MITIGATION PLAN

Morgan Branch Restoration Site
Buncombe County, North Carolina
RFP# 16-007724 (Issued: 3/1/19)
DMS Project Number 100127
DMS Contract 7909
USACE Action ID: SAW-2018-01163
DWR #: 20181030

French Broad River Basin
Cataloging Unit 06010105

Prepared for:
NC Department of Environmental Quality
Division of Mitigation Services
1652 Mail Service Center
Raleigh, NC 27699
May 2024

Prepared by:

KCI Associates of North Carolina, PC
4505 Falls of Neuse Rd, Suite 400
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KCI Project Staff: Kelsey Bartlett, Alex French, Kristin Knight-Meng, Tommy Seelinger, Adam Spiller, Joe Sullivan, and Kirsten Ullman

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 NCDMS operations and procedures for the delivery of compensatory mitigation.

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

REPLY TO
ATTENTION OF:

May 20, 2024

Regulatory Division

Re: NCIRT Review and USACE Approval of the NCDMS Morgan Branch Mitigation Site / Buncombe County

USACE ID: SAW-2018-01163
NCDMS Project # 100127
NCDWR # 2018-1030 v1

Mr. Paul Wiesner
North Carolina Division of Mitigation Services
217 West Jones St.
Raleigh, NC 27603

Dear 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 Morgan Branch Mitigation Site Draft Mitigation Plan, which closed on November 15, 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 and subsequent emails, which must be addressed in an updated 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

Project Manager
Steve Kichefski
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:

December 15, 2023

CESAW-RG/Kichefski

MEMORANDUM FOR RECORD

SUBJECT: NCDMS Morgan Branch Mitigation Site - NCIRT Comments during 30-day Mitigation Plan Review, Buncombe 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-2018-01163 30-Day Comment Deadline: November 15, 2023
DWR# 2018-1030 v1

Andrea Leslie, NCDWR:

1. This has been noted before, but 26 easement breaks, even on 18,546 ft of stream, is concerning.
2. Morgan Branch R1 is now slated for E1 instead of E2 as noted in the 2019 site visit. This reach is forested. Why the shift towards a more intensive design?
3. The cascade riffle is the predominant strategy across the whole site, with some reaches being a continuous cascade riffle.
   - The design specs for the cascade riffle show a lot of rock; we have not seen this cascade riffle approach before, and we're concerned that the designed channels will be very hardened. Can you provide photos of this approach that has already been constructed with the proportion and size of substrate as specified?
   - We are concerned that all of that cobble and woody debris could result in piping and destabilization.
   - 90% of the material is Class A and B riprap – we fear that this will basically result in what looks like a riprap-lined channel. Class B riprap is the dominant specified rock – is this amount of 8-12" stone found naturally in this system?
   - With this size and amount of riprap, will the interstitial spaces actually fill with native material and a hyporheic zone be created? Would adding soil to the mix allow for some interstitial space filling?
4. Plantings.
   - We recommend adding lower strata species to the Zone 2 plantings list.

- The planting plan specifies 20% of Zone 1 and 10% of Zone 2 as being planted in sycamore. Sycamore is typically associated with larger stream systems, and many of these streams are very small. We recommend eliminating sycamore along small streams [unless it is found on site (although it wasn't noted on site); if so, reduce it to 10% or less]. Otherwise, the planting plan seems very suitable; can they add Basswood?
- Will mature trees in riparian areas on channels in existing wooded areas be preserved where possible? It appears that the corridors will be cleared, and we recommend avoiding as much disturbance as possible in forested riparian areas.

5. Woven wire fencing is noted in the draft plan. The WRC requests that any woven wire fence that is used also be gapped at the bottom about 6 inches to facilitate passage by some wildlife species.

Maria Polizzi, NCDWR:

1. It would be helpful to have a map showing the location where DWR Stream ID forms were completed. On T4, for example, was this done at the bottom or top of the reach? Especially with a score of 30.5, DWR wonders whether the area above the intersection with T4-1 may be intermittent, but this is difficult to determine based on the information provided.
2. This is a very small easement considering the length of stream and credits generated.
3. Although stream credit has been reduced using the stream buffer credit calculator, the small buffers on this project are still considered a significant limitation to DWR. Buffer width requirements are already minimized in the mountains, from 50 ft. to 30 ft., and to see a project comprising ~19,000 LF of stream propose even narrower buffers is not ideal. It is understandable that there may be some locations where buffers need to be minimized due to project constraints, but why not extend buffers in other areas to off-set these limitations?
4. Please relocate the flow gauge on T5-Reach 2 to an area above the stream crossing.
5. The photos provided are very helpful and clearly show degraded stream systems that could benefit from restoration.
6. DWR recommends changing the name of the project to "Morgan Branch Mitigation Site". In order for DWR admin to properly classify projects, the word "mitigation" is used to track mitigation projects in our system and direct projects to me for review.
7. The number of easement breaks and stream crossings is concerning and a major limitation of the project. All but one of these crossings are also external to the easement, which means that maintenance cannot be performed by the long-term steward, and the current landowners have not shown a good track record for properly maintaining their current crossings, as detailed in the report. Why are these crossings proposed as external when agricultural access is the main function? Will there be free cattle access across any of these external crossings?

8. Section 4.3 states that 0.13 acres of temporary wetland impacts are anticipated as a result of stream relocation through the wetlands. Please explain how these are temporary impacts. Based on the description it seems that they would be permanent.
9. This project has four separate, disconnected pieces, in addition to all the stream crossings and other minor easement breaks. This is seen as a limitation of the project. Although it appears that all project sections flow into the same feature, it is preferable to connect the project components with a conservation easement.
10. DWR is pleased to see that topsoil will be used to treat at-risk planting areas (such as P2 cuts and old roadbeds), and believes that soil is key to vegetative success. What depth of topsoil is proposed in these areas? DWR also cautions that purchased topsoil/compost should be carefully sourced to ensure that invasive or weedy seeds are not present in the mix.
11. The planting density of 968 stems per acre seems high. This would allow for more than 2/3 of planted stems to die and still meet the performance standard. Assuming a lower mortality rate, the result would be an overly dense spacing, which can limit habitat and create excessive competition between individual trees.
12. DWR appreciates the inclusion of the two groundwater gauges to monitor adjacent wetlands. Would it be possible to add an additional gauge on T7?
13. In response to the DMS comment regarding physical site inspections KCI commits to a minimum of two site visits per year; however, in the text of Section 8.0 under “Visual Assessment” it states “an annual site walk will take place….”. Please update this text to reflect a minimum of two site walks per year, and quarterly site visits are recommended.
14. Would a footer log help prevent piping on the log vanes?
15. DWR shares the concern of WRC regarding the cascade riffles. Not only is the proposed rock size large for these streams (based on the pebble count it appears there is significantly less cobble in the existing channels than in the proposed channels), but the extent of these features is extensive. Most projects I review have a significantly longer list of proposed structure types and this is also one of the larger (in LF) projects that I have seen. Additionally, not all stream reaches are steep, which is typically where cascades are naturally found. DWR does not think that a one-size fits all approach is appropriate on such a large site, and especially not when this approach is essentially lining the channel with rock. This is a significant concern for DWR.
16. Will tile drains be removed from ag fields draining to project streams? The reach descriptions (specifically for MB Reach 3) mentions tile drains in surrounding fields.
17. Based on the report it sounds like there have been some cattle trampling impacts on project wetlands. I realize that wetland credits are not proposed, but will any minor repair activities occur within these locations?
18. In the future, please include more information about the reference reaches. Why is contributing drainage area not included? This is critical to determine if the reference is an appropriate comparison to the project stream? Discharge width and depth, etc.?

19. DWR questions whether an E1 (1.5:1) is appropriate for MB Reach 1. Based on the design plans it appears that the targeted bank work is very limited, only partial planting is needed due to forested buffers being present on one side of the stream, etc.
20. Due to the complexity of CE boundaries and the proximity of nearby structures, both current and proposed, the risk of encroachment on this project is high. More frequent monitoring or other actions may be needed to offset this risk.
21. DWR would like to request a site visit for this project.

Steve Kichefski, USACE:

1. No grading contours or limits of disturbance (LOD) lines were shown on the design plans, which made this review challenging. Please provide a short description of the areas of valley grading. This information should be included on the next plan submittal.
2. In forested project areas does a healthy understory exist or is supplemental planting needed to ensure proper strata?
3. The Corps appreciates the inclusion of Wetland 1 and 6 within the CE. Were attempts made to include more of Wetland 11 and the upper stream extents of T7 and T4-2?
4. Concur with DMS comment on proposed rock outlets and drainageways. The valleys are steep so rock may be necessary for long term stabilization, but we don't want to see piles of deep loose rock along drainage features. Rock should be sized appropriately and embedded as practical, allowing for necessary armoring but not over hardening.
5. Section 3.1.2 notes that an area was logged after 2010.Where was this? Is there evidence that past logging activities have had an impact on the project streams? More information would be helpful.
6. Why does Table 4 show reduced linear footage for nearly all project streams, including an enhancement reach?
7. Section 4: Table 4 (page 13) say "resolved" for all species issues. Make sure the Categorical Exclusion is updated prior to finalizing the mitigation plan and submitting the PCN to reflect any changes that have occurred since its signature on April 15, 2020. For example, ensure project commitments for NLEB are still sufficient and if the TriColored Bat has been listed consultation and project commitments should be addressed/reaffirmed.
8. Make sure to note whether a NCWRC trout moratorium applies for this project both in the mitigation plan and the PCN submittal.
9. Culverts:
    a. Agree with DWR comment 8; there can't be a 0.13 ac. temp impact if the permanent channel goes thru a wetland (see Table 4 on pg. 13 and Section 4.3 on pg. 18).

b. Of the 26 culverts proposed, 14 have an easement break length the exact same as the pipe length. This leaves no room for error in placement to avoid CE encroachment. It also leaves no room for temp construction impacts for future culvert replacement. Will the road slope and floodplain culverts (including slope/dissipator) be completely located outside the CE? The culvert proposed on T7 has a break listed as 10 feet shorter than the pipe length. Recommend re-evaluating whether easement breaks need adjusting.
c. Will dissipator pads be utilized or required with any of the culverts? If so, they may need to be removed from the CE as well.
d. Make sure an impact map is included with the permit submittal. The impact list should distinguish between crossing impacts and NWP 27 project impacts.
e. Please add a column in Table 4 and plan sheet DT6 describing whether the crossings are proposed as agricultural exemptions or permitted crossings and which permit is requested.
f. It is recommended to take a picture at each culvert inlet/outlet immediately post construction to document whether the pipe was buried in accordance with permit conditions in case sediment does not stay.

10. Existing conditions describe several incised channels, however Section 6 design approach for each reach should include information about whether a priority 1 or 2 approach will be utilized in restoration reaches. This is included on Table 19 and vaguely understood with references about floodplain integration but could be more clearly added to applicable reach descriptions.
11. The IRT cautioned during the site visit and in the response to the 2022 project update memo that despite the large project length there were too many crossings, multiple of which seem redundant. We believe that credit should be removed for double the width of easement breaks in areas of redundant crossings to reflect (or account for) the adverse effect of the crossing on the functional uplift of the project reaches. This credit reduction should be at the ratio of the approach utilized at the redundant crossing. For example, a 30-foot easement break on a restoration reach at a 1:1 ratio would be reduced by an additional 30 credits or a 50-foot easement break on an enhancement II reach at a 2.5:1 ratio would be reduced by an additional 20 credits. Please provide more information on the need for each crossing, which crossings are redundant, and updated credit tables reflecting the change for redundant crossings kept as part of the project mitigation plan.
12. Make sure (and confirm in the As-Built) that all utilities (both the lines and ROW's) and all roads (including enough room for maintenance) are located outside of the CE. This includes underground utilities.
13. Please add the existing project wetlands to Figures 9 and 10. These figures (especially Figure 10) should be split into multiple sheets at a more viewable scale.

14. Need to add the IRT's 3/17/22 response email to KCI's project update memo to Appendix 12.
15. T9: Section 6.7 – Based on how it is depicted on SP1 and PP1, please confirm that the short rock ford crossing is the same as the 10' internal crossing mentioned in Section 3.3. If yes, and this is a legal break in the CE (even though kept internal) this needs to be shown as a non-credit CE break on Figures.
16. Section 7 – Given the confined valleys on perennial tributaries proposed to be restored to A or B type channels, are bankfull events expected? Is there a floodplain?
17. While this plan has a site constraints section with discussion of some potential issues, it would be beneficial to also have a Project Risks & Uncertainties Section. It may be a bit redundant, but it's important to document concerns and recognize potential risks to the project (cascade design, crossings, narrow buffer, future building, logging, multiple landowners, etc.).
18. The Corps shares concern with other IRT commenters about the extensive use of a cascade riffle design throughout the project.
    a. We have not seen this design used so extensively on a project. Although slopes were not shown on design sheets, this approach seems to be used in the steeper headwater reaches and further downstream where gradient reduces. Why was this design better than some more traditional designs? Please provide photos and site descriptions of previous construction and use of this design, please note how long sites were in monitoring and if any modifications/repairs were necessary. Provide a discussion and photos of reference streams that were used for proposed project reaches comparison.
    b. There is a lot of rock incorporated into this design. With this approach the right balance of stabilizing but not over armoring is concern. Also, we have concern over piping of flow thru the mixed material instead of over it.
    c. Additional monitoring may be needed for such long sections of this approach, such as extra cross-sections, additional long pros, photo stations or flow gages or cameras to demonstrate success. Please provide feedback as to how you feel project success in these areas can more effectively be captured in monitoring for the IRT to consider.

Design Sheets:

19. Details – no boulder/rock sill detail is shown but at least one is proposed; Can log structures and brush toes withstand the long-term stress of the confined, steep-sloped, rock dominated system?
20. Please add representative slope to the design sheet profiles.
21. SP1 –Any concerns about live lift bank treatment keeping banks directly below crossings stable long-term? What is the distance from the proposed ditch edge to CE boundary, is the setback sufficient for future ditch maintenance without affecting CE? Provide more detail how all abandoned roads within the CE will be handled (example: decompacted, seeded/planted, any barriers needed to prevent continued passage or will they be behind fencing)?

22. SP2 –
    a. Several rock drainages proposed across the site, make sure none of these are located in features considered jurisdictional because the rock drainage appears to overlap wetland W3.
    b. T8 shows stream work through a wetland, how can there be only temp impacts (stated in narrative)?
    c. Justify proposed ratio, since no work is shown on plans within EI reach despite Section 6.6 stating, “This short reach will be stabilized using Enhancement 1 techniques…”.
    d. The MB1 ratio 1.5:1 for 1,653 LF is partially due to uplift from relocating the road. However, since there is only one area of stream/bank repair other than work associated with the crossing and two stabilized gullies and only half CE buffer planting, you need to better justify this ratio.
23. SP3 – What is setback of CE from road? Difficult to tell from scaling, is the distance sufficient for future road maintenance? Question applies to entire project.
24. SP4 – Why are cascades still proposed in areas where slope is reduced and valley opens at least on one side? This comment applies to lower reaches of several project streams (MB, T1, T3).
25. SP5 – There is a section of stream excluded from the CE at Sta. 50+00, please show the existing deck/dock structure located on the stream and add a callout. . There is a callout to enhance an existing seep with stone, please show this feature on the plan.
26. SP6 – WQT not called out on T3.
27. SP7 – T1A ratio of 2.5:1 is primarily due to road relocation. Not sure if T1R1 justifies same ratio since largely forested. Further justify your work/ratio here.
28. SP8 – Why callout to over widen banks at confluence?
29. SP11 – It appears the landscape transitions into a more open valley, what affect does this have on the channel design? Is sufficient bedform diversity and instream habitat enhancement uplift expected throughout the project from the cascade design?
30. SP12 – Rock is added within jurisdictional Wetland 11. Design a better transition/extension for wetland to connect to relocated channel. Stream impacts to wetlands W8, W9 and W10 due to new location or wider channel would not be temporary.
31. SP14 appears to be the same as SP12 except for the profile, it would be helpful to label profiles on all sheets that show multiple tributaries.
32. SP15 – Confirm the small CE area above the road on T4 is not for credit. No planting is proposed, and it is too short a stream segment for creditable uplift. Also, where is the culvert location that is noted in the WQT area callout?
33. SP18 – Can’t add rock to wetland W6 and stream impacts to wetland W7 are not temporary.

34. Fencing Plan – Please label stream reaches. There needs to be adequate access for regulatory, IRT, and stewardship staff to inspect the site. If encroachment is a concern, consider alternative pedestrian access designs. Due to health and safety concerns, staff should not be expected to climb fences during inspections.

Sincerely,

Steve Kichefski

Steve Kichefski

Project Manager
USACE Regulatory Division

Electronic Copies Furnished:

NCIRT Distribution List

KCI ASSOCIATES OF NC

ISO 9001:2015 CERTIFIED

ENGINEERS • PLANNERS • SCIENTISTS • CONSTRUCTION MANAGERS

4505 Falls of Neuse Rd., Suite 400 • Raleigh, NC 27609 • Phone 919-783-9214 • Fax 919-783-9266

Date: May 30, 2024

To: Steve Kichefski, USACE

From: Kirsten Ullman, Project Manager
KCI Associates of North Carolina, P.A.

Subject: Morgan Branch Restoration Site
Mitigation Plan Review – Response to IRT Comments
French Broad River Basin - 06010105
Buncombe County, North Carolina
DEQ Contract No. #7909
DMS Project #100127
USACE AID # SAW-2018-01163
DWR # 2018-1030 v1

Below are our responses to the IRT comments received on the mitigation plan for the Morgan Branch Restoration Site dated December 15, 2023, and the additional comments received on March 13, 2024 which resulted from a meeting on February 16, 2024. We've revised the mitigation plan to incorporate these comments and revisions where appropriate. We've also included revised mitigation and monitoring figures, which break the project into sub-maps, and a new figure that shows the locations of the stream forms.

We understand that the IRT would like to visit the site during construction and would also like to visit the nearby Dale's Creek Site, in MY03, which features similar streams and utilizes the same cascade riffle approach. We will coordinate with the IRT once a construction schedule has been established.

Andrea Leslie, NCDWR:

1. This has been noted before, but 26 easement breaks, even on 18,546 ft of stream, is concerning.

   This is a large mitigation site in the mountains formed from multiple parcels with different landowners. As we have shared with the IRT through this site's history, we have worked to minimize crossings to the extent possible. Of the existing crossings, one has been eliminated from the bottom of T2 to go from 27 to the current total of 26. The configuration of the parcels between landowners and the site's steep terrain limits the access options between the multiple independent working farms that span the project. The landowners were unwilling to give up existing crossings. The current conservation easement represents the best possible configuration for a viable mitigation site at this location with these landowners. Based on direction from the IRT in the spring of 2022, we took additional credit reductions from these crossings by using the USACE

Wilmington's buffer width tool. This resulted in a further reduction of 322.390 stream mitigation credits from our project total. As documented in additional comments provided by the IRT on 3/13/24, an additional reduction of 80 credits was applied to crossings on T2, T4-2, and T5.

As an additional note, many of the existing active crossings are unstable and are significantly degrading stream functions in their current state. All will be improved as a result of the project.

2. Morgan Branch R1 is now slated for E1 instead of E2 as noted in the 2019 site visit. This reach is forested. Why the shift towards a more intensive design?

   In the February 24, 2022 memo to the IRT (included in Appendix 12), we stated that a portion of this reach had formed a cut-off channel and needed restoration-level work in targeted areas. We also realigned the crossing location of the road that will be moved to replace a failing culvert and restore portions of channel that have been negatively affected up and downstream of the old culvert. Based on these changes and increased level of effort, we changed the overall crediting from E2 to E1. This approach was agreed upon by the IRT, with particular attention given to the positive benefits of moving the existing farm road away from the stream.

3. The cascade riffle is the predominant strategy across the whole site, with some reaches being a continuous cascade riffle.
   a. The design specs for the cascade riffle show a lot of rock; we have not seen this cascade riffle approach before, and we're concerned that the designed channels will be very hardened. Can you provide photos of this approach that has already been constructed with the proportion and size of substrate as specified?

      We have developed the cascade riffle structure from reference systems in similar steep A-type channels in the North Carolina mountains as well as from guidance documents by Will Harman for headwater mountain streams. We have also already used this structure on another DMS full-delivery project, Dale's Creek Restoration Site, which is only 0.8 mile to the south of this project and quite similar; Dale's Creek has successfully completed its second year of monitoring.

      We understand the cascade riffles across the site look extensive and uniform at the scale of the plans, but these structures have a diverse bedform and structure included in the details that has integrated woody debris and micropool habitat. We will also incorporate native rock as much as possible; the rip rap specified is for those scenarios in which the existing stream has been so highly modified or impacted by cattle that outside rock is needed (such as in highly impacted areas on T4). You can view examples of the reference systems (Haunted Creek Restoration Site) project and the implemented structures at Dale's Creek in this video: https://youtu.be/SArI4t1k2ik .

   b. We are concerned that all of that cobble and woody debris could result in piping and destabilization.

      We anticipate stable baseflow in these primarily headwater reaches. In addition, these structures are not designed to be abrupt grade transitions at risk of piping. The cascade riffle structures will accommodate the channel slope in a gentler fashion than a step pool, for example. Finer native materials will be mixed in with the rock material to fill in voids.

c. 90% of the material is Class A and B riprap – we fear that this will basically result in what looks like a riprap-lined channel. Class B riprap is the dominant specified rock – is this amount of 8-12" stone found naturally in this system?

The intent of the rock is to imitate natural cascade structures that are found in these types of North Carolina mountain channels; larger rock is needed in the absence of the stabilizing roots that might be found in nature. In addition to the rip rap specified, we also show in the detail embedded logs and woody material along with micropools. We do not want or intend these streams to look like rip rap-lined channels. We used the cascade riffle structures on the nearby Dale's Creek Restoration Site, and the restored reaches do not have the appearance of a rip rap lining. We use whatever available mixture native material to fill in larger voids and replicate a natural streambed.

d. With this size and amount of riprap, will the interstitial spaces actually fill with native material and a hyporheic zone be created? Would adding soil to the mix allow for some interstitial space filling?

We have specified for both woody material and natural stone to be used during construction. The woody material will be used to fill the interstitial spaces. If existing larger native stone can be used instead of off-site rip rap, we will use that. The amount of rip rap specified is the quantity that will be needed in those portions of the site that have been highly altered and may not have available rock like potentially the T4 reaches.

4. Plantings.

a. We recommend adding lower strata species to the Zone 2 plantings list.

We have changed Zone 2 by decreasing the 2 hickory species to 5% each, the 4 oak species to 7.5% each, and then adding 5% each of Basswood (Tilia americana FACU), Paw Paw (Asimina triloba FAC), American Hornbeam (Carpinus caroliniana FAC), and Sourwood (Oxydendrum arboreum UPL).

b. The planting plan specifies 20% of Zone 1 and 10% of Zone 2 as being planted in sycamore. Sycamore is typically associated with larger stream systems, and many of these streams are very small. We recommend eliminating sycamore along small streams [unless it is found on site (although it wasn't noted on site); if so, reduce it to 10% or less]. Otherwise, the planting plan seems very suitable; can they add Basswood?

The target community is Montane Alluvial Forest (Small River subtype), which Schafale says are distinguished from similar communities "by more than a trace presence of some of a characteristic suite of wetland or alluvial indicator species, such as Platanus occidentalis, Betula nigra, and Alnus errulate." We think sycamore should be a part of the planting, but we will reduce it to 10% in Zone 1 and instruct the planting crew to not plant sycamore along the smaller reaches. We will increase yellow birch and black gum to 15% as a result.

c. Will mature trees in riparian areas on channels in existing wooded areas be preserved where possible? It appears that the corridors will be cleared, and we recommend avoiding as much disturbance as possible in forested riparian areas.

Yes, we make an effort to save all large trees wherever possible. Part of the benefit of this large site is that there are reaches (tops of T1 and T2, for example) that are well-vegetated and require minimal clearing. Other parts of the site, like T4, the lower reach of Morgan Branch, and T7, do not have existing trees.

d. Woven wire fencing is noted in the draft plan. The WRC requests that any woven wire fence that is used also be gapped at the bottom about 6 inches to facilitate passage by some wildlife species.

The current specification has a gap of 5 inches between the bottom wire and the next wire. This information has been added to Section 6.10

Maria Polizzi, NCDWR:

1. It would be helpful to have a map showing the location where DWR Stream ID forms were completed. On T4, for example, was this done at the bottom or top of the reach? Especially with a score of 30.5, DWR wonders whether the area above the intersection with T4-1 may be intermittent, but this is difficult to determine based on the information provided.

   We have included a figure with the location of the stream forms to the appendix. The form for T4 was completed between the confluences of T4-1 and T4-2. A representative form for the upper reach of T4 has been added to the Appendix. It scores out to 27.5, as it is located above the confluence with T4-1 and not 2nd order. However, we believe that this section of T4 exhibits perennial flow. It starts as a groundwater spring/seep with a drainage area of 22 acres.

2. This is a very small easement considering the length of stream and credits generated.

   As discussed in relation to the crossings above, we realize there are limitations to the easement due to the multiple landowners and site constraints, but have accounted for this by using USACE Wilmington's buffer width tool. This resulted in a further reduction of 322.390 stream mitigation credits from our project total.

3. Although stream credit has been reduced using the stream buffer credit calculator, the small buffers on this project are still considered a significant limitation to DWR. Buffer width requirements are already minimized in the mountains, from 50 ft. to 30 ft., and to see a project comprising ~19,000 LF of stream propose even narrower buffers is not ideal. It is understandable that there may be some locations where buffers need to be minimized due to project constraints, but why not extend buffers in other areas to off-set these limitations?

   The negotiations with the landowners involved compromise to put together this type of large project in the French Broad. Many project streams flow through active agricultural areas where the landowners were unwilling to give up additional working land in narrow valleys. There are several locations where project streams follow active roads within tight mountain valleys that could not be eliminated due to ingress/egress requirements. We did extend the conservation

easement where we could, which included additional buffer and wetland protection above T1, T1A, T7, and T9. The conservation easements are recorded at this time and not able to be changed.

4. Please relocate the flow gauge on T5-Reach 2 to an area above the stream crossing.

   The gauge has been relocated and is shown on Figure 10.2.

5. The photos provided are very helpful and clearly show degraded stream systems that could benefit from restoration.

   Noted.

6. DWR recommends changing the name of the project to "Morgan Branch Mitigation Site". In order for DWR admin to properly classify projects, the word "mitigation" is used to track mitigation projects in our system and direct projects to me for review.

   The name of the project has already been established through the DMS contract and the USACE action ID. KCI will use this naming convention for future projects.

7. The number of easement breaks and stream crossings is concerning and a major limitation of the project. All but one of these crossings are also external to the easement, which means that maintenance cannot be performed by the long-term steward, and the current landowners have not shown a good track record for properly maintaining their current crossings, as detailed in the report. Why are these crossings proposed as external when agricultural access is the main function? Will there be free cattle access across any of these external crossings?

   This project has undergone many changes since inception. At the time the conservation easement was established, the IRT had not expressed preference for internal crossings. The conservation easement has been established for this project and cannot be changed. Additionally, all crossings will be gated to limit cattle or other access except for when necessary.

8. Section 4.3 states that 0.13 acres of temporary wetland impacts are anticipated as a result of stream relocation through the wetlands. Please explain how these are temporary impacts. Based on the description it seems that they would be permanent.

   Based on feedback in these comments, we will mark these as permanent as part of the NWP 27 application. We do anticipate that any stream adjustments through existing wetlands will be a contiguous effort to develop adjacent stream and wetland riparian complexes and therefore will not be a permanent loss of wetlands as such.

9. This project has four separate, disconnected pieces, in addition to all the stream crossings and other minor easement breaks. This is seen as a limitation of the project. Although it appears that all project sections flow into the same feature, it is preferable to connect the project components with a conservation easement.

   There are pros and cons to alternate layouts of this site. If we had focused on having a connected second to third-order system in the valley, we would not have been able to include other vulnerable

headwater systems. The larger sections of Morgan Branch that we included in the project are the reaches that were more highly degraded and in higher need of restoration.

10. DWR is pleased to see that topsoil will be used to treat at-risk planting areas (such as P2 cuts and old roadbeds) and believes that soil is key to vegetative success. What depth of topsoil is proposed in these areas? DWR also cautions that purchased topsoil/compost should be carefully sourced to ensure that invasive or weedy seeds are not present in the mix.

    We will reserve existing topsoil for placement following grading completion. We generally anticipate this to be about 0.3'. This information has been added to Section 6.0.

11. The planting density of 968 stems per acre seems high. This would allow for more than 2/3 of planted stems to die and still meet the performance standard. Assuming a lower mortality rate, the result would be an overly dense spacing, which can limit habitat and create excessive competition between individual trees.

    In our experience with planting restoration sites, this has been the density that we have found best ensures project success and avoids having to replant for low-density areas. We have not found that these lead to overly dense riparian zones. The following statement has been added to section 6.12: "If necessary, thinning may be performed during future monitoring years in areas with low mortality/excess surviving stem density. "

12. DWR appreciates the inclusion of the two groundwater gauges to monitor adjacent wetlands. Would it be possible to add an additional gauge on T7?

    We will add an additional gauge to the wetland at the top of T7. Wetland gauges are discussed in Section 6.8 and shown on Figure 10.

13. In response to the DMS comment regarding physical site inspections KCI commits to a minimum of two site visits per year; however, in the text of Section 8.0 under "Visual Assessment" it states, "an annual site walk will take place….". Please update this text to reflect a minimum of two site walks per year, and quarterly site visits are recommended.

    We have updated the text in Section 8 and Table 22 to reflect a minimum of two annual visits a year.

14. Would a footer log help prevent piping on the log vanes?

    The detail shows footer boulders or large cobble for these structures. Typically, in smaller streams, there is not enough room to accommodate a footer log nor is it needed if footer rock is used. The log will be installed below bankfull height and act more as toe protection/deflector.

15. DWR shares the concern of WRC regarding the cascade riffles. Not only is the proposed rock size large for these streams (based on the pebble count it appears there is significantly less cobble in the existing channels than in the proposed channels), but the extent of these features is extensive. Most projects I review have a significantly longer list of proposed structure types and this is also one of the larger (in LF) projects that I have seen. Additionally, not all stream reaches are steep, which is typically where cascades are naturally found. DWR does not think that a one-size fits all

approach is appropriate on such a large site, and especially not when this approach is essentially lining the channel with rock. This is a significant concern for DWR.

Please see the answer to Ms. Leslie's question #3a.

In regard to the question of the lower reaches, we have designed the cascade riffle as an adaptive structure. While Morgan Branch does come out into more of a valley than the upper reaches, it still classifies as an A-type channel with steep slopes compared to lower gradient riffle-pool sequences. The structure is adaptable to the changing size of the stream. With a lower slope, we will be able to develop larger pools than in the upper, steeper reaches, which is shown in both the plan and profile views. We have also designed a slightly higher sinuosity and wider floodprone benches to accommodate the change in slope. As to instream habitat enhancement, the structure will still have a mixture of woody material and rock combined with supplemental native material that will be worked into the finished streambed.

16. Will tile drains be removed from ag fields draining to project streams? The reach descriptions (specifically for MB Reach 3) mentions tile drains in surrounding fields.

    Any tile drains encountered in the easement will be cut back to outside of the easement extent, but we expect that the tile drains are all further away from the easement.

17. Based on the report it sounds like there have been some cattle trampling impacts on project wetlands. I realize that wetland credits are not proposed, but will any minor repair activities occur within these locations?

    We will be protecting these wetlands within the conservation easement and adding plantings as part of the planting plan. We will also stabilize any erosive headcuts with logs or woody debris as needed. See the newly added Section 6.8 for description.

18. In the future, please include more information about the reference reaches. Why is contributing drainage area not included? This is critical to determine if the reference is an appropriate comparison to the project stream? Discharge width and depth, etc.?

    In general, there are fewer published reference values for A-type streams, but we did locate four on-site reference cross-sections with drainage areas ranging from 0.1-0.4 sq miles; their locations are shown on Figure 7. The cross-section sheets are included in Appendix B. On-site reference cross-sectional areas were corroborated with available NC, SC, and TN Mountain Regional Curves and from the design guidelines within Will Harman's "Design Criteria for Restoring Headwater Mountain Stream".

19. DWR questions whether an E1 (1.5:1) is appropriate for MB Reach 1. Based on the design plans it appears that the targeted bank work is very limited, only partial planting is needed due to forested buffers being present on one side of the stream, etc.

    Please see the response to Ms. Leslie's question #2. In addition, while we are not planting the entire easement along that reach, there is still substantial reforestation occurring.

20. Due to the complexity of CE boundaries and the proximity of nearby structures, both current and proposed, the risk of encroachment on this project is high. More frequent monitoring or other actions may be needed to offset this risk.

    We have increased our minimum annual site visits to two a year.

21. DWR would like to request a site visit for this project.

    During the 2/16/25 meeting it was determined that the IRT would visit the site during construction and would also visit the nearby Dale's Creek site to see an example of a post-implementation site where cascade riffles were used as the primary technique for restoration. KCI will coordinate with the IRT once a construction schedule has been established.

Steve Kichefski, USACE:

1. No grading contours or limits of disturbance (LOD) lines were shown on the design plans, which made this review challenging. Please provide a short description of the areas of valley grading. This information should be included on the next plan submittal.

    We have included the sediment and erosion control sheets in this submittal, which shows the LOD. The extent of valley grading is represented by where we are relocating portions of the stream channel as well as the profile and designed cross-sections.

2. In forested project areas does a healthy understory exist or is supplemental planting needed to ensure proper strata?

    Yes, there is sufficient understory. Those areas that are forested are generally more difficult for livestock to reach and thus less impacted.

3. The Corps appreciates the inclusion of Wetland 1 and 6 within the CE. Were attempts made to include more of Wetland 11 and the upper stream extents of T7 and T4-2?

    Yes. However, we were limited by what the landowners were willing to convert from working farm to conservation easement.

4. Concur with DMS comment on proposed rock outlets and drainageways. The valleys are steep so rock may be necessary for long term stabilization, but we don't want to see piles of deep loose rock along drainage features. Rock should be sized appropriately and embedded as practical, allowing for necessary armoring but not over hardening.

    We concur as well, and only use a small amount of rock as necessary in areas that need stabilization.

5. Section 3.1.2 notes that an area was logged after 2010. Where was this? Is there evidence that past logging activities have had an impact on the project streams? More information would be helpful.

    Selective logging has occurred sporadically on land outside the conservation easement and has mostly been concentrated in the upper slopes surrounding Morgan Branch, T8, and T9. There are no obvious signs of impairment from logging like increased sedimentation; the most evident sources

of impairment at the site are due to riparian vegetation removal, proximity to roads and other infrastructure, and livestock.

6. Why does Table 4 show reduced linear footage for nearly all project streams, including an enhancement reach?

   The existing stream lengths are calculated from the detailed survey, whereas the proposed stream lengths are based on a generalized design line that lacks the micro-sinuosity that will form as the channel develops over time and responds to flow and grade control. In several places, the existing streams have been relocated to positions outside the center of the valley, which increases their length. These discrepancies appear magnified due to the size of the project. The enhancement reach referenced included a short section of channel relocation, which will result in a shorter overall length.

7. Section 4: Table 4 (page 13) say "resolved" for all species issues. Make sure the Categorical Exclusion is updated prior to finalizing the mitigation plan and submitting the PCN to reflect any changes that have occurred since its signature on April 15, 2020. For example, ensure project commitments for NLEB are still sufficient and if the Tricolored Bat has been listed consultation and project commitments should be addressed/reaffirmed.

   KCI has had additional consultation with USFWS about both NLEB and Tricolored bat, and that correspondence is included in Appendix 10 with the CE info.

8. Make sure to note whether a NCWRC trout moratorium applies for this project both in the mitigation plan and the PCN submittal.

   A trout moratorium is not required for this project, and this is noted in section 4.1.

9. Culverts:
   a. Agree with DWR comment 8; there can't be a 0.13 ac. temp impact if the permanent channel goes thru a wetland (see Table 4 on pg. 13 and Section 4.3 on pg. 18).

      As stated in our response to Ms. Polizzi's question #8, we will categorize the impact as permanent for the purposes of the NWP 27 permit application.

   b. Of the 26 culverts proposed, 14 have an easement break length the exact same as the pipe length. This leaves no room for error in placement to avoid CE encroachment. It also leaves no room for temp construction impacts for future culvert replacement. Will the road slope and floodplain culverts (including slope/dissipator) be completely located outside the CE? The culvert proposed on T7 has a break listed as 10 feet shorter than the pipe length. Recommend re-evaluating whether easement breaks need adjusting.

      The crossing exceptions on this project are exact, but we have dealt with similar constraints when designing crossings and have been able to accommodate them to ensure the culverts remain outside of the conservation easement.

      The second crossing on T7 has a pipe of 20' in length in line with the exception size, and this has been corrected in Table 16 in the report.

Additional comments post 2/16/2024 meeting: During the project meeting discussion on February 16, 2024 the IRT reiterated their concern that the culvert lengths compared to the break in the CE do not leave enough room for construction or potential dissipator pads at the culvert outlets. This could lead to encroachments at initial construction and during long term repairs. Please describe more specifically how encroachments will be avoided in these situations. For example, will culverts be shortened, does design account for lack of dissipater pads, etc.?

KCI conducted an additional review of all the proposed culverts and have reduced the length of those wherever possible to reduce the risk of encroachment at the easement edges. These have been updated in mitigation plan text, in Table 16, and in the Construction Documents. In addition to shortening pipes where possible, we will conduct additional visual monitoring of the culvert ends to evaluate any easement encroachments or changes in aquatic organism passage.

c. Will dissipator pads be utilized or required with any of the culverts? If so, they may need to be removed from the CE as well.

No, we do not anticipate using any dissipator pads.

d. Make sure an impact map is included with the permit submittal. The impact list should distinguish between crossing impacts and NWP 27 project impacts.

We will list all impacts by category as part of our NWP 27 permit package.

e. Please add a column in Table 4 and plan sheet DT6 describing whether the crossings are proposed as agricultural exemptions or permitted crossings and which permit is requested.

We are planning on submitting the crossings as permitted replacements of existing culverts within our NWP 27 permit application.

f. It is recommended to take a picture at each culvert inlet/outlet immediately post construction to document whether the pipe was buried in accordance with permit conditions in case sediment does not stay.

KCI will document the post-construction culvert inlet/outlet conditions post-construction.

10. Existing conditions describe several incised channels, however Section 6 design approach for each reach should include information about whether a priority 1 or 2 approach will be utilized in restoration reaches. This is included on Table 19 and vaguely understood with references about floodplain integration but could be more clearly added to applicable reach descriptions.

We have added some additional descriptions. That said, as A-type channels, these streams don't fit as neatly into the categories of Priority 1 and 2 approaches.

11. The IRT cautioned during the site visit and in the response to the 2022 project update memo that despite the large project length there were too many crossings, multiple of which seem redundant. We believe that credit should be removed for double the width of easement breaks in areas of redundant crossings to reflect (or account for) the adverse effect of the crossing on the functional uplift of the project reaches. This credit reduction should be at the ratio of the approach utilized at the redundant crossing. For example, a 30-foot easement break on a restoration reach at a 1:1 ratio would be reduced by an additional 30 credits or a 50-foot easement break on an enhancement II reach at a 2.5:1 ratio would be reduced by an additional 20 credits. Please provide more information on the need for each crossing, which crossings are redundant, and updated credit tables reflecting the change for redundant crossings kept as part of the project mitigation plan.

    Please see the response to Ms. Leslie's question #1. At the time of the 2022 IRT memo and response, we were directed to use the USACE Wilmington's buffer width tool as a means to further quantify the loss from the project crossings. This resulted in a further reduction of 322.390 stream mitigation credits from our project total in addition to already eliminating the project crossings from any stream credit.

    Additional comments post 2/16/2024 meeting: Based on IRT repeatedly seeking a reduction in project crossings, the Corps proposes doubling the credit reduction in areas seen as redundant. We suggest an 80 SMU reduction in project credit for three redundant crossings (on T2 E1, T4-2 R and T5 R) each consisting of a 30 linear foot break in the project.

    KCI has revised the project asset tables (Table 1 and Table 20) to include these credit reductions.

12. Make sure (and confirm in the As-Built) that all utilities (both the lines and ROW's) and all roads (including enough room for maintenance) are located outside of the CE. This includes underground utilities.

    We have worked with all utilities to confirm that they will be relocated out of the easement. Figure 8B shows the proposed relocations of power lines.

13. Please add the existing project wetlands to Figures 9 and 10. These figures (especially Figure 10) should be split into multiple sheets at a more viewable scale.

    These changes have been made to the figures.

14. Need to add the IRT's 3/17/22 response email to KCI's project update memo to Appendix 12.

    This has been added.

15. T9: Section 6.7 – Based on how it is depicted on SP1 and PP1, please confirm that the short rock ford crossing is the same as the 10' internal crossing mentioned in Section 3.3. If yes, and this is a legal break in the CE (even though kept internal) this needs to be shown as a non-credit CE break on Figures.

Yes, these two are one and the same. This was shown as "No Credit" on Figures 9 and 10, but was difficult to see due to the short segment. We've updated the figures to make the internal easement exception more visible.

16. Section 7 – Given the confined valleys on perennial tributaries proposed to be restored to A or B type channels, are bankfull events expected? Is there a floodplain?

    We do anticipate large flow events but at a slightly higher recurrence interval than the typical bankfull event. There will not be a floodplain in the upper reaches. The lower reaches will have floodprone benches as shown in the typical cross-sections in the details.

17. While this plan has a site constraints section with discussion of some potential issues, it would be beneficial to also have a Project Risks & Uncertainties Section. It may be a bit redundant, but it's important to document concerns and recognize potential risks to the project (cascade design, crossings, narrow buffer, future building, logging, multiple landowners, etc.).

    We have added a new table (Table 5 in Section 3.3) in the mitigation plan summarizing risk and uncertainty and steps to mitigate risk.

18. The Corps shares concern with other IRT commenters about the extensive use of a cascade riffle design throughout the project.

    a. We have not seen this design used so extensively on a project. Although slopes were not shown on design sheets, this approach seems to be used in the steeper headwater reaches and further downstream where gradient reduces. Why was this design better than some more traditional designs? Please provide photos and site descriptions of previous construction and use of this design, please note how long sites were in monitoring and if any modifications/repairs were necessary. Provide a discussion and photos of reference streams that were used for proposed project reaches comparison.

       Please see response to Ms. Leslie's question #3a.

    b. There is a lot of rock incorporated into this design. With this approach the right balance of stabilizing but not over armoring is concern. Also, we have concern over piping of flow thru the mixed material instead of over it.

       Please see response to Ms. Leslie's question #3b.

    c. Additional monitoring may be needed for such long sections of this approach, such as extra cross-sections, additional long pros, photo stations or flow gages or cameras to demonstrate success. Please provide feedback as to how you feel project success in these areas can more effectively be captured in monitoring for the IRT to consider.

       In these types of scenarios, photo stations are an effective way to gauge the success of bed features. They can most quickly and easily show where the bed is stable versus where headcuts or other knickpoints may be developing. Additionally, all these areas will be evaluated multiple times each year during monitoring to determine their success as stable bed and habitat features. If there are any deficiencies that are observed, we can add cross-

sections, additional photos, or small lengths of longitudinal profile to determine how they are adjusting.

Additional comments post 2/16/2024 meeting: The IRT has communicated several concerns for such a broad use of the cascade riffle design throughout the project and KCI has not proposed any adjustments to its approach. This approach is being utilized over a larger project area than other approved mitigation sites and leaves significant room to interpretation during project construction for which traditional project monitoring is not always great at capturing. This is a risk to both the IRT and the sponsor. The IRT recommends stronger monitoring within these reaches such as extra photo points, cross sections and visual observation comments. Although it is already built into monitoring procedures, I want to reiterate that during monitoring we may request additional flow cameras, longitudinal profiles or other monitoring measures if areas of concern are found.

KCI has added additional detail in the construction documents to demonstrate the variety of cascade riffle configurations, including small/steep reaches and less steep reaches with larger drainage areas. We are confident that our approach is flexible enough to successfully be adapted to the variety of gradient and stream channel sizes within the project area. At this time, it is difficult to anticipate additional areas of the project that could develop problems and require additional monitoring. There are already 66 planned photo points distributed throughout the project along channel reaches: 40 at cross sections, and 26 at the crossings. We propose documenting channel conditions twice per year via photos at these 66 photo points: once while data is being gathered to complete the monitoring report, and once during the dormant season. We understand that the proposed monitoring plan may need to be adapted if there are specific areas of concern once the project is constructed and are open to adding additional monitoring points or cross sections at these locations should they develop.

Design Sheets:

19. Details – no boulder/rock sill detail is shown but at least one is proposed; Can log structures and brush toes withstand the long-term stress of the confined, steep- sloped, rock dominated system?

    We have log vanes and live lifts designed in strategic locations, such as in unforested areas below easement exceptions. These locations will be served well by vegetated soil lifts as they will become well-vegetated and provide immediate protection to the stream banks. The log vanes are used as a deflector arm in select locations in the lower portions of Morgan Branch where the channel is less steep and wider. A detail has been added to the construction plans.

20. Please add representative slope to the design sheet profiles.

    These have been added and are also included in the morphological tables.

21. SP1 –Any concerns about live lift bank treatment keeping banks directly below crossings stable long-term? What is the distance from the proposed ditch edge to CE boundary, is the setback sufficient for future ditch maintenance without affecting CE? Provide more detail how all abandoned roads within the CE will be handled (example: decompacted, seeded/planted, any barriers needed to prevent continued passage or will they be behind fencing)?

We are not concerned about the live lifts in these locations; rather, they are stabilizing features that have reliably performed for us on many streambank projects. The live lifts will be installed in locations that are relatively straight and are intended to add quick bank stabilization. Areas with abandoned/removed infrastructure will be decompacted, seeded, and planted.

There is a 5'-distance between the edge of the road and the easement that will be sufficient for ditch maintenance. Abandoned roads will be decompacted with an excavator so that there is a stable slope transition within the easement. Any existing gravel will be scraped off and then the area scarified prior to reseeding and tree planting. The former road will not be accessible once it is integrated into the riparian buffer.

22. SP2 –
    a. Several rock drainages proposed across the site, make sure none of these are located in features considered jurisdictional because the rock drainage appears to overlap wetland W3.

       In W3, we will use log or woody debris stabilization in combination with any rock outside of the wetland.

    b. T8 shows stream work through a wetland, how can there be only temp impacts (stated in narrative)?

       Please see previous comments addressing this issue; we will change the impacts to permanent as listed in the NWP 27 permit application with the understanding that these are a combined stream and wetland system that will benefit from uplift. Additionally, many stream restoration projects end up creating adjacent wetlands as byproduct of the project. It's anticipated that may happen along portions of this project as well.

    c. Justify proposed ratio, since no work is shown on plans within EI reach despite Section 6.6 stating, "This short reach will be stabilized using Enhancement 1 techniques…".

       T8 Reach 1 will be improved by stabilizing the initiation of the stream, grading back any erosive banks, planting the riparian buffer, and providing an easement above the stream.

    d. The MB1 ratio 1.5:1 for 1,653 LF is partially due to uplift from relocating the road. However, since there is only one area of stream/bank repair other than work associated with the crossing and two stabilized gullies and only half CE buffer planting, you need to better justify this ratio.

       Please see the response to Ms. Leslie's question #2.

23. SP3 – What is setback of CE from road? Difficult to tell from scaling, is the distance sufficient for future road maintenance? Question applies to entire project.

    The distance between the CE and the road on this sheet ranges from 1-4'. There is sufficient room on the roadway and on the opposite side to perform necessary maintenance.

24. SP4 – Why are cascades still proposed in areas where slope is reduced and valley opens at least on one side? This comment applies to lower reaches of several project streams (MB, T1, T3).

    Please see the response to Ms. Polizzi's question #15.

25. SP5 – There is a section of stream excluded from the CE at Sta. 50+00, please show the existing deck/dock structure located on the stream and add a callout. There is a callout to enhance an existing seep with stone, please show this feature on the plan.

    We have added these to the sheet.

26. SP6 – WQT not called out on T3.

    We have added this label.

27. SP7 – T1A ratio of 2.5:1 is primarily due to road relocation. Not sure if T1R1 justifies same ratio since largely forested. Further justify your work/ratio here.

    T1A is largely forested but will be treated for invasive species such as multiflora rose, and the work will include invasive removal and installing fencing to protect the stream from livestock. This portion of the project also included expanded conservation easement area to protect the ephemeral reach of the channel, as well as the area between T1 and T1A. This information has been added to Section 6.2.

28. SP8 – Why callout to over widen banks at confluence?

    This will be done to accommodate the joining of the two streams as is found in reference systems and reduce the potential for bank scour if the banks were kept too tightly confined. It does not indicate a larger channel there, but rather an area where two streams are merging.

29. SP11 – It appears the landscape transitions into a more open valley, what affect does this have on the channel design? Is sufficient bedform diversity and instream habitat enhancement uplift expected throughout the project from the cascade design?

    Please see the response to Ms. Polizzi's question #15.

30. SP12 – Rock is added within jurisdictional Wetland 11. Design a better transition/extension for wetland to connect to relocated channel. Stream impacts to wetlands W8, W9 and W10 due to new location or wider channel would not be temporary.

    We have limited the rock stabilization to be outside of Wetland 11 and have added woody debris or logs to be used as an alternative in the wetland to prevent further headcuts. We will document the stream impacts to the wetlands as permanent in the NWP 27 application.

31. SP14 appears to be the same as SP12 except for the profile, it would be helpful to label profiles on all sheets that show multiple tributaries.

    We have labeled the profiles with the reach names.

32. SP15 – Confirm the small CE area above the road on T4 is not for credit. No planting is proposed, and it is too short a stream segment for creditable uplift. Also, where is the culvert location that is noted in the WQT area callout?

    Correct, we are not requesting credit for the reasons you mentioned, although we are improving this short section to have a stable transition to the downstream section.

    We have added the location of the roadside culvert on the sheet to indicate the source of flow being treated in the WQT area.

33. SP18 – Can't add rock to wetland W6 and stream impacts to wetland W7 are not temporary.

    We have adjusted the limits of the rock stabilization to be outside of W6 and have added woody debris or logs to be used as an alternative in the wetland to prevent further headcuts. We will include the stream through W7 as permanent as part of the NWP 27 application.

34. Fencing Plan – Please label stream reaches. There needs to be adequate access for regulatory, IRT, and stewardship staff to inspect the site. If encroachment is a concern, consider alternative pedestrian access designs. Due to health and safety concerns, staff should not be expected to climb fences during inspections.

    The stream reaches are now labeled in the fencing plans. We also want to ensure convenient access to the site. Careful consideration has been put into this with our monitoring team to confirm that access gates are in adequate locations throughout the project. Please see the Easement Boundary Marking plans legend that indicates gate locations with a "G". There are a total of 107 gates.

Sincerely,

Kirsten Ullman
Project Manager

From:	Kichefski, Steven L CIV USARMY CESAW (USA)
To:	Kirsten Ullman; Wiesner, Paul
Cc:	Tsomides, Harry; Kristin Knight-Meng; Adam Spiller; Leslie, Andrea J; Polizzi, Maria; Davis, Erin B CIV USARMY CESAW (USA); Tugwell, Todd J CIV USARMY CESAW (US); Kristin Knight-Meng
Subject:	RE: IRT Review Request_RE: Draft Mitigation Plan Comment Response / Morgan Branch/ SAW-2018-01163/ DWR# 2018-1030v1/ Buncombe Co.
Attachments:	image001.png image002.png image003.png image004.png image006.png image007.png image008.png

Sounds good, thanks Kirsten. I recommend including some of the increased monitoring such as additional photo stations and possibly cross-sections in your final plan figure.

Steve Kichefski
Regulatory Project Manager

From: Kirsten Ullman <Kirsten.Ullman@kci.com>
Sent: Friday, March 15, 2024 2:27 PM
To: Kichefski, Steven L CIV USARMY CESAW (USA) <Steven.L.Kichefski@usace.army.mil>; Wiesner, Paul <paul.wiesner@deq.nc.gov>
Cc: Tsomides, Harry <harry.tsomides@deq.nc.gov>; Kristin Knight-Meng <Kristin.KnightMeng@kci.com>; Adam Spiller <Adam.Spiller@kci.com>; Leslie, Andrea J <andrea.leslie@ncwildlife.org>; Polizzi, Maria <maria.polizzi@deq.nc.gov>; Davis, Erin B CIV USARMY CESAW (USA) <Erin.B.Davis@usace.army.mil>; Tugwell, Todd J CIV USARMY CESAW (USA) <Todd.J.Tugwell@usace.army.mil>; Kristin Knight-Meng <Kristin.KnightMeng@kci.com>
Subject: [Non-DoD Source] RE: IRT Review Request_RE: Draft Mitigation Plan Comment Response / Morgan Branch/ SAW-2018-01163/ DWR# 2018-1030v1/ Buncombe Co.

Hi Steve –

Thanks for providing these additional comments. We are planning to address them, along with the full original suite of comments, in the revised mitigation plan. Below I've included some additional responses, *in red italics*. I'll make sure this email chain is included in the correspondence with the revised mitigation plan.

Kirsten

From: Kichefski, Steven L CIV USARMY CESAW (USA) <Steven.L.Kichefski@usace.army.mil>
Sent: Wednesday, March 13, 2024 11:24 AM
To: Wiesner, Paul <paul.wiesner@deq.nc.gov>
Cc: Tsomides, Harry <harry.tsomides@deq.nc.gov>; Kirsten Ullman <Kirsten.Ullman@kci.com>; Kristin Knight-Meng <Kristin.KnightMeng@kci.com>; Adam Spiller <Adam.Spiller@kci.com>; Leslie, Andrea J <andrea.leslie@ncwildlife.org>; Polizzi, Maria <maria.polizzi@deq.nc.gov>; Davis, Erin B CIV

USARMY CESAW (USA) <Erin.B.Davis@usace.army.mil>; Tugwell, Todd J CIV USARMY CESAW (USA) <Todd.J.Tugwell@usace.army.mil>
Subject: [External Email] RE: IRT Review Request_RE: Draft Mitigation Plan Comment Response / Morgan Branch/ SAW-2018-01163/ DWR# 2018-1030v1/ Buncombe Co.

Good morning Paul,
Below are additional comments regarding the project to follow up on our Morgan Branch comment meeting from February 16, 2024. The IRT committed to getting them additional feedback on some of the major points of the project comment responses that were discussed during that meeting. Please incorporate responses to these additional comments in the Morgan Branch submittal.

USACE comment 9. b. : Of the 26 culverts proposed, 14 have an easement break length the exact same as the pipe
length. This leaves no room for error in placement to avoid CE encroachment. It also leaves no room for temp construction impacts for future culvert replacement. Will the road slope and floodplain culverts (including slope/dissipator) be completely located outside the CE? The culvert proposed on T7 has a break listed as 10 feet shorter than the pipe length. Recommend re-evaluating whether easement breaks need adjusting.

The crossing exceptions on this project are exact, but we have dealt with similar constraints when designing crossings and have been able to accommodate them to ensure the culverts remain outside of the conservation easement.

Additional comments post 2/16/2024 meeting: During the project meeting discussion on February 16, 2024 the IRT reiterated their concern that the culvert lengths compared to the break in the CE do not leave enough room for construction or potential dissipator pads at the culvert outlets. This could lead to encroachments at initial construction and during long term repairs. Please describe more specifically how encroachments will be avoided in these situations. For example, will culverts be shortened, does design account for lack of dissipater pads, etc.?

KCI is reviewing the specifications for all the proposed culverts and will provide additional detail in the revised mitigation plan to demonstrate how encroachments will be avoided at each crossing.

USACE comment 11. : The IRT cautioned during the site visit and in the response to the 2022 project update memo that
despite the large project length there were too many crossings, multiple of which seem redundant. We believe that credit should be removed for double the width of easement breaks in areas of redundant crossings to reflect (or account for) the adverse effect of the crossing on the functional uplift of the project reaches. This credit reduction should be at the ratio of the approach utilized at the redundant crossing. For example, a 30-foot easement break on a restoration reach at a 1:1 ratio would be reduced by an additional 30 credits or a 50-foot easement break on an enhancement II reach at a 2.5:1 ratio would be reduced by an

additional 20 credits. Please provide more information on the need for each crossing, which crossings are redundant, and updated credit tables reflecting the change for redundant crossings kept as part of the project mitigation plan.

Please see the response to Ms. Leslie's question #1. At the time of the 2022 IRT memo and response, we were directed to use the USACE Wilmington's buffer width tool as a means to further quantify the loss from the project crossings. This resulted in a further reduction of 322.390 stream mitigation credits from our project total in addition to already eliminating the project crossings from any stream credit. Based on this project history and significant deduction of credits by using this method, we are not proposing any further reductions in credits.

Additional comments post 2/16/2024 meeting: Based on IRT repeatedly seeking a reduction in project crossings, the Corps proposes doubling the credit reduction in areas seen as redundant. We suggest an 80 SMU reduction in project credit for three redundant crossings (on T2 E1, T4-2 R and T5 R) each consisting of a 30 linear foot break in the project.

KCI will revise the project asset table to include these credit reductions.

18. The Corps shares concern with other IRT commenters about the extensive use of a cascade riffle design throughout the project.

a. We have not seen this design used so extensively on a project. Although slopes were not shown on design sheets, this approach seems to be used in the steeper headwater reaches and further downstream where gradient reduces. Why was this design better than some more traditional designs? Please provide photos and site descriptions of previous construction and use of this design, please note how long sites were in monitoring and if any modifications/repairs were necessary. Provide a discussion and photos of reference streams that were used for proposed project reaches comparison.

Please see response to Ms. Leslie's question #3a.

b. There is a lot of rock incorporated into this design. With this approach the right balance of stabilizing but not over armoring is concern. Also, we have concern over piping of flow thru the mixed material instead of over it.

Please see response to Ms. Leslie's question #3b.

c. Additional monitoring may be needed for such long sections of this approach, such as extra cross-sections, additional long pros, photo stations or flow gages or cameras to demonstrate success. Please provide feedback as to how you feel project success in these areas can more effectively be captured in monitoring for the IRT to consider.

In these types of scenarios, photo stations are an effective way to gauge the success

of bed features. They can most quickly and easily show where the bed is stable versus where headcuts or other knickpoints may be developing. Additionally, all these areas will be evaluated multiple times each year during monitoring to determine their success as stable bed and habitat features. If there are any deficiencies that are observed, we can add cross-sections, additional photos, or small lengths of longitudinal profile to determine how they are adjusting.

Additional comments post 2/16/2024 meeting: The IRT has communicated several concerns for such a broad use of the cascade riffle design throughout the project and KCI has not proposed any adjustments to its approach. This approach is being utilized over a larger project area than other approved mitigation sites and leaves significant room to interpretation during project construction for which traditional project monitoring is not always great at capturing. This is a risk to both the IRT and the sponsor. The IRT recommends stronger monitoring within these reaches such as extra photo points, cross sections and visual observation comments. Although it is already built into monitoring procedures, I want to reiterate that during monitoring we may request additional flow cameras, longitudinal profiles or other monitoring measures if areas of concern are found.

KCI will provide additional detail in the construction documents to demonstrate the variety of cascade riffle configurations, including small/steep reaches and less steep reaches with larger drainage areas. We understand that the proposed monitoring plan may need to be adapted if there are specific areas of concern once the project is constructed.

Feel free to contact me or email the group if this response triggers additional questions.

Regards,

Steve Kichefski
Regulatory Project Manager
U.S. Army Corps of Engineers
Wilmington District, Mitigation Branch
(828)-271-7980 Ext. 4234
(828)-933-8032 cell

From: Wiesner, Paul <paul.wiesner@deq.nc.gov>
Sent: Friday, March 1, 2024 3:43 PM
To: Kichefski, Steven L CIV USARMY CESAW (USA) <Steven.L.Kichefski@usace.army.mil>; Polizzi, Maria <maria.polizzi@deq.nc.gov>; Davis, Erin B CIV USARMY CESAW (USA)

<Erin.B.Davis@usace.army.mil>
Cc: Tsomides, Harry <harry.tsomides@deq.nc.gov>; Kirsten Ullman <kirsten.ullman@kci.com>; Kristin Knight-Meng <Kristin.KnightMeng@kci.com>; Adam Spiller <adam.spiller@kci.com>; Leslie, Andrea J <andrea.leslie@ncwildlife.org>
Subject: [Non-DoD Source] RE: IRT Review Request_RE: Draft Mitigation Plan Comment Response / Morgan Branch/ SAW-2018-01163/ DWR# 2018-1030v1/ Buncombe Co.

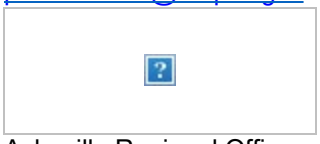
Good afternoon Erin, Maria and Steve,

I am checking in to see if the IRT has feedback from KCI's responses to IRT comments and our Friday Feb 16th meeting regarding Morgan Branch.

Please let us know when you will be able to provide feedback so DMS and KCI can take next steps.

Thank you and have a good weekend.

Paul Wiesner
Western Regional Supervisor
North Carolina Department of Environmental Quality
Division of Mitigation Services
Cell: (828) 273-1673
paul.wiesner@deq.nc.gov



Asheville Regional Office
2090 U.S. 70 Highway
Swannanoa, NC 28778-8211

From: Wiesner, Paul
Sent: Tuesday, February 6, 2024 8:32 AM
To: Kichefski, Steven L CIV USARMY CESAW (USA) <Steven.L.Kichefski@usace.army.mil>; Leslie, Andrea J <andrea.leslie@ncwildlife.org>; Polizzi, Maria <maria.polizzi@deq.nc.gov>; Davis, Erin B CIV USARMY CESAW (USA) <Erin.B.Davis@usace.army.mil>; Tugwell, Todd J CIV USARMY CESAW (US) <Todd.J.Tugwell@usace.army.mil>
Cc: Tsomides, Harry <harry.tsomides@deq.nc.gov>; Kirsten Ullman <kirsten.ullman@kci.com>; Kristin Knight-Meng <Kristin.KnightMeng@kci.com>; Adam Spiller <adam.spiller@kci.com>; Alex French <Alex.French@kci.com>; Reid, Matthew <matthew.reid@deq.nc.gov>
Subject: RE: IRT Review Request_RE: Draft Mitigation Plan Comment Response / Morgan Branch/ SAW-2018-01163/ DWR# 2018-1030v1/ Buncombe Co.

Thank you all for letting us know your availability for the Morgan Branch meeting.

Based on all responses, **Friday February 16th from 1:30pm – 2:30pm** is the best fit for the meeting.

I will send an Outlook Calendar entry with the applicable documents attached as a follow up.

Thanks

Paul Wiesner
Western Regional Supervisor
North Carolina Department of Environmental Quality
Division of Mitigation Services
Cell: (828) 273-1673
paul.wiesner@deq.nc.gov

Asheville Regional Office
2090 U.S. 70 Highway
Swannanoa, NC 28778-8211

From: Kichefski, Steven L CIV USARMY CESAW (USA) <Steven.L.Kichefski@usace.army.mil>
Sent: Tuesday, February 6, 2024 7:54 AM
To: Leslie, Andrea J <andrea.leslie@ncwildlife.org>; Polizzi, Maria <maria.polizzi@deq.nc.gov>; Wiesner, Paul <paul.wiesner@deq.nc.gov>; Davis, Erin B CIV USARMY CESAW (USA) <Erin.B.Davis@usace.army.mil>; Tugwell, Todd J CIV USARMY CESAW (US) <Todd.J.Tugwell@usace.army.mil>
Cc: Tsomides, Harry <harry.tsomides@deq.nc.gov>; Kirsten Ullman <kirsten.ullman@kci.com>; Kristin Knight-Meng <Kristin.KnightMeng@kci.com>; Adam Spiller <adam.spiller@kci.com>; Alex French <Alex.French@kci.com>
Subject: [External] RE: IRT Review Request_RE: Draft Mitigation Plan Comment Response / Morgan Branch/ SAW-2018-01163/ DWR# 2018-1030v1/ Buncombe Co.

Good morning,
USACE is available on 2/14. Also 2/16 (except from 8:30-10:30)

Regards,

Steve Kichefski
Regulatory Project Manager
U.S. Army Corps of Engineers
Wilmington District, Mitigation Branch
(828)-271-7980 Ext. 4234
(828)-933-8032 cell

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 our

website at https://regulatory.ops.usace.army.mil/customer-service-survey/ to complete the survey online.

From: Leslie, Andrea J <andrea.leslie@ncwildlife.org>
Sent: Monday, February 5, 2024 9:23 AM
To: Polizzi, Maria <maria.polizzi@deq.nc.gov>; Wiesner, Paul <paul.wiesner@deq.nc.gov>; Kichefski, Steven L CIV USARMY CESAW (USA) <Steven.L.Kichefski@usace.army.mil>; Davis, Erin B CIV USARMY CESAW (USA) <Erin.B.Davis@usace.army.mil>; Tugwell, Todd J CIV USARMY CESAW (USA) <Todd.J.Tugwell@usace.army.mil>
Cc: Tsomides, Harry <harry.tsomides@deq.nc.gov>; Kirsten Ullman <kirsten.ullman@kci.com>; Kristin Knight-Meng <Kristin.KnightMeng@kci.com>; Adam Spiller <adam.spiller@kci.com>; Alex French <Alex.French@kci.com>
Subject: [Non-DoD Source] RE: IRT Review Request_RE: Draft Mitigation Plan Comment Response / Morgan Branch/ SAW-2018-01163/ DWR# 2018-1030v1/ Buncombe Co.

I'm available 2/14, 2/16 (except for 10-11:30)

Andrea Leslie
Mountain Habitat Conservation Coordinator
NC Wildlife Resources Commission
645 Fish Hatchery Rd., Building B
Marion, NC 28752
828-803-6054 (office)
828-400-4223 (cell)
www.ncwildlife.org

From: Polizzi, Maria <maria.polizzi@deq.nc.gov>
Sent: Friday, February 2, 2024 10:29 AM
To: Wiesner, Paul <paul.wiesner@deq.nc.gov>; Steve Kichefski <Steven.l.kichefski@usace.army.mil>; Davis, Erin B CIV USARMY CESAW (USA) <Erin.B.Davis@usace.army.mil>; Tugwell, Todd J CIV USARMY CESAW (US) <Todd.J.Tugwell@usace.army.mil>
Cc: Leslie, Andrea J <andrea.leslie@ncwildlife.org>; Tsomides, Harry <harry.tsomides@deq.nc.gov>; Kirsten Ullman <kirsten.ullman@kci.com>; Kristin Knight-Meng <Kristin.KnightMeng@kci.com>; Adam Spiller <adam.spiller@kci.com>; Alex French <Alex.French@kci.com>
Subject: Re: IRT Review Request_RE: Draft Mitigation Plan Comment Response / Morgan Branch/ SAW-2018-01163/ DWR# 2018-1030v1/ Buncombe Co.

Good morning,

Thank you for providing these response to comments. I am available to discuss on 2/14 after 2pm, or any time on 2/16, 2/20, or 2/22.

Have a great weekend!

Maria Polizzi
Stream and Wetland Mitigation Coordinator
401 & Buffer Permitting Branch
Division of Water Resources, NCDEQ

Office: (919)-707-9083 Cell: (919)-815-4586
Email: maria.polizzi@deq.nc.gov

Address: 512 N. Salisbury St., Archdale Building 942-H, Raleigh, NC
US Mail: 1617 Mail Service Center, Raleigh, NC 27699-1617

From: Wiesner, Paul <paul.wiesner@deq.nc.gov>
Sent: Friday, February 2, 2024 9:27 AM
To: Steve Kichefski <Steven.l.kichefski@usace.army.mil>; Davis, Erin B CIV USARMY CESAW (USA) <Erin.B.Davis@usace.army.mil>; Tugwell, Todd J CIV USARMY CESAW (US) <Todd.J.Tugwell@usace.army.mil>; Polizzi, Maria <maria.polizzi@deq.nc.gov>
Cc: Leslie, Andrea J <andrea.leslie@ncwildlife.org>; Tsomides, Harry <harry.tsomides@deq.nc.gov>; Kirsten Ullman <kirsten.ullman@kci.com>; Kristin Knight-Meng <Kristin.KnightMeng@kci.com>; Adam Spiller <adam.spiller@kci.com>; Alex French <Alex.French@kci.com>
Subject: IRT Review Request_RE: Draft Mitigation Plan Comment Response / Morgan Branch/ SAW-2018-01163/ DWR# 2018-1030v1/ Buncombe Co.

Good morning Steve, Erin, Maria and Todd;

Thank you for the IRT mitigation plan review comments provided on 12/15/23. KCI's responses to comments are attached along with the IRT comments received. These documents have also been uploaded to the USACE RIBITS site.

As noted below, the IRT would like to review KCI's responses to comments prior to submitting the Final mitigation plan.

DMS and KCI would like to set up an on-line meeting with the IRT to discuss the responses prior to updating the Final mitigation plan.

Once you all have reviewed the responses, please let us know a date and time that would work for a MS Teams meeting and I will set it up.

DMS staff are not available next week, but we have availability on the afternoon of Wednesday February 14th & the afternoon of Thursday February 15th.

If one of those afternoon dates work, please let us know the preferred date and time. If not, please suggest a date and time that would work.

Thank you

Paul Wiesner
Western Regional Supervisor
North Carolina Department of Environmental Quality
Division of Mitigation Services
Cell: (828) 273-1673
paul.wiesner@deq.nc.gov

Asheville Regional Office
2090 U.S. 70 Highway
Swannanoa, NC 28778-8211

From: Kichefski, Steven L CIV USARMY CESAW (USA) <Steven.L.Kichefski@usace.army.mil>
Sent: Friday, December 15, 2023 4:07 PM
To: Wiesner, Paul <paul.wiesner@deq.nc.gov>; Tsomides, Harry <harry.tsomides@deq.nc.gov>; Kirsten Ullman <kirsten.ullman@kci.com>
Cc: Davis, Erin B CIV USARMY CESAW (USA) <Erin.B.Davis@usace.army.mil>; Tugwell, Todd J CIV USARMY CESAW (US) <Todd.J.Tugwell@usace.army.mil>; Isenhour, Kimberly T CIV USARMY CESAW (USA) <Kimberly.T.Isenhour@usace.army.mil>; Haywood, Casey M CIV USARMY CESAW (USA) <Casey.M.Haywood@usace.army.mil>; Bowers, Todd <bowers.todd@epa.gov>; Holland Youngman <holland_youngman@fws.gov>; Polizzi, Maria <maria.polizzi@deq.nc.gov>; Leslie, Andrea J <andrea.leslie@ncwildlife.org>; Wilson, Travis W. <travis.wilson@ncwildlife.org>; McHenry, David G <david.mchenry@ncwildlife.org>
Subject: [External] Draft Mitigation Plan Comment Response / Morgan Branch/ SAW-2018-01163/ Buncombe Co.

Good afternoon IRT,

We have completed our review of the Draft Mitigation Plan for the NCDMS Morgan Branch Mitigation Site (SAW-2018-01163). Please see the attached memo, which includes all NCIRT comments that were received during the review process along with additional comments provided by Wilmington District staff following our review.

We have evaluated the comments generated during the review period and determined that there are concerns raised for which we would like to review responses to comments prior to submitting the Final mitigation plan. Please review the attached comments contact me if you have questions or wish to discuss.

Thank you for your participation. Please contact me if you have questions or wish to discuss.

Thank you,

Regards,

Steve Kichefski
Regulatory Project Manager
U.S. Army Corps of Engineers
Wilmington District, Mitigation Branch
(828)-271-7980 Ext. 4234
(828)-933-8032 cell

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 our website at https://regulatory.ops.usace.army.mil/customer-service-survey/ to complete the survey online.

From: Davis, Erin B CIV USARMY CESAW (USA) <Erin.B.Davis@usace.army.mil>
Sent: Wednesday, October 11, 2023 8:05 AM
To: Tugwell, Todd J CIV USARMY CESAW (USA) <Todd.J.Tugwell@usace.army.mil>; Kichefski, Steven L CIV USARMY CESAW (USA) <Steven.L.Kichefski@usace.army.mil>; Isenhour, Kimberly T CIV USARMY CESAW (USA) <Kimberly.T.Isenhour@usace.army.mil>; Haywood, Casey M CIV USARMY CESAW (USA) <Casey.M.Haywood@usace.army.mil>; Bowers, Todd <bowers.todd@epa.gov>; Holland Youngman <holland_youngman@fws.gov>; Polizzi, Maria <maria.polizzi@deq.nc.gov>; Leslie, Andrea J <andrea.leslie@ncwildlife.org>; Wilson, Travis W. <travis.wilson@ncwildlife.org>; Dave McHenry <david.mchenry@ncwildlife.org>
Cc: Wiesner, Paul <paul.wiesner@deq.nc.gov>; Tsomides, Harry <harry.tsomides@deq.nc.gov>; Kirsten Ullman <kirsten.ullman@kci.com>
Subject: Notice of NCDMS Mitigation Plan Review / Morgan Branch/ SAW-2018-01163/ Buncombe Co.

Good morning IRT,

The below referenced Draft Mitigation Plan has been posted by NCDMS on the Draft Mitigation Plan Review section of the DMS & IRT SharePoint Site and on RIBITS. Per Section 332.8(g) of the 2008 Mitigation Rule, this review period will remain open for 30 calendar days from this email notification. Please provide comments by 5 PM on the 30-day comment deadline shown below.

When providing comments please indicate if your concerns are great enough that you intend to initiate the Dispute Resolution Process described in Section 332.8(3) of the Mitigation Rule. Comments provided after the 30-day comment deadline (shown below) may not be considered. This comment period may be extended at the request of NCDMS if they determine that additional time is necessary to make changes to the Draft Mitigation Plan.

At the conclusion of this comment period, a copy of all comments will be provided to NCDMS and the NCIRT of the District Engineer's intent to approve or disapprove this project. More information, including instructions to access and use the SharePoint Site, and a flow chart detailing the process are included in the updated document attached to this email notice.

Please send comments to the USACE Mitigation Team only. The USACE Project Manager is Steve Kichefski (Steven.L.Kichefski@usace.army.mil) and the Mitigation Specialist is Erin Davis (Erin.B.Davis@usace.army.mil).

30-Day Comment Start Date: October 16, 2023

30-Day Comment Deadline: **November 15, 2023**

60-Day Intent to Approve Deadline: December 15, 2023

Project information is as follows:
Morgan Branch Restoration Site
DMS Project # 100127
Institution Date: 5/23/2019
RFP# 16-007724 (Issued: 11/13/2018)
French Broad River Basin
Cataloging Unit 06010105
Buncombe County, North Carolina
USACE Action ID: SAW- 2018-01163
DWR# 2018-1030 v1

Proposed Mitigation Project Credits:
13,930.610 SMU (Cool)

Full Delivery Provider: KCI Associates of North Carolina
Contact: Kirsten Ullman, Natural Resources Project Manager, Kirsten.Ullman@kci.com (919) 278-2551

NCDEQ - DMS Project Manager: Harry Tsomides, harry.tsomides@deq.nc.gov, (828) 545-7057

The full Mitigation Plan has been uploaded to the IRT/NCDEQ SharePoint Mitigation Plan Review page and the USACE RIBITS Cyber Repository for IRT review:

RIBITS (please note that you must be logged in to access documents):

https://ribits.ops.usace.army.mil/ords/f?p=107:278:16348378546387:::RP,278:P278_BANK_ID:5402

IRT SharePoint page:
https://ncconnect.sharepoint.com/sites/IRT-DMS/SitePages/Home.aspx

Morgan Branch_100127_Mit Plan(for IRT)_2023
Morgan Branch_100127_MP (for IRT Review)_2023.pdf

Please let us know if you have any questions.

Thank you,
Erin

Erin B. Davis
Mitigation Specialist, Regulatory Division
U.S. Army Corps of Engineers, Wilmington District
(919) 930-1887 work cell

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TABLES

FIGURES

APPENDICES

1.0 PROJECT INTRODUCTION

The Morgan Branch Restoration Site (MBRS) is a full-delivery stream mitigation project being developed for the North Carolina Division of Mitigation Services (DMS) in the French Broad River Basin (06010105 8-digit cataloging unit) in Buncombe County, North Carolina. The site's natural hydrologic regime has been substantially modified through livestock impacts and removal of the riparian buffer. This site offers the chance to restore streams impacted by pasture and agriculture to a stable headwater ecosystem with a functional riparian buffer and floodplain access, while also reducing incoming nutrients from livestock.

The MBRS is situated in northwest Buncombe County. The site is located approximately 3.5 miles southwest of the town of Leicester, North Carolina. Specifically, the site is on Morgan Branch Road, northwest of the intersection of Morgan Branch Road and Newfound Road (Figure 1). The center of the site is at approximately 35.6099 N and –82.7469 W in the Enka and Canton United States Geological Survey (USGS) Quadrangles (Figure 2).

The MBRS will restore a mountain stream ecosystem along Morgan Branch and twelve of its tributaries (T1, T1A, T2, T3, T4, T4-1, T4-2, T4-3, T5, T7, T8, and T9) – over 19,000 existing linear feet of steam - with a combination of Restoration, Enhancement I, and Enhancement II techniques. Approximately 1.11 acres of existing jurisdictional wetlands are also being protected in the conservation easement.

Once site grading is complete, the unforested portions of the stream buffer will be planted with riparian species. The site will be monitored for a minimum of seven years or until the success criteria are met. The table below summarizes the credits that will be produced from this project.

Table 1. Project Credit Summary

Restoration Level	Stream Credits			Riparian Wetland		Non-Rip	Coastal
	Warm	Cool	Cold	Riverine	Non-Riv	Wetland	Marsh
Restoration		**11,412.000**					
Re-establishment							
Rehabilitation							
Enhancement							
Enhancement I		**1,546.000**					
Enhancement II		**1,295.000**					
Creation							
Preservation							
Credit Reduction*		**-402.390**					
Total**		**13,850.609**					

*See Section 6.14 and Appendix 11 for information about credit deductions.

** Total base SMU differ by 0.001 due to rounding error.

2.0 WATERSHED APPROACH AND SITE SELECTION

The site's watershed, 14-Digit Hydrologic Unit Code (HU) 06010105090020 and 12-Digit HU 060101050902, Newfound Creek (Figure 3), was identified in the 2009 Upper French Broad River Basin Restoration Priorities (RBRP) plan as a Targeted Local Watershed (TLW) (NCDMS 2009). The 14-digit watershed is largely rural in nature (42% agriculture and 47% forest with only 39% of stream length having adequate buffers). At the time of the RBRP, there was no land in conservation, and the Division of Water

Resources (DWR) marked the HU as a priority area, as most of Newfound Creek is impaired, suffering from severe habitat degradation (including sedimentation), excess nutrients, and high fecal coliform bacteria. The RBRP listed impacts from agriculture use, including stream bank erosion, excessive sedimentation, livestock access to streams, and fecal coliform pollution, as the major stressors within this TLW. The goals and priorities for the MBRS are based on the information presented in the French Broad River Basin Restoration Priorities: restoring riparian buffer vegetation, stabilizing banks, excluding livestock, and restoring natural geomorphology, especially in headwater streams (NCDMS 2009). The project will support the following basin priorities:

- Reducing fecal coliform inputs
- Improving/restoring riparian buffers
- Reducing sediment loading
- Improving stream stability
- Reducing nutrient loading
- Excluding livestock and implementing other agricultural best-management practices (BMPs)

There are no conservation or protected areas located adjacent to the project site, although some of the upstream headwaters have mature forested riparian buffers. With the permanent protection of the project streams, there will be continuous buffers along most streams within the project watershed.

The upper project portion of Morgan Branch has been named Jones Branch by NCDWR (NCDWR Index # 6-84-1-1). None of the project tributaries have been rated except Jones Branch, which is classified for surface water as Class C. NCDWR has Jones Branch transitioning to Morgan Branch at the confluence with T4. Jones Branch is named Morgan Branch on the USGS mapping (Figure 2) and will be referred to as Morgan Branch for the purposes of this project. All the streams drain directly into Morgan Branch (NCDWR Index# 6-84-1), which is classified for surface water as Class C. Morgan Branch drains to Newfound Creek approximately 0.92-mile downstream of the project reach, and approximately 0.45-mile downstream of its confluence with T7. The section of Newfound Creek downstream of the site is identified as 6-84 and is classified for surface water as Class C. Newfound Creek is listed as impaired on the 2018 and 2020 303(d) lists for Benthos exceeding criteria and was given a Fair rating. The project watershed is shown in Figure 2, and another map illustrating the project location in relation to the TLW is shown in Figure 3. In addition to MBRS, there are three other DMS mitigation sites within the TLW: Newfound Creek, a closed-out stream project under stewardship that is 2.8 miles to the northeast and two full-delivery projects in monitoring by KCI, Round Hill Branch (full-delivery project by KCI), 2.1 miles to the north, and Dale's Creek, approximately 0.8 mile to the south (Figure 3).

The TLW also has a Total Maximum Daily Load (TMDL) developed in 2005 for Newfound Creek (Waterbody ID NC_6-84b, Waterbody ID NC_6-84c, and Waterbody ID NC_6-84d) for fecal coliform. The project is a direct tributary to Newfound Creek and will permanently eliminate livestock access to the streams and provide a vegetated riparian buffer to capture and reduce upslope bacterial sources. The project is not within a mapped Federal Emergency Management Agency (FEMA) flood zone; the nearest mapped floodplain is downstream of the project along Newfound Creek. Due to the nature of the steep headwater reaches at this site, the potential for hydrologic trespass beyond the project easement is not a concern.

3.0 BASELINE AND EXISTING CONDITIONS

3.1 Watershed Processes and Resource Conditions

3.1.1 Landscape Characteristics

The site lies within the Broad Basins (Level IV 66j) ecoregion of the Mountain physiographic province. The Broad Basins ecoregion is drier, has lower elevations, and less relief than the more mountainous Blue Ridge Regions. It also has less boulder colluvium than the surrounding regions and more saprolite. Although some areas are mostly forested, there are more areas of pasture, cropland, industrial land uses, and human settlement than other Blue Ridge ecoregions. The natural vegetation generally contains a mix of oaks and pines similar to the Piedmont, with more shortleaf and Virginia pine, and white, southern red, black, and scarlet oaks (Griffith et al. 2002).

The MBRS is located within the Blue Ridge geologic belt, in a formation of Biotite gneiss (Zybn), which consists of inequigranular, locally abundant potassic feldspar and garnet, interlayered and gradational with calc-silicate rock, sillimanite-mica schist, mica schist, and amphibolite. The formation also contains small masses of granitic rock (USGS 2020). The project watershed consists of steep, confined first-order stream valleys before it reaches the floodplain of Morgan Branch. Project valleys vary from semi-confined to open, with boulders and bedrock interspersed along the stream reaches.

According to the NRCS Web Soil Survey (see Figure 4), most of the project is underlain by Toecane-Tusquitee complex soils (ToC, TpD, TpE) (USDA 2020). These mountain soils have a high content of rock fragments, characterized by random areas of seeps and springs, consisting of Toecame (approximately 45-50%) and Tusquitee (approximately 35-40%). The project also includes areas of Tate loam (TaB, TaC, TaD), which is an intermountain hill soil found on footslopes and toeslopes, characterized by random areas of seeps and springs; and French loam (FrA), which is an occasionally flooded, floodplain soil found in mountain valleys. The results of the soil survey are presented in Figure 4. These soil types do not present any major limitations for typical construction activities associated with stream restoration.

3.1.2 Land Use/Land Cover and Chronology of Impacts

The project watershed for the MBRS drains 1.13 square miles (724 acres). Current land use in the project watershed (Figure 5) was derived from the 2019 orthoimagery and consists of pasture/farmland (28% / 203 ac), forest (69% / 500 ac), and low-density development (3% / 21 ac). The current adjacent land use has a negative impact on water quality of the project streams. This is evidenced by livestock having direct access to most of the project reaches. KCI's measurement of the total impervious area for the project watershed is 3%, which is based on the land use delineated from the 2019 orthoimagery. There are sections of forested area along the middle portions of Morgan Branch and T1 which consist of large, mature trees such as tulip poplar (*Liriodendron tulipifera*), red maple (*Acer rubrum*), northern red oak (*Quercus rubra*), and pignut hickory (*Carya glabra*) in the canopy, with a sparse understory due to livestock grazing. The project site is located in a rural area in western Buncombe County with low development pressure within the project watershed.

Historic aerials were examined for information about how the site has changed over recent history. The reviewed aerials are displayed in Figures 6a and 6b. Historic aerials were obtained from NCDOT and NC OneMap for 1974, 1993, 2002, and 2010. The historic aerials show that the site has been systematically impacted by agriculture and grazing for at least the last 47 years. In the earliest aerial photo from 1974, all the project streams have already been cleared. There is little change within the project area between

1974 and the most recent aerial photo. An area of logging has occurred to the south of Morgan Branch since the date of the most recent aerial photo.

Over the 47 years of available record, both physical and functional impacts to the project streams on the site have been documented. These impacts included channel modification, ditching and draining, impacts from adjacent agriculture and livestock, and riparian vegetation removal.

3.1.3 Watershed Disturbance and Response

The project has experienced landscape and vegetative modifications to maximize the potential for agriculture, most recently hay production, and grazing on the site. As a result, the existing project streams have adjusted in response to these changes. All the project streams have bank height and entrenchment ratios outside the natural range expected for their landscape position as shown in Table 2 below. Appendix 2 contains comprehensive existing conditions data.

KCI assessed nearly 20,000 feet of existing streams within the project area for stability and causes of impairment, including the primary project stream, Morgan Branch, and twelve tributaries (T1, T1A, T2, T3, T4, T4-1, T4-2, T4-3, T5, T7, T8, and T9). The project streams are generally in Stage IV, Degradation and Widening, in the channel evolutionary process (Simon and Rinaldi 2006), although some are still in Stage III. The primary disturbance to the system has been grazing and agricultural production that have modified the project stream banks and riparian buffers. This has included channelization in places where the streams could be modified. There have been disturbances to the sediment regime of the site, but sources are on-site from upslope erosion induced by cattle and direct impacts on stream banks made by cattle hooves. Table 2 describes the bank height and entrenchment ratios at the most impacted reaches on the project.

Wooded riparian buffers are absent from the site streams in the wider valley bottoms, which are populated with pasture grass species in the cattle pastures and sown hay in the hay fields. Wetland vegetation in these areas has been impacted by cattle and consists primarily of common rush (*Juncus effusus*). Some invasive species are present at the fringe areas between forested areas and pasture. Invasive species on-site include tree-of-heaven (*Ailanthus altissima*), oriental bittersweet (*Celastrus orbiculatus*), Chinese privet (*Ligustrum sinense*), Japanese honeysuckle (*Lonicera japonica*), princess tree (*Paulownia tomentosa*), multiflora rose (*Rosa multiflora*), and johnsongrass (*Sorghum halepense*).

In the less disturbed forested areas along sections of Morgan Branch and T1, the canopy is primarily red maple (*Acer rubrum*), green ash (*Fraxinus pennsylvanica*), tulip poplar (*Liriodendron tulipifera*), northern red oak (*Quercus rubra*), and black walnut (*Juglans nigra*). Additional canopy species include yellow buckeye (*Aesculus flava*), yellow birch (*Betula alleghaniensis*), witchhazel (*Hamamelis virginiana*), and American basswood (*Tilia americana*). The understory contains flowering dogwood (*Cornus florida*) spicebush (*Lindera benzoin*), black cherry (*Prunus serotina*), and sapling species of tulip poplar and red maple. Herbaceous species include jewelweed (*Impatiens capensis*), and Japanese stiltgrass (*Microstegium vimineum*), Christmas fern (*Polystichum acrostichoides*), and poison ivy (*Toxicodendron radicans*).

Table 2. Existing Stream Bank Height and Entrenchment Ratios

Stream	Existing Bank Height Ratios	Existing Entrenchment Ratios
MB Reach 3	2.9, 1.5	1.6, 2.9
T1 Reach 1	1.3	7.1
T1 Reach 3	3.3, 3.2	1.4, 1.3
T2 Reach 1	1.0	1.4
T2 Reach 2	1.1	13.9
T3	1.0 – 1.5	5.2 – 13.2
T4	1.3 – 4.1	1.1-5.8
T4-1	8.1	1.4
T4-2	5.2 – 11.5	1.2 – 1.4
T4-3	3.0	1.4
T5 Reach 1	7.0	1.2
T5 Reach 2	2.9, 3.3	1.5, 1.5
T7	3.1 – 10.3	1.2 – 2.7
T8 Reach 2	2.2, 7.9	1.2, 1.8
T9	4.2, 1.3	1.3, 1.4

Morgan Branch (MB), 5,903 existing linear feet (lf), has been divided into three reaches for assessment and design: MB Reach 1 (1,704 lf), MB Reach 2 (2,625 lf), and MB Reach 3 (1,574 lf).

MB-2 looking downstream. There is an access road along the right bank.

Morgan Branch (MB) enters the project from the west. The upstream source of MB is a seep originating from bedrock on the northwest slope of Jones Mountain. Upstream from the project area, the channel is high functioning and stable with wide forested buffers. The stream becomes degraded as it nears the start of the project easement. This reach has been designated as Morgan Branch, Reach 1. Tributary 9 (T9) enters MB Reach 1 from the left bank approximately 250' downstream from the start, and Tributary 8 (T8) flows south into the left bank of MB Reach 1 about 765' downstream from the confluence of T9. In areas where the banks are less steep, cattle have destroyed the channel form, the left bank riparian buffer had been cleared, and an existing gravel cattle road runs parallel to the stream. These conditions continue until the beginning of MB Reach 2. After approximately 1,300 lf, there is an existing 24"-diameter corrugated metal pipe (CMP) crossing, which has been maintained in adequate condition, but is experiencing erosion up and downstream of the structure. Below the culverted crossing, MB Reach 1 continues to flow east, but has a narrow riparian buffer with large trees along the banks.

MB Reach 2 begins as the stream reaches a larger forested area and continues east. The stream flows through another 24" culvert, as it crosses a forestry road leading north. This culvert has repeatedly been compromised by large flow events, and the landowner has made attempts to shore up the structure with concrete and other materials. This area is open to cattle, but due to the steep, forested terrain and the valley confinement, the stream has not been accessed by the cattle as frequently. There are large drops in bed elevation, but they are stable and show no signs of bed migration. Riparian vegetation is present on both sides of the stream, but the existing cattle road continues to run parallel to the stream.

MB-3 looking downstream as it flows through an active cattle field.

After MB exits the forested area, MB Reach 3 begins and continues east and shortly after flows through a 4' CMP as it crosses under a road again. The right bank contains a thin canopy consisting of mature trees. The landowners have constructed a small timber deck pad immediately adjacent to the stream along this reach. MB Reach 3 continues to flow east for another 775 feet, where it reaches the open area of the valley. This reach is severely impacted by cattle, resulting in inconsistent bed and channel form, signs of instability, and fine sediment from bank erosion compromising stream function. There is no forested riparian buffer located along this section of the reach. This area also contains a small emergent wetland, W4 (0.07 acre), which has been impacted by cattle trampling and a reduced hydroperiod by the disconnected stream.

MB Reach 3 continues through a 6' squash corrugated metal pipe culvert as it crosses Morgan Branch Road, a gravel access route. The channel then flows into a part of the farm that is used for livestock feeding in the winter. This part of the stream has severe impacts due to the high concentration of livestock that use this area and shows indications of channelization through agricultural buildings. The stream is highly degraded and minimally functioning. Livestock have damaged the channel to an extent that there is no bedform and there is active erosion along the entire reach in the feeding area. The direct input of livestock waste to the stream in this location is a source of high amounts of nutrients and fecal coliform for this stream system. There are also multiple tile drain outlets to the stream along this reach. These drains collect the groundwater under this feeding area that is also contaminated with livestock waste and directly pipe it to the stream. The two assessment cross-sections (MB-XS A and B) in this location show bank height ratios of 1.5 – 2.9 and eroding, vertical banks. Additionally, while this reach does have a base layer of gravel and cobble, most of the interstitial space is filled with fine sands and silts that are coming from the surrounding bank erosion.

Tributary 9 (T9) begins to the west of MB Reach 1 at a degraded wetland W1 (0.41 ac), and has cattle impacts along its entire length. This part of the stream has significant impacts because of the high concentration of livestock that use this area. The stream is highly degraded, shows multiple signs of instability, including incision and active erosion, and in general is minimally functioning. This stream flows down valley, with no buffer on the right bank, until it flows under a farm road and then cuts down in grade to meet Morgan Branch. The two assessment cross-sections (T9-XS A and B) in this location show bank height ratios of 1.3 - 4.2 and eroding, vertical banks. Fine sands and silts from bank and channel erosion are also affecting this reach.

Tributary 8 (T8) (448 existing lf) enters downstream of the confluence with MB and T9 and has been divided into two reaches for assessment and design. T8 Reach 1 starts at wetland seep W3 (0.07 ac) at the head of a steep valley. The upstream portion has impacts from cattle access and generally unstable bedform. There are numerous hillside seeps that contribute flow to T8 and take the form of degraded fringe wetlands that have been impacted by cattle. One significant seep comes from the east side of the channel and is connected by a large headcut that is contributing significant sediment to the system. T8 Reach 2 begins at this headcut. This reach has poor bed and channel form because of the cattle impacts. The bank erosion, incision, active head cuts, and cattle impacts become more severe and frequent as the

stream progresses down valley. The vegetation is dominated by multiflora rose, privet and other invasive species. T8 ends after it flows under the farm road and loses a significant amount of grade to meet MB Reach 1. The two assessment cross-sections (T8-XS A and B) in Reach 2 show bank height ratios of 2.2 – 7.9. Here again, cattle impacts to T8 have resulted in eroding, vertical banks that contribute large quantities of sand and silt to the gravel and cobble base layer of the streambed.

Tributary 1 (T1) (3,233 existing lf) has been divided into three reaches for assessment and design: T1 Reach 1 (674 lf), T1 Reach 2 (1,575 lf), and T1 Reach 3 (984 lf). The source of T1 is a series of seeps on Jones Mountain, with two primary seeps contributing most of the hydrology to the stream. These two seeps are the start of T1 Reach 1 and T1A (206 lf). T1 Reach 1 starts at a seep at the head of a steep valley with T1A joining after a few hundred feet. This upper section of T1 and T1A are open to cattle access, with the seep areas having the most impacts. There are many invasives within this buffer, but the buffer also has a canopy of large native trees. Once T1 and T1A come together, they flow down this steep valley for almost 200 feet before reaching a 12" CMP crossing. Here the valley walls flatten and open up for about 216 feet with no buffer on the stream; as a result, the cattle are able to access the channel and have caused more damage. Cross-Section T1A (XS T1A) was taken midway down T1 Reach 1. The reach exhibits a high entrenchment ratio of 7.1 due to the cattle impacts. T1 Reach 2 begins after this section of channel where the valley narrows again and becomes forested. This portion of channel is high functioning and appears stable even though cattle have intermittent access. Due to the steepness of the valley, it is unlikely that cattle access the stream regularly. There is one existing crossing along T1 Reach 2.

T1 Reach 3 begins downstream where T1 flows through a farm road culvert under Morgan Branch Road. The vegetation transitions from a mix of forest and pasture to entirely pasture and agriculture and the valley gradually widens. The reach has been straightened in the past, and cattle have also degraded the channel so there is limited vegetated buffer. This channel condition is poor, with few defined bed features and erosion and excess sedimentation from cattle have caused silt to cover the channel bed. There is a failing culverted crossing along this reach. Shortly after this crossing, the stream flows through a fence line and the stream becomes channelized. Starting here, the channel is incised, entrenched, and vertical eroding banks are common. This condition is consistent until the confluence with Morgan Branch.

Tributary 2 (T2) (734 existing lf) has been divided into two reaches for assessment and design: T2 Reach 1 (326 lf) and T2 Reach 2 (408 lf). Like T1, T2 Reach 1 starts at a seep along the side of Jones Mountain, outside the project area. The project portion of T2 Reach 1 starts where it comes out of the forested valley and into the cleared cattle pasture. This reach shows signs of cattle impacts, but other than a degraded culvert crossing, the channel is small, and the bed form is primarily stable. T2 Reach 2 begins after T2 flows through another degraded 18" metal culvert, the stream becomes more degraded as cattle impacts become substantial. T2 Reach 2 continues for about 225 feet where it flows through an 18" CMP under Morgan Branch Road. This degraded state of channel erosion, poor bed form, and embedded bed features continues to the confluence with T1.

Tributary 3 (T3) is similar to T2 in that it originates in a steep forested valley outside the project area. The project reach begins where the stream flows into a more open part of the valley where there is no riparian buffer, and the channel becomes more degraded. There are numerous hillside seeps that contribute flow to T3 and take the form of degraded fringe wetlands that have been impacted by cattle. The upstream part of this reach has poor bed and channel form because of the cattle impacts. As the stream flows down valley, it becomes more incised where it appears to have been historically channelized. Cattle have access

to the upper 75% of this reach before the stream flows through a fence line and becomes a ditched channel between two hay fields. This channel condition continues to the confluence with Morgan Branch.

T4 looking upstream as it flows through an active cattle field.

Tributary 4 (T4) (1,880 lf) is the primary stream to the northeast of the project and flows to Morgan Branch from the north side of Morgan Branch Road. There are three other contributing tributaries (T4-1, T4-2, and T4-3) in this catchment. T4 starts at a spring/seep that has been historically stabilized with large boulders. Water flows from this spring down this steep valley in a confined channel. This channel has cut down through the valley bottom and the banks are all generally steep, with signs of erosion from full cattle access. There are numerous cattle paths along these banks and the stream drops over a succession of several active headcuts and alternates between incision with vertical banks followed by aggraded sections of channel with low but trampled banks. Where there are a few identifiable riffles, there are signs of gravel in the channel, but most of the channel is imbedded with fine silt. T4 continues in this degraded state as it flows downstream. This area also contains two small emergent wetlands along the stream channel, W9 (0.02 acre) and W10 (0.06 ac), which have been impacted by cattle. Wetland W11 (0.05 ac) is a seep wetland that enters the left bank of T4 downstream of the confluence with T4-1.

Soon after the confluence with T4-2 towards the end of the project reach, T4 flows through a cattle feed lot. This last reach is severely degraded because of the high concentration of cattle in this area and the lack of streamside vegetation. T4-3 then joins T4 from the east and the project reach ends at Morgan Branch Road. Six assessment cross-sections (T4-XS A through F) were completed along T4. T4-XSA and B were done upstream of the confluence with T4-1, and T4-XSC, T4-XSD, and T4-XSE were completed downstream of the confluence with T4-1. T4-XSF was surveyed downstream of the confluence with T4-2. The cross sections along T4 exhibit bank height ratios ranging from 1.3 – 4.1, indicative of the eroding channel banks that are contributing finer particles to the channel bed.

T4-1 (473 lf) is in a similar condition to the upper half of T4. It also begins at a perennial spring/seep wetland W8 (0.01 ac), has cattle impacts along its entire length, is in a steep confined valley, and has poor bedform with multiple headcuts. This condition continues until its confluence with T4. T4-2 (1,053 lf) begins shortly below a culvert under Potato Branch Road. From this culvert, the channel is in a similar condition to T4-1 and upper T4 but is even more extremely incised with bank height ratios of 5.2 – 11.5. As the channel flows south, there are multiple headcuts, similar to the adjacent tributaries, but these headcuts are larger and advancing at a higher rate. Once T4-2 flows through a fence into a more heavily cattle impacted pasture, there are signs of past grade stabilization attempts. These measures involved installing boulder sills across the channel at intervals. Some of these sills are still intact, while the stream has cut around others, causing more erosion. T4-2 flows into T4 near the feed lot where the cattle impacts are more significant, and the bank form of T4-2 is even lost among the impacts.

The last tributary on T4 is T4-3 (95 lf). T4-3 originates outside the project area and flows into T4 from the east, with the project reach being only a short section that begins at the property line. Like the other reaches in this portion of the project T4-3 is narrow, incised, and severely degraded by cattle.

Tributary 5 (T5) (1,836 lf) flows from a separate catchment in the southeastern quadrant of the project and has been divided into two reaches for assessment and design. T5 Reach 1 begins at a seep/spring at a boulder cluster and flows east-northeast. T5 Reach 1 has a narrow buffer of invasives and the channel is confined within the valley, which has protected it from severe cattle impacts. This reach still has some eroding banks and small head cuts. T5 Reach 2 begins as the bank erosion, incision, active head cuts, and cattle impacts become more substantial and frequent as the stream progresses down valley. The lower 200' of T5 Reach 2 does not have cattle access but is still incised with actively eroding banks (bank height ratios 2.9 and 3.3). This project reach ends at the confluence with Morgan Branch.

Tributary 7 (T7) (1,750 lf) is the most downstream project tributary to Morgan Branch. It is severely degraded by cattle and portions flow adjacent to a feed lot and barn, which are a contributor to poor water quality in this stream. Like many of the other project streams, T7 begins at a spring/seep near the top of the valley. After the seep area, the stream quickly drops through a series of headcuts down the valley. Wetland W6 (0.07 ac) is a cattle-impacted seep that drains into the left bank near the top of T7. There is no riparian buffer along this reach and cattle have full access to the channel, causing erosion and destroying the natural bedform. After the headcuts the valley opens, and the stream runs through the degraded wetland W7 (0.38 ac) upstream of an old levee. While the stream is not incised here, it is devoid of bed form because of the cattle impacts. From here, the stream hits another headcut, and flows into an area that is excluded from cattle with a thicket of invasive species and early successional vegetation. This area lasts for approximately 200' before the stream again flows into the pasture. In the pasture area, the stream is incised and degraded by cattle, with poor bedform and eroding banks. From this cattle pasture, the stream runs through a series of crumbling culverts and immediately adjacent to a feed lot and barns, which all drain to the stream. The project reach of T7 ends approximately 40' upstream of a dairy barn adjacent to the channel.

Note that a Tributary 6 (T6), originally a part of the proposed project, has been eliminated. Post-contract meetings with the IRT changed the assets and credit structure such that the additional credits generated from T6 would not be necessary to meet project commitments.

3.1.4 Jurisdictional Determination

A jurisdictional determination was received from the US Army Corps of Engineers on September 24, 2020. The jurisdictional determination is included in Appendix 8 and Table 3 below shows the delineated features on-site. Project activities including the reconnection of stream channels to adjacent floodplains, replanting of vegetation, and exclusion of livestock will have a net benefit on the condition of jurisdictional wetlands within the project easement, by improving both hydrology and vegetation.

Table 3. Existing Stream and Wetland Conditions

Reach Name	Flow Status	DWQ Score	NCSAM Rating
MB Reach 1	Perennial	39	Medium
MB Reach 2	Perennial	39	Medium
MB Reach 3	Perennial	39	Low
T1 Reach 1	Perennial	32	High/Low
T1 Reach 2	Perennial	32	Medium
T1 Reach 3	Perennial	32	Low
T1A	Intermittent	23.5	High
T2 Reach 1	Perennial	30	Low
T2 Reach 2	Perennial	30	Low
T3	Perennial	30.5	Low
T4	Perennial	30.5	Low
T4-1	Intermittent	23.25	Low
T4-2	Intermittent	24.5	Low
T4-3	Intermittent	19.5	Low
T5 Reach 1	Intermittent	26	Medium
T5 Reach 2	Intermittent	26	Low
T7	Intermittent/Perennial	19.5/28	Low
T8 Reach 1	Intermittent	25.75	Medium
T8 Reach 2	Intermittent	25.75	Low
T9	Intermittent/Perennial	22.5/30	Low

Wetland ID	NCWAM	Hydrologic Class	NCWAM Rating	Cowardin Class	Size (Acres)	Anticipated Impacts (Acres)	Location
W1	Headwater Forest	Riparian	High	PSS	0.41	0.01	Top of T9
W2	Headwater Forest	Riparian	Medium	PEM	0.03	0.01	Floodplain T8
W3	Headwater Forest	Riparian	Medium	PSS	0.07	0.01	Floodplain T8
W4	Bottomland Hardwood Forest	Riparian	Low	PEM	0.01	N/A	LB of MB
W6	Seep	Riparian	Medium	PEM	0.07	N/A	Seep entering the LB of T7
W7	Headwater Forest/Seep	Riparian	Medium	PEM	0.38	0.05	Floodplain T7
W8	Headwater Forest	Riparian	Medium	PEM	0.01	0.01	Floodplain T4-1
W9	Headwater Forest	Riparian	Medium	PEM	0.02	0.01	Floodplain T4
W10	Headwater Forest	Riparian	Medium	PEM	0.06	0.03	Floodplain T4
W11	Seep	Riparian	Medium	PEM	0.05	N/A	Seep entering the LB of T4

Table 4. Project Attribute Table

Project Attribute Table				
Project Name		Morgan Branch Restoration Site		
County		Buncombe County		
Project Area (acres)		724 acres		
Project Coordinates (latitude and longitude decimal degrees)		35.6099 N, -82.7469 W		
Project Watershed Summary Information				
Physiographic Province		Mountain		
River Basin		French Broad		
USGS Hydrologic Unit 8-digit	06010105	USGS Hydrologic Unit 14-	06010105090020	
DWR Sub-basin		04-03-02		
Project Drainage Area (acres)		754 acres		
Project Drainage Area Percentage of Impervious Area		1%		
Land Use Classification		Forest (67%), Pasture/Farmland (30%), Rural Development (3%)		
Reach Summary Information				
Parameters		**Morgan Branch**	**T1**	**T1A**
Pre-project length (feet)		5,903	3,233	206
Post-project (feet)*		5,760	3,248	206
Valley confinement (Confined, moderately confined, unconfined)		Confined	Confined	Confined
Drainage area (acres)		530 acres	61 acres	44 acres
Perennial, Intermittent, Ephemeral		Perennial	Perennial	Intermittent
NCDWR Water Quality Classification		C	C	C
Dominant Stream Classification (existing)		A4	A4	A4
Dominant Stream Classification (proposed)		B4a	A4/B4a	A4
Dominant Evolutionary class (Simon) if applicable		Stage IV	Stage III/IV	Stage III
Parameters		**T2**	**T3**	**T4**
Pre-project length (feet)		734	1,429	1,880
Post-project (feet)*		725	1,411	1,754
Valley confinement (Confined, moderately confined, unconfined)		Confined	Confined	Confined
Drainage area (acres)		33 acres	45 acres	48 acres
Perennial, Intermittent, Ephemeral		Perennial	Perennial	Perennial
NCDWR Water Quality Classification		C	C	C
Dominant Stream Classification (existing)		A4	A4	A4/B4a
Dominant Stream Classification (proposed)		A4	A4/B4a	B4
Dominant Evolutionary class (Simon) if applicable		Stage III	Stage III/IV	Stage III/IV

Table 4 continued

Parameters	T4-1	T4-2	T4-3
Pre-project length (feet)	473	1,053	95
Post-project (feet)*	460	991	64
Valley confinement (Confined, moderately confined, unconfined)	Confined	Confined	Confined
Drainage area (acres)	10 acres	25 acres	22 acres
Perennial, Intermittent, Ephemeral	Intermittent	Intermittent	Intermittent
NCDWR Water Quality Classification	C	C	C
Dominant Stream Classification (existing)	A4	A4	A4
Dominant Stream Classification (proposed)	B4	B4	B4
Dominant Evolutionary class (Simon) if applicable	Stage III	Stage III	Stage III/IV
Parameters	**T5**	**T7**	**T8**
Pre-project length (feet)	1,836	1,750	448
Post-project (feet)*	1,815	1,727	424
Valley confinement (Confined, moderately confined, unconfined)	Confined	Confined	Confined
Drainage area (acres)	39 acres	50 acres	6 acres
Perennial, Intermittent, Ephemeral	Intermittent	Intermittent/Perennial	Intermittent
NCDWR Water Quality Classification	C	C	C
Dominant Stream Classification (existing)	A4	A4/F4b	A4
Dominant Stream Classification (proposed)	B4	A4/B4a	A4
Dominant Evolutionary class (Simon) if applicable	Stage III	Stage III/IV	Stage III
Parameters	**T9**		
Pre-project length (feet)	919		
Post-project (feet)*	887		
Valley confinement (Confined, moderately confined, unconfined)	Confined		
Drainage area (acres)	23 acres		
Perennial, Intermittent, Ephemeral	Intermittent/Perennial		
NCDWR Water Quality Classification	C		
Dominant Stream Classification (existing)	A4		
Dominant Stream Classification (proposed)	A4		
Dominant Evolutionary class (Simon) if applicable	Stage III		

* = Post-project stream length includes non-credited reaches such as crossings

Table 4 continued

Wetland Summary Information			
Parameters	**W1 and W8**	**W2, W3, W6, W7, W9, W10, and W11**	**W4**
Pre-project (acres)	0.42	0.68	0.01
Post-project (acres)	0.42	0.68	0.01
Wetland Type (non-riparian, riparian)	Riparian	Riparian	Riparian
Mapped Soil Series	Edneyville-Chestnut complex	Toecane-Tusquitee complex	Tusquitee-Whiteside complex
Soil Hydric Status	Non-Hydric	Non-Hydric	Non-Hydric
Regulatory Considerations			
Parameters	**Applicable?**	**Resolved?**	**Supporting Docs?**
Water of the United States - Section 404	Yes	Applying for NWP 27	Preliminary JD approved
Water of the United States - Section 401	Yes	Applying for NWP 27	Preliminary JD approved
Endangered Species Act**	Yes	Yes	USFWS
Historic Preservation Act**	No	Yes	NCSHPO
Coastal Zone Management Act (CZMA or CAMA)**	No	N/A	N/A
Essential Fisheries Habitat**	No	N/A	N/A

**Items addressed in the Categorical Exclusion in Appendix 10.

3.1.4 Site Photographs

Photo 1: Cattle-impacted channel. Morgan Branch – enhancement reach. 1/24/2018

Photo 2: Cattle-impacted channel. Morgan Branch – restoration reach. 1/24/2018

Photo 3: Channelized portion of T1. 1/24/2018

Photo 4: Channelized portion of T2. 1/24/2018

Photo 5: Channelized portion of T3. 1/24/2018

Photo 6: Highly incised and cattle impacted channel along T4. 1/24/2018

Photo 7: Highly incised and cattle impacted channel along T4-2. 1/24/2018

Photo 8: Cattle crossing/wallow along T5. 1/24/2018

Photo 9: Cattle feed lot runoff spilling into T7. 1/24/2018

Photo 10: Cattle crossing/wallow along T7. 1/24/2018

Photo 11: Erosion and instability along T9. 1/24/2018

Photo 12: Headcut and erosion along T8. 1/24/2018

3.2 Functional Uplift Potential

Cattle impacts, vegetation removal, and channelization are the main stressors that have reduced the functionality of the project streams and riparian buffers. The proposed project captures a large proportion of the project watershed's surface water drainage and offers the opportunity to produce functional uplift at the site that would not otherwise occur within the near future.

The uplift for MBRS will be achieved at the hydraulic, geomorphological, and physicochemical functional levels. Hydraulic improvements will come from redeveloping stable banks with a floodplain bench. Reestablishing this type of connectivity will return a hydraulic routing system through this stream corridor that will distribute flood flows through a broader area with reduced in-channel stress rather than within a confined channel. Geomorphological functional uplift will be achieved through channels sized to the bankfull flow, a planform and profile design emphasizing bedform variation with woody debris for bank protection and habitat, and the reestablishment of a forested riparian corridor. As a result, bank migration and lateral stability will be restored to a sustainable level and the banks and bed will accommodate design flows. Sediment inputs will decrease due to reduced bank erosion and sediment transport can return to an equilibrium level that will accommodate watershed inputs. Riparian plantings will further support geomorphological functionality by increasing bank stability. Physicochemical functions will improve with the reductions in bacterial and nutrient inputs to the project streams from converted land use (pasture to forested buffer) and filtering capabilities of the riparian buffer. These nutrient and bacterial parameters will not be monitored directly, but rather have been estimated as a reduced contribution to project streams of 1030 $x10^{18}$ fecal coliform colonies, 1,876 pounds of total nitrogen, and 151 pounds of total phosphorus per year (based on NCDMS 2016 guidance; see Appendix 2).

3.3 Site Constraints to Functional Uplift

Consideration of existing and future impacts to the area that could limit functional uplift opportunities is important when assessing project potential. The surrounding land use is predominantly rural with the lower part of the watershed comprised of rural residences and agricultural and the upper part transitioning into forested ridges. The project site and the adjacent parcels are zoned as an Open Use District within Buncombe County but have experienced little change in recent years as evidenced in the historic aerial photographs. If development were to occur within the watershed, the proposed restoration would ensure that the project streams are more resilient to changes in the runoff hydrograph with an accessible floodplain to reduce erosion potential compared to the currently constrained condition of the straightened channels.

Within the project site itself, there are site constraints that shape the project. The site is owned by multiple landowners and contains several homesites and active agricultural operations. Extensive efforts have been made with the landowners to consolidate and reduce the total number of crossings within the project. However, there are twenty-six existing crossings on project streams, in varying condition. While numerous, these crossing easement exceptions represent less than 5% of the total project stream length. All remaining crossings will be stabilized and improved as a result of the project activities, and fencing will be installed to exclude livestock from project streams. All crossings will be excluded from the project easement, except for one 10' culverted recreational crossing along T9, which will be excluded from credit but interior to the easement. Proposed project crossings and easement exceptions are detailed in Section 6 and shown in the site plans (Appendix 1).

There are also existing roadways that constrain the site in these steep mountainous areas. A portion of gravel road leading to a house on the upper slopes of Jones Mountain will be relocated near the confluence of MB Reach 1 and T9, as shown in Figure 8B, in order to pull the road away from the streams and consolidate crossings. In several places, the gravel road along MB Reach 2 is closer than 30 feet to the existing channel and cannot be relocated within the steep valley. One additional easement exception will occur along MB Reach 3, where the landowner has constructed a streamside deck adjacent to the right bank. This section of MB has been removed from stream crediting. To compensate for these easement exceptions, a reduced credit structure along this reach is detailed in Section 6. The Wilmington District Stream Buffer Credit Calculator was also used to compute credit adjustments along this reach and for the site in general. The sum of buffer adjustments is included in all credit tables, with detailed calculations and supporting documentation in Appendix 11.

Invasive species are not anticipated to be a threat at the project site. There are scattered individual plants, but not extensive areas where invasives have taken over the site. No evidence of beaver activity has been observed, and beavers are not expected to be a factor in the site management due to the steep nature of many of the project streams. However, KCI will monitor the project for any of these elements that may arise as a threat to project success.

Based on our analysis and design for the project, we would assign MBRS a low level of risk in the path toward long-term stability and resilience following restoration implementation. The upper watershed outside of the project easement is steep and forested and not expected to be suitable for large-scale development in the future. Most of the project will consist of enhancement work in large gravel and cobble material streams, taking advantage of existing stable features found within the reaches while reducing bank erosion and improving bedform diversity. The overall sediment load from the watershed is low, with current fine sediment within the project reaches coming from localized bank erosion. Any remaining fine sediment found within the streams should move through the project limits within the monitoring period following construction. Restored riparian buffers will reduce sedimentation and nutrient inputs from ongoing livestock and agricultural operations.

There are limited areas of moderate risk on the project for encroachment due to the number of crossings present among multiple landowners. These areas will be monitored closely with more visual monitoring at least twice a year to ensure no encroachments are occurring.

Table 5. Project Risks and Uncertainty Summary

Risk Source	Level of Risk and Uncertainty	Risk Mitigation Features or Actions
Future Development	Low	Steep hillside less desirable for development.
Potential Logging	Medium	Stream buffer to protect stream.
Steep Stream Gradient	Low	Use of adaptable cascade riffles mimicking natural A-stream systems
Easement Encroachment due to Multiple Landowners	Medium	Completely fenced easement; frequent site visits and boundary inspections
Impaired Aquatic Organism Passage due to Culverted Crossings	Medium	Proper sizing/installation of culverts; Visual inspections of bed integrity; photo documentation of culvert inlets/outlets
Invasive Species	Low	Limited existing populations/seed sources to be eradicated

4.0 REGULATORY CONSIDERATIONS

4.1 Biological and Cultural Resources

The list of federally protected species that are known to occur in Buncombe County, North Carolina, was obtained from the USFWS website. A literature review was completed for each of the listed species to determine their physical description and habitat requirements. A biological conclusion for each species was submitted to USFWS on August 26, 2019. USFWS responded that they had no additional comments on September 20, 2019. Copies of the correspondence are included in Appendix 10.

After the 2019 USFWS correspondence, the status of northern long-eared bat *(Myotis septentrionalis)* and tricolored bat (*Perimyotis subflavus*) was updated. KCI re-initiated consultation with USFWS for these species. USFWS found that the project may affect but is not likely to adversely affect both northern long-eared bat and tricolored bat. This additional correspondence is included in Appendix 10. In order to minimize potential negative impacts to bats, KCI commits to conduct tree clearing activities associated with the project during the bat inactive season of October 16 to March 31.

A trout moratorium is not required for this project.

A desktop review of historic structures was completed for the site and a request for cultural resources review was to the NC State Historic Property Office (SHPO) and the Tribal Historic Preservation Office of the United Keetoowah Band of Cherokee Indians in Oklahoma, Cherokee Nation, and Eastern Band of the Cherokee Indians on August 22, 2019. A comprehensive archaeological survey report was also submitted to the SHPO on December 30, 2019, and the Tribal Historic Preservation Offices on February 11, 2020. A response was received from SHPO on January 27, 2020, concurring with the findings of the archaeological survey and the recommendations that the archaeological sites not be listed on the National Register of Historic Places. No responses were received from the Tribal Historic Preservation Offices. Copies of the correspondence are included in Appendix 10.

4.2 FEMA Floodplain Compliance and Hydrologic Trespass

The project is not within a mapped FEMA flood zone. The nearest mapped floodplain is approximately 2,500 downstream of the project along Newfound Creek. Due to the nature of many of the steep, headwater reaches at this site, hydrologic trespass beyond the project easement is not a concern onsite.

4.3 Permitting

Following the approval of the mitigation plan, KCI will submit a Pre-Construction Notification (PCN) applying for a Nationwide Permit (NWP) 27 and Water Quality General Certification No. 4255 (Aquatic Habitat Restoration, Enhancement, and Establishment Activities) under Sections 404 and 401 of the Clean Water Act. It is anticipated that the project will result in impacts to jurisdictional wetlands as the project streams will be relocated through small sections of seven existing unforested wetlands (see Section 6.8 and Table 3). Precautions will be taken to minimize these impacts during construction, with the goal of making many of the impacts temporary by using woody debris instead of rock where feasible. Replacement of existing culverts will also be permitted under the NWP 27 and will be outlined in the PCN; all culverted crossings will be outside of the conservation easement.

Prior to initiating construction, KCI will also obtain NPDES coverage under General Permit NCG01 through the NCDEQ Division of Energy, Mineral, and Land Resources (DEMLR).

5.0 MITIGATION PROJECT GOALS AND OBJECTIVES

As part of the project, the site easement will also protect 1.11 acre of existing wetland. Wetland 1 at the top of T9, wetlands 2 and 3 along T8, Wetland 4 along MB Reach 3, and several wetland areas along T4 and T7 will be integrated into the restoration of the stream floodplains. These non-credit generating improvements to the project will help create additional functional improvement of this system. Table 6 summarizes the project goals and objectives that will lead to functional improvements and specific parameters that will be addressed.

Table 6. Project Goals, Objectives, and Functional Outcomes

Goals	Objective	Functional Level	Function-Based Parameter Effects	Monitoring Measurement
Restore channelized and livestock-impacted streams to stable channels	Relocate or stabilize channelized and/or incised streams to connect to a floodplain or floodprone area	Hydraulics	Floodplain Connectivity	Flood Frequency
				Bank Height Ratio and Entrenchment Ratio
	Install a cross-section sized to the bankfull discharge	Geomorphology	Bank Migration/Lateral Stability	Cross-Sectional Survey
				Visual Inspection of Bank Stability
	Create bedform diversity with pools, riffles, and habitat structures	Geomorphology	Bed Form Diversity	Percent Riffle and Pool, Facet Slopes, Visual Inspection
				Visual Inspection of Feature Maintenance
Restore a forested riparian buffer to provide bank stability, filtration, and shading	Fence out livestock to reduce nutrient, bacterial, and sediment impacts from adjacent grazing and farming practices to the project tributaries.	Geomorphology	Bed Material Characterization	Pebble Count, Boundary Assessment
		Physicochemical	Nutrient and Bacteria Reductions	Estimated Reductions based on Converted Land Use, Boundary Assessment
	Plant the site with native trees and shrubs and an herbaceous seed mix.	Geomorphology/ Species Composition	Vegetation	Density, Boundary Assessment
				Species Composition/Diversity

Table adapted from Harman et al 2012

6.0 DESIGN APPROACH AND MITIGATION WORK PLAN

The proposed mitigation at the MBRS will focus on using targeted enhancement and restoration techniques to improve and protect the headwater tributaries flowing to Morgan Branch. This will be accomplished by re-establishing bankfull cross-sections and bed morphology impacted by cattle, reconnecting to floodprone benches, excluding cattle with fencing, protecting existing wetlands, and establishing a native riparian buffer.

The project will restore and enhance a total of 18,546 proposed lf, which will generate 14,253 stream credits prior to credit adjustments within the conservation easement (described in Section 6.13). An overview map of the proposed mitigation is shown in Figure 9 and the project plan sheets are included in Appendix 1. Based on the deficiencies described above, a mitigation work plan has been developed to achieve functional improvements. Mitigation will occur along Morgan Branch and its twelve tributaries.

The project streams were designed using a modified reference reach approach using four stable A-type on-site cross-sections with drainage areas ranging from 0.1-0.4 sq miles similar to the project stream sizes (locations shown on Figure 7; see Appendix 2 for data and Section 6.11 for a discussion of design discharge values). The common reference values from Harman et al. 2009 were also used to adjust the design criteria as necessary to fit the existing site conditions. Many of the project reaches are steep headwater systems that will be driven by channel grade and bed and bank roughness rather than by alluvial dynamics found in the lower reaches such as MB Reach 3 and the ends of T4 and T7. Due to the nature of these steep reaches, we will use typical cross-section dimensions across tributaries in similar drainage areas. The project plans have tables at the bottoms of Sheets DT4 and DT5 as to how these typical proposed cross-sections will be applied across the project streams. Proposed cross-section A will be applied across the upper reaches of all streams except for MB and represents the lower range of what we consider to be constructable dimensions at 5.6’ wide and 0.6’ maximum depth. The remaining cross-sections B-I are more specific to particular reaches.

All the project streams with Restoration and Enhancement I will also use a cascade riffle structure, an adaptable structure with embedded rock and woody debris to stabilize grade transitions. Within the cascade riffles, cobble steps will lead into micropools within the cascade. This profile resembles the cascading nature of reference streams found on-site and used in similar steep reference mountain streams. The cascade riffle structures will accommodate steeper channel slopes in a more graduated fashion than a step pool and are designed to avoid abrupt grade transitions that may pose a risk for piping. In reaches with a less steep slope, such as the lower portion of Morgan Branch, the cascade riffle structures will be designed with larger pools than those in the upper, steeper reaches, and the channel will have a slightly higher sinuosity and wider floodprone benches. The structures will be designed to incorporate native rock and woody material such as embedded logs wherever possible; the rip rap specified in the design plans is intended for scenarios in which the existing stream has been so highly modified or impacted by cattle that outside rock is needed. Finer native materials will be mixed in with the rock material to fill in voids. KCI has used these structures successfully, most recently at Dale’s Creek Restoration Site approximately 0.8 mile to the south of this project (shown on Figure 3). More detail on the variety and adaptability of these structures may be found in Appendix 1 on Sheet DT2.

Existing topsoil harvested during construction will be reserved for placement in at-risk planting areas (such as P2 cuts and old road beds) following grading completion. The depth of placed topsoil is anticipated to be 0.3’.

The project area contains potential roosting habitat for northern long-eared bat (*Myotis septentrionalis*), and tricolored bat *(Perimyotis subflavus),* two federally listed species. Consultation was initiated with the USFWS to ensure that project activities would not adversely affect these species. All tree clearing associated with the project will take place between October 15 and April 1; as a result, USFWS issued a statement of concurrence with the lead federal agency on a "may affect, not likely to adversely affect" determination for northern long-eared bat and tricolored bat. Correspondence with USFWS is included in Appendix 10.

Below is a more detailed description of each of the proposed actions on the project streams.

6.1 Morgan Branch

MB is the primary stream channel at the site and involves 5,515 lf of Restoration, Enhancement I, and Enhancement II over three reaches as depicted in Figure 9. This stream has been channelized and largely disconnected from a floodplain and riparian buffer.

MB Reach 1 will begin at Station (STA) 10+00 as it enters the property and will involve stream Enhancement I for 1,653 lf of credited stream. Cattle currently have access to the entire reach. This Enhancement I work will include bank grading and riffle enhancement along a section of the channel starting at STA 20+50 where it has divided flow; realignment and stabilization of a culverted road crossing near STA 23+00 that will be moved downstream to accommodate the realigned road; a short reach of restoration in the area of the old culvert; and installation of a stabilized rock outlet to attenuate channelized ephemeral flows from a road culvert. Section of the access road and power line utilities will be relocated upslope away from the channel. Areas of invasive species treatment and removal, combined with subsequent planting along the left bank of the channel will restore a functional riparian buffer. Cattle will be excluded from the reach with a combination of installed fencing and cattle guards.

MB Reach 2 will begin at STA 26+83 using Enhancement II techniques, including limited sections of channel re-alignment, bank work and installation of live lifts, installation of bed feature structures such as cascade riffles and riffle enhancement, and installation of stabilized rock outlets to mitigate concentrated drainage from the adjacent road. Cattle have access to the entire reach, but it is surrounded by steep valley walls and forest, resulting in less intensive livestock impacts. This Enhancement II work will also include invasive species control, cattle exclusion with fencing, and planting of native species. The culverted crossing near STA 32+00 will be realigned and re-constructed, and the existing culvert will be removed, along with an existing shed building that falls within the easement. The short, steep section of stream immediately upstream and downstream of the culvert will be restored to enable the culvert realignment and stabilized with cascade riffles to accommodate the grade change. A second existing culvert at STA 44+50 will be re-aligned, and a portion of the channel that is currently bypassing the culvert will be re-routed and restored, with the abandoned bypass portion of channel filled. The road that runs along MB Reach 2 cannot reasonably be relocated completely outside the project easement, resulting in some areas where the easement and buffer will be less than 30 feet.

Due to the variation of existing conditions and site constraints along this reach, two credit ratios are proposed: the reach from Stations 26+83 to 43+86 (1,657 lf) will receive 5:1 credit. This portion of the reach is identified in the asset table and on the construction drawings as MB Reach 2a. The portion of MB Reach 2 from Stations 43+86 to 52+62 has been impacted more severely by livestock, so the typical 2.5:1 Enhancement II credit ratio will be used to improve the reach. This portion of the reach is identified in the asset table and on the construction drawings as MB Reach 2b. One short reach of stream at STA 50+00, where the landowner has constructed a stream viewing patio on the right bank, will be uncredited for 20 lf. The additional unavoidable reduced buffer widths near the road have been accounted for with credit reductions calculated using the buffer width reduction tool (Appendix 11).

MB Reach 3, which begins at STA 52+62 and ends at STA 67+60+98 at the confluence with UT3, will be realigned through the valley bottom to create sinuosity and riffle-pool sequencing in the bedform suited to this lower gradient reach. The channel that has undergone severe cattle impacts to both the bed and

banks, and active headcuts are present as the bedform adjusts to this disturbance. Restoration on this reach will focus on integrating it into a broad excavated floodplain with a meandering pattern. Realigning the stream in its proper position in the valley will eliminate the current bank erosion. The near-bank stress will also be reduced with a new pattern, as larger flow events will be connected to a floodplain instead of confined to a channelized reach. Woody habitat will be improved by installing a wood base in areas of live lifts and near log vanes. Cascade riffles will use integrated woody debris for habitat and grade control to this reach. Two existing culverts along this reach will be reconstructed, and abandoned culverts, roads, drainage pipes, and farm structures will be removed from the easement.

Table 7a. Morphological Essential Parameters for Morgan Branch Reach 2

Parameter	Existing Condition	Reference Condition	Proposed
Valley Width (ft)	12-24	-	16.2+
Contributing Drainage Area (acres)	301	-	301
Channel/Reach Classification	A4	B4	A4/B4a
Discharge Width (ft)	6.9, 8.9	-	9.2 - 10.8
Discharge Depth (ft)	0.8, 0.6	-	0.7 - 0.8
Discharge Area (ft^2)	5.2, 5.6	-	6.3 - 8.8
Discharge Velocity (ft/s)	7.2, 6.6	4.0 - 6.0	6.4 - 8.5
Discharge (cfs)	37.2, 37.2	-	53.3 - 57.0
Water Surface Slope	0.12, 0.14	0.02-0.04	0.09
Sinuosity	1 - 1.1	1.1 - 1.2	1 - 1.1
Width/Depth Ratio	9.1, 14.2	12 - 18	13.2 - 13.4
Bank Height Ratio	1.0, 1.0	1.0 - 1.1	1.0
Entrenchment Ratio	1.8, 1.5	1.4 - 2.2	2+
d16 / d35 / d50 / d84 / d95 / dip / disp (mm)	1.5/14/51/190/440/-0.33/18.9	Gravel	Gravel-Cobble

Table 7b. Morphological Essential Parameters for Morgan Branch Reach 3

Parameter	Existing Condition	Reference Condition	Proposed
Valley Width (ft)	11-29	-	17.2+
Contributing Drainage Area (acres)	499	-	499
Channel/Reach Classification	A4	B4	B4a
Discharge Width (ft)	9.4, 6.2	-	11.6
Discharge Depth (ft)	1.1, 1.5	-	0.9
Discharge Area (ft^2)	10.2, 9.3	-	10.4
Discharge Velocity (ft/s)	7.6, 8.5	4.0 - 6.0	7.3
Discharge (cfs)	77.0, 78.7	-	75.9
Water Surface Slope	0.044	0.02 – 0.04	0.05
Sinuosity	1 - 1.1	1.1 - 1.2	1.1
Width/Depth Ratio	9.9, 4.7	12 - 18	13.0
Bank Height Ratio	3.5, 1.8	1.0 - 1.1	1.0
Entrenchment Ratio	1.4, 2.4	1.4 - 2.2	2+
d16 / d35 / d50 / d84 / d95 / dip / disp (mm)	1.2/5.3/15/140/230/0.02/10.8	Gravel	Gravel-Cobble

6.2 Tributary 1

The uppermost portion of T1 (T1 Reach 1) begins at STA 100+00 as the stream begins at a headcut. Mitigation will be achieved through Enhancement II techniques for 636 lf of credited stream. This Enhancement II work will include invasive species control and cattle exclusion with fencing at the top of the reach. At the lower end of the reach near STA 105+00, a culvert will be replaced with a correctly sized pipe and stabilized with cascade riffles on either end. These structures will create bed diversity and arrest the active headcuts.

T1 Reach A (T1A) will begin at STA 150+00 where the stream starts at a headcut and end at 152+06 where it joins with T1. A crossing outside of the easement will be installed as part of the project construction above the reach. T1A is largely forested but will be treated for invasive species such as multiflora rose, and the work will include invasive removal and installing fencing to protect the stream from livestock. This portion of the project also included expanded conservation easement area to protect the ephemeral reach of the channel, as well as the area between T1 and T1A.

The middle portion of T1 (T1 Reach 2) will begin at STA 106+66 as the stream enters a forested portion of the project, approximately 66 feet downstream of a culverted crossing. It will involve stream Enhancement II, but at a lower ratio of 5:1, due to less intensive livestock impacts. This Enhancement II work will also include invasive species control and cattle exclusion with fencing. T1 Reach 2 ends as the stream crosses Morgan Branch Road through a culvert.

The lower portion of T1 (T1 Reach 3) will begin at STA 122+42 as the stream exits a culverted crossing under Morgan Branch Road and continues to the confluence with Morgan Branch at STA 132+48. This reach will be restored and realigned through the valley bottom to create sinuosity and riffle-pool sequencing in the bedform. Restoration on this reach will focus on integrating it into an excavated floodplain with a meandering pattern. Realigning the stream in its proper position in the valley will eliminate the current bank erosion. The near-bank stress will also be reduced with a new pattern, as larger flow events will be connected to a floodplain instead of confined to a channelized reach. Cascade riffles with embedded woody debris will provide habitat and grade control to this reach.

Table 8a. Morphological Essential Parameters for T1 Reach 1

Parameter	Existing Condition	Reference Condition	Proposed
Valley Width (ft)	10.5	-	13.1+
Contributing Drainage Area (acres)	64	-	64
Channel/Reach Classification	A4	B4	A4
Discharge Width (ft)	3.5	-	5.6
Discharge Depth (ft)	0.6	-	0.5
Discharge Area (ft^2)	2.1	-	2.5
Discharge Velocity (ft/s)	8.9	4.0 - 6.0	8.2
Discharge (cfs)	18.3	-	20.8
Water Surface Slope	0.14	0.02	0.14
Sinuosity	1-1.1	1.1-1.2	1-1.1
Width/Depth Ratio	5.9	12-18	12.4
Bank Height Ratio	1.3	1.0-1.1	1.0
Entrenchment Ratio	7.1	1.4-2.2	2+
d16 / d35 / d50 / d84 / d95 / dip / disp (mm)	1/4.9/9.6/76/150/-0.03/8.8	Gravel	Gravel-Cobble

Table 8b. Morphological Essential Parameters for T1 Reach 3

Parameter	Existing Condition	Reference Condition	Proposed
Valley Width (ft)	12.9	-	14.4
Contributing Drainage Area (acres)	141	-	141
Channel/Reach Classification	A4	B4	B4a
Discharge Width (ft)	4.7, 4.8	-	6.4-7.4
Discharge Depth (ft)	0.7	-	0.5-0.6
Discharge Area (ft^2)	3.2, 3.6	-	3.3-4.4
Discharge Velocity (ft/s)	7.7-8.5	4.0 - 6.0	6.7-7.3
Discharge (cfs)	27.3	-	21.9-32.3
Water Surface Slope	0.08-0.10	0.02	0.082
Sinuosity	1-1.1	1.1-1.2	1-1.1
Width/Depth Ratio	6.7, 6.5	12-18	12.4
Bank Height Ratio	3.3, 3.2	1.0-1.1	1.0
Entrenchment Ratio	1.4, 1.3	1.4-2.2	2+
d16 / d35 / d50 / d84 / d95 / dip / disp (mm)	0.68/3/8.5/67/120/-0.07/10.2	Gravel	Gravel-Cobble

6.3 Tributary 2

T2 Reach 1 will begin at STA 200+00 as it enters the project and starts with Enhancement I for 296 lf of credited stream. This Enhancement I work will include bank grading to redefine the banks in select locations where bank definition has been eliminated by cattle. The reach will also include invasive species control and cattle exclusion with fencing. Reach 2 of T2 begins at an existing ford crossing used by the cattle and other farm equipment. This crossing will be eliminated, and the reach will be restored using Restoration for 368 lf from STA 203+26 to STA 207+25. The bed elevation will be raised at the very beginning of the reach to reconnect the stream to its riparian buffer. The stream will be relocated to its historic floodplain, where a new pattern with riffles, pools, and woody debris in the channel will be constructed. An area of erosion adjacent to the crossing to be removed will be graded and stabilized. Cascade riffles will be used to provide grade control and habitat enhancement with its incorporated woody debris.

Table 9. Morphological Essential Parameters for T2 Reach 2

Parameter	Existing Condition	Ref. Condition	Proposed
Valley Width (ft)	19.3	-	19.3
Contributing Drainage Area (acres)	38.4	-	38.4
Channel/Reach Classification	A4	B4	A4
Discharge Width (ft)	2.4	-	5.6
Discharge Depth (ft)	1.2	-	0.5
Discharge Area (ft^2)	3.0	-	2.5
Discharge Velocity (ft/s)	8.7	4.0 - 6.0	7.1
Discharge (cfs)	25.9	-	17.8
Water Surface Slope	0.102	0.02	0.11
Sinuosity	1 -1.1	1.1-1.2	1-1.1
Width/Depth Ratio	2.0	12-18	12.4
Bank Height Ratio	1.1	1.0-1.1	1.0
Entrenchment Ratio	13.9	1.4-2.2	2+
d16 / d35 / d50 / d84 / d95 / dip / disp (mm)	0.13/0.19/0.35/9.4/22/0.37/14.8	Gravel	Gravel

6.4 Tributary 3

T3 will be restored for approximately 1,350 lf from STA 300+35 to STA 314+46. Restoration work will begin at the upstream end of this reach where there is an existing farm road crossing. T3 will be implemented as Restoration measures as well as cattle exclusion and relocation and repair of existing infrastructure. The stream will be realigned through the valley bottom to create sinuosity and riffle-pool sequencing in the bedform. Cascade riffles with embedded woody debris will provide habitat and grade control along the length of the reach. A water quality treatment feature will be installed at STA 311+30 to treat runoff from a proposed farm building that will be located outside the easement.

Table 10. Morphological Essential Parameters for T3

Parameter	Existing Condition	Reference Condition	Proposed
Valley Width (ft)	16	-	16
Contributing Drainage Area (acres)	44.8	-	44.8
Channel/Reach Classification	A4	B4	A4/B4a
Discharge Width (ft)	2.6, 2.9, 3.5	-	5.6
Discharge Depth (ft)	0.9, 1.0, 0.9	-	0.5
Discharge Area (ft^2)	2.4, 2.8, 3.1	-	2.5
Discharge Velocity (ft/s)	7.2, 7.7, 5.7	4.0 - 6.0	5.9
Discharge (cfs)	17.2, 21.5, 17.7	-	15.0
Water Surface Slope	0.056 - 0.086	0.02	0.078
Sinuosity	1 - 1.1	1.1-1.2	1.1
Width/Depth Ratio	2.7, 3.1, 3.9	12-18	12.4
Bank Height Ratio	1.0, 1.5, 1.0	1.0-1.1	1.0
Entrenchment Ratio	5.8, 5.2, 13.2	1.4-2.2	2+
d16 / d35 / d50 / d84 / d95 / dip / disp (mm)	0.56/2.6/8/29/57/-0.23/9	Gravel	Gravel

6.5 Tributaries 4, 4-1, 4-2, and 4-3

T4 will begin at STA 400+00 as it enters the project. This is a steep channel that has undergone severe cattle impacts, and active headcuts are present as the bedform adjusts to this disturbance. The restoration work will focus on restoring this headwater channel to a more natural cascade system. Cascade riffle structures will be installed along the entire reach to mimic the natural grade control that is found in the stable systems throughout the Newfound Creek watershed. The work will also include adjustments to dimension, pattern, and profile and the installation of woody debris within the cascade riffles to provide habitat niches throughout the stream. The outlet of an adjacent riparian wetland will be stabilized and re-aligned with the reconfigured channel. The lower portion of T4 flattens out as a floodplain develops as it enters what is currently a cattle feedlot. As this reach transitions to a Priority 1 approach, the stream will be realigned through the valley bottom with variable bedform and continuing to be stabilized with cascade riffles. Cattle will be excluded from the entire reach. An access road will be realigned outside the easement and a new culverted crossing will be constructed. A water quality treatment area will be constructed to capture runoff from the access road at STA 409+30. Mitigation crediting will stop at STA 417+54, but restoration actions will continue until the stream reaches Morgan Branch Road as the available buffer width narrows.

T4-1 will begin at STA 450+00 as it enters the project, and T4-2 will begin at STA 461+31 downstream of a culverted crossing. Both streams will be restored using a similar design approach to the upper portion

of T4 using cascade riffles. A water quality treatment area will be installed along the right bank of T4-2 at STA 467+40 to capture and treat the combined runoff from a stream crossing and the adjacent Potato Branch Road. Restoration credit on T4-3 will begin at STA 480+86, downstream of a culvert to be reconstructed. T4-3 is a short (64 lf) reach which will be restored using a similar design approach as the lower portion of T4. A cascade riffle will be installed upstream of the credited reach to provide grade control and energy dissipation. The channel alignment will be slightly reconfigured to facilitate the confluence with T4 in its new alignment.

Table 11a. Morphological Essential Parameters for T4

Parameter	Existing Condition	Reference Condition	Proposed
Valley Width (ft)	17	-	17
Contributing Drainage Area (acres)	102	-	102
Channel/Reach Classification	A4-B4a	B4	A4-B4a
Discharge Width (ft)	3.3-7.4	-	5.6-7.6
Discharge Depth (ft)	0.5-0.9	-	0.5-0.7
Discharge Area (ft^2)	2.6-4.6	-	2.5-5.0
Discharge Velocity (ft/s)	5.0-7.6	4.0 - 6.0	6.6-6.7
Discharge (cfs)	17.3-23.5	-	16.9-32.9
Water Surface Slope	0.035-0.091	0.02	0.06-0.10
Sinuosity	1-1.1	1.1-1.2	1-1.1
Width/Depth Ratio	4.0-12.5	12-18	11.7-12.4
Bank Height Ratio	1.3-4.1	1.0-1.1	1.0
Entrenchment Ratio	1.2-5.8	1.4-2.2	2+
d16 / d35 / d50 / d84 / d95 / dip / disp (mm)	0.14/0.32/0.9/13/81/0.13/10.5	Gravel	Gravel

Table 11b. Morphological Essential Parameters for T4-1

Parameter	Existing Condition	Reference Condition	Proposed
Valley Width (ft)	11.5	-	13.1
Contributing Drainage Area (acres)	12.8	-	12.8
Channel/Reach Classification	A4	B4	A4
Discharge Width (ft)	1.8	-	5.6
Discharge Depth (ft)	0.3	-	0.5
Discharge Area (ft^2)	0.5	-	2.5
Discharge Velocity (ft/s)	6.4	4.0 - 6.0	8.8
Discharge (cfs)	3.5	-	22.1
Water Surface Slope	0.18	0.02	0.17
Sinuosity	1-1.1	1.1-1.2	1-1.1
Width/Depth Ratio	6.2	12-18	12.4
Bank Height Ratio	8.1	1.0-1.1	1.0
Entrenchment Ratio	1.4	1.4-2.2	2+
d16 / d35 / d50 / d84 / d95 / dip / disp (mm)	0.45/3.1/8/32/130/-0.24/10.9	Gravel	Gravel

Table 11c. Morphological Essential Parameters for T4-2

Parameter	Existing Condition	Reference Condition	Proposed
Valley Width (ft)	14.6	-	14.6
Contributing Drainage Area (acres)	25.6	-	25.6
Channel/Reach Classification	A4	B4	A4
Discharge Width (ft)	3.0-4.9	-	5.6
Discharge Depth (ft)	0.3-0.5	-	0.5
Discharge Area (ft^2)	1.0-1.5	-	2.5
Discharge Velocity (ft/s)	5.0-6.0	4.0 - 6.0	7.7
Discharge (cfs)	5.8, 6.7, 7.3	-	19.3
Water Surface Slope	0.09 - 0.14	0.02	0.13
Sinuosity	1 - 1.1	1.1-1.2	1-1.1
Width/Depth Ratio	8.6, 5.5, 14.1	12-18	12.4
Bank Height Ratio	5.2, 11.5, 11.3	1.0-1.1	1.0
Entrenchment Ratio	1.3, 1.4, 1.2	1.4-2.2	2+
d16 / d35 / d50 / d84 / d95 / dip / disp (mm)	1.1/9.5/50/140/190/-0.42/24.1	Gravel	Gravel

Table 11d. Morphological Essential Parameters for T4-3

Parameter	Existing Condition	Reference Condition	Proposed
Valley Width (ft)	10.5	-	13.1
Contributing Drainage Area (acres)	22.9	-	22.9
Channel/Reach Classification	A4	B4	A4
Discharge Width (ft)	3.7	-	5.6
Discharge Depth (ft)	0.6	-	0.5
Discharge Area (ft^2)	2.3	-	2.5
Discharge Velocity (ft/s)	5.6	4.0 - 6.0	5.2
Discharge (cfs)	12.8	-	13.0
Water Surface Slope	0.059	0.02	0.059
Sinuosity	1.0 - 1.1	1.1-1.2	1-1.1
Width/Depth Ratio	6.1	12-18	12.4
Bank Height Ratio	3.0	1.0-1.1	1.0
Entrenchment Ratio	1.4	1.4-2.2	2+
d16 / d35 / d50 / d84 / d95 / dip / disp (mm)	1.3/13/26/74/120/-0.32/11.4	Gravel	Gravel

6.6 Tributary 5

Work on T5 will be divided into two reaches. T5 Reach 1 will begin at STA 500+00 as it enters the project at a headcut and will involve stream Enhancement I for 287 lf of credited stream. This Enhancement I work will include bank grading and the installation of cascade riffles for grade control and habitat in the channel as well as invasive species control and cattle exclusion with fencing. The lower portion of T5 (T5 Reach 2) begins as the stream exits a forested area and will be restored for 1,468 lf from STA 502+87 to STA 518+15, where it flows into a portion of Morgan Branch outside of the project. The bed elevation will be raised at the very beginning of the reach to reconnect the stream to its riparian buffer. The stream will be relocated to its historic floodplain, where a new pattern with cascade riffles with woody debris in the

channel will be constructed. An area of erosion adjacent to the floodplain along the right bank in the middle of the reach will be graded and stabilized.

Table 12. Morphological Essential Parameters for T5 Reaches 1 and 2

Parameter	Existing Condition	Reference Condition	Proposed
Valley Width (ft)	25	-	25
Contributing Drainage Area (acres)	38.4	-	38.4
Channel/Reach Classification	A4	B4	B4a
Discharge Width (ft)	4.0-4.4	-	5.6
Discharge Depth (ft)	0.5-0.8	-	0.4
Discharge Area (ft^2)	2.3-3.3	-	2.5
Discharge Velocity (ft/s)	5.7-7.0	4.0 - 6.0	4.9
Discharge (cfs)	15.8-21.0	-	12.5
Water Surface Slope	0.050 - 0.10	0.02	0.054
Sinuosity	1.0-1.1	1.1-1.2	1.1
Width/Depth Ratio	4.9-8.6	12-18	12.4
Bank Height Ratio	2.9-4.5	1.0-1.1	1.0
Entrenchment Ratio	1.1-1.5	1.4-2.2	2+
d16 / d35 / d50 / d84 / d95 / dip / disp (mm)	0.39/2/4.5/49/90/-0.01/11.2	Gravel	Gravel

6.7 Tributary 7

Restoration on T7 will begin at STA 700+00 as it begins at a headcut. Like T4, this is a steep channel that has undergone severe cattle impacts, and active headcuts are present as the bedform adjusts to this disturbance. The Restoration work will focus on restoring this headwater channel to a more natural step and cascade pool system. Like T4, cascade riffle structures will be constructed to mimic the natural grade control that is found in the stable systems throughout the Newfound Creek watershed. The work will also include adjustments to dimension, pattern, and profile and the installation of woody debris structures to provide habitat niches throughout the stream. Along the upper reach, rock outlets will be installed in several places to stabilize drainage from an access road located outside the easement, and to connect an existing riparian wetland with the reconfigured channel. The middle portion of T7 will be restored as the floodplain widens through wetland W7. As this reach transitions to a Priority 1 approach, the stream will be realigned through the valley bottom with variable bedform and wood habitat features added to the channel. Several structures adjacent to the lower reach of T7 will be removed from the project easement, and cattle will be excluded from the entire reach.

Table 13. Morphological Essential Parameters for T7

Parameter	Existing Condition	Reference Condition	Proposed
Valley Width (ft)	20	-	20
Contributing Drainage Area (acres)	44.8	-	44.8
Channel/Reach Classification	A4/B4a	B4	B4a
Discharge Width (ft)	1.0-8.0	-	5.6-6.4
Discharge Depth (ft)	0.4-0.8	-	0.5
Discharge Area (ft^2)	0.6-3.3	-	2.5-3.3
Discharge Velocity (ft/s)	3.0-4.7	4.0 - 6.0	3.5-5.9
Discharge (cfs)	2.8-10.1	-	12.6-15.0
Water Surface Slope	0.03-0.09	0.02	0.027-0.078
Sinuosity	1.0-1.1	1.1-1.2	1.1
Width/Depth Ratio	1.8-19.1	12-18	12.4
Bank Height Ratio	2.2-10.3	1.0-1.1	1.0
Entrenchment Ratio	1.2-2.7	1.4-2.2	2+
d16 / d35 / d50 / d84 / d95 / dip / disp (mm)	0.062/0.093/0.16/7.9/32/0.44/26.0	Gravel	Gravel

6.6 Tributary 8

Tributary 8 is a short, steep headwater reach that has been divided into two sub reaches based on channel condition and slope. T8 Reach 1 begins at STA 800+00 near an adjacent wetland. This short reach will be stabilized using Enhancement 1 techniques (stabilizing the initiation of the stream, grading back any erosive banks, planting a riparian buffer, and providing an easement above the stream). At STA 800+83, the approach transitions to Restoration at a headcut just upstream of a confluence with an ephemeral gully. This reach, T8 Reach 2, will be restored using cascade riffles, in a manner similar to T4, until its confluence with Morgan Branch at STA 804+25.

Table 14. Morphological Essential Parameters for T8

Parameter	Existing Condition	Reference Condition	Proposed
Valley Width (ft)	16	-	16
Contributing Drainage Area (acres)	6.4	-	6.4
Channel/Reach Classification	A4	B4	A4
Discharge Width (ft)	0.8-0.9	-	5.6
Discharge Depth (ft)	0.2-0.5	-	0.5
Discharge Area (ft^2)	0.2-0.4	-	2.5
Discharge Velocity (ft/s)	4.2-4.6	4.0 - 6.0	7.4
Discharge (cfs)	1.0-1.7	-	18.6
Water Surface Slope	0.09-0.17	0.02	0.12
Sinuosity	1.0-1.1	1.1-1.2	1.0
Width/Depth Ratio	4.2-4.3	12-18	12.4
Bank Height Ratio	2.2-7.9	1.0-1.1	1.0
Entrenchment Ratio	1.2-1.8	1.4-2.2	2+
d16 / d35 / d50 / d84 / d95 / dip / disp (mm)	0.12/0.16/0.2/3.1/6.9/0.41/8.6	Gravel	Gravel

6.7 Tributary 9

T9 Restoration begins at STA 900+00, downstream of existing wetland W1. This reach will also be restored using cascade riffle structures along nearly the entire length. In several places, the channel will be realigned toward the center of the natural valley and away from its current alignment against the toe of the adjacent steep hillside. Cattle will be excluded from the entire reach. A rock outlet will stabilize concentrated flow from an adjacent ephemeral drainage at STA 903+30. A short rock ford crossing will be installed between the upstream wetland and STA 901+00 to facilitate landowner access. An adjacent access road will be relocated outside the easement along the lower portion of the reach, which is discussed in greater detail in Section 6.8.

Table 15. Morphological Essential Parameters for T9

Parameter	Existing Condition	Reference Condition	Proposed
Valley Width (ft)	11	-	13.1
Contributing Drainage Area (acres)	25.6	-	25.6
Channel/Reach Classification	A4	B4	A4
Discharge Width (ft)	1.4-2.6	-	5.6
Discharge Depth (ft)	0.4-0.6	-	0.5
Discharge Area (ft^2)	1.2-1.4	-	2.5
Discharge Velocity (ft/s)	6.1-6.4	4.0 - 6.0	7.4
Discharge (cfs)	7.2-8.8	-	18.6
Water Surface Slope	0.10-0.14	0.02	0.12
Sinuosity	1.0-1.1	1.1-1.2	1.1
Width/Depth Ratio	3.6-5.9	12-18	12.4
Bank Height Ratio	1.3-4.2	1.0-1.1	1.0
Entrenchment Ratio	1.3-1.4	1.4-2.2	2+
d16 / d35 / d50 / d84 / d95 / dip / disp (mm)	0.28/0.76/2.7/14/90/-0.10/7.4	Gravel	Gravel

6.8 Wetlands

As mentioned, several areas of existing wetland fall within the project footprint. While no wetland credit is proposed, project activities will stabilize and revegetate the impacted wetlands within the conservation easement. Any areas of erosion due to cattle impacts found within wetlands adjacent to project streams will be stabilized with logs or woody debris to minimize headcutting. Any rock used for stabilization will be limited to use outside the limits of existing wetlands. Existing Wetland 1 will be protected at the top of T9 through the conservation easement. Wetlands 2 and 3 will be integrated into the enhancement activities at the top of T8. Wetland 4 will be adjacent to the riparian buffer of Morgan Branch Reach 3. Along T7, Wetlands 6 and 7 are seep and riparian systems that will incorporated into the restored stream. Wetlands 8 – 11 exist within the T4 system and will be improved as part of that restoration. In order to monitor the effects of project activities on existing wetlands, groundwater gauges will be installed in three locations to record groundwater elevations along T7 (two gauges in existing wetlands W6 and W7) and T9 (one gauge within W1). The locations of these gauges are shown on Figure 10.

6.9 Crossings, Structures, and Improvements

The project will modify and improve 26 stream crossings within the MBRS project area. All new primary crossing pipes will be corrugated metal (CMP). One existing crossing has been eliminated from the bottom of T2. In addition, a culverted crossing outside the project easement will be re-aligned on the upstream

end of T4-2 to convey ephemeral flow. All crossings will be permitted as replacements of existing crossings within a Nationwide 27 permit application. All replaced culverts will be embedded 1' and will include floodplain culverts to convey overbank flow. KCI will document post-construction culvert inlet/outlet conditions to ensure compliance with permit conditions. All crossings will exclude livestock from the project easement. Table 16 describes each crossing and full design specifications can be found in the Site Plans in Appendix 1.

Several aboveground utility lines will also be relocated as a part of project activities. Power lines running to houses in the area around the confluence of Morgan Branch and T1 will be relocated to follow road crossings. One existing line running to a barn and crossing Morgan Branch will be relocated to the upstream side of the barn and consolidated with a farm road crossing and easement exception, as shown in Figure 8A. A power line to the house on upper Jones Mountain will be relocated to follow the re-routed portion of gravel road outside the easement shown in Figure 8B.

There are existing farm buildings and associated farming infrastructure that are currently located within the project easement. All buildings, equipment, fences, roads, and other agricultural infrastructure currently located within the easement will be removed and/or relocated outside the project easement by KCI. Most notably, the feedlot barn directly adjacent to T7 will be removed from the project area. Four additional smaller structures will also be removed. An existing gravel road along MB Reach 1 will be re-aligned so that it falls outside the easement. Abandoned roads will be decompacted with an excavator so that there is a stable slope transition within the easement. Any existing gravel will be scraped off and then the area scarified prior to reseeding and tree planting. Buildings to be relocated are shown in Figure 8C, and the road realignment is shown in Figure 8B.

KCI has provided the landowners with compensation for the structures to be removed from the project easement. The landowners intend to rebuild several of these structures outside the project. Where known, KCI's understanding of the future location of new structures to be rebuilt outside the easement are shown in the site plans in Appendix 1. The landowners have been made aware that any future structures should be offset at least 15 feet from the conservation easement to allow adequate boundary maintenance and minimize risk of future encroachment.

Based on the number of crossings at the project and areas of limited easement width discussed along Morgan Branch, KCI used the most recent version of the buffer width reduction tool from the USACE Wilmington District to account for a reduction in stream credit. A detailed accounting of credits related to limited buffer width is found in Appendix 11.

Table 16. Crossings and Easement Exceptions

Reach	From STA	To STA	Pipe Length	Easement	Description
Morgan Branch Reach 1	22+90	23+18	28	External	60" x 28' CMP with two 24" x 28' floodplain PEP pipes; re-alignment of existing crossing
Morgan Branch Reach 2	31+95	32+25	30	External	60" x 30' CMP with two 24" x 30' floodplain PEP pipes; re-alignment of existing crossing
	44+43	44+73	30	External	60" x 30' CMP with two 30" x 30' floodplain PEP pipes; re-alignment of existing crossing
	49+83	50+03	20	External	Existing landowner patio/viewing area to remain
Morgan Branch Reach 3	54+39	54+87	48	External	72" x 48' CMP with two 30" x 48' floodplain PEP pipes; re-alignment of existing crossing
	57+90	58+20	30	External	72" x 30' CMP with two 30" x 30' floodplain PEP pipes; re-alignment of existing crossing
T1 Reach 1	104+87	105+17	30	External	48" x 30' CMP with two 24" x 30' floodplain PEP pipes; re-alignment of existing crossing
T1 Reach 2	117+21	117+42	21	External	Existing footbridge over stream to remain
	121+85	122+42	57	External	Existing roadway crossing to remain
	122+17	122+41	24	External	60” x 24’ CMP with two 24” x 24’ floodplain PEP pipes
T1 Reach 3	125+82	126+12	30	External	60" x 30' CMP with two 24" x 30' floodplain PEP pipes; re-alignment of existing crossing
	131+08	131+38	30	External	60" x 30' CMP with two 24" x 30' floodplain PEP pipes; relocation of existing crossing
T2 Reach 1	200+67	200+97	30	External	48" x 30' CMP with two 12" x 30' floodplain PEP pipes; replacement of existing 12” CMP crossing.
T2 Reach 2	205+81	206+09	28	External	48" x 28' CMP with two 24" x 28' floodplain PEP pipes; re-alignment of existing crossing
T3	305+24	305+54	30	External	48" x 30' CMP with two 12" x 30' floodplain PEP pipes; re-alignment of existing crossing
	312+79	313+07	28	External	48" x 28' CMP with two 24" x 28' floodplain PEP pipes; relocation of existing crossing
T4	402+84	403+14	30	External	48" x 30' CMP with two 12" x 30' floodplainPEP pipes; re-alignment of existing crossing
	412+08	412+38	30	External	48" x 30' CMP with two 12" x 30' floodplainPEP pipes; re-alignment of existing crossing
	414+59	414+89	30	External	48" x 30' CMP with two 12" x 30' floodplainPEP pipes; re-alignment of existing crossing

Reach	From STA	To STA	Pipe Length	Easement	Description
T4-1	452+12	452+40	28	External	48" x 28' CMP with two 12" x 28' floodplain PEP pipes; re-alignment of existing crossing
T4-2	460+98	461+28	30	External	48" x 30' CMP with two 12" x 30' floodplain PEP pipes; re-alignment of existing crossing
	466+50	466+80	30	External	48" x 30' CMP with two 12" x 30' floodplain PEP pipes; re-alignment of existing crossing
	470+35	470+65	30	External	48" x 30' CMP with two 12" x 30' floodplain PEP pipes; re-alignment of existing crossing
T5 Reach 2	504+99	505+29	30	External	48" x 30' CMP with two 12" x 30' floodplain PEP pipes; re-alignment of existing crossing
	515+58	515+88	30	External	48" x 30' CMP with two 12" x 30' floodplain PEP pipes; re-alignment of existing crossing
T7	709+22	709+52	30	External	48" x 30' CMP with two 12" x 30' floodplain PEP pipes; re-alignment of existing crossing
	712+90	713+10	20	External	48" x 30' CMP with two 12" x 30' floodplain PEP pipes; re-alignment of existing crossing
T8 Reach 2	802+80	803+10	30	External	48" x 30' CMP with two 12" x 30' floodplain PEP pipes; re-alignment of existing crossing
T9	900+63	900+73	10	Internal	Rock ford
	906+95	907+23	28	External	48" x 28' CMP with two 12" x 28' floodplain PEP pipes; re-alignment of existing crossing

6.10 Fencing and Livestock Watering

Livestock exclusion fencing and gates will be installed to keep all livestock out of the project streams. New fencing locations are shown on the project plan sheets (Appendix 1) and will be constructed of woven wire built to NRCS standards, with a 5-inch gap between the bottom wire and next wire to facilitate passage by some wildlife species while excluding livestock. 107 gates will be placed throughout the project to provide convenient access to all project reaches. KCI will install two wells and four drinkers during the construction phase of the project to provide water outside of the project for the livestock on the property. Water lines associated with the wells and drinkers will be located outside the project easement, and crossings will be co-located with easement breaks.

6.11 Design Discharge Determination

KCI conducted bankfull verification by locating four reference cross-sections on-site that had stable bankfull indicators (see Figure 7 for locations). Using these on-site field measurements as well as data from the nearby DMS Dale's Creek Restoration Site, we developed a local curve relating drainage area and cross-sectional area. This curve was compared to the rural Mountain regional curve estimates for cross-sectional area (Harman et al., 1999). The change in streambed slope from higher in this headwater system down to Morgan Branch in the valley leads to more variation than typical in discharge values. Some of the smaller headwater tributaries also have a larger designed discharge due to the minimum constructable channel sizes. See the morphological tables in Appendix 2 that include the proposed discharge values.

6.12 Sediment

To analyze the existing sediment conditions within the project stream, 36 pebble counts (including 4 reference locations on upper Morgan Branch) were completed across the project site along with 2 bulk samples done on Morgan Branch. These data are provided in Appendix 2 and summarized in the two tables below. The sediment sampling shows that the predominant D50 sizes are in the small to medium gravel range with D84 values often in the cobble range. Bedrock is located in isolated areas within the project streams but is not a dominant bed material.

Most of the project streams are steep, headwater reaches that will function as threshold systems shaped by existing bed material, inclusive of logs and existing rock, with minimal bed transport. Table 17a summarizes the existing sediment ranges encountered in these reaches. We will use cascade riffle structures to accommodate steep transitions that will simulate the existing stable boundary conditions found in reference areas around the project.

Morgan Branch and the lower sections of T4 and T7 have slopes below 5% and will function more as an active bed system with a moderate supply of incoming gravel. Using the collected sediment and cross-sectional data, shear stress values were calculated using both average channel boundary shear stress and a modified critical shear stress (USDA, Forest Service 2008), which is suitable for streams with an average water surface slope of 5% or less that are anticipated to have alluvial transport. The modified shear stress was calculated using the D84 values from field samples and compared to the average channel boundary shear stress based on the existing and proposed channel dimensions and slopes. The shear stress results are shown in Table 17b.

Based on the calculated average channel boundary shear stress for the proposed channels, the lower reaches will have adequate stream power to transport the existing D84 material during a bankfull event. The lower reaches of MB, T4, and T7 will also use a cascade riffle structure with a 30%/60% mix of Class A and B stone with 10% native stream material; Class A (the smallest among Classes A and B) has a modified critical shear stress that is large enough to withstand all the predicted average channel boundary stresses.

Table 17a. Pebble Count Summary for Headwater Reaches

XS	Project Reach	D50 (mm)	D84 (mm)
MB-xsrefA1	Above MB Reach 1	10	110
MB-xsrefA2	Above MB Reach 1	13	150
MB-xsrefB1	MB Reach 2	51	190
MB-xsrefB2	MB Reach 2	53	180
T1-xsA	T1-R2	9.6	76
T1-xsB	T1-R4	8.5	67
T1-xsC	T1-R4	10	120
T2-xsA	T2-R1	11	100
T2-xsB	T2-R2	0.35	9.4
T3-xsA	T3	1.9	13
T3-xsB	T3	9.8	66
T3-xsC	T3	8	29
T4-xsA	T4	0.4	49
T4-xsB	T4	0.33	40
T4-xsC	T4	0.89	13
T4-xsD	T4	0.35	9.9
T4-1-xsA	T4-1-R3	8	32
T4-2-xsA	T4-2	1.7	33
T4-2-xsB	T4-2	11	47
T4-2-xsC	T4-2	50	140
T4-3	T4-3	26	74
T5-xsA	T5-R1	50	100
T5-xsB	T5-R2	4.5	49
T5-xsC	T5-R2	1.8	30
T7-xsA	T7	0.16	7.9
T8-xsA	T8-R2	0.24	4.3
T8-xsB	T8-R2	0.2	3.1
T9-xsA	T9	5.8	24
T9-xsB	T9	2.7	14

Table 17b. Sediment Summary for Lower Reaches

Type	XS	Project Reach	Avg Shear Stress (lb/sf)	D50 (mm)	D84 (mm)	Sample Type	Modif. Critical Shear Stress (lb/sf)	Predicted Grain Size Movement (mm)
Existing	MB-xsA	MB Reach 3	2.62	12	140	PC	0.37	212
Existing	MB-xsB	MB Reach 3	3.08	19	100	PC	0.49	251
Existing	T4-xsE	T4	1.34	0.62	7.1	PC	0.02	106
Existing	T4-xsF	T4	1.34	6.6	59	PC	0.18	106
Existing	T7-xsB	T7	1.44	0.1	1.2	PC	0.00	114
Existing	T7-xsC	T7	1.40	0.21	9.3	PC	0.01	111
Existing	T7-xsD	T7	0.99	13	120	PC	0.38	77
Proposed	MB Reach 3	MB Reach 3	2.70	19	100	PC	0.152	220
Proposed	T4	T4	3.32	6.6	59	PC	0.054	272
Proposed	T7	T7	2.29	13	120	PC	0.164	185

6.13 Planting

The existing vegetation at the project site consists of primarily pasture grasses aside from isolated trees on the tops of banks and a forested area along the upper portion of Morgan Branch. All unforested portions of the project easement will be planted to establish a forested riparian buffer. The target community type will be Montane Alluvial Forest (Small River Subtype) as described by Schafale (2012). This community type is found on the smaller spectrum of alluvial systems in the North Carolina mountains. They can be distinguished by a "characteristic suite of wetland or alluvial indicator species, such as *Platanus occidentalis, Betula nigra*, and *Alnus serrulata*, coupled with evidence of flooding." While the riparian forests at MBRS may be on a smaller scale than that described in Schafale, the species are expected to have a similar composition and distribution. Where possible, mature existing trees will be preserved.

The planting plan is shown in the attached project plan sheets (Appendix 1). Trees and shrubs will be planted at a density of 968 stems per acre (9 feet x 5 feet spacing) in an area of approximately 27.6 acres to achieve a mature survivability of 210 stems per acre after seven years. If necessary, thinning may be performed during future monitoring years in areas with low mortality/excess surviving stem density. Woody vegetation planting will be conducted during dormancy (the growing season ends November 8th according to the USDA WETS table) and will occur before March 15. Species to be planted may consist of the following shown in two separate zones. Of note, sycamore is currently present within forested areas of the site and will only be planted along the larger project reaches. Any existing or proposed wetland areas will be planted with species from the Zone 1 list. Any changes to the approved planting plan must be submitted to the IRT prior to installation.

A custom herbaceous seed mix composed of native species will be used to further stabilize and restore the site (see plan sheets for detailed seed mixes). Existing undesirable pasture grasses will be sprayed with herbicide and left fallow until full mortality is achieved. The areas will then be scarified or disked to break up any existing compaction prior to seeding and stabilizing with temporary and permanent seed mixes as prescribed in the project plans. In areas that typically have poor soil characteristics affecting vegetation establishment and growth, including Enhancement I, new bench cuts, and existing road removal segments within the easement, furnished or salvaged topsoil will be used to surface treat all planting areas within the floodplain extents shown on the plans; adequate lime and fertilizer will be used to ensure adequate vegetative stabilization.

Table 18. Planting Zones

Zone	Common Name	Scientific Name	Wetland Status (Eastern Mts & Piedmont)
1	Hazel Alder	*Alnus serrulata*	OBL
	Pawpaw	*Asimina triloba*	FAC
	Yellow Birch	*Betula alleghaniensis*	FAC
	American Hornbeam	*Carpinus caroliniana*	FAC
	Sugarberry	*Celtis laevigata*	FACW
	Silky Dogwood	*Cornus amomum*	FACW
	Spicebush	*Lindera benzoin*	FAC
	Black Gum	*Nyssa sylvatica*	FAC
	American Sycamore	*Platanus occidentalis*	FACW
2	Yellow Buckeye	*Aesculus flava*	FACU
	Paw Paw	*Asimina triloba*	FAC
	Sweet Birch	*Betula lenta*	FACU
	American Hornbeam	*Carpinus caroliniana*	FAC
	Bitternut Hickory	*Carya cordiformis*	FACU
	Pignut Hickory	*Carya glabra*	FACU
	Tulip Poplar	*Liriodendron tulipifera*	FACU
	Sourwood	*Oxydendrum arboretum*	UPL
	American Sycamore	*Platanus occidentalis*	FACW
	White Oak	*Quercus alba*	FACU
	Southern Red Oak	*Quercus falcata*	FACU
	Chestnut Oak	*Quercus montana*	UPL
	Northern Red Oak	*Quercus rubra*	FACU
	Basswood	*Tilia americana*	FACU
Live Stakes	Silky Dogwood	*Cornus amomum*	FACW
	Black Willow	*Salix nigra*	OBL
	Silky Willow	*Salix sericea*	OBL
	Elderberry	*Sambucus canadensis*	FAC
	Ninebark	*Physocarpus opulifolius*	FACW

6.14 Project Assets

Tables 19 and 20 detail the anticipated mitigation assets that will be produced from the MBRS project. Assets and project components are shown in Figure 9.

Table 19. Mitigation Assets and Components

Project Segment	Existing Footage or Acreage	Mitigation Plan Footage or Acreage	Mitigation Category	Restoration Level	Priority Level	Mitigation Ratio (X:1)	Mitigation Plan Credits	Comments
MB Reach 1	1,704	1,653	Cool	EI	n/a	1.50000	1102.00000	Moving access road, planting, targeted bank work, and cattle exclusion.
MB Reach 2a	1,719	1,657	Cool	EII	n/a	5.00000	331.40000	Culvert improvements, targeted bank work, planting, and cattle exclusion.
MB Reach 2b	906	818	Cool	EII	n/a	2.50000	327.20000	Culvert improvements, bank work, planting, and cattle exclusion.
MB Reach 3	1,574	1,387	Cool	R	1	1.00000	1387.00000	Restoration with cascade riffle structure.
T1 Reach 1	674	636	Cool	EII	n/a	2.50000	254.40000	Culvert improvements, targeted bank work, planting, and cattle exclusion.
T1 Reach 2	1,575	1,498	Cool	EII	n/a	5.00000	299.60000	Culvert improvements, planting, and cattle exclusion.
T1 Reach 3	984	947	Cool	R	1	1.00000	947.00000	Restoration with cascade riffle structure.
T1A	206	206	Cool	EII	n/a	2.50000	82.40000	Planting and cattle exclusion.
T2 Reach 1	326	296	Cool	EI	n/a	1.50000	197.33333	Bank work, planting, and cattle exclusion.
T2 Reach 2	408	368	Cool	R	1	1.00000	368.00000	Restoration with cascade riffle structure.
T3	1,429	1,350	Cool	R	1	1.00000	1350.00000	Restoration with cascade riffle structure.
T4	1,880	1,651	Cool	R	1	1.00000	1651.00000	Restoration with cascade riffle structure.
T4-1	473	430	Cool	R	1	1.00000	430.00000	Restoration with cascade riffle structure.
T4-2	1,053	911	Cool	R	1	1.00000	911.00000	Restoration with cascade riffle structure.
T4-3	95	64	Cool	R	1	1.00000	64.00000	Restoration with cascade riffle structure.
T5 Reach 1	287	287	Cool	EI	n/a	1.50000	191.33333	Bank work, planting, and cattle exclusion.
T5 Reach 2	1,549	1,468	Cool	R	1	1.00000	1468.00000	Restoration with cascade riffle structure.
T7	1,750	1,677	Cool	R	1	1.00000	1677.00000	Restoration with cascade riffle structure.
T8 Reach 1	83	83	Cool	EI	n/a	1.50000	55.33333	Seep stabilization, planting, and cattle exclusion.
T8 Reach2	365	312	Cool	R	1	1.00000	312.00000	Restoration with cascade riffle structure.
T9	919	847	Cool	R	1	1.00000	847.00000	Restoration with cascade riffle structure.

Table 20. Project Credits

Restoration Level	Stream			Riparian Wetland		Non-Rip Wetland	Coastal Marsh
	Warm	Cool	Cold	Riverine	Non-Riv		
Restoration		**11,412.000**					
Re-establishment							
Rehabilitation							
Enhancement							
Enhancement I		**1,546.000**					
Enhancement II		**1,295.000**					
Creation							
Preservation							
Totals*		**14,253.000**					

Total Base SMUs*	14,252.999
Credit Loss in Required Buffer (NSBWM 2019)**	-322.390
Credit Gain for Additional Buffer	0.000
Credit Loss for Redundant Crossings***	-80.00
Net Change in Credit	*-402.390*
Total Adjusted SMUs	**13,850.609**

*Total base SMU differ by 0.001 due to rounding error.
**Credit adjustment for Non-standard Buffer Width calculation using Wilmington District Stream Buffer Credit Calculator (updated 01/19/2019)
***The IRT has assessed an additional 80-credit penalty for crossings deemed redundant (03/24/2024).

7.0 PERFORMANCE STANDARD

Monitoring of the site shall occur for a minimum of seven years following construction. The following performance standards for stream and wetland mitigation are based on the *Wilmington District Stream and Wetland Compensatory Mitigation Update* (NCIRT 2016) and will be used to judge site success.

Vegetation Performance

The site must achieve a woody stem density of 320 stems/acre after three years, 260 stems/acre after five years, and 210 stems/acre after seven years to be considered successful. Trees in each plot must average 6 feet in height at Year 5 and 8 feet at Year 7. A single species may not account for more than 50% of the required number of stems within any plot. All volunteer stems or supplemental plantings must be present in the plot data for two years to be included as meeting the established vegetation performance standards in Year 5 and Year 7. For any volunteer tree stem to count toward vegetative success, it must be a species from the approved planting list included in Section 6.11. If monitoring indicates that any of these standards are not being met, corrective actions will take place.

Stream Hydrologic Performance

During the monitoring period, a minimum of four bankfull events must be recorded. These bankfull events must occur in separate monitoring years. The intermittent project streams (T1A, T4-1, T4-2, T4-3, T5, upper T7, T8, and upper T9) must also show a minimum of 30 continuous flow days within each calendar year (assuming normal precipitation); Morgan Branch, T1, T2, T3, T4, and the lower portions of T7 and T8, which are all perennial streams, are anticipated to have nearly continuous flow in a normal year. A "normal" year will be based on NRCS climatological data for Buncombe County with the 30th to 70th percentile thresholds as the range of normal, as documented in the USACE Technical Report "Accessing and Using Meteorological Data to Evaluate Wetland Hydrology, April 2000." Bankfull events and flow documentation will be verified using automatic stream monitoring gauges as described in the Monitoring Plan below.

Stream Geomorphology Performance

The site's geomorphology will be monitored per the NCIRT 2016 monitoring guidelines. The bank height ratio (BHR) should not exceed 1.2. BHR and ER at any measured riffle cross-section should not change by more than 10% from the baseline condition during any given monitoring interval (e.g., no more than 10% between years 1 and 2, 2 and 3, 3 and 5, or 5 and 7). There will be an overall assessment for each reach to distinguish localized versus systemic concerns for that stream. Adjustment and lateral movement following construction and as the channel settles over the monitoring period are to be expected. Geomorphological measurements of cross-sections will be used to determine if any adjustments that occur are out of the range typically expected for this type of stream.

8.0 MONITORING PLAN

Monitoring of the MBRS shall consist of the collection and analysis of stream hydrology, stability, and vegetation survivability data to support the evaluation of the project in meeting established performance standards described above. Stream monitoring will follow protocol established in the October 2016 IRT Guidance document. The Proposed Monitoring Plan in Figure 10 shows the proposed locations of monitoring features described below.

Vegetation Monitoring
Vegetation monitoring will take place between July 1st and leaf drop. The success of the riparian buffer plantings will be evaluated using twenty-eight 0.02-acre square or rectangular plots within the planted stream buffer. Fourteen plots will be permanently installed, while the remainder will be randomly placed at the time of each monitoring visit. Vegetation must be planted, and plots established at least 180 days prior to the start of the first year of monitoring.

In the permanent plots, the plant's height, species, location, and origin (planted versus volunteer) will be noted. In the random plots, species and height will be recorded. In all plots, invasive stems will also be recorded to determine the percentage of invasive stems present. Additionally, a photograph will be taken of each plot. Beginning at the end of the first growing season, the site's vegetation will be monitored in years 1, 2, 3, 5, and 7.

Stream Hydrologic Monitoring
Bankfull events on-site will be verified using 7 automatic stream monitoring gauges (two on MB, and one each on T1, T3, T4, T5, and T7. A minimum of 6 additional gauges and/or documentation means such as cameras (set to record a photo or video a minimum of once per day) will be installed on T4-1, T4-2, T5, T7, T8 and T9 document the presence of flow. Flow gauges will be installed in the upper third of reaches; where possible, bankfull gauges will be installed in the lower third of reaches, at or near the location of an existing cross section. The proposed locations of hydrologic monitoring gauges are shown in Figure 10.

Stream Geomorphology Monitoring
For stream monitoring, the purpose of monitoring is to evaluate the stability of the restored stream. Following the procedures established in the USDA Forest Service Manual, Stream Channel Reference Sites (Harrelson et al. 1994) and the methodologies utilized in the Rosgen stream assessment and classification system (1994 and 1996), data collected will consist of detailed dimension measurements, longitudinal profiles, and bed materials sampling.

<u>Dimension</u>
Twenty-six permanent cross-sections will be established throughout the site to document each reach that is being restored, as well as the Enhancement I section along MB Reach 1. The distribution of the cross-sections is shown in Figure 10 and in Table 20. The extents of each cross-section will be recorded by either conventional survey or GPS. The cross-sectional surveys shall provide a detailed measurement of the stream and banks and will include points on the adjacent floodplain or valley, at the top of bank, bankfull, at all breaks in slope, the edge of water, and thalweg. Width/depth, bank height and entrenchment ratios, as well as bankfull cross-sectional area, width, max depth and mean depth will be calculated for each riffle cross-section based on the survey data. The BHR will be measured by using a constant bankfull area over the monitoring period and adjusting the bankfull elevation each monitoring event based on how this area fits in the cross-sectional data. The revised bankfull elevation will then be used to calculate BHR along with the current low bank height. Width/depth ratios, bankfull cross-sectional area, width, max depth and mean depth will be calculated for each pool cross-section. Cross-section measurements will take place in Years 1, 2, 3, 5, and 7. Additional cross-sections may be added in subsequent monitoring years to document any areas of concern.

Profile

A detailed longitudinal profile will be conducted along the lengths of the project streams during the as-built survey. Measurements will include slopes (average, pool, and riffle) as well as calculations of pool-to-pool spacing. No additional profile measurements will be taken during the monitoring period unless deemed necessary due to concerns about bed elevation adjustments.

Visual Assessment

A site walk will be conducted twice each year to document any problem areas. Specific problem areas could include low stem density or poor plant vigor, areas dominated by undesirable volunteer species, prolonged inundation, native and exotic invasive species, beaver activity, herbivory, encroachments, indicators of livestock access, or other areas of concern. Visual assessment walks will include a comprehensive assessment of the easement boundary. All encroachments or violations of the conservation easement will be documented and submitted to the DMS project manager. Violations or encroachments identified during the annual monitoring visual assessment will be located and documented in the annual CCPV and noted in the Vegetation Visual Assessment Table.

Photograph reference points (PRPs) will be established to assist in characterizing the site and to allow qualitative evaluation of the site conditions. The location of each photo point will be marked in the monitoring plan and the bearing/orientation of the photograph will be documented to allow for repeated use. Photographs will also be taken semi-annually (once during collection of monitoring data, once during the dormant season) at all stream crossings and cross section locations. Locations of proposed PRPs are shown in Figure 10.

Reporting

Annual monitoring data will be reported using the most current DMS monitoring template. 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, research purposes, and assist in decision making regarding project close-out. The report will document the monitored components and include all collected data, analyses, and photographs. The first scheduled monitoring will be conducted during the first full growing season following project completion. The site will be monitored for performance standards for seven years as needed after completion of construction. Full monitoring reports will be completed in Years 1, 2, 3, 5, and 7. Limited monitoring reports (CCPV, photos, gauge data, and site narrative) will be submitted in Years 4 and 6.

Table 21. Monitoring Cross Sections

Restoration Reach Name	Proposed Reach Length	Monitoring Cross-Sections
MB Reach 1 (EI)	1,653	2
MB Reach 3	1,387	2
T1 Reach 3	947	2
T2 Reach 2	368	2
T3	1,350	2
T4	1,651	4
T4-1	636	1
T4-2	911	2
T5 Reach 2	1,468	2
T7	1,677	3
T8 Reach 2	312	1
T9	847	2

Table 22. Monitoring Requirements

Morgan Branch Restoration Site				
Required	**Parameter**	**Quantity**	**Frequency**	**Notes**
Yes	Pattern and Profile	All project reaches	Once, during as-built survey	Additional measurements in later years may be taken as necessary.
Yes	Stream Dimension	26 cross-sections	Monitoring Years 1, 2, 3, 5, and 7	Photos taken at all cross sections semi-annually. Additional measurements in later years may be taken as necessary.
Yes	Stream Hydrology	7 pressure transducer gauges on Morgan Branch (2), T1 (1), T3 (1), T4 (1), T5 (1), and T7 (1)	Annual – throughout year	
Yes	Stream Hydrology	6 flow documentation stations on T4-1, T4-2, T5, T7, T8 and T9	Annual – throughout year	30 days of consecutive intermittent stream flow required
Yes	Vegetation	28 (14 permanent and 14 random) vegetation monitoring plots	Monitoring Years 1, 2, 3, 5, and 7	Minimum size of 0.02 acre
Yes	Photo Reference Points	34 Permanent	Semi-annual	In addition to cross-section and vegetation plot photos
Yes	Visual Assessment	Sitewide	Semi-annual	
Yes	Exotic and nuisance vegetation		Annual	Locations of exotic and nuisance vegetation will be mapped*
Yes	Project boundary		Semi-annual	Locations of vegetation damage, boundary encroachments, etc. will be mapped

* See Appendix 9 for proposed invasive species management.

9.0 ADAPTIVE MANAGEMENT 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, KCI shall notify DMS and members of the IRT and work with these two organizations to develop contingency plans and remedial actions.

10.0 LONG-TERM MANAGEMENT PLAN

MBRS 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 annual inspection of the site to ensure that restrictions required in the conservation easement are upheld. Funding will be supplied by

the responsible party on a yearly basis until such time an endowment is established. The NCDEQ Stewardship Program is developing an endowment system within the non-reverting, interest-bearing Conservation Lands Conservation Fund Account. The use of funds from the Endowment Account will be governed by North Carolina General Statue GS 113A-232(d)(3). Interest gained by the endowment fund may be used for the purpose of stewardship, monitoring, stewardship administration, and land transaction costs, if applicable. The Stewardship Program will periodically install signage as needed to identify boundary markings as needed. Any fencing or permanent crossings will be the responsibility of the owner of the underlying property to maintain.

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FIGURES

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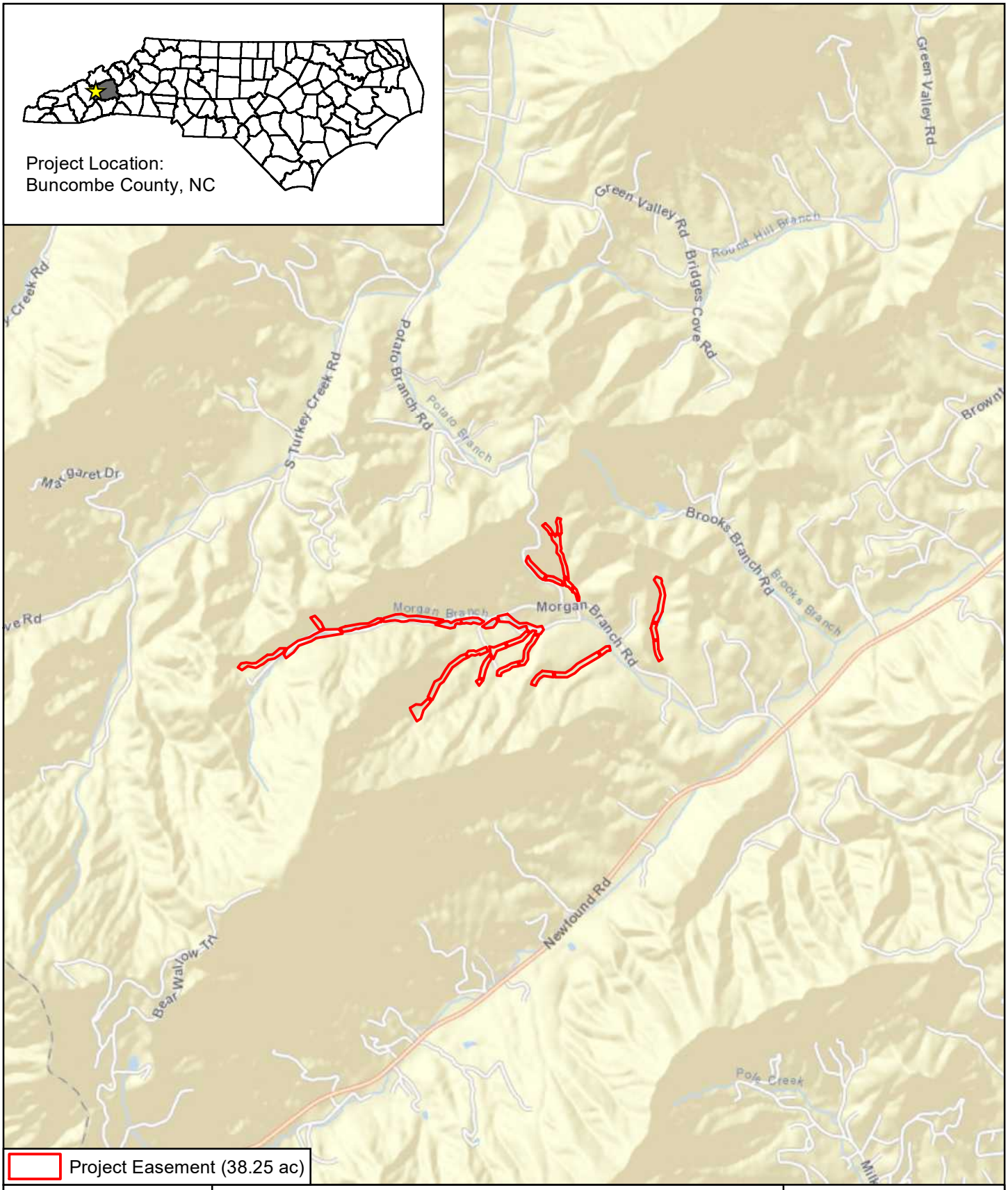
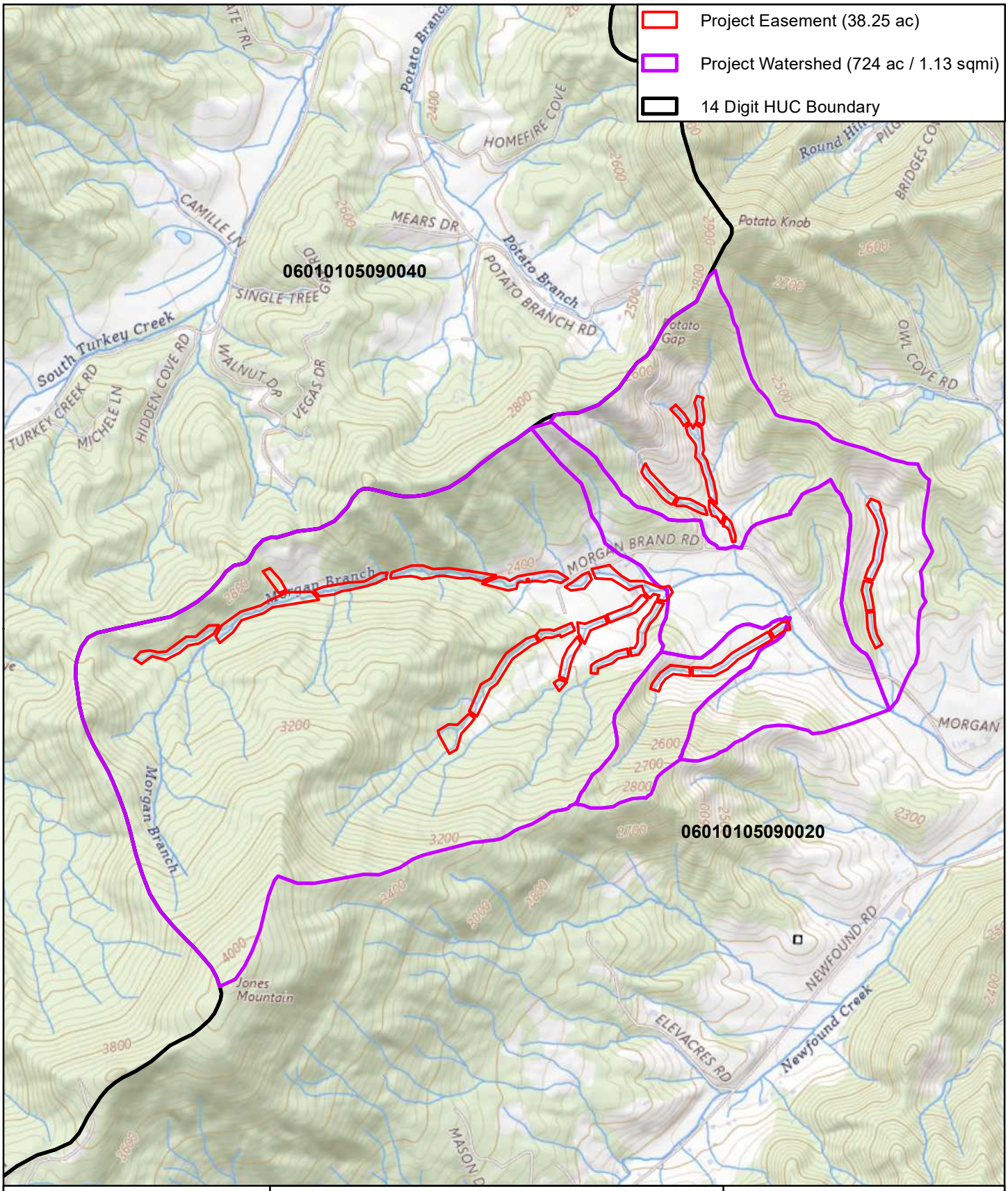


FIGURE 1. PROJECT SITE VICINITY MAP
MORGAN BRANCH RESTORATION SITE
BUNCOMBE COUNTY, NC



0 700 1,400 Feet

FIGURE 2. USGS TOPOGRAPHIC MAP
MORGAN BRANCH RESTORATION SITE
BUNCOMBE COUNTY, NC

N

Source: USGS Topo Map, Canton and Enka Quadrangles

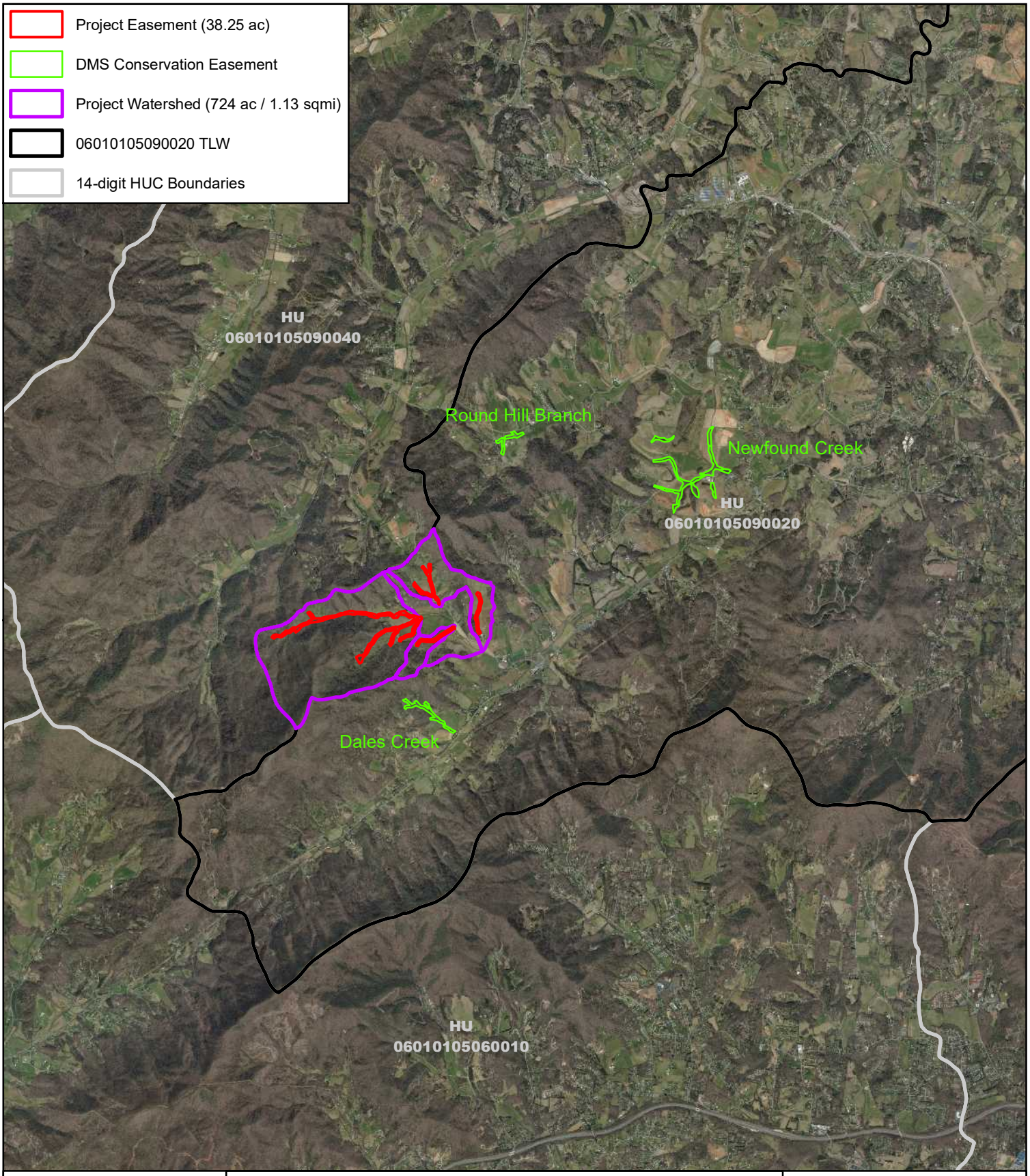


FIGURE 3. WATERSHED PLANNING CONTEXTUAL MAP
MORGAN BRANCH RESTORATION SITE
BUNCOMBE COUNTY, NC

Source: NC Statewide Orthoimagery, 2019

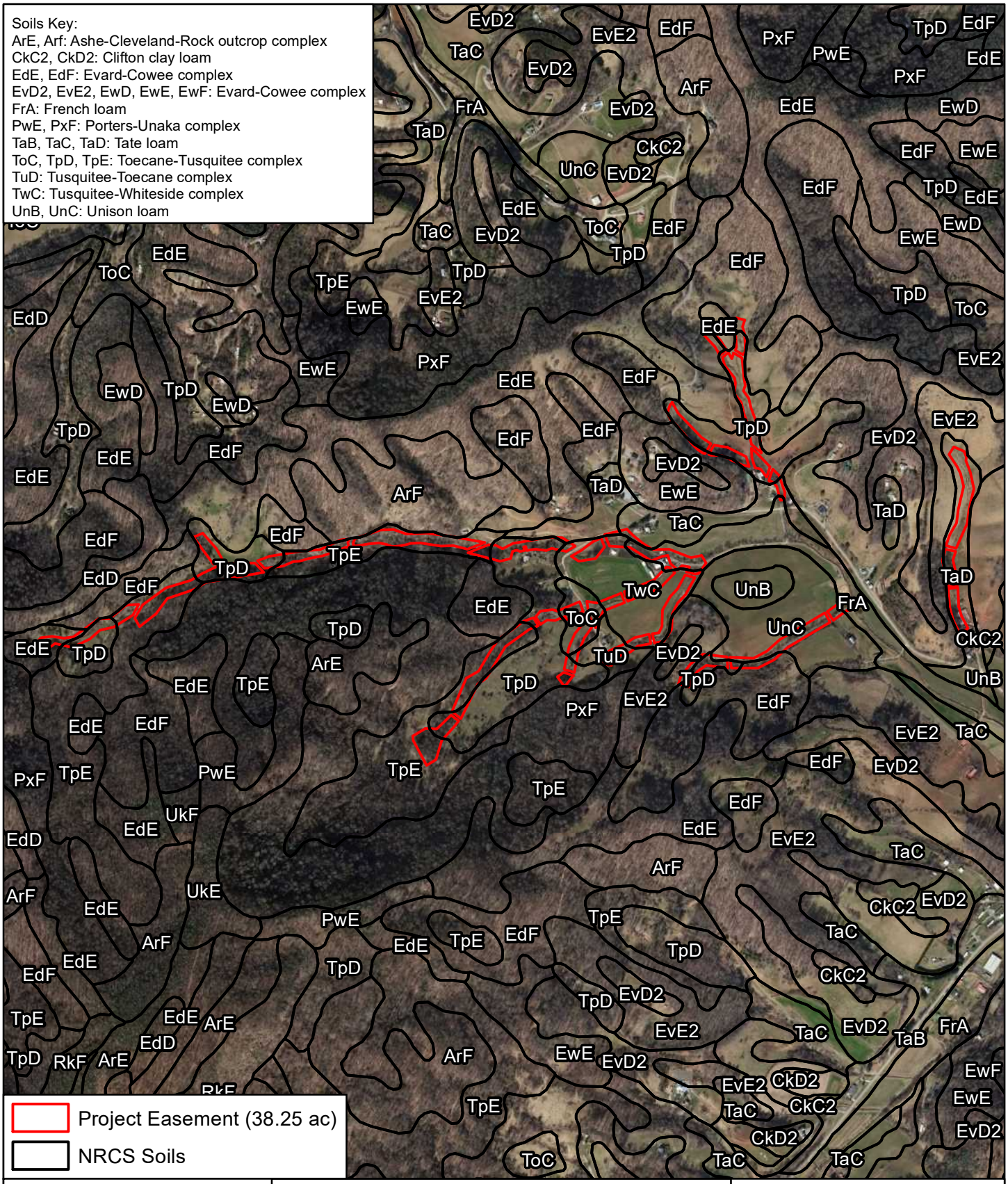


FIGURE 4. NRCS SOIL SURVEY
MORGAN BRANCH RESTORATION SITE
BUNCOMBE COUNTY, NC

Source: NRCS Soil Survey, Buncombe County; NC Statewide Orthoimagery, 2019

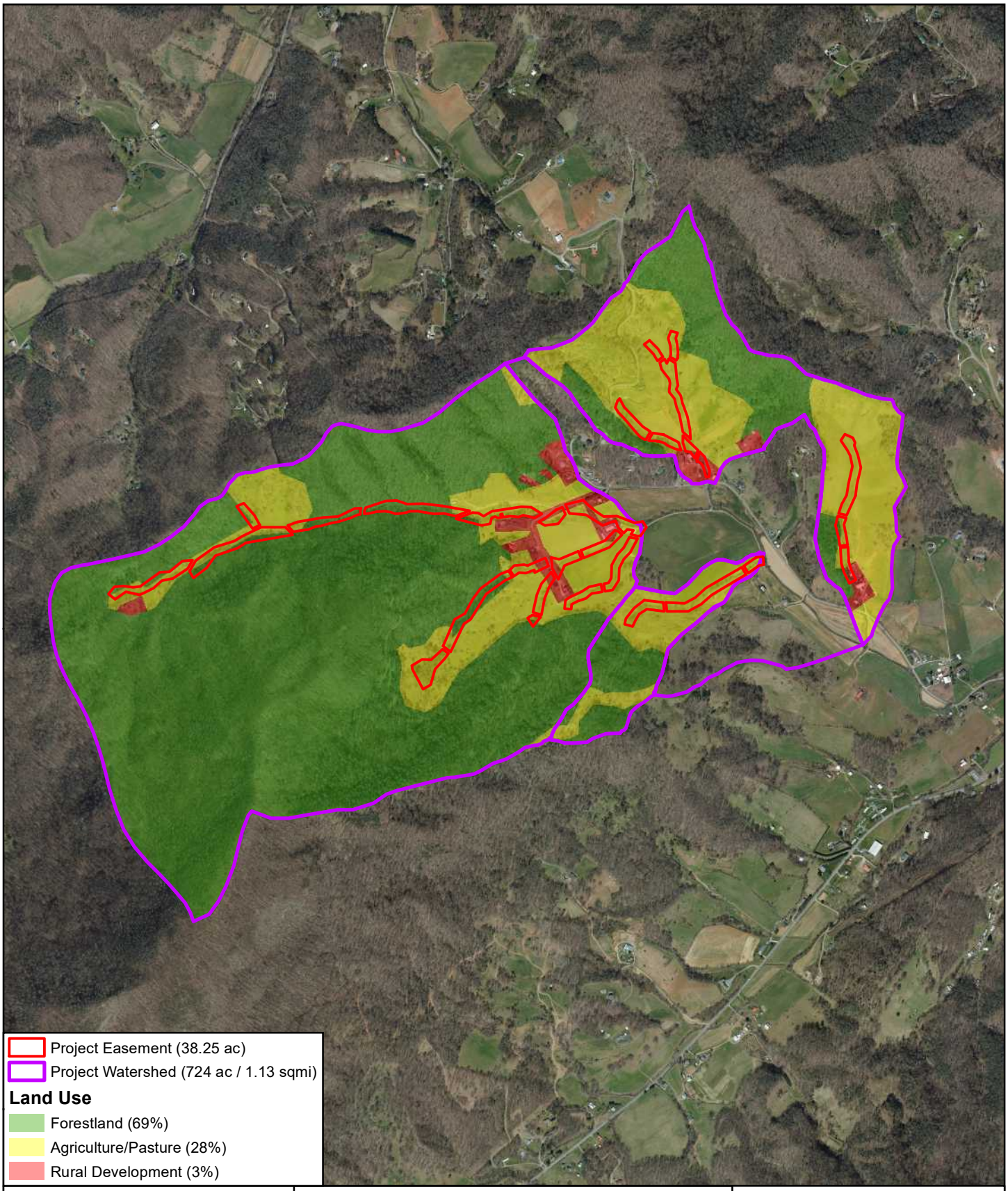


FIGURE 5. PROJECT WATERSHED LAND USE
MORGAN BRANCH RESTORATION SITE
BUNCOMBE COUNTY, NC

Image Source: NC Statewide Orthoimagery, 2019
Land Cover from Imagery

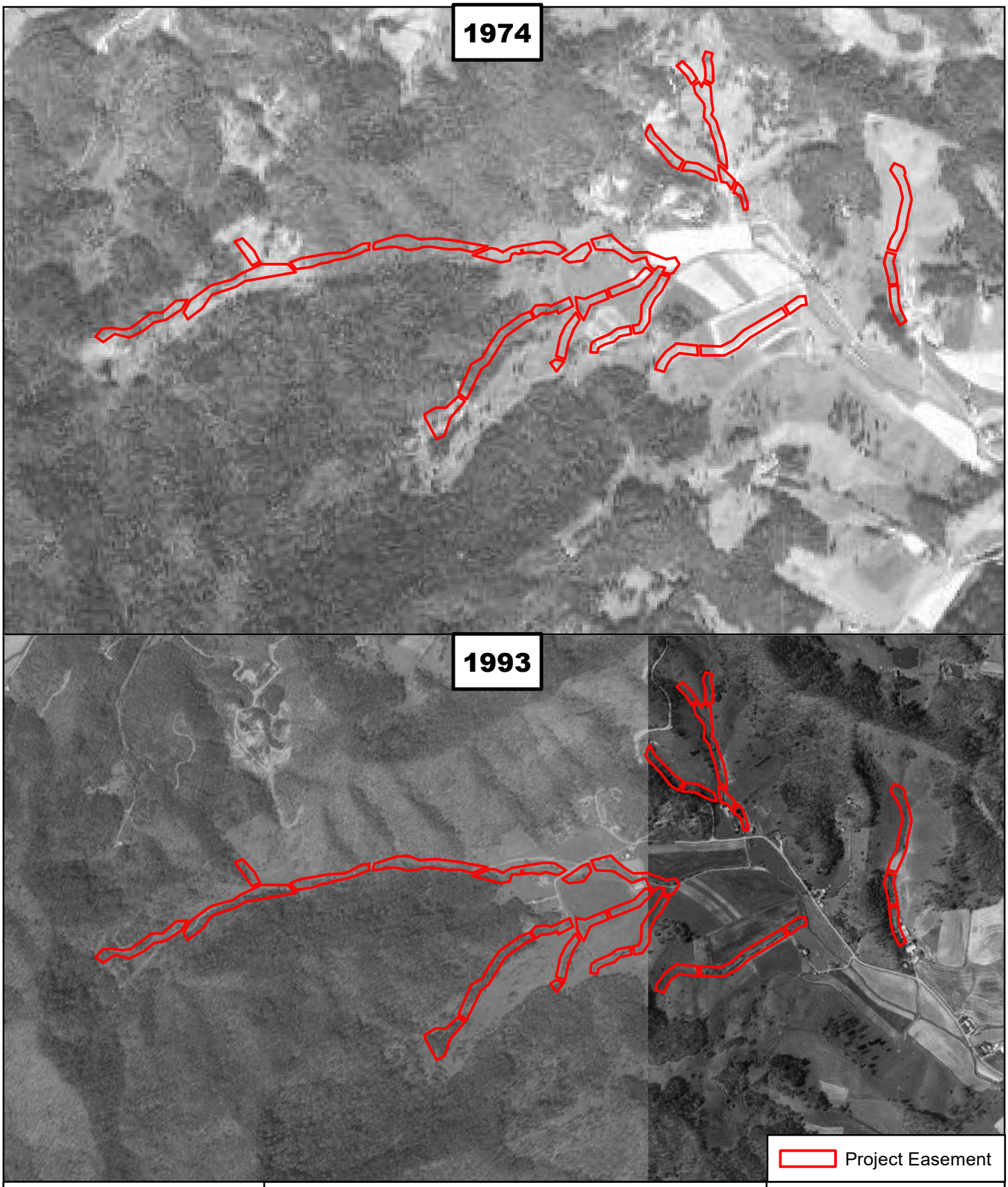


FIGURE 6A. HISTORIC AERIAL PHOTOGRAPHS
MORGAN BRANCH RESTORATION SITE
BUNCOMBE COUNTY, NC

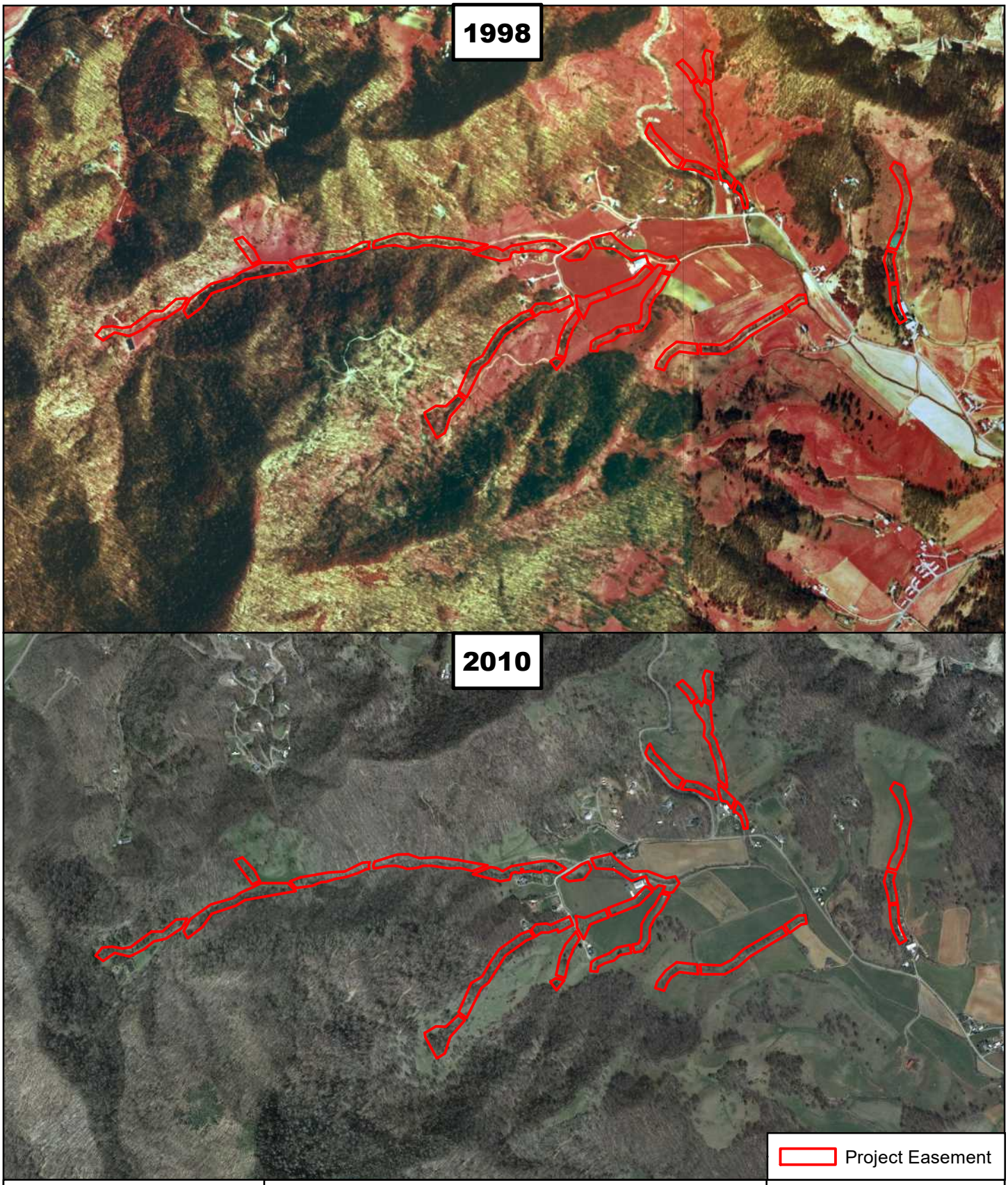


FIGURE 6B. HISTORIC AERIAL PHOTOGRAPHS
MORGAN BRANCH RESTORATION SITE
BUNCOMBE COUNTY, NC

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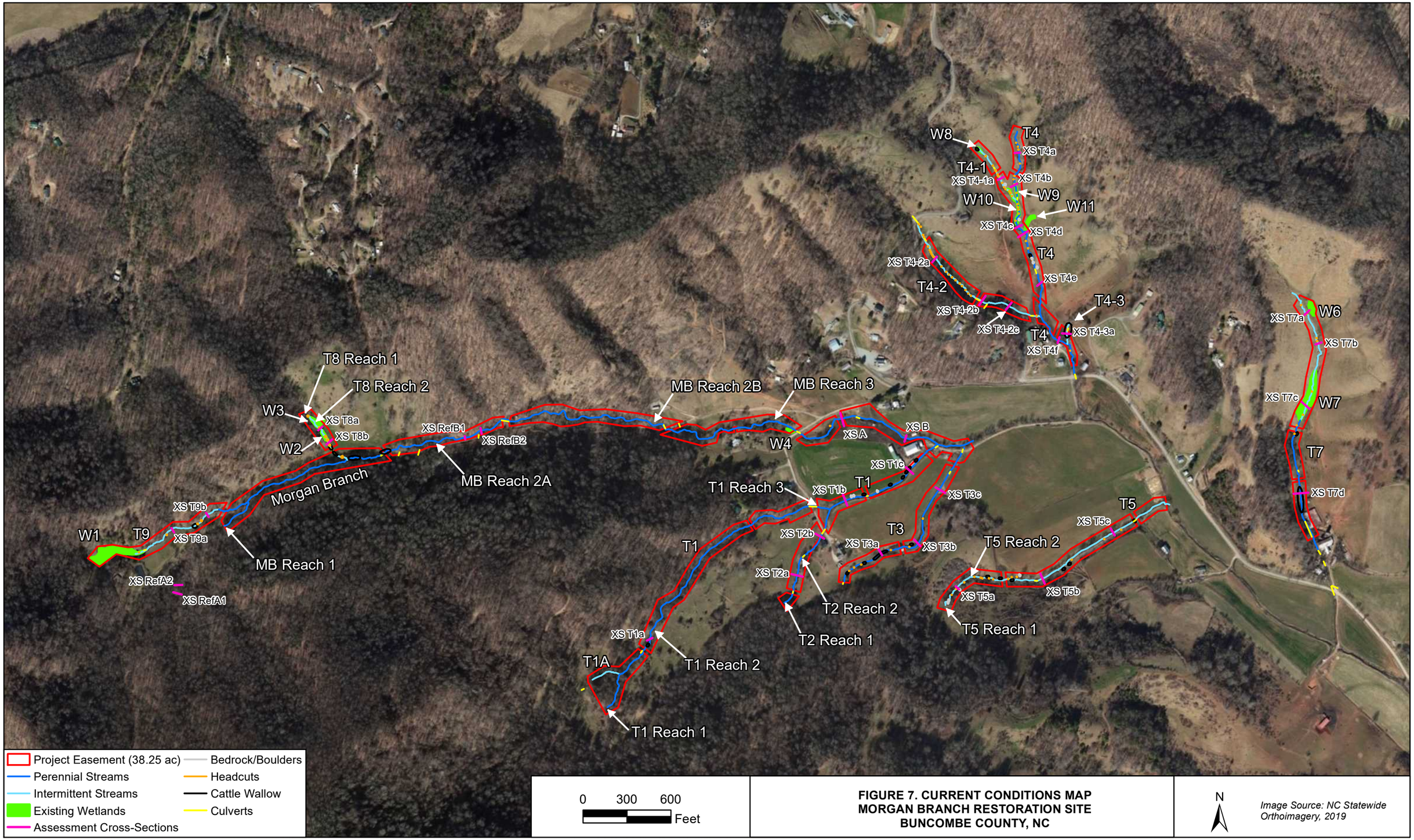

FIGURE 7. CURRENT CONDITIONS MAP
MORGAN BRANCH RESTORATION SITE
BUNCOMBE COUNTY, NC

Image Source: NC Statewide Orthoimagery, 2019

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FIGURE 8A. UTILITY LINE RELOCATION MAP
MORGAN BRANCH RESTORATION SITE
BUNCOMBE COUNTY, NC

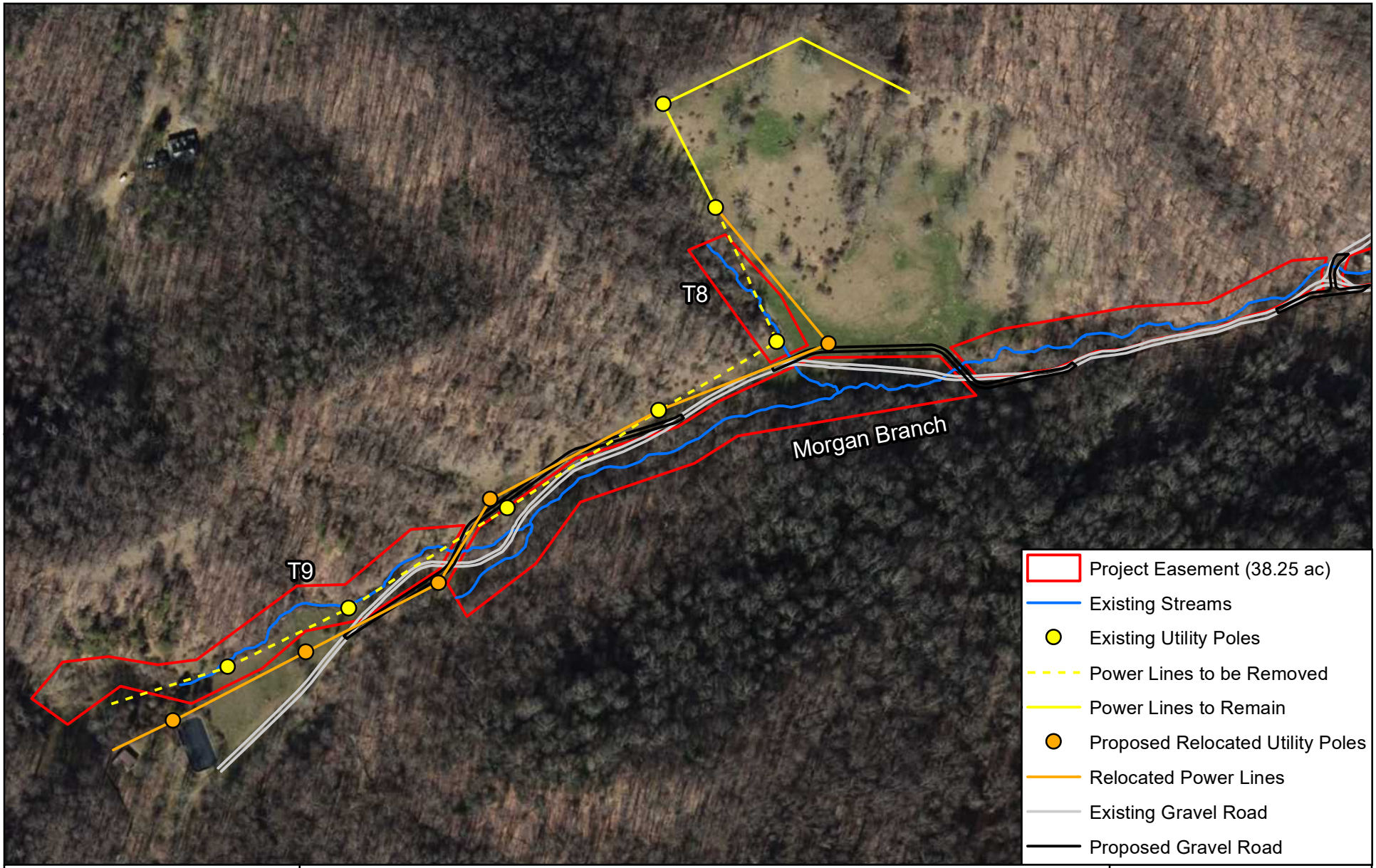


FIGURE 8B. ROAD & UTILITY LINE RELOCATION MAP
MORGAN BRANCH RESTORATION SITE
BUNCOMBE COUNTY, NC

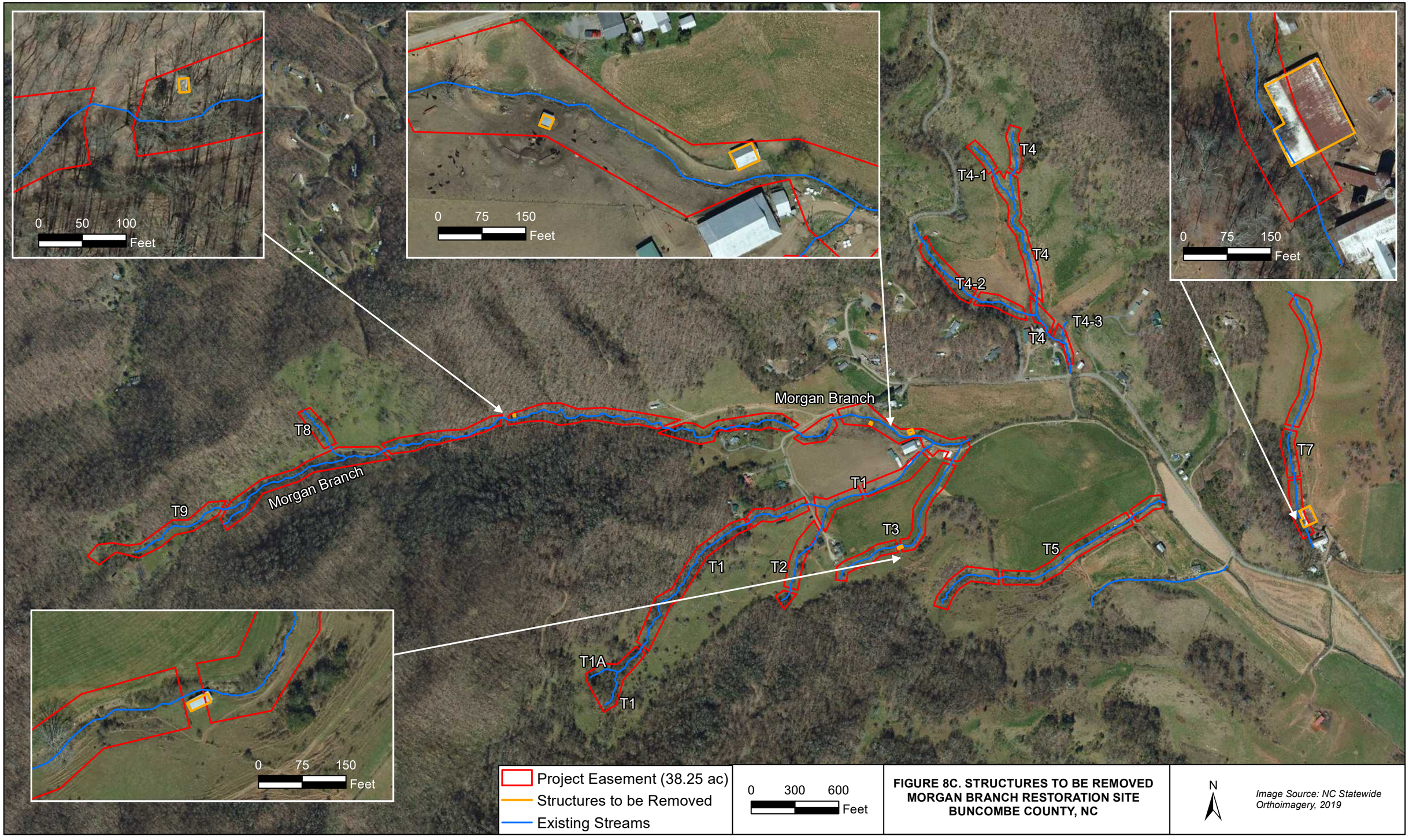


FIGURE 8C. STRUCTURES TO BE REMOVED
MORGAN BRANCH RESTORATION SITE
BUNCOMBE COUNTY, NC

Image Source: NC Statewide Orthoimagery, 2019

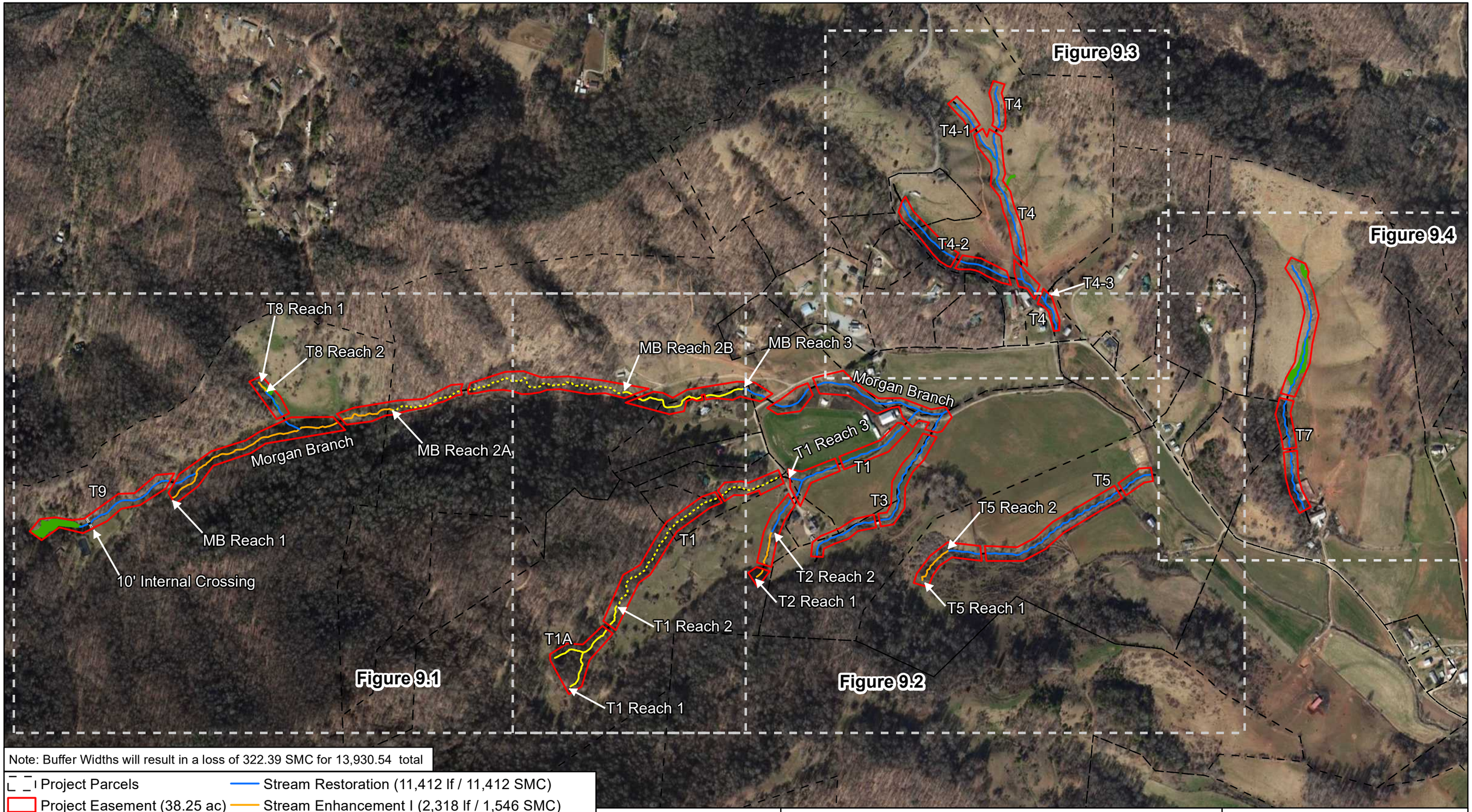


FIGURE 9. PROJECT ASSET MAP
TYPE AND EXTENT
MORGAN BRANCH RESTORATION SITE
BUNCOMBE COUNTY, NC

Image Source: NC Statewide Orthoimagery, 2019

Project Parcels
Project Easement (38.25 ac)
Existing Wetlands
Stream Restoration (11,412 lf / 11,412 SMC)
Stream Enhancement I (2,318 lf / 1,546 SMC)
Stream Enhancement II (1,661 lf / 664 SMC)
Stream Enhancement II @5:1 (3,156 lf / 631 SMC)
No Credit

Note: Buffer Widths will result in a loss of 322.39 SMC for 13,930.54 total

T8 Reach 1
T8 Reach 2
MB Reach 2A
MB Reach 2B
MB Reach 3
Morgan Branch
T9
MB Reach 1
10' Internal Crossing
T1
T2 Re
T1 Reach 2
T1A
T1 Reach 1

0 150 300
Feet

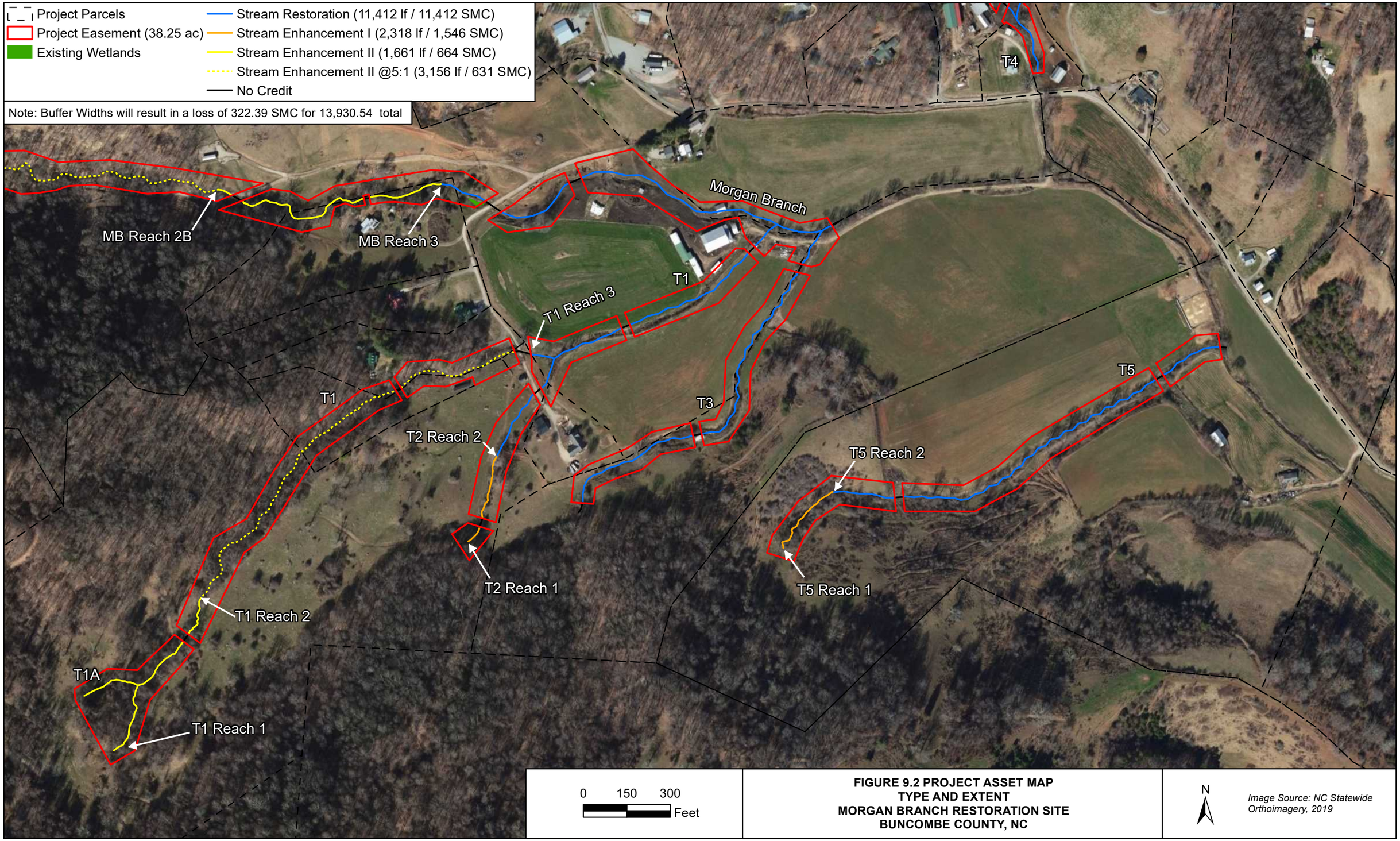
FIGURE 9.1 PROJECT ASSET MAP
TYPE AND EXTENT
MORGAN BRANCH RESTORATION SITE
BUNCOMBE COUNTY, NC

N

Image Source: NC Statewide Orthoimagery, 2019

Project Parcels
Project Easement (38.25 ac)
Existing Wetlands
Stream Restoration (11,412 lf / 11,412 SMC)
Stream Enhancement I (2,318 lf / 1,546 SMC)
Stream Enhancement II (1,661 lf / 664 SMC)
Stream Enhancement II @5:1 (3,156 lf / 631 SMC)
No Credit

Note: Buffer Widths will result in a loss of 322.39 SMC for 13,930.54 total



0 150 300 Feet

FIGURE 9.2 PROJECT ASSET MAP
TYPE AND EXTENT
MORGAN BRANCH RESTORATION SITE
BUNCOMBE COUNTY, NC

N

Image Source: NC Statewide Orthoimagery, 2019

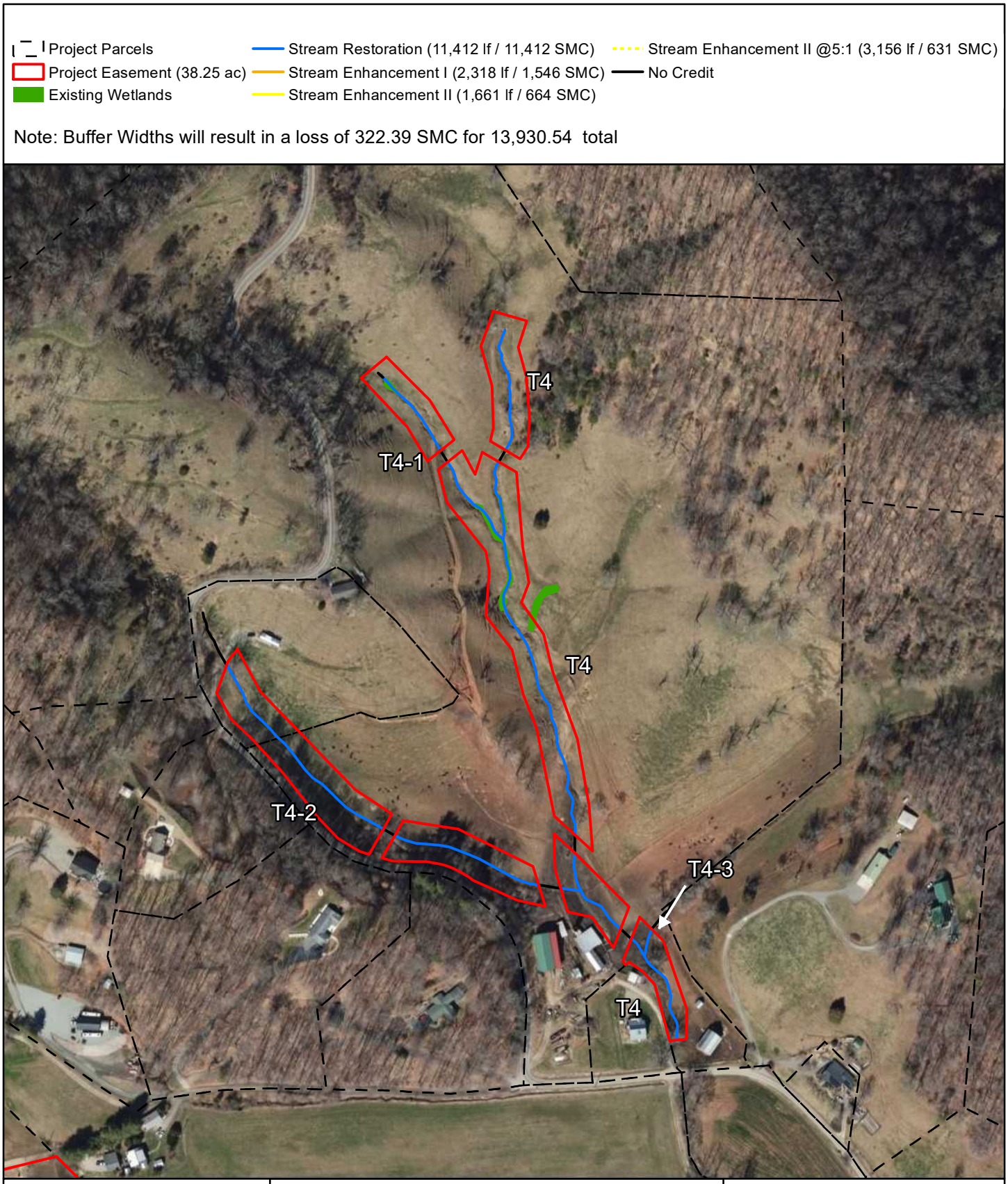
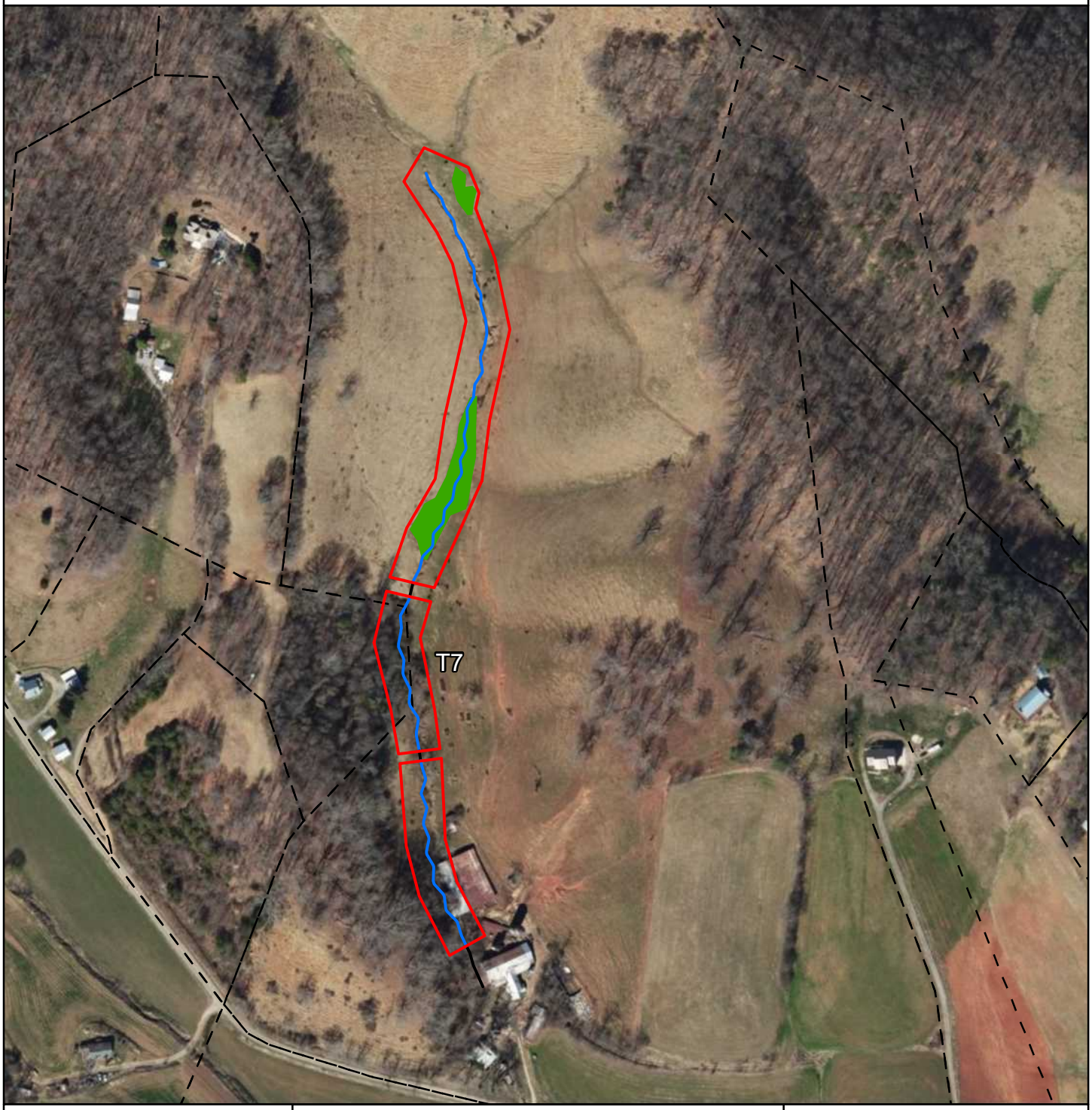


FIGURE 9.3 PROJECT ASSET MAP
TYPE AND EXTENT
MORGAN BRANCH RESTORATION SITE
BUNCOMBE COUNTY, NC

Project Parcels
Project Easement (38.25 ac)
Existing Wetlands
Stream Restoration (11,412 lf / 11,412 SMC)
Stream Enhancement I (2,318 lf / 1,546 SMC)
Stream Enhancement II (1,661 lf / 664 SMC)
Stream Enhancement II @5:1 (3,156 lf / 631 SMC)
No Credit

Note: Buffer Widths will result in a loss of 322.39 SMC for 13,930.54 total



0 150 300 Feet

FIGURE 9.4 PROJECT ASSET MAP
TYPE AND EXTENT
MORGAN BRANCH RESTORATION SITE
BUNCOMBE COUNTY, NC

N

Image Source: NC Statewide Orthoimagery, 2019

Project Easement (38.25 ac)
Existing Wetlands
Proposed Photo Points (34) - in addition to XS and Veg Plot Photo Points
Proposed Wetland Gauges (3)
Stream Flow Gauges (6)
Stream Bankfull Gauges (7)
Proposed Stream Monitoring Cross-Sections (26)
Proposed Permanent Vegetation Plots (14)
Proposed Random Vegetation Plots (14) - Relocated Annually
Stream Restoration (11,412 lf / 11,412 SMC)
Stream Enhancement I (2,318 lf / 1,546 SMC)
Stream Enhancement II (1,661 lf / 664 SMC)
Stream Enhancement II @5:1 (3,156 lf / 631 SMC)
No Credit

Note: Buffer Widths will result in a loss of 322.39 SMC for 13,930.54 total

Note: Monitoring feature locations are approximate and final placement will be determined when the features are installed.

0 300 600 Feet

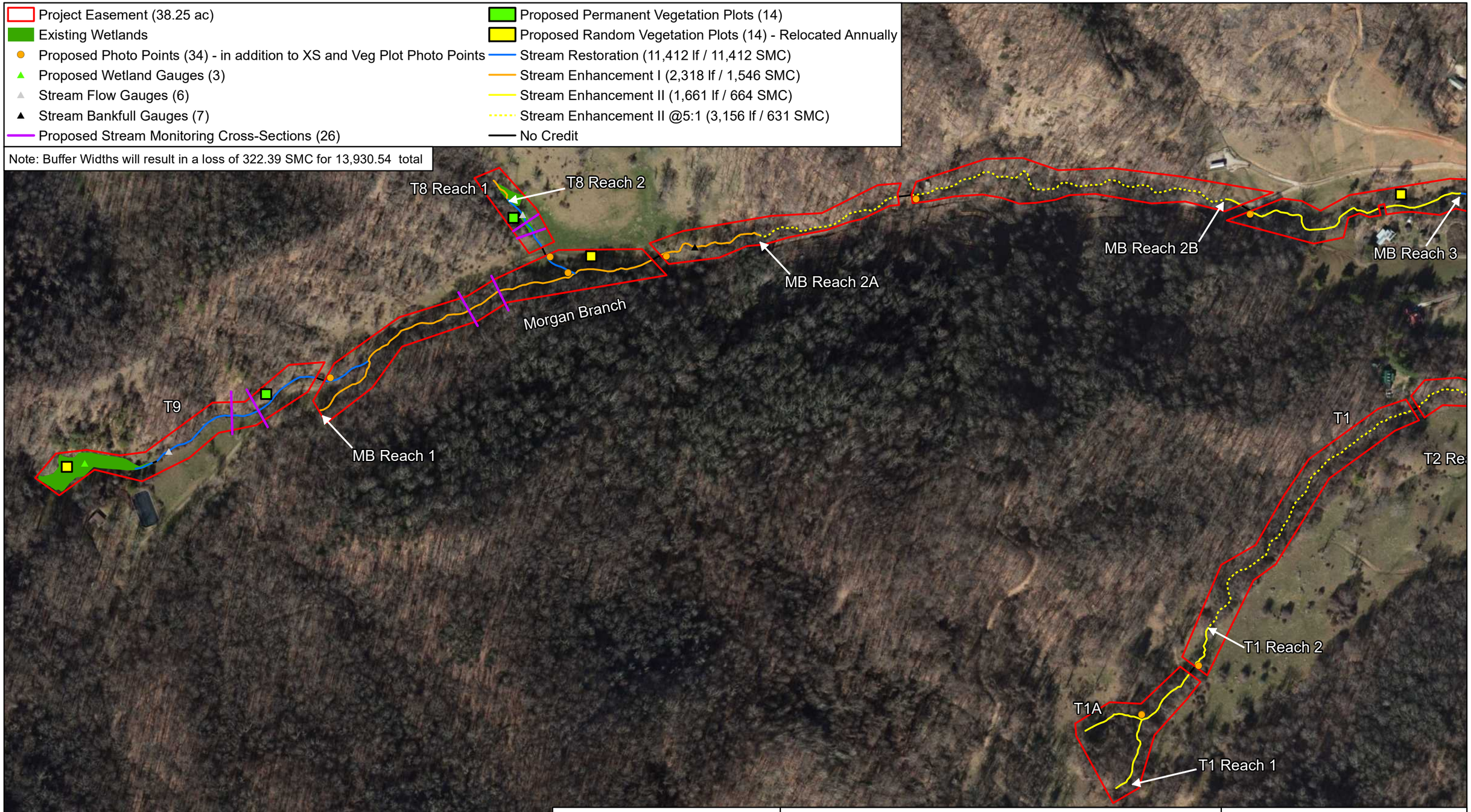
FIGURE 10. PROPOSED MONITORING PLAN
TYPE AND EXTENT
MORGAN BRANCH RESTORATION SITE
BUNCOMBE COUNTY, NC

N

Image Source: NC Statewide Orthoimagery, 2019

Project Easement (38.25 ac)
Existing Wetlands
Proposed Photo Points (34) - in addition to XS and Veg Plot Photo Points
Proposed Wetland Gauges (3)
Stream Flow Gauges (6)
Stream Bankfull Gauges (7)
Proposed Stream Monitoring Cross-Sections (26)
Proposed Permanent Vegetation Plots (14)
Proposed Random Vegetation Plots (14) - Relocated Annually
Stream Restoration (11,412 lf / 11,412 SMC)
Stream Enhancement I (2,318 lf / 1,546 SMC)
Stream Enhancement II (1,661 lf / 664 SMC)
Stream Enhancement II @5:1 (3,156 lf / 631 SMC)
No Credit

Note: Buffer Widths will result in a loss of 322.39 SMC for 13,930.54 total



Note: Monitoring feature locations are approximate and final placement will be determined when the features are installed.

0 150 300 Feet

FIGURE 10.1 PROPOSED PROPOSED MONITORING PLAN TYPE AND EXTENT
MORGAN BRANCH RESTORATION SITE
BUNCOMBE COUNTY, NC

N

Image Source: NC Statewide Orthoimagery, 2019

Project Easement (38.25 ac)
Existing Wetlands
Proposed Photo Points (34) - in addition to XS and Veg Plot Photo Points
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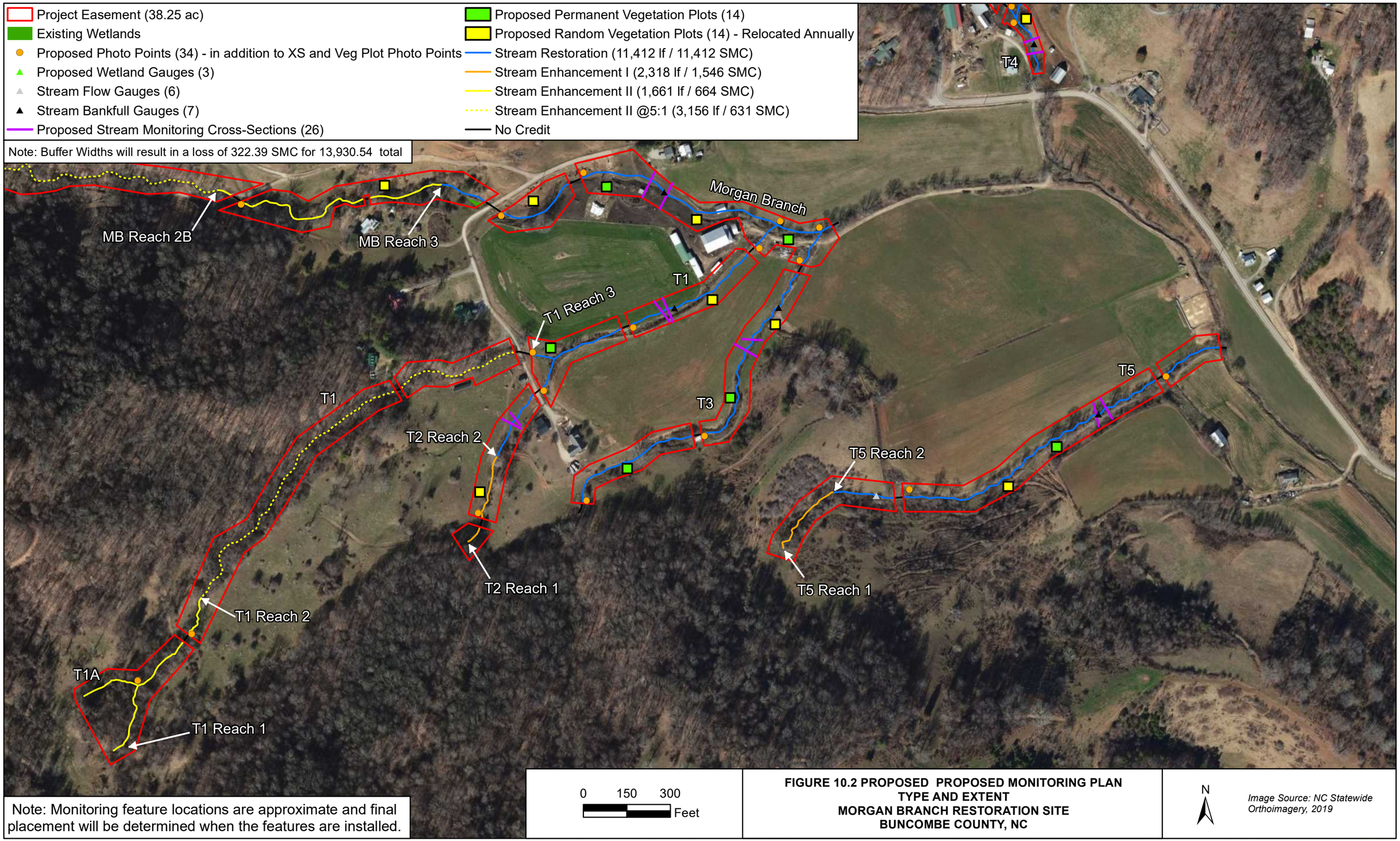
Stream Enhancement II @5:1 (3,156 lf / 631 SMC)
No Credit

Note: Buffer Widths will result in a loss of 322.39 SMC for 13,930.54 total



Note: Monitoring feature locations are approximate and final placement will be determined when the features are installed.

0 150 300 Feet

FIGURE 10.2 PROPOSED PROPOSED MONITORING PLAN TYPE AND EXTENT
MORGAN BRANCH RESTORATION SITE
BUNCOMBE COUNTY, NC

N

Image Source: NC Statewide Orthoimagery, 2019

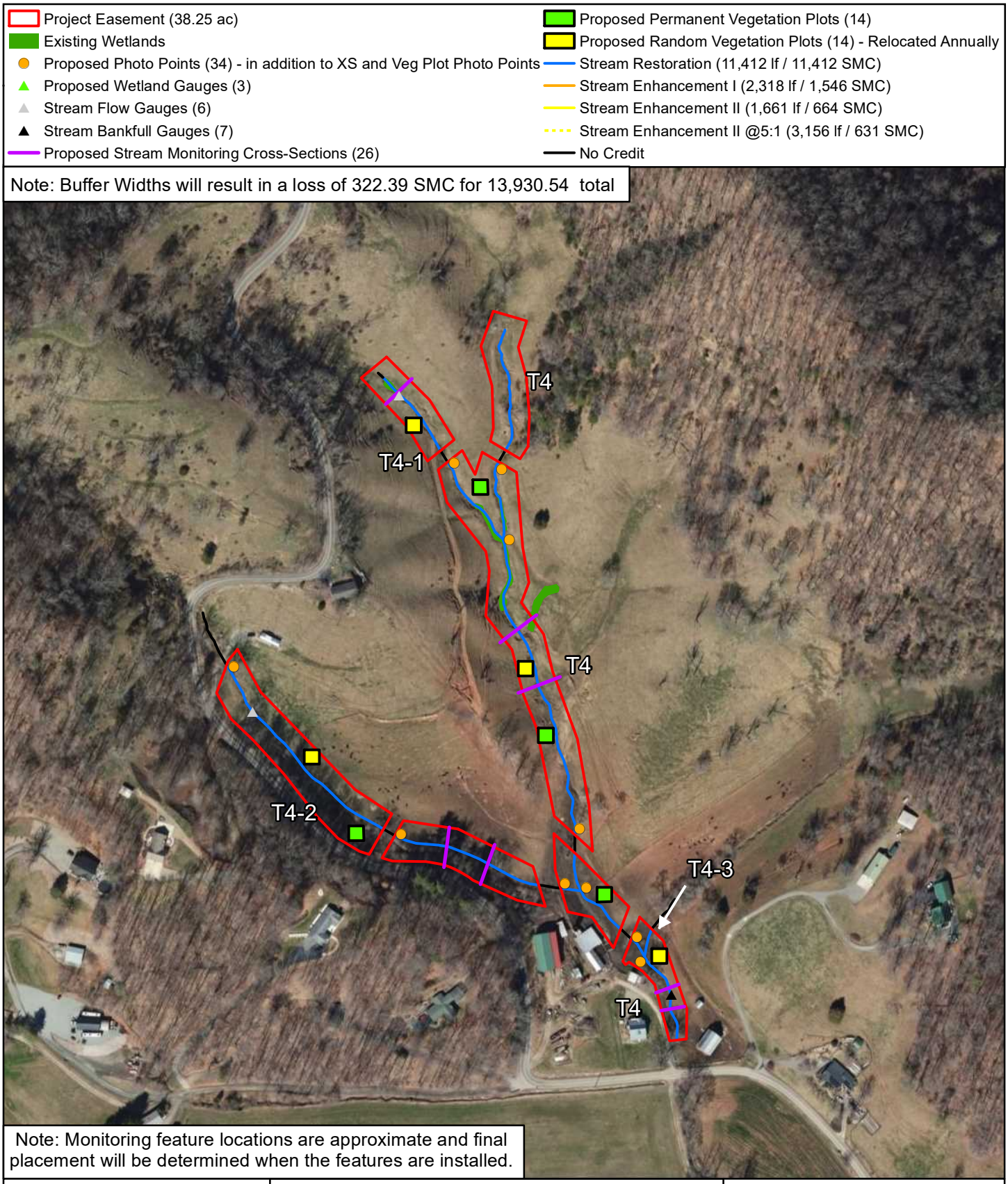


FIGURE 10.3 PROPOSED MONITORING PLAN TYPE AND EXTENT
MORGAN BRANCH RESTORATION SITE
BUNCOMBE COUNTY, NC

Image Source: NC Statewide Orthoimagery, 2019

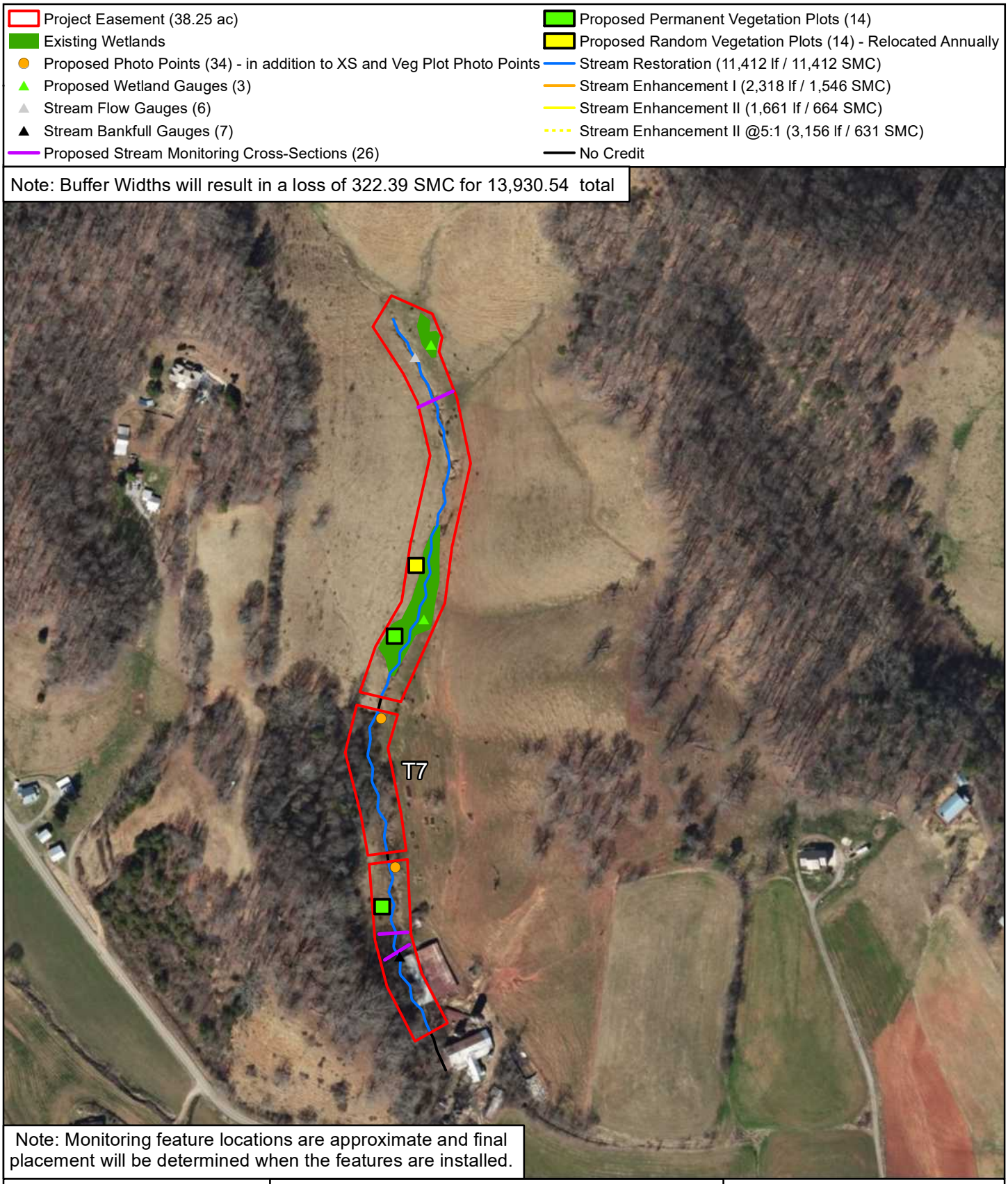


FIGURE 10.4 PROPOSED MONITORING PLAN TYPE AND EXTENT
MORGAN BRANCH RESTORATION SITE
BUNCOMBE COUNTY, NC

Image Source: NC Statewide Orthoimagery, 2019

APPENDICES

1. Plan Sheets

KCI JOB# : 161904755

CONTRACT #: 7909

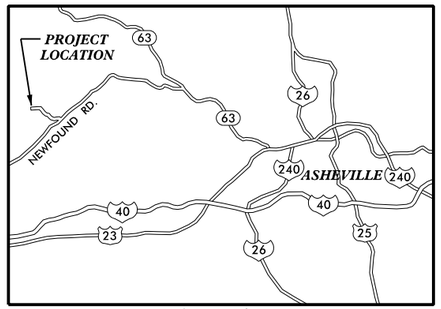
NCDEQ DIVISION OF MITIGATION SERVICES

STATE	CONTRACT NUMBER	SHEET NO.
N.C.	7909	TS1

A	REVISED PER IRT COMMENTS	MAY 2024
REVISIONS		

MORGAN BRANCH RESTORATION SITE

BUNCOMBE COUNTY, NORTH CAROLINA
FRENCH BROAD RIVER BASIN
CATALOGING UNIT 06010105
(LAT 35.6096 / LON –82.7522)

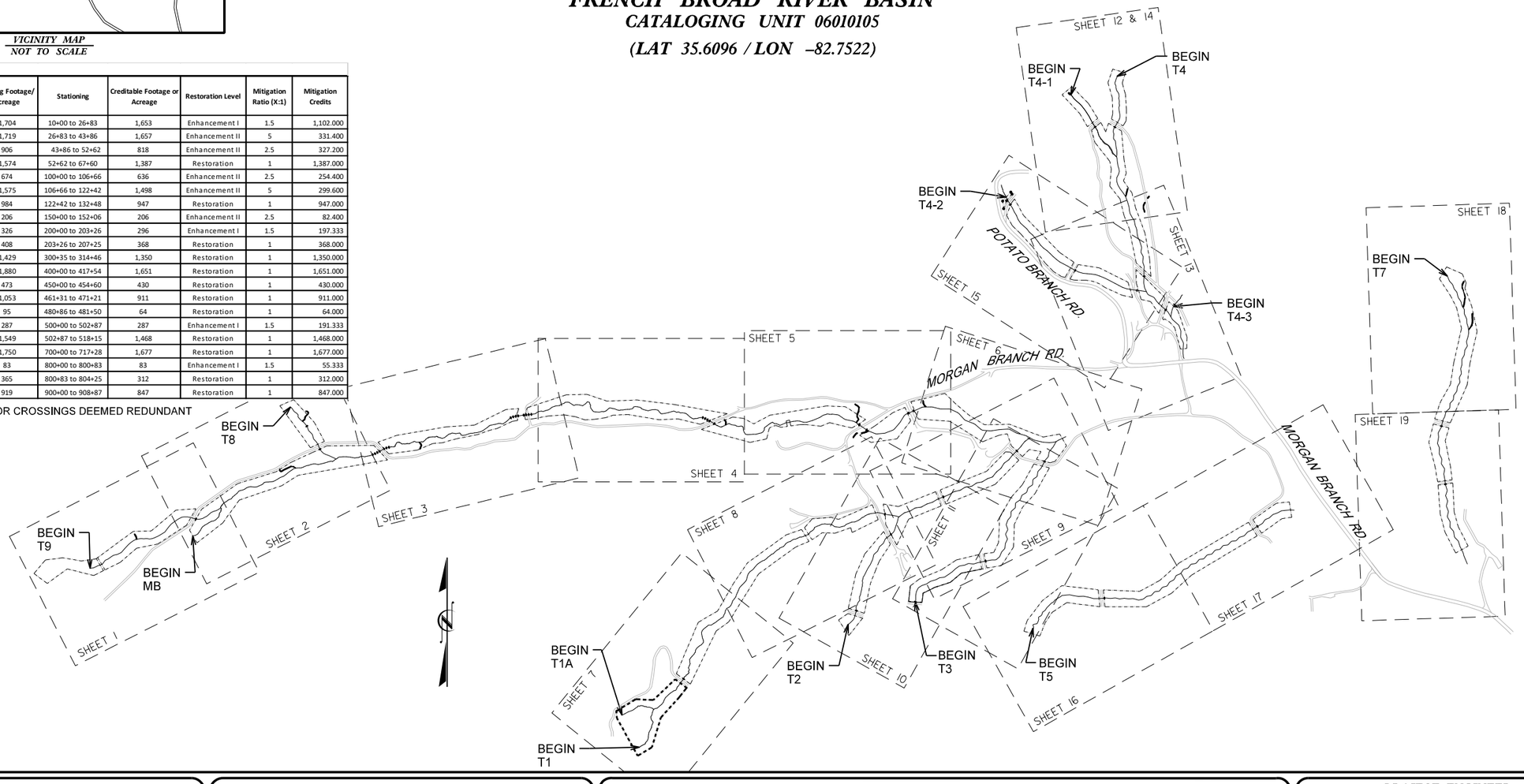


VICINITY MAP
NOT TO SCALE

Project Asset Table

Project Component -or- Reach ID	Existing Footage/ Acreage	Stationing	Creditable Footage or Acreage	Restoration Level	Mitigation Ratio (X:1)	Mitigation Credits
MB Reach 1	1,704	10+00 to 26+83	1,653	Enhancement I	1.5	1,102.000
MB Reach 2a	1,719	26+83 to 43+86	1,657	Enhancement II	5	331.400
MB Reach 2b	906	43+86 to 52+62	818	Enhancement II	2.5	327.200
MB Reach 3	1,574	52+62 to 67+60	1,387	Restoration	1	1,387.000
T1 Reach 1	674	100+00 to 106+66	636	Enhancement II	2.5	254.400
T1 Reach 2	1,575	106+66 to 122+42	1,498	Enhancement II	5	299.600
T1 Reach 3	984	122+42 to 132+48	947	Restoration	1	947.000
T1A	206	150+00 to 152+06	206	Enhancement II	2.5	82.400
T2 Reach 1	326	200+00 to 203+26	296	Enhancement I	1.5	197.333
T2 Reach 2	408	203+26 to 207+25	368	Restoration	1	368.000
T3	1,429	300+35 to 314+46	1,350	Restoration	1	1,350.000
T4	1,880	400+00 to 417+54	1,651	Restoration	1	1,651.000
T4-1	473	450+00 to 454+60	430	Restoration	1	430.000
T4-2	1,053	461+31 to 471+21	911	Restoration	1	911.000
T4-3	95	480+86 to 481+50	64	Restoration	1	64.000
T5 Reach 1	287	500+00 to 502+87	287	Enhancement I	1.5	191.333
T5 Reach 2	1,549	502+87 to 518+15	1,468	Restoration	1	1,468.000
T7	1,750	700+00 to 717+28	1,677	Restoration	1	1,677.000
T8 Reach 1	83	800+00 to 800+83	83	Enhancement I	1.5	55.333
T8 Reach 2	365	800+83 to 804+25	312	Restoration	1	312.000
T9	919	900+00 to 908+87	847	Restoration	1	847.000

80 CREDIT PENALTY FOR CROSSINGS DEEMED REDUNDANT



DIRECTIONS TO SITE

FROM ASHEVILLE, TAKE U.S. 74 ATL. USE THE TWO RIGHT LANES TO TAKE A RIGHT ONTO NC-63 WEST. TURN LEFT ONTO NEWFOUND ROAD. AFTER 5 MILES, TAKE A RIGHT ONTO MORGAN BRANCH ROAD AND FOLLOW FOR ABOUT 1 MILE. AT THE POTATO BRANCH ROAD INTERSECTION, MERGE LEFT TO STAY ON MORGAN BRANCH ROAD. FOLLOW FOR ANOTHER 600FT, AND MERGE LEFT AT A DRIVEWAY INTERSECTION TO STAY ON MORGAN BRANCH ROAD. THE STREAM PROJECT WILL BE APPROX. 500FT DOWN THE ROAD ON THE LEFT SIDE.

INDEX OF SHEETS

TOTAL DISTURBED AREA = 36.79 ACRES

Prepared in the Office of:

KCI ASSOCIATES OF NC
ENGINEERS•PLANNERS•ECOLOGISTS
4505 FALLS OF NEUSE ROAD
SUITE 400
RALEIGH, NC 27609

Prepared for:

HARRY TSOMIDES
DMS PROJECT MANAGER

Prepared by:

KRISTIN E. KNIGHT, PE
PROJECT ENGINEER

ALEX FRENCH
PROJECT DESIGNER

PROJECT ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 040899 ENGINEER KRISTIN E. KNIGHT

SIGNATURE: Kristin E. Knight 05-24-2024 P.E.

GENERAL NOTES:

BEARINGS AND DISTANCES:
ALL BEARINGS ARE NAD 1983 GRID BEARINGS. ALL DISTANCES AND COORDINATES SHOWN ARE HORIZONTAL (GROUND) VALUES.

UTILITY/SUBSURFACE PLANS:
NO SUBSURFACE PLANS ARE AVAILABLE ON THIS PROJECT. EXISTING UNDERGROUND UTILITIES HAVE NOT BEEN VERIFIED. THE CONTRACTOR IS RESPONSIBLE FOR CONTACTING A UTILITY LOCATOR AND ESTABLISHING THE EXACT LOCATION OF ANY AND ALL EXISTING UTILITIES IN THE PROJECT REACH.

SITE PLANS:
CONTRACTOR SHALL TAKE ALL PRECAUTIONS TO MINIMIZE DAMAGING EXISTING NATIVE TREES WHERE POSSIBLE.

ANY TREES THAT NEED TO BE REMOVED DUE TO GRADING NEW BANKS WILL BE SAVED FOR IN-STREAM STRUCTURE MATERIAL.

ANY NEW STREAM BANKS/BENCHES OR TERRACE TIE-OUTS THAT HAVE SUB-PAR SOILS SHALL BE SUPPLEMENTED WITH TOP SOIL, AS DIRECTED BY THE DESIGN REPRESENTATIVE.

STONE ALONG ABANDONED PORTIONS OF ACCESS DRIVE SHALL BE HARVESTED AND USED IN PROPOSED STREAM SRUCTURES. FINISHED GRADE SHALL HAVE A SMOOTH TRANSITION FROM NEWLY GRADED SURFACE TO EXISTING GRADE. SEED AND STRAW ALL DISTURBED AREAS.

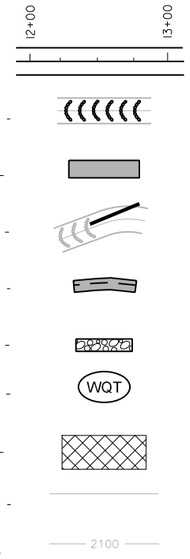
HARVEST STREAM BED MATERIAL BEFORE FILLING EXISTING OFFLINE STREAM SECTIONS. HARVESTED GRAVEL MATERIAL TO BE STOCK-PILED AND USED IN NEW STREAM BED AND STRUCTURES. BEFORE HARVESTING BED MATERIAL, ENSURE THAT HARVEST LOCATIONS ARE OFFLINE WITH NO FLOWING WATER AND NO FUTURE FLOW WILL BE REESTABLISHED.

ALL EXISTING FENCING, UNUSED CULVERTS AND STRUCTURES WITHIN PROPOSED CONSERVATION EASEMENT TO BE REMOVED.

TREE CLEARING WILL BE LIMITED TO OCTOBER 15-APRIL 1, DUE TO NLEB.

CULVERTS, HEADWALLS, AND RELATED CROSSING MATERIALS MUST BE CONSTRUCTED WITHIN THE CONSERVATION EASEMENT BREAK.

PROJECT LEGEND:



Proposed Thalweg w/Approximate Bankfull Limits

Proposed Cascade Riffle

Proposed Riffle Enhancement

Proposed Log Vane

Proposed Live Lift

Stabilized Rock Outlet

Water Quality Treatment Area

Existing Channel to be Filled

Minor Contour Line (1ft.)

Major Contour Line (5ft.)

CONTROL POINTS:

POINT	NORTHING	EASTING	ELEV.
1	697698.890	885882.710	2278.150
2	697136.880	885326.980	2361.270
101	696898.570	887920.770	2202.810
102	697362.900	887449.300	2217.390
103	696781.210	888633.210	2199.810
104	696826.670	887706.700	2223.630
105	696898.570	887920.770	2202.520
106	696914.550	887410.070	2251.290
107	696930.260	887225.990	2264.750
108	696920.840	887061.030	2277.100
109	696902.750	886542.400	2276.730
110	696978.070	886693.080	2270.230
113	698242.590	886931.190	2243.190
114	698193.950	886480.990	2250.870
200	697675.660	886048.450	2271.700
201	697269.900	885824.800	2302.630
202	697393.980	885592.920	2311.940
203	697202.070	885215.470	2356.560
258	697255.550	885859.830	2303.170
262	696711.600	884716.190	2458.720
263	696597.690	884536.260	2508.260
264	696456.880	884367.570	2555.760
265	696293.600	884147.400	2601.420
266	696227.420	883870.290	2646.490
267	696205.500	883749.710	2648.320
268	696271.820	883860.080	2628.160
269	696389.610	883956.980	2604.100
271	696720.490	884233.940	2540.850
272	696866.810	884426.830	2501.190
273	696956.070	884563.300	2462.870
274	697057.030	884744.140	2427.360
275	697197.270	884876.060	2385.430
276	697353.290	885072.390	2357.370
277	697265.050	885262.460	2346.010
400	697438.630	887271.180	2228.240
401	697415.630	887603.600	2211.360
700	697015.510	888610.190	2206.430
701	697060.530	888538.590	2205.740
702	697127.650	888509.740	2205.360
703	697160.680	888489.830	2213.430
704	697234.570	888432.380	2218.330
705	697582.730	888345.660	2235.850
706	697740.010	888484.730	2236.690
707	697903.160	888443.530	2240.790
708	698199.040	888553.530	2252.660
711	698000.730	885121.930	2331.190
712	698031.300	884504.570	2381.200
801	697889.060	884049.130	2394.720
802	697937.560	883614.440	2440.640
804	697937.770	883355.120	2471.310
805	697914.190	883116.410	2500.630
806	697901.290	882951.670	2512.030
807	697798.910	882641.150	2542.340
808	697728.690	882333.410	2576.480
810	697759.290	882016.600	2601.420
811	697685.000	881722.210	2630.750
813	697506.300	881316.000	2673.860
814	697269.430	881066.420	2710.080

NORTH CAROLINA PROFESSIONAL SEAL 040899 ENGINEER KRISTIN E. KNIGHT
05-24-2024

REVISIONS

	DATE	DESCRIPTION	SYM.
A	MAY 2024	REVISIONS PER IRT COMMENTS	

NORTH CAROLINA
Environmental Quality

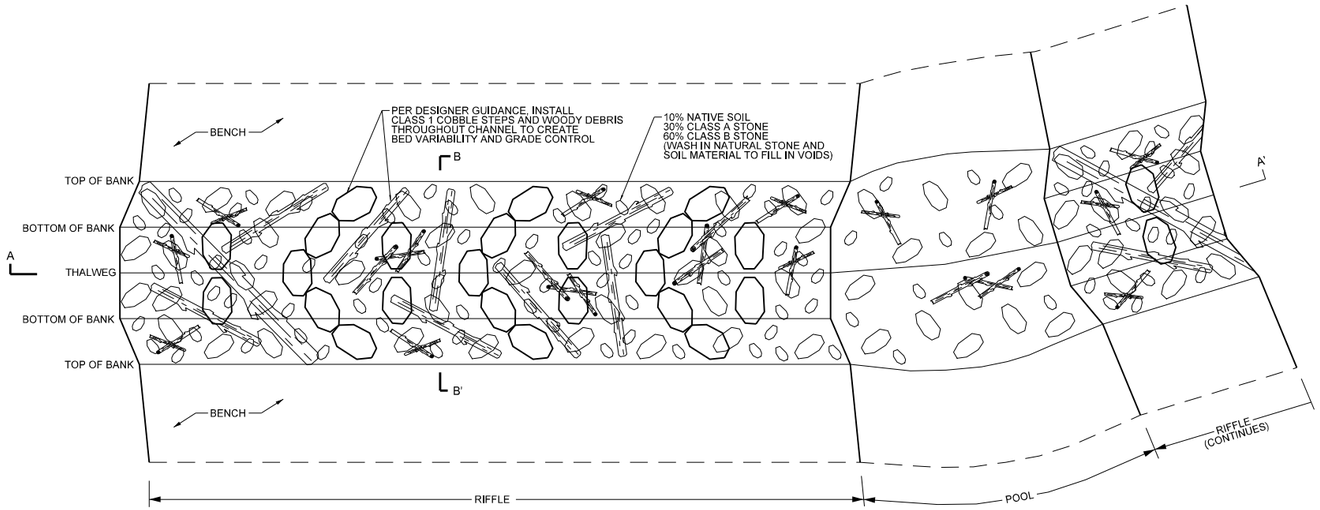
KCI ASSOCIATES OF NC
ENGINEERS • PLANNERS • SCIENTISTS
4505 FALLS OF NEUSE ROAD, SUITE 400
RALEIGH, NORTH CAROLINA 27609

MORGAN BRANCH
RESTORATION SITE
BUNCOMBE COUNTY, NORTH CAROLINA

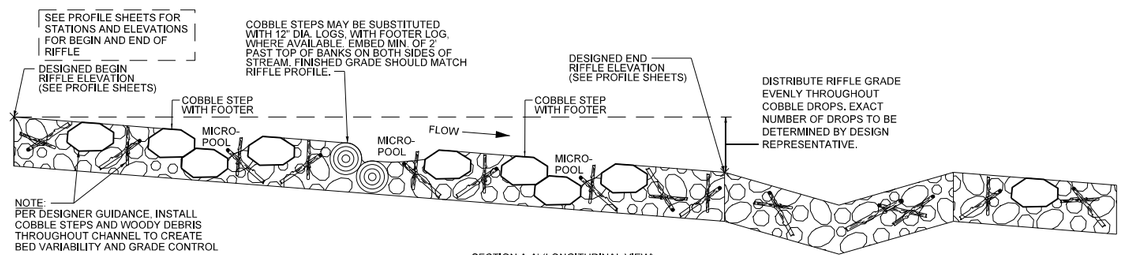
DATE: MAY 2024
SCALE: N.T.S.

GENERAL NOTES & PROJECT LEGEND

SHEET DT1



PLAN VIEW



SECTION A-A' (LONGITUDINAL VIEW)

NOTES:

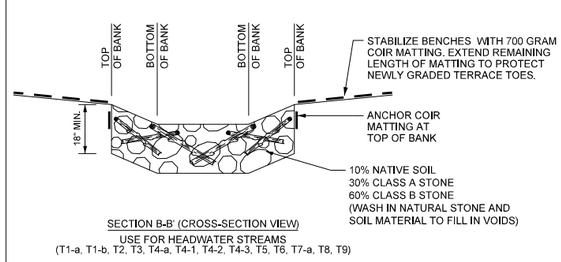
START BY INSTALLING STONE / SOIL / WOOD MIXTURE. FINISH BY WASHING IN NATURAL STREAM BED MATERIAL TO FILL IN VOIDS AND OBTAIN FINAL GRADE. ENSURE THAT THE MIXTURE IS WELL PACKED TO MINIMIZE WATER PIPING.

INSTALL COIR MATTING THROUGHOUT ENTIRE LENGTH OF CHANNEL, STAKE AT 3' CENTERS.

COBBLE STEPS MAY BE SUBSTITUTED WITH 12" DIA. LOGS, WITH FOOTER LOG, WHERE AVAILABLE. EMBED MIN. OF 2' PAST TOP OF BANKS ON BOTH SIDES OF STREAM. FINISHED GRADE SHOULD MATCH RIFFLE PROFILE.

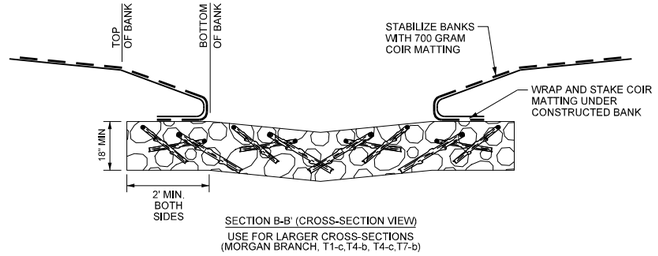
SEE TYPICAL CROSS-SECTION SHEETS FOR EXACT DIMENSIONS OF STRUCTURE CROSS-SECTION.

BOULDERS ONLY USED IN LOCATIONS SHOWN IN PLAN VIEW AND AT THE END OF EACH CULVERT.



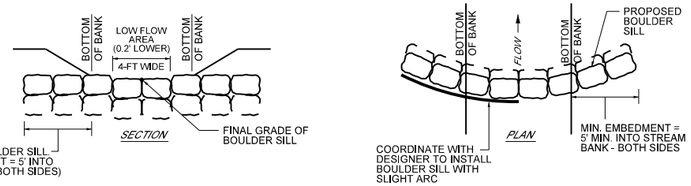
SECTION B-B' (CROSS-SECTION VIEW)

USE FOR HEADWATER STREAMS
(T1-a, T1-b, T2, T3, T4-a, T4-1, T4-2, T4-3, T5, T6, T7-a, T8, T9)



SECTION B-B' (CROSS-SECTION VIEW)

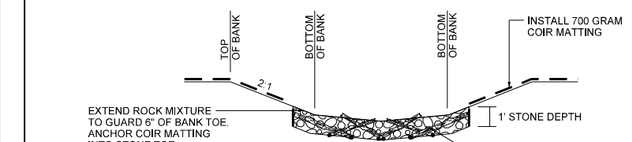
USE FOR LARGER CROSS-SECTIONS
(MORGAN BRANCH, T1-c,T4-b, T4-c,T7-b)



* NOTE:
FOOTER BOULDER CAN BE ELIMINATED IF BOULDER HEIGHT IS 2-FT OR MORE.

CASCADE RIFFLE

SCALE: NTS



SECTION

STONE INSTALLATION:

START BY INSTALLING STONE / SOIL MIXTURE. FINISH BY WASHING IN NATURAL STREAM BED MATERIAL TO FILL IN VOIDS AND OBTAIN FINAL GRADE. ENSURE THAT THE MIXTURE IS WELL PACKED TO MINIMIZE WATER PIPING.

SEE CROSS-SECTION SHEET FOR EXACT DIMENSIONS.

NOTE:
PER DESIGNER DIRECTION INTERSPERSE RIFFLE WITH WOODY DEBRIS.

RIFFLE ENHANCEMENT

SCALE: NTS

NOTES:

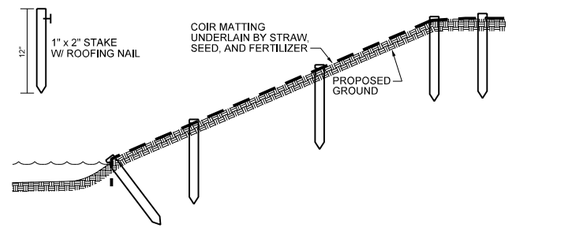
MATTING SHALL BE INSTALLED PRIOR TO THE INTRODUCTION OF WATER TO A STREAM SECTION.

NOTE THAT COIR MATTING IS ALREADY INCORPERATED INTO STREAM STRUCTURE DETAILS. THIS DETAIL IS MEANT TO SHOW HOW TO INSTALL COIR MATTING ALONG SECTIONS OF NEWLY GRADED STREAMS THAT DO NOT HAVE STRUCTURES PROPOSED.

ALL NEWLY GRADED BANKS SHALL BE PROTECTED WITH COIR MATTING. SEED AND STRAW WILL BE INSTALLED PRIOR TO LAYING OUT MATTING.

COIR MATTING SHALL EXTEND FROM TOE OF SLOPE TO THE TOP OF BANK. ANY BANKS WITH EXTRA MATTING LENGTH WILL BE USED TO PROTECT THE BENCH.

COORDINATE WITH DESIGNER TO DETERMINE EXTENTS OF COIR MATTING ALONG INNER BENDS OF POOL LOCATIONS.



COIR MATTING

SCALE: NTS

NORTH CAROLINA PROFESSIONAL SEAL 040899 ENGINEER KRISTIN E. KNIGHT
05-24-2024

DATE	DESCRIPTION	SYM.
MAY 2024	REVISIONS PER IRT COMMENTS	A

REVISIONS

NORTH CAROLINA *Environmental Quality*

KCI ASSOCIATES OF NC
ENGINEERS • PLANNERS • SCIENTISTS
4505 FALLS OF NEUSE ROAD, SUITE 400
RALEIGH, NORTH CAROLINA 27609

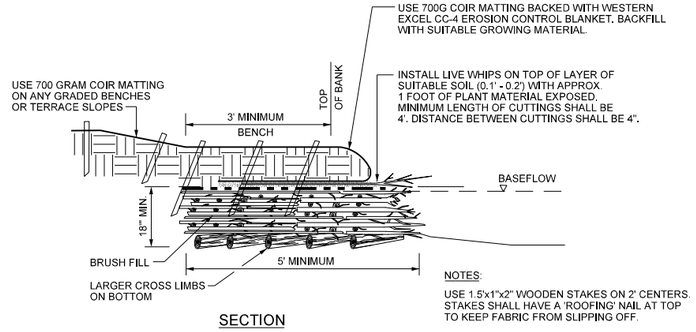
MORGAN BRANCH RESTORATION SITE

BUNCOMBE COUNTY, NORTH CAROLINA

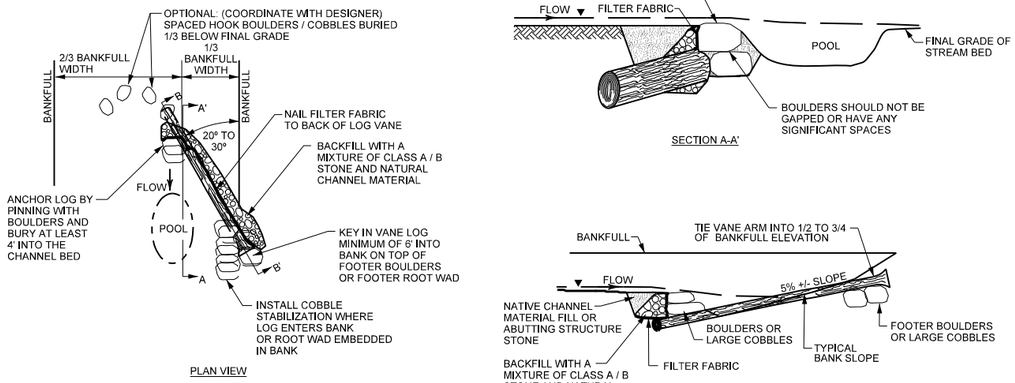
DATE: MAY 2024
SCALE: N.T.S.

DETAILS

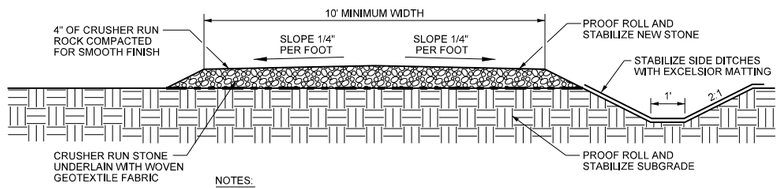
SHEET DT2



LIVE LIFT
SCALE: NTS



LOG VANE
SCALE: NTS

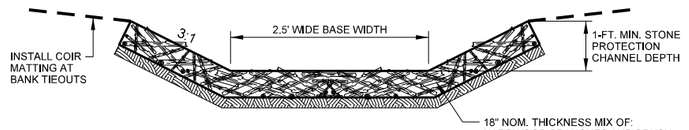


NOTES:

IF ACCESS DRIVE IS CUT INTO A STEEP SLOPE, A DRAINAGE DITCH WILL BE PROVIDED AT THE UPSLOPE SIDE OF THE ROAD ONLY. DITCH WATER WILL BE CONVEYED TO A STABLE OUTLET AT A LOW POINT IN THE TOPOGRAPHY AND CONVEYED VIA CULVERT ACROSS THE ACCESS DRIVE. WATER-BARS MAY ALSO BE EMPLOYED ALONG THE ACCESS DRIVE TO MINIMIZE CONCENTRATED FLOW AND TO DIRECT SHEET FLOWS TO STABLE LOCATIONS ALONG THE ACCESS DRIVE.

SEE 'SITE PLAN' SHEETS TO DETERMINE WHICH SIDE OF THE ROAD THE STABILIZED DITCH WILL BE INSTALLED ALONG.

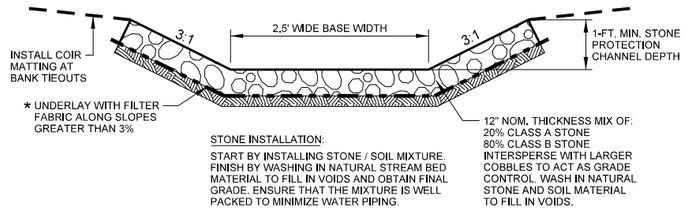
STABILIZED ACCESS DRIVE
SCALE: NTS



STONE INSTALLATION:

ENSURE THAT THE MIXTURE IS WELL PACKED TO MINIMIZE WATER PIPING.

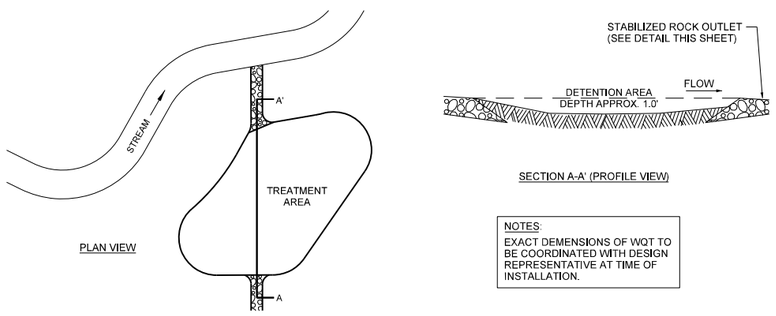
STABILIZED WOOD OUTLET (FOR WETLAND AREAS)
SCALE: NTS



STONE INSTALLATION:

START BY INSTALLING STONE / SOIL MIXTURE. FINISH BY WASHING IN NATURAL STREAM BED MATERIAL TO FILL IN VOIDS AND OBTAIN FINAL GRADE. ENSURE THAT THE MIXTURE IS WELL PACKED TO MINIMIZE WATER PIPING.

STABILIZED ROCK OUTLET
SCALE: NTS



NOTES:

EXACT DEMENSIONS OF WQT TO BE COORDINATED WITH DESIGN REPRESENTATIVE AT TIME OF INSTALLATION.

WATER QUALITY TREATMENT AREA
SCALE: NTS

NORTH CAROLINA PROFESSIONAL SEAL 040899 ENGINEER KRISTIN E. KNIGHT
05-24-2024

	DATE	DESCRIPTION
A	MAY 2024	REVISIONS PER IRT COMMENTS

REVISIONS

NORTH CAROLINA *Environmental Quality*

KCI ASSOCIATES OF NC
ENGINEERS • PLANNERS • SCIENTISTS
4505 FALLS OF NEUSE ROAD, SUITE 400
RALEIGH, NORTH CAROLINA 27609

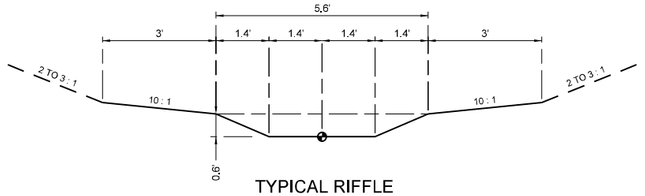
MORGAN BRANCH
RESTORATION SITE
BUNCOMBE COUNTY, NORTH CAROLINA

DATE: MAY 2024
SCALE: N.T.S.

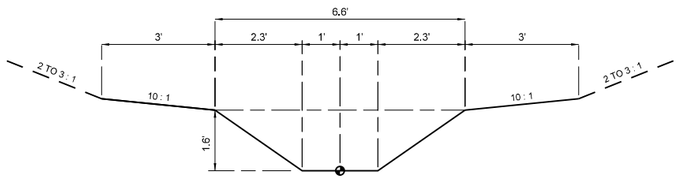
DETAILS

SHEET DT3

CROSS-SECTION A

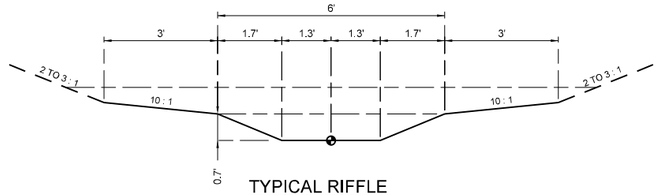


TYPICAL RIFFLE
= THALWEG LOCATION



TYPICAL POOL
= THALWEG LOCATION

CROSS-SECTION B



TYPICAL RIFFLE
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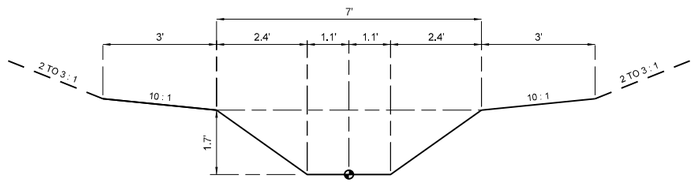
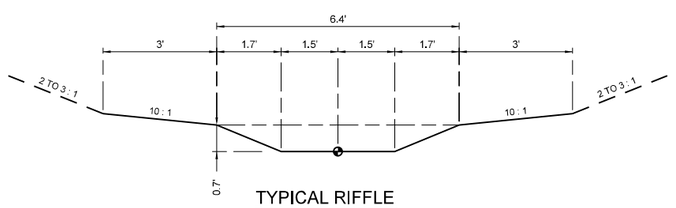


TYPICAL POOL
= THALWEG LOCATION

CROSS-SECTION C



TYPICAL RIFFLE
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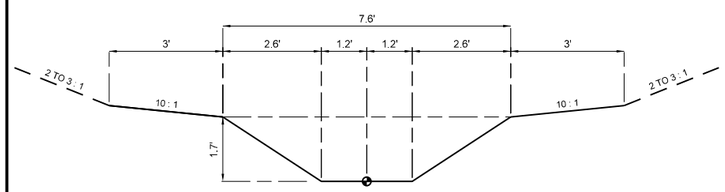
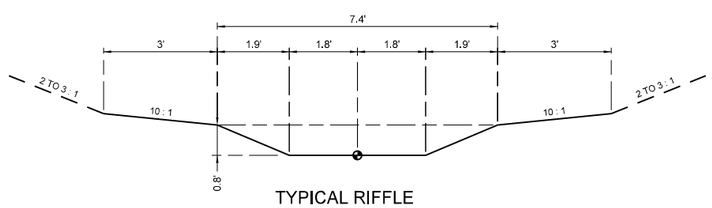
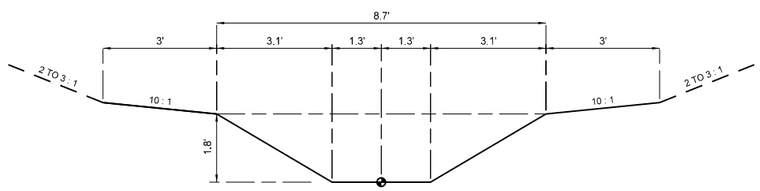


TYPICAL POOL
= THALWEG LOCATION

CROSS-SECTION D

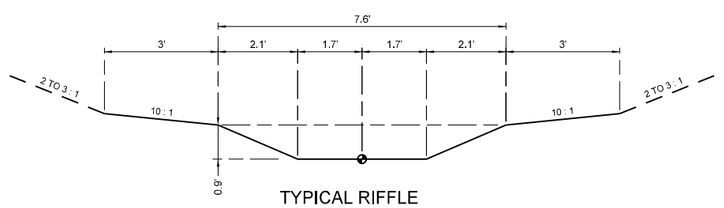


TYPICAL RIFFLE
= THALWEG LOCATION



TYPICAL POOL
= THALWEG LOCATION

CROSS-SECTION E



TYPICAL RIFFLE
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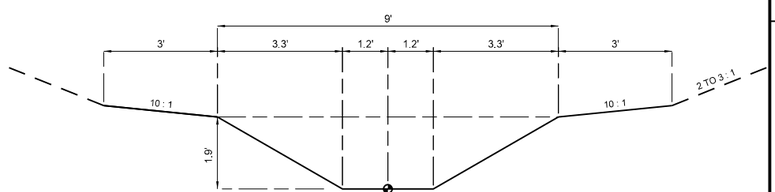


TYPICAL POOL
= THALWEG LOCATION

	XS A	XS B	XS C	XS D	XS E
T1	104+60 TO 106+66*		122+42 TO 123+25	123+25 TO 132+48	
T2	200+00 TO 207+25*				
T3	300+00 TO 314+46				
T4	400+00 TO 404+96	404+96 TO 413+31			413+31 TO 418+12
T4-1	450+71 TO 454+60				
T4-2	460+79 TO 471+21				
T4-3	480+00 TO 481+50				
T5	500+00 TO 518+36*				
T7	700+00 TO 709+22		709+22 TO 718+18		
T8	800+83 TO 804+25				
T9	900+00 TO 908+87				

*COORDINATE AREAS OF CROSS-SECTION APPLICATION WITH DESIGNER

NORTH CAROLINA PROFESSIONAL SEAL 040899 ENGINEER KRISTIN E. KNIGHT
05-24-2024

−2′ 0′ 2′ 4′
XS GRAPHIC SCALE

	DATE	DESCRIPTION
A	MAY 2024	REVISIONS PER IRT COMMENTS

REVISIONS

NORTH CAROLINA *Environmental Quality*

KCI ASSOCIATES OF NC
ENGINEERS • PLANNERS • SCIENTISTS
4505 FALLS OF NEUSE ROAD, SUITE 400
RALEIGH, NORTH CAROLINA 27609

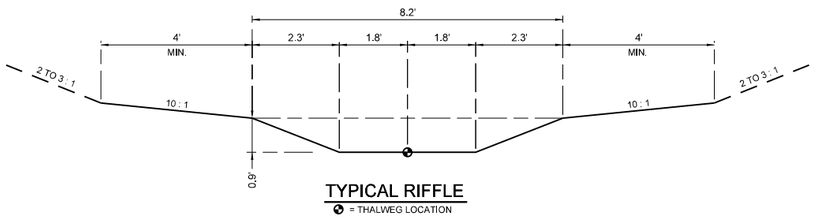
MORGAN BRANCH
RESTORATION SITE
BUNCOMBE COUNTY, NORTH CAROLINA

DATE: MAY 2024
SCALE: SEE SHEET

TYPICAL CROSS-SECTIONS

SHEET DT4

CROSS-SECTION F



TYPICAL RIFFLE
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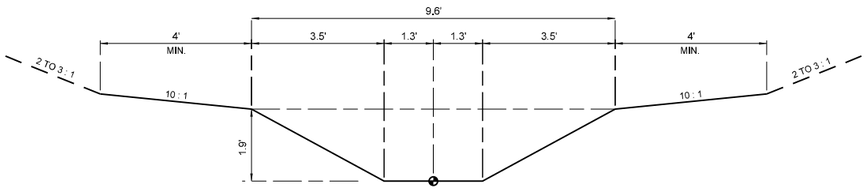
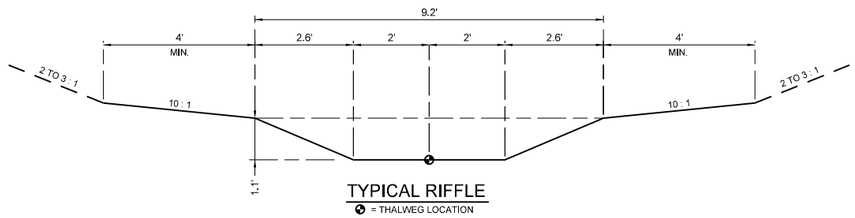
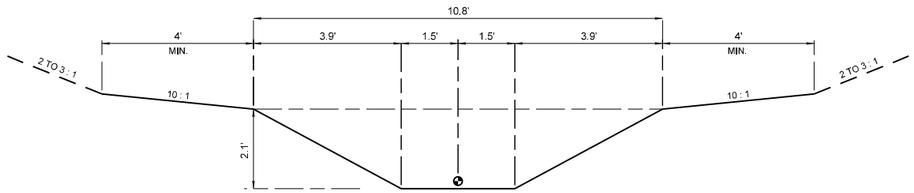


TYPICAL POOL
= THALWEG LOCATION

CROSS-SECTION G

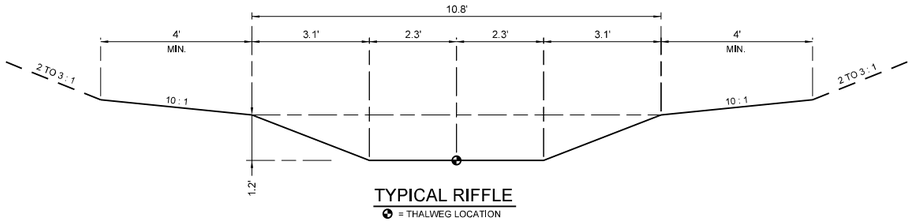


TYPICAL RIFFLE
= THALWEG LOCATION

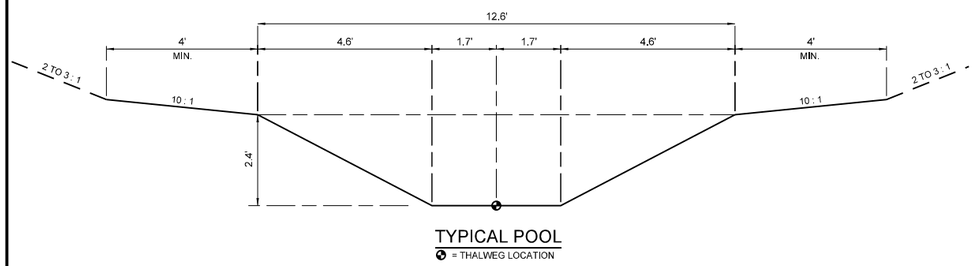


TYPICAL POOL
= THALWEG LOCATION

CROSS-SECTION H

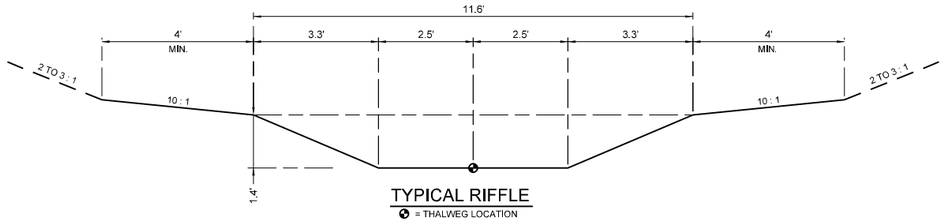


TYPICAL RIFFLE
= THALWEG LOCATION

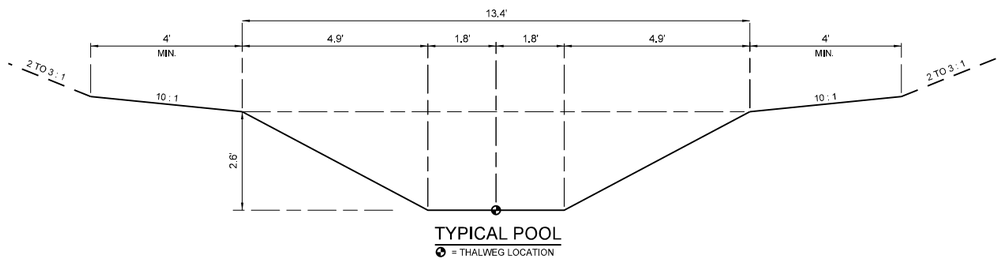


TYPICAL POOL
= THALWEG LOCATION

CROSS-SECTION I



TYPICAL RIFFLE
= THALWEG LOCATION



TYPICAL POOL
= THALWEG LOCATION

	XS F	XS G	XS H	XS I
MB	20+45 TO 21+50* 22+24 TO 23+60**	31+25 TO 32+87** 43+86 TO 49+07***	51+00 TO 65+61	65+61 TO 67+83

* COORDINATE AREAS OF CROSS-SECTION APPLICATION WITH DESIGNER
** CULVERT RELOCATION

NORTH CAROLINA PROFESSIONAL SEAL 040899 ENGINEER KRISTIN E. KNIGHT
05-24-2024

−2′ 0′ 2′ 4′
XS GRAPHIC SCALE

	DATE	DESCRIPTION
A	MAY 2024	REVISIONS PER IRT COMMENTS

REVISIONS

NORTH CAROLINA
Environmental Quality

KCI ASSOCIATES OF NC
ENGINEERS • PLANNERS • SCIENTISTS
4505 FALLS OF NEUSE ROAD, SUITE 400
RALEIGH, NORTH CAROLINA 27609

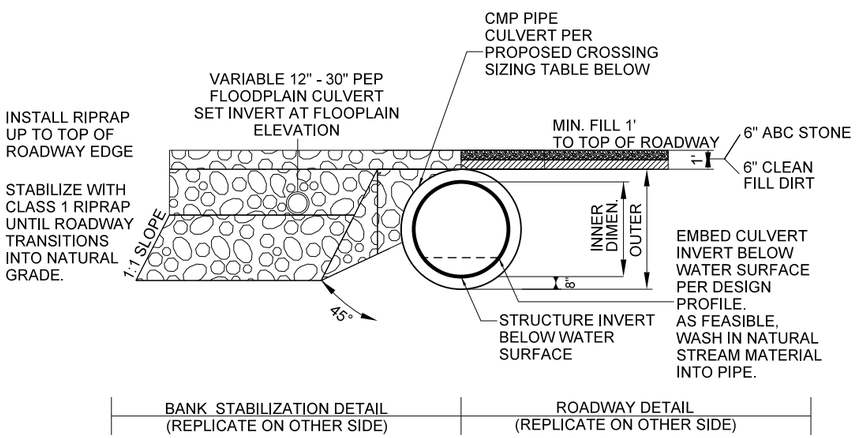
MORGAN BRANCH
RESTORATION SITE
BUNCOMBE COUNTY, NORTH CAROLINA

DATE: MAY 2024
SCALE: SEE SHEET

TYPICAL CROSS-SECTIONS

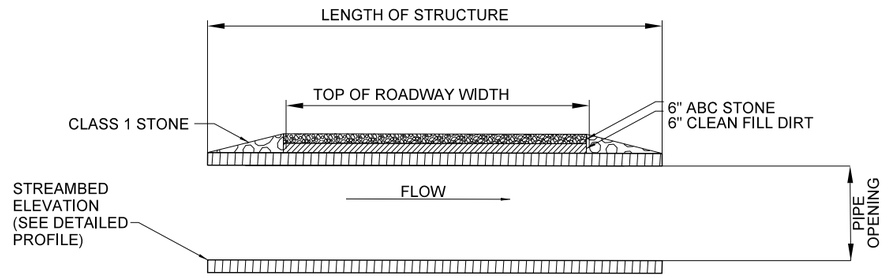
SHEET DT5

TYPICAL CROSSING - CROSS-SECTIONAL VIEW



UPSTREAM SECTION

TYPICAL CROSSING - PROFILE VIEW



PROFILE A-A' THROUGH PIPE

REACH	PIPE DIAM. (IN)	PIPE LENGTH (FT)	Upstream Pipe Station	Downstream Pipe Station	US PIPE INV (ft) (1 FT BELOW	DS PIPE INV (ft) (1 FT BELOW STREAMBED)	SEC. PIPE DIAM. (IN)	RDWY WIDTH (FT)
MB-1	60	28	22+89.48	23+17.48	2580.26	2577.60	24	10
MB-2	60	30	31+95.00	32+25.01	2498.27	2494.37	24	10
MB-2	60	30	44+42.54	44+72.54	2385.99	2383.93	30	10
MB-3	72	48	54+38.80	54+86.80	2313.51	2311.80	30	10
MB-3	72	30	57+90.39	58+20.39	2294.50	2293.20	30	15
T1-1	48	30	104+87.42	105+17.42	2605.43	2601.69	24	10
T1-2	60	24	122+16.70	122+40.70	2350.07	2347.83	24	10
T1-3	60	30	125+82.42	126+12.42	2313.00	2309.63	24	15
T1-3	60	30	131+07.73	131+37.73	2272.66	2269.94	24	10
T2-1	48	30	200+66.49	200+96.49	2415.25	2412.00	12	10
T2-2	48	28	205+80.56	206+08.56	2352.70	2348.69	24	10
T3	48	24	300+09.86	300+33.12	2364.53	2360.98	12	10
T3	48	30	305+24.15	305+54.15	2321.57	2318.15	12	15
T3	48	28	312+79.40	313+07.40	2270.05	2266.34	24	10
T4	48	30	402+84.44	403+14.41	2324.00	2320.32	12	10
T4	48	30	412+07.41	412+37.41	2257.18	2256.52	12	10
T4	48	30	414+59.17	414+89.17	2247.65	2246.55	24	10
T4-1	48	28	452+12.10	452+40.10	2338.03	2332.92	12	10
T4-2	48	30	460+97.56	461+27.56	2380.00	2374.34	12	10
T4-2	48	30	466+49.80	466+79.80	2300.10	2298.00	12	10
T4-2	48	30	470+34.74	470+64.74	2258.80	2256.51	12	10
T4-3	48	30	480+43.42	408+73.42	2252.80	2250.94	12	10
T5-2	48	30	504+98.54	505+28.54	2281.00	2278.00	12	10
T5-2	48	30	515+58.39	515+88.39	2223.03	2221.26	12	10
T7	48	30	709+22.41	709+52.41	2224.47	2222.77	12	10
T7	48	20	712+90.00	713+10.00	2214.32	2213.53	12	10
T8-2	48	30	802+80.13	803+10.13	2619.45	2617.34	12	10
T9	48	28	906+94.81	907+22.81	2705.59	2701.30	12	10

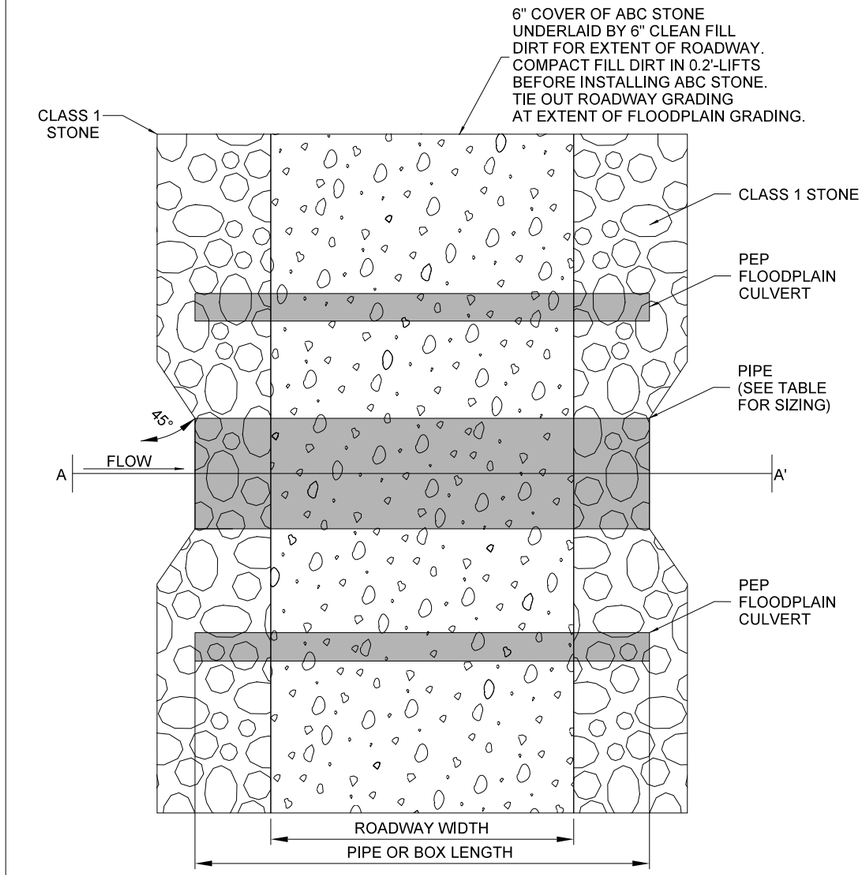
NOTES:

CULVERT THICKNESSES ASSUMED TO BE 8". ACTUAL THICKNESSES TO BE DETERMINED BY FABRICATOR.

DESIGN ROADWAY FILL IS A MINIMUM OF 1.0' AT ALL CROSSINGS.

IN LIEU OF WINGWALLS SEE RIPRAP PROTECTION/STABILIZATION.

TYPICAL CROSSING - PLANVIEW



NORTH CAROLINA PROFESSIONAL SEAL 040899 ENGINEER KRISTIN E. KNIGHT
05-24-2024

A	REVISIONS PER IRT COMMENTS		MAY 2024
SYM.	DESCRIPTION	REVISIONS	DATE

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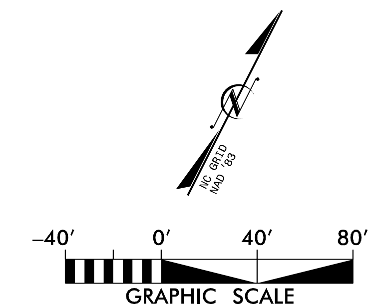
RALEIGH, NORTH CAROLINA 27609

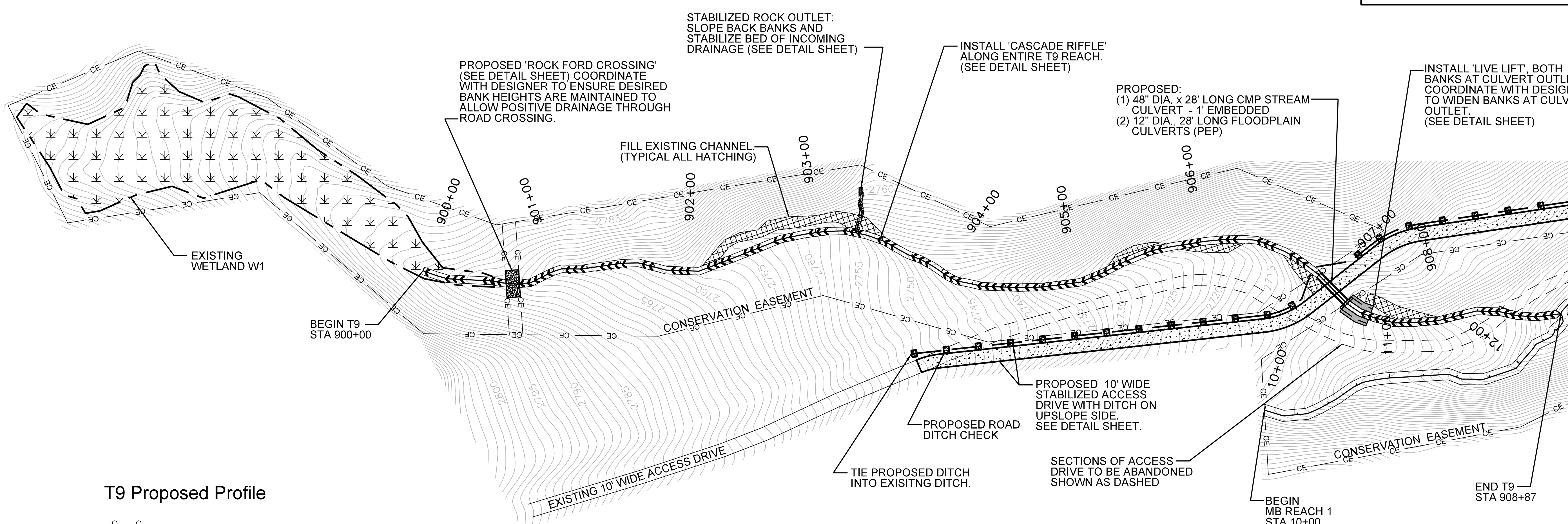
MORGAN BRANCH RESTORATION SITE
BUNCOMBE COUNTY, NORTH CAROLINA

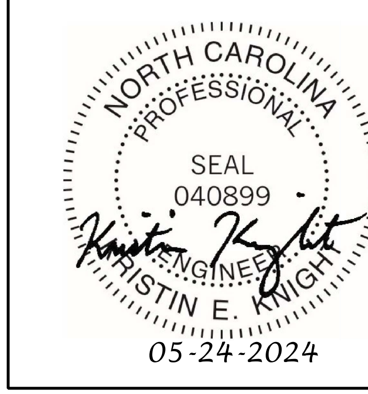
DATE: MAY 2024
SCALE: N.T.S.

CULVERT AND CROSSING DETAILS

SHEET DT6







SYM.	DESCRIPTION	DATE
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Environmental Quality

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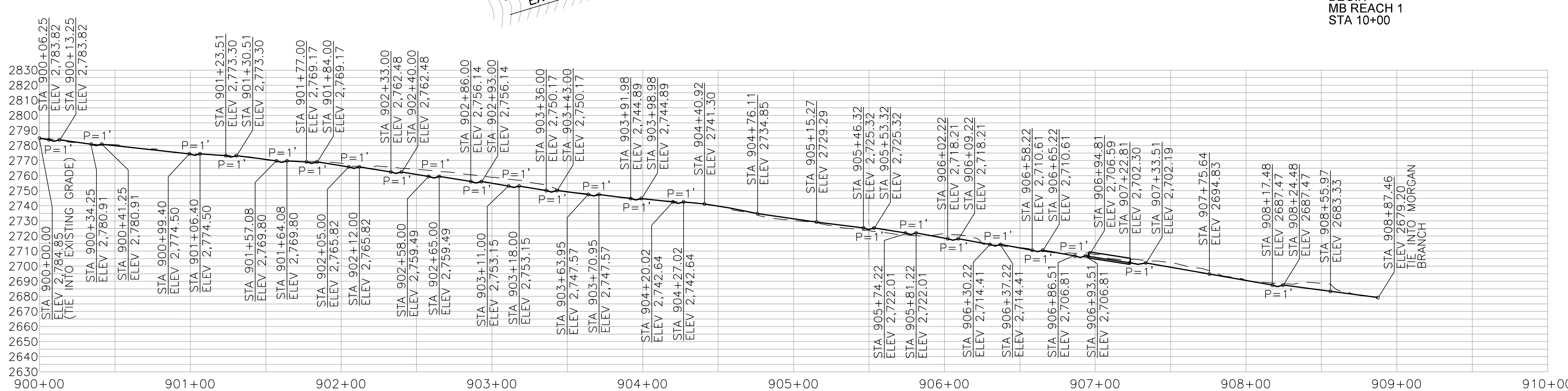
RALEIGH, NORTH CAROLINA 27609

T9 Proposed Profile



*P = POOL DEPTH

MORGAN BRANCH RESTORATION SITE

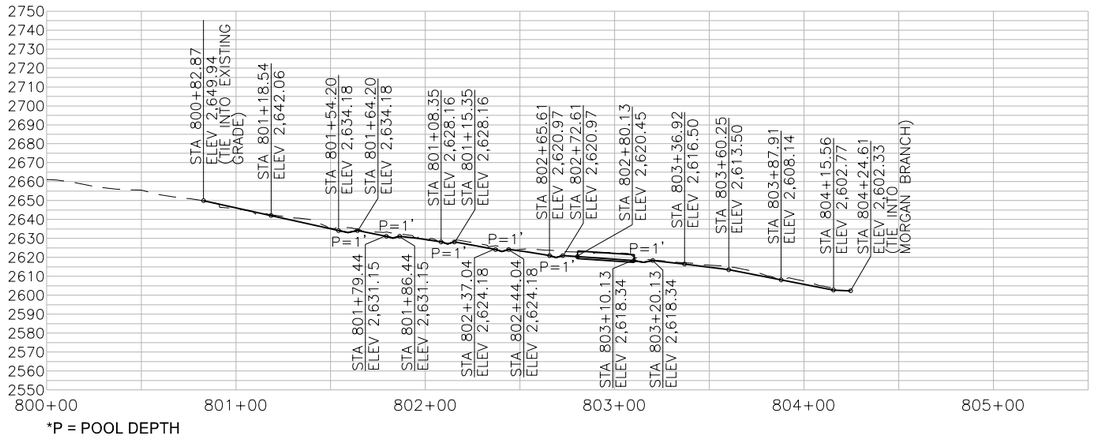
BUNCOMBE COUNTY, NORTH CAROLINA

DATE: MAY 2024
SCALE: GRAPHIC

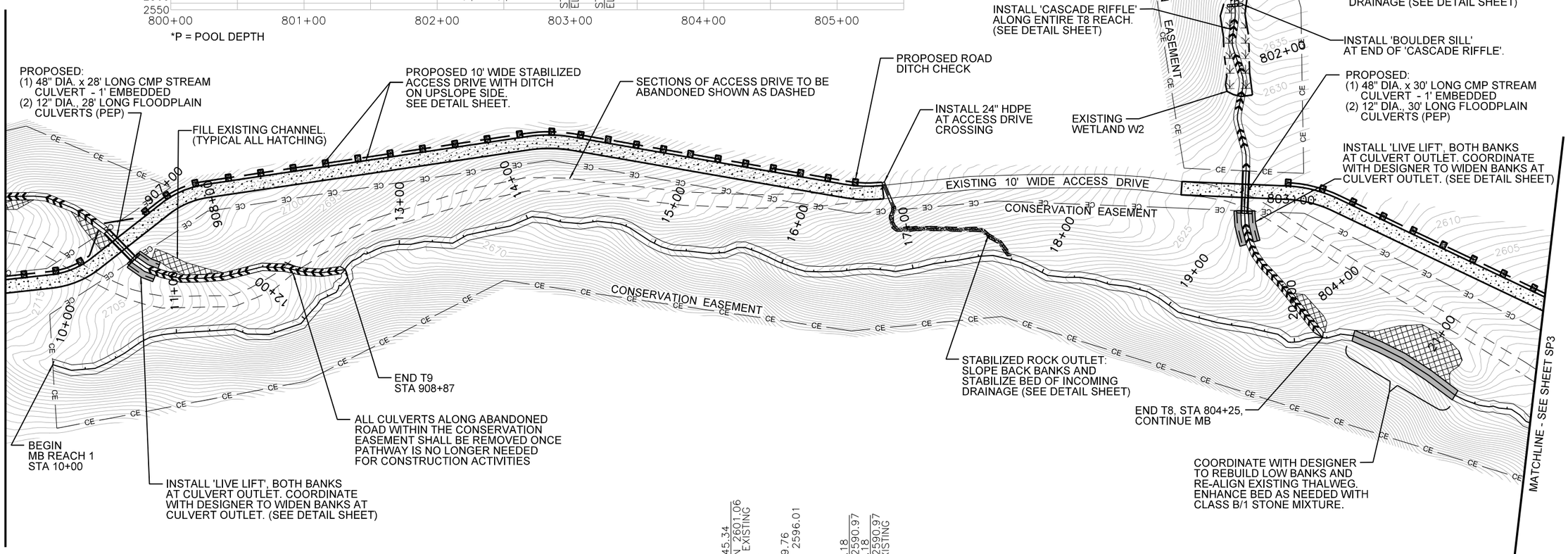
SITE PLAN

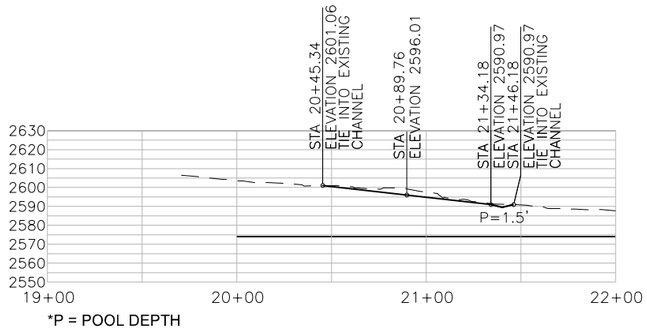
SHEET SP1

T8 PROPOSED PROFILE



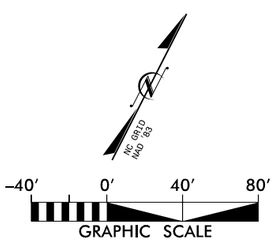
*P = POOL DEPTH





*P = POOL DEPTH

BEGIN MB REACH 1 PROPOSED PROFILE



NORTH CAROLINA PROFESSIONAL SEAL 040899 ENGINEER KRISTIN E. KNIGHT
05-24-2024

	DATE	DESCRIPTION
A	MAY 2024	REVISIONS PER IRT COMMENTS

REVISIONS

NORTH CAROLINA *Environmental Quality*

KCI ASSOCIATES OF NC
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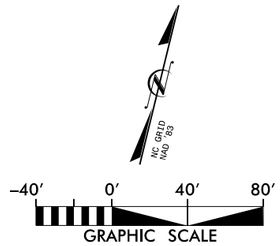
4505 FALLS OF NEUSE ROAD, SUITE 400
RALEIGH, NORTH CAROLINA 27609

MORGAN BRANCH
RESTORATION SITE
BUNCOMBE COUNTY, NORTH CAROLINA

DATE: MAY 2024
SCALE: GRAPHIC

SITE PLAN

SHEET SP2



	DATE	DESCRIPTION
A	MAY 2024	REVISIONS PER IRT COMMENTS

REVISIONS

SECTIONS OF ACCESS DRIVE TO BE ABANDONED SHOWN AS DASHED

ALL CULVERTS ALONG ABANDONED ROAD WITHIN THE CONSERVATION EASEMENT SHALL BE REMOVED ONCE PATHWAY IS NO LONGER NEEDED FOR CONSTRUCTION ACTIVITIES

RE-ALIGN APPROX. 60-FT OF STREAM PATH TO CONVEY FLOW THROUGH NEW CULVERT AT EASEMENT CROSSING. INSTALL 'CASCADE RIFFLE' WITH 'LIVE LIFT' BANKS (SEE DETAIL SHEET) * USE 2' X 2' X 3' (W x D x L) BOULDER STEPS.

FILL EXISTING CHANNEL (TYPICAL ALL HATCHING)

EXISTING CULVERT TO BE REMOVED AND RELOCATED

EXISTING SHED AND TROUGH INSIDE EASEMENT TO BE REMOVED

RE-ALIGN APPROX. 90-FT OF STREAM PATH TO CONVEY FLOW THROUGH NEW CULVERT AT EASEMENT CROSSING. INSTALL 'CASCADE RIFFLE' WITH 'LIVE LIFT' BANKS (SEE DETAIL SHEET) * USE 2' X 2' X 3' (W x D x L) BOULDERS STEPS.

MATCHLINE - SEE SHEET SP2

MATCHLINE - SEE SHEET SP4

CONSERVATION EASEMENT

CON. EASEMENT

CONTINUE MB

PROPOSED ROAD DITCH CHECK

PROPOSED STABILIZED ACCESS DRIVE WITH DITCH ON UPSLOPE SIDE. SEE DETAIL SHEET.

BEGIN MB REACH 2a STA 26+83

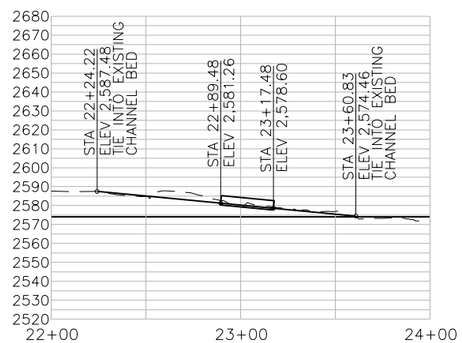
EXISTING ACCESS DRIVE

PROPOSED 10' WIDE STABILIZED ACCESS DRIVE (SEE DETAIL SHEET)

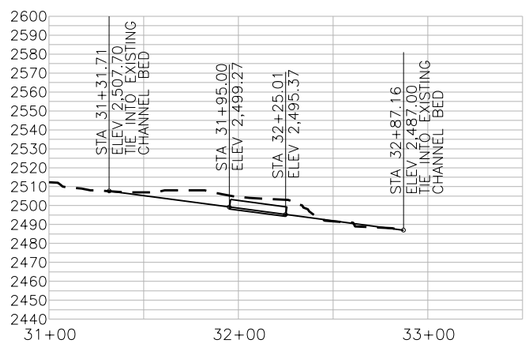
PROPOSED: (1) 60" DIA. x 28' LONG CMP STREAM CULVERT - 1' EMBEDDED (2) 24" DIA., 28' LONG FLOODPLAIN CULVERTS (PEP)

INSTALL 24" HDPE AT NEW ACCESS DRIVE CROSSING

PROPOSED: (1) 60" DIA. x 30' LONG CMP STREAM CULVERT - 1' EMBEDDED (2) 24" DIA., 30' LONG FLOODPLAIN CULVERTS (PEP)



MB PROPOSED PROFILE



MB PROPOSED PROFILE

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RALEIGH, NORTH CAROLINA 27609

NORTH CAROLINA
Environmental Quality

MORGAN BRANCH RESTORATION SITE

BUNCOMBE COUNTY, NORTH CAROLINA

DATE: MAY 2024

SCALE: GRAPHIC

SITE PLAN

SHEET SP3

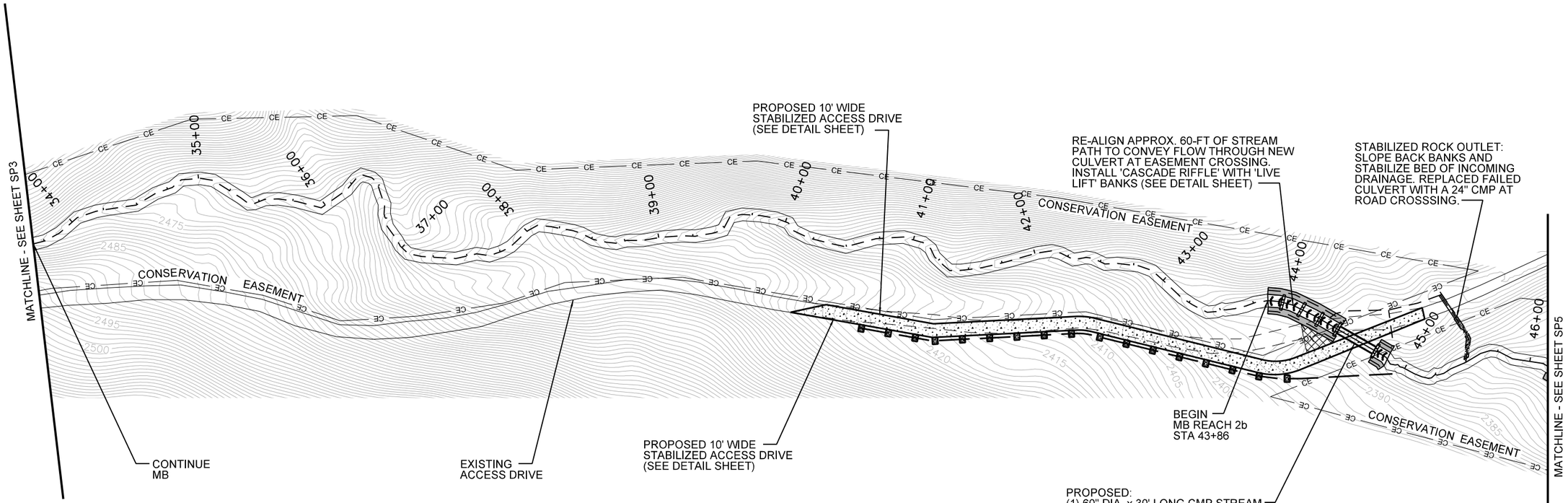
NC GRID NAD 83

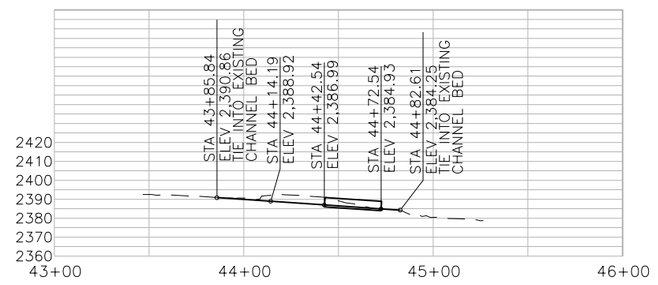
–40′ 0′ 40′ 80′

GRAPHIC SCALE

NORTH CAROLINA PROFESSIONAL SEAL 040899 ENGINEER KRISTIN E. KNIGHT

05-24-2024





MB REACH 2b PROPOSED PROFILE

A	REVISIONS PER IRT COMMENTS		MAY 2024
SYM.	DESCRIPTION	DATE	

REVISIONS

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RALEIGH, NORTH CAROLINA 27609

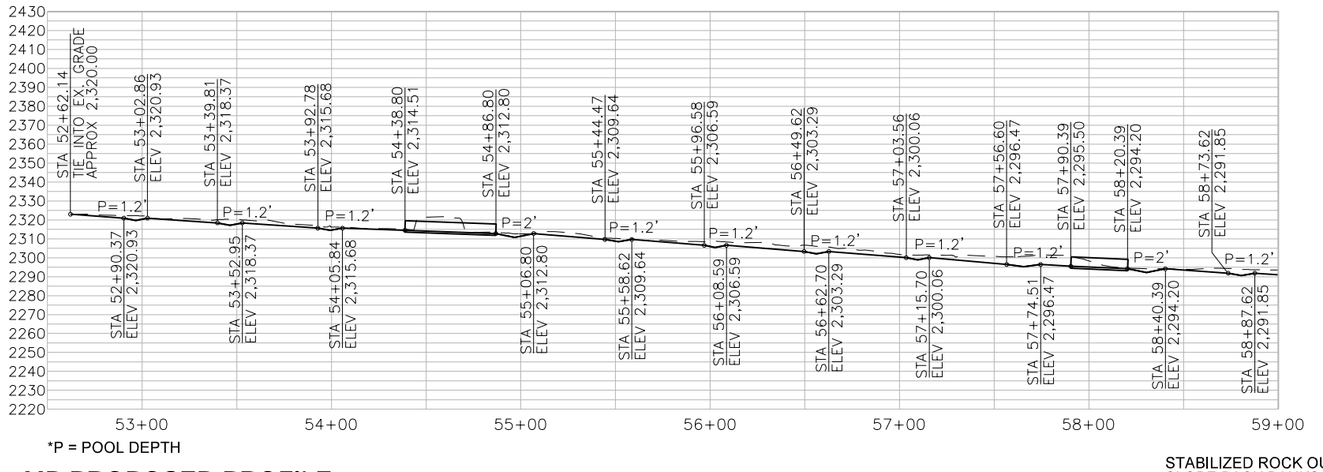
MORGAN BRANCH RESTORATION SITE

BUNCOMBE COUNTY, NORTH CAROLINA

DATE: MAY 2024
SCALE: GRAPHIC

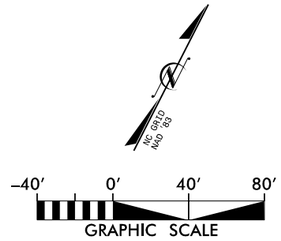
SITE PLAN

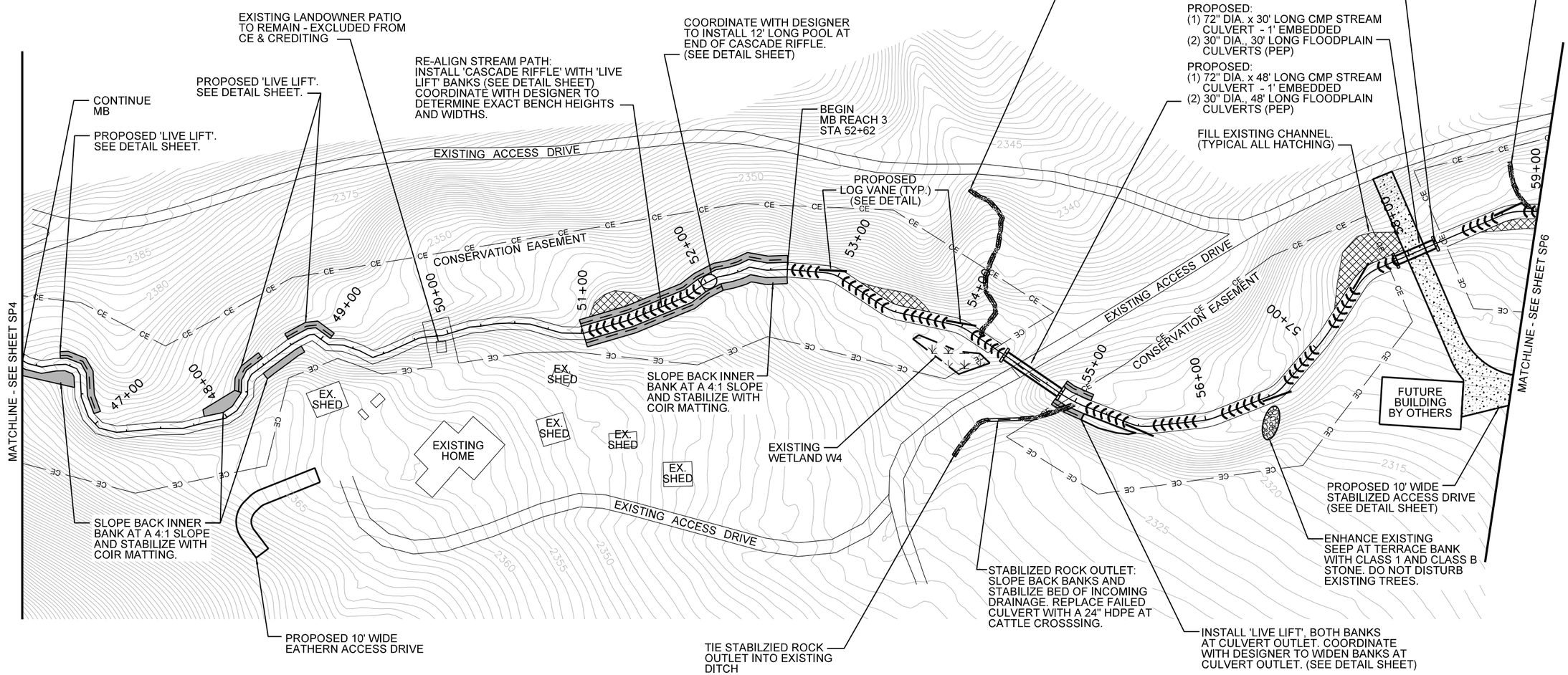
SHEET SP4



*P = POOL DEPTH

MB PROPOSED PROFILE





NORTH CAROLINA PROFESSIONAL SEAL 040899 ENGINEER KRISTIN E. KNIGHT
05-24-2024

	DATE	DESCRIPTION
A	MAY 2024	REVISIONS PER IRT COMMENTS

REVISIONS

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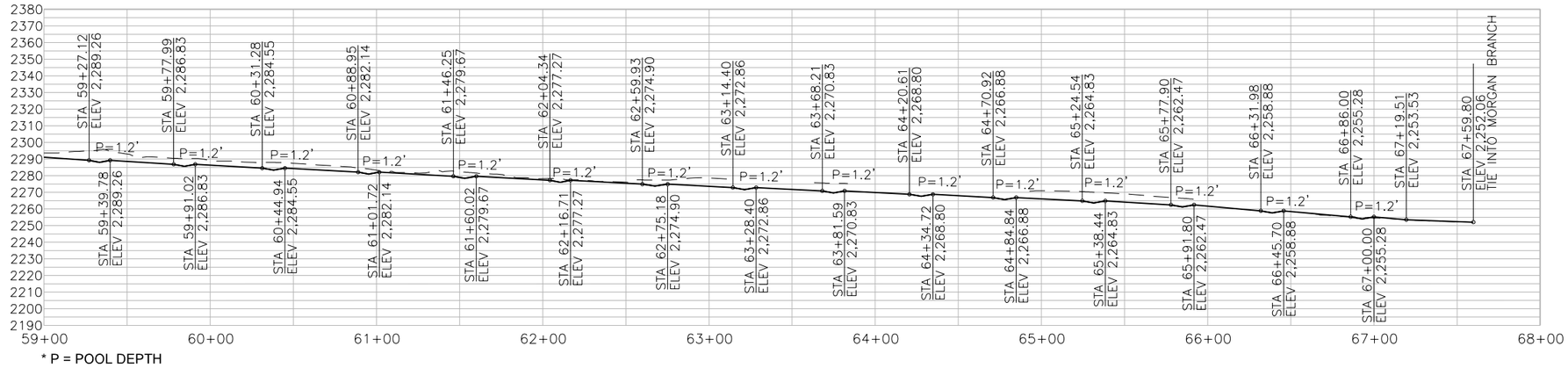
MORGAN BRANCH
RESTORATION SITE
BUNCOMBE COUNTY, NORTH CAROLINA

DATE: MAY 2024
SCALE: GRAPHIC

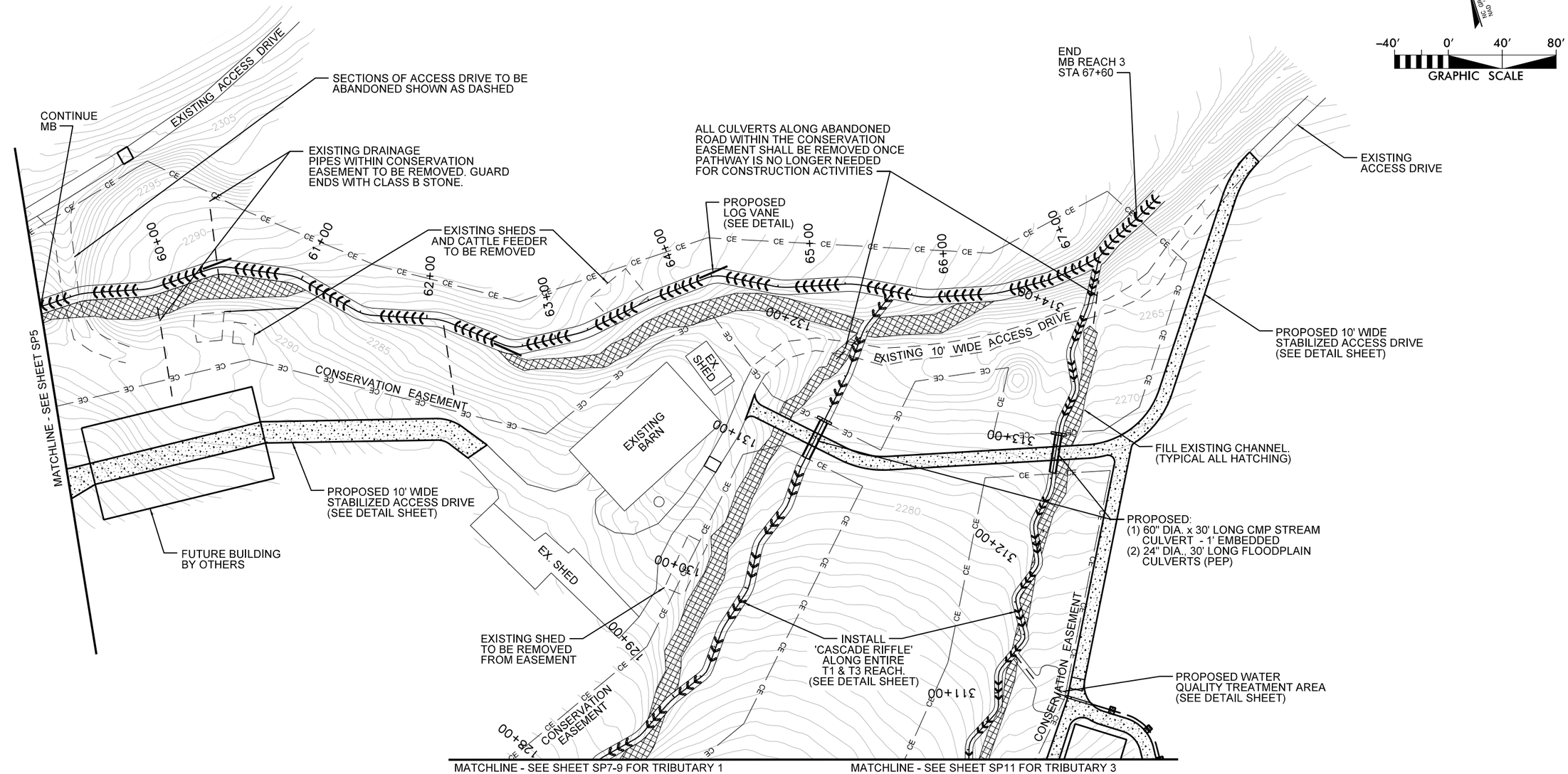
SITE PLAN

SHEET SP5

END OF MB PROPOSED PROFILE ABOVE CONFLUENCE OF T1 AND T3



* P = POOL DEPTH



NORTH CAROLINA PROFESSIONAL SEAL 040899 ENGINEER KRISTIN E. KNIGHT
05-24-2024

NORTH

–40′ 0′ 40′ 80′
GRAPHIC SCALE

A	REVISIONS PER IRT COMMENTS	MAY 2024
SYM.	DESCRIPTION	DATE

REVISIONS

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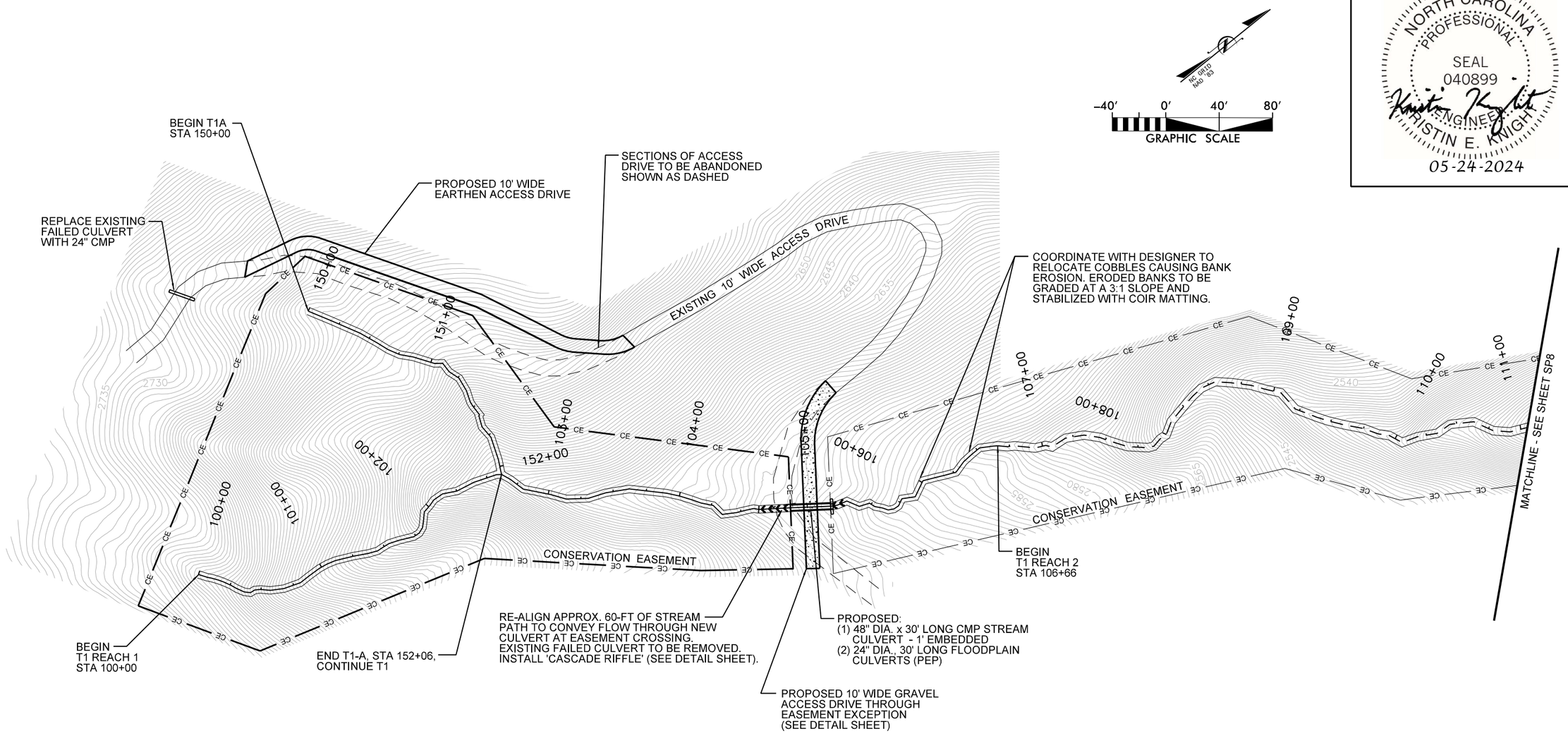
MORGAN BRANCH RESTORATION SITE

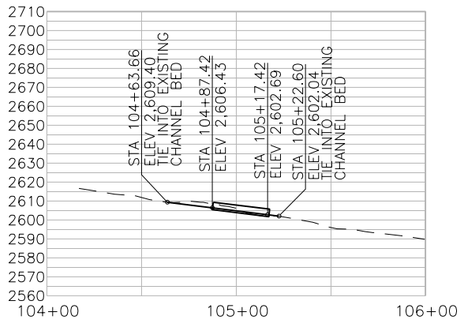
BUNCOMBE COUNTY, NORTH CAROLINA

DATE: MAY 2024
SCALE: GRAPHIC

SITE PLAN

SHEET SP6





T1 PROPOSED PROFILE

NORTH CAROLINA PROFESSIONAL SEAL 040899 ENGINEER KRISTIN E. KNIGHT
05-24-2024

	DATE	DESCRIPTION
A	MAY 2024	REVISIONS PER IRT COMMENTS

REVISIONS

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Environmental Quality

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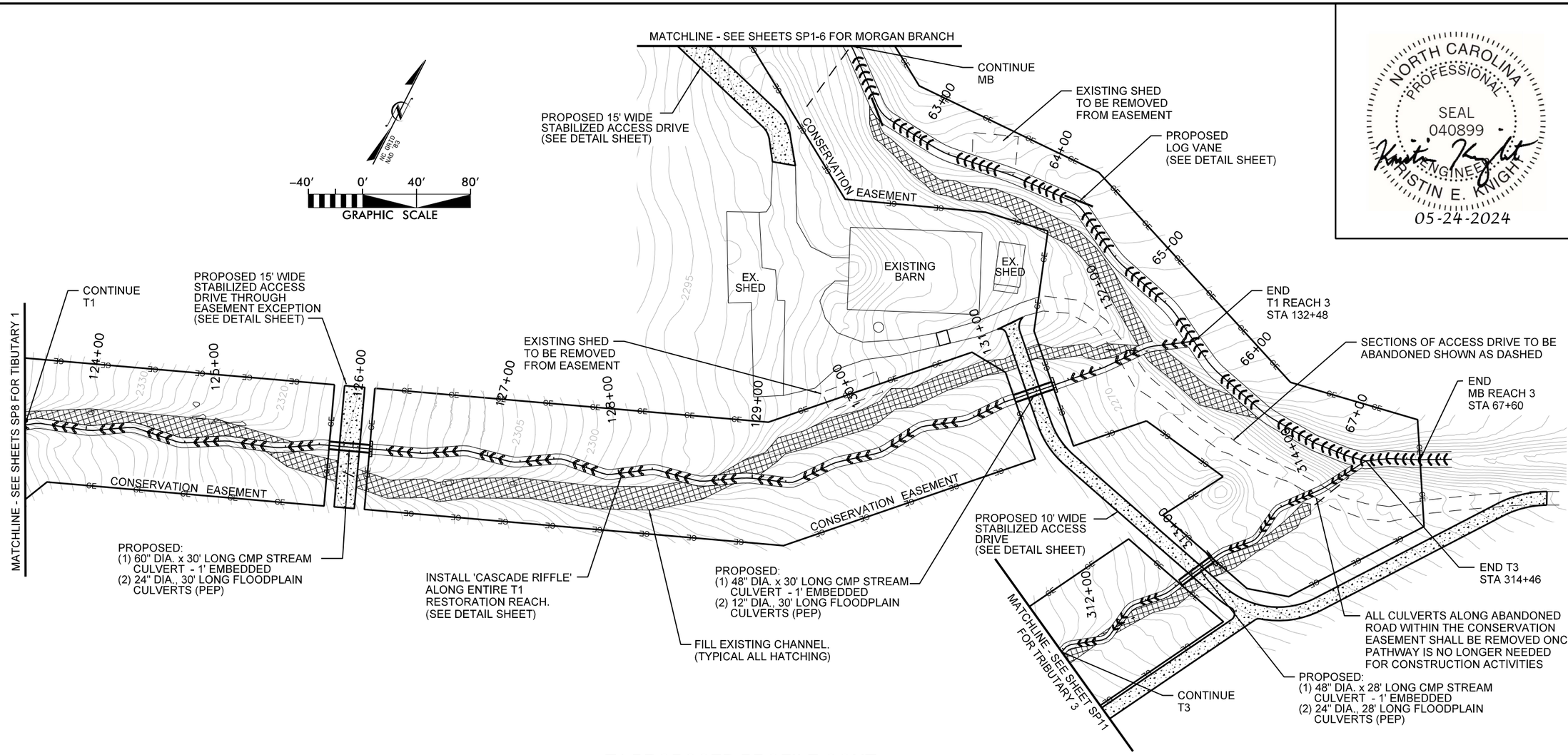
RALEIGH, NORTH CAROLINA 27609

MORGAN BRANCH
RESTORATION SITE
BUNCOMBE COUNTY, NORTH CAROLINA

DATE: MAY 2024
SCALE: GRAPHIC

SITE
PLAN

SHEET SP7



NORTH CAROLINA PROFESSIONAL SEAL 040899 ENGINEER KRISTIN E. KNIGHT
05-24-2024

	DATE	DESCRIPTION
A	MAY 2024	REVISIONS PER IRT COMMENTS

REVISIONS

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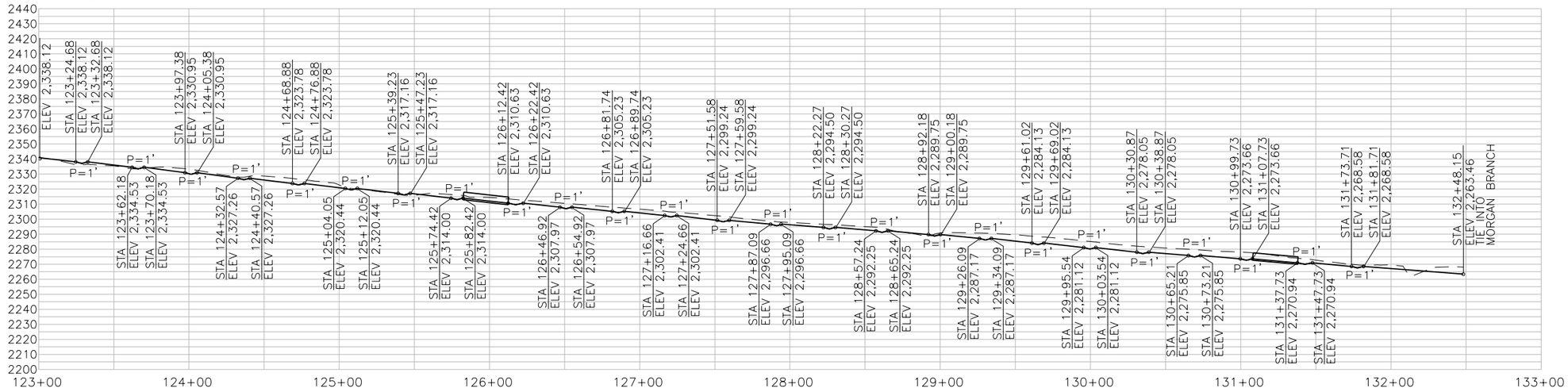
T1 PROPOSED PROFILE CONT.

* P = POOL DEPTH



MORGAN BRANCH
RESTORATION SITE
BUNCOMBE COUNTY, NORTH CAROLINA

DATE: MAY 2024
SCALE: GRAPHIC

SITE PLAN

SHEET SP9

NC GRID
NAD '83

–40′ 0′ 40′ 80′
GRAPHIC SCALE

NORTH CAROLINA PROFESSIONAL SEAL 040899 ENGINEER KRISTIN E. KNIGHT
05-24-2024

COORDINATE WITH DESIGNER TO LOWER THALWEG APPROX. 1FT AND ENHANCE LEFT BANK IN ORDER TO ELIMINATE HYDRAULIC TRESPASS CAUSED BY BOULDER OUTCROP. STABILIZE ANY GRADED BANKS WITH COIR MATTING.

PROPOSED 10' WIDE GRAVEL ACCESS DRIVE THROUGH EASEMENT EXCEPTION (SEE DETAIL SHEET)

BEGIN T2 REACH 1 STA. 200+00

PROPOSED:
(1) 48" DIA. x 30' LONG CMP STREAM CULVERT - 1' EMBEDDED
(2) 12" DIA., 30' LONG FLOODPLAIN CULVERTS (PEP)

ALL CULVERTS ALONG ABANDONED ROADS WITHIN THE CONSERVATION EASEMENT SHALL BE REMOVED ONCE PATHWAY IS NO LONGER NEEDED FOR CONSTRUCTION ACTIVITIES

BEGIN T2 REACH 2 STA. 203+26

INSTALL 'CASCADE RIFFLE' ALONG ENTIRE T2 RESTORATION REACH. (SEE DETAIL SHEET)

CONSERVATION EASEMENT

EROSION CAUSE BY CATTLE ACCESS TO BE GRADED AND STABILIZED WITH EXCELSIOR MATTING, SEED AND STRAW.

COORDINATE WITH DESIGNER TO RELOCATE COBBLE AND DEBRIS CLUSTERS CAUSING NEAR BANK STRESS. STABILIZE ANY GRADED . BANKS WITH COIR MATTING.

FUTURE BUILDING BY OTHERS

EXISTING HOME

EX. SHED

EX. SHED

PROPOSED:
(1) 48" DIA. x 28' LONG CMP STREAM CULVERT - 1' EMBEDDED
(2) 24" DIA., 28' LONG FLOODPLAIN CULVERTS (PEP)

MATCHLINE - SEE SHEETS SP7-9 FOR TRIBUTARY 1

CONTINUE T1

EXISTING ACCESS DRIVE

PROPOSED:
(1) 60" DIA. x 24' LONG CMP STREAM CULVERT - 1' EMBEDDED
(2) 24" DIA., 24' LONG FLOODPLAIN CULVERTS (PEP)

OVERWIDEN BANKS AT CONFLUENCE / POOL

CONTINUE T1

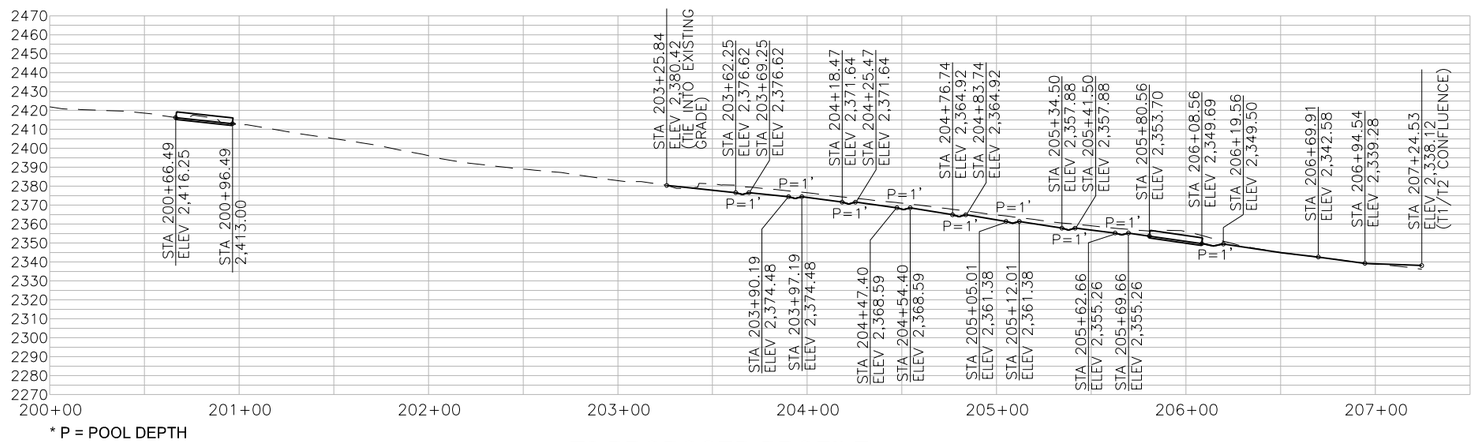
MATCHLINE - SEE SHEETS SP7-9 FOR TRIBUTARY 1

CONSERVATION EASEMENT

END T2, STA 207+25, CONTINUE T1

FILL EXISTING CHANNEL. (TYPICAL ALL HATCHING)

PROPOSED 10' WIDE GRAVEL ACCESS DRIVE THROUGH EASEMENT EXCEPTION (SEE DETAIL SHEET)



* P = POOL DEPTH

T2 PROPOSED PROFILE

A	REVISIONS PER IRT COMMENTS		MAY 2024
SYM.	DESCRIPTION	REVISIONS	DATE

NORTH CAROLINA
Environmental Quality

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MORGAN BRANCH
RESTORATION SITE
BUNCOMBE COUNTY, NORTH CAROLINA

DATE: MAY 2024
SCALE: GRAPHIC

SITE
PLAN

SHEET SP10

PROPOSED:
(1) 48" DIA. x 24' LONG CMP STREAM CULVERT - 1' EMBEDDED
(2) 12" DIA., 24' LONG FLOODPLAIN CULVERTS (PEP)

FILL EXISTING CHANNEL. (TYPICAL ALL HATCHING)

NC GRID NAD 83

–40′ 0′ 40′ 80′
GRAPHIC SCALE

BEGIN T3
STA 300+35

CONSERVATION EASEMENT

INSTALL 'CASCADE RIFFLE' ALONG ENTIRE T3 REACH. (SEE DETAIL SHEET)

PROPOSED 10' WIDE STABILIZED ACCESS DRIVE (SEE DETAIL SHEET)

EXISTING SHED INSIDE EASEMENT TO BE REMOVED

PROPOSED:
(1) 48" DIA. x 30' LONG CMP STREAM CULVERT - 1' EMBEDDED
(2) 12" DIA., 30' LONG FLOODPLAIN CULVERTS (PEP)

PROPOSED WATER QUALITY TREATMENT AREA (SEE DETAIL)

PROPOSED:
(1) 48" DIA. x 28' LONG CMP STREAM CULVERT - 1' EMBEDDED
(2) 12" DIA., 28' LONG FLOODPLAIN CULVERTS (PEP)

WQT

CONSERVATION EASEMENT

18" PIPE WITH RIPRAP STABILIZATION ON ENDS.

FUTURE BUILDING BY OTHERS

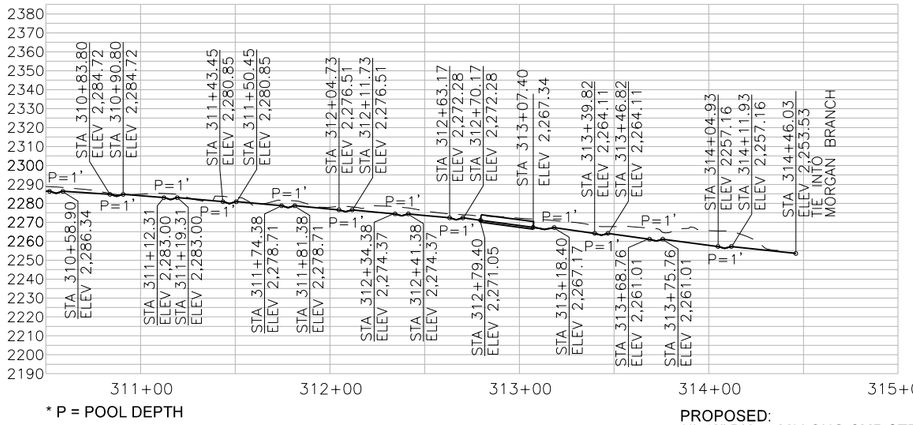
PROPOSED ROAD DITCH CHECK

ALL CULVERTS ALONG ABANDONED ROAD WITHIN THE CONSERVATION EASEMENT SHALL BE REMOVED ONCE PATHWAY IS NO LONGER NEEDED FOR CONSTRUCTION ACTIVITIES

PROPOSED 10' WIDE STABILIZED ACCESS DRIVE WITH DITCH.

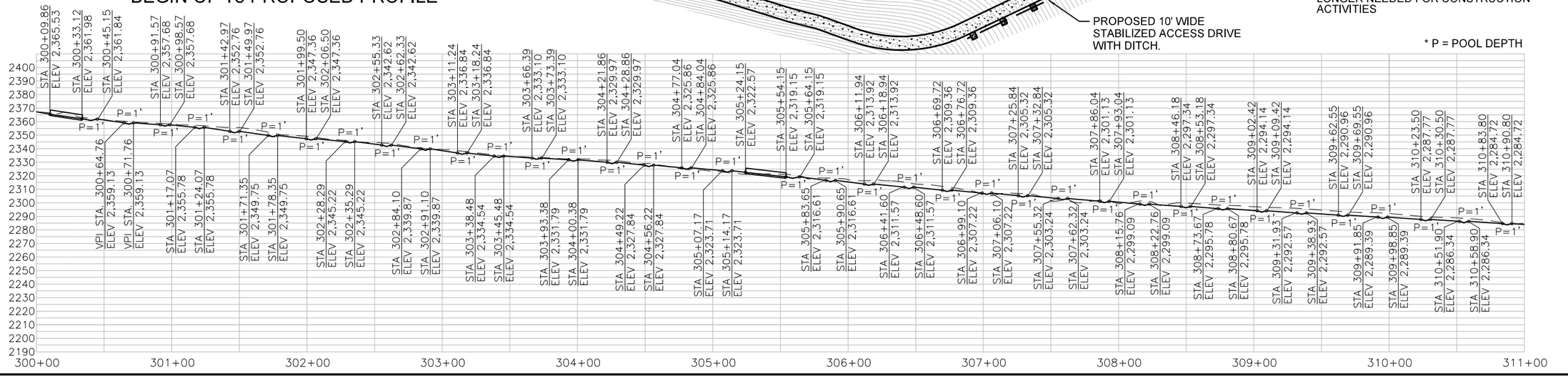
MATCHLINE - SEE SHEET SP9

T3 PROPOSED PROFILE CONT.



* P = POOL DEPTH

BEGIN OF T3 PROPOSED PROFILE



* P = POOL DEPTH

NORTH CAROLINA PROFESSIONAL SEAL 040899 ENGINEER KRISTIN E. KNIGHT
05-24-2024

	DATE	DESCRIPTION	SYM.
A	MAY 2024	REVISIONS PER IRT COMMENTS	

REVISIONS

NORTH CAROLINA *Environmental Quality*

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RALEIGH, NORTH CAROLINA 27609

MORGAN BRANCH RESTORATION SITE

BUNCOMBE COUNTY, NORTH CAROLINA

DATE: MAY 2024
SCALE: GRAPHIC

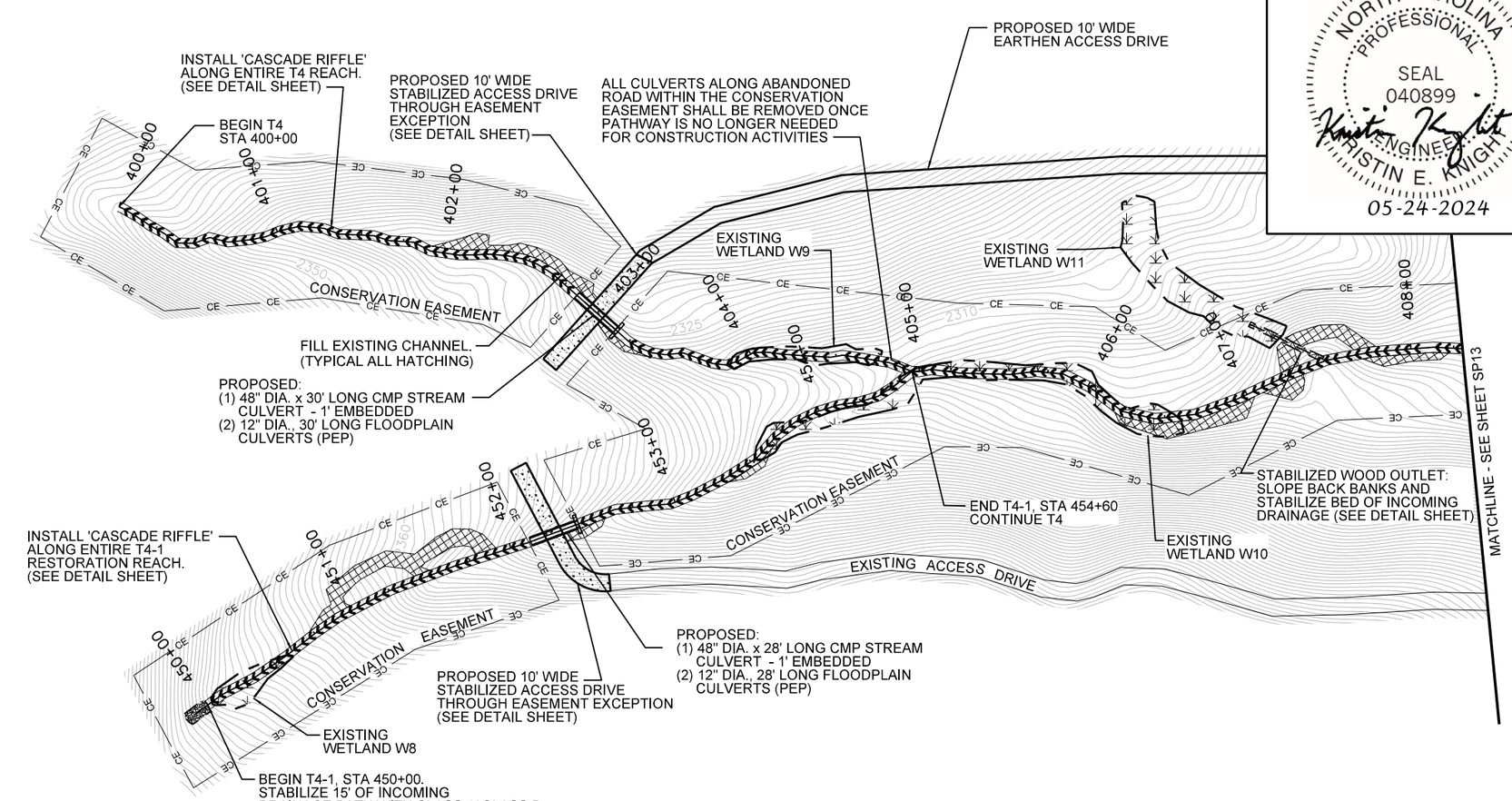
SITE PLAN

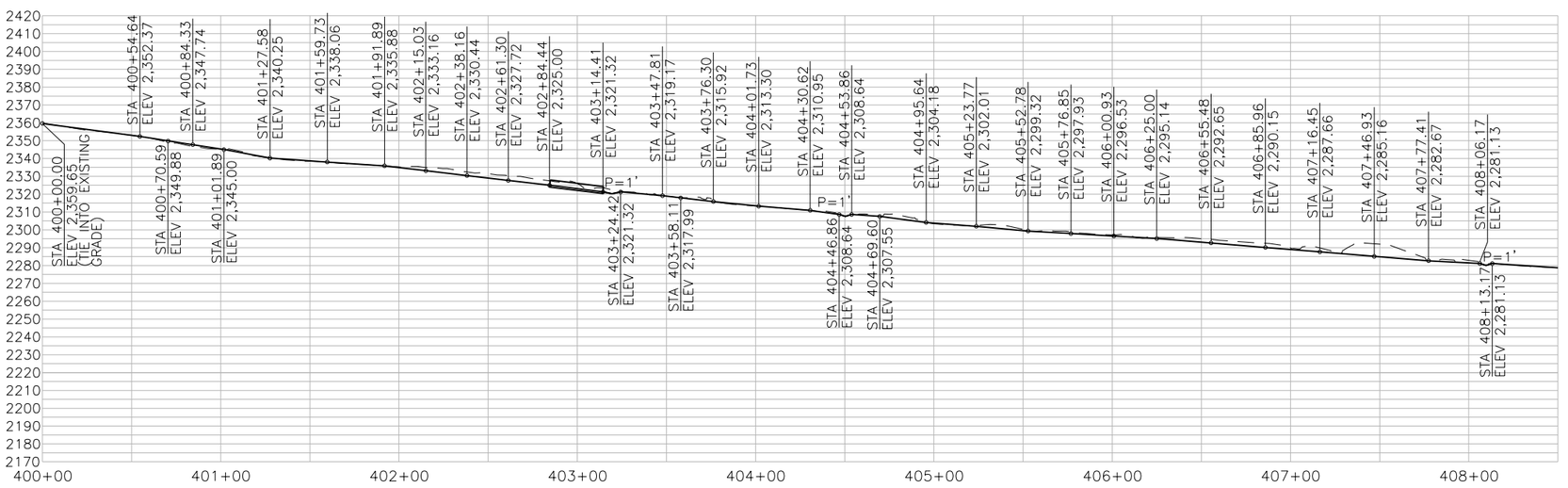
SHEET SP10

NC GRID NAD '83

–40′ 0′ 40′ 80′

GRAPHIC SCALE





* P = POOL DEPTH

T4 PROPOSED PROFILE

NORTH CAROLINA PROFESSIONAL SEAL 040899 ENGINEER KRISTIN E. KNIGHT
05-24-2024

	DATE	DESCRIPTION	SYM.
REVISIONS	MAY 2024	REVISIONS PER IRT COMMENTS	A

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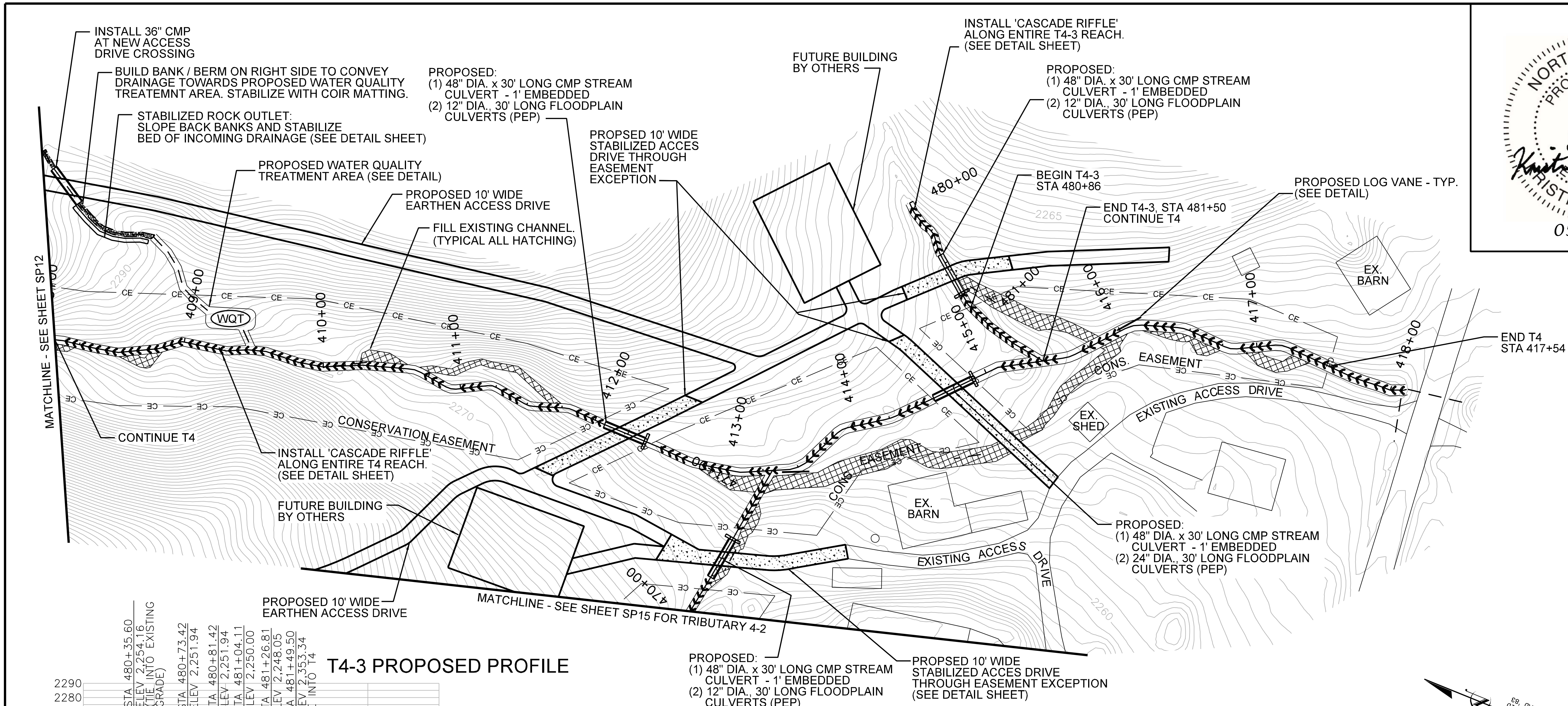
MORGAN BRANCH RESTORATION SITE

BUNCOMBE COUNTY, NORTH CAROLINA

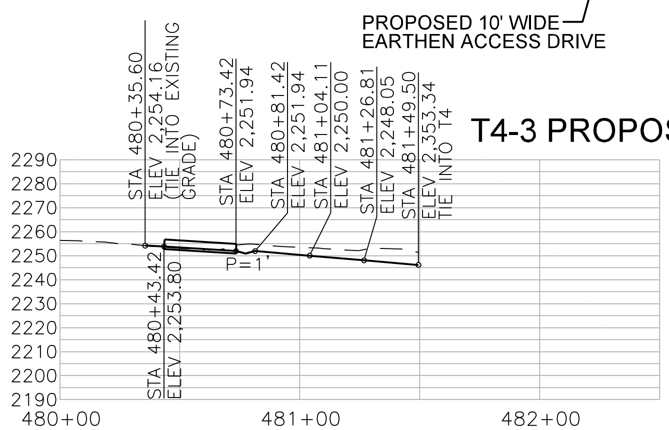
DATE: MAY 2024
SCALE: GRAPHIC

SITE PLAN

SHEET SP12

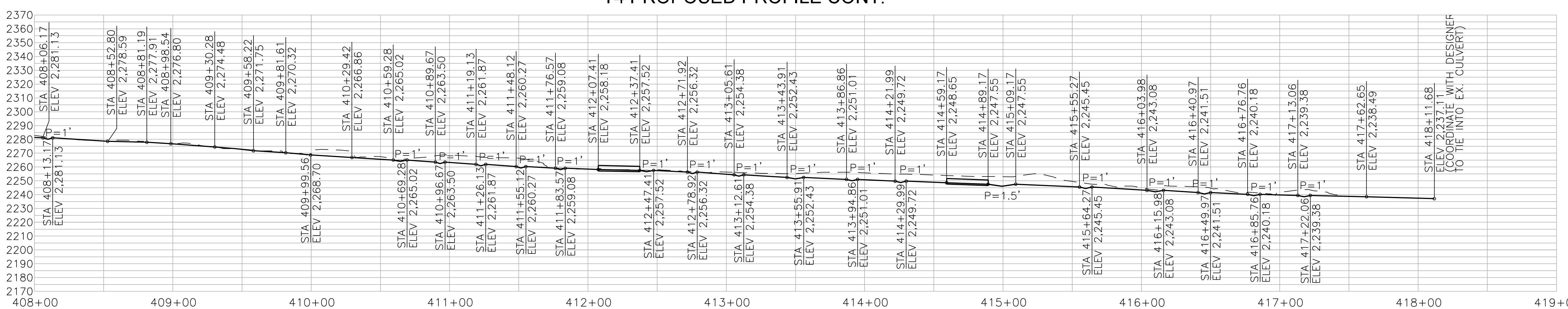


T4-3 PROPOSED PROFILE



* P = POOL DEPTH

T4 PROPOSED PROFILE CONT.



SYM.	DESCRIPTION	DATE
A	REVISIONS PER IRT COMMENTS	MAY 2024

REVISIONS

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Environmental Quality

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MORGAN BRANCH RESTORATION SITE

BUNCOMBE COUNTY, NORTH CAROLINA

DATE: MAY 2024
SCALE: GRAPHIC

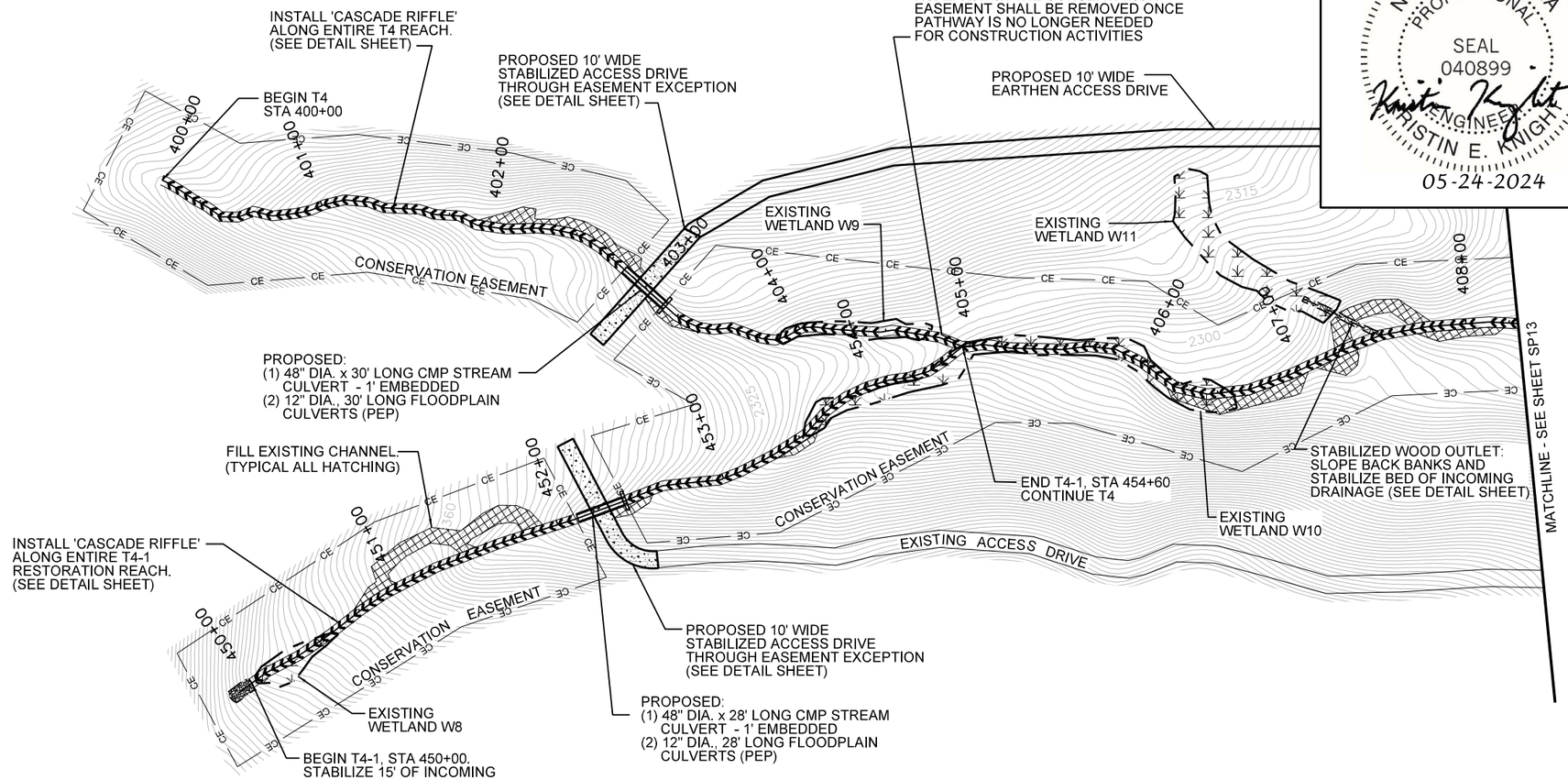
SITE PLAN

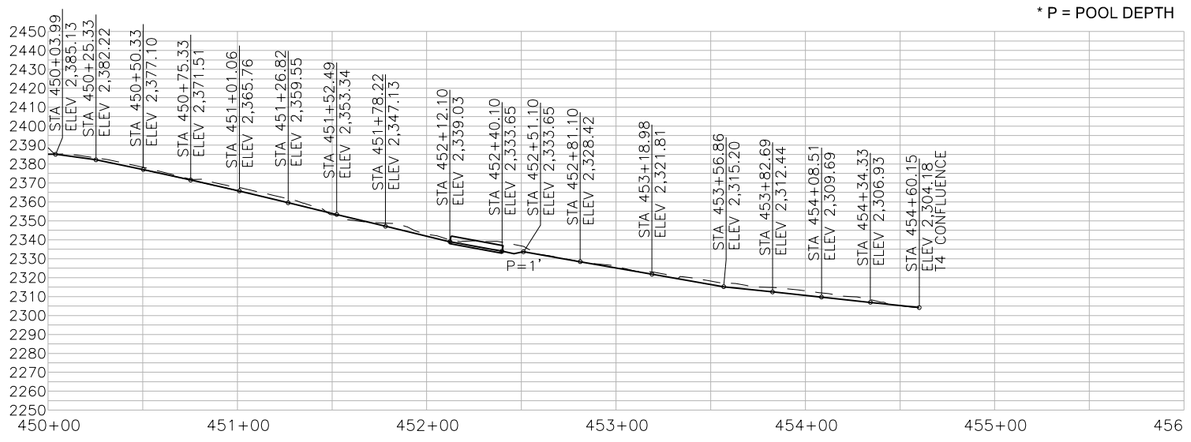
SHEET SP13

NC GRID NAD '83

–40′ 0′ 40′ 80′

GRAPHIC SCALE





T4-1 PROPOSED PROFILE

NORTH CAROLINA PROFESSIONAL SEAL 040899 ENGINEER KRISTIN E. KNIGHT
05-24-2024

	DATE	DESCRIPTION	SYM.
REVISIONS	MAY 2024		
A REVISIONS PER IRT COMMENTS			

NORTH CAROLINA *Environmental Quality*

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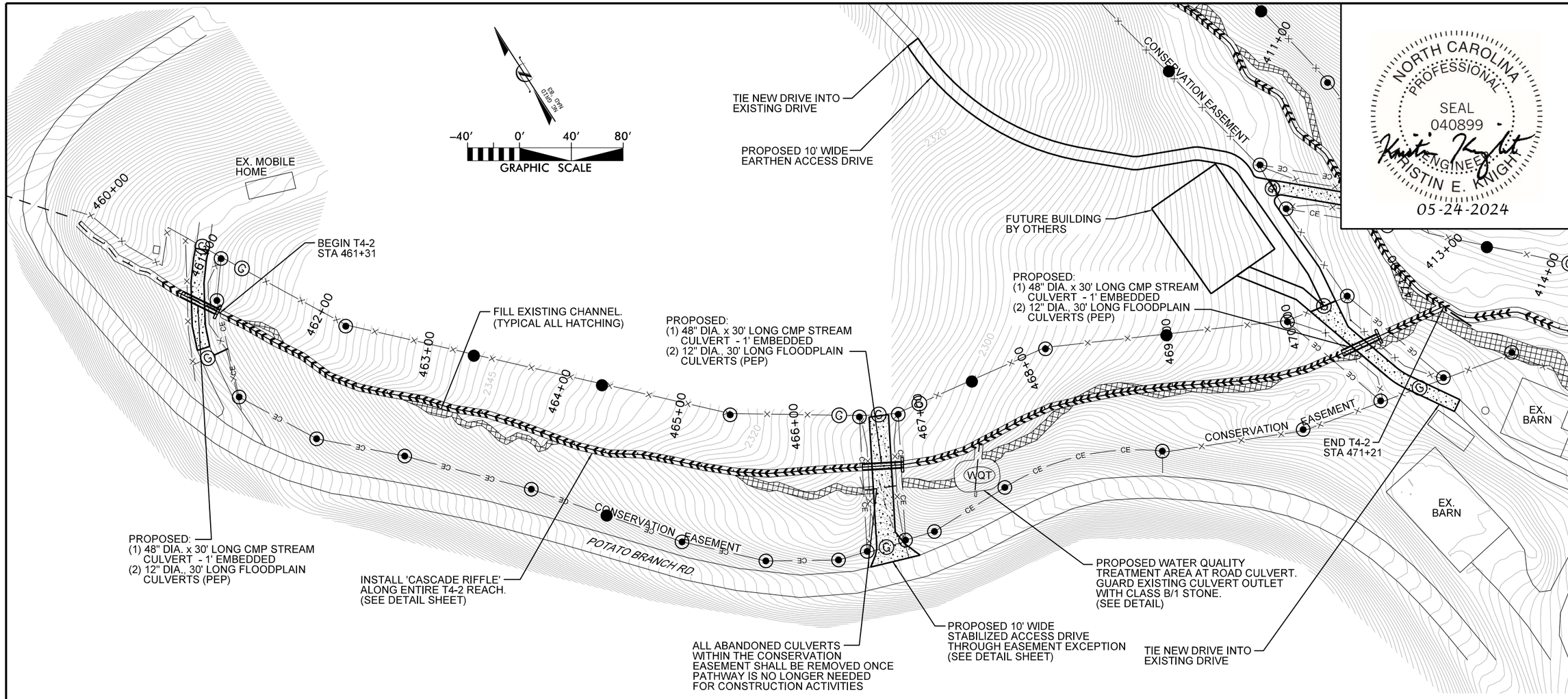
MORGAN BRANCH
RESTORATION SITE
BUNCOMBE COUNTY, NORTH CAROLINA

DATE: MAY 2024
SCALE: GRAPHIC

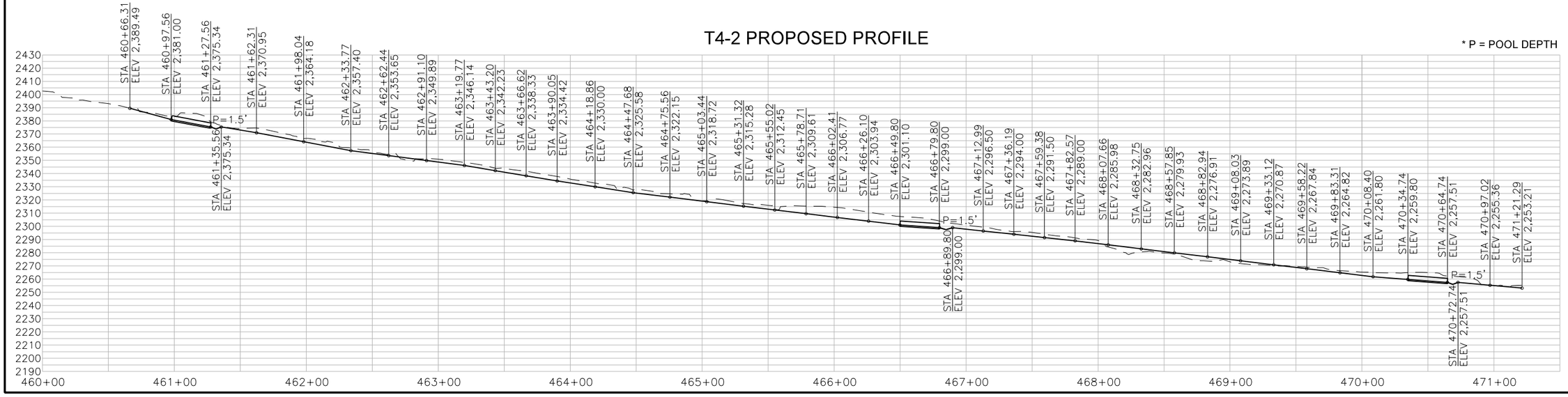
SITE PLAN

SHEET SP14



T4-2 PROPOSED PROFILE

* P = POOL DEPTH



NORTH CAROLINA PROFESSIONAL SEAL 040899 ENGINEER KRISTIN E. KNIGHT
05-24-2024

	DATE	DESCRIPTION
A	MAY 2024	REVISIONS PER IRT COMMENTS

REVISIONS

NORTH CAROLINA *Environmental Quality*

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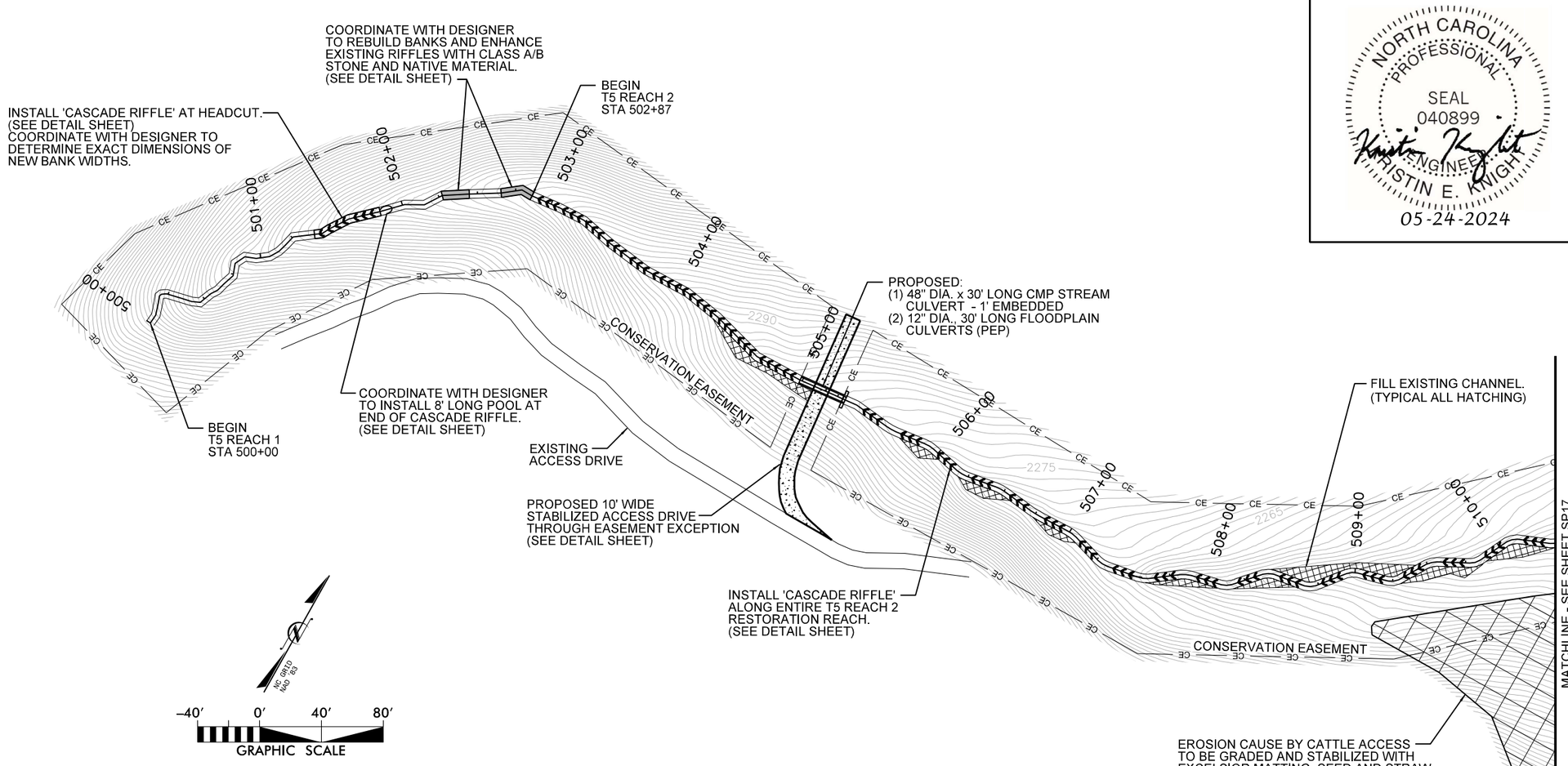
RALEIGH, NORTH CAROLINA 27609

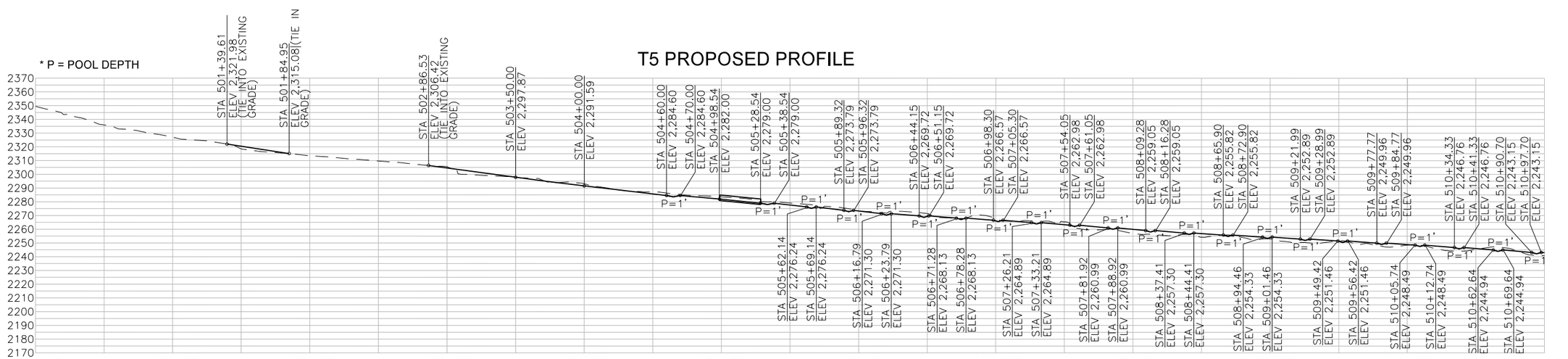
MORGAN BRANCH RESTORATION SITE
BUNCOMBE COUNTY, NORTH CAROLINA

DATE: MAY 2024
SCALE: GRAPHIC

SITE PLAN

SHEET SP15





NORTH CAROLINA PROFESSIONAL SEAL 040899 ENGINEER KRISTIN E. KNIGHT
05-24-2024

	DATE	DESCRIPTION	SYM.
REVISIONS	MAY 2024	REVISIONS PER IRT COMMENTS	A

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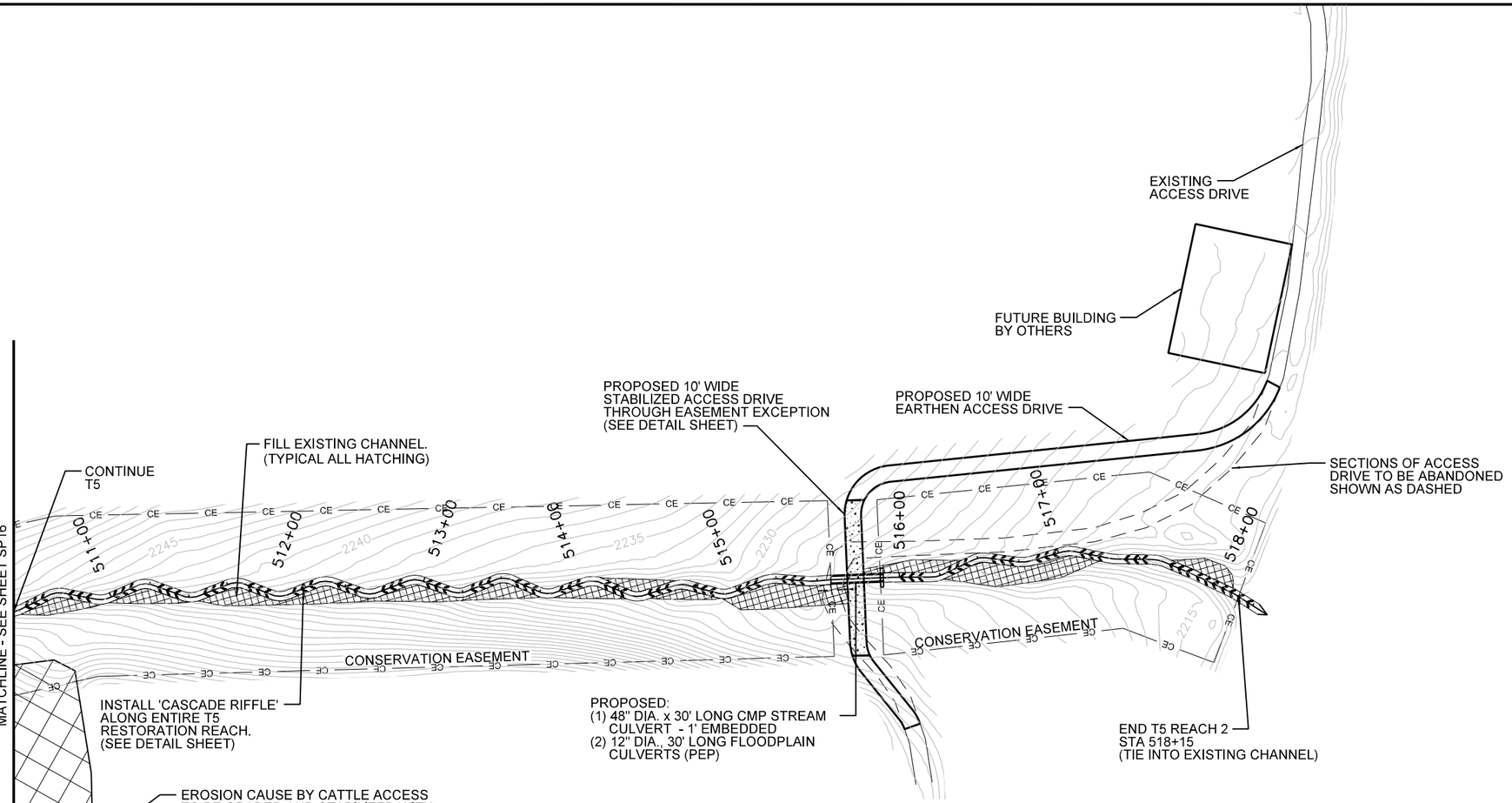
MORGAN BRANCH RESTORATION SITE

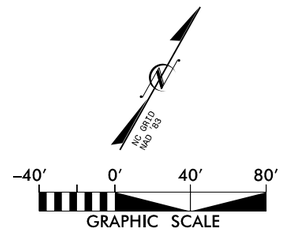
BUNCOMBE COUNTY, NORTH CAROLINA

DATE: MAY 2024
SCALE: GRAPHIC

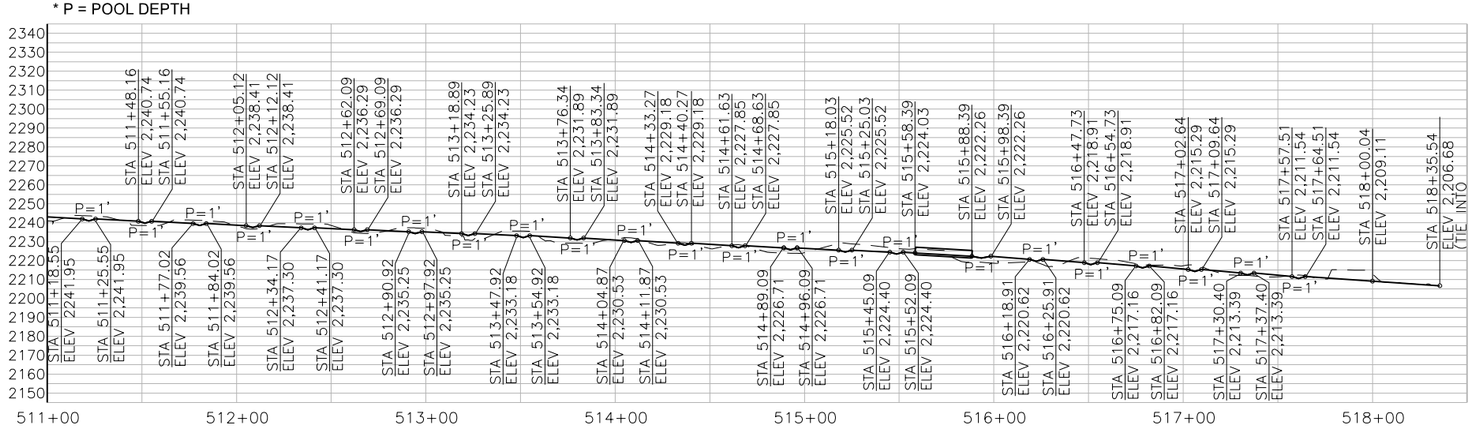
SITE PLAN

SHEET SP16





* P = POOL DEPTH



T5 PROPOSED PROFILE CONT.

NORTH CAROLINA PROFESSIONAL SEAL 040899 ENGINEER KRISTIN E. KNIGHT
05-24-2024

	DATE	DESCRIPTION
A	MAY 2024	REVISIONS PER IRT COMMENTS

REVISIONS

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MORGAN BRANCH
RESTORATION SITE
BUNCOMBE COUNTY, NORTH CAROLINA

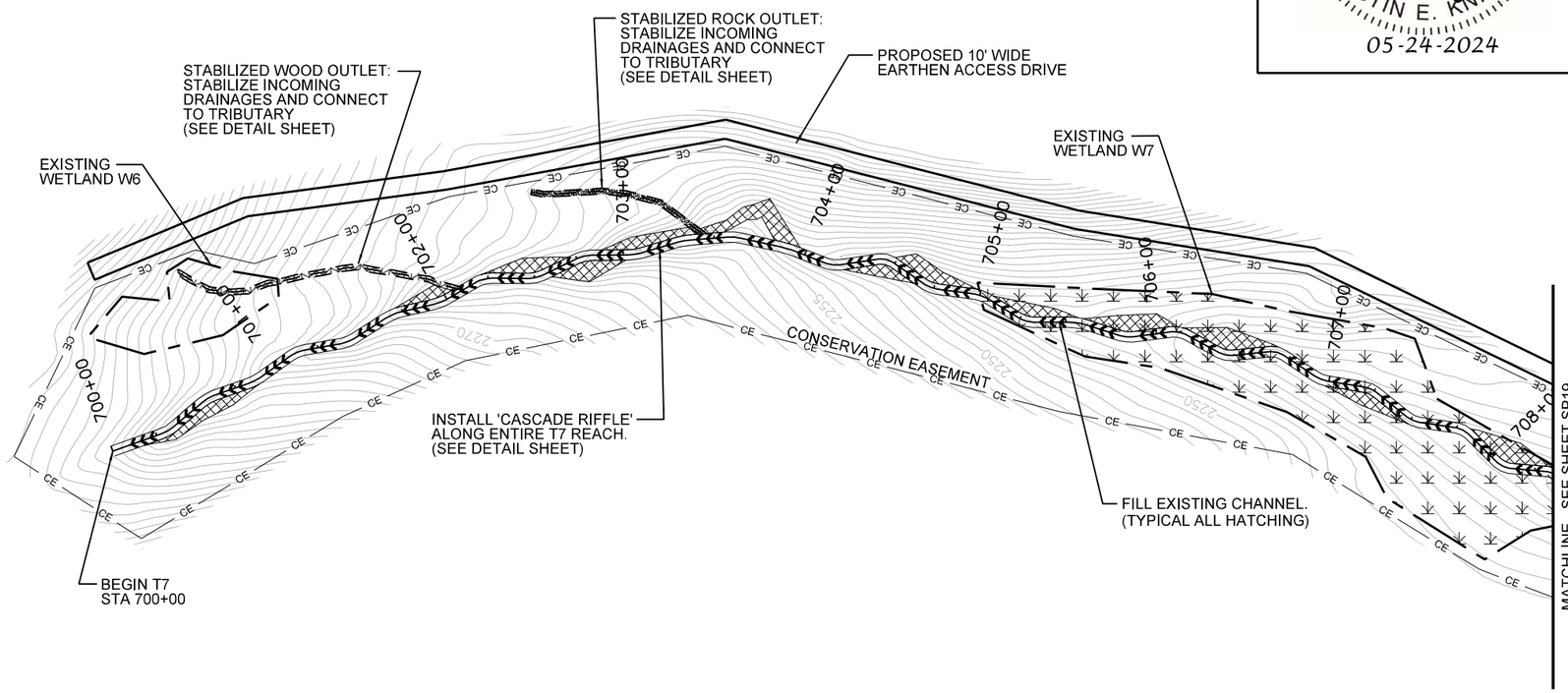
DATE: MAY 2024
SCALE: GRAPHIC

SITE PLAN

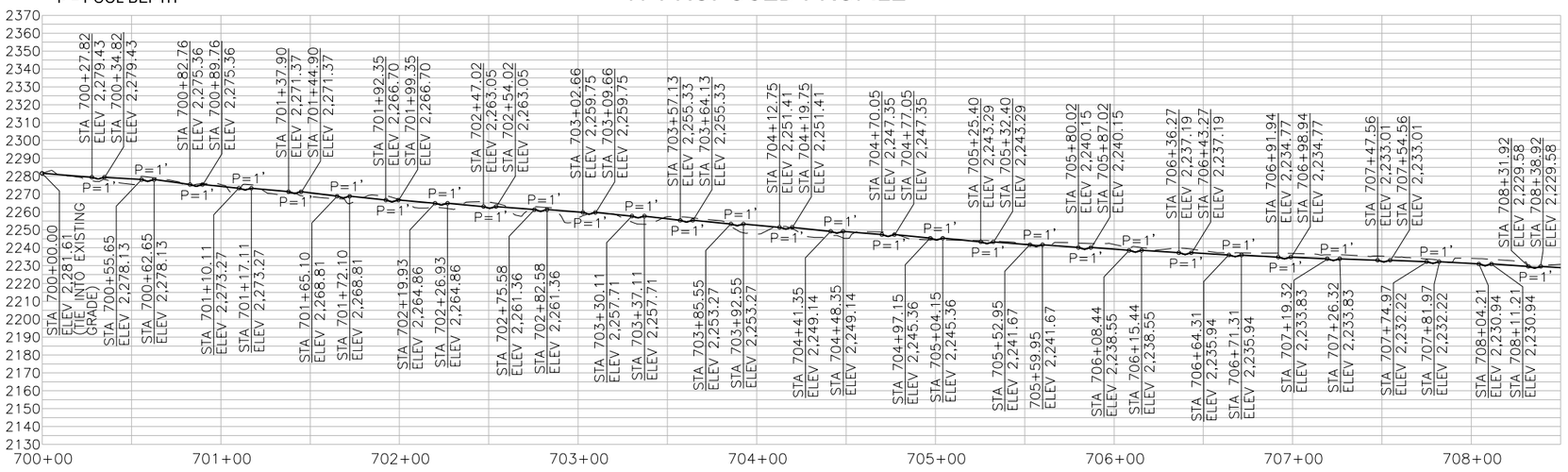
SHEET SP17

NC GRID
NAD '83

–40′ 0′ 40′ 80′
GRAPHIC SCALE



T7 PROPOSED PROFILE



NORTH CAROLINA PROFESSIONAL SEAL 040899 ENGINEER KRISTIN E. KNIGHT
05-24-2024

	DATE	DESCRIPTION
A	MAY 2024	REVISIONS PER IRT COMMENTS

REVISIONS

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MORGAN BRANCH RESTORATION SITE

BUNCOMBE COUNTY, NORTH CAROLINA

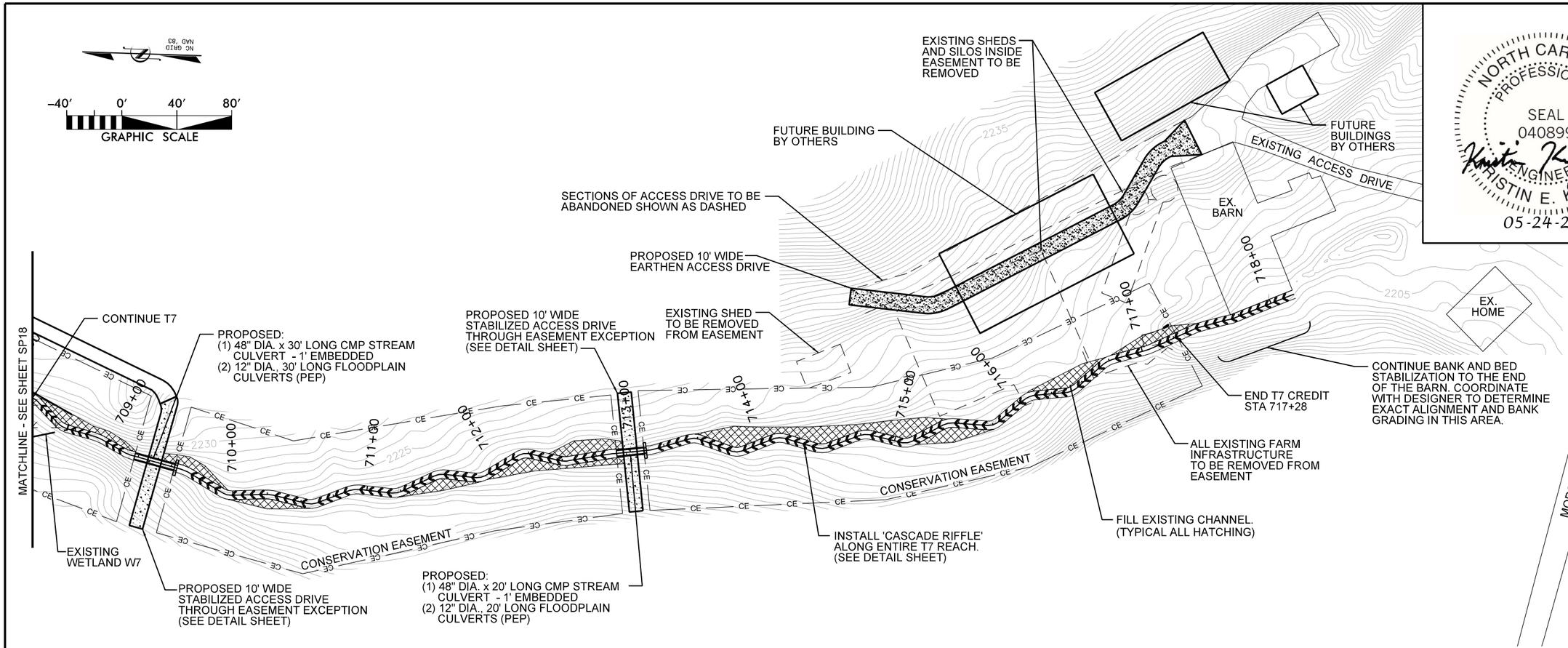
DATE: MAY 2024
SCALE: GRAPHIC

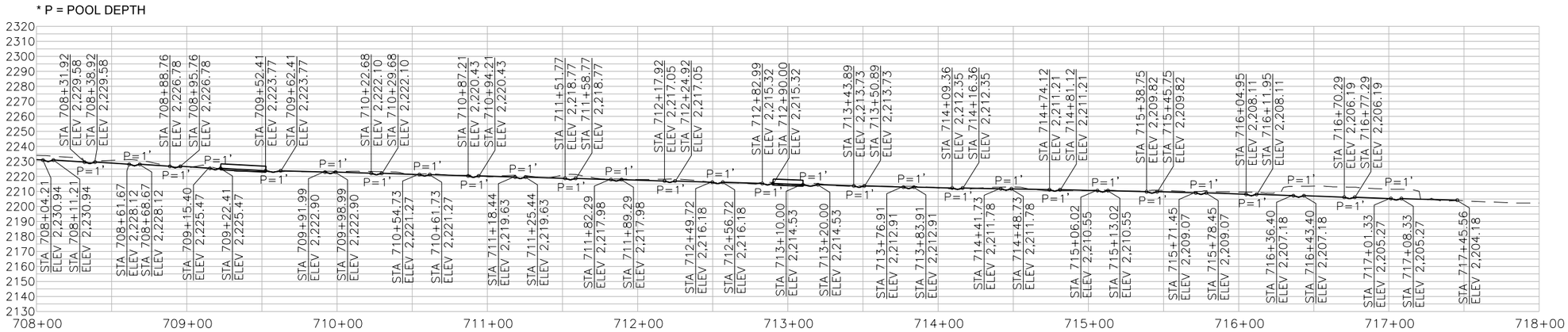
SITE PLAN

SHEET SP18

NC GRID
NAD '83

–40′ 0′ 40′ 80′
GRAPHIC SCALE





T7 PROPOSED PROFILE CONT.

NORTH CAROLINA PROFESSIONAL SEAL 040899 ENGINEER KRISTIN E. KNIGHT
05-24-2024

A	REVISIONS PER IRT COMMENTS		MAY 2024
SYM.	DESCRIPTION	REVISIONS	DATE

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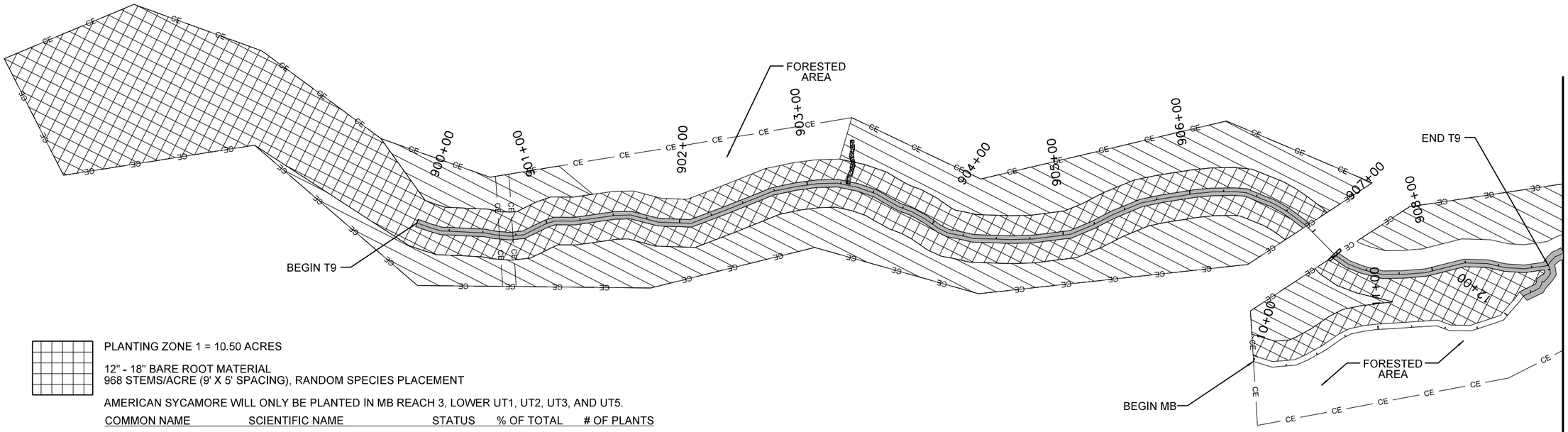
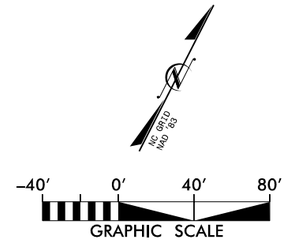
MORGAN BRANCH
RESTORATION SITE
BUNCOMBE COUNTY, NORTH CAROLINA

DATE: MAY 2024
SCALE: GRAPHIC

SITE
PLAN

SHEET SP19





NORTH CAROLINA PROFESSIONAL SEAL 040899 ENGINEER KRISTIN E. KNIGHT
05-24-2024

A	REVISIONS PER IRT COMMENTS			MAY 2024
SYM.	DESCRIPTION	REVISIONS	DATE	

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PLANTING ZONE 1 = 10.50 ACRES

12" - 18" BARE ROOT MATERIAL
968 STEMS/ACRE (9' X 5' SPACING), RANDOM SPECIES PLACEMENT

AMERICAN SYCAMORE WILL ONLY BE PLANTED IN MB REACH 3, LOWER UT1, UT2, UT3, AND UT5.

COMMON NAME	SCIENTIFIC NAME	STATUS	% OF TOTAL	# OF PLANTS
HAZEL ALDER	ALNUS SERRULATA	OBL	10	1,017
PAWPAW	ASIMINA TRILOBA	FAC	10	1,017
YELLOW BIRCH	BETULA ALLEGHANIENSIS	FAC	15	1,526
AMERICAN HORNBEAM	CARPINUS CAROLINIANA	FAC	10	1,017
SUGARBERRY	CELTIS LAEVIGATA	FACW	10	1,017
SILKY DOGWOOD	CORNUS AMOMUM	FACW	10	1,017
SPICEBUSH	LINDERA BENZOIN	FAC	10	1,017
BLACK GUM	NYSSA SYLVATICA	FAC	15	1,526
AMERICAN SYCAMORE	PLATANUS OCCIDENTALIS	FACW	10	1,017
				10,171

PLANTING ZONE 2 = 17.07 ACRES

12" - 18" BARE ROOT MATERIAL
968 STEMS/ACRE (9' X 5' SPACING), RANDOM SPECIES PLACEMENT

COMMON NAME	SCIENTIFIC NAME	STATUS	% OF TOTAL	# OF PLANTS
PAW PAW	ASIMINA TRILOBA	FAC	5	827
YELLOW BUCKEYE	AESCULUS FLAVA	FACU	10	1,653
SWEET BIRCH	BETULA LENTA	FACU	10	1,653
AMERICAN HORNBEAM	CARPINUS CAROLINIANA	FAC	5	827
BITTERNUT HICKORY	CARYA CORDIFORMIS	FACU	5	827
PIGNUT HICKORY	CARYA GLABRA	FACU	5	827
TULIP POPLAR	LIRIODENDRON TULIPIFERA	FACU	10	1,653
SOURWOOD	OXYDENDRUM ARBOREUM	UPL	5	827
AMERICAN SYCAMORE	PLATANUS OCCIDENTALIS	FACU	10	1,653
WHITE OAK	QUERCA ALBA	FACW	7.5	1,240
SOUTHERN RED OAK	QUERCUS FALCATA	FACU	7.5	1,240
CHESTNUT OAK	QUERCUS MONTANA	FACU	7.5	1,240
NORTHERN RED OAK	QUERCUS RUBRA	UPL	7.5	1,240
BASSWOOD	TILIA AMERICANA	FACU	5	827
				16,534

STREAM ZONE

LIVE STAKES: 1.5' TO 2' LENGTHS, 1/2' TO 2" DIAMETER, PLANT ONE ROW PER BANK AT 3' SPACING, RANDOM SPECIES PLACEMENT.

COMMON NAME	SCIENTIFIC NAME
BLACK WILLOW	SALIX NIGRA
SILKY WILLOW	SALIX SERICEA
SILKY DOGWOOD	CORNUS AMOMUM
ELDERBERRY	SAMBUCUS CANADENSIS
NINEBARK	PHYSOCARPUS OPULIFOLIUS

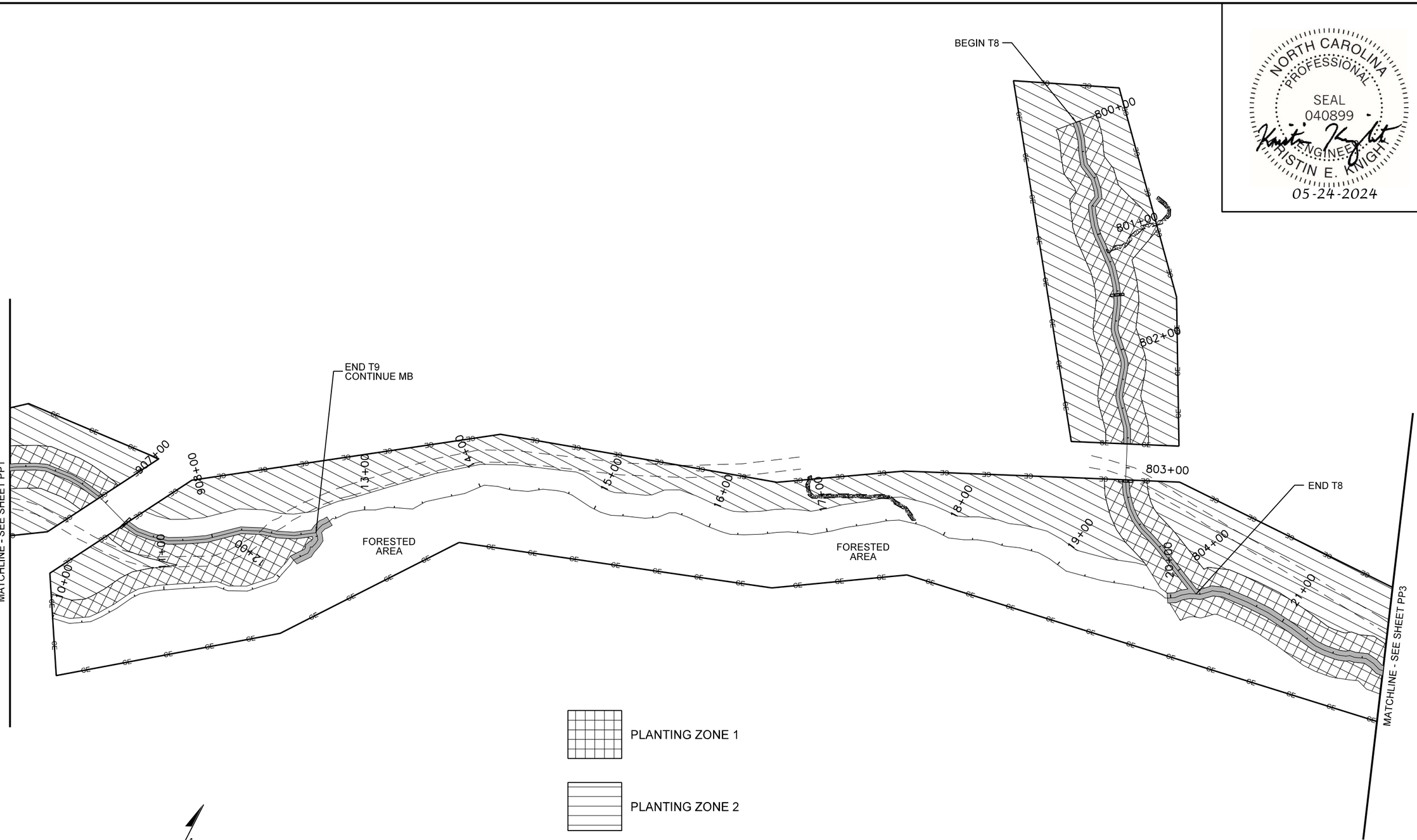
EXACT SPECIES AND %'s OF LIVE STAKES WILL BE DEPENDANT ON AVAILABILITY AT TIME OF CONSTRUCTION. NO SINGLE LIVE STAKE SPECIES SHALL COMPOSE MORE THAN 40% OF THE TOTAL NUMBER OF LIVE STAKES TO BE INSTALLED. CONTRACTOR TO COORDINATE WITH DESIGNER BEFORE PLACING ORDERS.

MORGAN BRANCH RESTORATION SITE
BUNCOMBE COUNTY, NORTH CAROLINA

DATE: MAY 2024
SCALE: GRAPHIC

PLANTING PLAN

SHEET PP1



NORTH CAROLINA PROFESSIONAL SEAL 040899 ENGINEER KRISTIN E. KNIGHT
05-24-2024

A	REVISIONS PER IRT COMMENTS		MAY 2024
SYM.	DESCRIPTION	DATE	

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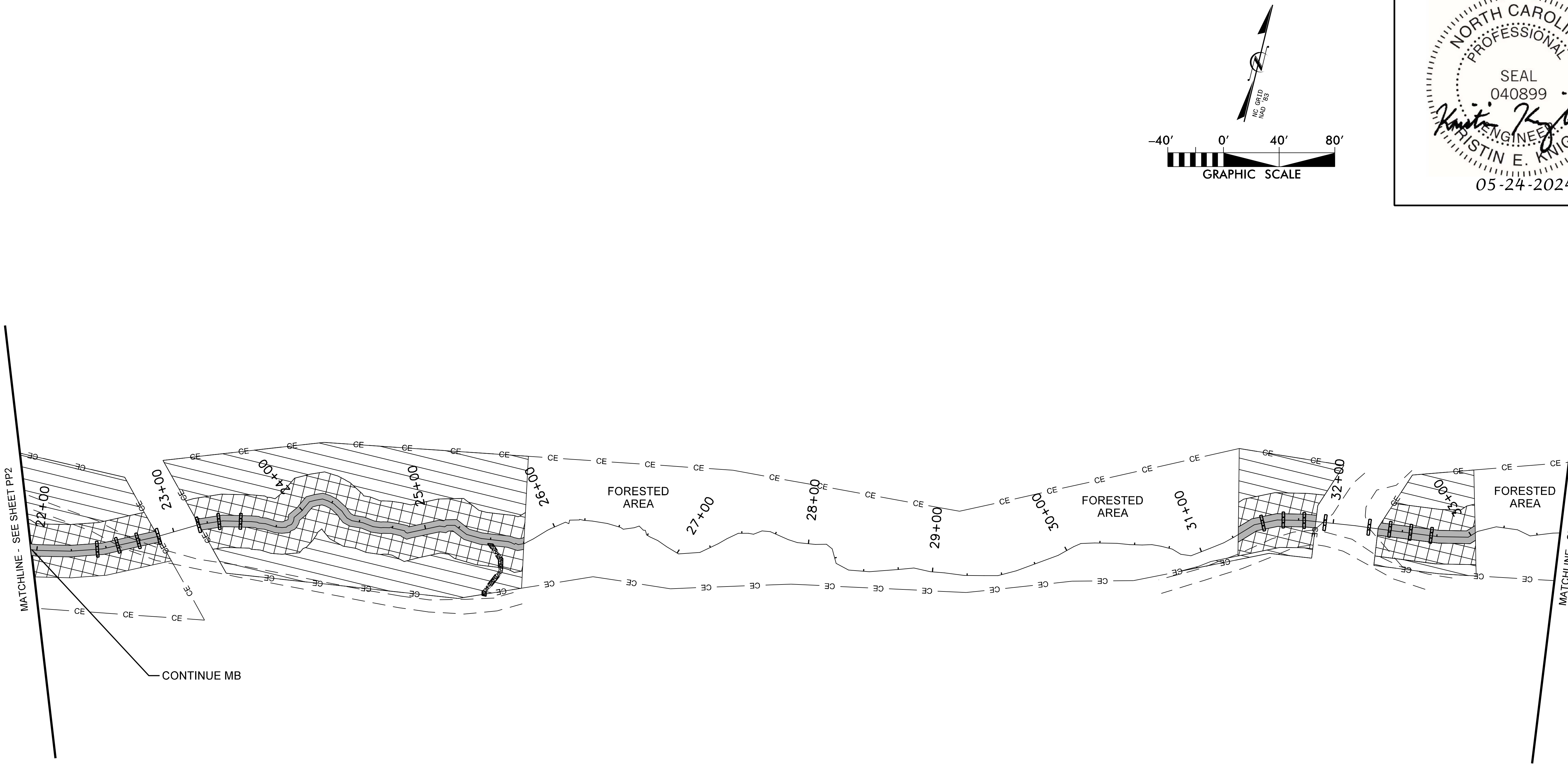
RALEIGH, NORTH CAROLINA 27609

MORGAN BRANCH
RESTORATION SITE
BUNCOMBE COUNTY, NORTH CAROLINA

DATE: MAY 2024
SCALE: GRAPHIC

PLANTING
PLAN

SHEET PP2



PLANTING ZONE 1

PLANTING ZONE 2

STREAM ZONE

*NOTE:
SEE SHEET PP1 FOR
PLANTING QUANTITIES

NORTH CAROLINA PROFESSIONAL SEAL 040899 ENGINEER KRISTIN E. KNIGHT
05-24-2024

SYM.	DESCRIPTION	DATE
A	REVISIONS PER IRT COMMENTS	MAY 2024

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MORGAN BRANCH
RESTORATION SITE
BUNCOMBE COUNTY, NORTH CAROLINA

DATE: MAY 2024
SCALE: GRAPHIC

PLANTING
PLAN

NC GRID NAD 83

–40′ 0′ 40′ 80′

GRAPHIC SCALE

NORTH CAROLINA PROFESSIONAL SEAL 040899 ENGINEER KRISTIN E. KNIGHT

05-24-2024

A	REVISIONS PER IRT COMMENTS		MAY 2024
		DESCRIPTION	DATE
		REVISIONS	

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MATCHLINE - SEE SHEET PP3

CONTINUE MB

34+00 35+00 36+00 37+00 38+00 39+00 40+00 41+00 42+00 43+00 44+00 45+00 46+00

FORESTED AREA

FORESTED AREA

FORESTED AREA

MATCHLINE - SEE SHEET PP5

PLANTING ZONE 1

PLANTING ZONE 2

STREAM ZONE

*NOTE:
SEE SHEET PP1 FOR PLANTING QUANTITIES

MORGAN BRANCH RESTORATION SITE

BUNCOMBE COUNTY, NORTH CAROLINA

DATE: MAY 2024
SCALE: GRAPHIC

PLANTING PLAN

SHEET PP4

PLANTING ZONE 1

PLANTING ZONE 2

STREAM ZONE

*NOTE:
SEE SHEET PP1 FOR
PLANTING QUANTITIES

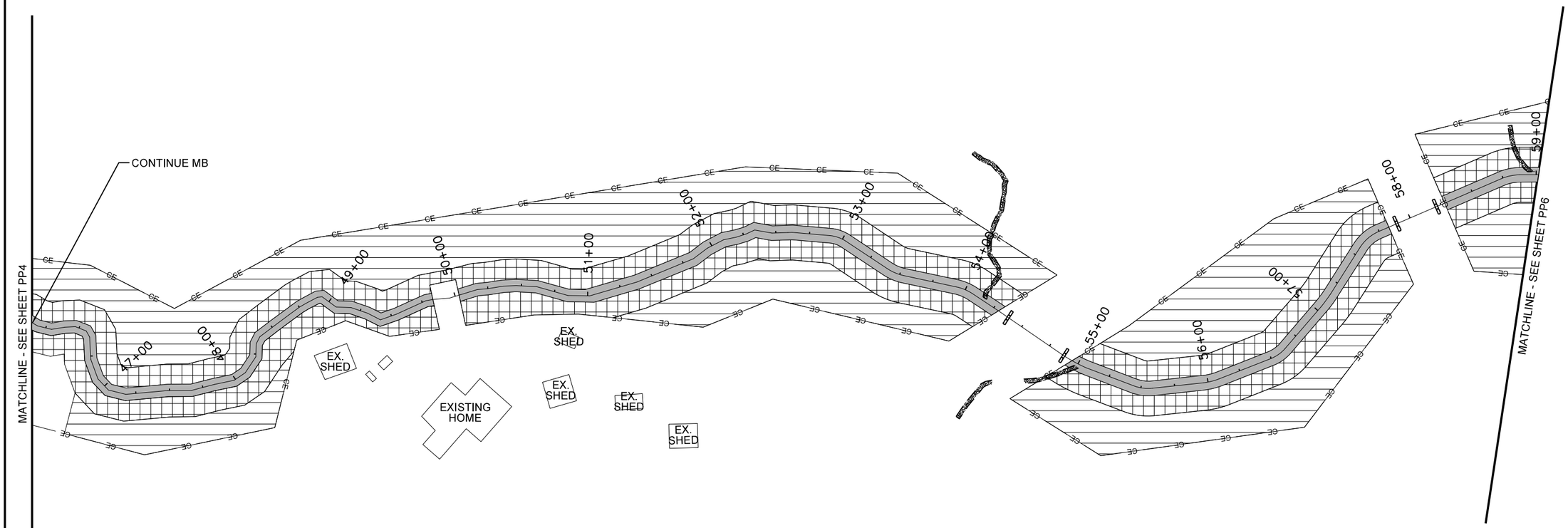
NC GRID NAD 83

–40′ 0′ 40′ 80′

GRAPHIC SCALE

NORTH CAROLINA PROFESSIONAL SEAL 040899 ENGINEER KRISTIN E. KNIGHT

05-24-2024



A	REVISIONS PER IRT COMMENTS	SYM.	DESCRIPTION	DATE
			REVISIONS	MAY 2024

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MORGAN BRANCH RESTORATION SITE

BUNCOMBE COUNTY, NORTH CAROLINA

DATE: MAY 2024
SCALE: GRAPHIC

PLANTING PLAN

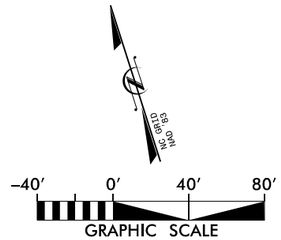
SHEET PP5

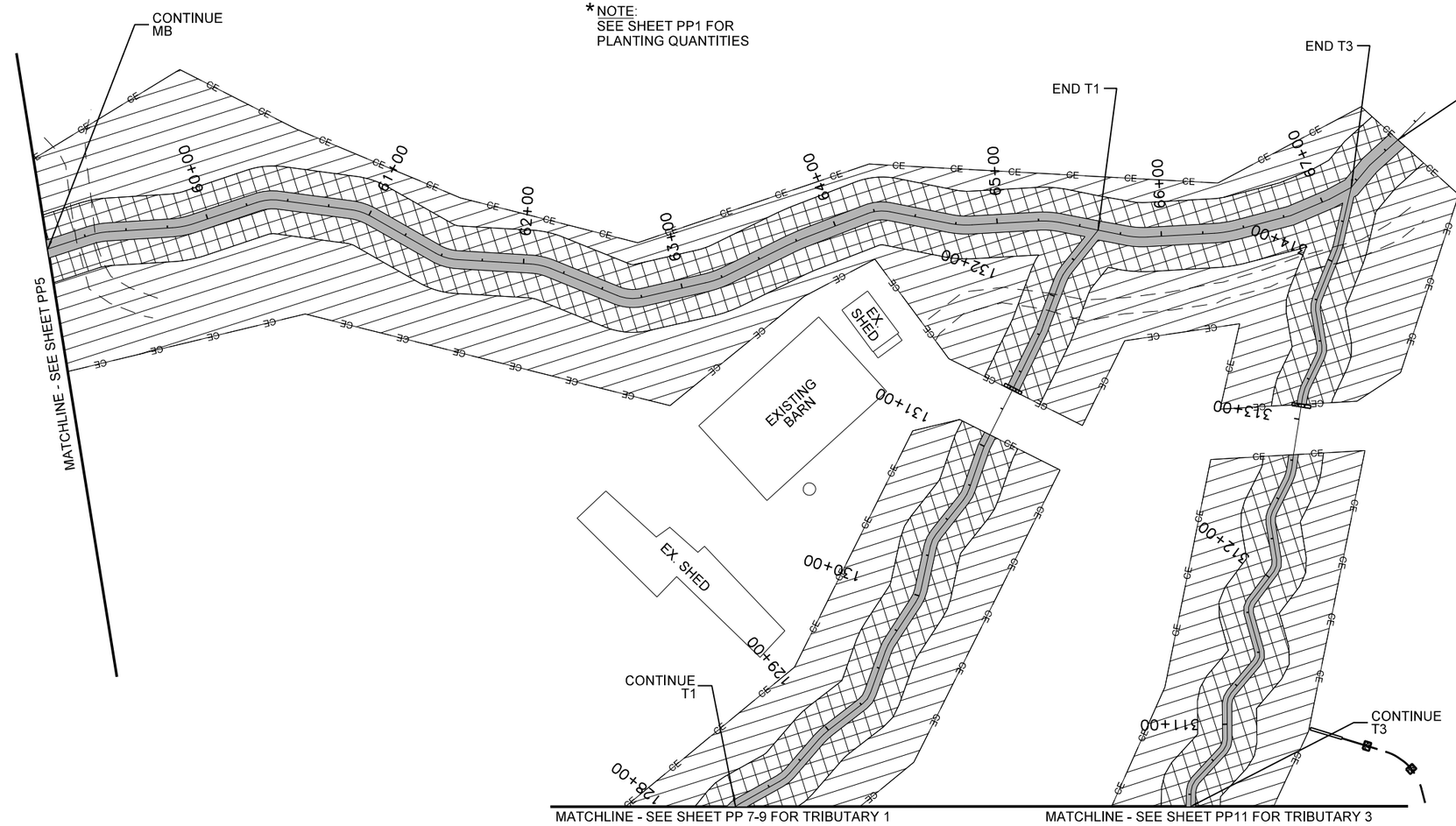
PLANTING ZONE 1

PLANTING ZONE 2

STREAM ZONE

*NOTE:
SEE SHEET PP1 FOR
PLANTING QUANTITIES





NORTH CAROLINA
PROFESSIONAL
SEAL
040899
ENGINEER
KRISTIN E. KNIGHT
05-24-2024

A	REVISIONS PER IRT COMMENTS	SYM.	DESCRIPTION	DATE
			REVISIONS	MAY 2024

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Environmental Quality

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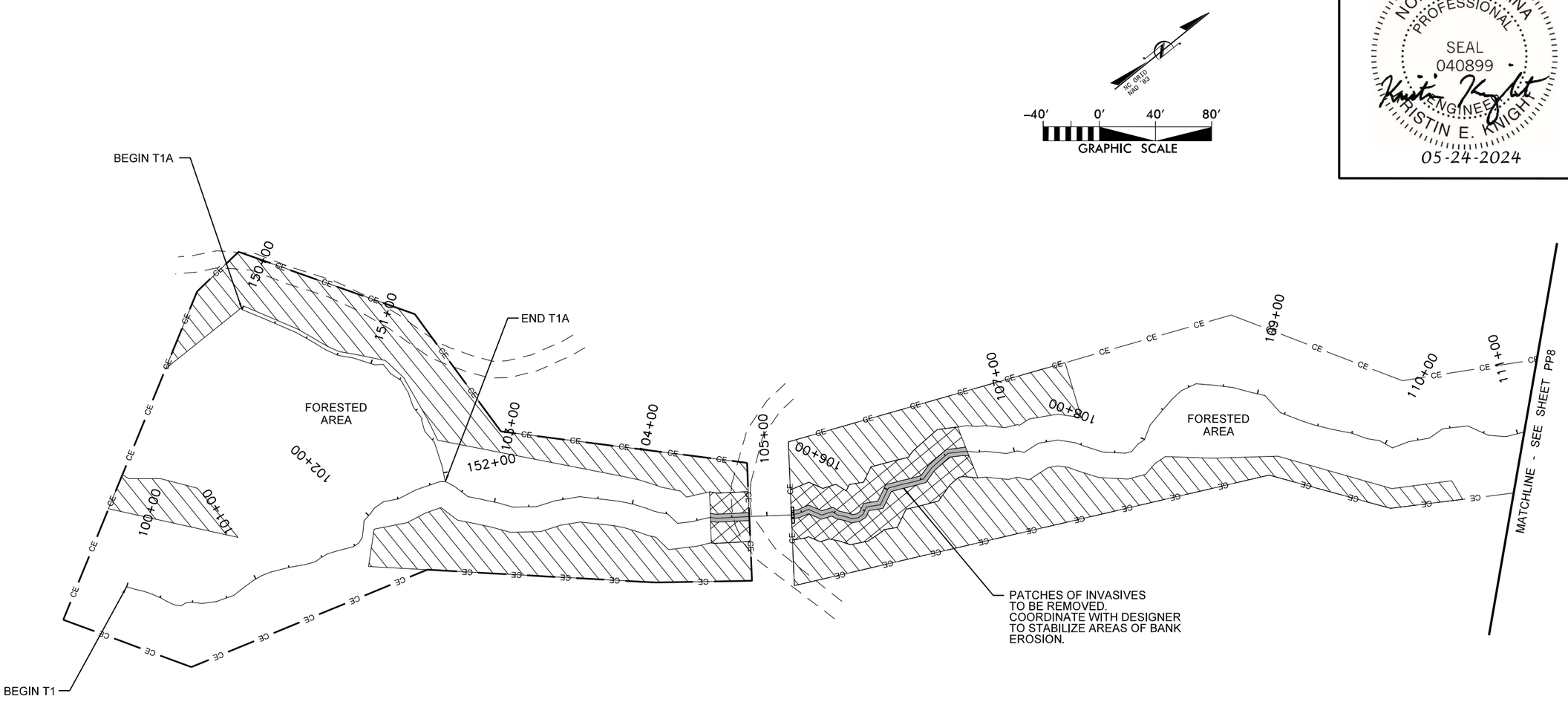
MORGAN BRANCH RESTORATION SITE

BUNCOMBE COUNTY, NORTH CAROLINA

DATE: MAY 2024
SCALE: GRAPHIC

PLANTING PLAN

SHEET PP6



PLANTING ZONE 1

PLANTING ZONE 2

STREAM ZONE

*NOTE:
SEE SHEET PP1 FOR
PLANTING QUANTITIES

NORTH CAROLINA PROFESSIONAL SEAL 040899 ENGINEER KRISTIN E. KNIGHT
05-24-2024

A	REVISIONS PER IRT COMMENTS		MAY 2024
		DESCRIPTION	DATE
		REVISIONS	

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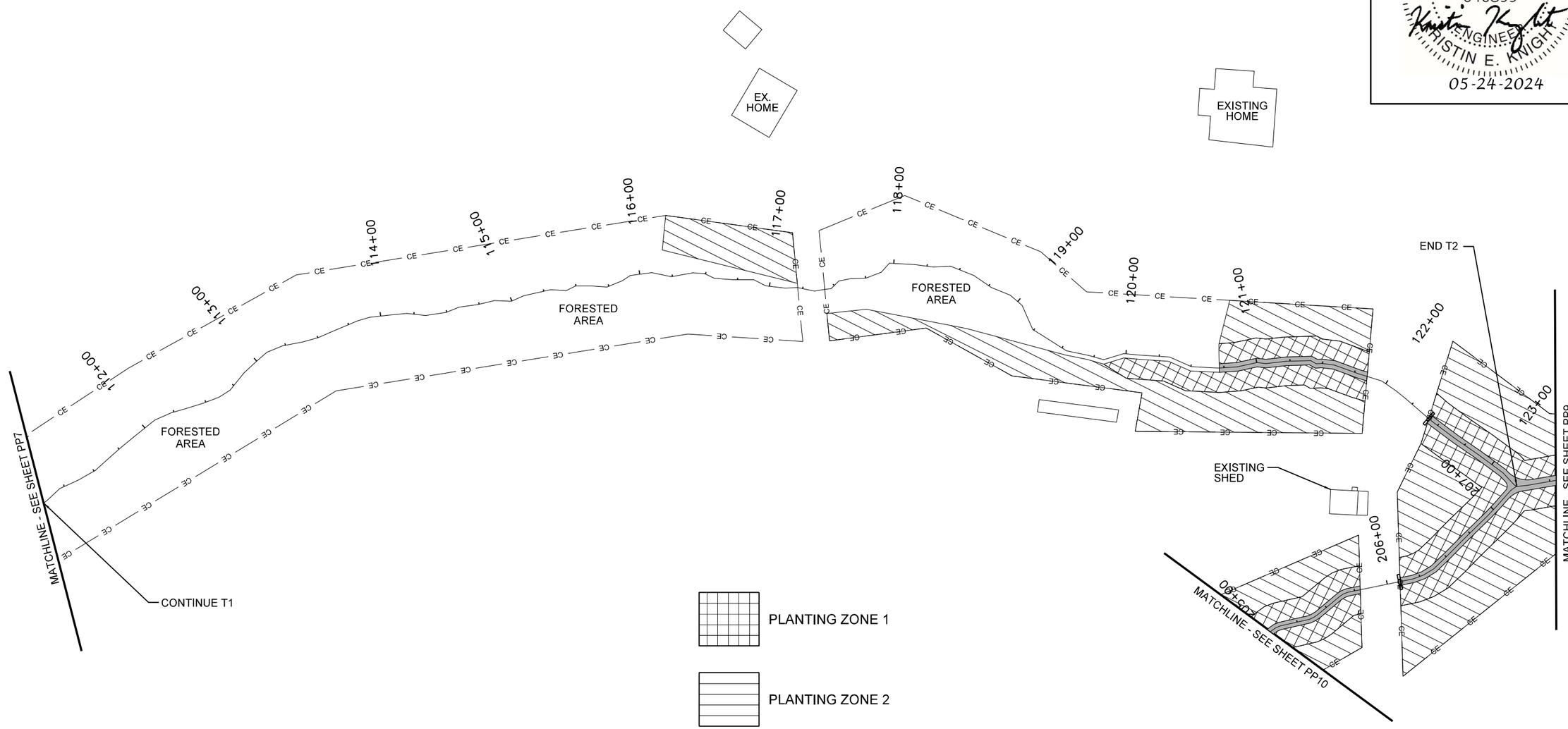
MORGAN BRANCH
RESTORATION SITE
BUNCOMBE COUNTY, NORTH CAROLINA

DATE: MAY 2024
SCALE: GRAPHIC

PLANTING PLAN

SHEET PP7



NORTH CAROLINA PROFESSIONAL SEAL 040899 ENGINEER KRISTIN E. KNIGHT
05-24-2024

A	REVISIONS PER IRT COMMENTS	SML	MAY 2024
			DATE
			REVISIONS

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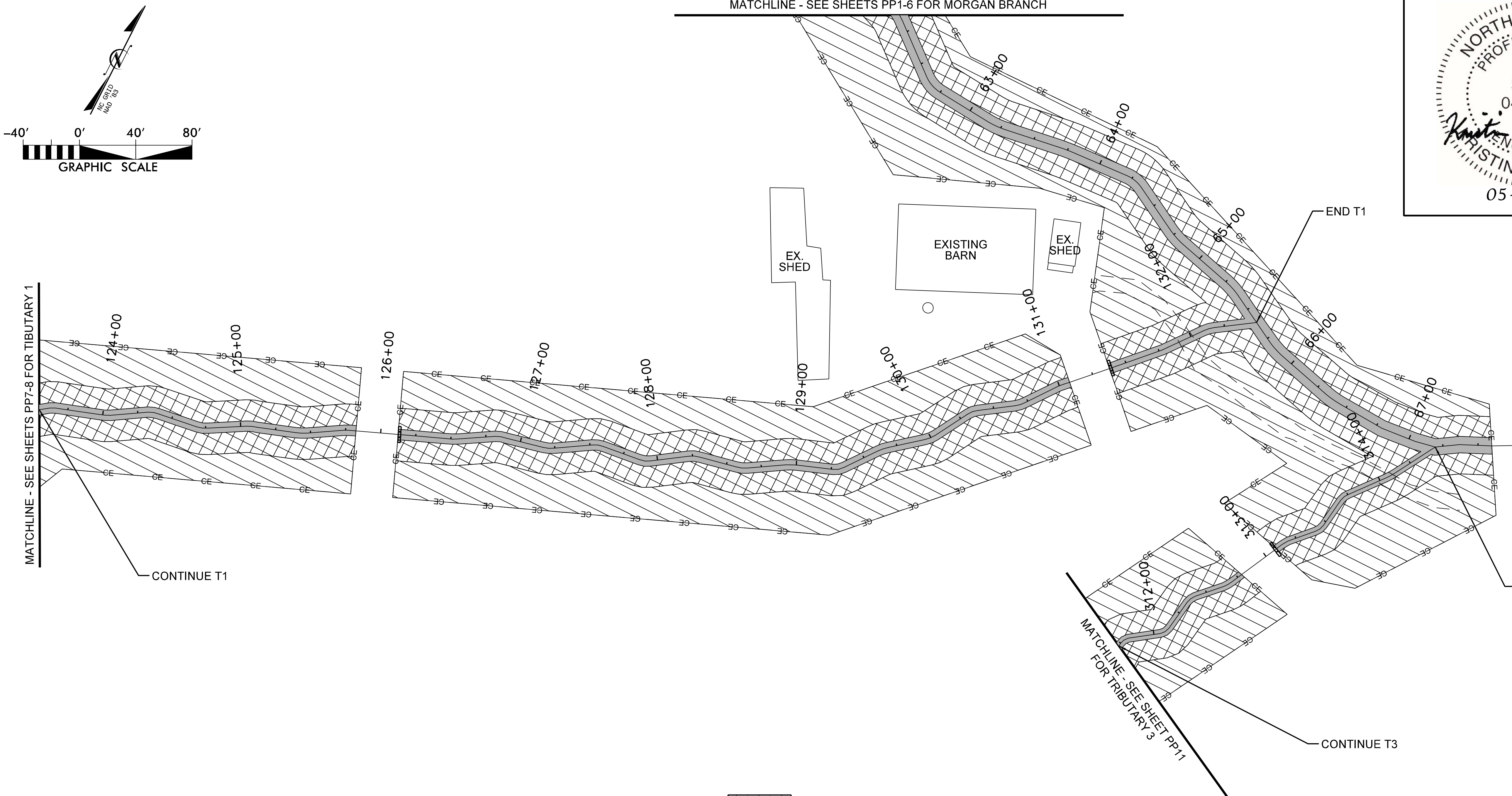
MORGAN BRANCH RESTORATION SITE

BUNCOMBE COUNTY, NORTH CAROLINA

DATE: MAY 2024
SCALE: GRAPHIC

PLANTING PLAN

SHEET PP8



PLANTING ZONE 1

PLANTING ZONE 2

STREAM ZONE

* NOTE:
SEE SHEET PP1 FOR
PLANTING QUANTITIES

05-24-2024

SYM.	DESCRIPTION	DATE
A	REVISIONS PER IRT COMMENTS	MAY 2024

REVISIONS

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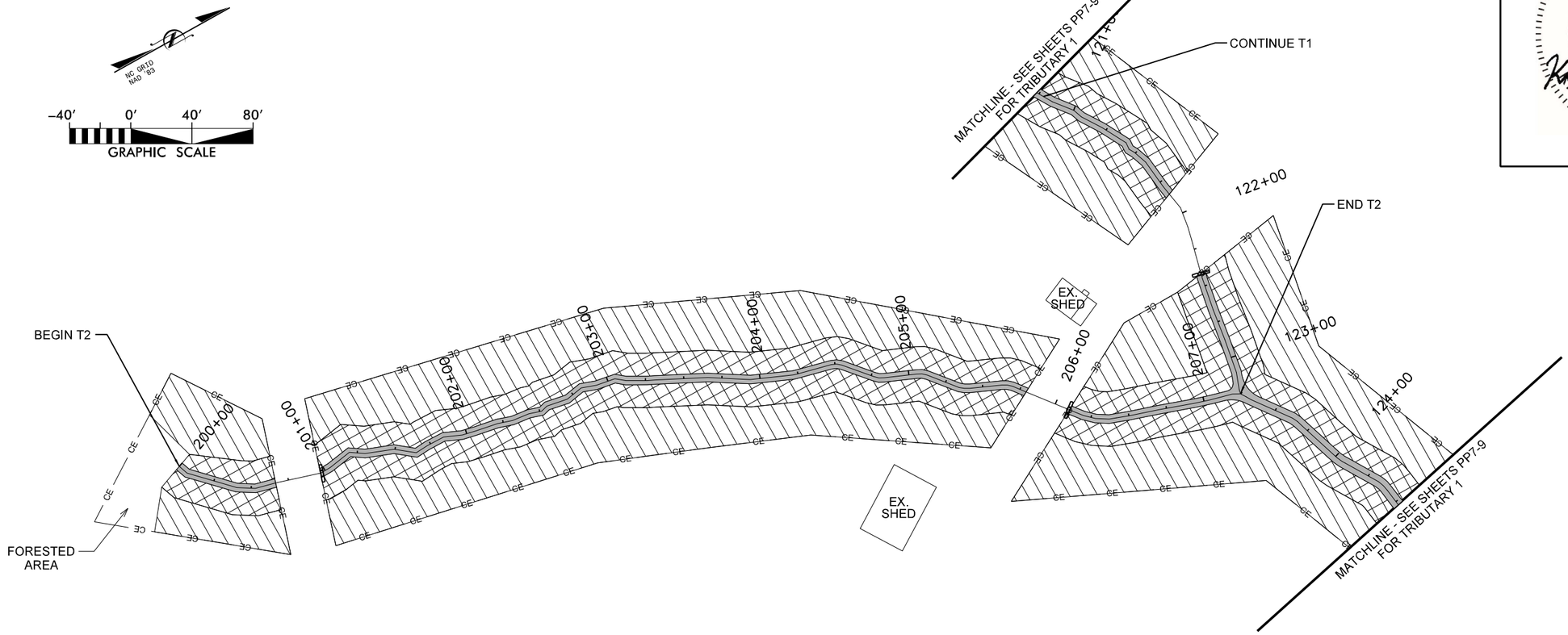
MORGAN BRANCH
RESTORATION SITE
BUNCOMBE COUNTY, NORTH CAROLINA

DATE: MAY 2024
SCALE: GRAPHIC

PLANTING
PLAN

SHEET PP9



PLANTING ZONE 1

PLANTING ZONE 2

STREAM ZONE

*NOTE:
SEE SHEET PP1 FOR
PLANTING QUANTITIES

NORTH CAROLINA
PROFESSIONAL
SEAL
040899
ENGINEER
KRISTIN E. KNIGHT
05-24-2024

	DATE	DESCRIPTION
A	MAY 2024	REVISIONS PER IRT COMMENTS

REVISIONS

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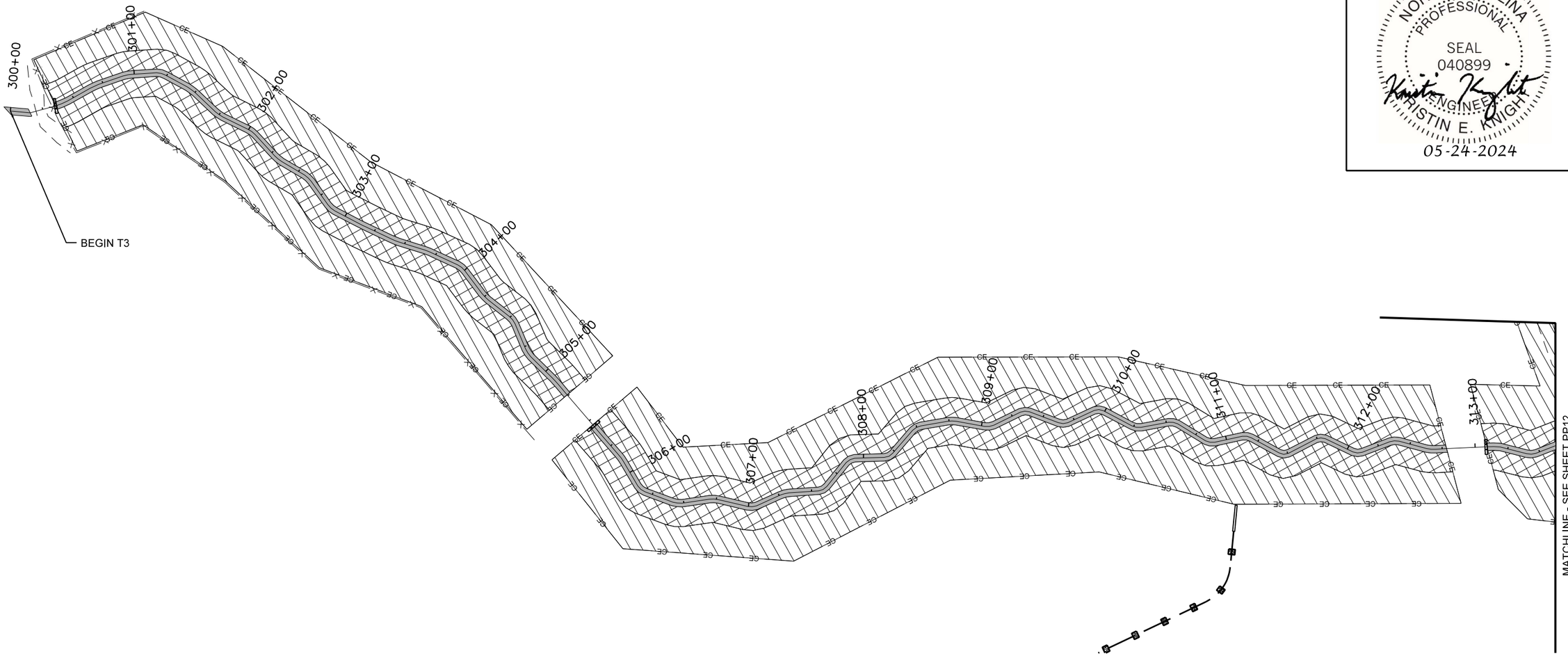
MORGAN BRANCH
RESTORATION SITE
BUNCOMBE COUNTY, NORTH CAROLINA

DATE: MAY 2024
SCALE: GRAPHIC

PLANTING
PLAN

SHEET PP10



PLANTING ZONE 1

PLANTING ZONE 2

STREAM ZONE

*NOTE:
SEE SHEET PP1 FOR
PLANTING QUANTITIES

NORTH CAROLINA PROFESSIONAL SEAL 040899 ENGINEER KRISTIN E. KNIGHT
05-24-2024

		DESCRIPTION	DATE
A	REVISIONS PER IRT COMMENTS	REVISIONS	MAY 2024

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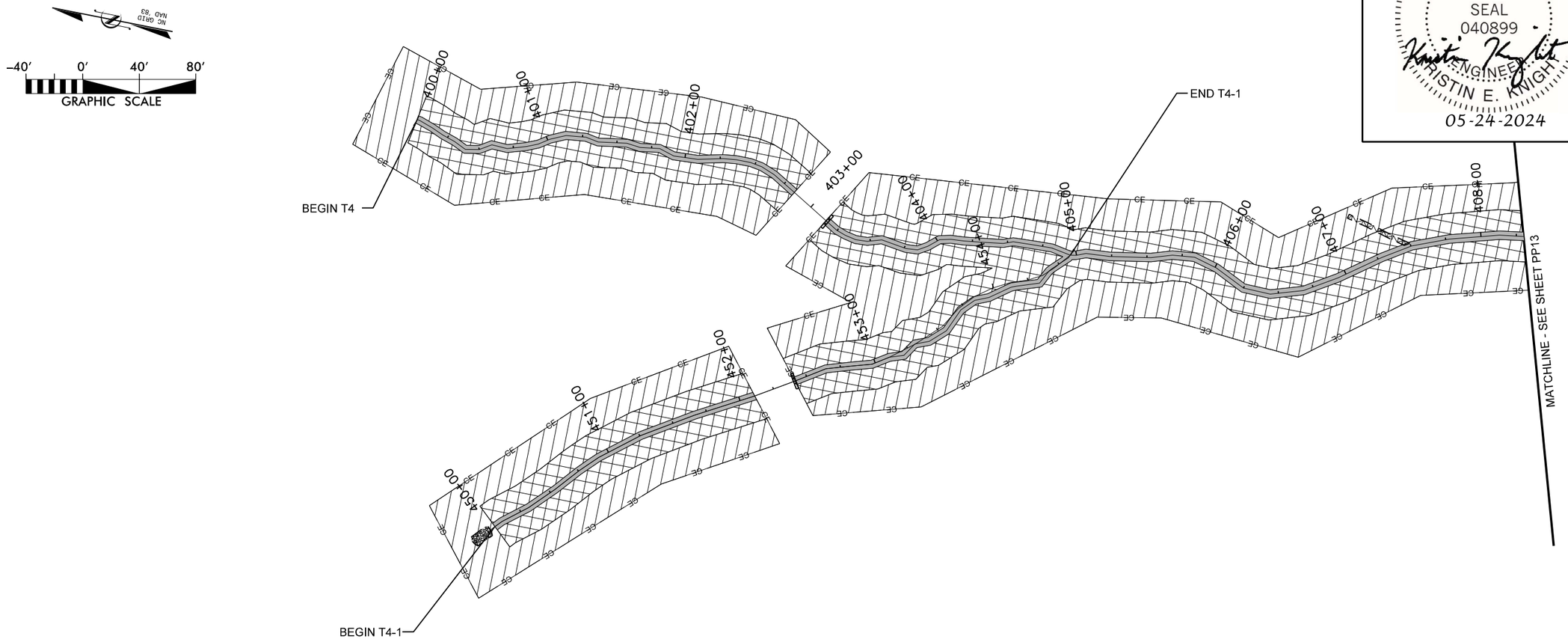
RESTORATION SITE
BUNCOMBE COUNTY, NORTH CAROLINA

DATE: MAY 2024
SCALE: GRAPHIC

PLANTING
PLAN

SHEET PP11



PLANTING ZONE 1

PLANTING ZONE 2

STREAM ZONE

*NOTE:
SEE SHEET PP1 FOR
PLANTING QUANTITIES

NORTH CAROLINA PROFESSIONAL SEAL 040899 ENGINEER KRISTIN E. KNIGHT
05-24-2024

	DATE	DESCRIPTION	SYM.
REVISIONS			
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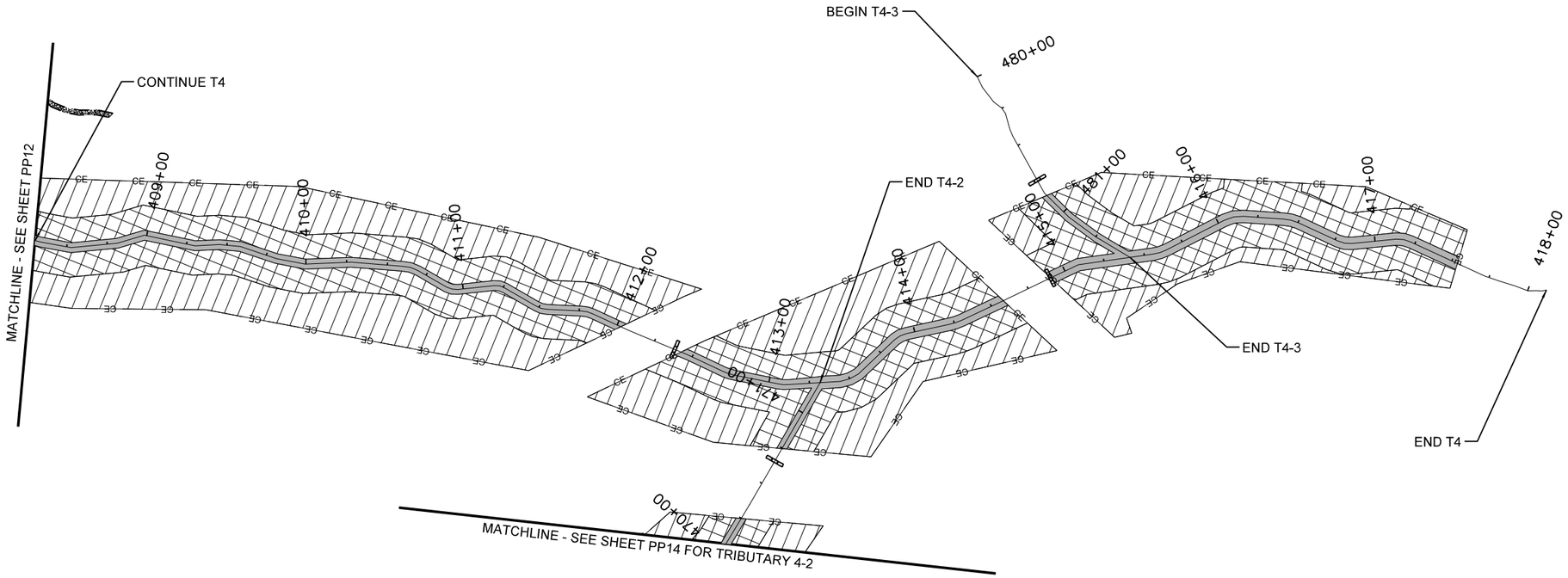
MORGAN BRANCH
RESTORATION SITE
BUNCOMBE COUNTY, NORTH CAROLINA

DATE: MAY 2024
SCALE: GRAPHIC

PLANTING
PLAN

SHEET PP12



NORTH CAROLINA PROFESSIONAL SEAL 040899 ENGINEER KRISTIN E. KNIGHT
05-24-2024

NC GRID NAD 83

–40′ 0′ 40′ 80′
GRAPHIC SCALE

PLANTING ZONE 1

PLANTING ZONE 2

STREAM ZONE

*NOTE:
SEE SHEET PP1 FOR
PLANTING QUANTITIES

	DATE	DESCRIPTION
A	MAY 2024	REVISIONS PER IRT COMMENTS

REVISIONS

NORTH CAROLINA
Environmental Quality

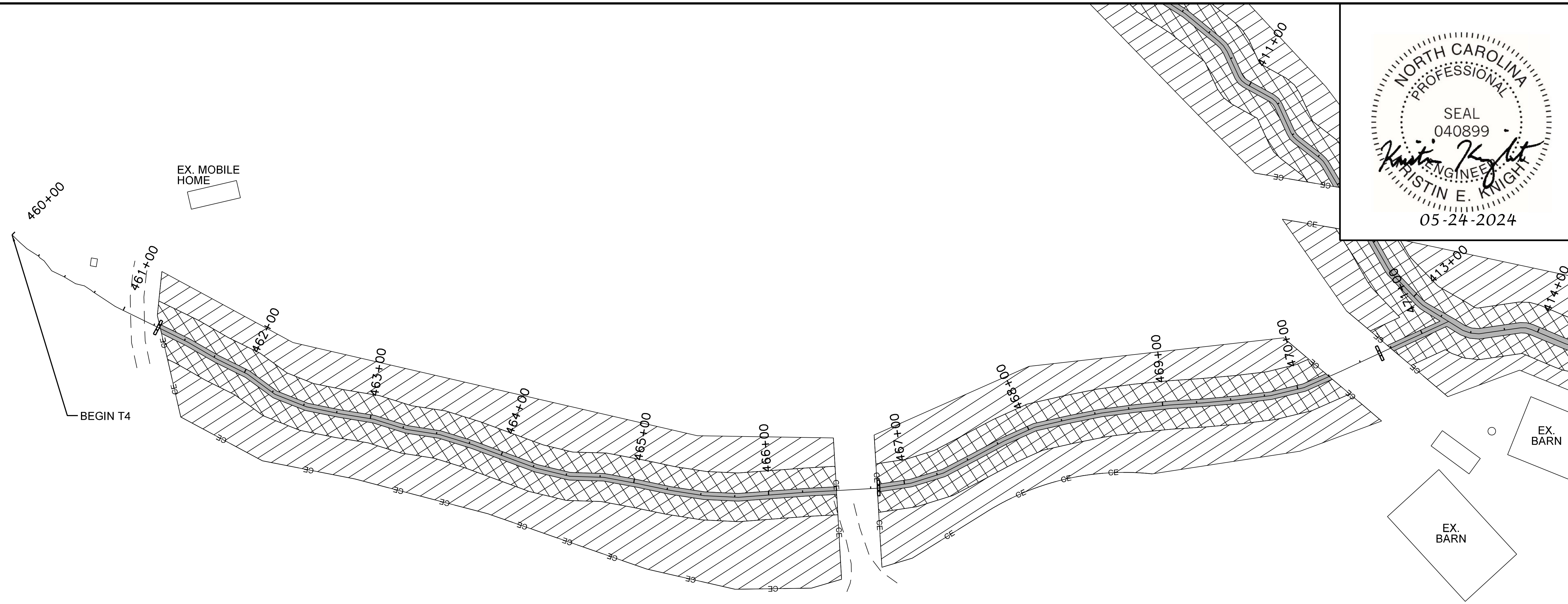
KCI ASSOCIATES OF NC
ENGINEERS • PLANNERS • SCIENTISTS
4505 FALLS OF NEUSE ROAD, SUITE 400
RALEIGH, NORTH CAROLINA 27609

MORGAN BRANCH
RESTORATION SITE
BUNCOMBE COUNTY, NORTH CAROLINA

DATE: MAY 2024
SCALE: GRAPHIC

PLANTING
PLAN

SHEET PP13

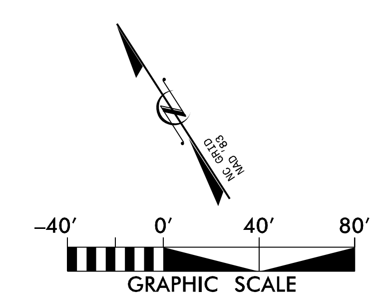


PLANTING ZONE 1

PLANTING ZONE 2

STREAM ZONE

*NOTE:
SEE SHEET PP1 FOR
PLANTING QUANTITIES



SYM.	DESCRIPTION	DATE
A	REVISIONS PER IRT COMMENTS	MAY 2024

REVISIONS

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Environmental Quality

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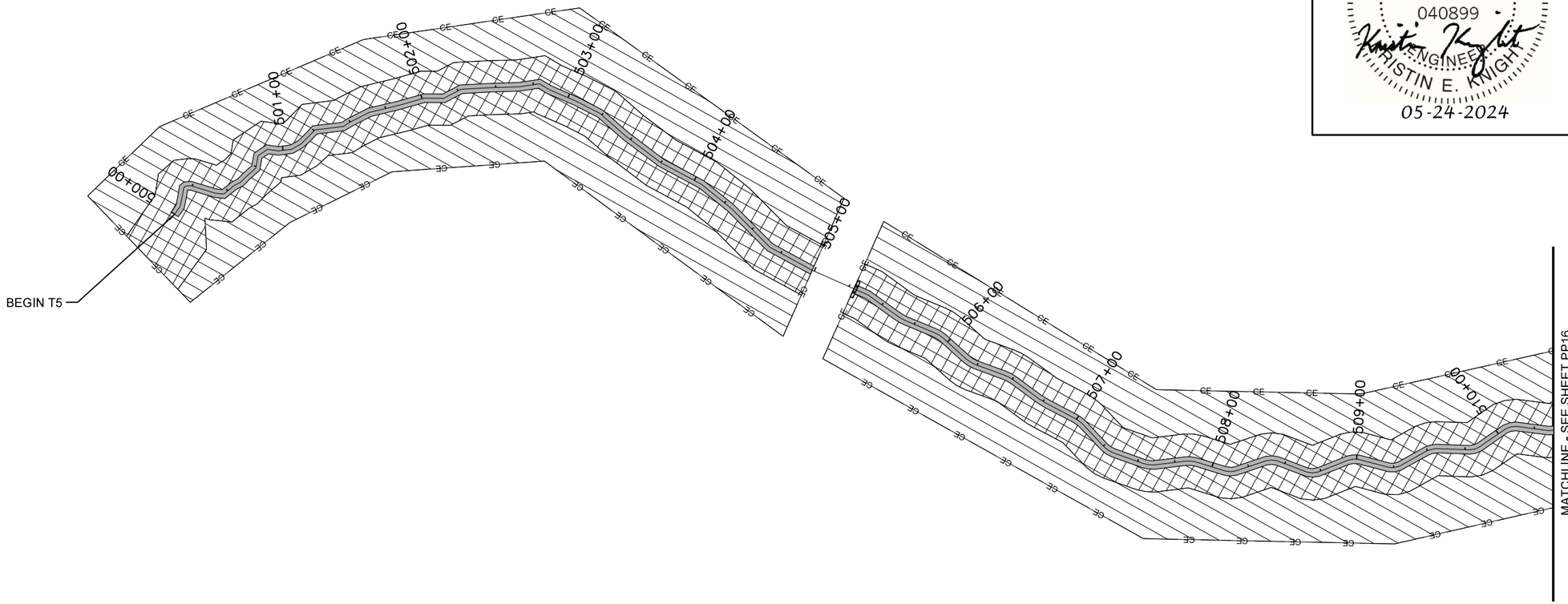
RALEIGH, NORTH CAROLINA 27609

MORGAN BRANCH
RESTORATION SITE
BUNCOMBE COUNTY, NORTH CAROLINA

DATE: MAY 2024
SCALE: GRAPHIC

PLANTING
PLAN

SHEET PP14



MATCHLINE - SEE SHEET PP16

PLANTING ZONE 1

PLANTING ZONE 2

STREAM ZONE

*NOTE:
SEE SHEET PP1 FOR
PLANTING QUANTITIES

NC GRID
NAD 83

–40′ 0′ 40′ 80′

GRAPHIC SCALE

NORTH CAROLINA
PROFESSIONAL
SEAL
040899
ENGINEER
KRISTIN E. KNIGHT
05-24-2024

A	REVISIONS PER IRT COMMENTS		MAY 2024
SYM.	DESCRIPTION	REVISIONS	DATE

NORTH CAROLINA
Environmental Quality

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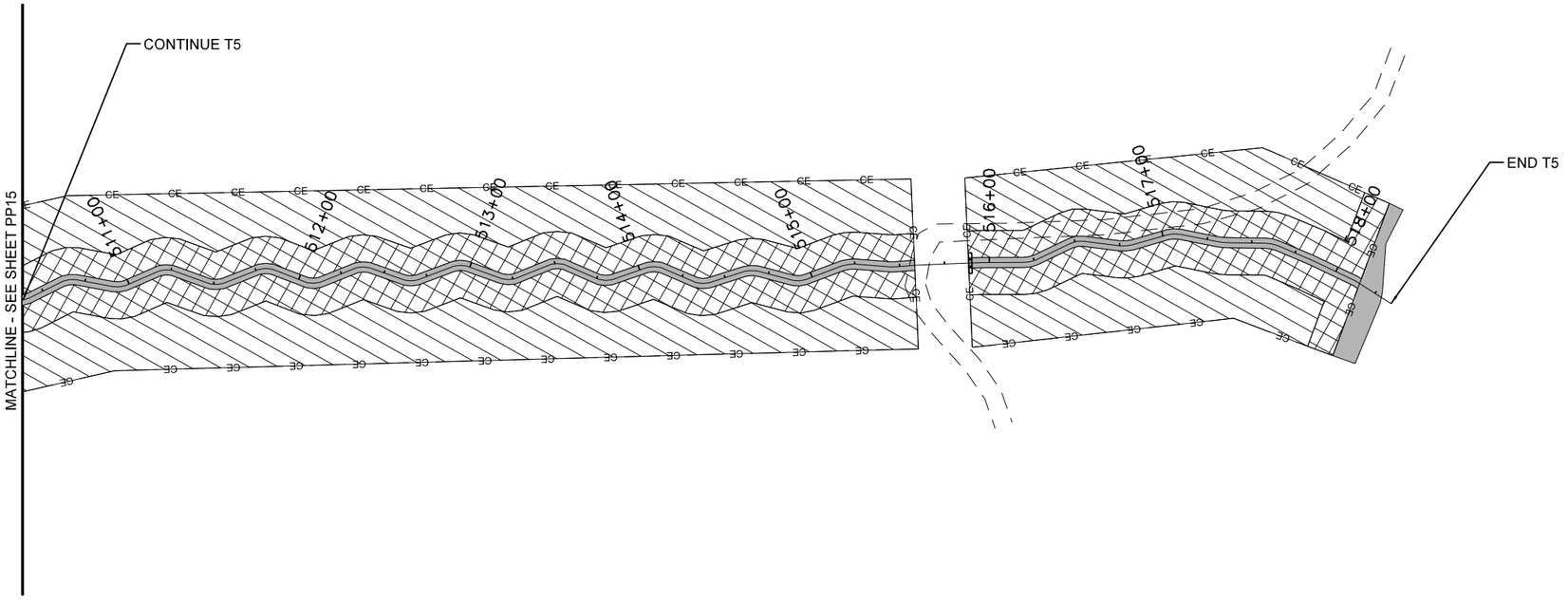
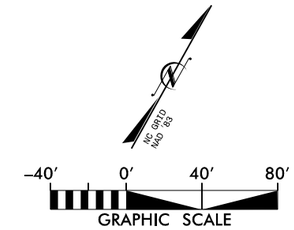
MORGAN BRANCH
RESTORATION SITE
BUNCOMBE COUNTY, NORTH CAROLINA

DATE: MAY 2024
SCALE: GRAPHIC

PLANTING
PLAN

SHEET PP15





PLANTING ZONE 1

PLANTING ZONE 2

STREAM ZONE

*NOTE:
SEE SHEET PP1 FOR
PLANTING QUANTITIES

NORTH CAROLINA PROFESSIONAL SEAL 040899 ENGINEER KRISTIN E. KNIGHT
05-24-2024

A	REVISIONS PER IRT COMMENTS		MAY 2024
SYM.	DESCRIPTION	REVISIONS	DATE

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Environmental Quality

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MORGAN BRANCH
RESTORATION SITE
BUNCOMBE COUNTY, NORTH CAROLINA

DATE: MAY 2024
SCALE: GRAPHIC

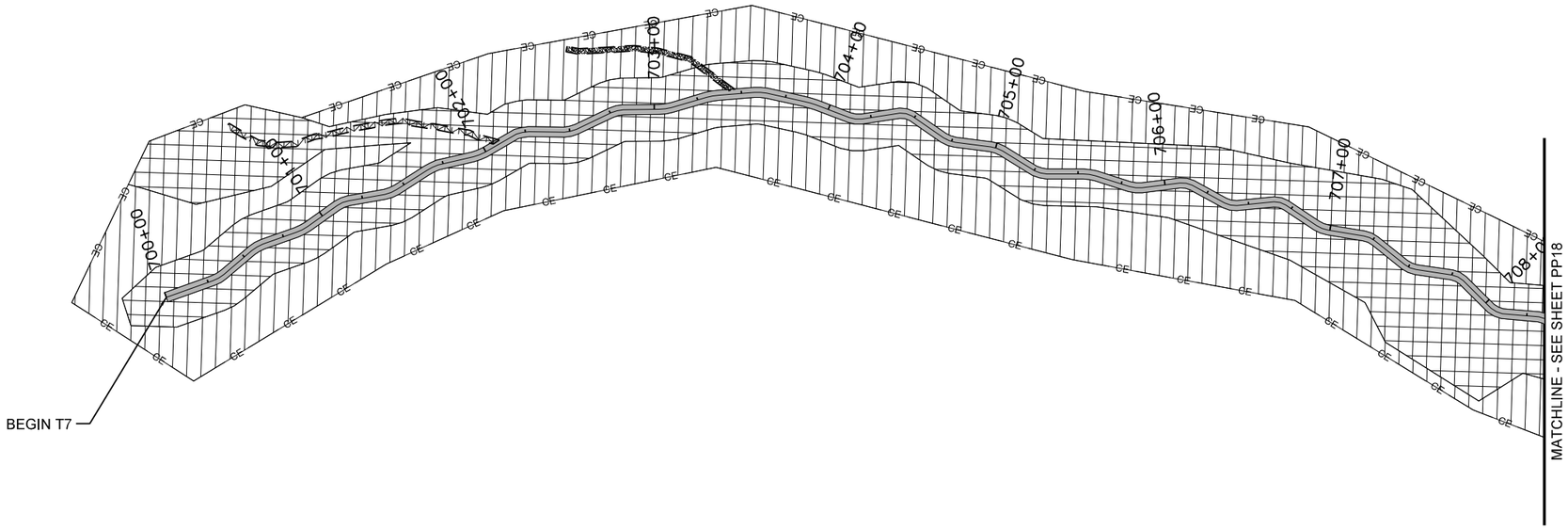
PLANTING
PLAN

SHEET PP16

NC GRID
NAD '83

–40′ 0′ 40′ 80′
GRAPHIC SCALE

NORTH CAROLINA
PROFESSIONAL
SEAL
040899
ENGINEER
KRISTIN E. KNIGHT
05-24-2024



PLANTING ZONE 1

PLANTING ZONE 2

STREAM ZONE

*NOTE:
SEE SHEET PP1 FOR
PLANTING QUANTITIES

A	REVISIONS PER IRT COMMENTS	MAY 2024
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REVISIONS

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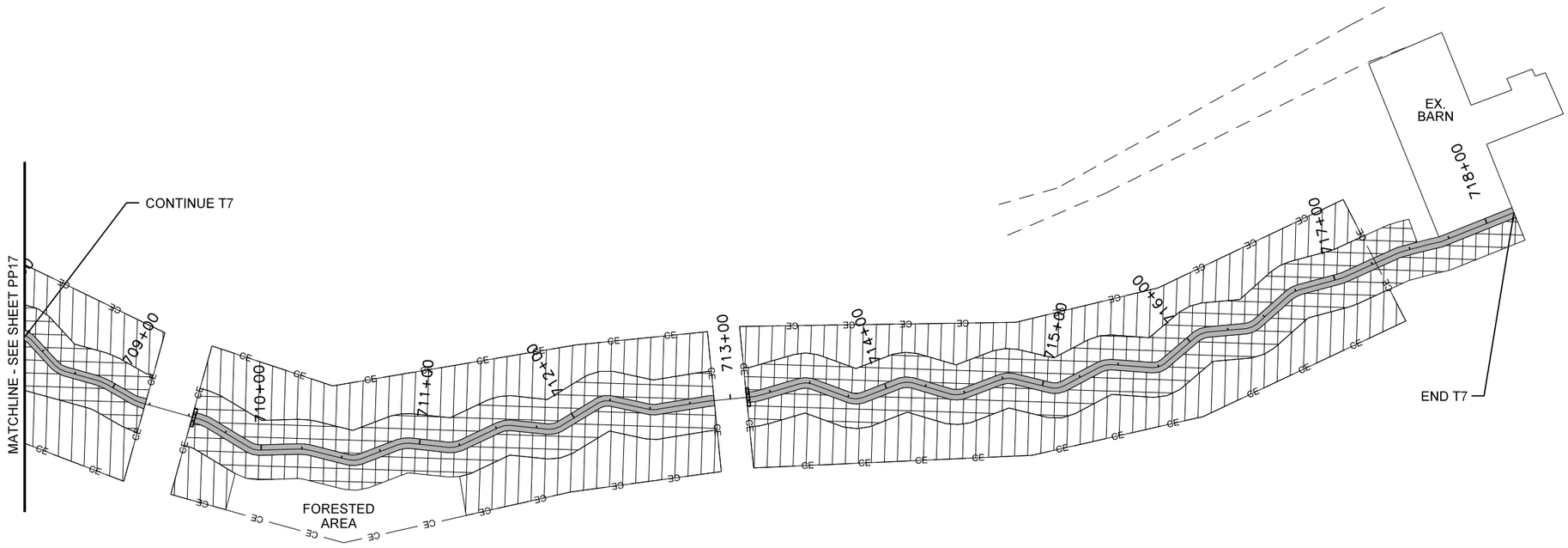
MORGAN BRANCH RESTORATION SITE

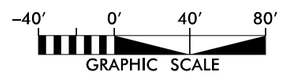
BUNCOMBE COUNTY, NORTH CAROLINA

DATE: MAY 2024
SCALE: GRAPHIC

PLANTING PLAN

SHEET PP17





PLANTING ZONE 1

PLANTING ZONE 2

STREAM ZONE

*NOTE:
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PLANTING QUANTITIES

NORTH CAROLINA
PROFESSIONAL
SEAL
040899
ENGINEER
KRISTIN E. KNIGHT
05-24-2024

	DATE	DESCRIPTION
		REVISIONS
A		REVISIONS PER IRT COMMENTS
	MAY 2024	

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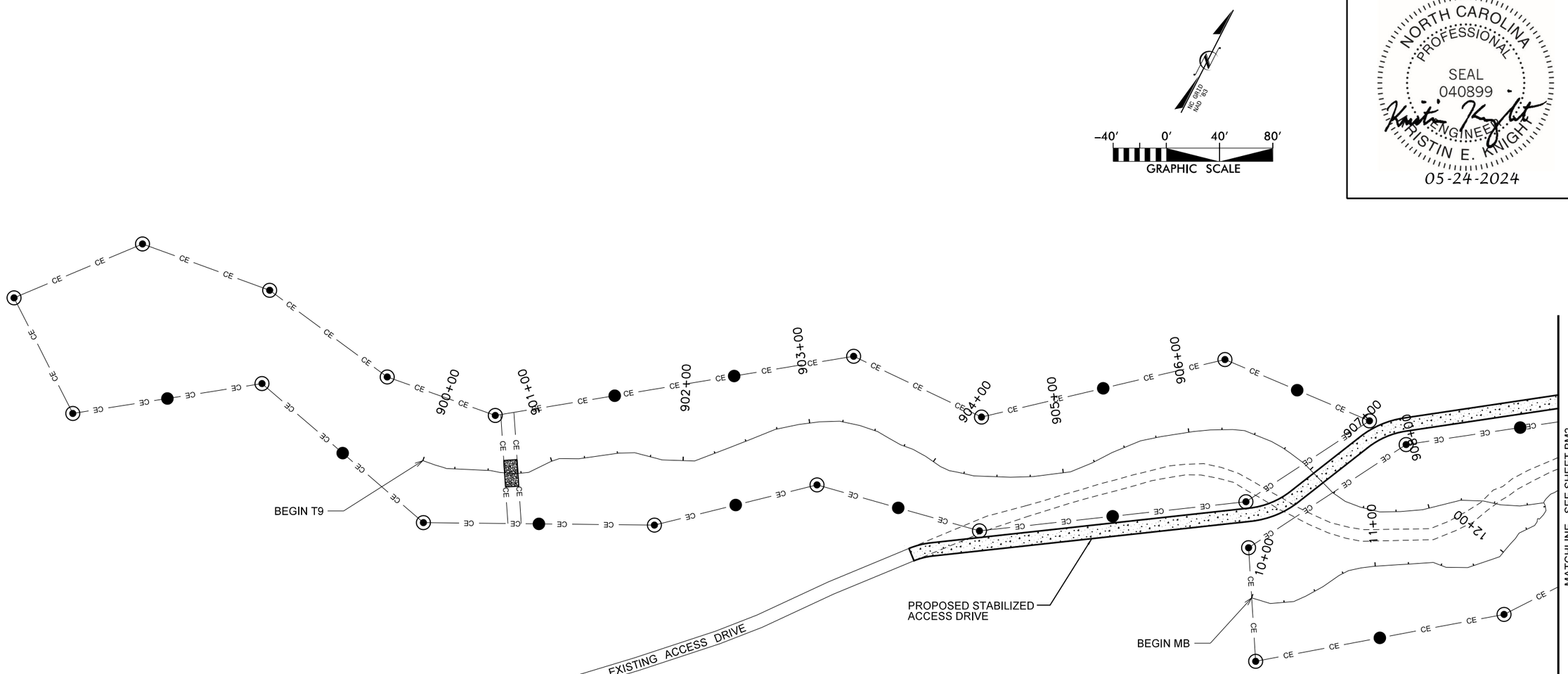
MORGAN BRANCH
RESTORATION SITE
BUNCOMBE COUNTY, NORTH CAROLINA

DATE: MAY 2024
SCALE: GRAPHIC

PLANTING
PLAN

SHEET PP18



EASEMENT BOUNDARY MARKING

THE EASEMENT BOUNDARY WILL BE MARKED WITH METAL OR SALT TREATED WOOD POSTS AND CONSERVATION EASEMENT SIGNS AT THE CORNERS AND AT A MINIMUM OF 100' INTERVALS ALONG THE BOUNDARY.

WHEN APPROPRIATE, PROVIDER SHALL MARK EXISTING TREES WITH CONSERVATION EASEMENT SIGNS AND / OR BLAZE PROPERTY LINES AT APPROXIMATELY EYE LEVEL.

◉	6-FOOT TALL DURABLE WITNESS POSTS AND 5/8" REBAR 30" IN LENGTH WITH 3-1/4" ALUMINUM CAPS ON ALL EASEMENT CORNERS. CAPS SHALL MEET DMS SPECIFICATIONS (BERNSTEN RBD5325 IMPRINTED WITH NC STATE LOGO #B9087 OR EQUIVALENT). AFTER INSTALLATION, CAPS SHALL BE STAMPED WITH THE CORRESPONDING NUMBER.
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—0—	EXISTING FENCE
—×—	INSTALL WOVEN WIRE FENCE ALONG CONSERVATION EASEMENT
— CE —	CONSERVATION EASEMENT NOT REQUIRING FENCING
Ⓖ	INSTALL ACCESS GATE

NORTH CAROLINA PROFESSIONAL SEAL 040899 ENGINEER KRISTIN E. KNIGHT
05-24-2024

	DESCRIPTION	DATE
A	REVISIONS PER IRT COMMENTS	MAY 2024
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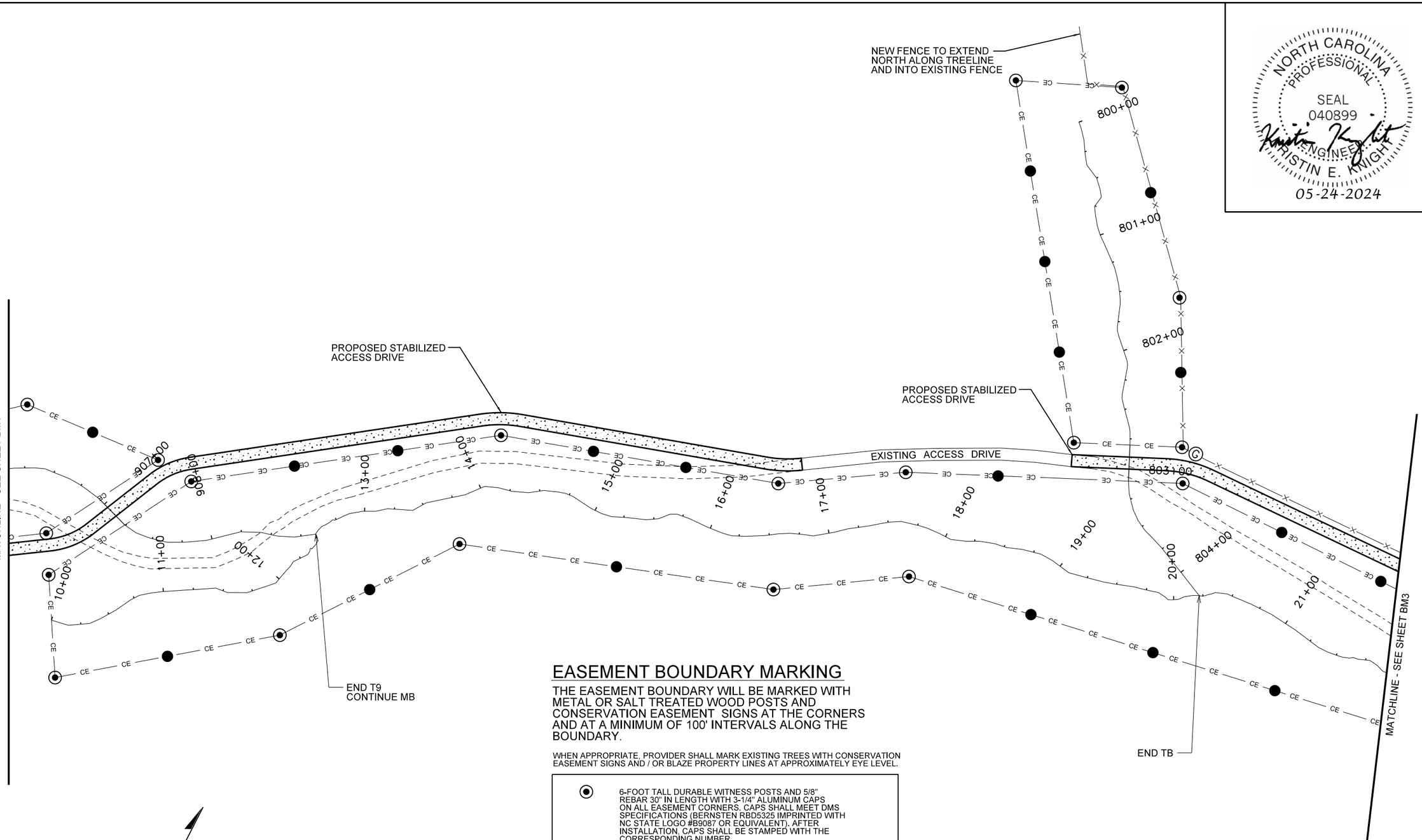
MORGAN BRANCH RESTORATION SITE

BUNCOMBE COUNTY, NORTH CAROLINA

DATE: MAY 2024
SCALE: GRAPHIC

BOUNDARY MARKING PLAN

SHEET BMI



NORTH CAROLINA PROFESSIONAL SEAL 040899 ENGINEER KRISTIN E. KNIGHT
05-24-2024

A	REVISIONS PER IRT COMMENTS	MAY 2024
SYM.	DESCRIPTION	DATE

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Ⓖ	INSTALL ACCESS GATE

NC GRID NAD 83

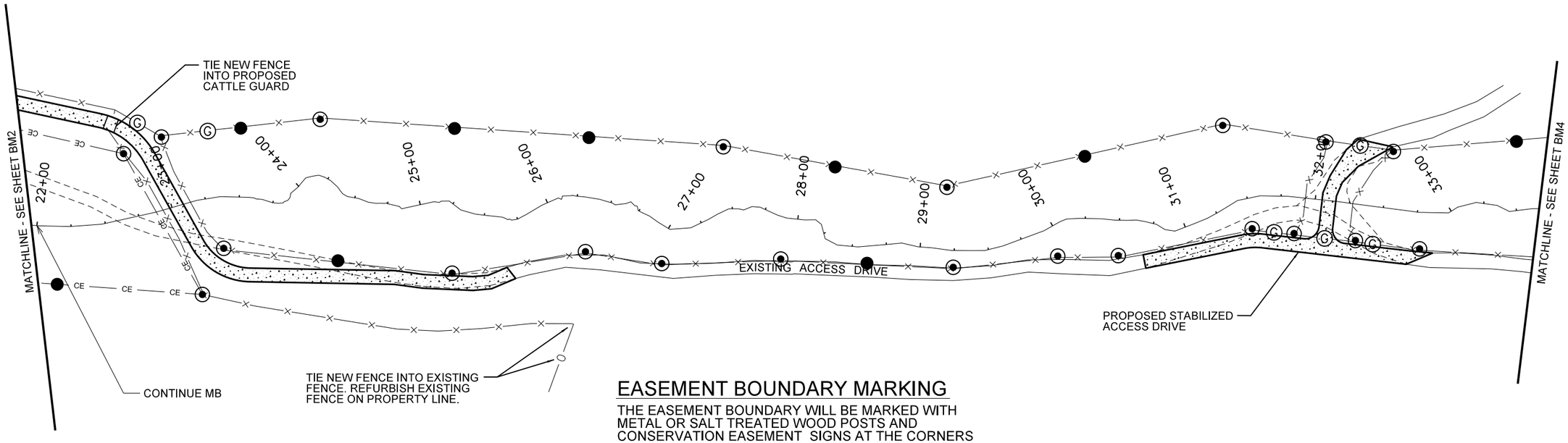
−40′ 0′ 40′ 80′
GRAPHIC SCALE

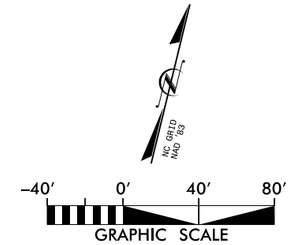
MORGAN BRANCH
RESTORATION SITE
BUNCOMBE COUNTY, NORTH CAROLINA

DATE: MAY 2024
SCALE: GRAPHIC

BOUNDARY MARKING PLAN

SHEET BM2





NORTH CAROLINA PROFESSIONAL SEAL 040899 ENGINEER KRISTIN E. KNIGHT
05-24-2024

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— O —	EXISTING FENCE
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A	REVISIONS PER IRT COMMENTS		MAY 2024
		DESCRIPTION	DATE
		REVISIONS	

NORTH CAROLINA *Environmental Quality*

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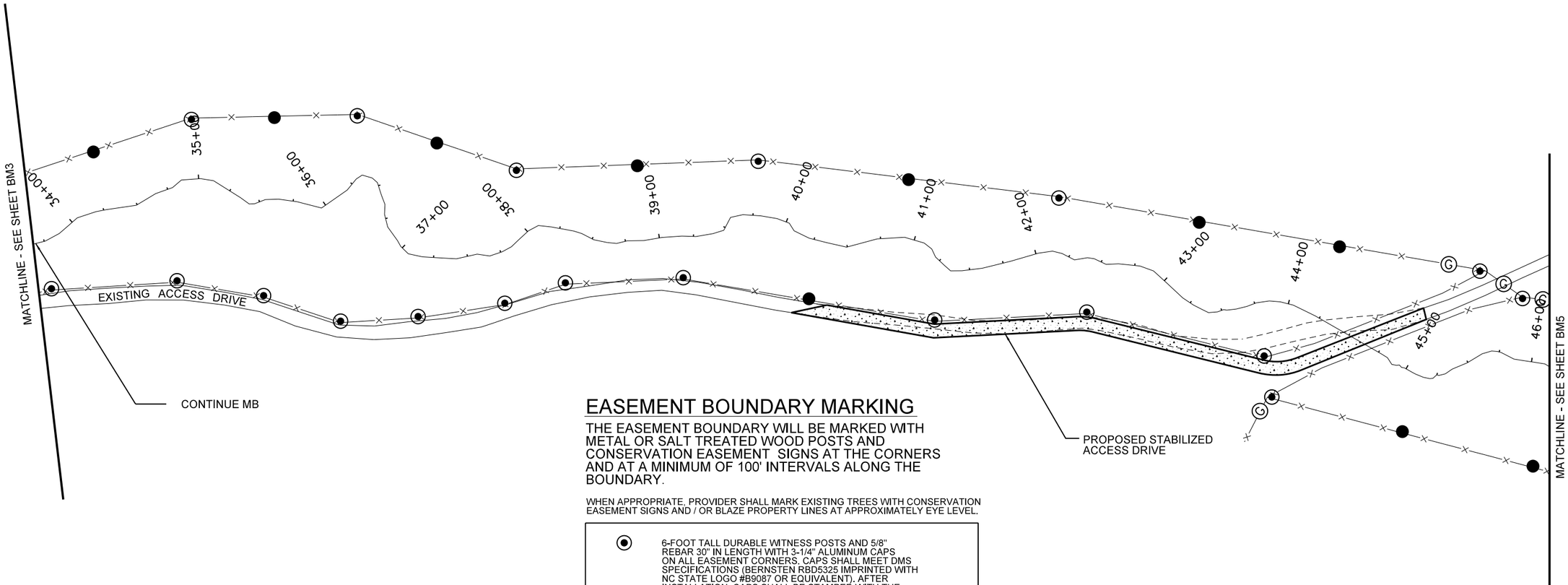
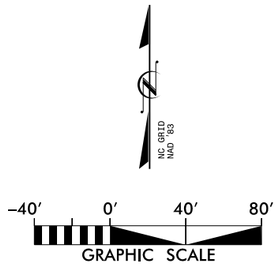
MORGAN BRANCH RESTORATION SITE
BUNCOMBE COUNTY, NORTH CAROLINA

DATE: MAY 2024
SCALE: GRAPHIC

BOUNDARY MARKING PLAN

SHEET BM3





NORTH CAROLINA PROFESSIONAL SEAL 040899 ENGINEER KRISTIN E. KNIGHT
05-24-2024

EASEMENT BOUNDARY MARKING

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A	REVISIONS PER IRT COMMENTS		MAY 2024
		DESCRIPTION	DATE
		STAL	REVISIONS

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MORGAN BRANCH
RESTORATION SITE
BUNCOMBE COUNTY, NORTH CAROLINA

DATE: MAY 2024
SCALE: GRAPHIC

BOUNDARY MARKING PLAN

SHEET BM4

EASEMENT BOUNDARY MARKING

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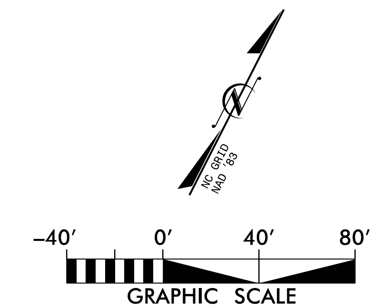

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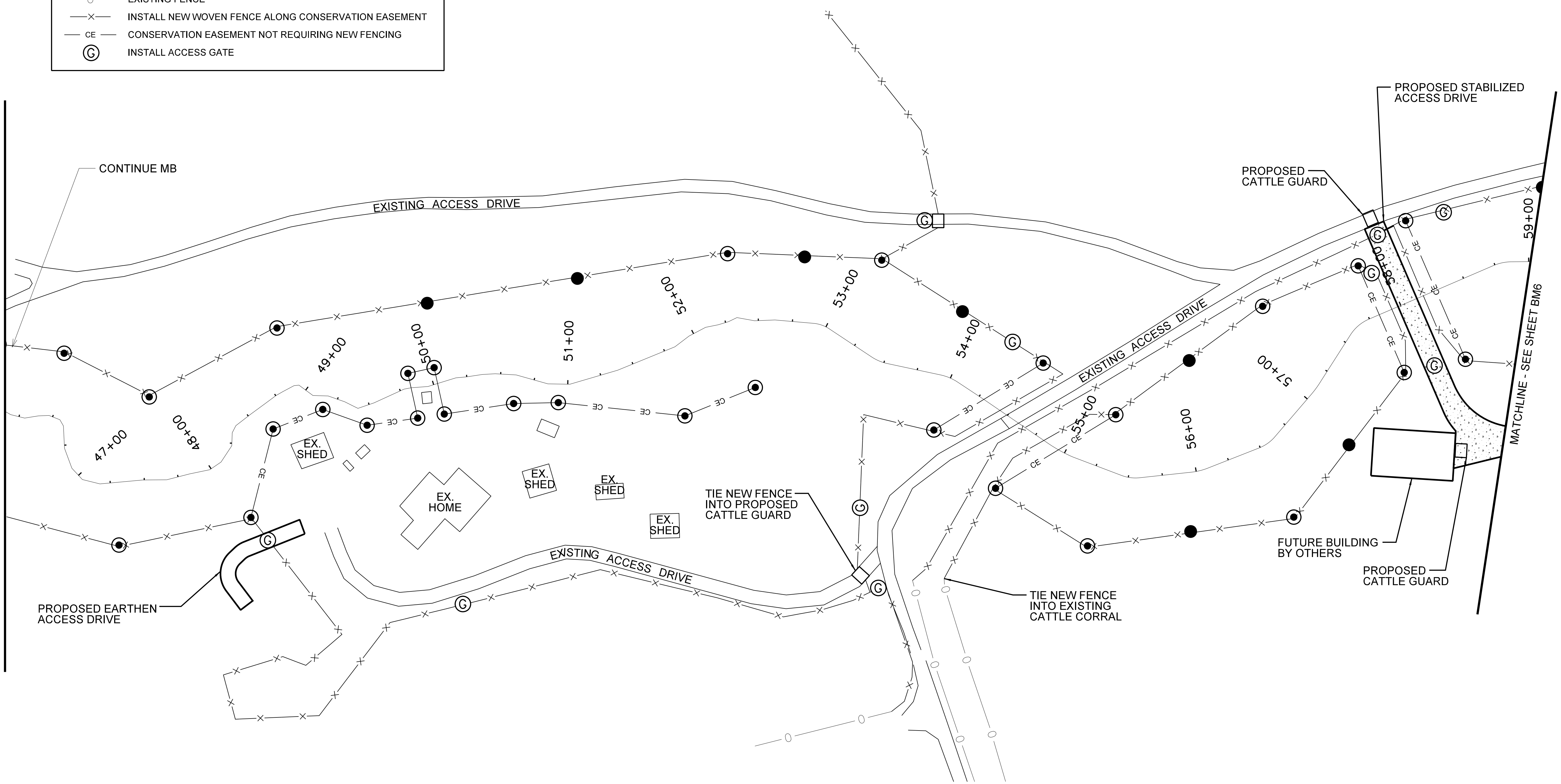
05-24-2024



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MORGAN BRANCH
RESTORATION SITE
BUNCOMBE COUNTY, NORTH CAROLINA

DATE: MAY 2024
SCALE: GRAPHIC

BOUNDARY MARKING PLAN

SHEET BM5

EASEMENT BOUNDARY MARKING

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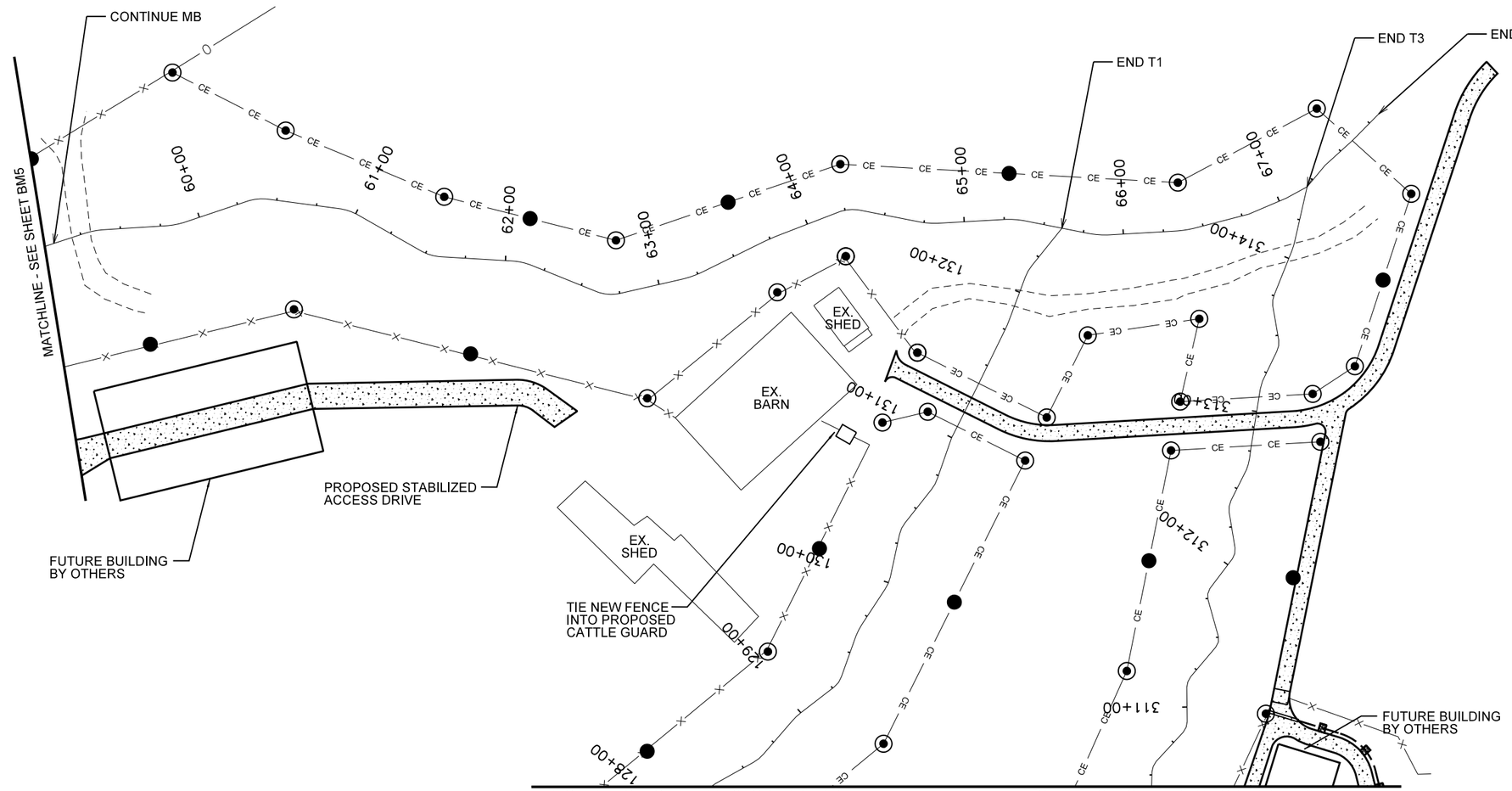
NC GRID
NAD 83

–40′ 0′ 40′ 80′
GRAPHIC SCALE



NORTH CAROLINA PROFESSIONAL SEAL 040899 ENGINEER KRISTIN E. KNIGHT
05-24-2024

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REVISIONS

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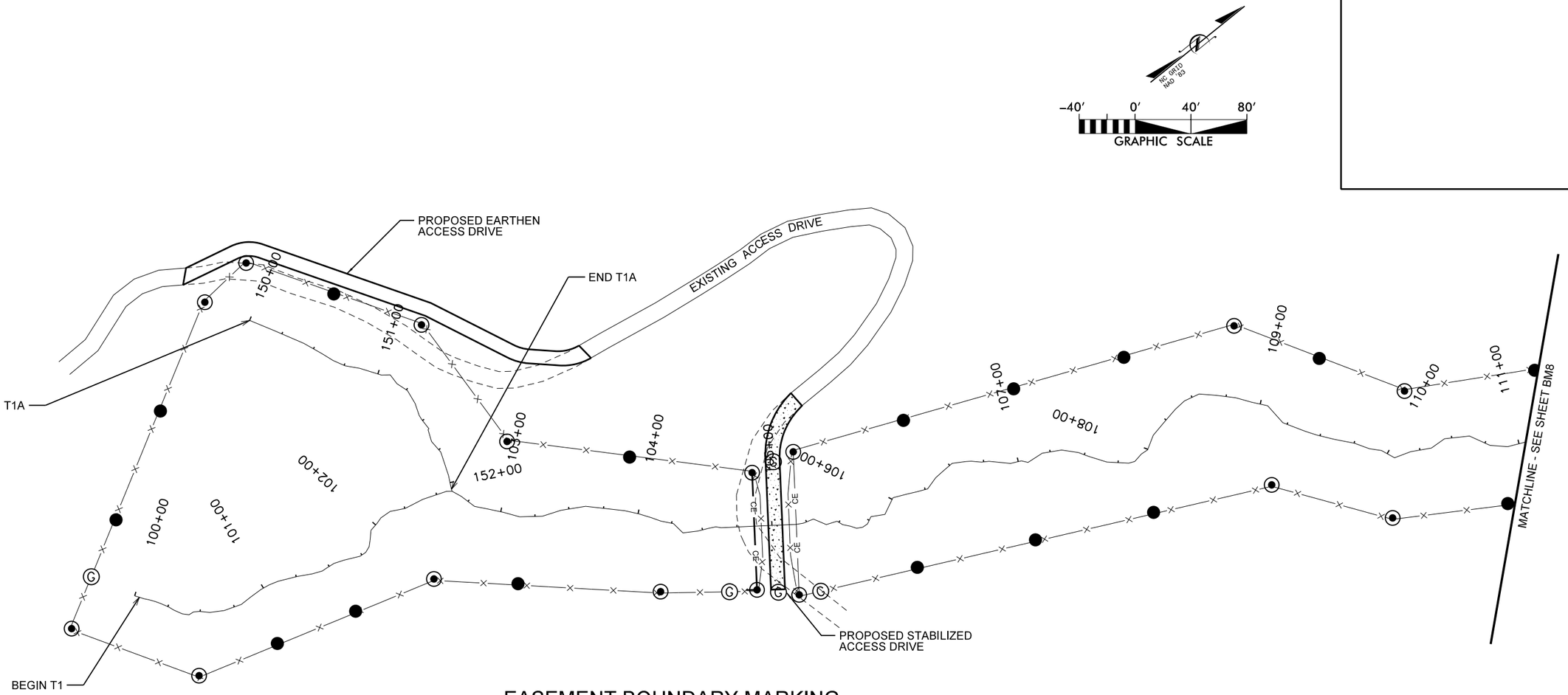
MORGAN BRANCH
RESTORATION SITE
BUNCOMBE COUNTY, NORTH CAROLINA

DATE: MAY 2024
SCALE: GRAPHIC

BOUNDARY MARKING PLAN

SHEET BM6



EASEMENT BOUNDARY MARKING

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REVISIONS			
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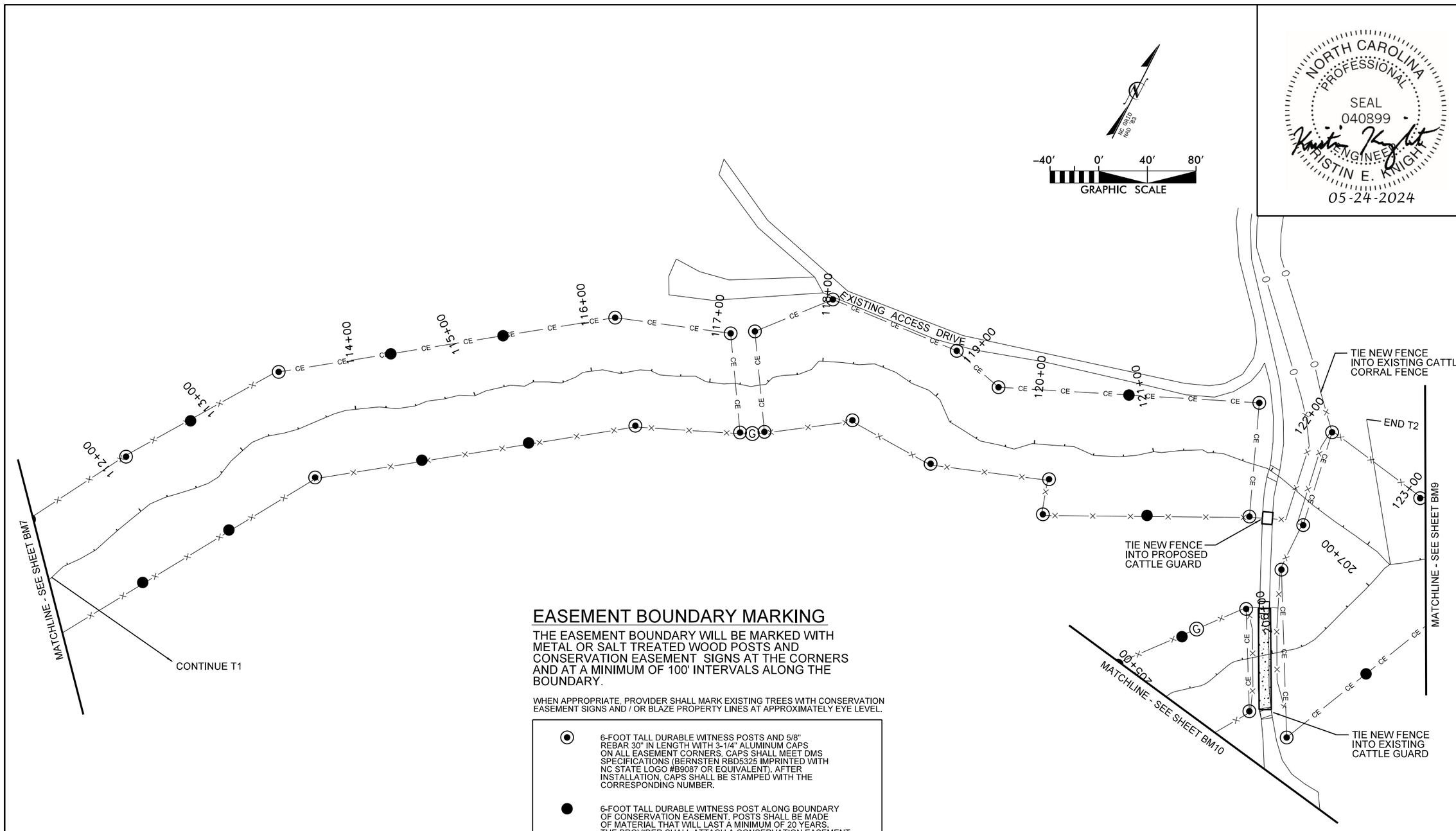
MORGAN BRANCH
RESTORATION SITE
BUNCOMBE COUNTY, NORTH CAROLINA

DATE: MAY 2024
SCALE: GRAPHIC

BOUNDARY
MARKING
PLAN

SHEET BM7



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NORTH CAROLINA PROFESSIONAL SEAL 040899 ENGINEER KRISTIN E. KNIGHT
05-24-2024

	DATE	DESCRIPTION
SYM.		REVISIONS
A	MAY 2024	REVISIONS PER IRT COMMENTS

NORTH CAROLINA
Environmental Quality

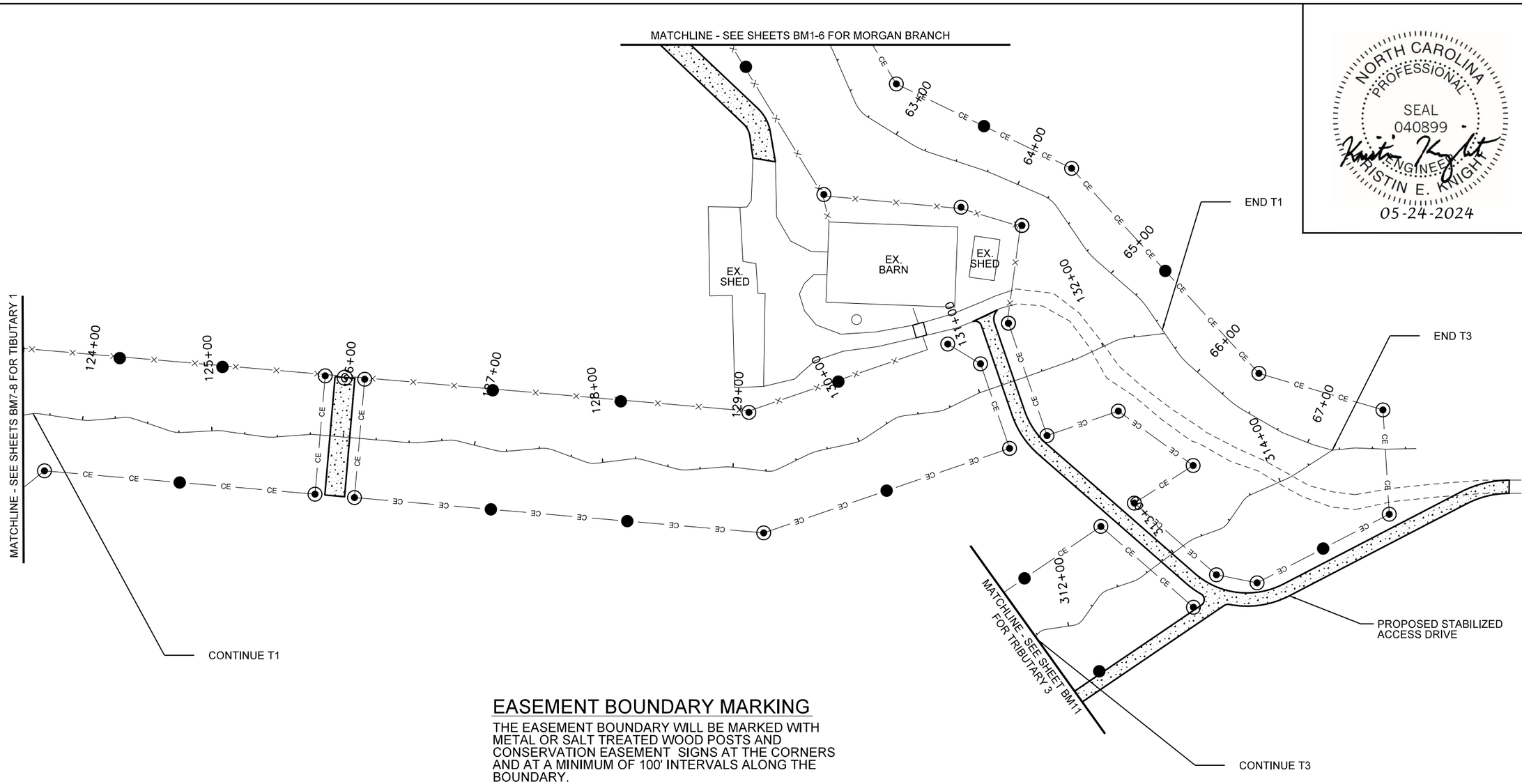
KCI
ASSOCIATES OF NC
ENGINEERS • PLANNERS • SCIENTISTS
4505 FALLS OF NEUSE ROAD, SUITE 400
RALEIGH, NORTH CAROLINA 27609

MORGAN BRANCH
RESTORATION SITE
BUNCOMBE COUNTY, NORTH CAROLINA

DATE: MAY 2024
SCALE: GRAPHIC

BOUNDARY MARKING PLAN

SHEET BM8



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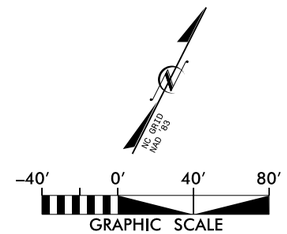

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BOUNDARY MARKING PLAN

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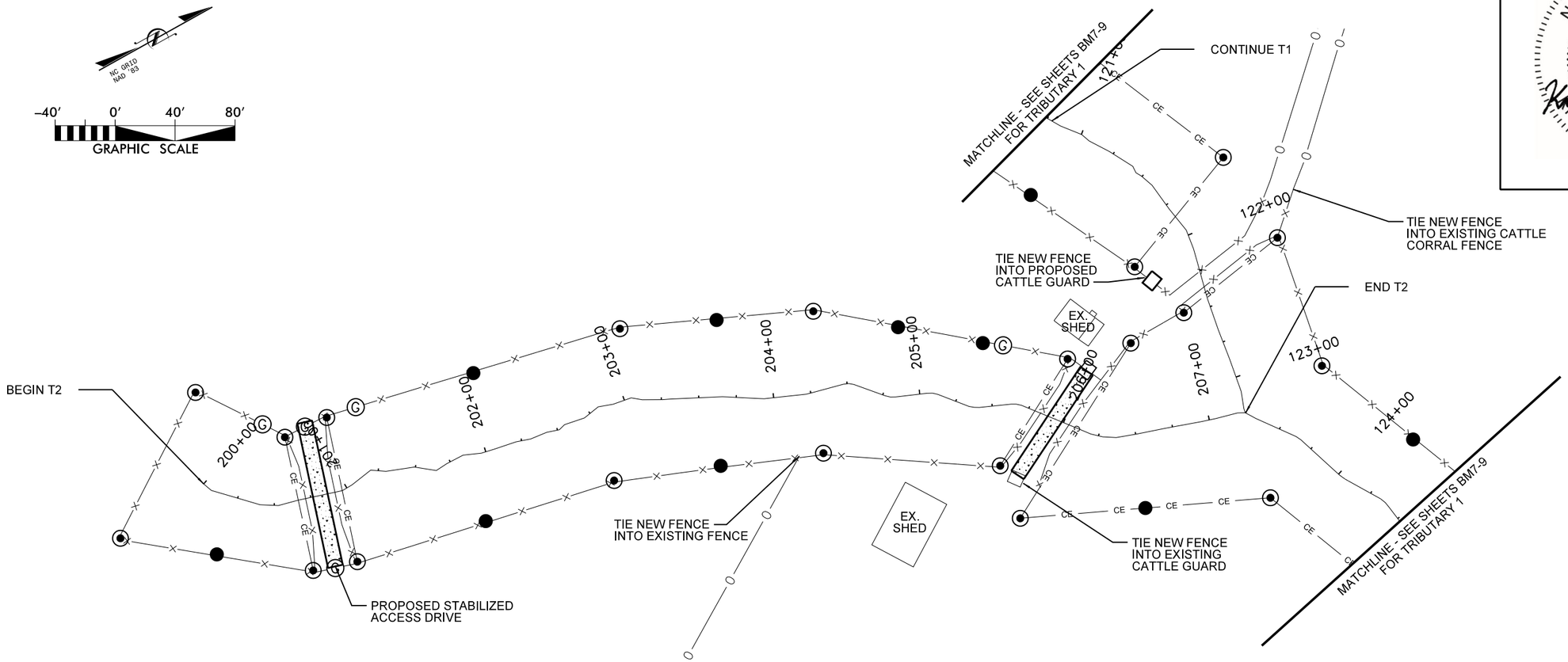

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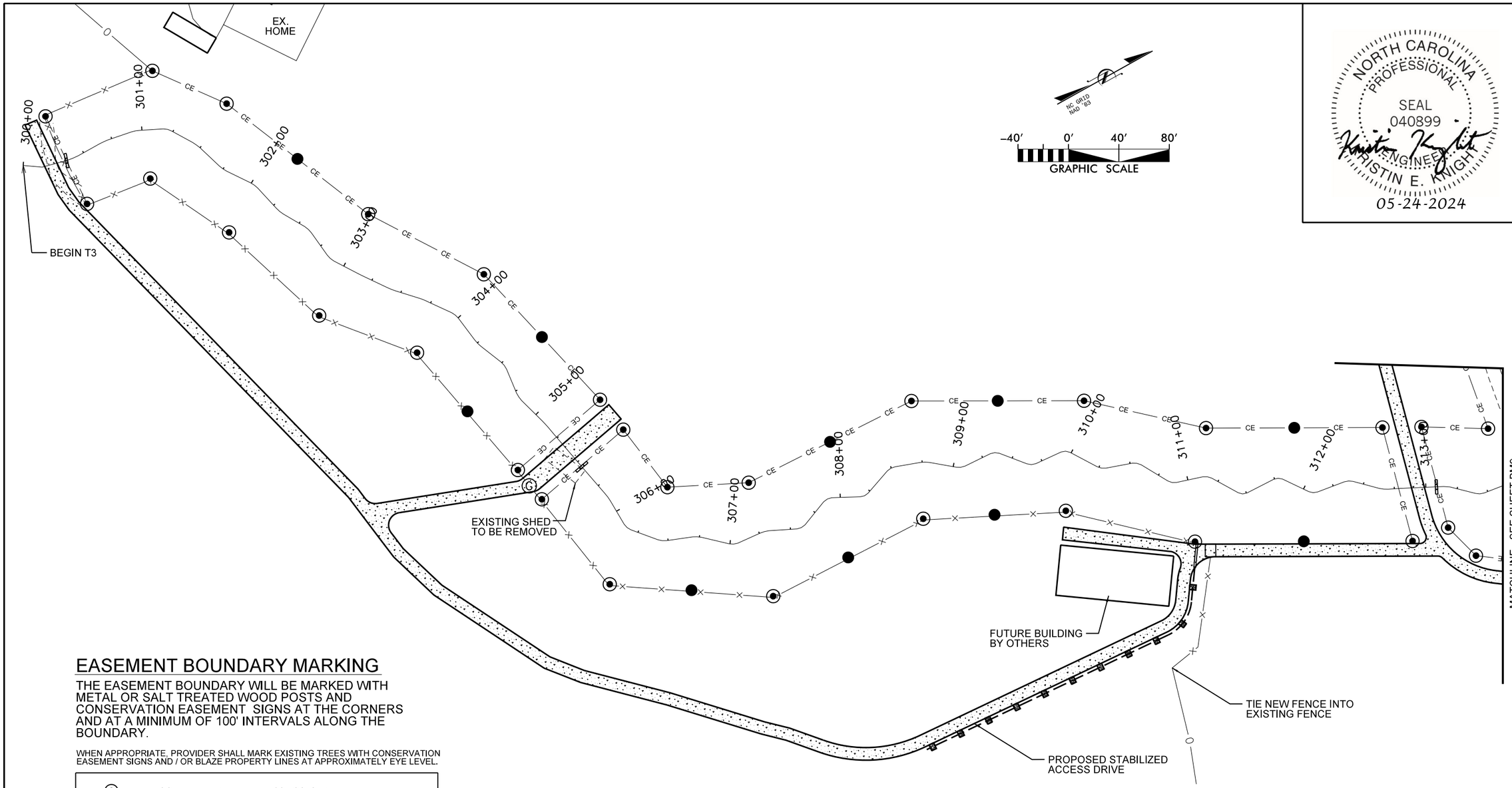

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BOUNDARY MARKING PLAN

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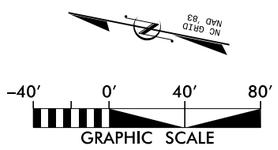

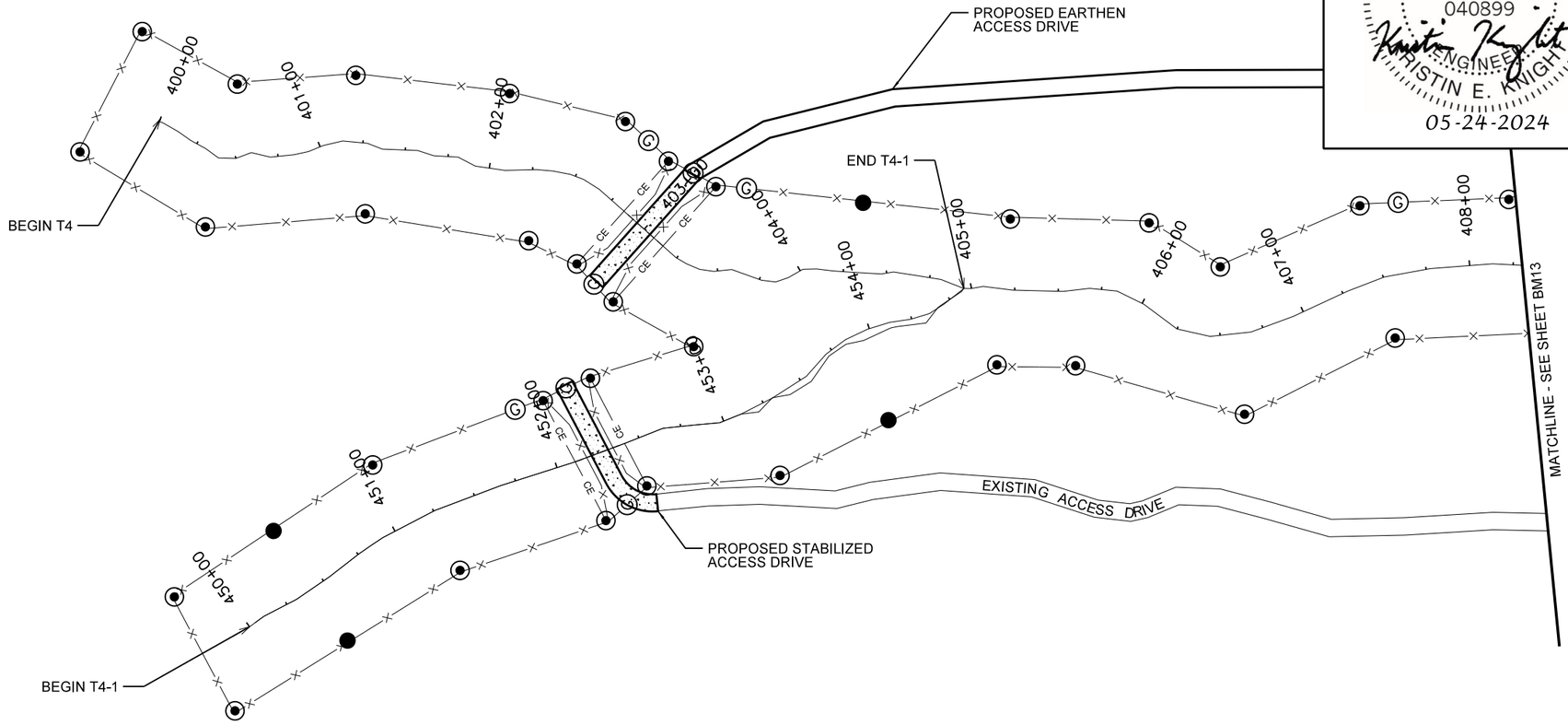

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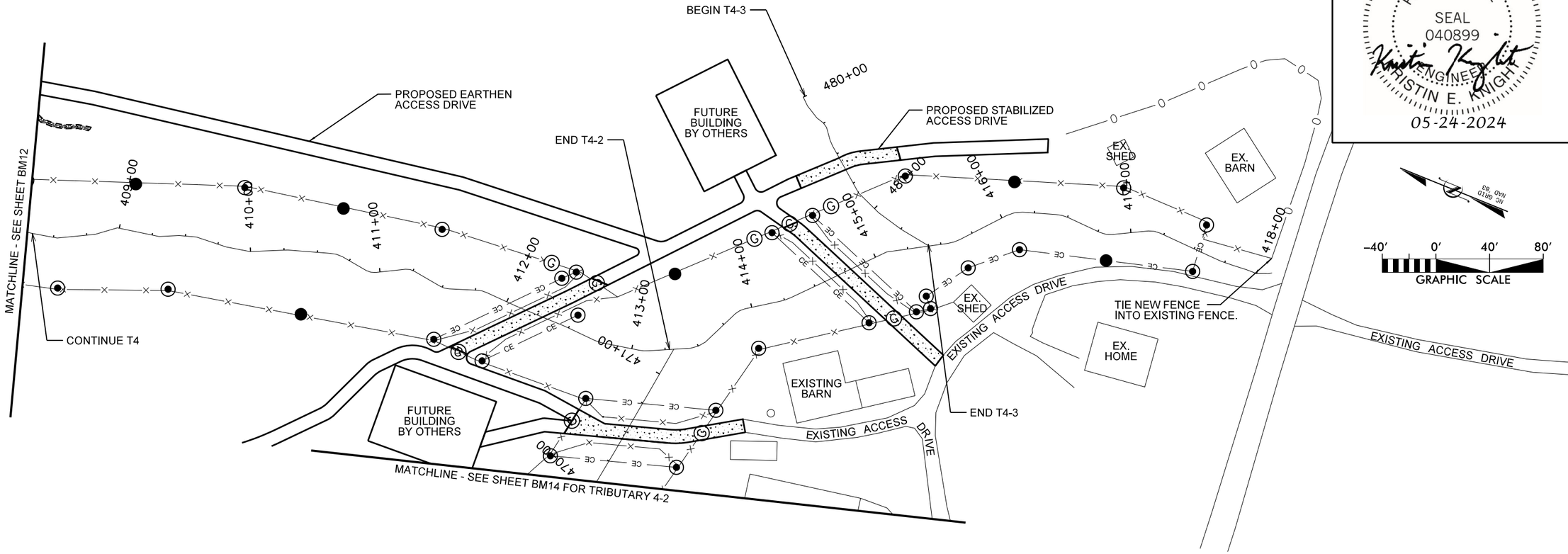

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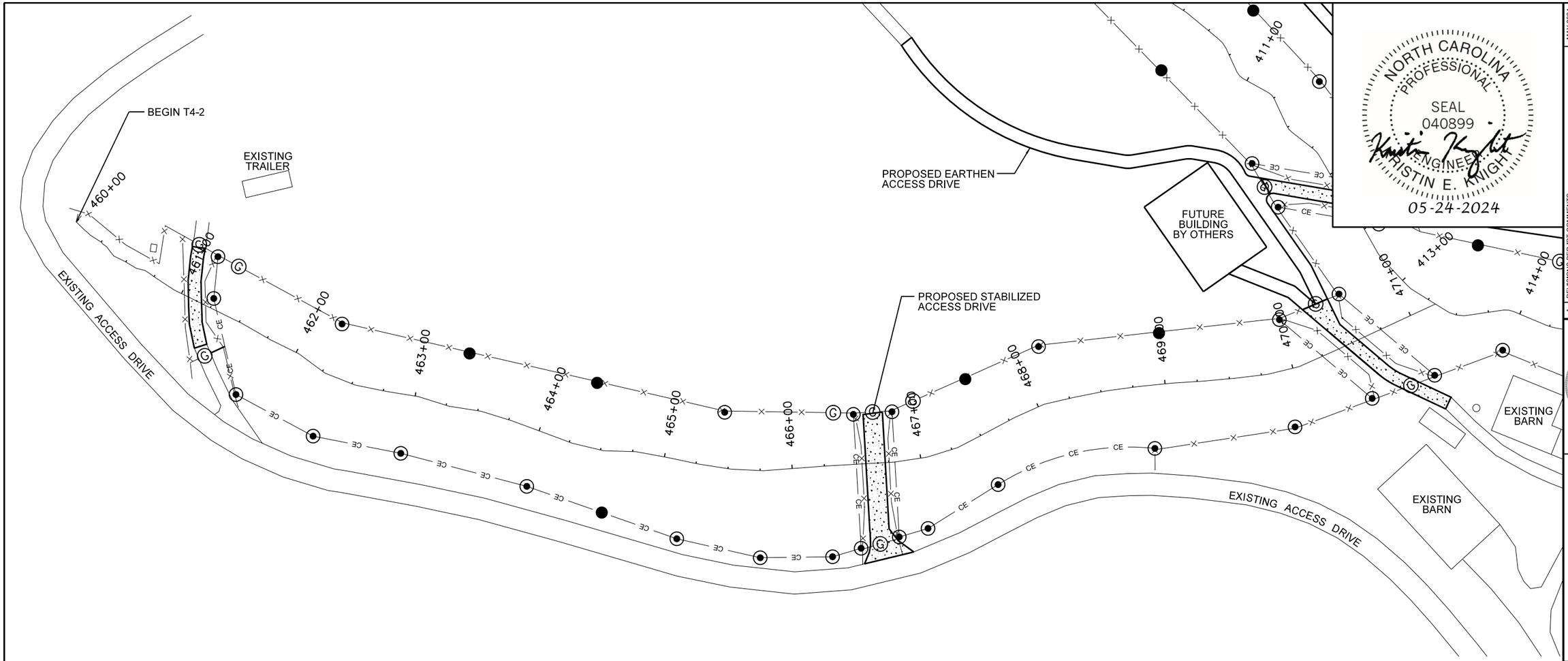

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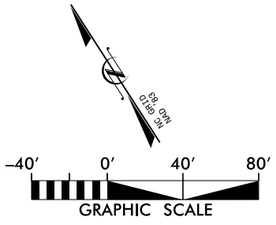

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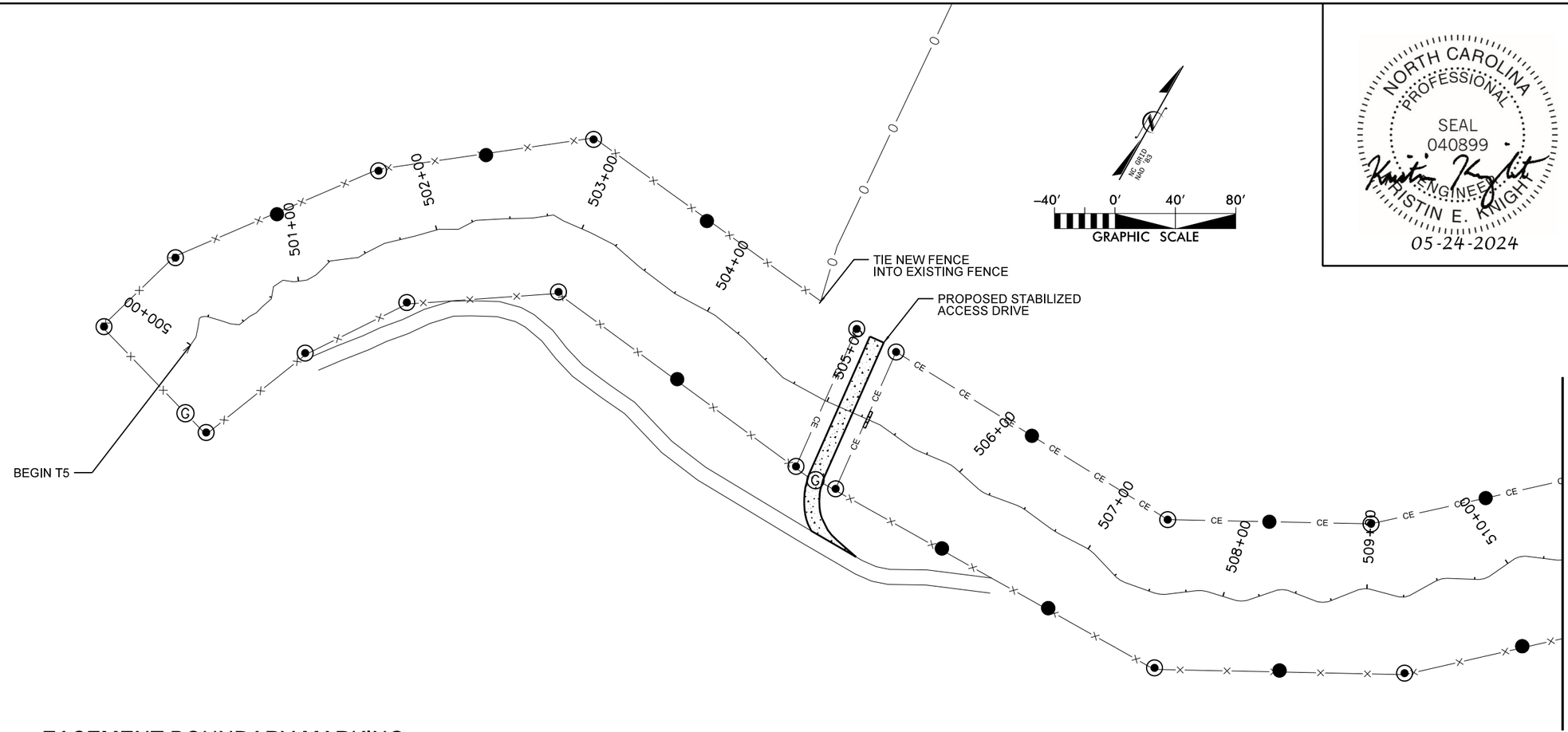
BOUNDARY MARKING PLAN

SHEET BMI4



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NORTH CAROLINA
Environmental Quality

MORGAN BRANCH
RESTORATION SITE
BUNCOMBE COUNTY, NORTH CAROLINA

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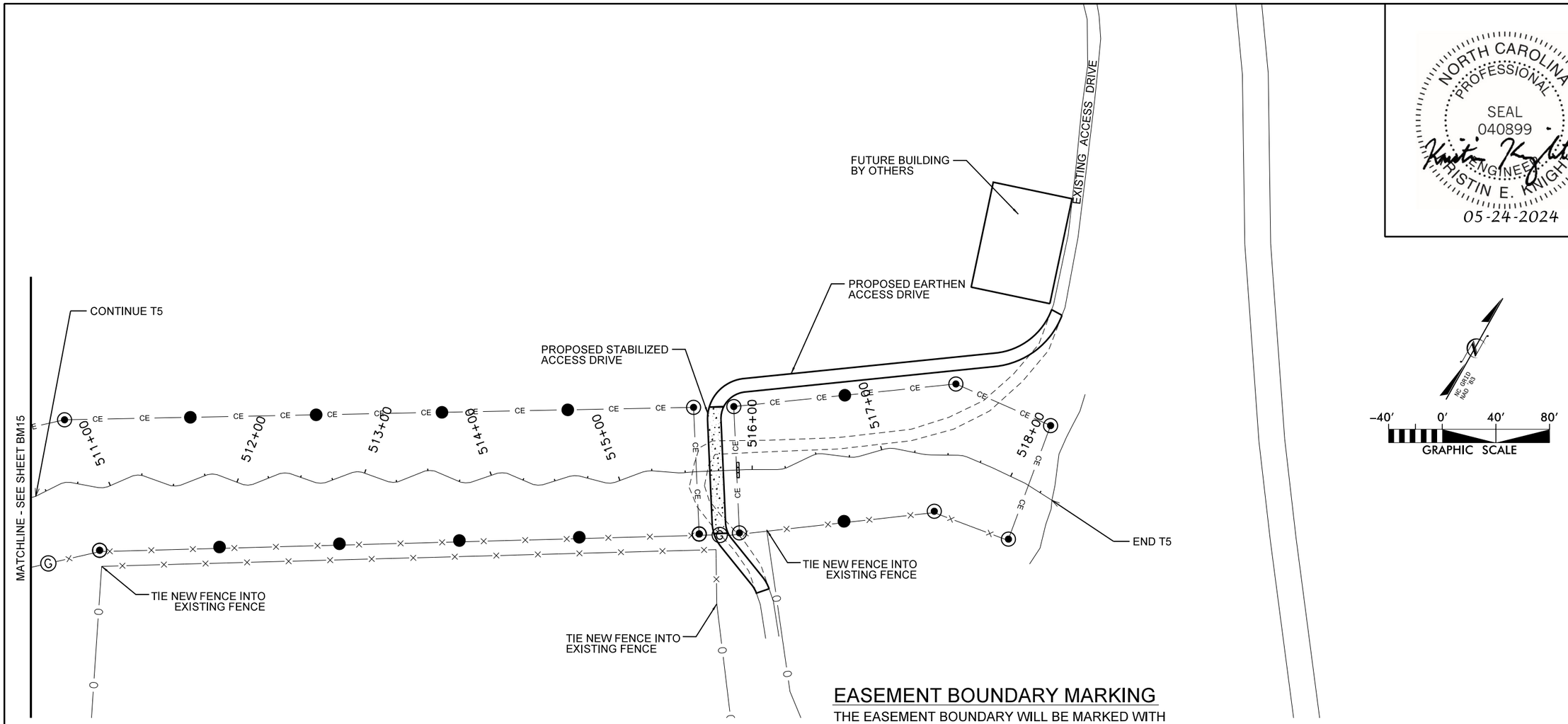
BOUNDARY
MARKING
PLAN

SHEET BM15



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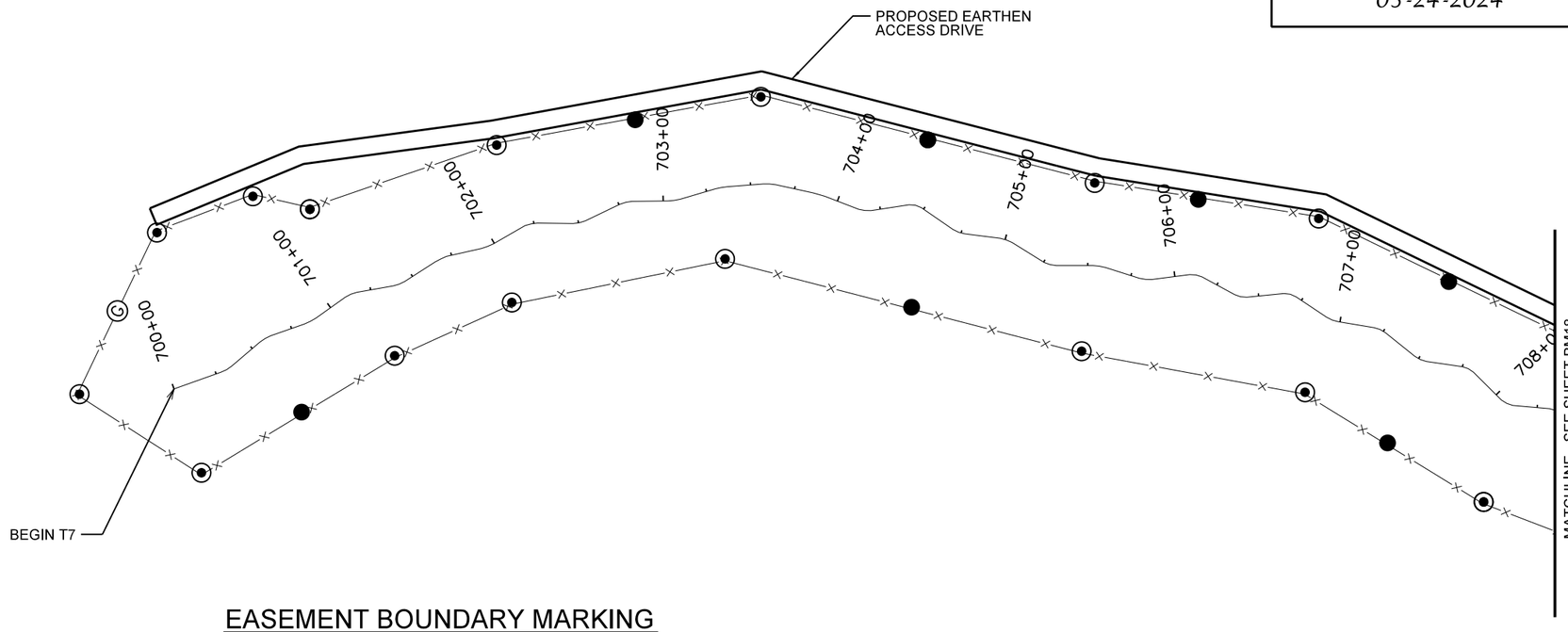
BOUNDARY MARKING PLAN

SHEET BM16

NC GRID
NAD '83

–40′ 0′ 40′ 80′

GRAPHIC SCALE



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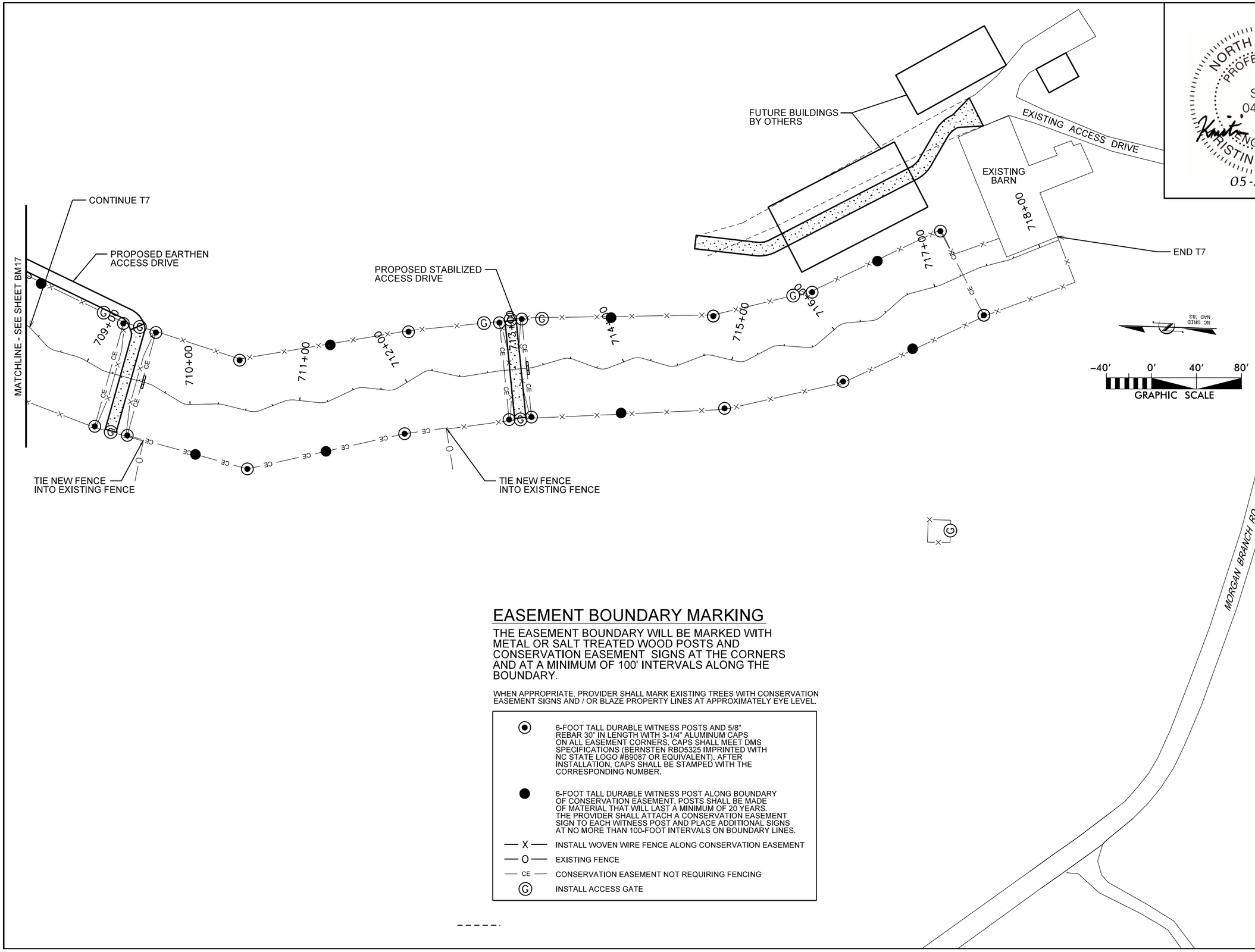

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SHEET BM18

SEDIMENTATION AND EROSION CONTROL NOTES:

1. IT IS THE INTENT OF THESE PLANS THAT AS SOON AS AN AREA OF GRADING IS COMPLETE IT SHALL BE STABILIZED IN ACCORDANCE WITH THE EROSION CONTROL PRACTICES DESCRIBED IN THESE PLANS.DUE TO THE ANTICIPATED DURATION AND SEQUENCE OF THE CONSTRUCTION ACTIVITIES, THE CONTRACTOR IS REQUIRED TO MINIMIZE, AS MUCH AS POSSIBLE, THE AMOUNT OF THE AREA THAT IS DISTURBED AT ONE TIME.

2. THE CONTRACTOR SHALL EXERCISE EVERY REASONABLE PRECAUTION THROUGHOUT THE CONSTRUCTION OF THE PROJECT TO PREVENT EROSION AND SEDIMENTATION. EROSION CONTROL MEASURES SHALL BE INSTALLED AND MAINTAINED IN ACCORDANCE WITH THE PROJECT PLANS, NORTH CAROLINA SEDIMENT AND EROSION CONTROL GUIDELINES AND AS DIRECTED BY THE DESIGNER.

3. IN THE EVENT OF A STORM, THE CONTRACTOR WILL BE RESPONSIBLE FOR REMOVAL OR PROTECTION OF ANY EQUIPMENT, TOOLS, MATERIALS OR OTHER ITEMS NEEDED TO COMPLETE THE WORK THAT COULD BE AFFECTED BY STORMWATER.

4. EACH SEDIMENT CONTROL DEVICE WILL BE REMOVED AFTER ALL WORK IN THE CORRESPONDING CONSTRUCTION PHASE HAS BEEN COMPLETED AND ADEQUATE PERMANENT GROUND COVER HAS BEEN RE-ESTABLISHED ON THE DISTURBED AREAS, AS DETERMINED BY THE DESIGNER.

5. THE CONSTRUCTION ENTRANCES AND STAGING AREAS IDENTIFIED ON THE PLANS PROVIDE THE ONLY ACCESS POINTS INTO THE LIMITS OF DISTURBANCE. NO ADDITIONAL ACCESS POINTS SHALL BE USED WITHOUT APPROVAL OF THE DESIGNER.

6. ALL EXCAVATED MATERIAL SHALL BE STOCKPILED WITHIN THE LIMITS OF DISTURBANCE FOR LATER USE AS FILL MATERIAL. SILT FENCE SHALL BE INSTALLED ON THE LOW SIDE OF ANY TEMPORARY OR PERMANENT SPOIL AND TOPSOIL PILES. THESE SPOIL PILES SHALL ALSO BE SEEDED AND MULCHED FOR VEGETATIVE STABILIZATION WITHIN 7 DAYS THAT THEY ARE CREATED. ALL SPOIL MATERIAL SHALL STAY ON THE SITE AND SHALL NOT BE REMOVED FROM THE SUBJECT PROPERTY WITHOUT DESIGNER APPROVAL.

7. ALL EROSION AND SEDIMENT CONTROL PRACTICES WILL BE CHECKED FOR STABILITY AND FUNCTIONAL OPERATION FOLLOWING EVERY RUNOFF PRODUCING RAIN EVENT AND/OR AT LEAST ONCE PER WEEK. ANY NEEDED MAINTENANCE OR REPAIRS SHALL BE MADE IMMEDIATELY TO MAINTAIN ALL MEASURES AS DESIGNED. ACCUMULATED SEDIMENT SHALL BE REMOVED FROM CONTROL MEASURES WHEN THEY REACH APPROXIMATELY 50% OF THEIR FUNCTIONAL CAPACITY. THESE MEASURES SHALL BE REPAIRED IF DISTURBED DURING MAINTENANCE. ALL SEEDED AREAS SHALL BE FERTILIZED, RESEEDED AND MULCHED, AS NECESSARY, TO PROMOTE THE ESTABLISHMENT OF VEGETATION COVER.

8. THE CONSTRUCTION MANAGER AND EROSION CONTROL CONTACT FOR THIS SITE IS KRISTIN KNIGHT-MENG. MOBILE PHONE (919) 923-2854.

9. ALL EXCESS WASTE MATERIAL SHALL BE DISPOSED OF AT A PERMITTED FACILITY OR SITE. (15A NCAC 04B .0110)

SEDIMENTATION & EROSION CONTROL PLAN LEGEND

LIMITS OF DISTURBANCE	LOD
SILT FENCE	SF
STRAW WADDLE	W
TEMPORARY BRIDGE MAT STREAM CROSSING	
STREAM TO BE FILLED	
STAGING AREA	
STOCK PILE	
TEMPORARY CHANNEL DIVERSION	TCD

SEEDING AND PLANTING NOTES:

TEMPORARY SEED MIX

THE CONTRACTOR SHALL UTILIZE THE FOLLOWING SEED/FERTILIZER MIX IN SEEDING ALL DISTURBED AREAS WITHIN THE PROJECT LIMITS:

SUMMER MIX (MAY 15 - AUGUST 15)
GERMAN MILLET . . . SETARIA ITALICA . . . . 20 LBS / ACRE
BROWNTOP MILLET . . UROCHLOA RAMOSA . . 20 LBS / ACRE

WINTER MIX (AUGUST 15 - MAY 15)
RYE GRAIN . . . . . SECALE CEREALE . . . . 120 LBS / ACRE

PERMANENT RIPARIAN SEED MIX

SUMMER MIX (MAY 15 -- AUGUST 15)

SPECIES	APPLICATION RATE (IN MIX) % OF MIX	LBS / ACRE
VIRGINIA WILDRYE -- ELYMUS VIRGINICUS	15	4.6
BIG BLUESTEM -- ANDROPOGON GERARDII	8	2.3
SWITCHGRASS -- PANICUM VIRGATUM	11	3.3
AUTUMN BENTGRASS -- AGROSTIS PERENNANS	11	3.3
BLACK-EYED SUSAN -- RUDBECKIA HIRTA	8	2.3
LANCELEAF COREOPSIS -- COREOPSIS LANCEOLATA	8	2.3
SOFT RUSH -- JUNCUS EFFUSUS	4	1.1
LITTLE BLUESTEM -- SCHIZACHYRIUM SCOPARIUM	4	1.1
INDIAN GRASS -- SORGHASTRUM NUTANS	4	1.1
EASTERN GAMMA -- TRIPSACUM DACTYLOIDES	4	1.1
PEARL MILLET -- PENNISETUM GLAUCOMA	25	7.5
TOTALS	100	30

WINTER MIX (AUGUST 15 -- MAY 15)

SPECIES	APPLICATION RATE (IN MIX) % OF MIX	LBS / ACRE
VIRGINIA WILDRYE -- ELYMUS VIRGINICUS	15	4.6
BIG BLUESTEM -- ANDROPOGON GERARDII	8	2.3
SWITCHGRASS -- PANICUM VIRGATUM	11	3.3
AUTUMN BENTGRASS -- AGROSTIS PERENNANS	11	3.3
BLACK-EYED SUSAN -- RUDBECKIA HIRTA	8	2.3
LANCELEAF COREOPSIS -- COREOPSIS LANCEOLATA	8	2.3
SOFT RUSH -- JUNCUS EFFUSUS	4	1.1
LITTLE BLUESTEM -- SCHIZACHYRIUM SCOPARIUM	4	1.1
INDIAN GRASS -- SORGHASTRUM NUTANS	4	1.1
EASTERN GAMMA -- TRIPSACUM DACTYLOIDES	4	1.1
RYE GRAIN -- SECALE CEREALE	25	7.5
TOTALS	100	30

FERTILIZER . . . . . 750 LBS / ACRE
LIMESTONE . . . . . 2000 LBS / ACRE

FERTILIZER RATIO APPLIED WILL BE DEPENDENT UPON SOIL ANALYSIS PROVIDED TO THE DESIGNER FOR APPROVAL.

SEEDBED PREPARATION

THE SEEDBED SHALL BE COMPRISED OF LOOSE SOIL AND NOT COMPACTED. THIS MAY REQUIRE MECHANICAL LOOSENING OF THE SOIL. SOIL AMENDMENTS SHOULD FOLLOW THE FERTILIZER AND LIMING DESCRIPTION IN THE ABOVE SECTIONS. FOLLOWING SEEDING, MULCHING SHALL FOLLOW THE BELOW APPLICATION METHODS AND AMOUNTS. AREAS CONTAINING SEVERE SOIL COMPACTION WILL BE SCARIFIED TO A DEPTH OF 8 INCHES.

MULCHING

SEEDED AREAS ARE TO BE PROTECTED BY SPREADING STRAW MULCH UNIFORMLY TO FORM A CONTINUOUS BLANKET (75% COVERAGE = 2 TONS/ACRE).

NOTE: FERTILIZER IS ONLY TO BE APPLIED ONCE. IF TEMPORARY SEED AND FERTILIZER IS APPLIED PRIOR TO PERMANENT SEED, THEN FERTILIZER SHALL NOT BE APPLIED WITH THE PERMANENT SEED.

NORTH CAROLINA PROFESSIONAL SEAL 040899 ENGINEER KRISTIN E. KNIGHT
05-24-2024

	DATE	DESCRIPTION
A	MAY 2024	REVISIONS PER IRT COMMENTS

REVISIONS

NORTH CAROLINA *Environmental Quality*

KCI ASSOCIATES OF NC
ENGINEERS • PLANNERS • SCIENTISTS
4505 FALLS OF NEUSE ROAD, SUITE 400
RALEIGH, NORTH CAROLINA 27609

MORGAN BRANCH
RESTORATION SITE
BUNCOMBE COUNTY, NORTH CAROLINA

DATE: MAY 2024
SCALE: N.T.S.

EROSION CONTROL PLAN

SHEET EC01

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

EQUIPMENT AND VEHICLE MAINTENANCE

1. Maintain vehicles and equipment to prevent discharge of fluids.
2. Provide drip pans under any stored equipment.
3. Identify leaks and repair as soon as feasible, or remove leaking equipment from the project.
4. Collect all spent fluids, store in separate containers and properly dispose as hazardous waste (recycle when possible).
5. Remove leaking vehicles and construction equipment from service until the problem has been corrected.
6. Bring used fuels, lubricants, coolants, hydraulic fluids and other petroleum products to a recycling or disposal center that handles these materials.

LITTER, BUILDING MATERIAL AND LAND CLEARING WASTE

1. Never bury or burn waste. Place litter and debris in approved waste containers.
2. Provide a sufficient number and size of waste containers (e.g dumpster, trash receptacle) on site to contain construction and domestic wastes.
3. Locate waste containers at least 50 feet away from storm drain inlets and surface waters unless no other alternatives are reasonably available.
4. Locate waste containers on areas that do not receive substantial amounts of runoff from upland areas and does not drain directly to a storm drain, stream or wetland.
5. Cover waste containers at the end of each workday and before storm events or provide secondary containment. Repair or replace damaged waste containers.
6. Anchor all lightweight items in waste containers during times of high winds.
7. Empty waste containers as needed to prevent overflow. Clean up immediately if containers overflow.
8. Dispose waste off-site at an approved disposal facility.
9. On business days, clean up and dispose of waste in designated waste containers.

PAINT AND OTHER LIQUID WASTE

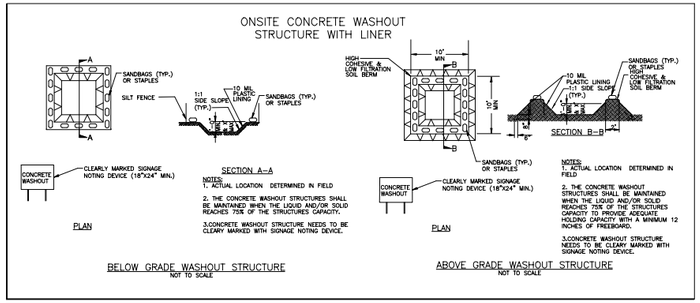
1. Do not dump paint and other liquid waste into storm drains, streams or wetlands.
2. Locate paint washouts at least 50 feet away from storm drain inlets and surface waters unless no other alternatives are reasonably available.
3. Contain liquid wastes in a controlled area.
4. Containment must be labeled, sized and placed appropriately for the needs of site.
5. Prevent the discharge of soaps, solvents, detergents and other liquid wastes from construction sites.

PORTABLE TOILETS

1. Install portable toilets on level ground, at least 50 feet away from storm drains, streams or wetlands unless there is no alternative reasonably available. If 50 foot offset is not attainable, provide relocation of portable toilet behind silt fence or place on a gravel pad and surround with sand bags.
2. Provide staking or anchoring of portable toilets during periods of high winds or in high foot traffic areas.
3. Monitor portable toilets for leaking and properly dispose of any leaked material. Utilize a licensed sanitary waste hauler to remove leaking portable toilets and replace with properly operating unit.

EARTHEN STOCKPILE MANAGEMENT

1. Show stockpile locations on plans. Locate earthen-material stockpile areas at least 50 feet away from storm drain inlets, sediment basins, perimeter sediment controls and surface waters unless it can be shown no other alternatives are reasonably available.
2. Protect stockpile with silt fence installed along toe of slope with a minimum offset of five feet from the toe of stockpile.
3. Provide stable stone access point when feasible.
4. Stabilize stockpile within the timeframes provided on this sheet and in accordance with the approved plan and any additional requirements. Soil stabilization is defined as vegetative, physical or chemical coverage techniques that will restrain accelerated erosion on disturbed soils for temporary or permanent control needs.



CONCRETE WASHOUTS

1. Do not discharge concrete or cement slurry from the site.
2. Dispose of, or recycle settled, hardened concrete residue in accordance with local and state solid waste regulations and at an approved facility.
3. Manage washout from mortar mixers in accordance with the above item and in addition place the mixer and associated materials on impervious barrier and within lot perimeter silt fence.
4. Install temporary concrete washouts per local requirements, where applicable. If an alternate method or product is to be used, contact your approval authority for review and approval. If local standard details are not available, use one of the two types of temporary concrete washouts provided on this detail.
5. Do not use concrete washouts for dewatering or storing defective curb or sidewalk sections. Stormwater accumulated within the washout may not be pumped into or discharged to the storm drain system or receiving surface waters. Liquid waste must be pumped out and removed from project.
6. Locate washouts at least 50 feet from storm drain inlets and surface waters unless it can be shown that no other alternatives are reasonably available. At a minimum, install protection of storm drain inlet(s) closest to the washout which could receive spills or overflow.
7. Locate washouts in an easily accessible area, on level ground and install a stone entrance pad in front of the washout. Additional controls may be required by the approving authority.
8. Install at least one sign directing concrete trucks to the washout within the project limits. Post signage on the washout itself to identify this location.
9. Remove leavings from the washout when at approximately 75% capacity to limit overflow events. Replace the tarp, sand bags or other temporary structural components when no longer functional. When utilizing alternative or proprietary products, follow manufacturer's instructions.
10. At the completion of the concrete work, remove remaining leavings and dispose of in an approved disposal facility. Fill pit, if applicable, and stabilize any disturbance caused by removal of washout.

HERBICIDES, PESTICIDES AND RODENTICIDES

1. Store and apply herbicides, pesticides and rodenticides in accordance with label restrictions.
2. Store herbicides, pesticides and rodenticides in their original containers with the label, which lists directions for use, ingredients and first aid steps in case of accidental poisoning.
3. Do not store herbicides, pesticides and rodenticides in areas where flooding is possible or where they may spill or leak into wells, stormwater drains, ground water or surface water. If a spill occurs, clean area immediately.
4. Do not stockpile these materials onsite.

HAZARDOUS AND TOXIC WASTE

1. Create designated hazardous waste collection areas on-site.
2. Place hazardous waste containers under cover or in secondary containment.
3. Do not store hazardous chemicals, drums or bagged materials directly on the ground.

NCG01 GROUND STABILIZATION AND MATERIALS HANDLING

EFFECTIVE: 04/01/19

	DATE	DESCRIPTION
	MAY 2024	
A		REVISIONS PER IRT COMMENTS

REVISIONS

NORTH CAROLINA
Environmental Quality

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MORGAN BRANCH
RESTORATION SITE
BUNCOMBE COUNTY, NORTH CAROLINA

DATE: MAY 2024
SCALE: N.T.S.

EROSION CONTROL PLAN

SHEET EC02

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 ≥ 1.0 inch in 24 hours	1. Identification of the measures inspected, 2. Date and time of the inspection, 3. Name of the person performing the inspection, 4. Indication of whether the measures were operating properly, 5. Description of maintenance needs for the measure, 6. Description, evidence, and date of corrective actions taken.
(3) Stormwater discharge outfalls (SDOs)	At least once per 7 calendar days and within 24 hours of a rain event ≥ 1.0 inch in 24 hours	1. Identification of the discharge outfalls inspected, 2. Date and time of the inspection, 3. Name of the person performing the inspection, 4. Evidence of indicators of stormwater pollution such as oil sheen, floating or suspended solids or discoloration, 5. Indication of visible sediment leaving the site, 6. Description, evidence, and date of corrective actions taken.
(4) Perimeter of site	At least once per 7 calendar days and within 24 hours of a rain event ≥ 1.0 inch in 24 hours	If visible sedimentation is found outside site limits, then a record of the following shall be made: 1. Actions taken to clean up or stabilize the sediment that has left the site limits, 2. Description, evidence, and date of corrective actions taken, and 3. An explanation as to the actions taken to control future releases.
(5) Streams or wetlands onsite or offsite (where accessible)	At least once per 7 calendar days and within 24 hours of a rain event ≥ 1.0 inch in 24 hours	If the stream or wetland has increased visible sedimentation or a stream has visible increased turbidity from the construction activity, then a record of the following shall be made: 1. Description, evidence and date of corrective actions taken, and 2. Records of the required reports to the appropriate Division Regional Office per Part III, Section C, Item (2)(a) of this permit.
(6) Ground stabilization measures	After each phase of grading	1. The phase of grading (installation of perimeter E&SC measures, clearing and grubbing, installation of storm drainage facilities, completion of all land-disturbing activity, construction or redevelopment, permanent ground cover). 2. Documentation that the required ground stabilization measures have been provided within the required timeframe or an assurance that they will be provided as soon as possible.

NOTE: The rain inspection resets the required 7 calendar day inspection requirement.

PART III
SELF-INSPECTION, RECORDKEEPING AND REPORTING

SECTION B: RECORDKEEPING

1. E&SC Plan Documentation

The approved E&SC plan as well as any approved deviation shall be kept on the site. The approved E&SC plan must be kept up-to-date throughout the coverage under this permit. The following items pertaining to the E&SC plan shall be kept on site and available for inspection at all times during normal business hours.

Item to Document	Documentation Requirements
(a) Each E&SC measure has been installed and does not significantly deviate from the locations, dimensions and relative elevations shown on the approved E&SC plan.	Initial and date each E&SC measure on a copy of the approved E&SC plan or complete, date and sign an inspection report that lists each E&SC measure shown on the approved E&SC plan. This documentation is required upon the initial installation of the E&SC measures or if the E&SC measures are modified after initial installation.
(b) A phase of grading has been completed.	Initial and date a copy of the approved E&SC plan or complete, date and sign an inspection report to indicate completion of the construction phase.
(c) Ground cover is located and installed in accordance with the approved E&SC plan.	Initial and date a copy of the approved E&SC plan or complete, date and sign an inspection report to indicate compliance with approved ground cover specifications.
(d) The maintenance and repair requirements for all E&SC measures have been performed.	Complete, date and sign an inspection report.
(e) Corrective actions have been taken to E&SC measures.	Initial and date a copy of the approved E&SC plan or complete, date and sign an inspection report to indicate the completion of the corrective action.

2. Additional Documentation to be Kept on Site

In addition to the E&SC plan documents above, the following items shall be kept on the site and available for inspectors at all times during normal business hours, unless the Division provides a site-specific exemption based on unique site conditions that make this requirement not practical:

(a) This General Permit as well as the Certificate of Coverage, after it is received.

(b) Records of inspections made during the previous twelve months. The permittee shall record the required observations on the Inspection Record Form provided by the Division or a similar inspection form that includes all the required elements. Use of electronically-available records in lieu of the required paper copies will be allowed if shown to provide equal access and utility as the hard-copy records.

3. Documentation to be Retained for Three Years

All data used to complete the e-NOI and all inspection records shall be maintained for a period of three years after project completion and made available upon request. [40 CFR 122.41]

PART III
SELF-INSPECTION, RECORDKEEPING AND REPORTING

SECTION C: REPORTING

1. Occurrences that Must be Reported

Permittees shall report the following occurrences:

(a) Visible sediment deposition in a stream or wetland.

(b) Oil spills if:
- They are 25 gallons or more,
- They are less than 25 gallons but cannot be cleaned up within 24 hours,
- They cause sheen on surface waters (regardless of volume), or
- They are within 100 feet of surface waters (regardless of volume).

(c) Releases of hazardous substances in excess of reportable quantities under Section 311 of the Clean Water Act (Ref: 40 CFR 110.3 and 40 CFR 117.3) or Section 102 of CERCLA (Ref: 40 CFR 302.4) or G.S. 143-215.85.

(d) Anticipated bypasses and unanticipated bypasses.

(e) Noncompliance with the conditions of this permit that may endanger health or the environment.

2. Reporting Timeframes and Other Requirements

After a permittee becomes aware of an occurrence that must be reported, he shall contact the appropriate Division regional office within the timeframes and in accordance with the other requirements listed below. Occurrences outside normal business hours may also be reported to the Department's Environmental Emergency Center personnel at (800) 858-0368.

Occurrence	Reporting Timeframes (After Discovery) and Other Requirements
(a) Visible sediment deposition in a stream or wetland	• ***Within 24 hours***, an oral or electronic notification. • ***Within 7 calendar days***, a report that contains a description of the sediment and actions taken to address the cause of the deposition. Division staff may waive the requirement for a written report on a case-by-case basis. • If the stream is named on the NC 303(d) list as impaired for sediment-related causes, the permittee may be required to perform additional monitoring, inspections or apply more stringent practices if staff determine that additional requirements are needed to assure compliance with the federal or state impaired-waters conditions.
(b) Oil spills and release of hazardous substances per Item 1(b)-(c) above	• ***Within 24 hours***, an oral or electronic notification. The notification shall include information about the date, time, nature, volume and location of the spill or release.
(c) Anticipated bypasses [40 CFR 122.41(m)(3)]	• ***A report at least ten days before the date of the bypass, if possible***. The report shall include an evaluation of the anticipated quality and effect of the bypass.
(d) Unanticipated bypasses [40 CFR 122.41(m)(3)]	• ***Within 24 hours***, an oral or electronic notification. • ***Within 7 calendar days,*** a report that includes an evaluation of the quality and effect of the bypass.
(e) Noncompliance with the conditions of this permit that may endanger health or the environment[40 CFR 122.41(l)(7)]	• ***Within 24 hours***, an oral or electronic notification. • ***Within 7 calendar days***, a report that contains a description of the noncompliance, and its causes; the period of noncompliance, including exact dates and times, and if the noncompliance has not been corrected, the anticipated time noncompliance is expected to continue; and steps taken or planned to reduce, eliminate, and prevent reoccurrence of the noncompliance. [40 CFR 122.41(l)(6). • Division staff may waive the requirement for a written report on a case-by-case basis.

NCG01 SELF-INSPECTION, RECORDKEEPING AND REPORTING

EFFECTIVE: 04/01/19

DATE	DESCRIPTION	BY
MAY 2024	REVISIONS PER IRT COMMENTS	A

REVISIONS

NORTH CAROLINA
Environmental Quality

KCI
ASSOCIATES OF NC
ENGINEERS • PLANNERS • SCIENTISTS
4505 FALLS OF NEUSE ROAD, SUITE 400
RALEIGH, NORTH CAROLINA 27609

MORGAN BRANCH
RESTORATION SITE
BUNCOMBE COUNTY, NORTH CAROLINA

DATE: MAY 2024
SCALE: N.T.S.

EROSION CONTROL PLAN

SHEET EC03

NORTH CAROLINA PROFESSIONAL SEAL 040899 ENGINEER KRISTIN E. KNIGHT
05-24-2024

SEQUENCE OF CONSTRUCTION:

THE CONTRACTOR IS RESPONSIBLE FOR FOLLOWING THE SEQUENCE OF CONSTRUCTION IN ACCORDANCE WITH THE PLANS AND THE FOLLOWING PROVISIONS, AS DIRECTED BY THE DESIGNER. CONSTRUCTION SHALL PROCEED IN THE SPECIFIED MANNER UNLESS OTHERWISE DIRECTED OR APPROVED BY THE DESIGNER. THE FOLLOWING PROVISIONS, ALONG WITH THE INSTRUCTIONS CONTAINED IN THE PLANS, CONSTITUTE THE SEQUENCE OF CONSTRUCTION.

GENERAL SITE NOTES:

1. THE CONTRACTOR SHALL ONLY CONDUCT STREAM WORK, INCLUDING ALL IN-STREAM STRUCTURES, GRADING, STABILIZATION MEASURES, AND SEEDING, MULCHING, AND MATTING WORK, ON A SECTION OF STREAM THAT SHALL BE ENTIRELY COMPLETED WITHIN A SINGLE DAY. EACH SECTION OF COMPLETED STREAM MUST BE STABILIZED AND MATTED BEFORE FLOW CAN BE RETURNED INTO THE CHANNEL.

2. WHEN WORKING IN STREAMS WITH NO ACTIVE FLOW THE CONTRACTOR IS REQUIRED TO HAVE APPROPRIATELY SIZED PUMPS AND MATERIALS TO INSTALL AND MAINTAIN A TEMPORARY STREAM DIVERSION IN ANTICIPATION OF PENDING STORM EVENTS. WORKING IN A DRY CHANNEL DOES NOT PRECLUDE THE CONTRACTOR FROM HAVING TO COMPLY WITH NOTE 1 ABOVE.

3. UPON APPROVAL FROM THE DESIGNER, PHASES 2 THROUGH 11 MAY BE CONSTRUCTED IN A DIFFERENT SEQUENCE THAN INDICATED BELOW OR CONCURRENTLY.

4. ALL CONSTRUCTION WORK SHALL BE DONE DURING PERIODS OF DRY WEATHER.

5. ALL STREAM/DITCH CROSSINGS WILL BE LOCATED IN AREAS OF THE STREAM WHERE LEFT AND RIGHT BANK HEIGHTS ARE SIMILAR OR CAN BE GRADED TO PROVIDE A LEVEL, OR NEAR LEVEL, CROSSING SURFACE. BRIDGE MATS CAN BE MADE OF WOOD OR STEEL, BUT MUST BE CAPABLE OF SUPPORTING THE GROUND PRESSURE OF THE EQUIPMENT THAT WILL BE UTILIZING THE CROSSING. UPON ENSURING A LEVEL CROSSING SURFACE, THE BRIDGE MATS WILL BE LAID ACROSS THE CHANNEL IN A MANNER THAT DOES NOT DISRUPT STREAM FLOW OR CAUSE EROSION IN THE CHANNEL. THIS IS TYPICALLY ACHIEVED USING AN EXCAVATOR TO LIFT THE MATS ACROSS THE CHANNEL WITH CHAINS AND GUIDED AND SET BY A GROUND CREW. THE MATS MUST BE CONTINUOUS ACROSS THE CHANNEL, WITH NO GAPS THAT COULD ALLOW SEDIMENT TO ENTER THE STREAM. ACCUMULATED SEDIMENT ON THE MATS WILL BE REMOVED ON A FREQUENT BASIS TO MINIMIZE DISCHARGE OF SEDIMENT TO THE STREAM DURING USE. AFTER SETTING THE BRIDGE MATS, A STONE APRON WILL BE APPLIED ON THE ENTRANCE AND EXIT OF THE BRIDGE AS PER THE DETAIL IN THE PLANS. THIS APRON WILL BE MAINTAINED AND REPLACED AS NEEDED TO MINIMIZE SEDIMENT MOBILIZATION TO THE STREAM. PRIOR TO REMOVING THE CROSSINGS, THE MATS SHOULD BE CLEANED OF SEDIMENT. SIMILAR TO INSTALLATION, THE MATS SHOULD BE REMOVED USING AN EXCAVATOR AND CHAINS SO THEY CAN BE LIFTED UP AND OUT OF THE AREA WITHOUT DAMAGING THE STREAM OR ENTERING THE STREAM FLOW. MECHANICAL EQUIPMENT SHALL NOT TRAVERSE STREAMS WITHOUT THE USE OF TEMPORARY BRIDGES.

6. EROSION AND SEDIMENT CONTROL PERMIT, ALONG WITH 401 / 404 PERMITS, MUST BE OBTAINED BEFORE ANY LAND DISTURBING ACTIVITIES OCCUR. A COPY OF THIS PERMITS AND A HARD COPY OF THE PLAN MUST BE KEPT ON SITE, PREFERABLY IN A PERMITS BOX, AND ACCESSIBLE DURING INSPECTION.

7. SELF-INSPECTIONS FOR EROSION AND SEDIMENTATION CONTROL MEASURES ARE TO BE PERFORMED AT LEAST ONCE EVERY SEVEN CALENDAR DAYS AND WITHIN 24 HOURS OF EVERY RAIN EVENT OF GREATER THAN 0.5 INCH. ANY NEEDED REPAIRS SHALL BE MADE IMMEDIATELY TO MAINTAIN MEASURES AS DESIGNED. ALL ESC MEASURES SHALL BE MAINTAINED AS SPECIFIED IN THE CONSTRUCTION DETAILS.

8. AFTER SITE IS STABILIZED, REMOVE ALL TEMPORARY EROSION CONTROL MEASURES AND PROVIDE PERMANENT SEEDING WHERE TEMPORARY MEASURES HAVE BEEN REMOVED AND GROUND COVER IS NOT ADEQUATE.

9. PER NPDES REQUIREMENTS, A RAIN GAUGE, SELF-INSPECTIONS RECORDS, PERMIT, AND EROSION AND SEDIMENT CONTROL PLAN ARE REQUIRED TO BE MAINTAINED ON SITE AND ACCESSIBLE DURING INSPECTION. IT IS RECOMMENDED THAT THESE ITEMS BE PLACED IN A PERMITS BOX AT THE BEGINNING OR ENTRANCE OF PROJECT.

10. CONTACT THE DEMLR ASHEVILLE REGIONAL OFFICE AT LEAST 48 HOURS PRIOR TO COMMENCING THE LAND DISTURBING ACTIVITY 828-296-4500.

PHASE 1: INITIAL SITE PREPARATION
A. IDENTIFY PROJECT BOUNDARY, LIMITS OF DISTURBANCE, SENSITIVE AREAS, STAGING AREAS, STABILIZED ENTRANCES, TEMPORARY CROSSINGS AND ACCESS POINTS WITH THE DESIGNER.

B. CONSTRUCT ENTRANCE AND STAGING AREAS AND THEIR ASSOCIATED SEDIMENT AND EROSION CONTROL DEVICES IN A MANNER TO SUPPORT EXECUTION OF THE RESTORATION IN PHASES AS INDICATED IN THE PLANS AND AS DIRECTED BY THE DESIGNER.

PHASE 2: STREAM REACH T1 - STA. 104+55 TO 106+60, 122+00 TO 132+48
COMPLETE CHANNEL WORK IN ACCORDANCE WITH THE FOLLOWING PROCEDURES:
A. INSTALL SEDIMENT AND EROSION CONTROL MEASURES ALONG EXISTING CHANNEL AS DEPICTED ON THE PLANS.

B. ESTABLISH AN ISOLATED WORK AREA BY INSTALLING IMPERVIOUS DIKES AND TEMPORARY CHANNEL DIVERSION AND DIVERT FLOWS AROUND THE DESIGNATED WORK AREA (MAXIMUM LENGTH OF ISOLATED WORK AREA SHALL BE DEFINED AS 300 FEET).

C. COMPLETE CHANNEL GRADING AS DIRECTED IN THE PLANS. INSTALL ANY BANK STABILIZATION TREATMENTS AND IN-STREAM STRUCTURES.

D. SEED AND MULCH COMPLETED WORK AREAS ALONG COMPLETED STREAM

PHASE 3: STREAM REACH T2 - STA. 200+00 TO 207+25
COMPLETE CHANNEL WORK IN ACCORDANCE WITH THE FOLLOWING PROCEDURES:
A. INSTALL SEDIMENT AND EROSION CONTROL MEASURES ALONG EXISTING CHANNEL AS DEPICTED ON THE PLANS.

B. ESTABLISH AN ISOLATED WORK AREA BY INSTALLING IMPERVIOUS DIKES AND TEMPORARY CHANNEL DIVERSION AND DIVERT FLOWS AROUND THE DESIGNATED WORK AREA (MAXIMUM LENGTH OF ISOLATED WORK AREA SHALL BE DEFINED AS 300 FEET).

C. COMPLETE CHANNEL GRADING AS DIRECTED IN THE PLANS. INSTALL ANY BANK STABILIZATION TREATMENTS AND IN-STREAM STRUCTURES.

D. SEED AND MULCH COMPLETED WORK AREAS ALONG COMPLETED STREAM BANKS.

PHASE 4: STREAM REACH T3 - STA. 300+00 TO 314+46
COMPLETE CHANNEL WORK IN ACCORDANCE WITH THE FOLLOWING PROCEDURES:
A. INSTALL SEDIMENT AND EROSION CONTROL MEASURES ALONG EXISTING CHANNEL AS DEPICTED ON THE PLANS.

B. ESTABLISH AN ISOLATED WORK AREA BY INSTALLING IMPERVIOUS DIKES AND TEMPORARY CHANNEL DIVERSION AND DIVERT FLOWS AROUND THE DESIGNATED WORK AREA (MAXIMUM LENGTH OF ISOLATED WORK AREA SHALL BE DEFINED AS 300 FEET).

C. COMPLETE CHANNEL GRADING AS DIRECTED IN THE PLANS. INSTALL ANY BANK STABILIZATION TREATMENTS AND IN-STREAM STRUCTURES.

D. SEED AND MULCH COMPLETED WORK AREAS ALONG COMPLETED STREAM BANKS.

PHASE 5: STREAM REACH T4 - STA. 400+00 TO 418+12
COMPLETE CHANNEL WORK IN ACCORDANCE WITH THE FOLLOWING PROCEDURES:
A. INSTALL SEDIMENT AND EROSION CONTROL MEASURES ALONG EXISTING CHANNEL AS DEPICTED ON THE PLANS.

B. ESTABLISH AN ISOLATED WORK AREA BY INSTALLING IMPERVIOUS DIKES AND TEMPORARY CHANNEL DIVERSION AND DIVERT FLOWS AROUND THE DESIGNATED WORK AREA (MAXIMUM LENGTH OF ISOLATED WORK AREA SHALL BE DEFINED AS 300 FEET).

C. COMPLETE CHANNEL GRADING AS DIRECTED IN THE PLANS. INSTALL ANY BANK STABILIZATION TREATMENTS AND IN-STREAM STRUCTURES.

D. SEED AND MULCH COMPLETED WORK AREAS ALONG COMPLETED STREAM BANKS.

PHASE 6: STREAM REACH T4-1 - STA. 450+00 TO 454+60
COMPLETE CHANNEL WORK IN ACCORDANCE WITH THE FOLLOWING PROCEDURES:
A. INSTALL SEDIMENT AND EROSION CONTROL MEASURES ALONG EXISTING CHANNEL AS DEPICTED ON THE PLANS.

B. ESTABLISH AN ISOLATED WORK AREA BY INSTALLING IMPERVIOUS DIKES AND TEMPORARY CHANNEL DIVERSION AND DIVERT FLOWS AROUND THE DESIGNATED WORK AREA (MAXIMUM LENGTH OF ISOLATED WORK AREA SHALL BE DEFINED AS 300 FEET).

C. COMPLETE CHANNEL GRADING AS DIRECTED IN THE PLANS. INSTALL ANY BANK STABILIZATION TREATMENTS AND IN-STREAM STRUCTURES.

D. SEED AND MULCH COMPLETED WORK AREAS ALONG COMPLETED STREAM

PHASE 7: STREAM REACH T4-2 - STA. 460+75 TO 471+21
COMPLETE CHANNEL WORK IN ACCORDANCE WITH THE FOLLOWING PROCEDURES:
A. INSTALL SEDIMENT AND EROSION CONTROL MEASURES ALONG EXISTING CHANNEL AS DEPICTED ON THE PLANS.

B. ESTABLISH AN ISOLATED WORK AREA BY INSTALLING IMPERVIOUS DIKES AND TEMPORARY CHANNEL DIVERSION AND DIVERT FLOWS AROUND THE DESIGNATED WORK AREA (MAXIMUM LENGTH OF ISOLATED WORK AREA SHALL BE DEFINED AS 300 FEET).

C. COMPLETE CHANNEL GRADING AS DIRECTED IN THE PLANS. INSTALL ANY BANK STABILIZATION TREATMENTS AND IN-STREAM STRUCTURES.

D. SEED AND MULCH COMPLETED WORK AREAS ALONG COMPLETED STREAM

PHASE 8: STREAM REACH T4-3 - STA. 480+00 TO 481+25
COMPLETE CHANNEL WORK IN ACCORDANCE WITH THE FOLLOWING PROCEDURES:
A. INSTALL SEDIMENT AND EROSION CONTROL MEASURES ALONG EXISTING CHANNEL AS DEPICTED ON THE PLANS.

B. ESTABLISH AN ISOLATED WORK AREA BY INSTALLING IMPERVIOUS DIKES AND TEMPORARY CHANNEL DIVERSION AND DIVERT FLOWS AROUND THE DESIGNATED WORK AREA (MAXIMUM LENGTH OF ISOLATED WORK AREA SHALL BE DEFINED AS 300 FEET).

C. COMPLETE CHANNEL GRADING AS DIRECTED IN THE PLANS. INSTALL ANY BANK STABILIZATION TREATMENTS AND IN-STREAM STRUCTURES.

D. SEED AND MULCH COMPLETED WORK AREAS ALONG COMPLETED STREAM

PHASE 9: STREAM REACH T5 - STA. 501+30 TO 518+40
COMPLETE CHANNEL WORK IN ACCORDANCE WITH THE FOLLOWING PROCEDURES:
A. INSTALL SEDIMENT AND EROSION CONTROL MEASURES ALONG EXISTING CHANNEL AS DEPICTED ON THE PLANS.

B. ESTABLISH AN ISOLATED WORK AREA BY INSTALLING IMPERVIOUS DIKES AND TEMPORARY CHANNEL DIVERSION AND DIVERT FLOWS AROUND THE DESIGNATED WORK AREA (MAXIMUM LENGTH OF ISOLATED WORK AREA SHALL BE DEFINED AS 300 FEET).

C. COMPLETE CHANNEL GRADING AS DIRECTED IN THE PLANS. INSTALL ANY BANK STABILIZATION TREATMENTS AND IN-STREAM STRUCTURES.

D. SEED AND MULCH COMPLETED WORK AREAS ALONG COMPLETED STREAM

PHASE 10: STREAM REACH T7 - STA. 700+00 TO 718+18
COMPLETE CHANNEL WORK IN ACCORDANCE WITH THE FOLLOWING PROCEDURES:
A. INSTALL SEDIMENT AND EROSION CONTROL MEASURES ALONG EXISTING CHANNEL AS DEPICTED ON THE PLANS.

B. ESTABLISH AN ISOLATED WORK AREA BY INSTALLING IMPERVIOUS DIKES AND TEMPORARY CHANNEL DIVERSION AND DIVERT FLOWS AROUND THE DESIGNATED WORK AREA (MAXIMUM LENGTH OF ISOLATED WORK AREA SHALL BE DEFINED AS 300 FEET).

C. COMPLETE CHANNEL GRADING AS DIRECTED IN THE PLANS. INSTALL ANY BANK STABILIZATION TREATMENTS AND IN-STREAM STRUCTURES.

D. SEED AND MULCH COMPLETED WORK AREAS ALONG COMPLETED STREAM

PHASE 11: STREAM REACH MORGAN BRANCH (MB) - STA. 20+45 TO 21+34, 22+24 TO 23+60, INCOMING DRAINAGE AT STA. 25+50, 31+31 TO 32+87, 43+85 TO44+85, 46+25 TO 49+19, AND 51+00 TO 67+83.
COMPLETE CHANNEL WORK IN ACCORDANCE WITH THE FOLLOWING PROCEDURES:
A. INSTALL SEDIMENT AND EROSION CONTROL MEASURES ALONG EXISTING CHANNEL AS DEPICTED ON THE PLANS.

B. ESTABLISH AN ISOLATED WORK AREA BY INSTALLING IMPERVIOUS DIKES AND TEMPORARY CHANNEL DIVERSION AND DIVERT FLOWS AROUND THE DESIGNATED WORK AREA (MAXIMUM LENGTH OF ISOLATED WORK AREA SHALL BE DEFINED AS 300 FEET).

C. COMPLETE CHANNEL GRADING AS DIRECTED IN THE PLANS. INSTALL ANY BANK STABILIZATION TREATMENTS AND IN-STREAM STRUCTURES.

D. SEED AND MULCH COMPLETED WORK AREAS ALONG COMPLETED STREAM

PHASE 12: TREE PLANTING
A. PLANTS SHOULD BE PLANTED DURING THE DORMANT SEASON (NOVEMBER 17 - MARCH 17).
B. PREPARE AND PLANT TREES IN ACCORDANCE WITH THE PLANTING PLAN AND AS DIRECTED BY THE DESIGNER.

PHASE 13: COMPLETION OF PROJECT SITE
A. PHASE 11 CAN BE INITIATED AFTER THE STREAM GRADING WORK IS COMPLETED AND AFTER THE SITE IS STABILIZED WITH REQUIRED VEGETATIVE COVER.
B. REMOVE ALL REMAINING WASTE MATERIALS, AND THE EROSION CONTROL MEASURES AND RESTORE THE REMAINING STAGING AND STOCKPILING AREAS AND CONSTRUCTION ENTRANCES TO THEIR PRIOR CONDITION. SEED AND MULCH ALL DISTURBED AREAS UTILIZING THE SEED/MULCH MIXES SPECIFIED IN THE PLANS.

REVISIONS

	DESCRIPTION	DATE
A	REVISIONS PER IRT COMMENTS	MAY 2024

NORTH CAROLINA *Environmental Quality*

KCI ASSOCIATES OF NC
ENGINEERS • PLANNERS • SCIENTISTS
4505 FALLS OF NEUSE ROAD, SUITE 400
RALEIGH, NORTH CAROLINA 27609

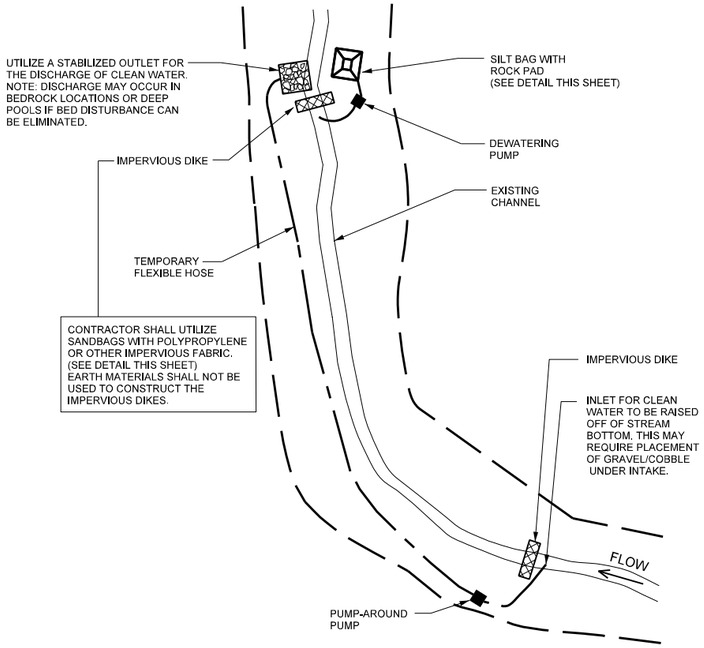
MORGAN BRANCH RESTORATION SITE

BUNCOMBE COUNTY, NORTH CAROLINA

DATE: MAY 2024
SCALE: N.T.S.

EROSION CONTROL PLAN

SHEET EC04



SEQUENCE OF DEWATERING OPERATIONS

* ANY DEVIATION FROM ABOVE DEWATERING PLAN WILL REQUIRE DESIGNER APPROVAL.

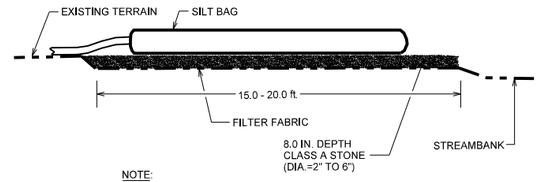
1. INSTALL SILT BAGS(S) AND ROCK PAD(S) AND STABILIZED OUTLET.
2. INSTALL UPSTREAM PUMP AND TEMPORARY FLEXIBLE HOSE.
3. PLACE UPSTREAM IMPERVIOUS DIKE AND BEGIN PUMPING OPERATIONS FOR STREAM DIVERSION.
4. PLACE DOWNSTREAM IMPERVIOUS DIKE AND PUMPING APPARATUS. DEWATER ENTRAPPED AREA.
5. PERFORM REPAIR WORK IN ACCORDANCE WITH THE PLANS.
6. EXCAVATE ANY ACCUMULATED SILT AND DEWATER BEFORE REMOVAL OF IMPERVIOUS DIKES. REMOVE IMPERVIOUS DIKES, PUMPS, AND TEMPORARY FLEXIBLE HOSE (DOWNSTREAM IMPERVIOUS DIKES FIRST).
7. REMOVE SILT BAG(S) AND STABILIZE DISTURBED AREA WITH SEED AND MULCH.
8. CARE SHALL BE TAKEN WHEN SETTING UP THE PUMP-AROUND TO MINIMIZE DISTURBANCE TO EXISTING BANKS.
9. THE PUMP-AROUND SHALL ONLY BE OPERATED DURING PERIODS OF NORMAL BASEFLOW AND WHEN NO PRECIPITATION IS ANTICIPATED.

EXAMPLE OF PUMP-AROUND OPERATION

SCALE: NTS

STILLING BASIN MAINTENANCE:

1. SEDIMENT BAGS SHALL BE REPLACED AND DISPOSED OF WHEN IT IS THREE-QUARTERS FULL OF SEDIMENT OR WHEN IT IS IMPRACTICAL FOR THE BAG TO FILTER THE SEDIMENT OUT AT A REASONABLE FLOW RATE.
2. ACCUMULATED SEDIMENT SHOULD BE DISPOSED OF IN A DESIGNATED DISPOSAL AREA.
3. SPENT BAGS SHOULD BE DISPOSED OF PROPERLY AND NOT BURIED.
4. GRAVEL PADS SHOULD BE CHECKED DAILY DURING USE TO ENSURE THAT GRAVEL HAS NOT BEEN WASHED AWAY OR BEEN CHOKED BY EXCESSIVE SEDIMENTATION.
5. REPLACE PAD WITH CLEAN GRAVEL, AS NEEDED.



NOTE:

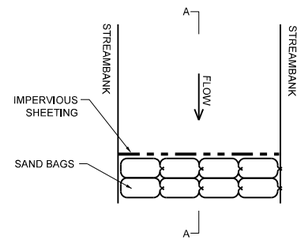
PROVIDE STABILIZED OUTLET DOWN BANK TO STREAM IF SILT BAG CAN NOT BE INSTALLED ON LOW STREAM BANK.

EXTRA SILT BAGS MUST BE MAINTAINED ON-SITE AND IN CLOSE PROXIMITY TO THE ACTIVE PUMP-AROUND OPERATION.

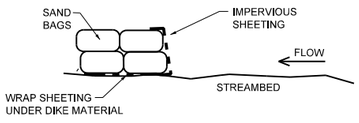
SILT BAGS MAY NOT BE PLACED ON SLOPES GREATER THAN 5% WITHOUT ADDITIONAL STABILITY MEASURES.

SPECIAL STILLING BASIN (SILT BAG) WITH ROCK PAD

SCALE: NTS



PLAN



SECTION AA

NOT TO SCALE

NOTES:

DIKE MATERIAL SHALL BE LARGE SANDBAGS. WATERBAGS MAY BE USED UPON APPROVAL OF THE DESIGNER.

DIKE MATERIAL MAY NOT BE EARTH OR DIRT.

DIKE MATERIAL MUST CONFORM TO THE SHAPE OF THE STREAM CHANNEL AND MUST BE HIGH ENOUGH IN THE CHANNEL TO NOT ALLOW FLOW TO OVERTOP THE DIKE.

IMPERVIOUS SHEETING SHOULD BE PLASTIC OR RUBBER SHEETING THICK ENOUGH TO NOT BE EASILY PUNCTURED GIVEN THE CONDITIONS OF THE CHANNEL.

ROCKS, SANDBAGS, OR OTHER WEIGHTS (NOT DIRT OR EARTH) MAY BE USED TO WEIGH DOWN THE SHEETING TO ENSURE THAT THERE IS PROPER CONTACT BETWEEN THE SHEETING AND THE BANKS AND BED OF THE CHANNEL.

IMPERVIOUS DIKE DETAIL

SCALE: NTS

NORTH CAROLINA PROFESSIONAL SEAL 040899 ENGINEER KRISTIN E. KNIGHT

05-24-2024

REVISIONS

	DATE	DESCRIPTION	SYM.
A	MAY 2024	REVISIONS PER IRT COMMENTS	

NORTH CAROLINA *Environmental Quality*

KCI ASSOCIATES OF NC
ENGINEERS • PLANNERS • SCIENTISTS
4505 FALLS OF NEUSE ROAD, SUITE 400
RALEIGH, NORTH CAROLINA 27609

MORGAN BRANCH RESTORATION SITE

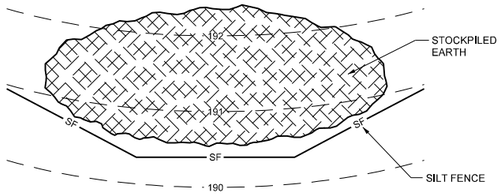
BUNCOMBE COUNTY, NORTH CAROLINA

DATE: MAY 2024

SCALE: N.T.S.

EROSION CONTROL PLAN

SHEET EC05



NOTES:

TEMPORARY SEEDING MUST BE APPLIED TO STOCKPILES IF NOT RELOCATED WITHIN 7 DAYS.

ALL STOCKPILES SHALL BE WITHIN LIMITS OF DISTURBANCE.

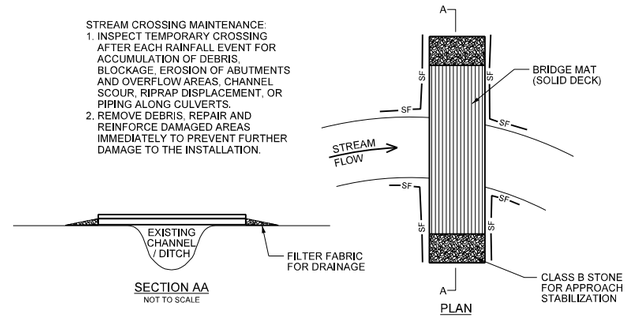
SILT FENCE SHALL BE INSTALLED DOWN GRADIENT OF ALL STOCK-PILES.

STOCKPILE LOCATIONS DEPICTED ON SITE PLANS ARE APPROXIMATE AND ARE SUBJECT TO CHANGE DEPENDING ON THE AREA THAT IS BEING WORKED UPON. EXACT LOCATION AND QUANTITY OF STOCKPILES WILL BE DETERMINED BY DESIGN REPRESENTATIVE IN THE FIELD.

TEMPORARY STOCKPILE DETAIL

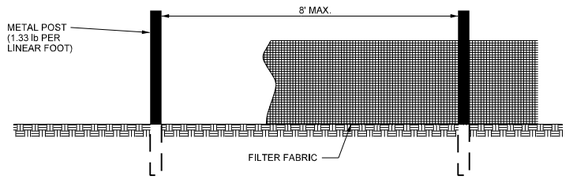
SCALE: NTS

STREAM CROSSING MAINTENANCE:
1. INSPECT TEMPORARY CROSSING AFTER EACH RAINFALL EVENT FOR ACCUMULATION OF DEBRIS, BLOCKAGE, EROSION OF ABUTMENTS AND OVERFLOW AREAS, CHANNEL SCOUR, RIPRAP DISPLACEMENT, OR PIPING ALONG CULVERTS.
2. REMOVE DEBRIS, REPAIR AND REINFORCE DAMAGED AREAS IMMEDIATELY TO PREVENT FURTHER DAMAGE TO THE INSTALLATION.

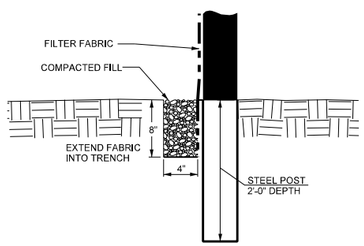


1. BRIDGE LOCATIONS DEPICTED ON SITE PLANS ARE APPROXIMATE AND ARE SUBJECT TO CHANGE DEPENDING ON THE AREA THAT IS BEING WORKED UPON. EXACT LOCATION AND QUANTITY OF BRIDGE CROSSINGS WILL BE DETERMINED BY DESIGN REPRESENTATIVE IN THE FIELD.
2. WIDTH OF EACH MAT IS DEPENDENT ON THE SIZE OF THE EQUIPMENT MEANT TO CROSS IT.
3. APPROACH STABILIZATION, COMPOSED OF CLASS B STONE, WILL BE REQUIRED FOR EACH SECTION OF THE BRIDGE.
4. BRIDGE SHALL BE CONSTRUCTED OF A SOLID DECK.

TEMPORARY BRIDGE MAT CROSSING

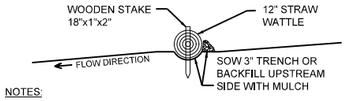


SILT FENCE MAINTENANCE
1. INSPECT SEDIMENT FENCES WEEKLY AND AFTER EACH RAINFALL EVENT.
2. SHOULD FABRIC TEAR, DECOMPOSE, OR IN ANY WAY BECOME INEFFECTIVE, REPLACE IT IMMEDIATELY.
3. REMOVE SEDIMENT DEPOSITS PROMPTLY TO PROVIDE ADEQUATE STORAGE VOLUME FOR THE NEXT RAIN AND TO REDUCE PRESSURE ON THE FENCE. TAKE CARE TO AVOID UNDERMINING FENCE DURING CLEANOUT.
4. REMOVE ALL FENCING MATERIALS AND UNSTABLE SEDIMENT DEPOSITS AFTER THE CONTRIBUTING DRAINAGE AREA HAS BEEN PROPERLY STABILIZED, INSPECTED AND APPROVED. BRING THE DISTURBED AREA TO GRADE AND STABILIZE AS SHOWN IN THE VEGETATION PLAN.



SILT FENCE DETAIL

SCALE: NTS



NOTES:

WATTLES SHALL BE INSTALLED IN ALL LOCATIONS SHOWN ON PLANS; AND ALSO ON TOP OF ANY FINISHED BANK OR TERRACE TIE-OUTS THAT ARE SUBJECT TO RILLING - EXAMPLE UT3.
WATTLES SHALL BE INSTALLED ALONG LOW SIDE OF HAUL ROADS WITH HEAVY USE OR THAT SHOW SEDIMENT ISUUES; OR AS DIRECTED BY DESIGNER.

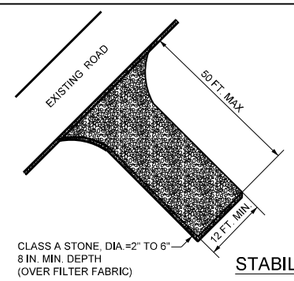
WATTLES SHALL BE INSTALLED ACCORDING TO THE MANUFACTURERS SPECIFICATIONS.

ALL WATTLE JUNCTIONS SHALL BE OVERLAPPED AND STAKED TO ENSURE CONTINUOUS PROTECTION.

STAKES SHALL BE INSTALLED ALONG WATTLES AT 5 FEET SPACING.

STRAW WATTLE DETAIL

NOT TO SCALE



NOTES:
1. TURNING RADIUS SUFFICIENT TO ACCOMMODATE LARGE TRUCKS SHALL BE PROVIDED.
2. ENTRANCE(S) SHOULD BE LOCATED TO PROVIDE FOR UTILIZATION BY ALL CONSTRUCTION VEHICLES.
3. MUST BE MAINTAINED IN A CONDITION WHICH WILL PREVENT TRACKING OR DIRECT FLOW OF MUD ONTO STREETS. PERIODIC TOP DRESSING WITH STONE WILL BE NECESSARY.
4. ANY MATERIAL TRACKED ONTO THE ROADWAY MUST BE CLEANED UP IMMEDIATELY.
5. GRAVEL CONSTRUCTION ENTRANCE SHALL BE LOCATED AT ALL POINTS OF INGRESS AND EGRESS UNTIL SITE IS STABILIZED. FREQUENT CHECKS OF THE DEVICE AND TIMELY MAINTENANCE MUST BE PROVIDED.

STABILIZED CONSTRUCTION ENTRANCE DETAIL

SCALE: NTS

NORTH CAROLINA PROFESSIONAL SEAL 040899 ENGINEER KRISTIN E. KNIGHT
05-24-2024

REVISIONS

	DESCRIPTION	DATE
A	REVISIONS PER IRT COMMENTS	MAY 2024

NORTH CAROLINA *Environmental Quality*

KCI ASSOCIATES OF NC
ENGINEERS • PLANNERS • SCIENTISTS
4505 FALLS OF NEUSE ROAD, SUITE 400
RALEIGH, NORTH CAROLINA 27609

MORGAN BRANCH
RESTORATION SITE
BUNCOMBE COUNTY, NORTH CAROLINA

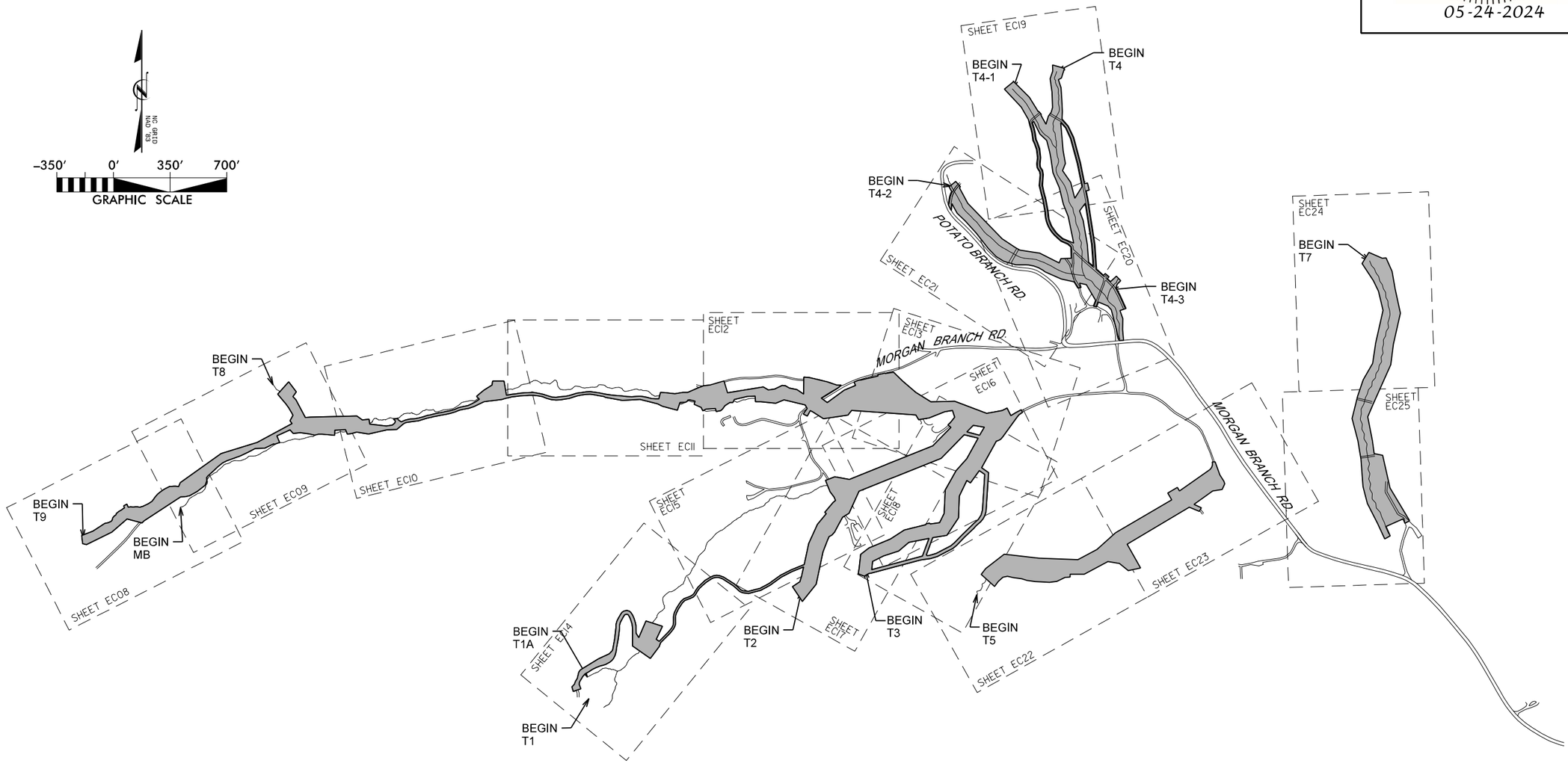
DATE: MAY 2024
SCALE: N.T.S.

EROSION CONTROL PLAN

SHEET EC06

LIMITS OF DISTURBANCE = 36.79 ACRES
(GREY AREA)

** SEE SHEETS EC08 - EC25 FOR DETAILED EROSION CONTROL PLANS*



NORTH CAROLINA PROFESSIONAL SEAL 040899 ENGINEER KRISTIN E. KNIGHT
05-24-2024

A	REVISIONS PER IRT COMMENTS							MAY 2024
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Environmental Quality

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RALEIGH, NORTH CAROLINA 27609

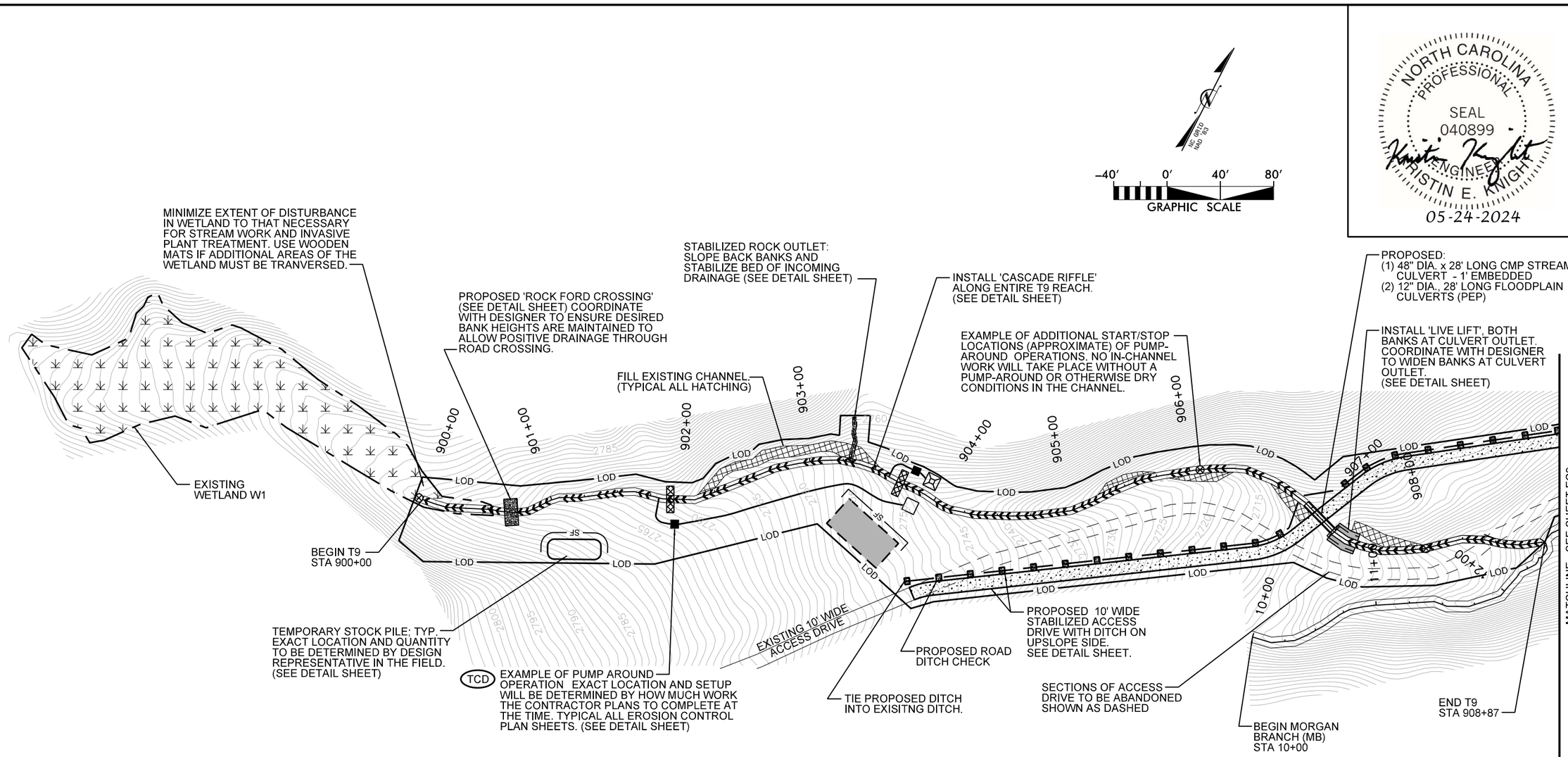
MORGAN BRANCH RESTORATION SITE

BUNCOMBE COUNTY, NORTH CAROLINA

DATE: MAY 2024
SCALE: GRAPHIC

EROSION CONTROL PLAN -OVERVIEW-

SHEET EC07



NORTH CAROLINA PROFESSIONAL SEAL 040899 ENGINEER KRISTIN E. KNIGHT
05-24-2024

A	REVISIONS PER IRT COMMENTS	MAY 2024
SYM.	DESCRIPTION	DATE

REVISIONS

NORTH CAROLINA *Environmental Quality*

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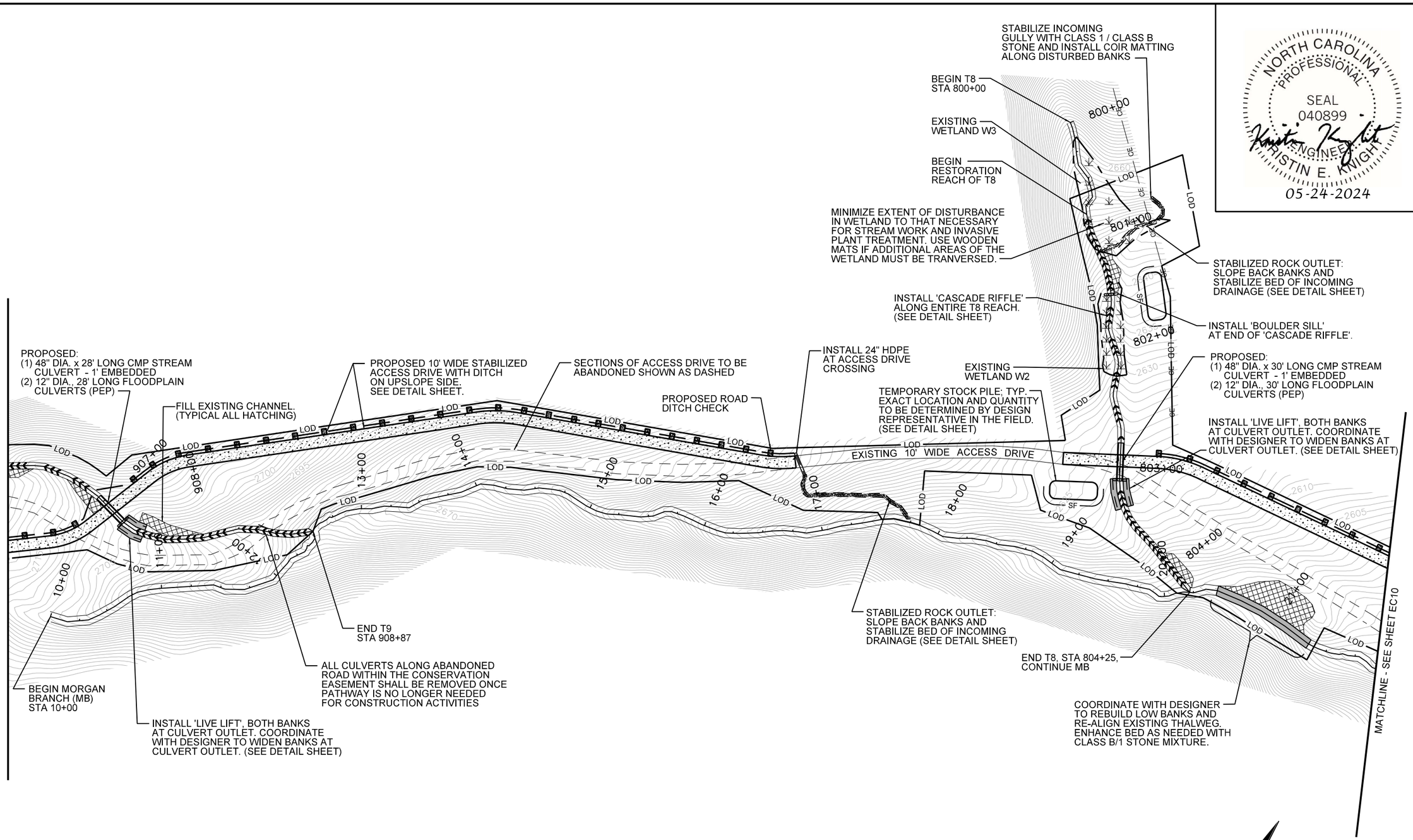
MORGAN BRANCH RESTORATION SITE

BUNCOMBE COUNTY, NORTH CAROLINA

DATE: MAY 2024
SCALE: GRAPHIC

EROSION CONTROL PLAN

SHEET EC08



NORTH CAROLINA PROFESSIONAL SEAL 040899 ENGINEER KRISTIN E. KNIGHT
05-24-2024

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DESCRIPTION	DATE
SYM.	
A REVISIONS PER IRT COMMENTS	MAY 2024

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MORGAN BRANCH RESTORATION SITE

BUNCOMBE COUNTY, NORTH CAROLINA

DATE: MAY 2024
SCALE: GRAPHIC

EROSION CONTROL PLAN

SHEET EC09

NO. GRID
NAD 83

–40′ 0′ 40′ 80′

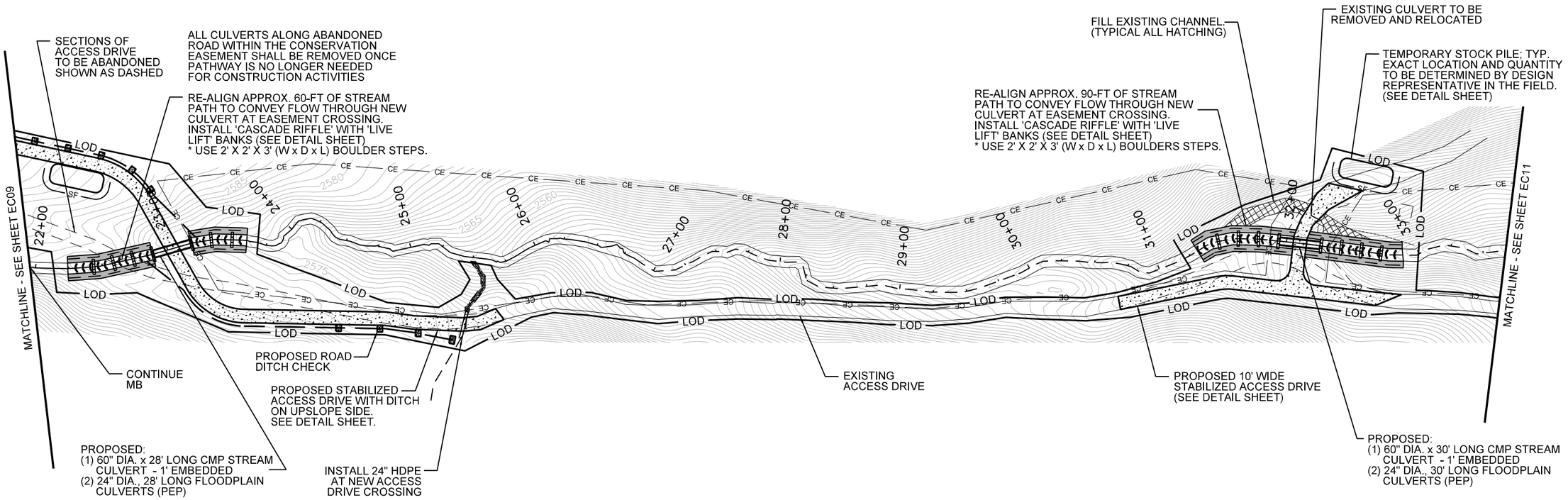
GRAPHIC SCALE

NORTH CAROLINA
PROFESSIONAL
SEAL
040899
ENGINEER
KRISTIN E. KNIGHT

05-24-2024

	DESCRIPTION	DATE
A	REVISIONS PER IRT COMMENTS	MAY 2024

REVISIONS



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MORGAN BRANCH RESTORATION SITE

BUNCOMBE COUNTY, NORTH CAROLINA

DATE: MAY 2024
SCALE: GRAPHIC

EROSION CONTROL PLAN

SHEET EC10

NC GRID NAD 83

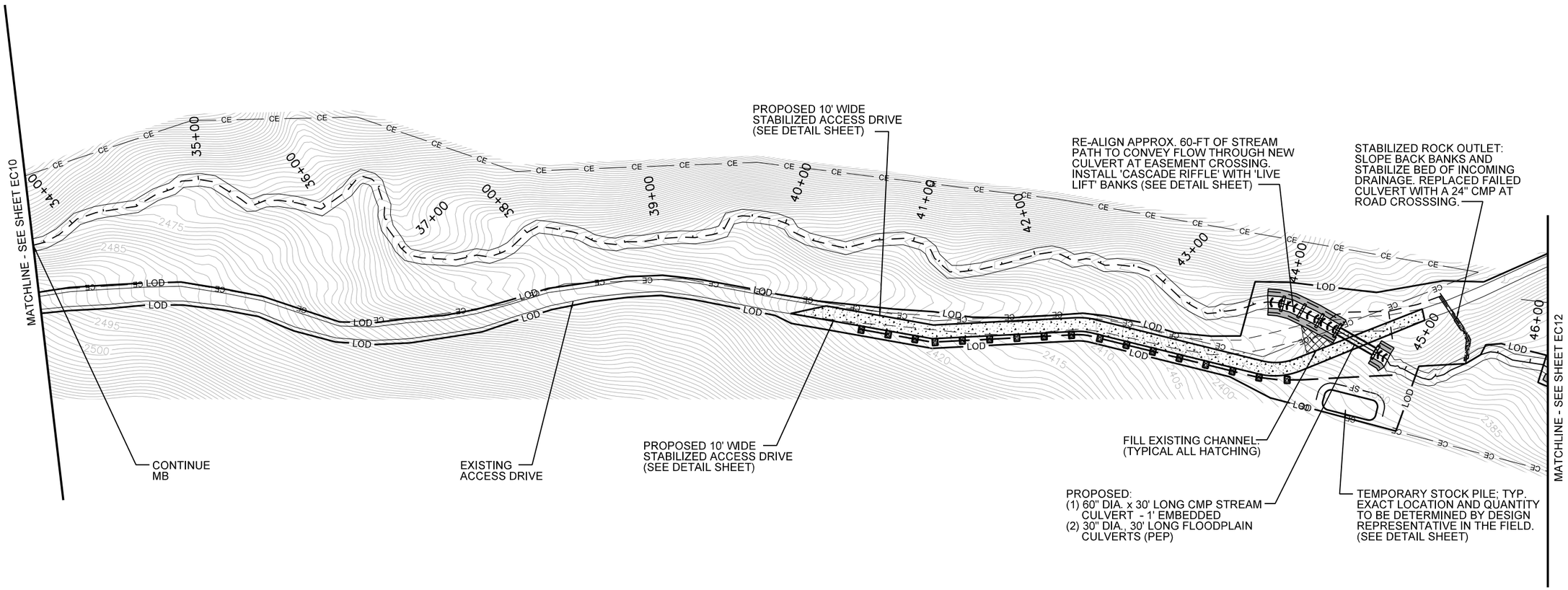
–40′ 0′ 40′ 80′

GRAPHIC SCALE

NORTH CAROLINA PROFESSIONAL SEAL 040899 ENGINEER KRISTIN E. KNIGHT

05-24-2024

A	REVISIONS PER IRT COMMENTS		MAY 2024
		DESCRIPTION	DATE
SYM.	REVISIONS		



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MORGAN BRANCH RESTORATION SITE

BUNCOMBE COUNTY, NORTH CAROLINA

DATE: MAY 2024

SCALE: GRAPHIC

EROSION CONTROL PLAN

SHEET EC11

NC GRID NAD '83

–40′ 0′ 40′ 80′

GRAPHIC SCALE

NORTH CAROLINA PROFESSIONAL SEAL 040899 ENGINEER KRISTIN E. KNIGHT

05-24-2024

	DATE	DESCRIPTION
A	MAY 2024	REVISIONS PER IRT COMMENTS

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MATCHLINE - SEE SHEET EC11

CONTINUE MB

PROPOSED 'LIVE LIFT'. SEE DETAIL SHEET.

PROPOSED 'LIVE LIFT'. SEE DETAIL SHEET.

RE-ALIGN STREAM PATH: INSTALL 'CASCADE RIFFLE' WITH 'LIVE LIFT' BANKS (SEE DETAIL SHEET) COORDINATE WITH DESIGNER TO DETERMINE EXACT BENCH HEIGHTS AND WIDTHS.

TEMPORARY STOCK PILE: TYP. EXACT LOCATION AND QUANTITY TO BE DETERMINED BY DESIGN REPRESENTATIVE IN THE FIELD. (SEE DETAIL SHEET)

COORDINATE WITH DESIGNER TO INSTALL 12' LONG POOL AT END OF CASCADE RIFFLE. (SEE DETAIL SHEET)

STABILIZED ROCK OUTLET: SLOPE BACK BANKS AND STABILIZE BED OF INCOMING DRAINAGE (SEE DETAIL SHEET)

PROPOSED: (1) 72" DIA. x 48' LONG CMP STREAM CULVERT - 1' EMBEDDED (2) 30" DIA., 48' LONG FLOODPLAIN CULVERTS (PEP)

PROPOSED: (1) 72" DIA. x 30' LONG CMP STREAM CULVERT - 1' EMBEDDED (2) 30" DIA., 30' LONG FLOODPLAIN CULVERTS (PEP)

STABILIZED ROCK OUTLET: SLOPE BACK BANKS AND STABILIZE BED OF INCOMING DRAINAGE (SEE DETAIL SHEET)

COORDINATE WITH DESIGNER TO WIDEN BANKS AT CULVERT OUTLET.

PROPOSED 10' WIDE STABILIZED ACCESS DRIVE (SEE DETAIL SHEET)

STABILIZED CONSTRUCTION ENTRANCE (SEE DETAIL SHEET)

FILL EXISTING CHANNEL. (TYPICAL ALL HATCHING)

EXISTING ACCESS DRIVE

PROPOSED LOG VANE (SEE DETAIL)

TEMPORARY STAGING AREA

TEMPORARY STAGING AREA

EXISTING HOME

EX. SHED

EX. SHED

EX. SHED

EX. SHED

SLOPE BACK INNER BANK AT A 4:1 SLOPE AND STABILIZE WITH COIR MATTING.

SLOPE BACK INNER BANK AT A 4:1 SLOPE AND STABILIZE WITH COIR MATTING.

EXISTING WETLAND W4 MINIMIZE EXTENT OF DISTURBANCE IN WETLAND TO THAT NECESSARY FOR STREAM WORK AND INVASIVE PLANT TREATMENT. USE WOODEN MATS IF ADDITIONAL AREAS OF THE WETLAND MUST BE TRANVERSED.

TIE STABILZIED ROCK OUTLET INTO EXISTING DITCH

STABILIZED ROCK OUTLET: SLOPE BACK BANKS AND STABILIZE BED OF INCOMING DRAINAGE. REPLACE FAILED CULVERT WITH A 24" HDPE AT CATTLE CROSSSING.

ENHANCE EXISTING SEEP AT TERRACE BANK WITH CLASS 1 AND CLASS B STONE. DO NOT DISTURB EXISTING TREES.

INSTALL 'LIVE LIFT', BOTH BANKS AT CULVERT OUTLET. COORDINATE WITH DESIGNER TO WIDEN BANKS AT CULVERT OUTLET. (SEE DETAIL SHEET)

TEMPORARY BRIDGE MAT STREAM CROSSING. EXACT LOCATION AND QUANTITY OF CROSSINGS WILL BE DETERMINED BY DESIGN REPRESENTATIVE IN THE FIELD.

MATCHLINE - SEE SHEET EC13

47+00 48+00 49+00 50+00 51+00 52+00 54+00 54+00 55+00 56+00 57+00 58+00 59+00

LOD CE SF

2375 2370 2365 2360 2355 2350 2345 2340 2335 2330 2325 2320

MORGAN BRANCH RESTORATION SITE

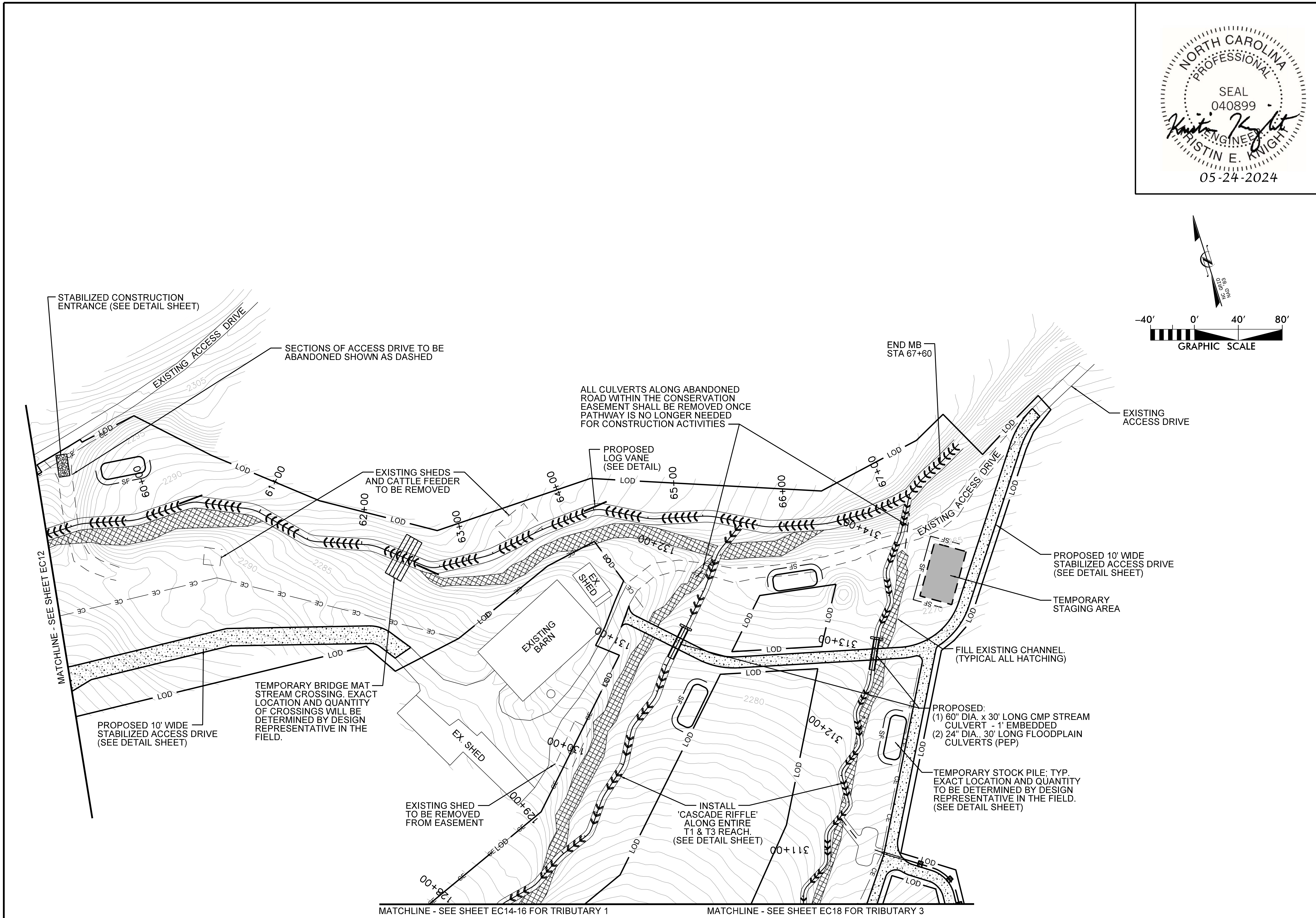
BUNCOMBE COUNTY, NORTH CAROLINA

DATE: MAY 2024

SCALE: GRAPHIC

EROSION CONTROL PLAN

SHEET EC12



SYM.	DESCRIPTION	DATE
A	REVISIONS PER IRT COMMENTS	MAY 2024

REVISIONS

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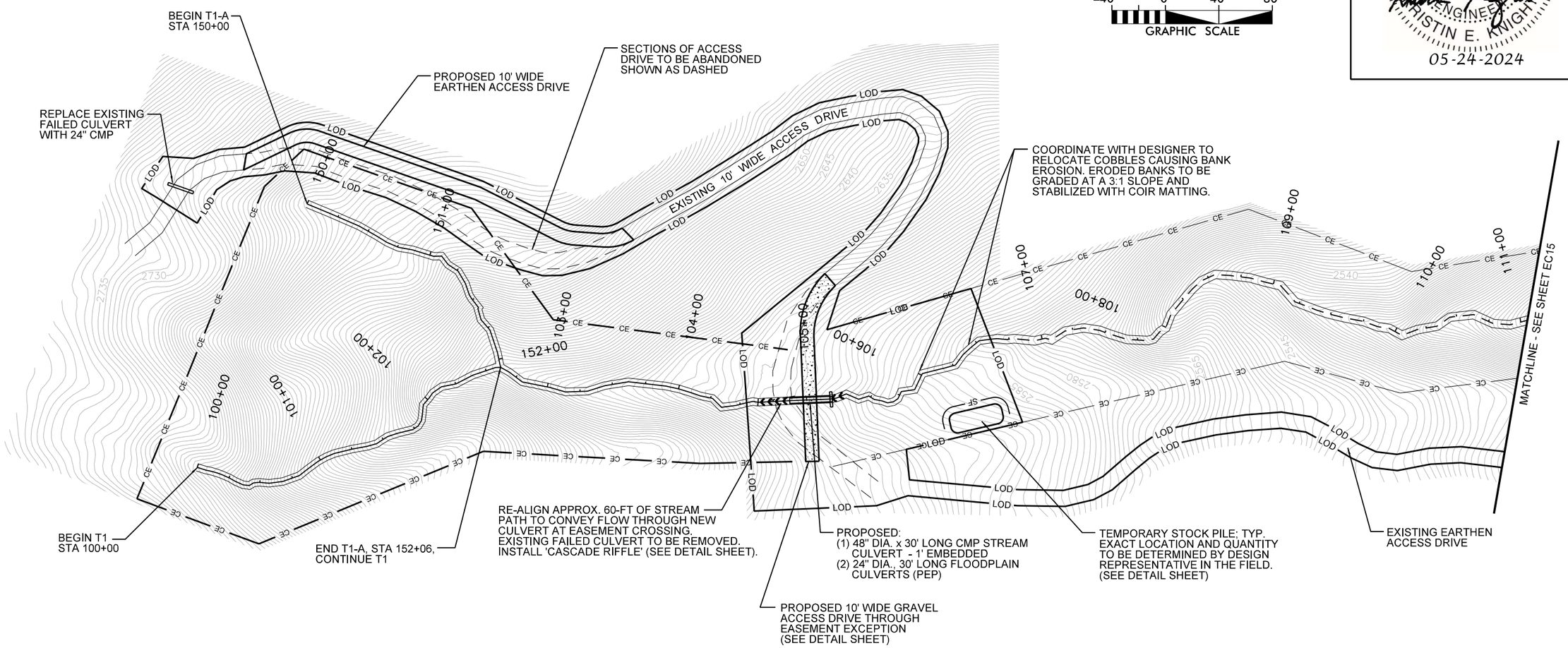
MORGAN BRANCH RESTORATION SITE
BUNCOMBE COUNTY, NORTH CAROLINA

DATE: MAY 2024
SCALE: GRAPHIC

EROSION CONTROL PLAN

SHEET EC13



NORTH CAROLINA PROFESSIONAL SEAL 040899 ENGINEER KRISTIN E. KNIGHT
05-24-2024

DATE	REVISIONS
MAY 2024	A REVISIONS PER IRT COMMENTS

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MORGAN BRANCH RESTORATION SITE

BUNCOMBE COUNTY, NORTH CAROLINA

DATE: MAY 2024
SCALE: GRAPHIC

EROSION CONTROL PLAN

SHEET EC14

NC GRID
NAD 83

–40′ 0′ 40′ 80′
GRAPHIC SCALE

NORTH CAROLINA PROFESSIONAL SEAL 040899 ENGINEER KRISTIN E. KNIGHT
05-24-2024

EX. HOME

EXISTING HOME

EXISTING ACCESS DRIVE

TEMPORARY STOCK PILE: TYP. EXACT LOCATION AND QUANTITY TO BE DETERMINED BY DESIGN REPRESENTATIVE IN THE FIELD. (SEE DETAIL SHEET)

EXISTING FOOT BRIDGE TO REMAIN

EXISTING SOLAR ARRAY

PROPOSED:
(1) 60" DIA. x 24' LONG CMP STREAM CULVERT - 1' EMBEDDED
(2) 24" DIA., 24' LONG FLOOD-PLAIN CULVERTS (PEP)

EXISTING SHED

STABILIZED CONSTRUCTION ENTRANCE (SEE DETAIL SHEET)

TEMPORARY STAGING AREA

MATCHLINE - SEE SHEET EC14

CONTINUE T1

MATCHLINE - SEE SHEET EC16

MATCHLINE - SEE SHEET EC17

END T2
STA 207+25

PROPOSED 'CASCADE RIFFLE'
(SEE DETAIL SHEET)

FILL EXISTING CHANNEL.
(TYPICAL ALL HATCHING)

PROPOSED 10' WIDE GRAVEL ACCESS DRIVE THROUGH EASEMENT EXCEPTION
(SEE DETAIL SHEET)

PROPOSED:
(1) 48" DIA. x 28' LONG CMP STREAM CULVERT - 1' EMBEDDED
(2) 24" DIA., 28' LONG FLOODPLAIN CULVERTS (PEP)

	DESCRIPTION	DATE
A	REVISIONS PER IRT COMMENTS	MAY 2024

REVISIONS

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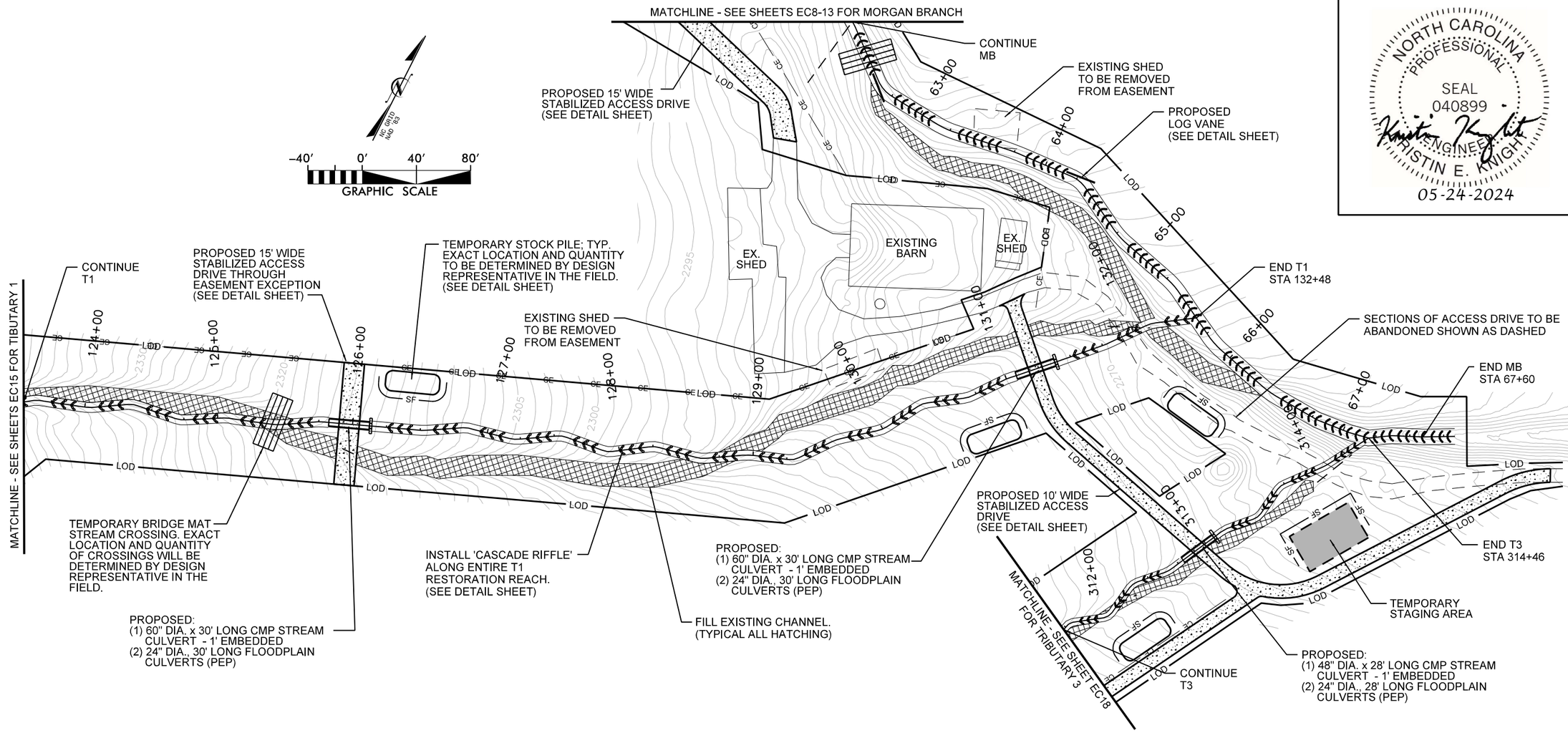
MORGAN BRANCH RESTORATION SITE

BUNCOMBE COUNTY, NORTH CAROLINA

DATE: MAY 2024
SCALE: GRAPHIC

EROSION CONTROL PLAN

SHEET EC15



NORTH CAROLINA PROFESSIONAL SEAL 040899 ENGINEER KRISTIN E. KNIGHT
05-24-2024

	DATE	DESCRIPTION
A	MAY 2024	REVISIONS PER IRT COMMENTS

REVISIONS

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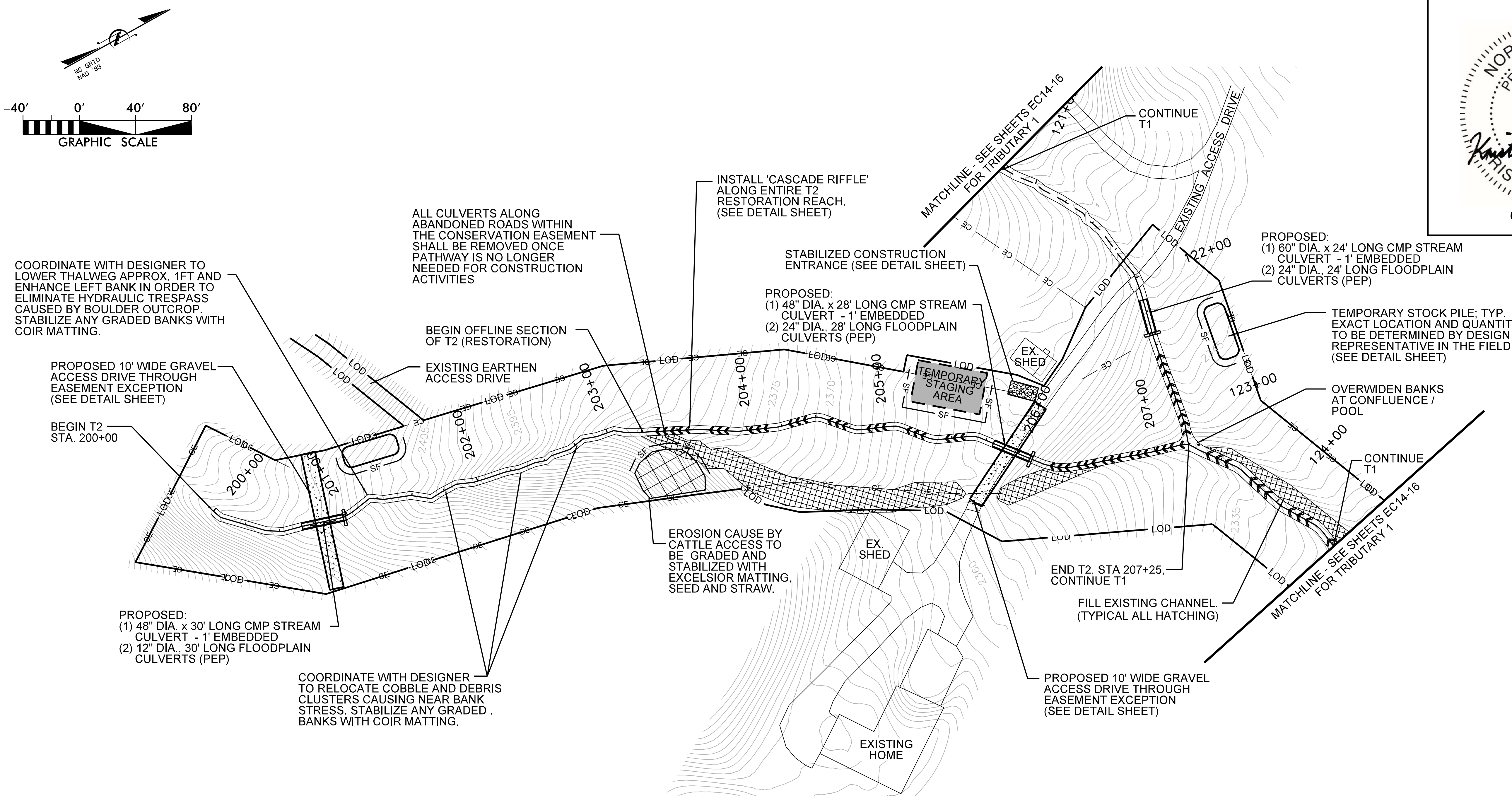
MORGAN BRANCH RESTORATION SITE

BUNCOMBE COUNTY, NORTH CAROLINA

DATE: MAY 2024
SCALE: GRAPHIC

EROSION CONTROL PLAN

SHEET EC16



NORTH CAROLINA PROFESSIONAL SEAL 040899 ENGINEER KRISTIN E. KNIGHT
05-24-2024

SYM.	DESCRIPTION	DATE
A	REVISIONS PER IRT COMMENTS	MAY 2024

REVISIONS

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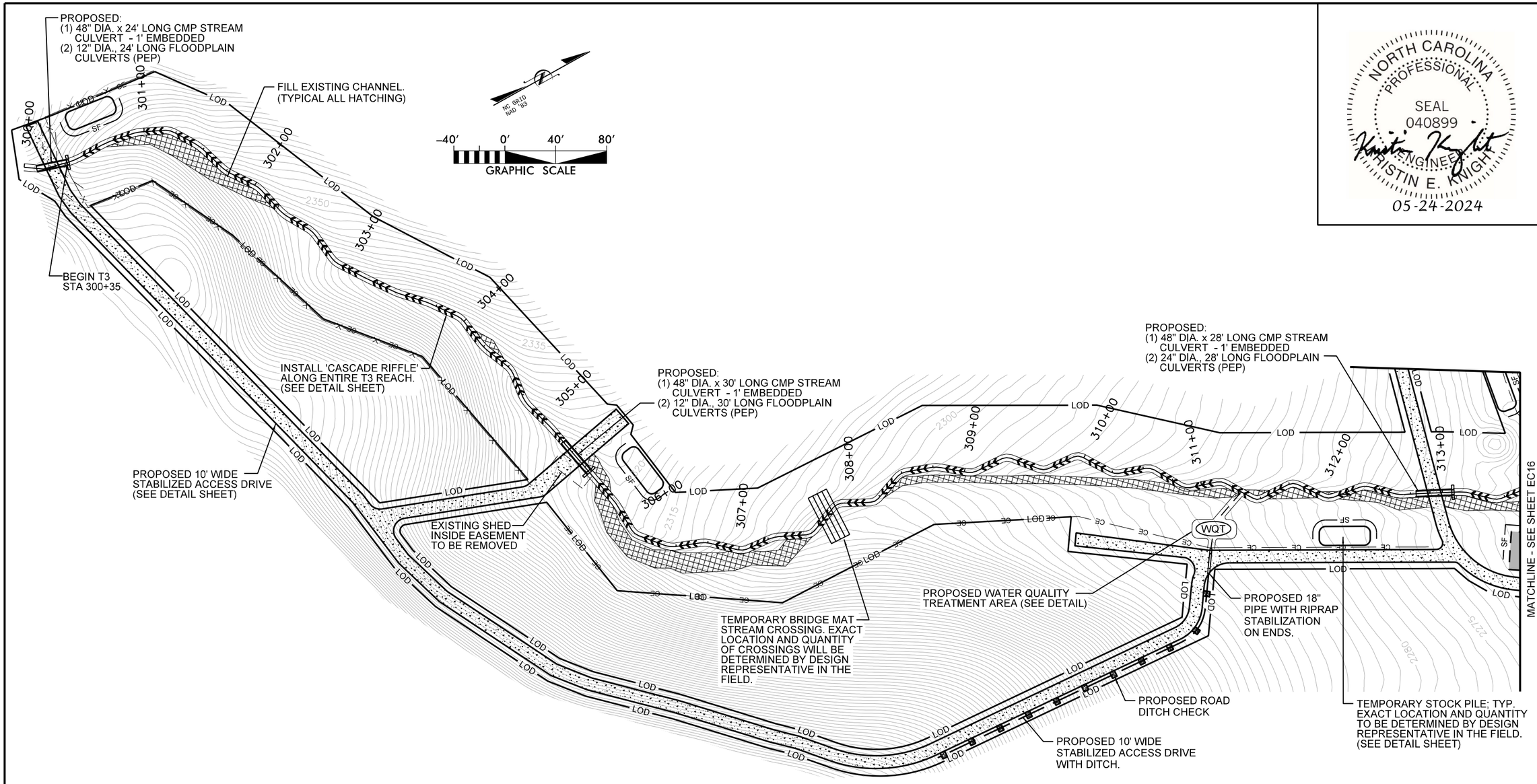
MORGAN BRANCH
RESTORATION SITE
BUNCOMBE COUNTY, NORTH CAROLINA

DATE: MAY 2024
SCALE: GRAPHIC

EROSION CONTROL PLAN

SHEET EC17



NORTH CAROLINA PROFESSIONAL SEAL 040899 ENGINEER KRISTIN E. KNIGHT
05-24-2024

A	REVISIONS PER IRT COMMENTS	MAY 2024
SYM.	DESCRIPTION	DATE

REVISIONS

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MORGAN BRANCH RESTORATION SITE

BUNCOMBE COUNTY, NORTH CAROLINA

DATE: MAY 2024
SCALE: GRAPHIC

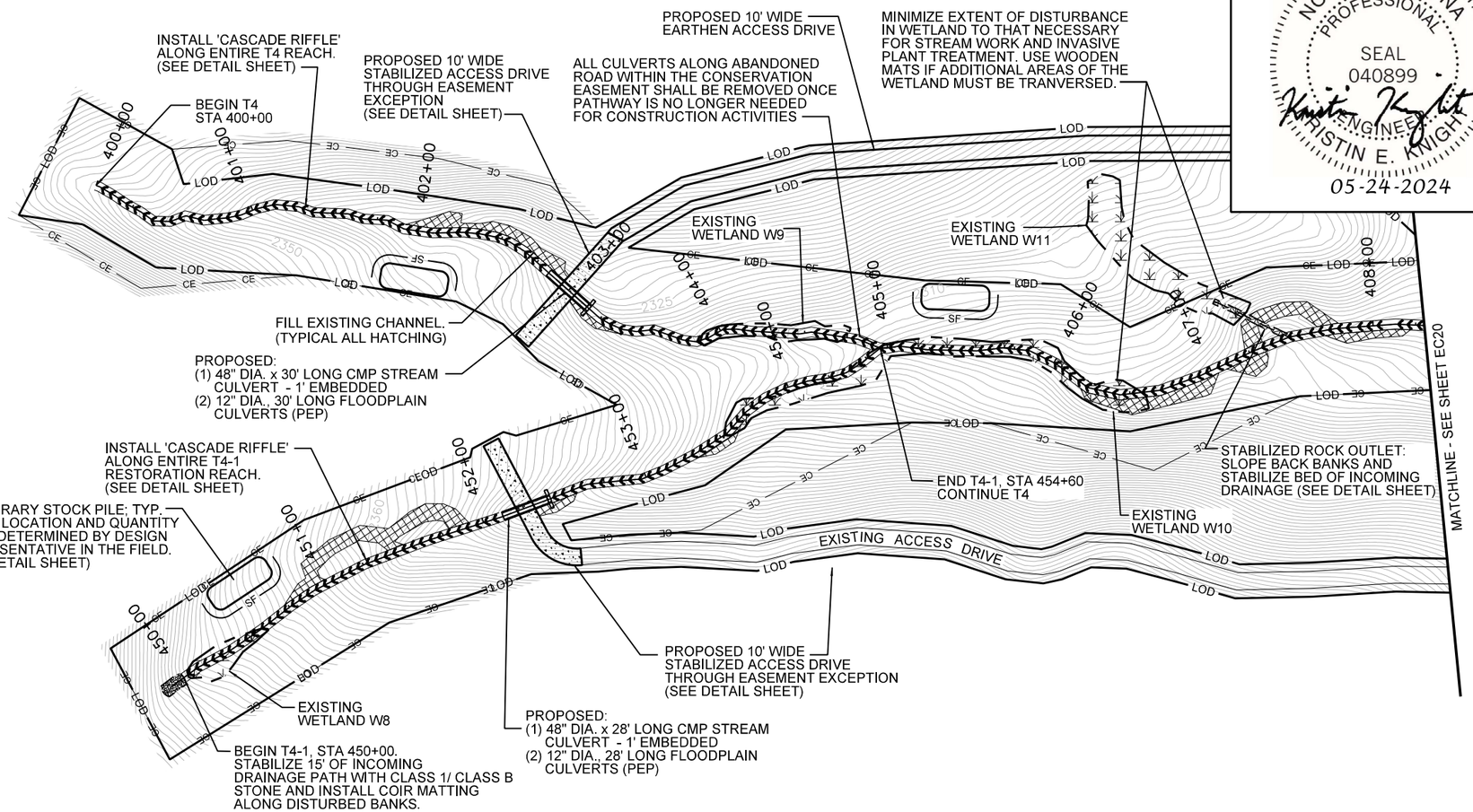
EROSION CONTROL PLAN

SHEET EC18

NC GRID NAD '83

–40′ 0′ 40′ 80′

GRAPHIC SCALE



NORTH CAROLINA PROFESSIONAL SEAL 040899 ENGINEER KRISTIN E. KNIGHT
05-24-2024

A	REVISIONS PER IRT COMMENTS		MAY 2024
	DESCRIPTION	DATE	

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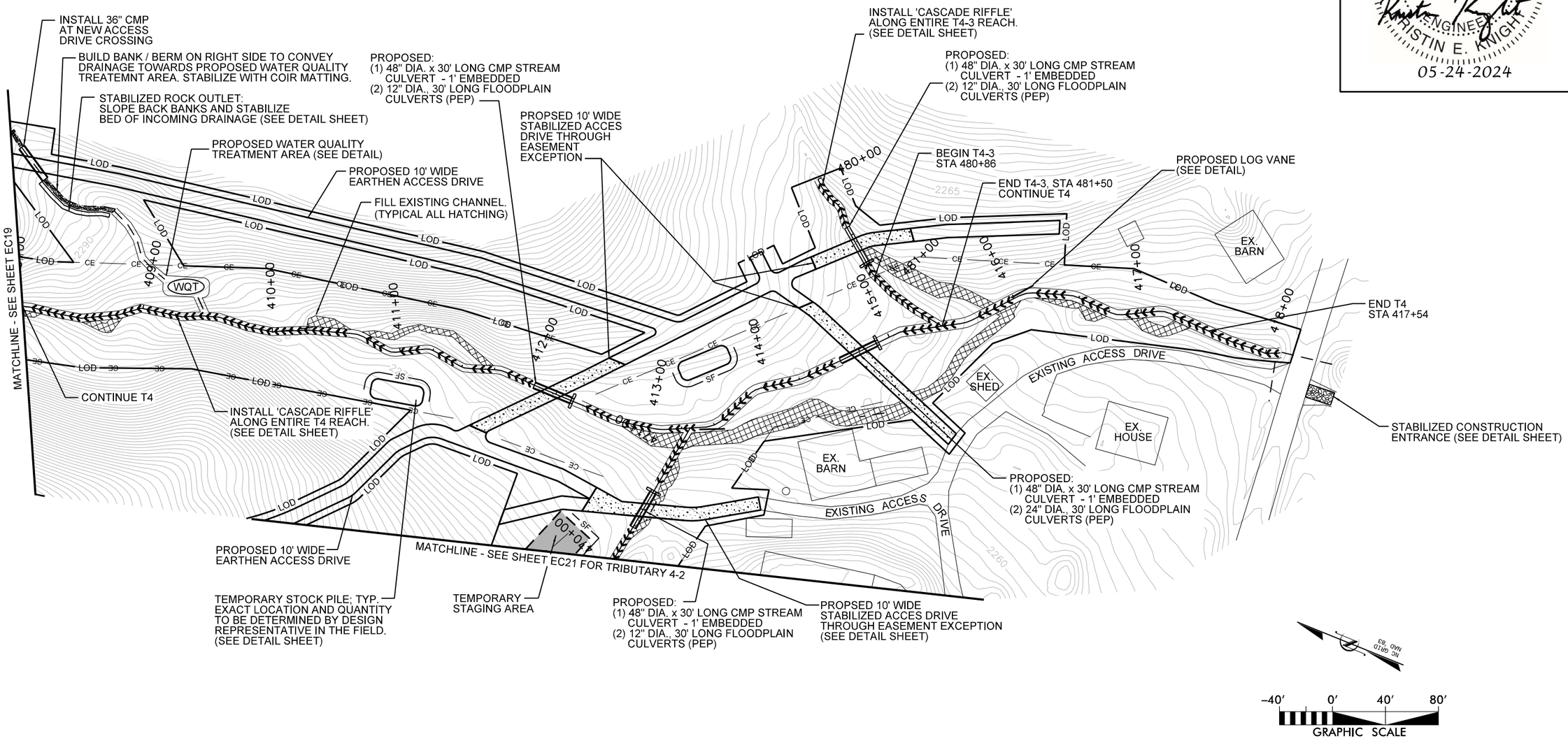
MORGAN BRANCH RESTORATION SITE

BUNCOMBE COUNTY, NORTH CAROLINA

DATE: MAY 2024
SCALE: GRAPHIC

EROSION CONTROL PLAN

SHEET EC19



NORTH CAROLINA PROFESSIONAL SEAL 040899 ENGINEER KRISTIN E. KNIGHT
05-24-2024

	DATE	DESCRIPTION
		REVISIONS
A	MAY 2024	REVISIONS PER IRT COMMENTS

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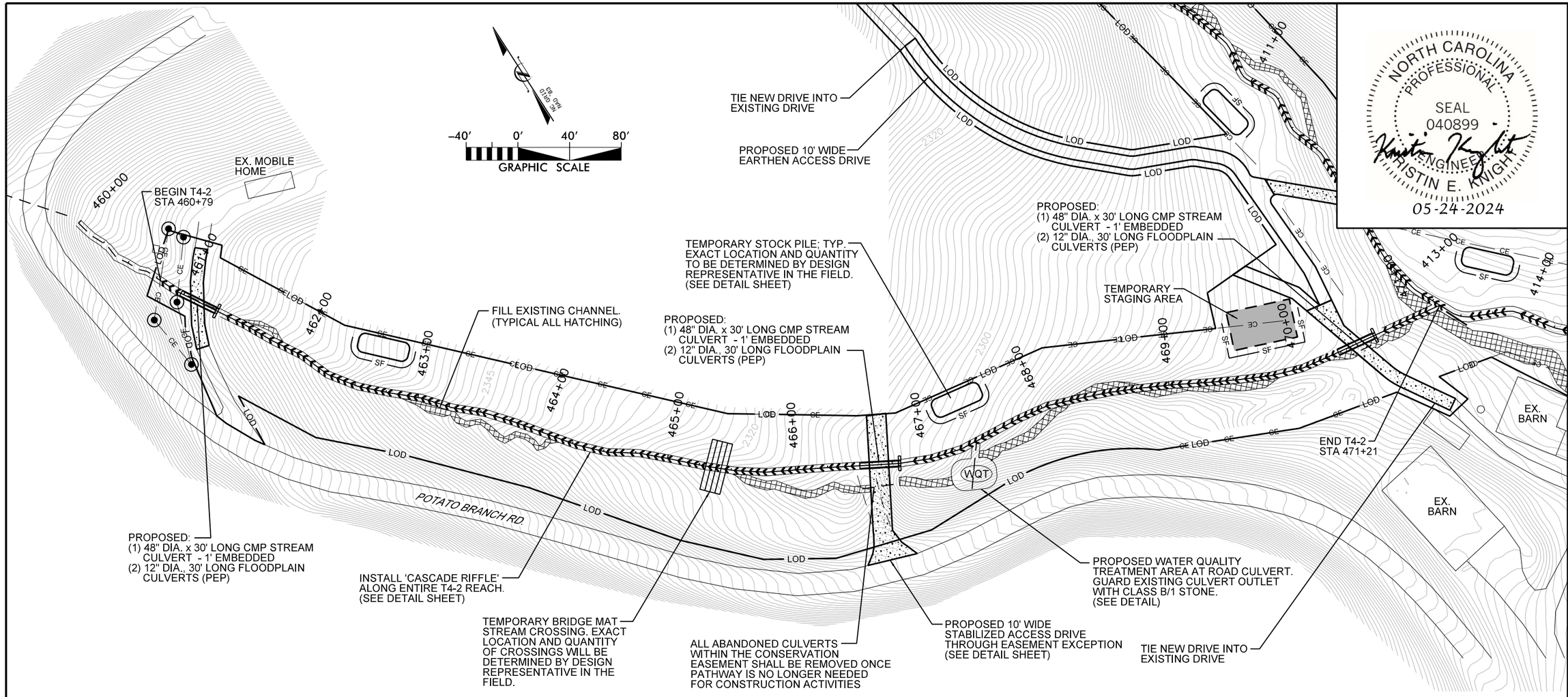
MORGAN BRANCH RESTORATION SITE

BUNCOMBE COUNTY, NORTH CAROLINA

DATE: MAY 2024
SCALE: GRAPHIC

EROSION CONTROL PLAN

SHEET EC20



NORTH CAROLINA PROFESSIONAL SEAL 040899 ENGINEER KRISTIN E. KNIGHT
05-24-2024

	DATE	DESCRIPTION
A	MAY 2024	REVISIONS PER IRT COMMENTS

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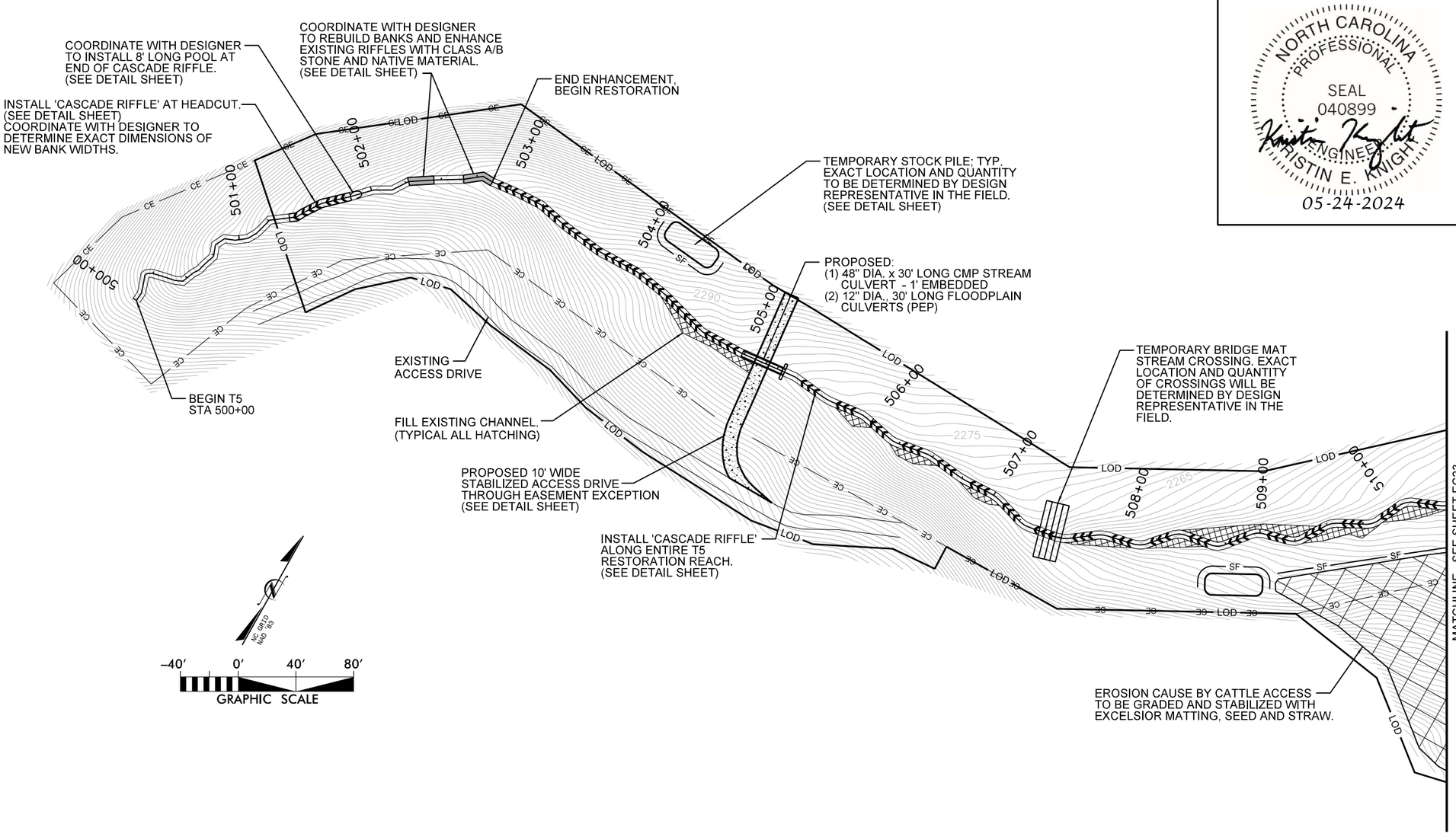
MORGAN BRANCH RESTORATION SITE

BUNCOMBE COUNTY, NORTH CAROLINA

DATE: MAY 2024
SCALE: GRAPHIC

EROSION CONTROL PLAN

SHEET EC21



NORTH CAROLINA PROFESSIONAL SEAL 040899 ENGINEER KRISTIN E. KNIGHT
05-24-2024

	DATE	DESCRIPTION
	MAY 2024	REVISIONS
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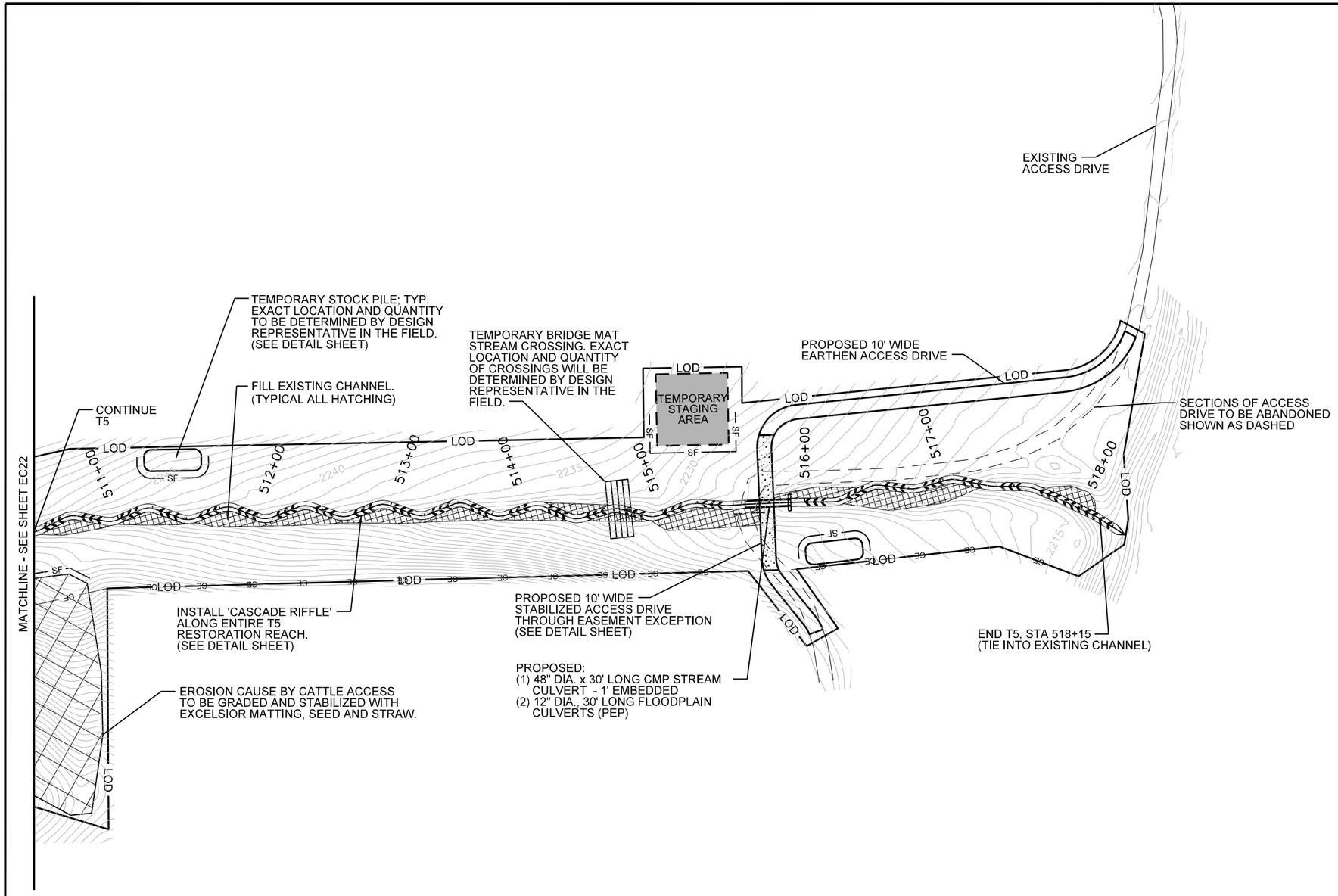
MORGAN BRANCH
RESTORATION SITE
BUNCOMBE COUNTY, NORTH CAROLINA

DATE: MAY 2024
SCALE: GRAPHIC

EROSION CONTROL PLAN

SHEET EC22



NORTH CAROLINA PROFESSIONAL SEAL 040899 ENGINEER KRISTIN E. KNIGHT
05-24-2024

	DATE	DESCRIPTION	SYM.
REVISIONS			
A	MAY 2024	REVISIONS PER IRT COMMENTS	

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MORGAN BRANCH RESTORATION SITE

BUNCOMBE COUNTY, NORTH CAROLINA

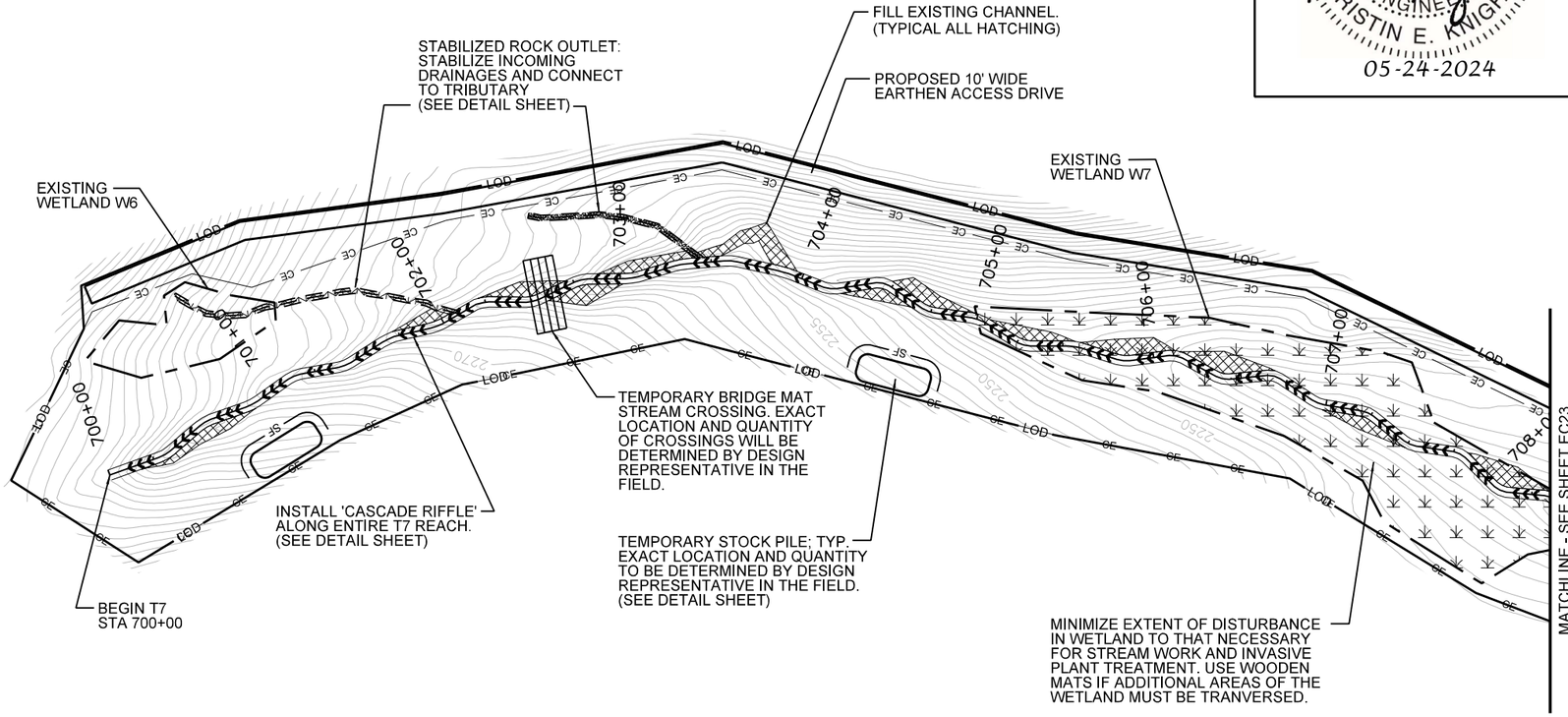
DATE: MAY 2024
SCALE: GRAPHIC

EROSION CONTROL PLAN

SHEET EC23

NC GRID
NAD '83

–40′ 0′ 40′ 80′
GRAPHIC SCALE



NORTH CAROLINA PROFESSIONAL SEAL 040899 ENGINEER KRISTIN E. KNIGHT
05-24-2024

	DATE	DESCRIPTION
	MAY 2024	REVISIONS
A		REVISIONS PER IRT COMMENTS

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MORGAN BRANCH
RESTORATION SITE
BUNCOMBE COUNTY, NORTH CAROLINA

DATE: MAY 2024
SCALE: GRAPHIC

EROSION CONTROL PLAN

SHEET EC24

NC GRID
NAD '83

–40′ 0′ 40′ 80′
GRAPHIC SCALE

NORTH CAROLINA PROFESSIONAL SEAL 040899 ENGINEER KRISTIN E. KNIGHT
05-24-2024

MATCHLINE - SEE SHEET EC24

CONTINUE T7

PROPOSED:
(1) 48" DIA. x 30' LONG CMP STREAM CULVERT - 1' EMBEDDED
(2) 12" DIA., 30' LONG FLOODPLAIN CULVERTS (PEP)

PROPOSED 10' WIDE STABILIZED ACCESS DRIVE THROUGH EASEMENT EXCEPTION (SEE DETAIL SHEET)

SECTIONS OF ACCESS DRIVE TO BE ABANDONED SHOWN AS DASHED

PROPOSED 10' WIDE EARTHEN ACCESS DRIVE

TEMPORARY STAGING AREA

EXISTING ACCESS DRIVE

EX. BARN

EX. HOME

CONTINUE BANK AND BED STABILIZATION TO THE END OF THE BARN. COORDINATE WITH DESIGNER TO DETERMINE EXACT ALIGNMENT AND BANK GRADING IN THIS AREA.

END T7 CREDIT STA 717+27

ALL EXISTING FARM INFRASTRUCTURE TO BE REMOVED FROM EASEMENT

FILL EXISTING CHANNEL. (TYPICAL ALL HATCHING)

TEMPORARY STOCK PILE; TYP. EXACT LOCATION AND QUANTITY TO BE DETERMINED BY DESIGN REPRESENTATIVE IN THE FIELD. (SEE DETAIL SHEET)

INSTALL 'CASCADE RIFFLE' ALONG ENTIRE T7 REACH. (SEE DETAIL SHEET)

EXISTING WETLAND W7

PROPOSED 10' WIDE STABILIZED ACCESS DRIVE THROUGH EASEMENT EXCEPTION (SEE DETAIL SHEET)

PROPOSED:
(1) 48" DIA. x 20' LONG CMP STREAM CULVERT - 1' EMBEDDED
(2) 12" DIA., 20' LONG FLOODPLAIN CULVERTS (PEP)

TEMPORARY BRIDGE MAT STREAM CROSSING. EXACT LOCATION AND QUANTITY OF CROSSINGS WILL BE DETERMINED BY DESIGN REPRESENTATIVE IN THE FIELD.

MORGAN BRANCH ROAD

REVISIONS			
NO.	DESCRIPTION	DWN.	DATE
A	REVISIONS PER IRT COMMENTS		MAY 2024

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MORGAN BRANCH RESTORATION SITE

BUNCOMBE COUNTY, NORTH CAROLINA

DATE: MAY 2024
SCALE: GRAPHIC

EROSION CONTROL PLAN

SHEET EC25

2. Data Analysis/Supplemental Information and Maps

Existing Conditions Cross-Sections
Pebble Counts
Stream Morphological Tables
Nutrient Reduction Analysis

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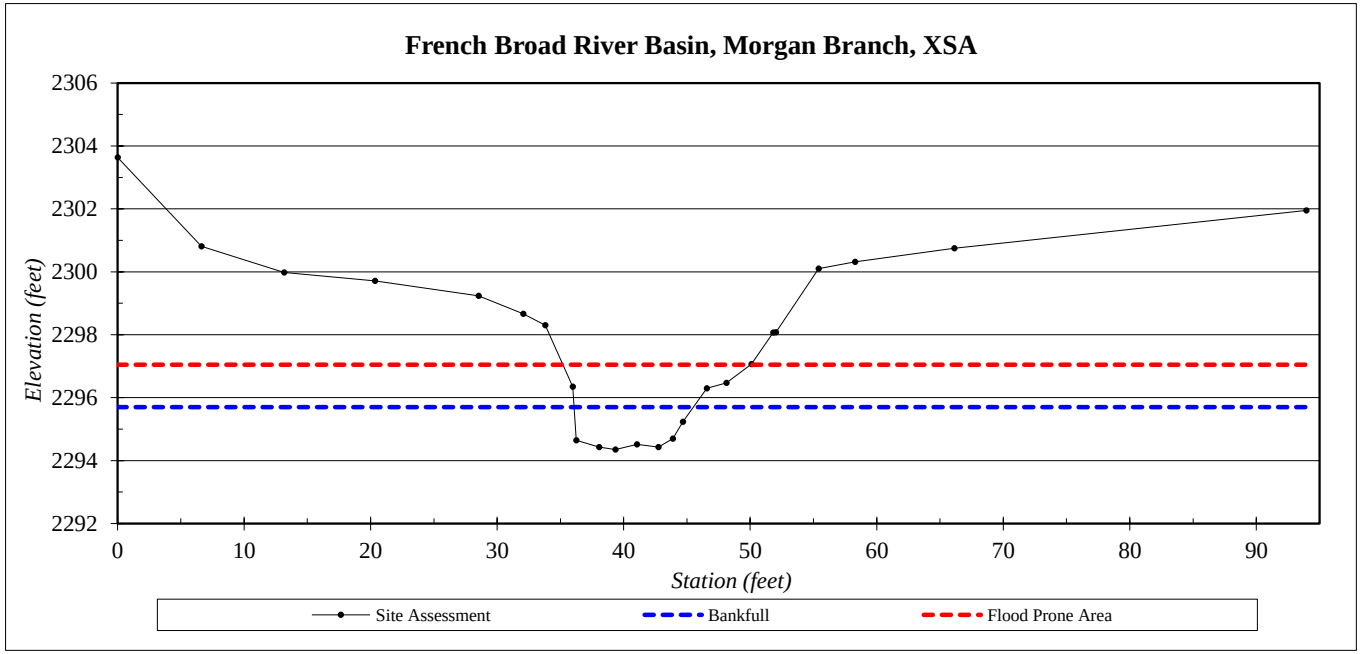
River Basin:	French Broad
Site	Morgan Branch
XS ID	XSA
Drainage Area (sq mi):	0.54
Date:	5/11/2020
Field Crew:	T. Seelinger, A. Gutierrez

Station	Elevation
0.0	2303.64
6.6	2300.81
13.2	2299.98
20.4	2299.72
28.5	2299.24
32.1	2298.66
33.8	2298.30
36.0	2296.35
36.2	2294.65
38.1	2294.43
39.3	2294.35
41.1	2294.51
42.7	2294.43
43.9	2294.70
44.7	2295.24
46.6	2296.30
48.1	2296.47
50.1	2297.07
51.8	2298.07
52.0	2298.08
55.4	2300.11
58.3	2300.32
66.1	2300.75
93.9	2301.95

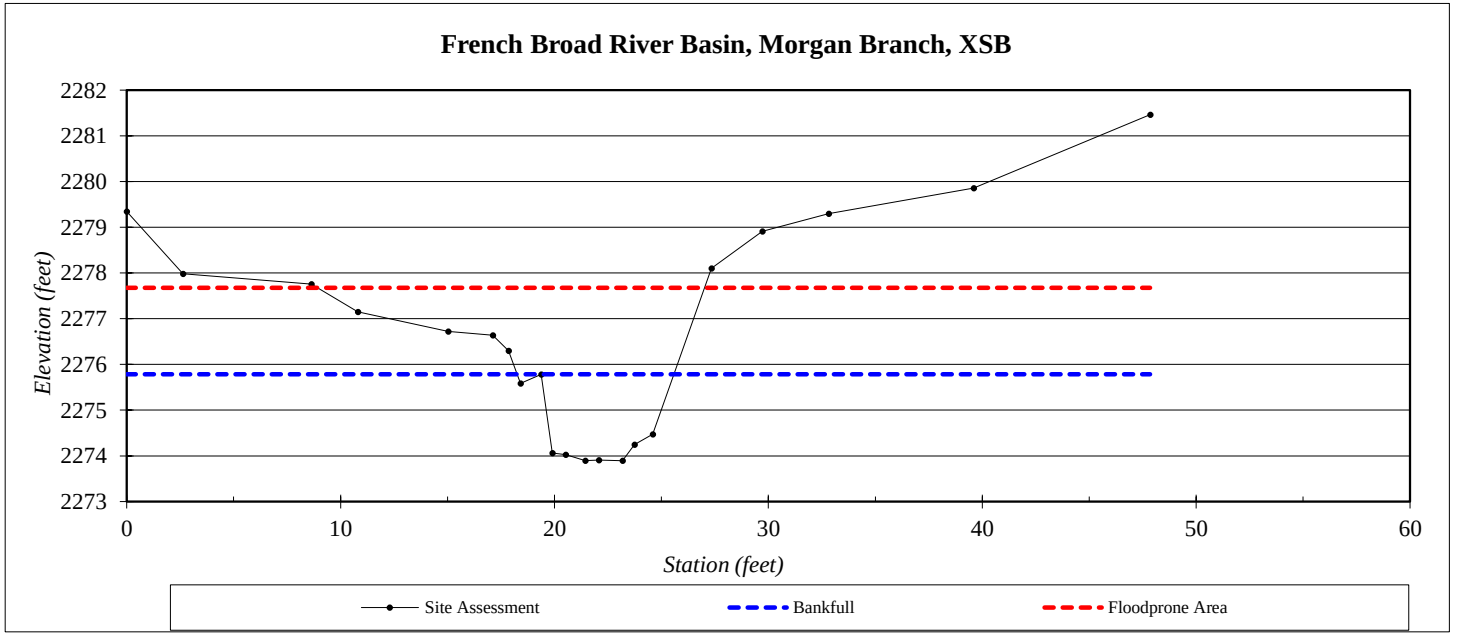
SUMMARY DATA	
Bankfull Elevation (ft):	2295.7
Bankfull Cross-Sectional Area (ft^2):	10.2
Bankfull Width (ft):	9.4
Flood Prone Area Elevation (ft):	2297.0
Flood Prone Width (ft):	14.8
Max Depth at Bankfull (ft):	1.3
Mean Depth at Bankful (ft)l:	1.1
W / D Ratio:	8.7
Entrenchment Ratio:	1.6
Bank Height Ratio:	2.9



River Basin:	French Broad
Site	Morgan Branch
XS ID	XSB
Drainage Area (sq mi):	0.54
Date:	5/11/2020
Field Crew:	T. Seelinger, A. Gutierrez

Station	Elevation
0.0	2279.35
2.6	2277.98
8.6	2277.76
10.8	2277.15
15.0	2276.73
17.1	2276.64
17.9	2276.30
18.4	2275.59
19.4	2275.79
19.9	2274.06
20.5	2274.02
21.4	2273.90
22.1	2273.91
23.2	2273.89
23.7	2274.25
24.6	2274.47
27.3	2278.11
29.7	2278.91
32.8	2279.30
39.6	2279.86
47.8	2281.46

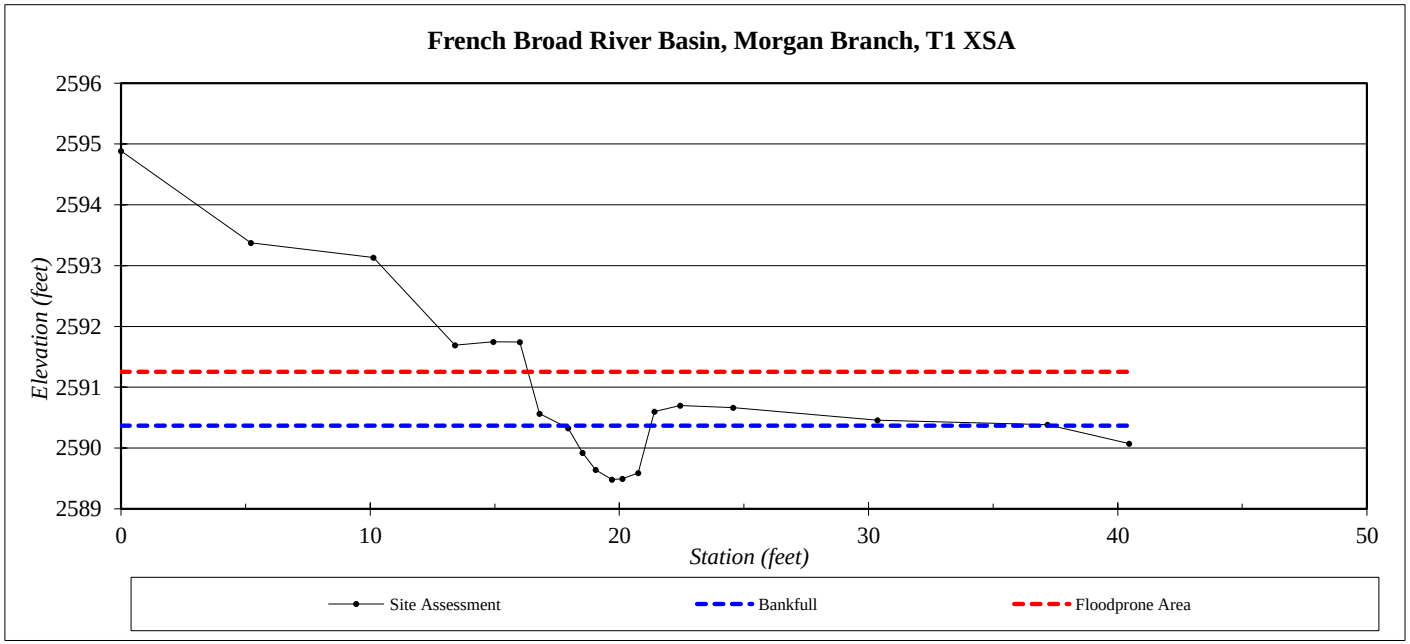
SUMMARY DATA	
Bankfull Elevation (ft):	2275.8
Bankfull Cross-Sectional Area (ft^2):	9.4
Bankfull Width (ft):	7.3
Flood Prone Area Elevation (ft):	2277.7
Flood Prone Width (ft):	18.1
Max Depth at Bankfull (ft):	1.9
Mean Depth at Bankful (ft)l:	1.3
W / D Ratio:	5.7
Entrenchment Ratio:	2.5
Bank Height Ratio:	1.5



River Basin:	French Broad
Site	Morgan Branch
XS ID	T1 XSA
Drainage Area (sq mi):	0.13
Date:	5/11/2020
Field Crew:	T. Seelinger, A. Gutierrez

Station	Elevation
0.0	2594.89
5.2	2593.38
10.1	2593.14
13.4	2591.69
14.9	2591.75
16.0	2591.74
16.8	2590.57
17.9	2590.33
18.5	2589.92
19.0	2589.64
19.7	2589.48
20.1	2589.50
20.8	2589.59
21.4	2590.60
22.4	2590.70
24.6	2590.67
30.4	2590.46
37.2	2590.38
40.5	2590.07

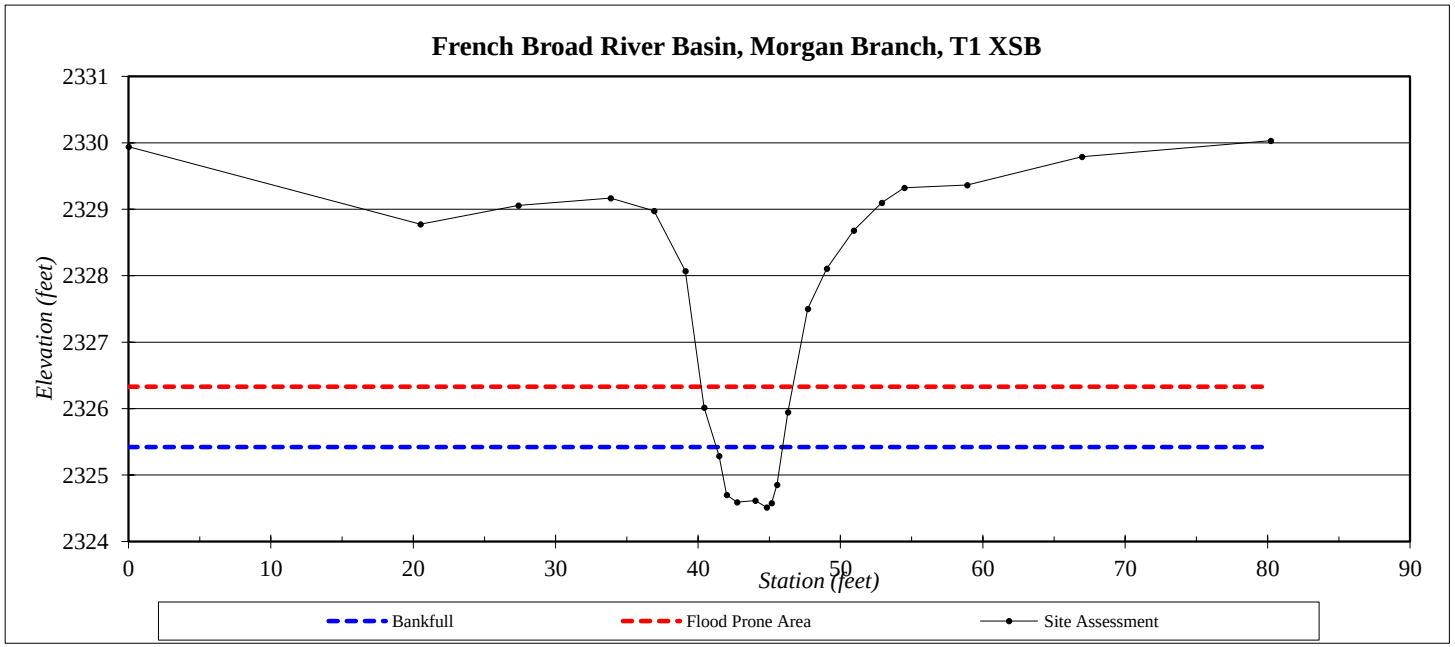
SUMMARY DATA	
Bankfull Elevation (ft):	2590.37
Bankfull Cross-Sectional Area (ft^2):	2.1
Bankfull Width (ft):	3.5
Flood Prone Area Elevation (ft):	2591.3
Flood Prone Width (ft):	24.1
Max Depth at Bankfull (ft):	0.9
Mean Depth at Bankful (ft)l:	0.6
W / D Ratio:	5.9
Entrenchment Ratio:	6.9
Bank Height Ratio:	1.3



River Basin:	French Broad
Site	Morgan Branch
XS ID	T1 XSB
Drainage Area (sq mi):	0.16
Date:	5/12/2020
Field Crew:	T. Seelinger, A. Gutierrez

Station	Elevation
0.0	2329.94
20.5	2328.78
27.4	2329.06
33.9	2329.17
36.9	2328.98
39.1	2328.07
40.4	2326.02
41.5	2325.29
42.0	2324.70
42.7	2324.59
44.0	2324.62
44.8	2324.51
45.2	2324.58
45.5	2324.86
46.3	2325.95
47.7	2327.50
49.0	2328.11
50.9	2328.68
52.9	2329.10
54.5	2329.33
58.9	2329.37
67.0	2329.79
80.2	2330.03

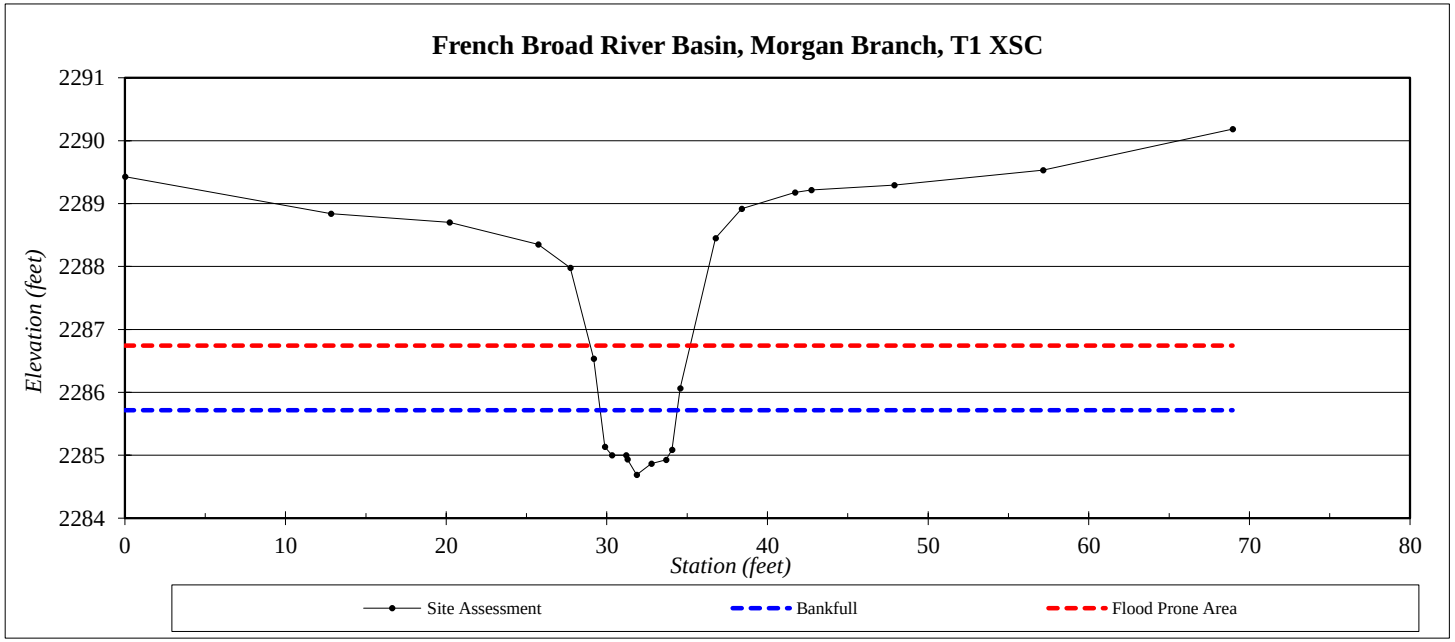
SUMMARY DATA	
Bankfull Elevation (ft):	2325.4
Bankfull Cross-Sectional Area (ft^2):	3.2
Bankfull Width (ft):	4.7
Flood Prone Area Elevation (ft):	2326.3
Flood Prone Width (ft):	6.4
Max Depth at Bankfull (ft):	0.9
Mean Depth at Bankful (ft)l:	0.7
W / D Ratio:	6.7
Entrenchment Ratio:	1.4
Bank Height Ratio:	3.3



River Basin:	French Broad
Site	Morgan Branch
XS ID	T1 XSC
Drainage Area (sq mi):	0.16
Date:	5/12/2020
Field Crew:	T. Seelinger, A. Gutierrez

Station	Elevation
0.0	2289.43
12.8	2288.84
20.2	2288.70
25.7	2288.35
27.7	2287.98
29.2	2286.54
29.9	2285.13
30.3	2285.00
31.2	2285.00
31.3	2284.94
31.9	2284.69
32.8	2284.87
33.7	2284.93
34.1	2285.09
34.6	2286.07
36.8	2288.45
38.4	2288.92
41.7	2289.18
42.7	2289.22
47.9	2289.29
57.2	2289.53
69.0	2290.18

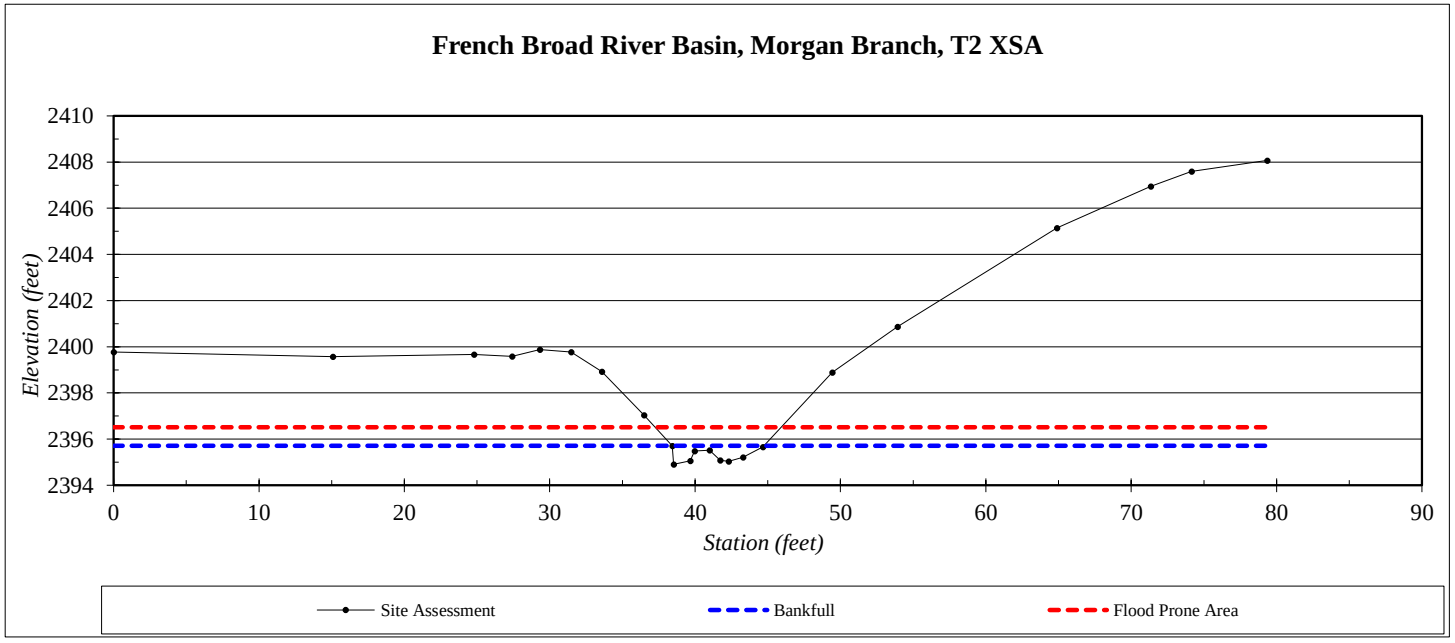
SUMMARY DATA	
Bankfull Elevation (ft):	2285.7
Bankfull Cross-Sectional Area (ft^2):	3.6
Bankfull Width (ft):	4.8
Flood Prone Area Elevation (ft):	2286.7
Flood Prone Width (ft):	6.2
Max Depth at Bankfull (ft):	1.0
Mean Depth at Bankful (ft)l:	0.7
W / D Ratio:	6.5
Entrenchment Ratio:	1.3
Bank Height Ratio:	3.2



River Basin:	French Broad
Site	Morgan Branch
XS ID	T2 XSA
Drainage Area (sq mi):	0.05
Date:	5/12/2020
Field Crew:	T. Seelinger, A. Gutierrez

Station	Elevation
0.0	2399.77
15.1	2399.57
24.8	2399.67
27.4	2399.59
29.3	2399.87
31.5	2399.77
33.6	2398.93
36.5	2397.04
38.4	2395.71
38.5	2394.91
39.7	2395.06
40.0	2395.49
41.0	2395.52
41.7	2395.09
42.3	2395.04
43.3	2395.22
44.7	2395.67
49.4	2398.89
53.9	2400.87
64.9	2405.14
71.3	2406.95
74.1	2407.59
79.3	2408.07

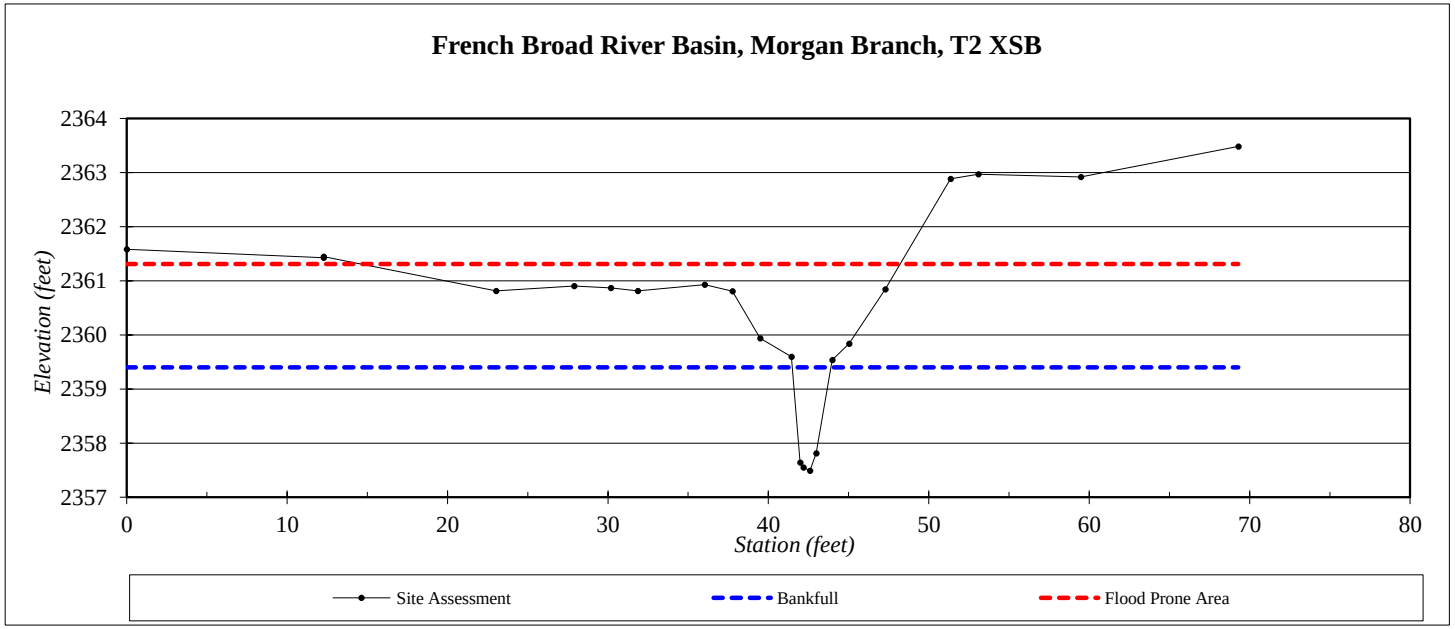
SUMMARY DATA	
Bankfull Elevation (ft):	2395.71
Bankfull Cross-Sectional Area (ft^2):	2.8
Bankfull Width (ft):	6.3
Flood Prone Area Elevation (ft):	2396.5
Flood Prone Width (ft):	8.7
Max Depth at Bankfull (ft):	0.8
Mean Depth at Bankful (ft)l:	0.5
W / D Ratio:	14.0
Entrenchment Ratio:	1.4
Bank Height Ratio:	1.0



River Basin:	French Broad
Site	Morgan Branch
XS ID	T2 XSB
Drainage Area (sq mi):	0.05
Date:	5/12/2020
Field Crew:	T. Seelinger, A. Gutierrez

Station	Elevation
0.0	2361.58
12.3	2361.43
12.3	2361.45
23.0	2360.81
27.9	2360.90
30.2	2360.87
31.8	2360.81
36.0	2360.93
37.8	2360.81
39.5	2359.94
41.4	2359.60
42.0	2357.64
42.2	2357.55
42.6	2357.49
43.0	2357.81
44.0	2359.53
45.0	2359.84
47.3	2360.85
51.4	2362.89
53.1	2362.97
59.5	2362.92
69.3	2363.48

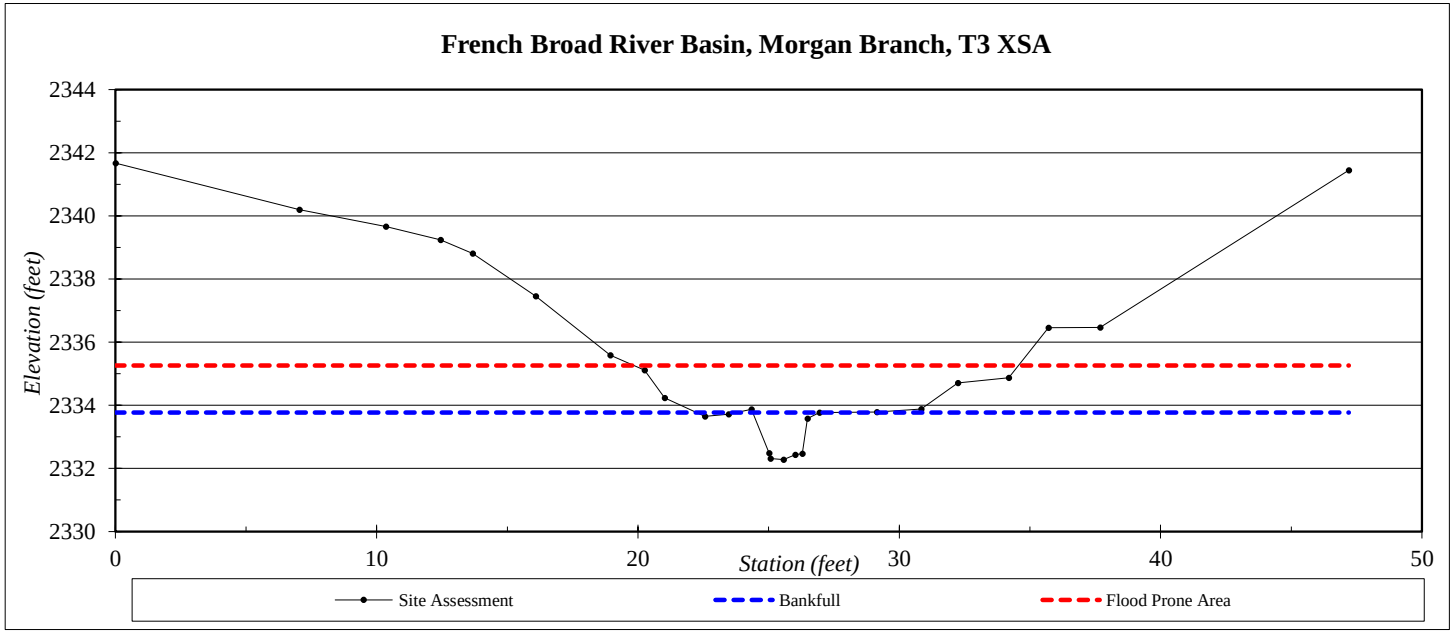
SUMMARY DATA	
Bankfull Elevation (ft):	2359.4
Bankfull Cross-Sectional Area (ft^2):	3.0
Bankfull Width (ft):	2.4
Flood Prone Area Elevation (ft):	2361.3
Flood Prone Width (ft):	33.6
Max Depth at Bankfull (ft):	1.9
Mean Depth at Bankful (ft)l:	1.2
W / D Ratio:	2.0
Entrenchment Ratio:	13.9
Bank Height Ratio:	1.1



River Basin:	French Broad
Site	Morgan Branch
XS ID	T3 XSA
Drainage Area (sq mi):	0.05
Date:	5/12/2020
Field Crew:	T. Seelinger, A. Gutierrez

Station	Elevation
0.0	2341.67
7.0	2340.20
10.3	2339.67
12.4	2339.24
13.7	2338.81
16.1	2337.46
18.9	2335.59
20.3	2335.11
21.0	2334.23
22.6	2333.65
23.5	2333.72
24.3	2333.87
25.0	2332.49
25.1	2332.31
25.6	2332.28
26.0	2332.44
26.3	2332.47
26.5	2333.58
26.9	2333.77
29.1	2333.79
30.8	2333.88
32.2	2334.71
34.2	2334.87
35.7	2336.46
37.7	2336.47
47.2	2341.45

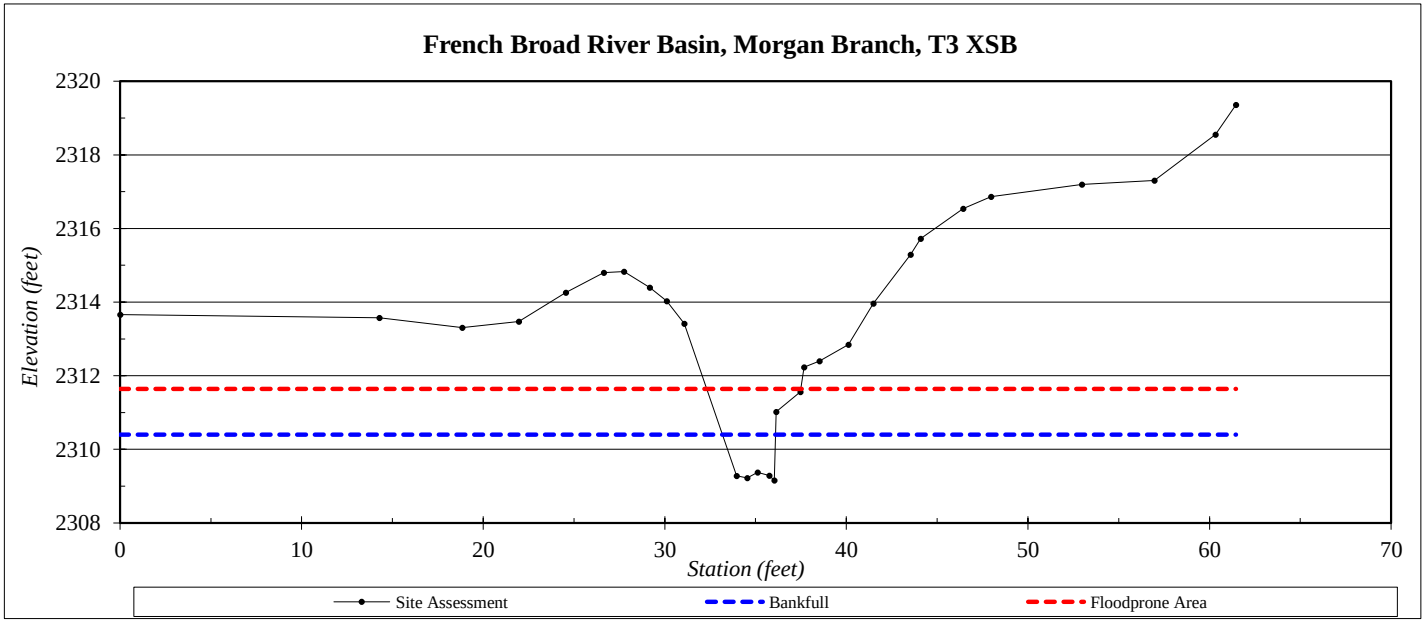
SUMMARY DATA	
Bankfull Elevation (ft):	2333.8
Bankfull Cross-Sectional Area (ft^2):	2.5
Bankfull Width (ft):	4.1
Flood Prone Area Elevation (ft):	2335.3
Flood Prone Width (ft):	14.7
Max Depth at Bankfull (ft):	1.5
Mean Depth at Bankful (ft)l:	0.6
W / D Ratio:	6.6
Entrenchment Ratio:	3.6
Bank Height Ratio:	1.0



River Basin:	French Broad
Site	Morgan Branch
XS ID	T3 XSB
Drainage Area (sq mi):	0.06
Date:	5/12/2020
Field Crew:	T. Seelinger, A. Gutierrez

Station	Elevation
0.0	2313.66
14.3	2313.57
18.8	2313.31
22.0	2313.47
24.5	2314.26
26.6	2314.80
27.7	2314.83
29.2	2314.40
30.1	2314.03
31.1	2313.42
33.9	2309.28
34.5	2309.22
35.1	2309.37
35.8	2309.29
36.0	2309.16
36.1	2311.02
37.5	2311.56
37.7	2312.23
38.5	2312.40
40.1	2312.85
41.5	2313.97
43.5	2315.29
44.1	2315.73
46.4	2316.54
48.0	2316.87
53.0	2317.19
57.0	2317.30
60.3	2318.55
61.5	2319.36

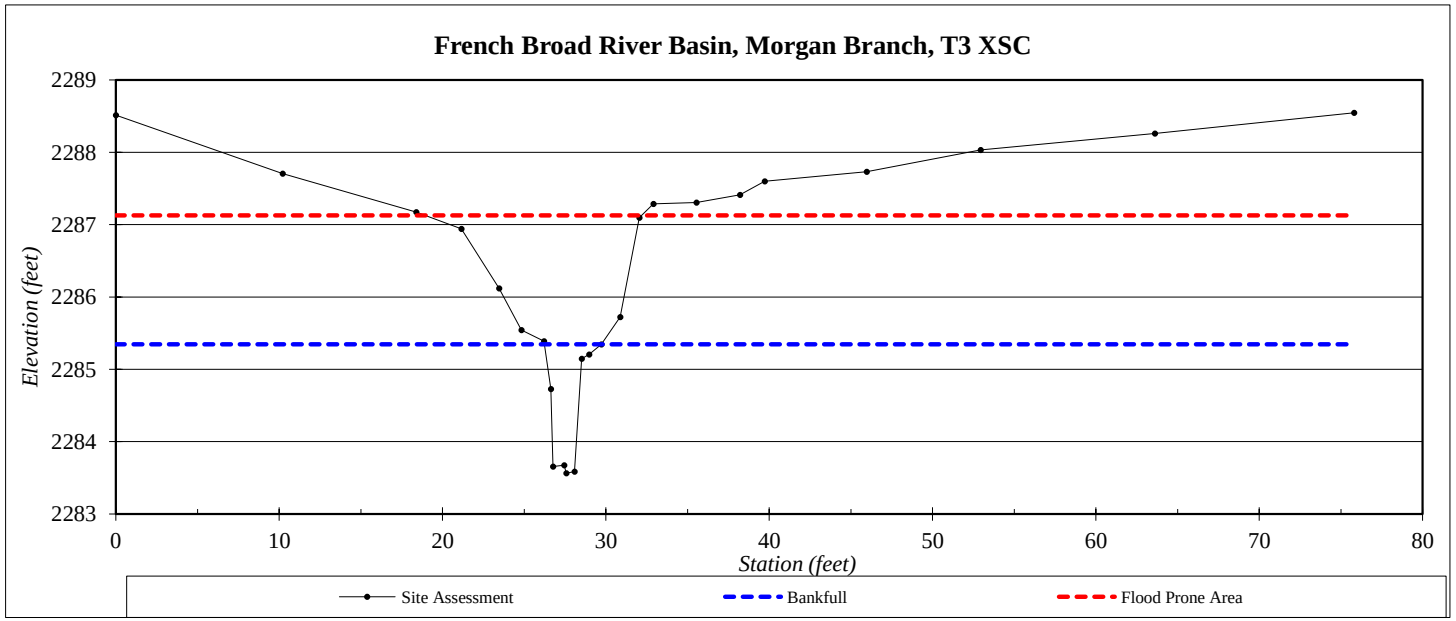
SUMMARY DATA	
Bankfull Elevation (ft):	2310.4
Bankfull Cross-Sectional Area (ft^2):	2.8
Bankfull Width (ft):	2.9
Flood Prone Area Elevation (ft):	2311.6
Flood Prone Width (ft):	5.2
Max Depth at Bankfull (ft):	1.2
Mean Depth at Bankful (ft)l:	1.0
W / D Ratio:	3.1
Entrenchment Ratio:	1.8
Bank Height Ratio:	1.5



River Basin:	French Broad
Site	Morgan Branch
XS ID	T3 XSC
Drainage Area (sq mi):	0.07
Date:	5/12/2020
Field Crew:	T. Seelinger, A. Gutierrez

Station	Elevation
0.0	2288.51
10.2	2287.71
18.4	2287.17
21.2	2286.94
23.5	2286.12
24.8	2285.55
26.2	2285.39
26.6	2284.73
26.8	2283.66
27.4	2283.67
27.6	2283.56
28.1	2283.59
28.5	2285.15
29.0	2285.20
29.7	2285.35
30.9	2285.72
32.0	2287.10
32.9	2287.29
35.5	2287.30
38.2	2287.41
39.7	2287.60
46.0	2287.73
52.9	2288.03
63.6	2288.26
75.8	2288.55

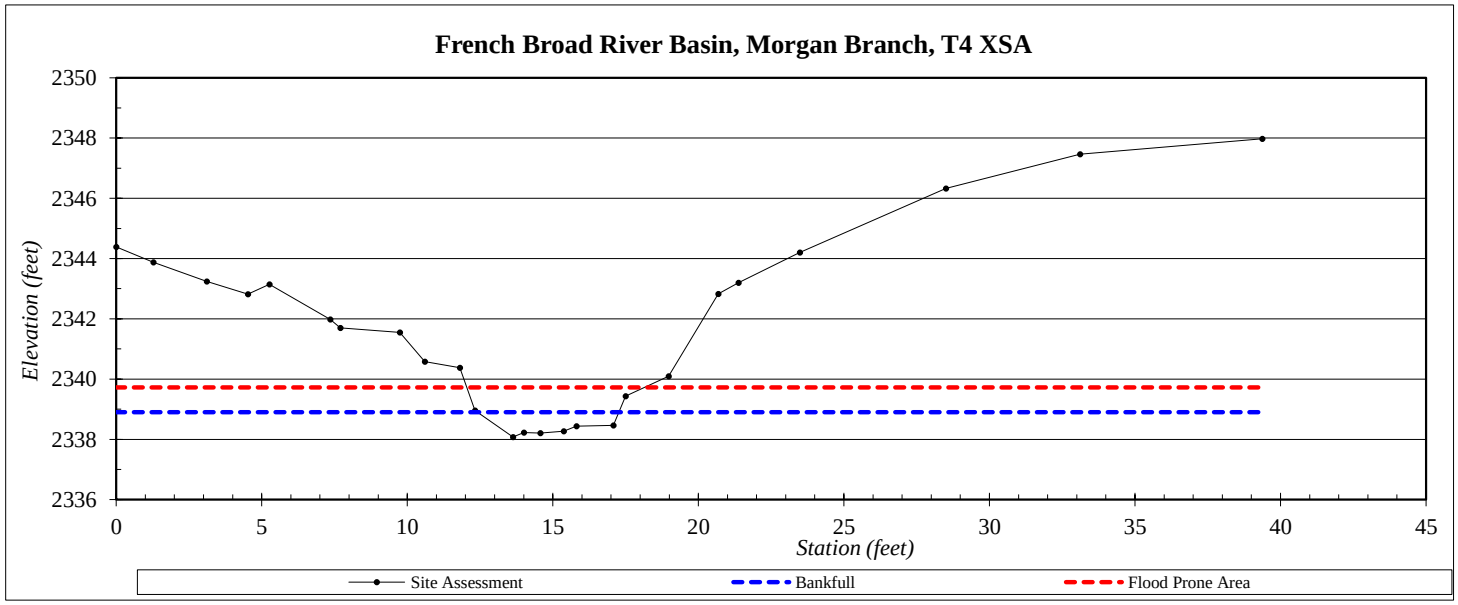
SUMMARY DATA	
Bankfull Elevation (ft):	2285.3
Bankfull Cross-Sectional Area (ft^2):	3.1
Bankfull Width (ft):	3.5
Flood Prone Area Elevation (ft):	2287.1
Flood Prone Width (ft):	13.2
Max Depth at Bankfull (ft):	1.8
Mean Depth at Bankful (ft)l:	0.9
W / D Ratio:	3.9
Entrenchment Ratio:	3.8
Bank Height Ratio:	1.0



River Basin:	French Broad
Site	Morgan Branch
XS ID	T4 XSA
Drainage Area (sq mi):	0.03
Date:	5/14/2020
Field Crew:	T. Seelinger, A. Gutierrez

Station	Elevation
0.0	2344.39
1.3	2343.88
3.1	2343.24
4.5	2342.82
5.3	2343.15
7.4	2341.98
7.7	2341.70
9.7	2341.55
10.6	2340.58
11.8	2340.38
12.3	2338.96
13.6	2338.08
14.0	2338.23
14.6	2338.21
15.4	2338.27
15.8	2338.43
17.1	2338.46
17.5	2339.44
19.0	2340.09
20.7	2342.83
21.4	2343.20
23.5	2344.20
28.5	2346.33
33.1	2347.47
39.4	2347.98

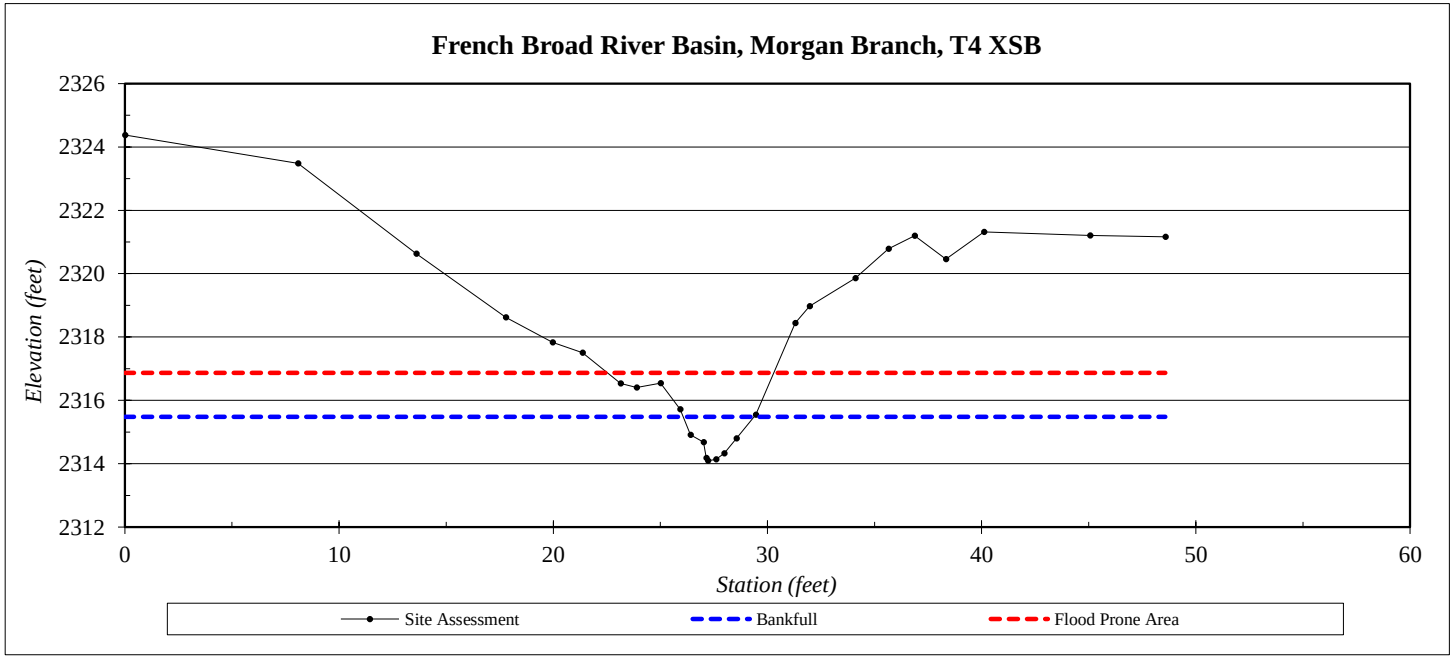
SUMMARY DATA	
Bankfull Elevation (ft):	2338.9
Bankfull Cross-Sectional Area (ft^2):	2.6
Bankfull Width (ft):	4.9
Flood Prone Area Elevation (ft):	2339.7
Flood Prone Width (ft):	6.1
Max Depth at Bankfull (ft):	0.8
Mean Depth at Bankful (ft)l:	0.5
W / D Ratio:	9.2
Entrenchment Ratio:	1.3
Bank Height Ratio:	1.7



River Basin:	French Broad
Site	Morgan Branch
XS ID	T4 XSB
Drainage Area (sq mi):	0.04
Date:	5/14/2020
Field Crew:	T. Seelinger, A. Gutierrez

Station	Elevation
0.0	2324.38
8.1	2323.48
13.6	2320.63
17.8	2318.63
20.0	2317.83
21.4	2317.51
23.1	2316.54
23.9	2316.41
25.0	2316.54
25.9	2315.72
26.4	2314.91
27.0	2314.68
27.1	2314.18
27.2	2314.09
27.6	2314.14
28.0	2314.33
28.6	2314.80
29.4	2315.55
31.3	2318.45
32.0	2318.98
34.1	2319.86
35.7	2320.79
36.9	2321.20
38.3	2320.46
40.1	2321.31
45.1	2321.21
48.6	2321.16

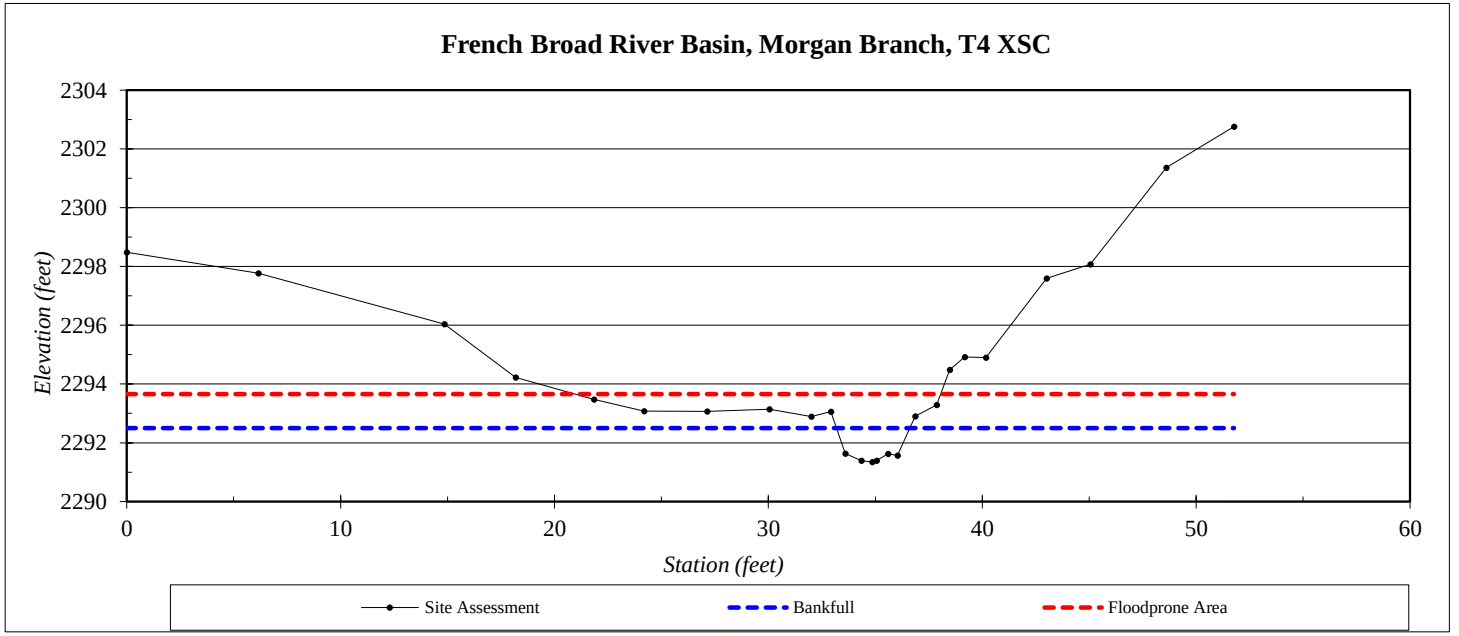
SUMMARY DATA	
Bankfull Elevation (ft):	2315.5
Bankfull Cross-Sectional Area (ft^2):	2.6
Bankfull Width (ft):	3.3
Flood Prone Area Elevation (ft):	2316.9
Flood Prone Width (ft):	7.8
Max Depth at Bankfull (ft):	1.4
Mean Depth at Bankful (ft)l:	0.8
W / D Ratio:	4.3
Entrenchment Ratio:	2.3
Bank Height Ratio:	1.8



River Basin:	French Broad
Site	Morgan Branch
XS ID	T4 XSC
Drainage Area (sq mi):	0.06
Date:	5/14/2020
Field Crew:	T. Seelinger, A. Gutierrez

Station	Elevation
0.0	2298.49
6.1	2297.77
14.8	2296.04
18.2	2294.23
21.8	2293.48
24.2	2293.07
27.1	2293.07
30.0	2293.14
32.0	2292.89
32.9	2293.06
33.6	2291.63
34.4	2291.40
34.9	2291.34
35.1	2291.39
35.6	2291.62
36.0	2291.57
36.9	2292.90
37.9	2293.29
38.5	2294.48
39.2	2294.92
40.2	2294.90
43.0	2297.59
45.1	2298.08
48.6	2301.36
51.8	2302.76

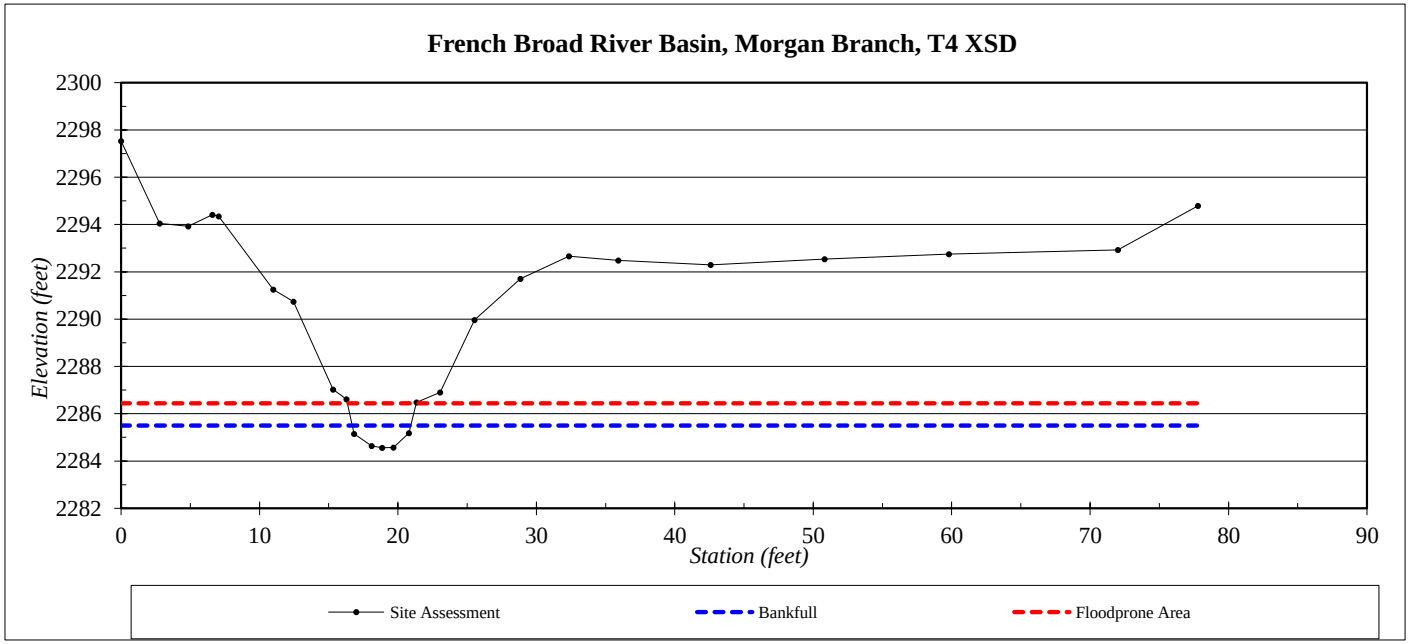
SUMMARY DATA	
Bankfull Elevation (ft):	2292.5
Bankfull Cross-Sectional Area (ft^2):	2.9
Bankfull Width (ft):	3.4
Flood Prone Area Elevation (ft):	2293.7
Flood Prone Width (ft):	17.1
Max Depth at Bankfull (ft):	1.2
Mean Depth at Bankful (ft)l:	0.9
W / D Ratio:	4.0
Entrenchment Ratio:	5.0
Bank Height Ratio:	1.5



River Basin:	French Broad
Site	Morgan Branch
XS ID	T4 XSD
Drainage Area (sq mi):	0.06
Date:	5/14/2020
Field Crew:	T. Seelinger, A. Gutierrez

Station	Elevation
0.0	2297.53
2.8	2294.05
4.9	2293.93
6.6	2294.42
7.1	2294.35
11.0	2291.26
12.5	2290.74
15.3	2287.03
16.3	2286.61
16.8	2285.15
18.1	2284.64
18.9	2284.56
19.7	2284.57
20.8	2285.19
21.3	2286.48
23.1	2286.90
25.5	2289.97
28.9	2291.71
32.4	2292.67
35.9	2292.49
42.6	2292.29
50.8	2292.54
59.8	2292.75
72.0	2292.93
77.8	2294.79

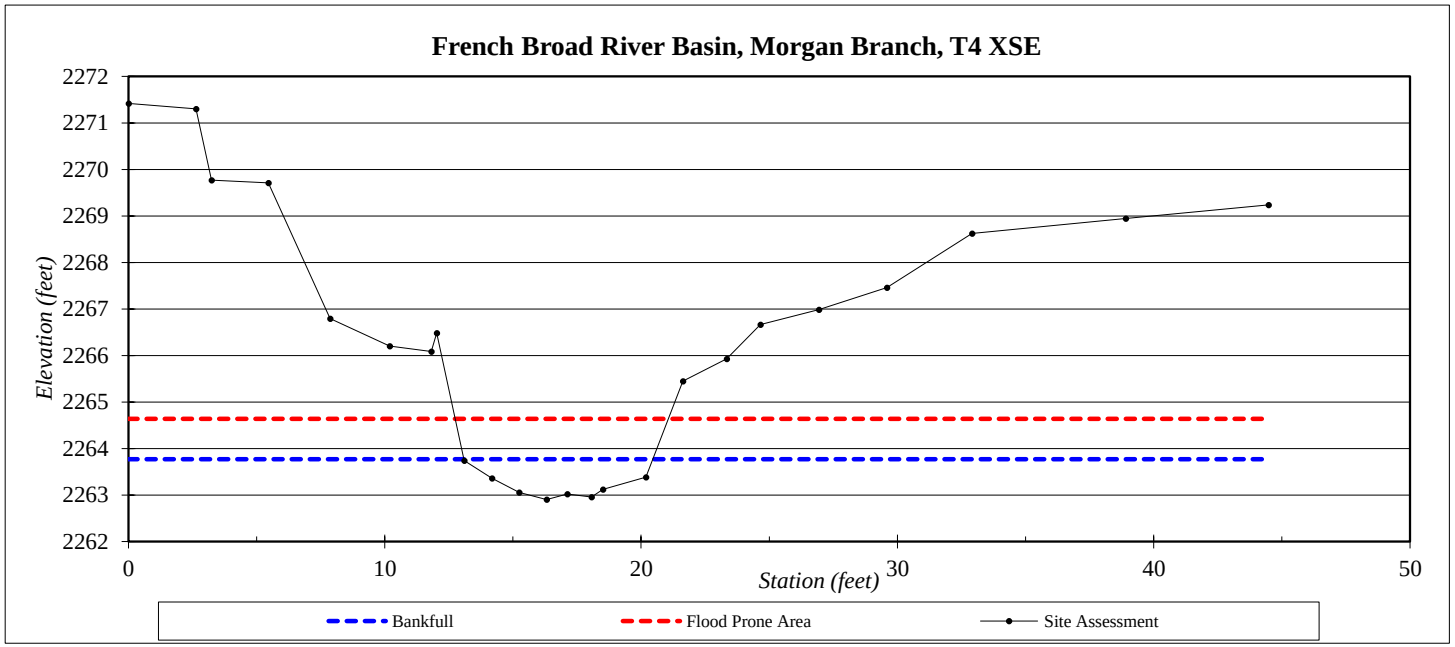
SUMMARY DATA	
Bankfull Elevation (ft):	2285.50
Bankfull Cross-Sectional Area (ft^2):	3.0
Bankfull Width (ft):	4.2
Flood Prone Area Elevation (ft):	2286.4
Flood Prone Width (ft):	5.0
Max Depth at Bankfull (ft):	0.9
Mean Depth at Bankful (ft)l:	0.7
W / D Ratio:	6.0
Entrenchment Ratio:	1.2
Bank Height Ratio:	2.0



River Basin:	French Broad
Site	Morgan Branch
XS ID	T4 XSE
Drainage Area (sq mi):	0.08
Date:	5/13/2020
Field Crew:	T. Seelinger, A. Gutierrez

Station	Elevation
0.0	2271.42
2.6	2271.30
3.2	2269.77
5.5	2269.71
7.9	2266.79
10.2	2266.20
11.8	2266.08
12.0	2266.48
13.1	2263.74
14.2	2263.36
15.2	2263.06
16.3	2262.90
17.1	2263.02
18.1	2262.96
18.5	2263.12
20.2	2263.39
21.6	2265.45
23.3	2265.93
24.7	2266.67
26.9	2266.99
29.6	2267.46
32.9	2268.62
38.9	2268.94
44.5	2269.24

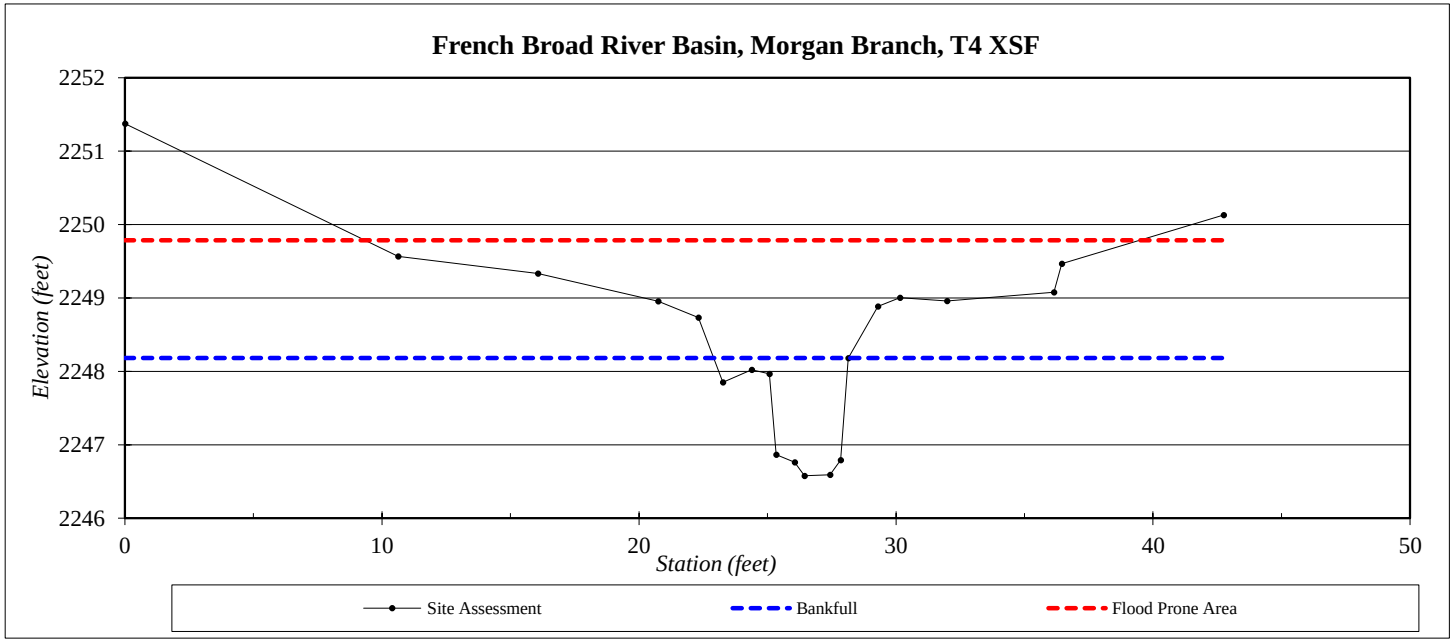
SUMMARY DATA	
Bankfull Elevation (ft):	2263.8
Bankfull Cross-Sectional Area (ft^2):	4.3
Bankfull Width (ft):	7.4
Flood Prone Area Elevation (ft):	2264.6
Flood Prone Width (ft):	8.3
Max Depth at Bankfull (ft):	0.9
Mean Depth at Bankful (ft)l:	0.6
W / D Ratio:	12.5
Entrenchment Ratio:	1.1
Bank Height Ratio:	4.1



River Basin:	French Broad
Site	Morgan Branch
XS ID	T4 XSF
Drainage Area (sq mi):	0.12
Date:	5/13/2020
Field Crew:	T. Seelinger, A. Gutierrez

Station	Elevation
0.0	2251.38
10.6	2249.57
16.1	2249.33
20.7	2248.95
22.3	2248.73
23.3	2247.85
24.4	2248.02
25.1	2247.97
25.3	2246.87
26.1	2246.76
26.4	2246.58
27.4	2246.59
27.8	2246.79
28.1	2248.18
29.3	2248.88
30.2	2249.00
32.0	2248.96
36.1	2249.08
36.5	2249.47
42.7	2250.13

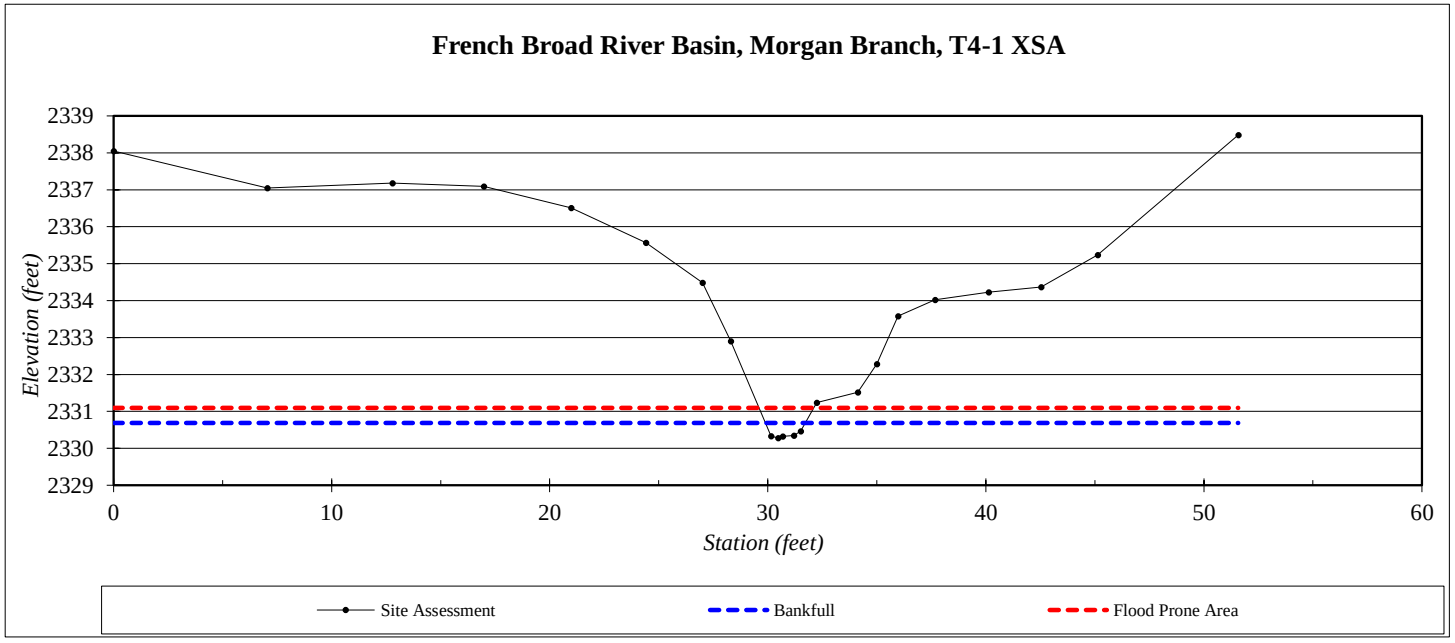
SUMMARY DATA	
Bankfull Elevation (ft):	2248.2
Bankfull Cross-Sectional Area (ft^2):	4.6
Bankfull Width (ft):	5.2
Flood Prone Area Elevation (ft):	2249.8
Flood Prone Width (ft):	30.1
Max Depth at Bankfull (ft):	1.6
Mean Depth at Bankful (ft)l:	0.9
W / D Ratio:	5.9
Entrenchment Ratio:	5.8
Bank Height Ratio:	1.3



River Basin:	French Broad
Site	Morgan Branch
XS ID	T4-1 XSA
Drainage Area (sq mi):	0.02
Date:	5/14/2020
Field Crew:	T. Seelinger, A. Gutierrez

Station	Elevation
0.0	2338.05
7.1	2337.05
12.8	2337.18
17.0	2337.09
21.0	2336.51
24.4	2335.57
27.0	2334.49
28.3	2332.90
30.1	2330.33
30.5	2330.28
30.7	2330.32
31.2	2330.35
31.5	2330.46
32.2	2331.24
34.1	2331.52
35.0	2332.29
36.0	2333.58
37.7	2334.02
40.1	2334.23
42.5	2334.37
45.1	2335.24
51.6	2338.48

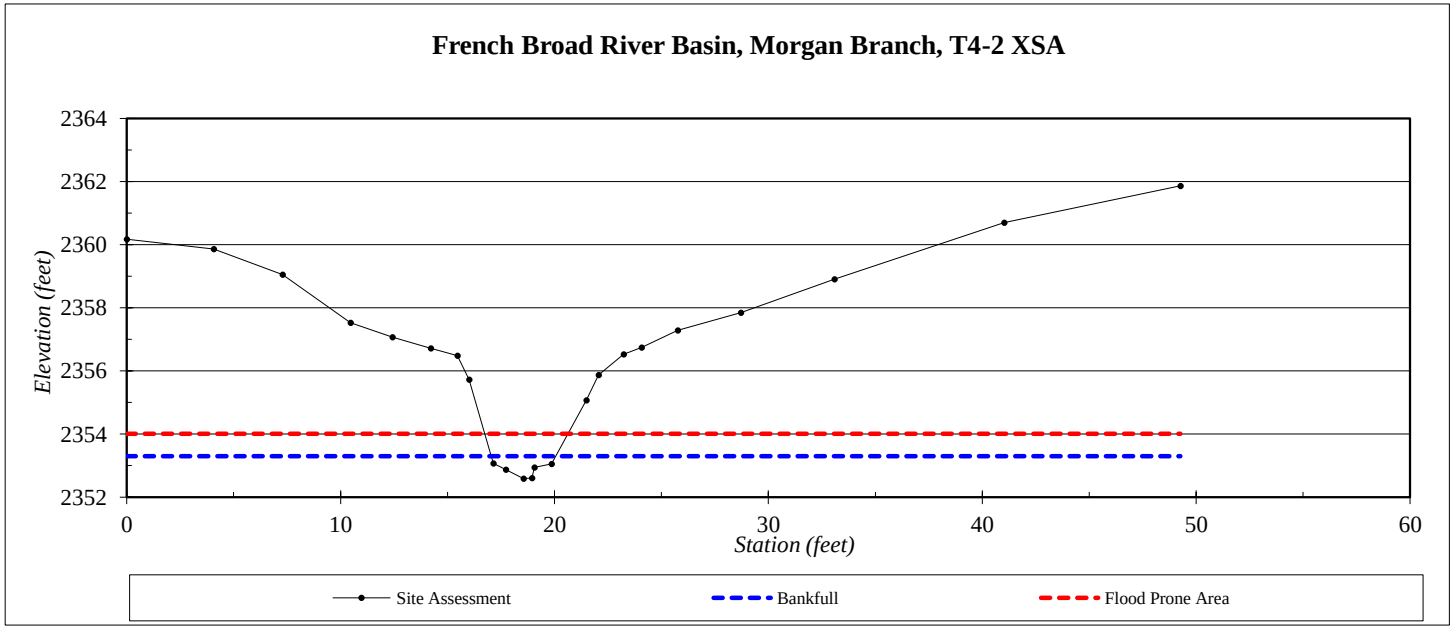
SUMMARY DATA	
Bankfull Elevation (ft):	2330.69
Bankfull Cross-Sectional Area (ft^2):	0.5
Bankfull Width (ft):	1.8
Flood Prone Area Elevation (ft):	2331.1
Flood Prone Width (ft):	2.5
Max Depth at Bankfull (ft):	0.4
Mean Depth at Bankful (ft)l:	0.3
W / D Ratio:	6.2
Entrenchment Ratio:	1.4
Bank Height Ratio:	8.1



River Basin:	French Broad
Site	Morgan Branch
XS ID	T4-2 XSA
Drainage Area (sq mi):	0.02
Date:	5/14/2020
Field Crew:	T. Seelinger, A. Gutierrez

Station	Elevation
0.0	2360.18
4.1	2359.86
7.3	2359.05
10.5	2357.53
12.4	2357.07
14.2	2356.72
15.5	2356.49
16.0	2355.72
17.1	2353.07
17.7	2352.87
18.6	2352.59
18.9	2352.61
19.1	2352.95
19.9	2353.05
21.5	2355.07
22.1	2355.87
23.2	2356.53
24.1	2356.74
25.8	2357.29
28.7	2357.85
33.1	2358.90
41.0	2360.70
49.3	2361.87

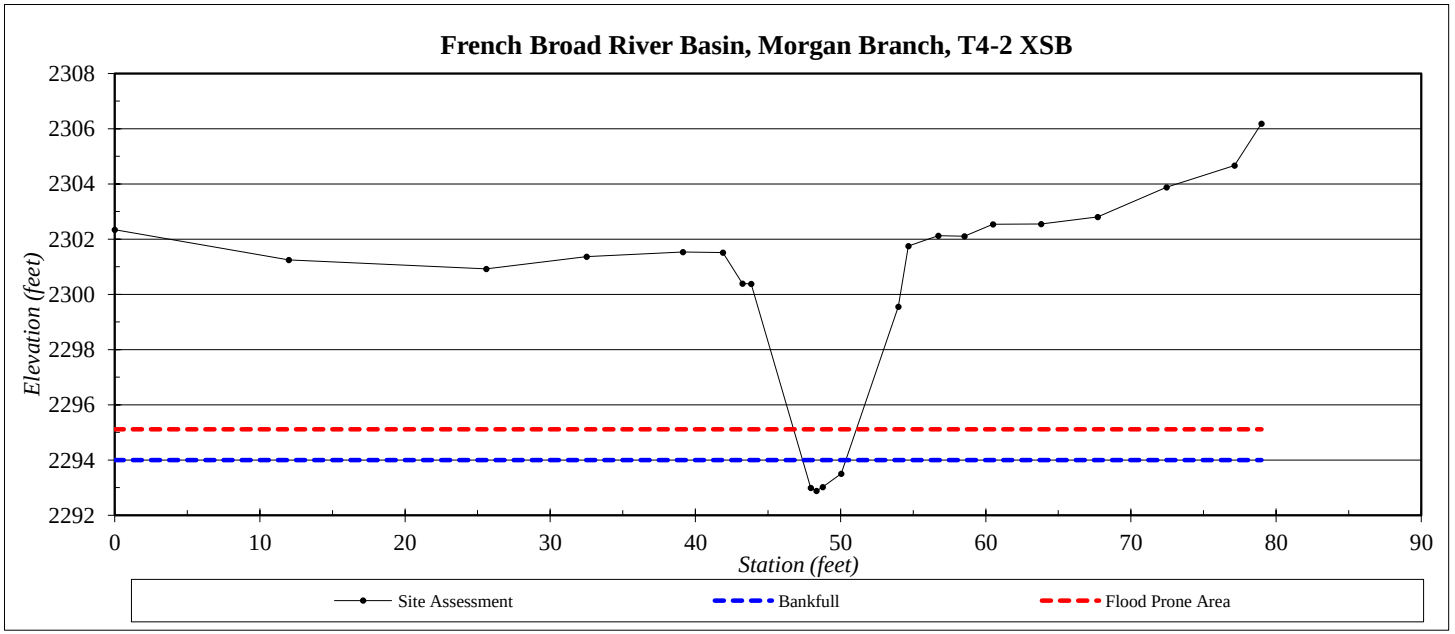
SUMMARY DATA	
Bankfull Elevation (ft):	2353.3
Bankfull Cross-Sectional Area (ft^2):	1.3
Bankfull Width (ft):	3.0
Flood Prone Area Elevation (ft):	2354.0
Flood Prone Width (ft):	3.9
Max Depth at Bankfull (ft):	0.7
Mean Depth at Bankful (ft)l:	0.4
W / D Ratio:	7.1
Entrenchment Ratio:	1.3
Bank Height Ratio:	4.4



River Basin:	French Broad
Site	Morgan Branch
XS ID	T4-2 XSB
Drainage Area (sq mi):	0.03
Date:	5/14/2020
Field Crew:	T. Seelinger, A. Gutierrez

Station	Elevation
0.0	2302.35
12.0	2301.25
25.6	2300.92
32.5	2301.37
39.1	2301.54
41.9	2301.52
43.2	2300.39
43.8	2300.39
47.9	2292.99
48.3	2292.89
48.8	2293.03
50.0	2293.51
54.0	2299.56
54.7	2301.75
56.7	2302.13
58.5	2302.11
60.5	2302.54
63.8	2302.55
67.7	2302.81
72.4	2303.88
77.1	2304.67
79.0	2306.19

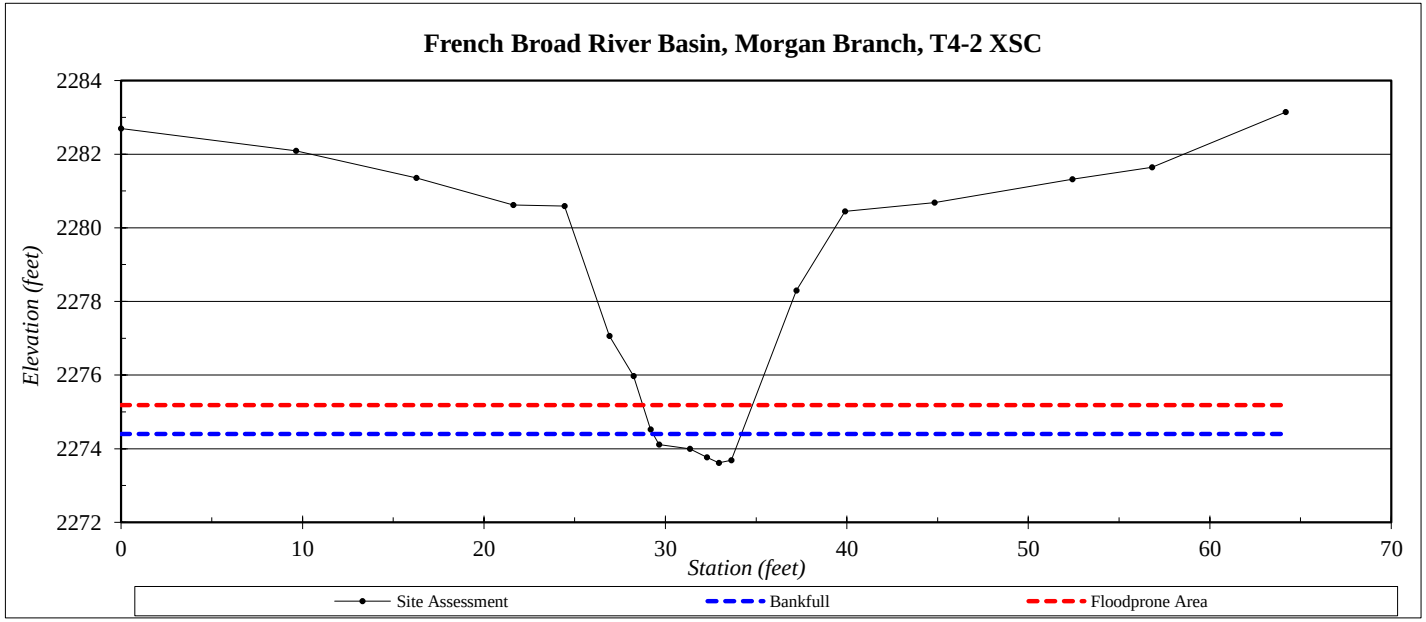
SUMMARY DATA	
Bankfull Elevation (ft):	2294.0
Bankfull Cross-Sectional Area (ft^2):	2.2
Bankfull Width (ft):	3.0
Flood Prone Area Elevation (ft):	2295.1
Flood Prone Width (ft):	4.3
Max Depth at Bankfull (ft):	1.1
Mean Depth at Bankful (ft)l:	0.7
W / D Ratio:	4.1
Entrenchment Ratio:	1.5
Bank Height Ratio:	7.7



River Basin:	French Broad
Site	Morgan Branch
XS ID	T4-2 XSC
Drainage Area (sq mi):	0.04
Date:	5/13/2020
Field Crew:	T. Seelinger, A. Gutierrez

Station	Elevation
0.0	2282.70
9.6	2282.09
16.3	2281.36
21.6	2280.62
24.4	2280.59
26.9	2277.06
28.2	2275.98
29.2	2274.52
29.6	2274.11
31.3	2274.00
32.3	2273.77
32.9	2273.62
33.6	2273.69
37.2	2278.30
39.9	2280.44
44.8	2280.68
52.4	2281.32
56.8	2281.64
64.2	2283.14

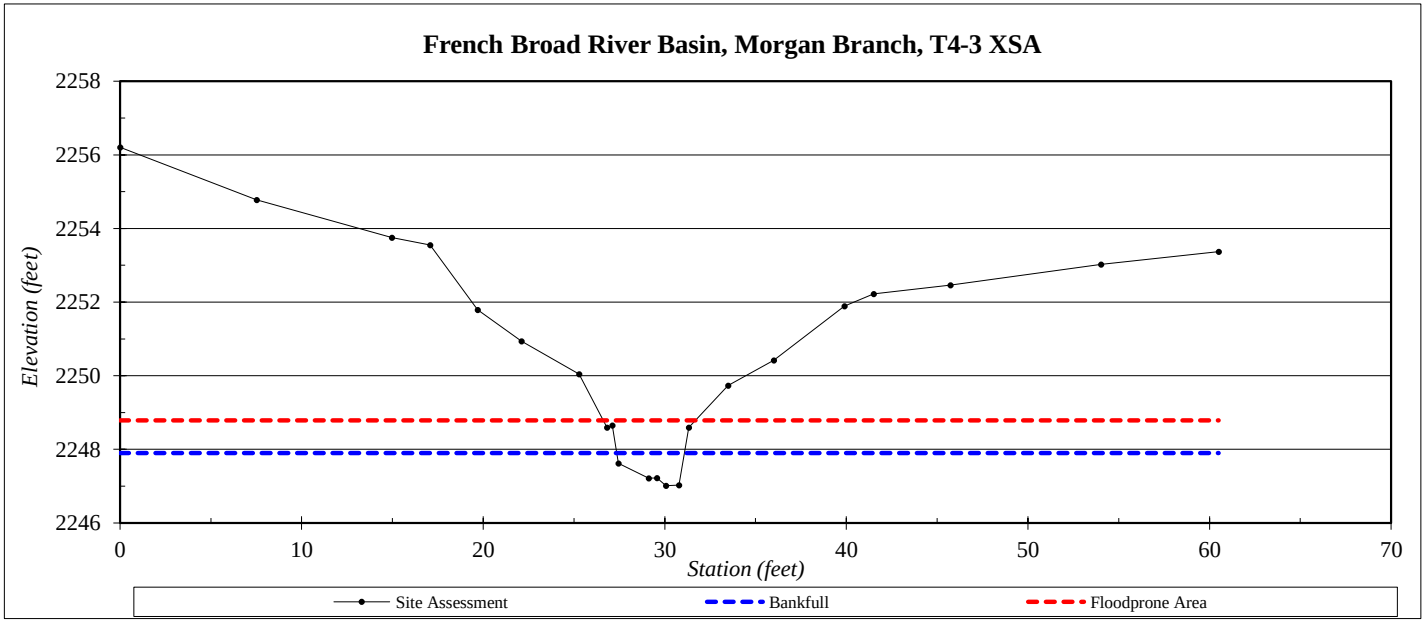
SUMMARY DATA	
Bankfull Elevation (ft):	2274.4
Bankfull Cross-Sectional Area (ft^2):	2.3
Bankfull Width (ft):	4.9
Flood Prone Area Elevation (ft):	2275.2
Flood Prone Width (ft):	6.0
Max Depth at Bankfull (ft):	0.8
Mean Depth at Bankful (ft)l:	0.5
W / D Ratio:	10.3
Entrenchment Ratio:	1.2
Bank Height Ratio:	8.7



River Basin:	French Broad
Site	Morgan Branch
XS ID	T4-3 XSA
Drainage Area (sq mi):	0.03
Date:	5/13/2020
Field Crew:	T. Seelinger, A. Gutierrez

Station	Elevation
0.0	2256.21
7.5	2254.78
15.0	2253.75
17.1	2253.55
19.7	2251.79
22.1	2250.94
25.3	2250.05
26.8	2248.59
27.1	2248.65
27.4	2247.62
29.1	2247.22
29.6	2247.22
30.1	2247.01
30.8	2247.03
31.3	2248.59
33.5	2249.74
36.0	2250.42
39.9	2251.89
41.5	2252.23
45.7	2252.46
54.0	2253.03
60.5	2253.37

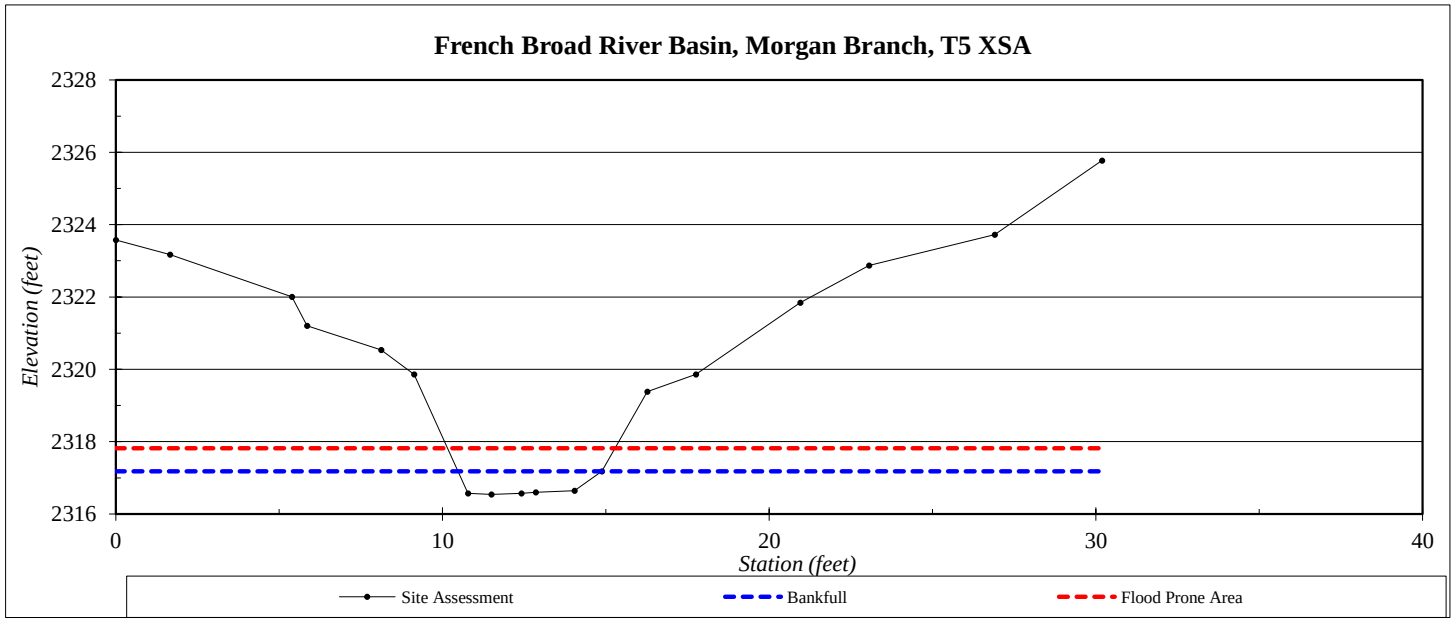
SUMMARY DATA	
Bankfull Elevation (ft):	2247.9
Bankfull Cross-Sectional Area (ft^2):	2.3
Bankfull Width (ft):	3.7
Flood Prone Area Elevation (ft):	2248.8
Flood Prone Width (ft):	5.1
Max Depth at Bankfull (ft):	0.9
Mean Depth at Bankful (ft)l:	0.6
W / D Ratio:	6.1
Entrenchment Ratio:	1.4
Bank Height Ratio:	3.0



River Basin:	French Broad
Site	Morgan Branch
XS ID	T5 XSA
Drainage Area (sq mi):	0.03
Date:	5/12/2020
Field Crew:	T. Seelinger, A. Gutierrez

Station	Elevation
0.0	2323.57
1.7	2323.17
5.4	2322.01
5.9	2321.21
8.1	2320.54
9.1	2319.86
10.8	2316.57
11.5	2316.54
12.4	2316.57
12.9	2316.60
14.0	2316.64
14.9	2317.18
16.3	2319.38
17.8	2319.86
20.9	2321.84
23.1	2322.87
26.9	2323.73
30.2	2325.77

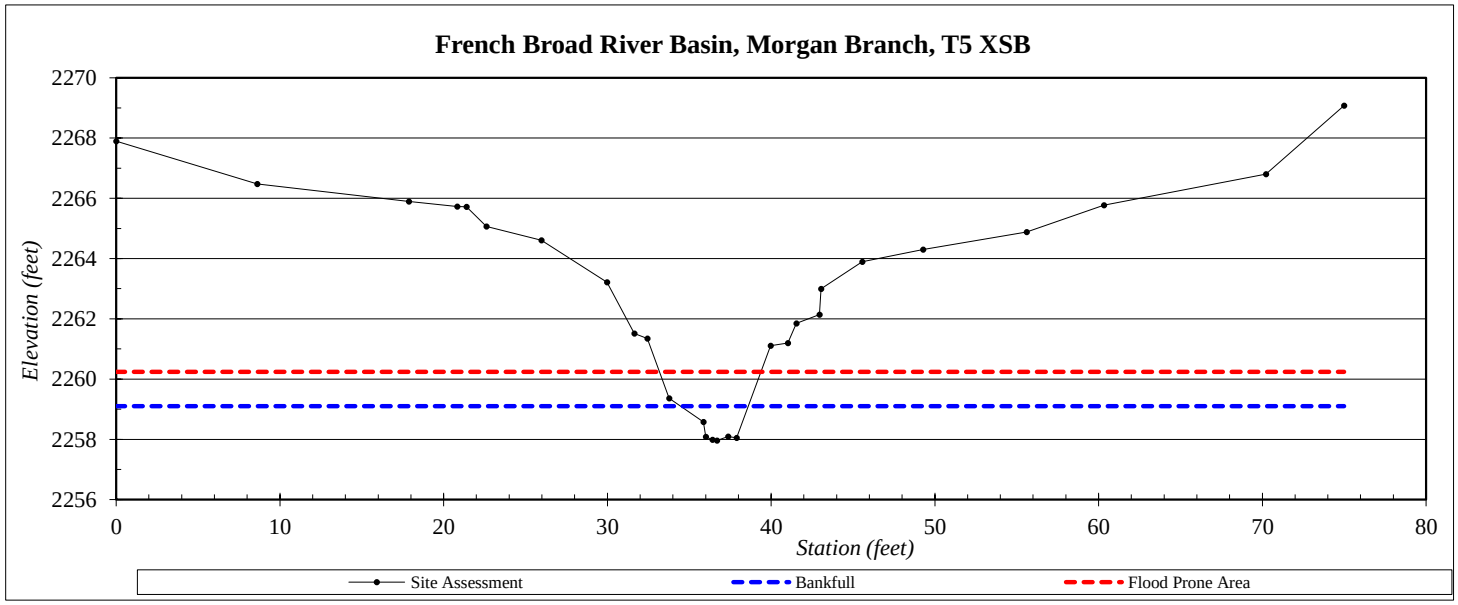
SUMMARY DATA	
Bankfull Elevation (ft):	2317.2
Bankfull Cross-Sectional Area (ft^2):	2.3
Bankfull Width (ft):	4.4
Flood Prone Area Elevation (ft):	2317.8
Flood Prone Width (ft):	5.1
Max Depth at Bankfull (ft):	0.6
Mean Depth at Bankful (ft)l:	0.5
W / D Ratio:	8.6
Entrenchment Ratio:	1.2
Bank Height Ratio:	4.5



River Basin:	French Broad
Site	Morgan Branch
XS ID	T5 XSB
Drainage Area (sq mi):	0.05
Date:	5/12/2020
Field Crew:	T. Seelinger, A. Gutierrez

Station	Elevation
0.0	2267.90
8.6	2266.48
17.9	2265.90
20.8	2265.73
21.4	2265.72
22.6	2265.07
26.0	2264.61
30.0	2263.22
31.6	2261.52
32.4	2261.35
33.8	2259.37
35.9	2258.58
36.0	2258.08
36.4	2257.99
36.7	2257.96
37.4	2258.09
37.9	2258.05
40.0	2261.11
41.0	2261.19
41.5	2261.85
43.0	2262.14
43.0	2262.99
45.6	2263.89
49.3	2264.30
55.6	2264.88
60.3	2265.77
70.2	2266.81
75.0	2269.08

SUMMARY DATA	
Bankfull Elevation (ft):	2259.1
Bankfull Cross-Sectional Area (ft^2):	2.9
Bankfull Width (ft):	4.1
Flood Prone Area Elevation (ft):	2260.2
Flood Prone Width (ft):	6.2
Max Depth at Bankfull (ft):	1.1
Mean Depth at Bankful (ft)l:	0.7
W / D Ratio:	5.9
Entrenchment Ratio:	1.5
Bank Height Ratio:	2.9

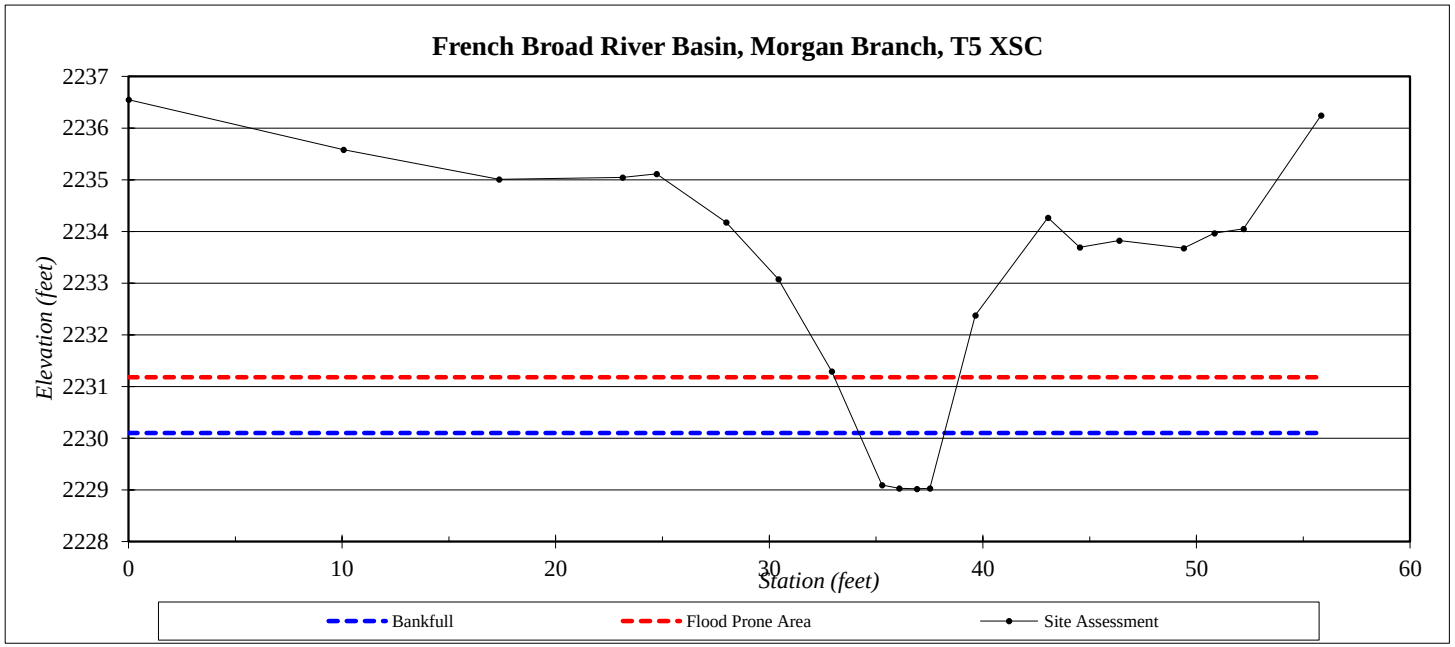


River Basin:	French Broad
Site	Morgan Branch
XS ID	T5 XSC
Drainage Area (sq mi):	0.06
Date:	5/12/2020
Field Crew:	T. Seelinger, A. Gutierrez

Station	Elevation
0.0	2236.55
10.1	2235.58
17.3	2235.01
23.1	2235.04
24.7	2235.11
28.0	2234.18
30.4	2233.08
32.9	2231.29
35.3	2229.09
36.1	2229.03
36.9	2229.02
37.5	2229.03
39.7	2232.38
43.1	2234.27
44.5	2233.69
46.4	2233.83
49.4	2233.68
50.8	2233.97
52.2	2234.05
55.8	2236.25

SUMMARY DATA	
Bankfull Elevation (ft):	2230.1
Bankfull Cross-Sectional Area (ft^2):	3.3
Bankfull Width (ft):	4.0
Flood Prone Area Elevation (ft):	2231.2
Flood Prone Width (ft):	5.8
Max Depth at Bankfull (ft):	1.1
Mean Depth at Bankful (ft)l:	0.8
W / D Ratio:	4.9
Entrenchment Ratio:	1.5
Bank Height Ratio:	3.3

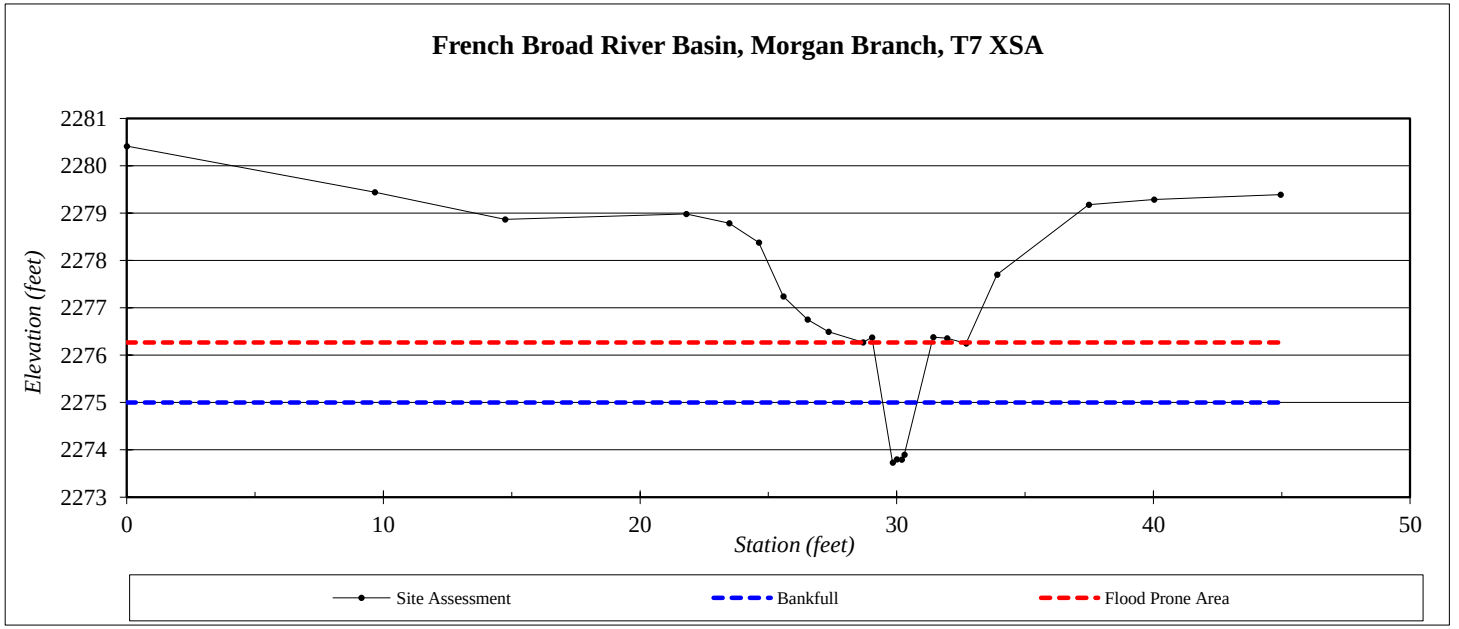
Cross-section picture unavailable



River Basin:	French Broad
Site	Morgan Branch
XS ID	T7 XSA
Drainage Area (sq mi):	0.01
Date:	5/13/2020
Field Crew:	T. Seelinger, A. Gutierrez

Station	Elevation
0.0	2280.42
9.7	2279.44
14.7	2278.87
21.8	2278.99
23.5	2278.79
24.6	2278.38
25.6	2277.25
26.5	2276.75
27.3	2276.50
28.7	2276.27
29.0	2276.38
29.8	2273.73
30.0	2273.80
30.2	2273.80
30.3	2273.90
31.4	2276.38
32.0	2276.36
32.7	2276.25
33.9	2277.70
37.5	2279.18
40.0	2279.29
44.9	2279.39

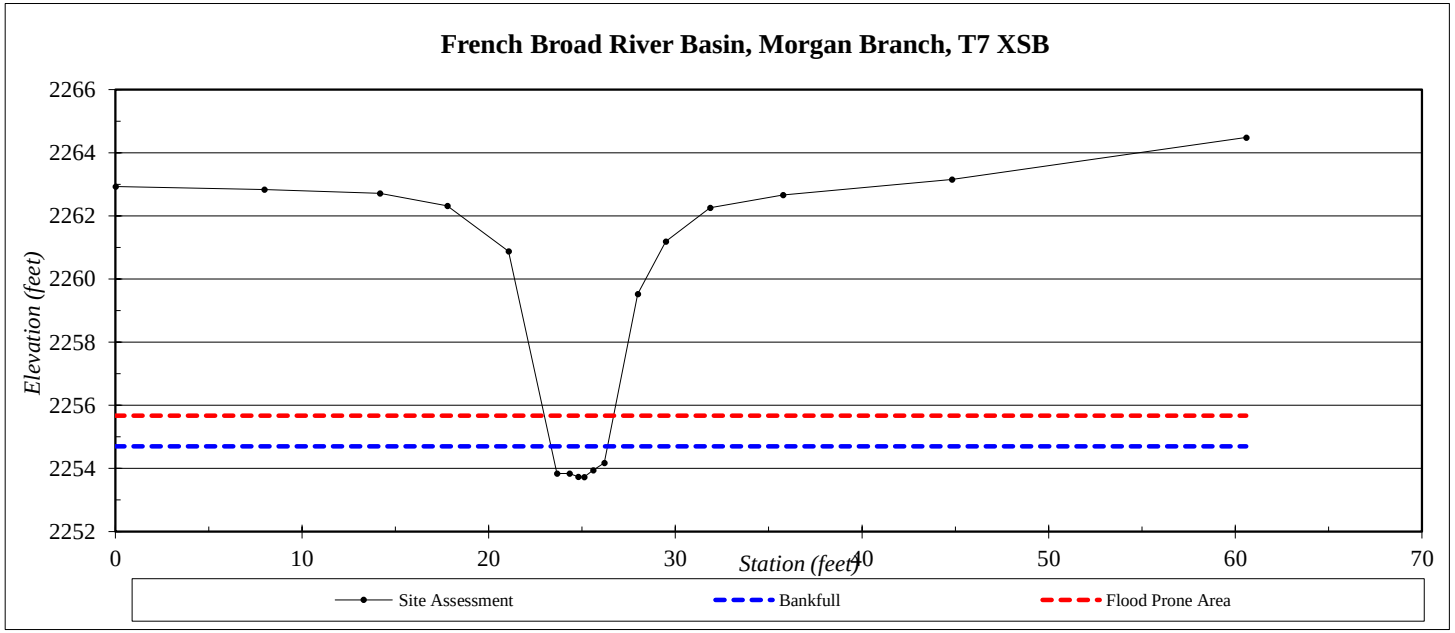
SUMMARY DATA	
Bankfull Elevation (ft):	2275.0
Bankfull Cross-Sectional Area (ft^2):	1.1
Bankfull Width (ft):	1.3
Flood Prone Area Elevation (ft):	2276.3
Flood Prone Width (ft):	2.4
Max Depth at Bankfull (ft):	1.3
Mean Depth at Bankful (ft)l:	0.8
W / D Ratio:	1.7
Entrenchment Ratio:	1.8
Bank Height Ratio:	2.1



River Basin:	French Broad
Site	Morgan Branch
XS ID	T7 XSB
Drainage Area (sq mi):	0.02
Date:	5/13/2020
Field Crew:	T. Seelinger, A. Gutierrez

Station	Elevation
0.0	2262.93
8.0	2262.83
14.2	2262.72
17.8	2262.32
21.1	2260.88
23.7	2253.84
24.3	2253.84
24.8	2253.73
25.1	2253.73
25.6	2253.95
26.2	2254.17
28.0	2259.53
29.5	2261.19
31.9	2262.25
35.8	2262.66
44.8	2263.15
60.6	2264.48

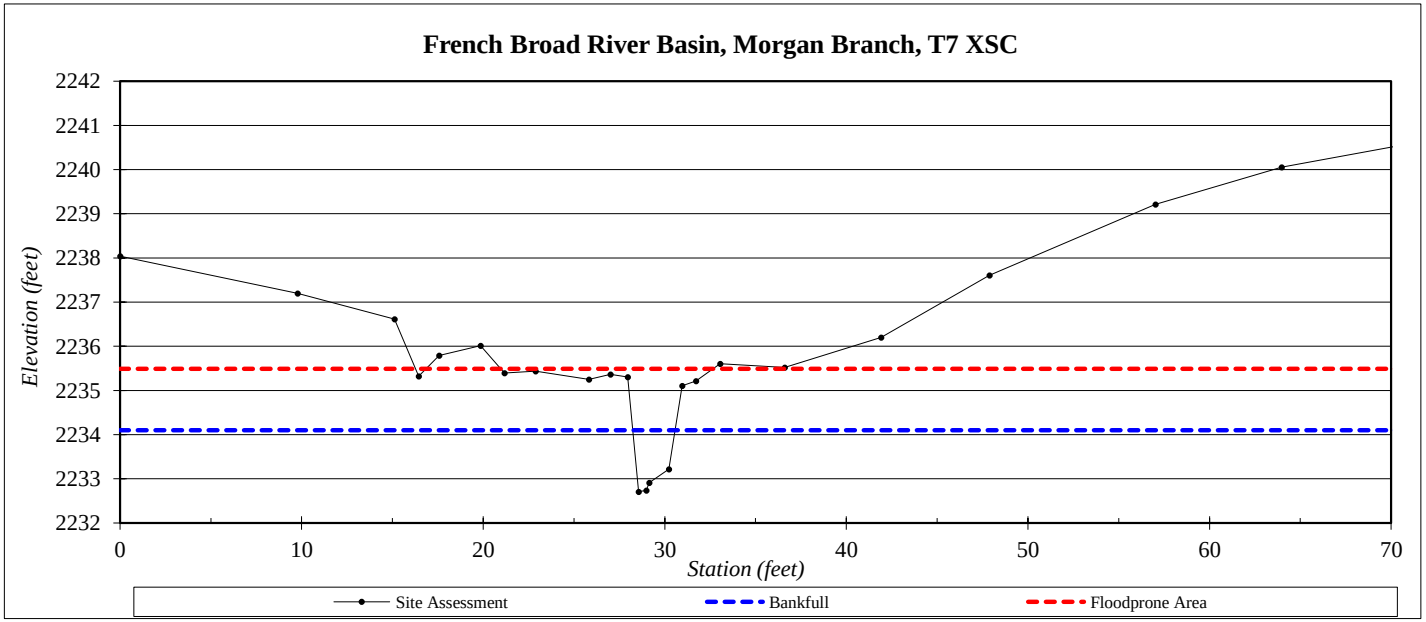
SUMMARY DATA	
Bankfull Elevation (ft):	2254.7
Bankfull Cross-Sectional Area (ft^2):	2.3
Bankfull Width (ft):	3.0
Flood Prone Area Elevation (ft):	2255.7
Flood Prone Width (ft):	3.7
Max Depth at Bankfull (ft):	1.0
Mean Depth at Bankful (ft)l:	0.8
W / D Ratio:	4.0
Entrenchment Ratio:	1.2
Bank Height Ratio:	7.4



River Basin:	French Broad
Site	Morgan Branch
XS ID	T7 XSC
Drainage Area (sq mi):	0.04
Date:	5/13/2020
Field Crew:	T. Seelinger, A. Gutierrez

Station	Elevation
0.0	2238.04
9.8	2237.20
15.1	2236.61
16.4	2235.32
17.6	2235.79
19.9	2236.02
21.2	2235.40
22.9	2235.43
25.8	2235.25
27.0	2235.36
28.0	2235.31
28.6	2232.71
29.0	2232.74
29.1	2232.91
30.2	2233.22
31.0	2235.11
31.7	2235.22
33.1	2235.61
36.6	2235.52
41.9	2236.20
47.9	2237.61
57.0	2239.21
64.0	2240.06
72.2	2240.67

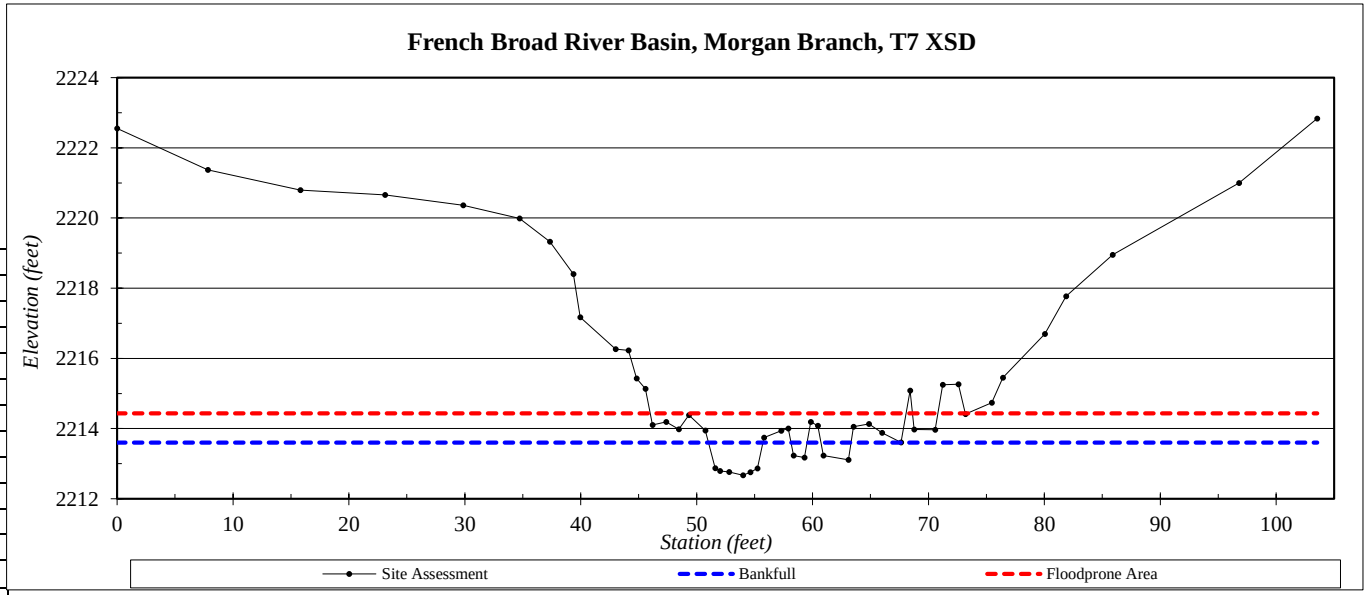
SUMMARY DATA	
Bankfull Elevation (ft):	2234.1
Bankfull Cross-Sectional Area (ft^2):	2.3
Bankfull Width (ft):	2.3
Flood Prone Area Elevation (ft):	2235.5
Flood Prone Width (ft):	12.3
Max Depth at Bankfull (ft):	1.4
Mean Depth at Bankful (ft)l:	1.0
W / D Ratio:	2.4
Entrenchment Ratio:	5.3
Bank Height Ratio:	1.7



River Basin:	French Broad
Site	Morgan Branch
XS ID	T7 XSD
Drainage Area (sq mi):	0.05
Date:	5/13/2020
Field Crew:	T. Seelinger, A. Gutierrez

Station	Elevation		
0.0	2222.55		
7.8	2221.37		
15.8	2220.79		
23.1	2220.66		
29.9	2220.36		
34.7	2219.99		
37.3	2219.32		
39.4	2218.41		
39.9	2217.17		
43.0	2216.27		
44.1	2216.23		
44.8	2215.43		
45.6	2215.13		
46.2	2214.10		
47.4	2214.19		
48.5	2213.98		
49.3	2214.39		
50.7	2213.95		
51.6	2212.87		
52.0	2212.79		
52.8	2212.77		
54.0	2212.67		
54.6	2212.76	67.6	2213.61
55.2	2212.87	68.4	2215.08
55.8	2213.74	68.8	2213.97
57.3	2213.94	70.6	2213.97
57.9	2214.00	71.2	2215.25
58.4	2213.23	72.6	2215.26
59.3	2213.18	73.2	2214.41
59.8	2214.19	75.5	2214.74
60.5	2214.09	76.4	2215.45
60.9	2213.23	80.0	2216.70
63.1	2213.11	81.9	2217.77
63.5	2214.05	85.9	2218.95
64.9	2214.13	96.8	2221.00
66.0	2213.88	103.5	2222.84

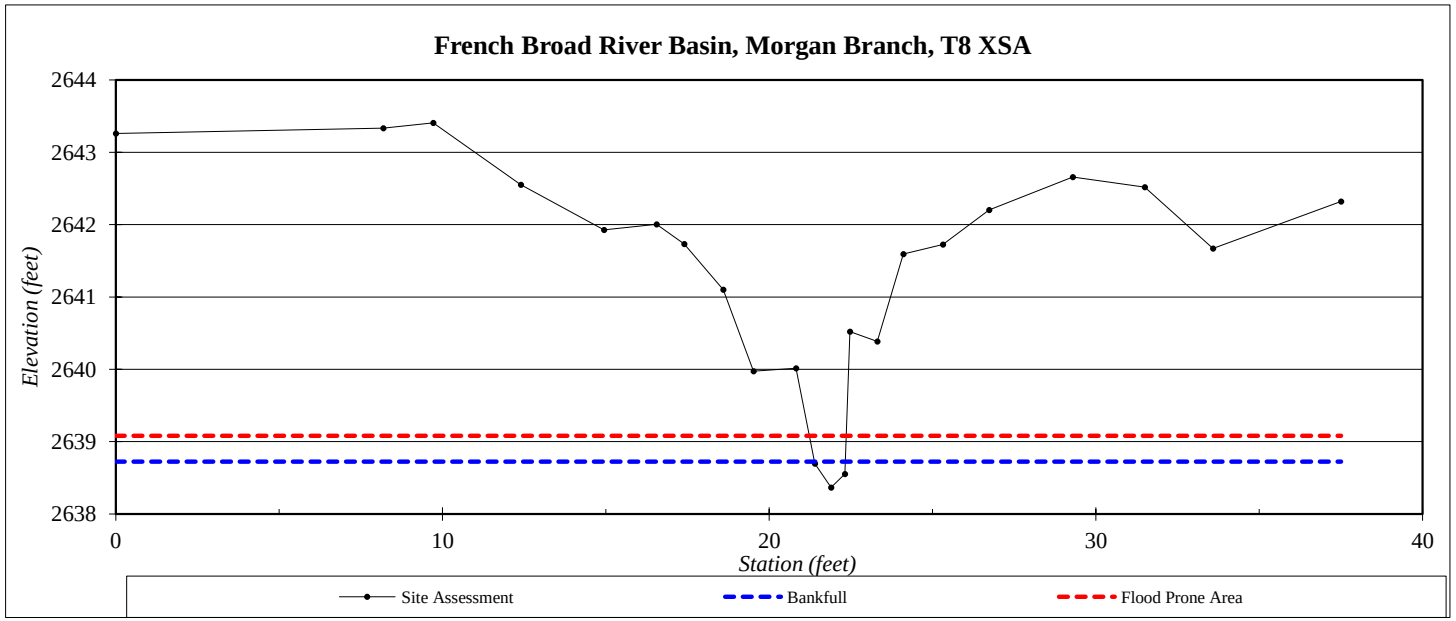
SUMMARY DATA	
Bankfull Elevation (ft):	2213.6
Bankfull Cross-Sectional Area (ft^2):	4.9
Bankfull Width (ft):	8.7
Flood Prone Area Elevation (ft):	2214.4
Flood Prone Width (ft):	24.4
Max Depth at Bankfull (ft):	0.8
Mean Depth at Bankful (ft)l:	0.6
W / D Ratio:	15.2
Entrenchment Ratio:	2.8
Bank Height Ratio:	3.8



River Basin:	French Broad
Site	Morgan Branch
XS ID	T8 XSA
Drainage Area (sq mi):	0.01
Date:	5/11/2020
Field Crew:	T. Seelinger, A. Gutierrez

Station	Elevation
0.0	2643.26
8.2	2643.34
9.7	2643.41
12.4	2642.55
14.9	2641.93
16.6	2642.00
17.4	2641.73
18.6	2641.10
19.5	2639.98
20.8	2640.01
21.4	2638.70
21.9	2638.37
22.3	2638.55
22.5	2640.52
23.3	2640.39
24.1	2641.59
25.3	2641.72
26.7	2642.20
29.3	2642.66
31.5	2642.52
33.6	2641.67
37.5	2642.32

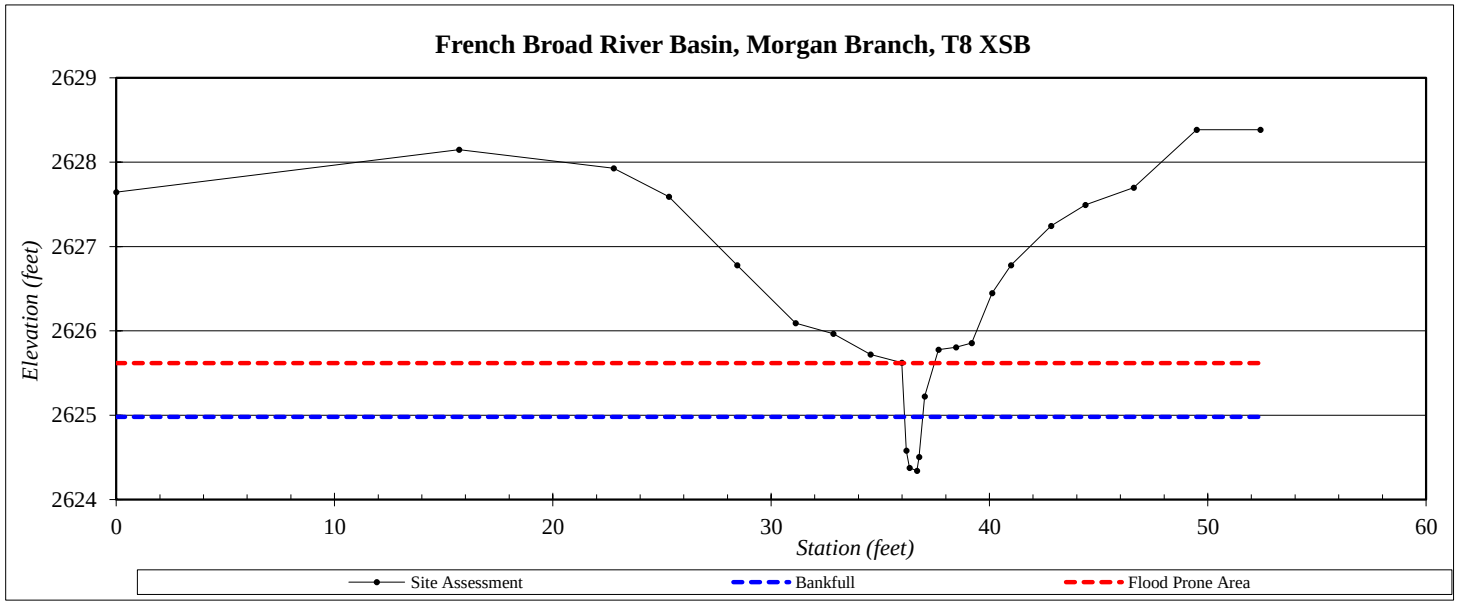
SUMMARY DATA	
Bankfull Elevation (ft):	2638.7
Bankfull Cross-Sectional Area (ft^2):	0.2
Bankfull Width (ft):	0.9
Flood Prone Area Elevation (ft):	2639.1
Flood Prone Width (ft):	1.1
Max Depth at Bankfull (ft):	0.4
Mean Depth at Bankful (ft)l:	0.2
W / D Ratio:	4.3
Entrenchment Ratio:	1.2
Bank Height Ratio:	7.9



River Basin:	French Broad
Site	Morgan Branch
XS ID	T8 XSB
Drainage Area (sq mi):	0.01
Date:	5/11/2020
Field Crew:	T. Seelinger, A. Gutierrez

Station	Elevation
0.0	2627.65
15.7	2628.15
22.8	2627.93
25.3	2627.59
28.4	2626.78
31.1	2626.09
32.9	2625.97
34.6	2625.72
36.0	2625.62
36.2	2624.58
36.3	2624.38
36.7	2624.34
36.8	2624.51
37.0	2625.22
37.7	2625.78
38.5	2625.81
39.2	2625.86
40.1	2626.45
41.0	2626.78
42.8	2627.25
44.4	2627.49
46.6	2627.70
49.5	2628.39
52.4	2628.39

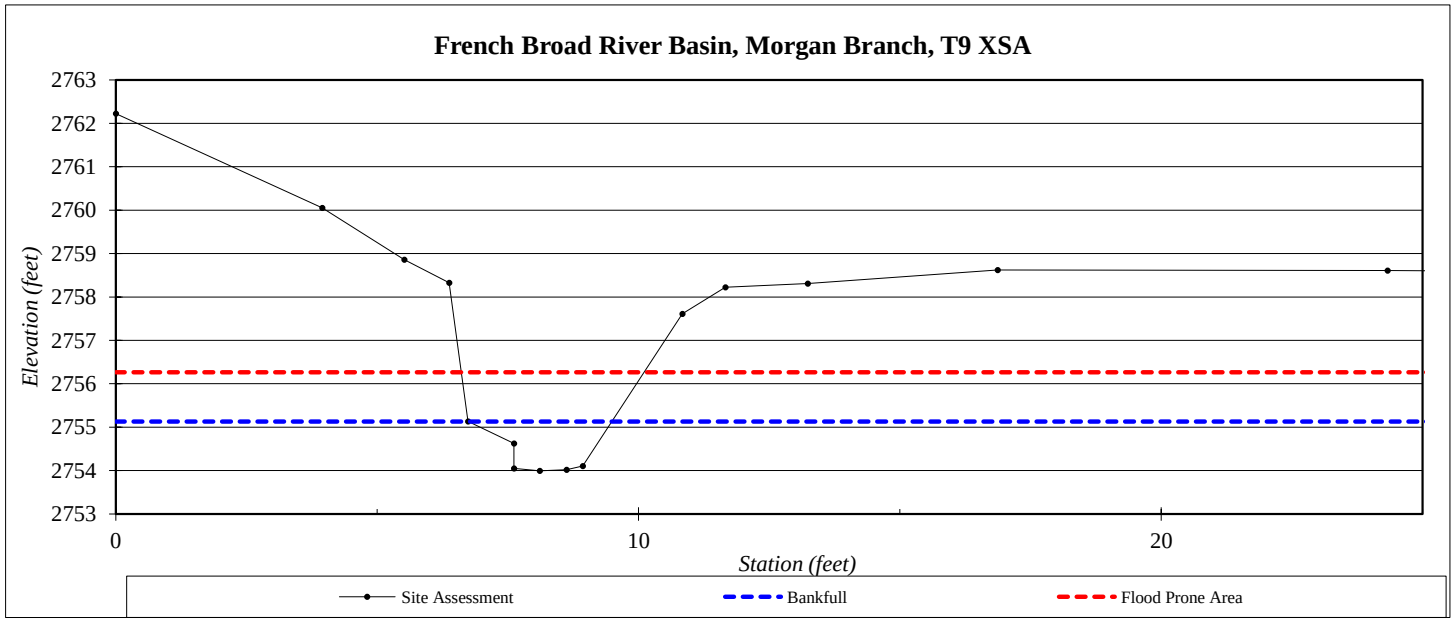
SUMMARY DATA	
Bankfull Elevation (ft):	2625.0
Bankfull Cross-Sectional Area (ft^2):	0.4
Bankfull Width (ft):	0.8
Flood Prone Area Elevation (ft):	2625.6
Flood Prone Width (ft):	1.5
Max Depth at Bankfull (ft):	0.6
Mean Depth at Bankful (ft)l:	0.5
W / D Ratio:	1.8
Entrenchment Ratio:	1.8
Bank Height Ratio:	2.2



River Basin:	French Broad
Site	Morgan Branch
XS ID	T9 XSA
Drainage Area (sq mi):	0.03
Date:	5/11/2020
Field Crew:	T. Seelinger, A. Gutierrez

Station	Elevation
0.0	2762.22
3.9	2760.06
5.5	2758.86
6.4	2758.33
6.7	2755.13
7.6	2754.63
7.6	2754.05
8.1	2754.00
8.6	2754.02
8.9	2754.11
10.8	2757.61
11.7	2758.23
13.2	2758.31
16.9	2758.62
24.3	2758.61
33.5	2758.54

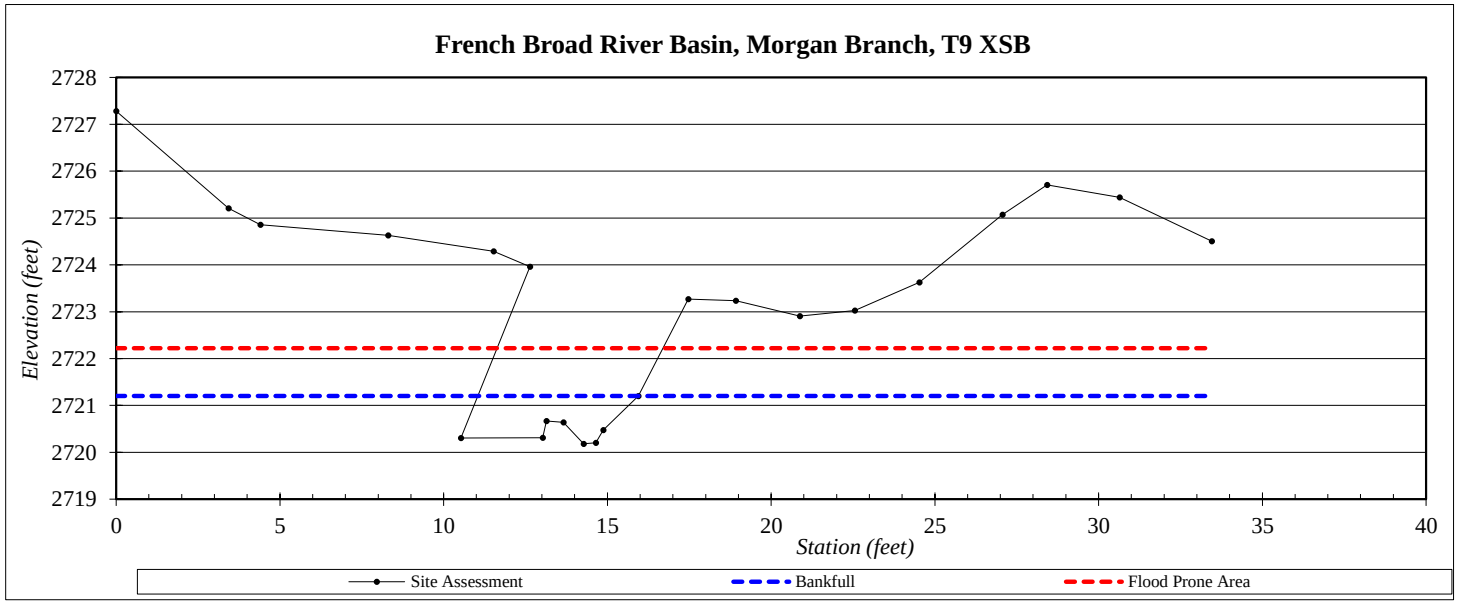
SUMMARY DATA	
Bankfull Elevation (ft):	2755.1
Bankfull Cross-Sectional Area (ft^2):	2.0
Bankfull Width (ft):	2.7
Flood Prone Area Elevation (ft):	2756.3
Flood Prone Width (ft):	3.5
Max Depth at Bankfull (ft):	1.1
Mean Depth at Bankful (ft)l:	0.7
W / D Ratio:	3.9
Entrenchment Ratio:	1.3
Bank Height Ratio:	3.4



River Basin:	French Broad
Site	Morgan Branch
XS ID	T9 XSB
Drainage Area (sq mi):	0.04
Date:	5/11/2020
Field Crew:	T. Seelinger, A. Gutierrez

Station	Elevation
0.0	2727.28
3.4	2725.21
4.4	2724.86
8.3	2724.63
11.5	2724.29
12.6	2723.96
10.5	2720.30
13.0	2720.31
13.1	2720.67
13.7	2720.64
14.3	2720.18
14.6	2720.20
14.9	2720.48
15.9	2721.20
17.5	2723.27
18.9	2723.24
20.9	2722.91
22.6	2723.02
24.5	2723.63
27.1	2725.07
28.4	2725.71
30.6	2725.44
33.5	2724.51

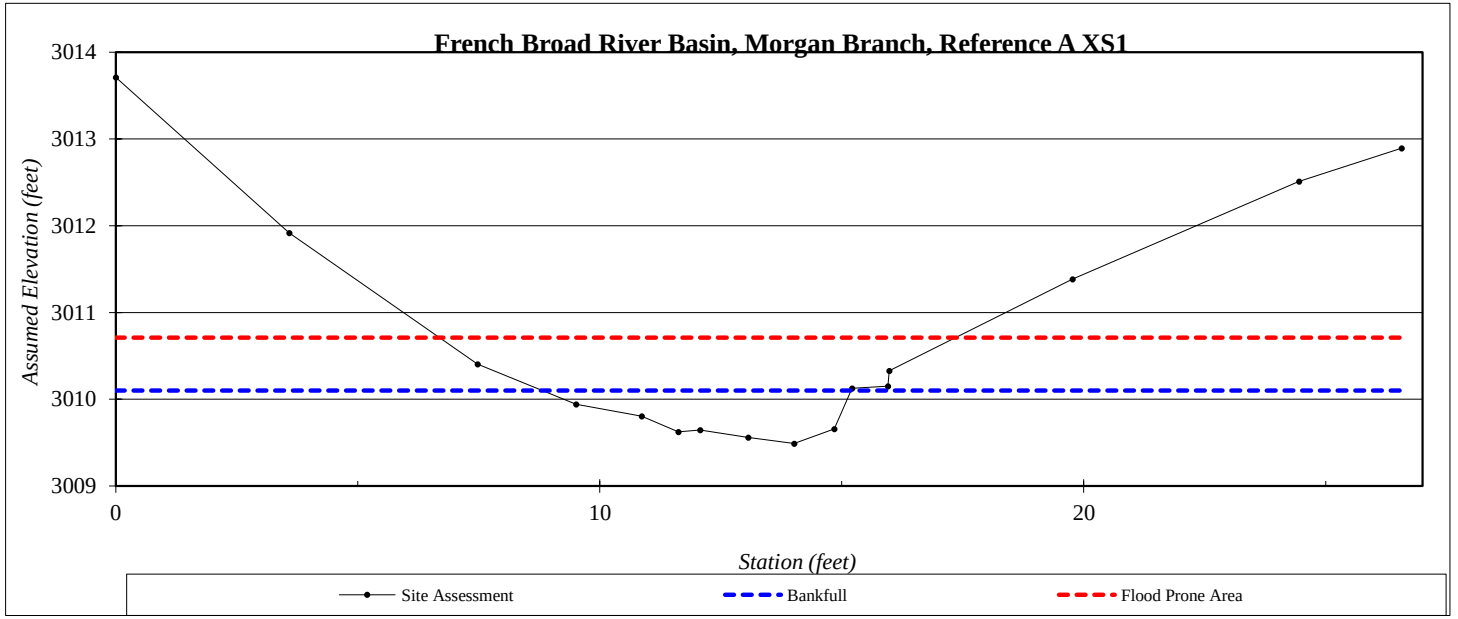
SUMMARY DATA	
Bankfull Elevation:	2721.20
Bankfull Cross-Sectional Area:	3.8
Bankfull Width:	4.9
Flood Prone Area Elevation:	2722.2
Flood Prone Width:	5.1
Max Depth at Bankfull:	1.0
Mean Depth at Bankfull:	0.8
W / D Ratio:	6.3
Entrenchment Ratio:	1.0
Bank Height Ratio:	3.0



River Basin:	French Broad
Site	Morgan Branch
XS ID	Reference A XS1
Drainage Area (sq mi):	0.10
Date:	5/13/2020
Field Crew:	T. Seelinger, A. Gutierrez

Station	Elevation
0.0	3013.71
3.6	3011.92
7.5	3010.41
9.5	3009.94
10.9	3009.81
11.6	3009.63
12.1	3009.65
13.1	3009.56
14.0	3009.49
14.8	3009.66
15.2	3010.13
16.0	3010.15
16.0	3010.33
19.8	3011.38
24.5	3012.51
26.6	3012.89

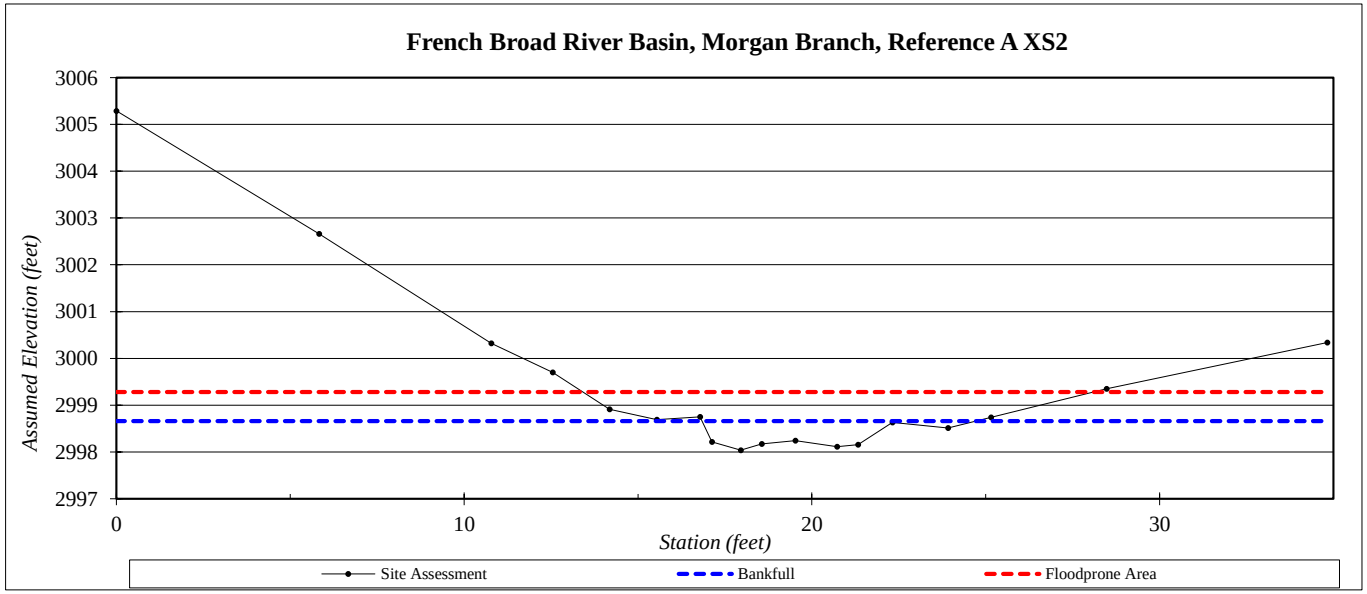
SUMMARY DATA	
Bankfull Elevation (ft):	3010.1
Bankfull Cross-Sectional Area (ft^2):	2.4
Bankfull Width (ft):	6.4
Flood Prone Area Elevation (ft):	3010.7
Flood Prone Width (ft):	10.7
Max Depth at Bankfull (ft):	0.6
Mean Depth at Bankful (ft)l:	0.4
W / D Ratio:	16.8
Entrenchment Ratio:	1.7
Bank Height Ratio:	1.0



River Basin:	French Broad
Site	Morgan Branch
XS ID	Reference A XS2
Drainage Area (sq mi):	0.10
Date:	5/13/2020
Field Crew:	T. Seelinger, A. Gutierrez

Station	Elevation
0.0	3005.29
5.8	3002.66
10.8	3000.32
12.5	2999.70
14.2	2998.91
15.5	2998.69
16.8	2998.75
17.1	2998.21
18.0	2998.04
18.6	2998.17
19.5	2998.25
20.7	2998.11
21.3	2998.15
22.3	2998.63
23.9	2998.51
25.2	2998.74
28.5	2999.35
34.8	3000.34

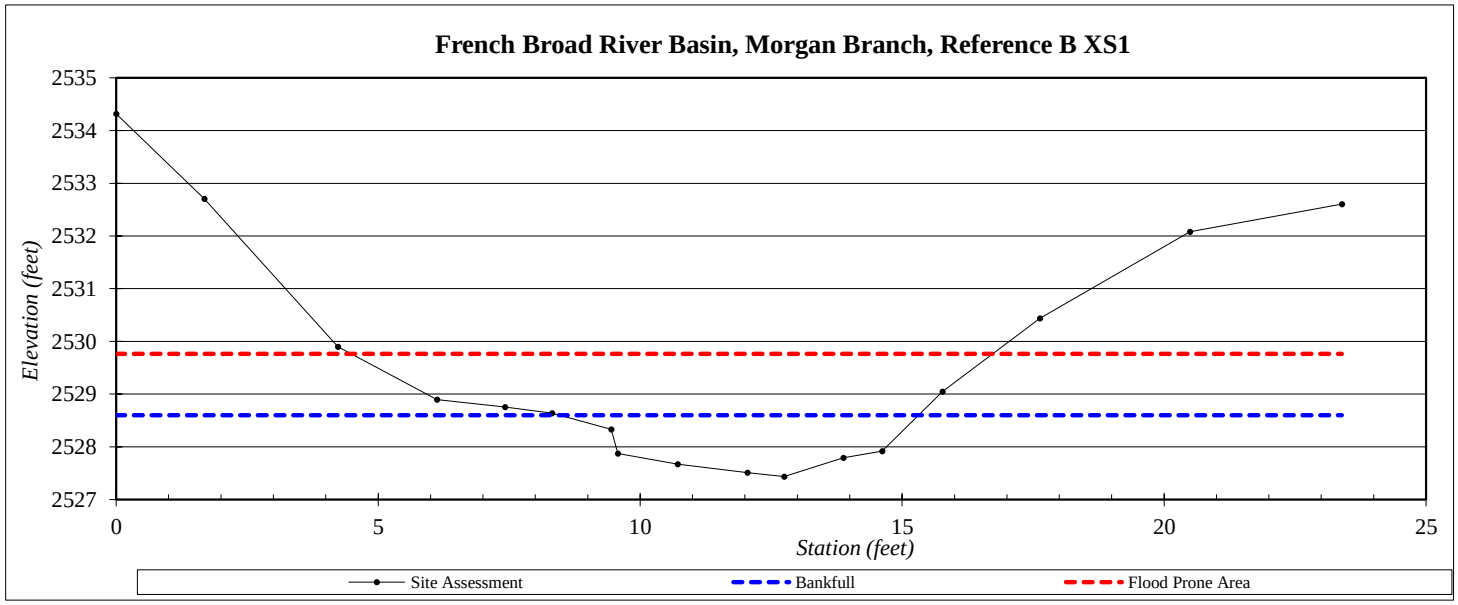
SUMMARY DATA	
Bankfull Elevation (ft):	2998.7
Bankfull Cross-Sectional Area (ft^2):	2.6
Bankfull Width (ft):	7.9
Flood Prone Area Elevation (ft):	2999.3
Flood Prone Width (ft):	14.7
Max Depth at Bankfull (ft):	0.6
Mean Depth at Bankful (ft)l:	0.3
W / D Ratio:	23.5
Entrenchment Ratio:	1.9
Bank Height Ratio:	1.0



River Basin:	French Broad
Site	Morgan Branch
XS ID	Reference B XS1
Drainage Area (sq mi):	0.40
Date:	5/13/2020
Field Crew:	T. Seelinger, A. Gutierrez

Station	Elevation
0.0	2534.32
1.7	2532.70
4.2	2529.90
6.1	2528.90
7.4	2528.75
8.3	2528.64
9.4	2528.33
9.6	2527.87
10.7	2527.67
12.1	2527.51
12.7	2527.44
13.9	2527.79
14.6	2527.92
15.8	2529.05
17.6	2530.44
20.5	2532.08
23.4	2532.60

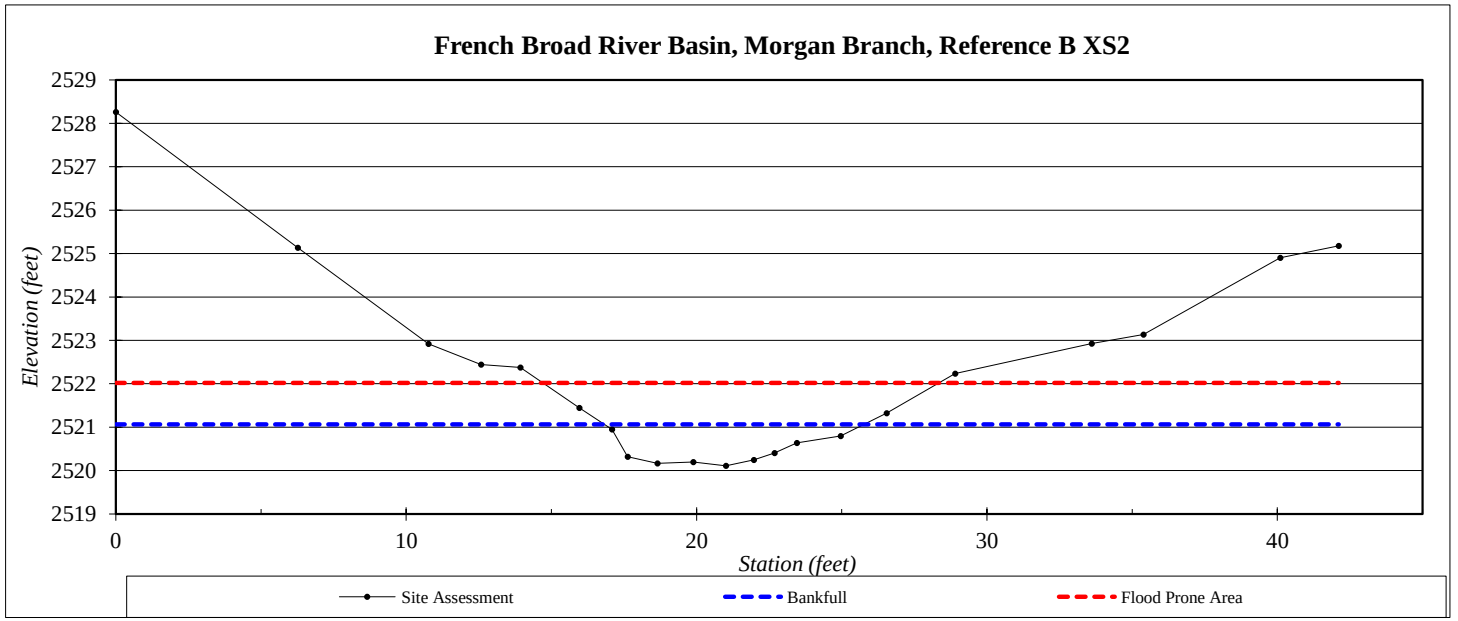
SUMMARY DATA	
Bankfull Elevation (ft):	2528.6
Bankfull Cross-Sectional Area (ft^2):	5.2
Bankfull Width (ft):	6.9
Flood Prone Area Elevation (ft):	2529.8
Flood Prone Width (ft):	12.2
Max Depth at Bankfull (ft):	1.2
Mean Depth at Bankful (ft)l:	0.8
W / D Ratio:	9.1
Entrenchment Ratio:	1.8
Bank Height Ratio:	1.0



River Basin:	French Broad
Site	Morgan Branch
XS ID	Reference B XS2
Drainage Area (sq mi):	0.40
Date:	5/13/2020
Field Crew:	T. Seelinger, A. Gutierrez

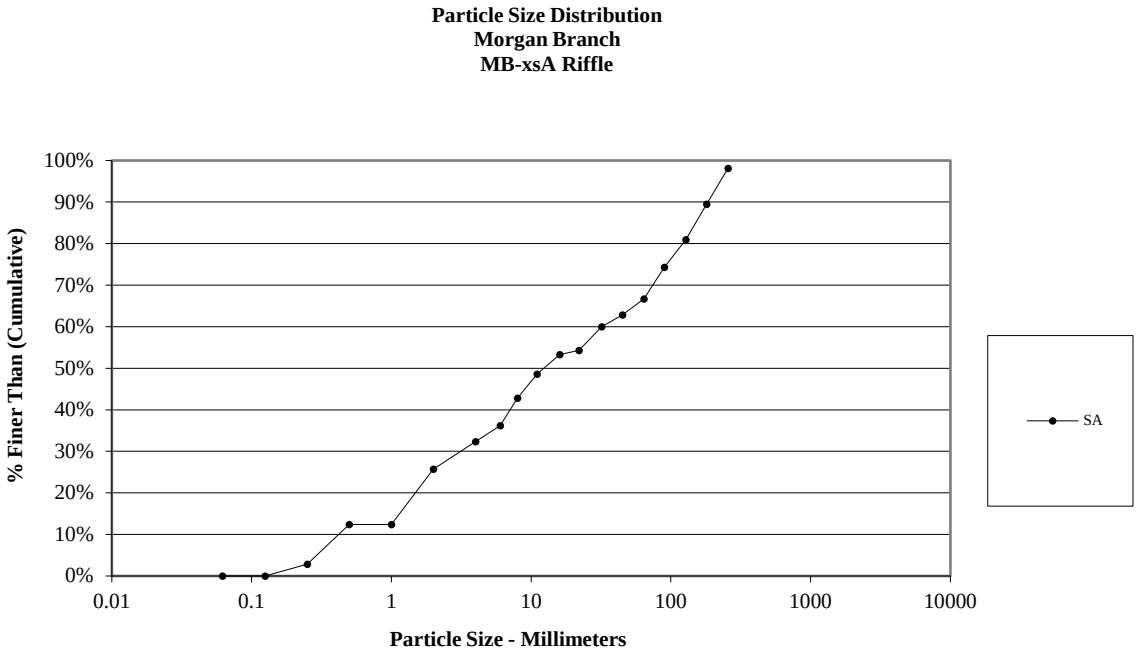
Station	Elevation
0.0	2528.26
6.3	2525.14
10.8	2522.92
12.6	2522.45
13.9	2522.38
16.0	2521.45
17.1	2520.95
17.6	2520.32
18.7	2520.17
19.9	2520.20
21.0	2520.11
22.0	2520.25
22.7	2520.40
23.4	2520.64
25.0	2520.80
26.5	2521.32
28.9	2522.23
33.6	2522.93
35.4	2523.13
40.1	2524.91
42.1	2525.18

SUMMARY DATA	
Bankfull Elevation (ft):	2521.1
Bankfull Cross-Sectional Area (ft^2):	5.6
Bankfull Width (ft):	8.9
Flood Prone Area Elevation (ft):	2522.0
Flood Prone Width (ft):	13.6
Max Depth at Bankfull (ft):	1.0
Mean Depth at Bankful (ft)l:	0.6
W / D Ratio:	14.2
Entrenchment Ratio:	1.5
Bank Height Ratio:	1.0



Cross-Section MB-A Riffle - SA			
Particle	Millimeter		Count
Silt/Clay	< 0.062	S/C	
Very Fine	.062 - .125	S	
Fine	.125 - .25	A	3
Medium	.25 - .50	N	10
Coarse	.50 - 1	D	
Very Coarse	1 - 2	S	14
Very Fine	2 - 4		7
Fine	4 - 5.7	G	4
Fine	5.7 - 8	R	7
Medium	8 - 11.3	A	6
Medium	11.3 - 16	V	5
Coarse	16 - 22.6	E	1
Coarse	22.6 - 32	L	6
Very Coarse	32 - 45	S	3
Very Coarse	45 - 64		4
Small	64 - 90	C	8
Small	90 - 128	O	7
Large	128 - 180	B	9
Large	180 - 256	L	9
Small	256 - 362	B	1
Small	362 - 512	L	1
Medium	512 - 1024	D	
Lrg- Very Lrg	1024 - 2048	R	
Bedrock	>2048	BDRK	
		Total	105

Note:



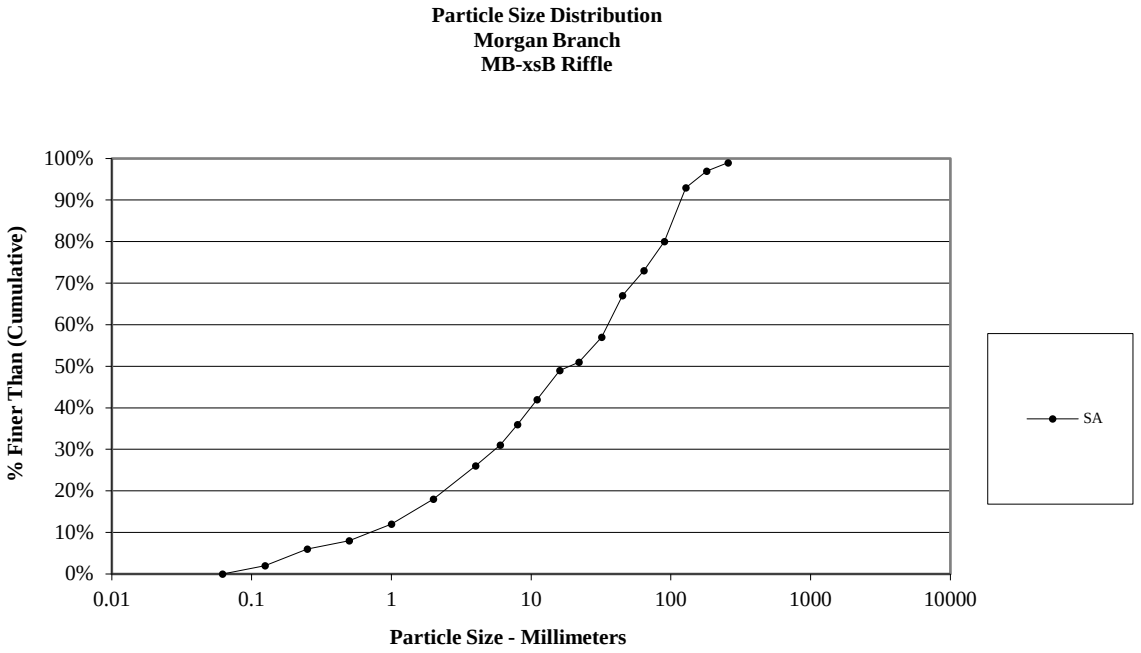
Size (mm)	
D16	1.2
D35	5.3
D50	12
D65	55
D84	140
D95	230

Size Distribution	
mean	13.0
dispersion	10.8
skewness	0.02

Type	
silt/clay	0%
sand	26%
gravel	41%
cobble	31%
boulder	2%
bedrock	0%
hardpan	0%
wood/det	0%
artificial	0%

Cross-Section MB-B Riffle - SA			
Particle	Millimeter		Count
Silt/Clay	< 0.062	S/C	
Very Fine	.062 - .125	S	2
Fine	.125 - .25	A	4
Medium	.25 - .50	N	2
Coarse	.50 - 1	D	4
Very Coarse	1 - 2	S	6
Very Fine	2 - 4		8
Fine	4 - 5.7	G	5
Fine	5.7 - 8	R	5
Medium	8 - 11.3	A	6
Medium	11.3 - 16	V	7
Coarse	16 - 22.6	E	2
Coarse	22.6 - 32	L	6
Very Coarse	32 - 45	S	10
Very Coarse	45 - 64		6
Small	64 - 90	C	7
Small	90 - 128	O	13
Large	128 - 180	B	4
Large	180 - 256	L	2
Small	256 - 362	B	1
Small	362 - 512	L	
Medium	512 - 1024	D	
Lrg- Very Lrg	1024 - 2048	R	
Bedrock	>2048	BDRK	
		Total	100

Note:



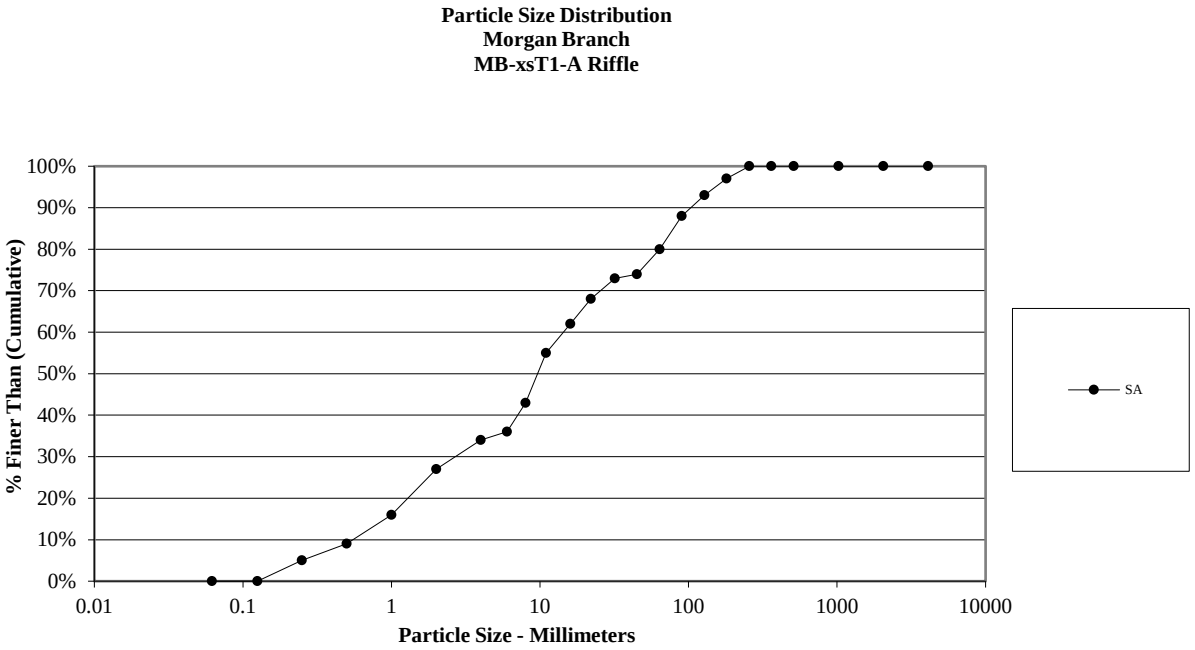
Size (mm)	
D16	1.6
D35	7.6
D50	19
D65	42
D84	100
D95	150

Size Distribution	
mean	12.6
dispersion	8.6
skewness	-0.13

Type	
silt/clay	0%
sand	18%
gravel	55%
cobble	26%
boulder	1%
bedrock	0%
hardpan	0%
wood/det	0%
artificial	0%

Cross-Section T1-A - SA			
Particle	Millimeter		Count
Silt/Clay	< 0.062	S/C	
Very Fine	.062 - .125	S	
Fine	.125 - .25	A	5
Medium	.25 - .50	N	4
Coarse	.50 - 1	D	7
Very Coarse	1 - 2	S	11
Very Fine	2 - 4		7
Fine	4 - 5.7	G	2
Fine	5.7 - 8	R	7
Medium	8 - 11.3	A	12
Medium	11.3 - 16	V	7
Coarse	16 - 22.6	E	6
Coarse	22.6 - 32	L	5
Very Coarse	32 - 45	S	1
Very Coarse	45 - 64		6
Small	64 - 90	C	8
Small	90 - 128	O	5
Large	128 - 180	B	4
Large	180 - 256	L	3
Small	256 - 362	B	
Small	362 - 512	L	
Medium	512 - 1024	D	
Lrg- Very Lrg	1024 - 2048	R	
Bedrock	>2048	BDRK	
		Total	100

Note:



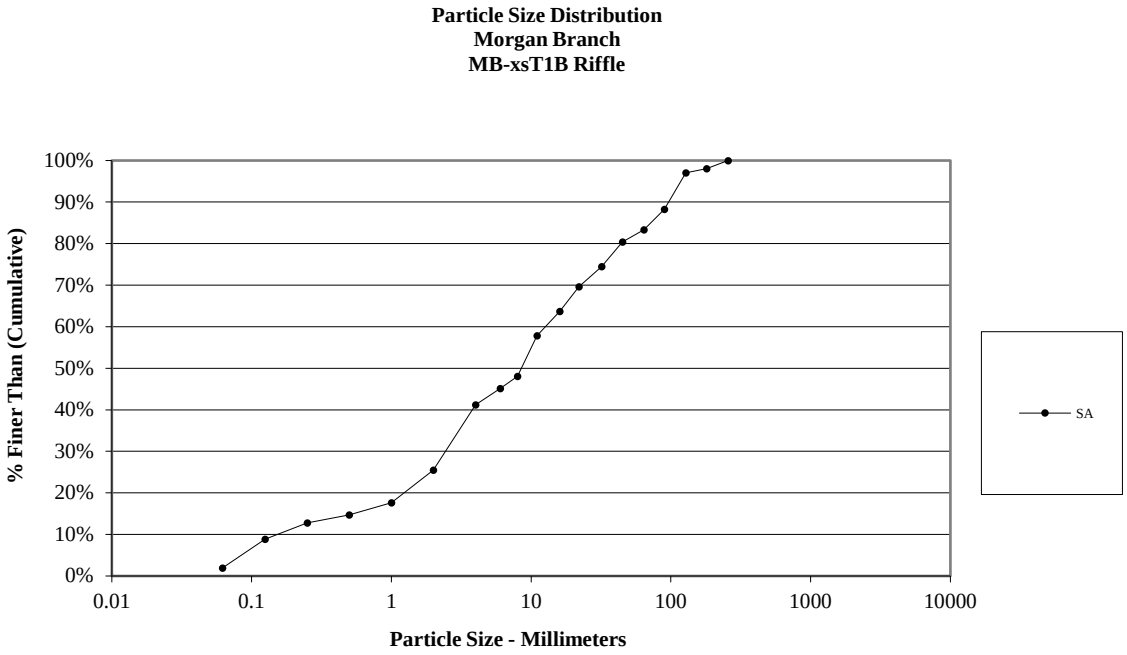
Size (mm)	
D16	1
D35	4.9
D50	9.6
D65	19
D84	76
D95	150

Size Distribution	
mean	8.7
dispersion	8.8
skewness	-0.03

Type	
silt/clay	0%
sand	27%
gravel	53%
cobble	13%
boulder	0%
bedrock	0%
hardpan	0%
wood/det	0%
artificial	0%

Cross-Section T1-B - SA			
Particle	Millimeter		Count
Silt/Clay	< 0.062	S/C	2
Very Fine	.062 - .125	S	7
Fine	.125 - .25	A	4
Medium	.25 - .50	N	2
Coarse	.50 - 1	D	3
Very Coarse	1 - 2	S	8
Very Fine	2 - 4		16
Fine	4 - 5.7	G	4
Fine	5.7 - 8	R	3
Medium	8 - 11.3	A	10
Medium	11.3 - 16	V	6
Coarse	16 - 22.6	E	6
Coarse	22.6 - 32	L	5
Very Coarse	32 - 45	S	6
Very Coarse	45 - 64		3
Small	64 - 90	C	5
Small	90 - 128	O	9
Large	128 - 180	B	1
Large	180 - 256	L	2
Small	256 - 362	B	
Small	362 - 512	L	
Medium	512 - 1024	D	
Lrg- Very Lrg	1024 - 2048	R	
Bedrock	>2048	BDRK	
		Total	102

Note:



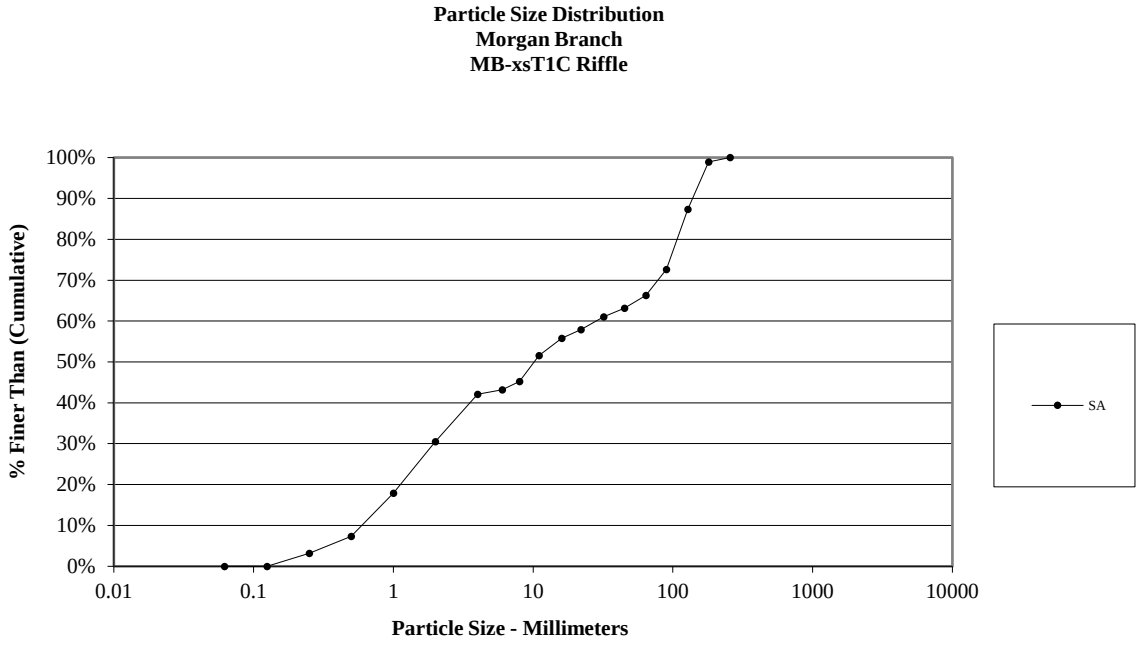
Size (mm)	
D16	0.68
D35	3
D50	8.5
D65	17
D84	67
D95	120

Size Distribution	
mean	6.7
dispersion	10.2
skewness	-0.07

Type	
silt/clay	2%
sand	24%
gravel	58%
cobble	17%
boulder	0%
bedrock	0%
hardpan	0%
wood/det	0%
artificial	0%

Cross-Section T1-C - SA			
Particle	Millimeter		Count
Silt/Clay	< 0.062	S/C	
Very Fine	.062 - .125	S	
Fine	.125 - .25	A	3
Medium	.25 - .50	N	4
Coarse	.50 - 1	D	10
Very Coarse	1 - 2	S	12
Very Fine	2 - 4		11
Fine	4 - 5.7	G	1
Fine	5.7 - 8	R	2
Medium	8 - 11.3	A	6
Medium	11.3 - 16	V	4
Coarse	16 - 22.6	E	2
Coarse	22.6 - 32	L	3
Very Coarse	32 - 45	S	2
Very Coarse	45 - 64		3
Small	64 - 90	C	6
Small	90 - 128	O	14
Large	128 - 180	B	11
Large	180 - 256	L	1
Small	256 - 362	B	
Small	362 - 512	L	
Medium	512 - 1024	D	
Lrg- Very Lrg	1024 - 2048	R	
Bedrock	>2048	BDRK	
		Total	95

Note:



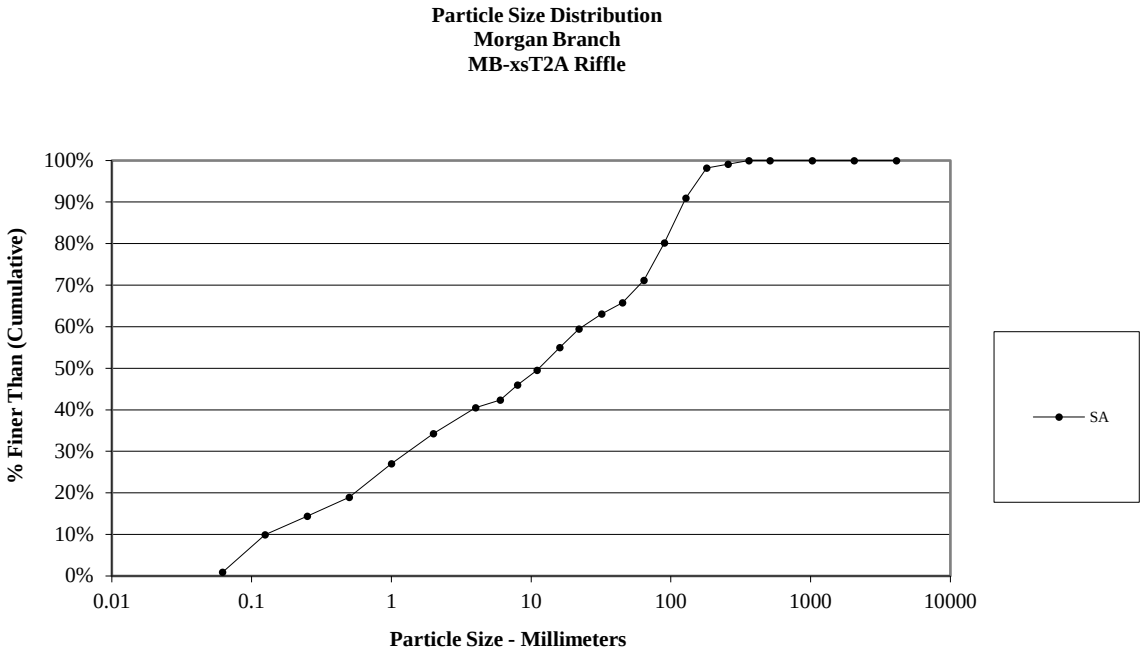
Size (mm)	
D16	0.88
D35	2.6
D50	10
D65	55
D84	120
D95	160

Size Distribution	
mean	10.3
dispersion	11.7
skewness	0.01

Type	
silt/clay	0%
sand	31%
gravel	36%
cobble	34%
boulder	0%
bedrock	0%
hardpan	0%
wood/det	0%
artificial	0%

Cross-Section T2-A Riffle SA			
Particle	Millimeter		Count
Silt/Clay	< 0.062	S/C	1
Very Fine	.062 - .125	S	10
Fine	.125 - .25	A	5
Medium	.25 - .50	N	5
Coarse	.50 - 1	D	9
Very Coarse	1 - 2	S	8
Very Fine	2 - 4		7
Fine	4 - 5.7	G	2
Fine	5.7 - 8	R	4
Medium	8 - 11.3	A	4
Medium	11.3 - 16	V	6
Coarse	16 - 22.6	E	5
Coarse	22.6 - 32	L	4
Very Coarse	32 - 45	S	3
Very Coarse	45 - 64		6
Small	64 - 90	C	10
Small	90 - 128	O	12
Large	128 - 180	B	8
Large	180 - 256	L	1
Small	256 - 362	B	1
Small	362 - 512	L	
Medium	512 - 1024	D	
Lrg- Very Lrg	1024 - 2048	R	
Bedrock	>2048	BDRK	
		Total	111

Note:



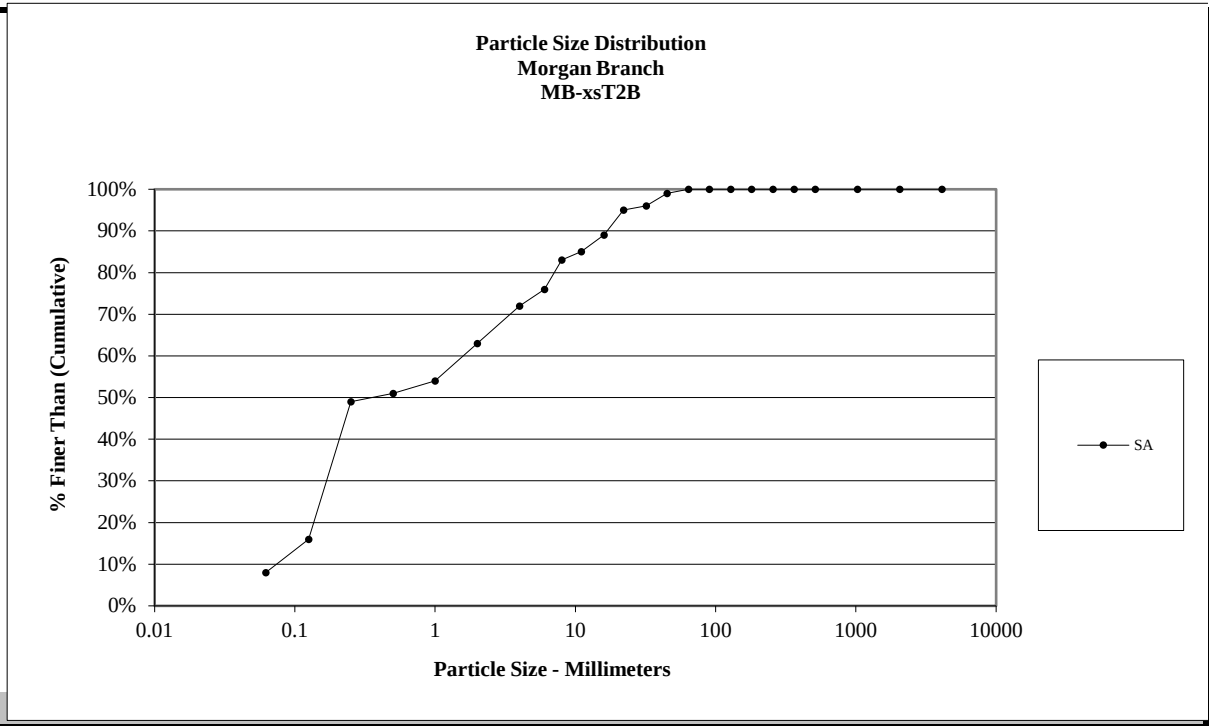
Size (mm)	
D16	0.32
D35	2.2
D50	11
D65	41
D84	100
D95	150

Size Distribution	
mean	5.7
dispersion	21.7
skewness	-0.18

Type	
silt/clay	1%
sand	33%
gravel	37%
cobble	27%
boulder	1%
bedrock	0%
hardpan	0%
wood/det	0%
artificial	0%

Cross-Section T2-B - SA			
Particle	Millimeter		Count
Silt/Clay	< 0.062	S/C	8
Very Fine	.062 - .125	S	8
Fine	.125 - .25	A	33
Medium	.25 - .50	N	2
Coarse	.50 - 1	D	3
Very Coarse	1 - 2	S	9
Very Fine	2 - 4		9
Fine	4 - 5.7	G	4
Fine	5.7 - 8	R	7
Medium	8 - 11.3	A	2
Medium	11.3 - 16	V	4
Coarse	16 - 22.6	E	6
Coarse	22.6 - 32	L	1
Very Coarse	32 - 45	S	3
Very Coarse	45 - 64		1
Small	64 - 90	C	
Small	90 - 128	O	
Large	128 - 180	B	
Large	180 - 256	L	
Small	256 - 362	B	
Small	362 - 512	L	
Medium	512 - 1024	D	
Lrg- Very Lrg	1024 - 2048	R	
Bedrock	>2048	BDRK	
		Total	100

Note:



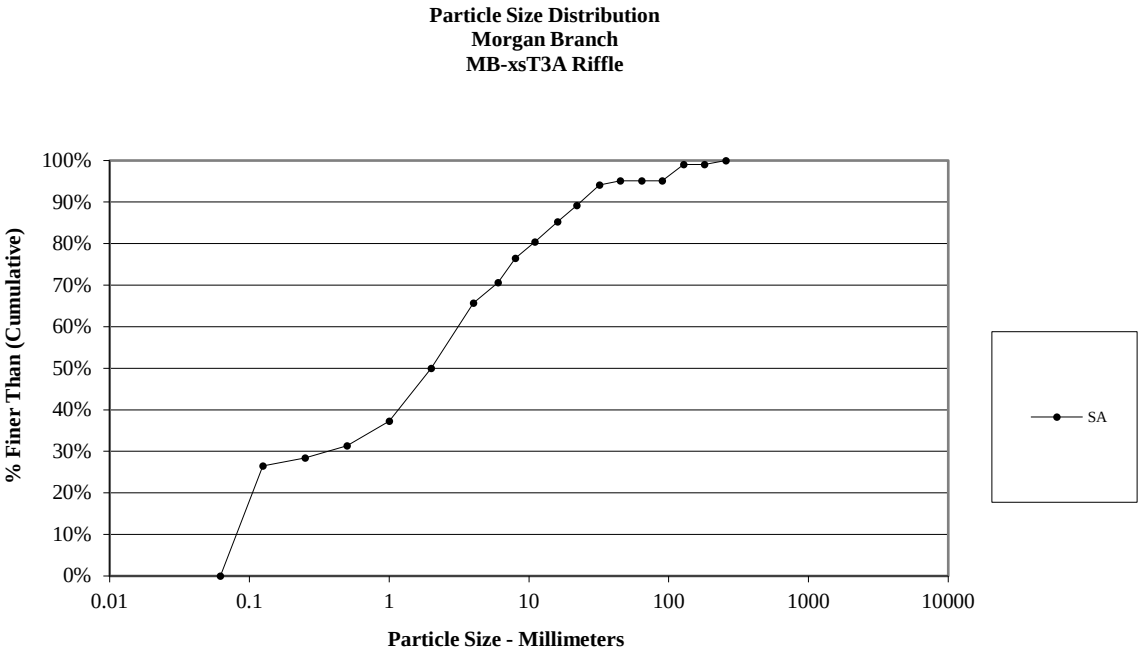
Size (mm)	
D16	0.13
D35	0.19
D50	0.35
D65	2.3
D84	9.4
D95	22

Size Distribution	
mean	1.1
dispersion	14.8
skewness	0.37

Type	
silt/clay	8%
sand	55%
gravel	37%
cobble	0%
boulder	0%
bedrock	0%
hardpan	0%
wood/det	0%
artificial	0%

Cross-Section T3-A - SA			
Particle	Millimeter		Count
Silt/Clay	< 0.062	S/C	
Very Fine	.062 - .125	S	27
Fine	.125 - .25	A	2
Medium	.25 - .50	N	3
Coarse	.50 - 1	D	6
Very Coarse	1 - 2	S	13
Very Fine	2 - 4		16
Fine	4 - 5.7	G	5
Fine	5.7 - 8	R	6
Medium	8 - 11.3	A	4
Medium	11.3 - 16	V	5
Coarse	16 - 22.6	E	4
Coarse	22.6 - 32	L	5
Very Coarse	32 - 45	S	1
Very Coarse	45 - 64		
Small	64 - 90	C	
Small	90 - 128	O	2
Large	128 - 180	B	
Large	180 - 256	L	1
Small	256 - 362	B	
Small	362 - 512	L	
Medium	512 - 1024	D	
Lrg- Very Lrg	1024 - 2048	R	
Bedrock	>2048	BDRK	
		Total	100

Note:



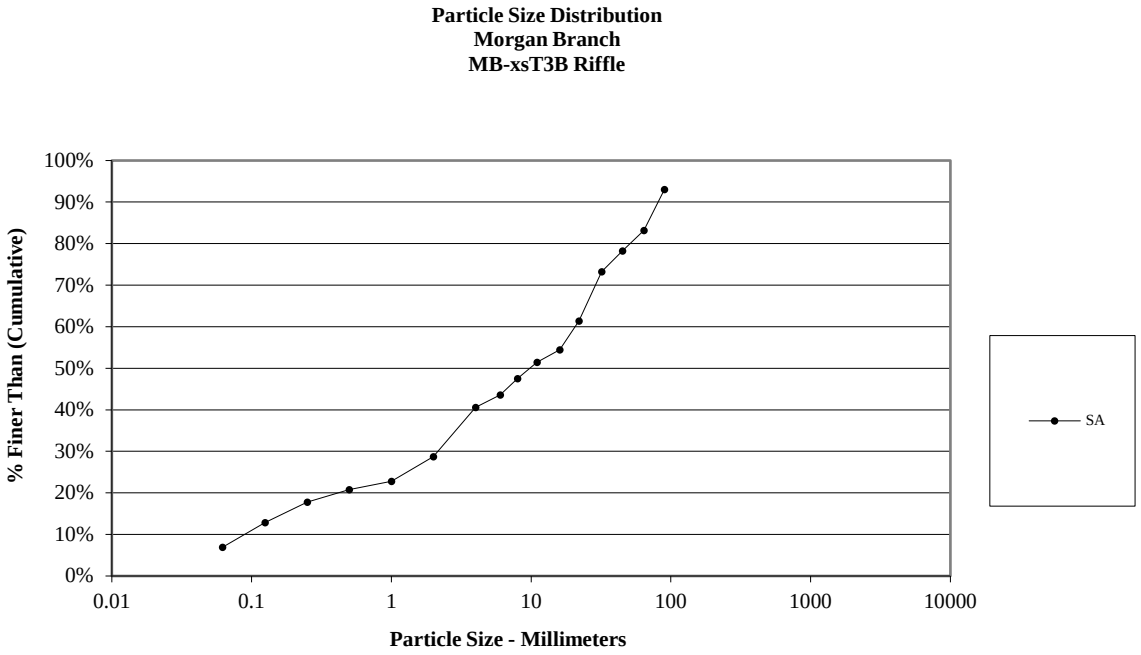
Size (mm)	
D16	0.094
D35	0.71
D50	1.9
D65	3.7
D84	13
D95	30

Size Distribution	
mean	1.1
dispersion	13.5
skewness	-0.16

Type	
silt/clay	0%
sand	51%
gravel	46%
cobble	3%
boulder	0%
bedrock	0%
hardpan	0%
wood/det	0%
artificial	0%

Cross-Section T3-B Riffle SA			
Particle	Millimeter		Count
Silt/Clay	< 0.062	S/C	7
Very Fine	.062 - .125	S	6
Fine	.125 - .25	A	5
Medium	.25 - .50	N	3
Coarse	.50 - 1	D	2
Very Coarse	1 - 2	S	6
Very Fine	2 - 4		12
Fine	4 - 5.7	G	3
Fine	5.7 - 8	R	4
Medium	8 - 11.3	A	4
Medium	11.3 - 16	V	3
Coarse	16 - 22.6	E	7
Coarse	22.6 - 32	L	12
Very Coarse	32 - 45	S	5
Very Coarse	45 - 64		5
Small	64 - 90	C	10
Small	90 - 128	O	4
Large	128 - 180	B	2
Large	180 - 256	L	1
Small	256 - 362	B	
Small	362 - 512	L	
Medium	512 - 1024	D	
Lrg- Very Lrg	1024 - 2048	R	
Bedrock	>2048	BDRK	
		Total	101

Note:



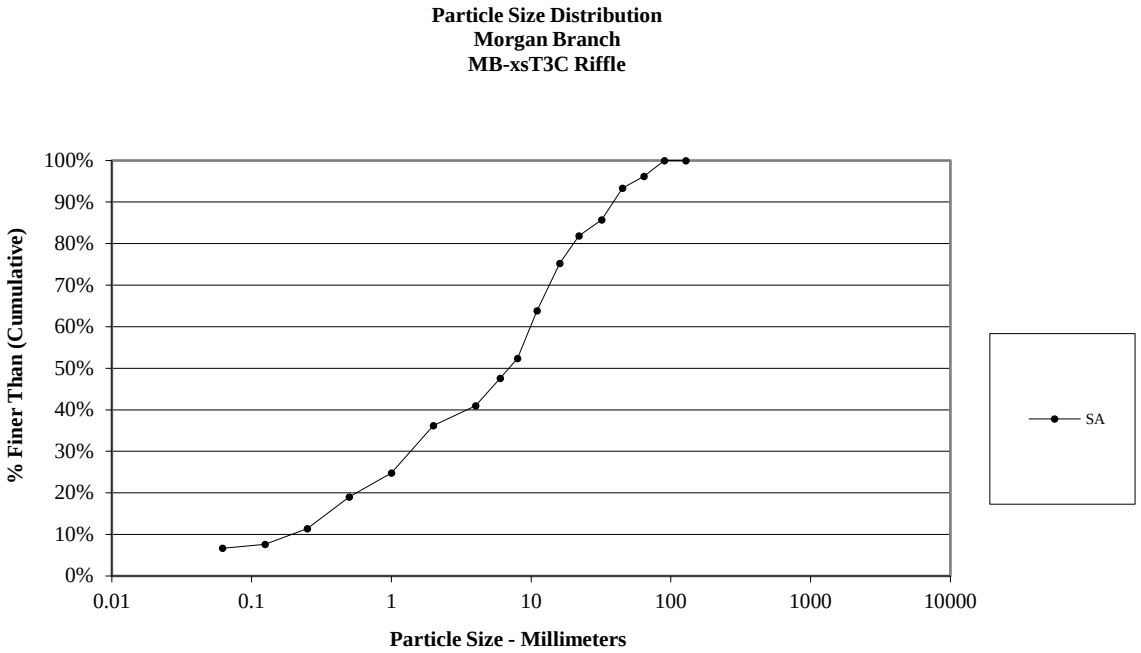
Size (mm)	
D16	0.19
D35	2.9
D50	9.8
D65	25
D84	66
D95	110

Size Distribution	
mean	3.5
dispersion	29.2
skewness	-0.28

Type	
silt/clay	7%
sand	22%
gravel	54%
cobble	17%
boulder	0%
bedrock	0%
hardpan	0%
wood/det	0%
artificial	0%

Cross-Section T3-C- SA			
Particle	Millimeter		Count
Silt/Clay	< 0.062	S/C	2
Very Fine	.062 - .125	S	1
Fine	.125 - .25	A	4
Medium	.25 - .50	N	8
Coarse	.50 - 1	D	6
Very Coarse	1 - 2	S	12
Very Fine	2 - 4		5
Fine	4 - 5.7	G	7
Fine	5.7 - 8	R	5
Medium	8 - 11.3	A	12
Medium	11.3 - 16	V	12
Coarse	16 - 22.6	E	7
Coarse	22.6 - 32	L	4
Very Coarse	32 - 45	S	8
Very Coarse	45 - 64		3
Small	64 - 90	C	4
Small	90 - 128	O	
Large	128 - 180	B	
Large	180 - 256	L	
Small	256 - 362	B	
Small	362 - 512	L	
Medium	512 - 1024	D	
Lrg- Very Lrg	1024 - 2048	R	
Bedrock	>2048	BDRK	
		Total	100

Note:



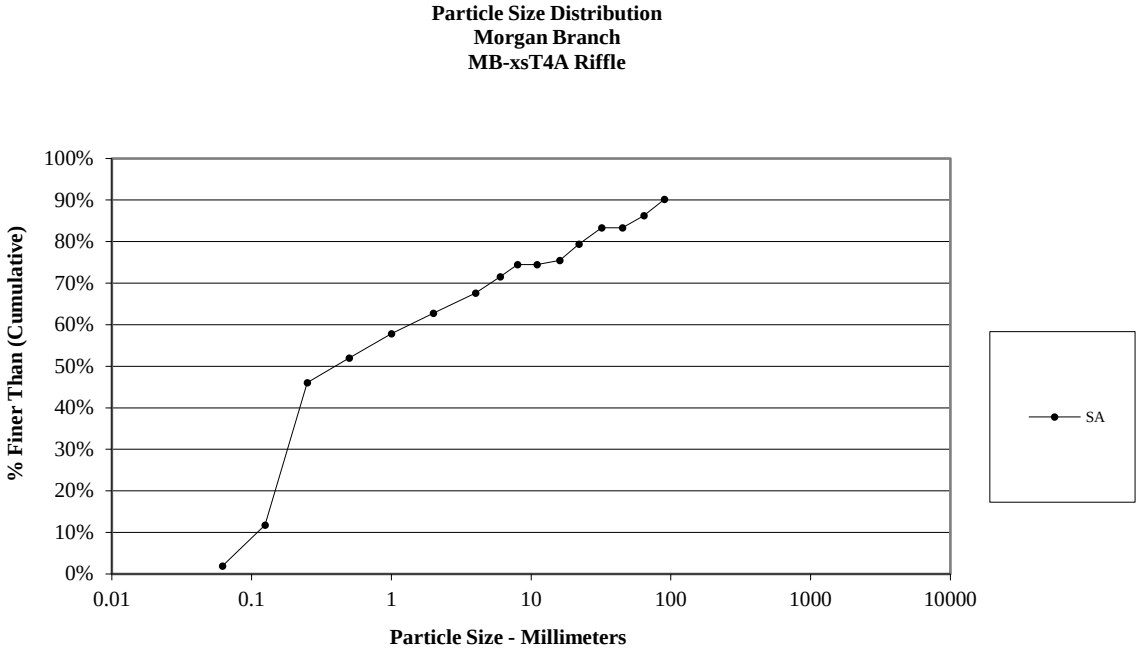
Size (mm)	
D16	0.56
D35	2.6
D50	8
D65	12
D84	29
D95	57

Size Distribution	
mean	4.0
dispersion	9.0
skewness	-0.23

Type	
silt/clay	2%
sand	31%
gravel	63%
cobble	4%
boulder	0%
bedrock	0%
hardpan	0%
wood/det	0%
artificial	0%

Cross-Section T4-A - SA			
Particle	Millimeter		Count
Silt/Clay	< 0.062	S/C	2
Very Fine	.062 - .125	S	10
Fine	.125 - .25	A	35
Medium	.25 - .50	N	6
Coarse	.50 - 1	D	6
Very Coarse	1 - 2	S	5
Very Fine	2 - 4		5
Fine	4 - 5.7	G	4
Fine	5.7 - 8	R	3
Medium	8 - 11.3	A	
Medium	11.3 - 16	V	1
Coarse	16 - 22.6	E	4
Coarse	22.6 - 32	L	4
Very Coarse	32 - 45	S	
Very Coarse	45 - 64		3
Small	64 - 90	C	4
Small	90 - 128	O	3
Large	128 - 180	B	6
Large	180 - 256	L	
Small	256 - 362	B	1
Small	362 - 512	L	
Medium	512 - 1024	D	
Lrg- Very Lrg	1024 - 2048	R	
Bedrock	>2048	BDRK	
		Total	102

Note:



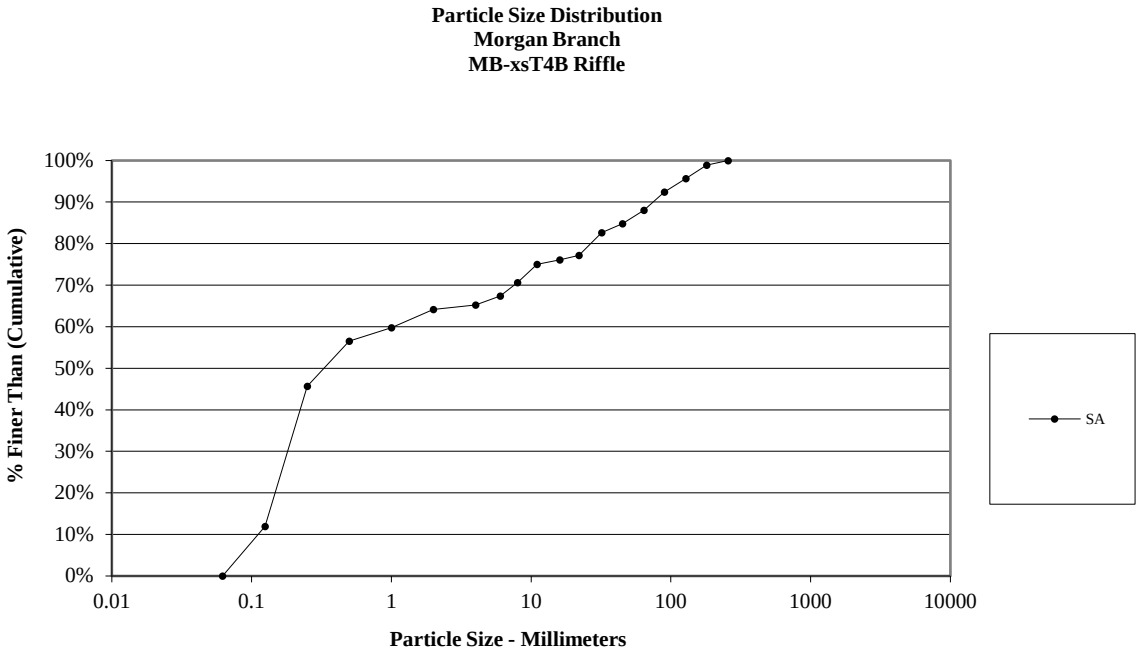
Size (mm)	
D16	0.14
D35	0.2
D50	0.4
D65	2.8
D84	49
D95	140

Size Distribution	
mean	2.6
dispersion	62.7
skewness	0.51

Type	
silt/clay	2%
sand	61%
gravel	24%
cobble	13%
boulder	1%
bedrock	0%
hardpan	0%
wood/det	0%
artificial	0%

Cross-Section T4-B Riffle - SA			
Particle	Millimeter		Count
Silt/Clay	< 0.062	S/C	
Very Fine	.062 - .125	S	11
Fine	.125 - .25	A	31
Medium	.25 - .50	N	10
Coarse	.50 - 1	D	3
Very Coarse	1 - 2	S	4
Very Fine	2 - 4		1
Fine	4 - 5.7	G	2
Fine	5.7 - 8	R	3
Medium	8 - 11.3	A	4
Medium	11.3 - 16	V	1
Coarse	16 - 22.6	E	1
Coarse	22.6 - 32	L	5
Very Coarse	32 - 45	S	2
Very Coarse	45 - 64		3
Small	64 - 90	C	4
Small	90 - 128	O	3
Large	128 - 180	B	3
Large	180 - 256	L	1
Small	256 - 362	B	
Small	362 - 512	L	
Medium	512 - 1024	D	
Lrg- Very Lrg	1024 - 2048	R	
Bedrock	>2048	BDRK	
		Total	92

Note:



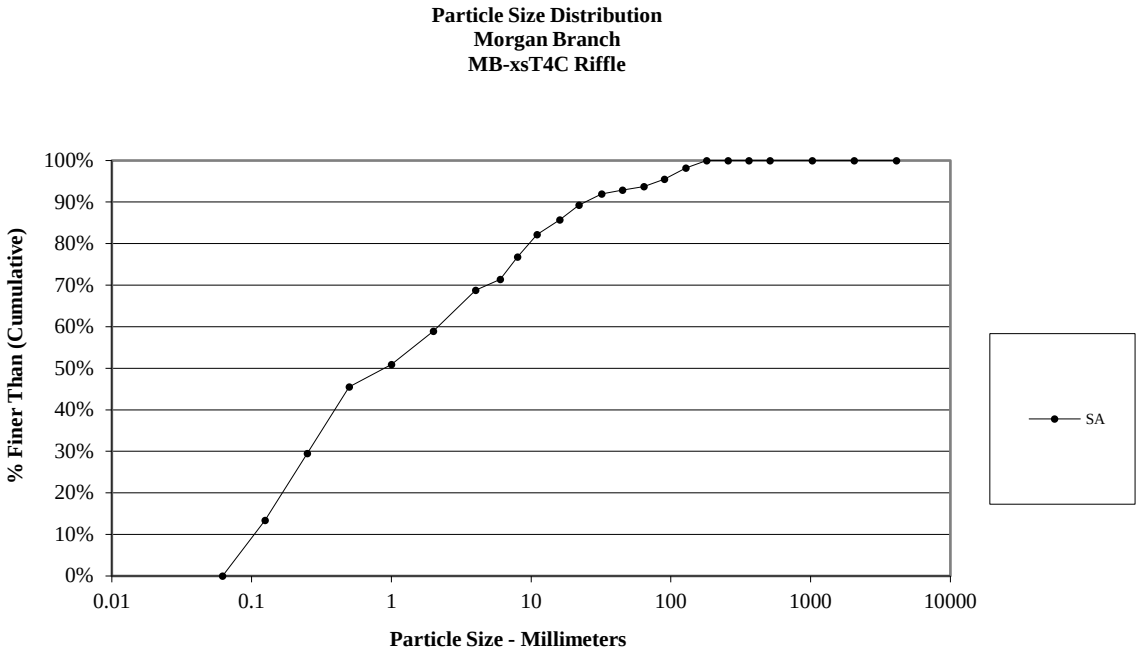
Size (mm)	
D16	0.14
D35	0.2
D50	0.33
D65	3.5
D84	40
D95	120

Size Distribution	
mean	2.4
dispersion	61.8
skewness	0.55

Type	
silt/clay	0%
sand	64%
gravel	24%
cobble	12%
boulder	0%
bedrock	0%
hardpan	0%
wood/det	0%
artificial	0%

Cross-Section T4-C Riffle - SA			
Particle	Millimeter		Count
Silt/Clay	< 0.062	S/C	
Very Fine	.062 - .125	S	15
Fine	.125 - .25	A	18
Medium	.25 - .50	N	18
Coarse	.50 - 1	D	6
Very Coarse	1 - 2	S	9
Very Fine	2 - 4		11
Fine	4 - 5.7	G	3
Fine	5.7 - 8	R	6
Medium	8 - 11.3	A	6
Medium	11.3 - 16	V	4
Coarse	16 - 22.6	E	4
Coarse	22.6 - 32	L	3
Very Coarse	32 - 45	S	1
Very Coarse	45 - 64		1
Small	64 - 90	C	2
Small	90 - 128	O	3
Large	128 - 180	B	2
Large	180 - 256	L	
Small	256 - 362	B	
Small	362 - 512	L	
Medium	512 - 1024	D	
Lrg- Very Lrg	1024 - 2048	R	
Bedrock	>2048	BDRK	
		Total	112

Note:



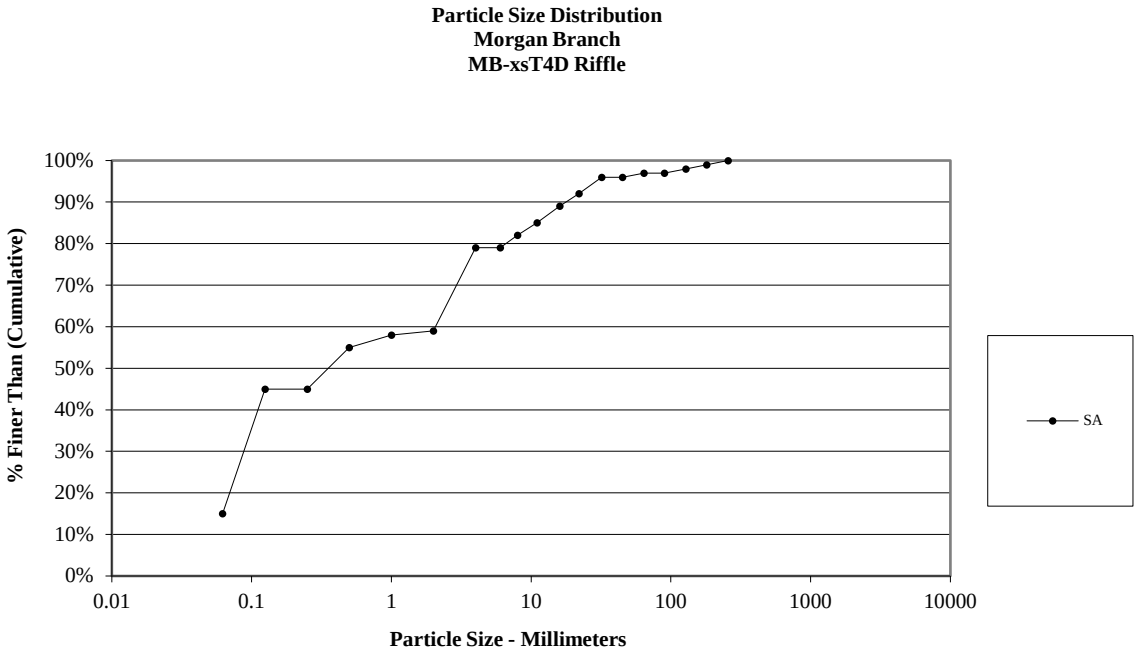
Size (mm)	
D16	0.14
D35	0.32
D50	0.89
D65	3.1
D84	13
D95	81

Size Distribution	
mean	1.3
dispersion	10.5
skewness	0.13

Type	
silt/clay	0%
sand	59%
gravel	35%
cobble	6%
boulder	0%
bedrock	0%
hardpan	0%
wood/det	0%
artificial	0%

Cross-Section T4-D Riffle - SA			
Particle	Millimeter		Count
Silt/Clay	< 0.062	S/C	15
Very Fine	.062 - .125	S	30
Fine	.125 - .25	A	
Medium	.25 - .50	N	10
Coarse	.50 - 1	D	3
Very Coarse	1 - 2	S	1
Very Fine	2 - 4		20
Fine	4 - 5.7	G	
Fine	5.7 - 8	R	3
Medium	8 - 11.3	A	3
Medium	11.3 - 16	V	4
Coarse	16 - 22.6	E	3
Coarse	22.6 - 32	L	4
Very Coarse	32 - 45	S	
Very Coarse	45 - 64		1
Small	64 - 90	C	
Small	90 - 128	O	1
Large	128 - 180	B	1
Large	180 - 256	L	1
Small	256 - 362	B	
Small	362 - 512	L	
Medium	512 - 1024	D	
Lrg- Very Lrg	1024 - 2048	R	
Bedrock	>2048	BDRK	
		Total	100

Note:



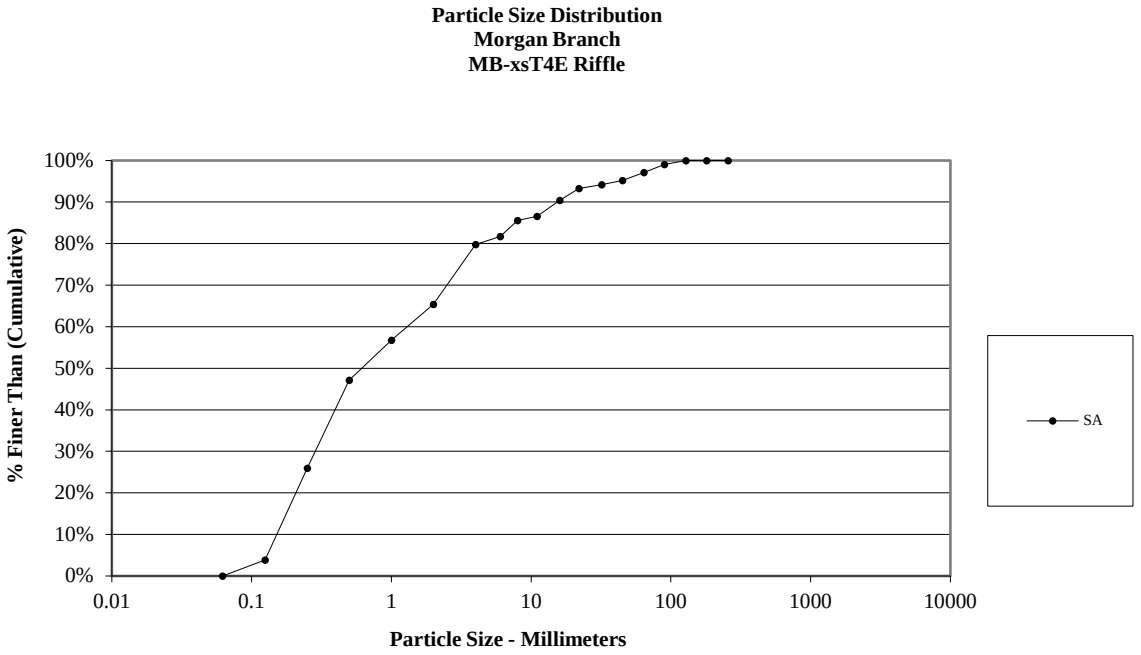
Size (mm)	
D16	0.063
D35	0.099
D50	0.35
D65	2.5
D84	9.9
D95	29

Size Distribution	
mean	0.8
dispersion	16.9
skewness	0.24

Type	
silt/clay	15%
sand	44%
gravel	38%
cobble	3%
boulder	0%
bedrock	0%
hardpan	0%
wood/det	0%
artificial	0%

Cross-Section T4-E Riffle - SA			
Particle	Millimeter		Count
Silt/Clay	< 0.062	S/C	
Very Fine	.062 - .125	S	4
Fine	.125 - .25	A	23
Medium	.25 - .50	N	22
Coarse	.50 - 1	D	10
Very Coarse	1 - 2	S	9
Very Fine	2 - 4		15
Fine	4 - 5.7	G	2
Fine	5.7 - 8	R	4
Medium	8 - 11.3	A	1
Medium	11.3 - 16	V	4
Coarse	16 - 22.6	E	3
Coarse	22.6 - 32	L	1
Very Coarse	32 - 45	S	1
Very Coarse	45 - 64		2
Small	64 - 90	C	2
Small	90 - 128	O	1
Large	128 - 180	B	
Large	180 - 256	L	
Small	256 - 362	B	
Small	362 - 512	L	
Medium	512 - 1024	D	
Lrg- Very Lrg	1024 - 2048	R	
Bedrock	>2048	BDRK	
		Total	104

Note:



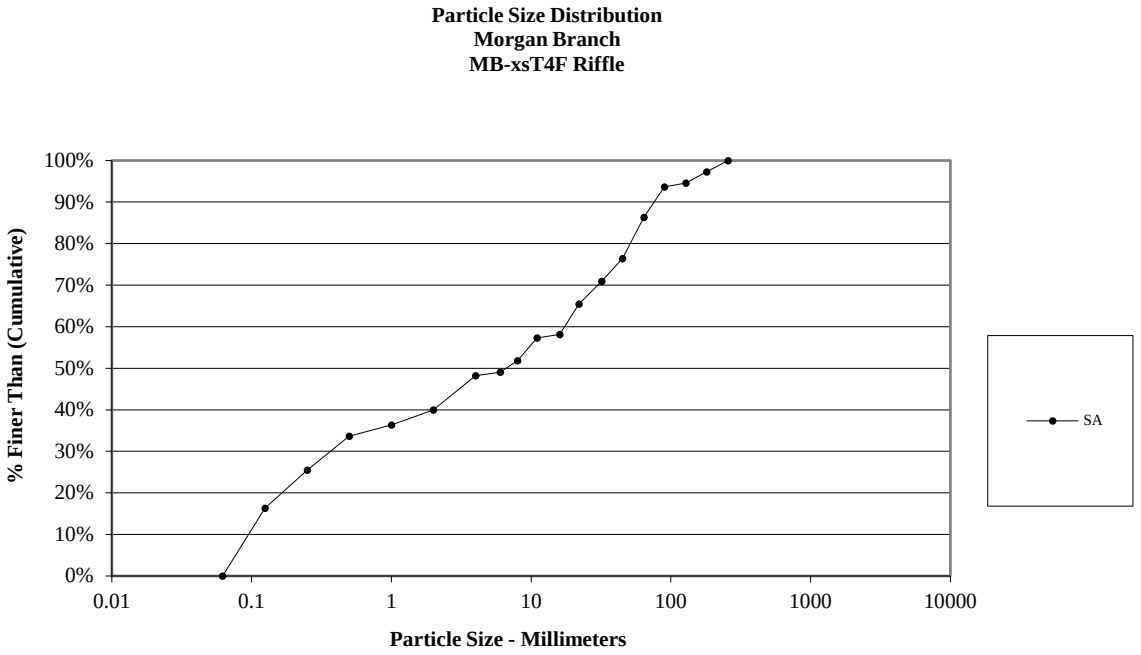
Size (mm)	
D16	0.18
D35	0.34
D50	0.62
D65	1.9
D84	7.1
D95	42

Size Distribution	
mean	1.1
dispersion	7.4
skewness	0.21

Type	
silt/clay	0%
sand	65%
gravel	32%
cobble	3%
boulder	0%
bedrock	0%
hardpan	0%
wood/det	0%
artificial	0%

Cross-Section T4-F Riffle - SA			
Particle	Millimeter		Count
Silt/Clay	< 0.062	S/C	
Very Fine	.062 - .125	S	18
Fine	.125 - .25	A	10
Medium	.25 - .50	N	9
Coarse	.50 - 1	D	3
Very Coarse	1 - 2	S	4
Very Fine	2 - 4		9
Fine	4 - 5.7	G	1
Fine	5.7 - 8	R	3
Medium	8 - 11.3	A	6
Medium	11.3 - 16	V	1
Coarse	16 - 22.6	E	8
Coarse	22.6 - 32	L	6
Very Coarse	32 - 45	S	6
Very Coarse	45 - 64		11
Small	64 - 90	C	8
Small	90 - 128	O	1
Large	128 - 180	B	3
Large	180 - 256	L	3
Small	256 - 362	B	
Small	362 - 512	L	
Medium	512 - 1024	D	
Lrg- Very Lrg	1024 - 2048	R	
Bedrock	>2048	BDRK	
		Total	110

Note:



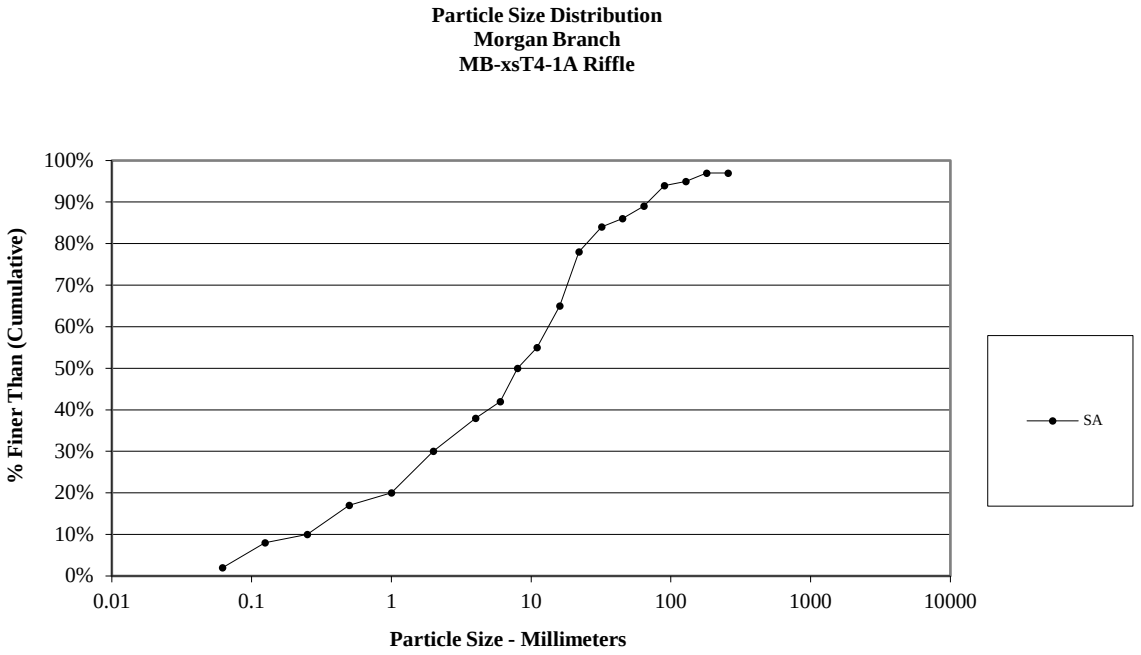
Size (mm)	
D16	0.12
D35	0.71
D50	6.6
D65	22
D84	59
D95	140

Size Distribution	
mean	2.7
dispersion	32.0
skewness	-0.24

Type	
silt/clay	0%
sand	40%
gravel	46%
cobble	14%
boulder	0%
bedrock	0%
hardpan	0%
wood/det	0%
artificial	0%

Cross-Section T4-1A Riffle - SA			
Particle	Millimeter		Count
Silt/Clay	< 0.062	S/C	2
Very Fine	.062 - .125	S	6
Fine	.125 - .25	A	2
Medium	.25 - .50	N	7
Coarse	.50 - 1	D	3
Very Coarse	1 - 2	S	10
Very Fine	2 - 4		8
Fine	4 - 5.7	G	4
Fine	5.7 - 8	R	8
Medium	8 - 11.3	A	5
Medium	11.3 - 16	V	10
Coarse	16 - 22.6	E	13
Coarse	22.6 - 32	L	6
Very Coarse	32 - 45	S	2
Very Coarse	45 - 64		3
Small	64 - 90	C	5
Small	90 - 128	O	1
Large	128 - 180	B	2
Large	180 - 256	L	
Small	256 - 362	B	
Small	362 - 512	L	
Medium	512 - 1024	D	
Lrg- Very Lrg	1024 - 2048	R	
Bedrock	>2048	BDRK	3
		Total	100

Note:



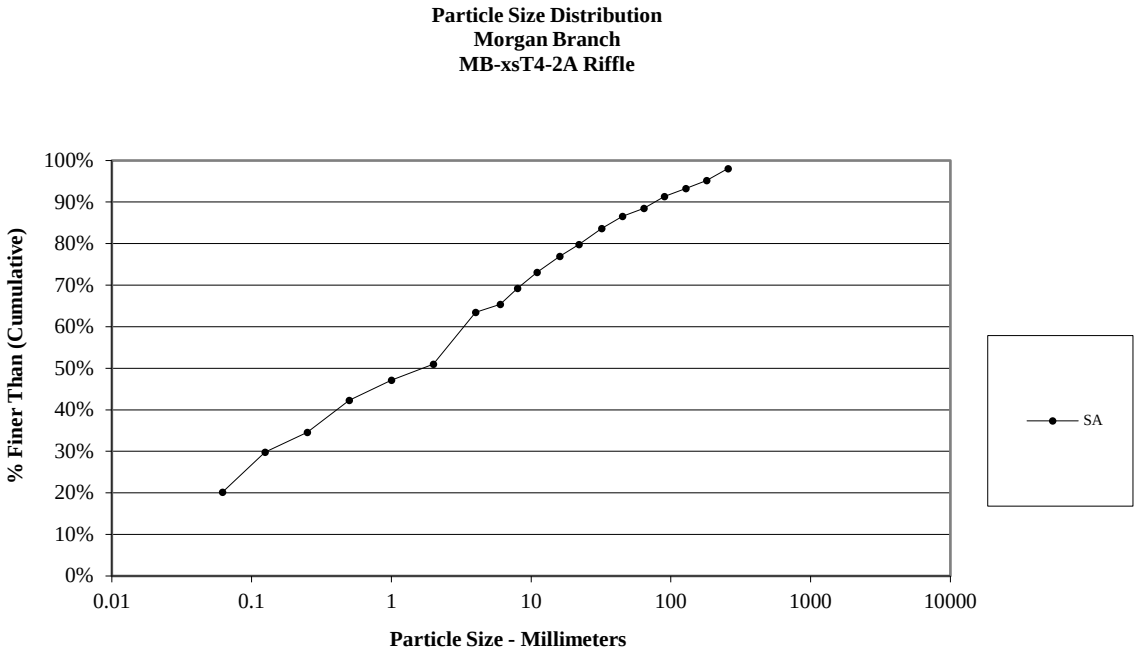
Size (mm)	
D16	0.45
D35	3.1
D50	8
D65	16
D84	32
D95	130

Size Distribution	
mean	3.8
dispersion	10.9
skewness	-0.24

Type	
silt/clay	2%
sand	28%
gravel	59%
cobble	8%
boulder	0%
bedrock	3%
hardpan	0%
wood/det	0%
artificial	0%

Cross-Section T4-2A Riffle - SA			
Particle	Millimeter		Count
Silt/Clay	< 0.062	S/C	21
Very Fine	.062 - .125	S	10
Fine	.125 - .25	A	5
Medium	.25 - .50	N	8
Coarse	.50 - 1	D	5
Very Coarse	1 - 2	S	4
Very Fine	2 - 4		13
Fine	4 - 5.7	G	2
Fine	5.7 - 8	R	4
Medium	8 - 11.3	A	4
Medium	11.3 - 16	V	4
Coarse	16 - 22.6	E	3
Coarse	22.6 - 32	L	4
Very Coarse	32 - 45	S	3
Very Coarse	45 - 64		2
Small	64 - 90	C	3
Small	90 - 128	O	2
Large	128 - 180	B	2
Large	180 - 256	L	3
Small	256 - 362	B	2
Small	362 - 512	L	
Medium	512 - 1024	D	
Lrg- Very Lrg	1024 - 2048	R	
Bedrock	>2048	BDRK	
		Total	104

Note:



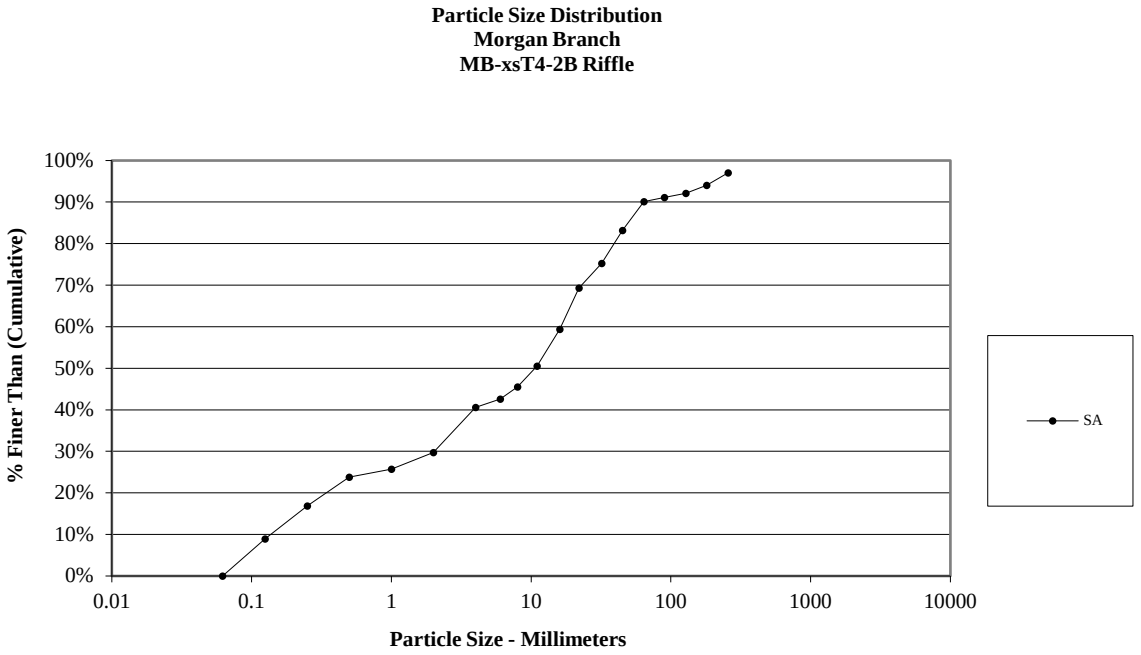
Size (mm)	
D16	0.062
D35	0.26
D50	1.7
D65	5.5
D84	33
D95	170

Size Distribution	
mean	1.4
dispersion	23.4
skewness	-0.05

Type	
silt/clay	20%
sand	31%
gravel	38%
cobble	10%
boulder	2%
bedrock	0%
hardpan	0%
wood/det	0%
artificial	0%

Cross-Section T4-2B Riffle - SA			
Particle	Millimeter		Count
Silt/Clay	< 0.062	S/C	
Very Fine	.062 - .125	S	9
Fine	.125 - .25	A	8
Medium	.25 - .50	N	7
Coarse	.50 - 1	D	2
Very Coarse	1 - 2	S	4
Very Fine	2 - 4		11
Fine	4 - 5.7	G	2
Fine	5.7 - 8	R	3
Medium	8 - 11.3	A	5
Medium	11.3 - 16	V	9
Coarse	16 - 22.6	E	10
Coarse	22.6 - 32	L	6
Very Coarse	32 - 45	S	8
Very Coarse	45 - 64		7
Small	64 - 90	C	1
Small	90 - 128	O	1
Large	128 - 180	B	2
Large	180 - 256	L	3
Small	256 - 362	B	
Small	362 - 512	L	
Medium	512 - 1024	D	
Lrg- Very Lrg	1024 - 2048	R	
Bedrock	>2048	BDRK	3
		Total	101

Note:



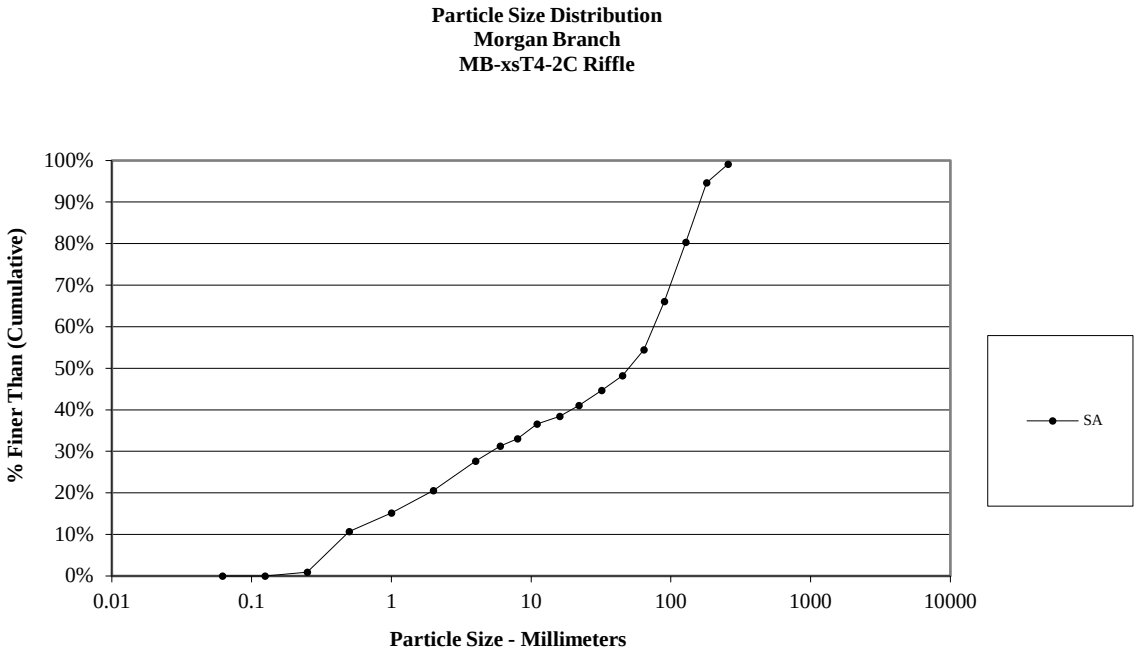
Size (mm)	
D16	0.23
D35	2.8
D50	11
D65	19
D84	47
D95	200

Size Distribution	
mean	3.3
dispersion	26.0
skewness	-0.35

Type	
silt/clay	0%
sand	30%
gravel	60%
cobble	7%
boulder	0%
bedrock	3%
hardpan	0%
wood/det	0%
artificial	0%

Cross-Section T4-2C Riffle - SA			
Particle	Millimeter		Count
Silt/Clay	< 0.062	S/C	
Very Fine	.062 - .125	S	
Fine	.125 - .25	A	1
Medium	.25 - .50	N	11
Coarse	.50 - 1	D	5
Very Coarse	1 - 2	S	6
Very Fine	2 - 4		8
Fine	4 - 5.7	G	4
Fine	5.7 - 8	R	2
Medium	8 - 11.3	A	4
Medium	11.3 - 16	V	2
Coarse	16 - 22.6	E	3
Coarse	22.6 - 32	L	4
Very Coarse	32 - 45	S	4
Very Coarse	45 - 64		7
Small	64 - 90	C	13
Small	90 - 128	O	16
Large	128 - 180	B	16
Large	180 - 256	L	5
Small	256 - 362	B	1
Small	362 - 512	L	
Medium	512 - 1024	D	
Lrg- Very Lrg	1024 - 2048	R	
Bedrock	>2048	BDRK	
		Total	112

Note:



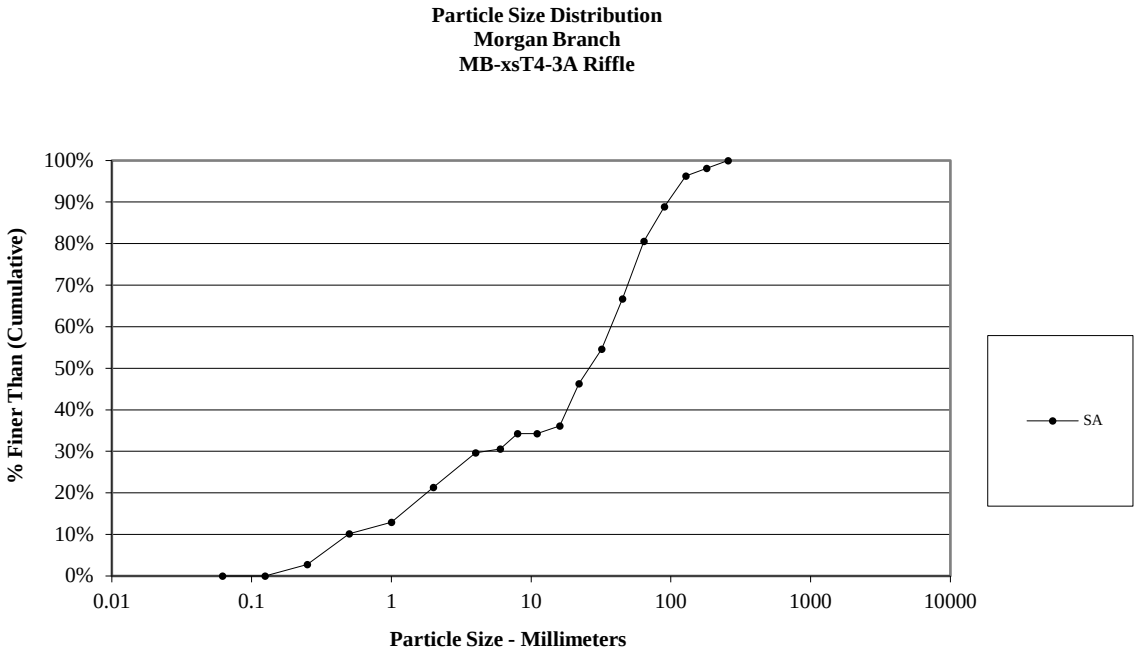
Size (mm)	
D16	1.1
D35	9.5
D50	50
D65	87
D84	140
D95	190

Size Distribution	
mean	12.4
dispersion	24.1
skewness	-0.42

Type	
silt/clay	0%
sand	21%
gravel	34%
cobble	45%
boulder	1%
bedrock	0%
hardpan	0%
wood/det	0%
artificial	0%

Cross-Section T4-3A Riffle - SA			
Particle	Millimeter		Count
Silt/Clay	< 0.062	S/C	
Very Fine	.062 - .125	S	
Fine	.125 - .25	A	3
Medium	.25 - .50	N	8
Coarse	.50 - 1	D	3
Very Coarse	1 - 2	S	9
Very Fine	2 - 4		9
Fine	4 - 5.7	G	1
Fine	5.7 - 8	R	4
Medium	8 - 11.3	A	
Medium	11.3 - 16	V	2
Coarse	16 - 22.6	E	11
Coarse	22.6 - 32	L	9
Very Coarse	32 - 45	S	13
Very Coarse	45 - 64		15
Small	64 - 90	C	9
Small	90 - 128	O	8
Large	128 - 180	B	2
Large	180 - 256	L	2
Small	256 - 362	B	
Small	362 - 512	L	
Medium	512 - 1024	D	
Lrg- Very Lrg	1024 - 2048	R	
Bedrock	>2048	BDRK	
		Total	108

Note:



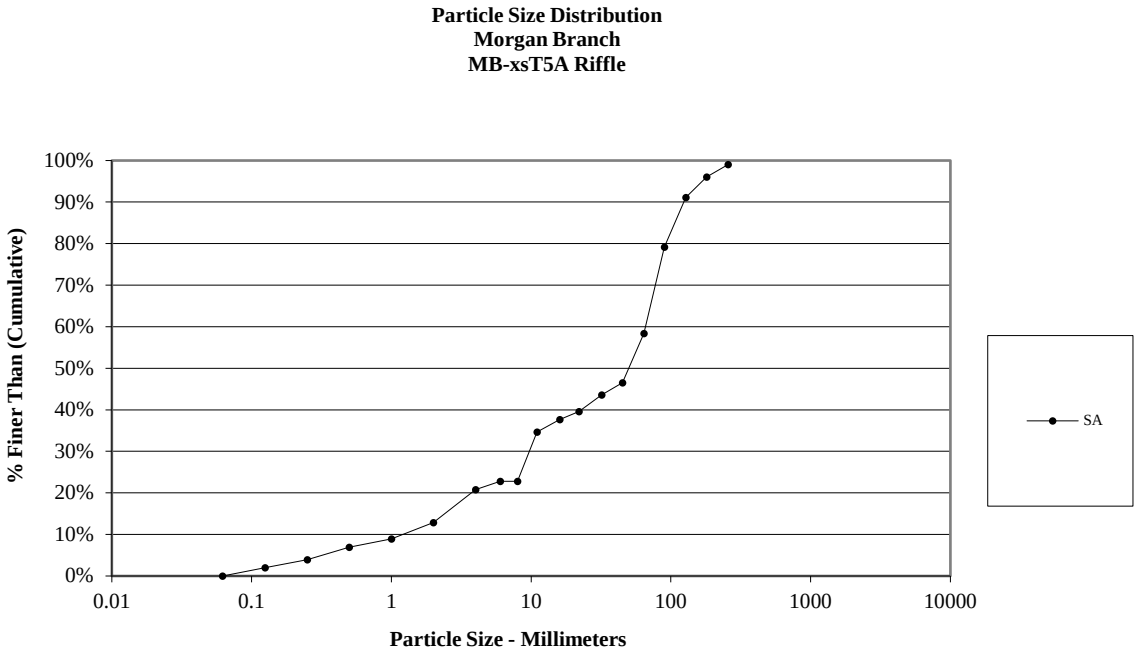
Size (mm)	
D16	1.3
D35	13
D50	26
D65	43
D84	74
D95	120

Size Distribution	
mean	9.8
dispersion	11.4
skewness	-0.32

Type	
silt/clay	0%
sand	21%
gravel	59%
cobble	19%
boulder	0%
bedrock	0%
hardpan	0%
wood/det	0%
artificial	0%

Cross-Section T5-A Riffle - SA			
Particle	Millimeter		Count
Silt/Clay	< 0.062	S/C	
Very Fine	.062 - .125	S	2
Fine	.125 - .25	A	2
Medium	.25 - .50	N	3
Coarse	.50 - 1	D	2
Very Coarse	1 - 2	S	4
Very Fine	2 - 4		8
Fine	4 - 5.7	G	2
Fine	5.7 - 8	R	
Medium	8 - 11.3	A	12
Medium	11.3 - 16	V	3
Coarse	16 - 22.6	E	2
Coarse	22.6 - 32	L	4
Very Coarse	32 - 45	S	3
Very Coarse	45 - 64		12
Small	64 - 90	C	21
Small	90 - 128	O	12
Large	128 - 180	B	5
Large	180 - 256	L	3
Small	256 - 362	B	
Small	362 - 512	L	1
Medium	512 - 1024	D	
Lrg- Very Lrg	1024 - 2048	R	
Bedrock	>2048	BDRK	
		Total	101

Note:



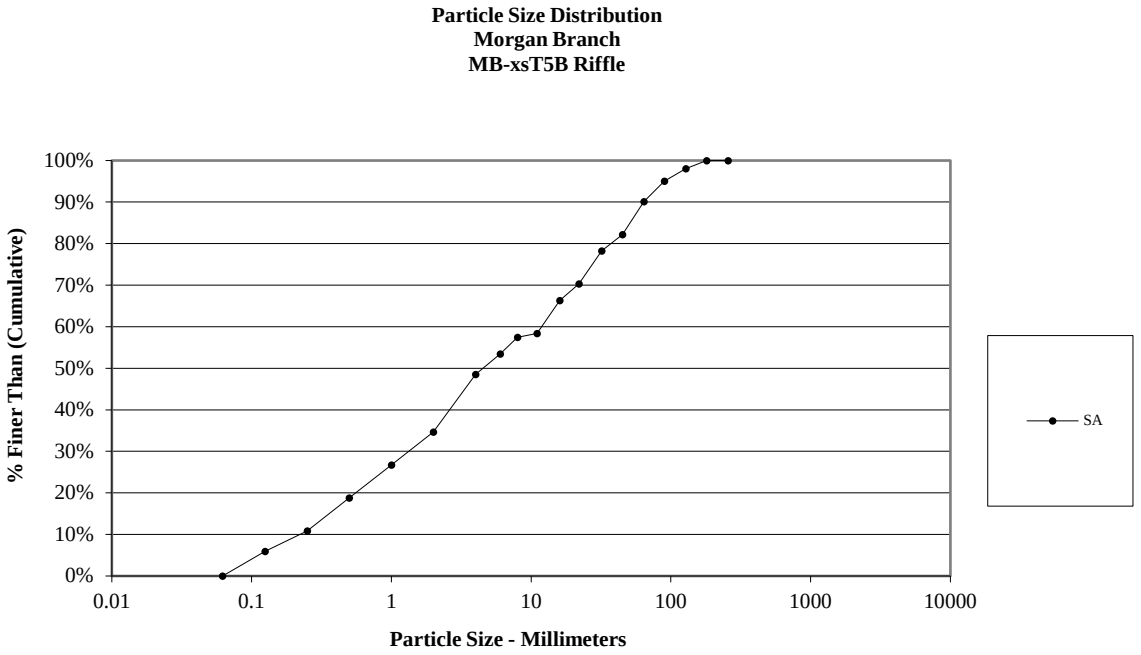
Size (mm)	
D16	2.6
D35	11
D50	50
D65	71
D84	100
D95	170

Size Distribution	
mean	16.1
dispersion	10.6
skewness	-0.39

Type	
silt/clay	0%
sand	13%
gravel	46%
cobble	41%
boulder	1%
bedrock	0%
hardpan	0%
wood/det	0%
artificial	0%

Cross-Section T5-B Riffle - SA			
Particle	Millimeter		Count
Silt/Clay	< 0.062	S/C	
Very Fine	.062 - .125	S	6
Fine	.125 - .25	A	5
Medium	.25 - .50	N	8
Coarse	.50 - 1	D	8
Very Coarse	1 - 2	S	8
Very Fine	2 - 4		14
Fine	4 - 5.7	G	5
Fine	5.7 - 8	R	4
Medium	8 - 11.3	A	1
Medium	11.3 - 16	V	8
Coarse	16 - 22.6	E	4
Coarse	22.6 - 32	L	8
Very Coarse	32 - 45	S	4
Very Coarse	45 - 64		8
Small	64 - 90	C	5
Small	90 - 128	O	3
Large	128 - 180	B	2
Large	180 - 256	L	
Small	256 - 362	B	
Small	362 - 512	L	
Medium	512 - 1024	D	
Lrg- Very Lrg	1024 - 2048	R	
Bedrock	>2048	BDRK	
		Total	101

Note:



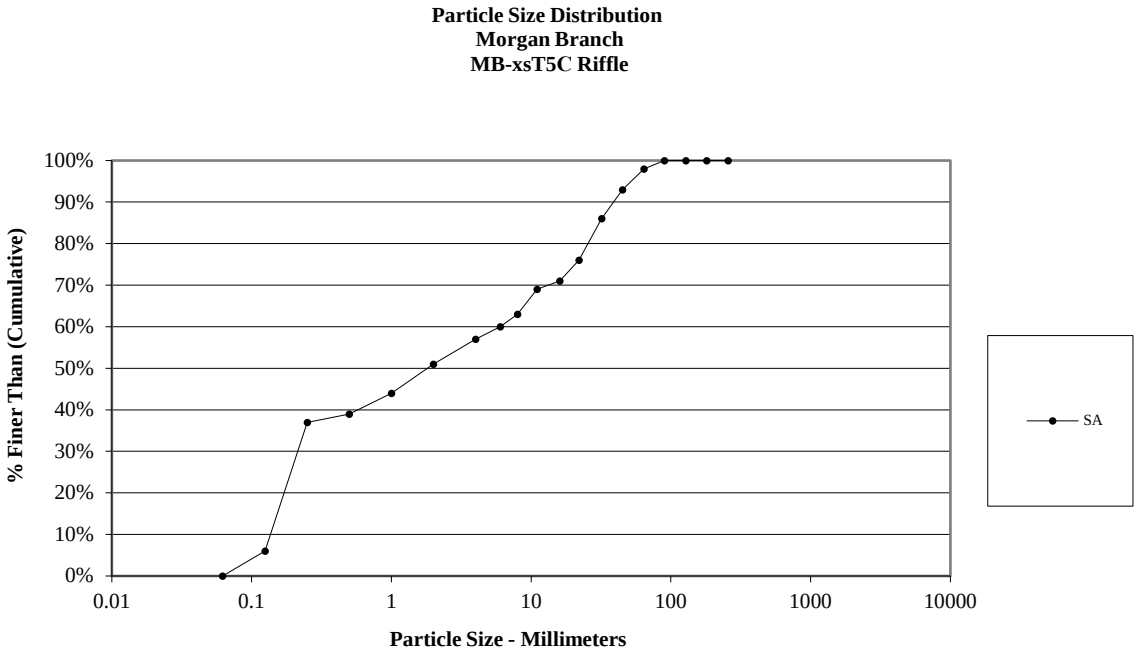
Size (mm)	
D16	0.39
D35	2
D50	4.5
D65	15
D84	49
D95	90

Size Distribution	
mean	4.4
dispersion	11.2
skewness	-0.01

Type	
silt/clay	0%
sand	35%
gravel	55%
cobble	10%
boulder	0%
bedrock	0%
hardpan	0%
wood/det	0%
artificial	0%

Cross-Section T5-C Riffle - SA			
Particle	Millimeter		Count
Silt/Clay	< 0.062	S/C	
Very Fine	.062 - .125	S	6
Fine	.125 - .25	A	31
Medium	.25 - .50	N	2
Coarse	.50 - 1	D	5
Very Coarse	1 - 2	S	7
Very Fine	2 - 4		6
Fine	4 - 5.7	G	3
Fine	5.7 - 8	R	3
Medium	8 - 11.3	A	6
Medium	11.3 - 16	V	2
Coarse	16 - 22.6	E	5
Coarse	22.6 - 32	L	10
Very Coarse	32 - 45	S	7
Very Coarse	45 - 64		5
Small	64 - 90	C	2
Small	90 - 128	O	
Large	128 - 180	B	
Large	180 - 256	L	
Small	256 - 362	B	
Small	362 - 512	L	
Medium	512 - 1024	D	
Lrg- Very Lrg	1024 - 2048	R	
Bedrock	>2048	BDRK	
		Total	100

Note:



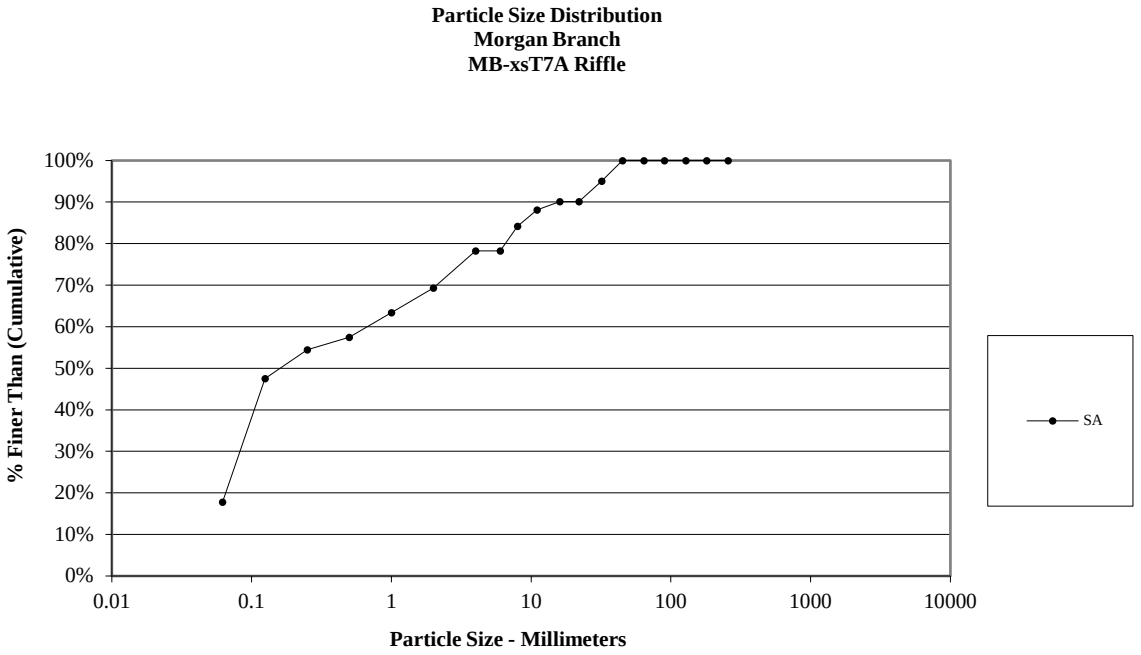
Size (mm)	
D16	0.16
D35	0.24
D50	1.8
D65	8.9
D84	30
D95	52

Size Distribution	
mean	2.2
dispersion	14.0
skewness	0.06

Type	
silt/clay	0%
sand	51%
gravel	47%
cobble	2%
boulder	0%
bedrock	0%
hardpan	0%
wood/det	0%
artificial	0%

Cross-Section T7-A Riffle - SA			
Particle	Millimeter		Count
Silt/Clay	< 0.062	S/C	18
Very Fine	.062 - .125	S	30
Fine	.125 - .25	A	7
Medium	.25 - .50	N	3
Coarse	.50 - 1	D	6
Very Coarse	1 - 2	S	6
Very Fine	2 - 4		9
Fine	4 - 5.7	G	
Fine	5.7 - 8	R	6
Medium	8 - 11.3	A	4
Medium	11.3 - 16	V	2
Coarse	16 - 22.6	E	
Coarse	22.6 - 32	L	5
Very Coarse	32 - 45	S	5
Very Coarse	45 - 64		
Small	64 - 90	C	
Small	90 - 128	O	
Large	128 - 180	B	
Large	180 - 256	L	
Small	256 - 362	B	
Small	362 - 512	L	
Medium	512 - 1024	D	
Lrg- Very Lrg	1024 - 2048	R	
Bedrock	>2048	BDRK	
		Total	101

Note:



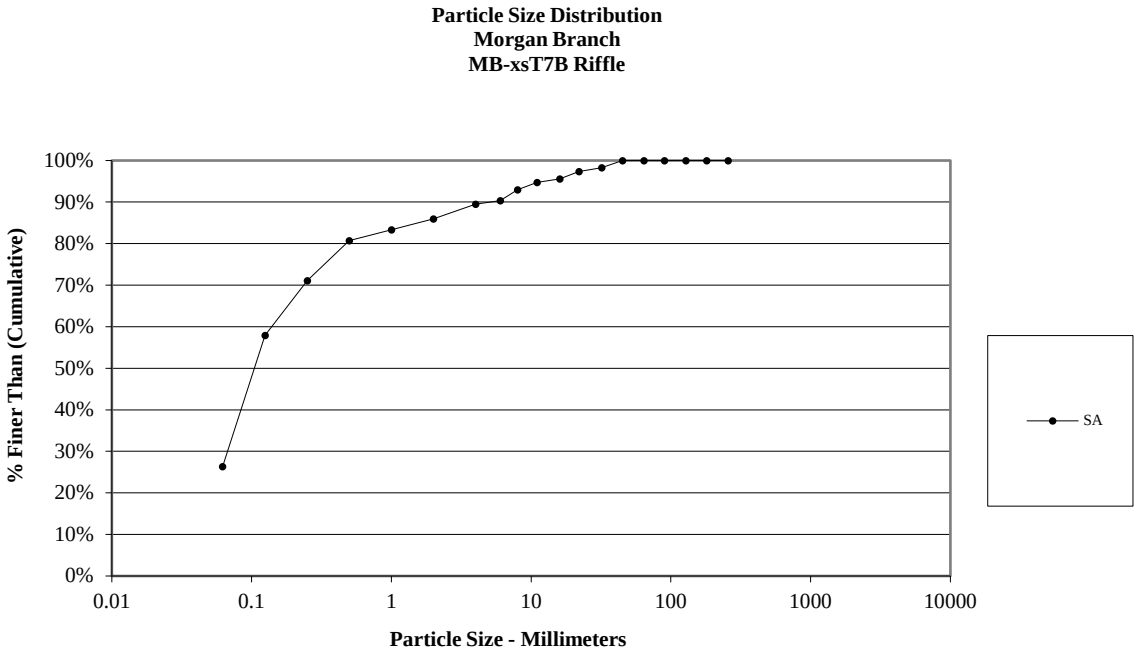
Size (mm)	
D16	0.062
D35	0.093
D50	0.16
D65	1.2
D84	7.9
D95	32

Size Distribution	
mean	0.7
dispersion	26.0
skewness	0.44

Type	
silt/clay	18%
sand	51%
gravel	31%
cobble	0%
boulder	0%
bedrock	0%
hardpan	0%
wood/det	0%
artificial	0%

Cross-Section T7-B Riffle - SA			
Particle	Millimeter		Count
Silt/Clay	< 0.062	S/C	30
Very Fine	.062 - .125	S	36
Fine	.125 - .25	A	15
Medium	.25 - .50	N	11
Coarse	.50 - 1	D	3
Very Coarse	1 - 2	S	3
Very Fine	2 - 4		4
Fine	4 - 5.7	G	1
Fine	5.7 - 8	R	3
Medium	8 - 11.3	A	2
Medium	11.3 - 16	V	1
Coarse	16 - 22.6	E	2
Coarse	22.6 - 32	L	1
Very Coarse	32 - 45	S	2
Very Coarse	45 - 64		
Small	64 - 90	C	
Small	90 - 128	O	
Large	128 - 180	B	
Large	180 - 256	L	
Small	256 - 362	B	
Small	362 - 512	L	
Medium	512 - 1024	D	
Lrg- Very Lrg	1024 - 2048	R	
Bedrock	>2048	BDRK	
		Total	114

Note:



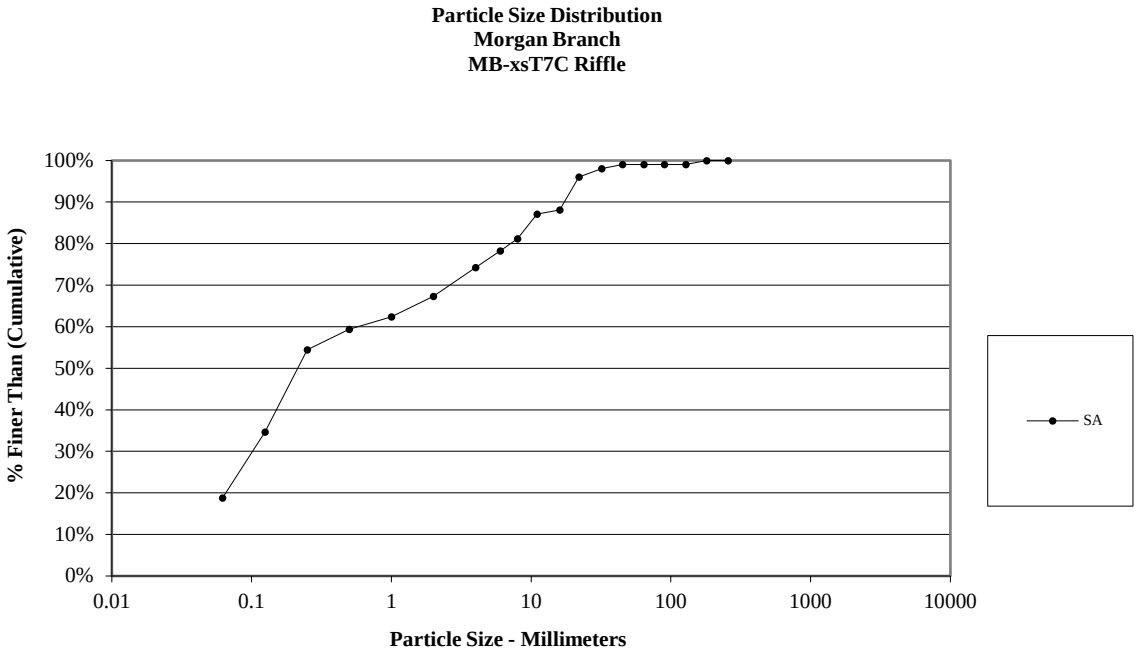
Size (mm)	
D16	0.062
D35	0.075
D50	0.1
D65	0.18
D84	1.2
D95	12

Size Distribution	
mean	0.3
dispersion	6.8
skewness	0.38

Type	
silt/clay	26%
sand	60%
gravel	14%
cobble	0%
boulder	0%
bedrock	0%
hardpan	0%
wood/det	0%
artificial	0%

Cross-Section T7-C Riffle - SA			
Particle	Millimeter		Count
Silt/Clay	< 0.062	S/C	19
Very Fine	.062 - .125	S	16
Fine	.125 - .25	A	20
Medium	.25 - .50	N	5
Coarse	.50 - 1	D	3
Very Coarse	1 - 2	S	5
Very Fine	2 - 4		7
Fine	4 - 5.7	G	4
Fine	5.7 - 8	R	3
Medium	8 - 11.3	A	6
Medium	11.3 - 16	V	1
Coarse	16 - 22.6	E	8
Coarse	22.6 - 32	L	2
Very Coarse	32 - 45	S	1
Very Coarse	45 - 64		
Small	64 - 90	C	
Small	90 - 128	O	
Large	128 - 180	B	1
Large	180 - 256	L	
Small	256 - 362	B	
Small	362 - 512	L	
Medium	512 - 1024	D	
Lrg- Very Lrg	1024 - 2048	R	
Bedrock	>2048	BDRK	
		Total	101

Note:



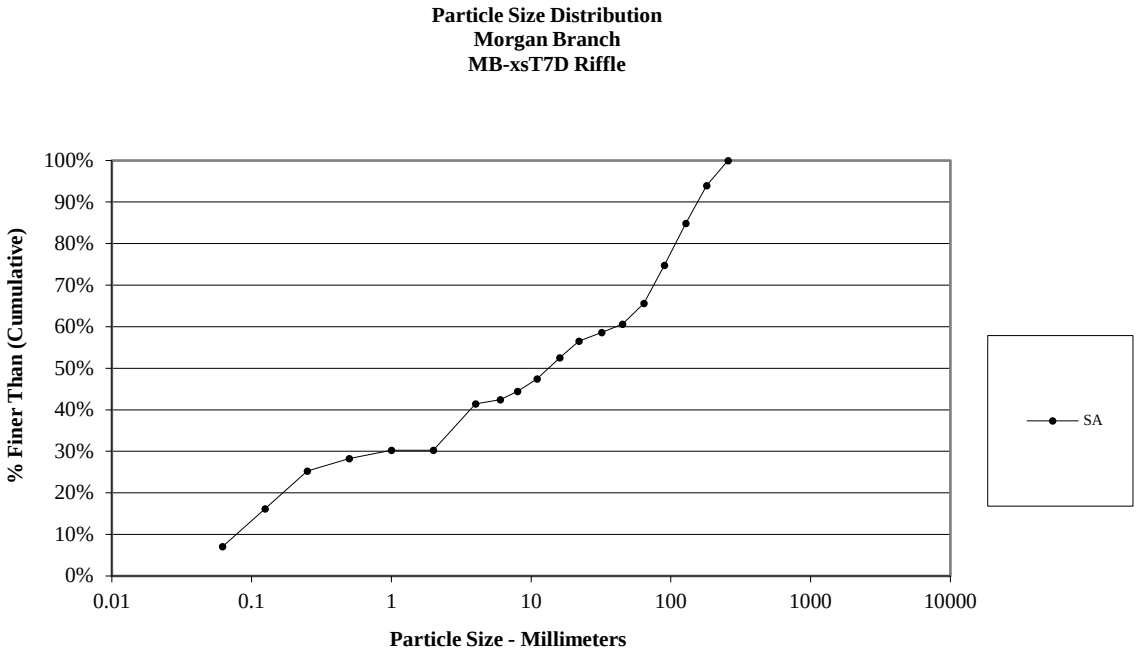
Size (mm)	
D16	0.062
D35	0.13
D50	0.21
D65	1.4
D84	9.3
D95	21

Size Distribution	
mean	0.8
dispersion	23.8
skewness	0.38

Type	
silt/clay	19%
sand	49%
gravel	32%
cobble	1%
boulder	0%
bedrock	0%
hardpan	0%
wood/det	0%
artificial	0%

Cross-Section T7-D Riffle - SA			
Particle	Millimeter		Count
Silt/Clay	< 0.062	S/C	7
Very Fine	.062 - .125	S	9
Fine	.125 - .25	A	9
Medium	.25 - .50	N	3
Coarse	.50 - 1	D	2
Very Coarse	1 - 2	S	
Very Fine	2 - 4		11
Fine	4 - 5.7	G	1
Fine	5.7 - 8	R	2
Medium	8 - 11.3	A	3
Medium	11.3 - 16	V	5
Coarse	16 - 22.6	E	4
Coarse	22.6 - 32	L	2
Very Coarse	32 - 45	S	2
Very Coarse	45 - 64		5
Small	64 - 90	C	9
Small	90 - 128	O	10
Large	128 - 180	B	9
Large	180 - 256	L	6
Small	256 - 362	B	
Small	362 - 512	L	
Medium	512 - 1024	D	
Lrg- Very Lrg	1024 - 2048	R	
Bedrock	>2048	BDRK	
		Total	99

Note:



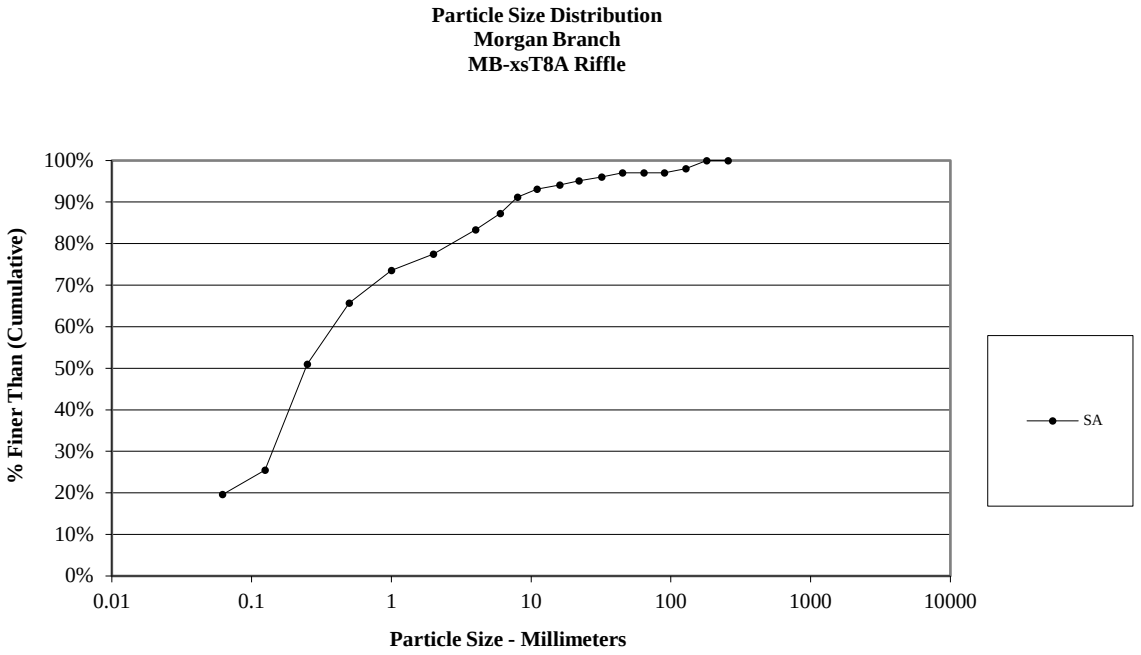
Size (mm)	
D16	0.12
D35	2.7
D50	13
D65	61
D84	120
D95	190

Size Distribution	
mean	3.8
dispersion	58.8
skewness	-0.31

Type	
silt/clay	7%
sand	23%
gravel	35%
cobble	34%
boulder	0%
bedrock	0%
hardpan	0%
wood/det	0%
artificial	0%

Cross-Section T8-A Riffle - SA			
Particle	Millimeter		Count
Silt/Clay	< 0.062	S/C	20
Very Fine	.062 - .125	S	6
Fine	.125 - .25	A	26
Medium	.25 - .50	N	15
Coarse	.50 - 1	D	8
Very Coarse	1 - 2	S	4
Very Fine	2 - 4		6
Fine	4 - 5.7	G	4
Fine	5.7 - 8	R	4
Medium	8 - 11.3	A	2
Medium	11.3 - 16	V	1
Coarse	16 - 22.6	E	1
Coarse	22.6 - 32	L	1
Very Coarse	32 - 45	S	1
Very Coarse	45 - 64		
Small	64 - 90	C	
Small	90 - 128	O	1
Large	128 - 180	B	2
Large	180 - 256	L	
Small	256 - 362	B	
Small	362 - 512	L	
Medium	512 - 1024	D	
Lrg- Very Lrg	1024 - 2048	R	
Bedrock	>2048	BDRK	
		Total	102

Note:



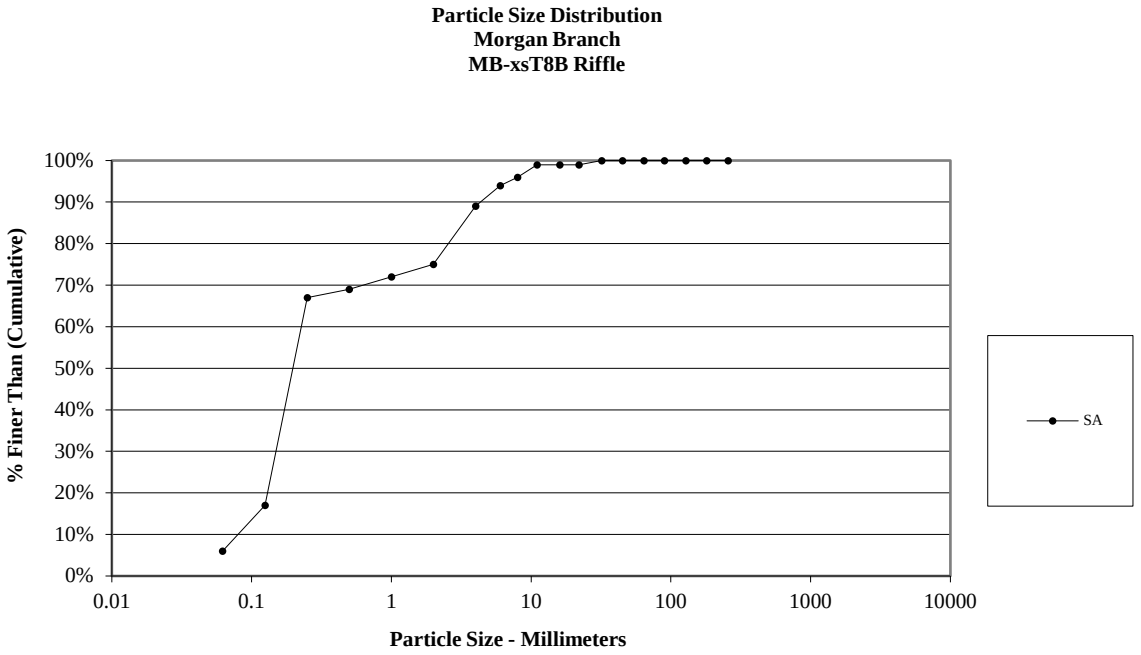
Size (mm)	
D16	0.062
D35	0.16
D50	0.24
D65	0.48
D84	4.3
D95	21

Size Distribution	
mean	0.5
dispersion	10.9
skewness	0.25

Type	
silt/clay	20%
sand	58%
gravel	20%
cobble	3%
boulder	0%
bedrock	0%
hardpan	0%
wood/det	0%
artificial	0%

Cross-Section T8-B Riffle - SA			
Particle	Millimeter		Count
Silt/Clay	< 0.062	S/C	6
Very Fine	.062 - .125	S	11
Fine	.125 - .25	A	50
Medium	.25 - .50	N	2
Coarse	.50 - 1	D	3
Very Coarse	1 - 2	S	3
Very Fine	2 - 4		14
Fine	4 - 5.7	G	5
Fine	5.7 - 8	R	2
Medium	8 - 11.3	A	3
Medium	11.3 - 16	V	
Coarse	16 - 22.6	E	
Coarse	22.6 - 32	L	1
Very Coarse	32 - 45	S	
Very Coarse	45 - 64		
Small	64 - 90	C	
Small	90 - 128	O	
Large	128 - 180	B	
Large	180 - 256	L	
Small	256 - 362	B	
Small	362 - 512	L	
Medium	512 - 1024	D	
Lrg- Very Lrg	1024 - 2048	R	
Bedrock	>2048	BDRK	
		Total	100

Note:



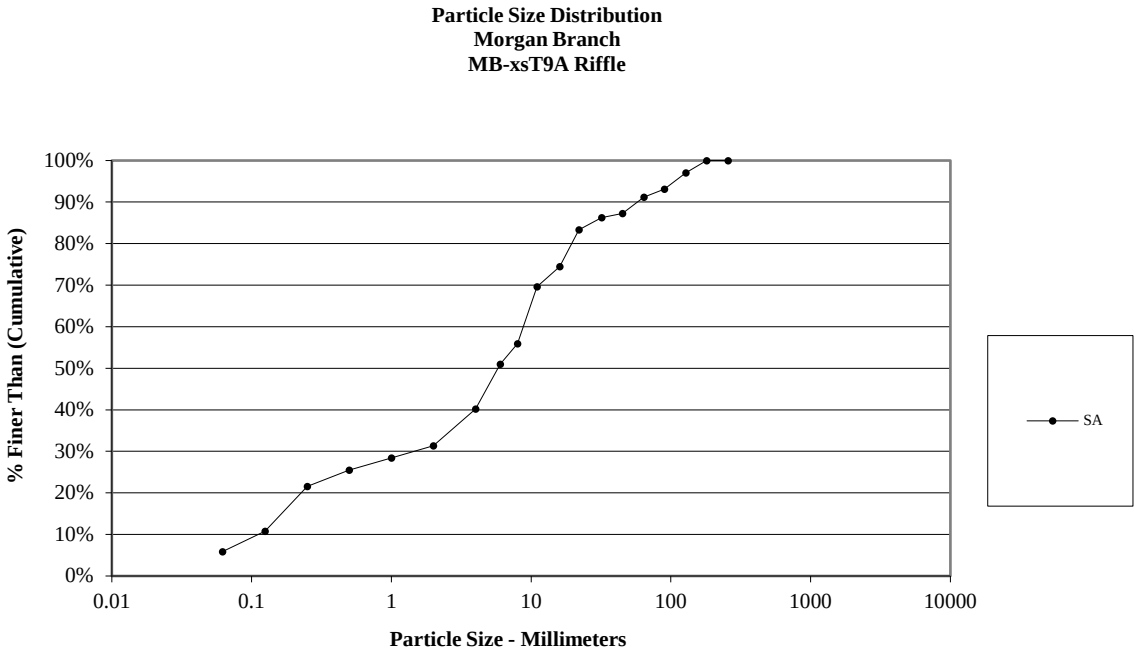
Size (mm)	
D16	0.12
D35	0.16
D50	0.2
D65	0.24
D84	3.1
D95	6.9

Size Distribution	
mean	0.6
dispersion	8.6
skewness	0.41

Type	
silt/clay	6%
sand	69%
gravel	25%
cobble	0%
boulder	0%
bedrock	0%
hardpan	0%
wood/det	0%
artificial	0%

Cross-Section T9-A Riffle - SA			
Particle	Millimeter		Count
Silt/Clay	< 0.062	S/C	6
Very Fine	.062 - .125	S	5
Fine	.125 - .25	A	11
Medium	.25 - .50	N	4
Coarse	.50 - 1	D	3
Very Coarse	1 - 2	S	3
Very Fine	2 - 4		9
Fine	4 - 5.7	G	11
Fine	5.7 - 8	R	5
Medium	8 - 11.3	A	14
Medium	11.3 - 16	V	5
Coarse	16 - 22.6	E	9
Coarse	22.6 - 32	L	3
Very Coarse	32 - 45	S	1
Very Coarse	45 - 64		4
Small	64 - 90	C	2
Small	90 - 128	O	4
Large	128 - 180	B	3
Large	180 - 256	L	
Small	256 - 362	B	
Small	362 - 512	L	
Medium	512 - 1024	D	
Lrg- Very Lrg	1024 - 2048	R	
Bedrock	>2048	BDRK	
		Total	102

Note:



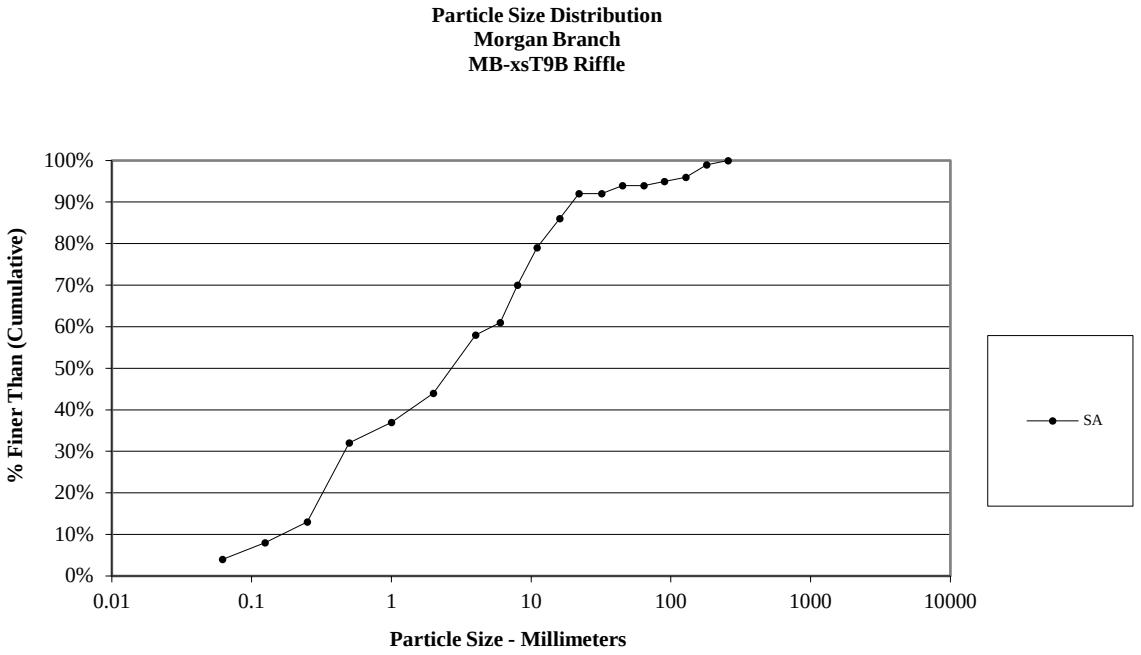
Size (mm)	
D16	0.17
D35	2.7
D50	5.8
D65	9.9
D84	24
D95	110

Size Distribution	
mean	2.0
dispersion	19.1
skewness	-0.31

Type	
silt/clay	6%
sand	25%
gravel	60%
cobble	9%
boulder	0%
bedrock	0%
hardpan	0%
wood/det	0%
artificial	0%

Cross-Section T9-B Riffle - SA			
Particle	Millimeter		Count
Silt/Clay	< 0.062	S/C	4
Very Fine	.062 - .125	S	4
Fine	.125 - .25	A	5
Medium	.25 - .50	N	19
Coarse	.50 - 1	D	5
Very Coarse	1 - 2	S	7
Very Fine	2 - 4		14
Fine	4 - 5.7	G	3
Fine	5.7 - 8	R	9
Medium	8 - 11.3	A	9
Medium	11.3 - 16	V	7
Coarse	16 - 22.6	E	6
Coarse	22.6 - 32	L	
Very Coarse	32 - 45	S	2
Very Coarse	45 - 64		
Small	64 - 90	C	1
Small	90 - 128	O	1
Large	128 - 180	B	3
Large	180 - 256	L	1
Small	256 - 362	B	
Small	362 - 512	L	
Medium	512 - 1024	D	
Lrg- Very Lrg	1024 - 2048	R	
Bedrock	>2048	BDRK	
		Total	100

Note:



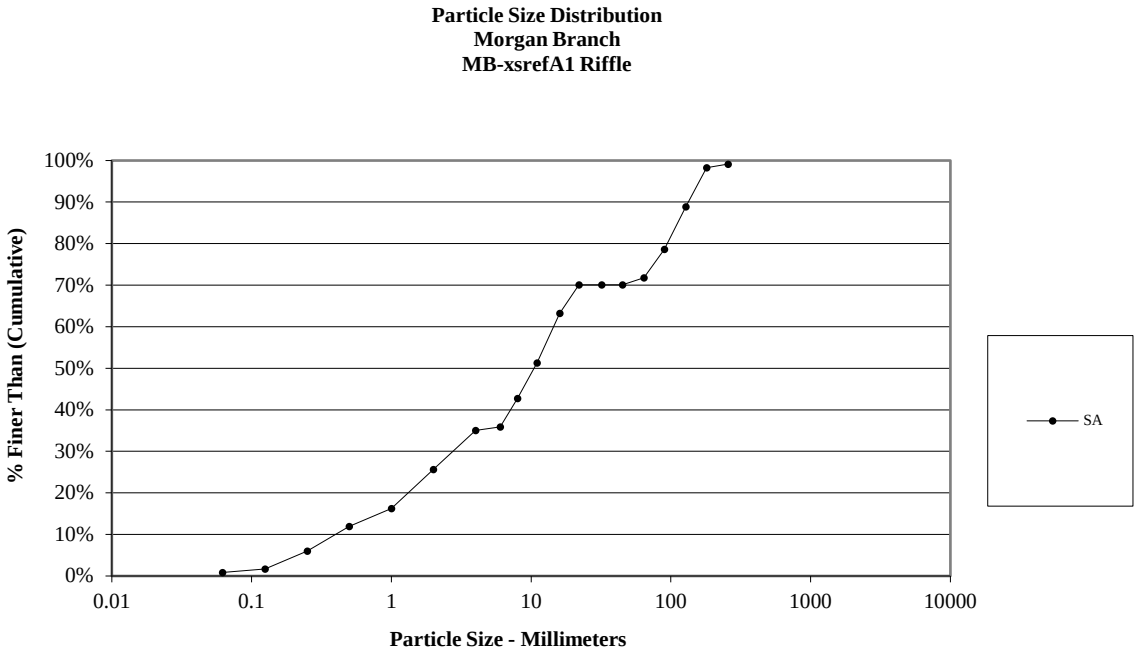
Size (mm)	
D16	0.28
D35	0.76
D50	2.7
D65	6.8
D84	14
D95	90

Size Distribution	
mean	2.0
dispersion	7.4
skewness	-0.10

Type	
silt/clay	4%
sand	40%
gravel	50%
cobble	6%
boulder	0%
bedrock	0%
hardpan	0%
wood/det	0%
artificial	0%

Cross-Section Ref-A1 Riffle - SA			
Particle	Millimeter		Count
Silt/Clay	< 0.062	S/C	1
Very Fine	.062 - .125	S	1
Fine	.125 - .25	A	5
Medium	.25 - .50	N	7
Coarse	.50 - 1	D	5
Very Coarse	1 - 2	S	11
Very Fine	2 - 4		11
Fine	4 - 5.7	G	1
Fine	5.7 - 8	R	8
Medium	8 - 11.3	A	10
Medium	11.3 - 16	V	14
Coarse	16 - 22.6	E	8
Coarse	22.6 - 32	L	
Very Coarse	32 - 45	S	
Very Coarse	45 - 64		2
Small	64 - 90	C	8
Small	90 - 128	O	12
Large	128 - 180	B	11
Large	180 - 256	L	1
Small	256 - 362	B	
Small	362 - 512	L	
Medium	512 - 1024	D	
Lrg- Very Lrg	1024 - 2048	R	
Bedrock	>2048	BDRK	1
		Total	117

Note:



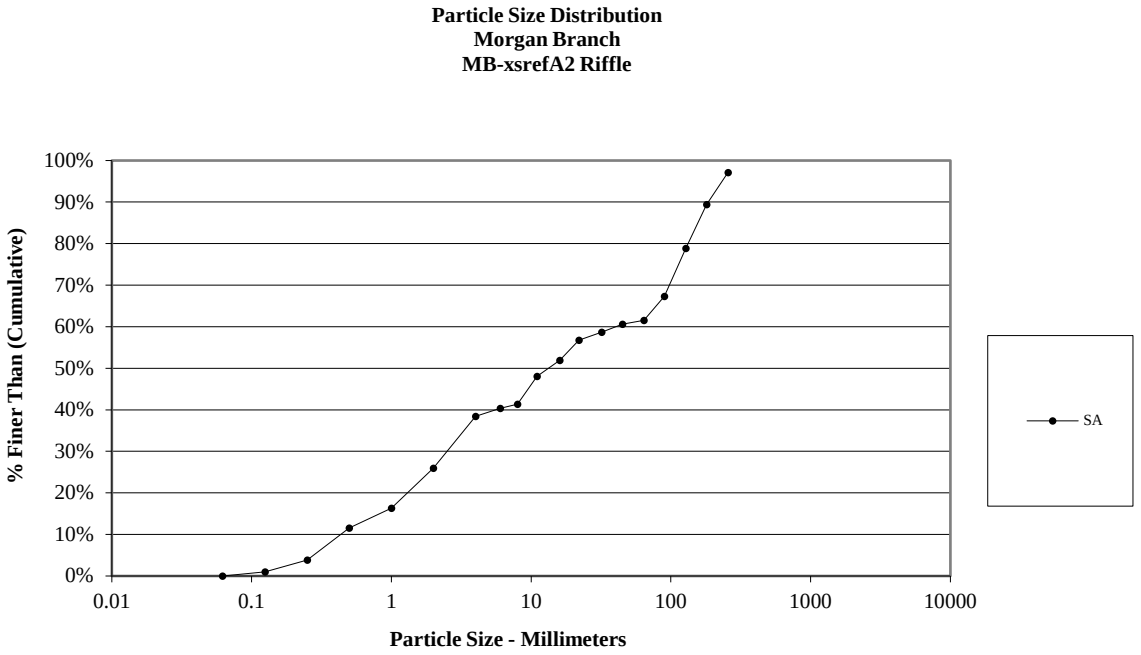
Size (mm)	
D16	0.96
D35	4
D50	10
D65	17
D84	110
D95	160

Size Distribution	
mean	10.3
dispersion	10.7
skewness	0.01

Type	
silt/clay	1%
sand	25%
gravel	46%
cobble	27%
boulder	0%
bedrock	1%
hardpan	0%
wood/det	0%
artificial	0%

Cross-Section Ref-A2 Riffle - SA			
Particle	Millimeter		Count
Silt/Clay	< 0.062	S/C	
Very Fine	.062 - .125	S	1
Fine	.125 - .25	A	3
Medium	.25 - .50	N	8
Coarse	.50 - 1	D	5
Very Coarse	1 - 2	S	10
Very Fine	2 - 4		13
Fine	4 - 5.7	G	2
Fine	5.7 - 8	R	1
Medium	8 - 11.3	A	7
Medium	11.3 - 16	V	5
Coarse	16 - 22.6	E	4
Coarse	22.6 - 32	L	2
Very Coarse	32 - 45	S	2
Very Coarse	45 - 64		1
Small	64 - 90	C	6
Small	90 - 128	O	12
Large	128 - 180	B	11
Large	180 - 256	L	8
Small	256 - 362	B	3
Small	362 - 512	L	
Medium	512 - 1024	D	
Lrg- Very Lrg	1024 - 2048	R	
Bedrock	>2048	BDRK	
		Total	104

Note:



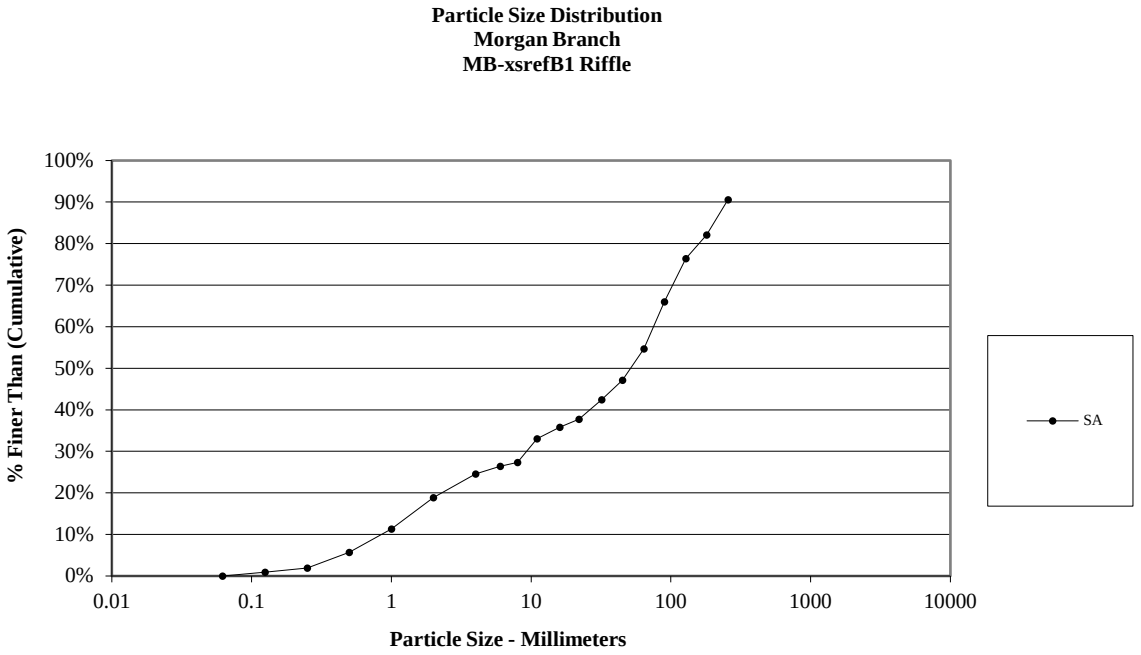
Size (mm)	
D16	0.95
D35	3.3
D50	13
D65	79
D84	150
D95	230

Size Distribution	
mean	11.9
dispersion	12.6
skewness	-0.02

Type	
silt/clay	0%
sand	26%
gravel	36%
cobble	36%
boulder	3%
bedrock	0%
hardpan	0%
wood/det	0%
artificial	0%

Cross-Section Ref-B1 Riffle - SA			
Particle	Millimeter		Count
Silt/Clay	< 0.062	S/C	
Very Fine	.062 - .125	S	1
Fine	.125 - .25	A	1
Medium	.25 - .50	N	4
Coarse	.50 - 1	D	6
Very Coarse	1 - 2	S	8
Very Fine	2 - 4		6
Fine	4 - 5.7	G	2
Fine	5.7 - 8	R	1
Medium	8 - 11.3	A	6
Medium	11.3 - 16	V	3
Coarse	16 - 22.6	E	2
Coarse	22.6 - 32	L	5
Very Coarse	32 - 45	S	5
Very Coarse	45 - 64		8
Small	64 - 90	C	12
Small	90 - 128	O	11
Large	128 - 180	B	6
Large	180 - 256	L	9
Small	256 - 362	B	3
Small	362 - 512	L	3
Medium	512 - 1024	D	1
Lrg- Very Lrg	1024 - 2048	R	
Bedrock	>2048	BDRK	3
		Total	106

Note:



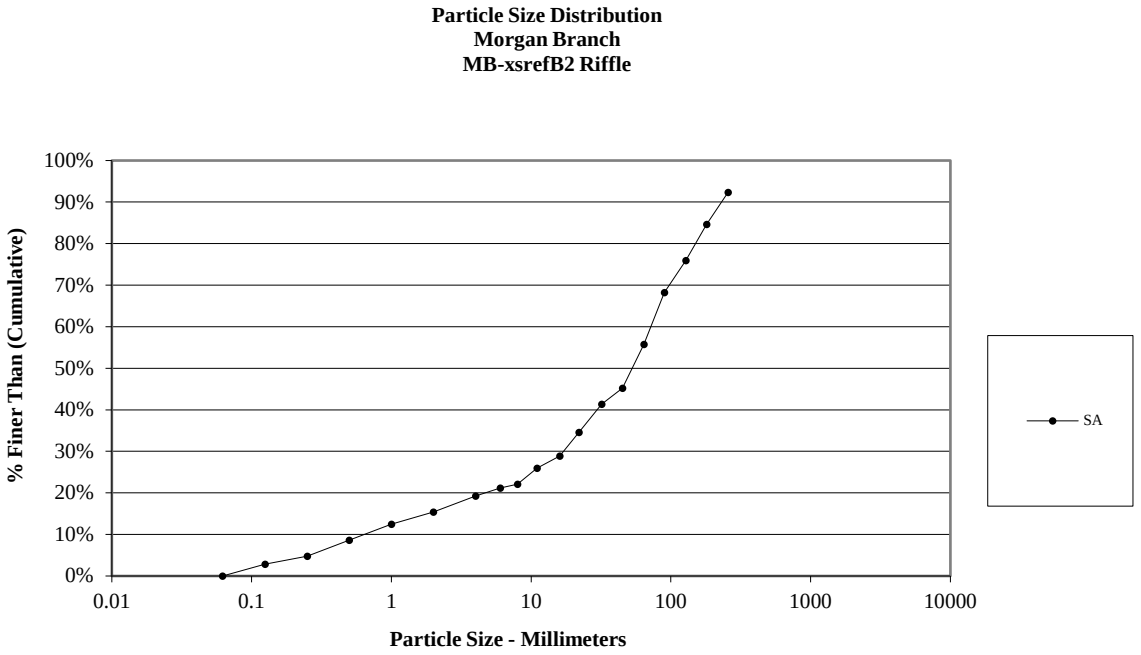
Size (mm)	
D16	1.5
D35	14
D50	51
D65	87
D84	190
D95	440

Size Distribution	
mean	16.9
dispersion	18.9
skewness	-0.33

Type	
silt/clay	0%
sand	19%
gravel	36%
cobble	36%
boulder	7%
bedrock	3%
hardpan	0%
wood/det	0%
artificial	0%

Cross-Section Ref-B2 Riffle - SA			
Particle	Millimeter		Count
Silt/Clay	< 0.062	S/C	
Very Fine	.062 - .125	S	3
Fine	.125 - .25	A	2
Medium	.25 - .50	N	4
Coarse	.50 - 1	D	4
Very Coarse	1 - 2	S	3
Very Fine	2 - 4		4
Fine	4 - 5.7	G	2
Fine	5.7 - 8	R	1
Medium	8 - 11.3	A	4
Medium	11.3 - 16	V	3
Coarse	16 - 22.6	E	6
Coarse	22.6 - 32	L	7
Very Coarse	32 - 45	S	4
Very Coarse	45 - 64		11
Small	64 - 90	C	13
Small	90 - 128	O	8
Large	128 - 180	B	9
Large	180 - 256	L	8
Small	256 - 362	B	2
Small	362 - 512	L	1
Medium	512 - 1024	D	1
Lrg- Very Lrg	1024 - 2048	R	
Bedrock	>2048	BDRK	4
		Total	104

Note:



Size (mm)	
D16	2.2
D35	22
D50	53
D65	82
D84	180
D95	480

Size Distribution	
mean	19.9
dispersion	13.7
skewness	-0.31

Type	
silt/clay	0%
sand	15%
gravel	40%
cobble	37%
boulder	4%
bedrock	4%
hardpan	0%
wood/det	0%
artificial	0%

Point / Side BAR-BULK MATERIALS SAMPLE DATA: Size Distribution Analysis

Party: K. Bartlett, J. Sullivan

Location: Morgan Branch- XS MB1

Date: 5/11/2020

Notes: bulk sample taken at riffle

SUB SAMPLES

	Sieve Size (mm)		Sieve Size (mm)		Sieve Size (mm)		Sieve Size (mm)		Sieve Size (mm)		Sieve Size (mm)		Sieve Size (mm)		Sieve Size (mm)		Sieve Size (mm)		Sieve Size (mm)	
	> 1		1.0		2.0		4.0		8.0		16.0		31.5		63.0					
	Tare Weight (kg)		Tare Weight (kg)		Tare Weight (kg)		Tare Weight (kg)		Tare Weight (kg)		Tare Weight (kg)		Tare Weight (kg)		Tare Weight (kg)		Tare Weight (kg)		Tare Weight (kg)	
	0.85		0.90		1.25		1.29		1.35		1.40		1.40		1.30					
	Sample Weights		Sample Weights		Sample Weights		Sample Weights		Sample Weights		Sample Weights		Sample Weights		Sample Weights		Sample Weights		Sample Weights	
	Total	Net	Total	Net	Total	Net	Total	Net	Total	Net	Total	Net	Total	Net	Total	Net	Total	Net	Total	Net
1	1.4	0.6	1.4	0.5	1.9	0.6	2.0	0.7	2.4	1.1	3.0	1.6	5.0	3.6	7.8	6.5				
2																				
3																				
4																				
5																				
6																				
7																				
8																				
9																				
10																				
11																				
12																				
13																				
14																				
15																				
Net Wt. Total	0.6		0.5		0.6		0.7		1.1		1.6		3.6		6.5		0.0		0.0	**15.1**
% Grand Tot.	3.6%		3.1%		4.1%		4.7%		7.0%		10.6%		23.9%		43.1%		0.0%		0.0%	
Accum. % =<	3.6%	→	6.7%	→	10.8%	→	15.5%	→	22.5%	→	33.1%	→	56.9%	→	100.0%	→	100.0%	→	100.0%	

SURFACE MATERIALS DATA
(Two Largest Particles)

No.	Dia.	WT.
1	**160mm**	**3.9 kg**
2	**119mm**	**2.0 kg**

Bucket + Materials Weight_____

Bucket Tare Weight_____

Materials Weight_____
(Materials less than: _____mm.)

Be Sure to Add Separate Material Weights to Grand Total

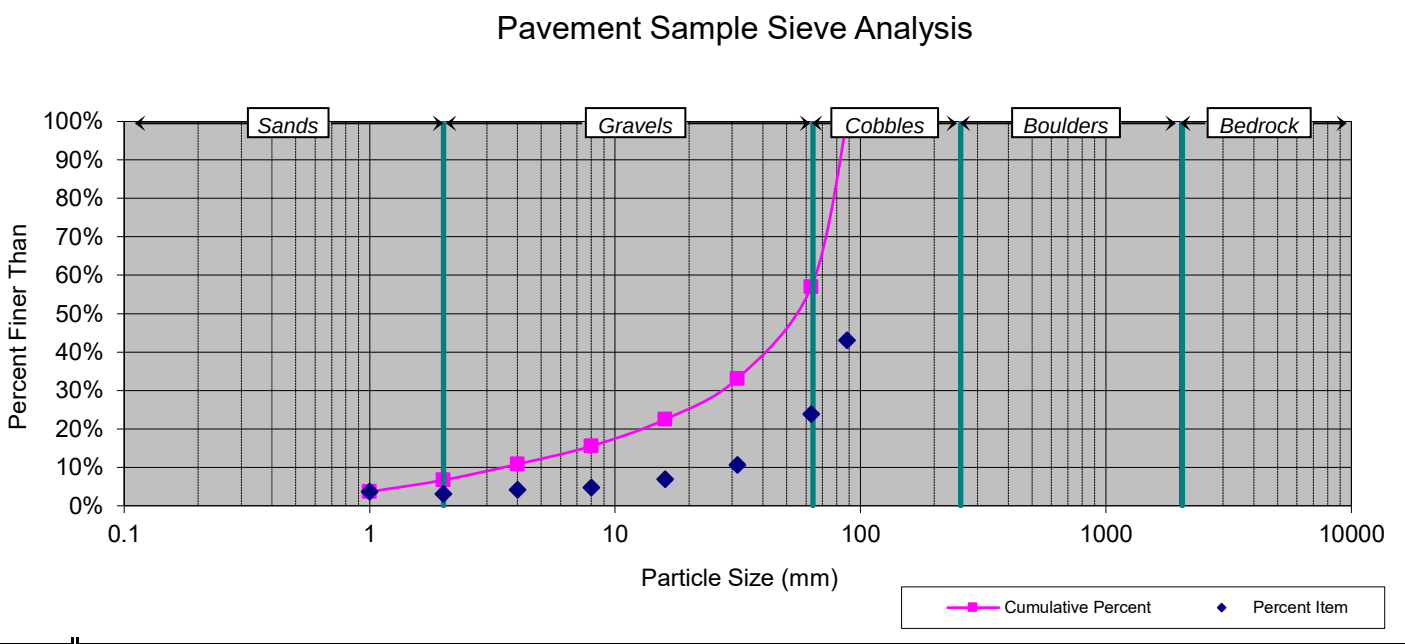
GRAND TOTAL SAMPLE WEIGHT

NOTES

Bar Sample Sieve Analysis

Smallest Sieve Passed (mm)	Weight (kg)	% Item	Percent Finer Than
1.0	0.6	3.6%	3.6%
2.0	0.5	3.1%	6.7%
4.0	0.6	4.1%	10.8%
8.0	0.7	4.7%	15.5%
16.0	1.1	7.0%	22.5%
31.5	1.6	10.6%	33.1%
63.0	3.6	23.9%	56.9%
88.0	6.5	43.1%	100.0%
Total:	15.1	100%	

Stream:	Morgan Branch
Watershed:	
Location:	XS MB1
Note:	



Size percent less than (mm)					Percent by substrate type					
D16	D35	D50	D84	D95	silt/clay	sand	gravel	cobble	boulder	bedrock
8.4	33.3	51.5	77.7	84.7	0%	7%	50%	43%	---	---

Point / Side BAR-BULK MATERIALS SAMPLE DATA: Size Distribution Analysis

Party: K. Bartlett, J. Sullivan

Location: Morgan Branch- XS MB2

Date: 5/12/2020

Notes: bulk sample taken at riffle

SUB SAMPLES

	Sieve Size (mm)		Sieve Size (mm)		Sieve Size (mm)		Sieve Size (mm)		Sieve Size (mm)		Sieve Size (mm)		Sieve Size (mm)		Sieve Size (mm)		Sieve Size (mm)		Sieve Size (mm)	
	> 1		1.0		2.0		4.0		8.0		16.0		31.5		63.0					
	Tare Weight (kg)		Tare Weight (kg)		Tare Weight (kg)		Tare Weight (kg)		Tare Weight (kg)		Tare Weight (kg)		Tare Weight (kg)		Tare Weight (kg)		Tare Weight (kg)		Tare Weight (kg)	
	0.85		0.90		1.25		1.29		1.35		1.40		1.40		1.30					
	Sample Weights		Sample Weights		Sample Weights		Sample Weights		Sample Weights		Sample Weights		Sample Weights		Sample Weights		Sample Weights		Sample Weights	
	Total	Net	Total	Net	Total	Net	Total	Net	Total	Net	Total	Net	Total	Net	Total	Net	Total	Net	Total	Net
1	1.2	0.3	1.1	0.2	1.4	0.2	1.6	0.3	2.1	0.8	2.9	1.5	3.9	2.5	9.3	8.0				
2																				
3																				
4																				
5																				
6																				
7																				
8																				
9																				
10																				
11																				
12																				
13																				
14																				
15																				
Net Wt. Total	0.3		0.2		0.2		0.3		0.8		1.5		2.5		8.0		0.0		0.0	**13.6**
% Grand Tot.	2.2%		1.5%		1.1%		1.9%		5.5%		10.7%		18.4%		58.8%		0.0%		0.0%	
Accum. % =<	2.2%	→	3.7%	→	4.8%	→	6.7%	→	12.2%	→	22.9%	→	41.2%	→	100.0%	→	100.0%	→	100.0%	

SURFACE MATERIALS DATA
(Two Largest Particles)

No.	Dia.	WT.
1	**130mm**	**2.0 kg**
2	**105mm**	**1.0 kg**

Bucket + Materials Weight_____

Bucket Tare Weight_____

Materials Weight_____
(Materials less than: _____mm.)

Be Sure to Add Separate Material Weights to Grand Total

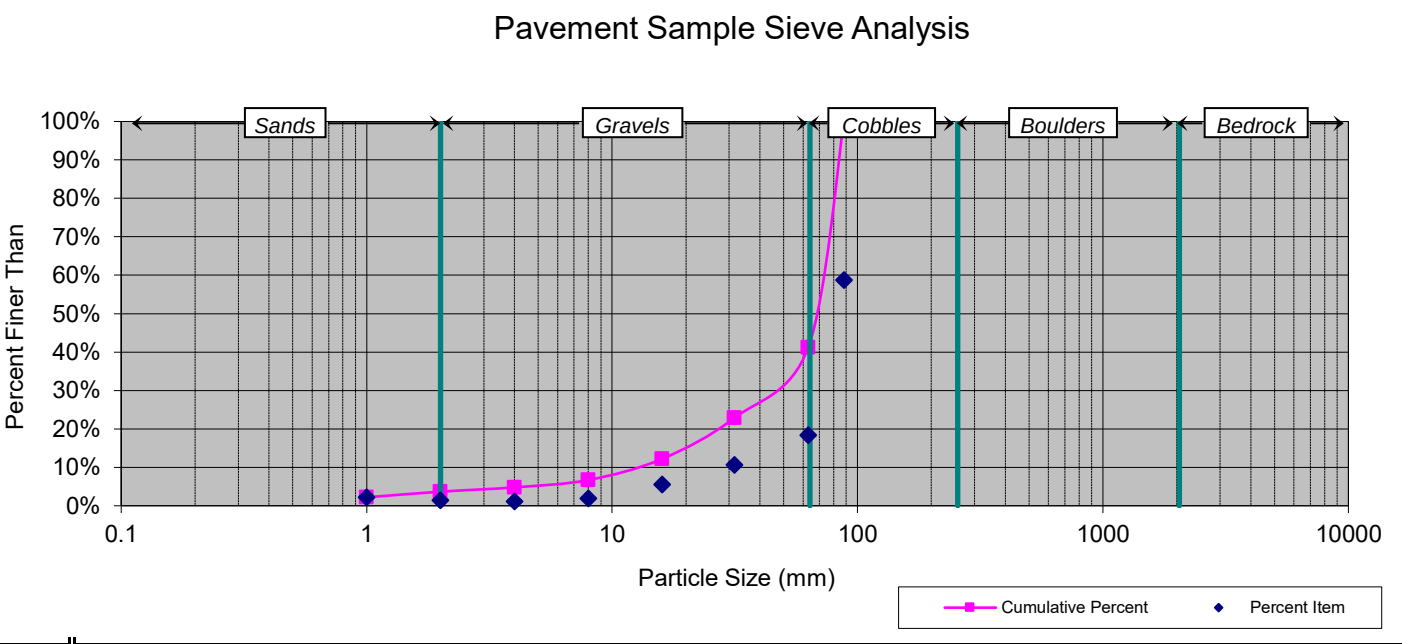
GRAND TOTAL SAMPLE WEIGHT

NOTES

Bar Sample Sieve Analysis

Smallest Sieve Passed (mm)	Weight (kg)	% Item	Percent Finer Than
1.0	0.3	2.2%	2.2%
2.0	0.2	1.5%	3.7%
4.0	0.2	1.1%	4.8%
8.0	0.3	1.9%	6.7%
16.0	0.8	5.5%	12.2%
31.5	1.5	10.7%	22.9%
63.0	2.5	18.4%	41.2%
88.0	8.0	58.8%	100.0%
Total:	13.6	100%	

Stream:	Morgan Branch
Watershed:	
Location:	XS MB2
Note:	



Size percent less than (mm)					Percent by substrate type					
D16	D35	D50	D84	D95	silt/clay	sand	gravel	cobble	boulder	bedrock
20.4	49.8	66.2	80.3	85.5	0%	4%	38%	59%	---	---

Morphological Criteria

		Existing Channel				Stable Design Ratios	Restored Reaches					
		MB-Reach 2 XS RefB1, RefB2	**MB-Reach 3** XS A,B	**T1 Reach 1** XS A	**T1 Reach 3** XS B, C		**MB Reach 1**	**MB Reach 2**	**MB Reach 3**	**T1 Reach 1**	**T1 Reach 2**	**T1 Reach 3**
Stream Type (Rosgen)		A4	A4	A4	A4	B4	B4a	B4a	B4a	A4	A4	A4
Drainage Area (mi^2)		0.35	0.51	0.12	0.21	~	0.27	0.50	0.85	0.10	0.15	0.22
Bankfull Width (W_{bkf}) (ft)		6.9, 8.9	9.4, 6.2	3.5	4.7, 4.8	~	8.2	9.2-10.8	11.6	5.6	6.4	7.4
Bankfull Mean Depth (D_{bkf}) (ft)		0.8, 0.6	1.1, 1.5	0.6	0.7, 0.7	~	0.6	0.7-0.8	0.9	0.4	0.4	0.5
Bankfull Cross-Sectional Area (A_{bkf}) (ft^2)		5.2, 5.6	10.2, 9.3	2.1	3.2, 3.6	~	4.7	6.3-8.8	10.4	2.4	2.7	4.1
Width / Depth Ratio (W_{bkf} / D_{bkf})		9.1, 14.2	8.7. 4.1	5.9	6.7, 6.5	12 -- 18	14.3	13.2-13.4	13.0	13.3	14.9	13.5
Maximum Depth (d_{mbkf}) (ft)		1.2, 1.0	1.3, 1.9	0.9	0.9, 1.0	~	0.9	1.1-1.2	1.4	0.6	0.7	0.8
Width of Flood Prone Area (W_{fpa}) (ft)		12.2, 13.6	14.8, 18.1	25 +	6.4, 6.2	~	16.4+	12.6+	23.2+	11.6+	12.8	14.8
Entrenchment Ratio (ER)		1.8, 1.5	1.6, 2.9	7.1 +	1.4, 1.3	1.4 -- 2.2	2+	2+	2+	2+	2+	2+
Sinuosity (stream length/valley length) (K)		1 - 1.1	1 - 1.1	1 - 1.1	1 - 1.1	1.1 -- 1.2	1 - 1.1	1 - 1.1	1.1	1 - 1.1	1 - 1.1	1 - 1.1
Dimension	Pool Mean Depth (ft)	*	*	*	*	~	1.2	1.3-1.5	1.6	1.0	1.1	1.2
	Riffle Mean Depth (ft) (Dbkf)	0.8, 0.6	1.1, 1.5	3.5	0.7, 0.7	~	0.6	0.7-0.8	0.9	0.4	0.4	0.5
	Pool Width (ft)	*	*	*	*	~	9.6	10.8-12.6	13.4	6.6	7.6	8.7
	Riffle Width (ft)	6.9, 8.9	9.4, 6.2	3.5	4.7, 4.8	1.4, 2.6	8.2	9.2-10.8	11.6	5.6	6.4	7.4
	Pool XS Area (sf)	*	*	*	*	~	11.6	14.5-19.2	22.1	6.9	8.5	10.2
	Riffle XS Area (sf)	5.2, 5.6	10.2, 9.3	2.1	3.2, 3.6	~	4.7	6.3-8.8	10.4	2.4	2.7	4.1
	Pool Width / Riffle Width	*	*	*	*	1.1 -- 1.5	1.2	1.2	1.2	1.2	1.2	1.2
	Pool Max Depth / D_{bkf}	*	*	*	*	2.0 -- 3.5	3.2	3.0	2.9	4.0	4.3	3.6
	Bank Height Ratio	1.0, 1.0	2.9, 1.5	1.3	3.3, 3.2	1.0 -- 1.1	1.0	1.0	1.0	1.0	1.0	1.0
	Mean Bankfull Velocity (V) (fps)	7.2, 6.6	7.6, 8.5	8.9	8.5, 7.7	4.0 -- 6.0	7.1	6.4-8.5	7.3	7.7	7.7	7.0
	Bankfull Discharge (Q) (cfs)	37.2, 37.2	77.0, 78.7	18.3	27.3, 27.3	~	33.3	53.3-57.0	75.9	18.2	21.0	28.3
Pattern	Radius of Curvature (Rc) (ft)	*	*	*	*	~	*	*	*	*	*	*
	Belt Width (Wblt) (ft)	*	*	*	*	~	*	*	*	*	*	*
	Meander Length (Lm) (ft)	*	*	*	*	~	*	*	*	*	*	*
	Radius of Curvature / Bankfull Width	*	*	*	*	n/a	*	*	*	*	*	*
	Meander Width Ratio (Wblt / Wbkf)	*	*	*	*	n/a	*	*	*	*	*	*
	Meander Length / Bankfull Width	*	*	*	*	n/a	*	*	*	*	*	*
Profile	Valley slope					0.020 -- 0.030	0.10	0.10	0.060	0.150	0.140	0.090
	Average water surface slope	0.12, 0.14	0.044	0.14	0.10, 0.08	~	0.08	0.09	0.050	0.14	0.13	0.082
	Riffle slope	*	*	*	*	~	0.1-0.11	**	0.07-0.09	**	**	0.077--0.14
	Pool slope	*	*	*	*	~	**	**	0	**	**	0
	Pool to pool spacing	*	*	*	*	~	**	**	50-94	**	**	34-38
	Pool length	*	*	*	*	~	**	**	12-20	**	**	8-10
	Riffle Slope / Avg. Water Surface Slope	*	*	*	*	1.1 -- 1.8	**	**	1.2-1.8	**	**	0.9-1.7
	Pool Slope / Avg. Water Surface Slope	*	*	*	*	0 -- 0.4	**	**	0	**	**	0
	Pool to Pool Spacing / Bankfull Width	*	*	*	*	0.5 -- 5.0	**	**	**	**	**	**

* : no data shown for pools, radius of curvature or meanders in stream due to nature of channel

** not applicable due to nature of the channel

Morphological Criteria

		Existing Channel						Stable Design Ratios	Restored Reaches				
		T2 Reach 1 XS A	T2 Reach 2 XS B	T3 XS A, B, C	T4 XS A through F	T4-1 XS A	T4-2 XS A, B, C		T2 Reach 2	T3	T4	T4-1	T4-2
Stream Type (Rosgen)		A4	A4	A4	A4-B4a	A4	A4	B4	A4	A4	A4-B4a	A4	A4
Drainage Area (mi^2)		0.05	0.06	0.06, 0.07	0.03, 0.04, 0.06, 0.06, 0.08, 0.13	0.02	0.03, 0.03, 0.04	~	0.06	0.07	0.16	0.02	0.04
Bankfull Width (W_{bkf}) (ft)		6.3	2.4	2.6, 2.9, 3.5	4.9, 3.3, 3.4, 4.2, 7.4, 5.2	1.8	3.0, 3.0, 4.9	~	5.6	5.6	5.6--7.6	5.6	5.6
Bankfull Mean Depth (D_{bkf}) (ft)		0.5	1.2	0.9, 1.0, 0.9	0.5, 0.8, 0.9, 0.7, 0.6, 0.9	0.3	0.3, 0.5, 0.3	~	0.4	0.4	0.4--0.6	0.4	0.4
Bankfull Cross-Sectional Area (A_{bkf}) (ft^2)		2.8	3.0	2.4, 2.8, 3.1	2.6, 2.6, 2.9, 3.0, 4.3, 4.6	0.5	1.0, 1.2, 1.5	~	1.7--2.4	2.2-2.4	2.4--4.2	2.2	2.2
Width / Depth Ratio (W_{bkf} / D_{bkf})		14.0	2.0	2.7, 3.1, 3.9	9.2, 4.3, 4.0, 6.0, 12.5, 5.9	6.2	8.6, 5.5, 14.1	12 -- 18	13.3	14.3	13.3--13.7	13.3	13.3
Maximum Depth (d_{mbkf}) (ft)		0.8	1.9	1.5, 1.2, 1.8	0.8, 1.4, 1.2, 0.9, 0.9, 1.6	0.4	0.6, 0.8, 0.6	~	0.6	0.6	0.6--0.9	0.6	0.6
Width of Flood Prone Area (W_{fpa}) (ft)		8.7	33.6	14.7, 5.2, 13.2	6.1, 7.8, 17.1, 5.0, 8.3, 30.1	2.5	3.6, 3.4, 5.5	~	11.2+	11.2+	11.2+	11.2+	11.2+
Entrenchment Ratio (ER)		1.4	13.9	5.8, 5.2, 13.2	1.3, 2.3, 5.0, 1.2, 1.1, 5.8	1.4	1.3, 1.4, 1.2	1.4 -- 2.2	2+	2+	2+	2+	2+
Sinuosity (stream length/valley length) (K)		1 - 1.1	1 - 1.1	1 - 1.1	1 - 1.1	1 - 1.1	1 - 1.1	1.1 -- 1.2	1.0	1.1	1.1	1.0	1.1
Dimension	Pool Mean Depth (ft)	*	*	*	*	*	*	~	1.0	1.0	1.0-1.2	1.0	1.0
	Riffle Mean Depth (ft) (Dbkf)	0.5	1.2	0.9, 1.0, 0.9	0.5, 0.8, 0.9, 0.7, 0.6, 0.9	0.3	0.3, 0.5, 0.3	~	0.4	0.4	0.4--0.6	0.4	0.4
	Pool Width (ft)	*	*	*	*	*	*	~	6.6	6.6	6.6-9	6.6	6.6
	Riffle Width (ft)	6.3	2.4	2.6, 2.9, 3.5	4.9, 3.3, 3.4, 4.2, 7.4, 5.2	1.8	2.9, 2.5, 4.5	1.4, 2.6	5.6	5.6	5.6--7.4	5.6	5.6
	Pool XS Area (sf)	*	*	*	*	*	*	~	6.9	6.9	6.9-10.8	6.9	6.9
	Riffle XS Area (sf)	2.8	3.0	2.4, 2.8, 3.1	2.6, 2.6, 2.9, 3.0, 4.3, 4.6	0.5	1.0, 1.2, 1.5	~	1.7--2.4	2.2-2.4	2.4--4.2	0.7--2.4	1.3--2.4
	Pool Width / Riffle Width	*	*	*	*	*	*	1.1 -- 1.5	1.2	1.2	1.2	1.2	1.2
	Pool Max Depth / D_{bkf}	*	*	*	*	*	*	2.0 -- 3.5	4.0	4.0	3.6-4.0	4.0	4.0
	Bank Height Ratio	1.0	1.1	1.0, 1.5, 1.0	1.7, 1.8, 1.5, 2.0, 4.1, 1.3	8.1	5.2, 11.5, 11.3	1.0 -- 1.1	1.0	1.0	1.0	1.0	1.0
	Mean Bankfull Velocity (V) (fps)	7.9	8.7	7.2, 7.7, 5.7	6.8, 7.6, 7.0, 6.7, 5.0, 5.1	6.4	6.0, 5.8, 5.0	4.0 -- 6.0	6.6	5.5	4.3--6.6	8.5	7.2
	Bankfull Discharge (Q) (cfs)	22.6	25.9	17.2, 21.5, 17.7	17.3, 19.5, 20.5, 20.0, 21.5, 23.5	3.5	5.8, 6.7, 7.3	~	15.6	12.0	15.6--18.3	20.0	17.0
Pattern	Radius of Curvature (Rc) (ft)	*	*	*	*	*	*	~	*	*	*	*	*
	Belt Width (Wblt) (ft)	*	*	*	*	*	*	~	*	*	*	*	*
	Meander Length (Lm) (ft)	*	*	*	*	*	*	~	*	*	*	*	*
	Radius of Curvature / Bankfull Width	*	*	*	*	*	*	n/a	*	*	*	*	*
	Meander Width Ratio (Wblt / Wbkf)	*	*	*	*	*	*	n/a	*	*	*	*	*
	Meander Length / Bankfull Width	*	*	*	*	*	*	n/a	*	*	*	*	*
Profile	Valley slope	0.17	0.12	0.09	0.10	0.20	0.150	0.020 -- 0.030	0.12	0.090	0.10	0.20	0.15
	Average water surface slope	0.164	0.102	0.056 - 0.086	0.035 - 0.091	0.180	0.09-0.14	~	0.11	0.078	0.06-0.10	0.170	0.130
	Riffle slope	*	*	*	*	*	*	~	0.10-0.17	0.065-0.16	0.02-0.19	0.15-0.24	0.07--0.272
	Pool slope	*	*	*	*	*	*	~	0	0	0	**	**
	Pool to pool spacing	*	*	*	*	*	*	~	28-47	22-47	28-68	**	**
	Pool length	*	*	*	*	*	*	~	7	7-10	7-20	**	**
	Riffle Slope / Avg. Water Surface Slope	*	*	*	*	*	*	1.1 -- 1.8	0.9-1.5	0.7-2.1	0.3-1.9	0.9-1.4	0.5-2.1
	Pool Slope / Avg. Water Surface Slope	*	*	*	*	*	*	0 -- 0.4	0	0	0	**	**
	Pool to Pool Spacing / Bankfull Width	*	*	*	*	*	*	0.5 -- 5.0	5.0-8.4	3.9-8.4	1.3-3.6	**	**

* : no data shown for pools, radius of curvature or meanders in stream due to nature of channel

** not applicable due to nature of the channel

Morphological Criteria

		Existing Channel						Stable Design Ratios	Restored Reaches				
		T4-3 XS A	T5 Reach 1 XS A	T5 Reach 2 XS B, C	T7 XS A, B, C, D	T8 Reach 2 XS A, B	T9 XS A, B		T4-3	T5 Reach 2	T7	T8 Reach 2	T9
Stream Type (Rosgen)		A4	A4	A4	A4/B4a	A4	A4	B4	B4a	B4a	B4a	A4	A4
Drainage Area (mi^2)		0.04	0.03	0.05, 0.06	0.01, 0.03, 0.04, 0.06	0.003, 0.01	0.04	~	0.04	0.06	0.07	0.01	0.04
Bankfull Width (W_{bkf}) (ft)		3.7	4.4	4.1, 4.0	1.0, 2.8, 2.2, 8.0	0.9, 0.8	1.4, 2.6	~	5.6	5.6	5.6--6.4	5.6	5.6
Bankfull Mean Depth (D_{bkf}) (ft)		0.6	0.5	0.7, 0.8	0.6, 0.5, 0.8, 0.4	0.2, 0.5	0.6, 0.4	~	0.4	0.4	0.4--0.5	0.4	0.4
Bankfull Cross-Sectional Area (A_{bkf}) (ft^2)		2.3	2.3	2.9, 3.3	0.6, 1.5, 1.7, 3.3	0.2, 0.4	1.4, 1.2	~	1.6--2.4	2.3--2.4	2.4-3.1	0.2-2.4	1.2-2.4
Width / Depth Ratio (W_{bkf} / D_{bkf})		6.1	8.6	5.9, 4.9	1.8, 5.4, 2.7, 19.1	4.3, 4.2	3.6, 5.9	12 -- 18	13.3	13.3	13.2-13.3	13.3	13.3
Maximum Depth (d_{mbkf}) (ft)		0.9	0.6	1.1, 1.1	0.9, 0.7, 1.2, 0.7	0.4, 0.6	0.9, 0.8	~	0.6	0.6	0.6-0.8	0.6	0.6
Width of Flood Prone Area (W_{fpa}) (ft)		5.1	5.1	6.2, 5.8	1.7, 3.3, 2.9, 21.5	1.1, 1.5	3.2, 3.5	~	11.2+	11.2+	11.2+	11.2+	11.2+
Entrenchment Ratio (ER)		1.4	1.2	1.5, 1.5	1.6, 1.2, 1.3, 2.7	1.2, 1.8	1.4, 1.3	1.4 -- 2.2	2+	2+	2+	2+	2+
Sinuosity (stream length/valley length) (K)		1.0 - 1.1	1.0 - 1.1	1.0 - 1.1	1.0 - 1.1	1.0 - 1.1	1.0 - 1.1	1.1 -- 1.2	1.0	1.1	1.1	1.0	1.1
Dimension	Pool Mean Depth (ft)	*	*	*	*	*	*	~	1.0	1.0	1.0-1.1	1.0	1.04
	Riffle Mean Depth (ft) (Dbkf)	0.6	0.5	0.7, 0.8	0.6, 0.5, 0.8, 0.4	0.2, 0.5	0.6, 0.4	~	0.4	0.4	0.4--0.5	0.4	0.4
	Pool Width (ft)	*	*	*	*	*	*	~	6.6	6.6	6.6-7.6	6.6	6.6
	Riffle Width (ft)	3.7	4.4	4.1, 4.0	1.0, 2.8, 2.2, 8.0	0.9, 0.8	1.4, 2.6	1.4, 2.6	5.6	5.6	5.6--6.4	5.6	5.6
	Pool XS Area (sf)	*	*	*	*	*	*	~	6.9	6.9	6.9-8.5	6.9	6.9
	Riffle XS Area (sf)	2.3	2.3	2.9, 3.3	0.6, 1.5, 1.7, 3.3	0.2, 0.4	1.4, 1.2	~	1.6--2.4	2.3--2.4	2.4--3.1	0.2--2.4	1.2--2.4
	Pool Width / Riffle Width	*	*	*	*	*	*	1.1 -- 1.5	1.2	1.2	1.2	1.2	1.2
	Pool Max Depth / D_{bkf}	*	*	*	*	*	*	2.0 -- 3.5	4.0	4.0	4.0-4.3	4.0	4.0
	Bank Height Ratio	3.0	4.5	2.9, 3.3	3.1, 10.3, 2.2, 4.2	7.9, 2.2	4.2, 1.3	1.0 -- 1.1	1.0	1.0	1.0	1.0	1.0
	Mean Bankfull Velocity (V) (fps)	5.6	7.0	5.7, 6.4	4.7, 4.2, 4.6, 3.0	4.6, 4.2	6.4, 6.1	4.0 -- 6.0	5.0	4.7--6.5	3.7--5.7	7.0	6.9
	Bankfull Discharge (Q) (cfs)	12.8	15.8	16.3, 21.0	2.8, 6.3, 8.1, 10.1	1.0, 1.7	8.8, 7.2	~	11.7	11.2--15.3	11.4--13.3	16.4	16.3
Pattern	Radius of Curvature (Rc) (ft)	*	*	*	*	*	*	~	*	*	*	*	*
	Belt Width (Wblt) (ft)	*	*	*	*	*	*	~	*	*	*	*	*
	Meander Length (Lm) (ft)	*	*	*	*	*	*	~	*	*	*	*	*
	Radius of Curvature / Bankfull Width	*	*	*	*	*	*	n/a	*	*	*	*	*
	Meander Width Ratio (Wblt / Wbkf)	*	*	*	*	*	*	n/a	*	*	*	*	*
	Meander Length / Bankfull Width	*	*	*	*	*	*	n/a	*	*	*	*	*
Profile	Valley slope	0.070	0.11	0.060	0.03-0.10	0.10-0.20	0.11-0.15	0.020 -- 0.030	0.70	0.060	0.03-0.10	0.10-0.20	0.11-0.15
	Average water surface slope	0.059	0.10	0.050	0.03-0.09	0.09-0.17	0.10-0.14	~	0.059	0.054	0.027-0.078	0.12	0.12
	Riffle slope	*	*	*	*	*	*	~	0.039-0.086	0.048-0.13	0.022-0.14	0.049-0.22	0.049-0.18
	Pool slope	*	*	*	*	*	*	~	0	0	0	0	0
	Pool to pool spacing	*	*	*	*	*	*	~	21-68	27-69	27-40	25-45	20-65
	Pool length	*	*	*	*	*	*	~	8	7	7	7-10	7-10
	Riffle Slope / Avg. Water Surface Slope	*	*	*	*	*	*	1.1 -- 1.8	0.7-1.5	0.9-2.4	0.8-1.8	0.4-1.8	0.4-1.5
	Pool Slope / Avg. Water Surface Slope	*	*	*	*	*	*	0 -- 0.4	0	0	0	0	0
	Pool to Pool Spacing / Bankfull Width	*	*	*	*	*	*	0.5 -- 5.0	3.4-12.1	4.8-12.3	4.8-6.3	4.5-8.0	3.6-11.6

* : no data shown for pools, radius of curvature or meanders in stream due to nature of channel

** not applicable due to nature of the channel

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Estimated Reduction in Total Nitrogen and Total Phosphorus

Cattle Exclusion (Grazing Pasture)

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

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

	Reduction (lbs/ac/year)	Acres	Total Reduction (lbs/year)
TN	51.04	31.7	1618.0
TP	4.23	31.7	134.1

Nutrient Reduction from Buffer Adjacent to Agricultural Fields

TN reduction (lbs/yr) = 75.77 (lbs/ac/yr) x Area (ac)

TP reduction (lbs/yr) = 4.88 (lbs/ac/yr) x Area (ac)

	Reduction (lbs/ac/year)	Acres	Total Reduction (lbs/year)
TN	75.77	3.4	257.6
TP	4.88	3.4	16.6

Total Estimated Nitrogen and Phosphorus Reduction from Exclusion and Buffer

	Cattle Exclusion	Buffer	Total Reduction (lbs/year)
TN	1618.0	257.6	**1876**
TP	134.091	16.6	**151**

Estimate of the Amount of Fecal Coliform Prevented from Entering Stream due to Livestock Exclusion

1. Fecal from direct input

	# cows	Average Weight	Total Weight	AU=total/1000
An animal unit (AU) is one thousand pounds of livestock. Assume avg cow weighs 1500 lb.	100	1,500	150,000	150

Fecal Coliform Reduction from Direct Input (col) = 2.2×10^{11}(col/AU/day) x AU x 0.085

Fecal (col/AU/day)	AU	Percent	Total (col/day)	Total(col/year)	Total (year round)
2.200E+11	150	0.085	2.805E+12	1.024E+15	1.024E+15

2. Fecal from buffer filtering

Weighted Curve Number

Land Use / Hydrologic Soil Group	CN	Acres	Weighted CN
Pasture (Poor) / C	86	31.7	86.0
Pasture (Fair) / C	79	0	

Runoff - Q (inches)

P (annual rainfall in inches)	Weighted CN	S (inches)	Ia (inches)	Q (inches)
46	86.0	1.63	0.33	44.1

Fecal Coliform Reduction from Buffer Filtration (col) = Runoff's fecal coliform concentration (col/gal) x Runoff volume (Gal) x 0.85

Common Fecal Coliform	Fecal conc (col/gal)	Q (in)	Total acres	Volume (in-ac)	Vol (gal)	Fecal reduction (col/year)
Pastures under Continually Grazing Year-round	1,894,000	44.1	31.7	1398.1	37,963,062	6.112E+12
Pastures Grazed for Half of Year	329,500					
Pastures Grazed for Two Months of Year	340,900					

Total Coliform Reducation

Direct Input Reduction	1.024E+15
Buffer Filtration	6.112E+12
Total (col/year)	**1.030E+15**

3. **Site Protection Instrument**

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NP

Workflow No. 0000789032-0001 MT

Doc ID: 035570950020 Type: CRP
Recorded: 08/25/2022 at 03:43:55 PM
Fee Amt: $359.00 Page 1 of 20
Revenue Tax: $313.00
Workflow# 0000789032-0001
Buncombe County, NC
Drew Reisinger Register of Deeds
BK6252 PG421-440

STATE OF NORTH CAROLINA

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

BUNCOMBE COUNTY

SPO File Number: 11-LA-232
DMS Project Number: 100127
Excise Stamps: $313.00

This instrument prepared by Paul Arena a licensed NC attorney. Delinquent taxes, if any, to be paid by the closing attorney to the County Tax Collector upon disbursement of closing proceeds.

Prepared by: Office of the Attorney General
Property Control Section
Return to: NC Department of Administration
State Property Office
1321 Mail Service Center Box 31, MWB
Raleigh, NC 27699-1321

THIS DEED OF CONSERVATION EASEMENT AND RIGHT OF ACCESS, made this 24th day of August, 2022, by FRANKLIN DALE MORGAN a/k/a F. DALE MORGAN and wife, JOYCE C. MORGAN (collectively, "**Grantor**"), whose mailing address is 1281 Newfound Road, Leicester, NC 28748, to the STATE OF NORTH CAROLINA ("**Grantee**"), whose mailing address is State of North Carolina, Department of Administration, State Property Office, 1321 Mail Service Center, Raleigh, NC 27699-1321. The designations of Grantor and Grantee as used herein shall include said parties, their heirs, successors, and assigns, and shall include singular, plural, masculine, feminine, or neuter as required by context.

WITNESSETH:

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

WHEREAS, this Conservation Easement from Grantor to Grantee has been negotiated, arranged and provided for as a condition of a full delivery contract between *KCI Technologies Inc., 4505 Falls of Neuse Road, Suite 400, Raleigh NC 27609* and the North Carolina Department of Environmental Quality, to provide stream, wetland and/or buffer mitigation pursuant to the North Carolina Department of Environmental Quality Purchase and Services Contract Number *7909*.

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

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

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

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

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

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

WHEREAS, Grantor owns in fee simple certain real property situated, lying, and being in *Leicester Township, Buncombe County*, North Carolina (the "**Property**"), and being more particularly described as that certain parcel(s) of land containing approximately 88.230 acres being more particularly described on "**Exhibit B**" attached hereto and incorporated herein; and

WHEREAS, Grantor is willing to grant a Conservation Easement and Right of Access over the herein described areas of the Property, thereby restricting and limiting the use of the areas of the Property subject to the Conservation Easement to the terms and conditions and purposes hereinafter set forth, and Grantee is willing to accept said Easement and Access Rights. The Conservation Easement shall be for the protection and benefit of the waters of ***the French Broad River.***

NOW, THEREFORE, in consideration of the mutual covenants, terms, conditions, and restrictions hereinafter set forth, Grantor unconditionally and irrevocably hereby grants and conveys unto Grantee, its successors and assigns, forever and in perpetuity, a Conservation Easement and Right of Access together with an access easement to and from the Conservation Easement Area described below.

The Conservation Easement Area consists of the following:

Conservation Easement **1** containing a total of **0.570 acres**, Conservation Easement **2** containing a total of **0.418 acres**, Conservation Easement **3** containing a total of **1.905 acres**, Conservation Easement **4** containing a total of **1.126 acres**, Conservation Easement **5** containing a total of **0.690 acres**, Conservation Easement **6** containing a total of **0.417 acres**, Conservation Easement **7** containing a total of **0.372 acres**, and Conservation Easement **8** containing a total of **0.507 acres, for a total combined easement acreage of 6.005 acres**, as shown on the plats of survey entitled "Final Plat, Conservation Easement for State of North Carolina Department of Environmental Quality Division of Mitigation Services, Project Name: Morgan Branch Site, DMS Project No. 100127, SPO File No. 11-LA-232 thru 11-LA-240, Leicester Township, Buncombe County, North Carolina", dated June 14, 2022, by *James M. Gellenthin*, PLS Number L-3860 and recorded in the Buncombe County, North Carolina Register of Deeds at **Plat Book 229, Pages 99-109.**

See attached "**Exhibit A**", Legal Description of area of the Property hereinafter referred to as the "Conservation Easement Area"

The purposes of this Conservation Easement are to maintain, restore, enhance, construct, create and preserve wetland and/or riparian resources in the Conservation Easement Area that contribute to the protection and improvement of water quality, flood prevention, fisheries,

aquatic habitat, wildlife habitat, and recreational opportunities; to maintain permanently the Conservation Easement Area in its natural condition, consistent with these purposes; and to prevent any use of the Easement Area that will significantly impair or interfere with these purposes. To achieve these purposes, the following conditions and restrictions are set forth:

I. DURATION OF EASEMENT

Pursuant to law, including the above referenced statutes, this Conservation Easement and Right of Access shall be perpetual and it shall run with, and be a continuing restriction upon the use of, the Property, and it shall be enforceable by the Grantee against the Grantor and against Grantor's heirs, successors and assigns, personal representatives, agents, lessees, and licensees.

II. ACCESS EASEMENT

Grantor hereby grants and conveys unto Grantee, its employees, agents, successors and assigns, a perpetual, non-exclusive easement for ingress and egress over and upon the Property at all reasonable times and at such location as practically necessary to access the Conservation Easement Area for the purposes set forth herein ("**Access Easement**"). This grant of easement shall not vest any rights in the public and shall not be construed as a public dedication of the Access Easement. Grantor covenants, represents and warrants that it is the sole owner of and is seized of the Property in fee simple and has the right to grant and convey this Access Easement.

III. GRANTOR RESERVED USES AND RESTRICTED ACTIVITIES

The Conservation Easement Area shall be restricted from any development or usage that would impair or interfere with the purposes of this Conservation Easement. Unless expressly reserved as a compatible use herein, any activity in, or use of, the Conservation Easement Area by the Grantor is prohibited as inconsistent with the purposes of this Conservation Easement. Any rights not expressly reserved hereunder by the Grantor have been acquired by the Grantee. Any rights not expressly reserved hereunder by the Grantor, including the rights to all mitigation credits, including, but not limited to, stream, wetland, and riparian buffer mitigation units, derived from each site within the area of the Conservation Easement, are conveyed to and belong to the Grantee. Without limiting the generality of the foregoing, the following specific uses are prohibited, restricted, or reserved as indicated:

A. Recreational Uses. Grantor expressly reserves the right to undeveloped recreational uses, including hiking, bird watching, hunting and fishing, and access to the Conservation Easement Area for the purposes thereof.

B. Motorized Vehicle Use. Motorized vehicle use in the Conservation Easement Area is prohibited except within a Crossing Area(s) or Road or Trail as shown on the recorded survey plat.

C. Educational Uses. The Grantor reserves the right to engage in and permit others to engage in educational uses in the Conservation Easement Area not inconsistent with this Conservation Easement, and the right of access to the Conservation Easement Area for such

purposes including organized educational activities such as site visits and observations. Educational uses of the property shall not alter vegetation, hydrology or topography of the site.

D. **Damage to Vegetation.** Except within Crossing Area(s) as shown on the recorded survey plat and as related to the removal of non-native plants, diseased or damaged trees, or vegetation that destabilizes or renders unsafe the Conservation Easement Area to persons or natural habitat, all cutting, removal, mowing, harming, or destruction of any trees and vegetation in the Conservation Easement Area is prohibited.

E. Industrial, Residential and Commercial Uses. All industrial, residential and commercial uses are prohibited in the Conservation Easement Area.

F. Agricultural Use. All agricultural uses are prohibited within the Conservation Easement Area including any use for cropland, waste lagoons, or pastureland.

G. New Construction. There shall be no building, facility, mobile home, antenna, utility pole, tower, or other structure constructed or placed in the Conservation Easement Area.

H. **Roads and Trails.** There shall be no construction or maintenance of new roads, trails, walkways, or paving in the Conservation Easement.

All existing roads, trails and crossings within the Conservation Easement Area shall be shown on the recorded survey plat.

I. Signs. No signs shall be permitted in the Conservation Easement Area except interpretive signs describing restoration activities and the conservation values of the Conservation Easement Area, signs identifying the owner of the Property and the holder of the Conservation Easement, signs giving directions, or signs prescribing rules and regulations for the use of the Conservation Easement Area.

J. Dumping or Storing. Dumping or storage of soil, trash, ashes, garbage, waste, abandoned vehicles, appliances, machinery, or any other material in the Conservation Easement Area is prohibited.

K. Grading, Mineral Use, Excavation, Dredging. There shall be no grading, filling, excavation, dredging, mining, drilling, hydraulic fracturing; removal of topsoil, sand, gravel, rock, peat, minerals, or other materials.

L. Water Quality and Drainage Patterns. There shall be no diking, draining, dredging, channeling, filling, leveling, pumping, impounding or diverting, causing, allowing or permitting the diversion of surface or underground water in the Conservation Easement Area. No altering or tampering with water control structures or devices, or disruption or alteration of the restored, enhanced, or created drainage patterns is allowed. All removal of wetlands, polluting or discharging into waters, springs, seeps, or wetlands, or use of pesticide or biocides in the Conservation Easement Area is prohibited. In the event of an emergency interruption or shortage of all other water sources, water from within the Conservation Easement Area may

temporarily be withdrawn for good cause shown as needed for the survival of livestock on the Property.

M. Subdivision and Conveyance. Grantor voluntarily agrees that no further subdivision, partitioning, or dividing of the Conservation Easement Area portion of the Property owned by the Grantor in fee simple ("fee") that is subject to this Conservation Easement is allowed. Any future transfer of the Property shall be subject to this Conservation Easement and Right of Access and to the Grantee's right of unlimited and repeated ingress and egress over and across the Property to the Conservation Easement Area for the purposes set forth herein.

N. Development Rights. All development rights are permanently removed from the Conservation Easement Area and are non-transferrable.

O. Disturbance of Natural Features. Any change, disturbance, alteration or impairment of the natural features of the Conservation Easement Area or any intentional introduction of non-native plants, trees and/or animal species by Grantor is prohibited.

The Grantor may request permission to vary from the above restrictions for good cause shown, provided that any such request is not inconsistent with the purposes of this Conservation Easement, and the Grantor obtains advance written approval from the Division of Mitigation Services, 1652 Mail Services Center, Raleigh, NC 27699-1652.

IV. GRANTEE RESERVED USES

A. Right of Access, Construction, and Inspection. The Grantee, its employees, agents, successors and assigns, shall have a perpetual Right of Access over and upon the Conservation Easement Area to undertake or engage in any activities necessary to construct, maintain, manage, enhance, repair, restore, protect, monitor and inspect the stream, wetland and any other riparian resources in the Conservation Easement Area for the purposes set forth herein or any long-term management plan for the Conservation Easement Area developed pursuant to this Conservation Easement.

B. Restoration Activities. These activities include planting of trees, shrubs and herbaceous vegetation, installation of monitoring wells, utilization of heavy equipment to grade, fill, and prepare the soil, modification of the hydrology of the site, and installation of natural and manmade materials as needed to direct in-stream, above ground, and subterraneous water flow.

C. Signs. The Grantee, its employees and agents, successors or assigns, shall be permitted to place signs and witness posts on the Property to include any or all of the following: describe the project, prohibited activities within the Conservation Easement, or identify the project boundaries and the holder of the Conservation Easement.

D. Fences. Conservation Easements are purchased to protect the investments by the State (Grantee) in natural resources. Livestock within conservations easements damages the investment and can result in reductions in natural resource value and mitigation credits which would cause financial harm to the State. Therefore, Landowners (Grantor) with livestock are required to restrict livestock access to the Conservation Easement area. Repeated failure to do so

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

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

V. ENFORCEMENT AND REMEDIES

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

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

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

D. Costs of Enforcement. Beyond regular and typical monitoring expenses, any costs incurred by Grantee in enforcing the terms of this Conservation Easement against Grantor,

including, without limitation, any costs of restoration necessitated by Grantor's acts or omissions in violation of the terms of this Conservation Easement, shall be borne by Grantor.

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

VI. MISCELLANEOUS

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

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

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

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

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

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

Division of Mitigation Services Program Manager

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

and

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

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

VII. QUIET ENJOYMENT

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

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

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

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

Franklin Dale Morgan (SEAL)
Franklin Dale Morgan

Joyce C. Morgan (SEAL)
Joyce C. Morgan

NORTH CAROLINA
COUNTY OF Buncombe

I, Peter U. Kanipe, a Notary Public in and for the County and State aforesaid, do hereby certify that Franklin Dale Morgan, Grantor, personally appeared before me this day and acknowledged the execution of the foregoing instrument.

IN WITNESS WHEREOF, I have hereunto set my hand and Notary Seal this the 26th day of July, 2022.

Notary Public

Peter U Kanipe
NOTARY PUBLIC
Buncombe County, NC
My Commission Expires June 08, 2024

My commission expires:

NORTH CAROLINA
COUNTY OF Buncombe

I, Peter U. Kanipe, a Notary Public in and for the County and State aforesaid, do hereby certify that Joyce C. Morgan, Grantor, personally appeared before me this day and acknowledged the execution of the foregoing instrument. **IN WITNESS WHEREOF**, I have hereunto set my hand and Notary Seal this the 26th day of July, 2022.

Notary Public

Peter U Kanipe
NOTARY PUBLIC
Buncombe County, NC
My Commission Expires June 08, 2024

My commission expires:

Exhibit A

Legal Description of area of the Property hereinafter referred to as the "Conservation Easement Area"

CONSERVATION EASEMENT #1

A PARCEL OF LAND TO BE USED FOR CONSERVATION EASEMENT PURPOSES LOCATED ON LANDS NOW OR FORMERLY OWNED BY FRANKLIN DALE MORGAN AND WIFE, JOYCE C. MORGAN (TAX PIN 8689-69-5419) AS RECORDED IN BOOK 1233, PAGE 83, BOOK 1315, PAGE 594, BOOK 1315, PAGE 597, BOOK 1401, PAGE 254, PAGE 1401, PAGE 255, BOOK 1401, PAGE 257, LESS AND EXCEPT BOOK 1401, PAGE 256, LOCATED IN LEICESTER TOWNSHIP, BUNCOMBE COUNTY, NORTH CAROLINA AND BEING MORE PARTICULARLY DESCRIBED AS FOLLOWS:

COMMENCING AT NORTH CAROLINA GEODETIC SURVEY STATION BETHEL BASE ARP, WITH NAD 83(2011) STATE PLANE COORDINATES OF X = 840,744.23 AND Y = 649,700.01; THENCE RUNNING N 42°26'58" E FOR A DISTANCE OF 67,726.73 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 1, SAID REBAR BEING THE POINT OF BEGINNING;

THENCE N 14°33'21" E, A DISTANCE OF 30.67 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 2;
THENCE N 1°56'08" W, A DISTANCE OF 95.01 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 3;
THENCE N 15°55'29" W, A DISTANCE OF 91.97 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 4;
THENCE N 19°39'45" E, A DISTANCE OF 83.78 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 5;
THENCE S 73°53'50" E, A DISTANCE OF 77.61 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 6;
THENCE S 17°37'30" W, A DISTANCE OF 62.29 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 7;
THENCE S 15°27'06" E, A DISTANCE OF 68.15 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 8;
THENCE S 4°28'46" E, A DISTANCE OF 88.80 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 9;
THENCE S 2°19'12" W, A DISTANCE OF 68.32 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 10;
THENCE S 31°28'50" W, A DISTANCE OF 33.58 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 11;
THENCE N 59°29'29" W, A DISTANCE OF 78.87 FEET TO THE POINT OF BEGINNING;

CONSERVATION EASEMENT CONTAINING 24,838 SQUARE FEET OR 0.570 ACRES MORE OR LESS.

CONSERVATION EASEMENT #2

A PARCEL OF LAND TO BE USED FOR CONSERVATION EASEMENT PURPOSES LOCATED ON LANDS NOW OR FORMERLY OWNED BY FRANKLIN DALE MORGAN AND WIFE, JOYCE C. MORGAN (TAX PIN 8689-69-5419) AS RECORDED IN BOOK 1233, PAGE 83, BOOK 1315, PAGE 594, BOOK 1315, PAGE 597, BOOK 1401, PAGE 254, PAGE 1401, PAGE 255, BOOK 1401, PAGE 257, LESS AND EXCEPT BOOK 1401, PAGE 256, LOCATED IN LEICESTER TOWNSHIP, BUNCOMBE COUNTY, NORTH CAROLINA AND BEING MORE PARTICULARLY DESCRIBED AS FOLLOWS:

COMMENCING AT NORTH CAROLINA GEODETIC SURVEY STATION BETHEL BASE ARP, WITH NAD 83(2011) STATE PLANE COORDINATES OF X = 840,744.23 AND Y = 649,700.01; THENCE RUNNING N 42°23'13" E FOR A DISTANCE OF 67,598.36 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 12, SAID REBAR BEING THE POINT OF BEGINNING;

THENCE N 30°04'09" W, A DISTANCE OF 88.41 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 13;
THENCE N 43°11'38" W, A DISTANCE OF 152.12 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 14;
THENCE N 50°44'32" E, A DISTANCE OF 73.99 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 15;
THENCE S 44°50'49" E, A DISTANCE OF 136.57 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 16;
THENCE S 31°54'10" E, A DISTANCE OF 104.44 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 17;

THENCE S 51°05'07" W, A DISTANCE OF 77.60 FEET TO THE POINT OF BEGINNING;

CONSERVATION EASEMENT CONTAINING 18,206 SQUARE FEET OR 0.418 ACRES MORE OR LESS.

CONSERVATION EASEMENT #3

A PARCEL OF LAND TO BE USED FOR CONSERVATION EASEMENT PURPOSES LOCATED ON LANDS NOW OR FORMERLY OWNED BY FRANKLIN DALE MORGAN AND WIFE, JOYCE C. MORGAN (TAX PIN 8689-69-5419) AS RECORDED IN BOOK 1233, PAGE 83, BOOK 1315, PAGE 594, BOOK 1315, PAGE 597, BOOK 1401, PAGE 254, PAGE 1401, PAGE 255, BOOK 1401, PAGE 257, LESS AND EXCEPT BOOK 1401, PAGE 256, LOCATED IN LEICESTER TOWNSHIP, BUNCOMBE COUNTY, NORTH CAROLINA AND BEING MORE PARTICULARLY DESCRIBED AS FOLLOWS:

COMMENCING AT NORTH CAROLINA GEODETIC SURVEY STATION BETHEL BASE ARP, WITH NAD 83(2011) STATE PLANE COORDINATES OF X = 840,744.23 AND Y = 649,700.01; THENCE RUNNING N 43°01'30" E FOR A DISTANCE OF 67,206.01 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 18, SAID REBAR BEING THE POINT OF BEGINNING;

THENCE N 11°22'24" W, A DISTANCE OF 201.50 FEET TO A S/8" REBAR SET WITH ALUMINUM CAP NO. 19;
THENCE N 21°27'32" W, A DISTANCE OF 82.35 FEET TO A S/8" REBAR SET WITH ALUMINUM CAP NO. 20;
THENCE N 14°00'40" W, A DISTANCE OF 102.88 FEET TO A S/8" REBAR SET WITH ALUMINUM CAP NO. 21;
THENCE N 38°04'00" W, A DISTANCE OF 96.81 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 22;
THENCE N 4°46'49" E, A DISTANCE OF 100.80 FEET TO A S/8" REBAR SET WITH ALUMINUM CAP NO. 23;
THENCE N 10°37'03" W, A DISTANCE OF 45.1S FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 24;
THENCE N 38°14'54" W, A DISTANCE OF 139.S9 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 2S;
THENCE N 15°44'18" W, A DISTANCE OF 76.61 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 26;
THENCE N S1°0S'07" E, A DISTANCE OF 69.71 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 27;
THENCE S 28°14'16" E, A DISTANCE OF 61.95 FEET TO A S/8" REBAR SET WITH ALUMINUM CAP NO. 28;
THENCE N 17°50'57" E, A DISTANCE OF 52.83 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 29;
THENCE S 59°29'29" E, A DISTANCE OF 88.47 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 30;
THENCE S 4°58'24" E, A DISTANCE OF 169.83 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 31;
THENCE S 9°38'19" E, A DISTANCE OF 79.65 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 32;
THENCE 5 20°27'56" W, A DISTANCE OF 47.99 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 33;
THENCE 5 34°51'45" E, A DISTANCE OF 87.36 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 34;
THENCE S 13°41'00" E, A DISTANCE OF 85.50 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 35;
THENCE 5 20°11'10" E, A DISTANCE OF 162.56 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 36;
THENCE 5 10°05'22" E, A DISTANCE OF 150.30 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 37;
THENCE 5 4°22'15" E, A DISTANCE OF 104.93 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 38;
THENCE N 45°04'42" W, A DISTANCE OF 11.68 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 39;
THENCE N 47°32'15" W, A DISTANCE OF 105.70 FEET TO THE POINT OF BEGINNING;

CONSERVATION EASEMENT CONTAINING 82,965 SQUARE FEET OR 1.905 ACRES MORE OR LESS.

CONSERVATION EASEMENT #4

A PARCEL OF LAND TO BE USED FOR CONSERVATION EASEMENT PURPOSES LOCATED ON LANDS NOW OR FORMERLY OWNED BY FRANKLIN DALE MORGAN AND WIFE, JOYCE C. MORGAN (TAX PIN 8689-69-5419) AS RECORDED IN BOOK 1233, PAGE 83, BOOK 131S, PAGE 594, BOOK 1315, PAGE 597, BOOK 1401, PAGE 254, PAGE 1401, PAGE 255, BOOK 1401, PAGE 257, LESS AND EXCEPT BOOK 1401, PAGE 256, LOCATED IN LEICESTER TOWNSHIP, BUNCOMBE COUNTY, NORTH CAROLINA AND BEING MORE PARTICULARLY DESCRIBED AS FOLLOWS:

COMMENCING AT NORTH CAROLINA GEODETIC SURVEY STATION BETHEL BASE ARP, WITH NAD 83(2011) STATE PLANE COORDINATES OF X = 840,744.23 AND Y = 649,700.01; THENCE RUNNING N 42°44'59" E FOR A DISTANCE

OF 66,838.84 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 40, SAID REBAR BEING THE POINT OF BEGINNING;

THENCE N 44°19'00" W, A DISTANCE OF 66.35 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 41;
THENCE N 37°54'00" W, A DISTANCE OF 123.17 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 42;
THENCE N 42°27'00" W, A DISTANCE OF 100.97 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 43;
THENCE N 46°02'55" W, A DISTANCE OF 69.28 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 44;
THENCE N 28°48'29" W, A DISTANCE OF 67.91 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 45;
THENCE N 19°S1'15" E, A DISTANCE OF 76.40 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 46;
THENCE N 38°35'15" E, A DISTANCE OF 32.S3 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 47;
THENCE S 28°40'03" E, A DISTANCE OF 109.41 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 48;
THENCE S 44°09'01" E, A DISTANCE OF 304.41 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 49;
THENCE S 56°13'06" E, A DISTANCE OF 99.80 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. S0;
THENCE S 29°32'46" W, A DISTANCE OF 103.93 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 51;
THENCE N 73°39'00" W, A DISTANCE OF 23.10 FEET TO A S/8" REBAR SET WITH ALUMINUM CAP NO. 52;
THENCE N 57°S6'00" W, A DISTANCE OF 56.07 FEET TO THE POINT OF BEGINNING;

CONSERVATION EASEMENT CONTAINING 49,052 SQUARE FEET OR 1.126 ACRES MORE OR LESS.

CONSERVATION EASEMENT #5

A PARCEL OF LAND TO BE USED FOR CONSERVATION EASEMENT PURPOSES LOCATED ON LANDS NOW OR FORMERLY OWNED BY FRANKLIN DALE MORGAN AND WIFE, JOYCE C. MORGAN (TAX PIN 8689-69-5419) AS RECORDED IN BOOK 1233, PAGE 83, BOOK 1315, PAGE 594, BOOK 1315, PAGE S97, BOOK 1401, PAGE 254, PAGE 1401, PAGE 2S5, BOOK 1401, PAGE 257, LESS AND EXCEPT BOOK 1401, PAGE 256, LOCATED IN LEICESTER TOWNSHIP, BUNCOMBE COUNTY, NORTH CAROLINA AND BEING MORE PARTICULARLY DESCRIBED AS FOLLOWS:

COMMENCING AT NORTH CAROLINA GEODETIC SURVEY STATION BETHEL BASE ARP, WITH NAD 83(2011) STATE PLANE COORDINATES OF X = 840,744.23 AND Y = 649,700.01; THENCE RUNNING N 42°50'18" E FOR A DISTANCE OF 66,873.29 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. S3, SAID REBAR BEING THE POINT OF BEGINNING;

THENCE N 29°32'46" E, A DISTANCE OF 97.18 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 54;
THENCE S 81°06'12" E, A DISTANCE OF 124.33 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 5S;
THENCE S 63°30'36" E, A DISTANCE OF 187.87 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 56;
THENCE S 16°49'42" E, A DISTANCE OF 94.33 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 57;
THENCE N 77°24'38" W, A DISTANCE OF 63.75 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. S8;
THENCE N 65°51'08" W, A DISTANCE OF 109.94 FEET TO A S/8" REBAR SET WITH ALUMINUM CAP NO. 59;
THENCE ALONG A CURVE TO THE LEFT HAVING A RADIUS OF 191.30 FEET, A LENGTH OF 127.04 FEET, AND BEING SUBTENDED BY A CHORD BEARING N 70°07'31" W, A DISTANCE OF 124.72 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 60;
THENCE N 89°09'00" W, A DISTANCE OF 64.07 FEET TO A 5/8" REBAR 5ET WITH ALUMINUM CAP NO. 61;
THENCE N 73°39'00" W, A DISTANCE OF 23.26 FEET TO THE POINT OF BEGINNING;

CONSERVATION EASEMENT CONTAINING 30,042 SQUARE FEET OR 0.690 ACRES MORE OR LESS.

CONSERVATION EASEMENT #6

A PARCEL OF LAND TO BE USED FOR CONSERVATION EASEMENT PURPOSES LOCATED ON LANDS NOW OR FORMERLY OWNED BY FRANKLIN DALE MORGAN AND WIFE, JOYCE C. MORGAN (TAX PIN 8689-69-5419) AS RECORDED IN BOOK 1233, PAGE 83, BOOK 1315, PAGE 594, BOOK 1315, PAGE 597, BOOK 1401, PAGE 254, PAGE

1401, PAGE 25S, BOOK 1401, PAGE 2S7, LESS AND EXCEPT BOOK 1401, PAGE 2S6, LOCATED IN LEICESTER TOWNSHIP, BUNCOMBE COUNTY, NORTH CAROLINA AND BEING MORE PARTICULARLY DESCRIBED AS FOLLOWS:

COMMENCING AT NORTH CAROLINA GEODETIC SURVEY STATION BETHEL BASE ARP, WITH NAD 83(2011) STATE PLANE COORDINATES OF X = 840,744.23 AND Y = 649,700.01; THENCE RUNNING N 43°16'51" E FOR A DISTANCE OF 67,081.16 FEET TO A S/8" REBAR SET WITH ALUMINUM CAP NO. 62, SAID REBAR BEING THE POINT OF BEGINNING;

THENCE N 35°04'27" W, A DISTANCE OF 84.43 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 63;
THENCE N 77°24'38" W, A DISTANCE OF 56.16 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 64;
THENCE N 16°49'42" W, A DISTANCE OF 97.34 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 65;
THENCE N 2°08'28" W, A DISTANCE OF 82.16 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 66;
THENCE S 47°32'S1" E, A DISTANCE OF 79.16 FEET TO A S/8" REBAR SET WITH ALUMINUM CAP NO. 67;
THENCE S 45°04'42" E, A DISTANCE OF 157.11 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 68;
THENCE S 20°49'10" W, A DISTANCE OF 98.69 FEET TO THE POINT OF BEGINNING;

CONSERVATION EASEMENT CONTAINING 18,177 SQUARE FEET OR 0.417 ACRES MORE OR LESS.

CONSERVATION EASEMENT #7

A PARCEL OF LAND TO BE USED FOR CONSERVATION EASEMENT PURPOSES LOCATED ON LANDS NOW OR FORMERLY OWNED BY FRANKLIN DALE MORGAN AND WIFE, JOYCE C. MORGAN (TAX PIN 8689-69-5419) AS RECORDED IN BOOK 1233, PAGE 83, BOOK 1315, PAGE 594, BOOK 1315, PAGE 597, BOOK 1401, PAGE 254, PAGE 1401, PAGE 255, BOOK 1401, PAGE 2S7, LESS AND EXCEPT BOOK 1401, PAGE 256, LOCATED IN LEICESTER TOWNSHIP, BUNCOMBE COUNTY, NORTH CAROLINA AND BEING MORE PARTICULARLY DESCRIBED AS FOLLOWS:

COMMENCING AT NORTH CAROLINA GEODETIC SURVEY STATION BETHEL BASE ARP, WITH NAD 83(2011) STATE PLANE COORDINATES OF X = 840,744.23 AND Y = 649,700.01; THENCE RUNNING N 43°28'55" E FOR A DISTANCE OF 67,015.70 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 69, SAID REBAR BEING THE POINT OF BEGINNING;

THENCE N 14°53'00" W, A DISTANCE OF 130.0S FEET TO A 5/8" REBAR 5ET WITH ALUMINUM CAP NO. 70;
THENCE N 41°35'00" W, A DISTANCE OF 40.58 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 71;
THENCE N 56°04'00" W, A DISTANCE OF 37.71 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 72;
THENCE S 48°50'00" W, A DISTANCE OF 9.77 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 73;
THENCE N 35°04'27" W, A DISTANCE OF 10.79 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 74;
THENCE N 20°49'10" E, A DISTANCE OF 105.58 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 75;
THENCE S 45°04'42" E, A DISTANCE OF 75.11 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 76;
THENCE S 18°56'40" E, A DISTANCE OF 162.93 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 77;
THENCE S 1°01'07" W, A DISTANCE OF 67.53 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 78;
THENCE S 84°36'20" W, A DISTANCE OF 37.39 FEET TO THE POINT OF BEGINNING;

CONSERVATION EASEMENT CONTAINING 16,226 SQUARE FEET OR 0.372 ACRES MORE OR LESS.

CONSERVATION EASEMENT #8

A PARCEL OF LAND TO BE USED FOR CONSERVATION EASEMENT PURPOSES LOCATED ON LANDS NOW OR FORMERLY OWNED BY FRANKLIN DALE MORGAN AND WIFE, JOYCE C. MORGAN (TAX PIN 8689-69-5419) AS RECORDED IN BOOK 1233, PAGE 83, BOOK 1315, PAGE 594, BOOK 131S, PAGE 597, BOOK 1401, PAGE 254, PAGE 1401, PAGE 255, BOOK 1401, PAGE 257, LESS AND EXCEPT BOOK 1401, PAGE 256, LOCATED IN LEICESTER TOWNSHIP, BUNCOMBE COUNTY, NORTH CAROLINA AND BEING MORE PARTICULARLY DESCRIBED AS FOLLOWS:

COMMENCING AT NORTH CAROLINA GEODETIC SURVEY STATION BETHEL BASE ARP, WITH NAD 83(2011) STATE PLANE COORDINATES OF X = 840,744.23 AND Y = 649,700.01; THENCE RUNNING N 42°S5'4S" E FOR A DISTANCE OF 65,885.35 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 79, SAID REBAR BEING THE POINT OF BEGINNING;

THENCE S 58°05'34" E, A DISTANCE OF 110.27 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 80;
THENCE N 88°57'21" E, A DISTANCE OF 147.40 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 81;
THENCE S 69°10'32" E, A DISTANCE OF 210.40 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 82;
THENCE N 79°39'04" E, A DISTANCE OF 97.96 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 83;
THENCE S 30°14'20" E, A DISTANCE OF 27.44 FEET TO A CALCULATED POINT;
THENCE S 62°S6'00" W, A DISTANCE OF 48.46 FEET TO A CALCULATED POINT;
THENCE S 86°23'00" W, A DISTANCE OF 131.82 FEET TO A CALCULATED POINT;
THENCE N 63°19'00" W, A DISTANCE OF 138.73 FEET TO A CALCULATED POINT;
THENCE S 84°20'00" W, A DISTANCE OF 113.59 FEET TO A CALCULATED POINT;
THENCE N 49°37'00" W, A DISTANCE OF 178.70 FEET TO THE POINT OF BEGINNING;

CONSERVATION EASEMENT CONTAINING 22,080 SQUARE FEET OR 0.507 ACRES MORE OR LESS.

Exhibit B – Parent Tracts

Parcel One: PIN 8689-69-5419

Tract One:

BEGINNING at a point in the center of Morgan Branch Road at the top of the ridge, said point being located South 25° 37' West 22.25 feet from an axle, which axle is the westernmost corner of the certain tract of land owned by Charles L. Phillips and wife, recorded in Deed Book 1109, at Page 178, of the Buncombe County Public Registry, said axle also being a corner of the property of Charles W. Freeman as described in Deed recorded in Deed Book 1030, at Page 466, said Registry, said axle also being the beginning corner of that tract of land conveyed by Taylor E. Sluder and wife, to Charles L. Phillips and wife, Clara R. Phillips, by Deed dated the 29th day of September, 1979, and recorded in Deed Book 1229, at Page 393, of said Registry; and runs thence from the said beginning point thus established South 46° 09' East 61.39 feet with the center of Morgan Branch Road; thence with the Southern line of that 0.18 acre tract conveyed by Taylor E. Sluder and wife, to Charles L. Phillips and wife above referred to, North 78° 12' East 164.28 feet to an iron pipe; thence North 67° 49' East 31.20 feet to an iron pipe, the Easternmost corner of said 0.18 acre tract conveyed by Taylor E. Sluder and wife, to Charles L. Phillips and wife; thence with the Southern line of Charles L. Phillips the following three (3) calls South 85° 37' East 261.51 feet to a 20-inch oak snag; South 34° East 638 feet; thence South 88° East 588.50 feet to a point in the Western line of Robert E. Riddle tract as described in Deed Book 1093, at Page 642, also shown in Plat recorded in Plat Book 36, at Page 61, of said Registry; thence with the Western line of said Riddle tract South 02° West 412.5 feet to a point, the Northwest corner of the C.C. Morgan tract as described in Deed Book 561, at Page 430; thence with the Western line of the C.C. Morgan tract South 01° East 627 feet to an iron pipe on the West bank of a gully; thence continuing with the Western line of the C.C. Morgan and with the gully, South 59° 39' West 517.64 feet to an iron pipe on the west bank of a gully; thence South 06° 30' West 163.87 feet; thence South 59° 16' East 23.42 feet; thence North 71° 50' East 69.98 feet; thence South 40° 58' East 262.27 feet to a point in the Northern margin of Morgan Branch Road, State Road No. 1220, said point also being the Southeastern corner of Tract Two as described in Deed recorded in Deed Book 560, at Page 481, said point being located by a drill hole in a rock; thence South 85° 36' West 197.72 feet to a point in the center of the road and at a culvert; thence North 48° 45' West 12.89 feet; thence North 14° 53' West 194.28 feet; thence North 41° 35' West 40.58 feet to an iron pipe in a branch; thence up with the branch North 56° 04' West 37.71 feet to an iron pipe; thence leaving said branch South 48° 50' West 128.33 feet to an iron pipe; thence South 04° 29' East 186.99 feet to a point in the center of Morgan Branch Road; thence with the centerline of said road South 87° 52' West 155.15 feet to a point, a corner in the David E. Smith tract as described in Deed recorded in Deed Book 1229, at Page 495, of said Registry; thence continuing with the centerline of Morgan Branch Road and with the Eastern and Northern lines of the Smith tract the following five (5) courses and distances: North 02° 06' East 191.50 feet, North 08° 51' West 75.17 feet, thence on a curve to the left the radius of which is 216.12 feet a length of 153.24 feet, thence North 49° 29' West 63.17 feet, thence on a curve to the left, the radius of which is 166.30 feet, a length of 115.17 feet; thence continuing with the centerline of Morgan Branch Road and with the Northern line of the John W. Gossett tract as recorded in Deed Book 1095, at Page 688, of said Registry, the following six (6) courses and distances: North 89° 09'

West 67.47 feet, North 73° 39' West 84.03 feet, North 57° 56' West 62.51, North 44° 19' West 70.74 feet, North 37° 54' West 123.58 feet, and North 42° 27' West 99.19 feet to a point, said point being the Southwestern corner of the Thomas Schumacher as described in Deed recorded in Deed Book 1203, at Page 255, of said Registry; thence with the Schumacher tract the following thirteen courses and distances: North 72° 40' East 271.06 feet, South 71° 21' East 45.67 feet, North 82° 03' East 127.40 feet, North 64° 47' East 41.85 feet, North 33° 53' East 24.65 feet, North 40° 47' West 216.97 feet, North 45° 46' West 157.94 feet, North 60° 13' West 22.93 feet to a point in Morgan Branch Road, thence down and with Morgan Branch Road and continuing with the line of Thomas Schumacher, South 60° 26' West 56.45 feet, South 88° 52' West 217.63 feet, South 65° 49' West 73.39 feet, South 07° 03' East 200.59 feet, and South 28° 54' East 33.11 feet; thence leaving the center of Morgan Branch Road and running with the Norther line of Francis E. Drake as described in Deeds recorded in Deed Book 1101, at Page 395, and Deed Book 1101, at Page 396, of said Registry, the following five (5) courses and distances: South 85° 42' 20" West 251.40 feet, South 87° 38' West 105.54 feet, South 80° 15' West 81.82 feet, North 44° 00' West 243.93 feet, and South 65° 00' West 429.00 feet to a hub, said hub also being a corner in the lands of Carrie Mae Morgan Estate and runs thence with the Carrie Mae Morgan line South 44° 30' West 204.60 feet and North 28° West 726 feet to a 20-inch pine in the top of the ridge, said 20-inch pine also being a point in the line of Robert M. Kelso as described by Deed recorded in Deed Book 1154, at Page 69, of said Registry; thence with the Southern line of Kelso North 52° 06' East 202.20 feet to an axle, said axle being the Southwestern corner of Kenneth C. Freeman as described in Deed recorded in Deed Book 1030, at Page 472, of said Registry, and runs thence with the Southern line of Freeman and with the top of the ridge the following five (5) courses and distances: North 78° 25' East 243 feet to a 3-inch ironwood tree, North 33° 59' East 245 feet to a10-inch red oak, North 77° 22' East 516 feet to an 18-inch wild cherry, North 49° 20' East 540.60 feet to a 6-inch persimmon tree, and North 25° 37' East 205.02 feet to the place of BEGINNING. Containing 70 acres, more or less.

Being the same property described in Deed Book 1233, at Page 83, of the Buncombe County Registry.

Tract Two:

BEGINNING at a hub set at or near the East margin of Morgan Branch Road and runs thence South 72° 40' West 12.92 feet to a point in Morgan Branch Road; thence with the Road the following courses and distances: North 45° 58' West 72.25 feet; North 28° 54' West 109.64 feet; North 07° 03' West 200.59 feet to a Hub in the West margin of Morgan Branch Road; thence continuing on said Road and crossing a branch North 65° 49' East 74.39 feet; North 88° 52' East 217.63 feet; North 60° 26' East 56.45 feet to a Hub; thence leaving Morgan Branch Road, South 60° 13' East 22.93 feet to a locust; thence South 45° 46' East 157.94 feet to a Locust Post; thence South 40° 47' East 216.97 feet along a fence to a stake at a fence corner; thence South 33° 53' West 24.65 feet to a 14 inch locust; thence South 64° 47 West 41.85 feet to a 14 inch locust; thence South 82° 03' West along a fence 127.40 feet to an 18 inch locust; thence 71° 21' West 45.67 feet to a stake; thence South 72° 40' West 258.14 feet to the BEGINNING. Containing 3.69 acres more or less as shown by a survey and plat of the property by Ray E. Anders, RLS, January, 1973, and being a part of the property described in Deed Book 560, at Page 481, of the Buncombe County Registry.

Being the same property described in Deed Book 1315, at Page 594, of the Buncombe County Registry.

Tract Three:

LYING AND BEING in Leicester Township, Buncombe County, North Carolina, and being more particularly described as follows:

Beginning at a point in the center line of Morgan Branch Road, State Road 1220, said point being located over a corrugated metal pipe beneath said road, said point also being located at the Southeastern corner of that tract of land conveyed to Taylor E. Sluder by Deed recorded in Deed Book 560, at Page 481, of the Buncombe County Public Registry, said point also being the Southwestern corner of that tract of land conveyed to F. Dale Morgan by Deed recorded in Deed Book 1233, at Page 83, of said Registry, and runs thence from said beginning point thus established down and with the branch, the following four (4) courses and distances: South 05° 19' East 186.17 feet, South 30° 11' East 49.91 feet, South 60° 21' East 61.59 feet, and South 34° 13' East 19.08 feet to a point at the intersection of said branch with Morgan Branch; thence up and with Morgan Branch and with the Northern line of the property of Don E. Morgan as described in Deed recorded in Deed Book 1078, at Page 205, said Registry, the following six (6) courses and distances: South 80° 01' West 76.75 feet, South 86° 01' West 138.11 feet, South 85° 57' West 170.23 feet, South 83° 32' West 168.19 feet, South 68° 17' West 166.05 feet, and South 63° 29' West 184.62 feet; thence leaving the Northern line of Don E. Morgan and continuing up and with Morgan Branch the following three (3) courses and distances: South 86° 23' West 131.82 feet, North 63° 19' West 138.73 feet, and South 84° 20' West 113.59 feet; thence leaving Morgan Branch and running North 49° 37' West 285.65 feet to an iron pipe; thence North 45° 12' West 468.72 feet to an existing iron pipe at the Easternmost corner of that tract conveyed to Virginia B. Mell by Deed recorded in Deed Book 1165, at Page 320, of said Registry, said point also a corner of that tract conveyed to Annie M. Gossett as described in Deed recorded in Book 1059, at Page 256, of said Registry; and runs thence with the Southern line of Annie M. Gossett the following (4) courses and distances: North 65° 46' East 93.00 feet to an iron pipe, South 82° 44' East 81.65 feet to an iron pipe, South 55° 17' East 357.36 feet to an iron pipe and North 57° 36' East 39.85 feet to an iron pipe, said iron pipe being the Southeastern corner of said Annie M. Gossett tract, said point also being the Southwestern corner of that certain tract conveyed to John W. Gossett by Deed recorded in Deed Book 1151, at Page 607, of said Registry, and runs thence with the Southern line of said John W. Gossett, North 76° 56' East 79.67 feet to a point in a gravel road; thence continuing with the Southern line of John W. Gossett and with the center of said gravel road the following four (4) courses and distances: North 82° 03' East 78.60 feet, North 87° 45' East 98.18 feet, South 85° 40' East 95.95 feet, and North 89° 19' East 43.15 feet to a point, said point being the Southeastern corner of John W. Gossett and the Southwestern corner of that tract conveyed to David E. Smith by Deed recorded in Deed Book 1229, at Page 495, of said Registry; and thence with the Southern line of said David E. Smith tract the following (4) courses and distances: South 89° 05' East 128.13 feet, South 86° 58' East 151.27 feet, North 83° 55' East 114.56 feet, and North 81° 20' East 50.00 feet to a point at the intersection of said gravel drive and Morgan Branch Road and at the Southeastern corner of said David E. Smith tract; thence with the center line of Morgan Branch Road North 87° 52' East 155.15 feet and North 83°

22' East 201.11 feet to the point and place of BEGINNING. Containing 11.83 acres, more or less, and being the same property described in Deed Book 1315, at Page 597, of the Buncombe County Registry.

Tract Four:

BEGINNING at an existing iron pin, said point being North 40 degrees 58 minutes 00 seconds West 262.27 feet from a drill hole in a stone which is the beginning corner of Deed Book 561 at Page 430, and also referred to in Deed Book 1233 at Page 83 as a drill hole in a rock, thence from the beginning point thus established and with the line in Deed Book 1233 at Page 83 the following three calls: South 71 degrees 50 minutes 00 seconds West 69.98 feet to the center line of a branch; thence up the branch North 59 degrees 16 minutes 00 seconds West 23.42 feet; thence leaving the branch but continuing with the line of Deed Book 1233 at Page 83 North 06 degrees 30 minutes 00 seconds East 163.87 feet; thence with the new line of C.C. Morgan South 23 degrees 59 minutes 23 seconds East 167.43 feet to the place of BEGINNING, containing .174 acre, more or less, and being the same property described in Deed Book 1401, at Page 254, of the Buncombe County Registry.

Tract Five:

BEGINNING at an existing iron pin, the southwest corner of property described in Deed Book 1151 at Page 607 also being the southeast corner of the property described in Deed Book 1059 at Page 256, thence with the original line in Deed Book 1151 at Page 607 North 17 degrees 10 minutes 15 seconds West 25.80 feet; thence with the new line of John W. Gossett South 88 degrees 13 minutes 49 seconds East 84.22 feet to the center of an existing gravel road to State Road 1220; thence South 73 degrees 56 minutes 00 seconds West 79.67 feet to the place of BEGINNING, containing 0.24 acre and being a portion of Deed Book 1151 at Page 607 and shown on a map prepared for Dale Morgan by Webb A. Morgan and Associates, P.A., dated January 31, 1985.

Being the same property described in Deed Book 1401, at Page 255, of the Buncombe County Registry.

Tract Six:

Beginning at an iron pipe in the beginning corner of the George and Claudia Frisbee Tract, described in the Buncombe County Registry of Deeds in Deed Book 1342 at Page 548; thence with the Southern margin of said Frisbee Tract South 57 Degrees 36 Minutes West 39.85 Feet to an iron pipe in the Southernmost corner of said Frisbee Tract; thence with the Southwestern margin of said Frisbee Tract North 55 Degrees 17 Minutes West 357.36 Feet to an iron pipe; thence South 69 Degrees 33 Minutes 12 Seconds East 40.44 Feet to an iron pipe; thence South 50 Degrees 43 Minutes 04 Seconds East 80.20 Feet to an iron pipe; thence South 54 Degrees 43 Minutes 45 Seconds East 159.51 Feet to an iron pipe; thence South 73 Degrees 51 Minutes 28 Seconds East 64.06 Feet to an iron pipe; thence South 87 Degrees 11 Minutes 44 Seconds East

33.94 Feet to an iron pipe in the Eastern Margin of said Frisbee Tract; thence with said Eastern margin South 17 Degrees 10 Minutes 15 Seconds East 5.95 Feet to the point of beginning. Being .063 acres according to a survey by Webb A. Morgan, R.L.S., dated January 31, 1985.

Being the same property described in Deed Book 1401, at Page 257, of the Buncombe County Registry.

Said Parcel One consisting of Tracts One through Six above LESS AND EXCEPT the property described in Deed Book 1401, at Page 256, of the Buncombe County Registry.

4865-0786-8970, v. 1

Workflow No. 0000789032-0002

Doc ID: 035570960020 Type: CRP
Recorded: 08/25/2022 at 03:44:53 PM
Fee Amt: $411.00 Page 1 of 20
Revenue Tax: $365.00
Workflow# 0000789032-0002
Buncombe County, NC
Drew Reisinger Register of Deeds
BK 6252 PG 441-460

STATE OF NORTH CAROLINA

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

BUNCOMBE COUNTY

SPO File Number: 11-LA-233 and 11-LA-234
DMS Project Number: 100127
Excise Stamps: $365.00

This instrument prepared by Paul Arena a licensed NC attorney. Delinquent taxes, if any, to be paid by the closing attorney to the County Tax Collector upon disbursement of closing proceeds.

Prepared by: Office of the Attorney General
Property Control Section
Return to: NC Department of Administration
State Property Office c/o MLWB Box 31
1321 Mail Service Center
Raleigh, NC 27699-1321

THIS DEED OF CONSERVATION EASEMENT AND RIGHT OF ACCESS, made this 24th day of August, 2022, by NEAL A. MORGAN and wife, AVA MARIE J. MORGAN, a 1/3 undivided interest, whose mailing address is 321 Morgan Branch Road, Leicester, NC 28748; MARTIN C. MORGAN, unmarried, a 1/6 undivided interest, whose mailing address is 75 Morgan Branch Road, Leicester, NC 28748; MARCIA M. MOREHEAD and husband, JAMES R. MOREHEAD, a 1/6 undivided interest, whose mailing address is 171 Elk Mountain Road, Asheville NC 28804; and FRANKLIN DALE MORGAN and wife, JOYCE C. MORGAN, a 1/3 undivided interest, whose mailing address is 1281 Newfound Road Leicester, NC 28748 (collectively, "**Grantor**"), to the STATE OF NORTH CAROLINA ("**Grantee**"), whose mailing address is State of North Carolina, Department of Administration, State Property Office, 1321 Mail Service Center, Raleigh, NC 27699-1321. The designations of Grantor and Grantee as used herein shall include said parties, their heirs, successors, and assigns, and shall include singular, plural, masculine, feminine, or neuter as required by context.

WITNESSETH:

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

WHEREAS, this Conservation Easement from Grantor to Grantee has been negotiated, arranged and provided for as a condition of a full delivery contract between *KCI Technologies Inc., 4505 Falls of Neuse Road, Suite 400, Raleigh NC 27609* and the North Carolina Department of Environmental Quality, to provide stream, wetland and/or buffer mitigation pursuant to the North Carolina Department of Environmental Quality Purchase and Services Contract Number *7909*.

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

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

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

WHEREAS, the Department of Environment and Natural Resources, the U.S. Army Corps of Engineers, the U.S. Environmental Protection Agency, the U.S. Fish and Wildlife Service, the North Carolina Wildlife Resources Commission, the North Carolina Division of Water Quality, the North Carolina Division of Coastal Management, and the National Marine Fisheries Service entered into an agreement to continue the In-Lieu Fee operations of the North Carolina Department of Natural Resources' Division of Mitigation Services (formerly Ecosystem

Enhancement Program) with an effective date of 28 July, 2010, which supersedes and replaces the previously effective MOA and MOU referenced above; and

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

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

WHEREAS, Grantor owns in fee simple certain real property situated, lying, and being in *Leicester Township, Buncombe County*, North Carolina (the "**Property**"), and being more particularly described as those certain parcels of land containing approximately and collectively 263.72 acres being more particularly described on "**Exhibit B**" attached hereto and incorporated herein; and

WHEREAS, Grantor is willing to grant a Conservation Easement and Right of Access over the herein described areas of the Property, thereby restricting and limiting the use of the areas of the Property subject to the Conservation Easement to the terms and conditions and purposes hereinafter set forth, and Grantee is willing to accept said Easement and Access Rights. The Conservation Easement shall be for the protection and benefit of the waters of ***the French Broad River.***

NOW, THEREFORE, in consideration of the mutual covenants, terms, conditions, and restrictions hereinafter set forth, Grantor unconditionally and irrevocably hereby grants and conveys unto Grantee, its successors and assigns, forever and in perpetuity, a Conservation Easement and Right of Access together with an access easement to and from the Conservation Easement Area described below.

The Conservation Easement Area consists of the following:

Conservation Easement **9** containing a total of **1.116 acres**, Conservation Easement **10** containing a total of **2.205 acres**, Conservation Easement **11** containing a total of **0.479 acres**, Conservation Easement **12** containing a total of **2.065 acres**, Conservation Easement **13** containing a total of **0.381 acres**, and Conservation Easement **14** containing a total of **0.773 acres, for a total combined easement acreage of 7.019 acres**, as shown on the plats of survey entitled "Final Plat, Conservation Easement for State of North Carolina Department of Environmental Quality Division of Mitigation Services, Project Name: Morgan Branch Site, DMS Project No. 100127, SPO File No. 11-LA-232 thru 11-LA-240, Leicester Township, Buncombe County, North Carolina", dated June 14, 2022, by *James M. Gellenthin,* PLS Number L-3860 and recorded in the Buncombe County, North Carolina Register of Deeds at **Plat Book 229, Pages 99-109.**

See attached "**Exhibit A**", Legal Description of area of the Property hereinafter referred to as the "Conservation Easement Area"

The purposes of this Conservation Easement are to maintain, restore, enhance, construct, create and preserve wetland and/or riparian resources in the Conservation Easement Area that contribute to the protection and improvement of water quality, flood prevention, fisheries, aquatic habitat, wildlife habitat, and recreational opportunities; to maintain permanently the Conservation Easement Area in its natural condition, consistent with these purposes; and to prevent any use of the Easement Area that will significantly impair or interfere with these purposes. To achieve these purposes, the following conditions and restrictions are set forth:

I. DURATION OF EASEMENT

Pursuant to law, including the above referenced statutes, this Conservation Easement and Right of Access shall be perpetual and it shall run with, and be a continuing restriction upon the use of, the Property, and it shall be enforceable by the Grantee against the Grantor and against Grantor's heirs, successors and assigns, personal representatives, agents, lessees, and licensees.

II. ACCESS EASEMENT

Grantor hereby grants and conveys unto Grantee, its employees, agents, successors and assigns, a perpetual, non-exclusive easement for ingress and egress over and upon the Property at all reasonable times and at such location as practically necessary to access the Conservation Easement Area for the purposes set forth herein ("**Access Easement**"). This grant of easement shall not vest any rights in the public and shall not be construed as a public dedication of the Access Easement. Grantor covenants, represents and warrants that it is the sole owner of and is seized of the Property in fee simple and has the right to grant and convey this Access Easement.

III. GRANTOR RESERVED USES AND RESTRICTED ACTIVITIES

The Conservation Easement Area shall be restricted from any development or usage that would impair or interfere with the purposes of this Conservation Easement. Unless expressly reserved as a compatible use herein, any activity in, or use of, the Conservation Easement Area by the Grantor is prohibited as inconsistent with the purposes of this Conservation Easement. Any rights not expressly reserved hereunder by the Grantor have been acquired by the Grantee. Any rights not expressly reserved hereunder by the Grantor, including the rights to all mitigation credits, including, but not limited to, stream, wetland, and riparian buffer mitigation units, derived from each site within the area of the Conservation Easement, are conveyed to and belong to the Grantee. Without limiting the generality of the foregoing, the following specific uses are prohibited, restricted, or reserved as indicated:

A. Recreational Uses. Grantor expressly reserves the right to undeveloped recreational uses, including hiking, bird watching, hunting and fishing, and access to the Conservation Easement Area for the purposes thereof.

B. Motorized Vehicle Use. Motorized vehicle use in the Conservation Easement Area is prohibited except within a Crossing Area(s) or Road or Trail as shown on the recorded survey plat.

C. Educational Uses. The Grantor reserves the right to engage in and permit others to engage in educational uses in the Conservation Easement Area not inconsistent with this Conservation Easement, and the right of access to the Conservation Easement Area for such purposes including organized educational activities such as site visits and observations. Educational uses of the property shall not alter vegetation, hydrology or topography of the site.

D. **Damage to Vegetation.** Except within Crossing Area(s) as shown on the recorded survey plat and as related to the removal of non-native plants, diseased or damaged trees, or vegetation that destabilizes or renders unsafe the Conservation Easement Area to persons or natural habitat, all cutting, removal, mowing, harming, or destruction of any trees and vegetation in the Conservation Easement Area is prohibited.

E. Industrial, Residential and Commercial Uses. All industrial, residential and commercial uses are prohibited in the Conservation Easement Area.

F. Agricultural Use. All agricultural uses are prohibited within the Conservation Easement Area including any use for cropland, waste lagoons, or pastureland.

G. New Construction. There shall be no building, facility, mobile home, antenna, utility pole, tower, or other structure constructed or placed in the Conservation Easement Area.

H. **Roads and Trails.** There shall be no construction or maintenance of new roads, trails, walkways, or paving in the Conservation Easement.

All existing roads, trails and crossings within the Conservation Easement Area shall be shown on the recorded survey plat.

I. Signs. No signs shall be permitted in the Conservation Easement Area except interpretive signs describing restoration activities and the conservation values of the Conservation Easement Area, signs identifying the owner of the Property and the holder of the Conservation Easement, signs giving directions, or signs prescribing rules and regulations for the use of the Conservation Easement Area.

J. Dumping or Storing. Dumping or storage of soil, trash, ashes, garbage, waste, abandoned vehicles, appliances, machinery, or any other material in the Conservation Easement Area is prohibited.

K. Grading, Mineral Use, Excavation, Dredging. There shall be no grading, filling, excavation, dredging, mining, drilling, hydraulic fracturing; removal of topsoil, sand, gravel, rock, peat, minerals, or other materials.

L. Water Quality and Drainage Patterns. There shall be no diking, draining, dredging, channeling, filling, leveling, pumping, impounding or diverting, causing, allowing or permitting the diversion of surface or underground water in the Conservation Easement Area. No altering or tampering with water control structures or devices, or disruption or alteration of the restored, enhanced, or created drainage patterns is allowed. All removal of wetlands, polluting or discharging into waters, springs, seeps, or wetlands, or use of pesticide or biocides in the Conservation Easement Area is prohibited. In the event of an emergency interruption or shortage of all other water sources, water from within the Conservation Easement Area may temporarily be withdrawn for good cause shown as needed for the survival of livestock on the Property.

M. Subdivision and Conveyance. Grantor voluntarily agrees that no further subdivision, partitioning, or dividing of the Conservation Easement Area portion of the Property owned by the Grantor in fee simple ("fee") that is subject to this Conservation Easement is allowed. Any future transfer of the Property shall be subject to this Conservation Easement and Right of Access and to the Grantee's right of unlimited and repeated ingress and egress over and across the Property to the Conservation Easement Area for the purposes set forth herein.

N. Development Rights. All development rights are permanently removed from the Conservation Easement Area and are non-transferrable.

O. Disturbance of Natural Features. Any change, disturbance, alteration or impairment of the natural features of the Conservation Easement Area or any intentional introduction of non-native plants, trees and/or animal species by Grantor is prohibited.

The Grantor may request permission to vary from the above restrictions for good cause shown, provided that any such request is not inconsistent with the purposes of this Conservation Easement, and the Grantor obtains advance written approval from the Division of Mitigation Services, 1652 Mail Services Center, Raleigh, NC 27699-1652.

IV. GRANTEE RESERVED USES

A. Right of Access, Construction, and Inspection. The Grantee, its employees, agents, successors and assigns, shall have a perpetual Right of Access over and upon the Conservation Easement Area to undertake or engage in any activities necessary to construct, maintain, manage, enhance, repair, restore, protect, monitor and inspect the stream, wetland and any other riparian resources in the Conservation Easement Area for the purposes set forth herein or any long-term management plan for the Conservation Easement Area developed pursuant to this Conservation Easement.

B. Restoration Activities. These activities include planting of trees, shrubs and herbaceous vegetation, installation of monitoring wells, utilization of heavy equipment to grade, fill, and prepare the soil, modification of the hydrology of the site, and installation of natural and manmade materials as needed to direct in-stream, above ground, and subterraneous water flow.

C. Signs. The Grantee, its employees and agents, successors or assigns, shall be permitted to place signs and witness posts on the Property to include any or all of the following: describe

the project, prohibited activities within the Conservation Easement, or identify the project boundaries and the holder of the Conservation Easement.

D. Fences. Conservation Easements are purchased to protect the investments by the State (Grantee) in natural resources. Livestock within conservations easements damages the investment and can result in reductions in natural resource value and mitigation credits which would cause financial harm to the State. Therefore, Landowners (Grantor) with livestock are required to restrict livestock access to the Conservation Easement area. Repeated failure to do so may result in the State (Grantee) repairing or installing livestock exclusion devices (fences) within the conservation area for the purpose of restricting livestock access. In such cases, the landowner (Grantor) must provide access to the State (Grantee) to make repairs.

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

V. ENFORCEMENT AND REMEDIES

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

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

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

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

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

VI. MISCELLANEOUS

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

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

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

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

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

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

Division of Mitigation Services Program Manager
NC State Property Office
1321 Mail Service Center
Raleigh, NC 27699-1321

and

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

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

VII. QUIET ENJOYMENT

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

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

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

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

Franklin Dale Morgan (SEAL)
Franklin Dale Morgan

Joyce C. Morgan (SEAL)
Joyce C. Morgan

NORTH CAROLINA
COUNTY OF Buncombe

I, Peter U Kanipe, a Notary Public in and for the County and State aforesaid, do hereby certify that Franklin Dale Morgan & Joyce C. Morgan, Grantor, personally appeared before me this day and acknowledged the execution of the foregoing instrument.

IN WITNESS, WHEREOF, I have hereunto set my hand and Notary Seal this the 26th day of July, 2022.

Notary Public

My commission expires:

Peter U Kanipe
NOTARY PUBLIC
Buncombe County, NC
My Commission Expires June 08, 2024

_____ (SEAL)
Neal A. Morgan

_____ (SEAL)
Ava Marie J. Morgan

NORTH CAROLINA
COUNTY OF Buncombe

I, Peter U Kanipe, a Notary Public in and for the County and State aforesaid, do hereby certify that Neal A. Morgan & Ava Marie J. Morgan, Grantor, personally appeared before me this day and acknowledged the execution of the foregoing instrument.

IN WITNESS, WHEREOF, I have hereunto set my hand and Notary Seal this the 25th day of July, 2022.

_____
Notary Public

My commission expires:_____

Peter U Kanipe
NOTARY PUBLIC
Buncombe County, NC
My Commission Expires June 08, 2024

Martin C. Morgan (SEAL)

Martin C. Morgan

NORTH CAROLINA
COUNTY OF Buncombe

I, Peter U Kanipe, a Notary Public in and for the County and State aforesaid, do hereby certify that Martin C. Morgan, Grantor, personally appeared before me this day and acknowledged the execution of the foregoing instrument.

IN WITNESS, WHEREOF, I have hereunto set my hand and Notary Seal this the 25th day of July, 2022.

Notary Public

My commission expires:

Peter U Kanipe
NOTARY PUBLIC
Buncombe County, NC
My Commission Expires June 08, 2024

Marcia M. Morehead (SEAL)
Marcia M. Morehead

James R. Morehead (SEAL)
James R. Morehead

NORTH CAROLINA
COUNTY OF Buncombe

I, Peter U. Kanipe, a Notary Public in and for the County and State aforesaid, do hereby certify that Marcia M. Morehead & James R. Morehead, Grantor, personally appeared before me this day and acknowledged the execution of the foregoing instrument.

IN WITNESS, WHEREOF, I have hereunto set my hand and Notary Seal this the 25th day of July, 2022.

Notary Public

My commission expires:

Peter U Kanipe
NOTARY PUBLIC
Buncombe County, NC
My Commission Expires June 08, 2024

Exhibit A

Legal Description of area of the Property hereinafter referred to as the "Conservation Easement Area"

CONSERVATION EASEMENT #9

A PARCEL OF LAND TO BE USED FOR CONSERVATION EASEMENT PURPOSES LOCATED ON LANDS NOW OR FORMERLY OWNED BY NEAL A. MORGAN AND WIFE, AVA MARIE J. MORGAN (A 1/3 INTEREST); FRANKLIN DALE MORGAN A/K/A DALE MORGAN AND WIFE, JOYCE C. MORGAN (A 1/3 INTEREST); MARTIN C. MORGAN (A 1/6 INTEREST); MARCIA M. MOREHEAD (A 1/6 INTEREST), WITH THOSE TWO 1/6 INTERESTS OWNED AS JTWROS (TAX PIN 8689-66-3036) AS RECORDED IN BOOK 5755 PAGE 973 FOR MARTIN MORGAN, KATHY MORGAN AND MARCIA MOREHEAD; BOOK 909 PAGE 271 FOR FRANKLIN DALE MORGAN AND JOYCE C. MORGAN; BOOK S608 PAGE 1682 FOR NEAL AND AVA MORGAN, LOCATED IN LEICESTER TOWNSHIP, BUNCOMBE COUNTY, NORTH CAROLINA AND BEING MORE PARTICULARLY DESCRIBED AS FOLLOWS:

COMMENCING AT NORTH CAROLINA GEODETIC SURVEY STATION BETHEL BASE ARP, WITH NAD 83(2011) STATE PLANE COORDINATES OF X = 840,744.23 AND Y = 649,700.01; THENCE RUNNING N 43°53'48" E FOR A DISTANCE OF 65,187.52 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 84, SAID REBAR BEING THE POINT OF BEGINNING;

THENCE N 16°43'30" E, A DISTANCE OF 65.75 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 85;
THENCE N 37°31'47" E, A DISTANCE OF 146.24 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 86;
THENCE N 52°24'30" E, A DISTANCE OF 143.87 FEET TO A 5/8" REBAR 5ET WITH ALUMINUM CAP NO. 87;
THENCE S 83°32'02" E, A DISTANCE OF 214.72 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 88;
THENCE S 5°27'01" E, A DISTANCE OF 99.51 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 89;
THENCE N 82°59'29" W, A DISTANCE OF 195.11 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 90;
THENCE S S6°43'02" W, A DISTANCE OF 100.66 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 91;
THENCE S 34°14'15" W, A DISTANCE OF 75.18 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 92;
THENCE 5 21°58'45" W, A DISTANCE OF 84.02 FEET TO A S/8" REBAR SET WITH ALUMINUM CAP NO. 93;
THENCE N 73°16'30" W, A DISTANCE OF 97.39 FEET TO THE POINT OF BEGINNING;

CONSERVATION EASEMENT CONTAINING 48,621 SQUARE FEET OR 1.116 ACRES MORE OR LESS.

CONSERVATION EASEMENT #10

A PARCEL OF LAND TO BE USED FOR CONSERVATION EASEMENT PURPOSES LOCATED ON LANDS NOW OR FORMERLY OWNED BY NEAL A. MORGAN AND WIFE, AVA MARIE J. MORGAN (A 1/3 INTEREST); FRANKLIN DALE MORGAN A/K/A DALE MORGAN AND WIFE, JOYCE C. MORGAN (A 1/3 INTEREST); MARTIN C. MORGAN (A 1/6 INTEREST); MARCIA M. MOREHEAD (A 1/6 INTEREST), WITH THOSE TWO 1/6 INTERESTS OWNED AS JTWROS (TAX PIN 8689-66-3036) AS RECORDED IN BOOK 5755 PAGE 973 FOR MARTIN MORGAN, KATHY MORGAN AND MARCIA MOREHEAD; BOOK 909 PAGE 271 FOR FRANKLIN DALE MORGAN AND JOYCE C. MORGAN; BOOK 5608 PAGE 1682 FOR NEAL AND AVA MORGAN, LOCATED IN LEICESTER TOWNSHIP, BUNCOMBE COUNTY, NORTH CAROLINA AND BEING MORE PARTICULARLY DESCRIBED AS FOLLOWS:

COMMENCING AT NORTH CAROLINA GEODETIC SURVEY STATION BETHEL BASE ARP, WITH NAD 83(2011) 5TATE PLANE COORDINATES OF X = 840,744.23 AND Y = 649,700.01; THENCE RUNNING N 44°06'32" E FOR A DISTANCE

OF 65,620.61 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 94, SAID REBAR BEING THE POINT OF BEGINNING;

THENCE N S°27'01" W, A DISTANCE OF 99.0S FEET TO A S/8" REBAR SET WITH ALUMINUM CAP NO. 9S;
THENCE S 87°36'13" E, A DISTANCE OF 211.31 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 96;
THENCE N 61°53'44" E, A DISTANCE OF 134.64 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 97;
THENCE N 48°01'53" E, A DISTANCE OF 155.64 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 98;
THENCE N 59°34'18" E, A DISTANCE OF 469.31 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 99;
THENCE S 31°50'09" E, A DISTANCE OF 94.57 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 100;
THENCE S 59°08'49" W, A DISTANCE OF 447.39 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 101;
THENCE S 47°49'16" W, A DISTANCE OF 159.85 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 102;
THENCE S 61°SS'24" W, A DISTANCE OF 165.58 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 103;
THENCE N 89°58'47" W, A DISTANCE OF 242.12 FEET TO THE POINT OF BEGINNING;

CONSERVATION EASEMENT CONTAINING 96,053 SQUARE FEET OR 2.205 ACRE5 MORE OR LESS.

CONSERVATION EASEMENT #11

A PARCEL OF LAND TO BE USED FOR CONSERVATION EASEMENT PURPOSES LOCATED ON LANDS NOW OR FORMERLY OWNED BY NEAL A. MORGAN AND WIFE, AVA MARIE J. MORGAN (A 1/3 INTEREST); FRANKLIN DALE MORGAN A/K/A DALE MORGAN AND WIFE, JOYCE C. MORGAN (A 1/3 INTEREST); MARTIN C. MORGAN (A 1/6 INTEREST); MARCIA M. MOREHEAD (A 1/6 INTEREST), WITH THOSE TWO 1/6 INTERESTS OWNED A5 JTWROS (TAX PIN 8689-66-3036) AS RECORDED IN BOOK 5755 PAGE 973 FOR MARTIN MORGAN, KATHY MORGAN AND MARCIA MOREHEAD; BOOK 909 PAGE 271 FOR FRANKLIN DALE MORGAN AND JOYCE C. MORGAN; BOOK 5608 PAGE 1682 FOR NEAL AND AVA MORGAN, LOCATED IN LEICESTER TOWNSHIP, BUNCOMBE COUNTY, NORTH CAROLINA AND BEING MORE PARTICULARLY DESCRIBED AS FOLLOWS:

COMMENCING AT NORTH CAROLINA GEODETIC SURVEY STATION BETHEL BASE ARP, WITH NAD 83(2011) STATE PLANE COORDINATES OF X = 840,744.23 AND Y = 649,700.01; THENCE RUNNING N 44°25'03" E FOR A DISTANCE OF 66,568.23 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 104, SAID REBAR BEING THE POINT OF BEGINNING;

THENCE N 31°50'09" W, A DISTANCE OF 94.35 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 105;
THENCE N 54°53'40" E, A DISTANCE OF 166.52 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 106;
THENCE N 84°26'28" E, A DISTANCE OF 77.15 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 107;
THENCE S 8°56'00" E, A DISTANCE OF 90.32 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 108;
THENCE S 81°17'02" W, A DISTANCE OF 59.08 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 109;
THENCE S 54°22'09" W, A DISTANCE OF 146.26 FEET TO THE POINT OF BEGINNING;

CONSERVATION EASEMENT CONTAINING 20,887 SQUARE FEET OR 0.479 ACRE5 MORE OR LESS.

CONSERVATION EASEMENT #12

A PARCEL OF LAND TO BE USED FOR CONSERVATION EASEMENT PURPOSES LOCATED ON LANDS NOW OR FORMERLY OWNED BY NEAL A. MORGAN AND WIFE, AVA MARIE J. MORGAN (A 1/3 INTEREST); FRANKLIN DALE MORGAN A/K/A F. DALE MORGAN (A 1/3 INTEREST); MARTIN C. MORGAN (A 1/6 INTEREST); MARCIA M. MOREHEAD (A 1/6 INTEREST), WITH THOSE TWO 1/6 INTERESTS OWNED AS JTWROS (TAX PIN 8689-87-7949) AS RECORDED IN BOOK 5755 PAGE 973 FOR MARTIN MORGAN, KATHY MORGAN AND MARCIA MOREHEAD; BOOK 1202 PAGE 563 FOR F. DALE MORGAN; BOOK 5608 PAGE 1682 FOR NEAL AND AVA MORGAN, LOCATED IN LEICESTER TOWNSHIP, BUNCOMBE COUNTY, NORTH CAROLINA AND BEING MORE PARTICULARLY DESCRIBED AS FOLLOWS:

COMMENCING AT NORTH CAROLINA GEODETIC SURVEY STATION BETHEL BASE ARP, WITH NAD 83(2011) STATE PLANE COORDINATES OF X = 840,744.23 AND Y = 649,700.01; THENCE RUNNING N 44°38'01" E FOR A DISTANCE OF 67,756.77 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 124, SAID REBAR BEING THE POINT OF BEGINNING;

THENCE N 19°04'34" E, A DISTANCE OF 107.99 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 12S;
THENCE N 29°43'58" E, A DISTANCE OF 117.45 FEET TO A 5/8" REBAR 5ET WITH ALUMINUM CAP NO. 126;
THENCE N 8°34'38" E, A DISTANCE OF 127.31 FEET TO A 5/8" REBAR 5ET WITH ALUMINUM CAP NO. 127;
THENCE N 12°41'24" E, A DISTANCE OF 206.40 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 128;
THENCE N 13°23'35" W, A DISTANCE OF 121.95 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 129;
THENCE N 26°16'57" W, A DISTANCE OF 72.12 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 130;
THENCE N 33°02'45" W, A DISTANCE OF 126.59 FEET TO A 5/8" REBAR 5ET WITH ALUMINUM CAP NO. 131;
THENCE N 30°57'37" E, A DISTANCE OF 81.31 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 132;
THENCE S 66°12'58" E, A DISTANCE OF 100.46 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 133;
THENCE 5 22°33'31" E, A DISTANCE OF S7.46 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 134;
THENCE S 10°57'25" W, A DISTANCE OF 32.76 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 135;
THENCE S 20°48'32" E, A DISTANCE OF 110.67 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 136;
THENCE S 12°10'40" E, A DISTANCE OF 1S0.48 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 137;
THENCE S 12°37'30" W, A DISTANCE OF 193.19 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 138;
THENCE S 7°11'S9" W, A DISTANCE OF 127.09 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 139;
THENCE S 24°02'53" W, A DISTANCE OF 243.10 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 140;
THENCE N 76°17'24" W, A DISTANCE OF 94.77 FEET TO THE POINT OF BEGINNING;

CONSERVATION EASEMENT CONTAINING 89,951 SQUARE FEET OR 2.065 ACRES MORE OR LESS.

CONSERVATION EASEMENT #13

A PARCEL OF LAND TO BE USED FOR CONSERVATION EASEMENT PURPOSES LOCATED ON LANDS NOW OR FORMERLY OWNED BY NEAL A. MORGAN AND WIFE, AVA MARIE J. MORGAN (A 1/3 INTEREST); FRANKLIN DALE MORGAN A/K/A F. DALE MORGAN (A 1/3 INTEREST); MARTIN C. MORGAN (A 1/6 INTEREST); MARCIA M. MOREHEAD (A 1/6 INTEREST), WITH THOSE TWO 1/6 INTERESTS OWNED AS JTWROS (TAX PIN 8689-87-7949) A5 RECORDED IN BOOK 5755 PAGE 973 FOR MARTIN MORGAN, KATHY MORGAN AND MARCIA MOREHEAD; BOOK 1202 PAGE 563 FOR F. DALE MORGAN; BOOK 5608 PAGE 1682 FOR NEAL AND AVA MORGAN, LOCATED IN LEICESTER TOWNSHIP, BUNCOMBE COUNTY, NORTH CAROLINA AND BEING MORE PARTICULARLY DESCRIBED AS FOLLOW5:

COMMENCING AT NORTH CAROLINA GEODETIC SURVEY STATION BETHEL BASE ARP, WITH NAD 83(2011) STATE PLANE COORDINATES OF X = 840,744.23 AND Y = 649,700.01; THENCE RUNNING N 44°51'48" E FOR A DISTANCE OF 67,S08.37 FEET TO A 5/8" REBAR 5ET WITH ALUMINUM CAP NO. 118, SAID REBAR BEING THE POINT OF BEGINNING;

THENCE N 9°31'48" W, A DISTANCE OF 56.30 FEET TO A CALCULATED POINT;
THENCE N 43°57'31" E, A DISTANCE OF 55.01 FEET TO A CALCULATED POINT;
THENCE N 3°48'17" W, A DISTANCE OF 211.00 FEET TO A CALCULATED POINT;
THENCE N 80°19'27" W, A DISTANCE OF 46.42 FEET TO A CALCULATED POINT;
THENCE N 13°46'25" E, A DISTANCE OF 25.45 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 119;
THENCE S 76°17'24" E, A DISTANCE OF 94.77 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 120;
THENCE S 16°28'00" W, A DISTANCE OF 78.24 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 121;
THENCE S 11°22'55" E, A DISTANCE OF 151.98 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 122;
THENCE S 7°31'21" E, A DISTANCE OF 81.09 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 123;
THENCE S 82°28'39" W, A DISTANCE OF 86.41 FEET TO THE POINT OF BEGINNING;

CONSERVATION EASEMENT CONTAINING 16,599 SQUARE FEET OR 0.381 ACRES MORE OR LESS.

CONSERVATION EASEMENT #14

A PARCEL OF LAND TO BE USED FOR CONSERVATION EASEMENT PURPOSES LOCATED ON LANDS NOW OR FORMERLY OWNED BY NEAL A. MORGAN AND WIFE, AVA MARIE J. MORGAN (A 1/3 INTEREST); FRANKLIN DALE MORGAN A/K/A F. DALE MORGAN (A 1/3 INTEREST); MARTIN C. MORGAN (A 1/6 INTEREST); MARCIA M. MOREHEAD (A 1/6 INTEREST), WITH THOSE TWO 1/6 INTERESTS OWNED AS JTWROS (TAX PIN 8689-87-7949) AS RECORDED IN BOOK 5755 PAGE 973 FOR MARTIN MORGAN, KATHY MORGAN AND MARCIA MOREHEAD; BOOK 1202 PAGE 563 FOR F. DALE MORGAN; BOOK 5608 PAGE 1682 FOR NEAL AND AVA MORGAN, LOCATED IN LEICESTER TOWNSHIP, BUNCOMBE COUNTY, NORTH CAROLINA AND BEING MORE PARTICULARLY DESCRIBED AS FOLLOWS:

COMMENCING AT NORTH CAROLINA GEODETIC SURVEY STATION BETHEL BASE ARP, WITH NAD 83(2011) STATE PLANE COORDINATES OF X = 840,744.23 AND Y = 649,700.01; THENCE RUNNING N 45°10'42" E FOR A DISTANCE OF 67,287.83 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 110, SAID REBAR BEING THE POINT OF BEGINNING;

THENCE N 27°01'49" W, A DISTANCE OF 138.05 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 111;
THENCE N 14°36'31" W, A DISTANCE OF 107.82 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 112;
THENCE N 4°25'04" W, A DISTANCE OF 171.49 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 113;
THENCE N 82°28'39" E, A DISTANCE OF 87.41 FEET TO A S/8" REBAR SET WITH ALUMINUM CAP NO. 114;
THENCE 5 2°42'47" E, A DISTANCE OF 170.01 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 115;
THENCE S 1S°25'24" E, A DISTANCE OF 90.21 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 116;
THENCE S 27°17'28" E, A DISTANCE OF 126.07 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 117;
THENCE S 60°S0'59" W, A DISTANCE OF 84.00 FEET TO THE POINT OF BEGINNING;

CONSERVATION EASEMENT CONTAINING 33,688 SQUARE FEET OR 0.773 ACRES MORE OR LESS.

Exhibit B – Parent Tracts

Parcel Two: PIN 8689-66-3036

First Tract:

All that certain piece, parcel or lot of land, situate, lying and being in Leicester Township, Buncombe County, N.C., adjoining the lands of A.M. Jones, H.P. Coffey, et al, and bounded and more particularly described as follows:

BEGINNING on a stake in the center of an old road, A.M. Jones and R.C. Morgan corner, and runs with Jones line South 66° West 1610 feet to a stake in the said line on top of a ridge; then up with said ridge and Jones' line South 36° 45' West 755 feet; South 13° 30' West 205 feet to a black oak on top of said ridge in the Sluder line; then with the Sluder line South 65° 40' East 600 feet to a stake on face of a cliff, formerly a chestnut oak; then with Sluder line North 44° East 745 feet to a sassafras on ridge; then South 70° 30' East 1105 feet t o a stake on a ridge, H.P. Coffey's corner; then with his line North 20° 30' East 950 feet to a stake in the center of road, R.C. Morgan's corner; then with his line and center of said road, North 39° West 529 feet to a stake in center of said road; then with the center of an old road North 29° West 279 feet to the BEGINNING. Containing 51.4 acres, more or less, and being the land conveyed by B.J. Downs and wife, Cora Downs, to M.A. Daves (single), C.H. Daves (single) and Mark Daves (single), by Deed dated August 9, 1940, and recorded in the Buncombe County Registry 523, page 273.

Second Tract:

All that certain piece, parcel or lot of land, situate, lying and being in Leicestwer Township, Buncombe County, N.C., adjoining lands of J.C. Plemmons, David Cole, Gaston M. Cole, J.H. Cole, et al, and bonded and more particularly described as follows:

BEGINNING on a stake below the barn, J.C. Plemmons' corner, and runs with his line five calls as follows: South 35° 30 West and crossing branch 10.8 poles to a stake; thence North 84° 30' West 20.5 poles to a stake; thence North 41° 15' West 8 poles to a stake; thence North 72° 30' West 18.5 poles to a stake; thence South 6° West and crossing still house branch 36 poles to a large Spanish oak on top of ridge; thence with David Cole's line South 3° West 13 poles to a post oak in a hollow, Gaston M. Cole's corner; thence with his line North 86° 30' West 100 poles to a stone and dogwood pointers; thence with J.H. Cole's line North 2° 45' East 27.3 poles to a locust stump, the Southeast corner of 35 acre tract; thence on with J.H. Cole line South 68° 15' West up top of ridge 78 poles to a stone and pointers; thence North 2° East with O.W. Morgan's line of his Coffey tract 84 poles to a fallen chestnut oak and stone on the North bank of a small branch in old Jones line; thence with said line South 86° 40' East 72.7 poles to a black oak, the Northeast corner of 35 acres tract and the Northwest corner of F. Sluder 63 acres tract; thence with Downs line of his Plemmons tract South 66° 45' East 34.2 poles to a stake at the point of a cliff; thence on with said line North 42° 40' East 45.8 poles to a stake; thence on with said line South 65° 15' East 44.8 poles to a stake on top of the ridge, the West corner of Coffey tract; thence down and with the top of said ridge with said Downs and Coffey line four calls as follows: South 85° 45' East 18.5 poles; thence South 62° East 10 poles; thence South 56° 30' East 9.6 poles; thence

South 48° 15' East 10.3 poles to a large Spanish oak in the old line; thence with said line, it being Coffey's line, as follows: South 11° 30' East 10 poles to a stake at the South edge of the Daves Road; thence with the Southern margin of said Road North 86° 30' West 32.5 poles to the place or point of BEGINNING. Containing 106 ¼ acres, be the same, more or less, and including all of the J.W. Davis, deceased, mountain tract.

Parcel Three: PIN 8689-87-7949

Lying and being in Leicester Township, Buncombe County, North Carolina, and being all of the lands presently owned by Grantors in Leicester Township, Buncombe County, North Carolina, said lands having been acquired by Grantors by Deeds recorded in Deed Book 523, at Page 495, Deed Book 415, at Page 337, Deed Book 530, at Page 367, Deed Book 584, at Page 343, Deed Book 584, at Page 346, Deed Book 642, at Page 79, Deed Book 665, at Page 379, Deed Book 484, at Page 452, Deed Book 550, at Page 23, Deed Book 966, at Page 55, and Deed Book 969, at Page 275, of the Buncombe County Public Registry.

4879-7377-8474, v. 2

Workflow No. 0000789032-0003

Doc ID: 035570970017 Type: CRP
Recorded: 08/25/2022 at 03:46:22 PM
Fee Amt: $623.00 Page 1 of 17
Revenue Tax: $589.00
Workflow# 0000789032-0003
Buncombe County, NC
Drew Reisinger Register of Deeds
BK6252 PG461-477

STATE OF NORTH CAROLINA

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

BUNCOMBE COUNTY

SPO File Number: 11-LA-235
DMS Project Number: 100127
Excise Stamps: $589.00

This instrument prepared by Paul Arena a licensed NC attorney. Delinquent taxes, if any, to be paid by the closing attorney to the County Tax Collector upon disbursement of closing proceeds.

Prepared by: Office of the Attorney General
Property Control Section
Return to: NC Department of Administration
State Property Office c/o MWB Box31
1321 Mail Service Center
Raleigh, NC 27699-1321

THIS DEED OF CONSERVATION EASEMENT AND RIGHT OF ACCESS, made this 24th day of August, 2022, by NEAL A. MORGAN and wife, AVA MARIE J. MORGAN (collectively, "**Grantor**"), whose mailing address is 321 Morgan Branch Road, Leicester, NC 28748, to the STATE OF NORTH CAROLINA ("**Grantee**"), whose mailing address is State of North Carolina, Department of Administration, State Property Office, 1321 Mail Service Center, Raleigh, NC 27699-1321. The designations of Grantor and Grantee as used herein shall include said parties, their heirs, successors, and assigns, and shall include singular, plural, masculine, feminine, or neuter as required by context.

WITNESSETH:

WHEREAS, pursuant to the provisions of N.C. Gen. Stat. § 143-214.8 et seq., the State of North Carolina has established the Division of Mitigation Services (formerly known as the

Ecosystem Enhancement Program and Wetlands Restoration Program) within the Department of Environmental Quality (formerly Department of Environment and Natural Resources) for the purposes of acquiring, maintaining, restoring, enhancing, creating and preserving wetland and riparian resources that contribute to the protection and improvement of water quality, flood prevention, fisheries, aquatic habitat, wildlife habitat, and recreational opportunities; and

WHEREAS, this Conservation Easement from Grantor to Grantee has been negotiated, arranged and provided for as a condition of a full delivery contract between *KCI Technologies Inc., 4505 Falls of Neuse Road, Suite 400, Raleigh NC 27609* and the North Carolina Department of Environmental Quality, to provide stream, wetland and/or buffer mitigation pursuant to the North Carolina Department of Environmental Quality Purchase and Services Contract Number *7909*.

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

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

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

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

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

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

WHEREAS, Grantor owns in fee simple certain real property situated, lying, and being in *Leicester Township, Buncombe County*, North Carolina (the "**Property**"), and being more particularly described as that certain parcels of land containing approximately and collectively 136.970 acres being more particularly described on "**Exhibit B**" attached hereto and incorporated herein; and

WHEREAS, Grantor is willing to grant a Conservation Easement and Right of Access over the herein described areas of the Property, thereby restricting and limiting the use of the areas of the Property subject to the Conservation Easement to the terms and conditions and purposes hereinafter set forth, and Grantee is willing to accept said Easement and Access Rights. The Conservation Easement shall be for the protection and benefit of the waters of ***the French Broad River.***

NOW, THEREFORE, in consideration of the mutual covenants, terms, conditions, and restrictions hereinafter set forth, Grantor unconditionally and irrevocably hereby grants and conveys unto Grantee, its successors and assigns, forever and in perpetuity, a Conservation Easement and Right of Access together with an access easement to and from the Conservation Easement Area described below.

The Conservation Easement Area consists of the following:

Conservation Easement **15** containing a total of **0.838 acres**, Conservation Easement **16** containing a total of **2.479 acres**, Conservation Easement **17** containing a total of **1.273 acres**, Conservation Easement **18** containing a total of **0.702 acres**, Conservation Easement **19** containing a total of **1.865 acres**, Conservation Easement **20** containing a total of **1.006 acres**, Conservation Easement **21** containing a total of **0.802 acres**, Conservation Easement **22** containing a total of **0.828 acres**, Conservation Easement **23** containing a total of **1.399 acres**, Conservation Easement **41** containing a total of **0.041 acres**, and Conservation Easement **42** containing a total of **0.084 acres, or a total combined easement acreage of 11.317 acres**, as shown on the plats of survey entitled "Final Plat, Conservation Easement for State of North Carolina Department of Environmental Quality Division of Mitigation Services, Project Name: Morgan Branch Site, DMS Project No. 100127, SPO File No. 11-LA-232 thru 11-LA-240, Leicester Township, Buncombe County, North Carolina", dated June 14, 2022, by *James M. Gellenthin*, PLS Number L-3860 and recorded in the Buncombe County, North Carolina Register of Deeds at **Plat Book 229, Pages 99-109.**

See attached "**Exhibit A**", Legal Description of area of the Property hereinafter referred to as the "Conservation Easement Area"

The purposes of this Conservation Easement are to maintain, restore, enhance, construct, create and preserve wetland and/or riparian resources in the Conservation Easement Area that contribute to the protection and improvement of water quality, flood prevention, fisheries, aquatic habitat, wildlife habitat, and recreational opportunities; to maintain permanently the Conservation Easement Area in its natural condition, consistent with these purposes; and to prevent any use of the Easement Area that will significantly impair or interfere with these purposes. To achieve these purposes, the following conditions and restrictions are set forth:

I. DURATION OF EASEMENT

Pursuant to law, including the above referenced statutes, this Conservation Easement and Right of Access shall be perpetual and it shall run with, and be a continuing restriction upon the use of, the Property, and it shall be enforceable by the Grantee against the Grantor and against Grantor's heirs, successors and assigns, personal representatives, agents, lessees, and licensees.

II. ACCESS EASEMENT

Grantor hereby grants and conveys unto Grantee, its employees, agents, successors and assigns, a perpetual, non-exclusive easement for ingress and egress over and upon the Property at all reasonable times and at such location as practically necessary to access the Conservation Easement Area for the purposes set forth herein ("**Access Easement**"). This grant of easement shall not vest any rights in the public and shall not be construed as a public dedication of the Access Easement. Grantor covenants, represents and warrants that it is the sole owner of and is seized of the Property in fee simple and has the right to grant and convey this Access Easement.

III. GRANTOR RESERVED USES AND RESTRICTED ACTIVITIES

The Conservation Easement Area shall be restricted from any development or usage that would impair or interfere with the purposes of this Conservation Easement. Unless expressly reserved as a compatible use herein, any activity in, or use of, the Conservation Easement Area by the Grantor is prohibited as inconsistent with the purposes of this Conservation Easement. Any rights not expressly reserved hereunder by the Grantor have been acquired by the Grantee. Any rights not expressly reserved hereunder by the Grantor, including the rights to all mitigation credits, including, but not limited to, stream, wetland, and riparian buffer mitigation units, derived from each site within the area of the Conservation Easement, are conveyed to and belong to the Grantee. Without limiting the generality of the foregoing, the following specific uses are prohibited, restricted, or reserved as indicated:

A. Recreational Uses. Grantor expressly reserves the right to undeveloped recreational uses, including hiking, bird watching, hunting and fishing, and access to the Conservation Easement Area for the purposes thereof.

B. Motorized Vehicle Use. Motorized vehicle use in the Conservation Easement Area is prohibited except within a Crossing Area(s) or Road or Trail as shown on the recorded survey plat.

C. **Educational Uses.** The Grantor reserves the right to engage in and permit others to engage in educational uses in the Conservation Easement Area not inconsistent with this Conservation Easement, and the right of access to the Conservation Easement Area for such purposes including organized educational activities such as site visits and observations. Educational uses of the property shall not alter vegetation, hydrology or topography of the site.

D. **Damage to Vegetation.** Except within Crossing Area(s) as shown on the recorded survey plat and as related to the removal of non-native plants, diseased or damaged trees, or vegetation that destabilizes or renders unsafe the Conservation Easement Area to persons or natural habitat, all cutting, removal, mowing, harming, or destruction of any trees and vegetation in the Conservation Easement Area is prohibited.

E. **Industrial, Residential and Commercial Uses.** All industrial, residential and commercial uses are prohibited in the Conservation Easement Area.

F. **Agricultural Use.** All agricultural uses are prohibited within the Conservation Easement Area including any use for cropland, waste lagoons, or pastureland.

G. **New Construction.** There shall be no building, facility, mobile home, antenna, utility pole, tower, or other structure constructed or placed in the Conservation Easement Area.

H. **Roads and Trails.** There shall be no construction or maintenance of new roads, trails, walkways, or paving in the Conservation Easement.

All existing roads, trails and crossings within the Conservation Easement Area shall be shown on the recorded survey plat.

I. **Signs.** No signs shall be permitted in the Conservation Easement Area except interpretive signs describing restoration activities and the conservation values of the Conservation Easement Area, signs identifying the owner of the Property and the holder of the Conservation Easement, signs giving directions, or signs prescribing rules and regulations for the use of the Conservation Easement Area.

J. **Dumping or Storing.** Dumping or storage of soil, trash, ashes, garbage, waste, abandoned vehicles, appliances, machinery, or any other material in the Conservation Easement Area is prohibited.

K. **Grading, Mineral Use, Excavation, Dredging.** There shall be no grading, filling, excavation, dredging, mining, drilling, hydraulic fracturing; removal of topsoil, sand, gravel, rock, peat, minerals, or other materials.

L. **Water Quality and Drainage Patterns.** There shall be no diking, draining, dredging, channeling, filling, leveling, pumping, impounding or diverting, causing, allowing or permitting the diversion of surface or underground water in the Conservation Easement Area. No altering or tampering with water control structures or devices, or disruption or alteration of the restored, enhanced, or created drainage patterns is allowed. All removal of wetlands, polluting or

discharging into waters, springs, seeps, or wetlands, or use of pesticide or biocides in the Conservation Easement Area is prohibited. In the event of an emergency interruption or shortage of all other water sources, water from within the Conservation Easement Area may temporarily be withdrawn for good cause shown as needed for the survival of livestock on the Property.

M. Subdivision and Conveyance. Grantor voluntarily agrees that no further subdivision, partitioning, or dividing of the Conservation Easement Area portion of the Property owned by the Grantor in fee simple ("fee") that is subject to this Conservation Easement is allowed. Any future transfer of the Property shall be subject to this Conservation Easement and Right of Access and to the Grantee's right of unlimited and repeated ingress and egress over and across the Property to the Conservation Easement Area for the purposes set forth herein.

N. Development Rights. All development rights are permanently removed from the Conservation Easement Area and are non-transferrable.

O. Disturbance of Natural Features. Any change, disturbance, alteration or impairment of the natural features of the Conservation Easement Area or any intentional introduction of non-native plants, trees and/or animal species by Grantor is prohibited.

The Grantor may request permission to vary from the above restrictions for good cause shown, provided that any such request is not inconsistent with the purposes of this Conservation Easement, and the Grantor obtains advance written approval from the Division of Mitigation Services, 1652 Mail Services Center, Raleigh, NC 27699-1652.

IV. GRANTEE RESERVED USES

A. Right of Access, Construction, and Inspection. The Grantee, its employees, agents, successors and assigns, shall have a perpetual Right of Access over and upon the Conservation Easement Area to undertake or engage in any activities necessary to construct, maintain, manage, enhance, repair, restore, protect, monitor and inspect the stream, wetland and any other riparian resources in the Conservation Easement Area for the purposes set forth herein or any long-term management plan for the Conservation Easement Area developed pursuant to this Conservation Easement.

B. Restoration Activities. These activities include planting of trees, shrubs and herbaceous vegetation, installation of monitoring wells, utilization of heavy equipment to grade, fill, and prepare the soil, modification of the hydrology of the site, and installation of natural and manmade materials as needed to direct in-stream, above ground, and subterraneous water flow.

C. Signs. The Grantee, its employees and agents, successors or assigns, shall be permitted to place signs and witness posts on the Property to include any or all of the following: describe the project, prohibited activities within the Conservation Easement, or identify the project boundaries and the holder of the Conservation Easement.

D. Fences. Conservation Easements are purchased to protect the investments by the State (Grantee) in natural resources. Livestock within conservations easements damages the

investment and can result in reductions in natural resource value and mitigation credits which would cause financial harm to the State. Therefore, Landowners (Grantor) with livestock are required to restrict livestock access to the Conservation Easement area. Repeated failure to do so may result in the State (Grantee) repairing or installing livestock exclusion devices (fences) within the conservation area for the purpose of restricting livestock access. In such cases, the landowner (Grantor) must provide access to the State (Grantee) to make repairs.

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

V. ENFORCEMENT AND REMEDIES

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

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

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

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

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

VI. MISCELLANEOUS

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

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

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

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

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

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

request to void or modify this Conservation Easement. Such notifications and modification requests shall be addressed to:

Division of Mitigation Services Program Manager
NC State Property Office
1321 Mail Service Center
Raleigh, NC 27699-1321

and

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

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

VII. QUIET ENJOYMENT

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

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

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

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

_____ (SEAL)
Neal A. Morgan

_____ (SEAL)
Ava Marie J. Morgan

NORTH CAROLINA
COUNTY OF Buncombe

I, Peter U. Kanipe, a Notary Public in and for the County and State aforesaid, do hereby certify that Neal A. Morgan, Grantor, personally appeared before me this day and acknowledged the execution of the foregoing instrument.

IN WITNESS WHEREOF, I have hereunto set my hand and Notary Seal this the 25th day of July, 2022.

_____
Notary Public

My commission expires: _____

Peter U Kanipe
NOTARY PUBLIC
Buncombe County, NC
My Commission Expires June 08, 2024

NORTH CAROLINA
COUNTY OF Buncombe

I, Peter U. Kanipe, a Notary Public in and for the County and State aforesaid, do hereby certify that Ava Marie J. Morgan, Grantor, personally appeared before me this day and acknowledged the execution of the foregoing instrument. **IN WITNESS WHEREOF**, I have hereunto set my hand and Notary Seal this the 25th day of July, 2022.

_____
Notary Public

My commission expires: _____

Peter U Kanipe
NOTARY PUBLIC
Buncombe County, NC
My Commission Expires June 08, 2024

Exhibit A

Legal Description of area of the Property hereinafter referred to as the "Conservation Easement Area"

CONSERVATION EASEMENT #15

A PARCEL OF LAND TO BE USED FOR CONSERVATION EASEMENT PURPOSES LOCATED ON LANDS NOW OR FORMERLY OWNED BY NEAL A. MORGAN AND WIFE, AVA MARIE J. MORGAN (TAX PIN 8689-48-8018) AS RECORDED IN BOOK 5608 PAGE 1682; LESS AND EXCEPT BOOK 2688 PAGE 430, LOCATED IN LEICESTER TOWNSHIP, BUNCOMBE COUNTY, NORTH CAROLINA AND BEING MORE PARTICULARLY DESCRIBED AS FOLLOWS:

COMMENCING AT NORTH CAROLINA GEODETIC SURVEY STATION BETHEL BASE ARP, WITH NAD 83(2011) STATE PLANE COORDINATES OF X = 840,744.23 AND Y = 649,700.01; THENCE RUNNING N 40°58'10" E FOR A DISTANCE OF 63,668.36 FEET TO A CALCULATED POINT, SAID POINT BEING THE POINT OF BEGINNING;

THENCE N 6°33'29" E, A DISTANCE OF 87.59 FEET TO A CALCULATED POINT;
THENCE N 80°13'51" E, A DISTANCE OF 60.04 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 141;
THENCE N 86°35'42" E, A DISTANCE OF 165.61 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 142;
THENCE N 63°41'09" E, A DISTANCE OF 206.00 FEET TO A 5/8" REBAR 5ET WITH ALUMINUM CAP NO. 143;
THENCE N 85°26'05" E, A DISTANCE OF 76.19 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 144;
THENCE S 19°21'34" W, A DISTANCE OF 34.62 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 145;
THENCE S 7°04'07" E, A DISTANCE OF 38.00 FEET TO A 5/8" REBAR 5ET WITH ALUMINUM CAP NO. 146;
THENCE S 82°51'22" W, A DISTANCE OF 30.7S FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 147;
THENCE S 64°S7'50" W, A DISTANCE OF 99.50 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 148;
THENCE S 75°50'59" W, A DISTANCE OF 44.13 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 149;
THENCE S 70°12'05" W, A DISTANCE OF 76.59 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 150;
THENCE S 79°04'17" W, A DISTANCE OF 125.87 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 151;
THENCE S 74°10'15" W, A DISTANCE OF 86.77 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 152;
THENCE S 85°10'23" W, A DISTANCE OF 45.87 FEET TO THE POINT OF BEGINNING;

CONSERVATION EASEMENT CONTAINING 36,487 SQUARE FEET OR 0.838 ACRES MORE OR LESS.

CONSERVATION EASEMENT #16

A PARCEL OF LAND TO BE USED FOR CONSERVATION EASEMENT PURPOSES LOCATED ON LANDS NOW OR FORMERLY OWNED BY NEAL A. MORGAN AND WIFE, AVA MARIE J. MORGAN (TAX PIN 8689-48-8018) AS RECORDED IN BOOK 5608 PAGE 1682; LESS AND EXCEPT BOOK 2688 PAGE 430, LOCATED IN LEICESTER TOWNSHIP, BUNCOMBE COUNTY, NORTH CAROLINA AND BEING MORE PARTICULARLY DESCRIBED AS FOLLOWS:

COMMENCING AT NORTH CAROLINA GEODETIC SURVEY STATION BETHEL BASE ARP, WITH NAD 83(2011) STATE PLANE COORDINATES OF X = 840,744.23 AND Y = 649,700.01; THENCE RUNNING N 41°14'50" E FOR A DISTANCE OF 64,123.98 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 153, SAID REBAR BEING THE POINT OF BEGINNING;

THENCE N 7°04'07" W, A DISTANCE OF 27.37 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 154;
THENCE N 19°21'34" E, A DISTANCE OF 45.01 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 155;
THENCE N 71°40'17" E, A DISTANCE OF 241.03 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 156;
THENCE N 88°44'11" E, A DISTANCE OF 121.34 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 157;
THENCE S 71°05'51" E, A DISTANCE OF 123.02 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 158;

THENCE N 87°51'26" E, A DISTANCE OF 177.01 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 159;
THENCE S 83°02'13" E, A DISTANCE OF 221.52 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 160;
THENCE 5 80°09'08" E, A DISTANCE OF 312.59 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 161;
THENCE S 68°33'16" W, A DISTANCE OF 169.56 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 162;
THENCE N 76°07'40" W, A DISTANCE OF 133.63 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 163;
THENCE S 87°02'35" W, A DISTANCE OF 111.45 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 164;
THENCE N 80°26'42" W, A DISTANCE OF 186.47 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 16S;
THENCE S 87°28'29" W, A DISTANCE OF 86.29 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 166;
THENCE S 71°22'S9" W, A DISTANCE OF 46.76 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 167;
THENCE S 81°17'08" W, A DISTANCE OF 64.16 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 168;
THENCE S 86°35'13" W, A DISTANCE OF S6.77 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 169;
THENCE N 71°39'27" W, A DISTANCE OF 59.3S FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 170;
THENCE N 80°1S'48" W, A DISTANCE OF 64.23 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 171;
THENCE S 86°23'14" W, A DISTANCE OF 92.03 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 172;
THENCE S 79°41'01" W, A DISTANCE OF 92.64 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 173;
THENCE S 83°46'06" W, A DISTANCE OF 47.13 FEET TO THE POINT OF BEGINNING;

CONSERVATION EASEMENT CONTAINING 107,998 SQUARE FEET OR 2.479 ACRES MORE OR LESS.

CONSERVATION EASEMENT #17

A PARCEL OF LAND TO BE USED FOR CONSERVATION EASEMENT PURPOSES LOCATED ON LANDS NOW OR FORMERLY OWNED BY NEAL A. MORGAN AND WIFE, AVA MARIE J. MORGAN (TAX PIN 8689-48-8018) A5 RECORDED IN BOOK 5608 PAGE 1682; LESS AND EXCEPT BOOK 2688 PAGE 430, LOCATED IN LEICESTER TOWNSHIP, BUNCOMBE COUNTY, NORTH CAROLINA AND BEING MORE PARTICULARLY DESCRIBED AS FOLLOWS:

COMMENCING AT NORTH CAROLINA GEODETIC SURVEY STATION BETHEL BASE ARP, WITH NAD 83(2011) STATE PLANE COORDINATES OF X = 840,744.23 AND Y = 649,700.01; THENCE RUNNING N 41°57'59" E FOR A DISTANCE OF 64,765.33 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 174, SAID REBAR BEING THE POINT OF BEGINNING;

THENCE N 68°33'16" E, A DISTANCE OF 197.04 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 175;
THENCE S 83°19'26" E, A DISTANCE OF 63.39 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 176;
THENCE S 62°49'06" E, A DISTANCE OF 70.05 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 177;
THENCE N 61°37'26" E, A DISTANCE OF 106.25 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 178;
THENCE N 80°37'37" E, A DISTANCE OF 334.26 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 179;
THENCE S 87°35'28" E, A DISTANCE OF 112.93 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 180;
THENCE S 57°27'56" E, A DISTANCE OF 140.15 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 181;
THENCE S 58°30'39" W, A DISTANCE OF 93.88 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 182;
THENCE N 76°34'51" W, A DISTANCE OF S2.77 FEET TO A CALCULATED POINT;
THENCE N 15°49'29" W, A DISTANCE OF 94.75 FEET TO A CALCULATED POINT;
THENCE S 77°37'32" W, A DISTANCE OF 294.23 FEET TO A CALCULATED POINT;
THENCE N 12°19'49" W, A DISTANCE OF 5.45 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 183;
THENCE S 77°40'11" W, A DISTANCE OF 19.64 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 184;
THENCE S 12°19'49" E, A DISTANCE OF S.47 FEET TO A CALCULATED POINT;
THENCE S 77°37'32" W, A DISTANCE OF 275.45 FEET TO A CALCULATED POINT;
THENCE S 32°58'19" W, A DISTANCE OF 47.27 FEET TO A 5/8" CALCULATED POINT;
THENCE N 75°10'39" W, A DISTANCE OF 211.42 FEET TO THE POINT OF BEGINNING;

CONSERVATION EASEMENT CONTAINING 5S,431 SQUARE FEET OR 1.273 ACRES MORE OR LESS.

CONSERVATION EASEMENT #18

A PARCEL OF LAND TO BE USED FOR CONSERVATION EASEMENT PURPOSES LOCATED ON LANDS NOW OR FORMERLY OWNED BY NEAL A. MORGAN AND WIFE, AVA MARIE J. MORGAN (TAX PIN 8689-48-8018) AS RECORDED IN BOOK 5608 PAGE 1682; LESS AND EXCEPT BOOK 2688 PAGE 430, LOCATED IN LEICESTER TOWNSHIP, BUNCOMBE COUNTY, NORTH CAROLINA AND BEING MORE PARTICULARLY DESCRIBED AS FOLLOWS:

COMMENCING AT NORTH CAROLINA GEODETIC SURVEY STATION BETHEL BASE ARP, WITH NAD 83(2011) STATE PLANE COORDINATES OF X = 840,744.23 AND Y = 649,700.01; THENCE RUNNING N 42°35'28" E FOR A DISTANCE OF 65,364.36 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 185, 5AID REBAR BEING THE POINT OF BEGINNING;

THENCE N 58°30'39" E, A DISTANCE OF 103.18 FEET TO A S/8" REBAR SET WITH ALUMINUM CAP NO. 186;
THENCE N 53°33'22" E, A DISTANCE OF 133.66 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 187;
THENCE N 67°01'15" E, A DISTANCE OF 75.93 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 188;
THENCE S 23°19'34" E, A DISTANCE OF 85.07 FEET TO A S/8" REBAR SET WITH ALUMINUM CAP NO. 189;
THENCE S 37°20'24" W, A DISTANCE OF 133.23 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 190;
THENCE S 82°02'54" W, A DISTANCE OF 152.45 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 191;
THENCE N S7°54'33" W, A DISTANCE OF 79.43 FEET TO THE POINT OF BEGINNING;

CONSERVATION EASEMENT CONTAINING 30,585 SQUARE FEET OR 0.702 ACRES MORE OR LESS.

CONSERVATION EASEMENT #19

A PARCEL OF LAND TO BE USED FOR CONSERVATION EASEMENT PURPOSES LOCATED ON LANDS NOW OR FORMERLY OWNED BY NEAL A. MORGAN AND WIFE, AVA MARIE J. MORGAN (TAX PIN 8689-48-8018) AS RECORDED IN BOOK 5608 PAGE 1682; LESS AND EXCEPT BOOK 2688 PAGE 430, LOCATED IN LEICESTER TOWNSHIP, BUNCOMBE COUNTY, NORTH CAROLINA AND BEING MORE PARTICULARLY DESCRIBED AS FOLLOWS:

COMMENCING AT NORTH CAROLINA GEODETIC SURVEY STATION BETHEL BASE ARP, WITH NAD 83(2011) STATE PLANE COORDINATES OF X = 840,744.23 AND Y = 649,700.01; THENCE RUNNING N 42°45'23" E FOR A DISTANCE OF 65,666.97 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 192, SAID REBAR BEING THE POINT OF BEGINNING;

THENCE N 23°19'34" W, A DISTANCE OF 110.49 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 193;
THENCE N 76°15'26" E, A DISTANCE OF 205.89 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 194;
THENCE S 45°12'00" E, A DISTANCE OF 79.15 FEET TO A S/8" REBAR SET WITH ALUMINUM CAP NO. 195;
THENCE S 49°37'00" E, A DISTANCE OF 106.95 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 79;
THENCE S 49°37'00" E, A DISTANCE OF 178.70 FEET TO A CALCULATED POINT;
THENCE N 84°20'00" E, A DISTANCE OF 113.59 FEET TO A CALCULATED POINT;
THENCE S 63°19'00" E, A DISTANCE OF 138.73 FEET TO A CALCULATED POINT;
THENCE N 86°23'00" E, A DISTANCE OF 131.82 FEET TO A CALCULATED POINT;
THENCE N 62°56'00" E, A DISTANCE OF 48.46 FEET TO A CALCULATED POINT;
THENCE S 30°14'20" E, A DISTANCE OF 51.73 FEET TO A S/8" REBAR SET WITH ALUMINUM CAP NO. 196;
THENCE S 35°48'33" W, A DISTANCE OF 112.85 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 197;
THENCE S 74°26'38" W, A DISTANCE OF 31.38 FEET TO A S/8" REBAR SET WITH ALUMINUM CAP NO. 198;
THENCE N 75°37'28" W, A DISTANCE OF 82.61 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 199;
THENCE N 30°40'18" E, A DISTANCE OF 52.86 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 200;
THENCE N 80°43'25" W, A DISTANCE OF 70.12 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 201;
THENCE S 44°16'45" W, A DISTANCE OF S7.10 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 202;
THENCE N 45°43'1S" W, A DISTANCE OF 90.00 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 203;
THENCE N 18°55'09" W, A DISTANCE OF 74.70 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 204;
THENCE S 79°58'19" W, A DISTANCE OF 48.16 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 205;

THENCE S 68°32'07" W, A DISTANCE OF 104.36 FEET TO A S/8" REBAR SET WITH ALUMINUM CAP NO. 206;
THENCE N S8°10'59" W, A DISTANCE OF 226.72 FEET TO A S/8" REBAR SET WITH ALUMINUM CAP NO. 207;
THENCE N 85°57'30" W, A DISTANCE OF 183.96 FEET TO THE POINT OF BEGINNING;

CONSERVATION EASEMENT CONTAINING 81,243 SQUARE FEET OR 1.865 ACRES MORE OR LESS.

CONSERVATION EASEMENT #20

A PARCEL OF LAND TO BE USED FOR CONSERVATION EASEMENT PURPOSES LOCATED ON LANDS NOW OR FORMERLY OWNED BY NEAL A. MORGAN AND WIFE, AVA MARIE J. MORGAN (TAX PIN 8689-48-8018) AS RECORDED IN BOOK 5608 PAGE 1682; LESS AND EXCEPT BOOK 2688 PAGE 430, LOCATED IN LEICESTER TOWNSHIP, BUNCOMBE COUNTY, NORTH CAROLINA AND BEING MORE PARTICULARLY DESCRIBED AS FOLLOWS:

COMMENCING AT NORTH CAROLINA GEODETIC SURVEY STATION BETHEL BASE ARP, WITH NAD 83(2011) STATE PLANE COORDINATES OF X = 840,744.23 AND Y = 649,700.01; THENCE RUNNING N 43°09'23" E FOR A DISTANCE OF 6S,413.11 FEET TO A S/8" REBAR SET WITH ALUMINUM CAP NO. 208, SAID REBAR BEING THE POINT OF BEGINNING;

THENCE N 21°49'50" W, A DISTANCE OF 90.00 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 209;
THENCE N 68°10'10" E, A DISTANCE OF 292.20 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 210;
THENCE N 44°16'45" E, A DISTANCE OF 159.34 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 211;
THENCE S 85°40'1S" E, A DISTANCE OF 28.98 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 212;
THENCE S 45°43'15" E, A DISTANCE OF 67.79 FEET TO A 5/8" REBAR 5ET WITH ALUMINUM CAP NO. 213;
THENCE S 44°16'45" W, A DISTANCE OF 196.99 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 214;
THENCE S 68°10'10" W, A DISTANCE OF 311.24 FEET TO THE POINT OF BEGINNING;

CONSERVATION EASEMENT CONTAINING 43,820 5QUARE FEET OR 1.006 ACRES MORE OR LESS.

CONSERVATION EASEMENT #21

A PARCEL OF LAND TO BE USED FOR CONSERVATION EASEMENT PURPOSES LOCATED ON LANDS NOW OR FORMERLY OWNED BY NEAL A. MORGAN AND WIFE, AVA MARIE J. MORGAN (TAX PIN 8689-48-8018) AS RECORDED IN BOOK 5608 PAGE 1682; LESS AND EXCEPT BOOK 2688 PAGE 430, LOCATED IN LEICESTER TOWN5HIP, BUNCOMBE COUNTY, NORTH CAROLINA AND BEING MORE PARTICULARLY DE5CRIBED AS FOLLOW5:

COMMENCING AT NORTH CAROLINA GEODETIC SURVEY 5TATION BETHEL BASE ARP, WITH NAD 83(2011) STATE PLANE COORDINATES OF X = 840,744.23 AND Y = 649,700.01; THENCE RUNNING N 43°03'56" E FOR A DISTANCE OF 65,091.65 FEET TO A CALCULATED POINT, SAID POINT BEING THE POINT OF BEGINNING;

THENCE N 29°55'55" W, A DISTANCE OF 127.19 FEET TO A CALCULATED POINT;
THENCE N 9°28'48" W, A DISTANCE OF 5S.37 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 218;
THENCE S 79°56'59" E, A DISTANCE OF 90.42 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 219;
THENCE N 68°10'10" E, A DISTANCE OF 234.40 FEET TO A S/8" REBAR SET WITH ALUMINUM CAP NO. 215;
THENCE S 21°49'50" E, A DISTANCE OF 90.00 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 216;
THENCE S 68°10'10" W, A DISTANCE OF 205.77 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 217;
THENCE 5 24°31'12" W, A DISTANCE OF 109.40 FEET TO A CALCULATED POINT;
THENCE N 53°03'55" W, A DI5TANCE OF 38.89 FEET TO THE POINT OF BEGINNING;

CONSERVATION EASEMENT CONTAINING 34,956 SQUARE FEET OR 0.802 ACRES MORE OR LESS.

CONSERVATION EASEMENT #22

A PARCEL OF LAND TO BE USED FOR CONSERVATION EASEMENT PURPOSES LOCATED ON LANDS NOW OR FORMERLY OWNED BY NEAL A. MORGAN AND WIFE, AVA MARIE J. MORGAN (TAX PIN 8689-48-8018) AS RECORDED IN BOOK S608 PAGE 1682; LESS AND EXCEPT BOOK 2688 PAGE 430, LOCATED IN LEICESTER TOWNSHIP, BUNCOMBE COUNTY, NORTH CAROLINA AND BEING MORE PARTICULARLY DESCRIBED AS FOLLOWS:

COMMENCING AT NORTH CAROLINA GEODETIC SURVEY STATION BETHEL BASE ARP, WITH NAD 83(2011) STATE PLANE COORDINATES OF X = 840,744.23 AND Y = 649,700.01; THENCE RUNNING N 43°21'37" E FOR A DISTANCE OF 64,848.61 FEET TO A S/8" REBAR SET WITH ALUMINUM CAP NO. 220, SAID REBAR BEING THE POINT OF BEGINNING;

THENCE N 6°08'08" E, A DISTANCE OF 92.09 FEET TO A S/8" REBAR SET WITH ALUMINUM CAP NO. 221;
THENCE N 71°54'02" E, A DISTANCE OF S2.48 FEET TO A CALCULATED POINT;
THENCE N 71°33'21" E, A DISTANCE OF 130.32 FEET TO A 5/8" REBAR IRON PIN FOUND;
THENCE N 26°07'07" W, A DISTANCE OF 30.02 FEET TO A CALCULATED POINT;
THENCE N 67°11'01" E, A DISTANCE OF 24.41 FEET TO A S/8" REBAR SET WITH ALUMINUM CAP NO. 223;
THENCE N S6°42'09" E, A DISTANCE OF 103.37 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 224;
THENCE N 76°25'22" E, A DISTANCE OF 135.63 FEET TO A S/8" REBAR SET WITH ALUMINUM CAP NO. 225;
THENCE S 11°20'25" E, A DISTANCE OF 85.73 FEET TO A S/8" REBAR SET WITH ALUMINUM CAP NO. 226;
THENCE S 78°33'06" W, A DISTANCE OF 122.72 FEET TO A S/8" REBAR SET WITH ALUMINUM CAP NO. 227;
THENCE S S0°00'21" W, A DISTANCE OF 83.0S FEET TO A S/8" REBAR SET WITH ALUMINUM CAP NO. 228;
THENCE S 71°S4'12" W, A DISTANCE OF 97.21 FEET TO A S/8" REBAR SET WITH ALUMINUM CAP NO. 229;
THENCE S 63°34'12" W, A DISTANCE OF 7S.71 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 230;
THENCE S 7°23'47" W, A DISTANCE OF S4.01 FEET TO A S/8" REBAR SET WITH ALUMINUM CAP NO. 231;
THENCE N 86°09'39" W, A DISTANCE OF 76.85 FEET TO THE POINT OF BEGINNING;

CONSERVATION EASEMENT CONTAINING 36,060 SQUARE FEET OR 0.828 ACRES MORE OR LESS.

CONSERVATION EASEMENT #23

A PARCEL OF LAND TO BE USED FOR CONSERVATION EASEMENT PURPOSES LOCATED ON LANDS NOW OR FORMERLY OWNED BY NEAL A. MORGAN AND WIFE, AVA MARIE J. MORGAN (TAX PIN 8689-48-8018) AS RECORDED IN BOOK S608 PAGE 1682; LESS AND EXCEPT BOOK 2688 PAGE 430, LOCATED IN LEICESTER TOWNSHIP, BUNCOMBE COUNTY, NORTH CAROLINA AND BEING MORE PARTICULARLY DESCRIBED AS FOLLOWS:

COMMENCING AT NORTH CAROLINA GEODETIC SURVEY STATION BETHEL BASE ARP, WITH NAD 83(2011) STATE PLANE COORDINATES OF X = 840,744.23 AND Y = 649,700.01; THENCE RUNNING N 43°32'03" E FOR A DISTANCE OF 65,304.86 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 232, SAID REBAR BEING THE POINT OF BEGINNING;

THENCE N 11°20'25" W, A DISTANCE OF 84.97 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 233;
THENCE N 81°45'22" E, A DISTANCE OF 57.50 FEET TO A S/8" REBAR SET WITH ALUMINUM CAP NO. 234;
THENCE N 26°02'47" E, A DISTANCE OF 64.61 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 23S;
THENCE N 2°33'18" E, A DISTANCE OF 144.44 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 236;
THENCE N 29°08'12" E, A DISTANCE OF 136.85 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 237;
THENCE N 41°50'52" E, A DISTANCE OF 99.18 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 238;
THENCE N 29°02'07" E, A DISTANCE OF 139.94 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 239;
THENCE S 7S°37'28" E, A DISTANCE OF 93.11 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 240;
THENCE S 29°02'07" W, A DISTANCE OF 172.53 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 241;
THENCE S 42°39'29" W, A DISTANCE OF 105.34 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 242;
THENCE S 26°02'02" W, A DISTANCE OF 113.25 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 243;

THENCE S 1°54'39" W, A DISTANCE OF 133.94 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 244;
THENCE S 33°23'25" W, A DISTANCE OF 129.97 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 245;
THENCE S 80°3S'49" W, A DISTANCE OF 86.26 FEET TO THE POINT OF BEGINNING;

CONSERVATION EASEMENT CONTAINING 60,944 SQUARE FEET OR 1.399 ACRES MORE OR LESS.

CONSERVATION EASEMENT #41

A PARCEL OF LAND TO BE USED FOR CONSERVATION EASEMENT PURPOSES LOCATED ON LANDS NOW OR FORMERLY OWNED BY NEAL ALAN MORGAN AND WIFE, AVA MARIE MORGAN (TAX PIN 8689-45-0160) AS RECORDED IN BOOK 2688, PAGE 430, LOCATED IN LEICESTER TOWNSHIP, BUNCOMBE COUNTY, NORTH CAROLINA AND BEING MORE PARTICULARLY DESCRIBED AS FOLLOWS:

COMMENCING AT NORTH CAROLINA GEODETIC SURVEY STATION BETHEL BASE ARP, WITH NAD 83(2011) STATE PLANE COORDINATES OF X = 840,744.23 AND Y = 649,700.01; THENCE RUNNING N 43°06'57" E FOR A DISTANCE OF 6S,040.9S FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 349, SAID REBAR BEING THE POINT OF BEGINNING;

THENCE N 28°32'37" W, A DISTANCE OF 46.29 FEET TO A CALCULATED POINT;
THENCE N 23°03'22" E, A DISTANCE OF 38.44 FEET TO A CALCULATED POINT;
THENCE S S3°03'SS" E, A DISTANCE OF 38.89 FEET TO A CALCULATED POINT;
THENCE S 24°31'12" W, A DISTANCE OF S7.88 FEET TO THE POINT OF BEGINNING;

CONSERVATION EASEMENT CONTAINING 1,797 SQUARE FEET OR 0.041 ACRES MORE OR LESS.

CONSERVATION EASEMENT #42

A PARCEL OF LAND TO BE USED FOR CONSERVATION EASEMENT PURPOSES LOCATED ON LANDS NOW OR FORMERLY OWNED BY NEAL ALAN MORGAN AND WIFE, AVA MARIE MORGAN (TAX PIN 8689-45-0160) AS RECORDED IN BOOK 2688, PAGE 430, LOCATED IN LEICESTER TOWNSHIP, BUNCOMBE COUNTY, NORTH CAROLINA AND BEING MORE PARTICULARLY DESCRIBED AS FOLLOWS:

COMMENCING AT NORTH CAROLINA GEODETIC SURVEY STATION BETHEL BASE ARP, WITH NAD 83(2011) STATE PLANE COORDINATES OF X = 840,744.23 AND Y = 649,700.01; THENCE RUNNING N 43°18'40" E FOR A DISTANCE OF 64,921.96 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 221, SAID REBAR BEING THE POINT OF BEGINNING;

THENCE N 53°03'43" E, A DISTANCE OF 64.41 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 222;
THENCE N 67°11'01" E, A DISTANCE OF 118.0S FEET TO A CALCULATED POINT;
THENCE S 26°07'07" E, A DISTANCE OF 30.02 FEET TO A 5/8" REBAR IRON PIN FOUND;
THENCE S 71°33'21" W, A DISTANCE OF 130.32 FEET TO A CALCULATED POINT;
THENCE S 71°54'02" W, A DISTANCE OF 52.48 FEET TO THE POINT OF BEGINNING;

CONSERVATION EASEMENT CONTAINING 3,666 SQUARE FEET OR 0.084 ACRES MORE OR LESS.

Exhibit B – Parent Tracts

Parcel Four: PIN 8689-48-8018

BEING that parcel consisting of 136.97 acres, more or less, and known in the Buncombe County Tax Office records as PIN # 8689-00-37-3843.000. Said parcel consists of two tracts, described as follows:

Tract One:

Said tract consists of Grantor's entire interest in that parcel conveyed to them by Wachovia Bank and Trust Company, as executor for the Will of Carrie Morgan, by a North Carolina Warranty Deed, dated July 17, 1980, and recorded in the Buncombe County Registry, Deed Book 1248, at Page 639, reference to which is included herein for a more exact description.

Tract Two:

Said tract consists of Grantors' entire interest in that parcel conveyed to them by Carrie Morgan, now deceased, by a North Carolina Warranty Deed, dated March 26, 1973, and recorded in the Buncombe County Registry, Deed Book 1078, at Page 205, reference to which is included herein for a more exact description.

LESS AND EXCEPT all that property described in Deed Book 2688, at Page 430, of the Buncombe County Registry.

Parcel Eleven: PIN 8689-45-0160

Beginning at the most eastern corner of that property described in Deed Book 1092 at Page 311 of the Buncombe County, North Carolina Public Registry and from said point of beginning thus established, runs South 71 deg. 53' 35" West 146.91 feet to a #5 rebar; thence North 33 deg. 23' 33" West 158.53 feet to a #5 rebar; thence North 23 deg. 02' 58" East 151.81 feet to a point located within the center of 16 foot right of way; thence North 23 deg. 02' 58" East 77.91 feet to a #5 rebar; thence South 53 deg. 04' 22" East 45.58 feet to a point; thence South 53 deg. 04' 22" East 221.08 feet to a #5 rebar; thence South 26 deg. 07' 34" East 107.63 feet to a #5 rebar; thence South 71 deg. 32' 54" West 130.32 feet to the point and place of beginning containing 1.535 acres, more or less, as shown on a survey dated October 27, 1992 and revised on December 21, 2001 prepared for Neal Alan Morgan and wife, Ava Marie J. Morgan by Webb A. Morgan & Associates, P.A. being Job File No. 00018-C854 and being a portion of those properties described in Deed Book 1092 at Page 311, Deed Book 1102 at Page 212, Deed Book 1858 at Page 761, Deed Book 2430 at Page 172, and Deed Book 1248 at Page 639, all of the aforesaid Registry.

4876-3128-7338, v. 1

18

Workflow No. 0000789032-0004

Doc ID: 035570980018 Type: CRP
Recorded: 08/25/2022 at 03:48:51 PM
Fee Amt: $288.00 Page 1 of 18
Revenue Tax: $250.00
Workflow# 0000789032-0004
Buncombe County, NC
Drew Reisinger Register of Deeds
BK6252 PG478-495

STATE OF NORTH CAROLINA

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

BUNCOMBE COUNTY

SPO File Number: 11-LA-236
DMS Project Number: 100127
Excise Stamps: $250.00

This instrument prepared by Paul Ahrens a licensed NC attorney. Delinquent taxes, if any, to be paid by the closing attorney to the County Tax Collector upon disbursement of closing proceeds

Prepared by: Office of the Attorney General
Property Control Section
Return to: NC Department of Administration
State Property Office
1321 Mail Service Center
Raleigh, NC 27699-1321

c/o MWB Box31

THIS DEED OF CONSERVATION EASEMENT AND RIGHT OF ACCESS, made this 24th day of August, 2022, by NEAL A. MORGAN and wife, AVA MARIE J. MORGAN, a 1/2 undivided interest, whose mailing address is 321 Morgan Branch Road, Leicester, NC 28748; MARTIN C. MORGAN, unmarried, a 1/4 undivided interest, whose mailing address is 75 Morgan Branch Road, Leicester, NC 28748; MARCIA M. MOREHEAD and husband, JAMES R. MOREHEAD, a 1/4 undivided interest, whose mailing address is 171 Elk Mountain Road, Asheville NC 28804 (collectively, "**Grantor**"), to the STATE OF NORTH CAROLINA ("**Grantee**"), whose mailing address is State of North Carolina, Department of Administration, State Property Office, 1321 Mail Service Center, Raleigh, NC 27699-1321. The designations of Grantor and Grantee as used herein shall include said parties, their heirs, successors, and assigns, and shall include singular, plural, masculine, feminine, or neuter as required by context.

WITNESSETH:

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

WHEREAS, this Conservation Easement from Grantor to Grantee has been negotiated, arranged and provided for as a condition of a full delivery contract between *KCI Technologies Inc., 4505 Falls of Neuse Road, Suite 400, Raleigh NC 27609* and the North Carolina Department of Environmental Quality, to provide stream, wetland and/or buffer mitigation pursuant to the North Carolina Department of Environmental Quality Purchase and Services Contract Number *7909*.

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

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

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

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

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

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

WHEREAS, Grantor owns in fee simple certain real property situated, lying, and being in *Leicester Township, Buncombe County*, North Carolina (the "**Property**"), and being more particularly described as those certain parcels of land containing approximately and collectively 85.82 acres being more particularly described on "**Exhibit B**" attached hereto and incorporated herein; and

WHEREAS, Grantor is willing to grant a Conservation Easement and Right of Access over the herein described areas of the Property, thereby restricting and limiting the use of the areas of the Property subject to the Conservation Easement to the terms and conditions and purposes hereinafter set forth, and Grantee is willing to accept said Easement and Access Rights. The Conservation Easement shall be for the protection and benefit of the waters of ***the French Broad River.***

NOW, THEREFORE, in consideration of the mutual covenants, terms, conditions, and restrictions hereinafter set forth, Grantor unconditionally and irrevocably hereby grants and conveys unto Grantee, its successors and assigns, forever and in perpetuity, a Conservation Easement and Right of Access together with an access easement to and from the Conservation Easement Area described below.

The Conservation Easement Area consists of the following:

Conservation Easement **24** containing a total of **1.733 acres**, Conservation Easement **25** containing a total of **1.725 acres**, Conservation Easement **26** containing a total of **0.049 acres**, Conservation Easement **27** containing a total of **0.072 acres**, Conservation Easement **28** containing a total of **1.010 acres**, and Conservation Easement **29** containing a total of **0.210 acres for a total combined easement acreage of 4.799 acres**, as shown on the plats of survey entitled "Final Plat, Conservation Easement for State of North Carolina Department of Environmental Quality Division of Mitigation Services, Project Name: Morgan Branch Site, DMS Project No. 100127, SPO File No. 11-LA-232 thru 11-LA-240, Leicester Township, Buncombe County, North Carolina", dated June 14, 2022, by *James M. Gellenthin,* PLS Number L-3860 and recorded in the Buncombe County, North Carolina Register of Deeds at **Plat Book 229, Pages 99-109.**

See attached "**Exhibit A**", Legal Description of area of the Property hereinafter referred to as the "Conservation Easement Area"

See attached "**Exhibit A**", Legal Description of area of the Property hereinafter referred to as the "Conservation Easement Area"

The purposes of this Conservation Easement are to maintain, restore, enhance, construct, create and preserve wetland and/or riparian resources in the Conservation Easement Area that contribute to the protection and improvement of water quality, flood prevention, fisheries, aquatic habitat, wildlife habitat, and recreational opportunities; to maintain permanently the Conservation Easement Area in its natural condition, consistent with these purposes; and to prevent any use of the Easement Area that will significantly impair or interfere with these purposes. To achieve these purposes, the following conditions and restrictions are set forth:

I. DURATION OF EASEMENT

Pursuant to law, including the above referenced statutes, this Conservation Easement and Right of Access shall be perpetual and it shall run with, and be a continuing restriction upon the use of, the Property, and it shall be enforceable by the Grantee against the Grantor and against Grantor's heirs, successors and assigns, personal representatives, agents, lessees, and licensees.

II. ACCESS EASEMENT

Grantor hereby grants and conveys unto Grantee, its employees, agents, successors and assigns, a perpetual, non-exclusive easement for ingress and egress over and upon the Property at all reasonable times and at such location as practically necessary to access the Conservation Easement Area for the purposes set forth herein ("**Access Easement**"). This grant of easement shall not vest any rights in the public and shall not be construed as a public dedication of the Access Easement. Grantor covenants, represents and warrants that it is the sole owner of and is seized of the Property in fee simple and has the right to grant and convey this Access Easement.

III. GRANTOR RESERVED USES AND RESTRICTED ACTIVITIES

The Conservation Easement Area shall be restricted from any development or usage that would impair or interfere with the purposes of this Conservation Easement. Unless expressly reserved as a compatible use herein, any activity in, or use of, the Conservation Easement Area by the Grantor is prohibited as inconsistent with the purposes of this Conservation Easement. Any rights not expressly reserved hereunder by the Grantor have been acquired by the Grantee. Any rights not expressly reserved hereunder by the Grantor, including the rights to all mitigation credits, including, but not limited to, stream, wetland, and riparian buffer mitigation units, derived from each site within the area of the Conservation Easement, are conveyed to and belong to the Grantee. Without limiting the generality of the foregoing, the following specific uses are prohibited, restricted, or reserved as indicated:

A. Recreational Uses. Grantor expressly reserves the right to undeveloped recreational uses, including hiking, bird watching, hunting and fishing, and access to the Conservation Easement Area for the purposes thereof.

B. Motorized Vehicle Use. Motorized vehicle use in the Conservation Easement Area is prohibited except within a Crossing Area(s) or Road or Trail as shown on the recorded survey plat.

C. Educational Uses. The Grantor reserves the right to engage in and permit others to engage in educational uses in the Conservation Easement Area not inconsistent with this Conservation Easement, and the right of access to the Conservation Easement Area for such purposes including organized educational activities such as site visits and observations. Educational uses of the property shall not alter vegetation, hydrology or topography of the site.

D. **Damage to Vegetation.** Except within Crossing Area(s) as shown on the recorded survey plat and as related to the removal of non-native plants, diseased or damaged trees, or vegetation that destabilizes or renders unsafe the Conservation Easement Area to persons or natural habitat, all cutting, removal, mowing, harming, or destruction of any trees and vegetation in the Conservation Easement Area is prohibited.

E. Industrial, Residential and Commercial Uses. All industrial, residential and commercial uses are prohibited in the Conservation Easement Area.

F. Agricultural Use. All agricultural uses are prohibited within the Conservation Easement Area including any use for cropland, waste lagoons, or pastureland.

G. New Construction. There shall be no building, facility, mobile home, antenna, utility pole, tower, or other structure constructed or placed in the Conservation Easement Area.

H. **Roads and Trails.** There shall be no construction or maintenance of new roads, trails, walkways, or paving in the Conservation Easement.

All existing roads, trails and crossings within the Conservation Easement Area shall be shown on the recorded survey plat.

I. Signs. No signs shall be permitted in the Conservation Easement Area except interpretive signs describing restoration activities and the conservation values of the Conservation Easement Area, signs identifying the owner of the Property and the holder of the Conservation Easement, signs giving directions, or signs prescribing rules and regulations for the use of the Conservation Easement Area.

J. Dumping or Storing. Dumping or storage of soil, trash, ashes, garbage, waste, abandoned vehicles, appliances, machinery, or any other material in the Conservation Easement Area is prohibited.

K. Grading, Mineral Use, Excavation, Dredging. There shall be no grading, filling, excavation, dredging, mining, drilling, hydraulic fracturing; removal of topsoil, sand, gravel, rock, peat, minerals, or other materials.

L. Water Quality and Drainage Patterns. There shall be no diking, draining, dredging, channeling, filling, leveling, pumping, impounding or diverting, causing, allowing or permitting the diversion of surface or underground water in the Conservation Easement Area. No altering or tampering with water control structures or devices, or disruption or alteration of the restored, enhanced, or created drainage patterns is allowed. All removal of wetlands, polluting or discharging into waters, springs, seeps, or wetlands, or use of pesticide or biocides in the Conservation Easement Area is prohibited. In the event of an emergency interruption or shortage of all other water sources, water from within the Conservation Easement Area may temporarily be withdrawn for good cause shown as needed for the survival of livestock on the Property.

M. Subdivision and Conveyance. Grantor voluntarily agrees that no further subdivision, partitioning, or dividing of the Conservation Easement Area portion of the Property owned by the Grantor in fee simple ("fee") that is subject to this Conservation Easement is allowed. Any future transfer of the Property shall be subject to this Conservation Easement and Right of Access and to the Grantee's right of unlimited and repeated ingress and egress over and across the Property to the Conservation Easement Area for the purposes set forth herein.

N. Development Rights. All development rights are permanently removed from the Conservation Easement Area and are non-transferrable.

O. Disturbance of Natural Features. Any change, disturbance, alteration or impairment of the natural features of the Conservation Easement Area or any intentional introduction of non-native plants, trees and/or animal species by Grantor is prohibited.

The Grantor may request permission to vary from the above restrictions for good cause shown, provided that any such request is not inconsistent with the purposes of this Conservation Easement, and the Grantor obtains advance written approval from the Division of Mitigation Services, 1652 Mail Services Center, Raleigh, NC 27699-1652.

IV. GRANTEE RESERVED USES

A. Right of Access, Construction, and Inspection. The Grantee, its employees, agents, successors and assigns, shall have a perpetual Right of Access over and upon the Conservation Easement Area to undertake or engage in any activities necessary to construct, maintain, manage, enhance, repair, restore, protect, monitor and inspect the stream, wetland and any other riparian resources in the Conservation Easement Area for the purposes set forth herein or any long-term management plan for the Conservation Easement Area developed pursuant to this Conservation Easement.

B. Restoration Activities. These activities include planting of trees, shrubs and herbaceous vegetation, installation of monitoring wells, utilization of heavy equipment to grade, fill, and prepare the soil, modification of the hydrology of the site, and installation of natural and manmade materials as needed to direct in-stream, above ground, and subterraneous water flow.

C. Signs. The Grantee, its employees and agents, successors or assigns, shall be permitted to place signs and witness posts on the Property to include any or all of the following: describe

the project, prohibited activities within the Conservation Easement, or identify the project boundaries and the holder of the Conservation Easement.

D. Fences. Conservation Easements are purchased to protect the investments by the State (Grantee) in natural resources. Livestock within conservations easements damages the investment and can result in reductions in natural resource value and mitigation credits which would cause financial harm to the State. Therefore, Landowners (Grantor) with livestock are required to restrict livestock access to the Conservation Easement area. Repeated failure to do so may result in the State (Grantee) repairing or installing livestock exclusion devices (fences) within the conservation area for the purpose of restricting livestock access. In such cases, the landowner (Grantor) must provide access to the State (Grantee) to make repairs.

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

V. ENFORCEMENT AND REMEDIES

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

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

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

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

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

VI. MISCELLANEOUS

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

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

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

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

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

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

Division of Mitigation Services Program Manager
NC State Property Office
1321 Mail Service Center
Raleigh, NC 27699-1321

and

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

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

VII. QUIET ENJOYMENT

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

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

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

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

_____ (SEAL)
Neal A. Morgan

_____ (SEAL)
Ava Marie J. Morgan

NORTH CAROLINA
COUNTY OF Buncombe

I, Peter U. Kanipe, a Notary Public in and for the County and State aforesaid, do hereby certify that Neal A. Morgan & Ava Marie J. Morgan, Grantor, personally appeared before me this day and acknowledged the execution of the foregoing instrument.

IN WITNESS, WHEREOF, I have hereunto set my hand and Notary Seal this the 25th day of July, 2022.

_____
Notary Public

My commission expires: _____

Peter U Kanipe
NOTARY PUBLIC
Buncombe County, NC
My Commission Expires June 08, 2024

Martin C. Morgan (SEAL)

Martin C. Morgan

NORTH CAROLINA
COUNTY OF Buncombe

I, Peter U Kanipe, a Notary Public in and for the County and State aforesaid, do hereby certify that Martin C. Morgan, Grantor, personally appeared before me this day and acknowledged the execution of the foregoing instrument.

IN WITNESS, WHEREOF, I have hereunto set my hand and Notary Seal this the 25th day of July, 2022

Notary Public

My commission expires: _____

Peter U Kanipe
NOTARY PUBLIC
Buncombe County, NC
My Commission Expires June 08, 2024

Marcia M. Morehead (SEAL)
Marcia M. Morehead

James R. Morehead (SEAL)
James R. Morehead

NORTH CAROLINA
COUNTY OF Buncombe

I, Peter U Kanipe, a Notary Public in and for the County and State aforesaid, do hereby certify that Marcia M. Morehead & James R. Morehead, Grantor, personally appeared before me this day and acknowledged the execution of the foregoing instrument.

IN WITNESS, WHEREOF, I have hereunto set my hand and Notary Seal this the 25th day of July, 2022.

Notary Public

My commission expires: _____

Peter U Kanipe
NOTARY PUBLIC
Buncombe County, NC
My Commission Expires June 08, 2024

Exhibit A

Legal Description of area of the Property hereinafter referred to as the "Conservation Easement Area"

CONSERVATION EASEMENT #24

A PARCEL OF LAND TO BE USED FOR CONSERVATION EASEMENT PURPOSES LOCATED ON LANDS NOW OR FORMERLY OWNED BY NEAL A. MORGAN AND WIFE, AVA MARIE J. MORGAN (A 1/2 INTEREST); MARTIN C. MORGAN (A 1/6 INTEREST); KATHY M. MORGAN (A 1/6 INTEREST); MARCIA M. MOREHEAD (A 1/6 INTEREST), WITH THOSE THREE 1/6 INTERESTS OWNED AS JTWROS (TAX PIN 8689-36-4053) AS RECORDED IN BOOK 5608 PAGE 1682 FOR NEAL AND AVA MORGAN AND BOOK 5755 PAGE 973 FOR MARTIN MORGAN, KATHY MORGAN AND MARCIA MOREHEAD; LESS AND EXCEPT BOOK 4912, PAGE 1390 AND BOOK 2688 PAGE 430, LOCATED IN LEICESTER TOWNSHIP, BUNCOMBE COUNTY, NORTH CAROLINA AND BEING MORE PARTICULARLY DESCRIBED AS FOLLOWS:

COMMENCING AT NORTH CAROLINA GEODETIC SURVEY STATION BETHEL BASE ARP, WITH NAD 83(2011) STATE PLANE COORDINATES OF X = 840,744.23 AND Y = 649,700.01; THENCE RUNNING N 42°54'02" E FOR A DISTANCE OF 63,195.88 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 254, SAID REBAR BEING THE POINT OF BEGINNING;

THENCE S 59°17'56" W, A DISTANCE OF 97.19 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 255;
THENCE N 28°47'39" W, A DISTANCE OF 252.26 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 246;
THENCE N 4°31'31" W, A DISTANCE OF 40.75 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 247;
THENCE N S8°27'39" E, A DISTANCE OF 133.01 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 248;
THENCE S 87°15'06" E, A DISTANCE OF 103.48 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 249;
THENCE N 46°16'24" E, A DISTANCE OF 176.69 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 250;
THENCE S 53°22'48" E, A DISTANCE OF 83.93 FEET TO A 5/8" REBAR 5ET WITH ALUMINUM CAP NO. 251;
THENCE S 37°56'16" W, A DISTANCE OF 68.97 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 252;
THENCE S 42°13'03" W, A DISTANCE OF 162.40 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 253;
THENCE S 16°36'55" W, A DISTANCE OF 181.67 FEET TO THE POINT OF BEGINNING;

CONSERVATION EASEMENT CONTAINING 75,483 SQUARE FEET OR 1.733 ACRES MORE OR LESS.

CONSERVATION EASEMENT #25

A PARCEL OF LAND TO BE USED FOR CONSERVATION EASEMENT PURPOSES LOCATED ON LANDS NOW OR FORMERLY OWNED BY NEAL A. MORGAN AND WIFE, AVA MARIE J. MORGAN (A 1/2 INTEREST); MARTIN C. MORGAN (A 1/6 INTEREST); KATHY M. MORGAN (A 1/6 INTEREST); MARCIA M. MOREHEAD (A 1/6 INTEREST), WITH THOSE THREE 1/6 INTERESTS OWNED AS JTWROS (TAX PIN 8689-36-4053) AS RECORDED IN BOOK 5608 PAGE 1682 FOR NEAL AND AVA MORGAN AND BOOK S755 PAGE 973 FOR MARTIN MORGAN, KATHY MORGAN AND MARCIA MOREHEAD; LESS AND EXCEPT BOOK 4912, PAGE 1390 AND BOOK 2688 PAGE 430, LOCATED IN LEICESTER TOWNSHIP, BUNCOMBE COUNTY, NORTH CAROLINA AND BEING MORE PARTICULARLY DESCRIBED AS FOLLOWS:

COMMENCING AT NORTH CAROLINA GEODETIC SURVEY STATION BETHEL BASE ARP, WITH NAD 83(2011) STATE PLANE COORDINATES OF X = 840,744.23 AND Y = 649,700.01; THENCE RUNNING N 42°43'51" E FOR A DISTANCE

OF 63,609.29 FEET TO A S/8" REBAR SET WITH ALUMINUM CAP NO. 256, SAID REBAR BEING THE POINT OF BEGINNING;

THENCE N 23°03'15" E, A DISTANCE OF 327.97 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 257;
THENCE N 59°57'18" E, A DISTANCE OF 130.53 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 258;
THENCE N 29°57'10" E, A DISTANCE OF 188.51 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 259;
THENCE N 34°11'32" E, A DISTANCE OF 123.14 FEET TO A CALCULATED POINT;
THENCE S 43°13'12" E, A DISTANCE OF 29.96 FEET TO A CALCULATED POINT;
THENCE S 31°28'39" E, A DISTANCE OF 68.87 FEET TO A CALCULATED POINT;
THENCE S 31°53'42" W, A DISTANCE OF 292.56 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 260;
THENCE S 54°18'36" W, A DISTANCE OF 89.67 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 261;
THENCE S 25°54'27" W, A DISTANCE OF 347.01 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 262;
THENCE N 53°22'48" W, A DISTANCE OF 102.42 FEET TO THE POINT OF BEGINNING;

CONSERVATION EASEMENT CONTAINING 75,122 SQUARE FEET OR 1.725 ACRES MORE OR LESS.

CONSERVATION EASEMENT #26

A PARCEL OF LAND TO BE USED FOR CONSERVATION EASEMENT PURPOSES LOCATED ON LANDS NOW OR FORMERLY OWNED BY NEAL A. MORGAN AND WIFE, AVA MARIE J. MORGAN (A 1/2 INTEREST); MARTIN C. MORGAN (A 1/6 INTEREST); KATHY M. MORGAN (A 1/6 INTEREST); MARCIA M. MOREHEAD (A 1/6 INTEREST), WITH THOSE THREE 1/6 INTERESTS OWNED AS JTWROS (TAX PIN 8689-36-4053) AS RECORDED IN BOOK 5608 PAGE 1682 FOR NEAL AND AVA MORGAN AND BOOK 5755 PAGE 973 FOR MARTIN MORGAN, KATHY MORGAN AND MARCIA MOREHEAD; LESS AND EXCEPT BOOK 4912, PAGE 1390 AND BOOK 2688 PAGE 430, LOCATED IN LEICESTER TOWNSHIP, BUNCOMBE COUNTY, NORTH CAROLINA AND BEING MORE PARTICULARLY DESCRIBED AS FOLLOWS:

COMMENCING AT NORTH CAROLINA GEODETIC SURVEY STATION BETHEL BASE ARP, WITH NAD 83(2011) STATE PLANE COORDINATES OF X = 840,744.23 AND Y = 649,700.01; THENCE RUNNING N 42°S6'30" E FOR A DISTANCE OF 65,038.34 FEET TO A CALCULATED POINT, SAID POINT BEING THE POINT OF BEGINNING;

THENCE N 3S°07'21" W, A DISTANCE OF 43.17 FEET TO THE SOUTHEAST CORNER OF A ROCK;
THENCE N 54°23'2S" E, A DISTANCE OF 51.11 FEET TO A CALCULATED POINT;
THENCE S 21°47'48" E, A DISTANCE OF 51.14 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 263;
THENCE S 63°46'27" W, A DISTANCE OF 39.80 FEET TO THE POINT OF BEGINNING;

CONSERVATION EASEMENT CONTAINING 2,118 SQUARE FEET OR 0.049 ACRES MORE OR LESS.

CONSERVATION EASEMENT #27

A PARCEL OF LAND TO BE USED FOR CONSERVATION EASEMENT PURPOSES LOCATED ON LANDS NOW OR FORMERLY OWNED BY NEAL A. MORGAN AND WIFE, AVA MARIE J. MORGAN (A 1/2 INTEREST); MARTIN C. MORGAN (A 1/6 INTEREST); KATHY M. MORGAN (A 1/6 INTEREST); MARCIA M. MOREHEAD (A 1/6 INTEREST), WITH THOSE THREE 1/6 INTERESTS OWNED AS JTWROS (TAX PIN 8689-36-4053) AS RECORDED IN BOOK 5608 PAGE 1682 FOR NEAL AND AVA MORGAN AND BOOK 5755 PAGE 973 FOR MARTIN MORGAN, KATHY MORGAN AND MARCIA MOREHEAD; LESS AND EXCEPT BOOK 4912, PAGE 1390 AND BOOK 2688 PAGE 430, LOCATED IN LEICESTER TOWNSHIP, BUNCOMBE COUNTY, NORTH CAROLINA AND BEING MORE PARTICULARLY DESCRIBED AS FOLLOWS:

COMMENCING AT NORTH CAROLINA GEODETIC SURVEY STATION BETHEL BASE ARP, WITH NAD 83(2011) STATE PLANE COORDINATES OF X = 840,744.23 AND Y = 649,700.01; THENCE RUNNING N 43°04'37" E FOR A DISTANCE OF 65,055.53 FEET TO A CALCULATED POINT, SAID POINT BEING THE POINT OF BEGINNING;

THENCE N 28°32'37" W, A DISTANCE OF 91.79 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 264;
THENCE N 0°42'22" W, A DISTANCE OF 40.73 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 26S;
THENCE N 9°28'48" W, A DISTANCE OF 24.57 FEET TO A CALCULATED POINT;
THENCE S 29°55'55" E, A DISTANCE OF 127.19 FEET TO A CALCULATED POINT;
THENCE 5 23°03'22" W, A DISTANCE OF 38.44 FEET TO THE POINT OF BEGINNING;

CONSERVATION EASEMENT CONTAINING 3,117 SQUARE FEET OR 0.072 ACRES MORE OR LESS.

CONSERVATION EASEMENT #28

A PARCEL OF LAND TO BE USED FOR CONSERVATION EASEMENT PURPOSES LOCATED ON LANDS NOW OR FORMERLY OWNED BY NEAL A. MORGAN AND WIFE, AVA MARIE J. MORGAN (A 1/2 INTEREST); MARTIN C. MORGAN (A 1/6 INTEREST); KATHY M. MORGAN (A 1/6 INTEREST); MARCIA M. MOREHEAD (A 1/6 INTEREST), WITH THOSE THREE 1/6 INTERESTS OWNED AS JTWROS (TAX PIN 8689-36-4053) AS RECORDED IN BOOK S608 PAGE 1682 FOR NEAL AND AVA MORGAN AND BOOK 5755 PAGE 973 FOR MARTIN MORGAN, KATHY MORGAN AND MARCIA MOREHEAD; LESS AND EXCEPT BOOK 4912, PAGE 1390 AND BOOK 2688 PAGE 430, LOCATED IN LEICESTER TOWNSHIP, BUNCOMBE COUNTY, NORTH CAROLINA AND BEING MORE PARTICULARLY DESCRIBED AS FOLLOWS:

COMMENCING AT NORTH CAROLINA GEODETIC SURVEY STATION BETHEL BASE ARP, WITH NAD 83(2011) STATE PLANE COORDINATES OF X = 840,744.23 AND Y = 649,700.01; THENCE RUNNING N 43°09'23" E FOR A DISTANCE OF 64,576.16 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 266, SAID REBAR BEING THE POINT OF BEGINNING;

THENCE N 12°21'26" E, A DISTANCE OF 204.14 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 267;
THENCE N 24°03'39" E, A DISTANCE OF 129.42 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 268;
THENCE N 39°50'47" E, A DISTANCE OF 172.43 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 269;
THENCE S 28°32'37" E, A DISTANCE OF 84.17 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 270;
THENCE S 33°16'54" W, A DISTANCE OF 118.10 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 271;
THENCE S 22°10'56" W, A DISTANCE OF 68.98 FEET TO A S/8" REBAR 5ET WITH ALUMINUM CAP NO. 272;
THENCE S 21°22'15" W, A DISTANCE OF 71.73 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 273;
THENCE S 11°39'48" W, A DISTANCE OF 179.45 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 274;
THENCE N 72°46'03" W, A DISTANCE OF 98.29 FEET TO THE POINT OF BEGINNING;

CONSERVATION EASEMENT CONTAINING 43,974 SQUARE FEET OR 1.010 ACRES MORE OR LESS.

CONSERVATION EASEMENT #29

A PARCEL OF LAND TO BE USED FOR CONSERVATION EASEMENT PURPOSES LOCATED ON LANDS NOW OR FORMERLY OWNED BY NEAL A. MORGAN AND WIFE, AVA MARIE J. MORGAN (A 1/2 INTEREST); MARTIN C. MORGAN (A 1/6 INTEREST); KATHY M. MORGAN (A 1/6 INTEREST); MARCIA M. MOREHEAD (A 1/6 INTEREST), WITH THOSE THREE 1/6 INTERESTS OWNED AS JTWROS (TAX PIN 8689-36-4053) AS RECORDED IN BOOK 5608 PAGE 1682 FOR NEAL AND AVA MORGAN AND BOOK 5755 PAGE 973 FOR MARTIN MORGAN, KATHY MORGAN AND MARCIA MOREHEAD; LESS AND EXCEPT BOOK 4912, PAGE 1390 AND BOOK 2688 PAGE 430, LOCATED IN LEICESTER TOWNSHIP, BUNCOMBE COUNTY, NORTH CAROLINA AND BEING MORE PARTICULARLY DESCRIBED AS FOLLOWS:

COMMENCING AT NORTH CAROLINA GEODETIC SURVEY STATION BETHEL BASE ARP, WITH NAD 83(2011) STATE PLANE COORDINATES OF X = 840,744.23 AND Y = 649,700.01; THENCE RUNNING N 43°15'19" E FOR A DISTANCE OF 64,462.22 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 275, SAID REBAR BEING THE POINT OF BEGINNING;

THENCE N 33°33'46" W, A DISTANCE OF 109.33 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 276;
THENCE N 55°48'33" E, A DISTANCE OF 66.64 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 277;
THENCE S 72°46'03" E, A DISTANCE OF 90.84 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 278;
THENCE S 38°42'10" W, A DISTANCE OF 130.24 FEET TO THE POINT OF BEGINNING;

CONSERVATION EASEMENT CONTAINING 9,148 SQUARE FEET OR 0.210 ACRES MORE OR LESS.

Exhibit B – Parent Tracts

Parcel Five: PIN 8689-36-4053

BEGINNING at a stake said stake being the easternmost corner of the property conveyed by the grantor to William J. Nichols and Ellen R. Nichols and recorded in Deed Book 1069, at Page 643, in the Office of the Register of Deed for Buncombe County, North Carolina, and runs thence North 84° 30' East 54.18 feet to a iron pipe; thence South 20° 41' East 479.49 feet to a stake; thence South 63° 20' West 314.33 feet to a stake; thence South 12° 15' West 419 feet to a stake; thence North 87° 55' West 568.38 feet to a Oak; thence South 3° 50' West 379.5 feet to a Chestnut; thence South 54° West 2,953.5 feet to a stake the southwesternmost corner of the property of the grantor as described in Deed Book 250, at Page 171, of said Registry; thence North 2° East 1,122 feet to a Locust; thence North 66° 10' East 726 feet to a Hickory; thence North 2° 10' East 554.4 feet to a Water Oak; thence North 55° 20' East 1,010.63 feet to a Poplar; thence leaving the outside boundary of the property of the grantor described in Deed Book 250, at Page 171, in the said Registry North 2° 15' East 296.57 feet to a stake; thence North 48° 23' East 247.8 feet to a stake on a rock cliff; thence South 43° 46' East 72.25 feet to a stake; thence South 75° 21' East 66.43 feet to a stake; thence South 85° 34' East 101.91 feet to a stake; thence North 31° 10' East 157.48 feet to a stake, the westernmost corner of the property conveyed to William J. Nichols and wife referred to above; thence with the line of the said William J. Nichols the following twelve courses and distances: South 73° East 81 feet to a stake; South 45° East 82 feet to a stake; thence North 80° East 64 feet to a stake; thence North 68° East 141 feet to a stake; thence South 80° East 30 feet to a 10-inch Birch; thence South 64° East 200 feet to a 6-inch Pine; thence South 71° East 97 feet to a Apple Tree; thence North 59° East 80 feet to a 3-inch Birch; thence North 47° East 64 feet to a stake; South 85° East 139 feet to a 10-inch Pine; North 66° East 160 feet to a stake; thence North 47° East 96 feet to the point and place of Beginning. Containing 98.13 acres, more or less, and being a portion of the Oliver W. Morgan and Carrie M. Morgan lands as described in a deed from A.M. Jones and wife to Oliver W. Morgan and Carrie M. Morgan dated July 6, 1921, and recorded in Deed Book 250 at Page 171, of said Registry.

LESS AND EXCEPT the property described in Deed Book 2688, at Page 430, and in Deed Book 4912, at Page 1390, of the Buncombe County Registry.

4892-4098-2058, v. 1

Workflow No. 0000789032-0005

Doc ID: 035570990013 Type: CRP
Recorded: 08/25/2022 at 03:50:38 PM
Fee Amt: $152.00 Page 1 of 13
Revenue Tax: $126.00
Workflow# 0000789032-0005
Buncombe County, NC
Drew Reisinger Register of Deeds
BK 6252 PG 496-508

STATE OF NORTH CAROLINA

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

BUNCOMBE COUNTY

SPO File Number: 11-LA-237
DMS Project Number: 100127
Excise Stamps: $126.00

This instrument prepared by Paul Arena a licensed NC attorney. Delinquent taxes, if any, to be paid by the closing attorney to the County Tax Collector upon disbursement of closing proceeds.

Prepared by: Office of the Attorney General
Property Control Section
Return to: NC Department of Administration
State Property Office c/o NWB
1321 Mail Service Center Box 31
Raleigh, NC 27699-1321

THIS DEED OF CONSERVATION EASEMENT AND RIGHT OF ACCESS, made this 24th day of August, 2022, by CHRISTOPHER McGRATH and wife, SUSAN L. McGRATH whose mailing address is 315 Morgan Branch Road, Leicester, NC 28748 (collectively, "**Grantor**"), to the STATE OF NORTH CAROLINA ("**Grantee**"), whose mailing address is State of North Carolina, Department of Administration, State Property Office, 1321 Mail Service Center, Raleigh, NC 27699-1321. The designations of Grantor and Grantee as used herein shall include said parties, their heirs, successors, and assigns, and shall include singular, plural, masculine, feminine, or neuter as required by context.

WITNESSETH:

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

WHEREAS, this Conservation Easement from Grantor to Grantee has been negotiated, arranged and provided for as a condition of a full delivery contract between *KCI Technologies Inc., 4505 Falls of Neuse Road, Suite 400, Raleigh NC 27609* and the North Carolina Department of Environmental Quality, to provide stream, wetland and/or buffer mitigation pursuant to the North Carolina Department of Environmental Quality Purchase and Services Contract Number *7909*.

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

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

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

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

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

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

WHEREAS, Grantor owns in fee simple certain real property situated, lying, and being in *Leicester Township, Buncombe County*, North Carolina (the "**Property**"), and being more particularly described as those certain parcels of land containing approximately and collectively 6.31 acres being more particularly described on "**Exhibit B**" attached hereto and incorporated herein; and

WHEREAS, Grantor is willing to grant a Conservation Easement and Right of Access over the herein described areas of the Property, thereby restricting and limiting the use of the areas of the Property subject to the Conservation Easement to the terms and conditions and purposes hereinafter set forth, and Grantee is willing to accept said Easement and Access Rights. The Conservation Easement shall be for the protection and benefit of the waters of ***the French Broad River.***

NOW, THEREFORE, in consideration of the mutual covenants, terms, conditions, and restrictions hereinafter set forth, Grantor unconditionally and irrevocably hereby grants and conveys unto Grantee, its successors and assigns, forever and in perpetuity, a Conservation Easement and Right of Access together with an access easement to and from the Conservation Easement Area described below.

The Conservation Easement Area consists of the following:

Conservation Easement **30** containing a total of **0.711 acres**, Conservation Easement **31** containing a total of **0.884 acres**, Conservation Easement **32** containing a total of **0.504 acres**, and Conservation Easement **33** containing a total of **0.319 acres, for a total combined easement acreage of 2.418 acres**, as shown on the plats of survey entitled "Final Plat, Conservation Easement for State of North Carolina Department of Environmental Quality Division of Mitigation Services, Project Name: Morgan Branch Site, DMS Project No. 100127, SPO File No. 11-LA-232 thru 11-LA-240, Leicester Township, Buncombe County, North Carolina", dated June 14, 2022, by *James M. Gellenthin*, PLS Number L-3860 and recorded in the Buncombe County, North Carolina Register of Deeds at **Plat Book 229, Pages 99-109.**

See attached "**Exhibit A**", Legal Description of area of the Property hereinafter referred to as the "Conservation Easement Area"

The purposes of this Conservation Easement are to maintain, restore, enhance, construct, create and preserve wetland and/or riparian resources in the Conservation Easement Area that contribute to the protection and improvement of water quality, flood prevention, fisheries, aquatic habitat, wildlife habitat, and recreational opportunities; to maintain permanently the Conservation Easement Area in its natural condition, consistent with these purposes; and to

prevent any use of the Easement Area that will significantly impair or interfere with these purposes. To achieve these purposes, the following conditions and restrictions are set forth:

I. DURATION OF EASEMENT

Pursuant to law, including the above referenced statutes, this Conservation Easement and Right of Access shall be perpetual and it shall run with, and be a continuing restriction upon the use of, the Property, and it shall be enforceable by the Grantee against the Grantor and against Grantor's heirs, successors and assigns, personal representatives, agents, lessees, and licensees.

II. ACCESS EASEMENT

Grantor hereby grants and conveys unto Grantee, its employees, agents, successors and assigns, a perpetual, non-exclusive easement for ingress and egress over and upon the Property at all reasonable times and at such location as practically necessary to access the Conservation Easement Area for the purposes set forth herein ("**Access Easement**"). This grant of easement shall not vest any rights in the public and shall not be construed as a public dedication of the Access Easement. Grantor covenants, represents and warrants that it is the sole owner of and is seized of the Property in fee simple and has the right to grant and convey this Access Easement.

III. GRANTOR RESERVED USES AND RESTRICTED ACTIVITIES

The Conservation Easement Area shall be restricted from any development or usage that would impair or interfere with the purposes of this Conservation Easement. Unless expressly reserved as a compatible use herein, any activity in, or use of, the Conservation Easement Area by the Grantor is prohibited as inconsistent with the purposes of this Conservation Easement. Any rights not expressly reserved hereunder by the Grantor have been acquired by the Grantee. Any rights not expressly reserved hereunder by the Grantor, including the rights to all mitigation credits, including, but not limited to, stream, wetland, and riparian buffer mitigation units, derived from each site within the area of the Conservation Easement, are conveyed to and belong to the Grantee. Without limiting the generality of the foregoing, the following specific uses are prohibited, restricted, or reserved as indicated:

A. Recreational Uses. Grantor expressly reserves the right to undeveloped recreational uses, including hiking, bird watching, hunting and fishing, and access to the Conservation Easement Area for the purposes thereof.

B. Motorized Vehicle Use. Motorized vehicle use in the Conservation Easement Area is prohibited except within a Crossing Area(s) or Road or Trail as shown on the recorded survey plat.

C. Educational Uses. The Grantor reserves the right to engage in and permit others to engage in educational uses in the Conservation Easement Area not inconsistent with this Conservation Easement, and the right of access to the Conservation Easement Area for such purposes including organized educational activities such as site visits and observations. Educational uses of the property shall not alter vegetation, hydrology or topography of the site.

D. **Damage to Vegetation.** Except within Crossing Area(s) as shown on the recorded survey plat and as related to the removal of non-native plants, diseased or damaged trees, or vegetation that destabilizes or renders unsafe the Conservation Easement Area to persons or natural habitat, all cutting, removal, mowing, harming, or destruction of any trees and vegetation in the Conservation Easement Area is prohibited.

E. Industrial, Residential and Commercial Uses. All industrial, residential and commercial uses are prohibited in the Conservation Easement Area.

F. Agricultural Use. All agricultural uses are prohibited within the Conservation Easement Area including any use for cropland, waste lagoons, or pastureland.

G. New Construction. There shall be no building, facility, mobile home, antenna, utility pole, tower, or other structure constructed or placed in the Conservation Easement Area.

H. **Roads and Trails.** There shall be no construction or maintenance of new roads, trails, walkways, or paving in the Conservation Easement.

All existing roads, trails and crossings within the Conservation Easement Area shall be shown on the recorded survey plat.

I. Signs. No signs shall be permitted in the Conservation Easement Area except interpretive signs describing restoration activities and the conservation values of the Conservation Easement Area, signs identifying the owner of the Property and the holder of the Conservation Easement, signs giving directions, or signs prescribing rules and regulations for the use of the Conservation Easement Area.

J. Dumping or Storing. Dumping or storage of soil, trash, ashes, garbage, waste, abandoned vehicles, appliances, machinery, or any other material in the Conservation Easement Area is prohibited.

K. Grading, Mineral Use, Excavation, Dredging. There shall be no grading, filling, excavation, dredging, mining, drilling, hydraulic fracturing; removal of topsoil, sand, gravel, rock, peat, minerals, or other materials.

L. Water Quality and Drainage Patterns. There shall be no diking, draining, dredging, channeling, filling, leveling, pumping, impounding or diverting, causing, allowing or permitting the diversion of surface or underground water in the Conservation Easement Area. No altering or tampering with water control structures or devices, or disruption or alteration of the restored, enhanced, or created drainage patterns is allowed. All removal of wetlands, polluting or discharging into waters, springs, seeps, or wetlands, or use of pesticide or biocides in the Conservation Easement Area is prohibited. In the event of an emergency interruption or shortage of all other water sources, water from within the Conservation Easement Area may temporarily be withdrawn for good cause shown as needed for the survival of livestock on the Property.

M. Subdivision and Conveyance. Grantor voluntarily agrees that no further subdivision, partitioning, or dividing of the Conservation Easement Area portion of the Property owned by the Grantor in fee simple ("fee") that is subject to this Conservation Easement is allowed. Any future transfer of the Property shall be subject to this Conservation Easement and Right of Access and to the Grantee's right of unlimited and repeated ingress and egress over and across the Property to the Conservation Easement Area for the purposes set forth herein.

N. Development Rights. All development rights are permanently removed from the Conservation Easement Area and are non-transferrable.

O. Disturbance of Natural Features. Any change, disturbance, alteration or impairment of the natural features of the Conservation Easement Area or any intentional introduction of non-native plants, trees and/or animal species by Grantor is prohibited.

The Grantor may request permission to vary from the above restrictions for good cause shown, provided that any such request is not inconsistent with the purposes of this Conservation Easement, and the Grantor obtains advance written approval from the Division of Mitigation Services, 1652 Mail Services Center, Raleigh, NC 27699-1652.

IV. GRANTEE RESERVED USES

A. Right of Access, Construction, and Inspection. The Grantee, its employees, agents, successors and assigns, shall have a perpetual Right of Access over and upon the Conservation Easement Area to undertake or engage in any activities necessary to construct, maintain, manage, enhance, repair, restore, protect, monitor and inspect the stream, wetland and any other riparian resources in the Conservation Easement Area for the purposes set forth herein or any long-term management plan for the Conservation Easement Area developed pursuant to this Conservation Easement.

B. Restoration Activities. These activities include planting of trees, shrubs and herbaceous vegetation, installation of monitoring wells, utilization of heavy equipment to grade, fill, and prepare the soil, modification of the hydrology of the site, and installation of natural and manmade materials as needed to direct in-stream, above ground, and subterraneous water flow.

C. Signs. The Grantee, its employees and agents, successors or assigns, shall be permitted to place signs and witness posts on the Property to include any or all of the following: describe the project, prohibited activities within the Conservation Easement, or identify the project boundaries and the holder of the Conservation Easement.

D. Fences. Conservation Easements are purchased to protect the investments by the State (Grantee) in natural resources. Livestock within conservations easements damages the investment and can result in reductions in natural resource value and mitigation credits which would cause financial harm to the State. Therefore, Landowners (Grantor) with livestock are required to restrict livestock access to the Conservation Easement area. Repeated failure to do so may result in the State (Grantee) repairing or installing livestock exclusion devices (fences)

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

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

V. ENFORCEMENT AND REMEDIES

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

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

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

D. Costs of Enforcement. Beyond regular and typical monitoring expenses, any costs incurred by Grantee in enforcing the terms of this Conservation Easement against Grantor,

including, without limitation, any costs of restoration necessitated by Grantor's acts or omissions in violation of the terms of this Conservation Easement, shall be borne by Grantor.

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

VI. MISCELLANEOUS

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

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

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

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

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

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

Division of Mitigation Services Program Manager

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

and

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

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

VII. QUIET ENJOYMENT

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

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

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

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

_____ (SEAL)
Christopher McGrath

_____ (SEAL)
Susan L. McGrath

NORTH CAROLINA
COUNTY OF Buncombe

I, Peter U. Kanipe, a Notary Public in and for the County and State aforesaid, do hereby certify that Christopher McGrath & Susan L. McGrath, Grantor, personally appeared before me this day and acknowledged the execution of the foregoing instrument.

IN WITNESS, WHEREOF, I have hereunto set my hand and Notary Seal this the 22nd day of July, 2022.

_____
Notary Public

My commission expires: _____

Peter U Kanipe
NOTARY PUBLIC
Buncombe County, NC
My Commission Expires June 08, 2024

Exhibit A

Legal Description of area of the Property hereinafter referred to as the "Conservation Easement Area"

CONSERVATION EASEMENT #30

A PARCEL OF LAND TO BE USED FOR CONSERVATION EASEMENT PURPOSES LOCATED ON LANDS NOW OR FORMERLY OWNED BY CHRISTOPHER MCGRATH AND WIFE, SUSAN MCGRATH (TAX PIN 8689-47-4283) AS RECORDED IN BOOK 4912 PAGE 1390, LOCATED IN LEICESTER TOWNSHIP, BUNCOMBE COUNTY, NORTH CAROLINA AND BEING MORE PARTICULARLY DESCRIBED AS FOLLOWS:

COMMENCING AT NORTH CAROLINA GEODETIC SURVEY STATION BETHEL BASE ARP, WITH NAD 83(2011) STATE PLANE COORDINATES OF X = 840,744.23 AND Y = 649,700.01; THENCE RUNNING N 42°41'S6" E FOR A DISTANCE OF 64,327.S6 FEET TO A CALCULATED POINT, SAID POINT BEING THE POINT OF BEGINNING;

THENCE N 31°28'39" W, A DISTANCE OF 68.87 FEET TO A CALCULATED POINT;
THENCE N 43°13'12" W, A DISTANCE OF 29.96 FEET TO A CALCULATED POINT;
THENCE N 34°11'32" E, A DISTANCE OF 20.40 FEET TO A S/8" REBAR SET WITH ALUMINUM CAP NO. 279;
THENCE N S4°04'33" E, A DISTANCE OF 275.80 FEET TO A CALCULATED POINT;
THENCE S 70°46'38" E, A DISTANCE OF 88.18 FEET TO A CALCULATED POINT;
THENCE N S8°07'57" E, A DISTANCE OF 42.70 FEET TO A CALCULATED POINT;
THENCE S 32°09'51" E, A DISTANCE OF 34.30 FEET TO A S/8" REBAR SET WITH ALUMINUM CAP NO. 282;
THENCE S 66°57'50" W, A DISTANCE OF 86.26 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 283;
THENCE S S4°03'28" W, A DISTANCE OF 266.71 FEET TO A S/8" REBAR SET WITH ALUMINUM CAP NO. 284;
THENCE S 31°53'42" W, A DISTANCE OF 39.38 FEET TO THE POINT OF BEGINNING;

CONSERVATION EASEMENT CONTAINING 30,966 SQUARE FEET OR 0.711 ACRES MORE OR LESS.

CONSERVATION EASEMENT #31

A PARCEL OF LAND TO BE USED FOR CONSERVATION EASEMENT PURPOSES LOCATED ON LANDS NOW OR FORMERLY OWNED BY CHRISTOPHER MCGRATH AND WIFE, SUSAN MCGRATH (TAX PIN 8689-47-5347) AS RECORDED IN BOOK 1910 PAGE 459, LOCATED IN LEICESTER TOWNSHIP, BUNCOMBE COUNTY, NORTH CAROLINA AND BEING MORE PARTICULARLY DESCRIBED AS FOLLOWS:

COMMENCING AT NORTH CAROLINA GEODETIC SURVEY STATION BETHEL BASE ARP, WITH NAD 83(2011) STATE PLANE COORDINATES OF X = 840,744.23 AND Y = 649,700.01; THENCE RUNNING N 42°39'34" E FOR A DISTANCE OF 64,639.05 FEET TO A CALCULATED POINT, SAID POINT BEING THE POINT OF BEGINNING;

THENCE N 54°04'33" E, A DISTANCE OF 4.43 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 280;
THENCE N 70°59'51" E, A DISTANCE OF 95.83 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 281;
THENCE S 32°09'51" E, A DISTANCE OF 47.59 FEET TO A CALCULATED POINT;
THENCE S 58°07'57" W, A DISTANCE OF 42.70 FEET TO A CALCULATED POINT;
THENCE N 70°46'38" W, A DISTANCE OF 88.18 FEET TO THE POINT OF BEGINNING;

CONSERVATION EASEMENT CONTAINING 3,852 SQUARE FEET OR 0.884 ACRES MORE OR LESS.

CONSERVATION EASEMENT #32

A PARCEL OF LAND TO BE USED FOR CONSERVATION EASEMENT PURPOSES LOCATED ON LANDS NOW OR FORMERLY OWNED BY CHRISTOPHER MCGRATH AND WIFE, SUSAN MCGRATH (TAX PIN 8689-47-5347) AS RECORDED IN BOOK 1910 PAGE 459, LOCATED IN LEICESTER TOWNSHIP, BUNCOMBE COUNTY, NORTH CAROLINA AND BEING MORE PARTICULARLY DESCRIBED AS FOLLOWS:

COMMENCING AT NORTH CAROLINA GEODETIC SURVEY STATION BETHEL BASE ARP, WITH NAD 83(2011) STATE PLANE COORDINATES OF X = 840,744.23 AND Y = 649,700.01; THENCE RUNNING N 42°44'45" E FOR A DISTANCE OF 64,734.62 FEET TO A CALCULATED POINT, SAID POINT BEING THE POINT OF BEGINNING;

THENCE N 32°09'51" W, A DISTANCE OF 47.44 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 289;
THENCE N 40°58'31" E, A DISTANCE OF 69.26 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 290;
THENCE N 85°45'47" E, A DISTANCE OF 110.27 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 291;
THENCE S 75°41'53" E, A DISTANCE OF 45.53 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 292;
THENCE N 66°39'55" E, A DISTANCE OF 214.78 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 293;
THENCE S 21°47'48" E, A DISTANCE OF 42.45 FEET TO A CALCULATED POINT;
THENCE S 54°23'25" W, A DISTANCE OF 51.11 FEET TO THE SOUTHEAST CORNER OF A ROCK;
THENCE S 66°49'39" W, A DISTANCE OF 159.36 FEET TO A CALCULATED POINT;
THENCE N 86°28'55" W, A DISTANCE OF 140.37 FEET TO A CALCULATED POINT;
THENCE S 47°24'32" W, A DISTANCE OF 65.89 FEET TO A CALCULATED POINT;
THENCE S 58°07'57" W, A DISTANCE OF 12.43 FEET TO THE POINT OF BEGINNING;

CONSERVATION EASEMENT CONTAINING 21,943 SQUARE FEET OR 0.504 ACRES MORE OR LESS.

CONSERVATION EASEMENT #33

A PARCEL OF LAND TO BE USED FOR CONSERVATION EASEMENT PURPOSES LOCATED ON LANDS NOW OR FORMERLY OWNED BY CHRISTOPHER MCGRATH AND WIFE, SUSAN MCGRATH (TAX PIN 8689-47-4283) AS RECORDED IN BOOK 4912 PAGE 1390, LOCATED IN LEICESTER TOWNSHIP, BUNCOMBE COUNTY, NORTH CAROLINA AND BEING MORE PARTICULARLY DESCRIBED AS FOLLOWS:

COMMENCING AT NORTH CAROLINA GEODETIC SURVEY STATION BETHEL BASE ARP, WITH NAD 83(2011) STATE PLANE COORDINATES OF X = 840,744.23 AND Y = 649,700.01; THENCE RUNNING N 42°46'34" E FOR A DISTANCE OF 64,725.37 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 288, SAID REBAR BEING THE POINT OF BEGINNING;

THENCE N 32°09'51" W, A DISTANCE OF 35.54 FEET TO A CALCULATED POINT;
THENCE N 58°07'57" E, A DISTANCE OF 12.43 FEET TO A CALCULATED POINT;
THENCE N 47°24'32" E, A DISTANCE OF 65.89 FEET TO A CALCULATED POINT;
THENCE S 86°28'55" E, A DISTANCE OF 140.37 FEET TO A CALCULATED POINT;
THENCE N 66°49'39" E, A DISTANCE OF 159.36 FEET TO THE SOUTHEAST CORNER OF A ROCK;
THENCE S 35°07'21" E, A DISTANCE OF 43.17 FEET TO A 5/8" REBAR FOUND;
THENCE S 63°46'27" W, A DISTANCE OF 130.06 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 294;
THENCE N 16°46'20" W, A DISTANCE OF 29.30 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 295;
THENCE S 70°40'12" W, A DISTANCE OF 98.20 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 296;
THENCE N 87°39'44" W, A DISTANCE OF 73.57 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 297;
THENCE S 55°43'22" W, A DISTANCE OF 72.97 FEET TO THE POINT OF BEGINNING;

CONSERVATION EASEMENT CONTAINING 13,881 SQUARE FEET OR 0.319 ACRES MORE OR LESS.

Exhibit B – Parent Tracts

Parcel Six: PIN 8689-47-5347

BEGINNING at a 3/4" iron pin in the eastern margin of a 16 foot right of way to Morgan Branch Road (S.R. 1220) said beginning point is also located South 17° 19' 47" East 145.12 feet from the point of beginning of the property described in Deed Book 1203 at Page 250, Buncombe County Registry and runs from said beginning point 42° 56' 53" East 169.95 feet to a 3/4" iron pin; thence South 55° 32' 43" West 94.97 feet to a nail in a rock; thence South 66° 00' 29" West 160.10 feet to a 24" marked pine; thence North 84° 27' 47" West 140.37 feet to a 3/4" iron pin; thence South 47° 51' 03" West 66.36 feet to a 9" marked birch; thence South 59° 56' 41" West 74.59 feet to marked apple tree; thence North 70° 42' 26" West 94.46 feet to a 8" pine; thence North 64° 08' 48" West 181.59 feet to a marked birch; thence North 79° 08' 04" West 37.68 feet to a 5/8" iron pin in an old road bed; thence with said road bed the following three courses and distances: South 68° 37' 36" West 138.66, South 80° 37' 37" West 62.95, North 44° 23' 05" West 48.47; thence North 66° 59' 34" East 428.58 feet to a 1" iron pin; thence South 72° 54' 23" East 92.51 feet to a 3/4" solid iron pin; South 86° 01' 14" East 245.40 feet to a 1" iron pin; thence North 56° East 177.95 feet to the point and place of Beginning containing 3.13 acres more or less as shown on a survey prepared for Carl R. Marvin and Marilyn P. Marvin by Freeland-Clinkscales & Associates, Inc., dated May 25, 1992. (Drawing No. 12276)

Parcel Seven: PIN 8689-47-4283

Being the same property as shown on a plat duly recorded in the Office of the Register of Deeds for Buncombe County, North Carolina in Plat Book 155 at Page 198 reference to which is hereby made for a more particular and accurate description of said property. Containing 3.18 acres more or less.

4867-6614-5578, v. 1

Doc ID: 035571000012 Type: CRP
Recorded: 08/25/2022 at 03:51:41 PM
Fee Amt: $62.00 Page 1 of 12
Revenue Tax: $36.00
Workflow# 0000789032-0006
Buncombe County, NC
Drew Reisinger Register of Deeds
BK 6252 PG 509-520

STATE OF NORTH CAROLINA

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

BUNCOMBE COUNTY

SPO File Number: 11-LA-238
DMS Project Number: 100127
Excise Stamps: $36.00

This instrument prepared by Paul Arena a licensed NC attorney. Delinquent taxes, if any, to be paid by the closing attorney to the County Tax Collector upon disbursement of closing proceeds

Prepared by: Office of the Attorney General
Property Control Section
Return to: NC Department of Administration
State Property Office c/o MWB Box 31
1321 Mail Service Center
Raleigh, NC 27699-1321

THIS DEED OF CONSERVATION EASEMENT AND RIGHT OF ACCESS, made this 24th day of August, 2022, by DOUGLAS M. KEEFER and wife, NELLE H. GREGORY, whose address is 23 Success Avenue, Asheville NC 28806 (collectively, "**Grantor**"), to the STATE OF NORTH CAROLINA ("**Grantee**"), whose mailing address is State of North Carolina, Department of Administration, State Property Office, 1321 Mail Service Center, Raleigh, NC 27699-1321. The designations of Grantor and Grantee as used herein shall include said parties, their heirs, successors, and assigns, and shall include singular, plural, masculine, feminine, or neuter as required by context.

WITNESSETH:

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

WHEREAS, this Conservation Easement from Grantor to Grantee has been negotiated, arranged and provided for as a condition of a full delivery contract between *KCI Technologies Inc., 4505 Falls of Neuse Road, Suite 400, Raleigh NC 27609* and the North Carolina Department of Environmental Quality, to provide stream, wetland and/or buffer mitigation pursuant to the North Carolina Department of Environmental Quality Purchase and Services Contract Number *7909*.

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

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

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

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

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

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

WHEREAS, Grantor owns in fee simple certain real property situated, lying, and being in *Leicester Township, Buncombe County*, North Carolina (the "**Property**"), and being more particularly described as that certain parcel of land containing approximately 6.26 acres being more particularly described on "**Exhibit B**" attached hereto and incorporated herein; and

WHEREAS, Grantor is willing to grant a Conservation Easement and Right of Access over the herein described areas of the Property, thereby restricting and limiting the use of the areas of the Property subject to the Conservation Easement to the terms and conditions and purposes hereinafter set forth, and Grantee is willing to accept said Easement and Access Rights. The Conservation Easement shall be for the protection and benefit of the waters of ***the French Broad River.***

NOW, THEREFORE, in consideration of the mutual covenants, terms, conditions, and restrictions hereinafter set forth, Grantor unconditionally and irrevocably hereby grants and conveys unto Grantee, its successors and assigns, forever and in perpetuity, a Conservation Easement and Right of Access together with an access easement to and from the Conservation Easement Area described below.

The Conservation Easement Area consists of the following:

Conservation Easement **34** containing a total of **0.315 acres,** and Conservation Easement **35** containing a total of **0.375 acres, for a total combined easement acreage of 0.69 acres**, as shown on the plats of survey entitled "Final Plat, Conservation Easement for State of North Carolina Department of Environmental Quality Division of Mitigation Services, Project Name: Morgan Branch Site, DMS Project No. 100127, SPO File No. 11-LA-232 thru 11-LA-240, Leicester Township, Buncombe County, North Carolina", dated June 14, 2022, by *James M. Gellenthin*, PLS Number L-3860 and recorded in the Buncombe County, North Carolina Register of Deeds at **Plat Book 229, Pages 99-109.**

See attached "**Exhibit A**", Legal Description of area of the Property hereinafter referred to as the "Conservation Easement Area"

The purposes of this Conservation Easement are to maintain, restore, enhance, construct, create and preserve wetland and/or riparian resources in the Conservation Easement Area that contribute to the protection and improvement of water quality, flood prevention, fisheries, aquatic habitat, wildlife habitat, and recreational opportunities; to maintain permanently the Conservation Easement Area in its natural condition, consistent with these purposes; and to prevent any use of the Easement Area that will significantly impair or interfere with these purposes. To achieve these purposes, the following conditions and restrictions are set forth:

I. DURATION OF EASEMENT

Pursuant to law, including the above referenced statutes, this Conservation Easement and Right of Access shall be perpetual and it shall run with, and be a continuing restriction upon the use of, the Property, and it shall be enforceable by the Grantee against the Grantor and against Grantor's heirs, successors and assigns, personal representatives, agents, lessees, and licensees.

II. ACCESS EASEMENT

Grantor hereby grants and conveys unto Grantee, its employees, agents, successors and assigns, a perpetual, non-exclusive easement for ingress and egress over and upon the Property at all reasonable times and at such location as practically necessary to access the Conservation Easement Area for the purposes set forth herein ("**Access Easement**"). This grant of easement shall not vest any rights in the public and shall not be construed as a public dedication of the Access Easement. Grantor covenants, represents and warrants that it is the sole owner of and is seized of the Property in fee simple and has the right to grant and convey this Access Easement.

III. GRANTOR RESERVED USES AND RESTRICTED ACTIVITIES

The Conservation Easement Area shall be restricted from any development or usage that would impair or interfere with the purposes of this Conservation Easement. Unless expressly reserved as a compatible use herein, any activity in, or use of, the Conservation Easement Area by the Grantor is prohibited as inconsistent with the purposes of this Conservation Easement. Any rights not expressly reserved hereunder by the Grantor have been acquired by the Grantee. Any rights not expressly reserved hereunder by the Grantor, including the rights to all mitigation credits, including, but not limited to, stream, wetland, and riparian buffer mitigation units, derived from each site within the area of the Conservation Easement, are conveyed to and belong to the Grantee. Without limiting the generality of the foregoing, the following specific uses are prohibited, restricted, or reserved as indicated:

A. Recreational Uses. Grantor expressly reserves the right to undeveloped recreational uses, including hiking, bird watching, hunting and fishing, and access to the Conservation Easement Area for the purposes thereof.

B. Motorized Vehicle Use. Motorized vehicle use in the Conservation Easement Area is prohibited except within a Crossing Area(s) or Road or Trail as shown on the recorded survey plat.

C. Educational Uses. The Grantor reserves the right to engage in and permit others to engage in educational uses in the Conservation Easement Area not inconsistent with this Conservation Easement, and the right of access to the Conservation Easement Area for such purposes including organized educational activities such as site visits and observations. Educational uses of the property shall not alter vegetation, hydrology or topography of the site.

D. **Damage to Vegetation.** Except within Crossing Area(s) as shown on the recorded survey plat and as related to the removal of non-native plants, diseased or damaged trees, or vegetation that destabilizes or renders unsafe the Conservation Easement Area to persons or natural habitat, all cutting, removal, mowing, harming, or destruction of any trees and vegetation in the Conservation Easement Area is prohibited.

E. Industrial, Residential and Commercial Uses. All industrial, residential and commercial uses are prohibited in the Conservation Easement Area.

F. Agricultural Use. All agricultural uses are prohibited within the Conservation Easement Area including any use for cropland, waste lagoons, or pastureland.

G. New Construction. There shall be no building, facility, mobile home, antenna, utility pole, tower, or other structure constructed or placed in the Conservation Easement Area.

H. **Roads and Trails.** There shall be no construction or maintenance of new roads, trails, walkways, or paving in the Conservation Easement.

All existing roads, trails and crossings within the Conservation Easement Area shall be shown on the recorded survey plat.

I. Signs. No signs shall be permitted in the Conservation Easement Area except interpretive signs describing restoration activities and the conservation values of the Conservation Easement Area, signs identifying the owner of the Property and the holder of the Conservation Easement, signs giving directions, or signs prescribing rules and regulations for the use of the Conservation Easement Area.

J. Dumping or Storing. Dumping or storage of soil, trash, ashes, garbage, waste, abandoned vehicles, appliances, machinery, or any other material in the Conservation Easement Area is prohibited.

K. Grading, Mineral Use, Excavation, Dredging. There shall be no grading, filling, excavation, dredging, mining, drilling, hydraulic fracturing; removal of topsoil, sand, gravel, rock, peat, minerals, or other materials.

L. Water Quality and Drainage Patterns. There shall be no diking, draining, dredging, channeling, filling, leveling, pumping, impounding or diverting, causing, allowing or permitting the diversion of surface or underground water in the Conservation Easement Area. No altering or tampering with water control structures or devices, or disruption or alteration of the restored, enhanced, or created drainage patterns is allowed. All removal of wetlands, polluting or discharging into waters, springs, seeps, or wetlands, or use of pesticide or biocides in the Conservation Easement Area is prohibited. In the event of an emergency interruption or shortage of all other water sources, water from within the Conservation Easement Area may temporarily be withdrawn for good cause shown as needed for the survival of livestock on the Property.

M. Subdivision and Conveyance. Grantor voluntarily agrees that no further subdivision, partitioning, or dividing of the Conservation Easement Area portion of the Property owned by the Grantor in fee simple ("fee") that is subject to this Conservation Easement is allowed. Any future transfer of the Property shall be subject to this Conservation Easement and Right of Access and to the Grantee's right of unlimited and repeated ingress and egress over and across the Property to the Conservation Easement Area for the purposes set forth herein.

N. Development Rights. All development rights are permanently removed from the Conservation Easement Area and are non-transferrable.

O. Disturbance of Natural Features. Any change, disturbance, alteration or impairment of the natural features of the Conservation Easement Area or any intentional introduction of non-native plants, trees and/or animal species by Grantor is prohibited.

The Grantor may request permission to vary from the above restrictions for good cause shown, provided that any such request is not inconsistent with the purposes of this Conservation Easement, and the Grantor obtains advance written approval from the Division of Mitigation Services, 1652 Mail Services Center, Raleigh, NC 27699-1652.

IV. GRANTEE RESERVED USES

A. Right of Access, Construction, and Inspection. The Grantee, its employees, agents, successors and assigns, shall have a perpetual Right of Access over and upon the Conservation Easement Area to undertake or engage in any activities necessary to construct, maintain, manage, enhance, repair, restore, protect, monitor and inspect the stream, wetland and any other riparian resources in the Conservation Easement Area for the purposes set forth herein or any long-term management plan for the Conservation Easement Area developed pursuant to this Conservation Easement.

B. Restoration Activities. These activities include planting of trees, shrubs and herbaceous vegetation, installation of monitoring wells, utilization of heavy equipment to grade, fill, and prepare the soil, modification of the hydrology of the site, and installation of natural and manmade materials as needed to direct in-stream, above ground, and subterraneous water flow.

C. Signs. The Grantee, its employees and agents, successors or assigns, shall be permitted to place signs and witness posts on the Property to include any or all of the following: describe the project, prohibited activities within the Conservation Easement, or identify the project boundaries and the holder of the Conservation Easement.

D. Fences. Conservation Easements are purchased to protect the investments by the State (Grantee) in natural resources. Livestock within conservations easements damages the investment and can result in reductions in natural resource value and mitigation credits which would cause financial harm to the State. Therefore, Landowners (Grantor) with livestock are required to restrict livestock access to the Conservation Easement area. Repeated failure to do so may result in the State (Grantee) repairing or installing livestock exclusion devices (fences) within the conservation area for the purpose of restricting livestock access. In such cases, the landowner (Grantor) must provide access to the State (Grantee) to make repairs.

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

V. ENFORCEMENT AND REMEDIES

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

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

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

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

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

VI. MISCELLANEOUS

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

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

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

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

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

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

Division of Mitigation Services Program Manager
NC State Property Office
1321 Mail Service Center
Raleigh, NC 27699-1321

and

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

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

VII. QUIET ENJOYMENT

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

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

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

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

_____ (SEAL)
Douglas M. Keefer

_____ (SEAL)
Nelle H. Gregory

NORTH CAROLINA
COUNTY OF Buncombe

I, Peter U Kanipe, a Notary Public in and for the County and State aforesaid, do hereby certify that Douglas M. Keefer & Nelle H. Gregory, Grantor, personally appeared before me this day and acknowledged the execution of the foregoing instrument.

IN WITNESS, WHEREOF, I have hereunto set my hand and Notary Seal this the 22nd day of July, 2022.

_____
Notary Public

My commission expires: _____

Peter U Kanipe
NOTARY PUBLIC
Buncombe County, NC
My Commission Expires June 08, 2024

Exhibit A

Legal Description of area of the Property hereinafter referred to as the "Conservation Easement Area"

CONSERVATION EASEMENT #34

A PARCEL OF LAND TO BE USED FOR CONSERVATION EASEMENT PURPOSES LOCATED ON LANDS NOW OR FORMERLY OWNED BY DOUGLAS M. KEEFER, UNMARRIED AND NELLE H. GREGORY, UNMARRIED (TAX PIN 8689-47-3784) AS RECORDED IN BOOK 1838, PAGE 490, LOCATED IN LEICESTER TOWNSHIP, BUNCOMBE COUNTY, NORTH CAROLINA AND BEING MORE PARTICULARLY DESCRIBED AS FOLLOWS:

COMMENCING AT NORTH CAROLINA GEODETIC SURVEY STATION BETHEL BASE ARP, WITH NAD 83(2011) STATE PLANE COORDINATES OF X = 840,744.23 AND Y = 649,700.01; THENCE RUNNING N 42°07'57" E FOR A DISTANCE OF 64,862.06 FEET TO A CALCULATED POINT, SAID POINT BEING THE POINT OF BEGINNING;

THENCE N 32°58'19" E, A DISTANCE OF 47.27 FEET TO A CALCULATED POINT;
THENCE N 77°37'32" E, A DISTANCE OF 275.45 FEET TO A CALCULATED POINT;
THENCE S 12°19'49" E, A DISTANCE OF 28.07 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 298;
THENCE S 81°57'32" W, A DISTANCE OF 37.38 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 299;
THENCE N 70°23'36" W, A DISTANCE OF 34.45 FEET TO A S/8" REBAR SET WITH ALUMINUM CAP NO. 300;
THENCE S 68°30'26" W, A DISTANCE OF 39.07 FEET TO A S/8" REBAR SET WITH ALUMINUM CAP NO. 301;
THENCE S 14d03'46" W, A DISTANCE OF 66.79 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 302;
THENCE S 78d10'27" W, A DISTANCE OF 98.66 FEET TO A S/8" REBAR SET WITH ALUMINUM CAP NO. 303;
THENCE N 7S°10'39" W, A DISTANCE OF 84.98 FEET TO THE POINT OF BEGINNING;

CONSERVATION EASEMENT CONTAINING 13,712 SQUARE FEET OR 0.31S ACRES MORE OR LESS.

CONSERVATION EASEMENT #35

A PARCEL OF LAND TO BE USED FOR CONSERVATION EASEMENT PURPOSES LOCATED ON LANDS NOW OR FORMERLY OWNED BY DOUGLAS M. KEEFER, UNMARRIED AND NELLE H. GREGORY, UNMARRIED (TAX PIN 8689-47-3784) AS RECORDED IN BOOK 1838, PAGE 490, LOCATED IN LEICESTER TOWNSHIP, BUNCOMBE COUNTY, NORTH CAROLINA AND BEING MORE PARTICULARLY DESCRIBED AS FOLLOWS:

COMMENCING AT NORTH CAROLINA GEODETIC SURVEY STATION BETHEL BASE ARP, WITH NAD 83(2011) STATE PLANE COORDINATES OF X = 840,744.23 AND Y = 649,700.01; THENCE RUNNING N 42°17'S1" E FOR A DISTANCE OF 65,132.18 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 308, SAID REBAR BEING THE POINT OF BEGINNING;

THENCE N 12°19'49" W, A DISTANCE OF 29.35 FEET TO A CALCULATED POINT;
THENCE N 77°37'32" E, A DISTANCE OF 294.23 FEET TO A CALCULATED POINT;
THENCE S 15°49'29" E, A DISTANCE OF 94.75 FEET TO A CALCULATED POINT;
THENCE N 76°34'51" W, A DISTANCE OF 81.55 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 304;
THENCE S 67°59'13" W, A DISTANCE OF 55.57 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 305;
THENCE N 84°00'06" W, A DISTANCE OF 93.17 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 306;
THENCE S 88°48'28" W, A DISTANCE OF 32.68 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 307;
THENCE S 81°21'07" W, A DISTANCE OF 51.36 FEET TO THE POINT OF BEGINNING;

CONSERVATION EASEMENT CONTAINING 16,353 SQUARE FEET OR 0.375 ACRES MORE OR LE55.

Exhibit B – Parent Tracts

Parcel Eight: PIN 8689-47-3784

In Leicester Township, Buncombe County, North Carolina. Containing 6.26 acres more or less. And being all of the property described in Deed Book 1838, Page 491, Buncombe County Registry.

Described in the following paragraph. The calls which contain pairings of the letters "N," "E," "S" and "W," followed by a series of hyphenated numbers, represent the compass quadrant ("NW," "SE," etc.) and the number of "degrees"-"minutes"-"seconds" off the North-South axis. [For instance, "NW-10-10-10" would represent what is traditionally noted as "North 10 degrees, 10 minutes, 10 seconds West."] When used "IP" means iron pipe or iron pin; "RB" mean rebar; "CM" means concrete monument; "RRS" means railroad spike.
BEGINNING at an IP which marks the Northeast corner of that property described in Deed Book 1373, Page 386, Buncombe County Registry, and being the Southeast corner of the property described in Deed Book 1261, Page 553, Buncombe County Registry, and from said beginning point, NW-20-00-00 129.93 feet to an IP at or near the Eastern margin of a 12-foot gravel road on a 16-foot right of way as recorded in Deed Book 1203, Page 250, Buncombe County Registry, then crossing said right of way, NW-18-26-10 186.50 feet to an IP at a twin Cedar which marks the beginning corner of the property described in Deed Book 1261, Page 553, Buncombe County Registry, then along and with a fence the following six calls and distances: SW-75-00-51 589.31 feet to an IP, SW-30-21-38 128.23 feet to a Beech, SW-46-59-01 97.10 feet to a Chestnut Oak stump, SW-49-29-41 254.91 feet to a Locust snag, SE-14-45-12 100.14 feet, SE-39-17-07 30.01 feet to an IP, then along and with a different fence, NE-67-49-04 485.99 feet to an IP, and NE-75-23-14 524.76 feet to the point and place of BEGINNING, as shown on a survey by Alan B. Styles, RLS, for Douglas Michael Keefer and Nelle Haynes Gregory, dated 02/23/95 and numbered 95-B-23.

4882-7812-7402, v. 1

Workflow #: 0000789032-0007

Doc ID: 035571010016 Type: CRP
Recorded: 08/25/2022 at 03:52:18 PM
Fee Amt: $368.00 Page 1 of 16
Revenue Tax: $338.00
Workflow# 0000789032-0007
Buncombe County, NC
Drew Reisinger Register of Deeds
BK 6252 PG 521-536

STATE OF NORTH CAROLINA

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

BUNCOMBE COUNTY

SPO File Number: 11-LA-239
DMS Project Number: 100127
Excise Stamps: $338.00

This instrument prepared by Paul Arena a licensed NC attorney. Delinquent taxes, if any, to be paid by the closing attorney to the County Tax Collector upon disbursement of closing proceeds

Prepared by: Office of the Attorney General
Property Control Section
Return to: NC Department of Administration
State Property Office c/o MWB
1321 Mail Service Center BW 31
Raleigh, NC 27699-1321

THIS DEED OF CONSERVATION EASEMENT AND RIGHT OF ACCESS, made this 24th day of August, 2022, by HILARY ESSER RINGLE and husband PETER RINGLE, a 1/3 undivided interest, whose mailing address is 4462 Coconut Road, Lake Worth FL 33461-4520, WILLIAM ESSER, IV and wife KATIE E. ESSER, a 1/3 undivided interest, whose mailing address is 9715 Kerns Road, Huntersville, NC 28078 and STEPHAN M. ESSER and wife, TIFFANY ESSER, a 1/3 undivided interest, whose mailing address is 186 North Roscoe Blvd, Ponte Vedra, FL 32082 (collectively, "**Grantor**"), to the STATE OF NORTH CAROLINA ("**Grantee**"), whose mailing address is State of North Carolina, Department of Administration, State Property Office, 1321 Mail Service Center, Raleigh, NC 27699-1321. The designations of Grantor and Grantee as used herein shall include said parties, their heirs, successors, and assigns, and shall include singular, plural, masculine, feminine, or neuter as required by context.

WITNESSETH:

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

WHEREAS, this Conservation Easement from Grantor to Grantee has been negotiated, arranged and provided for as a condition of a full delivery contract between *KCI Technologies Inc., 4505 Falls of Neuse Road, Suite 400, Raleigh NC 27609* and the North Carolina Department of Environmental Quality, to provide stream, wetland and/or buffer mitigation pursuant to the North Carolina Department of Environmental Quality Purchase and Services Contract Number *7909.*

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

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

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

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

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

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

WHEREAS, Grantor owns in fee simple certain real property situated, lying, and being in *Leicester Township, Buncombe County*, North Carolina (the "**Property**"), and being more particularly described as that certain parcels of land containing approximately 193.240 acres being more particularly described on "**Exhibit B**" attached hereto and incorporated herein; and

WHEREAS, Grantor is willing to grant a Conservation Easement and Right of Access over the herein described areas of the Property, thereby restricting and limiting the use of the areas of the Property subject to the Conservation Easement to the terms and conditions and purposes hereinafter set forth, and Grantee is willing to accept said Easement and Access Rights. The Conservation Easement shall be for the protection and benefit of the waters of ***the French Broad River.***

NOW, THEREFORE, in consideration of the mutual covenants, terms, conditions, and restrictions hereinafter set forth, Grantor unconditionally and irrevocably hereby grants and conveys unto Grantee, its successors and assigns, forever and in perpetuity, a Conservation Easement and Right of Access together with an access easement to and from the Conservation Easement Area described below.

The Conservation Easement Area consists of the following:

Conservation Easement **36** containing a total of **2.075 acres**, Conservation Easement **37** containing a total of **3.061 acres**, Conservation Easement **38** containing a total of **0.670 acres**, and Conservation Easement **39** containing a total of **0.685 acres, for a total combined easement acreage of 6.491 acres**, as shown on the plats of survey entitled "Final Plat, Conservation Easement for State of North Carolina Department of Environmental Quality Division of Mitigation Services, Project Name: Morgan Branch Site, DMS Project No. 100127, SPO File No. 11-LA-232 thru 11-LA-240, Leicester Township, Buncombe County, North Carolina", dated June 14, 2022, by *James M. Gellenthin,* PLS Number L-3860 and recorded in the Buncombe County, North Carolina Register of Deeds at **Plat Book 229, Pages 99-109.**

See attached "**Exhibit A**", Legal Description of area of the Property hereinafter referred to as the "Conservation Easement Area"

The purposes of this Conservation Easement are to maintain, restore, enhance, construct, create and preserve wetland and/or riparian resources in the Conservation Easement Area that

contribute to the protection and improvement of water quality, flood prevention, fisheries, aquatic habitat, wildlife habitat, and recreational opportunities; to maintain permanently the Conservation Easement Area in its natural condition, consistent with these purposes; and to prevent any use of the Easement Area that will significantly impair or interfere with these purposes. To achieve these purposes, the following conditions and restrictions are set forth:

I. DURATION OF EASEMENT

Pursuant to law, including the above referenced statutes, this Conservation Easement and Right of Access shall be perpetual and it shall run with, and be a continuing restriction upon the use of, the Property, and it shall be enforceable by the Grantee against the Grantor and against Grantor's heirs, successors and assigns, personal representatives, agents, lessees, and licensees.

II. ACCESS EASEMENT

Grantor hereby grants and conveys unto Grantee, its employees, agents, successors and assigns, a perpetual, non-exclusive easement for ingress and egress over and upon the Property at all reasonable times and at such location as practically necessary to access the Conservation Easement Area for the purposes set forth herein ("**Access Easement**"). This grant of easement shall not vest any rights in the public and shall not be construed as a public dedication of the Access Easement. Grantor covenants, represents and warrants that it is the sole owner of and is seized of the Property in fee simple and has the right to grant and convey this Access Easement.

III. GRANTOR RESERVED USES AND RESTRICTED ACTIVITIES

The Conservation Easement Area shall be restricted from any development or usage that would impair or interfere with the purposes of this Conservation Easement. Unless expressly reserved as a compatible use herein, any activity in, or use of, the Conservation Easement Area by the Grantor is prohibited as inconsistent with the purposes of this Conservation Easement. Any rights not expressly reserved hereunder by the Grantor have been acquired by the Grantee. Any rights not expressly reserved hereunder by the Grantor, including the rights to all mitigation credits, including, but not limited to, stream, wetland, and riparian buffer mitigation units, derived from each site within the area of the Conservation Easement, are conveyed to and belong to the Grantee. Without limiting the generality of the foregoing, the following specific uses are prohibited, restricted, or reserved as indicated:

A. Recreational Uses. Grantor expressly reserves the right to undeveloped recreational uses, including hiking, bird watching, hunting and fishing, and access to the Conservation Easement Area for the purposes thereof.

B. Motorized Vehicle Use. Motorized vehicle use in the Conservation Easement Area is prohibited except within a Crossing Area(s) or Road or Trail as shown on the recorded survey plat.

C. Educational Uses. The Grantor reserves the right to engage in and permit others to engage in educational uses in the Conservation Easement Area not inconsistent with this

Conservation Easement, and the right of access to the Conservation Easement Area for such purposes including organized educational activities such as site visits and observations. Educational uses of the property shall not alter vegetation, hydrology or topography of the site.

D. **Damage to Vegetation.** Except within Crossing Area(s) as shown on the recorded survey plat and as related to the removal of non-native plants, diseased or damaged trees, or vegetation that destabilizes or renders unsafe the Conservation Easement Area to persons or natural habitat, all cutting, removal, mowing, harming, or destruction of any trees and vegetation in the Conservation Easement Area is prohibited.

E. Industrial, Residential and Commercial Uses. All industrial, residential and commercial uses are prohibited in the Conservation Easement Area.

F. Agricultural Use. All agricultural uses are prohibited within the Conservation Easement Area including any use for cropland, waste lagoons, or pastureland.

G. New Construction. There shall be no building, facility, mobile home, antenna, utility pole, tower, or other structure constructed or placed in the Conservation Easement Area.

H. **Roads and Trails.** There shall be no construction or maintenance of new roads, trails, walkways, or paving in the Conservation Easement.

All existing roads, trails and crossings within the Conservation Easement Area shall be shown on the recorded survey plat.

I. Signs. No signs shall be permitted in the Conservation Easement Area except interpretive signs describing restoration activities and the conservation values of the Conservation Easement Area, signs identifying the owner of the Property and the holder of the Conservation Easement, signs giving directions, or signs prescribing rules and regulations for the use of the Conservation Easement Area.

J. Dumping or Storing. Dumping or storage of soil, trash, ashes, garbage, waste, abandoned vehicles, appliances, machinery, or any other material in the Conservation Easement Area is prohibited.

K. Grading, Mineral Use, Excavation, Dredging. There shall be no grading, filling, excavation, dredging, mining, drilling, hydraulic fracturing; removal of topsoil, sand, gravel, rock, peat, minerals, or other materials.

L. Water Quality and Drainage Patterns. There shall be no diking, draining, dredging, channeling, filling, leveling, pumping, impounding or diverting, causing, allowing or permitting the diversion of surface or underground water in the Conservation Easement Area. No altering or tampering with water control structures or devices, or disruption or alteration of the restored, enhanced, or created drainage patterns is allowed. All removal of wetlands, polluting or discharging into waters, springs, seeps, or wetlands, or use of pesticide or biocides in the Conservation Easement Area is prohibited. In the event of an emergency interruption or

shortage of all other water sources, water from within the Conservation Easement Area may temporarily be withdrawn for good cause shown as needed for the survival of livestock on the Property.

M. Subdivision and Conveyance. Grantor voluntarily agrees that no further subdivision, partitioning, or dividing of the Conservation Easement Area portion of the Property owned by the Grantor in fee simple ("fee") that is subject to this Conservation Easement is allowed. Any future transfer of the Property shall be subject to this Conservation Easement and Right of Access and to the Grantee's right of unlimited and repeated ingress and egress over and across the Property to the Conservation Easement Area for the purposes set forth herein.

N. Development Rights. All development rights are permanently removed from the Conservation Easement Area and are non-transferrable.

O. Disturbance of Natural Features. Any change, disturbance, alteration or impairment of the natural features of the Conservation Easement Area or any intentional introduction of non-native plants, trees and/or animal species by Grantor is prohibited.

The Grantor may request permission to vary from the above restrictions for good cause shown, provided that any such request is not inconsistent with the purposes of this Conservation Easement, and the Grantor obtains advance written approval from the Division of Mitigation Services, 1652 Mail Services Center, Raleigh, NC 27699-1652.

IV. GRANTEE RESERVED USES

A. Right of Access, Construction, and Inspection. The Grantee, its employees, agents, successors and assigns, shall have a perpetual Right of Access over and upon the Conservation Easement Area to undertake or engage in any activities necessary to construct, maintain, manage, enhance, repair, restore, protect, monitor and inspect the stream, wetland and any other riparian resources in the Conservation Easement Area for the purposes set forth herein or any long-term management plan for the Conservation Easement Area developed pursuant to this Conservation Easement.

B. Restoration Activities. These activities include planting of trees, shrubs and herbaceous vegetation, installation of monitoring wells, utilization of heavy equipment to grade, fill, and prepare the soil, modification of the hydrology of the site, and installation of natural and manmade materials as needed to direct in-stream, above ground, and subterraneous water flow.

C. Signs. The Grantee, its employees and agents, successors or assigns, shall be permitted to place signs and witness posts on the Property to include any or all of the following: describe the project, prohibited activities within the Conservation Easement, or identify the project boundaries and the holder of the Conservation Easement.

D. Fences. Conservation Easements are purchased to protect the investments by the State (Grantee) in natural resources. Livestock within conservations easements damages the investment and can result in reductions in natural resource value and mitigation credits which would cause financial harm to the State. Therefore, Landowners (Grantor) with livestock are

required to restrict livestock access to the Conservation Easement area. Repeated failure to do so may result in the State (Grantee) repairing or installing livestock exclusion devices (fences) within the conservation area for the purpose of restricting livestock access. In such cases, the landowner (Grantor) must provide access to the State (Grantee) to make repairs.

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

V. ENFORCEMENT AND REMEDIES

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

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

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

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

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

VI. MISCELLANEOUS

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

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

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

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

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

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

Division of Mitigation Services Program Manager
NC State Property Office
1321 Mail Service Center
Raleigh, NC 27699-1321

and

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

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

VII. QUIET ENJOYMENT

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

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

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

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

_____ (SEAL)
William Esser, IV

_____ (SEAL)
Katie E. Esser

NORTH CAROLINA
COUNTY OF Mecklenburg

I, Janice Phillips, a Notary Public in and for the County and State aforesaid, do hereby certify that William Esser IV & Katie E. Esser, Grantor, personally appeared before me this day and acknowledged the execution of the foregoing instrument.

IN WITNESS, WHEREOF, I have hereunto set my hand and Notary Seal this the 27th day of July, 2022

_____
Notary Public

My commission expires: 12-12-2026

JANICE PHILLIPS NOTARY PUBLIC MECKLENBURG COUNTY, N.C. MY COMMISSION EXPIRES 12-12-2026

Hilary E Ringle (SEAL)
Hilary E. Ringle

Peter Ringle (SEAL)
Peter Ringle

STATE OF FL
COUNTY OF PBC

I, Tiffany Mulvay, a Notary Public in and for the County and State aforesaid, do hereby certify that Hilary Ringle & Peter Ringle, Grantor, personally appeared before me this day and acknowledged the execution of the foregoing instrument.

IN WITNESS, WHEREOF, I have hereunto set my hand and Notary Seal this the 27th day of July, 2022

Notary Public

TIFFANY MULVAY
Notary Public - State of Florida
Commission # HH 59072
My Comm. Expires Jan 21, 2025
Bonded through National Notary Assn.

My commission expires:

_____ (SEAL)
Stephan M. Esser

_____ (SEAL)
Tiffany Esser

NORTH CAROLINA
COUNTY OF St. Johns

I, Raelawn Dawson, a Notary Public in and for the County and State aforesaid, do hereby certify that Stephan M. Esser / Tiffany Esser, Grantor, personally appeared before me this day and acknowledged the execution of the foregoing instrument.

IN WITNESS, WHEREOF, I have hereunto set my hand and Notary Seal this the 1st day of August, 2022

_____
Notary Public

My commission expires: June 16, 2023

RAELAWN DAWSON NOTARY PUBLIC STATE OF FLORIDA
My Comm. Expires June 16, 2023
No. GG 345285

Exhibit A

Legal Description of area of the Property hereinafter referred to as the "Conservation Easement Area"

CONSERVATION EASEMENT #36

A PARCEL OF LAND TO BE USED FOR CONSERVATION EASEMENT PURPOSES LOCATED ON LANDS NOW OR FORMERLY OWNED BY HILARY ESSER RINGLE, WILLIAM ESSER IV, AND STEPHAN ESSER (TAX PIN 8689-1S-0926) AS RECORDED IN BOOK 2230, PAGE 538, LOCATED IN LEICESTER TOWNSHIP, BUNCOMBE COUNTY, NORTH CAROLINA AND BEING MORE PARTICULARLY DESCRIBED AS FOLLOWS:

COMMENCING AT NORTH CAROLINA GEODETIC SURVEY STATION BETHEL BASE ARP, WITH NAD 83(2011) STATE PLANE COORDINATES OF X = 840,744.23 AND Y = 649,700.01; THENCE RUNNING N 39°52'36" E FOR A DISTANCE OF 61,574.07 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 309, SAID REBAR BEING THE POINT OF BEGINNING;

THENCE N 53°55'32" W, A DISTANCE OF 97.42 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 310;
THENCE N 40°15'43" E, A DISTANCE OF 104.67 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 311;
THENCE N 83°02'48" E, A DISTANCE OF 101.68 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 312;
THENCE S 80°34'49" E, A DISTANCE OF 109.71 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 313;
THENCE N 82°37'25" E, A DISTANCE OF 86.18 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 314;
THENCE N 53°39'03" E, A DISTANCE OF 272.88 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 315;
THENCE N 88°26'20" E, A DISTANCE OF 106.36 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 316;
THENCE N 49°43'55" E, A DISTANCE OF 187.94 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 317;
THENCE N 86°00'38" E, A DISTANCE OF 117.93 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 318;
THENCE S 29°48'34" W, A DISTANCE OF 110.92 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 319;
THENCE S 56°47'23" W, A DISTANCE OF 201.41 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 320;
THENCE S 78°48'35" W, A DISTANCE OF 126.83 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 321;
THENCE S 49°07'59" W, A DISTANCE OF 125.83 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 322;
THENCE S 63°38'14" W, A DISTANCE OF 173.57 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 323;
THENCE N 76°14'02" W, A DISTANCE OF 160.06 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 324;
THENCE S 54°02'48" W, A DISTANCE OF 143.90 FEET TO THE POINT OF BEGINNING;

CONSERVATION EASEMENT CONTAINING 90,40S SQUARE FEET OR 2.075 ACRES MORE OR LESS.

CONSERVATION EASEMENT #37

A PARCEL OF LAND TO BE USED FOR CONSERVATION EASEMENT PURPOSES LOCATED ON LANDS NOW OR FORMERLY OWNED BY HILARY ESSER RINGLE, WILLIAM ESSER IV, AND STEPHAN ESSER (TAX PIN 8689-15-0926) AS RECORDED IN BOOK 2230, PAGE 538, LOCATED IN LEICESTER TOWNSHIP, BUNCOMBE COUNTY, NORTH CAROLINA AND BEING MORE PARTICULARLY DESCRIBED AS FOLLOWS:

COMMENCING AT NORTH CAROLINA GEODETIC SURVEY STATION BETHEL BASE ARP, WITH NAD 83(2011) STATE PLANE COORDINATES OF X = 840,744.23 AND Y = 649,700.01; THENCE RUNNING N 40°21'19" E FOR A DISTANCE OF 62,320.19 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 325, SAID REBAR BEING THE POINT OF BEGINNING;

THENCE N 30°32'07" W, A DISTANCE OF 85.49 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 326;

THENCE N 29°48'34" E, A DISTANCE OF 141.48 FEET TO A S/8" REBAR SET WITH ALUMINUM CAP NO. 327;
THENCE N S4°32'S4" E, A DISTANCE OF 260.0S FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 328;
THENCE N 72°S2'48" E, A DISTANCE OF 233.66 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 329;
THENCE N 57°59'26" E, A DISTANCE OF 106.24 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 330;
THENCE N 65°15'08" E, A DISTANCE OF 138.39 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 331;
THENCE N 6S°27'4S" E, A DISTANCE OF 91.71 FEET TO A S/8" REBAR SET WITH ALUMINUM CAP NO. 332;
THENCE N 89°19'51" E, A DISTANCE OF 27S.28 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 333;
THENCE S 42°53'40" E, A DISTANCE OF 117.67 FEET TO A S/8" REBAR SET WITH ALUMINUM CAP NO. 334;
THENCE S 80°20'30" W, A DISTANCE OF 530.31 FEET TO A S/8" REBAR SET WITH ALUMINUM CAP NO. 335;
THENCE S 57°32'42" W, A DISTANCE OF 113.08 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 336;
THENCE S 71°16'53" W, A DISTANCE OF 263.36 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 337;
THENCE S 36°07'2S" W, A DISTANCE OF 167.28 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 338;
THENCE S 52°19'S6" W, A DISTANCE OF 189.92 FEET TO THE POINT OF BEGINNING;

CONSERVATION EASEMENT CONTAINING 133,317 SQUARE FEET OR 3.061 ACRES MORE OR LESS.

CONSERVATION EASEMENT #38

A PARCEL OF LAND TO BE USED FOR CONSERVATION EASEMENT PURPOSES LOCATED ON LANDS NOW OR FORMERLY OWNED BY HILARY ESSER RINGLE, WILLIAM E5SER IV, AND STEPHAN ESSER (TAX PIN 8689-15-0926) AS RECORDED IN BOOK 2230, PAGE 538, LOCATED IN LEICESTER TOWNSHIP, BUNCOMBE COUNTY, NORTH CAROLINA AND BEING MORE PARTICULARLY DESCRIBED AS FOLLOWS:

COMMENCING AT NORTH CAROLINA GEODETIC SURVEY STATION BETHEL BASE ARP, WITH NAD 83(2011) STATE PLANE COORDINATES OF X = 840,744.23 AND Y = 649,700.01; THENCE RUNNING N 40°29'15" E FOR A DISTANCE OF 63,176.07 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 339, SAID REBAR BEING THE POINT OF BEGINNING;

THENCE N 36°04'18" W, A DISTANCE OF 304.S9 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 340;
THENCE N 66°51'54" E, A DISTANCE OF 88.23 FEET TO A S/8" REBAR SET WITH ALUMINUM CAP NO. 341;
THENCE S 42°18'55" E, A DISTANCE OF 180.96 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 342;
THENCE S 27°56'42" E, A DISTANCE OF 124.18 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 343;
THENCE S 65°27'4S" W, A DISTANCE OF 89.93 FEET TO THE POINT OF BEGINNING;

CONSERVATION EASEMENT CONTAINING 29,206 SQUARE FEET OR 0.670 ACRES MORE OR LESS.

CONSERVATION EASEMENT #39

A PARCEL OF LAND TO BE USED FOR CONSERVATION EASEMENT PURPOSES LOCATED ON LANDS NOW OR FORMERLY OWNED BY HILARY ESSER RINGLE, WILLIAM ESSER IV, AND STEPHAN ESSER (TAX PIN 8689-15-0926) AS RECORDED IN BOOK 2230, PAGE 538, LOCATED IN LEICESTER TOWNSHIP, BUNCOMBE COUNTY, NORTH CAROLINA AND BEING MORE PARTICULARLY DESCRIBED AS FOLLOWS:

COMMENCING AT NORTH CAROLINA GEODETIC SURVEY STATION BETHEL BASE ARP, WITH NAD 83(2011) STATE PLANE COORDINATES OF X = 840,744.23 AND Y = 649,700.01; THENCE RUNNING N 40°49'24" E FOR A DISTANCE OF 63,447.54 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 344, SAID REBAR BEING THE POINT OF BEGINNING;

THENCE N 42°53'40" W, A DISTANCE OF 92.99 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 345;
THENCE N 69°56'58" E, A DISTANCE OF 116.42 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 346;
THENCE N 80°13'51" E, A DISTANCE OF 234.42 FEET TO A CALCULATED POINT;
THENCE S 6°33'29" W, A DISTANCE OF 87.S9 FEET TO A CALCULATED POINT;

THENCE S 85°10'23" W, A DISTANCE OF 10.40 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 347;
THENCE S 67°09'05" W, A DISTANCE OF 98.44 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 348;
THENCE S 82°33'04" W, A DISTANCE OF 167.42 FEET TO THE POINT OF BEGINNING;

CONSERVATION EASEMENT CONTAINING 29,858 SQUARE FEET OR 0.685 ACRES MORE OR LESS.

Exhibit B – Parent Tracts

Parcel Nine: PIN 8689-15-0926

Being all of that 189.94 acre tract, more or less, of real property which is shown upon the "Survey for William L. Esser III Trust" by Hurley T. King, R.L.S., dated 12-26-85, which is on record in Plat Book 52, Page 104 of the Buncombe County Registry, reference to which is hereby made for a more particular description.

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Workflow No. 0000789032-0008

Doc ID: 035571020012 Type: CRP
Recorded: 08/25/2022 at 03:53:28 PM
Fee Amt: $42.00 Page 1 of 12
Revenue Tax: $16.00
Workflow# 0000789032-0008
Buncombe County, NC
Drew Reisinger Register of Deeds
BK6252 PG537-548

STATE OF NORTH CAROLINA

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

BUNCOMBE COUNTY

SPO File Number: 11-LA-240
DMS Project Number: 100127
Excise Stamps: $16.00

This instrument prepared by Paul Arena a licensed NC attorney. Delinquent taxes, if any, to be paid by the closing attorney to the County Tax Collector upon disbursement of closing proceeds.

Prepared by: Office of the Attorney General
Property Control Section
Return to: NC Department of Administration
State Property Office
1321 Mail Service Center
Raleigh, NC 27699-1321

c/o MWB
BM 31

THIS DEED OF CONSERVATION EASEMENT AND RIGHT OF ACCESS, made this 24th day of August, 2022, by ELIZABETH A. SHOPE, f/k/a Elizabeth A. Sossamon, and husband, RICHARD BRANDON SHOPE, whose mailing address is 40 Sunny Acres Lane, Leicester, NC 28748 (collectively, "**Grantor**"), to the STATE OF NORTH CAROLINA ("**Grantee**"), whose mailing address is State of North Carolina, Department of Administration, State Property Office, 1321 Mail Service Center, Raleigh, NC 27699-1321. The designations of Grantor and Grantee as used herein shall include said parties, their heirs, successors, and assigns, and shall include singular, plural, masculine, feminine, or neuter as required by context.

WITNESSETH:

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

WHEREAS, this Conservation Easement from Grantor to Grantee has been negotiated, arranged and provided for as a condition of a full delivery contract between *KCI Technologies Inc., 4505 Falls of Neuse Road, Suite 400, Raleigh NC 27609* and the North Carolina Department of Environmental Quality, to provide stream, wetland and/or buffer mitigation pursuant to the North Carolina Department of Environmental Quality Purchase and Services Contract Number *7909*.

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

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

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

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

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

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

WHEREAS, Grantor owns in fee simple certain real property situated, lying, and being in *Leicester Township, Buncombe County*, North Carolina (the "**Property**"), and being more particularly described as that certain parcel of land containing approximately 3.09 acres being more particularly described on "**Exhibit B**" attached hereto and incorporated herein; and

WHEREAS, Grantor is willing to grant a Conservation Easement and Right of Access over the herein described areas of the Property, thereby restricting and limiting the use of the areas of the Property subject to the Conservation Easement to the terms and conditions and purposes hereinafter set forth, and Grantee is willing to accept said Easement and Access Rights. The Conservation Easement shall be for the protection and benefit of the waters of ***the French Broad River.***

NOW, THEREFORE, in consideration of the mutual covenants, terms, conditions, and restrictions hereinafter set forth, Grantor unconditionally and irrevocably hereby grants and conveys unto Grantee, its successors and assigns, forever and in perpetuity, a Conservation Easement and Right of Access together with an access easement to and from the Conservation Easement Area described below.

The Conservation Easement Area consists of the following:

Conservation Easement **40** containing a total of **0.307 acres**, as shown on the plats of survey entitled "Final Plat, Conservation Easement for State of North Carolina Department of Environmental Quality Division of Mitigation Services, Project Name: Morgan Branch Site, DMS Project No. 100127, SPO File No. 11-LA-232 thru 11-LA-240, Leicester Township, Buncombe County, North Carolina", dated June 14, 2022, by *James M. Gellenthin*, PLS Number L-3860 and recorded in the Buncombe County, North Carolina Register of Deeds at **Plat Book 229, Pages 99-109.**

See attached "**Exhibit A**", Legal Description of area of the Property hereinafter referred to as the "Conservation Easement Area"

The purposes of this Conservation Easement are to maintain, restore, enhance, construct, create and preserve wetland and/or riparian resources in the Conservation Easement Area that contribute to the protection and improvement of water quality, flood prevention, fisheries, aquatic habitat, wildlife habitat, and recreational opportunities; to maintain permanently the Conservation Easement Area in its natural condition, consistent with these purposes; and to prevent any use of the Easement Area that will significantly impair or interfere with these purposes. To achieve these purposes, the following conditions and restrictions are set forth:

I. DURATION OF EASEMENT

Pursuant to law, including the above referenced statutes, this Conservation Easement and Right of Access shall be perpetual and it shall run with, and be a continuing restriction upon the use of, the Property, and it shall be enforceable by the Grantee against the Grantor and against Grantor's heirs, successors and assigns, personal representatives, agents, lessees, and licensees.

II. ACCESS EASEMENT

Grantor hereby grants and conveys unto Grantee, its employees, agents, successors and assigns, a perpetual, non-exclusive easement for ingress and egress over and upon the Property at all reasonable times and at such location as practically necessary to access the Conservation Easement Area for the purposes set forth herein ("**Access Easement**"). This grant of easement shall not vest any rights in the public and shall not be construed as a public dedication of the Access Easement. Grantor covenants, represents and warrants that it is the sole owner of and is seized of the Property in fee simple and has the right to grant and convey this Access Easement.

III. GRANTOR RESERVED USES AND RESTRICTED ACTIVITIES

The Conservation Easement Area shall be restricted from any development or usage that would impair or interfere with the purposes of this Conservation Easement. Unless expressly reserved as a compatible use herein, any activity in, or use of, the Conservation Easement Area by the Grantor is prohibited as inconsistent with the purposes of this Conservation Easement. Any rights not expressly reserved hereunder by the Grantor have been acquired by the Grantee. Any rights not expressly reserved hereunder by the Grantor, including the rights to all mitigation credits, including, but not limited to, stream, wetland, and riparian buffer mitigation units, derived from each site within the area of the Conservation Easement, are conveyed to and belong to the Grantee. Without limiting the generality of the foregoing, the following specific uses are prohibited, restricted, or reserved as indicated:

A. Recreational Uses. Grantor expressly reserves the right to undeveloped recreational uses, including hiking, bird watching, hunting and fishing, and access to the Conservation Easement Area for the purposes thereof.

B. Motorized Vehicle Use. Motorized vehicle use in the Conservation Easement Area is prohibited except within a Crossing Area(s) or Road or Trail as shown on the recorded survey plat.

C. Educational Uses. The Grantor reserves the right to engage in and permit others to engage in educational uses in the Conservation Easement Area not inconsistent with this Conservation Easement, and the right of access to the Conservation Easement Area for such purposes including organized educational activities such as site visits and observations. Educational uses of the property shall not alter vegetation, hydrology or topography of the site.

D. **Damage to Vegetation.** Except within Crossing Area(s) as shown on the recorded survey plat and as related to the removal of non-native plants, diseased or damaged trees, or

vegetation that destabilizes or renders unsafe the Conservation Easement Area to persons or natural habitat, all cutting, removal, mowing, harming, or destruction of any trees and vegetation in the Conservation Easement Area is prohibited.

E. Industrial, Residential and Commercial Uses. All industrial, residential and commercial uses are prohibited in the Conservation Easement Area.

F. Agricultural Use. All agricultural uses are prohibited within the Conservation Easement Area including any use for cropland, waste lagoons, or pastureland.

G. New Construction. There shall be no building, facility, mobile home, antenna, utility pole, tower, or other structure constructed or placed in the Conservation Easement Area.

H. **Roads and Trails.** There shall be no construction or maintenance of new roads, trails, walkways, or paving in the Conservation Easement.

All existing roads, trails and crossings within the Conservation Easement Area shall be shown on the recorded survey plat.

I. Signs. No signs shall be permitted in the Conservation Easement Area except interpretive signs describing restoration activities and the conservation values of the Conservation Easement Area, signs identifying the owner of the Property and the holder of the Conservation Easement, signs giving directions, or signs prescribing rules and regulations for the use of the Conservation Easement Area.

J. Dumping or Storing. Dumping or storage of soil, trash, ashes, garbage, waste, abandoned vehicles, appliances, machinery, or any other material in the Conservation Easement Area is prohibited.

K. Grading, Mineral Use, Excavation, Dredging. There shall be no grading, filling, excavation, dredging, mining, drilling, hydraulic fracturing; removal of topsoil, sand, gravel, rock, peat, minerals, or other materials.

L. Water Quality and Drainage Patterns. There shall be no diking, draining, dredging, channeling, filling, leveling, pumping, impounding or diverting, causing, allowing or permitting the diversion of surface or underground water in the Conservation Easement Area. No altering or tampering with water control structures or devices, or disruption or alteration of the restored, enhanced, or created drainage patterns is allowed. All removal of wetlands, polluting or discharging into waters, springs, seeps, or wetlands, or use of pesticide or biocides in the Conservation Easement Area is prohibited. In the event of an emergency interruption or shortage of all other water sources, water from within the Conservation Easement Area may temporarily be withdrawn for good cause shown as needed for the survival of livestock on the Property.

M. Subdivision and Conveyance. Grantor voluntarily agrees that no further subdivision, partitioning, or dividing of the Conservation Easement Area portion of the Property owned by the Grantor in fee simple ("fee") that is subject to this Conservation Easement is allowed. Any future

transfer of the Property shall be subject to this Conservation Easement and Right of Access and to the Grantee's right of unlimited and repeated ingress and egress over and across the Property to the Conservation Easement Area for the purposes set forth herein.

N. **Development Rights.** All development rights are permanently removed from the Conservation Easement Area and are non-transferrable.

O. **Disturbance of Natural Features**. Any change, disturbance, alteration or impairment of the natural features of the Conservation Easement Area or any intentional introduction of non-native plants, trees and/or animal species by Grantor is prohibited.

The Grantor may request permission to vary from the above restrictions for good cause shown, provided that any such request is not inconsistent with the purposes of this Conservation Easement, and the Grantor obtains advance written approval from the Division of Mitigation Services, 1652 Mail Services Center, Raleigh, NC 27699-1652.

IV. GRANTEE RESERVED USES

A. **Right of Access, Construction, and Inspection.** The Grantee, its employees, agents, successors and assigns, shall have a perpetual Right of Access over and upon the Conservation Easement Area to undertake or engage in any activities necessary to construct, maintain, manage, enhance, repair, restore, protect, monitor and inspect the stream, wetland and any other riparian resources in the Conservation Easement Area for the purposes set forth herein or any long-term management plan for the Conservation Easement Area developed pursuant to this Conservation Easement.

B. **Restoration Activities.** These activities include planting of trees, shrubs and herbaceous vegetation, installation of monitoring wells, utilization of heavy equipment to grade, fill, and prepare the soil, modification of the hydrology of the site, and installation of natural and manmade materials as needed to direct in-stream, above ground, and subterraneous water flow.

C. **Signs.** The Grantee, its employees and agents, successors or assigns, shall be permitted to place signs and witness posts on the Property to include any or all of the following: describe the project, prohibited activities within the Conservation Easement, or identify the project boundaries and the holder of the Conservation Easement.

D. **Fences.** Conservation Easements are purchased to protect the investments by the State (Grantee) in natural resources. Livestock within conservations easements damages the investment and can result in reductions in natural resource value and mitigation credits which would cause financial harm to the State. Therefore, Landowners (Grantor) with livestock are required to restrict livestock access to the Conservation Easement area. Repeated failure to do so may result in the State (Grantee) repairing or installing livestock exclusion devices (fences) within the conservation area for the purpose of restricting livestock access. In such cases, the landowner (Grantor) must provide access to the State (Grantee) to make repairs.

E. **Crossing Area(s).** The Grantee is not responsible for maintenance of crossing area(s), however, the Grantee, its employees and agents, successors or assigns, reserve the right to repair

crossing area(s), at its sole discretion and to recover the cost of such repairs from the Grantor if such repairs are needed as a result of activities of the Grantor, his successors or assigns.

V. ENFORCEMENT AND REMEDIES

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

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

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

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

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

VI. MISCELLANEOUS

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

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

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

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

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

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

Division of Mitigation Services Program Manager
NC State Property Office
1321 Mail Service Center
Raleigh, NC 27699-1321

and

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

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

VII. QUIET ENJOYMENT

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

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

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

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

Elizabeth A. Shope (SEAL)
Elizabeth A. Shope

Richard Brandon Shope (SEAL)
Richard Brandon Shope

NORTH CAROLINA
COUNTY OF Buncombe

I, Peter U. Kanipe, a Notary Public in and for the County and State aforesaid, do hereby certify that Elizabeth A. Shope & Richard Brandon Shope, Grantor, personally appeared before me this day and acknowledged the execution of the foregoing instrument.

IN WITNESS, WHEREOF, I have hereunto set my hand and Notary Seal this the 25th day of July, 2022.

Notary Public

My commission expires: _____

Peter U Kanipe
NOTARY PUBLIC
Buncombe County, NC
My Commission Expires June 08, 2024

Exhibit A

Legal Description of area of the Property hereinafter referred to as the "Conservation Easement Area"

CONSERVATION EASEMENT #40

A PARCEL OF LAND TO BE USED FOR CONSERVATION EASEMENT PURPOSES LOCATED ON LANDS NOW OR FORMERLY OWNED BY ELIZABETH SOSSAMON (TAX PIN 8689-87-1646) AS RECORDED IN BOOK 4385, PAGE 235, LOCATED IN LEICESTER TOWN5HIP, BUNCOMBE COUNTY, NORTH CAROLINA AND BEING MORE PARTICULARLY DESCRIBED AS FOLLOWS:

COMMENCING AT NORTH CAROLINA GEODETIC SURVEY STATION BETHEL BASE ARP, WITH NAD 83(2011) STATE PLANE COORDINATES OF X = 840,744.23 AND Y = 649,700.01; THENCE RUNNING N 44°49'28" E FOR A DISTANCE OF 67,541.16 FEET TO A CALCULATED POINT, 5AID POINT BEING THE POINT OF BEGINNING;

THENCE N 9°31'48" W, A DISTANCE OF 37.25 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 349;
THENCE N 14°26'53" W, A DISTANCE OF 143.02 FEET TO A 5/8" REBAR SET WITH ALUMINUM CAP NO. 350;
THENCE N 13°46'25" E, A DISTANCE OF 85.15 FEET TO A CALCULATED POINT;
THENCE S 80°19'27" E, A DISTANCE OF 46.42 FEET TO A CALCULATED POINT;
THENCE S 3°48'17" E, A DISTANCE OF 211.00 FEET TO A CALCULATED POINT;
THENCE S 43°57'31" W, A DISTANCE OF 55.01 FEET TO THE POINT OF BEGINNING;

CONSERVATION EASEMENT CONTAINING 13,394 SQUARE FEET OR 0.307 ACRES MORE OR LESS.

Exhibit B – Parent Tracts

Parcel Ten: PIN 8689-87-1646

BEGINNING on a stake in the center of a private drive leading to Ray D. Gasperson's property, said stake South 64 deg 34 min. 33 sec. East 501.54 feet from an iron pipe marking a corner in the Eastern boundary of C.C. Morgan's property, and runs with the Southern line of the said Gasperson's property South 64 deg. 34 min. 33 sec. East 93.77 feet to an iron pipe at a Pine stump; thence South 81 deg. 23 min. 12 sec. East 332.07 feet passing the corner of Gasperson and Harry M. Morgan's property to an iron pipe at the fence corner on the east edge of a small branch; thence continuing with Harry M. Morgan's property and the Eastern margin of the branch South 04 deg. 52 min. 02 sec. East 211.00 feet to an iron pipe at the fence corner; thence South 42 deg. 53 min. 46 sec. West 325.44 feet to a 36-inch White Oak; thence leaving Harry M. Morgan's property and a new line within the property of C.C. Morgan, North 19 deg 23 min. 00 sec. West 261.45 feet to an iron pipe at a Locust Stump; thence North 50 deg. 56 min. 12 sec. West 218.47 feet, passing an iron pipe at 204.73 feet set in the lien to a point in the center of a 30-foot road right of way; thence with the centerline of said right of way four calls as follows: North 42 deg. 55 min. 33 sec. East 31.33 feet; North 25 deg. 48 min. 44 sec. East 51.08 feet; North 07 deg. 40 min. 11 sec. East 43.07 feet; North 03 deg. 06 min. 59 sec. West 42.80 feet to the point or the place of BEGINNING. Containing 3.087 acres more or less.

4875-5677-1626, v. 2

8

Workflow No. 0000789032-0009

Doc ID: 035571030008 Type: CRP
Recorded: 08/25/2022 at 03:54:43 PM
Fee Amt: $26.00 Page 1 of 8
Revenue Tax: $0.00
Workflow# 0000789032-0009
Buncombe County, NC
Drew Reisinger Register of Deeds
BK 6252 PG 549-556

SPECIAL WARRANTY DEED

Excise tax: none required
Tax Lot No.: recombination of 8689-63-4964.00000 and 8689-73-5044.00000
Prepared by / return to: Paul A. Arena, Moore & Van Allen PLLC, 100 N. Tryon St., Suite 4700, Charlotte, NC 28202*
(*Prepared without title examination) c/o MVB Box 31

THIS DEED is made this 24th day of August, 2022, by and between NEAL A. MORGAN and wife, AVA MARIE J. MORGAN, a 1/3 undivided interest, whose mailing address is 321 Morgan Branch Road, Leicester, NC 28748; MARTIN C. MORGAN, unmarried, a 1/6 undivided interest, whose mailing address is 75 Morgan Branch Road, Leicester, NC 28748; MARCIA M. MOREHEAD and husband, JAMES R. MOREHEAD, a 1/6 undivided interest, whose mailing address is 171 Elk Mountain Road, Asheville NC 28804; and FRANKLIN DALE MORGAN and wife, JOYCE C. MORGAN, a 1/3 undivided interest, whose mailing address is 1281 Newfound Road Leicester, NC 28748 (collectively, "**Grantor**") and FRANKLIN DALE MORGAN and wife, JOYCE C. MORGAN, whose mailing address is 1281 Newfound Road Leicester, NC 28748 ("**Grantee**").

W I T N E S S E T H:

Grantor, for a valuable consideration paid by the Grantee, the receipt of which is hereby acknowledged, has and by these presents does grant, bargain, sell and convey unto the Grantee in fee simple, all that certain lot or parcel of land situated in Buncombe County, North Carolina, and more particularly described as follows (the "**Property**"):

See Exhibit A attached hereto and incorporated herein.

Together with all right, title and interest of Grantor in and to any current or former streams, alleys, roads, streets, ways, strips, gores or railroad rights-of-way abutting or adjoining the Property, and together with all the improvements thereon and all privileges, easements and appurtenances thereto belonging.

TO HAVE AND TO HOLD the Property and all privileges and appurtenances thereto belonging to Grantee in fee simple.

CHAR2\2417139v2

This instrument prepared by Paul A. Arena a licensed NC attorney. Delinquent taxes, if any, to be paid by the closing attorney to the County Tax Collector upon disbursement of closing proceeds

And Grantor covenants that Grantor has done nothing to impair such title as Grantor received, and Grantor will warrant and defend the title against the lawful claims of all persons claiming by, under or through Grantor, except with respect to the exceptions hereinafter stated. Title to the Property is conveyed subject to the following exceptions:

1. Real property taxes for the year 2021 and subsequent years.

2. Easements, covenants, restrictions, encumbrances and other matters of record.

3. Matters that would be shown by a current survey and/or inspection of the Property.

4. Laws, regulations or ordinances relating to zoning, environmental protection, subdivision, occupancy, use, construction or development of the Property.

Grantor states that the Property does not include the primary residence of Grantor.

The purpose of this deed is to recombine the Property with PIN 8689-73-5044.00000. A description of recombined PIN 8689-73-5044.00000, including the Property, is attached hereto as Exhibit B and incorporated herein. The recombined parcel also is shown as that certain parcel containing 0.920 acre on plat entitled "Recombination Plat 1281 Newfound Road" recorded in Plat Book 221, Page 96, Buncombe County Registry.

The designation Grantor and Grantee as used herein shall include said parties, their heirs, successors and assigns, and shall include singular, plural, masculine, feminine or neuter, as required by the context.

IN WITNESS WHEREOF, Grantor has executed this instrument under seal the day and year first above written.

Franklin Dale Morgan (SEAL)
Franklin Dale Morgan

Joyce C. Morgan (SEAL)
Joyce C. Morgan

NORTH CAROLINA
COUNTY OF Buncombe

I, Peter U. Kanipe, a Notary Public in and for the County and State aforesaid, do hereby certify that Franklin Dale Morgan & Joyce C. Morgan, Grantor, personally appeared before me this day and acknowledged the execution of the foregoing instrument.

IN WITNESS, WHEREOF, I have hereunto set my hand and Notary Seal this the 26th day of July, 2022.

Notary Public

My commission expires:

Peter U Kanipe
NOTARY PUBLIC
Buncombe County, NC
My Commission Expires June 08, 2024

CHAR2\2417139v2

_____ (SEAL)
Neal A. Morgan

_____ (SEAL)
Ava Marie J. Morgan

NORTH CAROLINA
COUNTY OF Buncombe

I, Peter U Kanipe, a Notary Public in and for the County and State aforesaid, do hereby certify that Neal A. Morgan & Ava Marie J. Morgan, Grantor, personally appeared before me this day and acknowledged the execution of the foregoing instrument.

IN WITNESS, WHEREOF, I have hereunto set my hand and Notary Seal this the 25th day of July, 2022.

_____
Notary Public

My commission expires:_____

Peter U Kanipe
NOTARY PUBLIC
Buncombe County, NC
My Commission Expires June 08, 2024

CHAR2\2417139v2

Martin C. Morgan (SEAL)

NORTH CAROLINA
COUNTY OF Buncombe

I, Peter U Kanipe, a Notary Public in and for the County and State aforesaid, do hereby certify that Martin C. Morgan, Grantor, personally appeared before me this day and acknowledged the execution of the foregoing instrument.

IN WITNESS, WHEREOF, I have hereunto set my hand and Notary Seal this the 25th day of July, 2022.

Notary Public

My commission expires:

Peter U Kanipe
NOTARY PUBLIC
Buncombe County, NC
My Commission Expires June 08, 2024

CHAR2\2417139v2

Marcia M. Morehead (SEAL)
Marcia M. Morehead

James R. Morehead (SEAL)
James R. Morehead

NORTH CAROLINA
COUNTY OF Buncombe

I, Peter U Kanipe, a Notary Public in and for the County and State aforesaid, do hereby certify that Marcia M. Morehead & James R. Morehead, Grantor, personally appeared before me this day and acknowledged the execution of the foregoing instrument.

IN WITNESS, WHEREOF, I have hereunto set my hand and Notary Seal this the 25th day of July, 2022.

Notary Public

My commission expires:

Peter U Kanipe
NOTARY PUBLIC
Buncombe County, NC
My Commission Expires June 08, 2024

CHAR2\2417139v2

Exhibit A

Property Description

Conveyance Area - a portion of PIN 8689-63-4964.00000

All that certain piece, parcel or lot of land lying, situate and being in Leicester Township, Buncombe County, State of North Carolina, and having the following metes and bounds, to wit:

Commencing at North Carolina Geodetic Survey station Bethel Base ARP, having NAD 83(2011) US Survey Foot coordinates of X 840,744.23, Y 649,700.01; thence running North 47°16'28" East for a grid distance of 63,667.03 feet to a MAG nail set in the center of Newfound Road; thence turning and running along lands now or formerly of Martin Craig Morgan, et al South 85°42'44" West, passing a 5/8" rebar iron pin set at 40.98 feet, for a total distance of 164.00 feet to a point, said Point being the Point of Beginning; thence turning and running through lands now or formerly of Martin Craig Morgan the following three courses: South 85°42'44" West for a distance of 11.69 feet to a 5/8" rebar iron pin set; 2) North 26°21'44" East, passing a 5/8" rebar iron pin set at 287.86 feet, for a total distance of 289.86 feet to a utility pole; 3) North 88°40'00" East, passing 5/8" rebar iron pins set at 2.00 feet and 209.28 feet, for a total distance of 248.44 feet to a MAG nail set in the center of Newfound Road; thence turning and running along and with said center of Newfound Road South 38°39'33" West for a distance of 37.18 feet to a point at lands now or formerly of Dale Morgan and wife, Joyce Morgan; thence turning and running along lands now or formerly of Dale Morgan and wife, Joyce Morgan, the following two courses: 1) South 87°07'55" West for a distance of 210.00 feet to a point; 2) South 30°28'38" West for a distanee of 261.17 feet to the place and Point of Beginning; said piece containing 0.289 acres, all measurements being a little more or less.

Exhibit B

Recombined Parcel

Combined Dale and Joyce Morgan Lot - PIN 8689-73-5044.00000

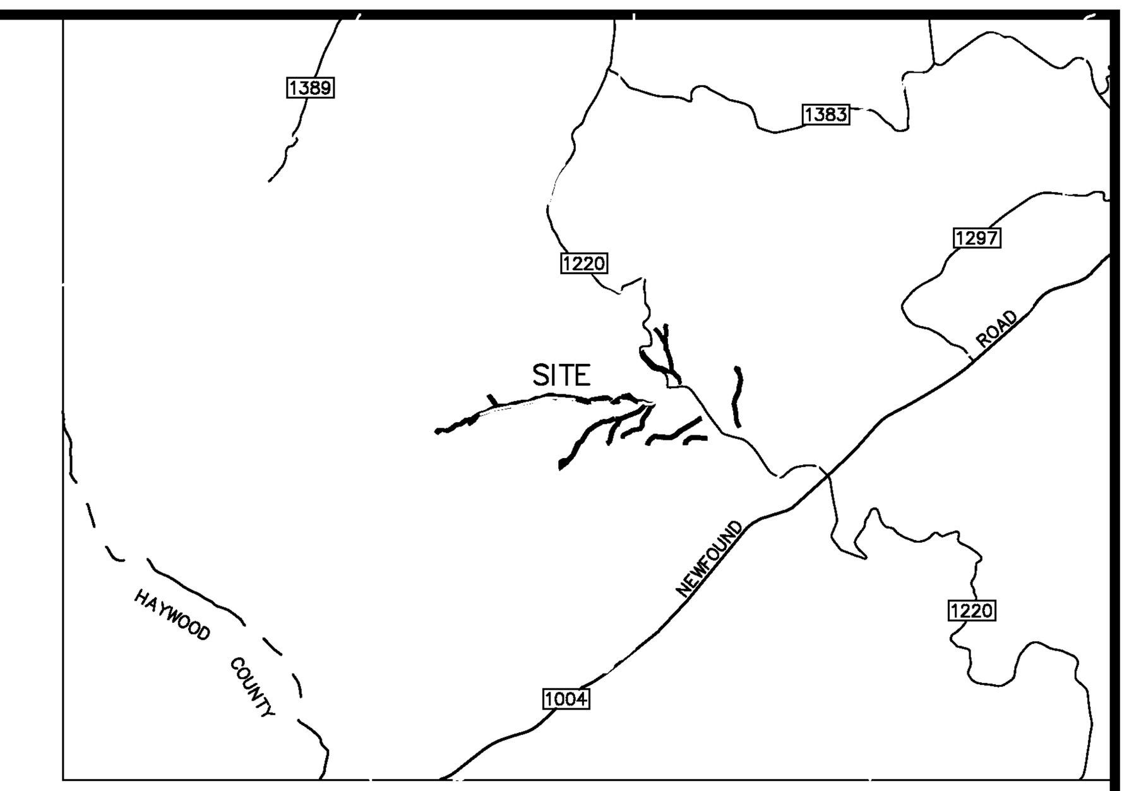
All that certain piece, parcel or lot of land lying, situate and being in Leicester Township, Buncombe County, State of North Carolina, and having the following metes and bounds, to wit:

Commencing at North Carolina Geodetic Survey station Bethel Base ARP, having NAD 83(2011) US Survey Foot coordinates of X 840,744.23, Y 649,700.01; thence running North 47°16'28" East for a grid distance of 63,667.03 feet to a MAG nail set in the center of Newfound Road, said MAG nail being the Point of Beginning; thence turning and running along lands now or formerly of Martin Craig Morgan, et al, the following three courses: 1) South 85°42'44" West, passing a 5/8" rebar iron pin set at 40.98 feet, for a total distance of 175.69 feet to a 5/8" rebar iron pin set; 2) North 26°21'44" East, passing a 5/8" rebar iron pin set at 287.86 feet, for a total distance of 289.86 feet to a utility pole; 3) North 88°40'00" East, passing 5/8" rebar iron pins set at 2.00 feet and 209.28 feet, for a total distance of 248.44 feet to a MAG nail set in the center of Newfound Road; thence turning and running along and with said center of Newfound Road South 38°39'33" West for a distance of 323.18 feet to the place and Point of Beginning; said lot containing 1.209 acres, all measurements being a little more or less.

Said lot being subject to a fifteen-foot access easement along its southern boundary.

CHAR2\2417139v2

Type: CONSOLIDATED REAL PROPERTY
Recorded: 8/19/2022 3:05:23 PM
Fee Amt: $231.00 Page 1 of 11
Buncombe County, NC
Drew Reisinger Register of Deeds
BK 229 PG 99 - 109



VICINITY MAP
SCALE: 1" = 1 mile

Submitted electronically by "KCI Technologies, Inc"
in compliance with North Carolina statutes governing recordable documents
and the terms of the submitter agreement with the Buncombe County Register of Deeds.

SURVEYOR NOTES

1. THIS PLAT DOES NOT REPRESENT A BOUNDARY SURVEY OF THE PARENT TRACTS. THE PARENT TRACT BOUNDARIES ADJACENT TO THIS EASEMENT ARE NOT CHANGED BY THIS PLAT. BOUNDARY INFORMATION SHOWN HEREON WAS DERIVED FROM DEEDS AND MAPS OF RECORD IN BUNCOMBE COUNTY AND MONUMENTATION FOUND IN THE FIELD.
2. DISTANCES SHOWN ARE HORIZONTAL GROUND DISTANCES IN U.S. SURVEY FEET UNLESS OTHER NOTED.
3. AREAS CALCULATED BY THE COORDINATE METHOD.
4. THE BASIS OF THE MERIDIANS AND COORDINATES FOR THIS PLAT IS THE NORTH CAROLINA STATE PLANE COORDINATE SYSTEM, NORTH AMERICAN DATUM 1983 (NAD 83), BASED ON DIFFERENTIAL GPS OBSERVATIONS PERFORMED IN SEPTEMBER 2019.
5. DEED AND PLAT REFERENCES: AS SHOWN HEREON.
6. SUBJECT PROPERTIES KNOWN AS PARCEL NUMBERS: AS SHOWN HEREON.
7. SUBJECT EASEMENT LIES WITHIN THE AREA DESIGNATED AS ZONE "X", BASED ON FEDERAL FLOOD INSURANCE RATE MAP 3700868900J, EFFECTIVE JANUARY 6, 2010.
8. NO UNDERGROUND UTILITY LOCATING PERFORMED DURING THE COURSE OF THIS SURVEY.
9. THE PROJECT SCALE FACTOR IS 0.9997886597. THIS PROJECT WAS LOCALIZED AROUND A 2" STAINLESS STEEL PIPE FOUND AND DEPICTED HEREON.
10. THE HEREON SHOWN IS SUBJECT TO ANY AND ALL CONDITIONS, RESTRICTIONS, EASEMENTS AND/OR RIGHTS-OF-WAY OF RECORD.
11. THE STATE OF NORTH CAROLINA, ITS EMPLOYEES AND AGENTS, SUCCESSORS AND ASSIGNS, RECEIVE 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 RESTORATION ACTIVITIES OR A LONG-TERM MANAGEMENT PLAN AS DESCRIBED IN SECTION III-A OF THE CONSERVATION EASEMENT AGREEMENT.
12. ALL EXISTING FENCES WITHIN THE CONSERVATION EASEMENT AREAS ARE TO BE REMOVED.
13. ALL EXISTING ROADS WITHIN THE CONSERVATION EASEMENT AREAS ARE TO BE REMOVED FROM THE EASEMENT AREAS. THE EXCEPTION IS THE EXISTING 10'-WIDE FORD THAT WILL BE INCLUDED IN THE EASEMENT IN CONSERVATION EASEMENT 36 AS SHOWN ON SHEET 9.
14. ALL STRUCTURES WITHIN THE CONSERVATION EASEMENT AREAS ARE TO BE REMOVED.
15. ALL UTILITY LINES WITHIN THE CONSERVATION EASEMENT AREAS ARE TO BE MOVED OUTSIDE OF THE EASEMENT AREAS.

EXEMPTION STATEMENT

STATE OF NORTH CAROLINA, COUNTY OF BUNCOMBE

EXEMPT FROM THE BUNCOMBE COUNTY LAND DEVELOPMENT AND SUBDIVISION ORDINANCE.

DocuSigned by: Courtney S. Gibson
EB9BDEE60EA8433...
COUNTY PLANNER — DATE 8/18/2022

REVIEW OFFICER CERTIFICATE

STATE OF NORTH CAROLINA, COUNTY OF BUNCOMBE

I, Courtney S. Gibson, REVIEW OFFICER OF BUNCOMBE COUNTY CERTIFY THAT THE MAP OR PLAT TO WHICH THIS CERTIFICATION IS AFFIXED MEETS ALL STATUTORY REQUIREMENTS FOR RECORDING.

DocuSigned by: Courtney S. Gibson
EB9BDEE60EA8433...
REVIEW OFFICER — DATE 8/18/2022

OWNER CERTIFICATIONS

SEE INDIVIDUAL SHEETS

CERTIFICATE OF SURVEY AND ACCURACY

I, JAMES M. GELLENTHIN, CERTIFY THAT THIS PLAT WAS DRAWN UNDER MY SUPERVISION FROM AN ACTUAL SURVEY MADE UNDER MY SUPERVISION (DEED DESCRIPTIONS RECORDED AS SHOWN HEREON); THAT THE BOUNDARIES SURVEYED AND NOT SURVEYED ARE CLEARLY INDICATED AS DRAWN FROM INFORMATION FOUND IN REFERENCES SHOWN HEREON; THAT THE RATIO OF PRECISION OR POSITIONAL ACCURACY AS CALCULATED IS GREATER THAN 1:10,000; THAT THE SURVEY IS OF ANOTHER CATEGORY, SUCH AS THE RECOMBINATION OF EXISTING PARCELS, A COURT-ORDERED SURVEY, OR OTHER EXEMPTION OR EXCEPTION TO THE DEFINITION OF SUBDIVISION; THAT THIS PLAT WAS PREPARED IN ACCORDANCE WITH G.S. 47-30 AS AMENDED. WITNESS MY ORIGINAL SIGNATURE, REGISTRATION LICENSE NUMBER AND SEAL THIS 16TH DAY OF AUGUST, A.D., 2022.

James M. Gellenthin
NORTH CAROLINA REGISTRATION NUMBER L-3860
JAMES M. GELLENTHIN 8/16/22

NORTH CAROLINA PROFESSIONAL LAND SURVEYOR SEAL L-3860 JAMES M. GELLENTHIN

LEGEND

- EXISTING PROPERTY MONUMENT
- EASEMENT MONUMENT SET
- CALCULATED POINT
- WELL
- UTILITY POLE
- EASEMENT AREA
- WETLANDS AREA
- BUILDING
- OHE — OVERHEAD UTILITY
- UTILITY EASEMENT
- X — FENCE LINE
- UNIMPROVED ROAD OR PATH
- PAVED ROAD
- EXISTING STREAM CENTERLINE
- WETLANDS BOUNDARY
- EXISTING PROPERTY LINE NOT SURVEYED
- SURVEYED CONSERVATION EASEMENT LINE

FINAL PLAT
CONSERVATION EASEMENT
FOR
STATE OF NORTH CAROLINA
DEPARTMENT OF ENVIRONMENTAL QUALITY
DIVISION OF MITIGATION SERVICES
PROJ. NAME: MORGAN BRANCH SITE
DMS PROJECT #: 100127
SPO FILE NO.: 11-LA-232 thru 11-LA-240
LEICESTER TOWNSHIP, BUNCOMBE COUNTY, NORTH CAROLINA

KCI ASSOCIATES OF NC
ENGINEERS, SURVEYORS AND PLANNERS
KCI
FIRM NO. C-0764
4505 Falls of Neuse Road, Floor 4
Raleigh, North Carolina 27609
Phone: 919.783.9214
FAX: 919.783.9266

File No.:	161904775-ESMT
Date:	JUNE 14, 2022
Scale:	AS SHOWN
Sheet:	1 of 11

Line Table		
Line #	Length	Direction
L1	30.67'	N 14°33'21" E
L2	95.01'	N 01°56'08" W
L3	91.97'	N 15°55'29" W
L4	83.78'	N 19°39'45" E
L5	77.61'	S 73°53'50" E
L6	62.29'	S 17°37'30" W
L7	68.15'	S 15°27'06" E
L8	88.80'	S 04°28'46" E
L9	68.32'	S 02°19'12" W
L10	33.58'	S 31°28'50" W
L11	78.87'	N 59°29'29" W
L12	88.41'	N 30°04'09" W
L13	152.12'	N 43°11'38" W
L14	73.99'	N 50°44'32" E
L15	136.57'	S 44°50'49" E

Line Table		
Line #	Length	Direction
L16	104.44'	S 31°54'10" E
L17	77.60'	S 51°05'07" W
L18	201.50'	N 11°22'24" W
L19	82.35'	N 21°27'32" W
L20	102.88'	N 14°00'40" W
L21	96.81'	N 38°04'00" W
L22	100.80'	N 04°46'49" E
L23	45.15'	N 10°37'03" W
L24	139.59'	N 38°14'54" W
L25	76.61'	N 15°44'18" W
L26	69.71'	N 51°05'07" E
L27	61.95'	S 28°14'16" E
L28	52.83'	N 17°50'57" E
L29	88.47'	S 59°29'29" E
L30	169.83'	S 04°58'24" E

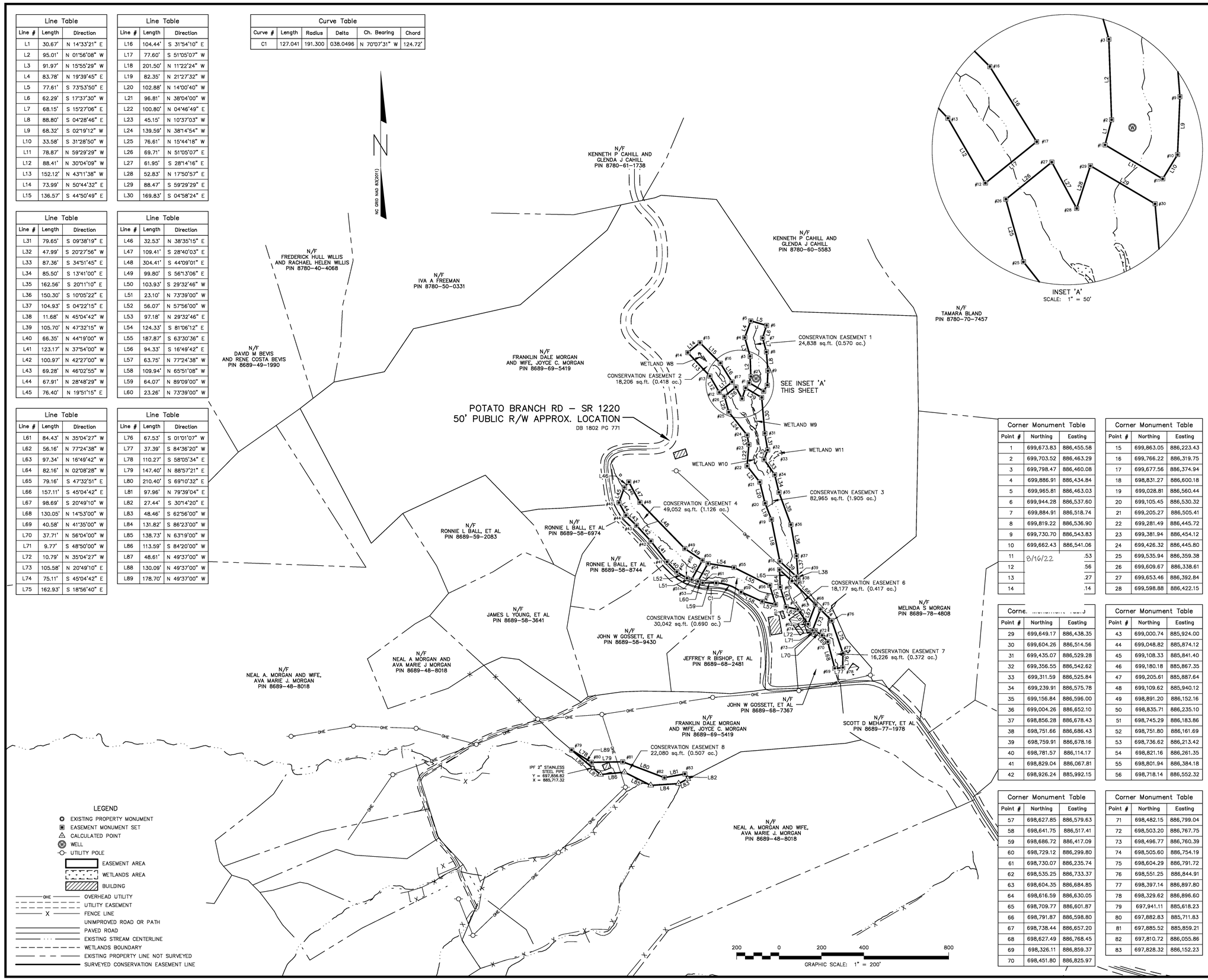
Curve Table					
Curve #	Length	Radius	Delta	Ch. Bearing	Chord
C1	127.041	191.300	038.0496	N 70°07'31" W	124.72'

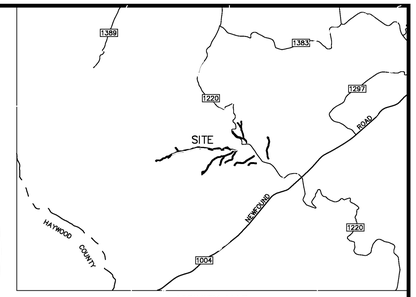
Line Table		
Line #	Length	Direction
L31	79.65'	S 09°38'19" E
L32	47.99'	S 20°27'56" W
L33	87.36'	S 34°51'45" E
L34	85.50'	S 13°41'00" E
L35	162.56'	S 20°11'10" E
L36	150.30'	S 10°05'22" E
L37	104.93'	S 04°22'15" E
L38	11.68'	N 45°04'42" W
L39	105.70'	N 47°32'15" W
L40	66.35'	N 44°19'00" W
L41	123.17'	N 37°54'00" W
L42	100.97'	N 42°27'00" W
L43	69.28'	N 46°02'55" W
L44	67.91'	N 28°48'29" W
L45	76.40'	N 19°51'15" E

Line Table		
Line #	Length	Direction
L46	32.53'	N 38°35'15" E
L47	109.41'	S 28°40'03" E
L48	304.41'	S 44°09'01" E
L49	99.80'	S 56°13'06" E
L50	103.93'	S 29°32'46" W
L51	23.10'	N 73°39'00" W
L52	56.07'	N 57°56'00" W
L53	97.18'	N 29°32'46" E
L54	124.33'	S 81°06'12" E
L55	187.87'	S 63°30'36" E
L56	94.33'	S 16°49'42" E
L57	63.75'	N 77°24'38" W
L58	109.94'	N 65°51'08" W
L59	64.07'	N 89°09'00" W
L60	23.26'	N 73°39'00" W

Line Table		
Line #	Length	Direction
L61	84.43'	N 35°04'27" W
L62	56.16'	N 77°24'38" W
L63	97.34'	N 16°49'42" W
L64	82.16'	N 02°08'28" W
L65	79.16'	S 47°32'51" E
L66	157.11'	S 45°04'42" E
L67	98.69'	S 20°49'10" W
L68	130.05'	N 14°53'00" W
L69	40.58'	N 41°35'00" W
L70	37.71'	N 56°04'00" W
L71	9.77'	S 48°50'00" W
L72	10.79'	N 35°04'27" W
L73	105.58'	N 20°49'10" E
L74	75.11'	S 45°04'42" E
L75	162.93'	S 18°56'40" E

Line Table		
Line #	Length	Direction
L76	67.53'	S 01°01'07" W
L77	37.39'	S 84°36'20" W
L78	110.27'	S 58°05'34" E
L79	147.40'	N 88°57'21" E
L80	210.40'	S 69°10'32" E
L81	97.96'	N 79°39'04" E
L82	27.44'	S 30°14'20" E
L83	48.46'	S 62°56'00" W
L84	131.82'	S 86°23'00" W
L85	138.73'	N 63°19'00" W
L86	113.59'	S 84°20'00" W
L87	48.61'	N 49°37'00" W
L88	130.09'	N 49°37'00" W
L89	178.70'	N 49°37'00" W





VICINITY MAP
SCALE: 1" = 1 mile

PARCEL 1
PIN 8689-69-5419

Corner Monument Table		
Point #	Northing	Easting
1	699,673.83	886,455.58
2	699,703.52	886,463.29
3	699,798.47	886,460.08
4	699,886.91	886,434.84
5	699,965.81	886,463.03
6	699,944.28	886,537.60
7	699,884.91	886,518.74
8	699,819.22	886,536.90
9	699,730.70	886,543.83
10	699,662.43	886,541.06
11	8/16/22	.53
12		.56
13		.27
14		.14

Corner Monument Table		
Point #	Northing	Easting
15	699,863.05	886,223.43
16	699,766.22	886,319.75
17	699,677.56	886,374.94
18	698,831.27	886,600.18
19	699,028.81	886,560.44
20	699,105.45	886,530.32
21	699,205.27	886,505.41
22	699,281.49	886,445.72
23	699,381.94	886,454.12
24	699,426.32	886,445.80
25	699,535.94	886,359.38
26	699,609.67	886,338.61
27	699,653.46	886,392.84
28	698,598.88	886,422.15

Corner Monument Table		
Point #	Northing	Easting
29	699,649.17	886,438.35
30	699,604.26	886,514.56
31	699,435.07	886,529.28
32	699,356.55	886,542.62
33	699,311.59	886,525.84
34	699,239.91	886,575.78
35	699,156.84	886,596.00
36	699,004.26	886,652.10
37	698,856.28	886,678.43
38	698,751.66	886,686.43
39	698,759.91	886,678.16
40	698,781.57	886,114.17
41	698,829.04	886,067.81
42	698,926.24	885,992.15

Corner Monument Table		
Point #	Northing	Easting
43	699,000.74	885,924.00
44	699,048.82	885,874.12
45	699,108.33	885,841.40
46	699,180.18	885,867.35
47	699,205.61	885,887.64
48	699,109.62	885,940.12
49	698,891.20	886,152.16
50	698,835.71	886,235.10
51	698,745.29	886,183.86
52	698,751.80	886,161.69
53	698,736.62	886,213.42
54	698,821.16	886,261.35
55	698,801.94	886,384.18
56	698,718.14	886,552.32

Corner Monument Table		
Point #	Northing	Easting
57	698,627.85	886,579.63
58	698,641.75	886,517.41
59	698,686.72	886,417.09
60	698,729.12	886,299.80
61	698,730.07	886,235.74
62	698,535.25	886,733.37
63	698,604.35	886,684.85
64	698,616.59	886,630.05
65	698,709.77	886,601.87
66	698,791.87	886,598.80
67	698,738.44	886,657.20
68	698,627.49	886,768.45
69	698,326.11	886,859.37
70	698,451.80	886,825.97

Corner Monument Table		
Point #	Northing	Easting
71	698,482.15	886,799.04
72	698,503.20	886,767.75
73	698,496.77	886,760.39
74	698,505.60	886,754.19
75	698,604.29	886,791.72
76	698,551.25	886,844.91
77	698,397.14	886,897.80
78	698,329.62	886,896.60
79	697,941.11	885,618.23
80	697,882.83	885,711.83
81	697,885.52	885,859.21
82	697,810.72	886,055.86
83	697,828.32	886,152.23

LEGEND
- EXISTING PROPERTY MONUMENT
- EASEMENT MONUMENT SET
- CALCULATED POINT
- WELL
- UTILITY POLE
- EASEMENT AREA
- WETLANDS AREA
- BUILDING
- OHE — OVERHEAD UTILITY
- UTILITY EASEMENT
- FENCE LINE
- UNIMPROVED ROAD OR PATH
- PAVED ROAD
- EXISTING STREAM CENTERLINE
- WETLANDS BOUNDARY
- EXISTING PROPERTY LINE NOT SURVEYED
- SURVEYED CONSERVATION EASEMENT LINE

SURVEYOR NOTES

12. ALL EXISTING FENCES WITHIN THE CONSERVATION EASEMENT AREAS ARE TO BE REMOVED.
13. ALL EXISTING ROADS WITHIN THE CONSERVATION EASEMENT AREAS ARE TO BE REMOVED FROM THE EASEMENT AREAS. THE EXCEPTION IS THE EXISTING 10'-WIDE FORD THAT WILL BE INCLUDED IN THE EASEMENT IN CONSERVATION EASEMENT 36 AS SHOWN ON SHEET 9.
14. ALL STRUCTURES WITHIN THE CONSERVATION EASEMENT AREAS ARE TO BE REMOVED.
15. ALL UTILITY LINES WITHIN THE CONSERVATION EASEMENT AREAS ARE TO BE MOVED OUTSIDE OF THE EASEMENT AREAS.

CURRENT OWNERSHIP

FRANKLIN DALE MORGAN AND WIFE, JOYCE C. MORGAN

DEED REFERENCE

BOOK 1233 PAGE 83; BOOK 1315 PAGE 594; BOOK 1315 PAGE 597; BOOK 1401 PAGE 254; BOOK 1401 PAGE 255; BOOK 1401 PAGE 257; LESS AND EXCEPT BOOK 1401 PAGE 256

OTHER CONSIDERATIONS

ELECTRIC EASEMENT RECORDED IN DEED BOOK 1301, PAGE 513; BOOK 1379, PAGE 556; BOOK 1539, PAGE 269; AND BOOK 3909, PAGE 292 OF THE BUNCOMBE COUNTY REGISTRY.

RIGHT OF WAY EASEMENT RECORDED IN BOOK 1802, PAGE 771 OF THE BUNCOMBE COUNTY REGISTRY.

RIGHT OF WAY AGREEMENT RECORDED IN BOOK 1867, PAGE 122 OF THE BUNCOMBE COUNTY REGISTRY.

RIGHT OF WAY EASEMENT DESCRIBED IN DEED BOOK 4999, PAGE 240 OF THE BUNCOMBE COUNTY REGISTRY.

OWNER CERTIFICATION

I (WE) HEREBY CERTIFY THAT I (WE) AM (ARE) THE OWNER(S) OF THE PROPERTY SHOWN AND DESCRIBED HEREON, WHICH IS LOCATED IN THE COUNTY OF BUNCOMBE, AND THAT I (WE) HEREBY ADOPT THIS PLAN WITH MY (OUR) FREE CONSENT.

DocuSigned by: Dale Morgan 8/18/2022
FRANKLIN DALE MORGAN

DocuSigned by: Joyce Morgan 8/19/2022
JOYCE C. MORGAN

NORTH CAROLINA PROFESSIONAL SEAL L-3960 LAND SURVEYOR JAMES M. GELLENTHIN
8/16/22

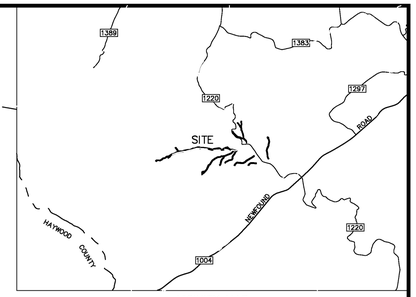
FINAL PLAT
CONSERVATION EASEMENT
FOR
STATE OF NORTH CAROLINA
DEPARTMENT OF ENVIRONMENTAL QUALITY
DIVISION OF MITIGATION SERVICES
PROJ. NAME: MORGAN BRANCH SITE
DMS PROJECT #: 100127
SPO FILE NO.: 11-LA-232
LEICESTER TOWNSHIP, BUNCOMBE COUNTY, NORTH CAROLINA

KCI ASSOCIATES OF NC
ENGINEERS, SURVEYORS AND PLANNERS
4505 Falls of Neuse Road, Floor 4
Raleigh, North Carolina 27609
Phone: 919.783.9214
FAX: 919.783.9266
FIRM NO. C-0764

File No.:	161904775-ESMT
Date:	JUNE 14, 2022
Scale:	1" = 200'
Sheet:	2 of 11

LEGEND

- EXISTING PROPERTY MONUMENT
- EASEMENT MONUMENT SET
- CALCULATED POINT
- WELL
- UTILITY POLE
- EASEMENT AREA
- WETLANDS AREA
- BUILDING
- OHE — OVERHEAD UTILITY
- UTILITY EASEMENT
- X — FENCE LINE
- UNIMPROVED ROAD OR PATH
- PAVED ROAD
- EXISTING STREAM CENTERLINE
- WETLANDS BOUNDARY
- EXISTING PROPERTY LINE NOT SURVEYED
- SURVEYED CONSERVATION EASEMENT LINE



VICINITY MAP
SCALE: 1" = 1 mile

N/F
NEAL A. MORGAN AND WIFE, AVA MARIE J. MORGAN
PIN 8689-48-8018

N/F
SCOTT D MEHAFFEY, ET AL
PIN 8689-77-7842

N/F
JUDY BRYSON QUINN
PIN 8689-77-9436

MORGAN BRANCH RD

SR 1220 50' PUBLIC R/W

DB 1802, PG 740

NC GRID NAD 83(2011)

CONSERVATION EASEMENT 11
20,887 sq.ft. (0.479 ac.)

CONSERVATION EASEMENT 10
96,053 sq.ft. (2.205 ac.)

CONSERVATION EASEMENT 9
48,621 sq.ft. (1.116 ac.)

WETLAND W5

N/F
NEAL A. MORGAN AND WIFE, AVA MARIE J. MORGAN, ET AL
PIN 8689-66-3036

N/F
NEAL A. MORGAN AND WIFE,
AVA MARIE J. MORGAN, ET AL
PIN 8689-87-7949

PARCEL 2
PIN 8689-66-3036

SURVEYOR NOTES

12. ALL EXISTING FENCES WITHIN THE CONSERVATION EASEMENT AREAS ARE TO BE REMOVED.
13. ALL EXISTING ROADS WITHIN THE CONSERVATION EASEMENT AREAS ARE TO BE REMOVED FROM THE EASEMENT AREAS. THE EXCEPTION IS THE EXISTING 10'-WIDE FORD THAT WILL BE INCLUDED IN THE EASEMENT IN CONSERVATION EASEMENT 36 AS SHOWN ON SHEET 9.
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15. ALL UTILITY LINES WITHIN THE CONSERVATION EASEMENT AREAS ARE TO BE MOVED OUTSIDE OF THE EASEMENT AREAS.

CURRENT OWNERSHIP

NEAL A. MORGAN AND WIFE, AVA MARIE J. MORGAN (A 1/3 INTEREST); FRANKLIN DALE MORGAN A/K/A DALE MORGAN AND WIFE, JOYCE C. MORGAN (A 1/3 INTEREST); MARTIN C. MORGAN (A 1/9 INTEREST); KATHY M. MORGAN (A 1/9 INTEREST); MARCIA M. MOREHEAD (A 1/9 INTEREST), WITH THOSE THREE 1/9 INTERESTS OWNED AS JTWROS

DEED REFERENCE

BOOK 5755 PAGE 973 FOR MARTIN MORGAN, KATHY MORGAN AND MARCIA MOREHEAD; BOOK 909 PAGE 271 FOR FRANKLIN DALE MORGAN AND JOYCE C. MORGAN; BOOK 5608 PAGE 1682 FOR NEAL AND AVA MORGAN

OTHER CONSIDERATIONS

RIGHT OF WAY AGREEMENT RECORDED IN BOOK 1802, PAGE 740 OF THE BUNCOMBE COUNTY REGISTRY

OWNER CERTIFICATION

I (WE) HEREBY CERTIFY THAT I (WE) AM (ARE) THE OWNER(S) OF THE PROPERTY SHOWN AND DESCRIBED HEREON, WHICH IS LOCATED IN THE COUNTY OF BUNCOMBE, AND THAT I (WE) HEREBY ADOPT THIS PLAN WITH MY (OUR) FREE CONSENT.

DocuSigned by: Neal Morgan — 8/17/2022
NEAL A. MORGAN

DocuSigned by: Ava Morgan — 8/17/2022
AVA MARIE J. MORGAN

DocuSigned by: Dale Morgan — 8/18/2022
FRANKLIN DALE MORGAN a/k/a F. DALE MORGAN

DocuSigned by: Joyce Morgan — 8/19/2022
JOYCE C. MORGAN

DocuSigned by: Martin Morgan — 8/17/2022
MARTIN C. MORGAN

DocuSigned by: Marcia Morehead — 8/17/2022
MARCIA M. MOREHEAD

NORTH CAROLINA PROFESSIONAL SEAL L-3360 LAND SURVEYOR JAMES M. GELLENTHIN
8/16/22

Corner Monument Table		
Point #	Northing	Easting
84	696,673.50	885,942.72
85	696,736.48	885,961.64
86	696,852.45	886,050.73
87	696,940.22	886,164.73
88	696,916.04	886,378.08
89	696,816.98	886,387.53
90	696,840.79	886,193.88
91	696,785.55	886,109.73
92	696,723.39	886,067.43
93	696,645.48	886,035.98
94	696,816.89	886,417.68
95	696,915.49	886,408.27
96	696,906.66	886,619.40

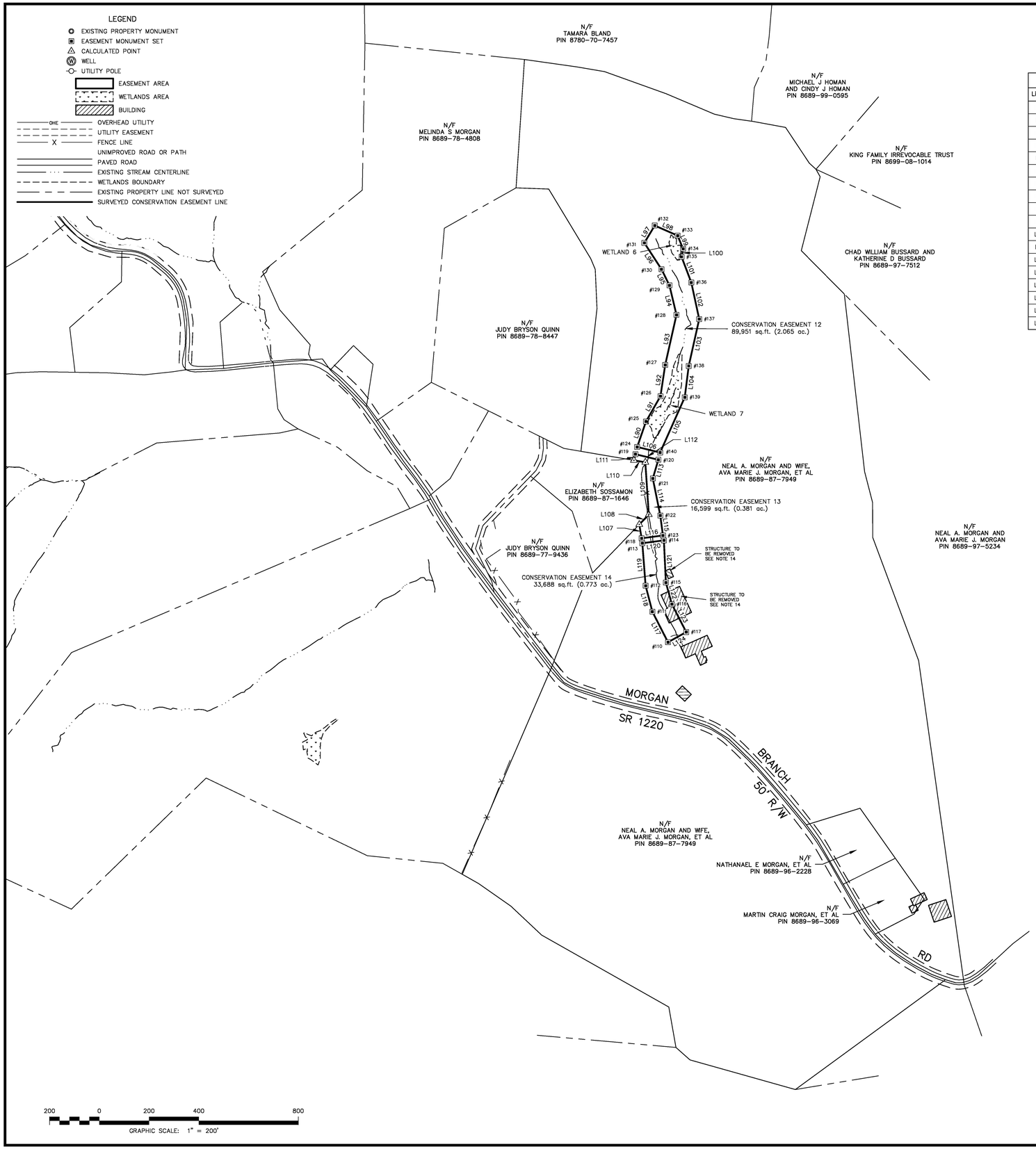
Corner Monument Table		
Point #	Northing	Easting
97	696,970.08	886,738.16
98	697,074.16	886,853.88
99	697,311.84	887,258.55
100	697,231.50	887,308.43
101	697,002.06	886,924.35
102	696,894.74	886,805.90
103	696,816.80	886,659.80
104	697,246.89	887,334.19
105	697,327.04	887,284.42
106	697,422.80	887,420.65
107	697,430.28	887,497.44
108	697,341.05	887,511.47
109	697,332.10	887,453.07

100 0 100 200 400
GRAPHIC SCALE: 1" = 100'

FINAL PLAT
CONSERVATION EASEMENT
FOR
STATE OF NORTH CAROLINA
DEPARTMENT OF ENVIRONMENTAL QUALITY
DIVISION OF MITIGATION SERVICES
PROJ. NAME: MORGAN BRANCH SITE
DMS PROJECT #: 100127
SPO FILE NO.: 11-LA-233
LEICESTER TOWNSHIP, BUNCOMBE COUNTY, NORTH CAROLINA

KCI ASSOCIATES OF NC
ENGINEERS, SURVEYORS AND PLANNERS
4505 Falls of Neuse Road, Floor 4
Raleigh, North Carolina 27609
Phone: 919.783.9214
FAX: 919.783.9266
KCI FIRM NO. C-0764

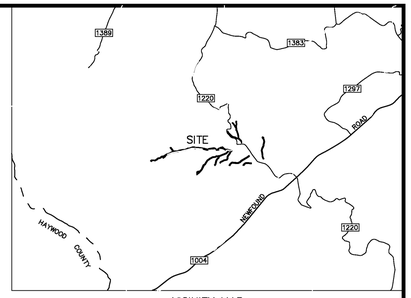
File No.:	161904775-ESMT
Date:	JUNE 14, 2022
Scale:	1" = 100'
Sheet:	3 of 11



Line Table		
Line #	Length	Direction
L90	107.99'	N 19°04'34" E
L91	117.45'	N 29°43'58" E
L92	127.31'	N 08°34'38" E
L93	206.40'	N 12°41'24" E
L94	121.95'	N 13°23'35" W
L95	72.12'	N 26°16'57" W
L96	126.59'	N 33°02'45" W
L97	81.31'	N 30°57'37" E
L98	100.46'	S 66°12'58" E
L99	57.46'	S 22°33'31" E
L100	32.76'	S 10°57'25" W
L101	110.67'	S 20°48'32" E
L102	150.48'	S 12°10'40" E
L103	193.19'	S 12°37'30" W
L104	127.09'	S 07°11'59" W
L105	243.10'	S 24°02'53" W
L106	94.77'	N 76°17'24" W
L107	56.30'	N 09°31'48" W

Line Table		
Line #	Length	Direction
L108	55.01'	N 43°57'31" E
L109	211.00'	N 03°48'17" W
L110	46.42'	N 80°19'27" W
L111	25.45'	N 13°46'25" E
L112	94.77'	S 76°17'24" E
L113	78.24'	S 16°28'00" W
L114	151.98'	S 11°22'55" E
L115	81.09'	S 07°31'21" E
L116	86.41'	S 82°28'39" W
L117	138.05'	N 27°01'49" W
L118	107.82'	N 14°36'31" W
L119	171.49'	N 04°25'04" W
L120	87.41'	N 82°28'39" E
L121	170.01'	S 02°42'47" E
L122	90.21'	S 15°25'24" E
L123	126.07'	S 27°17'28" E
L124	84.00'	S 60°50'59" W

Corner Monument Table		
Point #	Northing	Easting
110	697,131.28	888,471.87
111	697,254.24	888,409.13
112	697,358.58	888,381.93
113	697,529.56	888,368.72
114	697,541.01	888,455.38
115	697,371.19	888,463.43
116	697,284.23	888,487.42
117	697,172.19	888,545.23
118	697,549.36	888,365.86
119	697,887.54	888,341.02
120	697,865.08	888,433.09
121	697,790.05	888,410.91
122	697,641.06	888,440.91
123	697,560.67	888,451.52
124	697,916.69	888,348.13
125	698,018.75	888,383.43
126	698,120.74	888,441.68
127	698,246.62	888,460.66
128	698,447.98	888,506.00
129	698,566.61	888,477.76
130	698,631.28	888,445.82
131	698,737.40	888,376.79
132	698,807.12	888,418.62
133	698,766.61	888,510.55
134	698,713.55	888,532.59
135	698,681.38	888,526.36
136	698,577.94	888,565.68
137	698,430.84	888,597.42
138	698,242.31	888,555.19
139	698,116.23	888,539.27
140	697,894.23	888,440.20



VICINITY MAP
SCALE: 1" = 1 mile

NC GRID NAD 83(2011)

PARCEL 3
PIN 8689-87-7949

SURVEYOR NOTES

12. ALL EXISTING FENCES WITHIN THE CONSERVATION EASEMENT AREAS ARE TO BE REMOVED.
13. ALL EXISTING ROADS WITHIN THE CONSERVATION EASEMENT AREAS ARE TO BE REMOVED FROM THE EASEMENT AREAS. THE EXCEPTION IS THE EXISTING 10'-WIDE FORD THAT WILL BE INCLUDED IN THE EASEMENT IN CONSERVATION EASEMENT 36 AS SHOWN ON SHEET 9.
14. ALL STRUCTURES WITHIN THE CONSERVATION EASEMENT AREAS ARE TO BE REMOVED.
15. ALL UTILITY LINES WITHIN THE CONSERVATION EASEMENT AREAS ARE TO BE MOVED OUTSIDE OF THE EASEMENT AREAS.

CURRENT OWNERSHIP

NEAL A. MORGAN AND WIFE, AVA MARIE J. MORGAN (A 1/3 INTEREST); FRANKLIN DALE MORGAN A/K/A F. DALE MORGAN (A 1/3 INTEREST); MARTIN C. MORGAN (A 1/9 INTEREST); KATHY M. MORGAN (A 1/9 INTEREST); MARCIA M. MOREHEAD (A 1/9 INTEREST), WITH THOSE THREE 1/9 INTERESTS OWNED AS JTWROS

DEED REFERENCE

BOOK 5755 PAGE 973 FOR MARTIN MORGAN, KATHY MORGAN AND MARCIA MOREHEAD; BOOK 1202 PAGE 563 FOR F. DALE MORGAN; BOOK 5608 PAGE 1682 FOR NEAL AND AVA MORGAN

OWNER CERTIFICATION

I (WE) HEREBY CERTIFY THAT I (WE) AM (ARE) THE OWNER(S) OF THE PROPERTY SHOWN AND DESCRIBED HEREON, WHICH IS LOCATED IN THE COUNTY OF BUNCOMBE, AND THAT I (WE) HEREBY ADOPT THIS PLAN WITH MY (OUR) FREE CONSENT.

DocuSigned by: Neal Morgan 8/17/2022
NEAL A. MORGAN

DocuSigned by: Ava Morgan 8/17/2022
AVA MARIE J. MORGAN

DocuSigned by: Dale Morgan 8/18/2022
FRANKLIN DALE MORGAN a/k/a F. DALE MORGAN

DocuSigned by: Martin Morgan 8/17/2022
MARTIN C. MORGAN

DocuSigned by: Marcia Morehead 8/17/2022
MARCIA M. MOREHEAD

NORTH CAROLINA PROFESSIONAL SEAL L-3660 LAND SURVEYOR JAMES M. GELLENTHIN
8/16/22

FINAL PLAT
CONSERVATION EASEMENT
FOR
STATE OF NORTH CAROLINA
DEPARTMENT OF ENVIRONMENTAL QUALITY
DIVISION OF MITIGATION SERVICES
PROJ. NAME: MORGAN BRANCH SITE
DMS PROJECT #: 100127
SPO FILE NO.: 11-LA-234
LEICESTER TOWNSHIP, BUNCOMBE COUNTY, NORTH CAROLINA

KCI ASSOCIATES OF NC
ENGINEERS, SURVEYORS AND PLANNERS
4505 Falls of Neuse Road, Floor 4
Raleigh, North Carolina 27609
Phone: 919.783.9214
FAX: 919.783.9266
FIRM NO. C-0764

File No.:	161904775-ESMT
Date:	JUNE 14, 2022
Scale:	1" = 200'
Sheet:	4 of 11

Corner Monument Table		
Point #	Northing	Easting
141	697,870.55	882,558.04
142	697,880.39	882,723.35
143	697,971.70	882,908.00
144	697,977.77	882,983.95
145	697,945.11	882,972.47
146	697,907.40	882,977.15
147	697,903.57	882,946.63
148	697,861.47	882,856.49
149	697,850.68	882,813.70
150	697,824.74	882,741.64
151	697,800.88	882,618.05
152	697,777.21	882,534.58
153	697,913.00	883,021.80
154	697,940.16	883,018.43
155	697,982.63	883,033.35

Corner Monument Table		
Point #	Northing	Easting
156	698,058.42	883,262.15
157	698,061.10	883,383.46
158	698,021.24	883,499.85
159	698,027.86	883,676.74
160	698,001.01	883,896.62
161	697,947.54	884,204.60
162	697,885.55	884,046.78
163	697,917.59	883,917.06
164	697,911.84	883,805.76
165	697,942.79	883,621.88
166	697,938.99	883,535.67
167	697,924.06	883,491.35
168	697,914.34	883,427.94
169	697,910.96	883,371.27
170	697,929.64	883,314.94

Corner Monument Table		
Point #	Northing	Easting
171	697,940.50	883,251.64
172	697,934.70	883,159.79
173	697,918.11	883,068.65
174	697,855.51	884,052.37
175	697,927.56	884,235.77
176	697,920.19	884,298.73
177	697,888.19	884,361.05
178	697,938.69	884,454.53
179	697,993.13	884,784.33
180	697,988.38	884,897.16
181	697,913.00	885,015.32
182	697,863.97	884,935.27
183	697,909.65	884,569.54
184	697,905.45	884,550.36
185	697,821.28	884,980.44

Corner Monument Table		
Point #	Northing	Easting
186	697,875.17	885,068.43
187	697,954.57	885,175.94
188	697,984.21	885,245.85
189	697,906.10	885,279.54
190	697,800.17	885,198.73
191	697,779.08	885,047.74
192	697,915.80	885,324.36
193	698,017.26	885,280.60
194	698,066.18	885,480.60
195	698,010.40	885,536.76
196	697,759.92	886,192.10
197	697,668.40	886,126.07
198	697,659.99	886,095.84
199	697,680.50	886,015.82
200	697,725.96	886,042.79

Corner Monument Table		
Point #	Northing	Easting
201	697,737.27	885,973.58
202	697,696.38	885,933.71
203	697,759.22	885,869.28
204	697,829.88	885,845.06
205	697,821.50	885,797.64
206	697,783.31	885,700.51
207	697,902.84	885,507.85
208	697,418.13	885,486.33
209	697,501.68	885,452.86
210	697,610.34	885,724.10
211	697,724.42	885,835.34
212	697,722.23	885,864.24
213	697,674.90	885,912.77
214	697,533.87	885,775.24
215	697,490.52	885,425.01

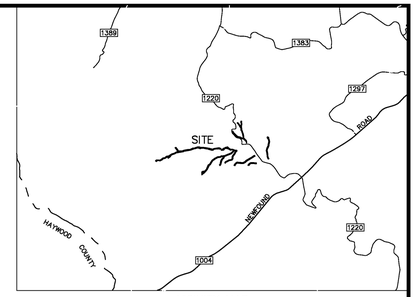
Corner Monument Table		
Point #	Northing	Easting
216	697,406.98	885,458.48
217	697,330.46	885,267.46
218	697,419.14	885,118.39
219	697,403.36	885,207.42
220	696,848.32	885,268.15
223	697,033.84	885,460.79
224	697,090.58	885,547.19
225	697,122.42	885,679.02
226	697,038.37	885,695.88
227	697,014.01	885,575.61
228	696,960.63	885,511.98
229	696,930.43	885,419.58
230	696,896.74	885,351.78
231	696,843.18	885,344.83
232	697,043.62	885,725.42

Corner Monument Table		
Point #	Northing	Easting
233	697,126.93	885,708.72
234	697,135.18	885,765.62
235	697,193.23	885,793.99
236	697,337.52	885,800.43
237	697,457.05	885,867.06
238	697,530.94	885,933.23
239	697,653.29	886,001.15
240	697,630.17	886,091.35
241	697,479.32	886,007.61
242	697,401.85	885,936.23
243	697,300.10	885,886.52
244	697,166.24	885,882.06
245	697,057.71	885,810.53

LEGEND

- EXISTING PROPERTY MONUMENT
- EASEMENT MONUMENT SET
- CALCULATED POINT
- WELL
- UTILITY POLE
- EASEMENT AREA
- WETLANDS AREA
- BUILDING
- OHE — OVERHEAD UTILITY
- UTILITY EASEMENT
- FENCE LINE
- UNIMPROVED ROAD OR PATH
- PAVED ROAD
- EXISTING STREAM CENTERLINE
- WETLANDS BOUNDARY
- EXISTING PROPERTY LINE NOT SURVEYED
- SURVEYED CONSERVATION EASEMENT LINE

NC GRID NAD 83(2011)



VICINITY MAP
SCALE: 1" = 1 mile

PARCEL 4
PIN 8689-48-8018

N/F
RONNIE L BALL, ET AL
PIN 8689-59-2083

N/F
JAMES L YOUNG, ET AL
PIN 8689-58-3641

N/F
DAVID A HOLDER, ET AL
PIN 8689-48-9455

IPF 2" PIPE

IPF #5 REBAR

N 6°33'29" E
383.83' (TIE)

N 45°12'00" W
389.57' (TIE)

CONSERVATION EASEMENT 16
107,998 sq.ft. (2.479 ac.)

CONSERVATION EASEMENT 17
55,431 sq.ft. (1.273 ac.)

C/L GRAVEL RD & 16' R/W
DB 1867 PG 122

CONSERVATION EASEMENT 19
81,243 sq.ft. (1.865 ac.)

N/F
FRANKLIN DALE MORGAN
AND WIFE, JOYCE C. MORGAN
PIN 8689-69-5419

IPF 2" STAINLESS STEEL PIPE
Y = 697,806.82
X = 885,717.32

N/F
SCOTT D MEHAFFEY, ET AL
PIN 8689-77-1978

N 63°41'09" E
206.00'

S 83°02'13" E
312.59'

S 80°09'08" E
221.52'

N 80°37'37" E
334.26'

N 76°15'26" E
209.89'

S 77°37'32" W
294.23'

N 58°10'59" W
226.72'

WETLAND W4

N/F
NEAL A. MORGAN AND WIFE, AVA MARIE J. MORGAN
PIN 8689-48-8018

CONSERVATION EASEMENT 15
36,487 sq.ft. (0.838 ac.)

N/F
DOUGLAS M. KEEFER, UNMARRIED
AND NELLE H. GREGORY, UNMARRIED
PIN 8689-47-3784

CONSERVATION EASEMENT 18
30,585 sq.ft. (0.702 ac.)

CONSERVATION EASEMENT 20
43,820 sq.ft. (1.006 ac.)

N/F
GARY R WAGONER, ET AL
PIN 8689-47-4534

N 68°10'10" E
292.20'

S 44°16'45" W
196.89'

N 68°10'10" E
234.40'

S 68°10'10" W
205.77'

S 68°10'10" W
311.24'

N 29°55'55" W
41.80' (TIE)

N/F
CHRISTOPHER MCGRATH
AND WIFE, SUSAN MCGRATH
PIN 8689-47-4283
AND PIN 8689-47-5347

CONSERVATION EASEMENT 21
34,956 sq.ft. (0.802 ac.)

CONSERVATION EASEMENT 23
60,944 sq.ft. (1.399 ac.)

N/F
NEAL ALAN MORGAN
AND WIFE, AVA MARIE MORGAN
PIN 8689-45-0160

IPF #4 REBAR

IPF #5 REBAR

S 71°54'02" W
94.43' (TIE)

N/F
NEAL A MORGAN, ET AL
PIN 8689-26-8750

N/F
NEAL A. MORGAN AND WIFE, AVA MARIE J. MORGAN, ET AL
PIN 8689-36-4053

CONSERVATION EASEMENT 22
36,060 sq.ft. (0.828 ac.)

N/F
NEAL A. MORGAN AND WIFE, AVA MARIE J. MORGAN, ET AL
PIN 8689-66-3036

200 0 200 400 800
GRAPHIC SCALE: 1" = 200'

SURVEYOR NOTES

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14. ALL STRUCTURES WITHIN THE CONSERVATION EASEMENT AREAS ARE TO BE REMOVED.
15. ALL UTILITY LINES WITHIN THE CONSERVATION EASEMENT AREAS ARE TO BE MOVED OUTSIDE OF THE EASEMENT AREAS.

CURRENT OWNERSHIP

NEAL A. MORGAN AND WIFE, AVA MARIE J. MORGAN

DEED REFERENCE

BOOK 5608 PAGE 1682; LESS AND EXCEPT BOOK 2688 PAGE 430

OTHER CONSIDERATIONS

ROAD MAINTENANCE AGREEMENT RECORDED IN BOOK 1544, PAGE 117 OF THE BUNCOMBE COUNTY REGISTRY.

ROAD EASEMENT RECORDED IN BOOK 1929, PAGE 146 OF THE BUNCOMBE COUNTY REGISTRY.

RIGHT OF WAY AGREEMENTS RECORDED IN BOOK 1203, PAGE 250; BOOK 1294, PAGE 164; BOOK 1867, PAGE 122; AND BOOK 1867, PAGE 126 OF THE BUNCOMBE COUNTY REGISTRY.

OWNER CERTIFICATION

I (WE) HEREBY CERTIFY THAT I (WE) AM (ARE) THE OWNER(S) OF THE PROPERTY SHOWN AND DESCRIBED HEREON, WHICH IS LOCATED IN THE COUNTY OF BUNCOMBE, AND THAT I (WE) HEREBY ADOPT THIS PLAN WITH MY (OUR) FREE CONSENT.

DocuSigned by:
Neal Morgan 8/17/2022
NEAL A. MORGAN

DocuSigned by:
Ava Morgan 8/17/2022
AVA MARIE J. MORGAN

NORTH CAROLINA PROFESSIONAL SEAL L-3960 LAND SURVEYOR JAMES M. GELLENTIN
8/16/22

Line Table		
Line #	Length	Direction
L125	87.59'	N 06°33'29" E
L126	60.04'	N 80°13'51" E
L127	165.61'	N 86°35'42" E
L128	76.19'	N 85°26'05" E
L129	34.62'	S 19°21'34" W
L130	38.00'	S 07°04'07" E
L131	30.75'	S 82°51'22" W
L132	99.50'	S 64°57'50" W
L133	44.13'	S 75°50'59" W
L134	76.59'	S 70°12'05" W
L135	125.87'	S 79°04'17" W
L136	86.77'	S 74°10'15" W
L137	45.87'	S 85°10'23" W
L138	27.37'	N 07°04'07" W

Line Table		
Line #	Length	Direction
L139	45.01'	N 19°21'34" E
L140	241.03'	N 71°40'17" E
L141	121.34'	N 88°44'11" E
L142	123.02'	S 71°05'51" E
L143	177.01'	N 87°51'26" E
L144	169.56'	S 68°33'16" W
L145	133.63'	N 76°07'40" W
L146	111.45'	S 87°02'35" W
L147	186.47'	N 80°26'42" W
L148	86.29'	S 87°28'29" W
L149	46.76'	S 71°22'59" W
L150	64.16'	S 81°17'08" W
L151	56.77'	S 86°35'13" W
L152	59.35'	N 71°39'27" W

Line Table		
Line #	Length	Direction
L153	64.23'	N 80°15'48" W
L154	92.03'	S 86°23'14" W
L155	92.64'	S 79°41'01" W
L156	47.13'	S 83°46'06" W
L157	197.04'	N 68°33'16" E
L158	63.39'	S 83°19'26" E
L159	70.05'	S 62°49'06" E
L160	106.25'	N 61°37'26" E
L161	112.93'	S 87°35'28" E
L162	140.15'	S 57°27'56" E
L163	93.88'	S 58°30'39" W
L164	52.77'	N 76°34'51" W
L165	94.75'	N 15°49'29" W
L166	5.45'	N 12°19'49" W

Line Table		
Line #	Length	Direction
L167	19.64'	S 77°40'11" W
L168	5.47'	S 12°19'49" E
L169	275.45'	S 77°37'32" W
L170	47.27'	S 32°58'19" W
L171	211.42'	N 75°10'39" W
L172	103.18'	N 58°30'39" E
L173	133.66'	N 53°33'22" E
L174	75.93'	N 67°01'15" E
L175	85.07'	S 23°19'34" E
L176	133.23'	S 37°20'24" W
L177	152.45'	S 82°02'54" W
L178	79.43'	N 57°54'33" W
L179	110.49'	N 23°19'34" W
L180	79.15'	S 45°12'00" E

Line Table		
Line #	Length	Direction
L181	106.95'	S 49°37'00" E
L182	178.70'	S 49°37'00" E
L183	113.59'	N 84°20'00" E
L184	138.73'	S 63°19'00" E
L185	131.82'	N 86°23'00" E
L186	48.46'	N 62°56'00" E
L187	51.73'	S 30°14'20" E
L188	112.85'	S 35°48'33" W
L189	31.38'	S 74°26'38" W
L190	82.61'	N 75°37'28" W
L191	52.86'	N 30°40'18" E
L192	70.12'	N 80°43'25" W
L193	57.10'	S 44°16'45" W
L194	90.00'	N 45°43'15" W

Line Table		
Line #	Length	Direction
L195	74.70'	N 18°55'09" W
L196	48.16'	S 79°58'19" W
L197	104.36'	S 68°32'07" W
L198	90.00'	N 21°49'50" W
L199	159.34'	N 44°16'45" E
L200	28.98'	S 85°40'15" E
L201	67.79'	S 45°43'15" E
L202	90.00'	S 21°49'50" E
L203	109.40'	S 24°31'12" W
L204	38.89'	N 53°03'55" W
L205	127.19'	N 29°55'55" W
L206	55.37'	N 09°28'48" W
L207	90.42'	S 79°56'59" E
L208	92.09'	N 06°08'08" E

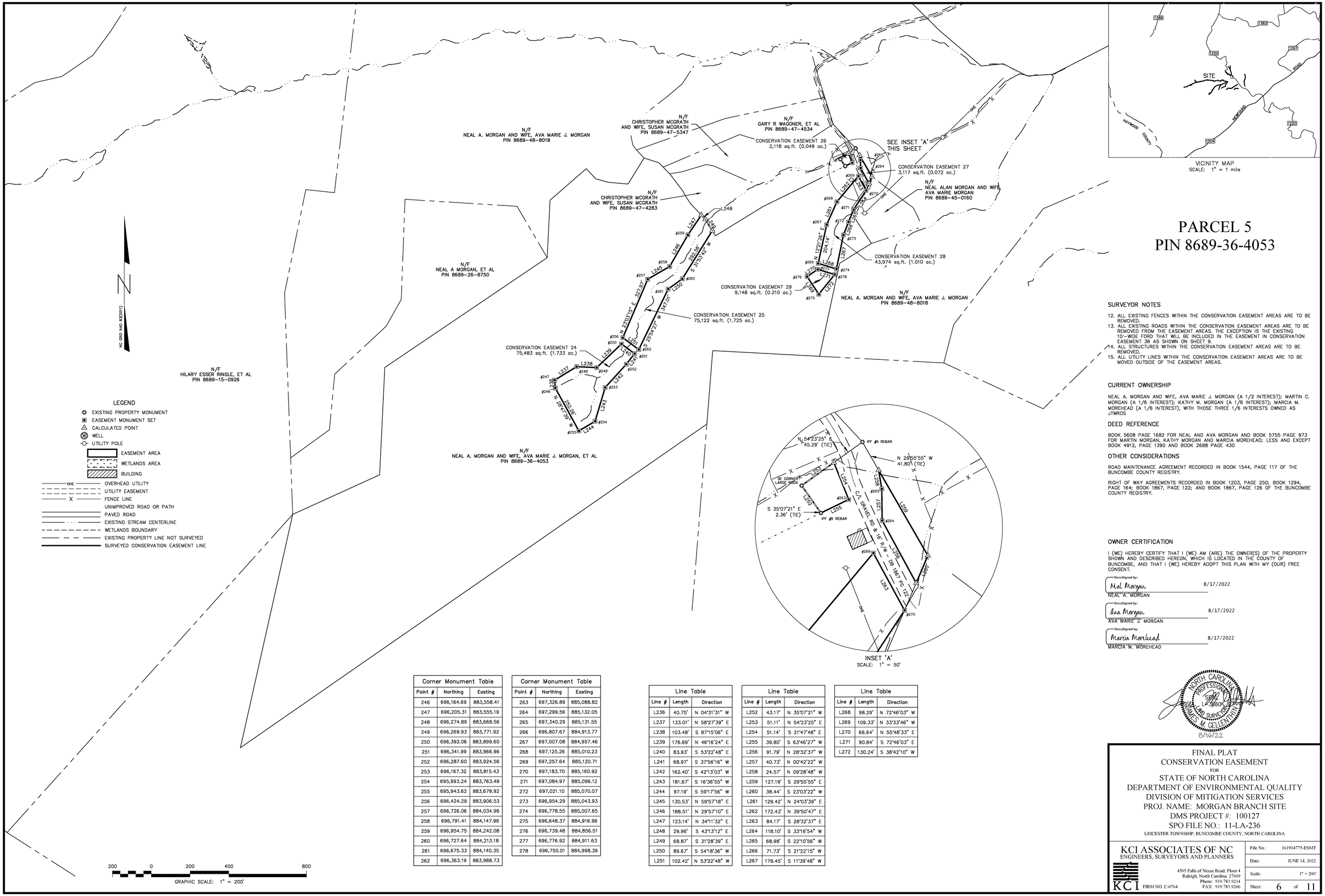
Line Table		
Line #	Length	Direction
L209	52.48'	N 71°54'02" E
L210	130.32'	N 71°33'21" E
L211	30.02'	N 26°07'07" W
L212	24.41'	N 67°11'01" E
L213	103.37'	N 56°42'09" E
L214	135.63'	N 76°25'22" E
L215	85.73'	S 11°20'25" E
L216	122.72'	S 78°33'06" W
L217	83.05'	S 50°00'21" W
L218	97.21'	S 71°54'12" W
L219	75.71'	S 63°34'12" W
L220	54.01'	S 07°23'47" W
L221	76.85'	N 86°09'39" W
L222	84.97'	N 11°20'25" W

Line Table		
Line #	Length	Direction
L223	57.50'	N 81°45'22" E
L224	64.61'	N 26°02'47" E
L225	144.44'	N 02°33'18" E
L226	136.85'	N 29°08'12" E
L227	99.18'	N 41°50'52" E
L228	139.94'	N 29°02'07" E
L229	93.11'	S 75°37'28" E
L230	172.53'	S 29°02'07" W
L231	105.34'	S 42°39'29" W
L232	113.25'	S 26°02'02" W
L233	133.94'	S 01°54'39" W
L234	129.97'	S 33°23'25" W
L235	86.26'	S 80°35'49" W

FINAL PLAT
CONSERVATION EASEMENT
FOR
STATE OF NORTH CAROLINA
DEPARTMENT OF ENVIRONMENTAL QUALITY
DIVISION OF MITIGATION SERVICES
PROJ. NAME: MORGAN BRANCH SITE
DMS PROJECT #: 100127
SPO FILE NO.: 11-LA-235
LEICESTER TOWNSHIP, BUNCOMBE COUNTY, NORTH CAROLINA

KCI ASSOCIATES OF NC
ENGINEERS, SURVEYORS AND PLANNERS
4505 Falls of Neuse Road, Floor 4
Raleigh, North Carolina 27609
Phone: 919.783.9214
FAX: 919.783.9266
FIRM NO. C-0764

File No.:	161904775-ESMT
Date:	JUNE 14, 2022
Scale:	1" = 200'
Sheet:	5 of 11



VICINITY MAP
SCALE: 1" = 1 mile

PARCEL 5
PIN 8689-36-4053

Corner Monument Table		
Point #	Northing	Easting
246	696,164.69	883,558.41
247	696,205.31	883,555.19
248	696,274.89	883,668.56
249	696,269.93	883,771.92
250	696,392.06	883,899.60
251	696,341.99	883,966.96
252	696,287.60	883,924.56
253	696,167.32	883,815.43
254	695,993.24	883,763.49
255	695,943.62	883,679.92
256	696,424.29	883,906.53
257	696,726.06	884,034.96
258	696,791.41	884,147.96
259	696,954.75	884,242.08
260	696,727.64	884,213.18
261	696,675.33	884,140.35
262	696,363.19	883,988.73

Corner Monument Table		
Point #	Northing	Easting
263	697,326.89	885,088.82
264	697,299.56	885,132.05
265	697,340.29	885,131.55
266	696,807.67	884,913.77
267	697,007.08	884,957.46
268	697,125.26	885,010.23
269	697,257.64	885,120.71
270	697,183.70	885,160.92
271	697,084.97	885,096.12
272	697,021.10	885,070.07
273	696,954.29	885,043.93
274	696,778.55	885,007.65
275	696,648.37	884,916.96
276	696,739.48	884,856.51
277	696,776.92	884,911.63
278	696,750.01	884,998.39

Line Table		
Line #	Length	Direction
L236	40.75'	N 04°31'31" W
L237	133.01'	N 58°27'39" E
L238	103.48'	S 87°15'06" E
L239	176.69'	N 46°16'24" E
L240	83.93'	S 53°22'48" E
L241	68.97'	S 37°56'16" W
L242	162.40'	S 42°13'03" W
L243	181.67'	S 16°36'55" W
L244	97.19'	S 59°17'56" W
L245	130.53'	N 59°57'18" E
L246	188.51'	N 29°57'10" E
L247	123.14'	N 34°11'32" E
L248	29.96'	S 43°13'12" E
L249	68.87'	S 31°28'39" E
L250	89.67'	S 54°18'36" W
L251	102.42'	N 53°22'48" W

Line Table		
Line #	Length	Direction
L252	43.17'	N 35°07'21" W
L253	51.11'	N 54°23'25" E
L254	51.14'	S 21°47'48" E
L255	39.80'	S 63°46'27" W
L256	91.79'	N 28°32'37" W
L257	40.73'	N 00°42'22" W
L258	24.57'	N 09°28'48" W
L259	127.19'	S 29°55'55" E
L260	38.44'	S 23°03'22" W
L261	129.42'	N 24°03'39" E
L262	172.43'	N 39°50'47" E
L263	84.17'	S 28°32'37" E
L264	118.10'	S 33°16'54" W
L265	68.98'	S 22°10'56" W
L266	71.73'	S 21°22'15" W
L267	179.45'	S 11°39'48" W

Line Table		
Line #	Length	Direction
L268	98.29'	N 72°46'03" W
L269	109.33'	N 33°33'46" W
L270	66.64'	N 55°48'33" E
L271	90.84'	S 72°46'03" E
L272	130.24'	S 38°42'10" W

SURVEYOR NOTES

12. ALL EXISTING FENCES WITHIN THE CONSERVATION EASEMENT AREAS ARE TO BE REMOVED.
13. ALL EXISTING ROADS WITHIN THE CONSERVATION EASEMENT AREAS ARE TO BE REMOVED FROM THE EASEMENT AREAS. THE EXCEPTION IS THE EXISTING 10'-WIDE FORD THAT WILL BE INCLUDED IN THE EASEMENT IN CONSERVATION EASEMENT 36 AS SHOWN ON SHEET 9.
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CURRENT OWNERSHIP

NEAL A. MORGAN AND WIFE, AVA MARIE J. MORGAN (A 1/2 INTEREST); MARTIN C. MORGAN (A 1/6 INTEREST); KATHY M. MORGAN (A 1/6 INTEREST); MARCIA M. MOREHEAD (A 1/6 INTEREST), WITH THOSE THREE 1/6 INTERESTS OWNED AS JTWROS

DEED REFERENCE

BOOK 5608 PAGE 1682 FOR NEAL AND AVA MORGAN AND BOOK 5755 PAGE 973 FOR MARTIN MORGAN, KATHY MORGAN AND MARCIA MOREHEAD; LESS AND EXCEPT BOOK 4912, PAGE 1390 AND BOOK 2688 PAGE 430

OTHER CONSIDERATIONS

ROAD MAINTENANCE AGREEMENT RECORDED IN BOOK 1544, PAGE 117 OF THE BUNCOMBE COUNTY REGISTRY.

RIGHT OF WAY AGREEMENTS RECORDED IN BOOK 1203, PAGE 250; BOOK 1294, PAGE 164; BOOK 1867, PAGE 122; AND BOOK 1867, PAGE 126 OF THE BUNCOMBE COUNTY REGISTRY.

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DocuSigned by:
Neal Morgan 8/17/2022
NEAL A. MORGAN

DocuSigned by:
Ava Morgan 8/17/2022
AVA MARIE J. MORGAN

DocuSigned by:
Marcia Morehead 8/17/2022
MARCIA M. MOREHEAD

NORTH CAROLINA PROFESSIONAL SEAL L-3660 LAND SURVEYOR JAMES M. GELLENTHIN
8/16/22

FINAL PLAT
CONSERVATION EASEMENT
FOR
STATE OF NORTH CAROLINA
DEPARTMENT OF ENVIRONMENTAL QUALITY
DIVISION OF MITIGATION SERVICES
PROJ. NAME: MORGAN BRANCH SITE
DMS PROJECT #: 100127
SPO FILE NO.: 11-LA-236
LEICESTER TOWNSHIP, BUNCOMBE COUNTY, NORTH CAROLINA

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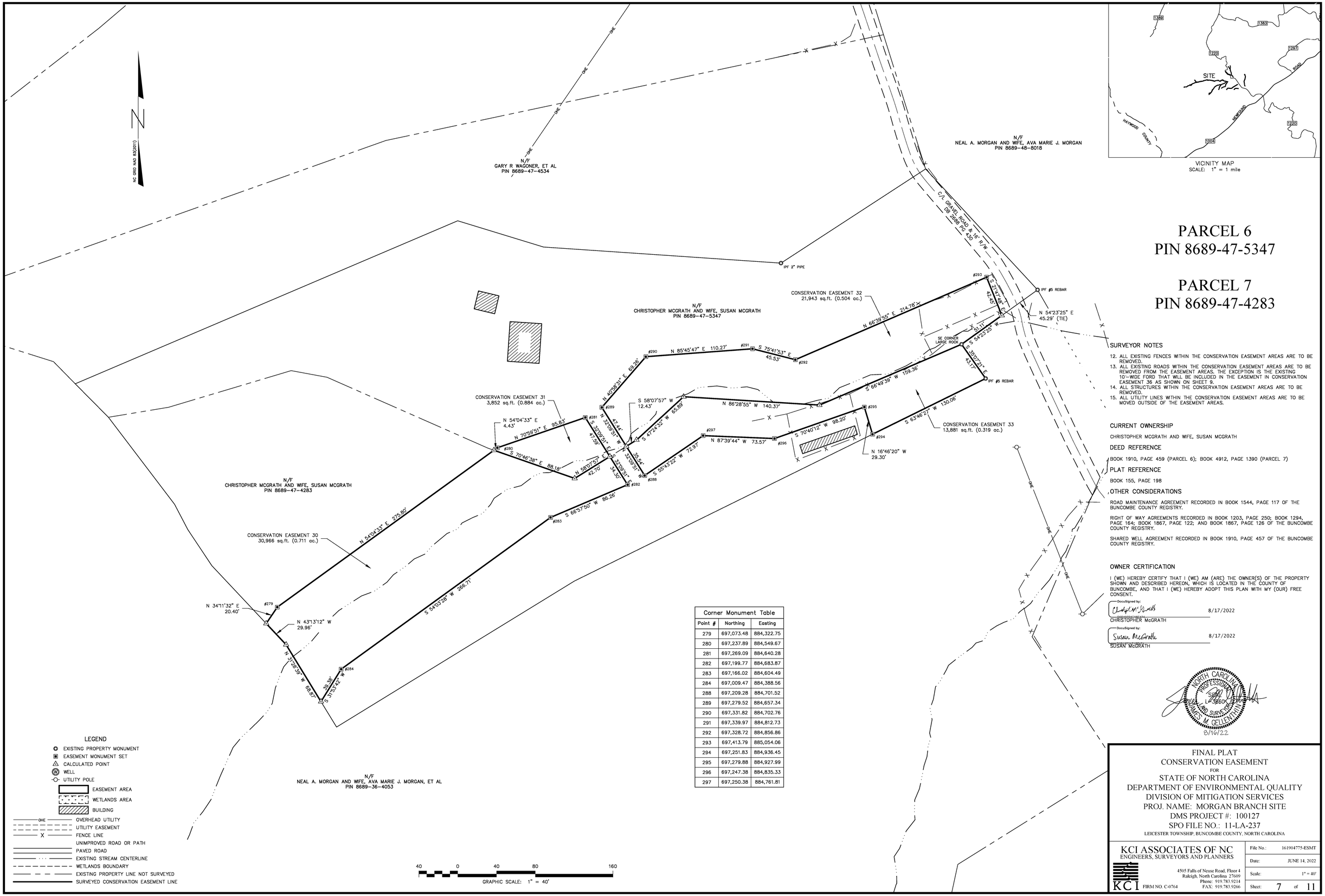
ENGINEERS, SURVEYORS AND PLANNERS
4505 Falls of Neuse Road, Floor 4
Raleigh, North Carolina 27609
Phone: 919.783.9214
FAX: 919.783.9266
FIRM NO. C-0764

File No.:	161904775-ESMT
Date:	JUNE 14, 2022
Scale:	1" = 200'
Sheet:	6 of 11



PARCEL 6
PIN 8689-47-5347

PARCEL 7
PIN 8689-47-4283

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15. ALL UTILITY LINES WITHIN THE CONSERVATION EASEMENT AREAS ARE TO BE MOVED OUTSIDE OF THE EASEMENT AREAS.

CURRENT OWNERSHIP

CHRISTOPHER MCGRATH AND WIFE, SUSAN MCGRATH

DEED REFERENCE

BOOK 1910, PAGE 459 (PARCEL 6); BOOK 4912, PAGE 1390 (PARCEL 7)

PLAT REFERENCE

BOOK 155, PAGE 198

OTHER CONSIDERATIONS

ROAD MAINTENANCE AGREEMENT RECORDED IN BOOK 1544, PAGE 117 OF THE BUNCOMBE COUNTY REGISTRY.

RIGHT OF WAY AGREEMENTS RECORDED IN BOOK 1203, PAGE 250; BOOK 1294, PAGE 164; BOOK 1867, PAGE 122; AND BOOK 1867, PAGE 126 OF THE BUNCOMBE COUNTY REGISTRY.

SHARED WELL AGREEMENT RECORDED IN BOOK 1910, PAGE 457 OF THE BUNCOMBE COUNTY REGISTRY.

OWNER CERTIFICATION

I (WE) HEREBY CERTIFY THAT I (WE) AM (ARE) THE OWNER(S) OF THE PROPERTY SHOWN AND DESCRIBED HEREON, WHICH IS LOCATED IN THE COUNTY OF BUNCOMBE, AND THAT I (WE) HEREBY ADOPT THIS PLAN WITH MY (OUR) FREE CONSENT.

DocuSigned by:
Christopher McGrath 8/17/2022
CHRISTOPHER McGRATH

DocuSigned by:
Susan McGrath 8/17/2022
SUSAN McGRATH

Corner Monument Table		
Point #	Northing	Easting
279	697,073.48	884,322.75
280	697,237.89	884,549.67
281	697,269.09	884,640.28
282	697,199.77	884,683.87
283	697,166.02	884,604.49
284	697,009.47	884,388.56
288	697,209.28	884,701.52
289	697,279.52	884,657.34
290	697,331.82	884,702.76
291	697,339.97	884,812.73
292	697,328.72	884,856.86
293	697,413.79	885,054.06
294	697,251.83	884,936.45
295	697,279.88	884,927.99
296	697,247.38	884,835.33
297	697,250.38	884,761.81

LEGEND

- EXISTING PROPERTY MONUMENT
- EASEMENT MONUMENT SET
- CALCULATED POINT
- WELL
- UTILITY POLE
- EASEMENT AREA
- WETLANDS AREA
- BUILDING
- OHE — OVERHEAD UTILITY
- UTILITY EASEMENT
- X — FENCE LINE
- UNIMPROVED ROAD OR PATH
- PAVED ROAD
- EXISTING STREAM CENTERLINE
- WETLANDS BOUNDARY
- EXISTING PROPERTY LINE NOT SURVEYED
- SURVEYED CONSERVATION EASEMENT LINE

40 0 40 80 160
GRAPHIC SCALE: 1" = 40'

NORTH CAROLINA PROFESSIONAL SEAL L-3960 LAND SURVEYOR JAMES M. GELLENTINE
8/16/22

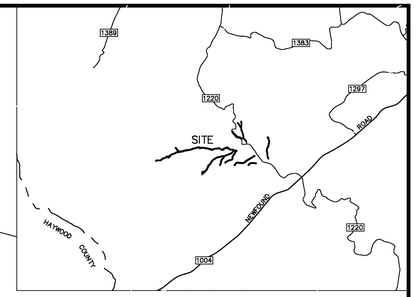
FINAL PLAT
CONSERVATION EASEMENT
FOR
STATE OF NORTH CAROLINA
DEPARTMENT OF ENVIRONMENTAL QUALITY
DIVISION OF MITIGATION SERVICES
PROJ. NAME: MORGAN BRANCH SITE
DMS PROJECT #: 100127
SPO FILE NO.: 11-LA-237
LEICESTER TOWNSHIP, BUNCOMBE COUNTY, NORTH CAROLINA

KCI ASSOCIATES OF NC
ENGINEERS, SURVEYORS AND PLANNERS
4505 Falls of Neuse Road, Floor 4
Raleigh, North Carolina 27609
Phone: 919.783.9214
FAX: 919.783.9266
FIRM NO. C-0764

File No.:	161904775-ESMT
Date:	JUNE 14, 2022
Scale:	1" = 40'
Sheet:	7 of 11

LEGEND

- EXISTING PROPERTY MONUMENT
- EASEMENT MONUMENT SET
- CALCULATED POINT
- WELL
- UTILITY POLE
- EASEMENT AREA
- WETLANDS AREA
- BUILDING
- OVERHEAD UTILITY
- UTILITY EASEMENT
- FENCE LINE
- UNIMPROVED ROAD OR PATH
- PAVED ROAD
- EXISTING STREAM CENTERLINE
- WETLANDS BOUNDARY
- EXISTING PROPERTY LINE NOT SURVEYED
- SURVEYED CONSERVATION EASEMENT LINE



VICINITY MAP
SCALE: 1" = 1 mile

N/F
NEAL A. MORGAN AND WIFE, AVA MARIE J. MORGAN
PIN 8689-48-8018

N/F
DOUGLAS M. KEEFER AND WIFE,
NELLE H. GREGORY
PIN 8689-47-3784

N/F
GARY R WAGONER, ET AL
PIN 8689-47-4534

N/F
CHRISTOPHER MCGRATH AND WIFE, SUSAN MCGRATH
PIN 8689-47-5347

CONSERVATION EASEMENT 35
16,353 sq.ft. (0.375 ac.)

CONSERVATION EASEMENT 34
13,712 sq.ft. (0.315 ac.)

N 77°37'32" E 275.45'
N 12°59'19" E 41.27'
N 75°10'39" W 84.98'
S 78°10'27" W 98.66'
S 14°03'46" W 66.79'
S 68°30'26" W 39.07'
S 81°57'32" W 37.38'
N 70°23'36" W 34.45'
S 12°19'49" E 28.07'
N 77°37'32" E 294.23'
N 12°19'49" W 29.35'
S 81°21'07" W 51.36'
S 88°48'28" W 32.68'
N 84°00'06" W 93.17'
S 67°59'13" W 55.57'
N 76°34'51" W 81.55'
S 15°45'25" E 94.75'

30' ELEC. R/W
DB 1366 pg 267

C/L GRASS ROAD
DB 2880 Pg 430
R 16' R/W

NC GRID NAD 83(2011)

Corner Monument Table

Point #	Northing	Easting
298	697,872.69	884,557.52
299	697,867.46	884,520.51
300	697,879.02	884,488.06
301	697,864.70	884,451.70
302	697,799.91	884,435.47
303	697,779.69	884,338.91
304	697,895.14	884,804.61
305	697,874.31	884,753.09
306	697,884.05	884,660.43
307	697,883.37	884,627.75
308	697,875.64	884,576.98

40 0 40 80 160
GRAPHIC SCALE: 1" = 40'

PARCEL 8
PIN 8689-47-3784

SURVEYOR NOTES

12. ALL EXISTING FENCES WITHIN THE CONSERVATION EASEMENT AREAS ARE TO BE REMOVED.
13. ALL EXISTING ROADS WITHIN THE CONSERVATION EASEMENT AREAS ARE TO BE REMOVED FROM THE EASEMENT AREAS. THE EXCEPTION IS THE EXISTING 10'-WIDE FORD THAT WILL BE INCLUDED IN THE EASEMENT IN CONSERVATION EASEMENT 36 AS SHOWN ON SHEET 9.
14. ALL STRUCTURES WITHIN THE CONSERVATION EASEMENT AREAS ARE TO BE REMOVED.
15. ALL UTILITY LINES WITHIN THE CONSERVATION EASEMENT AREAS ARE TO BE MOVED OUTSIDE OF THE EASEMENT AREAS.

CURRENT OWNERSHIP

DOUGLAS M. KEEFER AND WIFE NELLE H. GREGORY

DEED REFERENCE

BOOK 1838, PAGE 490

OTHER CONSIDERATIONS

RIGHT OF WAY AGREEMENTS RECORDED IN BOOK 1203, PAGE 250; BOOK 1261, PAGE 553 OF THE BUNCOMBE COUNTY REGISTRY.

ROAD MAINTENANCE AGREEMENT RECORDED IN BOOK 1544, PAGE 117 OF THE BUNCOMBE COUNTY REGISTRY.

ELECTRIC EASEMENT RECORDED IN BOOK 1366, PAGE 267 OF THE BUNCOMBE COUNTY REGISTRY.

OWNER CERTIFICATION

I (WE) HEREBY CERTIFY THAT I (WE) AM (ARE) THE OWNER(S) OF THE PROPERTY SHOWN AND DESCRIBED HEREON, WHICH IS LOCATED IN THE COUNTY OF BUNCOMBE, AND THAT I (WE) HEREBY ADOPT THIS PLAN WITH MY (OUR) FREE CONSENT.

DocuSigned by: Douglas Keefer 8/19/2022
DOUGLAS M. KEEFER

DocuSigned by: Nelle Gregory 8/19/2022
NELLE H. GREGORY

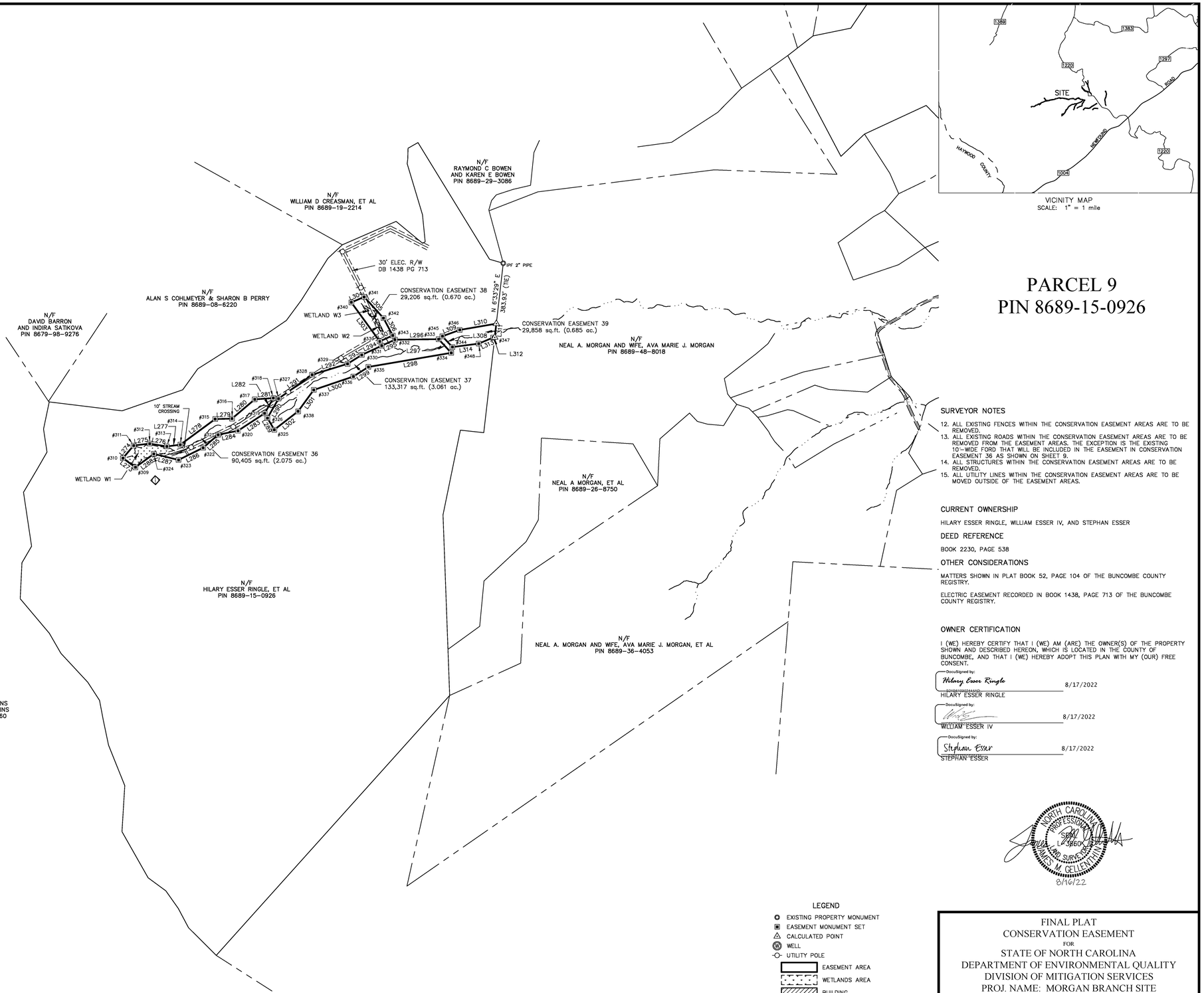
NORTH CAROLINA PROFESSIONAL SEAL L-3860 LAND SURVEYOR JAMES M. GELLERT III

8/16/22

FINAL PLAT
CONSERVATION EASEMENT
FOR
STATE OF NORTH CAROLINA
DEPARTMENT OF ENVIRONMENTAL QUALITY
DIVISION OF MITIGATION SERVICES
PROJ. NAME: MORGAN BRANCH SITE
DMS PROJECT #: 100127
SPO FILE NO.: 11-LA-238
LEICESTER TOWNSHIP, BUNCOMBE COUNTY, NORTH CAROLINA

KCI ASSOCIATES OF NC
ENGINEERS, SURVEYORS AND PLANNERS
4505 Falls of Neuse Road, Floor 4
Raleigh, North Carolina 27609
Phone: 919.783.9214
FAX: 919.783.9266
FIRM NO. C-0764

File No.:	161904775-ESMT
Date:	JUNE 14, 2022
Scale:	1" = 40'
Sheet:	8 of 11



VICINITY MAP
SCALE: 1" = 1 mile

PARCEL 9
PIN 8689-15-0926

Corner Monument Table		
Point #	Northing	Easting
309	696,953.60	880,221.62
310	697,010.97	880,142.88
311	697,090.84	880,210.52
312	697,103.15	880,311.45
313	697,085.19	880,419.69
314	697,096.26	880,505.16
315	697,257.99	880,724.94
316	697,260.89	880,831.26
317	697,382.37	880,974.66
318	697,390.57	881,092.31
319	697,294.33	881,037.17
320	697,184.02	880,868.66
321	697,159.40	880,744.24
322	697,077.07	880,649.08
323	697,000.00	880,493.57
324	697,038.09	880,338.10
325	697,190.80	881,098.05
326	697,264.43	881,054.62
327	697,387.19	881,124.95
328	697,538.02	881,336.78

Corner Monument Table		
Point #	Northing	Easting
329	697,606.81	881,560.09
330	697,663.12	881,650.18
331	697,721.06	881,775.86
332	697,759.14	881,859.29
333	697,762.36	882,134.55
334	697,676.15	882,214.64
335	697,587.18	881,691.85
336	697,526.50	881,596.43
337	697,441.98	881,347.00
338	697,306.86	881,248.38
339	697,748.35	881,763.40
340	697,994.54	881,584.06
341	698,029.21	881,665.19
342	697,895.40	881,787.01
343	697,785.69	881,845.21
344	697,712.55	882,221.78
345	697,780.67	882,158.48
346	697,820.59	882,267.84
347	697,772.48	882,478.50
348	697,734.25	882,387.79

Line Table		
Line #	Length	Direction
L273	97.42'	N 53°55'32" W
L274	104.67'	N 40°15'43" E
L275	101.68'	N 83°02'48" E
L276	109.71'	S 80°34'49" E
L277	86.18'	N 82°37'25" E
L278	272.88'	N 53°39'03" E
L279	106.36'	N 88°26'20" E
L280	187.94'	N 49°43'55" E
L281	117.93'	N 86°00'38" E
L282	110.92'	S 29°48'34" W
L283	201.41'	S 56°47'23" W
L284	126.83'	S 78°48'35" W
L285	125.83'	S 49°07'59" W
L286	173.57'	S 63°38'14" W
L287	160.06'	N 76°14'02" W
L288	143.90'	S 54°02'48" W
L289	85.49'	N 30°32'07" W
L290	141.48'	N 29°48'34" E
L291	260.05'	N 54°32'54" E
L292	233.66'	N 72°52'48" E
L293	106.24'	N 57°59'26" E

Line Table		
Line #	Length	Direction
L294	138.39'	N 65°15'08" E
L295	91.71'	N 65°27'45" E
L296	275.28'	N 89°19'51" E
L297	117.67'	S 42°53'40" E
L298	530.31'	S 80°20'30" W
L299	113.08'	S 57°32'42" W
L300	263.36'	S 71°16'53" W
L301	167.28'	S 36°07'25" W
L302	189.92'	S 52°19'56" W
L303	304.59'	N 36°04'18" W
L304	88.23'	N 66°51'54" E
L305	180.96'	S 42°18'55" E
L306	124.18'	S 27°56'42" E
L307	89.93'	S 65°27'45" W
L308	92.99'	N 42°53'40" W
L309	116.42'	N 69°56'58" E
L310	234.42'	N 80°13'51" E
L311	87.59'	S 06°33'29" W
L312	10.40'	S 85°10'23" W
L313	98.44'	S 67°09'05" W
L314	167.42'	S 82°33'04" W

300 0 300 600 1200
GRAPHIC SCALE: 1" = 300'

SURVEYOR NOTES

12. ALL EXISTING FENCES WITHIN THE CONSERVATION EASEMENT AREAS ARE TO BE REMOVED.
13. ALL EXISTING ROADS WITHIN THE CONSERVATION EASEMENT AREAS ARE TO BE REMOVED FROM THE EASEMENT AREAS. THE EXCEPTION IS THE EXISTING 10'-WIDE FORD THAT WILL BE INCLUDED IN THE EASEMENT IN CONSERVATION EASEMENT 36 AS SHOWN ON SHEET 9.
14. ALL STRUCTURES WITHIN THE CONSERVATION EASEMENT AREAS ARE TO BE REMOVED.
15. ALL UTILITY LINES WITHIN THE CONSERVATION EASEMENT AREAS ARE TO BE MOVED OUTSIDE OF THE EASEMENT AREAS.

CURRENT OWNERSHIP

HILARY ESSER RINGLE, WILLIAM ESSER IV, AND STEPHAN ESSER

DEED REFERENCE

BOOK 2230, PAGE 538

OTHER CONSIDERATIONS

MATTERS SHOWN IN PLAT BOOK 52, PAGE 104 OF THE BUNCOMBE COUNTY REGISTRY.

ELECTRIC EASEMENT RECORDED IN BOOK 1438, PAGE 713 OF THE BUNCOMBE COUNTY REGISTRY.

OWNER CERTIFICATION

I (WE) HEREBY CERTIFY THAT I (WE) AM (ARE) THE OWNER(S) OF THE PROPERTY SHOWN AND DESCRIBED HEREON, WHICH IS LOCATED IN THE COUNTY OF BUNCOMBE, AND THAT I (WE) HEREBY ADOPT THIS PLAN WITH MY (OUR) FREE CONSENT.

DocuSigned by: Hilary Esser Ringle 8/17/2022
HILARY ESSER RINGLE

DocuSigned by: 8/17/2022
WILLIAM ESSER IV

DocuSigned by: Stephan Esser 8/17/2022
STEPHAN ESSER

NORTH CAROLINA PROFESSIONAL SEAL L-3800 LAND SURVEYOR JAMES M. GELLENTIN
8/16/22

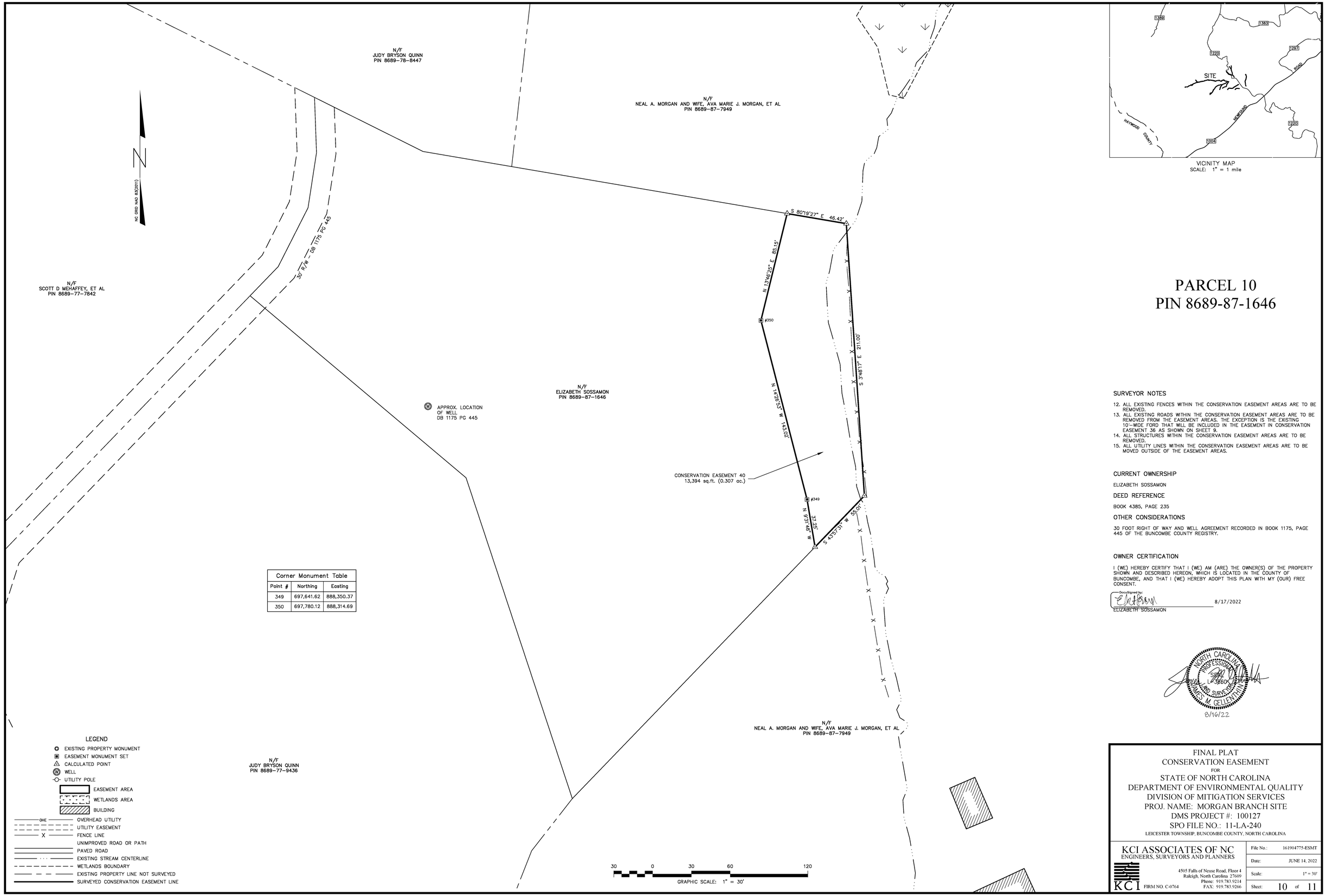
LEGEND

- EXISTING PROPERTY MONUMENT
- EASEMENT MONUMENT SET
- CALCULATED POINT
- WELL
- UTILITY POLE
- EASEMENT AREA
- WETLANDS AREA
- BUILDING
- OHE — OVERHEAD UTILITY
- UTILITY EASEMENT
- X — FENCE LINE
- UNIMPROVED ROAD OR PATH
- PAVED ROAD
- EXISTING STREAM CENTERLINE
- WETLANDS BOUNDARY
- EXISTING PROPERTY LINE NOT SURVEYED
- SURVEYED CONSERVATION EASEMENT LINE

FINAL PLAT
CONSERVATION EASEMENT
FOR
STATE OF NORTH CAROLINA
DEPARTMENT OF ENVIRONMENTAL QUALITY
DIVISION OF MITIGATION SERVICES
PROJ. NAME: MORGAN BRANCH SITE
DMS PROJECT #: 100127
SPO FILE NO.: 11-LA-239
LEICESTER TOWNSHIP, BUNCOMBE COUNTY, NORTH CAROLINA

KCI ASSOCIATES OF NC
ENGINEERS, SURVEYORS AND PLANNERS
4505 Falls of Neuse Road, Floor 4
Raleigh, North Carolina 27609
Phone: 919.783.9214
FAX: 919.783.9266
FIRM NO. C-0764

File No.:	161904775-ESMT
Date:	JUNE 14, 2022
Scale:	1" = 300'
Sheet:	9 of 11



Corner Monument Table		
Point #	Northing	Easting
349	697,641.62	888,350.37
350	697,780.12	888,314.69

VICINITY MAP
SCALE: 1" = 1 mile

PARCEL 10
PIN 8689-87-1646

SURVEYOR NOTES

12. ALL EXISTING FENCES WITHIN THE CONSERVATION EASEMENT AREAS ARE TO BE REMOVED.
13. ALL EXISTING ROADS WITHIN THE CONSERVATION EASEMENT AREAS ARE TO BE REMOVED FROM THE EASEMENT AREAS. THE EXCEPTION IS THE EXISTING 10'-WIDE FORD THAT WILL BE INCLUDED IN THE EASEMENT IN CONSERVATION EASEMENT 36 AS SHOWN ON SHEET 9.
14. ALL STRUCTURES WITHIN THE CONSERVATION EASEMENT AREAS ARE TO BE REMOVED.
15. ALL UTILITY LINES WITHIN THE CONSERVATION EASEMENT AREAS ARE TO BE MOVED OUTSIDE OF THE EASEMENT AREAS.

CURRENT OWNERSHIP

ELIZABETH SOSSAMON

DEED REFERENCE

BOOK 4385, PAGE 235

OTHER CONSIDERATIONS

30 FOOT RIGHT OF WAY AND WELL AGREEMENT RECORDED IN BOOK 1175, PAGE 445 OF THE BUNCOMBE COUNTY REGISTRY.

OWNER CERTIFICATION

I (WE) HEREBY CERTIFY THAT I (WE) AM (ARE) THE OWNER(S) OF THE PROPERTY SHOWN AND DESCRIBED HEREON, WHICH IS LOCATED IN THE COUNTY OF BUNCOMBE, AND THAT I (WE) HEREBY ADOPT THIS PLAN WITH MY (OUR) FREE CONSENT.

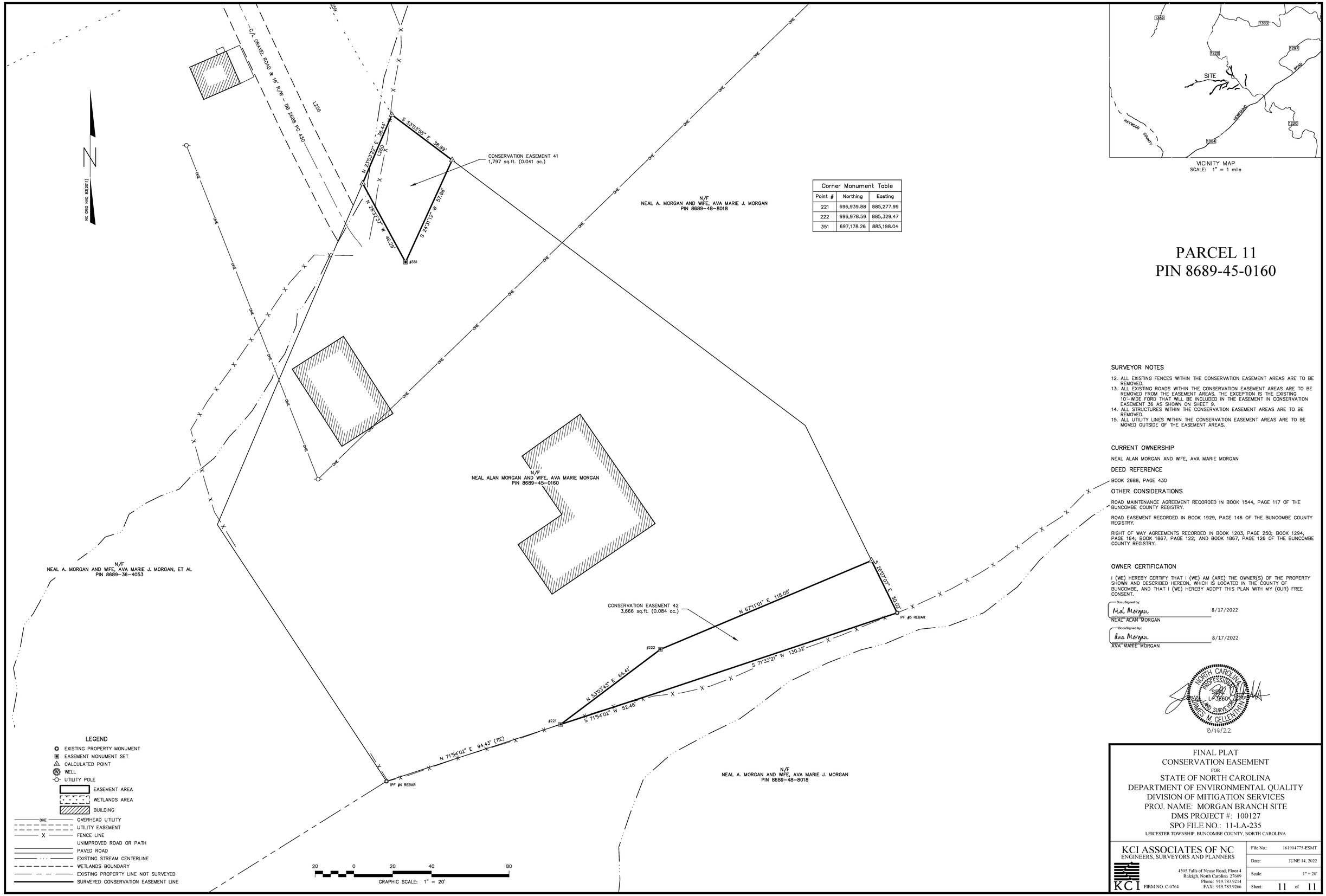
Docusigned by:
8/17/2022
ELIZABETH SOSSAMON

NORTH CAROLINA PROFESSIONAL SEAL L-3860 LAND SURVEYOR JAMES M. GELLENTHIN
8/16/22

FINAL PLAT
CONSERVATION EASEMENT
FOR
STATE OF NORTH CAROLINA
DEPARTMENT OF ENVIRONMENTAL QUALITY
DIVISION OF MITIGATION SERVICES
PROJ. NAME: MORGAN BRANCH SITE
DMS PROJECT #: 100127
SPO FILE NO.: 11-LA-240
LEICESTER TOWNSHIP, BUNCOMBE COUNTY, NORTH CAROLINA

KCI ASSOCIATES OF NC
ENGINEERS, SURVEYORS AND PLANNERS
4505 Falls of Neuse Road, Floor 4
Raleigh, North Carolina 27609
Phone: 919.783.9214
FAX: 919.783.9266
FIRM NO. C-0764

File No.:	161904775-ESMT
Date:	JUNE 14, 2022
Scale:	1" = 30'
Sheet:	10 of 11



Corner Monument Table		
Point #	Northing	Easting
221	696,939.88	885,277.99
222	696,978.59	885,329.47
351	697,178.26	885,198.04

VICINITY MAP
SCALE: 1" = 1 mile

PARCEL 11
PIN 8689-45-0160

SURVEYOR NOTES

12. ALL EXISTING FENCES WITHIN THE CONSERVATION EASEMENT AREAS ARE TO BE REMOVED.
13. ALL EXISTING ROADS WITHIN THE CONSERVATION EASEMENT AREAS ARE TO BE REMOVED FROM THE EASEMENT AREAS. THE EXCEPTION IS THE EXISTING 10'-WIDE FORD THAT WILL BE INCLUDED IN THE EASEMENT IN CONSERVATION EASEMENT 36 AS SHOWN ON SHEET 9.
14. ALL STRUCTURES WITHIN THE CONSERVATION EASEMENT AREAS ARE TO BE REMOVED.
15. ALL UTILITY LINES WITHIN THE CONSERVATION EASEMENT AREAS ARE TO BE MOVED OUTSIDE OF THE EASEMENT AREAS.

CURRENT OWNERSHIP

NEAL ALAN MORGAN AND WIFE, AVA MARIE MORGAN

DEED REFERENCE

BOOK 2688, PAGE 430

OTHER CONSIDERATIONS

ROAD MAINTENANCE AGREEMENT RECORDED IN BOOK 1544, PAGE 117 OF THE BUNCOMBE COUNTY REGISTRY.

ROAD EASEMENT RECORDED IN BOOK 1929, PAGE 146 OF THE BUNCOMBE COUNTY REGISTRY.

RIGHT OF WAY AGREEMENTS RECORDED IN BOOK 1203, PAGE 250; BOOK 1294, PAGE 164; BOOK 1867, PAGE 122; AND BOOK 1867, PAGE 126 OF THE BUNCOMBE COUNTY REGISTRY.

OWNER CERTIFICATION

I (WE) HEREBY CERTIFY THAT I (WE) AM (ARE) THE OWNER(S) OF THE PROPERTY SHOWN AND DESCRIBED HEREON, WHICH IS LOCATED IN THE COUNTY OF BUNCOMBE, AND THAT I (WE) HEREBY ADOPT THIS PLAN WITH MY (OUR) FREE CONSENT.

DocuSigned by:
Neal Morgan 8/17/2022
NEAL ALAN MORGAN

DocuSigned by:
Ava Morgan 8/17/2022
AVA MARIE MORGAN

NORTH CAROLINA PROFESSIONAL L-3960 LAND SURVEYOR JAMES M. GELLENTHIN
8/16/22

LEGEND

- EXISTING PROPERTY MONUMENT
- EASEMENT MONUMENT SET
- CALCULATED POINT
- WELL
- UTILITY POLE
- EASEMENT AREA
- WETLANDS AREA
- BUILDING
- OHE — OVERHEAD UTILITY
- UTILITY EASEMENT
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- UNIMPROVED ROAD OR PATH
- PAVED ROAD
- EXISTING STREAM CENTERLINE
- WETLANDS BOUNDARY
- EXISTING PROPERTY LINE NOT SURVEYED
- SURVEYED CONSERVATION EASEMENT LINE

FINAL PLAT
CONSERVATION EASEMENT
FOR
STATE OF NORTH CAROLINA
DEPARTMENT OF ENVIRONMENTAL QUALITY
DIVISION OF MITIGATION SERVICES
PROJ. NAME: MORGAN BRANCH SITE
DMS PROJECT #: 100127
SPO FILE NO.: 11-LA-235
LEICESTER TOWNSHIP, BUNCOMBE COUNTY, NORTH CAROLINA

KCI ASSOCIATES OF NC
ENGINEERS, SURVEYORS AND PLANNERS
4505 Falls of Neuse Road, Floor 4
Raleigh, North Carolina 27609
Phone: 919.783.9214
FAX: 919.783.9266
FIRM NO. C-0764

File No.:	161904775-ESMT
Date:	JUNE 14, 2022
Scale:	1" = 20'
Sheet:	11 of 11

4. **Credit Release Schedule**

All credit releases will be based on the total credit generated as reported in the final design plans unless otherwise documented and provided to the Interagency Review Team following construction. Under no circumstances shall any mitigation project be debited until the necessary DA authorization has been received for its construction or the District Engineer (DE) has otherwise provided written approval for the project in the case where no DA authorization is required for construction of the mitigation project. The DE, in consultation with the Interagency Review Team (IRT), will determine if performance standards have been satisfied sufficiently to meet the requirements of the release schedules below. In cases where some performance standards have not been met, credits may still be released depending on the specifics of the case. Monitoring may be required to restart or be extended, depending on the extent to which the site fails to meet the specified performance standard. The release of project credits will be subject to the criteria described as follows:

Stream Credit Release Schedule			
Monitoring Year	**Credit Release Activity**	**Interim Release**	**Total Released**
0	Initial Allocation – see requirements below	30%	30%
1	First year monitoring report demonstrates performance standards are being met	10%	40%
2	Second year monitoring report demonstrates performance standards are being met	10%	50%
3	Third year monitoring report demonstrates performance standards are being met	10%	60%
4	Fourth year monitoring report demonstrates performance standards are being met	5%	65% (75%*)
5	Fifth year monitoring report demonstrates performance standards are being met	10%	75% (85%*)
6	Sixth year monitoring report demonstrates performance standards are being met	5%	80% (90%*)
7	Seventh year monitoring report demonstrates performance standards are being met, and project has received close-out approval from IRT	10%	90% (100%*)

**See Subsequent Credit Releases description below*

Initial Allocation of Released Credits

The initial allocation of released credits, as specified in the mitigation plan can be released by the NCDMS upon approval by the DE following 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 sit\e 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.

Subsequent Credit Releases

All subsequent credit releases must be approved by the DE, in consultation with the IRT, based on a determination that required performance standards have been achieved. For stream project with a 7-year monitoring period, a reserve of 10% of a site's total stream credits shall 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 shall be at the discretion of the IRT. As projects approach milestones associated with credit release, the NCDMS will submit a request for credit release to the DE along with documentation substantiating achievement of criteria required for release to occur. This documentation will be included with the annual monitoring report.

5. Financial Assurance

Pursuant to Section IV H and Appendix III of the Division of Mitigation Service's In-Lieu Fee Instrument dated July 28, 2010, the North Carolina Department of Environmental Quality (formerly NCDENR) has provided the U.S. Army Corps of Engineers Wilmington District with a formal commitment to fund projects to satisfy mitigation requirements assumed by DMS. This commitment provides financial assurance for all mitigation projects implemented by the program.

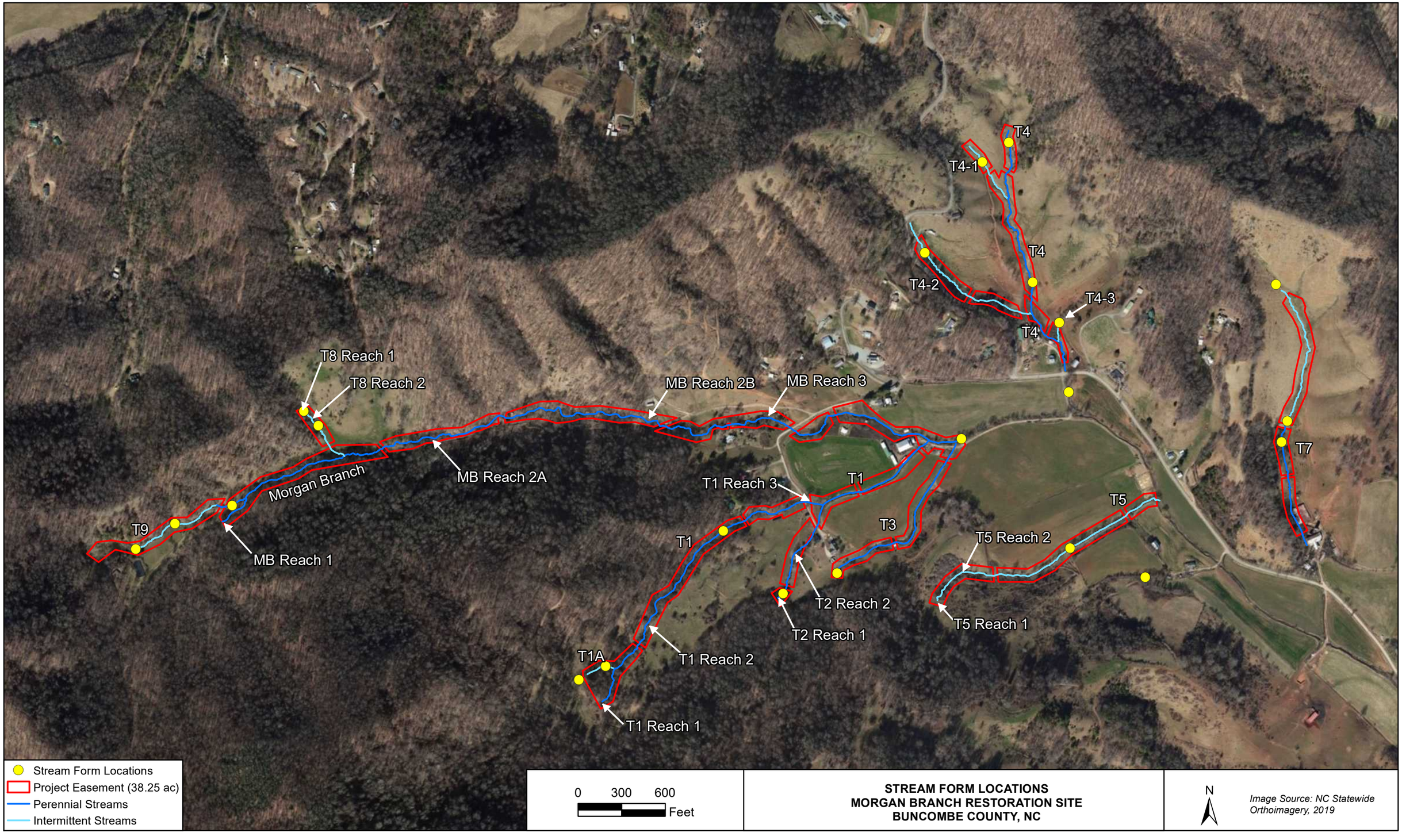
6. **Maintenance Plan**

The site will be monitored on a regular basis, with a physical inspection of the site 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. Maintenance needs or actions will be recorded in the annual monitoring reports. See Appendix 9 for more information on invasive species.

Planned Maintenance

Component/Feature	Maintenance Through Project Close-Out
Stream	Routine channel maintenance and repair activities may include securing of loose coir matting and supplemental installations of live stakes and other target vegetation along the channel. Areas where stormwater and floodplain flows intercept the channel (such as the proposed water quality treatment areas) may also require maintenance to prevent bank failures, knick points, and erosion.
Vegetation	Vegetation shall be maintained to ensure the health and vigor of the targeted plant community. Any vegetation control requiring herbicide application will be performed in accordance with NC Department of Agriculture (NCDA) rules and regulations.
Site Boundary	Site boundaries shall be identified in the field to ensure clear distinction between the mitigation site and adjacent properties. Boundaries may be identified by fence, marker, bollard, post, tree-blazing, or other means as allowed by site conditions and/or conservation easement. Boundary markers disturbed, damaged, or destroyed will be repaired and/or replaced on an as needed basis up until the project is closed out.
Beaver and Other Nuisance Fauna	The site will be monitored for the presence of beaver or other fauna that may impact the success of the project. Adaptive management approaches will be used to evaluate whether or not beaver or their structures or other animals should be controlled or managed at the site.

7. **DWR Stream Identification Forms, Wetland JD Forms, and NC SAM & WAM Forms**


T4
T4-1
T4
T4-2
T4-3
T4
T8 Reach 1
T8 Reach 2
MB Reach 2B
MB Reach 3
Morgan Branch
MB Reach 2A
T9
MB Reach 1
T1 Reach 3
T1
T1
T3
T5
T5 Reach 2
T2 Reach 2
T2 Reach 1
T5 Reach 1
T1A
T1 Reach 2
T1 Reach 1
T7
Stream Form Locations
Project Easement (38.25 ac)
Perennial Streams
Intermittent Streams
0 300 600
Feet
STREAM FORM LOCATIONS
MORGAN BRANCH RESTORATION SITE
BUNCOMBE COUNTY, NC
N
Image Source: NC Statewide Orthoimagery, 2019

NC DWQ Stream Identification Form Version 4.11

Date: 1/24/18	**Project/Site:** Morgan Branch	**Latitude:** 35.6097
Evaluator: J. Sullivan	**County:** Buncombe	**Longitude:** -82.7478
Total Points: *Stream is at least intermittent if ≥ 19 or perennial if ≥ 30** 39	**Stream Determination (circle one)** Ephemeral Intermittent **(Perennial)**	**Other** *e.g. Quad Name*:

A. Geomorphology (Subtotal = 24)	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 = 9)				
12. Presence of Baseflow	0	1	2	(3)
13. Iron oxidizing bacteria	(0)	1	2	3
14. Leaf litter	(1.5)	1	0.5	0
15. Sediment on plants or debris	0	(0.5)	1	1.5
16. Organic debris lines or piles	0	0.5	(1)	1.5
17. Soil-based evidence of high water table?	No = 0		Yes = 3	

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

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

Notes: Previously ditched.

Sketch:

NC DWQ Stream Identification Form Version 4.11

Date: 1/24/18	**Project/Site:** Morgan Branch	**Latitude:** 35.6076
Evaluator: J. Sullivan	**County:** Buncombe	**Longitude:** -82.7537
Total Points: *Stream is at least intermittent if ≥ 19 or perennial if ≥ 30** 32	**Stream Determination (circle one)** Ephemeral Intermittent **Perennial**	**Other** *e.g. Quad Name*:

A. Geomorphology (Subtotal = 14)	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 = 9.5)				
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: 3 stoneflies, 1 deerfly, 1 juv. salamander, and 1 right snail.

Sketch:

NC DWQ Stream Identification Form Version 4.11

Date: 1/24/20	**Project/Site:** Morgan Branch	**Latitude:** 35.6050
Evaluator: J. Sullivan	**County:** Buncombe	**Longitude:** -82.7563
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*:

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

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

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

C. Biology (Subtotal = 7)				
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: 1 stonefly

Sketch:

T1A above Start

NC DWQ Stream Identification Form Version 4.11

Date: 5/11/20	**Project/Site:** Morgan Branch	**Latitude:** 35.6047
Evaluator: J. Sullivan	**County:** Buncombe	**Longitude:** -82.7569
Total Points: *Stream is at least intermittent if ≥ 19 or perennial if ≥ 30** 12	**Stream Determination (circle one)** (Ephemeral) Intermittent Perennial	**Other** *e.g. Quad Name*:

A. Geomorphology (Subtotal = 5.5)	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 = 2.5)				
12. Presence of Baseflow	0	(1)	2	3
13. Iron oxidizing bacteria	(0)	1	2	3
14. Leaf litter	(1.5)	1	0.5	0
15. Sediment on plants or debris	(0)	0.5	1	1.5
16. Organic debris lines or piles	(0)	0.5	1	1.5
17. Soil-based evidence of high water table?	(No = 0)		Yes = 3	

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

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

Notes:

Sketch:

NC DWQ Stream Identification Form Version 4.11

Date: 1/24/20	**Project/Site:** Morgan Branch	**Latitude:** 35.6065
Evaluator: J. Sullivan	**County:** Buncombe	**Longitude:** -82.7523
Total Points: *Stream is at least intermittent if ≥ 19 or perennial if ≥ 30** 30	**Stream Determination (circle one)** Ephemeral Intermittent **(Perennial)**	**Other** *e.g. Quad Name*:

A. Geomorphology (Subtotal = 13)	Absent	Weak	Moderate	Strong
1[a]. Continuity of channel bed and bank	0	1	(2)	3
2. Sinuosity of channel along thalweg	0	1	(2)	3
3. In-channel structure: ex. riffle-pool, step-pool, ripple-pool sequence	0	1	(2)	3
4. Particle size of stream substrate	0	1	(2)	3
5. Active/relict floodplain	(0)	1	2	3
6. Depositional bars or benches	(0)	1	2	3
7. Recent alluvial deposits	0	(1)	2	3
8. Headcuts	0	1	(2)	3
9. Grade control	0	0.5	(1)	1.5
10. Natural valley	0	0.5	(1)	1.5
11. Second or greater order channel	(No = 0)		Yes = 3	

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

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

C. Biology (Subtotal = 9.5)				
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: 1 dragonfly, 1 stonefly, 1 right snail, and 1 juv. salamander.

Sketch:

NC DWQ Stream Identification Form Version 4.11

Date: 1/24/20	**Project/Site:** Morgan Branch	**Latitude:** 35.6069
Evaluator: J. Sullivan	**County:** Buncombe	**Longitude:** -82.7510
Total Points: *Stream is at least intermittent if ≥ 19 or perennial if ≥ 30** 30.5	**Stream Determination (circle one)** Ephemeral Intermittent **(Perennial)**	**Other** *e.g. Quad Name*:

A. Geomorphology (Subtotal = 15)	Absent	Weak	Moderate	Strong
1[a]. Continuity of channel bed and bank	0	(1)	2	3
2. Sinuosity of channel along thalweg	0	1	(2)	3
3. In-channel structure: ex. riffle-pool, step-pool, ripple-pool sequence	0	1	2	(3)
4. Particle size of stream substrate	0	1	(2)	3
5. Active/relict floodplain	0	1	(2)	3
6. Depositional bars or benches	(0)	1	2	3
7. Recent alluvial deposits	0	(1)	2	3
8. Headcuts	0	1	(2)	3
9. Grade control	0	0.5	(1)	1.5
10. Natural valley	0	0.5	(1)	1.5
11. Second or greater order channel	(No = 0)		Yes = 3	

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

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

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

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

Notes: 1 dragonfly, 1 stonefly, and 1 right snail.

Sketch:

NC DWQ Stream Identification Form Version 4.11

Date: 2/4/18	**Project/Site:** Morgan Branch	**Latitude:** 35.6151
Evaluator: J. Sullivan	**County:** Buncombe	**Longitude:** -82.7474
Total Points: 27.5 *Stream is at least intermittent if ≥ 19 or perennial if ≥ 30**	**Stream Determination (circle one)** Ephemeral Intermittent **Perennial**	**Other** *e.g. Quad Name*:

A. Geomorphology (Subtotal = 14)	Absent	Weak	Moderate	Strong
1[a]. Continuity of channel bed and bank	0	1	(2)	3
2. Sinuosity of channel along thalweg	0	1	(2)	3
3. In-channel structure: ex. riffle-pool, step-pool, ripple-pool sequence	0	1	(2)	3
4. Particle size of stream substrate	0	1	(2)	3
5. Active/relict floodplain	0	(1)	2	3
6. Depositional bars or benches	0	(1)	2	3
7. Recent alluvial deposits	(0)	1	2	3
8. Headcuts	0	1	(2)	3
9. Grade control	0	(0.5)	1	1.5
10. Natural valley	0	0.5	1	(1.5)
11. Second or greater order channel	(No = 0)		Yes = 3	

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

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

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

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

Notes: Cattle impacts.

Sketch:

NC DWQ Stream Identification Form Version 4.11

Date: 2/4/18	**Project/Site:** Morgan Branch	**Latitude:** 35.6126
Evaluator: J. Sullivan	**County:** Buncombe	**Longitude:** -82.7464
Total Points: *Stream is at least intermittent if ≥ 19 or perennial if ≥ 30** 30.5	**Stream Determination (circle one)** Ephemeral Intermittent **(Perennial)**	**Other** *e.g. Quad Name*:

A. Geomorphology (Subtotal = 17)	Absent	Weak	Moderate	Strong
1[a]. Continuity of channel bed and bank	0	1	(2)	3
2. Sinuosity of channel along thalweg	0	1	(2)	3
3. In-channel structure: ex. riffle-pool, step-pool, ripple-pool sequence	0	1	(2)	3
4. Particle size of stream substrate	0	1	(2)	3
5. Active/relict floodplain	0	1	(2)	3
6. Depositional bars or benches	0	(1)	2	3
7. Recent alluvial deposits	(0)	1	2	3
8. Headcuts	0	(1)	2	3
9. Grade control	0	(0.5)	1	1.5
10. Natural valley	0	0.5	1	(1.5)
11. Second or greater order channel	No = 0		(Yes = 3)	

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

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

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

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

Notes: Cattle impacts.

Sketch:

NC DWQ Stream Identification Form Version 4.11

Date: 2/4/18	**Project/Site:** Morgan Branch	**Latitude:** 35.6148
Evaluator: J. Sullivan	**County:** Buncombe	**Longitude:** -82.7480
Total Points: *Stream is at least intermittent if ≥ 19 or perennial if ≥ 30** 23.25	**Stream Determination (circle one)** Ephemeral (Intermittent) Perennial	**Other** *e.g. Quad Name*:

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 = 8)				
12. Presence of Baseflow	0	1	(2)	3
13. Iron oxidizing bacteria	(0)	1	2	3
14. Leaf litter	(1.5)	1	0.5	0
15. Sediment on plants or debris	0	(0.5)	1	1.5
16. Organic debris lines or piles	0	0.5	(1)	1.5
17. Soil-based evidence of high water table?	No = 0		(Yes = 3)	

C. Biology (Subtotal = 4.75)				
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: Juncus effusus

Sketch:

NC DWQ Stream Identification Form Version 4.11

Date: 2/4/18	**Project/Site:** Morgan Branch	**Latitude:** 35.6130
Evaluator: J. Sullivan	**County:** Buncombe	**Longitude:** -82.7493
Total Points: *Stream is at least intermittent if ≥ 19 or perennial if ≥ 30** 24.5	**Stream Determination (circle one)** Ephemeral (Intermittent) Perennial	**Other** *e.g. Quad Name*:

A. Geomorphology (Subtotal = 12.5)	Absent	Weak	Moderate	Strong
1[a]. Continuity of channel bed and bank	0	1	(2)	3
2. Sinuosity of channel along thalweg	0	(1)	2	3
3. In-channel structure: ex. riffle-pool, step-pool, ripple-pool sequence	0	1	(2)	3
4. Particle size of stream substrate	0	1	(2)	3
5. Active/relict floodplain	0	(1)	2	3
6. Depositional bars or benches	(0)	1	2	3
7. Recent alluvial deposits	0	(1)	2	3
8. Headcuts	0	1	(2)	3
9. Grade control	0	(0.5)	1	1.5
10. Natural valley	0	0.5	(1)	1.5
11. Second or greater order channel	(No = 0)		Yes = 3	

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

B. Hydrology (Subtotal = 7)				
12. Presence of Baseflow	0	1	(2)	3
13. Iron oxidizing bacteria	(0)	1	2	3
14. Leaf litter	1.5	(1)	0.5	0
15. Sediment on plants or debris	0	(0.5)	1	1.5
16. Organic debris lines or piles	0	(0.5)	1	1.5
17. Soil-based evidence of high water table?	No = 0		(Yes = 3)	

C. Biology (Subtotal = 5)				
18. Fibrous roots in streambed	3	(2)	1	0
19. Rooted upland plants in streambed	(3)	2	1	0
20. Macrobenthos (note diversity and abundance)	(0)	1	2	3
21. Aquatic Mollusks	(0)	1	2	3
22. Fish	(0)	0.5	1	1.5
23. Crayfish	(0)	0.5	1	1.5
24. Amphibians	(0)	0.5	1	1.5
25. Algae	(0)	0.5	1	1.5
26. Wetland plants in streambed	FACW = 0.75; OBL = 1.5 (Other = 0)			

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

Notes:

Sketch:

NC DWQ Stream Identification Form Version 4.11

Date: 5/13/20	**Project/Site:** Morgan Branch	**Latitude:** 35.6118
Evaluator: J. Sullivan	**County:** Buncombe	**Longitude:** -82.7461
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*:

A. Geomorphology (Subtotal = 5.5)	Absent	Weak	Moderate	Strong
1[a]. Continuity of channel bed and bank	0	(1)	2	3
2. Sinuosity of channel along thalweg	0	(1)	2	3
3. In-channel structure: ex. riffle-pool, step-pool, ripple-pool sequence	0	(1)	2	3
4. Particle size of stream substrate	0	(1)	2	3
5. Active/relict floodplain	(0)	1	2	3
6. Depositional bars or benches	(0)	1	2	3
7. Recent alluvial deposits	0	(1)	2	3
8. Headcuts	(0)	1	2	3
9. Grade control	(0)	0.5	1	1.5
10. Natural valley	0	(0.5)	1	1.5
11. Second or greater order channel	(No = 0)		Yes = 3	

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

B. Hydrology (Subtotal = 8)				
12. Presence of Baseflow	0	1	(2)	3
13. Iron oxidizing bacteria	0	(1)	2	3
14. Leaf litter	(1.5)	1	0.5	0
15. Sediment on plants or debris	0	(0.5)	1	1.5
16. Organic debris lines or piles	(0)	0.5	1	1.5
17. Soil-based evidence of high water table?	No = 0		(Yes = 3)	

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

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

Notes:

Sketch:

T4 South of Road

NC DWQ Stream Identification Form Version 4.11

Date: 1/24/20	**Project/Site:** Morgan Branch	**Latitude:** 35.6105
Evaluator: J. Sullivan	**County:** Buncombe	**Longitude:** -82.7458
Total Points: *Stream is at least intermittent if ≥ 19 or perennial if ≥ 30** 30.5	**Stream Determination (circle one)** Ephemeral Intermittent **Perennial**	**Other** *e.g. Quad Name*:

A. Geomorphology (Subtotal = 16)	Absent	Weak	Moderate	Strong
1[a]. Continuity of channel bed and bank	0	1	(2)	3
2. Sinuosity of channel along thalweg	0	(1)	2	3
3. In-channel structure: ex. riffle-pool, step-pool, ripple-pool sequence	0	1	(2)	3
4. Particle size of stream substrate	0	1	(2)	3
5. Active/relict floodplain	0	1	(2)	3
6. Depositional bars or benches	0	(1)	2	3
7. Recent alluvial deposits	0	(1)	2	3
8. Headcuts	0	(1)	2	3
9. Grade control	0	(0.5)	1	1.5
10. Natural valley	0	(0.5)	1	1.5
11. Second or greater order channel	No = 0		(Yes = 3)	

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

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

C. Biology (Subtotal = 7)				
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: 5 midges

Sketch:

NC DWQ Stream Identification Form Version 4.11

Date: 2/4/18	**Project/Site:** Morgan Branch	**Latitude:** 35.6075
Evaluator: J. Sullivan	**County:** Buncombe	**Longitude:** -82.7456
Total Points: *Stream is at least intermittent if ≥ 19 or perennial if ≥ 30** 26	**Stream Determination (circle one)** Ephemeral (Intermittent) Perennial	**Other** *e.g. Quad Name*:

A. Geomorphology (Subtotal = 12.5)	Absent	Weak	Moderate	Strong
1[a]. Continuity of channel bed and bank	0	1	(2)	3
2. Sinuosity of channel along thalweg	0	(1)	2	3
3. In-channel structure: ex. riffle-pool, step-pool, ripple-pool sequence	0	1	(2)	3
4. Particle size of stream substrate	0	1	(2)	3
5. Active/relict floodplain	0	(1)	2	3
6. Depositional bars or benches	0	(1)	2	3
7. Recent alluvial deposits	0	(1)	2	3
8. Headcuts	0	(1)	2	3
9. Grade control	0	(0.5)	1	1.5
10. Natural valley	0	0.5	(1)	1.5
11. Second or greater order channel	(No = 0)		Yes = 3	

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

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

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

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

Notes: Cattle impacts.

Sketch:

NC DWQ Stream Identification Form Version 4.11

Date: 2/4/18	**Project/Site:** Morgan Branch	**Latitude:** 35.6070
Evaluator: J. Sullivan	**County:** Buncombe	**Longitude:** -82.7438
Total Points: *Stream is at least intermittent if ≥ 19 or perennial if ≥ 30** 20.5	**Stream Determination (circle one)** Ephemeral (Intermittent) Perennial	**Other** *e.g. Quad Name*:

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

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

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

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

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

Notes: Cattle impacts.

Sketch:

NC DWQ Stream Identification Form Version 4.11

Date: 2/4/18	**Project/Site:** Morgan Branch	**Latitude:** 35.6101
Evaluator: J. Sullivan	**County:** Buncombe	**Longitude:** -82.7408
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*:

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

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

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

C. Biology (Subtotal = 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: Active cattle impacts.

Sketch:

T7 above Start

NC DWQ Stream Identification Form Version 4.11

Date: 5/13/20	**Project/Site:** Morgan Branch	**Latitude:** 35.6127
Evaluator: J. Sullivan	**County:** Buncombe	**Longitude:** -82.7411
Total Points: *Stream is at least intermittent if ≥ 19 or perennial if ≥ 30** 15.5	**Stream Determination (circle one)** Ephemeral Intermittent Perennial	**Other** *e.g. Quad Name*:

A. Geomorphology (Subtotal = 7)	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 = 2.5)				
12. Presence of Baseflow	0	1	2	3
13. Iron oxidizing bacteria	0	1	2	3
14. Leaf litter	1.5	1	0.5	0
15. Sediment on plants or debris	0	0.5	1	1.5
16. Organic debris lines or piles	0	0.5	1	1.5
17. Soil-based evidence of high water table?	No = 0		Yes = 3	

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

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

Notes:

Sketch:

T7 Below Old Pond

NC DWQ Stream Identification Form Version 4.11

Date: 5/13/20	**Project/Site:** Morgan Branch	**Latitude:** 35.6097
Evaluator: J. Sullivan	**County:** Buncombe	**Longitude:** -82.7408
Total Points: *Stream is at least intermittent if ≥ 19 or perennial if ≥ 30** 30	**Stream Determination (circle one)** Ephemeral Intermittent **(Perennial)**	**Other** *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 = 7.5)				
12. Presence of Baseflow	0	1	(2)	3
13. Iron oxidizing bacteria	(0)	1	2	3
14. Leaf litter	(1.5)	1	0.5	0
15. Sediment on plants or debris	0	(0.5)	1	1.5
16. Organic debris lines or piles	0	(0.5)	1	1.5
17. Soil-based evidence of high water table?	No = 0		(Yes = 3)	

C. Biology (Subtotal = 7)				
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: Many midges

Sketch:

NC DWQ Stream Identification Form Version 4.11

Date: 5/12/20	**Project/Site:** Morgan Branch	**Latitude:** 35.6093
Evaluator: J. Sullivan	**County:** Buncombe	**Longitude:** -82.7632
Total Points: *Stream is at least intermittent if ≥ 19 or perennial if ≥ 30** 25.75	**Stream Determination (circle one)** Ephemeral (Intermittent) Perennial	**Other** *e.g. Quad Name*:

A. Geomorphology (Subtotal = 12)	Absent	Weak	Moderate	Strong
1[a]. Continuity of channel bed and bank	0	1	(2)	3
2. Sinuosity of channel along thalweg	0	(1)	2	3
3. In-channel structure: ex. riffle-pool, step-pool, ripple-pool sequence	0	(1)	2	3
4. Particle size of stream substrate	0	(1)	2	3
5. Active/relict floodplain	0	1	(2)	3
6. Depositional bars or benches	(0)	1	2	3
7. Recent alluvial deposits	0	(1)	2	3
8. Headcuts	0	1	(2)	3
9. Grade control	0	(0.5)	1	1.5
10. Natural valley	0	0.5	1	(1.5)
11. Second or greater order channel	(No = 0)		Yes = 3	

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

B. Hydrology (Subtotal = 7)				
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 = 6.75)				
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: Juncus effusus

Sketch:

NC DWQ Stream Identification Form Version 4.11

Date: 5/12/20	**Project/Site:** Morgan Branch	**Latitude:** 35.6096
Evaluator: J. Sullivan	**County:** Buncombe	**Longitude:** -82.7635
Total Points: *Stream is at least intermittent if ≥ 19 or perennial if ≥ 30** 16	**Stream Determination (circle one)** Ephemeral Intermittent Perennial	**Other** *e.g. Quad Name*:

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

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

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

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

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

Notes:

Sketch:

NC DWQ Stream Identification Form Version 4.11

Date: 5/12/20	**Project/Site:** Morgan Branch	**Latitude:** 35.6074
Evaluator: J. Sullivan	**County:** Buncombe	**Longitude:** -82.7664
Total Points: *Stream is at least intermittent if ≥ 19 or perennial if ≥ 30** 23	**Stream Determination (circle one)** Ephemeral (Intermittent) Perennial	**Other** *e.g. Quad Name*:

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

C. Biology (Subtotal = 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:

NC DWQ Stream Identification Form Version 4.11

Date: 5/12/20	**Project/Site:** Morgan Branch	**Latitude:** 35.6078
Evaluator: J. Sullivan	**County:** Buncombe	**Longitude:** -82.7651
Total Points: *Stream is at least intermittent if ≥ 19 or perennial if ≥ 30** 30	**Stream Determination (circle one)** Ephemeral Intermittent (Perennial)	**Other** *e.g. Quad Name*:

A. Geomorphology (Subtotal = 12.5)	Absent	Weak	Moderate	Strong
1[a]. Continuity of channel bed and bank	0	1	(2)	3
2. Sinuosity of channel along thalweg	0	(1)	2	3
3. In-channel structure: ex. riffle-pool, step-pool, ripple-pool sequence	0	1	(2)	3
4. Particle size of stream substrate	0	1	(2)	3
5. Active/relict floodplain	(0)	1	2	3
6. Depositional bars or benches	0	(1)	2	3
7. Recent alluvial deposits	0	(1)	2	3
8. Headcuts	0	1	(2)	3
9. Grade control	0	(0.5)	1	1.5
10. Natural valley	0	0.5	(1)	1.5
11. Second or greater order channel	(No = 0)		Yes = 3	

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

B. Hydrology (Subtotal = 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 = 9)				
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: Midge, caddisfly, stonefly, mayfly, and right snail.

Sketch:

NC DWQ Stream Identification Form Version 4.11

Date: 5/12/20	**Project/Site:** Morgan Branch	**Latitude:** 35.6069
Evaluator: J. Sullivan	**County:** Buncombe	**Longitude:** -82.7673
Total Points: *Stream is at least intermittent if ≥ 19 or perennial if ≥ 30** 22.5	**Stream Determination (circle one)** Ephemeral (Intermittent) Perennial	**Other** *e.g. Quad Name*:

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

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

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

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

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

Notes:

Sketch:

NC SAM FIELD ASSESSMENT RESULTS
Accompanies User Manual Version 2.1

USACE AID #: NCDWR #:

INSTRUCTIONS: Attach a sketch of the assessment area and photographs. Attach a copy of the USGS 7.5-minute topographic quadrangle, and circle the location of the stream reach under evaluation. If multiple stream reaches will be evaluated on the same property, identify and number all reaches on the attached map, and include a separate form for each reach. See the NC SAM User Manual for detailed descriptions and explanations of requested information. Record in the "Notes/Sketch" section if supplementary measurements were performed. See the NC SAM User Manual for examples of additional measurements that may be relevant.

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

PROJECT/SITE INFORMATION:

1. Project name (if any): Morgan Branch Restoration Site
2. Date of evaluation: 1/24/2018
3. Applicant/owner name: KCI
4. Assessor name/organization: J. Sullivan / KCI
5. County: Buncombe
6. Nearest named water body on USGS 7.5-minute quad: Morgan Branch
7. River basin: French Broad
8. Site coordinates (decimal degrees, at lower end of assessment reach): 35.6084 / -82.7637

STREAM INFORMATION: (depth and width can be approximations)

9. Site number (show on attached map): Morgan Branch R-1
10. Length of assessment reach evaluated (feet): 50
11. Channel depth from bed (in riffle, if present) to top of bank (feet): 5 ☐Unable to assess channel depth.
12. Channel width at top of bank (feet): 8
13. Is assessment reach a swamp steam? ☐Yes ☐No
14. Feature type: ☒Perennial flow ☐Intermittent flow ☐Tidal Marsh Stream

STREAM CATEGORY INFORMATION:

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

ADDITIONAL INFORMATION:

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

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

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

2. Evidence of Flow Restriction – assessment reach metric

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

3. Feature Pattern – assessment reach metric

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

4. Feature Longitudinal Profile – assessment reach metric

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

5. Signs of Active Instability – assessment reach metric

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

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

6. Streamside Area Interaction – streamside area metric
Consider for the Left Bank (LB) and the Right Bank (RB).

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

7. Water Quality Stressors – assessment reach/intertidal zone metric
Check all that apply.

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

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

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

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

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

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

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

Check for Tidal Marsh Streams Only

- ☐F 5% oysters or other natural hard bottoms
- ☐G Submerged aquatic vegetation
- ☐H Low-tide refugia (pools)
- ☐I Sand bottom
- ☐J 5% vertical bank along the marsh
- ☐K Little or no habitat

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

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

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

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

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

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

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

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

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

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

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

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

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

LB	RB	
☐A	☐A	Little or no alteration to water storage capacity over a majority of the streamside area
☒B	☒B	Moderate alteration to water storage capacity over a majority of the streamside area
☐C	☐C	Severe alteration to water storage capacity over a majority of the streamside area (examples: ditches, fill, soil compaction, livestock disturbance, buildings, man-made levees, drainage pipes)

14. Streamside Area Water Storage – streamside area metric (skip for Size 1 streams, Tidal Marsh Streams, and B valley types)
Consider for the Left Bank (LB) and the Right Bank (RB) of the streamside area.

LB	RB	
☐A	☐A	Majority of streamside area with depressions able to pond water ≥ 6 inches deep
☐B	☐B	Majority of streamside area with depressions able to pond water 3 to 6 inches deep
☒C	☒C	Majority of streamside area with depressions able to pond water < 3 inches deep

15. Wetland Presence – streamside area metric (skip for Tidal Marsh Streams)
Consider for the Left Bank (LB) and the Right Bank (RB). Do not consider wetlands outside of the streamside area or within the normal wetted perimeter of assessment reach.

LB	RB	
☐Y	☐Y	Are wetlands present in the streamside area?
☒N	☒N	

16. Baseflow Contributors – assessment reach metric (skip for Size 4 streams and Tidal Marsh Streams)
Check all contributors within the assessment reach or within view of <u>and</u> draining to the assessment reach.

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

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

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

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

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

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

Vegetated		Wooded		
LB	RB	LB	RB	
☐A	☒A	☐A	☒A	≥ 100 feet wide or extends to the edge of the watershed
☐B	☐B	☐B	☐B	From 50 to < 100 feet wide
☐C	☐C	☐C	☐C	From 30 to < 50 feet wide
☒D	☐D	☐D	☐D	From 10 to < 30 feet wide
☐E	☐E	☒E	☐E	< 10 feet wide or no trees

20. Buffer Structure – streamside area metric (skip for Tidal Marsh Streams)
Consider for left bank (LB) and right bank (RB) for Metric 19 ("Vegetated" Buffer Width).

LB	RB	
☐A	☐A	Mature forest
☐B	☒B	Non-mature woody vegetation or modified vegetation structure
☒C	☐C	Herbaceous vegetation with or without a strip of trees < 10 feet wide
☐D	☐D	Maintained shrubs
☐E	☐E	Little or no vegetation

21. Buffer Stressors – streamside area metric (skip for Tidal Marsh Streams)
Check all appropriate boxes for left bank (LB) and right bank (RB). Indicate if listed stressor abuts stream (Abuts), does not abut but is within 30 feet of stream (< 30 feet), or is between 30 to 50 feet of stream (30-50 feet).
If none of the following stressors occurs on either bank, check here and skip to Metric 22: ☐

Abuts		< 30 feet		30-50 feet		
LB	RB	LB	RB	LB	RB	
☐A	☐A	☐A	☐A	☐A	☐A	Row crops
☐B	☐B	☐B	☐B	☐B	☐B	Maintained turf
☐C	☐C	☐C	☐C	☐C	☐C	Pasture (no livestock)/commercial horticulture
☒D	☐D	☐D	☐D	☐D	☐D	Pasture (active livestock use)

22. Stem Density – streamside area metric (skip for Tidal Marsh Streams)
Consider for left bank (LB) and right bank (RB) for Metric 19 ("Wooded" Buffer Width).

LB	RB	
☐A	☐A	Medium to high stem density
☐B	☒B	Low stem density
☒C	☐C	No wooded riparian buffer or predominantly herbaceous species or bare ground

23. Continuity of Vegetated Buffer – streamside area metric (skip for Tidal Marsh Streams)
Consider whether vegetated buffer is continuous along stream (parallel). Breaks are areas lacking vegetation > 10 feet wide.

LB	RB	
☒A	☒A	The total length of buffer breaks is < 25 percent.
☐B	☐B	The total length of buffer breaks is between 25 and 50 percent.
☐C	☐C	The total length of buffer breaks is > 50 percent.

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

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

25. Conductivity – assessment reach metric (skip for all Coastal Plain streams)
25a. ☐Yes ☒No Was conductivity measurement recorded?
If No, select one of the following reasons. ☐No Water ☐Other: _____

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

Notes/Sketch:
Cattle have access to the stream

Draft NC SAM Stream Rating Sheet
Accompanies User Manual Version 2.1

Stream Site Name	Morgan Branch Restoration Site	Date of Assessment	1/24/2018
Stream Category	Mb2	Assessor Name/Organization	J. Sullivan / KCI

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

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

NC SAM FIELD ASSESSMENT RESULTS
Accompanies User Manual Version 2.1

USACE AID #: NCDWR #:

INSTRUCTIONS: Attach a sketch of the assessment area and photographs. Attach a copy of the USGS 7.5-minute topographic quadrangle, and circle the location of the stream reach under evaluation. If multiple stream reaches will be evaluated on the same property, identify and number all reaches on the attached map, and include a separate form for each reach. See the NC SAM User Manual for detailed descriptions and explanations of requested information. Record in the "Notes/Sketch" section if supplementary measurements were performed. See the NC SAM User Manual for examples of additional measurements that may be relevant.

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

PROJECT/SITE INFORMATION:

1. Project name (if any): Morgan Branch Restoration Site
2. Date of evaluation: 1/24/2018
3. Applicant/owner name: KCI
4. Assessor name/organization: J. Sullivan / KCI
5. County: Buncombe
6. Nearest named water body on USGS 7.5-minute quad: Morgan Branch
7. River basin: French Broad
8. Site coordinates (decimal degrees, at lower end of assessment reach): 35.6097 / -82.7569

STREAM INFORMATION: (depth and width can be approximations)

9. Site number (show on attached map): MB R-2
10. Length of assessment reach evaluated (feet): 50
11. Channel depth from bed (in riffle, if present) to top of bank (feet): 3 ☐Unable to assess channel depth.
12. Channel width at top of bank (feet): 8
13. Is assessment reach a swamp steam? ☐Yes ☐No
14. Feature type: ☒Perennial flow ☐Intermittent flow ☐Tidal Marsh Stream

STREAM CATEGORY INFORMATION:

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

ADDITIONAL INFORMATION:

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

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

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

2. Evidence of Flow Restriction – assessment reach metric

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

3. Feature Pattern – assessment reach metric

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

4. Feature Longitudinal Profile – assessment reach metric

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

5. Signs of Active Instability – assessment reach metric

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

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

6. **Streamside Area Interaction – streamside area metric**
Consider for the Left Bank (LB) and the Right Bank (RB).

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

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

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

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

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

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

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

Check for Tidal Marsh Streams Only
- ☐F 5% oysters or other natural hard bottoms
- ☐G Submerged aquatic vegetation
- ☐H Low-tide refugia (pools)
- ☐I Sand bottom
- ☐J 5% vertical bank along the marsh
- ☐K Little or no habitat

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

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

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

11b. Bedform evaluated. **Check the appropriate box(es).**
- ☒A Riffle-run section **(evaluate 11c)**
- ☒B Pool-glide section **(evaluate 11d)**
- ☐C Natural bedform absent **(skip to Metric 12, Aquatic Life)**

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

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

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

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

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

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

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

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

LB	RB	
☒A	☐A	Little or no alteration to water storage capacity over a majority of the streamside area
☐B	☒B	Moderate alteration to water storage capacity over a majority of the streamside area
☐C	☐C	Severe alteration to water storage capacity over a majority of the streamside area (examples: ditches, fill, soil compaction, livestock disturbance, buildings, man-made levees, drainage pipes)

14. Streamside Area Water Storage – streamside area metric (skip for Size 1 streams, Tidal Marsh Streams, and B valley types)
Consider for the Left Bank (LB) and the Right Bank (RB) of the streamside area.

LB	RB	
☐A	☐A	Majority of streamside area with depressions able to pond water ≥ 6 inches deep
☐B	☐B	Majority of streamside area with depressions able to pond water 3 to 6 inches deep
☒C	☒C	Majority of streamside area with depressions able to pond water < 3 inches deep

15. Wetland Presence – streamside area metric (skip for Tidal Marsh Streams)
Consider for the Left Bank (LB) and the Right Bank (RB). Do not consider wetlands outside of the streamside area or within the normal wetted perimeter of assessment reach.

LB	RB	
☐Y	☐Y	Are wetlands present in the streamside area?
☒N	☒N	

16. Baseflow Contributors – assessment reach metric (skip for Size 4 streams and Tidal Marsh Streams)
Check all contributors within the assessment reach or within view of <u>and</u> draining to the assessment reach.

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

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

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

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

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

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

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

Vegetated		Wooded		
LB	RB	LB	RB	
☒A	☐A	☒A	☐A	≥ 100 feet wide or extends to the edge of the watershed
☐B	☐B	☐B	☐B	From 50 to < 100 feet wide
☐C	☐C	☐C	☐C	From 30 to < 50 feet wide
☐D	☒D	☐D	☒D	From 10 to < 30 feet wide
☐E	☐E	☐E	☐E	< 10 feet wide or no trees

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

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

LB	RB	
☒A	☒A	Mature forest
☐B	☐B	Non-mature woody vegetation or modified vegetation structure
☐C	☐C	Herbaceous vegetation with or without a strip of trees < 10 feet wide
☐D	☐D	Maintained shrubs
☐E	☐E	Little or no vegetation

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

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

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

Abuts		< 30 feet		30-50 feet		
LB	RB	LB	RB	LB	RB	
☐A	☐A	☐A	☐A	☐A	☐A	Row crops
☐B	☐B	☐B	☐B	☐B	☐B	Maintained turf
☐C	☐C	☐C	☐C	☐C	☐C	Pasture (no livestock)/commercial horticulture
☐D	☐D	☐D	☐D	☐D	☐D	Pasture (active livestock use)

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

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

LB	RB	
☐A	☐A	Medium to high stem density
☒B	☒B	Low stem density
☐C	☐C	No wooded riparian buffer or predominantly herbaceous species or bare ground

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

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

LB	RB	
☒A	☒A	The total length of buffer breaks is < 25 percent.
☐B	☐B	The total length of buffer breaks is between 25 and 50 percent.
☐C	☐C	The total length of buffer breaks is > 50 percent.

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

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

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

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

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

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

Notes/Sketch:
Cattle have access to the stream

Draft NC SAM Stream Rating Sheet
Accompanies User Manual Version 2.1

Stream Site Name	Morgan Branch Restoration Site	Date of Assessment	1/24/2018
Stream Category	Mb2	Assessor Name/Organization	J. Sullivan / KCI

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

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

NC SAM FIELD ASSESSMENT RESULTS
Accompanies User Manual Version 2.1

USACE AID #: NCDWR #:

INSTRUCTIONS: Attach a sketch of the assessment area and photographs. Attach a copy of the USGS 7.5-minute topographic quadrangle, and circle the location of the stream reach under evaluation. If multiple stream reaches will be evaluated on the same property, identify and number all reaches on the attached map, and include a separate form for each reach. See the NC SAM User Manual for detailed descriptions and explanations of requested information. Record in the "Notes/Sketch" section if supplementary measurements were performed. See the NC SAM User Manual for examples of additional measurements that may be relevant.

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

PROJECT/SITE INFORMATION:

1. Project name (if any): Morgan Branch Restoration Site
2. Date of evaluation: 1/24/2018
3. Applicant/owner name: KCI
4. Assessor name/organization: J. Sullivan / KCI
5. County: Buncombe
6. Nearest named water body on USGS 7.5-minute quad: Morgan Branch
7. River basin: French Broad
8. Site coordinates (decimal degrees, at lower end of assessment reach): 35.6097 / -82.7530

STREAM INFORMATION: (depth and width can be approximations)

9. Site number (show on attached map): MB R-3
10. Length of assessment reach evaluated (feet): 50
11. Channel depth from bed (in riffle, if present) to top of bank (feet): 3 ☐Unable to assess channel depth.
12. Channel width at top of bank (feet): 8
13. Is assessment reach a swamp steam? ☐Yes ☐No
14. Feature type: ☒Perennial flow ☐Intermittent flow ☐Tidal Marsh Stream

STREAM CATEGORY INFORMATION:

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

ADDITIONAL INFORMATION:

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

1. Channel Water – assessment reach metric (skip for Size 1 streams and Tidal Marsh Streams)
☒A Water throughout assessment reach.
☐B No flow, water in pools only.
☐C No water in assessment reach.

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

3. Feature Pattern – assessment reach metric
☐A A majority of the assessment reach has altered pattern (examples: straightening, modification above or below culvert).
☒B Not A

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

5. Signs of Active Instability – assessment reach metric
Consider only current instability, not past events from which the stream has currently recovered. Examples of instability include active bank failure, active channel down-cutting (head-cut), active widening, and artificial hardening (such as concrete, gabion, rip-rap).
☒A < 10% of channel unstable
☐B 10 to 25% of channel unstable
☐C > 25% of channel unstable

6. Streamside Area Interaction – streamside area metric
Consider for the Left Bank (LB) and the Right Bank (RB).

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

7. Water Quality Stressors – assessment reach/intertidal zone metric
Check all that apply.

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

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

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

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

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

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

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

Check for Tidal Marsh Streams Only

- ☐F 5% oysters or other natural hard bottoms
- ☐G Submerged aquatic vegetation
- ☐H Low-tide refugia (pools)
- ☐I Sand bottom
- ☐J 5% vertical bank along the marsh
- ☐K Little or no habitat

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

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

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

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

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

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

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

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

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

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

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

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

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

LB	RB	
☒A	☐A	Little or no alteration to water storage capacity over a majority of the streamside area
☐B	☒B	Moderate alteration to water storage capacity over a majority of the streamside area
☐C	☐C	Severe alteration to water storage capacity over a majority of the streamside area (examples: ditches, fill, soil compaction, livestock disturbance, buildings, man-made levees, drainage pipes)

14. Streamside Area Water Storage – streamside area metric (skip for Size 1 streams, Tidal Marsh Streams, and B valley types)
Consider for the Left Bank (LB) and the Right Bank (RB) of the streamside area.

LB	RB	
☐A	☐A	Majority of streamside area with depressions able to pond water ≥ 6 inches deep
☐B	☐B	Majority of streamside area with depressions able to pond water 3 to 6 inches deep
☒C	☒C	Majority of streamside area with depressions able to pond water < 3 inches deep

15. Wetland Presence – streamside area metric (skip for Tidal Marsh Streams)
Consider for the Left Bank (LB) and the Right Bank (RB). Do not consider wetlands outside of the streamside area or within the normal wetted perimeter of assessment reach.

LB	RB	
☐Y	☐Y	Are wetlands present in the streamside area?
☒N	☒N	

16. Baseflow Contributors – assessment reach metric (skip for Size 4 streams and Tidal Marsh Streams)
Check all contributors within the assessment reach or within view of <u>and</u> draining to the assessment reach.

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

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

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

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

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

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

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

Vegetated LB	Vegetated RB	Wooded LB	Wooded RB	
☐A	☐A	☒A	☐A	≥ 100 feet wide or extends to the edge of the watershed
☐B	☒B	☐B	☐B	From 50 to < 100 feet wide
☐C	☐C	☐C	☐C	From 30 to < 50 feet wide
☐D	☐D	☐D	☐D	From 10 to < 30 feet wide
☒E	☐E	☐E	☒E	< 10 feet wide or no trees

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

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

LB	RB	
☐A	☐A	Mature forest
☐B	☐B	Non-mature woody vegetation or modified vegetation structure
☒C	☒C	Herbaceous vegetation with or without a strip of trees < 10 feet wide
☐D	☐D	Maintained shrubs
☐E	☐E	Little or no vegetation

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

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

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

Abuts LB	Abuts RB	< 30 feet LB	< 30 feet RB	30-50 feet LB	30-50 feet RB	
☐A	☐A	☐A	☐A	☐A	☐A	Row crops
☐B	☐B	☐B	☐B	☐B	☐B	Maintained turf
☐C	☐C	☐C	☐C	☐C	☐C	Pasture (no livestock)/commercial horticulture
☐D	☐D	☐D	☐D	☐D	☐D	Pasture (active livestock use)

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

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

LB	RB	
☐A	☐A	Medium to high stem density
☐B	☐B	Low stem density
☒C	☒C	No wooded riparian buffer or predominantly herbaceous species or bare ground

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

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

LB	RB	
☒A	☒A	The total length of buffer breaks is < 25 percent.
☐B	☐B	The total length of buffer breaks is between 25 and 50 percent.
☐C	☐C	The total length of buffer breaks is > 50 percent.

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

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

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

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

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

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

Notes/Sketch:
Cattle have access to the stream

Draft NC SAM Stream Rating Sheet
Accompanies User Manual Version 2.1

Stream Site Name	Morgan Branch Restoration Site	Date of Assessment	1/24/2018
Stream Category	Ma2	Assessor Name/Organization	J. Sullivan / KCI

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

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

NC SAM FIELD ASSESSMENT RESULTS
Accompanies User Manual Version 2.1

USACE AID #: NCDWR #:

INSTRUCTIONS: Attach a sketch of the assessment area and photographs. Attach a copy of the USGS 7.5-minute topographic quadrangle, and circle the location of the stream reach under evaluation. If multiple stream reaches will be evaluated on the same property, identify and number all reaches on the attached map, and include a separate form for each reach. See the NC SAM User Manual for detailed descriptions and explanations of requested information. Record in the "Notes/Sketch" section if supplementary measurements were performed. See the NC SAM User Manual for examples of additional measurements that may be relevant.

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

PROJECT/SITE INFORMATION:

1. Project name (if any): Morgan Branch Restoration Site
2. Date of evaluation: 1/24/2018
3. Applicant/owner name: KCI
4. Assessor name/organization: J. Sullivan / KCI
5. County: Buncombe
6. Nearest named water body on USGS 7.5-minute quad: Morgan Branch
7. River basin: French Broad
8. Site coordinates (decimal degrees, at lower end of assessment reach): 35.6097 / -82.7500

STREAM INFORMATION: (depth and width can be approximations)

9. Site number (show on attached map): MB R-3
10. Length of assessment reach evaluated (feet): 50
11. Channel depth from bed (in riffle, if present) to top of bank (feet): 5 ☐Unable to assess channel depth.
12. Channel width at top of bank (feet): 8
13. Is assessment reach a swamp steam? ☐Yes ☐No
14. Feature type: ☒Perennial flow ☐Intermittent flow ☐Tidal Marsh Stream

STREAM CATEGORY INFORMATION:

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

ADDITIONAL INFORMATION:

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

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

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

2. Evidence of Flow Restriction – assessment reach metric

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

3. Feature Pattern – assessment reach metric

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

4. Feature Longitudinal Profile – assessment reach metric

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

5. Signs of Active Instability – assessment reach metric

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

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

6. Streamside Area Interaction – streamside area metric
Consider for the Left Bank (LB) and the Right Bank (RB).

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

7. Water Quality Stressors – assessment reach/intertidal zone metric
Check all that apply.

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

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

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

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

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

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

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

Check for Tidal Marsh Streams Only

- ☐F 5% oysters or other natural hard bottoms
- ☐G Submerged aquatic vegetation
- ☐H Low-tide refugia (pools)
- ☐I Sand bottom
- ☐J 5% vertical bank along the marsh
- ☐K Little or no habitat

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

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

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

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

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

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

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

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

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

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

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

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

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

LB	RB	
☐A	☐A	Little or no alteration to water storage capacity over a majority of the streamside area
☐B	☐B	Moderate alteration to water storage capacity over a majority of the streamside area
☒C	☒C	Severe alteration to water storage capacity over a majority of the streamside area (examples: ditches, fill, soil compaction, livestock disturbance, buildings, man-made levees, drainage pipes)

14. Streamside Area Water Storage – streamside area metric (skip for Size 1 streams, Tidal Marsh Streams, and B valley types)
Consider for the Left Bank (LB) and the Right Bank (RB) of the streamside area.

LB	RB	
☐A	☐A	Majority of streamside area with depressions able to pond water ≥ 6 inches deep
☐B	☐B	Majority of streamside area with depressions able to pond water 3 to 6 inches deep
☒C	☒C	Majority of streamside area with depressions able to pond water < 3 inches deep

15. Wetland Presence – streamside area metric (skip for Tidal Marsh Streams)
Consider for the Left Bank (LB) and the Right Bank (RB). Do not consider wetlands outside of the streamside area or within the normal wetted perimeter of assessment reach.

LB	RB	
☐Y	☐Y	Are wetlands present in the streamside area?
☒N	☒N	

16. Baseflow Contributors – assessment reach metric (skip for Size 4 streams and Tidal Marsh Streams)
Check all contributors within the assessment reach or within view of <u>and</u> draining to the assessment reach.

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

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

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

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

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

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

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

Vegetated LB	Vegetated RB	Wooded LB	Wooded RB	
☐A	☐A	☐A	☐A	≥ 100 feet wide or extends to the edge of the watershed
☐B	☒B	☐B	☐B	From 50 to < 100 feet wide
☒C	☐C	☐C	☐C	From 30 to < 50 feet wide
☐D	☐D	☐D	☐D	From 10 to < 30 feet wide
☐E	☐E	☒E	☒E	< 10 feet wide or no trees

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

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

LB	RB	
☐A	☐A	Mature forest
☐B	☐B	Non-mature woody vegetation or modified vegetation structure
☒C	☒C	Herbaceous vegetation with or without a strip of trees < 10 feet wide
☐D	☐D	Maintained shrubs
☐E	☐E	Little or no vegetation

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

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

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

Abuts LB	Abuts RB	< 30 feet LB	< 30 feet RB	30-50 feet LB	30-50 feet RB	
☐A	☐A	☐A	☐A	☐A	☐A	Row crops
☐B	☐B	☐B	☐B	☐B	☐B	Maintained turf
☐C	☐C	☐C	☐C	☐C	☐C	Pasture (no livestock)/commercial horticulture
☒D	☒D	☐D	☐D	☐D	☐D	Pasture (active livestock use)

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

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

LB	RB	
☐A	☐A	Medium to high stem density
☐B	☐B	Low stem density
☒C	☒C	No wooded riparian buffer or predominantly herbaceous species or bare ground

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

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

LB	RB	
☒A	☒A	The total length of buffer breaks is < 25 percent.
☐B	☐B	The total length of buffer breaks is between 25 and 50 percent.
☐C	☐C	The total length of buffer breaks is > 50 percent.

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

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

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

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

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

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

Notes/Sketch:
Cattle have access to the stream

Draft NC SAM Stream Rating Sheet
Accompanies User Manual Version 2.1

Stream Site Name	Morgan Branch Restoration Site	Date of Assessment	1/24/2018
Stream Category	Ma3	Assessor Name/Organization	J. Sullivan / KCI

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

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

NC SAM FIELD ASSESSMENT RESULTS
Accompanies User Manual Version 2.1

USACE AID #: NCDWR #:

INSTRUCTIONS: Attach a sketch of the assessment area and photographs. Attach a copy of the USGS 7.5-minute topographic quadrangle, and circle the location of the stream reach under evaluation. If multiple stream reaches will be evaluated on the same property, identify and number all reaches on the attached map, and include a separate form for each reach. See the NC SAM User Manual for detailed descriptions and explanations of requested information. Record in the "Notes/Sketch" section if supplementary measurements were performed. See the NC SAM User Manual for examples of additional measurements that may be relevant.

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

PROJECT/SITE INFORMATION:

1. Project name (if any): Morgan Branch Restoration Site
2. Date of evaluation: 1/24/2018
3. Applicant/owner name: KCI
4. Assessor name/organization: J. Sullivan / KCI
5. County: Buncombe
6. Nearest named water body on USGS 7.5-minute quad: Morgan Branch
7. River basin: French Broad
8. Site coordinates (decimal degrees, at lower end of assessment reach): 35.6049 / -82.7565

STREAM INFORMATION: (depth and width can be approximations)

9. Site number (show on attached map): T1A
10. Length of assessment reach evaluated (feet): 50
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): 1
13. Is assessment reach a swamp steam? ☐Yes ☐No
14. Feature type: ☐Perennial flow ☒Intermittent flow ☐Tidal Marsh Stream

STREAM CATEGORY INFORMATION:

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

ADDITIONAL INFORMATION:

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

1. Channel Water – assessment reach metric (skip for Size 1 streams and Tidal Marsh Streams)
☐A Water throughout assessment reach.
☒B No flow, water in pools only.
☐C No water in assessment reach.

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

3. Feature Pattern – assessment reach metric
☐A A majority of the assessment reach has altered pattern (examples: straightening, modification above or below culvert).
☒B Not A

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

5. Signs of Active Instability – assessment reach metric
Consider only current instability, not past events from which the stream has currently recovered. Examples of instability include active bank failure, active channel down-cutting (head-cut), active widening, and artificial hardening (such as concrete, gabion, rip-rap).
☒A < 10% of channel unstable
☐B 10 to 25% of channel unstable
☐C > 25% of channel unstable

6. Streamside Area Interaction – streamside area metric
Consider for the Left Bank (LB) and the Right Bank (RB).

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

7. Water Quality Stressors – assessment reach/intertidal zone metric
Check all that apply.

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

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

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

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

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

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

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

Check for Tidal Marsh Streams Only

- ☐F 5% oysters or other natural hard bottoms
- ☐G Submerged aquatic vegetation
- ☐H Low-tide refugia (pools)
- ☐I Sand bottom
- ☐J 5% vertical bank along the marsh
- ☐K Little or no habitat

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

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

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

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

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

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

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

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

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

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

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

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

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

LB	RB	
☐A	☒A	Little or no alteration to water storage capacity over a majority of the streamside area
☒B	☐B	Moderate alteration to water storage capacity over a majority of the streamside area
☐C	☐C	Severe alteration to water storage capacity over a majority of the streamside area (examples: ditches, fill, soil compaction, livestock disturbance, buildings, man-made levees, drainage pipes)

14. Streamside Area Water Storage – streamside area metric (skip for Size 1 streams, Tidal Marsh Streams, and B valley types)
Consider for the Left Bank (LB) and the Right Bank (RB) of the streamside area.

LB	RB	
☐A	☐A	Majority of streamside area with depressions able to pond water ≥ 6 inches deep
☐B	☐B	Majority of streamside area with depressions able to pond water 3 to 6 inches deep
☒C	☒C	Majority of streamside area with depressions able to pond water < 3 inches deep

15. Wetland Presence – streamside area metric (skip for Tidal Marsh Streams)
Consider for the Left Bank (LB) and the Right Bank (RB). Do not consider wetlands outside of the streamside area or within the normal wetted perimeter of assessment reach.

LB	RB	
☐Y	☐Y	Are wetlands present in the streamside area?
☒N	☒N	

16. Baseflow Contributors – assessment reach metric (skip for Size 4 streams and Tidal Marsh Streams)
Check all contributors within the assessment reach or within view of <u>and</u> draining to the assessment reach.

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

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

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

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

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

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

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

Vegetated LB	Vegetated RB	Wooded LB	Wooded RB	
☒A	☒A	☐A	☒A	≥ 100 feet wide or extends to the edge of the watershed
☐B	☐B	☐B	☐B	From 50 to < 100 feet wide
☐C	☐C	☐C	☐C	From 30 to < 50 feet wide
☐D	☐D	☒D	☐D	From 10 to < 30 feet wide
☐E	☐E	☐E	☐E	< 10 feet wide or no trees

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

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

LB	RB	
☐A	☐A	Mature forest
☒B	☒B	Non-mature woody vegetation or modified vegetation structure
☐C	☐C	Herbaceous vegetation with or without a strip of trees < 10 feet wide
☐D	☐D	Maintained shrubs
☐E	☐E	Little or no vegetation

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

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

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

Abuts LB	Abuts RB	< 30 feet LB	< 30 feet RB	30-50 feet LB	30-50 feet RB	
☐A	☐A	☐A	☐A	☐A	☐A	Row crops
☐B	☐B	☐B	☐B	☐B	☐B	Maintained turf
☐C	☐C	☐C	☐C	☐C	☐C	Pasture (no livestock)/commercial horticulture
☒D	☐D	☐D	☐D	☐D	☒D	Pasture (active livestock use)

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

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

LB	RB	
☐A	☒A	Medium to high stem density
☐B	☐B	Low stem density
☒C	☐C	No wooded riparian buffer or predominantly herbaceous species or bare ground

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

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

LB	RB	
☐A	☐A	The total length of buffer breaks is < 25 percent.
☒B	☒B	The total length of buffer breaks is between 25 and 50 percent.
☐C	☐C	The total length of buffer breaks is > 50 percent.

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

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

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

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

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

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

Notes/Sketch:
Cattle have access to the stream

Draft NC SAM Stream Rating Sheet
Accompanies User Manual Version 2.1

Stream Site Name	Morgan Branch Restoration Site	Date of Assessment	1/24/2018
Stream Category	Mb1	Assessor Name/Organization	J. Sullivan / KCI

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

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

NC SAM FIELD ASSESSMENT RESULTS
Accompanies User Manual Version 2.1

USACE AID #: NCDWR #:

INSTRUCTIONS: Attach a sketch of the assessment area and photographs. Attach a copy of the USGS 7.5-minute topographic quadrangle, and circle the location of the stream reach under evaluation. If multiple stream reaches will be evaluated on the same property, identify and number all reaches on the attached map, and include a separate form for each reach. See the NC SAM User Manual for detailed descriptions and explanations of requested information. Record in the "Notes/Sketch" section if supplementary measurements were performed. See the NC SAM User Manual for examples of additional measurements that may be relevant.

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

PROJECT/SITE INFORMATION:

1. Project name (if any): Morgan Branch Restoration Site
2. Date of evaluation: 1/24/2018
3. Applicant/owner name: KCI
4. Assessor name/organization: J. Sullivan / KCI
5. County: Buncombe
6. Nearest named water body on USGS 7.5-minute quad: Morgan Branch
7. River basin: French Broad
8. Site coordinates (decimal degrees, at lower end of assessment reach): 35.6047 / -82.7564

STREAM INFORMATION: (depth and width can be approximations)

9. Site number (show on attached map): T1-R1
10. Length of assessment reach evaluated (feet): 50
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): 3.5
13. Is assessment reach a swamp steam? ☐Yes ☐No
14. Feature type: ☒Perennial flow ☐Intermittent flow ☐Tidal Marsh Stream

STREAM CATEGORY INFORMATION:

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

ADDITIONAL INFORMATION:

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

1. Channel Water – assessment reach metric (skip for Size 1 streams and Tidal Marsh Streams)
☒A Water throughout assessment reach.
☐B No flow, water in pools only.
☐C No water in assessment reach.

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

3. Feature Pattern – assessment reach metric
☐A A majority of the assessment reach has altered pattern (examples: straightening, modification above or below culvert).
☒B Not A

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

5. Signs of Active Instability – assessment reach metric
Consider only current instability, not past events from which the stream has currently recovered. Examples of instability include active bank failure, active channel down-cutting (head-cut), active widening, and artificial hardening (such as concrete, gabion, rip-rap).
☒A < 10% of channel unstable
☐B 10 to 25% of channel unstable
☐C > 25% of channel unstable

6. Streamside Area Interaction – streamside area metric
Consider for the Left Bank (LB) and the Right Bank (RB).

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

7. Water Quality Stressors – assessment reach/intertidal zone metric
Check all that apply.

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

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

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

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

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

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

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

Check for Tidal Marsh Streams Only

- ☐F 5% oysters or other natural hard bottoms
- ☐G Submerged aquatic vegetation
- ☐H Low-tide refugia (pools)
- ☐I Sand bottom
- ☐J 5% vertical bank along the marsh
- ☐K Little or no habitat

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

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

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

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

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

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

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

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

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

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

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

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

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

LB	RB	
☒A	☐A	Little or no alteration to water storage capacity over a majority of the streamside area
☐B	☒B	Moderate alteration to water storage capacity over a majority of the streamside area
☐C	☐C	Severe alteration to water storage capacity over a majority of the streamside area (examples: ditches, fill, soil compaction, livestock disturbance, buildings, man-made levees, drainage pipes)

14. Streamside Area Water Storage – streamside area metric (skip for Size 1 streams, Tidal Marsh Streams, and B valley types)
Consider for the Left Bank (LB) and the Right Bank (RB) of the streamside area.

LB	RB	
☐A	☐A	Majority of streamside area with depressions able to pond water ≥ 6 inches deep
☐B	☐B	Majority of streamside area with depressions able to pond water 3 to 6 inches deep
☒C	☒C	Majority of streamside area with depressions able to pond water < 3 inches deep

15. Wetland Presence – streamside area metric (skip for Tidal Marsh Streams)
Consider for the Left Bank (LB) and the Right Bank (RB). Do not consider wetlands outside of the streamside area or within the normal wetted perimeter of assessment reach.

LB	RB	
☐Y	☐Y	Are wetlands present in the streamside area?
☒N	☒N	

16. Baseflow Contributors – assessment reach metric (skip for Size 4 streams and Tidal Marsh Streams)
Check all contributors within the assessment reach or within view of <u>and</u> draining to the assessment reach.

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

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

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

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

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

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

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

Vegetated LB	Vegetated RB	Wooded LB	Wooded RB	
☒A	☒A	☐A	☐A	≥ 100 feet wide or extends to the edge of the watershed
☐B	☐B	☒B	☐B	From 50 to < 100 feet wide
☐C	☐C	☐C	☒C	From 30 to < 50 feet wide
☐D	☐D	☐D	☐D	From 10 to < 30 feet wide
☐E	☐E	☐E	☐E	< 10 feet wide or no trees

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

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

LB	RB	
☐A	☐A	Mature forest
☒B	☒B	Non-mature woody vegetation or modified vegetation structure
☐C	☐C	Herbaceous vegetation with or without a strip of trees < 10 feet wide
☐D	☐D	Maintained shrubs
☐E	☐E	Little or no vegetation

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

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

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

Abuts LB	Abuts RB	< 30 feet LB	< 30 feet RB	30-50 feet LB	30-50 feet RB	
☐A	☐A	☐A	☐A	☐A	☐A	Row crops
☐B	☐B	☐B	☐B	☐B	☐B	Maintained turf
☐C	☐C	☐C	☐C	☐C	☐C	Pasture (no livestock)/commercial horticulture
☐D	☐D	☐D	☐D	☒D	☒D	Pasture (active livestock use)

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

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

LB	RB	
☐A	☐A	Medium to high stem density
☐B	☐B	Low stem density
☒C	☒C	No wooded riparian buffer or predominantly herbaceous species or bare ground

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

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

LB	RB	
☒A	☒A	The total length of buffer breaks is < 25 percent.
☐B	☐B	The total length of buffer breaks is between 25 and 50 percent.
☐C	☐C	The total length of buffer breaks is > 50 percent.

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

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

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

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

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

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

Notes/Sketch:
Cattle have access to the stream

Draft NC SAM Stream Rating Sheet
Accompanies User Manual Version 2.1

Stream Site Name	Morgan Branch Restoration Site	Date of Assessment	1/24/2018
Stream Category	Mb1	Assessor Name/Organization	J. Sullivan / KCI

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

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

NC SAM FIELD ASSESSMENT RESULTS
Accompanies User Manual Version 2.1

USACE AID #: NCDWR #:

INSTRUCTIONS: Attach a sketch of the assessment area and photographs. Attach a copy of the USGS 7.5-minute topographic quadrangle, and circle the location of the stream reach under evaluation. If multiple stream reaches will be evaluated on the same property, identify and number all reaches on the attached map, and include a separate form for each reach. See the NC SAM User Manual for detailed descriptions and explanations of requested information. Record in the "Notes/Sketch" section if supplementary measurements were performed. See the NC SAM User Manual for examples of additional measurements that may be relevant.

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

PROJECT/SITE INFORMATION:

1. Project name (if any): Morgan Branch Restoration Site
2. Date of evaluation: 1/24/2018
3. Applicant/owner name: KCI
4. Assessor name/organization: J. Sullivan / KCI
5. County: Buncombe
6. Nearest named water body on USGS 7.5-minute quad: Morgan Branch
7. River basin: French Broad
8. Site coordinates (decimal degrees, at lower end of assessment reach): 35.6056 / -82.7554

STREAM INFORMATION: (depth and width can be approximations)

9. Site number (show on attached map): T1-R2, T2-R1
10. Length of assessment reach evaluated (feet): 50
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): 3.5
13. Is assessment reach a swamp steam? ☐Yes ☐No
14. Feature type: ☒Perennial flow ☐Intermittent flow ☐Tidal Marsh Stream

STREAM CATEGORY INFORMATION:

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

ADDITIONAL INFORMATION:

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

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

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

2. Evidence of Flow Restriction – assessment reach metric

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

3. Feature Pattern – assessment reach metric

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

4. Feature Longitudinal Profile – assessment reach metric

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

5. Signs of Active Instability – assessment reach metric

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

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

6. Streamside Area Interaction – streamside area metric
Consider for the Left Bank (LB) and the Right Bank (RB).

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

7. Water Quality Stressors – assessment reach/intertidal zone metric
Check all that apply.

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

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

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

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

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

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

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

Check for Tidal Marsh Streams Only

- ☐F 5% oysters or other natural hard bottoms
- ☐G Submerged aquatic vegetation
- ☐H Low-tide refugia (pools)
- ☐I Sand bottom
- ☐J 5% vertical bank along the marsh
- ☐K Little or no habitat

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

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

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

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

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

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

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

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

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

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

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

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

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

LB	RB	
☐A	☐A	Little or no alteration to water storage capacity over a majority of the streamside area
☒B	☒B	Moderate alteration to water storage capacity over a majority of the streamside area
☐C	☐C	Severe alteration to water storage capacity over a majority of the streamside area (examples: ditches, fill, soil compaction, livestock disturbance, buildings, man-made levees, drainage pipes)

14. Streamside Area Water Storage – streamside area metric (skip for Size 1 streams, Tidal Marsh Streams, and B valley types)
Consider for the Left Bank (LB) and the Right Bank (RB) of the streamside area.

LB	RB	
☐A	☐A	Majority of streamside area with depressions able to pond water ≥ 6 inches deep
☐B	☐B	Majority of streamside area with depressions able to pond water 3 to 6 inches deep
☒C	☒C	Majority of streamside area with depressions able to pond water < 3 inches deep

15. Wetland Presence – streamside area metric (skip for Tidal Marsh Streams)
Consider for the Left Bank (LB) and the Right Bank (RB). Do not consider wetlands outside of the streamside area or within the normal wetted perimeter of assessment reach.

LB	RB	
☐Y	☐Y	Are wetlands present in the streamside area?
☒N	☒N	

16. Baseflow Contributors – assessment reach metric (skip for Size 4 streams and Tidal Marsh Streams)
Check all contributors within the assessment reach or within view of <u>and</u> draining to the assessment reach.

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

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

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

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

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

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

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

Vegetated LB	Vegetated RB	Wooded LB	Wooded RB	
☒A	☒A	☐A	☐A	≥ 100 feet wide or extends to the edge of the watershed
☐B	☐B	☐B	☐B	From 50 to < 100 feet wide
☐C	☐C	☐C	☐C	From 30 to < 50 feet wide
☐D	☐D	☐D	☐D	From 10 to < 30 feet wide
☐E	☐E	☒E	☒E	< 10 feet wide or no trees

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

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

LB	RB	
☐A	☐A	Mature forest
☐B	☐B	Non-mature woody vegetation or modified vegetation structure
☒C	☒C	Herbaceous vegetation with or without a strip of trees < 10 feet wide
☐D	☐D	Maintained shrubs
☐E	☐E	Little or no vegetation

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

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

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

Abuts LB	Abuts RB	< 30 feet LB	< 30 feet RB	30-50 feet LB	30-50 feet RB	
☐A	☐A	☐A	☐A	☐A	☐A	Row crops
☐B	☐B	☐B	☐B	☐B	☐B	Maintained turf
☐C	☐C	☐C	☐C	☐C	☐C	Pasture (no livestock)/commercial horticulture
☐D	☐D	☐D	☐D	☒D	☒D	Pasture (active livestock use)

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

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

LB	RB	
☐A	☐A	Medium to high stem density
☐B	☐B	Low stem density
☒C	☒C	No wooded riparian buffer or predominantly herbaceous species or bare ground

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

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

LB	RB	
☒A	☒A	The total length of buffer breaks is < 25 percent.
☐B	☐B	The total length of buffer breaks is between 25 and 50 percent.
☐C	☐C	The total length of buffer breaks is > 50 percent.

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

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

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

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

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

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

Notes/Sketch:
Cattle have access to the stream

Draft NC SAM Stream Rating Sheet
Accompanies User Manual Version 2.1

Stream Site Name	Morgan Branch Restoration Site	Date of Assessment	1/24/2018
Stream Category	Mb1	Assessor Name/Organization	J. Sullivan / KCI

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

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

NC SAM FIELD ASSESSMENT RESULTS
Accompanies User Manual Version 2.1

USACE AID #: NCDWR #:

INSTRUCTIONS: Attach a sketch of the assessment area and photographs. Attach a copy of the USGS 7.5-minute topographic quadrangle, and circle the location of the stream reach under evaluation. If multiple stream reaches will be evaluated on the same property, identify and number all reaches on the attached map, and include a separate form for each reach. See the NC SAM User Manual for detailed descriptions and explanations of requested information. Record in the "Notes/Sketch" section if supplementary measurements were performed. See the NC SAM User Manual for examples of additional measurements that may be relevant.

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

PROJECT/SITE INFORMATION:

1. Project name (if any): Morgan Branch Restoration Site
2. Date of evaluation: 1/24/2018
3. Applicant/owner name: KCI
4. Assessor name/organization: J. Sullivan / KCI
5. County: Buncombe
6. Nearest named water body on USGS 7.5-minute quad: Morgan Branch
7. River basin: French Broad
8. Site coordinates (decimal degrees, at lower end of assessment reach): 35.6075 / -82.7539

STREAM INFORMATION: (depth and width can be approximations)

9. Site number (show on attached map): T1-R3
10. Length of assessment reach evaluated (feet): 50
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): 3.5
13. Is assessment reach a swamp steam? ☐Yes ☐No
14. Feature type: ☒Perennial flow ☐Intermittent flow ☐Tidal Marsh Stream

STREAM CATEGORY INFORMATION:

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

ADDITIONAL INFORMATION:

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

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

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

2. Evidence of Flow Restriction – assessment reach metric

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

3. Feature Pattern – assessment reach metric

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

4. Feature Longitudinal Profile – assessment reach metric

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

5. Signs of Active Instability – assessment reach metric

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

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

6. Streamside Area Interaction – streamside area metric
Consider for the Left Bank (LB) and the Right Bank (RB).

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

7. Water Quality Stressors – assessment reach/intertidal zone metric
Check all that apply.

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

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

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

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

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

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

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

Check for Tidal Marsh Streams Only

- ☐F 5% oysters or other natural hard bottoms
- ☐G Submerged aquatic vegetation
- ☐H Low-tide refugia (pools)
- ☐I Sand bottom
- ☐J 5% vertical bank along the marsh
- ☐K Little or no habitat

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

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

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

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

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

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

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

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

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

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

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

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

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

LB	RB	
☒A	☐A	Little or no alteration to water storage capacity over a majority of the streamside area
☐B	☒B	Moderate alteration to water storage capacity over a majority of the streamside area
☐C	☐C	Severe alteration to water storage capacity over a majority of the streamside area (examples: ditches, fill, soil compaction, livestock disturbance, buildings, man-made levees, drainage pipes)

14. Streamside Area Water Storage – streamside area metric (skip for Size 1 streams, Tidal Marsh Streams, and B valley types)
Consider for the Left Bank (LB) and the Right Bank (RB) of the streamside area.

LB	RB	
☐A	☐A	Majority of streamside area with depressions able to pond water ≥ 6 inches deep
☐B	☐B	Majority of streamside area with depressions able to pond water 3 to 6 inches deep
☒C	☒C	Majority of streamside area with depressions able to pond water < 3 inches deep

15. Wetland Presence – streamside area metric (skip for Tidal Marsh Streams)
Consider for the Left Bank (LB) and the Right Bank (RB). Do not consider wetlands outside of the streamside area or within the normal wetted perimeter of assessment reach.

LB	RB	
☐Y	☐Y	Are wetlands present in the streamside area?
☒N	☒N	

16. Baseflow Contributors – assessment reach metric (skip for Size 4 streams and Tidal Marsh Streams)
Check all contributors within the assessment reach or within view of <u>and</u> draining to the assessment reach.

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

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

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

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

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

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

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

Vegetated LB	Vegetated RB	Wooded LB	Wooded RB	
☒A	☒A	☐A	☐A	≥ 100 feet wide or extends to the edge of the watershed
☐B	☐B	☒B	☐B	From 50 to < 100 feet wide
☐C	☐C	☐C	☒C	From 30 to < 50 feet wide
☐D	☐D	☐D	☐D	From 10 to < 30 feet wide
☐E	☐E	☐E	☐E	< 10 feet wide or no trees

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

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

LB	RB	
☐A	☐A	Mature forest
☒B	☒B	Non-mature woody vegetation or modified vegetation structure
☐C	☐C	Herbaceous vegetation with or without a strip of trees < 10 feet wide
☐D	☐D	Maintained shrubs
☐E	☐E	Little or no vegetation

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

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

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

Abuts LB	Abuts RB	< 30 feet LB	< 30 feet RB	30-50 feet LB	30-50 feet RB	
☐A	☐A	☐A	☐A	☐A	☐A	Row crops
☐B	☐B	☐B	☐B	☐B	☐B	Maintained turf
☐C	☐C	☐C	☐C	☐C	☐C	Pasture (no livestock)/commercial horticulture
☐D	☐D	☐D	☐D	☒D	☒D	Pasture (active livestock use)

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

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

LB	RB	
☐A	☐A	Medium to high stem density
☐B	☐B	Low stem density
☒C	☒C	No wooded riparian buffer or predominantly herbaceous species or bare ground

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

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

LB	RB	
☒A	☒A	The total length of buffer breaks is < 25 percent.
☐B	☐B	The total length of buffer breaks is between 25 and 50 percent.
☐C	☐C	The total length of buffer breaks is > 50 percent.

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

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

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

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

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

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

Notes/Sketch:
Cattle have access to the stream

Draft NC SAM Stream Rating Sheet
Accompanies User Manual Version 2.1

Stream Site Name	Morgan Branch Restoration Site	Date of Assessment	1/24/2018
Stream Category	Mb2	Assessor Name/Organization	J. Sullivan / KCI

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

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

NC SAM FIELD ASSESSMENT RESULTS
Accompanies User Manual Version 2.1

USACE AID #: NCDWR #:

INSTRUCTIONS: Attach a sketch of the assessment area and photographs. Attach a copy of the USGS 7.5-minute topographic quadrangle, and circle the location of the stream reach under evaluation. If multiple stream reaches will be evaluated on the same property, identify and number all reaches on the attached map, and include a separate form for each reach. See the NC SAM User Manual for detailed descriptions and explanations of requested information. Record in the "Notes/Sketch" section if supplementary measurements were performed. See the NC SAM User Manual for examples of additional measurements that may be relevant.

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

PROJECT/SITE INFORMATION:

1. Project name (if any): Morgan Branch Restoration Site
2. Date of evaluation: 1/24/2018
3. Applicant/owner name: KCI
4. Assessor name/organization: J. Sullivan / KCI
5. County: Buncombe
6. Nearest named water body on USGS 7.5-minute quad: Morgan Branch
7. River basin: French Broad
8. Site coordinates (decimal degrees, at lower end of assessment reach): 35.6087 / -82.7500

STREAM INFORMATION: (depth and width can be approximations)

9. Site number (show on attached map): T1-R3
10. Length of assessment reach evaluated (feet): 50
11. Channel depth from bed (in riffle, if present) to top of bank (feet): 4 ☐Unable to assess channel depth.
12. Channel width at top of bank (feet): 4
13. Is assessment reach a swamp steam? ☐Yes ☐No
14. Feature type: ☒Perennial flow ☐Intermittent flow ☐Tidal Marsh Stream

STREAM CATEGORY INFORMATION:

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

ADDITIONAL INFORMATION:

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

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

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

2. Evidence of Flow Restriction – assessment reach metric

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

3. Feature Pattern – assessment reach metric

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

4. Feature Longitudinal Profile – assessment reach metric

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

5. Signs of Active Instability – assessment reach metric

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

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

6. Streamside Area Interaction – streamside area metric
Consider for the Left Bank (LB) and the Right Bank (RB).

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

7. Water Quality Stressors – assessment reach/intertidal zone metric
Check all that apply.

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

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

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

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

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

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

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

Check for Tidal Marsh Streams Only

- ☐F 5% oysters or other natural hard bottoms
- ☐G Submerged aquatic vegetation
- ☐H Low-tide refugia (pools)
- ☐I Sand bottom
- ☐J 5% vertical bank along the marsh
- ☐K Little or no habitat

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

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

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

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

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

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

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

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

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

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

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

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

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

LB	RB	
☐A	☐A	Little or no alteration to water storage capacity over a majority of the streamside area
☒B	☒B	Moderate alteration to water storage capacity over a majority of the streamside area
☐C	☐C	Severe alteration to water storage capacity over a majority of the streamside area (examples: ditches, fill, soil compaction, livestock disturbance, buildings, man-made levees, drainage pipes)

14. Streamside Area Water Storage – streamside area metric (skip for Size 1 streams, Tidal Marsh Streams, and B valley types)
Consider for the Left Bank (LB) and the Right Bank (RB) of the streamside area.

LB	RB	
☐A	☐A	Majority of streamside area with depressions able to pond water ≥ 6 inches deep
☐B	☐B	Majority of streamside area with depressions able to pond water 3 to 6 inches deep
☒C	☒C	Majority of streamside area with depressions able to pond water < 3 inches deep

15. Wetland Presence – streamside area metric (skip for Tidal Marsh Streams)
Consider for the Left Bank (LB) and the Right Bank (RB). Do not consider wetlands outside of the streamside area or within the normal wetted perimeter of assessment reach.

LB	RB	
☐Y	☐Y	Are wetlands present in the streamside area?
☒N	☒N	

16. Baseflow Contributors – assessment reach metric (skip for Size 4 streams and Tidal Marsh Streams)
Check all contributors within the assessment reach or within view of <u>and</u> draining to the assessment reach.

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

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

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

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

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

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

Vegetated		Wooded		
LB	RB	LB	RB	
☒A	☒A	☐A	☐A	≥ 100 feet wide or extends to the edge of the watershed
☐B	☐B	☐B	☐B	From 50 to < 100 feet wide
☐C	☐C	☐C	☐C	From 30 to < 50 feet wide
☐D	☐D	☐D	☐D	From 10 to < 30 feet wide
☐E	☐E	☒E	☒E	< 10 feet wide or no trees

20. Buffer Structure – streamside area metric (skip for Tidal Marsh Streams)
Consider for left bank (LB) and right bank (RB) for Metric 19 ("Vegetated" Buffer Width).

LB	RB	
☐A	☐A	Mature forest
☐B	☐B	Non-mature woody vegetation or modified vegetation structure
☒C	☒C	Herbaceous vegetation with or without a strip of trees < 10 feet wide
☐D	☐D	Maintained shrubs
☐E	☐E	Little or no vegetation

21. Buffer Stressors – streamside area metric (skip for Tidal Marsh Streams)
Check all appropriate boxes for left bank (LB) and right bank (RB). Indicate if listed stressor abuts stream (Abuts), does not abut but is within 30 feet of stream (< 30 feet), or is between 30 to 50 feet of stream (30-50 feet).
If none of the following stressors occurs on either bank, check here and skip to Metric 22: ☐

Abuts		< 30 feet		30-50 feet		
LB	RB	LB	RB	LB	RB	
☐A	☐A	☐A	☐A	☐A	☐A	Row crops
☐B	☐B	☐B	☐B	☐B	☐B	Maintained turf
☐C	☒C	☐C	☐C	☐C	☐C	Pasture (no livestock)/commercial horticulture
☒D	☐D	☐D	☐D	☐D	☐D	Pasture (active livestock use)

22. Stem Density – streamside area metric (skip for Tidal Marsh Streams)
Consider for left bank (LB) and right bank (RB) for Metric 19 ("Wooded" Buffer Width).

LB	RB	
☐A	☐A	Medium to high stem density
☐B	☐B	Low stem density
☒C	☒C	No wooded riparian buffer or predominantly herbaceous species or bare ground

23. Continuity of Vegetated Buffer – streamside area metric (skip for Tidal Marsh Streams)
Consider whether vegetated buffer is continuous along stream (parallel). Breaks are areas lacking vegetation > 10 feet wide.

LB	RB	
☒A	☒A	The total length of buffer breaks is < 25 percent.
☐B	☐B	The total length of buffer breaks is between 25 and 50 percent.
☐C	☐C	The total length of buffer breaks is > 50 percent.

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

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

25. Conductivity – assessment reach metric (skip for all Coastal Plain streams)
25a. ☐Yes ☒No Was conductivity measurement recorded?
If No, select one of the following reasons. ☐No Water ☐Other: _____

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

Notes/Sketch:
Cattle have access to the stream

Draft NC SAM Stream Rating Sheet
Accompanies User Manual Version 2.1

Stream Site Name	Morgan Branch Restoration Site	Date of Assessment	1/24/2018
Stream Category	Ma2	Assessor Name/Organization	J. Sullivan / KCI

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

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

NC SAM FIELD ASSESSMENT RESULTS
Accompanies User Manual Version 2.1

USACE AID #: NCDWR #:

INSTRUCTIONS: Attach a sketch of the assessment area and photographs. Attach a copy of the USGS 7.5-minute topographic quadrangle, and circle the location of the stream reach under evaluation. If multiple stream reaches will be evaluated on the same property, identify and number all reaches on the attached map, and include a separate form for each reach. See the NC SAM User Manual for detailed descriptions and explanations of requested information. Record in the "Notes/Sketch" section if supplementary measurements were performed. See the NC SAM User Manual for examples of additional measurements that may be relevant.

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

PROJECT/SITE INFORMATION:

1. Project name (if any): Morgan Branch Restoration Site
2. Date of evaluation: 1/24/2018
3. Applicant/owner name: KCI
4. Assessor name/organization: J. Sullivan / KCI
5. County: Buncombe
6. Nearest named water body on USGS 7.5-minute quad: Morgan Branch
7. River basin: French Broad
8. Site coordinates (decimal degrees, at lower end of assessment reach): 35.6079 / -82.7515

STREAM INFORMATION: (depth and width can be approximations)

9. Site number (show on attached map): T2-R2, T3
10. Length of assessment reach evaluated (feet): 50
11. Channel depth from bed (in riffle, if present) to top of bank (feet): 4 ☐Unable to assess channel depth.
12. Channel width at top of bank (feet): 3
13. Is assessment reach a swamp steam? ☐Yes ☐No
14. Feature type: ☒Perennial flow ☐Intermittent flow ☐Tidal Marsh Stream

STREAM CATEGORY INFORMATION:

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

ADDITIONAL INFORMATION:

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

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

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

2. Evidence of Flow Restriction – assessment reach metric

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

3. Feature Pattern – assessment reach metric

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

4. Feature Longitudinal Profile – assessment reach metric

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

5. Signs of Active Instability – assessment reach metric

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

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

6. Streamside Area Interaction – streamside area metric
Consider for the Left Bank (LB) and the Right Bank (RB).

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

7. Water Quality Stressors – assessment reach/intertidal zone metric
Check all that apply.

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

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

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

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

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

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

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

Check for Tidal Marsh Streams Only

- ☐F 5% oysters or other natural hard bottoms
- ☐G Submerged aquatic vegetation
- ☐H Low-tide refugia (pools)
- ☐I Sand bottom
- ☐J 5% vertical bank along the marsh
- ☐K Little or no habitat

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

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

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

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

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

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

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

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

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

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

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

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

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

LB	RB	
☐A	☐A	Little or no alteration to water storage capacity over a majority of the streamside area
☒B	☐B	Moderate alteration to water storage capacity over a majority of the streamside area
☐C	☒C	Severe alteration to water storage capacity over a majority of the streamside area (examples: ditches, fill, soil compaction, livestock disturbance, buildings, man-made levees, drainage pipes)

14. Streamside Area Water Storage – streamside area metric (skip for Size 1 streams, Tidal Marsh Streams, and B valley types)
Consider for the Left Bank (LB) and the Right Bank (RB) of the streamside area.

LB	RB	
☐A	☐A	Majority of streamside area with depressions able to pond water ≥ 6 inches deep
☐B	☐B	Majority of streamside area with depressions able to pond water 3 to 6 inches deep
☒C	☒C	Majority of streamside area with depressions able to pond water < 3 inches deep

15. Wetland Presence – streamside area metric (skip for Tidal Marsh Streams)
Consider for the Left Bank (LB) and the Right Bank (RB). Do not consider wetlands outside of the streamside area or within the normal wetted perimeter of assessment reach.

LB	RB	
☐Y	☐Y	Are wetlands present in the streamside area?
☒N	☒N	

16. Baseflow Contributors – assessment reach metric (skip for Size 4 streams and Tidal Marsh Streams)
Check all contributors within the assessment reach or within view of <u>and</u> draining to the assessment reach.

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

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

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

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

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

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

Vegetated		Wooded		
LB	RB	LB	RB	
☒A	☒A	☐A	☐A	≥ 100 feet wide or extends to the edge of the watershed
☐B	☐B	☐B	☐B	From 50 to < 100 feet wide
☐C	☐C	☐C	☐C	From 30 to < 50 feet wide
☐D	☐D	☐D	☐D	From 10 to < 30 feet wide
☐E	☐E	☒E	☒E	< 10 feet wide or no trees

20. Buffer Structure – streamside area metric (skip for Tidal Marsh Streams)
Consider for left bank (LB) and right bank (RB) for Metric 19 ("Vegetated" Buffer Width).

LB	RB	
☐A	☐A	Mature forest
☐B	☐B	Non-mature woody vegetation or modified vegetation structure
☒C	☒C	Herbaceous vegetation with or without a strip of trees < 10 feet wide
☐D	☐D	Maintained shrubs
☐E	☐E	Little or no vegetation

21. Buffer Stressors – streamside area metric (skip for Tidal Marsh Streams)
Check all appropriate boxes for left bank (LB) and right bank (RB). Indicate if listed stressor abuts stream (Abuts), does not abut but is within 30 feet of stream (< 30 feet), or is between 30 to 50 feet of stream (30-50 feet).
If none of the following stressors occurs on either bank, check here and skip to Metric 22: ☐

Abuts		< 30 feet		30-50 feet		
LB	RB	LB	RB	LB	RB	
☐A	☐A	☐A	☐A	☐A	☐A	Row crops
☐B	☐B	☐B	☐B	☐B	☐B	Maintained turf
☐C	☒C	☐C	☐C	☐C	☐C	Pasture (no livestock)/commercial horticulture
☒D	☐D	☐D	☐D	☐D	☐D	Pasture (active livestock use)

22. Stem Density – streamside area metric (skip for Tidal Marsh Streams)
Consider for left bank (LB) and right bank (RB) for Metric 19 ("Wooded" Buffer Width).

LB	RB	
☐A	☐A	Medium to high stem density
☐B	☐B	Low stem density
☒C	☒C	No wooded riparian buffer or predominantly herbaceous species or bare ground

23. Continuity of Vegetated Buffer – streamside area metric (skip for Tidal Marsh Streams)
Consider whether vegetated buffer is continuous along stream (parallel). Breaks are areas lacking vegetation > 10 feet wide.

LB	RB	
☒A	☒A	The total length of buffer breaks is < 25 percent.
☐B	☐B	The total length of buffer breaks is between 25 and 50 percent.
☐C	☐C	The total length of buffer breaks is > 50 percent.

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

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

25. Conductivity – assessment reach metric (skip for all Coastal Plain streams)
25a. ☐Yes ☒No Was conductivity measurement recorded?
If No, select one of the following reasons. ☐No Water ☐Other: _____

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

Notes/Sketch:
Cattle have access to the stream

Draft NC SAM Stream Rating Sheet
Accompanies User Manual Version 2.1

Stream Site Name	Morgan Branch Restoration Site	Date of Assessment	1/24/2018
Stream Category	Ma1	Assessor Name/Organization	J. Sullivan / KCI

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

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

NC SAM FIELD ASSESSMENT RESULTS
Accompanies User Manual Version 2.1

USACE AID #: NCDWR #:

INSTRUCTIONS: Attach a sketch of the assessment area and photographs. Attach a copy of the USGS 7.5-minute topographic quadrangle, and circle the location of the stream reach under evaluation. If multiple stream reaches will be evaluated on the same property, identify and number all reaches on the attached map, and include a separate form for each reach. See the NC SAM User Manual for detailed descriptions and explanations of requested information. Record in the "Notes/Sketch" section if supplementary measurements were performed. See the NC SAM User Manual for examples of additional measurements that may be relevant.

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

PROJECT/SITE INFORMATION:

1. Project name (if any): Morgan Branch Restoration Site
2. Date of evaluation: 1/24/2018
3. Applicant/owner name: KCI
4. Assessor name/organization: J. Sullivan / KCI
5. County: Buncombe
6. Nearest named water body on USGS 7.5-minute quad: Morgan Branch
7. River basin: French Broad
8. Site coordinates (decimal degrees, at lower end of assessment reach): 35.6114 / -82.7460

STREAM INFORMATION: (depth and width can be approximations)

9. Site number (show on attached map): T4
10. Length of assessment reach evaluated (feet): 50
11. Channel depth from bed (in riffle, if present) to top of bank (feet): 4 ☐Unable to assess channel depth.
12. Channel width at top of bank (feet): 3
13. Is assessment reach a swamp steam? ☐Yes ☐No
14. Feature type: ☒Perennial flow ☐Intermittent flow ☐Tidal Marsh Stream

STREAM CATEGORY INFORMATION:

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

ADDITIONAL INFORMATION:

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

1. Channel Water – assessment reach metric (skip for Size 1 streams and Tidal Marsh Streams)
☒A Water throughout assessment reach.
☐B No flow, water in pools only.
☐C No water in assessment reach.

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

3. Feature Pattern – assessment reach metric
☒A A majority of the assessment reach has altered pattern (examples: straightening, modification above or below culvert).
☐B Not A

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

5. Signs of Active Instability – assessment reach metric
Consider only current instability, not past events from which the stream has currently recovered. Examples of instability include active bank failure, active channel down-cutting (head-cut), active widening, and artificial hardening (such as concrete, gabion, rip-rap).
☐A < 10% of channel unstable
☒B 10 to 25% of channel unstable
☐C > 25% of channel unstable

6. Streamside Area Interaction – streamside area metric
Consider for the Left Bank (LB) and the Right Bank (RB).

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

7. Water Quality Stressors – assessment reach/intertidal zone metric
Check all that apply.

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

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

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

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

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

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

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

Check for Tidal Marsh Streams Only

- ☐F 5% oysters or other natural hard bottoms
- ☐G Submerged aquatic vegetation
- ☐H Low-tide refugia (pools)
- ☐I Sand bottom
- ☐J 5% vertical bank along the marsh
- ☐K Little or no habitat

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

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

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

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

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

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

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

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

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

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

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

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

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

LB	RB	
☐A	☐A	Little or no alteration to water storage capacity over a majority of the streamside area
☐B	☐B	Moderate alteration to water storage capacity over a majority of the streamside area
☒C	☒C	Severe alteration to water storage capacity over a majority of the streamside area (examples: ditches, fill, soil compaction, livestock disturbance, buildings, man-made levees, drainage pipes)

14. Streamside Area Water Storage – streamside area metric (skip for Size 1 streams, Tidal Marsh Streams, and B valley types)
Consider for the Left Bank (LB) and the Right Bank (RB) of the streamside area.

LB	RB	
☐A	☐A	Majority of streamside area with depressions able to pond water ≥ 6 inches deep
☐B	☐B	Majority of streamside area with depressions able to pond water 3 to 6 inches deep
☒C	☒C	Majority of streamside area with depressions able to pond water < 3 inches deep

15. Wetland Presence – streamside area metric (skip for Tidal Marsh Streams)
Consider for the Left Bank (LB) and the Right Bank (RB). Do not consider wetlands outside of the streamside area or within the normal wetted perimeter of assessment reach.

LB	RB	
☒Y	☒Y	Are wetlands present in the streamside area?
☐N	☐N	

16. Baseflow Contributors – assessment reach metric (skip for Size 4 streams and Tidal Marsh Streams)
Check all contributors within the assessment reach or within view of <u>and</u> draining to the assessment reach.

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

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

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

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

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

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

Vegetated LB	Vegetated RB	Wooded LB	Wooded RB	
☒A	☒A	☐A	☐A	≥ 100 feet wide or extends to the edge of the watershed
☐B	☐B	☐B	☐B	From 50 to < 100 feet wide
☐C	☐C	☐C	☐C	From 30 to < 50 feet wide
☐D	☐D	☐D	☐D	From 10 to < 30 feet wide
☐E	☐E	☒E	☒E	< 10 feet wide or no trees

20. Buffer Structure – streamside area metric (skip for Tidal Marsh Streams)
Consider for left bank (LB) and right bank (RB) for Metric 19 ("Vegetated" Buffer Width).

LB	RB	
☐A	☐A	Mature forest
☐B	☐B	Non-mature woody vegetation or modified vegetation structure
☒C	☒C	Herbaceous vegetation with or without a strip of trees < 10 feet wide
☐D	☐D	Maintained shrubs
☐E	☐E	Little or no vegetation

21. Buffer Stressors – streamside area metric (skip for Tidal Marsh Streams)
Check all appropriate boxes for left bank (LB) and right bank (RB). Indicate if listed stressor abuts stream (Abuts), does not abut but is within 30 feet of stream (< 30 feet), or is between 30 to 50 feet of stream (30-50 feet).
If none of the following stressors occurs on either bank, check here and skip to Metric 22: ☐

Abuts LB	Abuts RB	< 30 feet LB	< 30 feet RB	30-50 feet LB	30-50 feet RB	
☐A	☐A	☐A	☐A	☐A	☐A	Row crops
☐B	☐B	☐B	☐B	☐B	☐B	Maintained turf
☐C	☐C	☐C	☐C	☐C	☐C	Pasture (no livestock)/commercial horticulture
☒D	☒D	☐D	☐D	☐D	☐D	Pasture (active livestock use)

22. Stem Density – streamside area metric (skip for Tidal Marsh Streams)
Consider for left bank (LB) and right bank (RB) for Metric 19 ("Wooded" Buffer Width).

LB	RB	
☐A	☐A	Medium to high stem density
☐B	☐B	Low stem density
☒C	☒C	No wooded riparian buffer or predominantly herbaceous species or bare ground

23. Continuity of Vegetated Buffer – streamside area metric (skip for Tidal Marsh Streams)
Consider whether vegetated buffer is continuous along stream (parallel). Breaks are areas lacking vegetation > 10 feet wide.

LB	RB	
☒A	☒A	The total length of buffer breaks is < 25 percent.
☐B	☐B	The total length of buffer breaks is between 25 and 50 percent.
☐C	☐C	The total length of buffer breaks is > 50 percent.

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

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

25. Conductivity – assessment reach metric (skip for all Coastal Plain streams)
25a. ☐Yes ☒No Was conductivity measurement recorded?
If No, select one of the following reasons. ☐No Water ☐Other: _____

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

Notes/Sketch:
Cattle have access to the stream

Draft NC SAM Stream Rating Sheet
Accompanies User Manual Version 2.1

Stream Site Name	Morgan Branch Restoration Site	Date of Assessment	1/24/2018
Stream Category	Mb2	Assessor Name/Organization	J. Sullivan / KCI

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

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

NC SAM FIELD ASSESSMENT RESULTS
Accompanies User Manual Version 2.1

USACE AID #: NCDWR #:

INSTRUCTIONS: Attach a sketch of the assessment area and photographs. Attach a copy of the USGS 7.5-minute topographic quadrangle, and circle the location of the stream reach under evaluation. If multiple stream reaches will be evaluated on the same property, identify and number all reaches on the attached map, and include a separate form for each reach. See the NC SAM User Manual for detailed descriptions and explanations of requested information. Record in the "Notes/Sketch" section if supplementary measurements were performed. See the NC SAM User Manual for examples of additional measurements that may be relevant.

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

PROJECT/SITE INFORMATION:

1. Project name (if any): Morgan Branch Restoration Site
2. Date of evaluation: 1/24/2018
3. Applicant/owner name: KCI
4. Assessor name/organization: J. Sullivan / KCI
5. County: Buncombe
6. Nearest named water body on USGS 7.5-minute quad: Morgan Branch
7. River basin: French Broad
8. Site coordinates (decimal degrees, at lower end of assessment reach): 35.6141 / -82.7475

STREAM INFORMATION: (depth and width can be approximations)

9. Site number (show on attached map): T4-1
10. Length of assessment reach evaluated (feet): 50
11. Channel depth from bed (in riffle, if present) to top of bank (feet): 2.5 ☐Unable to assess channel depth.
12. Channel width at top of bank (feet): 4
13. Is assessment reach a swamp steam? ☐Yes ☐No
14. Feature type: ☐Perennial flow ☒Intermittent flow ☐Tidal Marsh Stream

STREAM CATEGORY INFORMATION:

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

ADDITIONAL INFORMATION:

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

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

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

2. Evidence of Flow Restriction – assessment reach metric

- ☐A At least 10% of assessment reach in-stream habitat or riffle-pool sequence is severely affected by a flow restriction or fill to the point of obstructing flow or a channel choked with aquatic macrophytes or ponded water or impoundment on flood or ebb within the assessment reach (examples: undersized or perched culverts, causeways that constrict the channel, tidal gates, debris jams, beaver dams).
- ☒B Not A

3. Feature Pattern – assessment reach metric

- ☐A A majority of the assessment reach has altered pattern (examples: straightening, modification above or below culvert).
- ☒B Not A

4. Feature Longitudinal Profile – assessment reach metric

- ☐A Majority of assessment reach has a substantially altered stream profile (examples: channel down-cutting, existing damming, over widening, active aggradation, dredging, and excavation where appropriate channel profile has not reformed from any of these disturbances).
- ☒B Not A

5. Signs of Active Instability – assessment reach metric

Consider only current instability, not past events from which the stream has currently recovered. Examples of instability include active bank failure, active channel down-cutting (head-cut), active widening, and artificial hardening (such as concrete, gabion, rip-rap).

- ☒A < 10% of channel unstable
- ☐B 10 to 25% of channel unstable
- ☐C > 25% of channel unstable

6. Streamside Area Interaction – streamside area metric
Consider for the Left Bank (LB) and the Right Bank (RB).

LB	RB	
☐A	☐A	Little or no evidence of conditions that adversely affect reference interaction
☐B	☐B	Moderate evidence of conditions (examples: berms, levees, down-cutting, aggradation, dredging) that adversely affect reference interaction (examples: limited streamside area access, disruption of flood flows through streamside area, leaky or intermittent bulkheads, causeways with floodplain constriction, minor ditching [including mosquito ditching])
☒C	☒C	Extensive evidence of conditions that adversely affect reference interaction (little to no floodplain/intertidal zone access [examples: causeways with floodplain and channel constriction, bulkheads, retaining walls, fill, stream incision, disruption of flood flows through streamside area] or too much floodplain/intertidal zone access [examples: impoundments, intensive mosquito ditching]) or floodplain/intertidal zone unnaturally absent or assessment reach is a man-made feature on an interstream divide

7. Water Quality Stressors – assessment reach/intertidal zone metric
Check all that apply.

- ☐A Discolored water in stream or intertidal zone (milky white, blue, unnatural water discoloration, oil sheen, stream foam)
- ☐B Excessive sedimentation (burying of stream features or intertidal zone)
- ☐C Noticeable evidence of pollutant discharges entering the assessment reach and causing a water quality problem
- ☐D Odor (not including natural sulfide odors)
- ☐E Current published or collected data indicating degraded water quality in the assessment reach. Cite source in "Notes/Sketch" section.
- ☒F Livestock with access to stream or intertidal zone
- ☐G Excessive algae in stream or intertidal zone
- ☐H Degraded marsh vegetation in the intertidal zone (removal, burning, regular mowing, destruction, etc)
- ☐I Other: ____________________ (explain in "Notes/Sketch" section)
- ☐J Little to no stressors

8. Recent Weather – watershed metric (skip for Tidal Marsh Streams)
For Size 1 or 2 streams, D1 drought or higher is considered a drought; for Size 3 or 4 streams, D2 drought or higher is considered a drought.

- ☐A Drought conditions and no rainfall or rainfall not exceeding 1 inch within the last 48 hours
- ☐B Drought conditions and rainfall exceeding 1 inch within the last 48 hours
- ☒C No drought conditions

9. Large or Dangerous Stream – assessment reach metric
☐Yes ☒No Is stream is too large or dangerous to assess? If Yes, skip to Metric 13 (Streamside Area Ground Surface Condition).

10. Natural In-stream Habitat Types – assessment reach metric

10a. ☐Yes ☒No Degraded in-stream habitat over majority of the assessment reach (examples of stressors include excessive sedimentation, mining, excavation, in-stream hardening [for example, rip-rap], recent dredging, and snagging) **(evaluate for Size 4 Coastal Plain streams only, then skip to Metric 12)**

10b. **Check all that occur** (occurs if > 5% coverage of assessment reach) **(skip for Size 4 Coastal Plain streams)**

- ☐A Multiple aquatic macrophytes and aquatic mosses (include liverworts, lichens, and algal mats)
- ☐B Multiple sticks and/or leaf packs and/or emergent vegetation
- ☐C Multiple snags and logs (including lap trees)
- ☐D 5% undercut banks and/or root mats and/or roots in banks extend to the normal wetted perimeter
- ☒E Little or no habitat

Check for Tidal Marsh Streams Only

- ☐F 5% oysters or other natural hard bottoms
- ☐G Submerged aquatic vegetation
- ☐H Low-tide refugia (pools)
- ☐I Sand bottom
- ☐J 5% vertical bank along the marsh
- ☐K Little or no habitat

***********************************REMAINING QUESTIONS ARE NOT APPLICABLE FOR TIDAL MARSH STREAMS*******************************

11. Bedform and Substrate – assessment reach metric (skip for Size 4 Coastal Plain streams and Tidal Marsh Streams)

11a. ☒Yes ☐No Is assessment reach in a natural sand-bed stream? **(skip for Coastal Plain streams)**

11b. Bedform evaluated. **Check the appropriate box(es).**

- ☒A Riffle-run section **(evaluate 11c)**
- ☒B Pool-glide section **(evaluate 11d)**
- ☐C Natural bedform absent **(skip to Metric 12, Aquatic Life)**

11c. In riffle sections, check all that occur below the normal wetted perimeter of the assessment reach – whether or not submerged. **Check at least one box in each row (skip for Size 4 Coastal Plain streams and Tidal Marsh Streams)**. Not Present (NP) = absent, Rare (R) = present but ≤ 10%, Common (C) = > 10-40%, Abundant (A) = > 40-70%, Predominant (P) = > 70%. Cumulative percentages should not exceed 100% for each assessment reach.

NP	R	C	A	P	
☒	☐	☐	☐	☐	Bedrock/saprolite
☒	☐	☐	☐	☐	Boulder (256 – 4096 mm)
☐	☐	☒	☐	☐	Cobble (64 – 256 mm)
☐	☐	☒	☐	☐	Gravel (2 – 64 mm)
☐	☐	☒	☐	☐	Sand (.062 – 2 mm)
☐	☒	☐	☐	☐	Silt/clay (< 0.062 mm)
☒	☐	☐	☐	☐	Detritus
☒	☐	☐	☐	☐	Artificial (rip-rap, concrete, etc.)

11d. ☐Yes ☒No Are pools filled with sediment? (**skip for Size 4 Coastal Plain streams and Tidal Marsh Streams**)

12. Aquatic Life – assessment reach metric (skip for Tidal Marsh Streams)

12a. ☒Yes ☐No Was an in-stream aquatic life assessment performed as described in the User Manual?
If No, select one of the following reasons and skip to Metric 13. ☐No Water ☐Other: _____

12b. ☐Yes ☒No Are aquatic organisms present in the assessment reach (look in riffles, pools, then snags)? If Yes, check all that apply. If No, skip to Metric 13.

1	>1	Numbers over columns refer to "individuals" for Size 1 and 2 streams and "taxa" for Size 3 and 4 streams.
☐	☐	Adult frogs
☐	☐	Aquatic reptiles
☐	☐	Aquatic macrophytes and aquatic mosses (include liverworts, lichens, and algal mats)
☐	☐	Beetles
☐	☐	Caddisfly larvae (T)
☐	☐	Asian clam (*Corbicula*)
☐	☐	Crustacean (isopod/amphipod/crayfish/shrimp)
☐	☐	Damselfly and dragonfly larvae
☐	☐	Dipterans
☐	☐	Mayfly larvae (E)
☐	☐	Megaloptera (alderfly, fishfly, dobsonfly larvae)
☐	☐	Midges/mosquito larvae
☐	☐	Mosquito fish (*Gambusia*) or mud minnows (*Umbra pygmaea*)
☐	☐	Mussels/Clams (not *Corbicula*)
☐	☐	Other fish
☐	☐	Salamanders/tadpoles
☐	☐	Snails
☐	☐	Stonefly larvae (P)
☐	☐	Tipulid larvae
☐	☐	Worms/leeches

13. Streamside Area Ground Surface Condition – streamside area metric (skip for Tidal Marsh Streams and B valley types)
Consider for the Left Bank (LB) and the Right Bank (RB). Consider storage capacity with regard to both overbank flow and upland runoff.

LB	RB	
☐A	☐A	Little or no alteration to water storage capacity over a majority of the streamside area
☐B	☐B	Moderate alteration to water storage capacity over a majority of the streamside area
☒C	☒C	Severe alteration to water storage capacity over a majority of the streamside area (examples: ditches, fill, soil compaction, livestock disturbance, buildings, man-made levees, drainage pipes)

14. Streamside Area Water Storage – streamside area metric (skip for Size 1 streams, Tidal Marsh Streams, and B valley types)
Consider for the Left Bank (LB) and the Right Bank (RB) of the streamside area.

LB	RB	
☐A	☐A	Majority of streamside area with depressions able to pond water ≥ 6 inches deep
☐B	☐B	Majority of streamside area with depressions able to pond water 3 to 6 inches deep
☒C	☒C	Majority of streamside area with depressions able to pond water < 3 inches deep

15. Wetland Presence – streamside area metric (skip for Tidal Marsh Streams)
Consider for the Left Bank (LB) and the Right Bank (RB). Do not consider wetlands outside of the streamside area or within the normal wetted perimeter of assessment reach.

LB	RB	
☒Y	☒Y	Are wetlands present in the streamside area?
☐N	☐N	

16. Baseflow Contributors – assessment reach metric (skip for Size 4 streams and Tidal Marsh Streams)
Check all contributors within the assessment reach or within view of <u>and</u> draining to the assessment reach.

- ☐A Streams and/or springs (jurisdictional discharges)
- ☐B Ponds (include wet detention basins; do not include sediment basins or dry detention basins)
- ☐C Obstruction passing flow during low-flow periods within the assessment area (beaver dam, leaky dam, bottom-release dam, weir)
- ☐D Evidence of bank seepage or sweating (iron in water indicates seepage)
- ☒E Stream bed or bank soil reduced (dig through deposited sediment if present)
- ☐F None of the above

17. Baseflow Detractors – assessment area metric (skip for Tidal Marsh Streams)
Check all that apply.

- ☐A Evidence of substantial water withdrawals from the assessment reach (includes areas excavated for pump installation)
- ☐B Obstruction not passing flow during low-flow periods affecting the assessment reach (ex: watertight dam, sediment deposit)
- ☐C Urban stream (≥ 24% impervious surface for watershed)
- ☐D Evidence that the streamside area has been modified resulting in accelerated drainage into the assessment reach
- ☐E Assessment reach relocated to valley edge
- ☒F None of the above

18. Shading – assessment reach metric (skip for Tidal Marsh Streams)
Consider aspect. Consider "leaf-on" condition.

- ☐A Stream shading is appropriate for stream category (may include gaps associated with natural processes)
- ☐B Degraded (example: scattered trees)
- ☒C Stream shading is gone or largely absent

19. Buffer Width – streamside area metric (skip for Tidal Marsh Streams)
Consider "vegetated buffer" and "wooded buffer" separately for left bank (LB) and right bank (RB) starting at the top of bank out to the first break.

Vegetated LB	Vegetated RB	Wooded LB	Wooded RB	
☒A	☒A	☐A	☐A	≥ 100 feet wide or extends to the edge of the watershed
☐B	☐B	☐B	☐B	From 50 to < 100 feet wide
☐C	☐C	☐C	☐C	From 30 to < 50 feet wide
☐D	☐D	☐D	☐D	From 10 to < 30 feet wide
☐E	☐E	☒E	☒E	< 10 feet wide or no trees

20. Buffer Structure – streamside area metric (skip for Tidal Marsh Streams)
Consider for left bank (LB) and right bank (RB) for Metric 19 ("Vegetated" Buffer Width).

LB	RB	
☐A	☐A	Mature forest
☐B	☐B	Non-mature woody vegetation or modified vegetation structure
☒C	☒C	Herbaceous vegetation with or without a strip of trees < 10 feet wide
☐D	☐D	Maintained shrubs
☐E	☐E	Little or no vegetation

21. Buffer Stressors – streamside area metric (skip for Tidal Marsh Streams)
Check all appropriate boxes for left bank (LB) and right bank (RB). Indicate if listed stressor abuts stream (Abuts), does not abut but is within 30 feet of stream (< 30 feet), or is between 30 to 50 feet of stream (30-50 feet).
If none of the following stressors occurs on either bank, check here and skip to Metric 22: ☐

Abuts LB	Abuts RB	< 30 feet LB	< 30 feet RB	30-50 feet LB	30-50 feet RB	
☐A	☐A	☐A	☐A	☐A	☐A	Row crops
☐B	☐B	☐B	☐B	☐B	☐B	Maintained turf
☐C	☐C	☐C	☐C	☐C	☐C	Pasture (no livestock)/commercial horticulture
☒D	☒D	☐D	☐D	☐D	☐D	Pasture (active livestock use)

22. Stem Density – streamside area metric (skip for Tidal Marsh Streams)
Consider for left bank (LB) and right bank (RB) for Metric 19 ("Wooded" Buffer Width).

LB	RB	
☐A	☐A	Medium to high stem density
☐B	☐B	Low stem density
☒C	☒C	No wooded riparian buffer or predominantly herbaceous species or bare ground

23. Continuity of Vegetated Buffer – streamside area metric (skip for Tidal Marsh Streams)
Consider whether vegetated buffer is continuous along stream (parallel). Breaks are areas lacking vegetation > 10 feet wide.

LB	RB	
☒A	☒A	The total length of buffer breaks is < 25 percent.
☐B	☐B	The total length of buffer breaks is between 25 and 50 percent.
☐C	☐C	The total length of buffer breaks is > 50 percent.

24. Vegetative Composition – streamside area metric (skip for Tidal Marsh Streams)
Evaluate the dominant vegetation within 100 feet of each bank or to the edge of the watershed (whichever comes first) as it contributes to assessment reach habitat.

LB	RB	
☐A	☐A	Vegetation is close to undisturbed in species present and their proportions. Lower strata composed of native species, with non-native invasive species absent or sparse.
☐B	☐B	Vegetation indicates disturbance in terms of species diversity or proportions, but is still largely composed of native species. This may include communities of weedy native species that develop after clear-cutting or clearing or communities with non-native invasive species present, but not dominant, over a large portion of the expected strata or communities missing understory but retaining canopy trees.
☒C	☒C	Vegetation is severely disturbed in terms of species diversity or proportions. Mature canopy is absent or communities with non-native invasive species dominant over a large portion of expected strata or communities composed of planted stands of non-characteristic species or communities inappropriately composed of a single species or no vegetation.

25. Conductivity – assessment reach metric (skip for all Coastal Plain streams)
25a. ☐Yes ☒No Was conductivity measurement recorded?
If No, select one of the following reasons. ☐No Water ☐Other: _____

25b. Check the box corresponding to the conductivity measurement (units of microsiemens per centimeter).
☐A < 46 ☐B 46 to < 67 ☐C 67 to < 79 ☐D 79 to < 230 ☐E ≥ 230

Notes/Sketch:
Cattle have access to the stream

Draft NC SAM Stream Rating Sheet
Accompanies User Manual Version 2.1

Stream Site Name	Morgan Branch Restoration Site	Date of Assessment	1/24/2018
Stream Category	Mb1	Assessor Name/Organization	J. Sullivan / KCI

Notes of Field Assessment Form (Y/N)	YES
Presence of regulatory considerations (Y/N)	NO
Additional stream information/supplementary measurements included (Y/N)	YES
NC SAM feature type (perennial, intermittent, Tidal Marsh Stream)	Intermittent

Function Class Rating Summary	USACE/ All Streams	NCDWR Intermittent
(1) Hydrology	**MEDIUM**	**MEDIUM**
(2) Baseflow	**HIGH**	**HIGH**
(2) Flood Flow	**MEDIUM**	**MEDIUM**
(3) Streamside Area Attenuation	**LOW**	**LOW**
(4) Floodplain Access	**LOW**	**LOW**
(4) Wooded Riparian Buffer	**LOW**	**LOW**
(4) Microtopography	NA	NA
(3) Stream Stability	**HIGH**	**HIGH**
(4) Channel Stability	**HIGH**	**HIGH**
(4) Sediment Transport	**HIGH**	**HIGH**
(4) Stream Geomorphology	**HIGH**	**HIGH**
(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	**HIGH**	**HIGH**
(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	**LOW**	**NA**
(2) Intertidal Zone Filtration	NA	NA
(1) Habitat	**LOW**	**LOW**
(2) In-stream Habitat	**MEDIUM**	**MEDIUM**
(3) Baseflow	**HIGH**	**HIGH**
(3) Substrate	**HIGH**	**HIGH**
(3) Stream Stability	**HIGH**	**HIGH**
(3) In-stream Habitat	**LOW**	**LOW**
(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	NA	NA
Overall	**LOW**	**LOW**

NC SAM FIELD ASSESSMENT RESULTS
Accompanies User Manual Version 2.1

USACE AID #: NCDWR #:

INSTRUCTIONS: Attach a sketch of the assessment area and photographs. Attach a copy of the USGS 7.5-minute topographic quadrangle, and circle the location of the stream reach under evaluation. If multiple stream reaches will be evaluated on the same property, identify and number all reaches on the attached map, and include a separate form for each reach. See the NC SAM User Manual for detailed descriptions and explanations of requested information. Record in the "Notes/Sketch" section if supplementary measurements were performed. See the NC SAM User Manual for examples of additional measurements that may be relevant.

NOTE EVIDENCE OF STRESSORS AFFECTING THE ASSESSMENT AREA (do not need to be within the assessment area).

PROJECT/SITE INFORMATION:

1. Project name (if any): Morgan Branch Restoration Site
2. Date of evaluation: 1/24/2018
3. Applicant/owner name: KCI
4. Assessor name/organization: J. Sullivan / KCI
5. County: Buncombe
6. Nearest named water body on USGS 7.5-minute quad: Morgan Branch
7. River basin: French Broad
8. Site coordinates (decimal degrees, at lower end of assessment reach): 35.6122 / -82.7479

STREAM INFORMATION: (depth and width can be approximations)

9. Site number (show on attached map): T4-2, T4-3
10. Length of assessment reach evaluated (feet): 50
11. Channel depth from bed (in riffle, if present) to top of bank (feet): 4 ☐Unable to assess channel depth.
12. Channel width at top of bank (feet): 5
13. Is assessment reach a swamp steam? ☐Yes ☐No
14. Feature type: ☐Perennial flow ☒Intermittent flow ☐Tidal Marsh Stream

STREAM CATEGORY INFORMATION:

15. NC SAM Zone: ☒ Mountains (M) ☐ Piedmont (P) ☐ Inner Coastal Plain (I) ☐ Outer Coastal Plain (O)
16. Estimated geomorphic valley shape (**skip for Tidal Marsh Stream**):
☐A  (more sinuous stream, flatter valley slope)
☒B  (less sinuous stream, steeper valley slope)
17. Watershed size: (**skip for Tidal Marsh Stream**) ☒Size 1 (< 0.1 mi^2) ☐Size 2 (0.1 to < 0.5 mi^2) ☐Size 3 (0.5 to < 5 mi^2) ☐Size 4 (≥ 5 mi^2)

ADDITIONAL INFORMATION:

18. Were regulatory considerations evaluated? ☒Yes ☐No If Yes, check all that apply to the assessment area.
☐Section 10 water ☐Classified Trout Waters ☐Water Supply Watershed (☐I ☐II ☐III ☐IV ☐V)
☐Essential Fish Habitat ☐Primary Nursery Area ☐ High Quality Waters/Outstanding Resource Waters
☐Publicly owned property ☐NCDWR Riparian buffer rule in effect ☐Nutrient Sensitive Waters
☐Anadromous fish ☐303(d) List ☐CAMA Area of Environmental Concern (AEC)
☐Documented presence of a federal and/or state listed protected species within the assessment area.
List species:
☐Designated Critical Habitat (list species)
19. Are additional stream information/supplementary measurements included in "Notes/Sketch" section or attached? ☒Yes ☐No

1. Channel Water – assessment reach metric (skip for Size 1 streams and Tidal Marsh Streams)

☒A Water throughout assessment reach.
☐B No flow, water in pools only.
☐C No water in assessment reach.

2. Evidence of Flow Restriction – assessment reach metric

☐A At least 10% of assessment reach in-stream habitat or riffle-pool sequence is severely affected by a flow restriction or fill to the point of obstructing flow or a channel choked with aquatic macrophytes or ponded water or impoundment on flood or ebb within the assessment reach (examples: undersized or perched culverts, causeways that constrict the channel, tidal gates, debris jams, beaver dams).
☒B Not A

3. Feature Pattern – assessment reach metric

☒A A majority of the assessment reach has altered pattern (examples: straightening, modification above or below culvert).
☐B Not A

4. Feature Longitudinal Profile – assessment reach metric

☒A Majority of assessment reach has a substantially altered stream profile (examples: channel down-cutting, existing damming, over widening, active aggradation, dredging, and excavation where appropriate channel profile has not reformed from any of these disturbances).
☐B Not A

5. Signs of Active Instability – assessment reach metric

Consider only current instability, not past events from which the stream has currently recovered. Examples of instability include active bank failure, active channel down-cutting (head-cut), active widening, and artificial hardening (such as concrete, gabion, rip-rap).

☐A < 10% of channel unstable
☒B 10 to 25% of channel unstable
☐C > 25% of channel unstable

6. Streamside Area Interaction – streamside area metric
Consider for the Left Bank (LB) and the Right Bank (RB).

LB	RB	
☐A	☐A	Little or no evidence of conditions that adversely affect reference interaction
☐B	☐B	Moderate evidence of conditions (examples: berms, levees, down-cutting, aggradation, dredging) that adversely affect reference interaction (examples: limited streamside area access, disruption of flood flows through streamside area, leaky or intermittent bulkheads, causeways with floodplain constriction, minor ditching [including mosquito ditching])
☒C	☒C	Extensive evidence of conditions that adversely affect reference interaction (little to no floodplain/intertidal zone access [examples: causeways with floodplain and channel constriction, bulkheads, retaining walls, fill, stream incision, disruption of flood flows through streamside area] or too much floodplain/intertidal zone access [examples: impoundments, intensive mosquito ditching]) or floodplain/intertidal zone unnaturally absent or assessment reach is a man-made feature on an interstream divide

7. Water Quality Stressors – assessment reach/intertidal zone metric
Check all that apply.

- ☐A Discolored water in stream or intertidal zone (milky white, blue, unnatural water discoloration, oil sheen, stream foam)
- ☐B Excessive sedimentation (burying of stream features or intertidal zone)
- ☐C Noticeable evidence of pollutant discharges entering the assessment reach and causing a water quality problem
- ☐D Odor (not including natural sulfide odors)
- ☐E Current published or collected data indicating degraded water quality in the assessment reach. Cite source in "Notes/Sketch" section.
- ☒F Livestock with access to stream or intertidal zone
- ☐G Excessive algae in stream or intertidal zone
- ☐H Degraded marsh vegetation in the intertidal zone (removal, burning, regular mowing, destruction, etc)
- ☐I Other: _____ (explain in "Notes/Sketch" section)
- ☐J Little to no stressors

8. Recent Weather – watershed metric (skip for Tidal Marsh Streams)
For Size 1 or 2 streams, D1 drought or higher is considered a drought; for Size 3 or 4 streams, D2 drought or higher is considered a drought.

- ☐A Drought conditions and no rainfall or rainfall not exceeding 1 inch within the last 48 hours
- ☐B Drought conditions and rainfall exceeding 1 inch within the last 48 hours
- ☒C No drought conditions

9. Large or Dangerous Stream – assessment reach metric
☐Yes ☒No Is stream is too large or dangerous to assess? If Yes, skip to Metric 13 (Streamside Area Ground Surface Condition).

10. Natural In-stream Habitat Types – assessment reach metric
10a. ☐Yes ☒No Degraded in-stream habitat over majority of the assessment reach (examples of stressors include excessive sedimentation, mining, excavation, in-stream hardening [for example, rip-rap], recent dredging, and snagging) **(evaluate for Size 4 Coastal Plain streams only, then skip to Metric 12)**

10b. **Check all that occur** (occurs if > 5% coverage of assessment reach) **(skip for Size 4 Coastal Plain streams)**

- ☐A Multiple aquatic macrophytes and aquatic mosses (include liverworts, lichens, and algal mats)
- ☐B Multiple sticks and/or leaf packs and/or emergent vegetation
- ☐C Multiple snags and logs (including lap trees)
- ☐D 5% undercut banks and/or root mats and/or roots in banks extend to the normal wetted perimeter
- ☒E Little or no habitat

Check for Tidal Marsh Streams Only

- ☐F 5% oysters or other natural hard bottoms
- ☐G Submerged aquatic vegetation
- ☐H Low-tide refugia (pools)
- ☐I Sand bottom
- ☐J 5% vertical bank along the marsh
- ☐K Little or no habitat

*************************************REMAINING QUESTIONS ARE NOT APPLICABLE FOR TIDAL MARSH STREAMS*****************************

11. Bedform and Substrate – assessment reach metric (skip for Size 4 Coastal Plain streams and Tidal Marsh Streams)

11a. ☒Yes ☐No Is assessment reach in a natural sand-bed stream? **(skip for Coastal Plain streams)**

11b. Bedform evaluated. **Check the appropriate box(es).**

- ☒A Riffle-run section **(evaluate 11c)**
- ☒B Pool-glide section **(evaluate 11d)**
- ☐C Natural bedform absent **(skip to Metric 12, Aquatic Life)**

11c. In riffle sections, check all that occur below the normal wetted perimeter of the assessment reach – whether or not submerged. **Check at least one box in each row (skip for Size 4 Coastal Plain streams and Tidal Marsh Streams)**. Not Present (NP) = absent, Rare (R) = present but < 10%, Common (C) = > 10-40%, Abundant (A) = > 40-70%, Predominant (P) = > 70%. Cumulative percentages should not exceed 100% for each assessment reach.

NP	R	C	A	P	
☐	☒	☐	☐	☐	Bedrock/saprolite
☐	☒	☐	☐	☐	Boulder (256 – 4096 mm)
☐	☐	☒	☐	☐	Cobble (64 – 256 mm)
☐	☐	☒	☐	☐	Gravel (2 – 64 mm)
☐	☐	☐	☒	☐	Sand (.062 – 2 mm)
☐	☐	☒	☐	☐	Silt/clay (< 0.062 mm)
☒	☐	☐	☐	☐	Detritus
☒	☐	☐	☐	☐	Artificial (rip-rap, concrete, etc.)

11d. ☐Yes ☒No Are pools filled with sediment? (**skip for Size 4 Coastal Plain streams and Tidal Marsh Streams**)

12. Aquatic Life – assessment reach metric (skip for Tidal Marsh Streams)

12a. ☒Yes ☐No Was an in-stream aquatic life assessment performed as described in the User Manual?
If No, select one of the following reasons and skip to Metric 13. ☐No Water ☐Other: _____

12b. ☐Yes ☒No Are aquatic organisms present in the assessment reach (look in riffles, pools, then snags)? If Yes, check all that apply. If No, skip to Metric 13.

1	>1	Numbers over columns refer to "individuals" for Size 1 and 2 streams and "taxa" for Size 3 and 4 streams.
☐	☐	Adult frogs
☐	☐	Aquatic reptiles
☐	☐	Aquatic macrophytes and aquatic mosses (include liverworts, lichens, and algal mats)
☐	☐	Beetles
☐	☐	Caddisfly larvae (T)
☐	☐	Asian clam (*Corbicula*)
☐	☐	Crustacean (isopod/amphipod/crayfish/shrimp)
☐	☐	Damselfly and dragonfly larvae
☐	☐	Dipterans
☐	☐	Mayfly larvae (E)
☐	☐	Megaloptera (alderfly, fishfly, dobsonfly larvae)
☐	☐	Midges/mosquito larvae
☐	☐	Mosquito fish (*Gambusia*) or mud minnows (*Umbra pygmaea*)
☐	☐	Mussels/Clams (not *Corbicula*)
☐	☐	Other fish
☐	☐	Salamanders/tadpoles
☐	☐	Snails
☐	☐	Stonefly larvae (P)
☐	☐	Tipulid larvae
☐	☐	Worms/leeches

13. Streamside Area Ground Surface Condition – streamside area metric (skip for Tidal Marsh Streams and B valley types)
Consider for the Left Bank (LB) and the Right Bank (RB). Consider storage capacity with regard to both overbank flow and upland runoff.

LB	RB	
☐A	☐A	Little or no alteration to water storage capacity over a majority of the streamside area
☐B	☐B	Moderate alteration to water storage capacity over a majority of the streamside area
☒C	☒C	Severe alteration to water storage capacity over a majority of the streamside area (examples: ditches, fill, soil compaction, livestock disturbance, buildings, man-made levees, drainage pipes)

14. Streamside Area Water Storage – streamside area metric (skip for Size 1 streams, Tidal Marsh Streams, and B valley types)
Consider for the Left Bank (LB) and the Right Bank (RB) of the streamside area.

LB	RB	
☐A	☐A	Majority of streamside area with depressions able to pond water ≥ 6 inches deep
☐B	☐B	Majority of streamside area with depressions able to pond water 3 to 6 inches deep
☒C	☒C	Majority of streamside area with depressions able to pond water < 3 inches deep

15. Wetland Presence – streamside area metric (skip for Tidal Marsh Streams)
Consider for the Left Bank (LB) and the Right Bank (RB). Do not consider wetlands outside of the streamside area or within the normal wetted perimeter of assessment reach.

LB	RB	
☐Y	☐Y	Are wetlands present in the streamside area?
☒N	☒N	

16. Baseflow Contributors – assessment reach metric (skip for Size 4 streams and Tidal Marsh Streams)
Check all contributors within the assessment reach or within view of <u>and</u> draining to the assessment reach.

- ☐A Streams and/or springs (jurisdictional discharges)
- ☐B Ponds (include wet detention basins; do not include sediment basins or dry detention basins)
- ☐C Obstruction passing flow during low-flow periods within the assessment area (beaver dam, leaky dam, bottom-release dam, weir)
- ☐D Evidence of bank seepage or sweating (iron in water indicates seepage)
- ☒E Stream bed or bank soil reduced (dig through deposited sediment if present)
- ☐F None of the above

17. Baseflow Detractors – assessment area metric (skip for Tidal Marsh Streams)
Check all that apply.

- ☐A Evidence of substantial water withdrawals from the assessment reach (includes areas excavated for pump installation)
- ☐B Obstruction not passing flow during low-flow periods affecting the assessment reach (ex: watertight dam, sediment deposit)
- ☐C Urban stream (≥ 24% impervious surface for watershed)
- ☐D Evidence that the streamside area has been modified resulting in accelerated drainage into the assessment reach
- ☐E Assessment reach relocated to valley edge
- ☒F None of the above

18. Shading – assessment reach metric (skip for Tidal Marsh Streams)
Consider aspect. Consider "leaf-on" condition.

- ☐A Stream shading is appropriate for stream category (may include gaps associated with natural processes)
- ☐B Degraded (example: scattered trees)
- ☒C Stream shading is gone or largely absent

19. Buffer Width – streamside area metric (skip for Tidal Marsh Streams)
Consider "vegetated buffer" and "wooded buffer" separately for left bank (LB) and right bank (RB) starting at the top of bank out to the first break.

Vegetated LB	Vegetated RB	Wooded LB	Wooded RB	
☒A	☐A	☐A	☐A	≥ 100 feet wide or extends to the edge of the watershed
☐B	☐B	☐B	☐B	From 50 to < 100 feet wide
☐C	☒C	☐C	☐C	From 30 to < 50 feet wide
☐D	☐D	☐D	☐D	From 10 to < 30 feet wide
☐E	☐E	☒E	☒E	< 10 feet wide or no trees

20. Buffer Structure – streamside area metric (skip for Tidal Marsh Streams)
Consider for left bank (LB) and right bank (RB) for Metric 19 ("Vegetated" Buffer Width).

LB	RB	
☐A	☐A	Mature forest
☐B	☐B	Non-mature woody vegetation or modified vegetation structure
☒C	☒C	Herbaceous vegetation with or without a strip of trees < 10 feet wide
☐D	☐D	Maintained shrubs
☐E	☐E	Little or no vegetation

21. Buffer Stressors – streamside area metric (skip for Tidal Marsh Streams)
Check all appropriate boxes for left bank (LB) and right bank (RB). Indicate if listed stressor abuts stream (Abuts), does not abut but is within 30 feet of stream (< 30 feet), or is between 30 to 50 feet of stream (30-50 feet).
If none of the following stressors occurs on either bank, check here and skip to Metric 22: ☐

Abuts LB	Abuts RB	< 30 feet LB	< 30 feet RB	30-50 feet LB	30-50 feet RB	
☐A	☐A	☐A	☐A	☐A	☐A	Row crops
☐B	☐B	☐B	☐B	☐B	☐B	Maintained turf
☐C	☐C	☐C	☐C	☐C	☐C	Pasture (no livestock)/commercial horticulture
☒D	☒D	☐D	☐D	☐D	☐D	Pasture (active livestock use)

22. Stem Density – streamside area metric (skip for Tidal Marsh Streams)
Consider for left bank (LB) and right bank (RB) for Metric 19 ("Wooded" Buffer Width).

LB	RB	
☐A	☐A	Medium to high stem density
☐B	☐B	Low stem density
☒C	☒C	No wooded riparian buffer or predominantly herbaceous species or bare ground

23. Continuity of Vegetated Buffer – streamside area metric (skip for Tidal Marsh Streams)
Consider whether vegetated buffer is continuous along stream (parallel). Breaks are areas lacking vegetation > 10 feet wide.

LB	RB	
☒A	☒A	The total length of buffer breaks is < 25 percent.
☐B	☐B	The total length of buffer breaks is between 25 and 50 percent.
☐C	☐C	The total length of buffer breaks is > 50 percent.

24. Vegetative Composition – streamside area metric (skip for Tidal Marsh Streams)
Evaluate the dominant vegetation within 100 feet of each bank or to the edge of the watershed (whichever comes first) as it contributes to assessment reach habitat.

LB	RB	
☐A	☐A	Vegetation is close to undisturbed in species present and their proportions. Lower strata composed of native species, with non-native invasive species absent or sparse.
☐B	☐B	Vegetation indicates disturbance in terms of species diversity or proportions, but is still largely composed of native species. This may include communities of weedy native species that develop after clear-cutting or clearing or communities with non-native invasive species present, but not dominant, over a large portion of the expected strata or communities missing understory but retaining canopy trees.
☒C	☒C	Vegetation is severely disturbed in terms of species diversity or proportions. Mature canopy is absent or communities with non-native invasive species dominant over a large portion of expected strata or communities composed of planted stands of non-characteristic species or communities inappropriately composed of a single species or no vegetation.

25. Conductivity – assessment reach metric (skip for all Coastal Plain streams)
25a. ☐Yes ☒No Was conductivity measurement recorded?
If No, select one of the following reasons. ☐No Water ☐Other: _____

25b. Check the box corresponding to the conductivity measurement (units of microsiemens per centimeter).
☐A < 46 ☐B 46 to < 67 ☐C 67 to < 79 ☐D 79 to < 230 ☐E ≥ 230

Notes/Sketch:
Cattle have access to the stream

Draft NC SAM Stream Rating Sheet
Accompanies User Manual Version 2.1

Stream Site Name	Morgan Branch Restoration Site	Date of Assessment	1/24/2018
Stream Category	Mb1	Assessor Name/Organization	J. Sullivan / KCI

Notes of Field Assessment Form (Y/N)	YES
Presence of regulatory considerations (Y/N)	NO
Additional stream information/supplementary measurements included (Y/N)	YES
NC SAM feature type (perennial, intermittent, Tidal Marsh Stream)	Intermittent

Function Class Rating Summary	USACE/ All Streams	NCDWR Intermittent
(1) Hydrology	**LOW**	**LOW**
(2) Baseflow	**HIGH**	**HIGH**
(2) Flood Flow	**LOW**	**LOW**
(3) Streamside Area Attenuation	**LOW**	**LOW**
(4) Floodplain Access	**LOW**	**LOW**
(4) Wooded Riparian Buffer	**LOW**	**LOW**
(4) Microtopography	NA	NA
(3) Stream Stability	**MEDIUM**	**MEDIUM**
(4) Channel Stability	**MEDIUM**	**MEDIUM**
(4) Sediment Transport	**HIGH**	**HIGH**
(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	**LOW**	**LOW**
(2) Baseflow	**HIGH**	**HIGH**
(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	**LOW**	**NA**
(2) Intertidal Zone Filtration	NA	NA
(1) Habitat	**LOW**	**LOW**
(2) In-stream Habitat	**MEDIUM**	**MEDIUM**
(3) Baseflow	**HIGH**	**HIGH**
(3) Substrate	**HIGH**	**HIGH**
(3) Stream Stability	**MEDIUM**	**MEDIUM**
(3) In-stream Habitat	**LOW**	**LOW**
(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	NA	NA
Overall	**LOW**	**LOW**

NC SAM FIELD ASSESSMENT RESULTS
Accompanies User Manual Version 2.1

USACE AID #: NCDWR #:

INSTRUCTIONS: Attach a sketch of the assessment area and photographs. Attach a copy of the USGS 7.5-minute topographic quadrangle, and circle the location of the stream reach under evaluation. If multiple stream reaches will be evaluated on the same property, identify and number all reaches on the attached map, and include a separate form for each reach. See the NC SAM User Manual for detailed descriptions and explanations of requested information. Record in the "Notes/Sketch" section if supplementary measurements were performed. See the NC SAM User Manual for examples of additional measurements that may be relevant.

NOTE EVIDENCE OF STRESSORS AFFECTING THE ASSESSMENT AREA (do not need to be within the assessment area).

PROJECT/SITE INFORMATION:

1. Project name (if any): Morgan Branch Restoration Site
2. Date of evaluation: 1/24/2018
3. Applicant/owner name: KCI
4. Assessor name/organization: J. Sullivan / KCI
5. County: Buncombe
6. Nearest named water body on USGS 7.5-minute quad: Morgan Branch
7. River basin: French Broad
8. Site coordinates (decimal degrees, at lower end of assessment reach): 35.6068 / -82.7485

STREAM INFORMATION: (depth and width can be approximations)

9. Site number (show on attached map): T5-R1
10. Length of assessment reach evaluated (feet): 50
11. Channel depth from bed (in riffle, if present) to top of bank (feet): 4 ☐Unable to assess channel depth.
12. Channel width at top of bank (feet): 3
13. Is assessment reach a swamp steam? ☐Yes ☐No
14. Feature type: ☐Perennial flow ☒Intermittent flow ☐Tidal Marsh Stream

STREAM CATEGORY INFORMATION:

15. NC SAM Zone: ☒ Mountains (M) ☐ Piedmont (P) ☐ Inner Coastal Plain (I) ☐ Outer Coastal Plain (O)
16. Estimated geomorphic valley shape (**skip for Tidal Marsh Stream**):
☐A  (more sinuous stream, flatter valley slope)
☒B  (less sinuous stream, steeper valley slope)
17. Watershed size: **(skip for Tidal Marsh Stream)** ☒Size 1 (< 0.1 mi^2) ☐Size 2 (0.1 to < 0.5 mi^2) ☐Size 3 (0.5 to < 5 mi^2) ☐Size 4 (≥ 5 mi^2)

ADDITIONAL INFORMATION:

18. Were regulatory considerations evaluated? ☒Yes ☐No If Yes, check all that apply to the assessment area.
☐Section 10 water ☐Classified Trout Waters ☐Water Supply Watershed (☐I ☐II ☐III ☐IV ☐V)
☐Essential Fish Habitat ☐Primary Nursery Area ☐ High Quality Waters/Outstanding Resource Waters
☐Publicly owned property ☐NCDWR Riparian buffer rule in effect ☐Nutrient Sensitive Waters
☐Anadromous fish ☐303(d) List ☐CAMA Area of Environmental Concern (AEC)
☐Documented presence of a federal and/or state listed protected species within the assessment area.
List species:
☐Designated Critical Habitat (list species)
19. Are additional stream information/supplementary measurements included in "Notes/Sketch" section or attached? ☒Yes ☐No

1. Channel Water – assessment reach metric (skip for Size 1 streams and Tidal Marsh Streams)
☒A Water throughout assessment reach.
☐B No flow, water in pools only.
☐C No water in assessment reach.

2. Evidence of Flow Restriction – assessment reach metric
☐A At least 10% of assessment reach in-stream habitat or riffle-pool sequence is severely affected by a flow restriction or fill to the point of obstructing flow or a channel choked with aquatic macrophytes or ponded water or impoundment on flood or ebb within the assessment reach (examples: undersized or perched culverts, causeways that constrict the channel, tidal gates, debris jams, beaver dams).
☒B Not A

3. Feature Pattern – assessment reach metric
☐A A majority of the assessment reach has altered pattern (examples: straightening, modification above or below culvert).
☒B Not A

4. Feature Longitudinal Profile – assessment reach metric
☐A Majority of assessment reach has a substantially altered stream profile (examples: channel down-cutting, existing damming, over widening, active aggradation, dredging, and excavation where appropriate channel profile has not reformed from any of these disturbances).
☒B Not A

5. Signs of Active Instability – assessment reach metric
Consider only current instability, not past events from which the stream has currently recovered. Examples of instability include active bank failure, active channel down-cutting (head-cut), active widening, and artificial hardening (such as concrete, gabion, rip-rap).
☒A < 10% of channel unstable
☐B 10 to 25% of channel unstable
☐C > 25% of channel unstable

6. Streamside Area Interaction – streamside area metric
Consider for the Left Bank (LB) and the Right Bank (RB).

LB	RB	
☐A	☐A	Little or no evidence of conditions that adversely affect reference interaction
☒B	☒B	Moderate evidence of conditions (examples: berms, levees, down-cutting, aggradation, dredging) that adversely affect reference interaction (examples: limited streamside area access, disruption of flood flows through streamside area, leaky or intermittent bulkheads, causeways with floodplain constriction, minor ditching [including mosquito ditching])
☐C	☐C	Extensive evidence of conditions that adversely affect reference interaction (little to no floodplain/intertidal zone access [examples: causeways with floodplain and channel constriction, bulkheads, retaining walls, fill, stream incision, disruption of flood flows through streamside area] or too much floodplain/intertidal zone access [examples: impoundments, intensive mosquito ditching]) or floodplain/intertidal zone unnaturally absent or assessment reach is a man-made feature on an interstream divide

7. Water Quality Stressors – assessment reach/intertidal zone metric
Check all that apply.

- ☐A Discolored water in stream or intertidal zone (milky white, blue, unnatural water discoloration, oil sheen, stream foam)
- ☐B Excessive sedimentation (burying of stream features or intertidal zone)
- ☐C Noticeable evidence of pollutant discharges entering the assessment reach and causing a water quality problem
- ☐D Odor (not including natural sulfide odors)
- ☐E Current published or collected data indicating degraded water quality in the assessment reach. Cite source in "Notes/Sketch" section.
- ☒F Livestock with access to stream or intertidal zone
- ☐G Excessive algae in stream or intertidal zone
- ☐H Degraded marsh vegetation in the intertidal zone (removal, burning, regular mowing, destruction, etc)
- ☐I Other: _____ (explain in "Notes/Sketch" section)
- ☐J Little to no stressors

8. Recent Weather – watershed metric (skip for Tidal Marsh Streams)
For Size 1 or 2 streams, D1 drought or higher is considered a drought; for Size 3 or 4 streams, D2 drought or higher is considered a drought.

- ☐A Drought conditions and no rainfall or rainfall not exceeding 1 inch within the last 48 hours
- ☐B Drought conditions and rainfall exceeding 1 inch within the last 48 hours
- ☒C No drought conditions

9. Large or Dangerous Stream – assessment reach metric
☐Yes ☒No Is stream is too large or dangerous to assess? If Yes, skip to Metric 13 (Streamside Area Ground Surface Condition).

10. Natural In-stream Habitat Types – assessment reach metric
10a. ☐Yes ☒No Degraded in-stream habitat over majority of the assessment reach (examples of stressors include excessive sedimentation, mining, excavation, in-stream hardening [for example, rip-rap], recent dredging, and snagging) **(evaluate for Size 4 Coastal Plain streams only, then skip to Metric 12)**

10b. **Check all that occur** (occurs if > 5% coverage of assessment reach) **(skip for Size 4 Coastal Plain streams)**

- ☐A Multiple aquatic macrophytes and aquatic mosses (include liverworts, lichens, and algal mats)
- ☐B Multiple sticks and/or leaf packs and/or emergent vegetation
- ☐C Multiple snags and logs (including lap trees)
- ☐D 5% undercut banks and/or root mats and/or roots in banks extend to the normal wetted perimeter
- ☒E Little or no habitat

Check for Tidal Marsh Streams Only

- ☐F 5% oysters or other natural hard bottoms
- ☐G Submerged aquatic vegetation
- ☐H Low-tide refugia (pools)
- ☐I Sand bottom
- ☐J 5% vertical bank along the marsh
- ☐K Little or no habitat

**************************************REMAINING QUESTIONS ARE NOT APPLICABLE FOR TIDAL MARSH STREAMS************************************

11. Bedform and Substrate – assessment reach metric (skip for Size 4 Coastal Plain streams and Tidal Marsh Streams)

11a. ☒Yes ☐No Is assessment reach in a natural sand-bed stream? **(skip for Coastal Plain streams)**

11b. Bedform evaluated. **Check the appropriate box(es).**

- ☒A Riffle-run section **(evaluate 11c)**
- ☒B Pool-glide section **(evaluate 11d)**
- ☐C Natural bedform absent **(skip to Metric 12, Aquatic Life)**

11c. In riffle sections, check all that occur below the normal wetted perimeter of the assessment reach – whether or not submerged. **Check at least one box in each row (skip for Size 4 Coastal Plain streams and Tidal Marsh Streams)**. Not Present (NP) = absent, Rare (R) = present but < 10%, Common (C) = > 10-40%, Abundant (A) = > 40-70%, Predominant (P) = > 70%. Cumulative percentages should not exceed 100% for each assessment reach.

NP	R	C	A	P	
☒	☐	☐	☐	☐	Bedrock/saprolite
☒	☐	☐	☐	☐	Boulder (256 – 4096 mm)
☐	☐	☒	☐	☐	Cobble (64 – 256 mm)
☐	☐	☒	☐	☐	Gravel (2 – 64 mm)
☐	☐	☒	☐	☐	Sand (.062 – 2 mm)
☐	☒	☐	☐	☐	Silt/clay (< 0.062 mm)
☒	☐	☐	☐	☐	Detritus
☒	☐	☐	☐	☐	Artificial (rip-rap, concrete, etc.)

11d. ☐Yes ☒No Are pools filled with sediment? (**skip for Size 4 Coastal Plain streams and Tidal Marsh Streams**)

12. Aquatic Life – assessment reach metric (skip for Tidal Marsh Streams)

12a. ☒Yes ☐No Was an in-stream aquatic life assessment performed as described in the User Manual?
If No, select one of the following reasons and skip to Metric 13. ☐No Water ☐Other: _____

12b. ☐Yes ☒No Are aquatic organisms present in the assessment reach (look in riffles, pools, then snags)? If Yes, check all that apply. If No, skip to Metric 13.

1	>1	Numbers over columns refer to "individuals" for Size 1 and 2 streams and "taxa" for Size 3 and 4 streams.
☐	☐	Adult frogs
☐	☐	Aquatic reptiles
☐	☐	Aquatic macrophytes and aquatic mosses (include liverworts, lichens, and algal mats)
☐	☐	Beetles
☐	☐	Caddisfly larvae (T)
☐	☐	Asian clam (*Corbicula*)
☐	☐	Crustacean (isopod/amphipod/crayfish/shrimp)
☐	☐	Damselfly and dragonfly larvae
☐	☐	Dipterans
☐	☐	Mayfly larvae (E)
☐	☐	Megaloptera (alderfly, fishfly, dobsonfly larvae)
☐	☐	Midges/mosquito larvae
☐	☐	Mosquito fish (*Gambusia*) or mud minnows (*Umbra pygmaea*)
☐	☐	Mussels/Clams (not *Corbicula*)
☐	☐	Other fish
☐	☐	Salamanders/tadpoles
☐	☐	Snails
☐	☐	Stonefly larvae (P)
☐	☐	Tipulid larvae
☐	☐	Worms/leeches

13. Streamside Area Ground Surface Condition – streamside area metric (skip for Tidal Marsh Streams and B valley types)
Consider for the Left Bank (LB) and the Right Bank (RB). Consider storage capacity with regard to both overbank flow and upland runoff.

LB	RB	
☒A	☒A	Little or no alteration to water storage capacity over a majority of the streamside area
☐B	☐B	Moderate alteration to water storage capacity over a majority of the streamside area
☐C	☐C	Severe alteration to water storage capacity over a majority of the streamside area (examples: ditches, fill, soil compaction, livestock disturbance, buildings, man-made levees, drainage pipes)

14. Streamside Area Water Storage – streamside area metric (skip for Size 1 streams, Tidal Marsh Streams, and B valley types)
Consider for the Left Bank (LB) and the Right Bank (RB) of the streamside area.

LB	RB	
☐A	☐A	Majority of streamside area with depressions able to pond water ≥ 6 inches deep
☐B	☐B	Majority of streamside area with depressions able to pond water 3 to 6 inches deep
☒C	☒C	Majority of streamside area with depressions able to pond water < 3 inches deep

15. Wetland Presence – streamside area metric (skip for Tidal Marsh Streams)
Consider for the Left Bank (LB) and the Right Bank (RB). Do not consider wetlands outside of the streamside area or within the normal wetted perimeter of assessment reach.

LB	RB	
☐Y	☐Y	Are wetlands present in the streamside area?
☒N	☒N	

16. Baseflow Contributors – assessment reach metric (skip for Size 4 streams and Tidal Marsh Streams)
Check all contributors within the assessment reach or within view of <u>and</u> draining to the assessment reach.

- ☐A Streams and/or springs (jurisdictional discharges)
- ☐B Ponds (include wet detention basins; do not include sediment basins or dry detention basins)
- ☐C Obstruction passing flow during low-flow periods within the assessment area (beaver dam, leaky dam, bottom-release dam, weir)
- ☐D Evidence of bank seepage or sweating (iron in water indicates seepage)
- ☒E Stream bed or bank soil reduced (dig through deposited sediment if present)
- ☐F None of the above

17. Baseflow Detractors – assessment area metric (skip for Tidal Marsh Streams)
Check all that apply.

- ☐A Evidence of substantial water withdrawals from the assessment reach (includes areas excavated for pump installation)
- ☐B Obstruction not passing flow during low-flow periods affecting the assessment reach (ex: watertight dam, sediment deposit)
- ☐C Urban stream (≥ 24% impervious surface for watershed)
- ☐D Evidence that the streamside area has been modified resulting in accelerated drainage into the assessment reach
- ☐E Assessment reach relocated to valley edge
- ☒F None of the above

18. Shading – assessment reach metric (skip for Tidal Marsh Streams)
Consider aspect. Consider "leaf-on" condition.

- ☐A Stream shading is appropriate for stream category (may include gaps associated with natural processes)
- ☒B Degraded (example: scattered trees)
- ☐C Stream shading is gone or largely absent

19. Buffer Width – streamside area metric (skip for Tidal Marsh Streams)
Consider "vegetated buffer" and "wooded buffer" separately for left bank (LB) and right bank (RB) starting at the top of bank out to the first break.

Vegetated LB	Vegetated RB	Wooded LB	Wooded RB	
☒A	☒A	☐A	☐A	≥ 100 feet wide or extends to the edge of the watershed
☐B	☐B	☐B	☐B	From 50 to < 100 feet wide
☐C	☐C	☒C	☒C	From 30 to < 50 feet wide
☐D	☐D	☐D	☐D	From 10 to < 30 feet wide
☐E	☐E	☐E	☐E	< 10 feet wide or no trees

20. Buffer Structure – streamside area metric (skip for Tidal Marsh Streams)
Consider for left bank (LB) and right bank (RB) for Metric 19 ("Vegetated" Buffer Width).

LB	RB	
☐A	☐A	Mature forest
☒B	☒B	Non-mature woody vegetation or modified vegetation structure
☐C	☐C	Herbaceous vegetation with or without a strip of trees < 10 feet wide
☐D	☐D	Maintained shrubs
☐E	☐E	Little or no vegetation

21. Buffer Stressors – streamside area metric (skip for Tidal Marsh Streams)
Check all appropriate boxes for left bank (LB) and right bank (RB). Indicate if listed stressor abuts stream (Abuts), does not abut but is within 30 feet of stream (< 30 feet), or is between 30 to 50 feet of stream (30-50 feet).
If none of the following stressors occurs on either bank, check here and skip to Metric 22: ☐

Abuts LB	Abuts RB	< 30 feet LB	< 30 feet RB	30-50 feet LB	30-50 feet RB	
☐A	☐A	☐A	☐A	☐A	☐A	Row crops
☐B	☐B	☐B	☐B	☐B	☐B	Maintained turf
☐C	☐C	☐C	☐C	☐C	☐C	Pasture (no livestock)/commercial horticulture
☐D	☐D	☐D	☐D	☒D	☒D	Pasture (active livestock use)

22. Stem Density – streamside area metric (skip for Tidal Marsh Streams)
Consider for left bank (LB) and right bank (RB) for Metric 19 ("Wooded" Buffer Width).

LB	RB	
☒A	☒A	Medium to high stem density
☐B	☐B	Low stem density
☐C	☐C	No wooded riparian buffer or predominantly herbaceous species or bare ground

23. Continuity of Vegetated Buffer – streamside area metric (skip for Tidal Marsh Streams)
Consider whether vegetated buffer is continuous along stream (parallel). Breaks are areas lacking vegetation > 10 feet wide.

LB	RB	
☒A	☒A	The total length of buffer breaks is < 25 percent.
☐B	☐B	The total length of buffer breaks is between 25 and 50 percent.
☐C	☐C	The total length of buffer breaks is > 50 percent.

24. Vegetative Composition – streamside area metric (skip for Tidal Marsh Streams)
Evaluate the dominant vegetation within 100 feet of each bank or to the edge of the watershed (whichever comes first) as it contributes to assessment reach habitat.

LB	RB	
☐A	☐A	Vegetation is close to undisturbed in species present and their proportions. Lower strata composed of native species, with non-native invasive species absent or sparse.
☒B	☒B	Vegetation indicates disturbance in terms of species diversity or proportions, but is still largely composed of native species. This may include communities of weedy native species that develop after clear-cutting or clearing or communities with non-native invasive species present, but not dominant, over a large portion of the expected strata or communities missing understory but retaining canopy trees.
☐C	☐C	Vegetation is severely disturbed in terms of species diversity or proportions. Mature canopy is absent or communities with non-native invasive species dominant over a large portion of expected strata or communities composed of planted stands of non-characteristic species or communities inappropriately composed of a single species or no vegetation.

25. Conductivity – assessment reach metric (skip for all Coastal Plain streams)
25a. ☐Yes ☒No Was conductivity measurement recorded?
If No, select one of the following reasons. ☐No Water ☐Other: _____

25b. Check the box corresponding to the conductivity measurement (units of microsiemens per centimeter).
☐A < 46 ☐B 46 to < 67 ☐C 67 to < 79 ☐D 79 to < 230 ☐E ≥ 230

Notes/Sketch:
Cattle have access to the stream

Draft NC SAM Stream Rating Sheet
Accompanies User Manual Version 2.1

Stream Site Name	Morgan Branch Restoration Site	Date of Assessment	1/24/2018
Stream Category	Mb1	Assessor Name/Organization	J. Sullivan / KCI

Notes of Field Assessment Form (Y/N)	YES
Presence of regulatory considerations (Y/N)	NO
Additional stream information/supplementary measurements included (Y/N)	YES
NC SAM feature type (perennial, intermittent, Tidal Marsh Stream)	Intermittent

Function Class Rating Summary	USACE/ All Streams	NCDWR Intermittent
(1) Hydrology	**HIGH**	**HIGH**
(2) Baseflow	**HIGH**	**HIGH**
(2) Flood Flow	**HIGH**	**HIGH**
(3) Streamside Area Attenuation	**MEDIUM**	**MEDIUM**
(4) Floodplain Access	**MEDIUM**	**MEDIUM**
(4) Wooded Riparian Buffer	**HIGH**	**HIGH**
(4) Microtopography	NA	NA
(3) Stream Stability	**HIGH**	**HIGH**
(4) Channel Stability	**HIGH**	**HIGH**
(4) Sediment Transport	**HIGH**	**HIGH**
(4) Stream Geomorphology	**HIGH**	**HIGH**
(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	**HIGH**	**HIGH**
(2) Streamside Area Vegetation	**HIGH**	**HIGH**
(3) Upland Pollutant Filtration	**HIGH**	**HIGH**
(3) Thermoregulation	**MEDIUM**	**MEDIUM**
(2) Indicators of Stressors	**YES**	**YES**
(2) Aquatic Life Tolerance	**LOW**	**NA**
(2) Intertidal Zone Filtration	NA	NA
(1) Habitat	**MEDIUM**	**MEDIUM**
(2) In-stream Habitat	**MEDIUM**	**MEDIUM**
(3) Baseflow	**HIGH**	**HIGH**
(3) Substrate	**HIGH**	**HIGH**
(3) Stream Stability	**HIGH**	**HIGH**
(3) In-stream Habitat	**LOW**	**LOW**
(2) Stream-side Habitat	**MEDIUM**	**MEDIUM**
(3) Stream-side Habitat	**MEDIUM**	**MEDIUM**
(3) Thermoregulation	**MEDIUM**	**MEDIUM**
(2) Tidal Marsh In-stream Habitat	NA	NA
(3) Flow Restriction	NA	NA
(3) Tidal Marsh Stream Stability	NA	NA
(4) Tidal Marsh Channel Stability	NA	NA
(4) Tidal Marsh Stream Geomorphology	NA	NA
(3) Tidal Marsh In-stream Habitat	NA	NA
(2) Intertidal Zone	NA	NA
Overall	**MEDIUM**	**MEDIUM**

NC SAM FIELD ASSESSMENT RESULTS
Accompanies User Manual Version 2.1

USACE AID #: NCDWR #:

INSTRUCTIONS: Attach a sketch of the assessment area and photographs. Attach a copy of the USGS 7.5-minute topographic quadrangle, and circle the location of the stream reach under evaluation. If multiple stream reaches will be evaluated on the same property, identify and number all reaches on the attached map, and include a separate form for each reach. See the NC SAM User Manual for detailed descriptions and explanations of requested information. Record in the "Notes/Sketch" section if supplementary measurements were performed. See the NC SAM User Manual for examples of additional measurements that may be relevant.

NOTE EVIDENCE OF STRESSORS AFFECTING THE ASSESSMENT AREA (do not need to be within the assessment area).

PROJECT/SITE INFORMATION:

1. Project name (if any): Morgan Branch Restoration Site
2. Date of evaluation: 1/24/2018
3. Applicant/owner name: KCI
4. Assessor name/organization: J. Sullivan / KCI
5. County: Buncombe
6. Nearest named water body on USGS 7.5-minute quad: Morgan Branch
7. River basin: French Broad
8. Site coordinates (decimal degrees, at lower end of assessment reach): 35.6075 / -82.7458

STREAM INFORMATION: (depth and width can be approximations)

9. Site number (show on attached map): T5-R2, T6-R2
10. Length of assessment reach evaluated (feet): 50
11. Channel depth from bed (in riffle, if present) to top of bank (feet): 4 ☐Unable to assess channel depth.
12. Channel width at top of bank (feet): 3
13. Is assessment reach a swamp steam? ☐Yes ☐No
14. Feature type: ☐Perennial flow ☒Intermittent flow ☐Tidal Marsh Stream

STREAM CATEGORY INFORMATION:

15. NC SAM Zone: ☒ Mountains (M) ☐ Piedmont (P) ☐ Inner Coastal Plain (I) ☐ Outer Coastal Plain (O)
16. Estimated geomorphic valley shape (**skip for Tidal Marsh Stream**):
☒A  (more sinuous stream, flatter valley slope)
☐B  (less sinuous stream, steeper valley slope)
17. Watershed size: (**skip for Tidal Marsh Stream**) ☒Size 1 (< 0.1 mi^2) ☐Size 2 (0.1 to < 0.5 mi^2) ☐Size 3 (0.5 to < 5 mi^2) ☐Size 4 (≥ 5 mi^2)

ADDITIONAL INFORMATION:

18. Were regulatory considerations evaluated? ☒Yes ☐No If Yes, check all that apply to the assessment area.
☐Section 10 water ☐Classified Trout Waters ☐Water Supply Watershed (☐I ☐II ☐III ☐IV ☐V)
☐Essential Fish Habitat ☐Primary Nursery Area ☐ High Quality Waters/Outstanding Resource Waters
☐Publicly owned property ☐NCDWR Riparian buffer rule in effect ☐Nutrient Sensitive Waters
☐Anadromous fish ☐303(d) List ☐CAMA Area of Environmental Concern (AEC)
☐Documented presence of a federal and/or state listed protected species within the assessment area.
List species:
☐Designated Critical Habitat (list species)
19. Are additional stream information/supplementary measurements included in "Notes/Sketch" section or attached? ☒Yes ☐No

1. Channel Water – assessment reach metric (skip for Size 1 streams and Tidal Marsh Streams)

☒A Water throughout assessment reach.
☐B No flow, water in pools only.
☐C No water in assessment reach.

2. Evidence of Flow Restriction – assessment reach metric

☐A At least 10% of assessment reach in-stream habitat or riffle-pool sequence is severely affected by a flow restriction or fill to the point of obstructing flow or a channel choked with aquatic macrophytes or ponded water or impoundment on flood or ebb within the assessment reach (examples: undersized or perched culverts, causeways that constrict the channel, tidal gates, debris jams, beaver dams).
☒B Not A

3. Feature Pattern – assessment reach metric

☒A A majority of the assessment reach has altered pattern (examples: straightening, modification above or below culvert).
☐B Not A

4. Feature Longitudinal Profile – assessment reach metric

☒A Majority of assessment reach has a substantially altered stream profile (examples: channel down-cutting, existing damming, over widening, active aggradation, dredging, and excavation where appropriate channel profile has not reformed from any of these disturbances).
☐B Not A

5. Signs of Active Instability – assessment reach metric

Consider only current instability, not past events from which the stream has currently recovered. Examples of instability include active bank failure, active channel down-cutting (head-cut), active widening, and artificial hardening (such as concrete, gabion, rip-rap).

☐A < 10% of channel unstable
☒B 10 to 25% of channel unstable
☐C > 25% of channel unstable

6. Streamside Area Interaction – streamside area metric
Consider for the Left Bank (LB) and the Right Bank (RB).

LB	RB	
☐A	☐A	Little or no evidence of conditions that adversely affect reference interaction
☒B	☒B	Moderate evidence of conditions (examples: berms, levees, down-cutting, aggradation, dredging) that adversely affect reference interaction (examples: limited streamside area access, disruption of flood flows through streamside area, leaky or intermittent bulkheads, causeways with floodplain constriction, minor ditching [including mosquito ditching])
☐C	☐C	Extensive evidence of conditions that adversely affect reference interaction (little to no floodplain/intertidal zone access [examples: causeways with floodplain and channel constriction, bulkheads, retaining walls, fill, stream incision, disruption of flood flows through streamside area] or too much floodplain/intertidal zone access [examples: impoundments, intensive mosquito ditching]) or floodplain/intertidal zone unnaturally absent or assessment reach is a man-made feature on an interstream divide

7. Water Quality Stressors – assessment reach/intertidal zone metric
Check all that apply.

- ☐A Discolored water in stream or intertidal zone (milky white, blue, unnatural water discoloration, oil sheen, stream foam)
- ☐B Excessive sedimentation (burying of stream features or intertidal zone)
- ☐C Noticeable evidence of pollutant discharges entering the assessment reach and causing a water quality problem
- ☐D Odor (not including natural sulfide odors)
- ☐E Current published or collected data indicating degraded water quality in the assessment reach. Cite source in "Notes/Sketch" section.
- ☒F Livestock with access to stream or intertidal zone
- ☐G Excessive algae in stream or intertidal zone
- ☐H Degraded marsh vegetation in the intertidal zone (removal, burning, regular mowing, destruction, etc)
- ☐I Other: _____ (explain in "Notes/Sketch" section)
- ☐J Little to no stressors

8. Recent Weather – watershed metric (skip for Tidal Marsh Streams)
For Size 1 or 2 streams, D1 drought or higher is considered a drought; for Size 3 or 4 streams, D2 drought or higher is considered a drought.

- ☐A Drought conditions and no rainfall or rainfall not exceeding 1 inch within the last 48 hours
- ☐B Drought conditions and rainfall exceeding 1 inch within the last 48 hours
- ☒C No drought conditions

9. Large or Dangerous Stream – assessment reach metric
☐Yes ☒No Is stream is too large or dangerous to assess? If Yes, skip to Metric 13 (Streamside Area Ground Surface Condition).

10. Natural In-stream Habitat Types – assessment reach metric
10a. ☐Yes ☒No Degraded in-stream habitat over majority of the assessment reach (examples of stressors include excessive sedimentation, mining, excavation, in-stream hardening [for example, rip-rap], recent dredging, and snagging) **(evaluate for Size 4 Coastal Plain streams only, then skip to Metric 12)**

10b. **Check all that occur** (occurs if > 5% coverage of assessment reach) **(skip for Size 4 Coastal Plain streams)**

- ☐A Multiple aquatic macrophytes and aquatic mosses (include liverworts, lichens, and algal mats)
- ☐B Multiple sticks and/or leaf packs and/or emergent vegetation
- ☐C Multiple snags and logs (including lap trees)
- ☐D 5% undercut banks and/or root mats and/or roots in banks extend to the normal wetted perimeter
- ☒E Little or no habitat

Check for Tidal Marsh Streams Only

- ☐F 5% oysters or other natural hard bottoms
- ☐G Submerged aquatic vegetation
- ☐H Low-tide refugia (pools)
- ☐I Sand bottom
- ☐J 5% vertical bank along the marsh
- ☐K Little or no habitat

**************************************REMAINING QUESTIONS ARE NOT APPLICABLE FOR TIDAL MARSH STREAMS************************************

11. Bedform and Substrate – assessment reach metric (skip for Size 4 Coastal Plain streams and Tidal Marsh Streams)

11a. ☒Yes ☐No Is assessment reach in a natural sand-bed stream? **(skip for Coastal Plain streams)**

11b. Bedform evaluated. **Check the appropriate box(es).**

- ☒A Riffle-run section **(evaluate 11c)**
- ☒B Pool-glide section **(evaluate 11d)**
- ☐C Natural bedform absent **(skip to Metric 12, Aquatic Life)**

11c. In riffle sections, check all that occur below the normal wetted perimeter of the assessment reach – whether or not submerged. **Check at least one box in each row (skip for Size 4 Coastal Plain streams and Tidal Marsh Streams)**. Not Present (NP) = absent, Rare (R) = present but < 10%, Common (C) = > 10-40%, Abundant (A) = > 40-70%, Predominant (P) = > 70%. Cumulative percentages should not exceed 100% for each assessment reach.

NP	R	C	A	P	
☒	☐	☐	☐	☐	Bedrock/saprolite
☒	☐	☐	☐	☐	Boulder (256 – 4096 mm)
☐	☒	☐	☐	☐	Cobble (64 – 256 mm)
☐	☐	☒	☐	☐	Gravel (2 – 64 mm)
☐	☐	☒	☐	☐	Sand (.062 – 2 mm)
☐	☐	☒	☐	☐	Silt/clay (< 0.062 mm)
☒	☐	☐	☐	☐	Detritus
☒	☐	☐	☐	☐	Artificial (rip-rap, concrete, etc.)

11d. ☐Yes ☒No Are pools filled with sediment? (**skip for Size 4 Coastal Plain streams and Tidal Marsh Streams**)

12. Aquatic Life – assessment reach metric (skip for Tidal Marsh Streams)

12a. ☒Yes ☐No Was an in-stream aquatic life assessment performed as described in the User Manual?
If No, select one of the following reasons and skip to Metric 13. ☐No Water ☐Other: _____

12b. ☐Yes ☒No Are aquatic organisms present in the assessment reach (look in riffles, pools, then snags)? If Yes, check all that apply. If No, skip to Metric 13.

1	>1	Numbers over columns refer to "individuals" for Size 1 and 2 streams and "taxa" for Size 3 and 4 streams.
☐	☐	Adult frogs
☐	☐	Aquatic reptiles
☐	☐	Aquatic macrophytes and aquatic mosses (include liverworts, lichens, and algal mats)
☐	☐	Beetles
☐	☐	Caddisfly larvae (T)
☐	☐	Asian clam (*Corbicula*)
☐	☐	Crustacean (isopod/amphipod/crayfish/shrimp)
☐	☐	Damselfly and dragonfly larvae
☐	☐	Dipterans
☐	☐	Mayfly larvae (E)
☐	☐	Megaloptera (alderfly, fishfly, dobsonfly larvae)
☐	☐	Midges/mosquito larvae
☐	☐	Mosquito fish (*Gambusia*) or mud minnows (*Umbra pygmaea*)
☐	☐	Mussels/Clams (not *Corbicula*)
☐	☐	Other fish
☐	☐	Salamanders/tadpoles
☐	☐	Snails
☐	☐	Stonefly larvae (P)
☐	☐	Tipulid larvae
☐	☐	Worms/leeches

13. Streamside Area Ground Surface Condition – streamside area metric (skip for Tidal Marsh Streams and B valley types)
Consider for the Left Bank (LB) and the Right Bank (RB). Consider storage capacity with regard to both overbank flow and upland runoff.

LB	RB	
☐A	☐A	Little or no alteration to water storage capacity over a majority of the streamside area
☒B	☐B	Moderate alteration to water storage capacity over a majority of the streamside area
☐C	☒C	Severe alteration to water storage capacity over a majority of the streamside area (examples: ditches, fill, soil compaction, livestock disturbance, buildings, man-made levees, drainage pipes)

14. Streamside Area Water Storage – streamside area metric (skip for Size 1 streams, Tidal Marsh Streams, and B valley types)
Consider for the Left Bank (LB) and the Right Bank (RB) of the streamside area.

LB	RB	
☐A	☐A	Majority of streamside area with depressions able to pond water ≥ 6 inches deep
☐B	☐B	Majority of streamside area with depressions able to pond water 3 to 6 inches deep
☒C	☒C	Majority of streamside area with depressions able to pond water < 3 inches deep

15. Wetland Presence – streamside area metric (skip for Tidal Marsh Streams)
Consider for the Left Bank (LB) and the Right Bank (RB). Do not consider wetlands outside of the streamside area or within the normal wetted perimeter of assessment reach.

LB	RB	
☐Y	☐Y	Are wetlands present in the streamside area?
☒N	☒N	

16. Baseflow Contributors – assessment reach metric (skip for Size 4 streams and Tidal Marsh Streams)
Check all contributors within the assessment reach or within view of <u>and</u> draining to the assessment reach.

- ☐A Streams and/or springs (jurisdictional discharges)
- ☐B Ponds (include wet detention basins; do not include sediment basins or dry detention basins)
- ☐C Obstruction passing flow during low-flow periods within the assessment area (beaver dam, leaky dam, bottom-release dam, weir)
- ☐D Evidence of bank seepage or sweating (iron in water indicates seepage)
- ☒E Stream bed or bank soil reduced (dig through deposited sediment if present)
- ☐F None of the above

17. Baseflow Detractors – assessment area metric (skip for Tidal Marsh Streams)
Check all that apply.

- ☐A Evidence of substantial water withdrawals from the assessment reach (includes areas excavated for pump installation)
- ☐B Obstruction not passing flow during low-flow periods affecting the assessment reach (ex: watertight dam, sediment deposit)
- ☐C Urban stream (≥ 24% impervious surface for watershed)
- ☐D Evidence that the streamside area has been modified resulting in accelerated drainage into the assessment reach
- ☐E Assessment reach relocated to valley edge
- ☒F None of the above

18. Shading – assessment reach metric (skip for Tidal Marsh Streams)
Consider aspect. Consider "leaf-on" condition.

- ☐A Stream shading is appropriate for stream category (may include gaps associated with natural processes)
- ☐B Degraded (example: scattered trees)
- ☒C Stream shading is gone or largely absent

19. Buffer Width – streamside area metric (skip for Tidal Marsh Streams)
Consider "vegetated buffer" and "wooded buffer" separately for left bank (LB) and right bank (RB) starting at the top of bank out to the first break.

Vegetated LB	Vegetated RB	Wooded LB	Wooded RB	
☒A	☒A	☐A	☐A	≥ 100 feet wide or extends to the edge of the watershed
☐B	☐B	☐B	☐B	From 50 to < 100 feet wide
☐C	☐C	☐C	☐C	From 30 to < 50 feet wide
☐D	☐D	☐D	☐D	From 10 to < 30 feet wide
☐E	☐E	☒E	☒E	< 10 feet wide or no trees

20. Buffer Structure – streamside area metric (skip for Tidal Marsh Streams)
Consider for left bank (LB) and right bank (RB) for Metric 19 ("Vegetated" Buffer Width).

LB	RB	
☐A	☐A	Mature forest
☐B	☐B	Non-mature woody vegetation or modified vegetation structure
☒C	☒C	Herbaceous vegetation with or without a strip of trees < 10 feet wide
☐D	☐D	Maintained shrubs
☐E	☐E	Little or no vegetation

21. Buffer Stressors – streamside area metric (skip for Tidal Marsh Streams)
Check all appropriate boxes for left bank (LB) and right bank (RB). Indicate if listed stressor abuts stream (Abuts), does not abut but is within 30 feet of stream (< 30 feet), or is between 30 to 50 feet of stream (30-50 feet).
If none of the following stressors occurs on either bank, check here and skip to Metric 22: ☐

Abuts LB	Abuts RB	< 30 feet LB	< 30 feet RB	30-50 feet LB	30-50 feet RB	
☐A	☐A	☐A	☐A	☐A	☐A	Row crops
☐B	☐B	☐B	☐B	☐B	☐B	Maintained turf
☒C	☐C	☐C	☐C	☐C	☐C	Pasture (no livestock)/commercial horticulture
☐D	☒D	☐D	☐D	☐D	☐D	Pasture (active livestock use)

22. Stem Density – streamside area metric (skip for Tidal Marsh Streams)
Consider for left bank (LB) and right bank (RB) for Metric 19 ("Wooded" Buffer Width).

LB	RB	
☐A	☐A	Medium to high stem density
☐B	☐B	Low stem density
☒C	☒C	No wooded riparian buffer or predominantly herbaceous species or bare ground

23. Continuity of Vegetated Buffer – streamside area metric (skip for Tidal Marsh Streams)
Consider whether vegetated buffer is continuous along stream (parallel). Breaks are areas lacking vegetation > 10 feet wide.

LB	RB	
☒A	☒A	The total length of buffer breaks is < 25 percent.
☐B	☐B	The total length of buffer breaks is between 25 and 50 percent.
☐C	☐C	The total length of buffer breaks is > 50 percent.

24. Vegetative Composition – streamside area metric (skip for Tidal Marsh Streams)
Evaluate the dominant vegetation within 100 feet of each bank or to the edge of the watershed (whichever comes first) as it contributes to assessment reach habitat.

LB	RB	
☐A	☐A	Vegetation is close to undisturbed in species present and their proportions. Lower strata composed of native species, with non-native invasive species absent or sparse.
☐B	☐B	Vegetation indicates disturbance in terms of species diversity or proportions, but is still largely composed of native species. This may include communities of weedy native species that develop after clear-cutting or clearing or communities with non-native invasive species present, but not dominant, over a large portion of the expected strata or communities missing understory but retaining canopy trees.
☒C	☒C	Vegetation is severely disturbed in terms of species diversity or proportions. Mature canopy is absent or communities with non-native invasive species dominant over a large portion of expected strata or communities composed of planted stands of non-characteristic species or communities inappropriately composed of a single species or no vegetation.

25. Conductivity – assessment reach metric (skip for all Coastal Plain streams)
25a. ☐Yes ☒No Was conductivity measurement recorded?
If No, select one of the following reasons. ☐No Water ☐Other: _____

25b. Check the box corresponding to the conductivity measurement (units of microsiemens per centimeter).
☐A < 46 ☐B 46 to < 67 ☐C 67 to < 79 ☐D 79 to < 230 ☐E ≥ 230

Notes/Sketch:
Cattle have access to the stream

Draft NC SAM Stream Rating Sheet
Accompanies User Manual Version 2.1

Stream Site Name	Morgan Branch Restoration Site	Date of Assessment	1/24/2018
Stream Category	Ma1	Assessor Name/Organization	J. Sullivan / KCI

Notes of Field Assessment Form (Y/N)	YES
Presence of regulatory considerations (Y/N)	NO
Additional stream information/supplementary measurements included (Y/N)	YES
NC SAM feature type (perennial, intermittent, Tidal Marsh Stream)	Intermittent

Function Class Rating Summary	USACE/ All Streams	NCDWR Intermittent
(1) Hydrology	**LOW**	**LOW**
(2) Baseflow	**HIGH**	**HIGH**
(2) Flood Flow	**LOW**	**LOW**
(3) Streamside Area Attenuation	**LOW**	**LOW**
(4) Floodplain Access	**MEDIUM**	**MEDIUM**
(4) Wooded Riparian Buffer	**LOW**	**LOW**
(4) Microtopography	**LOW**	**LOW**
(3) Stream Stability	**MEDIUM**	**MEDIUM**
(4) Channel Stability	**MEDIUM**	**MEDIUM**
(4) Sediment Transport	**HIGH**	**HIGH**
(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	**LOW**	**LOW**
(2) Baseflow	**HIGH**	**HIGH**
(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	**LOW**	**NA**
(2) Intertidal Zone Filtration	NA	NA
(1) Habitat	**LOW**	**LOW**
(2) In-stream Habitat	**MEDIUM**	**MEDIUM**
(3) Baseflow	**HIGH**	**HIGH**
(3) Substrate	**HIGH**	**HIGH**
(3) Stream Stability	**MEDIUM**	**MEDIUM**
(3) In-stream Habitat	**LOW**	**LOW**
(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	NA	NA
Overall	**LOW**	**LOW**

NC SAM FIELD ASSESSMENT RESULTS
Accompanies User Manual Version 2.1

USACE AID #: NCDWR #:

INSTRUCTIONS: Attach a sketch of the assessment area and photographs. Attach a copy of the USGS 7.5-minute topographic quadrangle, and circle the location of the stream reach under evaluation. If multiple stream reaches will be evaluated on the same property, identify and number all reaches on the attached map, and include a separate form for each reach. See the NC SAM User Manual for detailed descriptions and explanations of requested information. Record in the "Notes/Sketch" section if supplementary measurements were performed. See the NC SAM User Manual for examples of additional measurements that may be relevant.

NOTE EVIDENCE OF STRESSORS AFFECTING THE ASSESSMENT AREA (do not need to be within the assessment area).

PROJECT/SITE INFORMATION:

1. Project name (if any): Morgan Branch Restoration Site
2. Date of evaluation: 1/24/2018
3. Applicant/owner name: KCI
4. Assessor name/organization: J. Sullivan / KCI
5. County: Buncombe
6. Nearest named water body on USGS 7.5-minute quad: Morgan Branch
7. River basin: French Broad
8. Site coordinates (decimal degrees, at lower end of assessment reach): 35.6067 / -82.7451

STREAM INFORMATION: (depth and width can be approximations)

9. Site number (show on attached map): T6-R1
10. Length of assessment reach evaluated (feet): 50
11. Channel depth from bed (in riffle, if present) to top of bank (feet): 4 ☐Unable to assess channel depth.
12. Channel width at top of bank (feet): 3
13. Is assessment reach a swamp steam? ☐Yes ☐No
14. Feature type: ☐Perennial flow ☒Intermittent flow ☐Tidal Marsh Stream

STREAM CATEGORY INFORMATION:

15. NC SAM Zone: ☒ Mountains (M) ☐ Piedmont (P) ☐ Inner Coastal Plain (I) ☐ Outer Coastal Plain (O)
16. Estimated geomorphic valley shape (**skip for Tidal Marsh Stream**):
☐A  (more sinuous stream, flatter valley slope)
☒B  (less sinuous stream, steeper valley slope)
17. Watershed size: (**skip for Tidal Marsh Stream**) ☒Size 1 (< 0.1 mi^2) ☐Size 2 (0.1 to < 0.5 mi^2) ☐Size 3 (0.5 to < 5 mi^2) ☐Size 4 (≥ 5 mi^2)

ADDITIONAL INFORMATION:

18. Were regulatory considerations evaluated? ☒Yes ☐No If Yes, check all that apply to the assessment area.
☐Section 10 water ☐Classified Trout Waters ☐Water Supply Watershed (☐I ☐II ☐III ☐IV ☐V)
☐Essential Fish Habitat ☐Primary Nursery Area ☐ High Quality Waters/Outstanding Resource Waters
☐Publicly owned property ☐NCDWR Riparian buffer rule in effect ☐Nutrient Sensitive Waters
☐Anadromous fish ☐303(d) List ☐CAMA Area of Environmental Concern (AEC)
☐Documented presence of a federal and/or state listed protected species within the assessment area.
List species:
☐Designated Critical Habitat (list species)
19. Are additional stream information/supplementary measurements included in "Notes/Sketch" section or attached? ☒Yes ☐No

1. Channel Water – assessment reach metric (skip for Size 1 streams and Tidal Marsh Streams)
☒A Water throughout assessment reach.
☐B No flow, water in pools only.
☐C No water in assessment reach.

2. Evidence of Flow Restriction – assessment reach metric
☐A At least 10% of assessment reach in-stream habitat or riffle-pool sequence is severely affected by a flow restriction or fill to the point of obstructing flow or a channel choked with aquatic macrophytes or ponded water or impoundment on flood or ebb within the assessment reach (examples: undersized or perched culverts, causeways that constrict the channel, tidal gates, debris jams, beaver dams).
☒B Not A

3. Feature Pattern – assessment reach metric
☒A A majority of the assessment reach has altered pattern (examples: straightening, modification above or below culvert).
☐B Not A

4. Feature Longitudinal Profile – assessment reach metric
☐A Majority of assessment reach has a substantially altered stream profile (examples: channel down-cutting, existing damming, over widening, active aggradation, dredging, and excavation where appropriate channel profile has not reformed from any of these disturbances).
☒B Not A

5. Signs of Active Instability – assessment reach metric
Consider only current instability, not past events from which the stream has currently recovered. Examples of instability include active bank failure, active channel down-cutting (head-cut), active widening, and artificial hardening (such as concrete, gabion, rip-rap).
☒A < 10% of channel unstable
☐B 10 to 25% of channel unstable
☐C > 25% of channel unstable

6. Streamside Area Interaction – streamside area metric
Consider for the Left Bank (LB) and the Right Bank (RB).

LB	RB	
☐A	☐A	Little or no evidence of conditions that adversely affect reference interaction
☒B	☒B	Moderate evidence of conditions (examples: berms, levees, down-cutting, aggradation, dredging) that adversely affect reference interaction (examples: limited streamside area access, disruption of flood flows through streamside area, leaky or intermittent bulkheads, causeways with floodplain constriction, minor ditching [including mosquito ditching])
☐C	☐C	Extensive evidence of conditions that adversely affect reference interaction (little to no floodplain/intertidal zone access [examples: causeways with floodplain and channel constriction, bulkheads, retaining walls, fill, stream incision, disruption of flood flows through streamside area] or too much floodplain/intertidal zone access [examples: impoundments, intensive mosquito ditching]) or floodplain/intertidal zone unnaturally absent or assessment reach is a man-made feature on an interstream divide

7. Water Quality Stressors – assessment reach/intertidal zone metric
Check all that apply.

- ☐A Discolored water in stream or intertidal zone (milky white, blue, unnatural water discoloration, oil sheen, stream foam)
- ☐B Excessive sedimentation (burying of stream features or intertidal zone)
- ☐C Noticeable evidence of pollutant discharges entering the assessment reach and causing a water quality problem
- ☐D Odor (not including natural sulfide odors)
- ☐E Current published or collected data indicating degraded water quality in the assessment reach. Cite source in "Notes/Sketch" section.
- ☒F Livestock with access to stream or intertidal zone
- ☐G Excessive algae in stream or intertidal zone
- ☐H Degraded marsh vegetation in the intertidal zone (removal, burning, regular mowing, destruction, etc)
- ☐I Other: _____ (explain in "Notes/Sketch" section)
- ☐J Little to no stressors

8. Recent Weather – watershed metric (skip for Tidal Marsh Streams)
For Size 1 or 2 streams, D1 drought or higher is considered a drought; for Size 3 or 4 streams, D2 drought or higher is considered a drought.

- ☐A Drought conditions and no rainfall or rainfall not exceeding 1 inch within the last 48 hours
- ☐B Drought conditions and rainfall exceeding 1 inch within the last 48 hours
- ☒C No drought conditions

9. Large or Dangerous Stream – assessment reach metric
☐Yes ☒No Is stream is too large or dangerous to assess? If Yes, skip to Metric 13 (Streamside Area Ground Surface Condition).

10. Natural In-stream Habitat Types – assessment reach metric
10a. ☐Yes ☒No Degraded in-stream habitat over majority of the assessment reach (examples of stressors include excessive sedimentation, mining, excavation, in-stream hardening [for example, rip-rap], recent dredging, and snagging) **(evaluate for Size 4 Coastal Plain streams only, then skip to Metric 12)**

10b. **Check all that occur** (occurs if > 5% coverage of assessment reach) **(skip for Size 4 Coastal Plain streams)**

- ☐A Multiple aquatic macrophytes and aquatic mosses (include liverworts, lichens, and algal mats)
- ☐B Multiple sticks and/or leaf packs and/or emergent vegetation
- ☐C Multiple snags and logs (including lap trees)
- ☐D 5% undercut banks and/or root mats and/or roots in banks extend to the normal wetted perimeter
- ☒E Little or no habitat

Check for Tidal Marsh Streams Only

- ☐F 5% oysters or other natural hard bottoms
- ☐G Submerged aquatic vegetation
- ☐H Low-tide refugia (pools)
- ☐I Sand bottom
- ☐J 5% vertical bank along the marsh
- ☐K Little or no habitat

**************************************REMAINING QUESTIONS ARE NOT APPLICABLE FOR TIDAL MARSH STREAMS************************************

11. Bedform and Substrate – assessment reach metric (skip for Size 4 Coastal Plain streams and Tidal Marsh Streams)

11a. ☒Yes ☐No Is assessment reach in a natural sand-bed stream? **(skip for Coastal Plain streams)**

11b. Bedform evaluated. **Check the appropriate box(es).**

- ☒A Riffle-run section **(evaluate 11c)**
- ☒B Pool-glide section **(evaluate 11d)**
- ☐C Natural bedform absent **(skip to Metric 12, Aquatic Life)**

11c. In riffle sections, check all that occur below the normal wetted perimeter of the assessment reach – whether or not submerged. **Check at least one box in each row (skip for Size 4 Coastal Plain streams and Tidal Marsh Streams)**. Not Present (NP) = absent, Rare (R) = present but < 10%, Common (C) = > 10-40%, Abundant (A) = > 40-70%, Predominant (P) = > 70%. Cumulative percentages should not exceed 100% for each assessment reach.

NP	R	C	A	P	
☒	☐	☐	☐	☐	Bedrock/saprolite
☒	☐	☐	☐	☐	Boulder (256 – 4096 mm)
☐	☒	☐	☐	☐	Cobble (64 – 256 mm)
☐	☐	☒	☐	☐	Gravel (2 – 64 mm)
☐	☐	☒	☐	☐	Sand (.062 – 2 mm)
☐	☐	☒	☐	☐	Silt/clay (< 0.062 mm)
☒	☐	☐	☐	☐	Detritus
☒	☐	☐	☐	☐	Artificial (rip-rap, concrete, etc.)

11d. ☐Yes ☒No Are pools filled with sediment? (**skip for Size 4 Coastal Plain streams and Tidal Marsh Streams**)

12. Aquatic Life – assessment reach metric (skip for Tidal Marsh Streams)

12a. ☒Yes ☐No Was an in-stream aquatic life assessment performed as described in the User Manual?
If No, select one of the following reasons and skip to Metric 13. ☐No Water ☐Other: _____

12b. ☐Yes ☒No Are aquatic organisms present in the assessment reach (look in riffles, pools, then snags)? If Yes, check all that apply. If No, skip to Metric 13.

1	>1	Numbers over columns refer to "individuals" for Size 1 and 2 streams and "taxa" for Size 3 and 4 streams.
☐	☐	Adult frogs
☐	☐	Aquatic reptiles
☐	☐	Aquatic macrophytes and aquatic mosses (include liverworts, lichens, and algal mats)
☐	☐	Beetles
☐	☐	Caddisfly larvae (T)
☐	☐	Asian clam (*Corbicula*)
☐	☐	Crustacean (isopod/amphipod/crayfish/shrimp)
☐	☐	Damselfly and dragonfly larvae
☐	☐	Dipterans
☐	☐	Mayfly larvae (E)
☐	☐	Megaloptera (alderfly, fishfly, dobsonfly larvae)
☐	☐	Midges/mosquito larvae
☐	☐	Mosquito fish (*Gambusia*) or mud minnows (*Umbra pygmaea*)
☐	☐	Mussels/Clams (not *Corbicula*)
☐	☐	Other fish
☐	☐	Salamanders/tadpoles
☐	☐	Snails
☐	☐	Stonefly larvae (P)
☐	☐	Tipulid larvae
☐	☐	Worms/leeches

13. Streamside Area Ground Surface Condition – streamside area metric (skip for Tidal Marsh Streams and B valley types)
Consider for the Left Bank (LB) and the Right Bank (RB). Consider storage capacity with regard to both overbank flow and upland runoff.

LB	RB	
☐A	☒A	Little or no alteration to water storage capacity over a majority of the streamside area
☒B	☐B	Moderate alteration to water storage capacity over a majority of the streamside area
☐C	☐C	Severe alteration to water storage capacity over a majority of the streamside area (examples: ditches, fill, soil compaction, livestock disturbance, buildings, man-made levees, drainage pipes)

14. Streamside Area Water Storage – streamside area metric (skip for Size 1 streams, Tidal Marsh Streams, and B valley types)
Consider for the Left Bank (LB) and the Right Bank (RB) of the streamside area.

LB	RB	
☐A	☐A	Majority of streamside area with depressions able to pond water ≥ 6 inches deep
☐B	☒B	Majority of streamside area with depressions able to pond water 3 to 6 inches deep
☒C	☐C	Majority of streamside area with depressions able to pond water < 3 inches deep

15. Wetland Presence – streamside area metric (skip for Tidal Marsh Streams)
Consider for the Left Bank (LB) and the Right Bank (RB). Do not consider wetlands outside of the streamside area or within the normal wetted perimeter of assessment reach.

LB	RB	
☒Y	☒Y	Are wetlands present in the streamside area?
☐N	☐N	

16. Baseflow Contributors – assessment reach metric (skip for Size 4 streams and Tidal Marsh Streams)
Check all contributors within the assessment reach or within view of <u>and</u> draining to the assessment reach.

- ☐A Streams and/or springs (jurisdictional discharges)
- ☐B Ponds (include wet detention basins; do not include sediment basins or dry detention basins)
- ☐C Obstruction passing flow during low-flow periods within the assessment area (beaver dam, leaky dam, bottom-release dam, weir)
- ☐D Evidence of bank seepage or sweating (iron in water indicates seepage)
- ☒E Stream bed or bank soil reduced (dig through deposited sediment if present)
- ☐F None of the above

17. Baseflow Detractors – assessment area metric (skip for Tidal Marsh Streams)
Check all that apply.

- ☐A Evidence of substantial water withdrawals from the assessment reach (includes areas excavated for pump installation)
- ☐B Obstruction not passing flow during low-flow periods affecting the assessment reach (ex: watertight dam, sediment deposit)
- ☐C Urban stream (≥ 24% impervious surface for watershed)
- ☐D Evidence that the streamside area has been modified resulting in accelerated drainage into the assessment reach
- ☐E Assessment reach relocated to valley edge
- ☒F None of the above

18. Shading – assessment reach metric (skip for Tidal Marsh Streams)
Consider aspect. Consider "leaf-on" condition.

- ☐A Stream shading is appropriate for stream category (may include gaps associated with natural processes)
- ☒B Degraded (example: scattered trees)
- ☐C Stream shading is gone or largely absent

19. Buffer Width – streamside area metric (skip for Tidal Marsh Streams)

Consider "vegetated buffer" and "wooded buffer" separately for left bank (LB) and right bank (RB) starting at the top of bank out to the first break.

Vegetated LB	Vegetated RB	Wooded LB	Wooded RB	
☒A	☒A	☐A	☐A	≥ 100 feet wide or extends to the edge of the watershed
☐B	☐B	☐B	☒B	From 50 to < 100 feet wide
☐C	☐C	☐C	☐C	From 30 to < 50 feet wide
☐D	☐D	☐D	☐D	From 10 to < 30 feet wide
☐E	☐E	☒E	☐E	< 10 feet wide or no trees

20. Buffer Structure – streamside area metric (skip for Tidal Marsh Streams)

Consider for left bank (LB) and right bank (RB) for Metric 19 ("Vegetated" Buffer Width).

LB	RB	
☐A	☐A	Mature forest
☒B	☒B	Non-mature woody vegetation or modified vegetation structure
☐C	☐C	Herbaceous vegetation with or without a strip of trees < 10 feet wide
☐D	☐D	Maintained shrubs
☐E	☐E	Little or no vegetation

21. Buffer Stressors – streamside area metric (skip for Tidal Marsh Streams)

Check all appropriate boxes for left bank (LB) and right bank (RB). Indicate if listed stressor abuts stream (Abuts), does not abut but is within 30 feet of stream (< 30 feet), or is between 30 to 50 feet of stream (30-50 feet).

If none of the following stressors occurs on either bank, check here and skip to Metric 22: ☐

Abuts LB	Abuts RB	< 30 feet LB	< 30 feet RB	30-50 feet LB	30-50 feet RB	
☐A	☐A	☐A	☐A	☐A	☐A	Row crops
☐B	☐B	☐B	☐B	☐B	☐B	Maintained turf
☐C	☐C	☐C	☐C	☐C	☐C	Pasture (no livestock)/commercial horticulture
☒D	☒D	☐D	☐D	☐D	☐D	Pasture (active livestock use)

22. Stem Density – streamside area metric (skip for Tidal Marsh Streams)

Consider for left bank (LB) and right bank (RB) for Metric 19 ("Wooded" Buffer Width).

LB	RB	
☒A	☒A	Medium to high stem density
☐B	☐B	Low stem density
☐C	☐C	No wooded riparian buffer or predominantly herbaceous species or bare ground

23. Continuity of Vegetated Buffer – streamside area metric (skip for Tidal Marsh Streams)

Consider whether vegetated buffer is continuous along stream (parallel). Breaks are areas lacking vegetation > 10 feet wide.

LB	RB	
☒A	☒A	The total length of buffer breaks is < 25 percent.
☐B	☐B	The total length of buffer breaks is between 25 and 50 percent.
☐C	☐C	The total length of buffer breaks is > 50 percent.

24. Vegetative Composition – streamside area metric (skip for Tidal Marsh Streams)

Evaluate the dominant vegetation within 100 feet of each bank or to the edge of the watershed (whichever comes first) as it contributes to assessment reach habitat.

LB	RB	
☐A	☐A	Vegetation is close to undisturbed in species present and their proportions. Lower strata composed of native species, with non-native invasive species absent or sparse.
☒B	☒B	Vegetation indicates disturbance in terms of species diversity or proportions, but is still largely composed of native species. This may include communities of weedy native species that develop after clear-cutting or clearing or communities with non-native invasive species present, but not dominant, over a large portion of the expected strata or communities missing understory but retaining canopy trees.
☐C	☐C	Vegetation is severely disturbed in terms of species diversity or proportions. Mature canopy is absent or communities with non-native invasive species dominant over a large portion of expected strata or communities composed of planted stands of non-characteristic species or communities inappropriately composed of a single species or no vegetation.

25. Conductivity – assessment reach metric (skip for all Coastal Plain streams)

25a. ☐Yes ☒No Was conductivity measurement recorded?
If No, select one of the following reasons. ☐No Water ☐Other: _____

25b. Check the box corresponding to the conductivity measurement (units of microsiemens per centimeter).
☐A < 46 ☐B 46 to < 67 ☐C 67 to < 79 ☐D 79 to < 230 ☐E ≥ 230

Notes/Sketch:
Cattle have access to the stream

Draft NC SAM Stream Rating Sheet
Accompanies User Manual Version 2.1

Stream Site Name	Morgan Branch Restoration Site	Date of Assessment	1/24/2018
Stream Category	Mb1	Assessor Name/Organization	J. Sullivan / KCI

Notes of Field Assessment Form (Y/N)	YES
Presence of regulatory considerations (Y/N)	NO
Additional stream information/supplementary measurements included (Y/N)	YES
NC SAM feature type (perennial, intermittent, Tidal Marsh Stream)	Intermittent

Function Class Rating Summary	USACE/ All Streams	NCDWR Intermittent
(1) Hydrology	**HIGH**	**HIGH**
(2) Baseflow	**HIGH**	**HIGH**
(2) Flood Flow	**HIGH**	**HIGH**
(3) Streamside Area Attenuation	**MEDIUM**	**MEDIUM**
(4) Floodplain Access	**MEDIUM**	**MEDIUM**
(4) Wooded Riparian Buffer	**MEDIUM**	**MEDIUM**
(4) Microtopography	NA	NA
(3) Stream Stability	**HIGH**	**HIGH**
(4) Channel Stability	**HIGH**	**HIGH**
(4) Sediment Transport	**HIGH**	**HIGH**
(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	**HIGH**	**HIGH**
(2) Streamside Area Vegetation	**LOW**	**LOW**
(3) Upland Pollutant Filtration	**LOW**	**LOW**
(3) Thermoregulation	**MEDIUM**	**MEDIUM**
(2) Indicators of Stressors	**YES**	**YES**
(2) Aquatic Life Tolerance	**LOW**	**NA**
(2) Intertidal Zone Filtration	NA	NA
(1) Habitat	**MEDIUM**	**MEDIUM**
(2) In-stream Habitat	**MEDIUM**	**MEDIUM**
(3) Baseflow	**HIGH**	**HIGH**
(3) Substrate	**HIGH**	**HIGH**
(3) Stream Stability	**HIGH**	**HIGH**
(3) In-stream Habitat	**LOW**	**LOW**
(2) Stream-side Habitat	**MEDIUM**	**MEDIUM**
(3) Stream-side Habitat	**MEDIUM**	**MEDIUM**
(3) Thermoregulation	**MEDIUM**	**MEDIUM**
(2) Tidal Marsh In-stream Habitat	NA	NA
(3) Flow Restriction	NA	NA
(3) Tidal Marsh Stream Stability	NA	NA
(4) Tidal Marsh Channel Stability	NA	NA
(4) Tidal Marsh Stream Geomorphology	NA	NA
(3) Tidal Marsh In-stream Habitat	NA	NA
(2) Intertidal Zone	NA	NA
Overall	**MEDIUM**	**MEDIUM**

NC SAM FIELD ASSESSMENT RESULTS
Accompanies User Manual Version 2.1

USACE AID #: NCDWR #:

INSTRUCTIONS: Attach a sketch of the assessment area and photographs. Attach a copy of the USGS 7.5-minute topographic quadrangle, and circle the location of the stream reach under evaluation. If multiple stream reaches will be evaluated on the same property, identify and number all reaches on the attached map, and include a separate form for each reach. See the NC SAM User Manual for detailed descriptions and explanations of requested information. Record in the "Notes/Sketch" section if supplementary measurements were performed. See the NC SAM User Manual for examples of additional measurements that may be relevant.

NOTE EVIDENCE OF STRESSORS AFFECTING THE ASSESSMENT AREA (do not need to be within the assessment area).

PROJECT/SITE INFORMATION:

1. Project name (if any): Morgan Branch Restoration Site
2. Date of evaluation: 1/24/2018
3. Applicant/owner name: KCI
4. Assessor name/organization: J. Sullivan / KCI
5. County: Buncombe
6. Nearest named water body on USGS 7.5-minute quad: Morgan Branch
7. River basin: French Broad
8. Site coordinates (decimal degrees, at lower end of assessment reach): 35.6102 / -82.7407

STREAM INFORMATION: (depth and width can be approximations)

9. Site number (show on attached map): T7
10. Length of assessment reach evaluated (feet): 50
11. Channel depth from bed (in riffle, if present) to top of bank (feet): 5 ☐Unable to assess channel depth.
12. Channel width at top of bank (feet): 4
13. Is assessment reach a swamp steam? ☐Yes ☐No
14. Feature type: ☒Perennial flow ☐Intermittent flow ☐Tidal Marsh Stream

STREAM CATEGORY INFORMATION:

15. NC SAM Zone: ☒ Mountains (M) ☐ Piedmont (P) ☐ Inner Coastal Plain (I) ☐ Outer Coastal Plain (O)
16. Estimated geomorphic valley shape (**skip for Tidal Marsh Stream**):
☐A  (more sinuous stream, flatter valley slope)
☒B  (less sinuous stream, steeper valley slope)
17. Watershed size: (**skip for Tidal Marsh Stream**) ☒Size 1 (< 0.1 mi^2) ☐Size 2 (0.1 to < 0.5 mi^2) ☐Size 3 (0.5 to < 5 mi^2) ☐Size 4 (≥ 5 mi^2)

ADDITIONAL INFORMATION:

18. Were regulatory considerations evaluated? ☒Yes ☐No If Yes, check all that apply to the assessment area.
☐Section 10 water ☐Classified Trout Waters ☐Water Supply Watershed (☐I ☐II ☐III ☐IV ☐V)
☐Essential Fish Habitat ☐Primary Nursery Area ☐ High Quality Waters/Outstanding Resource Waters
☐Publicly owned property ☐NCDWR Riparian buffer rule in effect ☐Nutrient Sensitive Waters
☐Anadromous fish ☐303(d) List ☐CAMA Area of Environmental Concern (AEC)
☐Documented presence of a federal and/or state listed protected species within the assessment area.
List species:
☐Designated Critical Habitat (list species)
19. Are additional stream information/supplementary measurements included in "Notes/Sketch" section or attached? ☒Yes ☐No

1. Channel Water – assessment reach metric (skip for Size 1 streams and Tidal Marsh Streams)

☒A Water throughout assessment reach.
☐B No flow, water in pools only.
☐C No water in assessment reach.

2. Evidence of Flow Restriction – assessment reach metric

☐A At least 10% of assessment reach in-stream habitat or riffle-pool sequence is severely affected by a flow restriction or fill to the point of obstructing flow or a channel choked with aquatic macrophytes or ponded water or impoundment on flood or ebb within the assessment reach (examples: undersized or perched culverts, causeways that constrict the channel, tidal gates, debris jams, beaver dams).
☒B Not A

3. Feature Pattern – assessment reach metric

☒A A majority of the assessment reach has altered pattern (examples: straightening, modification above or below culvert).
☐B Not A

4. Feature Longitudinal Profile – assessment reach metric

☒A Majority of assessment reach has a substantially altered stream profile (examples: channel down-cutting, existing damming, over widening, active aggradation, dredging, and excavation where appropriate channel profile has not reformed from any of these disturbances).
☐B Not A

5. Signs of Active Instability – assessment reach metric

Consider only current instability, not past events from which the stream has currently recovered. Examples of instability include active bank failure, active channel down-cutting (head-cut), active widening, and artificial hardening (such as concrete, gabion, rip-rap).

☐A < 10% of channel unstable
☒B 10 to 25% of channel unstable
☐C > 25% of channel unstable

6. Streamside Area Interaction – streamside area metric
Consider for the Left Bank (LB) and the Right Bank (RB).

LB	RB	
☐A	☐A	Little or no evidence of conditions that adversely affect reference interaction
☒B	☒B	Moderate evidence of conditions (examples: berms, levees, down-cutting, aggradation, dredging) that adversely affect reference interaction (examples: limited streamside area access, disruption of flood flows through streamside area, leaky or intermittent bulkheads, causeways with floodplain constriction, minor ditching [including mosquito ditching])
☐C	☐C	Extensive evidence of conditions that adversely affect reference interaction (little to no floodplain/intertidal zone access [examples: causeways with floodplain and channel constriction, bulkheads, retaining walls, fill, stream incision, disruption of flood flows through streamside area] or too much floodplain/intertidal zone access [examples: impoundments, intensive mosquito ditching]) or floodplain/intertidal zone unnaturally absent or assessment reach is a man-made feature on an interstream divide

7. Water Quality Stressors – assessment reach/intertidal zone metric
Check all that apply.

- ☐A Discolored water in stream or intertidal zone (milky white, blue, unnatural water discoloration, oil sheen, stream foam)
- ☒B Excessive sedimentation (burying of stream features or intertidal zone)
- ☒C Noticeable evidence of pollutant discharges entering the assessment reach and causing a water quality problem
- ☐D Odor (not including natural sulfide odors)
- ☐E Current published or collected data indicating degraded water quality in the assessment reach. Cite source in "Notes/Sketch" section.
- ☒F Livestock with access to stream or intertidal zone
- ☐G Excessive algae in stream or intertidal zone
- ☐H Degraded marsh vegetation in the intertidal zone (removal, burning, regular mowing, destruction, etc)
- ☐I Other: _____ (explain in "Notes/Sketch" section)
- ☐J Little to no stressors

8. Recent Weather – watershed metric (skip for Tidal Marsh Streams)
For Size 1 or 2 streams, D1 drought or higher is considered a drought; for Size 3 or 4 streams, D2 drought or higher is considered a drought.

- ☐A Drought conditions and no rainfall or rainfall not exceeding 1 inch within the last 48 hours
- ☐B Drought conditions and rainfall exceeding 1 inch within the last 48 hours
- ☒C No drought conditions

9. Large or Dangerous Stream – assessment reach metric
☐Yes ☒No Is stream is too large or dangerous to assess? If Yes, skip to Metric 13 (Streamside Area Ground Surface Condition).

10. Natural In-stream Habitat Types – assessment reach metric
10a. ☐Yes ☒No Degraded in-stream habitat over majority of the assessment reach (examples of stressors include excessive sedimentation, mining, excavation, in-stream hardening [for example, rip-rap], recent dredging, and snagging) **(evaluate for Size 4 Coastal Plain streams only, then skip to Metric 12)**

10b. **Check all that occur** (occurs if > 5% coverage of assessment reach) **(skip for Size 4 Coastal Plain streams)**

- ☐A Multiple aquatic macrophytes and aquatic mosses (include liverworts, lichens, and algal mats)
- ☐B Multiple sticks and/or leaf packs and/or emergent vegetation
- ☐C Multiple snags and logs (including lap trees)
- ☐D 5% undercut banks and/or root mats and/or roots in banks extend to the normal wetted perimeter
- ☒E Little or no habitat

Check for Tidal Marsh Streams Only

- ☐F 5% oysters or other natural hard bottoms
- ☐G Submerged aquatic vegetation
- ☐H Low-tide refugia (pools)
- ☐I Sand bottom
- ☐J 5% vertical bank along the marsh
- ☐K Little or no habitat

**************************************REMAINING QUESTIONS ARE NOT APPLICABLE FOR TIDAL MARSH STREAMS************************************

11. Bedform and Substrate – assessment reach metric (skip for Size 4 Coastal Plain streams and Tidal Marsh Streams)

11a. ☒Yes ☐No Is assessment reach in a natural sand-bed stream? **(skip for Coastal Plain streams)**

11b. Bedform evaluated. **Check the appropriate box(es).**

- ☒A Riffle-run section **(evaluate 11c)**
- ☒B Pool-glide section **(evaluate 11d)**
- ☐C Natural bedform absent **(skip to Metric 12, Aquatic Life)**

11c. In riffle sections, check all that occur below the normal wetted perimeter of the assessment reach – whether or not submerged. **Check at least one box in each row (skip for Size 4 Coastal Plain streams and Tidal Marsh Streams)**. Not Present (NP) = absent, Rare (R) = present but < 10%, Common (C) = > 10-40%, Abundant (A) = > 40-70%, Predominant (P) = > 70%. Cumulative percentages should not exceed 100% for each assessment reach.

NP	R	C	A	P	
☒	☐	☐	☐	☐	Bedrock/saprolite
☒	☐	☐	☐	☐	Boulder (256 – 4096 mm)
☐	☒	☐	☐	☐	Cobble (64 – 256 mm)
☐	☐	☒	☐	☐	Gravel (2 – 64 mm)
☐	☐	☐	☒	☐	Sand (.062 – 2 mm)
☐	☐	☒	☐	☐	Silt/clay (< 0.062 mm)
☒	☐	☐	☐	☐	Detritus
☒	☐	☐	☐	☐	Artificial (rip-rap, concrete, etc.)

11d. ☐Yes ☒No Are pools filled with sediment? (**skip for Size 4 Coastal Plain streams and Tidal Marsh Streams**)

12. Aquatic Life – assessment reach metric (skip for Tidal Marsh Streams)

12a. ☒Yes ☐No Was an in-stream aquatic life assessment performed as described in the User Manual?
If No, select one of the following reasons and skip to Metric 13. ☐No Water ☐Other: _____

12b. ☒Yes ☐No Are aquatic organisms present in the assessment reach (look in riffles, pools, then snags)? If Yes, check all that apply. If No, skip to Metric 13.

1	>1	Numbers over columns refer to "individuals" for Size 1 and 2 streams and "taxa" for Size 3 and 4 streams.
☐	☐	Adult frogs
☐	☐	Aquatic reptiles
☐	☐	Aquatic macrophytes and aquatic mosses (include liverworts, lichens, and algal mats)
☐	☐	Beetles
☐	☐	Caddisfly larvae (T)
☐	☐	Asian clam (*Corbicula*)
☐	☐	Crustacean (isopod/amphipod/crayfish/shrimp)
☐	☐	Damselfly and dragonfly larvae
☐	☐	Dipterans
☐	☐	Mayfly larvae (E)
☐	☐	Megaloptera (alderfly, fishfly, dobsonfly larvae)
☐	☒	Midges/mosquito larvae
☐	☐	Mosquito fish (*Gambusia*) or mud minnows (*Umbra pygmaea*)
☐	☐	Mussels/Clams (not *Corbicula*)
☐	☐	Other fish
☐	☐	Salamanders/tadpoles
☐	☐	Snails
☐	☐	Stonefly larvae (P)
☐	☐	Tipulid larvae
☐	☐	Worms/leeches

13. Streamside Area Ground Surface Condition – streamside area metric (skip for Tidal Marsh Streams and B valley types)
Consider for the Left Bank (LB) and the Right Bank (RB). Consider storage capacity with regard to both overbank flow and upland runoff.

LB	RB	
☐A	☐A	Little or no alteration to water storage capacity over a majority of the streamside area
☐B	☐B	Moderate alteration to water storage capacity over a majority of the streamside area
☒C	☒C	Severe alteration to water storage capacity over a majority of the streamside area (examples: ditches, fill, soil compaction, livestock disturbance, buildings, man-made levees, drainage pipes)

14. Streamside Area Water Storage – streamside area metric (skip for Size 1 streams, Tidal Marsh Streams, and B valley types)
Consider for the Left Bank (LB) and the Right Bank (RB) of the streamside area.

LB	RB	
☐A	☐A	Majority of streamside area with depressions able to pond water ≥ 6 inches deep
☐B	☐B	Majority of streamside area with depressions able to pond water 3 to 6 inches deep
☒C	☒C	Majority of streamside area with depressions able to pond water < 3 inches deep

15. Wetland Presence – streamside area metric (skip for Tidal Marsh Streams)
Consider for the Left Bank (LB) and the Right Bank (RB). Do not consider wetlands outside of the streamside area or within the normal wetted perimeter of assessment reach.

LB	RB	
☒Y	☒Y	Are wetlands present in the streamside area?
☐N	☐N	

16. Baseflow Contributors – assessment reach metric (skip for Size 4 streams and Tidal Marsh Streams)
Check all contributors within the assessment reach or within view of <u>and</u> draining to the assessment reach.

- ☐A Streams and/or springs (jurisdictional discharges)
- ☐B Ponds (include wet detention basins; do not include sediment basins or dry detention basins)
- ☐C Obstruction passing flow during low-flow periods within the assessment area (beaver dam, leaky dam, bottom-release dam, weir)
- ☐D Evidence of bank seepage or sweating (iron in water indicates seepage)
- ☒E Stream bed or bank soil reduced (dig through deposited sediment if present)
- ☐F None of the above

17. Baseflow Detractors – assessment area metric (skip for Tidal Marsh Streams)
Check all that apply.

- ☐A Evidence of substantial water withdrawals from the assessment reach (includes areas excavated for pump installation)
- ☐B Obstruction not passing flow during low-flow periods affecting the assessment reach (ex: watertight dam, sediment deposit)
- ☐C Urban stream (≥ 24% impervious surface for watershed)
- ☐D Evidence that the streamside area has been modified resulting in accelerated drainage into the assessment reach
- ☐E Assessment reach relocated to valley edge
- ☒F None of the above

18. Shading – assessment reach metric (skip for Tidal Marsh Streams)
Consider aspect. Consider "leaf-on" condition.

- ☐A Stream shading is appropriate for stream category (may include gaps associated with natural processes)
- ☐B Degraded (example: scattered trees)
- ☒C Stream shading is gone or largely absent

19. Buffer Width – streamside area metric (skip for Tidal Marsh Streams)
Consider "vegetated buffer" and "wooded buffer" separately for left bank (LB) and right bank (RB) starting at the top of bank out to the first break.

Vegetated LB	Vegetated RB	Wooded LB	Wooded RB	
☒A	☒A	☐A	☐A	≥ 100 feet wide or extends to the edge of the watershed
☐B	☐B	☐B	☐B	From 50 to < 100 feet wide
☐C	☐C	☐C	☐C	From 30 to < 50 feet wide
☐D	☐D	☐D	☐D	From 10 to < 30 feet wide
☐E	☐E	☒E	☒E	< 10 feet wide or no trees

20. Buffer Structure – streamside area metric (skip for Tidal Marsh Streams)
Consider for left bank (LB) and right bank (RB) for Metric 19 ("Vegetated" Buffer Width).

LB	RB	
☐A	☐A	Mature forest
☐B	☐B	Non-mature woody vegetation or modified vegetation structure
☒C	☒C	Herbaceous vegetation with or without a strip of trees < 10 feet wide
☐D	☐D	Maintained shrubs
☐E	☐E	Little or no vegetation

21. Buffer Stressors – streamside area metric (skip for Tidal Marsh Streams)
Check all appropriate boxes for left bank (LB) and right bank (RB). Indicate if listed stressor abuts stream (Abuts), does not abut but is within 30 feet of stream (< 30 feet), or is between 30 to 50 feet of stream (30-50 feet).
If none of the following stressors occurs on either bank, check here and skip to Metric 22: ☐

Abuts LB	Abuts RB	< 30 feet LB	< 30 feet RB	30-50 feet LB	30-50 feet RB	
☐A	☐A	☐A	☐A	☐A	☐A	Row crops
☐B	☐B	☐B	☐B	☐B	☐B	Maintained turf
☐C	☐C	☐C	☐C	☐C	☐C	Pasture (no livestock)/commercial horticulture
☒D	☒D	☐D	☐D	☐D	☐D	Pasture (active livestock use)

22. Stem Density – streamside area metric (skip for Tidal Marsh Streams)
Consider for left bank (LB) and right bank (RB) for Metric 19 ("Wooded" Buffer Width).

LB	RB	
☐A	☐A	Medium to high stem density
☐B	☐B	Low stem density
☒C	☒C	No wooded riparian buffer or predominantly herbaceous species or bare ground

23. Continuity of Vegetated Buffer – streamside area metric (skip for Tidal Marsh Streams)
Consider whether vegetated buffer is continuous along stream (parallel). Breaks are areas lacking vegetation > 10 feet wide.

LB	RB	
☒A	☒A	The total length of buffer breaks is < 25 percent.
☐B	☐B	The total length of buffer breaks is between 25 and 50 percent.
☐C	☐C	The total length of buffer breaks is > 50 percent.

24. Vegetative Composition – streamside area metric (skip for Tidal Marsh Streams)
Evaluate the dominant vegetation within 100 feet of each bank or to the edge of the watershed (whichever comes first) as it contributes to assessment reach habitat.

LB	RB	
☐A	☐A	Vegetation is close to undisturbed in species present and their proportions. Lower strata composed of native species, with non-native invasive species absent or sparse.
☐B	☐B	Vegetation indicates disturbance in terms of species diversity or proportions, but is still largely composed of native species. This may include communities of weedy native species that develop after clear-cutting or clearing or communities with non-native invasive species present, but not dominant, over a large portion of the expected strata or communities missing understory but retaining canopy trees.
☒C	☒C	Vegetation is severely disturbed in terms of species diversity or proportions. Mature canopy is absent or communities with non-native invasive species dominant over a large portion of expected strata or communities composed of planted stands of non-characteristic species or communities inappropriately composed of a single species or no vegetation.

25. Conductivity – assessment reach metric (skip for all Coastal Plain streams)
25a. ☐Yes ☒No Was conductivity measurement recorded?
If No, select one of the following reasons. ☐No Water ☐Other: _____

25b. Check the box corresponding to the conductivity measurement (units of microsiemens per centimeter).
☐A < 46 ☐B 46 to < 67 ☐C 67 to < 79 ☐D 79 to < 230 ☐E ≥ 230

Notes/Sketch:
Cattle have access to the stream

Draft NC SAM Stream Rating Sheet
Accompanies User Manual Version 2.1

Stream Site Name	Morgan Branch Restoration Site	Date of Assessment	1/24/2018
Stream Category	Mb1	Assessor Name/Organization	J. Sullivan / KCI

Notes of Field Assessment Form (Y/N)	YES
Presence of regulatory considerations (Y/N)	NO
Additional stream information/supplementary measurements included (Y/N)	YES
NC SAM feature type (perennial, intermittent, Tidal Marsh Stream)	Perennial

Function Class Rating Summary	USACE/ All Streams	NCDWR Intermittent
(1) Hydrology	**LOW**	
(2) Baseflow	**HIGH**	
(2) Flood Flow	**LOW**	
(3) Streamside Area Attenuation	**LOW**	
(4) Floodplain Access	**MEDIUM**	
(4) Wooded Riparian Buffer	**LOW**	
(4) Microtopography	NA	
(3) Stream Stability	**MEDIUM**	
(4) Channel Stability	**MEDIUM**	
(4) Sediment Transport	**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	**HIGH**	
(2) Streamside Area Vegetation	**LOW**	
(3) Upland Pollutant Filtration	**LOW**	
(3) Thermoregulation	**LOW**	
(2) Indicators of Stressors	**YES**	
(2) Aquatic Life Tolerance	**LOW**	
(2) Intertidal Zone Filtration	NA	
(1) Habitat	**LOW**	
(2) In-stream Habitat	**MEDIUM**	
(3) Baseflow	**HIGH**	
(3) Substrate	**HIGH**	
(3) Stream Stability	**MEDIUM**	
(3) In-stream Habitat	**LOW**	
(2) Stream-side Habitat	**LOW**	
(3) Stream-side Habitat	**LOW**	
(3) Thermoregulation	**LOW**	
(2) Tidal Marsh In-stream Habitat	NA	
(3) Flow Restriction	NA	
(3) Tidal Marsh Stream Stability	NA	
(4) Tidal Marsh Channel Stability	NA	
(4) Tidal Marsh Stream Geomorphology	NA	
(3) Tidal Marsh In-stream Habitat	NA	
(2) Intertidal Zone	NA	
Overall	**LOW**	

NC SAM FIELD ASSESSMENT RESULTS
Accompanies User Manual Version 2.1

USACE AID #: NCDWR #:

INSTRUCTIONS: Attach a sketch of the assessment area and photographs. Attach a copy of the USGS 7.5-minute topographic quadrangle, and circle the location of the stream reach under evaluation. If multiple stream reaches will be evaluated on the same property, identify and number all reaches on the attached map, and include a separate form for each reach. See the NC SAM User Manual for detailed descriptions and explanations of requested information. Record in the "Notes/Sketch" section if supplementary measurements were performed. See the NC SAM User Manual for examples of additional measurements that may be relevant.

NOTE EVIDENCE OF STRESSORS AFFECTING THE ASSESSMENT AREA (do not need to be within the assessment area).

PROJECT/SITE INFORMATION:

1. Project name (if any): Morgan Branch Restoration Site
2. Date of evaluation: 1/24/2018
3. Applicant/owner name: KCI
4. Assessor name/organization: J. Sullivan / KCI
5. County: Buncombe
6. Nearest named water body on USGS 7.5-minute quad: Morgan Branch
7. River basin: French Broad
8. Site coordinates (decimal degrees, at lower end of assessment reach): 35.6094 / -82.7632

STREAM INFORMATION: (depth and width can be approximations)

9. Site number (show on attached map): T8-1
10. Length of assessment reach evaluated (feet): 50
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): 2
13. Is assessment reach a swamp steam? ☐Yes ☐No
14. Feature type: ☐Perennial flow ☒Intermittent flow ☐Tidal Marsh Stream

STREAM CATEGORY INFORMATION:

15. NC SAM Zone: ☒ Mountains (M) ☐ Piedmont (P) ☐ Inner Coastal Plain (I) ☐ Outer Coastal Plain (O)
16. Estimated geomorphic valley shape (**skip for Tidal Marsh Stream**):
☐A  (more sinuous stream, flatter valley slope)
☒B  (less sinuous stream, steeper valley slope)
17. Watershed size: **(skip for Tidal Marsh Stream**) ☒Size 1 (< 0.1 mi^2) ☐Size 2 (0.1 to < 0.5 mi^2) ☐Size 3 (0.5 to < 5 mi^2) ☐Size 4 (≥ 5 mi^2)

ADDITIONAL INFORMATION:

18. Were regulatory considerations evaluated? ☒Yes ☐No If Yes, check all that apply to the assessment area.
☐Section 10 water ☐Classified Trout Waters ☐Water Supply Watershed (☐I ☐II ☐III ☐IV ☐V)
☐Essential Fish Habitat ☐Primary Nursery Area ☐ High Quality Waters/Outstanding Resource Waters
☐Publicly owned property ☐NCDWR Riparian buffer rule in effect ☐Nutrient Sensitive Waters
☐Anadromous fish ☐303(d) List ☐CAMA Area of Environmental Concern (AEC)
☐Documented presence of a federal and/or state listed protected species within the assessment area.
List species:
☐Designated Critical Habitat (list species)
19. Are additional stream information/supplementary measurements included in "Notes/Sketch" section or attached? ☒Yes ☐No

1. Channel Water – assessment reach metric (skip for Size 1 streams and Tidal Marsh Streams)
☒A Water throughout assessment reach.
☐B No flow, water in pools only.
☐C No water in assessment reach.

2. Evidence of Flow Restriction – assessment reach metric
☐A At least 10% of assessment reach in-stream habitat or riffle-pool sequence is severely affected by a flow restriction or fill to the point of obstructing flow or a channel choked with aquatic macrophytes or ponded water or impoundment on flood or ebb within the assessment reach (examples: undersized or perched culverts, causeways that constrict the channel, tidal gates, debris jams, beaver dams).
☒B Not A

3. Feature Pattern – assessment reach metric
☐A A majority of the assessment reach has altered pattern (examples: straightening, modification above or below culvert).
☒B Not A

4. Feature Longitudinal Profile – assessment reach metric
☐A Majority of assessment reach has a substantially altered stream profile (examples: channel down-cutting, existing damming, over widening, active aggradation, dredging, and excavation where appropriate channel profile has not reformed from any of these disturbances).
☒B Not A

5. Signs of Active Instability – assessment reach metric
Consider only current instability, not past events from which the stream has currently recovered. Examples of instability include active bank failure, active channel down-cutting (head-cut), active widening, and artificial hardening (such as concrete, gabion, rip-rap).
☒A < 10% of channel unstable
☐B 10 to 25% of channel unstable
☐C > 25% of channel unstable

6. Streamside Area Interaction – streamside area metric
Consider for the Left Bank (LB) and the Right Bank (RB).

LB	RB	
☐A	☐A	Little or no evidence of conditions that adversely affect reference interaction
☒B	☐B	Moderate evidence of conditions (examples: berms, levees, down-cutting, aggradation, dredging) that adversely affect reference interaction (examples: limited streamside area access, disruption of flood flows through streamside area, leaky or intermittent bulkheads, causeways with floodplain constriction, minor ditching [including mosquito ditching])
☐C	☒C	Extensive evidence of conditions that adversely affect reference interaction (little to no floodplain/intertidal zone access [examples: causeways with floodplain and channel constriction, bulkheads, retaining walls, fill, stream incision, disruption of flood flows through streamside area] or too much floodplain/intertidal zone access [examples: impoundments, intensive mosquito ditching]) or floodplain/intertidal zone unnaturally absent or assessment reach is a man-made feature on an interstream divide

7. Water Quality Stressors – assessment reach/intertidal zone metric
Check all that apply.

- ☐A Discolored water in stream or intertidal zone (milky white, blue, unnatural water discoloration, oil sheen, stream foam)
- ☐B Excessive sedimentation (burying of stream features or intertidal zone)
- ☐C Noticeable evidence of pollutant discharges entering the assessment reach and causing a water quality problem
- ☐D Odor (not including natural sulfide odors)
- ☐E Current published or collected data indicating degraded water quality in the assessment reach. Cite source in "Notes/Sketch" section.
- ☒F Livestock with access to stream or intertidal zone
- ☐G Excessive algae in stream or intertidal zone
- ☐H Degraded marsh vegetation in the intertidal zone (removal, burning, regular mowing, destruction, etc)
- ☐I Other: _____ (explain in "Notes/Sketch" section)
- ☐J Little to no stressors

8. Recent Weather – watershed metric (skip for Tidal Marsh Streams)
For Size 1 or 2 streams, D1 drought or higher is considered a drought; for Size 3 or 4 streams, D2 drought or higher is considered a drought.

- ☐A Drought conditions and no rainfall or rainfall not exceeding 1 inch within the last 48 hours
- ☐B Drought conditions and rainfall exceeding 1 inch within the last 48 hours
- ☒C No drought conditions

9. Large or Dangerous Stream – assessment reach metric
☐Yes ☒No Is stream is too large or dangerous to assess? If Yes, skip to Metric 13 (Streamside Area Ground Surface Condition).

10. Natural In-stream Habitat Types – assessment reach metric
10a. ☐Yes ☒No Degraded in-stream habitat over majority of the assessment reach (examples of stressors include excessive sedimentation, mining, excavation, in-stream hardening [for example, rip-rap], recent dredging, and snagging) **(evaluate for Size 4 Coastal Plain streams only, then skip to Metric 12)**

10b. **Check all that occur** (occurs if > 5% coverage of assessment reach) **(skip for Size 4 Coastal Plain streams)**

- ☐A Multiple aquatic macrophytes and aquatic mosses (include liverworts, lichens, and algal mats)
- ☐B Multiple sticks and/or leaf packs and/or emergent vegetation
- ☐C Multiple snags and logs (including lap trees)
- ☐D 5% undercut banks and/or root mats and/or roots in banks extend to the normal wetted perimeter
- ☒E Little or no habitat

Check for Tidal Marsh Streams Only

- ☐F 5% oysters or other natural hard bottoms
- ☐G Submerged aquatic vegetation
- ☐H Low-tide refugia (pools)
- ☐I Sand bottom
- ☐J 5% vertical bank along the marsh
- ☐K Little or no habitat

**************************************REMAINING QUESTIONS ARE NOT APPLICABLE FOR TIDAL MARSH STREAMS************************************

11. Bedform and Substrate – assessment reach metric (skip for Size 4 Coastal Plain streams and Tidal Marsh Streams)

11a. ☒Yes ☐No Is assessment reach in a natural sand-bed stream? **(skip for Coastal Plain streams)**

11b. Bedform evaluated. **Check the appropriate box(es).**

- ☒A Riffle-run section **(evaluate 11c)**
- ☒B Pool-glide section **(evaluate 11d)**
- ☐C Natural bedform absent **(skip to Metric 12, Aquatic Life)**

11c. In riffle sections, check all that occur below the normal wetted perimeter of the assessment reach – whether or not submerged. **Check at least one box in each row (skip for Size 4 Coastal Plain streams and Tidal Marsh Streams)**. Not Present (NP) = absent, Rare (R) = present but < 10%, Common (C) = > 10-40%, Abundant (A) = > 40-70%, Predominant (P) = > 70%. Cumulative percentages should not exceed 100% for each assessment reach.

NP	R	C	A	P	
☒	☐	☐	☐	☐	Bedrock/saprolite
☒	☐	☐	☐	☐	Boulder (256 – 4096 mm)
☐	☐	☒	☐	☐	Cobble (64 – 256 mm)
☐	☐	☒	☐	☐	Gravel (2 – 64 mm)
☐	☐	☒	☐	☐	Sand (.062 – 2 mm)
☐	☒	☐	☐	☐	Silt/clay (< 0.062 mm)
☒	☐	☐	☐	☐	Detritus
☒	☐	☐	☐	☐	Artificial (rip-rap, concrete, etc.)

11d. ☐Yes ☒No Are pools filled with sediment? (**skip for Size 4 Coastal Plain streams and Tidal Marsh Streams**)

12. Aquatic Life – assessment reach metric (skip for Tidal Marsh Streams)

12a. ☒Yes ☐No Was an in-stream aquatic life assessment performed as described in the User Manual?
If No, select one of the following reasons and skip to Metric 13. ☐No Water ☐Other: _____

12b. ☐Yes ☒No Are aquatic organisms present in the assessment reach (look in riffles, pools, then snags)? If Yes, check all that apply. If No, skip to Metric 13.

1	>1	Numbers over columns refer to "individuals" for Size 1 and 2 streams and "taxa" for Size 3 and 4 streams.
☐	☐	Adult frogs
☐	☐	Aquatic reptiles
☐	☐	Aquatic macrophytes and aquatic mosses (include liverworts, lichens, and algal mats)
☐	☐	Beetles
☐	☐	Caddisfly larvae (T)
☐	☐	Asian clam (*Corbicula*)
☐	☐	Crustacean (isopod/amphipod/crayfish/shrimp)
☐	☐	Damselfly and dragonfly larvae
☐	☐	Dipterans
☐	☐	Mayfly larvae (E)
☐	☐	Megaloptera (alderfly, fishfly, dobsonfly larvae)
☐	☐	Midges/mosquito larvae
☐	☐	Mosquito fish (*Gambusia*) or mud minnows (*Umbra pygmaea*)
☐	☐	Mussels/Clams (not *Corbicula*)
☐	☐	Other fish
☐	☐	Salamanders/tadpoles
☐	☐	Snails
☐	☐	Stonefly larvae (P)
☐	☐	Tipulid larvae
☐	☐	Worms/leeches

13. Streamside Area Ground Surface Condition – streamside area metric (skip for Tidal Marsh Streams and B valley types)
Consider for the Left Bank (LB) and the Right Bank (RB). Consider storage capacity with regard to both overbank flow and upland runoff.

LB	RB	
☒A	☒A	Little or no alteration to water storage capacity over a majority of the streamside area
☐B	☐B	Moderate alteration to water storage capacity over a majority of the streamside area
☐C	☐C	Severe alteration to water storage capacity over a majority of the streamside area (examples: ditches, fill, soil compaction, livestock disturbance, buildings, man-made levees, drainage pipes)

14. Streamside Area Water Storage – streamside area metric (skip for Size 1 streams, Tidal Marsh Streams, and B valley types)
Consider for the Left Bank (LB) and the Right Bank (RB) of the streamside area.

LB	RB	
☐A	☐A	Majority of streamside area with depressions able to pond water ≥ 6 inches deep
☒B	☐B	Majority of streamside area with depressions able to pond water 3 to 6 inches deep
☐C	☒C	Majority of streamside area with depressions able to pond water < 3 inches deep

15. Wetland Presence – streamside area metric (skip for Tidal Marsh Streams)
Consider for the Left Bank (LB) and the Right Bank (RB). Do not consider wetlands outside of the streamside area or within the normal wetted perimeter of assessment reach.

LB	RB	
☒Y	☒Y	Are wetlands present in the streamside area?
☐N	☐N	

16. Baseflow Contributors – assessment reach metric (skip for Size 4 streams and Tidal Marsh Streams)
Check all contributors within the assessment reach or within view of <u>and</u> draining to the assessment reach.

- ☐A Streams and/or springs (jurisdictional discharges)
- ☐B Ponds (include wet detention basins; do not include sediment basins or dry detention basins)
- ☐C Obstruction passing flow during low-flow periods within the assessment area (beaver dam, leaky dam, bottom-release dam, weir)
- ☐D Evidence of bank seepage or sweating (iron in water indicates seepage)
- ☒E Stream bed or bank soil reduced (dig through deposited sediment if present)
- ☐F None of the above

17. Baseflow Detractors – assessment area metric (skip for Tidal Marsh Streams)
Check all that apply.

- ☐A Evidence of substantial water withdrawals from the assessment reach (includes areas excavated for pump installation)
- ☐B Obstruction not passing flow during low-flow periods affecting the assessment reach (ex: watertight dam, sediment deposit)
- ☐C Urban stream (≥ 24% impervious surface for watershed)
- ☐D Evidence that the streamside area has been modified resulting in accelerated drainage into the assessment reach
- ☐E Assessment reach relocated to valley edge
- ☒F None of the above

18. Shading – assessment reach metric (skip for Tidal Marsh Streams)
Consider aspect. Consider "leaf-on" condition.

- ☐A Stream shading is appropriate for stream category (may include gaps associated with natural processes)
- ☒B Degraded (example: scattered trees)
- ☐C Stream shading is gone or largely absent

19. Buffer Width – streamside area metric (skip for Tidal Marsh Streams)

Consider "vegetated buffer" and "wooded buffer" separately for left bank (LB) and right bank (RB) starting at the top of bank out to the first break.

Vegetated LB	Vegetated RB	Wooded LB	Wooded RB	
☒A	☒A	☐A	☒A	≥ 100 feet wide or extends to the edge of the watershed
☐B	☐B	☐B	☐B	From 50 to < 100 feet wide
☐C	☐C	☐C	☐C	From 30 to < 50 feet wide
☐D	☐D	☐D	☐D	From 10 to < 30 feet wide
☐E	☐E	☒E	☐E	< 10 feet wide or no trees

20. Buffer Structure – streamside area metric (skip for Tidal Marsh Streams)

Consider for left bank (LB) and right bank (RB) for Metric 19 ("Vegetated" Buffer Width).

LB	RB	
☒A	☐A	Mature forest
☐B	☒B	Non-mature woody vegetation or modified vegetation structure
☐C	☐C	Herbaceous vegetation with or without a strip of trees < 10 feet wide
☐D	☐D	Maintained shrubs
☐E	☐E	Little or no vegetation

21. Buffer Stressors – streamside area metric (skip for Tidal Marsh Streams)

Check all appropriate boxes for left bank (LB) and right bank (RB). Indicate if listed stressor abuts stream (Abuts), does not abut but is within 30 feet of stream (< 30 feet), or is between 30 to 50 feet of stream (30-50 feet).

If none of the following stressors occurs on either bank, check here and skip to Metric 22: ☐

Abuts LB	Abuts RB	< 30 feet LB	< 30 feet RB	30-50 feet LB	30-50 feet RB	
☐A	☐A	☐A	☐A	☐A	☐A	Row crops
☐B	☐B	☐B	☐B	☐B	☐B	Maintained turf
☐C	☐C	☐C	☐C	☐C	☐C	Pasture (no livestock)/commercial horticulture
☐D	☐D	☐D	☐D	☒D	☐D	Pasture (active livestock use)

22. Stem Density – streamside area metric (skip for Tidal Marsh Streams)

Consider for left bank (LB) and right bank (RB) for Metric 19 ("Wooded" Buffer Width).

LB	RB	
☐A	☐A	Medium to high stem density
☒B	☒B	Low stem density
☐C	☐C	No wooded riparian buffer or predominantly herbaceous species or bare ground

23. Continuity of Vegetated Buffer – streamside area metric (skip for Tidal Marsh Streams)

Consider whether vegetated buffer is continuous along stream (parallel). Breaks are areas lacking vegetation > 10 feet wide.

LB	RB	
☒A	☒A	The total length of buffer breaks is < 25 percent.
☐B	☐B	The total length of buffer breaks is between 25 and 50 percent.
☐C	☐C	The total length of buffer breaks is > 50 percent.

24. Vegetative Composition – streamside area metric (skip for Tidal Marsh Streams)

Evaluate the dominant vegetation within 100 feet of each bank or to the edge of the watershed (whichever comes first) as it contributes to assessment reach habitat.

LB	RB	
☐A	☐A	Vegetation is close to undisturbed in species present and their proportions. Lower strata composed of native species, with non-native invasive species absent or sparse.
☒B	☒B	Vegetation indicates disturbance in terms of species diversity or proportions, but is still largely composed of native species. This may include communities of weedy native species that develop after clear-cutting or clearing or communities with non-native invasive species present, but not dominant, over a large portion of the expected strata or communities missing understory but retaining canopy trees.
☐C	☐C	Vegetation is severely disturbed in terms of species diversity or proportions. Mature canopy is absent or communities with non-native invasive species dominant over a large portion of expected strata or communities composed of planted stands of non-characteristic species or communities inappropriately composed of a single species or no vegetation.

25. Conductivity – assessment reach metric (skip for all Coastal Plain streams)

25a. ☐Yes ☒No Was conductivity measurement recorded?
If No, select one of the following reasons. ☐No Water ☐Other: _____

25b. Check the box corresponding to the conductivity measurement (units of microsiemens per centimeter).
☐A < 46 ☐B 46 to < 67 ☐C 67 to < 79 ☐D 79 to < 230 ☐E ≥ 230

Notes/Sketch:
Cattle have access to the stream

Draft NC SAM Stream Rating Sheet
Accompanies User Manual Version 2.1

Stream Site Name	Morgan Branch Restoration Site	Date of Assessment	1/24/2018
Stream Category	Mb1	Assessor Name/Organization	J. Sullivan / KCI

Notes of Field Assessment Form (Y/N)	YES
Presence of regulatory considerations (Y/N)	NO
Additional stream information/supplementary measurements included (Y/N)	YES
NC SAM feature type (perennial, intermittent, Tidal Marsh Stream)	Intermittent

Function Class Rating Summary	USACE/ All Streams	NCDWR Intermittent
(1) Hydrology	**MEDIUM**	**MEDIUM**
(2) Baseflow	**HIGH**	**HIGH**
(2) Flood Flow	**MEDIUM**	**MEDIUM**
(3) Streamside Area Attenuation	**LOW**	**LOW**
(4) Floodplain Access	**LOW**	**LOW**
(4) Wooded Riparian Buffer	**LOW**	**LOW**
(4) Microtopography	NA	NA
(3) Stream Stability	**HIGH**	**HIGH**
(4) Channel Stability	**HIGH**	**HIGH**
(4) Sediment Transport	**HIGH**	**HIGH**
(4) Stream Geomorphology	**HIGH**	**HIGH**
(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	**HIGH**	**HIGH**
(2) Streamside Area Vegetation	**HIGH**	**HIGH**
(3) Upland Pollutant Filtration	**HIGH**	**HIGH**
(3) Thermoregulation	**MEDIUM**	**MEDIUM**
(2) Indicators of Stressors	**YES**	**YES**
(2) Aquatic Life Tolerance	**LOW**	**NA**
(2) Intertidal Zone Filtration	NA	NA
(1) Habitat	**MEDIUM**	**MEDIUM**
(2) In-stream Habitat	**MEDIUM**	**MEDIUM**
(3) Baseflow	**HIGH**	**HIGH**
(3) Substrate	**HIGH**	**HIGH**
(3) Stream Stability	**HIGH**	**HIGH**
(3) In-stream Habitat	**LOW**	**LOW**
(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	NA	NA
Overall	**MEDIUM**	**MEDIUM**

NC SAM FIELD ASSESSMENT RESULTS
Accompanies User Manual Version 2.1

USACE AID #: NCDWR #:

INSTRUCTIONS: Attach a sketch of the assessment area and photographs. Attach a copy of the USGS 7.5-minute topographic quadrangle, and circle the location of the stream reach under evaluation. If multiple stream reaches will be evaluated on the same property, identify and number all reaches on the attached map, and include a separate form for each reach. See the NC SAM User Manual for detailed descriptions and explanations of requested information. Record in the "Notes/Sketch" section if supplementary measurements were performed. See the NC SAM User Manual for examples of additional measurements that may be relevant.

NOTE EVIDENCE OF STRESSORS AFFECTING THE ASSESSMENT AREA (do not need to be within the assessment area).

PROJECT/SITE INFORMATION:

1. Project name (if any): Morgan Branch Restoration Site
2. Date of evaluation: 1/24/2018
3. Applicant/owner name: KCI
4. Assessor name/organization: J. Sullivan / KCI
5. County: Buncombe
6. Nearest named water body on USGS 7.5-minute quad: Morgan Branch
7. River basin: French Broad
8. Site coordinates (decimal degrees, at lower end of assessment reach): 35.6088 / -82.7626

STREAM INFORMATION: (depth and width can be approximations)

9. Site number (show on attached map): T8-R2, T9
10. Length of assessment reach evaluated (feet): 50
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): 3
13. Is assessment reach a swamp steam? ☐Yes ☐No
14. Feature type: ☐Perennial flow ☒Intermittent flow ☐Tidal Marsh Stream

STREAM CATEGORY INFORMATION:

15. NC SAM Zone: ☒ Mountains (M) ☐ Piedmont (P) ☐ Inner Coastal Plain (I) ☐ Outer Coastal Plain (O)
16. Estimated geomorphic valley shape (**skip for Tidal Marsh Stream**):
☐A  (more sinuous stream, flatter valley slope)
☒B  (less sinuous stream, steeper valley slope)
17. Watershed size: (**skip for Tidal Marsh Stream**) ☒Size 1 (< 0.1 mi^2) ☐Size 2 (0.1 to < 0.5 mi^2) ☐Size 3 (0.5 to < 5 mi^2) ☐Size 4 (≥ 5 mi^2)

ADDITIONAL INFORMATION:

18. Were regulatory considerations evaluated? ☒Yes ☐No If Yes, check all that apply to the assessment area.
☐Section 10 water ☐Classified Trout Waters ☐Water Supply Watershed (☐I ☐II ☐III ☐IV ☐V)
☐Essential Fish Habitat ☐Primary Nursery Area ☐ High Quality Waters/Outstanding Resource Waters
☐Publicly owned property ☐NCDWR Riparian buffer rule in effect ☐Nutrient Sensitive Waters
☐Anadromous fish ☐303(d) List ☐CAMA Area of Environmental Concern (AEC)
☐Documented presence of a federal and/or state listed protected species within the assessment area.
List species:
☐Designated Critical Habitat (list species)
19. Are additional stream information/supplementary measurements included in "Notes/Sketch" section or attached? ☒Yes ☐No

1. Channel Water – assessment reach metric (skip for Size 1 streams and Tidal Marsh Streams)

☒A Water throughout assessment reach.
☐B No flow, water in pools only.
☐C No water in assessment reach.

2. Evidence of Flow Restriction – assessment reach metric

☐A At least 10% of assessment reach in-stream habitat or riffle-pool sequence is severely affected by a flow restriction or fill to the point of obstructing flow or a channel choked with aquatic macrophytes or ponded water or impoundment on flood or ebb within the assessment reach (examples: undersized or perched culverts, causeways that constrict the channel, tidal gates, debris jams, beaver dams).
☒B Not A

3. Feature Pattern – assessment reach metric

☒A A majority of the assessment reach has altered pattern (examples: straightening, modification above or below culvert).
☐B Not A

4. Feature Longitudinal Profile – assessment reach metric

☒A Majority of assessment reach has a substantially altered stream profile (examples: channel down-cutting, existing damming, over widening, active aggradation, dredging, and excavation where appropriate channel profile has not reformed from any of these disturbances).
☐B Not A

5. Signs of Active Instability – assessment reach metric

Consider only current instability, not past events from which the stream has currently recovered. Examples of instability include active bank failure, active channel down-cutting (head-cut), active widening, and artificial hardening (such as concrete, gabion, rip-rap).

☒A < 10% of channel unstable
☐B 10 to 25% of channel unstable
☐C > 25% of channel unstable

6. Streamside Area Interaction – streamside area metric
Consider for the Left Bank (LB) and the Right Bank (RB).

LB	RB	
☐A	☐A	Little or no evidence of conditions that adversely affect reference interaction
☐B	☐B	Moderate evidence of conditions (examples: berms, levees, down-cutting, aggradation, dredging) that adversely affect reference interaction (examples: limited streamside area access, disruption of flood flows through streamside area, leaky or intermittent bulkheads, causeways with floodplain constriction, minor ditching [including mosquito ditching])
☒C	☒C	Extensive evidence of conditions that adversely affect reference interaction (little to no floodplain/intertidal zone access [examples: causeways with floodplain and channel constriction, bulkheads, retaining walls, fill, stream incision, disruption of flood flows through streamside area] or too much floodplain/intertidal zone access [examples: impoundments, intensive mosquito ditching]) or floodplain/intertidal zone unnaturally absent or assessment reach is a man-made feature on an interstream divide

7. Water Quality Stressors – assessment reach/intertidal zone metric
Check all that apply.

- ☐A Discolored water in stream or intertidal zone (milky white, blue, unnatural water discoloration, oil sheen, stream foam)
- ☒B Excessive sedimentation (burying of stream features or intertidal zone)
- ☐C Noticeable evidence of pollutant discharges entering the assessment reach and causing a water quality problem
- ☐D Odor (not including natural sulfide odors)
- ☐E Current published or collected data indicating degraded water quality in the assessment reach. Cite source in "Notes/Sketch" section.
- ☒F Livestock with access to stream or intertidal zone
- ☐G Excessive algae in stream or intertidal zone
- ☐H Degraded marsh vegetation in the intertidal zone (removal, burning, regular mowing, destruction, etc)
- ☐I Other: _____ (explain in "Notes/Sketch" section)
- ☐J Little to no stressors

8. Recent Weather – watershed metric (skip for Tidal Marsh Streams)
For Size 1 or 2 streams, D1 drought or higher is considered a drought; for Size 3 or 4 streams, D2 drought or higher is considered a drought.

- ☐A Drought conditions and no rainfall or rainfall not exceeding 1 inch within the last 48 hours
- ☐B Drought conditions and rainfall exceeding 1 inch within the last 48 hours
- ☒C No drought conditions

9. Large or Dangerous Stream – assessment reach metric
☐Yes ☒No Is stream is too large or dangerous to assess? If Yes, skip to Metric 13 (Streamside Area Ground Surface Condition).

10. Natural In-stream Habitat Types – assessment reach metric
10a. ☐Yes ☒No Degraded in-stream habitat over majority of the assessment reach (examples of stressors include excessive sedimentation, mining, excavation, in-stream hardening [for example, rip-rap], recent dredging, and snagging) **(evaluate for Size 4 Coastal Plain streams only, then skip to Metric 12)**

10b. **Check all that occur** (occurs if > 5% coverage of assessment reach) **(skip for Size 4 Coastal Plain streams)**

- ☐A Multiple aquatic macrophytes and aquatic mosses (include liverworts, lichens, and algal mats)
- ☐B Multiple sticks and/or leaf packs and/or emergent vegetation
- ☐C Multiple snags and logs (including lap trees)
- ☐D 5% undercut banks and/or root mats and/or roots in banks extend to the normal wetted perimeter
- ☒E Little or no habitat

Check for Tidal Marsh Streams Only

- ☐F 5% oysters or other natural hard bottoms
- ☐G Submerged aquatic vegetation
- ☐H Low-tide refugia (pools)
- ☐I Sand bottom
- ☐J 5% vertical bank along the marsh
- ☐K Little or no habitat

**************************************REMAINING QUESTIONS ARE NOT APPLICABLE FOR TIDAL MARSH STREAMS**************************************

11. Bedform and Substrate – assessment reach metric (skip for Size 4 Coastal Plain streams and Tidal Marsh Streams)

11a. ☒Yes ☐No Is assessment reach in a natural sand-bed stream? **(skip for Coastal Plain streams)**

11b. Bedform evaluated. **Check the appropriate box(es).**

- ☒A Riffle-run section **(evaluate 11c)**
- ☒B Pool-glide section **(evaluate 11d)**
- ☐C Natural bedform absent **(skip to Metric 12, Aquatic Life)**

11c. In riffle sections, check all that occur below the normal wetted perimeter of the assessment reach – whether or not submerged. **Check at least one box in each row (skip for Size 4 Coastal Plain streams and Tidal Marsh Streams)**. Not Present (NP) = absent, Rare (R) = present but < 10%, Common (C) = > 10-40%, Abundant (A) = > 40-70%, Predominant (P) = > 70%. Cumulative percentages should not exceed 100% for each assessment reach.

NP	R	C	A	P	
☒	☐	☐	☐	☐	Bedrock/saprolite
☒	☐	☐	☐	☐	Boulder (256 – 4096 mm)
☐	☐	☒	☐	☐	Cobble (64 – 256 mm)
☐	☐	☒	☐	☐	Gravel (2 – 64 mm)
☐	☐	☒	☐	☐	Sand (.062 – 2 mm)
☐	☐	☒	☐	☐	Silt/clay (< 0.062 mm)
☒	☐	☐	☐	☐	Detritus
☒	☐	☐	☐	☐	Artificial (rip-rap, concrete, etc.)

11d. ☐Yes ☒No Are pools filled with sediment? (**skip for Size 4 Coastal Plain streams and Tidal Marsh Streams**)

12. Aquatic Life – assessment reach metric (skip for Tidal Marsh Streams)

12a. ☒Yes ☐No Was an in-stream aquatic life assessment performed as described in the User Manual?
If No, select one of the following reasons and skip to Metric 13. ☐No Water ☐Other: _____

12b. ☒Yes ☐No Are aquatic organisms present in the assessment reach (look in riffles, pools, then snags)? If Yes, check all that apply. If No, skip to Metric 13.

1	>1	Numbers over columns refer to "individuals" for Size 1 and 2 streams and "taxa" for Size 3 and 4 streams.
☐	☐	Adult frogs
☐	☐	Aquatic reptiles
☐	☐	Aquatic macrophytes and aquatic mosses (include liverworts, lichens, and algal mats)
☐	☐	Beetles
☒	☐	Caddisfly larvae (T)
☐	☐	Asian clam (*Corbicula*)
☐	☐	Crustacean (isopod/amphipod/crayfish/shrimp)
☐	☐	Damselfly and dragonfly larvae
☐	☐	Dipterans
☒	☐	Mayfly larvae (E)
☐	☐	Megaloptera (alderfly, fishfly, dobsonfly larvae)
☒	☐	Midges/mosquito larvae
☐	☐	Mosquito fish (*Gambusia*) or mud minnows (*Umbra pygmaea*)
☐	☐	Mussels/Clams (not *Corbicula*)
☐	☐	Other fish
☐	☐	Salamanders/tadpoles
☒	☐	Snails
☒	☐	Stonefly larvae (P)
☐	☐	Tipulid larvae
☐	☐	Worms/leeches

13. Streamside Area Ground Surface Condition – streamside area metric (skip for Tidal Marsh Streams and B valley types)
Consider for the Left Bank (LB) and the Right Bank (RB). Consider storage capacity with regard to both overbank flow and upland runoff.

LB	RB	
☐A	☐A	Little or no alteration to water storage capacity over a majority of the streamside area
☐B	☐B	Moderate alteration to water storage capacity over a majority of the streamside area
☒C	☒C	Severe alteration to water storage capacity over a majority of the streamside area (examples: ditches, fill, soil compaction, livestock disturbance, buildings, man-made levees, drainage pipes)

14. Streamside Area Water Storage – streamside area metric (skip for Size 1 streams, Tidal Marsh Streams, and B valley types)
Consider for the Left Bank (LB) and the Right Bank (RB) of the streamside area.

LB	RB	
☐A	☐A	Majority of streamside area with depressions able to pond water ≥ 6 inches deep
☐B	☐B	Majority of streamside area with depressions able to pond water 3 to 6 inches deep
☒C	☒C	Majority of streamside area with depressions able to pond water < 3 inches deep

15. Wetland Presence – streamside area metric (skip for Tidal Marsh Streams)
Consider for the Left Bank (LB) and the Right Bank (RB). Do not consider wetlands outside of the streamside area or within the normal wetted perimeter of assessment reach.

LB	RB	
☒Y	☒Y	Are wetlands present in the streamside area?
☐N	☐N	

16. Baseflow Contributors – assessment reach metric (skip for Size 4 streams and Tidal Marsh Streams)
Check all contributors within the assessment reach or within view of <u>and</u> draining to the assessment reach.

- ☐A Streams and/or springs (jurisdictional discharges)
- ☐B Ponds (include wet detention basins; do not include sediment basins or dry detention basins)
- ☐C Obstruction passing flow during low-flow periods within the assessment area (beaver dam, leaky dam, bottom-release dam, weir)
- ☐D Evidence of bank seepage or sweating (iron in water indicates seepage)
- ☒E Stream bed or bank soil reduced (dig through deposited sediment if present)
- ☐F None of the above

17. Baseflow Detractors – assessment area metric (skip for Tidal Marsh Streams)
Check all that apply.

- ☐A Evidence of substantial water withdrawals from the assessment reach (includes areas excavated for pump installation)
- ☐B Obstruction not passing flow during low-flow periods affecting the assessment reach (ex: watertight dam, sediment deposit)
- ☐C Urban stream (≥ 24% impervious surface for watershed)
- ☐D Evidence that the streamside area has been modified resulting in accelerated drainage into the assessment reach
- ☐E Assessment reach relocated to valley edge
- ☒F None of the above

18. Shading – assessment reach metric (skip for Tidal Marsh Streams)
Consider aspect. Consider "leaf-on" condition.

- ☐A Stream shading is appropriate for stream category (may include gaps associated with natural processes)
- ☒B Degraded (example: scattered trees)
- ☐C Stream shading is gone or largely absent

19. Buffer Width – streamside area metric (skip for Tidal Marsh Streams)

Consider "vegetated buffer" and "wooded buffer" separately for left bank (LB) and right bank (RB) starting at the top of bank out to the first break.

Vegetated LB	Vegetated RB	Wooded LB	Wooded RB	
☒A	☒A	☒A	☐A	≥ 100 feet wide or extends to the edge of the watershed
☐B	☐B	☐B	☐B	From 50 to < 100 feet wide
☐C	☐C	☐C	☐C	From 30 to < 50 feet wide
☐D	☐D	☐D	☐D	From 10 to < 30 feet wide
☐E	☐E	☐E	☒E	< 10 feet wide or no trees

20. Buffer Structure – streamside area metric (skip for Tidal Marsh Streams)

Consider for left bank (LB) and right bank (RB) for Metric 19 ("Vegetated" Buffer Width).

LB	RB	
☒A	☐A	Mature forest
☐B	☐B	Non-mature woody vegetation or modified vegetation structure
☐C	☒C	Herbaceous vegetation with or without a strip of trees < 10 feet wide
☐D	☐D	Maintained shrubs
☐E	☐E	Little or no vegetation

21. Buffer Stressors – streamside area metric (skip for Tidal Marsh Streams)

Check all appropriate boxes for left bank (LB) and right bank (RB). Indicate if listed stressor abuts stream (Abuts), does not abut but is within 30 feet of stream (< 30 feet), or is between 30 to 50 feet of stream (30-50 feet).

If none of the following stressors occurs on either bank, check here and skip to Metric 22: ☐

Abuts LB	Abuts RB	< 30 feet LB	< 30 feet RB	30-50 feet LB	30-50 feet RB	
☐A	☐A	☐A	☐A	☐A	☐A	Row crops
☐B	☐B	☐B	☐B	☐B	☐B	Maintained turf
☐C	☐C	☐C	☐C	☐C	☐C	Pasture (no livestock)/commercial horticulture
☐D	☒D	☐D	☐D	☐D	☐D	Pasture (active livestock use)

22. Stem Density – streamside area metric (skip for Tidal Marsh Streams)

Consider for left bank (LB) and right bank (RB) for Metric 19 ("Wooded" Buffer Width).

LB	RB	
☒A	☐A	Medium to high stem density
☐B	☐B	Low stem density
☐C	☒C	No wooded riparian buffer or predominantly herbaceous species or bare ground

23. Continuity of Vegetated Buffer – streamside area metric (skip for Tidal Marsh Streams)

Consider whether vegetated buffer is continuous along stream (parallel). Breaks are areas lacking vegetation > 10 feet wide.

LB	RB	
☒A	☒A	The total length of buffer breaks is < 25 percent.
☐B	☐B	The total length of buffer breaks is between 25 and 50 percent.
☐C	☐C	The total length of buffer breaks is > 50 percent.

24. Vegetative Composition – streamside area metric (skip for Tidal Marsh Streams)

Evaluate the dominant vegetation within 100 feet of each bank or to the edge of the watershed (whichever comes first) as it contributes to assessment reach habitat.

LB	RB	
☒A	☐A	Vegetation is close to undisturbed in species present and their proportions. Lower strata composed of native species, with non-native invasive species absent or sparse.
☐B	☐B	Vegetation indicates disturbance in terms of species diversity or proportions, but is still largely composed of native species. This may include communities of weedy native species that develop after clear-cutting or clearing or communities with non-native invasive species present, but not dominant, over a large portion of the expected strata or communities missing understory but retaining canopy trees.
☐C	☒C	Vegetation is severely disturbed in terms of species diversity or proportions. Mature canopy is absent or communities with non-native invasive species dominant over a large portion of expected strata or communities composed of planted stands of non-characteristic species or communities inappropriately composed of a single species or no vegetation.

25. Conductivity – assessment reach metric (skip for all Coastal Plain streams)

25a. ☐Yes ☒No Was conductivity measurement recorded?
If No, select one of the following reasons. ☐No Water ☐Other: _____

25b. Check the box corresponding to the conductivity measurement (units of microsiemens per centimeter).
☐A < 46 ☐B 46 to < 67 ☐C 67 to < 79 ☐D 79 to < 230 ☐E ≥ 230

Notes/Sketch:
Cattle have access to the stream

Draft NC SAM Stream Rating Sheet
Accompanies User Manual Version 2.1

Stream Site Name	Morgan Branch Restoration Site	Date of Assessment	1/24/2018
Stream Category	Mb1	Assessor Name/Organization	J. Sullivan / KCI

Notes of Field Assessment Form (Y/N)	YES
Presence of regulatory considerations (Y/N)	NO
Additional stream information/supplementary measurements included (Y/N)	YES
NC SAM feature type (perennial, intermittent, Tidal Marsh Stream)	Intermittent

Function Class Rating Summary	USACE/ All Streams	NCDWR Intermittent
(1) Hydrology	**LOW**	**LOW**
(2) Baseflow	**HIGH**	**HIGH**
(2) Flood Flow	**LOW**	**LOW**
(3) Streamside Area Attenuation	**LOW**	**LOW**
(4) Floodplain Access	**LOW**	**LOW**
(4) Wooded Riparian Buffer	**MEDIUM**	**MEDIUM**
(4) Microtopography	NA	NA
(3) Stream Stability	**MEDIUM**	**MEDIUM**
(4) Channel Stability	**HIGH**	**HIGH**
(4) Sediment Transport	**HIGH**	**HIGH**
(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	**HIGH**	**HIGH**
(2) Streamside Area Vegetation	**LOW**	**LOW**
(3) Upland Pollutant Filtration	**LOW**	**LOW**
(3) Thermoregulation	**MEDIUM**	**MEDIUM**
(2) Indicators of Stressors	**YES**	**YES**
(2) Aquatic Life Tolerance	**HIGH**	**NA**
(2) Intertidal Zone Filtration	NA	NA
(1) Habitat	**LOW**	**LOW**
(2) In-stream Habitat	**MEDIUM**	**MEDIUM**
(3) Baseflow	**HIGH**	**HIGH**
(3) Substrate	**HIGH**	**HIGH**
(3) Stream Stability	**MEDIUM**	**MEDIUM**
(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	NA	NA
Overall	**LOW**	**LOW**

WETLAND DETERMINATION DATA FORM – Eastern Mountains and Piedmont Region

Project/Site: Morgan Branch Stream Restoration Site City/County: Buncombe Sampling Date: 5/14/20

Applicant/Owner: KCI State: NC Sampling Point: W1 Wet

Investigator(s): J. Sullivan Section, Township, Range:

Landform (hillslope, terrace, etc.): crenulation Local relief (concave, convex, none): Slope (%): 1%

Subregion (LRR or MLRA): N-130B Lat: 35.6068 Long: -82.7681 Datum: NAD83

Soil Map Unit Name: Evard-Cowee complex NWI classification: PSS

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? No Are "Normal Circumstances" present? Yes X No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? No (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:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- X Surface Water (A1)
- X High Water Table (A2)
- X Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ 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)
- ___ Microtopographic Relief (D4)
- X FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes X	No _____	Depth (inches): 1
Water Table Present?	Yes X	No _____	Depth (inches): 0
Saturation Present? (includes capillary fringe)	Yes X	No _____	Depth (inches): 0

Wetland Hydrology Present? Yes X No _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION (Four Strata) – Use scientific names of plants. Sampling Point: W1 Wet

Tree Stratum (Plot size: 30')	Absolute % Cover	Dominant Species?	Indicator Status
1. Salix nigra	10	X	OBL
2.			
3.			
4.			
5.			
6.			
7.			
	10 = Total Cover		
50% of total cover: 5	20% of total cover: 2		
Sapling/Shrub Stratum (Plot size: 15')			
1. Lindera benzoin	15	X	FAC
2. Salix nigra	15	X	OBL
3.			
4.			
5.			
6.			
7.			
8.			
9.			
	30 = Total Cover		
50% of total cover: 15	20% of total cover: 3		
Herb Stratum (Plot size: 5')			
1. Juncus effusus	40	X	FACW
2. Carex sp.	40	X	FACW
3. Impatiens capensis	20	X	FACW
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	100 = Total Cover		
50% of total cover: 50	20% of total cover: 20		
Woody Vine Stratum (Plot size: 30')			
1. None			
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: 6 (A)

Total Number of Dominant Species Across All Strata: 6 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100% (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
- 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: W1 Wet

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-2	10YR3/4	100					L	
2-5	10YR4/1	95	7.5YR4/4	5	C	PL	CL	
5-12+	10YR4/1	90	7.5YR4/4	10	C	MPL	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** X **No** _____

Remarks:

WETLAND DETERMINATION DATA FORM – Eastern Mountains and Piedmont Region

Project/Site: Morgan Branch Stream Restoration Site City/County: Buncombe Sampling Date: 5/13/20

Applicant/Owner: KCI State: NC Sampling Point: W5 Up

Investigator(s): J. Sullivan Section, Township, Range:

Landform (hillslope, terrace, etc.): Local relief (concave, convex, none): Slope (%): 5%

Subregion (LRR or MLRA): N-130B Lat: 35.6068 Long: -82.7454 Datum: NAD83

Soil Map Unit Name: Evard-Cowee complex NWI classification: -

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No _____ (If no, explain in Remarks.)

Are Vegetation X, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes X No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? No (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:

Cattle pasture.

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: W5 Up

Tree Stratum (Plot size: 30')	Absolute % Cover	Dominant Species?	Indicator Status
1. None			
2.			
3.			
4.			
5.			
6.			
7.			
	= Total Cover		

50% of total cover: _____ 20% of total cover: _____

Sapling/Shrub Stratum (Plot size: 15')			
1. None			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
	= Total Cover		

50% of total cover: _____ 20% of total cover: _____

Herb Stratum (Plot size: 5')			
1. Schedonorus arundinaceus	80	X	FACU
2. Andropogon gerardii	10		FACU
3. Trifolium repens	5		FACU
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	100 = Total Cover		

50% of total cover: 50 20% of total cover: 20

Woody Vine Stratum (Plot size: 30')			
1. None			
2.			
3.			
4.			
5.			
	= Total Cover		

50% of total cover: _____ 20% of total cover: _____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 0% (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: W5 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
0-13	7.5YR4/4	100					CL	
13-18+	7.5YR4/6	100					C	

[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: Morgan Branch Stream Restoration Site City/County: Buncombe Sampling Date: 5/13/20

Applicant/Owner: KCI State: NC Sampling Point: W5 Wet

Investigator(s): J. Sullivan Section, Township, Range:

Landform (hillslope, terrace, etc.): Headwater seep Local relief (concave, convex, none): Slope (%): 1%

Subregion (LRR or MLRA): N-130B Lat: 35.6066 Long: -82.7452 Datum: NAD83

Soil Map Unit Name: Evard-Cowee complex NWI classification: PEM

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 X No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? No (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 have grazing access to wetland.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- X Surface Water (A1)
- X High Water Table (A2)
- X Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- X Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- X Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ Microtopographic Relief (D4)
- X FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes X	No _____	Depth (inches): 1
Water Table Present?	Yes X	No _____	Depth (inches): 0
Saturation Present? (includes capillary fringe)	Yes X	No _____	Depth (inches): 0

Wetland Hydrology Present? Yes X No _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION (Four Strata) – Use scientific names of plants. Sampling Point: W5 Wet

Tree Stratum (Plot size: 30')	Absolute % Cover	Dominant Species?	Indicator Status
1. None			
2.			
3.			
4.			
5.			
6.			
7.			
	= Total Cover		
50% of total cover:	20% of total cover:		
Sapling/Shrub Stratum (Plot size: 15')			
1. Rubus argutus	5	X	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: 5')			
1. Juncus effusus	70	X	FACU
2. Carex sp.	30	X	FACU
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	100 = Total Cover		
50% of total cover: 50	20% of total cover: 20		
Woody Vine Stratum (Plot size: 30')			
1. None			
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: 5 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 67% (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
- 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: W5 Wet

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-2	10YR4/1	98	7.5YR4/6	2	C	PL	L	
2-8	10YR4/1	90	7.5YR4/6	10	C	PL	L	
8-14	10YR5/3	70	7.5YR4/6	30	C	M	SC	
14-18+	10YR5/3	70	7.5YR4/6	30	C	M	SC	Iron deposits/gravel

[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** X **No** _____

Remarks:

WETLAND DETERMINATION DATA FORM – Eastern Mountains and Piedmont Region

Project/Site: Morgan Branch Stream Restoration Site City/County: Buncombe Sampling Date: 5/14/20

Applicant/Owner: KCI State: NC Sampling Point: W7 Up

Investigator(s): J. Sullivan Section, Township, Range: _____

Landform (hillslope) terrace, etc.): _____ Local relief (concave, convex, none): _____ Slope (%): 5%

Subregion (LRR or MLRA): N-130B Lat: 35.6109 Long: -82.7406 Datum: NAD83

Soil Map Unit Name: Evard-Cowee complex NWI classification: -

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No _____ (If no, explain in Remarks.)

Are Vegetation X, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes X No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? No (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:

Active cattle pasture.

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: W7 Up

Tree Stratum (Plot size: 30')	Absolute % Cover	Dominant Species?	Indicator Status
1. None			
2.			
3.			
4.			
5.			
6.			
7.			
	= Total Cover		
50% of total cover:	20% of total cover:		
Sapling/Shrub Stratum (Plot size: 15')			
1. None			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
	= Total Cover		
50% of total cover:	20% of total cover:		
Herb Stratum (Plot size: 5')			
1. Schedonorus arundinaceus	80	X	FACU
2. Ranunculus sp.	15		NI
3. Trifolium repens	5		FACU
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	100 = Total Cover		
50% of total cover: 50	20% of total cover: 20		
Woody Vine Stratum (Plot size: 30')			
1. None			
2.			
3.			
4.			
5.			
	= Total Cover		
50% of total cover:	20% of total cover:		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 0% (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: W7 Wet

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-2	10YR4/4	100					L	
2-15	5YR4/6	100					CL	
15-18+	5YR4/6	100					C	

[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: Morgan Branch Stream Restoration Site City/County: Buncombe Sampling Date: 5/14/20

Applicant/Owner: KCI State: NC Sampling Point: W7 Wet

Investigator(s): J. Sullivan Section, Township, Range:

Landform (hillslope, terrace, etc.): Floodplain/seep Local relief (concave, convex, none): Slope (%): 1%

Subregion (LRR or MLRA): N-130B Lat: 35.6123 Long: -82.7405 Datum: NAD83

Soil Map Unit Name: Evard-Cowee complex NWI classification: PEM

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 X No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? No (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:

Located in cattle pasture.

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)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ Microtopographic Relief (D4)
- X FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes _____	No X	Depth (inches): -
Water Table Present?	Yes X	No _____	Depth (inches): 2
Saturation Present? (includes capillary fringe)	Yes X	No _____	Depth (inches): 2

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: W7 Wet

Tree Stratum (Plot size: 30')	Absolute % Cover	Dominant Species?	Indicator Status
1. Salix nigra	5	X	OBL
2.			
3.			
4.			
5.			
6.			
7.			
	5 = Total Cover		
50% of total cover: 2.5	20% of total cover: 1		
Sapling/Shrub Stratum (Plot size: 15')			
1. Rubus argutus	5	X	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: 5')			
1. Juncus effusus	45	X	FACW
2. Carex sp.	45	X	FACW
3. Ranunculus sp.	10		NI
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	100 = Total Cover		
50% of total cover: 50	20% of total cover: 20		
Woody Vine Stratum (Plot size: 30')			
1. None			
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: 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	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
- 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: W7 Wet

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-4	7.5YR4/4	100					CL	
4-9	10YR4/1	98	7.5YR3/4	2	C	PL	CL	
9-14	10YR4/1	95	7.5YR3/4	5	C	MPL	SCL	
14-18+	10YR4/1	90	7.5YR3/4	10	C	M	SCL	

[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** X **No** _____

Remarks:

NC WAM FIELD ASSESSMENT FORM
Accompanies User Manual Version 5.0

USACE AID #		NCDWR#	
Project Name	Morgan Branch Restoration Site	Date of Evaluation	5/14/2020
Applicant/Owner Name	KCI	Wetland Site Name	W1
Wetland Type	Headwater Forest	Assessor Name/Organization	J. Sullivan / KCI
Level III Ecoregion	Blue Ridge Mountains	Nearest Named Water Body	Morgan Branch
River Basin	French Broad	USGS 8-Digit Catalogue Unit	06010105
County	Buncombe	NCDWR Region	Asheville
☐ Yes ☒ No	Precipitation within 48 hrs?	Latitude/Longitude (deci-degrees)	35.6069 / -82.7678

Evidence of stressors affecting the assessment area (may not be within the assessment area)
Please circle and/or make note on the last page if evidence of stressors is apparent. Consider departure from reference, if appropriate, in recent past (for instance, within 10 years). Noteworthy stressors include, but are not limited to the following.

- Hydrological modifications (examples: ditches, dams, beaver dams, dikes, berms, ponds, etc.)
- Surface and sub-surface discharges into the wetland (examples: discharges containing obvious pollutants, presence of nearby septic tanks, underground storage tanks (USTs), hog lagoons, etc.)
- Signs of vegetation stress (examples: vegetation mortality, insect damage, disease, storm damage, salt intrusion, etc.)
- Habitat/plant community alteration (examples: mowing, clear-cutting, exotics, etc.)

Is the assessment area intensively managed? ☐ Yes ☒ No

Regulatory Considerations - Were regulatory considerations evaluated? ☒Yes ☐No If Yes, check all that apply to the assessment area.

☐ Anadromous fish
☐ Federally protected species or State endangered or threatened species
☐ NCDWR riparian buffer rule in effect
☐ Abuts a Primary Nursery Area (PNA)
☐ Publicly owned property
☐ N.C. Division of Coastal Management Area of Environmental Concern (AEC) (including buffer)
☐ Abuts a stream with a NCDWQ classification of SA or supplemental classifications of HQW, ORW, or Trout
☐ Designated NCNHP reference community
☐ Abuts a 303(d)-listed stream or a tributary to a 303(d)-listed stream

What type of natural stream is associated with the wetland, if any? (check all that apply)

☐ Blackwater
☒ Brownwater
☐ Tidal (if tidal, check one of the following boxes) ☐ Lunar ☐ Wind ☐ Both

Is the assessment area on a coastal island? ☐ Yes ☒ No

Is the assessment area's surface water storage capacity or duration substantially altered by beaver? ☐ Yes ☒ No

Does the assessment area experience overbank flooding during normal rainfall conditions? ☐ Yes ☒ No

1. Ground Surface Condition/Vegetation Condition – assessment area condition metric

Check a box in each column. Consider alteration to the ground surface (GS) in the assessment area and vegetation structure (VS) in the assessment area. Compare to reference wetland if applicable (see User Manual). If a reference is not applicable, then rate the assessment area based on evidence an effect.

GS	VS	
☒A	☒A	Not severely altered
☐B	☐B	Severely altered over a majority of the assessment area (ground surface alteration examples: vehicle tracks, excessive sedimentation, fire-plow lanes, skidder tracks, bedding, fill, soil compaction, obvious pollutants) (vegetation structure alteration examples: mechanical disturbance, herbicides, salt intrusion [where appropriate], exotic species, grazing, less diversity [if appropriate], hydrologic alteration)

2. Surface and Sub-Surface Storage Capacity and Duration – assessment area condition metric

Check a box in each column. Consider surface storage capacity and duration (Surf) and sub-surface storage capacity and duration (Sub). Consider both increase and decrease in hydrology. A ditch ≤ 1 foot deep is considered to affect surface water only, while a ditch > 1 foot deep is expected to affect both surface and sub-surface water. Consider tidal flooding regime, if applicable.

Surf	Sub	
☒A	☒A	Water storage capacity and duration are not altered.
☐B	☐B	Water storage capacity or duration are altered, but not substantially (typically, not sufficient to change vegetation).
☐C	☐C	Water storage capacity or duration are substantially altered (typically, alteration sufficient to result in vegetation change) (examples: draining, flooding, soil compaction, filling, excessive sedimentation, underground utility lines).

3. Water Storage/Surface Relief – assessment area/wetland type condition metric (skip for all marshes)

Check a box in each column. Select the appropriate storage for the assessment area (AA) and the wetland type (WT).

	AA	WT	
3a.	☐A	☐A	Majority of wetland with depressions able to pond water > 1 deep
	☐B	☐B	Majority of wetland with depressions able to pond water 6 inches to 1 foot deep
	☒C	☒C	Majority of wetland with depressions able to pond water 3 to 6 inches deep
	☐D	☐D	Depressions able to pond water < 3 inches deep

3b. ☐A Evidence that maximum depth of inundation is greater than 2 feet
☐B Evidence that maximum depth of inundation is between 1 and 2 feet
☒C Evidence that maximum depth of inundation is less than 1 foot

4. Soil Texture/Structure – assessment area condition metric (skip for all marshes)

Check a box from each of the three soil property groups below. Dig soil profile in the dominant assessment area landscape feature. Make soil observations within the top 12 inches. Use most recent National Technical Committee for Hydric Soils guidance for regional indicators.

4a.
- ☐A Sandy soil
- ☒B Loamy or clayey soils exhibiting redoximorphic features (concentrations, depletions, or rhizospheres)
- ☐C Loamy or clayey soils not exhibiting redoximorphic features
- ☐D Loamy or clayey gleyed soil
- ☐E Histosol or histic epipedon

4b.
- ☐A Soil ribbon < 1 inch
- ☒B Soil ribbon ≥ 1 inch

4c.
- ☒A No peat or muck presence
- ☐B A peat or muck presence

5. Discharge into Wetland – opportunity metric

Check a box in each column. Consider surface pollutants or discharges (Surf) and sub-surface pollutants or discharges (Sub). Examples of sub-surface discharges include presence of nearby septic tank, underground storage tank (UST), etc.

Surf	Sub	
☐A	☒A	Little or no evidence of pollutants or discharges entering the assessment area
☒B	☐B	Noticeable evidence of pollutants or discharges entering the wetland and stressing, but not overwhelming the treatment capacity of the assessment area
☐C	☐C	Noticeable evidence of pollutants or discharges (pathogen, particulate, or soluble) entering the assessment area and potentially overwhelming the treatment capacity of the wetland (water discoloration, dead vegetation, excessive sedimentation, odor)

6. Land Use – opportunity metric (skip for non-riparian wetlands)

Check all that apply (at least one box in each column). Evaluation involves a GIS effort with field adjustment. Consider sources draining to assessment area within entire upstream watershed (WS), within 5 miles and within the watershed draining to the assessment area (5M), and within 2 miles and within the watershed draining to the assessment area (2M).

WS	5M	2M	
☐A	☐A	☐A	≥ 10% impervious surfaces
☐B	☐B	☐B	Confined animal operations (or other local, concentrated source of pollutants
☐C	☐C	☐C	≥ 20% coverage of pasture
☐D	☐D	☐D	≥ 20% coverage of agricultural land (regularly plowed land)
☐E	☐E	☐E	≥ 20% coverage of maintained grass/herb
☐F	☐F	☐F	≥ 20% coverage of clear-cut land
☒G	☒G	☒G	Little or no opportunity to improve water quality. Lack of opportunity may result from little or no disturbance in the watershed or hydrologic alterations that prevent drainage and/or overbank flow from affecting the assessment area.

7. Wetland Acting as Vegetated Buffer – assessment area/wetland complex condition metric (skip for non-riparian wetlands)

7a. Is assessment area within 50 feet of a tributary or other open water?
☒Yes ☐No If Yes, continue to 7b. If No, skip to Metric 8.
Wetland buffer need only be present on one side of the water body. Make buffer judgment based on the average width of wetland. Record a note if a portion of the buffer has been removed or disturbed.

7b. How much of the first 50 feet from the bank is wetland? (Wetland buffer need only be present on one side of the .water body. Make buffer judgment based on the average width of wetland. Record a note if a portion of the buffer has been removed or disturbed.)
- ☐A ≥ 50 feet
- ☐B From 30 to < 50 feet
- ☒C From 15 to < 30 feet
- ☐D From 5 to < 15 feet
- ☐E < 5 feet or buffer bypassed by ditches

7c. Tributary width. If the tributary is anastomosed, combine widths of channels/braids for a total width.
☒≤ 15-feet wide ☐> 15-feet wide ☐ Other open water (no tributary present)

7d. Do roots of assessment area vegetation extend into the bank of the tributary/open water?
☐Yes ☒No

7e. Is stream or other open water sheltered or exposed?
☒Sheltered – adjacent open water with width < 2500 feet and no regular boat traffic.
☐Exposed – adjacent open water with width ≥ 2500 feet or regular boat traffic.

8. Wetland Width at the Assessment Area – wetland type/wetland complex condition metric (evaluate WT for all marshes and Estuarine Woody Wetland only; evaluate WC for Bottomland Hardwood Forest, Headwater Forest, and Riverine Swamp Forest only)

Check a box in each column for riverine wetlands only. Select the average width for the wetland type at the assessment area (WT) and the wetland complex at the assessment area (WC). See User Manual for WT and WC boundaries.

WT	WC	
☐A	☐A	≥ 100 feet
☐B	☐B	From 80 to < 100 feet
☐C	☐C	From 50 to < 80 feet
☒D	☒D	From 40 to < 50 feet
☐E	☐E	From 30 to < 40 feet
☐F	☐F	From 15 to < 30 feet
☐G	☐G	From 5 to < 15 feet
☐H	☐H	< 5 feet

9. Inundation Duration – assessment area condition metric (skip for non-riparian wetlands)

Answer for assessment area dominant landform.

☐A Evidence of short-duration inundation (< 7 consecutive days)
☒B Evidence of saturation, without evidence of inundation
☐C Evidence of long-duration inundation or very long-duration inundation (7 to 30 consecutive days or more)

10. Indicators of Deposition – assessment area condition metric (skip for non-riparian wetlands and all marshes)

Consider recent deposition only (no plant growth since deposition).

☒A Sediment deposition is not excessive, but at approximately natural levels.
☐B Sediment deposition is excessive, but not overwhelming the wetland.
☐C Sediment deposition is excessive and is overwhelming the wetland.

11. Wetland Size – wetland type/wetland complex condition metric

Check a box in each column. Involves a GIS effort with field adjustment. This metric evaluates three aspects of the wetland area: the size of the wetland type (WT), the size of the wetland complex (WC), and the size of the forested wetland (FW) (if applicable, see User Manual). See the User Manual for boundaries of these evaluation areas. If assessment area is clear-cut, select "K" for the FW column.

WT	WC	FW (if applicable)	
☐A	☐A	☐A	≥ 500 acres
☐B	☐B	☐B	From 100 to < 500 acres
☐C	☐C	☐C	From 50 to < 100 acres
☐D	☐D	☐D	From 25 to < 50 acres
☐E	☐E	☐E	From 10 to < 25 acres
☐F	☐F	☐F	From 5 to < 10 acres
☐G	☐G	☐G	From 1 to < 5 acres
☐H	☐H	☐H	From 0.5 to < 1 acre
☒I	☒I	☒I	From 0.1 to < 0.5 acre
☐J	☐J	☐J	From 0.01 to < 0.1 acre
☐K	☐K	☐K	< 0.01 acre or assessment area is clear-cut

12. Wetland Intactness – wetland type condition metric (evaluate for Pocosins only)

☐A Pocosin is the full extent (≥ 90%) of its natural landscape size.
☐B Pocosin type is < 90% of the full extent of its natural landscape size.

13. Connectivity to Other Natural Areas – landscape condition metric

13a. **Check appropriate box(es) (a box may be checked in each column).** Involves a GIS effort with field adjustment. This metric evaluates whether the wetland is well connected (Well) and/or loosely connected (Loosely) to the landscape patch, the contiguous naturally vegetated area and open water (if appropriate). Boundaries are formed by four-lane roads, regularly maintained utility line corridors the width of a four-lane road or wider, urban landscapes, maintained fields (pasture and agriculture), or open water > 300 feet wide.

Well	Loosely	
☐A	☐A	≥ 500 acres
☐B	☐B	From 100 to < 500 acres
☐C	☐C	From 50 to < 100 acres
☐D	☐D	From 10 to < 50 acres
☒E	☒E	< 10 acres
☐F	☐F	Wetland type has a poor or no connection to other natural habitats

13b. **Evaluate for marshes only**.

☐Yes ☐No Wetland type has a surface hydrology connection to open waters/stream or tidal wetlands.

14. Edge Effect – wetland type condition metric (skip for all marshes and Estuarine Woody Wetland)

May involve a GIS effort with field adjustment. Estimate distance from wetland type boundary to artificial edges. Artificial edges include non-forested areas ≥ 40 feet wide such as fields, development, roads, regularly maintained utility line corridors, and clear-cuts. Consider the eight main points of the compass. Artificial edge occurs within 150 feet in how many directions? If the assessment area is clear cut, select option "C."

☐A 0
☐B 1 to 4
☒C 5 to 8

15. Vegetative Composition – assessment area condition metric (skip for all marshes and Pine Flat)

☐A Vegetation is close to reference condition in species present and their proportions. Lower strata composed of appropriate species, with exotic plants absent or sparse within the assessment area.
☒B Vegetation is different from reference condition in species diversity or proportions, but still largely composed of native species characteristic of the wetland type. This may include communities of weedy native species that develop after clearcutting or clearing. It also includes communities with exotics present, but not dominant, over a large portion of the expected strata.
☐C Vegetation severely altered from reference in composition, or expected species are unnaturally absent (planted stands of non-characteristic species or at least one stratum inappropriately composed of a single species), or exotic species are dominant in at least one stratum.

16. Vegetative Diversity – assessment area condition metric (evaluate for Non-tidal Freshwater Marsh only)

☐A Vegetation diversity is high and is composed primarily of native species (< 10% cover of exotics).
☒B Vegetation diversity is low or has > 10% to 50% cover of exotics.
☐C Vegetation is dominated by exotic species (> 50 % cover of exotics).

17. Vegetative Structure – assessment area/wetland type condition metric

17a. Is vegetation present?
☒Yes ☐No If Yes, continue to 17b. If No, skip to Metric 18.

17b. Evaluate percent coverage of assessment area vegetation **for all marshes only**. Skip to 17c for non-marsh wetlands.
☒A ≥ 25% coverage of vegetation
☐B < 25% coverage of vegetation

17c. **Check a box in each column for each stratum**. Evaluate this portion of the metric **for non-marsh wetlands**. Consider structure in airspace above the assessment area (AA) and the wetland type (WT) separately.

	AA	WT	
Canopy	☐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.

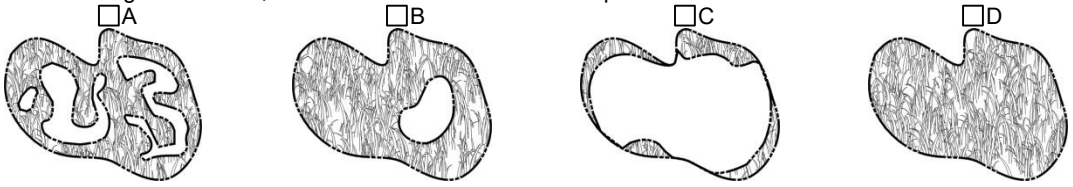
20. Large Woody Debris – wetland type condition metric (skip for all marshes)

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
Cattle have impacted the wetland

NC WAM Wetland Rating Sheet
Accompanies User Manual Version 5.0

Wetland Site Name	W1	Date of Assessment	5/14/2020
Wetland Type	Headwater Forest	Assessor Name/Organization	J. Sullivan / KCI

Notes on Field Assessment Form (Y/N)	YES
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	**HIGH**
	Sub-surface Storage and Retention	Condition	**MEDIUM**
Water Quality	Pathogen Change	Condition	**HIGH**
		Condition/Opportunity	**HIGH**
		Opportunity Presence (Y/N)	**NO**
	Particulate Change	Condition	**HIGH**
		Condition/Opportunity	NA
		Opportunity Presence (Y/N)	NA
	Soluble Change	Condition	**HIGH**
		Condition/Opportunity	**HIGH**
		Opportunity Presence (Y/N)	**NO**
	Physical Change	Condition	**MEDIUM**
		Condition/Opportunity	**MEDIUM**
		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	Rating
Hydrology	Condition	**HIGH**
Water Quality	Condition	**HIGH**
	Condition/Opportunity	**HIGH**
	Opportunity Presence (Y/N)	**NO**
Habitat	Condition	**LOW**

Overall Wetland Rating **HIGH**

NC WAM FIELD ASSESSMENT FORM
Accompanies User Manual Version 5.0

USACE AID #		NCDWR#	
Project Name	Morgan Branch Restoration Site	Date of Evaluation	5/14/2020
Applicant/Owner Name	KCI	Wetland Site Name	W2, W3
Wetland Type	Headwater Forest	Assessor Name/Organization	J. Sullivan / KCI
Level III Ecoregion	Blue Ridge Mountains	Nearest Named Water Body	Morgan Branch
River Basin	French Broad	USGS 8-Digit Catalogue Unit	06010105
County	Buncombe	NCDWR Region	Asheville
☐ Yes ☒ No	Precipitation within 48 hrs?	Latitude/Longitude (deci-degrees)	35.6092 / -82.7631

Evidence of stressors affecting the assessment area (may not be within the assessment area)
Please circle and/or make note on the last page if evidence of stressors is apparent. Consider departure from reference, if appropriate, in recent past (for instance, within 10 years). Noteworthy stressors include, but are not limited to the following.

- Hydrological modifications (examples: ditches, dams, beaver dams, dikes, berms, ponds, etc.)
- Surface and sub-surface discharges into the wetland (examples: discharges containing obvious pollutants, presence of nearby septic tanks, underground storage tanks (USTs), hog lagoons, etc.)
- Signs of vegetation stress (examples: vegetation mortality, insect damage, disease, storm damage, salt intrusion, etc.)
- Habitat/plant community alteration (examples: mowing, clear-cutting, exotics, etc.)

Is the assessment area intensively managed? ☐ Yes ☒ No

Regulatory Considerations - Were regulatory considerations evaluated? ☒Yes ☐No If Yes, check all that apply to the assessment area.

☐ Anadromous fish
☐ Federally protected species or State endangered or threatened species
☐ NCDWR riparian buffer rule in effect
☐ Abuts a Primary Nursery Area (PNA)
☐ Publicly owned property
☐ N.C. Division of Coastal Management Area of Environmental Concern (AEC) (including buffer)
☐ Abuts a stream with a NCDWQ classification of SA or supplemental classifications of HQW, ORW, or Trout
☐ Designated NCNHP reference community
☐ Abuts a 303(d)-listed stream or a tributary to a 303(d)-listed stream

What type of natural stream is associated with the wetland, if any? (check all that apply)

☐ Blackwater
☒ Brownwater
☐ Tidal (if tidal, check one of the following boxes) ☐ Lunar ☐ Wind ☐ Both

Is the assessment area on a coastal island? ☐ Yes ☒ No

Is the assessment area's surface water storage capacity or duration substantially altered by beaver? ☐ Yes ☒ No

Does the assessment area experience overbank flooding during normal rainfall conditions? ☐ Yes ☒ No

1. Ground Surface Condition/Vegetation Condition – assessment area condition metric

Check a box in each column. Consider alteration to the ground surface (GS) in the assessment area and vegetation structure (VS) in the assessment area. Compare to reference wetland if applicable (see User Manual). If a reference is not applicable, then rate the assessment area based on evidence an effect.

GS	VS	
☐A	☒A	Not severely altered
☒B	☐B	Severely altered over a majority of the assessment area (ground surface alteration examples: vehicle tracks, excessive sedimentation, fire-plow lanes, skidder tracks, bedding, fill, soil compaction, obvious pollutants) (vegetation structure alteration examples: mechanical disturbance, herbicides, salt intrusion [where appropriate], exotic species, grazing, less diversity [if appropriate], hydrologic alteration)

2. Surface and Sub-Surface Storage Capacity and Duration – assessment area condition metric

Check a box in each column. Consider surface storage capacity and duration (Surf) and sub-surface storage capacity and duration (Sub). Consider both increase and decrease in hydrology. A ditch ≤ 1 foot deep is considered to affect surface water only, while a ditch > 1 foot deep is expected to affect both surface and sub-surface water. Consider tidal flooding regime, if applicable.

Surf	Sub	
☒A	☒A	Water storage capacity and duration are not altered.
☐B	☐B	Water storage capacity or duration are altered, but not substantially (typically, not sufficient to change vegetation).
☐C	☐C	Water storage capacity or duration are substantially altered (typically, alteration sufficient to result in vegetation change) (examples: draining, flooding, soil compaction, filling, excessive sedimentation, underground utility lines).

3. Water Storage/Surface Relief – assessment area/wetland type condition metric (skip for all marshes)

Check a box in each column. Select the appropriate storage for the assessment area (AA) and the wetland type (WT).

	AA	WT	
3a.	☐A	☐A	Majority of wetland with depressions able to pond water > 1 deep
	☐B	☐B	Majority of wetland with depressions able to pond water 6 inches to 1 foot deep
	☒C	☒C	Majority of wetland with depressions able to pond water 3 to 6 inches deep
	☐D	☐D	Depressions able to pond water < 3 inches deep

3b. ☐A Evidence that maximum depth of inundation is greater than 2 feet
☐B Evidence that maximum depth of inundation is between 1 and 2 feet
☒C Evidence that maximum depth of inundation is less than 1 foot

4. Soil Texture/Structure – assessment area condition metric (skip for all marshes)

Check a box from each of the three soil property groups below. Dig soil profile in the dominant assessment area landscape feature. Make soil observations within the top 12 inches. Use most recent National Technical Committee for Hydric Soils guidance for regional indicators.

4a.
- ☐A Sandy soil
- ☒B Loamy or clayey soils exhibiting redoximorphic features (concentrations, depletions, or rhizospheres)
- ☐C Loamy or clayey soils not exhibiting redoximorphic features
- ☐D Loamy or clayey gleyed soil
- ☐E Histosol or histic epipedon

4b.
- ☐A Soil ribbon < 1 inch
- ☒B Soil ribbon ≥ 1 inch

4c.
- ☒A No peat or muck presence
- ☐B A peat or muck presence

5. Discharge into Wetland – opportunity metric

Check a box in each column. Consider surface pollutants or discharges (Surf) and sub-surface pollutants or discharges (Sub). Examples of sub-surface discharges include presence of nearby septic tank, underground storage tank (UST), etc.

Surf	Sub	
☐A	☒A	Little or no evidence of pollutants or discharges entering the assessment area
☒B	☐B	Noticeable evidence of pollutants or discharges entering the wetland and stressing, but not overwhelming the treatment capacity of the assessment area
☐C	☐C	Noticeable evidence of pollutants or discharges (pathogen, particulate, or soluble) entering the assessment area and potentially overwhelming the treatment capacity of the wetland (water discoloration, dead vegetation, excessive sedimentation, odor)

6. Land Use – opportunity metric (skip for non-riparian wetlands)

Check all that apply (at least one box in each column). Evaluation involves a GIS effort with field adjustment. Consider sources draining to assessment area within entire upstream watershed (WS), within 5 miles and within the watershed draining to the assessment area (5M), and within 2 miles and within the watershed draining to the assessment area (2M).

WS	5M	2M	
☐A	☐A	☐A	≥ 10% impervious surfaces
☐B	☐B	☐B	Confined animal operations (or other local, concentrated source of pollutants
☒C	☐C	☐C	≥ 20% coverage of pasture
☐D	☐D	☐D	≥ 20% coverage of agricultural land (regularly plowed land)
☐E	☐E	☐E	≥ 20% coverage of maintained grass/herb
☐F	☐F	☐F	≥ 20% coverage of clear-cut land
☐G	☒G	☒G	Little or no opportunity to improve water quality. Lack of opportunity may result from little or no disturbance in the watershed or hydrologic alterations that prevent drainage and/or overbank flow from affecting the assessment area.

7. Wetland Acting as Vegetated Buffer – assessment area/wetland complex condition metric (skip for non-riparian wetlands)

7a. Is assessment area within 50 feet of a tributary or other open water?
☒Yes ☐No If Yes, continue to 7b. If No, skip to Metric 8.
Wetland buffer need only be present on one side of the water body. Make buffer judgment based on the average width of wetland. Record a note if a portion of the buffer has been removed or disturbed.

7b. How much of the first 50 feet from the bank is wetland? (Wetland buffer need only be present on one side of the .water body. Make buffer judgment based on the average width of wetland. Record a note if a portion of the buffer has been removed or disturbed.)
- ☐A ≥ 50 feet
- ☐B From 30 to < 50 feet
- ☐C From 15 to < 30 feet
- ☒D From 5 to < 15 feet
- ☐E < 5 feet or buffer bypassed by ditches

7c. Tributary width. If the tributary is anastomosed, combine widths of channels/braids for a total width.
☒≤ 15-feet wide ☐> 15-feet wide ☐ Other open water (no tributary present)

7d. Do roots of assessment area vegetation extend into the bank of the tributary/open water?
☐Yes ☒No

7e. Is stream or other open water sheltered or exposed?
☒Sheltered – adjacent open water with width < 2500 feet and no regular boat traffic.
☐Exposed – adjacent open water with width ≥ 2500 feet or regular boat traffic.

8. Wetland Width at the Assessment Area – wetland type/wetland complex condition metric (evaluate WT for all marshes and Estuarine Woody Wetland only; evaluate WC for Bottomland Hardwood Forest, Headwater Forest, and Riverine Swamp Forest only)

Check a box in each column for riverine wetlands only. Select the average width for the wetland type at the assessment area (WT) and the wetland complex at the assessment area (WC). See User Manual for WT and WC boundaries.

WT	WC	
☐A	☐A	≥ 100 feet
☐B	☐B	From 80 to < 100 feet
☐C	☐C	From 50 to < 80 feet
☐D	☐D	From 40 to < 50 feet
☐E	☐E	From 30 to < 40 feet
☒F	☒F	From 15 to < 30 feet
☐G	☐G	From 5 to < 15 feet
☐H	☐H	< 5 feet

9. Inundation Duration – assessment area condition metric (skip for non-riparian wetlands)

Answer for assessment area dominant landform.

☐A Evidence of short-duration inundation (< 7 consecutive days)
☒B Evidence of saturation, without evidence of inundation
☐C Evidence of long-duration inundation or very long-duration inundation (7 to 30 consecutive days or more)

10. Indicators of Deposition – assessment area condition metric (skip for non-riparian wetlands and all marshes)

Consider recent deposition only (no plant growth since deposition).

☒A Sediment deposition is not excessive, but at approximately natural levels.
☐B Sediment deposition is excessive, but not overwhelming the wetland.
☐C Sediment deposition is excessive and is overwhelming the wetland.

11. Wetland Size – wetland type/wetland complex condition metric

Check a box in each column. Involves a GIS effort with field adjustment. This metric evaluates three aspects of the wetland area: the size of the wetland type (WT), the size of the wetland complex (WC), and the size of the forested wetland (FW) (if applicable, see User Manual). See the User Manual for boundaries of these evaluation areas. If assessment area is clear-cut, select "K" for the FW column.

WT	WC	FW (if applicable)	
☐A	☐A	☐A	≥ 500 acres
☐B	☐B	☐B	From 100 to < 500 acres
☐C	☐C	☐C	From 50 to < 100 acres
☐D	☐D	☐D	From 25 to < 50 acres
☐E	☐E	☐E	From 10 to < 25 acres
☐F	☐F	☐F	From 5 to < 10 acres
☐G	☐G	☐G	From 1 to < 5 acres
☐H	☐H	☐H	From 0.5 to < 1 acre
☐I	☒I	☐I	From 0.1 to < 0.5 acre
☒J	☐J	☐J	From 0.01 to < 0.1 acre
☐K	☐K	☒K	< 0.01 acre or assessment area is clear-cut

12. Wetland Intactness – wetland type condition metric (evaluate for Pocosins only)

☐A Pocosin is the full extent (≥ 90%) of its natural landscape size.
☐B Pocosin type is < 90% of the full extent of its natural landscape size.

13. Connectivity to Other Natural Areas – landscape condition metric

13a. **Check appropriate box(es) (a box may be checked in each column).** Involves a GIS effort with field adjustment. This metric evaluates whether the wetland is well connected (Well) and/or loosely connected (Loosely) to the landscape patch, the contiguous naturally vegetated area and open water (if appropriate). Boundaries are formed by four-lane roads, regularly maintained utility line corridors the width of a four-lane road or wider, urban landscapes, maintained fields (pasture and agriculture), or open water > 300 feet wide.

Well	Loosely	
☐A	☐A	≥ 500 acres
☐B	☐B	From 100 to < 500 acres
☐C	☐C	From 50 to < 100 acres
☐D	☐D	From 10 to < 50 acres
☒E	☒E	< 10 acres
☐F	☐F	Wetland type has a poor or no connection to other natural habitats

13b. **Evaluate for marshes only**.

☐Yes ☐No Wetland type has a surface hydrology connection to open waters/stream or tidal wetlands.

14. Edge Effect – wetland type condition metric (skip for all marshes and Estuarine Woody Wetland)

May involve a GIS effort with field adjustment. Estimate distance from wetland type boundary to artificial edges. Artificial edges include non-forested areas ≥ 40 feet wide such as fields, development, roads, regularly maintained utility line corridors, and clear-cuts. Consider the eight main points of the compass. Artificial edge occurs within 150 feet in how many directions? If the assessment area is clear cut, select option "C."

☐A 0
☐B 1 to 4
☒C 5 to 8

15. Vegetative Composition – assessment area condition metric (skip for all marshes and Pine Flat)

☐A Vegetation is close to reference condition in species present and their proportions. Lower strata composed of appropriate species, with exotic plants absent or sparse within the assessment area.
☐B Vegetation is different from reference condition in species diversity or proportions, but still largely composed of native species characteristic of the wetland type. This may include communities of weedy native species that develop after clearcutting or clearing. It also includes communities with exotics present, but not dominant, over a large portion of the expected strata.
☒C Vegetation severely altered from reference in composition, or expected species are unnaturally absent (planted stands of non-characteristic species or at least one stratum inappropriately composed of a single species), or exotic species are dominant in at least one stratum.

16. Vegetative Diversity – assessment area condition metric (evaluate for Non-tidal Freshwater Marsh only)

☐A Vegetation diversity is high and is composed primarily of native species (< 10% cover of exotics).
☒B Vegetation diversity is low or has > 10% to 50% cover of exotics.
☐C Vegetation is dominated by exotic species (> 50 % cover of exotics).

17. Vegetative Structure – assessment area/wetland type condition metric

17a. Is vegetation present?
☒Yes ☐No If Yes, continue to 17b. If No, skip to Metric 18.

17b. Evaluate percent coverage of assessment area vegetation **for all marshes only**. Skip to 17c for non-marsh wetlands.
☒A ≥ 25% coverage of vegetation
☐B < 25% coverage of vegetation

17c. **Check a box in each column for each stratum**. Evaluate this portion of the metric **for non-marsh wetlands**. Consider structure in airspace above the assessment area (AA) and the wetland type (WT) separately.

	AA	WT	
Canopy	☐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.

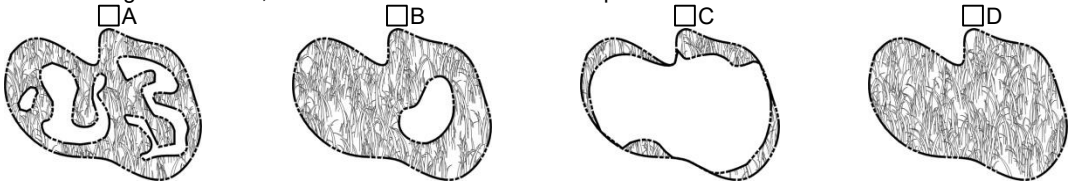
20. Large Woody Debris – wetland type condition metric (skip for all marshes)

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
Cattle have impacted the wetland

NC WAM Wetland Rating Sheet
Accompanies User Manual Version 5.0

Wetland Site Name	W2, W3	Date of Assessment	5/14/2020
Wetland Type	Headwater Forest	Assessor Name/Organization	J. Sullivan / KCI

Notes on Field Assessment Form (Y/N)	YES
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	**MEDIUM**
Water Quality	Pathogen Change	Condition	**HIGH**
		Condition/Opportunity	**HIGH**
		Opportunity Presence (Y/N)	**NO**
	Particulate Change	Condition	**LOW**
		Condition/Opportunity	NA
		Opportunity Presence (Y/N)	NA
	Soluble Change	Condition	**HIGH**
		Condition/Opportunity	**HIGH**
		Opportunity Presence (Y/N)	**NO**
	Physical Change	Condition	**MEDIUM**
		Condition/Opportunity	**MEDIUM**
		Opportunity Presence (Y/N)	**YES**
	Pollution Change	Condition	NA
		Condition/Opportunity	NA
		Opportunity Presence (Y/N)	NA
Habitat	Physical Structure	Condition	**LOW**
	Landscape Patch Structure	Condition	**LOW**
	Vegetation Composition	Condition	**LOW**

Function Rating Summary

Function	Metrics	Rating
Hydrology	Condition	**MEDIUM**
Water Quality	Condition	**HIGH**
	Condition/Opportunity	**HIGH**
	Opportunity Presence (Y/N)	**YES**
Habitat	Condition	**LOW**

Overall Wetland Rating **MEDIUM**

NC WAM FIELD ASSESSMENT FORM
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USACE AID #		NCDWR#	
Project Name	Morgan Branch Restoration Site	Date of Evaluation	5/14/2020
Applicant/Owner Name	KCI	Wetland Site Name	W4
Wetland Type	Bottomland Hardwood Forest	Assessor Name/Organization	J. Sullivan / KCI
Level III Ecoregion	Blue Ridge Mountains	Nearest Named Water Body	Morgan Branch
River Basin	French Broad	USGS 8-Digit Catalogue Unit	06010105
County	Buncombe	NCDWR Region	Asheville
☐ Yes ☒ No	Precipitation within 48 hrs?	Latitude/Longitude (deci-degrees)	35.6069 / -82.7524

Evidence of stressors affecting the assessment area (may not be within the assessment area)
Please circle and/or make note on the last page if evidence of stressors is apparent. Consider departure from reference, if appropriate, in recent past (for instance, within 10 years). Noteworthy stressors include, but are not limited to the following.

- Hydrological modifications (examples: ditches, dams, beaver dams, dikes, berms, ponds, etc.)
- Surface and sub-surface discharges into the wetland (examples: discharges containing obvious pollutants, presence of nearby septic tanks, underground storage tanks (USTs), hog lagoons, etc.)
- Signs of vegetation stress (examples: vegetation mortality, insect damage, disease, storm damage, salt intrusion, etc.)
- Habitat/plant community alteration (examples: mowing, clear-cutting, exotics, etc.)

Is the assessment area intensively managed? ☐ Yes ☒ No

Regulatory Considerations - Were regulatory considerations evaluated? ☒Yes ☐No If Yes, check all that apply to the assessment area.

☐ Anadromous fish
☐ Federally protected species or State endangered or threatened species
☐ NCDWR riparian buffer rule in effect
☐ Abuts a Primary Nursery Area (PNA)
☐ Publicly owned property
☐ N.C. Division of Coastal Management Area of Environmental Concern (AEC) (including buffer)
☐ Abuts a stream with a NCDWQ classification of SA or supplemental classifications of HQW, ORW, or Trout
☐ Designated NCNHP reference community
☐ Abuts a 303(d)-listed stream or a tributary to a 303(d)-listed stream

What type of natural stream is associated with the wetland, if any? (check all that apply)

☐ Blackwater
☒ Brownwater
☐ Tidal (if tidal, check one of the following boxes) ☐ Lunar ☐ Wind ☐ Both

Is the assessment area on a coastal island? ☐ Yes ☒ No

Is the assessment area's surface water storage capacity or duration substantially altered by beaver? ☐ Yes ☒ No

Does the assessment area experience overbank flooding during normal rainfall conditions? ☐ Yes ☒ No

1. Ground Surface Condition/Vegetation Condition – assessment area condition metric

Check a box in each column. Consider alteration to the ground surface (GS) in the assessment area and vegetation structure (VS) in the assessment area. Compare to reference wetland if applicable (see User Manual). If a reference is not applicable, then rate the assessment area based on evidence an effect.

GS	VS	
☒A	☐A	Not severely altered
☐B	☒B	Severely altered over a majority of the assessment area (ground surface alteration examples: vehicle tracks, excessive sedimentation, fire-plow lanes, skidder tracks, bedding, fill, soil compaction, obvious pollutants) (vegetation structure alteration examples: mechanical disturbance, herbicides, salt intrusion [where appropriate], exotic species, grazing, less diversity [if appropriate], hydrologic alteration)

2. Surface and Sub-Surface Storage Capacity and Duration – assessment area condition metric

Check a box in each column. Consider surface storage capacity and duration (Surf) and sub-surface storage capacity and duration (Sub). Consider both increase and decrease in hydrology. A ditch ≤ 1 foot deep is considered to affect surface water only, while a ditch > 1 foot deep is expected to affect both surface and sub-surface water. Consider tidal flooding regime, if applicable.

Surf	Sub	
☒A	☒A	Water storage capacity and duration are not altered.
☐B	☐B	Water storage capacity or duration are altered, but not substantially (typically, not sufficient to change vegetation).
☐C	☐C	Water storage capacity or duration are substantially altered (typically, alteration sufficient to result in vegetation change) (examples: draining, flooding, soil compaction, filling, excessive sedimentation, underground utility lines).

3. Water Storage/Surface Relief – assessment area/wetland type condition metric (skip for all marshes)

Check a box in each column. Select the appropriate storage for the assessment area (AA) and the wetland type (WT).

	AA	WT	
3a.	☐A	☐A	Majority of wetland with depressions able to pond water > 1 deep
	☐B	☐B	Majority of wetland with depressions able to pond water 6 inches to 1 foot deep
	☒C	☒C	Majority of wetland with depressions able to pond water 3 to 6 inches deep
	☐D	☐D	Depressions able to pond water < 3 inches deep

3b. ☐A Evidence that maximum depth of inundation is greater than 2 feet
☐B Evidence that maximum depth of inundation is between 1 and 2 feet
☒C Evidence that maximum depth of inundation is less than 1 foot

4. Soil Texture/Structure – assessment area condition metric (skip for all marshes)

Check a box from each of the three soil property groups below. Dig soil profile in the dominant assessment area landscape feature. Make soil observations within the top 12 inches. Use most recent National Technical Committee for Hydric Soils guidance for regional indicators.

4a.
- ☐A Sandy soil
- ☒B Loamy or clayey soils exhibiting redoximorphic features (concentrations, depletions, or rhizospheres)
- ☐C Loamy or clayey soils not exhibiting redoximorphic features
- ☐D Loamy or clayey gleyed soil
- ☐E Histosol or histic epipedon

4b.
- ☐A Soil ribbon < 1 inch
- ☒B Soil ribbon ≥ 1 inch

4c.
- ☒A No peat or muck presence
- ☐B A peat or muck presence

5. Discharge into Wetland – opportunity metric

Check a box in each column. Consider surface pollutants or discharges (Surf) and sub-surface pollutants or discharges (Sub). Examples of sub-surface discharges include presence of nearby septic tank, underground storage tank (UST), etc.

Surf	Sub	
☐A	☒A	Little or no evidence of pollutants or discharges entering the assessment area
☒B	☐B	Noticeable evidence of pollutants or discharges entering the wetland and stressing, but not overwhelming the treatment capacity of the assessment area
☐C	☐C	Noticeable evidence of pollutants or discharges (pathogen, particulate, or soluble) entering the assessment area and potentially overwhelming the treatment capacity of the wetland (water discoloration, dead vegetation, excessive sedimentation, odor)

6. Land Use – opportunity metric (skip for non-riparian wetlands)

Check all that apply (at least one box in each column). Evaluation involves a GIS effort with field adjustment. Consider sources draining to assessment area within entire upstream watershed (WS), within 5 miles and within the watershed draining to the assessment area (5M), and within 2 miles and within the watershed draining to the assessment area (2M).

WS	5M	2M	
☐A	☐A	☐A	≥ 10% impervious surfaces
☐B	☐B	☐B	Confined animal operations (or other local, concentrated source of pollutants
☒C	☐C	☐C	≥ 20% coverage of pasture
☐D	☐D	☐D	≥ 20% coverage of agricultural land (regularly plowed land)
☐E	☐E	☐E	≥ 20% coverage of maintained grass/herb
☐F	☐F	☐F	≥ 20% coverage of clear-cut land
☐G	☒G	☒G	Little or no opportunity to improve water quality. Lack of opportunity may result from little or no disturbance in the watershed or hydrologic alterations that prevent drainage and/or overbank flow from affecting the assessment area.

7. Wetland Acting as Vegetated Buffer – assessment area/wetland complex condition metric (skip for non-riparian wetlands)

7a. Is assessment area within 50 feet of a tributary or other open water?
☒Yes ☐No If Yes, continue to 7b. If No, skip to Metric 8.
Wetland buffer need only be present on one side of the water body. Make buffer judgment based on the average width of wetland. Record a note if a portion of the buffer has been removed or disturbed.

7b. How much of the first 50 feet from the bank is wetland? (Wetland buffer need only be present on one side of the .water body. Make buffer judgment based on the average width of wetland. Record a note if a portion of the buffer has been removed or disturbed.)
- ☐A ≥ 50 feet
- ☐B From 30 to < 50 feet
- ☐C From 15 to < 30 feet
- ☒D From 5 to < 15 feet
- ☐E < 5 feet or buffer bypassed by ditches

7c. Tributary width. If the tributary is anastomosed, combine widths of channels/braids for a total width.
☒≤ 15-feet wide ☐> 15-feet wide ☐ Other open water (no tributary present)

7d. Do roots of assessment area vegetation extend into the bank of the tributary/open water?
☐Yes ☒No

7e. Is stream or other open water sheltered or exposed?
☒Sheltered – adjacent open water with width < 2500 feet and no regular boat traffic.
☐Exposed – adjacent open water with width ≥ 2500 feet or regular boat traffic.

8. Wetland Width at the Assessment Area – wetland type/wetland complex condition metric (evaluate WT for all marshes and Estuarine Woody Wetland only; evaluate WC for Bottomland Hardwood Forest, Headwater Forest, and Riverine Swamp Forest only)

Check a box in each column for riverine wetlands only. Select the average width for the wetland type at the assessment area (WT) and the wetland complex at the assessment area (WC). See User Manual for WT and WC boundaries.

WT	WC	
☐A	☐A	≥ 100 feet
☐B	☐B	From 80 to < 100 feet
☐C	☐C	From 50 to < 80 feet
☐D	☐D	From 40 to < 50 feet
☐E	☐E	From 30 to < 40 feet
☐F	☐F	From 15 to < 30 feet
☒G	☒G	From 5 to < 15 feet
☐H	☐H	< 5 feet

9. Inundation Duration – assessment area condition metric (skip for non-riparian wetlands)

Answer for assessment area dominant landform.

☐A Evidence of short-duration inundation (< 7 consecutive days)
☒B Evidence of saturation, without evidence of inundation
☐C Evidence of long-duration inundation or very long-duration inundation (7 to 30 consecutive days or more)

10. Indicators of Deposition – assessment area condition metric (skip for non-riparian wetlands and all marshes)

Consider recent deposition only (no plant growth since deposition).

☒A Sediment deposition is not excessive, but at approximately natural levels.
☐B Sediment deposition is excessive, but not overwhelming the wetland.
☐C Sediment deposition is excessive and is overwhelming the wetland.

11. Wetland Size – wetland type/wetland complex condition metric

Check a box in each column. Involves a GIS effort with field adjustment. This metric evaluates three aspects of the wetland area: the size of the wetland type (WT), the size of the wetland complex (WC), and the size of the forested wetland (FW) (if applicable, see User Manual). See the User Manual for boundaries of these evaluation areas. If assessment area is clear-cut, select "K" for the FW column.

WT	WC	FW (if applicable)	
☐A	☐A	☐A	≥ 500 acres
☐B	☐B	☐B	From 100 to < 500 acres
☐C	☐C	☐C	From 50 to < 100 acres
☐D	☐D	☐D	From 25 to < 50 acres
☐E	☐E	☐E	From 10 to < 25 acres
☐F	☐F	☐F	From 5 to < 10 acres
☐G	☐G	☐G	From 1 to < 5 acres
☐H	☐H	☐H	From 0.5 to < 1 acre
☐I	☐I	☐I	From 0.1 to < 0.5 acre
☒J	☒J	☐J	From 0.01 to < 0.1 acre
☐K	☐K	☒K	< 0.01 acre or assessment area is clear-cut

12. Wetland Intactness – wetland type condition metric (evaluate for Pocosins only)

☐A Pocosin is the full extent (≥ 90%) of its natural landscape size.
☐B Pocosin type is < 90% of the full extent of its natural landscape size.

13. Connectivity to Other Natural Areas – landscape condition metric

13a. **Check appropriate box(es) (a box may be checked in each column).** Involves a GIS effort with field adjustment. This metric evaluates whether the wetland is well connected (Well) and/or loosely connected (Loosely) to the landscape patch, the contiguous naturally vegetated area and open water (if appropriate). Boundaries are formed by four-lane roads, regularly maintained utility line corridors the width of a four-lane road or wider, urban landscapes, maintained fields (pasture and agriculture), or open water > 300 feet wide.

Well	Loosely	
☐A	☐A	≥ 500 acres
☐B	☐B	From 100 to < 500 acres
☐C	☐C	From 50 to < 100 acres
☐D	☐D	From 10 to < 50 acres
☐E	☐E	< 10 acres
☒F	☒F	Wetland type has a poor or no connection to other natural habitats

13b. **Evaluate for marshes only**.

☐Yes ☐No Wetland type has a surface hydrology connection to open waters/stream or tidal wetlands.

14. Edge Effect – wetland type condition metric (skip for all marshes and Estuarine Woody Wetland)

May involve a GIS effort with field adjustment. Estimate distance from wetland type boundary to artificial edges. Artificial edges include non-forested areas ≥ 40 feet wide such as fields, development, roads, regularly maintained utility line corridors, and clear-cuts. Consider the eight main points of the compass. Artificial edge occurs within 150 feet in how many directions? If the assessment area is clear cut, select option "C."

☐A 0
☐B 1 to 4
☒C 5 to 8

15. Vegetative Composition – assessment area condition metric (skip for all marshes and Pine Flat)

☐A Vegetation is close to reference condition in species present and their proportions. Lower strata composed of appropriate species, with exotic plants absent or sparse within the assessment area.
☐B Vegetation is different from reference condition in species diversity or proportions, but still largely composed of native species characteristic of the wetland type. This may include communities of weedy native species that develop after clearcutting or clearing. It also includes communities with exotics present, but not dominant, over a large portion of the expected strata.
☒C Vegetation severely altered from reference in composition, or expected species are unnaturally absent (planted stands of non-characteristic species or at least one stratum inappropriately composed of a single species), or exotic species are dominant in at least one stratum.

16. Vegetative Diversity – assessment area condition metric (evaluate for Non-tidal Freshwater Marsh only)

☐A Vegetation diversity is high and is composed primarily of native species (< 10% cover of exotics).
☒B Vegetation diversity is low or has > 10% to 50% cover of exotics.
☐C Vegetation is dominated by exotic species (> 50 % cover of exotics).

17. Vegetative Structure – assessment area/wetland type condition metric

17a. Is vegetation present?
☒Yes ☐No If Yes, continue to 17b. If No, skip to Metric 18.

17b. Evaluate percent coverage of assessment area vegetation **for all marshes only**. Skip to 17c for non-marsh wetlands.
☒A ≥ 25% coverage of vegetation
☐B < 25% coverage of vegetation

17c. **Check a box in each column for each stratum**. Evaluate this portion of the metric **for non-marsh wetlands**. Consider structure in airspace above the assessment area (AA) and the wetland type (WT) separately.

	AA	WT	
Canopy	☐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.

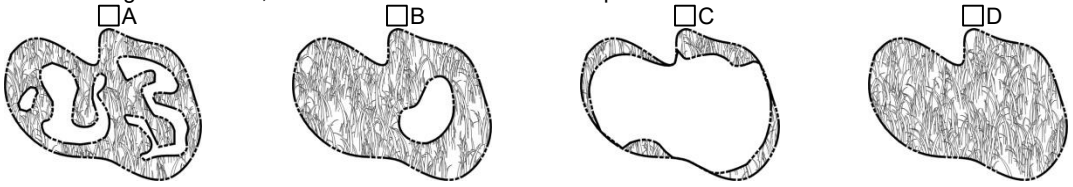
20. Large Woody Debris – wetland type condition metric (skip for all marshes)

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
Cattle have impacted the wetland

NC WAM Wetland Rating Sheet
Accompanies User Manual Version 5.0

Wetland Site Name	W4	Date of Assessment	5/14/2020
Wetland Type	Bottomland Hardwood Forest	Assessor Name/Organization	J. Sullivan / KCI

Notes on Field Assessment Form (Y/N)	YES
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	**HIGH**
		Condition/Opportunity	**HIGH**
		Opportunity Presence (Y/N)	**NO**
	Particulate Change	Condition	**LOW**
		Condition/Opportunity	**LOW**
		Opportunity Presence (Y/N)	**NO**
	Soluble Change	Condition	**MEDIUM**
		Condition/Opportunity	**MEDIUM**
		Opportunity Presence (Y/N)	**NO**
	Physical Change	Condition	**MEDIUM**
		Condition/Opportunity	**MEDIUM**
		Opportunity Presence (Y/N)	**YES**
	Pollution Change	Condition	NA
		Condition/Opportunity	NA
		Opportunity Presence (Y/N)	NA
Habitat	Physical Structure	Condition	**LOW**
	Landscape Patch Structure	Condition	**LOW**
	Vegetation Composition	Condition	**LOW**

Function Rating Summary

Function	Metrics	Rating
Hydrology	Condition	**LOW**
Water Quality	Condition	**MEDIUM**
	Condition/Opportunity	**MEDIUM**
	Opportunity Presence (Y/N)	**YES**
Habitat	Condition	**LOW**

Overall Wetland Rating **LOW**

NC WAM FIELD ASSESSMENT FORM
Accompanies User Manual Version 5.0

USACE AID #		NCDWR#	
Project Name	Morgan Branch Restoration Site	Date of Evaluation	5/14/2020
Applicant/Owner Name	KCI	Wetland Site Name	W5
Wetland Type	Headwater Forest	Assessor Name/Organization	J. Sullivan / KCI
Level III Ecoregion	Blue Ridge Mountains	Nearest Named Water Body	Morgan Branch
River Basin	French Broad	USGS 8-Digit Catalogue Unit	06010105
County	Buncombe	NCDWR Region	Asheville
☐ Yes ☒ No	Precipitation within 48 hrs?	Latitude/Longitude (deci-degrees)	35.6066 / -82.7451

Evidence of stressors affecting the assessment area (may not be within the assessment area)
Please circle and/or make note on the last page if evidence of stressors is apparent. Consider departure from reference, if appropriate, in recent past (for instance, within 10 years). Noteworthy stressors include, but are not limited to the following.

- Hydrological modifications (examples: ditches, dams, beaver dams, dikes, berms, ponds, etc.)
- Surface and sub-surface discharges into the wetland (examples: discharges containing obvious pollutants, presence of nearby septic tanks, underground storage tanks (USTs), hog lagoons, etc.)
- Signs of vegetation stress (examples: vegetation mortality, insect damage, disease, storm damage, salt intrusion, etc.)
- Habitat/plant community alteration (examples: mowing, clear-cutting, exotics, etc.)

Is the assessment area intensively managed? ☐ Yes ☒ No

Regulatory Considerations - Were regulatory considerations evaluated? ☒Yes ☐No If Yes, check all that apply to the assessment area.

☐ Anadromous fish
☐ Federally protected species or State endangered or threatened species
☐ NCDWR riparian buffer rule in effect
☐ Abuts a Primary Nursery Area (PNA)
☐ Publicly owned property
☐ N.C. Division of Coastal Management Area of Environmental Concern (AEC) (including buffer)
☐ Abuts a stream with a NCDWQ classification of SA or supplemental classifications of HQW, ORW, or Trout
☐ Designated NCNHP reference community
☐ Abuts a 303(d)-listed stream or a tributary to a 303(d)-listed stream

What type of natural stream is associated with the wetland, if any? (check all that apply)

☐ Blackwater
☒ Brownwater
☐ Tidal (if tidal, check one of the following boxes) ☐ Lunar ☐ Wind ☐ Both

Is the assessment area on a coastal island? ☐ Yes ☒ No

Is the assessment area's surface water storage capacity or duration substantially altered by beaver? ☐ Yes ☒ No

Does the assessment area experience overbank flooding during normal rainfall conditions? ☐ Yes ☒ No

1. Ground Surface Condition/Vegetation Condition – assessment area condition metric

Check a box in each column. Consider alteration to the ground surface (GS) in the assessment area and vegetation structure (VS) in the assessment area. Compare to reference wetland if applicable (see User Manual). If a reference is not applicable, then rate the assessment area based on evidence an effect.

GS	VS	
☐A	☐A	Not severely altered
☒B	☒B	Severely altered over a majority of the assessment area (ground surface alteration examples: vehicle tracks, excessive sedimentation, fire-plow lanes, skidder tracks, bedding, fill, soil compaction, obvious pollutants) (vegetation structure alteration examples: mechanical disturbance, herbicides, salt intrusion [where appropriate], exotic species, grazing, less diversity [if appropriate], hydrologic alteration)

2. Surface and Sub-Surface Storage Capacity and Duration – assessment area condition metric

Check a box in each column. Consider surface storage capacity and duration (Surf) and sub-surface storage capacity and duration (Sub). Consider both increase and decrease in hydrology. A ditch ≤ 1 foot deep is considered to affect surface water only, while a ditch > 1 foot deep is expected to affect both surface and sub-surface water. Consider tidal flooding regime, if applicable.

Surf	Sub	
☐A	☒A	Water storage capacity and duration are not altered.
☒B	☐B	Water storage capacity or duration are altered, but not substantially (typically, not sufficient to change vegetation).
☐C	☐C	Water storage capacity or duration are substantially altered (typically, alteration sufficient to result in vegetation change) (examples: draining, flooding, soil compaction, filling, excessive sedimentation, underground utility lines).

3. Water Storage/Surface Relief – assessment area/wetland type condition metric (skip for all marshes)

Check a box in each column. Select the appropriate storage for the assessment area (AA) and the wetland type (WT).

	AA	WT	
3a.	☐A	☐A	Majority of wetland with depressions able to pond water > 1 deep
	☒B	☒B	Majority of wetland with depressions able to pond water 6 inches to 1 foot deep
	☐C	☐C	Majority of wetland with depressions able to pond water 3 to 6 inches deep
	☐D	☐D	Depressions able to pond water < 3 inches deep

3b. ☐A Evidence that maximum depth of inundation is greater than 2 feet
☐B Evidence that maximum depth of inundation is between 1 and 2 feet
☒C Evidence that maximum depth of inundation is less than 1 foot

4. Soil Texture/Structure – assessment area condition metric (skip for all marshes)

Check a box from each of the three soil property groups below. Dig soil profile in the dominant assessment area landscape feature. Make soil observations within the top 12 inches. Use most recent National Technical Committee for Hydric Soils guidance for regional indicators.

4a.
- ☐A Sandy soil
- ☒B Loamy or clayey soils exhibiting redoximorphic features (concentrations, depletions, or rhizospheres)
- ☐C Loamy or clayey soils not exhibiting redoximorphic features
- ☐D Loamy or clayey gleyed soil
- ☐E Histosol or histic epipedon

4b.
- ☐A Soil ribbon < 1 inch
- ☒B Soil ribbon ≥ 1 inch

4c.
- ☒A No peat or muck presence
- ☐B A peat or muck presence

5. Discharge into Wetland – opportunity metric

Check a box in each column. Consider surface pollutants or discharges (Surf) and sub-surface pollutants or discharges (Sub). Examples of sub-surface discharges include presence of nearby septic tank, underground storage tank (UST), etc.

Surf	Sub	
☐A	☒A	Little or no evidence of pollutants or discharges entering the assessment area
☒B	☐B	Noticeable evidence of pollutants or discharges entering the wetland and stressing, but not overwhelming the treatment capacity of the assessment area
☐C	☐C	Noticeable evidence of pollutants or discharges (pathogen, particulate, or soluble) entering the assessment area and potentially overwhelming the treatment capacity of the wetland (water discoloration, dead vegetation, excessive sedimentation, odor)

6. Land Use – opportunity metric (skip for non-riparian wetlands)

Check all that apply (at least one box in each column). Evaluation involves a GIS effort with field adjustment. Consider sources draining to assessment area within entire upstream watershed (WS), within 5 miles and within the watershed draining to the assessment area (5M), and within 2 miles and within the watershed draining to the assessment area (2M).

WS	5M	2M	
☐A	☐A	☐A	≥ 10% impervious surfaces
☐B	☐B	☐B	Confined animal operations (or other local, concentrated source of pollutants
☒C	☐C	☐C	≥ 20% coverage of pasture
☐D	☐D	☐D	≥ 20% coverage of agricultural land (regularly plowed land)
☐E	☐E	☐E	≥ 20% coverage of maintained grass/herb
☐F	☐F	☐F	≥ 20% coverage of clear-cut land
☐G	☒G	☒G	Little or no opportunity to improve water quality. Lack of opportunity may result from little or no disturbance in the watershed or hydrologic alterations that prevent drainage and/or overbank flow from affecting the assessment area.

7. Wetland Acting as Vegetated Buffer – assessment area/wetland complex condition metric (skip for non-riparian wetlands)

7a. Is assessment area within 50 feet of a tributary or other open water?
☒Yes ☐No If Yes, continue to 7b. If No, skip to Metric 8.
Wetland buffer need only be present on one side of the water body. Make buffer judgment based on the average width of wetland. Record a note if a portion of the buffer has been removed or disturbed.

7b. How much of the first 50 feet from the bank is wetland? (Wetland buffer need only be present on one side of the .water body. Make buffer judgment based on the average width of wetland. Record a note if a portion of the buffer has been removed or disturbed.)
- ☐A ≥ 50 feet
- ☐B From 30 to < 50 feet
- ☒C From 15 to < 30 feet
- ☐D From 5 to < 15 feet
- ☐E < 5 feet or buffer bypassed by ditches

7c. Tributary width. If the tributary is anastomosed, combine widths of channels/braids for a total width.
☒≤ 15-feet wide ☐> 15-feet wide ☐ Other open water (no tributary present)

7d. Do roots of assessment area vegetation extend into the bank of the tributary/open water?
☐Yes ☒No

7e. Is stream or other open water sheltered or exposed?
☒Sheltered – adjacent open water with width < 2500 feet and no regular boat traffic.
☐Exposed – adjacent open water with width ≥ 2500 feet or regular boat traffic.

8. Wetland Width at the Assessment Area – wetland type/wetland complex condition metric (evaluate WT for all marshes and Estuarine Woody Wetland only; evaluate WC for Bottomland Hardwood Forest, Headwater Forest, and Riverine Swamp Forest only)

Check a box in each column for riverine wetlands only. Select the average width for the wetland type at the assessment area (WT) and the wetland complex at the assessment area (WC). See User Manual for WT and WC boundaries.

WT	WC	
☐A	☐A	≥ 100 feet
☐B	☐B	From 80 to < 100 feet
☐C	☐C	From 50 to < 80 feet
☒D	☒D	From 40 to < 50 feet
☐E	☐E	From 30 to < 40 feet
☐F	☐F	From 15 to < 30 feet
☐G	☐G	From 5 to < 15 feet
☐H	☐H	< 5 feet

9. Inundation Duration – assessment area condition metric (skip for non-riparian wetlands)

Answer for assessment area dominant landform.

☐A Evidence of short-duration inundation (< 7 consecutive days)
☒B Evidence of saturation, without evidence of inundation
☐C Evidence of long-duration inundation or very long-duration inundation (7 to 30 consecutive days or more)

10. Indicators of Deposition – assessment area condition metric (skip for non-riparian wetlands and all marshes)

Consider recent deposition only (no plant growth since deposition).

☐A Sediment deposition is not excessive, but at approximately natural levels.
☒B Sediment deposition is excessive, but not overwhelming the wetland.
☐C Sediment deposition is excessive and is overwhelming the wetland.

11. Wetland Size – wetland type/wetland complex condition metric

Check a box in each column. Involves a GIS effort with field adjustment. This metric evaluates three aspects of the wetland area: the size of the wetland type (WT), the size of the wetland complex (WC), and the size of the forested wetland (FW) (if applicable, see User Manual). See the User Manual for boundaries of these evaluation areas. If assessment area is clear-cut, select "K" for the FW column.

WT	WC	FW (if applicable)	
☐A	☐A	☐A	≥ 500 acres
☐B	☐B	☐B	From 100 to < 500 acres
☐C	☐C	☐C	From 50 to < 100 acres
☐D	☐D	☐D	From 25 to < 50 acres
☐E	☐E	☐E	From 10 to < 25 acres
☐F	☐F	☐F	From 5 to < 10 acres
☐G	☐G	☐G	From 1 to < 5 acres
☐H	☐H	☐H	From 0.5 to < 1 acre
☒I	☒I	☐I	From 0.1 to < 0.5 acre
☐J	☐J	☐J	From 0.01 to < 0.1 acre
☐K	☐K	☒K	< 0.01 acre or assessment area is clear-cut

12. Wetland Intactness – wetland type condition metric (evaluate for Pocosins only)

☐A Pocosin is the full extent (≥ 90%) of its natural landscape size.
☐B Pocosin type is < 90% of the full extent of its natural landscape size.

13. Connectivity to Other Natural Areas – landscape condition metric

13a. **Check appropriate box(es) (a box may be checked in each column).** Involves a GIS effort with field adjustment. This metric evaluates whether the wetland is well connected (Well) and/or loosely connected (Loosely) to the landscape patch, the contiguous naturally vegetated area and open water (if appropriate). Boundaries are formed by four-lane roads, regularly maintained utility line corridors the width of a four-lane road or wider, urban landscapes, maintained fields (pasture and agriculture), or open water > 300 feet wide.

Well	Loosely	
☐A	☐A	≥ 500 acres
☐B	☐B	From 100 to < 500 acres
☐C	☐C	From 50 to < 100 acres
☐D	☐D	From 10 to < 50 acres
☒E	☒E	< 10 acres
☐F	☐F	Wetland type has a poor or no connection to other natural habitats

13b. **Evaluate for marshes only**.

☐Yes ☐No Wetland type has a surface hydrology connection to open waters/stream or tidal wetlands.

14. Edge Effect – wetland type condition metric (skip for all marshes and Estuarine Woody Wetland)

May involve a GIS effort with field adjustment. Estimate distance from wetland type boundary to artificial edges. Artificial edges include non-forested areas ≥ 40 feet wide such as fields, development, roads, regularly maintained utility line corridors, and clear-cuts. Consider the eight main points of the compass. Artificial edge occurs within 150 feet in how many directions? If the assessment area is clear cut, select option "C."

☐A 0
☐B 1 to 4
☒C 5 to 8

15. Vegetative Composition – assessment area condition metric (skip for all marshes and Pine Flat)

☐A Vegetation is close to reference condition in species present and their proportions. Lower strata composed of appropriate species, with exotic plants absent or sparse within the assessment area.
☒B Vegetation is different from reference condition in species diversity or proportions, but still largely composed of native species characteristic of the wetland type. This may include communities of weedy native species that develop after clearcutting or clearing. It also includes communities with exotics present, but not dominant, over a large portion of the expected strata.
☐C Vegetation severely altered from reference in composition, or expected species are unnaturally absent (planted stands of non-characteristic species or at least one stratum inappropriately composed of a single species), or exotic species are dominant in at least one stratum.

16. Vegetative Diversity – assessment area condition metric (evaluate for Non-tidal Freshwater Marsh only)

☐A Vegetation diversity is high and is composed primarily of native species (< 10% cover of exotics).
☒B Vegetation diversity is low or has > 10% to 50% cover of exotics.
☐C Vegetation is dominated by exotic species (> 50 % cover of exotics).

17. Vegetative Structure – assessment area/wetland type condition metric

17a. Is vegetation present?
☒Yes ☐No If Yes, continue to 17b. If No, skip to Metric 18.

17b. Evaluate percent coverage of assessment area vegetation **for all marshes only**. Skip to 17c for non-marsh wetlands.
☒A ≥ 25% coverage of vegetation
☐B < 25% coverage of vegetation

17c. **Check a box in each column for each stratum**. Evaluate this portion of the metric **for non-marsh wetlands**. Consider structure in airspace above the assessment area (AA) and the wetland type (WT) separately.

	AA	WT	
Canopy	☐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.

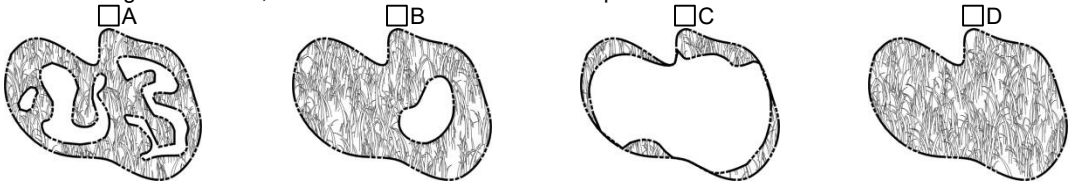
20. Large Woody Debris – wetland type condition metric (skip for all marshes)

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
Cattle have impacted the wetland

NC WAM Wetland Rating Sheet
Accompanies User Manual Version 5.0

Wetland Site Name	W5	Date of Assessment	5/14/2020
Wetland Type	Headwater Forest	Assessor Name/Organization	J. Sullivan / KCI

Notes on Field Assessment Form (Y/N)	YES
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	**MEDIUM**
Water Quality	Pathogen Change	Condition	**MEDIUM**
		Condition/Opportunity	**MEDIUM**
		Opportunity Presence (Y/N)	**NO**
	Particulate Change	Condition	**LOW**
		Condition/Opportunity	NA
		Opportunity Presence (Y/N)	NA
	Soluble Change	Condition	**MEDIUM**
		Condition/Opportunity	**MEDIUM**
		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	Rating
Hydrology	Condition	**LOW**
Water Quality	Condition	**LOW**
	Condition/Opportunity	**LOW**
	Opportunity Presence (Y/N)	**NO**
Habitat	Condition	**LOW**

Overall Wetland Rating **LOW**

NC WAM FIELD ASSESSMENT FORM
Accompanies User Manual Version 5.0

USACE AID #		NCDWR#	
Project Name	Morgan Branch Restoration Site	Date of Evaluation	5/14/2020
Applicant/Owner Name	KCI	Wetland Site Name	W6, W11
Wetland Type	Seep	Assessor Name/Organization	J. Sullivan / KCI
Level III Ecoregion	Blue Ridge Mountains	Nearest Named Water Body	Morgan Branch
River Basin	French Broad	USGS 8-Digit Catalogue Unit	06010105
County	Buncombe	NCDWR Region	Asheville
☐ Yes ☒ No	Precipitation within 48 hrs?	Latitude/Longitude (deci-degrees)	35.6123 / -82.7405

Evidence of stressors affecting the assessment area (may not be within the assessment area)
Please circle and/or make note on the last page if evidence of stressors is apparent. Consider departure from reference, if appropriate, in recent past (for instance, within 10 years). Noteworthy stressors include, but are not limited to the following.

- Hydrological modifications (examples: ditches, dams, beaver dams, dikes, berms, ponds, etc.)
- Surface and sub-surface discharges into the wetland (examples: discharges containing obvious pollutants, presence of nearby septic tanks, underground storage tanks (USTs), hog lagoons, etc.)
- Signs of vegetation stress (examples: vegetation mortality, insect damage, disease, storm damage, salt intrusion, etc.)
- Habitat/plant community alteration (examples: mowing, clear-cutting, exotics, etc.)

Is the assessment area intensively managed? ☐ Yes ☒ No

Regulatory Considerations - Were regulatory considerations evaluated? ☒Yes ☐No If Yes, check all that apply to the assessment area.

☐ Anadromous fish
☐ Federally protected species or State endangered or threatened species
☐ NCDWR riparian buffer rule in effect
☐ Abuts a Primary Nursery Area (PNA)
☐ Publicly owned property
☐ N.C. Division of Coastal Management Area of Environmental Concern (AEC) (including buffer)
☐ Abuts a stream with a NCDWQ classification of SA or supplemental classifications of HQW, ORW, or Trout
☐ Designated NCNHP reference community
☐ Abuts a 303(d)-listed stream or a tributary to a 303(d)-listed stream

What type of natural stream is associated with the wetland, if any? (check all that apply)

☐ Blackwater
☒ Brownwater
☐ Tidal (if tidal, check one of the following boxes) ☐ Lunar ☐ Wind ☐ Both

Is the assessment area on a coastal island? ☐ Yes ☒ No

Is the assessment area's surface water storage capacity or duration substantially altered by beaver? ☐ Yes ☒ No

Does the assessment area experience overbank flooding during normal rainfall conditions? ☐ Yes ☒ No

1. Ground Surface Condition/Vegetation Condition – assessment area condition metric

Check a box in each column. Consider alteration to the ground surface (GS) in the assessment area and vegetation structure (VS) in the assessment area. Compare to reference wetland if applicable (see User Manual). If a reference is not applicable, then rate the assessment area based on evidence an effect.

GS	VS	
☒A	☐A	Not severely altered
☐B	☒B	Severely altered over a majority of the assessment area (ground surface alteration examples: vehicle tracks, excessive sedimentation, fire-plow lanes, skidder tracks, bedding, fill, soil compaction, obvious pollutants) (vegetation structure alteration examples: mechanical disturbance, herbicides, salt intrusion [where appropriate], exotic species, grazing, less diversity [if appropriate], hydrologic alteration)

2. Surface and Sub-Surface Storage Capacity and Duration – assessment area condition metric

Check a box in each column. Consider surface storage capacity and duration (Surf) and sub-surface storage capacity and duration (Sub). Consider both increase and decrease in hydrology. A ditch ≤ 1 foot deep is considered to affect surface water only, while a ditch > 1 foot deep is expected to affect both surface and sub-surface water. Consider tidal flooding regime, if applicable.

Surf	Sub	
☒A	☒A	Water storage capacity and duration are not altered.
☐B	☐B	Water storage capacity or duration are altered, but not substantially (typically, not sufficient to change vegetation).
☐C	☐C	Water storage capacity or duration are substantially altered (typically, alteration sufficient to result in vegetation change) (examples: draining, flooding, soil compaction, filling, excessive sedimentation, underground utility lines).

3. Water Storage/Surface Relief – assessment area/wetland type condition metric (skip for all marshes)

Check a box in each column. Select the appropriate storage for the assessment area (AA) and the wetland type (WT).

	AA	WT	
3a.	☐A	☐A	Majority of wetland with depressions able to pond water > 1 deep
	☐B	☐B	Majority of wetland with depressions able to pond water 6 inches to 1 foot deep
	☒C	☒C	Majority of wetland with depressions able to pond water 3 to 6 inches deep
	☐D	☐D	Depressions able to pond water < 3 inches deep

3b. ☐A Evidence that maximum depth of inundation is greater than 2 feet
☐B Evidence that maximum depth of inundation is between 1 and 2 feet
☒C Evidence that maximum depth of inundation is less than 1 foot

4. Soil Texture/Structure – assessment area condition metric (skip for all marshes)

Check a box from each of the three soil property groups below. Dig soil profile in the dominant assessment area landscape feature. Make soil observations within the top 12 inches. Use most recent National Technical Committee for Hydric Soils guidance for regional indicators.

4a.
- ☐A Sandy soil
- ☒B Loamy or clayey soils exhibiting redoximorphic features (concentrations, depletions, or rhizospheres)
- ☐C Loamy or clayey soils not exhibiting redoximorphic features
- ☐D Loamy or clayey gleyed soil
- ☐E Histosol or histic epipedon

4b.
- ☐A Soil ribbon < 1 inch
- ☒B Soil ribbon ≥ 1 inch

4c.
- ☒A No peat or muck presence
- ☐B A peat or muck presence

5. Discharge into Wetland – opportunity metric

Check a box in each column. Consider surface pollutants or discharges (Surf) and sub-surface pollutants or discharges (Sub). Examples of sub-surface discharges include presence of nearby septic tank, underground storage tank (UST), etc.

Surf	Sub	
☐A	☒A	Little or no evidence of pollutants or discharges entering the assessment area
☒B	☐B	Noticeable evidence of pollutants or discharges entering the wetland and stressing, but not overwhelming the treatment capacity of the assessment area
☐C	☐C	Noticeable evidence of pollutants or discharges (pathogen, particulate, or soluble) entering the assessment area and potentially overwhelming the treatment capacity of the wetland (water discoloration, dead vegetation, excessive sedimentation, odor)

6. Land Use – opportunity metric (skip for non-riparian wetlands)

Check all that apply (at least one box in each column). Evaluation involves a GIS effort with field adjustment. Consider sources draining to assessment area within entire upstream watershed (WS), within 5 miles and within the watershed draining to the assessment area (5M), and within 2 miles and within the watershed draining to the assessment area (2M).

WS	5M	2M	
☐A	☐A	☐A	≥ 10% impervious surfaces
☐B	☐B	☐B	Confined animal operations (or other local, concentrated source of pollutants
☒C	☐C	☐C	≥ 20% coverage of pasture
☐D	☐D	☐D	≥ 20% coverage of agricultural land (regularly plowed land)
☐E	☐E	☐E	≥ 20% coverage of maintained grass/herb
☐F	☐F	☐F	≥ 20% coverage of clear-cut land
☐G	☒G	☒G	Little or no opportunity to improve water quality. Lack of opportunity may result from little or no disturbance in the watershed or hydrologic alterations that prevent drainage and/or overbank flow from affecting the assessment area.

7. Wetland Acting as Vegetated Buffer – assessment area/wetland complex condition metric (skip for non-riparian wetlands)

7a. Is assessment area within 50 feet of a tributary or other open water?
☒Yes ☐No If Yes, continue to 7b. If No, skip to Metric 8.
Wetland buffer need only be present on one side of the water body. Make buffer judgment based on the average width of wetland. Record a note if a portion of the buffer has been removed or disturbed.

7b. How much of the first 50 feet from the bank is wetland? (Wetland buffer need only be present on one side of the .water body. Make buffer judgment based on the average width of wetland. Record a note if a portion of the buffer has been removed or disturbed.)
- ☐A ≥ 50 feet
- ☐B From 30 to < 50 feet
- ☒C From 15 to < 30 feet
- ☐D From 5 to < 15 feet
- ☐E < 5 feet or buffer bypassed by ditches

7c. Tributary width. If the tributary is anastomosed, combine widths of channels/braids for a total width.
☒≤ 15-feet wide ☐> 15-feet wide ☐ Other open water (no tributary present)

7d. Do roots of assessment area vegetation extend into the bank of the tributary/open water?
☐Yes ☒No

7e. Is stream or other open water sheltered or exposed?
☒Sheltered – adjacent open water with width < 2500 feet and no regular boat traffic.
☐Exposed – adjacent open water with width ≥ 2500 feet or regular boat traffic.

8. Wetland Width at the Assessment Area – wetland type/wetland complex condition metric (evaluate WT for all marshes and Estuarine Woody Wetland only; evaluate WC for Bottomland Hardwood Forest, Headwater Forest, and Riverine Swamp Forest only)

Check a box in each column for riverine wetlands only. Select the average width for the wetland type at the assessment area (WT) and the wetland complex at the assessment area (WC). See User Manual for WT and WC boundaries.

WT	WC	
☐A	☐A	≥ 100 feet
☐B	☐B	From 80 to < 100 feet
☐C	☐C	From 50 to < 80 feet
☐D	☐D	From 40 to < 50 feet
☐E	☐E	From 30 to < 40 feet
☒F	☒F	From 15 to < 30 feet
☐G	☐G	From 5 to < 15 feet
☐H	☐H	< 5 feet

9. Inundation Duration – assessment area condition metric (skip for non-riparian wetlands)

Answer for assessment area dominant landform.

☐A Evidence of short-duration inundation (< 7 consecutive days)
☒B Evidence of saturation, without evidence of inundation
☐C Evidence of long-duration inundation or very long-duration inundation (7 to 30 consecutive days or more)

10. Indicators of Deposition – assessment area condition metric (skip for non-riparian wetlands and all marshes)

Consider recent deposition only (no plant growth since deposition).

☒A Sediment deposition is not excessive, but at approximately natural levels.
☐B Sediment deposition is excessive, but not overwhelming the wetland.
☐C Sediment deposition is excessive and is overwhelming the wetland.

11. Wetland Size – wetland type/wetland complex condition metric

Check a box in each column. Involves a GIS effort with field adjustment. This metric evaluates three aspects of the wetland area: the size of the wetland type (WT), the size of the wetland complex (WC), and the size of the forested wetland (FW) (if applicable, see User Manual). See the User Manual for boundaries of these evaluation areas. If assessment area is clear-cut, select "K" for the FW column.

WT	WC	FW (if applicable)	
☐A	☐A	☐A	≥ 500 acres
☐B	☐B	☐B	From 100 to < 500 acres
☐C	☐C	☐C	From 50 to < 100 acres
☐D	☐D	☐D	From 25 to < 50 acres
☐E	☐E	☐E	From 10 to < 25 acres
☐F	☐F	☐F	From 5 to < 10 acres
☐G	☐G	☐G	From 1 to < 5 acres
☐H	☐H	☐H	From 0.5 to < 1 acre
☐I	☒I	☐I	From 0.1 to < 0.5 acre
☒J	☐J	☐J	From 0.01 to < 0.1 acre
☐K	☐K	☒K	< 0.01 acre or assessment area is clear-cut

12. Wetland Intactness – wetland type condition metric (evaluate for Pocosins only)

☐A Pocosin is the full extent (≥ 90%) of its natural landscape size.
☐B Pocosin type is < 90% of the full extent of its natural landscape size.

13. Connectivity to Other Natural Areas – landscape condition metric

13a. **Check appropriate box(es) (a box may be checked in each column).** Involves a GIS effort with field adjustment. This metric evaluates whether the wetland is well connected (Well) and/or loosely connected (Loosely) to the landscape patch, the contiguous naturally vegetated area and open water (if appropriate). Boundaries are formed by four-lane roads, regularly maintained utility line corridors the width of a four-lane road or wider, urban landscapes, maintained fields (pasture and agriculture), or open water > 300 feet wide.

Well	Loosely	
☐A	☐A	≥ 500 acres
☐B	☐B	From 100 to < 500 acres
☐C	☐C	From 50 to < 100 acres
☐D	☐D	From 10 to < 50 acres
☒E	☒E	< 10 acres
☐F	☐F	Wetland type has a poor or no connection to other natural habitats

13b. **Evaluate for marshes only**.

☐Yes ☐No Wetland type has a surface hydrology connection to open waters/stream or tidal wetlands.

14. Edge Effect – wetland type condition metric (skip for all marshes and Estuarine Woody Wetland)

May involve a GIS effort with field adjustment. Estimate distance from wetland type boundary to artificial edges. Artificial edges include non-forested areas ≥ 40 feet wide such as fields, development, roads, regularly maintained utility line corridors, and clear-cuts. Consider the eight main points of the compass. Artificial edge occurs within 150 feet in how many directions? If the assessment area is clear cut, select option "C."

☐A 0
☐B 1 to 4
☒C 5 to 8

15. Vegetative Composition – assessment area condition metric (skip for all marshes and Pine Flat)

☐A Vegetation is close to reference condition in species present and their proportions. Lower strata composed of appropriate species, with exotic plants absent or sparse within the assessment area.
☐B Vegetation is different from reference condition in species diversity or proportions, but still largely composed of native species characteristic of the wetland type. This may include communities of weedy native species that develop after clearcutting or clearing. It also includes communities with exotics present, but not dominant, over a large portion of the expected strata.
☒C Vegetation severely altered from reference in composition, or expected species are unnaturally absent (planted stands of non-characteristic species or at least one stratum inappropriately composed of a single species), or exotic species are dominant in at least one stratum.

16. Vegetative Diversity – assessment area condition metric (evaluate for Non-tidal Freshwater Marsh only)

☐A Vegetation diversity is high and is composed primarily of native species (< 10% cover of exotics).
☒B Vegetation diversity is low or has > 10% to 50% cover of exotics.
☐C Vegetation is dominated by exotic species (> 50 % cover of exotics).

17. Vegetative Structure – assessment area/wetland type condition metric

17a. Is vegetation present?
☒Yes ☐No If Yes, continue to 17b. If No, skip to Metric 18.

17b. Evaluate percent coverage of assessment area vegetation **for all marshes only**. Skip to 17c for non-marsh wetlands.
☒A ≥ 25% coverage of vegetation
☐B < 25% coverage of vegetation

17c. **Check a box in each column for each stratum**. Evaluate this portion of the metric **for non-marsh wetlands**. Consider structure in airspace above the assessment area (AA) and the wetland type (WT) separately.

	AA	WT	
Canopy	☐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.

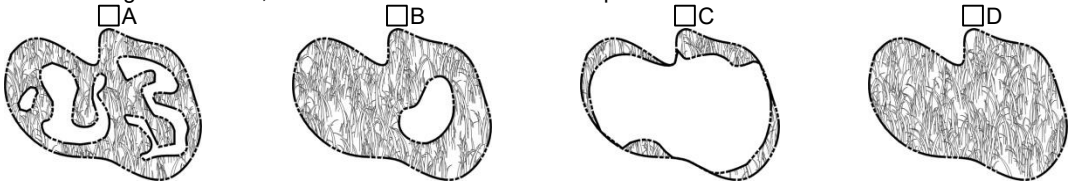
20. Large Woody Debris – wetland type condition metric (skip for all marshes)

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
Cattle have impacted the wetland

NC WAM Wetland Rating Sheet
Accompanies User Manual Version 5.0

Wetland Site Name	W6, W11	Date of Assessment	5/14/2020
Wetland Type	Seep	Assessor Name/Organization	J. Sullivan / KCI

Notes on Field Assessment Form (Y/N)	YES
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	NA
	Sub-surface Storage and Retention	Condition	NA
Water Quality	Pathogen Change	Condition	NA
		Condition/Opportunity	NA
		Opportunity Presence (Y/N)	NA
	Particulate Change	Condition	NA
		Condition/Opportunity	NA
		Opportunity Presence (Y/N)	NA
	Soluble Change	Condition	NA
		Condition/Opportunity	NA
		Opportunity Presence (Y/N)	NA
	Physical Change	Condition	NA
		Condition/Opportunity	NA
		Opportunity Presence (Y/N)	NA
	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	Rating
Hydrology	Condition	**HIGH**
Water Quality	Condition	**MEDIUM**
	Condition/Opportunity	NA
	Opportunity Presence (Y/N)	NA
Habitat	Condition	**LOW**

Overall Wetland Rating **MEDIUM**

NC WAM FIELD ASSESSMENT FORM
Accompanies User Manual Version 5.0

USACE AID #		NCDWR#	
Project Name	Morgan Branch Restoration Site	Date of Evaluation	5/14/2020
Applicant/Owner Name	KCI	Wetland Site Name	W7, W8, W9, W10
Wetland Type	Headwater Forest	Assessor Name/Organization	J. Sullivan / KCI
Level III Ecoregion	Blue Ridge Mountains	Nearest Named Water Body	Morgan Branch
River Basin	French Broad	USGS 8-Digit Catalogue Unit	06010105
County	Buncombe	NCDWR Region	Asheville
☐ Yes ☒ No	Precipitation within 48 hrs?	Latitude/Longitude (deci-degrees)	35.6138 / -82.7473

Evidence of stressors affecting the assessment area (may not be within the assessment area)
Please circle and/or make note on the last page if evidence of stressors is apparent. Consider departure from reference, if appropriate, in recent past (for instance, within 10 years). Noteworthy stressors include, but are not limited to the following.

- Hydrological modifications (examples: ditches, dams, beaver dams, dikes, berms, ponds, etc.)
- Surface and sub-surface discharges into the wetland (examples: discharges containing obvious pollutants, presence of nearby septic tanks, underground storage tanks (USTs), hog lagoons, etc.)
- Signs of vegetation stress (examples: vegetation mortality, insect damage, disease, storm damage, salt intrusion, etc.)
- Habitat/plant community alteration (examples: mowing, clear-cutting, exotics, etc.)

Is the assessment area intensively managed? ☐ Yes ☒ No

Regulatory Considerations - Were regulatory considerations evaluated? ☒Yes ☐No If Yes, check all that apply to the assessment area.

☐ Anadromous fish
☐ Federally protected species or State endangered or threatened species
☐ NCDWR riparian buffer rule in effect
☐ Abuts a Primary Nursery Area (PNA)
☐ Publicly owned property
☐ N.C. Division of Coastal Management Area of Environmental Concern (AEC) (including buffer)
☐ Abuts a stream with a NCDWQ classification of SA or supplemental classifications of HQW, ORW, or Trout
☐ Designated NCNHP reference community
☐ Abuts a 303(d)-listed stream or a tributary to a 303(d)-listed stream

What type of natural stream is associated with the wetland, if any? (check all that apply)

☐ Blackwater
☒ Brownwater
☐ Tidal (if tidal, check one of the following boxes) ☐ Lunar ☐ Wind ☐ Both

Is the assessment area on a coastal island? ☐ Yes ☒ No

Is the assessment area's surface water storage capacity or duration substantially altered by beaver? ☐ Yes ☒ No

Does the assessment area experience overbank flooding during normal rainfall conditions? ☐ Yes ☒ No

1. Ground Surface Condition/Vegetation Condition – assessment area condition metric

Check a box in each column. Consider alteration to the ground surface (GS) in the assessment area and vegetation structure (VS) in the assessment area. Compare to reference wetland if applicable (see User Manual). If a reference is not applicable, then rate the assessment area based on evidence an effect.

GS	VS	
☒A	☐A	Not severely altered
☐B	☒B	Severely altered over a majority of the assessment area (ground surface alteration examples: vehicle tracks, excessive sedimentation, fire-plow lanes, skidder tracks, bedding, fill, soil compaction, obvious pollutants) (vegetation structure alteration examples: mechanical disturbance, herbicides, salt intrusion [where appropriate], exotic species, grazing, less diversity [if appropriate], hydrologic alteration)

2. Surface and Sub-Surface Storage Capacity and Duration – assessment area condition metric

Check a box in each column. Consider surface storage capacity and duration (Surf) and sub-surface storage capacity and duration (Sub). Consider both increase and decrease in hydrology. A ditch ≤ 1 foot deep is considered to affect surface water only, while a ditch > 1 foot deep is expected to affect both surface and sub-surface water. Consider tidal flooding regime, if applicable.

Surf	Sub	
☒A	☒A	Water storage capacity and duration are not altered.
☐B	☐B	Water storage capacity or duration are altered, but not substantially (typically, not sufficient to change vegetation).
☐C	☐C	Water storage capacity or duration are substantially altered (typically, alteration sufficient to result in vegetation change) (examples: draining, flooding, soil compaction, filling, excessive sedimentation, underground utility lines).

3. Water Storage/Surface Relief – assessment area/wetland type condition metric (skip for all marshes)

Check a box in each column. Select the appropriate storage for the assessment area (AA) and the wetland type (WT).

	AA	WT	
3a.	☐A	☐A	Majority of wetland with depressions able to pond water > 1 deep
	☐B	☐B	Majority of wetland with depressions able to pond water 6 inches to 1 foot deep
	☒C	☒C	Majority of wetland with depressions able to pond water 3 to 6 inches deep
	☐D	☐D	Depressions able to pond water < 3 inches deep

3b. ☐A Evidence that maximum depth of inundation is greater than 2 feet
☐B Evidence that maximum depth of inundation is between 1 and 2 feet
☒C Evidence that maximum depth of inundation is less than 1 foot

4. Soil Texture/Structure – assessment area condition metric (skip for all marshes)

Check a box from each of the three soil property groups below. Dig soil profile in the dominant assessment area landscape feature. Make soil observations within the top 12 inches. Use most recent National Technical Committee for Hydric Soils guidance for regional indicators.

4a.
- ☐A Sandy soil
- ☒B Loamy or clayey soils exhibiting redoximorphic features (concentrations, depletions, or rhizospheres)
- ☐C Loamy or clayey soils not exhibiting redoximorphic features
- ☐D Loamy or clayey gleyed soil
- ☐E Histosol or histic epipedon

4b.
- ☐A Soil ribbon < 1 inch
- ☒B Soil ribbon ≥ 1 inch

4c.
- ☒A No peat or muck presence
- ☐B A peat or muck presence

5. Discharge into Wetland – opportunity metric

Check a box in each column. Consider surface pollutants or discharges (Surf) and sub-surface pollutants or discharges (Sub). Examples of sub-surface discharges include presence of nearby septic tank, underground storage tank (UST), etc.

Surf	Sub	
☐A	☒A	Little or no evidence of pollutants or discharges entering the assessment area
☒B	☐B	Noticeable evidence of pollutants or discharges entering the wetland and stressing, but not overwhelming the treatment capacity of the assessment area
☐C	☐C	Noticeable evidence of pollutants or discharges (pathogen, particulate, or soluble) entering the assessment area and potentially overwhelming the treatment capacity of the wetland (water discoloration, dead vegetation, excessive sedimentation, odor)

6. Land Use – opportunity metric (skip for non-riparian wetlands)

Check all that apply (at least one box in each column). Evaluation involves a GIS effort with field adjustment. Consider sources draining to assessment area within entire upstream watershed (WS), within 5 miles and within the watershed draining to the assessment area (5M), and within 2 miles and within the watershed draining to the assessment area (2M).

WS	5M	2M	
☐A	☐A	☐A	≥ 10% impervious surfaces
☐B	☐B	☐B	Confined animal operations (or other local, concentrated source of pollutants
☒C	☐C	☐C	≥ 20% coverage of pasture
☐D	☐D	☐D	≥ 20% coverage of agricultural land (regularly plowed land)
☐E	☐E	☐E	≥ 20% coverage of maintained grass/herb
☐F	☐F	☐F	≥ 20% coverage of clear-cut land
☐G	☒G	☒G	Little or no opportunity to improve water quality. Lack of opportunity may result from little or no disturbance in the watershed or hydrologic alterations that prevent drainage and/or overbank flow from affecting the assessment area.

7. Wetland Acting as Vegetated Buffer – assessment area/wetland complex condition metric (skip for non-riparian wetlands)

7a. Is assessment area within 50 feet of a tributary or other open water?
☒Yes ☐No If Yes, continue to 7b. If No, skip to Metric 8.
Wetland buffer need only be present on one side of the water body. Make buffer judgment based on the average width of wetland. Record a note if a portion of the buffer has been removed or disturbed.

7b. How much of the first 50 feet from the bank is wetland? (Wetland buffer need only be present on one side of the .water body. Make buffer judgment based on the average width of wetland. Record a note if a portion of the buffer has been removed or disturbed.)
- ☐A ≥ 50 feet
- ☐B From 30 to < 50 feet
- ☒C From 15 to < 30 feet
- ☐D From 5 to < 15 feet
- ☐E < 5 feet or buffer bypassed by ditches

7c. Tributary width. If the tributary is anastomosed, combine widths of channels/braids for a total width.
☒≤ 15-feet wide ☐> 15-feet wide ☐ Other open water (no tributary present)

7d. Do roots of assessment area vegetation extend into the bank of the tributary/open water?
☐Yes ☒No

7e. Is stream or other open water sheltered or exposed?
☒Sheltered – adjacent open water with width < 2500 feet and no regular boat traffic.
☐Exposed – adjacent open water with width ≥ 2500 feet or regular boat traffic.

8. Wetland Width at the Assessment Area – wetland type/wetland complex condition metric (evaluate WT for all marshes and Estuarine Woody Wetland only; evaluate WC for Bottomland Hardwood Forest, Headwater Forest, and Riverine Swamp Forest only)

Check a box in each column for riverine wetlands only. Select the average width for the wetland type at the assessment area (WT) and the wetland complex at the assessment area (WC). See User Manual for WT and WC boundaries.

WT	WC	
☐A	☐A	≥ 100 feet
☐B	☐B	From 80 to < 100 feet
☐C	☐C	From 50 to < 80 feet
☐D	☐D	From 40 to < 50 feet
☐E	☐E	From 30 to < 40 feet
☒F	☒F	From 15 to < 30 feet
☐G	☐G	From 5 to < 15 feet
☐H	☐H	< 5 feet

9. Inundation Duration – assessment area condition metric (skip for non-riparian wetlands)

Answer for assessment area dominant landform.

☐A Evidence of short-duration inundation (< 7 consecutive days)
☒B Evidence of saturation, without evidence of inundation
☐C Evidence of long-duration inundation or very long-duration inundation (7 to 30 consecutive days or more)

10. Indicators of Deposition – assessment area condition metric (skip for non-riparian wetlands and all marshes)

Consider recent deposition only (no plant growth since deposition).

☒A Sediment deposition is not excessive, but at approximately natural levels.
☐B Sediment deposition is excessive, but not overwhelming the wetland.
☐C Sediment deposition is excessive and is overwhelming the wetland.

11. Wetland Size – wetland type/wetland complex condition metric

Check a box in each column. Involves a GIS effort with field adjustment. This metric evaluates three aspects of the wetland area: the size of the wetland type (WT), the size of the wetland complex (WC), and the size of the forested wetland (FW) (if applicable, see User Manual). See the User Manual for boundaries of these evaluation areas. If assessment area is clear-cut, select "K" for the FW column.

WT	WC	FW (if applicable)	
☐A	☐A	☐A	≥ 500 acres
☐B	☐B	☐B	From 100 to < 500 acres
☐C	☐C	☐C	From 50 to < 100 acres
☐D	☐D	☐D	From 25 to < 50 acres
☐E	☐E	☐E	From 10 to < 25 acres
☐F	☐F	☐F	From 5 to < 10 acres
☐G	☐G	☐G	From 1 to < 5 acres
☐H	☐H	☐H	From 0.5 to < 1 acre
☒I	☒I	☐I	From 0.1 to < 0.5 acre
☐J	☐J	☐J	From 0.01 to < 0.1 acre
☐K	☐K	☒K	< 0.01 acre or assessment area is clear-cut

12. Wetland Intactness – wetland type condition metric (evaluate for Pocosins only)

☐A Pocosin is the full extent (≥ 90%) of its natural landscape size.
☐B Pocosin type is < 90% of the full extent of its natural landscape size.

13. Connectivity to Other Natural Areas – landscape condition metric

13a. **Check appropriate box(es) (a box may be checked in each column).** Involves a GIS effort with field adjustment. This metric evaluates whether the wetland is well connected (Well) and/or loosely connected (Loosely) to the landscape patch, the contiguous naturally vegetated area and open water (if appropriate). Boundaries are formed by four-lane roads, regularly maintained utility line corridors the width of a four-lane road or wider, urban landscapes, maintained fields (pasture and agriculture), or open water > 300 feet wide.

Well	Loosely	
☐A	☐A	≥ 500 acres
☐B	☐B	From 100 to < 500 acres
☐C	☐C	From 50 to < 100 acres
☐D	☐D	From 10 to < 50 acres
☒E	☒E	< 10 acres
☐F	☐F	Wetland type has a poor or no connection to other natural habitats

13b. **Evaluate for marshes only**.

☐Yes ☐No Wetland type has a surface hydrology connection to open waters/stream or tidal wetlands.

14. Edge Effect – wetland type condition metric (skip for all marshes and Estuarine Woody Wetland)

May involve a GIS effort with field adjustment. Estimate distance from wetland type boundary to artificial edges. Artificial edges include non-forested areas ≥ 40 feet wide such as fields, development, roads, regularly maintained utility line corridors, and clear-cuts. Consider the eight main points of the compass. Artificial edge occurs within 150 feet in how many directions? If the assessment area is clear cut, select option "C."

☐A 0
☐B 1 to 4
☒C 5 to 8

15. Vegetative Composition – assessment area condition metric (skip for all marshes and Pine Flat)

☐A Vegetation is close to reference condition in species present and their proportions. Lower strata composed of appropriate species, with exotic plants absent or sparse within the assessment area.
☐B Vegetation is different from reference condition in species diversity or proportions, but still largely composed of native species characteristic of the wetland type. This may include communities of weedy native species that develop after clearcutting or clearing. It also includes communities with exotics present, but not dominant, over a large portion of the expected strata.
☒C Vegetation severely altered from reference in composition, or expected species are unnaturally absent (planted stands of non-characteristic species or at least one stratum inappropriately composed of a single species), or exotic species are dominant in at least one stratum.

16. Vegetative Diversity – assessment area condition metric (evaluate for Non-tidal Freshwater Marsh only)

☐A Vegetation diversity is high and is composed primarily of native species (< 10% cover of exotics).
☒B Vegetation diversity is low or has > 10% to 50% cover of exotics.
☐C Vegetation is dominated by exotic species (> 50 % cover of exotics).

17. Vegetative Structure – assessment area/wetland type condition metric

17a. Is vegetation present?
☒Yes ☐No If Yes, continue to 17b. If No, skip to Metric 18.

17b. Evaluate percent coverage of assessment area vegetation **for all marshes only**. Skip to 17c for non-marsh wetlands.
☒A ≥ 25% coverage of vegetation
☐B < 25% coverage of vegetation

17c. **Check a box in each column for each stratum**. Evaluate this portion of the metric **for non-marsh wetlands**. Consider structure in airspace above the assessment area (AA) and the wetland type (WT) separately.

	AA	WT	
Canopy	☐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.

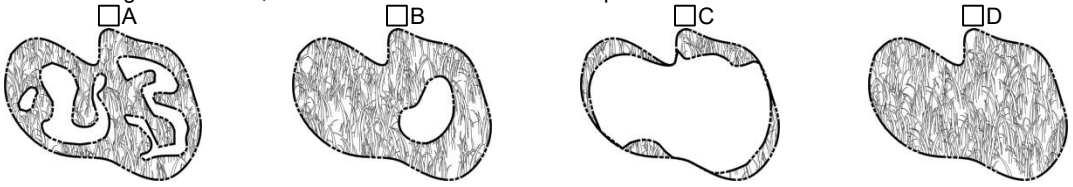
20. Large Woody Debris – wetland type condition metric (skip for all marshes)

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
Cattle have impacted the wetland

NC WAM Wetland Rating Sheet
Accompanies User Manual Version 5.0

Wetland Site Name	W7, W8, W9, W10	Date of Assessment	5/14/2020
Wetland Type	Headwater Forest	Assessor Name/Organization	J. Sullivan / KCI

Notes on Field Assessment Form (Y/N)	YES
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	**MEDIUM**
Water Quality	Pathogen Change	Condition	**HIGH**
		Condition/Opportunity	**HIGH**
		Opportunity Presence (Y/N)	**NO**
	Particulate Change	Condition	**LOW**
		Condition/Opportunity	NA
		Opportunity Presence (Y/N)	NA
	Soluble Change	Condition	**HIGH**
		Condition/Opportunity	**HIGH**
		Opportunity Presence (Y/N)	**NO**
	Physical Change	Condition	**MEDIUM**
		Condition/Opportunity	**MEDIUM**
		Opportunity Presence (Y/N)	**YES**
	Pollution Change	Condition	NA
		Condition/Opportunity	NA
		Opportunity Presence (Y/N)	NA
Habitat	Physical Structure	Condition	**LOW**
	Landscape Patch Structure	Condition	**LOW**
	Vegetation Composition	Condition	**LOW**

Function Rating Summary

Function	Metrics	Rating
Hydrology	Condition	**MEDIUM**
Water Quality	Condition	**HIGH**
	Condition/Opportunity	**HIGH**
	Opportunity Presence (Y/N)	**YES**
Habitat	Condition	**LOW**

Overall Wetland Rating **MEDIUM**

8. **Jurisdictional Determination**

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U.S. ARMY CORPS OF ENGINEERS
WILMINGTON DISTRICT

Action Id. **2020-01259** County: **Buncombe** U.S.G.S. Quad: **NC- Enka**

NOTIFICATION OF JURISDICTIONAL DETERMINATION

Requestor: **KCI Technologies, Inc.**
Joe Sullivan
Address: **4505 Falls of the Neuse Road, Suite 400**
Raleigh, NC 27609
Telephone Number: **919-278-2533**
E-mail: **joe.sullivan@kci.com**

Size (acres) **39.86**
Nearest Waterway **Newfound Creek**
USGS HUC **06010105**

Nearest Town **Leicester**
River Basin **French Broad-Holston**
Coordinates Latitude: **35.607**
Longitude: **-82.7478**

Location description: **The site is located at/near 321 Morgan Branch Road, in Leicester and the project boundary are easements on multiple parcels for the purpose of developing a mitigation bank.**

Indicate Which of the Following Apply:

A. Preliminary Determination

☒ There appear to be **waters, including wetlands** on the above described project area/property, that may be subject to Section 404 of the Clean Water Act (CWA)(33 USC § 1344) and/or Section 10 of the Rivers and Harbors Act (RHA) (33 USC § 403). The **waters, including wetlands** have been delineated, and the delineation has been verified by the Corps to be sufficiently accurate and reliable. The approximate boundaries of these waters are shown on the enclosed delineation map dated **9/24/2020 (Figure 3)**. Therefore this preliminary jurisdiction determination may be used in the permit evaluation process, including determining compensatory mitigation. For purposes of computation of impacts, compensatory mitigation requirements, and other resource protection measures, a permit decision made on the basis of a preliminary JD will treat all waters and wetlands that would be affected in any way by the permitted activity on the site as if they are jurisdictional waters of the U.S. This preliminary determination is not an appealable action under the Regulatory Program Administrative Appeal Process (Reference 33 CFR Part 331). However, you may request an approved JD, which is an appealable action, by contacting the Corps district for further instruction.

☐ There appear to be **waters, including wetlands** on the above described project area/property, that may be subject to Section 404 of the Clean Water Act (CWA)(33 USC § 1344) and/or Section 10 of the Rivers and Harbors Act (RHA) (33 USC § 403). However, since the **waters, including wetlands** have not been properly delineated, this preliminary jurisdiction determination may not be used in the permit evaluation process. Without a verified wetland delineation, this preliminary determination is merely an effective presumption of CWA/RHA jurisdiction over all of the **waters, including wetlands** at the project area, which is not sufficiently accurate and reliable to support an enforceable permit decision. We recommend that you have the **waters, including wetlands** on your project area/property delineated. As the Corps may not be able to accomplish this wetland delineation in a timely manner, you may wish to obtain a consultant to conduct a delineation that can be verified by the Corps.

B. Approved Determination

☐ There are Navigable Waters of the United States within the above described project area/property subject to the permit requirements of Section 10 of the Rivers and Harbors Act (RHA) (33 USC § 403) and Section 404 of the Clean Water Act (CWA)(33 USC § 1344). Unless there is a change in law or our published regulations, this determination may be relied upon for a period not to exceed five years from the date of this notification.

☐ There are **waters, including wetlands** on the above described project area/property subject to the permit requirements of Section 404 of the Clean Water Act (CWA) (33 USC § 1344). Unless there is a change in the law or our published regulations, this determination may be relied upon for a period not to exceed five years from the date of this notification.

☐ We recommend you have the **waters, including wetlands** on your project area/property delineated. As the Corps may not be able to accomplish this wetland delineation in a timely manner, you may wish to obtain a consultant to conduct a delineation that can be verified by the Corps.

2020-01259

☐ The **waters, including wetlands** on your project area/property have been delineated and the delineation has been verified by the Corps. The approximate boundaries of these waters are shown on the enclosed delineation map dated **DATE**. We strongly suggest you have this delineation surveyed. Upon completion, this survey should be reviewed and verified by the Corps. Once verified, this survey will provide an accurate depiction of all areas subject to CWA jurisdiction on your property which, provided there is no change in the law or our published regulations, may be relied upon for a period not to exceed five years.

☐ The **waters, including wetlands** have been delineated and surveyed and are accurately depicted on the plat signed by the Corps Regulatory Official identified below on **DATE**. Unless there is a change in the law or our published regulations, this determination may be relied upon for a period not to exceed five years from the date of this notification.

☐ There are no waters of the U.S., to include wetlands, present on the above described project area/property which are subject to the permit requirements of Section 404 of the Clean Water Act (33 USC 1344). Unless there is a change in the law or our published regulations, this determination may be relied upon for a period not to exceed five years from the date of this notification.

☐ The property is located in one of the 20 Coastal Counties subject to regulation under the Coastal Area Management Act (CAMA). You should contact the Division of Coastal Management in **Morehead City, NC, at (252) 808-2808** to determine their requirements.

Placement of dredged or fill material within waters of the US, including wetlands, without a Department of the Army permit may constitute a violation of Section 301 of the Clean Water Act (33 USC § 1311). Placement of dredged or fill material, construction or placement of structures, or work within navigable waters of the United States without a Department of the Army permit may constitute a violation of Sections 9 and/or 10 of the Rivers and Harbors Act (33 USC § 401 and/or 403). If you have any questions regarding this determination and/or the Corps regulatory program, please contact **Amanda Jones at 828-271-7980 ext. 4225 or amanda.jones@usace.army.mil**.

C. Basis for Determination: See the preliminary jurisdictional determination form dated 09/24/2020.

D. Remarks: None.

E. Attention USDA Program Participants

This delineation/determination has been conducted to identify the limits of Corps' Clean Water Act jurisdiction for the particular site identified in this request. The delineation/determination may not be valid for the wetland conservation provisions of the Food Security Act of 1985. If you or your tenant are USDA Program participants, or anticipate participation in USDA programs, you should request a certified wetland determination from the local office of the Natural Resources Conservation Service, prior to starting work.

F. Appeals Information **(This information applies only to approved jurisdictional determinations as indicated in B. above)**

This correspondence constitutes an approved jurisdictional determination for the above described site. If you object to this determination, you may request an administrative appeal under Corps regulations at 33 CFR Part 331. Enclosed you will find a Notification of Appeal Process (NAP) fact sheet and request for appeal (RFA) form. If you request to appeal this determination you must submit a completed RFA form to the following address:

US Army Corps of Engineers
South Atlantic Division
Attn: Phillip Shannin, Review Officer
60 Forsyth Street SW, Room 10M15
Atlanta, Georgia 30303-8801

In order for an RFA to be accepted by the Corps, the Corps must determine that it is complete, that it meets the criteria for appeal under 33 CFR part 331.5, and that it has been received by the Division Office within 60 days of the date of the NAP. Should you decide to submit an RFA form, it must be received at the above address by **Not applicable**.
It is not necessary to submit an RFA form to the Division Office if you do not object to the determination in this correspondence.

Corps Regulatory Official: FUEMMELER.AMANDA.JONES.1242835090 Digitally signed by FUEMMELER.AMANDA.JONES.1242835090 Date: 2020.09.24 08:07:31 -04'00'

Date of JD: **09/24/2020** Expiration Date of JD: **Not applicable**

NOTIFICATION OF ADMINISTRATIVE APPEAL OPTIONS AND PROCESS AND REQUEST FOR APPEAL

Applicant: **KCI Technologies, Inc., Joe Sullivan**	File Number: **2020-01259**	Date: **09/24/2020**

Attached is:		See Section below
☐	INITIAL PROFFERED PERMIT (Standard Permit or Letter of permission)	A
☐	PROFFERED PERMIT (Standard Permit or Letter of permission)	B
☐	PERMIT DENIAL	C
☐	APPROVED JURISDICTIONAL DETERMINATION	D
☒	PRELIMINARY JURISDICTIONAL DETERMINATION	E

SECTION I - The following identifies your rights and options regarding an administrative appeal of the above decision. Additional information may be found at or http://www.usace.army.mil/Missions/CivilWorks/RegulatoryProgramandPermits.aspx or the Corps regulations at 33 CFR Part 331.

A: INITIAL PROFFERED PERMIT: You may accept or object to the permit.

- ACCEPT: If you received a Standard Permit, you may sign the permit document and return it to the district engineer for final authorization. If you received a Letter of Permission (LOP), you may accept the LOP and your work is authorized. Your signature on the Standard Permit or acceptance of the LOP means that you accept the permit in its entirety, and waive all rights to appeal the permit, including its terms and conditions, and approved jurisdictional determinations associated with the permit.
- OBJECT: If you object to the permit (Standard or LOP) because of certain terms and conditions therein, you may request that the permit be modified accordingly. You must complete Section II of this form and return the form to the district engineer. Your objections must be received by the district engineer within 60 days of the date of this notice, or you will forfeit your right to appeal the permit in the future. Upon receipt of your letter, the district engineer will evaluate your objections and may: (a) modify the permit to address all of your concerns, (b) modify the permit to address some of your objections, or (c) not modify the permit having determined that the permit should be issued as previously written. After evaluating your objections, the district engineer will send you a proffered permit for your reconsideration, as indicated in Section B below.

B: PROFFERED PERMIT: You may accept or appeal the permit

- ACCEPT: If you received a Standard Permit, you may sign the permit document and return it to the district engineer for final authorization. If you received a Letter of Permission (LOP), you may accept the LOP and your work is authorized. Your signature on the Standard Permit or acceptance of the LOP means that you accept the permit in its entirety, and waive all rights to appeal the permit, including its terms and conditions, and approved jurisdictional determinations associated with the permit.
- APPEAL: If you choose to decline the proffered permit (Standard or LOP) because of certain terms and conditions therein, you may appeal the declined permit under the Corps of Engineers Administrative Appeal Process by completing Section II of this form and sending the form to the division engineer. This form must be received by the division engineer within 60 days of the date of this notice.

C: PERMIT DENIAL: You may appeal the denial of a permit under the Corps of Engineers Administrative Appeal Process by completing Section II of this form and sending the form to the division engineer. This form must be received by the division engineer within 60 days of the date of this notice.

D: APPROVED JURISDICTIONAL DETERMINATION: You may accept or appeal the approved JD or provide new information.

- ACCEPT: You do not need to notify the Corps to accept an approved JD. Failure to notify the Corps within 60 days of the date of this notice, means that you accept the approved JD in its entirety, and waive all rights to appeal the approved JD.
- APPEAL: If you disagree with the approved JD, you may appeal the approved JD under the Corps of Engineers Administrative Appeal Process by completing Section II of this form and sending the form to the district engineer. This form must be received by the division engineer within 60 days of the date of this notice.

E: PRELIMINARY JURISDICTIONAL DETERMINATION: You do not need to respond to the Corps regarding the preliminary JD. The Preliminary JD is not appealable. If you wish, you may request an approved JD (which may be appealed), by contacting the Corps district for further instruction. Also you may provide new information for further consideration by the Corps to reevaluate the JD.

SECTION II - REQUEST FOR APPEAL or OBJECTIONS TO AN INITIAL PROFFERED PERMIT

REASONS FOR APPEAL OR OBJECTIONS: (Describe your reasons for appealing the decision or your objections to an initial proffered permit in clear concise statements. You may attach additional information to this form to clarify where your reasons or objections are addressed in the administrative record.)

ADDITIONAL INFORMATION: The appeal is limited to a review of the administrative record, the Corps memorandum for the record of the appeal conference or meeting, and any supplemental information that the review officer has determined is needed to clarify the administrative record. Neither the appellant nor the Corps may add new information or analyses to the record. However, you may provide additional information to clarify the location of information that is already in the administrative record.

POINT OF CONTACT FOR QUESTIONS OR INFORMATION:

If you have questions regarding this decision and/or the appeal process you may contact:	If you only have questions regarding the appeal process you may also contact:
District Engineer, Wilmington Regulatory Division **Attn: Amanda Jones** **Asheville Regulatory Office** **U.S Army Corps of Engineers** **151 Patton Avenue, Room 208** **Asheville, North Carolina 28801**	Mr. Phillip Shannin, Administrative Appeal Review Officer CESAD-PDO U.S. Army Corps of Engineers, South Atlantic Division 60 Forsyth Street, Room 10M15 Atlanta, Georgia 30303-8801 Phone: (404) 562-5137

RIGHT OF ENTRY: Your signature below grants the right of entry to Corps of Engineers personnel, and any government consultants, to conduct investigations of the project site during the course of the appeal process. You will be provided a 15-day notice of any site investigation, and will have the opportunity to participate in all site investigations.

_____ Signature of appellant or agent.	Date:	Telephone number:

For appeals on Initial Proffered Permits send this form to:

District Engineer, Wilmington Regulatory Division, **Attn: Amanda Jones, 69 Darlington Avenue, Wilmington, North Carolina 28403**

For Permit denials, Proffered Permits and Approved Jurisdictional Determinations send this form to:

Division Engineer, Commander, U.S. Army Engineer Division, South Atlantic, Attn: Mr. Phillip Shannin, Administrative Appeal Officer, CESAD-PDO, 60 Forsyth Street, Room 10M15, Atlanta, Georgia 30303-8801
Phone: (404) 562-5137

Appendix 2 - PRELIMINARY JURISDICTIONAL DETERMINATION (PJD) FORM

BACKGROUND INFORMATION

A. REPORT COMPLETION DATE FOR PJD:

B. NAME AND ADDRESS OF PERSON REQUESTING PJD: Joseph Sullivan, 4505 Falls of Neuse Rd; Suite 400, Raleigh, NC 27609

C. DISTRICT OFFICE, FILE NAME, AND NUMBER: SAW-2020-01259/ Morgan Branch PJD

D. PROJECT LOCATION(S) AND BACKGROUND INFORMATION:
(USE THE TABLE BELOW TO DOCUMENT MULTIPLE AQUATIC RESOURCES AND/OR AQUATIC RESOURCES AT DIFFERENT SITES)

State: NC County/parish/borough: Buncombe City: Leicester

Center coordinates of site (lat/long in degree decimal format):

Lat.: 35.6099 Long.: –82.7469

Universal Transverse Mercator:

Name of nearest waterbody: Morgan Branch

E. REVIEW PERFORMED FOR SITE EVALUATION (CHECK ALL THAT APPLY):

☐ Office (Desk) Determination. Date:

☒ Field Determination. Date(s): August 5, 2020

TABLE OF AQUATIC RESOURCES IN REVIEW AREA WHICH "MAY BE" SUBJECT TO REGULATORY JURISDICTION.

Site number	Latitude (decimal degrees)	Longitude (decimal degrees)	Estimated amount of aquatic resource in review area (acreage and linear feet, if applicable)	Type of aquatic resource (i.e., wetland vs. non-wetland waters)	Geographic authority to which the aquatic resource "may be" subject (i.e., Section 404 or Section 10/404)
			see attached tables		

1) The Corps of Engineers believes that there may be jurisdictional aquatic resources in the review area, and the requestor of this PJD is hereby advised of his or her option to request and obtain an approved JD (AJD) for that review area based on an informed decision after having discussed the various types of JDs and their characteristics and circumstances when they may be appropriate.

2) In any circumstance where a permit applicant obtains an individual permit, or a Nationwide General Permit (NWP) or other general permit verification requiring "pre-construction notification" (PCN), or requests verification for a non-reporting NWP or other general permit, and the permit applicant has not requested an AJD for the activity, the permit applicant is hereby made aware that: (1) the permit applicant has elected to seek a permit authorization based on a PJD, which does not make an official determination of jurisdictional aquatic resources; (2) the applicant has the option to request an AJD before accepting the terms and conditions of the permit authorization, and that basing a permit authorization on an AJD could possibly result in less compensatory mitigation being required or different special conditions; (3) the applicant has the right to request an individual permit rather than accepting the terms and conditions of the NWP or other general permit authorization; (4) the applicant can accept a permit authorization and thereby agree to comply with all the terms and conditions of that permit, including whatever mitigation requirements the Corps has determined to be necessary; (5) undertaking any activity in reliance upon the subject permit authorization without requesting an AJD constitutes the applicant's acceptance of the use of the PJD; (6) accepting a permit authorization (e.g., signing a proffered individual permit) or undertaking any activity in reliance on any form of Corps permit authorization based on a PJD constitutes agreement that all aquatic resources in the review area affected in any way by that activity will be treated as jurisdictional, and waives any challenge to such jurisdiction in any administrative or judicial compliance or enforcement action, or in any administrative appeal or in any Federal court; and (7) whether the applicant elects to use either an AJD or a PJD, the JD will be processed as soon as practicable. Further, an AJD, a proffered individual permit (and all terms and conditions contained therein), or individual permit denial can be administratively appealed pursuant to 33 C.F.R. Part 331. If, during an administrative appeal, it becomes appropriate to make an official determination whether geographic jurisdiction exists over aquatic resources in the review area, or to provide an official delineation of jurisdictional aquatic resources in the review area, the Corps will provide an AJD to accomplish that result, as soon as is practicable. This PJD finds that there *"may be"* waters of the U.S. and/or that there *"may be"* navigable waters of the U.S. on the subject review area, and identifies all aquatic features in the review area that could be affected by the proposed activity, based on the following information:

SUPPORTING DATA. Data reviewed for PJD (check all that apply)

Checked items should be included in subject file. Appropriately reference sources below where indicated for all checked items:

- [■] Maps, plans, plots or plat submitted by or on behalf of the PJD requestor:
  Map: Vicinity Map.
- [X] Data sheets prepared/submitted by or on behalf of the PJD requestor.
  - [X] 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: Canton & Enka 1:24K.
- [ ] Natural Resources Conservation Service Soil Survey. Citation: _____.
- [ ] National wetlands inventory map(s). Cite name: _____.
- [ ] State/local wetland inventory map(s): _____.
- [ ] FEMA/FIRM maps: _____.
- [ ] 100-year Floodplain Elevation is: _____.(National Geodetic Vertical Datum of 1929)
- [■] Photographs: [■] Aerial (Name & Date): 2019 Statewide Aerial Photographs.
  or [ ] Other (Name & Date): _____.
- [ ] Previous determination(s). File no. and date of response letter: _____.
- [ ] Other information (please specify): _____.

IMPORTANT NOTE: The information recorded on this form has not necessarily been verified by the Corps and should not be relied upon for later jurisdictional determinations.

FUEMMELER.AMANDA.JONES.1242835090 Digitally signed by FUEMMELER.AMANDA.JONES.1242835090 Date: 2020.09.24 08:11:37 -04'00'

Signature and date of Regulatory staff member completing PJD

Joe Sullivan Digitally signed by Joe Sullivan DN: cn=Joe Sullivan, o=KCI Technologies Inc, ou, email=joe.sullivan@kci.com, c=US Date: 2020.07.13 09:59:46 -04'00'

Signature and date of person requesting PJD (REQUIRED, unless obtaining the signature is impracticable)[1]

[1] Districts may establish timeframes for requestor to return signed PJD forms. If the requestor does not respond within the established time frame, the district may presume concurrence and no additional follow up is necessary prior to finalizing an action.

Table 1.

Stream Name	Stream Status	Bankfull Height (Feet)	Bankfull Width (Feet)	Length (Feet)	DWQ Score	Lat	Long
Morgan Branch	Perennial	4.5	10	5,900	39	35.6097	-82.7478
T1	Perennial	2	3.5	3,227	32	35.6076	-82.7537
T1A	Intermittent	1	2	206	23.5	35.6050	-82.7563
T2	Perennial	4	3	750	30	35.6065	-82.7523
T3	Perennial	4	3	1,372	30.5	35.6069	-82.7510
T4	Perennial	3	4	1,938	30.5	35.6126	-82.7464
T4-1	Intermittent	2.5	4	417	23.25	35.6148	-82.7480
T4-2	Intermittent	4	5	1,182	24.5	35.6130	-82.7493
T4-3	Intermittent	2	2	150	19.5	35.6118	-82.7461
T5	Intermittent	4	3	1,835	26	35.6075	-82.7456
T6	Intermittent	4	3	1,045	20.5	35.6070	-82.7438
T7	Intermittent	2	4	988	19.5	35.6101	-82.7408
T7	Perennial	5	4	949	28	35.6097	-82.7408
T8	Intermittent	2	2	477	25.75	35.6093	-82.7632
T9	Intermittent	2	3	696	22.5	35.6069	-82.7673
T9	Perennial	2	3.5	226	30	35.6078	-82.7651

Palustrine Emergent
X = Data form completed

Table 2.

Wetland ID	NCWAM	Class		Isolated	Size	USACE Forms		Lat	Long
		Hydrologic	Cowardin	Yes/No	(Acres)	WET	UP		
W1	Headwater Forest	Riparian	PSS	No	0.41	X	W7	35.6068	-82.7681
W2	Headwater Forest	Riparian	PEM	No	0.03	W7	W7	35.6092	-82.7631
W3	Headwater Forest	Riparian	PSS	No	0.07	W7	W7	35.6094	-82.7633
W4	Bottomland Hardwood Forest	Riparian	PEM	No	0.01	W7	W7	35.6096	-82.7524
W5	Headwater Forest/Seep	Riparian	PEM	No	0.18	X	X	35.6066	-82.7452
W6	Seep	Riparian	PEM	No	0.07	W7	W7	35.6107	-82.7405
W7	Headwater Forest/Seep	Riparian	PEM	No	0.38	X	X	35.6123	-82.7405
W8	Headwater Forest	Riparian	PEM	No	0.01	W7	W5	35.6150	-82.7483
W9	Headwater Forest	Riparian	PEM	No	0.02	W7	W5	35.6143	-82.7474
W10	Headwater Forest	Riparian	PEM	No	0.06	W7	W5	35.6139	-82.7473
W11	Seep	Riparian	PEM	No	0.05	W7	W5	35.6137	-82.7471

Palustrine Emergent
X = Data form completed

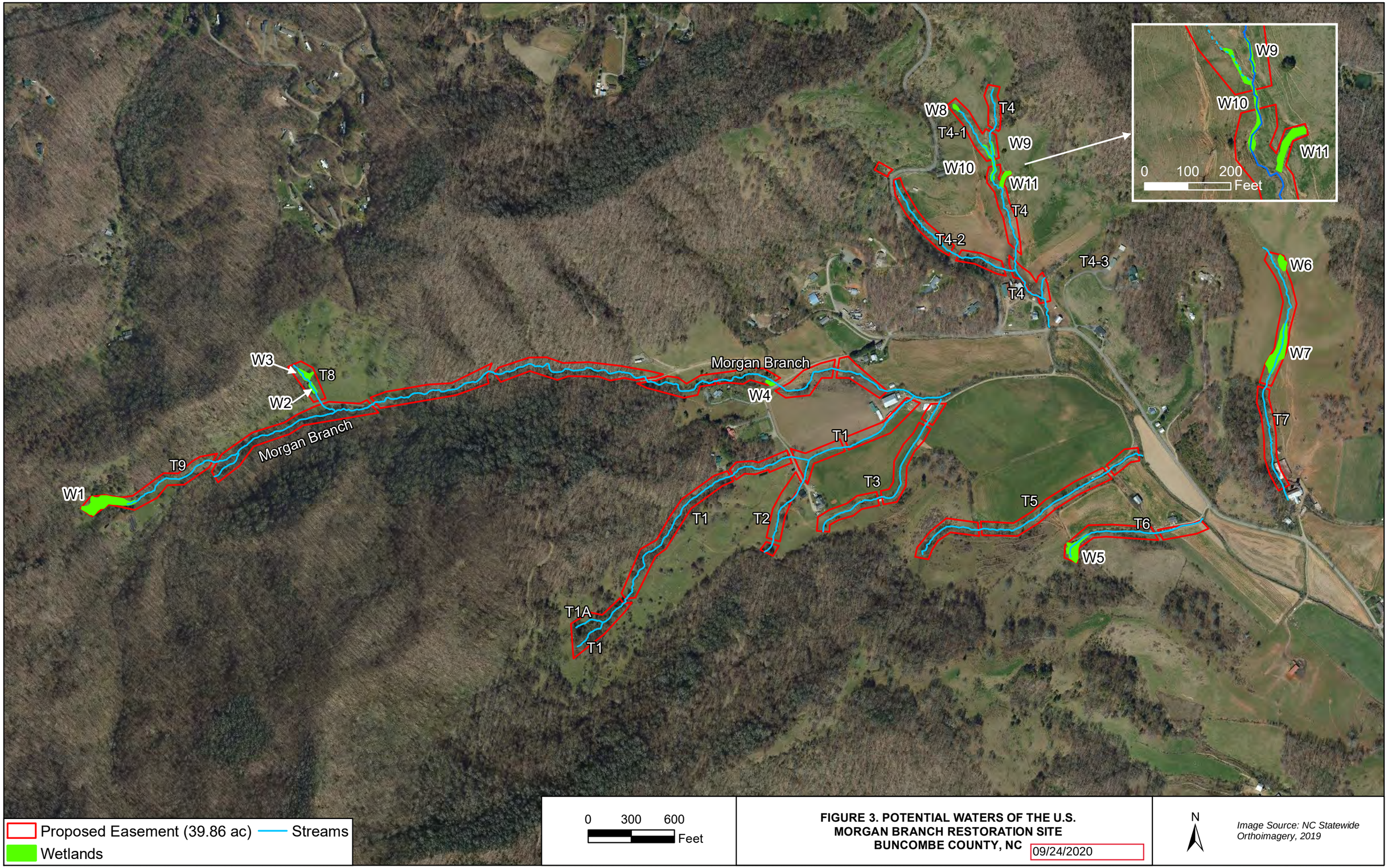


FIGURE 3. POTENTIAL WATERS OF THE U.S.
MORGAN BRANCH RESTORATION SITE
BUNCOMBE COUNTY, NC 09/24/2020

Image Source: NC Statewide Orthoimagery, 2019

9. **Invasive Species**

The site will be monitored for the presence of invasive species during both the visual assessments and vegetation plot monitoring events and will follow the guidance in the *Wilmington District Stream and Wetland Compensatory Mitigation Update* (NCIRT 2016) regarding invasive species. A list of non-native invasive species for North Carolina is found in the NC SAM User Manual Appendix I.

Per the NCIRT 2016 guidance, invasive species management should occur when the functional integrity of the vegetative community is impacted. One or more invasive species may present a threat to the site, but the desirable species may have the ability to survive or outcompete despite the competition. Once an invasive species is identified as impairing the site, physical and/or chemical removal and treatment should occur. Any control measures will be noted in the annual monitoring reports.

North Carolina Interagency Review Team. 2016. Wilmington District Stream and Wetland Compensatory Mitigation Update. Last accessed at: http://saw-reg.usace.army.mil/PN/2016/Wilmington-District-Mitigation-Update.pdf

N.C. Stream Functional Assessment Team. 2016. N.C. Stream Assessment Method (NC SAM) User Manual. (https://ribits.usace.army.mil/ribits_apex/f?p=107:150:16800695257725::NO::P150_DOCUMENT_ID:36298)

10. Approved FHWA Categorical Exclusion

Categorical Exclusion Form for Division of Mitigation Services Projects
Version 2

Note: Only Appendix A should to be submitted (along with any supporting documentation) as the environmental document.

Part 1: General Project Information	
Project Name:	**Morgan Branch Restoration Site**
County Name:	**Buncombe**
DMS Number:	**100127**
Project Sponsor:	**KCI**
Project Contact Name:	**Charlie Morgan**
Project Contact Address:	**4505 Falls of Neuse Road Suite 400 Raleigh NC 27609**
Project Contact E-mail:	**charlie.morgan@kci.com**
DMS Project Manager:	**Harry Tsomides**

Project Description

The Morgan Branch Restoration Site (MBRS) is in the French Broad River Basin in Buncombe County, North Carolina. As evidenced by historic aerial photos and site investigations, the streams at this site have been substantially modified by relocation and straightening, impacted from cattle, and other anthropogenic impacts. Restoring these streams will return this site to a stable stream ecosystem.

For Official Use Only

Reviewed By:

3/31/2020 — **Date**

Harry Tsomides — **DMS Project Manager**

Conditional Approved By:

Date

For Division Administrator FHWA

☐ **Check this box if there are outstanding issues**

Final Approval By:

4-15-20 — **Date**

Donald W. Brew — **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)?	☐ ☐ No ☑ N/A
3. Has a CAMA permit been secured?	☐ Yes ☐ No ☑ N/A
4. Has NCDCM agreed that the project is consistent with the NC Coastal Management Program?	☐ Yes ☐ No ☑ N/A
Comprehensive Environmental Response, Compensation and Liability Act (CERCLA)	
1. Is this a "full-delivery" project?	☑ Yes ☐ No
2. Has the zoning/land use of the subject property and adjacent properties ever been designated as commercial or industrial?	☐ Yes ☑ No ☐ N/A
3. As a result of a limited Phase I Site Assessment, are there known or potential hazardous waste sites within or adjacent to the project area?	☐ Yes ☑ No ☐ N/A
4. As a result of a Phase I Site Assessment, are there known or potential hazardous waste sites within or adjacent to the project area?	☐ Yes ☐ No ☑ N/A
5. As a result of a Phase II Site Assessment, are there known or potential hazardous waste sites within the project area?	☐ Yes ☐ No ☑ N/A
6. Is there an approved hazardous mitigation plan?	☐ Yes ☐ No ☑ N/A
National Historic Preservation Act (Section 106)	
1. Are there properties listed on, or eligible for listing on, the National Register of Historic Places in the project area?	☐ Yes ☑ No
2. Does the project affect such properties and does the SHPO/THPO concur?	☐ Yes ☐ No ☑ N/A
3. If the effects are adverse, have they been resolved?	☐ Yes ☐ No ☑ N/A
Uniform Relocation Assistance and Real Property Acquisition Policies Act (Uniform Act)	
1. Is this a "full-delivery" project?	☑ Yes ☐ No
2. Does the project require the acquisition of real estate?	☑ Yes ☐ No ☐ N/A
3. Was the property acquisition completed prior to the intent to use federal funds?	☐ Yes ☑ No ☐ N/A
4. Has the owner of the property been informed: * prior to making an offer that the agency does not have condemnation authority; and * what the fair market value is believed to be?	☑ Yes ☐ No ☐ N/A

Part 3: Ground-Disturbing Activities Regulation/Question	Response
American Indian Religious Freedom Act (AIRFA)	
1. Is the project located in a county claimed as "territory" by the Eastern Band of Cherokee Indians?	☑ Yes ☐ No
2. Is the site of religious importance to American Indians?	☐ Yes ☑ No ☐ N/A
3. Is the project listed on, or eligible for listing on, the National Register of Historic Places?	☐ Yes ☐ No ☑ N/A
4. Have the effects of the project on this site been considered?	☐ Yes ☐ No ☑ N/A
Antiquities Act (AA)	
1. Is the project located on Federal lands?	☐ Yes ☑ No
2. Will there be loss or destruction of historic or prehistoric ruins, monuments or objects of antiquity?	☐ Yes ☐ No ☑ N/A
3. Will a permit from the appropriate Federal agency be required?	☐ Yes ☐ No ☑ N/A
4. Has a permit been obtained?	☐ Yes ☐ No ☑ N/A
Archaeological Resources Protection Act (ARPA)	
1. Is the project located on federal or Indian lands (reservation)?	☐ Yes ☑ No
2. Will there be a loss or destruction of archaeological resources?	☐ Yes ☐ No ☑ N/A
3. Will a permit from the appropriate Federal agency be required?	☐ Yes ☐ No ☑ N/A
4. Has a permit been obtained?	☐ Yes ☐ No ☑ N/A
Endangered Species Act (ESA)	
1. Are federal Threatened and Endangered species and/or Designated Critical Habitat listed for the county?	☑ Yes ☐ No
2. Is Designated Critical Habitat or suitable habitat present for listed species?	☐ Yes ☑ No ☐ N/A
3. Are T&E species present or is the project being conducted in Designated Critical Habitat?	☐ Yes ☐ No ☑ N/A
4. Is the project "likely to adversely affect" the specie and/or "likely to adversely modify" Designated Critical Habitat?	☐ Yes ☐ No ☑ N/A
5. Does the USFWS/NOAA-Fisheries concur in the effects determination?	☐ Yes ☐ No ☑ N/A
6. Has the USFWS/NOAA-Fisheries rendered a "jeopardy" determination?	☐ Yes ☐ No ☑ N/A

Executive Order 13007 (Indian Sacred Sites)	
1. Is the project located on Federal lands that are within a county claimed as "territory" by the EBCI?	☐ Yes ☑ No
2. Has the EBCI indicated that Indian sacred sites may be impacted by the proposed project?	☐ Yes ☐ No ☑ N/A
3. Have accommodations been made for access to and ceremonial use of Indian sacred sites?	☐ Yes ☐ No ☑ N/A
Farmland Protection Policy Act (FPPA)	
1. Will real estate be acquired?	☑ Yes ☐ No
2. Has NRCS determined that the project contains prime, unique, statewide or locally important farmland?	☑ Yes ☐ No ☐ N/A
3. Has the completed Form AD-1006 been submitted to NRCS?	☑ Yes ☐ No ☐ N/A
Fish and Wildlife Coordination Act (FWCA)	
1. Will the project impound, divert, channel deepen, or otherwise control/modify any water body?	☑ Yes ☐ No
2. Have the USFWS and the NCWRC been consulted?	☑ Yes ☐ No ☐ N/A
Land and Water Conservation Fund Act (Section 6(f))	
1. Will the project require the conversion of such property to a use other than public, outdoor recreation?	☐ Yes ☑ No
2. Has the NPS approved of the conversion?	☐ Yes ☐ No ☑ N/A
Magnuson-Stevens Fishery Conservation and Management Act (Essential Fish Habitat)	
1. Is the project located in an estuarine system?	☐ Yes ☑ No
2. Is suitable habitat present for EFH-protected species?	☐ Yes ☐ No ☑ N/A
3. Is sufficient design information available to make a determination of the effect of the project on EFH?	☐ Yes ☐ No ☑ N/A
4. Will the project adversely affect EFH?	☐ Yes ☐ No ☑ N/A
5. Has consultation with NOAA-Fisheries occurred?	☐ Yes ☐ No ☑ N/A
Migratory Bird Treaty Act (MBTA)	
1. Does the USFWS have any recommendations with the project relative to the MBTA?	☐ Yes ☑ No
2. Have the USFWS recommendations been incorporated?	☐ Yes ☐ No ☑ N/A
Wilderness Act	
1. Is the project in a Wilderness area?	☐ Yes ☑ No
2. Has a special use permit and/or easement been obtained from the maintaining federal agency?	☐ Yes ☐ No ☑ N/A

Appendix
Supporting Documentation for
Categorical Exclusion Form for NC DENR Division of Mitigation Services (DMS) Projects

Contents

Limited Phase I ESA

1. Radius Report
2. Sanborn Map
3. Historic Aerials

Morgan Branch FDP
321 Morgan Branch Road
Leicester, NC 28748

Inquiry Number: 5285012.2s
May 08, 2018

The EDR Radius Map™ Report with GeoCheck®

6 Armstrong Road, 4th floor
Shelton, CT 06484
Toll Free: 800.352.0050
www.edrnet.com

TABLE OF CONTENTS

Thank you for your business.
Please contact EDR at 1-800-352-0050
with any questions or comments.

EXECUTIVE SUMMARY

A search of available environmental records was conducted by Environmental Data Resources, Inc (EDR). The report was designed to assist parties seeking to meet the search requirements of EPA's Standards and Practices for All Appropriate Inquiries (40 CFR Part 312), the ASTM Standard Practice for Environmental Site Assessments (E 1527-13), the ASTM Standard Practice for Environmental Site Assessments for Forestland or Rural Property (E 2247-16), the ASTM Standard Practice for Limited Environmental Due Diligence: Transaction Screen Process (E 1528-14) or custom requirements developed for the evaluation of environmental risk associated with a parcel of real estate.

TARGET PROPERTY INFORMATION

ADDRESS

321 MORGAN BRANCH ROAD
LEICESTER, NC 28748

COORDINATES

Latitude (North):	35.6088830 - 35° 36' 31.97''
Longitude (West):	82.7489210 - 82° 44' 56.11''
Universal Tranverse Mercator:	Zone 17
UTM X (Meters):	341587.6
UTM Y (Meters):	3941778.0
Elevation:	2288 ft. above sea level

USGS TOPOGRAPHIC MAP ASSOCIATED WITH TARGET PROPERTY

Target Property Map:	5948482 ENKA, NC
Version Date:	2013
Northeast Map:	5947757 LEICESTER, NC
Version Date:	2013
Southwest Map:	5948648 CANTON, NC
Version Date:	2013
Northwest Map:	5948518 SANDYMUSH, NC
Version Date:	2013

AERIAL PHOTOGRAPHY IN THIS REPORT

Portions of Photo from:	20141019
Source:	USDA

MAPPED SITES SUMMARY

Target Property Address:
321 MORGAN BRANCH ROAD
LEICESTER, NC 28748

Click on Map ID to see full detail.

MAP ID	SITE NAME	ADDRESS	DATABASE ACRONYMS	RELATIVE ELEVATION	DIST (ft. & mi.) DIRECTION

NO MAPPED SITES FOUND

EXECUTIVE SUMMARY

TARGET PROPERTY SEARCH RESULTS

The target property was not listed in any of the databases searched by EDR.

DATABASES WITH NO MAPPED SITES

No mapped sites were found in EDR's search of available ("reasonably ascertainable ") government records either on the target property or within the search radius around the target property for the following databases:

STANDARD ENVIRONMENTAL RECORDS

Federal NPL site list

NPL ---------- National Priority List
Proposed NPL ---------- Proposed National Priority List Sites
NPL LIENS ---------- Federal Superfund Liens

Federal Delisted NPL site list

Delisted NPL ---------- National Priority List Deletions

Federal CERCLIS list

FEDERAL FACILITY ---------- Federal Facility Site Information listing
SEMS ---------- Superfund Enterprise Management System

Federal CERCLIS NFRAP site list

SEMS-ARCHIVE ---------- Superfund Enterprise Management System Archive

Federal RCRA CORRACTS facilities list

CORRACTS ---------- Corrective Action Report

Federal RCRA non-CORRACTS TSD facilities list

RCRA-TSDF ---------- RCRA - Treatment, Storage and Disposal

Federal RCRA generators list

RCRA-LQG ---------- RCRA - Large Quantity Generators
RCRA-SQG ---------- RCRA - Small Quantity Generators
RCRA-CESQG ---------- RCRA - Conditionally Exempt Small Quantity Generator

Federal institutional controls / engineering controls registries

LUCIS ---------- Land Use Control Information System
US ENG CONTROLS ---------- Engineering Controls Sites List

US INST CONTROL..... Sites with Institutional Controls

Federal ERNS list

ERNS..... Emergency Response Notification System

State- and tribal - equivalent NPL

NC HSDS..... Hazardous Substance Disposal Site

State- and tribal - equivalent CERCLIS

SHWS..... Inactive Hazardous Sites Inventory

State and tribal landfill and/or solid waste disposal site lists

SWF/LF..... List of Solid Waste Facilities
OLI..... Old Landfill Inventory

State and tribal leaking storage tank lists

LUST..... Regional UST Database
LAST..... Leaking Aboveground Storage Tanks
INDIAN LUST..... Leaking Underground Storage Tanks on Indian Land
LUST TRUST..... State Trust Fund Database

State and tribal registered storage tank lists

FEMA UST..... Underground Storage Tank Listing
UST..... Petroleum Underground Storage Tank Database
AST..... AST Database
INDIAN UST..... Underground Storage Tanks on Indian Land

State and tribal institutional control / engineering control registries

INST CONTROL..... No Further Action Sites With Land Use Restrictions Monitoring

State and tribal voluntary cleanup sites

VCP..... Responsible Party Voluntary Action Sites
INDIAN VCP..... Voluntary Cleanup Priority Listing

State and tribal Brownfields sites

BROWNFIELDS..... Brownfields Projects Inventory

ADDITIONAL ENVIRONMENTAL RECORDS

Local Brownfield lists

US BROWNFIELDS..... A Listing of Brownfields Sites

Local Lists of Landfill / Solid Waste Disposal Sites

HIST LF..... Solid Waste Facility Listing

SWRCY	Recycling Center Listing
INDIAN ODI	Report on the Status of Open Dumps on Indian Lands
DEBRIS REGION 9	Torres Martinez Reservation Illegal Dump Site Locations
ODI	Open Dump Inventory
IHS OPEN DUMPS	Open Dumps on Indian Land

Local Lists of Hazardous waste / Contaminated Sites

US HIST CDL	Delisted National Clandestine Laboratory Register
US CDL	National Clandestine Laboratory Register

Local Land Records

LIENS 2	CERCLA Lien Information

Records of Emergency Release Reports

HMIRS	Hazardous Materials Information Reporting System
SPILLS	Spills Incident Listing
IMD	Incident Management Database
SPILLS 90	SPILLS 90 data from FirstSearch
SPILLS 80	SPILLS 80 data from FirstSearch

Other Ascertainable Records

RCRA NonGen / NLR	RCRA - Non Generators / No Longer Regulated
FUDS	Formerly Used Defense Sites
DOD	Department of Defense Sites
SCRD DRYCLEANERS	State Coalition for Remediation of Drycleaners Listing
US FIN ASSUR	Financial Assurance Information
EPA WATCH LIST	EPA WATCH LIST
2020 COR ACTION	2020 Corrective Action Program List
TSCA	Toxic Substances Control Act
TRIS	Toxic Chemical Release Inventory System
SSTS	Section 7 Tracking Systems
ROD	Records Of Decision
RMP	Risk Management Plans
RAATS	RCRA Administrative Action Tracking System
PRP	Potentially Responsible Parties
PADS	PCB Activity Database System
ICIS	Integrated Compliance Information System
FTTS	FIFRA/ TSCA Tracking System - FIFRA (Federal Insecticide, Fungicide, & Rodenticide Act)/TSCA (Toxic Substances Control Act)
MLTS	Material Licensing Tracking System
COAL ASH DOE	Steam-Electric Plant Operation Data
COAL ASH EPA	Coal Combustion Residues Surface Impoundments List
PCB TRANSFORMER	PCB Transformer Registration Database
RADINFO	Radiation Information Database
HIST FTTS	FIFRA/TSCA Tracking System Administrative Case Listing
DOT OPS	Incident and Accident Data
CONSENT	Superfund (CERCLA) Consent Decrees
INDIAN RESERV	Indian Reservations
FUSRAP	Formerly Utilized Sites Remedial Action Program
UMTRA	Uranium Mill Tailings Sites
LEAD SMELTERS	Lead Smelter Sites

US AIRS ---------- Aerometric Information Retrieval System Facility Subsystem
US MINES ---------- Mines Master Index File
ABANDONED MINES ---------- Abandoned Mines
FINDS ---------- Facility Index System/Facility Registry System
DOCKET HWC ---------- Hazardous Waste Compliance Docket Listing
UXO ---------- Unexploded Ordnance Sites
ECHO ---------- Enforcement & Compliance History Information
FUELS PROGRAM ---------- EPA Fuels Program Registered Listing
ASBESTOS ---------- ASBESTOS
COAL ASH ---------- Coal Ash Disposal Sites
DRYCLEANERS ---------- Drycleaning Sites
Financial Assurance ---------- Financial Assurance Information Listing
NPDES ---------- NPDES Facility Location Listing
UIC ---------- Underground Injection Wells Listing

EDR HIGH RISK HISTORICAL RECORDS

EDR Exclusive Records

EDR MGP ---------- EDR Proprietary Manufactured Gas Plants
EDR Hist Auto ---------- EDR Exclusive Historical Auto Stations
EDR Hist Cleaner ---------- EDR Exclusive Historical Cleaners

EDR RECOVERED GOVERNMENT ARCHIVES

Exclusive Recovered Govt. Archives

RGA HWS ---------- Recovered Government Archive State Hazardous Waste Facilities List
RGA LF ---------- Recovered Government Archive Solid Waste Facilities List
RGA LUST ---------- Recovered Government Archive Leaking Underground Storage Tank

SURROUNDING SITES: SEARCH RESULTS

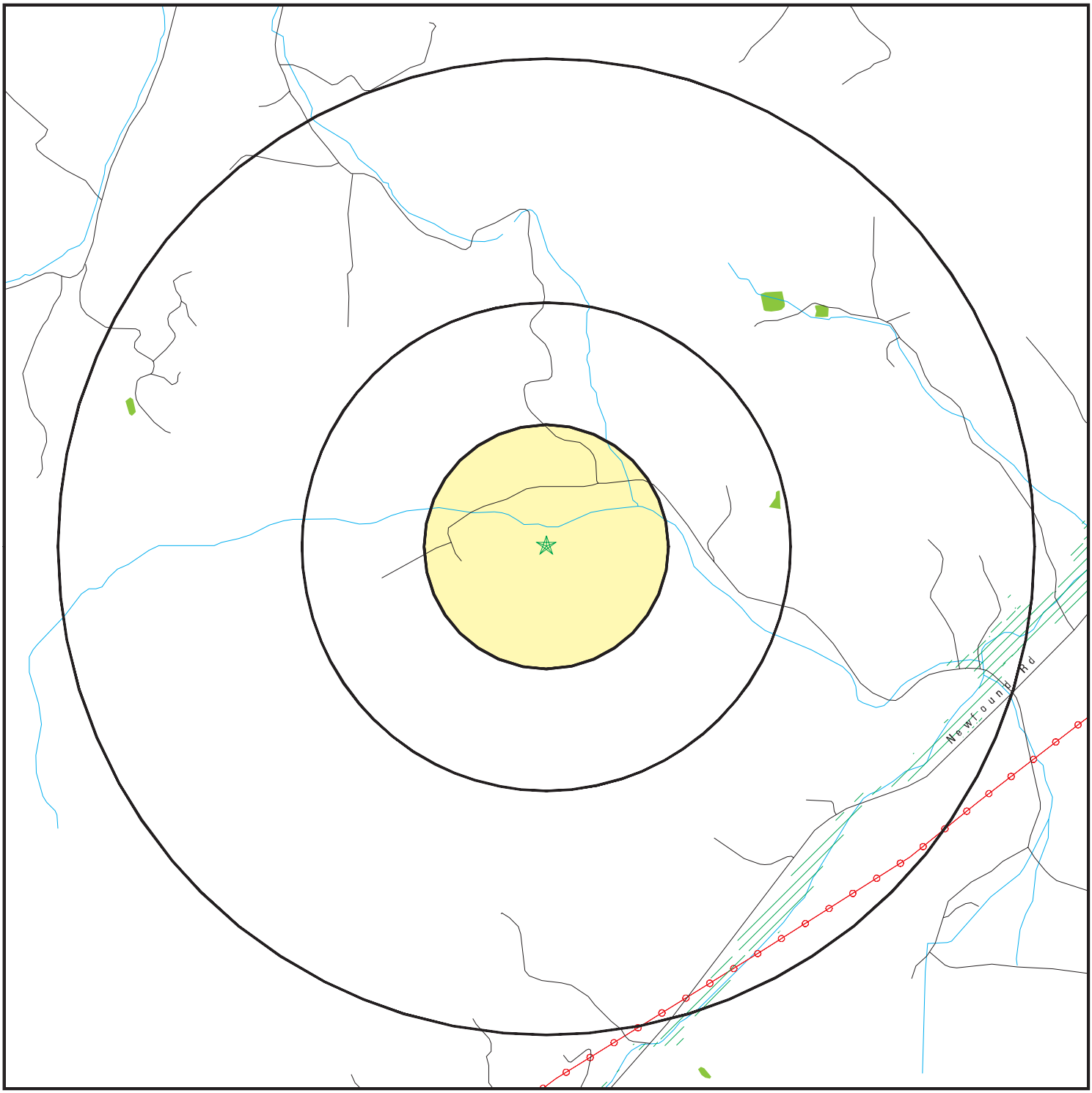
Surrounding sites were not identified.

Unmappable (orphan) sites are not considered in the foregoing analysis.

EXECUTIVE SUMMARY

There were no unmapped sites in this report.

OVERVIEW MAP - 5285012.2S



- Target Property
- Sites at elevations higher than or equal to the target property
- Sites at elevations lower than the target property
- Manufactured Gas Plants
- National Priority List Sites
- Dept. Defense Sites
- Indian Reservations BIA
- Power transmission lines
- 100-year flood zone
- 500-year flood zone
- National Wetland Inventory
- State Wetlands
- Upgradient Area
- Hazardous Substance Disposal Sites

0 1/4 1/2 1 Miles

N

This report includes Interactive Map Layers to display and/or hide map information. The legend includes only those icons for the default map view.

SITE NAME:	Morgan Branch FDP	CLIENT:	KCI Technologies, Inc.
ADDRESS:	321 Morgan Branch Road Leicester NC 28748	CONTACT:	Tim Morris
LAT/LONG:	35.608883 / 82.748921	INQUIRY #:	5285012.2s
		DATE:	May 08, 2018 10:25 am

Morgan Branch FDP

321 Morgan Branch Road

Leicester, NC 28748

Inquiry Number: 5285012.6

May 08, 2018

The EDR Aerial Photo Decade Package

6 Armstrong Road, 4th floor
Shelton, CT 06484
Toll Free: 800.352.0050
www.edrnet.com

EDR Aerial Photo Decade Package

05/08/18

Site Name:

Morgan Branch FDP
321 Morgan Branch Road
Leicester, NC 28748
EDR Inquiry # 5285012.6

Client Name:

KCI Technologies, Inc.
4601 Six Forks Road
Raleigh, NC 27609
Contact: Tim Morris

Environmental Data Resources, Inc. (EDR) Aerial Photo Decade Package is a screening tool designed to assist environmental professionals in evaluating potential liability on a target property resulting from past activities. EDR's professional researchers provide digitally reproduced historical aerial photographs, and when available, provide one photo per decade.

Search Results:

Year	*Scale*	*Details*	*Source*
2014	1"=500'	Flight Year: 2014	USDA/NAIP
2010	1"=500'	Flight Year: 2010	USDA/NAIP
2006	1"=500'	Flight Year: 2006	USDA/NAIP
1994	1"=500'	Acquisition Date: April 13, 1994	USGS/DOQQ
1985	1"=500'	Flight Date: April 10, 1985	USGS
1951	1"=500'	Flight Date: May 10, 1951	USDA

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INQUIRY #: 5285012.6
YEAR: 2014
= 500'
N
EDR


INQUIRY #: 5285012.6
YEAR: 2010
= 500'
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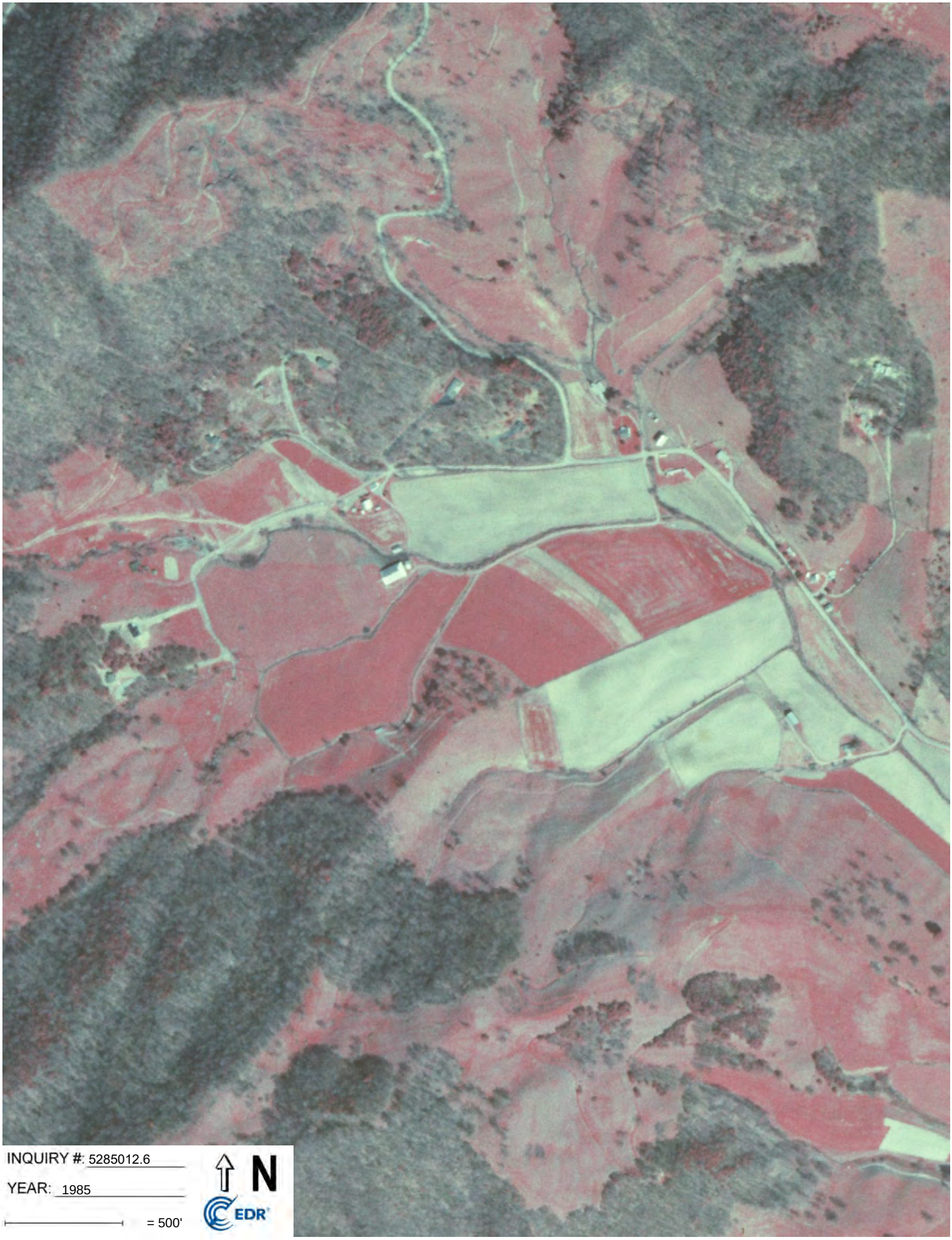
EDR


INQUIRY #: 5285012.6
YEAR: 2006
= 500'
N
EDR


INQUIRY #: 5285012.6
YEAR: 1994
= 500'
N
EDR



INQUIRY #: 5285012.6

YEAR: 1985

= 500'

N

EDR


INQUIRY #: 5285012.6
YEAR: 1951
= 500'
N
EDR

Agency Letters

KCI TECHNOLOGIES

ENGINEERS • SCIENTISTS • SURVEYORS • CONSTRUCTION MANAGERS

Landmark Center II, Suite 220 4601 Six Forks Road Raleigh, NC 27609 (919) 783-9214 (919) 783-9266 Fax

22 August 2019

Ms. Renee Gledhill-Earley
Environmental Review Coordinator
State Historic Preservation Office
4617 Mail Service Center
Raleigh, NC 27699-4617

Subject: Cultural Resources Review
Morgan Branch Restoration Site
KCI Job # 161904755

Dear Mrs. Gledhill-Earley:

On behalf of our client, the North Carolina Division of Mitigation Services (DMS), KCI Technologies, Inc. requests review and comment on any possible issues that might emerge with respect to archaeological or cultural resources associated with a potential stream and wetland restoration project on the above referenced site. The MBRS is situated in northwest of Buncombe County. The site is located approximately 3.5 miles southwest of the town of Leicester, North Carolina. Specifically, the site is on Morgan Branch Road, north west of the intersection of Morgan Branch Road and Newfound Road. The center of the site is at approximately 35.6099 N and –82.7469 W (Figure 1). The site is within the 06010105 Watershed Cataloging Unit (8-digit HUC) of the French Broad River Basin and the 14-digit HUC 06010105090020 (Figure 2). The 14-digit watershed includes a mix of agricultural (42% of land cover), forested (48% of land cover), and rural development (10% of land cover) with an overall imperviousness estimated at 1.1 percent (Figure 3). Please accept the attached information as a submittal for cultural resources review by the State Historic Preservation Office and the Office of State Archaeology.

The Morgan Branch Restoration Site (MBRS) is a candidate site for stream restoration in the French Broad River Basin in Buncombe County, North Carolina. As evidenced by historic aerial photos and site investigations, the streams at this site have been substantially modified by relocation and straightening, impacted from cattle, and other anthropogenic impacts. Restoring these streams will not only return this to a stable stream ecosystem with a functional riparian buffer, floodplain/bench access, and riparian wetlands, but will also lower the supply of sediment entering Morgan Branch and then Newfound Creek, a tributary to the French Broad River, and reduce incoming nutrients from livestock. No architectural structures or archeological artifacts have been observed or noted during preliminary surveys of the site for restoration purposes. Proposed mitigation actions are shown on Figure 4.

Please feel free to contact me at 919-278-2470 or charlie.morgan@kci.com, should you have any questions or require any further information concerning the extent of site disturbance associated with this project. Thank you in advance for your assistance.

Sincerely,

Charlie Morgan
Project Scientist

KCI TECHNOLOGIES

ENGINEERS • SCIENTISTS • SURVEYORS • CONSTRUCTION MANAGERS

Landmark Center II, Suite 220 4601 Six Forks Road Raleigh, NC 27609 (919) 783-9214 (919) 783-9266 Fax

26 August 2019

Ms. Claire Ellwanger
Endangered Species Biologist
USFWS Asheville Field Office
160 Zillicoa Street
Asheville, NC 28801

Subject: Endangered Species Act, Fish and Wildlife Coordination Act, Migratory Bird Treaty Act
Morgan Branch Restoration Site
KCI Job # 161904755

Dear Ms. Ellwanger:

Please accept this information pertaining to the above referenced stream restoration site for natural area and rare species review by the US Fish and Wildlife Service. The MBRS is situated in northwest of Buncombe County. The site is located approximately 3.5 miles southwest of the town of Leicester, North Carolina. Specifically, the site is on Morgan Branch Road, north west of the intersection of Morgan Branch Road and Newfound Road. The center of the site is at approximately 35.6099 N and –82.7469 W (Figure 1). The site is within the 06010105 Watershed Cataloging Unit (8-digit HUC) of the French Broad River Basin and the 14-digit HUC 06010105090020 (Figure 2). The 14-digit watershed includes a mix of agricultural (42% of land cover), forested (48% of land cover), and rural development (10% of land cover) with an overall imperviousness estimated at 1.1 percent (Figure 3).

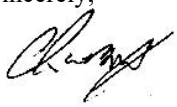
The Morgan Branch Restoration Site (MBRS) is a candidate site for stream restoration in the French Broad River Basin in Buncombe County, North Carolina. As evidenced by historic aerial photos and site investigations, the streams at this site have been substantially modified by relocation and straightening, impacted from cattle, and other anthropogenic impacts. Restoring these streams will not only return this to a stable stream ecosystem with a functional riparian buffer, floodplain/bench access, and riparian wetlands, but will also lower the supply of sediment entering Morgan Branch and then Newfound Creek, a tributary to the French Broad River, and reduce incoming nutrients from livestock. The site is currently under investigation as a stream restoration project for the North Carolina Department of Environmental Quality Division of Mitigation Services (DMS). The funding for this project comes from the USDOT Federal Highway Administration through the North Carolina Department of Transportation. Proposed mitigation actions are shown on Figure 4. This work will ensure the long term protections to the project streams and promote better agricultural practices into the future. As part of the environmental documentation process (Categorical Exclusion), coordination with the NCWRC and the USFWS is required for compliance with the Fish and Wildlife Coordination Act and the Endangered Species Act.

We have already obtained an updated species list for Buncombe County from your web site. The rare, threatened and endangered species for this county are included in Attachment 1. We are requesting that you please provide any known information for any additional species, if any, in the county that we should be aware of in the development of this project. The USFWS will be contacted if additional studies find suitable habitat for any listed species or if we determine that the project may affect one or more federally listed species or designated critical habitat. Please provide comments on any possible issues that might emerge with respect to endangered species, migratory birds or other trust resources from the construction of a stream and wetland restoration project on the subject property.

If we have not heard from you in 30 days we will assume that our species list is correct, that you do not have any comments regarding associated laws, and that you do not have any information relevant to this project at the current time.

We thank you in advance for your timely response and cooperation. Please feel free to contact us with any questions that you may have concerning the extent of site disturbance associated with this project. My phone number is 919-278-2470 and my email address is charlie.morgan@kci.com

Sincerely,



Charlie Morgan
Project Scientist

Endangered Species Review for Morgan Branch Restoration Site
Buncombe County, North Carolina

A review of the United States Fish and Wildlife Service's (USFWS) listing of federally endangered species, threatened species, species of concern and candidate species revealed fifteen endangered species, twenty-six federal species of concern, four at risk species, and one BGPA species in Buncombe County (Table 1).

Table 1. Species in Buncombe County, North Carolina listed under the federal Endangered Species Act.

Common Name	Scientific name	Federal Status	Record Status
Vertebrate:			
Allegheny woodrat	*Neotoma magister*	FSC	Current
Appalachian Bewick's wren	*Thryomanes bewickii altus*	FSC	Historic
Bachman's sparrow	*Aimophila aestivalis*	FSC	Historic
Blotchside logperch	*Percina burtoni*	FSC	Historic
Bog turtle	*Glyptemys muhlenbergii*	T (S/A)	Current
Carolina northern flying squirrel	*Glaucomys sabrinus coloratus*	E	Current
Cerulean warbler	*Dendroica cerulea*	FSC	Current
Eastern small-footed bat	*Myotis leibii*	ARS	Current
Gray bat	*Myotis grisescens*	E	Current
Hellbender	*Cryptobranchus alleganiensis*	ARS	Current
Longhead darter	*Percina macrocephala*	FSC	Historic
Northern long-eared bat	*Myotis septentrionalis*	T	Current
Northern saw-whet owl (Southern Appalachian population)	*Aegolius acadicus* pop. *1*	FSC	Current
Paddlefish	*Polyodon spathula*	FSC	Historic
Pygmy salamander	*Desmognathus wrighti*	FSC	Current
Rafinesque's big-eared bat	*Corynorhinus rafinesquii*	FSC	Historic
Red crossbill (Southern Appalachian)	*Loxia curvirostra*	FSC	Current
Southern Appalachian black-capped chickadee	*Poecile atricapillus practicus*	FSC	Historic
Southern water shrew	*Sorex palustris punctulatus*	FSC	Current
Spotfin chub (=turquise shiner)	*Erimonax monachus*	T	Historic
Yellow-bellied sapsucker (Southern Appalachian population)	*Sphyrapicus varius appalachiensis*	FSC	Current
Invertebrate:			
Appalachian elktoe	*Alasmidonta raveneliana*	E	Current
French Broad crayfish	*Cambarus reburrus*	FSC	Current
Rusty-patched bumble bee	*Bombus affinis*	E	Historic
Southern Tawny Crescent butterfly	*Phyciodes batesii maconensis*	FSC	Historic
Spruce-fir moss spider	*Microhexura montivaga*	E	Current
Tan riffleshell	*Epioblasma florentina walkeri* (=E. *walkeri)*	E	Historic and Obscure
Vascular Plant:			
Blue Ridge Goldenrod	*Solidago spithamaea*	T	Current
Blue Ridge Ragwort	*Packera millefolium*	FSC	Current
Bunched arrowhead	*Sagittaria fasciculata*	E	Historic
Butternut	*Juglans cinerea*	FSC	Historic

Cain's reedgrass	*Calamagrostis cainii*	FSC	Current
Fraser fir	*Abies fraseri*	FSC	Current
Fraser's loosestrife	*Lysimachia fraseri*	FSC	Historic
French Broad heartleaf	*Hexastylis rhombiformis*	FSC	Current
Gray's lily	*Lilium grayi*	FSC	Current
Granite Dome Goldenrod	*Solidago simulans*	FSC	Current
Mountain Sweet Pitcherplant	*Sarracenia rubra ssp. Jonesii*	E	Current
Piratebush	*Buckleya distichophylla*	FSC	Current
Spreading avens	*Geum radiatum*	E	Current
Virginia spiraea	*Spiraea virginiana*	T	Historic
Nonvascular Plant:			
a liverwort	*Plagiochila sharpii*	ARS	Current
a liverwort	*Plagiochila virginica var. caroliniana*	FSC	Current
Appalachian Pocket Moss	*Fissidens appalachiensis*	ARS	Historic
Lichen:			
Rock gnome lichen	*Gymnoderma lineare*	E	Current

Appalachian elktoe
Habitat Description: The Appalachian elktoe is known from the French Broad River watershed in North Carolina. The Appalachian elktoe has been observed in moderate- to fast-flowing water, in gravelly substrates often mixed with cobble and boulders, in cracks of bedrock and in relatively silt-free, coarse, sandy substrates. Apparently, stability of the substrate is critical to this species, as it is seldom found in stream reaches with accumulations of silt or shifting sand, gravel, or cobble.

Biological Conclusion: No Effect
The project streams have been severely impacted by agricultural practices, ditching, incision, and sediment deposition. They are not appropriate habitat for Appalachian elktoe. Additionally, NCNHP records does not indicate any populations within one mile of the project.

Bog turtle
Habitat Description: Bog turtle habitat consists of open, groundwater supplied (springfed), graminoid dominated wetlands along riparian corridors or on seepage slopes. These habitats are designated as mountain bogs by the NCNHP, but they are technically poor, moderate, or rich fens that may be associated with wet pastures and old drainage ditches that have saturated muddy substrates with open canopies. Plants found in bog turtle habitat include sedges, rushes, marsh ferns, herbs, shrubs (tag alder, hardhack, blueberry, etc.), and wetland tree species (red maple and silky willow). These habitats often support sphagnum moss and may contain carnivorous plants (sundews and pitcherplants) and rare orchids. Potential habitats may be found in western Piedmont and Mountain counties from 700 to 4500 feet elevation in North Carolina. Soil types (poorly drained silt loams) from which bog turtle habitats have been found include Arkaqua, Chewacla, Dellwood, Codorus complex, Hatboro, Nikwasi, Potomac – Iotla complex, Reddies, Rosman, Tate – Cullowhee complex, Toxaway, Tuckasegee – Cullasaja complex, Tusquitee, Watauga, and Wehadkee.

Biological Conclusion: Not Required
Species listed as threatened due to similarity of appearance do not require Section 7 consultation with the USFWS. No bog turtles were observed during field activities. Additionally, NCNHP records does not indicate any populations within one mile of the project.

Tan riffleshell
Habitat Description: Historic occurrences of the tan riffleshell are known from the French Broad and Hiawassee Rivers in North Carolina. Currently, the only known viable population of this species is located in Tazwell County, Virginia. Individuals are typically found in headwaters, riffles, and shoals in sand and gravel substrates.

Biological Conclusion: No Effect
The project streams have been severely impacted by agricultural practices, ditching, incision, and sediment deposition. They are not appropriate habitat for tan riffleshell. Additionally, NCNHP records does not indicate any populations within one mile of the project.

Spotfin chub (= turquoise shiner)
Habitat Description: The spotfin chub occurs in the Little Tennessee River drainage system. This minnow typically inhabits moderate to large streams, 49-230 feet in width. However, they have been documented utilizing smaller tributaries in the fall. These streams should have a good current, clear water, cool to warm temperatures, and pools alternating with riffles. Specimens of spotfin chub have been taken from a variety of substrates but rarely from significantly silted substrates. This species has been observed spawning under loose rocks over bedrock.

Biological Conclusion: No Effect
The USFWS lists the spotfin chub as threatened in Buncombe County based on historical records. The spotfin chub is currently only known to occur in the Little Tennessee River drainage system. The project is not within the Little Tennessee River drainage and therefore outside the current range of the species. Additionally, NCNHP records does not indicate any populations within one mile of the project.

Spreading avens

Habitat Description: Spreading avens occurs in areas exposed to full sun on high elevation cliffs, outcrops, and bases of steep talus slopes. This perennial herb also occurs in thin, gravelly soils of grassy balds near summit outcrops. The species prefers a northwest aspect, but can be found on west-southwest through north-northeast aspects. Forests surrounding known occurrences are generally dominated by either red spruce Fraser fir, northern hardwoods with scattered spruce, or high-elevation red oaks. Spreading avens typically occurs in shallow, acidic soil (such as the Burton series) in cracks and crevices of igneous, metamorphic, or metasedimentary rocks. Soils may be well drained but almost continuously wet, with soils at some known occurrences subject to drying out in summer due to exposure to sun and shallow depths. Known populations occur at elevations ranging from 4,296 to 6,268 feet above mean sea level. Blue Ridge goldenrod, Heller's blazing star, and Roan Mountain bluet are a few of its common associate species.

Biological Conclusion: No Effect
There is no suitable habitat for spreading avens within the study area. There are no areas exposed to full sunlight at or above 4,200 feet above mean sea level within the study area. Elevations in the study area do not exceed 2,500 feet above mean sea level. Additionally, NCNHP records does not indicate any populations within one mile of the project.

Carolina Northern flying squirrel
Habitat Description: There are several isolated populations of the Carolina Northern flying squirrel in the mountains of North Carolina. This nocturnal squirrel prefers the ecotone between coniferous (red spruce, Fraser fir, or hemlock) and mature northern hardwood forests (beech, yellow birch, maple, hemlock, red oak, and buckeye), typically at elevations above 4,500 feet mean sea level. In some instances, the squirrels may be found on narrow, north-facing valleys above 4,000 feet mean sea level. Both forest types are used to search for food and the hardwood forest is used for nesting sites. Mature forests with a thick evergreen understory and numerous snags are most preferable. In winter, squirrels inhabit tree cavities in older hardwoods, particularly yellow birch.

Biological Conclusion: No Effect
Suitable habitat for the Carolina northern flying squirrel does not exist within the study area. Elevations in the study area do not exceed 2,500 feet above mean sea level. Additionally, NCNHP records does not indicate any populations within one mile of the project.

Rock gnome lichen
Habitat Description: Rock gnome lichen occurs in high elevation coniferous forest (particularly those dominated by red spruce and Fraser fir) usually on rocky outcrop or cliff habitats. This squamulose lichen only grows in areas with a great deal of humidity, such as high elevations above 5,000 feet mean sea level where there is often fog, or on boulders and large outcrops in deep river gorges at lower elevations. Habitat is primarily limited to vertical rock faces where seepage water from forest soils above flows only at very wet times. The species requires a moderate amount of sunlight, but cannot tolerate high-intensity solar radiation. The lichen does well on moist, generally open sites with northern exposures, but requires at least partial canopy coverage on southern or western aspects because of its intolerance to high solar radiation.

Biological Conclusion: No Effect
Suitable habitat for the rock gnome lichen does not exist within the study area. There are no rocky outcrops or cliff habitats with a great deal of humidity and seepage that flows only during wet periods. Elevations in the study area do not exceed 2,500feet above mean sea level. Additionally, NCNHP records does not indicate any populations within one mile of the project.

Rusty-patched bumble bee
Habitat Description: Rusty-patched bumble bees once occupied grasslands and tallgrass prairies of the Upper Midwest and Northeast, but most grasslands and prairies have been lost, degraded, or fragmented by conversion to other uses. Bumble bees need areas that provide nectar and pollen from flowers, nesting sites (underground and abandoned rodent cavities or clumps of grasses), and overwintering sites for hibernating queens (undisturbed soil). Bumble bees gather pollen and nectar from a variety of flowering plants. The rusty-patched emerges early in spring and is one of the last species to go into hibernation. It needs a constant supply and diversity of flowers blooming throughout the colony's long life, April through September.
Biological Conclusion: No Effect

Suitable habitat for the rusty-patched bumble bee does not occur in the study area. The USFWS has categorized Buncombe County as historical range for potential rusty-patched bumble bee with a historical record last seen before 2000. Based off the USFWS Survey Protocols, paved areas; mowed lawns; areas planted to annual row crops; forest where invasive shrubs are dominant and spring ephemeral flowers are absent; and areas mowed too frequently to allow development of diverse wildflower resources are not suitable habitat for the rusty-patched bumble bee. The project area is mostly hayfields and areas grazed by cattle. Additionally, NCNHP records does not indicate any populations within one mile of the project.

Spruce-fir moss spider

Habitat Description: This species is known only from spruce-fir forests in the
Appalachian mountains of North Carolina and Tennessee. The spruce-fir moss spider occurs in well-drained moss and liverwort mats growing on rocks or boulders. These mats are found in well-shaded areas in mature, high elevation ($\geq$ 5,000 feet mean sea level) Fraser fir and red spruce forests. The spruce-fir moss spider is very sensitive to desiccation and requires environments of high and constant humidity. The need for humidity relates to the moss mats, which cannot become too parched or else the mats become dry and loose. Likewise, the moss mats cannot be too wet because large drops of water can also pose a threat to the spider. The spider constructs its tube-shaped webs in the interface between the moss mat and the rock surface. Some webs have been found to extend into the interior of the moss mat.

Biological Conclusion: No Effect
Suitable habitat for the spruce-fir moss spider does not exist within the study area. Elevations in the study area do not exceed 2,500 feet above mean sea level. Additionally, NCNHP records does not indicate any populations within one mile of the project.

Gray bat

Habitat Description: Gray bats are known mainly from the cave regions of the Southeast and Midwest. They live in colonies in caves, utilizing different caves for summer roosting and winter hibernating. Summer caves are usually within one half mile
of a river or reservoir, which provides foraging habitat. During the summer, females give birth and rear the young in maternity caves, while males and yearlings roost in separate bachelor caves. Caves preferred for hibernation are typically deep, vertical caves with a temperature between 42 and 52 degrees Fahrenheit. Gray bats are highly selective in choosing suitable caves, and nine known caves are thought to provide hibernation space for 95 percent of the population. Migration from summer to winter caves begins in September and is mainly complete by the beginning of November.

Biological Conclusion: No Effect
The project area has been heavily impacted by agricultural activities. No roosting habitat was found. Additionally, NCNHP records does not indicate any populations within one mile of the project.

Bunched arrowhead

Habitat Description: Bunched arrowhead, endemic to the southern Appalachian
Mountains of North Carolina and upper Piedmont of South Carolina, is rooted in shallow water seepage areas of bogs, wooded swamps, and deciduous woodlands. This early-successional perennial herb occurs in Swamp Forest-Bog Complex (Typic Subtype) and Southern Appalachian Bog (Southern Subtype) natural communities. A known occurrence also occurs in a maintained power line right-of-way along the headwaters of a river. The plant requires a slight but continuous and steady flow of cool, clean water that saturates or floods but does not stagnate. The species typically occurs in sandy loam soils found underneath a 10-24 inch deep layer of muck, sand, and silt. Undisturbed occurrences are usually located just below the origin of the seep on gently sloping terrain at the bluff-floodplain ecotone. While shaded areas contain the most vigorous plants, it will also grow in either full sun or partial shade beneath red maple, black gum, and alder at the base of steep slopes.

Biological Conclusion: No Effect
Suitable habitat for the bunched arrowhead exists in the project study area including a
few wetland seeps in the stream preservation areas. This is a stream restoration project, and areas of potential bunched arrowhead habitat will not be impacted. Additionally, NCNHP records does not indicate any populations within one mile of the project.

Mountain sweet pitcher plant
Habitat Description: Mountain sweet pitcher plant, endemic to the Blue Ridge
Mountains of North and South Carolina, is found along stream banks and in shrub/herb dominated, seepage-fed mountain bogs (Southern Appalachian Bog-Southern Subtype). Both stream bank and bog habitats are usually situated along intermittently exposed to intermittently flooded level depressions associated with valley floodplains. These habitats, typically on soils of the Toxaway or Hatboro series, contain deep, poorly drained, saturated soils of loam, sand, and silt with a high organic matter content and medium to high acidity. A few occurrences of the pitcher plant also grow in cataract bogs, either in thin strips along the edges of waterfalls or on soil islands over granite rock faces, where sphagnum and other bog plant species line the sides. This early successional species relies on natural disturbance (e.g., drought, water fluctuation, periodic fire, ice damage) to maintain its habitat by preventing the establishment of later successional woody seedlings.

Biological Conclusion: No Effect
Suitable habitat for the mountain sweet pitcher plant exists in the project study area including a few wetland seeps in the stream preservation areas. This is a stream restoration project, and areas of potential mountain sweet pitcher plant habitat will not be impacted. Additionally, NCNHP records does not indicate any populations within one mile of the project.

Northern long-eared bat
Habitat Description: In North Carolina, the northern long-eared bat (NLEB) occurs in the mountains, with scattered records in the piedmont and coastal plain. In western North Carolina, NLEB spend winter hibernating in caves and mines. During the summer, NLEB roosts singly or in colonies underneath bark, in cavities, or in crevices of both live and\ dead trees (typically ≥3 inches dbh). Males and non-reproductive females may also roost in cooler places, like caves and mines. This bat has also been found, rarely, roosting in strfuctures like barns and sheds, under eaves of buildings, behind window shutters, in bridges, and in bat houses. Foraging occurs on forested hillsides and ridges, and occasionally over forest clearings, over water, and along tree-lined corridors. Mature forests may be an important habitat type for foraging.

Blue Ridge goldenrod
Habitat Description: Blue Ridge goldenrod, endemic to the Appalachian Mountains of
North Carolina and Tennessee, occurs in the High Elevation Rocky Summit natural
community generally at or above elevations of 4,600 feet above mean sea level along cliffs, ledges, balds, and dry rock crevices of granite outcrops of the higher mountain peaks. This early pioneer herb usually grows in full sun on generally acidic soils of shallow humus or clay loams that are intermittently saturated. The encroachment of woody vegetation such as ericaceous shrubs can eliminate the goldenrod through competition and shading. Roan Mountain bluet, Heller's blazing star, and spreading avens are a few of its common associate species.

Biological Conclusion: No Effect
Suitable habitat for the Blue Ridge goldenrod does not exist within the study area. There are no rocky outcrops or cliff habitats generally at or above elevations of 4,600 feet above mean sea level in the study area. Elevations in the study area do not exceed 2,500 feet above mean sea level. Additionally, NCNHP records does not indicate any populations within one mile of the project.

Virginia spiraea
Habitat Description: Virginia spiraea occurs in flood-scoured, high-gradient sections of
rocky river banks of second and third order streams, often in gorges or canyons. This perennial shrub grows in sunny areas on moist, acidic soils, primarily over sandstone. The shrub tends to be found in thickets with little arboreal or herbaceous competition along early successional areas that rely on periodic disturbances such as high-velocity scouring floods to eliminate such competition. Virginia spiraea also occurs on meander scrolls and point bars, natural levees, and other braided features of lower stream reaches, often near the stream mouth. Scoured, riverine habitat sites are found where deposition occurs after high water flows, such as on floodplains and overwash islands, rather

than along areas of maximum erosion. Occurrences in depositional habitats are found among riparian debris piles, on fine alluvial sand and other alluvial deposits, or between boulders.

Biological Conclusion: No Effect
Suitable habitat for the Virginia spiraea does not exists in the project study area. Morgan branch is the only stream large enough to be considered habitat, and it has been heavily impacted by agricultural activities. Additionally, NCNHP records does not indicate any populations within one mile of the project.

Bald Eagle
Habitat Description: Bald Eagles live near rivers, lakes, and marshes where they can find fish, their staple food. Bald Eagles will also feed on waterfowl, turtles, rabbits, snakes, and other small animals and carrion. Bald Eagles require a good food base, perching areas, and nesting sites. Their habitat includes estuaries, large lakes, reservoirs, rivers, and some seacoasts. In winter, the birds congregate near open water in tall trees for spotting prey and night roosts for sheltering.

Biological Conclusion: No Effect
There are no large bodies of water near the project to provide preferred forage for the bald eagle.

Reference:

NCDEQ, Wildlife Resources Commission. 2018. Carolina Wildlife Profiles. http://www.ncwildlife.org/fs_index_07_conservation.htm

NCDEQ, Natural Heritage Program. 2018. Natural Heritage Data Explorer. https://ncnhde.natureserve.org/

United States Fish and Wildlife Service. 2018. Buncombe County Threatened and Endangered Species. https://www.fws.gov/raleigh/species/cntylist/chatham.html.

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.): FHWA, Donnie Brew, Donnie.brew@dot.gov

Project Name: Morgan Branch Restoration Site

Project Location (include coordinates if known): 35.6095 N, -82.7522 W

Basic Project Description (provide narrative below or attach additional information): The Morgan Branch Restoration Site (MBRS) is a full delivery project for stream restoration in the French Broad River Basin in Buncombe County, North Carolina. As evidenced by historic aerial photos and site investigations, the streams at this site have been substantially modified by relocation and straightening, impacted from cattle, and other anthropogenic impacts. Restoring these streams will not only return this to a stable stream ecosystem with a functional riparian buffer, floodplain/bench access, and riparian wetlands, but will also

[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.

lower the supply of sediment entering Morgan Branch and then Newfound Creek, a tributary to the French Broad River, and reduce incoming nutrients from livestock.

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	0.25	
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)		

Agency Determination:

By signing this form, the action agency determines that this project may affect the NLEB, but that any resulting incidental take of the NLEB is not prohibited by the final 4(d) rule.

If the USFWS does not respond within 30 days from submittal of this form, the action agency may presume that its determination is informed by the best available information and that its project responsibilities under 7(a)(2) with respect to the NLEB are fulfilled through the USFWS January 5, 2016, Programmatic BO. The action agency will update this determination annually for multi-year activities.

The action agency understands that the USFWS presumes that all activities are implemented as described herein. The action agency will promptly report any departures from the described activities to the appropriate USFWS Field Office. The action agency will provide the appropriate USFWS Field Office with the results of any surveys conducted for the NLEB. Involved parties will promptly notify the appropriate USFWS Field Office upon finding a dead, injured, or sick NLEB.

Signature: Donald W Brew Date Submitted: 3-16-20

[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.

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Landmark Center II, Suite 220 4601 Six Forks Road Raleigh, NC 27609 (919) 783-9214 (919) 783-9266 Fax

22 August 2019

Mr. Milton Cortes
Assistant State Soil Scientist
USDA Natural Resource Conservation Service
4407 Bland Rd., Suite 117
Raleigh, NC 27609

Subject: Farmland Conversion Impact Rating
Morgan Branch Restoration Site
KCI Job # 161904755

Dear Mr. Cortes:

The purpose of this letter is to inform NRCS of our contractual intent to complete a stream restoration project on the property above referenced property. This work is expected to occur over the course of the next year. The MBRS is situated in northwest of Buncombe County. The site is located approximately 3.5 miles southwest of the town of Leicester, North Carolina. Specifically, the site is on Morgan Branch Road, north west of the intersection of Morgan Branch Road and Newfound Road. The center of the site is at approximately 35.6099 N and –82.7469 W (Figure 1). The site is within the 06010105 Watershed Cataloging Unit (8-digit HUC) of the French Broad River Basin and the 14-digit HUC 06010105090020 (Figure 2). The 14-digit watershed includes a mix of agricultural (42% of land cover), forested (48% of land cover), and rural development (10% of land cover) with an overall imperviousness estimated at 1.1 percent (Figure 3).

The Morgan Branch Restoration Site (MBRS) is a candidate site for stream restoration in the French Broad River Basin in Buncombe County, North Carolina. As evidenced by historic aerial photos and site investigations, the streams at this site have been substantially modified by relocation and straightening, impacted from cattle, and other anthropogenic impacts. Restoring these streams will not only return this to a stable stream ecosystem with a functional riparian buffer, floodplain/bench access, and riparian wetlands, but will also lower the supply of sediment entering Morgan Branch and then Newfound Creek, a tributary to the French Broad River, and reduce incoming nutrients from livestock. The site is currently under investigation as a stream restoration project for the North Carolina Department of Environmental Quality Division of Mitigation Services (DMS). The funding for this project comes from the USDOT Federal Highway Administration through the North Carolina Department of Transportation. Proposed mitigation actions are shown on Figure 4. This work will ensure the long term protections to the project streams and promote better agricultural practices into the future.

Following the review of the included documentation, please provide a determination regarding any potential impacts from farmland conversion associated with this project. Included is the Farmland Conversion Impact Rating Form (AD-1006) and a soil map with the breakdown of soil type and acreage; please complete Parts II, IV and V. Feel free to contact me at charlie.morgan@kci.com, or 919-278-2470, should you have any questions or require any further information concerning the extent of site disturbance associated with this project. Thank you in advance for your assistance.

Sincerely,

Charlie Morgan
Project Scientist

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Landmark Center II, Suite 220 4601 Six Forks Road Raleigh, NC 27609 (919) 783-9214 (919) 783-9266 Fax

22 August 2019

Ms. Shannon Deaton
Habitat Conservation Program Manager
NC Wildlife Resources Commission, Division of Inland Fisheries
1721 Mail Service Center
Raleigh, NC 27699-1721

Subject: Fish and Wildlife Coordination Act
Morgan Branch Restoration Site
KCI Job # 161904755

Dear Ms. Deaton

The purpose of this letter is to request review and comment from the NC Wildlife Resources Commission with respect to potential fish and wildlife impacts associated with the above referenced project. The MBRS is situated in northwest of Buncombe County. The site is located approximately 3.5 miles southwest of the town of Leicester, North Carolina. Specifically, the site is on Morgan Branch Road, north west of the intersection of Morgan Branch Road and Newfound Road. The center of the site is at approximately 35.6099 N and –82.7469 W (Figure 1). The site is within the 06010105 Watershed Cataloging Unit (8-digit HUC) of the French Broad River Basin and the 14-digit HUC 06010105090020 (Figure 2). The 14-digit watershed includes a mix of agricultural (42% of land cover), forested (48% of land cover), and rural development (10% of land cover) with an overall imperviousness estimated at 1.1 percent (Figure 3).

The Morgan Branch Restoration Site (MBRS) is a candidate site for stream restoration in the French Broad River Basin in Buncombe County, North Carolina. As evidenced by historic aerial photos and site investigations, the streams at this site have been substantially modified by relocation and straightening, impacted from cattle, and other anthropogenic impacts. Restoring these streams will not only return this to a stable stream ecosystem with a functional riparian buffer, floodplain/bench access, and riparian wetlands, but will also lower the supply of sediment entering Morgan Branch and then Newfound Creek, a tributary to the French Broad River, and reduce incoming nutrients from livestock. The site is currently under investigation as a stream restoration project for the North Carolina Department of Environmental Quality Division of Mitigation Services (DMS). The funding for this project comes from the USDOT Federal Highway Administration through the North Carolina Department of Transportation. Proposed mitigation actions are shown on Figure 4. This work will ensure the long term protections to the project streams and promote better agricultural practices into the future. As part of the environmental documentation process (Categorical Exclusion), coordination with the NCWRC and the USFWS is required for compliance with the Fish and Wildlife Coordination Act and the Endangered Species Act.

Following the review of the included documentation, please provide a determination of the potential effects to wildlife associated with this project. Please feel free to contact me at charlie.morgan@kci.com, or 919-278-2470, should you have any questions or require any further information concerning the extent of site disturbance associated with this project. Thank you in advance for your assistance.

Sincerely,

Charlie Morgan
Project Scientist

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Landmark Center II, Suite 220 4601 Six Forks Road Raleigh, NC 27609 (919) 783-9214 (919) 783-9266 Fax

21 August 2019

William L. Esser IV
9715 Kerns Road
Huntersville, NC 28078

Subject: Notification of Uniform Act Provisions
KCI Job Number – 161904755

Dear Mr. Esser IV:

As part of the environmental documentation process in preparation for the stream and wetland restoration project on your property, this letter is to inform you of provisions in the Federal Highway Administration Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, as amended, referred to as the Uniform Act.

The Uniform Act was developed to provide for uniform and equitable treatment of persons displaced from their homes, businesses, non-profit associations, or farms by federal and federally-assisted programs, and establishes uniform and equitable land acquisition policies. The Act assures that such persons are treated fairly, consistently, and equitably, and so that they will not suffer disproportionate injuries.

This act applies to any project which utilizes federal funds for the purchase of any interest in real property, including conservation easements. A portion of the funding for this project is ultimately provided by the US Department of Transportation, through the NC Department of Transportation for in-kind mitigation to offset impacts from transportation projects in the area, and therefore we are required to inform you of the following provisions.

The provisions of this act require that we inform you in writing that this conservation easement transaction is voluntary and that the project is being developed by KCI for the North Carolina Division of Mitigation Services (NCDMS), and as a result, KCI or NCDMS does not have the authority to acquire the property by eminent domain in the event negotiations fail to reach an amicable agreement. In addition, the Act requires that we indicate the agreed purchase price of $26,000.00 per acre.

This letter is for your information, and no response is necessary. Please feel free to contact me at 919-278-2470 or charlie.morgan@kci.com, should you have any questions or require any further information.

Sincerely,

Charlie Morgan
Project Scientist

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Landmark Center II, Suite 220 4601 Six Forks Road Raleigh, NC 27609 (919) 783-9214 (919) 783-9266 Fax

21 August 2019

Stephan Esser
186 N. Roscoe Blvd
Ponte Verde, FL 32082

Subject: Notification of Uniform Act Provisions
KCI Job Number – 161904755

Dear Mr. Esser:

As part of the environmental documentation process in preparation for the stream and wetland restoration project on your property, this letter is to inform you of provisions in the Federal Highway Administration Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, as amended, referred to as the Uniform Act.

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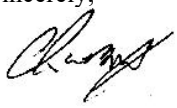

Charlie Morgan
Project Scientist

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21 August 2019

Douglas M. Keefer and Nelle H. Gregory
23 Success Ave
Ashville, NC 28806

Subject: Notification of Uniform Act Provisions
KCI Job Number – 161904755

Dear Mr. Keefer and Mrs. Gregory:

As part of the environmental documentation process in preparation for the stream and wetland restoration project on your property, this letter is to inform you of provisions in the Federal Highway Administration Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, as amended, referred to as the Uniform Act.

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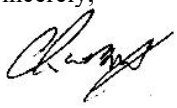

Charlie Morgan
Project Scientist

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21 August 2019

Christopher and Susan McGrath
315 Morgan Branch Road
Leicester, NC 28748

Subject: Notification of Uniform Act Provisions
KCI Job Number – 161904755

Dear Mr. and Mrs. McGrath:

As part of the environmental documentation process in preparation for the stream and wetland restoration project on your property, this letter is to inform you of provisions in the Federal Highway Administration Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, as amended, referred to as the Uniform Act.

The Uniform Act was developed to provide for uniform and equitable treatment of persons displaced from their homes, businesses, non-profit associations, or farms by federal and federally-assisted programs, and establishes uniform and equitable land acquisition policies. The Act assures that such persons are treated fairly, consistently, and equitably, and so that they will not suffer disproportionate injuries.

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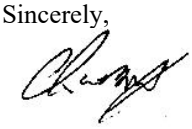

Charlie Morgan
Project Scientist

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21 August 2019

Franklin Dale Morgan and Joyce C. Morgan
1281 Newfound Road
Leicester, NC 28748

Subject: Notification of Uniform Act Provisions
KCI Job Number – 161904755

Dear Mr. and Mrs. Morgan:

As part of the environmental documentation process in preparation for the stream and wetland restoration project on your property, this letter is to inform you of provisions in the Federal Highway Administration Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, as amended, referred to as the Uniform Act.

The Uniform Act was developed to provide for uniform and equitable treatment of persons displaced from their homes, businesses, non-profit associations, or farms by federal and federally-assisted programs, and establishes uniform and equitable land acquisition policies. The Act assures that such persons are treated fairly, consistently, and equitably, and so that they will not suffer disproportionate injuries.

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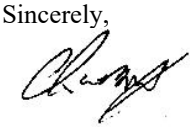

Charlie Morgan
Project Scientist

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21 August 2019

Martin C. Morgan
75 Morgan Branch Road
Leicester, NC 28748

Subject: Notification of Uniform Act Provisions
KCI Job Number – 161904755

Dear Mr. Morgan:

As part of the environmental documentation process in preparation for the stream and wetland restoration project on your property, this letter is to inform you of provisions in the Federal Highway Administration Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, as amended, referred to as the Uniform Act.

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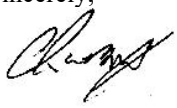

Charlie Morgan
Project Scientist

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21 August 2019

Neal A. Morgan and Ava M. Morgan
321 Morgan Branch Road
Leicester, NC 28748

Subject: Notification of Uniform Act Provisions
KCI Job Number – 161904755

Dear Mr. and Mrs. Morgan:

As part of the environmental documentation process in preparation for the stream and wetland restoration project on your property, this letter is to inform you of provisions in the Federal Highway Administration Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, as amended, referred to as the Uniform Act.

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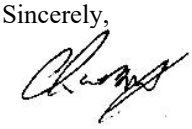

Charlie Morgan
Project Scientist

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21 August 2019

Hillary Esser Ringle
4462 Coconut Rd
Lake Worth, FL 33461

Subject: Notification of Uniform Act Provisions
KCI Job Number – 161904755

Dear Ms. Ringle:

As part of the environmental documentation process in preparation for the stream and wetland restoration project on your property, this letter is to inform you of provisions in the Federal Highway Administration Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, as amended, referred to as the Uniform Act.

The Uniform Act was developed to provide for uniform and equitable treatment of persons displaced from their homes, businesses, non-profit associations, or farms by federal and federally-assisted programs, and establishes uniform and equitable land acquisition policies. The Act assures that such persons are treated fairly, consistently, and equitably, and so that they will not suffer disproportionate injuries.

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This letter is for your information, and no response is necessary. Please feel free to contact me at 919-278-2470 or charlie.morgan@kci.com, should you have any questions or require any further information.

Sincerely,

Charlie Morgan
Project Scientist

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Landmark Center II, Suite 220 4601 Six Forks Road Raleigh, NC 27609 (919) 783-9214 (919) 783-9266 Fax

21 August 2019

Elizabeth Sossamon
45 Sunny Acres Ln
Leicester, NC 28748

Subject: Notification of Uniform Act Provisions
KCI Job Number – 161904755

Dear Ms. Sossamon:

As part of the environmental documentation process in preparation for the stream and wetland restoration project on your property, this letter is to inform you of provisions in the Federal Highway Administration Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, as amended, referred to as the Uniform Act.

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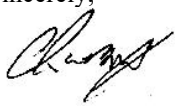
This letter is for your information, and no response is necessary. Please feel free to contact me at 919-278-2470 or charlie.morgan@kci.com, should you have any questions or require any further information.

Sincerely,



Charlie Morgan
Project Scientist

Letter References

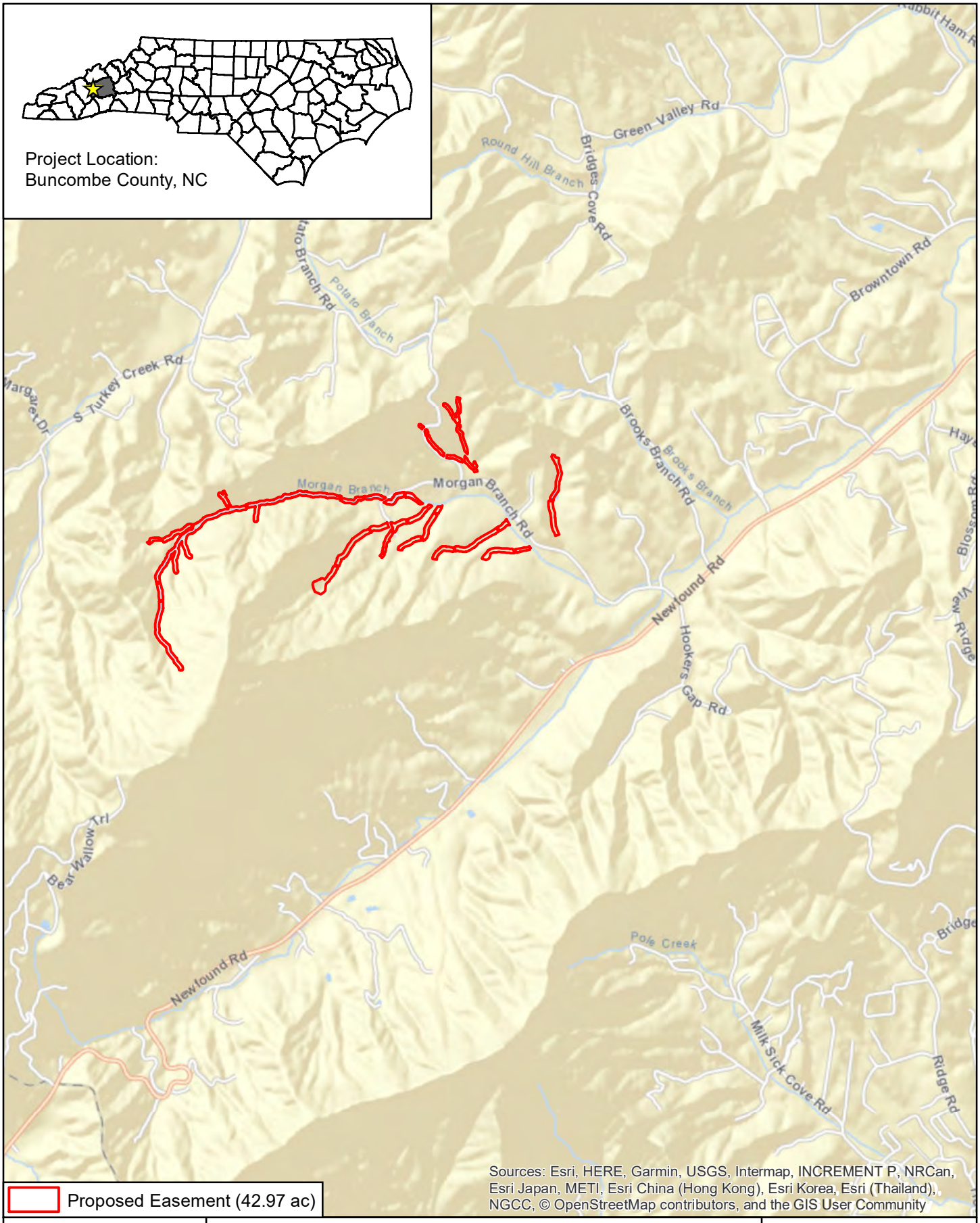


FIGURE 1. PROJECT SITE VICINITY MAP
MORGAN BRANCH RESTORATION SITE
BUNCOMBE COUNTY, NC

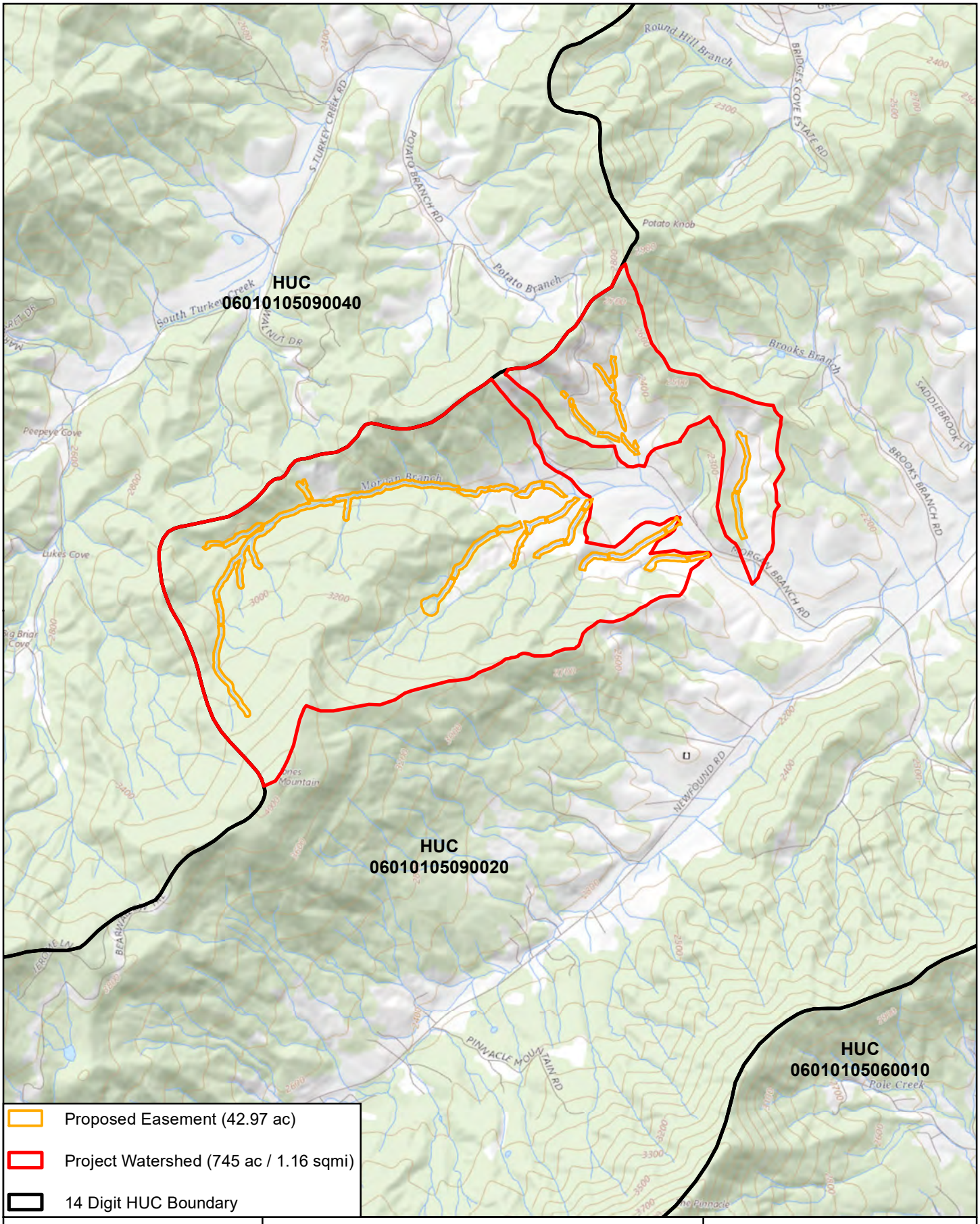
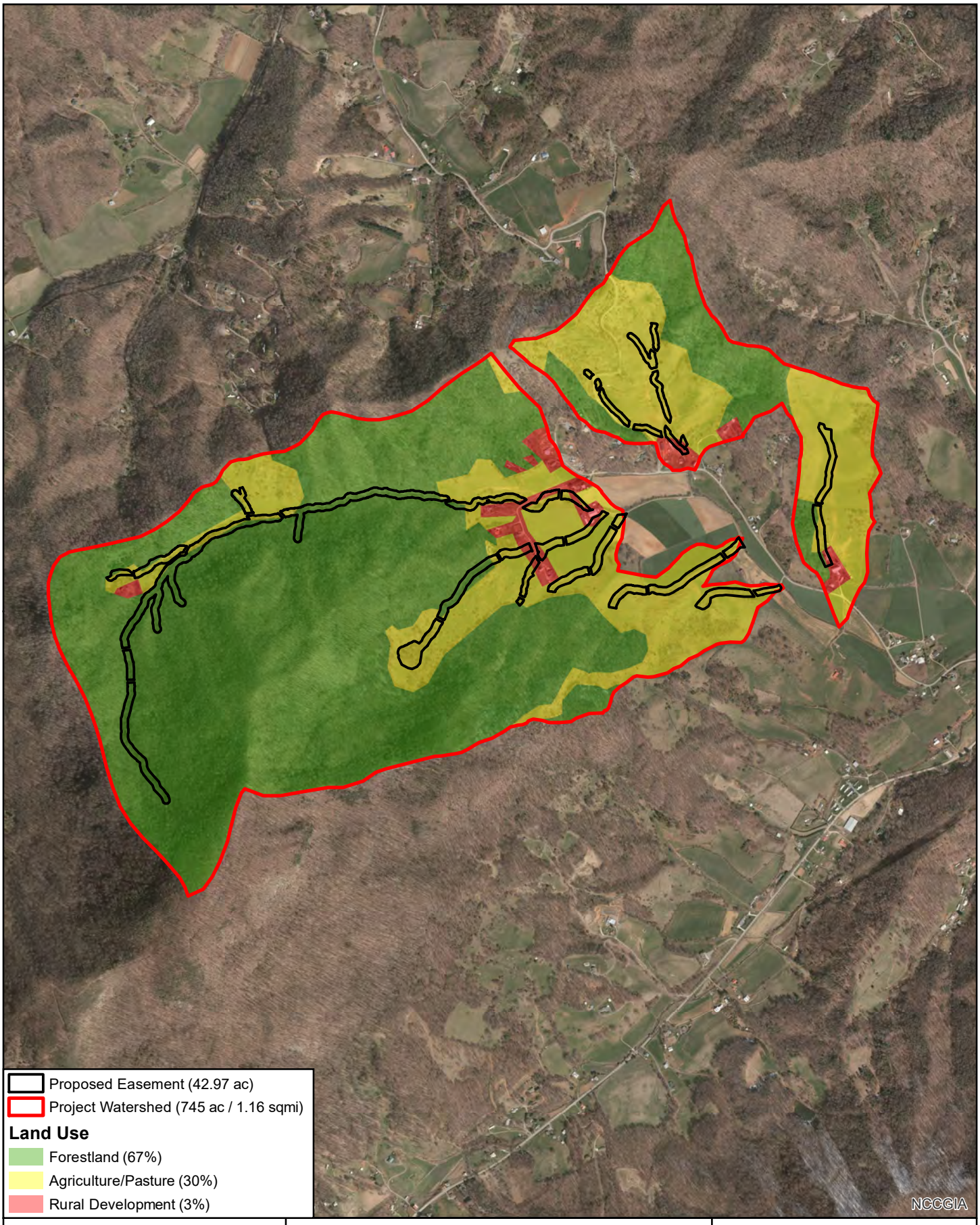


FIGURE 2. USGS TOPOGRAPHIC MAP
MORGAN BRANCH RESTORATION SITE
BUNCOMBE COUNTY, NC

Source: USGS National Map, Canton and Enka Quadrangles



0 750 1,500 Feet

FIGURE 3. PROJECT WATERSHED LAND USE
MORGAN BRANCH RESTORATION SITE
BUNCOMBE COUNTY, NC

N

Image Source: NC Statewide Orthoimagery, 2015
Land Cover from Imagery

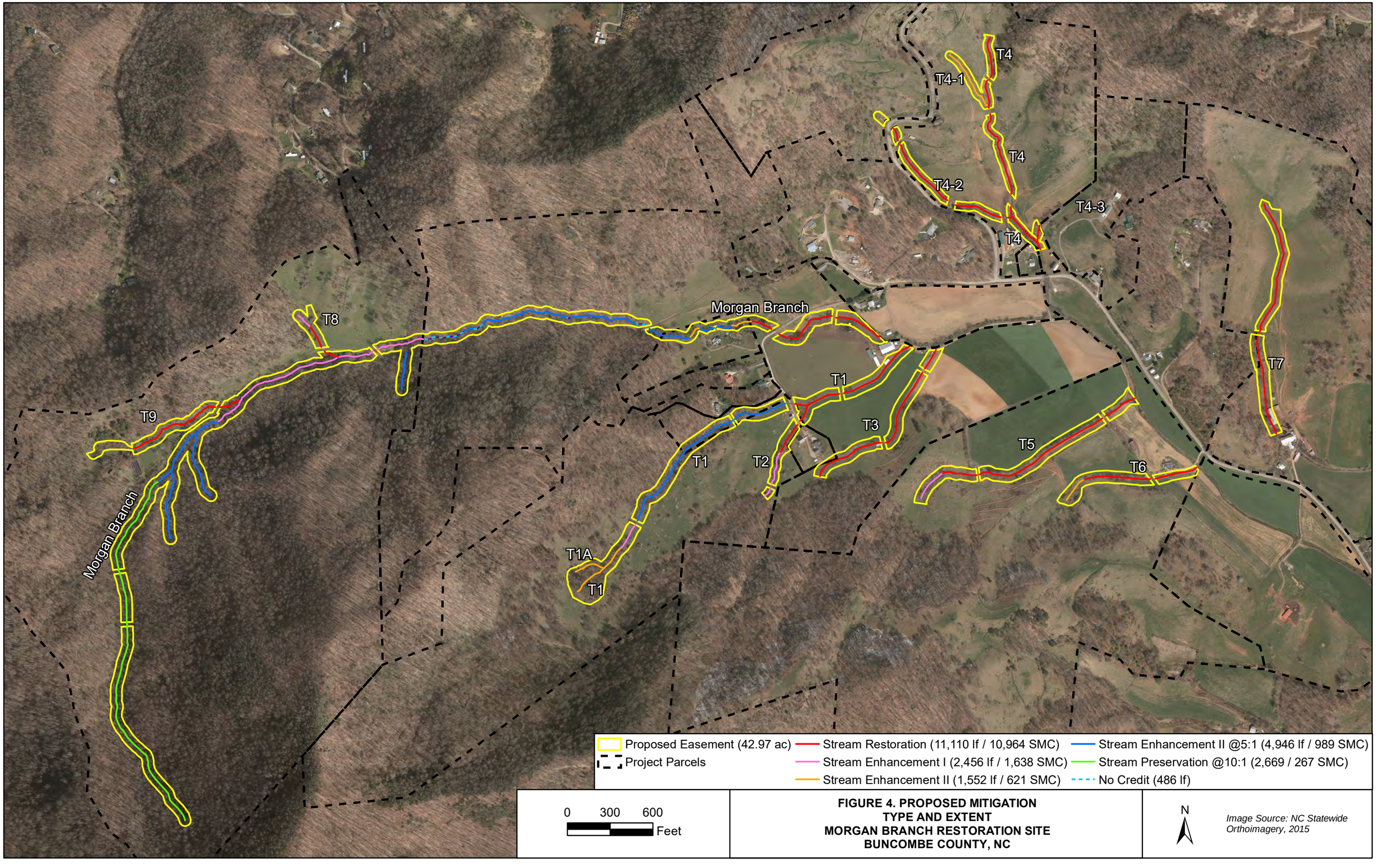


FIGURE 4. PROPOSED MITIGATION TYPE AND EXTENT
MORGAN BRANCH RESTORATION SITE
BUNCOMBE COUNTY, NC

Image Source: NC Statewide Orthoimagery, 2015

Tribal Letters

*Sent directly from DMS

ROY COOPER
Governor
MICHAEL S. REGAN
Secretary
TIM BAUMGARTNER
Director

NORTH CAROLINA
Environmental Quality

2/11/20

Ms. Whitney Warrior
Environmental Services & Historic Preservation Director
Tribal Historic Preservation Office
United Keetoowah Band of Cherokee Indians in Oklahoma
P. O. Box 746
Tahlequah, OK 74465
wwarrior@ukb-nsn.gov
CC: kpritchett@ukb-nsn.gov

Dear Ms. Warrior,

The North Carolina Department of Environmental Quality (NCDEQ) – Division of Mitigation Services (DMS) requests review and comment on any possible issues that might emerge concerning archaeological or cultural resources associated with the proposed Morgan Branch Restoration Site (Project). The Federal Highway Administration (FHWA) is the lead federal agency for this proposed mitigation project. A USGS Topographic Map and a proposed project conceptual map showing the project area are enclosed. The topographic figure was prepared from the USGS 7.5 Minute Topographic Map (Canton and Enka USGS Quadrangles). The center of the site is in the vicinity of 35.6099 N and –82.7469 W.

The Morgan Branch Stream Restoration Project is situated in northwest of Buncombe County. The site is located approximately 3.5 miles southwest of the town of Leicester, North Carolina. Specifically, the site is on Morgan Branch Road, north west of the intersection of Morgan Branch Road and Newfound Road. The site is within the 06010105 Watershed Cataloging Unit (8-digit HUC) of the French Broad River Basin and the 14-digit HUC 06010105090020.

The 14-digit watershed includes a mix of agricultural (42% of land cover), forested (48% of land cover), and rural development (10% of land cover) with an overall imperviousness estimated at 1.1 percent.

The Morgan Branch Stream Restoration Project will generate 13,894 Stream Mitigation Credits (SMCs). Depending on the reach, restoration and enhancement work will include: restoring the profile, dimension, and planform of project streams within the valley, reconnecting their relic floodplains, establishing access to bankfull benches, stabilization of

headcuts in the project streams, reduction and management of widespread invasive vegetation, excluding cattle from the project streams, and the establishment of a native riparian buffer. A conservation easement will preserve the Project in perpetuity, protecting the property from future development and agricultural uses.

On August 26, 2019, our consultant, KCI Associates (KCI), coordinated with the North Carolina Department of Natural and Cultural Resources – State Historic Preservation Office (NC SHPO) and requested review and comment on any possible issues that might emerge with respect to archaeological or cultural resources associated with the potential Morgan Branch Stream Restoration Project.

On September 19, 2019, NC SHPO responded with the following: "*Prior to any ground disturbing activities within the project area, we recommend a comprehensive archaeological survey be conducted by an experienced archaeologist. The purpose of this survey is to identify and evaluate the significance of archaeological sites and cemeteries that may be damaged or destroyed by the proposed project." "We have determined that the project as proposed will not have an effect on any historic structures."* A copy of this letter is provided in the attatched documentation.

Our consultant, KCI coordinated with TRC Environmental Corporation (TRC) to conduct an archaeological survey of the Morgan Branch Stream Restoration Project. The goals of the investigation were to identify all archaeological resources located within the project tract, assess those resources for eligibility to the National Register of Historic Places and advance management recommendations for NC SHPO concurrance.

On December 30, 2019, TRC submitted the attatched Archeological Survey for the Morgan Branch Stream Restoration to NC SHPO with the following recommendations:

"As identified within the Project APE, all seven sites (31BN265, 31BN266, 31BN411, 31BN413, 31BN1088, and 31BN1089) appear to represent low-density artifact scatters that have been impacted by past cultivation and erosion and are unlikely to contain the types of patterned artifact distributions or intact cultural deposits that could potentially provide additional information on local or regional prehistory or history (NRHP Criterion D); the sites also appear to lack the characteristics necessary for eligibility under NRHP Criteria A, B, or C (Table i.1). Consequently, TRC recommends that these sites be determined not eligible for the NRHP as presently defined and that no additional archaeological investigations be required for the Morgan Branch Stream Restoration Project. All seven sites likely extend outside the current Project APE, however, and TRC recommends that the NRHP eligibility of any portions of these sites outside the Project boundaries continue to be considered unassessed. No evidence of sites 31BN264, 31BN267, 31BN268, 31BN412, 31BN414, 31BN418, 31BN465, or 31BN545 was encountered, and those sites apparently do not extend into the Project APE. No additional efforts to locate those sites are proposed in connection with the Project."

On January 27, 2020 NC SHPO responded to TRC and noted; "*We concur with TRC's assessment of these sites, agree with the recommendations, and accept the report as final.*"

I am submitting this information on behalf of FHWA. Please review the attached information and notify us if you are aware of the presence of any potential historic properties of traditional religious or cultural importance within the project APE. Additionally, please let us know if you have any questions or concerns with the archaeological survey report.

We respectfully request a response within 30 days of receipt of this letter/ email in an effort to implement this necessary stream restoration/ mitigation project.

Please feel free to contact us with any questions that you may have concerning this project.

Respectfully,

Paul Wiesner

Paul Wiesner
Western Regional Supervisor
North Carolina Department of Environmental Quality
Division of Mitigation Services

828-273-1673 Mobile
paul.wiesner@ncdenr.gov

Western DMS Field Office
5 Ravenscroft Drive
Suite 102
Asheville, N.C. 28801

Attachments:
Figure 1: USGS Topographic Map
Figure 2: Proposed Project Conceptual Map

cc: Donnie Brew, FHWA

ROY COOPER
Governor
MICHAEL S. REGAN
Secretary
TIM BAUMGARTNER
Director

NORTH CAROLINA
Environmental Quality

2/11/20

Russell Townsend
Tribal Historic Preservation Officer
Tribal Historic Preservation Office
Eastern Band of the Cherokee Indians
russtown@nc-cherokee.com

Stephen Yerka
Historic Preservation Specialist
Tribal Historic Preservation Office
Eastern Band of the Cherokee Indians
syerka@nc-cherokee.com

Dear Mr. Townsend and Mr. Yerka,

The North Carolina Department of Environmental Quality (NCDEQ) – Division of Mitigation Services (DMS) requests review and comment on any possible issues that might emerge concerning archaeological or cultural resources associated with the proposed Morgan Branch Restoration Site (Project). The Federal Highway Administration (FHWA) is the lead federal agency for this proposed mitigation project. A USGS Topographic Map and a proposed project conceptual map showing the project area are enclosed. The topographic figure was prepared from the USGS 7.5 Minute Topographic Map (Canton and Enka USGS Quadrangles). The center of the site is in the vicinity of 35.6099 N and –82.7469 W.

The Morgan Branch Stream Restoration Project is situated in northwest of Buncombe County. The site is located approximately 3.5 miles southwest of the town of Leicester, North Carolina. Specifically, the site is on Morgan Branch Road, north west of the intersection of Morgan Branch Road and Newfound Road. The site is within the 06010105 Watershed Cataloging Unit (8-digit HUC) of the French Broad River Basin and the 14-digit HUC 06010105090020.

The 14-digit watershed includes a mix of agricultural (42% of land cover), forested (48% of land cover), and rural development (10% of land cover) with an overall imperviousness estimated at 1.1 percent.

The Morgan Branch Stream Restoration Project will generate 13,894 Stream Mitigation Credits (SMCs). Depending on the reach, restoration and enhancement work will include: restoring the profile, dimension, and planform of project streams within the valley, reconnecting their relic floodplains, establishing access to bankfull benches, stabilization of headcuts in the project streams, reduction and management of widespread invasive vegetation, excluding cattle from the project streams, and the establishment of a native riparian buffer. A conservation easement will preserve the Project in perpetuity, protecting the property from future development and agricultural uses.

On August 26, 2019, our consultant, KCI Associates (KCI), coordinated with the North Carolina Department of Natural and Cultural Resources – State Historic Preservation Office (NC SHPO) and requested review and comment on any possible issues that might emerge with respect to archaeological or cultural resources associated with the potential Morgan Branch Stream Restoration Project.

On September 19, 2019, NC SHPO responded with the following: "*Prior to any ground disturbing activities within the project area, we recommend a comprehensive archaeological survey be conducted by an experienced archaeologist. The purpose of this survey is to identify and evaluate the significance of archaeological sites and cemeteries that may be damaged or destroyed by the proposed project." "We have determined that the project as proposed will not have an effect on any historic structures."* A copy of this letter is provided in the attatched documentation.

Our consultant, KCI coordinated with TRC Environmental Corporation (TRC) to conduct an archaeological survey of the Morgan Branch Stream Restoration Project. The goals of the investigation were to identify all archaeological resources located within the project tract, assess those resources for eligibility to the National Register of Historic Places and advance management recommendations for NC SHPO concurrance.

On December 30, 2019, TRC submitted the attatched Archeological Survey for the Morgan Branch Stream Restoration to NC SHPO with the following recommendations:

"As identified within the Project APE, all seven sites (31BN265, 31BN266, 31BN411, 31BN413, 31BN1088, and 31BN1089) appear to represent low-density artifact scatters that have been impacted by past cultivation and erosion and are unlikely to contain the types of patterned artifact distributions or intact cultural deposits that could potentially provide additional information on local or regional prehistory or history (NRHP Criterion D); the sites also appear to lack the characteristics necessary for eligibility under NRHP Criteria A, B, or C (Table i.1). Consequently, TRC recommends that these sites be determined not eligible for the NRHP as presently defined and that no additional archaeological investigations be required for the Morgan Branch Stream Restoration Project. All seven sites likely extend outside the current Project APE, however, and TRC recommends that the NRHP eligibility of any portions of these sites outside the Project boundaries continue to be considered unassessed. No evidence of sites

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We respectfully request a response within 30 days of receipt of this letter/ email in an effort to implement this necessary stream restoration/ mitigation project.

Please feel free to contact us with any questions that you may have concerning this project.

Respectfully,

Paul Wiesner

Paul Wiesner
Western Regional Supervisor
North Carolina Department of Environmental Quality
Division of Mitigation Services

828-273-1673 Mobile
paul.wiesner@ncdenr.gov

Western DMS Field Office
5 Ravenscroft Drive
Suite 102
Asheville, N.C. 28801

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Figure 1: USGS Topographic Map
Figure 2: Proposed Project Conceptual Map

cc: Donnie Brew, FHWA

ROY COOPER
Governor
MICHAEL S. REGAN
Secretary
TIM BAUMGARTNER
Director

NORTH CAROLINA
Environmental Quality

2/11/20

Elizabeth Toombs
Cherokee Nation
Tribal Historic Preservation Office
P.O. Box 948
Tahlequah, OK 74465
elizabeth-toombs@cherokee.org

Dear Ms. Toombs,

The North Carolina Department of Environmental Quality (NCDEQ) – Division of Mitigation Services (DMS) requests review and comment on any possible issues that might emerge concerning archaeological or cultural resources associated with the proposed Morgan Branch Restoration Site (Project). The Federal Highway Administration (FHWA) is the lead federal agency for this proposed mitigation project. A USGS Topographic Map and a proposed project conceptual map showing the project area are enclosed. The topographic figure was prepared from the USGS 7.5 Minute Topographic Map (Canton and Enka USGS Quadrangles). The center of the site is in the vicinity of 35.6099 N and –82.7469 W.

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final."

I am submitting this information on behalf of FHWA. Please review the attached information and notify us if you are aware of the presence of any potential historic properties of traditional religious or cultural importance within the project APE. Additionally, please let us know if you have any questions or concerns with the archaeological survey report.

We respectfully request a response within 30 days of receipt of this letter/ email in an effort to implement this necessary stream restoration/ mitigation project.

Please feel free to contact us with any questions that you may have concerning this project.

Respectfully,

Paul Wiesner

Paul Wiesner
Western Regional Supervisor
North Carolina Department of Environmental Quality
Division of Mitigation Services

828-273-1673 Mobile
paul.wiesner@ncdenr.gov

Western DMS Field Office
5 Ravenscroft Drive
Suite 102
Asheville, N.C. 28801

Attachments:
Figure 1: USGS Topographic Map
Figure 2: Proposed Project Conceptual Map

cc: Donnie Brew, FHWA

Agency Responses

North Carolina Department of Natural and Cultural Resources

State Historic Preservation Office

Ramona M. Bartos, Administrator

Governor Roy Cooper
Secretary Susi H. Hamilton

Office of Archives and History
Deputy Secretary Kevin Cherry

September 19, 2019

Charlie Morgan
KCI Technologies
4601 Six Forks Road
Raleigh, NC 27609

Re: Morgan Branch Restoration Site, KCI 161904755, Buncombe County, ER 19-2632

Dear Mr. Morgan:

Thank you for your letter of August 26, 2019, concerning the above-referenced project. We have reviewed the materials provided and offer the following comments.

There are over thirty previously recorded archaeological sites located within the proposed project area. However, the project area has never been systematically surveyed to determine the location or significance of archaeological resources. Based on the topographical and hydrological situation and the density of sites in the area, there is a high probability for the presence of prehistoric or historic archaeological sites in the project area.

Prior to any ground disturbing activities within the project area, we recommend comprehensive archaeological survey be conducted by an experienced archaeologist. The purpose of this survey is to identify and evaluate the significance of archaeological sites and cemeteries that may be damaged or destroyed by the proposed project.

Please note that our office now requests consultation with the Office of State Archaeology Review Archaeologist to discuss appropriate field methodologies prior to the archaeological field investigation. A list of archaeological consultants who have conducted or expressed an interest in contract work in North Carolina is available at https://files.nc.gov/dncr-arch/Consultants-List-2019-08-columns.pdf. The archaeologists listed, or any other experienced archaeologist, may be contacted to conduct the recommended survey.

One paper and one digital copy of all resulting archaeological reports, as well as one digital copy of the North Carolina site form for each site recorded, should be forwarded to the Office of State Archaeology through this office for review and comment as soon as they are available and in advance of any construction or ground disturbance activities.

We have determined that the project as proposed will not have an effect on any historic structures.

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
Deputy State Historic Preservation Officer

50101 Governors Dr.
Suite 250
Chapel Hill, NC 27517

T 919.530.8446
TRCcompanies.com

December 30, 2019

Ms. Renee Gledhill-Earley
Environmental Review Coordinator
North Carolina State Historic Preservation Office
109 East Jones Street, Room 258
Raleigh, North Carolina 27601

RE: Morgan Branch Stream Restoration Project, Buncombe County, North Carolina. ER# 18-1123.

Dear Ms. Gledhill-Earley:

On behalf of KCI Associations of North Carolina, PA, enclosed for your review please find two hard copies and a digital copy of a comprehensive archaeological survey report for the Morgan Branch Steam Restoration Project (ER 18-1123) in Buncombe County, North Carolina. A similar report for the adjacent Dales Creek Stream Restoration Project (ER 19-2632) will be provided under separate cover. The archaeological site forms are being provided directly to the OSA via email.

Thank you for your review of this report and your assistance with this project. Please do not hesitate to contact me at (919) 414-3418 / pwebb@trccompanies.com, or Tim Morris of KCI at Tim.Morris@kci.com, if you have any questions or require any additional information.

Sincerely,

Paul A. Webb
Cultural Resources Program Manager

Cc: Tim Morris, KCI

ARCHAEOLOGICAL SURVEY FOR THE MORGAN BRANCH STREAM RESTORATION PROJECT, LEICESTER, BUNCOMBE COUNTY, NORTH CAROLINA

FINAL REPORT

TRC ENVIRONMENTAL CORPORATION

February 2020

ARCHAEOLOGICAL SURVEY FOR THE MORGAN BRANCH STREAM RESTORATION PROJECT, LEICESTER, BUNCOMBE COUNTY, NORTH CAROLINA

FINAL REPORT

ER 18-1123

Submitted to:

KCI ASSOCIATES OF NORTH CAROLINA, PA
KCI ENVIRONMENTAL TECHNOLOGIES AND CONSTRUCTION, INC.
4505 Falls of the Neuse Road, Suite 400
Raleigh, North Carolina 27609

By:

TRC ENVIRONMENTAL CORPORATION
5 Dogwood Road
Asheville, North Carolina 28806

Authored by:

Michael Nelson and Paul Webb

February 2020

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MANAGEMENT SUMMARY

TRC Environmental Corporation (TRC) has completed an intensive archaeological survey of approximately 14,548 linear feet (ca. 4,434 m) of proposed stream restoration corridor along nine tributaries of Morgan Branch in Leicester, Buncombe County, North Carolina on behalf of KCI Associates of NC, PA, and KCI Environmental Technologies and Construction, Inc. (ER 18-1123). The Morgan Branch Project (Project) is situated northwest of the intersection of Newfound Road (SR 1004) and Morgan Branch Road (SR 1220) along both sides of Morgan Branch Road and consists primarily of edges of agricultural fields or pastures with some overgrown areas along the drainages. Four different types of stream restoration or enhancement work are proposed along the drainages; the survey examined those portions of the tributaries where either Stream Restoration or Stream Enhancement I work is proposed. The fieldwork was conducted between September 12 and November 1, 2019, and was directed by Michael Nelson. The fieldwork required approximately 26 person-days.

This study was conducted to produce information on the presence and location of any significant cultural resources within or adjacent to the Project in order to comply with Section 106 of the National Historic Preservation Act and so that the information could be considered for planning purposes. The survey satisfies the requirements for an intensive archaeological survey as defined by the North Carolina State Historic Preservation Office and Office of State Archaeology (SHPO/OSA) and complies with the OSA's (2017) *Archaeological Investigation Standards and Guidelines*. The survey strategy, including the focus on the Stream Restoration or Stream Enhancement I portions of the Project, was approved by Ms. Linda Hall of the OSA via email. The Project Area of Potential Effect (APE) was considered to extend approximately 15 m (50 feet) on either side of the drainages.

Background research included review of site files and reports at the OSA Western Office in Asheville, which revealed that there are 13 previously recorded archaeological sites (31BN264–31BN268, 31BN411–31BN415, 31BN418, 31BN465, and 31BN546) that either extend into the Project or are situated in adjacent fields. Those sites were recorded in the 1980s through 1990s by avocational archaeologist V. Gary Henry and had not been evaluated for National Register of Historic Places (NRHP) eligibility prior to the present fieldwork. Another 58 sites, all but three of which were recorded by Henry, are located within a one-mile radius of the Project.

The fieldwork included systematic subsurface shovel testing at 20-m intervals across all parts of the Project designated for either Stream Restoration or Stream Enhancement I activities, except for areas with greater than 10 percent slope or heavily disturbed or eroded areas. Additional 10-m interval delineation shovel tests were excavated when subsurface artifacts were recovered; additional delineation shovel tests were often excavated at 5-m intervals to maximize information on sites within the narrow Project corridors. A total of 243 shovel tests were excavated, 34 of which contained artifacts.

Seven archaeological sites were identified, including five previously recovered sites (31BN265, 31BN266, 31BN411, 31BN413 and 31BN415) and two newly identified sites (31BN1088 and 31BN1089). Four sites (31BN265, 31BN413, 31BN415, and 31BN1089) contain precontact components, while three (31BN266, 31BN411, and 31BN1088) contain both precontact and historic period components. The precontact materials include nondiagnostic lithic artifacts and Mississippian period (Pisgah phase, ca. A.D. 1000–1400) ceramics. The historic components at sites 31BN266, 31BN411, and 31BN1088 represent low-density scatters of mid-19th to late 20th century artifacts; while 31BN411 also includes a standing structure outside the APE to the north.

As identified within the Project APE, all seven sites (31BN265, 31BN266, 31BN411, 31BN413, 31BN1088, and 31BN1089) appear to represent low-density artifact scatters that have been impacted by

past cultivation and erosion and are unlikely to contain the types of patterned artifact distributions or intact cultural deposits that could potentially provide additional information on local or regional prehistory or history (NRHP Criterion D); the sites also appear to lack the characteristics necessary for eligibility under NRHP Criteria A, B, or C (Table i.1). Consequently, TRC recommends that these sites be determined not eligible for the NRHP as presently defined and that no additional archaeological investigations be required for the Morgan Branch Stream Restoration Project. All seven sites likely extend outside the current Project APE, however, and TRC recommends that the NRHP eligibility of any portions of these sites outside the Project boundaries continue to be considered unassessed. No evidence of sites 31BN264, 31BN267, 31BN268, 31BN412, 31BN414, 31BN418, 31BN465, or 31BN545 was encountered, and those sites apparently do not extend into the Project APE. No additional efforts to locate those sites are proposed in connection with the Project.

Table i.1. NRHP Eligibility Recommendations for Morgan Branch Project Sites.

Site	Component(s)	NRHP Recommendation*
31BN265	Precontact: nondiagnostic lithic and ceramic	Not eligible (all four NRHP criteria)
31BN266	Precontact: nondiagnostic lithic and ceramic; Historic: mid-19th to late 20th century	Not eligible (all four NRHP criteria)
31BN411	Precontact: nondiagnostic lithic, Mississippian (Pisgah phase); Historic: mid-19th to late 20th century	Not eligible (all four NRHP criteria)
31BN413	Precontact: non-diagnostic lithic	Not eligible (all four NRHP criteria)
31BN415	Precontact: nondiagnostic lithic, Mississippian (Pisgah phase)	Not eligible (all four NRHP criteria)
31BN1088	Precontact: nondiagnostic lithic; Historic 19th to 20th century	Not eligible (all four NRHP criteria)
31BN1089	Precontact: Nondiagnostic lithic and ceramic	Not eligible (all four NRHP criteria)

* Recommendations only apply to portions of sites within Project APE.

ACKNOWLEDGMENTS

TRC would like to thank Tim Morris of KCI Associates for his assistance in facilitating the work and the Morgan Family, particularly Neal Morgan, for providing access and information about the Project.

For TRC, Michael Nelson, Brianna Baker, Lincoln Caldwell, Belinda Cox, Jeff Johnson, Kelsey Schmitz, Tim Swanson, and Chandra Wilson conducted the survey. Artifacts were processed by Brenda Magouirk-Nelson, while Belinda Cox conducted the lithic and historic artifact analysis and Tasha Benyshek conducted the precontact ceramic analysis. Belinda Cox prepared the graphics, and the report was copyedited by Heather Millis.

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CONTENTS

FIGURES

TABLES

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1. INTRODUCTION

TRC Environmental Corporation (TRC) has completed an archaeological survey of approximately 14,548 linear feet (ca. 4,434 m) of proposed stream restoration corridor along nine tributaries of Morgan Branch in Leicester, Buncombe County, North Carolina on behalf of KCI Associates of North Carolina, PA, and KCI Environmental Technologies and Construction, Inc. (ER 18-1123) (Figures 1.1 and 1.2). The Morgan Branch Project (Project) is situated northwest of the intersection of Newfound Road (SR 1004) and Morgan Branch Road (SR 1220) along both sides of Morgan Branch Road and consists primarily of edges of agricultural or livestock fields with some overgrown areas along the drainages. Four different types of stream restoration or enhancement work were proposed along the drainages; the survey examined those portions of the tributaries where either Stream Restoration or Stream Enhancement I work is proposed (Figure 1.3). The Project APE was considered to extend approximately 15 m (50 feet) on either side of the drainages. The fieldwork was conducted between September 12 and November 1, 2019, and was directed by Michael Nelson. The fieldwork required approximately 26 person-days.

This study was conducted to produce information on the presence and location of any significant cultural resources within or adjacent to the Project in order to comply with Section 106 of the National Historic Preservation Act and so that the information could be considered for planning purposes. The survey satisfies the requirements for an intensive archaeological survey as defined by the North Carolina State Historic Preservation Office and Office of State Archaeology (SHPO/OSA) and complies with the OSA's (2017) *Archaeological Investigation Standards and Guidelines.* The survey strategy, including the focus on the Stream Restoration or Stream Enhancement I portions of the Project, was approved by Ms. Linda Hall of the OSA via email.

The remainder of this report documents the results of the survey and is organized in the following way. Chapter 2 provides information on the natural environment, and Chapter 3 presents a summary of the regional culture history. Chapter 4 specifies the research goals and methods, while the results of the background research and the survey are presented in Chapter 5. The conclusions and recommendations are provided in Chapter 6, which is followed by a list of references cited in the text.

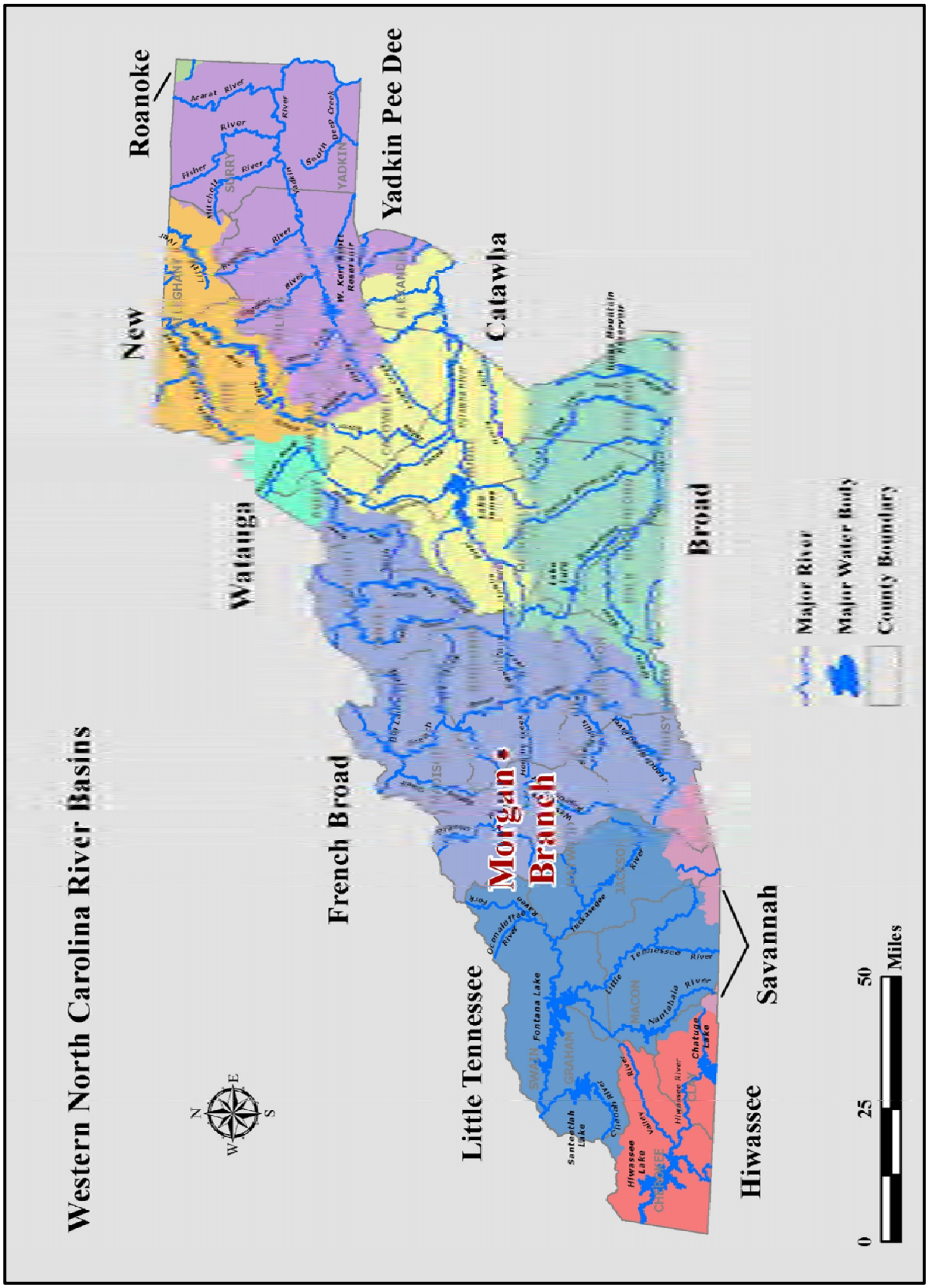

Figure 1.1. Location of the Morgan Branch Project in western North Carolina.

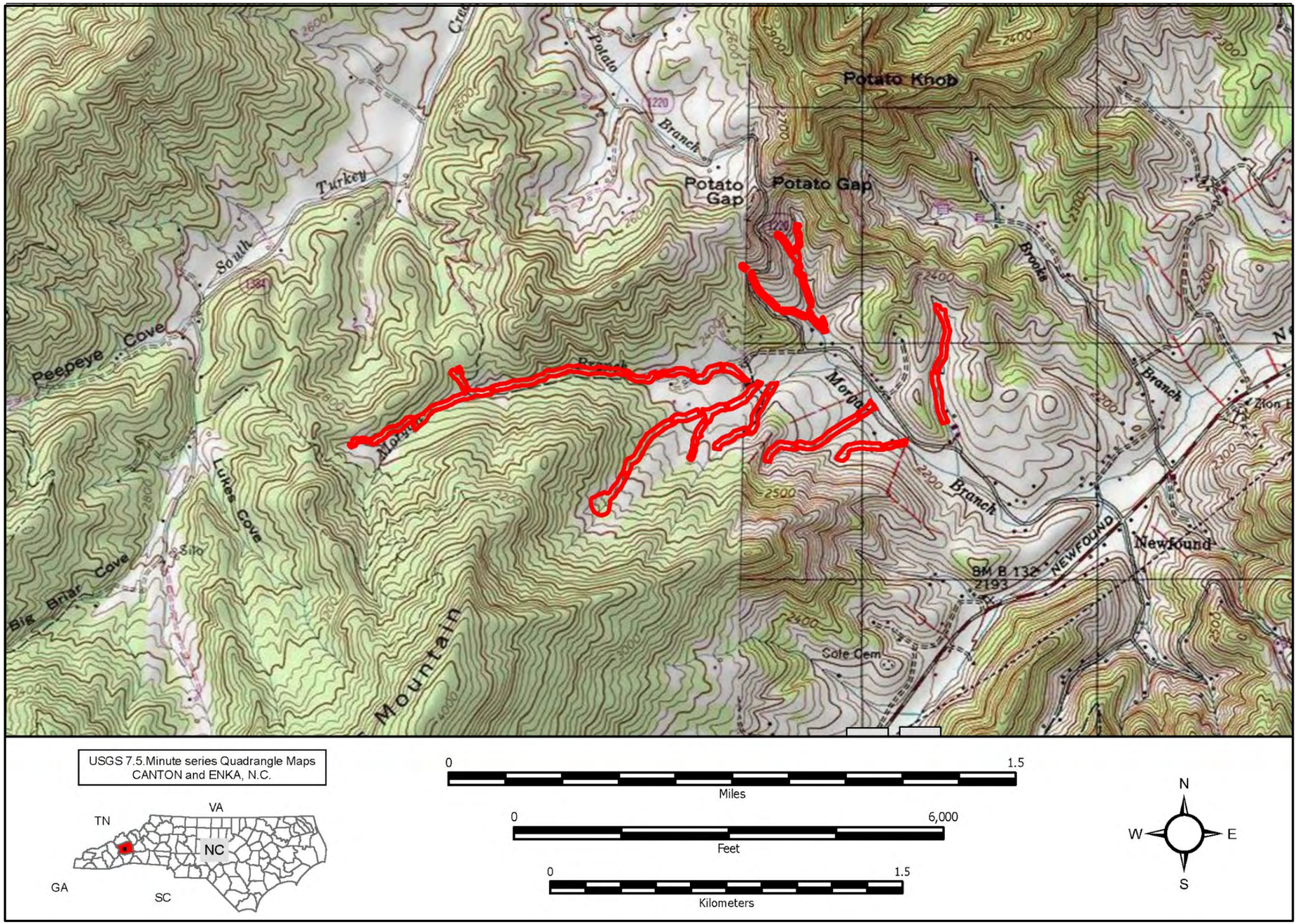

Figure 1.2. Location of the tributaries comprising the Morgan Branch Project.

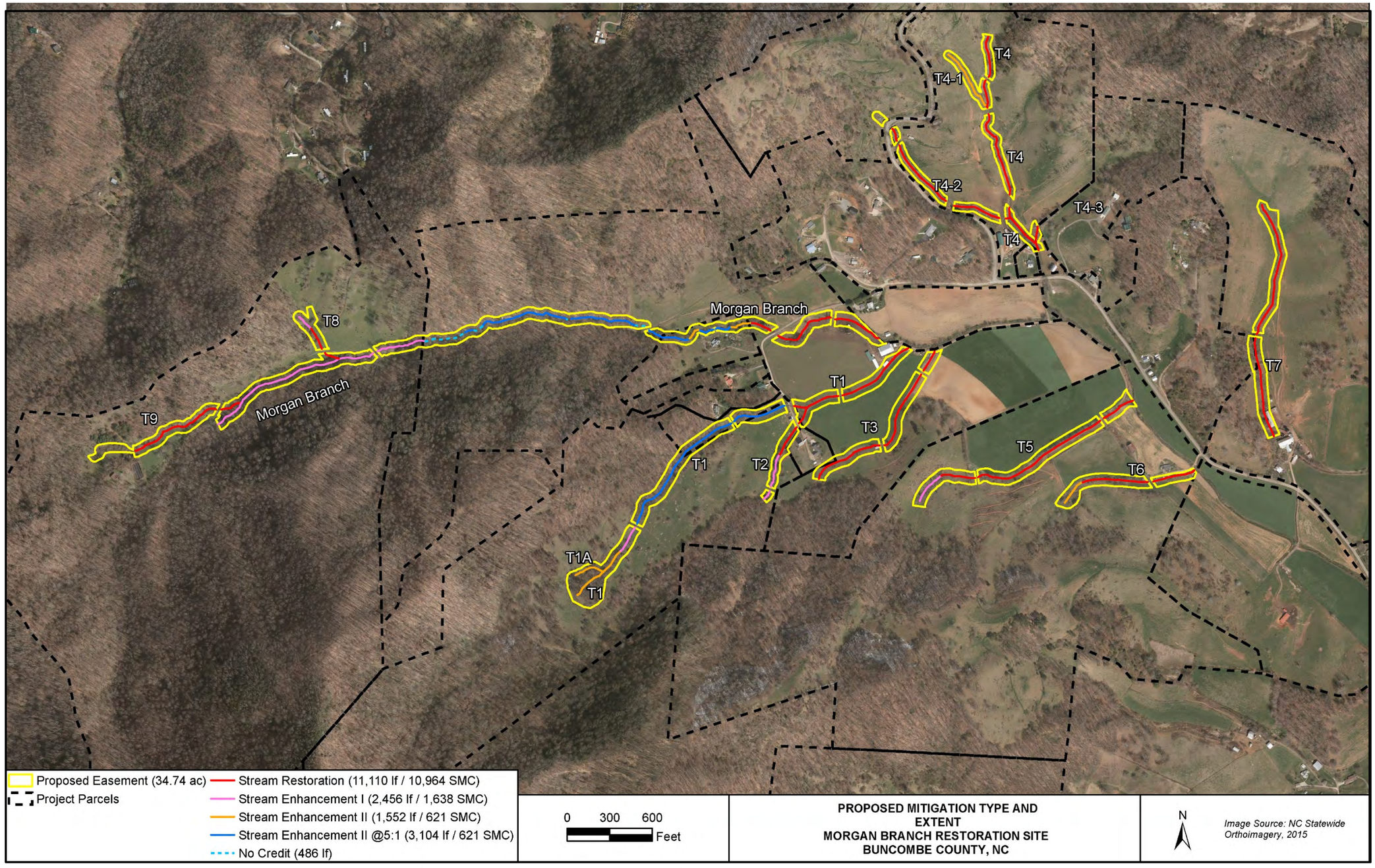

Figure 1.3. Proposed stream restoration and enhancement activities for the Morgan Branch Project (courtesy of KCI).

2. ENVIRONMENTAL SETTING

PROJECT SETTING

The Morgan Branch Stream Restoration Project is located along nine tributaries of Morgan Branch on the east and west sides of Morgan Branch Road (SR 1220) north of its intersection with Newfound Road (SR 1004) in Leicester, Buncombe County, North Carolina. The Project corridor includes both agricultural and livestock fields and/or pastures as well as wooded and overgrown areas along the stream courses (Figures 2.1–2.4).

PHYSIOGRAPHY, GEOLOGY, SOILS, AND HYDROLOGY

The study area is situated in the Blue Ridge province of the Appalachian Mountains within the intermountain plateau (Asheville Basin) physiographic subdivision (Goldston et al. 1954:3), which is the largest intermountain basin in the Blue Ridge. In North Carolina, the Blue Ridge stretches from the Unaka and Great Smoky Mountains in the west to the Blue Ridge escarpment, which borders the Piedmont at the Brevard fault in the east (Orr and Stuart 2000:21–20). The Blue Ridge Province is traditionally described as the area between the Brevard fault zone and the Blue Ridge fault systems and is characterized by thrust sheets with separate tectonic histories (Hatcher and Goldberg 1991). The intermountain plateau is a broad valley on either side of the French Broad River that is characteristically rolling and hilly, with an average elevation of 2,300 ft above mean sea level (AMSL) (Goldston et al. 1954:4). Elevations within the Project (including steeper areas that were not intensively surveyed) range from about 2,200 to 2,800 ft AMSL.

Geologically, the Project area is within the Blue Ridge Belt (North Carolina Geological Survey [NCGS] 1985). The Blue Ridge Belt is an area that has a similar complex geologic history characterized by metamorphosed sedimentary and igneous rocks that have been transformed by the intense pressures and temperatures related to internal plate tectonics. The Project area is within the northeast-southwest trending Ashe Metamorphic Suite and Tallulah Falls Formation and is underlain by foliated to massive, locally conglomeratic metagraywacke, which is interlayered and gradational with mica schist, muscovite-biotite gneiss, and rare graphite schist (NCGS 1985). Important materials in precontact times, locally available quartz, quartzite, and mica occur in the western North Carolina area. Soapstone outcrops also occur but are not plentiful. During the late 19th and early 20th centuries, such minerals as garnet, olivine, and mica were mined in the western North Carolina mountains.

The soils across the Project are highly varied. Soils along the main stem of Morgan Branch are primarily categorized as French loam (0–3% slopes) and Tusquitee-Whiteside complex (8–15% slopes); soils represented along the smaller tributaries include a variety of upland soil types, including Evard-Cowee complex (various slopes), Tate loam (various slopes), Toecane-Tusquitee (various slopes), and Unison loam (various slopes) (USDA NRCS 2019).

Morgan Branch flows southeast to Newfound Creek, which flows generally northeast to its confluence with the French Broad River, about 6.25 miles to the north of Asheville. From that confluence, the French Broad continues north through Buncombe and Madison counties in North Carolina and into Tennessee. It joins the Nolichucky River just north of Cherokee National Forest and flows west to join with the Holston River just east of Knoxville to form the Tennessee River. The Tennessee River flows west and south into Alabama and then turns north back into Tennessee, continuing north into Kentucky and eventually joining the Ohio River. The Ohio River joins the Mississippi just a few miles downstream and continues southward to empty into the Gulf of Mexico.

Figure 2.1. Tributary 2, severely eroded area in pasture, facing southeast.

Figure 2.2. South side of Tributary 1 along edge of corn field, facing west.

Figure 2.3. View of Tributary 4 within pasture, facing north.

Figure 2.4. Wooded portion of pasture at western edge of Tributary 9, facing west.

MODERN CLIMATE

The climate of Buncombe County is highly influenced by elevation, aspect, and wind direction. Daily temperatures can fluctuate widely, with cold and warm spells possible year-round. Asheville averages 47 inches of precipitation a year (Hudson 2009:7–9). The spring and fall months receive the most precipitation, while summer months are the driest. Temperature and precipitation records indicate that the growing season lasts for about 190 days, extending from the beginning of April through mid-October (Goldston et al. 1954:9–10). Accumulation of snowfall in the mountains can average 10–14 inches per year (Orr and Stuart 2000:25).

FLORA AND FAUNA

The study area is located in the Broad Basins subdivision of the Blue Ridge ecoregion as defined by Griffith et al. (2002). This area is drier and has lower elevations and less relief than the surrounding Blue Ridge region. Compared to the higher mountains, the Broad Basins presently have a mixture of oaks and pines more similar to the vegetation of the Piedmont. The tract also falls in Braun's (1950) Southern Appalachians section of the Oak-Chestnut Forest region. Prior to the 1920s and the chestnut blight, chestnut (*Castanea dentata*) dominated the region, although such species as tulip poplar (*Liriodendron tulipifera*), ash (*Fraxinus* spp.), hemlock (*Tsuga* spp.), white basswood (*Tilia* spp.), buckeye (*Aesculus* spp.), oak (*Quercus* spp.), red maple (*Acer rubrum*), walnut (*Juglans nigra*), wild cherry (*Prunus serotina*), birch (*Betula* spp.), and beech (*Fagus grandifolia*) could be found in the valleys, coves, and along sheltered mountain slopes (Holmes 1911:38). Little or no primary forest vegetation remains in this section of the region due to the blight, logging, and other human activity (see Braun 1950:199). Presently, oak and pine (*Pinus* spp.) are the most common species, with red maple, locust (*Gleditsia* spp.), black gum (*Nyssa sylvatica*), sourwood (*Oxydendrum arboreum*), and dogwood (*Cornus* spp.) also common on the intermountain plateau (Orr and Stuart 2000:36–37).

In addition to arboreal species, the forests supported a variety of undergrowth species. The latter included several varieties of edible berries, such as blackberries and raspberries (*Rubus* spp.) and huckleberries (*Gaylussacia* spp.), as well as rivercane and numerous other species used for tools, food, and medicinal purposes by both the Cherokee and later Euro-American settlers (Cozzo 2004; Mooney and Olbrechts 1932; Oliver 1989:29).

The varied forests in the area would have supported a substantial and diverse fauna during and prior to Euro-American settlement. Potential game species include white-tailed deer (*Odocoileus virginianus*), black bear (*Ursus americanus*), elk (*Cervus elaphus*), raccoon (*Procyon lotor*), opossum (*Didelphis marsupialis*), gray squirrel (*Sciurus carolinensis*), and fox squirrel (*Sciurus niger*). Other species present included beaver (*Castor canadensis*), gray fox (*Urocyon cinereoargenteus*), otter (*Lutra canadensis*), muskrat (*Ondatra zibethica*), mink (*Mustela vison*), wolf (*Canis* sp.), panther or mountain lion (*Felis concolor*), and bobcat (*Lynx rufus*) (Shelford 1963). Avian species of possible economic importance included turkey (*Meleagris gallopavo*) and smaller species; other species may have been valuable non-food resources as well. The local rivers would have provided a variety of fish, including catfish (Ictaluridae), sunfish (Centrarchidae), largemouth (*Micropterus salmoides*) and smallmouth (*Micropterus dolomieui*) bass, and brook trout (*Salvelinus fontinalis*) (Altman 2006:Appendix 4).

3. CULTURAL BACKGROUND

PRECONTACT OVERVIEW

This chapter presents an overview of the precontact occupations of Buncombe County and western North Carolina. Much of the earlier part of the cultural sequence for the region is based on Coe's (1964) investigations of the precontact cultures of North Carolina, coupled with later research elsewhere in North Carolina (e.g., Daniel 1998) and across the mountains in Tennessee (e.g., Davis 1990; Kimball 1985). Information on the later precontact and contact period Cherokee occupations of western North Carolina is derived from a variety of sources, including Dickens (1976), Keel (1976), Purrington (1983), Riggs (1988, 1996, 1999), Riggs and Rodning (2002), Rodning (2004), Steere (2013), Ward and Davis (1999), and Wetmore (2002). Other data come from recent Cultural Resource Management (CRM) reports for projects in western North Carolina (e.g., Benyshek and Webb 2008, 2009b; Bissett et al. 2009; Idol 2016, 2017; Shumate and Kimball 2016).

The precontact history of western North Carolina can be divided into four basic time and cultural periods—Paleoindian, Archaic, Woodland, and Mississippian—that relate to both social and technological factors. Several authors (e.g., Dickens 1976:10; Keel 1976:18; Riggs and Rodning 2002; Ward and Davis 1999; Wetmore 2002) divide some or all of these periods into phases, some of which overlap in time and name, but vary in precise definition (Table 3.1).

Table 3.1. Generalized Cultural Chronology for Western North Carolina through 1838.

Period	Phase	Chronology
Historic Cherokee	Late Qualla	A.D. 1700–1838
Protohistoric	Middle Qualla	A.D. 1500–1700
Mississippian	Early Qualla	A.D. 1400–1500
	Late Pisgah*	A.D. 1200–1400
	Early Pisgah*	A.D. 1000–1200
Late Woodland	Undefined (Napier/Woodstock?)	A.D. 800–1000
	Undefined (Late Swift Creek/Cane Creek)	A.D. 600–800
Middle Woodland	Connestee	A.D. 200–600 ↑
	Pigeon	200 B.C. – A.D. 200
Early Woodland	Swannanoa	1000?–200 B.C.
Late Archaic	Otarre	1500–1000 B.C.
	Savannah River	3000–1500 B.C.
Middle Archaic	Guilford	4000–3000 B.C.
	Morrow Mountain	6000–4000 B.C.
	Stanly	6000–5500 B.C.
Early Archaic	LeCroy	7000–6000 B.C.
	Kirk/Palmer	7500–7000 B.C. ↑
	Big Sandy	8000–7500 B.C.
Paleoindian	Undefined (Hardaway-Dalton?)	9000–8000 B.C.
	Clovis	10,500–9000 B.C.
Pre-Paleoindian	Undifferentiated	Unknown

↑ represents overlap into a later period. *The Hiwassee and upper Little Tennessee valleys contain Early and Middle Mississippian ceramic types that are more closely related to the Woodstock, Etowah, and Savannah cultural sequence of northern Georgia (see Benyshek and Webb 2009b; Riggs and Kimball 1996).

Paleoindian Period (ca. 10,500–8000 B.C.)

The earliest broadly acknowledged human presence in the continental United States dates to approximately 12,500 B.P. during the Paleoindian period. The most well-known cultural manifestation of this occupation is called Clovis, which is represented by distinctive, fluted projectile points that have been found over a wide geographic area in the United States. There is also an increasing number of sites that indicate (if not conclusively demonstrate) a pre-Clovis occupation in the Americas, however; these include Meadowcroft

Rockshelter in Pennsylvania (Adovasio et al. 1990, 1999); Saltville in Virginia (McDonald 2000; Weisner 1996); Cactus Hill in Virginia (McAvoy and McAvoy 1997); Topper in South Carolina (Goodyear and Steffy 2003); and the Sloth Hole and Page-Ladson sites in Jefferson County, Florida (Dunbar 2002, 2006; Hemmings 1999, 2004). Although none of those sites is without controversy, those and other sites (e.g., Monte Verde in Chile [Meltzer et al. 1997]) have forced archaeologists to revisit their models for how and when people first arrived in the Americas (e.g., Anderson and Gillam 2000).

Most researchers accept that the human occupation of North America began with a migration of people from Asia across the Bering land bridge, which would have been exposed from 20,000 B.P. to perhaps as late as 10,000 B.P. due to lower sea levels associated with the Last Glacial Maximum (Anderson and Gillam 2000; Dixon 1999, 2001; Fladmark 1979; Hoffecker et al. 1993:48; Meltzer 1988, 2004; Smith 1986). Once in North America, the method and timing of migration south into the Americas remain issues of debate. Some researchers have argued that an ice-free corridor allowed for movement into the interior of the continent sometime after 11,000 B.P. (e.g., Haynes 1966, 1969, 1971), while others have suggested that early settlers, once having occupied Beringia, followed a coastal route to colonize the Americas (e.g., Dixon 1999; Faught 2008; Fiedel 2000; Fladmark 1979).

Based on a study of Paleoindian settlement patterns, Anderson and Gillam (2000:43) have developed a comprehensive model concerning the colonization of the Western Hemisphere. The study analyzed paths at a continental scale, to determine which routes would have afforded the least cost to traveling hunter-gatherers. Factors in the model included topographic relief, locations of ice sheets and pluvial lakes, and the location of known Paleoindian archaeological sites. The findings suggest that initial dispersal occurred in coastal and riverine settings and on plains, and that founding populations probably spread and diversified rapidly. The model also implies that now-submerged portions of the continental shelf may have been important for early dispersal, whether by foot or by boat. In eastern North America, this is reflected in the distribution of sites along the Atlantic Coastal Plain and the paucity of sites in the Appalachian Mountains, which were a barrier to mobility.

Diagnostic Paleoindian artifacts include fluted and unfluted lanceolate projectile points (such as Clovis and Cumberland points); flake tools such as endscrapers, gravers, retouched blades, and burins are also found. Almost all of the Paleoindian materials found in the Southeast have come from surface contexts, and as a result few data are available concerning regional subsistence or social organization (Anderson 1990). Hunting of late Pleistocene megafauna is inferred based on evidence from other areas, although direct evidence for use of animals of any kind is rare in the region. Most, if not all, Paleoindian populations probably relied extensively on other animal and plant foods as well (Meltzer and Smith 1986). Paleoindian populations were generally highly mobile, and settlements are thought to have included small temporary camps and less common base camps that were occupied by loosely organized bands. Paleoindians selected high-quality lithic materials for tools, and many sites are linked to important source areas.

Paleoindian projectile points are relatively rare in the North Carolina mountains, reflecting their scarcity in the Appalachians as a whole, although a compilation of data on known fluted points from North Carolina revealed several examples from the region (Daniel 2005). The later Paleoindian phase appears to include Dalton (Goodyear 1982) and perhaps Hardaway (Ward 1983) points and related cultures, although both types of artifacts are very rare in the region (Purrington 1983).

Archaic Period (ca. 8000–1000 B.C.)

The Archaic period began with the onset of Holocene, post-glacial climatic conditions in the East and has been subdivided into Early, Middle, and Late subperiods. Diagnostic projectile points are the primary criteria used to identify and date Archaic manifestations. As a whole, the Archaic may be seen as a relatively long and successful foraging adaptation, with subsistence based on hunting, fishing, and the collection of

wild plant resources. The period is also marked by a general increase in the density and dispersal of archaeological remains, more regionally distinct tool forms, and the increased use of locally available lithic raw materials. Group size gradually increased during this period, culminating in larger populations by the end of the period. While Archaic groups no doubt used a variety of materials to fashion utilitarian and other items, lithic artifacts are all that remain on most sites in the Southeast due to the lack of preservation in acidic soils. Architectural evidence is rare, suggesting that most structures were not substantial constructions. An increasing number of Archaic sites have been the focus of intensive excavation in the North Carolina mountains (Benyshek and Webb, i.p.; Bissett et al. 2009; Idol 2016; Jorgenson et al. 2017; Purrington 1981; Shumate and Kimball 2016), and others have been investigated in the Tellico area of eastern Tennessee (e.g. Chapman 1981) and in the North Carolina Piedmont (Claggett and Cable 1982; Coe 1964).

Early Archaic (ca. 8000–6000 B.C.). During the Early Archaic period, the mixed coniferous forests present in much of the Southeast were replaced by mixed hardwood communities dominated by oak, hemlock, beech, and maple (Claggett and Cable 1982:212), and a modern faunal assemblage was in place following the extinction of the Pleistocene megafauna. Diagnostic markers of the Early Archaic period in western North Carolina and eastern Tennessee include side-notched Big Sandy projectile points and later Palmer-Kirk projectile points (ca. 8000–6800 B.C.). Palmer-Kirk projectile points are fairly common and widespread occurrences in the area but are sparse compared to Middle and Late Archaic types. Bifurcate-based points such as the St. Albans, LeCroy, and Kanawha types (ca. 6900–5800 B.C.) are also found (Kimball 1985). Although these appear to occur more rarely in the mountains than Kirk forms (Kimball 1996; Stanyard 2003), a long-term survey of sites near Asheville (Henry 1992) documented more bifurcate-based points than Kirks, perhaps a reflection of the intensive survey coverage up a smaller tributary (Kimball 1996). Other tools that occur on Early Archaic sites include knives, adzes, end and side scrapers, drills, perforators, and expedient tools (Stanyard 2003).

Low regional population densities and a continued high degree of group mobility are inferred for this subperiod in the mountains, where most known sites are located in high upland areas, and over 90 percent of projectile points found are of non-local chert (Bass 1975); it is also possible, however, that site burial in the floodplains could be largely masking Early Archaic period use of these landforms (see Benyshek and Webb 2004; Kimball 1991). The nature of more general land use patterns and strategies for technological organization remain the subjects of discussion. To the west in Tennessee, Kimball (1996) has proposed an ongoing change from logistical (relatively more permanent base camps from which a variety of other satellite camps and specialized use sites were accessed) to residential (wholesale moving frequently within zones to map onto resources) mobility patterns during the later Early Archaic period, perhaps as a result of the first signs of warming climatic conditions. Kimball (1996:173) notes that settlement patterns (and thus perhaps foraging strategies) for bifurcate and Kirk groups were different, with more bifurcate sites found on T1 terraces and islands compared to Kirk sites, which are more dispersed on various landforms, suggesting a change in foraging strategy in the later Early Archaic.

Middle Archaic (ca. 6000–4000 B.C.). During the Middle Archaic, the cool, moist conditions of the early Holocene are generally considered to have given way to the warmer, drier climate of the Mid-Holocene Hypsithermal interval, although there is increasing evidence that the Mountains may have seen increased rainfall during this period (e.g., Leigh 2002; Leigh and Webb 2006). Extensive estuarine marshes and riverine swamps began to emerge in coastal regions as sea levels ceased their post-Pleistocene rise by 3000 B.C. The northern hardwoods vegetation matrix in those regions was replaced by an oak-hickory forest, which was in turn replaced by a southern hardwoods-pine forest characterized by the species occupying the region today (Claggett and Cable 1982:212–216; Delcourt and Delcourt 1983, 1985). Subsistence economies became increasingly diversified, particularly evident in the Mid-South and lower Midwest during the Shell Mound Archaic, where riverine settings were chosen more often for occupation (Sassaman 1996).

The Middle Archaic witnessed the first substantial occupation of the Smoky Mountains (Bass 1975:109), and presumably of western North Carolina in general. Site file data indicate a marked increase in site numbers from the Early to the Middle Archaic in the Carolinas and Georgia (Anderson 1996), and Morrow Mountain projectile points increase markedly in frequency when compared to earlier types in western North Carolina (Leftwich 1999). Three subperiods recognized in most of North Carolina are identified by the presence of Stanly (ca. 6000–5000 B.C.), Morrow Mountain (ca. 5000–4200 B.C.), and Guilford (ca. 4200–3500 B.C.) projectile points, following the classic Archaic sequence first identified by Coe (1964), although more recent research demonstrates that additional projectile point forms were used as well (Shumate and Kimball 2016). Archaeologically, the transition from the Early Archaic to the Middle Archaic is characterized by the appearance of stemmed rather than notched projectile points and an increased incidence of groundstone tools. Reliance on locally available quartz and quartzite rather than higher quality non-local chert for stone tools increased in the Appalachian Summit as well as other parts of North Carolina, northern Georgia, and South Carolina. A state-wide distribution study shows that over 77 percent of Middle Archaic projectile points from Mountain counties are made of quartz (McReynolds 2005:23). Atlatl weights make their first appearance in the archaeological record during the Middle Archaic, as do stone net sinkers. The use of a more expedient stone tool technology (see Binford 1977, 1979) predominates during the Middle Archaic (Stanyard 2003).

Based on studies in South Carolina, researchers have suggested that Morrow Mountain peoples were foragers who resided at a location until local resources were depleted (Blanton and Sassaman 1989; Sassaman 1983). This idea is consistent with an archaeological pattern characterized by local raw material utilization, the wide distribution of sites in various landscape settings and their small size, the lack of evidence for long-term occupations, and the absence of discernible substantial trade networks (Stanyard 2003:48–49). Morrow Mountain sites are frequently encountered in the uplands of western North Carolina (e.g., Purrington 1981), on smaller drainages (Yu 2001), and in floodplains of major rivers, and are sometimes buried (e.g., Benyshek and Webb 2004). Bass (1975) found that half of the Middle Archaic sites he analyzed were in the uplands, with the others in valleys and coves.

Late Archaic (ca. 4000–1000 B.C.). Late Archaic sites are common in western North Carolina as elsewhere in the lower Southeast, suggesting region-wide population increase from the Middle Archaic (Anderson 1996). Late Archaic sites are in a wide range of environmental zones, although most major settlements were in riverine or estuarine settings (Bass 1975; Ward 1983). The existence of formal base camps occupied seasonally or longer is inferred, together with a range of smaller resource-exploitation sites, such as hunting, fishing, or plant collecting stations (Claggett and Cable 1982; Ward 1983). In particular, many Late Archaic sites in the Smoky Mountains appear to be situated near quartzite sources (Bass 1975:77; Shumate and Kimball 2016). Grinding implements, polished stone tools, and carved soapstone bowls became fairly common, suggesting increased use of plant resources, and possibly changes in subsistence strategies and cooking technologies. Although regional evidence is minimal, the first experiments with horticulture probably occurred at this time, with the cultivation of plants such as squash (*Cucurbita pepo*), sunflower (*Helianthus* sp.), and *Chenopodium* (Cowan 1985; Ford 1981; Smith 1989).

Soapstone vessels appear to have been most widely used in the eastern United States between 1800 to 1000 B.C. (associated dates range from ca. 4000 B.C. to ca. A.D. 0) (Truncer 2004:505–506). The scarcity of earlier dates and wide gaps in geographical distribution suggest that soapstone bowl manufacture occurred continuously at "low levels of production" or was adopted and then discontinued in some areas (Truncer 2004:497). Although soapstone vessel use appears to have preceded ceramic vessel use in some areas, in the central Savannah River valley, South Carolina, and northeastern Florida, use of soapstone slabs and pottery precedes soapstone vessel use by up to 1000 years (Elliott et al. 1994; Sassaman 1997; Stanyard 2003:54). Soapstone vessels were apparently used for cooking certain plant or animal foods over a direct heat source (e.g., Kroeber 1925:527) and may not have afforded any advantage over alternative cooking methods.

Another innovation in Late Archaic cooking technology was the use of drilled or perforated soapstone slabs, presumably for use in stone boiling (Anderson et al. 1979; Dagenhardt 1972; Elliott 1981; Trinkley 1974; Wood et al. 1986). These artifacts are abundant at some Late Archaic sites in the Savannah River and Oconee valleys in the Georgia and South Carolina Piedmont to the Fall Zone (Claflin 1931:32; Elliott 1981; Wood et al. 1986), but appear rarely in North Carolina (e.g., Bissett et al. 2009; Idol 2016).

Late Archaic occupations in the Appalachian Summit region are marked by a variety of large- to small-stemmed points. The most prominent and recognizable of these is the Savannah River stemmed, a large, broad-bladed, square stemmed point that appeared ca. 3000 B.C. and lasted to ca. 1500 B.C. Subsequent Late Archaic sites frequently contain slightly smaller stemmed points of the Iddins Undifferentiated stemmed or, perhaps, the Otarre stemmed type (Ward and Davis 1999:71), although these general forms were produced during the Middle Archaic and Early Woodland periods as well and may not be exclusive to the Late Archaic period (Larry Kimball, personal communication 2010). Size reduction of stemmed forms is indicated over the course of the Late Archaic to Early Woodland periods in the region, however (Oliver 1981, 1985). The most common feature type during the Late Archaic is a shallow, rock-filled pit (Chapman 1981; Keel 1976). Toward the end of the Late Archaic, fiber tempered pottery appeared in the coastal regions (Sassaman 1993); although such pottery was found at the Ravensford site in Swain County (Benyshek and Webb 2017), it is a rare occurrence in the Appalachian Summit. There is increased evidence for trade during the Late Archaic period, as indicated by the presence of soapstone, slate, and other materials outside their source areas (Chapman 1985).

Woodland Period (ca. 1000 B.C.–A.D. 1000)

The Woodland period began as early as 1000 B.C. and continued until the appearance of the Mississippian adaptation around A.D. 1000. Across the eastern Woodlands, the period is marked by the appearance of widespread pottery use, a greatly increased role for horticulture in subsistence economies, and an elaboration of mortuary ceremonialism, including the appearance of burial mounds.

Early Woodland (ca. 1000–200 B.C.). Initial Woodland occupations are generally thought to reflect a largely unchanged continuation of Late Archaic lifeways coupled with the first widespread introduction of ceramics. The earliest Early Woodland manifestation in the Project area is the Swannanoa phase, which dates ca. 1000–200 B.C. Regional radiocarbon dates for Swannanoa materials include a corrected, uncalibrated date of 2130±40 B.P. (representing a 2-sigma range of 260–100 B.C.) (Benyshek and Webb 2006) and a corrected, uncalibrated date of 2435±25 B.P. (representing a 2-sigma range of 535–435 B.C.) (Benyshek and Webb 2009a).

The hallmark of the Early Woodland is distinctive thick, crushed quartz or coarse sand tempered fabric impressed ceramics; cordmarked, plain, check stamped, and simple stamped wares are also thought to date to late in the Early Woodland period (Keel 1976:260–266; Ward and Davis 1999:140–143; Wetmore 2002:254–257). Vessel forms consist of unrestricted conical pots and simple bowls. Eastern Tennessee's Watts Bar and northern Georgia's Kellogg phases are similar stylistically to Swannanoa materials, as are Vinette ceramics from as far away as eastern New York (Ward and Davis 1999:142).

Early Woodland projectile points consist of smaller stemmed points, the terminal expressions of the large stemmed point tradition, along with large triangular varieties. The latter include the Transylvania and Garden Creek types, which are morphologically equivalent to Badin and Yadkin Piedmont types (Keel 1976; Oliver 1985). Although Swannanoa phase site distributions have not been thoroughly documented, it is apparent that the settlement pattern included large floodplain sites along with numerous small upland extractive camps. Direct evidence is lacking at present, but it seems likely that the Early Woodland inhabitants of the region were engaged in at least some degree of horticulture (Ward and Davis 1999:145). Based on evidence at Phipps Bend in eastern Tennessee, deer, elk, and turkey were the animals primarily

hunted (Lafferty 1981). To date, no well-defined Early Woodland structure patterns have been identified in the region.

Middle Woodland (ca. 200 B.C.–A.D. 600). The Middle Woodland period in western North Carolina is divided into an earlier Pigeon phase (ca. 200 B.C.–A.D. 200) and a later Connestee phase (ca. A.D. 200–600), each associated with distinct ceramic styles. Because it has proved difficult to isolate Pigeon phase components for study, relatively little is known about the cultural developments that occurred during this period (Ward and Davis 1999:146). Much more is known about the lifeways, architecture, and subsistence practices of the subsequent Connestee phase. The Connestee phase is characterized by mound construction and intensified long-distance trade, and it is apparent that some western North Carolina groups participated in the Hopewell exchange network (Chapman and Keel 1979; Keel 1976:157; Wetmore 2002:263; Wright 2013) in which raw materials and finished artifacts were traded over vast areas of eastern North America (Brose and Greber 1979; Seeman 1979). Regional sites with Middle Woodland components that have been the focus of intensive investigations include Garden Creek in Haywood County (Keel 1976; Wright 2013), Biltmore Mound in Buncombe County (Kimball and Shumate 2003; Kimball et al. 2004), Ela in Swain County (Wetmore 1989), Harshaw Bottom in Cherokee County (Robinson 1989), Tuckasegee in Jackson County (Keel 1976), the Tyler-Loughridge site in McDowell County (Robinson 1996), the Cherokee EMS site in Swain County (Benyshek 2007), the Bent Creek site in Buncombe County (Shumate and Kimball 2006), the Macon County Airport site (Benyshek and Webb 2009a), and the Icehouse Bottom site in Monroe County in eastern Tennessee (Chapman 1973; Cridlebaugh 1981).

Bass (1975:81) reports that while over 50 percent of Middle Woodland sites in his sample occurred on the floodplain, 40 percent were located above the valley in coves and on benches. Numerous large and small sites dating to this period have been found, suggesting periodic aggregation and dispersion or some kind of settlement dichotomy. By Connestee times, however, sites have been demonstrated to occur most often in the floodplains, and a higher percentage are present on the first rise above the river than in the preceding Pigeon or Swannanoa phases (Wetmore et al. 2000).

Horticulture is believed to have become increasingly important during this period, although mast resources remain the most visible dietary contributor. Possible late Middle Woodland cultigens in the region include maygrass, little barley, sumpweed, maize (*Zea mays*), squash, and perhaps *Chenopodium* (Benyshek 2007; Chapman and Crites 1987; Crites 2004; Robinson 1989). Evidence for the use of animal resources is scarce from Middle Woodland sites in the area, save Biltmore Mound where preservation is excellent. Faunal information from the Connestee phase mound area may not be representative of overall diet and utilization due to the probable ceremonial activities including feasting that took place there, but no information is available from the associated village to date. The assemblage is dominated by terrestrial species (white-tailed deer, turkey, box turtle, raccoon, squirrel), with aquatic resources (fish, mussels) used much less frequently (Whyte 2004).

Diagnostic early Middle Woodland ceramics in western North Carolina include the Pigeon series, which Keel (1976:256–260) defines as including check stamped, simple stamped, plain, brushed, and complicated stamped varieties with crushed quartz temper. Vessel forms include conical jars, hemispherical bowls, and tetrapodal and shouldered jars with flaring/everted rims. Pigeon ceramics are relatively common in the region but are generally found in mixed contexts (Ward and Davis 1999:146), perhaps indicative of stable populations inhabiting the same areas for long periods of time.

Subsequent Middle Woodland ceramics consist of the Connestee series, which are generally thinner, sand tempered wares most often plain or decorated with simple stamped, cordmarked, or brushed surfaces. Crushed quartz temper was added in small amounts. Fabric impressed and check stamped sherds are also included in the series. Plain necks are characteristic, with punctated shoulders rarely occurring (Keel 1976:247–255). Swift Creek ceramics are sometimes found as a minority ware on Middle Woodland sites

in the area (Keel 1976:71; Kimball and Shumate 2003; Robinson 1989). Also found, but extremely rare, are Ohio Hopewellian ceramics (both non-local manufacture and locally made copies) and figurines (Keel 1976:118–119; 120–123; Kimball and Shumate 2003). Lithic artifacts characteristic of the late Middle Woodland consist of large triangular and side notched projectile points (Garden Creek and Connestee triangulars, Pigeon side notched), bar gorgets, and a prismatic blade and polyhedral core technology that was probably ultimately derived from the Hopewellian Midwest (Chapman and Keel 1979:157). Copper is also found on Middle Woodland sites in the area but is rare (Chapman and Keel 1979; Setzler and Jennings 1941).

Connestee phase populations engaged in mound building, evidenced by such substructure mounds as Garden Creek No. 2 and the Biltmore Mound, and interacted with Hopewellian populations in the Midwest and elsewhere (Keel 1976; Kimball and Shumate 2003; Ward and Davis 1999:151–153; Wright 2013). Connestee series sherds are present on some Hopewellian sites, and small numbers of Hopewellian ceramics and bladelets made of chalcedony from Flint Ridge in Ohio are present at the Garden Creek site, at the Biltmore Mound site, and at Icehouse Bottom (Chapman 1973; Chapman and Keel 1979; Kimball and Shumate 2003; Moore 1984). Marine shell was also traded (Kimball et al. 2004). It has been hypothesized that western North Carolina was one source of the mica that was traded and used widely across the East during this period. Recent investigations at the Garden Creek site have recorded two subrectangular enclosures similar to those found in Midwestern Adena and Hopewell contexts; these appear to result from earlier ritual use of the site and further illustrate the extent of the socio-economic ties developed between local and non-local populations during the Middle Woodland period (Wright 2013).

Architectural information has been limited, but at Garden Creek Mound No. 2, at the base of the premound layer, a square structure measuring approximately 6 m across was identified and was attributed to the Connestee occupation (Keel 1976:95, 99). At Ela, eight circular structures 7–8 m in diameter were identified as representative of Connestee phase constructions (Wetmore 1989, 1996, 2002). More recent excavations at the Macon County Airport and Old Elementary School sites have also uncovered Connestee structures, both circular and square to rectangular (Benyshek 2016; Benyshek and Webb 2009a, 2009b; Steere 2017).

Late Woodland (ca. A.D. 600–1000). The Late Woodland subperiod in much of the Southeast saw the emergence of sedentary village life and intensive maize horticulture and the development of complex tribal and chiefdom-level political structures. Certainly, by A.D. 1000, many interior Southeastern groups were producing substantial amounts of corn, which continued into the Mississippian period when wild food resources were supplemental to cultivated ones (Scarry 2003:88–89).

The Late Woodland in the Appalachian Summit has been described as largely invisible (Wetmore 2002), and a similar lack of recognition of distinctive Late Woodland components has been described in northern Georgia (Rudolph 1991). Part of the problem may be the lack of specific diagnostic artifacts useful for unequivocally identifying sites of this period (as plain sherds and small triangular projectile points can be difficult to qualify), but it is also possible that the Appalachian Summit region was more lightly populated during this time and small, dispersed sites were more typical (Rudolph 1991). Robinson et al. (1994, 1996) indicate that the Connestee phase lasted into the Late Woodland period based on work at several sites. One Late Woodland manifestation was identified by Keel and Egloff (1984) at the Cane Creek site in Mitchell County; the distinctive, largely plain-surfaced assemblage from that site is similar to Connestee wares and associated with a single radiocarbon date of 1340±90 B.P. (uncorrected). Similarly, an AMS date from a Buncombe County site (31BN943) produced multiple 2-sigma ranges of Cal A.D. 690 to 900 and A.D. 920 to 950 associated with sand tempered plain ceramics (Idol 2010).

Scattered Napier and Late Swift Creek ceramics and sites (such as Cullowhee Valley School [31JK32] [Ashcraft 1996; Greene 1996:120–121; Moore 1992], Biltmore II [31BN175] [Hall and Baker 1993],

Ravensford [31SW78/136] [Benyshek personal communication 2016; Webb 2002; Wild 1994], Hominy Creek [31BN828] [Paré et al. 2007], Sneed [31JK466] [Benyshek 2008], and Boundary Tree [31SW494] [Idol 2011]) also occur in the region and reflect influences from the south during this period. A radiocarbon date obtained from Cullowhee Valley School is similar to those obtained from the Sneed site, which are calibrated at the 2-sigma level to A.D. 660–860 (Benyshek 2008) and to the one date from Boundary Tree (A.D. 654 to 769) (Idol 2011). Mid- to late 8th century dates obtained from 31SW136 in association with Napier and/or Late Swift Creek ceramics are similar to these (Benyshek and Webb i.p.; Wild 1994). Rudolph (1991) suggests that increased regionalization of ceramic styles and site dispersal occurred during this period in northern Georgia, and this appears be the case for western North Carolina as well.

Mississippian Period (ca. A.D. 1000–1540)

The Mississippian period in the Southeast is marked by the increasing intensification of maize horticulture, the establishment of increasingly hierarchical social structures and settlement systems, and an increase in ceremonialism expressed architecturally in the construction of flat-topped substructure mounds. Increasing evidence exists that territorial boundaries between chiefdoms were closely maintained during the Mississippian period, although individual chiefdoms rose and fell in cyclical patterns. Studies of relations between native chiefdoms and Spanish expeditions suggest that some type of supra-chiefdom level organization was maintained through a system in which paramount chiefs traveled from fief to fief, displaying royal powers and prerogative and receiving gifts and tribute from subservient chiefdoms (Smith and Hally 1992).

The Pisgah phase (ca. A.D. 1000–1400) corresponds with the early centuries of the Mississippian period in at least parts of western North Carolina (Dickens 1976:13–14); sites with Etowah phase (ca. A.D. 1100–1300) components also are present in the Hiwassee River valley (Riggs and Kimball 1996) and in the upper Little Tennessee River valley (Benyshek and Webb 2009a, 2009b). Sites with high percentages of Pisgah pottery are found primarily in the eastern and central parts of the Appalachian Summit region and range from small sites such as Brunk (Moore 1981) to nucleated villages with substructure mounds such as Garden Creek (Ward and Davis 1999:160–161). Pisgah pottery is also found in the western part of the summit region as well, however, and into northern South Carolina, southwestern Virginia, and northeastern Tennessee (Dickens 1976). Diagnostic Pisgah artifacts include small triangular projectile points and distinctive rectilinear complicated stamped vessels with collared, punctated rims. Dickens (1976) suggests that finer-lined complicated stamping and lack of rim elaboration characterize the earlier portion of the phase, and such materials have been documented from the Brunk, Ravensford, and other sites (Moore 1981; Webb et al. 2005; Jane Eastman, personal communication 2017). Corn and other crops were important sources of food, but floral and faunal remains document the persistence of wild resources as major components of the diet (Ward and Davis 1999:171). Warren Wilson is the most extensively explored Pisgah village to date, and work there over several field seasons documented at least seven palisade lines and 17 structures (Dickens 1976; Moore 2002; Ward 1986). Garden Creek Mound and Village also contains a Pisgah component, and the main mound (Mound No. 1) there was constructed during the Pisgah phase (Dickens 1976).

HISTORIC CHEROKEE OCCUPATIONS

The Qualla phase represents the final centuries of Native American autonomy in the region and reflects the close association between the Cherokees and the Appalachian Summit region. Although elements of the material culture, belief systems, place names, and social structure of Mississippian society lingered in the region well into the 19th century (and in some cases to the present day), the Qualla phase is largely one of social change due to increasing Euro-American intrusion and settlement.

The French Broad drainage lies east of the core area of known 17th and 18th century Cherokee settlement, which was concentrated in the Blue Ridge Mountains to the west and southwest. The area was likely frequented by Cherokee hunters, however, and may have contained small settlements at various times as well. According to Mooney (1900:380–381), the French Broad lies west of a neutral area between the Cherokees and the Catawbas, which was bounded by the Catawba River on the east and the Broad River on the west (Mooney 1900:380–381).

Pre-Removal Cherokee Occupations

The first Euro-American intrusion into western North Carolina took place in 1540, when Hernando de Soto's expedition passed through the area. Several different reconstructions of de Soto's route have been proposed, with some early scholars (e.g., Swanton 1985:201–202) suggesting that he crossed Cherokee country by way of the Hiwassee Valley. A later reconstruction (Hudson et al. 1984) proposed that de Soto crossed the Blue Ridge farther to the north at Swannanoa Gap and then continued along the French Broad River into Tennessee; more recently, Beck (1997) and Hudson (1997:193) agreed that the expedition probably followed a more northerly route along the Toe River. The route through the Swannanoa Gap may have been taken by Juan Pardo, however, who was a Spanish explorer who traversed much of the same area from 1567–1568 (Beck 1997:167; Hudson 1990:27–46, 1997:193).

Whatever the precise routes of these explorers, it is clear that the ancestral Cherokees' first encounter with Europeans occurred in the mid-16th century (and that the Spanish were unlikely to have traversed the Project area). These encounters were to have dramatic effects. The introduction of European diseases to which the native populations had little resistance caused a major reduction in Native American population levels and extensive changes in political organization. Elsewhere in the Southeast, the fragmentation and reformation of political groups resulted in a general decrease in social complexity and the total disappearance of some precontact societies (Smith 1987). Although substantial disruption occurred, the Cherokees managed to retain control of portions of their homeland.

The historic-period Cherokee occupation of western North Carolina is known archaeologically as the Qualla phase (ca. A.D. 1450–1838). Although early formulations of the phase (Dickens 1976) divided it into two segments (Early Qualla, ca. A.D. 1450–1650; and Late Qualla, ca. A.D. 1650–1838), more recent analysts (Riggs and Rodning 2002; Rodning 2004, 2008; Ward and Davis 1999) suggest a tripartite division. Following this latter scheme, the early Qualla phase predates A.D. 1500, and thus was likely contemporaneous with at least the later part of the Pisgah occupations in the region. These authors suggest that Qualla represents an *in situ* development in the Upper Little Tennessee and Hiwassee basins and likely is not a direct derivative of the Pisgah phase. Early Qualla phase ceramics show affinities to the more southern Savannah and Wilbanks styles, and samples from Coweta Creek and 31SW291 are characterized by grit tempered, primarily rectilinear complicated stamped wares (Riggs and Rodning 2002:39), sometimes with "sawtooth" rims. Red filming also occurs (Rodning 2004). Pisgah collared and punctated rims are not an uncommon occurrence with these Early Qualla wares, however, and Early and Late Pisgah ceramics have been identified at Ravensford (Webb and Benyshek 2005). Domestic structure forms during the Early Qualla are the same as Late Pisgah forms (Benyshek and Webb 2008).

Subsequent Middle Qualla phase (ca. A.D. 1500–1700) ceramics are characterized by jar forms with notched appliqué, or more often, folded and notched everted to flared rims, and also by the presence of carinated or cazuela bowls with incised designs. Curvilinear complicated stamping predominates, although rectilinear designs are also present (Rodning 2004). By the Late Qualla phase (post-A.D. 1700), some variations occurred; incised ceramics became much less common, while rectilinear stamped designs, rims with notched appliqué strips or fillets, and check stamping are more common in later, pre-Removal (pre-1838) assemblages.

The Qualla phase subsistence base was mixed, and included cultivation of corn, beans, and other foods as well as wild plant gathering, hunting, and fishing (Dickens 1976:14). The Late Qualla phase is marked by the increasing appearance of European goods at Cherokee sites. Although small triangular projectile points are found in Early and Middle Qualla phase assemblages, their manufacture (and most other stone tools) decreased rapidly with the increasing prevalence of European firearms after A.D. 1700 and widespread access to iron tools (Riggs 1999:52). During this time, Cherokee settlements became increasingly less nucleated, often appearing as a linear array of dispersed houses along streams, and agricultural fields were maintained closer to residential areas. European domesticated animals (especially pigs and chickens) and garden crops (notably sweet potatoes) were adopted by the mid-18th century. By this time and in the years after, traditional Cherokee life was increasingly disrupted by depopulation and demographic changes, and alterations to the traditional economies (Hatley 2006).

Structure forms varied throughout the Qualla phase. Early Qualla phase structures documented at Ravensford include winter-type structures, rounded squares of rigid post construction typically constructed in basins with central support posts and wall trench entryways. These were accompanied by (but not closely paired with) square to rectangular houses of less regular construction that lacked central support posts and entryway trenches. These domestic structures generally mimic the patterns documented at a number of late precontact and contact period sites in the southern Appalachians (e.g., Hally 1988, 1994, 2008; Moore 2002; Polhemus 1987; Rodning 2009a; Steere 2017). A few rounder 15th-century domestic structures were encountered at Coweeta Creek (Rodning 2009a:13). Larger, rectangular structures of more substantial construction appear to represent contemporaneous public buildings at Ravensford (Benyshek and Webb 2009b).

Middle Qualla phase architecture, known from the Coweeta Creek, Macon County Airport (MCA), and McCoy Bridge sites among others, was also similar to late Mississippian (and Early Qualla phase). Domestic structures are typically square with rounded corners and exhibit side or corner entrances and central hearths flanked by four central support posts (e.g., structures 3, 4, and 6 at Coweeta Creek) (Benyshek and Webb 2009b; Idol 2017; Rodning 2009a:11). At MCA these were associated with rectangular summer houses and storage facilities (Benyshek and Webb 2009b). Smaller auxiliary buildings that likely functioned as storehouses are present by the late 17th and early 18th centuries (Benyshek and Webb 2009b; Idol 2016; Shumate et al. 2005). By the end of the Middle Qualla phase (if not before), mounds associated with the cyclical demolishment and reconstruction of public townhouses were a prominent feature of many Cherokee villages and towns (Rodning 2002, 2009b). Contemporary domestic structures in part appear to have been modelled after the designs of the much larger townhouses (Rodning 2009a).

By the end of the 17th century into the 18th century, rectangular summer houses were closely paired with and often connected to winter houses, which were typically octagonal (e.g., Benyshek and Webb 2008; Cable et al. 1997; Marcoux 2010; Shumate et al. 2005; Webb and Benyshek 2008). The late 18th century witnessed a shift toward more European-style architecture (Dickens 1976:15); a final shift from traditional post-in-ground architecture to horizontal cribbed log cabin construction occurred in the 1790s (Riggs 1999:515).

Eighteenth through Twentieth Century Cherokee Settlements

During most of the 18th century, the Cherokees were concentrated in towns and villages throughout much of present-day western North Carolina, eastern Tennessee, and portions of Georgia and South Carolina. The towns in western North Carolina were known as the Middle Towns, the Out Towns, and the Valley Towns; the Lower Towns were situated some distance to the south, the Middle and Valley Towns were located to the southwest, and the Overhill Towns lay to the west, across the mountains in Tennessee (Greene

1996; Smith 1979). The late 18th century was marked by a general shift to a more dispersed settlement pattern (Dickens 1976:15), but some nucleated settlements remained in the region into the 19th century.

The 18th century also brought the continuous arrival of Europeans and the resulting loss of Cherokee lands. Early interaction between the two parties consisted mostly of trade. By the mid-18th century, increased Euro-American settlement began to lead to hostility, and expeditions under Archibald Montgomery and James Grant burned many Cherokee towns in 1760 and 1761. Many Cherokees sided with the British during the American Revolution out of fear of colonial expansion and the loss of more territory. In 1776, after several Cherokee raids, General Griffith Rutherford led a force from Old Fort through present-day Buncombe, Haywood, Jackson, and Macon counties to counter the Cherokee threat. Like the de Soto and Pardo expeditions, the route Rutherford took is open to interpretation. It is believed that his army took a known Native American Indian trail through Swannanoa Gap, down the Swannanoa River and then a short distance up the east bank of the French Broad River, before crossing at Warrior's Ford (Dykeman 1965:34). Rutherford's path continued on to present-day Waynesville and then to the southwest to the Middle and Valley towns (Dean 2012).

With the signing of the Treaty of Hopewell in 1785, the Cherokees lost their remaining lands east of the Blue Ridge, leading to widespread Euro-American settlements east of Asheville (Mooney 1900:61–62). A subsequent treaty in 1791, the Treaty of Holston, resulted in additional cessions by the Cherokees in the west (Mooney 1900:68–77), and a treaty in 1798 ceded additional lands in present-day Buncombe, Henderson, Transylvania, and Haywood counties (Royce 1887:660–661). A third treaty, signed in 1798, ceded additional lands in North Carolina (Riggs 1988:171).

The early 19th century witnessed the increasing acculturation of many Cherokees, largely as a result of increasing contact and intermarriage with white traders and settlers. Other Cherokees resisted changes to their traditional lifestyles, especially those residing in western North Carolina (Riggs 1988:10–11). Accounts by contemporary observers indicate that the population of that area was strongly traditionalist and contained the highest proportion of fullbloods to be found in the Cherokee Nation (McLoughlin and Cosner 1984:224–225).

Most remaining Cherokee land claims in North Carolina were ceded to the U.S. government by the Calhoun Treaty of February 1819 (Royce 1884, 1887), and the signing of the Treaty of New Echota in 1835, which set in motion the forced removal of many of the remaining Cherokees to lands in the Arkansas Territory (Mooney 1900:123–133). The cruelty of this march, known as the Trail of Tears, has been well documented.

Some Cherokees remained in their former lands despite the Treaty of New Echota and the Trail of Tears, however. A sizeable population living along the Oconaluftee and nearby was allowed to remain as a result of their assistance in the Tsali affair. Other Cherokees remained in the vicinity of Cheoah (along Buffalo Creek in present-day Graham County), primarily due to the difficulty in removing them along poor roads (Duggan 1998); in the Valley River area (Greene 2009); and along Cartoogechaye Creek in Macon County (Alexis 1852). Finally, still other Cherokees managed to evade the Army, escaped during the Removal, or, like Junaluska, returned from the Arkansas territory soon afterward. These groups became the nucleus of the Eastern Band of Cherokee (King 1979). After the death of Chief Yonagusta in 1839, they were increasingly assisted by William H. Thomas, a white merchant who was Yonagusta's adopted son. Thomas worked on the Cherokees' behalf for the next 40 years, acquiring land for both individual Cherokees and the tribe. Thomas eventually acquired some 73,000 acres for these communities, mostly within the present-day Qualla Boundary.

POST-CONTACT PERIOD OVERVIEW

Prior to the American Revolutionary War, the Blue Ridge Mountains formed the western boundary of European settlement in North Carolina. The first documented English foray into the French Broad drainage west of the Blue Ridge Escarpment occurred in 1674. This doomed expedition was led by James Needham and included an indentured servant Gabriel Arthur and eight native guides. Financed by a wealthy Virginian, Abraham Woods, the expedition did not provide the profits expected by the financier, but it did begin the opening of the vast lands of the Cherokees, which were coveted by the Euro-American settlers for their natural resources and beauty (Dykeman 1965:27–41).

After the Revolutionary War and the signing of the Treaty of Hopewell, large numbers of Euro-American settlers (mostly Scots-Irish but also English, Welsh, German, and French) moved into western North Carolina (Ager 1981:10; Blethen and Wood 1987:76; Sondley 1930:398). After 1783, Land Act legislation was approved that allowed land sales for western settlements. In addition, war veterans were rewarded with land grants in the west as compensation for time served.

In 1784 Samuel Davidson, his family and a single slave became the first known colonial settlers west of the Blue Ridge Mountains, in what was to become Buncombe County. They settled along the Swannanoa River near Jones Mountain east of Asheville. After Samuel Davidson's death, his brother (Major William Davidson), sister (Rachel Alexander), their families, and several friends followed in his footsteps and established a settlement a year later near the confluence of Bee Tree Creek and the Swannanoa River (Sondley 1930:397–398).

The expansion of settlement into the mountains was rapid. By 1792, the County of Buncombe was created, including present-day Buncombe, Cherokee, Clay, Graham, Henderson, Jackson, Macon, Madison, Polk, Swain, Transylvania, and Yancey counties. Eventually, the Buncombe County Court was established between the Bee Tree Creek settlement and the Reems Creek Valley settlement (northeast of Asheville); the court met on the property of Colonel William Davidson (a cousin of Major William Davidson), near the present-day entrance to the Biltmore Estate (Ager 1981:10–11; Sondley 1930:460). The joining of the two settlements was originally known as Morristown in 1792 (Blackmun 1977:162). In 1794, John Burton was granted 200 acres by the State of North Carolina next to William Davidson's property. Forty-two half-acre lots were laid off and sold on Burton's property along two newly formed roads now known as Broadway and Biltmore Avenue (Powell 1981:33). The town was incorporated in 1797 and renamed Asheville after Governor Samuel Ashe (Van Noppen and Van Noppen 1973:379).

Although, the communities farther east along the Swannanoa River were the first establishments in Buncombe County, Asheville became the dominant city and county seat. By 1800, Asheville had a hatter, a tailor, a blacksmith, an inn, a gristmill, and several merchants (Powell 1981:33). A post office was established in 1800, and the Public Square (now known as Pack Square) was laid out in 1805 (Sondley 1930:648–649; Stroupe et al. 1996). A brick courthouse was built in the square between 1825 and 1833 (Sondley 1930:649). By the early 1800s, Asheville was a stopping point for livestock, as herders moved cattle from Tennessee and Kentucky to market in Georgia and South Carolina along the Buncombe Turnpike (Powell 1981:34). The road ran from Greeneville, Tennessee, to Hot Springs and then along the French Broad into Asheville. From there, the road headed toward Old Fort and then on to Greenville, South Carolina. Most of the roadway was completed by 1827 and helped to contribute to the growth of the town (Blethen and Wood 1987:88). With a higher traffic flow through the region, Asheville experienced an economic and population boom (Powell 1981:34). In addition to drovers, the turnpike also brought in some of Asheville's first tourists. By 1860, the town had a population of 1,100, while 12,654 people resided in Buncombe County (Blackmun 1977:288; Powell 1981:38; Sondley 1930:827–828). Settlement of the Leicester area began in the early 19th century, and by 1829 a post office had been established under the name of Turkey Creek. The area acquired its current name (after the Earl of Leicester) in 1859.

In 1880, the railroad (Western North Carolina Railroad) was established to Asheville from Old Fort, connecting towns that had earlier been served by the Buncombe Turnpike. Just the year before, the first telegraph line was built and a public library opened (Bishir et al. 1999:56; Van Noppen and Van Noppen 1973:379). In 1882, the rail line was completed to the Tennessee state line, and by 1886 the railroad connected Asheville to points in all directions (Bailey et al. 2000). With new and easier access, Asheville experienced a revival in growth. From a population of about 2,600 in 1880, it had swollen to over 10,000 in 1890. By 1920, nearly 28,500 people resided in the town (Sondley 1930:828). In addition to an increase in industries such as logging in Buncombe County, Asheville grew as a resort for leisure and health. In the years after 1880, several sanitariums were opened in the town as many doctors recommended the healthy climate of Asheville and the surrounding area (Van Noppen and Van Noppen 1973:379). As tourism grew, many of the people who visited built second or vacation homes in the Asheville area or returned to invest in local industries.

PREVIOUS ARCHAEOLOGICAL RESEARCH

Western North Carolina has been the subject of archaeological research for over a century, and most trends in the history of North American archaeology are reflected in the region. As early as the 1880s, workers from the Valentine Museum in Richmond investigated several mound sites in the region (Dickens 1976:7), and other early investigations were carried out by the Osbornes (Keel 1976). The museum's work was primarily oriented toward recovering artifacts, although in some cases the resulting data have been useful in addressing present-day research questions (e.g., Dickens 1976:91). Also in the 1880s, researchers from the Smithsonian Institution's Bureau of Ethnology excavated sites in Buncombe and Henderson counties as part of their investigations into the origin of the "Mound Builders" (Thomas 1894). That research was instrumental in demonstrating that the mounds in western North Carolina and elsewhere had in fact been built by American Indians and were not the products of a mysterious, vanished race.

Early 20th century work in western North Carolina continued to focus on mound explorations. Captain R.D. Wainwright examined several mounds in the region in 1913 (Steere et al. 2012), including the now-destroyed Cullowhee mound (31JK2), and between 1915 and 1919, George Heye and associates excavated at the Garden Creek site in Haywood County and other nearby sites (Harrington 1922; Heye 1919; Heye et al. 1918). Although that work was designed to gather artifacts for Heye's Museum of the American Indian in New York, it did provide some data on the antiquity of the Cherokees in the region (Dickens 1976:7–8). Subsequent work in 1933 and 1934 by the Smithsonian Institution at the Peachtree Mound and Village in Cherokee County was also designed to investigate the relationship between the Cherokees and precontact cultures in the area (Setzler and Jennings 1941). Also in the 1930s, George MacPherson (1936a, 1936b) and Hiram Wilburn conducted surveys of numerous sites in Great Smoky Mountains National Park. Although many of their data were to be incorporated into later research (Bass 1975), at the time their work had little impact on the understanding of precontact occupations of the region.

Intensive, systematic work in the Appalachian Summit region did not begin until 1964, when the University of North Carolina instituted the Cherokee Archaeological Project. This project, which lasted until 1971, included large-scale surveys and salvage excavations, as well as intensive investigations of late precontact and historic Cherokee sites (Purrington 1983:98–99; Ward 1979; Ward and Davis 1999:17–18). Data from this project have been reported in several theses, dissertations, and other publications (e.g., Dickens 1976; Egloff 1967; Keel 1976) and provide much of the background information on the Appalachian Summit region. As part of that project, substantial work was conducted at the Warren Wilson site, which documented a Mississippian period Pisgah phase village as well as earlier Woodland period occupations (Keel 1976). Other substantial work was accomplished at Coweta Creek (Rodning 2004), Garden Creek (Keel 1976), Townson (Ward and Davis 1999; 268–271), and at the Tuckasegee site (Dickens 1976).

Beginning in the 1970s, the establishment of Federal cultural resources legislation and management procedures resulted in a large number of archaeological projects in Buncombe County and the rest of western North Carolina. Considerable survey has also been conducted during this time by avocational archaeologists, including the extensive work by Gary Henry (1992) across large parts of Buncombe County.

4. RESEARCH GOALS AND METHODS

RESEARCH GOALS

The goal of the survey was to systematically gather data on any archaeological resources present within the Project area. If significant resources were encountered, the archaeological field data were to be combined with information obtained in the background research to address the nature of the precontact, contact period, and/or post-contact occupations of the area.

RESEARCH METHODS

Specific research methods were utilized for the background studies, field research, analysis, and reporting stages of the Project, as outlined below.

Background Research

Background research was conducted to gather information on any known cultural resources on or adjacent to the Project area and included examination of the following materials:

- Archaeological site files, reports, and data on file at the OSA in Asheville;
- Published and on-line information regarding cemeteries in the Project vicinity; and
- Historical maps and other data available on-line and in TRC's collection.

Field Methods

The archaeological survey complied with all pertinent state and federal regulations, including the North Carolina Office of State Archaeology's (OSA) *Archaeological Investigation Standards and Guidelines* (OSA 2017). The field survey was conducted by a team of from one to four, consisting of the Field Director and up to three Archaeological Technicians, and required approximately 26 person-days.

As discussed with the OSA, the survey included intensive survey of all parts of the drainages where either Stream Restoration or Stream Enhancement I work is proposed. The Project APE was considered to extend approximately 50 feet (ca. 15 m) on either side of the drainages. Those areas were shovel tested at 20-m intervals, except for areas with greater than 10 percent slope, excellent surface visibility, or heavily disturbed or eroded areas. Additional 10-m interval delineation shovel tests were excavated along the APE when subsurface cultural artifacts were recovered; additional delineation shovel tests were often excavated at 5-m intervals to maximize information on sites within the narrow Project corridors. In addition to the shovel testing, exposed ground surfaces were visually inspected for surface artifacts and any evidence of above-ground cultural resources (i.e., chimney falls, modern graves or cemeteries, etc.).

Each shovel test measured 30 to 35 cm in diameter and was excavated to sterile subsoil. All removed soil (excluding obvious fill) was screened through ¼-inch mesh for uniform artifact recovery. Each shovel test was described in terms of depth, soil texture, Munsell soil color, and artifact recovery. All shovel test locations were recorded using a handheld Trimble Geo7X Global Positioning System (GPS) in NAD 27 coordinates and drawn on the Project map.

Laboratory Methods

All artifacts were returned to the TRC Asheville office for processing and analysis. The artifacts were washed and then sorted into categories according to established regional types or styles. All artifact data were entered into a Microsoft Excel spreadsheet.

Lithic Artifact Analysis. Lithic artifacts were first sorted into general flaked tool and debitage categories and non-flaked stone categories. The following categories were considered in the more detailed analysis, although not all are represented in the assemblage.

Hafted Biface. This category includes finished bifaces or unifaces exhibiting modification of the basal element to facilitate hafting and symmetrical, or occasionally asymmetrical edges converging to a point, if they are considered complete. They are traditionally considered to be projectile points and are frequently referred to as "points", but it is recognized that they may also function as hafted or unhafted knives so the designation projectile points/knives (PPKs) is used here. Still other artifacts in this category may have instead been used as perforators/drills. These artifacts are generally temporally diagnostic, although some Project examples could not be assigned to specific types. Regionally relevant projectile point typologies are found in several sources, including Cambron and Hulse (1975), Justice (1987), Keel (1976), Oliver (1985), and Whatley (2002).

Biface Preform. This category includes unfinished bifaces or unifaces that seem to result from primary flaking. These specimens exhibit developed shaping through the removal of primary trimming flakes after initial reduction. In the literature, these specimens are commonly labeled as "preforms" or "blanks."

Debitage. Debitage fragments are the byproduct of lithic tool manufacture. Count, weight, raw material, and size category were recorded for debitage. Most debitage was classified only by size (i.e., true flakes with platforms present and shatter lacking discernible platforms were not differentiated, mainly due to the amount of time required to accurately orient the flake and ambiguity encountered in platform characteristics). Similarly, the presence or absence of cortex was generally not noted, in part because of ambiguity on small flakes.

Raw Material Identification. Chipped stone raw materials were identified based on macroscopic characteristics. Categories recognized in the lithic assemblage include quartzite, quartz, and chert.

Ceramic Artifacts. All sherds greater than 2 cm were classified by surface decoration and aplastic content; the smaller sherds were counted and received no further analysis. The aplastic (inclusion) content was documented as the type (or raw material) of the major material present (e.g., crushed quartz, shell, or sand). Sand temper was identified using fine (< 0.25 mm), medium (0.25–0.5 mm), or coarse (>0.5 mm) categories. The coarse sand category may represent the "grit" tempered designation used by some researchers in the area. In sherds that appeared to have both crushed quartz/other rock and sand temper within the same vessel, temper was recorded as such. This category was also used when a determination could not be made whether or not crushed material (mainly quartz/quartzite) was used; the angular nature of the natural gravel and sand deposits in local streams and rivers often makes that determination difficult within a single sherd.

Historic Artifact Analysis. Historic artifacts were classified where possible according to published artifact descriptions. Ceramic artifacts were classified according to type (i.e. porcelain, whiteware, ironstone), and any decoration present was described. Rim and base fragments were identified. Metal objects were classified by function where possible. Other non-modern (i.e., pre-1969) artifacts were categorized according to material type and apparent function.

Curation

Curation. The Project materials are being prepared for curation in accordance with OSA standards and are currently stored in the TRC Asheville office. The landowner Neal Morgan has requested that all artifacts be returned to him at the end of the Project.

NRHP Eligibility Evaluation

The NRHP eligibility of the previously recorded sites 31BN338, 31BN455, and 31BN456 was considered in light of the NRHP *Eligibility Criteria* as outlined in 36 CFR 60.4 (USDOI 1991). The NRHP Eligibility Criteria state:

> The quality of significance in American history, architecture, archeology, engineering, and culture is present in districts, sites, buildings, structures and objects that possess integrity of location, design, setting, materials, workmanship, feeling and association.
>
> (a). That are associated with events that have made a significant contribution to the broad patterns of our history; or
>
> (b). That are associated with the lives of persons significant in our past; or
>
> (c). That embody the distinctive characteristics of a type, period, or method of construction; or that represent the work of a master, or that possess high artistic values; or that represent a significant and distinguishable entity whose components may lack individual distinction; or
>
> (d). That have yielded, or may be likely to yield, information important in prehistory or history.

Several factors were considered in assessing site significance and research potential under Criterion D, including artifact variety and quantity, site clarity and integrity, and environmental context (Glassow 1977).

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5. RESULTS

BACKGROUND RESEARCH

Previously Identified Resources

Archaeological Sites. A review of files and records at the OSA confirmed that while the Project had not been previously surveyed for regulatory compliance purposes, there are 13 previously identified sites situated nearby, both within and immediately adjacent to the Project APE (Table 5.1). All 13 sites were initially recorded by avocational archaeologist V. Gary Henry in the late 1980s and early 1990s based on surface collections. All are located within agricultural and livestock fields, and site boundaries are generally demarcated by existing tributaries, farm roads, and/or property lines. Five sites (31BN265, 31BN266, 31BN411, 31BN413, and 31BN415) cross into the current Project along Project tributaries T1, T3, T5, and T6 (see below).

Henry collected artifacts from these sites on numerous occasions from 1986 to 2009; the assemblages include a wide range of PPK types, including Palmer, Stanly, Morrow Mountain, Guilford, Savannah River, Otarre, Gypsy, Swannanoa, Lamoka, Coosa, and Connestee and Pisgah, along with nondiagnostic PPK fragments, chipped and groundstone tools and lithic debitage, suggesting generally multi-component sites dating from the Early Archaic into the Mississippian periods. Additionally, sites 31BN264–31BN268 produced low densities of precontact ceramic sherds, including simple stamped and rectilinear complicated stamped surface decorated sherds suggesting Woodland to Mississippian period occupations.

Table 5.1. Previously Recorded Sites within or adjacent to the Morgan Branch Project.

Site	Component(s)	NRHP Status	Reference
31BN264	Precontact: Archaic–Mississippian	Unassessed	Site form (Henry 1986)
31BN265*	Precontact: Archaic–Woodland	Unassessed	Site form (Henry 1986)
31BN266*	Precontact: Archaic–Mississippian	Unassessed	Site form (Henry 1986)
31BN267	Precontact: Archaic–Mississippian	Unassessed	Site form (Henry 1986)
31BN268	Precontact: Middle Archaic	Unassessed	Site form (Henry 1986)
31BN411*	Precontact: nondiagnostic lithic	Unassessed	Site form (Henry 1990)
31BN412	Precontact: Middle Archaic	Unassessed	Site form (Henry 1990)
31BN413*	Precontact: Early Archaic–Early Woodland	Unassessed	Site form (Henry 1990)
31BN414	Precontact: nondiagnostic lithic	Unassessed	Site form (Henry 1990)
31BN415*	Precontact: Early Archaic	Unassessed	Site form (Henry 1990)
31BN418	Precontact: Woodland–Mississippian	Unassessed	Site form (Henry 1990)
31BN465	Precontact: Early Archaic–Middle Woodland	Unassessed	Site form (Henry 1990)
31BN546	Precontact: Early Archaic–Middle Woodland	Unassessed	Site form (Henry 1992)

*Revisited during the current survey.

Another 56 previously recorded archaeological sites are located within a one-mile radius of the Project (Table 5.2). All but two of these sites were either recorded or revisited by Henry. Only one of those sites has been determined not eligible for the NRHP, while the remaining 55 are unassessed. Based on the site forms, most of those sites produced lithic artifacts, generally dating from the Late Paleoindian or Archaic period through the Middle Woodland period.

Table 5.2. Additional Previously Recorded Sites within One Mile of the Project.

Site	Component(s)	NRHP Status	Reference
31BN64	Precontact: Middle Archaic–Middle Woodland*	Unassessed	Site form (UNCCH 1941) (Henry 1984–1998)
31BN65	Precontact: Unspecified lithic and ceramic	Unassessed	Site form (Egloff 1964)
31BN187	Precontact: Archaic–Mississippian*	Unassessed	Site forms (Henry 1984–1998, Errante 2002)
31BN188	Precontact: Late Paleoindian–Mississippian*	Unassessed	Site form (Henry 1984–2009)
31BN189	Precontact: Early Archaic–Early Woodland*	Unassessed	Site form (Henry 1984–1990)
31BN190	Precontact: Late Paleoindian–Middle Woodland*	Unassessed	Site form (Henry 1984–1999)
31BN191	Precontact: Late Paleoindian–Mississippian*	Unassessed	Site form (Henry 1984–1999)
31BN192	Precontact: Archaic–Woodland*	Unassessed	Site form (Henry 1984)
31BN224	Precontact: Early Archaic–Middle Woodland*	Unassessed	Site form (Henry 1985–1993)
31BN255	Precontact: Late Paleoindian–Mississippian*	Unassessed	Site form (Henry 1986–2015)
31BN256	Precontact: Middle Archaic–Middle Woodland*	Unassessed	Site form (Henry 1986–1992)
31BN260	Precontact: Archaic–Mississippian	Unassessed	Site form (Henry 1986–2003)
31BN261	Precontact: Archaic–Mississippian	Unassessed	Site form (Henry 1986–2007)
31BN262	Precontact: Early Archaic–Middle Woodland*	Unassessed	Site form (Henry 1986–2007)
31BN263	Precontact: Late Paleoindian–Mississippian*	Unassessed	Site form (Henry 1986–2003)
31BN295	Precontact: Late Paleoindian–Mississippian**	Unassessed	Site form (Henry 1987)
31BN320	Precontact: Woodland–Mississippian*	Unassessed	Site form (Henry 1989)
31BN395	Precontact: Middle–Late Archaic*	Unassessed	Site form (Henry 1989)
31BN396	Precontact: Late Archaic*	Unassessed	Site form (Henry 1989)
31BN397	Precontact: Paleoindian–Woodland*	Unassessed	Site form (Henry 1989)
31BN416	Precontact: Middle Archaic*	Unassessed	Site form (Henry 1990)
31BN417	Precontact: Early Woodland*	Unassessed	Site form (Henry 1990)
31BN434	Precontact: Nondiagnostic lithic	Unassessed	Site form (Henry 1990)
31BN436	Precontact: Late Archaic; Middle Woodland; Early Mississippian*	Unassessed	Site form (Henry 1997)
31BN448	Precontact: Middle–Late Archaic, Early Woodland*	Unassessed	Site form (Henry n.d.)
31BN458	Precontact lithic; Middle Archaic–Early Woodland*	Unassessed	Site form (Henry 1994)
31BN459	Precontact: Middle Archaic*	Unassessed	Site form (Henry 1994)
31BN466	Precontact: Paleoindian–Mississippian*	Unassessed	Site form (Henry 1994)
31BN476	Historic: 20th century	Not eligible	Site form (Jenkins 2001)
31BN477	Precontact: Archaic–Woodland*	Unassessed	Site form (Henry 1964)
31BN484	Precontact: Late Paleoindian–Early Mississippian*	Unassessed	Site form (Henry 2006)
31BN485	Precontact: Middle Archaic*	Unassessed	Site form (Henry n.d.)
31BN509	Precontact: Archaic to Early Woodland*	Unassessed	Site form (Henry 1994)
31BN510	Precontact: Nondiagnostic lithic	Unassessed	Site form (Henry 1992)
31BN511	Precontact: Middle Archaic to Early Woodland*	Unassessed	Site form (Henry 1996–1998)
31BN512	Precontact: Paleo-Indian, Middle to Late Archaic, Middle to Late Woodland*	Unassessed	Site form (Henry 1996–1999)

Table 5.2. Additional Previously Recorded Sites within One Mile of the Project.

Site	Component(s)	NRHP Status	Reference
31BN525	Precontact: Early Archaic to Middle Woodland*	Unassessed	Site form (Henry 1992–1993)
31BN550	Precontact: Early Archaic to Middle Woodland*	Unassessed	Site form (Henry n.d.)
31BN551	Precontact: Late Paleo-Indian*	Unassessed	Site form (Henry 1992)
31BN552	Precontact: Middle Archaic*	Unassessed	Site form (Henry 1992)
31BN553	Precontact: Nondiagnostic lithic	Unassessed	Site form (Henry 1992)
31BN557	Precontact: Nondiagnostic lithic	Unassessed	Site form (Henry 1992)
31BN562	Precontact: Middle to Late Woodland*	Unassessed	Site form (Henry 1993)
31BN565	Precontact: Woodland*	Unassessed	Site form (Henry 1992)
31BN567	Precontact: Woodland*	Unassessed	Site form (Henry 1992)
31BN568	Precontact: Nondiagnostic lithic	Unassessed	Site form (Henry 1992)
31BN593	Precontact: Late Paleo-Indian to Mississippian*	Unassessed	Site form (Henry 1992)
31BN652	Precontact: Nondiagnostic lithic	Unassessed	Site form (Henry n.d.)
31BN661	Precontact: Nondiagnostic lithic	Unassessed	Site form (Henry 1996)
31BN664	Precontact: Nondiagnostic lithic	Unassessed	Site form (Henry n.d.)
31BN736	Precontact: Middle Archaic*	Unassessed	Site form (Henry 2002)
31BN811	Precontact: Nondiagnostic lithic	Unassessed	Site form (Henry 2005)
31BN949	Precontact: Early Archaic to Middle Woodland*	Unassessed	Site form (Henry 2009)
31BN951	Precontact: Middle Archaic*	Unassessed	Site form (Henry 2009)
31BN1005	Precontact: Middle Archaic–Early Woodland*	Unassessed	Site form (Henry 2014)
31BN1007	Historic: 19th–20th century	Not eligible	Site forms (Henry 2014, Southerlin 2014)

*Components as recorded on site form.

Structures. The HPO database (HPOweb 2019) indicates that there are no documented structures located within the Project area. However, there are two surveyed only structures (BN0331 [David Cole House] and BN0471 [Parker Hutchinson House] located within a mile radius of the Project to the south and southeast.

Cemeteries. On-line databases (http://cemeterycensus.com/nc/bunc/index.htm; www.findagrave.com) do not appear to list any cemeteries on or adjacent to the Project, and no cemeteries are shown on the historic period maps consulted for the Project.

Historic Map Review

A series of late 19th through 20th century maps were examined to gather information on historic period land use and assess the potential for unrecorded historic period sites in the vicinity. The earliest examined topographic maps including the Project area are the 1894 and 1901 USGS 1:125,000-scale Asheville quadrangles (Figures 5.1 and 5.1) (USGS 1894, 1901), both of which are imprecise by modern standards. Both maps depict a road leading up Morgan Branch from Newfound Road; the 1901 map also depicts a number of farmsteads scattered along the road. The 1920 Buncombe County soils map (Perkins et al. 1923) depicts a similar pattern. Subsequent 1936 and 1941 editions of the Canton and Enka 1:24,000-scale USGS quadrangles (Figures 5.5 and 5.6) (USGS 1936a, 1936b, 1941a, 1941b) depict a similar dispersed settlement pattern, which continues to be present in the area today.

Summary. In summary, the background research confirmed that a number of precontact archaeological sites have been previously identified in the area, although their boundaries are somewhat generalized and it was unclear if they extended into the Project APE. The historic map confirmed the likely existence of 19th century resources in the general vicinity but provided no indications that 19th to early 20th century structures have existed within the APE.

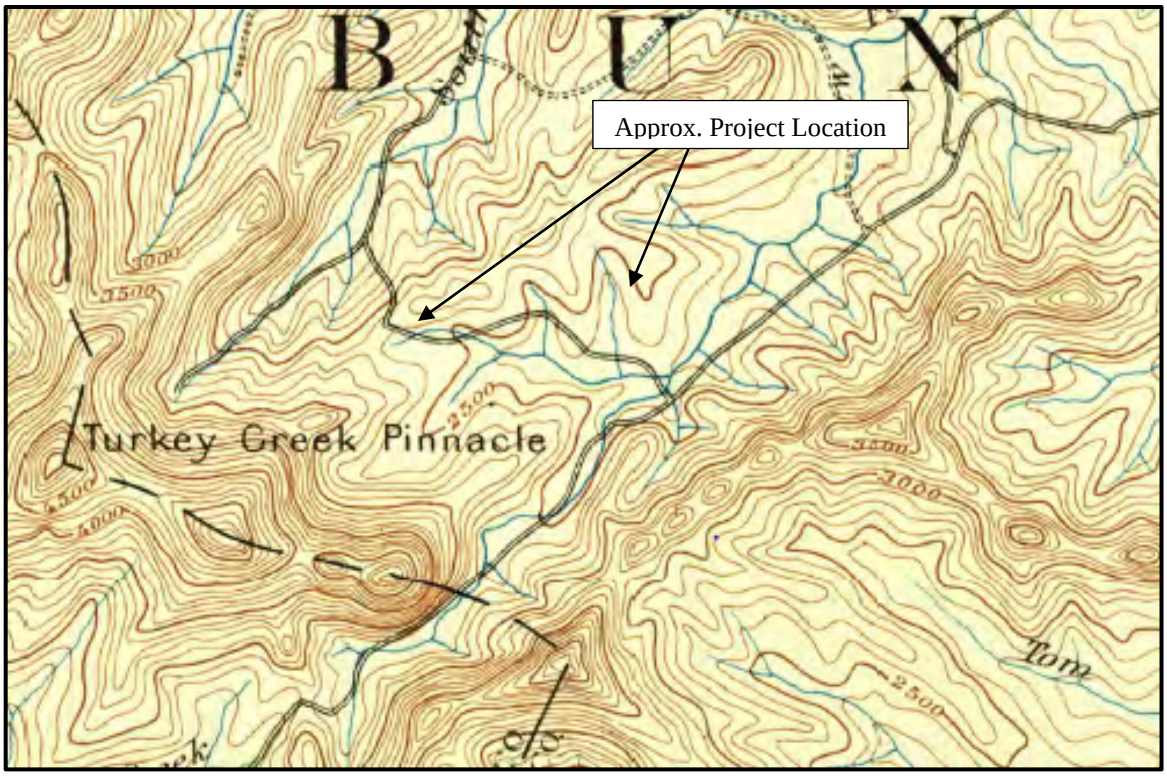

Figure 5.1. The approximate Project location as shown on the 1894 1:125,000-scale Asheville topographic quadrangle.

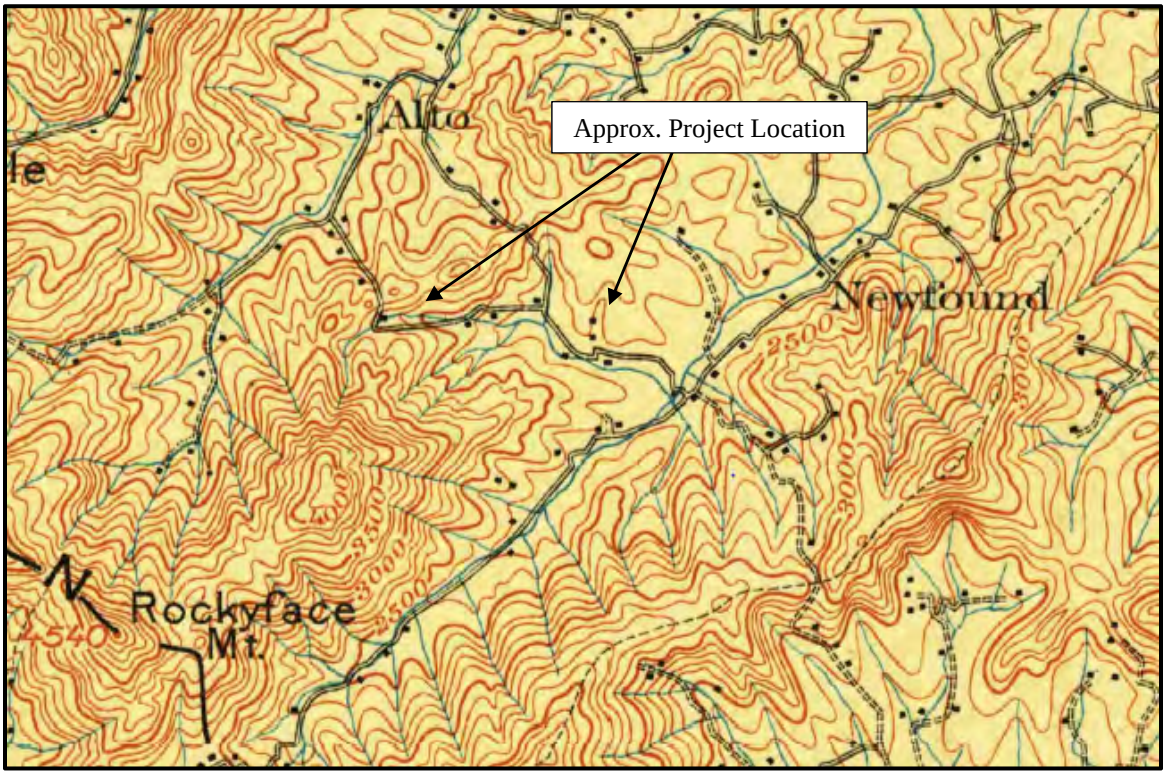

Figure 5.2. The approximate Project location as shown on the 1901 1:125,000-scale Asheville topographic quadrangle.

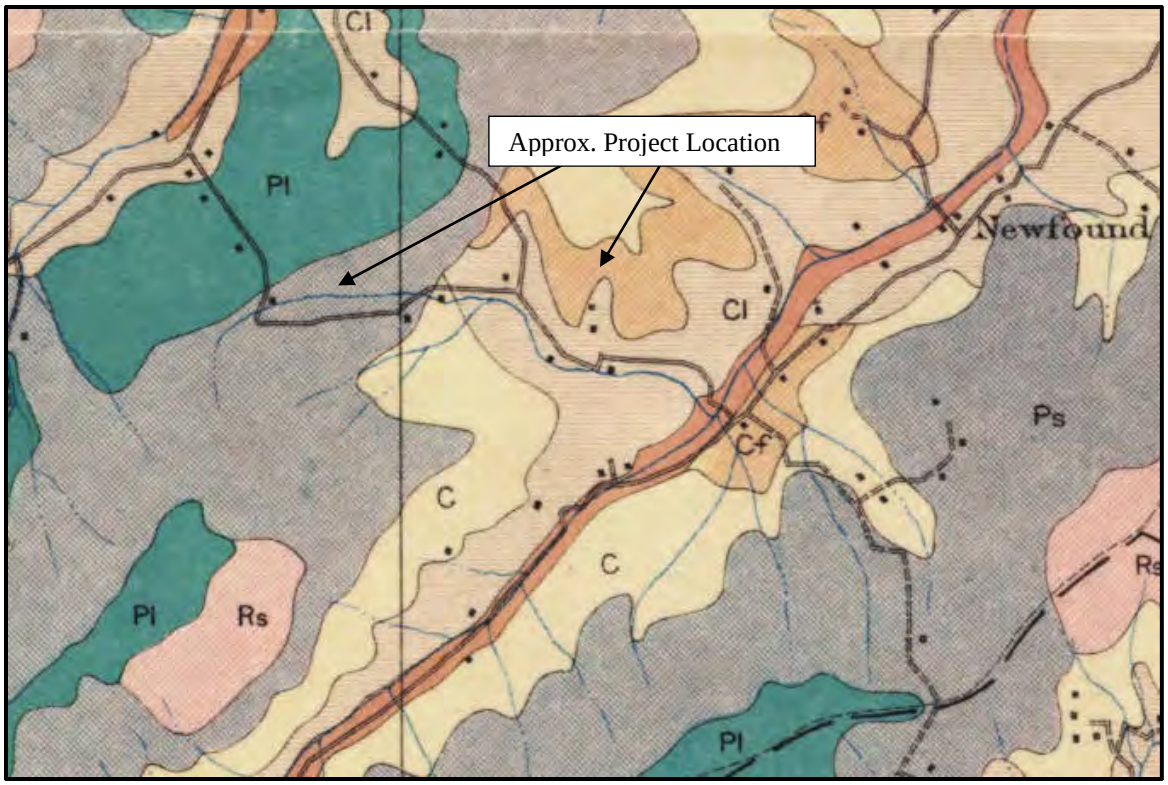

Figure 5.3. The approximate Project location as shown on the 1920 Buncombe County soils map.

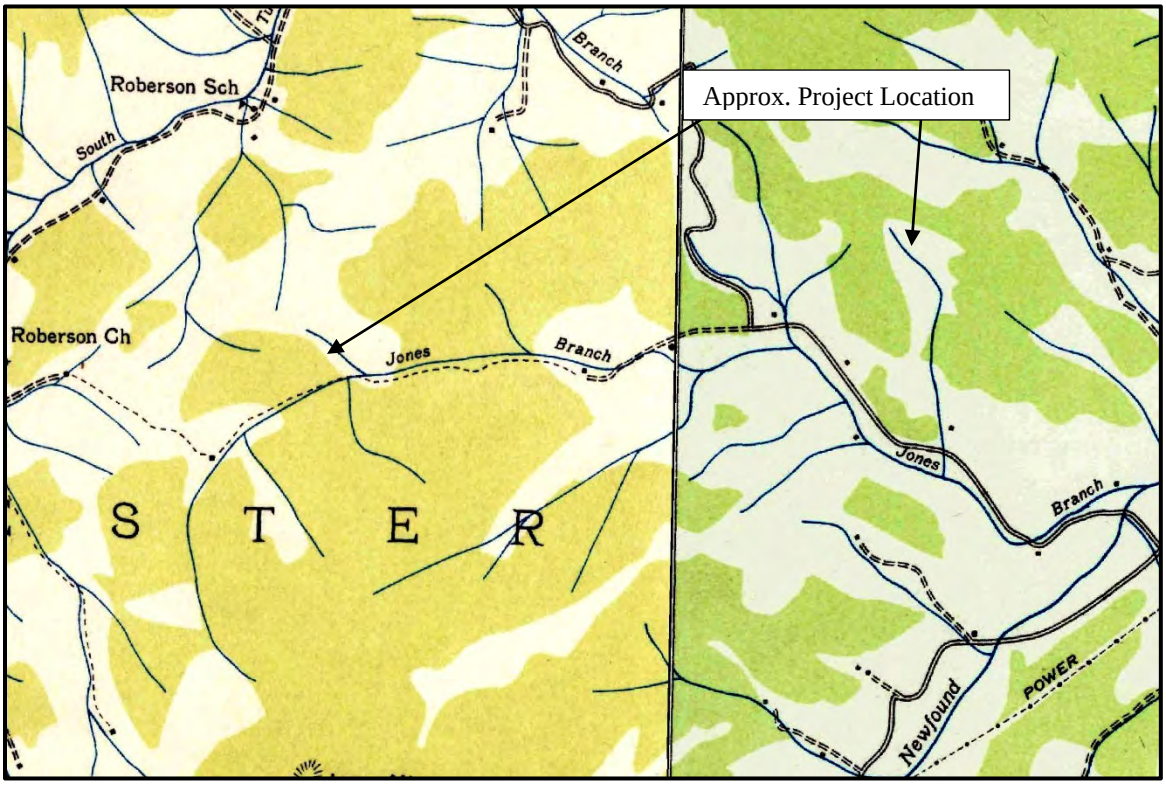

Figure 5.4. The approximate Project location as shown on the 1935 1:24,000-scale Enka and Canton planimetric quadrangles.

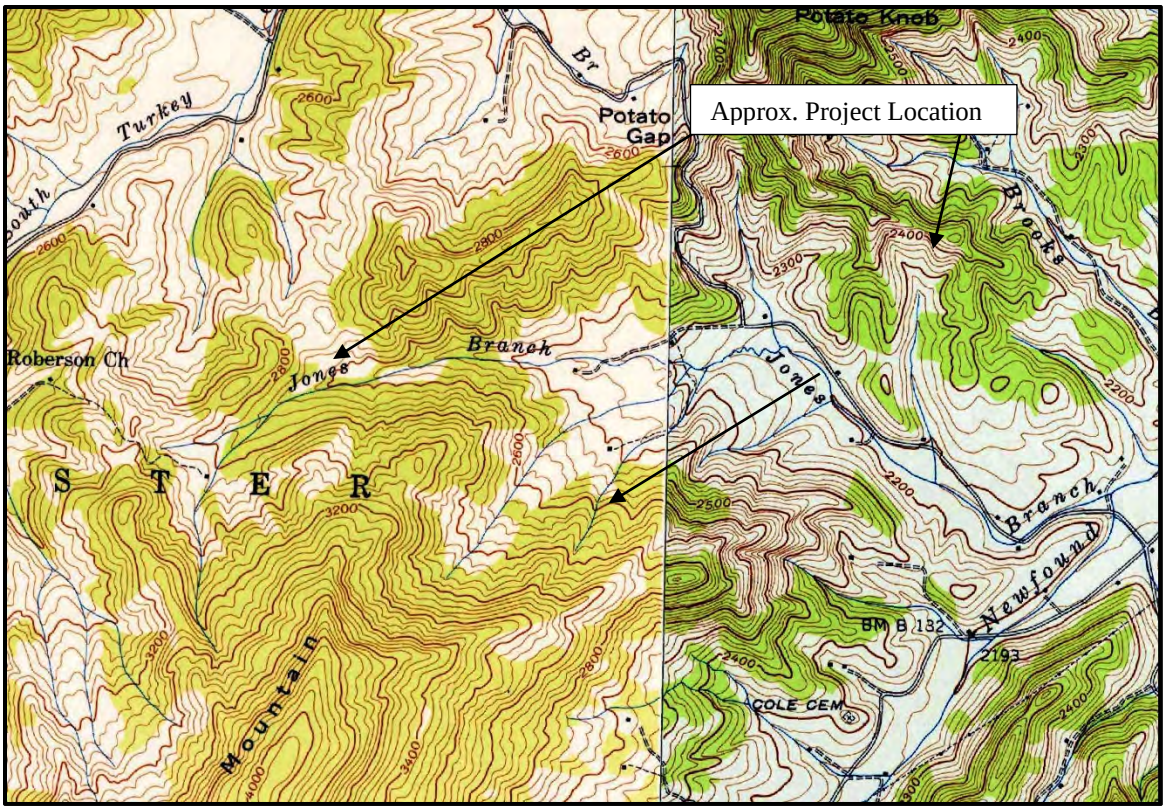

Figure 5.5. The approximate Project location as shown on the 1941 1:24,000-scale Enka and Canton topographic quadrangles.

ARCHAEOLOGICAL FIELD SURVEY

The fieldwork for the Morgan Branch Project included intensive survey of portions of all nine tributaries to be affected by the Project (see Figure 1.3) and involved the excavation of 230 shovel tests along both sides of approximately 14,548 feet (ca. 4,434 m) of stream corridor (Table 5.3). Thirty-three of the 230 shovel tests (14.3 percent) produced precontact ceramic or lithic artifacts, and five (2.2 percent) produced historic period artifacts. Seven sites (31BN265, 31BN266, 31BN411, 31BN413, 31BM415, 31BM1088, and 31BM1089) were relocated or identified (Figures 5.6 and 5.7; Table 5.4); those sites are discussed below in order by site number. No evidence of sites 31BN264, 31BN267, 31BN268, 31BN412, 31BN414, 31BN418, 31BN465, or 31BN545 was encountered, and those sites apparently do not extend into the Project APE.

Table 5.3. Survey Results by Tributary.

		Shovel Tests			
Tributary	Intensively Surveyed (feet)	Total	Pre.	Hist.	Sites Identified
1	1,110	26	2	0	31BN415
2	671	3	0	0	None
3	1,257	28	2	0	31BN413
4	3,103	14	0	0	None
5	1,715	47	19	2	313BN265, 31BN266
6	973	40	5	2	31BN411
7	1,682	39	4	0	31BN1089
8	393	5	1	1	31BN1088
9	3,644	29	0	0	None

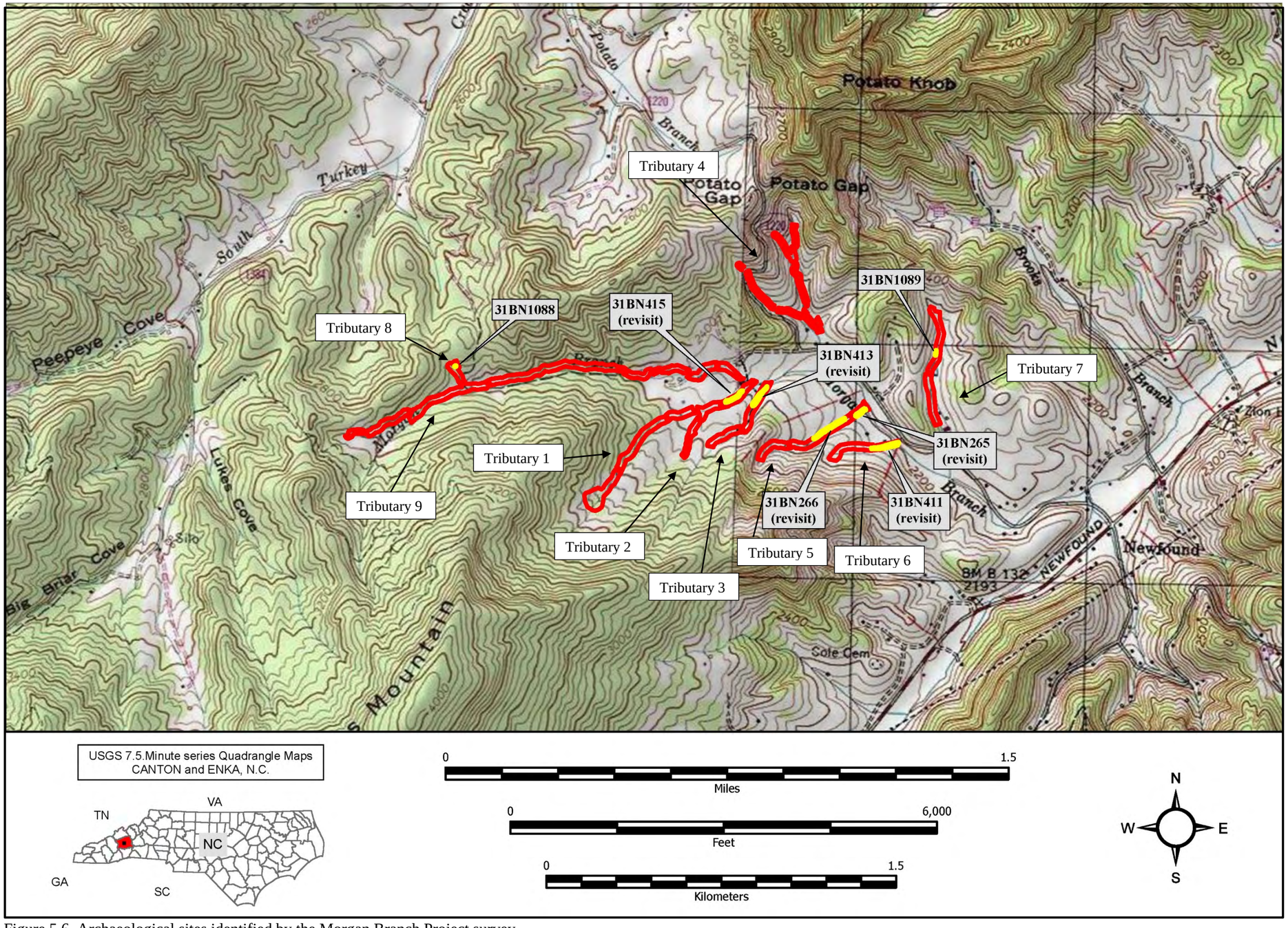

Figure 5.6. Archaeological sites identified by the Morgan Branch Project survey.

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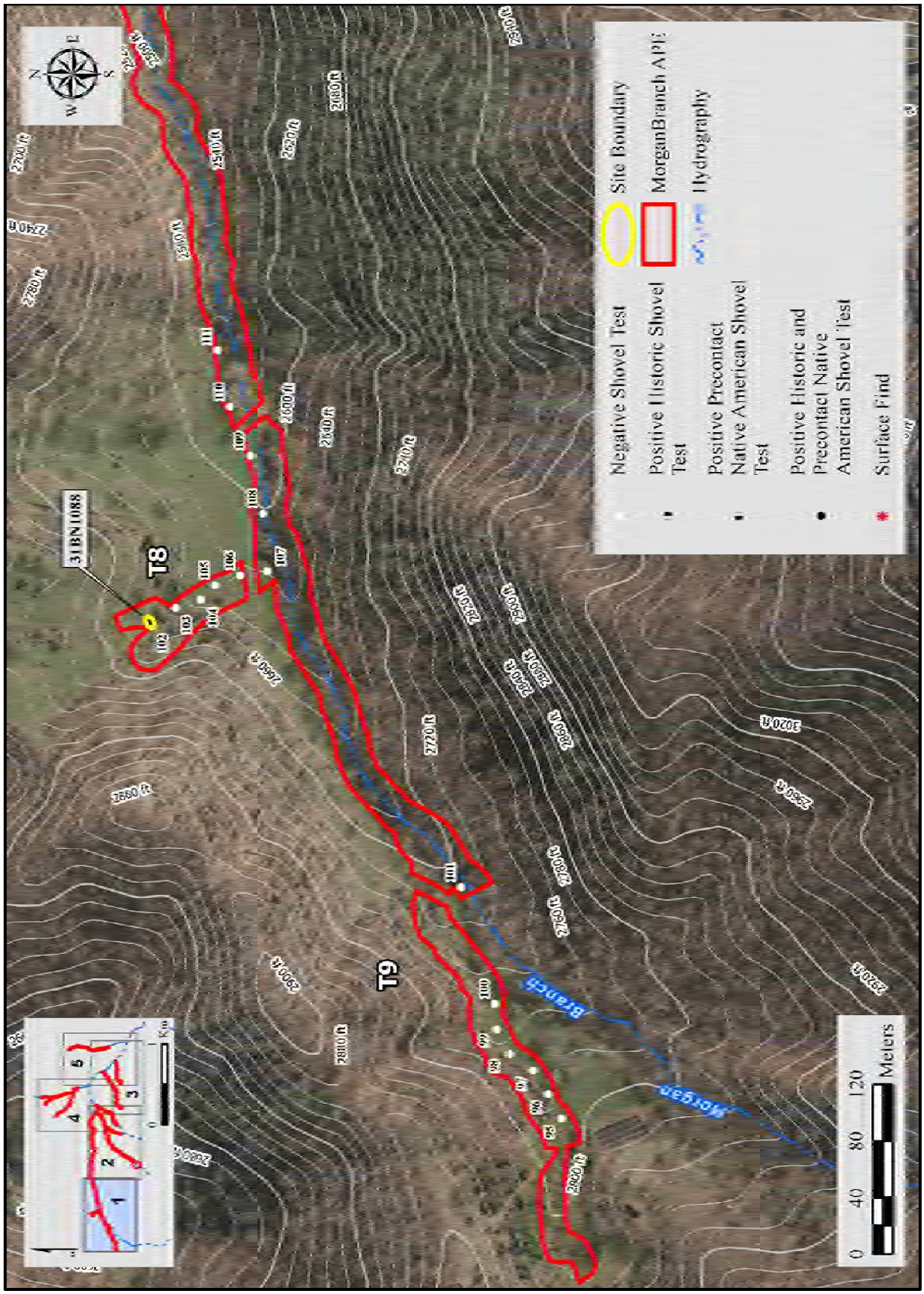

Figure 5.7a. Shovel tests and archaeological sites identified (sheet 1 of 5).

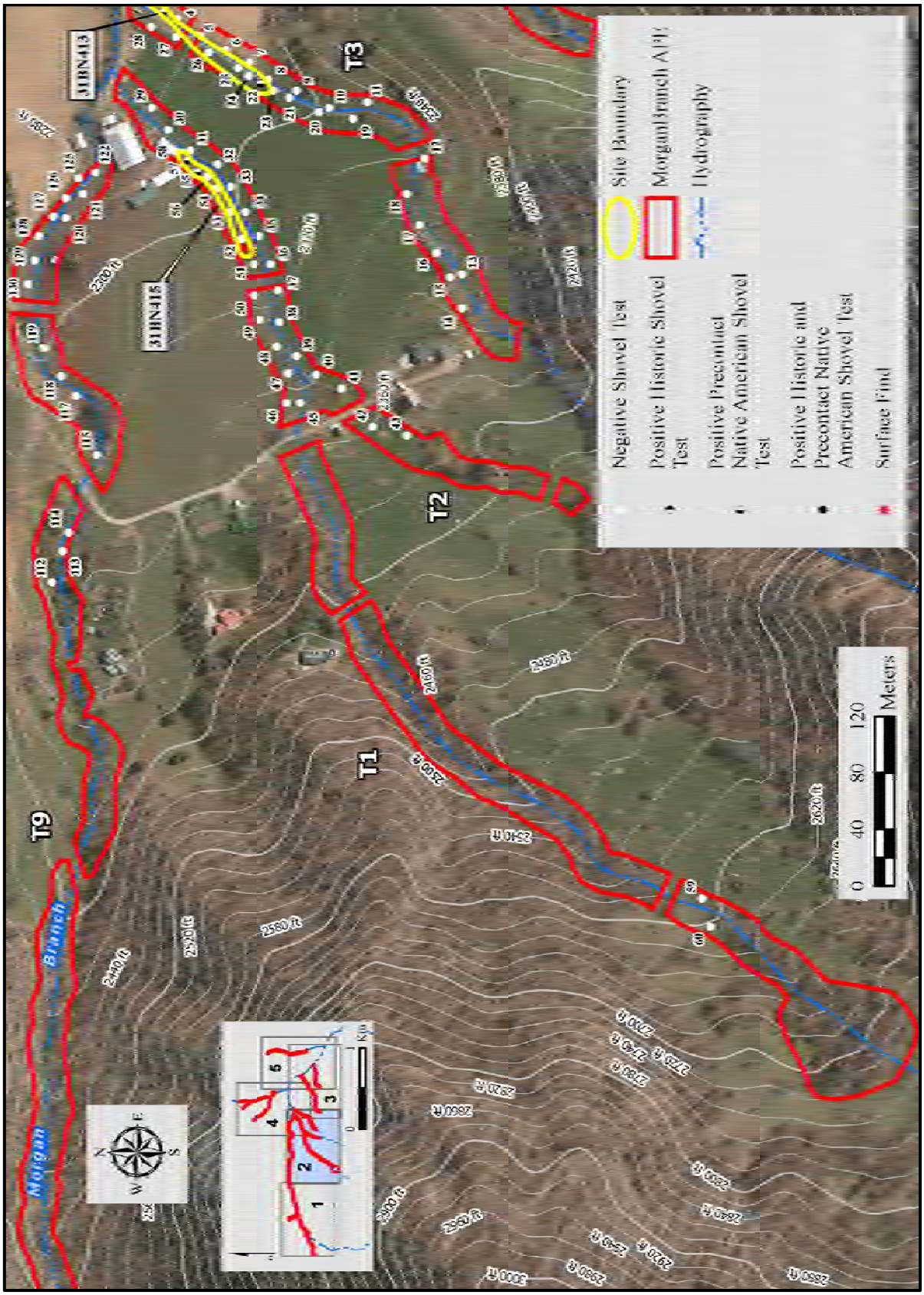

Figure 5.7b. Shovel tests and archaeological sites identified (sheet 2 of 5).

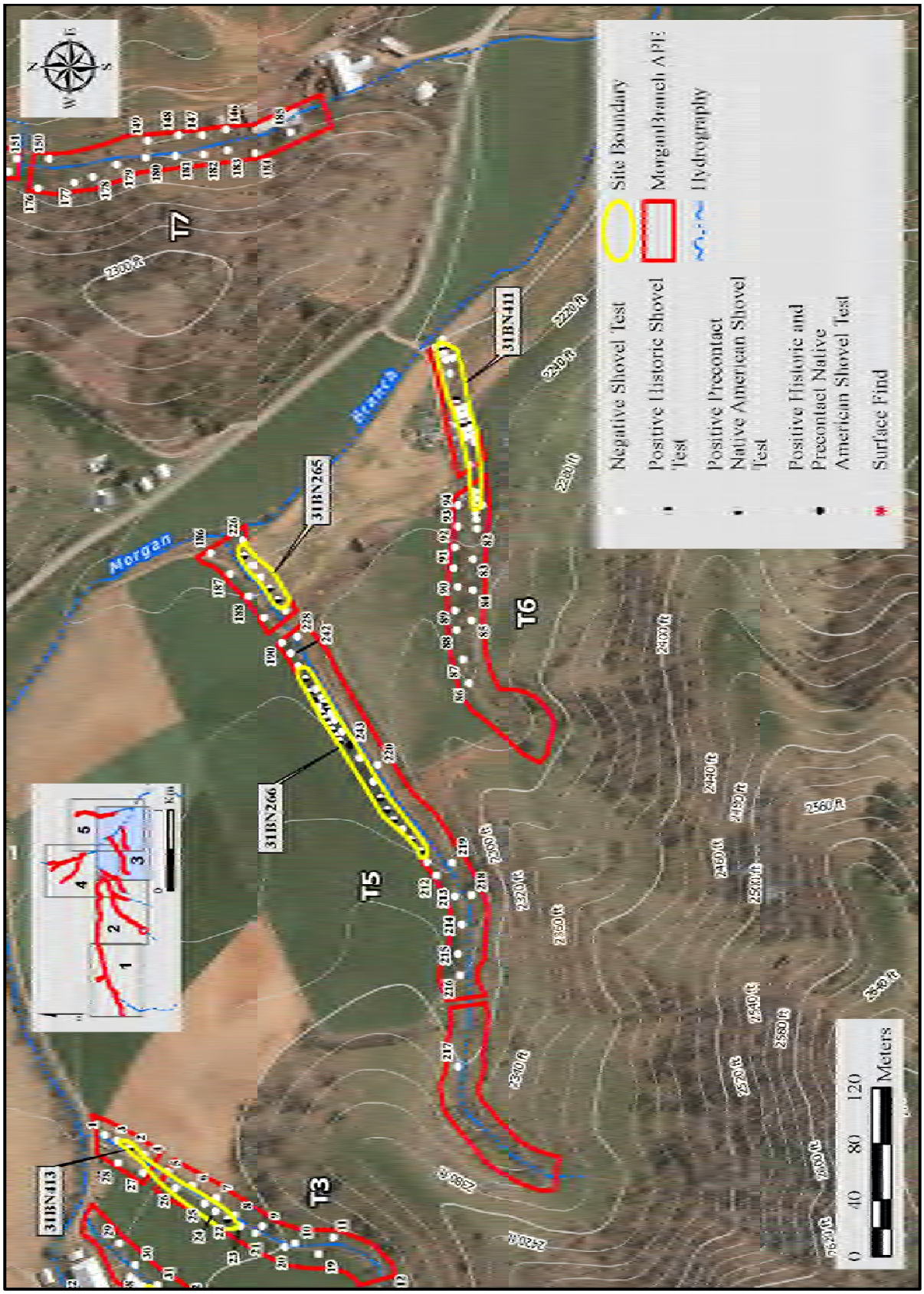

Figure 5.7c. Shovel tests and archaeological sites identified (sheet 3 of 5).

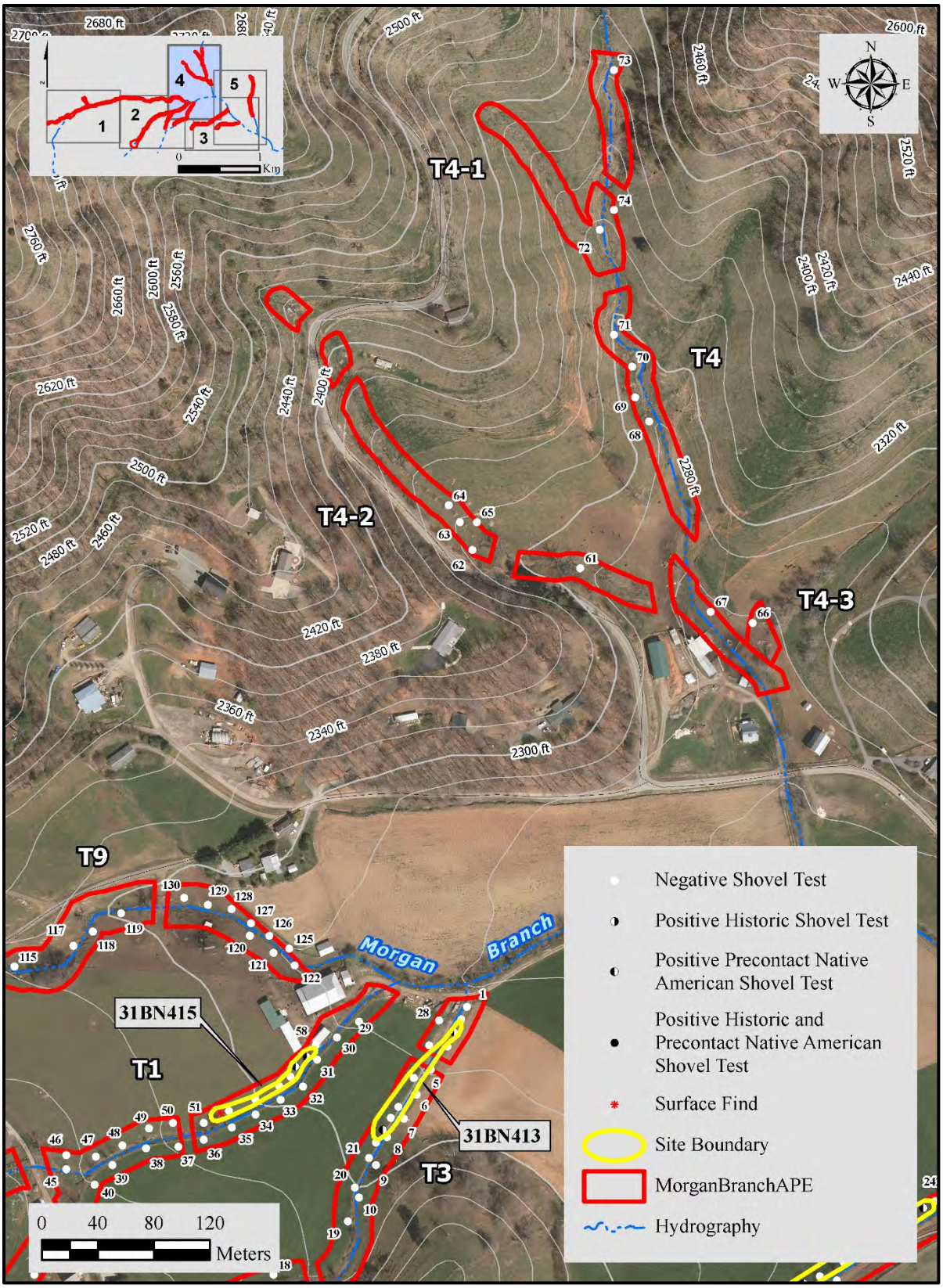

Figure 5.7d. Shovel tests and archaeological sites identified (sheet 4 of 5).

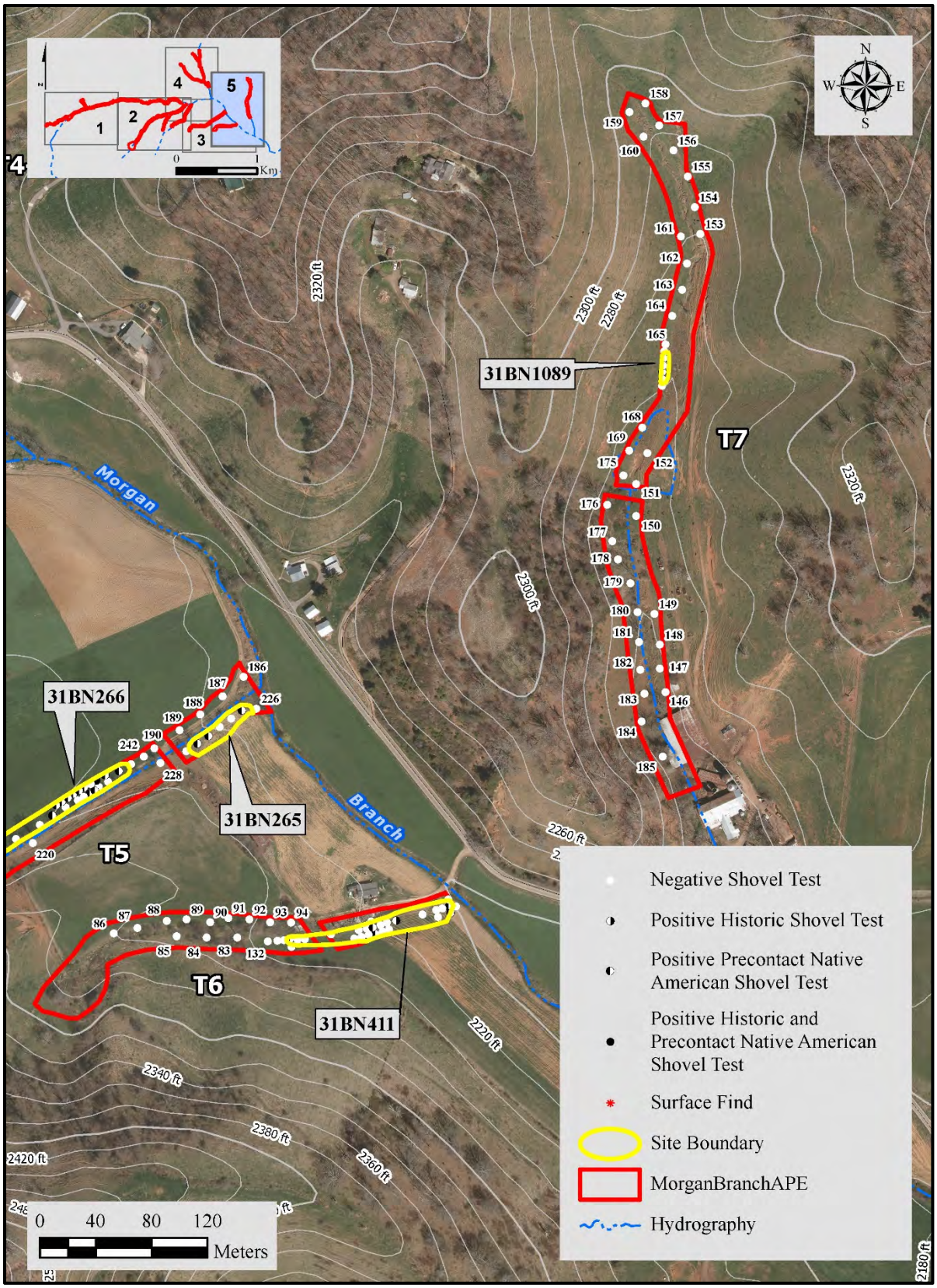

Figure 5.7e. Shovel tests and archaeological sites identified (sheet 5 of 5).

Table 5.4. Archaeological Sites Identified or Revisited by the Morgan Branch Project Survey.

		Shovel Tests			Artifacts				NRHP
Site #	**Component(s)***	**Total[1]**	**Pre.**	**Hist.**	**Cer.**	**Lith.**	**Hist.**	**Total**	**Recommendation**
31BN265	Precontact: nondiagnostic lithic and ceramic	7	3	0	3	1	0	4	Not Eligible within Project APE
31BN266	Precontact: nondiagnostic lithic and ceramic; Historic: 19th to 20th centuries	29	16	2	10	28	2	40	Not Eligible within Project APE
31BN411	Precontact: nondiagnostic lithic, Mississippian (Pisgah phase); Historic: late 19th to 20th century	28	5	2	10	1	3	14	Not Eligible within Project APE
31BN413	Precontact: nondiagnostic lithic	13	2	0	0	2	0	2	Not Eligible within Project APE
31BN415	Precontact: nondiagnostic lithic, Mississippian (Pisgah phase)	8	2	0	2	1	0	3	Not Eligible within Project APE
31BN1088	Precontact: nondiagnostic lithic; Historic: 19th to early 20th century	1	1	1	0	1	1	2	Not Eligible within Project APE
31BN1089	Precontact: Nondiagnostic lithic and ceramic	7	4	0	2	20	0	22	Not Eligible within Project APE

* Based on Project results only

[1] Includes all shovel tests within 15 m of positive tests

31BN265

Components:	Precontact: Nondiagnostic lithic and ceramic
Site Dimensions*:	50 m E-W × 10 m N-S
UTMs (NAD 27):	E342019 N3941900
Landform:	Terrace
Elevation:	ca. 2,221 ft AMSL
Soil Type:	Unison loam, 8–15% slopes (UnC)
Recommendation:	Not eligible (all four NRHP criteria) within Project APE

*Site measurements based on artifact distribution within the Project APE only; site likely extends outside APE

Description. Site 31BN265 was initially recorded by local avocational archaeologist V. Gary Henry during pedestrian survey in 1986 and was revisited by Henry in 1997 and 2002. Based on information provided on the site form, 31BN265 is a high-density scatter of precontact lithic artifacts and a low-density scatter of precontact ceramic artifacts located in an open field west of Morgan Branch and Morgan Branch Road, south of Project Tributary 5. According to the site form, Henry collected projectile points dating from the Paleo-Indian to Middle Woodland periods (including Clovis, Kirk, Morrow Mountain, Guilford, Gypsy, Swannanoa, and Connestee triangular types) as well as other unidentified projectile points and lithic artifacts from the plowed surface. He also reported discovering ceramic sherds with coarse quartz temper, and simple stamped surface decoration were also recovered.

As encountered by the survey, the site consists of a low-density scatter of precontact ceramic and lithic artifacts along the edge of a cultivated field on the south side of Tributary 5 (Figures 5.8 and 5.9; see Figures 5.6 and 5.7c). A total of four artifacts were recovered from three of seven shovel tests within a ca. 50 m area along the creek. As defined by the Project, the site measures approximately 50 m east-west by 10 m north-south, and is bounded to the north by Tributary 5 and to the east and west by negative shovel tests; the site could extend an unknown distance to the south outside the Project APE.

The soil type at 31BN265 is Unison loam, 8–15% slopes (UnC), which is a well-drained loam derived from old alluvium found on stream terraces and slope bases (USDA NRCS 2019). Soils observed in the shovel tests across the site were relatively consistent, consisting of a 31–49 cm thick plowzone (Ap horizon) of dark yellowish brown (10YR 4/4) sandy loam overlying dark yellowish brown (10YR 3/6) sandy loam to depths of 41 to 63 cmbs at which point the soils became coarser sand and more hydric in nature (Figure 5.10).

The artifacts recovered from 31BN265 include two eroded coarse sand tempered ceramic sherds (Figures 5.11a and 5.11b), a residual sherd, and a chert flake. Although the sherds cannot be assigned to a type, they likely date from the Middle Woodland to Mississippian periods.

Summary and Recommendations. Site 31BN265 was originally recorded as a multi-component Paleo-Indian to Woodland period lithic and ceramic artifact scatter situated in a plowed field west of Morgan Branch. The present survey was limited in extent and encountered only a few nondiagnostic precontact artifacts from the edge of the site as defined by Henry. Based on these results, the portion of the site within the APE is unlikely to contain the types of patterned artifact distributions or intact cultural deposits that could potentially provide additional information on the precontact history of the region (NRHP Criterion D). Similarly, the site appears to lack the potential to meet any of the other NRHP eligibility criteria (Criteria A–C). Consequently, TRC recommends that the portion of site 31BN265 within the Project APE be determined not eligible for the NRHP, and that no further archaeological investigations of the site be required for the Morgan Branch Stream Restoration Project.

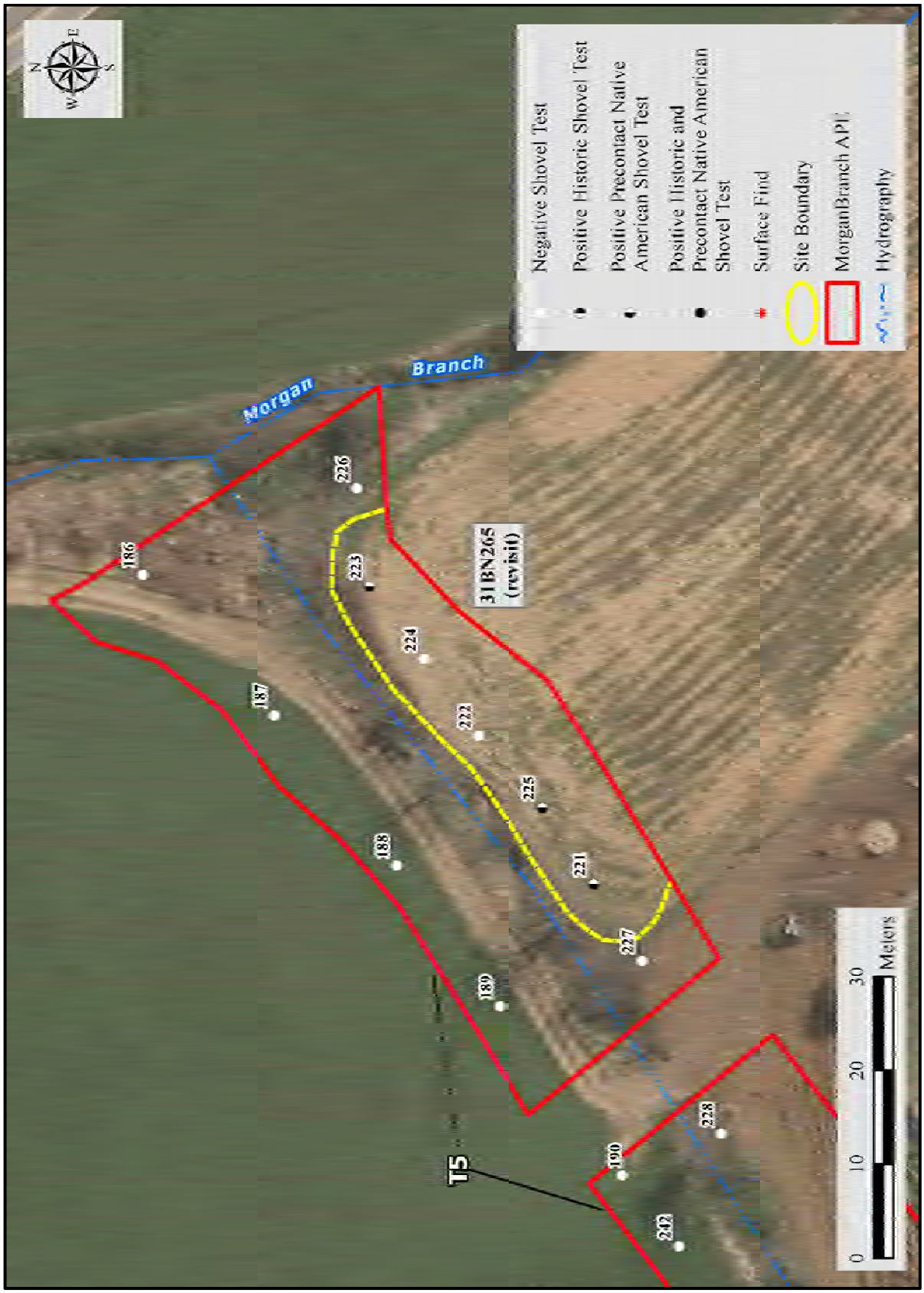

Figure 5.8. Map of site 31BN265.

Figure 5.9. View of 31BN265 along south bank of Tributary 5, facing east.

Figure 5.10. Shovel test 223 profile at 31BN265.

Figure 5.11. Selected precontact ceramic sherds from 31BN265. a: eroded body sherd, ST 225; b: eroded body sherd, ST 221

31BN266

Components:	Precontact: Nondiagnostic lithic, nondiagnostic ceramic (probably Mississippian period Pisgah phase); Historic: 19th–20th century
Site Dimensions*:	160 m E-W × 10 m (N-S)
UTMs (NAD 27):	E341942 N3941864
Landform:	Terrace
Elevation:	ca. 2,237 ft AMSL
Soil Type:	Unison loam, 8–15% slopes (UnC)
Recommendation:	Not eligible (all four NRHP criteria) within Project APE

*Site measurements based on artifact distribution within the Project APE only; likely extends outside APE

Description. Site 31BN266 was recorded by V. Gary Henry during pedestrian survey in 1986 and was revisited by Henry in 1990, 1992, 1993, 1995, 1997, and 2000–2002. Based on information provided on the site form, 31BN266 is a high-density scatter of precontact lithic artifacts, dating from the Early Archaic to Mississippian periods, located across a ridge toe between two drainages. According to the site form, Henry collected numerous projectile points (including Kirk corner notched, Morrow Mountain, Guilford, Gypsy, Swannanoa, Kanawha, and Pisgah and Connestee triangular types) as well as other lithic artifacts from the plowed surface. Henry did not report recovering ceramics from 31BN266.

As encountered by the present survey, the site consists of a low-density scatter of precontact ceramic and lithic artifacts, along with a few historic period artifacts along the edge of a cultivated field on the north side of Tributary 5, across the stream and west of 31BN265 (Figures 5.12 and 5.13; see Figures 5.6 and 5.7c). Surface visibility was excellent, and the shovel testing was augmented by surface inspection. As presently defined, the site extends up to 160 m east-west by at least 10 m north-south; the site extends an unknown distance to the north outside the Project APE.

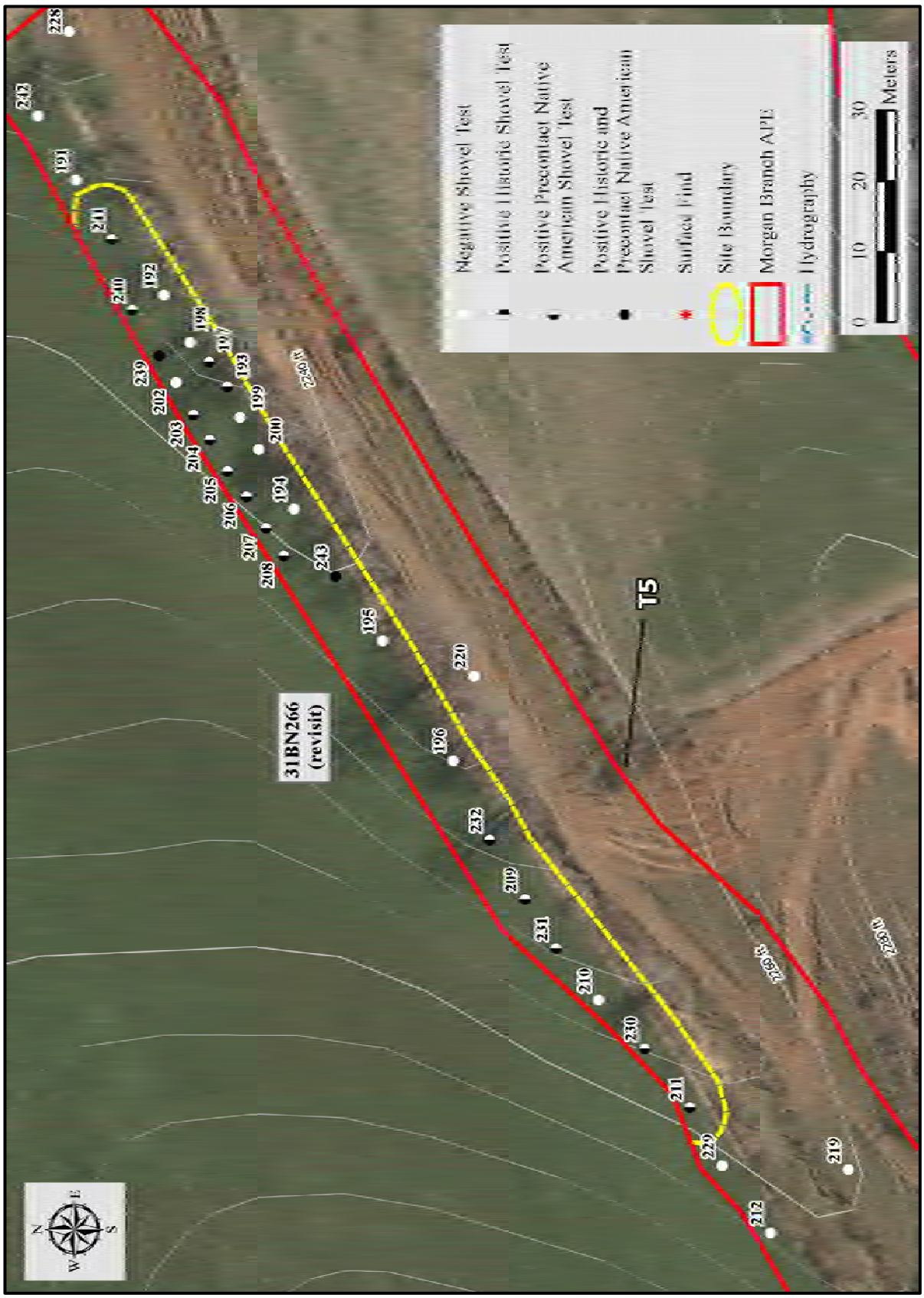

Figure 5.12. Map of site 31BN266.

Figure 5.13. View of 31BN266, facing southwest.

A total of 38 precontact artifacts (10 sherds and 28 lithic artifacts) were recovered from 16 of 29 shovel tests that defined the site boundary; a total of two historic artifacts were also recovered from two shovel tests. The on-site soils are mapped as Unison loam, 8–15% slopes (UnC), which is a well-drained, loam derived from old alluvium found on stream terraces and slope bases (USDA NRCS 2019). Two different soil profiles were observed in the shovel tests. Both contained an Ap horizon (plowzone) that varied in depth from 34–61 cmbs and consisted of yellowish brown (10YR 5/4) to dark yellowish brown (10YR 4/4) sandy loam. Six of the shovel tests with a thinned Ap horizon contained a buried Ap horizon (Apb) of dark yellowish brown (10YR 4/4) sandy loam that extended to 85 cmbs (Figure 5.14). The subsoil was encountered to depths up to 100 cmbs and consists of hydric soils of yellowish brown (10YR 5/4) sandy clay loam mottled with streaks of strong brown (7.5YR 4/5) sand.

The 10 preceramic sherds include one plain sherd, four sherds with unidentifiable stamped surfaces, and five residual examples. One of the sherds (Figure 5.15c) may be fine lined rectilinear complicated stamped, and if so, would likely date to the Pisgah phase; the others (e.g., Figure 5.15d) cannot be classified. All are tempered with coarse sand. The lithic artifacts include two nondiagnostic quartzite biface fragments (Figures 5.15a and 5.15b) and 26 debitage fragments, 15 of chert and 11 of quartz. The two historic period artifacts include a fragment of olive bottle glass and a brick fragment. All artifacts came from one of the plowzones; no evidence of intact cultural deposits or features was encountered.

Figure 5.14. Shovel test 211 profile at 31BN266.

Figure 5.15. Selected precontact artifacts from 31BN266. a: quartzite biface fragment, ST 230; b: quartzite biface fragment; c: unidentified stamped body sherd, ST 211; d: unidentified stamped body sherd; ST 193

Summary and Recommendations. Site 31BN266 was originally recorded as a high-density multi-component Archaic to Mississippian period lithic artifact scatter situated in a plowed upland field along a wide gently sloping ridge toe. The present survey was limited in extent and encountered only a few nondiagnostic precontact artifacts from the edge of the site as defined by Henry. Based on these results, the portion of the site within the APE is unlikely to contain the types of patterned artifact distributions or intact cultural deposits that could potentially provide additional information on the precontact history of the region (NRHP Criterion D). Similarly, the site appears to lack the potential to meet any of the other NRHP eligibility criteria (Criteria A–C). Consequently, TRC recommends that the portion of site 31BN266 within the Project APE be determined not eligible for the NRHP, and that no further archaeological investigations of the site be required for the Morgan Branch Stream Restoration Project.

31BN411

Components:	Precontact: Nondiagnostic lithic, Mississippian (Pisgah phase); Historic: late 19th–20th century
Site Dimensions*:	120 m E-W × 15 m N-S
UTMs (NAD 27):	E342199 N3941783
Landform:	Terrace
Elevation:	ca. 2,214 ft AMSL
Soil Type:	Unison loam, 8–15% slopes (UnC); French loam, 0–3% slopes (FrA)
Recommendation:	Not eligible (all four NRHP criteria) within Project APE

*Site measurements based on artifact distribution within the Project APE only; likely extends outside APE

Description. Site 31BN411 was recorded by local avocational archaeologist V. Gary Henry in 1990 as a low-density nondiagnostic lithic scatter; it is unclear if Henry revisited the site after 1990. As encountered by the present survey, the site consists of a low-density scatter of precontact ceramic and lithic artifacts and historic period artifacts on a low terrace on the south side of Tributary 6; a house is located on the north side of the drainage, just west of its confluence with Morgan Branch (Figures 5.16 and 5.17; see Figures 5.6 and 5.7c). As presently defined, the site extends up to 120 m east-west by 15 m north-south and likely extends to the south outside the Project APE.

Two soil types are mapped within site 31BN411, including Unison loam (8–15% slopes) along the northern and western edges of the site and French loam (0–3% slopes) in the southeastern corner. Unison loam is a well-drained loam derived from old alluvium found on stream terraces and slope bases, while French loam is somewhat poorly drained loamy alluvium atop sandy and gravelly alluvium (USDA NRCS 2019). Soils observed in the shovel tests across the site varied slightly, most shovel tests contained an approximately 30 cm thick plowzone (Ap horizon) of dark yellowish brown (10YR 3/6) silt loam overlying a strong brown (7.5YR 5/8) sandy clay B horizon. Five shovel tests, including two shovel tests (STs 75 and 81) that contained artifacts, encountered a buried plowzone or alluvial deposit of dark yellowish brown (10YR 3/4) coarse sandy loam at various depths (starting at 25–50 cmbs and ending at 32–75 cmbs) (Figure 5.18).

A total of 28 shovel tests were excavated at 5–20 intervals across the site, five of which yielded a total of 11 precontact artifacts; a total of two historic period artifacts were also recovered from two shovel tests. Precontact artifact density ranged from one to seven artifacts per positive shovel test; all artifacts were recovered from the plowzone or buried plowzone. Surface visibility was excellent, and additional 20th century artifacts were observed on the surface but were not collected. The precontact artifacts include 10 sherds, including three examples with fine line rectilinear stamping, at least two of which appear to date to the Mississippian period Early Pisgah phase (A.D. 1000–1200) (Figures 5.19a and 5.19b); two unidentifiable stamped examples (e.g., Figure 5.19c); a plain sherd; and four residual sherds. The single lithic artifact is a nondiagnostic chert flake. The two historic period artifacts from shovel tests include one Albany slipped stoneware fragment and a metal coupler.

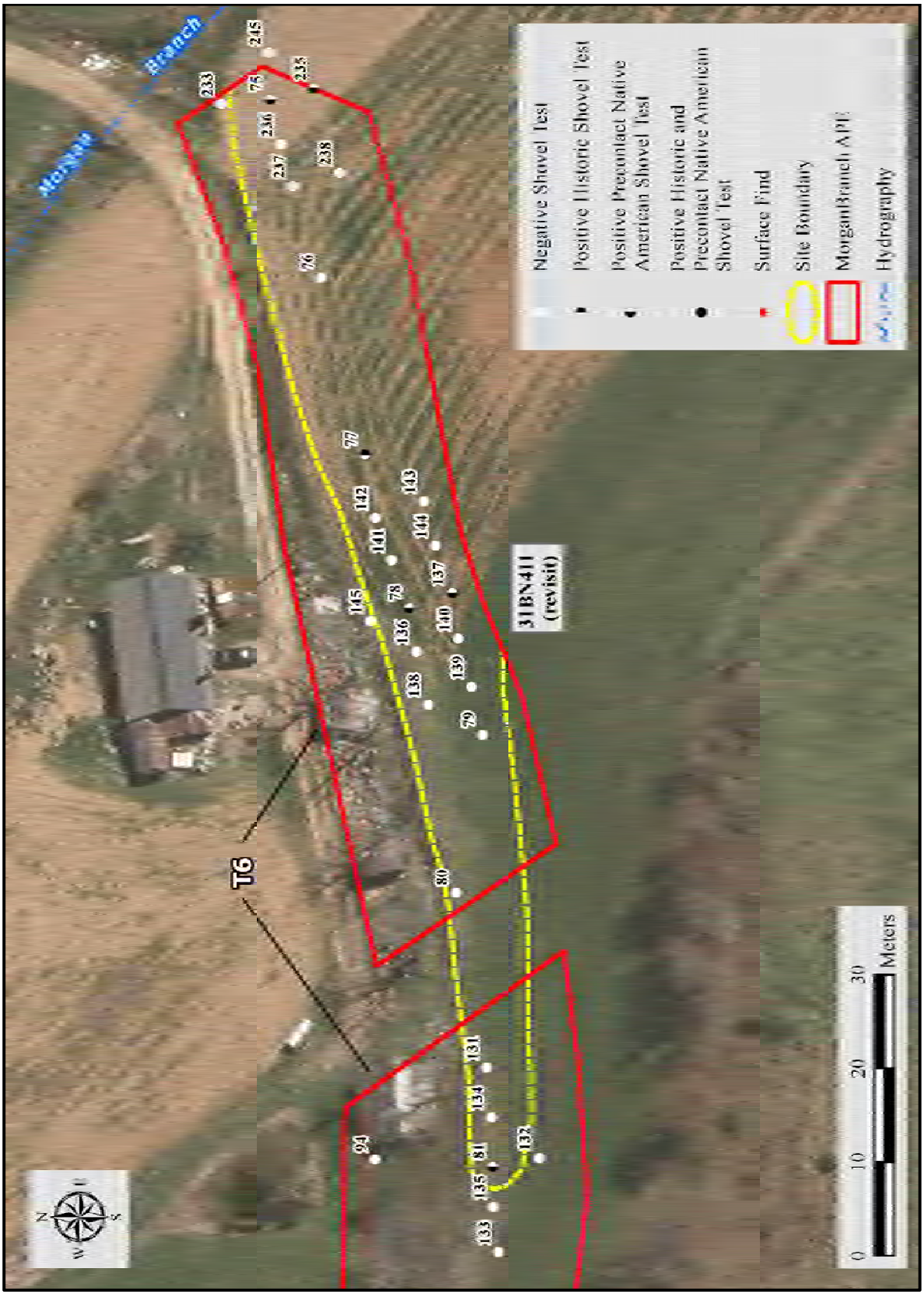

Figure 5.16. Map of site 31BN411.

Figure 5.17. View of 31BN411 from the southeastern corner along the south side of Tributary 6, facing west.

Figure 5.18. Shovel test 75 profile at 31BN411, showing buried Ap horizon.

Figure 5.19. Selected precontact ceramic sherds from 31BN411. a: Pisgah rectilinear complicated stamped body sherd, ST 75; b: Pisgah rectilinear complicated stamped body sherd, ST 81; c: unidentified stamped body sherd, ST 75

Summary and Recommendations. Site 31BN411 was originally recorded as a small nondiagnostic precontact lithic scatter situated in a small agricultural field; the Project survey documented precontact ceramic and lithic artifacts as well as historic period materials. Although diagnostic Pisgah phase artifacts were recovered, all were confined to plowzone contacts, and the overall artifact density is low. The historic period artifacts appear to date to the mid-20th century and are likely associated with an extant structure outside the Project APE on the north side of Tributary 6. Despite the presence of diagnostic precontact artifacts, it is considered unlikely that the portion of 31BN411 within the Project APE contains the types of patterned artifact distributions or intact cultural deposits that could potentially provide additional information on the prehistory or history of the region (NRHP Criterion D). Similarly, the site appears to lack the potential to meet any of the other NRHP eligibility criteria (A–C). Consequently, TRC recommends that the portion of 31BN411 within the Project APE be determined not eligible for the NRHP and that no further archaeological investigations of the site be required for the Morgan Branch Stream Restoration Project.

31BN413

Components:	Precontact: Nondiagnostic lithic
Site Dimensions*:	120 m E-W × 20 m N-S
UTMs (NAD 27):	E341630 N3942011
Landform:	Terrace
Elevation:	ca. 2,273 ft AMSL
Soil Type:	Tusquitee-Whiteside complex, 8–15% slopes (TwC)
Recommendation:	Not eligible (all four NRHP criteria) within Project APE

*Site measurements based on artifact distribution within the Project APE only; likely extends outside APE

Description. Site 31BN413 was recorded by V. Gary Henry during pedestrian survey in 1990 and revisited by Henry in 1992, 1993, 1994, 1996, 1997, 1998, 2004, 2007, and 2015. Henry defined 31BN413 as a surface scatter of Early Archaic to Early Woodland projectile points including Kirk corner notched, Savannah River, Morrow Mountain, Guilford, Gypsy, and Swannanoa types. As defined by the Project, 31BN413 is situated at the edge of planted fields located across small terraces on both the north and south banks of Tributary 3, just west of Morgan Branch (Figures 5.20 and 5.21; see Figures 5.6 and 5.7c).

The on-site soils are mapped as Tusquitee-Whiteside complex (8–15% slopes), which is a well-drained colluvium derived from metamorphic and igneous rocks (USDA NRCS 2019). Soils observed in the shovel tests across the site consist of a 20–30 cm thick plowzone (Ap horizon) of dark brown (10YR 3/3) loam overlying dark yellowish brown (10YR 4/4) compact clay loam (Figure 5.22).

Two nondiagnostic lithic artifacts (one chert flake and one quartzite flake) were recovered from two of 15 shovel tests within an area measuring approximately 120 m east-west by 20 m north-south. As both appear to fall within Henry's site boundaries, they are considered part of 31BN413. Both artifacts were recovered from the plowzone.

Summary and Recommendations. Site 31BN413 was originally recorded as a high-density scatter of lithic artifacts collected over many years from plowed fields, but the Project survey encountered few artifacts within the limited APE. As present within the Project APE, site 31BN413 is unlikely to contain the types of patterned artifact distributions or intact cultural deposits that could potentially provide additional information on the prehistory of the region (NRHP Criterion D). Similarly, the site appears to lack the potential to meet any of the other NRHP eligibility criteria (A–C). Consequently, TRC recommends that 31BN413 as defined within the current Project area be determined not eligible for the NRHP and that no further archaeological investigations of the site be required for the Morgan Branch Stream Restoration Project.

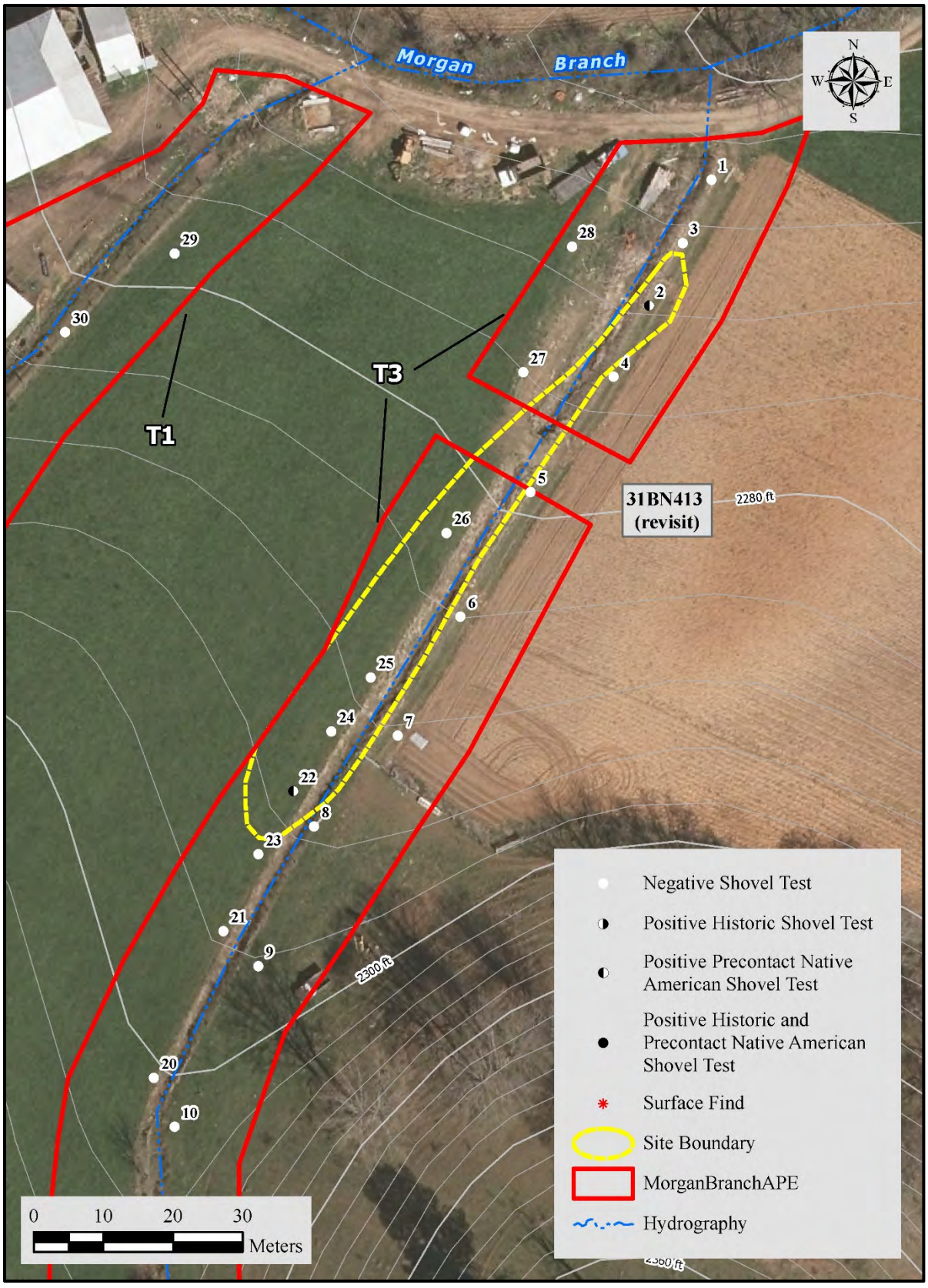

Figure 5.20. Map of site 31BN413.

Figure 5.21. Shovel testing along the western end of 31BN413 along southern bank of Tributary 3, facing east.

Figure 5.22. Shovel test 2 profile at 31BN413.

31BN415

Components:	Precontact: Nondiagnostic lithic, Mississippian (Pisgah phase)
Site Dimensions*:	75 m E-W × 10 m N-S
UTMs (NAD 27):	E341515 N3941981
Landform:	Terrace
Elevation:	ca. 2,290 ft AMSL
Soil Type:	Tusquitee-Whiteside complex, 8–15% slopes (TwC)
Recommendation:	Not eligible (all four NRHP criteria) within Project APE

*All site measurements based on artifact distribution within the Project APE only; likely extends outside the boundaries

Description. Site 31BN415 was recorded by V. Gary Henry during pedestrian survey in 1990 and revisited by Henry in 1995, 1996 and 1998. Over the years, he collected a low density of Middle Archaic to Early Woodland lithic artifacts, including Stanly and Swannanoa projectile points, from the plowed surface of a corn field. During the Project survey, a total of three precontact artifacts were recovered within the mapped site boundaries along a small terrace on the north side of Tributary 1, west of a cluster of barns and sheds along Morgan Branch (Figures 5.23 and 5.24; see Figures 5.6 and 5.7d).

The soil type on site 31BN415 is mapped as Tusquitee-Whiteside complex (8–15% slopes), which is a well-drained colluvium derived from metamorphic and igneous rocks (USDA NRCS 2019). Soils observed in the shovel tests across the site were relatively shallow and consisted of an 8–15 cm thick plowzone (Ap horizon) of dark brown (10YR 3/3) loam overlying a very compact dark yellowish brown (10YR 3/6) clay loam with small gravels (Figure 5.25).

Artifacts were recovered from two of eight shovel tests along the north side of the branch. The two adjacent shovel tests yielded a single sherd and a chert flake, while a second sherd was recovered from the surface about 50 m to the west. Both sherds are tempered with coarse sand and exhibit fine line rectilinear complicated stamping; at least one example with a ladder motif appears to date to the Mississippian period Early Pisgah phase (A.D. 1000–1200) (Figure 5.26a). Both shovel test artifacts were found in the plowzone.

Summary and Recommendations. Site 31BN415 was originally recorded as a low-density multi-component Middle Archaic to Early Woodland period lithic artifact scatter situated in a plowed field around a number of existing barns and sheds. The recent survey identified only three artifacts collected from shallow disturbed soils and the exposed surface of a plowed field. As present within the Project APE, site 31BN415 is unlikely to contain the types of patterned artifact distributions or intact cultural deposits that could potentially provide additional information on the prehistory of the region (NRHP Criterion D). Similarly, the site appears to lack the potential to meet any of the other NRHP eligibility criteria (A–C). Consequently, TRC recommends that 31BN415 as defined within the current Project area be determined not eligible for the NRHP and that no further archaeological investigations of the site be required for the Morgan Branch Stream Restoration Project.

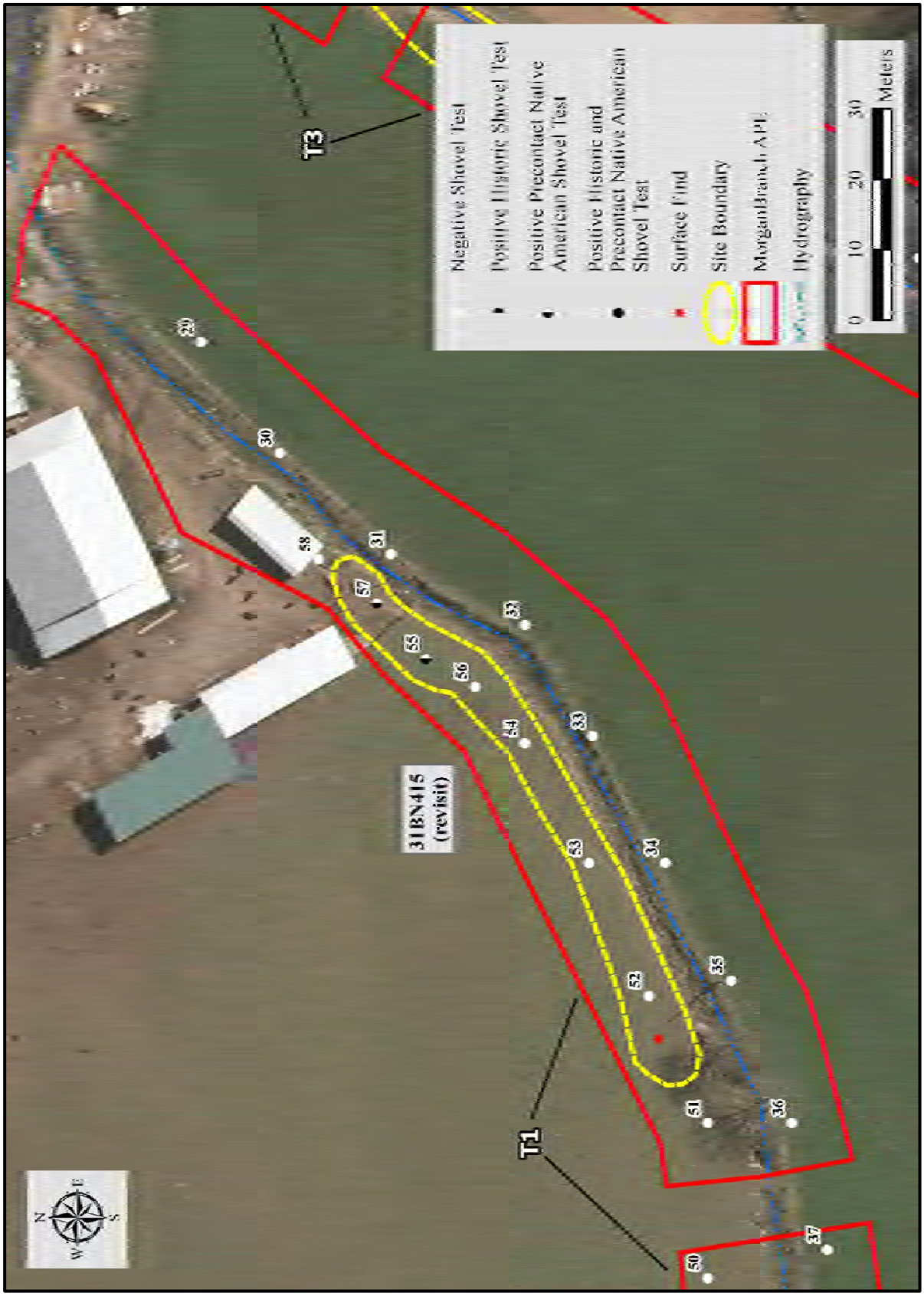

Figure 5.23. Map of site 31BN415.

Figure 5.24. View of 31BN415 along north bank of Tributary 1, facing east.

Figure 5.25. Shovel test 57 profile at 31BN415.

Figure 5.26. Precontact ceramic sherds from 31BN415. a: Pisgah rectilinear complicated stamped body sherd, ST 57; b: unidentified rectilinear complicated stamped body sherd, surface

31BN1088

Components:	Precontact: Nondiagnostic lithic; Historic: 19th–20th century
Site Dimensions:	10 m (N-S) × 10 m (E-W)
UTMs (NAD 27):	E340295 N3942076
Landform:	Upland slope
Elevation:	ca. 2,631 ft AMSL
Soil Type:	Evard-Cowee complex, 15–30% slopes (EwD)
Recommendation:	Not eligible (all four NRHP criteria)

Description. Site 31BN1088 is identified by a single cut nail and a quartzite flake recovered from a single shovel test located on an upland slope along the east side of Tributary 8 (Figures 5.27 and 5.28; see Figures 5.6 and 5.7a). The shovel test was situated within 5 m of the drainage (to the west) and immediately north of an eroded and sloping hillside; the ground also slopes to the north and west. For these reasons, no additional shovel tests were excavated; additional shovel tests to the south failed to produce artifacts.

Soils at 31BN1088 are mapped as Evard-Cowee complex (15–30% slopes), which is a well-drained loam residuum weathered from amphibolite and/or hornblende gneiss (USDA NRCS 2019). The shovel test encountered a 27 cm thick plowzone (Ap horizon) of brown (10YR 4/3) loam atop a 19 cm thick dark brown (10YR 3/3) clay loam buried plowzone (Apb); the artifacts were collected from the buried plowzone. Subsoil encountered from 48–63 cmbs is strong brown (7.5YR 4/6) sandy clay (Figure 5.29).

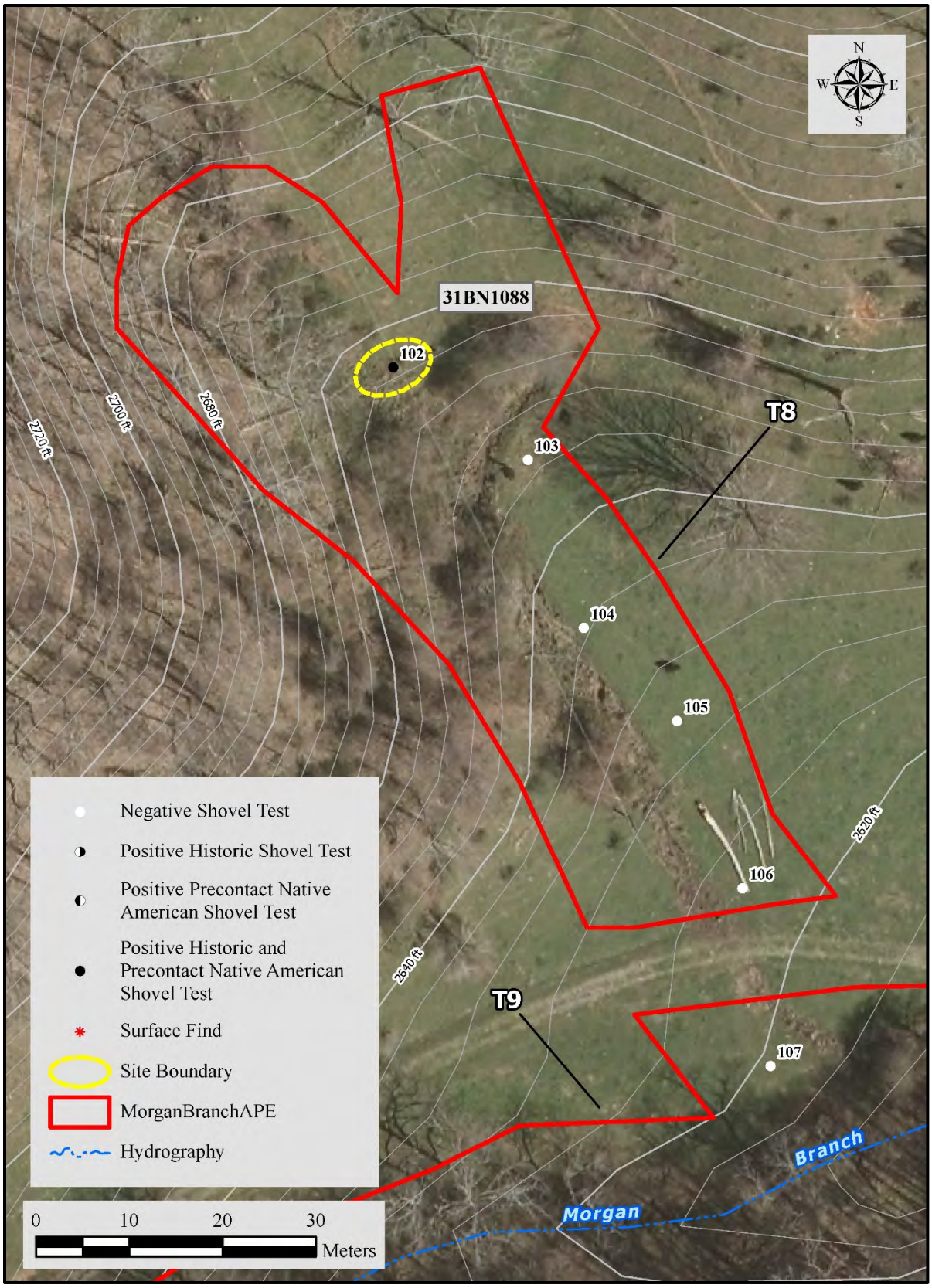

Figure 5.27. Map of site 31BN1088.

Figure 5.28. View of 31BN1088 with sloped bank to the north.

Figure 5.29. Shovel test 102 profile at 31BN1088.

Summary and Recommendations. Site 31BN1088 is a single occurrence of one precontact lithic artifact and a probable 19th century cut nail. Due to the limited size of the landform and the lack of additional artifacts or intact deposits, 31BN1088 is unlikely to contain the types of patterned artifact distributions or intact cultural deposits that could potentially provide additional information on the history of the region (NRHP Criterion D). Similarly, the site appears to lack the potential to meet any of the other NRHP eligibility criteria (A–C). Consequently, TRC recommends that 31BN1088 be determined not eligible for the NRHP and that no further archaeological investigations of the site be required for the Morgan Branch Stream Restoration Project.

31BN1089

Components:	Precontact: Nondiagnostic lithic and ceramic
Site Dimensions:	40 m (north-south) × 10 m (east-west)
UTMs (NAD 27):	E3462532 N3942166
Landform:	Upland slope
Elevation:	ca. 2,244 ft AMSL
Soil Type:	Tate loam basin, 15–30% slopes (TaD)
Recommendation:	Not eligible (all four NRHP criteria)

Description. Site 31BN1089 is a small precontact ceramic and lithic artifact scatter located on a small upland terrace along the west bank of Tributary 7, north of its confluence with Morgan Branch (Figures 5.30 and 5.31; see Figures 5.6 and 5.7e). The site is bounded to the west by the Project APE, to the north by consecutive negative shovel tests, to the south by a single negative shovel tests and the sloped landform, and to the east by the sloped bank along the edge of the drainage.

The soil type at 31BN1089 is Tate loam basin (15–30% slopes), which is a well-drained colluvium derived from metamorphic and igneous rocks (USDA NRCS 2019). Soils observed in the shovel tests across the site consist of three strata: the upper stratum is apparent colluvium (slope wash) of yellowish red (5YR 4/6) sandy clay loam to depths of 20–34 cmbs underlain by a buried plowzone (Apb) of reddish brown (5YR 4/4) sandy loam to approximate depths of 44–57 cmbs. Subsoil (B horizon) is strong brown (7.5YR 5/8) sandy clay (Figure 5.32). Artifacts were recovered from both the colluvium as well as the buried plowzone.

A total of 22 precontact artifacts were recovered from four of seven shovel tests excavated at 10-m intervals across the site, including two precontact ceramic sherds (Figures 5.33b and 5.33c), a quartzite biface fragment (Figure 5.33a), and 19 pieces of lithic debitage. Both sherds are eroded and have coarse sand temper; they likely date to the Woodland or Mississippian periods. The lithic assemblage is dominated by quartzite (*n*=17) but includes single pieces of quartz and chert.

Summary and Recommendations. Site 31BN1089 is a small precontact lithic and ceramic artifact scatter located within an active cow pasture along a small upland terrace along the west bank of Tributary 7. The site is located along the very edge of the Project APE and is limited in size within the Project APE by the small landform. It is unlikely that the portion of the site within the APE contains the types of patterned artifact distributions or intact cultural deposits that could potentially provide additional information on the precontact history of the region (NRHP Criterion D). Similarly, the site appears to lack the potential to meet any of the other NRHP eligibility criteria (A–C). Consequently, TRC recommends that 31BN1089 be determined not eligible for the NRHP and that no further archaeological investigations of the site be required for the Morgan Branch Stream Restoration Project.

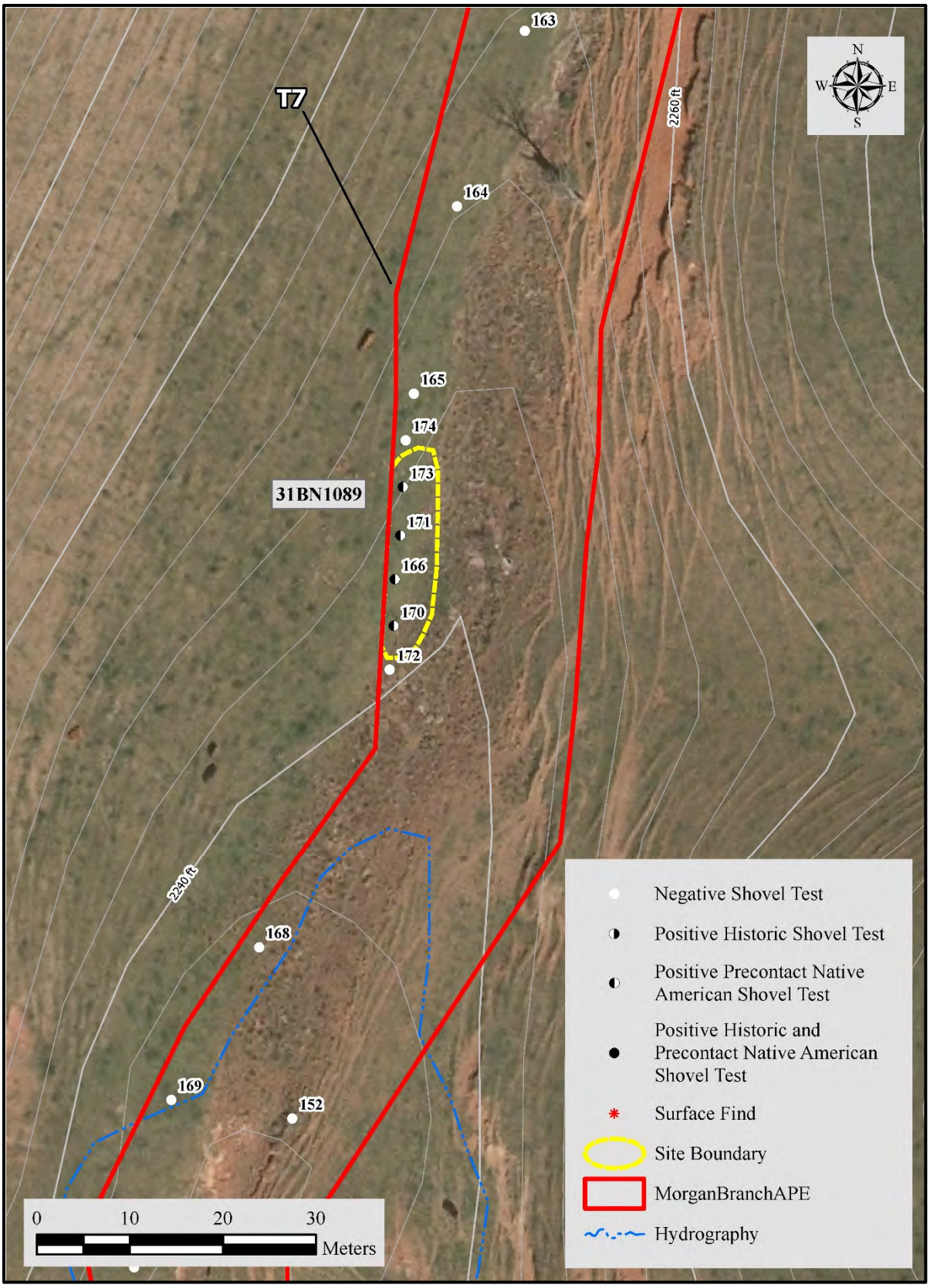

Figure 5.30. Map of site 31BN1089.

Figure 5.31. View of 31BN1089 along the western bank of Tributary 7, facing north.

Figure 5.32. Shovel test 166 profile at 31BN1089.

Figure 5.33. Selected precontact artifacts from 31BN1089. a: quartzite biface fragment, ST 170; b–c: eroded body sherds, ST 166

6. SUMMARY AND RECOMMENDATIONS

TRC has completed an intensive archaeological survey of approximately 14,548 linear feet (ca. 4,434 m) of proposed stream restoration corridor along nine tributaries of Morgan Branch in Leicester, Buncombe County, North Carolina on behalf of KCI Associates of NC, PA, and KCI Environmental Technologies and Construction, Inc. (ER 18-1123). The Project is situated northwest of the intersection of Newfound Road (SR 1004) and Morgan Branch Road (SR 1220) along both sides of Morgan Branch Road and consists primarily of edges of agricultural fields or pastures with some overgrown areas along the drainages. Four different types of stream restoration or enhancement work are proposed along the drainages; the survey examined those portions of the tributaries where either Stream Restoration or Stream Enhancement I work is proposed. The fieldwork was conducted between September 12 and November 1, 2019, and was directed by Michael Nelson. The fieldwork required approximately 26 person-days.

Background research included review of site files and reports at the OSA Western Office in Asheville, which revealed that there are 13 previously recorded archaeological sites (31BN264–31BN268, 31BN411–31BN415, 31BN418, 31BN465, and 31BN546) that either extended into the Project or were situated in adjacent fields. Those sites were recorded in the 1980s through 1990s by avocational archaeologist V. Gary Henry and had not been evaluated for NRHP eligibility prior to the Project fieldwork. Another 58 sites, all but three of which were recorded by Henry, are located within a one-mile radius of the Project area.

The fieldwork included systematic subsurface shovel testing at 20-m intervals across all parts of the Project designated for either Stream Restoration or Stream Enhancement I activities, except for areas with greater than 10 percent slope or heavily disturbed or eroded areas. Additional 10-m interval delineation shovel tests were excavated when subsurface cultural artifacts were recovered; additional delineation shovel tests were often excavated at 5-m intervals to maximize information on sites within the narrow Project corridors. A total of 243 shovel tests were excavated, 34 of which contained cultural artifacts.

Seven archaeological sites were identified, including five previously recovered sites (31BN265, 31BN266, 31BN411, 31BN413 and 31BN415) and two newly identified sites (31BN1088 and 31BN1089). Four sites (31BN265, 31BN413, 31BN415, and 31BN1089) yielded precontact components, while three (31BN266, 31BN411, and 31BN1088) included both precontact and historic period components. The precontact materials included nondiagnostic lithic artifacts and Mississippian period (Pisgah phase, ca. A.D. 1000–1400) ceramics. The historic components at sites 31BN266, 31BN411, and 31BN1088, represent low-density scatters of mid-19th to late 20th century artifacts; while 31BN411 also includes a standing structure outside the northern edge of the APE.

As identified within the Project APE, all seven sites (31BN265, 31BN266, 31BN411, 31BN413 31BN1088, and 31BN1089) appear to represent low-density artifact scatters that have been impacted by past cultivation and erosion and are unlikely to contain the types of patterned artifact distributions or intact cultural deposits that could potentially provide additional information on local or regional prehistory or history (NRHP Criterion D); the sites also appear to lack the characteristics necessary for eligibility under NRHP Criteria A, B, or C (Table 6.1). Consequently, TRC recommends that these sites be determined not eligible for the NRHP as presently defined, and that no additional archaeological investigations be required for the Morgan Branch Stream Restoration Project. All seven sites likely extend outside the current Project APE, however, and TRC recommends that the NRHP eligibility of any portions of these sites outside the Project boundaries continue to be considered unassessed. No evidence of sites 31BN264, 31BN267, 31BN268, 31BN412, 31BN414, 31BN418, 31BN465, or 31BN545 was encountered, and those sites apparently do not extend into the Project APE. No additional efforts to locate those sites are proposed in connection with the Project.

Table 6.1. NRHP Eligibility Recommendations for Morgan Branch Project Sites.

Site	Component(s)	NRHP Recommendation*
31BN265	Precontact: nondiagnostic lithic and ceramic	Not eligible (all four NRHP criteria)
31BN266	Precontact: nondiagnostic lithic and ceramic; Historic: mid-19th to late 20th century	Not eligible (all four NRHP criteria)
31BN411	Precontact: nondiagnostic lithic, Mississippian (Pisgah phase); Historic: mid-19th to late 20th century	Not eligible (all four NRHP criteria)
31BN413	Precontact: non-diagnostic lithic	Not eligible (all four NRHP criteria)
31BN415	Precontact: nondiagnostic lithic, Mississippian (Pisgah phase)	Not eligible (all four NRHP criteria)
31BN1088	Precontact: nondiagnostic lithic; Historic 19th to 20th century	Not eligible (all four NRHP criteria)
31BN1089	Precontact: Nondiagnostic lithic and ceramic	Not eligible (all four NRHP criteria)

* Recommendations only apply to portions of sites within Project APE.

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APPENDIX 1. ARTIFACT CATALOG

Appendix 1. Artifact Catalog.

Site	Bag#	Prov	MatClass	PrimClass	SecDesc	Ctx?/Color	Ext. Dec.	Int. Treatment	Temper	Qty	Size_cm	Wt_g	Comments
31BN413	1	ST2	LDEB	FLKE	Qzite	N				1	1-3	0.7	
31BN413	2	ST22	LDEB	FLKE	Che	N				1	1-3	0.1	
31BN415	3	Surface	CER	BODY			fine lined rectilinear complicated stamped	none	c sand	1			
31BN413	4	ST55	LDEB	FLKE	Che	N				1	1-3	0.3	
31BN415	5	ST57	CER	BODY			fine lined rectilinear complicated stamped	none	c sand	1			Early Pisgah; ladder motif
31BN1088	6	ST102	HIST	METL	cut nail					1		3.6	
31BN1088	6	ST102	LDEB	FLKE	Qzite	N				1	1-3	5.3	
31BN1089	7	ST166	LDEB	FLKE	Qzite	N				1	3-5	4.3	
31BN1089	7	ST166	LDEB	FLKE	Qzite	Y				1	3-5	12.1	
31BN1089	7	ST166	LDEB	FLKE	Qzite	N				2	1-3	2.8	
31BN1089	7	ST166	LDEB	FLKE	Qz	N				1	1-3	0.2	
31BN1089	7	ST166	LDEB	SHTR	Che	N				1	1-3	0.8	
31BN1089	7	ST166	CER	BODY			eroded	none	c sand	2			
31BN1089	8	ST170	LDEB	FLKE	Qzite	N				1	3-5	4.0	could just be fcr, instead
31BN1089	8	ST170	LTFL	BIF1	Qzite	N				1	4-5	13.6	midstage biface frag- distal?; one str, one excurv edge; obtuse tip; plano-convex x-section
31BN1089	9	ST171	LDEB	FLKE	Qzite	Y				1	3-5	8..4	
31BN1089	9	ST171	LDEB	FLKE	Qzite	N				5	1-3	6.5	
31BN1089	10	ST173	LDEB	FLKE	Qzite	N				2	3-5	15.1	
31BN1089	10	ST173	LDEB	FLKE	Qzite	N				3	1-3	3.3	
31BN1089	10	ST173	LDEB	SHTR	Qzite	N				1	1-3	2.1	
31BN265	11	ST221	CER	<2 cm			<2 cm			1			
31BN265	11	ST221	CER	BODY			eroded	eroded	c sand	1			
31BN265	12	ST223	LDEB	FLKE	Che	N				1	1-3	0.2	
31BN265	13	ST225	CER	BODY			eroded	none	c sand	1			
31BN266	14	ST193	LDEB	FLKE	Che	N				2	1-3	0.8	
31BN266	14	ST193	LTFL	BIF1	Qzite	N				1	2-3	2.1	Preform frag; distal; one str, one excurv edge; missing extreme tip; lent x-section
31BN266	14	ST193	CER	BODY			unidentified stamped	none	c sand	1			
31BN266	15	ST197	LDEB	FLKE	Che	N				3	1-3	1.0	
31BN266	15	ST197	LDEB	FLKE	Qzite	N				1	1-3	1.8	
31BN266	15	ST197	CER	BODY			unidentified stamped	none	c sand	1			
31BN266	16	ST203	CER	BODY			unidentified stamped	eroded	c sand	1			
31BN266	17	ST204	LDEB	FLKE	Qzite	N				1	1-3	3.2	
31BN266	18	ST206	LDEB	FLKE	Che	N				1	1-3	1.3	
31BN266	19	ST207	LDEB	FLKE	Che	N				1	1-3	1.5	
31BN266	20	ST208	LDEB	FLKE	Che	N				1	1-3	0.3	
31BN266	21	ST209	LDEB	FLKE	Qzite	N				1	1-3	1.4	
31BN266	22	ST211	LDEB	FLKE	Qzite	Y				1	3-5	10.4	
31BN266	23	ST211	CER	<2 cm			<2 cm			1			
31BN266	23	ST211	CER	BODY			unidentified stamped	smoothed	c sand	1	Ext		possibly flrcs
31BN266	24	ST230	LDEB	FLKE	Qzite	N				3	1-3	0.9	
31BN266	24	ST230	LTFL	BIF2	Qzite	N				1	2-3	1.7	distal PPK or Preform-Frag; exurv edges; broad tip (may be missing extreme tip); lent x-section
31BN266	25	ST231	LDEB	FLKE	Qzite	N				3	1-3	2.5	
31BN266	26	ST232	LDEB	SHTR	Qzite	N				1	1-3	1.1	
31BN266	26	ST232	LDEB	FLKE	Qzite	N				1	1-3	1.1	
31BN266	27	ST239	HIST	GLAS	curved	olive green				1	-	2.0	bottle glass
31BN266	27	ST239	CER	<2 cm						1			
31BN266	28	ST240	LDEB	FLKE	Che	N				1	1-3	0.3	
31BN266	29	ST241	LDEB	FLKE	Qzite	N				2	1-3	2.0	

Appendix 1. Artifact Catalog.

Site	Bag#	Prov	MatClass	PrimClass	SecDesc	Ctx?/Color	Ext. Dec.	Int. Treatment	Temper	Qty	Size_cm	Wt_g	Comments
31BN266	29	ST241	LDEB	FLKE	Qzite	Y				1	3-5	7.1	poss flake
31BN266	29	ST241	CER	<2 cm						2			
31BN266	29	ST241	CER	BODY			unidentified stamped	none	c sand	1			check or rcs
31BN266	30	ST243	LDEB	FLKE	Che	N				2	1-3	0.2	
31BN266	30	ST243	HIST	BRIK	brick frag	-				1	-	3.2	
31BN411	31	ST75	CER	BODY			plain	none	c sand	1			
31BN411	32	ST75	CER	<2 cm						2			
31BN411	32	ST75	CER	NECK			fine lined rectilinear complicated stamped	none	c sand	2			Early Pisgah; ladder motif
31BN411	32	ST75	CER	BODY			unidentified stamped	none	c sand	2			
31BN411	33	ST77	HIST	CERM	stoneware	albany-slip				1	-	2.4	
31BN411	34	ST78	LDEB	FLKE	Che	N				1	1-3	0.2	
31BN411	35	ST81	CER	BODY			flrcs	none	c sand	1			
31BN411	36	ST137	HIST	METL	coupler frag					1	-	1.6	2-pc refit; female hose coupling?
31BN411	36	ST137	CER	<2 cm						1			
31BN411	37	ST235	CER	<2 cm						1			

North Carolina Department of Natural and Cultural Resources

State Historic Preservation Office

Ramona M. Bartos, Administrator

Governor Roy Cooper
Secretary Susi H. Hamilton

Office of Archives and History
Deputy Secretary Kevin Cherry

January 27, 2020

Paul Webb
50101 Governors Drive
Suite 250
Chapel Hill, NC 27517

Re: Morgan Branch Stream Restoration Project, Leicester, Buncombe County, ER 18-1123

Dear Mr. Webb:

Thank you for your December 30, 2019, submission transmitting the report titled *Archaeological Survey for the Morgan Branch Stream Restoration Project, Leicester, Buncombe County, North Carolina* and seven North Carolina site forms. We have reviewed the information provided and offer the following comments.

Five previously recorded archaeological sites (31BN265, 31BN266, 31BN411, 31BN413, and 31BN415) and two newly recorded archaeological sites (31BN1088 and 31BN1089) were identified as a result of the survey. All seven sites represent low-density artifact scatters that have been disturbed by past cultivation and erosion.

Based on the lack of intact deposits and limited research potential, TRC recommended that all seven sites located within the project APE be considered not eligible for listing in the National Register of Historic Places (NRHP). However, as there is the potential for these sites to extend beyond the project APE, all seven sites will remain unassessed. The portions within the project APE are considered not eligible for listing in the NRHP and no further work is necessary.

TRC was unable to relocate eight previously recorded archaeological sites (31BN264, 31BN267, 31BN268, 31BN412, 31BN414, 31BN418, 31BN465, 31BN545). These sites do not extend into the project APE and will not be affect by the project as proposed.

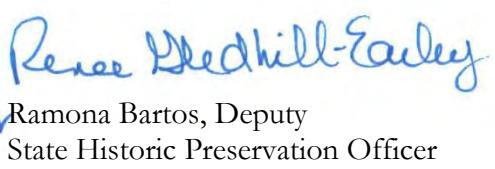
We concur with TRC's assessment of these sites, agree with the recommendations, and accept the report as final.

Please note that for all future project submissions, one paper copy and one digital copy of all resulting archaeological reports as well as one digital copy of the North Carolina site form for each site recorded, should be forwarded together through this office. We will ensure appropriate distribution.

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,



for Ramona Bartos, Deputy
State Historic Preservation Officer

cc: Kim Browning, USACE, Kimberly.D.Browning@usace.army.mil

U.S. Department of Agriculture

FARMLAND CONVERSION IMPACT RATING

PART I *(To be completed by Federal Agency)*		Date Of Land Evaluation Request 8/14/2019	
Name of Project Morgran Branch Stream Restoration		Federal Agency Involved NC DOT	
Proposed Land Use Stream Mitigation		County and State Buncombe County NC	
PART II *(To be completed by NRCS)*		Date Request Received By NRCS	Person Completing Form: Milton Cortes NC NRCS
Does the site contain Prime, Unique, Statewide or Local Important Farmland? *(If no, the FPPA does not apply - do not complete additional parts of this form)*	YES ☑ NO ☐	Acres Irrigated none	Average Farm Size 67 acres
Major Crop(s) CORN	Farmable Land In Govt. Jurisdiction Acres: 45.5 % 185,350 acres	Amount of Farmland As Defined in FPPA Acres: 14.5 % 31,000 acres	
Name of Land Evaluation System Used Buncombe Co. NC LESA	Name of State or Local Site Assessment System N/A	Date Land Evaluation Returned by NRCS October 09, 2019 by eMail	

PART III *(To be completed by Federal Agency)*	Alternative Site Rating Site A	Site B	Site C	Site D
A. Total Acres To Be Converted Directly	40.81			
B. Total Acres To Be Converted Indirectly	0.0			
C. Total Acres In Site	40.81			
PART IV *(To be completed by NRCS)* Land Evaluation Information				
A. Total Acres Prime And Unique Farmland	1.20			
B. Total Acres Statewide Important or Local Important Farmland	11.10			
C. Percentage Of Farmland in County Or Local Govt. Unit To Be Converted	0.0397			
D. Percentage Of Farmland in Govt. Jurisdiction With Same Or Higher Relative Value	44.5			
PART V (To be completed by NRCS) Land Evaluation Criterion Relative Value of Farmland To Be Converted (Scale of 0 to 100 Points)	47			

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)	0			
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)	10			
11. Effects Of Conversion On Farm Support Services	(10)	0			
12. Compatibility With Existing Agricultural Use	(10)	0			
TOTAL SITE ASSESSMENT POINTS	160	65	0	0	0
PART VII ***(To be completed by Federal Agency)***					
Relative Value Of Farmland *(From Part V)*	100	47	0	0	0
Total Site Assessment *(From Part VI above or local site assessment)*	160	65	0	0	0
TOTAL POINTS ***(Total of above 2 lines)***	260	112	0	0	0

Site Selected: Site A	Date Of Selection 1/27/2020	Was A Local Site Assessment Used? YES ☐ NO ☑

Reason For Selection:

N/A

Name of Federal agency representative completing this form: FHWA	Date: 1/27/2020

(See Instructions on reverse side) **Form AD-1006 (03-02)**

STEPS IN THE PROCESSING THE FARMLAND AND CONVERSION IMPACT RATING FORM

Step 1 - Federal agencies (or Federally funded projects) involved in proposed projects that may convert farmland, as defined in the Farmland Protection Policy Act (FPPA) to nonagricultural uses, will initially complete Parts I and III of the form. For Corridor type projects, the Federal agency shall use form NRCS-CPA-106 in place of form AD-1006. The Land Evaluation and Site Assessment (LESA) process may also be accessed by visiting the FPPA website, http://fppa.nrcs.usda.gov/lesa/.

Step 2 - Originator (Federal Agency) will send one original copy of the form together with appropriate scaled maps indicating location(s)of project site(s), to the Natural Resources Conservation Service (NRCS) local Field Office or USDA Service Center and retain a copy for their files. (NRCS has offices in most counties in the U.S. The USDA Office Information Locator may be found at http://offices.usda.gov/scripts/ndISAPI.dll/oip_public/USA_map**,** or the offices can usually be found in the Phone Book under U.S. Government, Department of Agriculture. A list of field offices is available from the NRCS State Conservationist and State Office in each State.)

Step 3 - NRCS will, within 10 working days after receipt of the completed form, make a determination as to whether the site(s) of the proposed project contains prime, unique, statewide or local important farmland. (When a site visit or land evaluation system design is needed, NRCS will respond within 30 working days.

Step 4 - For sites where farmland covered by the FPPA will be converted by the proposed project, NRCS will complete Parts II, IV and V of the form.

Step 5 - NRCS will return the original copy of the form to the Federal agency involved in the project, and retain a file copy for NRCS records.

Step 6 - The Federal agency involved in the proposed project will complete Parts VI and VII of the form and return the form with the final selected site to the servicing NRCS office.

Step 7 - The Federal agency providing financial or technical assistance to the proposed project will make a determination as to whether the proposed conversion is consistent with the FPPA.

INSTRUCTIONS FOR COMPLETING THE FARMLAND CONVERSION IMPACT RATING FORM

(For Federal Agency)

Part I: When completing the "County and State" questions, list all the local governments that are responsible for local land use controls where site(s) are to be evaluated.

Part III: When completing item B (Total Acres To Be Converted Indirectly), include the following:

1. Acres not being directly converted but that would no longer be capable of being farmed after the conversion, because the conversion would restrict access to them or other major change in the ability to use the land for agriculture.
2. Acres planned to receive services from an infrastructure project as indicated in the project justification (e.g. highways, utilities planned build out capacity) that will cause a direct conversion.

Part VI: Do not complete Part VI using the standard format if a State or Local site assessment is used. With local and NRCS assistance, use the local Land Evaluation and Site Assessment (LESA).

1. Assign the maximum points for each site assessment criterion as shown in § 658.5(b) of CFR. In cases of corridor-type project such as transportation, power line and flood control, criteria #5 and #6 will not apply and will, be weighted zero, however, criterion #8 will be weighed a maximum of 25 points and criterion #11 a maximum of 25 points.

2. Federal agencies may assign relative weights among the 12 site assessment criteria other than those shown on the FPPA rule after submitting individual agency FPPA policy for review and comment to NRCS. In all cases where other weights are assigned, relative adjustments must be made to maintain the maximum total points at 160. For project sites where the total points equal or exceed 160, consider alternative actions, as appropriate, that could reduce adverse impacts (e.g. Alternative Sites, Modifications or Mitigation).

Part VII: In computing the "Total Site Assessment Points" where a State or local site assessment is used and the total maximum number of points is other than 160, convert the site assessment points to a base of 160.
Example: if the Site Assessment maximum is 200 points, and the alternative Site "A" is rated 180 points:

$$\frac{\text{Total points assigned Site A}}{\text{Maximum points possible}} = \frac{180}{200} \times 160 = 144 \text{ points for Site A}$$

For assistance in completing this form or FPPA process, contact the local NRCS Field Office or USDA Service Center.

NRCS employees, consult the FPPA Manual and/or policy for additional instructions to complete the AD-1006 form.

Charlie Morgan

From: Charlie Morgan
Sent: Tuesday, January 28, 2020 1:10 PM
To: 'Cortes, Milton - NRCS, Raleigh, NC'
Subject: RE: Morgan's Branch CE review request NRCS
Attachments: AD1006_Morgan Branch Restoration Site-nrcsresponse-finaltonrcs.pdf

Milton,

Attached is the final form. Please let me know if you have any questions.

Thanks

Charlie Morgan
Project Scientist

KCI Technologies

4505 Falls of Neuse Road, Suite 400 Raleigh, NC 27609
charlie.morgan@kci.com
o: 919.783.9214 | d: 919.278.2470
f: 919.783.9266
www.kci.com

THE MOST INCREDIBLE THING
WE'VE ENGINEERED IS OUR TEAM

From: Cortes, Milton - NRCS, Raleigh, NC <milton.cortes@usda.gov>
Sent: Wednesday, October 9, 2019 3:38 PM
To: Charlie Morgan <Charlie.Morgan@kci.com>
Subject: RE: Morgan's Branch CE review request NRCS
Importance: High

Charlie:

Please find attached the Farmland Conversion Impact Rating for Morgran Branch Stream Restoration in Buncombe Co. NC

If we can be of further assistance please let us know

Best regards

Milton Cortes
State Soil Scientist
USDA NRCS
4407 Bland Rd., Suite 117
Raleigh, NC 27609
Desk: 919-873-2171
Cell: 984-365-2201

From: Charlie Morgan <Charlie.Morgan@kci.com>
Sent: Thursday, August 22, 2019 10:21 AM
To: Cortes, Milton - NRCS, Raleigh, NC <milton.cortes@usda.gov>
Cc: Tim Morris <Tim.Morris@kci.com>
Subject: Morgan's Branch CE review request NRCS

Mr. Cortes,

Please see the attached AD-1006.

This project has been reviewed by your agency in May 2018. At that time it had an Option B that has since become a separate project. Also there has been additional footprint added to the upper reaches of the project.

If you have any questions please let me know.

Thanks

Charlie Morgan
Project Scientist

KCI Technologies

4505 Falls of Neuse Road, Suite 400 Raleigh, NC 27609
charlie.morgan@kci.com
o: 919.783.9214 | d: 919.278.2470
f: 919.783.9266
www.kci.com

THE MOST INCREDIBLE THING
WE'VE ENGINEERED IS OUR TEAM

North Carolina Department of Natural and Cultural Resources
Natural Heritage Program

Governor Roy Cooper | Secretary Susi H. Hamilton

NCNHDE-5285

February 6, 2018

Thomas Seelinger
KCI Technologies, Inc.
4505 Falls of Neuse Road
Raleigh, NC 27609
RE: Morgan Branch Restoration Site

Dear Thomas Seelinger:

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, based on the project area mapped with your request, indicates that there are no records for rare species, important natural communities, natural areas, or conservation/managed areas within the proposed project boundary. Please note that although there may be no documentation of natural heritage elements within the project boundary, it does not imply or confirm their absence; the area may not have been surveyed. The results of this query should not be substituted for field surveys where suitable habitat exists. In the event that rare species are found within the project area, please contact the NCNHP so that we may update our records.

The attached 'Potential Occurrences' table summarizes rare species and natural communities that have been documented within a one-mile radius of the property boundary. The proximity of these records suggests that these natural heritage elements may potentially be present in the project area if suitable habitat exists and is included for reference. Tables of natural areas and conservation/managed area within a one-mile radius of the project area, if any, are also included in this report.

Please note that natural heritage element data are maintained for the purposes of conservation planning, project review, and scientific research, and are not intended for use as the primary criteria for regulatory decisions. Information provided by the NCNHP database may not be published without prior written notification to the NCNHP, and the NCNHP must be credited as an information source in these publications. Maps of NCNHP data may not be redistributed without permission.

The NC Natural Heritage Program may follow this letter with additional correspondence if a Dedicated Nature Preserve (DNP), Registered Heritage Area (RHA), Clean Water Management Trust Fund (CWMTF) easement, or Federally-listed species are documented near the project area.

If you have questions regarding the information provided in this letter or need additional assistance, please contact Rodney A. Butler at rodney.butler@ncdcr.gov or 919.707.8603.

Sincerely,
NC Natural Heritage Program

MAILING ADDRESS:
1651 Mail Service Center
Raleigh, NC 27699-1651

Telephone: (919) 707-8107
www.ncnhp.org

LOCATION:
121 West Jones Street
Raleigh, NC 27603

Natural Heritage Element Occurrences, Natural Areas, and Managed Areas Within a One-mile Radius of the Project Area
Morgan Branch Restoration Site
February 6, 2018
NCNHDE-5285

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
Butterfly	24857	Autochton cellus	Golden Banded-Skipper	2007-05-29	BC	3-Medium	---	Significantly Rare	G4	S2
Dragonfly or Damselfly	33442	Calopteryx amata	Superb Jewelwing	2004-Pre	H?	5-Very Low	---	Significantly Rare	G4	S1S2

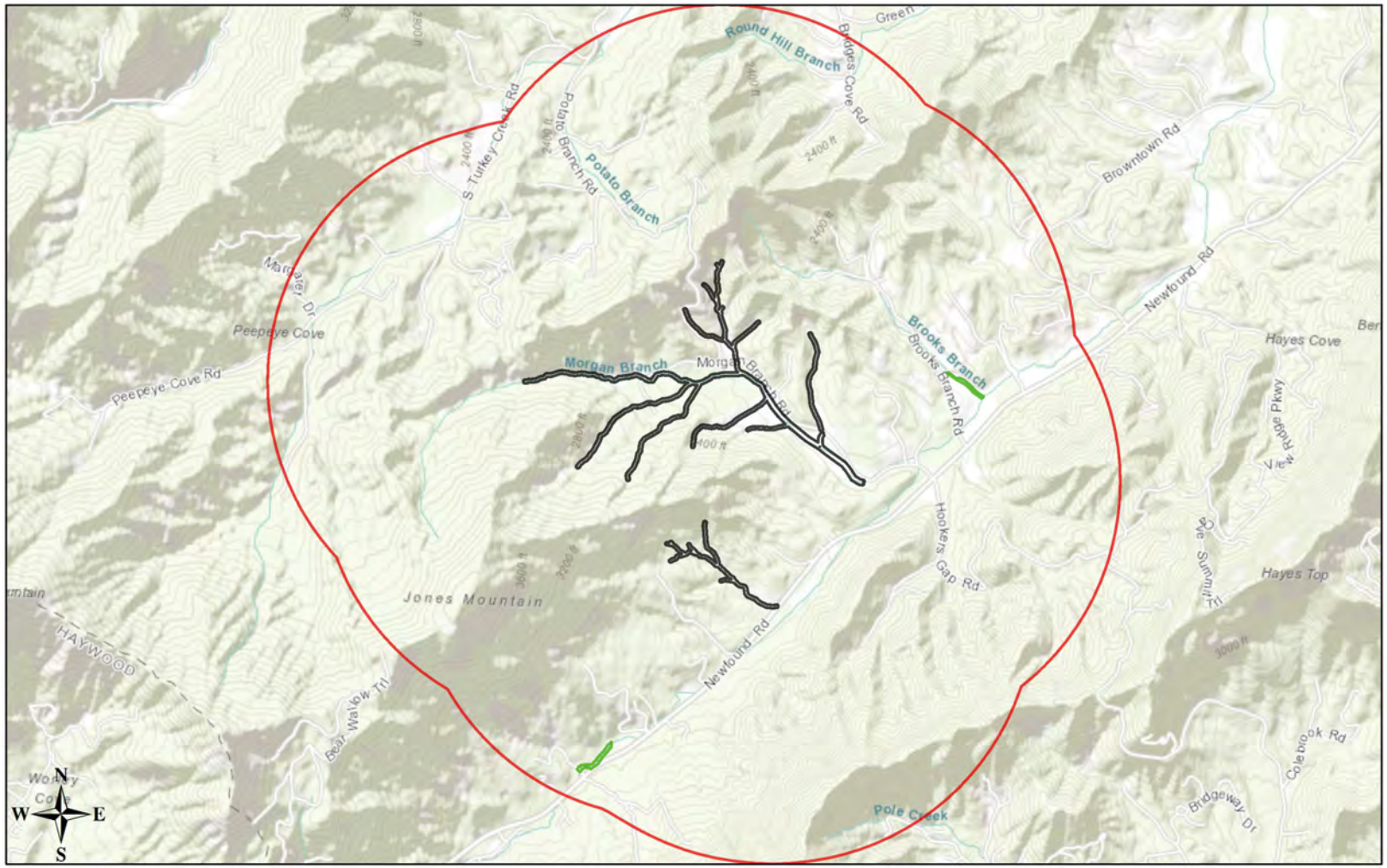
No Natural Areas are Documented Within a One-mile Radius of the Project Area

Managed Areas Documented Within a One-mile Radius of the Project Area

Managed Area Name	Owner	Owner Type
Buncombe County Open Space Easement	Buncombe County: multiple local government	Local Government

Definitions and an explanation of status designations and codes can be found at https://ncnhde.natureserve.org/content/help. Data query generated on February 6, 2018; source: NCNHP, Q4 October 2017. 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-5285: Morgan Branch Restoration Site



February 6, 2018

- Project Boundary
- Buffered Project Boundary
- Managed Area (MAREA)

1:34,074

0 0.275 0.55 1.1 mi

0 0.45 0.9 1.8 km

Sources: Esri, HERE, DeLorme, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community

Affidavit of Public Notice

US Army Corps
Of Engineers
Wilmington District

PUBLIC NOTICE

Issue Date: October 11, 2019
Comment Deadline: November 10, 2019
Corps Action ID #: SAW-2018-01163

FEDERAL PUBLIC NOTICE

The Wilmington District, Corps of Engineers (Corps) has received a request to modify the North Carolina Division of Mitigation Services (DMS) In-lieu Fee Instrument, for the addition of a 35.59-acre mitigation site, known as the Morgan Branch Restoration Site, which will be used to generate compensatory mitigation credits.

Sponsor:
N.C. Division of Mitigation Services
Attn: Mr. Tim Baumgartner
1652 Mail Service Center
Raleigh, NC 27699

This public notice does not imply, on the part of the Corps of Engineers or other agencies, either favorable or unfavorable opinion of the work to be performed, but is issued to solicit comments regarding the factors on which final decisions will be based.

LOCATION OF THE PROPOSED WORK: The Morgan Branch Site is situated in northwest of Buncombe County. The site is located approximately 3.5 miles southwest of the town of Leicester, North Carolina. Specifically, the site is on Morgan Branch Road, north west of the intersection of Morgan Branch Road and Newfound Road. The center of the site is in the vicinity of (35.6099° N, –82.7469° W)

EXISTING SITE CONDITIONS: The site is located on 9 parcels comprised primarily of pastureland and forest. Cattle have access to project streams. Primary stressors include livestock trampling, fecal coliform from cattle waste, active erosion, incision, and lack of stabilizing riparian vegetation.

PROPOSED WORK AND PURPOSE: The purpose of the proposal is the modification of the Division of Mitigation Services In-Lieu-Fee Program Instrument to add an additional mitigation site to generate mitigation credits that may be used to provide compensatory mitigation for unavoidable impacts to streams associated with Department of the Army permit authorizations pursuant to Section 404 of the Clean Water Act.

The Morgan Branch Restoration Project proposes the restoration, enhancement and preservation of approximately 21,509 linear feet of streams. Restoration and enhancement work will include: restoring the profile, dimension, and planform of project

streams within the valley, reconnecting their relic floodplains, establishing access to bankfull benches, stabilization of headcuts in the project streams, reduction and management of widespread invasive vegetation, excluding cattle from the project streams, moving livestock away from the existing dairy barn, and the establishment of a native riparian buffer. Raising the elevation of Tributary 7 will reconnect the site's riparian fringe wetlands and will provide functional uplift for this stream/wetland complex.

The sponsor has signed option agreements with the land owners to record a conservation easement on all land located within the site boundary. The easement will be conveyed to the State of North Carolina who will serve as long-term manager for the mitigation property.

GEOGRAPHIC SERVICE AREA: The proposed Geographic Service Area for the site encompasses the entire boundary of the 8-digit HUC 06010105, French Broad River Basin.

PROSPECTUS: This Public Notice document is available on the RIBITS web site at: https://ribits.usace.army.mil
To access the public notices, first select the Wilmington District from the Filter View drop-down menu in the lower left-hand corner, and then select the Bank & ILF Establishment tab, current public notices.

This mitigation site may be considered one of a number of practicable alternatives available to applicants to compensate for unavoidable stream impacts associated with permits issued under the authority of Sections 404 and 401 of the Clean Water Act for projects located within the prescribed geographic service area.

Oversight of this mitigation proposal will be by a group of federal and state agency representatives collectively referred to as the Interagency Review Team (IRT). The IRT shall be chaired by the Wilmington District, U.S. Army Corps of Engineers and is comprised of representatives from the U.S. Environmental Protection Agency, U.S. Fish and Wildlife Service, N.C. Division of Water Resources, State Historic Preservation Office, NOAA, and the N.C. Wildlife Resources Commission.

The actual approval of the use of this mitigation site for a specific project is the decision of the Corps pursuant to Section 404 of the Clean Water Act. The Corps provides no guarantee that any particular individual or general permit will be granted authorization to use this stream compensatory mitigation site to compensate for unavoidable stream impacts associated with a proposed permit, even though mitigation from this site may be available.

AUTHORITY: The Corps will evaluate this modification request and the establishment of the mitigation site in accordance with the procedures outlined in 33 CFR Part 332. Additionally, this proposal will also be reviewed pursuant to the permitting authority

under Section 404 of the Clean Water Act for proposed activities involving the discharge of fill material into waters and/or wetlands of the United States.

FEDERAL EVALUATION OF PROPOSAL: The Corps of Engineers is soliciting comments from the public; Federal, State and local agencies and officials; Indian Tribes; and other interested parties, in order to consider and evaluate the proposed mitigation bank. Any comments received will be considered by the Corps in evaluating this proposal.

Preliminary review indicates:

1) An environmental impact statement (EIS) will not be required.

2) The activities associated with development of the mitigation site are not likely to adversely affect any fish, wildlife, and/or plant species (or their critical habitat) listed as threatened or endangered under the Endangered Species Act of 1973 (PL-93-205).

3) There will be no effect to any cultural or historic resources considered eligible or potentially eligible for listing on the National Register of Historic Places.

Additional information may change any of these preliminary findings.

Written comments pertinent to the proposed work, as outlined above and as described in the modification request, will be received in this office, Wilmington District Corps of Engineers, Mitigation Field Office, Attn: Kim Browning, 3331 Heritage Trade Drive, Suite 105, until November 10, 2019. If you have questions, please contact Kim Browning by email at Kimberly.D.Browning@usace.army.mil .

LANDOWNER AUTHORIZATION FORM

PROPERTY LEGAL DESCRITION:

Deed Book: 5608 **Page:** 1682 **County:** Buncombe

Parcel ID Number: 8689-66-3036/ 8689-87-7949

Street Address: 208 Morgan Branch Road, Leicester NC 28748

Property Owner (please print: Neal Morgan/Dale Morgan/Martin Morgan

The undersigned, registered property owner(s) of the above property, do hereby authorize

Tim Morris **of** KCI Technologies Inc.
(Contractor/Agent/Project Manager)[1] **(Name of Contractor/Agent Firm/Agency)[2]**

to take all actions necessary for the evaluation of the property as a potential stream, wetland and/or riparian buffer mitigation project, including conducting stream and/or wetland determinations and delineations, as well as issuance and acceptance of any required permit(s) or certification(s). I agree to allow regulatory agencies, including the US Army Corps of Engineers, to visit the property as part of these environmental reviews.

Property Owners(s) Address: 321 Morgan Branch Road, Leicester NC 28748
(if different from above)

Property Owner Telephone Number: Neal Morgan - 828-768-4547

Property Owner Telephone Number: Dale Morgan – 828-683-3264

Property Owner Telephone Number: Martin Morgan – 828-712-9232

We hereby certify the above information to be true and accurate to the best of our knowledge.

Neal Morgan 6-12-18
Neal Morgan **(Date)**

Dale Morgan 6-12-18
Dale Morgan **(Date)**

Martin Morgan 6-8-18
Martin Morgan **(Date)**

[1]Name of full delivery staff member (full-deliveries) or DMS project manager (design-bid-build).
[2]Name of company (full-deliveries) or DMS (design-bid-build).

LANDOWNER AUTHORIZATION FORM

PROPERTY LEGAL DESCRITION:

Deed Book: 1315 **Page:** 0597 **County:** Buncombe

Parcel ID Number: 8689-69-5419

Street Address: 284 Morgan Branch Road, Leicester NC 28748

Property Owner (please print: Dale Morgan

The undersigned, registered property owner(s) of the above property, do hereby authorize

Tim Morris **of** KCI Technologies Inc.
(Contractor/Agent/Project Manager)[1] **(Name of Contractor/Agent Firm/Agency)[2]**

to take all actions necessary for the evaluation of the property as a potential stream, wetland and/or riparian buffer mitigation project, including conducting stream and/or wetland determinations and delineations, as well as issuance and acceptance of any required permit(s) or certification(s). I agree to allow regulatory agencies, including the US Army Corps of Engineers, to visit the property as part of these environmental reviews.

Property Owners(s) Address: 1281 Newfound Road, Leicester NC 28748
(if different from above)

Property Owner Telephone Number: 828-683-3264

We hereby certify the above information to be true and accurate to the best of our knowledge.

F. Dale Morgan 6/12/18
(Property Owner Authorized Signature) **(Date)**

[1]Name of full delivery staff member (full-deliveries) or DMS project manager (design-bid-build).
[2]Name of company (full-deliveries) or DMS (design-bid-build).

LANDOWNER AUTHORIZATION FORM

PROPERTY LEGAL DESCRITION:

Deed Book: 1838 **Page:** 490 **County:** Buncombe

Parcel ID Number: 8689-47-3784

Street Address: 299 Morgan Branch Road, Leicester NC 28748

Property Owner (please print): Douglas M. Keefer and Nelle H. Gregory

The undersigned, registered property owner(s) of the above property, do hereby authorize

Tim Morris **of** KCI Technologies Inc.
(Contractor/Agent/Project Manager)[1] **(Name of Contractor/Agent Firm/Agency)[2]**

to take all actions necessary for the evaluation of the property as a potential stream, wetland and/or riparian buffer mitigation project, including conducting stream and/or wetland determinations and delineations, as well as issuance and acceptance of any required permit(s) or certification(s). I agree to allow regulatory agencies, including the US Army Corps of Engineers, to visit the property as part of these environmental reviews.

Property Owners(s) Address: 23 Success Avenue, Asheville, NC 28806
(if different from above)

Property Owner Telephone Number: Douglas M. Keefer - 828-~~774-9650~~ 713-7208

Property Owner Telephone Number: Nelle H. Gregory - 828-774-9650

We hereby certify the above information to be true and accurate to the best of our knowledge.

Douglas M. Keefer — 6-1-18
Douglas M. Keefer **(Date)**

Nelle H. Gregory — 6-1-18
Nelle H. Gregory **(Date)**

[1]Name of full delivery staff member (full-deliveries) or DMS project manager (design-bid-build).
[2]Name of company (full-deliveries) or DMS (design-bid-build).

LANDOWNER AUTHORIZATION FORM

PROPERTY LEGAL DESCRITION:

Deed Book: 4912/1910 **Page:** 1390/0459 **County:** Buncombe

Parcel ID Number: 8689-47-4283/8689-47-5347

Street Address: 315 Morgan Branch Road, Leicester NC 28748

Property Owner (please print: Christopher McGrath

Property Owner (please print): Susan McGrath

The undersigned, registered property owner(s) of the above property, do hereby authorize

Tim Morris **of** KCI Technologies Inc.
(Contractor/Agent/Project Manager)[1] **(Name of Contractor/Agent Firm/Agency)[2]**

to take all actions necessary for the evaluation of the property as a potential stream, wetland and/or riparian buffer mitigation project, including conducting stream and/or wetland determinations and delineations, as well as issuance and acceptance of any required permit(s) or certification(s). I agree to allow regulatory agencies, including the US Army Corps of Engineers, to visit the property as part of these environmental reviews.

Property Owners(s) Address: Same as above
(if different from above)

Property Owner Telephone Number: 828-776-1010

Property Owner Telephone Number: 828-989-4082

We hereby certify the above information to be true and accurate to the best of our knowledge.

Christopher McGrath 5/31/18
(Property Owner Authorized Signature) **(Date)**

Susan McGrath 5/31/18
(Property Owner Authorized Signature) **(Date)**

[1]Name of full delivery staff member (full-deliveries) or DMS project manager (design-bid-build).
[2]Name of company (full-deliveries) or DMS (design-bid-build).

LANDOWNER AUTHORIZATION FORM

PROPERTY LEGAL DESCRITION:

Deed Book: 5608 **Page:** 1682 **County:** Buncombe

Parcel ID Number: 8689-36-4053

Street Address: 321 Morgan Branch Road, Leicester NC 28748

Property Owner (please print: Neal Morgan/Martin Morgan

The undersigned, registered property owner(s) of the above property, do hereby authorize

Tim Morris **of** KCI Technologies Inc.
(Contractor/Agent/Project Manager)[1] **(Name of Contractor/Agent Firm/Agency)[2]**

to take all actions necessary for the evaluation of the property as a potential stream, wetland and/or riparian buffer mitigation project, including conducting stream and/or wetland determinations and delineations, as well as issuance and acceptance of any required permit(s) or certification(s). I agree to allow regulatory agencies, including the US Army Corps of Engineers, to visit the property as part of these environmental reviews.

Property Owners(s) Address: 321 Morgan Branch Road, Leicester NC 28748
(if different from above)

Property Owner Telephone Number: Neal Morgan - 828-768-4547

Property Owner Telephone Number: Martin Morgan – 828-712-9232

We hereby certify the above information to be true and accurate to the best of our knowledge.

6-12-18
Neal Morgan **(Date)**

6-8-18
Martin Morgan **(Date)**

[1]Name of full delivery staff member (full-deliveries) or DMS project manager (design-bid-build).
[2]Name of company (full-deliveries) or DMS (design-bid-build).

LANDOWNER AUTHORIZATION FORM

PROPERTY LEGAL DESCRITION:

Deed Book: 5608 **Page:** 1682 **County:** Buncombe

Parcel ID Number: 8689-48-8018

Street Address: 321 Morgan Branch Road, Leicester NC 28748

Property Owner (please print: Neal Morgan

The undersigned, registered property owner(s) of the above property, do hereby authorize

Tim Morris **of** KCI Technologies Inc.
(Contractor/Agent/Project Manager)[1] **(Name of Contractor/Agent Firm/Agency)[2]**

to take all actions necessary for the evaluation of the property as a potential stream, wetland and/or riparian buffer mitigation project, including conducting stream and/or wetland determinations and delineations, as well as issuance and acceptance of any required permit(s) or certification(s). I agree to allow regulatory agencies, including the US Army Corps of Engineers, to visit the property as part of these environmental reviews.

Property Owners(s) Address: 321 Morgan Branch Road, Leicester NC 28748
(if different from above)

Property Owner Telephone Number: Neal Morgan - 828-768-4547

We hereby certify the above information to be true and accurate to the best of our knowledge.

Neal Morgan 6-12-18
Neal Morgan **(Date)**

[1]Name of full delivery staff member (full-deliveries) or DMS project manager (design-bid-build).
[2]Name of company (full-deliveries) or DMS (design-bid-build).

KCI ASSOCIATES OF NC

ISO 9001:2015 CERTIFIED

ENGINEERS • PLANNERS • SCIENTISTS • CONSTRUCTION MANAGERS

4505 Falls of Neuse Rd., Suite 400 • Raleigh, NC 27609 • Phone 919-783-9214 • Fax 919-783-9266

October 17, 2022

To: Harry Tsomides, DMS Project Manager

Subject: Northern long-eared bat (NLEB) Agency Coordination for Morgan Branch Project

The U.S. Fish and Wildlife Service (USFWS) plans to reclassify the northern long-eared bat (NLEB) as endangered under the Endangered Species Act. This reclassification is tentatively planned for November 2022. For DMS mitigation sites not constructed by November 2022, FHWA indicated that the 4D rule cannot be utilized and the site/s require additional consultation w/ USFWS.

The result of the original request for consultation for Morgan Branch from 2019 was concurrence (no additional comments) with the findings of the lead agency: that the project was unlikely to affect NLEB, and that adherence to guidance regarding tree clearing moratoria (October 15 – April 1) outside the NLEB active season would be acceptable.

On September 29, 2022, KCI requested additional consultation with USFWS for NLEB for the Morgan Branch site, in Buncombe County, NC, and provided documentation from the 2019 consultation. The DMS project manager and FHWA coordinator were included on the request. The 2022 letter and 2019 documentation are attached.

On October 13, 2022, USFWS responded via email, again agreeing with the lead federal agency that there is a "may affect, not likely to adversely affect" determination for northern long-eared bat for Morgan Branch, and that this finding would apply to any reclassification if the tree clearing moratoria was followed.

From: Youngman, Holland J
To: Kirsten Ullman
Cc: Kristin Knight-Meng; Andrea Benson
Subject: [External Email] Re: [EXTERNAL] NLEB consultation for Morgan Branch Stream Mitigation Site
Date: Wednesday, August 16, 2023 8:18:18 AM

*****From IT@KCI.COM 410-316-7820 *** This is an External Email from outside of KCI.*****

Thanks very much, Kirsten. That all sounds good. Please do provide a map with the locations (if it's handy) when you get the chance so that I can add that to the project file.

Given the commitment to clearing trees during the bat inactive season of October 16 - March 31, along with the negative 8/9/23 surveys of suitable culverts and structures within the action area, we agree that the project may affect but is not likely to adversely affect tricolored bat (*Perimyotis subflavus*). We would concur with this determination from the lead federal agency.

Please let me know if you need anything else at this time.
Best,

Holland Youngman
(she/her)
Wildlife Biologist
U.S. Fish and Wildlife Service
Asheville Ecological Services Field Office
160 Zillicoa Street, Asheville, North Carolina, 28801
Cell: 828-575-3920

From: Kirsten Ullman <Kirsten.Ullman@kci.com>
Sent: Thursday, August 10, 2023 2:51 PM
To: Youngman, Holland J <holland_youngman@fws.gov>
Cc: Kristin Knight-Meng <Kristin.KnightMeng@kci.com>; Andrea Benson <Andrea.Benson@kci.com>
Subject: RE: [EXTERNAL] NLEB consultation for Morgan Branch Stream Mitigation Site

Hi Holland –

Yesterday, a KCI employee trained in bat surveys went to the Morgan Branch site and inspected the culverts meeting the criteria you specified below, as well as four structures that will be relocated as a result of project activities. No bats were found during the survey. The culvert pipes on the site are mostly CMP and are not likely to be suitable roosting habitat. No signs of bats (visual, smell, sound, body oil staining, or guano) were observed in any of the structures.

Please let us know if you need any additional documentation of the survey work. If necessary, I can also provide a map of the locations that were surveyed.

Thank you,

Kirsten

Kirsten Ullman
Natural Resources Project Manager

KCI Associates of NC, PA

4505 Falls of Neuse Road, Suite 400, Raleigh, NC 27609
kirsten.ullman@kci.com
o: 919.278.2551 | f: 919.783.9266
www.kci.com

RISE TO THE **CHALLENGE**

From: Youngman, Holland J <holland_youngman@fws.gov>
Sent: Wednesday, August 9, 2023 11:56 AM
To: Kirsten Ullman <Kirsten.Ullman@kci.com>
Subject: [External Email] Re: [EXTERNAL] NLEB consultation for Morgan Branch Stream Mitigation Site

---

Thanks Kirsten,

I think just making sure that a thorough survey is done to ensure the absence of roosting/signs of roosting bats is the important thing. For the buildings, if it isn't clear whether or not there are roosting bats present from a daytime survey, an evening emergence survey may be a good way to go. Guidance on how to conduct such a survey can be found in the Range-wide Indiana Bat NLEB Survey Guidelines, Appendix E: https://www.fws.gov/sites/default/files/documents/USFWS_Range-wide_IBat_%26_NLEB_Survey_Guidelines_2023.05.10_0.pdf

Let me know once y'all have verified absence of roosting bats in structures that will be impacted by project work. Of course in the event that bats are observed, please let me know and we'll work with y'all on that.

Best,

Holland Youngman

(she/her)
Wildlife Biologist
U.S. Fish and Wildlife Service

Asheville Ecological Services Field Office
160 Zillicoa Street, Asheville, North Carolina, 28801
Cell: 828-575-3920

From: Kirsten Ullman <Kirsten.Ullman@kci.com>
Sent: Monday, August 7, 2023 10:39 AM
To: Youngman, Holland J <holland_youngman@fws.gov>
Subject: RE: [EXTERNAL] NLEB consultation for Morgan Branch Stream Mitigation Site

Hi Holland –

The proposed project does have a few larger culverts that will be replaced and old barns that will be removed/relocated. We will get someone out to do bat surveys in those areas this week. Are there any other things we should check while she's there?

Thanks,

Kirsten

From: Youngman, Holland J <holland_youngman@fws.gov>
Sent: Friday, August 4, 2023 12:10 PM
To: Kirsten Ullman <Kirsten.Ullman@kci.com>
Subject: [External Email] Re: [EXTERNAL] NLEB consultation for Morgan Branch Stream Mitigation Site

---

Hi Kirsten, I think we can handle this through email discussion. Just a few questions:

Can you let me know if there are culverts equal to or greater than 2' in diameter and approx. 20' in length within the project action area that will be impacted by the proposed work? If so, have they been surveyed for roosting bats?

Are there any old structures with suitable bat roosting features that will be altered/removed associated with the project work?

Thanks,

Holland Youngman

(she/her)
Wildlife Biologist
U.S. Fish and Wildlife Service
Asheville Ecological Services Field Office
160 Zillicoa Street, Asheville, North Carolina, 28801
Cell: 828-575-3920

From: Kirsten Ullman <Kirsten.Ullman@kci.com>
Sent: Thursday, August 3, 2023 8:53 AM
To: Youngman, Holland J <holland_youngman@fws.gov>
Subject: RE: [EXTERNAL] NLEB consultation for Morgan Branch Stream Mitigation Site

Hi Holland –

Our plans are to construct the Morgan Branch project between October 15, 2023, and April 1, 2024, in adherence to the tree clearing moratorium for NLEB. Given the potential listing for tricolored bat, we'd also like to re-initiate consultation for that species, with the intent that measures taken to protect NLEB would also be suitable for tricolored bat. What is the best way to re-initiate consultation for this additional species?

Thanks,

Kirsten Ullman
Natural Resources Project Manager

KCI ASSOCIATES OF NC
KCI Associates of NC, PA

4505 Falls of Neuse Road, Suite 400, Raleigh, NC 27609
kirsten.ullman@kci.com
o: 919.278.2551 | f: 919.783.9266
www.kci.com

From: Youngman, Holland J <holland_youngman@fws.gov>
Sent: Thursday, October 13, 2022 12:05 PM
To: Kirsten Ullman <Kirsten.Ullman@kci.com>
Subject: [External Email] Re: [EXTERNAL] NLEB consultation for Morgan Branch Stream Mitigation Site

---

Thank you for that clarification. I'll note for the file that the request is only for northern long-eared bat and not for any other federally designated species. Because the request is solely for one species and is not addressing additional project/species review, I'm providing a response via the body of this email:

Given the commitment to conduct tree clearing between October 15 and April 1, we would concur

with the lead federal agency on a "may affect, not likely to adversely affect" determination for northern long-eared bat.

Please let me know if you need anything else on this one.
Best,

Holland Youngman
(she/her)
Wildlife Biologist
U.S. Fish and Wildlife Service
Asheville Ecological Services Field Office
160 Zillicoa Street, Asheville, North Carolina, 28801
Cell: 828-575-3920 Office: 828-258-3939 x42235

From: Kirsten Ullman <Kirsten.Ullman@kci.com>
Sent: Thursday, October 13, 2022 11:49 AM
To: Youngman, Holland J <holland_youngman@fws.gov>
Subject: RE: [EXTERNAL] NLEB consultation for Morgan Branch Stream Mitigation Site

Hi Holland –

We specifically want to just address NLEB, due to its potential uplisting to Endangered before the project is constructed. Similar to the message I sent a few weeks ago about our Haunted Creek in the Little Tennessee Basin, we just want to make sure that past consultation/concurrence and proposed projects actions to limit any potential effect will extend to this species for this project, if its listing status changes before it is constructed.

Kirsten

From: Youngman, Holland J <holland_youngman@fws.gov>
Sent: Thursday, October 13, 2022 11:42 AM
To: Kirsten Ullman <Kirsten.Ullman@kci.com>
Subject: [External Email] Re: [EXTERNAL] NLEB consultation for Morgan Branch Stream Mitigation Site

---

Hi Kirsten -

Are you looking for a full concurrence letter associated with this project (i.e. addressing all species in consultation range) OR only for a statement on northern long-eared bat?

Your letter only addresses NLEB but I'll point out that the project is within the range of gray bat (endangered), tricolored bat (proposed endangered), bog turtle (at-risk species), Monarch butterfly (candidate species) and mountain sweet pitcher plant (endangered). I see from the original letter from KCI for this project that suitable habitat isn't present on site for rock gnome lichen. If you do

want to include these other species in the review, please let me know and please specifically request a conference on tricolored bat if so.

I ask so that I can provide a response that's in line with what you're seeking - just let me know! Thanks,

Holland Youngman
(she/her)
Wildlife Biologist
U.S. Fish and Wildlife Service
Asheville Ecological Services Field Office
160 Zillicoa Street, Asheville, North Carolina, 28801
Cell: 828-575-3920 Office: 828-258-3939 x42235

From: Kirsten Ullman <Kirsten.Ullman@kci.com>
Sent: Tuesday, October 11, 2022 8:07 AM
To: Youngman, Holland J <holland_youngman@fws.gov>
Subject: RE: [EXTERNAL] NLEB consultation for Morgan Branch Stream Mitigation Site

Thank you!

Kirsten

From: Youngman, Holland J <holland_youngman@fws.gov>
Sent: Tuesday, October 11, 2022 7:34 AM
To: Kirsten Ullman <Kirsten.Ullman@kci.com>
Subject: [External Email] Re: [EXTERNAL] NLEB consultation for Morgan Branch Stream Mitigation Site

---

Good morning, Kirsten. I have this on my list. I was finally able to find the original file. I'm catching up after a four day break and will reach out once I've had a chance to review if I have any questions.

Best,

Holland Youngman
(she/her)
Wildlife Biologist
U.S. Fish and Wildlife Service
Asheville Ecological Services Field Office
160 Zillicoa Street, Asheville, North Carolina, 28801
Cell: 828-575-3920 Office: 828-258-3939 x42235

From: Kirsten Ullman <Kirsten.Ullman@kci.com>
Sent: Monday, October 10, 2022 9:50 AM

To: Youngman, Holland J <holland_youngman@fws.gov>
Subject: RE: [EXTERNAL] NLEB consultation for Morgan Branch Stream Mitigation Site

Hi Holland –

Following up on my message below regarding NLEB concurrence and the Morgan Branch restoration site in Buncombe County. Please let me know if you have any additional questions.

Kirsten

From: Kirsten Ullman
Sent: Tuesday, October 4, 2022 10:18 AM
To: Youngman, Holland J <holland_youngman@fws.gov>
Subject: RE: [EXTERNAL] NLEB consultation for Morgan Branch Stream Mitigation Site

Hi Holland –

We don't have a specific concurrence letter, just an email chain documenting that USFWS had no additional comments to add to our submission packet (which I sent you a few days ago) – I've attached this message, which is the official record included in the categorical exclusion.

Kirsten

From: Youngman, Holland J <holland_youngman@fws.gov>
Sent: Friday, September 30, 2022 4:01 PM
To: Kirsten Ullman <Kirsten.Ullman@kci.com>
Subject: [External Email] Re: [EXTERNAL] NLEB consultation for Morgan Branch Stream Mitigation Site

---

Thank you, Kirsten - that helps.

I was able to locate the project in our GIS system based on the lat/long. Looks like it was designated as Service log# 20-239. Unfortunately I haven't been able to find any of the project documents electronically - though may be able to unearth some paper files once I get into the office next week. In the meantime, if you can share the concurrence letter that was issued from this office that would be great.

Best,

Holland Youngman
(she/her)
Wildlife Biologist
U.S. Fish and Wildlife Service
Asheville Ecological Services Field Office

160 Zillicoa Street, Asheville, North Carolina, 28801
Cell: 828-575-3920 Office: 828-258-3939 x42235

From: Kirsten Ullman <Kirsten.Ullman@kci.com>
Sent: Friday, September 30, 2022 11:49 AM
To: Youngman, Holland J <holland_youngman@fws.gov>
Cc: harry.tsomides@ncdenr.gov <harry.tsomides@ncdenr.gov>; donnie.brew@dot.gov <donnie.brew@dot.gov>
Subject: RE: [EXTERNAL] NLEB consultation for Morgan Branch Stream Mitigation Site

Hi Holland –

I've attached a copy of the 2019 Morgan Branch submittal. I believe the USFWS Project log # is 19-385. It was initially submitted for USFWS review in 2018, under a different configuration. This version of the project was cancelled and re-submitted as two adjacent projects in 2019 (Morgan Branch and Dale's Creek). The Dale's Creek project was constructed in early 2022. It's unclear from the records on my end if USFWS continued to use the same project log for both, or if they were assigned separate numbers.

Please let me know if I can provide any additional information.

Kirsten

From: Youngman, Holland J <holland_youngman@fws.gov>
Sent: Friday, September 30, 2022 11:31 AM
To: Kirsten Ullman <Kirsten.Ullman@kci.com>
Cc: harry.tsomides@ncdenr.gov; donnie.brew@dot.gov
Subject: [External Email] Re: [EXTERNAL] NLEB consultation for Morgan Branch Stream Mitigation Site

*****From IT@KCI.COM 410-316-7820 *** This is an External Email from outside of KCI.*****

Hi Kirsten,

Thanks for touching base on this project. It looks like the previous consultation was conducted prior to my time with FWS. Any additional information that you can provide, especially the FWS log number (probably something like 19-### or 20-###, depending on the year), letter attachments, lat/long of the project location, etc. will help me to locate project info in our records and mapping system.

Once I can get acquainted with the project background I'll be able to work with you on reinitiation and an updated concurrence letter.

Best,

Holland Youngman

(she/her)
Wildlife Biologist
U.S. Fish and Wildlife Service
Asheville Ecological Services Field Office
160 Zillicoa Street, Asheville, North Carolina, 28801
Cell: 828-575-3920 Office: 828-258-3939 x42235

From: Kirsten Ullman <Kirsten.Ullman@kci.com>
Sent: Thursday, September 29, 2022 2:48 PM
To: Youngman, Holland J <holland_youngman@fws.gov>
Cc: harry.tsomides@ncdenr.gov <harry.tsomides@ncdenr.gov>; donnie.brew@dot.gov <donnie.brew@dot.gov>
Subject: [EXTERNAL] NLEB consultation for Morgan Branch Stream Mitigation Site

Good afternoon, Ms. Youngman:

In consideration of the USFWS proposal to reclassify the northern long-eared bat (NLEB) as endangered under the Endangered Species Act, KCI would like to re-initiate consultation regarding the Morgan Branch stream mitigation site in Buncombe County. Please find attached a request for re-initiation, which details prior correspondence related to the project, as well as project details specific to the NLEB.

Kirsten Ullman
Natural Resources Project Manager

KCI ASSOCIATES OF NC
KCI Associates of NC, PA

4505 Falls of Neuse Road, Suite 400, Raleigh, NC 27609
kirsten.ullman@kci.com
o: 919.278.2551 | f: 919.783.9266
www.kci.com

11. Buffer Width Calculations

Wilmington District Stream Buffer Credit Calculator

Site Name:	MB - <15' areas remain as credit
USACE Action ID:	
NCDWR Project Number:	
Sponsor:	
Number of Exempt Terminal Stream Ends[1]:	9
County:	Buncombe
Minimum Required Buffer Width[2]:	30

Mitigation Type	Mitigation Ratio Multiplier[3]	Creditable Stream Length[4]	Include in Buffer Calculations	Baseline Stream Credit	Buffered Stream Length	Credit From Buffered Streams
Restoration (1:1)	1	11412	Yes	11412.00	11412.00	11412.00
Enhancement I (1.5:1)	1.5	2318	Yes	1545.33	2318.00	1545.33
Enhancement II (2.5:1)	2.5	1661	Yes	664.40	1661.00	664.40
Preservation (5:1)	5	3156	Yes	631.20	3156.00	631.20
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		**18547.00**		14252.93	18547.00	14252.93

	Buffer Width Zone (feet from Ordinary High Water Mark)								
Buffer Zones	**less than 15 feet**	**>15 to 20 feet**	**>20 to 25 feet**	**>25 to 30 feet**	**>30 to 50 feet**	**>50 to 75 feet**	**>75 to 100 feet**	**>100 to 125 feet**	**>125 to 150 feet**
Max Possible Buffer (square feet)[5]	559589.25	187942.75	188649.25	189355.75	764488	932648.75	933355.25	934061.75	971506.25
Ideal Buffer (square feet)[6]	**579858.13**	**195965.52**	**194945.24**	**194422.86**	**775643.81**	**970032.32**	**966936.65**	**956104.65**	**958523.51**
Actual Buffer (square feet)[7]	**549790.90**	**179266.02**	**175030.78**	**170118.28**	**398532.17**	**38293.42**	**5917.47**	**1987.36**	**1623.88**
Zone Multiplier	50%	20%	15%	15%	9%	7%	6%	5%	3%
Buffer Credit Equivalent	7126.47	2850.59	2137.94	2137.94	1282.76	997.71	855.18	712.65	427.59
Percent of Ideal Buffer	95%	92%	91%	88%	51%	4%	1%	0%	0%
Credit Adjustment	-350.95	-226.36	-202.62	-248.38	659.09	39.39	5.23	1.48	0.72

Total Baseline Credit	Credit Loss in Required Buffer	Credit Gain for Additional Buffer	Net Change in Credit from Buffers	Total Credit
14252.93	**-1028.31**	**705.92**	**-322.39**	**13930.54**

[1]Number of terminal stream ends, including all points where streams enter or exit parcel boundaries. This does not include internal crossings. The District/NCIRT must approve the number of allowable/exempt terminal ends.

[2]Minimum standard buffer width measured from the top of bank (50 feet in piedmont and coastal plain counties or 30 feet in mountain counties)

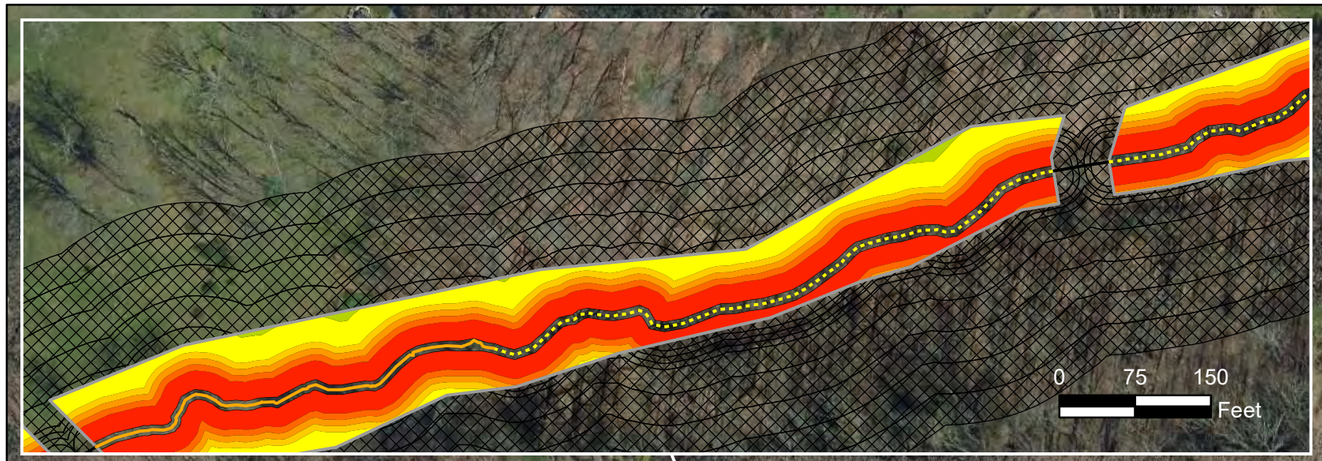
[3]Use the Custom Ratio fields to enter non-standard ratios, which are equal to the number of feet in the feet-to-credit mitigation ratio (e.g., for a perservation ratio of 8 feet to 1 credit, the multiplier would be 8).

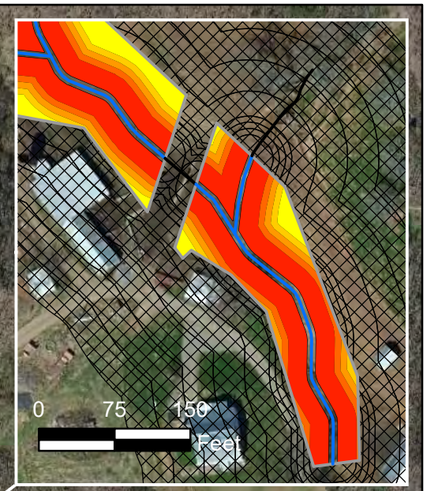
[4]Equal to the number of feet of stream in each Mitigation Type. If stream reaches are not creditable, they should be excluded from this measurement, even if they fall within the easement.

[5]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 and no internal crossings. This number is not used in calculations, but is provided as a reference.

[6]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.

[7]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.





T4 &T4-1 Terminal Stream Ends

T4

T4-1

T4

T4-2

T4-3

T4

T7 Terminal Stream End

T7

T8 Terminal Stream End

T8

Wetland Preservation Area

Morgan Branch

Morgan Branch

T9

T9 Terminal Stream End

T1

T2

T3

T1

T5

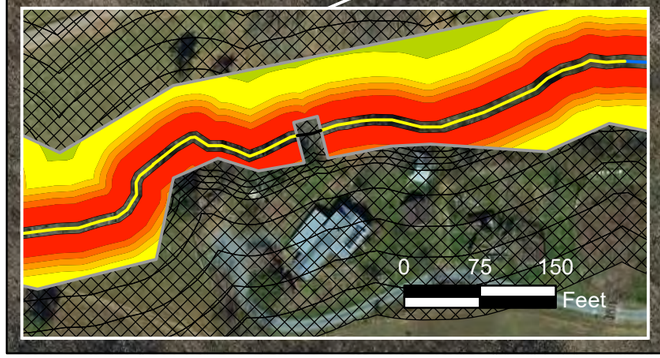
T5 Terminal Stream End

T5 Terminal Stream End

T1A

T1 &T1A Terminal Stream Ends

T1



Property Lines
Project Easement (38.25 ac)
Stream Restoration (11,412 lf / 11,412 SMC)
Stream Enhancement I (2,318 lf / 1,546 SMC)
Stream Enhancement II (1,661 lf / 664 SMC)
Stream Enhancement II @5:1 (3,156 lf / 631 SMC)
No Credit

Ideal Buffer

Actual Buffer Zones

0-15'
15-20'
20-25'
25-30'
30-50'
50-75'
75-100'
100-125'
125-150'

Note: There will be a loss of 322.39 SMC due to areas of reduced buffer width for a total of 13,930.61 SMC

0 300 600
Feet

STREAM BUFFER WIDTH ANALYSIS
MORGAN BRANCH RESTORATION SITE
BUNCOMBE COUNTY, NC

N

Image Source: NC Statewide Orthoimagery, 2019

12. Agency Correspondence

KCI ASSOCIATES OF NC

ISO 9001:2015 CERTIFIED

ENGINEERS • PLANNERS • SCIENTISTS • CONSTRUCTION MANAGERS

4505 Falls of Neuse Rd., Suite 400 • Raleigh, NC 27609 • Phone 919-783-9214 • Fax 919-783-9266

Date: hŎúƨōŜℕ нп, 2018

Attendees: Paul Wiesner, NC DMS
Matthew Reid, NC DMS
Periann Russell, NC DMS
Tim Baumgartner, NC DMS
Mac Haupt, NC DWR
Todd Tugwell, ACOE
Steve Kichefski, ACOE
Tim Morris, KCI
Charlie Morgan, KCI
Adam Spiller, KCI

From: Tim Morris, Project Manager
KCI Associates of North Carolina, P.A.

Subject: Morgan Branch Restoration Site
Post Contract IRT Site Review Meeting
French Broad 05
Buncombe County, North Carolina
Contract No. #7533
DMS Project #100065

An IRT field review was conducted for the above referenced project on August 2nd starting at approximately 8:00 am. Weather was overcast with periods of rain. Approximately 0.22" of rainfall had fallen earlier in the morning (Weather Underground Station KNCLEICE18). All project tributaries were flowing during the meeting with the exception of the upper portions of Tributary 4-3.

The comments follow the order of the site walk. There was overall agreement on the proposed levels of intervention and the proposed credit strategy unless specified below.

Attached to this memo are maps of the original credit scenario (Figure 1) from the proposal as well as the final credit scenario resulting from the IRT Post Contract Review Meeting (Figure 2).

Tributary 4-2

- IRT requested reducing the number of crossings. KCI reached out to the landowner and explained the concern. One crossing will likely be eliminated based on this conversation, with the possibility of removing an additional crossing. According to the landowner, the other crossings are needed to accommodate his pasture plan.

Tributary 4 and 4-1

- Change 4-1 from R to E2
- Consider reducing the number of crossings

Tributary 4-3

- Although the upper portion of this tributary was not included in the initial proposal, KCI requested that it be looked at b/c the landowner on the southeast side of the tributary has expressed interest in an easement on their property.
- The IRT expressed concern that the stream was not actively flowing at the time of the site visit in a wetter than normal period.
- If KCI was to incorporate this stream in the project, it would be at risk and detailed flow monitoring of this reach would be required.

Tributary 7

- Concerns were raised by DMS regarding the proximity of the Dairy Barn to the easement and the potential liability that stewarding that easement could bring to the State in the future.

- IRT stated that if narrow buffers (15'-30') were greater than 5% of the total project, credit reductions would occur (as per 2016 guidelines). The areas currently containing buffer (15'-30') are currently slightly over 5% as shown, however KCI believes that negotiations with the landowners may allow changes to the buffer widths, effectively bringing the total narrow buffer lengths to be below 5% of the total project length.

Morgan Branch

- Change E1 section of Morgan Branch to E2.

Tributary 1

- Change small section of Restoration between driveway and preservation to E2 @ 2.5:1.

Tributary 2

- Reduce crossings on E1 section from two down to one. Landowner has agreed to this change.

Tributary 5

- No changes

Tributary 6

- No changes

Credit Impact Summary:

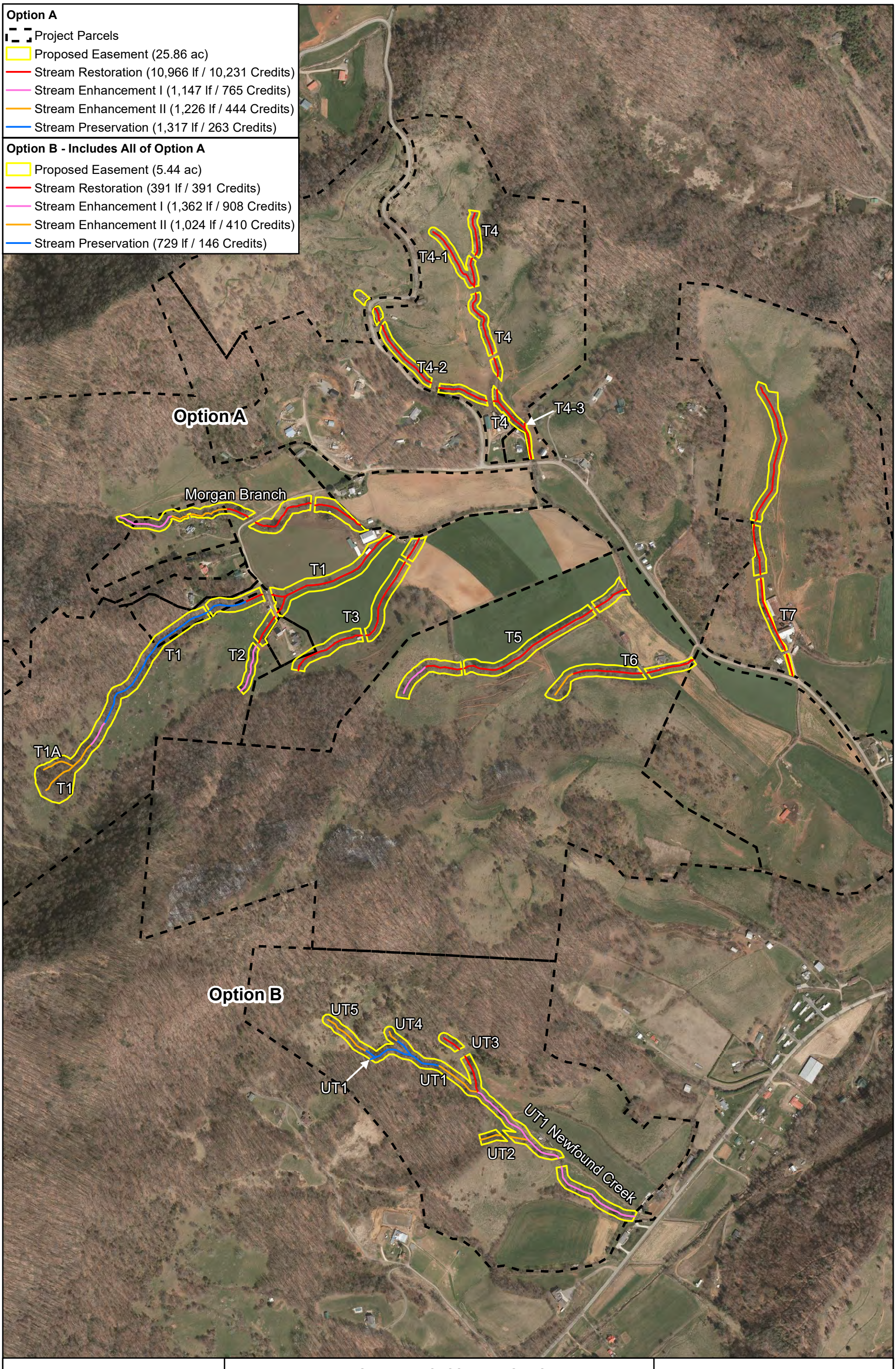
Credit Impacts – IRT credit reduction requests would result in a credit reduction of 397 credits (3.4% of the total project). DMS potential credit reduction associated with the elimination of the buffer behind the dairy barn would result in the reduction of 662 credits (5.6% of the total project). Unfortunately, the loss of 1.059 credits from the contracted value burdens KCI with a project that is no longer financially viable, especially considering the significant investments that would be made in moving the cattle operations outside of the stream valleys. As a result, KCI has submitted a letter to NC DMS requesting to terminate the contract. We hope that one day this project will be completed for the benefit of State water quality and basin-wide goals - we believe the need is well demonstrated.

Option A

- Project Parcels
- Proposed Easement (25.86 ac)
- Stream Restoration (10,966 lf / 10,231 Credits)
- Stream Enhancement I (1,147 lf / 765 Credits)
- Stream Enhancement II (1,226 lf / 444 Credits)
- Stream Preservation (1,317 lf / 263 Credits)

Option B - Includes All of Option A

- Proposed Easement (5.44 ac)
- Stream Restoration (391 lf / 391 Credits)
- Stream Enhancement I (1,362 lf / 908 Credits)
- Stream Enhancement II (1,024 lf / 410 Credits)
- Stream Preservation (729 lf / 146 Credits)



0 300 600 Feet

FIGURE 1. PROPOSED MITIGATION TYPE AND EXTENT
MORGAN BRANCH RESTORATION SITE
BUNCOMBE COUNTY, NC

N

Image Source: NC Statewide Orthoimagery, 2015

T4
T4-1
T4
T4-2
T4-3
T4
Morgan Branch
T1
T3
T1
T2
T5
T6
T7
T1A
T1

Proposed Easement (25.32 ac)
Potential Addition to Project Easement (1.21 ac)
Project Parcels
Stream Restoration (9,692 lf / 9,085 SMC)
Stream Enhancement I (733 lf / 489 SMC)
Stream Enhancement II (2,091 lf / 836 SMC)
Stream Enhancement II @5:1 (1,398 lf / 280 SMC)
Potential Addition Stream Enhancement I (606 lf / 404 SMC)

0 250 500
Feet

FIGURE 2. PROPOSED MITIGATION - POST CONTRACT REVIEW
TYPE AND EXTENT
MORGAN BRANCH RESTORATION SITE
BUNCOMBE COUNTY, NC

N

Image Source: NC Statewide Orthoimagery, 2015

KCI ASSOCIATES OF NC

ISO 9001:2015 CERTIFIED

ENGINEERS • PLANNERS • SCIENTISTS • CONSTRUCTION MANAGERS

4505 Falls of Neuse Rd., Suite 400 • Raleigh, NC 27609 • Phone 919-783-9214 • Fax 919-783-9266

Date: February 24, 2022

To: Interagency Review Team

From: Adam Spiller, Project Manager
KCI Technologies, Inc.

Subject: Morgan Branch Restoration Site
Pre-Mitigation Plan Coordination
French Broad 05
Buncombe County, North Carolina
Contract No. #7909
DMS Project #100127
USACE AID: SAW-2018-01163

Since the last post-contract site visit with the IRT to the Morgan Branch Restoration Site on 7/23/19, KCI has been working with the landowners to solidify the project easements. This site is large and covers multiple working farms, and as a result, the negotiations with the landowners have extended this process out more than at our previous mitigation sites. Additionally, Tropical Storm Fred flooded this site with over 8" of rain in a short period of time on August 16, 2021. This extreme storm event required a reassessment of the site's streams and design approaches to ensure our design will provide for the long-term stability of the project. Generally, the streams were already in such poor condition that the design approach did not change; however, some reaches that at one point only warranted enhancement-level work now require a restoration approach.

Between the changes due to landowner negotiations and the storm event, we are presenting this memo to summarize the project since the IRT site visit so that we as providers, DMS, and the IRT share similar expectations. These changes also better align the proposed project with the number of credits contracted with DMS. The change in credit total was accomplished by reducing the project length. The changes to the mitigation types do not substantially change the number of credits the project reaches are producing, but will streamline the number of reaches and make project communication and organization easier throughout the life of the project.

For reference, we have included the map that was attached to the meeting minutes from the post-contract site visit to compare to a new map showing the revisions (both maps have been updated with symbology and color changes to be easily comparable). Below is a discussion of the justifications for these changes, with letters in parentheses as references for locations on the map that are being discussed. The narrative for each stream starts at the upstream end of the tributary and progresses to the bottom. There is also a photo log that illustrates many of the discussion points below.

Morgan Branch

Following the final easement negotiations, the project no longer includes the original preservation reach, the upstream Enhancement 2 reaches, or the small unnamed side tributaries of Morgan Branch. The upstream limit of the Morgan Branch project reach now starts at the Enhancement 1 Reach (A) at 1.5 : 1. As discussed during the site walk, this credit ratio comes from moving the access road away from the

stream, reforesting the old road bed and areas that are in pasture now, and excluding cattle from the stream.

During our reassessment, we found a portion of this reach had formed a cut-off channel and needed restoration level work (B). We also realigned the crossing location of the road that will be moved, replacing a failing culvert and restoring portions of channel that have been negatively affected up and downstream of the old culvert (C).

Along the next section of Morgan Branch, one change along this reach is that the landowner would like to maintain access across this reach where there is an existing crossing (D). This culverted crossing washed out in the August 2021 event, and the landowner installed a temporary ford, shored up with jersey barriers. Our design proposes realigning this crossing to a more sustainable location, installing a new culvert, and restoring portions of this stream up and downstream of the new crossing.

Further downstream is another culvert on Morgan Branch that will be replaced and realigned to a more sustainable alignment (E), which will also restore sections of channel up and downstream of the crossing. Between this crossing and the restoration portion of Morgan Branch, there was evidence of active erosion and channel instability in parts of the channel that were discussed as relatively stable during the post-contract site walk. Because of this, there are two sections of bank instability that will be addressed (F) during the project work.

While negotiating with the landowner in this section, we had to accept a narrow easement on the south side of the stream, which means that portions of stream will not be credit-bearing, and the landowners wanted to maintain their small sitting area at the stream, which is not part of the easement.

After this section of channel, the stream has become more incised after the storm and restoration level work, coupled with some downstream bank stabilization, is required to prevent the stream from further destabilizing.

When looking at the entirety of the work along this reach of Morgan Branch, including moving the access road, excluding cattle, planting, restoration sections, areas of bank grading and stabilization, and replacing failing culverts, we have combined this into one reach using Enhancement 2 at a 2.5:1 ratio. This will create a streamlined reach approach and is consistent with the justification used on other reaches.

KCI was able to negotiate with the landowner and extend the restoration reach on Morgan Branch past the confluences with T1 and T3 (K). This will create more connectivity throughout the restored channels in this section and reduce sediment and nutrient impacts in this area. We feel this is a valuable addition to the project.

T1/T1A

We had to revise the original location depicted in the figure for the upstream portion of T1; the revised map shows the surveyed location of the stream. This revision means that the project will protect a larger area of headwaters under easement (including T1A, which has always been a part of the project). These drainages are heavily dominated by invasives, particularly multiflora rose, and the work will include invasive removal and control as well as planting the areas currently in pasture. In addition, work in the stretch that had been called Enhancement 1. A failing culvert will be replaced here and the channel immediately up and downstream of the culvert will be restored. Then the stretch downstream, which has been impacted by cattle but does not need full restoration, will be stabilized with bank grading and live lifts (J). To decrease the number of reaches, we have grouped this section of channel into the upstream reach of T1 and called it all Enhancement 2 mitigation at a 2.5:1 ratio.

T4
During landowner negotiations and because of topographic site constraints, several small changes were made to T4. These include removing the crossing proposed below the confluence of T4-1(M); the 60' easement exception upstream of the T4-2 confluence has been reduced to 30', but an additional culverted crossing has been added below the T4-2 confluence (N); and lastly for T4, the restoration reach has been extended approximately 175' downstream from the original ending point (O).

T4-1
The mitigation type has changed on T4-1. During further site assessment in the dormant season, this reach had less stabilizing vegetation than during the IRT post-contract site visit and there was more active erosion and bed instability. A new channel also cut in the valley around the former channel. Because of these factors, the proposed mitigation type for T4-1 is now Restoration instead of Enhancement 2. From our analysis, we determined that minor efforts such as planting will not arrest the headcuts and other areas of instability that have developed and that a more extensive restoration approach is needed.

T4-2
The beginning point of this restoration reach has been moved down to the start of the stream (P). Additionally, the original 60' easement exception will now be only a 30' easement exception (Q).

T6
To better align the project with the contracted number of credits, T6 has been removed from the scope of this project (L). This was one of the shorter streams within the project and less impacted compared to the other project reaches. With the additional length we have added to other reaches (such as the connecting section at the confluences of Morgan Branch, T1, and T3), the total functional uplift of the project is not compromised by the elimination of T6. Even though we are removing T6 from the project, we are not going to rename T7, T8, or T9 so that we can maintain continuity in project documentation.

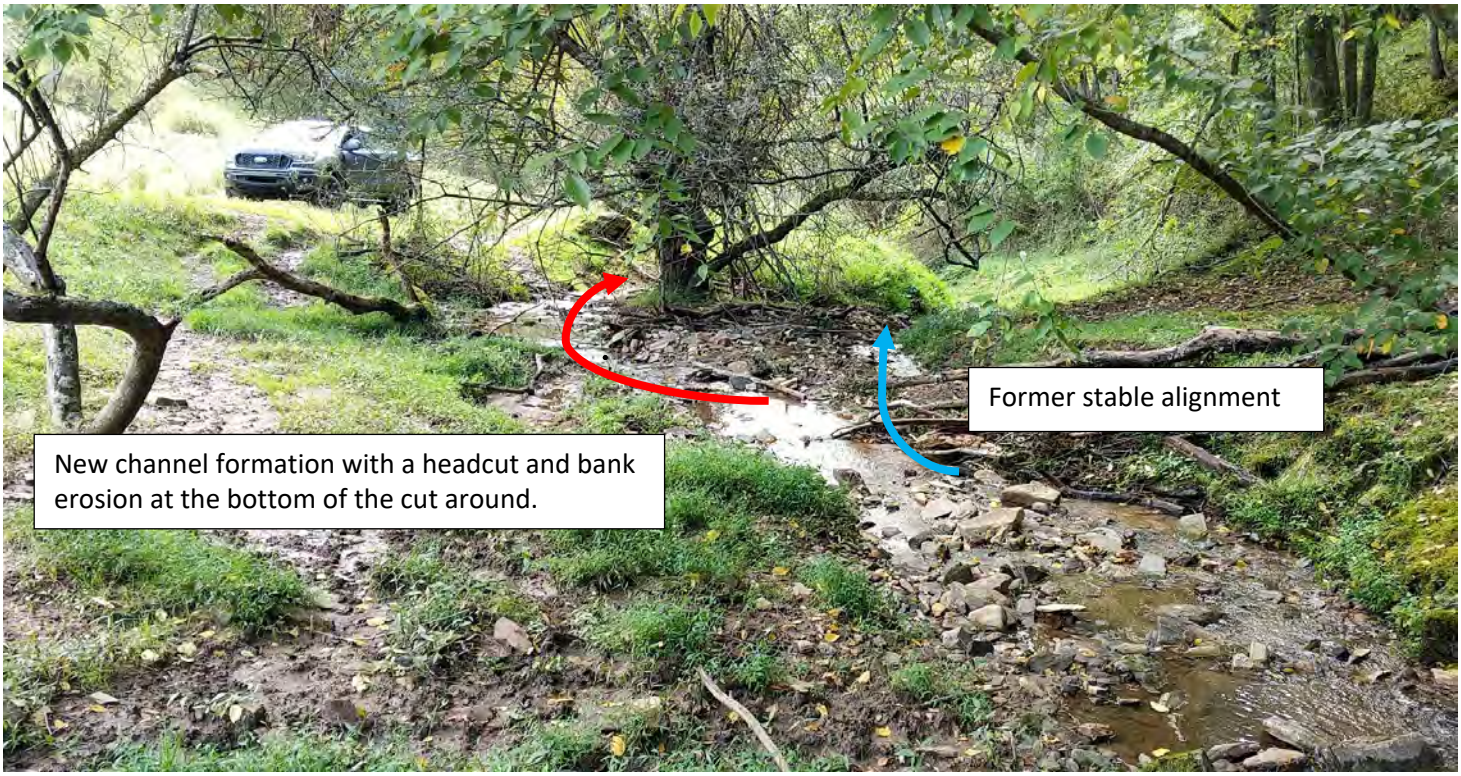
T7
Along T7, the easement at the top of the channel has been widened to include incoming seeps in the easement (R). An additional crossing was needed for landowner access to the west side of the stream (S).

T9
The only change to T9 is a small 10' landowner crossing allowance that will be included in the conservation easement description. The existing failing culvert will be replaced as a part of the access allowance.

Credit Reductions Due to Narrow Buffers
Following the guidance on credit reductions due to narrow buffers in the 2016 guidance, we have reduced credit where the buffer will be less than 30' on one side of the channel. This table is attached to give a preliminary credit estimate for the project.

Attachments:

Photo Log
Revised Figure 11
Original Figure 11
Buffer Width/Credit Table



Area of channel instability requiring more intervention along Morgan Branch (Area B).


Washed-out culvert was temporary repaired by the landowner with a ford secured with concrete blocks (Area D).

Formerly stable bank on Morgan Branch, now actively eroding after storm event, will require bank grading, stabilization, and bench grading (Area F).

Another view on Morgan Branch of a formerly stable bank, now actively eroding after storm event requiring bank grading, stabilization, and bench grading (Area F).

Formerly stable banks, now both are actively eroding after storm event requiring bank grading, stabilization, and bench grading (Area F).

Formerly stable banks throughout this section are now unconsolidated and actively eroding after storm event requiring bank grading, stabilization, and bench grading (Area H).

Bed lowering and incision has occurred in this section. The banks are unconsolidated and eroding and the minimal buffer is almost all invasive vegetation (Area H). This area will benefit from bank grading and stabilization and bed work to create more stable bed features.

A portion of T4-1 has continued to erode, and the bed and banks are poorly formed from cattle impacts. This reach would benefit from a Restoration approach, matching the approach proposed for T4 and T4-2.

Another portion of T4-1 showing that the bed has lowered and is in a poorly functioning state. Being able to restore this stream and shift this part of T4-2 to the left would produce a higher functioning channel.

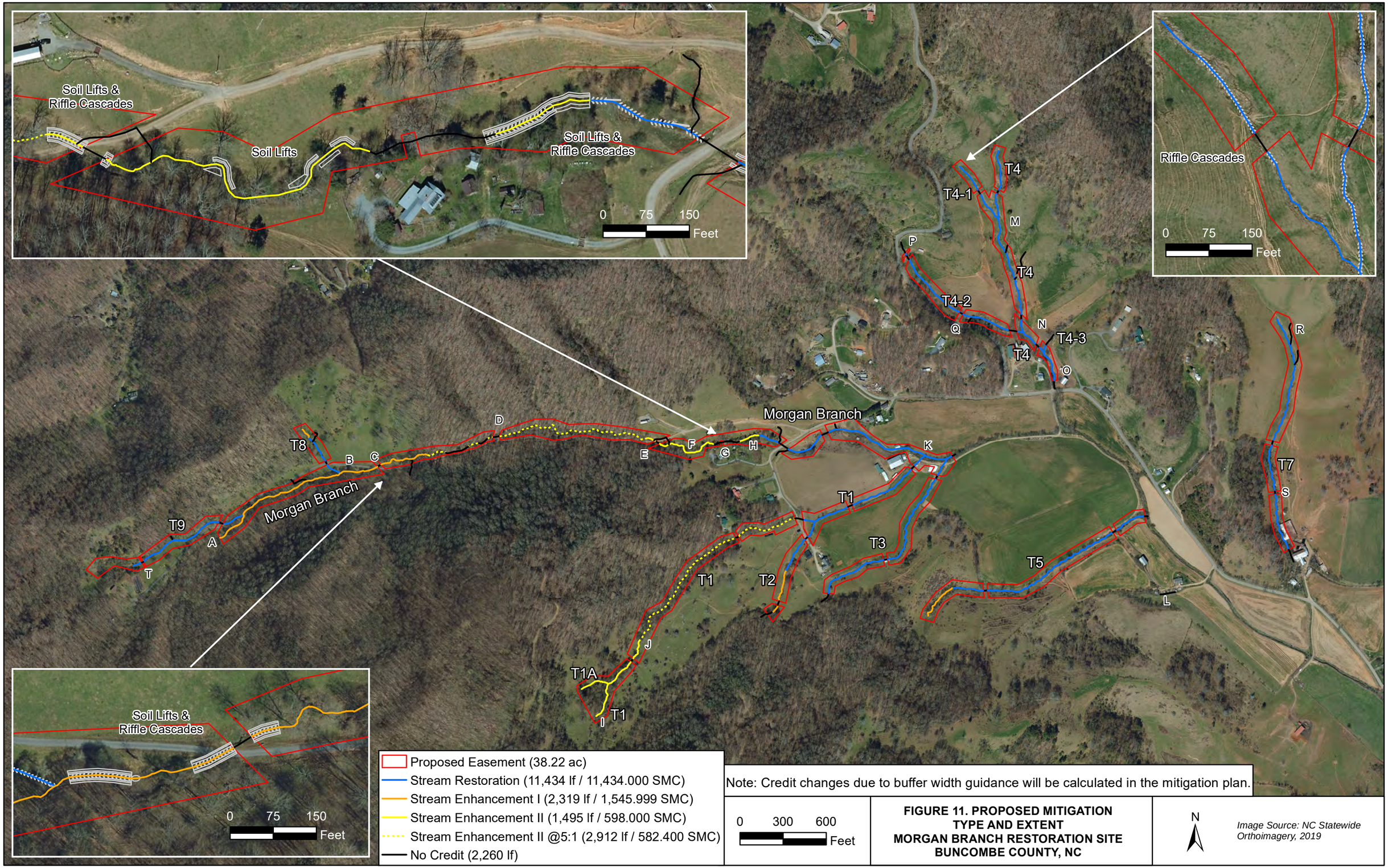


FIGURE 11. PROPOSED MITIGATION TYPE AND EXTENT
MORGAN BRANCH RESTORATION SITE
BUNCOMBE COUNTY, NC

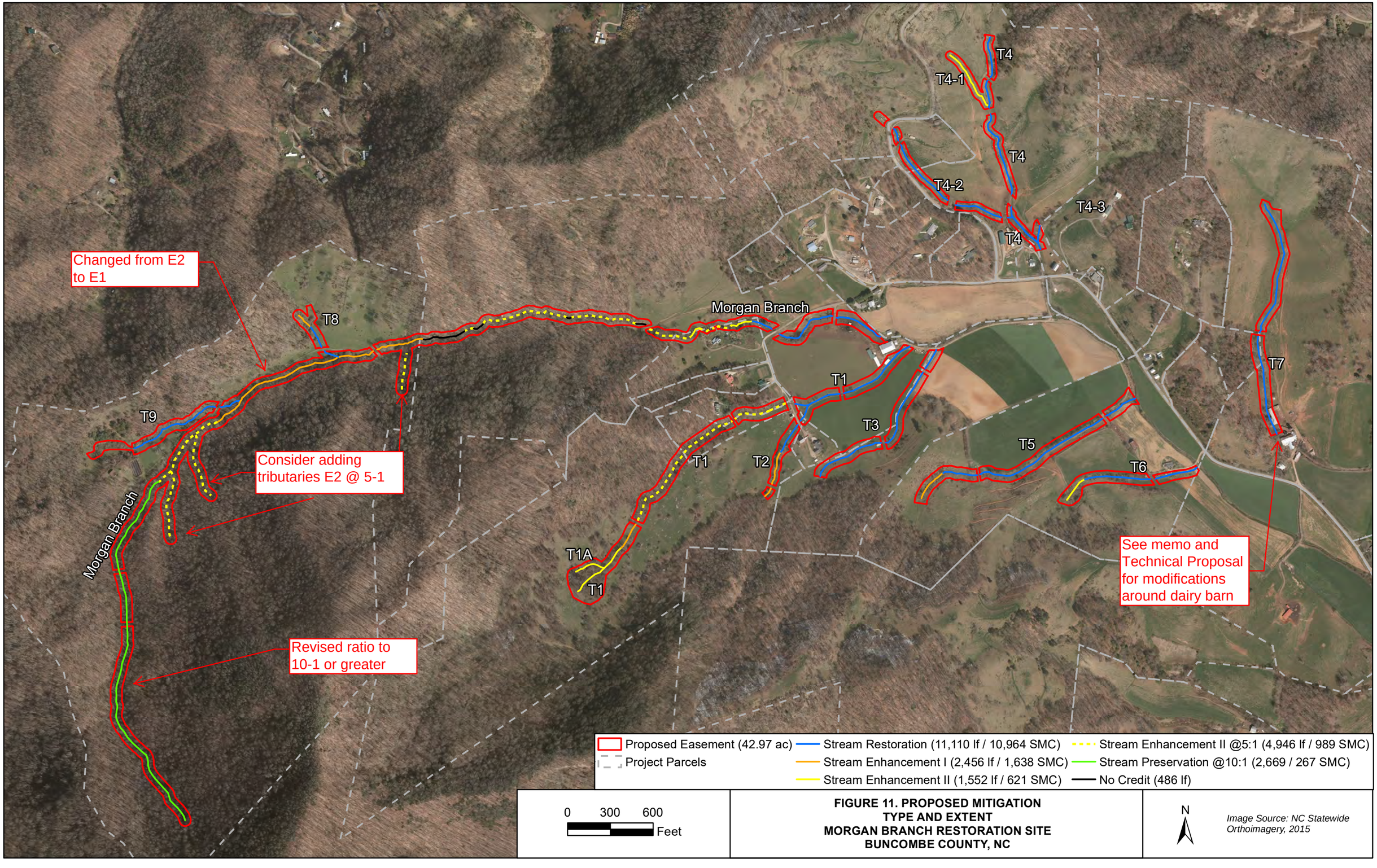


FIGURE 11. PROPOSED MITIGATION TYPE AND EXTENT
MORGAN BRANCH RESTORATION SITE
BUNCOMBE COUNTY, NC

Image Source: NC Statewide Orthoimagery, 2015

		Buffer Width						
Credit Type	**Ratio**	**Total Linear Feet**	**Less than 15ft -100% Reduced Linear Feet**	**15ft to <20ft -50% Reduced Linear Feet**	**20ft to <25ft -30% Reduced Linear Feet**	**25ft to <30ft -15% Reduced Linear Feet**	**30ft and above 0% Reduced Linear Feet**	**Credits**
Enhancement 1	1.5 to 1	2317.868	0	0	0	7.633 FT (5.089 CR) (4.325 R.CR)	2,310.235 FT (1,540.157 CR)	1,544.482 CR
Enhancement 2	2.5 to 1	1680.364	177.578 FT (71.031 CR) (0 R.CR)	27.273 FT (10.909 CR) (5.455 R.CR)	113.671 FT (45.468 CR) (31.828 R.CR)	17.150 FT (6.860 CR) (5.831 R.CR)	1,344.692 FT (537.877 CR)	580.991 CR
Enhancement 2	5 to 1	3155.597	218.537 FT (43.707 CR) (0 R.CR)	126.535 FT (25.307 CR) (12.654 R.CR)	282.915 FT (56.583 CR) (39.608 R.CR)	158.291 FT (31.658 CR) (26.909 R.CR)	2,369.320 FT (473.864 CR)	553.035 CR
Restoration	1 to 1	11428.528	0	145.430 FT (145.430 CR) (72.715 R.CR)	230.925 FT (230.925 CR) (161.648 R.CR)	454.647 FT (454.647 CR) (386.450 R.CR)	10,597.526 FT (10,597.526 CR)	11,218.339 CR
No Credit (crossings and other none project sections of channel)	0	1349.797	NA	NA	NA	NA	NA	0
TOTALS		19932.154	NA	NA	NA	NA	NA	**13,896.847 CR**

Key (example numbers)

113.671 FT - total linear feet in this category
(45.468 CR) - credits generated with no reduction
(31.828 R.CR) - credits generated with the reduction

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4505 Falls of Neuse Rd., Suite 400 • Raleigh, NC 27609 • Phone 919-783-9214 • Fax 919-783-9266

October 17, 2022

To: Harry Tsomides, DMS Project Manager

Subject: Northern long-eared bat (NLEB) Agency Coordination for Morgan Branch Project

The U.S. Fish and Wildlife Service (USFWS) plans to reclassify the northern long-eared bat (NLEB) as endangered under the Endangered Species Act. This reclassification is tentatively planned for November 2022. For DMS mitigation sites not constructed by November 2022, FHWA indicated that the 4D rule cannot be utilized and the site/s require additional consultation w/ USFWS.

The result of the original request for consultation for Morgan Branch from 2019 was concurrence (no additional comments) with the findings of the lead agency: that the project was unlikely to affect NLEB, and that adherence to guidance regarding tree clearing moratoria (October 15 – April 1) outside the NLEB active season would be acceptable.

On September 29, 2022, KCI requested additional consultation with USFWS for NLEB for the Morgan Branch site, in Buncombe County, NC, and provided documentation from the 2019 consultation. The DMS project manager and FHWA coordinator were included on the request. The 2022 letter and 2019 documentation are attached.

On October 13, 2022, USFWS responded via email, again agreeing with the lead federal agency that there is a "may affect, not likely to adversely affect" determination for northern long-eared bat for Morgan Branch, and that this finding would apply to any reclassification if the tree clearing moratoria was followed.

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September 29, 2022

Holland Youngman
US Fish and Wildlife Service
Asheville Field Office
160 Zillicoa Street
Asheville, NC 28801
Submitted via email: holland_youngman@fws.gov

Subject: Morgan Branch Stream Mitigation Site
Buncombe County, NC

Dear Ms. Youngman,

KCI Associates, Inc. (KCI) requests review and comment on any possible issues that might emerge with respect to the proposed reclassification of the northern long-eared bat (*Myotis septentrionalis*) (NLEB) from a threatened to an endangered status on the Morgan Branch Stream Mitigation Site located in Buncombe County, NC. A scoping letter was submitted to the US Fish and Wildlife Service (USFWS) by KCI on August 26, 2019, and a NLEB 4(d) streamlined consultation form was submitted to the USFWS by the Federal Highway Administration (FHWA) on March 16, 2020. USFWS responded on September 20, 2019, stating that the proposed project occurs at a location where any incidental take that may result from associated activities with this project is exempt under the 4(d) rule. In anticipation of the proposed reclassification, which if finalized, would remove the current 4(d) rule for the NLEB, KCI would like to re-initiate NLEB consultation for this project.

Suitable habitat identified for the NLEB within the project area consists of trees with a dbh greater than 3 inches, with exfoliating bark, crevices, and hollows. The project is located approximately 20 miles from a known NLEB 12-digit HUC and 9.4 miles from a known occurrence as reported in the NC Natural Heritage Program (NCNHP) data explorer. No known element occurrences exist within the proposed project area. KCI can commit to the tree clearing moratoria (October 15 – April 1) outside of the NLEB active season. The estimated acres of forest conversion are approximately 2 acres.

We thank you in advance for your timely response and cooperation. Please feel free to contact me with any questions that you may have regarding this project.

Sincerely,

Kirsten Ullman
Natural Resources Project Manager

cc: Harry Tsomides (DMS), Donnie Brew (FHWA) (email)

From: Youngman, Holland J
To: Kirsten Ullman
Subject: [External Email] Re: [EXTERNAL] NLEB consultation for Morgan Branch Stream Mitigation Site
Date: Thursday, October 13, 2022 12:07:11 PM

*****From IT@KCI.COM 410-316-7820 *** This is an External Email from outside of KCI.*****

Thank you for that clarification. I'll note for the file that the request is only for northern long-eared bat and not for any other federally designated species. Because the request is solely for one species and is not addressing additional project/species review, I'm providing a response via the body of this email:

Given the commitment to conduct tree clearing between October 15 and April 1, we would concur with the lead federal agency on a "may affect, not likely to adversely affect" determination for northern long-eared bat.

Please let me know if you need anything else on this one.
Best,

Holland Youngman
(she/her)
Wildlife Biologist
U.S. Fish and Wildlife Service
Asheville Ecological Services Field Office
160 Zillicoa Street, Asheville, North Carolina, 28801
Cell: 828-575-3920 Office: 828-258-3939 x42235

From: Kirsten Ullman <Kirsten.Ullman@kci.com>
Sent: Thursday, October 13, 2022 11:49 AM
To: Youngman, Holland J <holland_youngman@fws.gov>
Subject: RE: [EXTERNAL] NLEB consultation for Morgan Branch Stream Mitigation Site

Hi Holland –

We specifically want to just address NLEB, due to its potential uplisting to Endangered before the project is constructed. Similar to the message I sent a few weeks ago about our Haunted Creek in the Little Tennessee Basin, we just want to make sure that past consultation/concurrence and proposed projects actions to limit any potential effect will extend to this species for this project, if its listing status changes before it is constructed.

Kirsten

From: Youngman, Holland J <holland_youngman@fws.gov>
Sent: Thursday, October 13, 2022 11:42 AM
To: Kirsten Ullman <Kirsten.Ullman@kci.com>
Subject: [External Email] Re: [EXTERNAL] NLEB consultation for Morgan Branch Stream Mitigation Site

*****From IT@KCI.COM 410-316-7820 *** This is an External Email from outside of KCI.*****

Hi Kirsten -

Are you looking for a full concurrence letter associated with this project (i.e. addressing all species in consultation range) OR only for a statement on northern long-eared bat?

Your letter only addresses NLEB but I'll point out that the project is within the range of gray bat (endangered), tricolored bat (proposed endangered), bog turtle (at-risk species), Monarch butterfly (candidate species) and mountain sweet pitcher plant (endangered). I see from the original letter from KCI for this project that suitable habitat isn't present on site for rock gnome lichen. If you do want to include these other species in the review, please let me know and please specifically request a conference on tricolored bat if so.

I ask so that I can provide a response that's in line with what you're seeking - just let me know!
Thanks,

Holland Youngman
(she/her)
Wildlife Biologist
U.S. Fish and Wildlife Service
Asheville Ecological Services Field Office
160 Zillicoa Street, Asheville, North Carolina, 28801
Cell: 828-575-3920 Office: 828-258-3939 x42235

From: Kirsten Ullman <Kirsten.Ullman@kci.com>
Sent: Tuesday, October 11, 2022 8:07 AM
To: Youngman, Holland J <holland_youngman@fws.gov>
Subject: RE: [EXTERNAL] NLEB consultation for Morgan Branch Stream Mitigation Site

Thank you!

Kirsten

From: Youngman, Holland J <holland_youngman@fws.gov>
Sent: Tuesday, October 11, 2022 7:34 AM
To: Kirsten Ullman <Kirsten.Ullman@kci.com>
Subject: [External Email] Re: [EXTERNAL] NLEB consultation for Morgan Branch Stream Mitigation Site

*****From IT@KCI.COM 410-316-7820 *** This is an External Email from outside of KCI.*****

Good morning, Kirsten. I have this on my list. I was finally able to find the original file. I'm catching up after a four day break and will reach out once I've had a chance to review if I have any questions.

Best,

Holland Youngman
(she/her)
Wildlife Biologist
U.S. Fish and Wildlife Service
Asheville Ecological Services Field Office
160 Zillicoa Street, Asheville, North Carolina, 28801
Cell: 828-575-3920 Office: 828-258-3939 x42235

From: Kirsten Ullman <Kirsten.Ullman@kci.com>
Sent: Monday, October 10, 2022 9:50 AM
To: Youngman, Holland J <holland_youngman@fws.gov>
Subject: RE: [EXTERNAL] NLEB consultation for Morgan Branch Stream Mitigation Site

Hi Holland –

Following up on my message below regarding NLEB concurrence and the Morgan Branch restoration site in Buncombe County. Please let me know if you have any additional questions.

Kirsten

From: Kirsten Ullman
Sent: Tuesday, October 4, 2022 10:18 AM
To: Youngman, Holland J <holland_youngman@fws.gov>
Subject: RE: [EXTERNAL] NLEB consultation for Morgan Branch Stream Mitigation Site

Hi Holland –

We don't have a specific concurrence letter, just an email chain documenting that USFWS had no additional comments to add to our submission packet (which I sent you a few days ago) – I've attached this message, which is the official record included in the categorical exclusion.

Kirsten

From: Youngman, Holland J <holland_youngman@fws.gov>
Sent: Friday, September 30, 2022 4:01 PM
To: Kirsten Ullman <Kirsten.Ullman@kci.com>
Subject: [External Email] Re: [EXTERNAL] NLEB consultation for Morgan Branch Stream Mitigation Site

---

Thank you, Kirsten - that helps.

I was able to locate the project in our GIS system based on the lat/long. Looks like it was designated

as Service log# 20-239. Unfortunately I haven't been able to find any of the project documents electronically - though may be able to unearth some paper files once I get into the office next week. In the meantime, if you can share the concurrence letter that was issued from this office that would be great.

Best,

Holland Youngman
(she/her)
Wildlife Biologist
U.S. Fish and Wildlife Service
Asheville Ecological Services Field Office
160 Zillicoa Street, Asheville, North Carolina, 28801
Cell: 828-575-3920 Office: 828-258-3939 x42235

From: Kirsten Ullman <Kirsten.Ullman@kci.com>
Sent: Friday, September 30, 2022 11:49 AM
To: Youngman, Holland J <holland_youngman@fws.gov>
Cc: harry.tsomides@ncdenr.gov <harry.tsomides@ncdenr.gov>; donnie.brew@dot.gov <donnie.brew@dot.gov>
Subject: RE: [EXTERNAL] NLEB consultation for Morgan Branch Stream Mitigation Site

Hi Holland –

I've attached a copy of the 2019 Morgan Branch submittal. I believe the USFWS Project log # is 19-385. It was initially submitted for USFWS review in 2018, under a different configuration. This version of the project was cancelled and re-submitted as two adjacent projects in 2019 (Morgan Branch and Dale's Creek). The Dale's Creek project was constructed in early 2022. It's unclear from the records on my end if USFWS continued to use the same project log for both, or if they were assigned separate numbers.

Please let me know if I can provide any additional information.

Kirsten

From: Youngman, Holland J <holland_youngman@fws.gov>
Sent: Friday, September 30, 2022 11:31 AM
To: Kirsten Ullman <Kirsten.Ullman@kci.com>
Cc: harry.tsomides@ncdenr.gov; donnie.brew@dot.gov
Subject: [External Email] Re: [EXTERNAL] NLEB consultation for Morgan Branch Stream Mitigation Site

---

Hi Kirsten,

Thanks for touching base on this project. It looks like the previous consultation was conducted prior to my time with FWS. Any additional information that you can provide, especially the FWS log number (probably something like 19-### or 20-###, depending on the year), letter attachments, lat/long of the project location, etc. will help me to locate project info in our records and mapping system.

Once I can get acquainted with the project background I'll be able to work with you on reinitiation and an updated concurrence letter.

Best,

Holland Youngman
(she/her)
Wildlife Biologist
U.S. Fish and Wildlife Service
Asheville Ecological Services Field Office
160 Zillicoa Street, Asheville, North Carolina, 28801
Cell: 828-575-3920 Office: 828-258-3939 x42235

From: Kirsten Ullman <Kirsten.Ullman@kci.com>
Sent: Thursday, September 29, 2022 2:48 PM
To: Youngman, Holland J <holland_youngman@fws.gov>
Cc: harry.tsomides@ncdenr.gov <harry.tsomides@ncdenr.gov>; donnie.brew@dot.gov <donnie.brew@dot.gov>
Subject: [EXTERNAL] NLEB consultation for Morgan Branch Stream Mitigation Site

Good afternoon, Ms. Youngman:

In consideration of the USFWS proposal to reclassify the northern long-eared bat (NLEB) as endangered under the Endangered Species Act, KCI would like to re-initiate consultation regarding the Morgan Branch stream mitigation site in Buncombe County. Please find attached a request for re-initiation, which details prior correspondence related to the project, as well as project details specific to the NLEB.

Kirsten Ullman
Natural Resources Project Manager

KCI
ASSOCIATES OF NC

KCI Associates of NC, PA

4505 Falls of Neuse Road, Suite 400, Raleigh, NC 27609
kirsten.ullman@kci.com
o: 919.278.2551 | f: 919.783.9266
www.kci.com

RISE TO THE **CHALLENGE**

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From: Ellwanger, Claire
To: Charlie Morgan
Subject: Re: [EXTERNAL] Morgan Branch CE review request USFWS
Date: Friday, September 20, 2019 10:42:43 AM
Attachments: image001.png
image002.png

Hi Charlie,

Thanks for the clarification on the phone. We do not have any additional comments for Morgan Branch or Dale's Creek. USFWS Project log # 19-385.

On Fri, Sep 20, 2019 at 10:05 AM Ellwanger, Claire <claire_ellwanger@fws.gov> wrote:

> Hi Charlie,
>
> We do not have any additional comments. Could you please provide the project number associated with the previous letter you received from our office?
>
> Thanks,
>
> On Mon, Aug 26, 2019 at 9:54 AM Charlie Morgan <Charlie.Morgan@kci.com> wrote:
>
> > Ms. Ellwanger,
> >
> > Attached you will find a review request packet.
> >
> > This project has been reviewed by your agency in May 2018. At that time it had an Option B that has since become a separate project. Also there has been additional footprint added to the upper reaches of the project.
> >
> > If you have any questions please let me know.
> >
> > Thanks
> >
> > Charlie Morgan
> >
> > *Project Scientist*

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WE'VE ENGINEERED IS OUR TEAM

--

Claire Ellwanger
Biologist
U.S. Fish and Wildlife Service
160 Zillicoa St # B
Asheville, NC 28801
(828) 258-3939 x 42235

--

Claire Ellwanger
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4505 Falls of Neuse Rd., Suite 400 • Raleigh, NC 27609 • Phone 919-783-9214 • Fax 919-783-9266

Date: hŎúƨōŜℕ нп, 2018

Attendees: Paul Wiesner, NC DMS
Matthew Reid, NC DMS
Periann Russell, NC DMS
Tim Baumgartner, NC DMS
Mac Haupt, NC DWR
Todd Tugwell, ACOE
Steve Kichefski, ACOE
Tim Morris, KCI
Charlie Morgan, KCI
Adam Spiller, KCI

From: Tim Morris, Project Manager
KCI Associates of North Carolina, P.A.

Subject: Morgan Branch Restoration Site
Post Contract IRT Site Review Meeting
French Broad 05
Buncombe County, North Carolina
Contract No. #7533
DMS Project #100065

An IRT field review was conducted for the above referenced project on August 2nd starting at approximately 8:00 am. Weather was overcast with periods of rain. Approximately 0.22" of rainfall had fallen earlier in the morning (Weather Underground Station KNCLEICE18). All project tributaries were flowing during the meeting with the exception of the upper portions of Tributary 4-3.

The comments follow the order of the site walk. There was overall agreement on the proposed levels of intervention and the proposed credit strategy unless specified below.

Attached to this memo are maps of the original credit scenario (Figure 1) from the proposal as well as the final credit scenario resulting from the IRT Post Contract Review Meeting (Figure 2).

Tributary 4-2

- IRT requested reducing the number of crossings. KCI reached out to the landowner and explained the concern. One crossing will likely be eliminated based on this conversation, with the possibility of removing an additional crossing. According to the landowner, the other crossings are needed to accommodate his pasture plan.

Tributary 4 and 4-1

- Change 4-1 from R to E2
- Consider reducing the number of crossings

Tributary 4-3

- Although the upper portion of this tributary was not included in the initial proposal, KCI requested that it be looked at b/c the landowner on the southeast side of the tributary has expressed interest in an easement on their property.
- The IRT expressed concern that the stream was not actively flowing at the time of the site visit in a wetter than normal period.
- If KCI was to incorporate this stream in the project, it would be at risk and detailed flow monitoring of this reach would be required.

Tributary 7

- Concerns were raised by DMS regarding the proximity of the Dairy Barn to the easement and the potential liability that stewarding that easement could bring to the State in the future.

- IRT stated that if narrow buffers (15'-30') were greater than 5% of the total project, credit reductions would occur (as per 2016 guidelines). The areas currently containing buffer (15'-30') are currently slightly over 5% as shown, however KCI believes that negotiations with the landowners may allow changes to the buffer widths, effectively bringing the total narrow buffer lengths to be below 5% of the total project length.

Morgan Branch

- Change E1 section of Morgan Branch to E2.

Tributary 1

- Change small section of Restoration between driveway and preservation to E2 @ 2.5:1.

Tributary 2

- Reduce crossings on E1 section from two down to one. Landowner has agreed to this change.

Tributary 5

- No changes

Tributary 6

- No changes

Credit Impact Summary:

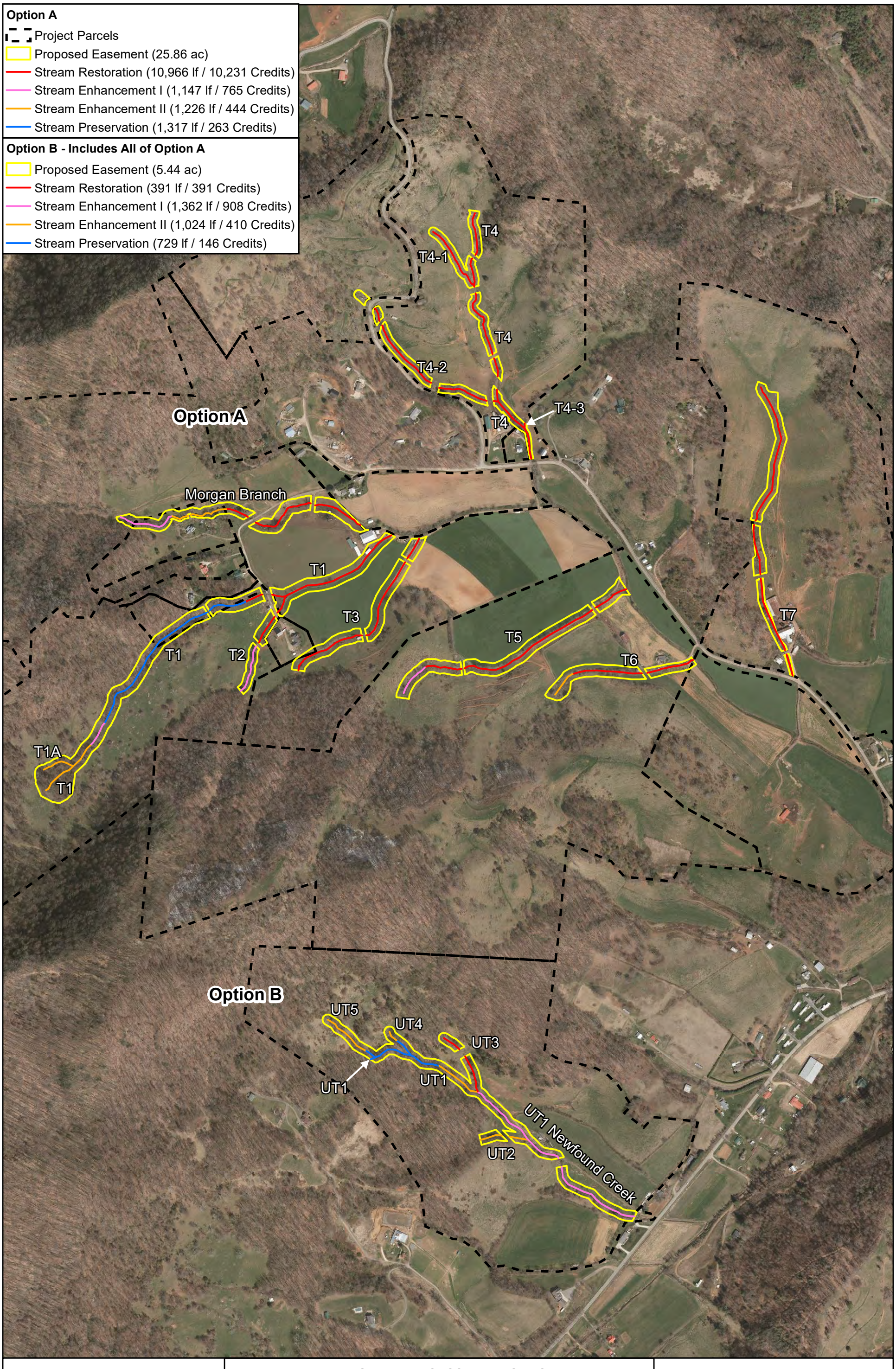
Credit Impacts – IRT credit reduction requests would result in a credit reduction of 397 credits (3.4% of the total project). DMS potential credit reduction associated with the elimination of the buffer behind the dairy barn would result in the reduction of 662 credits (5.6% of the total project). Unfortunately, the loss of 1.059 credits from the contracted value burdens KCI with a project that is no longer financially viable, especially considering the significant investments that would be made in moving the cattle operations outside of the stream valleys. As a result, KCI has submitted a letter to NC DMS requesting to terminate the contract. We hope that one day this project will be completed for the benefit of State water quality and basin-wide goals - we believe the need is well demonstrated.

Option A

- Project Parcels
- Proposed Easement (25.86 ac)
- Stream Restoration (10,966 lf / 10,231 Credits)
- Stream Enhancement I (1,147 lf / 765 Credits)
- Stream Enhancement II (1,226 lf / 444 Credits)
- Stream Preservation (1,317 lf / 263 Credits)

Option B - Includes All of Option A

- Proposed Easement (5.44 ac)
- Stream Restoration (391 lf / 391 Credits)
- Stream Enhancement I (1,362 lf / 908 Credits)
- Stream Enhancement II (1,024 lf / 410 Credits)
- Stream Preservation (729 lf / 146 Credits)



0 300 600 Feet

FIGURE 1. PROPOSED MITIGATION TYPE AND EXTENT
MORGAN BRANCH RESTORATION SITE
BUNCOMBE COUNTY, NC

N

Image Source: NC Statewide Orthoimagery, 2015

T4
T4-1
T4
T4-2
T4-3
T4
Morgan Branch
T1
T3
T1
T2
T5
T6
T7
T1A
T1

Proposed Easement (25.32 ac)
Potential Addition to Project Easement (1.21 ac)
Project Parcels
Stream Restoration (9,692 lf / 9,085 SMC)
Stream Enhancement I (733 lf / 489 SMC)
Stream Enhancement II (2,091 lf / 836 SMC)
Stream Enhancement II @5:1 (1,398 lf / 280 SMC)
Potential Addition Stream Enhancement I (606 lf / 404 SMC)

0 250 500
Feet

FIGURE 2. PROPOSED MITIGATION - POST CONTRACT REVIEW
TYPE AND EXTENT
MORGAN BRANCH RESTORATION SITE
BUNCOMBE COUNTY, NC

N

Image Source: NC Statewide Orthoimagery, 2015

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4505 Falls of Neuse Rd., Suite 400 • Raleigh, NC 27609 • Phone 919-783-9214 • Fax 919-783-9266

Date: February 24, 2022

To: Interagency Review Team

From: Adam Spiller, Project Manager
KCI Technologies, Inc.

Subject: Morgan Branch Restoration Site
Pre-Mitigation Plan Coordination
French Broad 05
Buncombe County, North Carolina
Contract No. #7909
DMS Project #100127
USACE AID: SAW-2018-01163

Since the last post-contract site visit with the IRT to the Morgan Branch Restoration Site on 7/23/19, KCI has been working with the landowners to solidify the project easements. This site is large and covers multiple working farms, and as a result, the negotiations with the landowners have extended this process out more than at our previous mitigation sites. Additionally, Tropical Storm Fred flooded this site with over 8" of rain in a short period of time on August 16, 2021. This extreme storm event required a reassessment of the site's streams and design approaches to ensure our design will provide for the long-term stability of the project. Generally, the streams were already in such poor condition that the design approach did not change; however, some reaches that at one point only warranted enhancement-level work now require a restoration approach.

Between the changes due to landowner negotiations and the storm event, we are presenting this memo to summarize the project since the IRT site visit so that we as providers, DMS, and the IRT share similar expectations. These changes also better align the proposed project with the number of credits contracted with DMS. The change in credit total was accomplished by reducing the project length. The changes to the mitigation types do not substantially change the number of credits the project reaches are producing, but will streamline the number of reaches and make project communication and organization easier throughout the life of the project.

For reference, we have included the map that was attached to the meeting minutes from the post-contract site visit to compare to a new map showing the revisions (both maps have been updated with symbology and color changes to be easily comparable). Below is a discussion of the justifications for these changes, with letters in parentheses as references for locations on the map that are being discussed. The narrative for each stream starts at the upstream end of the tributary and progresses to the bottom. There is also a photo log that illustrates many of the discussion points below.

Morgan Branch

Following the final easement negotiations, the project no longer includes the original preservation reach, the upstream Enhancement 2 reaches, or the small unnamed side tributaries of Morgan Branch. The upstream limit of the Morgan Branch project reach now starts at the Enhancement 1 Reach (A) at 1.5 : 1. As discussed during the site walk, this credit ratio comes from moving the access road away from the

stream, reforesting the old road bed and areas that are in pasture now, and excluding cattle from the stream.

During our reassessment, we found a portion of this reach had formed a cut-off channel and needed restoration level work (B). We also realigned the crossing location of the road that will be moved, replacing a failing culvert and restoring portions of channel that have been negatively affected up and downstream of the old culvert (C).

Along the next section of Morgan Branch, one change along this reach is that the landowner would like to maintain access across this reach where there is an existing crossing (D). This culverted crossing washed out in the August 2021 event, and the landowner installed a temporary ford, shored up with jersey barriers. Our design proposes realigning this crossing to a more sustainable location, installing a new culvert, and restoring portions of this stream up and downstream of the new crossing.

Further downstream is another culvert on Morgan Branch that will be replaced and realigned to a more sustainable alignment (E), which will also restore sections of channel up and downstream of the crossing. Between this crossing and the restoration portion of Morgan Branch, there was evidence of active erosion and channel instability in parts of the channel that were discussed as relatively stable during the post-contract site walk. Because of this, there are two sections of bank instability that will be addressed (F) during the project work.

While negotiating with the landowner in this section, we had to accept a narrow easement on the south side of the stream, which means that portions of stream will not be credit-bearing, and the landowners wanted to maintain their small sitting area at the stream, which is not part of the easement.

After this section of channel, the stream has become more incised after the storm and restoration level work, coupled with some downstream bank stabilization, is required to prevent the stream from further destabilizing.

When looking at the entirety of the work along this reach of Morgan Branch, including moving the access road, excluding cattle, planting, restoration sections, areas of bank grading and stabilization, and replacing failing culverts, we have combined this into one reach using Enhancement 2 at a 2.5:1 ratio. This will create a streamlined reach approach and is consistent with the justification used on other reaches.

KCI was able to negotiate with the landowner and extend the restoration reach on Morgan Branch past the confluences with T1 and T3 (K). This will create more connectivity throughout the restored channels in this section and reduce sediment and nutrient impacts in this area. We feel this is a valuable addition to the project.

T1/T1A

We had to revise the original location depicted in the figure for the upstream portion of T1; the revised map shows the surveyed location of the stream. This revision means that the project will protect a larger area of headwaters under easement (including T1A, which has always been a part of the project). These drainages are heavily dominated by invasives, particularly multiflora rose, and the work will include invasive removal and control as well as planting the areas currently in pasture. In addition, work in the stretch that had been called Enhancement 1. A failing culvert will be replaced here and the channel immediately up and downstream of the culvert will be restored. Then the stretch downstream, which has been impacted by cattle but does not need full restoration, will be stabilized with bank grading and live lifts (J). To decrease the number of reaches, we have grouped this section of channel into the upstream reach of T1 and called it all Enhancement 2 mitigation at a 2.5:1 ratio.

T4
During landowner negotiations and because of topographic site constraints, several small changes were made to T4. These include removing the crossing proposed below the confluence of T4-1(M); the 60' easement exception upstream of the T4-2 confluence has been reduced to 30', but an additional culverted crossing has been added below the T4-2 confluence (N); and lastly for T4, the restoration reach has been extended approximately 175' downstream from the original ending point (O).

T4-1
The mitigation type has changed on T4-1. During further site assessment in the dormant season, this reach had less stabilizing vegetation than during the IRT post-contract site visit and there was more active erosion and bed instability. A new channel also cut in the valley around the former channel. Because of these factors, the proposed mitigation type for T4-1 is now Restoration instead of Enhancement 2. From our analysis, we determined that minor efforts such as planting will not arrest the headcuts and other areas of instability that have developed and that a more extensive restoration approach is needed.

T4-2
The beginning point of this restoration reach has been moved down to the start of the stream (P). Additionally, the original 60' easement exception will now be only a 30' easement exception (Q).

T6
To better align the project with the contracted number of credits, T6 has been removed from the scope of this project (L). This was one of the shorter streams within the project and less impacted compared to the other project reaches. With the additional length we have added to other reaches (such as the connecting section at the confluences of Morgan Branch, T1, and T3), the total functional uplift of the project is not compromised by the elimination of T6. Even though we are removing T6 from the project, we are not going to rename T7, T8, or T9 so that we can maintain continuity in project documentation.

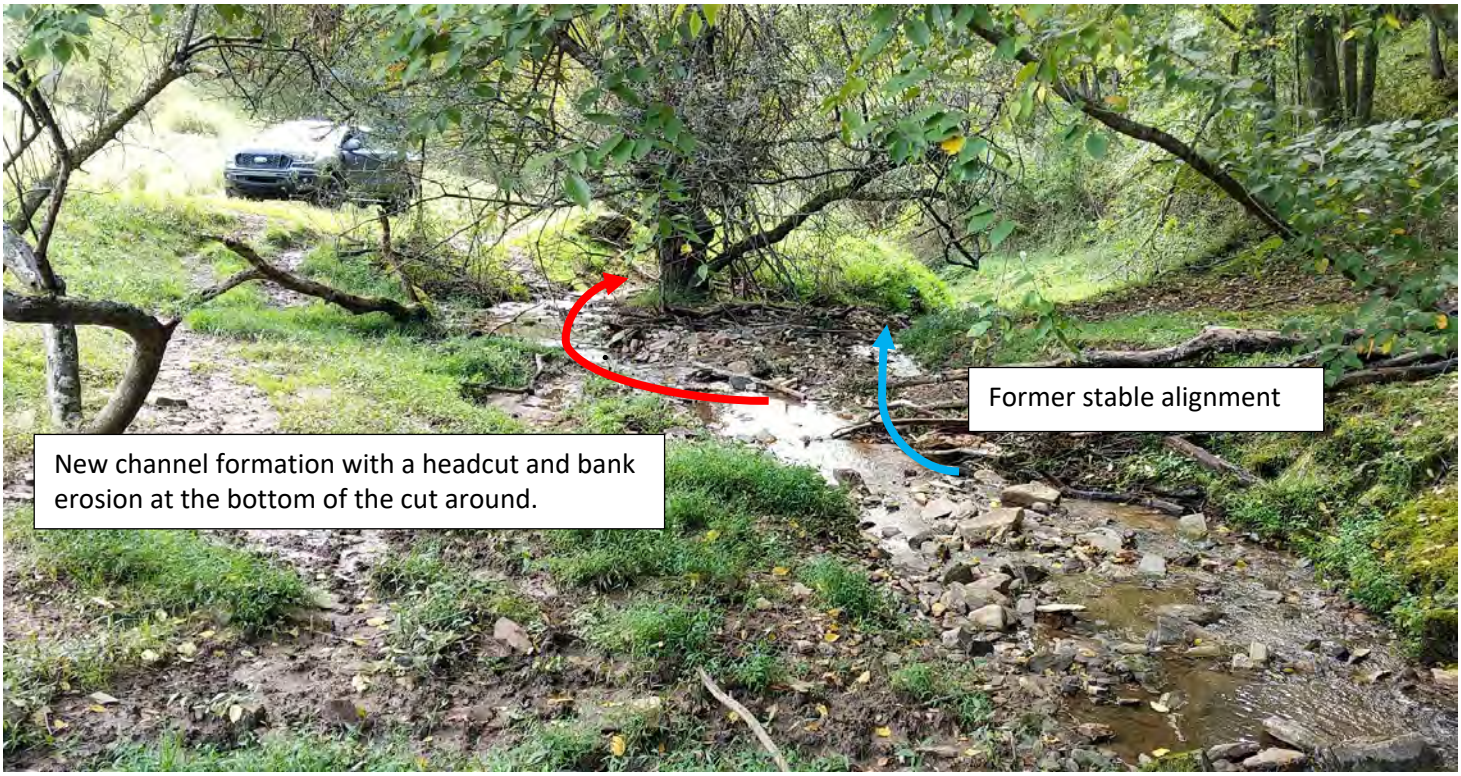
T7
Along T7, the easement at the top of the channel has been widened to include incoming seeps in the easement (R). An additional crossing was needed for landowner access to the west side of the stream (S).

T9
The only change to T9 is a small 10' landowner crossing allowance that will be included in the conservation easement description. The existing failing culvert will be replaced as a part of the access allowance.

Credit Reductions Due to Narrow Buffers
Following the guidance on credit reductions due to narrow buffers in the 2016 guidance, we have reduced credit where the buffer will be less than 30' on one side of the channel. This table is attached to give a preliminary credit estimate for the project.

Attachments:

Photo Log
Revised Figure 11
Original Figure 11
Buffer Width/Credit Table



Area of channel instability requiring more intervention along Morgan Branch (Area B).


Washed-out culvert was temporary repaired by the landowner with a ford secured with concrete blocks (Area D).

Formerly stable bank on Morgan Branch, now actively eroding after storm event, will require bank grading, stabilization, and bench grading (Area F).

Another view on Morgan Branch of a formerly stable bank, now actively eroding after storm event requiring bank grading, stabilization, and bench grading (Area F).

Formerly stable banks, now both are actively eroding after storm event requiring bank grading, stabilization, and bench grading (Area F).

Formerly stable banks throughout this section are now unconsolidated and actively eroding after storm event requiring bank grading, stabilization, and bench grading (Area H).

Bed lowering and incision has occurred in this section. The banks are unconsolidated and eroding and the minimal buffer is almost all invasive vegetation (Area H). This area will benefit from bank grading and stabilization and bed work to create more stable bed features.

A portion of T4-1 has continued to erode, and the bed and banks are poorly formed from cattle impacts. This reach would benefit from a Restoration approach, matching the approach proposed for T4 and T4-2.

Another portion of T4-1 showing that the bed has lowered and is in a poorly functioning state. Being able to restore this stream and shift this part of T4-2 to the left would produce a higher functioning channel.

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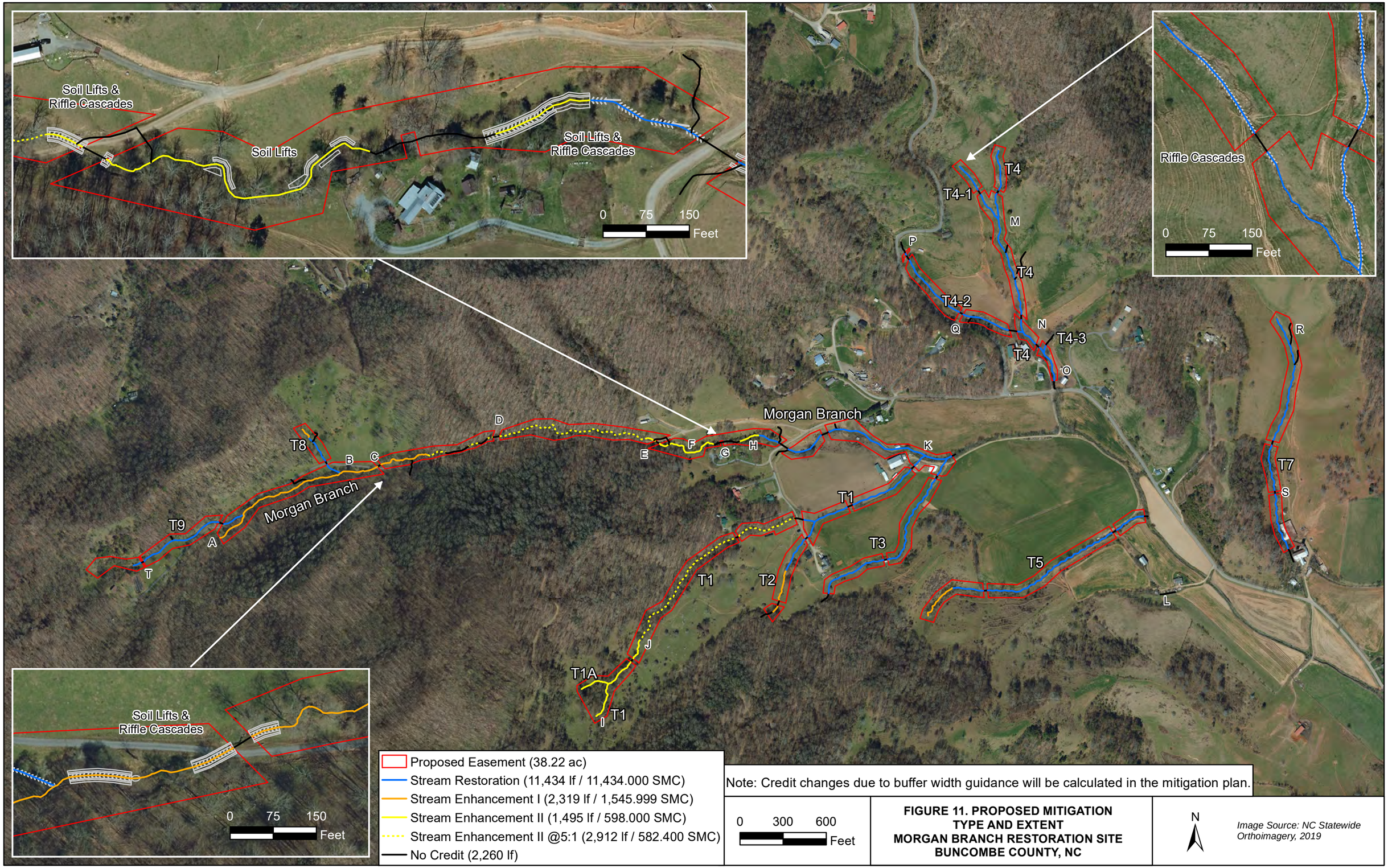

FIGURE 11. PROPOSED MITIGATION TYPE AND EXTENT
MORGAN BRANCH RESTORATION SITE
BUNCOMBE COUNTY, NC

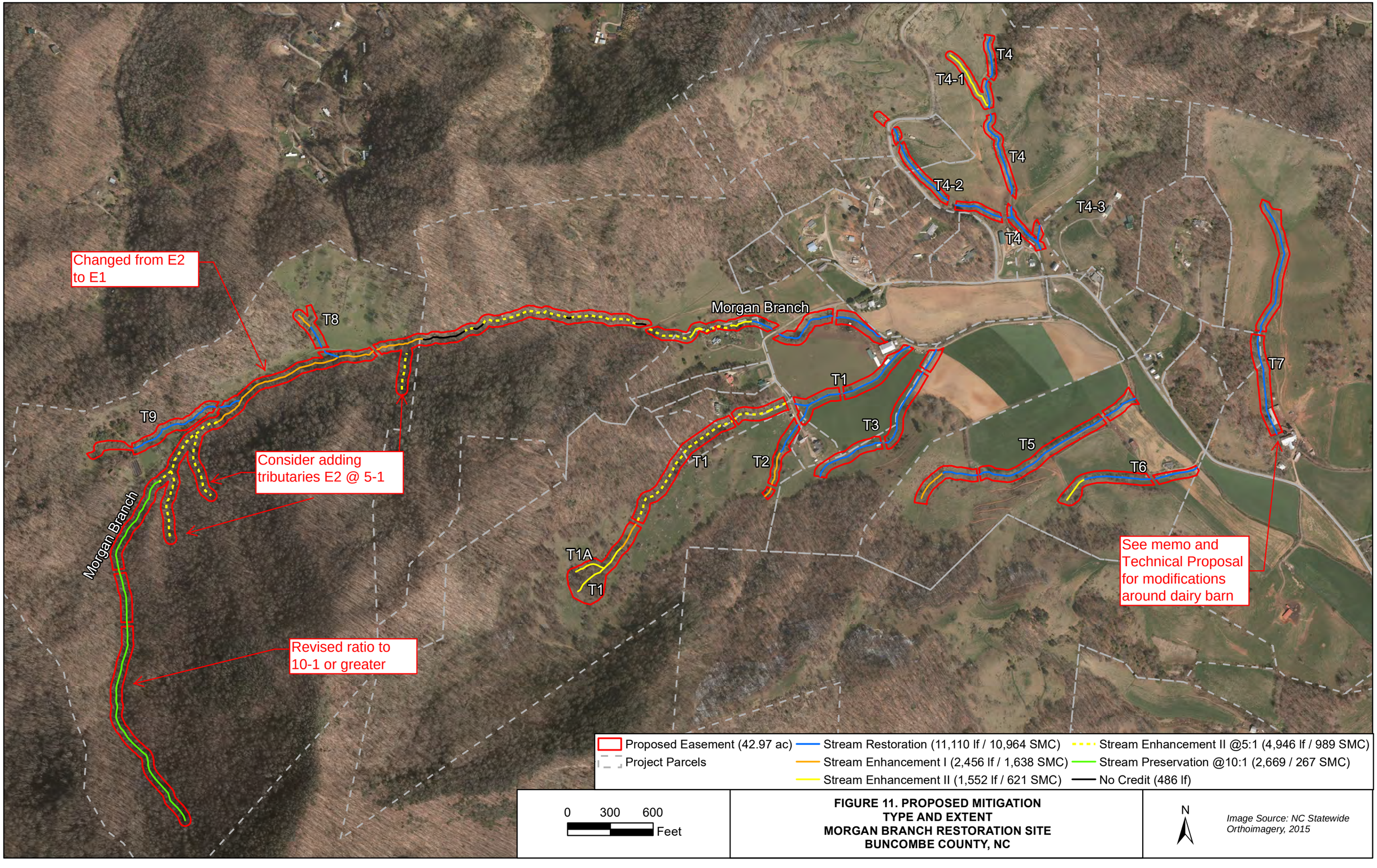

FIGURE 11. PROPOSED MITIGATION TYPE AND EXTENT
MORGAN BRANCH RESTORATION SITE
BUNCOMBE COUNTY, NC

Image Source: NC Statewide Orthoimagery, 2015

		Buffer Width						
Credit Type	**Ratio**	**Total Linear Feet**	**Less than 15ft -100% Reduced Linear Feet**	**15ft to <20ft -50% Reduced Linear Feet**	**20ft to <25ft -30% Reduced Linear Feet**	**25ft to <30ft -15% Reduced Linear Feet**	**30ft and above 0% Reduced Linear Feet**	**Credits**
Enhancement 1	1.5 to 1	2317.868	0	0	0	7.633 FT (5.089 CR) (4.325 R.CR)	2,310.235 FT (1,540.157 CR)	1,544.482 CR
Enhancement 2	2.5 to 1	1680.364	177.578 FT (71.031 CR) (0 R.CR)	27.273 FT (10.909 CR) (5.455 R.CR)	113.671 FT (45.468 CR) (31.828 R.CR)	17.150 FT (6.860 CR) (5.831 R.CR)	1,344.692 FT (537.877 CR)	580.991 CR
Enhancement 2	5 to 1	3155.597	218.537 FT (43.707 CR) (0 R.CR)	126.535 FT (25.307 CR) (12.654 R.CR)	282.915 FT (56.583 CR) (39.608 R.CR)	158.291 FT (31.658 CR) (26.909 R.CR)	2,369.320 FT (473.864 CR)	553.035 CR
Restoration	1 to 1	11428.528	0	145.430 FT (145.430 CR) (72.715 R.CR)	230.925 FT (230.925 CR) (161.648 R.CR)	454.647 FT (454.647 CR) (386.450 R.CR)	10,597.526 FT (10,597.526 CR)	11,218.339 CR
No Credit (crossings and other none project sections of channel)	0	1349.797	NA	NA	NA	NA	NA	0
TOTALS		19932.154	NA	NA	NA	NA	NA	**13,896.847 CR**

Key (example numbers)

113.671 FT - total linear feet in this category
(45.468 CR) - credits generated with no reduction
(31.828 R.CR) - credits generated with the reduction

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ENGINEERS • PLANNERS • SCIENTISTS • CONSTRUCTION MANAGERS

4505 Falls of Neuse Rd., Suite 400 • Raleigh, NC 27609 • Phone 919-783-9214 • Fax 919-783-9266

October 17, 2022

To: Harry Tsomides, DMS Project Manager

Subject: Northern long-eared bat (NLEB) Agency Coordination for Morgan Branch Project

The U.S. Fish and Wildlife Service (USFWS) plans to reclassify the northern long-eared bat (NLEB) as endangered under the Endangered Species Act. This reclassification is tentatively planned for November 2022. For DMS mitigation sites not constructed by November 2022, FHWA indicated that the 4D rule cannot be utilized and the site/s require additional consultation w/ USFWS.

The result of the original request for consultation for Morgan Branch from 2019 was concurrence (no additional comments) with the findings of the lead agency: that the project was unlikely to affect NLEB, and that adherence to guidance regarding tree clearing moratoria (October 15 – April 1) outside the NLEB active season would be acceptable.

On September 29, 2022, KCI requested additional consultation with USFWS for NLEB for the Morgan Branch site, in Buncombe County, NC, and provided documentation from the 2019 consultation. The DMS project manager and FHWA coordinator were included on the request. The 2022 letter and 2019 documentation are attached.

On October 13, 2022, USFWS responded via email, again agreeing with the lead federal agency that there is a "may affect, not likely to adversely affect" determination for northern long-eared bat for Morgan Branch, and that this finding would apply to any reclassification if the tree clearing moratoria was followed.

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September 29, 2022

Holland Youngman
US Fish and Wildlife Service
Asheville Field Office
160 Zillicoa Street
Asheville, NC 28801
Submitted via email: holland_youngman@fws.gov

Subject: Morgan Branch Stream Mitigation Site
Buncombe County, NC

Dear Ms. Youngman,

KCI Associates, Inc. (KCI) requests review and comment on any possible issues that might emerge with respect to the proposed reclassification of the northern long-eared bat (*Myotis septentrionalis*) (NLEB) from a threatened to an endangered status on the Morgan Branch Stream Mitigation Site located in Buncombe County, NC. A scoping letter was submitted to the US Fish and Wildlife Service (USFWS) by KCI on August 26, 2019, and a NLEB 4(d) streamlined consultation form was submitted to the USFWS by the Federal Highway Administration (FHWA) on March 16, 2020. USFWS responded on September 20, 2019, stating that the proposed project occurs at a location where any incidental take that may result from associated activities with this project is exempt under the 4(d) rule. In anticipation of the proposed reclassification, which if finalized, would remove the current 4(d) rule for the NLEB, KCI would like to re-initiate NLEB consultation for this project.

Suitable habitat identified for the NLEB within the project area consists of trees with a dbh greater than 3 inches, with exfoliating bark, crevices, and hollows. The project is located approximately 20 miles from a known NLEB 12-digit HUC and 9.4 miles from a known occurrence as reported in the NC Natural Heritage Program (NCNHP) data explorer. No known element occurrences exist within the proposed project area. KCI can commit to the tree clearing moratoria (October 15 – April 1) outside of the NLEB active season. The estimated acres of forest conversion are approximately 2 acres.

We thank you in advance for your timely response and cooperation. Please feel free to contact me with any questions that you may have regarding this project.

Sincerely,

Kirsten Ullman
Natural Resources Project Manager

cc: Harry Tsomides (DMS), Donnie Brew (FHWA) (email)

From: Youngman, Holland J
To: Kirsten Ullman
Subject: [External Email] Re: [EXTERNAL] NLEB consultation for Morgan Branch Stream Mitigation Site
Date: Thursday, October 13, 2022 12:07:11 PM

*****From IT@KCI.COM 410-316-7820 *** This is an External Email from outside of KCI.*****

Thank you for that clarification. I'll note for the file that the request is only for northern long-eared bat and not for any other federally designated species. Because the request is solely for one species and is not addressing additional project/species review, I'm providing a response via the body of this email:

Given the commitment to conduct tree clearing between October 15 and April 1, we would concur with the lead federal agency on a "may affect, not likely to adversely affect" determination for northern long-eared bat.

Please let me know if you need anything else on this one.
Best,

Holland Youngman
(she/her)
Wildlife Biologist
U.S. Fish and Wildlife Service
Asheville Ecological Services Field Office
160 Zillicoa Street, Asheville, North Carolina, 28801
Cell: 828-575-3920 Office: 828-258-3939 x42235

From: Kirsten Ullman <Kirsten.Ullman@kci.com>
Sent: Thursday, October 13, 2022 11:49 AM
To: Youngman, Holland J <holland_youngman@fws.gov>
Subject: RE: [EXTERNAL] NLEB consultation for Morgan Branch Stream Mitigation Site

Hi Holland –

We specifically want to just address NLEB, due to its potential uplisting to Endangered before the project is constructed. Similar to the message I sent a few weeks ago about our Haunted Creek in the Little Tennessee Basin, we just want to make sure that past consultation/concurrence and proposed projects actions to limit any potential effect will extend to this species for this project, if its listing status changes before it is constructed.

Kirsten

From: Youngman, Holland J <holland_youngman@fws.gov>
Sent: Thursday, October 13, 2022 11:42 AM
To: Kirsten Ullman <Kirsten.Ullman@kci.com>
Subject: [External Email] Re: [EXTERNAL] NLEB consultation for Morgan Branch Stream Mitigation Site

*****From IT@KCI.COM 410-316-7820 *** This is an External Email from outside of KCI.*****

Hi Kirsten -

Are you looking for a full concurrence letter associated with this project (i.e. addressing all species in consultation range) OR only for a statement on northern long-eared bat?

Your letter only addresses NLEB but I'll point out that the project is within the range of gray bat (endangered), tricolored bat (proposed endangered), bog turtle (at-risk species), Monarch butterfly (candidate species) and mountain sweet pitcher plant (endangered). I see from the original letter from KCI for this project that suitable habitat isn't present on site for rock gnome lichen. If you do want to include these other species in the review, please let me know and please specifically request a conference on tricolored bat if so.

I ask so that I can provide a response that's in line with what you're seeking - just let me know!
Thanks,

Holland Youngman
(she/her)
Wildlife Biologist
U.S. Fish and Wildlife Service
Asheville Ecological Services Field Office
160 Zillicoa Street, Asheville, North Carolina, 28801
Cell: 828-575-3920 Office: 828-258-3939 x42235

From: Kirsten Ullman <Kirsten.Ullman@kci.com>
Sent: Tuesday, October 11, 2022 8:07 AM
To: Youngman, Holland J <holland_youngman@fws.gov>
Subject: RE: [EXTERNAL] NLEB consultation for Morgan Branch Stream Mitigation Site

Thank you!

Kirsten

From: Youngman, Holland J <holland_youngman@fws.gov>
Sent: Tuesday, October 11, 2022 7:34 AM
To: Kirsten Ullman <Kirsten.Ullman@kci.com>
Subject: [External Email] Re: [EXTERNAL] NLEB consultation for Morgan Branch Stream Mitigation Site

*****From IT@KCI.COM 410-316-7820 *** This is an External Email from outside of KCI.*****

Good morning, Kirsten. I have this on my list. I was finally able to find the original file. I'm catching up after a four day break and will reach out once I've had a chance to review if I have any questions.

Best,

Holland Youngman
(she/her)
Wildlife Biologist
U.S. Fish and Wildlife Service
Asheville Ecological Services Field Office
160 Zillicoa Street, Asheville, North Carolina, 28801
Cell: 828-575-3920 Office: 828-258-3939 x42235

From: Kirsten Ullman <Kirsten.Ullman@kci.com>
Sent: Monday, October 10, 2022 9:50 AM
To: Youngman, Holland J <holland_youngman@fws.gov>
Subject: RE: [EXTERNAL] NLEB consultation for Morgan Branch Stream Mitigation Site

Hi Holland –

Following up on my message below regarding NLEB concurrence and the Morgan Branch restoration site in Buncombe County. Please let me know if you have any additional questions.

Kirsten

From: Kirsten Ullman
Sent: Tuesday, October 4, 2022 10:18 AM
To: Youngman, Holland J <holland_youngman@fws.gov>
Subject: RE: [EXTERNAL] NLEB consultation for Morgan Branch Stream Mitigation Site

Hi Holland –

We don't have a specific concurrence letter, just an email chain documenting that USFWS had no additional comments to add to our submission packet (which I sent you a few days ago) – I've attached this message, which is the official record included in the categorical exclusion.

Kirsten

From: Youngman, Holland J <holland_youngman@fws.gov>
Sent: Friday, September 30, 2022 4:01 PM
To: Kirsten Ullman <Kirsten.Ullman@kci.com>
Subject: [External Email] Re: [EXTERNAL] NLEB consultation for Morgan Branch Stream Mitigation Site

---

Thank you, Kirsten - that helps.

I was able to locate the project in our GIS system based on the lat/long. Looks like it was designated

as Service log# 20-239. Unfortunately I haven't been able to find any of the project documents electronically - though may be able to unearth some paper files once I get into the office next week. In the meantime, if you can share the concurrence letter that was issued from this office that would be great.

Best,

Holland Youngman
(she/her)
Wildlife Biologist
U.S. Fish and Wildlife Service
Asheville Ecological Services Field Office
160 Zillicoa Street, Asheville, North Carolina, 28801
Cell: 828-575-3920 Office: 828-258-3939 x42235

From: Kirsten Ullman <Kirsten.Ullman@kci.com>
Sent: Friday, September 30, 2022 11:49 AM
To: Youngman, Holland J <holland_youngman@fws.gov>
Cc: harry.tsomides@ncdenr.gov <harry.tsomides@ncdenr.gov>; donnie.brew@dot.gov <donnie.brew@dot.gov>
Subject: RE: [EXTERNAL] NLEB consultation for Morgan Branch Stream Mitigation Site

Hi Holland –

I've attached a copy of the 2019 Morgan Branch submittal. I believe the USFWS Project log # is 19-385. It was initially submitted for USFWS review in 2018, under a different configuration. This version of the project was cancelled and re-submitted as two adjacent projects in 2019 (Morgan Branch and Dale's Creek). The Dale's Creek project was constructed in early 2022. It's unclear from the records on my end if USFWS continued to use the same project log for both, or if they were assigned separate numbers.

Please let me know if I can provide any additional information.

Kirsten

From: Youngman, Holland J <holland_youngman@fws.gov>
Sent: Friday, September 30, 2022 11:31 AM
To: Kirsten Ullman <Kirsten.Ullman@kci.com>
Cc: harry.tsomides@ncdenr.gov; donnie.brew@dot.gov
Subject: [External Email] Re: [EXTERNAL] NLEB consultation for Morgan Branch Stream Mitigation Site

---

Hi Kirsten,

Thanks for touching base on this project. It looks like the previous consultation was conducted prior to my time with FWS. Any additional information that you can provide, especially the FWS log number (probably something like 19-### or 20-###, depending on the year), letter attachments, lat/long of the project location, etc. will help me to locate project info in our records and mapping system.

Once I can get acquainted with the project background I'll be able to work with you on reinitiation and an updated concurrence letter.

Best,

Holland Youngman
(she/her)
Wildlife Biologist
U.S. Fish and Wildlife Service
Asheville Ecological Services Field Office
160 Zillicoa Street, Asheville, North Carolina, 28801
Cell: 828-575-3920 Office: 828-258-3939 x42235

From: Kirsten Ullman <Kirsten.Ullman@kci.com>
Sent: Thursday, September 29, 2022 2:48 PM
To: Youngman, Holland J <holland_youngman@fws.gov>
Cc: harry.tsomides@ncdenr.gov <harry.tsomides@ncdenr.gov>; donnie.brew@dot.gov <donnie.brew@dot.gov>
Subject: [EXTERNAL] NLEB consultation for Morgan Branch Stream Mitigation Site

Good afternoon, Ms. Youngman:

In consideration of the USFWS proposal to reclassify the northern long-eared bat (NLEB) as endangered under the Endangered Species Act, KCI would like to re-initiate consultation regarding the Morgan Branch stream mitigation site in Buncombe County. Please find attached a request for re-initiation, which details prior correspondence related to the project, as well as project details specific to the NLEB.

Kirsten Ullman
Natural Resources Project Manager

KCI
ASSOCIATES OF NC

KCI Associates of NC, PA

4505 Falls of Neuse Road, Suite 400, Raleigh, NC 27609
kirsten.ullman@kci.com
o: 919.278.2551 | f: 919.783.9266
www.kci.com

RISE TO THE **CHALLENGE**

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From: Ellwanger, Claire
To: Charlie Morgan
Subject: Re: [EXTERNAL] Morgan Branch CE review request USFWS
Date: Friday, September 20, 2019 10:42:43 AM
Attachments: image001.png
image002.png

Hi Charlie,

Thanks for the clarification on the phone. We do not have any additional comments for Morgan Branch or Dale's Creek. USFWS Project log # 19-385.

On Fri, Sep 20, 2019 at 10:05 AM Ellwanger, Claire <claire_ellwanger@fws.gov> wrote:

> Hi Charlie,
>
> We do not have any additional comments. Could you please provide the project number associated with the previous letter you received from our office?
>
> Thanks,
>
> On Mon, Aug 26, 2019 at 9:54 AM Charlie Morgan <Charlie.Morgan@kci.com> wrote:
>
> > Ms. Ellwanger,
> >
> > Attached you will find a review request packet.
> >
> > This project has been reviewed by your agency in May 2018. At that time it had an Option B that has since become a separate project. Also there has been additional footprint added to the upper reaches of the project.
> >
> > If you have any questions please let me know.
> >
> > Thanks
> >
> > Charlie Morgan
> >
> > *Project Scientist*

KCI TECHNOLOGIES
ENGINEERS | PLANNERS | SCIENTISTS | CONSTRUCTION MANAGERS

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WE'VE ENGINEERED IS OUR TEAM

--

Claire Ellwanger
Biologist
U.S. Fish and Wildlife Service
160 Zillicoa St # B
Asheville, NC 28801
(828) 258-3939 x 42235

--

Claire Ellwanger
Biologist
U.S. Fish and Wildlife Service
160 Zillicoa St # B
Asheville, NC 28801
(828) 258-3939 x 42235

Subject: FW: NCDMS Morgan Branch Update Memo/ SAW-2018-01163/ Buncombe County
Date: 12/7/2023 10:43 AM
From: "Davis, Erin B CIV USARMY CESAW (USA)" <Erin.B.Davis@usace.army.mil>
To: "Kirsten Ullman" <kirsten.ullman@kci.com>

From IT@KCI.COM 410-316-7820 *** This is an External Email from outside of KCI.

Hi Kirsten,

Just wanted to make sure you had the below email in your project file, I didn't see it included in the draft mitigation plan appendix.

Thanks,
Erin

-----Original Message-----
From: Browning, Kimberly D CIV USARMY CESAW (USA)
<Kimberly.D.Browning@usace.army.mil>
Sent: Thursday, March 17, 2022 4:45 PM
To: Adam Spiller <Adam.Spiller@kci.com>
Cc: Kristin Knight-Meng <Kristin.KnightMeng@kci.com>; Jean Cheveallier
<Jean.Cheveallier@kci.com>; Kevin O'Briant <Kevin.OBriant@kci.com>; Harry Tsomides
<harry.tsomides@ncdenr.gov>; erin.davis@ncdenr.gov; Tugwell, Todd J CIV USARMY CESAW
(USA) <Todd.J.Tugwell@usace.army.mil>; Haywood, Casey M CIV USARMY CESAW (USA)
<Casey.M.Haywood@usace.army.mil>; Bowers, Todd <bowers.todd@epa.gov>; Leslie, Andrea J
<andrea.leslie@ncwildlife.org>; travis.wilson@ncwildlife.org; Wiesner, Paul
<paul.wiesner@ncdenr.gov>
Subject: RE: NCDMS Morgan Branch Update Memo/ SAW-2018-01163/ Buncombe County

Hi Adam,
The IRT discussed the revised Morgan Branch proposal and we would offer the following comments:

1. We understand the challenges in working with multiple landowners; however, the number of crossings (approximately 28) is concerning, especially since the proposed number of crossings has increased, while the total length of the project has decreased. Site connectivity is important for maintaining habitat corridors and adding to the overall functional uplift of a project. If possible, please work with the landowners to relocate crossings to either the upstream or downstream ends of the streams, and if there are small parcels of land that are inaccessible, we suggest including them within the project easement by expanding the required buffer. As presented, the IRT would support a reduced ratio on all reaches with multiple crossings. Ratios will be discussed during the draft mitigation plan review period.

2. The IRT agrees that the proposed buffers are insufficiently wide, with many areas falling below the 30' minimum width. We would welcome wider buffers on any portion of the project. In the draft mitigation plan, please specify what percent of the project does not meet the minimum 30' width. If the percentage exceeds 5%, credit reductions will be applied in those areas.

3. The preservation portion of this project would have added a lot of value to the project by capturing the headwaters, especially given the high development pressure in the area.

It's unfortunate that Tropical Storm Fred caused further degradation of the site streams. We agree that this project will provide needed uplift, and would encourage you to work with the landowners to reduce the number of crossings and expand the buffers if possible.
Please reach out with any questions or if you would like to discuss.
Thanks
Kim

Kim (Browning) Isenhour
Mitigation Project Manager, Regulatory Division I U.S. Army Corps of Engineers l 919.946.5107

-----Original Message-----
From: Adam Spiller <Adam.Spiller@kci.com>
Sent: Tuesday, March 01, 2022 11:33 AM
To: Davis, Erin B <erin.davis@ncdenr.gov> <erin.davis@ncdenr.gov>; Browning, Kimberly D CIV USARMY CESAW (USA) <Kimberly.D.Browning@usace.army.mil>
Cc: Kristin Knight-Meng <Kristin.KnightMeng@kci.com>; Jean Cheveallier <Jean.Cheveallier@kci.com>; Kevin O'Briant <Kevin.OBriant@kci.com>; Harry Tsomides <harry.tsomides@ncdenr.gov>
Subject: [URL Verdict: Neutral][Non-DoD Source] Morgan Branch Update Memo

I'm using Mimecast to share large files with you. Please see the attached instructions.

Kim and Erin,

Good morning! We've been working diligently to move this project forward and have made a lot of progress, but the landowner coordination has slowed things down. We're actively working on the design and mitigation plan now, but we wanted to share this updated memo with the IRT to make sure that we're on the same page as we're moving forward with those items. Since the last time we formally talked about this project with the IRT a very large storm event has impacted this watershed, we've adjusted some of the reaches (lengthening some and reducing others), and we've tried to tailor the project to provide the most functional uplift, while also staying close to the contracted credit amount with DMS. All of this has been moving forward as we've been working hand-in-hand with the landowners to identify the constraints they are throwing at us, finalizing easement shapes, and addressing other landowner incentives. So that brings us to the attached memo, which documents where we are with the project streams and mitigation approaches. It also compares the figure we distributed after the IRT site walk with the most updated approach. I would like the IRT to take a look at this and provide any feedback necessary. The memo provides pretty thorough explanation as to the changes, so hopefully this confirms that we're on the same page with this project.

Can you forward on to the other members of the IRT who may need to review this?

Please let me know if you've got any questions or comments!

Thanks,

adam

Adam Spiller

Regional Practice Leader – Natural Resources

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KCI ASSOCIATES OF NC

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ENGINEERS • PLANNERS • SCIENTISTS • CONSTRUCTION MANAGERS

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Date: 9/18/2023

To: Harry Tsomides, Project Manager

From: Kirsten Ullman, Project Manager
KCI Associates of North Carolina, P.A.

Subject: Morgan Branch Restoration Site
Draft Mitigation Plan Review
French Broad River Basin – CU# 06010105
Buncombe County
DMS Project ID No. 100127
Contract # 7909

Dear Mr. Tsomides,

Please see the below responses to your comments from July 21, 2023 on the draft of the Morgan Branch Mitigation Plan. We have addressed your comments in the report and have outlined our changes. Following your acceptance of these changes, we will submit hard copies of the final draft report along with the supporting digital files.

General:
Please change “USACE AID #” to “USACE Action ID”

This has been changed to "USACE Action ID"

The USACE Action ID on the cover page, 2018-01163, is different than the one issued with the PJD, 2020-01259 (Appendix 8). Please correct to the proper USACE Action ID.

The action ID on the cover page has been changed to 2020-01259

Please summarize the Native American coordination conducted (United Keetoowah Band of Cherokee Indians in Oklahoma; Cherokee Nation; and Eastern Band of the Cherokee Indians) and discuss any tribal responses received. If no responses were received from a particular tribe, please note that.

We have added this information to Section 4.1.

Please review the IRT post contract site visit meeting minutes and confirm that all IRT requests and concerns have been addressed in the mitigation plan.

Yes, we have reviewed past meeting minutes and incorporated the recommendations into the current project.

Have wetland impacts (temporary and permanent) been quantified? Several of the project restoration reaches are going straight through wetlands, as identified on the PJD and mapped on the PJD map. How will restoration activities affect these existing wetlands?

This comment has been addressed in the new Section 4.3 Permitting. We anticipated 0.13 acre of temporary wetland impacts in areas around stream restoration construction.

Please note that the IRT must be notified and approve of any changes to the approved planting plan prior to installing the plants. Species substitutions may affect attainment of required vegetative performance standards if substitutions are not IRT approved.

This comment has been noted in Section 6.12.

Does KCI feel that the credited stream restoration reaches along the streamside wetlands will be able to maintain adequate hydrology to sustain as single thread channels and jurisdictional streams?

Yes, we anticipate the proposed streams will have adequate stream flow near existing wetlands as is currently the case. The nature of the steep headwater terrain within the project easement combined with cattle exclusion should ensure that stream channels maintain their designed dimension and pattern.

Please verify that no site-specific long-term management strategies have been identified for this site.

No site-specific long-term management strategies have been identified for the site.

Maintenance Plan: "The site will be monitored on a regular basis, with a physical inspection of the site conducted a minimum of once per year throughout the post-construction monitoring period until performance standards are met. " DMS recommends quarterly project site visits at a minimum. Yearly site visits by full delivery providers are unacceptable and can lead to compounded project issues and problems. Please update accordingly.

In the text, KCI commits to a minimum of two site visits annually. This is regarded as a minimum, and it is very likely that more site visits will take place in most monitoring years. KCI commits to visiting the site as frequently as necessary to uphold the requirements of the DMS full-delivery agreement and IRT guidance, and to address potential landowner concerns or encroachments throughout the project lifespan.

There are several stabilized rock outlets designed in the easement (ex. SP 18, one originates in a jurisdictional wetland and continues downslope adjacent to another outlet structure); is there a viable way to incorporate natural materials into these structures?

These types of stabilized outlets for ephemeral flow perform best with rock material as opposed to woody material that may rot if not consistently wetted. Due to the flow conditions and steep nature of these areas, we believe the rock is justified and will settle into the landscape as vegetation becomes established around them.

Report:
A Biological and Cultural Resources section needs to be added to the report, summarizing the findings of the Categorical Exclusion, Archaeological Survey, and Tribal Coordination.

We have added this information to Section 4.1.

Agency correspondence with USFWS indicates that tree clearing will be limited to October 15-April 1 due to NLEB; please mention this in the report narrative, and in the plan sheet General Notes section. The 10/17/2022 update with USFWS should be summarized in the narrative and included in the Appendix.

The summary of consultation activities for both northern long-eared bat and tricolored bat and the statement of commitment to tree clearing moratoria are included in Section 4.1; documentation of post-CE correspondence with USFWS included in Appendix 10. This note was added to General Notes on sheet DT1.

Tricolored bat is currently listed by USFWS as "Proposed Endangered". On September 14, 2022, the USFWS published a proposal in the Federal Register to list the tricolored bat as endangered. The USFWS has up to 12 months from the date of the proposal to make a final determination. This will more than likely occur in September 2023. Recommend reaching out to the USFWS and re-initiating consultation to provide uninterrupted authorization for covered activities. The conservation measures will likely be the same as for NLEB but KCI will need confirmation from USFWS to this effect. Please include all correspondence and update the section.

See note above to previous comment.

A permitting section needs to be added to the report, summarizing 401/404 and plans to obtain a Land Quality permit and any other permitting concerns. Recommend including impact list summary with the plan. The expectation is that the draft plans represent KCI's final unsealed design. The proposed floodplain grading should be included in the draft along with erosion and sediment control plans and details. Please include safety fencing around wetlands to prevent unintended impacts.

This information has been addressed in Section 4.3 Permitting.

There is some reach-by-reach discussion of cattle exclusion but please provide a summary of the site wide farm plan to address cattle exclusion installations, fence types, watering systems, and other livestock amenities that are being provided as part of this project. Will the landowner or KCI be responsible for installing these, and when will this occur (pre-construction, during, or post-construction)? DMS highly recommends cattle watering system installation before or during construction to avoid livestock watering at proposed ford crossings post project construction. This has been an issue and IRT concern on other DMS projects. In addition, water lines should cross along the installed crossings, not the conservation easement; please confirm where water line crossings will be.

Comment addressed in new Section 6.9: Fencing and Livestock Watering.

Please be aware that Task 6 is not considered completed until relocated utility lines are installed, old lines and poles within the easement are removed, and new lines are surveyed and included in the as built

survey and record drawings. Please be aware that the relocated, surveyed lines and associated utility easement corridors may affect as-built crediting if there is any overlap of the as-built utility easement with the conservation easement.

This comment has been noted.

The report states in several places (page 1 introduction, page 4 watershed disturbance) that the major stressors to the system are agricultural production and cattle; but also reports BHR's that indicate stressors other than cattle and current land use and notes that the project is in stage IV of the Simon Evolutionary process. Later in the report, cattle impacts are noted as the source of channel entrenchment on TIA. In section 4.0, channelization is included as stressor; suggest including channelization and watershed scale descriptions of stressors throughout the document to be consistent and clear on justification for level of intervention chosen.

We have gone through and added supplemental information in the report to describe channelization as an influence.

Please clarify the statement that Morgan Branch R1 alternates between being incised and confined, page 5.

This statement has been removed.

Please clarify the structure proposed on Morgan Branch R3, a "Squat" culvert. Is this meant to indicate a squash pipe culvert, or flat bottom/ arched?

Yes, this has been changed to squash pipe culvert, which in this case is a corrugated metal pipe in an elliptical shape with a bottom.

Stream Monitoring (Section 8) – Please indicate that project monitoring will follow the October 2016 IRT Guidance document.

The following text has been added to Section 8.0, first paragraph: "Stream monitoring will follow protocol established in the October 2016 IRT Guidance document."

Section 6.2 page 21 – 22: The narrative for T1-1 describes an EII approach of cattle exclusion and invasive species control with a culvert replacement, however, Table 7a indicates changes for that reach in valley width, discharge width, depth, area, a change in velocity, W/D and entrenchment ratios and particle size distribution. Please clarify.

The upper portion of T1-1 is more confined and will be limited to cattle exclusion and invasive control. At the downstream end of the reach, cascade riffles will be used strategically on either end of the new culvert to provide grade control. The dimensions in the table reflect what will be used for the limited areas that will be reshaped in this reach.

Section 6.2: Several reaches (T1 r 1, T1 r3, T4 r3) have valley width adjustments, some on EII reaches; please verify that the valley width is being systemically affected through the work proposed on these reaches.

The valley width in these cases reflects the wider excavated stream valley to increase the floodprone width. As some of the EII work will be more intensive in certain problem areas, the widths will not be uniformly applied.

Section 8, Visual Assessment: Please include a statement that interim and annual visual assessment walks will include a comprehensive assessment of the easement boundary and that all encroachments or violations of the conservation easement will be documented and submitted to the DMS project manager. Violations or encroachments identified during the annual monitoring visual assessment will be located and documented in the annual CCPV and noted in the Vegetation Visual Assessment Table.

The following text has been added to Section 8.0, Visual Assessment: "interim and annual visual assessment walks will include a comprehensive assessment of the easement boundary and that all encroachments or violations of the conservation easement will be documented and submitted to the DMS project manager. Violations or encroachments identified during the annual monitoring visual assessment will be located and documented in the annual CCPV and noted in the Vegetation Visual Assessment Table."

DMS recommends installing the fences 1-2' outside the conservation easement to allow landowners the ability to maintain under the fence by spraying or cutting. Please include discussion of fencing and type proposed in the report text, including that relic fencing will be removed from the conservation easement during construction.

This comment has been now addressed in Section 6.9 Fencing and Livestock Watering and fencing specifications are also described in the Boundary Marking Plan in Appendix 1.

3.1.4 Site Photographs: Thank you for including the site photographs. For comparative purposes please collect photos from the same locations and include them in the MY0 report. Please make sure to include close-up culvert photos (upstream and downstream) beginning in MY0 and throughout monitoring, to verify that culverts are not getting filled in or perched.

This comment has been noted.

DMS strongly recommends U-channel posts with riveted signs, in combination with round wooden posts, especially where fencing is not installed. This will help avoid problems during the monitoring period (and beyond) with loose/bent posts; failing signs, and lack of visibility for the landowner. The specifications are provided as an addendum to this letter (see attached recommended specs, below).

This comment has been noted.

Appendices:

Appendix 1, Draft Construction Plan Sheets: As a reminder, the construction plans should represent KCI's final unsealed design for the project; any subsequent changes other than minor adjustments (e.g., structure types/quantities, stream pattern, lengths and areas, planting plan, etc.) either before or during construction will need prior written approval from IRT.

We have noted this reminder.

The full Categorical Exclusion Document (Task 1) needs to be included in an Appendix (not just the approved CE checklist).

The full CE has been included.

Please include the Management Summary from the TRC Archaeological Survey, and related correspondences with SHPO, in an Appendix.

The full TRC Archaeological Survey report has been included with the compiled CE.

Figures:
Overhead utility rights of way look like they partially intersect over the conservation easement and need to be factored in with the additional buffer crediting method if they have not. There appear to be some areas where proposed relocated utility poles run right along the easement line and result in rights of way overlap into the easement, e.g., T9 and portions of Morgan Branch. How wide are the recorded rights of way? Please show the utility corridors on Figures 8A and 8B (Utility Line Relocation Maps). Have the utility lines been relocated yet? If not, when is this going to occur relative to stream construction? Please discuss further in Section 4.1, Site Constraints to Functional Uplift.

KCI is currently coordinating with Duke Energy on utility relocations throughout the site. Figure 8b has been updated to show additional locations where utilities will be relocated underground. These maps show the proposed locations of utilities to be located above-ground. As coordination is ongoing, additional poles may need to be added/relocated so that all utility ROWs fall within recorded project easement breaks. Utility relocation will take place during construction so that KCI's contractors may dig trenches for the utilities that will be relocated underground. Utility relocations will be scheduled as to not interfere with stream work and will be completed before the as-built survey.

The monitoring features map (Figure 10) indicates there are 13 stream gages, however the bank full gages are not distinguished from the flow verification gages/cameras. Can KCI please differentiate these on the map and summarize in the monitoring discussion (Section 8) what the rationale is for the flow gage placement as they relate to intermittent/perennial statuses listed in Table 3. Table 3 indicates 10 reaches as intermittent. Also, where on each reach will the monitoring devices be placed? For example, in the upper third of each reach? Please discuss hydrology monitoring in a bit more detail to explain how gage types and placement will adequately document presence of flow for monitored reaches. Are there any perennial restoration reaches that would warrant flow gages (e.g., where they flow through a wetland/wet area)?

Figure 10 has been updated to reflect 6 flow gauges and 7 bankfull gauges. Flow gauges will be installed in the upper third of reaches to document flow in intermittent reaches; where possible, bankfull gauges will be installed in the lower third of reaches, at or near the location of an existing cross section. Text describing the placement of hydrologic monitoring gauges has been added to Section 8.

Tables:
Please use the current asset table summary format (see excel table example attached to this email). The credit loss, gain, and net credits from the buffer methodology all need to be listed. In addition, please list the restoration approach (P1, P2, etc) in the asset detail table. Buffer results and sums do not need to be included in the reach detail table.

> *KCI originally used the "Quantities and Credits" table from the file "DMSMitigationPlanTablesOct2020.xlsx," which is currently posted on the DMS templates web page under the link "Mitigation Plan Tables - 10/1/2020," and which does not include the section for reduction in stream buffer area. KCI reformatted the tables to the format provided by the DMS project manager, but requests that DMS check to see that this format is available to all providers on their website.*

Table 4 Project Attributes: This table has been modified from the DMS template; the 'All reaches Combined' section of the table renders the information useless. The addition of the non-template 'existing vegetation community' is not clear as agriculture is not a community; thermal regime is not a necessary entry on this table.

> *Table 4 has been updated to the version currently available on the DMS website, "DMSMitigationPlanTablesOct2020.xlsx," which is currently posted under the link "Mitigation Plan Tables - 10/1/2020".*

5.0 Goals and Objectives: Please add boundary assessment as a monitoring parameter to the table.

> *Boundary Assessment has been added as a monitoring measurement under "Restore a forested riparian buffer to provide bank stability, filtration, and shading" for Geomorphology/Bed Material Characterization, Physicochemical/Nutrient and Bacteria Reductions, and Geomorphology/Species Composition / Vegetation.*

Please note that Table 15 and plan sheet DT6 indicate specific lengths of external crossings and length of proposed CMP to be installed. In many instances the length of the pipe is equivalent to the C.E. -excluded areas, which will require strategic placement of the pipes to ensure no easement encroachment via infrastructure installation. Installation of infrastructure in the easement will affect project credits, result in infrastructure encroachment, and may require re-installation. Please note in the General Notes on the Plan Sheets that culverts, headwalls, and related crossing materials must be constructed within the conservation easement break.

> *This has been noted, and a note has been added to General Notes on sheet DT1.*

Plan Sheets:
Recommend adding more pedestrian/maintenance access gates to the boundary marking plan; there are some at crossings but you might want to consider more to facilitate better routine site accessibility and/or potential maintenance in the future.

> *The size of the site, number of existing crossings, and extent of farm operations including multiple landowners puts this site at elevated risk for unintended encroachment due to gates*

being accidentally left open. The planned number of gates has been established through landowner negotiation to meet their future needs. KCI would prefer not to add any additional gates to minimize the potential for future encroachment.

Please note that CCPV maps for monitoring reports will need to have breakout sheets in addition to the overall plan view sheet, to adequately show monitoring features and results. (preferably beginning in MY0).

This comment has been noted.

Boundary Marking– The Conservation easement is not evident on the Plan Sheets along several of the crossings (where fencing is planned). Please show the entirety of the conservation easement layer on the boundary marking sheets.

The line style has been changed for the conservation easement on all sheets to better distinguish it from other linework. The conservation easement linework has been added to the Boundary Marking sheets. All fencing is now shown offset 1ft outside of the easement to reflect the minimum offset.

Please add stream names to each channel shown on the plan sheet plan views.

Sheets SP3 and SP4 were updated to show the new reach names "MB Reach 2a" and "MB Reach 2b".

Sheet SP5 (and other areas) indicates a building ("Future Building by Others", see below). What does this mean? Please keep in mind any structure should be offset at least 15 feet from the conservation easement in order to allow adequate boundary maintenance and minimize risk of future encroachment.

This comment is addressed in Section 3.3: Site Constraints to Functional Uplift and Section 6.8: Crossings, Structures, and Improvements. KCI is removing four existing structures that are currently located within the easement (shown on Figure 8c) and providing the landowner with incentives to rebuild new structures outside the easement. The approximate planned locations of future buildings, as KCI understands them, are shown in the construction drawings to provide transparency. Landowners have been made aware of future project easement stewardship requirements, and the necessity to locate future buildings such that the easement may be accessed to facilitate site maintenance.

Digital Support Files:

Digital Data: The Project Attribute Table in the document does not follow the required segmentation convention; a separate credit ratio requires a separate reach. MB Reach 2 has both 5:1 and 2.5: 1 ratios. In the future, please follow the segmentation rules.

MB Reach 2 has been broken out into MB Reach 2a and MB Reach 2b. This has been updated and detailed in the narrative (Section 6.1), in the asset tables, and on the plan sheets.

Digital Data: There is a 10’ discrepancy in the linear feet submitted in the digital submission file and that reported in the Mitigation Plan Table for Morgan Branch Reach 2 (327 in digital file; 337 in the report). Please resolve.

All reach lengths have been checked and resolved.

Please provide a set of digitals (PDF plus revised digitals in correct file structure) for a final completeness check. Then I will need one hard copy sent to my attention, along with a flash drive with the final report and all digital support files in the correct file structure. USACE and DWR will need one hard copy each along with just the PDF on a flash drive (mailing instructions to be sent later). Please include a copy of your response letter, bound inside the front cover the final PDF as well as hard copies.

Noted.

Please contact me if you have any questions or would like clarification concerning the responses.

Sincerely,

Kirsten Ullman
Project Manager