Lower

NC DWQ Stream Identification Form Version 4.11

Date: 7/30/21	**Project/Site:** Bandy Farm	**Latitude:** 35.63521
Evaluator: T. Barrett / J. Cocanower	**County:** Catawba	**Longitude:** -81.088972
Total Points: *Stream is at least intermittent if ≥ 19 or perennial if ≥ 30** 32.75	**Stream Determination (circle one)** Ephemeral Intermittent Perennial	**Other** Catawba *e.g. Quad Name:*

A. Geomorphology (Subtotal = 18.0)	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 = 6.25)				
18. Fibrous roots in streambed	3	2	1	0
19. Rooted upland plants in streambed	3	2	1	0
20. Macrobenthos (note diversity and abundance)	0	1	2	3
21. Aquatic Mollusks	0	1	2	3
22. Fish	0	0.5	1	1.5
23. Crayfish	0	0.5	1	1.5
24. Amphibians	0	0.5	1	1.5
25. Algae	0	0.5	1	1.5
26. Wetland plants in streambed		FACW = 0.75; OBL = 1.5 Other = 0		

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

Notes:

Sketch: Stream and banks heavily trampled by cattle. Only midges and water striders noted
Large pools and banks are not as steep, so cows can access and loaf.
Scattered riparian buffer (larger trees) > 5 frogs noted.
Bedrock seam
BM = Sand, gravel, bedrock

Incised, entrenched

- UT1a -

NC DWQ Stream Identification Form Version 4.11

Date: 7/30/21	**Project/Site:** Bandy Farm	**Latitude:** 35.637460
Evaluator: T. Barrett / J. Cocarower	**County:** Catawba	**Longitude:** -81.089029
Total Points: *Stream is at least intermittent if ≥ 19 or perennial if ≥ 30** 22.75	**Stream Determination (circle one)** **Ephemeral Intermittent Perennial**	**Other** *e.g. Quad Name*: Catawba

A. Geomorphology (Subtotal = 13.0)	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

7.5 6 4.5

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 = 4.25)				
18. Fibrous roots in streambed	3	2	1	0
19. Rooted upland plants in streambed	3	2	1	0
20. Macrobenthos (note diversity and abundance)	0	1	2	3
21. Aquatic Mollusks	0	1	2	3
22. Fish	0	0.5	1	1.5
23. Crayfish	0	0.5	1	1.5
24. Amphibians	0	0.5	1	1.5
25. Algae	0	0.5	1	1.5
26. Wetland plants in streambed	0.75	FACW = 0.75; OBL = 1.5 Other = 0		

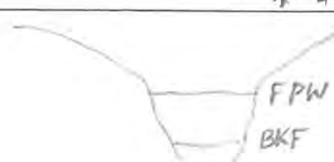
*perennial streams may also be identified using other methods. See p. 35 of manual.

Notes:

Sketch: No macrobenthos noted
wood and debris in channel
Form completed near start of reach
* Incised, entrenched channel.

Limited riparian buffer
Woody vegetation is located along top of bank and extends only 5' wide
Chinese privet and multiflora rose scattered along reach (low density)

BM = sand, sm - med. gravel



- UT2 -

NC DWQ Stream Identification Form Version 4.11

Date: 7/30/21	Project/Site: Bandy Farm	Latitude: 36.63336
Evaluator: T. Barrett / J. Cocanower	County: Catawba	Longitude: -81.081262
Total Points: *Stream is at least intermittent if ≥ 19 or perennial if ≥ 30** 35.5	**Stream Determination (~~circle one~~)** Ephemeral Intermittent Perennial	Other *e.g. Quad Name:* Catawba

A. Geomorphology (Subtotal = 22.0)	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 = 5.0)	Absent	Weak	Moderate	Strong
12. Presence of Baseflow	0	1	2	3
13. Iron oxidizing bacteria	0	1	2	3
14. Leaf litter	1.5	1	0.5	0
15. Sediment on plants or debris	0	0.5	1	1.5
16. Organic debris lines or piles	0	0.5	1	1.5
17. Soil-based evidence of high water table?	No = 0		Yes = 3	

C. Biology (Subtotal = 8.5)	Absent	Weak	Moderate	Strong
18. Fibrous roots in streambed	3	2	1	0
19. Rooted upland plants in streambed	3	2	1	0
20. Macrobenthos (note diversity and abundance)	0	1	2	3
21. Aquatic Mollusks	0	1	2	3
22. Fish	0	0.5	1	1.5
23. Crayfish	0	0.5	1	1.5
24. Amphibians	0	0.5	1	1.5
25. Algae	0	0.5	1	1.5
26. Wetland plants in streambed	—	FACW = 0.75; OBL = 1.5 Other = 0		

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

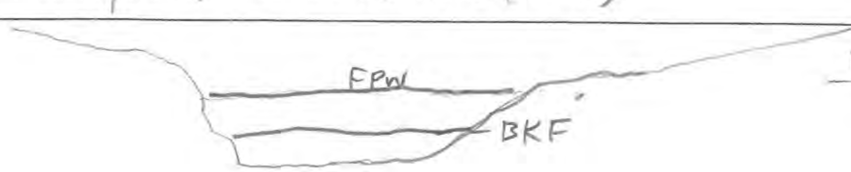
Notes:

Sketch: 2 caddisfly cases, 1 aquatic beetle. Small minnows and larger sunfish noted
> 5 frogs noted, 1 crayfish

Riparian buffer small at top of reach and on portions of lower reach

Chinese privet and multiflora rose noted on majority of reach, except for mature woods (middle).

BM @ upper reach
- Sand, sm - med. gravel



BM middle, lower
large gravel to cobble

– UT3 –

NC DWQ Stream Identification Form Version 4.11

Date: 8/4/21	**Project/Site:** Bandy Farm	**Latitude:** 35.628687
Evaluator: T. Barrett / J. Cocanower	**County:** Catawba	**Longitude:** -81.077743
Total Points: *Stream is at least intermittent if ≥ 19 or perennial if ≥ 30** 19.5	**Stream Determination (circle one)** **Ephemeral Intermittent Perennial**	**Other** *e.g. Quad Name:* Catawba

A. Geomorphology (Subtotal = 10.5)	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 = 4.5)				
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 = 4.5)				
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.

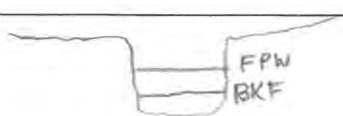
Notes:

Sketch: No macrobenthos noted

Several frogs and 3 salamanders noted.
No fish.

Bed mat. = Small to large gravel
– incised, entrenched

Riparian buffer is small on right bank and wooded on left.



UT3A

NC DWQ Stream Identification Form Version 4.11

Date: 6/16/22	**Project/Site:** Bandys Farm	**Latitude:** 35.628504
Evaluator: SK, PW	**County:** Catawba	**Longitude:** -81.077985
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:* Catawba Quad

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 @ top/start	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

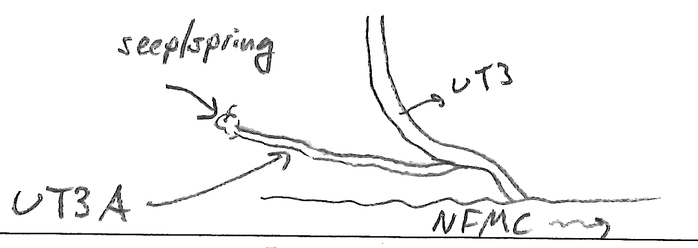
B. Hydrology (Subtotal = 6)	Absent	Weak	Moderate	Strong
12. Presence of Baseflow	0	1 ⟷	2	3
13. Iron oxidizing bacteria	0	1	2	3
14. Leaf litter	1.5	1	0.5	0
15. Sediment on plants or debris	0	0.5	1	1.5
16. Organic debris lines or piles	0	0.5	1	1.5
17. Soil-based evidence of high water table?	No = 0		Yes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

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

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

Notes:

Sketch:



seep/spring origin @ a headcut

* Despite the score, EPR staff believes the stream is likely perennial due to the spring/seep origin. Flow was solid in June and July.

— North Fork Mtn. Creek —

NC DWQ Stream Identification Form Version 4.11

Date: 8/4/21	**Project/Site:** Bandy Farm	**Latitude:** 35.628642
Evaluator: T. Barrett / J. Cocanower	**County:** Catawba	**Longitude:** -81.07923
Total Points: *Stream is at least intermittent if ≥ 19 or perennial if ≥ 30** See Notes	**Stream Determination (circle one)** Ephemeral Intermittent Perennial	**Other** *e.g. Quad Name:* Catawba

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

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

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

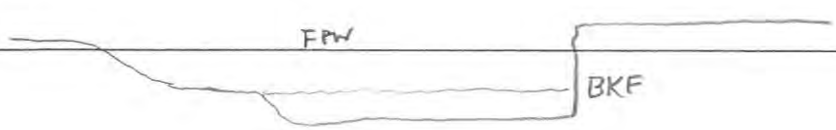
C. Biology (Subtotal = —)	Absent	Weak	Moderate	Strong
18. Fibrous roots in streambed	3	2	1	0
19. Rooted upland plants in streambed	3	2	1	0
20. Macrobenthos (note diversity and abundance)	0	1	2	3
21. Aquatic Mollusks	0	1	2	3
22. Fish	0	0.5	1	1.5
23. Crayfish	0	0.5	1	1.5
24. Amphibians	0	0.5	1	1.5
25.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

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

Notes:

Sketch: Stream was not scored since it was a named stream.
Drainage area ranges from 1.5 - 2.1 mi^2

Large gravel, cobble, bedrock



NFMC

NC SAM FIELD ASSESSMENT FORM
Accompanies User Manual Version 2.1

USACE AID #: NCDWR #:

INSTRUCTIONS: Attach a sketch of the assessment area and photographs. Attach a copy of the USGS 7.5-minute topographic quadrangle, and circle the location of the stream reach under evaluation. If multiple stream reaches will be evaluated on the same property, identify and number all reaches on the attached map, and include a separate form for each reach. See the NC SAM User Manual for detailed descriptions and explanations of requested information. Record in the "Notes/Sketch" section if any 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).

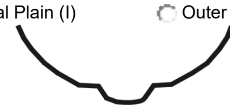
PROJECT / SITE INFORMATION:
1. Project name (if any): Bandy's Farm 2. Date of evaluation:
3. Applicant/owner name: 4. Assessor name/organization: EPR: Ecosystem Planning and Restora
5. County: Catawba 6. Nearest named water body
7. River Basin: Catawba on USGS 7.5-minute quad: North Fork Mountain Creek
8. Site coordinates (decimal degrees, at lower end of assessment reach): 35.6279, -81.0776

STREAM INFORMATION: (depth and width can be approximations)
9. Site number (show on attached map): North Fork Mountain Cr 10. Length of assessment reach evaluated (feet): 1362
11. Channel depth from bed (in riffle, if present) to top of bank (feet): 5.5 ☐ Unable to assess channel depth.
12. Channel width at top of bank (feet): 27 13. Is assessment reach a swamp stream? ○ Yes ○ No
14. Feature type: ◉ Perennial flow ○ Intermittent flow ○ Tidal Marsh Stream

STREAM RATING 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 appy 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 adversely affected by a flow restriction or fill to the point of obstructing flow or a channel choked with aquatic macrophytes or ponded water or impounded on flood or ebb within the assessment reach (examples: undersized or perched culverts, causeways that constrict the channel, tidal gates).
- ◉ B Not A

3. Feature Pattern – assessment reach metric
- ○ A A majority of the assessment reach has altered pattern (examples: straightening, modification above or below culvert).
- ◉ B Not A.

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

5. Signs of Active Instability – assessment reach metric
Consider only current instability, not past events from which the stream has currently recovered. Examples of instability include active bank failure, active channel down-cutting (head-cut), active widening, and artificial hardening (such as concrete, gabion, rip-rap).
- ○ A < 10% of channel unstable
- ◉ B 10 to 25% of channel unstable
- ○ C > 25% of channel unstable

6. Streamside Area Interaction – streamside area metric
Consider for the Left Bank (LB) and the Right Bank (RB).

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

7. Water Quality Stressors – assessment reach/intertidal zone metric
Check all that apply.

- ☐ A Discolored water in stream or intertidal zone (milky white, blue, unnatural water discoloration, oil sheen, stream foam)
- ☐ B <u>Excessive</u> sedimentation (burying of stream features or intertidal zone)
- ☐ C Noticeable evidence of pollutant discharges entering the assessment reach <u>and</u> causing a water quality problem
- ☐ D Odor (not including natural sulfide odors)
- ☐ E Current published or collected data indicating degraded water quality in the assessment reach. Cite source in the "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
For Size 1 or 2 streams, D1 drought or higher is considered a drought; for Size 3 or 4 streams, D2 drought or higher is considered a drought.

- ○ A Drought conditions <u>and</u> no rainfall or rainfall not exceeding 1 inch within the last 48 hours
- ○ B Drought conditions <u>and</u> rainfall exceeding 1 inch within the last 48 hours
- ● C No drought conditions

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

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

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

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

Check for Tidal Marsh Streams only

- ☐ F 5% oysters or other natural hard bottoms
- ☐ G Submerged aquatic vegetation
- ☐ H Low-tide refugia (pools)
- ☐ I Sand bottom
- ☐ J 5% vertical bank along the marsh
- ☐ K Little or no habitat

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

11. Bedform and Substrate – assessment reach metric (skip for Size 4 Coastal Plain streams and Tidal Marsh Streams)
11a. ○ Yes ● No Is assessment reach in a natural sand-bed stream? **(skip for Coastal Plain streams)**

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

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

11c. In riffles 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 Size 4 Coastal Plain streams and Tidal Marsh Streams)**

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

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

1	>1	Numbers over columns refer to "individuals" for size 1 and 2 streams and "taxa" for size 3 and 4 streams.
☐	☐	Adult frogs
☐	☐	Aquatic reptiles
☐	☐	Aquatic macrophytes and aquatic mosses (include liverworts, lichens, and algal mats)
☐	☐	Beetles (including water pennies)
☐	☐	Caddisfly larvae (Trichoptera [T])
☐	☐	Asian clam (*Corbicula*)
☐	☐	Crustacean (isopod/amphipod/crayfish/shrimp)
☐	☐	Damselfly and dragonfly larvae
☐	☐	Dipterans (true flies)
☐	☐	Mayfly larvae (Ephemeroptera [E])
☐	☐	Megaloptera (alderfly, fishfly, dobsonfly larvae)
☐	☐	Midges/mosquito larvae
☐	☐	Mosquito fish (*Gambusia*) or mud minnows (*Umbra pygmaea)*
☐	☐	Mussels/Clams (not *Corbicula*)
☐	☐	Other fish
☐	☐	Salamanders/tadpoles
☐	☐	Snails
☐	☐	Stonefly larvae (Plecoptera [P])
☐	☐	Tipulid larvae
☐	☐	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 include: ditches, fill, soil, compaction, livestock disturbance, buildings, man-made levees, drainage pipes)

14. **Streamside Area Water Storage – streamside area metric (skip for Size 1 streams, Tidal Marsh Streams, and B valley types)**
Consider for the Left Bank (LB) and the Right Bank (RB) of the streamside area.

LB	RB	
○ A	○ A	Majority of streamside area with depressions able to pond water ≥ 6 inches deep
◉ B	◉ B	Majority of streamside area with depressions able to pond water 3 to 6 inches deep
○ C	○ C	Majority of streamside area with depressions able to pond water < 3 inches deep

15. **Wetland Presence – streamside area metric (skip for Tidal Marsh Streams)**
Consider for the Left Bank (LB) and the Right Bank (RB). Do not consider wetlands outside of the streamside area or within the normal wetted perimeter of assessment reach.

LB	RB	
◉ Y	◉ Y	Are wetlands present in the streamside area?
○ N	○ N	

16. **Baseflow Contributors – assessment reach metric (skip for size 4 streams and Tidal Marsh Streams)**
Check all contributors within the assessment reach or within view of <u>and</u> draining to the assessment reach.

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

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

- ☐ A Evidence of substantial water withdrawals from the assessment reach (includes areas excavated for pump installation)
- ☐ B Obstruction not passing flow during low flow periods affecting the assessment reach (ex: watertight dam, sediment deposit)
- ☐ C Urban stream (≥ 24% impervious surface for watershed)
- ☑ D Evidence that the stream-side 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 – First 100 feet of streamside area metric (skip for Tidal Marsh Streams)
Evaluate the dominant vegetation within 100 feet of each bank or to the edge of the watershed (whichever comes first) as it contributes to assessment reach habitat.

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

25. Conductivity – assessment reach metric (skip for all Coastal Plain streams)
25a. Yes No Was a 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:

NC SAM Stream Rating Sheet
Accompanies User Manual Version 2.1

Stream Site Name Bandy's Farm | Date of Evaluation
Stream Category Pa3 | Assessor Name/Organization :osystem Planning and Res

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

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

UT1

NC SAM FIELD ASSESSMENT FORM
Accompanies User Manual Version 2.1

USACE AID #: NCDWR #:

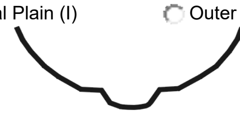
INSTRUCTIONS: Attach a sketch of the assessment area and photographs. Attach a copy of the USGS 7.5-minute topographic quadrangle, and circle the location of the stream reach under evaluation. If multiple stream reaches will be evaluated on the same property, identify and number all reaches on the attached map, and include a separate form for each reach. See the NC SAM User Manual for detailed descriptions and explanations of requested information. Record in the "Notes/Sketch" section if any 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): Bandy's Farm
2. Date of evaluation:
3. Applicant/owner name:
4. Assessor name/organization: EPR: Ecosytem Planning and Restorati
5. County: Catawba
6. Nearest named water body on USGS 7.5-minute quad: North Fork Mountain Creek
7. River Basin: Catawba
8. Site coordinates (decimal degrees, at lower end of assessment reach): 35.6344,-81.0874

STREAM INFORMATION: (depth and width can be approximations)
9. Site number (show on attached map): UT1
10. Length of assessment reach evaluated (feet): 1625
11. Channel depth from bed (in riffle, if present) to top of bank (feet): 2 ☐ Unable to assess channel depth.
12. Channel width at top of bank (feet): 20
13. Is assessment reach a swamp stream? ( ) Yes ( ) No
14. Feature type: (•) Perennial flow ( ) Intermittent flow ( ) Tidal Marsh Stream

STREAM RATING 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 appy 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 adversely affected by a flow restriction or fill to the point of obstructing flow or a channel choked with aquatic macrophytes or ponded water or impounded on flood or ebb within the assessment reach (examples: undersized or perched culverts, causeways that constrict the channel, tidal gates).
- (•) B Not A

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

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

5. Signs of Active Instability – assessment reach metric
Consider only current instability, not past events from which the stream has currently recovered. Examples of instability include active bank failure, active channel down-cutting (head-cut), active widening, and artificial hardening (such as concrete, gabion, rip-rap).
- ( ) A < 10% of channel unstable
- ( ) B 10 to 25% of channel unstable
- (•) C > 25% of channel unstable

6. **Streamside Area Interaction – streamside area metric**
Consider for the Left Bank (LB) and the Right Bank (RB).

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

7. **Water Quality Stressors – assessment reach/intertidal zone metric**
Check all that apply.
- [ ] A Discolored water in stream or intertidal zone (milky white, blue, unnatural water discoloration, oil sheen, stream foam)
- [ ] B <u>Excessive</u> sedimentation (burying of stream features or intertidal zone)
- [x] C Noticeable evidence of pollutant discharges entering the assessment reach <u>and</u> causing a water quality problem
- [ ] D Odor (not including natural sulfide odors)
- [ ] E Current published or collected data indicating degraded water quality in the assessment reach. Cite source in the "Notes/Sketch" section.
- [x] 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**
For Size 1 or 2 streams, D1 drought or higher is considered a drought; for Size 3 or 4 streams, D2 drought or higher is considered a drought.
- ( ) A Drought conditions <u>and</u> no rainfall or rainfall not exceeding 1 inch within the last 48 hours
- ( ) B Drought conditions <u>and</u> rainfall exceeding 1 inch within the last 48 hours
- (•) C No drought conditions

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

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

10b. **Check all that occur** (occurs if > 5% coverage of assessment reach) **(skip for Size 4 Coastal Plain streams)**
- [ ] A Multiple aquatic macrophytes and aquatic mosses (include liverworts, lichens, and algal mats)
- [x] B Multiple sticks and/or leaf packs and/or emergent vegetation
- [x] C Multiple snags and logs (including lap trees)
- [x] 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).**
- [x] A Riffle-run section (evaluate 11c)
- [ ] B Pool-glide section (evaluate 11d)
- [ ] C Natural bedform absent **(skip to Metric 12, Aquatic Life)**

11c. In riffles 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 Size 4 Coastal Plain streams and Tidal Marsh Streams)**

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

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

1	>1	Numbers over columns refer to "individuals" for size 1 and 2 streams and "taxa" for size 3 and 4 streams.
☐	☐	Adult frogs
☐	☐	Aquatic reptiles
☐	☐	Aquatic macrophytes and aquatic mosses (include liverworts, lichens, and algal mats)
☐	☐	Beetles (including water pennies)
☐	☐	Caddisfly larvae (Trichoptera [T])
☐	☐	Asian clam (*Corbicula*)
☐	☐	Crustacean (isopod/amphipod/crayfish/shrimp)
☐	☐	Damselfly and dragonfly larvae
☐	☐	Dipterans (true flies)
☐	☐	Mayfly larvae (Ephemeroptera [E])
☐	☐	Megaloptera (alderfly, fishfly, dobsonfly larvae)
☐	☐	Midges/mosquito larvae
☐	☐	Mosquito fish (*Gambusia*) or mud minnows (*Umbra pygmaea)*
☐	☐	Mussels/Clams (not *Corbicula*)
☐	☐	Other fish
☐	☐	Salamanders/tadpoles
☐	☐	Snails
☐	☐	Stonefly larvae (Plecoptera [P])
☐	☐	Tipulid larvae
☐	☐	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 include: ditches, fill, soil, compaction, livestock disturbance, buildings, man-made levees, drainage pipes)

14. **Streamside Area Water Storage – streamside area metric (skip for Size 1 streams, Tidal Marsh Streams, and B valley types)**
Consider for the Left Bank (LB) and the Right Bank (RB) of the streamside area.

LB	RB	
○ A	○ A	Majority of streamside area with depressions able to pond water ≥ 6 inches deep
○ B	○ B	Majority of streamside area with depressions able to pond water 3 to 6 inches deep
◉ C	◉ C	Majority of streamside area with depressions able to pond water < 3 inches deep

15. **Wetland Presence – streamside area metric (skip for Tidal Marsh Streams)**
Consider for the Left Bank (LB) and the Right Bank (RB). Do not consider wetlands outside of the streamside area or within the normal wetted perimeter of assessment reach.

LB	RB	
◉ Y	○ Y	Are wetlands present in the streamside area?
○ N	◉ N	

16. **Baseflow Contributors – assessment reach metric (skip for size 4 streams and Tidal Marsh Streams)**
Check all contributors within the assessment reach or within view of <u>and</u> draining to the assessment reach.

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

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

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

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

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

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

Vegetated LB	Vegetated RB	Wooded LB	Wooded RB	
◉ A	◉ A	○ A	○ A	≥ 100-feet wide <u>or</u> extends to the edge of the watershed
○ B	○ B	○ B	○ B	From 50 to < 100-feet wide
○ C	○ C	○ C	○ C	From 30 to < 50-feet wide
○ D	○ D	○ D	○ D	From 10 to < 30-feet wide
○ E	○ E	◉ E	◉ E	< 10-feet wide <u>or</u> no trees

20. Buffer Structure – streamside area metric (skip for Tidal Marsh Streams)
Consider for left bank (LB) and right bank (RB) for Metric 19 ("Vegetated" Buffer Width).

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

21. Buffer Stressors – streamside area metric (skip for Tidal Marsh Streams)
Check all appropriate boxes for left bank (LB) and right bank (RB). Indicate if listed stressor abuts stream (Abuts), does not abut but is within 30 feet of stream (< 30 feet), or is between 30 to 50 feet of stream (30-50 feet).
If none of the following stressors occurs on either bank, check here and skip to Metric 22: ☐

Abuts LB	Abuts RB	< 30 feet LB	< 30 feet RB	30-50 feet LB	30-50 feet RB	
○ A	○ A	○ A	○ A	○ A	○ A	Row crops
○ B	○ B	○ B	○ B	○ B	○ B	Maintained turf
○ C	○ C	○ C	○ C	○ C	○ C	Pasture (no livestock)/commercial horticulture
◉ D	◉ D	◉ D	◉ D	◉ D	◉ D	Pasture (active livestock use)

22. Stem Density – streamside area metric (skip for Tidal Marsh Streams)
Consider for left bank (LB) and right bank (RB) for Metric 19 ("Wooded" Buffer Width).

LB	RB	
○ A	○ A	Medium to high stem density
◉ B	◉ B	Low stem density
○ C	○ C	No wooded riparian buffer <u>or</u> predominantly herbaceous species <u>or</u> bare ground

23. Continuity of Vegetated Buffer – streamside area metric (skip for Tidal Marsh Streams)
Consider whether vegetated buffer is continuous along stream (parallel). Breaks are areas lacking vegetation > 10-feet wide.

LB	RB	
○ A	○ A	The total length of buffer breaks is < 25 percent.
◉ B	◉ B	The total length of buffer breaks is between 25 and 50 percent.
○ C	○ C	The total length of buffer breaks is > 50 percent.

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

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

25. Conductivity – assessment reach metric (skip for all Coastal Plain streams)
25a. ○ Yes ◉ No Was a 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:

NC SAM Stream Rating Sheet
Accompanies User Manual Version 2.1

Stream Site Name Bandy's Farm

Date of Evaluation

Stream Category Pa2

Assessor Name/Organization cosytem Planning and Res

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

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

UT1A

NC SAM FIELD ASSESSMENT FORM
Accompanies User Manual Version 2.1

USACE AID #: NCDWR #:

INSTRUCTIONS: Attach a sketch of the assessment area and photographs. Attach a copy of the USGS 7.5-minute topographic quadrangle, and circle the location of the stream reach under evaluation. If multiple stream reaches will be evaluated on the same property, identify and number all reaches on the attached map, and include a separate form for each reach. See the NC SAM User Manual for detailed descriptions and explanations of requested information. Record in the "Notes/Sketch" section if any 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).

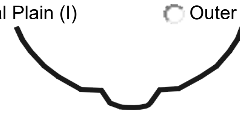
PROJECT / SITE INFORMATION:
1. Project name (if any): Bandy's Farm
2. Date of evaluation:
3. Applicant/owner name:
4. Assessor name/organization: EPR: Ecosystem Planning and Restorat
5. County: Catawba
6. Nearest named water body on USGS 7.5-minute quad: North Fork Mountain Creek
7. River Basin: Catawba
8. Site coordinates (decimal degrees, at lower end of assessment reach): 35.6345, -81.0874

STREAM INFORMATION: (depth and width can be approximations)
9. Site number (show on attached map): UT1a
10. Length of assessment reach evaluated (feet): 1279
11. Channel depth from bed (in riffle, if present) to top of bank (feet): 4.2 ☐ Unable to assess channel depth.
12. Channel width at top of bank (feet): 14
13. Is assessment reach a swamp stream? ( ) Yes ( ) No
14. Feature type: ( ) Perennial flow (•) Intermittent flow ( ) Tidal Marsh Stream

STREAM RATING 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 appy 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 adversely affected by a flow restriction or fill to the point of obstructing flow or a channel choked with aquatic macrophytes or ponded water or impounded on flood or ebb within the assessment reach (examples: undersized or perched culverts, causeways that constrict the channel, tidal gates).
   - (•) B Not A

3. **Feature Pattern – assessment reach metric**
   - ( ) A A majority of the assessment reach has altered pattern (examples: straightening, modification above or below culvert).
   - (•) B Not A.

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

5. **Signs of Active Instability – assessment reach metric**
   Consider only current instability, not past events from which the stream has currently recovered. Examples of instability include active bank failure, active channel down-cutting (head-cut), active widening, and artificial hardening (such as concrete, gabion, rip-rap).
   - ( ) A < 10% of channel unstable
   - ( ) B 10 to 25% of channel unstable
   - (•) C > 25% of channel unstable

6. Streamside Area Interaction – streamside area metric
Consider for the Left Bank (LB) and the Right Bank (RB).

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

7. Water Quality Stressors – assessment reach/intertidal zone metric
Check all that apply.

- [ ] A Discolored water in stream or intertidal zone (milky white, blue, unnatural water discoloration, oil sheen, stream foam)
- [ ] B <u>Excessive</u> sedimentation (burying of stream features or intertidal zone)
- [x] C Noticeable evidence of pollutant discharges entering the assessment reach <u>and</u> causing a water quality problem
- [ ] D Odor (not including natural sulfide odors)
- [ ] E Current published or collected data indicating degraded water quality in the assessment reach. Cite source in the "Notes/Sketch" section.
- [x] 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
For Size 1 or 2 streams, D1 drought or higher is considered a drought; for Size 3 or 4 streams, D2 drought or higher is considered a drought.

- ( ) A Drought conditions <u>and</u> no rainfall or rainfall not exceeding 1 inch within the last 48 hours
- ( ) B Drought conditions <u>and</u> rainfall exceeding 1 inch within the last 48 hours
- (•) C No drought conditions

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

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

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

- [ ] A Multiple aquatic macrophytes and aquatic mosses (include liverworts, lichens, and algal mats)
- [ ] B Multiple sticks and/or leaf packs and/or emergent vegetation
- [x] C Multiple snags and logs (including lap trees)
- [x] 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).**

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

11c. In riffles 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 Size 4 Coastal Plain streams and Tidal Marsh Streams)**

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

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

1	>1	Numbers over columns refer to "individuals" for size 1 and 2 streams and "taxa" for size 3 and 4 streams.
☐	☐	Adult frogs
☐	☐	Aquatic reptiles
☐	☐	Aquatic macrophytes and aquatic mosses (include liverworts, lichens, and algal mats)
☐	☐	Beetles (including water pennies)
☐	☐	Caddisfly larvae (Trichoptera [T])
☐	☐	Asian clam (*Corbicula*)
☐	☐	Crustacean (isopod/amphipod/crayfish/shrimp)
☐	☐	Damselfly and dragonfly larvae
☐	☐	Dipterans (true flies)
☐	☐	Mayfly larvae (Ephemeroptera [E])
☐	☐	Megaloptera (alderfly, fishfly, dobsonfly larvae)
☐	☐	Midges/mosquito larvae
☐	☐	Mosquito fish (*Gambusia*) or mud minnows (*Umbra pygmaea)*
☐	☐	Mussels/Clams (not *Corbicula*)
☐	☐	Other fish
☐	☐	Salamanders/tadpoles
☐	☐	Snails
☐	☐	Stonefly larvae (Plecoptera [P])
☐	☐	Tipulid larvae
☐	☐	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 include: ditches, fill, soil, compaction, livestock disturbance, buildings, man-made levees, drainage pipes)

14. **Streamside Area Water Storage – streamside area metric (skip for Size 1 streams, Tidal Marsh Streams, and B valley types)**
Consider for the Left Bank (LB) and the Right Bank (RB) of the streamside area.

LB	RB	
○ A	○ A	Majority of streamside area with depressions able to pond water ≥ 6 inches deep
○ B	○ B	Majority of streamside area with depressions able to pond water 3 to 6 inches deep
◉ C	◉ C	Majority of streamside area with depressions able to pond water < 3 inches deep

15. **Wetland Presence – streamside area metric (skip for Tidal Marsh Streams)**
Consider for the Left Bank (LB) and the Right Bank (RB). Do not consider wetlands outside of the streamside area or within the normal wetted perimeter of assessment reach.

LB	RB	
○ Y	◉ Y	Are wetlands present in the streamside area?
◉ N	○ N	

16. **Baseflow Contributors – assessment reach metric (skip for size 4 streams and Tidal Marsh Streams)**
Check all contributors within the assessment reach or within view of <u>and</u> draining to the assessment reach.

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

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

☐ A Evidence of substantial water withdrawals from the assessment reach (includes areas excavated for pump installation)
☐ B Obstruction not passing flow during low flow periods affecting the assessment reach (ex: watertight dam, sediment deposit)
☐ C Urban stream (≥ 24% impervious surface for watershed)
☑ D Evidence that the stream-side 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 – First 100 feet of streamside area metric (skip for Tidal Marsh Streams)
Evaluate the dominant vegetation within 100 feet of each bank or to the edge of the watershed (whichever comes first) as it contributes to assessment reach habitat.

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

25. Conductivity – assessment reach metric (skip for all Coastal Plain streams)
25a. ( ) Yes (●) No Was a 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:

NC SAM Stream Rating Sheet
Accompanies User Manual Version 2.1

Stream Site Name Bandy's Farm
Date of Evaluation
Stream Category Pa1
Assessor Name/Organization :osystem Planning and Res

Notes of Field Assessment Form (Y/N)	NO
Presence of regulatory considerations (Y/N)	NO
Additional stream information/supplementary measurements included (Y/N)	
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	**MEDIUM**	**MEDIUM**
(2) Flood Flow	**LOW**	**LOW**
(3) Streamside Area Attenuation	**LOW**	**LOW**
(4) Floodplain Access	**LOW**	**LOW**
(4) Wooded Riparian Buffer	**LOW**	**LOW**
(4) Microtopography	**LOW**	**LOW**
(3) Stream Stability	**LOW**	**LOW**
(4) Channel Stability	**LOW**	**LOW**
(4) Sediment Transport	**MEDIUM**	**MEDIUM**
(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	**LOW**	**LOW**
(2) Baseflow	**MEDIUM**	**MEDIUM**
(2) Streamside Area Vegetation	**LOW**	**LOW**
(3) Upland Pollutant Filtration	**LOW**	**LOW**
(3) Thermoregulation	**LOW**	**LOW**
(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**	**MEDIUM**
(3) Baseflow	**MEDIUM**	**MEDIUM**
(3) Substrate	**LOW**	**LOW**
(3) Stream Stability	**LOW**	**LOW**
(3) In-stream Habitat	**MEDIUM**	**HIGH**
(2) Stream-side Habitat	**LOW**	**LOW**
(3) Stream-side Habitat	**LOW**	**LOW**
(3) Thermoregulation	**LOW**	**LOW**
(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 Habitat	NA	NA
Overall	**LOW**	**LOW**

UT2

NC SAM FIELD ASSESSMENT FORM
Accompanies User Manual Version 2.1

USACE AID #: NCDWR #:

INSTRUCTIONS: Attach a sketch of the assessment area and photographs. Attach a copy of the USGS 7.5-minute topographic quadrangle, and circle the location of the stream reach under evaluation. If multiple stream reaches will be evaluated on the same property, identify and number all reaches on the attached map, and include a separate form for each reach. See the NC SAM User Manual for detailed descriptions and explanations of requested information. Record in the "Notes/Sketch" section if any 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).

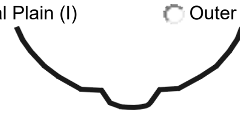
PROJECT / SITE INFORMATION:
1. Project name (if any): Bandy's Farm
2. Date of evaluation:
3. Applicant/owner name:
4. Assessor name/organization: EPR
5. County: Catawba
6. Nearest named water body on USGS 7.5-minute quad: North Fork Moutain Creek
7. River Basin: Catawba
8. Site coordinates (decimal degrees, at lower end of assessment reach): 35.6291, -81.0806

STREAM INFORMATION: (depth and width can be approximations)
9. Site number (show on attached map): UT2
10. Length of assessment reach evaluated (feet): 3076
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): 25
13. Is assessment reach a swamp stream? ( ) Yes ( ) No
14. Feature type: (•) Perennial flow ( ) Intermittent flow ( ) Tidal Marsh Stream

STREAM RATING 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 appy 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 adversely affected by a flow restriction or fill to the point of obstructing flow or a channel choked with aquatic macrophytes or ponded water or impounded on flood or ebb within the assessment reach (examples: undersized or perched culverts, causeways that constrict the channel, tidal gates).
   - (•) 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 the "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
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 riffles 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 Size 4 Coastal Plain streams and Tidal Marsh Streams)**
  12a. ◯ Yes ◉ No Was an in-stream aquatic life assessment performed as described in the User Manual?
  If No, select one of the following reasons and skip to Metric 13. ◯ No Water ◯ Other: ______________________

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

  1 >1 Numbers over columns refer to "individuals" for size 1 and 2 streams and "taxa" for size 3 and 4 streams.
  ☐ ☐ Adult frogs
  ☐ ☐ Aquatic reptiles
  ☐ ☐ Aquatic macrophytes and aquatic mosses (include liverworts, lichens, and algal mats)
  ☐ ☐ Beetles (including water pennies)
  ☐ ☐ Caddisfly larvae (Trichoptera [T])
  ☐ ☐ Asian clam (*Corbicula*)
  ☐ ☐ Crustacean (isopod/amphipod/crayfish/shrimp)
  ☐ ☐ Damselfly and dragonfly larvae
  ☐ ☐ Dipterans (true flies)
  ☐ ☐ Mayfly larvae (Ephemeroptera [E])
  ☐ ☐ Megaloptera (alderfly, fishfly, dobsonfly larvae)
  ☐ ☐ Midges/mosquito larvae
  ☐ ☐ Mosquito fish (*Gambusia*) or mud minnows (*Umbra pygmaea)*
  ☐ ☐ Mussels/Clams (not *Corbicula*)
  ☐ ☐ Other fish
  ☐ ☐ Salamanders/tadpoles
  ☐ ☐ Snails
  ☐ ☐ Stonefly larvae (Plecoptera [P])
  ☐ ☐ Tipulid larvae
  ☐ ☐ 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 include: ditches, fill, soil, compaction, livestock disturbance, buildings, man-made levees, drainage pipes)

14. **Streamside Area Water Storage – streamside area metric (skip for Size 1 streams, Tidal Marsh Streams, and B valley types)**
  Consider for the Left Bank (LB) and the Right Bank (RB) of the streamside area.
  LB RB
  ◯ A ◯ A Majority of streamside area with depressions able to pond water ≥ 6 inches deep
  ◯ B ◯ B Majority of streamside area with depressions able to pond water 3 to 6 inches deep
  ◉ C ◉ C Majority of streamside area with depressions able to pond water < 3 inches deep

15. **Wetland Presence – streamside area metric (skip for Tidal Marsh Streams)**
  Consider for the Left Bank (LB) and the Right Bank (RB). Do not consider wetlands outside of the streamside area or within the normal wetted perimeter of assessment reach.
  LB RB
  ◉ Y ◉ Y Are wetlands present in the streamside area?
  ◯ N ◯ N

16. **Baseflow Contributors – assessment reach metric (skip for size 4 streams and Tidal Marsh Streams)**
  Check all contributors within the assessment reach or within view of <u>and</u> draining to the assessment reach.
  ☐ A Streams and/or springs (jurisdictional discharges)
  ☐ B Ponds (include wet detention basins; do not include sediment basins or dry detention basins)
  ☐ C Obstruction that passes some flow during low-flow periods within assessment area (beaver dam, bottom-release dam)
  ☐ D Evidence of bank seepage or sweating (iron oxidizing bacteria in water indicates seepage)
  ☐ E Stream bed or bank soil reduced (dig through deposited sediment if present)
  ☑ F None of the above

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

18. **Shading – assessment reach metric (skip for Tidal Marsh Streams)**
  Consider aspect. Consider "leaf-on" condition.
  ◯ A Stream shading is appropriate for stream category (may include gaps associated with natural processes)
  ◉ B Degraded (example: scattered trees)
  ◯ C Stream shading is gone or largely absent

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

Vegetated		Wooded		
LB	RB	LB	RB	
◉ A	◉ A	○ A	○ A	≥ 100-feet wide <u>or</u> extends to the edge of the watershed
○ B	○ B	○ B	○ B	From 50 to < 100-feet wide
○ C	○ C	○ C	○ C	From 30 to < 50-feet wide
○ D	○ D	◉ D	◉ D	From 10 to < 30-feet wide
○ E	○ E	○ E	○ E	< 10-feet wide <u>or</u> no trees

20. Buffer Structure – streamside area metric (skip for Tidal Marsh Streams)
Consider for left bank (LB) and right bank (RB) for Metric 19 ("Vegetated" Buffer Width).

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

21. Buffer Stressors – streamside area metric (skip for Tidal Marsh Streams)
Check all appropriate boxes for left bank (LB) and right bank (RB). Indicate if listed stressor abuts stream (Abuts), does not abut but is within 30 feet of stream (< 30 feet), or is between 30 to 50 feet of stream (30-50 feet).
If none of the following stressors occurs on either bank, check here and skip to Metric 22: ☐

Abuts		< 30 feet		30-50 feet		
LB	RB	LB	RB	LB	RB	
○ A	○ A	○ A	○ A	○ A	○ A	Row crops
○ B	○ B	○ B	○ B	○ B	○ B	Maintained turf
○ C	○ C	○ C	○ C	○ C	○ C	Pasture (no livestock)/commercial horticulture
◉ D	◉ D	◉ D	◉ D	◉ D	◉ D	Pasture (active livestock use)

22. Stem Density – streamside area metric (skip for Tidal Marsh Streams)
Consider for left bank (LB) and right bank (RB) for Metric 19 ("Wooded" Buffer Width).

LB	RB	
○ A	○ A	Medium to high stem density
◉ B	◉ B	Low stem density
○ C	○ C	No wooded riparian buffer <u>or</u> predominantly herbaceous species <u>or</u> bare ground

23. Continuity of Vegetated Buffer – streamside area metric (skip for Tidal Marsh Streams)
Consider whether vegetated buffer is continuous along stream (parallel). Breaks are areas lacking vegetation > 10-feet wide.

LB	RB	
○ A	○ A	The total length of buffer breaks is < 25 percent.
◉ B	◉ B	The total length of buffer breaks is between 25 and 50 percent.
○ C	○ C	The total length of buffer breaks is > 50 percent.

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

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

25. Conductivity – assessment reach metric (skip for all Coastal Plain streams)
25a. ○ Yes ◉ No Was a 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:

NC SAM Stream Rating Sheet
Accompanies User Manual Version 2.1

Stream Site Name	Bandy's Farm	Date of Evaluation	
Stream Category	Pa1	Assessor Name/Organization	EPR

Notes of Field Assessment Form (Y/N)	NO
Presence of regulatory considerations (Y/N)	NO
Additional stream information/supplementary measurements included (Y/N)	
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	**LOW**	
(4) Wooded Riparian Buffer	**LOW**	
(4) Microtopography	**LOW**	
(3) Stream Stability	**LOW**	
(4) Channel Stability	**LOW**	
(4) Sediment Transport	**HIGH**	
(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	**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	**MEDIUM**	
(2) In-stream Habitat	**HIGH**	
(3) Baseflow	**MEDIUM**	
(3) Substrate	**HIGH**	
(3) Stream Stability	**LOW**	
(3) In-stream Habitat	**HIGH**	
(2) Stream-side Habitat	**LOW**	
(3) Stream-side Habitat	**MEDIUM**	
(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 Habitat	NA	
Overall	**LOW**	

UT3

NC SAM FIELD ASSESSMENT FORM
Accompanies User Manual Version 2.1

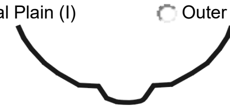
USACE AID #: NCDWR #:

INSTRUCTIONS: Attach a sketch of the assessment area and photographs. Attach a copy of the USGS 7.5-minute topographic quadrangle, and circle the location of the stream reach under evaluation. If multiple stream reaches will be evaluated on the same property, identify and number all reaches on the attached map, and include a separate form for each reach. See the NC SAM User Manual for detailed descriptions and explanations of requested information. Record in the "Notes/Sketch" section if any 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): Bandy's Farm
2. Date of evaluation:
3. Applicant/owner name:
4. Assessor name/organization: EPR: Ecosystem Planning and Restora
5. County: Catawba
6. Nearest named water body on USGS 7.5-minute quad: North Fork Mountain Creek
7. River Basin: Catawba
8. Site coordinates (decimal degrees, at lower end of assessment reach): 35.6283, -81.0779

STREAM INFORMATION: (depth and width can be approximations)
9. Site number (show on attached map): UT3
10. Length of assessment reach evaluated (feet): 243
11. Channel depth from bed (in riffle, if present) to top of bank (feet): 4.0 ( ) Unable to assess channel depth.
12. Channel width at top of bank (feet): 15
13. Is assessment reach a swamp stream? ( ) Yes ( ) No
14. Feature type: ( ) Perennial flow (•) Intermittent flow ( ) Tidal Marsh Stream

STREAM RATING 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 appy 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 adversely affected by a flow restriction or fill to the point of obstructing flow or a channel choked with aquatic macrophytes or ponded water or impounded on flood or ebb within the assessment reach (examples: undersized or perched culverts, causeways that constrict the channel, tidal gates).
- (•) B Not A

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

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

5. Signs of Active Instability – assessment reach metric
Consider only current instability, not past events from which the stream has currently recovered. Examples of instability include active bank failure, active channel down-cutting (head-cut), active widening, and artificial hardening (such as concrete, gabion, rip-rap).
- ( ) A < 10% of channel unstable
- ( ) B 10 to 25% of channel unstable
- (•) C > 25% of channel unstable

6. **Streamside Area Interaction – streamside area metric**
Consider for the Left Bank (LB) and the Right Bank (RB).

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

7. **Water Quality Stressors – assessment reach/intertidal zone metric**
Check all that apply.

- [ ] A Discolored water in stream or intertidal zone (milky white, blue, unnatural water discoloration, oil sheen, stream foam)
- [ ] B <u>Excessive</u> sedimentation (burying of stream features or intertidal zone)
- [ ] C Noticeable evidence of pollutant discharges entering the assessment reach <u>and</u> causing a water quality problem
- [ ] D Odor (not including natural sulfide odors)
- [ ] E Current published or collected data indicating degraded water quality in the assessment reach. Cite source in the "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)
- [x] J Little to no stressors

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

- ( ) A Drought conditions <u>and</u> no rainfall or rainfall not exceeding 1 inch within the last 48 hours
- ( ) B Drought conditions <u>and</u> rainfall exceeding 1 inch within the last 48 hours
- (•) C No drought conditions

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

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

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

- [ ] A Multiple aquatic macrophytes and aquatic mosses (include liverworts, lichens, and algal mats)
- [x] B Multiple sticks and/or leaf packs and/or emergent vegetation
- [ ] C Multiple snags and logs (including lap trees)
- [x] 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).**

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

11c. In riffles 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 Size 4 Coastal Plain streams and Tidal Marsh Streams)

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

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

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

1	>1	Numbers over columns refer to “individuals” for size 1 and 2 streams and “taxa” for size 3 and 4 streams.
☐	☐	Adult frogs
☐	☐	Aquatic reptiles
☐	☐	Aquatic macrophytes and aquatic mosses (include liverworts, lichens, and algal mats)
☐	☐	Beetles (including water pennies)
☐	☐	Caddisfly larvae (Trichoptera [T])
☐	☐	Asian clam (*Corbicula*)
☐	☐	Crustacean (isopod/amphipod/crayfish/shrimp)
☐	☐	Damselfly and dragonfly larvae
☐	☐	Dipterans (true flies)
☐	☐	Mayfly larvae (Ephemeroptera [E])
☐	☐	Megaloptera (alderfly, fishfly, dobsonfly larvae)
☐	☐	Midges/mosquito larvae
☐	☐	Mosquito fish (*Gambusia*) or mud minnows (*Umbra pygmaea)*
☐	☐	Mussels/Clams (not *Corbicula*)
☐	☐	Other fish
☐	☐	Salamanders/tadpoles
☐	☐	Snails
☐	☐	Stonefly larvae (Plecoptera [P])
☐	☐	Tipulid larvae
☐	☐	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 include: ditches, fill, soil, compaction, livestock disturbance, buildings, man-made levees, drainage pipes)

14. Streamside Area Water Storage – streamside area metric (skip for Size 1 streams, Tidal Marsh Streams, and B valley types)
Consider for the Left Bank (LB) and the Right Bank (RB) of the streamside area.

LB	RB	
◯ A	◯ A	Majority of streamside area with depressions able to pond water ≥ 6 inches deep
◉ B	◯ B	Majority of streamside area with depressions able to pond water 3 to 6 inches deep
◯ C	◉ C	Majority of streamside area with depressions able to pond water < 3 inches deep

15. Wetland Presence – streamside area metric (skip for Tidal Marsh Streams)
Consider for the Left Bank (LB) and the Right Bank (RB). Do not consider wetlands outside of the streamside area or within the normal wetted perimeter of assessment reach.

LB	RB	
◯ Y	◯ Y	Are wetlands present in the streamside area?
◉ N	◉ N	

16. Baseflow Contributors – assessment reach metric (skip for size 4 streams and Tidal Marsh Streams)
Check all contributors within the assessment reach or within view of <u>and</u> draining to the assessment reach.

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

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

- ☐ A Evidence of substantial water withdrawals from the assessment reach (includes areas excavated for pump installation)
- ☐ B Obstruction not passing flow during low flow periods affecting the assessment reach (ex: watertight dam, sediment deposit)
- ☐ C Urban stream (≥ 24% impervious surface for watershed)
- ☑ D Evidence that the stream-side 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 – First 100 feet of streamside area metric (skip for Tidal Marsh Streams)
Evaluate the dominant vegetation within 100 feet of each bank or to the edge of the watershed (whichever comes first) as it contributes to assessment reach habitat.

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

25. Conductivity – assessment reach metric (skip for all Coastal Plain streams)
25a. ○ Yes ● No Was a 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:

NC SAM Stream Rating Sheet
Accompanies User Manual Version 2.1

Stream Site Name Bandy's Farm
Stream Category Pa1

Date of Evaluation
Assessor Name/Organization :osystem Planning and Res

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

UT3A

NC SAM FIELD ASSESSMENT FORM
Accompanies User Manual Version 2.1

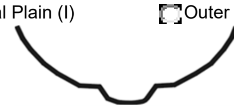
USACE AID #: NCDWR #:

INSTRUCTIONS: Attach a sketch of the assessment area and photographs. Attach a copy of the USGS 7.5-minute topographic quadrangle, and circle the location of the stream reach under evaluation. If multiple stream reaches will be evaluated on the same property, identify and number all reaches on the attached map, and include a separate form for each reach. See the NC SAM User Manual for detailed descriptions and explanations of requested information. Record in the "Notes/Sketch" section if any 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): Bandy's Farm 2. Date of evaluation: 6/16/22
3. Applicant/owner name: EPR 4. Assessor name/organization: Ecosystem Planning and Restoration
5. County: Catawba 6. Nearest named water body
7. River Basin: Catawba on USGS 7.5-minute quad: Balls Creek
8. Site coordinates (decimal degrees, at lower end of assessment reach): 35.6283, -81.0779

STREAM INFORMATION: (depth and width can be approximations)
9. Site number (show on attached map): UT3A 10. Length of assessment reach evaluated (feet): 81
11. Channel depth from bed (in riffle, if present) to top of bank (feet): 2 [ ] Unable to assess channel depth.
12. Channel width at top of bank (feet): 15 13. Is assessment reach a swamp stream? [ ] Yes [ ] No
14. Feature type: [ ] Perennial flow [x] Intermittent flow [ ] Tidal Marsh Stream

STREAM RATING INFORMATION:
15. NC SAM Zone: [ ] Mountains (M) [x] Piedmont (P) [ ] Inner Coastal Plain (I) [ ] Outer Coastal Plain (O)

16. Estimated geomorphic valley shape **(skip for Tidal Marsh Stream):**
[x] a 
(more sinuous stream, flatter valley slope)
[ ] b 
(less sinuous stream, steeper valley slope)

17. Watershed size: **(skip for Tidal Marsh Stream)** [x] 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 appy 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)
- [x] 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 adversely affected by a flow restriction or fill to the point of obstructing flow or a channel choked with aquatic macrophytes or ponded water or impounded on flood or ebb within the assessment reach (examples: undersized or perched culverts, causeways that constrict the channel, tidal gates).
- [x] B Not A

3. Feature Pattern – assessment reach metric
- [x] 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
- [x] 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
- [x] 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 the "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
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 riffles 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 Size 4 Coastal Plain streams and Tidal Marsh Streams)

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

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

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

1	>1	Numbers over columns refer to "individuals" for size 1 and 2 streams and "taxa" for size 3 and 4 streams.
☐	☐	Adult frogs
☐	☐	Aquatic reptiles
☐	☐	Aquatic macrophytes and aquatic mosses (include liverworts, lichens, and algal mats)
☐	☐	Beetles (including water pennies)
☐	☐	Caddisfly larvae (Trichoptera [T])
☐	☐	Asian clam (*Corbicula*)
☐	☐	Crustacean (isopod/amphipod/crayfish/shrimp)
☐	☐	Damselfly and dragonfly larvae
☐	☐	Dipterans (true flies)
☐	☐	Mayfly larvae (Ephemeroptera [E])
☐	☐	Megaloptera (alderfly, fishfly, dobsonfly larvae)
☐	☐	Midges/mosquito larvae
☐	☐	Mosquito fish (*Gambusia*) or mud minnows (*Umbra pygmaea)*
☐	☐	Mussels/Clams (not *Corbicula*)
☐	☐	Other fish
☐	☐	Salamanders/tadpoles
☐	☐	Snails
☐	☐	Stonefly larvae (Plecoptera [P])
☐	☐	Tipulid larvae
☐	☐	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 include: ditches, fill, soil, compaction, livestock disturbance, buildings, man-made levees, drainage pipes)

14. Streamside Area Water Storage – streamside area metric (skip for Size 1 streams, Tidal Marsh Streams, and B valley types)
Consider for the Left Bank (LB) and the Right Bank (RB) of the streamside area.

LB	RB	
◯ A	◯ A	Majority of streamside area with depressions able to pond water ≥ 6 inches deep
◯ B	◯ B	Majority of streamside area with depressions able to pond water 3 to 6 inches deep
● C	● C	Majority of streamside area with depressions able to pond water < 3 inches deep

15. Wetland Presence – streamside area metric (skip for Tidal Marsh Streams)
Consider for the Left Bank (LB) and the Right Bank (RB). Do not consider wetlands outside of the streamside area or within the normal wetted perimeter of assessment reach.

LB	RB	
● Y	● Y	Are wetlands present in the streamside area?
◯ N	◯ N	

16. Baseflow Contributors – assessment reach metric (skip for size 4 streams and Tidal Marsh Streams)
Check all contributors within the assessment reach or within view of <u>and</u> draining to the assessment reach.

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

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

- ☐ A Evidence of substantial water withdrawals from the assessment reach (includes areas excavated for pump installation)
- ☐ B Obstruction not passing flow during low flow periods affecting the assessment reach (ex: watertight dam, sediment deposit)
- ☐ C Urban stream (≥ 24% impervious surface for watershed)
- ☑ D Evidence that the stream-side 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	
[x] A	[x] A	[ ] A	[ ] A	≥ 100-feet wide <u>or</u> extends to the edge of the watershed
[ ] B	[ ] B	[ ] B	[ ] B	From 50 to < 100-feet wide
[ ] C	[ ] C	[ ] C	[ ] C	From 30 to < 50-feet wide
[ ] D	[ ] D	[ ] D	[ ] D	From 10 to < 30-feet wide
[ ] E	[ ] E	[x] E	[x] E	< 10-feet wide <u>or</u> no trees

20. Buffer Structure – streamside area metric (skip for Tidal Marsh Streams)
Consider for left bank (LB) and right bank (RB) for Metric 19 ("Vegetated" Buffer Width).

LB	RB	
[ ] A	[ ] A	Mature forest
[x] B	[x] B	Non-mature woody vegetation <u>or</u> modified vegetation structure
[ ] C	[ ] C	Herbaceous vegetation with or without a strip of trees < 10 feet wide
[ ] D	[ ] D	Maintained shrubs
[ ] E	[ ] E	Little or no vegetation

21. Buffer Stressors – streamside area metric (skip for Tidal Marsh Streams)
Check all appropriate boxes for left bank (LB) and right bank (RB). Indicate if listed stressor abuts stream (Abuts), does not abut but is within 30 feet of stream (< 30 feet), or is between 30 to 50 feet of stream (30-50 feet).
If none of the following stressors occurs on either bank, check here and skip to Metric 22: [ ]

Abuts LB	Abuts RB	< 30 feet LB	< 30 feet RB	30-50 feet LB	30-50 feet RB	
[ ] A	[ ] A	[ ] A	[ ] A	[ ] A	[ ] A	Row crops
[ ] B	[ ] B	[ ] B	[ ] B	[ ] B	[ ] B	Maintained turf
[ ] C	[ ] C	[ ] C	[ ] C	[ ] C	[ ] C	Pasture (no livestock)/commercial horticulture
[ ] D	[ ] D	[x] D	[x] 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
[x] B	[x] B	Low stem density
[ ] C	[ ] C	No wooded riparian buffer <u>or</u> predominantly herbaceous species <u>or</u> bare ground

23. Continuity of Vegetated Buffer – streamside area metric (skip for Tidal Marsh Streams)
Consider whether vegetated buffer is continuous along stream (parallel). Breaks are areas lacking vegetation > 10-feet wide.

LB	RB	
[x] A	[x] A	The total length of buffer breaks is < 25 percent.
[ ] B	[ ] B	The total length of buffer breaks is between 25 and 50 percent.
[ ] C	[ ] C	The total length of buffer breaks is > 50 percent.

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

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

25. Conductivity – assessment reach metric (skip for all Coastal Plain streams)
25a. [ ] Yes [x] No Was a 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:

NC SAM Stream Rating Sheet
Accompanies User Manual Version 2.1

Stream Site Name	Bandy's Farm	Date of Evaluation	6/16/22
Stream Category	Pa1	Assessor Name/Organization	ystem Planning and Restor

Notes of Field Assessment Form (Y/N)	NO
Presence of regulatory considerations (Y/N)	NO
Additional stream information/supplementary measurements included (Y/N)	
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	**MEDIUM**	**MEDIUM**
(2) Flood Flow	**LOW**	**LOW**
(3) Streamside Area Attenuation	**LOW**	**LOW**
(4) Floodplain Access	**LOW**	**LOW**
(4) Wooded Riparian Buffer	**LOW**	**LOW**
(4) Microtopography	**LOW**	**LOW**
(3) Stream Stability	**LOW**	**LOW**
(4) Channel Stability	**LOW**	**LOW**
(4) Sediment Transport	**LOW**	**LOW**
(4) Stream Geomorphology	**LOW**	**LOW**
(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	**MEDIUM**	**MEDIUM**
(2) Streamside Area Vegetation	**MEDIUM**	**MEDIUM**
(3) Upland Pollutant Filtration	**MEDIUM**	**MEDIUM**
(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	**MEDIUM**	**MEDIUM**
(3) Substrate	**LOW**	**LOW**
(3) Stream Stability	**LOW**	**LOW**
(3) In-stream Habitat	**LOW**	**LOW**
(2) Stream-side Habitat	**LOW**	**LOW**
(3) Stream-side Habitat	**LOW**	**LOW**
(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 Habitat	NA	NA
Overall	**LOW**	**LOW**

Appendix 6

Ecosystem Planning and Restoration, LLC
1150 SE Maynard Road, Suite 140
Raleigh, NC 27511

Phone: (919) 388-0787
www.eprusa.net

April 6, 2022

Harry Tsomides, Project Manager
North Carolina Department of Environmental Quality
Division of Mitigation Services (NCDMS)
Western DMS Field Office
5 Ravenscroft Dr. #102
Asheville, NC 28801

RE: Bandys Farm Stream and Wetland Mitigation Project
Catawba County, North Carolina
NCDEQ DMS Project ID# 100594

Dear Mr. Tsomides,

Attached is the Categorical Exclusion Form for NCDMS Projects (Version 2. 11/2018) and associated supporting documentation for the Bandys Farm Stream and Wetland Mitigation Project (Project). The following is a brief discussion of applicable regulations and associated coordination with the subject agencies, as appropriate.

Comprehensive Environmental Resources, Compensation and Liability Act

The December 15, 2021 ERIS Report (attached) did not identify any known or potential hazardous waste sites within or directly adjacent to the Project area.

National Historic Preservation Act (Section 106)

The North Carolina Department of Natural and Cultural Resources, State Historic Preservation Office (NCSHPO) did not identify historic resources that would be affected by the Project. The January 19, 2022 correspondence from NCSHPO is attached.

Uniform Relocation Assistance and Real Property Acquisition Policies Act

Page 1 Paragraph 5 of the attached executed Option to Purchase Conservation Easement informed the property owner that the acquiring entity does not have condemnation authority and that fair market value is being offered for the easement.

Endangered Species Act, Fish and Wildlife Coordination Act, and Migratory Bird Treaty Act

On January 6, 2022, the US Fish and Wildlife Service (USFWS) provided comments and preliminary concurrence with EPR's findings for federally protected species listed in the project vicinity. There are two federally listed species with habitat in the project area for which surveys[1]

[1] For appropriate survey windows for federally listed species, see: https://www.fws.gov/story/2022-03/north-carolinas-federally-threatened-endangered-and-risk-plant-species

are required, the dwarf-flowered heartleaf (*Hexastylis naniflora*) and the Schweinitz's sunflower (*Helianthus schweinitzii*). A survey for heartleaf was conducted on April 5, 2022, during the survey window for this species. No dwarf-flowered heartleaf was observed during the survey. The survey window for the sunflower does not open until late August 2022; USFWS coordination will not be completed until surveys for this species are conducted at that time.

A Northern Long-Eared Bat (NLEB) 4(d) Rule Streamlined Consultation Form was sent from the Federal Highway Administration (FHWA) to the USFWS on December 17, 2021. Email correspondence from FHWA to USFWS indicating the use of the streamlined consultation framework for the Bandys Farm site is attached.

Regarding the Migratory Bird Treaty Act, USFWS recommends visual inspection of structures to be removed or maintained as well as other migratory bird nesting habitat between March and September and to avoid destruction of nests. No existing structures will be demolished, and a limited number of trees will be removed for this project; any obvious nests will be avoided where possible during the nesting period.

A project review package, with associated mapping and photos, was also sent to the North Carolina Wildlife Resources Commission (NCWRC); a response (attached) was received on January 19, 2022. The NCWRC requested that a survey for the state significantly rare prairie trillium (*Trillium recurvatum*) be conducted at the same time as the dwarf-flowered heartleaf since these species have overlapping flowering periods (*T. recurvatum* blooms April to May in NC[2]). No trilliums were observed during the heartleaf survey on April 5, 2022—while this is somewhat early for prairie trillium, it was deemed late enough that any trilliums would still be apparent.

Farmland Protection Policy Act

The completed NRCS Form AD-1006 is attached.

American Indian Religious Freedom Act (AIRFA)

Letters and project mapping were sent by DMS to the Eastern Band of Cherokee Indians, Cherokee Nation, and the United Keetoowah Band of Cherokee Indians in Oklahoma requesting comment on this project on February 1, 2022. No responses have been received.

Please contact Amy James at ajames@eprusa.net or at the above phone number with any questions.

Sincerely,

Jake Byers, PE

cc: Paul Wiesner, Western Region Supervisor

[2] https://plants.ces.ncsu.edu/plants/trillium-recurvatum/

Appendix A

Categorical Exclusion Form for Division of Mitigation Services Program Projects
Version 2

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

Part 1: General Project Information	
Project Name:	Bandys Farm Stream and Wetland Mitigation Project
County Name:	Catawba County
DMS Number:	100594
Project Sponsor:	Ecosystem Planning and Restoration, PLLC
Project Contact Name:	Kevin Tweedy, PE
Project Contact Address:	1150 SE Maynard Rd. Suite 140, Cary NC 27511
Project Contact E-mail:	ktweedy@eprusa.net
DMS Project Manager:	Harry Tsomides

Project Description

This project will involve the restoration of four unnamed headwater tributaries to North Fork Mountain Creek (NFMC), the enhancement of a reach of NFMC, and the restoration of adjacent riparian wetlands, all of which have been impacted by past channelization and incision, livestock access, and loss of riparian buffers. Stream restoration practices involve raising the streambeds of the project streams, which will restore flow dynamics and contribute to a healthy headwater stream and wetland system. Enhancement practices include the addition of in-stream structures, bank stabilization, treatment of invasive species vegetation, livestock exclusion, and planting of native woody riparian and wetland vegetation. Wetland re-establishment practices will also involve grading and tillage to remove historic livestock soil compaction, restore natural wetland topography, and increase surface storage.

For Official Use Only

Reviewed By:

4/6/2022 — Harry Tsomides

Date — **NCDMS Project Manager**

Conditional Approved By:

4-12-22 — Donald W Brew

Date — **For Division Administrator FHWA**

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

Final Approval By:

10-6-22 — 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? *To be determined.*	☐ Yes ☐ No ☐ N/A
4. Is the project "likely to adversely affect" the species and/or "likely to adversely modify" Designated Critical Habitat?	☐ Yes ☐ No ☐ N/A
5. Does the USFWS/NOAA-Fisheries concur in the effects determination?	☐ Yes ☐ No ☐ N/A
6. Has the USFWS/NOAA-Fisheries rendered a "jeopardy" determination?	☐ Yes ☐ No ☐ N/A

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

USFWS Response

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Asheville Field Office
160 Zillicoa Street Suite B
Asheville, North Carolina 28801

January 06, 2022

Amy James
Ecosystem Planning and Restoration, LLC
1150 South East Maynard Road, Suite 140
Cary, North Carolina 27511

Subject: Scoping Request for Bandys Farm Stream and Wetland Restoration Site, North Carolina Division of Mitigation Services (NCDMS) Full-Delivery Project in Catawba River Basin, Catawba County, North Carolina

Dear Ms. James:

On December 20, 2021, we received your letter (via email) requesting our comments on the subject project. We have reviewed the information that you presented, and the following comments are provided in accordance with the provisions of the National Environmental Policy Act (42 U.S.C.§ 4321 et seq.) (NEPA); the Migratory Bird Treaty Act (MBTA), as amended (16 U.S.C. 703); the Bald and Golden Eagle Protection Act (BGEPA, 16 U.S.C. 668-668d); the Fish and Wildlife Coordination Act, as amended (16 U.S.C. 661 - 667e); and section 7 of the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 - 1543) (Act).

Project Description

According to the information provided, Ecosystem Planning and Restoration (EPR) proposes to conduct a NCDMS-supported project in Catawba County, North Carolina consisting of restoration in portions of four unnamed headwater tributaries to North Fork Mountain Creek (NFMC), enhancement in a portion of NFMC, and restoration in adjacent wetlands. In total, approximately 7,500 linear feet of stream will be restored and approximately 2.6 acres of riparian wetlands will be re-established or rehabilitated. All work will take place within a 31.5-acre conservation easement. You provided this description, a list of federally designated species and associated considerations, site photographs, and project site location, topographic, and aerial maps.

Federally Listed Species

In accordance with section 7 (a)(2) of the Act and 50 CFR Part 402.01, before any federal authorization/permits or funding can be issued for this project, it is the responsibility of the appropriate federal regulatory/permitting and/or funding agency(ies) to determine whether the project *may affect* any federally endangered or threatened species (listed species) or designated critical habitat. If it is determined that this project *may affect* any listed species or designated critical habitat, you and the federal action agency must initiate section 7 consultation with this office.

To determine whether your project *may affect* a listed species, we recommend surveying the project areas for suitable habitat for the below listed species prior to any on-the-ground activities. Your letter indicates that suitable habitat exists within the project area for numerous federally listed species. Notably, dwarf-flowered heartleaf has been documented within 0.5 miles of the project site. Where suitable habitat is present for any species, we recommend that the project proponent conduct species-specific surveys during the appropriate timeframe to ensure that no populations of rare species are inadvertently affected by the proposed project and to better inform effects determinations for section 7 purposes.

Information on optimal botanical survey windows can be found here: https://www.fws.gov/southeast/pdf/fact-sheet/north-carolina-optimal-survey-windows-for-at-risk-and-listed-plants.pdf. Those completing animal surveys must have a Section 10(a)(1)(A) permit from the U.S. Fish and Wildlife Service (Service) in the event an animal is captured and handled. A condition of the permit is to coordinate with the Service at least 15 days prior to surveys so that we can determine if a survey and animal handling is absolutely necessary. If surveys are not performed, the project proponent may assume presence of the species and consult with us under section 7(a)(2).

Species with federal designations that occur in the region and for which we are concerned include:

Common Name	**Scientific Name**	**Federal Status**[1]
Bald eagle	*Haliaeetus leucocephalus*	BGEPA
Bog turtle	*Glyptemys muhlenbergii*	T S/A
Dwarf-flowered heartleaf	*Hexastylis naniflora*	T
Golden eagle	*Aquila chrysaetos canadensis*	BGEPA
Little brown bat	*Myotis lucifugus*	ARS
Monarch butterfly	*Danaus plexippus*	CAN
Northern long-eared bat, NLEB	*Myotis septentrionalis*	T
Schweinitz's sunflower	*Helianthus schweinitzii*	E

[1]E = endangered, T = threatened, ARS = at-risk species, CAN = candidate species, BGEPA = Bald and Golden Eagle Protection Act, T S/A = threatened due to similarity of appearance

Dwarf-flowered heartleaf, NLEB, and Schweinitz's sunflower should be considered in any biological evaluation and/or biological assessment (BE/BA) prepared for this project. Guidance on what is included in a complete BE/BA can be found at:

- *https://www.fws.gov/asheville/htmls/project_review/assessment_guidance.html*
- *https://www.fws.gov/midWest/endangered/section7/ba_guide.html*

Based on the information provided, suitable summer roosting habitat for northern long-eared bat (NLEB) may be present on the site. However, the final 4(d) rule (effective as of February 16, 2016), exempts incidental take of NLEB associated with activities that occur greater than 0.25 miles from a known hibernation site, and greater than 150 feet from a known, occupied maternity roost during the pup season (June 1 – July 31). The proposed project occurs at a location where any incidental take that may result from associated activities is exempt under the 4(d) rule. Although not required if using the 4(d) rule, we encourage the project proponent to avoid any associated tree clearing activities during the NLEB active season from April 1 – October 15. Project proponents also have the option of conducting consultation without the 4(d) rule; in some cases implementation of a winter tree clearing conservation measure may be enough to make a "may affect, not likely to adversely affect" (NLAA) determination. A listing review of NLEB is expected in the near future. Consultations that use the 4(d) rule for NLEB may need to be reinitiated if the 4(d) rule is rescinded or the listing status of the species changes. Projects resulting in a concurrence with a NLAA determination would not need to be reinitiated.

Little brown bat is an at-risk species (ARS) and monarch butterfly is a candidate species (CAN). ARS and CAN are not legally protected under the Act and are not subject to any of its provisions, including section 7, unless they are formally proposed or listed as endangered or threatened. While lead federal agencies are not prohibited from jeopardizing the continued existence of an ARS, CAN, or proposed species until the species becomes listed, the prohibition against jeopardy and taking a listed species under section 9 of the Act applies as soon as the listing becomes effective, regardless of the stage of completion of the proposed action. We are including these species in our response to give you advance notification and request your assistance in protecting them. Although not required, we recommend that the presence/absence of these species be addressed in any BE/BA prepared for this or future projects, depending on your expected completion timeline. Finally, we encourage you to coordinate projects with the North Carolina Wildlife Resources Commission (NCWRC) on behalf of these species.

Migratory Birds and Eagles

The MBTA implements four treaties that provide for the international protection of migratory birds. The MBAT prohibits taking, killing, possession, transportation, and importation of migratory birds, their eggs, parts, and nests, except when specifically authorized by the Department of the Interior. Bald and golden eagles are afforded additional legal protection under the BGEPA.

For many industries/activities, the Service has developed activity-specific guidance found at the following website: *https://www.fws.gov/birds/management/project-assessment-tools-and-guidance.php*. These guidance documents are designed to help industry and project developers implement measures to reduce activity specific impacts to migratory birds. These documents provide important background on the applicable laws and policies, helping clarify standards and expectations and/or offering suggested best practices to avoid or minimize negative impacts to birds.

To avoid impacts to migratory birds, we recommend conducting a visual inspection of any structures to be demolished or maintained and other migratory bird nesting habitat within the work area during the migratory bird nesting season of March through September. If migratory birds are discovered nesting in the work area, including an existing structure, impacts to the occupied nests should be avoided. If birds are discovered nesting on or in a structure in the years prior to a proposed construction date, the project proponent, in consultation with us, should develop measures to discourage birds from establishing nests by means that will not result in the take of the birds or eggs.

Fish and Wildlife Resource Recommendations

We are also concerned about the potential effects the project could have on other natural resources within and surrounding the proposed project location. We offer the following general recommendations for the benefit of fish and wildlife resources:

- **Stream Channel and Bank Restoration**. Adequate measures to control sediment and erosion must be implemented prior to any ground-disturbing activities in order to minimize effects on downstream aquatic resources. In North Carolina, non-cohesive and erosion prone soils are most common in the felsic-crystalline terrains of the mountain and upper piedmont regions. Therefore, reconstruction work should be staged such that disturbed areas would be stabilized with seeding, mulch, and/or biodegradable (coir) erosion-control matting prior to the end of each workday. **No erosion-control matting or blankets should contain synthetic (netting) materials as they trap animals and can persist in the environment beyond their intended purpose.** Matting should be secured in place with staples; stakes; or, wherever possible, live stakes of native trees. If rain is expected prior to temporary seed establishment, additional measures should be implemented to protect water quality along slopes and overburden stockpiles (for example, stockpiles may be covered with plastic or other geotextile material and surrounded with silt fencing).

- **Erosion and Sedimentation Control.** Construction activities near streams, rivers, and lakes have the potential to cause water pollution and stream degradation if measures to control site runoff are not properly installed and maintained. In order to effectively reduce erosion and sedimentation impacts, best management practices specific to the extent and type of construction should be designed and installed during land disturbing activities and should be maintained until the project is complete and appropriate stormwater conveyances and vegetation are reestablished on the site. A complete design manual, which provides extensive details and procedures for developing site specific plans to control erosion and sediment and is consistent with the requirements of the North Carolina Sedimentation and Pollution Control Act and Administrative Rules, is available at: *http://portal.ncdenr.org/web/lr/publications*.

For maximum benefits to water quality and bank stabilization, riparian areas should be forested; however, if the areas are maintained in grass, they should not be mowed. We recommend planting disturbed areas with native riparian species. We can provide information on potential sources of plant material upon request.

We appreciate the opportunity to provide these comments. Please contact Ms. Holland Youngman of our staff at holland_youngman@fws.gov if you have any questions. In any future correspondence concerning this project, please reference our Log Number 22-212.

Sincerely,

- - *original signed* - -

Janet Mizzi
Field Supervisor

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Asheville Field Office
160 Zillicoa Street Suite B
Asheville, North Carolina 28801

October 3, 2022

Amy James
Ecosystem Planning and Restoration, LLC
1150 South East Maynard Road, Suite 140
Cary, North Carolina 27511

Subject: Informal Consultation for Bandys Farm Stream and Wetland Restoration Site, North Carolina Division of Mitigation Services (NCDMS) Full-Delivery Project in Catawba River Basin, Catawba County, North Carolina (Service Log #22-212)

Dear Ms. James:

On October 3, 2022, we received (via e-mail) your request for updated informal consultation and section 7 concurrence on effects the subject project may have on federally listed species. This letter serves to replace the concurrence letter issued from this office on September 30, 2022. We have reviewed the information you submitted along with additional information received on September 6, 2022, September 20, 2022, and information from previous project correspondence on January 6, 2022 and the following is provided in accordance with the provisions of the National Environmental Policy Act (42 U.S.C.§ 4321 et seq.) (NEPA); the Fish and Wildlife Coordination Act, as amended (16 U.S.C. 661 - 667e); and section 7 of the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 - 1543) (Act).

Project Description

According to the information provided, Ecosystem Planning and Restoration (EPR) proposes to conduct a NCDMS-supported project in Catawba County, North Carolina consisting of restoration in portions of four unnamed headwater tributaries to North Fork Mountain Creek (NFMC), enhancement in a portion of NFMC, and restoration in adjacent wetlands. In total, approximately 7,500 linear feet of stream will be restored and approximately 2.6 acres of riparian wetlands will be re-established or rehabilitated. All work will take place within a 31.5-acre conservation easement.

Federally Listed Species

Your letter provides a recent and complete list of species that may occur within the project area per our Information for Planning and Consultation website and an effect determination for each species.

On September 21, 2022, the U.S. Fish and Wildlife Service (Service) updated the consultation range for northern long-eared bat based on the best available scientific data. The action area for this project is no longer within the consultation range for the species. Therefore, we believe the project will have no effect on the northern long-eared bat.

Information provided in the submittal states that suitable habitat for dwarf-flowered heartleaf (*Hexastylis naniflora*) is present within the action area. EPR conducted botanical surveys on April 5, 2022 and identified plants of the *Hexastylis* genus within the action area. EPR measured 14 *Hexastylis* specimens and the Weakley's New Flora (2022) key was used to determine the species. Additionally, EPR compared these measurements with measurements taken from plants at a known *H. naniflora* site in the area. Information provided in the letter, data table and photographs supports the conclusion that the

Hexastylis within the action area do not exhibit the morphological characteristics of *H. naniflora* and are likely *H. minor*. Therefore, we would concur with a "may affect, not likely to adversely affect" (NLAA) determination from the lead federal action agency for dwarf-flowered heartleaf.

The information provided states that suitable habitat for Schweinitz's sunflower (*Helianthus schweinitzii*) is present at the margins of active pasture and in small clearings within the action area; however, the species was not observed during surveys during the optimal survey window. Based on negative results of visual surveys conducted on August 25, 2022, we would concur with a NLAA determination from the lead federal action agency for Schweinitz's sunflower.

On September 14, 2022, the Service published a proposal in the Federal Register to list the tricolored bat (*Perimyotis subflavus*) as endangered under the Act. The Service has up to 12-months from the date the proposal published to make a final determination, either to list the tricolored bat under the Act or to withdraw the proposal. The Service determined the bat faces extinction primarily due to the range-wide impacts of white-nose syndrome (WNS), a deadly fungal disease affecting cave-dwelling bats across North America. Because tricolored bat populations have been greatly reduced due to WNS, surviving bat populations are now more vulnerable to other stressors such as human disturbance and habitat loss. Species proposed for listing are not afforded protection under the Act; however, as soon as a listing becomes effective (typically 30 days after publication of the final rule in the Federal Register), the prohibitions against jeopardizing its continued existence and "take" will apply. Therefore, if you suspect your future or existing project may affect tricolored bats after the potential new listing goes into effect, we recommend analyzing possible effects of the project on tricolored bats and their habitat to determine whether consultation under section 7 of the Act is necessary. Conferencing procedures can be followed prior to listing to ensure the project does not jeopardize the existence of a species or adversely modify critical habitat. Contact your section 7 contact in the Asheville Ecological Services Field Office for assistance.

The southern population of the bog turtle (*Glyptemys muhlenbergii*) is federally listed as threatened (due to similarity of appearance) and was petitioned for listing, resulting in an at-risk species (ARS) designation, on January 13, 2022. While not subject to section 7 consultation, it is a species of concern for our office, and we would appreciate the consideration of bog turtle during planning and implementation of the project. The submitted information suggests that wetlands within the action area are currently unsuitable bog turtle habitat due to closed canopy and long-term livestock impacts. We recommend, if possible, incorporating design elements (i.e. light regime, soils, and hydrology) into your mitigation plan to improve wetland habitat suitability for this species. We also recommend coordinating any such efforts with the Service and the North Carolina Wildlife Resources Commission.

Little brown bat (*Myotis lucifugus*) is an ARS and monarch butterfly (*Danaus plexippus*) is a candidate species. These species may occur in the project area. The Service is expected to make listing determinations for these species in the next several years. ARS and candidate species are not legally protected under the Act and are not subject to any of its provisions, including section 7, unless they are formally proposed or listed as endangered or threatened. While lead federal agencies are not prohibited from jeopardizing the continued existence of an ARS or candidate species unless the species becomes listed, the prohibition against jeopardy and taking a listed species under section 9 of the Act applies as soon as a listing becomes effective, regardless of the stage of completion of the proposed action. We include this notification to make you aware of these species' current status and potential occurrence within the action area.

Fish and Wildlife Resource Recommendations
Resource recommendations were provided in our scoping letter dated January 6, 2022 and remain valid. We encourage the incorporation of those measures into project planning and implementation, as well as the recommendation provided below.

- Remove trees between October 15 and April 1 of any given year, outside the bat active season to reduce impacts to bats. If this is not possible, we encourage avoidance of the maternity season (May 15 – August 15), and/or spring migration period (April 1 to May 15), and/or fall migration period (August 15 – October 15).

Reinitiation Notice
We believe the requirements under section 7 of the Act are fulfilled for the federally listed species discussed above. However, obligations under section 7 must be reconsidered if: (1) new information reveals impacts of this proposed action may affect listed species or critical habitat in a manner not previously considered, (2) this proposed action is subsequently modified in a manner that was not considered in this review, or (3) a new species is listed, or critical habitat is determined that may be affected by the proposed action.

We appreciate the opportunity to provide these comments. Please contact Ms. Holland Youngman of our staff at holland_youngman@fws.gov if you have any questions. In any future correspondence concerning this project, please reference our Service Log #22-212.

Sincerely,

- - original signed - -

Janet Mizzi
Field Supervisor

NLEB 4(d) Coordination and Approval

Amy James

From: Brew, Donnie (FHWA) <Donnie.Brew@dot.gov>
Sent: Friday, December 17, 2021 4:29 PM
To: lauren_wilson@fws.gov; holland_youngman@fws.gov
Cc: Wiesner, Paul; Amy James; Kevin Tweedy
Subject: NLEB 4(d) rule consultation - Bandys Farm Mitigation Site - Catawba County
Attachments: Bandys Farm mitigation site_NLEB 4(d) Submittal.pdf

Good afternoon Lauren, Holland,

The purpose of this message is to notify your office that FHWA will use the streamlined consultation framework for the Bandys Farm mitigation site in Catawba County, NC.

Attached is a completed NLEB 4(d) Rule Streamlined Consultation form including site maps/figures.

Thank you,

Donnie

Notifying the Service Under the Framework
Northern Long-Eared Bat 4(d) Rule Streamlined Consultation Form
Federal agencies (or designated non-federal representatives) should use the Northern Long-Eared Bat 4(d) Rule Streamlined Consultation form to notify the Service of their project and meet the requirements of the framework.

Northern Long-Eared Bat 4(d) Rule Streamlined Consultation Form (Word document)

Information requested in the Northern Long-Eared Bat 4(d) Rule Streamlined Consultation Form serves to

(1) notify the field office that an action agency will use the streamlined framework;

(2) describe the project with sufficient detail to support the required determination; and

(3) enable the USFWS to track effects and determine if reinitiation of consultation for the 4(d) rule is required. This form requests the minimum amount of information required for the Service to be able to track this information.

Providing information in the Streamlined Consultation Form does not address section 7(a)(2) compliance for any other listed species.

Donnie Brew
Preconstruction & Environment Engineer
Federal Highway Administration
310 New Bern Ave, Suite 410

Northern Long-Eared Bat 4(d) Rule Streamlined Consultation Form

Federal agencies should use this form for the optional streamlined consultation framework for the northern long-eared bat (NLEB). This framework allows federal agencies to rely upon the U.S. Fish and Wildlife Service's (USFWS) January 5, 2016, intra-Service Programmatic Biological Opinion (BO) on the final 4(d) rule for the NLEB for section 7(a)(2) compliance by: (1) notifying the USFWS that an action agency will use the streamlined framework; (2) describing the project with sufficient detail to support the required determination; and (3) enabling the USFWS to track effects and determine if reinitiation of consultation is required per 50 CFR 402.16.

This form is not necessary if an agency determines that a proposed action will have no effect to the NLEB or if the USFWS has concurred in writing with an agency's determination that a proposed action may affect, but is not likely to adversely affect the NLEB (i.e., the standard informal consultation process). Actions that may cause prohibited incidental take require separate formal consultation. Providing this information does not address section 7(a)(2) compliance for any other listed species.

Information to Determine 4(d) Rule Compliance:	YES	NO
1. Does the project occur wholly outside of the WNS Zone[1]?	☐	☒
2. Have you contacted the appropriate agency[2] to determine if your project is near known hibernacula or maternity roost trees?	☒	☐
3. Could the project disturb hibernating NLEBs in a known hibernaculum?	☐	☒
4. Could the project alter the entrance or interior environment of a known hibernaculum?	☐	☒
5. Does the project remove any trees within 0.25 miles of a known hibernaculum at any time of year?	☐	☒
6. Would the project cut or destroy known occupied maternity roost trees, or any other trees within a 150-foot radius from the maternity roost tree from June 1 through July 31.	☐	☒

You are eligible to use this form if you have answered yes to question #1 **or** yes to question #2 **and** no to questions 3, 4, 5 and 6. The remainder of the form will be used by the USFWS to track our assumptions in the BO.

Agency and Applicant[3] (Name, Email, Phone No.):

Agency:
Federal Highway Administration (FHWA)
Donnie Brew, donnie.brew@dot.gov, (919) 747-7017

Agency Representative:
Ecosystem Planning and Restoration, LLC
Kevin Tweedy, PE, ktweedy@eprusa.net, (919) 388-1787

[1] http://www.fws.gov/midwest/endangered/mammals/nleb/pdf/WNSZone.pdf
[2] See http://www.fws.gov/midwest/endangered/mammals/nleb/nhisites.html
[3] If applicable - only needed for federal actions with applicants (e.g., for a permit, etc.) who are party to the consultation.

Project Name: Bandys Farm Stream and Wetland Restoration Site

Project Location (include coordinates if known):

The project is located in southeast Catawba County on two parcels of 378 and 69 acres respectively, approximately 2.5 miles northeast of the intersection of NC 16 and Buffalo Shoals Rd. (Figure 1; Parcel IDs 368903012848 and 368903310214). Figure 2 depicts the project on the United States Geological Survey (USGS) Catawba North Carolina 7.5-minute topographic map at 35.6338 N and -81.0829 E.

Basic Project Description (provide narrative below or attach additional information):

The Bandys Farm site was identified to provide in-kind mitigation for unavoidable stream and wetland impacts. In total, approximately 7,500 linear feet of stream will be restored and approximately 2.6 acres of riparian wetlands will be re-established or rehabilitated. While much of the existing stream length runs through pasture, there are trees within the proposed 31.5-acre conservation easement (Figure 2) that may need to be removed during construction. Tree removal will be avoided and minimized to the extent practicable.

General Project Information	**YES**	**NO**
Does the project occur within 0.25 miles of a known hibernaculum?	☐	☒
Does the project occur within 150 feet of a known maternity roost tree?	☐	☒
Does the project include forest conversion[4]? (if yes, report acreage below)	☒	☐
Estimated total acres of forest conversion (temporary)	2.5 Acres	
If known, estimated acres[5] of forest conversion from April 1 to October 31		
If known, estimated acres of forest conversion from June 1 to July 31[6]		
Does the project include timber harvest? (if yes, report acreage below)	☐	☒
Estimated total acres of timber harvest		
If known, estimated acres of timber harvest from April 1 to October 31		
If known, estimated acres of timber harvest from June 1 to July 31		
Does the project include prescribed fire? (if yes, report acreage below)	☐	☒
Estimated total acres of prescribed fire		
If known, estimated acres of prescribed fire from April 1 to October 31		
If known, estimated acres of prescribed fire from June 1 to July 31		
Does the project install new wind turbines? (if yes, report capacity in MW below)	☐	☒
Estimated wind capacity (MW)		

<u>Agency Determination</u>:

By signing this form, the action agency determines that this project may affect the NLEB, but that any resulting incidental take of the NLEB is not prohibited by the final 4(d) rule.

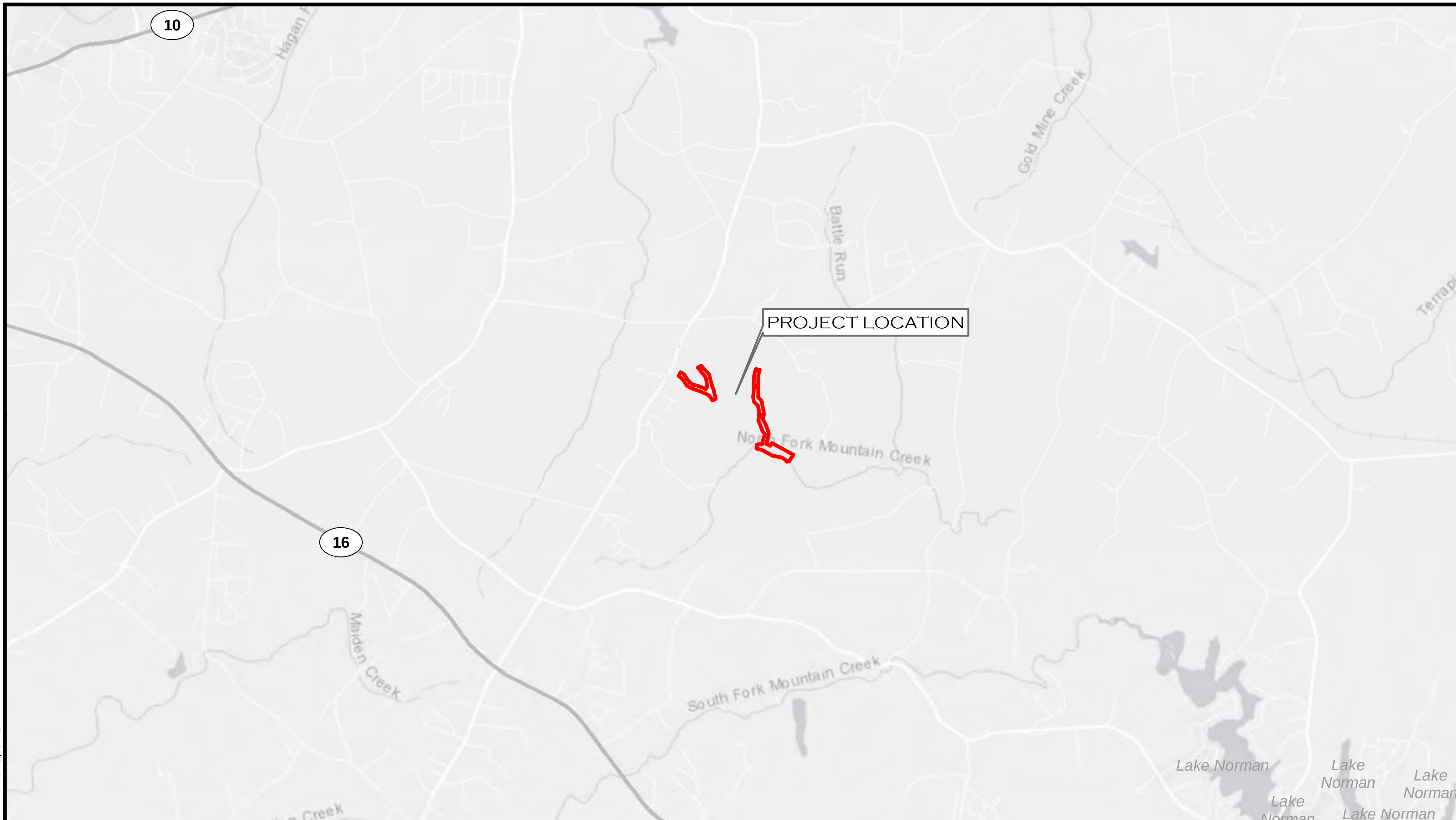
If the USFWS does not respond within 30 days from submittal of this form, the action agency may presume that its determination is informed by the best available information and that its project responsibilities under 7(a)(2) with respect to the NLEB are fulfilled through the USFWS January 5,

[4] Any activity that temporarily or permanently removes suitable forested habitat, including, but not limited to, tree removal from development, energy production and transmission, mining, agriculture, etc. (see page 48 of the BO).
[5] If the project removes less than 10 trees and the acreage is unknown, report the acreage as less than 0.1 acre.
[6] If the activity includes tree clearing in June and July, also include those acreage in April to October.

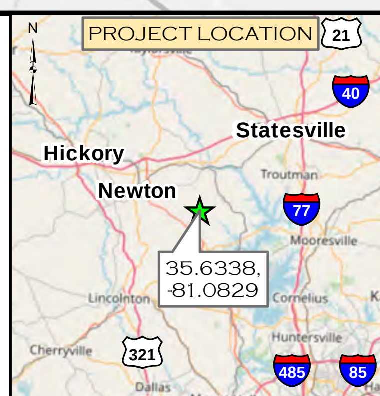
2016, Programmatic BO. The action agency will update this determination annually for multi-year activities.

The action agency understands that the USFWS presumes that all activities are implemented as described herein. The action agency will promptly report any departures from the described activities to the appropriate USFWS Field Office. The action agency will provide the appropriate USFWS Field Office with the results of any surveys conducted for the NLEB. Involved parties will promptly notify the appropriate USFWS Field Office upon finding a dead, injured, or sick NLEB.

Signature: Donald W Brew Date Submitted: 12-17-21



Conservation Easement



Bandys Farm
Stream and Wetland Mitigation Project
Vicinity Map
Catawba County, NC

Prepared By:

Ecosystem Planning & Restoration

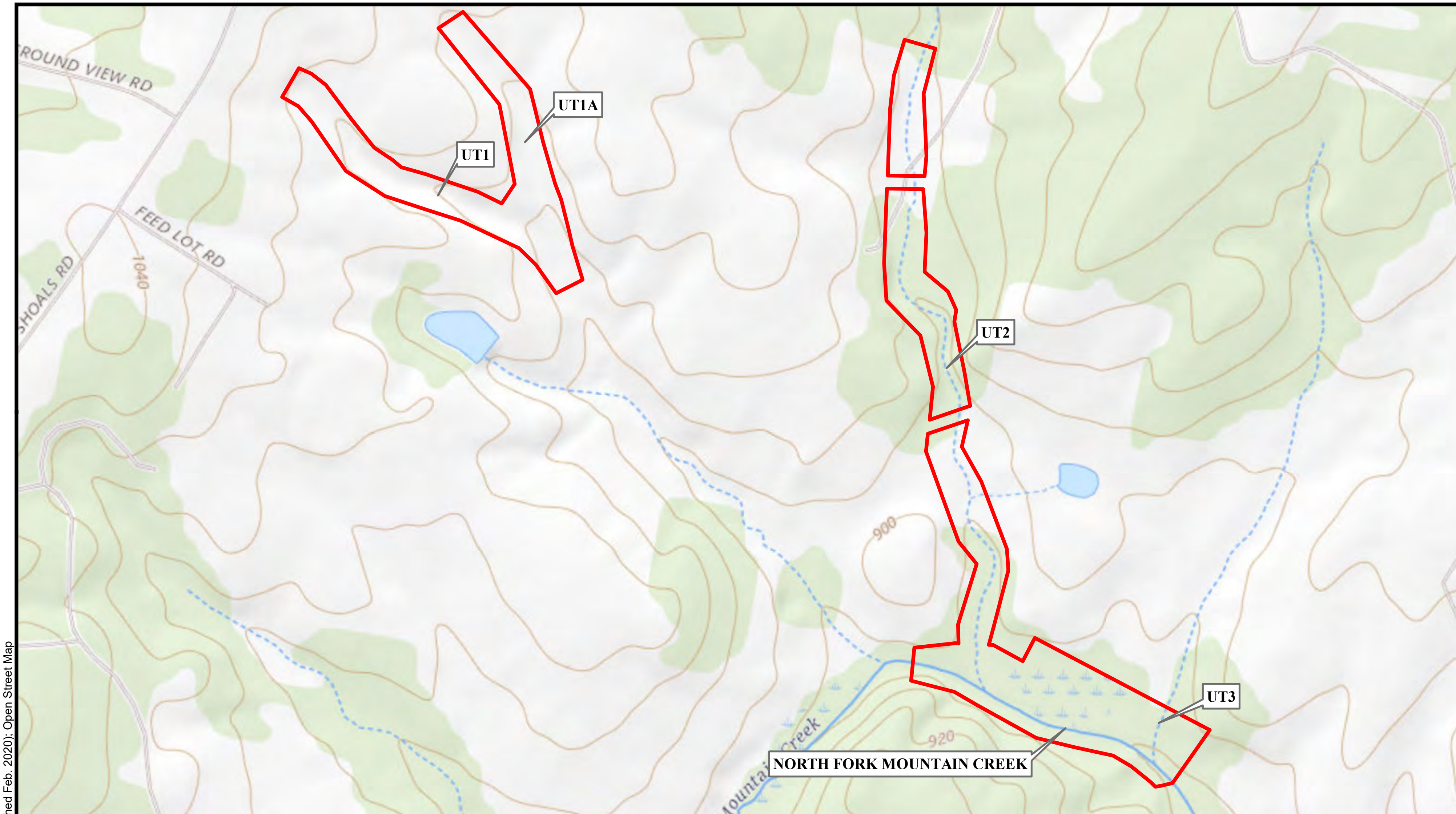
N

0 0.5 1 Miles
1:63,360

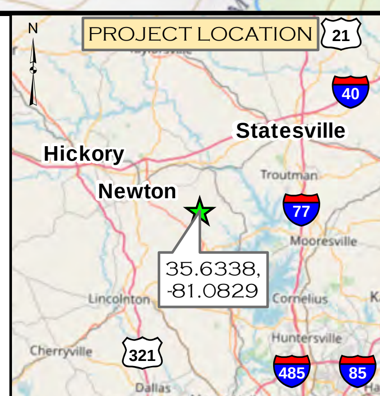
FIGURE 1

DATE:
December 2021

Sources: ESRI Gray Canvas; Open Street Map; TIGER Roads 2015; USGS NHD Streams/Water Bodies



Conservation Easement



Bandys Farm
Stream and Wetland Mitigation Project
USGS Topographic Map
Catawba County, NC

Prepared By:

Ecosystem Planning & Restoration

N

0 325 650 Feet
1:7,800

FIGURE 2

DATE:
December 2021

Sources: USGS Topographic Web Service (Data Refreshed Feb. 2020); Open Street Map

Path: C:\GIS_Data\Project_Temp\R_Pursuits\NC-Catawba-BandyFarmLLC\Proposal_MXDs_20210802\Fig6_USGS.mxd | Date: 8/11/2021 | Time: 6:15:32 PM | User Name: wsaulnier

NCWRC Response

North Carolina Wildlife Resources Commission

Cameron Ingram, Executive Director

19 January 2022

Kevin Tweedy
Ecosystem Planning and Restoration, LLC
1150 SE Maynard Rd., Suite 140
Cary, NC 27511

SUBJECT: Environmental Review of the Bandys Farm Stream and Wetland Mitigation Site in Catawba County, North Carolina.

Dear Mr. Tweedy,

Biologists with the North Carolina Wildlife Resource Commission (NCWRC) received your request for review and comments on any possible concerns regarding the Bandys Farm Mitigation Site. Comments are provided in accordance with provisions of the Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S.C. 661-667e) and North Carolina General Statutes (G.S. 113-131 et seq.).

The Bandys Farm Stream and Wetland Mitigation Site is located approximately 2.5 miles northeast of the intersection of NC 16 and Buffalo Shoals Road in Catawba County, North Carolina. The current land use is pastureland. The proposed project would restore and/or enhance the North Fork Mountain Creek and four of its unnamed tributaries and restore or rehabilitate riparian wetlands. The North Fork Mountain Creek is in the Catawba River basin.

We have records for the federal and state threatened dwarf-flowered heartleaf (*Hexastylis naniflora*) adjacent to the site and the state significantly rare prairie trillium (*Trillium recurvatum*) near the site. Prairie trilliums grow in rich moist soils in woodlands, and it blooms from April to May. We request EPR also survey for the prairie trillium during the survey for dwarf-flowered heartleaf.

Stream restoration projects often improve water quality and aquatic habitat. Establishing native, forested buffers in riparian areas will help protect water quality, improve aquatic and terrestrial habitats, and provide a travel corridor for wildlife species. We offer the following general recommendations to minimize impacts to aquatic and terrestrial wildlife resources:

1. We recommend riparian buffers are as wide as possible, given site constraints and landowner needs. NCWRC generally recommends a woody buffer of 100 feet on perennial streams to maximize the benefits of buffers, including bank stability, stream shading, treatment of overland runoff, and wildlife habitat.
2. Avoid tree clearing activities during the maternity roosting period for bats (May 15 – August 15) because of the decline in populations of several bat species.

Mailing Address: Habitat Conservation • 1721 Mail Service Center • Raleigh, NC 27699-1721
Telephone: (919) 707-0220 • **Fax:** (919) 707-0028

3.
4. We recommend a plant list that consists of species typically found in reference streams and the appropriate natural vegetation community, as described by M.P. Schafale in The Guide To The Natural Communities of North Carolina, Fourth Approximation (https://www.ncnhp.org/references/nhp-publications/fourth-approximation-descriptions). Also, ensure the species planted occur naturally within Catawba County.
5. Avoid using orchard grass, fescue, or cereal rye, which exhibits allelopathic characteristics, for soil stabilization.
6. The use of biodegradable and wildlife-friendly sediment and erosion control devices is strongly recommended. Silt fencing, fiber rolls and/or other products should have loose-weave netting that is made of **natural fiber materials with movable joints** between the vertical and horizontal twines. Silt fencing that has been reinforced with plastic or metal mesh should be avoided as it impedes the movement of terrestrial wildlife species. Excessive silt and sediment loads can have detrimental effects on aquatic resources including destruction of spawning habitat, suffocation of eggs, and clogging of gills.

Thank you for the opportunity to provide comments. If I can be of additional assistance, please call (336) 269-0074 or email olivia.munzer@ncwildlife.org.

Sincerely,

Olivia Munzer
Western Piedmont Habitat Conservation Coordinator
Habitat Conservation Program

NRCS Response

United States Department of Agriculture

Natural Resources
Conservation Service

North Carolina
State Office

4407 Bland Rd.
Suite 117
Raleigh, NC 27609
Voice (919) 873-2158
Fax (844) 325-6833

December 20, 2021

Amy James, PWS, Environmental Scientist
Ecosystem Planning & Restoration
1150 SE Maynard Rd. Suite 140
Cary, NC 27511
919-874-5314
ajames@eprusa.net

Dear Amy James,

The following information is in response to your request soliciting comments regarding the Bandys Farm Stream and Wetland Mitigation Site in Catawba County, NC.

Projects are subject to Farmland Protection Policy Act (FPPA) requirements if they may irreversibly convert farmland (directly or indirectly) to nonagricultural use and are completed by a Federal agency or with assistance from a Federal agency.

> For the purpose of FPPA, farmland includes prime farmland, unique farmland, and land of statewide or local importance. Farmland subject to FPPA requirements does not have to be currently used for cropland. It can be forest land, pastureland, cropland, or other land, but not water or urban built-up land. Farmland means prime or unique farmlands as defined in section 1540(c)(1) of the Act or farmland that is determined by the appropriate state or unit of local government agency or agencies with concurrence of the Secretary to be farmland of statewide of local importance.
>
> “Farmland" does not include land already in or committed to urban development or water storage. Farmland ``already in'' urban development or water storage includes all such land with a density of 30 structures per 40-acre area. Farmland already in urban development also includes lands identified as ``urbanized area'' (UA) on the Census Bureau Map, or as urban area mapped with a ``tint overprint'' on the USGS topographical maps, or as ``urban-built-up'' on the USDA Important Farmland Maps. See over for more information.

The area in question **does include** land classified as Prime Farmland. In accordance with the Code of Federal Regulations 7CFR 658, Farmland Protection Policy Act, the AD-1006 was initiated. NRCS has completed Parts II, IV, V of the form, and returned for completion by the requesting agency. The requesting federal agency will determine next steps when funding is initiated.

If you have any questions, please feel free to call me at (919) 873-2158.

Sincerely,

Laurie F. Muzzy

Laurie F. Muzzy
Resource Soil Scientist

cc:
Jim Propst, Supervisory Soil Conservationist, NRCS,Statesville , NC
Mike Jones, State Soil Scientist, Raleigh, NC

U.S. Department of Agriculture

FARMLAND CONVERSION IMPACT RATING

PART I *(To be completed by Federal Agency)*	Date Of Land Evaluation Request 12/17/2021
Name of Project Bandys Farm stream & wetland mitigation	Federal Agency Involved Federal Highwav Admin (FHWA)
Proposed Land Use Stream & wetland mitigation	County and State Catawba County. North Carolina
PART II *(To be completed by NRCS)*	Date Request Received By NRCS 12/20/2021 — Person Completing Form: Laurie F. Muzzy

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: 0	Average Farm Size: 100
Major Crop(s): corn	Farmable Land In Govt. Jurisdiction — Acres: 229,567 — 86.9%		Amount of Farmland As Defined in FPPA — Acres: 229,567 — 86.9%	
Name of Land Evaluation System Used: Catawba County LESA	Name of State or Local Site Assessment System: NA		Date Land Evaluation Returned by NRCS: 12/20/2021	

PART III *(To be completed by Federal Agency)*	Maximum Points	Alternative Site Rating Site A	Site B	Site C	Site D
A. Total Acres To Be Converted Directly		14.1			
B. Total Acres To Be Converted Indirectly		0			
C. Total Acres In Site		31.5			
PART IV *(To be completed by NRCS)* Land Evaluation Information					
A. Total Acres Prime And Unique Farmland		19.6			
B. Total Acres Statewide Important or Local Important Farmland		2.1			
C. Percentage Of Farmland in County Or Local Govt. Unit To Be Converted		0.000%			
D. Percentage Of Farmland in Govt. Jurisdiction With Same Or Higher Relative Value		67.3%			
PART V (To be completed by NRCS) Land Evaluation Criterion Relative Value of Farmland To Be Converted (Scale of 0 to 100 Points)		71.4			
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)				
2. Perimeter In Non-urban Use	(10)				
3. Percent Of Site Being Farmed	(20)				
4. Protection Provided By State and Local Government	(20)				
5. Distance From Urban Built-up Area	(15)				
6. Distance To Urban Support Services	(15)				
7. Size Of Present Farm Unit Compared To Average	(10)				
8. Creation Of Non-farmable Farmland	(10)				
9. Availability Of Farm Support Services	(5)				
10. On-Farm Investments	(20)				
11. Effects Of Conversion On Farm Support Services	(10)				
12. Compatibility With Existing Agricultural Use	(10)				
TOTAL SITE ASSESSMENT POINTS	160	0	0	0	0
PART VII ***(To be completed by Federal Agency)***					
Relative Value Of Farmland *(From Part V)*	100	71.4	0	0	0
Total Site Assessment *(From Part VI above or local site assessment)*	160	0	0	0	0
TOTAL POINTS *(Total of above 2 lines)*	260	71.4	0	0	0

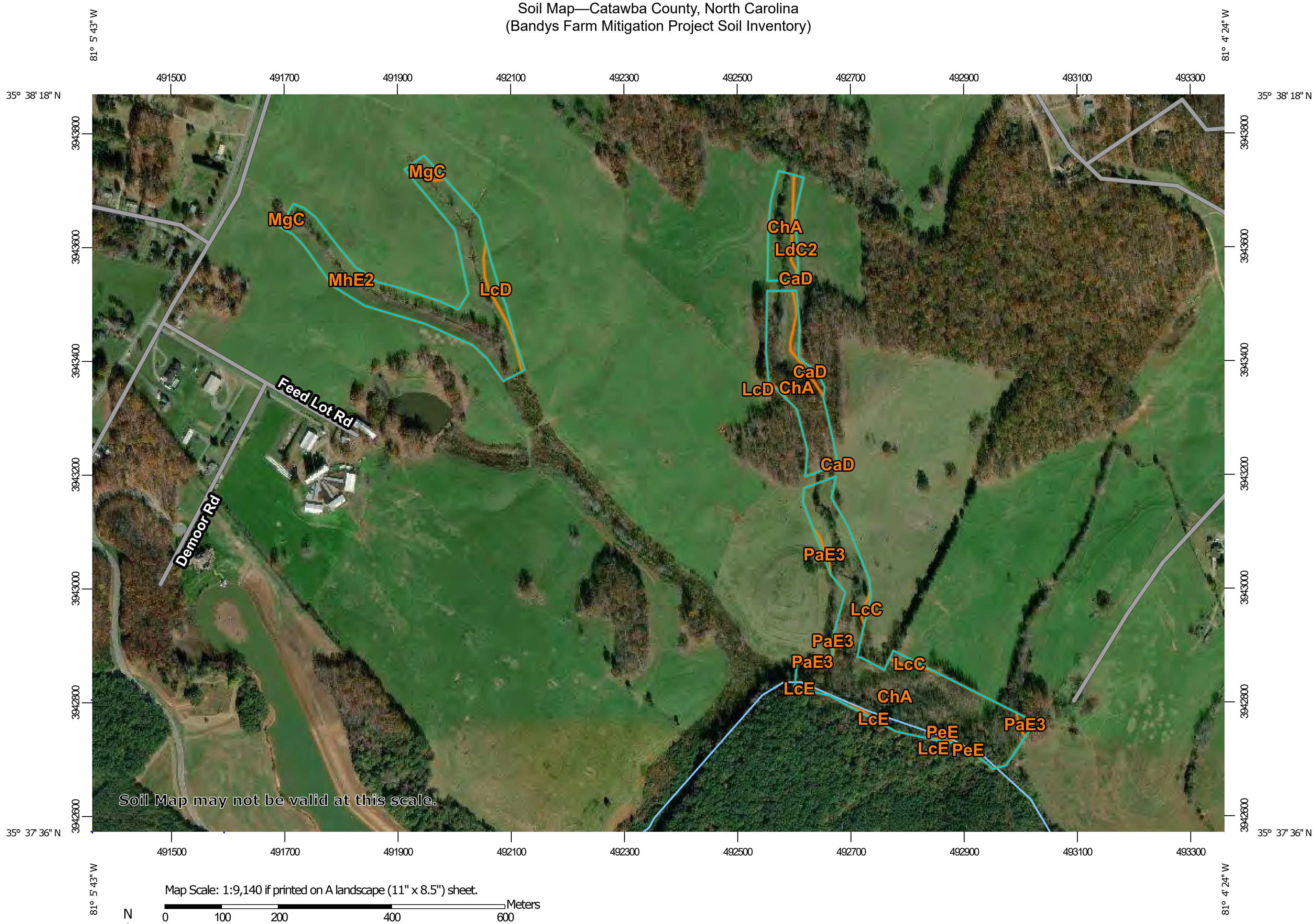
Site Selected:	Date Of Selection	Was A Local Site Assessment Used? YES ☐ NO ☐

Reason For Selection:

Name of Federal agency representative completing this form:	Date:

(See Instructions on reverse side) **Form AD-1006 (03-02)**

Soil Map—Catawba County, North Carolina
(Bandys Farm Mitigation Project Soil Inventory)



Map Scale: 1:9,140 if printed on A landscape (11" x 8.5") sheet.

Meters: 0, 100, 200, 400, 600

Feet: 0, 400, 800, 1600, 2400

N

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 17N WGS84

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:15,800.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Catawba County, North Carolina
Survey Area Data: Version 21, Sep 3, 2021

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Apr 8, 2015—Nov 28, 2017

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
CaD	Cecil sandy loam, 10 to 15 percent slopes	0.5	1.4%
ChA	Chewacla loam, 0 to 2 percent slopes, frequently flooded	19.6	62.3%
LcC	Lloyd loam, 6 to 10 percent slopes	0.3	0.9%
LcD	Lloyd loam, 10 to 15 percent slopes	0.6	1.8%
LcE	Lloyd loam, 15 to 25 percent slopes	0.0	0.1%
LdC2	Lloyd clay loam, 6 to 10 percent slopes, moderately eroded	0.4	1.2%
MgC	Madison gravelly sandy loam, 6 to 10 percent slopes	0.3	0.9%
MhE2	Madison-Bethlehem complex, 10 to 25 percent slopes, moderately eroded	9.5	30.0%
PaE3	Pacolet clay loam, 10 to 25 percent slopes, severely eroded	0.4	1.3%
PeE	Pacolet soils, 10 to 25 percent slopes	0.0	0.1%
Totals for Area of Interest		**31.5**	**100.0%**

Amy James

From: Amy James
Sent: Wednesday, December 22, 2021 3:53 PM
To: Muzzy, Laura - FPAC-NRCS, RALEIGH, NC
Cc: Jones, Michael - NRCS, Raleigh, NC; Propst, Jim - NRCS, Statesville, NC; Jake Byers
Subject: RE: [External Email]Bandys Farm Mitigation Site FPPA Review
Attachments: Catawba - Bandys Farm_AD-1006 form_completed.pdf

Hi Laura,

Thanks for such a quick turnaround! Attached you will find the AD-1006 form for the Bandys Farm restoration project with parts VI and VII completed. Please let me know if you have any questions or concerns.

Have a Merry Holiday!
Amy

From: Muzzy, Laura - FPAC-NRCS, RALEIGH, NC <Laura.Muzzy@usda.gov>
Sent: Monday, December 20, 2021 2:13 PM
To: Amy James <ajames@EPRUSA.NET>
Cc: Jones, Michael - NRCS, Raleigh, NC <michael.jones3@usda.gov>; Propst, Jim - NRCS, Statesville, NC <jim.propst@usda.gov>; Jake Byers <jbyers@EPRUSA.NET>
Subject: RE: [External Email]Bandys Farm Mitigation Site FPPA Review

Hello, Amy,

Thank you for your communication regarding the Bandys Farm Stream and Wetland Mitigation Site in Catawba County, NC. Attached is the AD-1006 and letter from NRCS.
Please let me know if you have any questions. Thank you, and have a good day!

best,

Laurie F. Muzzy
Resource Soil Scientist | NRCS-Natural Resource Conservation Service
4407 Bland Road Suite #117, Raleigh, NC 27609
(919) 873-2158

While the USDA North Carolina State Office is currently closed to visitors because of the pandemic, we continue to work with agricultural producers via phone, email, and other digital tools. Contact me at (919)873-2158 to make an appointment.

Please visit farmers.gov/coronavirus for the latest information on Service Center status.

From: Amy James <ajames@EPRUSA.NET>
Sent: Friday, December 17, 2021 2:02 PM
To: May, Kristin - NRCS, Salisbury, NC <kristin.may@usda.gov>
Cc: Jake Byers <jbyers@EPRUSA.NET>
Subject: [External Email]Bandys Farm Mitigation Site FPPA Review

[External Email]
If this message comes from an **unexpected sender** or references a **vague/unexpected topic;**

U.S. Department of Agriculture

FARMLAND CONVERSION IMPACT RATING

PART I *(To be completed by Federal Agency)*	Date Of Land Evaluation Request 12/17/2021
Name of Project Bandys Farm stream & wetland mitigation	Federal Agency Involved Federal Highwav Admin (FHWA)
Proposed Land Use Stream & wetland mitigation	County and State Catawba County. North Carolina
PART II *(To be completed by NRCS)*	Date Request Received By NRCS 12/20/2021 — Person Completing Form: Laurie F. Muzzy

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 0	Average Farm Size 100
Major Crop(s) corn	Farmable Land In Govt. Jurisdiction Acres: 229,567 86.9%	Amount of Farmland As Defined in FPPA Acres: 229,567 86.9%	
Name of Land Evaluation System Used Catawba County LESA	Name of State or Local Site Assessment System NA	Date Land Evaluation Returned by NRCS 12/20/2021	

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		14.1			
B. Total Acres To Be Converted Indirectly		0			
C. Total Acres In Site		31.5			
PART IV *(To be completed by NRCS)* Land Evaluation Information					
A. Total Acres Prime And Unique Farmland		19.6			
B. Total Acres Statewide Important or Local Important Farmland		2.1			
C. Percentage Of Farmland in County Or Local Govt. Unit To Be Converted		0.000%			
D. Percentage Of Farmland in Govt. Jurisdiction With Same Or Higher Relative Value		67.3%			
PART V (To be completed by NRCS) Land Evaluation Criterion Relative Value of Farmland To Be Converted (Scale of 0 to 100 Points)		71.4			
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)	10			
3. Percent Of Site Being Farmed	(20)	0			
4. Protection Provided By State and Local Government	(20)	0			
5. Distance From Urban Built-up Area	(15)	15			
6. Distance To Urban Support Services	(15)	15			
7. Size Of Present Farm Unit Compared To Average	(10)	10			
8. Creation Of Non-farmable Farmland	(10)	0			
9. Availability Of Farm Support Services	(5)	5			
10. On-Farm Investments	(20)	5			
11. Effects Of Conversion On Farm Support Services	(10)	0			
12. Compatibility With Existing Agricultural Use	(10)	0			
TOTAL SITE ASSESSMENT POINTS	160	75	0	0	0
PART VII ***(To be completed by Federal Agency)***					
Relative Value Of Farmland *(From Part V)*	100	71.4	0	0	0
Total Site Assessment *(From Part VI above or local site assessment)*	160	75	0	0	0
TOTAL POINTS *(Total of above 2 lines)*	260	146.4	0	0	0

Site Selected: Yes	Date Of Selection 12/22/2021	Was A Local Site Assessment Used? YES ☐ NO ☑

Reason For Selection:

The site scored less than 160 and "need not be given further consideration for protection". (7 CFR 658.4)

Name of Federal agency representative completing this form: Ecosystem Planning & Restoration	Date: 12/22/2021

(See Instructions on reverse side) **Form AD-1006 (03-02)**

NCSHPO Response

North Carolina Department of Natural and Cultural Resources

State Historic Preservation Office

Ramona M. Bartos, Administrator

Governor Roy Cooper
Secretary D. Reid Wilson

Office of Archives and History
Deputy Secretary, Darin J. Waters, Ph.D.

January 19, 2022

Amy James, PWS
Ecosystem Planning and Restoration, LLC
1150 SE Maynard Road, Suite 140
Cary, NC 27511

ajames@eprusa.net

Re: Bandys Farm Stream and Wetland mitigation, Buffalo Shoals Road, Catawba County, ER 21-3257

Dear Ms. James:

Thank you for your letter of December 17, 2021, regarding the above-referenced undertaking. We apologize for the delay in the response and any inconvenience it may have caused. We have reviewed the submittal and offer the following comments.

We have conducted a review of the project and are aware of no historic resources which would be affected by the project. Therefore, we have no comment on the project as proposed.

The above comments are made pursuant to Section 106 of the National Historic Preservation Act and the Advisory Council on Historic Preservation's Regulations for Compliance with Section 106 codified at 36 CFR Part 800.

Thank you for your cooperation and consideration. If you have questions concerning the above comment, contact Renee Gledhill-Earley, environmental review coordinator, at 919-814-6579 or environmental.review@ncdcr.gov. 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

NCNHP Response

Roy Cooper, **Governor**
D. Reid Wilson, **Secretary**
Misty Buchanan
Deputy Director, Natural Heritage Program

NCNHDE-16538

December 10, 2021

Amy James
Ecosystem Planning and Restoration
1150 SE Maynard Rd. Suite 140
Cary, NC 27511
RE: Bandys Farm Stream and Wetland Mitigation Site

Dear Amy James:

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

A query of the NCNHP database indicates that there are records for rare species, important natural communities, natural areas, and/or conservation/managed areas within the proposed project boundary. These results are presented in the attached 'Documented Occurrences' tables and map.

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 documented within the project area or 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.

Also please note that the NC Natural Heritage Program may follow this letter with additional correspondence if a Dedicated Nature Preserve, Registered Heritage Area, Land and Water Fund easement, or an occurrence of a Federally-listed species is 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 Intersecting the Project Area
Bandys Farm Stream and Wetland Mitigation Site
December 10, 2021
NCNHDE-16538

No Element Occurrences are Documented within the Project Area

There are no documented element occurrences (of medium to very high accuracy) that intersect with the project area. Please note, however, that although the NCNHP database does not show records for rare species within the project area, it does not necessarily mean that they are not present; it may simply mean that the area has not been surveyed. The use of Natural Heritage Program data should not be substituted for actual field surveys if needed, particularly if the project area contains suitable habitat for rare species. If rare species are found, the NCNHP would appreciate receiving this information so that we may update our database.

No Natural Areas are Documented within the Project Area

Managed Areas Documented Within Project Area*

Managed Area Name	Owner	Owner Type
NC Division of Mitigation Services Easement	NC DEQ, Division of Mitigation Services	State

*NOTE: If the proposed project intersects with a conservation/managed area, please contact the landowner directly for additional information. If the project intersects with a Dedicated Nature Preserve (DNP), Registered Natural Heritage Area (RHA), or Federally-listed species, NCNHP staff may provide additional correspondence regarding the project.

Definitions and an explanation of status designations and codes can be found at https://ncnhde.natureserve.org/help. Data query generated on December 10, 2021; source: NCNHP, Q3 October 2021. Please resubmit your information request if more than one year elapses before project initiation as new information is continually added to the NCNHP database.

Natural Heritage Element Occurrences, Natural Areas, and Managed Areas Within a One-mile Radius of the Project Area
Bandys Farm Stream and Wetland Mitigation Site
December 10, 2021
NCNHDE-16538

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	21835	Hexastylis naniflora	Dwarf-flowered Heartleaf	2005-06-07	CD	2-High	Threatened	Threatened	G3	S3

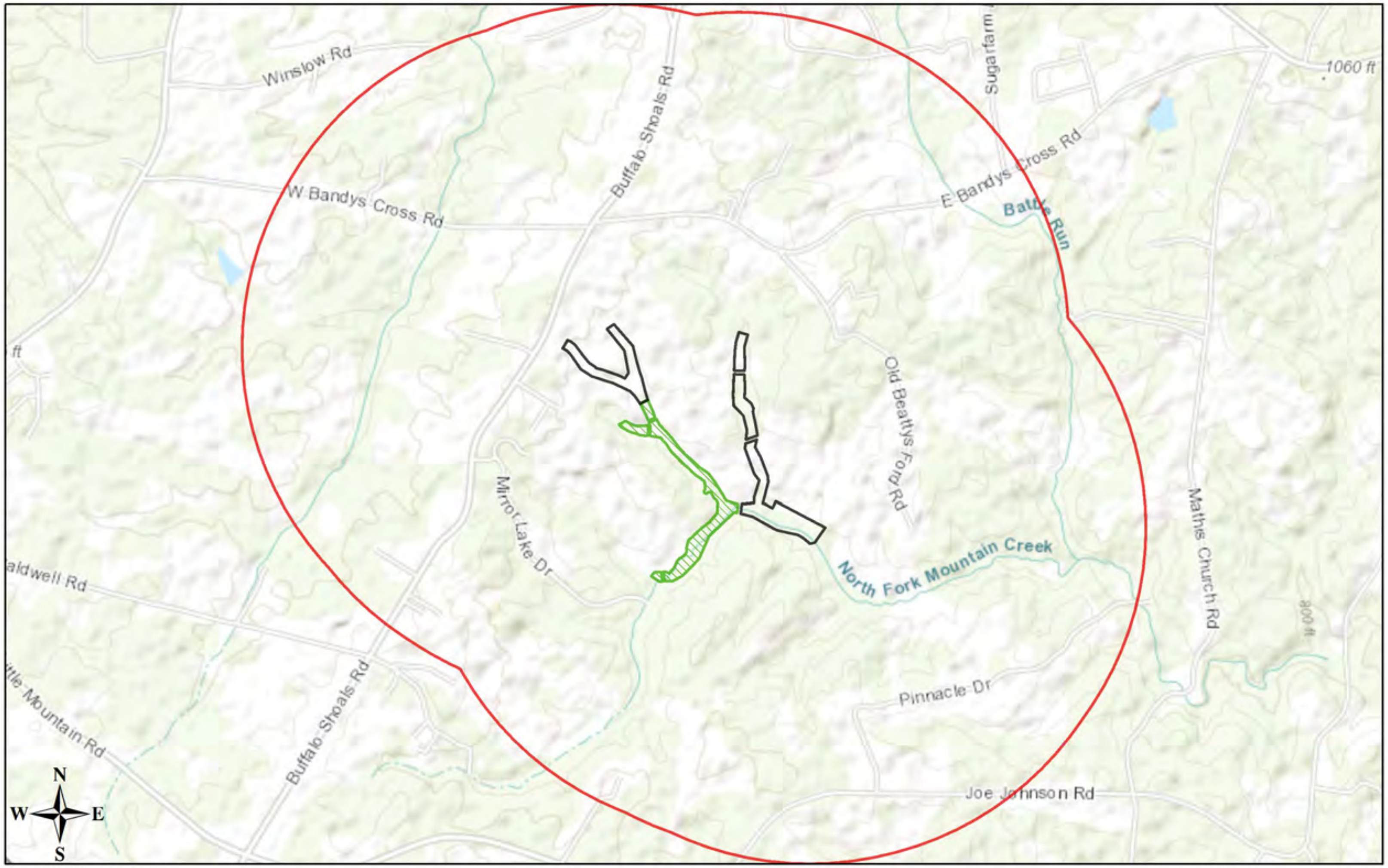
No Natural Areas are Documented Within a One-mile Radius of the Project Area

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

Definitions and an explanation of status designations and codes can be found at https://ncnhde.natureserve.org/help. Data query generated on December 10, 2021; source: NCNHP, Q3 October 2021. Please resubmit your information request if more than one year elapses before project initiation as new information is continually added to the NCNHP database.

NCNHDE-16538: Bandys Farm Stream and Wetland Mitigation Site



December 10, 2021

- Project Boundary
- Buffered Project Boundary
- Managed Area (MAREA)

1:27,211

0 0.225 0.45 0.9 mi

0 0.35 0.7 1.4 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

ERIS Report Summary Pages

ERIS

DATABASE REPORT

Project Property:	*Bandys Farm Stream and Wetland Mitigation Site* *Buffalo Shoals Rd.* *Catawba NC*
Project No:	
Report Type:	*Database Report*
Order No:	*21121300237*
Requested by:	*Ecosystem Planning & Restoration, LLC*
Date Completed:	*December 15, 2021*

Environmental Risk Information Services
A division of Glacier Media Inc.
1.866.517.5204 | info@erisinfo.com | erisinfo.com

Table of Contents

Executive Summary

Property Information:

Project Property:		*Bandys Farm Stream and Wetland Mitigation Site* *Buffalo Shoals Rd. Catawba NC*
Project No:		
Coordinates:		
	Latitude:	*35.63275968*
	Longitude:	*-81.0843755*
	UTM Northing:	*3,943,211.22*
	UTM Easting:	*492,359.48*
	UTM Zone:	*17S*
Elevation:		*934 FT*

Order Information:

Order No:	*21121300237*
Date Requested:	*December 13, 2021*
Requested by:	*Ecosystem Planning & Restoration, LLC*
Report Type:	*Database Report*

Historicals/Products:

ERIS Xplorer	*ERIS Xplorer*
Excel Add-On	*Excel Add-On*

Executive Summary: Report Summary

Database	Searched	Search Radius	Project Property	Within 0.12mi	0.125mi to 0.25mi	0.25mi to 0.50mi	0.50mi to 1.00mi	Total
Standard Environmental Records								
Federal								
DOE FUSRAP	Y	1	0	0	0	0	0	0
NPL	Y	1	0	0	0	0	0	0
PROPOSED NPL	Y	1	0	0	0	0	0	0
DELETED NPL	Y	0.5	0	0	0	0	-	0
SEMS	Y	0.5	0	0	0	0	-	0
ODI	Y	0.5	0	0	0	0	-	0
SEMS ARCHIVE	Y	0.5	0	0	0	0	-	0
CERCLIS	Y	0.5	0	0	0	0	-	0
IODI	Y	0.5	0	0	0	0	-	0
CERCLIS NFRAP	Y	0.5	0	0	0	0	-	0
CERCLIS LIENS	Y	PO	0	-	-	-	-	0
RCRA CORRACTS	Y	1	0	0	0	0	0	0
RCRA TSD	Y	0.5	0	0	0	0	-	0
RCRA LQG	Y	0.25	0	0	0	-	-	0
RCRA SQG	Y	0.25	0	0	0	-	-	0
RCRA VSQG	Y	0.25	0	0	0	-	-	0
RCRA NON GEN	Y	0.25	0	0	0	-	-	0
RCRA CONTROLS	Y	0.5	0	0	0	0	-	0
FED ENG	Y	0.5	0	0	0	0	-	0
FED INST	Y	0.5	0	0	0	0	-	0
LUCIS	Y	0.5	0	0	0	0	-	0
ERNS 1982 TO 1986	Y	PO	0	-	-	-	-	0
ERNS 1987 TO 1989	Y	PO	0	-	-	-	-	0
ERNS	Y	PO	0	-	-	-	-	0
FED BROWNFIELDS	Y	0.5	0	0	0	0	-	0
FEMA UST	Y	0.25	0	0	0	-	-	0
FRP	Y	0.25	0	0	0	-	-	0

Database	Searched	Search Radius	Project Property	Within 0.12mi	0.125mi to 0.25mi	0.25mi to 0.50mi	0.50mi to 1.00mi	Total
HIST GAS STATIONS	Y	0.25	0	0	0	-	-	0
REFN	Y	0.25	0	0	0	-	-	0
BULK TERMINAL	Y	0.25	0	0	0	-	-	0
SEMS LIEN	Y	PO	0	-	-	-	-	0
SUPERFUND ROD	Y	1	0	0	0	0	0	0
State								
SHWS	Y	1	0	0	0	0	0	0
LUST TRUST	Y	0.5	0	0	0	0	-	0
DELISTED SHWS	Y	1	0	0	0	0	0	0
SWF/LF	Y	0.5	0	0	0	0	-	0
OLD LF	Y	0.5	0	0	0	0	-	0
COAL ASH LF	Y	0.5	0	0	0	0	-	0
LUST	Y	0.5	0	**1**	**1**	0	-	**2**
HSDS	Y	1	0	0	0	0	0	0
LAST	Y	0.5	0	0	0	0	-	0
DELISTED LST	Y	0.5	0	0	0	0	-	0
UST	Y	0.25	0	**1**	0	-	-	**1**
AST	Y	0.25	0	0	0	-	-	0
TANK	Y	0.25	0	0	0	-	-	0
DTNK	Y	0.25	0	0	0	-	-	0
SOIL REM PERMITS	Y	0.25	0	0	0	-	-	0
INST	Y	0.5	0	0	0	0	-	0
LUR	Y	0.5	0	0	0	0	-	0
FUEL STATIONS	Y	0.25	0	0	0	-	-	0
DELISTED FSS	Y	0.25	0	0	0	-	-	0
VCP	Y	0.5	0	0	0	0	-	0
BROWNFIELDS	Y	0.5	0	0	0	0	-	0
Tribal								
INDIAN LUST	Y	0.5	0	0	0	0	-	0
INDIAN UST	Y	0.25	0	0	0	-	-	0
DELISTED ILST	Y	0.5	0	0	0	0	-	0
DELISTED IUST	Y	0.25	0	0	0	-	-	0

County *No County standard environmental record sources available for this State.*

Database	Searched	Search Radius	Project Property	Within 0.12mi	0.125mi to 0.25mi	0.25mi to 0.50mi	0.50mi to 1.00mi	Total

Additional Environmental Records

Federal

Database	Searched	Search Radius	Project Property	Within 0.12mi	0.125mi to 0.25mi	0.25mi to 0.50mi	0.50mi to 1.00mi	Total
FINDS/FRS	Y	PO	0	-	-	-	-	0
TRIS	Y	PO	0	-	-	-	-	0
PFAS TRI	Y	0.5	0	0	0	0	-	0
PFAS NPL	Y	0.5	0	0	0	0	-	0
PFAS WATER	Y	0.5	0	0	0	0	-	0
PFAS SSEHRI	Y	0.5	0	0	0	0	-	0
HMIRS	Y	0.125	0	0	-	-	-	0
NCDL	Y	0.125	0	0	-	-	-	0
TSCA	Y	0.125	0	0	-	-	-	0
HIST TSCA	Y	0.125	0	0	-	-	-	0
FTTS ADMIN	Y	PO	0	-	-	-	-	0
FTTS INSP	Y	PO	0	-	-	-	-	0
PRP	Y	PO	0	-	-	-	-	0
SCRD DRYCLEANER	Y	0.5	0	0	0	0	-	0
ICIS	Y	PO	0	-	-	-	-	0
FED DRYCLEANERS	Y	0.25	0	0	0	-	-	0
DELISTED FED DRY	Y	0.25	0	0	0	-	-	0
FUDS	Y	1	0	0	0	0	0	0
FORMER NIKE	Y	1	0	0	0	0	0	0
PIPELINE INCIDENT	Y	PO	0	-	-	-	-	0
MLTS	Y	PO	0	-	-	-	-	0
HIST MLTS	Y	PO	0	-	-	-	-	0
MINES	Y	0.25	0	0	0	-	-	0
SMCRA	Y	1	0	0	0	0	0	0
MRDS	Y	1	0	0	0	0	**2**	**2**
URANIUM	Y	1	0	0	0	0	0	0
ALT FUELS	Y	0.25	0	0	0	-	-	0
SSTS	Y	0.25	0	0	0	-	-	0
PCB	Y	0.5	0	0	0	0	-	0

State

Database	Searched	Search Radius	Project Property	Within 0.12mi	0.125mi to 0.25mi	0.25mi to 0.50mi	0.50mi to 1.00mi	Total
DRYC CLEANUP	Y	0.5	0	0	0	0	-	0
DRYCLEANERS	Y	0.25	0	0	0	-	-	0
DELISTED DRYCLEANERS	Y	0.25	0	0	0	-	-	0

Database	Searched	Search Radius	Project Property	Within 0.12mi	0.125mi to 0.25mi	0.25mi to 0.50mi	0.50mi to 1.00mi	Total
SPILLS	Y	0.125	0	0	-	-	-	0
MGP	Y	1	0	0	0	0	0	0
PFAS	Y	0.5	0	0	0	0	-	0
SWRCY	Y	0.5	0	0	0	0	-	0
HAZ	Y	0.25	0	0	0	-	-	0
SDTF	Y	0.125	0	0	-	-	-	0
TIER 2	Y	0.125	0	0	-	-	-	0
UIC	Y	PO	0	-	-	-	-	0
FEEDLOTS	Y	0.5	0	0	0	0	-	0
AIR PERMIT	Y	0.25	0	0	0	-	-	0
Tribal	***No Tribal additional environmental record sources available for this State.***							
County	***No County additional environmental record sources available for this State.***							
	Total:		0	**2**	**1**	0	**2**	**5**

**** PO – Property Only***
**** 'Property and adjoining properties' database search radii are set at 0.25 miles.***

Executive Summary: Site Report Summary - Project Property

Map Key	DB	Company/Site Name	Address	Direction	Distance (mi/ft)	Elev Diff (ft)	Page Number

No records found in the selected databases for the project property.

Executive Summary: Site Report Summary - Surrounding Properties

Map Key	DB	Company/Site Name	Address	Direction	Distance (mi/ft)	Elev Diff (ft)	Page Number
1	UST	CAROLINA GLOVE CO BALLS CREEK	RT 1 CATAWBA NC 28609	NW	0.06 / 320.00	104	17
			Facility ID: 00-0-0000000263 ***Tank ID | Tank Status:*** 001 | Removed, 002 | Removed				
1	LUST	CAROLINA GLOVE COMPANY	1637 BUFFALO SHOALS RD. CATAWBA NC 28609	NW	0.06 / 320.00	104	18
2	LUST	HEWITT PROPERTY	1557 BUFFALO SHOALS RD CATAWBA NC 28609	NNW	0.17 / 901.86	103	19
			Incident No: 15038 ***Incid Phase Desc:*** Response				
3	MRDS	PAINE'S ORE BANK MINE	CATAWBA COUNTY CATAWBA NC 28609	SE	0.60 / 3,180.12	9	21
			Dep ID: 10078882				
4	MRDS	SETZER LIMESTONE QUARRY	CATAWBA COUNTY CATAWBA NC 28609	NNE	0.76 / 4,023.09	-51	22
			Dep ID: 60001752				

Executive Summary: Summary by Data Source

Standard

State

LUST - Incident Management Database (Regional Underground Storage Tanks)

A search of the LUST database, dated Jul 30, 2021 has found that there are 2 LUST site(s) within approximately 0.50 miles of the project property.

Equal/Higher Elevation	Address	Direction	Distance (mi/ft)	Map Key
CAROLINA GLOVE COMPANY	1637 BUFFALO SHOALS RD. CATAWBA NC 28609	NW	0.06 / 320.00	1
HEWITT PROPERTY	1557 BUFFALO SHOALS RD CATAWBA NC 28609 ***Incident No**: 15038* ***Incid Phase Desc**: Response*	NNW	0.17 / 901.86	2

UST - Registered Tanks Database

A search of the UST database, dated Oct 8, 2021 has found that there are 1 UST site(s) within approximately 0.25 miles of the project property.

Equal/Higher Elevation	Address	Direction	Distance (mi/ft)	Map Key
CAROLINA GLOVE CO BALLS CREEK	RT 1 CATAWBA NC 28609 ***Facility ID**: 00-0-0000000263* ***Tank ID | Tank Status**: 001 | Removed, 002 | Removed*	NW	0.06 / 320.00	1

Non Standard

Federal

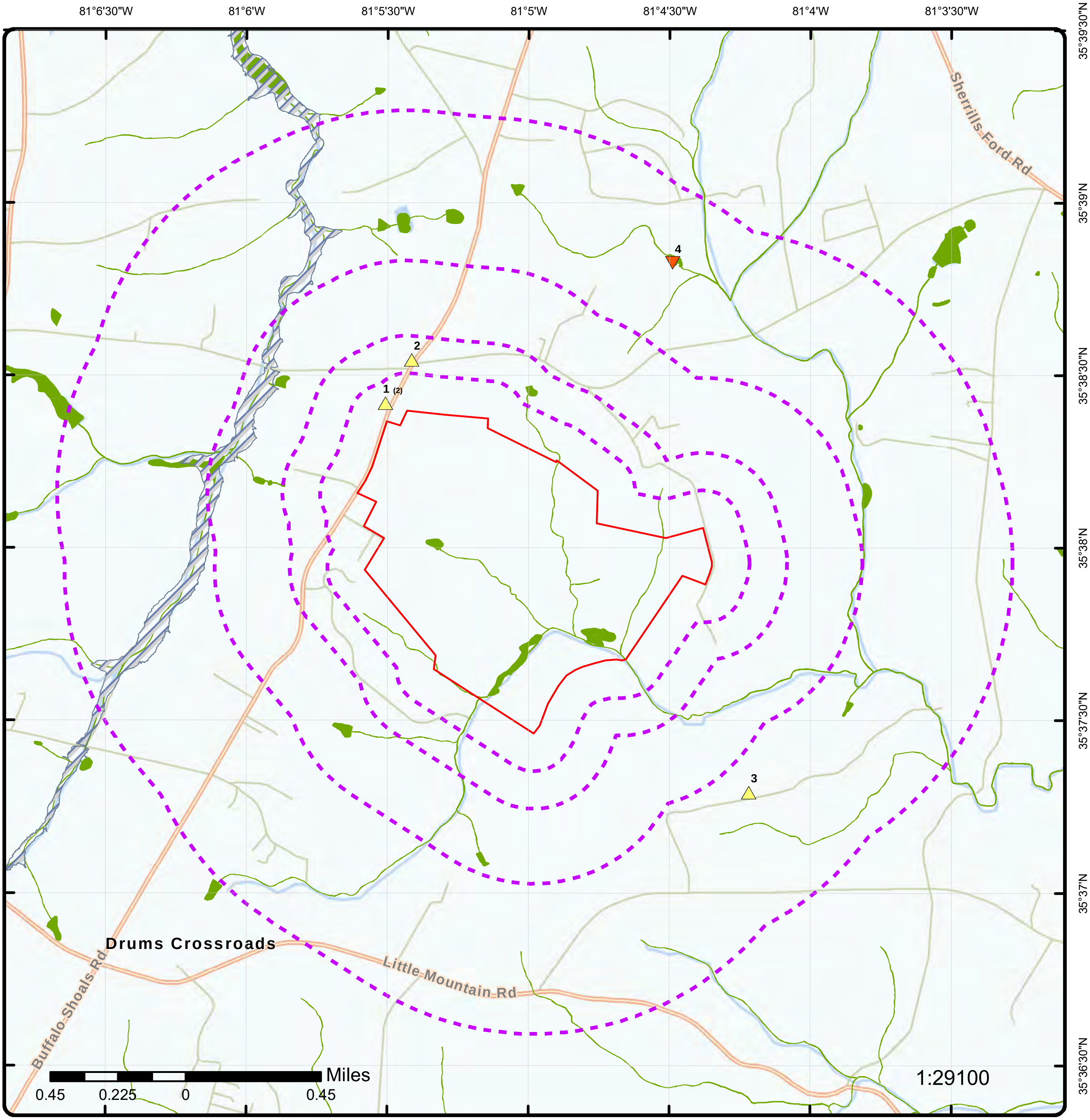
MRDS - Mineral Resource Data System

A search of the MRDS database, dated Mar 15, 2006 has found that there are 2 MRDS site(s) within approximately 1.00 miles of the project property.

Equal/Higher Elevation	Address	Direction	Distance (mi/ft)	Map Key
PAINE'S ORE BANK MINE	CATAWBA COUNTY CATAWBA NC 28609 ***Dep ID**: 10078882*	SE	0.60 / 3,180.12	3

Lower Elevation	Address	Direction	Distance (mi/ft)	Map Key
SETZER LIMESTONE QUARRY	CATAWBA COUNTY CATAWBA NC 28609	NNE	0.76 / 4,023.09	4

Lower Elevation	Address	Direction	Distance (mi/ft)	Map Key
	***Dep ID**: 60001752*			



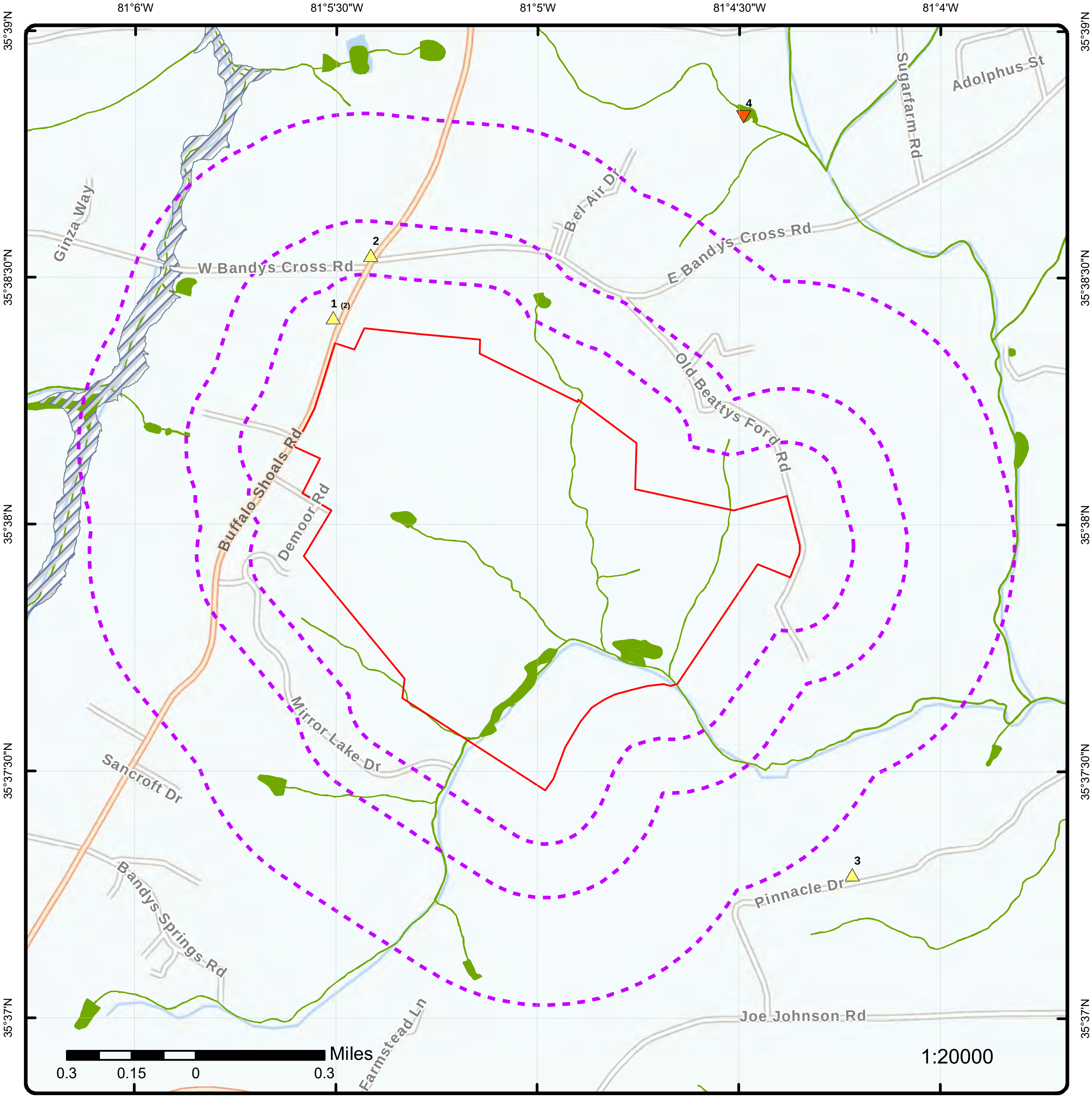
Map: 1.0 Mile Radius

Order Number: 21121300237

Address: Buffalo Shoals Rd., Catawba, NC

Project Property
Buffer Outline
Eris Sites with Higher Elevation
Eris Sites with Same Elevation
Eris Sites with Lower Elevation
Eris Sites with Unknown Elevation
Eris Areas with Higher Elevation
Eris Areas with Same Elevation
Eris Areas with Lower Elevation
Eris Areas with Unknown Elevation
Freeways; Highways
Traffic Circle; Ramp
Major & Minor Arterial
Traffic Circle; Ramp
Local Road
Rail
State
Country
National Priority List Sites
National Wetland
Indian Reserve Land
Historic Fill
100 Year Flood Zone
500 Year Flood Zone
FWS Special Designation Areas
Plume

Source: © 2021 ESRI StreetMap Premium



Map: 0.5 Mile Radius

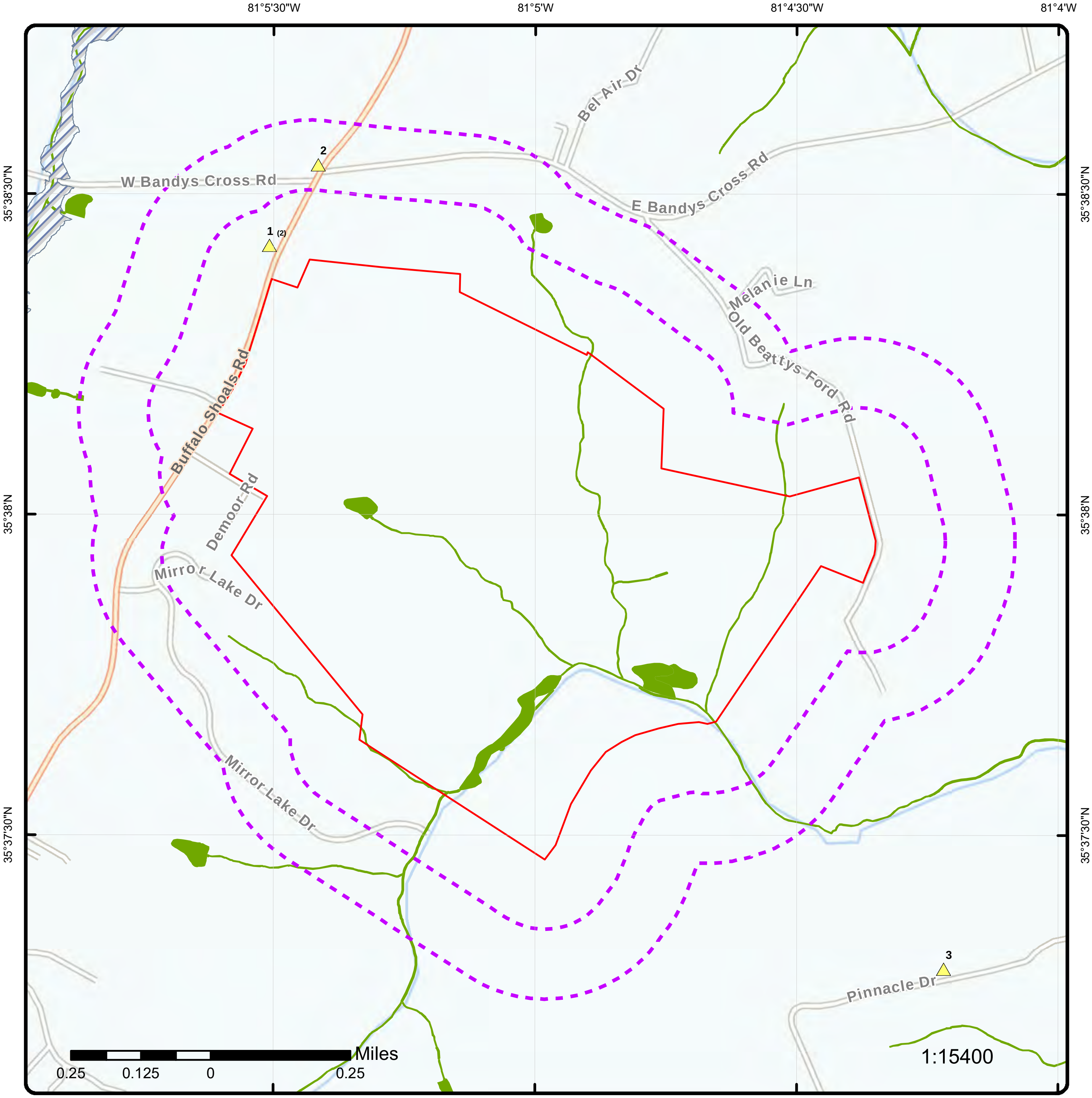
Order Number: 21121300237

Address: Buffalo Shoals Rd., Catawba, NC

ERIS

Project Property
Buffer Outline
Eris Sites with Higher Elevation
Eris Sites with Same Elevation
Eris Sites with Lower Elevation
Eris Sites with Unknown Elevation
Eris Areas with Higher Elevation
Eris Areas with Same Elevation
Eris Areas with Lower Elevation
Eris Areas with Unknown Elevation
Freeways; Highways
Traffic Circle; Ramp
Major & Minor Arterial
Traffic Circle; Ramp
Local Road
Rail
State
Country
National Priority List Sites
National Wetland
Indian Reserve Land
Historic Fill
100 Year Flood Zone
500 Year Flood Zone
FWS Special Designation Areas
Plume

Source: © 2021 ESRI StreetMap Premium



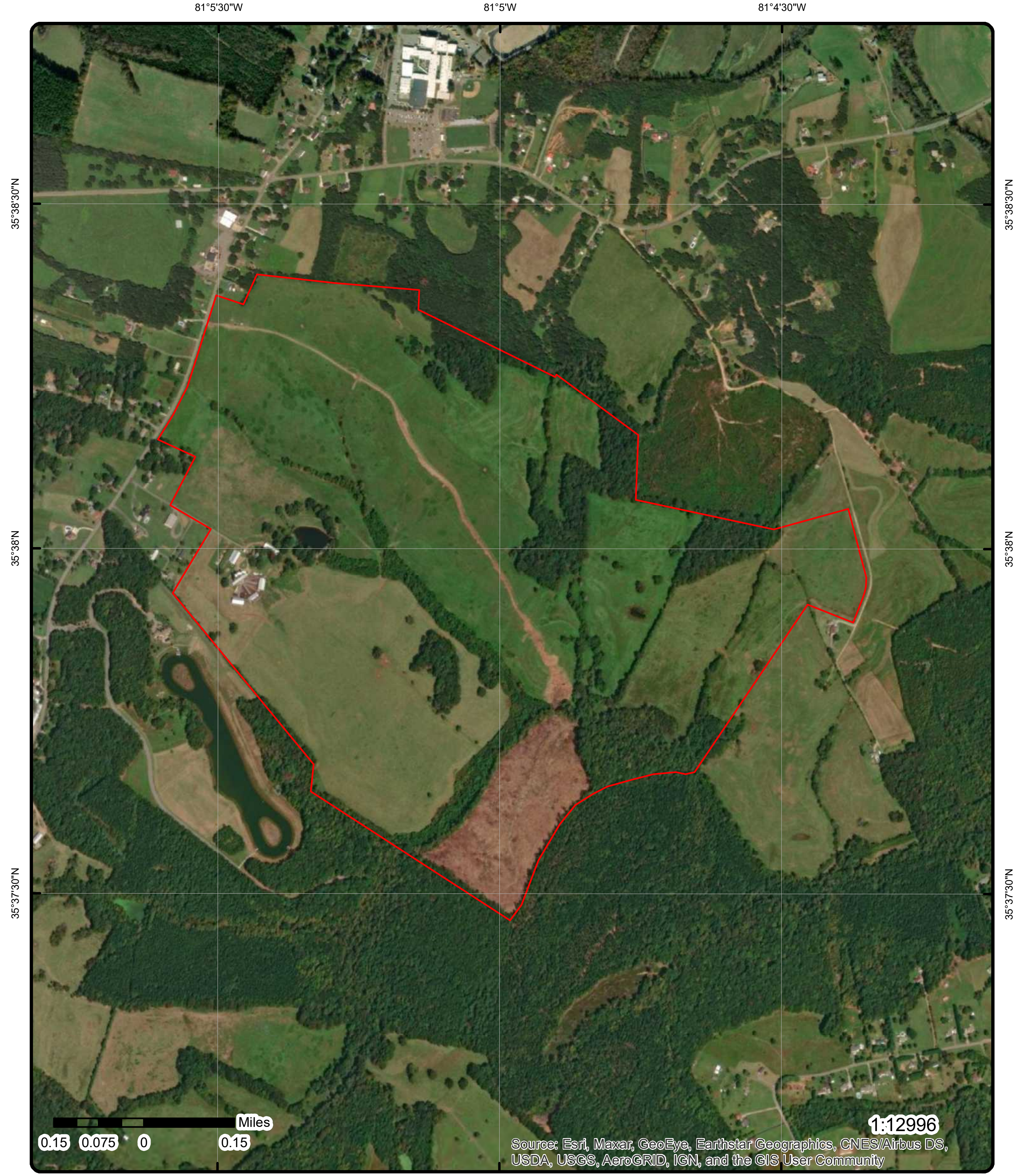
Map: 0.25 Mile Radius

Order Number: 21121300237

Address: Buffalo Shoals Rd., Catawba, NC

- Project Property
- Buffer Outline
- Eris Sites with Higher Elevation
- Eris Sites with Same Elevation
- Eris Sites with Lower Elevation
- Eris Sites with Unknown Elevation
- Eris Areas with Higher Elevation
- Eris Areas with Same Elevation
- Eris Areas with Lower Elevation
- Eris Areas with Unknown Elevation
- Freeways; Highways
- Traffic Circle; Ramp
- Major & Minor Arterial
- Traffic Circle; Ramp
- Local Road
- Rail
- State
- Country
- National Priority List Sites
- National Wetland
- Indian Reserve Land
- Historic Fill
- 100 Year Flood Zone
- 500 Year Flood Zone
- FWS Special Designation Areas
- Plume

Source: © 2021 ESRI StreetMap Premium

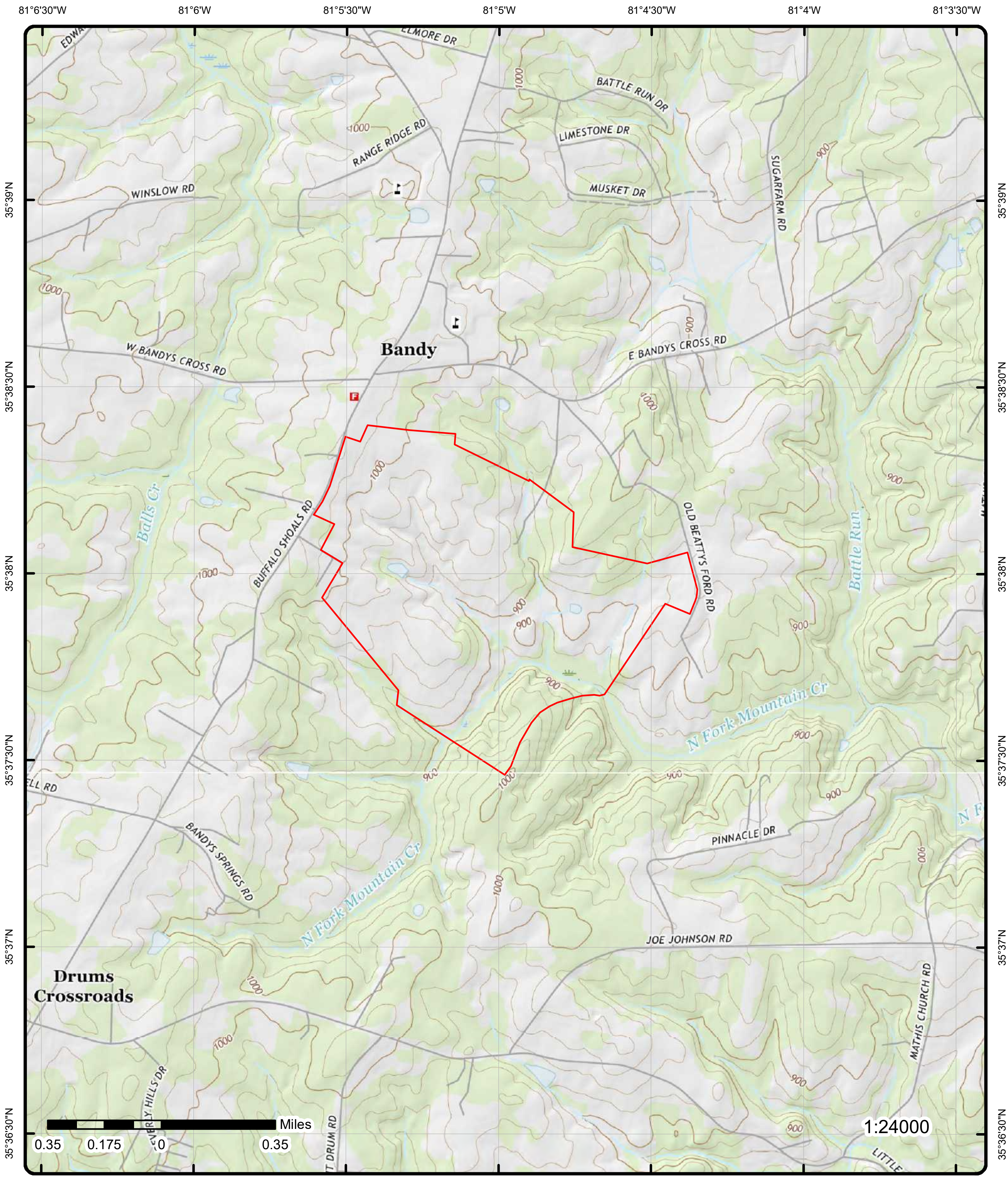


Aerial **Year: 2020**

Order Number: 21121300237

Address: Buffalo Shoals Rd., Catawba, NC

Source: ESRI World Imagery



Topographic Map

Year: 2016

Order Number: 21121300237

Address: Buffalo Shoals Rd., NC

Quadrangle(s): Maiden, NC; Catawba, NC; Newton, NC; Denver, NC

Source: USGS Topographic Map

Appendix 7

PROJECT: BANDYS FARM STREAM & WETLAND MITIGATION PROJECT

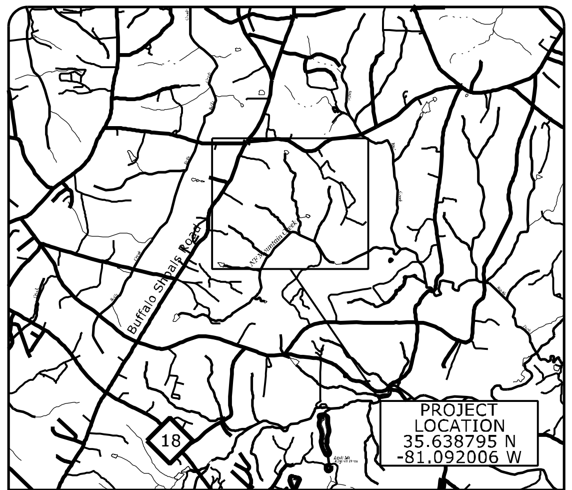
STATE	PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
NC	ASH0018	1	76

NC DEPARTMENT OF ENVIRONMENTAL QUALITY
DIVISION OF MITIGATION SERVICES

CATAWBA COUNTY

LOCATION: BUFFALO SHOALS ROAD, CATAWBA COUNTY, NC

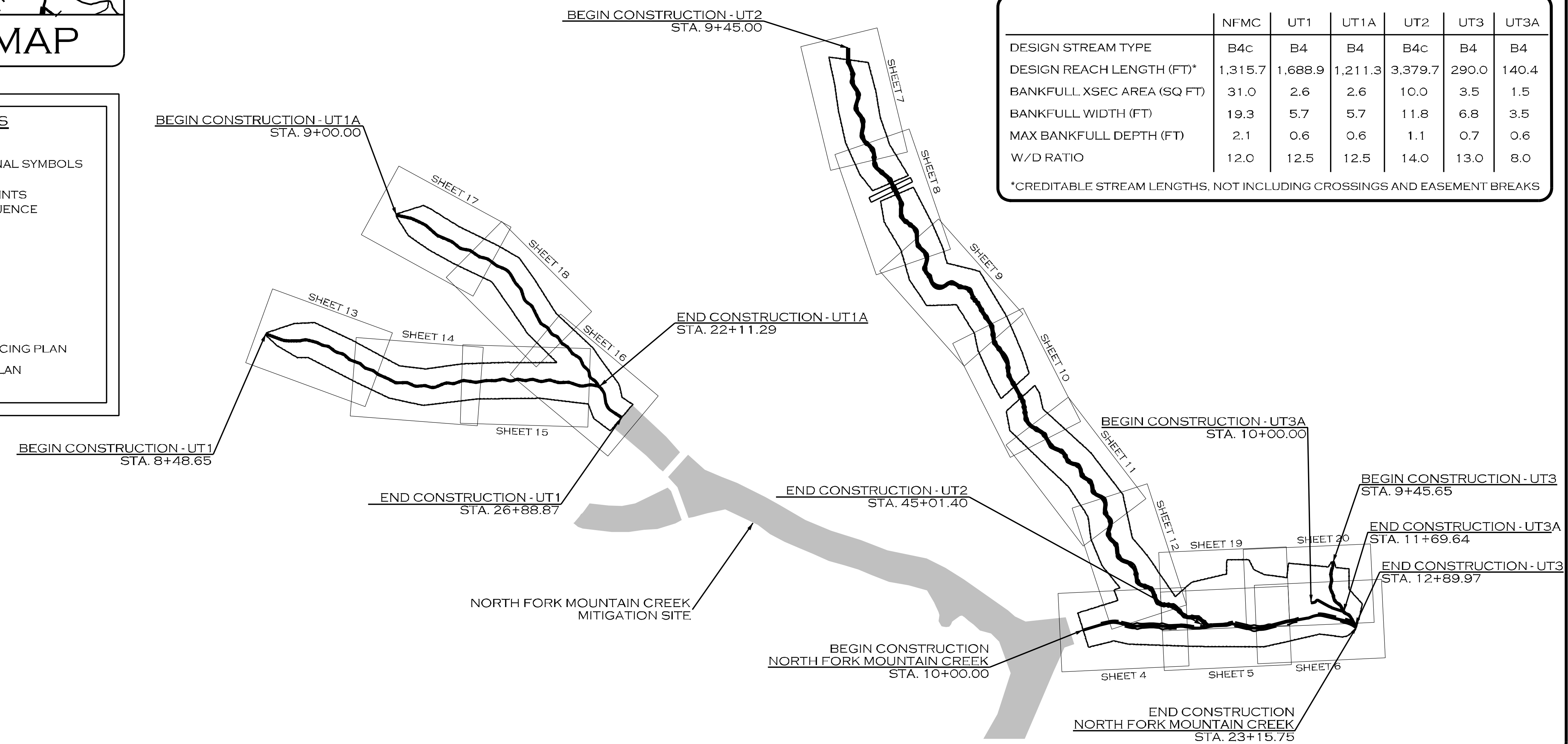
TYPE OF WORK: STREAM AND WETLAND RESTORATION



VICINITY MAP

NAD 83

INDEX OF SHEETS



	NFMC	UT1	UT1A	UT2	UT3	UT3A
DESIGN STREAM TYPE	B4c	B4	B4	B4c	B4	B4
DESIGN REACH LENGTH (FT)*	1,315.7	1,688.9	1,211.3	3,379.7	290.0	140.4
BANKFULL XSEC AREA (SQ FT)	31.0	2.6	2.6	10.0	3.5	1.5
BANKFULL WIDTH (FT)	19.3	5.7	5.7	11.8	6.8	3.5
MAX BANKFULL DEPTH (FT)	2.1	0.6	0.6	1.1	0.7	0.6
W/D RATIO	12.0	12.5	12.5	14.0	13.0	8.0

*CREDITABLE STREAM LENGTHS, NOT INCLUDING CROSSINGS AND EASEMENT BREAKS

GRAPHIC SCALES

20 10 0 20 40
PLANS

20 10 0 20 40
PROFILE (HORIZONTAL)

5 2.5 0 5 10
PROFILE (VERTICAL)

REVISIONS

NO.	DESCRIPTION	ENGR.	APPROV.	DATE
1	DRAFT MITIGATION PLAN	JB	KLT	12/16/22
2	FINAL MITIGATION PLAN	JB	KLT	2/21/23
3	ISSUED FOR BID	JB	KLT	7/20/23

PREPARED FOR:

Mitigation Services
ENVIRONMENTAL QUALITY

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

HARRY TSOMIDES
PROJECT MANAGER

PREPARED IN THE OFFICE OF:

ECOSYSTEM PLANNING & RESTORATION
EPR
204 STONE RIDGE BLVD.
ASHEVILLE, NC 28804

SUMMER 2023
LETTING DATE:

JAKE BYERS, PE
PROJECT ENGINEER

PROJECT ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 039201 ENGINEER JACOB M. BYERS

Jake Byers 7/2023

P.E.

SIGNATURE:

GENERAL NOTES

STREAM CONVENTIONAL SYMBOLS

- ROCK J-HOOK (JH)
- ROCK VANE (RV)
- OFFSET ROCK CROSS VANE (OV)
- ROCK CROSS VANE (XV)
- TEMPORARY SILT CHECK
- ROOTWAD (RW)
- GRADE CONTROL LOG J-HOOK VANE (LJH)
- LOG VANE (LV)
- LOG STEP (LS)
- ROCK STEP (RS)
- LOG CROSS VANE (XV)
- CONSTRUCTED CASCADE (CC)
- CONSTRUCTED RIFFLE (CR)
- BOULDER CLUSTER
- LOG ROLLER (LR)
- GRADE CONTROL WOODY RIFFLE (WR)
- TOEWOOD WITH GEOLIFT (TYPE 1) (TW1)
- TOEWOOD WITH GEOLIFT (TYPE 2) (TW2)
- SOD MATS (SM)
- DEBRIS JAM (DJ-T#)
- SINGLE WING DEFLECTOR (SW)
- DOUBLE WING DEFLECTOR (DW)
- ROCK STEP POOL (RSP)

- — SF — SAFETY FENCE
- — TP — TAPE FENCE
- — | | | — TEMPORARY SILT FENCE
- PROPOSED FENCING
- CONSERVATION EASEMENT (CE)
- - - 20 - - EXISTING MAJOR CONTOUR
- EXISTING MINOR CONTOUR
- LIMITS OF DISTURBANCE
- BANKFULL BENCH (GRADE)
- PROPERTY LINE
- ACCESS ROAD
- 10+00 STREAM THALWEG
- STREAM TOP OF BANKS
- FEMA FLOOD BOUNDARY ZONE AE
- FOOT BRIDGE
- TEMPORARY STREAM CROSSING
- PERMANENT FORD STREAM CROSSING (PFC)
- TRANSPLANTED VEGETATION
- TREE REMOVAL
- TREE PROTECTION
- GEOLIFT (GL)
- CHANNEL FILL / DITCH PLUG
- GRADE BANK 2:1 OR FLATTER
- WLB EXISTING WETLANDS
- SURVEYED EXISTING RIFFLE
- WETLAND REESTABLISHMENT AREA (W1)
- WETLAND REHABILITATION AREA (W2)

**NOTE: ALL ITEMS ABOVE MAY NOT BE USED ON THIS PROJECT

GENERAL NOTES

1. THE CONTRACTOR IS REQUIRED TO INSTALL INSTREAM STRUCTURES USING A TRACK HOE WITH A HYDRAULIC THUMB OF SUFFICIENT SIZE TO PLACE BOULDERS, AND LOGS.
2. WORK IS BEING PERFORMED AS AN ENVIRONMENTAL RESTORATION PLAN. THE CONTRACTOR SHOULD MAKE ALL REASONABLE EFFORTS TO REDUCE SEDIMENT LOSS AND MINIMIZE DISTURBANCE OF THE SITE WHILE PERFORMING THE CONSTRUCTION WORK.
3. CONSTRUCTION IS SCHEDULED TO BEGIN FALL 2023.
4. ALL DISTURBED STREAM BANKS SHALL BE SEEDED, MULCHED, MATTED AND LIVE STAKED UNLESS OTHERWISE NOTED.
5. STONE BACKFILL FOR INSTREAM STRUCTURES SHALL INCLUDE AN EVEN MIX OF CLASS A, CLASS B AND ONSITE ALLUVIUM IF AVAILABLE. IF ONSITE ALLUVIUM IS NOT AVAILABLE CLASS A, CLASS B AND #57 STONE SHALL BE USED.
6. PRIOR TO BEGINNING ANY LAND DISTURBING ACTIVITIES, NOTIFICATION AND APPROVAL MUST BE GRANTED FROM THE US ARMY CORP OF ENGINEERS, AND NC DIVISION OF WATER RESOURCES.
7. THE CONTRACTOR SHALL CONTACT NORTH CAROLINA “ONE CALL”CENTER (1.800.632.4949) BEFORE ANY EXCAVATION.
8. THE CONTRACTOR WILL MOBILIZE EQUIPMENT AND MATERIALS TO THE SITE USING THE EXISTING FARM ROAD OFF BUFFALO SHOALS ROAD.
9. THE CONTRACTOR WILL UTILIZE EXISTING ENTRANCES, PATHS, AND ROADS TO THE EXTENT POSSIBLE. ANY NECESSARY STREAM CROSSINGS SHALL CONSIST OF TIMBER MAT CROSSINGS AND BE BORDERED BY SILT FENCE.
10. CONTRACTOR WILL STORE ALL EQUIPMENT AND MATERIALS IN STAGING AND STOCKPILE AREAS.
11. ANY STOCKPILED SOIL MATERIAL SHALL BE BORDERED ON THE DOWNHILL SIDE BY SILT FENCE SO THAT ANY WASHED SEDIMENT IS TRAPPED.
12. IMMEDIATELY UPON COMPLETION OF BANK GRADING, THE SLOPE WILL BE SEEDED, MULCHED, AND MATTED WITH EROSION CONTROL MATTING UNLESS ANOTHER TREATMENT IS SHOWN IN THE DESIGN PLANS.
13. UPON COMPLETION OF EACH SECTION OF THE CHANNEL CONSTRUCTION, ALL DISTURBED FLOODPLAIN AREAS INCLUDING STAGING AREAS AND HAUL ROADS, SHALL BE SEEDED AND MULCHED. TREES SHALL BE PLANTED IN ACCORDANCE WITH THE VEGETATION SELECTION AND THE PLANS. PERMANENT SEEDING MIXTURES SHALL BE APPLIED AS SHOWN ON THE PLANS. SEEDING SHALL BE APPLIED IN ALL DISTURBED AREAS AND AREAS WITHIN THE WORK AREA SUSCEPTIBLE TO EROSION (I.E. DISTURBED DITCH BANKS, STEEP SLOPES, AND SPOIL AREAS).
14. CONTRACTOR SHALL NOT DISTURB STABLE SECTIONS OF THE CHANNEL AS DIRECTED BY THE ENGINEER.
15. ALL AREAS SHOULD BE SEEDED AND MULCHED BEFORE LEAVING THE PROJECT REACH. REMOVE TEMPORARY STREAM CROSSINGS AND ANY IN-STREAM TEMPORARY ROCK DAMS. ALL WASTE MATERIAL MUST BE REMOVED FROM THE PROJECT SITE.
16. THE CONTRACTOR SHALL PLANT WOODY VEGETATION AND LIVE STAKES, ACCORDING TO PLANTING DETAILS AND SPECIFICATIONS. THEY SHOULD COMPLETE THE REFORESTATION (BARE ROOT PLANTING) PHASE OF THE PROJECT AND APPLY PERMANENT SEEDING AT THE APPROPRIATE TIME OF THE YEAR.
17. THE CONTRACTOR SHALL ENSURE THAT THE SITE IS FREE OF TRASH AND LEFTOVER CONSTRUCTION MATERIALS BEFORE MOVING ON TO A NEW SECTION OF CHANNEL.
18. THE CONTRACTOR SHALL REMOVE ALL EXISTING FENCING WITHIN EASEMENT.

REVISIONS

NO.	DESCRIPTION	ENGR.	APPROV	DATE
1	DRAFT MITIGATION PLAN	JB	KLT	12/16/22
2	FINAL MITIGATION PLAN	JB	KLT	2/21/23
3	ISSUED FOR BID	JB	KLT	7/20/23

PREPARED FOR:

NC Mitigation Services ENVIRONMENTAL QUALITY

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

BANDYS FARM
CATAWBA COUNTY, NC

PREPARED IN THE OFFICE OF:

EPR Ecosystem Planning & Restoration
204 STONE RIDGE BLVD.
ASHEVILLE, NC 28804

PROJECT ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 039207 ENGINEER JACOB M. BYERS

Jake Byers 7/20/23

7/31/2023
X:\PROJECTS\ASH0018_NCDMS_BANDYS_FARM\CADD\PLANS\BF_PSH_1A.DGN
BYERS

SURVEY CONTROL POINTS

Control Point	Northing	Easting	Elevation (ft)	Description
1	690369.757	1382563.602	869.618	CP-IRN
2	690565.201	1382245.476	874.754	CP-IRN
3	690462.958	1381882.169	869.150	CP-IRN
4	690775.878	1381958.976	890.041	CP-IRN
5	691160.139	1381899.435	891.681	CP-IRN
6	691535.222	1381744.091	890.015	CP-IRN
7	692049.971	1381153.354	938.486	CP-IRN
8	692599.519	1381197.055	939.988	CP-IRN
9	693039.927	1381333.865	925.394	CP-IRN
10	693363.561	1381382.857	921.730	CP-IRN
11	693108.360	1381654.505	926.830	CP-IRN
12	692490.754	1379977.885	962.636	CP-IRN
13	692705.537	1379492.011	960.574	CP-IRN
14	692936.413	1379044.959	988.194	CP-IRN
15	693235.462	1378729.772	996.124	CP-IRN
16	693474.760	1379192.004	986.866	CP-IRN
17	692997.509	1379517.455	973.459	CP-IRN
206	690138.936	1382491.051	862.616	CP-NAIL
207	690048.964	1382638.125	861.416	CP-NAIL
295	690211.880	1382653.103	867.147	CP-NAIL
523	690166.394	1382286.067	864.013	CP-NAIL
759	690231.570	1382151.537	864.188	CP-NAIL
764	690265.540	1382075.212	865.351	CP-NAIL
935	690313.436	1381912.287	867.843	CP-NAIL
1174	690425.892	1381696.728	870.454	CP-NAIL
1251	690625.329	1381830.384	873.131	CP-NAIL
1316	690497.999	1381510.277	874.311	CP-NAIL
1693	690945.586	1381729.348	877.822	CP-NAIL
1694	691090.152	1381681.348	882.209	CP-NAIL
1925	691162.010	1381683.854	882.034	CP-NAIL
1926	691298.766	1381682.576	882.223	CP-NAIL
1927	691341.587	1381598.028	886.918	CP-NAIL
2213	691497.830	1381521.702	888.258	CP-NAIL
2426	691733.470	1381661.108	893.191	CP-NAIL
2594	692005.558	1381533.824	908.457	CP-NAIL
2733	692272.018	1381549.806	903.498	CP-NAIL
3124	692543.595	1381370.886	907.446	CP-NAIL
3408	692838.423	1381326.212	916.482	CP-NAIL
3646	693407.101	1381528.660	919.437	CP-NAIL

CONSTRUCTION SEQUENCE

PHASE 1 – ENTIRE PROJECT MOBILIZATION AND GENERAL EROSION CONTROL

1. Limits of Disturbance is 24.1 acres.

2. Identify and locate staging areas, stockpile areas, construction entrances, stream crossings required for construction access; limits of silt fencing, and construction access and haul roads as shown on plans.

3. Install construction entrances.

4. Install crossings required for construction access.

5. Stockpile materials in designated areas.

6. Install silt fencing to the limits shown on the plans and at any other locations as directed by the Engineer. Silt fencing will be installed along the downslope/stream side limits of all staging and stockpile areas.

7. Upon the completion of phase 1, the Contractor shall schedule an inspection of the phase by the Engineer. The Contractor must have written approval from the Engineer that the phase has been completed to satisfactory standards before beginning another phase.

8. Emergency Contact for Erosion and Sedimentation Control is:

Jake Byers, P.E.
Ecosystem Planning and Restoration
828-989-5592

NOTE: Each phase will be completed prior to beginning work on another phase. Upon the completion of each phase, the Contractor shall schedule an inspection of the phase by the Engineer. The Contractor must have written approval from the Engineer that the phase has been completed to satisfactory standards before beginning another phase.

All excavated soil materials not utilized will be stockpiled and maintained according to the project specifications. While onsite, unused material must be located in designated stockpile locations and must be provided temporary or permanent stabilization within 14 days of placement.

After the completion of construction, all unused soil materials shall be spread onsite, at the direction of the engineer. Spread soil must be stabilized using seeding and mulch per the project specifications within 14 days of placement.

If any excavated soil materials need to be, are specified to, and actually are disposed of off-site by the Contractor, the Contractor is responsible for disposal of such soil materials in a permitted area, as well as for providing and implementing an erosion and sedimentation control plan and permit, or any other required permit(s), for the location(s) off site where such materials are disposed.

PHASE 2 – NORTH FORK MOUNTAIN CREEK – 10+00.00 to 23+15.75, UT3 – 9+45.65 to 12+89.97, AND UT3A – 11+32.00 to 13+01.64 CHANNEL RESTORATION IN PLACE

1. Perform construction staking.

2. Work will be conducted North Fork Mountain Creek in the wet. All reasonable attempts shall be made to prevent and limit sedimentation to North Fork Mountain Creek during construction activities.

On UT3 and UT3A, begin pump-around operation at upstream end of each section that can be completed in the same work day. Install an impervious dike at upstream and downstream ends of the proposed limits of the area of active construction in order to isolate all work from stream flow. Pump-around operation should be conducted in accordance with the typical pump-around operation detail as shown on the plans. Turbid water between impervious dikes must be pumped with a separate pump into a special stilling basin to be discharged downstream of the impervious dikes in accordance with the typical pump-around operation detail as shown on the plans.

3. Perform required removal and treatment of any exotic vegetation (including fescue) within and adjacent to the specified reach limits. All required removal and treatment (initial treatment) of exotic vegetation should be completed prior to proceeding with the remaining activities in this phase.

4. Perform required clearing and grubbing. Segregate and stockpile topsoil and other soil material in accordance with the project specifications.

5. Beginning at the upstream end of the area of active construction on NFMC, proceed in the downstream direction with floodplain, channel, and in-stream structure construction as specified on the plans. Perform grading and construction on UT3 and UT3A near the downstream end of NFMC.

6. Construct connection with UT2 and UT3 in conjunction with construction on North Fork Mountain Creek.

7. Perform all topsoil replacement, vegetation transplanting, seeding (temporary and permanent), soil amendment, mulching, and installation of all coir fiber matting as specified on the plans and the project specifications. Associated disturbed stream banks will have temporary and permanent seed, soil amendments, mulch, and coir fiber matting applied to them as work progresses and by the end of each day. Coir fiber matting will be installed on top of the seeded, amended, and mulched stream banks according to the project specifications.

8. Remove and dispose of all unused vegetation and excavated materials.

9. All remaining disturbed areas are to be amended, seeded, mulched and matted according to the project plans and specifications and at a minimum within 14 days of disturbance.

10. Upon the completion of phase 2, the Contractor shall schedule an inspection of the phase by the Engineer. The Contractor must have written approval from the Owner that the phase has been completed to satisfactory standards before beginning another phase.

REVISIONS

NO.	DESCRIPTION	ENGR.	APPROV	DATE
1	DRAFT MITIGATION PLAN	JB	KLT	12/16/22
2	FINAL MITIGATION PLAN	JB	KLT	2/21/23
3	ISSUED FOR BID	JB	KLT	7/20/23

PREPARED FOR:
NC Mitigation Services
NC DEPARTMENT OF ENVIRONMENTAL QUALITY
DIVISION OF MITIGATION SERVICES
1652 MAIL SERVICE CENTER
RALEIGH, NC 27699-1652

BANDYS FARM
CATAWBA COUNTY, NC

PREPARED IN THE OFFICE OF:
Ecosystem Planning & Restoration
204 STONE RIDGE BLVD.
ASHEVILLE, NC 28804

PROJECT ENGINEER
NORTH CAROLINA PROFESSIONAL SEAL 039201 ENGINEER JACOB M. BYERS
7/20/23

7/31/2023
X:\PROJECTS\ASH0018_NCDMS_BANDYS_FARM\CADD\PLANS\BF_PSH_1B.DGN
BYERS

CONSTRUCTION SEQUENCE

PHASE 3 – UT2 – 9+45.00 TO 43+65.80 CHANNEL RESTORATION IN PLACE

1. Perform construction staking.

2. Begin pump-around operation at upstream end of each section that can be completed in the same work day. Install an impervious dike at upstream and downstream ends of the proposed limits of the area of active construction in order to isolate all work from stream flow. Pump-around operation should be conducted in accordance with the typical pump-around operation detail as shown on the plans. Turbid water between impervious dikes must be pumped with a separate pump into a special stilling basin to be discharged downstream of the impervious dikes in accordance with the typical pump-around operation detail as shown on the plans.

3. Perform required removal and treatment of any exotic vegetation within and adjacent to the specified reach limits. All required removal and treatment (initial treatment) of exotic vegetation should be completed prior to proceeding with the remaining activities in this phase.

4. Perform required clearing and grubbing. Segregate and stockpile topsoil and other soil material in accordance with the project specifications.

5. Beginning at the upstream end of the area of active construction, proceed in the downstream direction with floodplain, channel and in-stream structure construction as specified on the plans.

6. Perform all topsoil replacement, vegetation transplanting, seeding (temporary and permanent), soil amendment, mulching, and installation of all coir fiber matting as specified on the plans and the project specifications. Associated disturbed stream banks will have temporary and permanent seed, soil amendments, mulch, and coir fiber matting applied to them as work progresses and by the end of each day. Coir fiber matting will be installed on top of the seeded, amended, and mulched stream banks according to the project specifications.

7. Remove and dispose of all unused vegetation and excavated materials.

8. All remaining disturbed areas are to be amended, seeded, mulched and matted according to the project plans and specifications and at a minimum within 14 days of disturbance.

9. Upon the completion of phase 3, the Contractor shall schedule an inspection of the phase by the Engineer. The Contractor must have written approval from the Engineer that the phase has been completed to satisfactory standards before beginning another phase.

PHASE 4 – UT1 – 8+48.65 TO 26+88.87 AND UT1A – 9+00.00 TO 22+11.29 CHANNEL RESTORATION IN PLACE

1. Perform construction staking.

2. Begin pump-around operation at upstream end of each section that can be completed in the same work day. Install an impervious dike at upstream and downstream ends of the proposed limits of the area of active construction in order to isolate all work from stream flow. Pump-around operation should be conducted in accordance with the typical pump-around operation detail as shown on the plans. Turbid water between impervious dikes must be pumped with a separate pump into a special stilling basin to be discharged downstream of the impervious dikes in accordance with the typical pump-around operation detail as shown on the plans.

3. Perform required removal and treatment of any exotic vegetation within and adjacent to the specified reach limits. All required removal and treatment (initial treatment) of exotic vegetation should be completed prior to proceeding with the remaining activities in this phase.

4. Perform required clearing and grubbing. Segregate and stockpile topsoil and other soil material in accordance with the project specifications.

5. Beginning at the upstream end of the area of active construction, proceed in the downstream direction with floodplain, channel and in-stream structure construction as specified on the plans.

6. Perform all topsoil replacement, vegetation transplanting, seeding (temporary and permanent), soil amendment, mulching, and installation of all coir fiber matting as specified on the plans and the project specifications. Associated disturbed stream banks will have temporary and permanent seed, soil amendments, mulch, and coir fiber matting applied to them as work progresses and by the end of each day. Coir fiber matting will be installed on top of the seeded, amended, and mulched stream banks according to the project specifications.

7. Remove and dispose of all unused vegetation and excavated materials.

8. All remaining disturbed areas are to be amended, seeded, mulched and matted according to the project plans and specifications and at a minimum within 14 days of disturbance.

9. Upon the completion of phase 4, the Contractor shall schedule an inspection of the phase by the Engineer. The Contractor must have written approval from the Engineer that the phase has been completed to satisfactory standards before beginning another phase.

PHASE 5 – ENTIRE PROJECT DEMOBILIZATION AND PLANTING

1. Complete remaining minor grading and site planting preparation work, including ripping and/or disking, as specified in the project specifications.

2. All remaining disturbed areas, including areas that have been ripped and/or disked are to be amended, seeded, matted and/or mulched according to the project specifications and at a minimum within 14 days of disturbance.

3. Complete all remaining proposed permanent vegetation planting per the plans and project specifications.

4. Remove and dispose of all trash, metal, debris, woody material, and excess soil from the site according to local, state, and federal regulations.

5. Restore construction access roads, staging areas, and stockpile areas. Immediately regrade, replace topsoil, and seed, amend, and mulch as specified in the project specifications. Silt fence shall be removed once the site has been stabilized with vegetation.

REVISIONS				
NO.	DESCRIPTION	ENGR.	APPROV	DATE
1	DRAFT MITIGATION PLAN	JB	KLT	12/16/22
2	FINAL MITIGATION PLAN	JB	KLT	2/21/23
3	ISSUED FOR BID	JB	KLT	7/20/23

PREPARED FOR:

NC Mitigation Services

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

BANDYS FARM
CATAWBA COUNTY, NC

PREPARED IN THE OFFICE OF:

EPR Ecosystem Planning & Restoration
204 STONE RIDGE BLVD.
ASHEVILLE, NC 28804

PROJECT ENGINEER

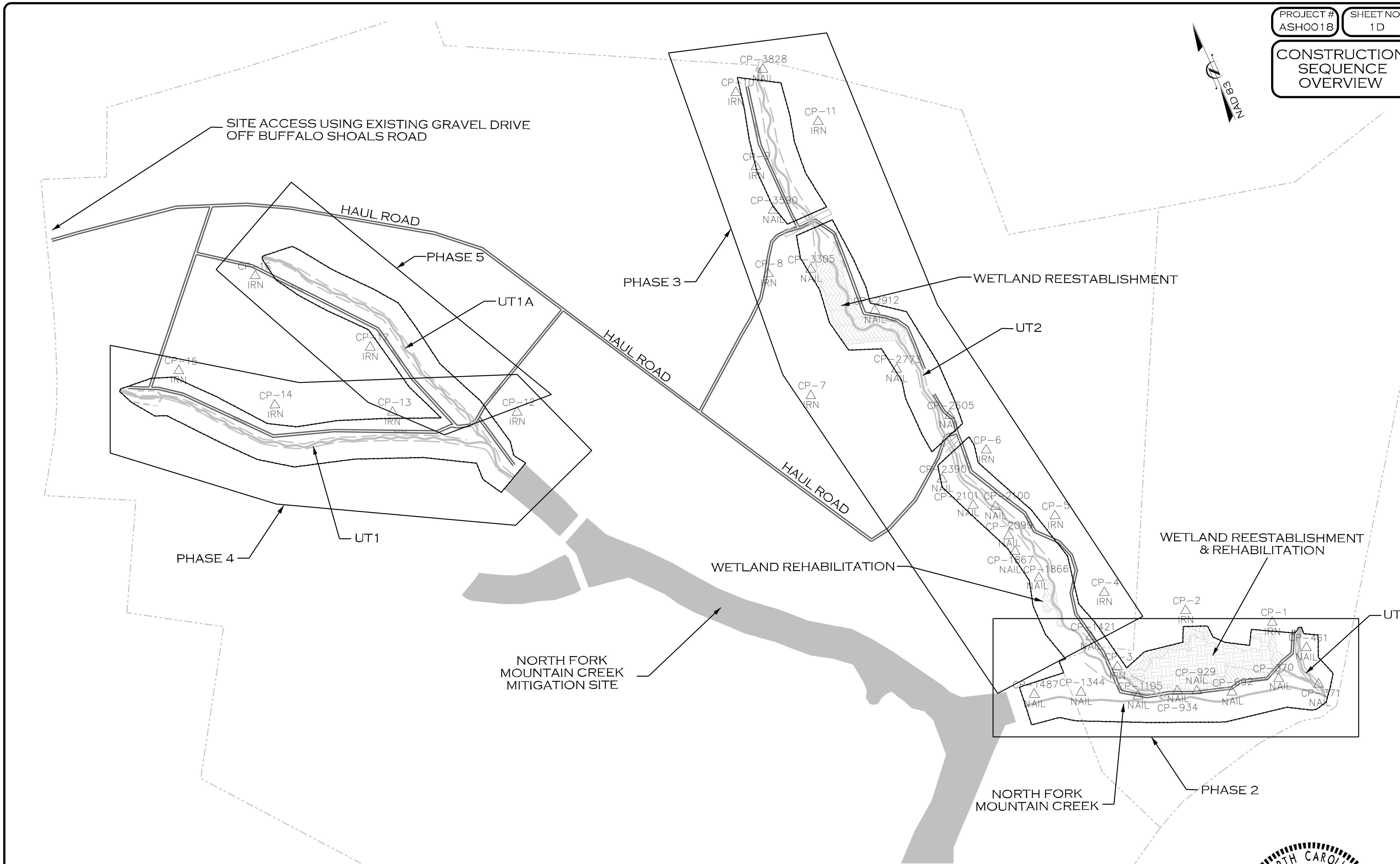
NORTH CAROLINA PROFESSIONAL SEAL 039201 ENGINEER JACOB M. BYERS

Jake Byers 7/20/23

7/31/2023
K:\PROJECTS\ASH0018_NCDMS_BANDYS_FARM\CADD\PLANS\BF_PSH_1C.DGN
BYERS

PROJECT # ASH0018 | SHEET NO. 1D

CONSTRUCTION SEQUENCE OVERVIEW



REVISIONS				
NO.	DESCRIPTION	ENGR.	APPROV	DATE
1	DRAFT MITIGATION PLAN	JB	KLT	12/16/22
2	FINAL MITIGATION PLAN	JB	KLT	2/21/23
3	ISSUED FOR BID	JB	KLT	7/20/23

PREPARED FOR:

NC Mitigation Services

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

BANDYS FARM
CATAWBA COUNTY, NC

PREPARED IN THE OFFICE OF:

EPR Ecosystem Planning & Restoration
204 STONE RIDGE BLVD.
ASHEVILLE, NC 28804

PROJECT ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 039201 ENGINEER JACOB M. BYERS

Jake Byers 7/20/23

7/31/2023
X:\PROJECTS\ASH0018_NCDMS_BANDYS_FARM\CADD\PLANS\BF_PSH_1D.DGN
BYERS

PROJECT # ASH0018 | SHEET NO. 1E

INSPECTION, RECORDKEEPING, AND REPORTING

PART III
SELF-INSPECTION, RECORDKEEPING AND REPORTING

SECTION A: SELF-INSPECTION

Self-inspections are required during normal business hours in accordance with the table below. When adverse weather or site conditions would cause the safety of the inspection personnel to be in jeopardy, the inspection may be delayed until the next business day on which it is safe to perform the inspection. In addition, when a storm event of equal to or greater than 1.0 inch occurs outside of normal business hours, the self-inspection shall be performed upon the commencement of the next business day. Any time when inspections were delayed shall be noted in the Inspection Record.

Inspect	Frequency (during normal business hours)	Inspection records must include:
(1) Rain gauge maintained in good working order	Daily	Daily rainfall amounts. If no daily rain gauge observations are made during weekend or holiday periods, and no individual-day rainfall information is available, record the cumulative rain measurement for those un-attended days (and this will determine if a site inspection is needed). Days on which no rainfall occurred shall be recorded as "zero." The permittee may use another rain-monitoring device approved by the Division.
(2) E&SC Measures	At least once per 7 calendar days and within 24 hours of a rain event $\geq$ 1.0 inch in 24 hours	1. Identification of the measures inspected, 2. Date and time of the inspection, 3. Name of the person performing the inspection, 4. Indication of whether the measures were operating properly, 5. Description of maintenance needs for the measure, 6. Description, evidence, and date of corrective actions taken.
(3) Stormwater discharge outfalls (SDOs)	At least once per 7 calendar days and within 24 hours of a rain event $\geq$ 1.0 inch in 24 hours	1. Identification of the discharge outfalls inspected, 2. Date and time of the inspection, 3. Name of the person performing the inspection, 4. Evidence of indicators of stormwater pollution such as oil sheen, floating or suspended solids or discoloration, 5. Indication of visible sediment leaving the site, 6. Description, evidence, and date of corrective actions taken.
(4) Perimeter of site	At least once per 7 calendar days and within 24 hours of a rain event $\geq$ 1.0 inch in 24 hours	If visible sedimentation is found outside site limits, then a record of the following shall be made: 1. Actions taken to clean up or stabilize the sediment that has left the site limits, 2. Description, evidence, and date of corrective actions taken, and 3. An explanation as to the actions taken to control future releases.
(5) Streams or wetlands onsite or offsite (where accessible)	At least once per 7 calendar days and within 24 hours of a rain event $\geq$ 1.0 inch in 24 hours	If the stream or wetland has increased visible sedimentation or a stream has visible increased turbidity from the construction activity, then a record of the following shall be made: 1. Description, evidence and date of corrective actions taken, and 2. Records of the required reports to the appropriate Division Regional Office per Part III, Section C, Item (2)(a) of this permit.
(6) Ground stabilization measures	After each phase of grading	1. The phase of grading (installation of perimeter E&SC measures, clearing and grubbing, installation of storm drainage facilities, completion of all land-disturbing activity, construction or redevelopment, permanent ground cover). 2. Documentation that the required ground stabilization measures have been provided within the required timeframe or an assurance that they will be provided as soon as possible.

NOTE: The rain inspection resets the required 7 calendar day inspection requirement.

PART III
SELF-INSPECTION, RECORDKEEPING AND REPORTING

SECTION B: RECORDKEEPING

1. E&SC Plan Documentation

The approved E&SC plan as well as any approved deviation shall be kept on the site. The approved E&SC plan must be kept up-to-date throughout the coverage under this permit. The following items pertaining to the E&SC plan shall be kept on site and available for inspection at all times during normal business hours.

Item to Document	Documentation Requirements
(a) Each E&SC measure has been installed and does not significantly deviate from the locations, dimensions and relative elevations shown on the approved E&SC plan.	Initial and date each E&SC measure on a copy of the approved E&SC plan or complete, date and sign an inspection report that lists each E&SC measure shown on the approved E&SC plan. This documentation is required upon the initial installation of the E&SC measures or if the E&SC measures are modified after initial installation.
(b) A phase of grading has been completed.	Initial and date a copy of the approved E&SC plan or complete, date and sign an inspection report to indicate completion of the construction phase.
(c) Ground cover is located and installed in accordance with the approved E&SC plan.	Initial and date a copy of the approved E&SC plan or complete, date and sign an inspection report to indicate compliance with approved ground cover specifications.
(d) The maintenance and repair requirements for all E&SC measures have been performed.	Complete, date and sign an inspection report.
(e) Corrective actions have been taken to E&SC measures.	Initial and date a copy of the approved E&SC plan or complete, date and sign an inspection report to indicate the completion of the corrective action.

2. Additional Documentation to be Kept on Site

In addition to the E&SC plan documents above, the following items shall be kept on the site and available for inspectors at all times during normal business hours, unless the Division provides a site-specific exemption based on unique site conditions that make this requirement not practical:

(a) This General Permit as well as the Certificate of Coverage, after it is received.

(b) Records of inspections made during the previous twelve months. The permittee shall record the required observations on the Inspection Record Form provided by the Division or a similar inspection form that includes all the required elements. Use of electronically-available records in lieu of the required paper copies will be allowed if shown to provide equal access and utility as the hard-copy records.

3. Documentation to be Retained for Three Years

All data used to complete the e-NOI and all inspection records shall be maintained for a period of three years after project completion and made available upon request. [40 CFR 122.41]

PART III
SELF-INSPECTION, RECORDKEEPING AND REPORTING

SECTION C: REPORTING

1. Occurrences that Must be Reported

Permittees shall report the following occurrences:

(a) Visible sediment deposition in a stream or wetland.

(b) Oil spills if:
- They are 25 gallons or more,
- They are less than 25 gallons but cannot be cleaned up within 24 hours,
- They cause sheen on surface waters (regardless of volume), or
- They are within 100 feet of surface waters (regardless of volume).

(c) Releases of hazardous substances in excess of reportable quantities under Section 311 of the Clean Water Act (Ref: 40 CFR 110.3 and 40 CFR 117.3) or Section 102 of CERCLA (Ref: 40 CFR 302.4) or G.S. 143-215.85.

(d) Anticipated bypasses and unanticipated bypasses.

(e) Noncompliance with the conditions of this permit that may endanger health or the environment.

2. Reporting Timeframes and Other Requirements

After a permittee becomes aware of an occurrence that must be reported, he shall contact the appropriate Division regional office within the timeframes and in accordance with the other requirements listed below. Occurrences outside normal business hours may also be reported to the Department's Environmental Emergency Center personnel at (800) 858-0368.

Occurrence	Reporting Timeframes (After Discovery) and Other Requirements
(a) Visible sediment deposition in a stream or wetland	• ***Within 24 hours***, an oral or electronic notification. • ***Within 7 calendar days***, a report that contains a description of the sediment and actions taken to address the cause of the deposition. Division staff may waive the requirement for a written report on a case-by-case basis. • If the stream is named on the NC 303(d) list as impaired for sediment-related causes, the permittee may be required to perform additional monitoring, inspections or apply more stringent practices if staff determine that additional requirements are needed to assure compliance with the federal or state impaired-waters conditions.
(b) Oil spills and release of hazardous substances per Item 1(b)-(c) above	• ***Within 24 hours***, an oral or electronic notification. The notification shall include information about the date, time, nature, volume and location of the spill or release.
(c) Anticipated bypasses [40 CFR 122.41(m)(3)]	• ***A report at least ten days before the date of the bypass, if possible***. The report shall include an evaluation of the anticipated quality and effect of the bypass.
(d) Unanticipated bypasses [40 CFR 122.41(m)(3)]	• ***Within 24 hours***, an oral or electronic notification. • ***Within 7 calendar days***, a report that includes an evaluation of the quality and effect of the bypass.
(e) Noncompliance with the conditions of this permit that may endanger health or the environment[40 CFR 122.41(l)(7)]	• ***Within 24 hours***, an oral or electronic notification. • ***Within 7 calendar days***, a report that contains a description of the noncompliance, and its causes; the period of noncompliance, including exact dates and times, and if the noncompliance has not been corrected, the anticipated time noncompliance is expected to continue; and steps taken or planned to reduce, eliminate, and prevent reoccurrence of the noncompliance. [40 CFR 122.41(l)(6). • Division staff may waive the requirement for a written report on a case-by-case basis.

NORTH CAROLINA
Environmental Quality

PART II, SECTION G, ITEM (4)
DRAW DOWN OF SEDIMENT BASINS FOR MAINTENANCE OR CLOSE OUT

Sediment basins and traps that receive runoff from drainage areas of one acre or more shall use outlet structures that withdraw water from the surface when these devices need to be drawn down for maintenance or close out unless this is infeasible. The circumstances in which it is not feasible to withdraw water from the surface shall be rare (for example, times with extended cold weather). Non-surface withdrawals from sediment basins shall be allowed only when all of the following criteria have been met:

(a) The E&SC plan authority has been provided with documentation of the non-surface withdrawal and the specific time periods or conditions in which it will occur. The non-surface withdrawal shall not commence until the E&SC plan authority has approved these items,

(b) The non-surface withdrawal has been reported as an anticipated bypass in accordance with Part III, Section C, Item (2)(c) and (d) of this permit,

(c) Dewatering discharges are treated with controls to minimize discharges of pollutants from stormwater that is removed from the sediment basin. Examples of appropriate controls include properly sited, designed and maintained dewatering tanks, weir tanks, and filtration systems,

(d) Vegetated, upland areas of the sites or a properly designed stone pad is used to the extent feasible at the outlet of the dewatering treatment devices described in Item (c) above,

(e) Velocity dissipation devices such as check dams, sediment traps, and riprap are provided at the discharge points of all dewatering devices, and

(f) Sediment removed from the dewatering treatment devices described in Item (c) above is disposed of in a manner that does not cause deposition of sediment into waters of the United States.

NCG01 SELF-INSPECTION, RECORDKEEPING AND REPORTING

EFFECTIVE: 04/01/19

REVISIONS				
NO.	DESCRIPTION	ENGR.	APPROV	DATE
1	DRAFT MITIGATION PLAN	JB	KLT	12/16/22
2	FINAL MITIGATION PLAN	JB	KLT	2/21/23
3	ISSUED FOR BID	JB	KLT	7/20/23

PREPARED FOR:
Mitigation Services
NC DEPARTMENT OF ENVIRONMENTAL QUALITY
DIVISION OF MITIGATION SERVICES
1652 MAIL SERVICE CENTER
RALEIGH, NC 27699-1652

BANDYS FARM
CATAWBA COUNTY, NC

PREPARED IN THE OFFICE OF:
ECOSYSTEM PLANNING & RESTORATION
EPR
204 STONE RIDGE BLVD.
ASHEVILLE, NC 28804

PROJECT ENGINEER
NORTH CAROLINA PROFESSIONAL SEAL 039201 ENGINEER JACOB M. BYERS
7/20/23

7/31/2023
X:\PROJECTS\ASH0018_NCDMS_BANDYS_FARM\CADD\PLANS\BF_PSH_1E.DGN
BYERS

GROUND STABILIZATION AND MATERIALS HANDLING PRACTICES FOR COMPLIANCE WITH THE NCG01 CONSTRUCTION GENERAL PERMIT

Implementing the details and specifications on this plan sheet will result in the construction activity being considered compliant with the Ground Stabilization and Materials Handling sections of the NCG01 Construction General Permit (Sections E and F, respectively). The permittee shall comply with the Erosion and Sediment Control plan approved by the delegated authority having jurisdiction. All details and specifications shown on this sheet may not apply depending on site conditions and the delegated authority having jurisdiction.

SECTION E: GROUND STABILIZATION

Required Ground Stabilization Timeframes

Site Area Description	Stabilize within this many calendar days after ceasing land disturbance	Timeframe variations
(a) Perimeter dikes, swales, ditches, and perimeter slopes	7	None
(b) High Quality Water (HQW) Zones	7	None
(c) Slopes steeper than 3:1	7	If slopes are 10' or less in length and are not steeper than 2:1, 14 days are allowed
(d) Slopes 3:1 to 4:1	14	-7 days for slopes greater than 50' in length and with slopes steeper than 4:1 -7 days for perimeter dikes, swales, ditches, perimeter slopes and HQW Zones -10 days for Falls Lake Watershed
(e) Areas with slopes flatter than 4:1	14	-7 days for perimeter dikes, swales, ditches, perimeter slopes and HQW Zones -10 days for Falls Lake Watershed unless there is zero slope

Note: After the permanent cessation of construction activities, any areas with temporary ground stabilization shall be converted to permanent ground stabilization as soon as practicable but in no case longer than 90 calendar days after the last land disturbing activity. Temporary ground stabilization shall be maintained in a manner to render the surface stable against accelerated erosion until permanent ground stabilization is achieved.

GROUND STABILIZATION SPECIFICATION

Stabilize the ground sufficiently so that rain will not dislodge the soil. Use one of the techniques in the table below:

Temporary Stabilization	Permanent Stabilization
• Temporary grass seed covered with straw or other mulches and tackifiers • Hydroseeding • Rolled erosion control products with or without temporary grass seed • Appropriately applied straw or other mulch • Plastic sheeting	• Permanent grass seed covered with straw or other mulches and tackifiers • Geotextile fabrics such as permanent soil reinforcement matting • Hydroseeding • Shrubs or other permanent plantings covered with mulch • Uniform and evenly distributed ground cover sufficient to restrain erosion • Structural methods such as concrete, asphalt or retaining walls • Rolled erosion control products with grass seed

POLYACRYLAMIDES (PAMS) AND FLOCCULANTS

1. Select flocculants that are appropriate for the soils being exposed during construction, selecting from the *NC DWR List of Approved PAMS/Flocculants*.
2. Apply flocculants at or before the inlets to Erosion and Sediment Control Measures.
3. Apply flocculants at the concentrations specified in the *NC DWR List of Approved PAMS/Flocculants* and in accordance with the manufacturer's instructions.
4. Provide ponding area for containment of treated Stormwater before discharging offsite.
5. Store flocculants in leak-proof containers that are kept under storm-resistant cover or surrounded by secondary containment structures.

EQUIPMENT AND VEHICLE MAINTENANCE

1. Maintain vehicles and equipment to prevent discharge of fluids.
2. Provide drip pans under any stored equipment.
3. Identify leaks and repair as soon as feasible, or remove leaking equipment from the project.
4. Collect all spent fluids, store in separate containers and properly dispose as hazardous waste (recycle when possible).
5. Remove leaking vehicles and construction equipment from service until the problem has been corrected.
6. Bring used fuels, lubricants, coolants, hydraulic fluids and other petroleum products to a recycling or disposal center that handles these materials.

LITTER, BUILDING MATERIAL AND LAND CLEARING WASTE

1. Never bury or burn waste. Place litter and debris in approved waste containers.
2. Provide a sufficient number and size of waste containers (e.g dumpster, trash receptacle) on site to contain construction and domestic wastes.
3. Locate waste containers at least 50 feet away from storm drain inlets and surface waters unless no other alternatives are reasonably available.
4. Locate waste containers on areas that do not receive substantial amounts of runoff from upland areas and does not drain directly to a storm drain, stream or wetland.
5. Cover waste containers at the end of each workday and before storm events or provide secondary containment. Repair or replace damaged waste containers.
6. Anchor all lightweight items in waste containers during times of high winds.
7. Empty waste containers as needed to prevent overflow. Clean up immediately if containers overflow.
8. Dispose waste off-site at an approved disposal facility.
9. On business days, clean up and dispose of waste in designated waste containers.

PAINT AND OTHER LIQUID WASTE

1. Do not dump paint and other liquid waste into storm drains, streams or wetlands.
2. Locate paint washouts at least 50 feet away from storm drain inlets and surface waters unless no other alternatives are reasonably available.
3. Contain liquid wastes in a controlled area.
4. Containment must be labeled, sized and placed appropriately for the needs of site.
5. Prevent the discharge of soaps, solvents, detergents and other liquid wastes from construction sites.

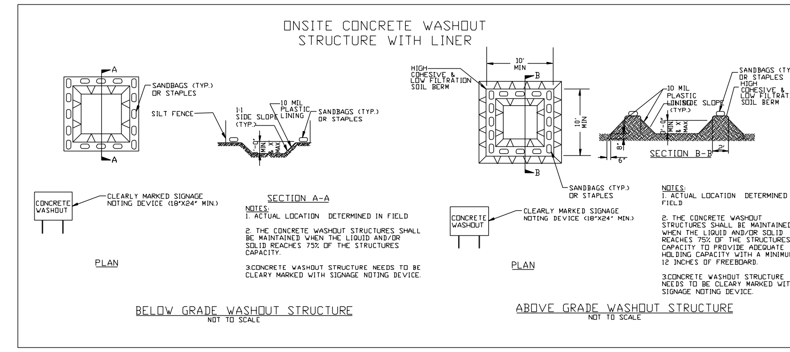
PORTABLE TOILETS

1. Install portable toilets on level ground, at least 50 feet away from storm drains, streams or wetlands unless there is no alternative reasonably available. If 50 foot offset is not attainable, provide relocation of portable toilet behind silt fence or place on a gravel pad and surround with sand bags.
2. Provide staking or anchoring of portable toilets during periods of high winds or in high foot traffic areas.
3. Monitor portable toilets for leaking and properly dispose of any leaked material. Utilize a licensed sanitary waste hauler to remove leaking portable toilets and replace with properly operating unit.

EARTHEN STOCKPILE MANAGEMENT

1. Show stockpile locations on plans. Locate earthen-material stockpile areas at least 50 feet away from storm drain inlets, sediment basins, perimeter sediment controls and surface waters unless it can be shown no other alternatives are reasonably available.
2. Protect stockpile with silt fence installed along toe of slope with a minimum offset of five feet from the toe of stockpile.
3. Provide stable stone access point when feasible.
4. Stabilize stockpile within the timeframes provided on this sheet and in accordance with the approved plan and any additional requirements. Soil stabilization is defined as vegetative, physical or chemical coverage techniques that will restrain accelerated erosion on disturbed soils for temporary or permanent control needs.

NORTH CAROLINA
Environmental Quality



CONCRETE WASHOUTS

1. Do not discharge concrete or cement slurry from the site.
2. Dispose of, or recycle settled, hardened concrete residue in accordance with local and state solid waste regulations and at an approved facility.
3. Manage washout from mortar mixers in accordance with the above item and in addition place the mixer and associated materials on impervious barrier and within lot perimeter silt fence.
4. Install temporary concrete washouts per local requirements, where applicable. If an alternate method or product is to be used, contact your approval authority for review and approval. If local standard details are not available, use one of the two types of temporary concrete washouts provided on this detail.
5. Do not use concrete washouts for dewatering or storing defective curb or sidewalk sections. Stormwater accumulated within the washout may not be pumped into or discharged to the storm drain system or receiving surface waters. Liquid waste must be pumped out and removed from project.
6. Locate washouts at least 50 feet from storm drain inlets and surface waters unless it can be shown that no other alternatives are reasonably available. At a minimum, install protection of storm drain inlet(s) closest to the washout which could receive spills or overflow.
7. Locate washouts in an easily accessible area, on level ground and install a stone entrance pad in front of the washout. Additional controls may be required by the approving authority.
8. Install at least one sign directing concrete trucks to the washout within the project limits. Post signage on the washout itself to identify this location.
9. Remove leavings from the washout when at approximately 75% capacity to limit overflow events. Replace the tarp, sand bags or other temporary structural components when no longer functional. When utilizing alternative or proprietary products, follow manufacturer's instructions.
10. At the completion of the concrete work, remove remaining leavings and dispose of in an approved disposal facility. Fill pit, if applicable, and stabilize any disturbance caused by removal of washout.

HERBICIDES, PESTICIDES AND RODENTICIDES

1. Store and apply herbicides, pesticides and rodenticides in accordance with label restrictions.
2. Store herbicides, pesticides and rodenticides in their original containers with the label, which lists directions for use, ingredients and first aid steps in case of accidental poisoning.
3. Do not store herbicides, pesticides and rodenticides in areas where flooding is possible or where they may spill or leak into wells, stormwater drains, ground water or surface water. If a spill occurs, clean area immediately.
4. Do not stockpile these materials onsite.

HAZARDOUS AND TOXIC WASTE

1. Create designated hazardous waste collection areas on-site.
2. Place hazardous waste containers under cover or in secondary containment.
3. Do not store hazardous chemicals, drums or bagged materials directly on the ground.

NCG01 GROUND STABILIZATION AND MATERIALS HANDLING

EFFECTIVE: 04/01/19

PROJECT #: ASH0018 | SHEET NO. 1F

GROUND STABILIZATION AND MATERIALS HANDLING

REVISIONS

NO.	DESCRIPTION	ENGR.	APPROV	DATE
1	DRAFT MITIGATION PLAN	JB	KLT	12/16/22
2	FINAL MITIGATION PLAN	JB	KLT	2/21/23
3	ISSUED FOR BID	JB	KLT	7/20/23

PREPARED FOR:
NC Mitigation Services
NC DEPARTMENT OF ENVIRONMENTAL QUALITY
DIVISION OF MITIGATION SERVICES
1652 MAIL SERVICE CENTER
RALEIGH, NC 27699-1652

BANDYS FARM
CATAWBA COUNTY, NC

PREPARED IN THE OFFICE OF:
ECOSYSTEM PLANNING & RESTORATION
204 STONE RIDGE BLVD.
ASHEVILLE, NC 28804

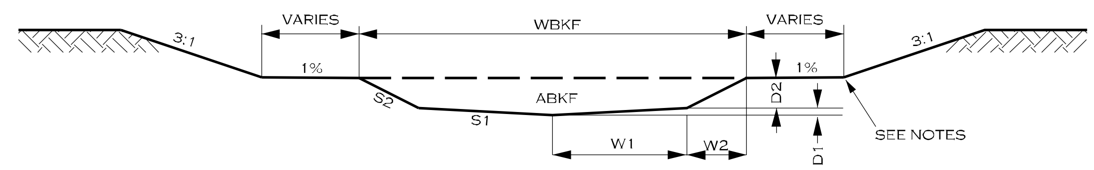
PROJECT ENGINEER
NORTH CAROLINA PROFESSIONAL SEAL 039201 ENGINEER JACOB M. BYERS
7/20/23

7/31/2023
X:\PROJECTS\ASH0018_NCDMS_BANDYS_FARM\CADD\PLANS\BF_PSH_1F.DGN
BYERS

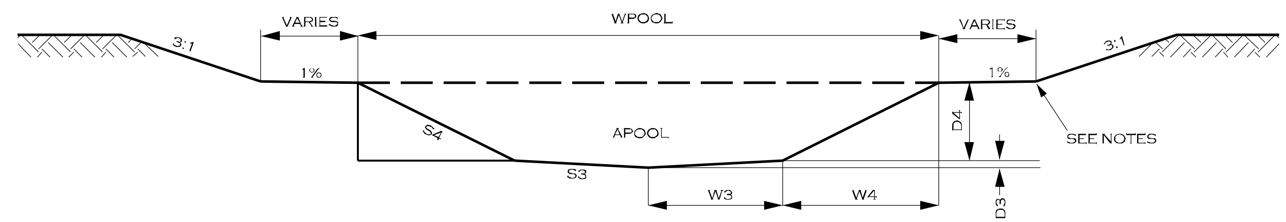
TYPICAL SECTIONS

TYPICAL SECTIONS

"B" & "Bc" TYPE CHANNELS



TYPICAL RIFFLE CROSS SECTION



TYPICAL POOL RIGHT CROSS SECTION

NOTES:
-THE BANKFULL BENCH LINE SHOWN ON THE PLAN SHEETS CORRESPONDS TO THE BACK OF THE BANKFULL BENCH/TOE OF TERRACE SLOPE.
-THE BACK OF ALL BANKFULL BENCHES SHALL BE HIGHER THAN THE BANKFULL ELEVATION AT THE CORRESPONDING STREAM STATION TO ENSURE POSITIVE DRAINAGE BACK TO THE STREAM.

Bc STREAM TYPE TYPICAL CROSS SECTION DIMENSIONS

		ABKF	WBKF	W1	W2	D1	D2	S1	S2	APool	WPool	W3	W4	D3	D4	S3	S4
NFMC	10+00.00 - 23+15.75	31.00	19.29	5.67	3.97	0.10	1.99	54.5:1	2:1	67.81	28.93	2.41	12.05	0.00	4.02	N/A	3:1
UT2	9+45.00 - 45.01.40	10.00	11.83	3.26	2.65	0.08	1.06	40.7:1	2.5:1	24.11	17.75	2.54	6.34	0.00	2.11	N/A	3:1

B STREAM TYPE TYPICAL CROSS SECTION DIMENSIONS

		ABKF	WBKF	W1	W2	D1	D2	S1	S2	APool	WPool	W3	W4	D3	D4	S3	S4
UT1	8+48.65 - 26+88.87	2.60	5.70	1.76	1.09	0.05	0.55	38:1	2:1	5.14	7.98	0.71	3.28	0.00	1.09	N/A	3:1
UT1A	9+00.00 - 22+11.29	2.60	5.70	1.76	1.09	0.05	0.55	38:1	2:1	5.14	7.98	0.71	3.28	0.00	1.09	N/A	3:1
UT3	9+45.65 - 12+89.97	3.50	6.75	2.16	1.21	0.07	0.61	31.2:1	2:1	7.11	9.44	0.99	3.74	0.00	1.25	N/A	3:1
UT3A	10+00.00 - 11+69.64	1.50	3.46	0.91	0.82	0.06	0.55	15.4:1	1.5:1	2.74	4.16	0.45	1.62	0.00	1.08	N/A	1.5:1

BANKFULL SLOPES

North Fork Mountain Creek

Station	Elevation (ft)	Slope (ft/ft)
10+00.00	871.59	0.014
15+00.00	864.59	0.009
21+25.00	858.89	0.013
23+00.00	856.59	0.012
24+38.62	854.87	-

UT1

Station	Elevation (ft)	Slope (ft/ft)
8+48.65	1014.74	0.145
9+40.00	1001.50	0.248
10+00.00	986.59	0.040
11+00.00	982.59	0.038
19+22.00	951.59	0.037
25+31.99	928.79	0.107
25+64.69	925.29	0.014
26+88.94	923.61	-

UT1a

Station	Elevation (ft)	Slope (ft/ft)
9+00.01	980.07	0.105
10+00.00	969.59	0.033
22+11.29	929.89	-

UT2

Station	Elevation (ft)	Slope (ft/ft)
9+55.00	914.54	0.009
20+00.00	904.89	0.014
24+00.00	899.14	0.017
24+89.00	897.64	0.020
26+50.00	894.34	0.038
27+27.00	891.43	0.000
28+00.00	891.44	0.017
37+00.00	876.24	0.011
40+00.00	872.99	0.022
45+01.40	862.10	-

UT3

Station	Elevation (ft)	Slope (ft/ft)
9+45.65	866.54	0.104
10+00.00	860.87	0.012
11+81.00	858.67	0.035
12+73.65	855.41	-

UT3a

Station	Elevation (ft)	Slope (ft/ft)
10+00.00	861.73	-
10+24.00	862.01	0.002
10+82.53	861.91	0.049
11+66.64	857.81	-

REVISIONS

NO.	DESCRIPTION	ENGR.	APPROV	DATE
1	DRAFT MITIGATION PLAN	JB	KLT	12/16/22
2	FINAL MITIGATION PLAN	JB	KLT	2/21/23
3	ISSUED FOR BID	JB	KLT	7/20/23

PREPARED FOR:
NC DEPARTMENT OF ENVIRONMENTAL QUALITY
DIVISION OF MITIGATION SERVICES
1652 MAIL SERVICE CENTER
RALEIGH, NC 27699-1652

BANDYS FARM
CATAWBA COUNTY, NC

PREPARED IN THE OFFICE OF:
ECOSYSTEM PLANNING & RESTORATION
204 STONE RIDGE BLVD.
ASHEVILLE, NC 28804

PROJECT ENGINEER
NORTH CAROLINA PROFESSIONAL SEAL 039207 ENGINEER JACOB M. BYERS
7/20/23

7/31/2023
X:\PROJECTS\ASH0018_NCDMS_BANDYS_FARM\CADD\PLANS\BF_PSH_02.DGN
BYERS

PROJECT #	SHEET NO.
ASH0018	2A

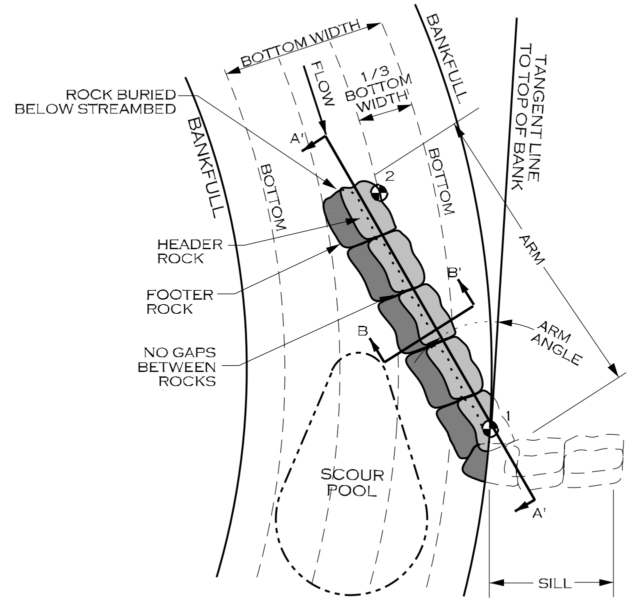
DETAILS

ROCK VANE (RV)

ROCK VANE SPECIFICATIONS	
MATERIALS:	SPECIFICATIONS:
BOULDER	TYPE: GRANITE OR COMPARABLE SIZE: NFMC: 4 FT X 3 FT X 2 FT UT2: 3 FT X 2 FT X 2 FT UT1, UT1A, UT3, UT3A: 2 FT X 2 FT X 1 FT NUMBER OF HEADER ROWS: 1 NUMBER OF FOOTER ROWS: 1
FILTER FABRIC	TYPE: TYPE 2 NON-WOVEN WIDTH UPSTREAM: 10 FT MINIMUM
STONE BACKFILL	CLASS A, CLASS B, AND ONSITE ALLUVIUM IF AVAILABLE (EVEN MIX)

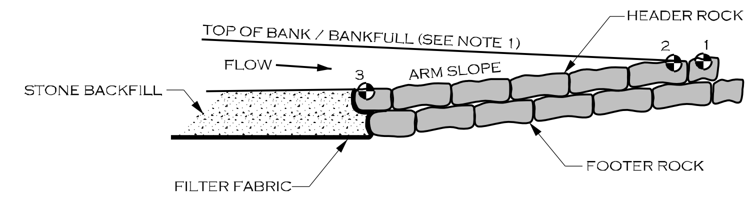
NOTES FOR ROCK VANE STRUCTURES:

1. STRUCTURE DIMENSIONS AND MEASUREMENTS ARE SHOWN ON THE STRUCTURES TABLE SHEET.
2. DIG A TRENCH BELOW THE STREAM BED FOR FOOTER AND HEADER ROCKS, FILTER FABRIC AND STONE BACKFILL.
3. PLACE FOOTER ROCKS AND THEN HEADER ROCKS TO ACHIEVE DESIGN DIMENSIONS AND ELEVATIONS.
4. USE HAND PLACED STONE TO FILL GAPS AND VOIDS ON UPSTREAM SIDE OF THE HEADER AND FOOTER ROCKS.
5. PLACE FILTER FABRIC BEGINNING AT THE TOP OF THE HEADER ROCKS AND EXTENDING DOWN TO THE DEPTH OF THE FOOTER ROCKS, THEN OUTWARD THE DISTANCE SPECIFIED IN THE STRUCTURES TABLE SHEET.
6. INSTALL STONE BACKFILL AS SHOWN, TO THE DIMENSIONS INDICATED IN THE STRUCTURES TABLE SHEET.



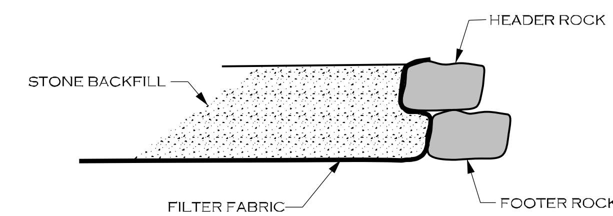
PLAN VIEW

⊕ - ELEVATION POINT (SEE STRUCTURES TABLE)



PROFILE VIEW A - A'

VANE ARM



SECTION B - B'

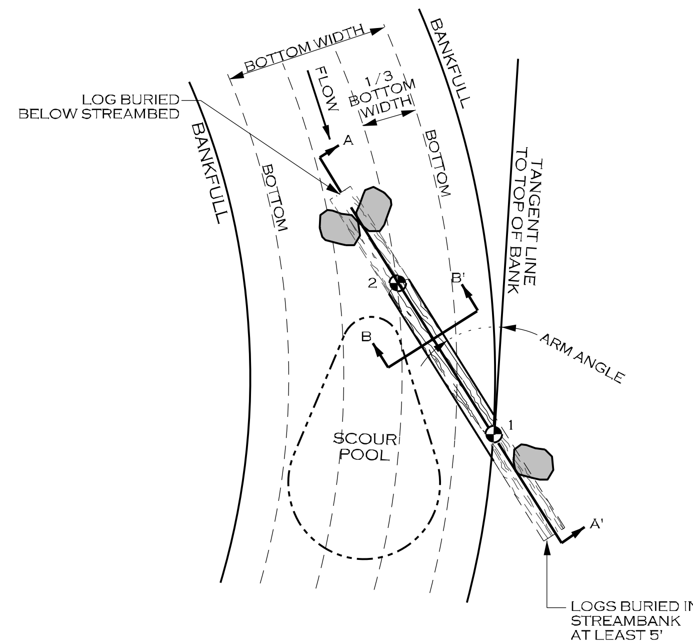
VANE ARM CROSS SECTION

LOG VANE (LV)

LOG VANE SPECIFICATIONS	
MATERIALS:	SPECIFICATIONS:
BOULDER	TYPE: GRANITE OR COMPARABLE SIZE: NFMC: 4 FT X 3 FT X 2 FT UT2: 3 FT X 2 FT X 2 FT UT1, UT1A, UT3, UT3A: 2 FT X 2 FT X 1 FT
LOGS	TYPE: HARDWOOD SIZE: 12 INCH Ø MIN. NUMBER OF HEADER LOGS: 1 NUMBER OF FOOTER LOGS: 1
FILTER FABRIC	TYPE: TYPE 2 NON-WOVEN WIDTH UPSTREAM: 6 FT MINIMUM
STONE BACKFILL	CLASS A, CLASS B, AND ONSITE ALLUVIUM IF AVAILABLE (EVEN MIX)

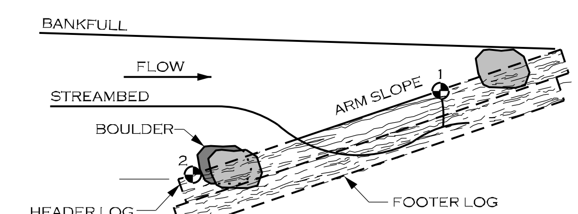
NOTES FOR LOG VANE STRUCTURES:

1. STRUCTURE DIMENSIONS AND MEASUREMENTS ARE SHOWN ON THE STRUCTURE TABLES SHEET.
2. LOGS SHOULD BE STRAIGHT, HARDWOOD, AND NOT ROTTEN.
3. BOULDERS MUST BE OF SUFFICIENT SIZE TO ANCHOR LOGS.
4. SOIL SHOULD BE COMPACTED WELL AROUND BURIED PORTIONS OF LOGS.
5. BOULDER SHOULD BE PLACED ON TOP OF HEADER LOG FOR ANCHORING.
6. FILTER FABRIC SHOULD BE NAILED TO THE LOG BELOW THE BACKFILL.
7. INSTALL STONE BACKFILL BEHIND THE LOGS.
8. BOLDERS SHALL NOT BE USED WHERE BOTTOM WIDTH IS LESS THAN 6.0'

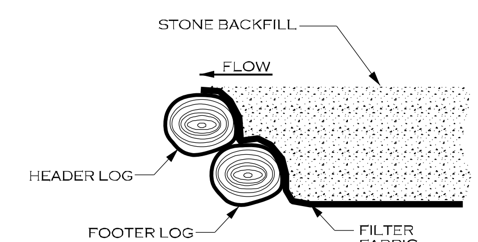


PLAN VIEW

⊕ - ELEVATION POINT (SEE STRUCTURE TABLES)



PROFILE VIEW A - A'



SECTION B - B'

REVISIONS				
NO.	DESCRIPTION	ENGR.	APPROV	DATE
1	DRAFT MITIGATION PLAN	JB	KLT	12/16/22
2	FINAL MITIGATION PLAN	JB	KLT	2/21/23
3	ISSUED FOR BID	JB	KLT	7/20/23

PREPARED FOR:

NC Mitigation Services

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

BANDYS FARM
CATAWBA COUNTY, NC

PREPARED IN THE OFFICE OF:

ECOSYSTEM PLANNING & RESTORATION

204 STONE RIDGE BLVD.
ASHEVILLE, NC 28804

PROJECT ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 039201 ENGINEER JACOB M. BYERS

Jake Byers 7/20/23

7/31/2023
X:\PROJECTS\ASH0018_NCDMS_BANDYS_FARM\CADD\PLANS\BF_PSH_02A.DGN
BYERS

PROJECT # ASH0018 | SHEET NO. 2B

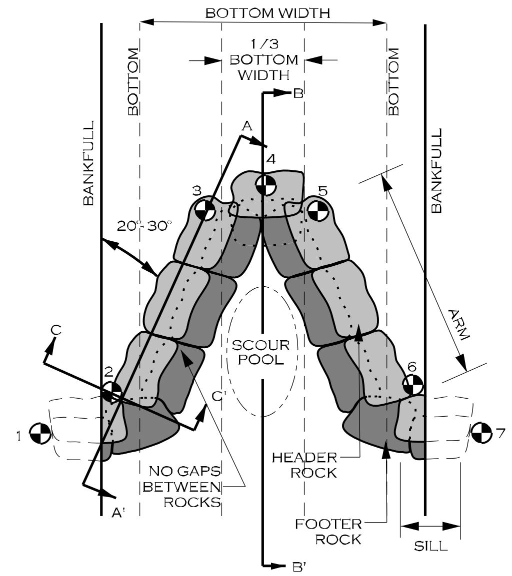
DETAILS

ROCK CROSS VANE (XV)

ROCK CROSS VANE SPECIFICATIONS	
MATERIALS:	SPECIFICATIONS:
BOULDER	TYPE: GRANITE OR COMPARABLE SIZE: NFMC: 4 FT X 3 FT X 2 FT UT2: 3 FT X 2 FT X 2 FT UT1, UT1A, UT3, UT3A: 2 FT X 2 FT X 1 FT NUMBER OF HEADER ROWS: 1 NUMBER OF FOOTER ROWS: 1
STONE BACKFILL	CLASS A, CLASS B, AND ONSITE ALLUVIUM IF AVAILABLE (EVEN MIX)
FILTER FABRIC	TYPE: TYPE 2 NON-WOVEN WIDTH UPSTREAM: 6 FT MINIMUM

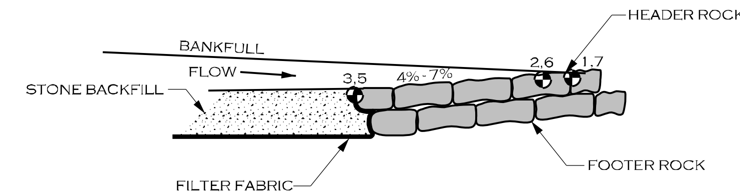
NOTES FOR CROSS VANE STRUCTURES:

1. STRUCTURE DIMENSIONS AND MEASUREMENTS ARE SHOWN ON THE STRUCTURES TABLE SHEET.
2. DIG A TRENCH BELOW THE STREAM BED FOR FOOTER AND HEADER ROCKS, FILTER FABRIC AND STONE BACKFILL.
3. PLACE FOOTER ROCKS AND THEN HEADER ROCKS TO ACHIEVE DESIGN DIMENSIONS AND ELEVATIONS.
4. USE HAND PLACED STONE TO FILL GAPS AND VOIDS ON UPSTREAM SIDE OF THE HEADER AND FOOTER ROCKS.
5. PLACE FILTER FABRIC BEGINNING AT THE TOP OF THE HEADER ROCKS AND EXTENDING DOWN TO THE DEPTH OF THE FOOTER ROCKS, THEN OUTWARD THE DISTANCE SPECIFIED IN THE STRUCTURES TABLE SHEET.
6. INSTALL STONE BACKFILL AS SHOWN, TO THE ELEVATION OF THE TOP OF THE HEADER ROCK.

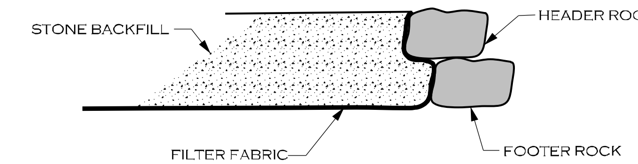


PLAN VIEW

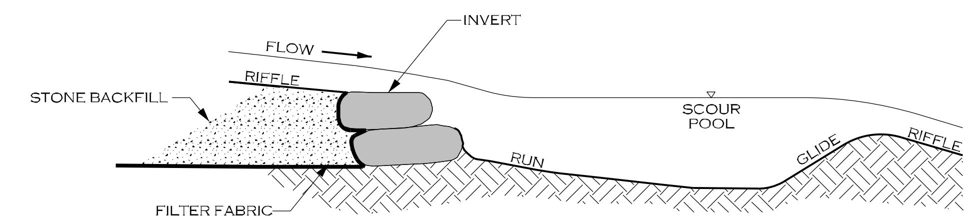
- ELEVATION POINT (SEE STRUCTURES TABLE)



PROFILE VIEW A - A'
VANE ARM



SECTION C - C'
INVERT AND POOL



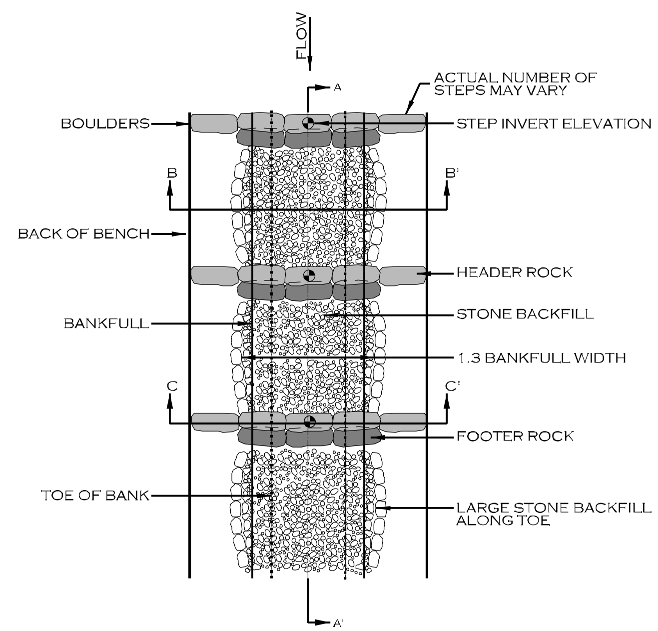
PROFILE VIEW B - B'
INVERT

ROCK STEP POOL/OUTLET PROTECTION (RSP)

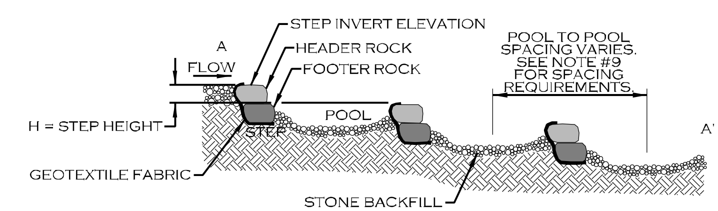
STEP POOL SPECIFICATIONS	
MATERIALS:	SPECIFICATIONS:
BOULDER	TYPE: GRANITE OR COMPARABLE SIZE: NFMC: 4 FT X 3 FT X 2 FT UT2: 3 FT X 2 FT X 2 FT UT1, UT1A, UT3, UT3A: 2 FT X 2 FT X 1 FT NUMBER OF HEADER ROWS: 1 NUMBER OF FOOTER ROWS: 1
STONE BACKFILL	CLASS A, CLASS B, AND ONSITE ALLUVIUM IF AVAILABLE (EVEN MIX)
FILTER FABRIC	TYPE: TYPE 2 NON-WOVEN WIDTH UPSTREAM: 6 FT MINIMUM

NOTES FOR CROSS VANE STRUCTURES:

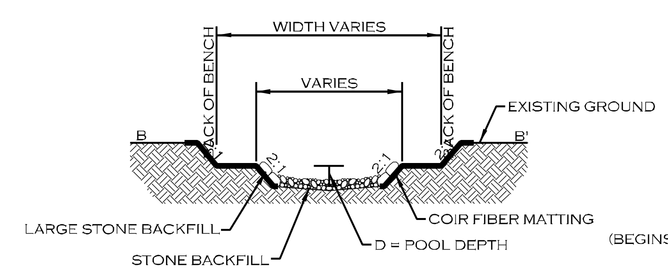
1. FOOTER ROCKS SHALL BE INSTALLED SUCH THAT 1/4 TO 1/3 OF THE LENGTH IS DOWNSTREAM OF THE HEADER ROCKS.
2. SOIL SHALL BE WELL COMPACTED AROUND BURIED PORTION OF FOOTER ROCKS WITH BUCKET OF TRACK HOE.
3. INSTALL GEOTEXTILE FILTER FABRIC UNDERNEATH FOOTER ROCKS.
4. UNDERCUT POOL BED ELEVATION 8 INCHES TO ALLOW FOR LAYER OF STONE.
5. INSTALL COIR FIBER MATTING ALONG COMPLETED BANKS SUCH THAT THE COIR FIBER MATTING AT THE TOE OF THE BANK EXTENDS DOWN TO THE UNDERCUT ELEVATION.
6. INSTALL LARGE STONE BACKFILL ALONG SIDE SLOPES.
7. FINAL CHANNEL BED SHAPE SHOULD BE ROUNDED, COMPACTED, AND CONCAVE, WITH THE ELEVATION OF THE BED APPROXIMATELY 0.5 FT DEEPER IN THE CENTER THAN AT THE EDGES.
8. STEP HEIGHT (H) SHALL NOT EXCEED 0.8 FT.
9. IN GENERAL, POOL TO POOL SPACING SHALL BE NO LESS THAN 10' AND NO GREATER THAN 20' AS SPECIFIED BY ENGINEER BASED ON EXISTING CONDITIONS SUCH AS SLOPE AND SUITABLE FILL MATERIAL. CONSTRUCTED RIFFLES MAY BE SUBSTITUTED IN AREAS WHERE EXISTING SLOPES EXCEED 10% AS DETERMINED IN THE FIELD BY THE ENGINEER.



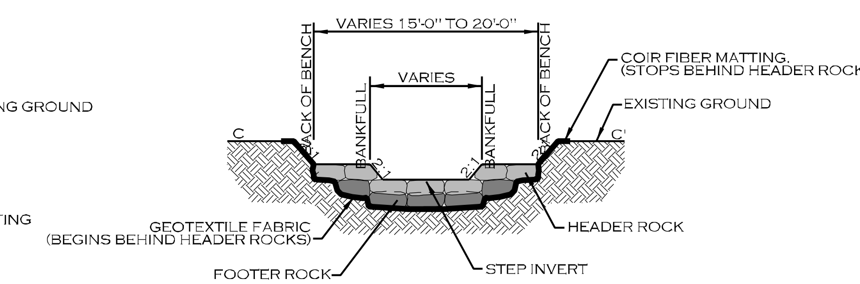
PLAN VIEW



PROFILE VIEW A-A'



POOL CROSS SECTION B-B'



POOL CROSS SECTION C-C'

REVISIONS				
NO.	DESCRIPTION	ENGR.	APPROV	DATE
1	DRAFT MITIGATION PLAN	JB	KLT	12/16/22
2	FINAL MITIGATION PLAN	JB	KLT	2/21/23
3	ISSUED FOR BID	JB	KLT	7/20/23

PREPARED FOR:

Mitigation Services

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

BANDYS FARM
CATAWBA COUNTY, NC

PREPARED IN THE OFFICE OF:

ECOSYSTEM PLANNING & RESTORATION
204 STONE RIDGE BLVD.
ASHEVILLE, NC 28804

PROJECT ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 039201 ENGINEER JACOB M. BYERS

7/20/23

7/31/2023
X:\PROJECTS\ASH0018_NCDMS_BANDYS_FARM\CADD\PLANS\BF_PSH_02B.DGN
BYERS

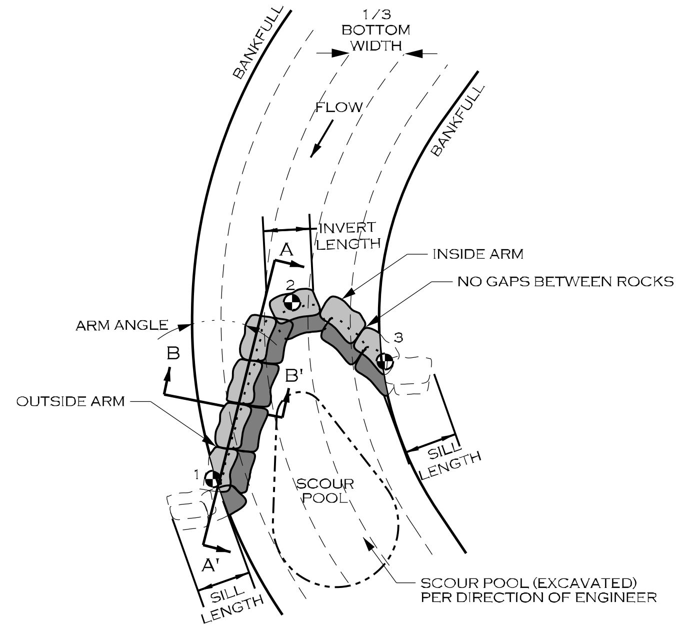
OFFSET ROCK CROSS VANE (OV)

OFFSET ROCK CROSS VANE SPECIFICATIONS

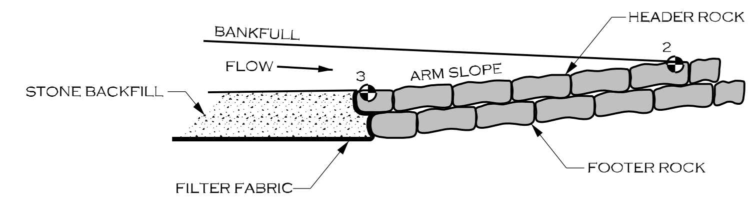
MATERIALS:	SPECIFICATIONS:
BOULDER	TYPE: GRANITE OR COMPARABLE SIZE: NFMC: 4 FT X 3 FT X 2 FT UT2: 3 FT X 2 FT X 2 FT UT1, UT1A, UT3, UT3A: 2 FT X 2 FT X 1 FT NUMBER OF HEADER ROWS: 1 NUMBER OF FOOTER ROWS: 1
FILTER FABRIC	TYPE: TYPE 2 NON-WOVEN WIDTH UPSTREAM: 6 FT MINIMUM
STONE BACKFILL	CLASS A, CLASS B, AND ONSITE ALLUVIUM IF AVAILABLE (EVEN MIX)

NOTES FOR OFFSET ROCK CROSS VANE:

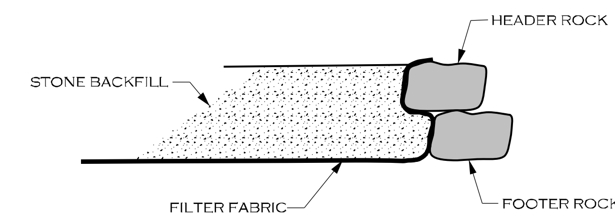
1. STRUCTURE DIMENSIONS AND MEASUREMENTS ARE SHOWN ON THE STRUCTURE TABLES.
2. DIG A TRENCH BELOW THE BED FOR FOOTER ROCKS AND PLACE FILL ON UPSTREAM SIDE OF VANE ARM, BETWEEN THE ARM AND STREAMBANK.
3. PLACE FOOTER ROCKS AND THEN HEADER ROCKS TO ACHIEVE DESIGN DIMENSIONS AND ELEVATIONS.
4. USE HAND PLACED STONE TO FILL GAPS ON UPSTREAM SIDE OF HEADER AND FOOTER ROCKS.
5. PLACE FILTER FABRIC BEGINNING AT THE TOP OF THE HEADER ROCKS AND EXTENDING DOWN TO THE DEPTH OF THE FOOTER ROCKS, THEN OUTWARD THE DISTANCE SPECIFIED ABOVE (FILTER FABRIC WIDTH UPSTREAM).
6. INSTALL STONE BACKFILL OVER FILTER FABRIC AS SHOWN.
7. AFTER ALL STONE BACKFILL HAS BEEN PLACED, FILL IN THE UPSTREAM SIDE OF THE STRUCTURE WITH ONSITE ALLUVIUM TO THE ELEVATION OF THE TOP OF HEADER ROCK.



PLAN VIEW



PROFILE VIEW A - A'
VANE OUTSIDE ARM



SECTION B - B'
VANE ARM CROSS SECTION

⊕ - ELEVATION POINT (SEE STRUCTURE TABLES)

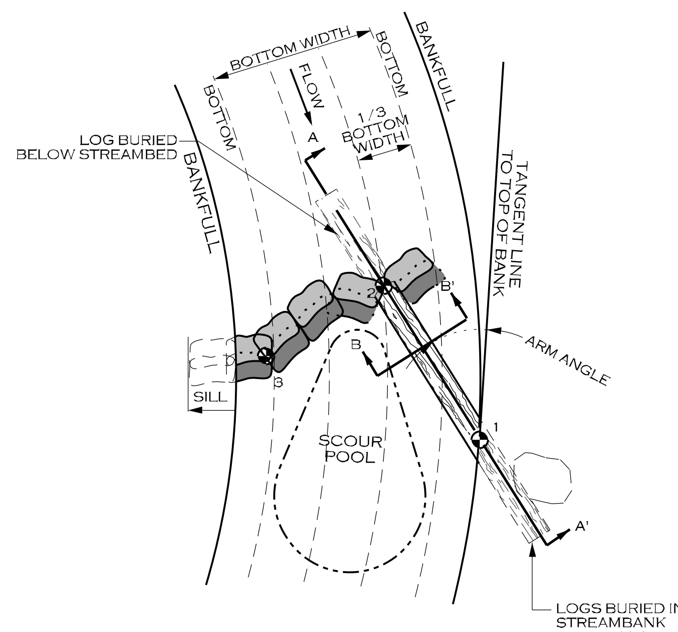
GRADE CONTROL LOG J-HOOK VANE (LJH)

LOG J-HOOK VANE SPECIFICATIONS

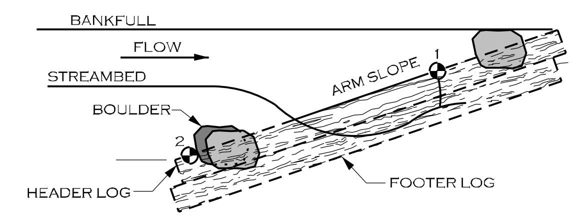
MATERIALS:	SPECIFICATIONS:
BOULDER	TYPE: GRANITE OR COMPARABLE SIZE: NFMC: 4 FT X 3 FT X 2 FT UT2: 3 FT X 2 FT X 2 FT UT1, UT1A, UT3, UT3A: 2 FT X 2 FT X 1 FT NUMBER OF HEADER ROWS: 1 NUMBER OF FOOTER ROWS: 1
LOGS	TYPE: HARDWOOD SIZE: 12 INCH Ø MIN. NUMBER OF HEADER LOGS: 1 NUMBER OF FOOTER LOGS: 1
FILTER FABRIC	TYPE: NON-WOVEN WIDTH UPSTREAM: 6 FT MINIMUM
STONE BACKFILL	CLASS A, CLASS B, AND ONSITE ALLUVIUM IF AVAILABLE (EVEN MIX)

NOTES FOR LOG J-HOOK VANE STRUCTURES:

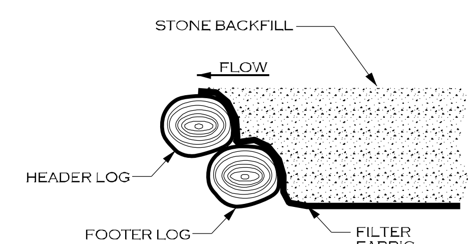
1. STRUCTURE DIMENSIONS AND MEASUREMENTS ARE SHOWN ON THE STRUCTURE TABLES SHEET.
2. LOGS SHOULD BE STRAIGHT, HARDWOOD, AND NOT ROTTEN.
3. BOULDERS MUST BE OF SUFFICIENT SIZE TO ANCHOR LOGS.
4. SOIL SHOULD BE COMPACTED WELL AROUND BURIED PORTIONS OF LOGS.
5. BOULDER SHOULD BE PLACED ON TOP OF HEADER LOG FOR ANCHORING.
6. FILTER FABRIC SHOULD BE NAILED TO THE LOG BELOW THE BACKFILL.
7. INSTALL STONE BACKFILL AS SHOWN, TO THE ELEVATION OF THE TOP HEADER ROCK. INSTALL STONE BACKFILL BEHIND LOG.



PLAN VIEW



PROFILE VIEW A - A'



SECTION B - B'

⊕ - ELEVATION POINT (SEE STRUCTURE TABLES)

REVISIONS				
NO.	DESCRIPTION	ENGR.	APPROV	DATE
1	DRAFT MITIGATION PLAN	JB	KLT	12/16/22
2	FINAL MITIGATION PLAN	JB	KLT	2/21/23
3	ISSUED FOR BID	JB	KLT	7/20/23

PREPARED FOR:

Mitigation Services

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

BANDYS FARM
CATAWBA COUNTY, NC

PREPARED IN THE OFFICE OF:

ECOSYSTEM PLANNING & RESTORATION

204 STONE RIDGE BLVD.
ASHEVILLE, NC 28804

PROJECT ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 039201 ENGINEER JACOB M. BYERS

7/20/23

7/31/2023
X:\PROJECTS\ASH0018_NCDMS_BANDYS_FARM\CADD\PLANS\BF_PSH_02C.DGN
BYERS

PROJECT #	SHEET NO.
ASH0018	2D

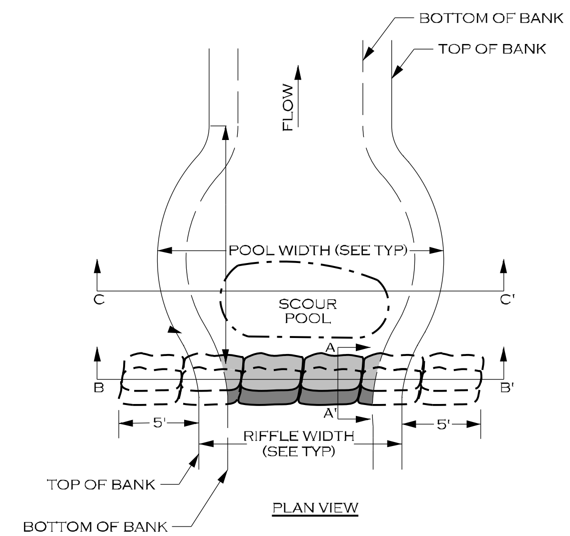
DETAILS

ROCK STEP (RS)

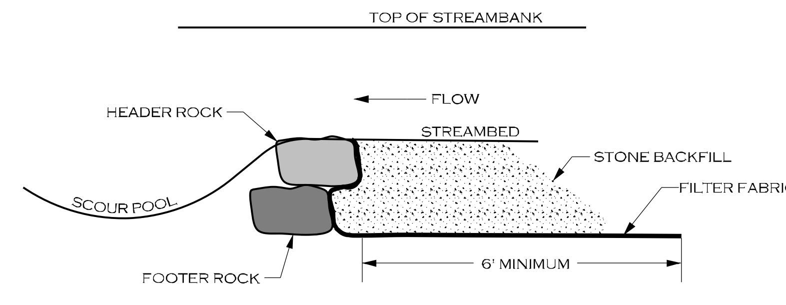
ROCK STEP SPECIFICATIONS	
MATERIALS:	SPECIFICATIONS:
BOULDER	TYPE: GRANITE OR COMPARABLE SIZE: NFMC: 4 FT X 3 FT X 2 FT UT2: 3 FT X 2 FT X 2 FT UT1, UT1A, UT3, UT3A: 2 FT X 2 FT X 1 FT NUMBER OF HEADER ROWS: 1 NUMBER OF FOOTER ROWS: 1
FILTER FABRIC	TYPE: TYPE 2 NON-WOVEN WIDTH UPSTREAM: 6 FT MINIMUM
STONE BACKFILL	CLASS A, CLASS B AND ON-SITE ALLUVIUM IF AVAILABLE (EVEN MIX)

NOTES FOR ROCK STEP STRUCTURES:

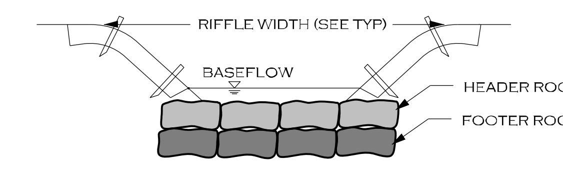
1. DIG A TRENCH BELOW THE STREAM BED FOR FOOTER AND HEADER ROCKS, FILTER FABRIC AND STONE BACKFILL.
2. PLACE FOOTER ROCKS AND THEN HEADER ROCKS TO ACHIEVE DESIGN DIMENSIONS AND ELEVATIONS.
3. USE HAND PLACED STONE TO FILL GAPS AND VOIDS ON UPSTREAM SIDE OF THE HEADER AND FOOTER ROCKS.
4. PLACE FILTER FABRIC BEGINNING AT THE TOP OF THE HEADER ROCKS AND EXTENDING DOWN TO THE DEPTH OF THE FOOTER ROCKS, THEN OUTWARD 6 FEET.
5. INSTALL STONE BACKFILL AS SHOWN, TO THE DIMENSIONS INDICATED IN THE STRUCTURES TABLE SHEET.
6. PLACE TRANSPLANTS FROM TOE OF STREAMBANK TO TOP OF STREAMBANK, IF AVAILABLE.
7. TRANSPLANTS CAN BE SUBSITUTED WITH COIR FIBER MATTING AT THE DIRECTION OF THE ENGINEER.



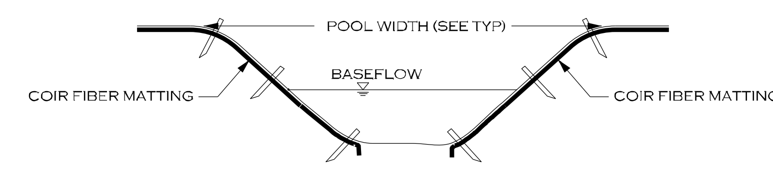
PLAN VIEW



SECTION A-A'



SECTION B-B'



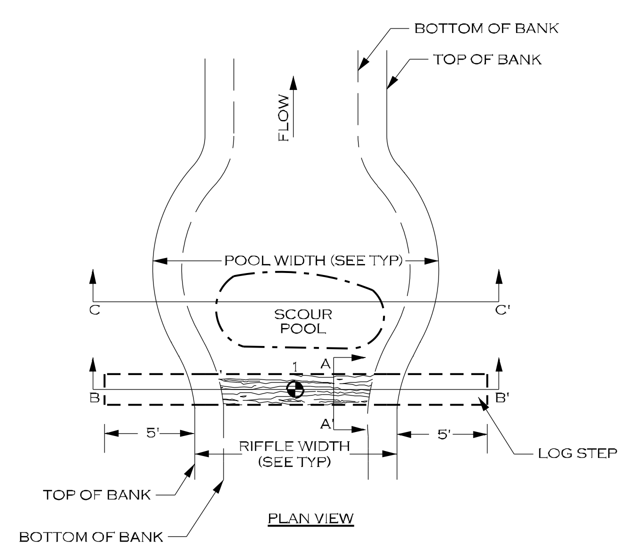
SECTION C-C'

LOG STEP (LS)

LOG STEP SPECIFICATIONS	
MATERIALS:	SPECIFICATIONS:
LOGS	TYPE: HARDWOOD SIZE: 12 INCH Ø MIN. NUMBER OF HEADER LOGS: 1 NUMBER OF FOOTER LOGS: 1
FILTER FABRIC	TYPE: NON-WOVEN WIDTH UPSTREAM: 6 FT MINIMUM
STONE BACKFILL	CLASS A, CLASS B AND ON-SITE ALLUVIUM IF AVAILABLE (EVEN MIX)

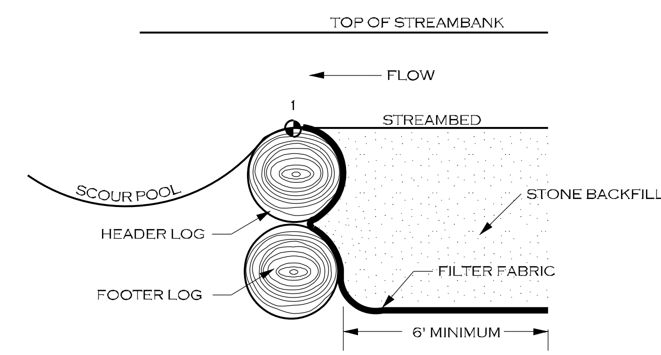
NOTES FOR LOG STEP STRUCTURES:

1. LOGS SHOULD BE AT LEAST 12 INCHES IN DIAMETER, RELATIVELY STRAIGHT, HARDWOOD, AND RECENTLY HARVESTED.
2. LOGS >24 INCHES IN DIAMETER MAY BE USED ALONE WITHOUT AN ADDITIONAL LOG.
3. USE FILTER FABRIC TO SEAL GAPS BETWEEN LOGS.
4. INSTALL STONE BACKFILL AS SHOWN, TO THE DIMENSIONS INDICATED IN THE STRUCTURES TABLE SHEET.
5. PLACE TRANSPLANTS FROM TOE OF STREAMBANK TO TOP OF STREAMBANK. (IF AVAILABLE)
6. TRANSPLANTS CAN BE SUBSITUTED WITH COIR FIBER MATTING AT THE DIRECTION OF THE ENGINEER.

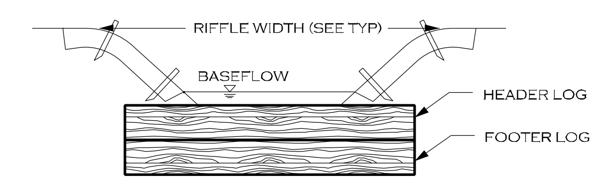


PLAN VIEW

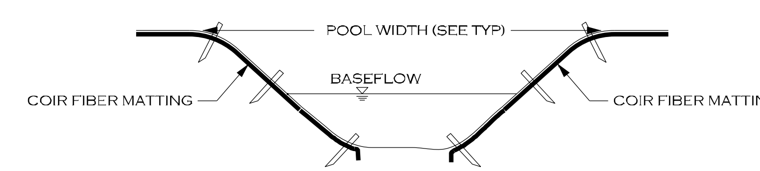
- ELEVATION POINT (SEE STRUCTURES TABLE)



SECTION A-A'



SECTION B-B'



SECTION C-C'

REVISIONS				
NO.	DESCRIPTION	ENGR.	APPROV	DATE
1	DRAFT MITIGATION PLAN	JB	KLT	12/16/22
2	FINAL MITIGATION PLAN	JB	KLT	2/21/23
3	ISSUED FOR BID	JB	KLT	7/20/23

PREPARED FOR:

NC Mitigation Services

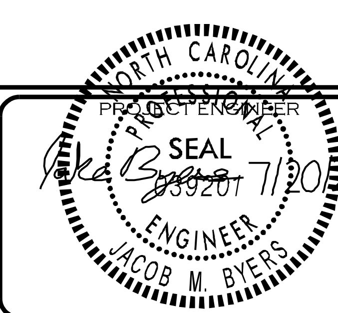
NC DEPARTMENT OF ENVIRONMENTAL QUALITY
DIVISION OF MITIGATION SERVICES
1652 MAIL SERVICE CENTER
RALEIGH, NC 27699-1652

BANDYS FARM
CATAWBA COUNTY, NC

PREPARED IN THE OFFICE OF:

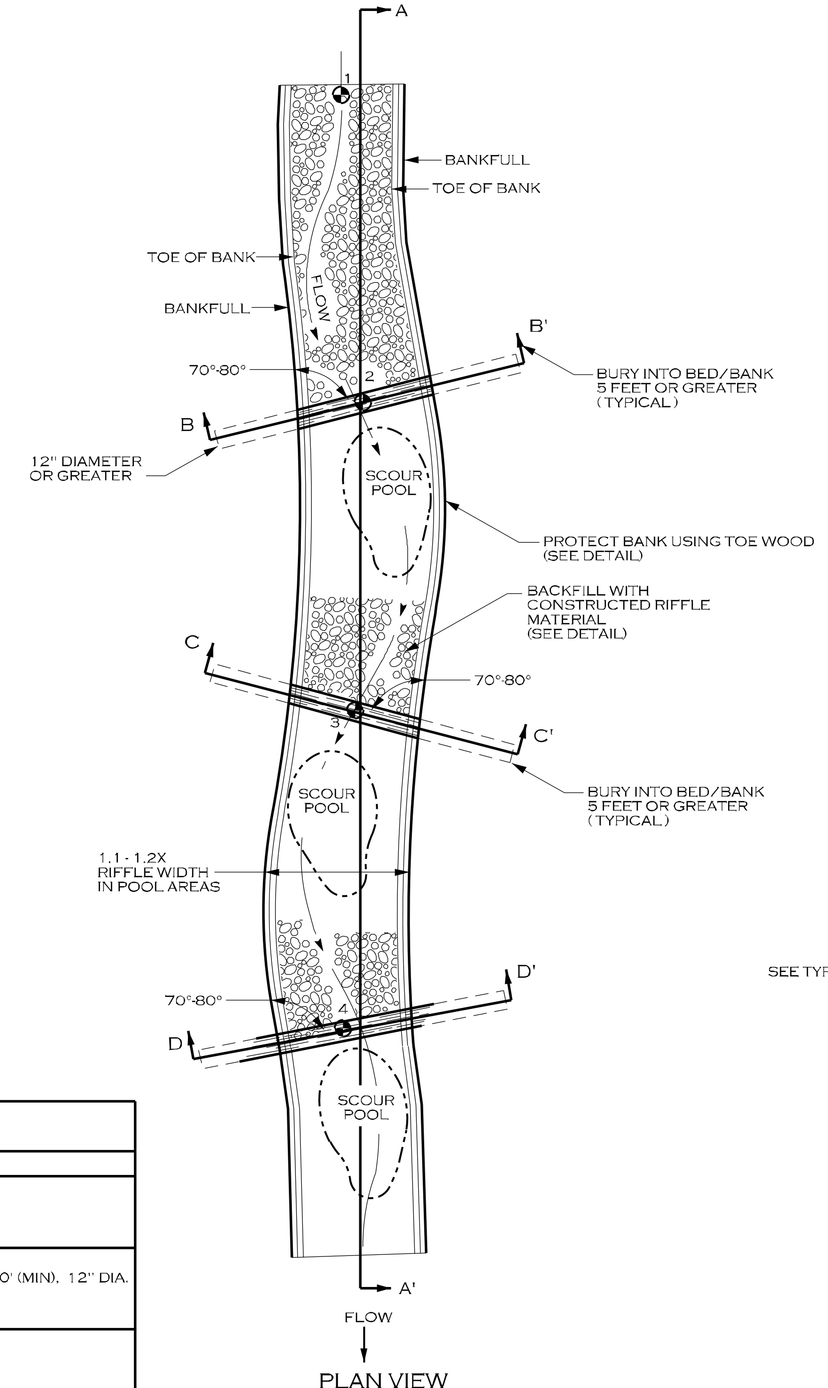
EPR Ecosystem Planning & Restoration
204 STONE RIDGE BLVD.
ASHEVILLE, NC 28804

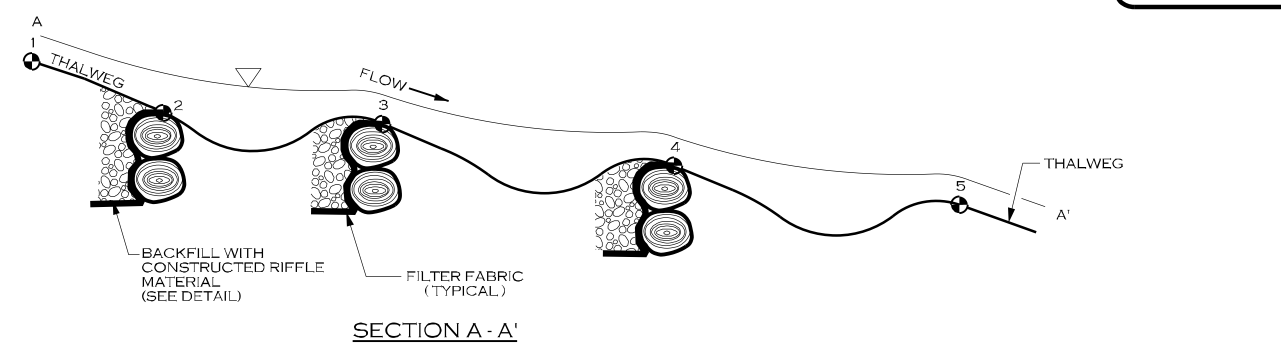
PROJECT ENGINEER

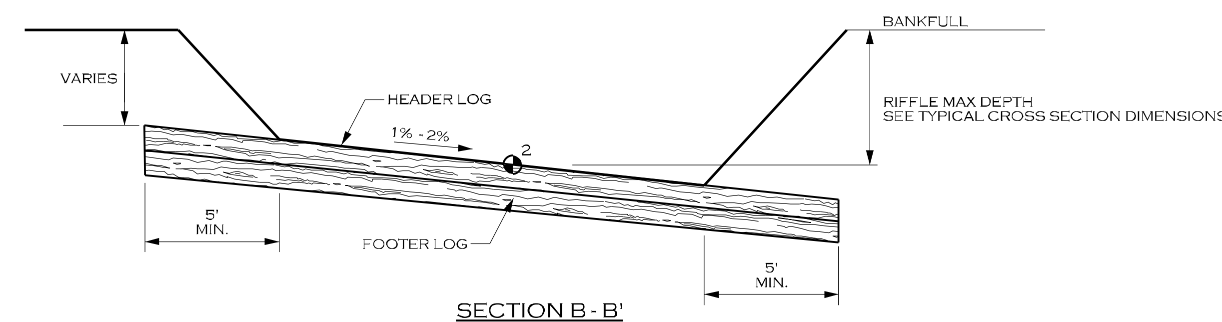


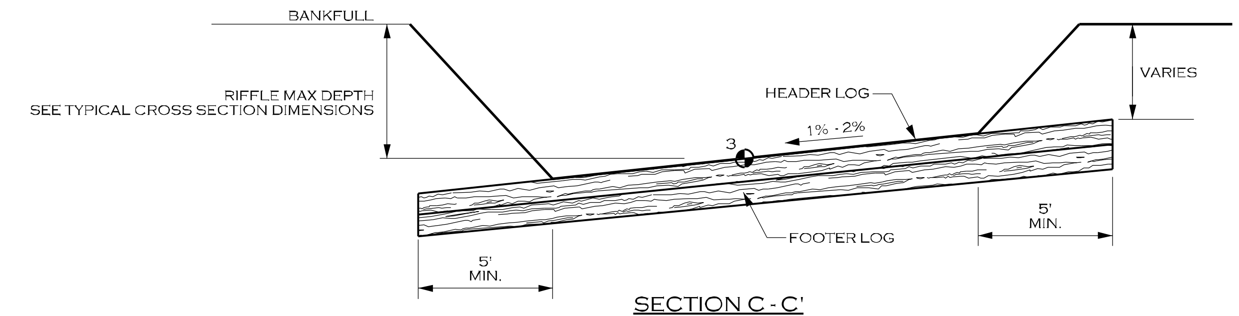
7/31/2023
K:\PROJECTS\ASH0018_NCDMS_BANDYS_FARM\CADD\PLANS\BF_PSH_02D.DGN
BYERS

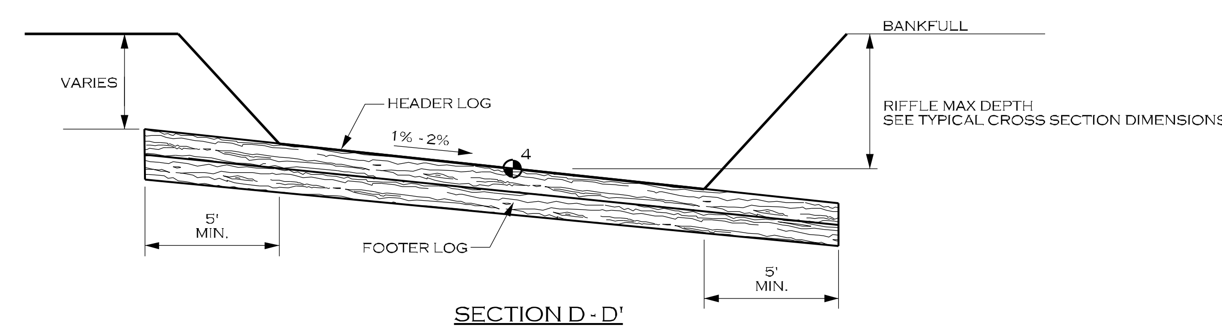
LOG ROLLER (LR)











LOG ROLLER SPECIFICATIONS

MATERIALS:	SPECIFICATIONS:
RIFFLE BED MATERIAL	SEE CONSTRUCTED RIFFLE DETAIL
LOGS	TYPE: HARDWOOD SIZE: LENGTH = W_{BKF} + 10' (MIN), 12" DIA. NUMBER OF HEADER LOGS: 1 NUMBER OF FOOTER LOGS: 1
STONE BACKFILL	CLASS A, CLASS B, AND ONSITE ALLUVIUM IF AVAILABLE (EVEN MIX)
FILTER FABRIC	TYPE: NON-WOVEN WIDTH UPSTREAM: 6 FT MINIMUM

NOTES FOR LOG ROLLER STRUCTURES:

1. STRUCTURE DIMENSIONS AND MEASUREMENTS ARE SHOWN ON THE STRUCTURE TABLES SHEET.
2. LOGS SHOULD BE STRAIGHT, HARDWOOD, AND NOT ROTTEN.
3. SOIL SHOULD BE COMPACTED WELL AROUND BURIED PORTIONS OF LOGS.
4. FILTER FABRIC SHOULD BE NAILED TO THE LOG BELOW THE BACKFILL.
5. RIFFLE STATIONS AND ELEVATIONS (1 & 5) ARE SHOWN ON BOTH THE STRUCTURE TABLES FOR LOG ROLLERS AND CONSTRUCTED RIFFLES IF APPLICABLE.
6. NUMBER OF LOGS MAY VARY.

PROJECT #: ASH0018 | SHEET NO. 2E

DETAILS

REVISIONS

NO.	DESCRIPTION	ENGR.	APPROV	DATE
1	DRAFT MITIGATION PLAN	JB	KLT	12/16/22
2	FINAL MITIGATION PLAN	JB	KLT	2/21/23
3	ISSUED FOR BID	JB	KLT	7/20/23

PREPARED FOR:

NC Mitigation Services

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

BANDYS FARM
CATAWBA COUNTY, NC

PREPARED IN THE OFFICE OF:

ECOSYSTEM PLANNING & RESTORATION

204 STONE RIDGE BLVD.
ASHEVILLE, NC 28804

PROJECT ENGINEER

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 039201 JACOB M. BYERS

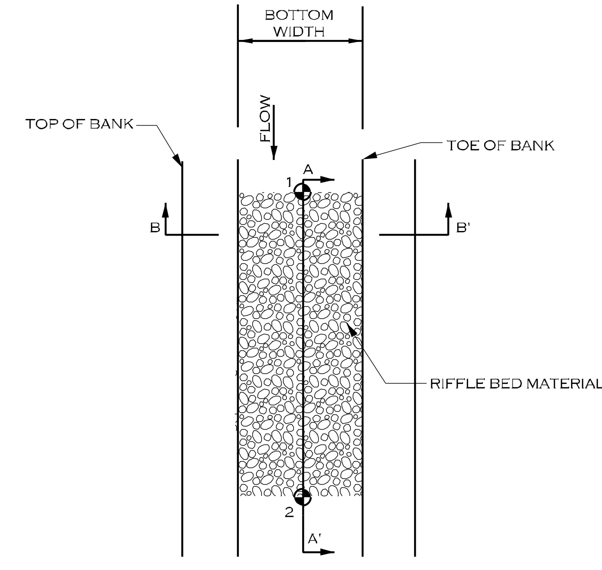
Jacob Byers 7/20/23

7/31/2023
K:\PROJECTS\ASH0018_NCDMS_BANDYS_FARM\CADD\PLANS\BF_PSH_02E.DGN
BYERS

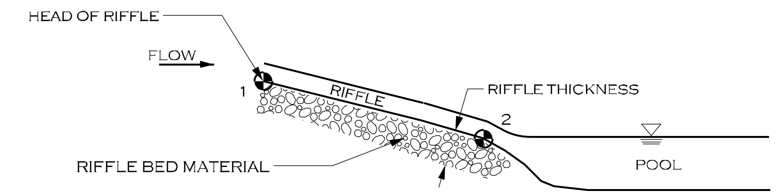
PROJECT #	SHEET NO.
ASH0018	2F

DETAILS

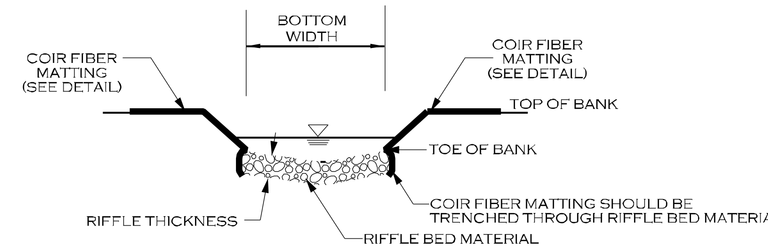
CONSTRUCTED RIFFLE (CR)



PLAN VIEW



PROFILE A - A'



SECTION B - B'

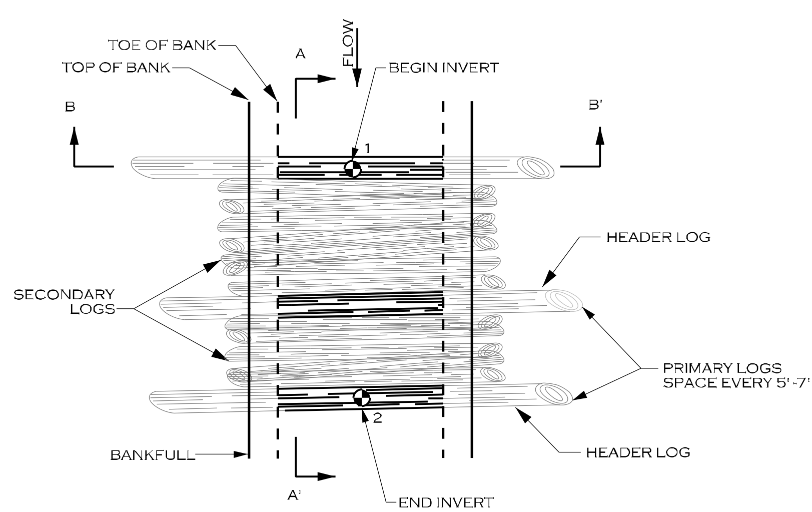
- ELEVATION POINT (SEE STRUCTURE TABLES)

CONSTRUCTED RIFFLE SPECIFICATIONS	
MATERIALS:	SPECIFICATIONS:
RIFFLE BED MATERIAL	TYPE: HARVESTED ON-SITE OR COMPARABLE SIZE: CLASS A, CLASS B AND ON-SITE ALLUVIUM (EVEN MIX) THICKNESS: 18 INCHES MIN.
COIR FIBER MATTING	SEE DETAIL

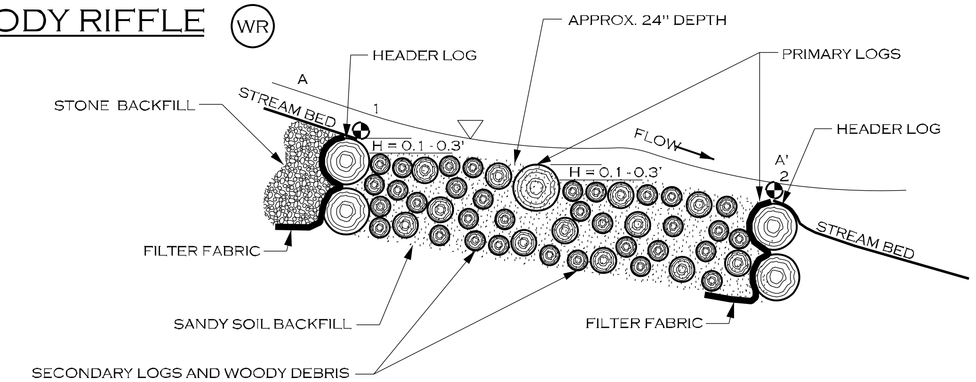
NOTES FOR CONSTRUCTED RIFFLE STRUCTURES:

1. GRADE STREAMBED AND BANKS TO PROPOSED DIMENSIONS PER TYPICAL CROSS-SECTION AND PROFILE.
2. EXCAVATE TRENCH BELOW PROPOSED STREAMBED ELEVATION EQUAL TO OR GREATER THAN RIFFLE THICKNESS.
3. INSTALL COIR FIBER MATTING ALONG STREAMBANKS ENSURING MATTING IS SUFFICIENTLY TRENCHED ALONG TOE OF BANK.
4. FILL TRENCH WITH RIFFLE BED MATERIAL TO FINAL DESIGN STREAM GRADE.

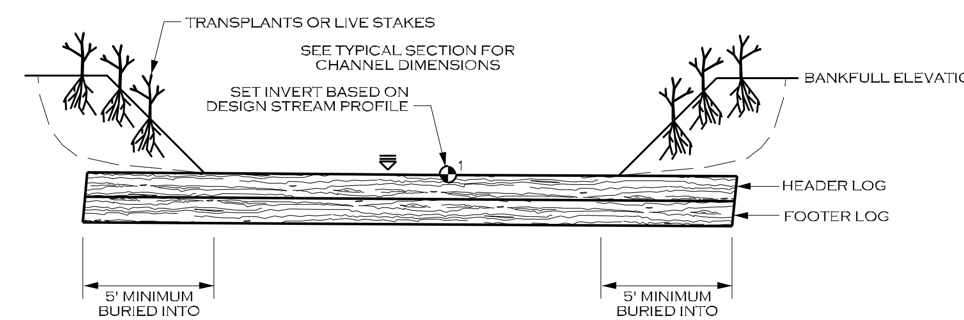
GRADE CONTROL WOODY RIFFLE (WR)



PLAN VIEW



SECTION A - A'



SECTION B - B'

NOTES:

1. PRIMARY LOGS SHOULD BE AT LEAST 10" OR MORE IN DIAMETER, RELATIVELY STRAIGHT, AND RECENTLY HARVESTED AND EXTENDING INTO THE BANK 5' ON EACH SIDE.
2. SECONDARY LOGS SHOULD BE AT LEAST 1" IN DIAMETER AND NO LARGER THAN 6", AND EXTEND INTO THE BANK 2 FEET ON EACH SIDE. WOOD MATERIAL SHALL BE VARYING DIAMETER TO ALLOW MATERIAL TO BE COMPACTED.
3. COIR FIBER MATTING CAN BE USED INSTEAD OF TRANSPLANTS, PER DIRECTION OF ENGINEER.
4. AFTER TRENCH HAS BEEN EXCAVATED A LAYER OF SECONDARY LOGS AND WOODY DEBRIS SHOULD BE PLACED WITH MINIMAL GAPS. A LAYER OF ON-SITE ALLUVIUM SHOULD BE APPLIED TO FILL VOIDS BETWEEN SECONDARY LOGS BEFORE ADDITIONAL LAYERS ARE PLACED.
5. TYPE 2 NON-WOVEN FILTER FABRIC SHALL BE INSTALLED ON THE UPSTREAM AND DOWNSTREAM MOST PRIMARY LOGS AND EXTEND DOWN BELOW THE FOOTER LOGS AND UPSTREAM A MINIMUM OF 6 FEET.

REVISIONS

NO.	DESCRIPTION	ENGR.	APPROV	DATE
1	DRAFT MITIGATION PLAN	JB	KLT	12/16/22
2	FINAL MITIGATION PLAN	JB	KLT	2/21/23
3	ISSUED FOR BID	JB	KLT	7/20/23

PREPARED FOR:

NC Mitigation Services

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

BANDYS FARM
CATAWBA COUNTY, NC

PREPARED IN THE OFFICE OF:

ECOSYSTEM PLANNING & RESTORATION

204 STONE RIDGE BLVD.
ASHEVILLE, NC 28804

PROJECT ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 039201 ENGINEER JACOB M. BYERS

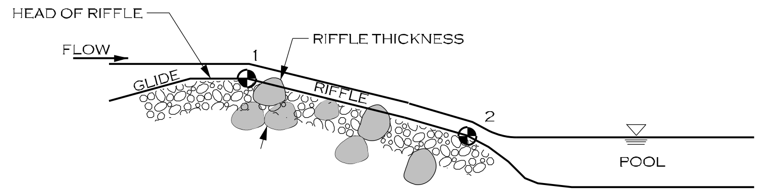
7/31/2023

7/31/2023
X:\PROJECTS\ASH0018_NCDMS_BANDYS_FARM\CADD\PLANS\BF_PSH_02F.DGN
BYERS

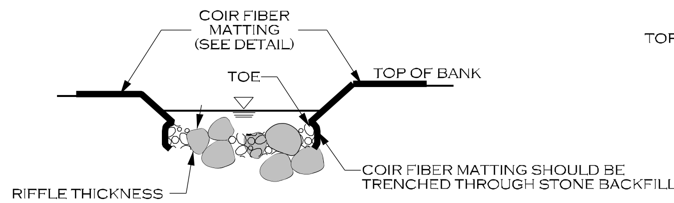
PROJECT #	SHEET NO.
ASH0018	2G

DETAILS

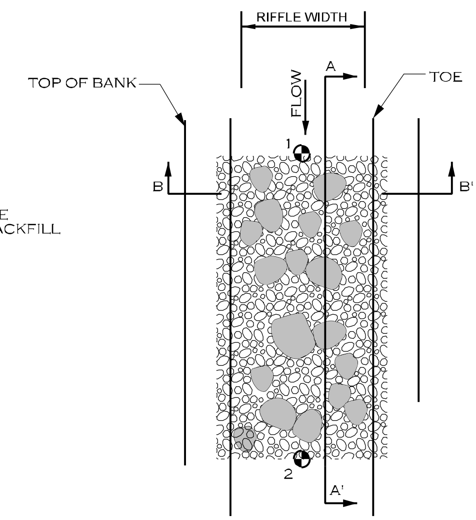
CONSTRUCTED CASCADE (CC)



PROFILE A - A'



SECTION B - B'



PLAN VIEW

CONSTRUCTED CASCADE SPECIFICATIONS

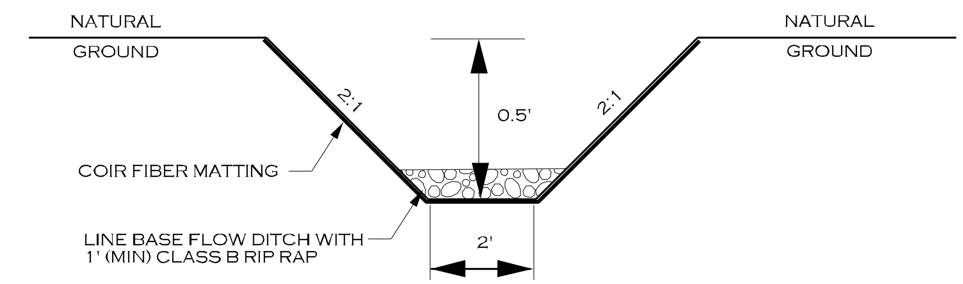
MATERIALS:	SPECIFICATIONS:
STONE BACKFILL	TYPE: GRANITE OR COMPARABLE SIZE: CLASS A, CLASS B AND CLASS 2 (EVEN MIX) THICKNESS: 18 INCHES MIN.
COIR FIBER MATTING	SEE DETAIL

NOTES FOR CONSTRUCTED CASCADE STRUCTURES:

1. GRADE STREAMBED AND BANKS TO PROPOSED DIMENSIONS PER TYPICAL CROSS-SECTION AND PROFILE.
2. EXCAVATE TRENCH BELOW PROPOSED STREAMBED ELEVATION EQUAL TO OR GREATER THAN RIFFLE THICKNESS.
3. INSTALL COIR FIBER MATTING ALONG STREAMBANKS ENSURING MATTING IS SUFFICIENTLY TRENCHED ALONG TOP OF BANK.
4. FILL TRENCH WITH STONE TO FINAL DESIGN STREAM GRADE.

- ELEVATION POINT (SEE STRUCTURE TABLES)

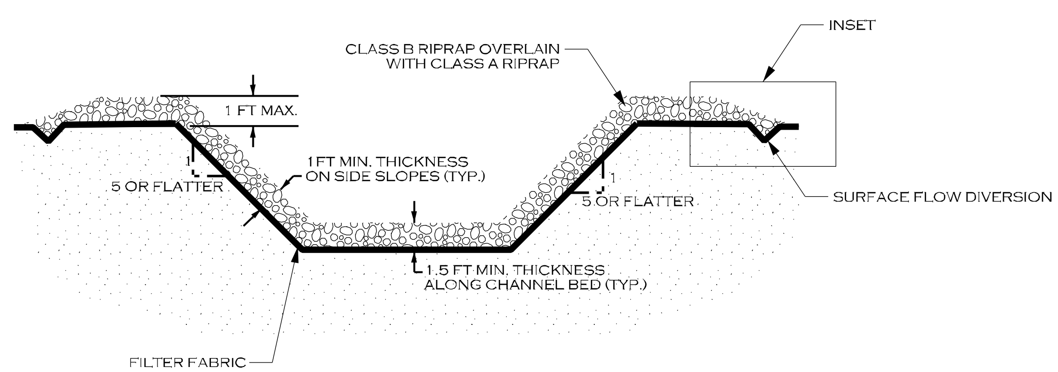
BASE FLOW DITCH



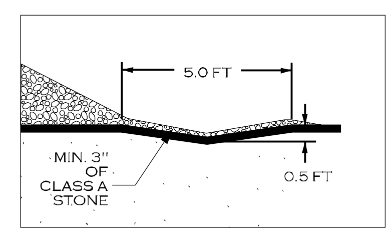
NOTE:

1. BANKS OF DITCHES TO BE PROTECTED WITH STRAW MULCH, TEMPORARY AND PERMNANENT SEEDING, AND COIR FIBER MATTING.

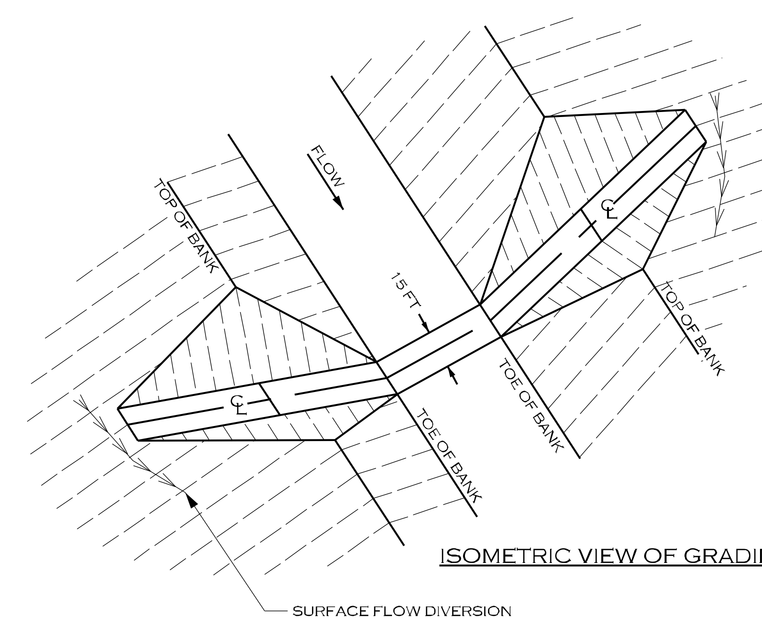
PERMANENT FORD STREAM CROSSING (PFC)



CROSS SECTION



INSET



ISOMETRIC VIEW OF GRADING

NOTES:

1. CONSTRUCT STREAM CROSSING WHEN FLOW IS LOW.
2. HAVE ALL NECESSARY MATERIALS AND EQUIPMENT ON-SITE BEFORE WORK BEGINS.
3. MINIMIZE CLEARING AND EXCAVATION OF STREAMBANKS. COMPLETE ONE SIDE BEFORE STARTING ON THE OTHER SIDE.
4. INSTALL STREAM CROSSING AT RIGHT ANGLE TO THE FLOW.
5. DIVERT ALL SURFACE RUNOFF FROM CONSTRUCTION SITE ONTO UNDISTURBED AREAS ADJOINING THE STREAM.
6. ALIGN ROAD APPROACHES WITH THE CENTERLINE OF THE CROSSING FOR A MINIMUM DISTANCE OF 30 FEET.
7. GRADE SLOPES TO A 5:1 SLOPE OR FLATTER. TRANSPLANT SOD FROM ORIGINAL STREAMBANK ONTO SIDE SLOPES IF POSSIBLE.
8. MAINTAIN CROSSING SO THAT RUNOFF FROM THE CONSTRUCTION ROAD DOES NOT ENTER EXISTING CHANNEL.
9. A STABILIZED PAD OF STONE BACKFILL, LINED WITH FILTER FABRIC SHALL BE USED OVER ACCESS SLOPES.
10. WIDTH OF THE CROSSING SHALL BE 20 FEET.
11. INSPECT STREAM CROSSING AFTER RUNOFF - PRODUCING RAINS TO CHECK FOR BLOCKAGE IN CHANNEL, EROSION OF BANKS, CHANNEL SCOUR, STONE DISPLACMENT, OR PIPING. MAKE ALL REPAIRS IMMEDIATELY TO PREVENT FUTHER DAMAGE TO INSTALLATION.

REVISIONS

NO.	DESCRIPTION	ENGR.	APPROV	DATE
1	DRAFT MITIGATION PLAN	JB	KLT	12/16/22
2	FINAL MITIGATION PLAN	JB	KLT	2/21/23
3	ISSUED FOR BID	JB	KLT	7/20/23

PREPARED FOR:

Mitigation Services

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

BANDYS FARM
CATAWBA COUNTY, NC

PREPARED IN THE OFFICE OF:

ECOSYSTEM PLANNING & RESTORATION

204 STONE RIDGE BLVD.
ASHEVILLE, NC 28804

PROJECT ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 039201 ENGINEER JACOB M. BYERS

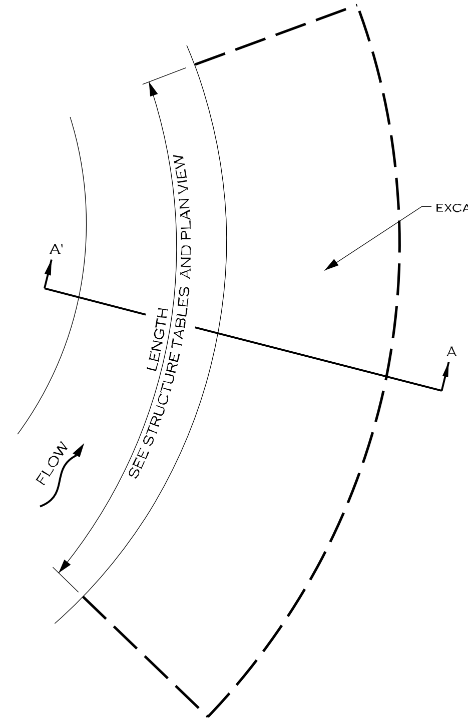
7/20/23

7/31/2023
X:\PROJECTS\ASH0018_NCDMS_BANDYS_FARM\CADD\PLANS\BF_PSH_02G.DGN
BYERS

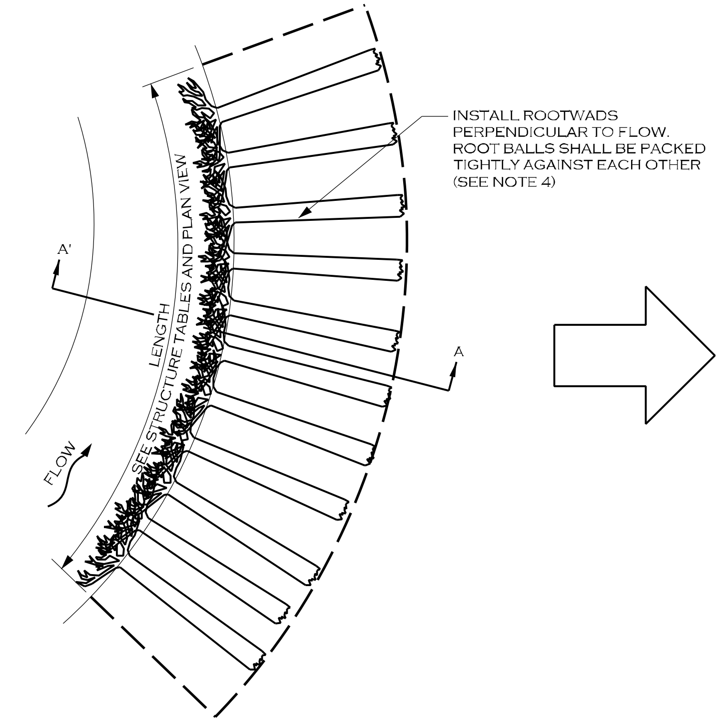
TOEWOOD WITH GEOLIFT (TYPE 1) TW1

PROJECT #	SHEET NO.
ASH0018	2H

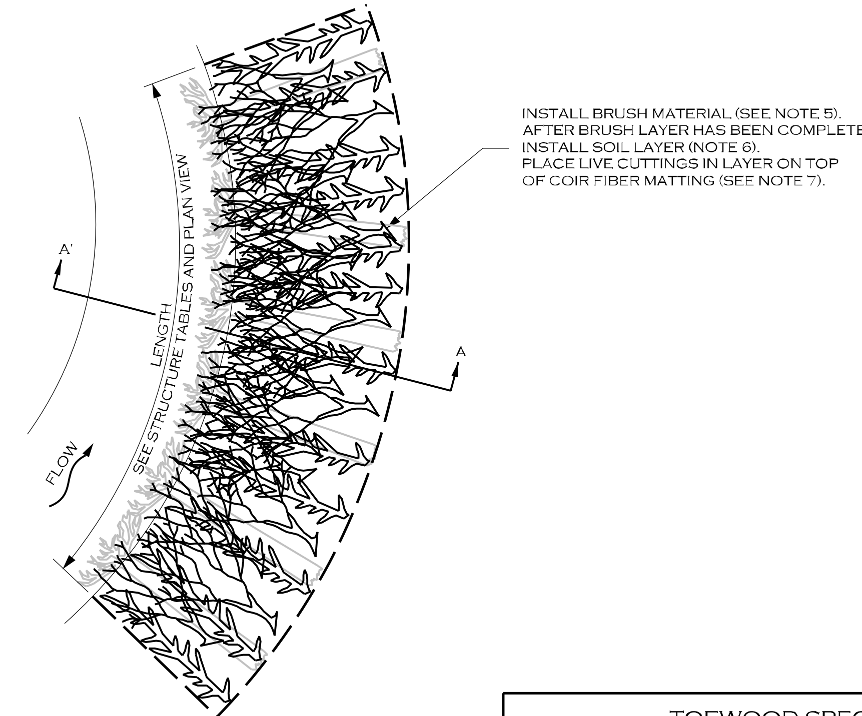
DETAILS



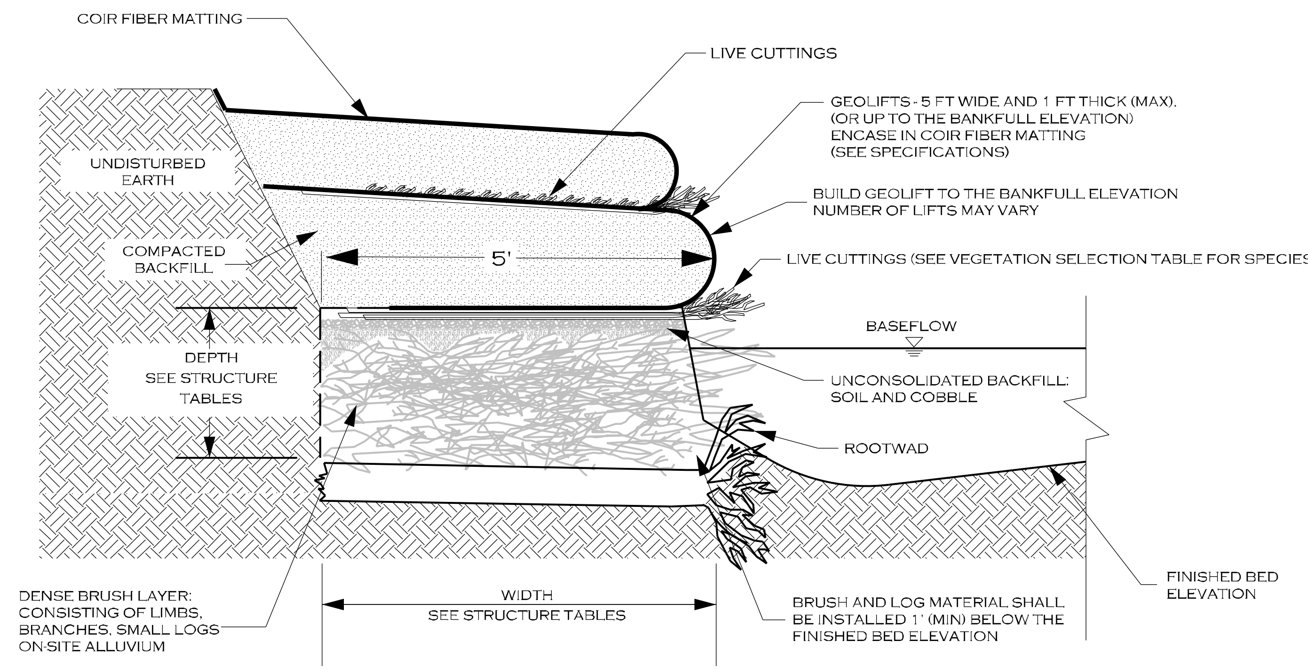
PLAN VIEW - 1
TRENCH EXCAVATION



PLAN VIEW - 2
ROOTWAD INSTALLATION



PLAN VIEW - 3
BRUSH LAYER INSTALLATION



SECTION VIEW

TOEWOOD SPECIFICATIONS

MATERIALS:	SPECIFICATIONS:
BRUSH MATERIAL	TYPE: BRUSH MATERIAL SIZE: MIN. 5 FT LONG. 1 INCH DIAMETER
ROOTWAD MATERIAL	TYPE: HARDWOOD SIZE: MIN. 5 FT LONG MIN. 12 INCH DIAMETER
COIR FIBER MATTING	SEE DETAIL

NOTES FOR TOEWOOD STRUCTURES:

1. STRUCTURE DIMENSIONS AND MEASUREMENTS ARE SHOWN ON THE STRUCTURE TABLES SHEET.
2. DIG A TRENCH ALONG BANK WHERE TOEWOOD IS TO BE INSTALLED TO THE DEPTH AND WIDTH SPECIFIED IN THE DETAILS AND STRUCTURE TABLES. IF TOEWOOD IS BEING PLACED IN A LOCATION WHERE THERE IS NOT EXISTING GROUND, PLACE FILL MATERIAL AND COMPACT TO FORM THE TRENCH FOR THE TOEWOOD MATERIALS.
3. EXCAVATE TRENCH BELOW TOEWOOD GRADE (PLAN VIEW 1). TO ELEVATION POINTS 2 AND 4.
4. INSTALL ROOTWADS PERPENDICULAR TO THE FLOW AS SHOWN IN PLAN VIEW 2.
5. INSTALL BRUSH MATERIAL INCLUDING BRANCHES, LOGS, AND BRUSH, OF AT LEAST 1"IN DIAMETER. LARGE AND SMALL MATERIALS SHALL BE MIXED, PLACED IN LAYERS NO MORE THAN 1 FOOT DEEP, COVERED IN A THIN LAYER OF ONSITE ALLUVIUM, AND COMPACTED BEFORE PLACING THE NEXT LAYER OF TOEWOOD MATERIAL. CONTINUE PLACING MATERIALS TO FORM A DENSE LAYER OF WOODY MATERIALS AND ONSITE ALLUVIUM TO THE DEPTH AND ELEVATIONS SPECIFIED (PLAN VIEW 3).
6. PLACE AN UNCONSOLIDATED LAYER OF SOIL AND COBBLE ON TOP OF BRUSH LAYER.
7. INSTALL LIVE CUTTINGS AT LEAST 5 FEET IN LENGTH.
8. CONSTRUCT GEOLIFTS OR PLACE TRANSPLANTS AS SPECIFIED OR DIRECTED BY THE ENGINEER) TO REBUILD THE STREAMBANK ABOVE THE TOEWOOD LAYER.
9. ROOTWADS CAN BE REPLACED WITH LARGER LOGS TO FORM THE BRUSH FOUNDATION PER THE DIRECTION OF THE ENGINEER.
10. BRUSH FOUNDATION SHALL BE APPROXIMATELY 0.5' ABOVE THE BASEFLOW LEVEL.
11. GEOLIFT THICKNESS CAN BE ADJUSTED AS NEEDED TO ENSURE LIFTS ARE CONSTRUCTED EVENLY UP TO THE BANKFULL ELEVATION.

REVISIONS

NO.	DESCRIPTION	ENGR.	APPROV	DATE
1	DRAFT MITIGATION PLAN	JB	KLT	12/16/22
2	FINAL MITIGATION PLAN	JB	KLT	2/21/23
3	ISSUED FOR BID	JB	KLT	7/20/23

PREPARED FOR:
NC Mitigation Services
NC DEPARTMENT OF ENVIRONMENTAL QUALITY
DIVISION OF MITIGATION SERVICES
1652 MAIL SERVICE CENTER
RALEIGH, NC 27699-1652

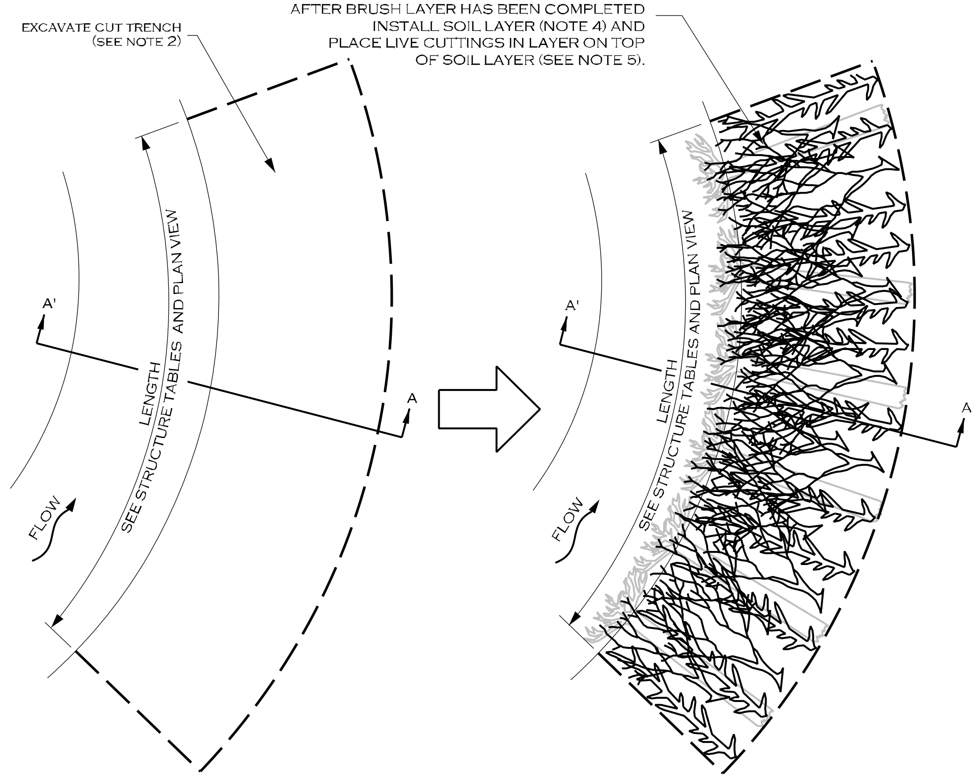
BANDYS FARM
CATAWBA COUNTY, NC

PREPARED IN THE OFFICE OF:
ECOSYSTEM PLANNING & RESTORATION
204 STONE RIDGE BLVD.
ASHEVILLE, NC 28804

PROJECT ENGINEER
NORTH CAROLINA PROFESSIONAL SEAL 039201 ENGINEER JACOB M. BYERS
7/20/23

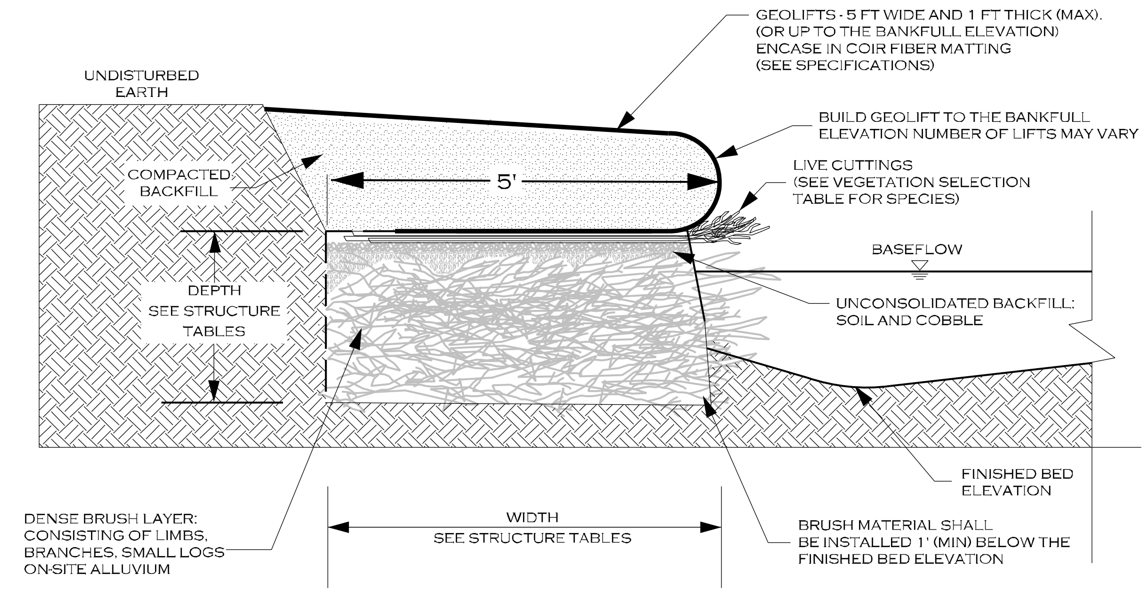
7/31/2023
K:\PROJECTS\ASH0018_NCDMS_BANDYS_FARM\CADD\PLANS\BF_PSH_02H.DGN
BYERS

TOEWOOD WITH GEOLIFT (TYPE 2) (TW2)



PLAN VIEW - 1
TRENCH EXCAVATION

PLAN VIEW - 2
BRUSH LAYER INSTALLATION



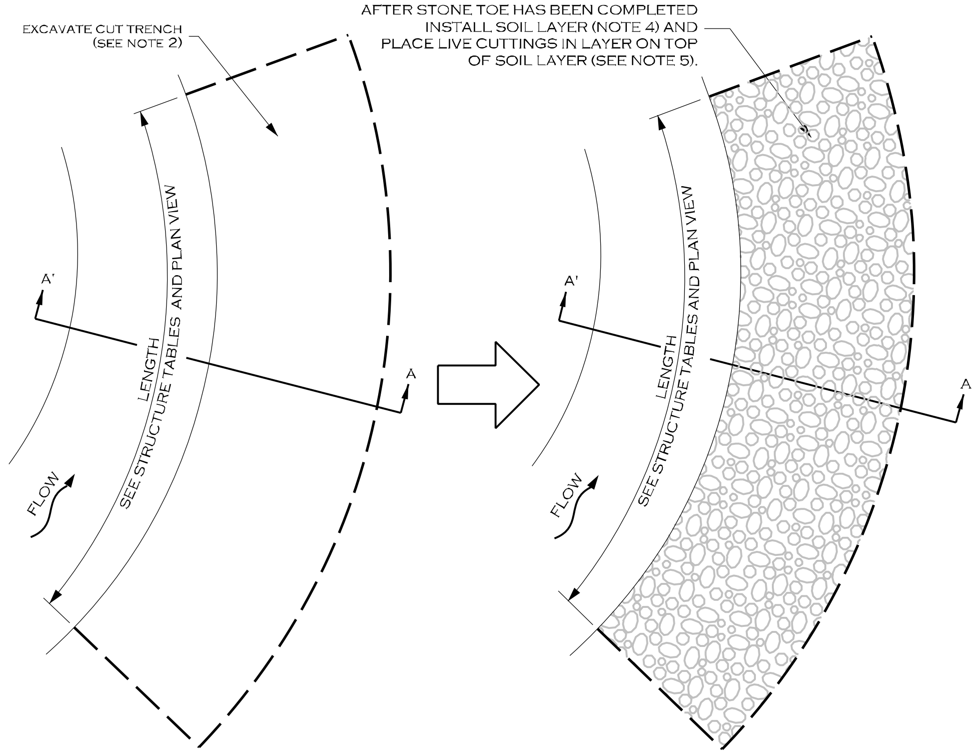
SECTION VIEW

TOE WOOD SPECIFICATIONS	
MATERIALS:	SPECIFICATIONS:
BRUSH MATERIAL	TYPE: BRUSH MATERIAL SIZE: MIN. 5 FT LONG, 1 INCH DIAMETER
COIR FIBER MATTING	SEE DETAIL

NOTES FOR TOE WOOD STRUCTURES WITHOUT ROOTWAD:

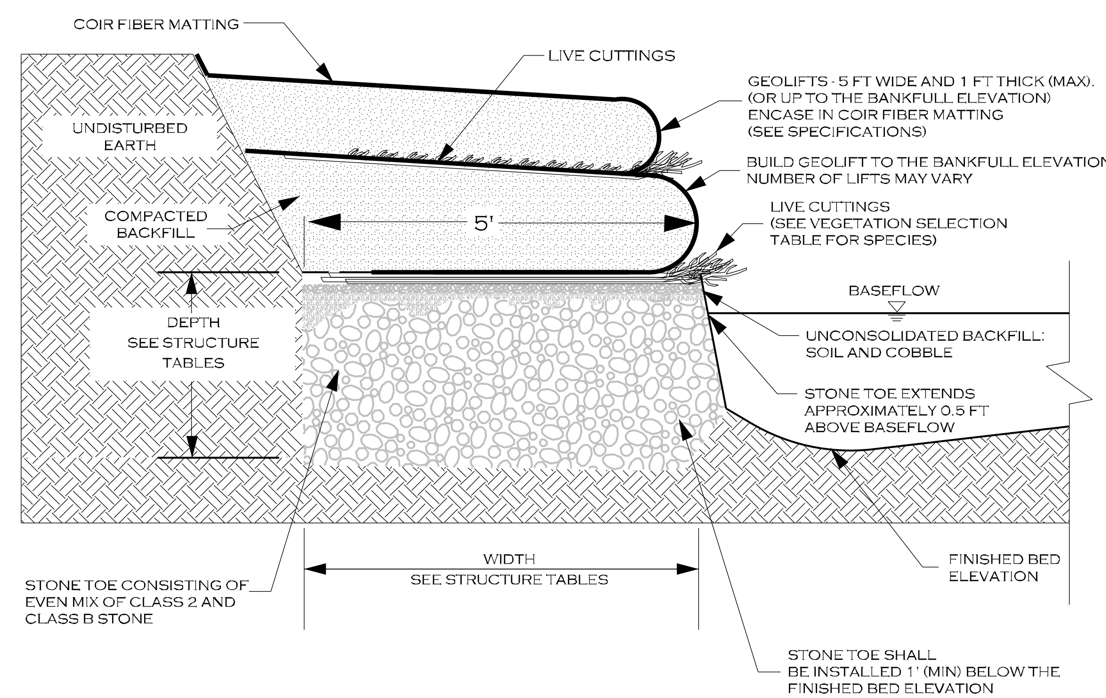
1. STRUCTURE DIMENSIONS AND MEASUREMENTS ARE SHOWN ON THE STRUCTURE TABLE SHEET.
2. DIG A TRENCH ALONG BANK WHERE TOE WOOD IS TO BE INSTALLED, TO THE DEPTH AND WIDTH SPECIFIED IN THE DETAILS AND STRUCTURE TABLE. IF TOE WOOD IS BEING PLACED IN A LOCATION WHERE THERE IS NOT EXISTING GROUND, PLACE FILL MATERIAL AND COMPACT TO FORM THE TRENCH FOR THE TOE WOOD MATERIALS.
3. INSTALL BRUSH MATERIALS INCLUDING BRANCHES, LOGS, AND BRUSH, AND AT LEAST 1" IN DIAMETER. LARGE MATERIALS AND SMALL MATERIALS SHALL BE MIXED, PLACED IN LAYERS NO MORE THAN 1 FOOT DEEP, COVERED IN A THIN LAYER OF ONSITE ALLUVIUM, AND COMPACTED BEFORE PLACING THE NEXT LAYER OF TOE WOOD MATERIAL. AT LEAST 50% OF THE WOOD MATERIAL SHALL HAVE A MINIMUM DIAMETER OF 4 INCHES. CONTINUE PLACING MATERIALS TO FORM A DENSE LAYER OF WOODY MATERIALS AND ONSITE ALLUVIUM TO THE DEPTH AND ELEVATIONS SPECIFIED (PLAN VIEW 2). BRUSH FOUNDATION SHALL BE APPROXIMATELY 0.5' ABOVE THE BASEFLOW LEVEL.
4. PLACE AN UNCONSOLIDATED LAYER OF SOIL AND COBBLE ON TOP OF BRUSH LAYER.
5. INSTALL LIVE CUTTINGS AT LEAST 5 FEET IN LENGTH, AND AT LEAST 1 INCH IN DIAMETER.
6. CONSTRUCT GEOLIFTS TO REBUILD THE STREAMBANK ABOVE THE TOE WOOD LAYER.
7. NUMBER OF LIFTS WILL BE DETERMINED IN THE FIELD BY THE ENGINEER.

GEOLIFT (GL)



PLAN VIEW - 1
TRENCH EXCAVATION

PLAN VIEW - 2
BRUSH LAYER INSTALLATION



SECTION VIEW

GEOLIFT SPECIFICATIONS	
MATERIALS:	SPECIFICATIONS:
STONE TOE MATERIAL	CLASS B STONE
COIR FIBER MATTING	SEE DETAIL

NOTES:

1. STRUCTURE DIMENSIONS AND MEASUREMENTS ARE SHOWN ON THE STRUCTURE TABLE SHEET.
2. DIG A TRENCH ALONG BANK WHERE TOE WOOD IS TO BE INSTALLED, TO THE DEPTH AND WIDTH SPECIFIED IN THE DETAILS AND STRUCTURE TABLE. IF STONE TOE IS BEING PLACED IN A LOCATION WHERE THERE IS NOT EXISTING GROUND, PLACE FILL MATERIAL AND COMPACT TO FORM THE TRENCH FOR THE FOUNDATION MATERIALS.
3. INSTALL STONE TOE FOUNDATION TO THE DEPTH SPECIFIED IN THE STRUCTURE TABLE.
4. PLACE AN UNCONSOLIDATED LAYER OF SOIL AND COBBLE ON TOP OF STONE TOE. STONE TOE FOUNDATION/SOIL COBBLE LAYER SHOULD EXTEND APPROXIMATELY 0.5 FT ABOVE THE TYPICAL BASEFLOW ELEVATION.
5. INSTALL LIVE CUTTINGS AT LEAST 5 FEET IN LENGTH, AND AT LEAST 1 INCH IN DIAMETER.
6. CONSTRUCT GEOLIFTS TO REBUILD THE STREAMBANK ABOVE THE STONE TOE.
7. NUMBER OF LIFTS WILL BE DETERMINED IN THE FIELD BY THE ENGINEER.

REVISIONS				
NO.	DESCRIPTION	ENGR.	APPROV	DATE
1	DRAFT MITIGATION PLAN	JB	KLT	12/16/22
2	FINAL MITIGATION PLAN	JB	KLT	2/21/23
3	ISSUED FOR BID	JB	KLT	7/20/23

PREPARED FOR:
Mitigation Services
NC DEPARTMENT OF ENVIRONMENTAL QUALITY
DIVISION OF MITIGATION SERVICES
1652 MAIL SERVICE CENTER
RALEIGH, NC 27699-1652

BANDYS FARM
CATAWBA COUNTY, NC

PREPARED IN THE OFFICE OF:
ECOSYSTEM PLANNING & RESTORATION
204 STONE RIDGE BLVD.
ASHEVILLE, NC 28804

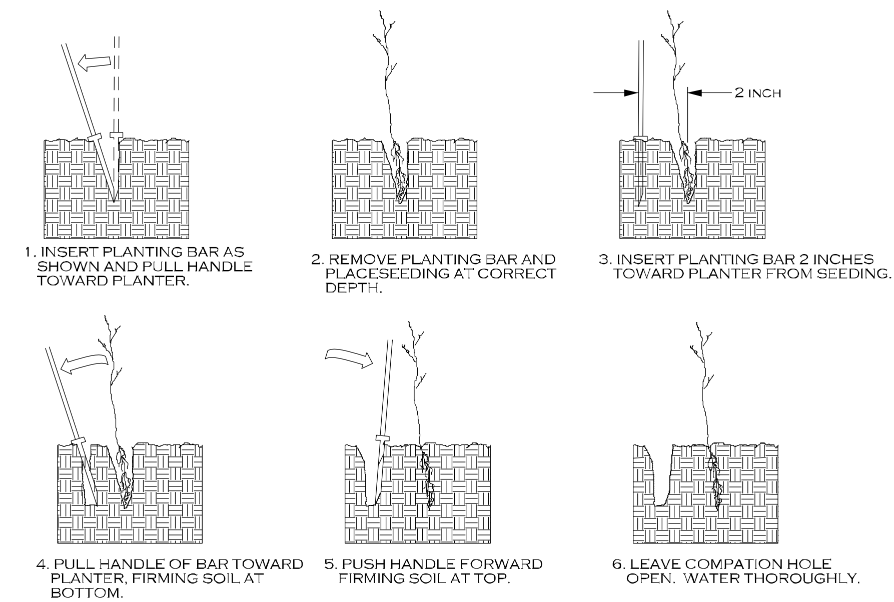
PROJECT ENGINEER
NORTH CAROLINA PROFESSIONAL SEAL 039201 ENGINEER JACOB M. BYERS
Jake Byers 7/20/23

7/31/2023
X:\PROJECTS\ASH0018_NCDMS_BANDYS_FARM\CADD\PLANS\BF_PSH_021.DGN
BYERS

PROJECT #	SHEET NO.
ASH0018	2J

DETAILS

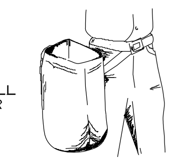
DIBBLE PLANTING METHOD USING THE KBC PLANTING BAR



PLANTING NOTES:

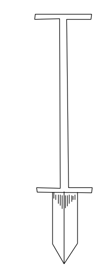
PLANTING BAG

DURING PLANTING, SEEDLINGS SHALL BE KEPT IN A MOIST CANVAS BAG OR SIMILAR CONTAINER TO PREVENT THE ROOT SYSTEMS FROM DRYING.



KBC PLANTING BAR

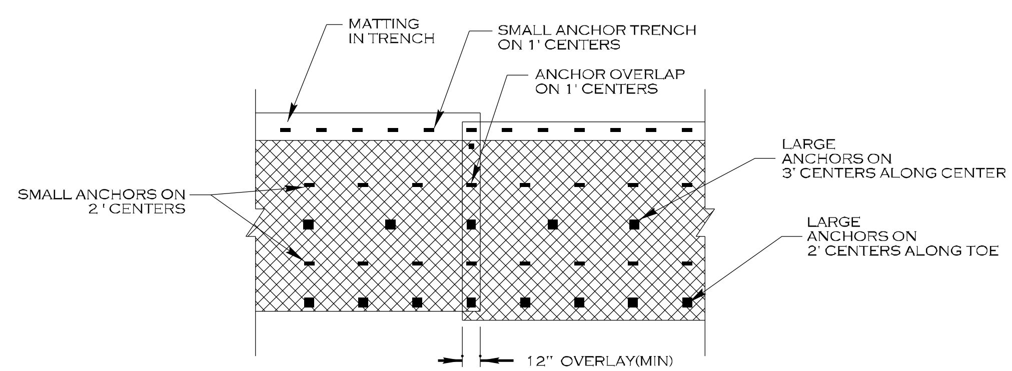
PLANTING BAR SHALL HAVE A BLADE WITH A TRIANGULAR CROSS SECTION, AND SHALL BE 12 INCHES LONG, 4 INCHES WIDE AND 1 INCH THICK AT CENTER.



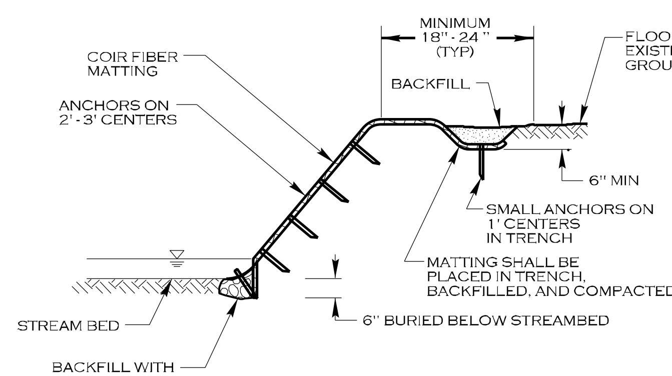
ROOT PRUNING

ALL SEEDLINGS SHALL BE ROOT PRUNED, IF NECESSARY, SO THAT NO ROOTS EXTEND MORE THAN 10 INCHES BELOW THE ROOT COLLAR.

COIR FIBER MATTING



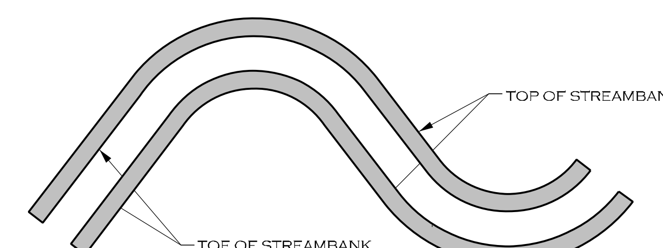
PLAN VIEW



TYPICAL CROSS SECTION

NOTES:

1. IN AREAS TO BE MATTED, ALL SEEDING, SOIL AMENDMENTS, AND SOIL PREPARATION MUST BE COMPLETED PRIOR TO PLACEMENT OF COIR FIBER MATTING.

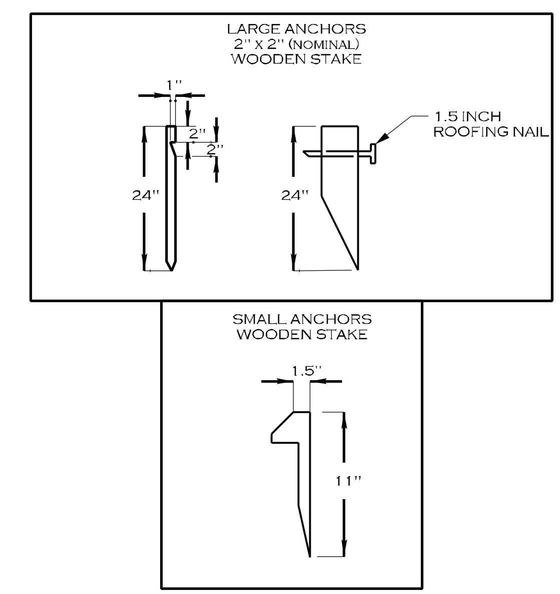


B TYPE STREAMS

MATTING PLACEMENT

TYPICAL MATTING PLAN VIEW

ANCHOR OPTIONS



REVISIONS				
NO.	DESCRIPTION	ENGR.	APPROV	DATE
1	DRAFT MITIGATION PLAN	JB	KLT	12/16/22
2	FINAL MITIGATION PLAN	JB	KLT	2/21/23
3	ISSUED FOR BID	JB	KLT	7/20/23

PREPARED FOR:

NC Mitigation Services

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

BANDYS FARM
CATAWBA COUNTY, NC

PREPARED IN THE OFFICE OF:

ECOSYSTEM PLANNING & RESTORATION

204 STONE RIDGE BLVD.
ASHEVILLE, NC 28804

PROJECT ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 039201 ENGINEER JACOB M. BYERS

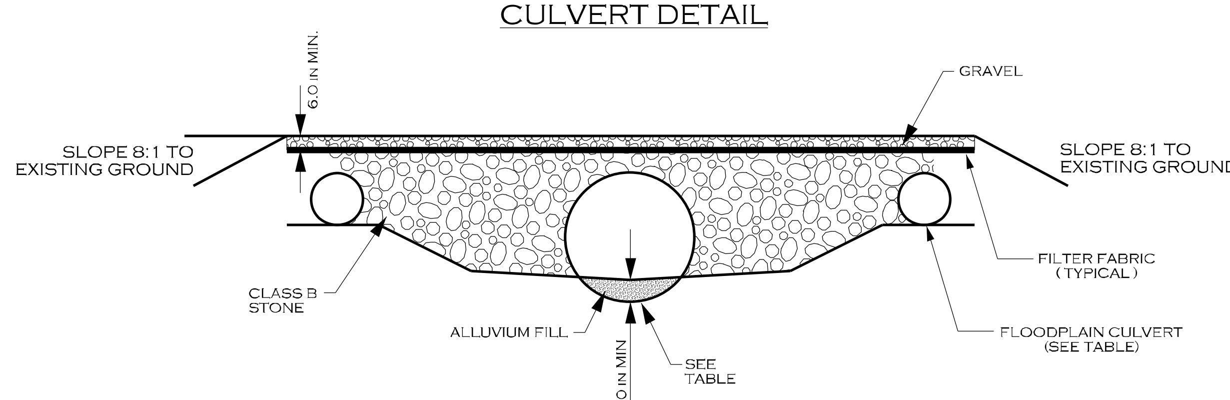
Jake Byers 7/20/23

7/31/2023
X:\PROJECTS\ASH0018_NCDMS_BANDYS_FARM\CADD\PLANS\BF_PSH_02J.DGN
BYERS

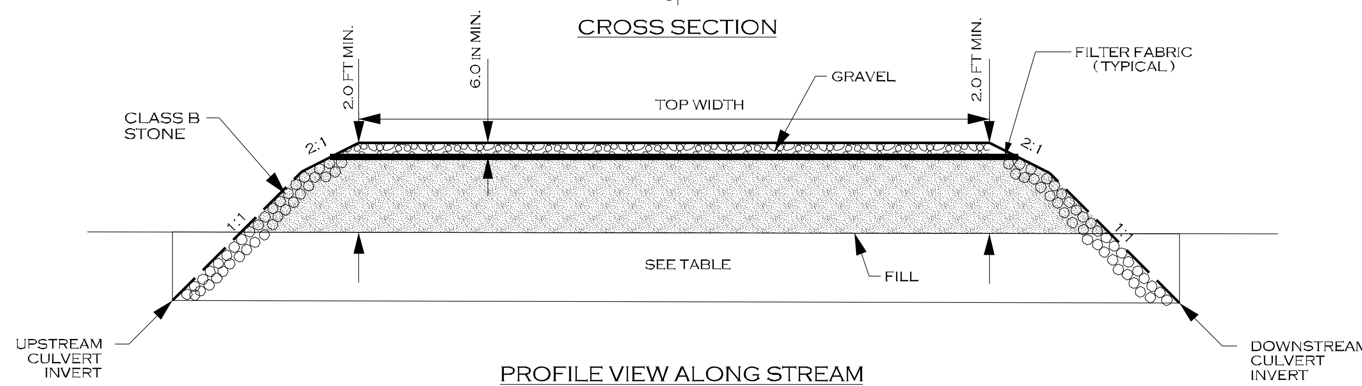
PROJECT #	SHEET NO.
ASH0018	2K

DETAILS

CULVERT DETAIL



CROSS SECTION



PROFILE VIEW ALONG STREAM

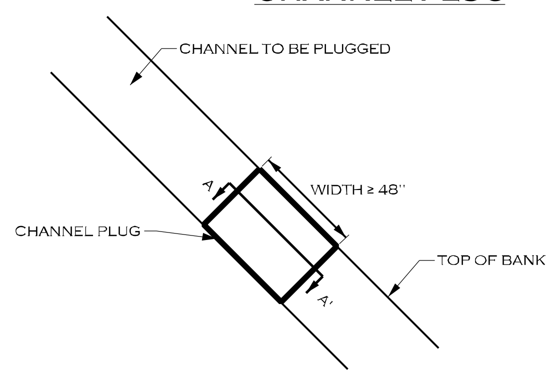
CULVERT SPECIFICATIONS	
MATERIALS:	SPECIFICATIONS:
PIPE	TYPE: REINFORCED CONCRETE PIPE TYPE: FLOODPLAIN: HDPE
GRAVEL	TYPE: CRUSHER RUN
FILL	TYPE: ON-SITE SOIL
FILTER FABRIC	TYPE: TYPE 2 NON-WOVEN

NOTES FOR CULVERT STRUCTURES:

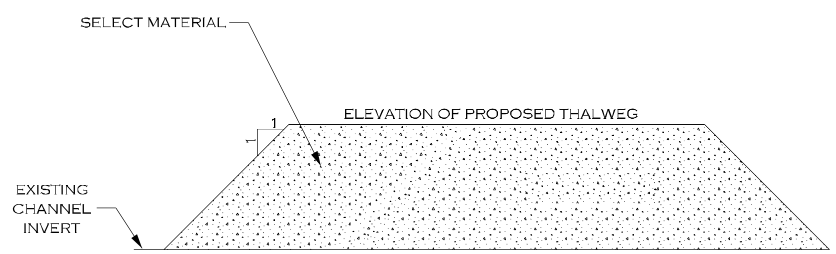
1. STABILIZE FILL AROUND CULVERTS WITH CLASS B STONE. STABILIZE REMAINING ROAD SIDE SLOPES WITH EROSION MATTING ACCORDING TO SPECIFICATIONS.
2. ROADWAY TIE IN SLOPES 8:1 OR FLATTER. AS DIRECTED PER ENGINEER.
3. FILTER FABRIC AND GRAVEL SHALL BE INSTALLED ALONG THE FARM PATH FOR A MINIMUM DISTANCE OF 50 FEET.

VARIABLE	CULVERT UT2	CULVERT FLOODPLAIN
REQUIRED COVER DEPTH	2.0'	2.0'
UPSTREAM INVERT ELEV.	906.31	907.95
DOWNSTREAM INVERT ELEV.	906.11	907.75
UPSTREAM INVERT STA.	16+74.20	16+74.20
DOWNSTREAM INVERT STA.	16+94.20	16+94.20
FARM PATH ELEV.	913.28	913.28
PIPE SIZE	60"	24"
PIPE LENGTH	24'	24'
TOP WIDTH (FT)	13'	13'

CHANNEL PLUG



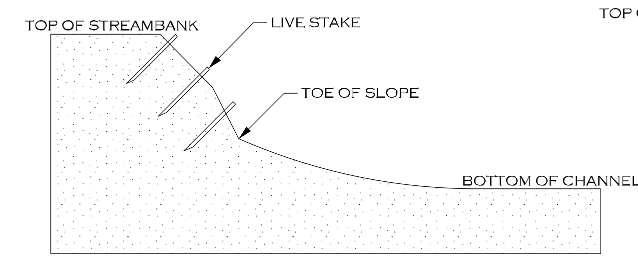
PLAN VIEW



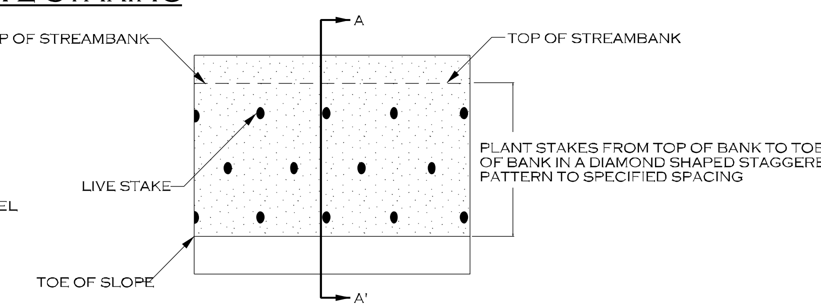
SECTION A - A'

NOTE:
COMPACT BACKFILL USING ON-SITE HEAVY EQUIPMENT IN 10 INCH LIFTS.

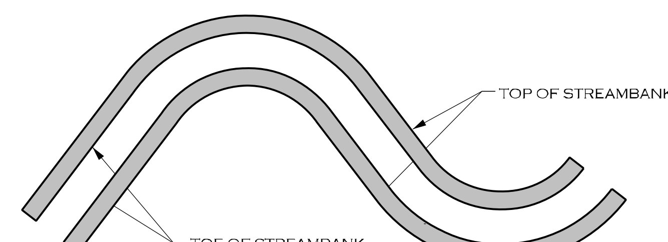
LIVE STAKING



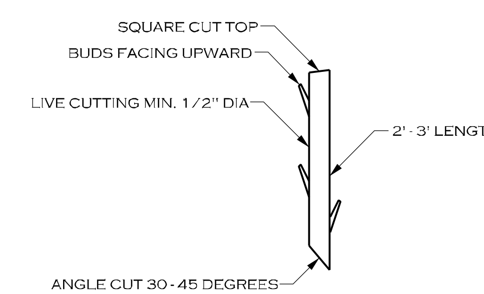
SECTION A - A'



PLAN VIEW



LIVE STAKE SPACING PLAN VIEW - C STREAM TYPE



LIVE STAKE DETAIL

NOTES:
1. STAKES SHOULD BE CUT AND INSTALLED ON THE SAME DAY.
2. DO NOT INSTALL STAKES THAT HAVE BEEN SPLIT.
3. STAKES MUST BE INSTALLED WITH BUDS POINTING UPWARDS.
4. STAKES SHOULD BE INSTALLED PERPENDICULAR TO BANK.
5. STAKES SHOULD BE 1/2 TO 2 INCHES IN DIAMETER AND 2 TO 3 FT LONG.
6. STAKES SHOULD BE INSTALLED LEAVING 1/5 OF STAKE ABOVE GROUND.
7. STAKES SHOULD BE INSTALLED ON B STREAM TYPES AT 6' SPACING ON BOTH BANKS

REVISIONS				
NO.	DESCRIPTION	ENGR.	APPROV	DATE
1	DRAFT MITIGATION PLAN	JB	KLT	12/16/22
2	FINAL MITIGATION PLAN	JB	KLT	2/21/23
3	ISSUED FOR BID	JB	KLT	7/20/23

PREPARED FOR:
NC Mitigation Services
NC DEPARTMENT OF ENVIRONMENTAL QUALITY
DIVISION OF MITIGATION SERVICES
1652 MAIL SERVICE CENTER
RALEIGH, NC 27699-1652

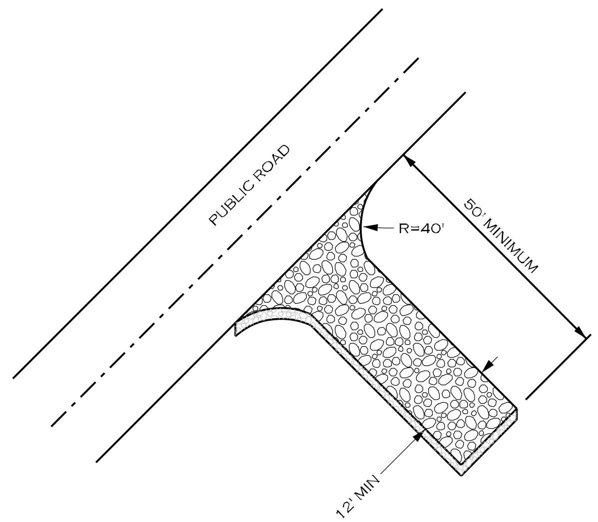
BANDYS FARM
CATAWBA COUNTY, NC

PREPARED IN THE OFFICE OF:
ECOSYSTEM PLANNING & RESTORATION
EPR
204 STONE RIDGE BLVD.
ASHEVILLE, NC 28804

PROJECT ENGINEER
NORTH CAROLINA PROFESSIONAL SEAL 039201 ENGINEER JACOB M. BYERS
7/20/23

7/31/2023
X:\PROJECTS\ASH0018_NCDMS_BANDYS_FARM\CADD\PLANS\BF_PSH_02K.DGN
BYERS

GRAVEL CONSTRUCTION ENTRANCE



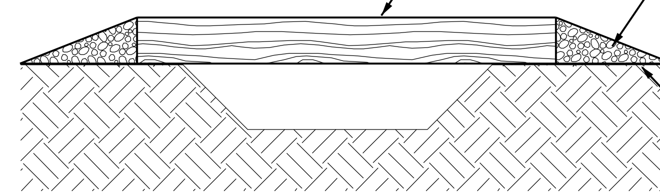
NOTES:

1. PROVIDE TURNING RADIUS SUFFICIENT TO ACCOMMODATE EXPECTED EQUIPMENT.
2. LOCATE ENTRANCES TO PROVIDE FOR UTILIZATION BY ALL CONSTRUCTION VEHICLES.
3. PLACE FILTER FABRIC FOR DRAINAGE BENEATH STONE.
4. MUST BE MAINTAINED IN THE CONDITION WHICH WILL PREVENT TRACKING OR DIRECT MUD INTO STREETS.
5. ANY MATERIAL TRACKED ONTO THE ROADWAY MUST BE CLEANED UP IMMEDIATELY.
6. LOCATE GRAVEL CONSTRUCTION ENTRANCE AT ALL POINTS OF INGRESS AND EGRESS UNTIL SITE IS STABILIZED. PROVIDE FREQUENT CHECKS TO THE ENTRANCE AND TIMELY MAINTENANCE.
7. NUMBER AND LOCATION OF CONSTRUCTION ENTRANCES AS SHOWN ON PLANS, OR AS DIRECTED BY THE ENGINEER.
8. USE CLASS A STONE OR OTHER COURSE AGGREGATE APPROVED BY THE ENGINEER.
9. INSTALL CONSTRUCTION ENTRANCES IN A WAY TO PREVENT VEHICLES LEAVING THE PROJECT SITE FROM BYPASSING CONSTRUCTION ENTRANCES.

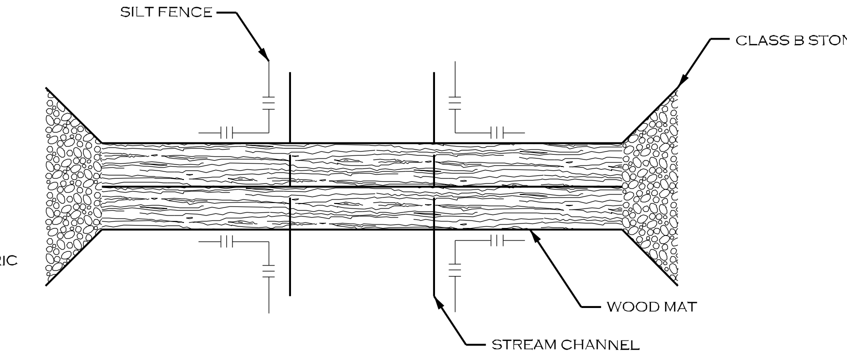
TEMPORARY STREAM CROSSING - WOOD MAT

PROJECT #	SHEET NO.
ASH0018	2L

DETAILS



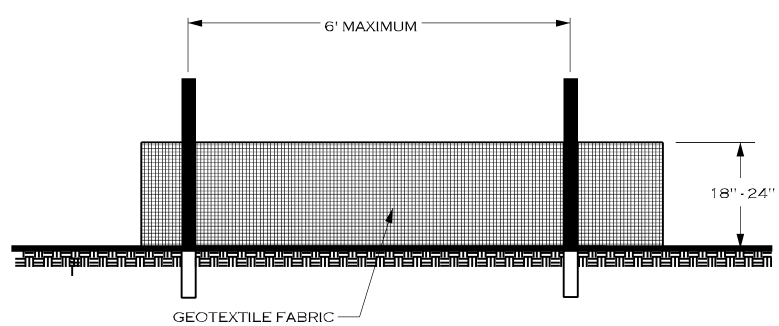
CROSS SECTION

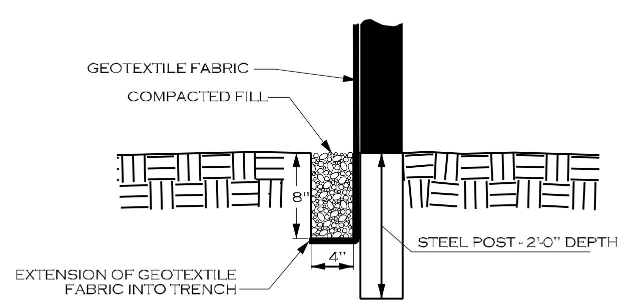


PLAN VIEW

NOTES:
1. CONSTRUCT STREAM CROSSING WHEN FLOW IS LOW.
2. HAVE ALL NECESSARY MATERIALS AND EQUIPMENT ON-SITE BEFORE WORK BEGINS.
3. MINIMIZE CLEARING AND EXCAVATION OF STREAMBANKS. DO NOT EXCAVATE CHANNEL BOTTOM.
4. LINE STREAMBANK AND ACCESS RAMP AREA WITH FILTER FABRIC.
5. INSTALL STREAM CROSSING AT RIGHT ANGLE TO THE FLOW.
6. TRANSPLANT SOD FROM ORIGINAL STREAMBANK ONTO SIDE SLOPES FOR LATER USE.
7. MAINTAIN CROSSING SO THAT RUNOFF IN THE CONSTRUCTION ROAD DOES NOT ENTER EXISTING CHANNEL BY INSTALLING SILT FENCE ON ALL FOUR CORNERS ADJACENT TO THE STREAM. SEE SILT FENCE DETAIL.
8. STABILIZE AN ACCESS RAMP OF CLASS A1 STONE TO THE EDGE OF THE WOOD MAT.
9. THE WOOD MAT SHALL BE OF SUFFICIENT SIZE AND WIDTH TO SUPPORT THE LARGEST VEHICLE CROSSING THE CHANNEL.
10. CONTRACTOR SHALL DETERMINE AN APPROPRIATE RAMP ANGLE ACCORDING TO EQUIPMENT UTILIZED. RECOMMENDED AT A 5:1 SLOPE.

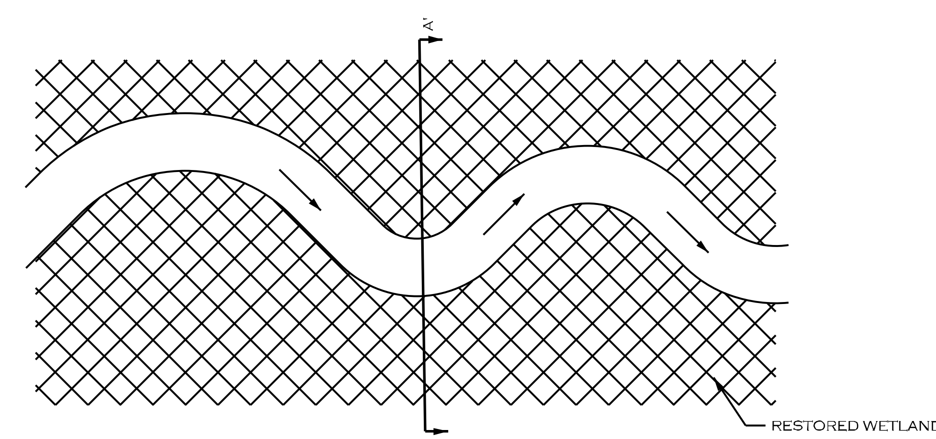
TEMPORARY SILT FENCE



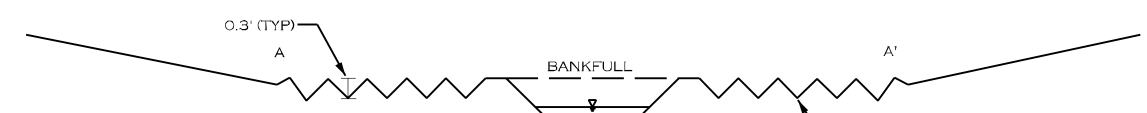


NOTES:
1. USE SILT FENCE A MINIMUM OF 36" IN WIDTH AND FASTEN ADEQUATELY TO THE STEEL POSTS.
2. PROVIDE 5' STEEL POST OF THE SELF-FASTENER ANGLE STEEL TYPE.
3. REMOVE ONCE AREA IS STABLE.

WETLAND SURFACE ROUGHENING



PLAN VIEW



ROUGHEN TOPSOIL IN RESTORED WETLAND AREA USING EXCAVATOR TEETH. ENSURE THERE ARE NO CONCENTRATED FLOW PATHS BACK TO CHANNEL. WETLAND ELEVATIONS SHOULD VARY BY +/-0.3' THROUGHOUT THE WETLAND. NO ELEVATION SHOULD BE GREATER THAN THE ADJACENT BANKFULL ELEVATION.

SECTION A - A'

REVISIONS				
NO.	DESCRIPTION	ENGR.	APPROV	DATE
1	DRAFT MITIGATION PLAN	JB	KLT	12/16/22
2	FINAL MITIGATION PLAN	JB	KLT	2/21/23
3	ISSUED FOR BID	JB	KLT	7/20/23

PREPARED FOR:

NC Mitigation Services

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

BANDYS FARM
CATAWBA COUNTY, NC

PREPARED IN THE OFFICE OF:

EPR Ecosystem Planning & Restoration

204 STONE RIDGE BLVD.
ASHEVILLE, NC 28804

PROJECT ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 039201 ENGINEER JACOB M. BYERS

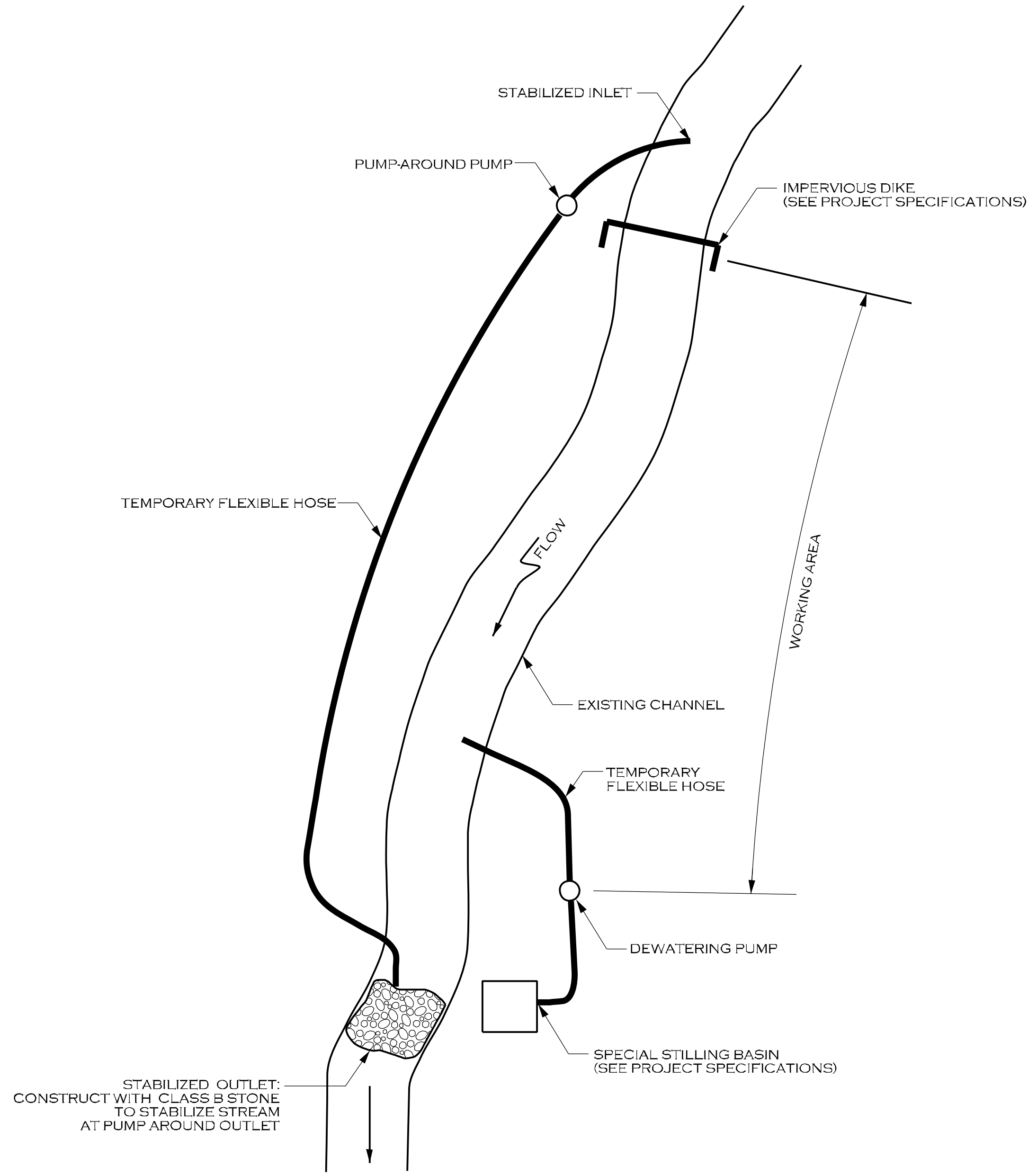
Jake Byers 7/20/23

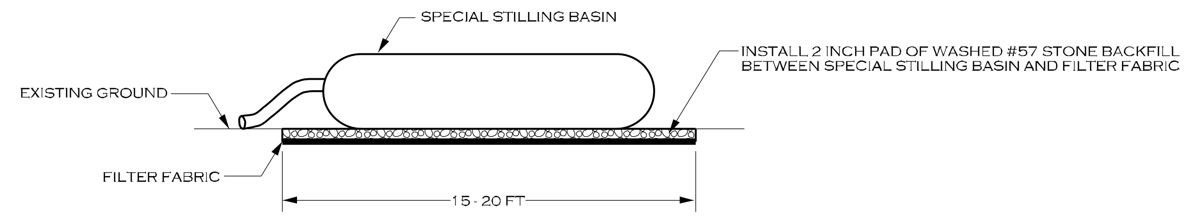
7/31/2023
K:\PROJECTS\ASH0018_NCDMS_BANDYS_FARM\CADD\PLANS\BF_PSH_02L.DGN
BYERS

PROJECT #	SHEET NO.
ASH0018	2M

DETAILS

TEMPORARY PUMP - AROUND OPERATION





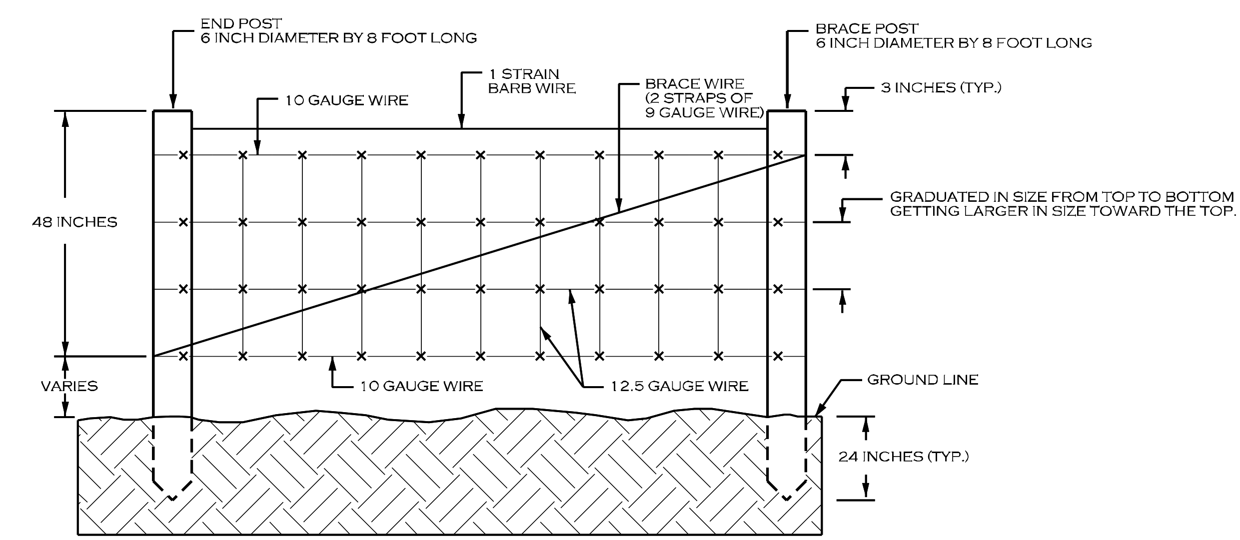
NOTES:

1. EXCAVATION SHALL BE PERFORMED IN ONLY DRY SECTIONS OF CHANNEL.
2. IMPERVIOUS DIKES SHOULD BE USED TO ISOLATE WORK AREAS FROM STREAM FLOW.
3. THE CONTRACTOR SHALL NOT DISTURB MORE AREA THAN CAN BE STABILIZED IN ONE WORKING DAY.
4. THE PUMP-AROUND PUMP SHOULD ADEQUATELY CONVEY BASEFLOW.

SEQUENCE OF CONSTRUCTION FOR TEMPORARY PUMP - AROUND OPERATION

1. INSTALL STABILIZED OUTLET AT THE DOWNSTREAM END OF THE DESIGNATED PROJECT WORKING AREA.
2. THE CONTRACTOR WILL INSTALL THE PUMP AROUND PUMP AND THE TEMPORARY FLEXIBLE HOSE THAT WILL CONVEY THE BASE FLOW FROM UPSTREAM OF THE WORK SITE TO THE SPECIAL STILLING BASIN OR STABILIZED OUTLET.
3. INSTALL UPSTREAM IMPERVIOUS DIKE AND BEGIN PUMPING OPERATIONS FOR STREAM DIVERSION.
4. INSTALL PUMPING APPARATUS IF NEEDED TO DEWATER THE ENTRAPPED AREA. THE PUMP AND HOSE FOR THIS PURPOSE SHALL BE OF SUFFICIENT SIZE TO DEWATER THE WORK AREA. THIS WATER WILL FLOW INTO A SPECIAL STILLING BASIN.
5. THE CONTRACTOR WILL PERFORM STREAM RESTORATION WORK IN ACCORDANCE WITH THE PLAN AND FOLLOWING THE GENERAL CONSTRUCTION SEQUENCE.
6. THE CONTRACTOR WILL EXCAVATE ANY ACCUMULATED SILT AND DEWATER BEFORE REMOVAL OF THE IMPERVIOUS DIKE. REMOVE IMPERVIOUS DIKES, PUMPS, AND TEMPORARY FLEXIBLE HOSE.
7. ONCE THE WORKING AREA IS COMPLETED, REMOVE THE SPECIAL STILLING BASIN AND STABILIZED OUTLET AND STABILIZE DISTURBED AREAS WITH SEED AND MULCH.

WOVEN FIELD FENCE WITH A SINGLE STRAND BARBED WIRE



NOTE:
1. END POSTS SHALL BE INSTALLED AT A SPACING OF 10-15 FEET.

REVISIONS

NO.	DESCRIPTION	ENGR.	APPROV	DATE
1	DRAFT MITIGATION PLAN	JB	KLT	12/16/22
2	FINAL MITIGATION PLAN	JB	KLT	2/21/23
3	ISSUED FOR BID	JB	KLT	7/20/23

PREPARED FOR:

Mitigation Services
NC DEPARTMENT OF ENVIRONMENTAL QUALITY
DIVISION OF MITIGATION SERVICES
1652 MAIL SERVICE CENTER
RALEIGH, NC 27699-1652

BANDYS FARM
CATAWBA COUNTY, NC

PREPARED IN THE OFFICE OF:

ECOSYSTEM PLANNING & RESTORATION
204 STONE RIDGE BLVD.
ASHEVILLE, NC 28804

PROJECT ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 039201 ENGINEER JACOB M. BYERS

Jake Byers 7/20/23

STRUCTURE TABLES

PROJECT #	SHEET NO.
ASH0018	3

TABLES

Rock Cross Vane Structures - NFMC

Structure #	Arm Length (ft)	Arm Angle (deg)	Arm Slope (%)	Sill Length (ft)	Invert Length (ft)	Station (ft) At Pt 4	Elevation (ft) Pt 1	Pt 2	Pt 3	Pt 4	Pt 5	Pt 6	Pt 7
CV-1	20.7	22	6.1%	5.0	3.8	12+52.32	866.55	866.55	865.30	865.30	865.30	866.55	866.55
CV-2	20.7	22	6.1%	5.0	3.8	13+70.00	865.25	865.25	864.00	864.00	864.00	865.25	865.25
CV-3	20.7	22	6.1%	5.0	3.8	19+67.04	859.25	859.25	858.00	858.00	858.00	859.25	859.25

Rock Cross Vane Structures - UT1

Structure #	Arm Length (ft)	Arm Angle (deg)	Arm Slope (%)	Sill Length (ft)	Invert Length (ft)	Station (ft) At Pt 4	Elevation (ft) Pt 1	Pt 2	Pt 3	Pt 4	Pt 5	Pt 6	Pt 7
CV-4	6.0	22	6.3%	4.0	1.2	10+72.23	983.38	983.38	983.00	983.00	983.00	983.38	983.38
CV-5	6.0	22	6.3%	4.0	1.2	11+73.01	979.43	979.43	979.05	979.05	979.05	979.43	979.43
CV-6	6.0	22	6.3%	4.0	1.2	14+54.68	968.78	968.78	968.40	968.40	968.40	968.78	968.78
CV-7	6.0	22	6.3%	4.0	1.2	14+86.61	967.58	967.58	967.20	967.20	967.20	967.58	967.58
CV-8	6.0	22	6.3%	4.0	1.2	17+36.87	958.23	958.23	957.85	957.85	957.85	958.23	958.23
CV-9	6.0	22	6.3%	4.0	1.2	18+75.34	952.98	952.98	952.60	952.60	952.60	952.98	952.98
CV-10	6.0	22	6.3%	4.0	1.2	19+50.91	950.13	950.13	949.75	949.75	949.75	950.13	950.13
CV-11	6.0	22	6.3%	4.0	1.2	24+79.74	930.33	930.33	929.95	929.95	929.95	930.33	930.33
CV-12	6.0	22	6.3%	4.0	1.2	25+11.19	929.18	929.18	928.80	928.80	928.80	929.18	929.18
CV-13	6.0	22	6.3%	4.0	1.2	26+51.23	923.83	923.83	923.45	923.45	923.45	923.83	923.83

Rock Cross Vane Structures - UT1a

Structure #	Arm Length (ft)	Arm Angle (deg)	Arm Slope (%)	Sill Length (ft)	Invert Length (ft)	Station (ft) At Pt 4	Elevation (ft) Pt 1	Pt 2	Pt 3	Pt 4	Pt 5	Pt 6	Pt 7
CV-14	6.0	22	6.3%	4.0	1.2	10+08.77	968.98	968.98	968.60	968.60	968.60	968.98	968.98
CV-15	6.0	22	6.3%	4.0	1.2	10+93.98	966.18	966.18	965.80	965.80	965.80	966.18	966.18
CV-16	6.0	22	6.3%	4.0	1.2	14+61.68	954.08	954.08	953.70	953.70	953.70	954.08	954.08
CV-17	6.0	22	6.3%	4.0	1.2	17+47.09	944.78	944.78	944.40	944.40	944.40	944.78	944.78
CV-18	6.0	22	6.3%	4.0	1.2	20+64.99	934.33	934.33	933.95	933.95	933.95	934.33	934.33

Rock Cross Vane Structures - UT2

Structure #	Arm Length (ft)	Arm Angle (deg)	Arm Slope (%)	Sill Length (ft)	Invert Length (ft)	Station (ft) At Pt 4	Elevation (ft) Pt 1	Pt 2	Pt 3	Pt 4	Pt 5	Pt 6	Pt 7
CV-19	12.9	22	6.2%	5.0	2.2	15+76.47	908.35	908.35	907.55	907.55	907.55	908.35	908.35
CV-20	12.9	22	6.2%	5.0	2.2	25+30.96	896.20	896.20	895.40	895.40	895.40	896.20	896.20
CV-21	12.9	22	6.2%	5.0	2.2	26+21.48	894.30	894.30	893.50	893.50	893.50	894.30	894.30
CV-22	12.9	22	6.2%	5.0	2.2	26+97.34	891.90	891.90	891.10	891.10	891.10	891.90	891.90
CV-23	12.9	22	6.2%	5.0	2.2	27+98.00	891.00	891.00	890.20	890.20	890.20	891.00	891.00
CV-24	12.9	22	6.2%	5.0	2.2	28+75.95	889.55	889.55	888.75	888.75	888.75	889.55	889.55
CV-25	12.9	22	6.2%	5.0	2.2	29+42.31	888.55	888.55	887.75	887.75	887.75	888.55	888.55
CV-26	12.9	22	6.2%	5.0	2.2	31+28.37	885.40	885.40	884.60	884.60	884.60	885.40	885.40
CV-27	12.9	22	6.2%	5.0	2.2	43+28.75	865.35	865.35	864.55	864.55	864.55	865.35	865.35
CV-28	12.9	22	6.2%	5.0	2.2	44+65.17	862.45	862.45	861.65	861.65	861.65	862.45	862.45

Rock Cross Vane Structures - UT3

Structure #	Arm Length (ft)	Arm Angle (deg)	Arm Slope (%)	Sill Length (ft)	Invert Length (ft)	Station (ft) At Pt 4	Elevation (ft) Pt 1	Pt 2	Pt 3	Pt 4	Pt 5	Pt 6	Pt 7
CV-29	7.1	22	6.1%	4.0	1.4	09+50.16	865.64	865.64	865.20	865.20	865.20	865.64	865.64
CV-30	7.1	22	6.1%	4.0	1.4	10+00.00	860.54	860.54	860.10	860.10	860.10	860.54	860.54
CV-31	7.1	22	6.1%	4.0	1.4	12+54.32	855.74	855.74	855.30	855.30	855.30	855.74	855.74

Offset Rock Cross Vane Structures - UT1

Structure #	Sill Length (ft)	Outside Arm Length (ft)	Outside Arm Angle (deg)	Outside Arm Slope (%)	Invert Length (ft)	Inside Arm Length (ft)	Inside Arm Angle (deg)	Inside Arm Slope (%)	Station (ft) At Pt 2	Elevation (ft) Pt 1	Pt 2	Pt 3
OV-1	4.0	6.0	22.0	6.4%	1.2	2.8	22.0	3.2%	11+47.52	980.38	980.00	980.09
OV-2	4.0	6.0	22.0	6.4%	1.2	2.8	22.0	3.2%	11+98.45	978.48	978.10	978.19
OV-3	4.0	6.0	22.0	6.4%	1.2	2.8	22.0	3.2%	12+66.35	975.98	975.60	975.69
OV-4	4.0	6.0	22.0	6.4%	1.2	2.8	22.0	3.2%	13+20.21	973.88	973.50	973.59
OV-5	4.0	6.0	22.0	6.4%	1.2	2.8	22.0	3.2%	13+54.08	972.58	972.20	972.29
OV-6	4.0	6.0	22.0	6.4%	1.2	2.8	22.0	3.2%	15+11.98	966.63	966.25	966.34
OV-7	4.0	6.0	22.0	6.4%	1.2	2.8	22.0	3.2%	15+68.20	964.58	964.20	964.29
OV-8	4.0	6.0	22.0	6.4%	1.2	2.8	22.0	3.2%	16+11.40	962.93	962.55	962.64
OV-9	4.0	6.0	22.0	6.4%	1.2	2.8	22.0	3.2%	16+58.66	961.18	960.80	960.89
OV-10	4.0	6.0	22.0	6.4%	1.2	2.8	22.0	3.2%	16+91.52	959.88	959.50	959.59
OV-11	4.0	6.0	22.0	6.4%	1.2	2.8	22.0	3.2%	17+61.95	957.28	956.90	956.99
OV-12	4.0	6.0	22.0	6.4%	1.2	2.8	22.0	3.2%	17+93.78	955.98	955.60	955.69
OV-13	4.0	6.0	22.0	6.4%	1.2	2.8	22.0	3.2%	18+44.05	954.13	953.75	953.84
OV-14	4.0	6.0	22.0	6.4%	1.2	0.0	22.0	3.2%	19+98.42	948.38	948.00	948.00
OV-15	4.0	6.0	22.0	6.4%	1.2	0.0	22.0	3.2%	20+35.35	946.98	946.60	946.60
OV-16	4.0	6.0	22.0	6.4%	1.2	0.0	22.0	3.2%	20+67.01	945.68	945.30	945.30
OV-17	4.0	6.0	22.0	6.4%	1.2	0.0	22.0	3.2%	21+01.55	944.38	944.00	944.00
OV-18	4.0	6.0	22.0	6.4%	1.2	0.0	22.0	3.2%	21+41.25	943.03	942.65	942.65
OV-19	4.0	6.0	22.0	6.4%	1.2	0.0	22.0	3.2%	21+73.94	941.68	941.30	941.30
OV-20	4.0	6.0	22.0	6.4%	1.2	0.0	22.0	3.2%	22+15.90	940.23	939.85	939.85
OV-21	4.0	6.0	22.0	6.4%	1.2	0.0	22.0	3.2%	22+59.23	938.63	938.25	938.25
OV-22	4.0	6.0	22.0	6.4%	1.2	0.0	22.0	3.2%	24+00.84	933.18	932.80	932.80

Offset Rock Cross Vane Structures - UT1a

Structure #	Sill Length (ft)	Outside Arm Length (ft)	Outside Arm Angle (deg)	Outside Arm Slope (%)	Invert Length (ft)	Inside Arm Length (ft)	Inside Arm Angle (deg)	Inside Arm Slope (%)	Station (ft) At Pt 2	Elevation (ft) Pt 1	Pt 2	Pt 3
OV-23	4.0	6.0	22.0	6.4%	1.2	2.8	22.0	3.2%	10+43.60	967.85	967.47	967.56
OV-24	4.0	6.0	22.0	6.4%	1.2	2.8	22.0	3.2%	11+19.06	965.38	965.00	965.09
OV-25	4.0	6.0	22.0	6.4%	1.2	2.8	22.0	3.2%	11+91.18	963.03	962.65	962.74
OV-26	4.0	6.0	22.0	6.4%	1.2	2.8	22.0	3.2%	12+41.94	961.33	960.95	961.04
OV-27	4.0	6.0	22.0	6.4%	1.2	2.8	22.0	3.2%	12+88.38	959.83	959.45	959.54
OV-28	4.0	6.0	22.0	6.4%	1.2	2.8	22.0	3.2%	13+40.13	958.13	957.75	957.84
OV-29	4.0	6.0	22.0	6.4%	1.2	2.8	22.0	3.2%	13+82.44	956.73	956.35	956.44
OV-30	4.0	6.0	22.0	6.4%	1.2	2.8	22.0	3.2%	14+91.05	953.13	952.75	952.84
OV-31	4.0	6.0	22.0	6.4%	1.2	2.8	22.0	3.2%	15+96.37	949.68	949.30	949.39
OV-32	4.0	6.0	22.0	6.4%	1.2	2.8	22.0	3.2%	16+46.75	948.03	947.65	947.74
OV-33	4.0	6.0	22.0	6.4%	1.2	2.8	22.0	3.2%	16+94.44	946.48	946.10	946.19
OV-34	4.0	6.0	22.0	6.4%	1.2	2.8	22.0	3.2%	17+89.19	943.38	943.00	943.09
OV-35	4.0	6.0	22.0	6.4%	1.2	2.8	22.0	3.2%	18+61.56	941.03	940.65	940.74
OV-36	4.0	6.0	22.0	6.4%	1.2	0.0	22.0	3.2%	18+89.37	940.08	939.70	939.70
OV-37	4.0	6.0	22.0	6.4%	1.2	0.0	22.0	3.2%	19+58.90	937.78	937.40	937.40

Offset Rock Cross Vane Structures - UT3

Structure #	Sill Length (ft)	Outside Arm Length (ft)	Outside Arm Angle (deg)	Outside Arm Slope (%)	Invert Length (ft)	Inside Arm Length (ft)	Inside Arm Angle (deg)	Inside Arm Slope (%)	Station (ft) At Pt 2	Elevation (ft) Pt 1	Pt 2	Pt 3
OV-38	4.0	7.0	22.0	6.2%	1.5	3.2	22.0	2.0%	10+32.52	860.16	859.72	859.78
OV-39	4.0	7.0	22.0	6.2%	1.5	3.2	22.0	2.0%	10+61.02	859.84	859.40	859.46
OV-40	4.0	7.0	22.0	6.2%	1.5	3.2	22.0	2.0%	11+27.98	859.04	858.60	858.66
OV-41	4.0	7.0	22.0	6.2%	1.5	3.2	22.0	2.0%	12+01.48	857.64	857.20	857.26
OV-42	4.0	7.0	22.0	6.2%	1.5	3.2	22.0	2.0%	12+25.52	856.69	856.25	856.31

REVISIONS

NO.	DESCRIPTION	ENGR.	APPROV	DATE
1	DRAFT MITIGATION PLAN	JB	KLT	12/16/22
2	FINAL MITIGATION PLAN	JB	KLT	2/21/23
3	ISSUED FOR BID	JB	KLT	7/20/23

PREPARED FOR:

NC Mitigation Services

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

BANDYS FARM
CATAWBA COUNTY, NC

PREPARED IN THE OFFICE OF:

EPR ECOSYSTEM PLANNING & RESTORATION

204 STONE RIDGE BLVD.
ASHEVILLE, NC 28804

PROJECT ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 039207 ENGINEER JACOB M. BYERS

7/20/23

7/31/2023
K:\PROJECTS\ASH0018_NCDMS_BANDYS_FARM\CADD\PLANS\BF_PSH_03.DGN
BYERS

STRUCTURE TABLES

TABLES

Grade Control Log J-Hook Structures - UT2

Structure #	Sill Length (ft)	Outside Arm Length (ft)	Outside Arm Angle (deg)	Outside Arm Slope (%)	Invert Length (ft)	Inside Arm Length (ft)	Inside Arm Angle (deg)	Inside Arm Slope (%)	Station (ft) At Pt 2	Elevation (ft) Pt 1	Elevation (ft) Pt 2	Elevation (ft) Pt 3
LJH-1	5.0	12.9	22.0	6.2%	2.2	6.0	22.0	3.1%	10+02.49	913.60	912.80	912.98
LJH-2	5.0	12.9	22.0	6.2%	2.2	6.0	22.0	3.1%	10+64.43	913.10	912.30	912.48
LJH-3	5.0	12.9	22.0	6.2%	2.2	6.0	22.0	3.1%	11+60.93	912.15	911.35	911.53
LJH-4	5.0	12.9	22.0	6.2%	2.2	6.0	22.0	3.1%	12+33.66	911.50	910.70	910.88
LJH-5	5.0	12.9	22.0	6.2%	2.2	6.0	22.0	3.1%	13+73.43	910.25	909.45	909.63
LJH-6	5.0	12.9	22.0	6.2%	2.2	6.0	22.0	3.1%	16+29.01	907.85	907.05	907.23
LJH-7	5.0	12.9	22.0	6.2%	2.2	6.0	22.0	3.1%	17+53.08	907.00	906.20	906.38
LJH-8	5.0	12.9	22.0	6.2%	2.2	6.0	22.0	3.1%	18+12.49	906.27	905.47	905.65
LJH-9	5.0	12.9	22.0	6.2%	2.2	6.0	22.0	3.1%	19+04.61	905.38	904.58	904.76
LJH-10	5.0	12.9	22.0	6.2%	2.2	6.0	22.0	3.1%	19+85.09	904.60	903.80	903.98
LJH-11	5.0	12.9	22.0	6.2%	2.2	6.0	22.0	3.1%	20+37.35	903.80	903.00	903.18
LJH-12	5.0	12.9	22.0	6.2%	2.2	6.0	22.0	3.1%	21+07.54	902.85	902.05	902.23
LJH-13	5.0	12.9	22.0	6.2%	2.2	6.0	22.0	3.1%	21+95.90	901.45	900.65	900.83
LJH-14	5.0	12.9	22.0	6.2%	2.2	6.0	22.0	3.1%	22+89.61	900.45	899.65	899.83
LJH-15	5.0	12.9	22.0	6.2%	2.2	6.0	22.0	3.1%	23+79.33	898.95	898.15	898.33
LJH-16	5.0	12.9	22.0	6.2%	2.2	6.0	22.0	3.1%	25+84.17	895.10	894.30	894.48
LJH-17	5.0	12.9	22.0	6.2%	2.2	6.0	22.0	3.1%	26+64.14	893.10	892.30	892.48
LJH-18	5.0	12.9	22.0	6.2%	2.2	6.0	22.0	3.1%	28+36.16	890.35	889.55	889.73
LJH-19	5.0	12.9	22.0	6.2%	2.2	6.0	22.0	3.1%	29+75.67	888.30	887.50	887.68
LJH-20	5.0	12.9	22.0	6.2%	2.2	6.0	22.0	3.1%	31+73.05	884.65	883.85	884.03
LJH-21	5.0	12.9	22.0	6.2%	2.2	6.0	22.0	3.1%	32+36.93	883.50	882.70	882.88
LJH-22	5.0	12.9	22.0	6.2%	2.2	6.0	22.0	3.1%	34+97.75	879.15	878.35	878.53
LJH-23	5.0	12.9	22.0	6.2%	2.2	6.0	22.0	3.1%	36+07.10	877.25	876.45	876.63
LJH-24	5.0	12.9	22.0	6.2%	2.2	6.0	22.0	3.1%	36+79.28	876.05	875.25	875.43
LJH-25	5.0	12.9	22.0	6.2%	2.2	6.0	22.0	3.1%	37+18.55	875.60	874.80	874.98
LJH-26	5.0	12.9	22.0	6.2%	2.2	6.0	22.0	3.1%	39+02.70	873.55	872.75	872.93
LJH-27	5.0	12.9	22.0	6.2%	2.2	6.0	22.0	3.1%	39+75.21	872.60	871.80	871.98
LJH-28	5.0	12.9	22.0	6.2%	2.2	6.0	22.0	3.1%	40+68.65	870.97	870.17	870.35
LJH-29	5.0	12.9	22.0	6.2%	2.2	6.0	22.0	3.1%	41+42.31	869.45	868.65	868.83
LJH-30	5.0	12.9	22.0	6.2%	2.2	6.0	22.0	3.1%	42+13.84	867.85	867.05	867.23
LJH-31	5.0	12.9	22.0	6.2%	2.2	6.0	22.0	3.1%	43+63.09	864.60	863.80	863.98
LJH-32	5.0	12.9	22.0	6.2%	2.2	6.0	22.0	3.1%	44+31.63	863.15	862.35	862.53

Log Rollers - UT1

Structure #	Top Riffle (Pt 1)		Log 1 (Pt 2)		Log 2 (Pt 3)		Log 3 (Pt 4)		Log 4 (Pt 5)	
	Sta. (ft)	Elev (ft.)	Sta. (ft)	Elev (ft.)	Sta. (ft)	Elev (ft.)	Sta. (ft)	Elev (ft.)	Sta. (ft)	Elev (ft.)
LR-1	22+89.36	937.27	22+98.08	936.80	23+22.59	935.85	23+46.42	934.95	23+68.77	934.13
LR-2	24+16.55	932.51	24+30.10	931.85	24+53.75	930.95				

*Top riffle material included in constructed riffle structure table.

Log Rollers - UT1a

Structure #	Top Riffle (Pt 1)		Log 1 (Pt 2)		Log 2 (Pt 3)	
	Sta. (ft)	Elev (ft.)	Sta. (ft)	Elev (ft.)	Sta. (ft)	Elev (ft.)
LR-3	20+10.71	935.87	20+19.50	935.45	20+39.73	934.80
LR-4	20+77.78	933.67	20+88.86	933.20	21+12.37	932.40

*Top riffle material included in constructed riffle structure table.

Log Rollers - UT2

Structure #	Top Riffle (Pt 1)		Log 1 (Pt 2)		Log 2 (Pt 3)		Log 3 (Pt 4)		Log 4 (Pt 5)	
	Sta. (ft)	Elev (ft.)	Sta. (ft)	Elev (ft.)	Sta. (ft)	Elev (ft.)	Sta. (ft)	Elev (ft.)	Sta. (ft)	Elev (ft.)
LR-5	10+85.72	912.19	10+99.35	912.00						
LR-6	14+05.34	909.24	14+18.48	909.05	14+52.18	908.72	14+96.38	908.35	15+25.21	908.05
LR-7	18+38.63	905.24	18+48.63	905.10	18+75.99	904.85				
LR-8	24+08.25	897.86	24+25.70	897.50	24+42.75	897.23	24+60.17	896.93		
LR-9	29+94.99	887.16	30+04.99	886.90	30+30.07	886.35	30+56.15	885.80		
LR-10	33+13.56	881.63	33+23.56	881.40	33+48.05	880.97	33+97.66	880.00		
LR-11	35+23.41	878.08	35+48.17	877.45						
LR-12	37+50.32	874.55	37+83.73	874.00						
LR-13	40+16.33	871.50	40+34.13	870.90						
LR-14	40+90.00	869.89	41+11.82	869.20						
LR-15	41+62.00	868.33	41+80.32	867.80						
LR-16	42+34.40	866.76	42+50.08	866.30	42+71.39	865.88	42+91.10	865.45		
LR-17	43+83.00	863.53	44+01.57	863.00						

*Top riffle material included in constructed riffle structure table.

Log Vane Structures - NFMC

Structure #	Arm Length (ft)	Arm Angle (deg)	Arm Slope (%)	Sill Length (ft)	Station (ft) At Pt 2	Elevation (ft) At Pt 1	Elevation (ft) Pt 2
LV-1	20.7	22.0	6.1%	5.0	18+03.00	860.59	859.33

Log Vane Structures - UT1

Structure #	Arm Length (ft)	Arm Angle (deg)	Arm Slope (%)	Sill Length (ft)	Station (ft) At Pt 2	Elevation (ft) At Pt 1	Elevation (ft) Pt 2
LV-2	6.0	22.0	6.3%	5.0	25+89.99	924.58	924.20
LV-3	6.0	22.0	6.3%	5.0	26+13.00	924.18	923.79

Log Vane Structures - UT2

Structure #	Arm Length (ft)	Arm Angle (deg)	Arm Slope (%)	Sill Length (ft)	Station (ft) At Pt 2	Elevation (ft) At Pt 1	Elevation (ft) Pt 2
LV-4	12.9	22.0	6.2%	5.0	22+38.13	900.48	899.68
LV-5	12.9	22.0	6.2%	5.0	40+02.67	871.93	871.13

REVISIONS

NO.	DESCRIPTION	ENGR.	APPROV	DATE
1	DRAFT MITIGATION PLAN	JB	KLT	12/16/22
2	FINAL MITIGATION PLAN	JB	KLT	2/21/23
3	ISSUED FOR BID	JB	KLT	7/20/23

PREPARED FOR:

Mitigation Services

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

BANDYS FARM
CATAWBA COUNTY, NC

PREPARED IN THE OFFICE OF:

ECOSYSTEM PLANNING & RESTORATION

204 STONE RIDGE BLVD.
ASHEVILLE, NC 28804

PROJECT ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 039201 ENGINEER JACOB M. BYERS

7/20/23

7/31/2023
X:\PROJECTS\ASH0018_NCDMS_BANDYS_FARM\CADD\PLANS\BF_PSH_03A.DGN
BYERS

STRUCTURE TABLES

PROJECT # ASH0018 | SHEET NO. 3B

TABLES

Rock Step Pools - UT1

Structure #	Station (ft) at Invert	Elevation (ft) at Invert
RSP-1	08+54.65	1013.28
RSP-2	08+66.15	1011.62
RSP-3	08+77.65	1009.95
RSP-4	08+89.15	1008.28
RSP-5	09+00.65	1006.61
RSP-6	09+12.15	1004.95
RSP-7	09+23.65	1003.28
RSP-8	09+35.15	1001.61
RSP-9	09+46.65	999.26
RSP-10	09+58.15	996.40
RSP-11	09+69.65	993.54
RSP-12	09+82.15	990.44
RSP-13	09+94.65	987.33

Rock Steps - UT1

Structure #	Station (ft) at Invert	Elevation (ft) at Invert
RS-1	10+10.38	985.50
RS-2	10+36.00	984.38
RS-3	10+55.28	983.70
RS-4	10+96.11	982.06
RS-5	11+20.74	981.00
RS-6	12+24.87	977.10
RS-7	12+48.70	976.25
RS-8	12+92.85	974.55
RS-9	13+92.13	970.80
RS-10	14+20.91	969.65
RS-11	15+46.91	964.95
RS-12	15+91.26	963.35
RS-13	16+37.24	961.60
RS-14	17+19.28	958.50
RS-15	18+22.49	954.60
RS-16	19+02.02	951.60
RS-17	19+27.26	950.65
RS-18	19+79.01	948.70
RS-19	20+18.44	947.25
RS-20	21+25.94	943.30
RS-21	21+98.33	940.55
RS-22	22+40.86	938.90
RS-23	22+80.73	937.45

Rock Steps - UT1a

Structure #	Station (ft) at Invert	Elevation (ft) at Invert
RS-24	09+08.01	978.64
RS-25	09+22.21	977.06
RS-26	09+36.41	975.57
RS-27	09+50.61	974.08
RS-28	09+64.81	972.59
RS-29	09+79.01	971.10
RS-30	09+93.21	969.61
RS-31	10+28.17	968.02
RS-32	10+70.38	966.55
RS-33	11+72.58	963.20
RS-34	12+20.53	961.60
RS-35	12+70.08	959.95
RS-36	14+12.85	955.30
RS-37	14+36.59	954.55
RS-38	15+18.27	951.90
RS-39	15+69.57	950.20
RS-40	16+73.22	946.80
RS-41	17+69.29	943.65
RS-42	18+08.94	942.40
RS-43	18+26.14	941.83
RS-44	19+31.23	938.35
RS-45	19+99.03	936.10
RS-46	21+38.16	931.55
RS-47	21+65.51	930.65
RS-48	21+87.71	929.95

Rock Steps - UT3

Structure #	Station (ft) at Invert	Elevation (ft) at Invert
RS-49	09+67.24	863.40
RS-50	09+84.07	861.70
RS-51	10+88.48	859.05
RS-52	11+07.62	858.85
RS-53	11+56.55	858.22
RS-54	11+81.00	857.90

Rock Steps - UT3a

Structure #	Station (ft) at Invert	Elevation (ft) at Invert
RS-55	10+82.53	861.20
RS-56	10+99.53	860.47
RS-57	10+88.48	859.05
RS-58	11+33.53	858.81
RS-59	11+50.53	857.99

Toe-Wood With Geolift - NFMC (Type 1)

Structure #	Toe Wood Dimensions						
	Stream Bank	Begin Station (ft)	End Station (ft)	STA Length (ft)	Bank Length (ft)	Width (ft)	Toe Wood Depth (ft)
TW-1	Right	12+05.30	12+95.71	90.4	94.1	5.0	4.4
TW-2	Left	13+05.52	13+78.87	73.3	75.1	5.0	4.4
TW-3	Left	18+90.74	20+24.56	133.8	132.3	5.0	4.4

Toe-Wood With Geolift - UT1 (Type 2)

Structure #	Toe Wood Dimensions						
	Stream Bank	Begin Station (ft)	End Station (ft)	STA Length (ft)	Bank Length (ft)	Width (ft)	Toe Wood Depth (ft)
TW-4	Right	11+95.70	12+09.31	13.6	15.4	5.0	2.7
TW-5	Right	12+65.71	12+79.03	13.3	16.5	5.0	2.7
TW-6	Right	13+51.93	13+66.26	14.3	17.8	5.0	2.7
TW-7	Right	15+10.14	15+27.33	17.2	21.2	5.0	2.7
TW-8	Left	16+56.64	16+71.38	14.7	17.5	5.0	2.7
TW-9	Right	17+91.57	18+07.74	16.2	20.2	5.0	2.7
TW-10	Right	19+00.76	19+13.73	13.0	15.8	5.0	2.7
TW-11	Right	19+96.18	20+11.74	15.6	17.0	5.0	2.7
TW-12	Right	20+59.33	20+83.84	24.5	29.3	5.0	2.7
TW-13	Right	22+14.08	22+28.75	14.7	17.8	5.0	2.7
TW-14	Right	22+96.67	23+09.11	12.4	15.0	5.0	2.7
TW-15	Left	23+21.00	23+33.25	12.3	12.2	5.0	2.7
TW-16	Right	23+43.57	23+53.86	10.3	8.7	5.0	2.7
TW-17	Left	23+48.26	23+58.07	9.8	11.5	5.0	2.7
TW-18	Right	23+66.89	23+80.04	13.2	13.3	5.0	2.7
TW-19	Right	24+27.94	24+38.00	10.1	9.9	5.0	2.7
TW-20	Left	24+51.50	24+67.51	16.0	18.3	5.0	2.7
TW-21	Left	24+92.64	25+15.13	22.5	25.4	5.0	2.7
TW-22	Right	25+86.91	26+23.74	36.8	41.8	5.0	2.7

Toe-Wood With Geolift - UT1a (Type 2)

Structure #	Toe Wood Dimensions						
	Stream Bank	Begin Station (ft)	End Station (ft)	STA Length (ft)	Bank Length (ft)	Width (ft)	Toe Wood Depth (ft)
TW-23	Left	11+85.83	12+03.91	18.1	20.3	5.0	2.7
TW-24	Right	16+44.03	16+69.74	25.7	29.8	5.0	2.7
TW-25	Right	17+83.85	17+99.98	16.1	20.6	5.0	2.7
TW-26	Right	19+26.86	19+39.75	12.9	16.1	5.0	2.7
TW-27	Right	19+95.48	20+07.51	12.0	15.3	5.0	2.7
TW-28	Left	20+17.90	20+28.73	10.8	10.8	5.0	2.7
TW-29	Right	20+36.79	20+48.22	11.4	8.3	5.0	2.7
TW-30	Left	20+86.97	20+96.50	9.5	9.6	5.0	2.7
TW-31	Left	21+09.31	21+25.78	16.5	21.8	5.0	2.7
TW-32	Right	21+10.59	21+20.36	9.8	7.0	5.0	2.7
TW-33	Left	21+65.02	21+81.32	16.3	19.6	5.0	2.7

Toe-Wood With Geolift - UT2 (Type 2)

Structure #	Toe Wood Dimensions						
	Stream Bank	Begin Station (ft)	End Station (ft)	STA Length (ft)	Bank Length (ft)	Width (ft)	Toe Wood Depth (ft)
TW-34	Right	10+00.31	10+31.24	30.9	35.1	5.0	3.4
TW-35	Right	11+00.68	11+29.77	29.1	35.7	5.0	3.4
TW-36	Right	12+25.15	12+63.30	38.1	47.9	5.0	3.4
TW-37	Left	14+13.12	14+26.77	13.7	12.5	5.0	3.4
TW-38	Right	14+49.45	14+61.52	12.1	9.6	5.0	3.4
TW-39	Left	14+53.00	14+86.38	33.4	39.8	5.0	3.4
TW-40	Right	14+92.00	15+02.18	10.2	10.1	5.0	3.4
TW-41	Left	15+21.37	15+34.17	12.8	10.4	5.0	3.4
TW-42	Right	15+26.79	15+57.92	31.1	37.6	5.0	3.4
TW-43	Left	16+20.98	16+51.31	30.3	34.7	5.0	3.4
TW-44	Left	17+50.43	17+73.42	23.0	28.1	5.0	3.4
TW-45	Right	18+01.14	18+50.22	49.1	60.5	5.0	3.4
TW-46	Left	18+44.51	18+55.21	10.7	9.7	5.0	3.4
TW-47	Right	18+72.35	18+80.83	8.5	8.7	5.0	3.4
TW-48	Left	20+35.85	20+75.08	39.2	47.5	5.0	3.4
TW-49	Right	21+91.01	22+61.47	70.5	88.7	5.0	3.4
TW-50	Left	23+76.23	24+07.48	31.3	39.2	5.0	3.4
TW-51	Left	24+21.91	24+33.34	11.4	8.5	5.0	3.4
TW-52	Right	24+27.32	24+61.33	34.0	37.7	5.0	3.4
TW-53	Left	24+58.70	24+74.98	16.3	19.2	5.0	3.4
TW-54	Right	24+89.37	25+12.63	23.3	23.4	5.0	3.4
TW-55	Left	24+89.77	25+12.79	23.0	22.9	5.0	3.4
TW-56	Left	25+76.54	26+05.36	28.8	34.0	5.0	3.4
TW-57	Right	26+56.51	26+81.36	24.8	30.5	5.0	3.4
TW-58	Left	27+26.95	27+45.95	19.0	20.7	5.0	3.4
TW-59	Left	27+76.14	27+99.80	23.7	27.0	5.0	3.4
TW-60	Left	29+72.30	30+11.63	39.3	42.8	5.0	3.4
TW-61	Right	30+26.02	30+38.43	12.4	12.5	5.0	3.4
TW-62	Left	30+51.96	30+63.46	11.5	10.5	5.0	3.4
TW-63	Right	30+58.53	31+12.69	54.2	63.6	5.0	3.4
TW-64	Left	31+70.66	31+97.11	26.5	30.8	5.0	3.4
TW-65	Left	32+90.71	33+22.75	32.0	40.6	5.0	3.4
TW-66	Right	33+19.36	33+32.36	13.0	12.5	5.0	3.4
TW-67	Left	33+43.62	33+56.84	13.2	9.9	5.0	3.4
TW-68	Right	33+49.62	33+74.83	25.2	32.2	5.0	3.4
TW-69	Left	33+92.86	34+04.90	12.0	8.5	5.0	3.4
TW-70	Left	33+98.60	34+28.66	30.1	39.6	5.0	3.4
TW-71	Left	35+43.15	35+58.80	15.7	11.6	5.0	3.4
TW-72	Right	35+45.64	35+77.74	32.1	42.8	5.0	3.4
TW-73	Left	36+03.57	36+50.05	46.5	56.7	5.0	3.4
TW-74	Right	37+85.61	38+19.65	34.0	43.2	5.0	3.4
TW-75	Left	39+71.61	40+32.89	61.3	72.8	5.0	3.4
TW-76	Right	40+30.49	40+44.84	14.4	15.1	5.0	3.4
TW-77	Right	40+55.67	40+98.99	43.3	50.8	5.0	3.4
TW-78	Left	41+08.35	41+25.43	17.1	18.5	5.0	3.4
TW-79	Left	41+39.49	41+67.11	27.6	33.9	5.0	3.4
TW-80	Right	41+75.75	41+90.11	14.4	15.2	5.0	3.4
TW-81	Right	42+10.44	42+58.84	48.4	57.1	5.0	3.4
TW-82	Left	42+67.66	42+79.58	11.9	13.0	5.0	3.4
TW-83	Right	42+86.33	43+00.20	13.9	13.7	5.0	3.4
TW-84	Left	42+89.52	43+17.77	28.3	34.5	5.0	3.4
TW-85	Right	43+58.52	43+89.40	30.9	36.1	5.0	3.4
TW-86	Left	43+98.68	44+13.96	15.3	17.0	5.0	3.4

REVISIONS

NO.	DESCRIPTION	ENGR.	APPROV	DATE
1	DRAFT MITIGATION PLAN	JB	KLT	12/16/22
2	FINAL MITIGATION PLAN	JB	KLT	2/21/23
3	ISSUED FOR BID	JB	KLT	7/20/23

PREPARED FOR:

NC Mitigation Services

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

BANDYS FARM
CATAWBA COUNTY, NC

PREPARED IN THE OFFICE OF:

EPR ECOSYSTEM PLANNING & RESTORATION

204 STONE RIDGE BLVD.
ASHEVILLE, NC 28804

PROJECT ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 039201 ENGINEER JACOB M. BYERS

7/20/23

7/31/2023 X:\PROJECTS\ASH0018_NCDMS_BANDYS_FARM\CADD\PLANS\BF_PSH_03B.DGN BYERS

STRUCTURE TABLES

PROJECT # ASH0018 | SHEET NO. 3C

TABLES

Constructed Riffle Structures - UT1

Structure #	Point 1 Station	Point 1 Elevation	Point 2 Station	Point 2 Elevation	Bottom Width	Length	Slope
CR-1	10+00.00	986.00	10+10.38	985.50	3.5	10.4	4.82%
CR-2	10+20.16	985.19	10+36.00	984.38	3.5	15.8	5.14%
CR-3	10+45.93	984.16	10+55.28	983.70	3.5	9.3	4.95%
CR-4	10+63.25	983.47	10+72.23	983.00	3.5	9.0	5.23%
CR-5	10+82.61	982.70	10+96.11	982.06	3.5	13.5	4.71%
CR-6	11+05.38	981.80	11+20.74	981.00	3.5	15.4	5.19%
CR-7	11+33.54	980.74	11+47.52	980.00	3.5	14.0	5.26%
CR-8	11+61.16	979.69	11+73.01	979.05	3.5	11.8	5.43%
CR-9	11+85.27	978.78	11+98.45	978.10	3.5	13.2	5.19%
CR-10	12+10.72	977.82	12+24.87	977.10	3.5	14.1	5.12%
CR-11	12+38.43	976.78	12+48.70	976.25	3.5	10.3	5.15%
CR-12	12+56.80	976.09	12+66.35	975.60	3.5	9.5	5.10%
CR-13	12+76.94	975.33	12+92.85	974.55	3.5	15.9	4.88%
CR-14	13+03.73	974.32	13+20.21	973.50	3.5	16.5	4.96%
CR-15	13+32.95	973.21	13+54.08	972.20	3.5	21.1	4.80%
CR-16	13+66.95	971.93	13+92.13	970.80	3.5	25.2	4.50%
CR-17	14+04.25	970.53	14+20.91	969.65	3.5	16.7	5.26%
CR-18	14+34.13	969.40	14+54.68	968.40	3.5	20.6	4.86%
CR-19	14+68.54	968.10	14+86.61	967.20	3.5	18.1	4.99%
CR-20	15+00.52	966.90	15+11.98	966.25	3.5	11.5	5.63%
CR-21	15+27.80	965.97	15+46.91	964.95	3.5	19.1	5.32%
CR-22	15+55.69	964.81	15+68.20	964.20	3.5	12.5	4.91%
CR-23	15+80.25	963.89	15+91.26	963.35	3.5	11.0	4.89%
CR-24	16+00.05	963.14	16+11.40	962.55	3.5	11.4	5.21%
CR-25	16+23.93	962.24	16+37.24	961.60	3.5	13.3	4.82%
CR-26	16+47.41	961.36	16+58.66	960.80	3.5	11.3	4.94%
CR-27	16+70.76	960.47	16+91.52	959.50	3.5	20.8	4.70%
CR-28	17+05.45	959.17	17+19.28	958.50	3.5	13.8	4.82%
CR-29	17+27.39	958.34	17+36.87	957.85	3.5	9.5	5.16%
CR-30	17+47.21	957.59	17+61.95	956.90	3.5	14.7	4.69%
CR-31	17+73.62	956.60	17+93.78	955.60	3.5	20.2	4.94%
CR-32	18+08.32	955.29	18+22.49	954.60	3.5	14.2	4.85%
CR-33	18+31.04	954.43	18+44.05	953.75	3.5	13.0	5.23%
CR-34	18+56.08	953.49	18+75.34	952.60	3.5	19.3	4.60%
CR-35	18+87.91	952.29	19+02.02	951.60	3.5	14.1	4.86%
CR-36	19+13.27	951.33	19+27.26	950.65	3.5	14.0	4.86%
CR-37	19+38.53	950.38	19+50.91	949.75	3.5	12.4	5.11%
CR-38	19+65.44	949.43	19+79.01	948.70	3.5	13.6	5.35%
CR-39	19+86.85	948.58	19+98.42	948.00	3.5	11.6	4.98%
CR-40	20+09.28	947.74	20+18.44	947.25	3.5	9.2	5.32%
CR-41	20+25.97	947.11	20+35.35	946.60	3.5	9.4	5.48%
CR-42	20+48.17	946.28	20+67.01	945.30	3.5	18.8	5.22%
CR-43	20+83.37	944.97	21+01.55	944.00	3.5	18.2	5.33%
CR-44	21+16.08	943.75	21+25.94	943.30	3.5	9.9	4.52%
CR-45	21+33.07	943.11	21+41.25	942.65	3.5	8.2	5.63%
CR-46	21+53.37	942.35	21+73.94	941.30	3.5	20.6	5.11%
CR-47	21+87.85	941.06	21+98.33	940.55	3.5	10.5	4.90%
CR-48	22+05.39	940.41	22+15.90	939.85	3.5	10.5	5.30%
CR-49	22+26.12	939.63	22+40.86	938.90	3.5	14.7	4.97%
CR-50	22+49.02	938.78	22+59.23	938.25	3.5	10.2	5.16%
CR-51	22+70.13	937.99	22+80.73	937.45	3.5	10.6	5.07%
CR-52	22+89.36	937.27	22+98.08	936.80	3.5	8.7	5.38%
CR-53	23+09.02	936.53	23+22.59	935.85	3.5	13.6	5.04%
CR-54	23+33.22	935.63	23+46.42	934.95	3.5	13.2	5.15%

Constructed Riffle Structures - UT1 (continued)

Structure #	Point 1 Station	Point 1 Elevation	Point 2 Station	Point 2 Elevation	Bottom Width	Length	Slope
CR-55	23+57.45	934.72	23+68.77	934.13	3.5	11.3	5.25%
CR-56	23+80.20	933.87	24+00.84	932.80	3.5	20.6	5.20%
CR-57	24+16.55	932.51	24+30.10	931.85	3.5	13.5	4.91%
CR-58	24+40.83	931.61	24+53.75	930.95	3.5	12.9	5.09%
CR-59	24+65.55	930.68	24+79.74	929.95	3.5	14.2	5.17%
CR-60	24+92.96	929.66	25+11.19	928.80	3.5	18.2	4.71%
CR-61	25+22.33	928.56	25+32.65	928.08	3.5	10.3	4.65%
CR-62	25+74.00	924.52	25+89.99	924.20	3.5	16.0	2.00%
CR-63	26+27.81	923.95	26+51.23	923.45	3.5	23.4	2.12%
CR-64	26+64.94	923.34	26+88.94	923.02	3.5	24.0	1.35%

Constructed Riffle Structures - UT1a

Structure #	Point 1 Station	Point 1 Elevation	Point 2 Station	Point 2 Elevation	Bottom Width	Length	Slope
CR-65	10+00.00	969.00	10+08.77	968.60	2.5	8.8	4.56%
CR-66	10+19.55	968.36	10+28.17	968.02	2.5	8.6	3.94%
CR-67	10+36.48	967.80	10+43.60	967.47	2.5	7.1	4.69%
CR-68	10+54.99	967.20	10+70.38	966.55	2.5	15.4	4.21%
CR-69	10+81.74	966.32	10+93.98	965.80	2.5	12.2	4.25%
CR-70	11+06.33	965.51	11+19.06	965.00	2.5	12.7	4.04%
CR-71	11+30.85	964.71	11+45.52	964.10	2.5	14.7	4.17%
CR-72	11+56.73	963.86	11+72.58	963.20	2.5	15.8	4.18%
CR-73	11+82.79	963.01	11+91.18	962.65	2.5	8.4	4.27%
CR-74	12+02.96	962.35	12+20.53	961.60	2.5	17.6	4.25%
CR-75	12+30.95	961.43	12+41.94	960.95	2.5	11.0	4.37%
CR-76	12+54.67	960.65	12+70.08	959.95	2.5	15.4	4.56%
CR-77	12+78.30	959.88	12+88.38	959.45	2.5	10.1	4.25%
CR-78	13+01.25	959.13	13+15.37	958.55	2.5	14.1	4.08%
CR-79	13+27.01	958.28	13+40.13	957.75	2.5	13.1	4.05%
CR-80	13+52.57	957.44	13+62.25	957.00	2.5	9.7	4.58%
CR-81	13+71.81	956.81	13+82.44	956.35	2.5	10.6	4.36%
CR-82	13+94.87	956.06	14+12.85	955.30	2.5	18.0	4.21%
CR-83	14+23.64	955.11	14+36.59	954.55	2.5	12.9	4.36%
CR-84	14+48.86	954.29	14+61.68	953.70	2.5	12.8	4.58%
CR-85	14+74.90	953.43	14+91.05	952.75	2.5	16.1	4.24%
CR-86	15+05.61	952.43	15+18.27	951.90	2.5	12.7	4.17%
CR-87	15+30.29	951.62	15+41.79	951.10	2.5	11.5	4.51%
CR-88	15+54.71	950.82	15+69.57	950.20	2.5	14.9	4.16%
CR-89	15+79.76	950.00	15+96.37	949.30	2.5	16.6	4.20%
CR-90	16+10.77	948.98	16+20.72	948.55	2.5	10.0	4.33%
CR-91	16+31.73	948.29	16+46.75	947.65	2.5	15.0	4.28%
CR-92	16+61.55	947.32	16+73.22	946.80	2.5	11.7	4.42%
CR-93	16+82.61	946.63	16+94.44	946.10	2.5	11.8	4.44%
CR-94	17+08.00	945.79	17+23.04	945.15	2.5	15.0	4.28%
CR-95	17+32.90	944.98	17+47.09	944.40	2.5	14.2	4.07%
CR-96	17+58.00	944.15	17+69.29	943.65	2.5	11.3	4.47%
CR-97	17+77.18	943.53	17+89.19	943.00	2.5	12.0	4.38%
CR-98	17+99.63	942.79	18+08.94	942.40	2.5	9.3	4.19%
CR-99	18+17.52	942.20	18+26.14	941.83	2.5	8.6	4.34%
CR-100	18+36.54	941.58	18+46.46	941.15	2.5	9.9	4.34%
CR-101	18+53.24	941.03	18+61.56	940.65	2.5	8.3	4.60%
CR-102	18+74.30	940.34	18+89.37	939.70	2.5	15.1	4.26%
CR-103	19+03.63	939.38	19+12.76	938.95	2.5	9.1	4.72%
CR-104	19+20.12	938.84	19+31.23	938.35	2.5	11.1	4.42%

Constructed Riffle Structures - UT1a (continued)

Structure #	Point 1 Station	Point 1 Elevation	Point 2 Station	Point 2 Elevation	Bottom Width	Length	Slope
CR-105	19+41.65	938.14	19+58.90	937.40	2.5	17.3	4.26%
CR-106	19+69.44	937.22	19+78.26	936.85	2.5	8.8	4.24%
CR-107	19+87.40	936.64	19+99.03	936.10	2.5	11.6	4.61%
CR-108	20+10.71	935.87	20+19.50	935.45	2.5	8.8	4.80%
CR-109	20+30.36	935.23	20+39.73	934.80	2.5	9.4	4.56%
CR-110	20+51.96	934.52	20+64.99	933.95	2.5	13.0	4.37%
CR-111	20+77.78	933.67	20+88.86	933.20	2.5	11.1	4.27%
CR-112	20+99.25	932.97	21+12.37	932.40	2.5	13.1	4.34%
CR-113	21+24.73	932.13	21+38.16	931.55	2.5	13.4	4.35%
CR-114	21+49.89	931.31	21+65.51	930.65	2.5	15.6	4.22%
CR-115	21+78.49	930.37	21+87.71	929.95	2.5	9.2	4.58%
CR-116	21+99.94	929.67	22+11.29	929.30	2.5	11.3	3.28%

Constructed Riffle Structures - UT2

Structure #	Point 1 Station	Point 1 Elevation	Point 2 Station	Point 2 Elevation	Bottom Width	Length	Slope
CR-117	09+55.00	913.40	10+02.49	912.80	6.5	47.5	1.26%
CR-118	10+29.72	912.71	10+64.43	912.30	6.5	34.7	1.18%
CR-119	10+85.72	912.19	10+99.35	912.00	6.5	13.6	1.42%
CR-120	11+27.29	911.81	11+60.93	911.35	6.5	33.6	1.36%
CR-121	11+96.35	911.17	12+33.66	910.70	6.5	37.3	1.26%
CR-122	13+33.75	910.00	13+73.43	909.45	6.5	39.7	1.39%
CR-123	14+05.34	909.24	14+18.48	909.05	6.5	13.1	1.46%
CR-124	14+33.83	908.98	14+52.18	908.72	6.5	18.4	1.41%
CR-125	14+85.73	908.50	14+96.38	908.35	6.5	10.7	1.40%
CR-126	15+11.23	908.26	15+25.21	908.05	6.5	14.0	1.53%
CR-127	15+57.36	907.84	15+76.47	907.55	6.5	19.1	1.50%
CR-128	16+01.48	907.43	16+29.01	907.05	6.5	27.5	1.38%
CR-129	16+54.01	906.95	16+70.20	906.78	6.5	16.2	1.02%
CR-130	17+22.83	906.60	17+53.08	906.20	6.5	30.3	1.32%
CR-131	17+84.31	905.88	18+12.49	905.47	6.5	28.2	1.46%
CR-132	18+38.63	905.24	18+48.63	905.10	6.5	10.0	1.40%
CR-133	18+65.99	904.99	18+75.99	904.85	6.5	10.0	1.38%
CR-134	18+91.92	904.75	19+04.61	904.58	6.5	12.7	1.32%
CR-135	19+42.68	904.38	19+85.09	903.80	6.5	42.4	1.37%
CR-136	20+08.94	903.62	20+37.35	903.00	6.5	28.4	2.19%
CR-137	20+74.94	902.77	21+07.54	902.05	6.5	32.6	2.22%
CR-138	21+71.93	901.18	21+95.90	900.65	6.5	24.0	2.20%
CR-139	22+55.61	900.31	22+89.61	899.65	6.5	34.0	1.93%
CR-140	23+52.74	898.68	23+79.33	898.15	6.5	26.6	1.99%
CR-141	24+08.25	897.86	24+25.70	897.50	6.5	17.4	2.07%
CR-142	24+34.75	897.41	24+42.75	897.23	6.5	8.0	2.30%
CR-143	24+52.17	897.12	24+60.17	896.93	6.5	8.0	2.38%
CR-144	24+74.58	896.74	24+91.44	896.30	6.5	16.9	2.63%
CR-145	25+12.54	895.97	25+30.96	895.40	6.5	18.4	3.08%
CR-146	25+59.57	895.05	25+84.17	894.30	6.5	24.6	3.06%
CR-147	26+04.03	894.04	26+21.48	893.50	6.5	17.4	3.11%
CR-148	26+47.10	893.16	26+64.14	892.30	6.5	17.0	5.04%
CR-149	26+81.45	891.91	26+97.34	891.10	6.5	15.9	5.11%
CR-150	27+18.00	890.73	27+27.00	890.29	6.5	9.0	4.89%
CR-151	27+88.00	890.30	27+98.00	890.20	6.5	10.0	0.99%

REVISIONS

NO.	DESCRIPTION	ENGR.	APPROV	DATE
1	DRAFT MITIGATION PLAN	JB	KLT	12/16/22
2	FINAL MITIGATION PLAN	JB	KLT	2/21/23
3	ISSUED FOR BID	JB	KLT	7/20/23

PREPARED FOR:

Mitigation Services
NC DEPARTMENT OF ENVIRONMENTAL QUALITY
DIVISION OF MITIGATION SERVICES
1652 MAIL SERVICE CENTER
RALEIGH, NC 27699-1652

BANDYS FARM
CATAWBA COUNTY, NC

PREPARED IN THE OFFICE OF:
ECOSYSTEM PLANNING & RESTORATION
204 STONE RIDGE BLVD.
ASHEVILLE, NC 28804

PROJECT ENGINEER
NORTH CAROLINA PROFESSIONAL SEAL 039201 ENGINEER JACOB M. BYERS
7/20/23

7/31/2023
K:\PROJECTS\ASH0018_NCDMS_BANDYS_FARM\CADD\PLANS\BF_PSH_03C.DGN
BYERS

STRUCTURE TABLES

PROJECT # ASH0018

SHEET NO. 3D

TABLES

Constructed Riffle Structures - UT2 (continued)

Structure #	Point 1		Point 2		Bottom Width	Length	Slope
	Station	Elevation	Station	Elevation			
CR-152	28+20.53	889.95	28+36.16	889.55	6.5	15.6	2.58%
CR-153	28+58.72	889.21	28+75.95	888.75	6.5	17.2	2.66%
CR-154	29+01.71	888.43	29+42.31	887.75	6.5	40.6	1.68%
CR-155	29+67.80	887.72	29+75.67	887.50	6.5	7.9	2.75%
CR-156	29+94.99	887.16	30+04.99	886.90	6.5	10.0	2.57%
CR-157	30+20.07	886.58	30+30.07	886.35	6.5	10.0	2.33%
CR-158	30+46.15	886.04	30+56.15	885.80	6.5	10.0	2.43%
CR-159	30+90.72	885.49	31+28.37	884.60	6.5	37.7	2.36%
CR-160	31+51.83	884.36	31+73.05	883.85	6.5	21.2	2.39%
CR-161	32+00.00	883.54	32+36.93	882.70	6.5	36.9	2.29%
CR-162	33+13.56	881.63	33+23.56	881.40	6.5	10.0	2.27%
CR-163	33+38.05	881.21	33+48.05	880.97	6.5	10.0	2.43%
CR-164	33+70.56	880.66	33+97.66	880.00	6.5	27.1	2.45%
CR-165	34+75.48	878.89	34+97.75	878.35	6.5	22.3	2.43%
CR-166	35+23.41	878.08	35+48.17	877.45	6.5	24.8	2.55%
CR-167	35+74.33	877.22	36+07.10	876.45	6.5	32.8	2.36%
CR-168	36+44.16	876.14	36+79.28	875.25	6.5	35.1	2.54%
CR-169	37+00.72	875.09	37+18.55	874.80	6.5	17.8	1.64%
CR-170	37+50.32	874.55	37+83.73	874.00	6.5	33.4	1.66%
CR-171	38+71.35	873.24	39+02.70	872.75	6.5	31.3	1.57%
CR-172	39+40.43	872.40	39+75.21	871.80	6.5	34.8	1.71%
CR-173	40+16.33	871.50	40+34.13	870.90	6.5	17.8	3.34%
CR-174	40+47.86	870.81	40+68.65	870.17	6.5	20.8	3.08%
CR-175	40+90.00	869.89	41+11.82	869.20	6.5	21.8	3.18%
CR-176	41+28.24	869.06	41+42.31	868.65	6.5	14.1	2.94%
CR-177	41+62.00	868.33	41+80.32	867.80	6.5	18.3	2.90%
CR-178	41+93.07	867.66	42+13.84	867.05	6.5	20.8	2.92%
CR-179	42+34.40	866.76	42+50.08	866.30	6.5	15.7	2.92%
CR-180	42+61.39	866.17	42+71.39	865.88	6.5	10.0	2.91%
CR-181	42+81.10	865.74	42+91.10	865.45	6.5	10.0	2.93%
CR-182	43+10.00	865.12	43+28.75	864.55	6.5	18.8	3.02%
CR-183	43+47.50	864.30	43+63.09	863.80	6.5	15.6	3.21%
CR-184	43+83.00	863.53	44+01.57	863.00	6.5	18.6	2.85%
CR-185	44+16.14	862.81	44+31.63	862.35	6.5	15.5	2.97%
CR-186	44+48.00	862.12	44+65.17	861.65	6.5	17.2	2.72%
CR-187	44+82.47	861.37	45+01.40	860.96	6.5	18.9	2.17%

Constructed Riffle Structures - UT3

Structure #	Point 1		Point 2		Bottom Width	Length	Slope
	Station	Elevation	Station	Elevation			
CR-188	10+15.23	860.01	10+32.52	859.72	4.3	17.3	1.71%
CR-189	10+45.62	859.65	10+61.02	859.40	4.3	15.4	1.59%
CR-190	10+76.07	859.28	10+88.48	859.05	4.3	12.4	1.82%
CR-191	10+98.28	859.01	11+07.62	858.85	4.3	9.3	1.66%
CR-192	11+17.47	858.77	11+27.98	858.60	4.3	10.5	1.64%
CR-193	11+42.70	858.47	11+56.55	858.22	4.3	13.8	1.77%
CR-194	11+69.85	858.14	11+81.00	857.90	4.3	11.2	2.11%
CR-195	11+91.06	857.65	12+01.48	857.20	4.3	10.4	4.28%
CR-196	12+14.53	856.82	12+25.52	856.25	4.3	11.0	5.19%
CR-197	12+42.23	855.85	12+54.32	855.30	4.3	12.1	4.52%

Constructed Riffle Structures - UT3a

Structure #	Point 1		Point 2		Bottom Width	Length	Slope
	Station	Elevation	Station	Elevation			
CR-198	10+16.00	861.34	10+40.22	861.34	1.8	24.2	0.00%
CR-199	10+62.05	861.27	10+82.53	861.20	1.8	20.5	0.34%
CR-200	10+89.53	860.96	10+99.53	860.47	1.8	10.0	4.87%
CR-201	11+06.53	860.13	11+16.53	859.64	1.8	10.0	4.87%
CR-202	11+23.53	859.30	11+33.53	858.81	1.8	10.0	4.87%
CR-203	11+40.53	858.47	11+50.53	857.99	1.8	10.0	4.87%
CR-204	11+57.53	857.64	11+66.64	857.20	1.8	9.1	4.87%

Constructed Cascade Structures - UT1

Structure #	Point 1		Point 2		Bottom Width	Length	Slope
	Station	Elevation	Station	Elevation			
CC-1	08+48.65	1014.15	08+54.65	1013.28	3.5	6.0	14.50%
CC-2	08+60.15	1012.48	08+66.15	1011.62	3.5	6.0	14.50%
CC-3	08+71.65	1010.82	08+77.65	1009.95	3.5	6.0	14.50%
CC-4	08+83.15	1009.15	08+89.15	1008.28	3.5	6.0	14.50%
CC-5	08+94.65	1007.48	09+00.65	1006.61	3.5	6.0	14.50%
CC-6	09+06.15	1005.82	09+12.15	1004.95	3.5	6.0	14.50%
CC-7	09+17.65	1004.15	09+23.65	1003.28	3.5	6.0	14.50%
CC-8	09+29.15	1002.48	09+35.15	1001.61	3.5	6.0	14.50%
CC-9	09+40.65	1000.75	09+46.65	999.26	3.5	6.0	24.85%
CC-10	09+52.15	997.89	09+58.15	996.40	3.5	6.0	24.85%
CC-11	09+63.65	995.03	09+69.65	993.54	3.5	6.0	24.85%
CC-12	09+75.15	992.18	09+82.15	990.44	3.5	7.0	24.85%
CC-13	09+87.65	989.07	09+94.65	987.33	3.5	7.0	24.85%

Constructed Cascade Structures - UT1a

Structure #	Point 1		Point 2		Bottom Width	Length	Slope
	Station	Elevation	Station	Elevation			
CC-14	09+00.01	979.48	09+08.01	978.64	2.5	8.0	10.48%
CC-15	09+14.21	977.99	09+22.21	977.06	2.5	8.0	11.73%
CC-16	09+28.41	976.51	09+36.41	975.57	2.5	8.0	11.73%
CC-17	09+42.61	975.02	09+50.61	974.08	2.5	8.0	11.73%
CC-18	09+56.81	973.53	09+64.81	972.59	2.5	8.0	11.73%
CC-19	09+71.01	972.04	09+79.01	971.10	2.5	8.0	11.73%
CC-20	09+85.21	970.55	09+93.21	969.61	2.5	8.0	11.73%

Constructed Cascade Structures - UT3

Structure #	Point 1		Point 2		Bottom Width	Length	Slope
	Station	Elevation	Station	Elevation			
CC-21	09+45.65	865.87	09+50.16	865.20	4.3	4.5	14.83%
CC-22	09+56.90	864.70	09+67.24	863.40	4.3	10.3	12.53%
CC-23	09+73.80	862.93	09+84.07	861.70	4.3	10.3	12.00%
CC-24	09+90.00	861.24	10+00.00	860.10	4.3	10.0	11.43%

Woody Riffle Structures - UT2

Structure #	Point 1		Point 2		Bottom Width	Length	Slope
	Station	Elevation	Station	Elevation			
WR-1	12+62.49	910.56	12+93.74	910.10	6.5	31.3	1.47%
WR-2	21+31.43	901.86	21+49.59	901.45	6.5	18.2	2.26%
WR-3	23+16.12	899.34	23+34.86	898.90	6.5	18.7	2.33%
WR-4	32+64.87	882.45	32+90.64	881.85	6.5	25.8	2.32%
WR-5	34+24.23	879.76	34+53.45	879.05	6.5	29.2	2.42%
WR-6	38+18.13	873.82	38+49.40	873.30	6.5	31.3	1.66%

REVISIONS

NO.	DESCRIPTION	ENGR.	APPROV	DATE
1	DRAFT MITIGATION PLAN	JB	KLT	12/16/22
2	FINAL MITIGATION PLAN	JB	KLT	2/21/23
3	ISSUED FOR BID	JB	KLT	7/20/23

PREPARED FOR:

Mitigation Services

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

BANDYS FARM
CATAWBA COUNTY, NC

PREPARED IN THE OFFICE OF:

ECOSYSTEM PLANNING & RESTORATION

204 STONE RIDGE BLVD.
ASHEVILLE, NC 28804

PROJECT ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 039207 ENGINEER JACOB M. BYERS

7/20/23

7/31/2023 X:\PROJECTS\ASH0018_NCDMS_BANDYS_FARM\CADD\PLANS\BF_PSH_03D.DGN BYERS

VEGETATION SELECTION

PROJECT # ASH0018 | SHEET NO. 3E

TABLES

Zone 1 - General Riparian Planting Zone			
The following table lists bare-root vegetation selection for the project site. Species shall be planted at a total density of 647 stems per acre. Total planting area is approximately 10.1 acres. Exact placement of species will be determined prior to site planting.			
Common Name	**Scientific Name**	**Percent Planted by Species**	**Wetness Tolerance**
Trees (85%) Planted 8' X 8' Spacing – 550 Stems/ Acre			
River Birch	*Betula nigra*	15%	FACW
Sycamore	*Platanus occidentalis*	15%	FACW
Tulip Poplar	*Liriodendron tulipifera*	10%	FACU
Willow Oak	*Quercus phellos*	10%	FAC
Sugarberry	*Celtis laevigata*	10%	FACW
White Oak	*Quercus alba*	5%	FACU
Box elder	*Acer negundo*	5%	FAC
Green Ash	*Fraxinus pennsylvanica*	5%	FACW
Persimmon	*Diospyros virginiana*	5%	FAC
American Elm	*Ulmus americana*	5%	FACW
	Tree Total	85%	
Understory/Shrubs (15%) Planted 8' X 8' Spacing - 97 Stems/ Acre			
Ironwood	*Carpinus caroliniana*	5%	FAC
Spicebush	*Lindera benzoin*	2.5%	FAC
Pawpaw	*Asimina triloba*	2.5%	FAC
Umbrella Tree	*Magnolia tripetala*	2.5%	FACU
Carolina Silverbell	*Halesia carolina*	2.5%	FAC
	Shrub Total	15%	

Zone 2 - Wetland Planting Zone			
The following table lists bare-root vegetation selection for the project site. Species shall be planted at a total density of 647 stems per acre. Total planting area is approximately 3.8 acres. Exact placement of species will be determined prior to site planting.			
Common Name	**Scientific Name**	**Percent Planted by Species**	**Wetness Tolerance**
Trees (85%) Planted 8' X 8' Spacing – 550 Stems/ Acre			
River Birch	*Betula nigra*	15%	FACW
Sycamore	*Platanus occidentalis*	15%	FACW
Swamp Chestnut Oak	*Quercus michauxii*	15%	FACW
Cherrybark Oak	*Quercus pagoda*	10%	FACW
Overcup Oak	*Quercus lyrata*	10%	OBL
Blackgum	*Nyssa sylvatica*	10%	FAC
Green Ash	*Fraxinus pennsylvanica*	5%	FACW
American Elm	*Ulmus americana*	5%	FACW
	Tree Total	85%	
Understory/Shrubs (15%) Planted 8' X 8' Spacing - 97 Stems/ Acre			
Tag Alder	*Alnus serrulata*	5%	OBL
Winterberry	*Ilex verticillata*	2.5%	FACW
Buttonbush	*Cephalanthus occidentalis*	2.5%	OBL
Silky Dogwood	*Cornus amomum*	2.5%	FACW
Red Chokeberry	*Aronia arbutifolia*	2.5%	FACW
	Shrub Total	15%	

Zone 2 - Wetland Planting Zone for W-C and Adjacent Area (approx. 4.0 acres)			
Understory/Shrubs (100%) Planted 16' X 16' Spacing - 200 Stems/ Acre			
Common Name	**Scientific Name**	**Percent Planted by Species**	**Wetness Tolerance**
Tag Alder	*Alnus serrulata*	20%	OBL
Black Willow	*Salix nigra*	20%	OBL
Winterberry	*Ilex verticillata*	10%	FACW
Buttonbush	*Cephalanthus occidentalis*	10%	OBL
Silky Dogwood	*Cornus amomum*	10%	FACW
Red Chokeberry	*Aronia arbutifolia*	10%	FACW
Spicebush	*Lindera benzoin*	10%	FAC
Highbush Blueberry	*Vaccinium corymbosum*	10%	FACW

Zone 3 - Upland Planting Zone			
The following table lists bare-root vegetation selection for the project site. Species shall be planted at a total density of 647 stems per acre. Total planting area is approximately 10.8 acres. Exact placement of species will be determined prior to site planting.			
Common Name	**Scientific Name**	**Percent Planted by Species**	**Wetness Tolerance**
Trees (85%) Planted 8' X 8' Spacing – 550 Stems/ Acre			
White Oak	*Quercus alba*	20%	FACU
Northern Red Oak	*Quercus rubra*	15%	FACU
American Beech	*Fagus grandifolia*	15%	FACU
Tulip Poplar	*Liriodendron tulipifera*	15%	FACU
Water Oak	*Quercus nigra*	10%	FAC
Pignut Hickory	*Carya glabra*	5%	FACU
White Ash	*Fraxinus americana*	5%	FACU
	Tree Total	85%	
Understory/Shrubs (15%) Planted 8' X 8' Spacing - 97 Stems/ Acre			
Sourwood	*Oxydendrum arboreum*	5%	UPL
American Holly	*Ilex opaca*	2.5%	FACU
Hop Hornbeam	*Ostrya virginiana*	2.5%	FACU
Hazelnut	*Corylus americana*	2.5%	FACU
Strawberry Bush	*Euonymus americanus*	2.5%	FAC
	Shrub Total	15%	

Live Stakes			
Live staking will be applied to all restored streambanks following the details in the plan set and according to the construction specifications.			
Common Name	**Scientific Name**	**Percentage of Total**	**Wetness Tolerance**
Elderberry	*Sambucus canadensis*	10%	FACW
Silky Dogwood	*Cornus amonum*	30%	FACW
Silky Willow	*Salix sericea*	30%	OBL
Black Willow	*Salix nigra*	30%	OBL
Total		100%	

Zone 1 - Permanent Riparian Seed				
Permanent seed mixtures for the project site shall be planted throughout the floodplain and riparian buffer areas. Permanent seed mixtures shall be applied with temporary seed, as defined in the construction specifications.				
Common Name	**Scientific Name**	**Percent of Mixture**	**Seeding Density (lbs/acre)**	**Wetness Tolerance**
Floodplain Buffer Areas				
Virginia Wildrye	*Elymus virginicus*	20%	3.00	FACW
Autumn bentgrass	*Agrostis perennans*	15%	2.25	FACW
Switchgrass	*Panicum virgatum*	15%	2.25	FAC
Black-Eyed Susan	*Rudbeckia hirta*	10%	1.50	FACU
Lance-Leaved Tick Seed	*Coreopsis lanceolata*	10%	1.50	FACU
Big Blue Stem	*Andropogon gerardii*	10%	1.50	FAC
Eastern Gamma Grass	*Tripsacum dactyloides*	5%	0.75	FACW
Little Blue Stem	*Schizachyrium scoparium*	5%	0.75	FACU
Soft Rush	*Juncus effusus*	5%	0.75	FACW
Yellow Indian Grass	*Sorghastrum nutans*	5%	0.75	FACU
	Total	**100%**	**15**	
Total Planting Area for Permanent Riparian Seed (ac)			**20.9**	

Zone 2 - Permanent Wetland Seed				
Permanent seed mixtures for the project site shall be planted throughout the floodplain and riparian buffer areas. Permanent seed mixtures shall be applied with temporary seed, as defined in the construction specifications.				
Common Name	**Scientific Name**	**Percent of Mixture**	**Seeding Density (lbs/acre)**	**Wetness Tolerance**
The following table lists bare-root vegetation selection for the project site. Species shall				
Switchgrass	*Panicum virgatum*	23%	3.45	FAC
Virginia wildrye	*Elymus virginicus*	20%	3.00	FACW
Smooth Panicgrass	*Panicum dichotomiflorum*	14%	2.10	FACW
Fox sedge	*Carex vulpinoidea*	12%	1.80	OBL
Redtop Panicgrass	*Panicum rigidulum*	8%	1.20	FACW
Deer-tongue	*Dichanthelium clandestinum*	8%	1.20	FAC
Beggars Tick	*Bidens frondosa (or aristosa)*	7%	1.05	FACW
Soft Rush	*Juncus effusus*	4%	0.60	FACW
Pennsylvania smartweed	*Persicaria pensylvanica*	2%	0.30	FACW
American Bur Reed	*Sparganium americanum*	2%	0.30	OBL
	Total	**100%**	**15**	
Total Planting Area for Permanent Wetland Seed (ac)			**7.9**	

Temporary Seed			
The following table lists temporary seed mix for the project site. All disturbed areas will be stabilized using mulch and temporary seed.			
Common Name	**Scientific Name**	**Rate**	**Dates**
Cereal Rye Grain	*Secale cereale*	130 LBS/ACRE	September to March
Browntop Millet	*Urochloa ramosa*	40 LBS/ACRE	April to August

Permanent Non-Riparian Seed			
The following table lists permanent seed mix for disturbed pasture areas outside of the riparain zone.			
Common Name	**Scientific Name**	**Rate**	**Dates**
Kentucky Bluegrass	*Poa pratensis*	44 LBS/ACRE	September to March
Tall Fescue	*Schedonorus arundinaceus*	218 LBS/ACRE	September to March

REVISIONS				
NO.	DESCRIPTION	ENGR.	APPROV	DATE
1	DRAFT MITIGATION PLAN	JB	KLT	12/16/22
2	FINAL MITIGATION PLAN	JB	KLT	2/21/23
3	ISSUED FOR BID	JB	KLT	7/20/23

PREPARED FOR:

NC Mitigation Services ENVIRONMENTAL QUALITY

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

BANDYS FARM
CATAWBA COUNTY, NC

PREPARED IN THE OFFICE OF:

EPR ECOSYSTEM PLANNING & RESTORATION

204 STONE RIDGE BLVD.
ASHEVILLE, NC 28804

PROJECT ENGINEER

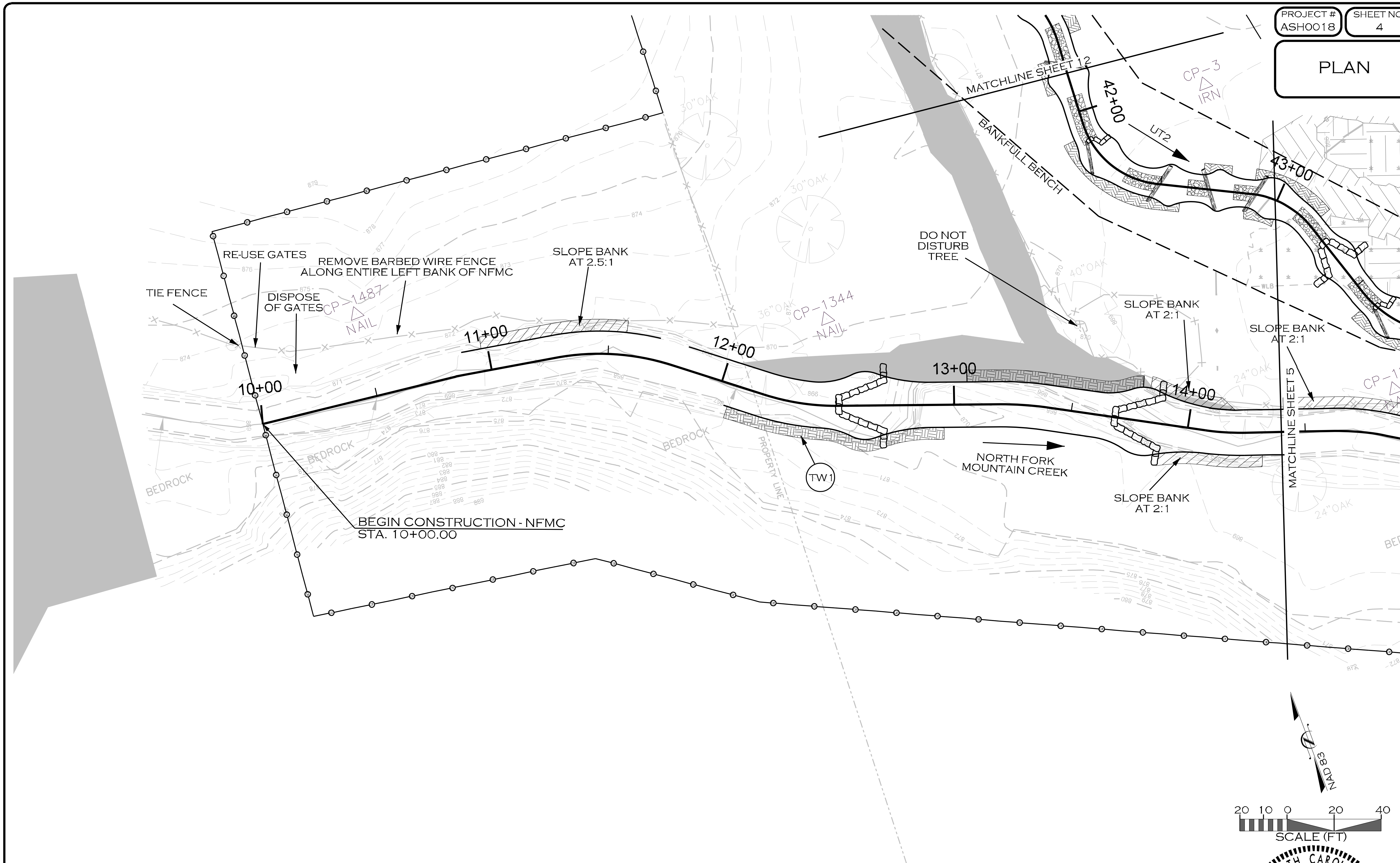
NORTH CAROLINA PROFESSIONAL SEAL 039201 ENGINEER JACOB M. BYERS

7/20/23

7/31/2023
X:\PROJECTS\ASH0018_NCDMS_BANDYS_FARM\CADD\PLANS\BF_PSH_03E.DGN
BYERS

PROJECT #	SHEET NO.
ASH0018	4

PLAN



REVISIONS				
NO.	DESCRIPTION	ENGR.	APPROV	DATE
1	DRAFT MITIGATION PLAN	JB	KLT	12/16/22
2	FINAL MITIGATION PLAN	JB	KLT	2/21/23
3	ISSUED FOR BID	JB	KLT	7/20/23

PREPARED FOR:

NC Mitigation Services

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

BANDYS FARM
CATAWBA COUNTY, NC

PREPARED IN THE OFFICE OF:

ECOSYSTEM PLANNING & RESTORATION

204 STONE RIDGE BLVD.
ASHEVILLE, NC 28804

PROJECT ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 039201 ENGINEER JACOB M. BYERS

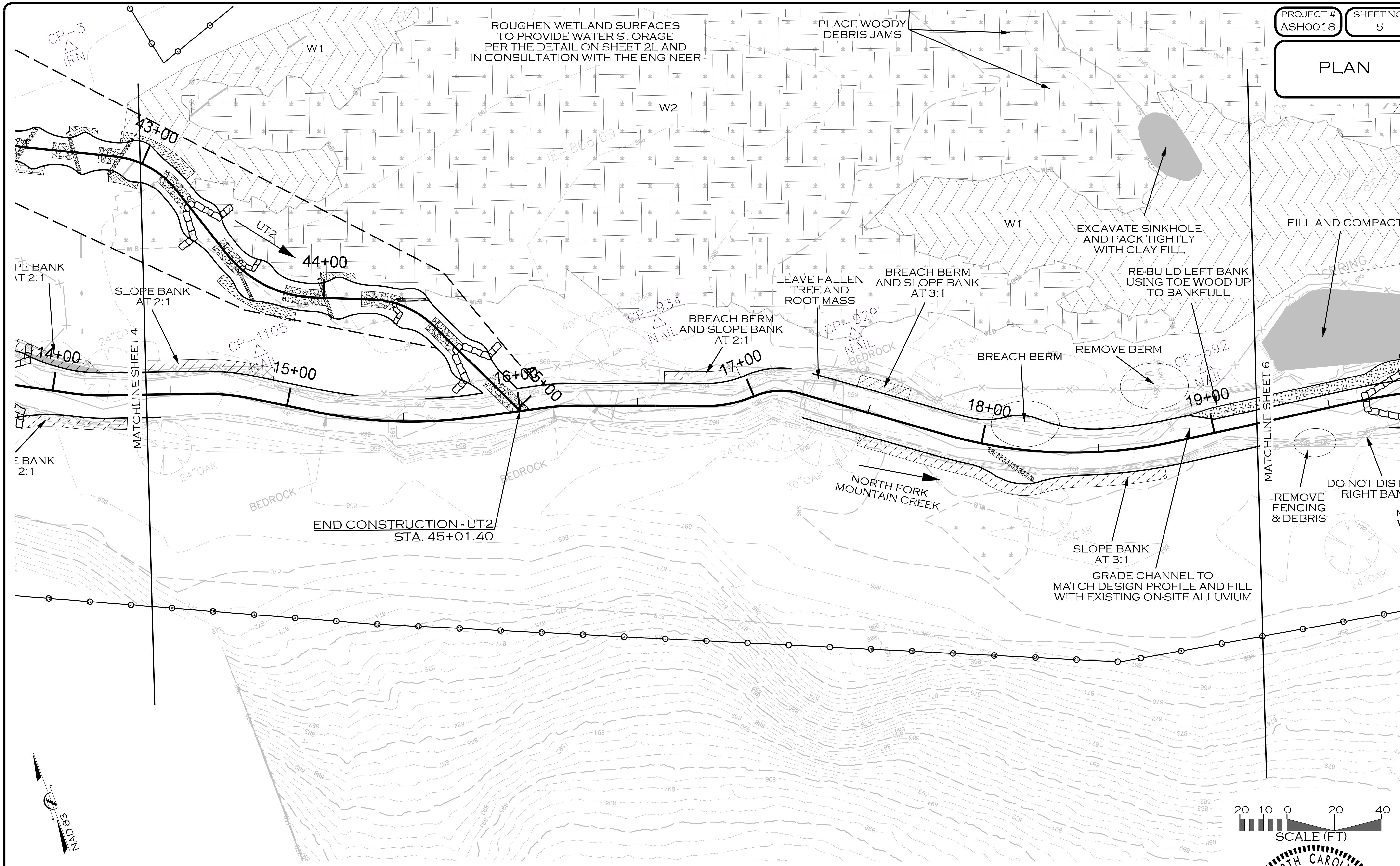
Jacob Byers 7/31/2023

7/31/2023
X:\PROJECTS\ASH0018_NCDMS_BANDYS_FARM\CADD\PLANS\BF_PSH_04.DGN
BYERS

PROJECT # ASH0018

SHEET NO. 5

PLAN



7/31/2023
X:\PROJECTS\ASH0018_NCDMS_BANDYS_FARM\CADD\PLANS\BF_PSH_05.DGN
BYERS

REVISIONS				
NO.	DESCRIPTION	ENGR.	APPROV	DATE
1	DRAFT MITIGATION PLAN	JB	KLT	12/16/22
2	FINAL MITIGATION PLAN	JB	KLT	2/21/23
3	ISSUED FOR BID	JB	KLT	7/20/23

PREPARED FOR:

NC Mitigation Services

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

BANDYS FARM
CATAWBA COUNTY, NC

PREPARED IN THE OFFICE OF:

ECOSYSTEM PLANNING & RESTORATION

204 STONE RIDGE BLVD.
ASHEVILLE, NC 28804

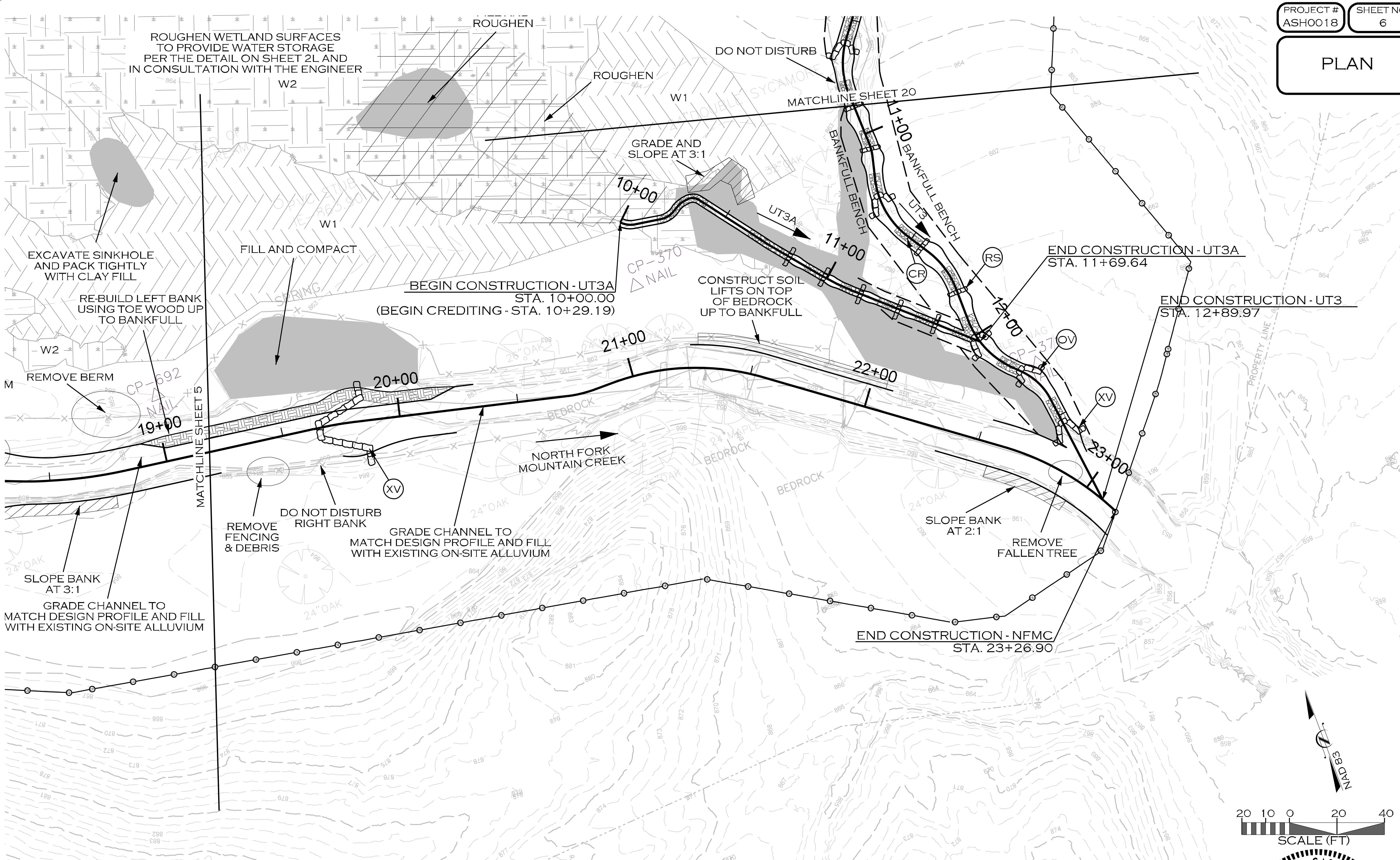
PROJECT ENGINEER

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 039201 JACOB M. BYERS

Jake Byers 7/31/2023

PROJECT # ASH0018 | SHEET NO. 6

PLAN



7/31/2023
K:\PROJECTS\ASH0018_NCDMS_BANDYS_FARM\CADD\PLANS\BF_PSH_06.DGN
BYERS

REVISIONS

NO.	DESCRIPTION	ENGR.	APPROV	DATE
1	DRAFT MITIGATION PLAN	JB	KLT	12/16/22
2	FINAL MITIGATION PLAN	JB	KLT	2/21/23
3	ISSUED FOR BID	JB	KLT	7/20/23

PREPARED FOR:

NC Mitigation Services

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

BANDYS FARM
CATAWBA COUNTY, NC

PREPARED IN THE OFFICE OF:

Ecosystem Planning & Restoration
204 STONE RIDGE BLVD.
ASHEVILLE, NC 28804

PROJECT ENGINEER

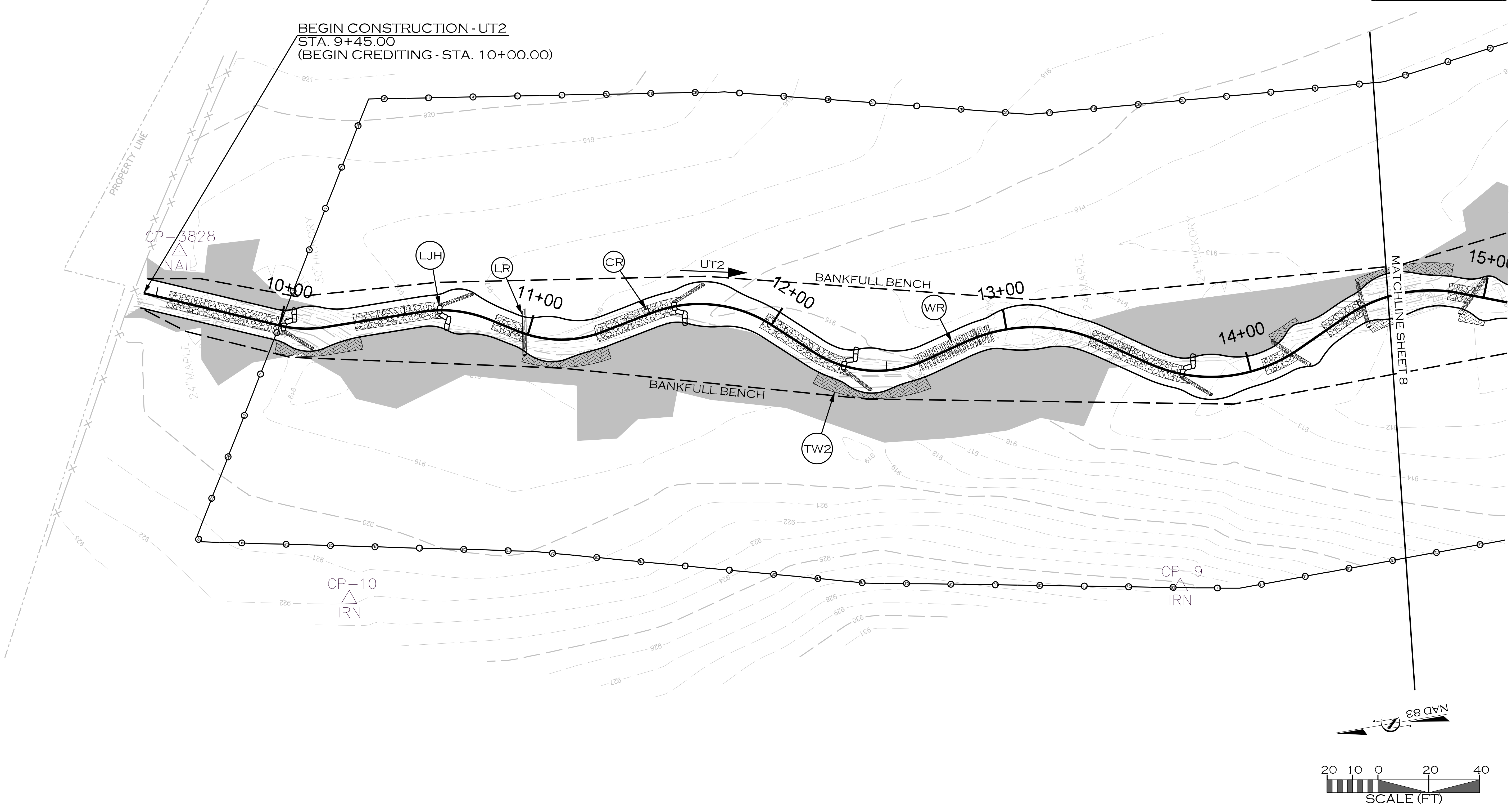
NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 039201 JACOB M. BYERS

Jake Byers 7/31/2023

PROJECT # ASH0018

SHEET NO. 7

PLAN



REVISIONS

NO.	DESCRIPTION	ENGR.	APPROV	DATE
1	DRAFT MITIGATION PLAN	JB	KLT	12/16/22
2	FINAL MITIGATION PLAN	JB	KLT	2/21/23
3	ISSUED FOR BID	JB	KLT	7/20/23

PREPARED FOR:

NC Mitigation Services

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

BANDYS FARM
CATAWBA COUNTY, NC

PREPARED IN THE OFFICE OF:

EPR Ecosystem Planning & Restoration

204 STONE RIDGE BLVD.
ASHEVILLE, NC 28804

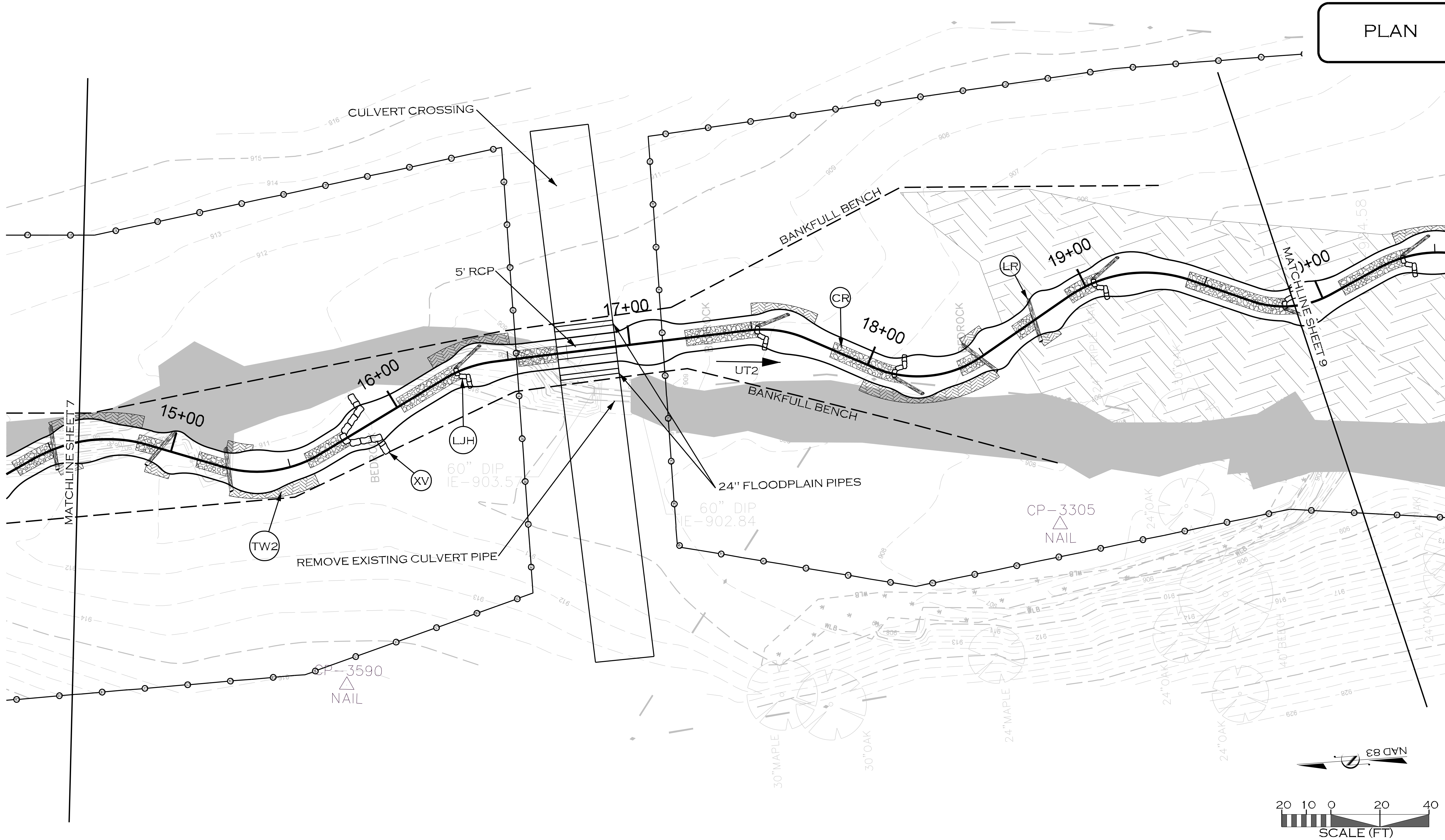
PROJECT ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 039201 ENGINEER JACOB M. BYERS

7/31/2023

7/31/2023
X:\PROJECTS\ASH0018_NCDMS_BANDYS_FARM\CADD\PLANS\BF_PSH_07.DGN
BYERS

PLAN



REVISIONS				
NO.	DESCRIPTION	ENGR.	APPROV	DATE
1	DRAFT MITIGATION PLAN	JB	KLT	12/16/22
2	FINAL MITIGATION PLAN	JB	KLT	2/21/23
3	ISSUED FOR BID	JB	KLT	7/20/23

PREPARED FOR:

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

BANDYS FARM
CATAWBA COUNTY, NC

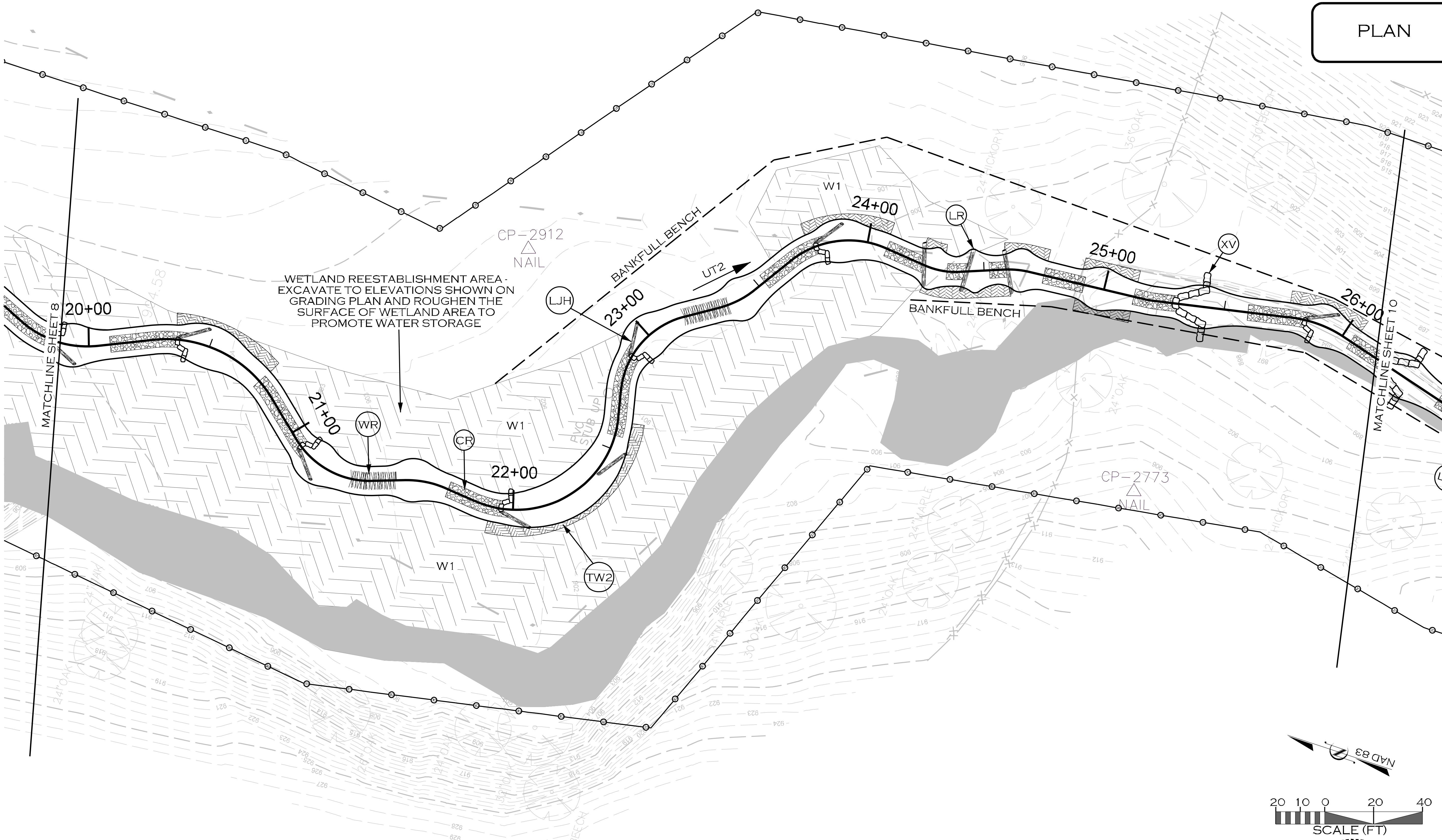
PREPARED IN THE OFFICE OF:
ECOSYSTEM PLANNING & RESTORATION
204 STONE RIDGE BLVD.
ASHEVILLE, NC 28804

PROJECT ENGINEER
NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 039201 JACOB M. BYERS
7/20/23

7/31/2023
X:\PROJECTS\ASH0018_NCDMS_BANDYS_FARM\CADD\PLANS\BF_PSH_08.DGN
BYERS

PROJECT #	SHEET NO.
ASH0018	9

PLAN



7/31/2023
X:\PROJECTS\ASH0018_NCDMS_BANDYS_FARM\CADD\PLANS\BF_PSH_09.DGN
BYERS

REVISIONS

NO.	DESCRIPTION	ENGR.	APPROV	DATE
1	DRAFT MITIGATION PLAN	JB	KLT	12/16/22
2	FINAL MITIGATION PLAN	JB	KLT	2/21/23
3	ISSUED FOR BID	JB	KLT	7/20/23

PREPARED FOR:

NC Mitigation Services

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

BANDYS FARM
CATAWBA COUNTY, NC

PREPARED IN THE OFFICE OF:

ECOSYSTEM PLANNING & RESTORATION

204 STONE RIDGE BLVD.
ASHEVILLE, NC 28804

PROJECT ENGINEER

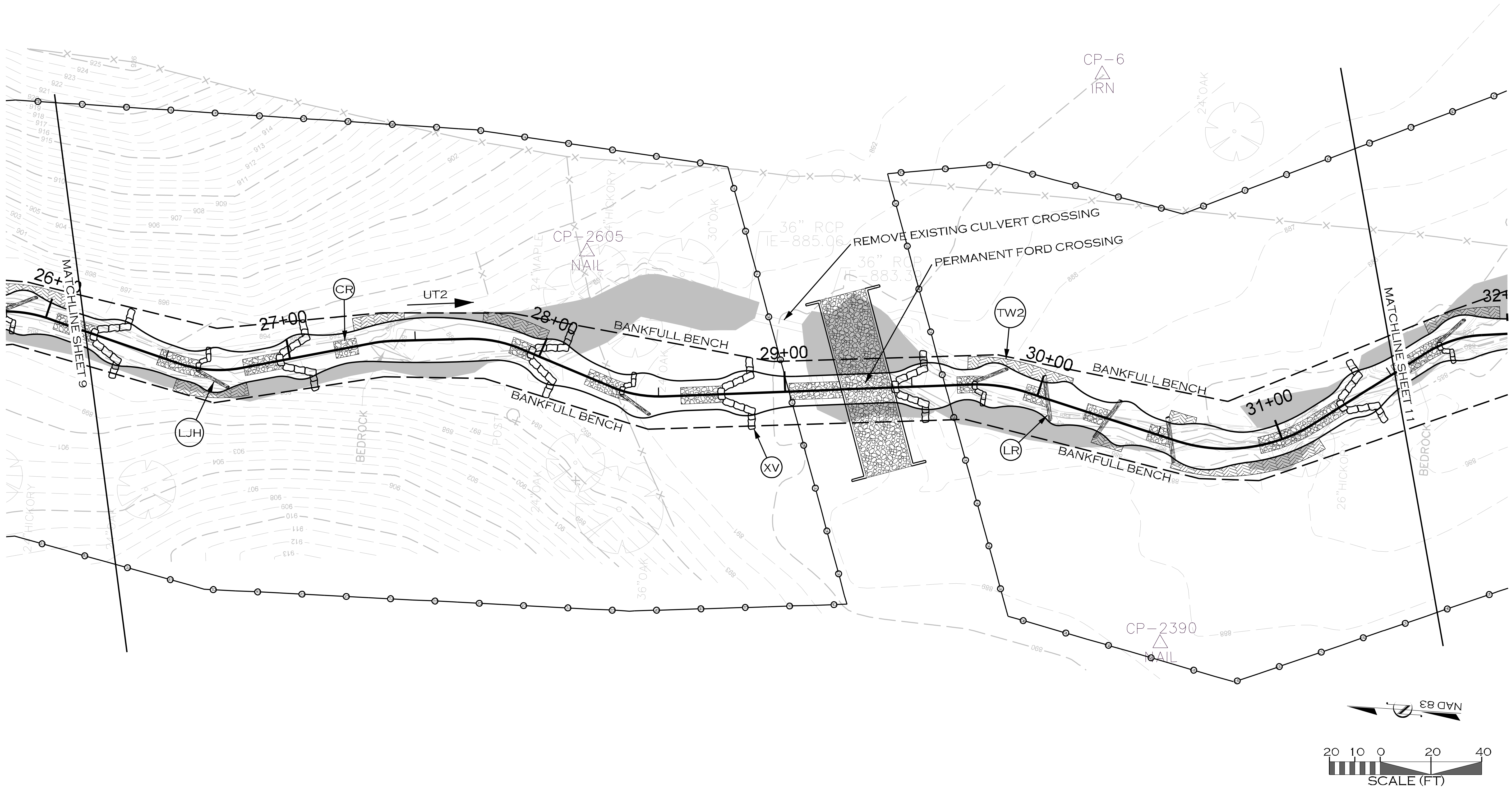
NORTH CAROLINA PROFESSIONAL SEAL 039201 ENGINEER JACOB M. BYERS

Jake Byers 7/31/2023

PROJECT # ASH0018

SHEET NO. 10

PLAN



NO.	DESCRIPTION	ENGR.	APPROV	DATE
1	DRAFT MITIGATION PLAN	JB	KLT	12/16/22
2	FINAL MITIGATION PLAN	JB	KLT	2/21/23
3	ISSUED FOR BID	JB	KLT	7/20/23

REVISIONS

PREPARED FOR:

NC Mitigation Services

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

BANDYS FARM
CATAWBA COUNTY, NC

PREPARED IN THE OFFICE OF:

EPR Ecosystem Planning & Restoration

204 STONE RIDGE BLVD.
ASHEVILLE, NC 28804

PROJECT ENGINEER

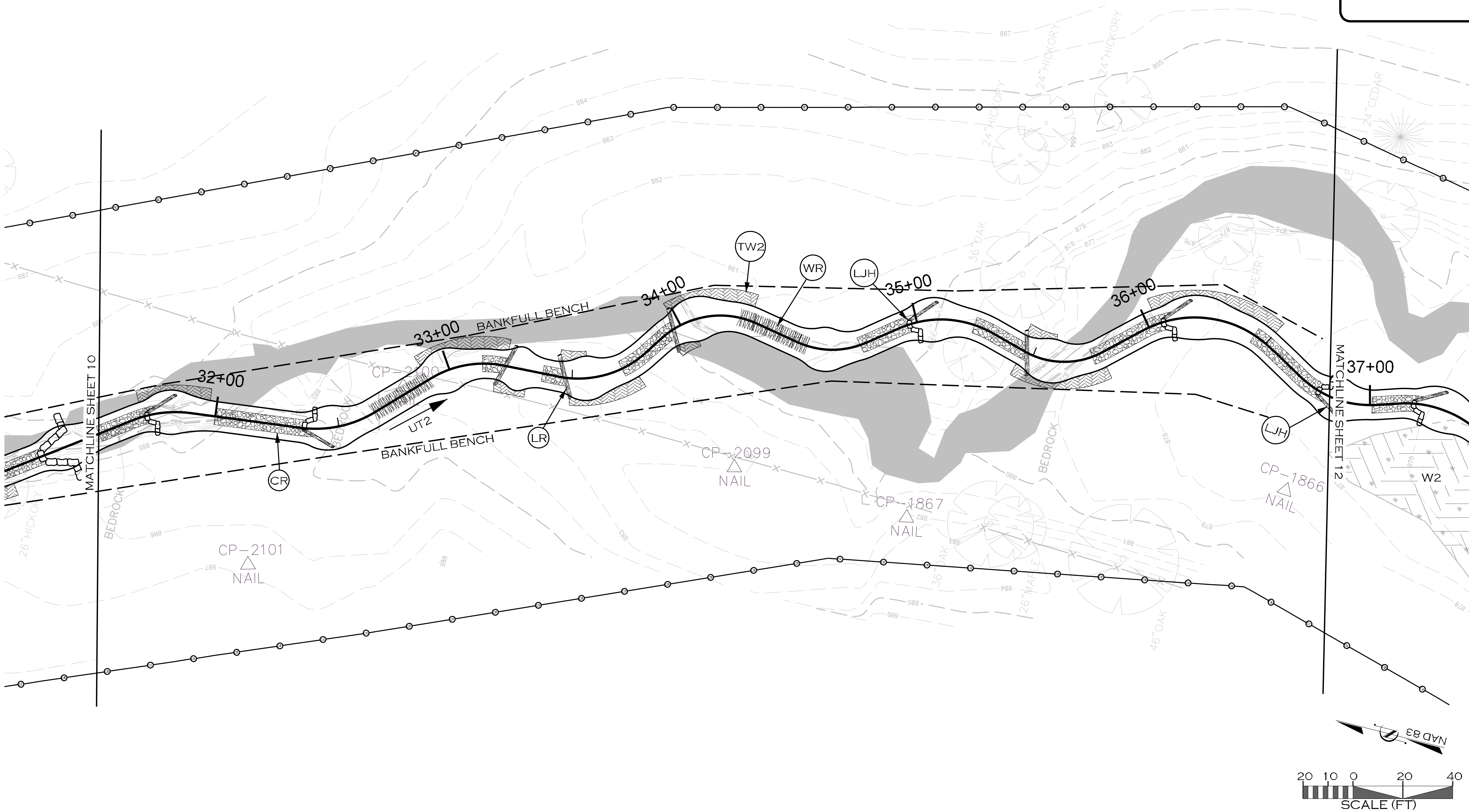
NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 039201 JACOB M. BYERS

Jake Byers 7/31/2023

7/31/2023
X:\PROJECTS\ASH0018_NCDMS_BANDYS_FARM\CADD\PLANS\BF_PSH_10.DGN
BYERS

PROJECT #	SHEET NO.
ASH0018	11

PLAN



REVISIONS				
NO.	DESCRIPTION	ENGR.	APPROV	DATE
1	DRAFT MITIGATION PLAN	JB	KLT	12/16/22
2	FINAL MITIGATION PLAN	JB	KLT	2/21/23
3	ISSUED FOR BID	JB	KLT	7/20/23

PREPARED FOR:

Mitigation Services

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

BANDYS FARM
CATAWBA COUNTY, NC

PREPARED IN THE OFFICE OF:

Ecosystem Planning & Restoration
EPR
204 STONE RIDGE BLVD.
ASHEVILLE, NC 28804

PROJECT ENGINEER

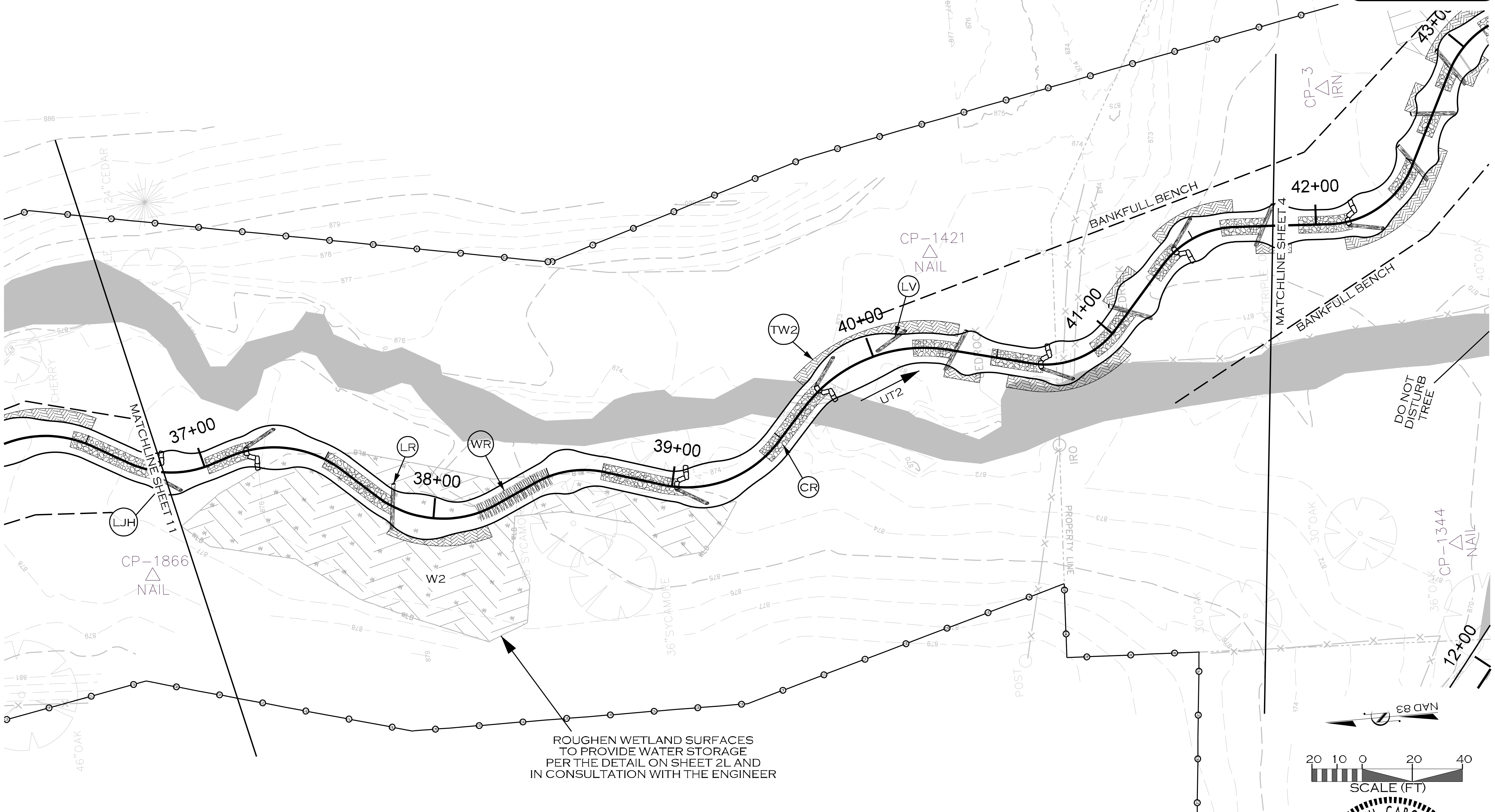
NORTH CAROLINA PROFESSIONAL SEAL 039207 ENGINEER JACOB M. BYERS

Jake Byers 7/20/23

7/31/2023
X:\PROJECTS\ASH0018_NCDMS_BANDYS_FARM\CADD\PLANS\BF_PSH_11.DGN
BYERS

PROJECT #	SHEET NO.
ASH0018	12

PLAN



7/31/2023
X:\PROJECTS\ASH0018_NCDMS_BANDYS_FARM\CADD\PLANS\BF_PSH_12.DGN
BYERS

REVISIONS				
NO.	DESCRIPTION	ENGR.	APPROV	DATE
1	DRAFT MITIGATION PLAN	JB	KLT	12/16/22
2	FINAL MITIGATION PLAN	JB	KLT	2/21/23
3	ISSUED FOR BID	JB	KLT	7/20/23

PREPARED FOR:

Mitigation Services

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

BANDYS FARM
CATAWBA COUNTY, NC

PREPARED IN THE OFFICE OF:

ECOSYSTEM PLANNING & RESTORATION

204 STONE RIDGE BLVD.
ASHEVILLE, NC 28804

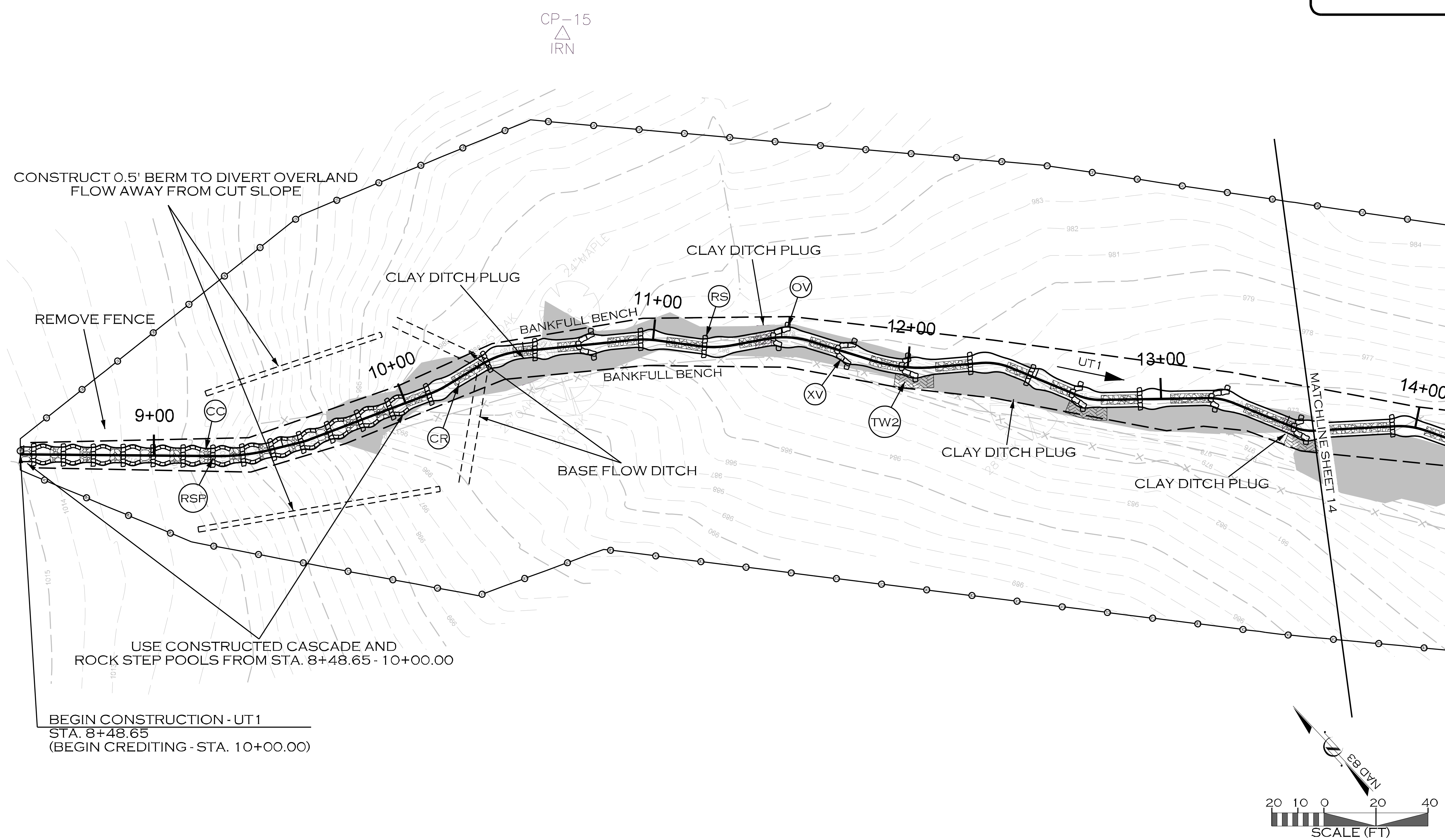
PROJECT ENGINEER

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 039207 JACOB M. BYERS

Jake Byers 7/20/23

PROJECT #	SHEET NO.
ASH0018	13

PLAN



7/31/2023
X:\PROJECTS\ASH0018_NCDMS_BANDYS_FARM\CADD\PLANS\BF_PSH_13.DGN
BYERS

REVISIONS				
NO.	DESCRIPTION	ENGR.	APPROV	DATE
1	DRAFT MITIGATION PLAN	JB	KLT	12/16/22
2	FINAL MITIGATION PLAN	JB	KLT	2/21/23
3	ISSUED FOR BID	JB	KLT	7/20/23

PREPARED FOR:

Mitigation Services

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

BANDYS FARM
CATAWBA COUNTY, NC

PREPARED IN THE OFFICE OF:

ECOSYSTEM PLANNING & RESTORATION

204 STONE RIDGE BLVD.
ASHEVILLE, NC 28804

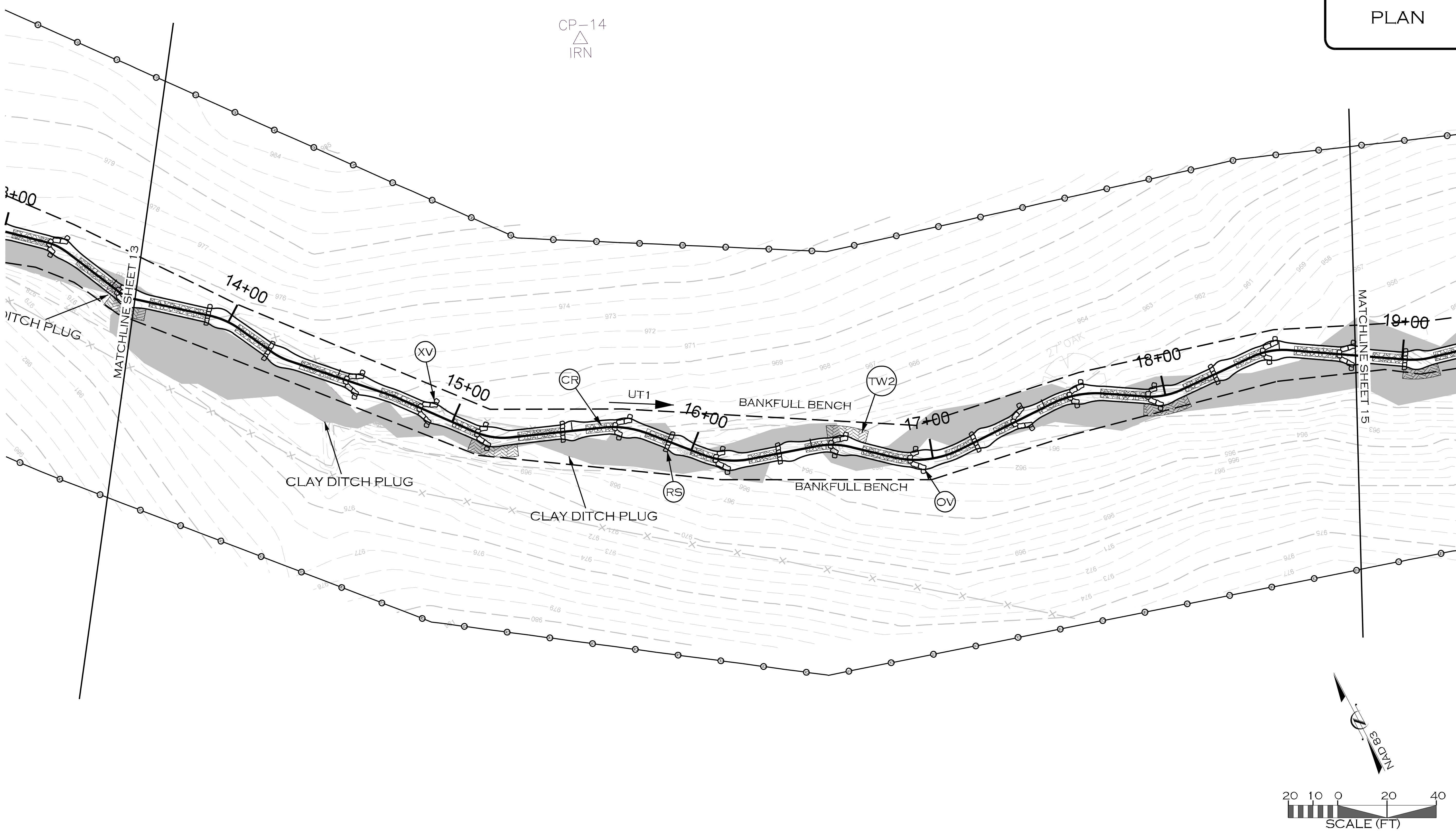
PROJECT ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 039201 ENGINEER JACOB M. BYERS

7/31/2023

PROJECT # ASH0018 | SHEET NO. 14

PLAN



NO.	DESCRIPTION	ENGR.	APPROV	DATE
1	DRAFT MITIGATION PLAN	JB	KLT	12/16/22
2	FINAL MITIGATION PLAN	JB	KLT	2/21/23
3	ISSUED FOR BID	JB	KLT	7/20/23

REVISIONS

PREPARED FOR:

NC Mitigation Services
NC DEPARTMENT OF ENVIRONMENTAL QUALITY
DIVISION OF MITIGATION SERVICES
1652 MAIL SERVICE CENTER
RALEIGH, NC 27699-1652

BANDYS FARM
CATAWBA COUNTY, NC

PREPARED IN THE OFFICE OF:

EPR Ecosystem Planning & Restoration
204 STONE RIDGE BLVD.
ASHEVILLE, NC 28804

PROJECT ENGINEER

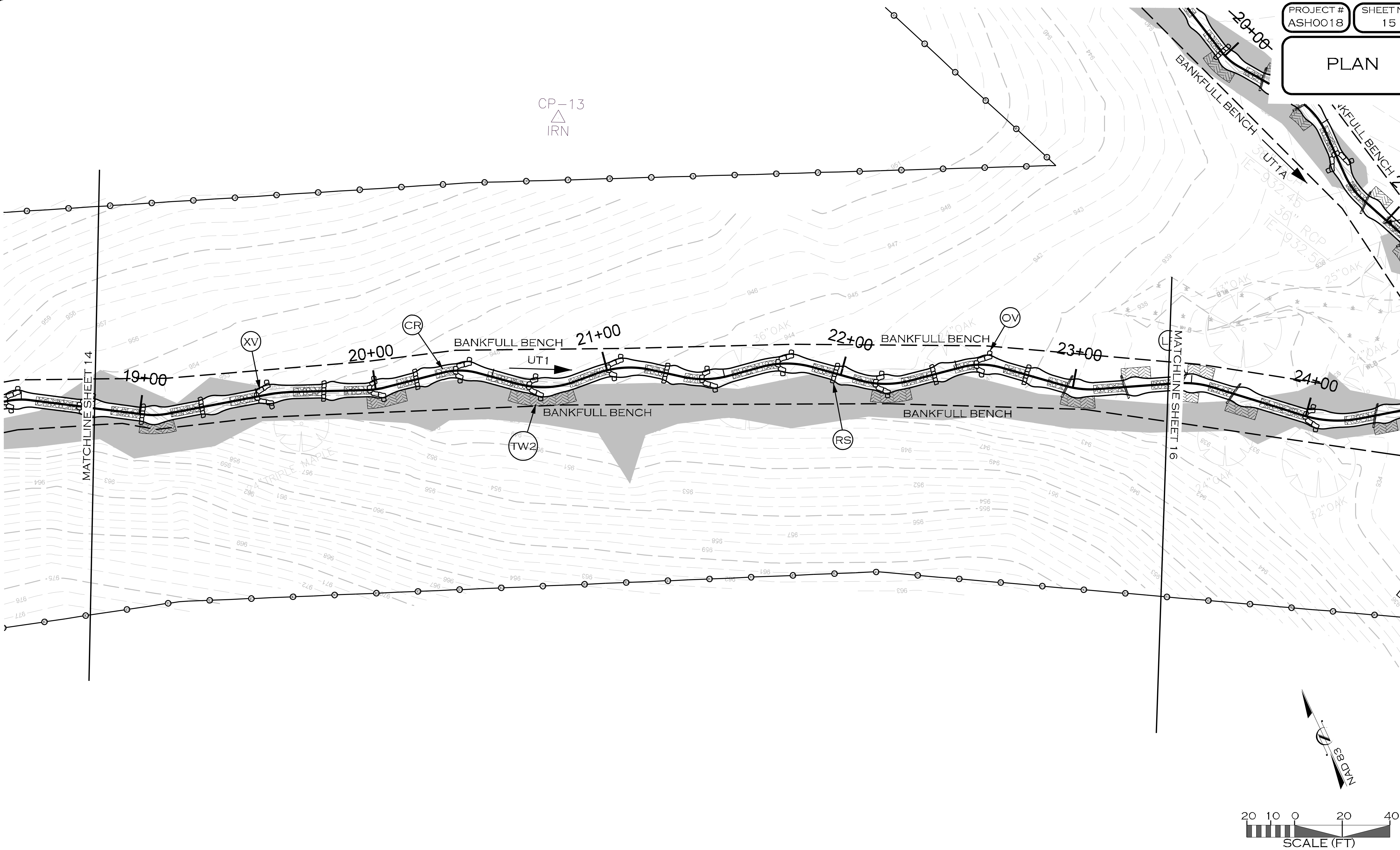
NORTH CAROLINA PROFESSIONAL SEAL 039201 ENGINEER JACOB M. BYERS

Jake Byers 7/31/2023

7/31/2023
X:\PROJECTS\ASH0018_NCDMS_BANDYS_FARM\CADD\PLANS\BF_PSH_14.DGN
BYERS

PROJECT #	SHEET NO.
ASH0018	15

PLAN



REVISIONS

NO.	DESCRIPTION	ENGR.	APPROV	DATE
1	DRAFT MITIGATION PLAN	JB	KLT	12/16/22
2	FINAL MITIGATION PLAN	JB	KLT	2/21/23
3	ISSUED FOR BID	JB	KLT	7/20/23

PREPARED FOR:

NC Mitigation Services

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

BANDYS FARM
CATAWBA COUNTY, NC

PREPARED IN THE OFFICE OF:

ECOSYSTEM PLANNING & RESTORATION

204 STONE RIDGE BLVD.
ASHEVILLE, NC 28804

PROJECT ENGINEER

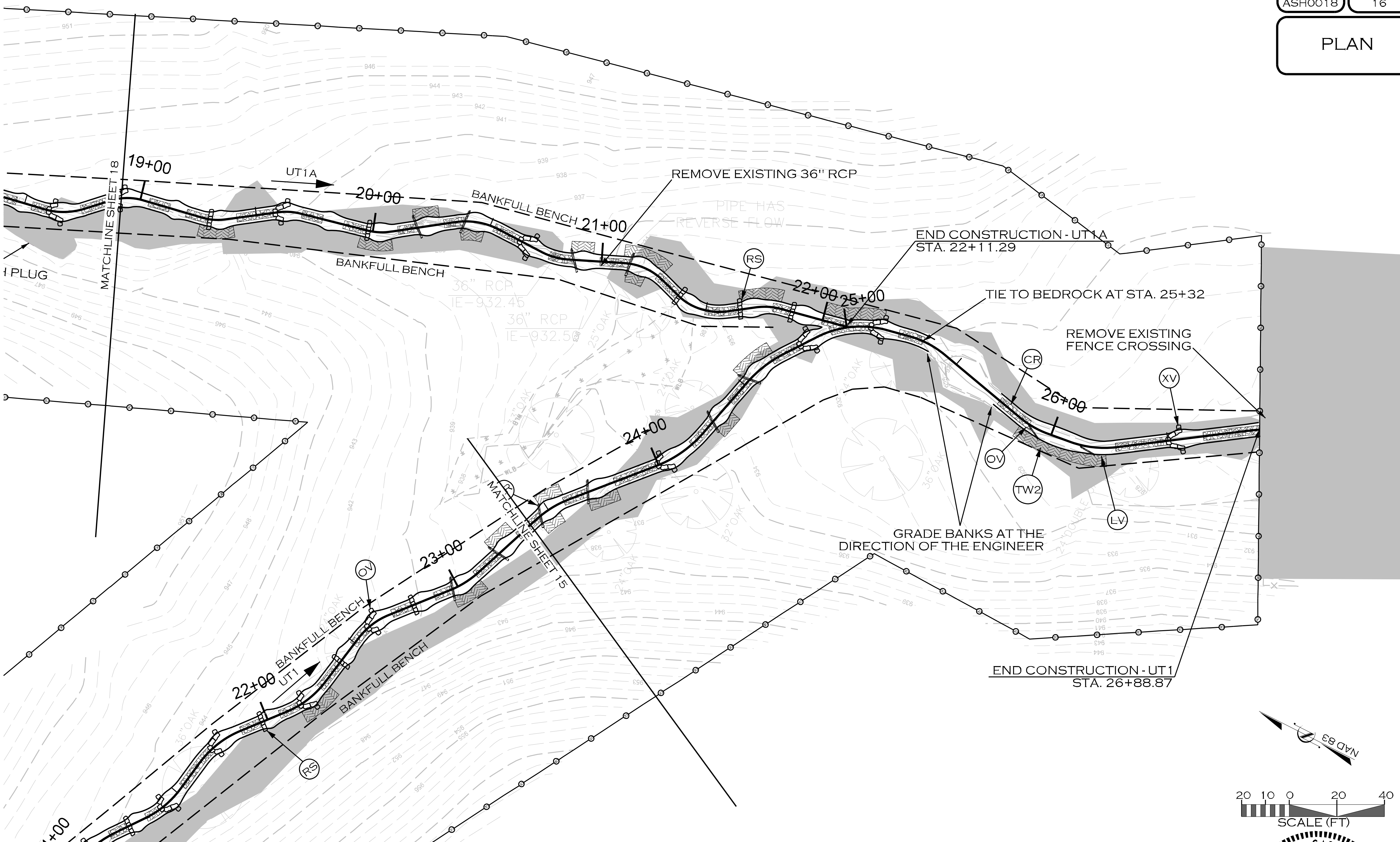
NORTH CAROLINA PROFESSIONAL SEAL 039201 ENGINEER JACOB M. BYERS

7/31/2023

7/31/2023
K:\PROJECTS\ASH0018_NCDMS_BANDYS_FARM\CADD\PLANS\BF_PSH_15.DGN
BYERS

PROJECT #	SHEET NO.
ASH0018	16

PLAN



REVISIONS				
NO.	DESCRIPTION	ENGR.	APPROV	DATE
1	DRAFT MITIGATION PLAN	JB	KLT	12/16/22
2	FINAL MITIGATION PLAN	JB	KLT	2/21/23
3	ISSUED FOR BID	JB	KLT	7/20/23

PREPARED FOR:

Mitigation Services

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

BANDYS FARM
CATAWBA COUNTY, NC

PREPARED IN THE OFFICE OF:

ECOSYSTEM PLANNING & RESTORATION

204 STONE RIDGE BLVD.
ASHEVILLE, NC 28804

PROFESSIONAL ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 039201 ENGINEER JACOB M. BYERS

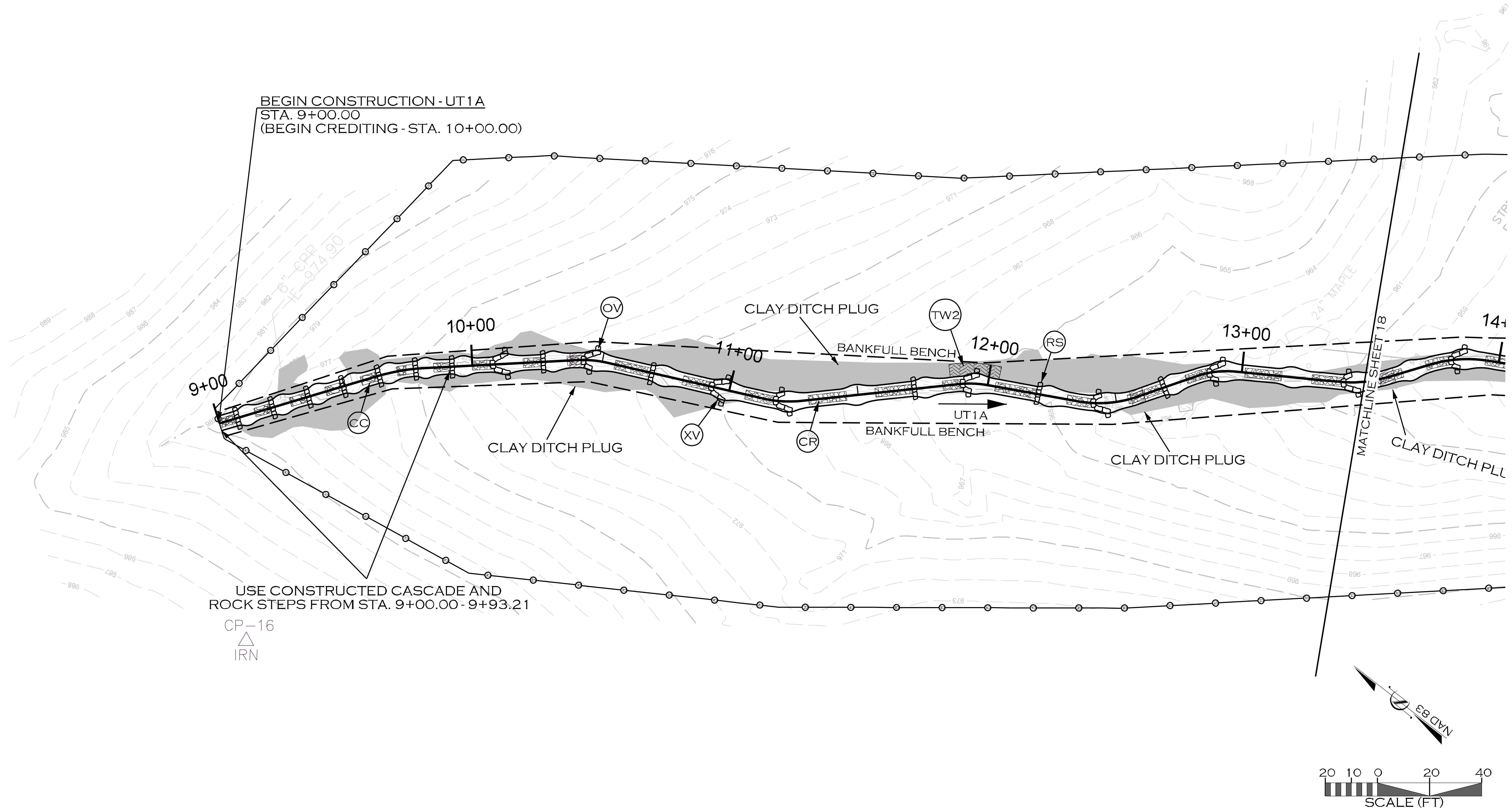
Jake Byers 7/31/2023

7/31/2023
X:\PROJECTS\ASH0018_NCDMS_BANDYS_FARM\CADD\PLANS\BF_PSH_16.DGN
BYERS

PROJECT # ASH0018

SHEET NO. 17

PLAN



REVISIONS				
NO.	DESCRIPTION	ENGR.	APPROV	DATE
1	DRAFT MITIGATION PLAN	JB	KLT	12/16/22
2	FINAL MITIGATION PLAN	JB	KLT	2/21/23
3	ISSUED FOR BID	JB	KLT	7/20/23

PREPARED FOR:

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

BANDYS FARM
CATAWBA COUNTY, NC

PREPARED IN THE OFFICE OF:

Ecosystem Planning & Restoration

204 STONE RIDGE BLVD.
ASHEVILLE, NC 28804

PROJECT ENGINEER

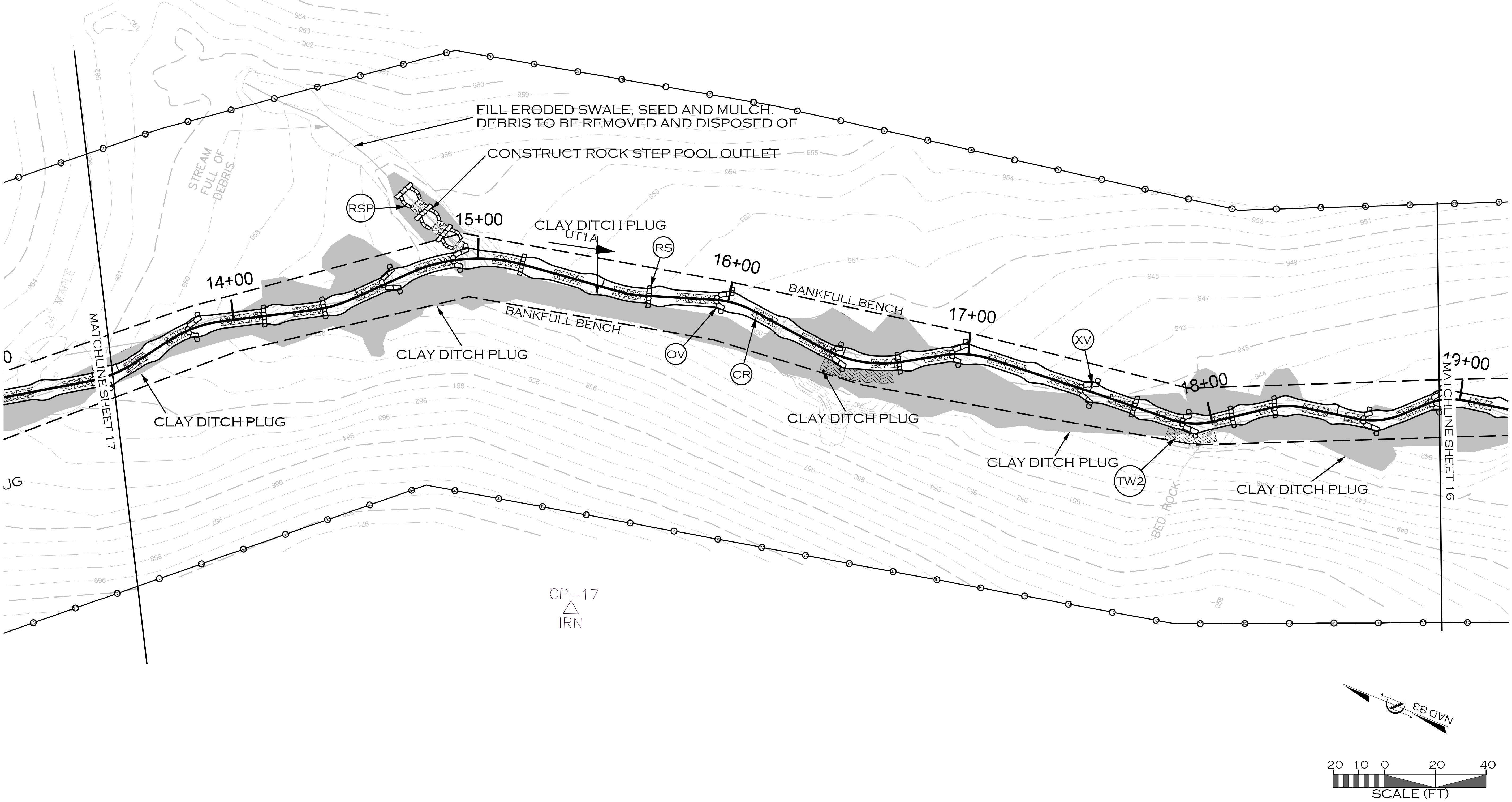
NORTH CAROLINA PROFESSIONAL SEAL 039201 ENGINEER JACOB M. BYERS

7/20/23

7/31/2023
X:\PROJECTS\ASH0018_NCDMS_BANDYS_FARM\CADD\PLANS\BF_PSH_17.DGN
BYERS

PROJECT #	SHEET NO.
ASH0018	18

PLAN



REVISIONS				
NO.	DESCRIPTION	ENGR.	APPROV	DATE
1	DRAFT MITIGATION PLAN	JB	KLT	12/16/22
2	FINAL MITIGATION PLAN	JB	KLT	2/21/23
3	ISSUED FOR BID	JB	KLT	7/20/23

PREPARED FOR:

NC Mitigation Services

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

BANDYS FARM
CATAWBA COUNTY, NC

PREPARED IN THE OFFICE OF:

EPR Ecosystem Planning & Restoration
204 STONE RIDGE BLVD.
ASHEVILLE, NC 28804

PROJECT ENGINEER

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 039201 JACOB M. BYERS

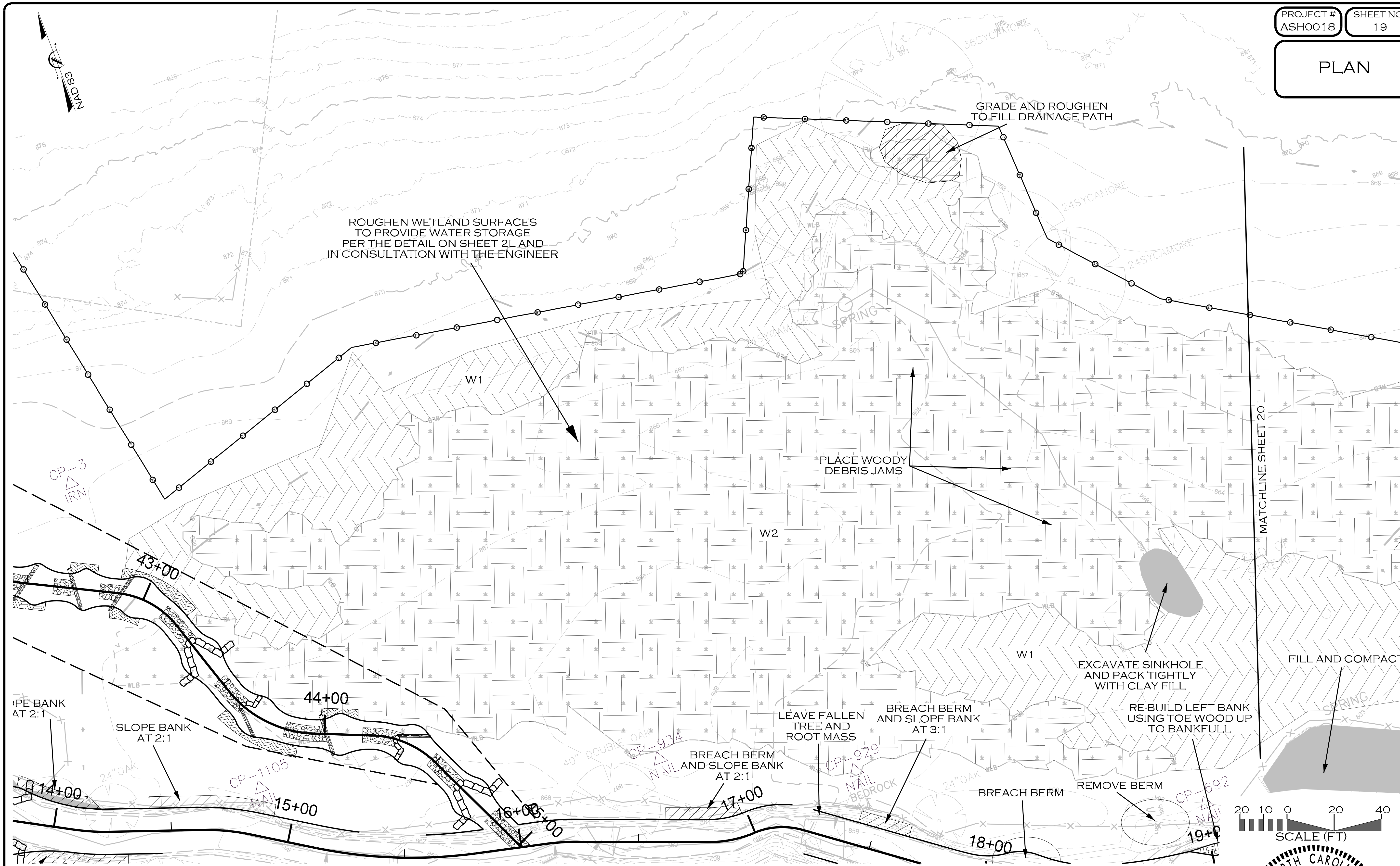
Jake Byers 7/31/2023

7/31/2023
X:\PROJECTS\ASH0018_NCDMS_BANDYS_FARM\CADD\PLANS\BF_PSH_18.DGN
BYERS

PROJECT # ASH0018

SHEET NO. 19

PLAN



REVISIONS				
NO.	DESCRIPTION	ENGR.	APPROV	DATE
1	DRAFT MITIGATION PLAN	JB	KLT	12/16/22
2	FINAL MITIGATION PLAN	JB	KLT	2/21/23
3	ISSUED FOR BID	JB	KLT	7/20/23

PREPARED FOR:

NC Mitigation Services

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

BANDYS FARM
CATAWBA COUNTY, NC

PREPARED IN THE OFFICE OF:

ECOSYSTEM PLANNING & RESTORATION

204 STONE RIDGE BLVD.
ASHEVILLE, NC 28804

PROFESSIONAL ENGINEER

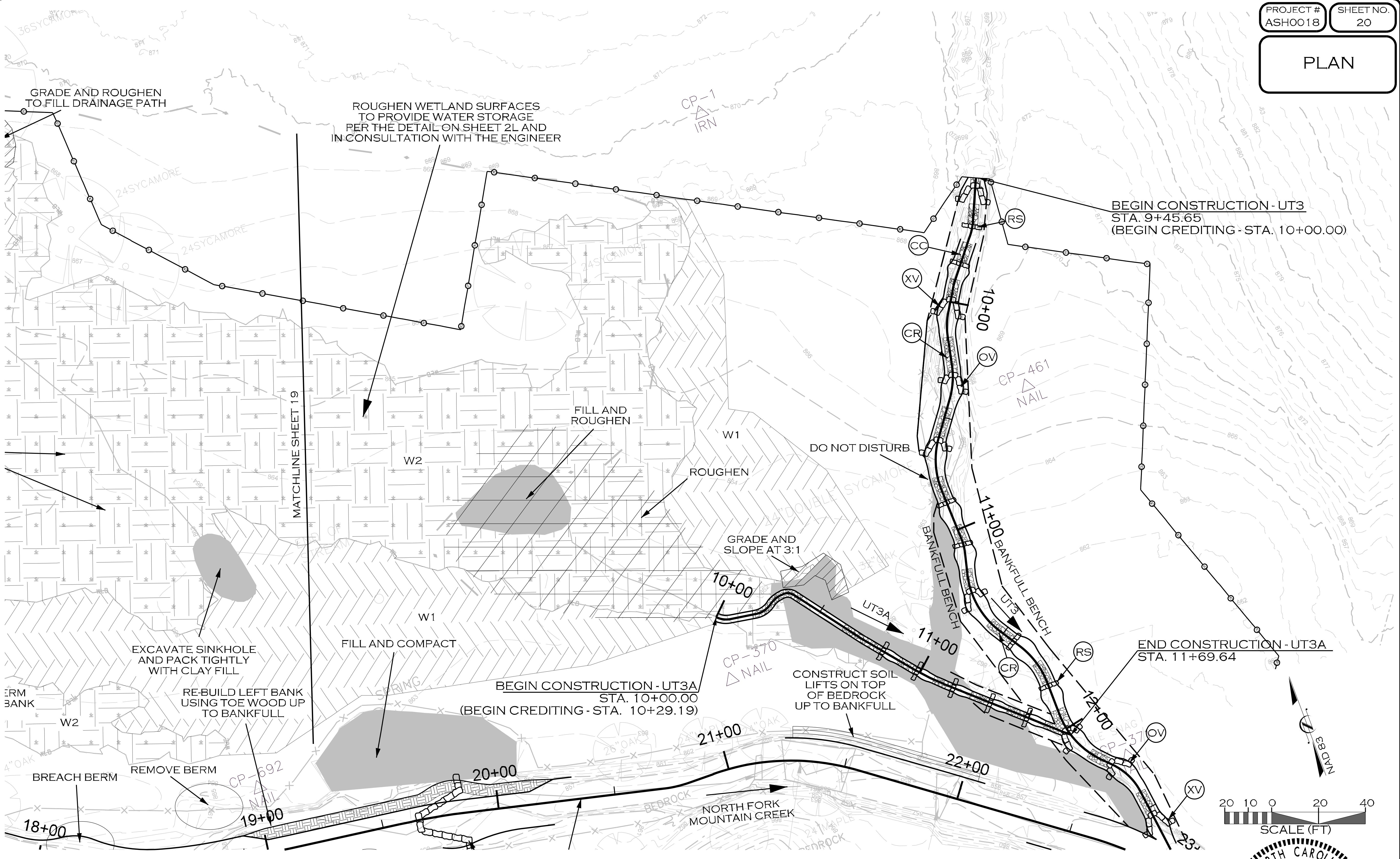
NORTH CAROLINA PROFESSIONAL SEAL 039201 ENGINEER JACOB M. BYERS

Jake Byers 7/31/2023

7/31/2023
X:\PROJECTS\ASH0018_NCDMS_BANDYS_FARM\CADD\PLANS\BF_PSH_19.DGN
BYERS

PROJECT # ASH0018 | SHEET NO. 20

PLAN



7/31/2023 X:\PROJECTS\ASH0018_NCDMS_Bandys_Farm\CADD\PLANS\BF_PSH_20.DGN BYERS

REVISIONS

NO.	DESCRIPTION	ENGR.	APPROV	DATE
1	DRAFT MITIGATION PLAN	JB	KLT	12/16/22
2	FINAL MITIGATION PLAN	JB	KLT	2/21/23
3	ISSUED FOR BID	JB	KLT	7/20/23

PREPARED FOR:

NC Mitigation Services

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

BANDYS FARM
CATAWBA COUNTY, NC

PREPARED IN THE OFFICE OF:

ECOSYSTEM PLANNING & RESTORATION

204 STONE RIDGE BLVD.
ASHEVILLE, NC 28804

PROJECT ENGINEER

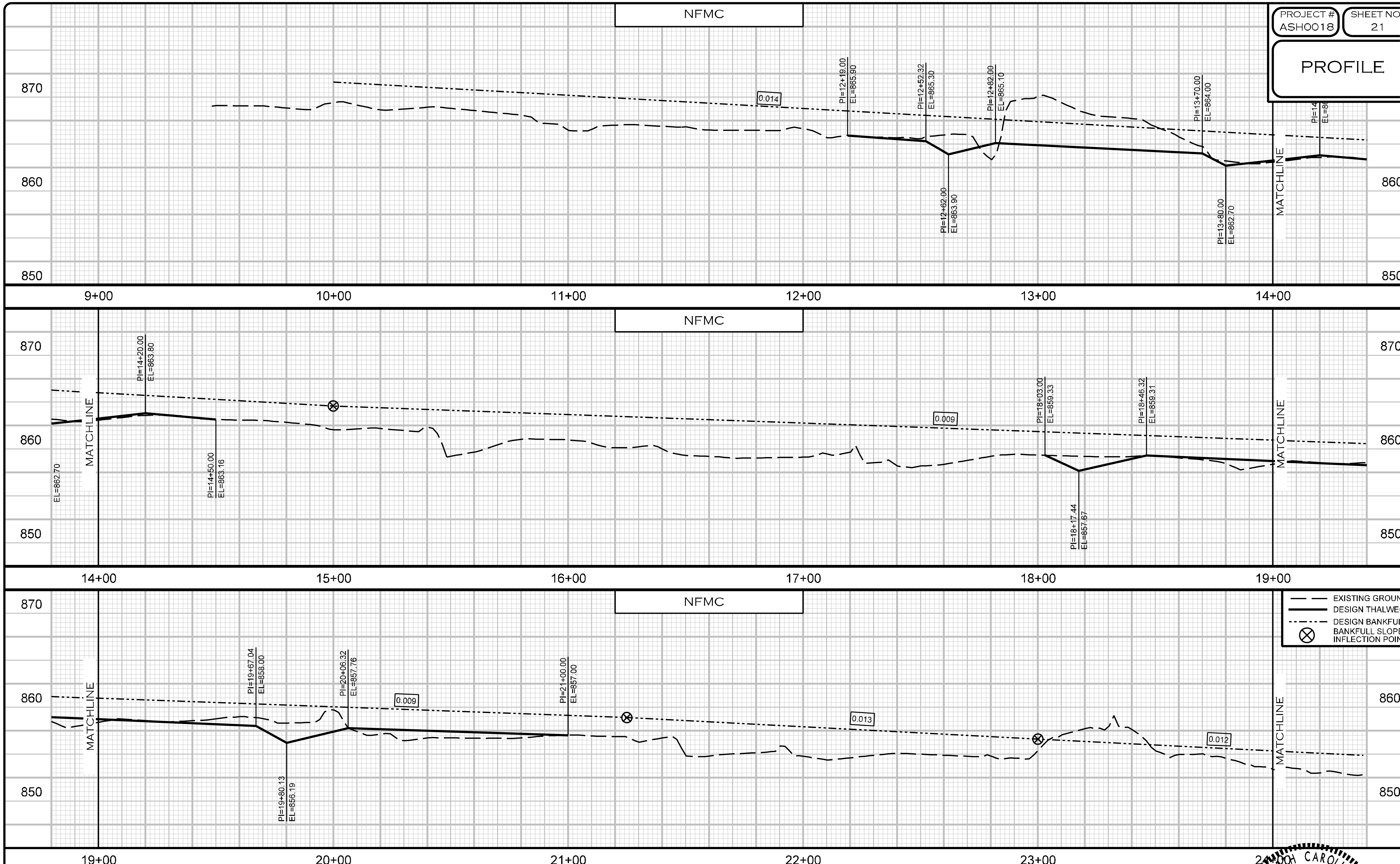
NORTH CAROLINA PROFESSIONAL SEAL 039201 ENGINEER JACOB M. BYERS

Jake Byers 7/31/2023

PROJECT # ASH0018

SHEET NO. 21

PROFILE



REVISIONS				
NO.	DESCRIPTION	ENGR.	APPROV.	DATE
1	DRAFT MITIGATION PLAN	JB	KLT	12/16/22
2	FINAL MITIGATION PLAN	JB	KLT	2/21/23
3	ISSUED FOR BID	JB	KLT	7/20/23

PREPARED FOR:

NC Mitigation Services

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

BANDYS FARM
CATAWBA COUNTY, NC

PREPARED IN THE OFFICE OF:

EPR Ecosystem Planning & Restoration
204 STONE RIDGE BLVD.
ASHEVILLE, NC 28804

PROFESSIONAL ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 039207 ENGINEER JACOB M. BYERS

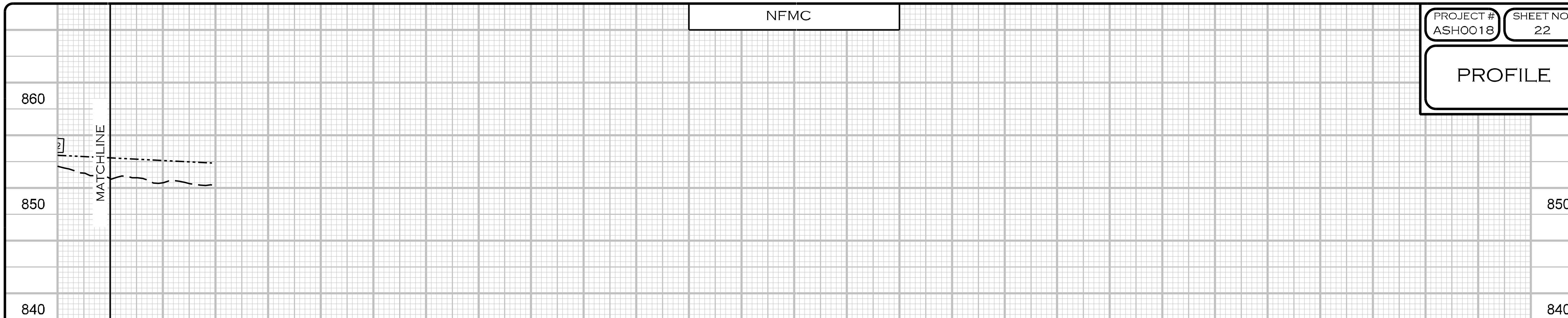
7/20/23

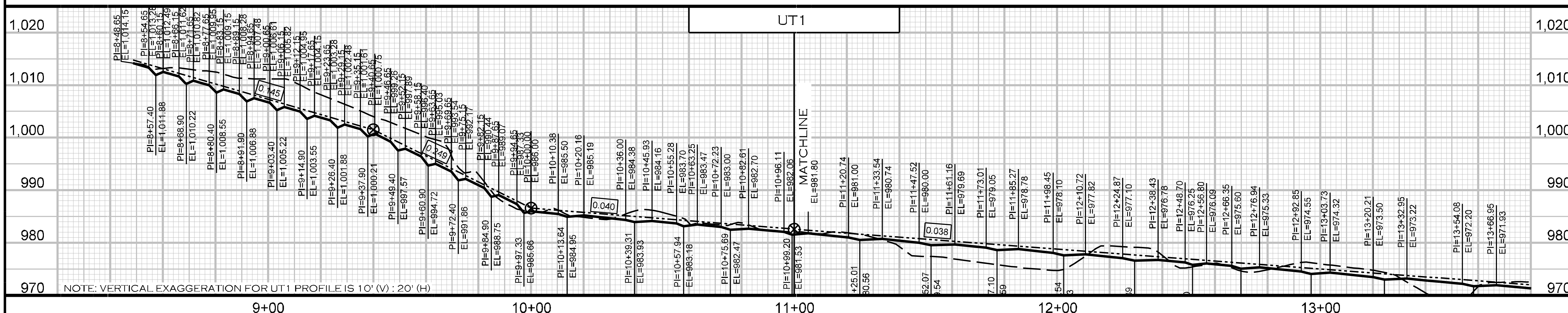
7/31/2023
A:\PROJECTS\ASH0018_NCDMS_BANDYS_FARM\CADD\PLANS\BF_PSH_21.DGN
BMYERS

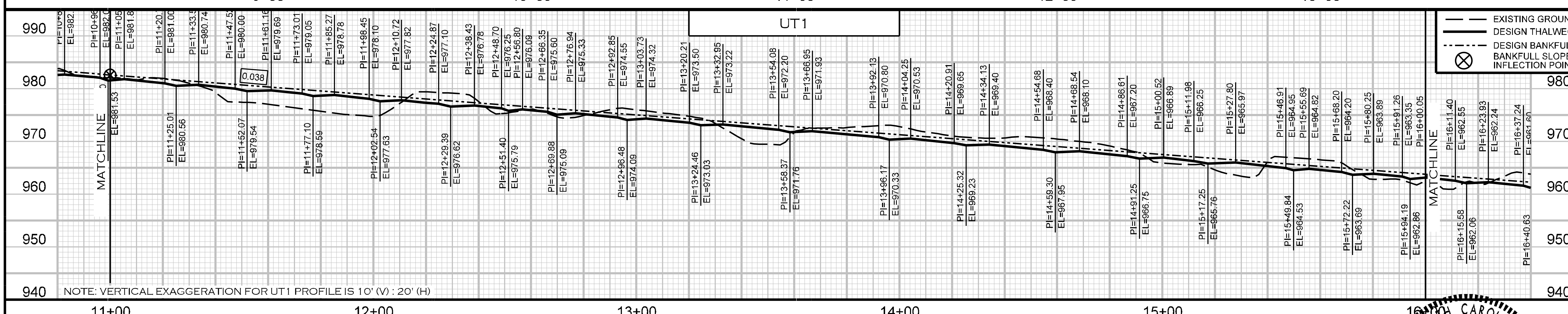
PROJECT # ASH0018

SHEET NO. 22

PROFILE







REVISIONS				
NO.	DESCRIPTION	ENGR.	APPROV	DATE
1	DRAFT MITIGATION PLAN	JB	KLT	12/16/22
2	FINAL MITIGATION PLAN	JB	KLT	2/21/23
3	ISSUED FOR BID	JB	KLT	7/20/23

PREPARED FOR:

NC Mitigation Services

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

BANDYS FARM
CATAWBA COUNTY, NC

PREPARED IN THE OFFICE OF:

ECOSYSTEM PLANNING & RESTORATION

204 STONE RIDGE BLVD.
ASHEVILLE, NC 28804

PROJECT ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 039207 ENGINEER JACOB M. BYERS

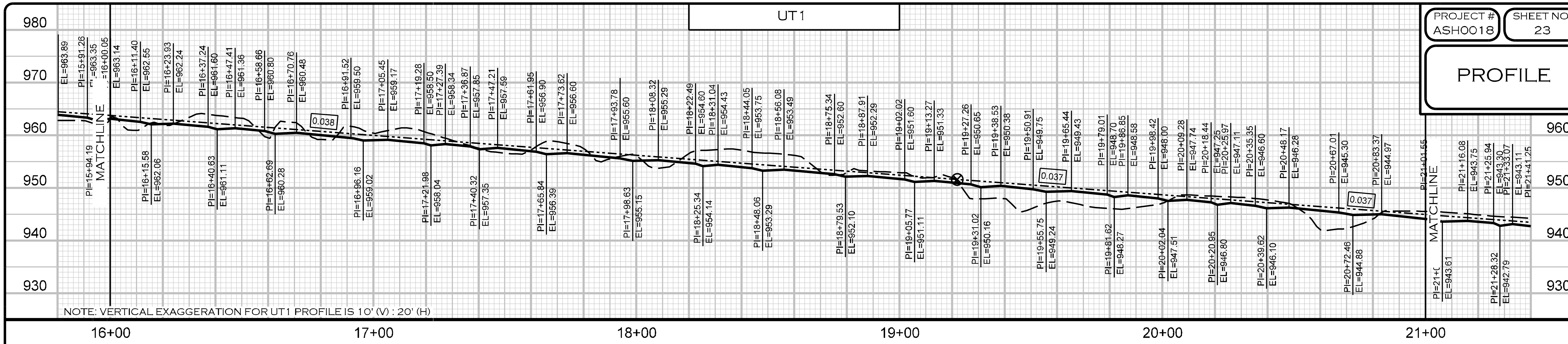
7/20/23

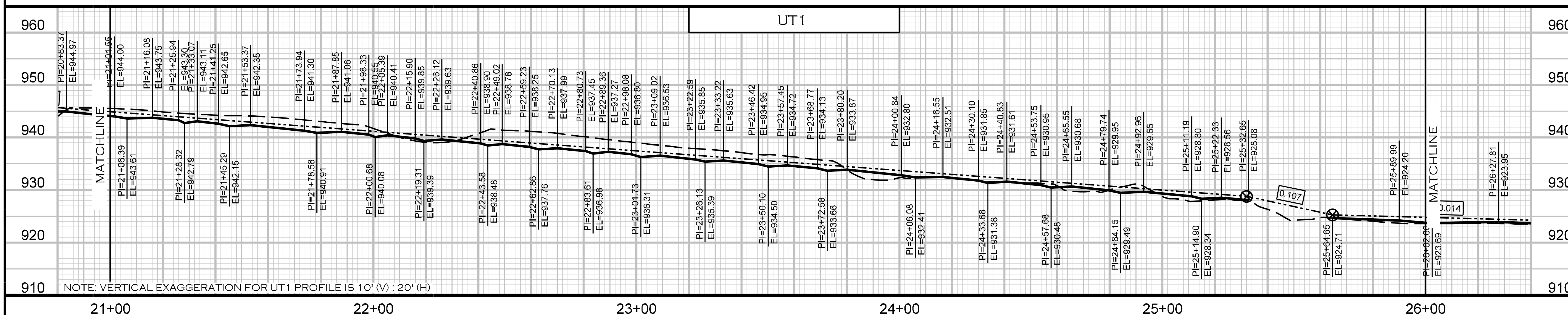
7/31/2023
K:\PROJECTS\ASH0018_NCDMS_BANDYS_FARM\CADD\PLANS\BF_PSH_22.DGN
BMYERS

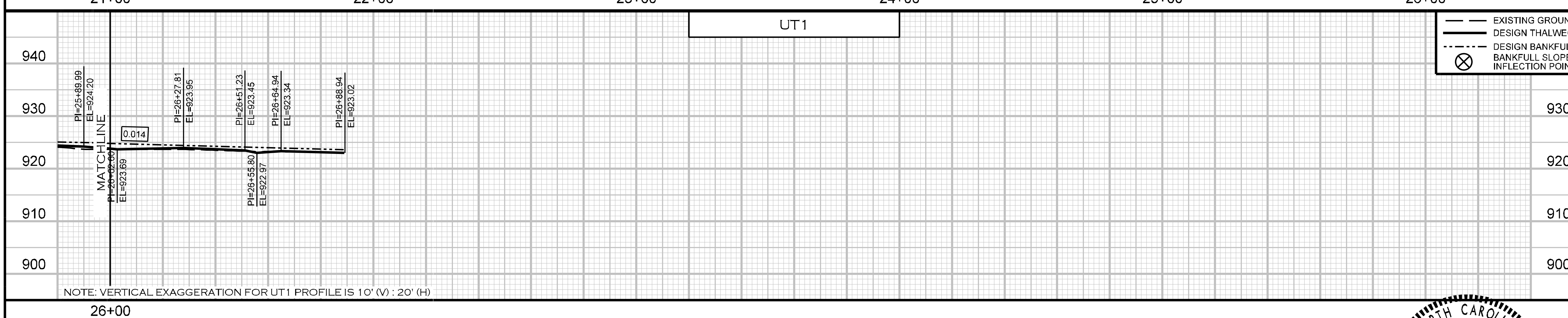
PROJECT # ASH0018

SHEET NO. 23

PROFILE







REVISIONS				
NO.	DESCRIPTION	ENGR.	APPROV.	DATE
1	DRAFT MITIGATION PLAN	JB	KLT	12/16/22
2	FINAL MITIGATION PLAN	JB	KLT	2/21/23
3	ISSUED FOR BID	JB	KLT	7/20/23

PREPARED FOR:

NC Mitigation Services

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

BANDYS FARM
CATAWBA COUNTY, NC

PREPARED IN THE OFFICE OF:

EPR ECOSYSTEM PLANNING & RESTORATION

204 STONE RIDGE BLVD.
ASHEVILLE, NC 28804

PROJECT ENGINEER

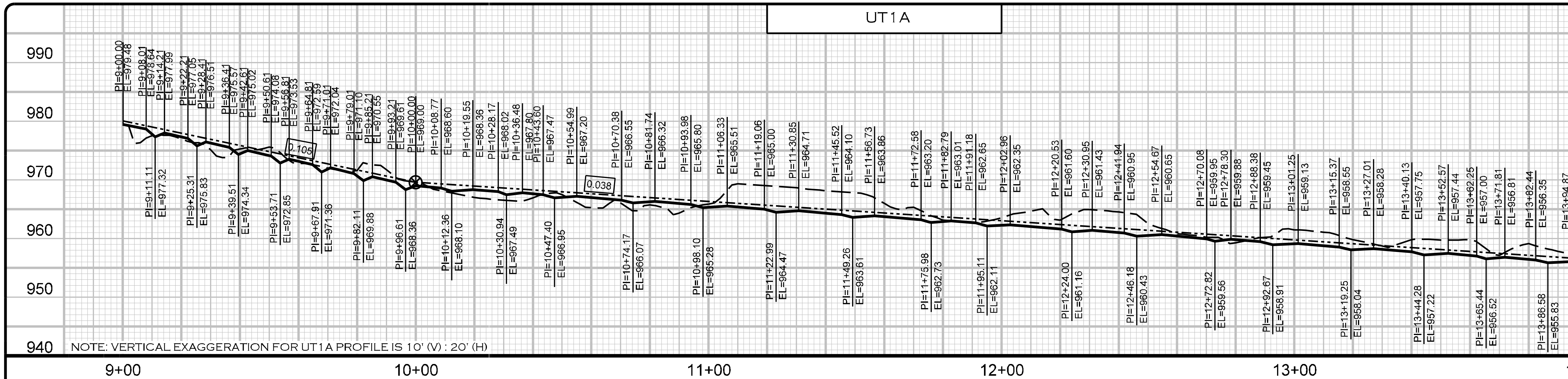
NORTH CAROLINA PROFESSIONAL SEAL 039201 ENGINEER JACOB M. BYERS

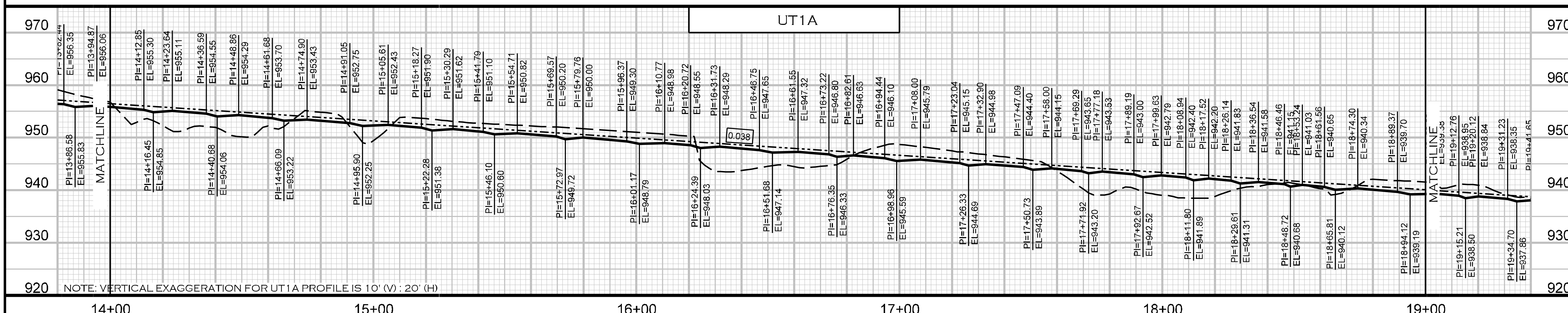
7/20/23

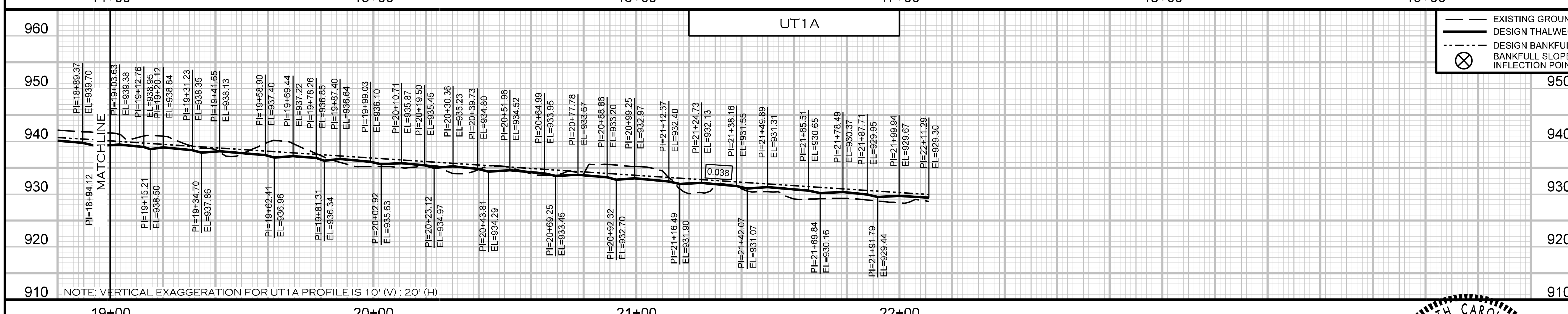
7/31/2023
A:\PROJECTS\ASH0018_NCDMS_BANDYS_FARM\CADD\PLANS\BF_PSH_23.DGN
BMYERS

PROJECT #	SHEET NO.
ASH0018	24

PROFILE







REVISIONS

NO.	DESCRIPTION	ENGR.	APPROV.	DATE
1	DRAFT MITIGATION PLAN	JB	KLT	12/16/22
2	FINAL MITIGATION PLAN	JB	KLT	2/21/23
3	ISSUED FOR BID	JB	KLT	7/20/23

PREPARED FOR:

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

BANDYS FARM
CATAWBA COUNTY, NC

PREPARED IN THE OFFICE OF:

ECOSYSTEM PLANNING & RESTORATION
204 STONE RIDGE BLVD.
ASHEVILLE, NC 28804

PROJECT ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 039201 ENGINEER JACOB M. BYERS

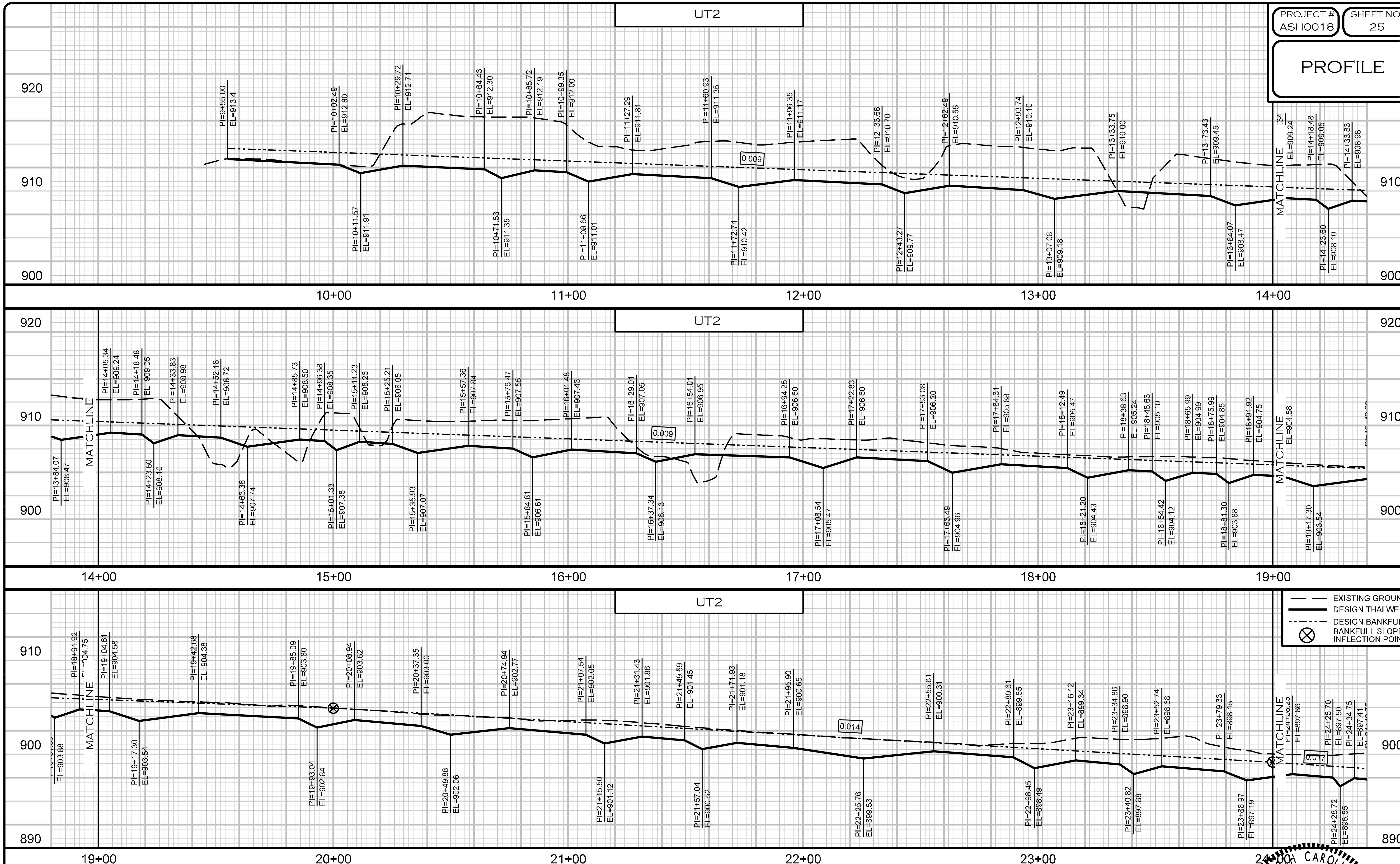
7/20/23

7/31/2023
K:\PROJECTS\ASH0018_NCDMS_BANDYS_FARM\CADD\PLANS\BF_PSH_24.DGN
BMYERS

PROJECT # ASH0018

SHEET NO. 25

PROFILE



REVISIONS				
NO.	DESCRIPTION	ENGR.	APPROV	DATE
1	DRAFT MITIGATION PLAN	JB	KLT	12/16/22
2	FINAL MITIGATION PLAN	JB	KLT	2/21/23
3	ISSUED FOR BID	JB	KLT	7/20/23

PREPARED FOR:

NC Mitigation Services

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

BANDYS FARM
CATAWBA COUNTY, NC

PREPARED IN THE OFFICE OF:

ECOSYSTEM PLANNING & RESTORATION

204 STONE RIDGE BLVD.
ASHEVILLE, NC 28804

PROJECT ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 039207 ENGINEER JACOB M. BYERS

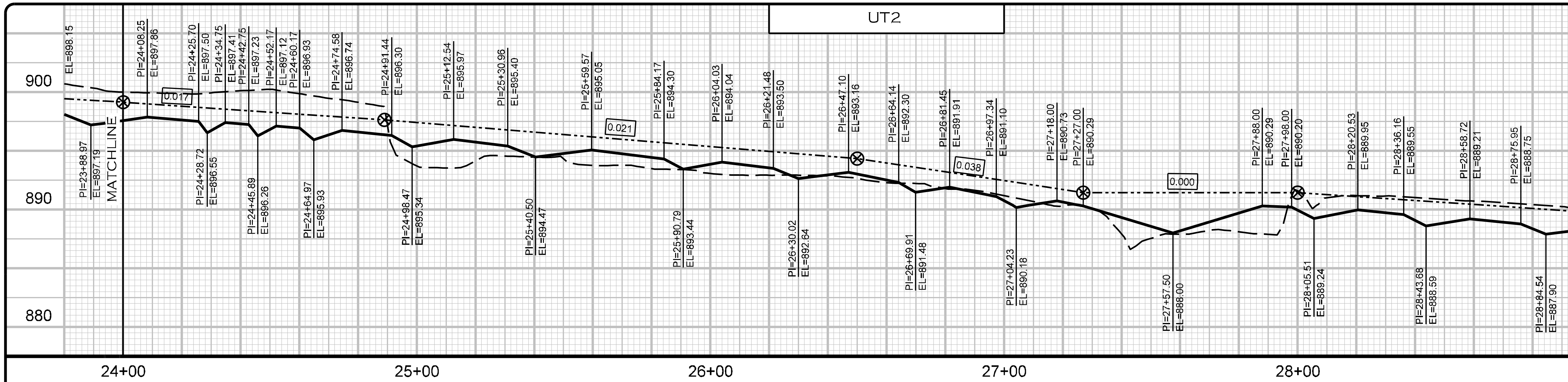
7/20/23

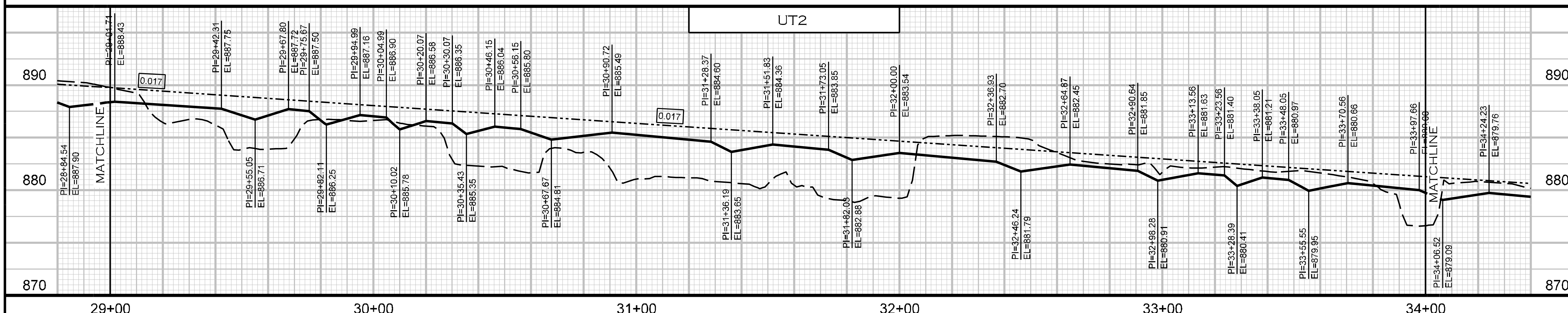
7/31/2023
K:\PROJECTS\ASH0018_NCDMS_BANDYS_FARM\CADD\PLANS\BF_PSH_25.DGN
BMYERS

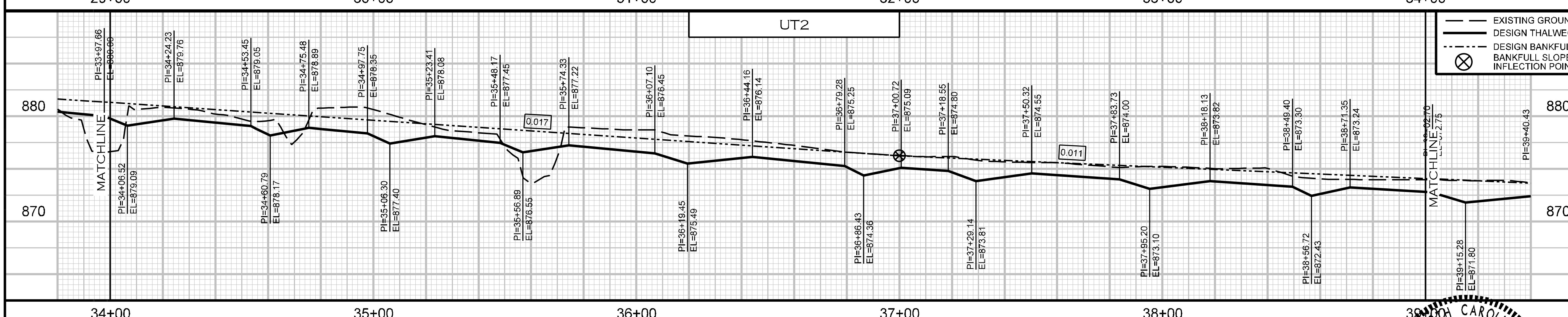
PROJECT # ASH0018

SHEET NO. 26

PROFILE







REVISIONS				
NO.	DESCRIPTION	ENGR.	APPROV.	DATE
1	DRAFT MITIGATION PLAN	JB	KLT	12/16/22
2	FINAL MITIGATION PLAN	JB	KLT	2/21/23
3	ISSUED FOR BID	JB	KLT	7/20/23

PREPARED FOR:

NC Mitigation Services

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

BANDYS FARM
CATAWBA COUNTY, NC

PREPARED IN THE OFFICE OF:

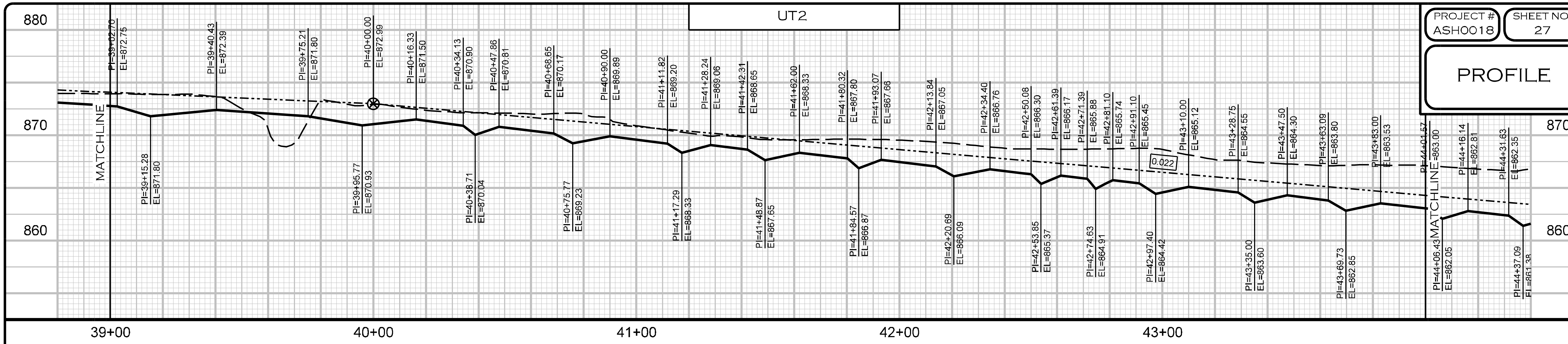
EPR Ecosystem Planning & Restoration
204 STONE RIDGE BLVD.
ASHEVILLE, NC 28804

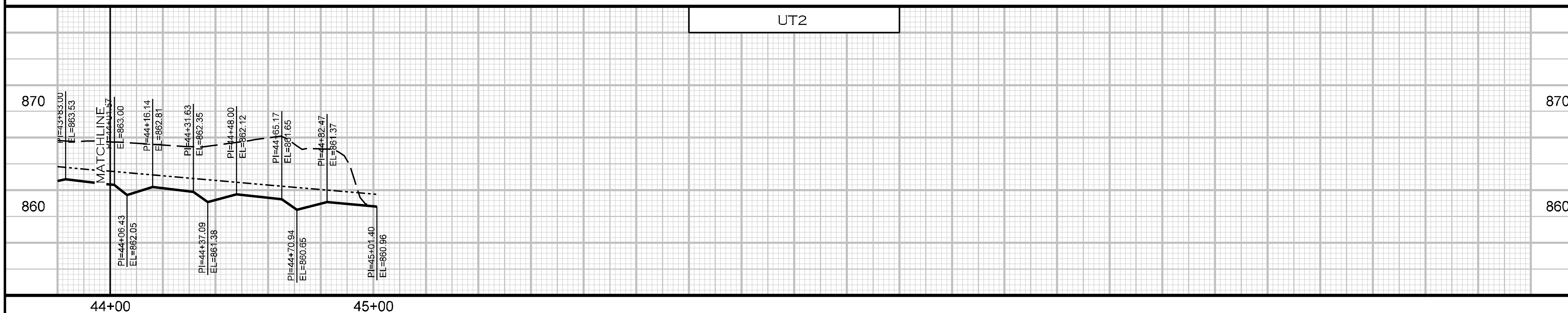
PROJECT ENGINEER

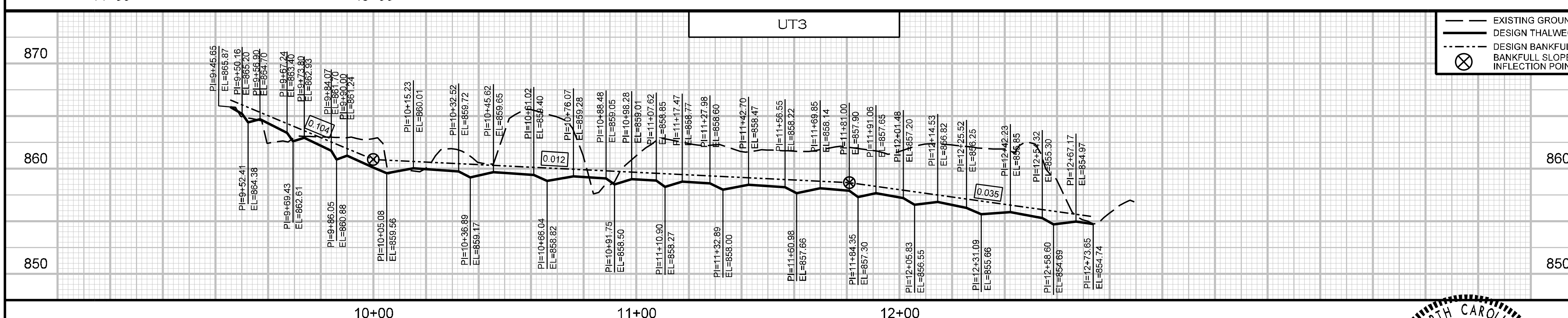
NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 039201 JACOB M. BYERS

Jake Byers 7/20/23

7/31/2023 A:\PROJECTS\ASH0018_NCDMS_BANDYS_FARM\CADD\PLANS\BF_PSH_26.DGN BMYERS







REVISIONS				
NO.	DESCRIPTION	ENGR.	APPROV	DATE
1	DRAFT MITIGATION PLAN	JB	KLT	12/16/22
2	FINAL MITIGATION PLAN	JB	KLT	2/21/23
3	ISSUED FOR BID	JB	KLT	7/20/23

PREPARED FOR:

NC Mitigation Services

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

BANDYS FARM
CATAWBA COUNTY, NC

PREPARED IN THE OFFICE OF:

ECOSYSTEM PLANNING & RESTORATION

204 STONE RIDGE BLVD.
ASHEVILLE, NC 28804

PROJECT ENGINEER

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 039201 JACOB M. BYERS

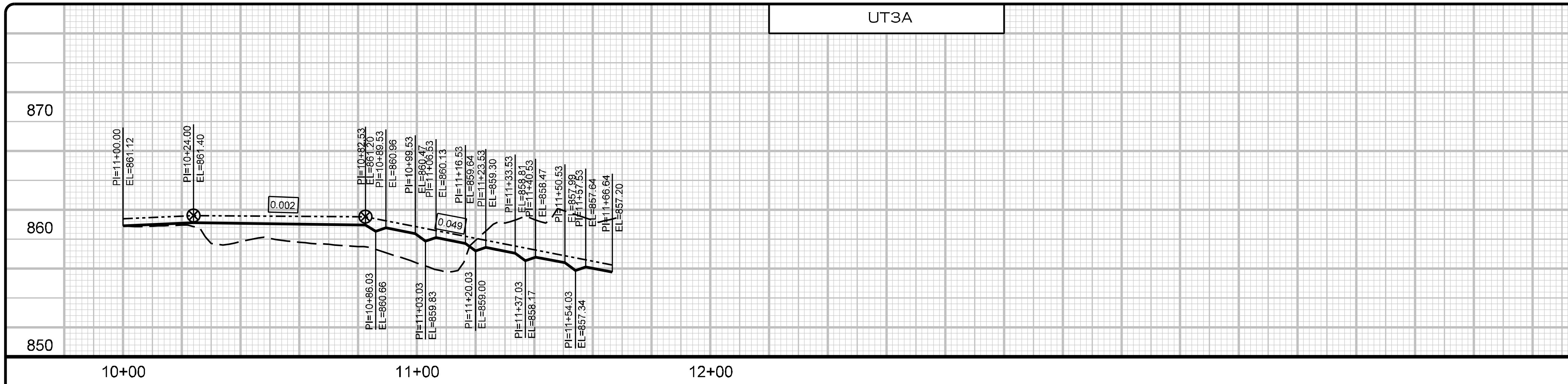
Jake Byers 7/20/23

7/31/2023
K:\PROJECTS\ASH0018_NCDMS_BANDYS_FARM\CADD\PLANS\BF_PSH_27.DGN
BMYERS

PROJECT #	SHEET NO.
ASH0018	28

PROFILE

UT3A



EXISTING GROUND
DESIGN THALWEG
DESIGN BANKFULL
BANKFULL SLOPE INFLECTION POINT

REVISIONS				
NO.	DESCRIPTION	ENGR.	APPROV	DATE
1	DRAFT MITIGATION PLAN	JB	KLT	12/16/22
2	FINAL MITIGATION PLAN	JB	KLT	2/21/23
3	ISSUED FOR BID	JB	KLT	7/20/23

PREPARED FOR:

NC Mitigation Services

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

BANDYS FARM
CATAWBA COUNTY, NC

PREPARED IN THE OFFICE OF:

ECOSYSTEM PLANNING & RESTORATION

204 STONE RIDGE BLVD.
ASHEVILLE, NC 28804

PROJECT ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 039201 ENGINEER JACOB M. BYERS

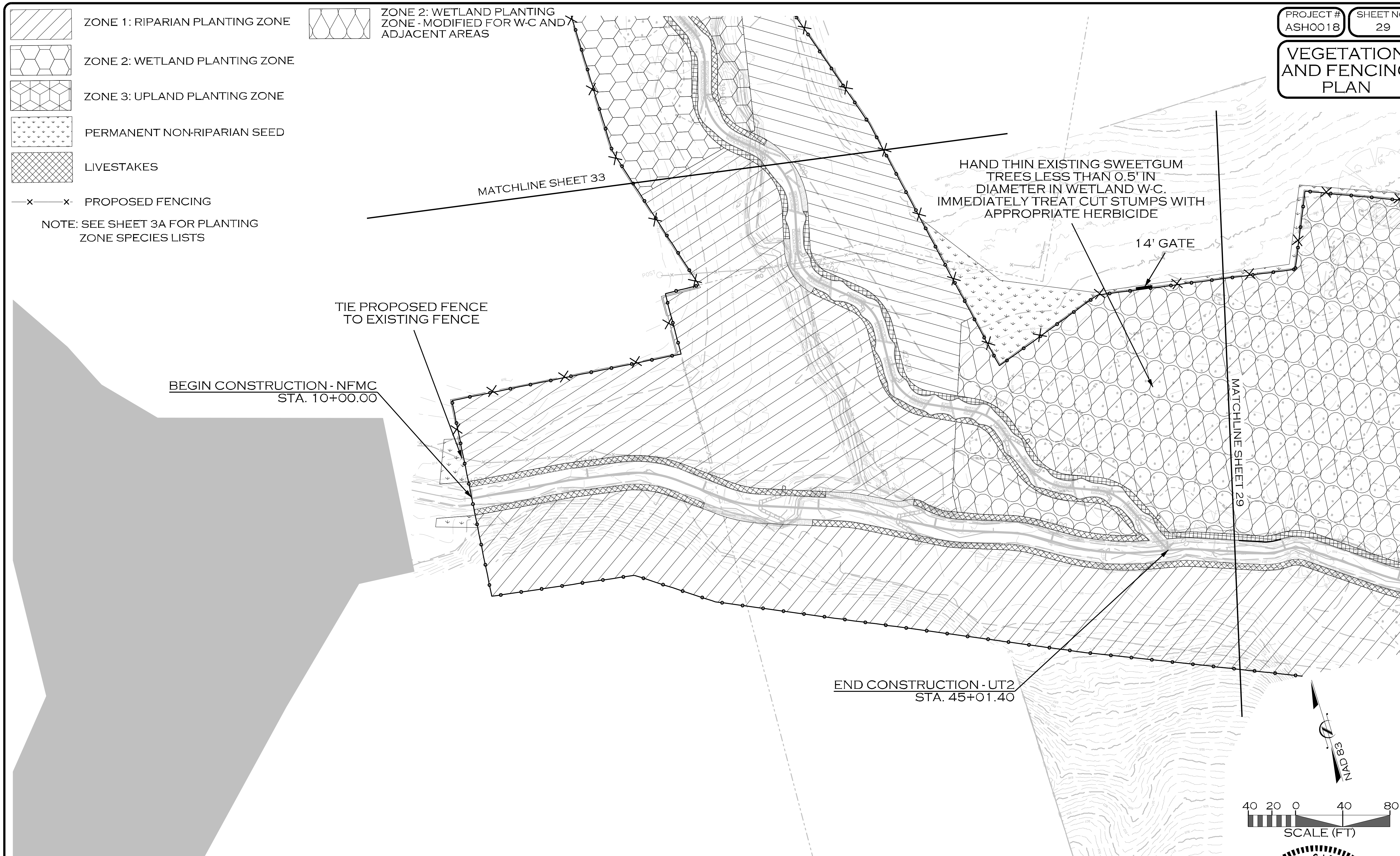
7/20/23

7/31/2023
A:\PROJECTS\ASH0018_NCDMS_BANDYS_FARM\CADD\PLANS\BF_PSH_28.DGN
BMYERS

PROJECT # ASH0018

SHEET NO. 29

VEGETATION AND FENCING PLAN



REVISIONS				
NO.	DESCRIPTION	ENGR.	APPROV	DATE
1	DRAFT MITIGATION PLAN	JB	KLT	12/16/22
2	FINAL MITIGATION PLAN	JB	KLT	2/21/23
3	ISSUED FOR BID	JB	KLT	7/20/23

PREPARED FOR:

NC Mitigation Services ENVIRONMENTAL QUALITY

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

BANDYS FARM
CATAWBA COUNTY, NC

PREPARED IN THE OFFICE OF:

EPR Ecosystem Planning & Restoration

204 STONE RIDGE BLVD.
ASHEVILLE, NC 28804

PROJECT ENGINEER

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 039201 JACOB M. BYERS

Jake Byers 7/20/23

7/31/2023
X:\PROJECTS\ASH0018_NCDMS_BANDYS_FARM\CADD\PLANS\BF_PSH_29.DGN
BYERS

PROJECT # ASH0018

SHEET NO. 30

VEGETATION AND FENCING PLAN

ZONE 1: RIPARIAN PLANTING ZONE

ZONE 2: WETLAND PLANTING ZONE

ZONE 3: UPLAND PLANTING ZONE

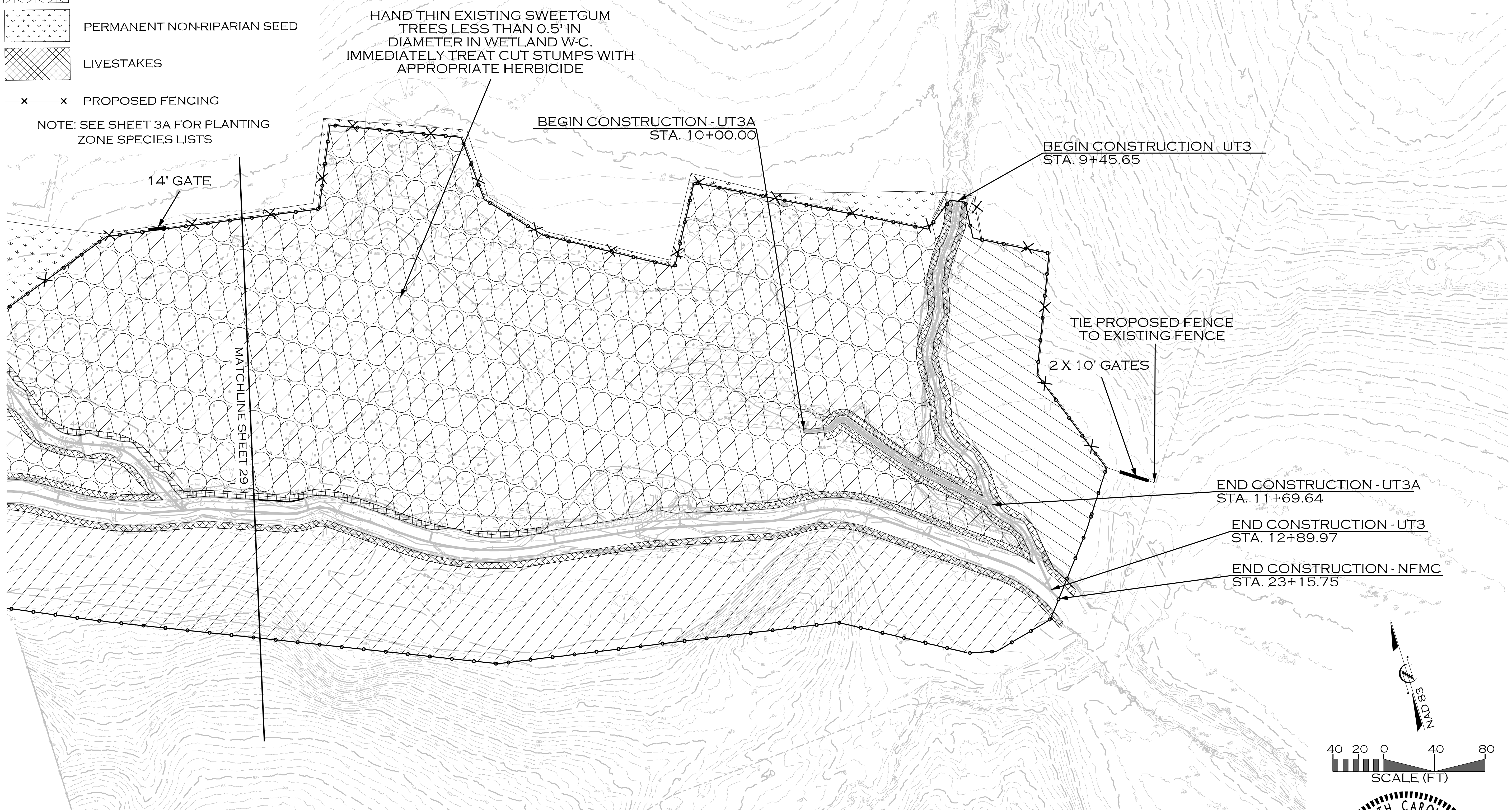
PERMANENT NON-RIPARIAN SEED

LIVESTAKES

PROPOSED FENCING

ZONE 2: WETLAND PLANTING ZONE - MODIFIED FOR W-C AND ADJACENT AREAS

NOTE: SEE SHEET 3A FOR PLANTING ZONE SPECIES LISTS



7/31/2023
X:\PROJECTS\ASH0018_NCDMS_Bandys_Farm\CADD\PLANS\BF_PSH_30.DGN
BYERS

REVISIONS

NO.	DESCRIPTION	ENGR.	APPROV	DATE
1	DRAFT MITIGATION PLAN	JB	KLT	12/16/22
2	FINAL MITIGATION PLAN	JB	KLT	2/21/23
3	ISSUED FOR BID	JB	KLT	7/20/23

PREPARED FOR:

NC Mitigation Services
NC DEPARTMENT OF ENVIRONMENTAL QUALITY
DIVISION OF MITIGATION SERVICES
1652 MAIL SERVICE CENTER
RALEIGH, NC 27699-1652

BANDYS FARM
CATAWBA COUNTY, NC

PREPARED IN THE OFFICE OF:

Ecosystem Planning & Restoration
204 STONE RIDGE BLVD.
ASHEVILLE, NC 28804

PROJECT ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 039207 ENGINEER JACOB M. BYERS

Jake Byers 7/20/23

PROJECT #	SHEET NO.
ASH0018	31

VEGETATION AND FENCING PLAN

ZONE 1: RIPARIAN PLANTING ZONE

ZONE 2: WETLAND PLANTING ZONE

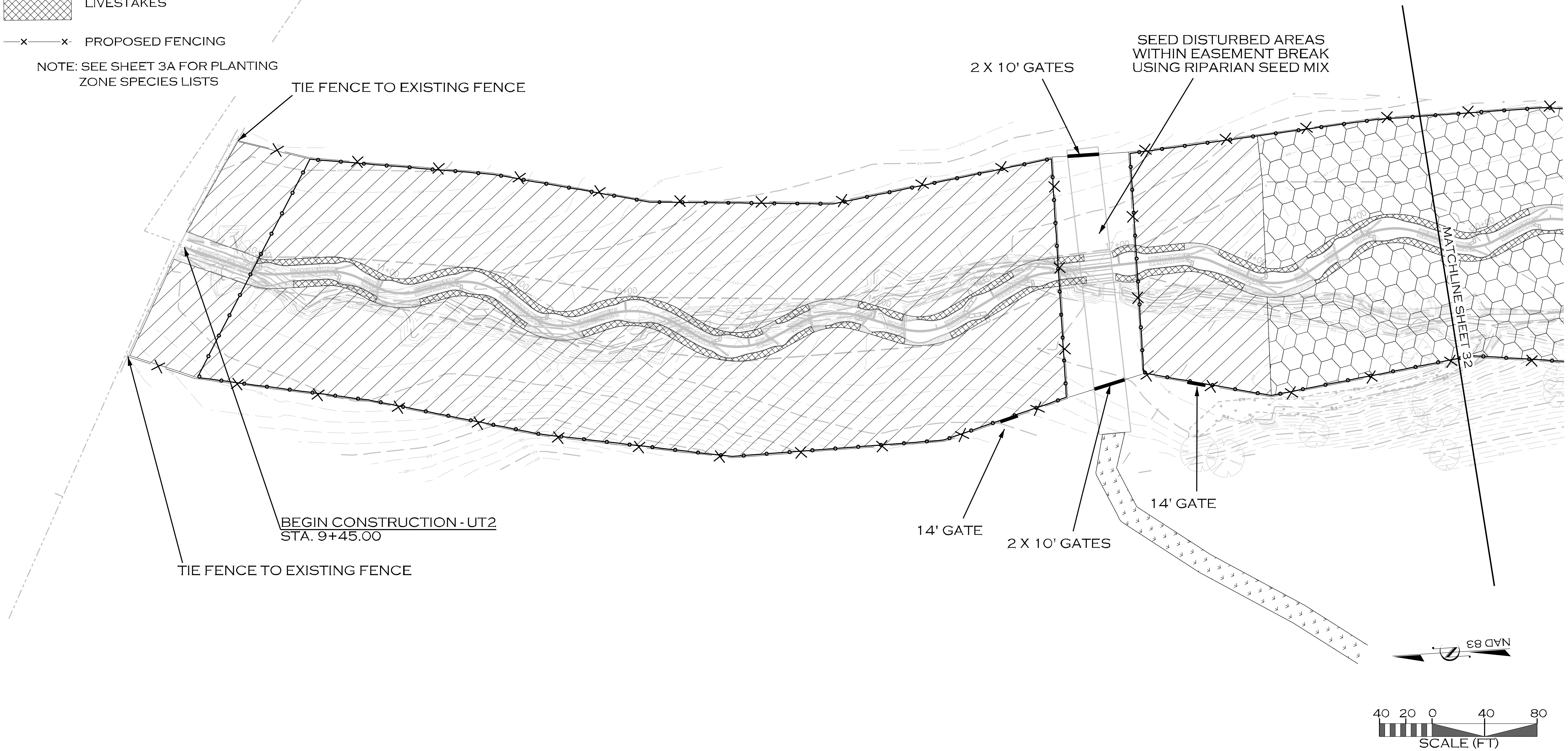
ZONE 3: UPLAND PLANTING ZONE

PERMANENT NON-RIPARIAN SEED

LIVESTAKES

PROPOSED FENCING

NOTE: SEE SHEET 3A FOR PLANTING ZONE SPECIES LISTS



REVISIONS

NO.	DESCRIPTION	ENGR.	APPROV	DATE
1	DRAFT MITIGATION PLAN	JB	KLT	12/16/22
2	FINAL MITIGATION PLAN	JB	KLT	2/21/23
3	ISSUED FOR BID	JB	KLT	7/20/23

PREPARED FOR:

NC Mitigation Services

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

BANDYS FARM
CATAWBA COUNTY, NC

PREPARED IN THE OFFICE OF:

Ecosystem Planning & Restoration

204 STONE RIDGE BLVD.
ASHEVILLE, NC 28804

PROJECT ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 039201 ENGINEER JACOB M. BYERS

7/20/23

7/31/2023
K:\PROJECTS\ASH0018_NCDMS_BANDYS_FARM\CADD\PLANS\BF_PSH_31.DGN
BYERS

PROJECT # ASH0018 | SHEET NO. 32

VEGETATION AND FENCING PLAN

ZONE 1: RIPARIAN PLANTING ZONE

ZONE 2: WETLAND PLANTING ZONE

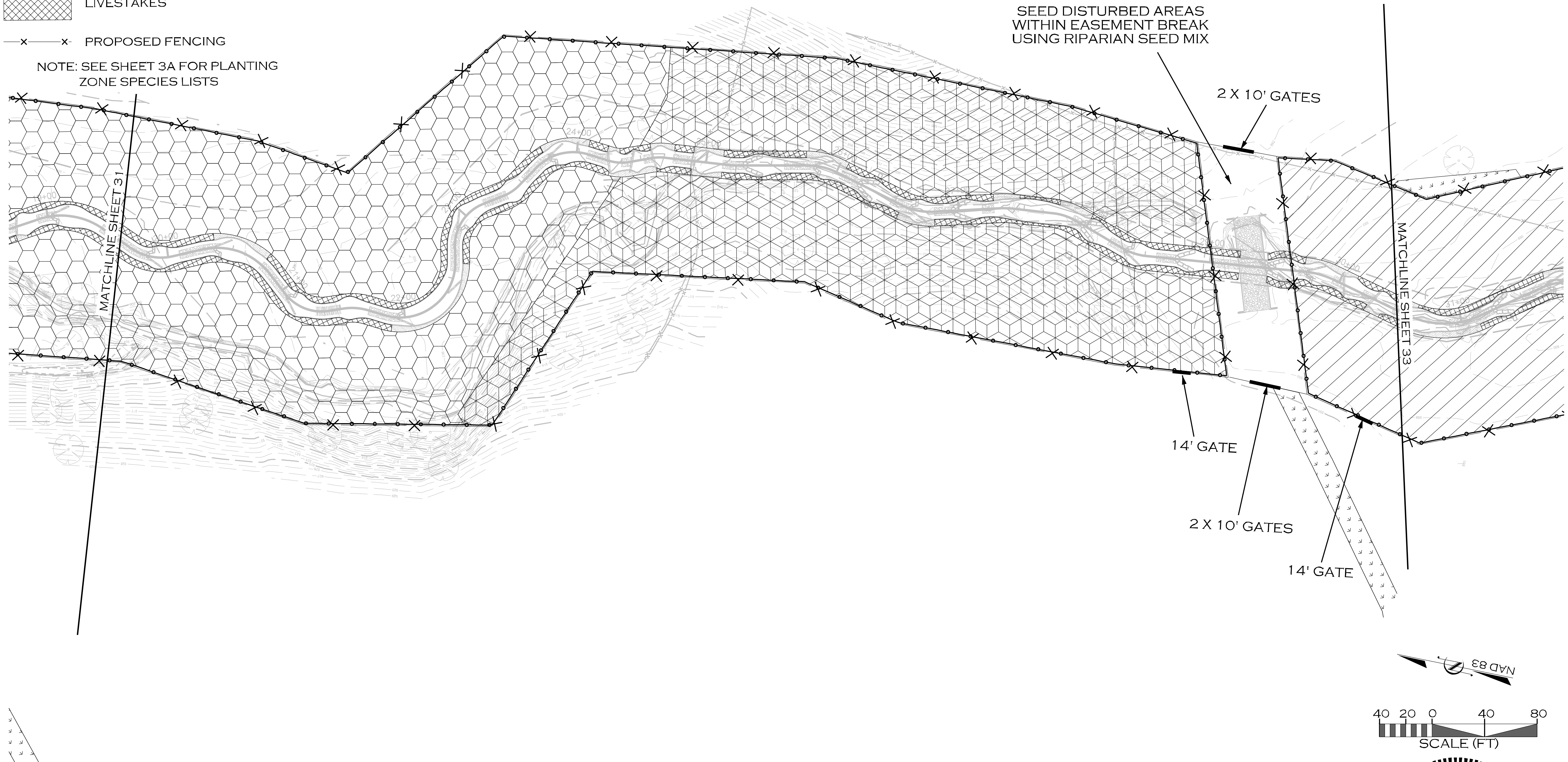
ZONE 3: UPLAND PLANTING ZONE

PERMANENT NON-RIPARIAN SEED

LIVESTAKES

PROPOSED FENCING

NOTE: SEE SHEET 3A FOR PLANTING ZONE SPECIES LISTS



REVISIONS				
NO.	DESCRIPTION	ENGR.	APPROV	DATE
1	DRAFT MITIGATION PLAN	JB	KLT	12/16/22
2	FINAL MITIGATION PLAN	JB	KLT	2/21/23
3	ISSUED FOR BID	JB	KLT	7/20/23

PREPARED FOR:

NC Mitigation Services

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

BANDYS FARM
CATAWBA COUNTY, NC

PREPARED IN THE OFFICE OF:

EPR Ecosystem Planning & Restoration

204 STONE RIDGE BLVD.
ASHEVILLE, NC 28804

PROJECT ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 039207 ENGINEER JACOB M. BYERS

7/20/23

7/31/2023
X:\PROJECTS\ASH0018_NCDMS_BANDYS_FARM\CADD\PLANS\BF_PSH_32.DGN
BYERS

ZONE 1: RIPARIAN PLANTING ZONE

ZONE 2: WETLAND PLANTING ZONE

ZONE 3: UPLAND PLANTING ZONE

PERMANENT NON-RIPARIAN SEED

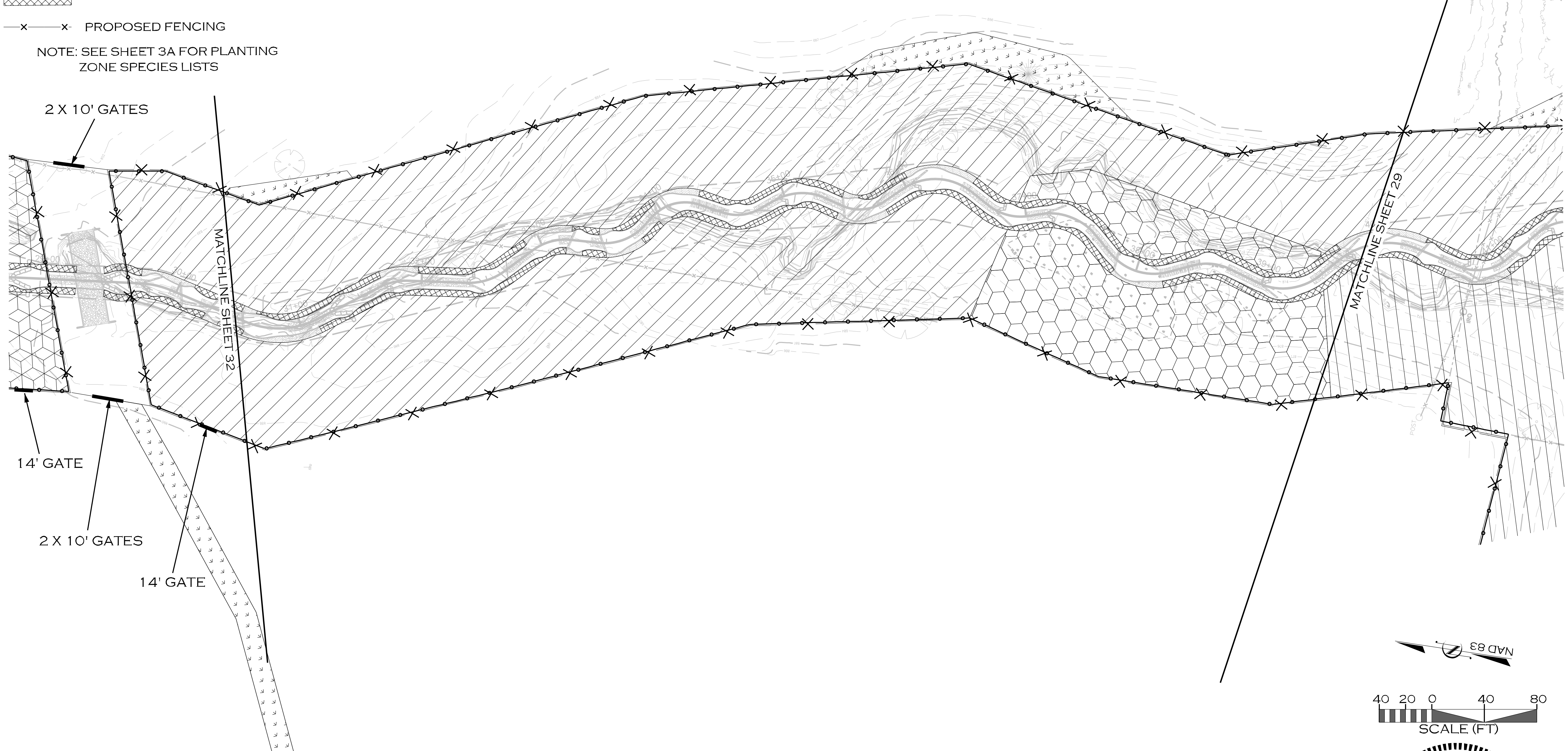
LIVESTAKES

PROPOSED FENCING

NOTE: SEE SHEET 3A FOR PLANTING ZONE SPECIES LISTS

PROJECT #	SHEET NO.
ASH0018	33

VEGETATION AND FENCING PLAN



REVISIONS

NO.	DESCRIPTION	ENGR.	APPROV	DATE
1	DRAFT MITIGATION PLAN	JB	KLT	12/16/22
2	FINAL MITIGATION PLAN	JB	KLT	2/21/23
3	ISSUED FOR BID	JB	KLT	7/20/23

PREPARED FOR:

Mitigation Services

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

BANDYS FARM
CATAWBA COUNTY, NC

PREPARED IN THE OFFICE OF:

Ecosystem Planning & Restoration

204 STONE RIDGE BLVD.
ASHEVILLE, NC 28804

PROJECT ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 039207 ENGINEER JACOB M. BYERS

7/20/23

7/31/2023
K:\PROJECTS\ASH0018_NCDMS_BANDYS_FARM\CADD\PLANS\BF_PSH_33.DGN
BYERS

PROJECT #: ASH0018

SHEET NO. 34

VEGETATION AND FENCING PLAN

ZONE 1: RIPARIAN PLANTING ZONE

ZONE 2: WETLAND PLANTING ZONE

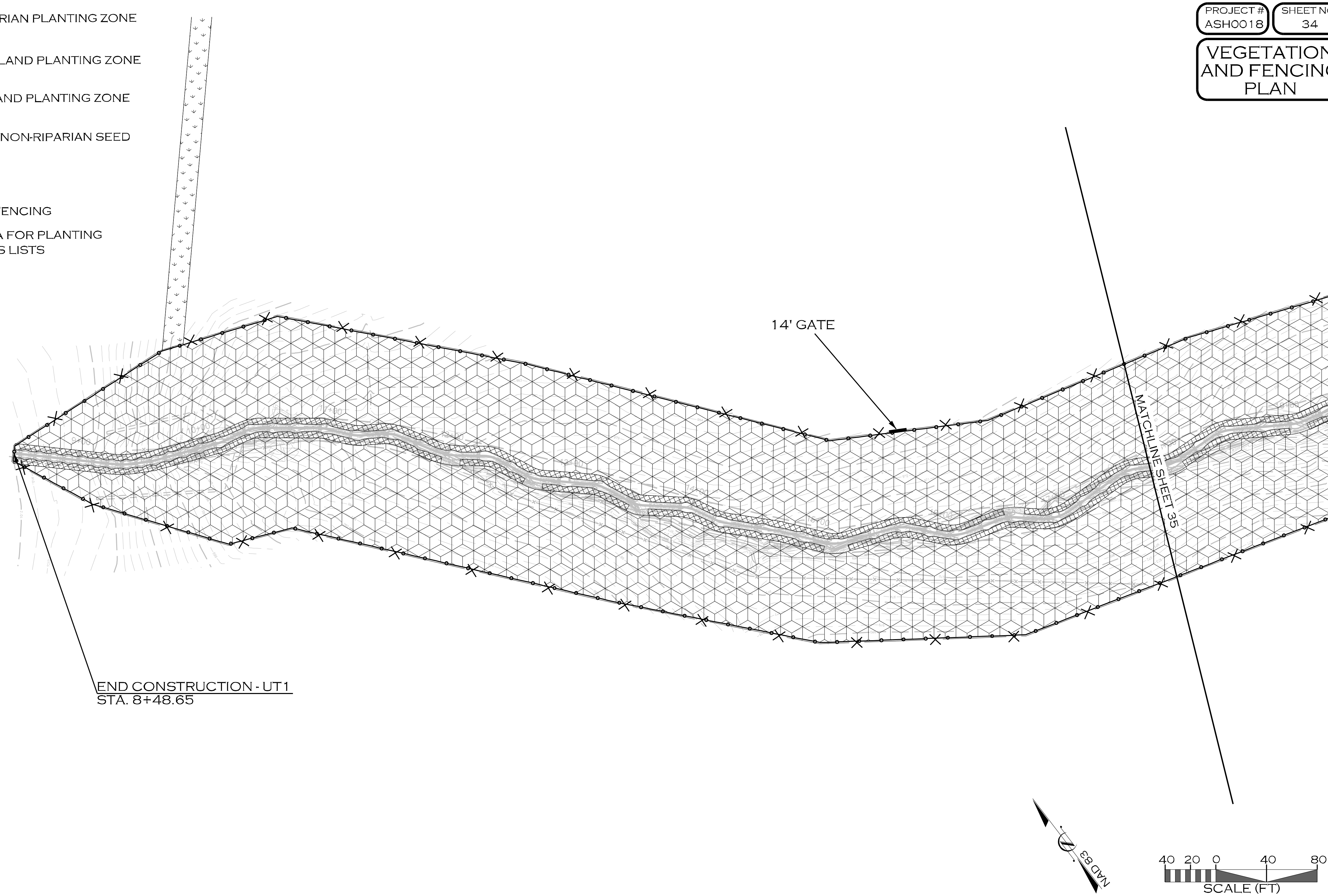
ZONE 3: UPLAND PLANTING ZONE

PERMANENT NON-RIPARIAN SEED

LIVESTAKES

PROPOSED FENCING

NOTE: SEE SHEET 3A FOR PLANTING ZONE SPECIES LISTS



REVISIONS

NO.	DESCRIPTION	ENGR.	APPROV	DATE
1	DRAFT MITIGATION PLAN	JB	KLT	12/16/22
2	FINAL MITIGATION PLAN	JB	KLT	2/21/23
3	ISSUED FOR BID	JB	KLT	7/20/23

PREPARED FOR:

NC Mitigation Services

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

BANDYS FARM
CATAWBA COUNTY, NC

PREPARED IN THE OFFICE OF:

EPR Ecosystem Planning & Restoration

204 STONE RIDGE BLVD.
ASHEVILLE, NC 28804

PROJECT ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 039201 ENGINEER JACOB M. BYERS

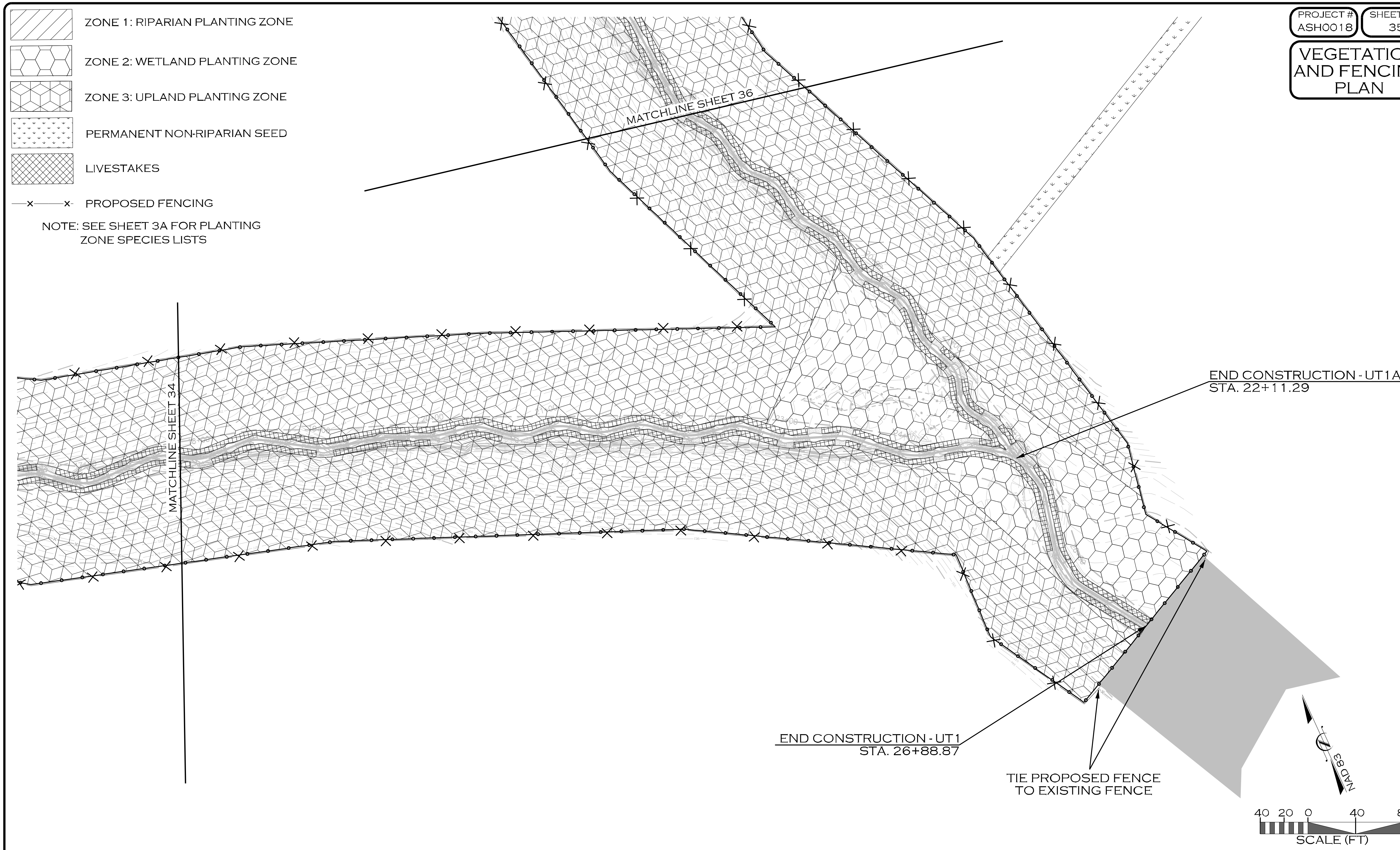
7/31/2023

7/31/2023
K:\PROJECTS\ASH0018_NCDMS_BANDYS_FARM\CADD\PLANS\BF_PSH_34.DGN
BYERS

PROJECT # ASH0018

SHEET NO. 35

VEGETATION AND FENCING PLAN



REVISIONS				
NO.	DESCRIPTION	ENGR.	APPROV.	DATE
1	DRAFT MITIGATION PLAN	JB	KLT	12/16/22
2	FINAL MITIGATION PLAN	JB	KLT	2/21/23
3	ISSUED FOR BID	JB	KLT	7/20/23

PREPARED FOR:

NC Mitigation Services

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

BANDYS FARM
CATAWBA COUNTY, NC

PREPARED IN THE OFFICE OF:

EPR Ecosystem Planning & Restoration
204 STONE RIDGE BLVD.
ASHEVILLE, NC 28804

PROJECT ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 039207 ENGINEER JACOB M. BYERS

7/20/23

7/31/2023
K:\PROJECTS\ASH0018_NCDMS_BANDYS_FARM\CADD\PLANS\BF_PSH_35.DGN
BYERS

PROJECT # ASH0018 | SHEET NO. 36

VEGETATION AND FENCING PLAN

ZONE 1: RIPARIAN PLANTING ZONE

ZONE 2: WETLAND PLANTING ZONE

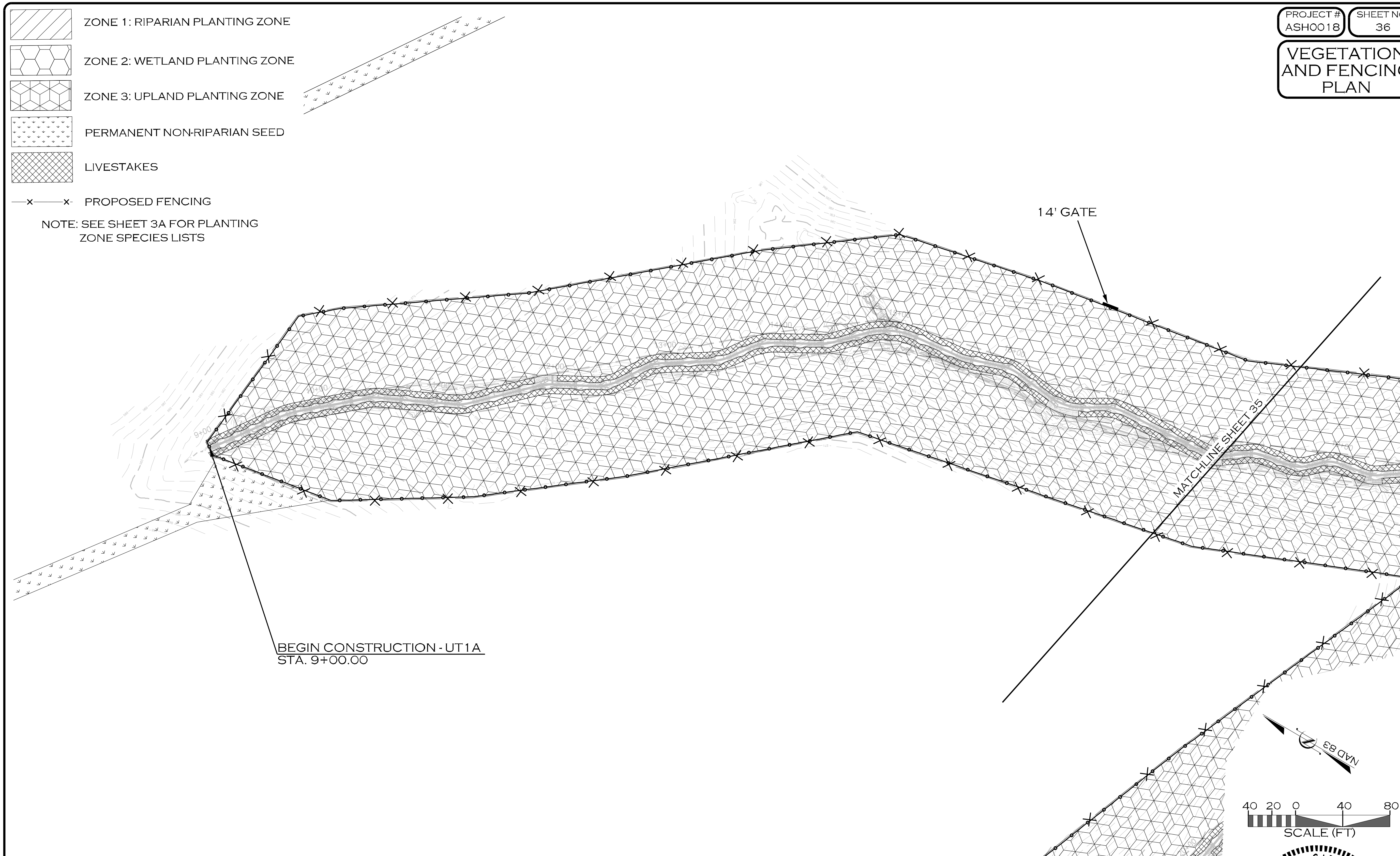
ZONE 3: UPLAND PLANTING ZONE

PERMANENT NON-RIPARIAN SEED

LIVESTAKES

PROPOSED FENCING

NOTE: SEE SHEET 3A FOR PLANTING ZONE SPECIES LISTS



REVISIONS				
NO.	DESCRIPTION	ENGR.	APPROV	DATE
1	DRAFT MITIGATION PLAN	JB	KLT	12/16/22
2	FINAL MITIGATION PLAN	JB	KLT	2/21/23
3	ISSUED FOR BID	JB	KLT	7/20/23

PREPARED FOR:

NC Mitigation Services
NC DEPARTMENT OF ENVIRONMENTAL QUALITY
DIVISION OF MITIGATION SERVICES
1652 MAIL SERVICE CENTER
RALEIGH, NC 27699-1652

BANDYS FARM
CATAWBA COUNTY, NC

PREPARED IN THE OFFICE OF:

Ecosystem Planning & Restoration
204 STONE RIDGE BLVD.
ASHEVILLE, NC 28804

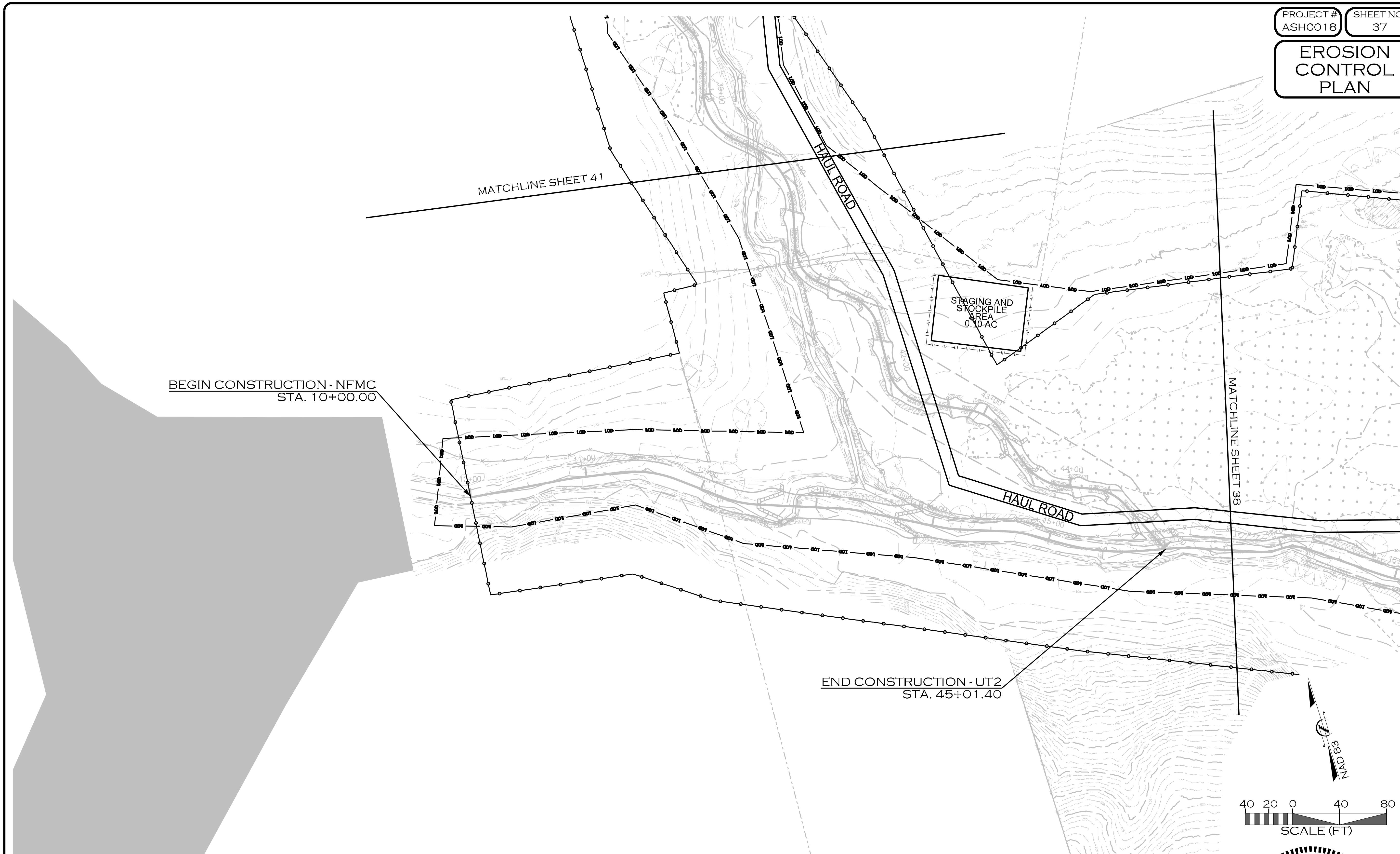
PROJECT ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 039201 ENGINEER JACOB M. BYERS

7/20/23

7/31/2023
X:\PROJECTS\ASH0018_NCDMS_BANDYS_FARM\CADD\PLANS\BF_PSH_36.DGN
BYERS

EROSION CONTROL PLAN



REVISIONS				
NO.	DESCRIPTION	ENGR.	APPROV	DATE
1	DRAFT MITIGAITON PLAN	JB	KLT	12/16/22
2	FINAL MITIGATION PLAN	JB	KLT	2/21/23
3	ISSUED FOR BID	JB	KLT	7/20/23

PREPARED FOR:

NC Mitigation Services

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

BANDYS FARM
CATAWBA COUNTY, NC

PREPARED IN THE OFFICE OF:

ECOSYSTEM PLANNING & RESTORATION

204 STONE RIDGE BLVD.
ASHEVILLE, NC 28804

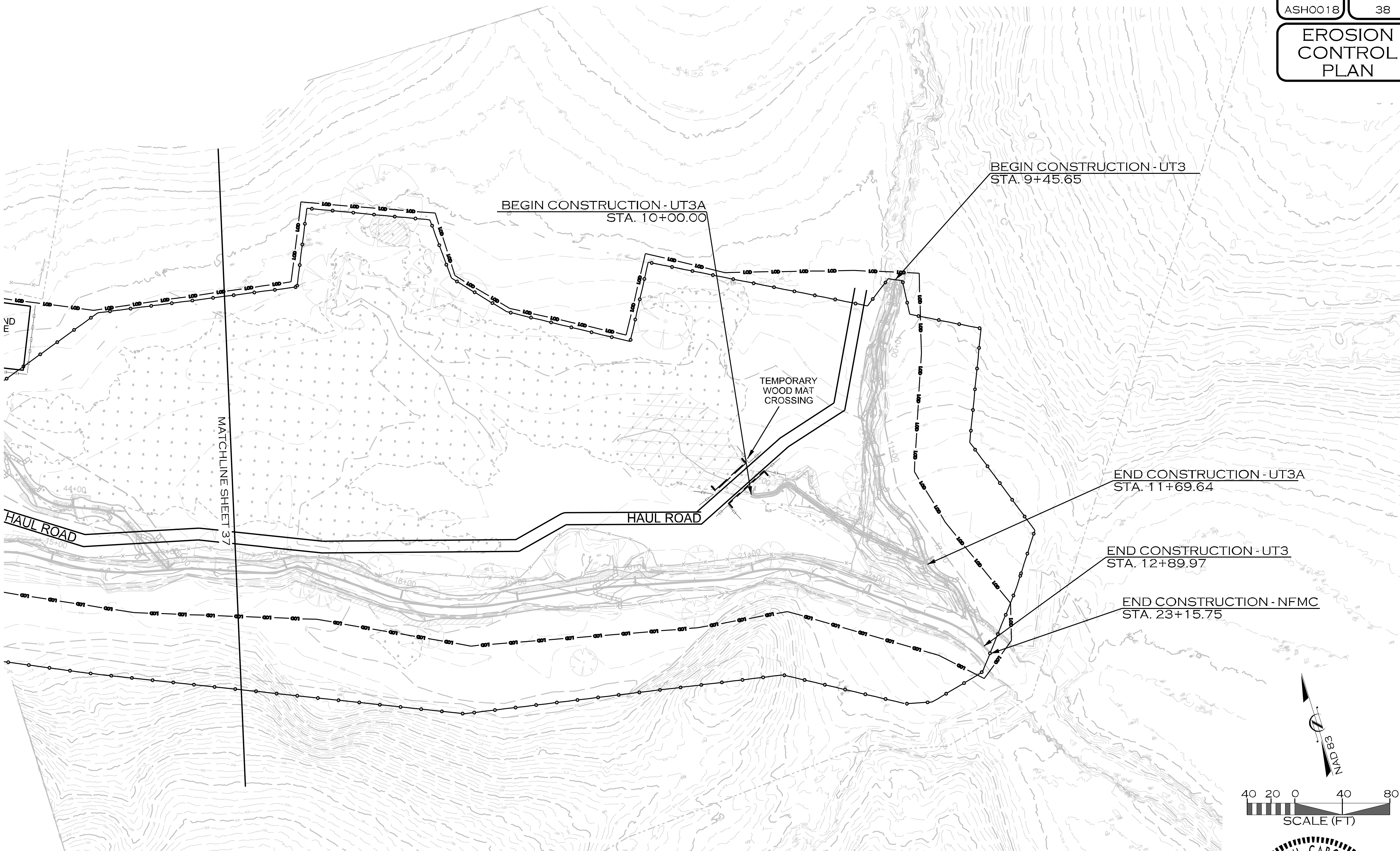
PROJECT ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 039201 ENGINEER JACOB M. BYERS

7/20/23

7/31/2023
X:\PROJECTS\ASH0018_NCDMS_BANDYS_FARM\CADD\PLANS\BF_PSH_37.DGN
BYERS

EROSION CONTROL PLAN



REVISIONS				
NO.	DESCRIPTION	ENGR.	APPROV	DATE
1	DRAFT MITIGAITON PLAN	JB	KLT	12/16/22
2	FINAL MITIGATION PLAN	JB	KLT	2/21/23
3	ISSUED FOR BID	JB	KLT	7/20/23

PREPARED FOR:
NC DEPARTMENT OF ENVIRONMENTAL QUALITY
DIVISION OF MITIGATION SERVICES
1652 MAIL SERVICE CENTER
RALEIGH, NC 27699-1652

BANDYS FARM
CATAWBA COUNTY, NC

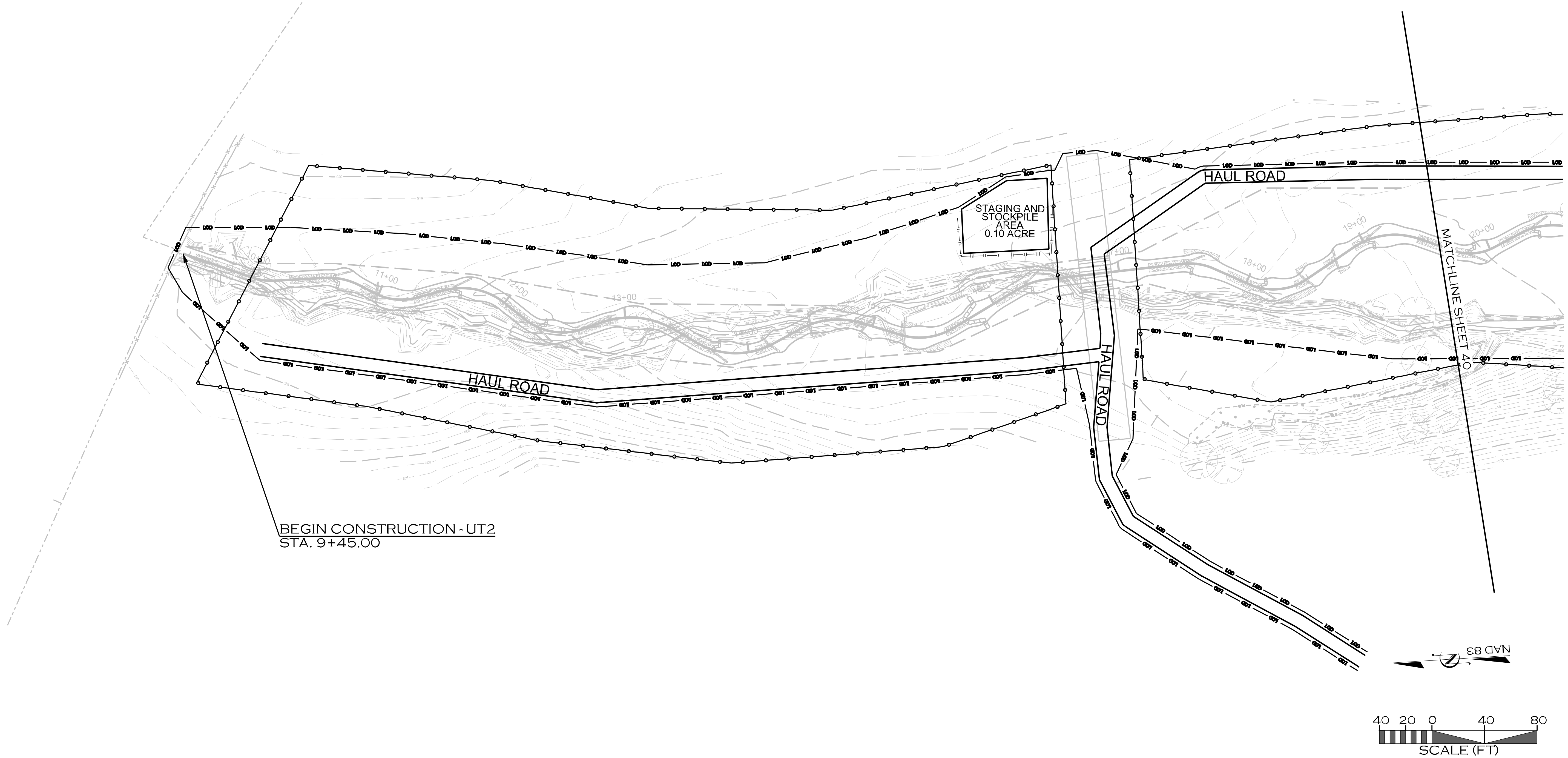
PREPARED IN THE OFFICE OF:
Ecosystem Planning & Restoration
204 STONE RIDGE BLVD.
ASHEVILLE, NC 28804

PROJECT ENGINEER
NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 039201 JACOB M. BYERS
7/20/23

7/31/2023
X:\PROJECTS\ASH0018_NCDMS_BANDYS_FARM\CADD\PLANS\BF_PSH_38.DGN
BYERS

PROJECT #	SHEET NO.
ASH0018	39

EROSION CONTROL PLAN



NO.	DESCRIPTION	ENGR.	APPROV	DATE
1	DRAFT MITIGAITON PLAN	JB	KLT	12/16/22
2	FINAL MITIGATION PLAN	JB	KLT	2/21/23
3	ISSUED FOR BID	JB	KLT	7/20/23

REVISIONS

PREPARED FOR:

Mitigation Services
NC DEPARTMENT OF ENVIRONMENTAL QUALITY
DIVISION OF MITIGATION SERVICES
1652 MAIL SERVICE CENTER
RALEIGH, NC 27699-1652

BANDYS FARM
CATAWBA COUNTY, NC

PREPARED IN THE OFFICE OF:

Ecosystem Planning & Restoration
204 STONE RIDGE BLVD.
ASHEVILLE, NC 28804

PROJECT ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 039207 ENGINEER JACOB M. BYERS

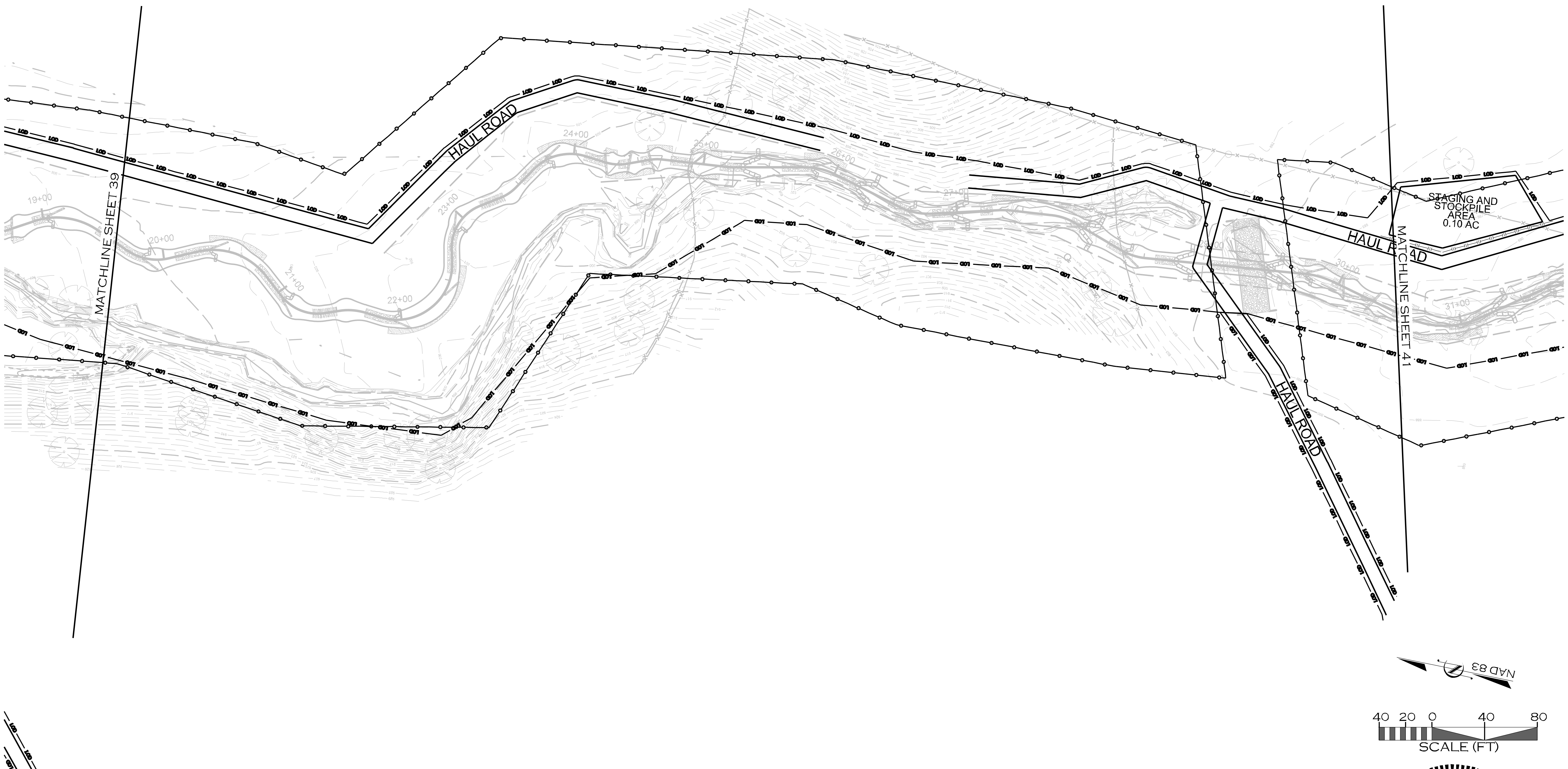
7/20/23

7/31/2023
K:\PROJECTS\ASH0018_NCDMS_BANDYS_FARM\CADD\PLANS\BF_PSH_39.DGN
BYERS

PROJECT # ASH0018

SHEET NO. 40

EROSION CONTROL PLAN



REVISIONS

NO.	DESCRIPTION	ENGR.	APPROV	DATE
1	DRAFT MITIGAITON PLAN	JB	KLT	12/16/22
2	FINAL MITIGATION PLAN	JB	KLT	2/21/23
3	ISSUED FOR BID	JB	KLT	7/20/23

PREPARED FOR:

NC Mitigation Services

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

BANDYS FARM
CATAWBA COUNTY, NC

PREPARED IN THE OFFICE OF:

Ecosystem Planning & Restoration

204 STONE RIDGE BLVD.
ASHEVILLE, NC 28804

PROJECT ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 039201 ENGINEER JACOB M. BYERS

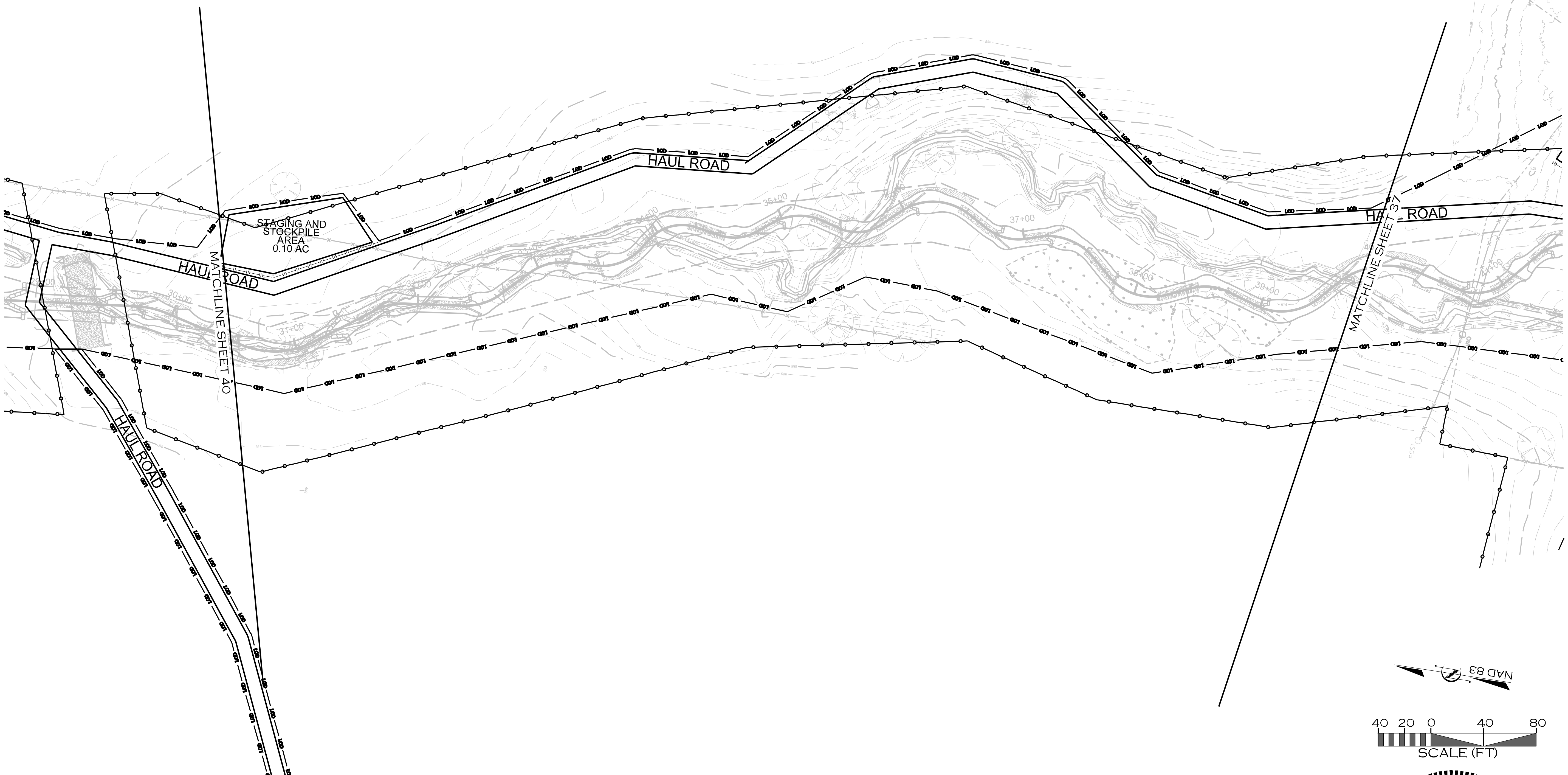
7/20/23

7/31/2023 X:\PROJECTS\ASH0018_NCDMS_BANDYS_FARM\CADD\PLANS\BF_PSH_40.DGN BYERS

PROJECT # ASH0018

SHEET NO. 41

EROSION CONTROL PLAN



REVISIONS				
NO.	DESCRIPTION	ENGR.	APPROV.	DATE
1	DRAFT MITIGAITON PLAN	JB	KLT	12/16/22
2	FINAL MITIGATION PLAN	JB	KLT	2/21/23
3	ISSUED FOR BID	JB	KLT	7/20/23

PREPARED FOR:

NC Mitigation Services

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

BANDYS FARM
CATAWBA COUNTY, NC

PREPARED IN THE OFFICE OF:

Ecosystem Planning & Restoration

204 STONE RIDGE BLVD.
ASHEVILLE, NC 28804

PROJECT ENGINEER

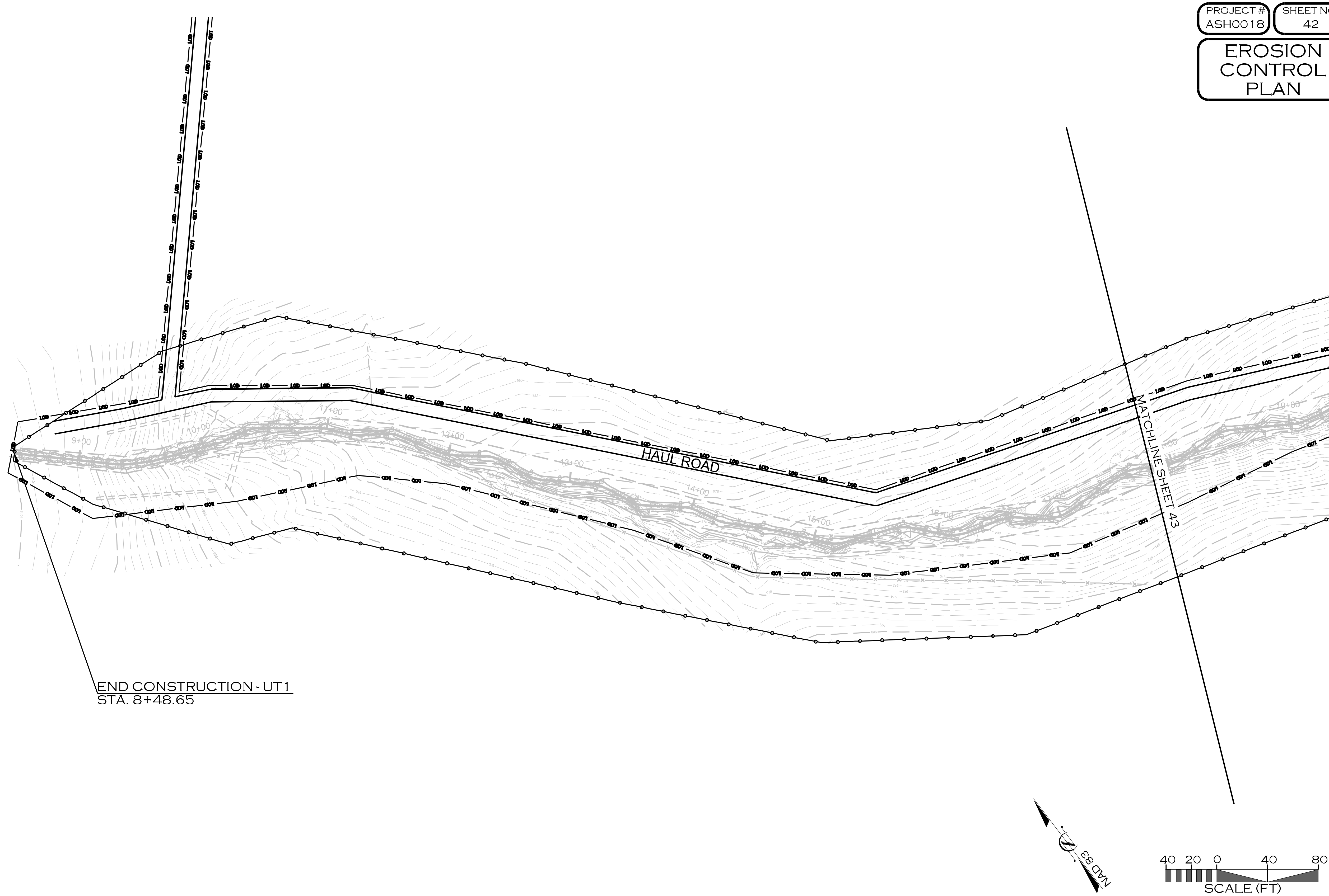
NORTH CAROLINA PROFESSIONAL SEAL 039201 ENGINEER JACOB M. BYERS

7/20/23

7/31/2023
X:\PROJECTS\ASH0018_NCDMS_BANDYS_FARM\CADD\PLANS\BF_PSH_41.DGN
BYERS

PROJECT #	SHEET NO.
ASH0018	42

EROSION CONTROL PLAN



REVISIONS

NO.	DESCRIPTION	ENGR.	APPROV	DATE
1	DRAFT MITIGAITON PLAN	JB	KLT	12/16/22
2	FINAL MITIGATION PLAN	JB	KLT	2/21/23
3	ISSUED FOR BID	JB	KLT	7/20/23

PREPARED FOR:

NC Mitigation Services

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

BANDYS FARM
CATAWBA COUNTY, NC

PREPARED IN THE OFFICE OF:

EPR Ecosystem Planning & Restoration
204 STONE RIDGE BLVD.
ASHEVILLE, NC 28804

PROJECT ENGINEER

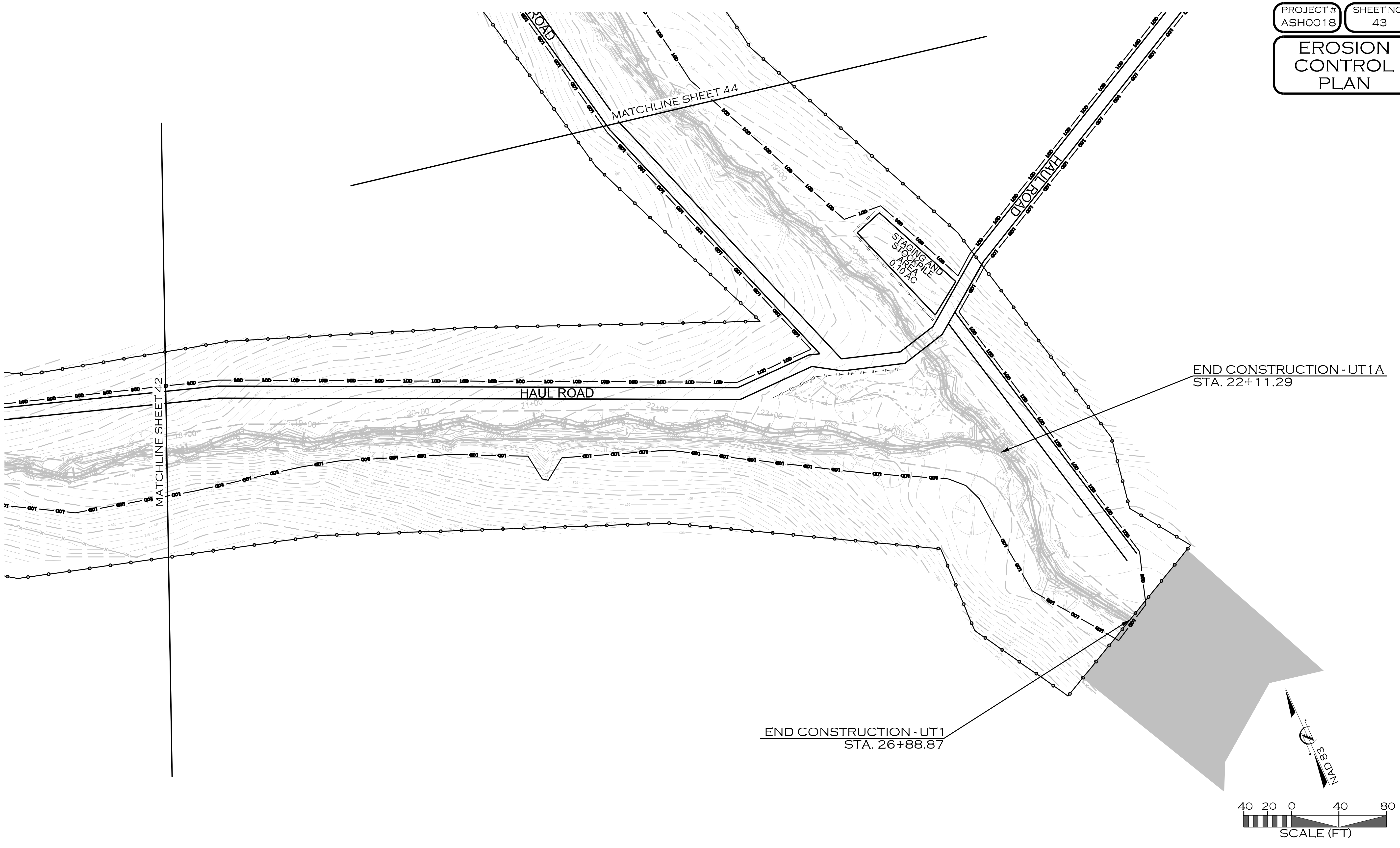
NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 039201 JACOB M. BYERS

7/20/23

7/31/2023
K:\PROJECTS\ASH0018_NCDMS_BANDYS_FARM\CADD\PLANS\BF_PSH_42.DGN
BYERS

PROJECT #	SHEET NO.
ASH0018	43

EROSION CONTROL PLAN



REVISIONS				
NO.	DESCRIPTION	ENGR.	APPROV	DATE
1	DRAFT MITIGAITON PLAN	JB	KLT	12/16/22
2	FINAL MITIGATION PLAN	JB	KLT	2/21/23
3	ISSUED FOR BID	JB	KLT	7/20/23

PREPARED FOR:

NC Mitigation Services

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

BANDYS FARM
CATAWBA COUNTY, NC

PREPARED IN THE OFFICE OF:

Ecosystem Planning & Restoration

204 STONE RIDGE BLVD.
ASHEVILLE, NC 28804

PROJECT ENGINEER

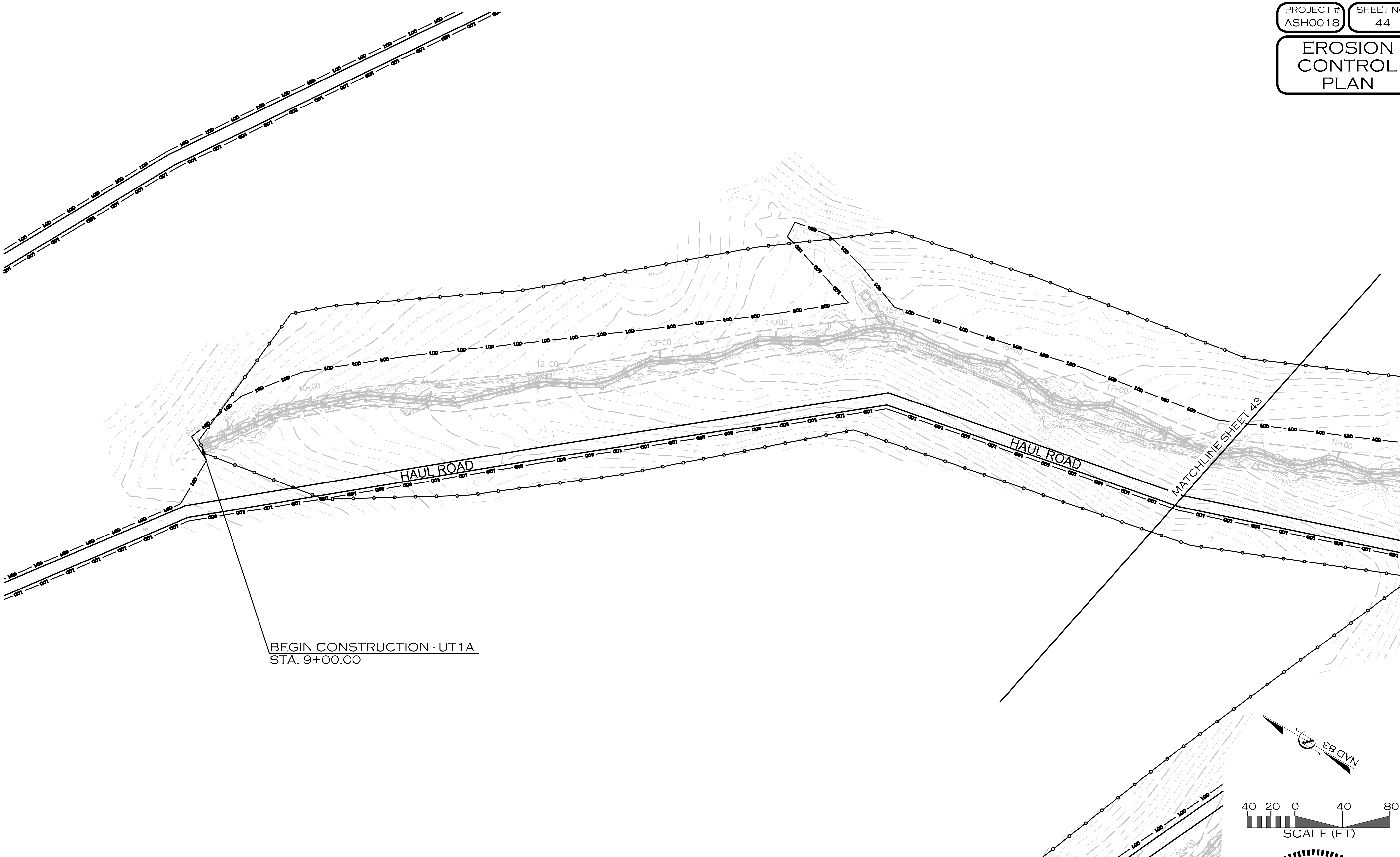
NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 039201 JACOB M. BYERS

7/20/23

7/31/2023
X:\PROJECTS\ASH0018_NCDMS_BANDYS_FARM\CADD\PLANS\BF_PSH_43.DGN
BYERS

PROJECT # ASH0018 | SHEET NO. 44

EROSION CONTROL PLAN



REVISIONS				
NO.	DESCRIPTION	ENGR.	APPROV	DATE
1	DRAFT MITIGAITON PLAN	JB	KLT	12/16/22
2	FINAL MITIGATION PLAN	JB	KLT	2/21/23
3	ISSUED FOR BID	JB	KLT	7/20/23

PREPARED FOR:

Mitigation Services
NC DEPARTMENT OF ENVIRONMENTAL QUALITY
DIVISION OF MITIGATION SERVICES
1652 MAIL SERVICE CENTER
RALEIGH, NC 27699-1652

BANDYS FARM
CATAWBA COUNTY, NC

PREPARED IN THE OFFICE OF:

Ecosystem Planning & Restoration
EPR
204 STONE RIDGE BLVD.
ASHEVILLE, NC 28804

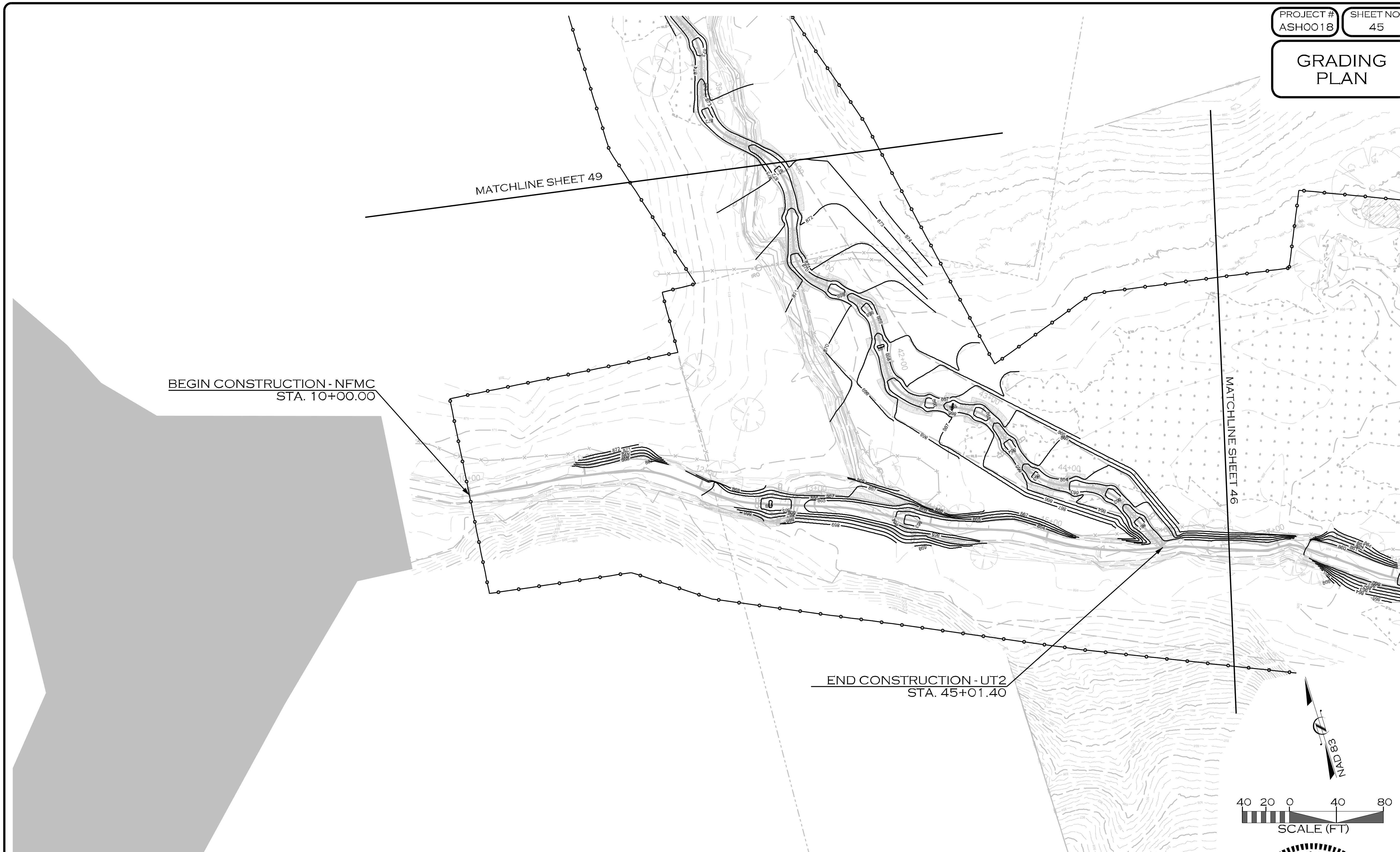
PROJECT ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 039207 ENGINEER JACOB M. BYERS
7/20/23

7/31/2023
K:\PROJECTS\ASH0018_NCDMS_BANDYS_FARM\CADD\PLANS\BF_PSH_44.DGN
BYERS

PROJECT #	SHEET NO.
ASH0018	45

GRADING PLAN



REVISIONS				
NO.	DESCRIPTION	ENGR.	APPROV	DATE
1	DRAFT MITIGATION PLAN	JB	KLT	12/16/22
2	FINAL MITIGATION PLAN	JB	KLT	2/21/23
3	ISSUED FOR BID	JB	KLT	7/20/23

PREPARED FOR:

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

BANDYS FARM
CATAWBA COUNTY, NC

PREPARED IN THE OFFICE OF:

ECOSYSTEM PLANNING & RESTORATION
204 STONE RIDGE BLVD.
ASHEVILLE, NC 28804

PROJECT ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 039201 ENGINEER JACOB M. BYERS

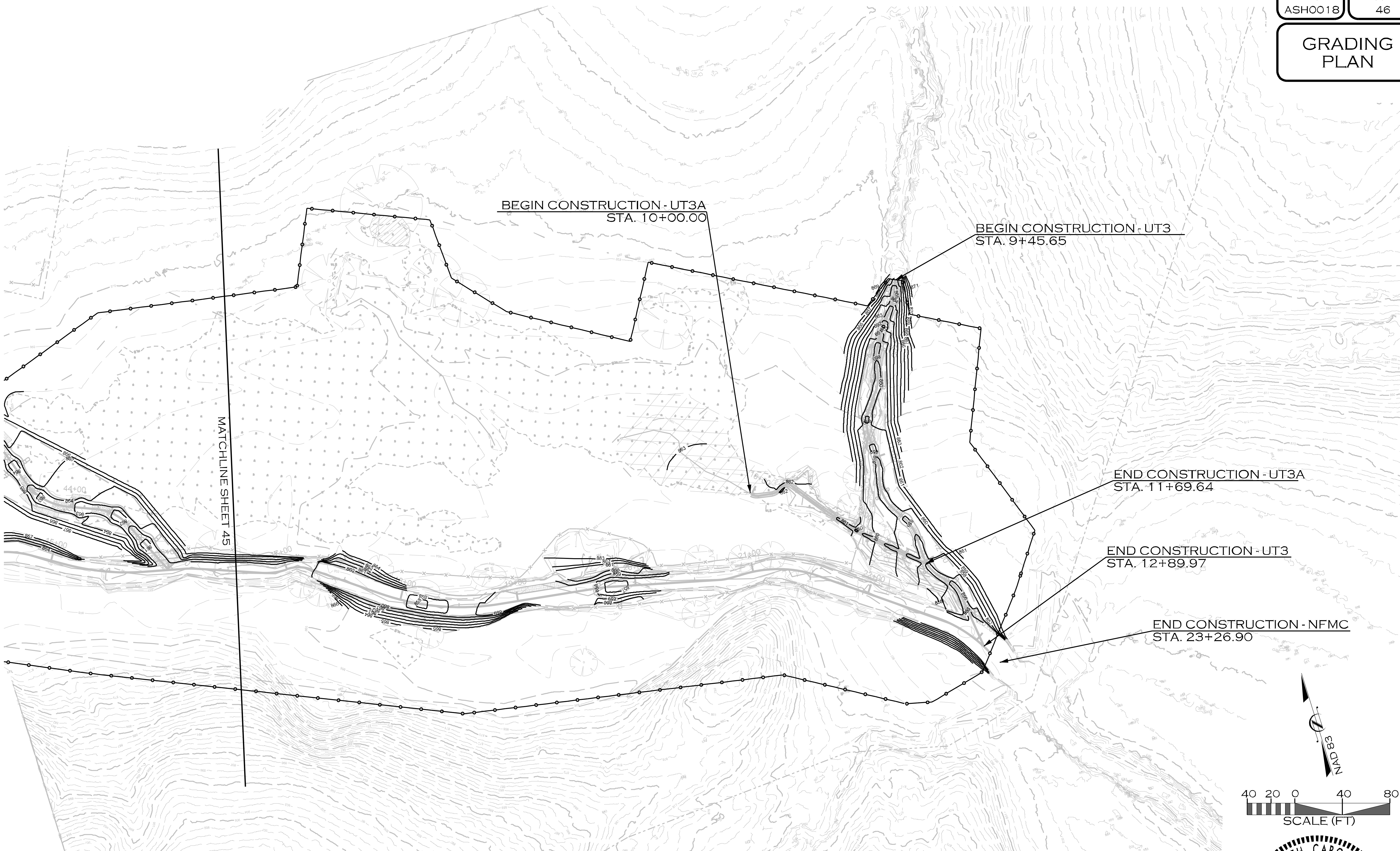
7/20/23

7/31/2023
K:\PROJECTS\ASH0018_NCDMS_BANDYS_FARM\CADD\PLANS\BF_PSH_45.DGN
BYERS

PROJECT # ASH0018

SHEET NO. 46

GRADING PLAN



NO.	DESCRIPTION	ENGR.	APPROV	DATE
1	DRAFT MITIGATION PLAN	JB	KLT	12/16/22
2	FINAL MITIGATION PLAN	JB	KLT	2/21/23
3	ISSUED FOR BID	JB	KLT	7/20/23

REVISIONS

PREPARED FOR:

NC Mitigation Services

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

BANDYS FARM
CATAWBA COUNTY, NC

PREPARED IN THE OFFICE OF:

EPR Ecosystem Planning & Restoration
204 STONE RIDGE BLVD.
ASHEVILLE, NC 28804

PROJECT ENGINEER

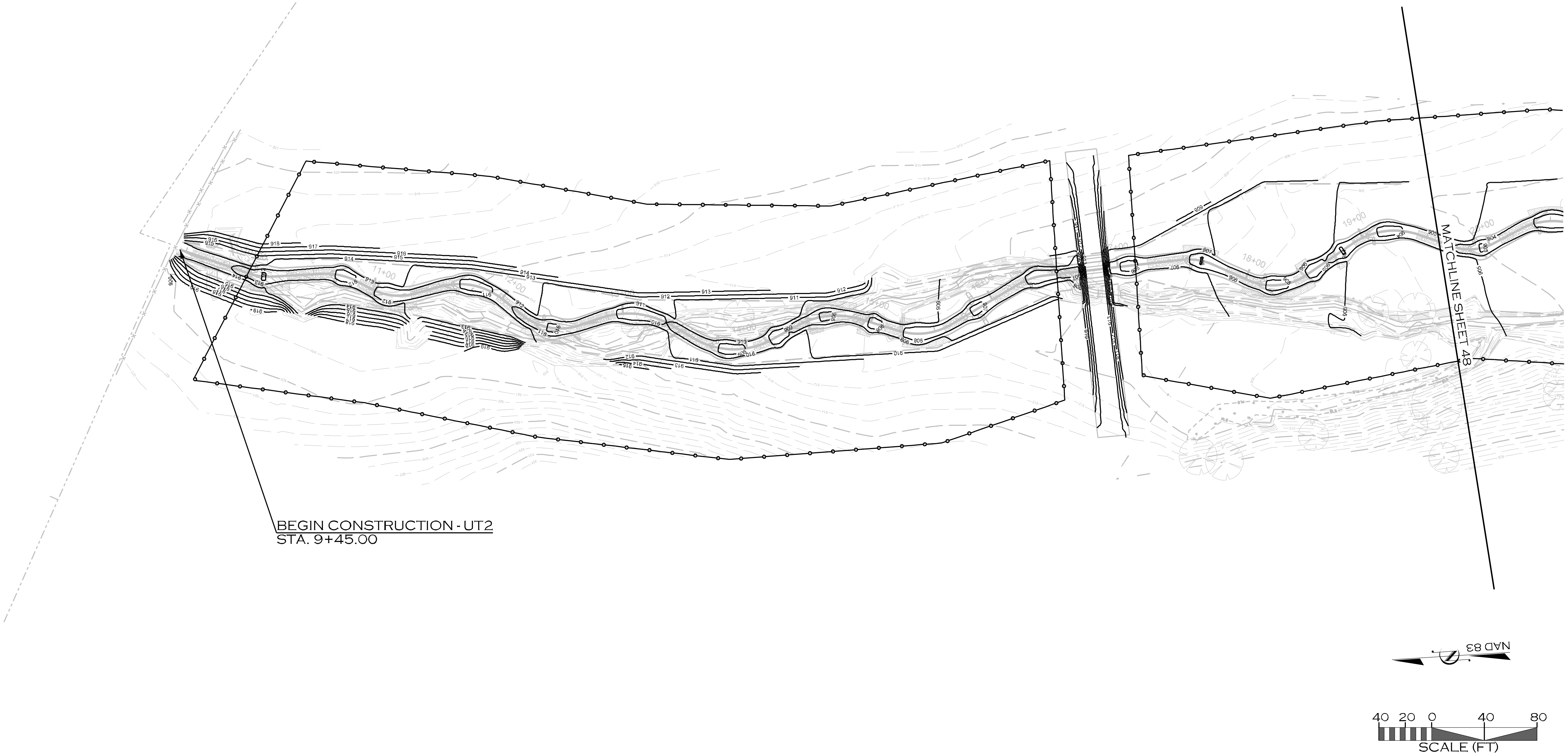
NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 039201 JACOB M. BYERS

Jake Byers 7/20/23

7/31/2023
X:\PROJECTS\ASH0018_NCDMS_BANDYS_FARM\CADD\PLANS\BF_PSH_46.DGN
BYERS

PROJECT #	SHEET NO.
ASH0018	47

GRADING PLAN



REVISIONS

NO.	DESCRIPTION	ENGR.	APPROV	DATE
1	DRAFT MITIGATION PLAN	JB	KLT	12/16/22
2	FINAL MITIGATION PLAN	JB	KLT	2/21/23
3	ISSUED FOR BID	JB	KLT	7/20/23

PREPARED FOR:

Mitigation Services
ENVIRONMENTAL QUALITY
NC DEPARTMENT OF ENVIRONMENTAL QUALITY
DIVISION OF MITIGATION SERVICES
1652 MAIL SERVICE CENTER
RALEIGH, NC 27699-1652

BANDYS FARM
CATAWBA COUNTY, NC

PREPARED IN THE OFFICE OF:

EPR
Ecosystem Planning & Restoration
204 STONE RIDGE BLVD.
ASHEVILLE, NC 28804

PROJECT ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 039201 ENGINEER JACOB M. BYERS

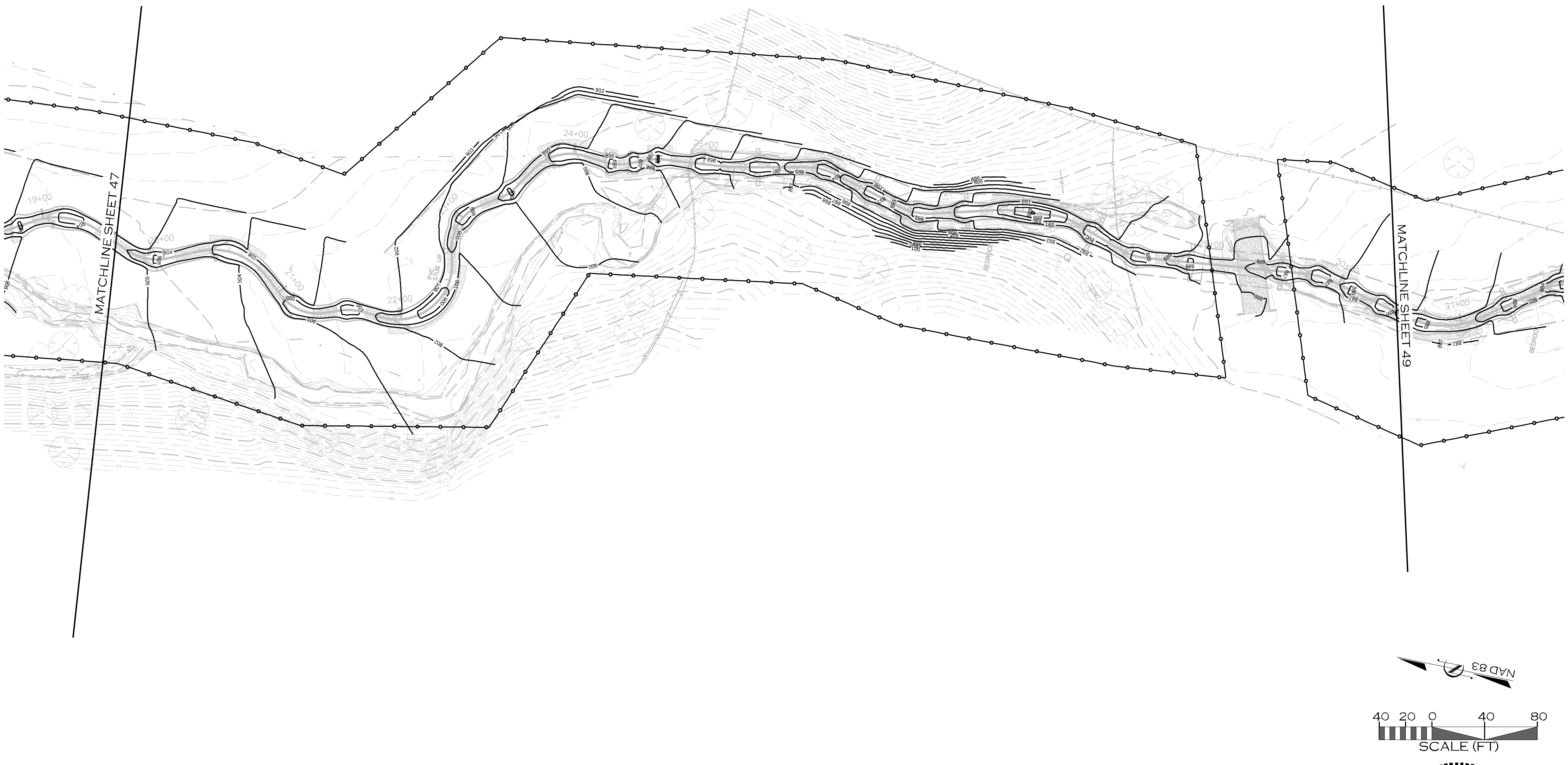
7/20/23

7/31/2023
X:\PROJECTS\ASH0018_NCDMS_BANDYS_FARM\CADD\PLANS\BF_PSH_47.DGN
BYERS

PROJECT # ASH0018

SHEET NO. 48

GRADING PLAN



REVISIONS				
NO.	DESCRIPTION	ENGR.	APPROV	DATE
1	DRAFT MITIGATION PLAN	JB	KLT	12/16/22
2	FINAL MITIGATION PLAN	JB	KLT	2/21/23
3	ISSUED FOR BID	JB	KLT	7/20/23

PREPARED FOR:

NC Mitigation Services

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

BANDYS FARM
CATAWBA COUNTY, NC

PREPARED IN THE OFFICE OF:

Ecosystem Planning & Restoration

204 STONE RIDGE BLVD.
ASHEVILLE, NC 28804

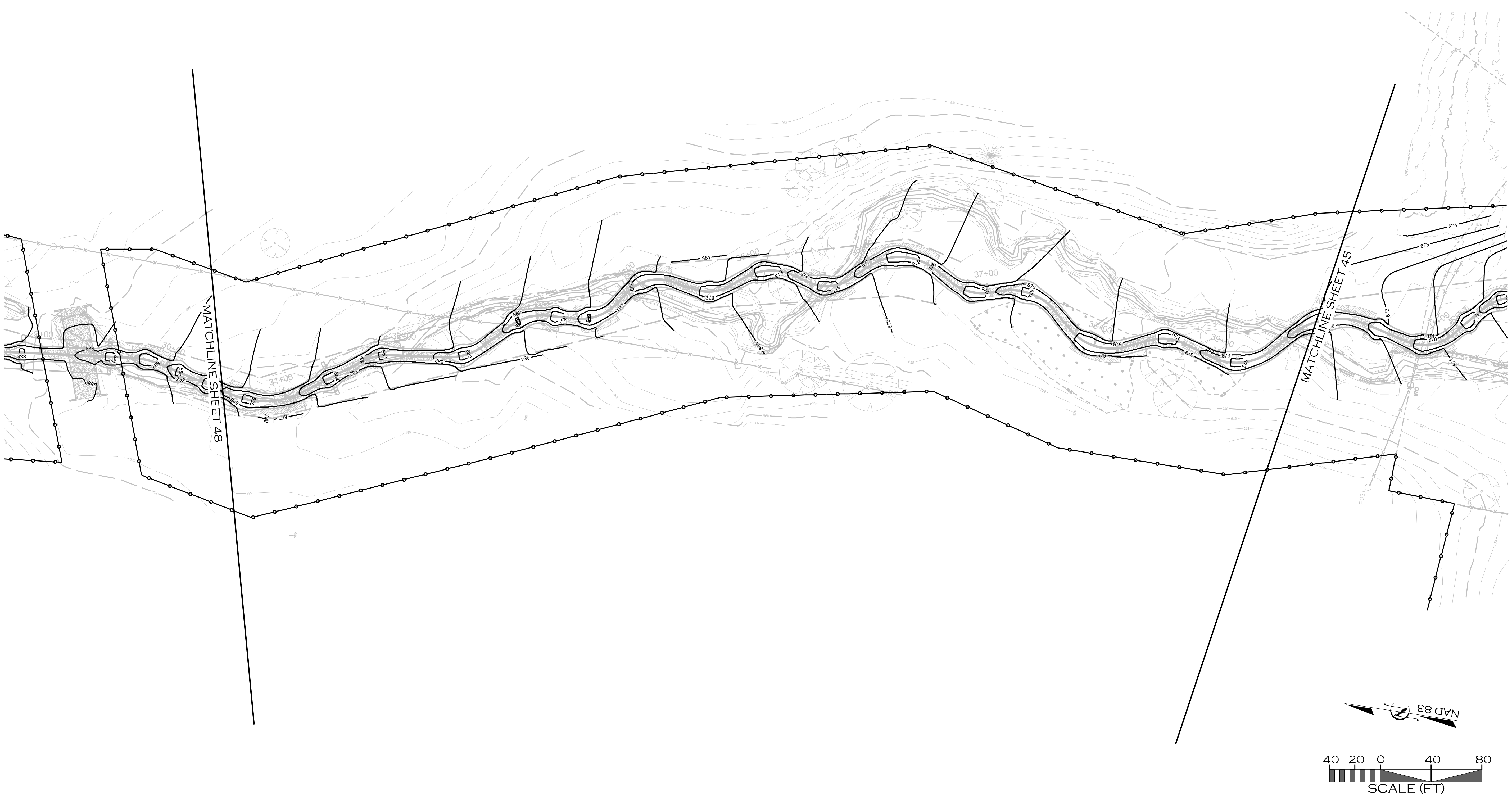
PROJECT ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 039201 ENGINEER JACOB M. BYERS

7/20/23

7/31/2023
X:\PROJECTS\ASH0018_NCDMS_BANDYS_FARM\CADD\PLANS\BF_PSH_48.DGN
BYERS

GRADING PLAN



REVISIONS

NO.	DESCRIPTION	ENGR.	APPROV	DATE
1	DRAFT MITIGATION PLAN	JB	KLT	12/16/22
2	FINAL MITIGATION PLAN	JB	KLT	2/21/23
3	ISSUED FOR BID	JB	KLT	7/20/23

PREPARED FOR:

Mitigation Services
NC DEPARTMENT OF ENVIRONMENTAL QUALITY
DIVISION OF MITIGATION SERVICES
1652 MAIL SERVICE CENTER
RALEIGH, NC 27699-1652

BANDYS FARM
CATAWBA COUNTY, NC

PREPARED IN THE OFFICE OF:

Ecosystem Planning & Restoration
204 STONE RIDGE BLVD.
ASHEVILLE, NC 28804

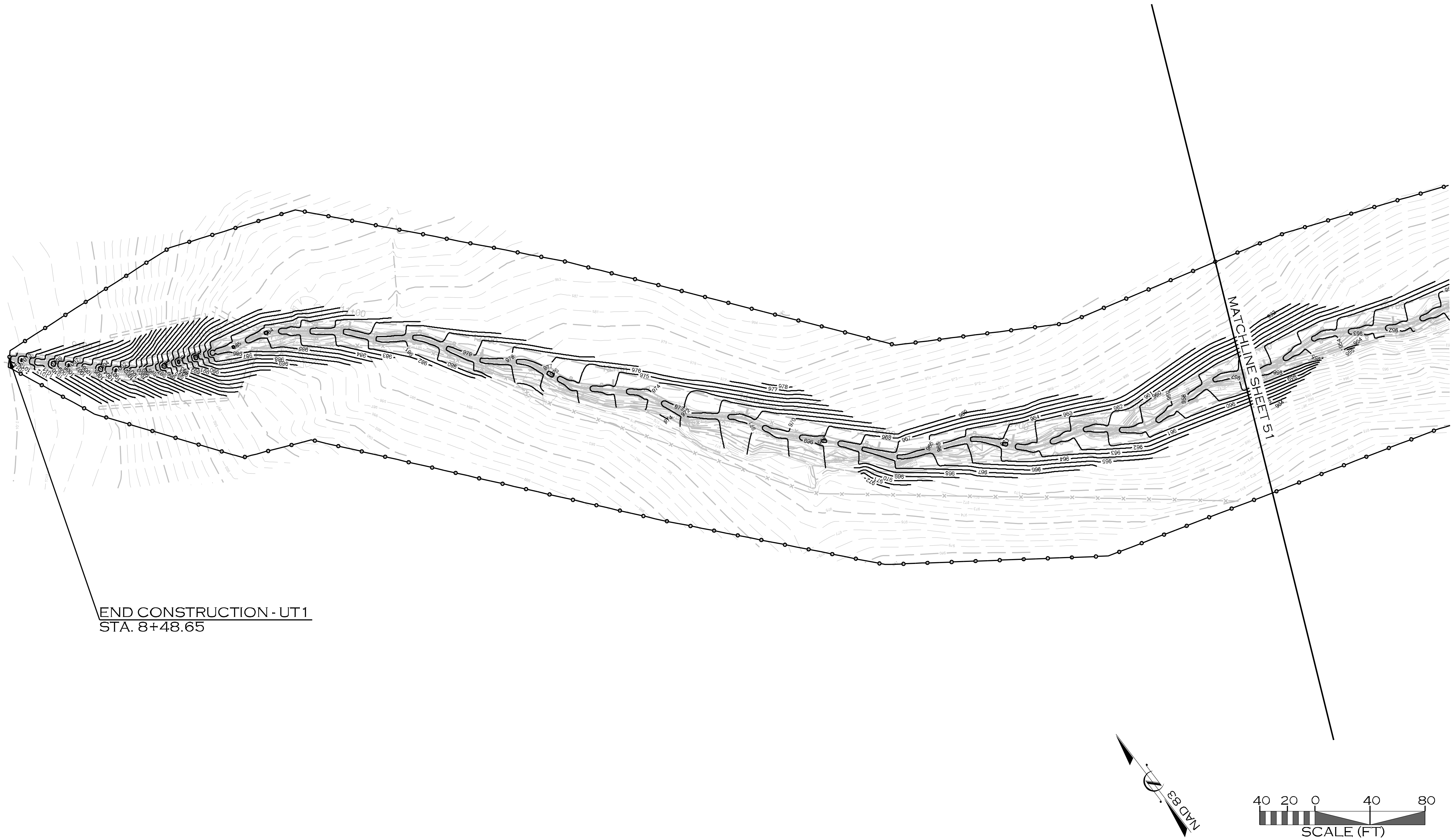
PROJECT ENGINEER
NORTH CAROLINA PROFESSIONAL SEAL 039201 ENGINEER JACOB M. BYERS
7/2023

7/31/2023
K:\PROJECTS\ASH0018_NCDMS_BANDYS_FARM\CADD\PLANS\BF_PSH_49.DGN
BYERS

PROJECT # ASH0018

SHEET NO. 50

GRADING PLAN



REVISIONS				
NO.	DESCRIPTION	ENGR.	APPROV	DATE
1	DRAFT MITIGATION PLAN	JB	KLT	12/16/22
2	FINAL MITIGATION PLAN	JB	KLT	2/21/23
3	ISSUED FOR BID	JB	KLT	7/20/23

PREPARED FOR:

NC Mitigation Services

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

BANDYS FARM
CATAWBA COUNTY, NC

PREPARED IN THE OFFICE OF:

EPR Ecosystem Planning & Restoration
204 STONE RIDGE BLVD.
ASHEVILLE, NC 28804

PROJECT ENGINEER

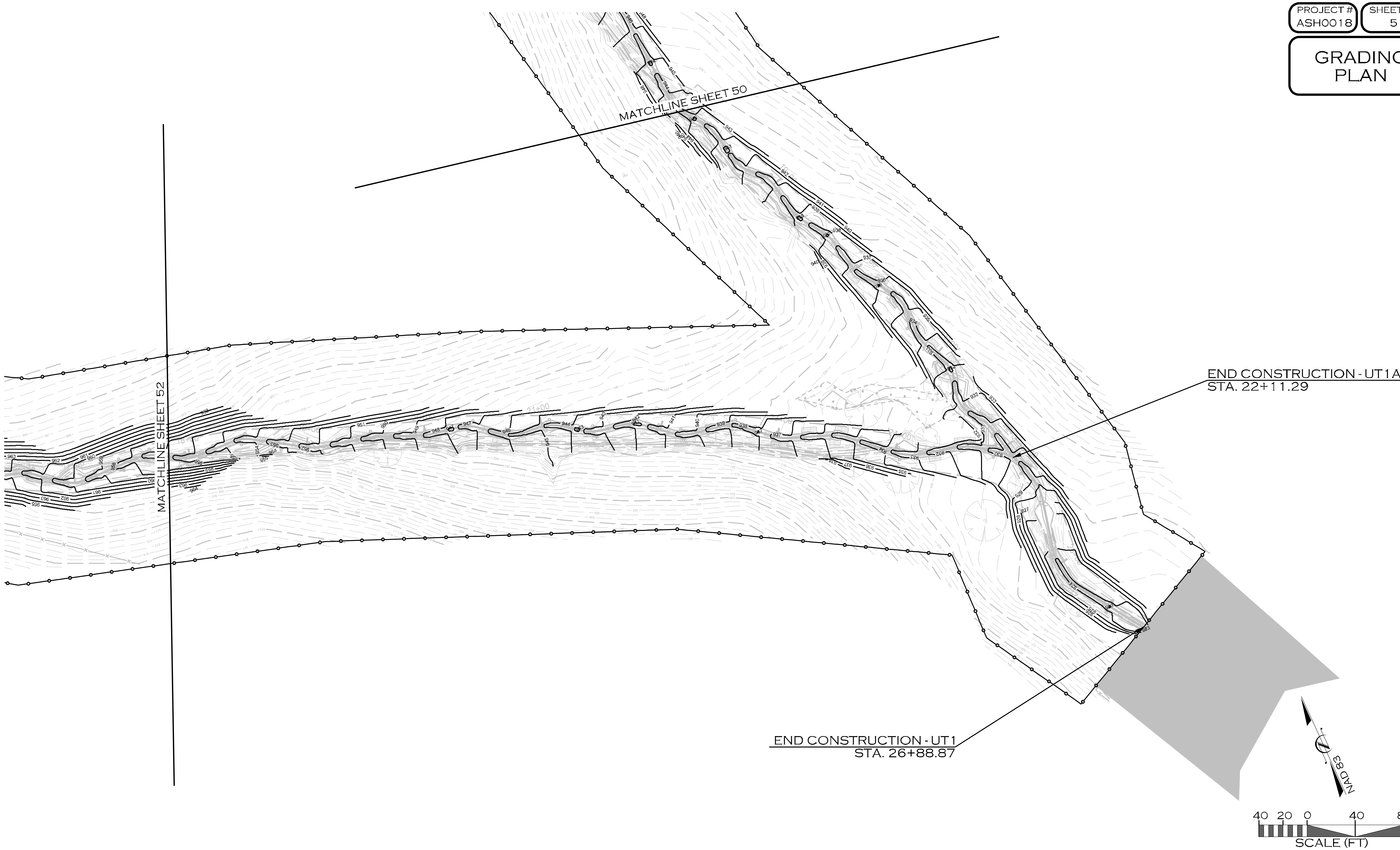
NORTH CAROLINA PROFESSIONAL SEAL 039201 ENGINEER JACOB M. BYERS

7/31/2023

7/31/2023
K:\PROJECTS\ASH0018_NCDMS_BANDYS_FARM\CADD\PLANS\BF_PSH_50.DGN
BYERS

PROJECT #	SHEET NO.
ASH0018	51

GRADING PLAN



REVISIONS

NO.	DESCRIPTION	ENGR.	APPROV	DATE
1	DRAFT MITIGATION PLAN	JB	KLT	12/16/22
2	FINAL MITIGATION PLAN	JB	KLT	2/21/23
3	ISSUED FOR BID	JB	KLT	7/20/23

PREPARED FOR:

Mitigation Services
ENVIRONMENTAL QUALITY
NC DEPARTMENT OF ENVIRONMENTAL QUALITY
DIVISION OF MITIGATION SERVICES
1652 MAIL SERVICE CENTER
RALEIGH, NC 27699-1652

BANDYS FARM
CATAWBA COUNTY, NC

PREPARED IN THE OFFICE OF:

EPR Ecosystem Planning & Restoration
204 STONE RIDGE BLVD.
ASHEVILLE, NC 28804

PROJECT ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 039201 ENGINEER JACOB M. BYERS

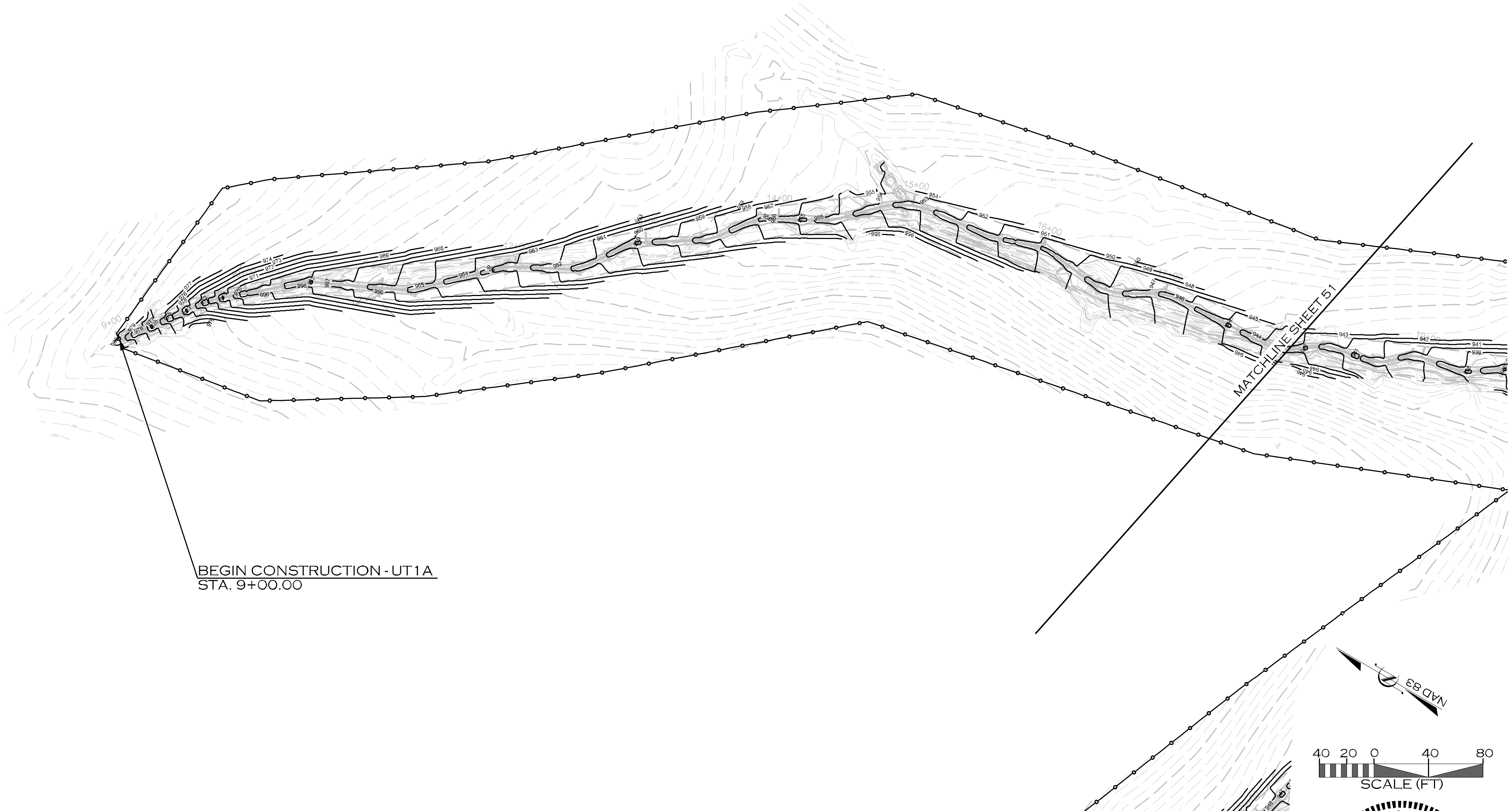
7/20/23

7/31/2023
X:\PROJECTS\ASH0018_NCDMS_BANDYS_FARM\CADD\PLANS\BF_PSH_51.DGN
BYERS

PROJECT # ASH0018

SHEET NO. 52

GRADING PLAN



REVISIONS				
NO.	DESCRIPTION	ENGR.	APPROV	DATE
1	DRAFT MITIGATION PLAN	JB	KLT	12/16/22
2	FINAL MITIGATION PLAN	JB	KLT	2/21/23
3	ISSUED FOR BID	JB	KLT	7/20/23

PREPARED FOR:

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

BANDYS FARM
CATAWBA COUNTY, NC

PREPARED IN THE OFFICE OF:

Ecosystem Planning & Restoration
204 STONE RIDGE BLVD.
ASHEVILLE, NC 28804

PROJECT ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 039201 ENGINEER JACOB M. BYERS

7/20/23

7/31/2023
K:\PROJECTS\ASH0018_NCDMS_BANDYS_FARM\CADD\PLANS\BF_PSH_52.DGN
BYERS

Appendix 8

Invasive Species Control Plan

Invasive species vegetation identified at the Site prior to construction was sparse and confined to the stream channel corridor. Common invasive species vegetation found at the Site include Chinese privet (*Ligustrum sinense*), mulitiflora rose (*Rosa multiflora*), and tree-of-heaven *(Ailanthus altissima,)*. Additionally, fescue grass is present throughout much of the pasture area within the Project boundary. During construction, these existing invasive vegetation species will be controlled using mechanical methods and/or chemical applications.

During the monitoring period, the Site will be reviewed annually to locate and to quantify any residual invasive species vegetation. If invasive species are identified at the Site during the monitoring period, their location and extent will be shown on the current condition plan view (CCPV). A corresponding discussion will be included in the annual monitoring report outlining the proposed management plan. Invasive species vegetation will be managed and reviewed on an annual basis to minimize its long-term impact to planted native species. Any vegetation control requiring herbicide application will be performed in accordance with NC Department of Agriculture (NCDA) rules and regulations.

Invasive species will be managed and controlled using a combination of chemical and/or mechanical methods throughout the monitoring phase of the project.

Appendix 9

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:

Routine Maintenance Components
Bandys Farm Stream and Wetland Mitigation Project

Component/Feature	Maintenance through project close-out
Stream	Routine channel maintenance and repair activities may include modifying in-stream structures to prevent piping, securing loose coir matting, and supplemental installations of live stakes and other target vegetation along the project reaches. Areas of concentrated stormwater and floodplain flows that intercept the channel may also require maintenance to prevent streambank failures and head-cutting until vegetation becomes established.
Vegetation	Vegetation will be maintained to ensure the health and vigor of the targeted plant community. Routine vegetation maintenance and repair activities may include supplemental planting, pruning, and fertilizing. Exotic invasive plant species will be treated by mechanical and/or chemical methods. Any invasive plant species control requiring herbicide application will be performed in accordance with NC Department of Agriculture (NCDA) rules and regulations.
Site Boundary	Site boundaries will be demarcated in the field to ensure clear distinction between the mitigation site and adjacent properties. Boundaries shall be identified by fence, marker, bollard, post, 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.
Farm Road Crossings	The farm road crossings within the site may be maintained only as allowed by the recorded Conservation Easement, deed restrictions, rights of way, or corridor agreements. Culverts and fords located at crossings outside the easement will be maintained for stability and flow whenever possible with respect to these restrictions.
Beaver Management	Routine maintenance and repair activities caused by beaver activity may include supplemental planting, pruning, and dam breeching, dewatering, and/or removal. Beaver management will be performed in accordance with US Department of Agriculture (USDA) rules and regulations using accepted trapping and removal techniques only within the project boundary.

Appendix 10

CREDIT RELEASE SCHEDULE

All credit releases will be based on the total approved credits generated as reported by the as-built / baseline report for the mitigation site. Under no circumstances shall any mitigation project be debited until the necessary Department of the Army (DA) authorization has been received for its construction or the District Engineer (DE) has otherwise provided written approval for the project in the case where no DA authorization is required for construction of the mitigation project. The DE, in consultation with the NCIRT, will determine if performance standards have been satisfied sufficiently to meet the requirements of the release schedules below. In cases where some performance standards have not been met, credits may still be released depending on the specifics of the case. Monitoring may be required to restart or be extended, depending on the extent to which the site fails to meet the specified performance standards. The release of project credits will be subject to the criteria described as follows:

Stream Credit Release Schedule
Bandys Farm Stream and Wetland Mitigation Project

Credit Release Milestone	Release Activity	ILF/DMS	
		Interim Release	Total Released
1	Site Establishment	0%	0%
2	Completion of all initial physical and biological improvements made pursuant to the Mitigation Plan	30%	30%
3	Year 1 monitoring report demonstrates that channels are stable and interim performance standards have been met	10%	40%
4	Year 2 monitoring report demonstrates that channels are stable and interim performance standards have been met	10%	50%
5	Year 3 monitoring report demonstrates that channels are stable and interim performance standards have been met	10%	60%
6*	Year 4 monitoring report demonstrates that channels are stable and interim performance standards have been met	5%	65% (75%**)
7	Year 5 monitoring report demonstrates that channels are stable and interim performance standards have been met	10%	75% (85%**)
8*	Year 6 monitoring report demonstrates that channels are stable and interim performance standards have been met	5%	80% (90%**)
9	Year 7 monitoring report demonstrates that channels are stable, and performance standards have been met and project has been approved for closeout	10%	90% (100%**)

* Please note that vegetation data and survey 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.

Wetland Credit Release Schedule Bandys Farm Stream and Wetland Mitigation Project			
Credit Release Milestone	**Release Activity**	**ILF/NCDMS**	
		Interim Release	**Total Released**
1	Site Establishment	0%	0%
2	Completion of all initial physical and biological improvements made pursuant to the Mitigation Plan	30%	30%
3	Year 1 monitoring report demonstrates that interim performance standards have been met	10%	40%
4	Year 2 monitoring report demonstrates that interim performance standards have been met	10%	50%
5	Year 3 monitoring report demonstrates that interim performance standards have been met	15%	65%
6*	Year 4 monitoring report demonstrates that interim performance standards have been met	5%	70%
7	Year 5 monitoring report demonstrates that interim performance standards have been met	15%	85%
8*	Year 6 monitoring report demonstrates that interim performance standards have been met	5%	90%
9	Year 7 monitoring report demonstrates that performance standards have been met	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.			

Initial Allocation of Released Credits

The initial allocation of released credits, as specified in the mitigation plan can be released by the NCDMS without prior written approval of the DE upon satisfactory completion of the following activities:

a. Approval of the final Mitigation Plan

b. Recordation of the preservation mechanism, as well as a title opinion acceptable to the USACE covering the property.

c. Completion of project construction (the initial physical and biological improvements to the mitigation site) pursuant to the mitigation plan; Per the NCDMS Instrument, construction means that a mitigation site has been constructed in its entirety, to include planting, and an as-built report has been produced. As-built reports must be sealed by an engineer prior to project closeout, if appropriate but not prior to the initial allocation of released credits.

d. Receipt of necessary DA permit authorization or written DA approval for projects where DA permit issuance is not required.

The following conditions apply to all subsequent credit release schedules:

a. A reserve of 10% of a site's total stream credits will be released after four bankfull events have occurred, in separate years, provided the channel is stable and all other performance standards are met. In the event that less than four bankfull events occur during the monitoring period, release of these reserve credits is at the discretion of the NCIRT.

b. After the second milestone, the credit releases are scheduled to occur on an annual basis, assuming that the annual monitoring report has been provided to the USACE in accordance with Section IV (General Monitoring Requirements) of the 2016 Wilmington District Stream and Wetland Compensatory Mitigation Update, and that the monitoring report demonstrates that interim performance standards are being met and that no other concerns have been identified on-site during the visual monitoring. All credit releases require written approval from the USACE.

c. The credits associated with the final credit release milestone will be released only upon a determination by the USACE, in consultation with the NCIRT, of functional success as defined in the Mitigation Plan.

Appendix 11

Financial Assurances

Pursuant to Section IV H and Appendix III of the NC Division of Mitigation Services' In-Lieu Fee Instrument dated July 28, 2010, the North Carolina Department of Environmental Quality has provided the USACE-Wilmington District with a formal commitment to fund projects to satisfy mitigation requirements assumed by DMS. This commitment provides financial assurance for all mitigation projects implemented by the program.

Appendix 12

Meeting Minutes

Bandys Farm Stream and Wetland Mitigation Project

Catawba River Basin 03050101 NCDEQ DMS Full-Delivery Project (RFP No. 16-20210102)

Catawba County, North Carolina

NCDEQ Contract No. 210102-01
DMS ID No. 100594
USACE Action ID No. SAW-2021-02609
NCDEQ DWR ID: 20211630V.1

Subject:	IRT Post-Contract Site Meeting
Meeting Date:	March 9, 2022
Minutes Provided:	March 14, 2022
Prepared For:	IRT Members NC Department of Environmental Quality, Division of Mitigation Services
Prepared By:	Ecosystem Planning and Restoration, LLC Jake Byers, PE – Project Manager
Meeting Attendees:	Todd Tugwell – US Army Corps of Engineers (IRT) Casey Haywood – US Army Corps of Engineers (IRT) Erin Davis - NC Department of Environmental Quality, Division of Water Resources (IRT) Paul Wiesner – NCDEQ Division of Mitigation Services Harry Tsomides – NCDEQ Division of Mitigation Services Jake Byers – Ecosystem Planning and Restoration

These meeting minutes document notes and discussion points from the North Carolina Interagency Review Team (IRT) Post-Contract Site Meeting for the Bandys Farm Stream and Wetland Mitigation Project (Catawba River Basin, HUC 03050101) (Project, Site). This full-delivery project was contracted on October 21, 2021, by the North Carolina Department of Environmental Quality (NCDEQ), Division of Mitigation Services (DMS), with Ecosystem Planning and Restoration, LLC (EPR), under RFP 16-20210102. The Site is located in Catawba County, North Carolina, near the Claremont community.

The site meeting began as scheduled at approximately 8:30 AM with introductions and a general summary of the overall Project background and concepts. After the Project introduction and overview, attendees toured the Site to review existing conditions and proposed mitigation types, strategies, and design concepts. The Site review notes are presented below in the order they were visited/discussed.

- The attendees first walked to the upstream end of UT1 where EPR showed the group the large headcut at the top and existing channelized stream. Jake described the general restoration approach (Priority 2 to Priority 1). Jake stated that the upper extents of UT1 will be Priority 2 and will transition to Priority "1.5" and then to Priority 1 utilizing existing bedrock knick points.

  - Todd stated the Corps would want stream gages in the upper extents of both UT1 and UT1A.
  - Todd stated that the Corps would have concern utilizing too much wood as grade control in the smaller channels due to intermittent flow and the wood eventually rotting. Jake stated that rock structures will also be included.
  - Todd asked EPR not to include any statement or reference to a potential early project closeout (e.g., 5 year) from the mitigation plan.
  - Todd asked EPR to ensure that the monitoring requirements provided in the mitigation plan are in conformance with the USACE 2016 Mitigation Guidance. A vegetation growth standard was mentioned specifically. Todd mentioned that some exceptions to this standard could be approved during the mitigation plan stage.
  - Todd recommended the planting of some larger, containerized stock in the outer edges of the planted conservation easement. EPR noted that this would be considered during the mitigation plan stage.
  - Todd recommended that fescue within the conservation easement be treated at some point before the as-built stage. EPR stated that any fescue that was not removed from inside the conservation easement from earthwork activities would be sprayed with herbicide during construction.
  - Erin asked that EPR describe in the mitigation plan, measures for erosion control and protection of the downstream mitigation project. Jake stated that a pump around operation would be utilized along with standard erosion control measures as part of the construction activities.
  - Todd asked that the cross fencing at the upstream end of UT1 on the older, closed out mitigation project be removed so that there was no fencing running through the easement. Jake stated that fence removal would be included in the mitigation plan.

- The group then walked UT1A from downstream to upstream. Jake described a similar restoration approach along UT1A except that UT1A will remain a Priority 2 restoration approach for most of its length. Jake stated that the existing crossing on UT1A will be removed.

  - There was a brief discussion regarding cut slopes or terrace slopes that would be required due to the Priority 2 restoration. The IRT stated that they have seen issues with erosion and rilling along these slopes in past projects. Jake stated that careful consideration will be given to these areas during design. He stated that some potential strategies may include matting, hydroseeding, or creating small berms at the cut slope to carry water to a stabilized outlet. All this would be determined during the design phase.
  - Todd stated that he had concerns regarding the hydrology in upper UT1A. He stated that this did not mean that we could not include it in the project but the Corps would look closely at it.

- The group then moved to the UT2 drainage. Jake described the restoration approach (Priority 1, Bc) and that there would be two updated culverted stream crossings along this reach and that wetland re-establishment was proposed in Wetland 1 along this reach. The group walked to the top of UT2 then back down to the confluence with North Fork Mountain Creek.

  - Erin asked (during the UT1 walk) EPR to ask the landowner if they would accept moving the middle crossing on UT2 from the current/proposed location to the upper end of the reach. Jake stated that EPR would ask but made no guarantee that the landowner would agree.
  - The group looked at Wetland 1. Jake described that the Priority 1 restoration, realigning the stream channel back through the center of the valley, and removal of small berm at the toe of the left hill slope would improve wetland hydrology. Jake noted that the gages were installed in this wetland recently and will be used to document existing hydrology conditions.
  - Todd requested that, if possible, keep gage locations the same in pre vs. post restoration. Jake stated that EPR would try but may not be possible due to the design and construction activities which Todd understood and was in agreement.
  - Erin asked about filling the old channel. Jake stated that the old channel would be filled but some vernal pools may be left open for habitat. Erin requested that vernal pools be shallow and care be given to filling the old channel to ensure flow paths do not return to the filled area. Jake agreed.
  - The group then crossed the fence and into the short, wooded section of UT2. Some concern was raised about removal of mature trees along this reach. Todd mentioned using a lighter approach in this small section. Jake stated the fewest number of trees will be removed as possible. Erin recommended describing in detail in the mitigation plan the approach for this section and why trees would need to be removed. Jake stated that this would be included in the mitigation plan.
  - Casey asked Jake to be cognizant of the size of the rock material that would be included for stabilization of concentrated flow areas coming into the restored stream.

- The group then looked at North Fork Mountain Creek. Jake stated that this reach is proposed for E2 and will include bank grading, installation of in-stream structures such as cross vanes to protect banks and improve habitat, livestock exclusion and some bio engineering such as live stakes and toe wood.

  - Erin asked Jake if the enhancements would be shown on the design plans and Jake stated that they would. Erin also asked Jake to include a monitoring cross section in the E2 section. The group stated no other concerns about this approach/reach and started looking at Wetland 2.

- Jake described the re-establishment and rehabilitation approaches for Wetland 2 which included minor grading and filling of concentrated flow paths, plugging direct outlets, removal of sweet gums, removal of berm along the left top of bank along North Fork Mountain Creek, livestock exclusion and supplemental planting for diversity. Jake showed the IRT several concentrated flow paths that were removing water from the wetland and into North Fork Mountain Creek or UT3.

- The IRT questioned whether removal of the mature sweet gums was appropriate. Jake stated that EPR was fine with leaving mature sweet gums and will plant more understory/shrubs within the wetland if the IRT preferred to leave sweet gums.
- Erin asked Jake to include a reference wetland community site. Jake stated that EPR will attempt to locate and use a wetland reference site for vegetation communities.
- Erin asked Jake to include a vegetation monitoring plot within the supplementally planted area in Wetland 2.
- The IRT requested that EPR go into detail regarding the current condition, approach and proposed functional improvement of Wetland 2 in the mitigation plan.
- The IRT stated that they were currently leaning towards the limited removal of smaller sweet gums (less than 6" in diameter) and leaving the rest and planting appropriate shrub species. Jake stated that he was fine with that approach.
- The IRT stated that EPR could reach out to the IRT during the mitigation plan development regarding the proposed wetland approach, success criteria, etc. to get "buy-in" or advice.
- Jake stated that the approach and success criteria would be greatly informed by the gage data collected during the 2022 growing season. Jake asked Todd what hydrology improvement meant in terms of wetland rehabilitation. No absolute answer was provided but would likely involve a percentage increase. This will be proposed in the mitigation plan.

- The group quickly looked at UT3. Jake described the restoration approach as Priority 2. No additional comments on UT3 were provided.

As the meeting was concluded at approximately 11:45 AM, no serious concerns regarding the viability of the Site for mitigation as presented in the technical proposal were raised, and there was overall agreement from the group on the proposed levels of intervention and the proposed mitigation credit strategies/ratios.

The above minutes represents EPR's interpretation and understanding of the meeting discussion and actions. If recipients of these minutes should find any information contained in these minutes to be in error, incomplete, please notify the author with appropriate corrections and/or additions to allow adequate time for correction and redistribution.