MITIGATION PLAN

Round Hill Branch Restoration Site
Buncombe County, North Carolina
DMS Project Number 100066
DEQ Contract 7534
USACE AID #: SAW-2018-01168
NC DWR#: 20181031 v1

FULL-DELIVERY PROJECT

French Broad River Basin
Cataloging Unit 06010105

Prepared for:

NC Department of Environmental Quality
Division of Mitigation Services
1652 Mail Service Center
Raleigh, NC 27699-1652
November 13, 2020

Prepared by:

KCI Associates of North Carolina, PC
4505 Falls of Neuse Rd, Suite 400
Raleigh, NC 27609
(919) 783-9214

KCI Project Staff: Alex French, Kristin Knight-Meng, Tim Morris,
Tommy Seelinger, Adam Spiller, and Joe Sullivan

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.

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: November 13, 2020

To: Kim Browning, USACE

From: Tim Morris, Project Manager
KCI Associates of North Carolina, P.A.

Subject: Round Hill Branch Restoration Site
Mitigation Plan Review – Response to IRT Comments
French Broad River Basin - 06010105
Buncombe County, North Carolina
DEQ Contract No. #7534
DMS Project #100066
USACE AID #: SAW-2018-1031 v1

Below are our responses to IRT comments received on the mitigation plan for the Round Hill Branch Restoration Site. All of the following changes have been completed in the final mitigation plan. Please contact me if you have any questions or would like clarification concerning these responses.

USACE Comments, Kim Browning:

1. For future consideration, it is helpful when all Figures are located in one appendix, rather than scattered throughout the document. Additionally, the mitigation plan is typically located at the front of the document, with the drawings and appendices located at the back. This may have just been an issue with the hard copy.

   We will locate all figures in the appendices in our upcoming mitigation plans under development. Yes, that was an error with the hard copy with the switch in order.

2. Section 4, Credit Release Schedule: The IRT will review the Record Drawing/As-Built reports according to the 2008 Mitigation Rule's streamlined review process prior to approving the initial credit release. Please alter the statement regarding credits being released by DMS without prior written approval of the DE.

   We have made the following change (underlined): "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:

3. It would have provided more functional uplift to the entire system to move the crossing on RHB near the barn out of the existing wetland.

   This was the existing crossing location used by the landowner and they are only planning on using it occasionally. We do expect the footprint of the wetlands to increase in that area based on the stream design.

4. For future projects, it is recommended to set the conservation easement back at least 30-50 feet from roads and road culverts to prevent future potential encroachments. It's difficult to discern if that's what the Easement Exceptions are on Figure 10.

   We will keep this in mind for future projects when adjoining public roads. The two easement exceptions within the project are 20' and 60'-wide for the upstream and downstream crossings, respectively. We have included the widths of the easement exceptions in Section 6.4 of the mitigation plan.

5. There is a lot of proposed channel to be filled. Please explain how a channel plug with a rock core will function to plug the old channel?

   The channel block detail was inadvertently included in the plans and has been removed. We will use earthen plugs compacted in lifts to fill the old channel.

6. Tables 14 & 15: I appreciate the inclusion of wetland status in these tables.

7. Section 6.9: Please include planting dates.

   In the second paragraph of Section 6.9, it states woody vegetation planting will be conducted during dormancy and will occur before March 15. We added that the growing season ends November 8th (according to NRCS WETS table for Asheville). This project is anticipated to be planted during the dormant season of 2021-2022.

8. Page 31: Volunteers will only be counted towards success if they are on the approved planting list. If you anticipate that the additional species listed in Table 15 will establish on-site, I suggest adding some of these species to your planting list, as availability allows. This applies to the Vegetation Performance standard as well. Volunteers will only be counted if listed in the approved Table 14 planting list.

   We have removed the volunteer list (Table 15) and altered the planting plan to include additional species per this comment and others from IRT members.

9. Page 34: Stream Hydrologic Performance for intermittent streams should be 30-days continuous flow, at a minimum. Perennial streams are expected to have nearly continuous flow.

   We changed this section to read (changes underlined): "The intermittent project streams (T1 and T2) must also show a minimum of 30 continuous flow days within each calendar year (assuming normal precipitation); Round Hill Branch, a perennial stream, is anticipated to have nearly continuous flow in a normal year."

10. Figure 10: Please also include photo points at the culverts along Green Valley Rd. and Bridges Cove Rd

    These have been added to the figure.

11. Since approximately 15% of the project is Proposed as Priority 2, please include a veg plot in one of the P2 bench cut areas to address soil fertility and compaction concerns associated with veg establishment.

    We have added an additional permanent plot along the bottom of Round Hill Branch Reach 3, which is in a Priority 2 section. We also added another random plot for a total of six veg plots; the three random plots may also coincide with Priority 2 areas.

12. Section 4.1, Potential Site Constraints: It would be beneficial to discuss the potential for utility line maintenance, and the future potential for road culverts to be replaced/widened, beaver activity, invasives, etc.

    We have altered the text as follows (changes underlined):

    Within the project site itself, there are site constraints that shape the project. There are existing culverts at Bridges Cove Road above T1 and Green Valley Road above T2 with permanent set elevations for the beginnings of these project reaches; however, one older degraded culvert and crossing just below the start of T1 will be removed. There is also an existing 60" corrugated metal pipe running under a private driveway below the confluence of RHB and T1; the pipe is in good condition, but will be retrofit to permanently increase the water surface elevation through the culvert. Additional floodplain drainage pipes (two 24" HPDE) will also be added to provide a connection for floodplain drainage at the crossing. There is a section of limited riparian buffer both up and downstream of the driveway culvert where the stream flows near a residential structure. An overhead electric distribution line also runs approximately along the driveway from the main residential structure to the barns on the other side of RHB; this line will be relocated to ensure it remains outside of the conservation easement. A 60' easement exception has been included for the existing crossing and utility line, which will allow for sufficient area for line and culvert maintenance or improvements without affecting the protected riparian buffer.

    Invasive species are not anticipated to be a problem at the project site. There are scattered individual plants, but not extensive areas where invasives have taken over the site. We also have not seen any evidence of beaver activity and do not expect beavers to be a factor in the site management. However, we will monitor the project for any of these elements that may arise as a threat to project success.

13. Although wetland credits are not being sought, stream restoration will occur through existing wetlands on site. It is not anticipated that overall wetland acreage will be lost, in fact it's likely that wetlands may increase on site due to raising the channel. During monitoring year 5 please re-verify the limits of jurisdiction to ensure that there was no net-loss of wetlands in-lieu of installing monitoring gauges.

    We have added a wetland delineation to the fifth-year monitoring requirements as reflected in Table 18 and Section 8.0.

WRC Comments, Andrea Leslie:

1. Although the existing culvert is described as 'not perched', Photo 4 on p.17 shows a culvert that does not appear buried and is likely an issue for aquatic passage if not long term stability. We recommend replacing this culvert.

   We have added a proposed retrofit to the existing culvert. This will involve installing a boulder sill at the end of the culvert to back water up through the culvert; rock material will be added within the bottom of the culvert to the extent feasible during construction. The profile downstream has been adjusted slightly to accommodate this design change. We will also install two 24" HPDE floodplain pipes along the right bank floodplain to provide additional capacity at higher flows. The left bank of the culvert is already constrained with a power pole and parking area (this area is not included in the conservation easement).

   We have updated both Section 6.4 Crossings and the construction plans to reflect this change.

2. We recommend finding a nearby reference reach for the vegetation community and using this to tailor the planting list. Shafale's 2012 Natural Communities of NC does provide general community descriptions but cannot be applied directly to every site. River Birch is found in large river floodplains in the mountains and not small streams; this should be replaced with something more typical of small streams, such as Sweet Birch. Likewise, Willow Oak is not a montane species. We recommend enriching the planted species list with understory species found on small streams in the area.

   We understand the Schafale descriptions are not a perfect fit for this site and have updated the planting plan to include more shrub species and have eliminated willow oak. We have substituted sweet birch for river birch, but have been told by our planting supplier that sweet birch is typically limited in quantity each year and may not be available at all. In that instance, we would adjust the planting percentages using the remaining species listed in the planting plan. As noted elsewhere, no bare root species will comprise more than 20% of the total quantity planted in any one zone.

WRC Comments, Travis Wilson:

1. It's a little difficult to get a highly accurate assessment of the existing driveway culvert condition and placement, but from the picture the culvert looks fairly aged. I can't tell if it's on bedrock or was installed on top of boulder/rip-rap, but either way it is not buried. The driveway side slopes look extremely steep and there is a lot of fill in the valley for there not to be any additional high flow culverts. None of those conditions are preferred and ultimately could result in a pipe failure particularly once woody debris is introduced into the system. We have discussed the option of including crossings within the easement in order to assure future maintenance or replacement is done properly, but I assume the easement has already been recorded for this project. The only other option would be to replace the crossing with a new and more adequate structure.

   Please see Response #1 to Ms. Leslie's question. We are proposing a retrofit to this structure.

EPA Comments, Todd Bowers:

1. Table 8/Page 26: The measured D50 and D84 particle sizes for the proposed Reaches seems to be off by an order of magnitude especially when considering the existing particle sizes of the same reaches. In particular, RHB-3 and T2 are the reaches in question. This may be resulting in errors in calculated critical shear stress for those reaches as well.

   The measured values for RHB-3 and T2 are based on pebble counts and reflect the existing fine material that has accumulated in these reaches from near-bank erosion. We anticipate the sediment ranges to coarsen in these areas post-construction once these sources of erosion are no longer present. The predicted grain sizes are reflective of the average shear stress of designed cross-sections.

2. Table 10/Page 28: I am somewhat concerned that the floodprone width for RHB 2 is potentially wider (65 feet) than the proposed riparian beltwidth of approximately 60 feet for this reach. This may result in hydrological trespass and a risk to the nearby structures just outside of the conservation easement.

   All of our proposed channel and floodplain excavation is contained within the project easement, and the width of the easement along RHB-2 is approximately 100'. For RHB Reach 2, the design stream belt width is 38-48' as shown in the Round Hill Branch Morphological Criteria found in Appendix 2. The riparian belt width of 44-65' is representative the lateral extents of the stream when at an elevation twice the maximum depth. These widths will both be within the project easement and are not anticipated to produce hydrologic trespass. Floodplain excavation along the stream will also increase the quantity of flood storage at a lower elevation than is currently available on-site.

3. Table 15/Page 31: Consider using the volunteer list of species in determining alternative species to plant in lieu of unavailable species or as a guide to understory development in the riparian Zone 2.

   Per other comments in addition to this one, we have removed the proposed volunteer list and expanded the planting lists with more shrub species.

4. Section 8.0/Page 35: Recommend adding a couple more vegetation monitoring plots (one fixed and one mobile) to adequately cover the site. The number of plots meets the 2% minimum coverage, however there are two zones of vegetation planting and three main reaches so six plots may be more appropriate to monitor the site effectively.

   We have added two more veg plots, for a total of six (three permanent, three random).

   Gauge on T1 needed to monitor intermittent flow of this reach. Recommend same approach and update of Table 19.

   We have added a gauge on T1.

5. Section 9.0/Page 39: Recommend listing the components of the site that may require adaptive management actions (beaver, lack of flow, channel instability, lack of livestock exclusion, landowner encroachment, etc.)

   These items are covered in the maintenance plan in Appendix 6. We added to Section 9: "The Maintenance Plan in Appendix 6 covers the anticipated items that may require maintenance and/or adaptive management."

6. General: Has there been any discussion or proposal to have the confluence of T1 and RHB moved further upstream to allow for a full riparian buffer along the entire length of T1?

   No, that has not been considered at this time. Regardless of where the confluence is, there will still need to be a section of impacted stream buffer outside of the easement at the driveway crossing and the associated buildings in this area.

DWR Comments, Erin Davis:

1. Page 8, Section 3.1.2 – Please provide a brief description of existing site vegetation, including a list of invasive/nuisance species.

   We have added the following paragraph to the end of Section 3.1.2: The vegetation on the site consists of almost entirely maintained pasture or agricultural areas containing tall fescue (Schedonorus arundinaceus). Unmaintained areas near the stream banks consist of annual prairie species such as goldenrod (Solidago sp.) and horseweed (Conyza canadensis). There are a few scattered red maple (Acer rubrum) and black walnut (Juglans nigra) trees along Round Hill Branch and T1. Wetland areas contain common rush (Juncus effusus), jewelweed (Impatiens capensis), and smartweed (Polygonum sp.). Aside from the tall fescue that covers most of the site, the understory areas of T1 contain isolated invasive species such as multiflora rose (Rosa multiflora) and Chinese privet (Ligustrum sinense).

2. Page 20, Table 5 – Please confirm that the restoration entrenchment ratio should be a minimum of 3.2.

   Yes, this is correct for this site when comparing enhancement versus restoration options. An entrenchment ratio of 2.2 or greater is required for a "C"-channel type, but for our restoration reaches, we have an entrenchment ratio higher than that to redevelop the appropriate bankfull bench within the belt width. In contrast, an enhancement reach would not necessarily have an excavated bench with that higher entrenchment ratio. Reach RHB-3 has the lowest designed entrenchment ratio of 3.2.

3. Page 21, Section 4.1 – First, DWR appreciates that outreach was completed to relocate utilities outside of the conservation easement. Second, what is the condition of the culverts on Bridges Cove Road and Green Valley Road? Are any NCDOT projects planned for these roadways?

   We do not know of any planned projects for these roadways. Both culverts are in adequate condition and we do not anticipate any needed maintenance actions.

4. Page 22, Section 6.0 – With 25% of the watershed being agriculture/pasture, please confirm that there are no offsite sediment loading concerns, particularly for T2.

   We have not observed any evidence of offsite sediment loading to the site.

5. Page 24, Section 6.4 – Please provide additional photo documentation to confirm that the driveway culvert is not perched. When was this culvert installed?

   We are unsure of when the culvert was installed. The culvert is not currently perched, but based on comments received, we are proposing retrofit of the culvert to ensure a permanent hydrologic connection through the pipe.

6. Page 24, Section 6.6 – Please include the referenced rural mountain regional curve estimates. Also, why weren't offsite reference reaches included for comparison? The IRT noted during the site visit that restoration approaches needed to be justified in the mitigation plan and using only onsite stable reference values infers that some stream sections do not warrant restoration.

   When comparing the mountain rural curve to on-site estimates, we found the mountain values to be higher than what we documented for the on-site features. Despite the site being impaired and in need of restoration, there are still bankfull features that form that can be useful in determining channel-forming area and discharge values. We typically find these on-site features are more reliable than regional curves. We did not find any suitable reference sites in the immediate area to use.

7. Page 30, Section 6.9 – Please confirm the total area to be planted. This section states 3.68 acres to be planted, but Table 4 notes 4.24 acres.

   The total planted area is 3.68 acres; this has been corrected in the "Planted Acreage" box in Table 4.

8. Page 31, Table 15 – DWR does not support pre-approval of volunteer species to be counted towards vegetative performance standard success. If veg plots are not meeting the required stem density and diversity thresholds based on planted species, then volunteers can be requested to count during the monitoring period review.

   We have removed Table 15 and will rely on the species within our planting plan unless conditions warrant a reconsideration of volunteers at a later date during monitoring.

9. Page 34, Section 7.0 Stream Hydrologic Performance – Please specify that "intermittent" project stream must show a minimum of 30 continuous flow days within "each" calendar year monitored.

   Please see proposed new text under Ms. Browning's Comment #2.

10. Page 35. Section 8 Stream Hydrologic Monitoring – Since T1 is an intermittent stream, please install a flow gauge in the upper one-third of the reach.

    We have added a stream gauge to T1.

11. Page 36, Table 19 – Please add reference to a flow gauge on T1. Also, should there be an asterisk footnote associated with the invasive mapping?

    We have updated Figure 10 and in Table 18 (formerly Table 19) to include the extra stream gauge. We have deleted the errant asterisk.

12. Page 39, Section 10 – DWR recommends annual inspections to confirm compliance with easement conditions.

    We have changed out "periodic" to "annual".

13. Figure 10 –
    a. Please add a T1 flow gauge and shift the T2 gauge slightly downstream to within the creditable reach.

       We have made these changes to the gauges.

    b. Please reference the two random veg plots.

       We have added a reference to these two additional plots in the legend.

    c. Please confirm that photo points for veg plots and cross sections not shown will be included in the annual monitoring reports. Please also add a photo point downstream of the driveway culvert crossing.

       Yes, we include photos for all veg plots and cross-sections in our monitoring reports; we have added to the legend that these photos are also included. We have also inserted the requested photo point downstream of the driveway crossing.

14. Sheet 4 – DWR questions the use of stone at the core of the channel block. Wouldn't this facilitate water movement? Typically, a compact high clay content core is indicated for channel block details.

    We have removed the channel block detail; it was mistakenly left in the set of details and will not be used for this project.

15. Sheet 6 – There appear to be multiple "trees to remain" dots shown within the new stream channel design. Please confirm.

    Yes, these trees will be integrated into the constructed channel as much as possible. There are instances where our plans to keep trees do not work out in the field, but for the most part all of these marked trees will remain.

16. Sheets 6 & 7 – DWR recommends that bench width be at least 1.5 times bankfull width. Particularly of concern are some of the bench widths on the outer meander bends where much of the flow energy vectors are directed based on the floodplain grading extent lines shown.

    We use a minimum of 1.0 times the bankfull width in certain locations on outer meander bends, but on average our bench widths on either side of the channel range from 1.5 - 2.0 times the bankfull width. We believe that the energy dissipation within the pools themselves combined with the additional floodplain expansion on the opposite side of the channel provide sufficient area for floodplain relief. In addition, in-stream structures also help to direct flow toward the center of the channel.

17. Sheet 8 – Please indicate easement break points.

    These breaks have been added to the profiles.

18. Sheet 9 – DWR requests that no species (excluding live stakes) account for more than 20 percent of a specified planting zone in order to promote diversity within the designated community type. DWR does appreciate the breakdown of the site into different planting zones.

    We have added a note indicating no species may make up more than 20% of the total stems.

19. Sheet 11 – DWR appreciates the inclusion of a fencing plan. Will there be any access points to the easement area east of the driveway for site monitors and regulatory staff?

    Yes, at each crossing location, there will be access gates to gain entry to the easement on either side. We have revised Sheet 11 to better show where new fence is, where old fence will remain, and where only easement markers will be installed (no fencing needed if not in pasture).

Sincerely,

Tim Morris
Project Manager

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: 7/20/2020

To: Matthew Reid, Project Manager

From: Tim Morris, Project Manager
KCI Associates of North Carolina, P.A.

Subject: Round Hill Branch Restoration Site
Draft Mitigation Plan Review
French Broad River Basin – CU# 06010105
Buncombe County
DMS Project ID No. 100066
Contract # 7534

Dear Mr. Reid,

Please see the below responses to your comments from June 30, 2020 on the draft of the Round Hill 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 (quantity to be determined) along with the supporting digital files.

Table of Contents:
Several of the figures (2, 3, 4, and 5) in the report have different titles than what is shown in the Table of Contents. Please update for consistency.

The TOC for figures 2 and 3 were updated and the titles of figure 4 and 5 were updated.

Consider adding planting tables in Section 6.8 to Table of Contents and update as necessary.

We have added these and updated the table numbers.

2.0 Watershed Approach and Site Selection:
Second paragraph incorrectly refers to stream as “RBH” instead of “RHB”. Please update.

This has been fixed.

Figure 3:
Please use points or conservation easement shape files for the three additional DMS sites listed on the Figure instead of the symbols currently selected.

The DMS sites have been changed to points.

3.1.3 Watershed Disturbance and Response:
First paragraph refers to NCSAM forms being located in Appendix 8. This should be Appendix 7.

This has been fixed.

Page 11: A small headcut is described as "just past the property line". It is unclear if this headcut is on the RHBRS property or adjoining property. Please clarify. If it is off the property, does KCI have permission to address and stabilize the headcut during construction?

The headcut is located about 15 feet within the property. The wording had been changed and the headcut is now shown in Figure 7.

Page 12: T2 is described as lacking defined channel pattern unlike the other two project reaches. This description is unclear, because the other reaches are also described as straight and lacking pattern. Please update.

We have removed the word pattern in the above sentence – it is more of a lack of defined channel than defined pattern. It now reads: "Unlike the other the two project streams, T2 lacks a defined channel due to the history of grazing and agriculture disturbing the riparian zone. The existing stream is characterized by diffuse flow through a wide cross-sectional area that is limited by eroding, vertical banks at the outer edge of the valley slopes; the assessment cross-section of T2 showed a width/depth ratio of 28.8. It flows south in this condition until the confluence with RHB."

Figure 7:
Please include existing features as points, call outs, etc. for:

- o Headcut on RHB-1
- o Existing Ford Crossing on RHB-1
- o Headcut on RHB-2
- o Bedrock

These have been added to the figure.

Please label roads: Bridges Cove Estate Road and Green Valley Road.

The roads have been labeled (in the NCDOT database, the road is called Bridges Cove Road).

Figure is mislabeled as page 17. Should be page 16.

The page number has been fixed.

Figure 8 and 9:
Please show existing wetlands on these figures and all future figures including CCPV.

The existing wetlands have been added to these figures.

Please label roads.

The roads have been labeled.

Figure 9 page number is incorrectly labeled.

The page number has been fixed.

4.0 Functional Uplift Potential:
This section needs additional discussion. Please compare/contrast existing conditions to the target potential of higher function. Was there any alternative analysis completed to support the design treatments and the proposed level of treatment? Please include any available data and resources used to inform functional uplift opportunities, constraints and optimization. The draft briefly discusses Hydraulic, geomorphology and physicochemical potential. Was Hydrology and biological considered? Please discuss further.

We have added a discussion of all of the functional levels and included a table comparing Enhancement I and Restoration. We do not anticipate any uplift at the hydrologic level. At the biological level, we do anticipate uplift but not enough to be significantly measurable throughout the monitoring period.

The P2 sections are for transition and tie-in sections only, correct? Suggest making that clarification here since the majority of the restoration is P1. This action will result in the most uplift.

Yes, the site will consist of primarily P1. We have added a discussion of this in the second paragraph of Section 6.0.

There is a statement saying that considerations of future impacts to the area is important when assessing project potential, but there is no further discussion. Please include a "Site Constraints to Functional Uplift" subsection. This section should include discussions about natural and anthropogenic constraints within the project area and/or watershed that limit the uplift potential. What is the anticipated growth or build-out that may limit success? What is the maximum uplift that will be achieved given landscape, current conditions and constraints? Easement breaks, culverts and stream crossings are considered site constraints since fragmentation can impact the site's potential functional uplift. Please address these concerns in the constraints section.

We have added this section, which includes a discussion of development pressure on the project watershed and existing site constraints.

6.0 Design Approach and Mitigation Work Plan:
Consider adding additional justification for Restoration work on T1 and RHB upstream from confluence with T1 to satisfy comment from the Post Contract Site Meeting minutes. Both of these reaches have a

great potential for uplift. This just needs to be explained further. Additional photos would be helpful as well.

We have added new material to both of the sections for T1 and RHB-1.

Additional photos have been added to Section 3.1.3 in keeping with the descriptions of the existing streams in that location.

The headcut mentioned in 3.1.3 is not included in the design approach for RHB-1. If this headcut is off property, how will the design account for any future impacts?

The headcut is located about 15 feet within the property. The wording had been changed and the headcut is now shown in Figure 7.

All Reaches: Approximately how many linear feet of Priority 2 is expected for each reach in the transition zones?

We have added a section in the second paragraph of Section 6.0 listing the areas of Priority 2 work, which totals approximately 322 lf or 15% of the creditable stream length.

Please describe how KCI will construct the Priority 2 sections. Will topsoil be stockpiled? Minimum bench and side slopes? Since establishment of vegetative cover and vigor can be a challenge on Priority 2 banks and benches, please include a discussion on how the soil restoration will be addressed during construction and reference potential adaptive management. Please elaborate for clarity.

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. This has been added to the end of the second paragraph of Section 6.0.

It is stated that livestock will be removed from RHB. Woven wire fence is shown on the Boundary Marking Plansheets, but is not discussed in the mitigation plan. Please include fencing discussion in report and add to figures and plansheets. Please include fence detail and location of gates as well in plansheets.

In addition to the channel work, livestock exclusion fencing will be installed to keep all livestock out of the channel. This has been added to Section 6.5. We have added the location of the gates in the plansheets; the fence to be installed is described as woven wire to NRCS standards.

Is drinking water being provided for excluded cattle? If so, please show on figures if possible. If waterers are not being provided, where will the cattle get water? How will they be excluded from gathering in crossings or other open areas? This has been an ongoing problem for DMS and stewardship.

Per the landowner agreement, we will be providing one well and two drinkers for the sheep and goats on the property. Gates will be used on either side of the ford crossing to prevent cattle from congregating in this area. See Section 6.5.

There are several culverts on the project site. Some will be replaced and others will remain. Please include a discussion regarding the current condition, confirm that sizing is appropriate and that they are not perched, buried or otherwise inhibiting aquatic passage.

We have updated Section 6.4 to better include this information. There will be one culvert remaining once the project is complete, a 60" corrugated metal pipe at the driveway crossing. Both T1 and T2 enter the site from roadway culverts that are not within the purview of the project. A derelict culvert on T1 will be removed.

There is no mention in the report regarding relocation of utilities on the site. Please include a discussion.

One overhead electric distribution pole will be relocated to ensure the electric line along the existing driveway is in alignment with the existing easement exception at the driveway culvert. This is included now in Section 4.1.

Please provide a statement identifying risks or uncertainties. Describe the range of uncertainty in terms of estimated magnitude and direction as needed. Examples include but are not limited to legacy sediment constraints, hydrologic trespass, land use/build out and/or easement restrictions. Was discharge estimated based on measured velocity, Manning's equation or was another method used?

We provided a section describing the risk and uncertainty at the end of Section 6.0. We added a sentence explaining that discharge was based on Manning's equation in Section 6.6.

6.8 Planting:
Please indicate how the pasture grasses will be managed. Will the grasses be treated prior to or during site construction or something else? DMS recommends treating pasture grasses to prevent impeding planted vegetation establishment and vigor.

At the end of Section 6.9 (now the Planting Section), we added: "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."

There is no mention of planting in the jurisdictional wetlands. What species will be used in these areas? Update report and plansheets as necessary to include wetland zone or other.

We have clarified that the existing jurisdictional wetlands will be planted with species from the Zone 1 list in Section 6.9.

The IRT has requested recently that a figure noting the different planting zones be included in the mitigation plan. Please consider adding this figure within this section.

We have added this as Figure 9. The Monitoring Figure is now Figure 10.

Please note that planting should occur before March 15 per the 2016 Monitoring Update.

This has been added to Section 6.9.

Consider adding the planting tables to Table of Contents (same comment as above).

We have added these and updated the table numbers.

Plansheets:

Sheet 6 and 8: Show existing culvert to be removed.

These have been added to the plan sheets.

Digital Deliverables:

Please provide DMS with the monitoring feature shape files displayed on Figure 9, including proposed stream gauges, veg plots, photo points, and cross sections.

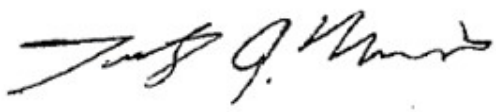
These have been added to the deliverable.

Please submit spreadsheet used to generate the particle size distribution figures.

These have been added to the deliverable.

Please contact me if you have any questions or would like clarification concerning these responses.

Sincerely,



Tim Morris
Project Manager

TABLE OF CONTENTS

APPENDICES

FIGURES

TABLES

1.0 PROJECT INTRODUCTION

The Round Hill Branch Restoration Site (RHBRS) 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 the relocation and straightening of the existing stream channels, livestock impacts, and clearing of the riparian buffers. This site offers the chance to restore streams impacted by pasture and agriculture to a stable stream ecosystem with a functional riparian buffer and floodplain access.

The project site is located approximately 4.0 miles south of Leicester, NC in Buncombe County. The existing primary stream, Round Hill Branch (RHB) and its two tributaries, Tributary 1 (T1) and Tributary 2 (T2), are comprised of 2,142 proposed linear feet (lf). RHBRS is on Green Valley Road (SR 1383) south of NC-63. The center of the site is at approximately 35.6305 N and -82.7369 W in the Leicester USGS Quadrangle.

The RHBRS will restore a stable stream ecosystem through various restoration techniques. The majority of the project streams will use a Priority 1 Approach aside from those areas where Priority 2 is necessary for transitional sections to match existing site constraints. Approximately 0.24 acre of existing jurisdictional wetlands are also being protected in the conservation easement. Altogether, the project will restore and protect a vital headwater watershed in the French Broad Basin.

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. Credit Summary

Round Hill Branch Restoration Site, Buncombe County DMS Contract 7534; DMS Project Number 100066									
Mitigation Credits									
	Stream		Riparian Wetland		Non-riparian Wetland		Buffer	Nitrogen Nutrient Offset	Phosphorous Nutrient Offset
Type	R	RE	R	RE	R	RE			
Linear Feet/Acres	2,142								
Credits	2,142.000								
TOTAL CREDITS	2,142.000								

R=Restoration RE=Restoration Equivalent

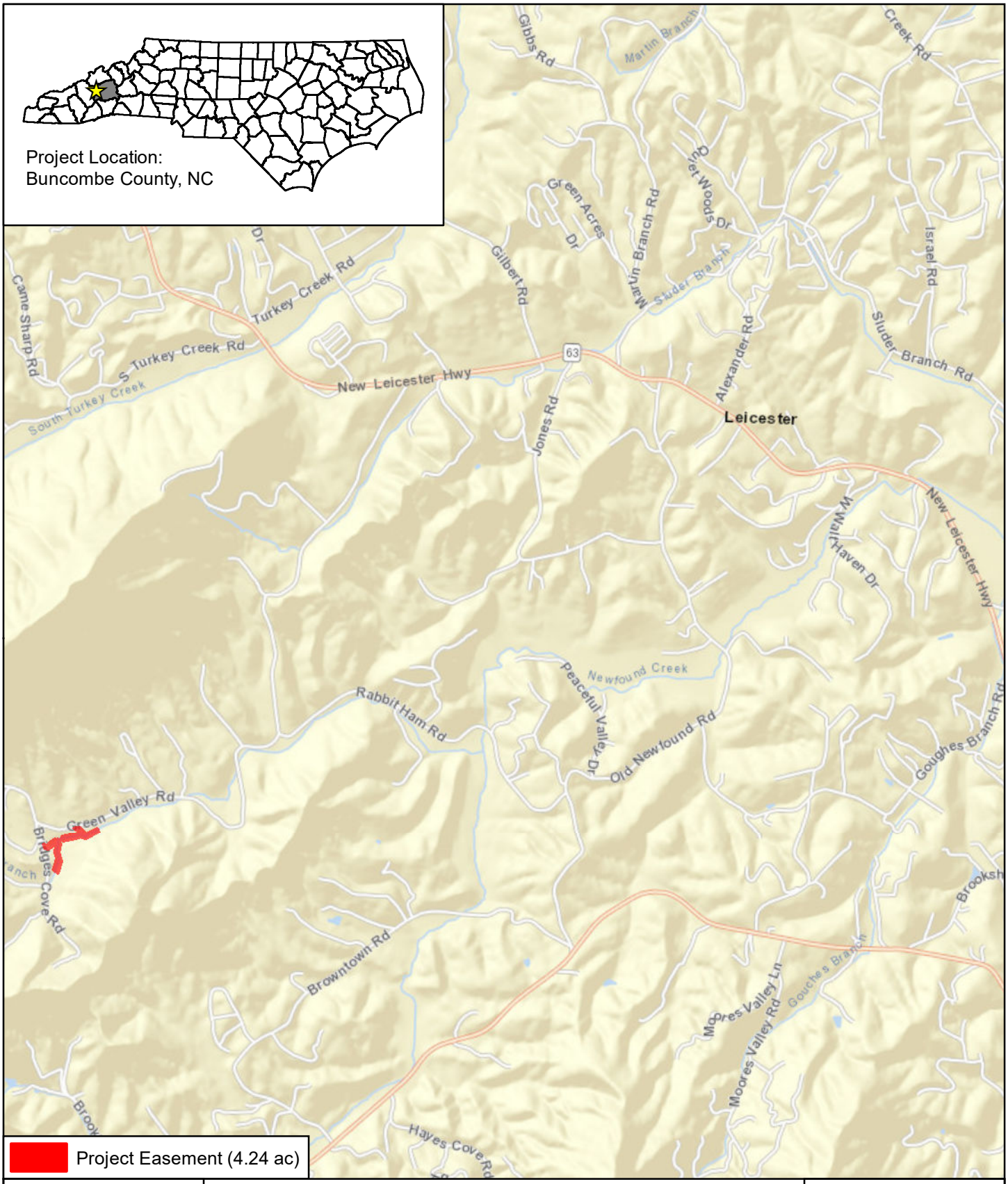


FIGURE 1. PROJECT SITE VICINITY MAP
ROUND HILL BRANCH RESTORATION SITE
BUNCOMBE COUNTY, NC

2.0 WATERSHED APPROACH AND SITE SELECTION

The site's 14-digit watershed, Hydrologic Unit (HU) 06010105090020, Newfound Creek, was identified in the 2009 French Broad River Basin RBRP as a Targeted Local Watershed (TLW) (NCEEP 2009). The watershed is largely rural in nature with 42% agriculture and 47% forest with 61% of streams lacking forested buffers at the time of the report. For this TLW, the RBRP listed impacts from agriculture use, including stream bank erosion, excessive sedimentation, livestock access to streams, excess nutrients, and high fecal coliform bacteria as the major stressors. The goals and priorities for the RHBRS are based on the information presented in the French Broad River Basin Restoration Priorities: maintaining and enhancing water quality, restoring hydrology, and improving fish and wildlife habitat (NCEEP, 2009). The project will support the basin priorities, which are to implement wetland and stream restoration projects that reduce sources of sediment and nutrients by:

- Restoring riparian buffer vegetation,
- Stabilizing banks,
- Excluding livestock,
- Restoring natural geomorphology, especially in headwater streams,
- Improve management of stormwater runoff,
- Restore and protect habitat.

The project section of Round Hill Branch (RHB) is identified as Reach 6-84-3 by the State of North Carolina, and is classified for surface water as Class C. RHB was not listed as impaired on the 2018 303(d) list. 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 RHBRS, there are three other DMS mitigation sites within the TLW: Newfound Creek, a closed-out stream project under stewardship that is 1.4 miles to the east, and two forthcoming full-delivery stream projects also being completed by KCI, Morgan Branch, approximately 1.5 miles to the southwest, and Dale's Creek, 2.0 miles to the south.

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.

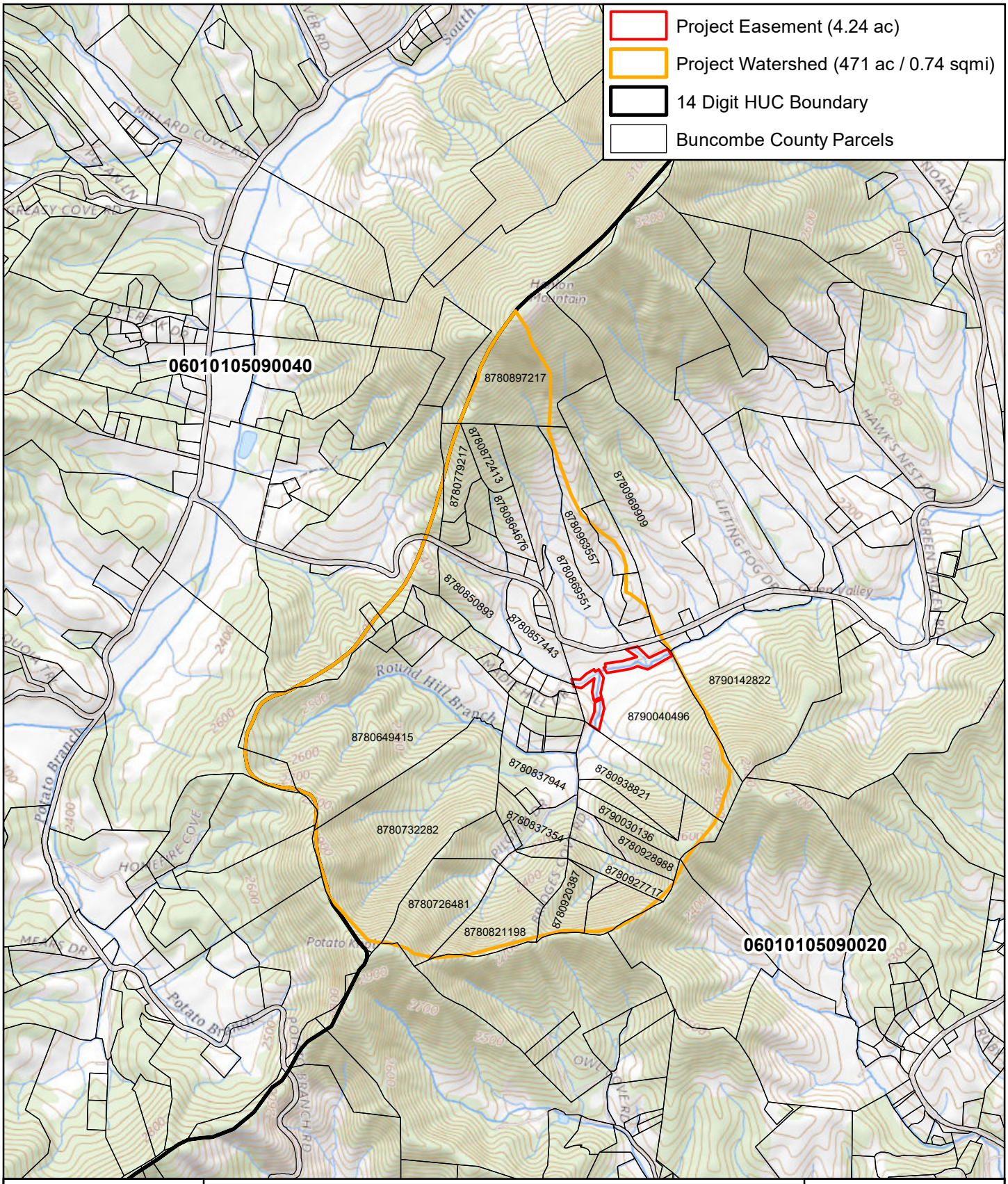


FIGURE 2. USGS TOPOGRAPHIC MAP
ROUND HILL BRANCH RESTORATION SITE
BUNCOMBE COUNTY, NC

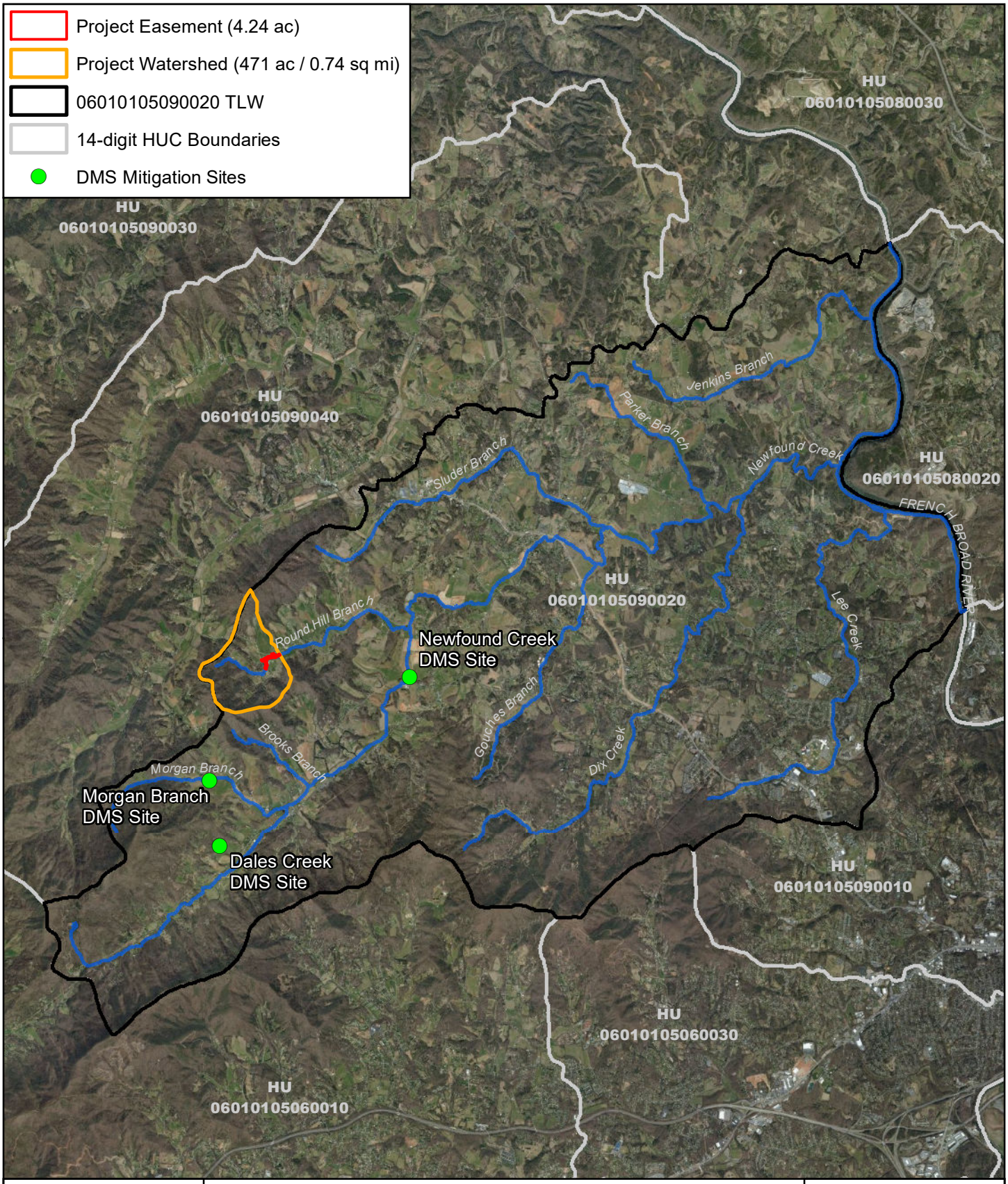


FIGURE 3. PROJECT SITE/TLW WATERSHED MAP
ROUND HILL BRANCH RESTORATION SITE
BUNCOMBE COUNTY, NC

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

The project watershed consists of steep, confined first-order stream valleys converging onto the floodplain of RHB. The valleys along the RHB streams are predominantly open with minor inclusions of bedrock. The geology is mapped as Amphibolite throughout the project site and for the lower portion of the project watershed. Amphibolite is described as equigranular, massive to well foliated, interlayered, rarely discordant, metamorphosed intrusive and extrusive mafic rock; the formation may also include metasedimentary rock. The remainder of the watershed intersects with the Migmatitic biotite-hornblende gneisses formation with the major constituent being gneiss with minor inclusions of amphibolite and calc-silicate rock (USGS 2020).

According to the Soil Survey of Buncombe County, the majority of the proposed project's soils are mapped as Tate loam (TaB and TaC) along the upper portions of RHB, T1, and T2 and French loam (FrA) along their lower portions (USDA, NRCS 2020). Tate loams are well-drained, moderately permeable soils that allow for potential seeps and springs. French loams are very deep, moderately drained, highly permeable soils formed from alluvial sedimentation. The project site is overlaid on the soil survey in Figure 4. These soil types do not present any major limitations for construction activities typically associated with stream restoration.

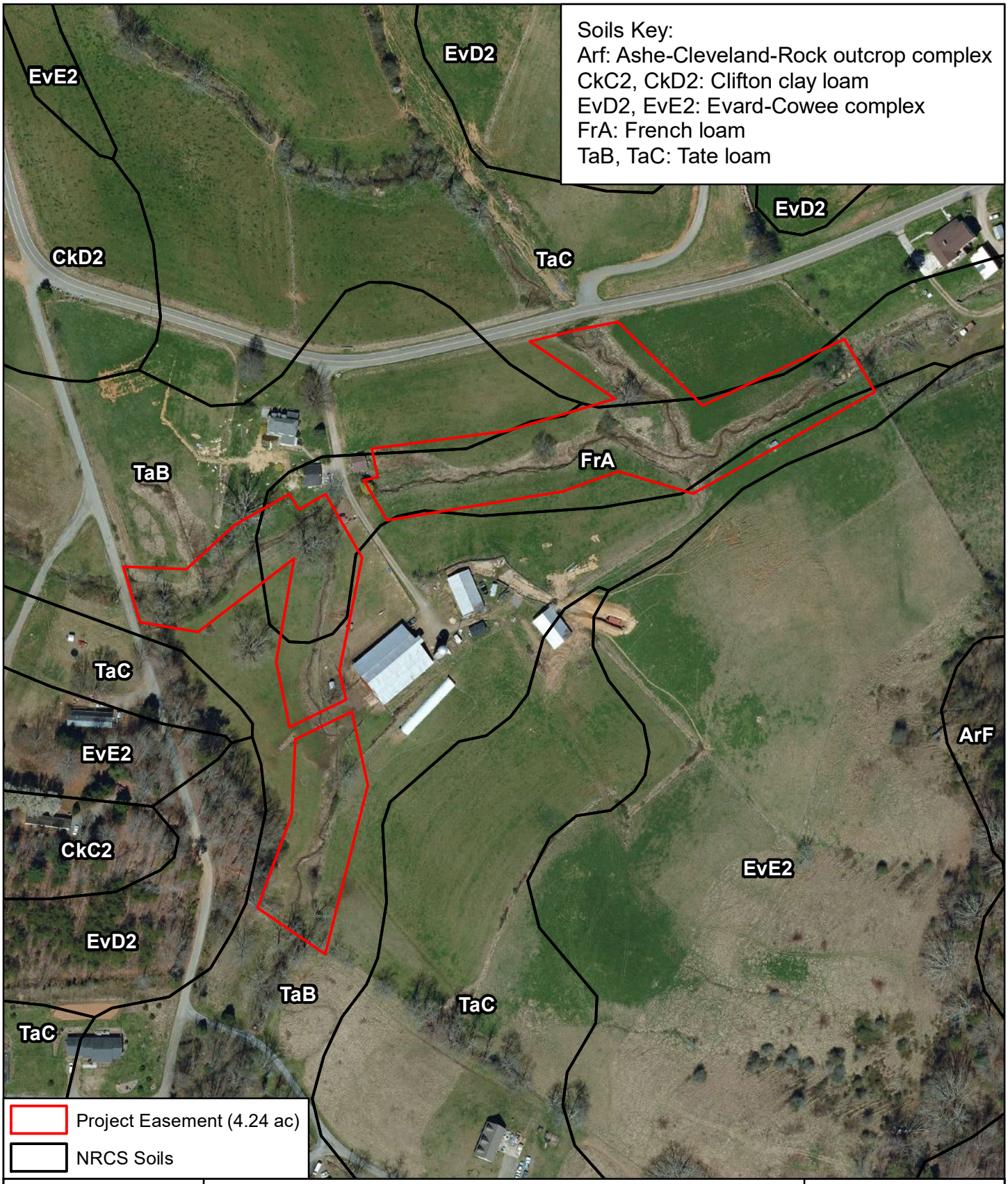


FIGURE 4. SOIL SURVEY MAP
ROUND HILL BRANCH RESTORATION SITE
BUNCOMBE COUNTY, NC

3.1.2 Land Use/Land Cover and Chronology of Impacts

The project watershed for the RHBRS is comprised of 0.74 square miles (471 acres). Current land use within the project watershed consists of forest (62%), pasture/farmland (25%), low-density residential development (12%), and roads (1%); the estimated percent impervious is 3%. The development pressure within the project watershed is low. Current land use is shown in Figure 5.

Historic aerials were examined for additional information about how the site has changed over recent history. The reviewed aerials are included in Figure 6. Historic aerials were obtained from the USGS EarthExplorer for 1969 and NCOneMap for 1993, 2006, and 2010.

This evidence shows that the site has been systematically impacted by vegetative clearing and stream channelization in support of agricultural and livestock grazing over the past 50 years with most of the impacts occurring prior to the earliest aerial photo available. In the 1969 image, all of the project streams have already been cleared and straightened. The visible portion of the project watershed to the north had been cleared of vegetation at that time as well.

In the 1993 photo, more clearing has occurred just upstream of the project area and by 2006, this area has been completely cleared. This area has started to grow back by 2010, particularly in the vegetative coverage at the top of T1, but there is little change within the actual project area between 1969 and current conditions.

The vegetation on the site consists of almost entirely of maintained pasture areas containing tall fescue (*Schedonorus arundinaceus*). Unmaintained areas near the stream banks consist of annual prairie species such as goldenrod (*Solidago* sp.) and horseweed (*Conyza canadensis*). There are a few scattered red maple (*Acer rubrum*) and black walnut (*Juglans nigra*) trees along Round Hill Branch and T1. Wetland areas contain common rush (*Juncus effusus*), jewelweed (*Impatiens capensis*), and smartweed (*Polygonum* sp.). Aside from the tall fescue that covers most of the site, the understory areas of T1 contain isolated invasive species such as multiflora rose (*Rosa multiflora*) and Chinese privet (*Ligustrum sinense*).

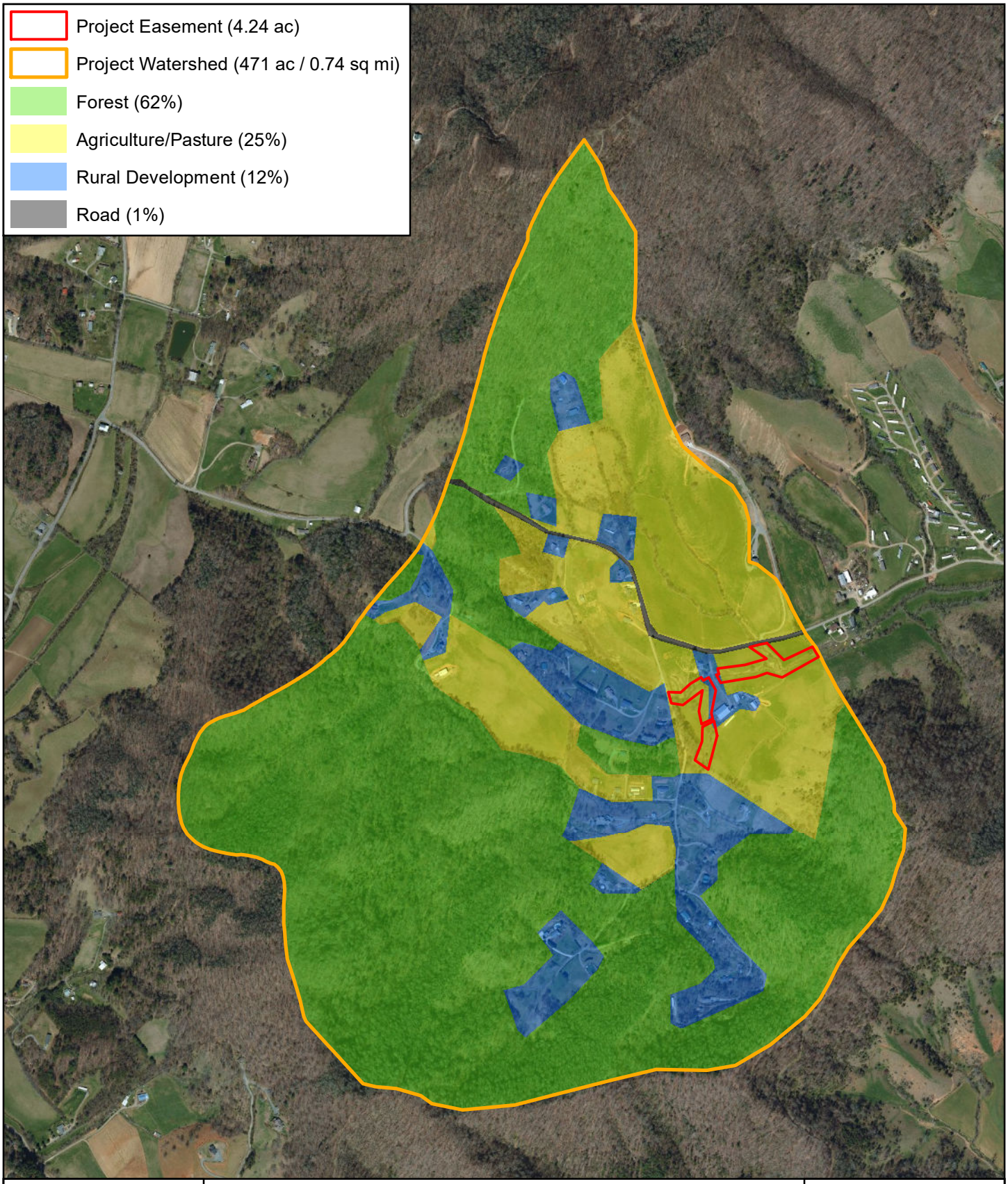


FIGURE 5. LAND USE / LAND COVER
ROUND HILL BRANCH RESTORATION SITE
BUNCOMBE COUNTY, NC

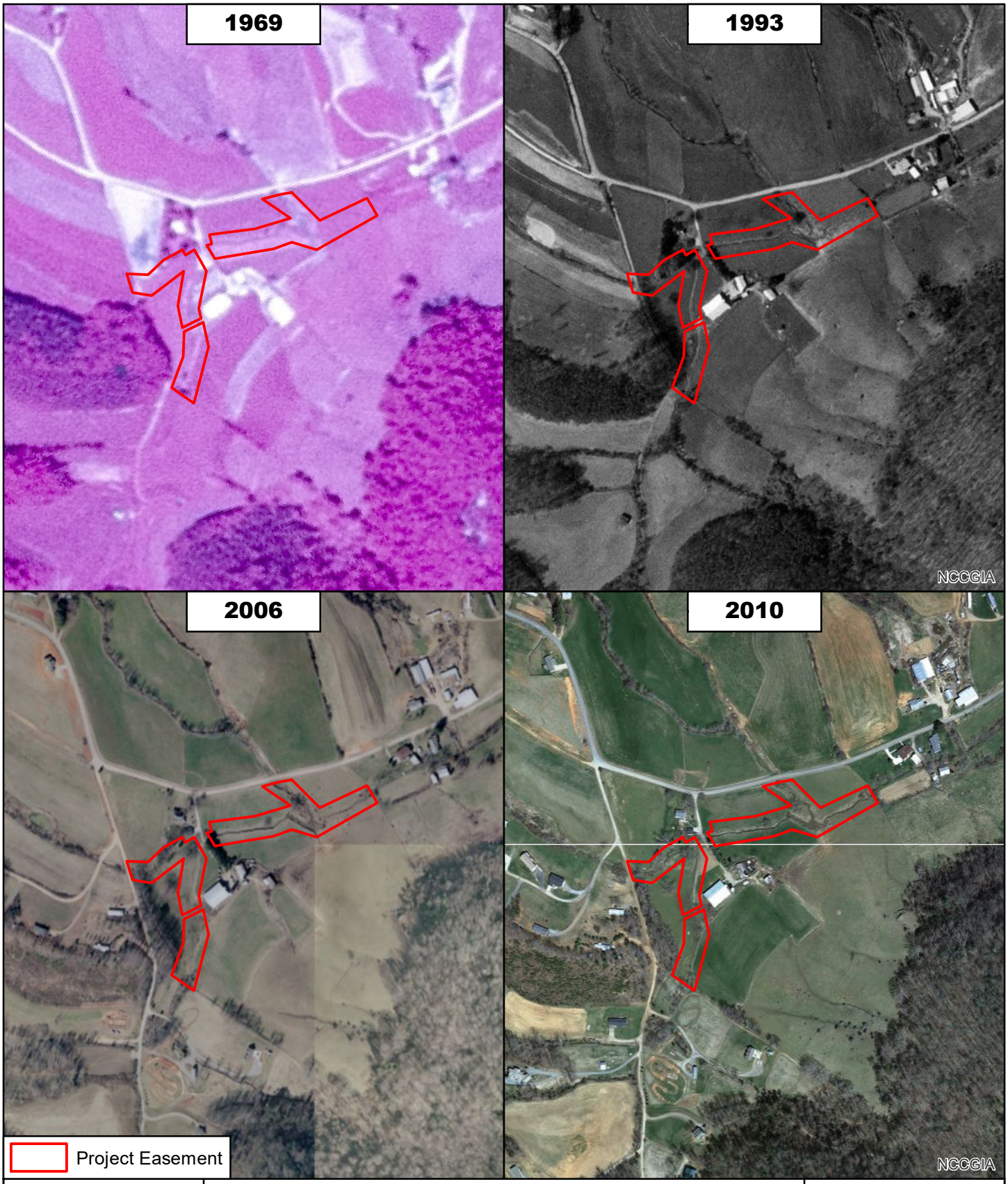


FIGURE 6. HISTORIC AERIALS
ROUND HILL BRANCH RESTORATION SITE
BUNCOMBE COUNTY, NC

3.1.3 Watershed Disturbance and Response

The project watershed and the site itself have experienced landscape and vegetative modifications to convert forested land for agriculture and grazing. A site-wide assessment was performed to show the degree of departure from a stable stream system and to identify causes of impairment. An existing site conditions map is shown in Figure 7 and additional site photographs are found in Section 3.1.4. Further detailed data is included in Appendix 2. The NC Stream Assessment Method was also performed on the project streams (see Appendix 7).

The three project reaches of RHB along with the two other project streams, T1 and T2, are generally in Stage IV (Degradation and Widening) in the channel evolutionary process (Simon and Rinaldi 2006). The primary disturbance to the system has been the relocation and straightening of the project streams, which has disconnected stream flows from a frequently accessible floodplain or bankfull bench. As a result, the streams are in the process of adjusting by widening at the bottom of the banks, inducing erosion. A bed mixture of gravel and small cobble has helped protect the bed from excessive bed degradation. Disturbances to the sediment regime of the site are localized on-site from upslope erosion induced by cattle and direct impacts on stream banks made by cattle hooves. Table 2 below shows the range of bank height and entrenchment ratios at the site based on the assessment cross-sectional data (see Appendix 2).

Table 2. Existing Bank Height and Entrenchment Ratios

Stream	Existing Bank Height Ratio	Existing Entrenchment Ratio
RHB	1.0 – 1.7	1.9 – 11.7
T1	1.0 – 1.9	1.9 – 7.7
T2	1.0	1.2

RHB (1,583 existing lf) has been divided into three reaches for assessment and design: Reach 1 (RHB-1), 691 lf from its start until the confluence with T1, Reach 2 (RHB-2), 575 lf from T1 to T2, and Reach 3 (RHB-3), 317 lf from T2 until the end of the project.

RHB-1 begins as it flows onto the project parcel from the south. A small headcut has developed approximately 15 feet within the project property line (Figure 7), and there is evidence that the stream has been historically channelized through the flat valley bottom. Former spoil materials are visible at the beginning of the reach on the right bank. The two assessment cross-sections (RHB-XS A and B) in this location show bank height ratios of 1.1-1.3 and eroding, vertical banks. The channelized stream is constrained in its lateral adjustment and erosion is occurring at the outer bends as a result. The stream also has low width/depth ratios (4.3-5.1) and little to no variation in the bed profile. In addition to the instability evidenced through the morphological parameters, the existing stream is routinely trampled by the livestock that routinely access the channel for water. Additionally, while this reach does have a base layer of gravel and cobble, most of the interstitial space is choked with fine sands and silts that are coming from the surrounding bank and channel erosion. After approximately 300 lf, there is an existing ford crossing, which

Bank erosion at outer left bend as RHB-1 attempts to adjusts laterally upstream of the ford crossing.

has been maintained in adequate condition, but is experiencing erosion up and downstream of the structure.

Below the ford crossing, RHB-1 continues in a similar condition with a straight, channelized pattern and spoil piles along the right bank. There is a series of spoil remnants along the right bank, which are preventing diffuse flow of runoff through the riparian zone. Wetland W1 is present along the floodplain in this area, originating from hillside seepage from the western slope. Riparian vegetation is limited to isolated trees along the tops of banks.

RHB-1 as it nears the confluence with T1; straightened stream is to left of fence and spoil is blocking overland flow on right of fence.

After the confluence with T1, RHB-2 begins as stream turns to the east and enters a culvert under the landowner's driveway. After this point, RHB-2 has developed more severe bank erosion as a result of the culvert and fewer trees along the banks. Livestock historically had access to the entire length of RHB, but cattle have recently been excluded from the lower two reaches. This section is incised with vertical banks and no floodplain access. There are several areas where piles of concrete are present in the channel and banks, possibly as a result of failed bank stabilization efforts. The channel conditions here consist of a straight, narrow channel with steep vertical banks, and severe erosion along the right bank. This section of the reach flows east for approximately 420 lf before a headcut forms at a fence that crosses the stream.

Below the fence line, RHB-2 has meanders that are starting to form and improved floodplain connectivity compared to the upper portion. The stream still lacks a riparian buffer and both banks are experiencing erosion. There is also a terrace present on the right side of the stream that is possibly a remnant of an old borrow area, pond or significant cattle wallow. RHB-2 flows for another 100 lf before its confluence with T2. The area surrounding the confluence contains Wetland 2 (W2) where the channel has widened. After the confluence with T2, RHB-3 continues with much the same characteristics before exiting the project site. At the end of the reach, there is a section of bedrock on the right that limits the planform in that location.

Looking upstream at the old roadbed and culvert in T1 causing a blockage.

T1 enters the project site flowing east after exiting the 24" CMP culvert under Bridges Cove Road. After 15 lf, T1 then flows through an older, unused road crossing with a crushed and failing 18" CMP pipe. The channel fill from the old crossing is severely impacting the channel dynamics and altering the flow and sediment transport downstream of the blockage. Approximately 130 lf downstream of the beginning of T1, a wetland seep (W4) joins enters T1 from the left bank. This seep was historically ditched and is currently functioning more as a vegetated ditch with a combination of pasture grasses and soft rush (*Juncus effusus*). After the seep enters, T1 flows straight along a fence line to the confluence with RHB and lacks any distinct bed feature morphology. There is

spoil evident along the right bank side similar to RHB-1. The assessment cross-section in this section of T1 indicates a bank height ratio of 1.9 and a width/depth ratio of 5.9 along with severe undercut and eroding banks.

T2 enters from a culvert under Green Valley Road and flows for 248 lf before reaching the confluence with RHB. At the outlet of the culvert, there is a large plunge pool, but then the stream enters an entrenched, overwidened valley. Unlike the other the two project streams, T2 lacks a defined channel due to the history of grazing and agriculture disturbing the riparian zone. The existing stream is characterized by diffuse flow through a wide cross-sectional area that is limited by eroding, vertical banks at the outer edge of the valley slopes; the assessment cross-section of T2 showed a width/depth ratio of 28.8. It flows south in this condition until the confluence with RHB.

A jurisdictional determination was received from the US Army Corps of Engineers on January 27, 2019 and was approved on April 25, 2019. The approved jurisdictional determination is included in Appendix 8 and Table 3 below shows the delineated features on-site. Following the completion of the mitigation plan, a pre-construction notification (PCN) will be completed to apply for a Nationwide 27 Permit (NWP) to comply with Sections 401 and 404 of the Clean Water Act with the Wilmington District of the US Army Corps of Engineers and the NCDEQ Division of Water Resources.

Table 3. Existing Stream and Wetland Conditions

Reach Name	Flow Status	DWQ Score	NCSAM Rating			
RHB	Perennial	35.0	Low			
T1	Intermittent	25.5	Low			
T2	Intermittent	22.5	Low			
Wetland ID	**NCWAM**	**Hydrologic Class**	**NCWAM Rating**	**Cowardin Class**	**Size (Acres)**	**Location**
W1	Bottomland Hardwood Forest	Riparian	Low	PEM	0.17	Left bank along RHB-1
W2	Bottomland Hardwood Forest	Riparian	Low	PEM	0.06	Overwidened channel at the confluence of RHB and T2
W3	Bottomland Hardwood Forest	Riparian	Low	PEM	0.01	Left bank of T2 adjacent to plunge pool
W4	Headwater Forest	Riparian	Low	PEM	< 0.01	Seep entering the left bank of T1

The project attribute table below summarizes current conditions at the site and Figure 7 displays the current conditions at the site.

Table 4. Project Attribute Table

Project Information			
Project Name	Round Hill Branch Restoration Site		
County	Buncombe County		
Project Area (acres)	4.24 acres		
Project Coordinates (lat. and long.)	35.6305 N and -82.7369 W		
Planted Acreage (Acres of Woody Stems Planted)	3.68 acres		
Project Watershed Summary Information			
Physiographic Province	Mountain		
River Basin	French Broad		
USGS Hydrologic Unit 8-digit	06010105	**USGS Hydrologic Unit 14-digit**	06010105090020
DWQ Sub-basin	04-03-02		
Project Drainage Area (acres)	471 acres		
Project Drainage Area Percentage of Impervious Area	3%		
CGIA Land Use Classification	Forest (62%), Pasture/Farmland (25%), Low-density Residential Development (12%), and Roads (1%).		
Existing Reach Summary Information			
Parameters	**All Reaches Combined**		
Length of reach (linear feet)	2,214		
Valley Confinement	Partially confined to confined		
Drainage area (acres)	471 acres		
Perennial, Intermittent, Ephemeral	Intermittent - Perennial		
NCDWQ Water Quality Classification	C (Aquatic Life, Secondary Recreation)		
Rosgen Stream Classification (Existing/Proposed)	F4/G4/E4		
Evolutionary trend (Simon)	Stage IV		
FEMA classification	Zone X		
Existing Wetland Summary Information			
Parameters	**W1 & W3**	**W2**	**W4**
Size of Wetland (acres)	0.17 & 0.01	0.10	0.10
Wetland Type	Riparian Non-Riverine	Riparian Non-Riverine	Riparian Non-Riverine
Mapped Soil Series	Tate loam	French loam	Tate loam
Drainage class	Well drained	Somewhat poorly drained	Well drained
Soil Hydric Status	Non-Hydric	Non-Hydric	Non-Hydric
Source of Hydrology	Groundwater	Groundwater	Groundwater
Restoration or Enhancement Method	N/A (Preservation)	Areas of erosion to stabilize	N/A (Preservation)
Regulatory Considerations			
Regulation	**Applicable?**	**Resolved?**	**Supporting Documentation**
Waters of the United States – Section 404	Yes	Applying for NWP 27	Preliminary JD approved
Waters 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)/ Coastal Area Management Act (CAMA)	No	N/A	N/A
FEMA Floodplain Compliance	No	N/A	N/A
Essential Fisheries Habitat**	No	N/A	N/A

**Items addressed in the Categorical Exclusion in Appendix.

Table 4 continued

Stream Parameters	RHB-1	RHB-2	RHB-3	T1	T2
Length of reach (linear feet)	691	575	317	383	248
Drainage area (acres)	307 acres	403 acres	474 acres	77 acres	74 acres
NCDWR Classification	C	C	C	C	C
Rosgen Classification	F4	F4	F4	F4	G4
Evolutionary trend	Stage IV	Stage IV	Stage IV	Stage IV	Stage IV
Mapped Soil Series	Tate loam	French loam	French loam	Tate loam / French loam	Tate loam / French loam
Drainage class	Well drained, Somewhat Poorly Drained	Somewhat poorly drained	Somewhat poorly drained	Well drained, Somewhat Poorly Drained	Well drained, Somewhat Poorly Drained
Soil Hydric status	Non-Hydric	Non-Hydric	Non-Hydric	Non-Hydric	Non-Hydric
Slope	2%	2%	1%	2%	3%
FEMA classification	Zone X	Zone X	Zone X	Zone X	Zone X
Existing vegetation community	Pasture	Pasture	Pasture	Pasture	Pasture
Thermal regime	Cool	Cool	Cool	Cool	Cool

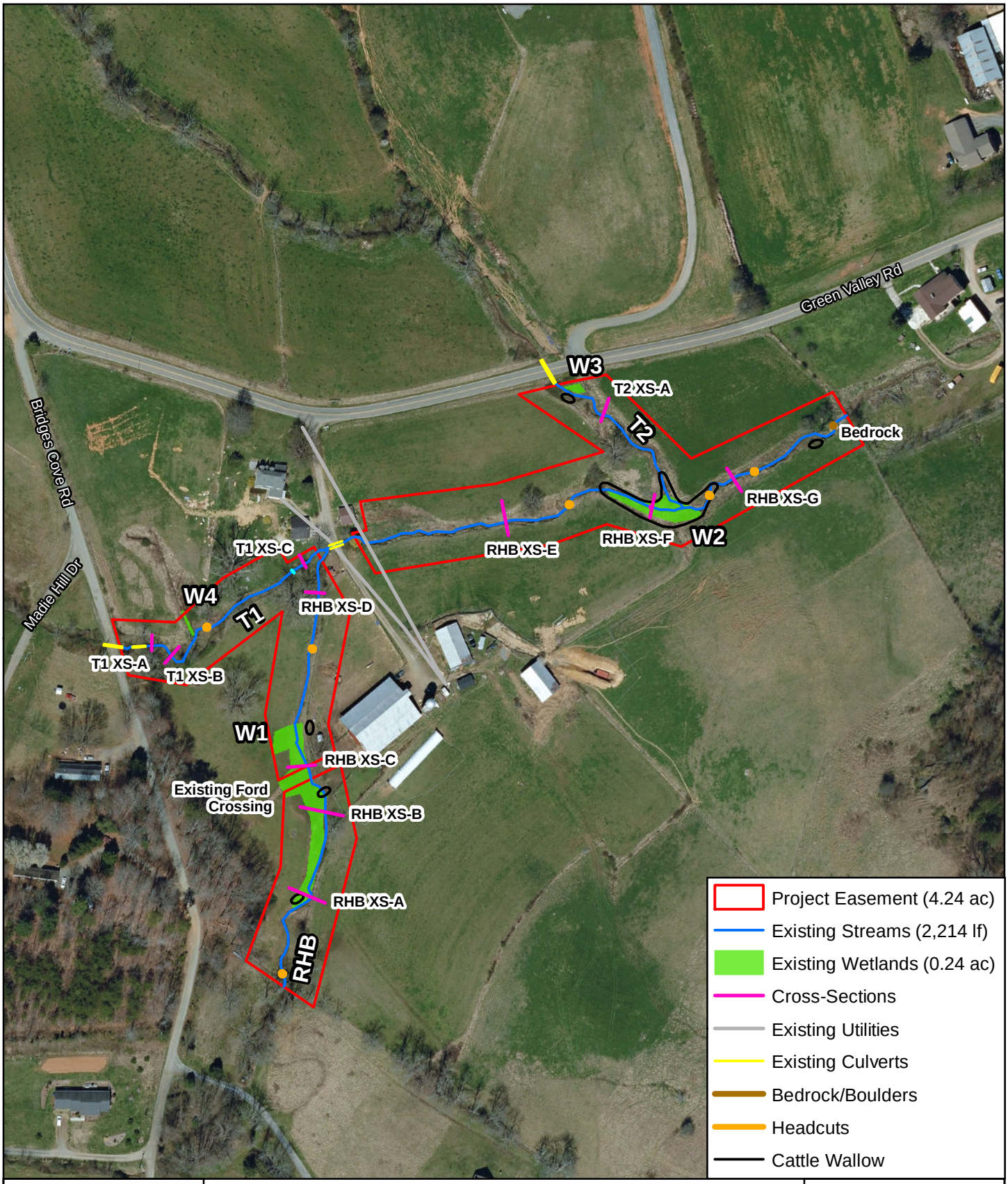


FIGURE 7. CURRENT CONDITIONS
ROUND HILL BRANCH RESTORATION SITE
BUNCOMBE COUNTY, NC

3.1.4 Site Photographs

Photo 1: Looking upstream at RHB-1 toward the property boundary.

Photo 2: Looking downstream at RHB-1 above the ford crossing.

Photo 3: Looking at RHB-1 at an existing crossing near the barn.

Photo 4: Looking at crossing below the confluence of T1 (left) and RHB-1 (right).

Photo 5: Looking upstream at T1 where it has been straightened and has a high right bank with spoil material.

Photo 6: Looking downstream on T1 midway on the reach.

Photo 7: Looking at RHB-2 downstream of the confluence with T1 and the driveway culvert.

Photo 8: Looking at RHB-2 unstable and slumping banks.

Photo 9: Looking at RHB-3 downstream of the confluence with T2.

Photo 10: Looking at bank erosion along the right bank of RHB-3 near the end of the property.

Photo 11: Looking downstream at the start of T2 just south of the Green Valley Road crossing.

Photo 12: Looking north at the top of T2 and the culvert crossing at Green Valley Road.

4.0 FUNCTIONAL UPLIFT POTENTIAL

We analyzed the potential functional uplift at the project site using the Stream Functions Pyramid Framework (Harman et al 2012). Each of the five levels was reviewed as to what changes and improvements are anticipated at RHBRS depending on the mitigation approach. For hydrology, we determined that there would be no measurable change in the hydrologic base conditions coming from the surrounding watershed. At the second level, hydraulics, functional improvements will come either from relocating project streams to a location with a historic floodplain or establishing an accessible bench for out-of-bank events. 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. The existing debilitated culvert at the top of T1 will also be removed, eliminating that restriction in the channel and returning unimpaired flow dynamics to that section of the stream.

The uplift at the third level, Geomorphology, will be achieved by sizing the project streams to the bankfull flow, developing 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 from bank erosion will decrease and sediment transport can return to a point that will accommodate watershed inputs. Riparian plantings will further support geomorphological functionality by increasing bank stability.

The potential for uplift at the hydraulic and geomorphological levels was further compared between different mitigation treatments – Enhancement I and Restoration – to determine what level of benefit each treatment would have for the project. Restoration would include the redevelopment of a more natural stream pattern from the current straightened condition of the streams and the grading of a well-developed floodplain or bankfull bench along with the restored pattern. Enhancement I would consist more of stabilized in-place work.

Table 5. Comparison of Functional Uplift Alternatives (Hydraulics and Geomorphology)

Functional Level	Function-Based Parameter Effects	Assessment/ Measurement	Existing Condition	Proposed Uplift Alternative	
				Enhancement I	Restoration
Hydraulics	Floodplain Connectivity	Flood Frequency	Rarely out of bank	Bankfull occurrence ~1.5 years	Bankfull occurrence ~1.5 years
		Bank Height Ratio/ Entrench. Ratio	1 - 1.7 BHR / 1.2 Min. ER	1.0 BHR / 2.2 Min. ER	1.0 BHR / 3.2 Min. ER
Geomorph.	Bank Migration/ Lateral Stability	Cross-Sectional Form	F4-G4	C4/B4c	C4/B4c with associated floodplain
		Visual Inspection of Bank Stability	Shear, eroding banks	Selective bank grading treatment	Vegetated banks with slopes 3:1 or less
	Bed Form Diversity	Percent Riffle and Pool, Facet Slopes, Visual Inspection	90/10% riffle/pool, little to no bed variation	70/30% riffle/pool, pool development limited to straight line, structured pools	60/40% riffle/pool, pools located in geomorphologically-appropriate meander bends
		Visual Inspection of Feature Maintenance	Straight channel with little bed variation	Predominantly riffle/run enhanced with in-line pool structures	Maintained riffle-pool sequencing
	Bed Material Characterization	Pebble Count	Lack of feature sorting; fine sediment from bank erosion	Sorting within features; coarsening of reachwide material	Sorting within features; coarsening of reachwide material

At the fourth level, 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 2.56 $x10^{14}$ fecal coliform colonies, 250 pounds of total nitrogen, and 18 pounds of total phosphorus per year (based on NCDMS 2016 guidance; see Appendix 2). Long-term functional improvements are expected in the fifth level, Biology; however, the amount of uplift is not anticipated to be significant over the course of monitoring.

In addition to the functions pyramid, we also used the North Carolina Stream Assessment Method (NC SAM) to evaluate the quality of the existing streams; the results indicate that all of the stream channels have low functional values (see Appendix 7).

4.1 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. There are existing culverts at Bridges Cove Road above T1 and Green Valley Road above T2 with permanent set elevations for the beginnings of these project reaches; however, one older degraded culvert and crossing just below the start of T1 will be removed. There is also an existing 60" corrugated metal pipe running under a private driveway below the confluence of RHB and T1; the pipe is in good condition, but will be retrofit to permanently increase the water surface elevation through the culvert. Additional floodplain drainage pipes (two 24" HPDE) will also be added to provide a connection for floodplain drainage at the crossing. There is a section of limited riparian buffer both up and downstream of the driveway culvert where the stream flows near a residential structure. An overhead electric distribution line also runs approximately along the driveway from the main residential structure to the barns on the other side of RHB; this line will be relocated to ensure it remains outside of the conservation easement. A 60' easement exception has been included for the existing crossing and utility line, which will allow for sufficient area for line and culvert maintenance or improvements without affecting the protected riparian buffer.

Invasive species are not anticipated to be a problem at the project site. There are scattered individual plants, but not extensive areas where invasives have taken over the site. We also have not seen any evidence of beaver activity and do not expect beavers to be a factor in the site management. However, we will monitor the project for any of these elements that may arise as a threat to project success.

As part of the project, the site easement will also protect 0.24 acre of existing wetland. Wetlands 1 through 4 along RHB-1, T1, top of T2, and confluence of RHB-2 and T2 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. The table below summarizes the project goals and objectives that will lead to functional improvements and the monitoring tools that will be used to track these changes to the site.

5.0 MITIGATION PROJECT GOALS AND OBJECTIVES

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 C and B-type 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
		Physicochemical	Nutrient and Bacteria Reductions	Estimated Reductions based on Converted Land Use
	Plant the site with native trees and shrubs and an herbaceous seed mix.	Geomorphology/ Species Composition	Vegetation	Density
				Species Composition/Diversity

Table adapted from Harman et al 2012

6.0 DESIGN APPROACH AND MITIGATION WORK PLAN

Mitigation at the RHBRS will include: the realignment of the project streams to their relic floodplains or development of bankfull benches, exclusion of livestock, long-term protection of existing wetlands, and the establishment of a native riparian buffer.

The project will restore a total of 2,142 lf, which will generate 2,142 stream credits within the conservation easement. An overview map of the proposed mitigation is shown in Figure 8 and the project plan sheets are included in Appendix 1. Based on the deficiencies described above, a mitigation work plan has been developed to restore the project streams and achieve functional improvements. Mitigation will occur along RHB and its two tributaries. The majority of the project will be restored using a Priority I Approach to redevelop a natural planform and bring the streambed elevation up higher in connection with a floodplain. Limited areas (approximately 15%) will be implemented with a Priority 2 Approach due to existing site constraints: RHB in vicinity of the driveway crossing (Stations 16+47 to 17+93), the end of RHB as it ties out at the property line (Stations 25+25 to 26+32), T1 where the valley is constrained near the top (Stations 100+00 to 101+12), T1 near the driveway crossing (Stations 103+35 to 103+84), and T2 as it enters the site from a culvert (Stations 200+00 to 200+53). In these Priority 2 areas, 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.

The project streams were designed using a modified reference reach approach using three stable on-site cross-sections (see Section 6.6 and Appendix 2 for data). The common reference values from Harmon et al. 2012 were also used to adjust the design criteria as necessary to fit the existing site conditions.

Based on our analysis and design for the project, we would assign RHBRS a low level of risk in the path toward long-term stability and resilience following restoration implementation. As with other impaired stream systems, the determination of the bankfull field indicators presents a margin of uncertainty given the eroding bank features and adjusting channel conditions. However, the project streams have been designed with channels that will accommodate frequent out-of-bank events and allow room for adjustment. The sediment load from the watershed is low, with current fine sediment within the project reaches coming from localized bank erosion. Given the establishment of a diverse and well-vegetated riparian buffer, the project streams should be resilient enough to handle any slight modifications in stream discharge that may happen due to watershed development or climate change.

6.1 Round Hill Branch

RHB is the primary stream channel at the site and involves 1,509 lf of Restoration over three reaches. This stream has been channelized and largely disconnected from a floodplain and riparian buffer. In addition, remnant spoil piles along the upper half of the stream are blocking diffuse flow into the riparian area to allow treatment of agricultural runoff.

The first section, RHB Reach 1 (RHB-1), will involve the restoration of 670 lf. The reach begins shortly downstream of the property line where the stream enters the site. A Priority 1 approach will be used for the majority of the reach. The stream will be realigned through the valley bottom to create sinuosity and riffle-pool sequencing in the bedform. Realigning the stream in its proper position in the valley will eliminate bank erosion that is occurring presently as the RHB-1 widens and erodes its banks in an attempt to redevelop a pattern. The near-bank stress will also be reduced with a new pattern, as larger flow events will be reconnected to a floodplain instead of confined to a channelized reach. Woody habitat will be improved by installing a wood toe within the live lifts and woody debris within the in-stream cascade structures to increase aquatic habitat variability within the channel. Spoil materials that were stockpiled along the former channel will be regraded or removed to develop a reconnected floodplain and natural transition to the upper slopes. Just upstream of the confluence with T1, the design will transition to a Priority 2 approach to match the existing elevation of the driveway culvert that will remain in place. Livestock will be excluded from this reach of RHB.

RHB Reach 2 (RHB-2) begins at the confluence with T1 and will provide 555 lf of Restoration until the confluence with T2. A portion of the stream buffer immediately up and downstream of the driveway culvert will be excluded from the easement to allow for maintained streambank near a residence and power line easement. Following the driveway culvert, the design will begin transitioning back to a Priority 1 approach, similar to RHB-1 upstream. The stream will be reconnected to its historic floodplain with a new pattern with riffle and pool sequence.

After the confluence with T2, RHB Reach 3 (RHB-3) begins, which is a restoration reach of 284 lf until the end of the project site. The same design approach will continue as outlined for the upper reaches of RHB. At the bottom of the site, the project design takes into account existing bedrock in the stream while transitioning back into a Priority 2 approach for the tie-out of the reach to the downstream property.

6.2 Tributary 1

T1 (375 lf) will be restored using a Priority 1 approach along with limited areas of Priority 2 at its beginning and end. The design will remove a failing culvert and road crossing, restore a straightened channel to a natural stream pattern, reconnect the channel to an active floodplain along its length, remove spoil piles that are preventing diffuse flow through the riparian buffers, and improve and protect an existing wetland.

Near the beginning of the reach, a remnant culvert crossing and roadway that is a major blockage will be removed. The fill material placed for the former road will be taken away and the banks will be graded back to redevelop the design cross-section dimensions to allow full expansion of flow in this area. Downstream of the culvert removal, the restoration design will continue to redevelop the straightened channel into a more sinuous stream pattern to allow full integration with a floodplain and the riparian buffer. The restoration of this reach will also include improving and protecting an active seepage wetland coming in from the north. The banks of the seep will be sloped back to transition and distribute flow into a connected riparian zones. Downstream of the wetland, T1 will be restored by developed a riffle-pool sequence with a connected floodplain; similar to RHB, woody material will be incorporated into the structures to improve habitat variability.

6.3 Tributary 2

The restoration of T2 will be below the existing culvert crossing for 258 lf. The design will focus on redeveloping a single-thread channel with a new pattern with riffle-pool sequencing. A short section of Priority 2 restoration below the roadway culvert with transition to a Priority 1 approach that will follow a similar design method used for RHB and T1.

6.4 Crossings

There are two existing crossings that will be included as a part of the project, one on RHB-1 and the other just downstream of the confluence of RHB-1 and T1. The first on RHB-1 is an existing ford crossing, which will be improved with a riffle grade control to ensure long-term stability. The crossing will also be fenced to exclude livestock and opened only temporarily when the landowner will need access to the other side of the stream. A ford crossing is preferable to installing a new culverted crossing in this location, because the current floodplain is connected to the stream, and adding additional fill for a culverted crossing would create a floodplain impairment.

The second crossing on RHB-2 consists of an existing 60” corrugated metal pipe (CMP) driveway culvert, which is in stable condition. We have designed a proposed retrofit to the existing culvert to ensure a long-term hydrologic connection and improved floodplain connection. This will involve installing a boulder sill at the end of the culvert to back water up through the culvert; within the extent feasible during construction, rock material will be added within the bottom of the culvert. We will also install two 24” HPDE floodplain pipes along the right bank floodplain to provide additional capacity at higher flows. The left bank of the culvert is constrained with a power pole and parking area.

Both crossings are excluded from the conservation easement, which are shown on Figure 8. In addition to culverts within the project, both T1 and T2 enter the site from roadway culverts, which are in stable condition.

6.5 Fencing and Livestock Watering

Livestock exclusion fencing and gates will be installed to keep livestock out of the portions of the project adjacent to pasture (approximately half of the site). New fencing locations as needed are shown on the project plan sheets and will be constructed of woven wire built to NRCS standards. KCI will provide one well and two livestock drinkers for the sheep and goats on the property (see Figure 8) to provide water away from the stream.

6.6 Design Determination

KCI conducted bankfull verification by using three cross-sections on-site that had evident bankfull indicators (see Figure 7 for locations). The locally determined bankfull data were then compared to the North Carolina rural mountain regional curve estimates (Harman et al. 2000). The cross-sectional areas determined from the on-site indicators were found to trend lower than the rural mountain regional curve estimates. Based on our analysis, we used our local bankfull determination values to set our design cross-sectional area to match the site-specific conditions. Manning's equation was used to relate the field-determined bankfull calls to the discharge values shown below.

Table 7. Bankfull Determination

Cross-Section Location	Drainage Area (Acres)	Drainage Area (Sq. Miles)	NC Mountain Rural Regional Curve XS Area (sf)	Field-determined XS Area (sf)	Field Calculated Q (cfs)
RHB-1 XSD	304	0.48	13.1	6.2	26.4
RHB-2 XSF	401	0.63	15.8	7.1	35.5
T1 XSB	71	0.11	4.8	2.5	10.0

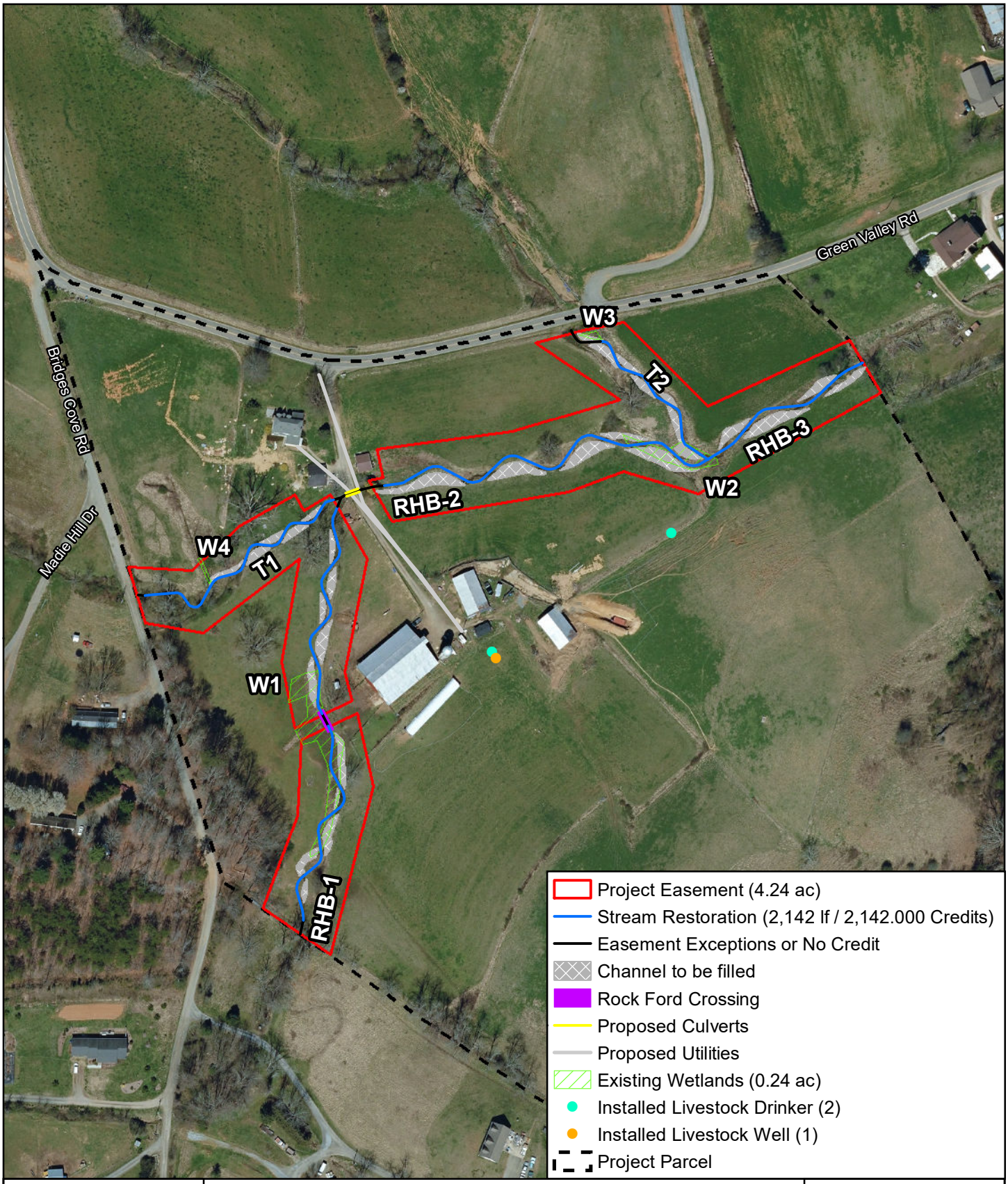


FIGURE 8. PROJECT ASSET MAP
ROUND HILL BRANCH RESTORATION SITE
BUNCOMBE COUNTY, NC

6.7 Sediment

In order to analyze the existing sediment conditions within the project stream, 11 pebble counts were completed across the site and 1 bulk sample was done on RHB Reach 2 for trend analysis. These data are provided in Appendix 2 and summarized in Table 8 below. The sediment sampling shows that the predominant sizes are in the coarse gravel range through the project streams. More impaired cross-sections, like RHB XS G along RHB-3, showed signs of finer materials as a result of localized bank erosion. Other sections, such as the reference cross-sections identified on XS D on RHB-1 and XS F on RHB-2, had similar ranges for their D50 and D84 classes in the coarse gravel range. These material sizes in the reference cross-sections are what are anticipated following construction. Bedrock does exist along isolated sections of RHB, but is not the predominant bed material. Based on the sampling and site observations, we anticipate RHB to have an active bed system with a low to moderate supply of incoming gravel moving through the project.

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). 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 the table below.

Table 8. Sediment Summary for Project Reaches

Reach	XS Type	XS ID	Avg Shear Stress (lb/sf)	Measured D50 (mm)	Measured D84 (mm)	Sample Type	Modif. Critical Shear Stress (lb/sf)	Predicted Grain Size Movement (mm)
RHB-1	Existing	RHB XSA	1.06	19	68	PC	0.441	
RHB-1	Existing	RHB XSB	1.09	3.3	58	PC	0.102	
RHB-1	Existing	RHB XSC	1.03	39	100	PC	0.871	
RHB-1	Existing	RHB XSD (Ref)	1.08	37	80	PC	0.785	
RHB-2	Existing	RHB XSE (Pool)	1.08	14	39	PC	0.282	
RHB-2	Existing	RHB XSF (Ref)	0.88	43	85	PC	0.888	
RHB-2	Existing	RHB XSF	0.88	43	85	Bulk Sample	0.796	
RHB-3	Existing	RHB XSG	0.72	1.3	17	PC	0.037	
T1	Existing	T1 XSA (Pool)	1.07	0.89	0.12	PC	0.001	
T1	Existing	T1 XSB (Ref)	0.51	19	31	PC	0.348	
T1	Existing	T1 XSC	1.16	9.2	34	PC	0.202	
T2	Existing	T2 XSA	2.02	0.62	0.62	PC	0.001	
RHB	Proposed	RHB-1	0.98	37	80	PC	0.785	76
RHB	Proposed	RHB-2	0.76	43	85	PC	0.888	58
RHB	Proposed	RHB-3	0.97	0.089	0.12	PC	0.001	75
T1	Proposed	T1	0.62	19	31	PC	0.348	47
T2	Proposed	T2	0.91	0.062	0.062	PC	0.001	71

Based on the calculated average channel boundary shear stress for the proposed channels, the stream will have adequate stream power to transport the existing D84 material during a bankfull event. We anticipate coarsening of certain areas of the project streams once bank erosion and other localized

sources of fine sediment are eliminated following project completion. However, since newly constructed streams may be susceptible to bed scour in the short-term, we will install riffle enhancements on all riffles not otherwise projected to prevent excessive scour in the immediate post-construction period. Proposed riffle enhancement structures have been designed with a mix of Class A and B stone topped 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 of the predicted average channel boundary stresses. The last column in Table 8 provides a predicted grain size that will move at the calculated modified critical shear stress for the proposed channel. The largest grain size predicted to be mobilized is 76 mm (1.7 inches). Given the mix of the constructed riffle, 106 mm equates to the midrange of the Class A Stone (approximately 4 in.). Additionally, our experience has revealed minimal movement of constructed riffle material when it is well mixed and placed in the stream bed in similar design conditions.

6.8 Morphological Essential Parameters Tables

Table 9. Morphological Essential Parameters for RHB Reach 1

Parameter	Existing Condition	Reference Condition	Proposed
Floodprone Belt Width (ft)	19 - 32	N/A	30 - 38
Contributing Drainage Area (acres)	307	N/A	307
Channel/Reach Classification	F4	C4/B4/B4c	C4
Design Discharge Width (ft)	5.2-6.8	N/A	9.8
Design Discharge Depth (ft)	0.9-1.2	N/A	0.8
Design Discharge Area (ft^2)	5.4-6.3	N/A	7.6
Design Discharge Velocity (ft/s)	4.2-5.2	N/A	5.1
Design Discharge (cfs)	26.4-29.5	N/A	39.2
Water Surface Slope	0.022	0.020	0.023
Sinuosity	1.07	1.1-1.2	1.1
Width/Depth Ratio	4.3-7.6	12-18	12.6
Bank Height Ratio	1.0-1.3	1.0	1.0
Entrenchment Ratio	4.4-11.7	1.4-2.2+	4.1 - 5.3
d16 / d35 / d50 / d84 / d95 / dip / disp (mm)	14/29/37/80/140/-0.05/2.4	Gravel	Gravel

Table 10. Morphological Essential Parameters for RHB Reach 2

Parameter	Existing Condition	Reference Condition	Proposed
Floodprone Belt Width (ft)	35	N/A	44 - 65
Contributing Drainage Area (acres)	403	N/A	403
Channel/Reach Classification	F4/E4	C4/B4/B4c	B4c/C4
Design Discharge Width (ft)	5.5	N/A	11.4
Design Discharge Depth (ft)	1.3	N/A	0.9
Design Discharge Area (ft^2)	7.1	N/A	10.2
Design Discharge Velocity (ft/s)	5.0	N/A	4.7
Design Discharge (cfs)	35.5	N/A	47.5
Water Surface Slope	0.02	0.020	0.14
Sinuosity	1.05	1.1-1.2	1.2
Width/Depth Ratio	4.2	12-18	12.8
Bank Height Ratio	1.0	1.0	1.0
Entrenchment Ratio	6.4	1.4-2.2+	3.9-5.7
d16 / d35 / d50 / d84 / d95 / dip / disp (mm)	10/29/43/85/130/-0.18/3.1	Gravel	Gravel

Table 11. Morphological Essential Parameters for RHB Reach 3

Parameter	Existing Condition	Reference Condition	Proposed
Floodprone Belt Width (ft)	29	N/A	38 - 55
Contributing Drainage Area (acres)	474	N/A	474
Channel/Reach Classification	F4/E4	C4/B4/B4c	C4/B4c
Design Discharge Width (ft)	11.5	N/A	11.8
Design Discharge Depth (ft)	0.8	N/A	0.9
Design Discharge Area (ft^2)	9.0	N/A	11.2
Design Discharge Velocity (ft/s)	4.7	N/A	5
Design Discharge (cfs)	42.7	N/A	55.6
Water Surface Slope	0.01	0.020	0.017
Sinuosity	1.12	1.1-1.2	N/A
Width/Depth Ratio	14.6	12-18	12.5
Bank Height Ratio	1.0	1.0	1.0
Entrenchment Ratio	2.6	1.4-2.2+	3.2 – 4.7
d16 / d35 / d50 / d84 / d95 / dip / disp (mm)	0.32/0.69/1.3/17.0/37/0.19/8.6	Gravel	Gravel

Table 12. Morphological Essential Parameters for T1

Parameter	Existing Condition	Reference Condition	Proposed
Floodprone Belt Width (ft)	9	N/A	35 - 45
Contributing Drainage Area (acres)	74	N/A	70
Channel/Reach Classification	F4	C4/B4/B4c	C4c
Design Discharge Width (ft)	3.8-4.1	N/A	6.8
Design Discharge Depth (ft)	0.7	N/A	0.5
Design Discharge Area (ft^2)	2.5-2.9	N/A	3.7
Design Discharge Velocity (ft/s)	3.5-4.0	N/A	3.9
Design Discharge (cfs)	10.0	N/A	14.2
Water Surface Slope	0.02	0.020	0.021
Sinuosity	1.10	1.1-1.2	1.13
Width/Depth Ratio	5.8-5.9	12-18	3.9
Bank Height Ratio	1.0-1.7	1.0	1.0
Entrenchment Ratio	1.9-7.9	1.4-2.2+	5.1 - 6.6
d16 / d35 / d50 / d84 / d95 / dip / disp (mm)	8.6/15/19/31/53/-0.9/1.9	Gravel	Gravel

Table 13. Morphological Essential Parameters for T2

Parameter	Existing Condition	Reference Condition	Proposed
Floodprone Belt Width (ft)	12	N/A	27 - 34
Contributing Drainage Area (acres)	74	N/A	74
Channel/Reach Classification	G4	N/A	B4/C4b
Design Discharge Width (ft)	9.7	N/A	6.4
Design Discharge Depth (ft)	0.3	N/A	0.5
Design Discharge Area (ft^2)	3.3	N/A	3.1
Design Discharge Velocity (ft/s)	3.1	N/A	4.6
Design Discharge (cfs)	10.3	N/A	14
Water Surface Slope	0.03	N/A	0.031
Sinuosity	1.06	N/A	1.13
Width/Depth Ratio	28.1	N/A	13.2
Bank Height Ratio	-0.2	N/A	1.0
Entrenchment Ratio	1.2	N/A	4.2 - 5.3
d16 / d35 / d50 / d84 / d95 / dip / disp (mm)	0.062/0.062/0.062/0.062/0.62/-/1.0	Gravel	Gravel

6.9 Planting

All unforested portions of the project easement will be planted to establish a forested riparian buffer. The target community type will most closely resemble a Montane Alluvial Forest (Small River Subtype) as described by Schafale (2012) albeit on a lower order stream. This community type is found on the smaller spectrum of alluvial systems in the North Carolina Mountains. While the riparian forests at RHBRS may be on a smaller scale than that described in Schafale, the species are expected to have a similar composition and distribution. The existing vegetation at the project site consists of primarily pasture grasses aside from isolated trees on the tops of banks along the upper portions of T1 and RHB-1.

The planting plan is shown in Figure 9 as well as 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 3.68 acres to achieve a mature survivability of 210 stems per acre after seven years. Woody vegetation planting will be conducted during dormancy (growing season ends November 8th) and will occur before March 15. Species to be planted may consist of the following shown in two separate zones. The existing jurisdictional wetlands will be planted with species from the Zone 1 list.

Table 14. 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
	Sweet Birch	*Betula lenta*	FACU
	Bitternut Hickory	*Carya cordiformis*	FACU
	Pignut Hickory	*Carya glabra*	FACU
	Tulip Poplar	*Liriodendron tulipifera*	FACU
	American Sycamore	*Platanus occidentalis*	FACW
	White Oak	*Querca alba*	FACU
	Southern Red Oak	*Quercus falcata*	FACU
	Chestnut Oak	*Quercus montana*	UPL
	Northern Red Oak	*Quercus rubra*	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

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.

6.10 Project Assets

The tables below outline the anticipated project assets that will be produced from the RHBRS project and are shown in Figure 8. A buffer analysis was completed to ensure that the site complies with required buffer widths; stream with limited buffer widths, such as at the top of the site and at the driveway crossing, are not being claimed for credit, and are described in Table 15.

Table 15. Project Asset Table

Project Component -or- Reach ID	Existing Footage/ Acreage	Stationing	Restoration Footage or Acreage	Creditable Footage or Acreage	Restoration Level	Approach Priority Level	Mitigation Ratio (X:1)	Mitigation Credits	Notes/Comments
RHB Reach 1	691	10+21 to 17+26	705	670	Restoration	I/II	1 : 1	670.000	Crediting at top begins at full 30'-width buffer; 20' exception for crossing STA 13+51 to 13+71; exception at crossing STA 17+11 to 17+26
RHB Reach 2	575	17+26 to 23+48	622	555	Restoration	I	1 : 1	555.000	No credit (limited widths/crossing) from STA 17+26 to 17+92
RHB Reach 3	317	23+48 to 26+32	284	284	Restoration	I/II	1 : 1	284.000	
T1	383	100+09 to 103+97	387	375	Restoration	I	1 : 1	375.000	Crediting begins at full 30'-width buffer; no credit at crossing from STA 103+84 to 103+97
T2	245	200+53 to 203+11	258	258	Restoration	I/II	1 : 1	258.000	Crediting begins at full 30'-width buffer

Table 16. Length and Summations by Mitigation Category

Restoration Level	Stream (linear feet)	Riparian Wetland (acres)		Non-riparian Wetland (acres)	Buffer (square feet)
		Riverine	Non-Riverine		
Restoration	2,142				
Enhancement					
Enhancement I					
Enhancement II					
Creation					
Preservation					
High Quality Preservation					

Table 17. Overall Assets Summary

Round Hill Branch Restoration Site (Project ID - 100066)	
Overall Assets Summary	
Asset Category	**Overall Credits**
Stream	2,142.000
RP Wetland	
NR Wetland	
Buffer	

7.0 PERFORMANCE STANDARDS

Monitoring of the RHBRS shall occur for a minimum of seven years following construction. The following performance standards for stream mitigation are conform to 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 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. Volunteers must be present for a minimum of two growing seasons before being included performance standards in Year 5 and Year 7. For any volunteer tree stem to count toward vegetative success, it must be a species from those listed in Section 6.9 from the planting zones. 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 within the seven-year monitoring period for the project streams. These bankfull events must occur in separate monitoring years. Bankfull events will be verified using an automatic stream monitoring gauge on RHB-2 to record daily stream depth readings. The intermittent project streams (T1 and T2) must also show a minimum of 30 continuous flow days within each calendar year (assuming normal precipitation); Round Hill Branch, a perennial stream, is 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."

Stream Geomorphology Performance

The site's geomorphology for all reaches will be monitored per the NCIRT 2016 monitoring guidelines. The bank height ratio (BHR) should not exceed 1.2 and the entrenchment ratio (ER) must not fall below 2.2 for C and E channels. 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 RHBRS 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. 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 six 0.02-acre square or rectangular plots within the planted stream

buffer. Three plots will be permanently installed, while the other three 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 one automatic stream monitoring gauge on RHB-2. Additional gauges and/or recording devices such as a camera (set to record a photo or video a minimum of once per day) will be installed at the tops of T1 and T2 to document the presence of flow.

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.

Dimension

Ten permanent cross-sections (5 riffles and 5 pools) will be established throughout the site to capture each reach that is being either restored. The distribution of the cross-sections is as follows and as shown on Figure 10: RHB-1 (1 riffle and 1 pool), RHB-2 (1 riffle and 1 pool), RHB-3 (1 riffle and 1 pool), T1 (1 riffle and 1 pool), T2 (1 riffle and 1 pool). 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.

Profile

Detailed longitudinal profile will be conducted along the lengths of all restoration reaches 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.

Wetland Delineation
A wetland delineation will be completed during the fifth year of project monitoring to ensure the existing on-site wetlands described in Section 3.1.3 have not been reduced due to the project. KCI will conduct a delineation of wetlands in accordance with methodologies outlined in the U.S. Army Corps of Engineers Wetland Delineation Manual (Environmental Laboratory, 1987) and the regional supplement.

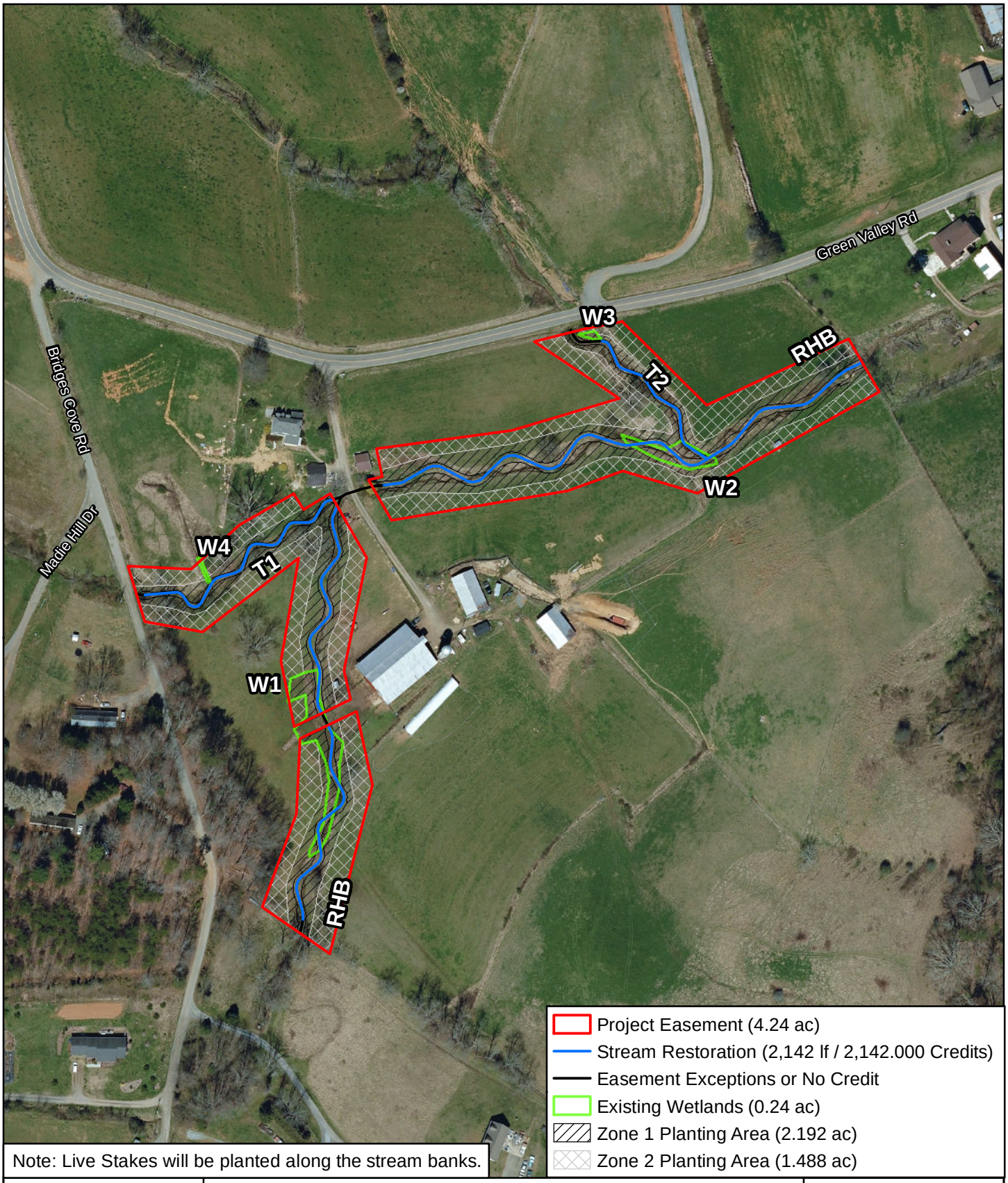
Visual Assessment
An annual site walk will be conducted at the end of each monitoring period to document any problem areas. Specific problem areas that could arise include excessive bank erosion, bed deposition or aggradation, problems with the installed structures, or sparse vegetative cover. The findings of the visual assessment as well as any recommended corrective actions for problem areas will be summarized in the monitoring reports by way of a Current Conditions Plan View (CCPV) figure.

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.

Reporting
Annual monitoring data will be reported using the most current DMS monitoring template from June 2017. 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 after completion of construction. Full monitoring reports will be completed in Years 1, 2, 3, 5, and 7. Limited monitoring reports (CCPV, photos, stream gauge data, and site narrative) will be submitted in Years 4 and 6.

Table 18. Monitoring Requirements

Round Hill Branch Restoration Site				
Required	**Parameter**	**Quantity**	**Frequency**	**Notes**
Yes	Pattern and Profile	2,142 lf (all restoration reaches)	Once, during as-built survey	Additional measurements in later years may be taken as necessary.
Yes	Stream Dimension	10 cross-sections (5 riffles, 5 pools)	Monitoring Years 1, 2, 3, 5, and 7	
Yes	Stream Hydrology	1 pressure transducer gauge; 2 other gauges or cameras on T1 and T2 for flow documentation	Annual – throughout year	1 pressure transducer on RHC-2
Yes	Wetland Extents	1 wetland delineation	Monitoring Year 5	Delineate existing on-site wetlands during the fifth year of monitoring to ensure no loss of wetland due to stream restoration.
Yes	Vegetation	6 vegetation monitoring plots	Monitoring Years 1, 2, 3, 5, and 7	3 permanently fixed, 3 randomly located each monitoring visit
Yes	Exotic and nuisance vegetation		Annual	Locations of invasive vegetation will be mapped
Yes	Project boundary		Semi-annual	Locations of vegetation damage, boundary encroachments, etc. will be mapped



Note: Live Stakes will be planted along the stream banks.

0 100 200 Feet

FIGURE 9. PROPOSED PLANTING PLAN
ROUND HILL BRANCH RESTORATION SITE
BUNCOMBE COUNTY, NC

Image Source: NC OneMap 2019 Orthoimagery.

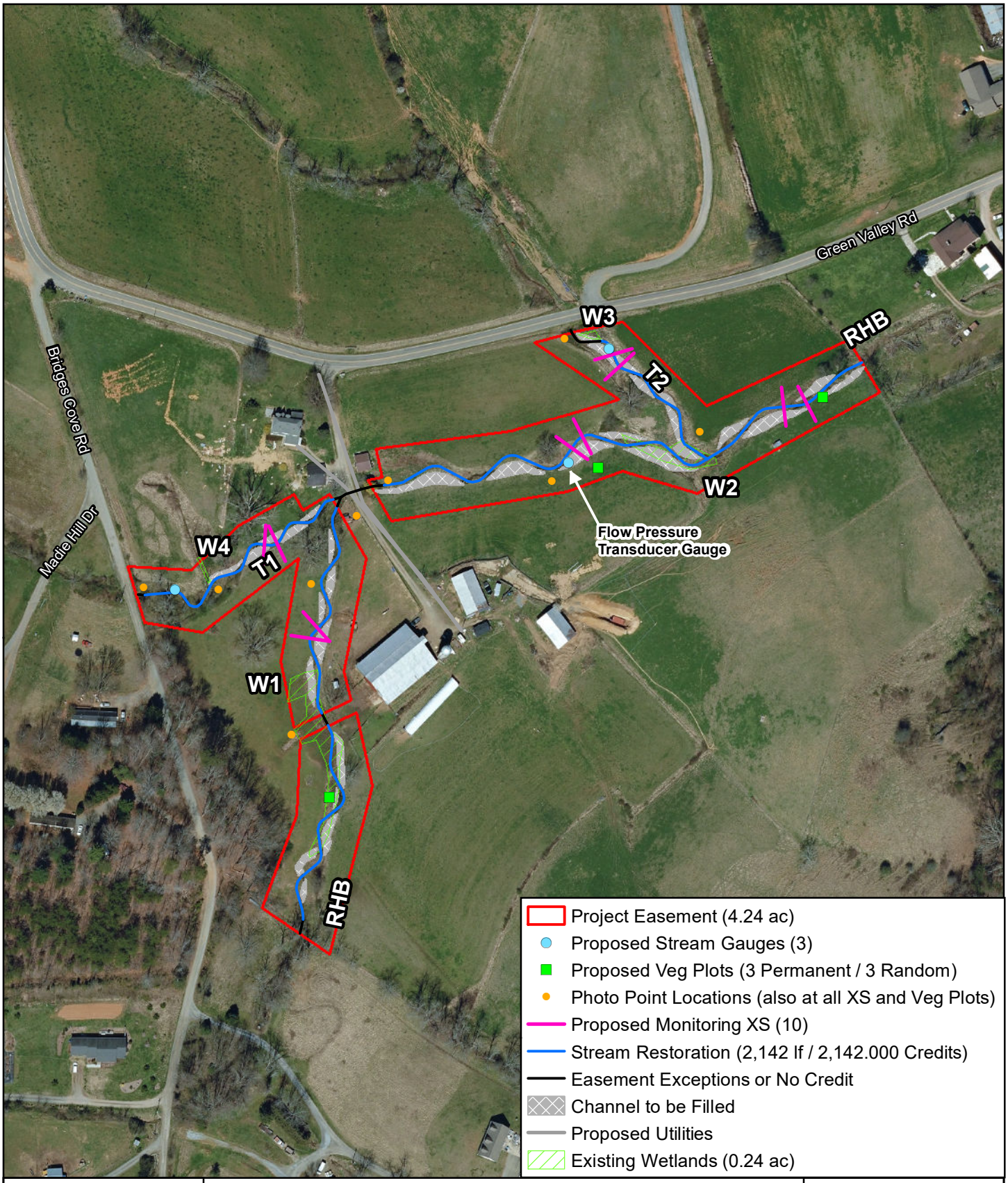


FIGURE 10. PROPOSED MONITORING PLAN
ROUND HILL BRANCH RESTORATION SITE
BUNCOMBE COUNTY, NC

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. The Maintenance Plan in Appendix 6 covers the anticipated items that may require maintenance and/or adaptive management.

10.0 LONG-TERM MANAGEMENT PLAN

The site will be transferred to the NCDEQ Stewardship Program. This party shall serve as conservation easement holder and long-term steward for the property and will conduct 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 the owner of the underlying fee to maintain.

11.0 REFERENCES CITED

Griffith, G., J. Omernik, and J. Comstock. 2002. Ecoregions of North Carolina, Regional Descriptions. US E.P.A. Last accessed at: https://www.epa.gov/eco-research/ecoregion-download-files-state-region-4#pane-31

Harman, W.A., D.E. Wise, M.A. Walker, R. Morris, M. A. Cantrell, M. Clemmons, G.D. Jennings, D. Clinton, and J. Patterson. 2000. Bankfull Regional Curves for North Carolina Mountain Streams. In: Kane, D.L. (Ed.). Proc. AWRA Conf. Water Resources in Extreme Environments, Anchorage, AK. Pp. 185-190.

Harman, W. and R. Starr. 2011. Natural Channel Design Review Checklist. US Fish and Wildlife Service, Chesapeake Bay Field Office, Annapolis, MD and US Environmental Protection Agency, Office of Wetlands, Oceans, and Watersheds, Wetlands Division. Washington, D.C. EPA 843-B-12-005

Harman, W., R. Starr, M. Carter, K. Tweedy, M. Clemmons, K. Suggs, C. Miller. 2012. A Function-Based Framework for Stream Assessment and Restoration Projects. US Environmental Protection Agency, Office of Wetlands, Oceans, and Watersheds, Washington, DC EPA 843-K-12-006.

Harrelson, C.C., C.L. Rawlins, and J.P. Potyondy. 1994. Stream Channel Reference Sites: an Illustrated Guide to Field Technique. Gen. Tech. Rep. RM-245. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Forest and Range Experiment Station.

NCDEQ, Division of Mitigation Services. 2016. Quantifying Benefits to Water Quality from Livestock Exclusion and Riparian Buffer Establishment for Stream Restoration. Last accessed at: https://files.nc.gov/ncdeq/Mitigation%20Services/Document%20Management%20Library/Guidance%20and%20Template%20Documents/Estimates%20for%20nutrient%20and%20FC%20reductions_June15_2016.pdf

NCDEQ, Division of Mitigation Services. 2017. Annual Monitoring Report Format, Data Requirements, and Content Guidance. Last accessed at: https://files.nc.gov/ncdeq/Mitigation%20Services/Document%20Management%20Library/Guidance%20and%20Template%20Documents/13_DMS_Mon_Rep_Templ_June_2017.pdf

NCDEQ, Division of Water Resources. 2018 Final 303(d) list. Raleigh, NC. Last accessed at: https://files.nc.gov/ncdeq/Water%20Quality/Planning/TMDL/303d/2018/2018-NC-303-d--List-Final.pdf

NCDEQ, Division of Water Resources. 2018. Surface Water Classification. Last accessed at: http://deq.nc.gov/about/divisions/water-resources/planning/classification-standards/classifications

NCDENR, Division of Water Quality. 2005. Total Maximum Daily Loads for Fecal Coliform for Newfound Creek, North Carolina, Waterbody ID NC_6-84b, Waterbody ID NC_6-84c, and Waterbody ID NC_6-84d. Last accessed at: https://files.nc.gov/ncdeq/Water%20Quality/Planning/TMDL/FINAL%20TMDLS/French%20Broad/NewfoundCreekApprovedFCTMDL.pdf

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

Rosgen, D.L. 1994. A Classification of Natural Rivers. Catena 22: 169-199.

Rosgen, D. 1996. Applied River Morphology. Wildland Hydrology. Pagosa Springs, Colorado.

Schafale, M.P. 2012. Guide to the Natural Communities of North Carolina, Fourth Approximation. North Carolina Natural Heritage Program, Department of Environment and Natural Resources. Last accessed at: https://files.nc.gov/dncr-nhp/documents/files/Natural-Community-Classification-Fourth-Approximation-2012.pdf

Shields, FD Jr, RR Copeland, PC Klingeman, MW Doyle, and A Simon. 2003. Design for Stream Restoration. Journal of Hydraulic Engineering 129 (8), 575-584.

Shields, Ing. A., W. P. Ott, and J. C. Van Uchelen. 1936. Application of Similarity Principles and Turbulence Research to Bed-load Movement. Pasadena, CA: Soil Conservation Service, California Institute of Technology.

Simon, Andrew and Massimo Rinaldi. 2006. Disturbance, stream incision, and channel evolution: The roles of excess transport capacity and boundary materials in controlling channel response. Geomorphology, Volume 79, Issue 3-4, p. 361-383.

Stream Mitigation Guidelines, April 2003, US Army Corps of Engineers Wilmington District.

USDA, Forest Service, National Technology and Development Program. 2008. Stream Simulation: An Ecological Approach to Providing Passage for Aquatic Organisms at Road-Stream Crossings. Appendix E: Methods for Streambed Mobility/Stability Analysis. Last accessed 9/2016 at: http://www.fs.fed.us/eng/pubs/pdf/StreamSimulation/

USDA, Natural Resources Conservation Service. 2020. Web Soil Survey. Last accessed at: http://websoilsurvey.sc.egov.usda.gov/App/WebSoilSurvey.aspx

USGS. 2020. Geologic Units by Geographic Area, Buncombe County, North Carolina. https://mrdata.usgs.gov/geology/state/geog-units.html

APPENDICES

1. Plan Sheets

KCI JOB# : 161802916

CONTRACT #: 7534

NCDEQ DIVISION OF MITIGATION SERVICES

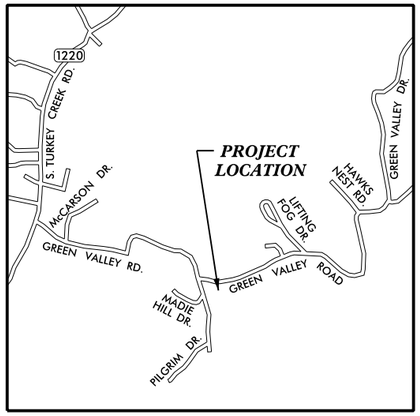
STATE	CONTRACT NUMBER	SHEET NO.	TOTAL SHEETS
N.C.	7534	1	19

REVISIONS		

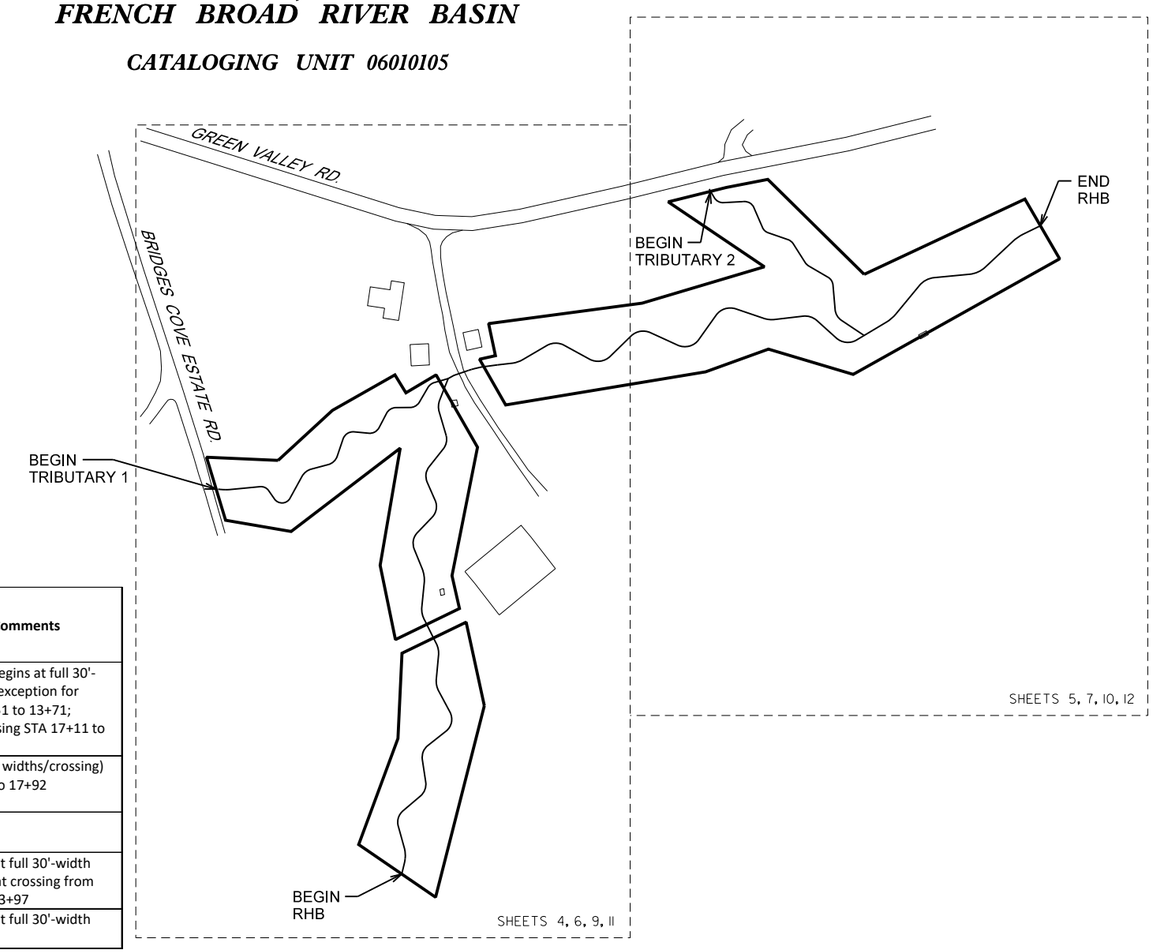
ROUND HILL BRANCH RESTORATION SITE

BUNCOMBE COUNTY, NORTH CAROLINA
FRENCH BROAD RIVER BASIN

CATALOGING UNIT 06010105



VICINITY MAP
NOT TO SCALE



Project Component -or- Reach ID	Existing Footage/ Acreage	Stationing	Restoration Footage or Acreage	Creditable Footage or Acreage	Restoration Level	Approach Priority Level	Mitigation Ratio (X:1)	Mitigation Credits	Notes/Comments
RHB Reach 1	691	10+21 to 17+26	705	670	R	I/II	1 : 1	670	Crediting at top begins at full 30'-width buffer; 20' exception for crossing STA 13+51 to 13+71; exception at crossing STA 17+11 to 17+26
RHB Reach 2	575	17+26 to 23+48	622	555	R	I	1 : 1	555	No credit (limited widths/crossing) from STA 17+26 to 17+92
RHB Reach 3	317	23+48 to 26+32	284	284	R	I/II	1 : 1	284	
T1	383	100+09 to 103+97	387	375	R	I	1 : 1	375	Crediting begins at full 30'-width buffer; no credit at crossing from STA 103+84 to 103+97
T2	248	200+53 to 203+11	258	258	R	I/II	1 : 1	258	Crediting begins at full 30'-width buffer

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. TAKE RABBIT HAM ROAD TO GREEN VALLEY ROAD. THE STREAM PROJECT ENTRANCE WILL BE ON ON THE LEFT AT 588 GREEN VALLEY ROAD, LEICESTER, NC 28748.

INDEX OF SHEETS

TOTAL DISTURBED AREA = 4.47 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:

MATTHEW REID
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

10-28-2020
SIGNATURE: *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.

CONTROL POINTS:

DESC.	NORTHING	EASTING	ELEV.
GPS 1	705359.06	890136.60	2171.12
GPS 2	705212.26	889485.47	2182.58
GPS 3	705368.42	888964.71	2218.47
GPS 4	704925.08	889131.44	2178.10
KCI # 200	705185.20	890235.08	2155.38
KCI # 201	705017.64	889840.76	2163.21
KC1 # 202	705060.21	889494.48	2169.86
KCI#500A	704939.49	889407.65	2169.87
KCI#501	704959.15	889308.46	2171.35
KCI#500	704939.48	889407.66	2169.86
KCI#503	704528.44	889427.22	2181.21
KCI#504	704434.43	889386.61	2184.71
KCI#550	704919.78	889225.81	2174.17
KCI#551	704493.12	889284.02	2219.89
KCI#552	704924.97	889131.34	2178.09
KCI#553	705368.40	888964.62	2218.43

PROJECT LEGEND:

Proposed Thalweg w/Approximate Bankfull Limits ..... 12+00 13+00

Proposed Riffle Enhancement .....

Proposed Riffle Grade Control .....

Proposed Cascade Structure .....

Proposed Step Pool .....

Proposed Live Lift .....

Floodplain Grading Extents .....

Existing Channel to be Filled .....

Minor Contour Line (1ft.) .....

Major Contour Line (5ft.) 720

NORTH CAROLINA PROFESSIONAL SEAL 040899 ENGINEER KRISTIN E. KNIGHT

10-28-2020

REVISIONS

DATE	DESCRIPTION	SYM.

NCDEQ – DIVISION OF MITIGATION SERVICES

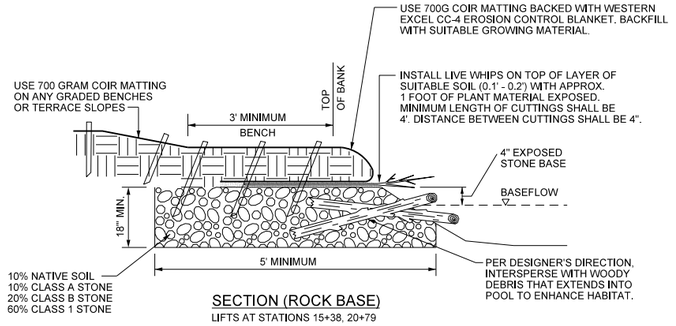
KCI ASSOCIATES OF NC
ENGINEERS • PLANNERS • SCIENTISTS
4505 FALLS OF NEUSE ROAD, SUITE 400
RALEIGH, NORTH CAROLINA 27609

ROUND HILL BRANCH RESTORATION SITE

BUNCOMBE COUNTY, NORTH CAROLINA

DATE: OCTOBER 2020
SCALE: N.T.S.

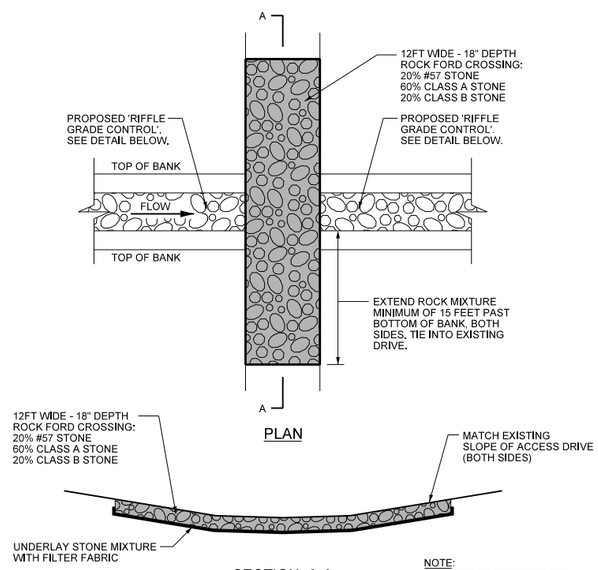
GENERAL NOTES & PROJECT LEGEND



LIVE LIFT
SCALE: NTS

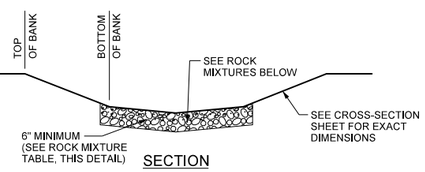
NOTES:

USE 1.5'x1"x2" WOODEN STAKES ON 2' CENTERS. STAKES SHALL HAVE A 'ROOFING' NAIL AT TOP TO KEEP FABRIC FROM SLIPPING OFF.



NOTE:
TOP 4" OF ROCK MIXTURE SHALL BE FINISHED WITH A COMBINATION OF CABC STONE AND NATIVE BED MATERIAL TO ENSURE THAT A SMOOTH, TAMPED SURFACE.

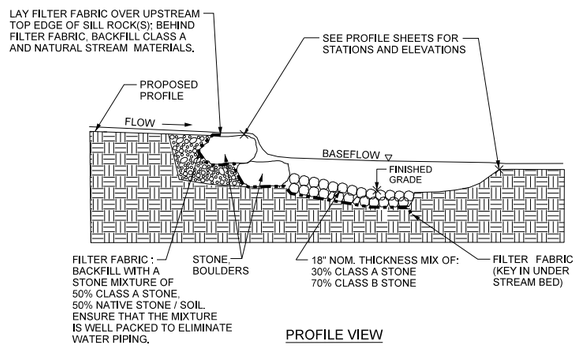
ROCK FORD CROSSING
SCALE: NTS

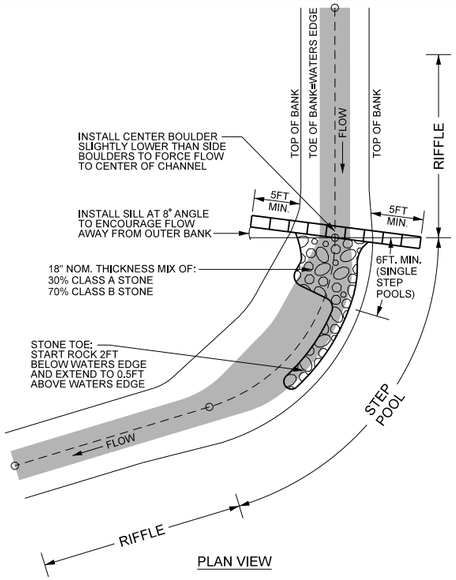


ROCK MIXTURES			
REACH	CLASS A	CLASS B	NATIVE SOIL
T1	50%	40%	10%
T2	50%	40%	10%
RHB-xsA	40%	50%	10%
RHB-xsB	40%	50%	10%
RHB-xsC	40%	50%	10%

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.

RIFFLE ENHANCEMENT
SCALE: NTS





NOTES:

FOR DOUBLE STEP POOLS, CONTINUE ROCK MIXTURE FROM FIRST SILL ALL THE WAY TO THE SECOND SILL. DO NOT STOP AT THE 6FT MINIMUM AS SHOWN IN THE SINGLE STEP POOL PLAN VIEW.

BOULDERS SHOULD BE NATIVE STONES OR SHOT ROCK, ANGULAR AND OBLONG, WITH AN AXIS APPROXIMATELY 3' L x 2' W x 1.5' D.

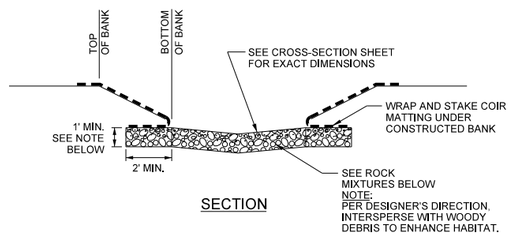
BOULDER SILLS TO EXTEND 5' MINIMUM INTO STREAM BANKS FOR STEP POOL STRUCTURES.

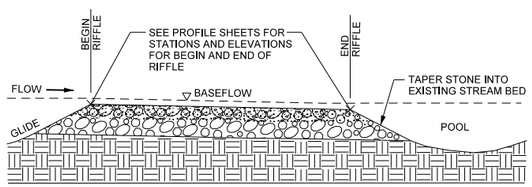
STONE INSTALLATION: START BY INSTALLING STONE MIXTURE. THEN ADD SURGE STONE TO FILL IN VOIDS. FINISH BY WASHING IN NATURAL STREAM MATERIAL TO OBTAIN FINAL GRADE.

IF APPROVED BY DESIGNER, BOULDER SILLS CAN BE REPLACED WITH LIVE HARDWOOD LOGS FOUND ON SITE. LOGS MUST BE A MINIMUM OF 10" DIAMETER AND STACKED IN A TRIANGLE FORMATION. NAIL (ROOFERS NAIL OR NAIL WITH WASHER) FILTER FABRIC TO THE TOP LOG AND CONTINUE DOWN AND UNDER STRUCTURE AS SHOWN ON STEP POOL DETAIL.

LOG SILL

STEP POOL
SCALE: NTS





ROCK MIXTURES			
REACH	CLASS A	CLASS B	NATIVE SOIL
T1	50%	40%	10%
T2	50%	40%	10%
RHB-xsA	40%	50%	10%
RHB-xsB	40%	50%	10%
RHB-xsC	40%	50%	10%

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.

RIFFLE GRADE CONTROL
SCALE: NTS

NORTH CAROLINA PROFESSIONAL SEAL 040899 ENGINEER KRISTIN E. KNIGHT

10-28-2020

DATE	DESCRIPTION	SYM.
	REVISIONS	

NCDEQ – DIVISION OF MITIGATION SERVICES

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

ROUND HILL BRANCH RESTORATION SITE
BUNCOMBE COUNTY, NORTH CAROLINA

DATE: OCTOBER 2020
SCALE: N.T.S.

DETAILS

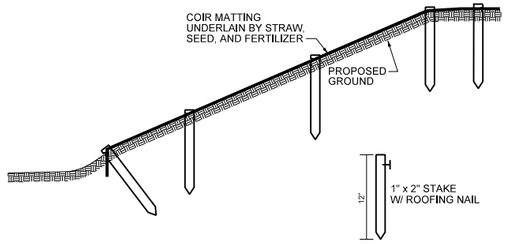
SHEET 3 OF 19

NOTES:

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

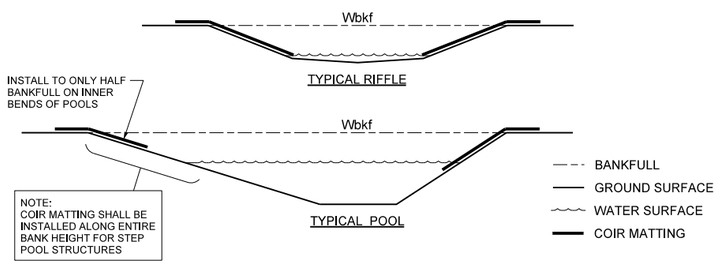
-MATTING SHALL BE INSTALLED ALONG BOTH SIDES OF NEW STREAM LENGTH.

-MATTING SHALL EXTEND FROM TOE OF SLOPE TO THE TOP OF BANK.



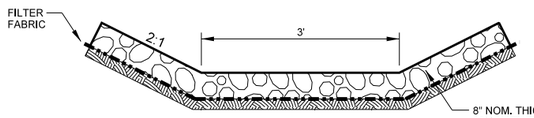
COIR MATTING

SCALE: NTS



EXAMPLE COIR MATTING PLACEMENT

SCALE: NTS

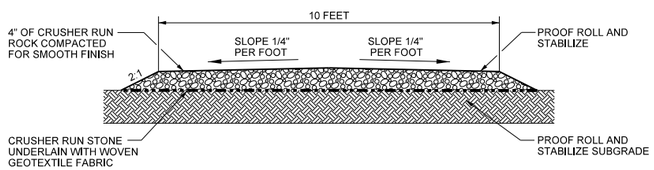


STONE INSTALLATION:

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.

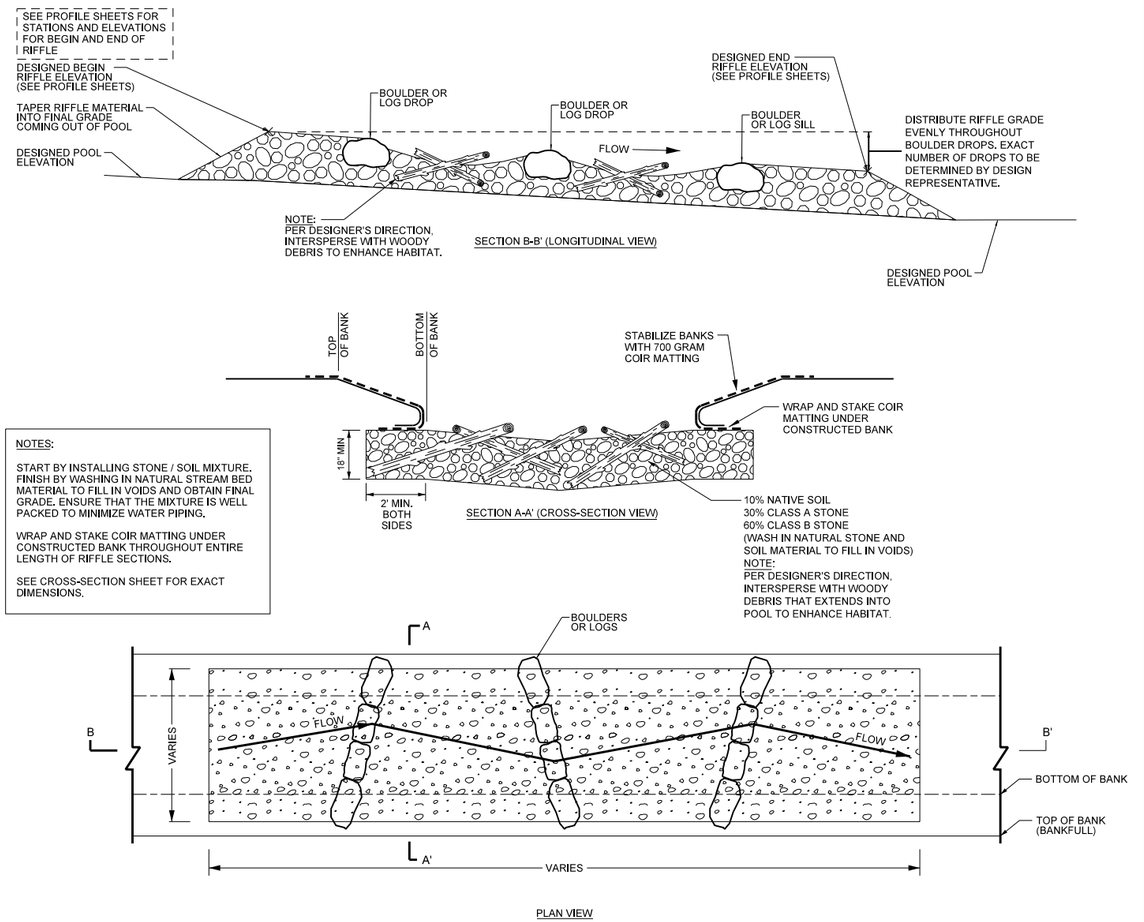
STABILIZED ROCK OUTLET

SCALE: NTS



STABILIZED ACCESS DRIVE

SCALE: NTS



NOTES:

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.

WRAP AND STAKE COIR MATTING UNDER CONSTRUCTED BANK THROUGHOUT ENTIRE LENGTH OF RIFFLE SECTIONS.

SEE CROSS-SECTION SHEET FOR EXACT DIMENSIONS.

CASCADE STRUCTURE

SCALE: NTS

NORTH CAROLINA PROFESSIONAL SEAL 040899 ENGINEER KRISTIN E. KNIGHT

10-28-2020

DATE	DESCRIPTION
	REVISIONS
	SYM.

NCDEQ – DIVISION OF MITIGATION SERVICES

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

ROUND HILL BRANCH RESTORATION SITE

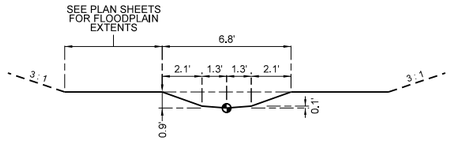
BUNCOMBE COUNTY, NORTH CAROLINA

DATE: OCTOBER 2020

SCALE: N.T.S.

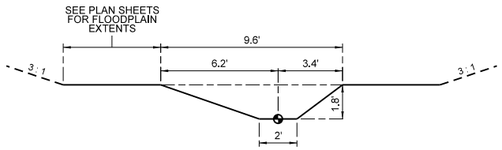
DETAILS

REACH : T1 - STATION 100+00 TO 103+97
"C4" STREAM TYPE

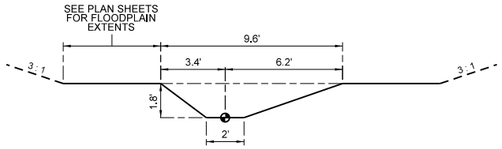


TYPICAL RIFFLE

= THALWEG LOCATION

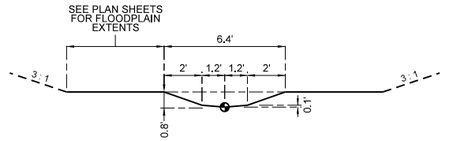


TYPICAL POOL - RIGHT MEANDER



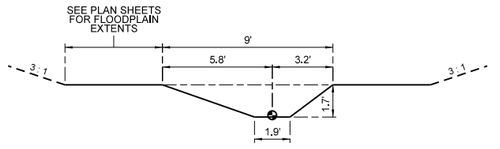
TYPICAL POOL - LEFT MEANDER

REACH : T2 - STATION 200+00 TO 203+11
"C4" STREAM TYPE

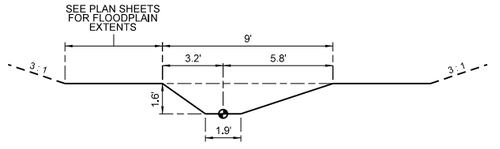


TYPICAL RIFFLE

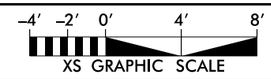
= THALWEG LOCATION

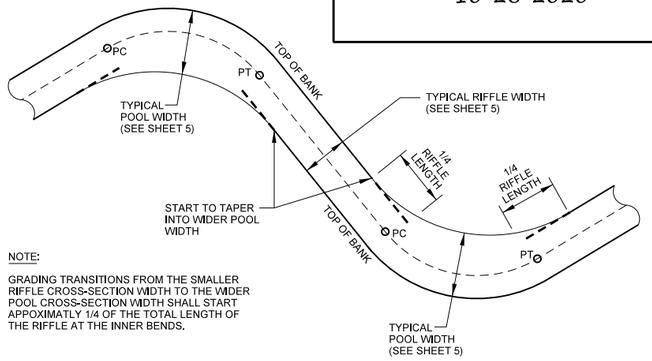


TYPICAL POOL - RIGHT MEANDER



TYPICAL POOL - LEFT MEANDER





NOTE:

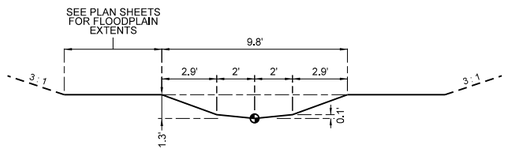
GRADING TRANSITIONS FROM THE SMALLER RIFFLE CROSS-SECTION WIDTH TO THE WIDER POOL CROSS-SECTION WIDTH SHALL START APPOXIMATLY 1/4 OF THE TOTAL LENGTH OF THE RIFFLE AT THE INNER BENDS.

TYPICAL RIFFLE-POOL TRANSITION GUIDANCE

NOT TO SCALE

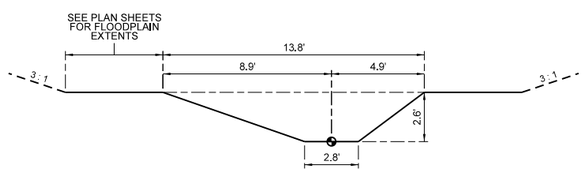
10-28-2020

RHB-REACH 1 - STATION 10+00 TO 17+26
"C4" STREAM TYPE

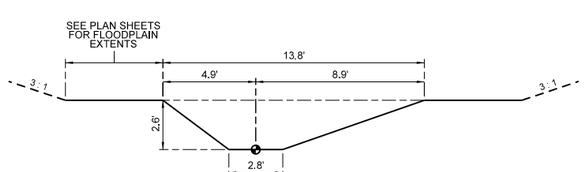


TYPICAL RIFFLE

= THALWEG LOCATION

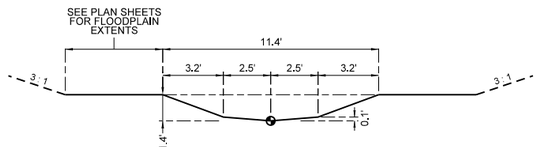


TYPICAL POOL - RIGHT MEANDER



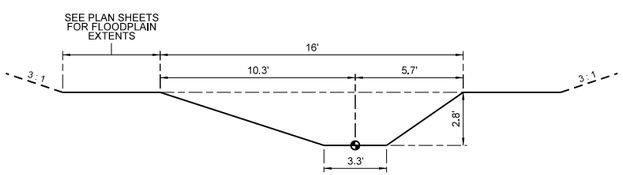
TYPICAL POOL - LEFT MEANDER

RHB-REACH 2 - STATION 17+26 TO 23+48
"C4" STREAM TYPE

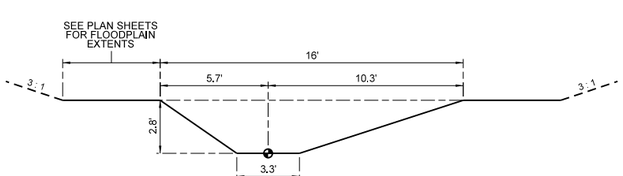


TYPICAL RIFFLE

= THALWEG LOCATION

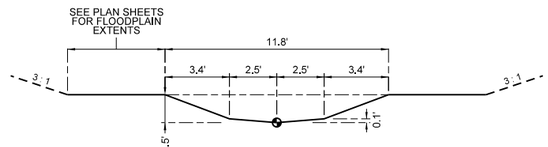


TYPICAL POOL - RIGHT MEANDER



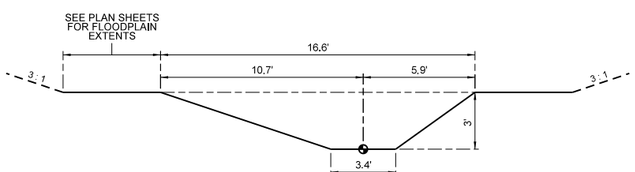
TYPICAL POOL - LEFT MEANDER

RHB-REACH 3 - STATION 23+48 TO 26+32
"C4" STREAM TYPE

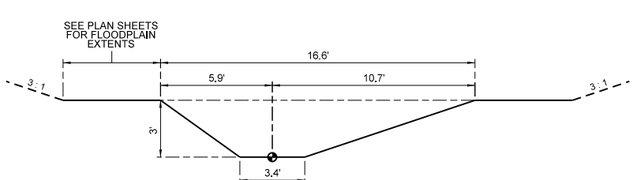


TYPICAL RIFFLE

= THALWEG LOCATION



TYPICAL POOL - RIGHT MEANDER



TYPICAL POOL - LEFT MEANDER

NO.	DESCRIPTION	DATE
	REVISIONS	

NCDEQ – DIVISION OF MITIGATION SERVICES

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

ROUND HILL BRANCH
RESTORATION SITE
BUNCOMBE COUNTY, NORTH CAROLINA

DATE: OCTOBER 2020
SCALE: SEE SHEET

TYPICAL CROSS-SECTIONS

NC GRID
NAD '83

–40′ –20′ 0′ 40′ 80′

GRAPHIC SCALE

BEGIN TRIBUTARY 1

BRIDGES COVE ESTATE RD.

EXISTING 18" CMP CULVERT TO BE REMOVED

100+00

PROPOSED PLUNGE POOL. COORDINATE WITH DESIGN REPRESENTATIVE TO INSTALL OVER-WIDENED BANKS IN THIS AREA.

101+00

STABILIZE INCOMING DRAINAGE WITH ROCK OUTLET. SEE DETAIL SHEET.

EXISTING WETLAND 'W4'

EXISTING TREES TO REMAIN. TYPICAL ALL "●"

102+00

CONSERVATION EASEMENT

103+00

PROPOSED 'RIFFLE GRADE CONTROL' / 'ROCK FORD'. SEE DETAIL SHEET.

PROPOSED 'LIVE LIFT'. SEE DETAIL SHEET.

BEGIN RHB

10+00

EXISTING WETLAND 'W1'

11+00

12+00

13+00

14+00

15+00

16+00

HOUSE

HOUSE

INSTALL CLASS 1 / B STONE MIXTURE CULVERT PROTECTION

GRAVEL ACCESS DRIVE

GREEN VALLEY RD.

17+00

SHED

18+00

CONSERVATION EASEMENT

19+00

20+00

PROPOSED 'STEP POOL'. SEE DETAIL SHEET.

PROPOSED 'CASCADE RIFFLE'. SEE DETAIL SHEET.

PROPOSED 'RIFFLE ENHANCEMENT'. SEE DETAIL SHEET.

EXISTING CHICKEN COOPS TO BE REMOVED

BARN

INSTALL (2) 24" DIA. x 24' HDPE FLOODPLAIN CULVERT

EXISTING PLUNGE POOL BANKS TO REMAIN AS-IS

FILL EXISTING CHANNEL (TYPICAL ALL HATCHING)

PROPOSED FLOODPLAIN GRADING EXTENTS

PROPOSED 'RIFFLE GRADE CONTROL'. SEE DETAIL SHEET.

MATCHLINE - SEE SHEET 7

NORTH CAROLINA PROFESSIONAL SEAL 040899 ENGINEER KRISTIN E. KNIGHT

10-28-2020

NO.	DESCRIPTION	DATE
	REVISIONS	

NCDEQ – DIVISION OF MITIGATION SERVICES

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

ROUND HILL BRANCH RESTORATION SITE

BUNCOMBE COUNTY, NORTH CAROLINA

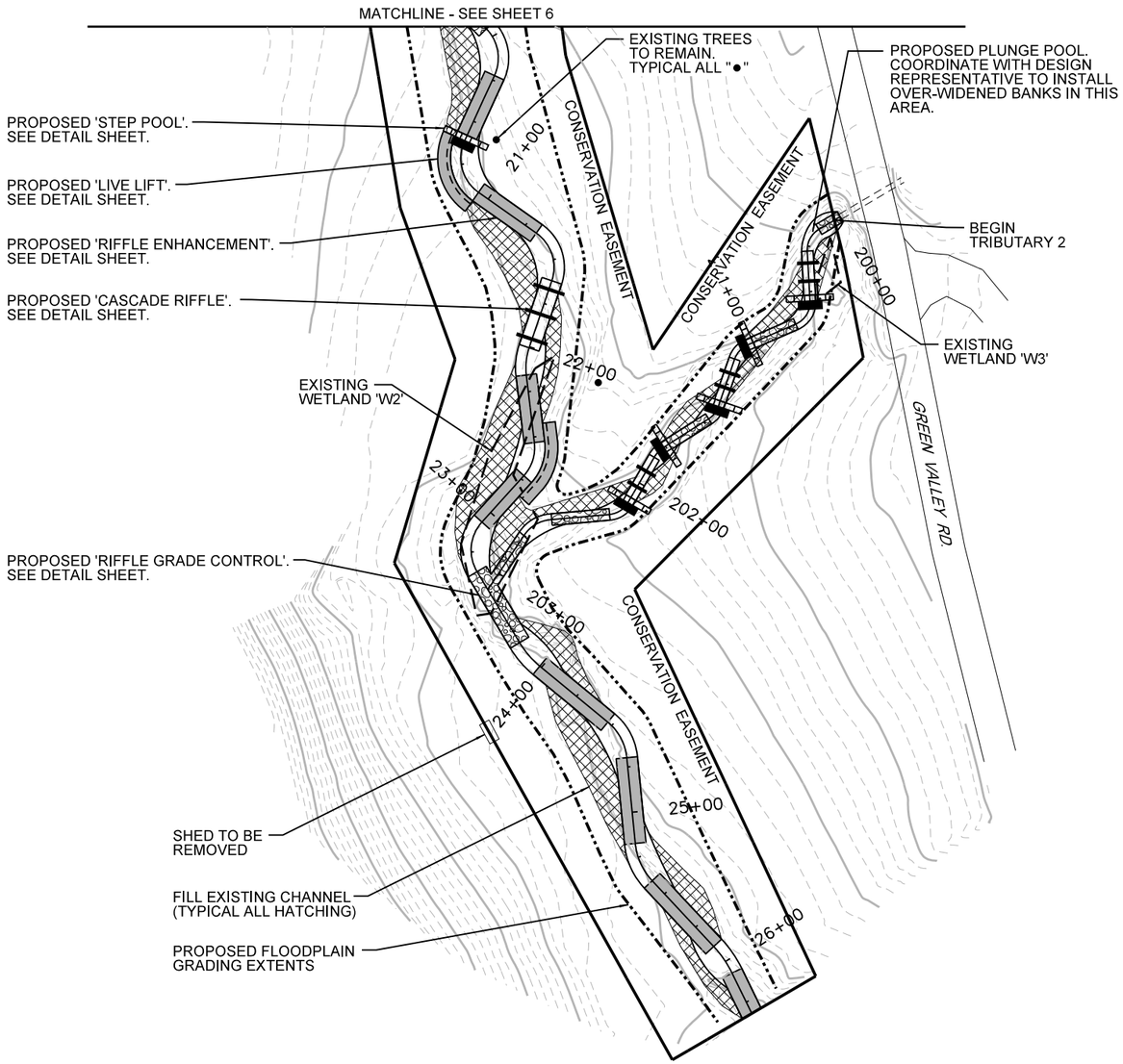
DATE: OCTOBER 2020
SCALE: GRAPHIC

SITE PLAN

NC GRID
NAD '83

–40′ –20′ 0′ 40′ 80′

GRAPHIC SCALE



NORTH CAROLINA PROFESSIONAL SEAL 040899 ENGINEER KRISTIN E. KNIGHT

10-28-2020

NO.	DESCRIPTION	DATE
	REVISIONS	

NCDEQ – DIVISION OF MITIGATION SERVICES

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

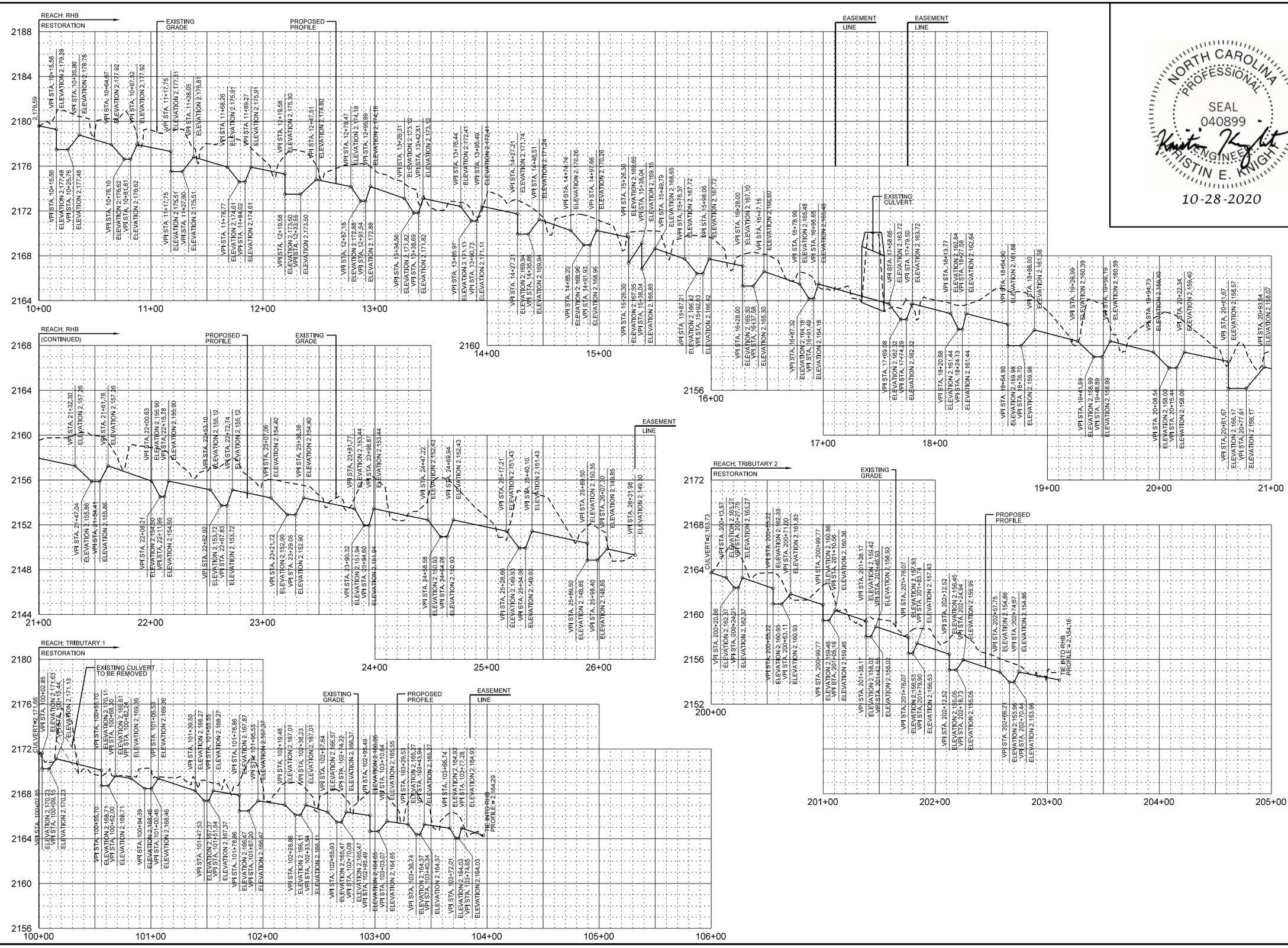
ROUND HILL BRANCH RESTORATION SITE

BUNCOMBE COUNTY, NORTH CAROLINA

DATE: OCTOBER 2020
SCALE: GRAPHIC

SITE PLAN

SHEET 7 OF 19



NORTH CAROLINA PROFESSIONAL SEAL 040899 ENGINEER KRISTIN E. KNIGHT

10-28-2020

NO.	DESCRIPTION	DATE
	REVISIONS	

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

NCDEQ – DIVISION OF MITIGATION SERVICES

ROUND HILL BRANCH RESTORATION SITE

BUNCOMBE COUNTY, NORTH CAROLINA

DATE: OCTOBER 2020
SCALE: 1"=40'

PROFILES

SHEET 8 OF 19

PLANTING ZONE 1 = 1.49 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
HAZEL ALDER	ALNUS SERRULATA	OBL	10	144
PAWPAW	ASIMINA TRILOBA	FAC	10	144
YELLOW BIRCH	BETULA ALLEGHANIENSIS	FAC	10	144
AMERICAN HORNBEAM	CARPINUS CAROLINIANA	FAC	10	144
SUGARBERRY	CELTIS LAEVIGATA	FACW	10	144
SILKY DOGWOOD	CORNUS AMOMUM	FACW	10	144
SPICEBUSH	LINDERA BENZOIN	FAC	10	144
BLACK GUM	NYSSA SYLVATICA	FAC	10	144
AMERICAN SYCAMORE	PLATANUS OCCIDENTALIS	FACW	20	290
				1,442

PLANTING ZONE 2 = 2.19 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
YELLOW BUCKEYE	AESCULUS FLAVA	FACU	10	212
SWEET BIRCH	BETULA LENTA	FACU	10	212
BITTERNUT HICKORY	CARYA CORDIFORMIS	FACU	10	212
PIGNUT HICKORY	CARYA GLABRA	FACU	10	212
TULIP POPLAR	LIRIODENDRON TULIPIFERA	FACU	10	212
AMERICAN SYCAMORE	PLATANUS OCCIDENTALIS	FACW	10	212
WHITE OAK	QUERCA ALBA	FACU	10	212
SOUTHERN RED OAK	QUERCUS FALCATA	FACU	10	212
CHESTNUT OAK	QUERCUS MONTANA	UPL	10	212
NORTHERN RED OAK	QUERCUS RUBRA	FACU	10	212
				2,120

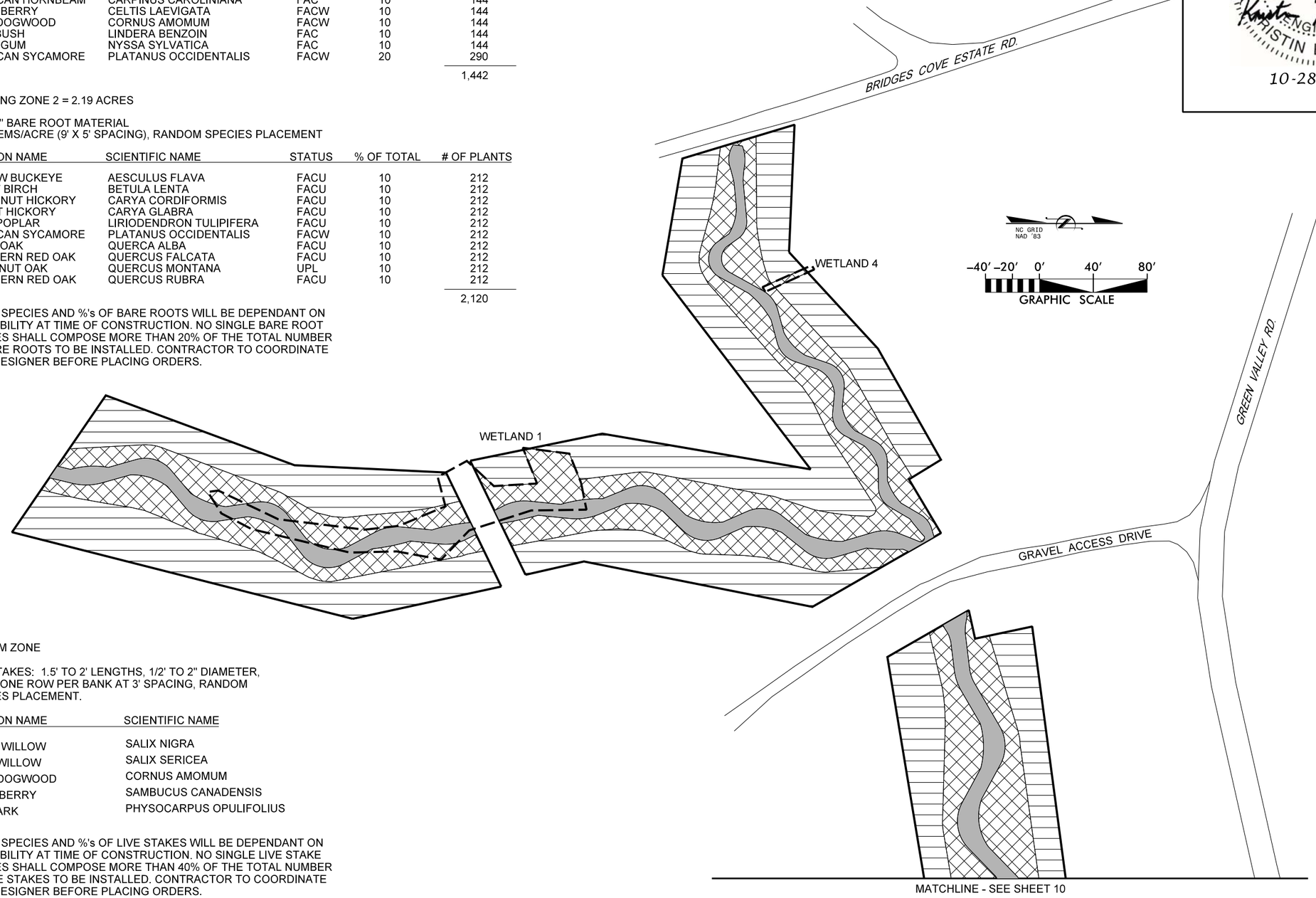
EXACT SPECIES AND %'s OF BARE ROOTS WILL BE DEPENDANT ON AVAILABILITY AT TIME OF CONSTRUCTION. NO SINGLE BARE ROOT SPECIES SHALL COMPOSE MORE THAN 20% OF THE TOTAL NUMBER OF BARE ROOTS TO BE INSTALLED. CONTRACTOR TO COORDINATE WITH DESIGNER BEFORE PLACING ORDERS.

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.



NC GRID
NAD '83

–40′ –20′ 0′ 40′ 80′
GRAPHIC SCALE

NORTH CAROLINA PROFESSIONAL SEAL 040899 ENGINEER KRISTIN E. KNIGHT

10-28-2020

REVISIONS		
A	UPDATED PLANTING ZONES TO ALIGN WITH WETLAND SHAPES	7/10/2020

NCDEQ – DIVISION OF MITIGATION SERVICES

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

ROUND HILL BRANCH
RESTORATION SITE
BUNCOMBE COUNTY, NORTH CAROLINA

DATE: OCTOBER 2020
SCALE: GRAPHIC

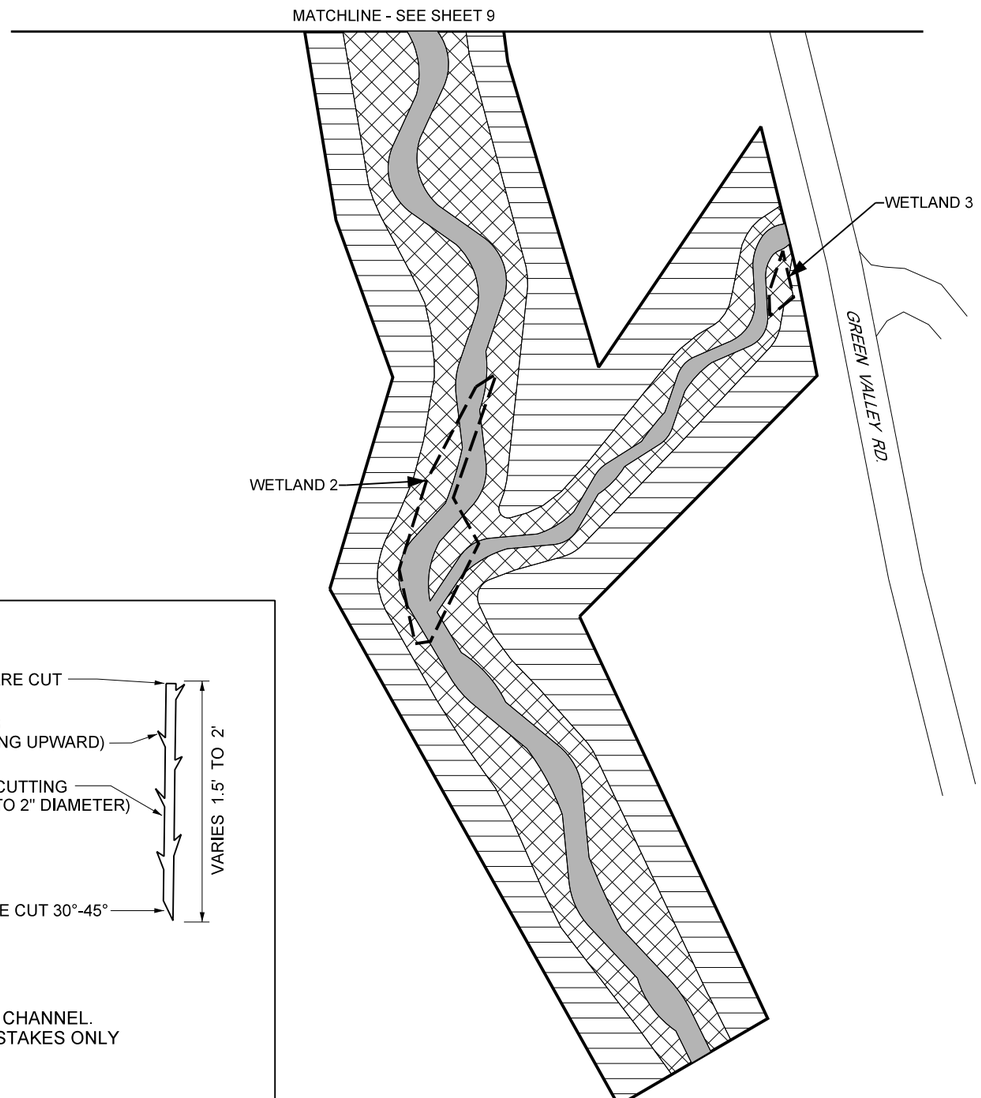
PLANTING PLAN

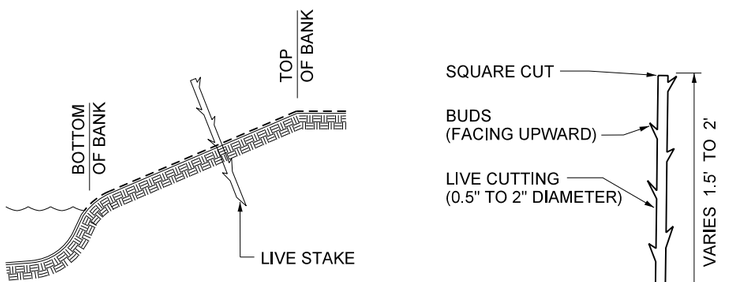
PLANTING ZONE 1

PLANTING ZONE 2

STREAM ZONE

*NOTE: SEE SHEET 9 FOR PLANTING QUANTITIES





STREAM BANK CROSS-SECTION

PLANTING NOTES:

RIFFLES - 1 ROW OF LIVE STAKES ON BOTH SIDES OF CHANNEL.
POOLS - NO LIVE STAKES ON INNER BANKS, INSTALL STAKES ONLY ON THE OUTER BANKS.

LIVE STAKES

SCALE: NTS

NORTH CAROLINA PROFESSIONAL SEAL 040899 ENGINEER KRISTIN E. KNIGHT

10-28-2020

NC GRID NAD '83

–40′ –20′ 0′ 40′ 80′

GRAPHIC SCALE

REVISIONS		
NO.	DESCRIPTION	DATE
A	UPDATED PLANTING ZONES TO ALIGN WITH WETLAND SHAPES	7/10/2020

NCDEQ – DIVISION OF MITIGATION SERVICES

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

ROUND HILL BRANCH RESTORATION SITE

BUNCOMBE COUNTY, NORTH CAROLINA

DATE: OCTOBER 2020

SCALE: GRAPHIC

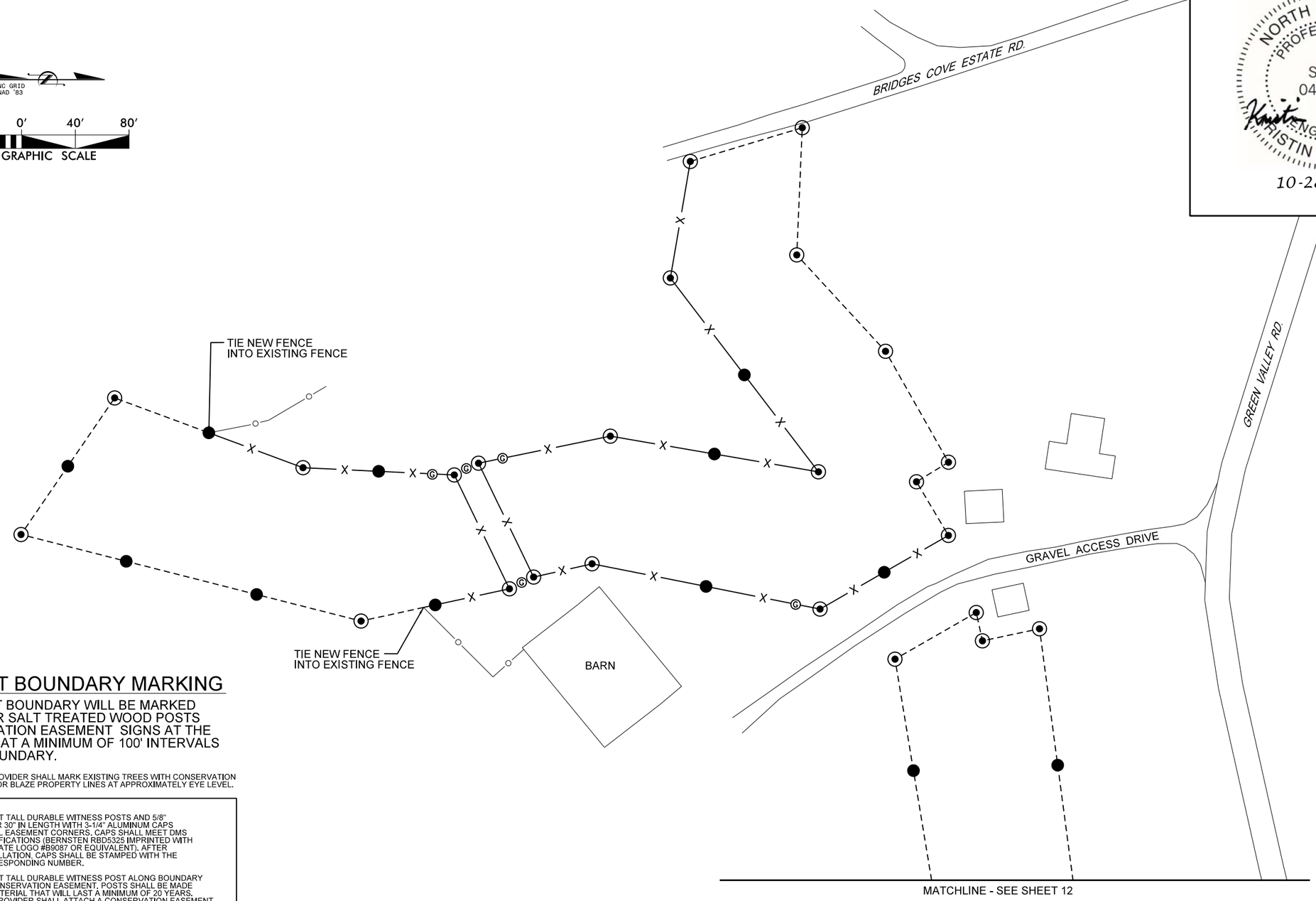
PLANTING PLAN

SHEET 10 OF 19

NC GRID
NAD '83

–40′ –20′ 0′ 40′ 80′

GRAPHIC SCALE



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.
●	6-FOOT TALL DURABLE WITNESS POST ALONG BOUNDARY OF CONSERVATION EASEMENT. POSTS SHALL BE MADE OF MATERIAL THAT WILL LAST A MINIMUM OF 20 YEARS. THE PROVIDER SHALL ATTACH A CONSERVATION EASEMENT SIGN TO EACH WITNESS POST AND PLACE ADDITIONAL SIGNS AT NO MORE THAN 100-FOOT INTERVALS ON BOUNDARY LINES.
— X —	INSTALL NEW WOVEN WIRE FENCE
- - - - -	DO NOT INSTALL FENCE - CONSERVATION EASEMENT
— o —	EXISTING CATTLE FENCE
Ⓖ	INSTALL ACCESS GATE

NORTH CAROLINA PROFESSIONAL SEAL 040899 ENGINEER KRISTIN E. KNIGHT

10-28-2020

NO.	DESCRIPTION	DATE
	REVISIONS	

NCDEQ – DIVISION OF MITIGATION SERVICES

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

ROUND HILL BRANCH RESTORATION SITE

BUNCOMBE COUNTY, NORTH CAROLINA

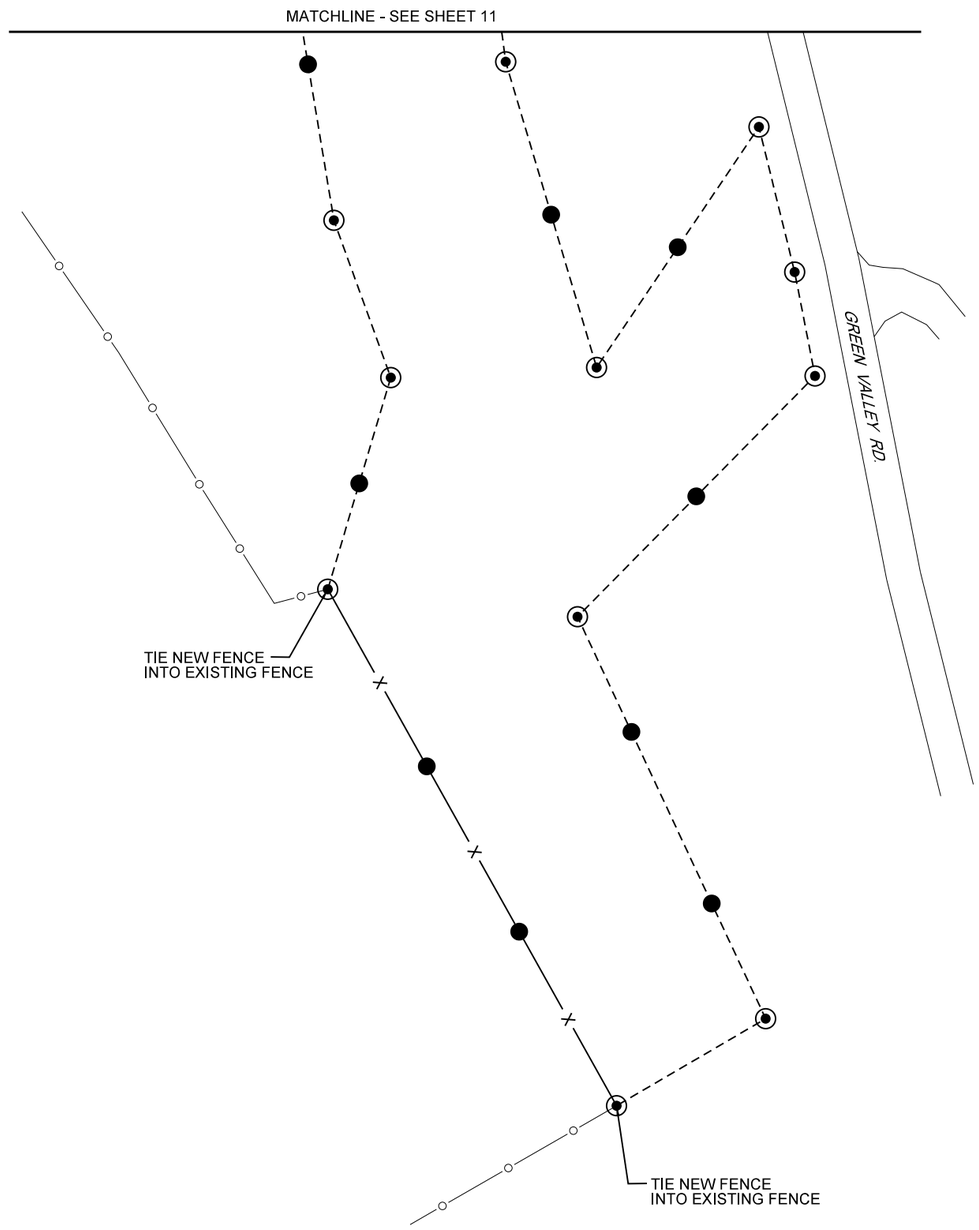
DATE: OCTOBER 2020
SCALE: GRAPHIC

BOUNDARY MARKING PLAN

NC GRID
NAD '83

–40′ –20′ 0′ 40′ 80′

GRAPHIC SCALE



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.
●	6-FOOT TALL DURABLE WITNESS POST ALONG BOUNDARY OF CONSERVATION EASEMENT. POSTS SHALL BE MADE OF MATERIAL THAT WILL LAST A MINIMUM OF 20 YEARS. THE PROVIDER SHALL ATTACH A CONSERVATION EASEMENT SIGN TO EACH WITNESS POST AND PLACE ADDITIONAL SIGNS AT NO MORE THAN 100-FOOT INTERVALS ON BOUNDARY LINES.
— X —	INSTALL NEW WOVEN WIRE FENCE
- - - - -	DO NOT INSTALL FENCE - CONSERVATION EASEMENT
— ○ —	EXISTING CATTLE FENCE
Ⓖ	INSTALL ACCESS GATE

NORTH CAROLINA PROFESSIONAL SEAL 040899 ENGINEER KRISTIN E. KNIGHT

10-28-2020

SYM.	DESCRIPTION	DATE
	REVISIONS	

NCDEQ – DIVISION OF MITIGATION SERVICES

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

ROUND HILL BRANCH
RESTORATION SITE
BUNCOMBE COUNTY, NORTH CAROLINA

DATE: OCTOBER 2020
SCALE: GRAPHIC

BOUNDARY MARKING PLAN

SHEET 12 OF 19

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 TIM MORRIS. OFFICE PHONE (919) 783-9214 / CELL PHONE (919) 793-6886.

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
BROWNTOP MILLET -- UROCHLOA RAMOSA	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 SHALL BE 10-10-10 ANALYSIS. UPON SOIL ANALYSIS A DIFFERENT RATIO OF FERTILIZER MAY BE USED.

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

10-28-2020

REVISIONS

SYM.	DESCRIPTION	DATE

NCDEQ -- DIVISION OF MITIGATION SERVICES

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

ROUND HILL BRANCH RESTORATION SITE

BUNCOMBE COUNTY, NORTH CAROLINA

DATE: OCTOBER 2020
SCALE: N.T.S.

EROSION CONTROL PLAN

SHEET 13 OF 19

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

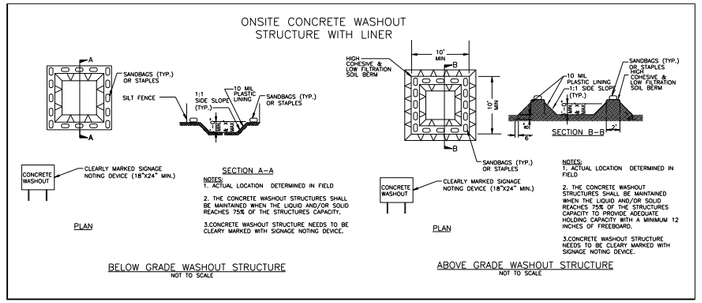
1. Do not dump paint and other liquid waste into storm drains, streams or wetlands.
2. Locate paint washouts at least 50 feet away from storm drain inlets and surface waters unless no other alternatives are reasonably available.
3. Contain liquid wastes in a controlled area.
4. Containment must be labeled, 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

REVISIONS			
SYM.	DESCRIPTION	DATE	
A	REVISED PER LAND QUALITY DIVISION	OCT. 201	

NCDEQ – DIVISION OF MITIGATION SERVICES

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

ROUND HILL BRANCH RESTORATION SITE
BUNCOMBE COUNTY, NORTH CAROLINA

DATE: OCTOBER 2020
SCALE: N.T.S.

EROSION CONTROL PLAN

SHEET 13A OF 19

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

REVISIONS			
	DESCRIPTION	BY	DATE
A	REVISED PER LAND QUALITY DIVISION	SML	OCT. 201

NCDEQ – DIVISION OF MITIGATION SERVICES

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

ROUND HILL BRANCH
RESTORATION SITE
BUNCOMBE COUNTY, NORTH CAROLINA

DATE: OCTOBER 2020
SCALE: N.T.S.

EROSION CONTROL PLAN

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 5 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 OFSUPPORTING 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 CLASS 1 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.

6. EROSION AND SEDIMENT CONTROL PERMIT MUST BE OBTAINED BEFORE ANY LAND DISTURBING ACTIVITIES OCCUR. A COPY OF THIS PERMIT 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 S&E 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 RALEIGH REGIONAL OFFICE AT LEAST 48 HOURS PRIOR TO COMMENCING THE LAND DISTURBING ACTIVITY 336-776-9800.

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: TRIBUTARY RHB - STA. 10+00 TO 26+32
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 (LENGTH OF ISOLATED WORK AREA IS LEFT TO THE DISCRETION OF THE CONTRACTOR).

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 3: TRIBUTARY 1 - STA. 100+00 TO 103+97
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 (LENGTH OF ISOLATED WORK AREA IS LEFT TO THE DISCRETION OF THE CONTRACTOR).

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: TRIBUTARY 3 - STA. 200+00 TO 203+11
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 (LENGTH OF ISOLATED WORK AREA IS LEFT TO THE DISCRETION OF THE CONTRACTOR).

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: 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 6: COMPLETION OF PROJECT SITE
A. PHASE 6 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.

NORTH CAROLINA PROFESSIONAL SEAL 040899 ENGINEER KRISTIN E. KNIGHT

10-28-2020

NO.	DESCRIPTION	DATE
	REVISIONS	

NCDEQ – DIVISION OF MITIGATION SERVICES

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

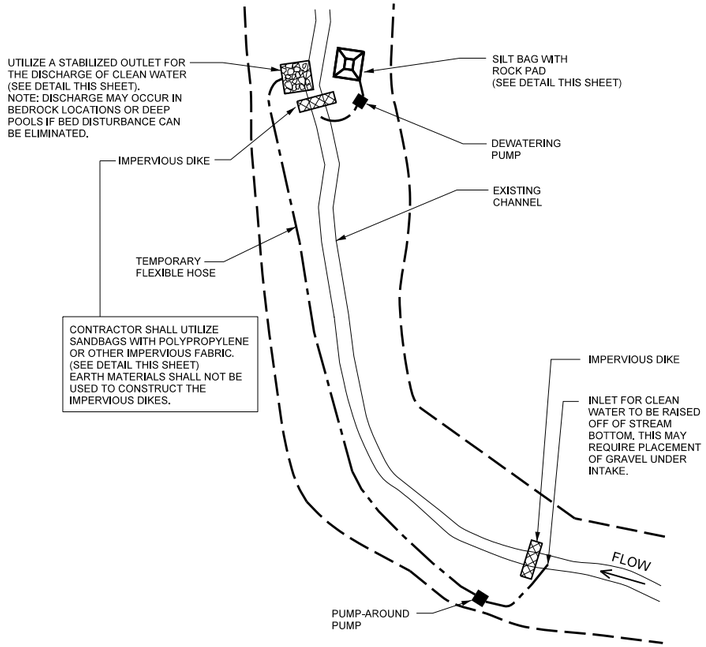
ROUND HILL BRANCH RESTORATION SITE

BUNCOMBE COUNTY, NORTH CAROLINA

DATE: OCTOBER 2020
SCALE: N.T.S.

EROSION CONTROL PLAN

SHEET 14 OF 19



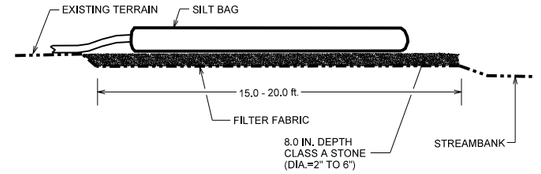
SEQUENCE OF DEWATERING OPERATIONS

* 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.

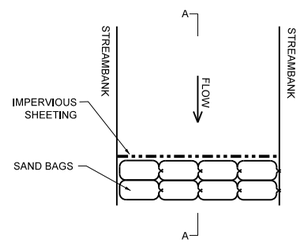
EXAMPLE OF PUMP-AROUND OPERATION
SCALE: NTS

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.

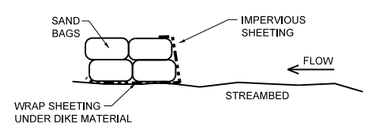


NOTE: PROVIDE STABILIZED OUTLET DOWN BANK TO STREAM

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

10-28-2020

NO.	DESCRIPTION	DATE
	REVISIONS	

NCDEQ – DIVISION OF MITIGATION SERVICES

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

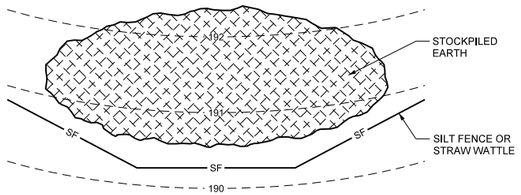
ROUND HILL BRANCH RESTORATION SITE

BUNCOMBE COUNTY, NORTH CAROLINA

DATE: OCTOBER 2020

SCALE: N.T.S.

EROSION CONTROL PLAN



NOTES:

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

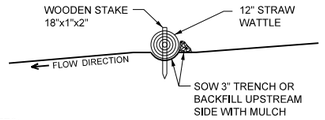
ALL STOCKPILES SHALL BE WITHIN LIMITS OF DISTURBANCE.

SILT FENCE SHALL BE INSTALLED DOWN GRADIENT OF ALL STOCKPILES.

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



NOTES:

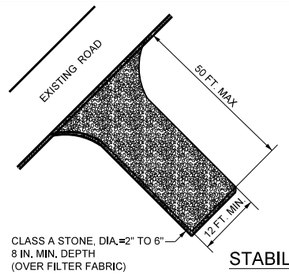
WATTLES SHALL BE INSTALLED ACCORDING TO THE MANUFACTURERS SPECIFICATIONS.

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

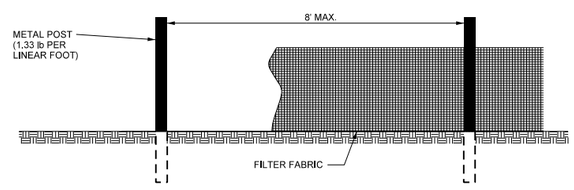
NOT TO SCALE



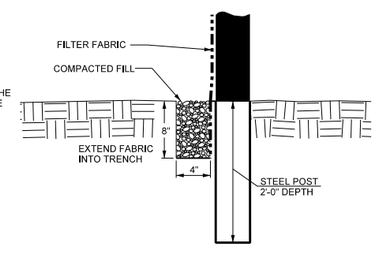
NOTES:
1. TURNING RADIUS SUFFICIENT TO ACCOMMODATE LARGE TRUCKS SHALL BE PROVIDED.
2. ENTRANCE(S) SHOULD BE LOCATED TO PROVIDE FOR UTILIZATION BY ALL CONSTRUCTION VEHICLES.
3. MUST BE MAINTAINED IN A CONDITION WHICH WILL PREVENT TRACKING OR DIRECT FLOW OF MUD ONTO STREETS. PERIODIC TOP DRESSING WITH 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



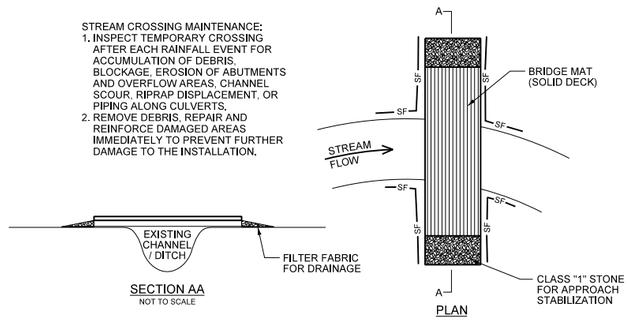
SILT FENCE MAINTENANCE
1. INSPECT SEDIMENT FENCES WEEKLY AND AFTER EACH RAINFALL EVENT.
2. SHOULD FABRIC TEAR, DECOMPOSE, OR IN ANY WAY BECOME INEFFECTIVE, REPLACE IT IMMEDIATELY.
3. REMOVE SEDIMENT DEPOSITS PROMPTLY TO PROVIDE ADEQUATE STORAGE VOLUME FOR THE NEXT RAIN AND TO REDUCE PRESSURE ON THE FENCE. 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

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 STOCK PILES 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 1 STONE, WILL BE REQUIRED FOR EACH SECTION OF THE BRIDGE.
4. BRIDGE SHALL BE CONSTRUCTED OF A SOLID DECK.

TEMPORARY BRIDGE MAT CROSSING

NORTH CAROLINA PROFESSIONAL SEAL 040899 ENGINEER KRISTIN E. KNIGHT

10-28-2020

SYM.	DESCRIPTION	DATE
	REVISIONS	

NCDEQ – DIVISION OF MITIGATION SERVICES

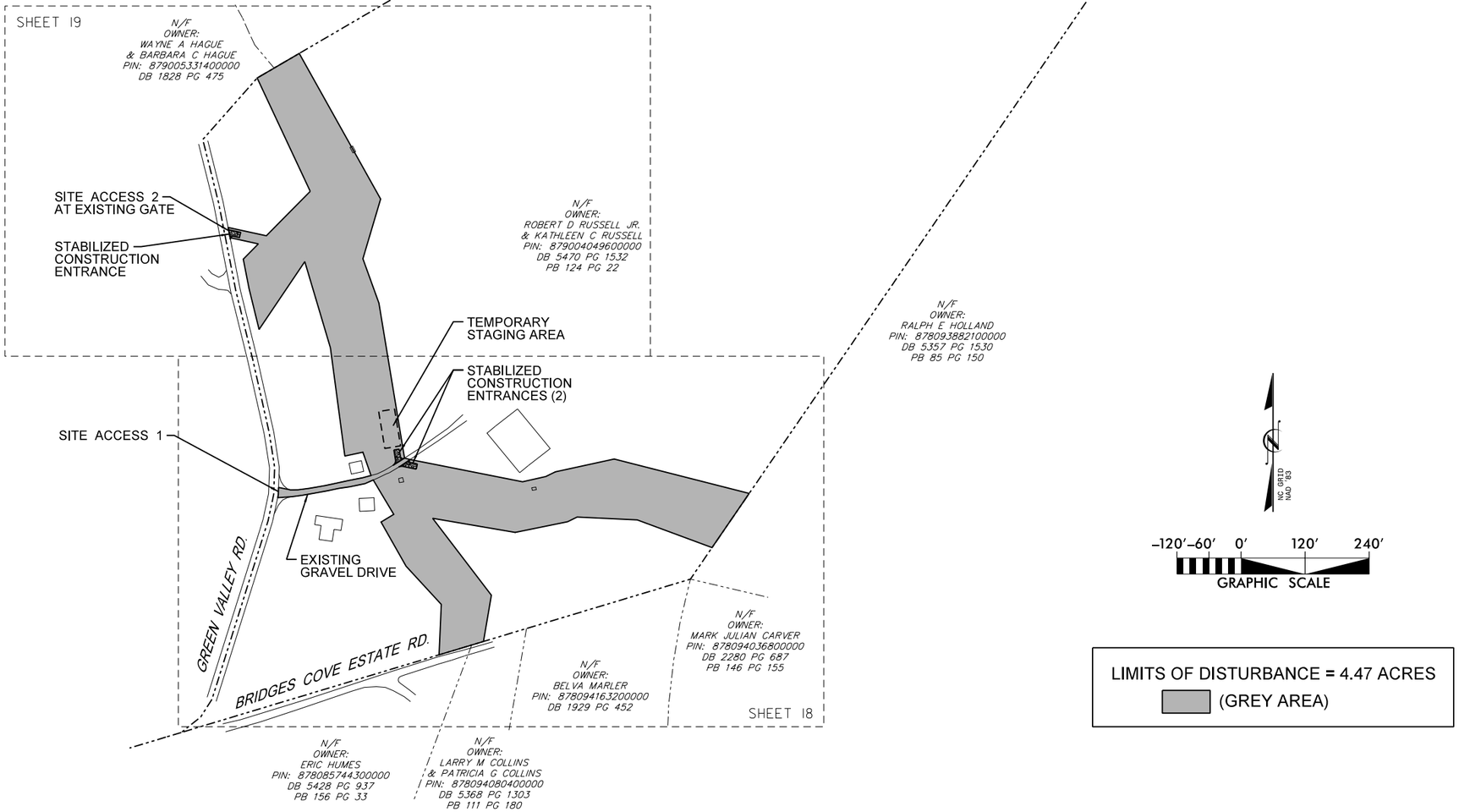
KCI ASSOCIATES OF NC
ENGINEERS • PLANNERS • SCIENTISTS
4505 FALLS OF NEUSE ROAD, SUITE 400
RALEIGH, NORTH CAROLINA 27609

ROUND HILL BRANCH
RESTORATION SITE
BUNCOMBE COUNTY, NORTH CAROLINA

DATE: OCTOBER 2020
SCALE: N.T.S.

EROSION CONTROL PLAN

SHEET 16 OF 19



NORTH CAROLINA PROFESSIONAL SEAL 040899 ENGINEER KRISTIN E. KNIGHT

10-28-2020

NO.	DESCRIPTION	DATE
	REVISIONS	

NCDEQ – DIVISION OF MITIGATION SERVICES

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

ROUND HILL BRANCH RESTORATION SITE

BUNCOMBE COUNTY, NORTH CAROLINA

DATE: OCTOBER 2020
SCALE: GRAPHIC

EROSION CONTROL PLAN -OVERVIEW-

SHEET 17 OF 19

NC GRID
NAD '83

–40′ –20′ 0′ 40′ 80′

GRAPHIC SCALE

BEGIN TRIBUTARY 1

EXISTING CULVERT 24" CMP

BRIDGES COVE ESTATE RD.

GREEN VALLEY RD.

BEGIN RHB

EXISTING WETLAND 'W1'

EXISTING WETLAND 'W4'

STABILIZE INCOMING DRAINAGE WITH ROCK OUTLET. SEE DETAIL SHEET.

FILL EXISTING CHANNEL (TYPICAL ALL HATCHING)

HOUSE

HOUSE

EXISTING CULVERT 60" CMP

GRAVEL ACCESS DRIVE

SHED

BARN

LOD

SF

10+00

11+00

12+00

13+00

14+00

15+00

16+00

17+00

18+00

19+00

20+00

100+00

101+00

102+00

103+00

TEMPORARY STOCK PILE; TYP. EXACT LOCATION AND QUANTITY TO BE DETERMINED BY DESIGN REPRESENTATIVE IN THE FIELD. (SEE DETAIL ON SHEET 16)

TCD EXAMPLE OF PUMP AROUND OPERATION EXACT LOCATION AND SETUP WILL BE DETERMINED BY HOW MUCH WORK THE CONTRACTOR PLANS TO COMPLETE AT THE TIME. TYPICAL ALL EROSION CONTROL PLAN SHEETS. (SEE DETAIL ON SHEET 15).

STABILIZED CONSTRUCTION ENTRANCES (2)

TEMPORARY STAGING AREA

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

MATCHLINE - SEE SHEET 19

NORTH CAROLINA PROFESSIONAL SEAL 040899 ENGINEER KRISTIN E. KNIGHT

10-28-2020

NO.	DESCRIPTION	DATE
	REVISIONS	

NCDEQ – DIVISION OF MITIGATION SERVICES

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

ROUND HILL BRANCH RESTORATION SITE

BUNCOMBE COUNTY, NORTH CAROLINA

DATE: OCTOBER 2020
SCALE: GRAPHIC

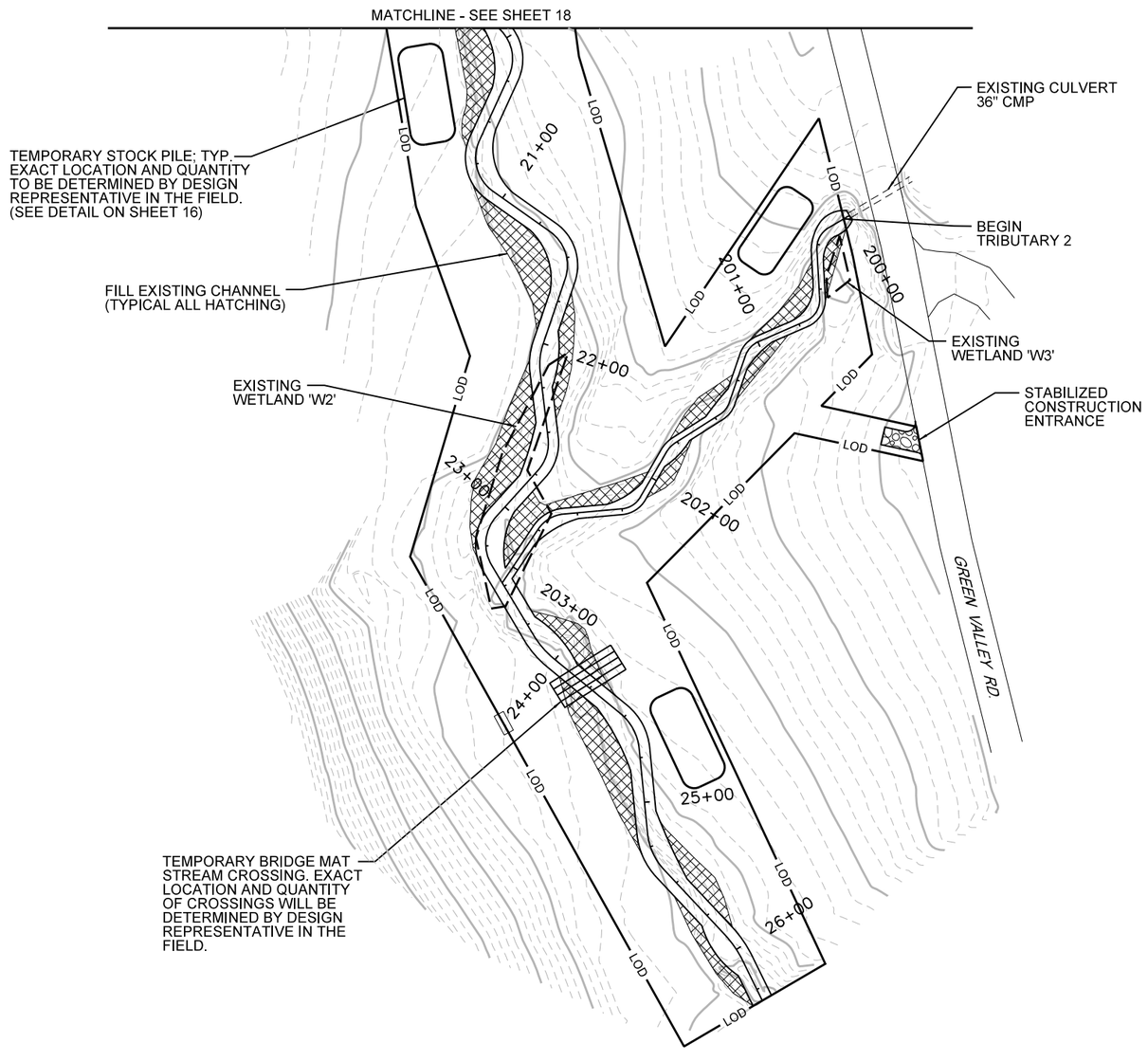
EROSION CONTROL PLAN

SHEET 18 OF 19

NC GRID
NAD '83

–40′ –20′ 0′ 40′ 80′

GRAPHIC SCALE



NORTH CAROLINA PROFESSIONAL SEAL 040899 ENGINEER KRISTIN E. KNIGHT

10-28-2020

NO.	DESCRIPTION	DATE
	REVISIONS	

NCDEQ – DIVISION OF MITIGATION SERVICES

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

ROUND HILL BRANCH RESTORATION SITE

BUNCOMBE COUNTY, NORTH CAROLINA

DATE: OCTOBER 2020
SCALE: GRAPHIC

EROSION CONTROL PLAN

SHEET 19 OF 19

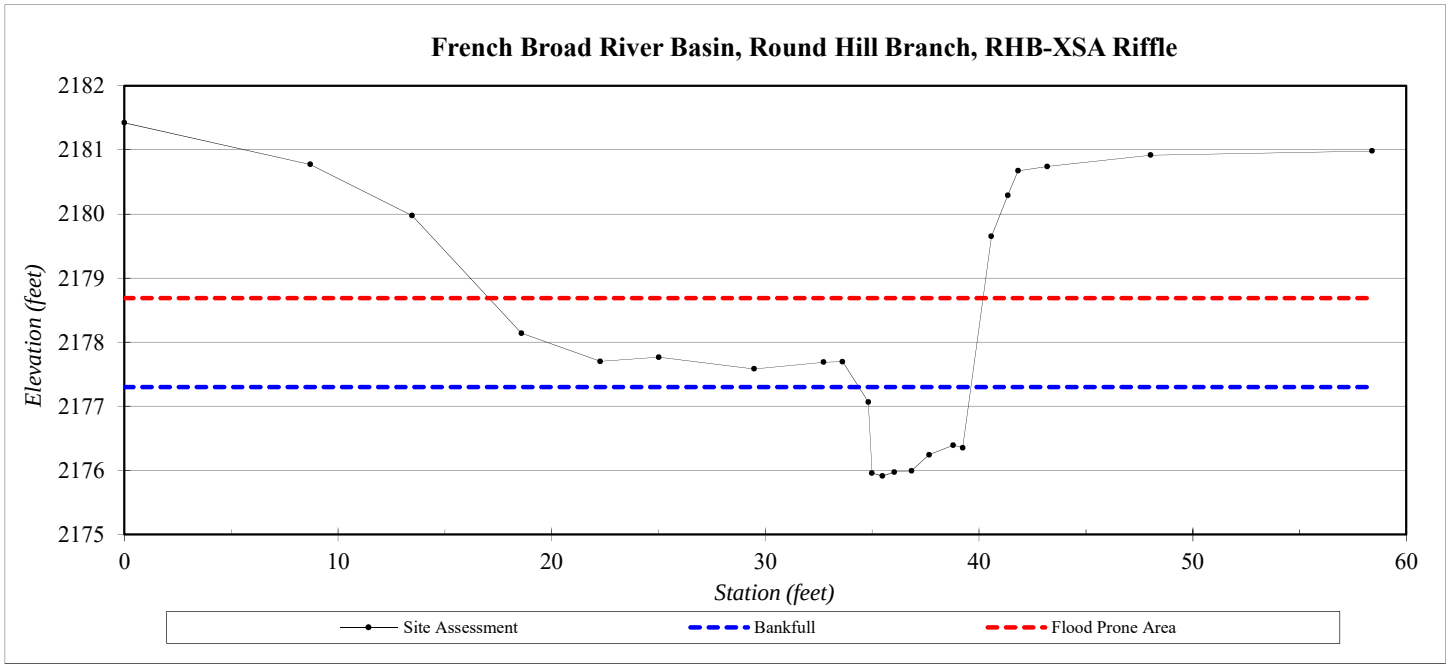
2. Data Analysis/Supplemental Information and Maps

Existing Conditions Cross-Sections
Pebble Counts and Bulk Sampling
Stream Morphological Tables
Estimated Nutrient and Bacterial Reductions

River Basin:	French Broad
Watershed:	Round Hill Branch
XS ID	RHB-XSA Riffle
Drainage Area (sq mi):	0.46
Date:	7/2/2019
Field Crew:	T. Seelinger, A. Gutierrez

Station	Elevation
0.00	2181.42
8.70	2180.77
13.47	2179.97
18.59	2178.14
22.28	2177.70
25.02	2177.77
29.48	2177.58
32.72	2177.69
33.61	2177.70
34.82	2177.07
34.99	2175.96
35.48	2175.91
36.04	2175.97
36.85	2175.99
37.67	2176.24
38.80	2176.39
39.24	2176.35
40.58	2179.65
41.35	2180.29
41.83	2180.67
43.20	2180.74
48.03	2180.92
58.40	2180.98

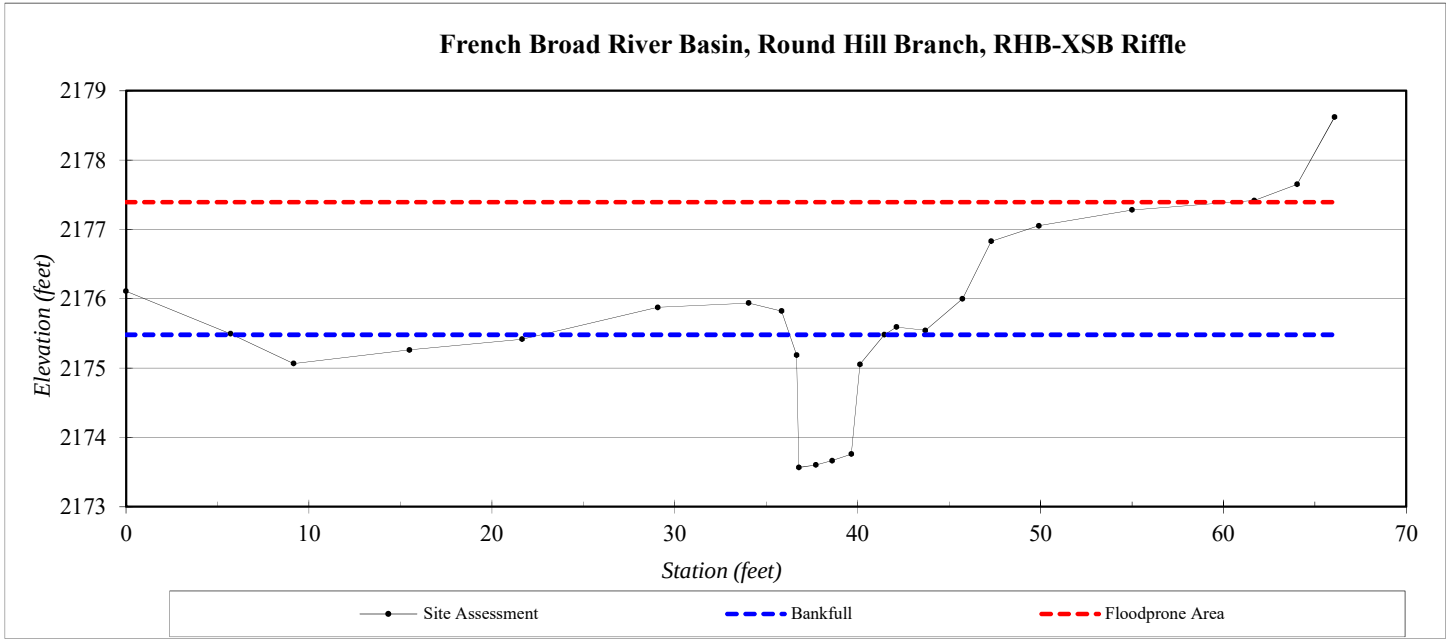
SUMMARY DATA	
Bankfull Elevation:	2177.30
Bankfull Cross-Sectional Area:	5.4
Bankfull Width:	5.2
Flood Prone Area Elevation:	2178.7
Flood Prone Width:	23.1
Max Depth at Bankfull:	1.4
Mean Depth at Bankfull:	1.0
W / D Ratio:	5.1
Entrenchment Ratio:	4.4
Bank Height Ratio:	1.3



River Basin:	French Broad
Watershed:	Round Hill Branch
XS ID	RHB-XSB Riffle
Drainage Area (sq mi):	0.48
Date:	7/2/2019
Field Crew:	T. Seelinger, A. Gutierrez

Station	Elevation
0.00	2176.11
5.71	2175.50
9.16	2175.07
15.49	2175.26
21.65	2175.42
29.07	2175.88
34.05	2175.94
35.84	2175.82
36.67	2175.19
36.79	2173.57
37.71	2173.60
38.60	2173.67
39.65	2173.76
40.13	2175.06
41.45	2175.48
42.13	2175.59
43.71	2175.54
45.74	2176.00
47.31	2176.83
49.91	2177.05
55.01	2177.28
61.69	2177.42
64.03	2177.65
66.08	2178.62

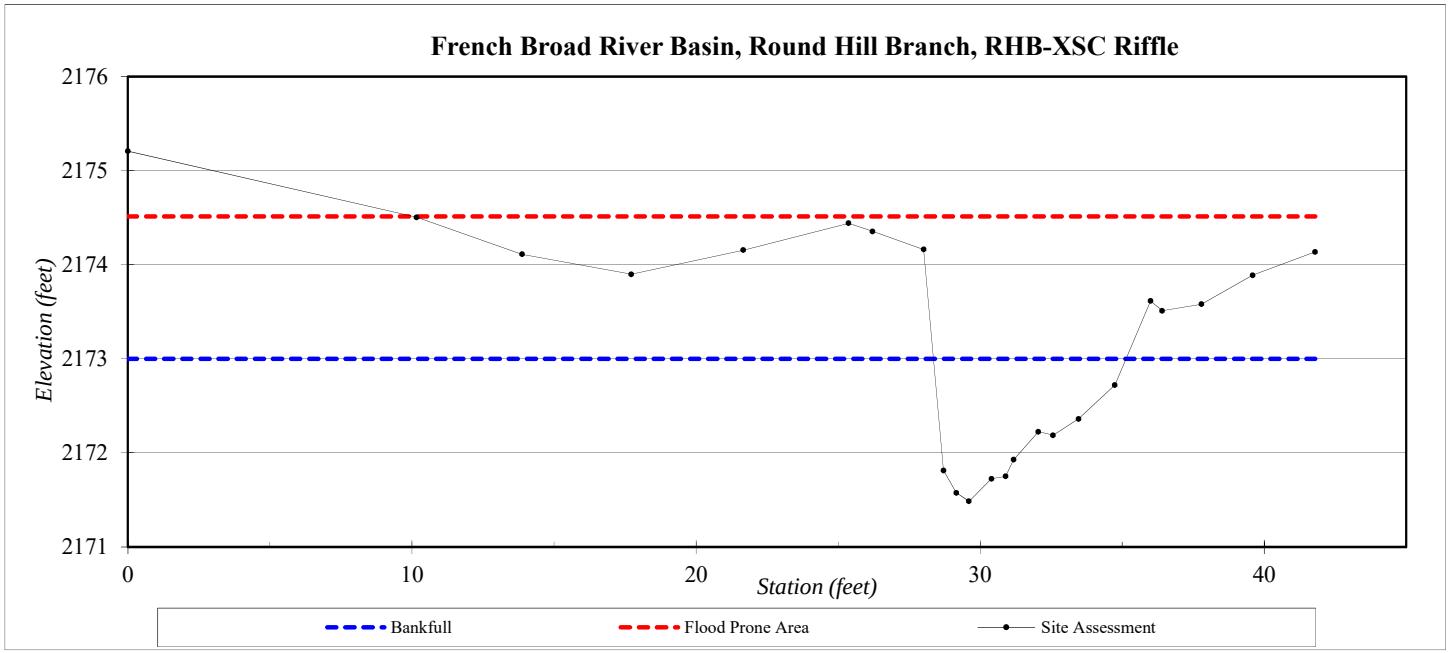
SUMMARY DATA	
Bankfull Elevation:	2175.48
Bankfull Cross-Sectional Area:	6.2
Bankfull Width:	5.2
Flood Prone Area Elevation:	2177.4
Flood Prone Width:	60.6
Max Depth at Bankfull:	1.9
Mean Depth at Bankfull:	1.2
W / D Ratio:	4.3
Entrenchment Ratio:	11.7
Bank Height Ratio:	1.1



River Basin:	French Broad
Watershed:	Round Hill Branch
XS ID	RHB-XSC Riffle
Drainage Area (sq mi):	0.48
Date:	7/2/2019
Field Crew:	T. Seelinger, A. Gutierrez

Station	Elevation
0.00	2175.21
10.16	2174.51
13.88	2174.11
17.72	2173.90
21.66	2174.16
25.37	2174.44
26.22	2174.35
28.01	2174.16
28.71	2171.81
29.16	2171.58
29.61	2171.49
30.40	2171.73
30.90	2171.75
31.18	2171.93
32.05	2172.23
32.57	2172.19
33.46	2172.36
34.74	2172.72
36.00	2173.62
36.41	2173.51
37.79	2173.58
39.59	2173.89
41.79	2174.14

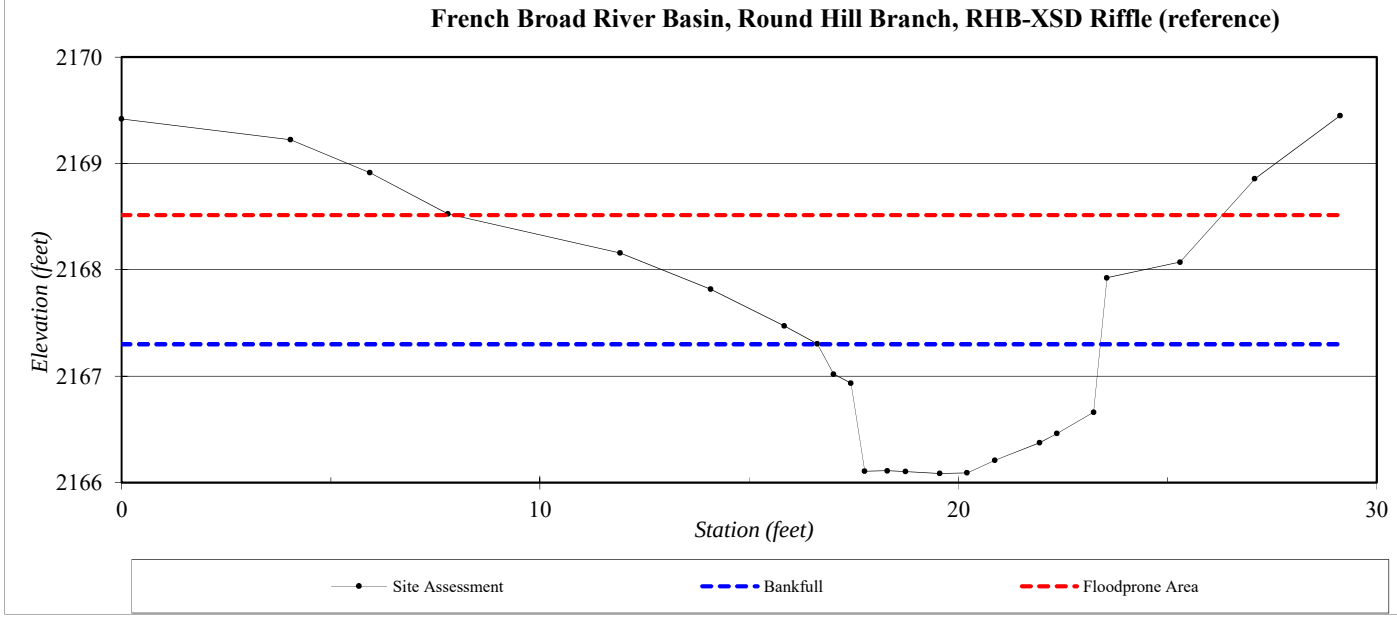
SUMMARY DATA	
Bankfull Elevation:	2173.00
Bankfull Cross-Sectional Area:	6.0
Bankfull Width:	6.8
Flood Prone Area Elevation:	2174.5
Flood Prone Width:	31.8
Max Depth at Bankfull:	1.5
Mean Depth at Bankfull:	0.9
W / D Ratio:	7.6
Entrenchment Ratio:	4.7
Bank Height Ratio:	1.3



River Basin:	French Broad
Watershed:	Round Hill Branch
XS ID	RHB-XSD Riffle (reference)
Drainage Area (sq mi):	0.48
Date:	7/2/2019
Field Crew:	T. Seelinger, A. Gutierrez

Station	Elevation
0.00	2169.42
4.04	2169.22
5.93	2168.91
7.80	2168.52
11.92	2168.16
14.08	2167.82
15.84	2167.47
16.63	2167.30
17.02	2167.02
17.43	2166.93
17.76	2166.11
18.30	2166.11
18.74	2166.10
19.56	2166.09
20.21	2166.09
20.87	2166.21
21.94	2166.37
22.35	2166.46
23.24	2166.66
23.55	2167.93
25.30	2168.07
27.09	2168.86
29.12	2169.45

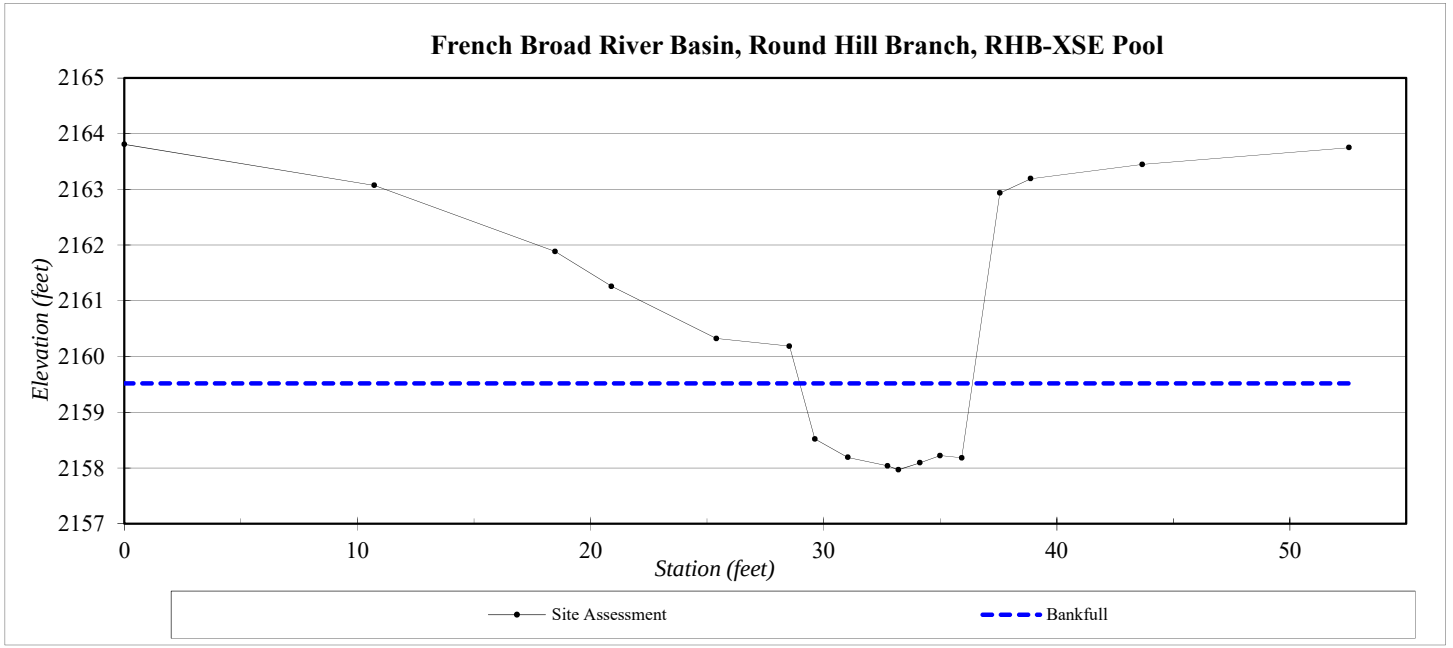
SUMMARY DATA	
Bankfull Elevation:	2167.30
Bankfull Cross-Sectional Area:	6.3
Bankfull Width:	6.8
Flood Prone Area Elevation:	2168.5
Flood Prone Width:	18.4
Max Depth at Bankfull:	1.2
Mean Depth at Bankfull:	0.9
W / D Ratio:	7.3
Entrenchment Ratio:	2.7
Bank Height Ratio:	1.0



River Basin:	French Broad
Watershed:	Round Hill Branch
XS ID	RHB-XSE Pool
Drainage Area (sq mi):	0.62
Date:	7/2/2019
Field Crew:	T. Seelinger, A. Gutierrez

Station	Elevation
0.00	2163.81
10.73	2163.07
18.48	2161.89
20.90	2161.26
25.40	2160.32
28.54	2160.19
29.63	2158.52
31.04	2158.19
32.75	2158.04
33.21	2157.97
34.13	2158.09
35.00	2158.22
35.93	2158.18
37.56	2162.93
38.89	2163.19
43.68	2163.45
52.55	2163.75

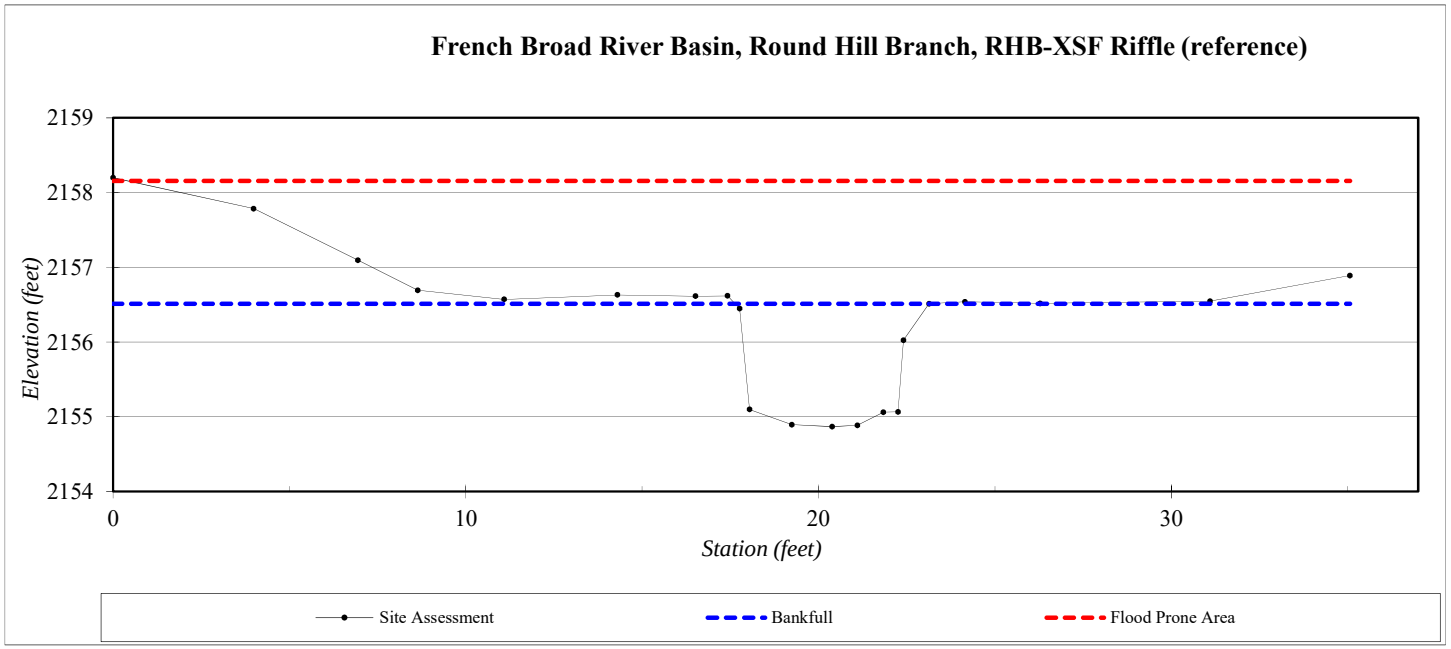
SUMMARY DATA	
Bankfull Elevation:	2159.52
Bankfull Cross-Sectional Area:	9.2
Bankfull Width:	7.4
Flood Prone Area Elevation:	-
Flood Prone Width:	-
Max Depth at Bankfull:	1.6
Mean Depth at Bankfull:	1.2
W / D Ratio:	-
Entrenchment Ratio:	-
Bank Height Ratio:	-



River Basin:	French Broad
Watershed:	Round Hill Branch
XS ID	RHB-XSF Riffle (reference)
Drainage Area (sq mi):	0.63
Date:	7/2/2019
Field Crew:	T. Seelinger, A. Gutierrez

Station	Elevation
0.00	2158.20
3.99	2157.78
6.94	2157.09
8.64	2156.69
11.09	2156.57
14.30	2156.63
16.51	2156.61
17.42	2156.62
17.76	2156.45
18.05	2155.10
19.24	2154.89
20.39	2154.87
21.11	2154.88
21.84	2155.06
22.26	2155.06
22.41	2156.02
23.13	2156.51
24.16	2156.54
26.28	2156.52
31.10	2156.55
35.07	2156.89

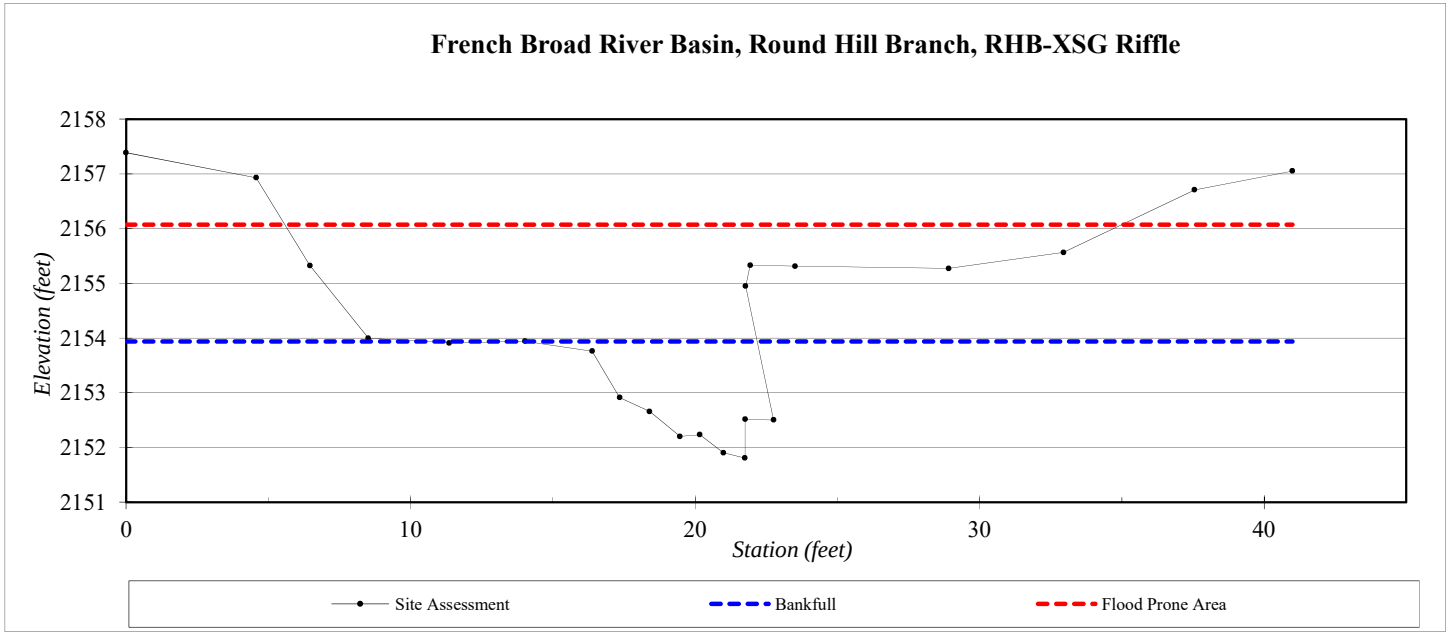
SUMMARY DATA	
Bankfull Elevation:	2156.51
Bankfull Cross-Sectional Area:	7.1
Bankfull Width:	5.5
Flood Prone Area Elevation:	2158.2
Flood Prone Width:	34.7
Max Depth at Bankfull:	1.6
Mean Depth at Bankfull:	1.3
W / D Ratio:	4.2
Entrenchment Ratio:	6.3
Bank Height Ratio:	1.0



River Basin:	French Broad
Watershed:	Round Hill Branch
XS ID	RHB-XSG Riffle
Drainage Area (sq mi):	0.73
Date:	7/2/2019
Field Crew:	T. Seelinger, A. Gutierrez

Station	Elevation
0.00	2157.39
4.57	2156.93
6.46	2155.32
8.51	2154.00
11.35	2153.91
14.02	2153.94
16.38	2153.76
17.35	2152.91
18.40	2152.66
19.47	2152.20
20.17	2152.23
20.99	2151.90
21.75	2151.81
21.76	2152.52
22.76	2152.50
21.78	2154.95
21.94	2155.33
23.51	2155.31
28.92	2155.27
32.95	2155.57
37.56	2156.71
41.00	2157.05

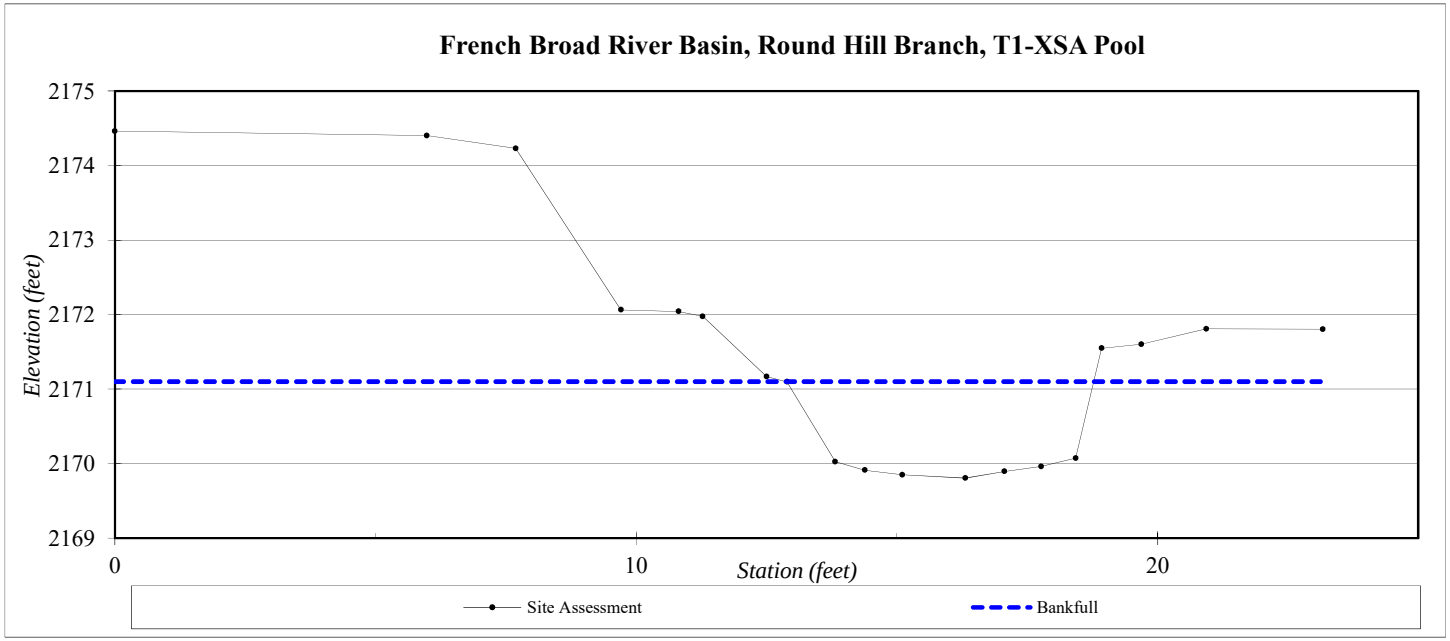
SUMMARY DATA	
Bankfull Elevation:	2153.94
Bankfull Cross-Sectional Area:	8.0
Bankfull Width:	7.7
Flood Prone Area Elevation:	2156.1
Flood Prone Width:	29.4
Max Depth at Bankfull:	2.1
Mean Depth at Bankfull:	1.0
W / D Ratio:	7.5
Entrenchment Ratio:	3.8
Bank Height Ratio:	1.0



River Basin:	French Broad
Watershed:	Round Hill Branch
XS ID	T1-XSA Pool
Drainage Area (sq mi):	0.11
Date:	7/2/2019
Field Crew:	T. Seelinger, A. Gutierrez

Station	Elevation
0.00	2174.46
5.99	2174.40
7.69	2174.23
9.71	2172.06
10.81	2172.04
11.28	2171.97
12.50	2171.17
12.90	2171.10
13.82	2170.03
14.39	2169.91
15.10	2169.85
16.31	2169.81
17.06	2169.89
17.77	2169.96
18.43	2170.07
18.93	2171.55
19.69	2171.60
20.94	2171.81
23.17	2171.80

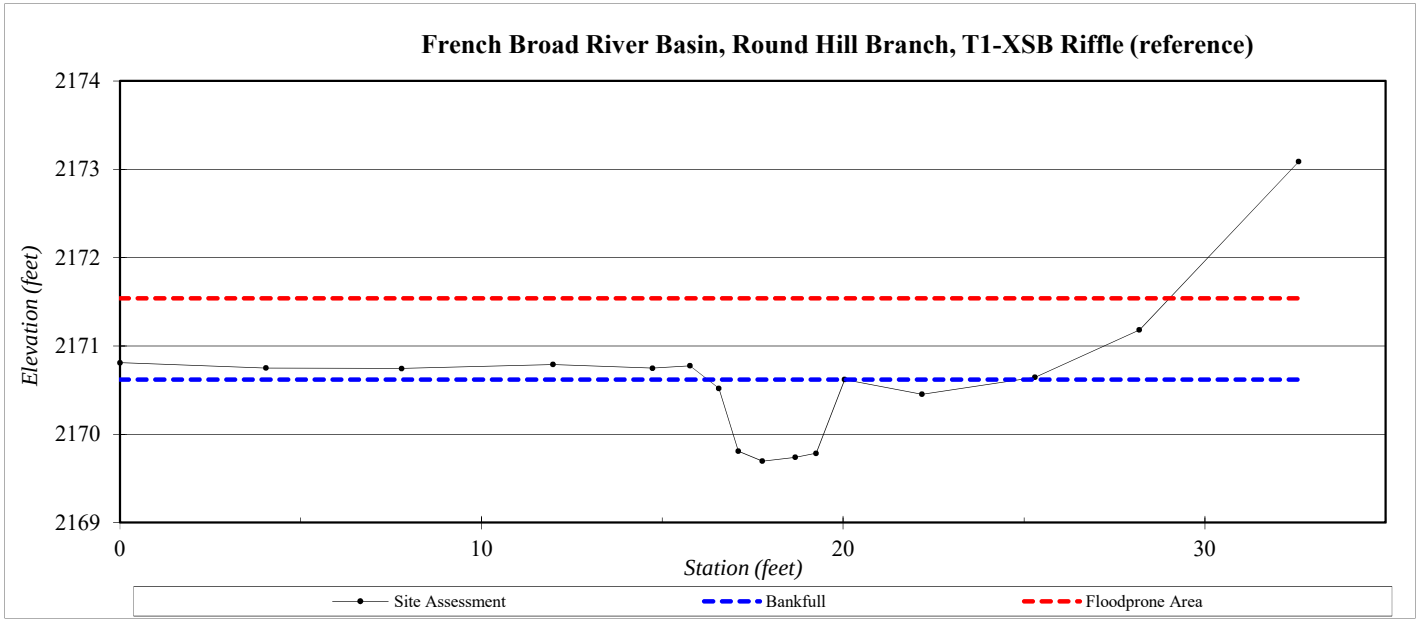
SUMMARY DATA	
Bankfull Elevation:	2171.1
Bankfull Cross-Sectional Area:	6.2
Bankfull Width:	5.9
Flood Prone Area Elevation:	-
Flood Prone Width:	-
Max Depth at Bankfull:	1.3
Mean Depth at Bankfull:	1.1
W / D Ratio:	-
Entrenchment Ratio:	-
Bank Height Ratio:	-



River Basin:	French Broad
Watershed:	Round Hill Branch
XS ID	T1-XSB Riffle (reference)
Drainage Area (sq mi):	0.11
Date:	7/2/2019
Field Crew:	T. Seelinger, A. Gutierrez

Station	Elevation
0.00	2170.81
4.04	2170.75
7.79	2170.74
11.98	2170.79
14.73	2170.75
15.76	2170.78
16.56	2170.52
17.10	2169.81
17.76	2169.70
18.68	2169.74
19.25	2169.78
20.04	2170.62
22.18	2170.45
25.30	2170.64
28.19	2171.18
32.60	2173.09

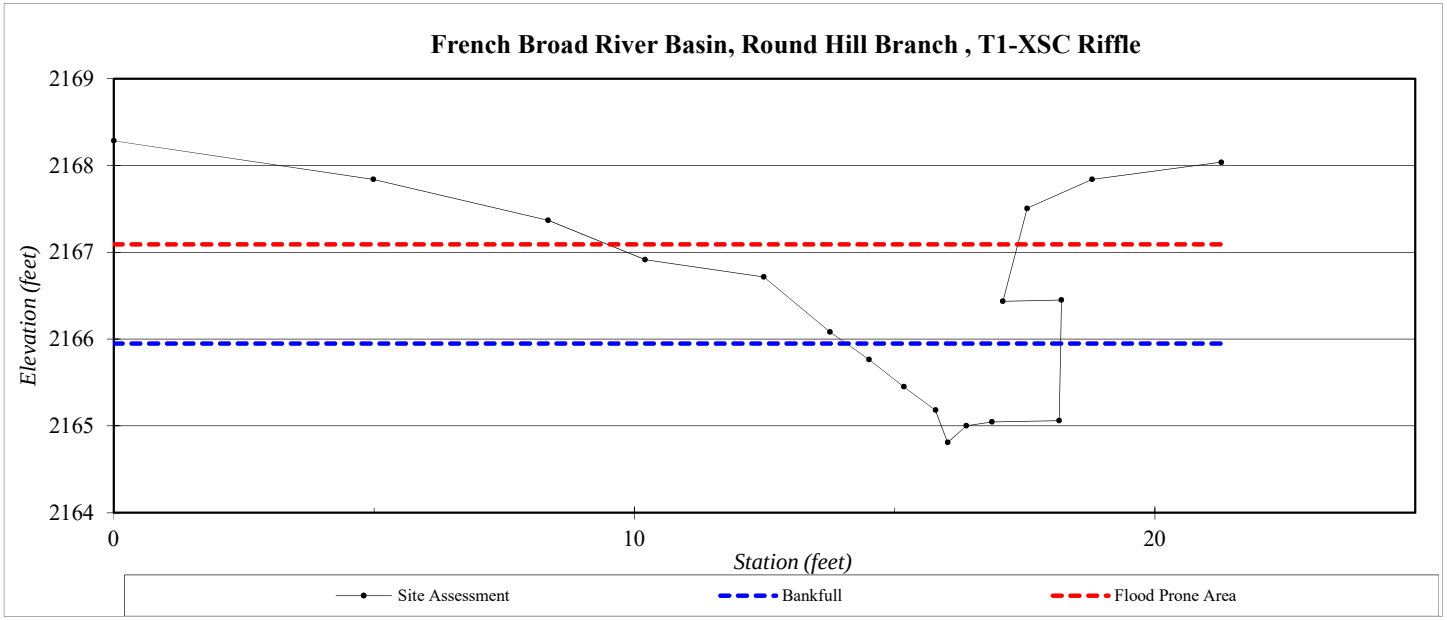
SUMMARY DATA	
Bankfull Elevation:	2170.62
Bankfull Cross-Sectional Area:	2.5
Bankfull Width:	3.8
Flood Prone Area Elevation:	2171.5
Flood Prone Width:	29.0
Max Depth at Bankfull:	0.9
Mean Depth at Bankfull:	0.7
W / D Ratio:	5.8
Entrenchment Ratio:	7.7
Bank Height Ratio:	1.0



River Basin:	French Broad
Watershed:	Round Hill Branch
XS ID	T1-XSC Riffle
Drainage Area (sq mi):	0.12
Date:	7/2/2019
Field Crew:	T. Seelinger, A. Gutierrez

Station	Elevation
0.00	2168.28
4.99	2167.84
8.34	2167.37
10.21	2166.91
12.49	2166.71
13.76	2166.08
14.51	2165.76
15.18	2165.45
15.79	2165.18
16.02	2164.81
16.38	2165.00
16.87	2165.05
18.16	2165.06
18.21	2166.45
17.08	2166.44
17.55	2167.51
18.80	2167.84
21.28	2168.04

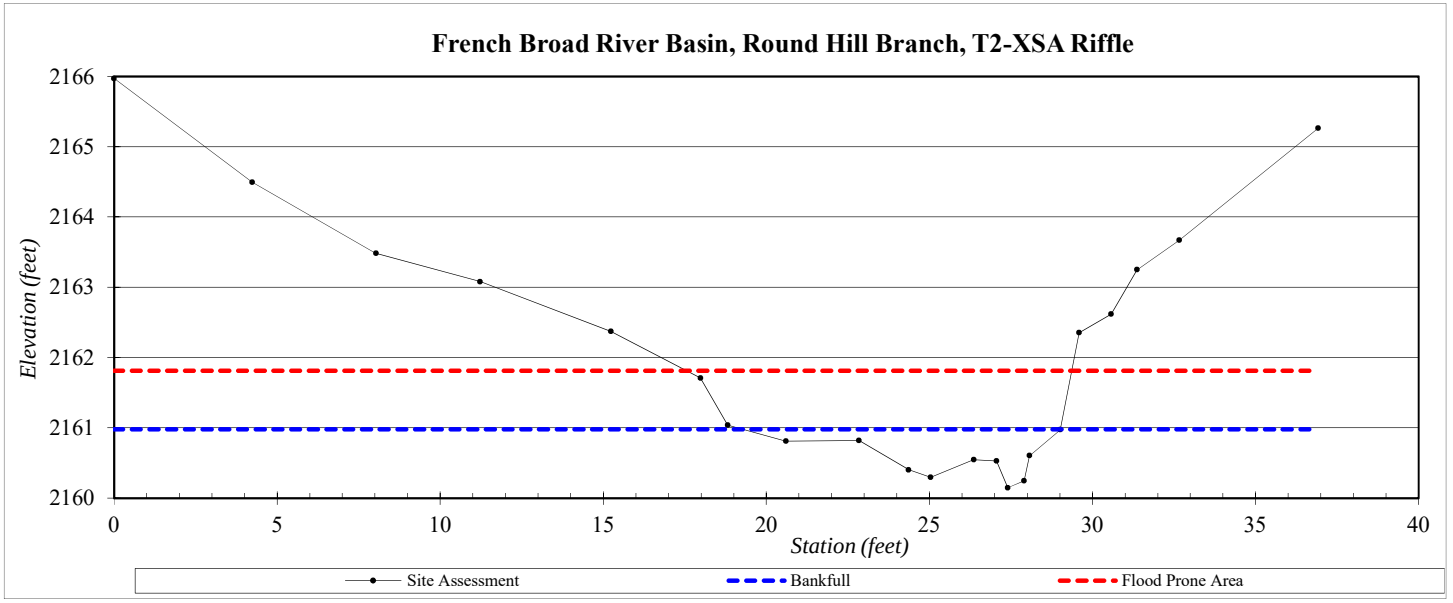
SUMMARY DATA	
Bankfull Elevation:	2165.95
Bankfull Cross-Sectional Area:	2.9
Bankfull Width:	4.1
Flood Prone Area Elevation:	2167.1
Flood Prone Width:	7.9
Max Depth at Bankfull:	1.1
Mean Depth at Bankfull:	0.7
W / D Ratio:	5.9
Entrenchment Ratio:	1.9
Bank Height Ratio:	1.7



River Basin:	French Broad
Watershed:	Round Hill Branch
XS ID	T2-XSA Riffle
Drainage Area (sq mi):	0.11
Date:	7/2/2019
Field Crew:	T. Seelinger, A. Gutierrez

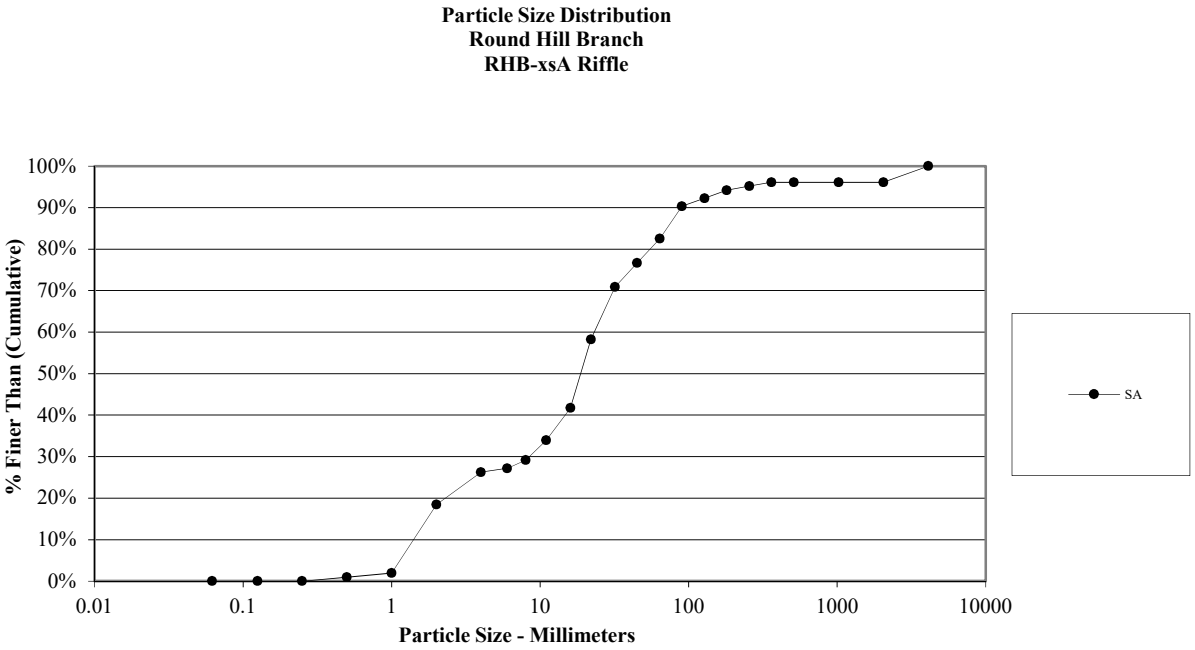
Station	Elevation
0.00	2165.97
4.23	2164.50
8.03	2163.48
11.23	2163.08
15.23	2162.37
17.98	2161.71
18.82	2161.04
20.60	2160.81
22.84	2160.82
24.36	2160.40
25.04	2160.30
26.36	2160.55
27.06	2160.53
27.40	2160.15
27.90	2160.25
28.07	2160.61
29.01	2160.98
29.59	2162.35
30.57	2162.62
31.36	2163.25
32.66	2163.67
36.91	2165.26

SUMMARY DATA	
Bankfull Elevation:	2160.98
Bankfull Cross-Sectional Area:	3.3
Bankfull Width:	9.7
Flood Prone Area Elevation:	2161.81
Flood Prone Width:	11.8
Max Depth at Bankfull:	0.8
Mean Depth at Bankfull:	0.3
W / D Ratio:	28.8
Entrenchment Ratio:	1.2
Bank Height Ratio:	1.0



Cross-Section A Riffle - SA			
Particle	Millimeter		Count
Silt/Clay	< 0.062	S/C	
Very Fine	.062 - .125	S	
Fine	.125 - .25	A	
Medium	.25 - .50	N	1
Coarse	.50 - 1	D	1
Very Coarse	1 - 2	S	17
Very Fine	2 - 4		8
Fine	4 - 5.7	G	1
Fine	5.7 - 8	R	2
Medium	8 - 11.3	A	5
Medium	11.3 - 16	V	8
Coarse	16 - 22.6	E	17
Coarse	22.6 - 32	L	13
Very Coarse	32 - 45	S	6
Very Coarse	45 - 64		6
Small	64 - 90	C	8
Small	90 - 128	O	2
Large	128 - 180	B	2
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	4
		Total	103

Note:



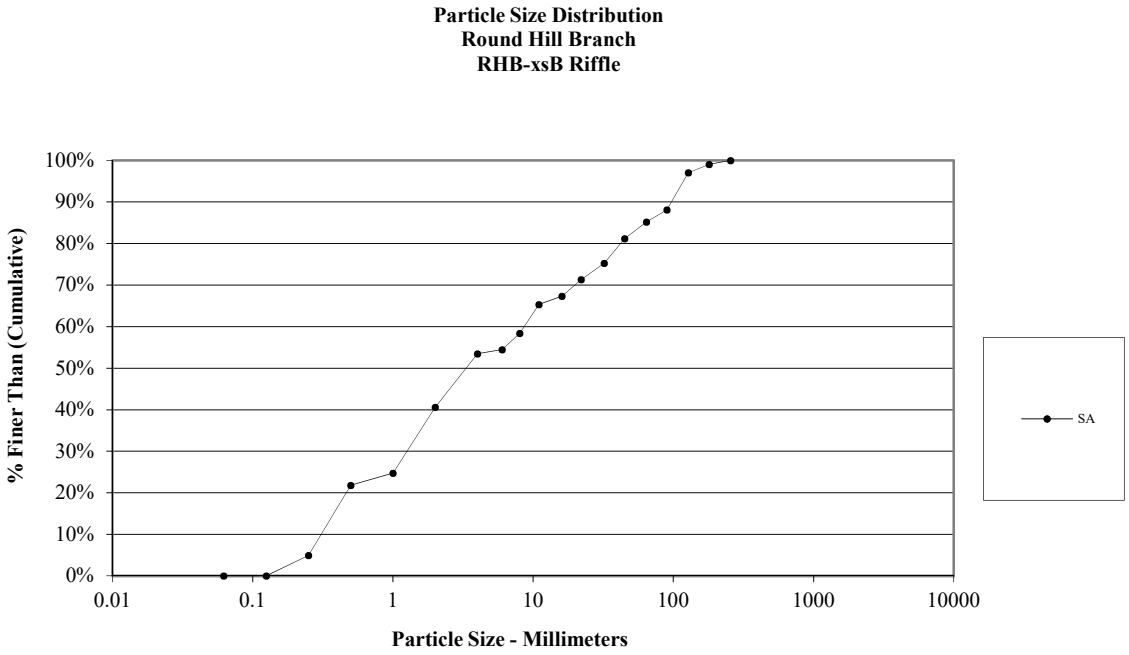
Size (mm)	
D16	1.8
D35	12
D50	19
D65	27
D84	68
D95	240

Size Distribution	
mean	11.1
dispersion	7.1
skewness	-0.19

Type	
silt/clay	0%
sand	18%
gravel	64%
cobble	10%
boulder	1%
bedrock	4%
hardpan	0%
wood/det	0%
artificial	0%

Cross-Section B Riffle - SA			
Particle	Millimeter		Count
Silt/Clay	< 0.062	S/C	
Very Fine	.062 - .125	S	
Fine	.125 - .25	A	5
Medium	.25 - .50	N	17
Coarse	.50 - 1	D	3
Very Coarse	1 - 2	S	16
Very Fine	2 - 4		13
Fine	4 - 5.7	G	1
Fine	5.7 - 8	R	4
Medium	8 - 11.3	A	7
Medium	11.3 - 16	V	2
Coarse	16 - 22.6	E	4
Coarse	22.6 - 32	L	4
Very Coarse	32 - 45	S	6
Very Coarse	45 - 64		4
Small	64 - 90	C	3
Small	90 - 128	O	9
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:



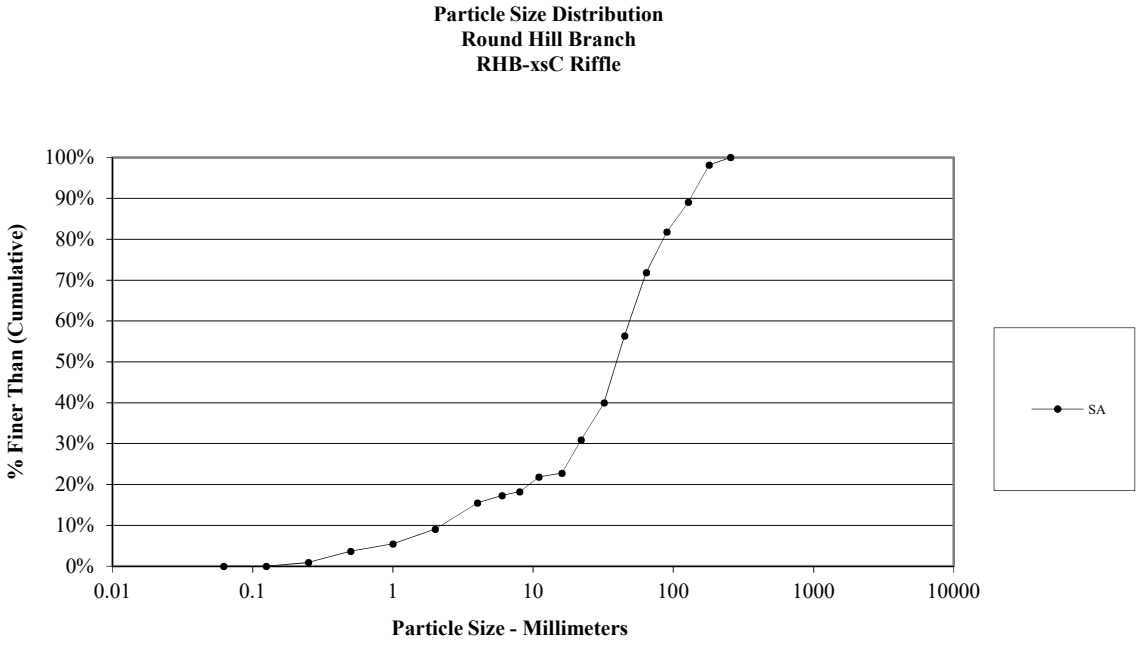
Size (mm)	
D16	0.39
D35	1.6
D50	3.3
D65	11
D84	58
D95	120

Size Distribution	
mean	4.8
dispersion	13.0
skewness	0.11

Type	
silt/clay	0%
sand	41%
gravel	45%
cobble	15%
boulder	0%
bedrock	0%
hardpan	0%
wood/det	0%
artificial	0%

Cross-Section C 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	3
Coarse	.50 - 1	D	2
Very Coarse	1 - 2	S	4
Very Fine	2 - 4		7
Fine	4 - 5.7	G	2
Fine	5.7 - 8	R	1
Medium	8 - 11.3	A	4
Medium	11.3 - 16	V	1
Coarse	16 - 22.6	E	9
Coarse	22.6 - 32	L	10
Very Coarse	32 - 45	S	18
Very Coarse	45 - 64		17
Small	64 - 90	C	11
Small	90 - 128	O	8
Large	128 - 180	B	10
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	110

Note:



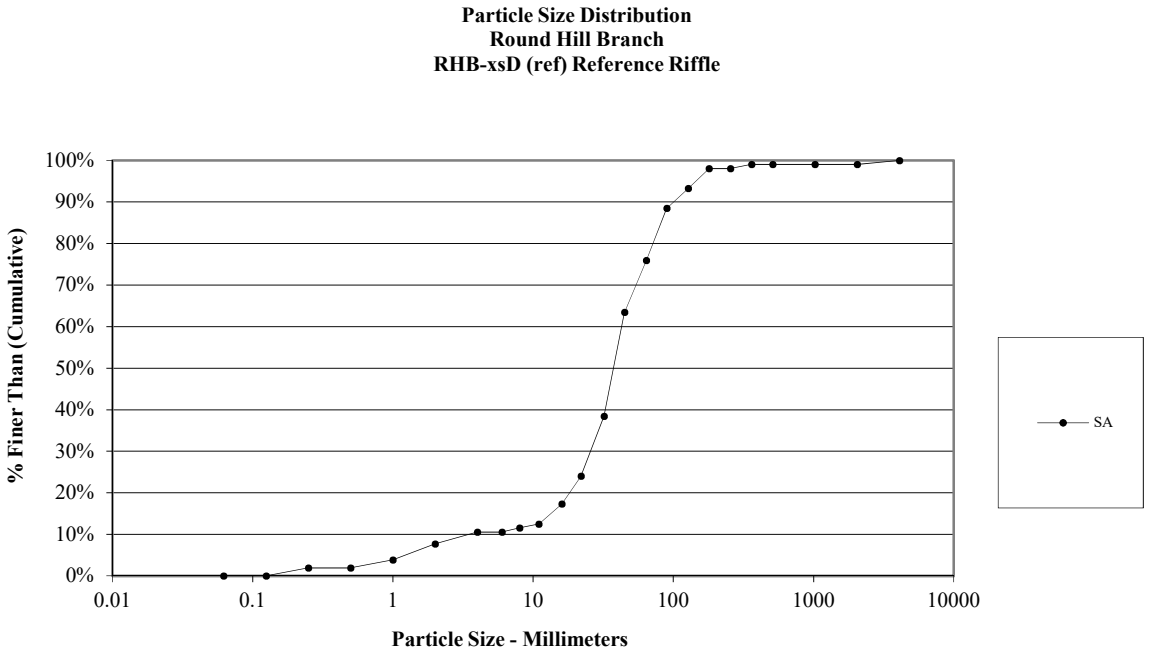
Size (mm)	
D16	4.5
D35	26
D50	39
D65	55
D84	100
D95	160

Size Distribution	
mean	21.2
dispersion	5.6
skewness	-0.23

Type	
silt/clay	0%
sand	9%
gravel	63%
cobble	28%
boulder	0%
bedrock	0%
hardpan	0%
wood/det	0%
artificial	0%

Cross-Section D (ref) Riffle SA			
Particle	Millimeter		Count
Silt/Clay	< 0.062	S/C	
Very Fine	.062 - .125	S	
Fine	.125 - .25	A	2
Medium	.25 - .50	N	
Coarse	.50 - 1	D	2
Very Coarse	1 - 2	S	4
Very Fine	2 - 4		3
Fine	4 - 5.7	G	
Fine	5.7 - 8	R	1
Medium	8 - 11.3	A	1
Medium	11.3 - 16	V	5
Coarse	16 - 22.6	E	7
Coarse	22.6 - 32	L	15
Very Coarse	32 - 45	S	26
Very Coarse	45 - 64		13
Small	64 - 90	C	13
Small	90 - 128	O	5
Large	128 - 180	B	5
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	1
		Total	104

Note:



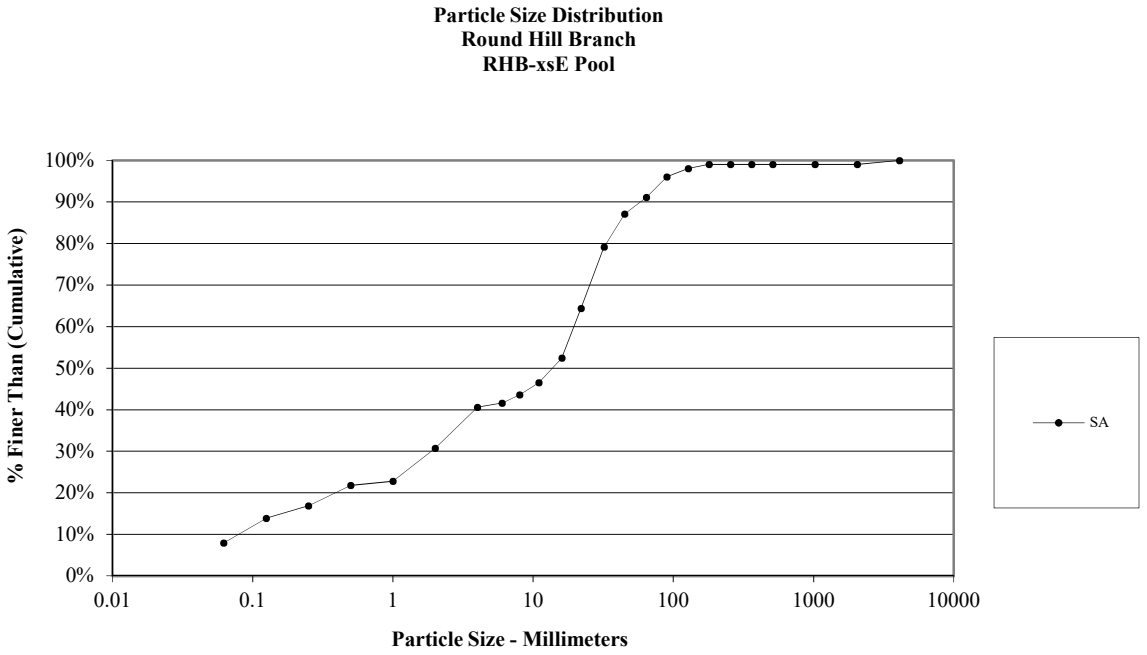
Size (mm)	
D16	14
D35	29
D50	37
D65	47
D84	80
D95	140

Size Distribution	
mean	33.5
dispersion	2.4
skewness	-0.05

Type	
silt/clay	0%
sand	8%
gravel	68%
cobble	22%
boulder	1%
bedrock	1%
hardpan	0%
wood/det	0%
artificial	0%

Cross-Section E Pool - SA			
Particle	Millimeter		Count
Silt/Clay	< 0.062	S/C	8
Very Fine	.062 - .125	S	6
Fine	.125 - .25	A	3
Medium	.25 - .50	N	5
Coarse	.50 - 1	D	1
Very Coarse	1 - 2	S	8
Very Fine	2 - 4		10
Fine	4 - 5.7	G	1
Fine	5.7 - 8	R	2
Medium	8 - 11.3	A	3
Medium	11.3 - 16	V	6
Coarse	16 - 22.6	E	12
Coarse	22.6 - 32	L	15
Very Coarse	32 - 45	S	8
Very Coarse	45 - 64		4
Small	64 - 90	C	5
Small	90 - 128	O	2
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	1
		Total	101

Note:



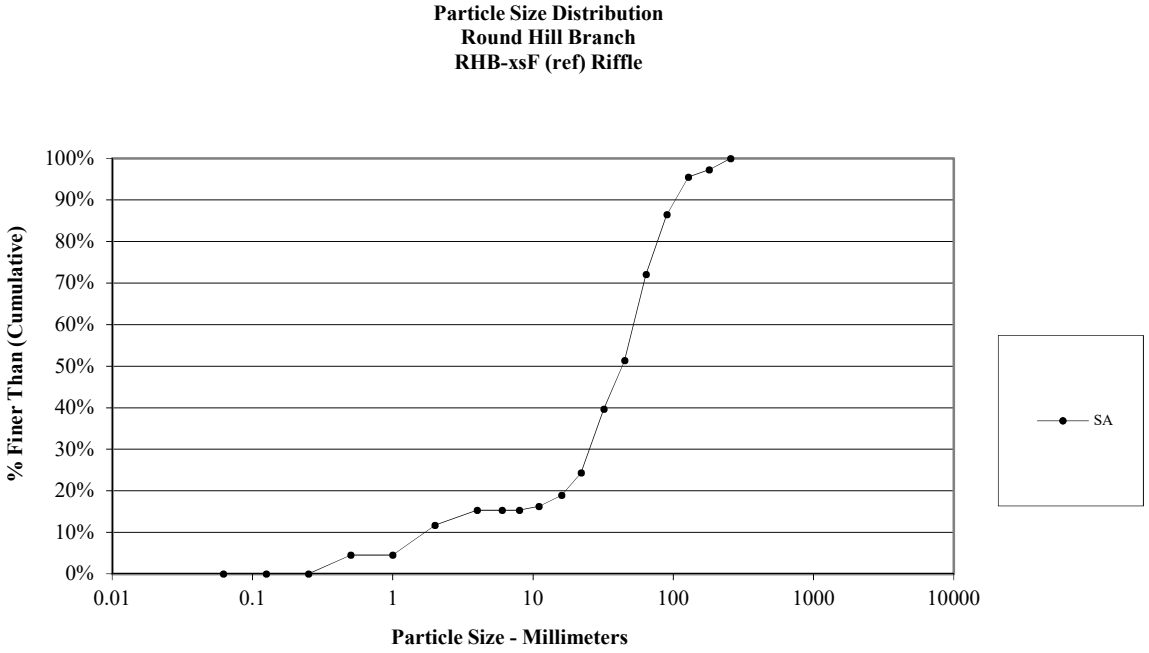
Size (mm)	
D16	0.21
D35	2.7
D50	14
D65	22
D84	39
D95	84

Size Distribution	
mean	2.9
dispersion	34.7
skewness	-0.46

Type	
silt/clay	8%
sand	23%
gravel	60%
cobble	8%
boulder	0%
bedrock	1%
hardpan	0%
wood/det	0%
artificial	0%

Cross-Section F (ref) - SA			
Particle	Millimeter		Count
Silt/Clay	< 0.062	S/C	
Very Fine	.062 - .125	S	
Fine	.125 - .25	A	
Medium	.25 - .50	N	5
Coarse	.50 - 1	D	
Very Coarse	1 - 2	S	8
Very Fine	2 - 4		4
Fine	4 - 5.7	G	
Fine	5.7 - 8	R	
Medium	8 - 11.3	A	1
Medium	11.3 - 16	V	3
Coarse	16 - 22.6	E	6
Coarse	22.6 - 32	L	17
Very Coarse	32 - 45	S	13
Very Coarse	45 - 64		23
Small	64 - 90	C	16
Small	90 - 128	O	10
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	
		Total	111

Note:



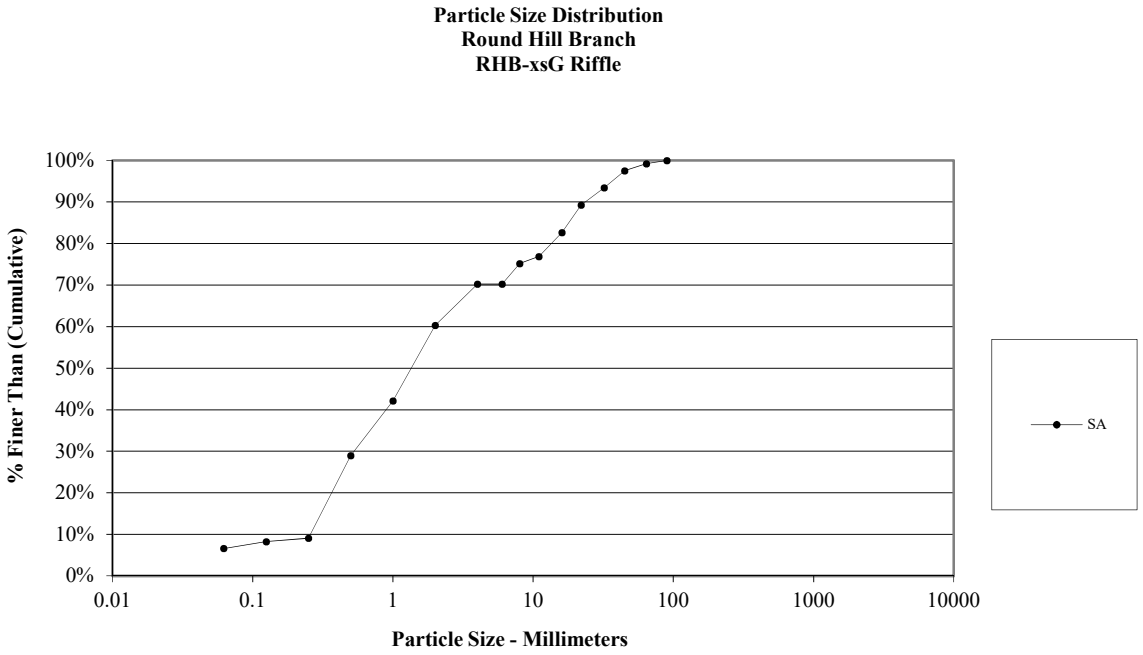
Size (mm)	
D16	10
D35	29
D50	43
D65	57
D84	85
D95	130

Size Distribution	
mean	29.2
dispersion	3.1
skewness	-0.18

Type	
silt/clay	0%
sand	12%
gravel	60%
cobble	28%
boulder	0%
bedrock	0%
hardpan	0%
wood/det	0%
artificial	0%

Cross-Section G Riffle SA			
Particle	Millimeter		Count
Silt/Clay	< 0.062	S/C	8
Very Fine	.062 - .125	S	2
Fine	.125 - .25	A	1
Medium	.25 - .50	N	24
Coarse	.50 - 1	D	16
Very Coarse	1 - 2	S	22
Very Fine	2 - 4		12
Fine	4 - 5.7	G	
Fine	5.7 - 8	R	6
Medium	8 - 11.3	A	2
Medium	11.3 - 16	V	7
Coarse	16 - 22.6	E	8
Coarse	22.6 - 32	L	5
Very Coarse	32 - 45	S	5
Very Coarse	45 - 64		2
Small	64 - 90	C	1
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	121

Note:



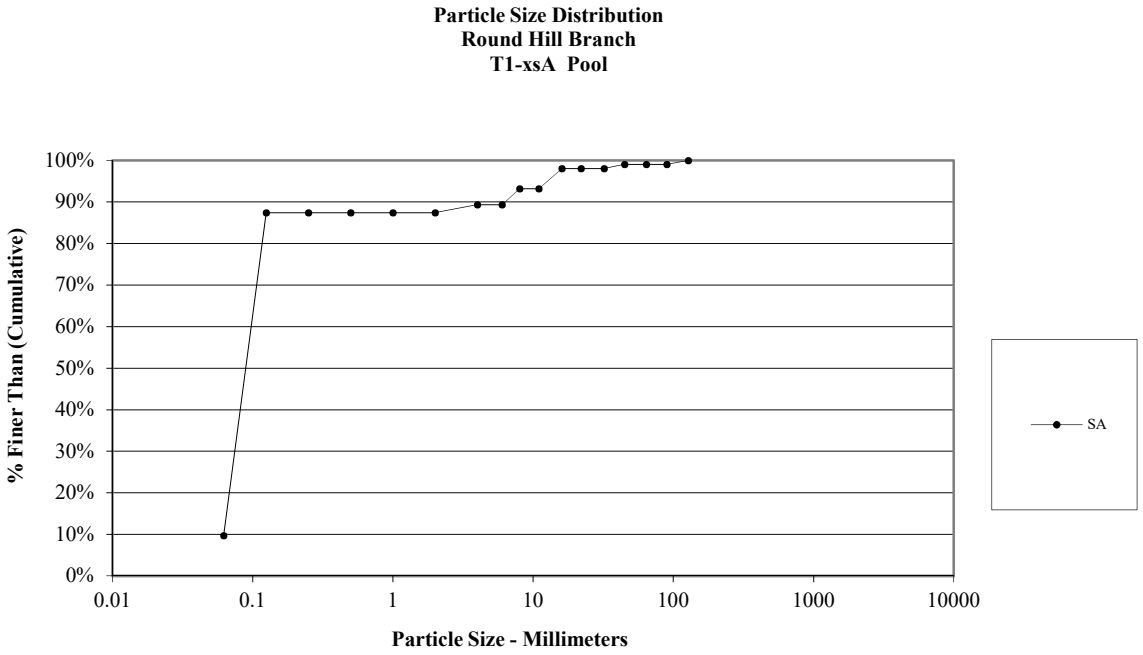
Size (mm)	
D16	0.32
D35	0.69
D50	1.3
D65	2.8
D84	17
D95	37

Size Distribution	
mean	2.3
dispersion	8.6
skewness	0.19

Type	
silt/clay	7%
sand	54%
gravel	39%
cobble	1%
boulder	0%
bedrock	0%
hardpan	0%
wood/det	0%
artificial	0%

Cross-Section T1-A Pool - SA			
Particle	Millimeter		Count
Silt/Clay	< 0.062	S/C	10
Very Fine	.062 - .125	S	80
Fine	.125 - .25	A	
Medium	.25 - .50	N	
Coarse	.50 - 1	D	
Very Coarse	1 - 2	S	
Very Fine	2 - 4		2
Fine	4 - 5.7	G	
Fine	5.7 - 8	R	4
Medium	8 - 11.3	A	
Medium	11.3 - 16	V	5
Coarse	16 - 22.6	E	
Coarse	22.6 - 32	L	
Very Coarse	32 - 45	S	1
Very Coarse	45 - 64		
Small	64 - 90	C	
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	103

Note:



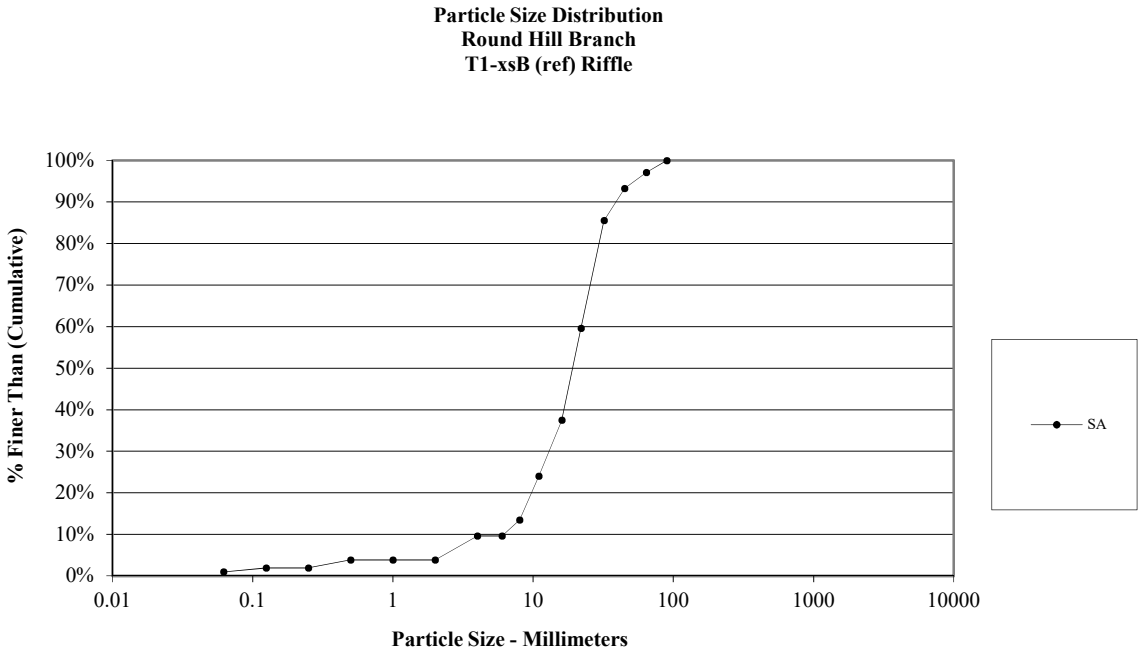
Size (mm)	
D16	0.066
D35	0.078
D50	0.089
D65	0.1
D84	0.12
D95	13

Size Distribution	
mean	0.1
dispersion	1.3
skewness	0.00

Type	
silt/clay	10%
sand	78%
gravel	12%
cobble	1%
boulder	0%
bedrock	0%
hardpan	0%
wood/det	0%
artificial	0%

Cross-Section T1-B (ref) Riffle - SA			
Particle	Millimeter		Count
Silt/Clay	< 0.062	S/C	1
Very Fine	.062 - .125	S	1
Fine	.125 - .25	A	
Medium	.25 - .50	N	2
Coarse	.50 - 1	D	
Very Coarse	1 - 2	S	
Very Fine	2 - 4		6
Fine	4 - 5.7	G	
Fine	5.7 - 8	R	4
Medium	8 - 11.3	A	11
Medium	11.3 - 16	V	14
Coarse	16 - 22.6	E	23
Coarse	22.6 - 32	L	27
Very Coarse	32 - 45	S	8
Very Coarse	45 - 64		4
Small	64 - 90	C	3
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	104

Note:



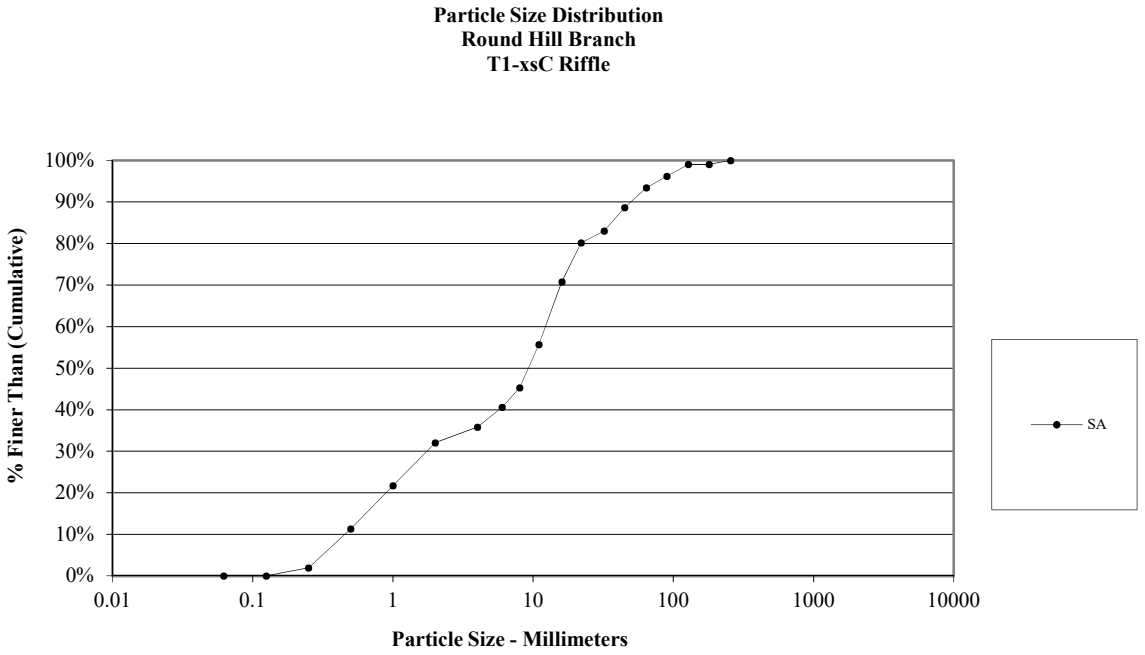
Size (mm)	
D16	8.6
D35	15
D50	19
D65	24
D84	31
D95	53

Size Distribution	
mean	16.3
dispersion	1.9
skewness	-0.09

Type	
silt/clay	1%
sand	3%
gravel	93%
cobble	3%
boulder	0%
bedrock	0%
hardpan	0%
wood/det	0%
artificial	0%

Cross-Section T1-C Riffle - SA			
Particle	Millimeter		Count
Silt/Clay	< 0.062	S/C	
Very Fine	.062 - .125	S	
Fine	.125 - .25	A	2
Medium	.25 - .50	N	10
Coarse	.50 - 1	D	11
Very Coarse	1 - 2	S	11
Very Fine	2 - 4		4
Fine	4 - 5.7	G	5
Fine	5.7 - 8	R	5
Medium	8 - 11.3	A	11
Medium	11.3 - 16	V	16
Coarse	16 - 22.6	E	10
Coarse	22.6 - 32	L	3
Very Coarse	32 - 45	S	6
Very Coarse	45 - 64		5
Small	64 - 90	C	3
Small	90 - 128	O	3
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	106

Note:



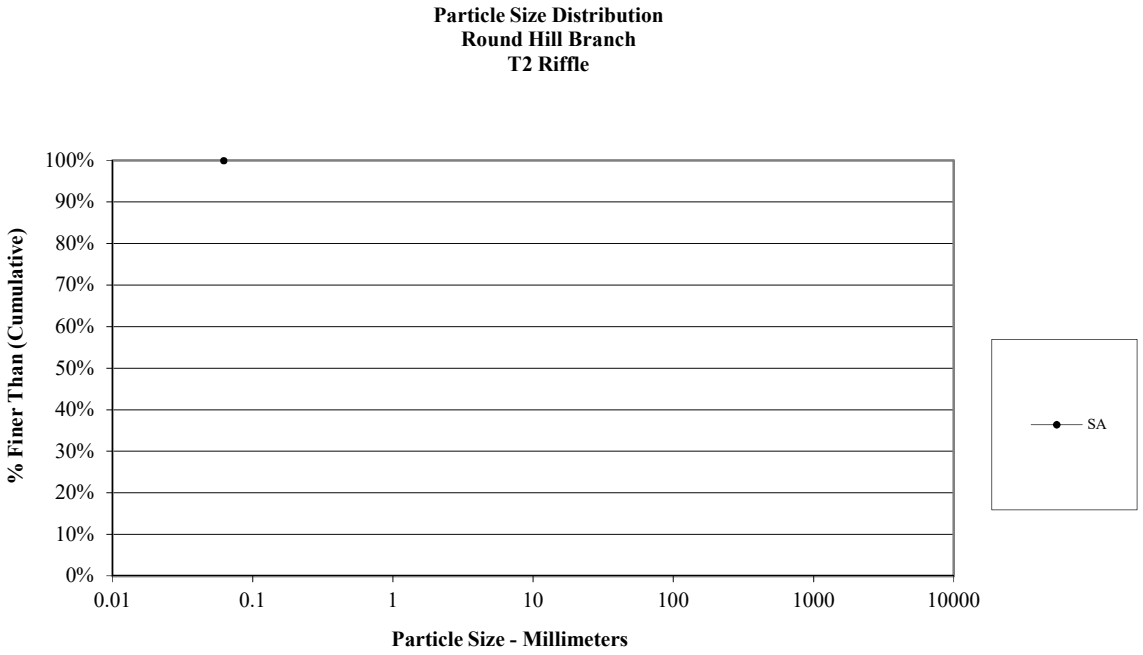
Size (mm)	
D16	0.68
D35	3.4
D50	9.2
D65	14
D84	34
D95	78

Size Distribution	
mean	4.8
dispersion	8.6
skewness	-0.22

Type	
silt/clay	0%
sand	32%
gravel	61%
cobble	7%
boulder	0%
bedrock	0%
hardpan	0%
wood/det	0%
artificial	0%

Cross-Section T2 Riffle - SA			
Particle	Millimeter		Count
Silt/Clay	< 0.062	S/C	100
Very Fine	.062 - .125	S	
Fine	.125 - .25	A	
Medium	.25 - .50	N	
Coarse	.50 - 1	D	
Very Coarse	1 - 2	S	
Very Fine	2 - 4		
Fine	4 - 5.7	G	
Fine	5.7 - 8	R	
Medium	8 - 11.3	A	
Medium	11.3 - 16	V	
Coarse	16 - 22.6	E	
Coarse	22.6 - 32	L	
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	0.062
D35	0.062
D50	0.062
D65	0.062
D84	0.062
D95	0.062

Size Distribution	
mean	0.1
dispersion	1.0
skewness	---

Type	
silt/clay	100%
sand	0%
gravel	0%
cobble	0%
boulder	0%
bedrock	0%
hardpan	0%
wood/det	0%
artificial	0%

Point / Side BAR-BULK MATERIALS SAMPLE DATA: Size Distribution Analysis

Party: A. French, J. Sullivan

Location: Round Hill Branch- XS F-Ref

Date: 7/2/2019

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)	
	0.88		0.91		1.25		1.28		1.33		1.39		1.36		1.33					
	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	0.4	1.4	0.5	1.9	0.6	1.8	0.5	2.0	0.7	2.2	0.8	2.8	1.4	4.2	2.8				
2																				
3																				
4																				
5																				
6																				
7																				
8																				
9																				
10																				
11																				
12																				
13																				
14																				
15																				
Net Wt. Total	0.4			0.5		0.6		0.5		0.7		0.8		1.4		2.8		0.0		0.0	7.7
% Grand Tot.	4.8%			5.9%		8.1%		6.3%		9.2%		10.3%		18.8%		36.8%		0.0%		0.0%	
Accum. % =<	4.8%		→	10.7%	→	18.8%	→	25.0%	→	34.2%	→	44.5%	→	63.2%	→	100.0%	→	100.0%	→	100.0%	

SURFACE MATERIALS DATA
(Two Largest Particles)

No.	Dia.	WT.
1	88mm	1.33 kg
2	68mm	0.62 kg

Bucket + Materials Weight_____

Bucket Tare Weight_____

Materials Weight_____
(Materials less than: _____mm.)

Be Sure to Add Separate Material Weights to Grand Total

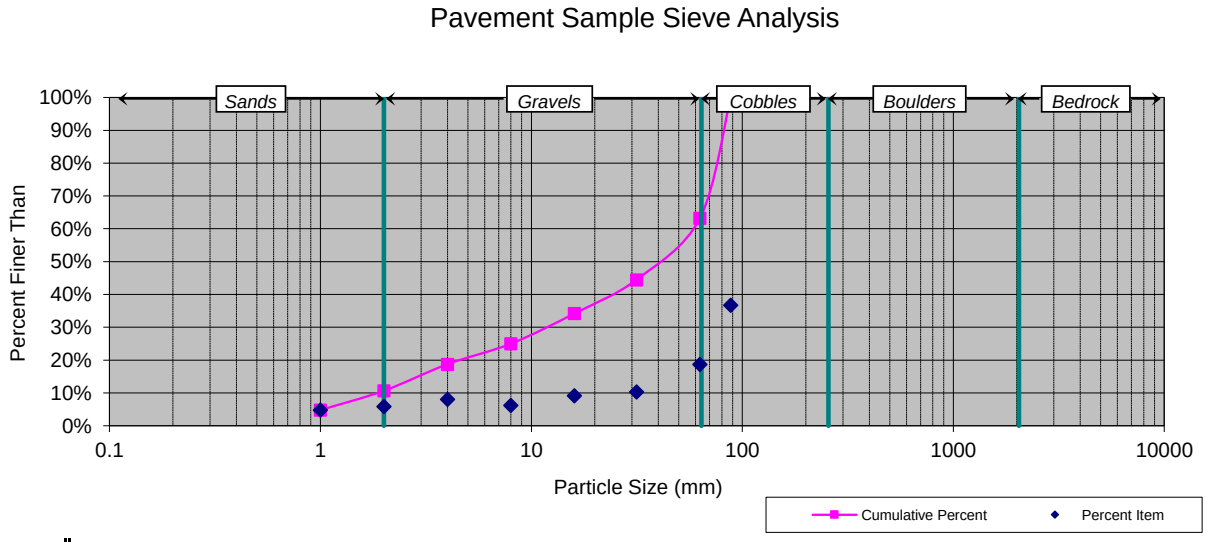
GRAND TOTAL SAMPLE WEIGHT

NOTES

Bar Sample Sieve Analysis

Smallest Sieve Passed (mm)	Weight (kg)	% Item	Percent Finer Than
1.0	0.4	4.8%	4.8%
2.0	0.5	5.9%	10.7%
4.0	0.6	8.1%	18.8%
8.0	0.5	6.3%	25.0%
16.0	0.7	9.2%	34.2%
31.5	0.8	10.3%	44.5%
63.0	1.4	18.8%	63.2%
88.0	2.8	36.8%	100.0%
Total:	7.7	100%	

Stream: Round Hill Branch
Watershed:
Location: XS F-Ref
Note:



Size percent less than (mm)					Percent by substrate type					
D16	D35	D50	D84	D95	silt/clay	sand	gravel	cobble	boulder	bedrock
3.2	16.9	38.6	76.1	84.1	0%	11%	53%	37%	---	---

Round Hill Branch Morphological Criteria

		Existing Conditions					Stable Design Ratios			Proposed Conditions				
		RHB-1 RHB-xsA - xs-D	**RHB-2** RHB-xsE - xsF	**RHB-3** RHB-xsG	**T1** T1 xsA - xsC	**T2** T2 XS				**RHB-1**	**RHB-2**	**RHB-3**	**T1**	**T2**
Stream Type (Rosgen)		F4	F4	F4	F4	G4	B4	B4c	C4	C4/B4c	C4/B4c	C4/B4c	C4/B4c	C4b
Drainage Area (mi^2)		0.44, 0.46, 0.46, 0.48	0.62, 0.63	0.74	0.11, 0.11, 0.12	0.11	~	~	~	0.48	0.63	0.74	0.12	0.11
Bankfull Width (W_{bkf}) (ft)		5.2, 5.2, 6.8, 6.8	5.5	7.5	3.8, 4.1	9.7	~	~	~	9.8	11.4	11.8	6.8	6.4
Bankfull Mean Depth (D_{bkf}) (ft)		1.0, 1.2, 0.9, 0.9	1.3	1.0	0.7, 0.7	0.3	~	~	~	0.8	0.9	0.9	0.5	0.5
Bankfull Cross-Sectional Area (A_{bkf}) (ft^2)		5.4, 6.2, 6.0, 6.3	7.1	8.0	2.5, 2.9	3.3	~	~	~	7.6	10.2	11.2	3.7	3.1
Width / Depth Ratio (W_{bkf} / D_{bkf})		5.1, 4.3, 7.6, 7.3	4.2	7.5	5.8, 5.9	28.1	12 -- 18	12 -- 18	10 -- 15	12.6	12.8	12.5	12.7	13.2
Maximum Depth (d_{mbkf}) (ft)		1.4, 1.9, 1.5, 1.2	1.6	2.1	0.9, 1.1	0.8	~	~	~	1.25	1.4	1.5	0.9	0.8
Width of Flood Prone Area (W_{fpa}) (ft)		23.1, 61+, 32+, 18.5	35+	29.4	30+, 7.9	11.8	~	~	~	40--52	44--65	38--55	35--45	27--34
Entrenchment Ratio (ER)		4.4, 11.7+, 4.7+, 2.7	6.4+	3.8	7.9+, 1.9	1.2	1.4 -- 2.2	>2.2	>2.2	4.1--5.3	3.9--5.7	3.2--4.7	5.1--6.6	4.2--5.3
Sinuosity (stream length/valley length) (K)		1.07	1.05	1.12	1.10	1.06	1.1 -- 1.2	1.1 -- 1.3	1.2 -- 1.4	1.10	1.20	1.10	1.13	1.13
Dimension	Pool Mean Depth (ft)	*	1.2	*	1.1	*	~	~	~	1.6	1.7	1.8	1.1	1.0
	Riffle Mean Depth (ft) (Dbkf)	1.0, 1.2, 0.9, 0.9	1.3	1.0	0.7, 0.7	0.3	~	~	~	0.8	0.9	0.9	0.5	0.5
	Pool Width (ft)	*	7.4	*	5.9	*	~	~	~	13.8	16.0	16.6	9.6	9.0
	Riffle Width (ft)	5.2, 5.2, 6.8, 6.8	5.5	7.5	3.8, 4.1	9.7	~	~	~	9.8	11.4	11.8	6.8	6.4
	Pool XS Area (sf)	*	9.2	*	6.2	*	~	~	~	21.6	27.0	30.0	10.4	8.7
	Riffle XS Area (sf)	5.4, 6.2, 6.0, 6.3	7.1	8.0	2.5, 2.9	3.3	~	~	~	7.6	10.2	11.2	3.7	3.1
	Pool Width / Riffle Width	*	1.3	*	1.4-1.6	*	1.1 -- 1.5	1.1 -- 1.5	1.2 -- 1.7	1.4	1.4	1.4	1.4	1.4
	Pool Max Depth / D_{bkf}	*	1.2	*	1.9	*	2.0 -- 3.5	2.0 -- 3.5	1.5 -- 3.5	3.3	3.1	3.3	3.6	3.4
	Bank Height Ratio	1.3, 1.1, 1.3, 1.0	1.0	1.0	1.0, 1.7	1.0	1.0 -- 1.1	1.0 -- 1.1	1.0 -- 1.1	1.0	1.0	1.0	1.0	1.0
	Mean Bankfull Velocity (V) (fps)	5.2, 4.2, 4.9, 4.4	5.0	5.5	4.0, 3.5	3.1	4.0 -- 6.0	4.0 -- 6.0	3.5 -- 5.0	4.5	4.1	4.4	3.4	3.9
	Bankfull Discharge (Q) (cfs)	27.6, 26.4, 29.5, 27.9	35.5	44.1	10.0, 10.0	10.3	~	~	~	34.3	41.6	48.6	12.4	12.2
Pattern	Radius of Curvature (Rc) (ft)	*	*	*	*	*	~	~	~	20--30	23--34	29--35	14--20	13--19
	Belt Width (Wblt) (ft)	*	*	*	*	*	~	~	~	30--38	38--48	37-55	21--36	14--23
	Meander Length (Lm) (ft)	*	*	*	*	*	~	~	~	89--99	106--119	130--134	58--87	71--78
	Radius of Curvature / Bankfull Width	*	*	*	*	*	n/a	n/a	2 -- 3	2.0-3.1	2.0--3.0	2.5--3.0	2.1--2.9	2.0--3.0
	Meander Width Ratio (Wblt / Wbkf)	*	*	*	*	*	n/a	n/a	3.5 -- 8	3.1-3.9	3.5--4.2	3.1--4.6	3.5--5.6	2.2--3.6
	Meander Length / Bankfull Width	*	*	*	*	*	n/a	n/a	7 -- 14	9.1-10.1	9.2--10.4	11.0--11.4	8.5-- 12.8	11.1--12.2
Profile	Valley slope	0.024	0.020	0.010	0.024	0.036	0.020 -- 0.030	0.005 -- 0.015	0.005 -- 0.015	0.023	0.017	0.018	0.021	0.035
	Average water surface slope	0.022	0.017	0.015	0.020	0.033	~	~	~	0.021	0.014	0.017	0.019	0.031
	Riffle slope	*	*	*	*	*	~	~	~	0.020-0.035	0.021-0.035	0.021-0.022	0.015-0.033	0.033-0.035
	Pool slope	*	*	*	*	*	~	~	~	0	0	0	0	0
	Pool to pool spacing	*	*	*	*	*	~	~	~	47--53	52--68	68--70	31--53	37--47
	Pool length	*	*	*	*	*	~	~	~	17--28	14--32	17--23	11--24	8--17
	Riffle Slope / Avg. Water Surface Slope	*	*	*	*	*	1.1 -- 1.8	1.1 -- 1.8	1.2 -- 1.5	0.9 -- 1.6	1.5--2.5	1.2--1.3	0.8--1.8	1.1
	Pool Slope / Avg. Water Surface Slope	*	*	*	*	*	0 -- 0.4	0 -- 0.4	0 -- 0.2	0	0	0	0	0
	Pool to Pool Spacing / Bankfull Width	*	*	*	*	*	0.5 -- 5.0	1.5 -- 6.0	3.5 -- 7	4.8 -- 5.4	4.6--6.0	5.8--5.9	4.6--7.8	5.8--7.3

* : no data shown for pools, radius of curvature or meanders in existing stream do to nature of channel

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	1.582736	81
TP	4.23	1.582736	7

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	2.2	169
TP	4.88	2.2	11

Total Estimated Nitrogen and Phosphorus Reduction from Exclusion and Buffer

	Cattle Exclusion	Buffer	Total Reduction (lbs/year)
TN	81	169	**250**
TP	7	11	**18**

Estimate of the Amount of Fecal Coliform Prevented from Entering Stream due to Livestock Exclusion

1. Fecal from direct input

	# animals	Average Weight	Total Weight	AU=total/1000
horses	3	1000	3,000	3
goats	20	100	2,000	2
An animal unit (AU) is one thousand pounds of livestock. Assume avg cow weighs 1500 lb.	-	1,500	-	-

Fecal Coliform Reduction from Direct Input (col) = 2.2 x 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 grazing)
2.200E+11	5	0.085	9.350E+10	3.413E+13	1.706E+13

2. Fecal from buffer filtering

Weighted Curve Number

Land Use / Hydrologic Soil Group	CN	Acres	Weighted CN
Pasture (Poor) / C	86	0.197487	80.7
Pasture (Fair) / C	79	0.618928	

Runoff - Q (inches)

P (annual rainfall in inches)	Weighted CN	S (inches)	Ia (inches)	Q (inches)
44	80.7	2.39	0.48	41.3

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	41.3	0.816415	33.7	914,557	1.472E+11
Pastures Grazed for Half of Year	329,500					
Pastures Grazed for Two Months of Year	340,900					

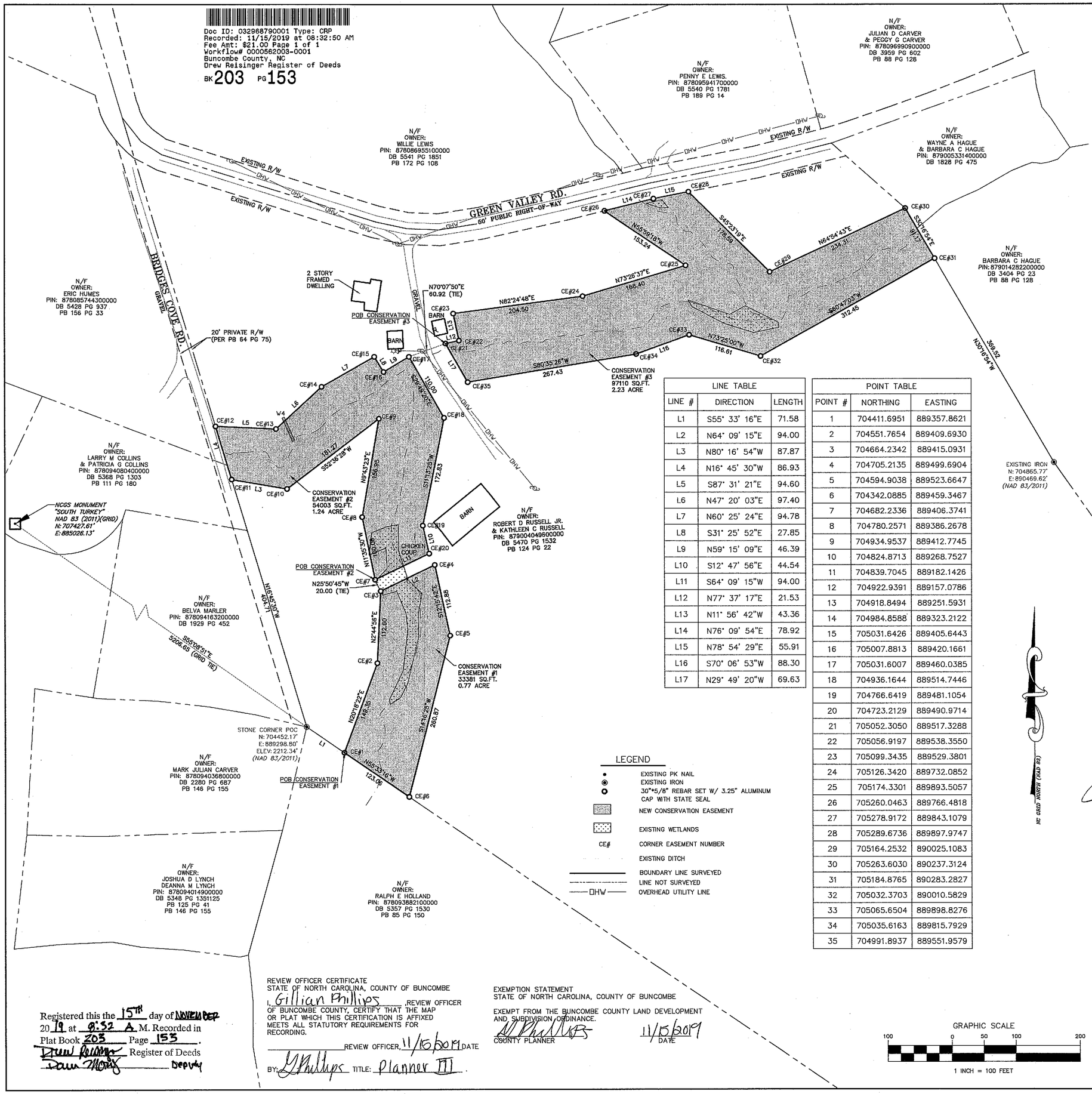
Total Coliform Reducation

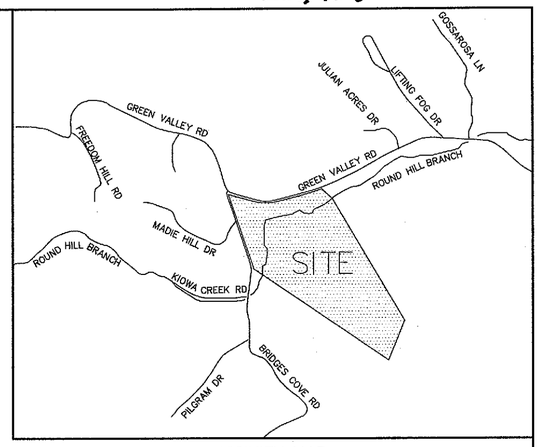
Direct Input Reduction	1.706E+13
Buffer Filtration	1.472E+11
Total (col/year)	**1.721E+13**

3. Site Protection Instrument

203/153

Doc ID: 032968790001 Type: CRP
Recorded: 11/15/2019 at 08:32:50 AM
Fee Amt: $21.00 Page 1 of 1
Workflow# 0000562003-0001
Buncombe County, NC
Drew Reisinger Register of Deeds
BK 203 PG 153





VICINITY MAP
SCALE: 1" = 1 mile

LINE TABLE		
LINE #	DIRECTION	LENGTH
L1	S55° 33' 16"E	71.58
L2	N64° 09' 15"E	94.00
L3	N80° 16' 54"W	87.87
L4	N16° 45' 30"W	86.93
L5	S87° 31' 21"E	94.60
L6	N47° 20' 03"E	97.40
L7	N60° 25' 24"E	94.78
L8	S31° 25' 52"E	27.85
L9	N59° 15' 09"E	46.39
L10	S12° 47' 56"E	44.54
L11	S64° 09' 15"W	94.00
L12	N77° 37' 17"E	21.53
L13	N11° 56' 42"W	43.36
L14	N76° 09' 54"E	78.92
L15	N78° 54' 29"E	55.91
L16	S70° 06' 53"W	88.30
L17	N29° 49' 20"W	69.63

POINT TABLE		
POINT #	NORTHING	EASTING
1	704411.6951	889357.8621
2	704551.7654	889409.6930
3	704664.2342	889415.0931
4	704705.2135	889499.6904
5	704594.9038	889523.6647
6	704342.0885	889459.3467
7	704682.2336	889406.3741
8	704780.2571	889386.2678
9	704934.9537	889412.7745
10	704824.8713	889268.7527
11	704839.7045	889182.1426
12	704922.9391	889157.0786
13	704918.8494	889251.5931
14	704984.8588	889323.2122
15	705031.6426	889405.6443
16	705007.8813	889420.1661
17	705031.6007	889460.0385
18	704936.1644	889514.7446
19	704766.6419	889481.1054
20	704723.2129	889490.9714
21	705052.3050	889517.3288
22	705056.9197	889538.3550
23	705099.3435	889529.3801
24	705126.3420	889732.0852
25	705174.3301	889893.5057
26	705260.0463	889766.4818
27	705278.9172	889843.1079
28	705289.6736	889897.9747
29	705164.2532	890025.1083
30	705263.6030	890237.3124
31	705184.8765	890283.2827
32	705032.3703	890010.5829
33	705065.6504	889898.8276
34	705035.6163	889815.7929
35	704991.8937	889551.9579

LEGEND
- EXISTING PK NAIL
- EXISTING IRON
- 30"x5/8" REBAR SET W/ 3.25" ALUMINUM CAP WITH STATE SEAL
- NEW CONSERVATION EASEMENT
- EXISTING WETLANDS
- CE# CORNER EASEMENT NUMBER
- EXISTING DITCH
- BOUNDARY LINE SURVEYED
- LINE NOT SURVEYED
- OHW OVERHEAD UTILITY LINE

NOTES

1. THIS PLAT DOES NOT REPRESENT A BOUNDARY SURVEY OF THE PARENT TRACT. 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 OTHERWISE NOTED.
3. AREA COMPUTED BY 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 OCTOBER 2018.
5. DEED REFERENCES: AS SHOWN HEREON.
6. SUBJECT PROPERTY KNOWN AS PARCEL NUMBER: 879004049600000.
7. SUBJECT EASEMENT LIES WITHIN THE AREA DESIGNATED AS ZONE "X", BASED ON FEDERAL FLOOD INSURANCE RATE MAP 37008780000J AND 3700879000J, EFFECTIVE JANUARY 1, 2010.
8. NO UNDERGROUND UTILITY LOCATING PERFORMED DURING THE COURSE OF THIS SURVEY.
9. THE STATE PLANE COORDINATES FOR THIS PROJECT WERE DETERMINED USING REAL TIME KINEMATIC GPS OBSERVATIONS (VRS) TAKEN IN OCTOBER 2018 BASED ON THE CORDS ID "NCBT" IN BUNCOMBE COUNTY.

OWNER CERTIFICATION

I HEREBY CERTIFY THAT I AM THE OWNER OF THE PROPERTY SHOWN AND DESCRIBED HEREON, WHICH IS LOCATED IN THE COUNTY OF BUNCOMBE AND THAT I HEREBY ADOPT THIS PLAN WITH MY FREE CONSENT.

Robert D Russell Jr.

ROBERT D RUSSELL JR.

SURVEYOR CERTIFICATION

I, JAMES M. GELLENTHIN, CERTIFY THAT THIS PLAT WAS DRAWN UNDER MY SUPERVISION FROM AN ACTUAL SURVEY MADE UNDER MY SUPERVISION (DEED DESCRIPTION RECORDED IN BOOK 663, PAGE 619); 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 29TH DAY OF OCTOBER, A.D., 2019.

James M Gellenthin

NORTH CAROLINA REGISTRATION NUMBER L-3860
JAMES M. GELLENTHIN

NORTH CAROLINA PROFESSIONAL SEAL L-3860 LAND SURVEYOR JAMES M. GELLENTHIN

REVIEW OFFICER CERTIFICATE
STATE OF NORTH CAROLINA, COUNTY OF BUNCOMBE
I, Gillian Phillips, REVIEW OFFICER OF BUNCOMBE COUNTY, CERTIFY THAT THE MAP OR PLAT WHICH THIS CERTIFICATION IS AFFIXED MEETS ALL STATUTORY REQUIREMENTS FOR RECORDING.
REVIEW OFFICER, 11/15/2019 DATE
BY: Gillian Phillips TITLE: Planner III

EXEMPTION STATEMENT
STATE OF NORTH CAROLINA, COUNTY OF BUNCOMBE
EXEMPT FROM THE BUNCOMBE COUNTY LAND DEVELOPMENT AND SUBDIVISION ORDINANCE.
COUNTY PLANNER
11/15/2019 DATE

Registered this the 15th day of NOVEMBER 2019 at 8:32 A M. Recorded in Plat Book 203 Page 153.
Drew Reisinger Register of Deeds
Dawn Morey Deputy

GRAPHIC SCALE
100 0 50 100 200
1 INCH = 100 FEET

NC GRID NORTH (NAD 83)

FINAL PLAT
CONSERVATION EASEMENT
FOR
STATE OF NORTH CAROLINA
DEPARTMENT OF ENVIRONMENTAL QUALITY
DIVISION OF MITIGATION SERVICES
PROJECT NAME: ROUND HILL BRANCH RESTORATION SITE
DMS PROJECT #: 100066
SPO FILE NO. 11-DK
LEICESTER TOWNSHIP, BUNCOMBE COUNTY
NORTH CAROLINA

DATE:	SCALE:	SHEET:
OCT 29, 2019	1" = 100'	1 OF 1

KCI ASSOCIATES OF N.C.
ENGINEERS, SURVEYORS AND PLANNERS
4505 FALLS OF NEUSE ROAD, FLOOR 4
RALEIGH, NC 27607
PHONE (919) 783-9214 * FAX (919) 783-9266
KCI ASSOCIATES OF NORTH CAROLINA C-0764

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 – 7 year Timeframe			
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 site has been constructed in its entirety, to include planting, and an as-built report has been produced. As-built reports must be sealed by an engineer prior to project closeout, if appropriate but not prior to the initial allocation of released credits.
d. Receipt of necessary DA permit authorization or written DA approval for projects where DA permit issuance is not required.

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 the 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 Control	The site will be monitored for the presence of beaver. Adaptive management approaches will be used to evaluate whether or not beaver or their structures should be controlled at the site.

7. Stream and Wetland Delineation (Incl. Stream Identification Forms)

NC DWQ Stream Identification Form Version 4.11 Round Hill Branch

Date: 1/23/2018	**Project/Site**: Round Hill Branch	**Latitude:** 35.6291
Evaluator: J. Sullivan	**County:** Buncombe	**Longitude:** -82.7381
Total Points: *Stream is at least intermittent if ≥ 19 or perennial if ≥ 30** 35	**Stream Determination (circle one)** Ephemeral Intermittent **Perennial**	**Other** *e.g. Quad Name*:

A. Geomorphology (Subtotal = 18.5)	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 = 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: Many right snails, one caddisfly, one dragonfly

Sketch:

NC DWQ Stream Identification Form Version 4.11 T1 Above Spring

Date: 1/23/18	**Project/Site:** Round Hill Branch	**Latitude:** 35.6293
Evaluator: J. Sullivan	**County:** Buncombe	**Longitude:** -82.7388
Total Points: *Stream is at least intermittent if ≥ 19 or perennial if ≥ 30** 25.5	**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 = 7.5)				
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: 1 Right Snail

Sketch:

NC DWQ Stream Identification Form Version 4.11

T2

Date: 1/23/18	**Project/Site:** Round Hill Branch	**Latitude:** 35.6304
Evaluator: J. Sullivan	**County:** Buncombe	**Longitude:** -82.7368
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 = 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)				
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: Many midges

Sketch:

WETLAND DETERMINATION DATA FORM – Eastern Mountains and Piedmont Region

Project/Site: Round Hill Branch City/County: Buncombe Sampling Date: 1/18/19

Applicant/Owner: KCI State: NC Sampling Point: W1 wet

Investigator(s): J. Sullivan Section, Township, Range:

Landform (hillslope, terrace, etc.): Floodplain Local relief (concave, convex, none): concave Slope (%): 3%

Subregion (LRR or MLRA): N-130B Lat: 35.6288 Long: -82.7381 Datum: NAD83

Soil Map Unit Name: Tate loam 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? (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: Wetland is located in a 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)
- 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)
- ___ FAC-Neutral Test (D5)

Field Observations:

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

Water Table Present? Yes X No _____ Depth (inches): 3

Saturation Present? (includes capillary fringe) Yes X No _____ Depth (inches): 1

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: Entire)	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: Entire)			
1. None			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
	= Total Cover		

50% of total cover: _____ 20% of total cover: _____

Herb Stratum (Plot size: Entire)			
1. Juncus effusus	60	X	FACW
2. Carex sp.	20	X	FACW
3. Schedonorus arundinaceus	20	X	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: Entire)			
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: 3 (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: 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
0-1	10YR 5/2	100					L	
1-5	10YR 5/2	90	7.5 YR 4/6	10	C	PL	CL	
5-13	10YR 4/1	95	7.5 YR 5/6	5	C	M PL	C	
13-18+	10YR 3/1	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)
- 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: Round Hill Branch City/County: Buncombe Sampling Date: 1/18/19

Applicant/Owner: KCI State: NC Sampling Point: W1up

Investigator(s): J. Sullivan Section, Township, Range:

Landform (hillslope, terrace, etc.): Hillslope Local relief (concave, convex, none): None Slope (%): 5%

Subregion (LRR or MLRA): N-130B Lat: 35.6290 Long: -82.7386 Datum: NAD83

Soil Map Unit Name: Tate loam 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? (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:

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:

Located in cattle pasture

VEGETATION (Four Strata) – Use scientific names of plants. Sampling Point: W1 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	90	X	FACU
2. Plantage major	10		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: 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: W1 up

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
0-18+	7.5YR 5/8	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:

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): Round Hill Branch Restoration Site
2. Date of evaluation: 1/23/2018
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: Round hill Branch
7. River basin: French Broad
8. Site coordinates (decimal degrees, at lower end of assessment reach): 35.6290 / -82.7381

STREAM INFORMATION: (depth and width can be approximations)

Round Hill Branch

9. Site number (show on attached map): Top
10. Length of assessment reach evaluated (feet): 50
11. Channel depth from bed (in riffle, if present) to top of bank (feet): 3.5 ☐Unable to assess channel depth.
12. Channel width at top of bank (feet): 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:

Draft NC SAM Stream Rating Sheet
Accompanies User Manual Version 2.1

Stream Site Name	Round Hill Branch Restoration Site	Date of Assessment	1/23/2018
Stream Category	Mb2	Assessor Name/Organization	J. Sullivan / KCI

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

Function Class Rating Summary	USACE/ All Streams	NCDWR Intermittent
(1) Hydrology	**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	**MEDIUM**	
(2) Stream/Intertidal Zone Interaction	NA	
(2) Longitudinal Tidal Flow	NA	
(2) Tidal Marsh Stream Stability	NA	
(3) Tidal Marsh Channel Stability	NA	
(3) Tidal Marsh Stream Geomorphology	NA	
(1) Water Quality	**LOW**	
(2) Baseflow	**HIGH**	
(2) Streamside Area Vegetation	**LOW**	
(3) Upland Pollutant Filtration	**LOW**	
(3) Thermoregulation	**LOW**	
(2) Indicators of Stressors	**YES**	
(2) Aquatic Life Tolerance	**MEDIUM**	
(2) Intertidal Zone Filtration	NA	
(1) Habitat	**LOW**	
(2) In-stream Habitat	**MEDIUM**	
(3) Baseflow	**HIGH**	
(3) Substrate	**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): Round Hill Branch Restoration Site
2. Date of evaluation: 1/23/2018
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: Round hill Branch
7. River basin: French Broad
8. Site coordinates (decimal degrees, at lower end of assessment reach): 35.6301 / -82.7360

STREAM INFORMATION: (depth and width can be approximations)

9. Site number (show on attached map): Round Hill Branch Lower
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		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:

Draft NC SAM Stream Rating Sheet
Accompanies User Manual Version 2.1

Stream Site Name	Round Hill Branch Restoration Site	Date of Assessment	1/23/2018
Stream Category	Mb3	Assessor Name/Organization	J. Sullivan / KCI

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

Function Class Rating Summary	USACE/ All Streams	NCDWR Intermittent
(1) Hydrology	**LOW**	
(2) Baseflow	**HIGH**	
(2) Flood Flow	**LOW**	
(3) Streamside Area Attenuation	**LOW**	
(4) Floodplain Access	**LOW**	
(4) Wooded Riparian Buffer	**LOW**	
(4) Microtopography	NA	
(3) Stream Stability	**LOW**	
(4) Channel Stability	**LOW**	
(4) Sediment Transport	**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	**MEDIUM**	
(2) Baseflow	**HIGH**	
(2) Streamside Area Vegetation	**LOW**	
(3) Upland Pollutant Filtration	**MEDIUM**	
(3) Thermoregulation	**LOW**	
(2) Indicators of Stressors	**NO**	
(2) Aquatic Life Tolerance	**MEDIUM**	
(2) Intertidal Zone Filtration	NA	
(1) Habitat	**LOW**	
(2) In-stream Habitat	**LOW**	
(3) Baseflow	**HIGH**	
(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): Round Hill Branch Restoration Site
2. Date of evaluation: 1/23/2018
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: Round hill Branch
7. River basin: French Broad
8. Site coordinates (decimal degrees, at lower end of assessment reach): 35.6293 / -82.7388

STREAM INFORMATION: (depth and width can be approximations)

9. Site number (show on attached map): T1
10. Length of assessment reach evaluated (feet): 50
11. Channel depth from bed (in riffle, if present) to top of bank (feet): 0.5 ☐Unable to assess channel depth.
12. Channel width at top of bank (feet): 1.5
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		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:

Draft NC SAM Stream Rating Sheet
Accompanies User Manual Version 2.1

Stream Site Name	Round Hill Branch Restoration Site	Date of Assessment	1/23/2018
Stream Category	Mb2	Assessor Name/Organization	J. Sullivan / KCI

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

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

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): Round Hill Branch Restoration Site
2. Date of evaluation: 1/23/2018
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: Round hill Branch
7. River basin: French Broad
8. Site coordinates (decimal degrees, at lower end of assessment reach): 35.6302 / -82.7365

STREAM INFORMATION: (depth and width can be approximations)

9. Site number (show on attached map): T2
10. Length of assessment reach evaluated (feet): 50
11. Channel depth from bed (in riffle, if present) to top of bank (feet): 1.5 ☐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:

Draft NC SAM Stream Rating Sheet
Accompanies User Manual Version 2.1

Stream Site Name	Round Hill Branch Restoration Site	Date of Assessment	1/23/2018
Stream Category	Mb2	Assessor Name/Organization	J. Sullivan / KCI

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

Function Class Rating Summary	USACE/ All Streams	NCDWR Intermittent
(1) Hydrology	**LOW**	**LOW**
(2) Baseflow	**MEDIUM**	**MEDIUM**
(2) Flood Flow	**LOW**	**LOW**
(3) Streamside Area Attenuation	**LOW**	**LOW**
(4) Floodplain Access	**MEDIUM**	**MEDIUM**
(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	**MEDIUM**	**MEDIUM**
(2) Streamside Area Vegetation	**LOW**	**LOW**
(3) Upland Pollutant Filtration	**MEDIUM**	**MEDIUM**
(3) Thermoregulation	**LOW**	**LOW**
(2) Indicators of Stressors	**NO**	**NO**
(2) Aquatic Life Tolerance	**LOW**	**NA**
(2) Intertidal Zone Filtration	NA	NA
(1) Habitat	**LOW**	**LOW**
(2) In-stream Habitat	**MEDIUM**	**MEDIUM**
(3) Baseflow	**MEDIUM**	**MEDIUM**
(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 WAM FIELD ASSESSMENT FORM
Accompanies User Manual Version 5.0

USACE AID #		NCDWR#	
Project Name	Round Hill Branch Restoration Site	Date of Evaluation	1/18/2019
Applicant/Owner Name	KCI	Wetland Site Name	W1
Wetland Type	Bottomland Hardwood Forest	Assessor Name/Organization	J. Sullivan / KCI
Level III Ecoregion	Blue Ridge Mountains	Nearest Named Water Body	Round Hill 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)	35.6288 / -82.7381

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)

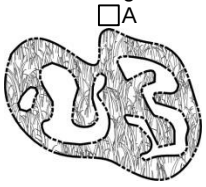
☐A Majority of canopy trees have stems > 6 inches in diameter at breast height (DBH); many large trees (> 12 inches DBH) are present.
☐B Majority of canopy trees have stems between 6 and 12 inches DBH, few are > 12 inch DBH.
☒C Majority of canopy trees are < 6 inches DBH or no trees.

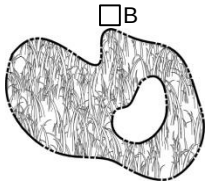
20. Large Woody Debris – wetland type condition metric (skip for all marshes)

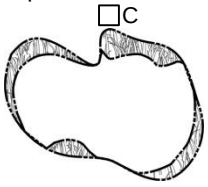
Include both natural debris and man-placed natural debris.
☐A Large logs (more than one) are visible (> 12 inches in diameter, or large relative to species present and landscape stability).
☒B Not A

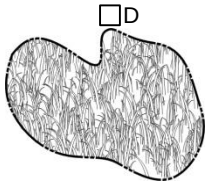
21. Vegetation/Open Water Dispersion – wetland type/open water condition metric (evaluate for Non-Tidal Freshwater Marsh only)

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
Livestock have access to the wetland

NC WAM Wetland Rating Sheet
Accompanies User Manual Version 5.0

Wetland Site Name	W1	Date of Assessment	1/18/2019
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)	YES
Assessment area is located within 50 feet of a natural tributary or other open water (Y/N)	YES
Assessment area is substantially altered by beaver (Y/N)	NO
Assessment area experiences overbank flooding during normal rainfall conditions (Y/N)	YES
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	**MEDIUM**
		Condition/Opportunity	**MEDIUM**
		Opportunity Presence (Y/N)	**NO**
	Particulate Change	Condition	**LOW**
		Condition/Opportunity	**LOW**
		Opportunity Presence (Y/N)	**NO**
	Soluble Change	Condition	**LOW**
		Condition/Opportunity	**LOW**
		Opportunity Presence (Y/N)	**NO**
	Physical Change	Condition	**LOW**
		Condition/Opportunity	**LOW**
		Opportunity Presence (Y/N)	**NO**
	Pollution Change	Condition	NA
		Condition/Opportunity	NA
		Opportunity Presence (Y/N)	NA
Habitat	Physical Structure	Condition	**LOW**
	Landscape Patch Structure	Condition	**LOW**
	Vegetation Composition	Condition	**MEDIUM**

Function Rating Summary

Function	Metrics	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	Round Hill Branch Restoration Site	Date of Evaluation	1/18/2019
Applicant/Owner Name	KCI	Wetland Site Name	W2 & W3
Wetland Type	Bottomland Hardwood Forest	Assessor Name/Organization	J. Sullivan / KCI
Level III Ecoregion	Blue Ridge Mountains	Nearest Named Water Body	Round Hill 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)	35.6288 / -82.7381

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.

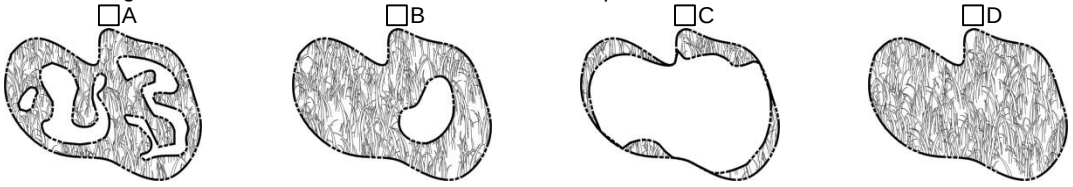
20. Large Woody Debris – wetland type condition metric (skip for all marshes)

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

NC WAM Wetland Rating Sheet
Accompanies User Manual Version 5.0

Wetland Site Name	W2 & W3	Date of Assessment	1/18/2019
Wetland Type	Bottomland Hardwood Forest	Assessor Name/Organization	J. Sullivan / KCI

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

Sub-function Rating Summary

Function	Sub-function	Metrics	Rating
Hydrology	Surface Storage and Retention	Condition	**LOW**
	Sub-surface Storage and Retention	Condition	**LOW**
Water Quality	Pathogen Change	Condition	**HIGH**
		Condition/Opportunity	**HIGH**
		Opportunity Presence (Y/N)	**YES**
	Particulate Change	Condition	**LOW**
		Condition/Opportunity	**LOW**
		Opportunity Presence (Y/N)	**YES**
	Soluble Change	Condition	**MEDIUM**
		Condition/Opportunity	**HIGH**
		Opportunity Presence (Y/N)	**YES**
	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	**MEDIUM**

Function Rating Summary

Function	Metrics	Rating
Hydrology	Condition	**LOW**
Water Quality	Condition	**MEDIUM**
	Condition/Opportunity	**HIGH**
	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	Round Hill Branch Restoration Site	Date of Evaluation	1/18/2019
Applicant/Owner Name	KCI	Wetland Site Name	W4
Wetland Type	Headwater Forest	Assessor Name/Organization	J. Sullivan / KCI
Level III Ecoregion	Blue Ridge Mountains	Nearest Named Water Body	Round Hill 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)	35.6288 / -82.7381

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.

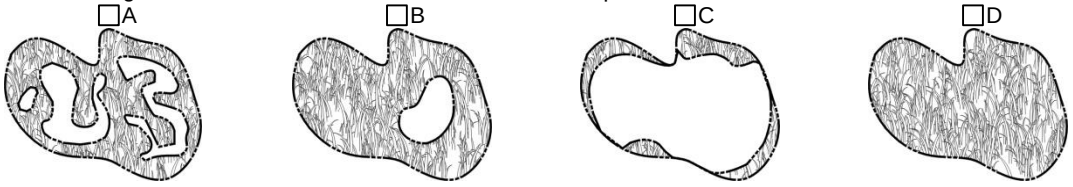
20. Large Woody Debris – wetland type condition metric (skip for all marshes)

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
Wetland has been ditched

NC WAM Wetland Rating Sheet
Accompanies User Manual Version 5.0

Wetland Site Name	W4	Date of Assessment	1/18/2019
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)	YES
Assessment area is located within 50 feet of a natural tributary or other open water (Y/N)	YES
Assessment area is substantially altered by beaver (Y/N)	NO
Assessment area experiences overbank flooding during normal rainfall conditions (Y/N)	YES
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	**HIGH**
		Condition/Opportunity	**HIGH**
		Opportunity Presence (Y/N)	**YES**
	Particulate Change	Condition	**LOW**
		Condition/Opportunity	NA
		Opportunity Presence (Y/N)	NA
	Soluble Change	Condition	**HIGH**
		Condition/Opportunity	**HIGH**
		Opportunity Presence (Y/N)	**YES**
	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	**MEDIUM**

Function Rating Summary

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

Overall Wetland Rating **LOW**

8. Approved Jurisdictional Determination

U.S. ARMY CORPS OF ENGINEERS
WILMINGTON DISTRICT

Action Id. **2018-01168** County: **Buncombe** U.S.G.S. Quad: **NC- Leicester**

NOTIFICATION OF JURISDICTIONAL DETERMINATION

Owner: **Robert D. Russell, Jr.**
Address: **588 Green Valley Road**
Leicester, NC 28748

Size (acres) **3.55 acres**
Nearest Waterway **Newfound Creek**
USGS HUC **06010105**

Nearest Town **Leicester**
River Basin **French Broad-Holston**
Coordinates Latitude: **35.6305**
Longitude: **-82.7369**

Location description: **The site for the proposed Round Hill Branch Restoration/Mitigation Site is located at 588 Green Valley Road, in Leicester, NC.**

Indicate Which of the Following Apply:

A. Preliminary Determination

☒ There appear to be **waters, including wetlands** on the above described project area/property, that may be subject to Section 404 of the Clean Water Act (CWA)(33 USC § 1344) and/or Section 10 of the Rivers and Harbors Act (RHA) (33 USC § 403). The **waters, including wetlands** have been delineated, and the delineation has been verified by the Corps to be sufficiently accurate and reliable. The approximate boundaries of these waters are shown on the enclosed delineation map dated **3/1/2019**. Therefore this preliminary jurisdiction determination may be used in the permit evaluation process, including determining compensatory mitigation. For purposes of computation of impacts, compensatory mitigation requirements, and other resource protection measures, a permit decision made on the basis of a preliminary JD will treat all waters and wetlands that would be affected in any way by the permitted activity on the site as if they are jurisdictional waters of the U.S. This preliminary determination is not an appealable action under the Regulatory Program Administrative Appeal Process (Reference 33 CFR Part 331). However, you may request an approved JD, which is an appealable action, by contacting the Corps district for further instruction.

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

B. Approved Determination

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

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

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

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

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

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

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

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

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

C. Basis For Determination: Basis For Determination: See the preliminary jurisdictional determination form dated 4/25/2019.

D. Remarks: Jurisdictional areas were verified through a site visit and this determination only applies to areas within the proposed easement boundaries as noted in red on the attached Figure 3.

E. Attention USDA Program Participants

This delineation/determination has been conducted to identify the limits of Corps' Clean Water Act jurisdiction for the particular site identified in this request. The delineation/determination may not be valid for the wetland conservation provisions of the Food Security Act of 1985. If you or your tenant are USDA Program participants, or anticipate participation in USDA programs, you should request a certified wetland determination from the local office of the Natural Resources Conservation Service, prior to starting work.

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

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

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

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

Corps Regulatory Official: FUEMMELER.AMANDA.JONES.1242835090 Digitally signed by FUEMMELER.AMANDA.JONES.12428 35090 Date: 2019.04.26 07:57:03 -04'00'

Date of JD: **4/25/2019** Expiration Date of JD: **Not applicable**

2018-01168

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

Copy furnished:

Agent:	**KCI Technologies, Inc.**
	Attn: Joe Sullivan
Address:	**4505 Falls of Neuse Road, Suite 400**
	Raleigh, NC 27609
Telephone Number:	**919-278-2533**
E-mail:	**joe.sullivan@kci.com**

NOTIFICATION OF44 ADMINISTRATIVE APPEAL OPTIONS AND PROCESS AND REQUEST FOR APPEAL

Applicant: **Robert D. Russell, Jr.**,	File Number: **2018-01168**	Date:**04/25/2019**

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

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

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

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

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

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

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

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

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

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

SECTION II - REQUEST FOR APPEAL or OBJECTIONS TO AN INITIAL PROFFERED PERMIT		
REASONS FOR APPEAL OR OBJECTIONS: (Describe your reasons for appealing the decision or your objections to an initial proffered permit in clear concise statements. You may attach additional information to this form to clarify where your reasons or objections are addressed in the administrative record.)		
ADDITIONAL INFORMATION: The appeal is limited to a review of the administrative record, the Corps memorandum for the record of the appeal conference or meeting, and any supplemental information that the review officer has determined is needed to clarify the administrative record. Neither the appellant nor the Corps may add new information or analyses to the record. However, you may provide additional information to clarify the location of information that is already in the administrative record.		
POINT OF CONTACT FOR QUESTIONS OR INFORMATION:		
If you have questions regarding this decision and/or the appeal process you may contact: **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**	If you only have questions regarding the appeal process you may also contact: Mr. Jason Steele, Administrative Appeal Review Officer CESAD-PDO U.S. Army Corps of Engineers, South Atlantic Division 60 Forsyth Street, Room 10M15 Atlanta, Georgia 30303-8801 Phone: (404) 562-5137	
RIGHT OF ENTRY: Your signature below grants the right of entry to Corps of Engineers personnel, and any government consultants, to conduct investigations of the project site during the course of the appeal process. You will be provided a 15 day notice of any site investigation, and will have the opportunity to participate in all site investigations.		
_____ Signature of appellant or agent.	Date:	Telephone number:

For appeals on Initial Proffered Permits send this form to:

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

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

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

PRELIMINARY JURISDICTIONAL DETERMINATION (PJD) FORM

BACKGROUND INFORMATION

A. REPORT COMPLETION DATE FOR PJD: 04/25/2019

B. NAME AND ADDRESS OF PERSON REQUESTING PJD: Robert D. Russell, Jr. 588 Green Valley Road, Leicester, NC 28748,

C. DISTRICT OFFICE, FILE NAME, AND NUMBER: Wilmington District, Round Hill Branch Restoration/Mitigation Site, 2018-01168

D. PROJECT LOCATION(S) AND BACKGROUND INFORMATION: The site for the proposed Round Hill Branch Restoration/Mitigation Site is located at 588 Green Valley Road, in Leicester, NC.

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

State: NC County: Buncombe City: Leicester
Center coordinates of site (lat/long in degree decimal format): Latitude: 35.6305 Longitude: -82.7369

Universal Transverse Mercator:

Name of nearest waterbody: Newfound Creek

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

☐ Office (Desk) Determination. Date:
☒ Field Determination. Date(s): 02/25/19

TABLE OF AQUATIC RESOURCES IN REVIEW AREA WHICH "MAY BE" SUBJECT TO REGULATORY JURISDICTION.

Site Number	Latitude (decimal degrees)	Longitude (decimal degrees)	Estimated amount of aquatic resources in review area (acreage and linear feet, if applicable	Type of aquatic resources (i.e., wetland vs. non-wetland waters)	Geographic authority to which the aquatic resource "may be" subject (i.e., Section 404 or Section 10/404)
Round Hill Branch	35.6291	-82.7381	1567 lf	Non wetland	Section 404
T1	35.6293	-82.7388	347 lf	Non wetland	Section 404
T2	35.6304	-82.7368	281 lf	Non wetland	Section 404
W1	35.6288	-82.7381	0.17 acre	Wetland	Section 404
W2	35.6299	-82.7364	0.06 acre	Wetland	Section 404
W3	35.6304	-82.7368	0.01 acre	Wetland	Section 404
W4	35.6294	-82.7387	<0.01 acre	Wetland	Section 404

1) The Corps of Engineers believes that there may be jurisdictional aquatic resources in the review area, and the requestor of this PJD is hereby advised of his or her option to request and obtain an approved JD (AJD) for that review area based on an informed decision after having discussed the various types of JDs and their characteristics and circumstances when they may be appropriate.

2) In any circumstance where a permit applicant obtains an individual permit, or a Nationwide General Permit (NWP) or other general permit verification requiring "pre- construction notification" (PCN), or requests verification for a non-reporting NWP or other general permit, and the permit applicant has not requested an AJD for the activity, the permit applicant is hereby made aware that: (1) the permit applicant has elected to seek a permit authorization based on a PJD, which does not make an official determination of jurisdictional aquatic resources; (2) the applicant has the option to request an AJD before accepting the terms and conditions of the permit authorization, and that basing a permit authorization on an AJD could possibly result in less compensatory mitigation being required or different special conditions; (3) the applicant has the right to request an individual permit rather than accepting the terms and conditions of the NWP or other general permit authorization; (4) the applicant can accept a permit authorization and thereby agree to comply with all the terms and conditions of that permit, including whatever mitigation requirements the Corps has determined to be necessary; (5) undertaking any activity in reliance upon the subject permit authorization without requesting an AJD constitutes the applicant's acceptance of the use of the PJD; (6) accepting a permit authorization (e.g., signing a proffered individual permit) or undertaking any activity in reliance on any form of Corps permit authorization based on a PJD constitutes agreement that all aquatic resources in the review area affected in any way by that activity will be treated as jurisdictional, and waives any challenge to such jurisdiction in any administrative or judicial compliance or enforcement action, or in any administrative appeal or in any Federal court; and (7) whether the applicant elects to use either an AJD or a PJD, the JD will be processed as soon as practicable. Further, an AJD, a proffered individual permit (and all terms and conditions contained therein), or individual permit denial can be administratively appealed pursuant to 33 C.F.R. Part 331. If, during an administrative appeal, it becomes appropriate to make an official determination whether geographic jurisdiction exists over aquatic resources in the review area, or to provide an official delineation of jurisdictional aquatic resources in the review area, the Corps will provide an AJD to accomplish that result, as soon as is practicable. This PJD finds that there *"may be"* waters of the U.S. and/or that there *"may be"* navigable waters of the U.S. on the subject review area, and identifies all aquatic features in the review area that could be affected by the proposed activity, based on the following information:

SUPPORTING DATA. Data reviewed for PJD (check all that apply)

Checked items 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:_____

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

☒ Office concurs with data sheets/delineation report.

☐ Office does not concur with data sheets/delineation report. Rationale:_____

☐ Data sheets prepared by the Corps:_____

☐ Corps navigable waters' study:_____

☐ U.S. Geological Survey Hydrologic Atlas:_____

☐ USGS NHD data.

☐ USGS 8 and 12 digit HUC maps.

☒ U.S. Geological Survey map(s). Cite scale & quad name:_____

☐ 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): _____

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.

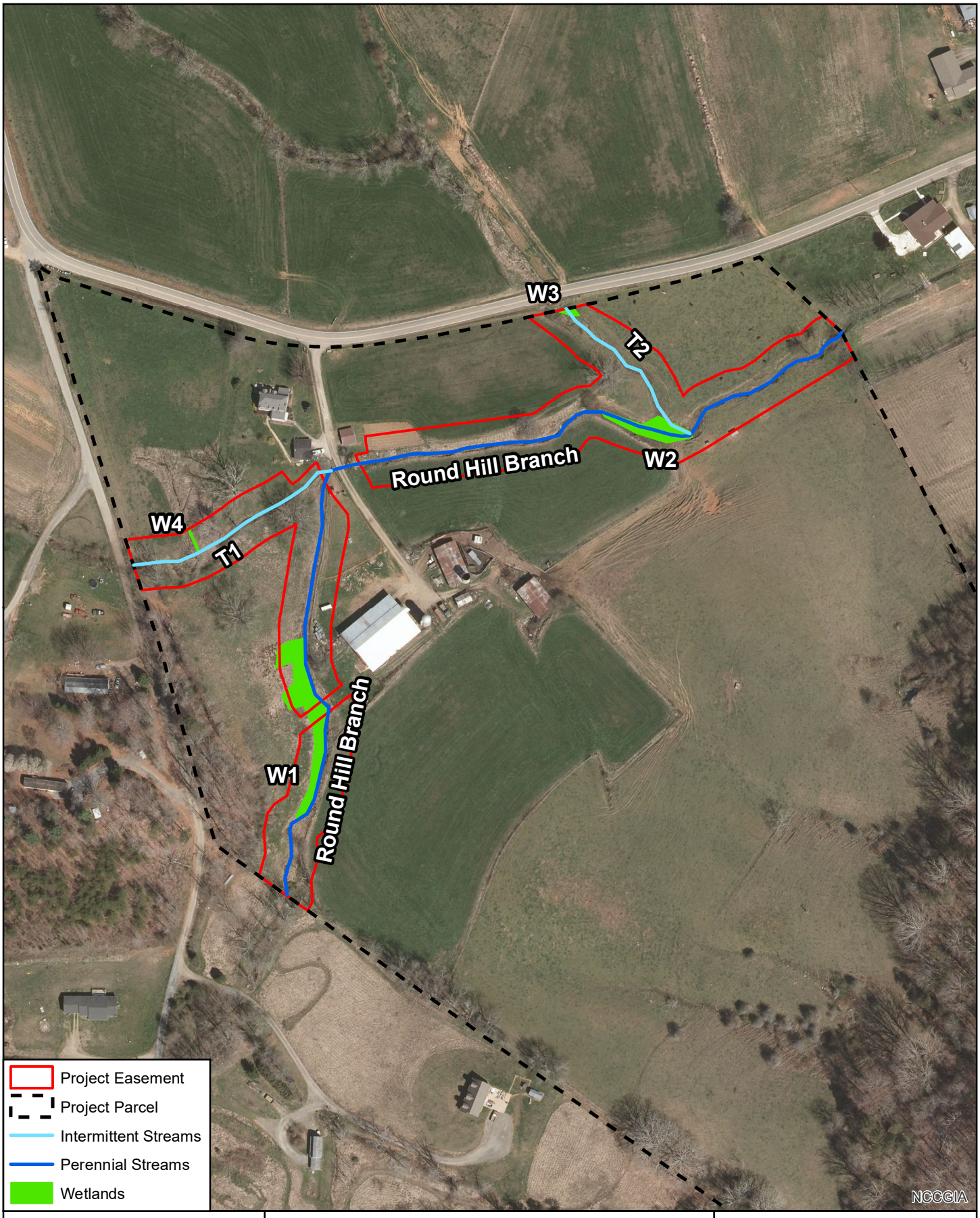
FUEMMELER.AMANDA.JONES.1242835090

Digitally signed by FUEMMELER.AMANDA.JONES.1242835090
Date: 2019.04.26 07:57:35 -04'00'

Signature and date of Regulatory staff member completing PJD
4/25/2019

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

[1] Districts may establish timeframes for requester to return signed PJD forms. If the requester does not respond within the established time frame, the district may presume concurrence and no additional follow up is necessary prior to finalizing an action.



0 100 200 Feet

FIGURE 3. POTENTIAL WATERS OF THE U.S.
ROUND HILL BRANCH RESTORATION SITE
BUNCOMBE COUNTY, NC

N

Source: NC OneMap Orthoimagery, 2015.

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 1.4

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

Part 1: General Project Information	
Project Name:	Round Hill Branch Stream Restoration Site
County Name:	Buncombe County, NC
DMS Number:	100066
Project Sponsor:	KCI Technologies, Inc.
Project Contact Name:	Tim Morris
Project Contact Address:	4505 Falls of Neuse Road Suite 400 Raleigh NC 27609
Project Contact E-mail:	tim.morris@kci.com
DMS Project Manager:	Matthew Reid

Project Description

For Official Use Only

Reviewed By:

8/14/2018
Date

DMS Project Manager

Conditional Approved By:

Date

For Division Administrator
FHWA

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

Final Approval By:

8-14-18
Date

For Division Administrator
FHWA

Part 2: All Projects Regulation/Question	Response
Coastal Zone Management Act (CZMA)	
1. Is the project located in a CAMA county?	☐ Yes ☒ No
2. Does the project involve ground-disturbing activities within a CAMA Area of Environmental Concern (AEC)?	☐ Yes ☐ No ☒ N/A
3. Has a CAMA permit been secured?	☐ Yes ☐ No ☒ N/A
4. Has NCDCM agreed that the project is consistent with the NC Coastal Management Program?	☐ Yes ☐ No ☒ N/A
Comprehensive Environmental Response, Compensation and Liability Act (CERCLA)	
1. Is this a "full-delivery" project?	☒ Yes ☐ No
2. Has the zoning/land use of the subject property and adjacent properties ever been designated as commercial or industrial?	☐ Yes ☒ No ☐ N/A
3. As a result of a limited Phase I Site Assessment, are there known or potential hazardous waste sites within or adjacent to the project area?	☐ Yes ☒ No ☐ N/A
4. As a result of a Phase I Site Assessment, are there known or potential hazardous waste sites within or adjacent to the project area?	☐ Yes ☐ No ☒ N/A
5. As a result of a Phase II Site Assessment, are there known or potential hazardous waste sites within the project area?	☐ Yes ☐ No ☒ N/A
6. Is there an approved hazardous mitigation plan?	☐ Yes ☐ No ☒ N/A
National Historic Preservation Act (Section 106)	
1. Are there properties listed on, or eligible for listing on, the National Register of Historic Places in the project area?	☐ Yes ☒ No
2. Does the project affect such properties and does the SHPO/THPO concur?	☐ Yes ☐ No ☒ N/A
3. If the effects are adverse, have they been resolved?	☐ Yes ☐ No ☒ N/A
Uniform Relocation Assistance and Real Property Acquisition Policies Act (Uniform Act)	
1. Is this a "full-delivery" project?	☒ Yes ☐ No
2. Does the project require the acquisition of real estate?	☒ Yes ☐ No ☐ N/A
3. Was the property acquisition completed prior to the intent to use federal funds?	☐ Yes ☒ No ☐ N/A
4. Has the owner of the property been informed: * prior to making an offer that the agency does not have condemnation authority; and * what the fair market value is believed to be?	☒ Yes ☐ No ☐ N/A

Part 3: Ground-Disturbing Activities Regulation/Question	Response
American Indian Religious Freedom Act (AIRFA)	
1. Is the project located in a county claimed as "territory" by the Eastern Band of Cherokee Indians?	☐ Yes ☒ No
2. Is the site of religious importance to American Indians?	☐ Yes ☐ No ☒ N/A
3. Is the project listed on, or eligible for listing on, the National Register of Historic Places?	☐ Yes ☐ No ☒ N/A
4. Have the effects of the project on this site been considered?	☐ Yes ☐ No ☒ N/A
Antiquities Act (AA)	
1. Is the project located on Federal lands?	☐ Yes ☒ No
2. Will there be loss or destruction of historic or prehistoric ruins, monuments or objects of antiquity?	☐ Yes ☐ No ☒ N/A
3. Will a permit from the appropriate Federal agency be required?	☐ Yes ☐ No ☒ N/A
4. Has a permit been obtained?	☐ Yes ☐ No ☒ N/A
Archaeological Resources Protection Act (ARPA)	
1. Is the project located on federal or Indian lands (reservation)?	☐ Yes ☒ No
2. Will there be a loss or destruction of archaeological resources?	☐ Yes ☐ No ☒ N/A
3. Will a permit from the appropriate Federal agency be required?	☐ Yes ☐ No ☒ N/A
4. Has a permit been obtained?	☐ Yes ☐ No ☒ N/A
Endangered Species Act (ESA)	
1. Are federal Threatened and Endangered species and/or Designated Critical Habitat listed for the county?	☒ Yes ☐ No
2. Is Designated Critical Habitat or suitable habitat present for listed species?	☐ Yes ☒ No ☐ N/A
3. Are T&E species present or is the project being conducted in Designated Critical Habitat?	☐ Yes ☐ No ☒ N/A
4. Is the project "likely to adversely affect" the 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? (By virtue of no-response)	☐ 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 local 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

11. 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: August 18, 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: Round Hill Branch Restoration Site
Post Contract IRT Site Review Meeting
French Broad 05
Buncombe County, North Carolina
Contract No. #7528
DMS Project #100059

An IRT field review was conducted for the above referenced project on August 2nd starting at approximately 1pm. Weather was overcast with periods of rain. Approximately 0.22" of rainfall had fallen earlier in the morning (Weather Underground Station KNCLEICE18). Project tributaries were flowing during the meeting with the exception of Tributary 2.

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.

A map depicting the crediting scenario is included as Figure 1.

Round Hill Branch - From Driveway Culvert to End of Project

- No issues were raised regarding this channel other than the fact that it was hard to evaluate the channel due to the thick vegetation. Evidence of erosion and channelization was evident throughout this reach, although erosion areas were concentrated near the end of the reach. The approach here would be full restoration of the planform and profile. Profile adjustments would need to transition back down to the receiving stream elevation at the bottom of the project. KCI would take advantage of the over-widened valley to integrate the P1-P2 transitions.

T2

- No issues were voiced for this reach other than to ensure that flow monitoring was conducted on this channel as there was not strong evidence of flow in this channel during the site visit

T1 - From Driveway Upstream to Bridges Cover Estate Road

- The IRT questioned the need for full scale restoration in this reach because many of the banks appeared to be stable at the time of the site visit. Although KCI agreed that there were stable elements of this reach, there were also areas (especially in the upstream reach) where the channel was unstable due to the presence of a deteriorating culvert (to be removed) and the thought was to do complete planform and profile work through this area. The E1 vs. R approach for this reach will be re-evaluated during the Mitigation Plan stage, with thorough justification of the mitigation approach at the request of the IRT.

Round Hill Branch from T1 Confluence Upstream to Property Line

- Similar to T1, this reach was heavily vegetated and much of the instability noted during previous site reviews was difficult to see. The IRT suggested providing detailed justification (including photo evidence) of the instability that led to the decision to consider restoration for this reach.

Meeting was adjourned at approximately 2pm.

If there are questions or concerns regarding the content in these minutes please call (919-278-2511) or email me tim.morris@kci.com.

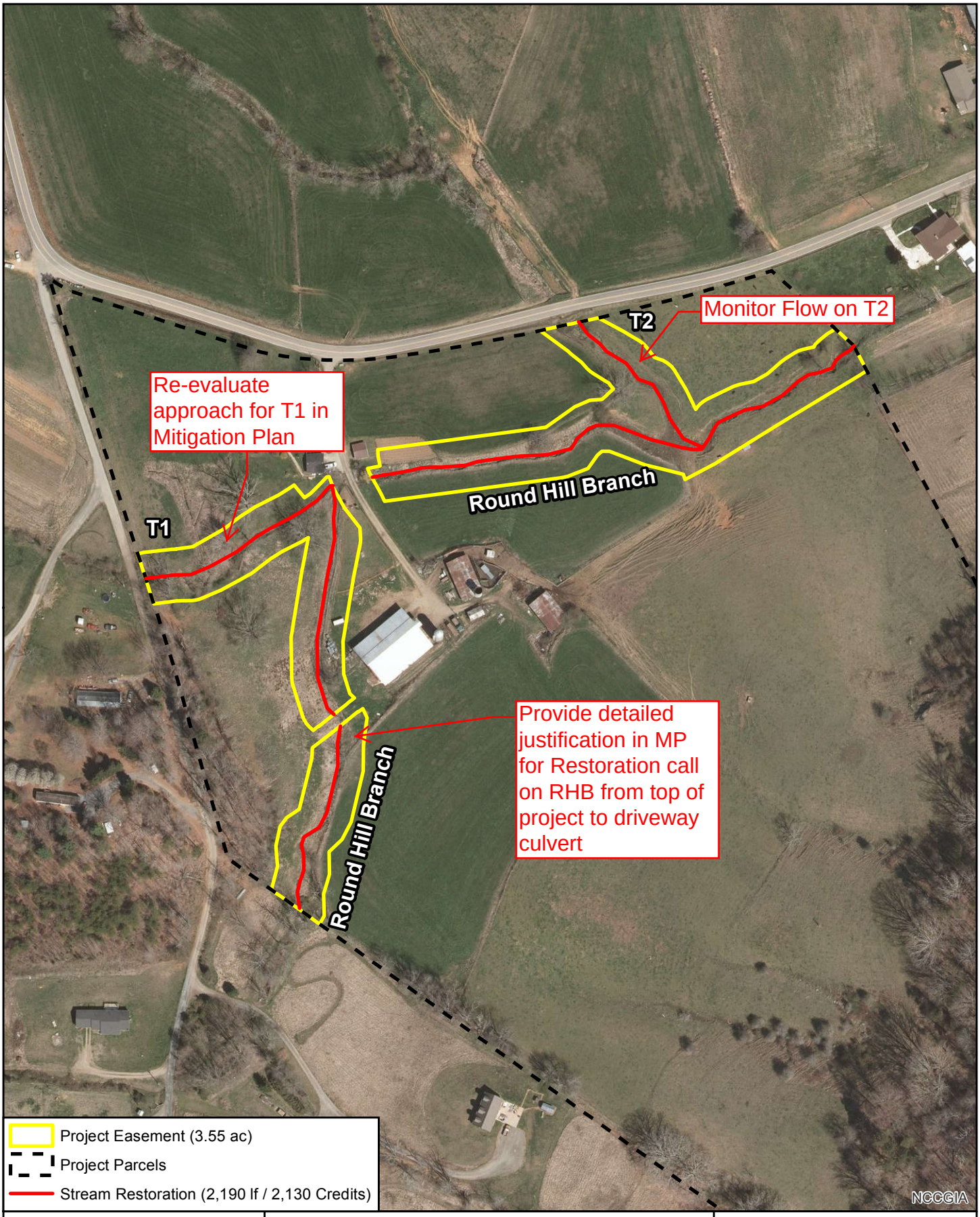


FIGURE 1. PROPOSED MITIGATION TYPE AND EXTENT
ROUND HILL BRANCH RESTORATION SITE
BUNCOMBE COUNTY, NC

Source: NC OneMap Orthoimagery, 2015.