MITIGATION PLAN

Dales Creek Restoration Site
Buncombe County, North Carolina
DMS Project Number 100128
DEQ Contract 7910
USACE AID #: SAW-2019-00834
NCDWR #: 20190864 Version 1

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
February 19, 2021

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.

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

REPLY TO
ATTENTION OF:

November 16, 2020

Regulatory Division

Re: NCIRT Review and USACE Approval of the NCDMS Dales Creek Mitigation Site / Buncombe Co./ SAW-2019-00834/ NCDMS Project # 100128

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

Dear Mr. Baumgartner:

The purpose of this letter is to provide the North Carolina Division of Mitigation Services (NCDMS) with all comments generated by the North Carolina Interagency Review Team (NCIRT) during the 30-day comment period for the Dales Creek Draft Mitigation Plan, which closed on October 8, 2020. These comments are attached for your review.

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

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

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

Sincerely,

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

Enclosures

Electronic Copies Furnished:

NCIRT Distribution List
Harry Tsomides, Paul Weisner—NCDMS
Tim Morris, Adam Spiller—KCI

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

REPLY TO
ATTENTION OF:

CESAW-RG/Browning October 27, 2020

MEMORANDUM FOR RECORD

SUBJECT: Dales Creek Mitigation Project - NCIRT Comments during 30-day Mitigation Plan Review

PURPOSE: The comments listed below were received during 30-day comment period in accordance with Section 332.8(g) of the 2008 Mitigation Rule in response to the Notice of NCDMS Mitigation Plan Review.

NCDMS Project Name: Dales Creek Restoration Site, Buncombe County, NC

USACE AID#: SAW-2019-00834
NCDMS #: 100128
30-Day Comment Deadline: October 8, 2020

USACE Comments, Kim Browning:

1. 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.
2. For future submittals, please place all the figures in one appendix or location.
3. Table 3 is organized well and helpful.
4. Table 4 lists 4,114 LF of existing stream, while section 6.0 (page 19) lists 3,978 LF The non-credited crossings are 320 LF. Please clarify.
5. Section 6.0, pg 20 discusses the unlikeliness for development due to steep slopes; however, the extra-wide crossings to accommodate future needs of the landowner suggest that roads are potentially planned. Please add a discussion on potential future risks and uncertainties.
6. Section 6.1: Please list target planting dates.
7. Section 6.1:. For sites constructed within pastures or areas that have fescue or other dense pasture grasses, it is recommended that treatments are conducted during site prep to ensure that planted vegetation is not smothered. *I did make note that this was addressed in the Invasive Species section.
8. Page 28: 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 12 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 11 planting list.
9. Section 7, page 31: Stream hydrologic performance of 30 continuous flow days only applies to intermittent streams. That is expected to be a minimum, not a goal. Perennial streams should

typically exhibit continuous surface water flow throughout the year, except during drought conditions.

10. Figure 11: Please add a veg plot to the wetland area at the top of UT5 since this area will be planted, and add one to UT3 above the crossing (random is fine). It's helpful to place veg plots in different soil types, planting zones, in areas that have been disturbed or compacted, and in wetlands. Additionally, please add a photo point to the top of UT2 to show the condition of the channel below the crossing that is outside the easement.

WRC Comments, Andrea Leslie:

1. KCI has HDPE specified for use on both stream culverts. Other material, such as CMP, should be used instead, because smooth-walled HDPE is less likely to hold stream substrate and provide for movement of aquatic organisms like fish and salamanders. Although not preferred, the 12" elevated floodplain barrels could remain HDPE.
2. The planting list is the same as that developed for the Round Hill site, and we have the same concerns. We recommend finding a nearby reference reach for the vegetation community and using this to tailor the planting list. Schafale'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.
3. Will the invasive species that exist in the wetland areas be eradicated as well? If not, we recommend treating these areas, as they will be a source of invasive species to the planted riparian areas. It is noted that the wetlands will be protected and "Zone 2" species will be planted within them – however, Zone 2 species include River Birch and Willow Oak, which are not appropriate (see above) for the site, several upland species, and sycamore. We recommend supplemental planting with additional wetland species that are more typical of seep systems in the mountains.
4. Wild trout reproduction should not be impacted by project activities, and a trout moratorium is not needed on this project.

EPA Comments, Todd Bowers:

1. General:

* I would like to commend the site sponsor and landowner for protecting the head of stream UT2 with fencing in lieu of a BMP even if the resource is not protected by a conservation easement. Limiting livestock access to site streams or drainages is crucial in protecting stream stability and minimizing harm to water quality downstream.
* Recommend extending the riparian buffers to 50 feet from stream beltwidth wherever feasible since the adjacent land use will continue to be cattle forage/pasture along with steep slopes. This will help maintain any water quality improvements realized by almost complete livestock exclusion.
* With so many site UTs it may have been helpful to name the main tributary of the site as Dales Creek.
* The reasoning for such wide crossings is understood and gated fencing beyond the CE boundaries to minimize cattle crossings is approved. Crossing width justification should be stated in Section 6.5.
* Please denote blank pages as "Intentionally blank" to minimize any confusion or perception of missing information from the document.
* Recommend keeping stream credits listed in tenths rather than more significant digits.

2. Tables 3 and 4/Pages 12 and 13:

* Inconsistent size given for W3.

3. Section 4/Page 18:
* Reiterating the need for wider riparian buffer in the presence of continued active livestock foraging outside of the conservation easement boundaries.

4. Section 6.0/Page 20:
* Reiterating the need for wider riparian buffer in the presence of continued active livestock foraging outside of the conservation easement boundaries.

5. Section 6.5/Page 21:
* State the widths and justification for wide crossings.

6. Table 10/Page 27:
    * Proposed BHR for UT3 seems erroneous. Recommend a more suitable BHR.

7. Section 6.10/Page 27:
    * Recommend adding date of last planting in order to meet the MY1 report requirements. Recommend planting no later than March 31 to ensure planting within the dormant period and to meet the 180-day post planting monitoring requirement before leaf drop.
    * Citation for Schafale 2012 is not included in References Section.

8. Table 11/Page 28:
    * Please provide the estimated percentages of preferred trees to be planted. Recommend including some understory/shrub species for diversity. Provide alternative species if primary desired species are not available at time of planting.

9. Section 7.0/Page 31:
    * Recommend installing a rain gauge on site to confirm or supplant regional rainfall data collected by NRCS for Buncombe County.

10. Section 8.0/Page 31-32:
    * Recommend coverage of both planting zones with two plots (one fixed, one random) each for vegetation monitoring. See Table 15 as well.
    * Recommend stating reason for monitoring stream flow for UT2-5 (verification of 30-day flow requirement for intermittent streams).

11. Figure 11/Page 34:
    * Please correct or improve the legend for stream gauges, veg plots and photo points.

DWR Comments, Erin Davis:

1. DWR appreciates the effort made to reduce the number of crossings, include adjacent wetland features and fence out the ephemeral channel above UT2. All of these things aid with the site's potential functional uplift.
2. Page 4, Figure 2 – Please show the delineated watersheds for each project tributary.
3. Pages 4-5, Figures 2 & 3 – The watershed area values included in the legends vary from other plan references, please confirm.
4. Page 8, Section 3.1.2 – To your knowledge, have any of the forested areas within the watershed been logged? What is the likely risk of these areas being logged in the future?

5. Page 12, Table 3 – The W3 value of 0.07 acres varies from the Appendix 8 jurisdiction determination table and does not calculate to the wetland total of 0.14 acres referenced on page 1. Please confirm.
6. Page 19, Section 6 – Please note the proposed relocation of the existing road segment to outside of the conservation easement.
7. Page 20, Section 6.2 – Please confirm whether the UT2 reach length is 359LF as stated, or 343LF.
8. Page 21, Section 6.5 – DWR appreciates DMS' questions/comments on the crossings. DWR agrees with DMS' recommendation that the crossings be internal to the conservation easement.
9. Page 22, Figure 8 – Can you please show the additional fencing areas at each of the proposed road crossings. DWR appreciates the extended fencing.
10. Page 28, Section 6.1 – Please include a brief discussion of proposed soil treatment for areas that typically have poor soil characteristics affecting vegetation establishment and growth, including Priority 2 Restoration, Enhancement I new bench cuts, and existing road removal segments within the easement.
11. Page 28, Table 12 – 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. However, a list of potential plant substitutions, including suitable understory/shrub species, would be appropriate for review and approval as part of the mitigation plan.
12. Page 29, Figure 10 – For consistency and ease of review, DWR requests the stream restoration line be designated blue.
13. Page 31, Section 7.0 Stream Hydrologic Performance – Please change "within a calendar year" to "within each calendar year".
14. Page 34, Table 11
    a. Please indicate the proposed random veg plots as a legend item or figure note.
    b. Please show or note additional photo points at the proposed veg plot and cross-section locations.
    c. Please add a flow gauge to the UT3 intermittent restoration reach.
15. Page 35, Section 9 – Please specify DMS as the point of contact to notify the IRT of any site issues.
16. Page 35, Section 10 – DWR recommends annual inspections to confirm compliance with easement conditions.
17. Sheet 3, Live Lift Detail – The rock base and wood based treatments are different enough that we request the type of treatment proposed be called out at each plan view location. DWR appreciates wood being integrated into stream bank and bed treatments.
18. Sheet 4, Cut/Create New Bench Detail
    a. Please indicate if a top soil planting medium will be added to the proposed bench cut areas.
    b. Please confirm whether the tie-out slope will be 2:1 or 2.5:1 (as noted on the typical cross sections).
19. Sheets 6 – 9
    a. Please call out reach start and end stations.
    b. Please show anticipated limits of disturbance for proposed bench and bank grading areas.
    c. Are the contour lines shown based on field survey data? Can contour lines be added to reaches with proposed bench and bank grading (i.e. UT4-1, UT5-1 and UT1-2)?
20. Sheet 10, Planting Plan – 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.

21. All Planting Plan Sheets – Please add tributary call outs.
22. Sheet 19 – DWR questions whether pearl millet is appropriate for the site's seed mix. An annual rye or browntop millet may be more suitable as an initial cover species.

Kim Browning
Mitigation Project Manager
Regulatory Division

KCI ASSOCIATES OF NC

ISO 9001:2015 CERTIFIED

ENGINEERS • PLANNERS • SCIENTISTS • CONSTRUCTION MANAGERS

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

Date: February 19, 2021

To: Kim Browning, USACE

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

Subject: Dales Creek Restoration Site
Mitigation Plan Review – Response to IRT Comments
French Broad River Basin - 06010105
Buncombe County, North Carolina
DEQ Contract No. #7910
DMS Project #100128
USACE AID #: SAW-2019-00834

Below are our responses to IRT comments received on the mitigation plan for the Dales Creek 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. 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:

2. For future submittals, please place all the figures in one appendix or location.

   We will locate all figures in the appendices in our upcoming mitigation plans under development.

3. Table 3 is organized well and helpful.

4. Table 4 lists 4,114 LF of existing stream, while section 6.0 (page 19) lists 3,978 LF. The non-credited crossings are 320 LF. Please clarify.

   The value in Table 4 refers to the existing linear feet, while Section 6.0 is referencing the proposed linear footage. We have added "…..a total of 3,978 proposed lf." The difference is related to proposed changes in stream alignment and the crossing exceptions.

5. Section 6.0, pg 20 discusses the unlikeliness for development due to steep slopes; however, the extra-wide crossings to accommodate future needs of the landowner suggest that roads are potentially planned. Please add a discussion on potential future risks and uncertainties.

   While there are no future plans for development, this crossing allowance does give adequate room to install a stable road crossing if necessary. Further discussion on these crossings has been added to Section 6.5.

6. Section 6.1: Please list target planting dates.

   In the second paragraph of Section 6.10, 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.

7. Section 6.1: For sites constructed within pastures or areas that have fescue or other dense pasture grasses, it is recommended that treatments are conducted during site prep to ensure that planted vegetation is not smothered. *I did make note that this was addressed in the Invasive Species section.

   The last paragraph in Section 6.10 states, "Existing undesirable pasture grasses, including fescue, 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."

8. Page 28: 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 12 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 11 planting list.

   We have removed the volunteer list (Table 12) and altered the planting plan to include additional species per this comment and others from IRT members.

9. Section 7, page 31: Stream hydrologic performance of 30 continuous flow days only applies to intermittent streams. That is expected to be a minimum, not a goal. Perennial streams should typically exhibit continuous surface water flow throughout the year, except during drought conditions.

   We changed this section to read (changes underlined): "The intermittent project streams (UT2, UT3, UT4, and UT5) must also show a minimum of 30 continuous flow days within each calendar year (assuming normal precipitation); UT1, a perennial stream, is anticipated to have nearly continuous flow in a normal year."

10. Figure 11: Please add a veg plot to the wetland area at the top of UT5 since this area will be planted, and add one to UT3 above the crossing (random is fine). It's helpful to place veg plots in different soil types, planting zones, in areas that have been disturbed or compacted, and in wetlands. Additionally, please add a photo point to the top of UT2 to show the condition of the channel below the crossing that is outside the easement.

    We have added two permanent plots at the top of UT5 and above the UT3 crossing for a total of four permanent and two random plots.

WRC Comments, Andrea Leslie:

1. KCI has HDPE specified for use on both stream culverts. Other material, such as CMP, should be used instead, because smooth-walled HDPE is less likely to hold stream substrate and provide for movement of aquatic organisms like fish and salamanders. Although not preferred, the 12" elevated floodplain barrels could remain HDPE.

    We will use corrugated HPDE pipe for the primary pipe if available.

2. The planting list is the same as that developed for the Round Hill site, and we have the same concerns. We recommend finding a nearby reference reach for the vegetation community and using this to tailor the planting list. Schafale'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.

3. Will the invasive species that exist in the wetland areas be eradicated as well? If not, we recommend treating these areas, as they will be a source of invasive species to the planted riparian areas. It is noted that the wetlands will be protected and "Zone 2" species will be planted within them – however, Zone 2 species include River Birch and Willow Oak, which are not appropriate (see above) for the site, several upland species, and sycamore. We recommend supplemental planting with additional wetland species that are more typical of seep systems in the mountains.

    The last paragraph in section 6.10 states, "The existing jurisdictional wetlands will be planted with species from the Zone 1 list."

4. Wild trout reproduction should not be impacted by project activities, and a trout moratorium is not needed on this project.

    Noted.

EPA Comments, Todd Bowers:

1. General:
   I would like to commend the site sponsor and landowner for protecting the head of stream UT2 with fencing in lieu of a BMP even if the resource is not protected by a conservation easement. Limiting livestock access to site streams or drainages is crucial in protecting stream stability and minimizing harm to water quality downstream.

   Recommend extending the riparian buffers to 50 feet from stream beltwidth wherever feasible since the adjacent land use will continue to be cattle forage/pasture along with steep slopes. This will help maintain any water quality improvements realized by almost complete livestock exclusion.

   The project easement has already been set for the site.

   With so many site UTs it may have been helpful to name the main tributary of the site as Dales Creek.

   We will use this type of naming convention, when applicable, in our upcoming mitigation plans under development.

   The reasoning for such wide crossings is understood and gated fencing beyond the CE boundaries to minimize cattle crossings is approved. Crossing width justification should be stated in Section 6.5.

   We have added justification to Section 6.5 (updates underlined): "…The crossings will be fenced to exclude livestock along the top of the proposed roadway to be installed and then continue to tie into the easement edges; there will be no breaks in fencing. The culverts have been designed to be embedded 1' below the proposed streambed elevation to allow aquatic organism passage and will have floodplain drain pipes to connect flows on either side of the crossing during large events. Both of the legal crossing exceptions are included at a larger width (approximately 60') to accommodate any future needs of the landowner; however, we design the crossing widths to the smallest extent possible (12-15' top width) based on the current use of the property to minimize the impacts on the project streams. Any future expansion of a crossing within the exception would have to be permitted separately by the landowner.

   Please denote blank pages as "Intentionally blank" to minimize any confusion or perception of missing information from the document.

   This has been added to the document.

   Recommend keeping stream credits listed in tenths rather than more significant digits.

   The use of 3 decimal places has been requested by DMS for credit tracking.

2. Tables 3 and 4/Pages 12 and 13: Inconsistent size given for W3.

   W3 in Table 3 has been corrected to 0.04 acres.

3. Section 4/Page 18: Reiterating the need for wider riparian buffer in the presence of continued active livestock foraging outside of the conservation easement boundaries.

4. Section 6.0/Page 20: Reiterating the need for wider riparian buffer in the presence of continued active livestock foraging outside of the conservation easement boundaries.

   The limits are set on this project at this point.

5. Section 6.5/Page 21: State the widths and justification for wide crossings.

   See previous response under general comments.

6. Table 10/Page 27: Proposed BHR for UT3 seems erroneous. Recommend a more suitable BHR.

   This has been corrected to 1.0.

7. Section 6.10/Page 27: Recommend adding date of last planting in order to meet the MY1 report requirements. Recommend planting no later than March 31 to ensure planting within the dormant period and to meet the 180-day post planting monitoring requirement before leaf drop.

   In the second paragraph of Section 6.10, 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.

   Citation for Schafale 2012 is not included in References Section.

   Citation has been added to the Reference Section.

8. Table 11/Page 28: Please provide the estimated percentages of preferred trees to be planted. Recommend including some understory/shrub species for diversity. Provide alternative species if primary desired species are not available at time of planting.

   We have updated the planting plan to include several small tree and shrub species.

9. Section 7.0/Page 31: Recommend installing a rain gauge on site to confirm or supplant regional rainfall data collected by NRCS for Buncombe County.

   There is an existing rain gauge located 4.4 miles east of the project site (Leicester 2 SE, NC (NC-BC-14) that will be used for rainfall documentation.

10. Section 8.0/Page 31-32: Recommend coverage of both planting zones with two plots (one fixed, one random) each for vegetation monitoring. See Table 15 as well.

    Per other comments in addition to this one, Figure 11 has been updated showing two additional vegetation monitoring plot locations. These plots will be located in both Zone 1 and Zone 2 areas.

Recommend stating reason for monitoring stream flow for UT2-5 (verification of 30-day flow requirement for intermittent streams).

The Stream Hydrologic monitoring section now states (change underlined): "Bankfull events on-site will be verified using one automatic stream monitoring gauge on UT1-4. Additional gauges will be installed on UT2, UT4, and UT5 in order to verify the 30-day continuous flow requirement for intermittent streams."

11. Figure 11/Page 34: Please correct or improve the legend for stream gauges, veg plots and photo points.

    The legend is up-to-date.

DWR Comments, Erin Davis:

1. DWR appreciates the effort made to reduce the number of crossings, include adjacent wetland features and fence out the ephemeral channel above UT2. All of these things aid with the site's potential functional uplift.

2. Page 4, Figure 2 – Please show the delineated watersheds for each project tributary.

   The delineated watersheds have been added to the figure.

3. Pages 4-5, Figures 2 & 3 – The watershed area values included in the legends vary from other plan references, please confirm.

   The values in Figures 2 and 3 are correct. The watershed size in Section 3.1.2 and Table 4 have been updated to match.

4. Page 8, Section 3.1.2 – To your knowledge, have any of the forested areas within the watershed been logged? What is the likely risk of these areas being logged in the future?

   Based off the oldest available aerial imagery, there is no evidence of recent logging in the watershed and there are no plans by the landowner to do so at this time. The surrounding land is used for grazing.

5. Page 12, Table 3 – The W3 value of 0.07 acres varies from the Appendix 8 jurisdiction determination table and does not calculate to the wetland total of 0.14 acres referenced on page 1. Please confirm.

   W3 in table 3 has been corrected to 0.04 acres.

6. Page 19, Section 6 – Please note the proposed relocation of the existing road segment to outside of the conservation easement.

   We added to the bottom of Section 6.0: "An existing farm road that runs parallel along the bottom half of UT1 will be relocated outside of the conservation easement and further away from the stream to buffer sediment impacts."

7. Page 20, Section 6.2 – Please confirm whether the UT2 reach length is 359LF as stated, or 343LF.

   The length of UT2 has been corrected to 343 lf.

8. Page 21, Section 6.5 – DWR appreciates DMS' questions/comments on the crossings. DWR agrees with DMS' recommendation that the crossings be internal to the conservation easement.

9. Page 22, Figure 8 – Can you please show the additional fencing areas at each of the proposed road crossings. DWR appreciates the extended fencing.

   These have been added to the figure.

10. Page 28, Section 6.1 – Please include a brief discussion of proposed soil treatment for areas that typically have poor soil characteristics affecting vegetation establishment and growth, including Priority 2 Restoration, Enhancement I new bench cuts, and existing road removal segments within the easement.

    Section 6.10 now includes "In areas that typically have poor soil characteristics affecting vegetation establishment and growth, including Priority 2 Restoration, Enhancement I, new bench cuts, and existing road removal segments within the easement, furnished or salvaged topsoil will be used to surface treat all planting areas within the floodplain extents shown on the plans; adequate lime and fertilizer will be used to ensure adequate vegetative stabilization."

11. Page 28, Table 12 – 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. However, a list of potential plant substitutions, including suitable understory/shrub species, would be appropriate for review and approval as part of the mitigation plan.

    See above response to comments.

12. Page 29, Figure 10 – For consistency and ease of review, DWR requests the stream restoration line be designated blue.

    We will abide by the preferred color scheme for future projects.

13. Page 31, Section 7.0 Stream Hydrologic Performance – Please change "within a calendar year" to "within each calendar year".

    We have made this change.

14. Page 34, Table 11
    a. Please indicate the proposed random veg plots as a legend item or figure note.

       2 Random veg plots have been added to Figure 11.

    b. Please show or note additional photo points at the proposed veg plot and cross-section locations.

A note has been added to Figure 11 stating, "Additional photographs will be taken of each vegetation plot and cross section."

c. Please add a flow gauge to the UT3 intermittent restoration reach.

The gauge has been added to Figure 11.

15. Page 35, Section 9 – Please specify DMS as the point of contact to notify the IRT of any site issues.

This change has been made

16. Page 35, Section 10 – DWR recommends annual inspections to confirm compliance with easement conditions.

We have made this change.

17. Sheet 3, Live Lift Detail – The rock base and wood based treatments are different enough that we request the type of treatment proposed be called out at each plan view location. DWR appreciates wood being integrated into stream bank and bed treatments.

The application of these treatments is dependent on available material on-site. Typically our preference is to use wood whenever possible on these types of systems with a rock base the secondary option.

18. Page 34, Table 11
    a. Please indicate if a top soil planting medium will be added to the proposed bench cut areas.

    No, we are not currently proposing any additional planting medium. We will reuse existing topsoil as much as possible during excavation, but the benches will most likely be comprised of a mix of rocky material and soil due to the nature of the landscape position.

    b. Please confirm whether the tie-out slope will be 2:1 or 2.5:1 (as noted on the typical cross sections).

    The slope tie-outs will be 2.5:1.

19. Sheets 6 - 9
    a. Please call out reach start and end stations.

    We have added these to the plans.

    b. Please show anticipated limits of disturbance for proposed bench and bank grading areas.

    On UT3, these limits will follow the typical cross-section tie-outs; for other areas, they are designated with gray shading where bank and bench work will occur.

c. Are the contour lines shown based on field survey data? Can contour lines be added to reaches with proposed bench and bank grading (i.e. UT4-1, UT5-1 and UT1-2)?

Yes, the contours shown are based on our detailed topographic survey and these upper reaches are not within that area.

20. Sheet 10, Planting Plan – 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.

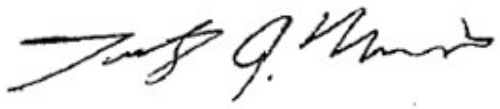
21. All Planting Plan Sheets – Please add tributary call outs.

    These have been added to the plans.

22. Sheet 19 – DWR questions whether pearl millet is appropriate for the site's seed mix. An annual rye or browntop millet may be more suitable as an initial cover species.

    We have substituted browntop millet for pearl millet.

Sincerely,



Tim Morris
Project Manager

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KCI ASSOCIATES OF NC

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ENGINEERS • PLANNERS • SCIENTISTS • CONSTRUCTION MANAGERS

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

Date: 8/31/2020

To: Harry Tsomides, Project Manager

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

Subject: Dales Creek Restoration Site
Draft Mitigation Plan Review
French Broad River Basin – CU# 06010105
Buncombe County
DMS Project ID No. 100128
Contract # 7910

Dear Mr. Tsomides,

Please see the below responses to your comments from July 31, 2020 on the draft of the Dales Creek Mitigation Plan. We have addressed your comments in the report and have outlined our changes. Following your acceptance of these changes, we will submit hard copies of the final draft report along with the supporting digital files.

General:
Cover page and various places throughout the text figures and tables – Indicates "Dale's Creek". Please change to the project name "Dales Creek" (non-possessive). The site was named and is being tracked according to KCI's technical proposal ("Dales Creek").

We have changed the Dale's Creek to Dales Creek throughout the report.

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.

We added a section at the bottom of Section 6.1 to address risk or uncertainties at the site: "Based on our analysis and design for the project, we would assign DCRS a low level of risk in the path toward long-term stability and resilience following restoration implementation. The upper watershed outside of the project easement is steep and forested and not expected to be suitable for large-scale development in the future. The majority of the project will consist of enhancement work in large gravel and cobble material streams, taking advantage of existing stable features found within the reaches while reducing bank erosion and improving bedform diversity. The overall sediment load from the watershed is low, with current fine sediment within the project reaches coming from

localized bank erosion. Any remaining fine sediment found within the streams should move through the project limits within the monitoring period following construction. Restored riparian buffers will reduce sedimentation and nutrient inputs from ongoing livestock and agricultural operations."

Please verify that all as-built streams will have the minimum required buffer width.

Approximately 30 feet of the right bank along the top of T2 have a narrow buffer due to an existing farm road; as a percentage of the total project stream length, this is less than 1%. Aside from that location, the project streams all meet the minimum 30-foot buffer widths.

Please add a section for FEMA/Hydrologic Trespass.

We have added a section at the end of Section 2.0 stating "The project is not within a mapped FEMA flood zone; the nearest mapped floodplain is downstream of the project along Newfound Creek. Due to the nature of the steep, headwater reaches at this site, hydrologic trespass beyond the project easement is not a concern."

Table of Contents:
Several of the figures in the report have different titles than what is shown in the Table of Contents. Please update for consistency.

These have been updated and are now consistent.

Please add planting tables in Section 6.9 to Table of Contents "Tables" section and update as necessary.

These tables have been added.

Project Introduction:
It would be great to list the total sum the site is aiming to deliver, in addition to the category sums.

We have added the total sum to Table 1.

Please summarize briefly why the technical proposal credits (1,842 SMU) are being exceeded in the draft plan (1,952 SMU).

Following the site survey and final design, the total credits are higher than originally calculated in the technical proposal. We also extended UT1 Reach 1 further upstream following the final stream delineation and IRT site walk. We added the following to last paragraph in Section 1.0: "The total credits are higher than originally presented in the technical proposal due to extending UT1 further upstream following the final stream delineation."

Report:
Recommend noting if a farm improvement plan (livestock BMPs, watering system, etc.) is being installed for the landowner as part of the project commitment.

We have added the locations of farm improvements to Figure 8, and discussed these elements in Section 6.6 on page 21: "Livestock exclusion fencing and gates will be installed to keep all livestock out of the project streams. New fencing locations are shown on the project plan sheets and will be

constructed of woven wire built to NRCS standards. KCI will provide two wells and six livestock drinkers for the cows on the property (see Figure 8) to provide water away from the stream."

Watershed disturbances – It is stated, "There have been disturbances to the sediment regime of the site, but they are localized on-site from upslope erosion induced by cattle and direct impacts on stream banks made by cattle hooves." Is the sediment source from upslope erosion on site or off site?

The sediment source is on-site due to the impacts from the livestock. The majority of the offsite watershed is forested and has no livestock.

Design Approach for UT1 -_During the IRT site meeting on 7/23/2019, it was noted that UT1 reaches 3 and 4 (E1) appeared to show characteristics that supported full restoration rather than an E1 approach, however they are being proposed as E1 reaches. Please describe in this section if a restoration alternative was developed/considered, and if so, what was the rationale for enhancing rather than restoring these reaches?

Following the IRT site walk, we did consider restoration in these two reaches, but determined that EI is the more appropriate treatment. We added the following to the first paragraph of Section 6.1 "During the site development, we did consider Restoration instead of Enhancement I for these reaches, but determined that EI is the more appropriate scenario due to the need to integrate existing stable features in portions of the stream as well as the current landscape position of the stream that would have required large-scale grading to implement Restoration."

Design Approach for UT2

- The IRT field review on 7/23/2019 there was discussion about expanding the easement upstream of the UT2 head-cut to incorporate the intermittent section of UT2 where cattle have access. In addition, the IRT recommended a BMP above the terminus of UT2 if cattle could not be excluded from the upstream reach. Please clarify how these issues were incorporated into, or why they were omitted from the design approach.

  KCI reached an agreement with the landowner that UT2 above the easement could be fenced instead of installing a BMP. The stabilized ford crossing will have a boulder sill that will provide grade control at this transition point. The additional fencing was added to Figure 8.

- How will the ford crossing above the top of UT2 be protected from livestock impacts?

  See Sheet 5A for stabilized ford crossing details that will include fencing with gates and a boulder sill at the downstream end of the crossing to protect bed integrity.

Design Approach and Reach Descriptions: Please indicate the Priority Level of Restoration/ Enhancement (PI vs. PII) being conducted on each reach.

Due to the steep landscape position of these streams, there will be no Priority 1. UT3 is the only restoration reach and will use a Priority 2 approach, although a bankfull bench will be installed along the stream. The remainder of the site consists of enhancement work that will not be changing the stream position. The priority approaches are summarized in Table 13.

Please indicate grade control structures will be installed downstream of the culvert outfalls to maintain the substrate thickness within the buried pipes.

We have added sill structures at the bottom of the two culverts to be installed within the project.

Crossings:

- DMS appreciates KCI's efforts leading to reducing the number of crossings on the project, an issue that was identified and discussed at the IRT field review on 7/23/2019.

- The plan sheets show 12 LF and 15 LF farm roads along the two culvert crossing areas however the easement breaks appear to be 60-65 LF wide. Why are the easement breaks so large in proportion to the farm road widths?

  The legal crossing exceptions are included at a larger width to accommodate any future needs of the landowner; however, we design the crossing widths to the smallest extent possible based on the current use of the property to minimize the impacts on the project streams.

- How are cattle going to be excluded from the entire crossings if the farm roads are much narrower?

  The crossings will be fenced along the top of the proposed roadway to be installed and then continue to tie into the easement edges; there will be no breaks in fencing.

- DMS recommends including all crossings as part of the recorded CE, and incorporating appropriate access/maintenance allowance language into the CE.

  Our typical procedure is to exclude cross from the conservation easement; we use the standard conservation easement language for this.

Appendices:

Appendix 3 (Site Protection) Indicates "Final Plat" in the title box, however the plat has not been recorded and property has not been acquired yet for the project. Please clarify in the report what is the status of land acquisition.

The processing of the plat is in progress and a final plat will be recorded soon. We noted "Draft" status on the plat.

Appendix 7 – NCSAM forms are included in Appendix 7, however not apparently mentioned or discussed in the plan. Any data included in an appendix should be referenced and/or explained in the text.

We added a column to Table 3 and a row to Table 4.

Appendix 9 (Invasive species) – Please indicate if fescue will be treated.

We have modified the second paragraph of this section to read: "….Once an invasive species is identified as impairing the site, physical and/or chemical removal and treatment should occur. One

anticipated treatment is that existing undesirable pasture grasses will be sprayed with herbicide and left fallow until full mortality is achieved during the construction/planting phase. 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…."

Figures:
Figure 1 - The proposed easement is identified in the legend but please add text callout identifying the site to the map.

We added a text callout identifying the project easement.

Figure 2 - Add callouts for the drainage basin boundary and the easement.

We added text callouts identifying the project easement and watershed boundary.

Figure 3

- Incorrectly indicates Newfound Creek as a FDP site. Newfound Creek DMS project is a DBB Project.
- Please use points or conservation easement shape files for the additional DMS sites listed on the Figure instead of the symbols currently selected.

The Newfound Creek site was changed to a DBB project. Points are now used instead of the symbols.

Figure 7

- Please include existing features as points, call outs, etc. for any head cuts, crossings (list type), bedrock, etc
- Please label roads: Newfound Road and project drive

Crossing type labels were added. Headcuts, bedrock, wallows, and culverts were added to the map. Labels for Newfound Rd and Elevacres Rd were added.

Additionally, we have added a new figure, "Figure 10. Proposed Planting Plan."

Figure 10 - Are the intermittent document stations for video only? Or something else? The IRT is asking for continuous stage recorders, although it is not a requirement (yet). DMS suggests installing continuous stage recorders to document days of consecutive flow for these intermittent streams.

(Now Figure 11) We have changed all stream gauges to pressure transducers.

Tables:
Table 3 – Existing wetlands – If there are going to be any expected impacts to the site wetlands from the project, they should be summarized in a table. If not, please state accordingly that no impacts are expected.

0.009 ac of temporary wetland impacts are anticipated during stream construction and have been added to the table.

Table 5 - For bed form monitoring measurement, KCI list Percent Riffle and Pool, Facet Slopes. IS KCI intending to measure these parameters throughout the monitoring period?

Yes, KCI will monitor these features using visual inspection throughout the monitoring period.

Table 11 – Project Assets – Please format as follows, leaving as-built footage blank; incorporate ratios as decimal numbers; include Project Credits table below the Mitigation Assets and Components Table; include details in the comments column; rename the table accordingly.

These tables have been updated.

Plan Sheets:
DMS PM is listed incorrectly.

We have corrected this.

Boundary Marking Plan

- The boundary marking plan does not reflect the survey plat alignment. For example, the crossings shown on the marking plan are narrower and align differently than what is shown on the survey plat. Please include a boundary marking plan that reflects the CE survey, if the fencing is intended to coincide with the CE. Please include the CE layer on the boundary marking plan.

  We have added the CE lines in additional to the fencing lines on the boundary marking sheets.

- The boundary marking plan should show any fencing/gates intended to keep cattle out of the crossings, and any pedestrian gates.

  We have added all gate locations to these sheets.

Sheet 7 Profile: The culvert outfall at STA 303+26.29 appears to rely on a riffle to maintain grade and substrate within the pipe. Will the step structure approximately 20 feet downstream ensure adequate grade control for the culvert? If an additional structure is needed please add to the sheet.

We have added sills below the two culverts to provide additional bed protection.

Digital Support Files:
KCI is addressing comments sent from DMS (email) on 7/14/2020. Please make sure the final digital support file deliverables reflect the comments accordingly. The final submittal should include a complete set of updated digital support files in the correct file structure.

We have updated any tables modified throughout this round of revisions and have included the GIS monitoring features as requested.

Additional DMS follow-up email comments from 8/25/2020:

The asset table is still missing the project credits table. Please add.

We added a copy below the asset table as Table 14. This table is also shown in the beginning as Table 1. Project Summary.

The structure of the DMS geodatabase will only accept veg plot polygons. Please provide the veg plot shape files as polygons, not points.

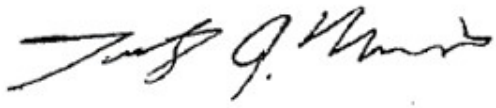
We have added a polygon feature to the geodatabase provided.

Can you clarify why the easement does not extend up UT3 to complete the reach? That is flagged as intermittent on Figure 7 (Current Conditions) and Plan sheet 7 shows the reach extending beyond the fence line. There is a cattle drinker going in that area so cattle will be present at the top end of that reach. The project area should try to protect or include the upstream stream origin areas if at all possible to avoid livestock congregating above the project reaches.

Where the easement stops, the stream is forested and more confined. The cattle do not go down into the channel because it's too steep for them. We have moved the drinker location to be further downstream outside of the easement along the bottom of T3 (see Figure 8).

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

Sincerely,



Tim Morris
Project Manager

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FIGURES

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1.0 PROJECT INTRODUCTION

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

The project site is located approximately 3.5 miles southwest of Leicester, North Carolina. Specifically, the site is on Newfound Road, southwest of the intersection of Morgan Branch Road and Newfound Road. The center of the site is at approximately 35.5991 N and -82.7466 W in the Enka USGS Quadrangle.

The DCRS will restore a mountain stream ecosystem along an Unnamed Tributary to Newfound Creek (UT1) and four of its tributaries (UT2, UT3, UT4, and UT5) with a combination of Restoration, Enhancement I, and Enhancement II techniques. Approximately 0.14 acre of existing jurisdictional wetlands are also being protected in the conservation easement.

Once site grading is complete, the unforested portions of the stream buffer will be planted with riparian species. The site will be monitored for a minimum of seven years or until the success criteria are met. The table below summarizes the credits that will be produced from this project. The total credits are higher than originally presented in the technical proposal due to extending UT1 further upstream following the final stream delineation.

Table 1. Project Summary

Restoration Level	Stream			Riparian Wetland		Non-Rip	Coastal
	Warm	Cool	Cold	Riverine	Non-Riv	Wetland	Marsh
Restoration		**396.000**					
Re-establishment							
Rehabilitation							
Enhancement							
Enhancement I		**907.333**					
Enhancement II		**648.400**					
Creation							
Preservation							
Totals		**1,951.733**					

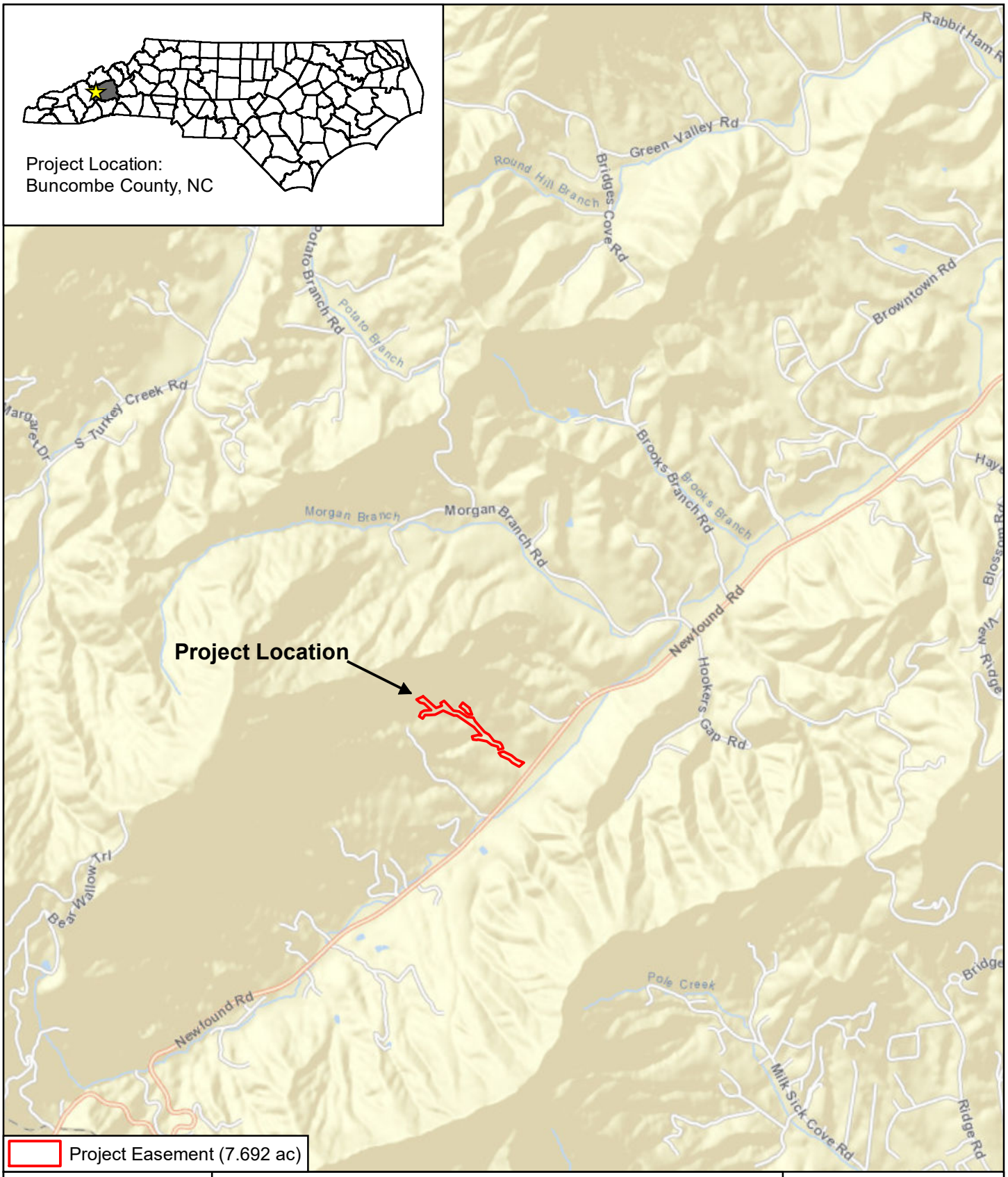


FIGURE 1. PROJECT SITE VICINITY MAP
DALES CREEK RESTORATION SITE
BUNCOMBE COUNTY, NC

2.0 WATERSHED APPROACH AND SITE SELECTION

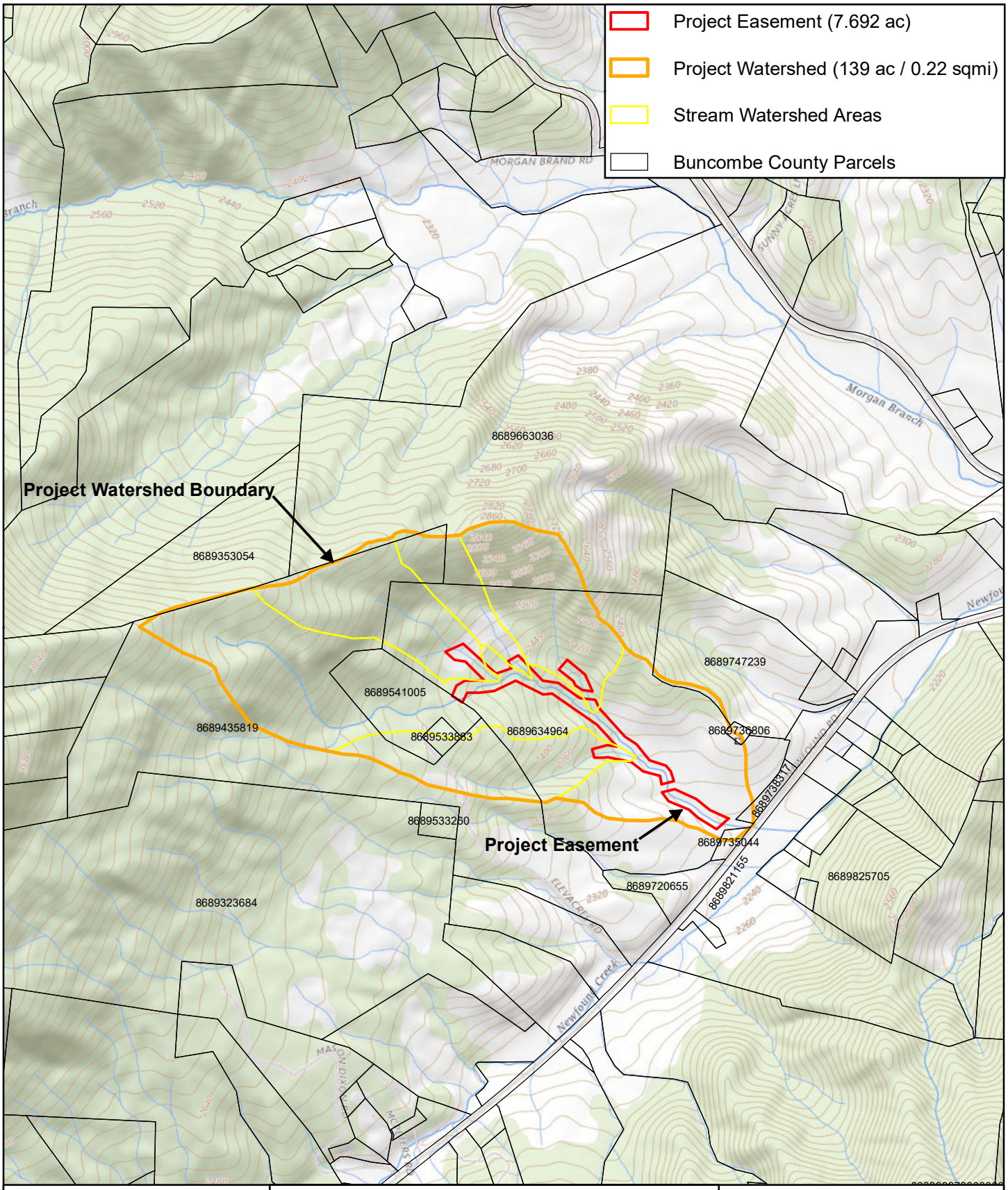
The site's watershed, Hydrologic Unit Code (HU) 06010105090020, Newfound Creek, was identified in the 2009 Upper French Broad River Basin RBRP as a Targeted Local Watershed (TLW) (NCEEP 2009). The 14-digit watershed is largely rural in nature (42% agriculture and 47% forest with only 39% of stream length having adequate buffers). At the time of the River Basin Restoration Priorities (RBRP) plan, there was no land in conservation, and the Division of Water Resources (DWR) marked the HU as a priority area, as most of Newfound Creek is impaired, suffering from severe habitat degradation (including sedimentation), excess nutrients, and high fecal coliform bacteria. The RBRP listed impacts from agriculture use, including stream bank erosion, excessive sedimentation, livestock access to streams, and fecal coliform pollution, as the major stressors within this TLW. The goals and priorities for the DCRS are based on the information presented in the French Broad River Basin Restoration Priorities: restoring riparian buffer vegetation, stabilizing banks, excluding livestock, and restoring natural geomorphology, especially in headwater streams (NCEEP 2009). The project will support the following basin priorities:

- Reducing fecal coliform inputs
- Improving/restoring riparian buffers
- Reducing sediment loading
- Improving stream stability
- Reducing nutrient loading
- Excluding livestock and implementing other agricultural BMP's

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

The nearest named downstream water body is Newfound Creek, which is about 500 feet downstream of UT1 at the lower end of the project. The section of Newfound Creek downstream of the site is identified as 6-84, and is classified for surface water as Class C. Newfound Creek is listed as impaired on the 2018 303(d) list for Benthos exceeding criteria and was given a Fair rating. The project watershed is shown in Figure 2, and another map illustrating the project location in relation to the TLW is shown in Figure 3. In addition to DCRS, there are three other DMS mitigation sites within the TLW: Newfound Creek, a closed-out stream project under stewardship that is 2.8 miles to the northeast, and two forthcoming full-delivery stream projects also being completed by KCI, Morgan Branch, approximately 0.8 mile to the north, and Round Hill Branch, 2.1 miles to the north.

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



0 500 1,000 Feet

FIGURE 2. USGS TOPOGRAPHIC MAP
DALES CREEK RESTORATION SITE
BUNCOMBE COUNTY, NC

N

Source: USGS National Map, Canton and Enka Quadrangles

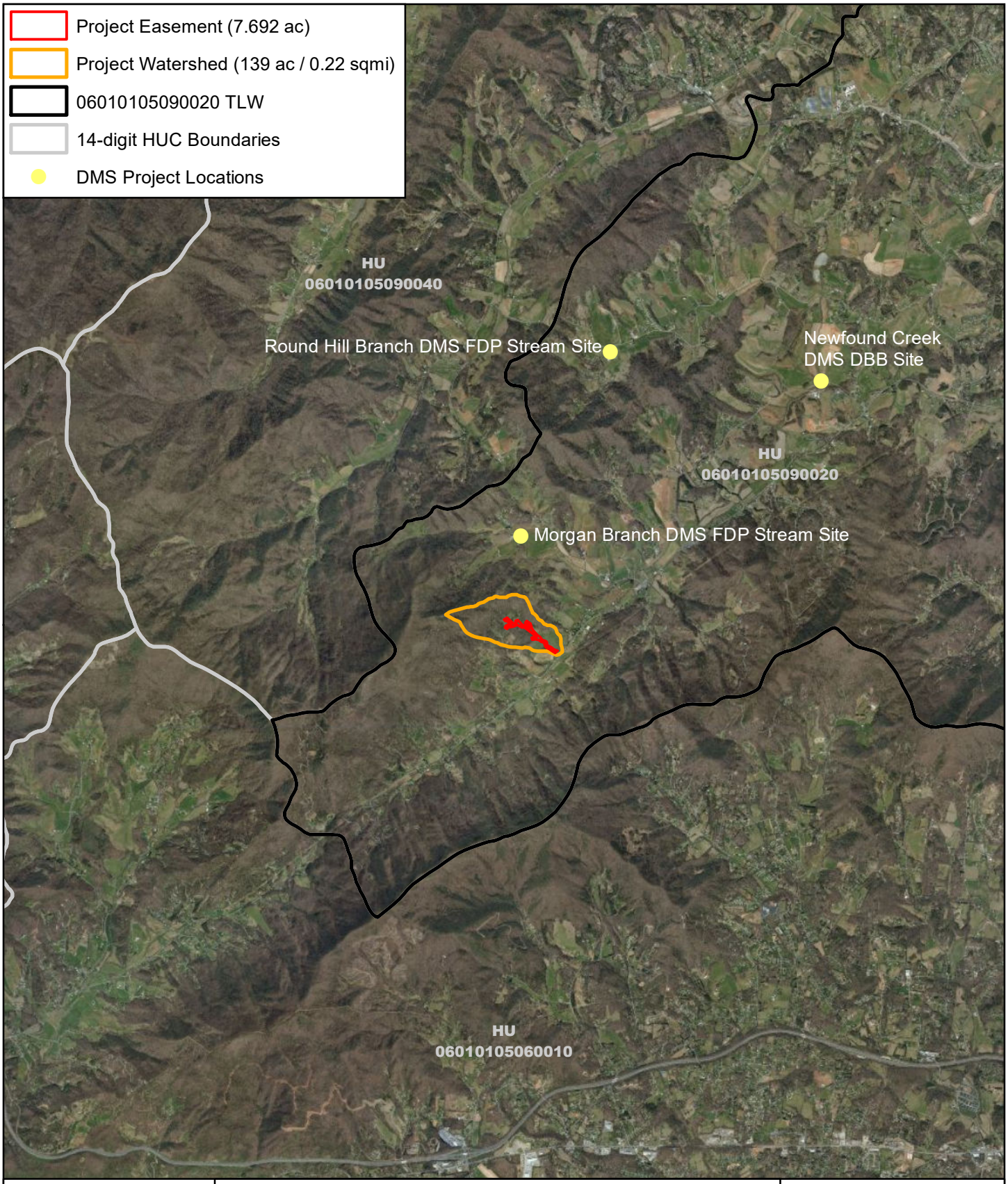


FIGURE 3.WATERSHED PLANNING CONTEXTUAL MAP
DALES CREEK RESTORATION SITE
BUNCOMBE COUNTY, NC

Source: NC Statewide Orthoimagery, 2019.

3.0 BASELINE AND EXISTING CONDITIONS

3.1 Watershed Processes and Resource Conditions

3.1.1 Landscape Characteristics

The site lies within the Broad Basins (Level IV 66j) ecoregion of the Mountain physiographic province. The Broad Basins is drier, has lower elevations, and less relief than the more mountainous Blue Ridge Regions. It also has less boulder colluvium than the surrounding regions and more saprolite. Although some areas are mostly forested, 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 similar to the Piedmont, with more shortleaf and Virginia pine, and white, southern red, black, and scarlet oaks (Griffith et al. 2002). The DCRS is within the Blue Ridge Belt and the geologic formation mapped at the project is Biotite gneiss (ZYbn), which consists of inequigranular, locally abundant potassic feldspar and garnet, interlayered and gradational with calc-silicate rock, sillimanite-mica schist, mica schist, and amphibolite. The formation also contains small masses of granitic rock (USGS 2020). The project watershed consists of steep, confined first-order stream valleys converging into UT1 before it reaches the floodplain of Newfound Creek downstream of the project. The valley along UT1 varies from semi-confined to open, and boulders and bedrock are interspersed in the reaches.

According to the NRCS Web Soil Survey, most of the project consists of Toecane-Tusquitee complex soils (TpD), which are soils with a high content of rock fragments, characterized by random areas of seeps and springs, consisting of Toecane (approximately 45-50%) and Tusquitee (approximately 35-40%); and Tate loam (TaC), which is an intermountain hill soil found on footslopes and toeslopes, characterized by random areas of seeps and springs. The results of the soil survey are presented in the following map (Figure 4). These soil types do not present any major limitations for typical construction activities associated with stream restoration.

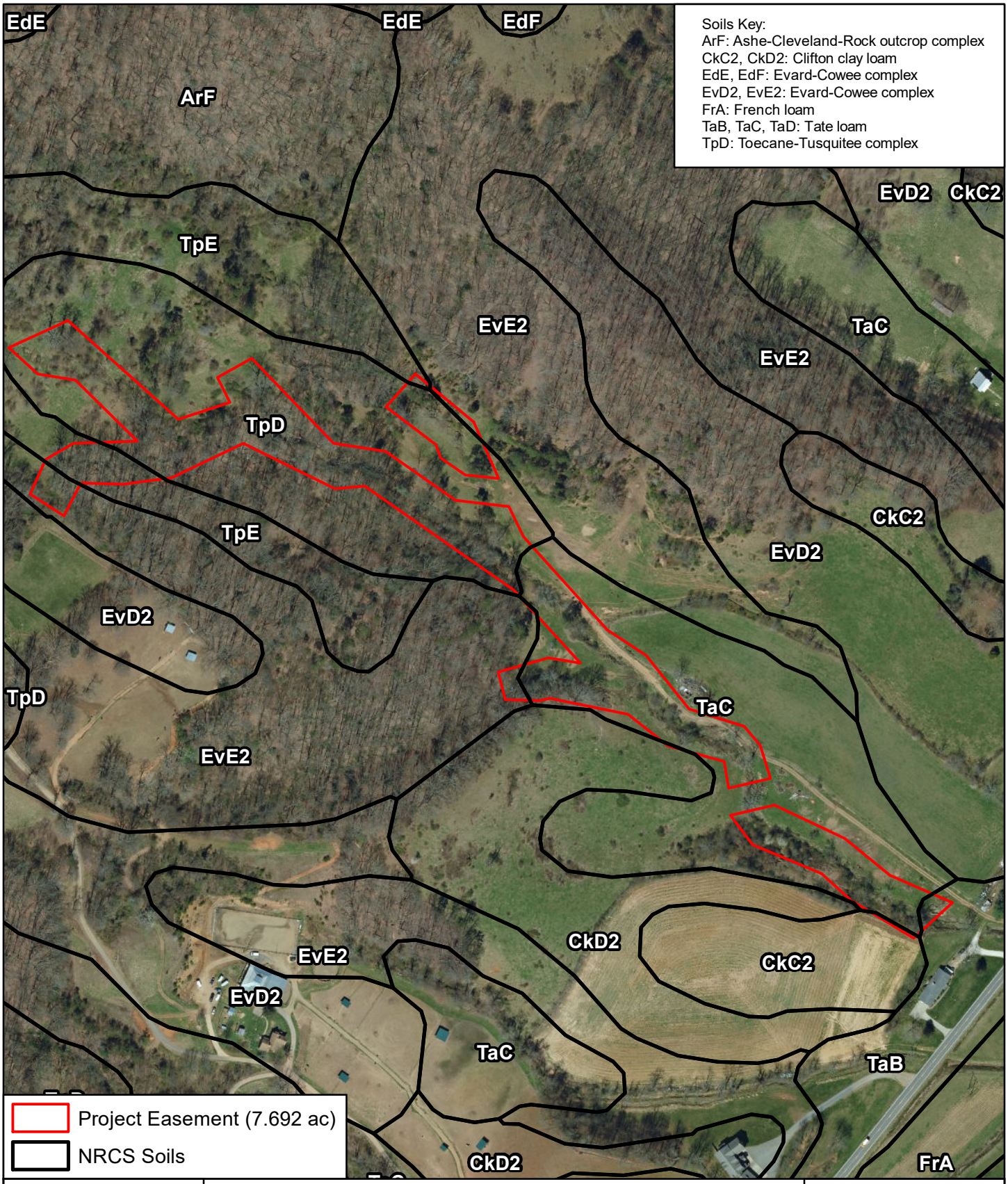


FIGURE 4. NRCS SOIL SURVEY MAP
DALES CREEK RESTORATION SITE
BUNCOMBE COUNTY, NC

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

3.1.2 Land Use/Land Cover and Chronology of Impacts

The project watershed for the DCRS is comprised of 0.22 square mile (137 acres). Current land use within the project watershed consists of forest (73%), pasture/farmland (26%), and low-density residential development (1%). The current adjacent land use has a negative impact on water quality of the project streams. This is evidenced by livestock having direct access to the majority of the project reaches. KCI's measurement of the total impervious area for the project watershed is less than 1%, which is based on the land use delineated from the 2019 orthoimagery. There are sections of narrow forested area along the downstream portions of UT1. The upstream land use of UT1 and its tributaries is forested and consists of large, mature trees such as tulip poplar (*Liriodendron tulipifera*), red maple (*Acer rubrum*), northern red oak (*Quercus rubra*), and pignut hickory (*Carya glabra*) in the canopy with a sparse understory due to livestock grazing. There are no existing piped crossings at the site, but ford crossings utilized by cattle are scattered throughout the project. The project site is located in a rural area in western Buncombe County with low development pressure within the project watershed. The current land use is shown in Figure 5.

Historic aerials were examined for any information about how the site has changed over recent history. The reviewed aerials are displayed on Figure 6. Historic aerials were obtained from the USGS EarthExplorer, NCDOT and NCOneMap for 1969, 1993, 2002, and 2010. The historic aerials show that the site has been systematically impacted by agriculture and grazing for at least the last 44 years; the earliest image in 1969 already shows clearing and stream modification on the lower half of the site. There is little change within the project area between 1969 and the most recent aerial photo.

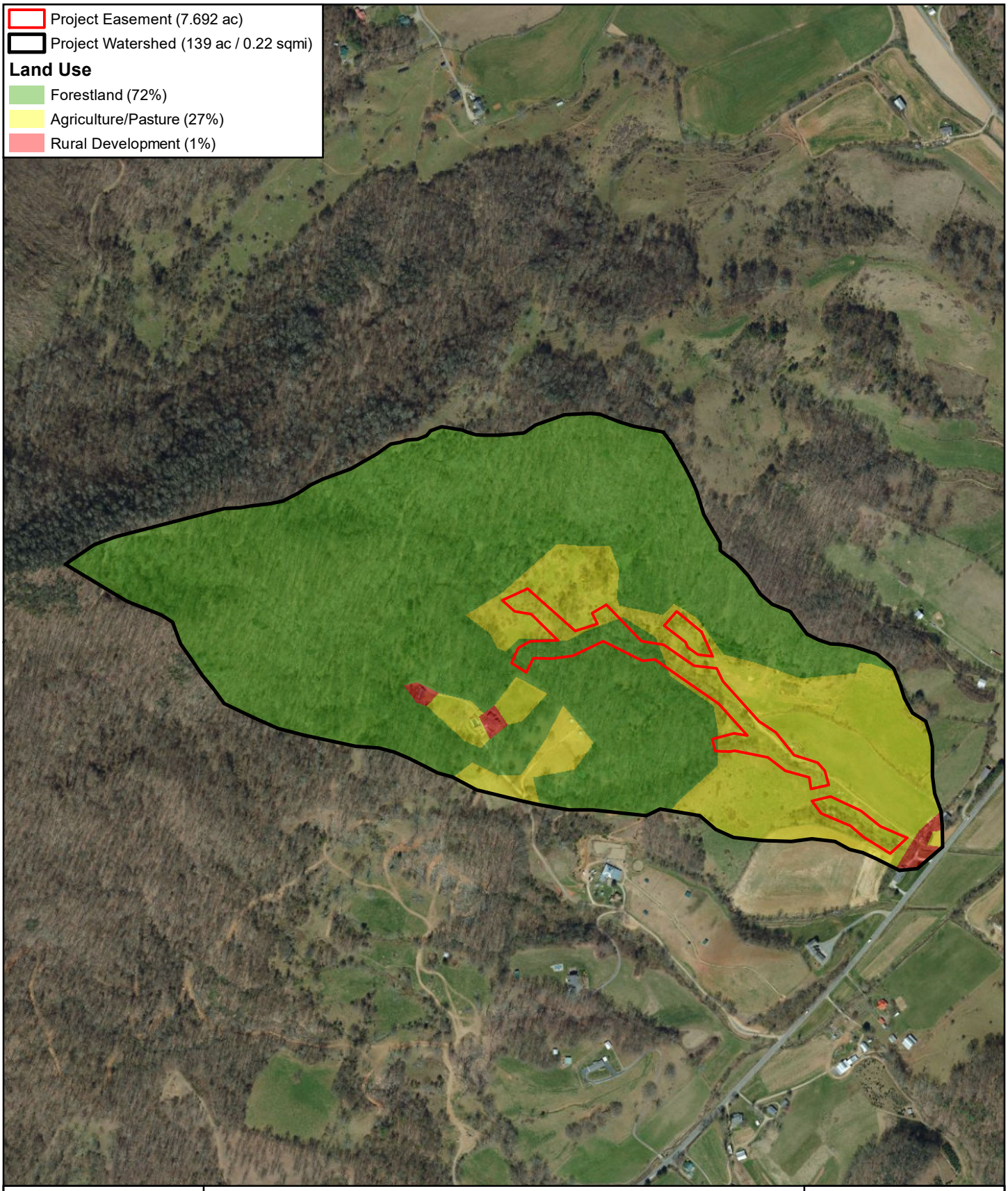


FIGURE 5. PROJECT LAND USE / LAND COVER MAP
DALES CREEK RESTORATION SITE
BUNCOMBE COUNTY, NC

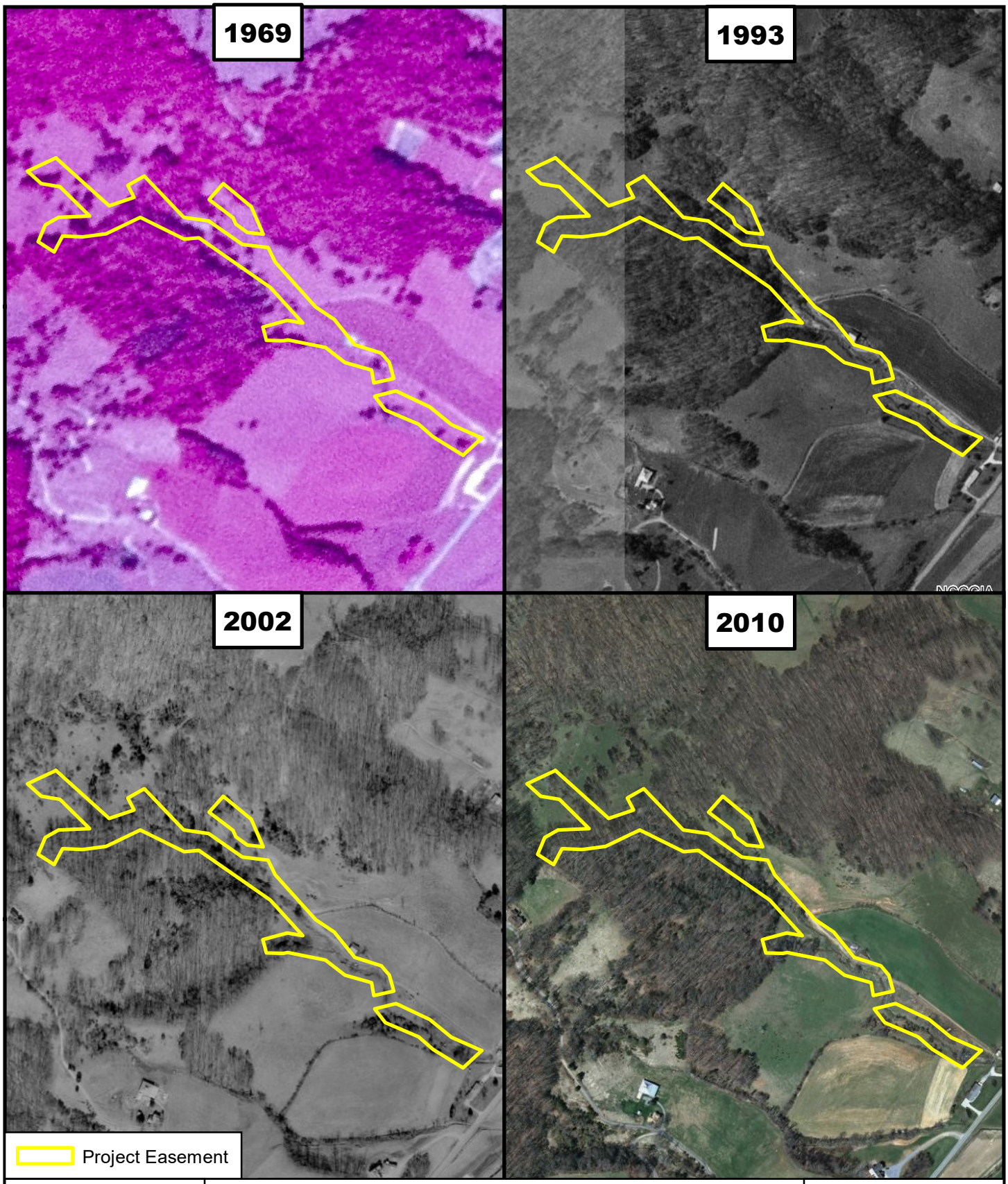


FIGURE 6. HISTORIC AERIALS
DALES CREEK RESTORATION SITE
BUNCOMBE COUNTY, NC

Image Source:
NCDOT Historic Aerials;
NC OneMap

3.1.3. Watershed Disturbance and Response

The project site and the five project streams have experienced landscape and vegetative modifications to allow for agriculture, most recently hay production, and grazing. The existing site conditions are shown in Figure 7 and seen in site photographs in the section below.

A project-wide assessment of stream stability and causes of impairment was performed at the site. The primary stream is an unnamed tributary to Newfound Creek (UT1), and it has four additional tributaries (unnamed tributaries 2, 3, 4, and 5) within the project area. The streams 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 grazing and agricultural production that have modified the project stream banks and riparian buffers. There have been disturbances to the sediment regime of the site, but they are localized on-site from upslope erosion induced by cattle and direct impacts on stream banks made by cattle hooves. The majority of the off-site watershed is forested and there are no cattle present. The table below describes the bank height and entrenchment ratios at the most impacted reaches on the project.

Table 2. Existing Stream Bank Height and Entrenchment Ratios

Stream	Existing Bank Height Ratios	Existing Entrenchment Ratios
UT1 Reach 3	1.7-3.8	1.2-2.0
UT1 Reach 4	1.0-6.0	1.4-2.6
UT3	1.0-4.9	1.2-3.3

UT1 runs for 2,726 existing linear feet (lf) north to south through the project and the stream has been divided into four reaches for assessment: UT1-1 (967 lf), UT1-2 (332 lf), UT1-3 (488 lf), and UT-4 (939 lf). UT1-1 enters the project at the property line in a forested area, downstream of multiple seeps. This area is open to cattle, but due to the steep, forested terrain and the valley confinement, the stream has not been degraded by the cattle. There are a couple of large drops in bed elevation, but they are stable and show no signs of bed migration. UT1-2 starts where the stream valley becomes broader and the forest transitions to pasture; there are still some sparse mature trees, but the cattle are able to access the channel in this area. The condition of UT1 continues to worsen as it flows downstream. UT1-3 begins after the confluence with UT3, and here the stream begins to experience widening as livestock have tramped the existing bank form. Bed variation is less discernable due to the fine sediment from bank erosion filling in the channel. UT1-4, the final reach of the main channel, runs from the confluence with UT2 until the end of the project. The channel alternates between being incised and confined to areas where the banks are less steep and cattle have destroyed the channel form. These varying conditions continue until the end of the project.

UT2 is a tributary entering UT1 midway through the project from the west and flows for 343 lf. It starts as an ephemeral channel upstream of the project boundary, but becomes intermittent at a headcut at the start of the project easement and flows toward the east. UT2 has been degraded by livestock impacts. The right bank is located along a slope with a thin rhododendron canopy, but the left bank is bare. After about 175 feet, UT2 transitions to the floodplain of UT1 where the cattle have severely impacted the stream and there is no riparian buffer. UT2 continues to flow east for another 175 feet to its confluence with UT1.

UT3 enters the project from the northeast corner and flows south for 466 lf until it meets UT1. This stream is the most severely impaired reach on the project. The left bank is located along the edge of a hillslope, and the entire stream has been impacted by cattle. This stream has an inconsistent bed and channel form with bank height ratios ranging from 1.7 to 3.8. Some portions of the channel are wide with minimal banks and other parts are narrow with steep drops at headcuts. The entire reach shows signs of instability, with fine sediment from bank erosion compromising stream function. There is a cattle ford crossing located about 150 feet downstream. About 300 feet downstream of the crossing, UT3 joins the confluence with UT1.

UT4 is 190 lf and begins from a wetland seep in an open area that is surrounded by invasive vegetation such as multiflora rose (*Rosa multiflora*) and Chinese privet (*Ligustrum sinense*) with frequent cattle access. The stream transitions to a forested valley with steeper side slopes that prevent extensive cattle access till the confluence with UT1.

UT5 has a similar landscape position as UT4, also beginning at a wetland seep near a series of boulders, and flows for 389 lf until reaching UT1. The first section of UT5 has a riparian buffer that is composed of invasive shrubs and vines before transitioning to an open pasture and then to a forested valley. Before the forested portion, the stream has evidence of cattle impacts throughout the channel. Once UT5 enters the forested valley, the stream condition improves with fewer cattle impacts until it joins UT1.

A jurisdictional determination was submitted to the US Army Corps of Engineers on November 20, 2019 and was approved on December 23, 2019. The approved jurisdictional determination is included in Appendix 8. In addition to the project streams, there are three jurisdictional wetlands at the site (see Table 3 below). 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.

The project attribute table below summarizes current conditions at the site and Figure 7 displays the mapped existing features. Stream and wetland assessment and rating forms are located in Appendix 7.

Table 3. Existing Stream and Wetland Conditions

Reach Name	Flow Status	DWQ Score	NCSAM Rating				
UT1	Perennial	22.5 / 34.5	Low / Medium / High				
UT2	Intermittent	20	Low				
UT3	Intermittent	22.5	Low				
UT4	Intermittent	19	Medium				
UT5	Intermittent	19.5	Medium				
Wetland ID	**NCWAM**	**Hydrologic Class**	**NCWAM Rating**	**Cowardin Class**	**Size (Acres)**	**Anticipated Temporary Impacts (Acres)**	**Location**
W1	Seep	Riparian	Low	PEM	0.07	0	Seep adjacent to UT5
W2	Seep	Riparian	Low	PEM	0.03	0.002	Seep at the top of UT4
W3	Bottomland Hardwood Forest	Riparian	Low	PEM	0.04	0.007	Confluence of UT1 and UT2

Table 4. Project Attribute Table

Project Information			
Project Name	Dales Creek Restoration Site		
County	Buncombe County		
Project Area (acres)	7.692 acres		
Project Coordinates (lat. and long.)	35.5991°N, -82.7466°W		
Planted Acreage (Acres of Woody Stems Planted)	4.55 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)	139 acres		
Project Drainage Area Percentage of Impervious Area	<1%		
CGIA Land Use Classification	Forest (73%), Pasture/Farmland (26%), and Low-density Residential Development (1%).		
Existing Reach Summary Information			
Parameters	**All Reaches Combined**		
Length of reach (linear feet)	4,114		
Valley Confinement	Partially confined to confined		
Drainage area (acres)	139 acres		
Perennial, Intermittent, Ephemeral	Intermittent - Perennial		
NCDWQ Water Quality Classification	C (Aquatic Life, Secondary Recreation)		
Rosgen Stream Classification (Existing/Proposed)	F4/B4a		
Evolutionary trend (Simon)	Stage IV		
FEMA classification	none		
Existing Wetland Summary Information			
Parameters	**W1 and W2**	**W3**	
Size of Wetland (acres)	0.10	0.04	
Wetland Type	Seep	Bottomland Hardwood Forest	
Mapped Soil Series	Toecane - Tusquitee Complex	Tate	
Drainage class	Well drained	Well drained	
Soil Hydric Status	Non-Hydric	Non-Hydric	
Source of Hydrology	Groundwater	Groundwater	
Restoration or Enhancement Method	N/A	N/A	
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	Yes	N/A
Essential Fisheries Habitat**	No	N/A	N/A

**Items addressed in the Categorical Exclusion in Appendix.

Table 4 continued

Stream Parameters	UT1	UT2	UT3	UT4	UT5
Length of reach (linear feet)	2,726	343	466	190	389
Drainage area (acres)	139 acres	17 acres	20 acres	9 acres	20 acres
NCDWR Classification	C	C	C	C	C
Rosgen Classification	F4/B4a	B4a	G4	B4a	B4a
Evolutionary trend	Stage IV	Stage IV	Stage IV	Stage IV	Stage IV
Mapped Soil Series	Evard-Cowee, Tate, Toecane-Tusquitee	Evard-Cowee, Tate	Toecane-Tusquitee	Toecane-Tusquitee	Toecane-Tusquitee
Drainage class	Well drained	Well drained	Well drained	Well drained	Well drained
Soil Hydric status	Non-Hydric	Non-Hydric	Non-Hydric	Non-Hydric	Non-Hydric
Slope	4-10%	4%	10%	10%	10%
FEMA classification	Zone X	Zone X	Zone X	Zone X	Zone X
Existing vegetation community	Pasture, Forest	Pasture, Forest	Pasture, Forest	Pasture, Forest	Pasture, Forest
Thermal regime	Cool	Cool	Cool	Cool	Cool

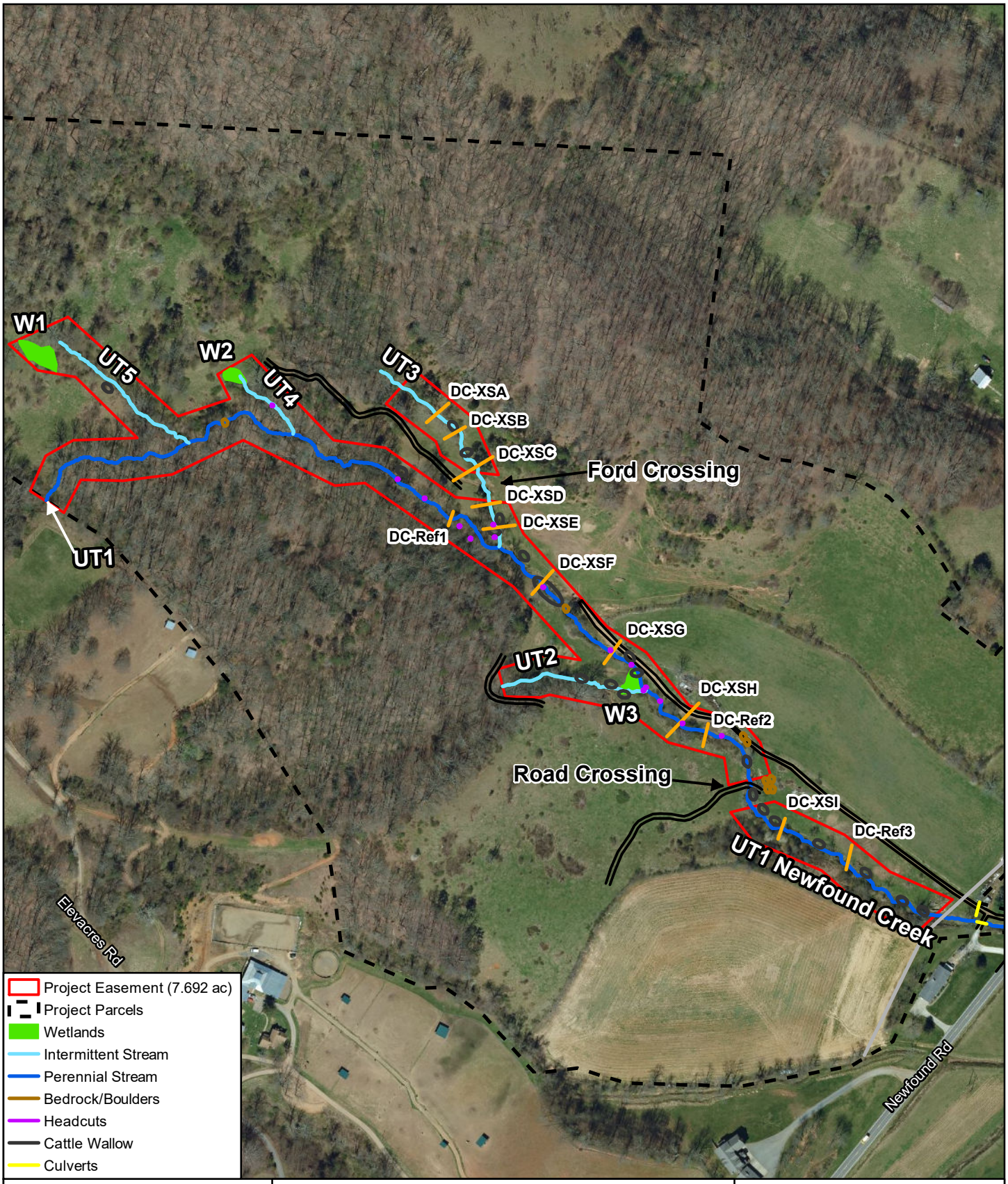


FIGURE 7. CURRENT CONDITIONS MAP
DALES CREEK RESTORATION SITE
BUNCOMBE COUNTY, NC

3.1.4 Site Photographs

Photo 1: 2/5/18 - Looking at UT1-4 below UT2 confluence.

Photo 2: 2/5/18 - Looking at upstream portion of UT2.

Photo 3: 2/5/18 - Looking downstream on UT1-3 above UT2 confluence.

Photo 4: 2/5/18 - Looking at UT1-2.

Photo 5: 2/5/18 - Looking at UT1-1.

Photo 6: 2/5/18 - Looking at the wetland above UT4.

Photo 7: 2/5/18 - Cattle access to UT1-3.

Photo 8: 2/5/18 - Cattle crossing along UT3.

Photo 9: 2/5/18 - Looking at UT5-2.

Photo 10: 2/5/18 – Looking at existing ford crossing at UT3.

Photo 11: 2/5/18 - Looking at W3 at the confluence of UT1 and UT2.

Photo 12: 2/5/18 - Looking at UT1 downstream of the project at Newfound Road.

4.0 FUNCTIONAL UPLIFT POTENTIAL

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

The uplift for DCRS will be achieved at the hydraulic, geomorphological, and physicochemical functional levels. Hydraulic improvements will come from redeveloping stable banks with a floodplain bench. Reestablishing this type of connectivity will return a hydraulic routing system through this stream corridor that will distribute flood flows through a broader area with reduced in-channel stress rather than within a confined channel. Geomorphological functional uplift will be achieved through channels sized to the bankfull flow, a planform and profile design emphasizing bedform variation with woody debris for bank protection and habitat, and the reestablishment of a forested riparian corridor. As a result, bank migration and lateral stability will be restored to a sustainable level and the banks and bed will accommodate design flows. Sediment inputs will decrease due to reduced bank erosion and sediment transport can return to an equilibrium level that will accommodate watershed inputs. Riparian plantings will further support geomorphological functionality by increasing bank stability. Physicochemical functions will improve with the reductions in bacterial and nutrient inputs to the project streams from converted land use (pasture to forested buffer) and filtering capabilities of the riparian buffer. These nutrient and bacterial parameters will not be monitored directly, but rather have been estimated as a reduced contribution to project streams of 1.024×10^{14} fecal coliform colonies, 2,634 pounds of total nitrogen, and 175 pounds of total phosphorus per year (based on NCDMS 2016 guidance; see Appendix 2).

Consideration of future impacts to the area that could limit functional uplift opportunities is important when assessing project potential. As mentioned above, the project will permanently protect the majority of the streams and drainages in this headwater system. The site will also protect 0.14 acre of existing wetland. 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 5. Project Goals, Objectives, and Functional Outcomes

Goals	Objective	Functional Level	Function-Based Parameter Effects	Monitoring Measurement
Restore channelized and livestock-impacted streams to stable 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

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

The project will restore and enhance a total of 3,978 proposed lf, which will generate 1,951.733 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 achieve functional improvements. Mitigation will occur along UT1 and its four tributaries.

The project streams were designed using a modified reference reach approach using three stable on-site cross-sections (see 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 DCRS a low level of risk in the path toward long-term stability and resilience following restoration implementation. The upper watershed outside of the project easement is steep and forested and not expected to be suitable for large-scale development in the future. The majority of the project will consist of enhancement work in large gravel and cobble material streams, taking advantage of existing stable features found within the reaches while reducing bank erosion and improving bedform diversity. The overall sediment load from the watershed is low, with current fine sediment within the project reaches coming from localized bank erosion. Any remaining fine sediment found within the streams should move through the project limits within the monitoring period following construction. Restored riparian buffers will reduce sedimentation and nutrient inputs from ongoing livestock and agricultural operations. An existing farm road that runs parallel along the bottom half of UT1 will be relocated outside of the conservation easement and further away from the stream to buffer sediment impacts.

6.1 UT to Newfound Creek (UT1)

The improvements on UT1 will use a combination of stream enhancement techniques. The uppermost reach, UT1-1, will begin at Station 10+00 as it enters the property and will involve stream Enhancement II, but at a lower ratio of 5:1. Cattle have access to the entire reach, but it is surrounded by steep valley walls and forest, resulting in less intensive livestock impacts. This Enhancement II work will also include invasive species control and cattle exclusion with fencing.

UT1-2, from Stations 19+67 to 22+98 at the confluence with UT3, will continue with a similar enhancement approach as the upstream reach. UT1-2 is a slightly larger channel than the upstream Enhancement II portions in this drainage and has been impacted more severely by livestock, so the typical 2.5:1 Enhancement II credit ratio will be used to improve the reach. Work along UT1-2 will consist of buffer planting, invasive species control, and cattle exclusion.

After the confluence with UT3, UT1 continues with two separate reaches until the end of the project. UT1-3 will consist of Enhancement I from Stations 22+98 to 27+86. During the site development, we did consider Restoration instead of Enhancement I for these reaches, but determined that EI is the more appropriate scenario due to the need to integrate existing stable features in portions of the stream as well as the current landscape position of the stream that would have required large-scale grading to implement Restoration. This reach will transition the stream with a larger cross-sectional area after the confluence with T3 to a downstream Enhancement I reach, UT1-4 from STA 27+86 to 37+25. The Enhancement I work on these two reaches will use similar methods as the Enhancement II reaches, but with the addition of bank grading and the installation of grade control and habitat structures in the channel. These structures will create habitat diversity and arrest the active headcuts.

6.2 UT2

UT2 begins at a headcut at Station 200+00 and ends at Station 203+43 where it enters UT1. UT2 will be enhanced using an Enhancement II (2.5:1 credit ratio) methodology for approximately 343 lf. The work along UT2 will concentrate on stabilizing local areas of instability, intermittent bank grading, livestock exclusion, invasive vegetation control, removing trash and dumped debris from the channel, and replanting the cleared parts of the easement.

6.3 UT3

UT3 begins at Station 300+00 and ends at Station 304+60 where it enters UT1. UT3 is the only reach requiring Restoration within this stream system. This is a steep channel that has undergone severe cattle impacts, and active headcuts are present as the bedform adjusts to this disturbance. The Restoration work will focus on restoring this headwater channel to a more natural step and cascade pool system. We will make use of cascade riffle structures to mimic the natural grade control that is found in the stable systems throughout the Newfound Creek watershed. The work will also include adjustments to dimension, pattern, and profile and the installation of woody debris structures to provide habitat niches throughout the stream. Special attention will be given to channel form where the cattle have destroyed the existing bed and banks and in the steeper portions of the channel as described here.

6.4 UT4 and UT5

UT4 and UT5 each have two separate reaches for mitigation treatment. The upstream reaches (UT4-1 and UT5-1) will use Enhancement II techniques at a ratio of 2.5:1 and the downstream reaches (UT4-2 and UT5-2) will also be improved through Enhancement II, but at a ratio of 5:1 to reflect the lower degree of work required. Both tributaries include the protection of existing wetland areas (Wetlands 1 and 2) that have been incorporated into the conservation easement at the head of these tributaries. UT4-1 and UT5-1 have a total of 346 lf (STA 400+00 to 400+56 and STA 500+00 to 502+90). These reaches are small spring/seep headwater channels, with poor quality or non-existent buffers that have been impacted by cattle and invasive species, but are still generally functioning. Work along these reaches will consist of buffer planting, invasive species control, and cattle exclusion. UT4-2 and UT5-2 consist of 233 lf (STA 400+56 to 401+90 and STA 502+90 to 503+89). Work along these reaches will be similar to UT1-1, which will involve invasive species control and cattle exclusion with fencing.

6.5 Crossings

Two culverted crossings will be installed as part of the project, one on UT1-4 (60" high-density polyethylene pipe) and one on UT3 (48" high-density polyethylene pipe). The crossings will be fenced to exclude livestock along the top of the proposed roadway to be installed and then continue to tie into the easement edges; there will be no breaks in fencing. The culverts have been designed to be embedded 1' below the proposed streambed elevation to allow aquatic organism passage and will have floodplain drain pipes to connect flows on either side of the crossing during large events. Both of the legal crossing exceptions are included at a larger width (approximately 60') to accommodate any future needs of the landowner; however, we design the crossing widths to the smallest extent possible (12-15' top width) based on the current use of the property to minimize the impacts on the project streams. Any future expansion of a crossing within the exception would have to be permitted separately by the landowner.

In addition, one ford crossing will be rebuilt above the top of UT2 with stone protection and a boulder sill as shown in the project plan details. The ford crossing will be protected by a fence and gates and connect to livestock exclusion fencing upstream of the ford crossing to provide additional protection of UT2 from cattle. All other existing ford crossings will be eliminated. These crossing locations are shown on Figure 8.

6.6 Fencing and Livestock Watering

Livestock exclusion fencing and gates will be installed to keep all livestock out of the project streams. New fencing locations are shown on the project plan sheets and will be constructed of woven wire built to NRCS standards. KCI will provide two wells and four livestock drinkers for the cows on the property (see Figure 8) to provide water away from the stream.

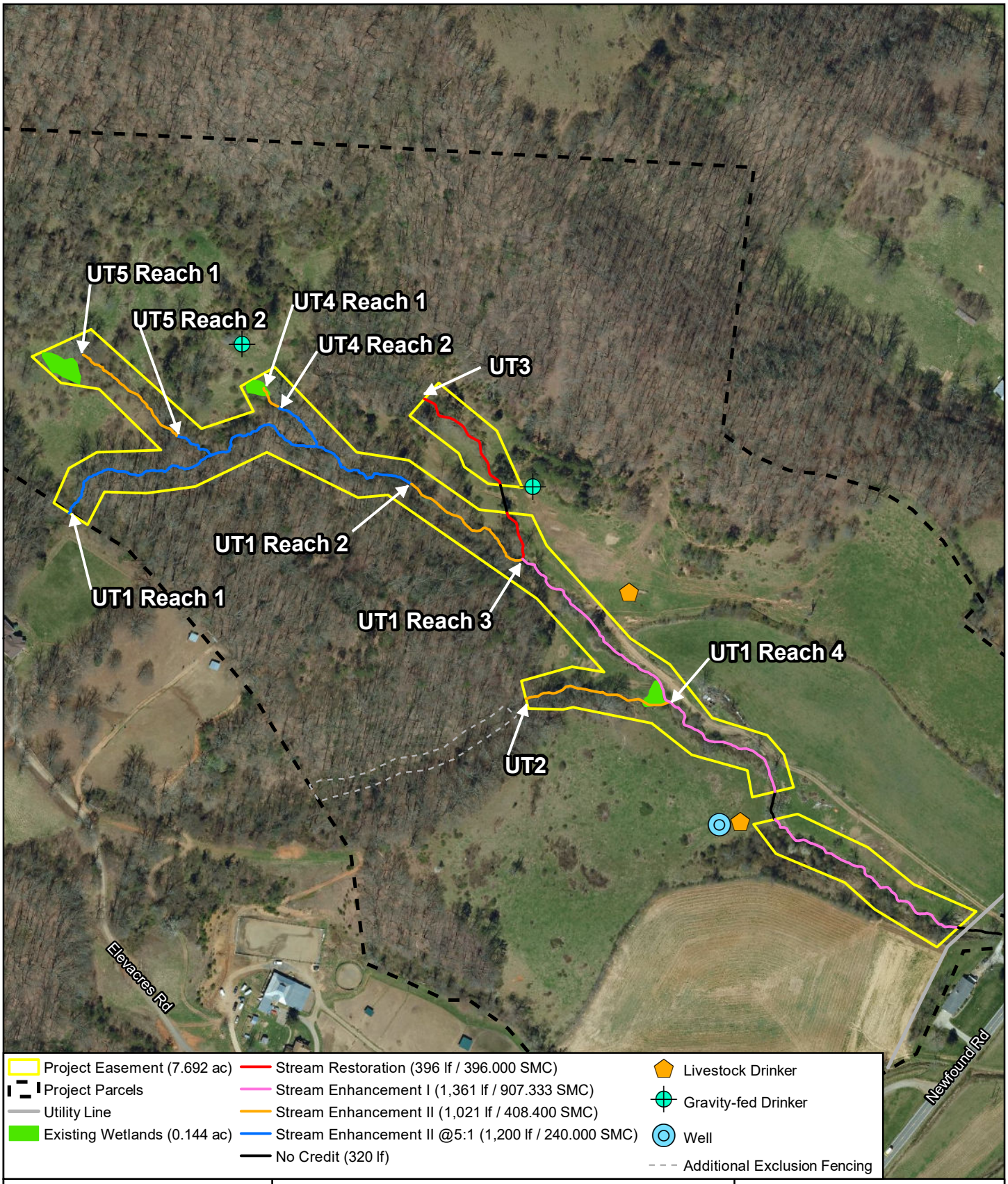


FIGURE 8. PROJECT ASSET MAP
DALES CREEK RESTORATION SITE
BUNCOMBE COUNTY, NC

6.7 Design Determination

KCI conducted bankfull verification by locating three reference cross-sections on-site that had stable bankfull indicators (see Figure 7 for locations). Using these on-site field measurements, we developed our own local curve relating drainage area and cross-sectional area. This curve was compared to the rural Mountain regional curve estimates for cross-sectional area (Harman et al., 1999). A summary of the bankfull verification is provided in the table below. Based on the results, we used our locally-determined values for area and discharge rather than the North Carolina Rural Mountain curve for our design values. The change in streambed slope from higher in this headwater system down to the bottom of UT1 leads to more variation than typical in discharge values.

Table 6. Local Curve Bankfull Determination

Cross-Section Location	Acres	Channel Slope	Drainage Area (Sq. Miles)	Field XS Area (sf)	Q (cfs)
UT1-2 Reference XS 1	76.8	7.2%	0.12	3.4	19.5
UT1-3 Reference XS 2	115.2	5.1%	0.18	4.1	26.7
UT1-4 Reference XS 3	121.6	4.7%	0.19	3.8	18.2

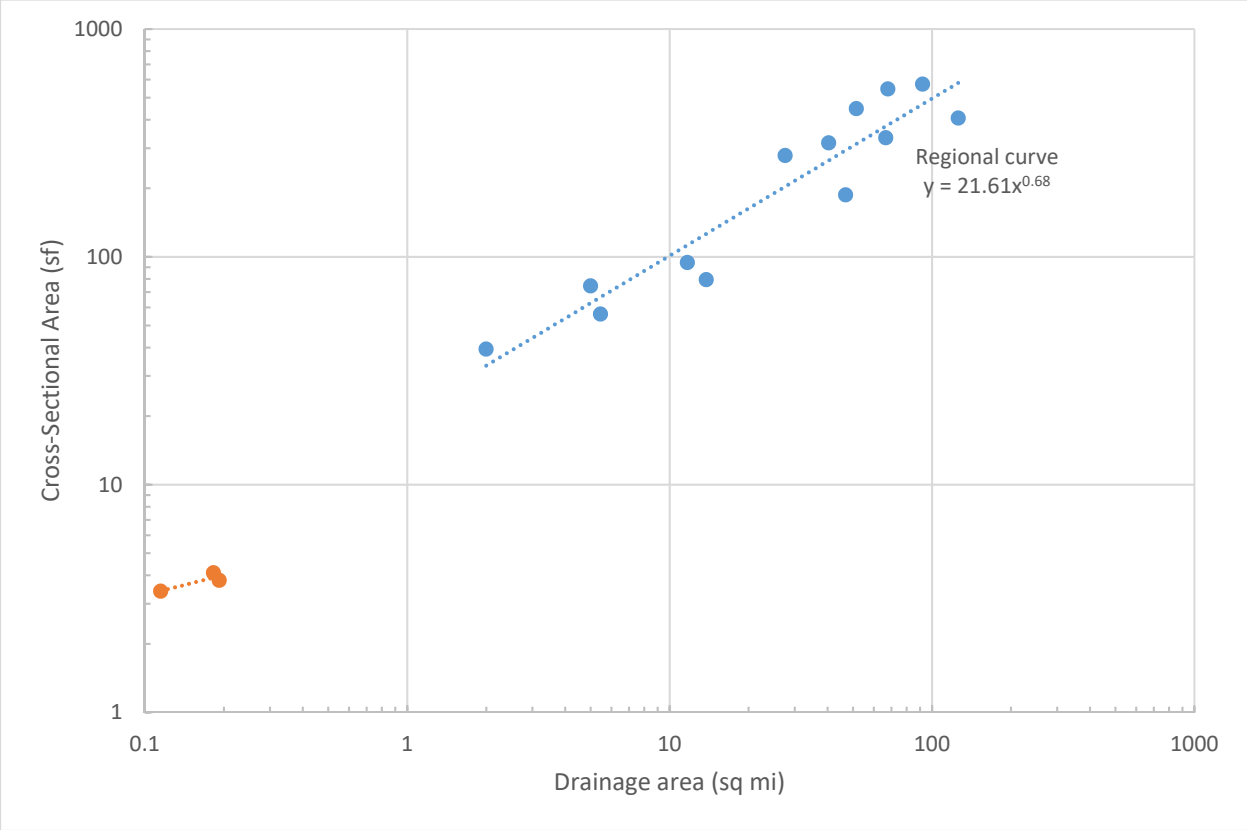


Figure 9. Local Bankfull Area Determination

6.8 Sediment

In order to analyze the existing sediment conditions within the Restoration and Enhancement I sections, 12 pebble counts were completed along UT1-3, UT1-4, and UT3, as well as 1 bulk pavement sample on UT1-4. These data are provided in Appendix 2 and summarized in Table 7 below. UT3 shows predominantly small gravels mixed with sand and silt from bank erosion. UT1 shifts to larger gravels and small cobble. UT3, which is the restoration reach at the site, has a small drainage area and functions as a threshold channel, which is defined as a stream where the bed material inflow is negligible and the channel boundary is immobile even at high flows (Shields et al. 2003). As opposed to an active bed system, a threshold channel never achieves full sediment transport; the system only achieves partial sediment transport. Reaches 3 and 4 of UT1 transition to a more active bed system, but still with only a low supply of incoming sediment.

Based on 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. Average shear stress values are high due to the steep slopes of the project streams (no less than 4%). On UT3, we will harvest and retain as much of the natural gravel as possible to seed the new riffles and supplement the bed material with rock; the sediment texture is expected to coarsen in the restored channel compared to the current impaired condition. The enhancement work on UT1 will maintain the existing sediment material in the channel. Table 7 presents the results from sediment sampling at the site and the calculated shear stresses across the project streams.

Table 7. Sediment Results and Shear Stress Comparison

Reach	Type	Cross-Section ID	Avg Shear Stress (lb/sf)	Predicted Grain Diam. (mm)	Measured D50 (mm)	Measured D84 (mm)	Modif. Critical Shear Stress (lb/sf)
UT3	Existing	XSA	1.46	116	0.43	6.9	0.01
UT3	Existing	XSB	2.30	185	0.23	16.0	0.01
UT3	Existing	XSC	2.26	183	0.84	3.2	0.02
UT3	Existing	XSD	2.58	210	0.10	8.5	0.00
UT3	Existing	XSE	1.43	113	0.31	9.2	0.01
UT1 Reach 3	Existing	XSF	0.95	74	5.3	76	0.17
UT1 Reach 4	Existing	XSG	2.55	207	0.71	9.9	0.02
UT1 Reach 4	Existing	XSH	2.28	184	8.4	140	0.29
UT1 Reach 4	Existing	XSI	1.55	123	5.2	43	0.14
UT1 Reach 2	Existing	XS-REF1	1.94	156	7.8	92	0.23
UT1 Reach 4	Existing	XS-REF2	2.12	171	1	53	0.04
UT1 Reach 4	Existing	XS-REF3	1.34	106	38	120	0.90
UT1 Reach 4	Existing	XS-REF3	1.34	106	28.7	75.9	0.61
UT1 Reach 3	Proposed	Proposed Riffle	2.26	182	5.3	76	0.17
UT1 Reach 4	Proposed	Proposed Riffle	1.75	140	38	120	0.85
UT3	Proposed	Proposed Riffle	2.34	189	0.31	9.2	0.01

Based on the calculated average channel boundary shear stress for the proposed channels, UT3 will have adequate stream power to transport the existing D84 material during a bankfull event. Because UT3 will have high average shear stress within a supply-limited headwater system, we will install cascade riffle structures to protect the bed and mimic natural rock riffles in these headwater systems. These cascade riffle structures will also have embedded woody debris to help capture and maintain rock. The cascade riffles will have a mix of Class A and B stone with 10% native stream material; Class A has a mid-range of 106 mm (approximately 4 in.).

6.9 Morphological Essential Parameters Tables

Table 8. Morphological Essential Parameters for UT1 Reach 3

Parameter	Existing Condition	Reference Condition	Proposed
Valley Width (ft)	10-35	N/A	10-35
Contributing Drainage Area (acres)	102	N/A	102
Channel/Reach Classification	G4/B4a	B4	B4a
Discharge Width (ft)	4.6-22.2	N/A	6.8
Discharge Depth (ft)	0.3-0.88	N/A	0.5
Discharge Area (ft^2)	3.5-6.3	N/A	3.4
Discharge Velocity (ft/s)	3.7-7.0	N/A	7.2
Discharge (cfs)	23.6-24.5	N/A	24.7
Water Surface Slope	0.074	N/A	0.074
Sinuosity	1.1	1.1	1.1
Width/Depth Ratio	6.0-77.7	12-18	13.5
Bank Height Ratio	1.7-3.8	1	1
Entrenchment Ratio	1.2-2.0	1.4-2.2+	2.7+
d16 / d35 / d50 / d84 / d95 / dip / disp (mm)	0.062/0.062/0.71/9.9/21/0.03/12.7	Gravel	Gravel

Table 9. Morphological Essential Parameters for UT1 Reach 4

Parameter	Existing Condition	Reference Condition	Proposed
Valley Width (ft)	15-40	N/A	15-40
Contributing Drainage Area (acres)	136	N/A	136
Channel/Reach Classification	G4/B4a	B4	B4a
Discharge Width (ft)	7.0-7.5	N/A	8.0
Discharge Depth (ft)	0.6-0.7	N/A	0.6
Discharge Area (ft^2)	4.3-5.3	N/A	4.8
Discharge Velocity (ft/s)	5.4.-6.5	N/A	6.4
Discharge (cfs)	27.7 - 28.4	N/A	31.2
Water Surface Slope	0.048	N/A	0.048
Sinuosity	1.1	1.1	1.1
Width/Depth Ratio	10.8-11.5	12-18	13.2
Bank Height Ratio	1.4 - 6.0	1.0	1.0
Entrenchment Ratio	1.4 – 1.6	1.4-2.2+	2.5+
d16 / d35 / d50 / d84 / d95 / dip / disp (mm)	0.31/1.4/8.4/140/210/-0.06/21.9	Gravel	Gravel

Table 10. Morphological Essential Parameters for UT3

Parameter	Existing Condition	Reference Condition	Proposed
Valley Width Belt Width (ft)	10-20	N/A	14-20
Contributing Drainage Area (acres)	20	N/A	20
Channel/Reach Classification	G4	B4	B4a
Discharge Width (ft)	2.0-6.3	N/A	5.0
Discharge Depth (ft)	0.3-0.5	N/A	0.4
Discharge Area (ft^2)	1.0-1.6	N/A	1.9
Discharge Velocity (ft/s)	4.5-6.5	N/A	7.0
Discharge (cfs)	5.8 - 7.0	N/A	12.9
Water Surface Slope	0.104	N/A	0.105
Sinuosity	1.1	1.1	1.1
Width/Depth Ratio	3.8-24.6	12-18	13.5
Bank Height Ratio	1.0 – 4.9	1.0	1.0
Entrenchment Ratio	1.2 – 3.3	1.4-2.2+	3.1
d16 / d35 / d50 / d84 / d95 / dip / disp (mm)	0.01/0.16/0.23/16/32/0.49/36	Gravel	Gravel

6.10 Planting

All unforested portions of the project easement will be planted to establish a forested riparian buffer. The target community type will be Montane Alluvial Forest (Small River Subtype) as described by Schafale

(2012). This community type is found on the smaller spectrum of alluvial systems in the North Carolina mountains. They can be distinguished by a "characteristic suite of wetland or alluvial indicator species, such as *Platanus occidentalis, Betula nigra*, and *Alnus serrulata*, coupled with evidence of flooding." While the riparian forests at DCRS 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 and a forested area along the upper portion of UT1.

The planting plan is shown in Figure 10 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 4.55 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 11. 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	*Quercus 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, including fescue,

will be sprayed with herbicide and left fallow until full mortality is achieved. The areas will then be scarified or disked to break up any existing compaction prior to seeding and stabilizing with temporary and permanent seed mixes as prescribed in the project plans. In areas that typically have poor soil characteristics affecting vegetation establishment and growth, including Priority 2 Restoration, Enhancement I, new bench cuts, and existing road removal segments within the easement, furnished or salvaged topsoil will be used to surface treat all planting areas within the floodplain extents shown on the plans; adequate lime and fertilizer will be used to ensure adequate vegetative stabilization.

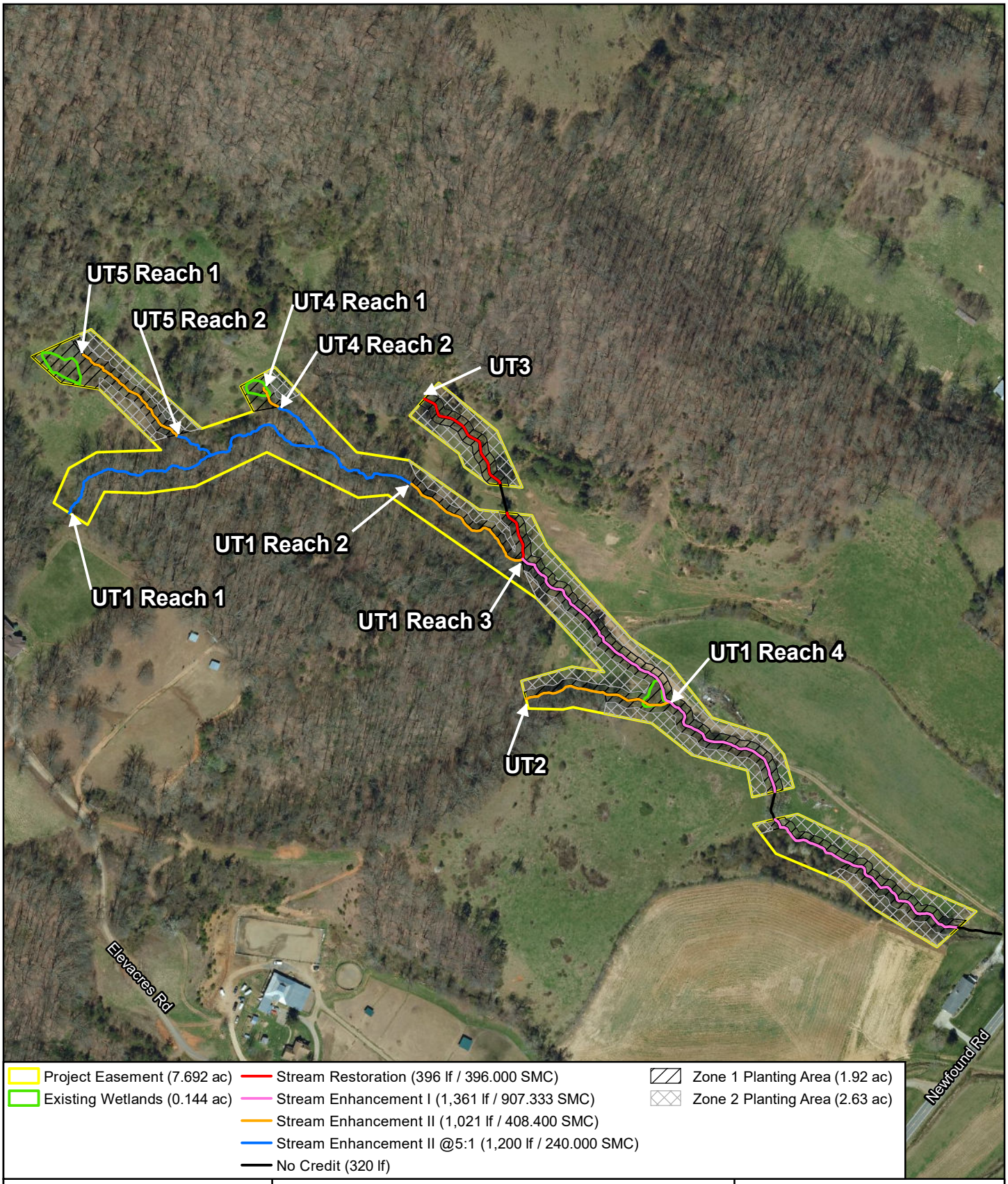


FIGURE 10. PROPOSED PLANTING PLAN
DALES CREEK RESTORATION SITE
BUNCOMBE COUNTY, NC

6.11 Project Assets

The tables below outline the anticipated project assets that will be produced from the DCRS project and are shown in Figure 8.

Table 12. Mitigation Assets and Components

Project Segment	Existing Footage or Acreage	Mitigation Plan Footage or Acreage	Mitigation Category	Restoration Level	Priority Level	Mitigation Ratio (X:1)	Mitigation Credits		As-Built Footage or Acreage	Comments
UT1 Reach 1	967	967	Cool	EII	N/A	5.000	193.400			Invasive species control and cattle exclusion.
UT1 Reach 2	332	332	Cool	EII	N/A	2.500	132.800			Buffer planting, invasive species control, and cattle exclusion.
UT1 Reach 3	488	488	Cool	EI	N/A	1.500	325.333			Bank grading, grade control and habitat structure installation, buffer planting, invasive species control, and cattle exclusion.
UT1 Reach 4	939	873	Cool	EI	N/A	1.50000	582.000			Bank grading, grade control and habitat structure installation, buffer planting, invasive species control, and cattle exclusion. Crossing exception at STA 31+37 to 32+03.
UT2	343	343	Cool	EII	N/A	2.500	137.200			Selective bank grading and buffer planting, invasive species control, cattle exclusion, and removal of dumped debris.
UT3	466	396	Cool	R	2	1.000	396.000			Full-scale channel restoration. Crossing exception at STA 302+79 to 303+43.
UT4 Reach 1	56	56	Cool	EII	N/A	2.500	22.400			Wetland seep protection, buffer planting, invasive species control, and cattle exclusion.
UT4 Reach 2	134	134	Cool	EII	N/A	5.000	26.800			Invasive species control and cattle exclusion.
UT5 Reach 1	290	290	Cool	EII	N/A	2.500	116.000			Wetland seep protection, buffer planting, invasive species control, and cattle exclusion.
UT5 Reach 2	99	99	Cool	EII	N/A	5.000	19.800			Invasive species control and cattle exclusion.

Table 13. Project Credits

Restoration Level	Stream			Riparian Wetland		Non-Rip Wetland	Coastal Marsh
	Warm	Cool	Cold	Riverine	Non-Riv		
Restoration		**396.000**					
Re-establishment							
Rehabilitation							
Enhancement							
Enhancement I		**907.333**					
Enhancement II		**648.400**					
Creation							
Preservation							
Totals		**1951.733**					

7.0 PERFORMANCE STANDARDS

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

Vegetation Performance

The site must achieve a woody stem density of 320 stems/acre after three years, 260 stems/acre after five years and 210 stems/acre after seven years to be considered successful. Trees in each plot must average 6 feet in height at Year 5 and 8 feet at Year 7. A single species may not account for more than 50% of the required number of stems within any plot. 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 the approved planting list included in Section 6.10. 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 (in separate years) must be recorded within the seven-year monitoring period for the project streams. The intermittent project streams (UT2, UT3, UT4, and UT5) must also show a minimum of 30 continuous flow days within each calendar year (assuming normal precipitation); UT1, 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 will be monitored per the NCIRT 2016 monitoring guidelines. The bank height ratio (BHR) should not exceed 1.2. BHR and ER at any measured riffle cross-section should not change by more than 10% from the baseline condition during any given monitoring interval (e.g., no more than 10% between years 1 and 2, 2 and 3, 3 and 5, or 5 and 7). There will be an overall assessment for each reach to distinguish localized versus systemic concerns for that stream. Adjustment and lateral movement following construction and as the channel settles over the monitoring period are to be expected. Geomorphological measurements of cross-sections will be used to determine if any adjustments that occur are out of the range typically expected for this type of stream.

8.0 MONITORING PLAN

Monitoring of the DCRS 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 11 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. Four plots will be permanently installed, while the remainder will be randomly placed at the time

of each monitoring visit. Vegetation must be planted and plots established at least 180 days prior to the start of the first year of monitoring.

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

Stream Hydrologic Monitoring

Bankfull events on-site will be verified using one automatic stream monitoring gauge on UT1-4. Additional gauges will be installed on UT2, UT3, UT4, and UT5 in order to verify the 30-day continuous flow requirement for intermittent streams.

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

Six permanent cross-sections (3 riffles and 3 pools) will be established throughout the site to capture each reach that is being either restored or completed with Enhancement I. The distribution of the cross-sections is as follows and as shown on Figure 11: UT1-3 (1 riffle and 1 pool), UT1-4 (1 riffle and 1 pool), UT3 (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 and Enhancement I 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.

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.

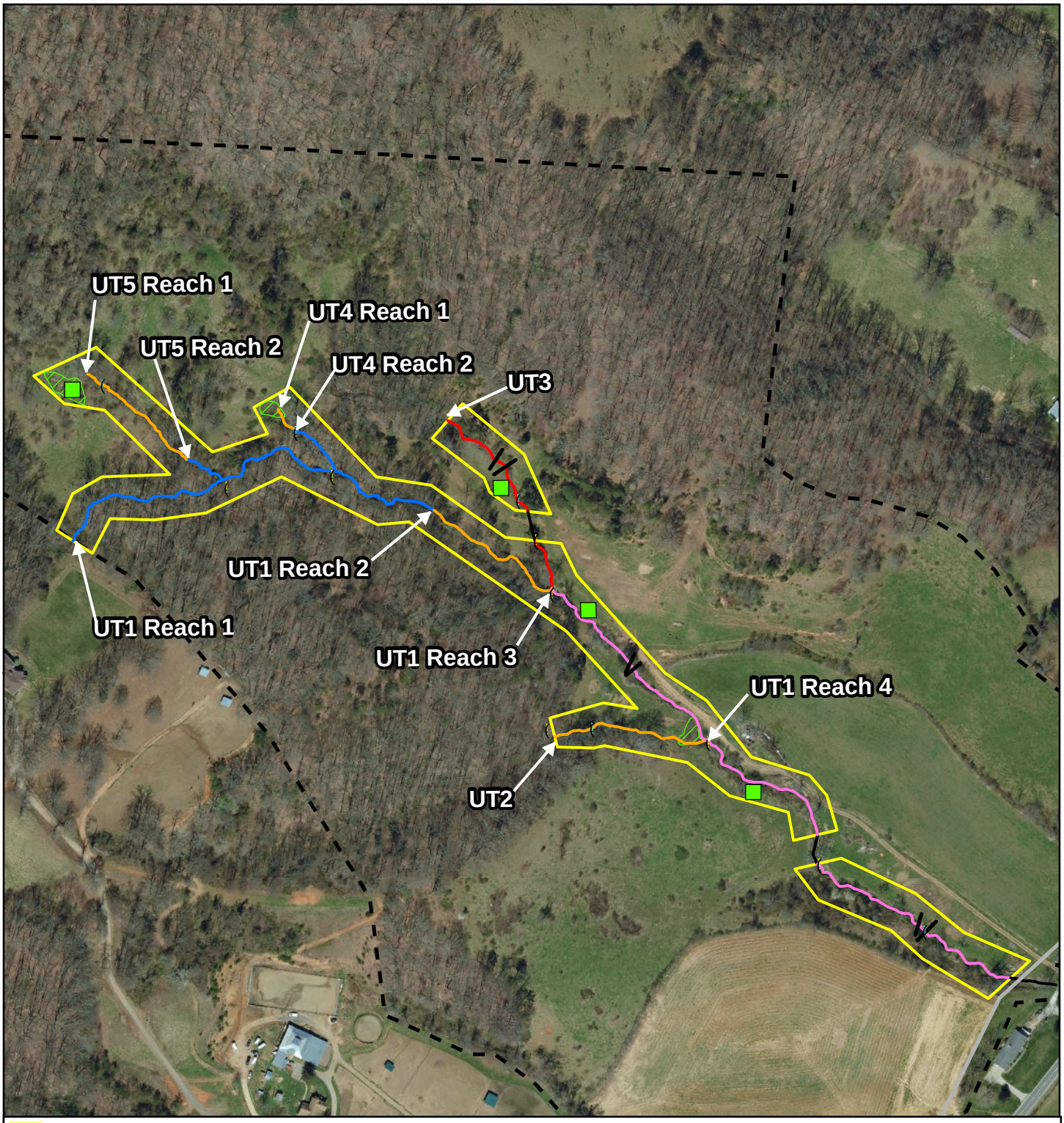
Reporting

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 14. Monitoring Requirements

Dales Creek Restoration Site				
Required	**Parameter**	**Quantity**	**Frequency**	**Notes**
Yes	Pattern and Profile	1,757 lf (all R and EI reaches)	Once, during as-built survey	Additional measurements in later years may be taken as necessary.
Yes	Stream Dimension	6 cross-sections (3 riffles, 3 pools)	Monitoring Years 1, 2, 3, 5, and 7	
Yes	Stream Hydrology	5 pressure transducer gauges	Annual – throughout year	1 gauge each on UT1, UT2, UT3, UT4, and UT5
Yes	Vegetation	6 vegetation monitoring plots	Monitoring Years 1, 2, 3, 5, and 7	4 permanently fixed, 2 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

* See Appendix 9 for proposed invasive species management.



Project Easement (7.692 ac)
Project Parcels
Utility Line
Existing Wetlands (0.144 ac)
Stream Restoration (396 lf / 396.000 SMC)
Stream Enhancement I (1,361 lf / 907.333 SMC)
Stream Enhancement II (1,021 lf / 408.400 SMC)
Stream Enhancement II @5:1 (1,200 lf / 240.000 SMC)
No Credit (320 lf)
Stream Gauges (5)
Vegetation Plots (4 Permanent, 2 Random)
Fixed Photo Points (7)*
Additional photo points will be taken at each vegetation plot and cross section.

0 150 300 Feet

FIGURE 11. PROPOSED MONITORING PLAN
DALES CREEK RESTORATION SITE
BUNCOMBE COUNTY, NC

Image Source: NC Statewide Orthoimagery, 2019

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, DMS shall notify the members of the IRT and work with the IRT to develop contingency plans and remedial actions.

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.

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11.0 REFERENCES CITED

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APPENDICES

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1. Plan Sheets

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KCI JOB# : 161904754

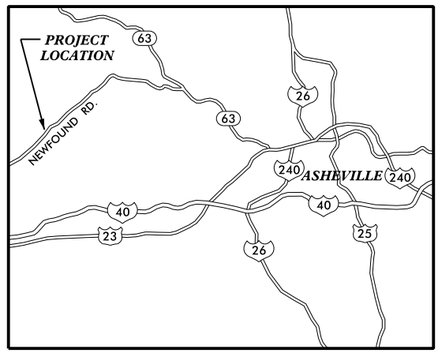
CONTRACT #: 7910

NCDEQ DIVISION OF MITIGATION SERVICES

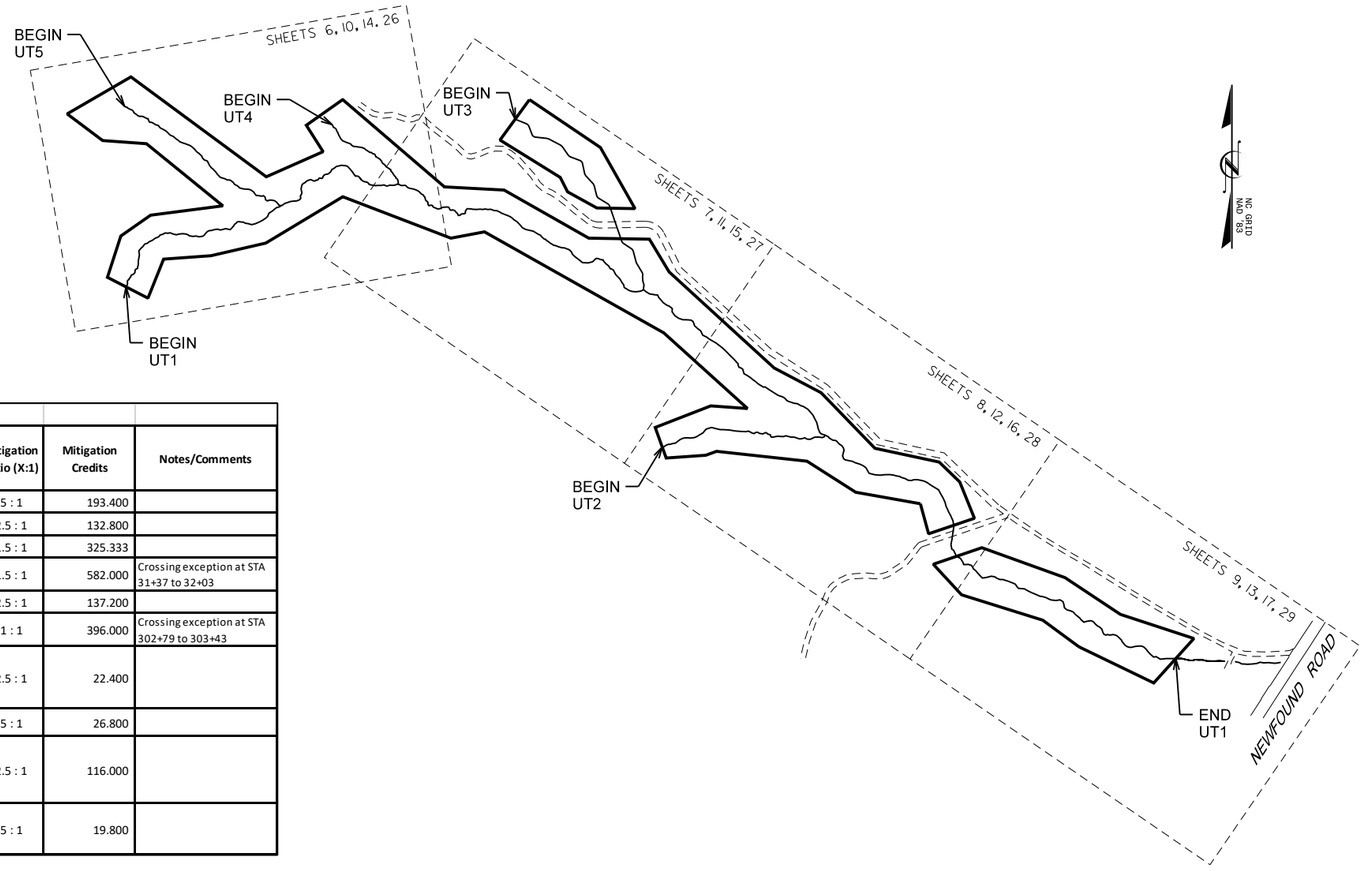
STATE	CONTRACT NUMBER	SHEET NO.	TOTAL SHEETS
N.C.	7910	1	29

DALE'S CREEK RESTORATION SITE

BUNCOMBE COUNTY, NORTH CAROLINA
FRENCH BROAD RIVER BASIN
CATALOGING UNIT 06010105
(LAT 35.5970 / LON –82.7427)



VICINITY MAP
NOT TO SCALE



Project Asset Table (Total Credits = 1951.733)

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
UT1 Reach 1	967	10+00 to 19+67	967	967	EII	-	5 : 1	193.400	
UT1 Reach 2	332	19+67 to 22+98	332	332	EII	-	2.5 : 1	132.800	
UT1 Reach 3	488	22+98 to 27+86	488	488	EI	-	1.5 : 1	325.333	
UT1 Reach 4	939	27+86 to 37+25	939	873	EI	-	1.5 : 1	582.000	Crossing exception at STA 31+37 to 32+03
UT2	343	200+00 to 203+43	343	343	EII	-	2.5 : 1	137.200	
UT3	466	300+00 to 304+60	460	396	R	P2	1 : 1	396.000	Crossing exception at STA 302+79 to 303+43
UT4 Reach 1	56	400+00 to 400+56	56	56	EII	-	2.5 : 1	22.400	
UT4 Reach 1	134	400+56 to 401+90	134	134	EII	-	5 : 1	26.800	
UT5 Reach 1	290	500+00 to 502+90	290	290	EII	-	2.5 : 1	116.000	
UT5 Reach 2	99	502+90 to 503+89	99	99	EII	-	5 : 1	19.800	

DIRECTIONS TO SITE

FROM ASHEVILLE, TAKE U.S. 74 ATL.
USE THE TWO RIGHT LANES TO TAKE
A RIGHT ONTO NC–63 WEST. TURN
LEFT ONTO NEWFOUND ROAD. AFTER
6 MILES, THE STREAM PROJECT ENTRANCE
WILL BE ON ON THE RIGHT ,JUST BEFORE
THE DRIVEWAY AT 1281 NEWFOUND RD.

INDEX OF SHEETS

TOTAL DISTURBED AREA = 8.55 ACRES

Prepared In the Office of:

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

Prepared for:

HARRY TSOMIDES
DMS PROJECT MANAGER

Prepared by:

KRISTIN E. KNIGHT, PE
PROJECT ENGINEER

ALEX FRENCH
PROJECT DESIGNER

PROJECT ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 040899 ENGINEER KRISTIN E. KNIGHT

P.E.

SIGNATURE:

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:

POINT	NORTHING	EASTING	ELEV.
101	693167.61	887709.51	2229.57
102	692666.28	887349.42	2242.21
103	693239.58	887436.71	2239.08
104	693185.23	887309.98	2264.79
105	693421.72	887149.68	2259.88
106	693407.22	886967.13	2279.77
107	693511.76	887037.65	2267.77
108	693624.14	886950.28	2275.15
109	693715.56	886844.99	2282.49
110	693790.30	886620.74	2306.39
111	693884.84	886706.61	2301.23
112	694034.92	886498.46	2320.02
113	694128.04	886509.55	2334.48
114	694260.40	886359.34	2353.97
117	693817.87	887511.07	2316.43
118	693750.94	887696.20	2307.26
119	692919.62	887227.77	2259.50

PROJECT LEGEND:

Proposed Thalweg w/Approximate Bankfull Limits ..... 

Proposed Riffle Enhancement ..... 

Proposed Riffle Grade Control ..... 

Proposed Cascade Riffle ..... 

Proposed Step Pool ..... 

Proposed Live Lift ..... 

Existing Channel to be Filled ..... 

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

Major Contour Line (5ft.) 720

Overhead Utility ..... OH

NORTH CAROLINA PROFESSIONAL SEAL 040899 ENGINEER KRISTIN E. KNIGHT

REVISIONS

SYM.	DESCRIPTION	DATE

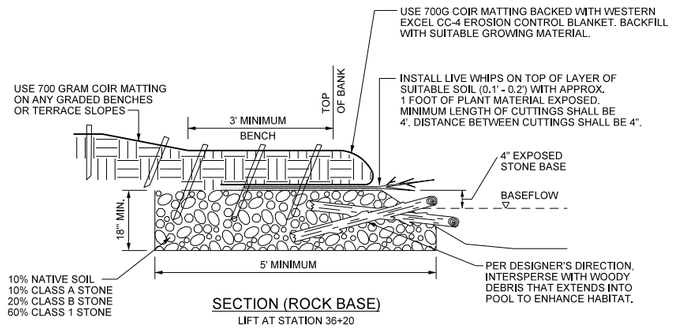
NCDEQ – DIVISION OF MITIGATION SERVICES

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

DALE'S CREEK
RESTORATION SITE
BUNCOMBE COUNTY, NORTH CAROLINA

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

GENERAL NOTES & PROJECT LEGEND

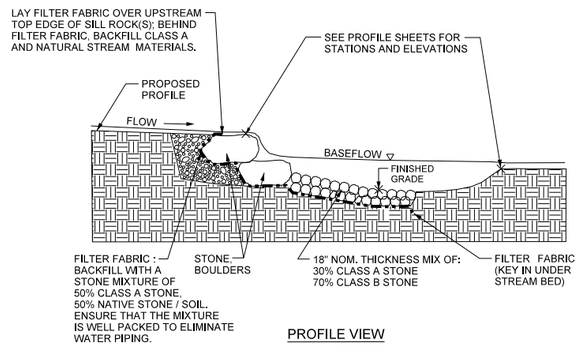


NOTES:

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

LIVE LIFT

SCALE: NTS



PROFILE VIEW

NOTES:

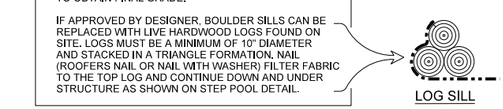
FOR DOUBLE STEP POOLS, CONTINUE ROCK MIXTURE FROM FIRST SILL ALL THE WAY TO THE SECOND SILL. DO NOT STOP AT THE 6FT MINIMUM AS SHOWN IN THE SINGLE STEP POOL PLAN VIEW.

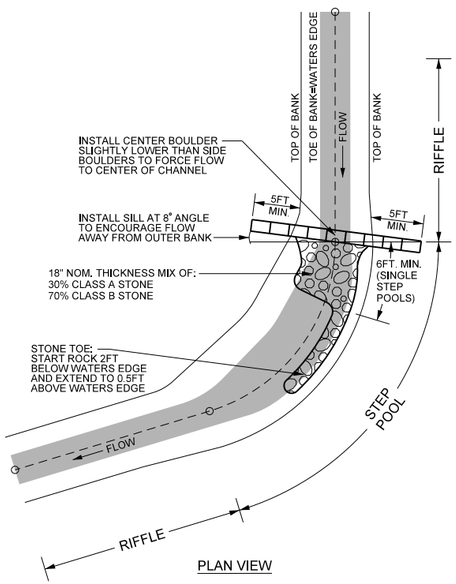
BOULDERS SHOULD BE NATIVE STONES OR SHOT ROCK, ANGULAR AND OBLONG, WITH AN AXIS APPROXIMATELY 3' L x 2' W x 1.5' D.

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.

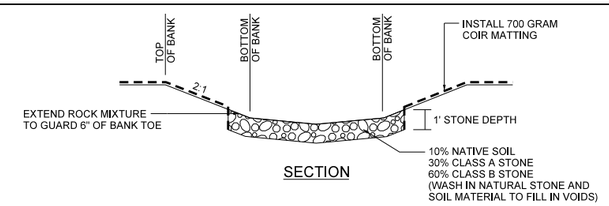




PLAN VIEW

STEP POOL

SCALE: NTS



SECTION

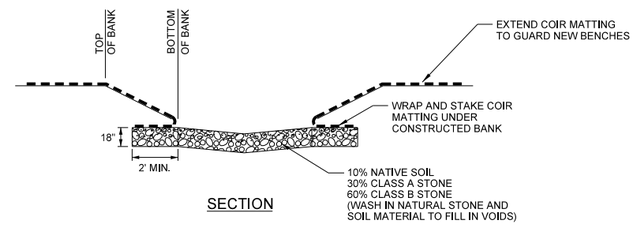
STONE INSTALLATION:

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

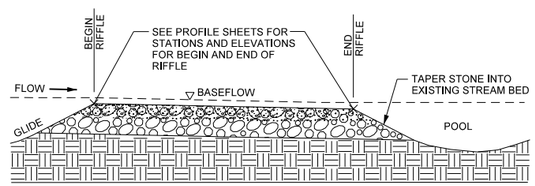
SEE CROSS-SECTION SHEET FOR EXACT DIMENSIONS.

RIFFLE ENHANCEMENT

SCALE: NTS



SECTION



PROFILE

STONE INSTALLATION:

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

SEE CROSS-SECTION SHEET FOR EXACT DIMENSIONS.

RIFFLE GRADE CONTROL

SCALE: NTS

NORTH CAROLINA PROFESSIONAL SEAL 040899 ENGINEER KRISTIN E. KNIGHT

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

DALE'S CREEK RESTORATION SITE

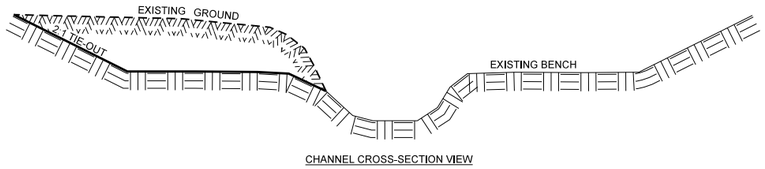
BUNCOMBE COUNTY, NORTH CAROLINA

DATE: AUGUST 2020

SCALE: N.T.S.

DETAILS

SHEET 3 OF 29



CHANNEL CROSS-SECTION VIEW

NOTES:

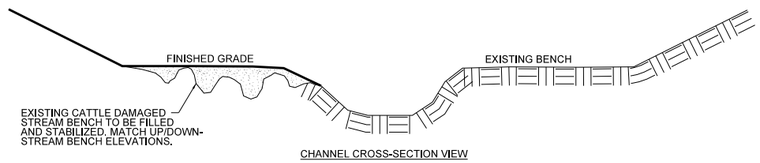
CUT / CREATE NEW 5' BENCH ALONG BANKS AS NOTED IN PLAN SHEETS.

BEFORE SEEDING AND MULCHING, CONTRACTOR SHALL ROUGHEN SURFACE TO AID IN GERMINATION.

ALL NEWLY CUT BENCHES SHALL BE STABILIZED WITH COIR MATTING.

CUT / CREATE NEW BENCH

SCALE: NTS



CHANNEL CROSS-SECTION VIEW

NOTES:

ENHANCE EXISTING STREAM BENCHES THROUGH CATTLE DAMAGED AREAS WITH SUITABLE CUT MATERIAL AS NOTED IN PLAN SHEETS.

BEFORE SEEDING AND MULCHING, CONTRACTOR SHALL ROUGHEN SURFACE TO AID IN GERMINATION.

ALL NEWLY FINISHED BENCHES SHALL BE STABILIZED WITH COIR MATTING.

BENCH ENHANCEMENT

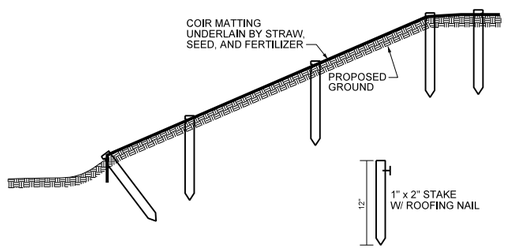
SCALE: NTS

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.

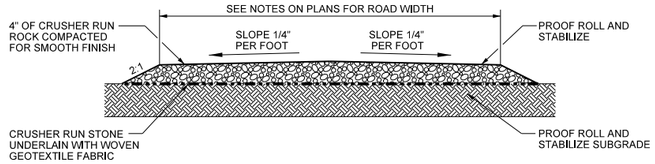


COIR MATTING

SCALE: NTS

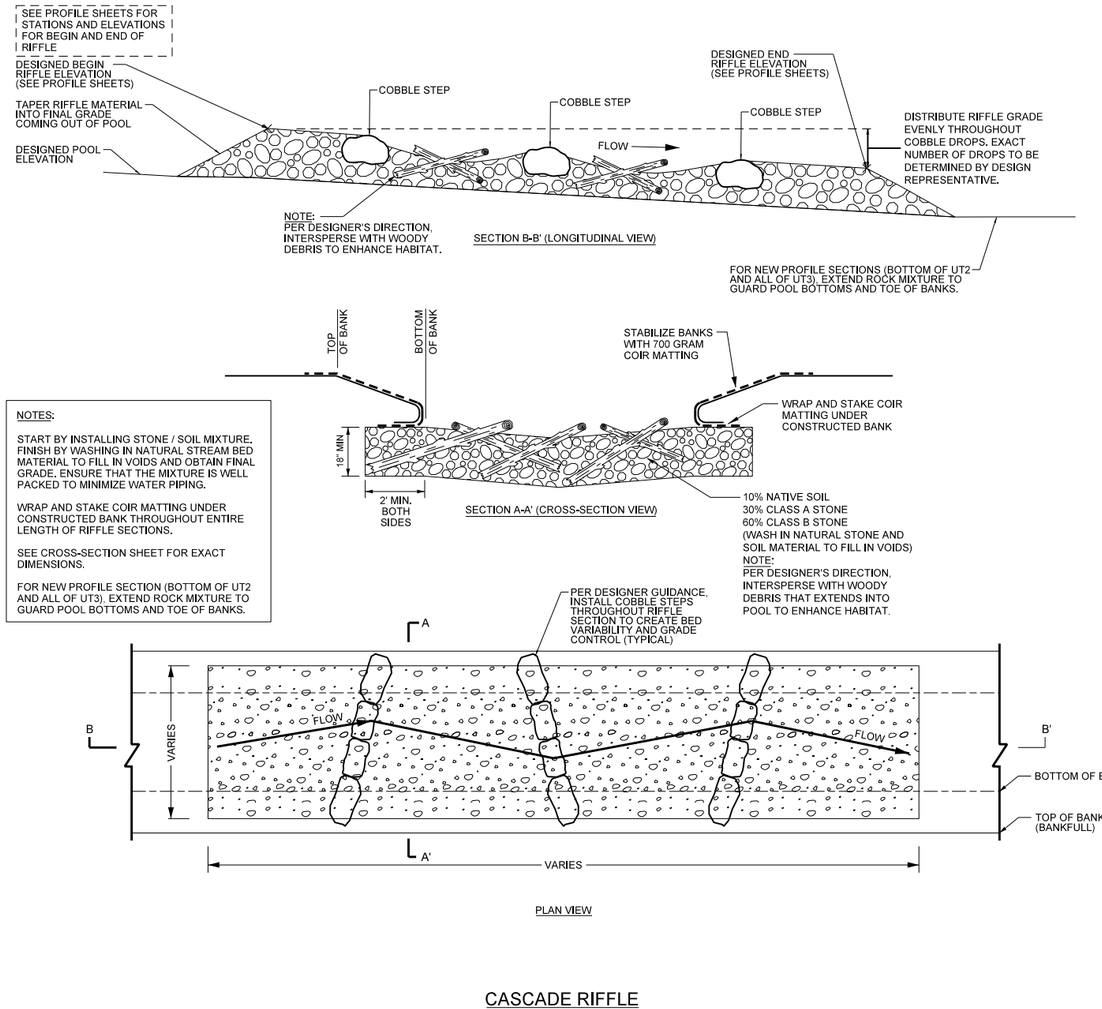
EXAMPLE COIR MATTING PLACEMENT

SCALE: NTS



STABILIZED ACCESS DRIVE

SCALE: NTS



PLAN VIEW

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.

FOR NEW PROFILE SECTION (BOTTOM OF UT2 AND ALL OF UT3), EXTEND ROCK MIXTURE TO GUARD POOL BOTTOMS AND TOE OF BANKS.

CASCADE RIFFLE

SCALE: NTS

NORTH CAROLINA PROFESSIONAL SEAL 040899 ENGINEER KRISTIN E. KNIGHT

DATE	REVISIONS	DESCRIPTION	SYM.

NCDEQ – DIVISION OF MITIGATION SERVICES

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

DALE'S CREEK RESTORATION SITE

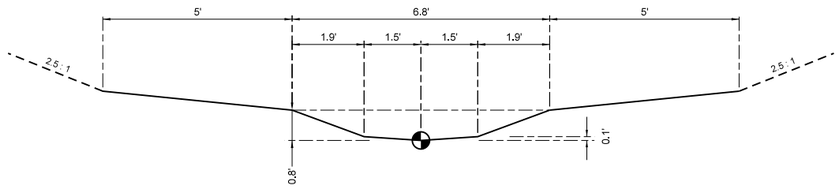
BUNCOMBE COUNTY, NORTH CAROLINA

DATE: AUGUST 2020

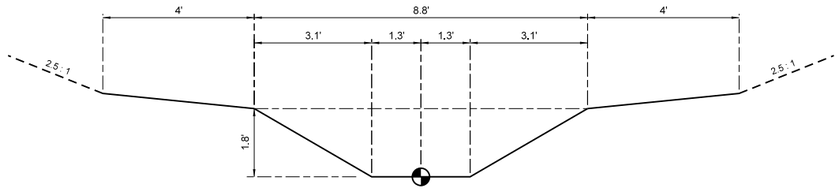
SCALE: N.T.S.

DETAILS

REACHES :
UT1 - STATION 24+20 TO 25+49
(COW WALLOW & BRAIDED AREA)
UT1 - STATION 31+10 TO 31+90
(CULVERT CROSSING)

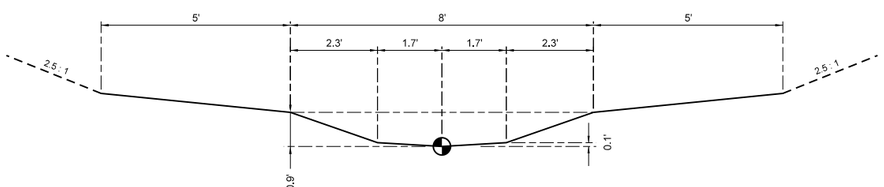


TYPICAL RIFFLE
= THALWEG LOCATION



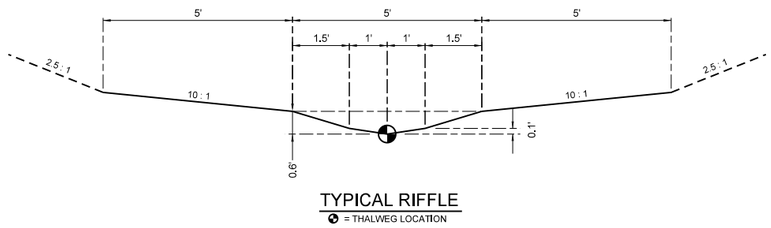
TYPICAL POOL
= THALWEG LOCATION

REACH :
UT1 - ALL CASCADE RIFFLE LOCATIONS BELOW UT2

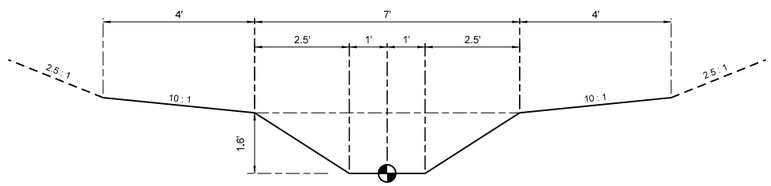


TYPICAL RIFFLE
= THALWEG LOCATION

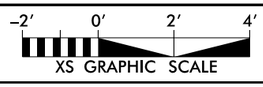
REACHES :
UT2 - STATION 201+95 TO 203+43
UT3 - STATION 300+00 TO 304+60
UT4 - RIFFLE ENHANCEMENT AREA
UT5 - RIFFLE ENHANCEMENT AREAS



TYPICAL RIFFLE
= THALWEG LOCATION



TYPICAL POOL
= THALWEG LOCATION



NO.	DESCRIPTION	DATE
	REVISIONS	

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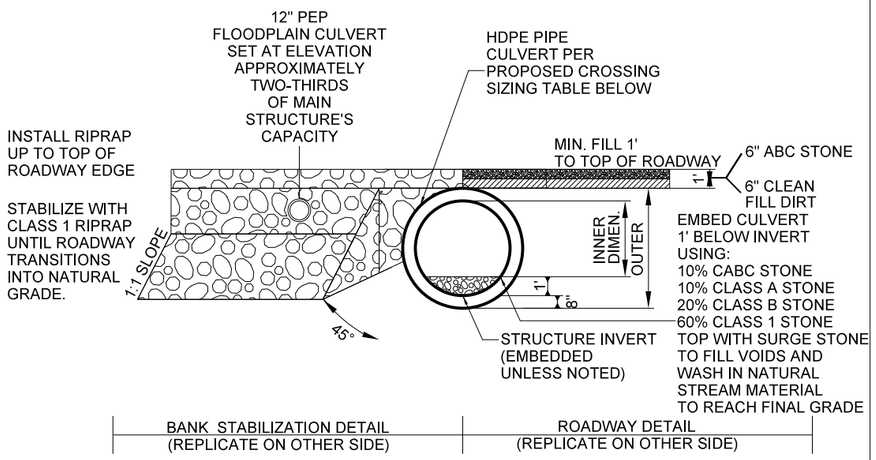
DALE'S CREEK RESTORATION SITE

BUNCOMBE COUNTY, NORTH CAROLINA

DATE: AUGUST 2020
SCALE: SEE SHEET

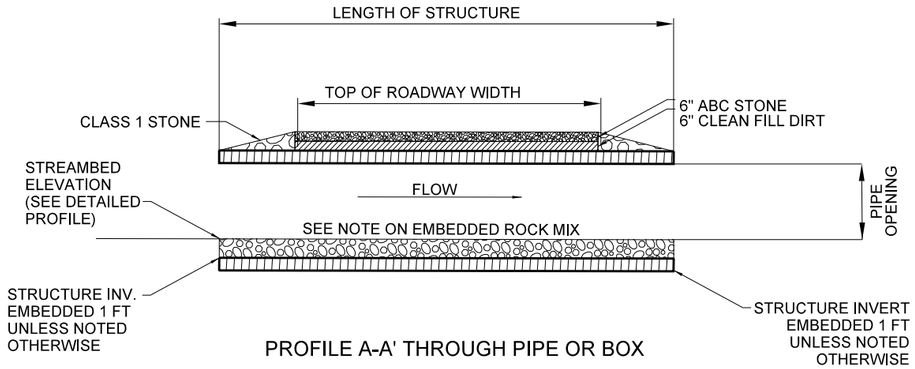
TYPICAL CROSS-SECTIONS

TYPICAL CROSSING - CROSS-SECTIONAL VIEW



UPSTREAM SECTION

TYPICAL CROSSING - PROFILE VIEW



PROFILE A-A' THROUGH PIPE OR BOX

A	UPDATED CULVERT INFORMATION	MARCH 2020
	DESCRIPTION	DATE
	REVISIONS	

PROPOSED CROSSING SIZING

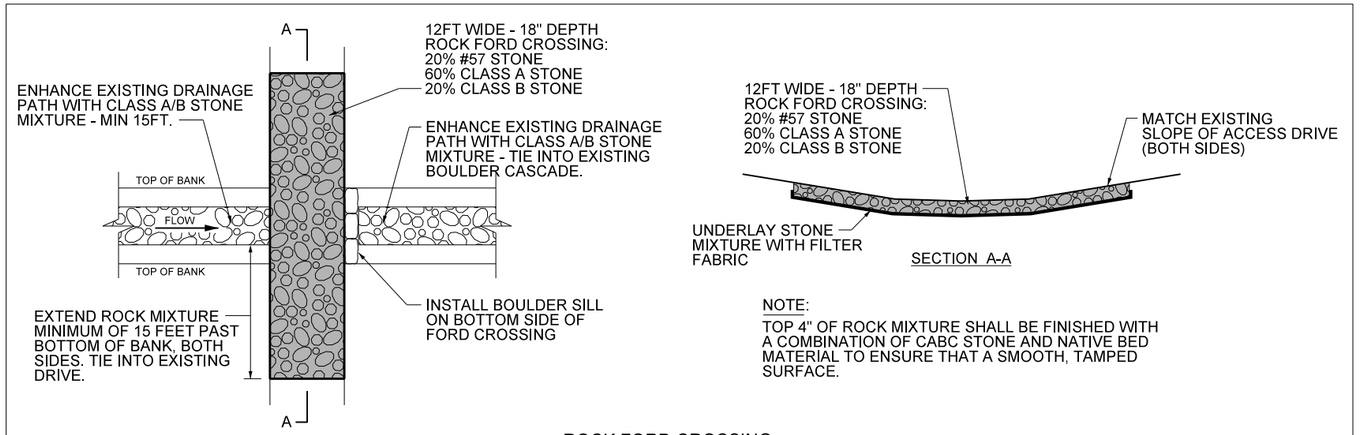
PROJECT REACH	WIDTH OF ROADWAY (FT)	APPROX TOP OF ROADWAY ELEVATION (FT)	PROPOSED STRUCTURE (ALL EMBEDDED 1 FT BELOW STREAM THALWEG UNLESS NOTED)	LENGTH OF PROPOSED STRUCTURE (FT)	UPSTREAM ELEVATIONS (FT) STREAM BED / EMBEDDED STRUCTURE	DOWNSTREAM ELEVATIONS (FT) STREAM BED / EMBEDDED STRUCTURE	UPSTREAM STRUCTURE STATION	DOWNSTREAM STRUCTURE STATION
UT1-4	15	2262.0	60" HDPE	30	2256.04 / 2255.04 emb	2256.04 / 2255.04 emb	31+42.01	31+72.01
UT3	12	2334.0	48" HDPE	24	2329.18 / 2328.18 emb	2329.18 / 2328.18 emb	303+02.29	303+26.29

NOTES:

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

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

IN LIEU OF WINGWALLS SEE RIPRAP PROTECTION/STABILIZATION.



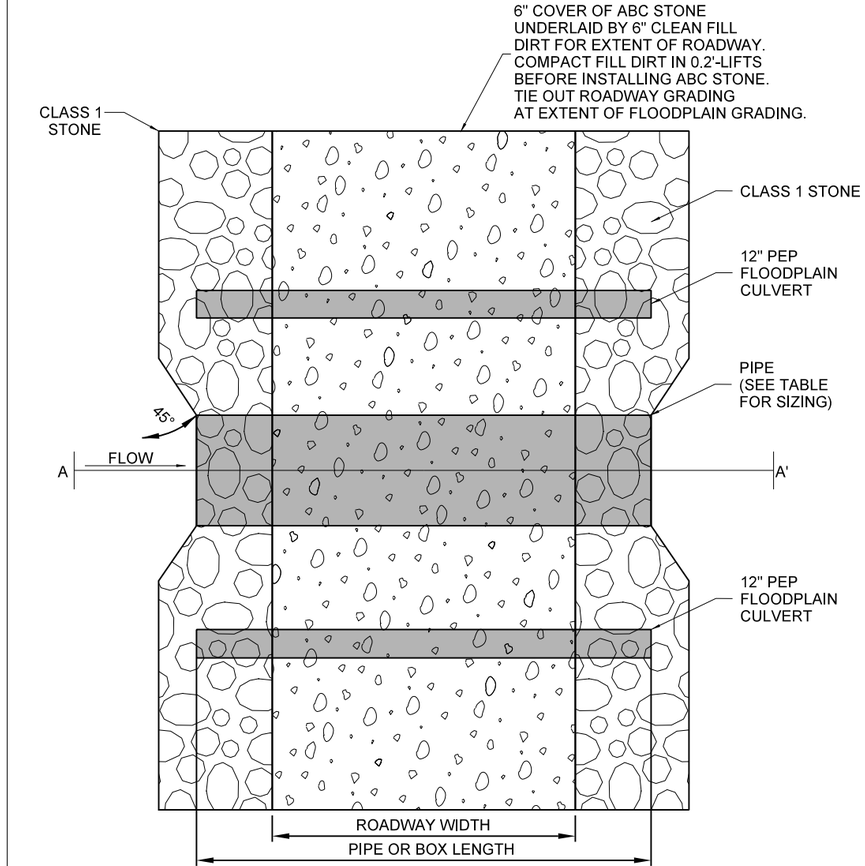
NOTE:

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

TYPICAL CROSSING - PLANVIEW



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DALE'S CREEK RESTORATION SITE

BUNCOMBE COUNTY, NORTH CAROLINA

DATE: AUGUST 2020
SCALE: NOT TO SCALE

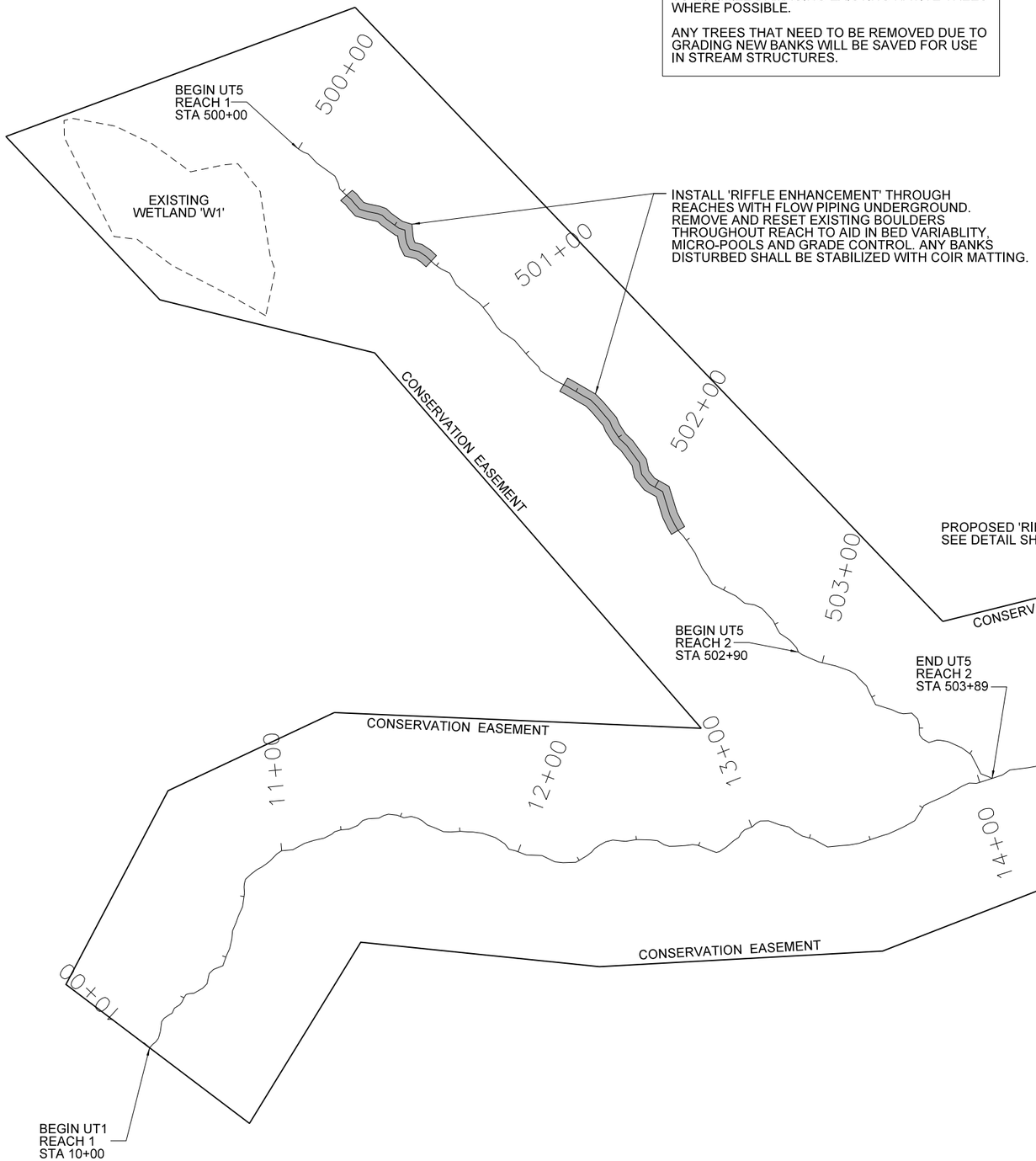
CULVERT AND CROSSING DETAILS

SHEET 5A OF 29

NOTES:

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

ANY TREES THAT NEED TO BE REMOVED DUE TO GRADING NEW BANKS WILL BE SAVED FOR USE IN STREAM STRUCTURES.



NC GRID
NAD '83

–25′ 0′ 25′ 50′
GRAPHIC SCALE

NORTH CAROLINA
PROFESSIONAL
SEAL
040899
ENGINEER
KRISTIN E. KNIGHT

NO.	DESCRIPTION	DATE
	REVISIONS	

NCDEQ – DIVISION OF MITIGATION SERVICES

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DALE'S CREEK RESTORATION SITE

BUNCOMBE COUNTY, NORTH CAROLINA

DATE: AUGUST 2020
SCALE: GRAPHIC

SITE PLAN

NOTES:

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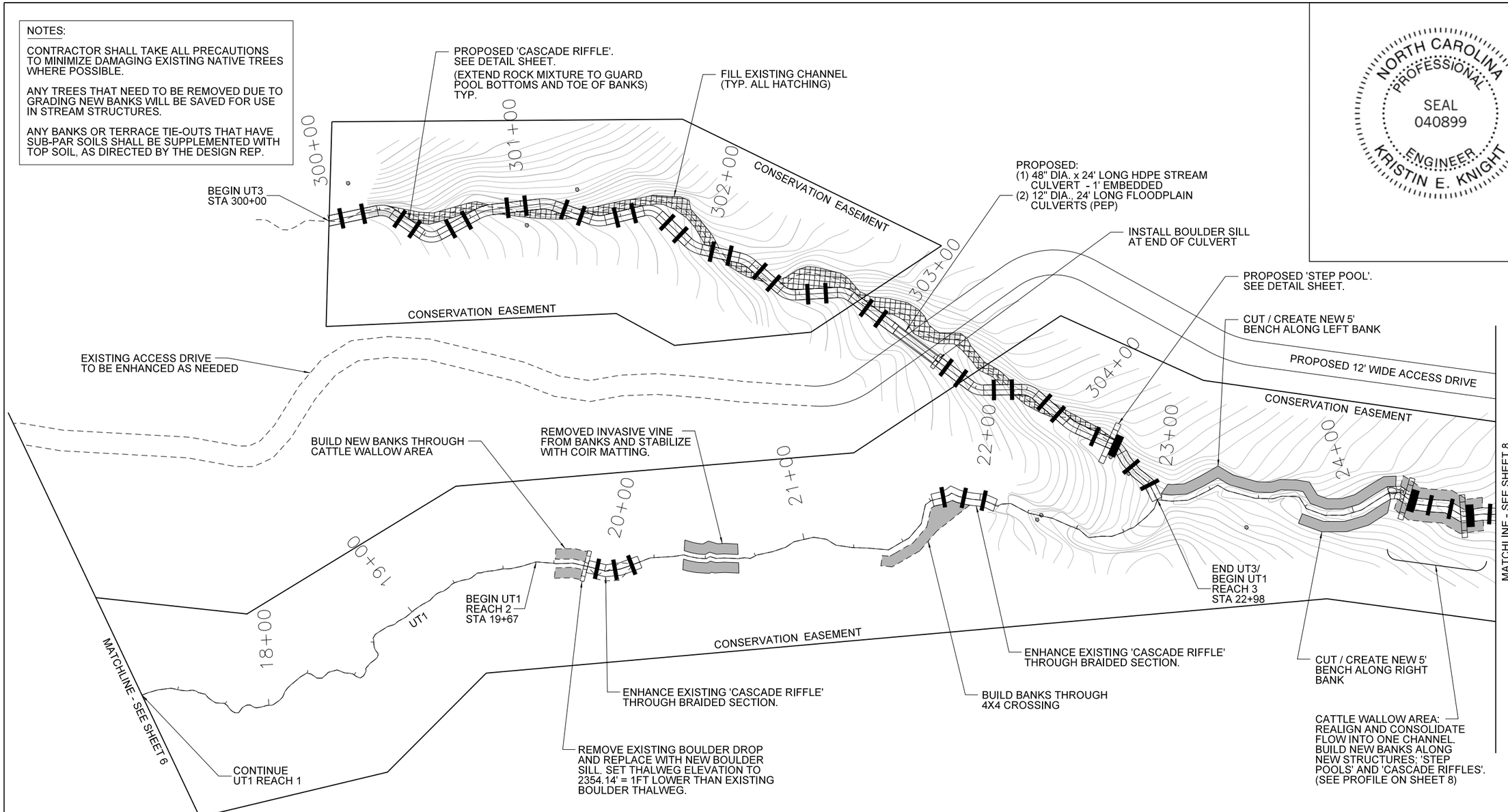
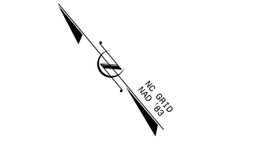
ANY TREES THAT NEED TO BE REMOVED DUE TO GRADING NEW BANKS WILL BE SAVED FOR USE IN STREAM STRUCTURES.

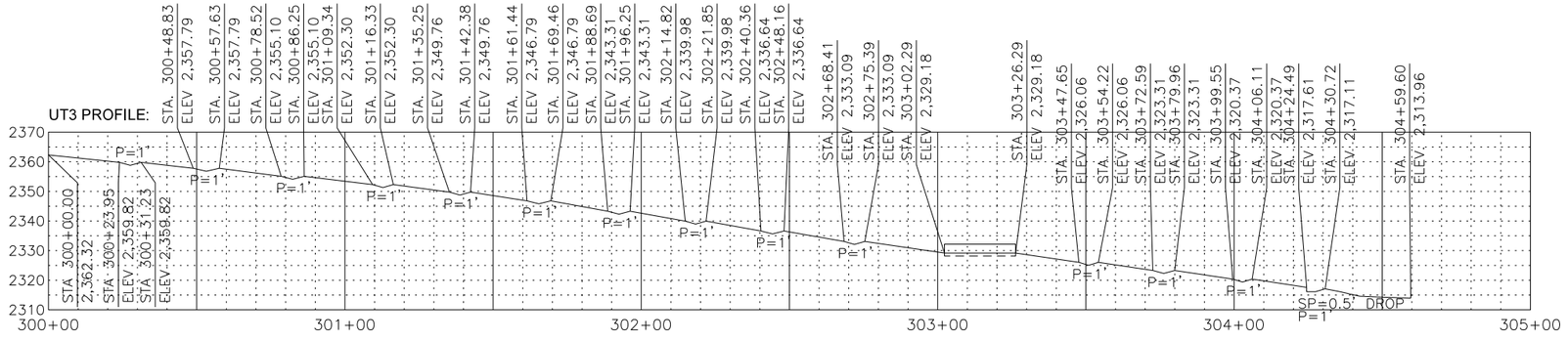
ANY BANKS OR TERRACE TIE-OUTS THAT HAVE SUB-PAR SOILS SHALL BE SUPPLEMENTED WITH TOP SOIL, AS DIRECTED BY THE DESIGN REP.





–25′ 0′ 25′ 50′

GRAPHIC SCALE



REVISIONS

SYM.	DESCRIPTION	DATE

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DALE'S CREEK RESTORATION SITE

BUNCOMBE COUNTY, NORTH CAROLINA

DATE: AUGUST 2020
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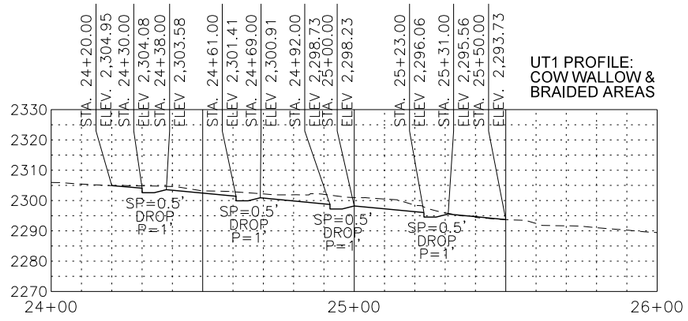
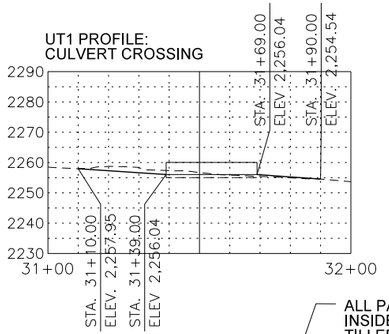
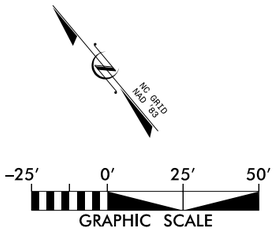
SITE PLAN

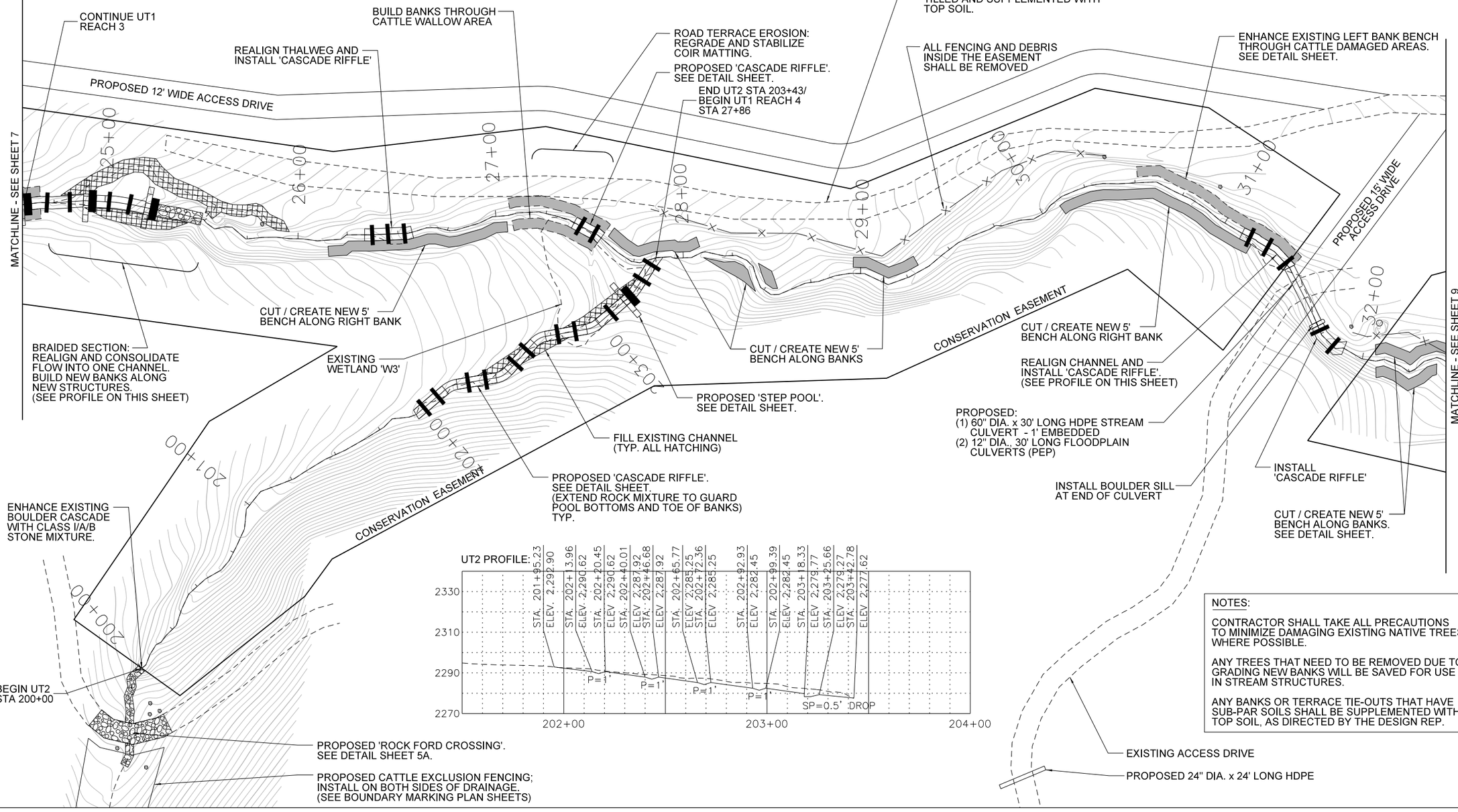






NORTH CAROLINA PROFESSIONAL SEAL 040899 ENGINEER KRISTIN E. KNIGHT

NO.	DESCRIPTION	DATE
	REVISIONS	



NOTES:

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

ANY TREES THAT NEED TO BE REMOVED DUE TO GRADING NEW BANKS WILL BE SAVED FOR USE IN STREAM STRUCTURES.

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

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DALE'S CREEK RESTORATION SITE

BUNCOMBE COUNTY, NORTH CAROLINA

DATE: AUGUST 2020
SCALE: GRAPHIC

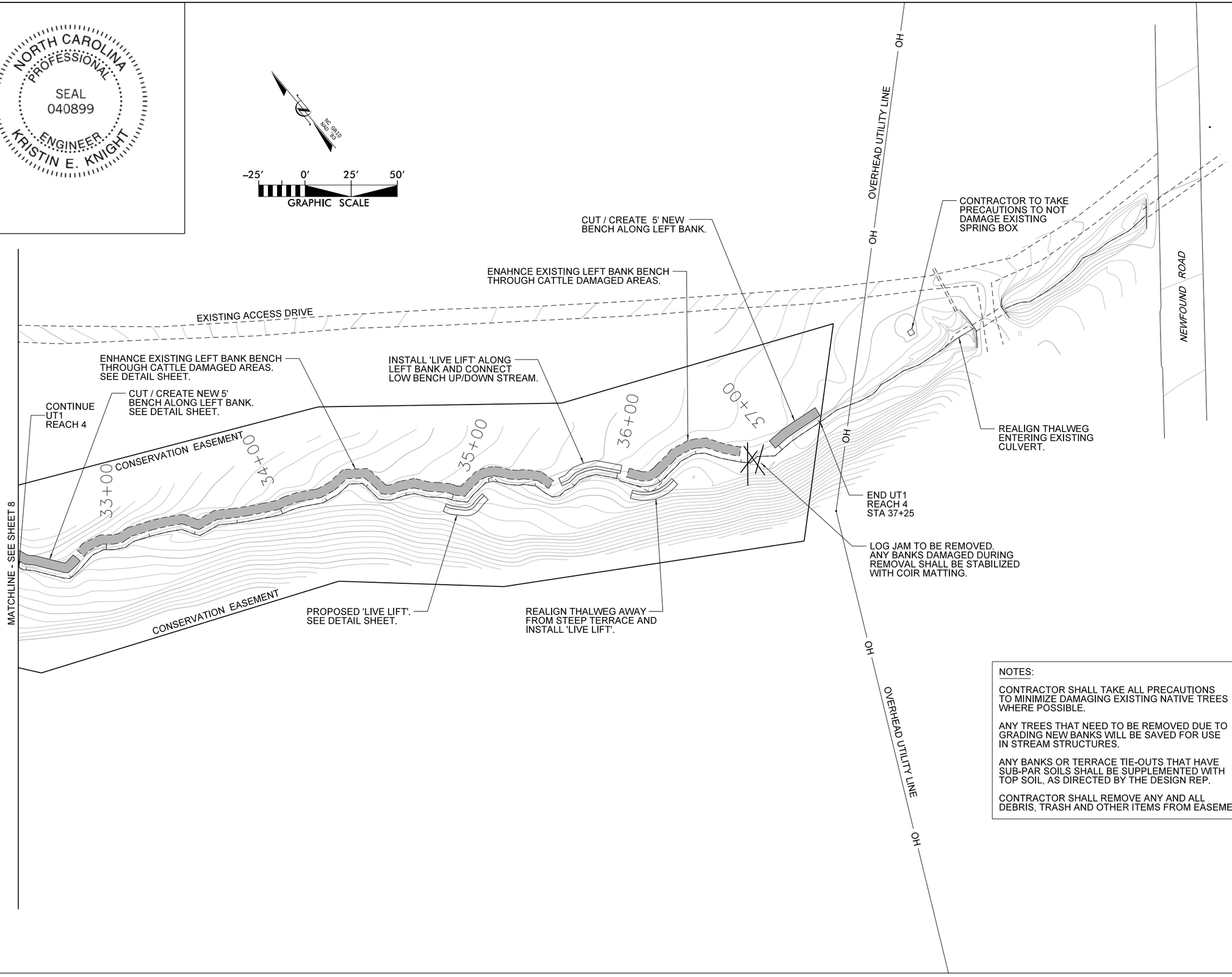
SITE PLAN

NORTH CAROLINA PROFESSIONAL SEAL 040899 ENGINEER KRISTIN E. KNIGHT

NC GRID NAD 83

–25′ 0′ 25′ 50′

GRAPHIC SCALE



NOTES:

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

ANY TREES THAT NEED TO BE REMOVED DUE TO GRADING NEW BANKS WILL BE SAVED FOR USE IN STREAM STRUCTURES.

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

CONTRACTOR SHALL REMOVE ANY AND ALL DEBRIS, TRASH AND OTHER ITEMS FROM EASEMENT.

REVISIONS

SYM.	DESCRIPTION	DATE

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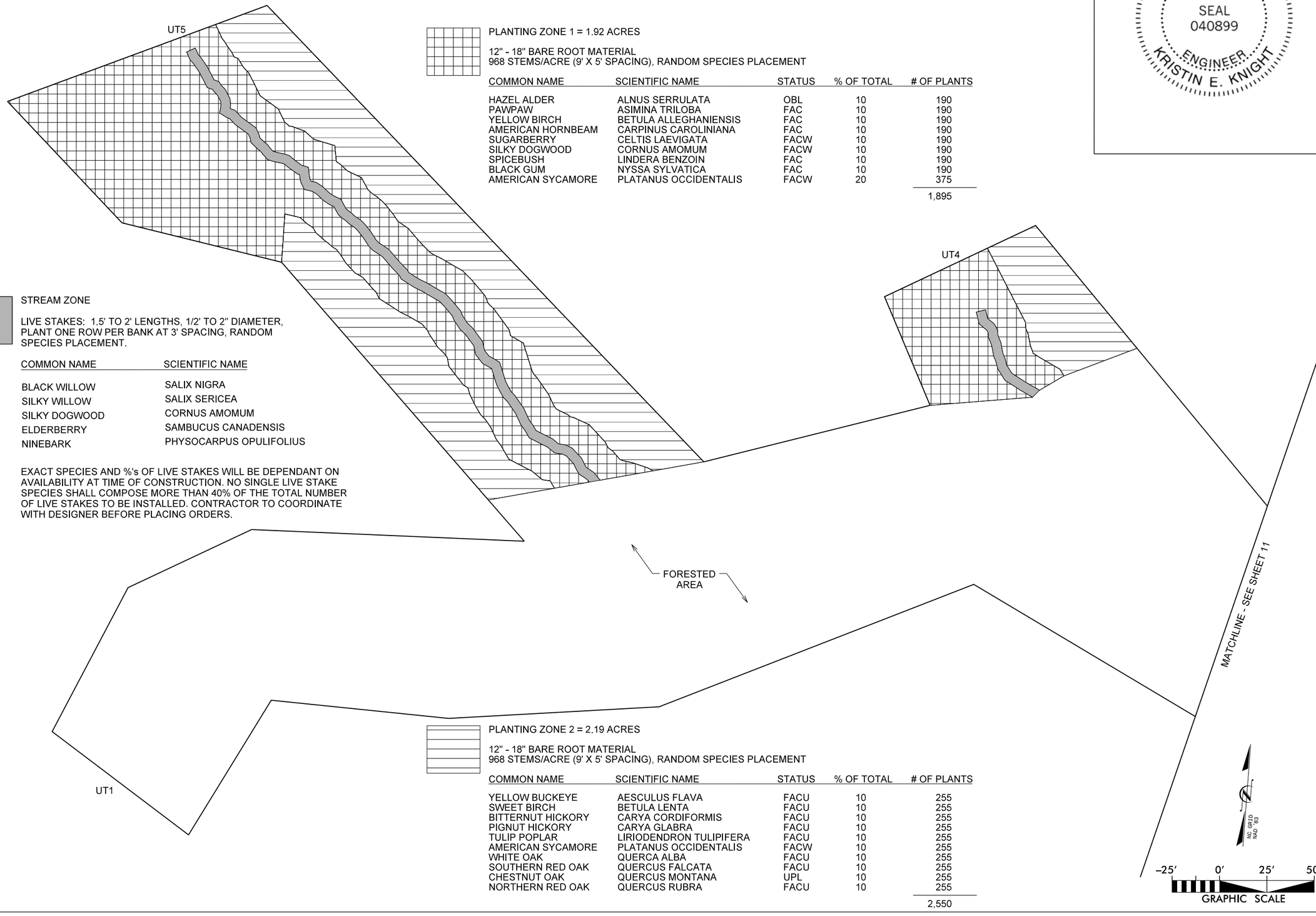
DALE'S CREEK RESTORATION SITE

BUNCOMBE COUNTY, NORTH CAROLINA

DATE: AUGUST 2020
SCALE: GRAPHIC

SITE PLAN

EXACT SPECIES AND %'s OF BARE ROOTS WILL BE DEPENDENT 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.



PLANTING ZONE 1 = 1.92 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	190
PAWPAW	ASIMINA TRILOBA	FAC	10	190
YELLOW BIRCH	BETULA ALLEGHANIENSIS	FAC	10	190
AMERICAN HORNBEAM	CARPINUS CAROLINIANA	FAC	10	190
SUGARBERRY	CELTIS LAEVIGATA	FACW	10	190
SILKY DOGWOOD	CORNUS AMOMUM	FACW	10	190
SPICEBUSH	LINDERA BENZOIN	FAC	10	190
BLACK GUM	NYSSA SYLVATICA	FAC	10	190
AMERICAN SYCAMORE	PLATANUS OCCIDENTALIS	FACW	20	375
				1,895

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.

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	255
SWEET BIRCH	BETULA LENTA	FACU	10	255
BITTERNUT HICKORY	CARYA CORDIFORMIS	FACU	10	255
PIGNUT HICKORY	CARYA GLABRA	FACU	10	255
TULIP POPLAR	LIRIODENDRON TULIPIFERA	FACU	10	255
AMERICAN SYCAMORE	PLATANUS OCCIDENTALIS	FACW	10	255
WHITE OAK	QUERCA ALBA	FACU	10	255
SOUTHERN RED OAK	QUERCUS FALCATA	FACU	10	255
CHESTNUT OAK	QUERCUS MONTANA	UPL	10	255
NORTHERN RED OAK	QUERCUS RUBRA	FACU	10	255
				2,550

NC GRID NAD '83

–25′ 0′ 25′ 50′
GRAPHIC SCALE

NORTH CAROLINA PROFESSIONAL SEAL 040899 ENGINEER KRISTIN E. KNIGHT

NO.	DESCRIPTION	DATE
	REVISIONS	

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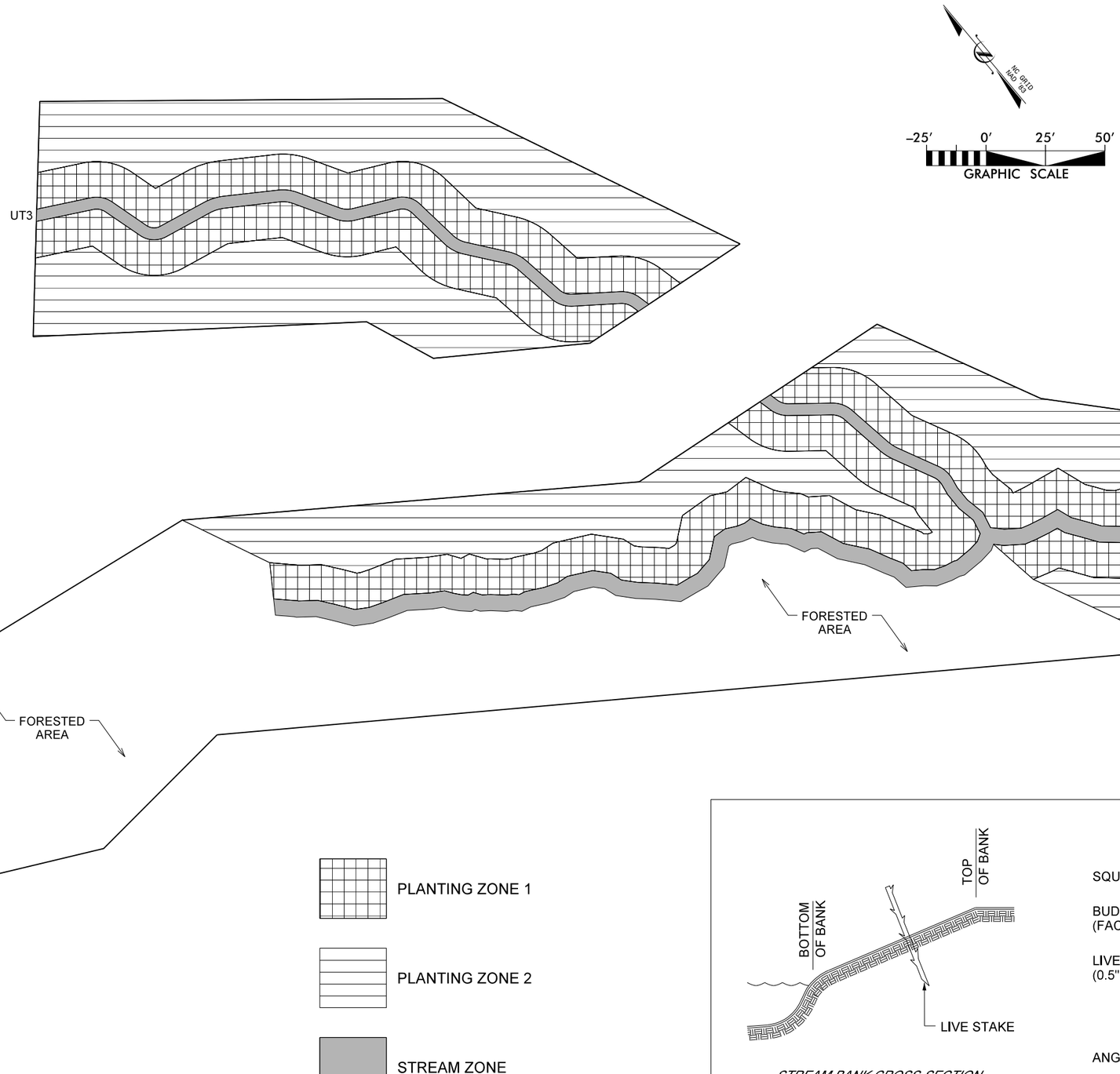
4505 FALLS OF NEUSE ROAD, SUITE 400
RALEIGH, NORTH CAROLINA 27609

DALE'S CREEK
RESTORATION SITE
BUNCOMBE COUNTY, NORTH CAROLINA

DATE: AUGUST 2020
SCALE: GRAPHIC

PLANTING PLAN

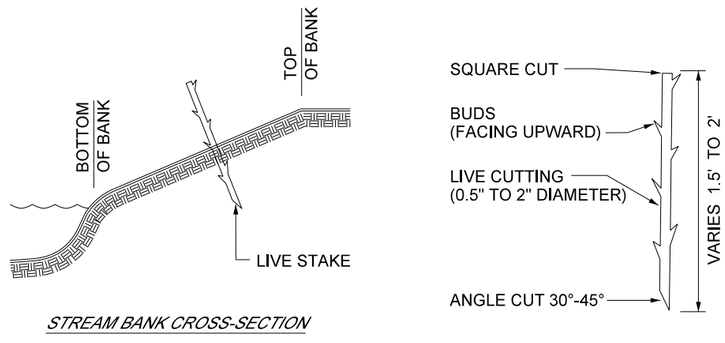


PLANTING ZONE 1

PLANTING ZONE 2

STREAM ZONE

*NOTE: SEE SHEET 10 FOR PLANTING QUANTITIES



STREAM BANK CROSS-SECTION

LIVE STAKES

SCALE: NTS

NORTH CAROLINA PROFESSIONAL SEAL 040899 ENGINEER KRISTIN E. KNIGHT

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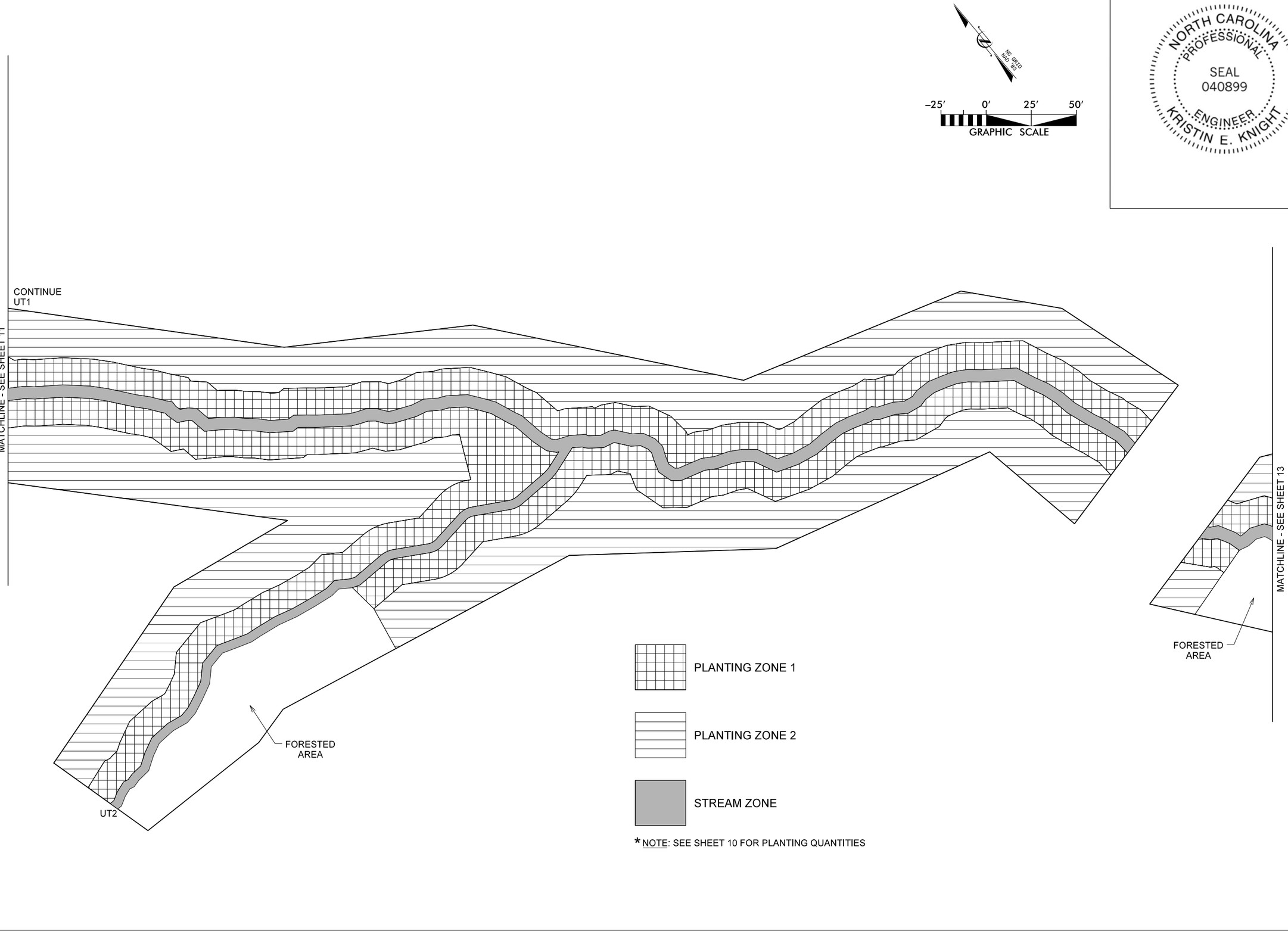

* NOTE: SEE SHEET 10 FOR PLANTING QUANTITIES

NORTH CAROLINA
PROFESSIONAL
SEAL
040899
ENGINEER
KRISTIN E. KNIGHT

SYM.	DESCRIPTION	DATE
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DALE'S CREEK RESTORATION SITE

BUNCOMBE COUNTY, NORTH CAROLINA

DATE: AUGUST 2020
SCALE: GRAPHIC

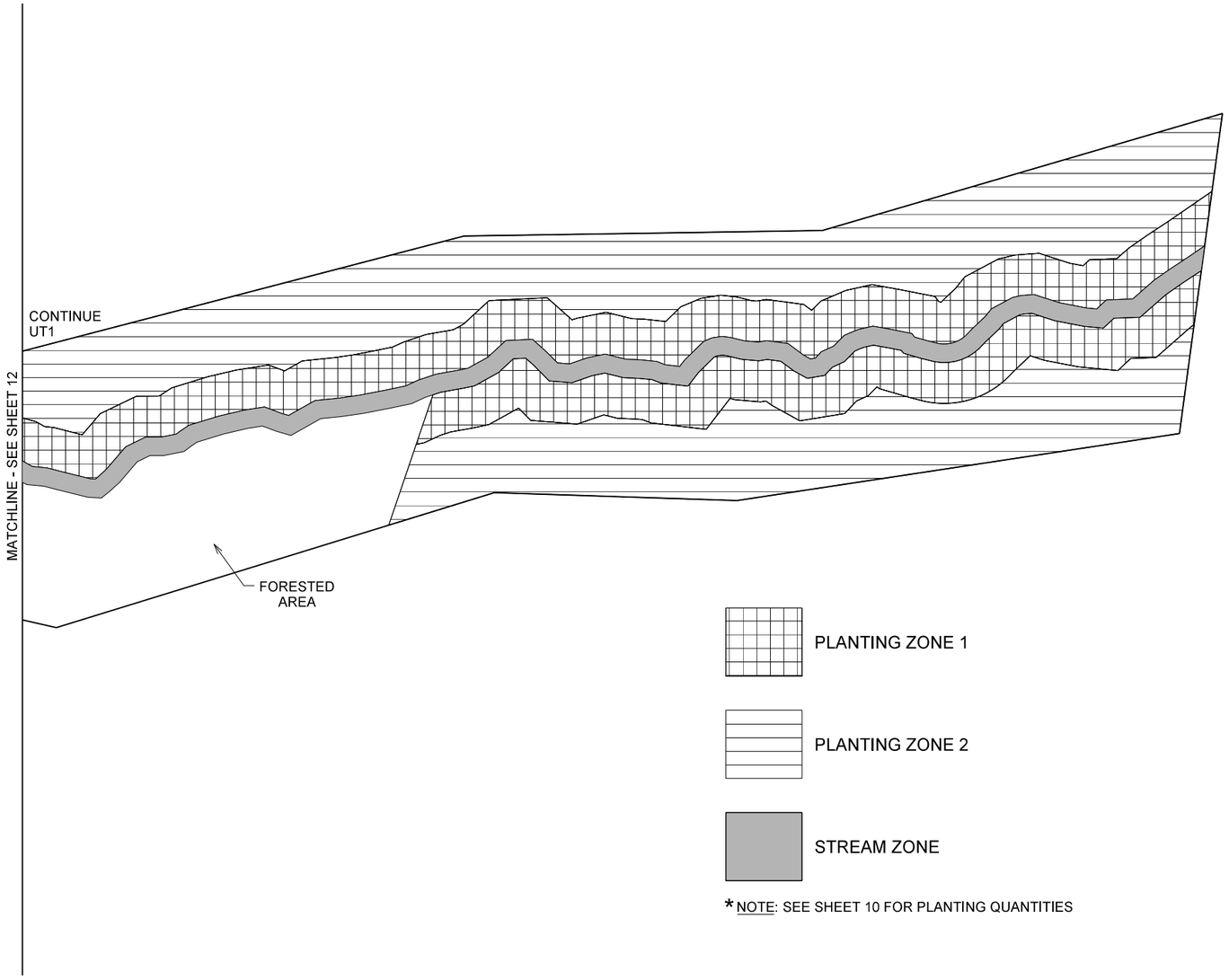
PLANTING PLAN

NORTH CAROLINA PROFESSIONAL SEAL 040899 ENGINEER KRISTIN E. KNIGHT

NC GRID NAD 83

–25′ 0′ 25′ 50′

GRAPHIC SCALE



PLANTING ZONE 1

PLANTING ZONE 2

STREAM ZONE

*NOTE: SEE SHEET 10 FOR PLANTING QUANTITIES

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RALEIGH, NORTH CAROLINA 27609

DALE'S CREEK RESTORATION SITE

BUNCOMBE COUNTY, NORTH CAROLINA

DATE: AUGUST 2020
SCALE: GRAPHIC

PLANTING PLAN

EASEMENT BOUNDARY MARKING

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

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

◉	6-FOOT TALL DURABLE WITNESS POSTS AND 5/8" REBAR 30" IN LENGTH WITH 3-1/4" ALUMINUM CAPS ON ALL EASEMENT CORNERS. CAPS SHALL MEET DMS SPECIFICATIONS (BERNSTEN RBD5325 IMPRINTED WITH NC STATE LOGO #B9087 OR EQUIVALENT). AFTER INSTALLATION, CAPS SHALL BE STAMPED WITH THE CORRESPONDING NUMBER.
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— X —	INSTALL WOVEN WIRE FENCE
Ⓖ	INSTALL ACCESS GATE

BEGIN UT5

BEGIN UT4

EXISTING ACCESS DRIVE

BEGIN UT1

UT1

UT1

MATCHLINE - SEE SHEET 15

NC GRID NAD '83

–25′ 0′ 25′ 50′

GRAPHIC SCALE

NORTH CAROLINA PROFESSIONAL SEAL 040899 ENGINEER KRISTIN E. KNIGHT

REVISIONS			
STNL	DESCRIPTION		DATE

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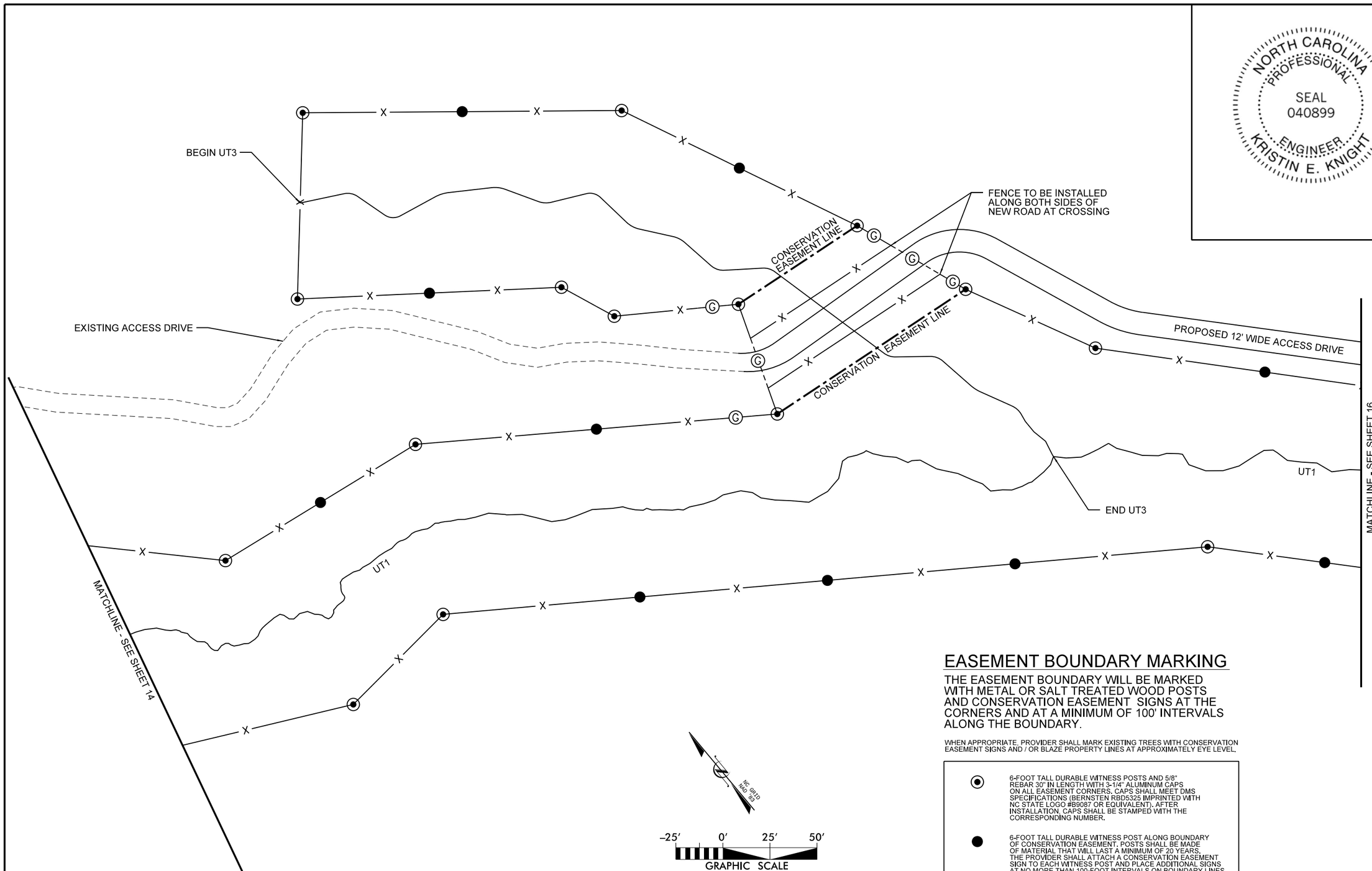
DALE'S CREEK
RESTORATION SITE
BUNCOMBE COUNTY, NORTH CAROLINA

DATE: AUGUST 2020
SCALE: GRAPHIC

BOUNDARY MARKING PLAN



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NORTH CAROLINA PROFESSIONAL SEAL 040899 ENGINEER KRISTIN E. KNIGHT

STAL	DESCRIPTION	DATE
	REVISIONS	

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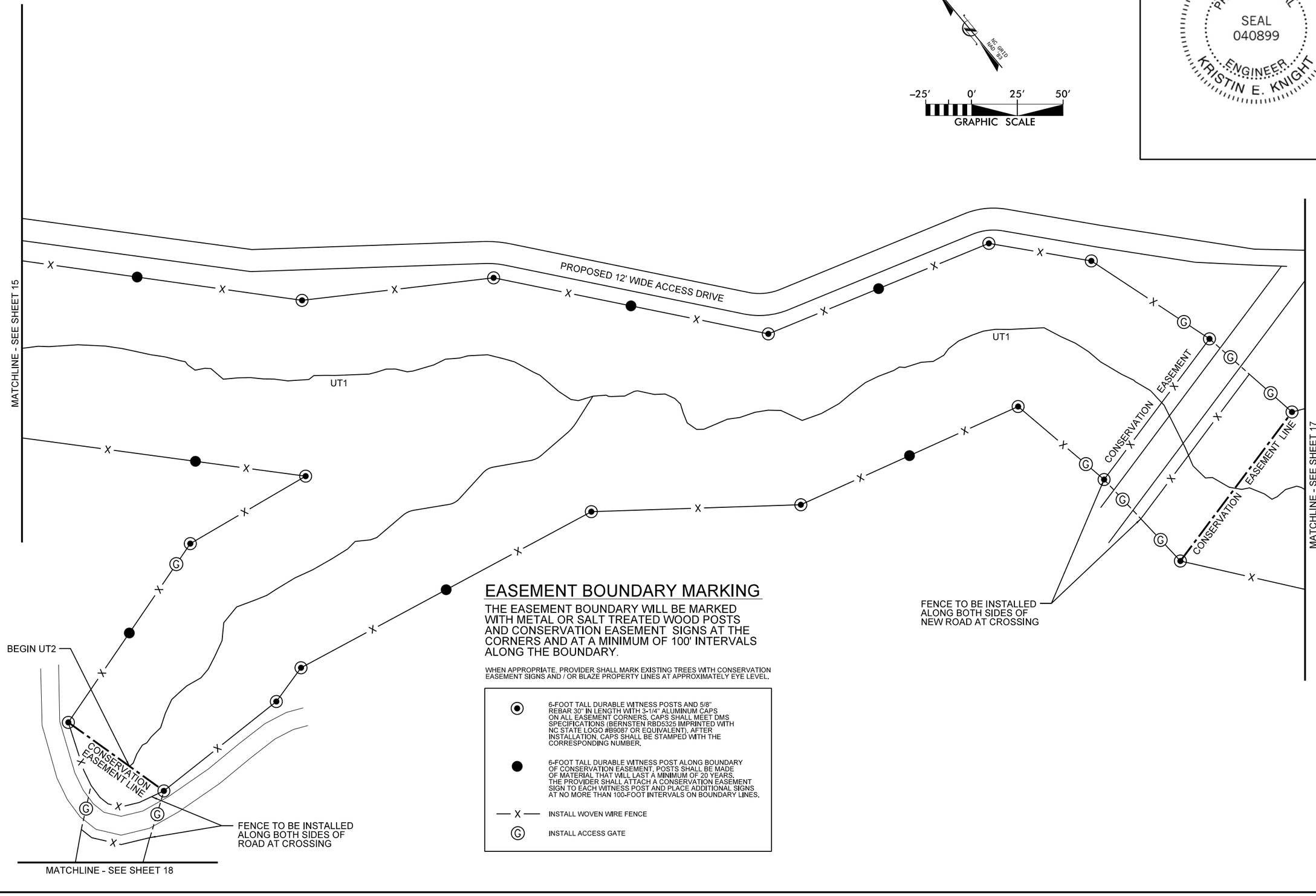
DALE'S CREEK
RESTORATION SITE
BUNCOMBE COUNTY, NORTH CAROLINA

DATE: AUGUST 2020
SCALE: GRAPHIC

BOUNDARY MARKING PLAN

SHEET 15 OF 29



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NORTH CAROLINA PROFESSIONAL SEAL 040899 ENGINEER KRISTIN E. KNIGHT

SYM.	DESCRIPTION	DATE
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DALE'S CREEK RESTORATION SITE
BUNCOMBE COUNTY, NORTH CAROLINA

DATE: AUGUST 2020
SCALE: GRAPHIC

BOUNDARY MARKING PLAN

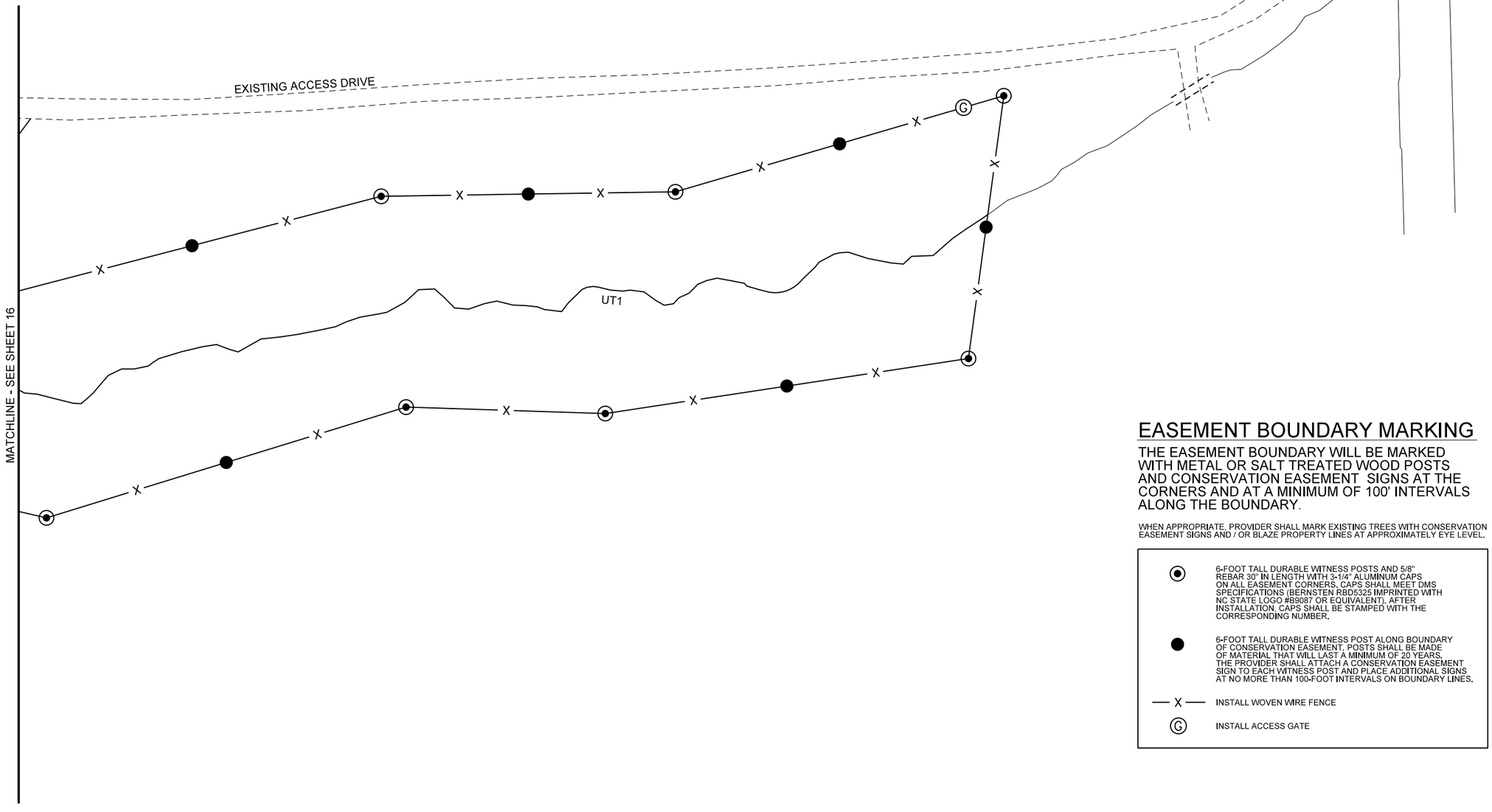
SHEET 16 OF 29

NORTH CAROLINA PROFESSIONAL SEAL 040899 ENGINEER KRISTIN E. KNIGHT

NC GRID MAG NORTH

–25′ 0′ 25′ 50′

GRAPHIC SCALE



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DALE'S CREEK RESTORATION SITE

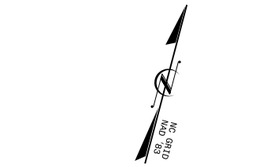
BUNCOMBE COUNTY, NORTH CAROLINA

DATE: AUGUST 2020

SCALE: GRAPHIC

BOUNDARY MARKING PLAN

SHEET 17 OF 29



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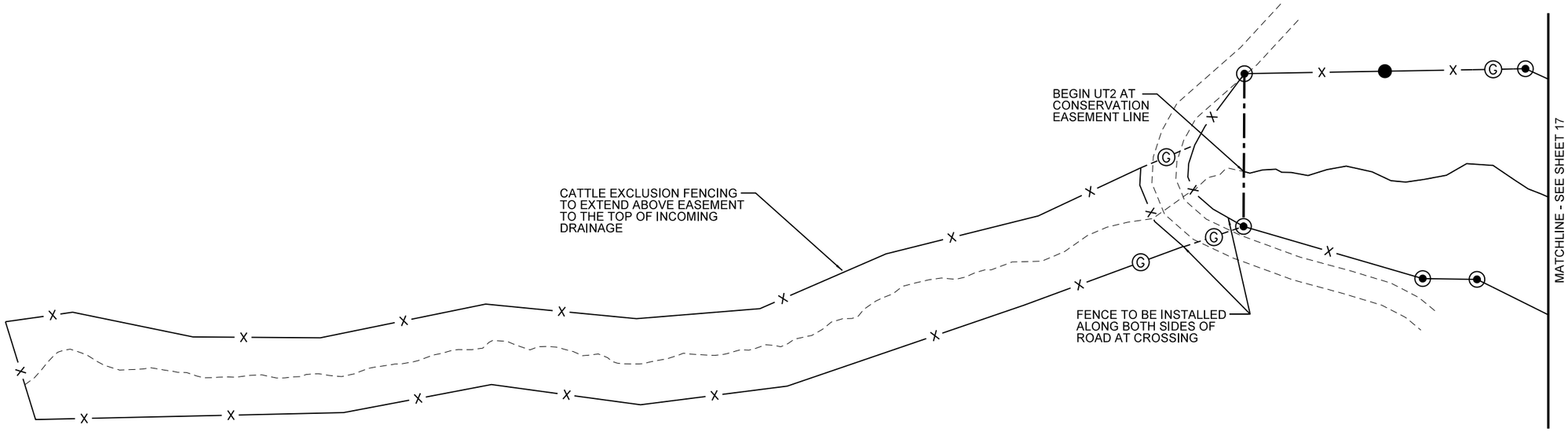
REVISIONS

SYM.	DESCRIPTION	DATE



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DALE'S CREEK RESTORATION SITE

BUNCOMBE COUNTY, NORTH CAROLINA

DATE: AUGUST 2020
SCALE: GRAPHIC

BOUNDARY MARKING PLAN

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
PEARL MILLET -- PENNISETUM GLAUCOMA	25	7.5
TOTALS	100	30

WINTER MIX (AUGUST 15 -- MAY 15)

SPECIES	APPLICATION RATE (IN MIX) % OF MIX	LBS / ACRE
VIRGINIA WILDRYE -- ELYMUS VIRGINICUS	15	4.6
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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

SYM.	DESCRIPTION	DATE
	REVISIONS	

NCDEQ – DIVISION OF MITIGATION SERVICES

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

DALE'S CREEK RESTORATION SITE
BUNCOMBE COUNTY, NORTH CAROLINA

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

EROSION CONTROL PLAN

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

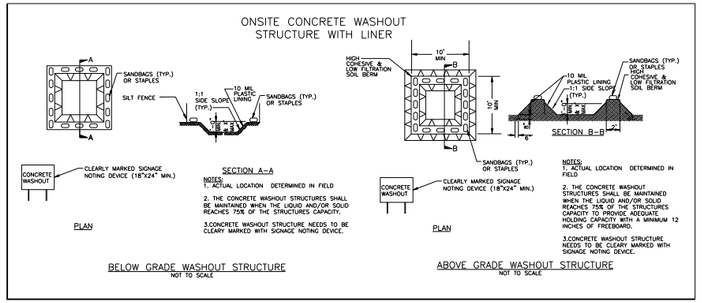
1. Do not dump paint and other liquid waste into storm drains, streams or wetlands.
2. Locate paint washouts at least 50 feet away from storm drain inlets and surface waters unless no other alternatives are reasonably available.
3. Contain liquid wastes in a controlled area.
4. Containment must be labeled,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

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

REVISIONS

NCDEQ – DIVISION OF MITIGATION SERVICES

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

DALE'S CREEK RESTORATION SITE

BUNCOMBE COUNTY, NORTH CAROLINA

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

EROSION CONTROL PLAN

SHEET 20 OF 29

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

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

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

EROSION CONTROL PLAN

SHEET 21 OF 29

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 I ABOVE.
3. UPON APPROVAL FROM THE DESIGNER, PHASES 2 THROUGH 6 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 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. 4" WOODEN BARRIERS WILL BE INSTALLED ON THE OUTER EDGE OF THE MATS TO PREVENT SOIL FROM SPILLING INTO THE CHANNEL DURING CROSSING. 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 ON SHEET 24 OF 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 ON THIS PLAN. A RAIN GAUGE SHALL BE INSTALLED AT THE PROJECT SITE FOR MONITORING.
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 (919) 791-4200.

PHASE 1: INITIAL SITE PREPARATION
- A. IDENTIFY PROJECT BOUNDARY, LIMITS OF DISTURBANCE, SENSITIVE AREAS, STAGING AREAS, STABILIZED ENTRANCES, TEMPORARY CROSSINGS AND ACCESS POINTS WITH THE DESIGNER.
- B. CONSTRUCT ENTRANCE AND STAGING AREAS AND THEIR ASSOCIATED SEDIMENT AND EROSION CONTROL DEVICES IN A MANNER TO SUPPORT EXECUTION OF THE RESTORATION IN PHASES AS INDICATED IN THE PLANS AND AS DIRECTED BY THE DESIGNER.

PHASE 2: STREAM REACH UT1 - STA. 19+65 TO END OF PROJECT
- A. COMPLETE CHANNEL WORK IN ACCORDANCE WITH THE FOLLOWING PROCEDURES:
  - i. ENSURE THAT ALL SEDIMENT AND EROSION CONTROL MEASURES HAVE BEEN INSTALLED ALONG EXISTING AND NEW CHANNEL AND ARE IN WORKING CONDITION.
  - ii. 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).
  - iii. COMPLETE CHANNEL GRADING AS DIRECTED IN THE PLANS. INSTALL ANY BANK STABILIZATION TREATMENTS AND IN-STREAM STRUCTURES.
  - iv. SEED AND MULCH COMPLETED WORK AREAS.

PHASE 3: STREAM REACH UT2 - STA. 201+95 TO 203+43
- A. COMPLETE CHANNEL WORK IN ACCORDANCE WITH THE FOLLOWING PROCEDURES:
  - i. ENSURE THAT ALL SEDIMENT AND EROSION CONTROL MEASURES HAVE BEEN INSTALLED ALONG EXISTING AND NEW CHANNEL AND ARE IN WORKING CONDITION.
  - ii. 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).
  - iii. COMPLETE CHANNEL GRADING AS DIRECTED IN THE PLANS. INSTALL ANY BANK STABILIZATION TREATMENTS AND IN-STREAM STRUCTURES.
  - iv. SEED AND MULCH COMPLETED WORK AREAS.

PHASE 4: STREAM REACH UT3 - STA. 300+00 TO 304+60
- A. COMPLETE CHANNEL WORK IN ACCORDANCE WITH THE FOLLOWING PROCEDURES:
  - i. ENSURE THAT ALL SEDIMENT AND EROSION CONTROL MEASURES HAVE BEEN INSTALLED ALONG EXISTING AND NEW CHANNEL AND ARE IN WORKING CONDITION.
  - ii. 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).
  - iii. COMPLETE CHANNEL GRADING AS DIRECTED IN THE PLANS. INSTALL ANY BANK STABILIZATION TREATMENTS AND IN-STREAM STRUCTURES.
  - iv. SEED AND MULCH COMPLETED WORK AREAS.

PHASE 5: STREAM REACH UT4 - STA. 400+00 TO 400+56
- A. COMPLETE CHANNEL WORK IN ACCORDANCE WITH THE FOLLOWING PROCEDURES:
  - i. ENSURE THAT ALL SEDIMENT AND EROSION CONTROL MEASURES HAVE BEEN INSTALLED ALONG EXISTING AND NEW CHANNEL AND ARE IN WORKING CONDITION.
  - ii. 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).
  - iii. COMPLETE CHANNEL GRADING AS DIRECTED IN THE PLANS. INSTALL ANY BANK STABILIZATION TREATMENTS AND IN-STREAM STRUCTURES.
  - iv. SEED AND MULCH COMPLETED WORK AREAS.

PHASE 6: STREAM REACH UT5 - STA. 500+00 TO 502+90
- A. COMPLETE CHANNEL WORK IN ACCORDANCE WITH THE FOLLOWING PROCEDURES:
  - i. ENSURE THAT ALL SEDIMENT AND EROSION CONTROL MEASURES HAVE BEEN INSTALLED ALONG EXISTING AND NEW CHANNEL AND ARE IN WORKING CONDITION.
  - ii. 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).
  - iii. COMPLETE CHANNEL GRADING AS DIRECTED IN THE PLANS. INSTALL ANY BANK STABILIZATION TREATMENTS AND IN-STREAM STRUCTURES.
  - iv. SEED AND MULCH COMPLETED WORK AREAS.

PHASE 7: RIPARIAN BUFFER PLANTING
- A. PHASE 7 CAN BE INITIATED AFTER THE STREAM WORK IS COMPLETED IN EACH SECTION OF THE PROJECT.
- B. PLANTS SHALL BE PLANTED DURING THE DORMANT SEASON (NOVEMBER 17 - MARCH 17).
- C. PREPARE AND PLANT BANK AND RIPARIAN VEGETATION IN ACCORDANCE WITH THE CONSTRUCTION PLANS AND AS DIRECTED BY THE DESIGNER.

PHASE 8: COMPLETION OF PROJECT SITE
- A. REMOVE ALL REMAINING WASTE MATERIALS AND RESTORE THE REMAINING STAGING AND STOCKPILING AREAS AND CONSTRUCTION ENTRANCES TO THEIR PRIOR CONDITION. REMOVE TEMPORARY CROSSINGS AND INSTALL BANK STABILIZATION TREATMENTS, AND PLANT, SEED AND MULCH DISTURBED AREAS. SEED AND MULCH ALL DISTURBED AREAS UTILIZING THE SEED/MULCH MIXES SPECIFIED IN THE PLANS.

NORTH CAROLINA PROFESSIONAL SEAL 040899 ENGINEER KRISTIN E. KNIGHT

NO.	DESCRIPTION	DATE
	REVISIONS	

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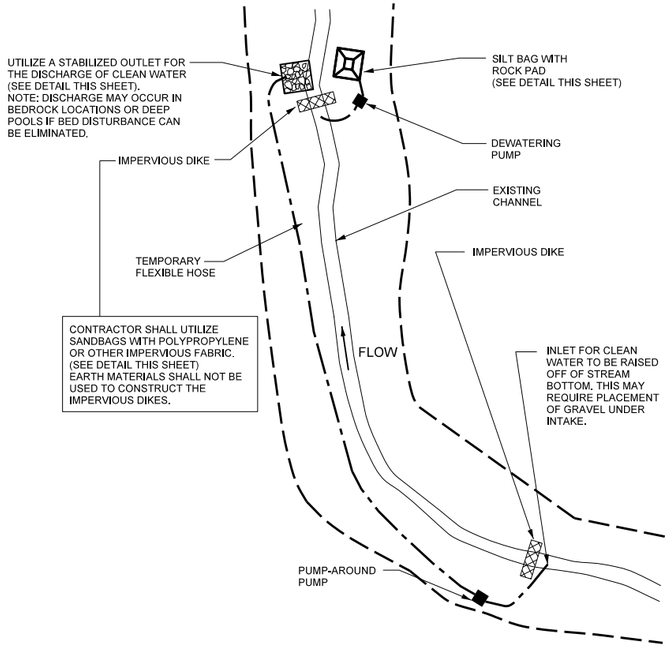


SEQUENCE OF DEWATERING OPERATIONS

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

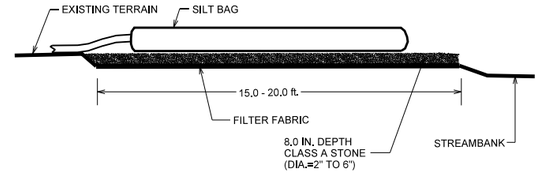
1. INSTALL SILT BAGS(S) AND ROCK PAD(S) AND STABILIZED OUTLET.
2. INSTALL UPSTREAM PUMP AND TEMPORARY FLEXIBLE HOSE.
3. PLACE UPSTREAM IMPERVIOUS DIKE AND BEGIN PUMPING OPERATIONS FOR STREAM DIVERSION.
4. PLACE DOWNSTREAM IMPERVIOUS DIKE AND PUMPING APPARATUS. DEWATER ENTRAPPED AREA.
5. PERFORM REPAIR 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:

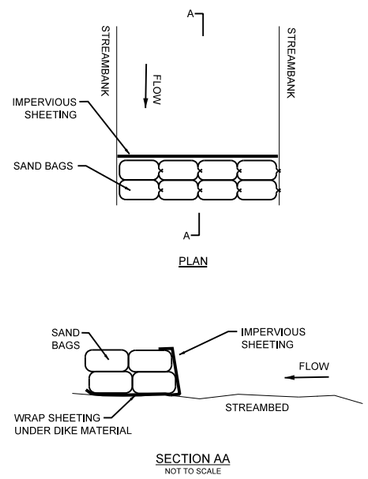
1. SEDIMENT BAGS SHALL BE REPLACED AND DISPOSED OF WHEN IT IS THREE-QUARTERS FULL OF SEDIMENT OR WHEN IT IS IMPRACTICAL FOR THE BAG TO FILTER THE SEDIMENT OUT AT A REASONABLE FLOW RATE.
2. ACCUMULATED SEDIMENT SHOULD BE DISPOSED OF IN A DESIGNATED DISPOSAL AREA.
3. SPENT BAGS SHOULD BE DISPOSED OF PROPERLY 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



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

REVISIONS

NO.	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

DALE'S CREEK RESTORATION SITE

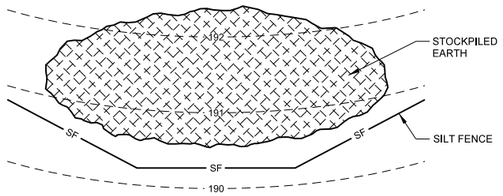
BUNCOMBE COUNTY, NORTH CAROLINA

DATE: AUGUST 2020

SCALE: N.T.S.

EROSION CONTROL PLAN

SHEET 23 OF 29



NOTES:

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

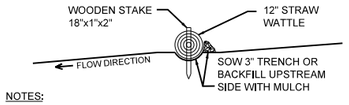
ALL STOCKPILES SHALL BE WITHIN LIMITS OF DISTURBANCE.

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

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

TEMPORARY STOCKPILE DETAIL

SCALE: NTS



NOTES:

WATTLES SHALL BE INSTALLED IN ALL LOCATIONS SHOWN ON PLANS: AND ALSO ON TOP OF ANY FINISHED BANK OR TERRACE TIE-OUTS THAT ARE SUBJECT TO RILLING - EXAMPLE UT3.

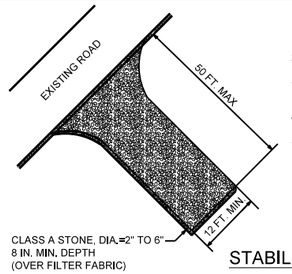
WATTLES SHALL BE INSTALLED ACCORDING TO THE MANUFACTURERS SPECIFICATIONS.

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

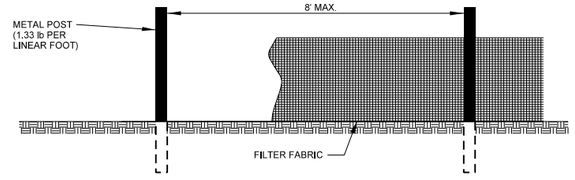
NOT TO SCALE



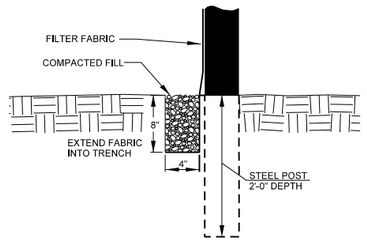
NOTES:
1. TURNING RADIUS SUFFICIENT TO ACCOMMODATE LARGE TRUCKS SHALL BE PROVIDED.
2. ENTRANCE(S) SHOULD BE LOCATED TO PROVIDE FOR UTILIZATION BY ALL CONSTRUCTION VEHICLES.
3. MUST BE MAINTAINED IN A CONDITION WHICH WILL PREVENT TRACKING OR DIRECT FLOW OF MUD ONTO STREETS. PERIODIC TOP DRESSING WITH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



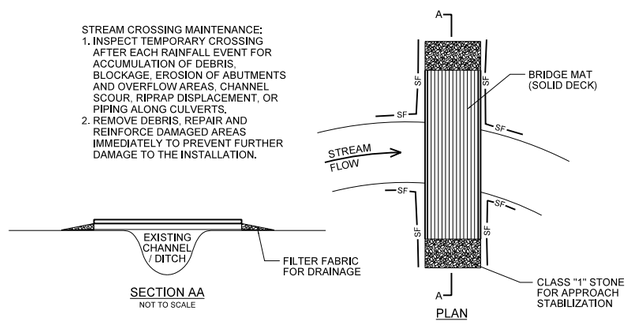
SILT FENCE MAINTENANCE
1. INSPECT SEDIMENT FENCES WEEKLY AND AFTER EACH RAINFALL EVENT.
2. SHOULD FABRIC TEAR, DECOMPOSE, OR IN ANY WAY BECOME INEFFECTIVE, REPLACE IT IMMEDIATELY.
3. REMOVE SEDIMENT DEPOSITS PROMPTLY TO PROVIDE ADEQUATE STORAGE VOLUME FOR THE NEXT RAIN AND TO REDUCE PRESSURE ON THE FENCE.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

SCALE: NTS

NORTH CAROLINA PROFESSIONAL SEAL 040899 ENGINEER KRISTIN E. KNIGHT

SYM.	DESCRIPTION	DATE
	REVISIONS	

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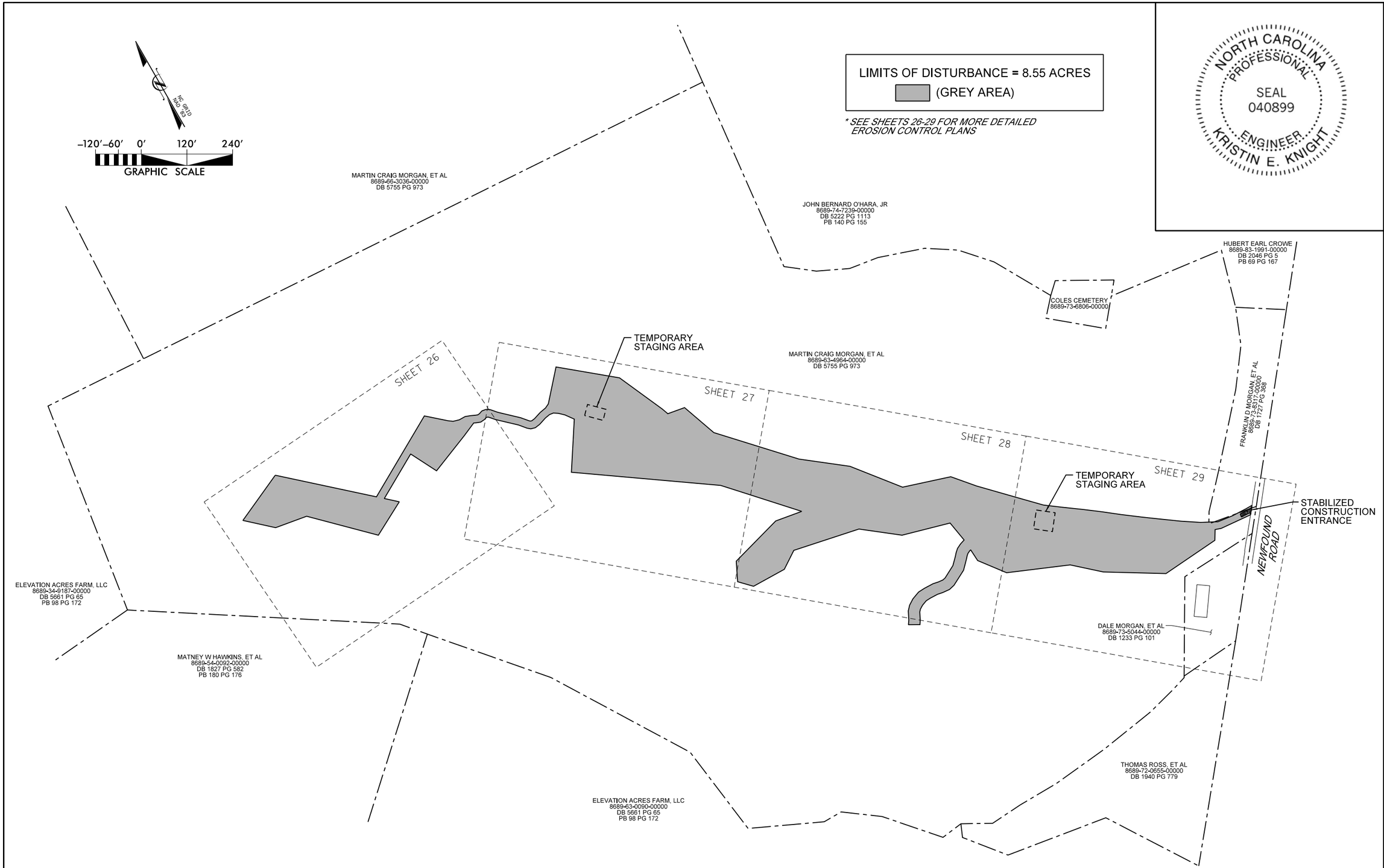
DALE'S CREEK RESTORATION SITE
BUNCOMBE COUNTY, NORTH CAROLINA

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

EROSION CONTROL PLAN

SHEET 24 OF 29



NORTH CAROLINA PROFESSIONAL SEAL 040899 ENGINEER KRISTIN E. KNIGHT

REVISIONS			
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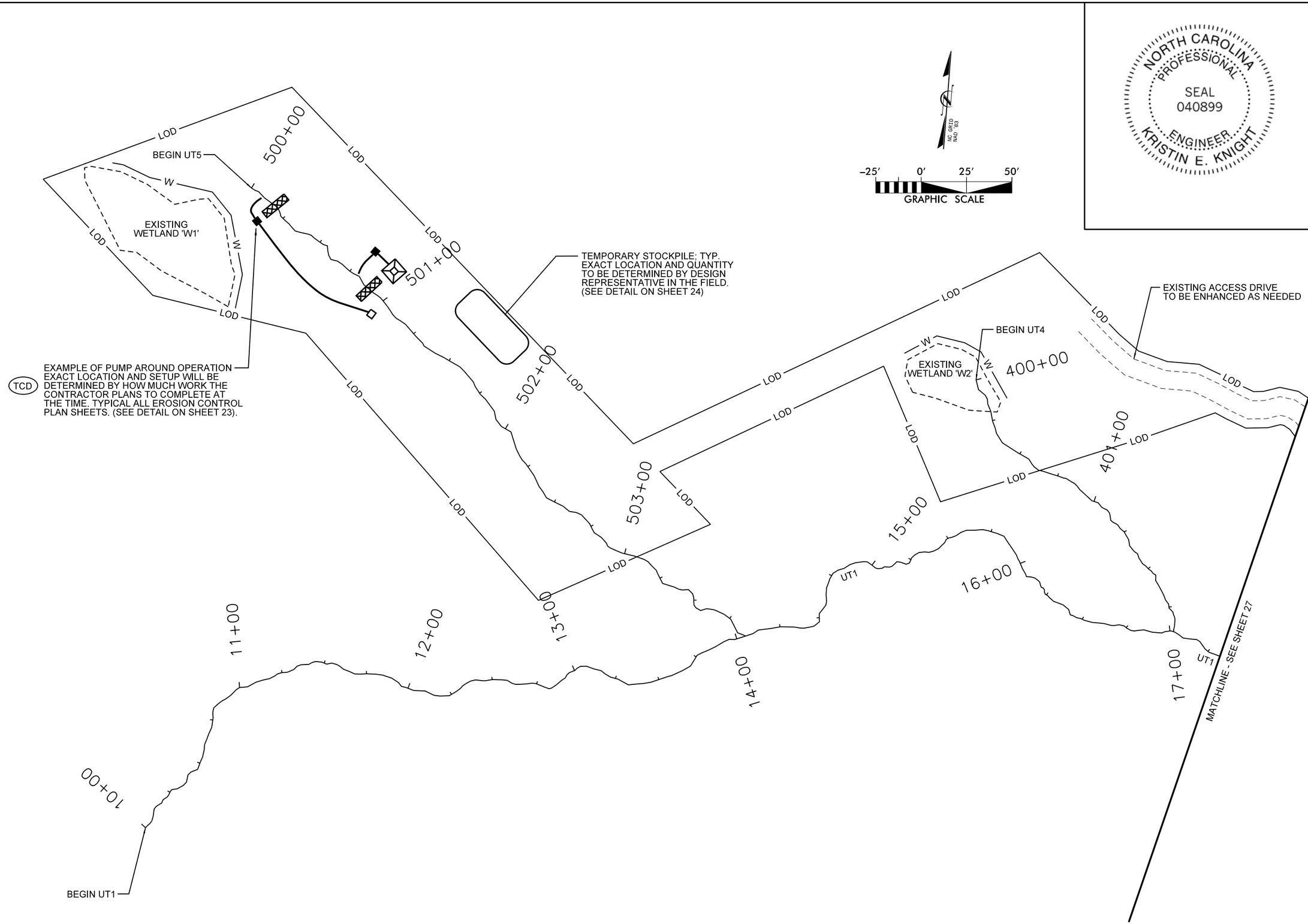
DALE'S CREEK RESTORATION SITE

BUNCOMBE COUNTY, NORTH CAROLINA

DATE: AUGUST 2020
SCALE: GRAPHIC

EROSION CONTROL PLAN -OVERVIEW-



NORTH CAROLINA
PROFESSIONAL
SEAL
040899
ENGINEER
KRISTIN E. KNIGHT

SYM.	DESCRIPTION	DATE
	REVISIONS	

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DALE'S CREEK RESTORATION SITE

BUNCOMBE COUNTY, NORTH CAROLINA

DATE: AUGUST 2020
SCALE: GRAPHIC

EROSION CONTROL PLAN

BEGIN UT3

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

FILL EXISTING CHANNEL (TYPICAL ALL HATCHING)

TEMPORARY STOCK PILE: TYP. EXACT LOCATION AND QUANTITY TO BE DETERMINED BY DESIGN REPRESENTATIVE IN THE FIELD. (SEE DETAIL ON SHEET 24)

EXISTING ACCESS DRIVE TO BE ENHANCED AS NEEDED

TEMPORARY STAGING AREA

SF

PROPOSED 12' WIDE ACCESS DRIVE

LOD

300+00

301+00

302+00

303+00

304+00

22+00

23+00

24+00

20+00

21+00

19+00

18+00

UT1

END UT3

MATCHLINE - SEE SHEET 28

MATCHLINE - SEE SHEET 26

NC GRID NAD 83

–25′ 0′ 25′ 50′

GRAPHIC SCALE

NORTH CAROLINA PROFESSIONAL SEAL 040899 ENGINEER KRISTIN E. KNIGHT

REVISIONS

NO.	DESCRIPTION	DATE

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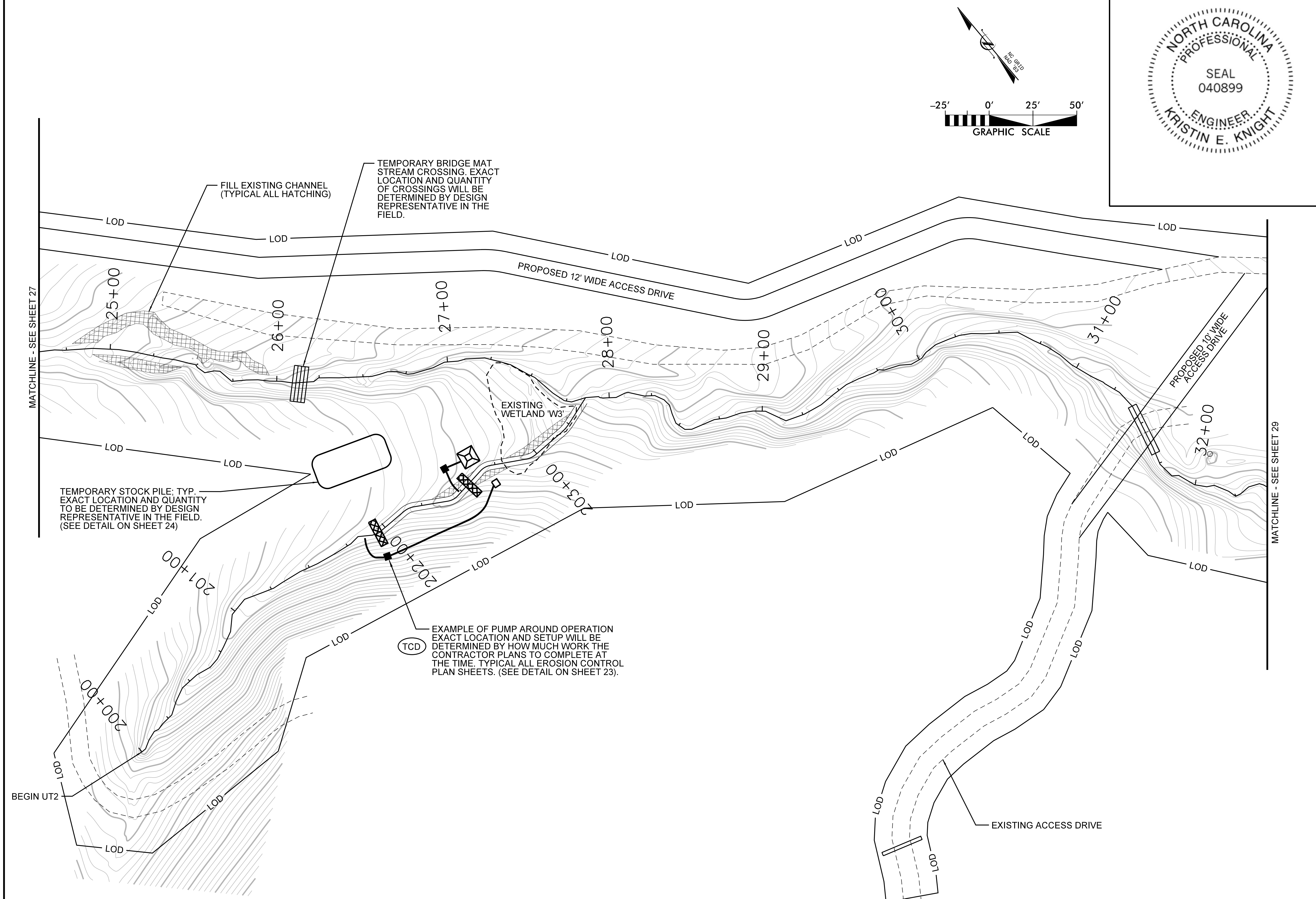
DALE'S CREEK RESTORATION SITE

BUNCOMBE COUNTY, NORTH CAROLINA

DATE: AUGUST 2020

SCALE: GRAPHIC

EROSION CONTROL PLAN


NC GRID NAD 83
-25' 0' 25' 50'
GRAPHIC SCALE
FILL EXISTING CHANNEL (TYPICAL ALL HATCHING)
TEMPORARY BRIDGE MAT STREAM CROSSING. EXACT LOCATION AND QUANTITY OF CROSSINGS WILL BE DETERMINED BY DESIGN REPRESENTATIVE IN THE FIELD.
LOD
PROPOSED 12' WIDE ACCESS DRIVE
PROPOSED 10' WIDE ACCESS DRIVE
MATCHLINE - SEE SHEET 27
MATCHLINE - SEE SHEET 29
25+00
26+00
27+00
28+00
29+00
30+00
31+00
32+00
EXISTING WETLAND 'W3'
TEMPORARY STOCK PILE; TYP. EXACT LOCATION AND QUANTITY TO BE DETERMINED BY DESIGN REPRESENTATIVE IN THE FIELD. (SEE DETAIL ON SHEET 24)
200+00
201+00
202+00
203+00
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 23).
TCD
BEGIN UT2
EXISTING ACCESS DRIVE

NORTH CAROLINA PROFESSIONAL SEAL 040899 ENGINEER KRISTIN E. KNIGHT

SYM.	DESCRIPTION	DATE
	REVISIONS	

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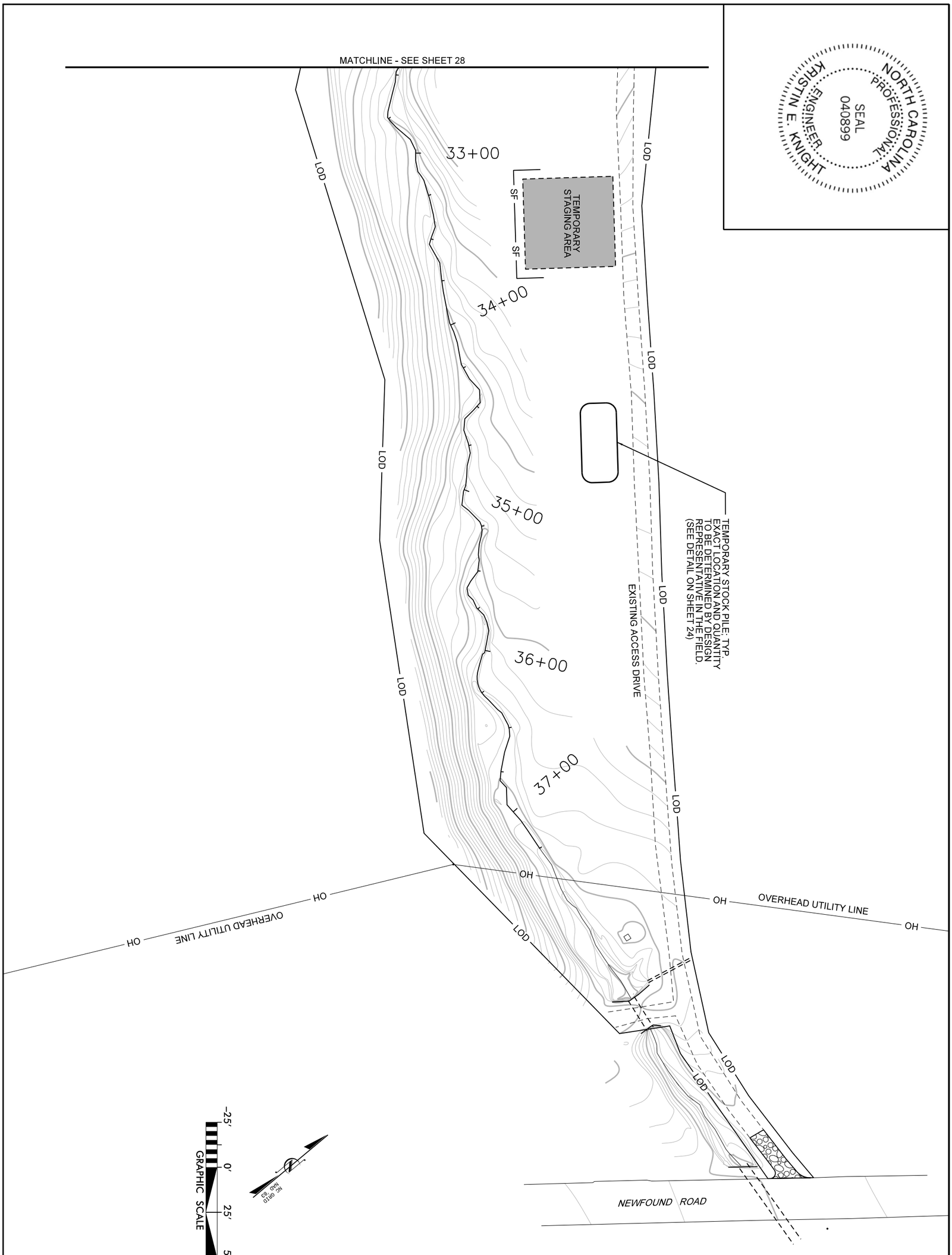
DALE'S CREEK RESTORATION SITE

BUNCOMBE COUNTY, NORTH CAROLINA

DATE: AUGUST 2020

SCALE: GRAPHIC

EROSION CONTROL PLAN



SHEET 29 OF 29

EROSION CONTROL PLAN

DATE: AUGUST 2020

SCALE: GRAPHIC

DALE'S CREEK RESTORATION SITE

BUNCOMBE COUNTY, NORTH CAROLINA

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NCDEQ – DIVISION OF MITIGATION SERVICES

SYM.	DESCRIPTION	DATE
	REVISIONS	

2. Data Analysis/Supplemental Information and Maps

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

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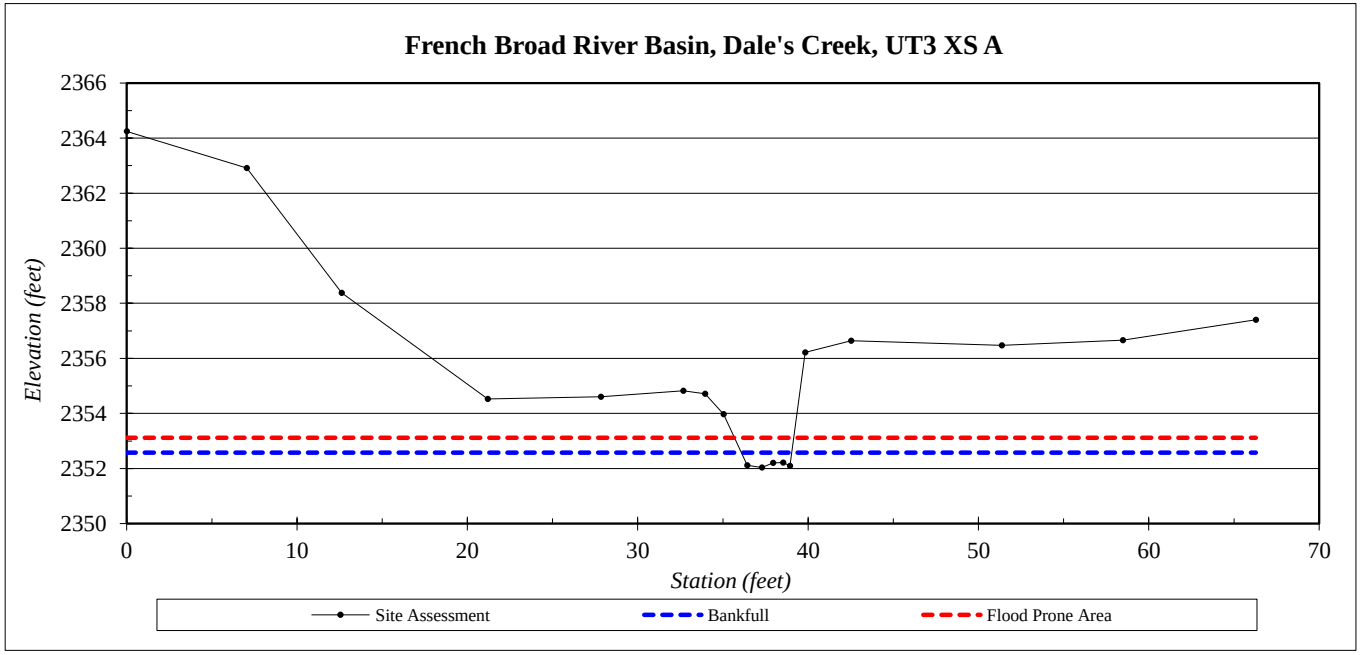
River Basin:	French Broad
Site	Dale's Creek
XS ID	UT3 XS A
Drainage Area (sq mi):	0.02
Date:	10/22/2019
Field Crew:	T. Seelinger, J. Sullivan

Station	Elevation
0.0	2364.25
7.0	2362.91
12.6	2358.38
21.2	2354.53
27.8	2354.61
32.7	2354.82
33.9	2354.71
35.0	2353.97
36.4	2352.11
37.3	2352.03
38.0	2352.20
38.5	2352.21
38.9	2352.10
39.8	2356.22
42.5	2356.64
51.4	2356.47
58.5	2356.67
66.3	2357.40

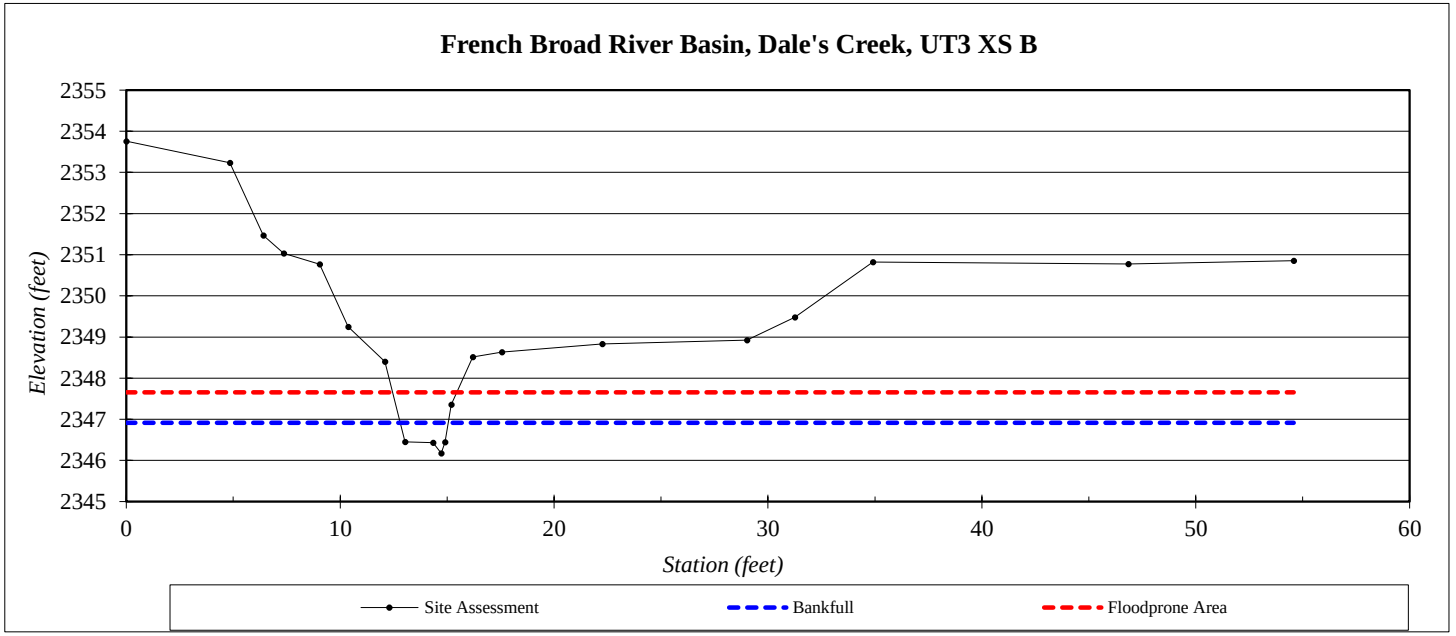
SUMMARY DATA	
Bankfull Elevation (ft):	2352.6
Bankfull Cross-Sectional Area (ft^2):	1.2
Bankfull Width (ft):	2.9
Flood Prone Area Elevation (ft):	2353.1
Flood Prone Width (ft):	3.5
Max Depth at Bankfull (ft):	0.5
Mean Depth at Bankful (ft)l:	0.4
W / D Ratio:	7.1
Entrenchment Ratio:	1.2
Bank Height Ratio:	4.9



River Basin:	French Broad
Site	Dale's Creek
XS ID	UT3 XS B
Drainage Area (sq mi):	0.02
Date:	10/22/2019
Field Crew:	T. Seelinger, J. Sullivan

Station	Elevation
0.0	2353.76
4.8	2353.23
6.4	2351.47
7.4	2351.03
9.0	2350.77
10.4	2349.25
12.1	2348.40
13.0	2346.45
14.3	2346.43
14.7	2346.18
14.9	2346.45
15.2	2347.36
16.2	2348.52
17.6	2348.63
22.3	2348.83
29.0	2348.92
31.3	2349.48
34.9	2350.82
46.9	2350.78
54.6	2350.85

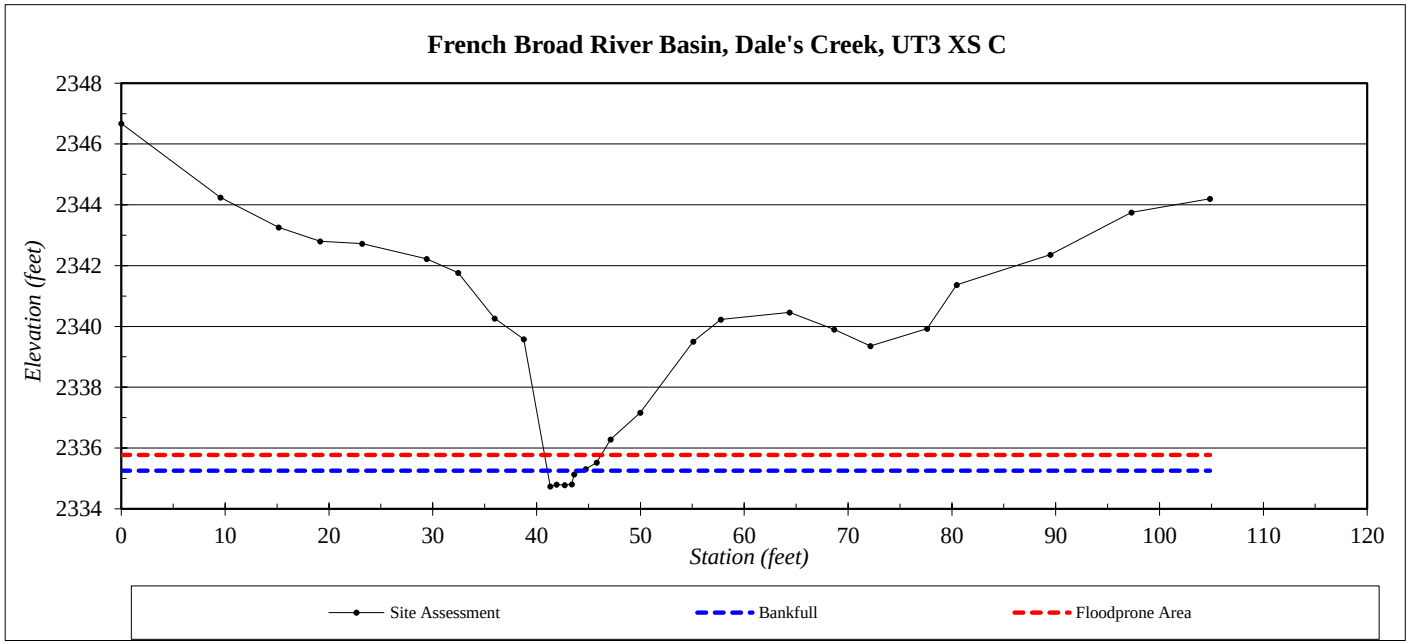
SUMMARY DATA	
Bankfull Elevation (ft):	2346.9
Bankfull Cross-Sectional Area (ft^2):	1.0
Bankfull Width (ft):	2.2
Flood Prone Area Elevation (ft):	2347.7
Flood Prone Width (ft):	3.0
Max Depth at Bankfull (ft):	0.7
Mean Depth at Bankful (ft)l:	0.5
W / D Ratio:	4.8
Entrenchment Ratio:	1.3
Bank Height Ratio:	3.1



River Basin:	French Broad
Site	Dale's Creek
XS ID	UT3 XS C
Drainage Area (sq mi):	0.02
Date:	10/22/2019
Field Crew:	T. Seelinger, J. Sullivan

Station	Elevation
0.0	2346.68
9.6	2344.24
15.2	2343.26
19.2	2342.80
23.2	2342.72
29.4	2342.23
32.4	2341.77
36.0	2340.27
38.8	2339.59
41.3	2334.74
41.9	2334.80
42.7	2334.78
43.4	2334.81
43.6	2335.14
44.7	2335.31
45.8	2335.52
47.1	2336.29
50.0	2337.17
55.1	2339.51
57.8	2340.23
64.4	2340.46
68.7	2339.91
72.2	2339.36
77.6	2339.93
80.5	2341.37
89.5	2342.36
97.3	2343.75
104.9	2344.20

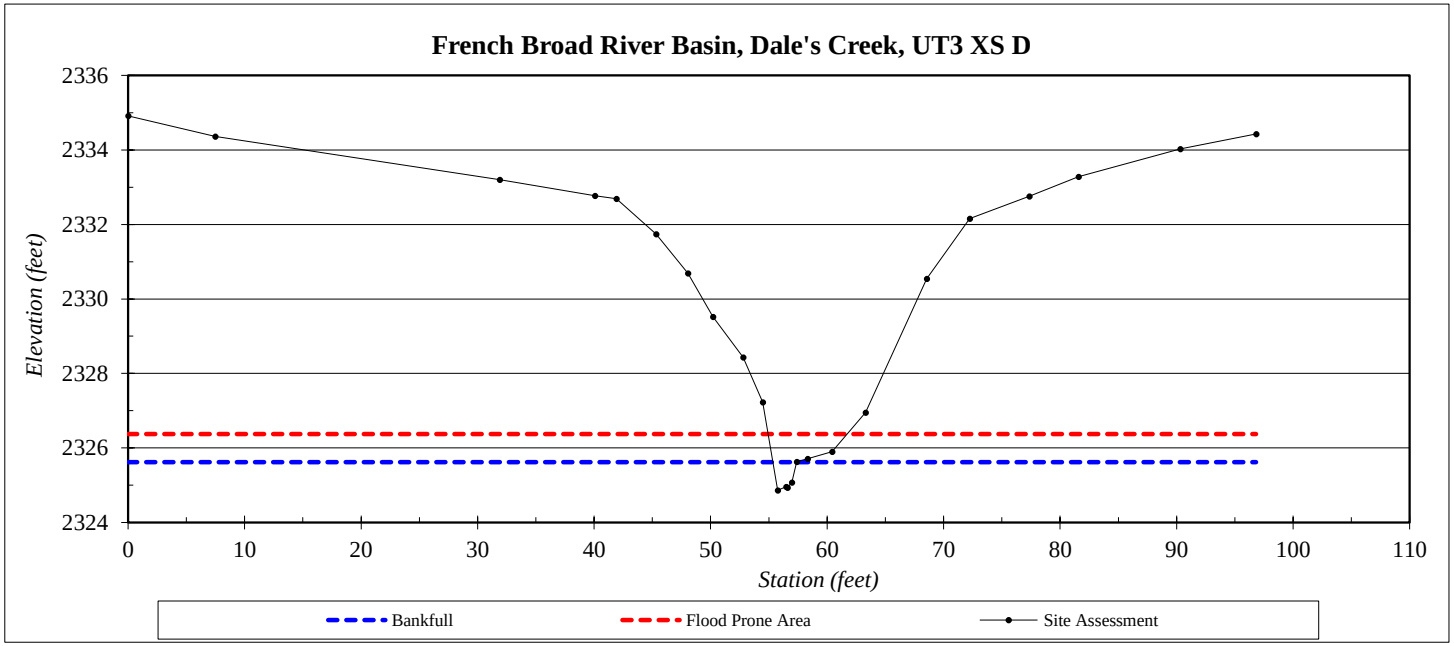
SUMMARY DATA	
Bankfull Elevation (ft):	2335.26
Bankfull Cross-Sectional Area (ft^2):	1.2
Bankfull Width (ft):	3.4
Flood Prone Area Elevation (ft):	2335.8
Flood Prone Width (ft):	5.5
Max Depth at Bankfull (ft):	0.5
Mean Depth at Bankful (ft)l:	0.3
W / D Ratio:	9.7
Entrenchment Ratio:	1.6
Bank Height Ratio:	1.0



River Basin:	French Broad
Site	Dale's Creek
XS ID	UT3 XS D
Drainage Area (sq mi):	0.03
Date:	10/22/2019
Field Crew:	T. Seelinger, J. Sullivan

Station	Elevation
0.0	2334.91
7.5	2334.36
31.9	2333.20
40.1	2332.77
41.9	2332.69
45.3	2331.74
48.0	2330.69
50.2	2329.53
52.8	2328.43
54.5	2327.23
55.8	2324.87
56.5	2324.96
56.6	2324.93
57.0	2325.08
57.4	2325.63
58.3	2325.71
60.4	2325.90
63.3	2326.95
68.6	2330.55
72.2	2332.16
77.3	2332.75
81.6	2333.28
90.3	2334.03
96.8	2334.43

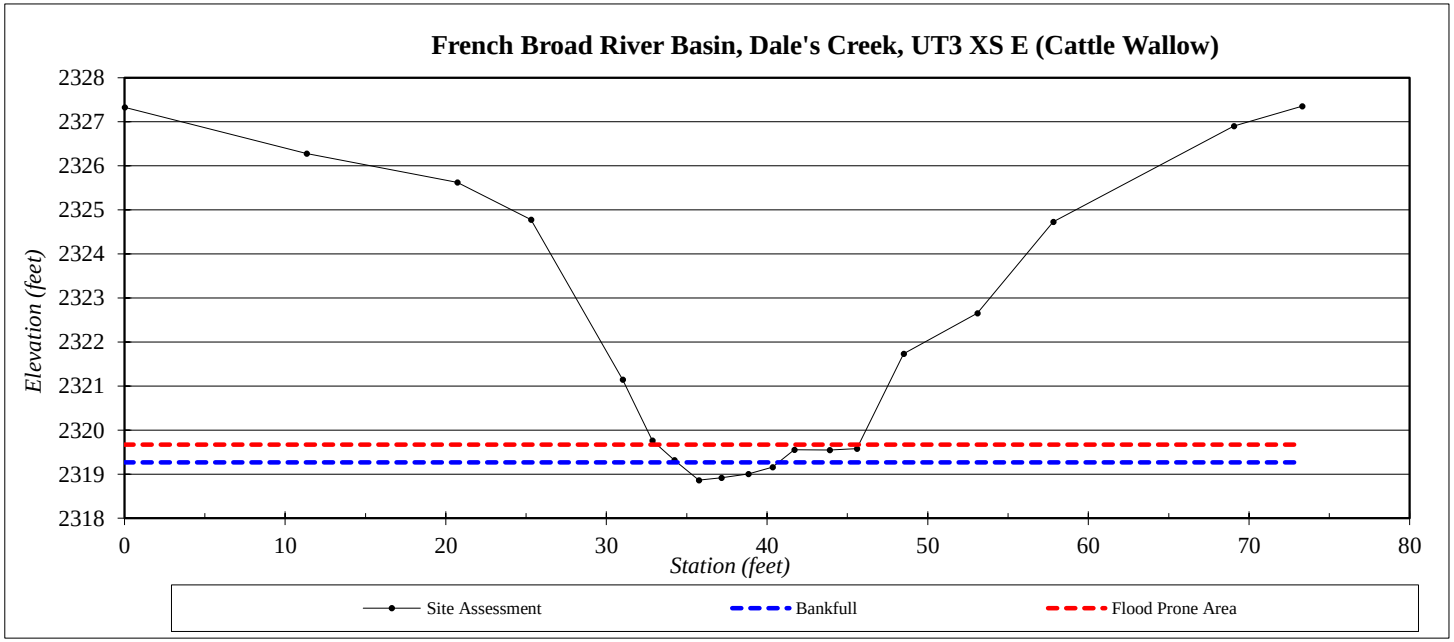
SUMMARY DATA	
Bankfull Elevation (ft):	2325.6
Bankfull Cross-Sectional Area (ft^2):	1.1
Bankfull Width (ft):	2.0
Flood Prone Area Elevation (ft):	2326.4
Flood Prone Width (ft):	6.8
Max Depth at Bankfull (ft):	0.8
Mean Depth at Bankful (ft)l:	0.5
W / D Ratio:	3.8
Entrenchment Ratio:	3.3
Bank Height Ratio:	1.1



River Basin:	French Broad
Site	Dale's Creek
XS ID	UT3 XS E (Cattle Wallow)
Drainage Area (sq mi):	0.03
Date:	10/22/2019
Field Crew:	T. Seelinger, J. Sullivan

Station	Elevation
0.0	2327.33
11.3	2326.28
20.7	2325.63
25.3	2324.78
31.0	2321.15
32.8	2319.76
34.2	2319.32
35.7	2318.86
37.2	2318.92
38.8	2319.00
40.3	2319.16
41.7	2319.56
43.9	2319.55
45.6	2319.58
48.5	2321.74
53.1	2322.66
57.8	2324.73
69.0	2326.91
73.3	2327.35

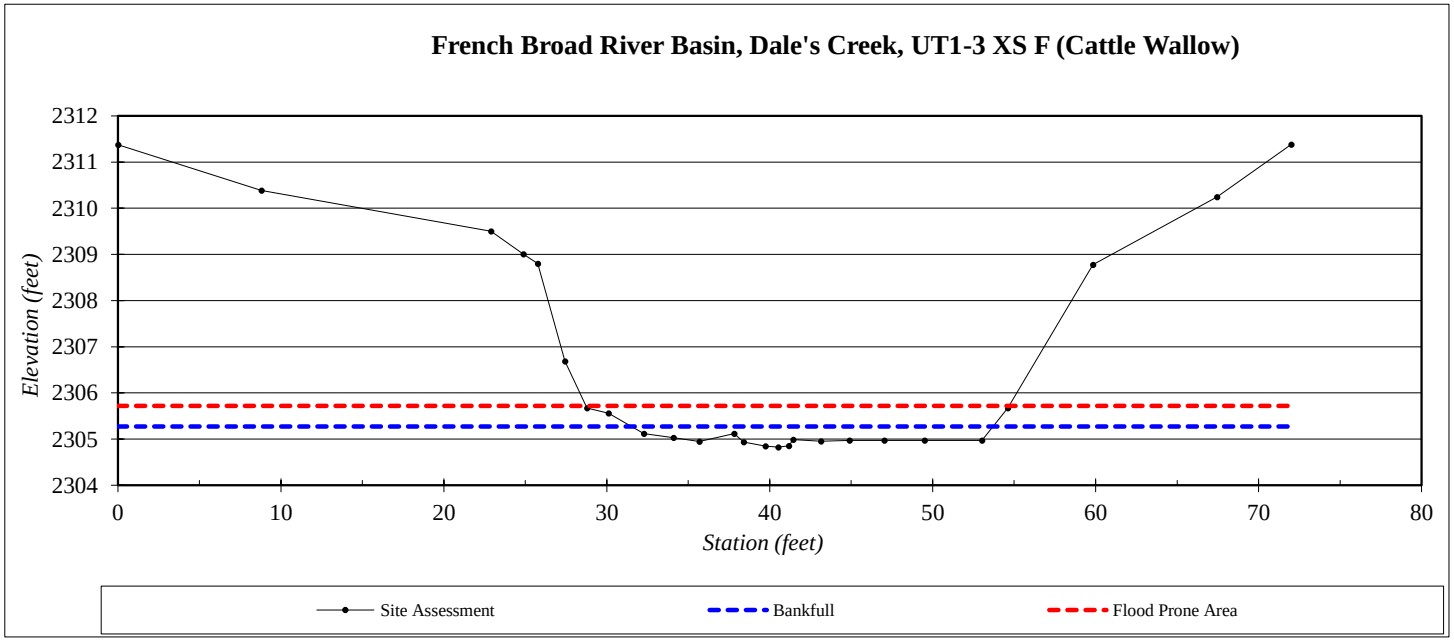
SUMMARY DATA	
Bankfull Elevation (ft):	2319.3
Bankfull Cross-Sectional Area (ft^2):	1.6
Bankfull Width (ft):	6.3
Flood Prone Area Elevation (ft):	2319.7
Flood Prone Width (ft):	12.6
Max Depth at Bankfull (ft):	0.4
Mean Depth at Bankful (ft)l:	0.3
W / D Ratio:	24.6
Entrenchment Ratio:	2.0
Bank Height Ratio:	1.9



River Basin:	French Broad
Site	Dale's Creek
XS ID	UT1-3 XS F (Cattle Wallow)
Drainage Area (sq mi):	0.15
Date:	10/22/2019
Field Crew:	T. Seelinger, J. Sullivan

Station	Elevation
0.0	2311.38
8.8	2310.39
22.9	2309.50
24.9	2309.01
25.8	2308.80
27.4	2306.68
28.8	2305.67
30.1	2305.56
32.3	2305.12
34.1	2305.03
35.7	2304.95
37.8	2305.12
38.4	2304.94
39.7	2304.85
40.5	2304.83
41.2	2304.85
41.4	2304.99
43.1	2304.96
44.9	2304.97
47.0	2304.97
49.5	2304.97
53.0	2304.97
54.6	2305.67
59.8	2308.78
67.4	2310.25
72.0	2311.38

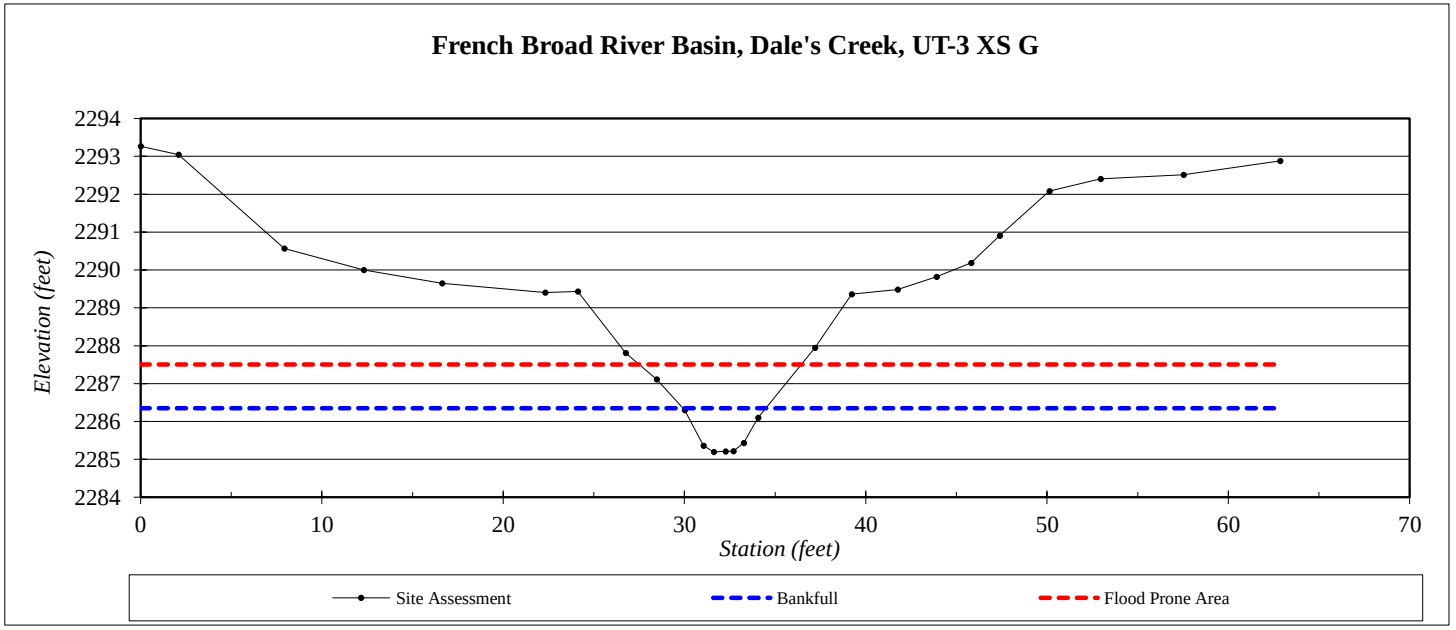
SUMMARY DATA	
Bankfull Elevation (ft):	2305.27
Bankfull Cross-Sectional Area (ft^2):	6.3
Bankfull Width (ft):	22.2
Flood Prone Area Elevation (ft):	2305.7
Flood Prone Width (ft):	26.0
Max Depth at Bankfull (ft):	0.4
Mean Depth at Bankful (ft)l:	0.3
W / D Ratio:	77.7
Entrenchment Ratio:	1.2
Bank Height Ratio:	1.7



River Basin:	French Broad
Site	Dale's Creek
XS ID	UT-3 XS G
Drainage Area (sq mi):	0.15
Date:	10/22/2019
Field Crew:	T. Seelinger, J. Sullivan

Station	Elevation
0.0	2293.27
2.1	2293.05
7.9	2290.57
12.3	2290.00
16.6	2289.65
22.3	2289.41
24.1	2289.44
26.8	2287.81
28.5	2287.11
30.0	2286.30
31.0	2285.36
31.6	2285.20
32.3	2285.21
32.7	2285.22
33.3	2285.43
34.1	2286.10
37.2	2287.95
39.2	2289.36
41.8	2289.48
43.9	2289.82
45.8	2290.19
47.4	2290.91
50.1	2292.09
52.9	2292.41
57.5	2292.52
62.9	2292.88

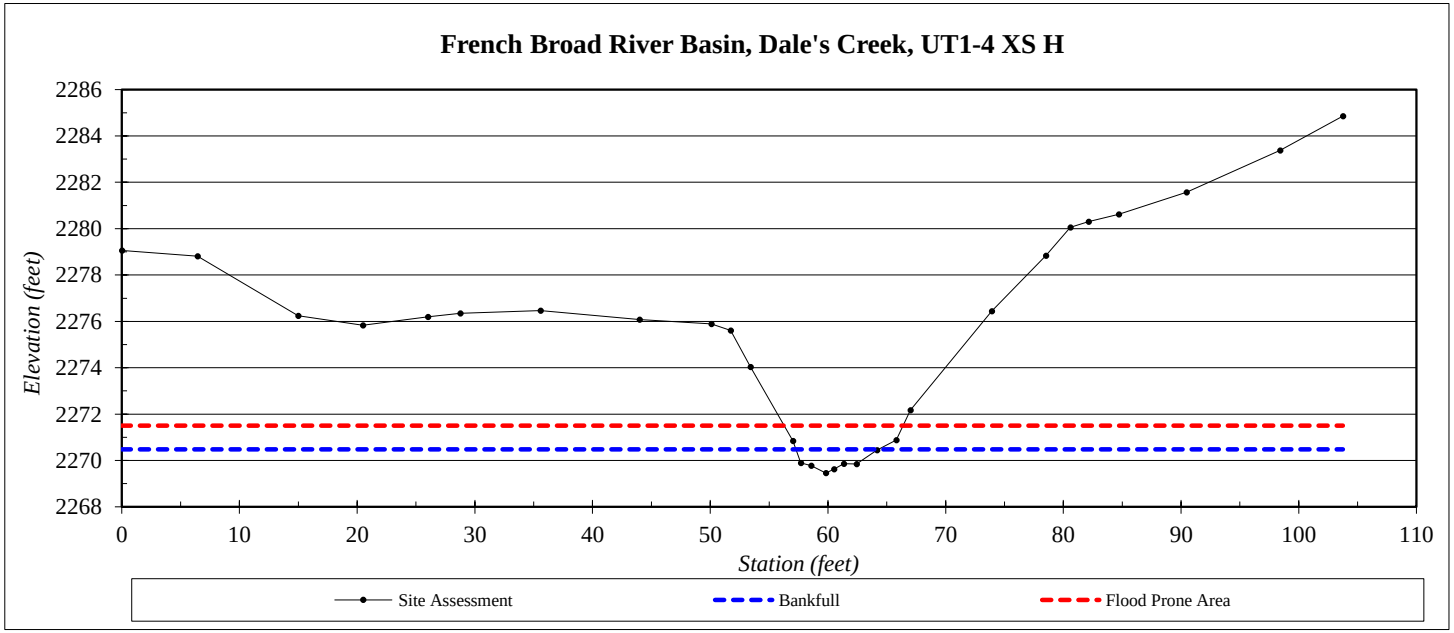
SUMMARY DATA	
Bankfull Elevation (ft):	2286.4
Bankfull Cross-Sectional Area (ft^2):	3.5
Bankfull Width (ft):	4.6
Flood Prone Area Elevation (ft):	2287.5
Flood Prone Width (ft):	8.9
Max Depth at Bankfull (ft):	1.2
Mean Depth at Bankful (ft)l:	0.8
W / D Ratio:	6.0
Entrenchment Ratio:	2.0
Bank Height Ratio:	3.8



River Basin:	French Broad
Site	Dale's Creek
XS ID	UT1-4 XS H
Drainage Area (sq mi):	0.19
Date:	10/22/2019
Field Crew:	T. Seelinger, J. Sullivan

Station	Elevation
0.0	2279.06
6.4	2278.82
15.0	2276.24
20.5	2275.83
26.0	2276.20
28.8	2276.35
35.6	2276.46
44.0	2276.08
50.1	2275.89
51.7	2275.61
53.4	2274.04
57.0	2270.84
57.7	2269.90
58.6	2269.78
59.8	2269.46
60.5	2269.63
61.4	2269.86
62.4	2269.85
64.2	2270.44
65.8	2270.88
67.0	2272.18
73.9	2276.44
78.5	2278.84
80.6	2280.06
82.1	2280.30
84.7	2280.62
90.5	2281.58
98.4	2283.38
103.7	2284.86

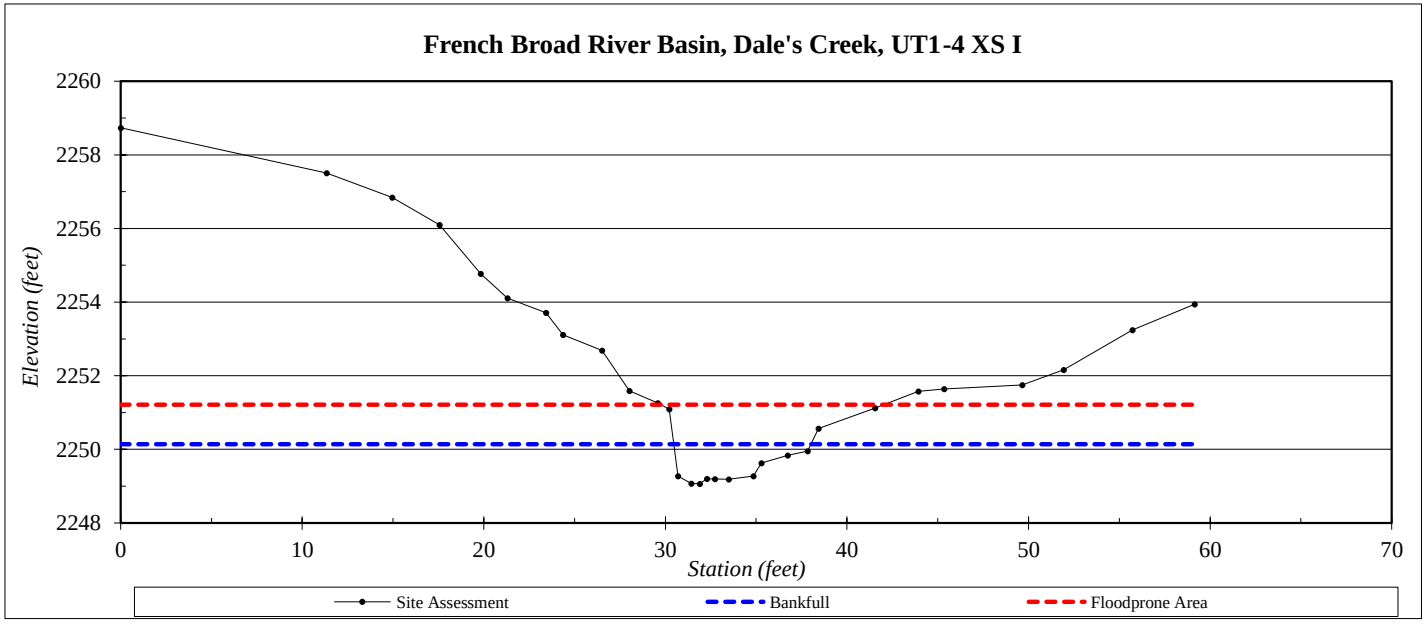
SUMMARY DATA	
Bankfull Elevation (ft):	2270.5
Bankfull Cross-Sectional Area (ft^2):	4.3
Bankfull Width (ft):	7.0
Flood Prone Area Elevation (ft):	2271.5
Flood Prone Width (ft):	10.1
Max Depth at Bankfull (ft):	1.0
Mean Depth at Bankful (ft)l:	0.6
W / D Ratio:	11.5
Entrenchment Ratio:	1.4
Bank Height Ratio:	6.0



River Basin:	French Broad
Site	Dale's Creek
XS ID	UT1-4 XS I
Drainage Area (sq mi):	0.21
Date:	10/22/2019
Field Crew:	T. Seelinger, J. Sullivan

Station	Elevation
0.0	2258.74
11.3	2257.50
14.9	2256.84
17.6	2256.10
19.8	2254.77
21.3	2254.11
23.4	2253.71
24.4	2253.11
26.5	2252.69
28.0	2251.59
29.6	2251.26
30.2	2251.10
30.7	2249.27
31.4	2249.07
31.9	2249.07
32.3	2249.20
32.7	2249.20
33.5	2249.19
34.8	2249.28
35.3	2249.63
36.7	2249.84
37.8	2249.95
38.4	2250.57
41.6	2251.12
43.9	2251.58
45.4	2251.64
49.6	2251.75
51.9	2252.16
55.7	2253.24
59.2	2253.94

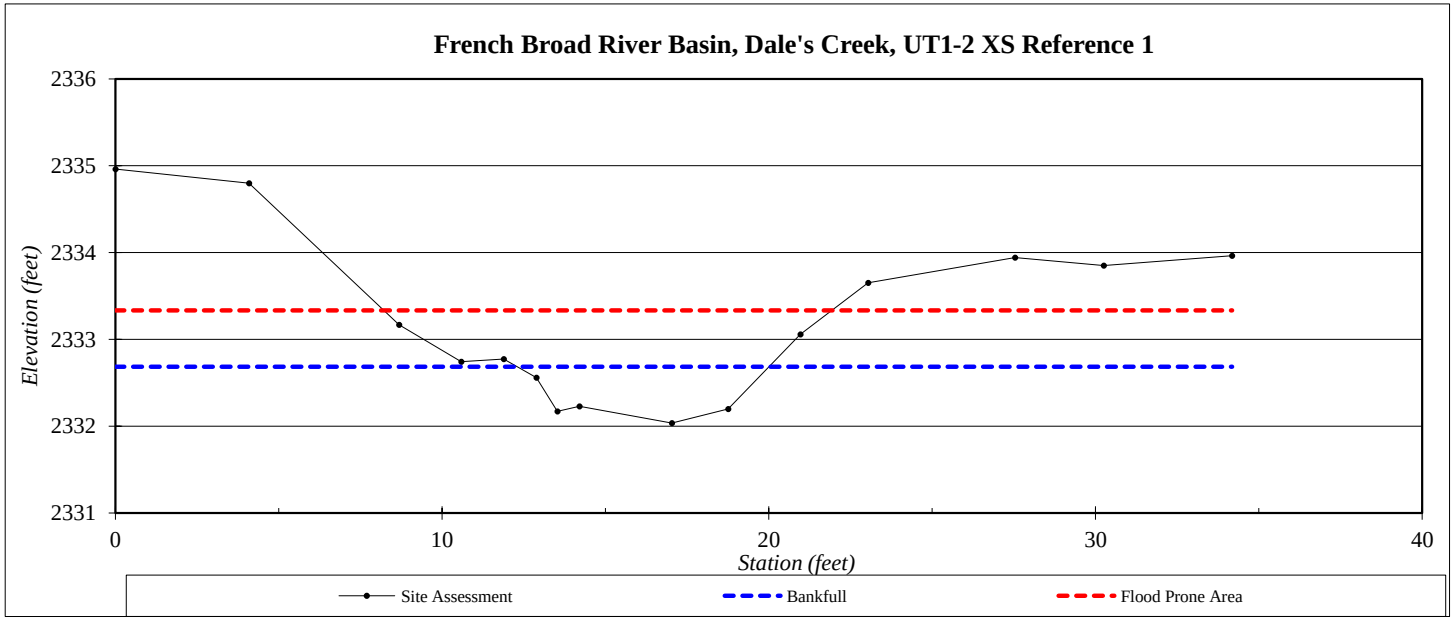
SUMMARY DATA	
Bankfull Elevation (ft):	2250.1
Bankfull Cross-Sectional Area (ft^2):	5.3
Bankfull Width (ft):	7.5
Flood Prone Area Elevation (ft):	2251.2
Flood Prone Width (ft):	12.3
Max Depth at Bankfull (ft):	1.1
Mean Depth at Bankful (ft)l:	0.7
W / D Ratio:	10.8
Entrenchment Ratio:	1.6
Bank Height Ratio:	1.4



River Basin:	French Broad
Site	Dale's Creek
XS ID	UT1-2 XS Reference 1
Drainage Area (sq mi):	0.11
Date:	10/22/2019
Field Crew:	T. Seelinger, J. Sullivan

Station	Elevation
0.0	2334.96
4.1	2334.80
8.7	2333.17
10.6	2332.74
11.9	2332.77
12.9	2332.56
13.5	2332.17
14.2	2332.23
17.0	2332.04
18.8	2332.20
21.0	2333.06
23.0	2333.65
27.5	2333.94
30.2	2333.85
34.2	2333.97

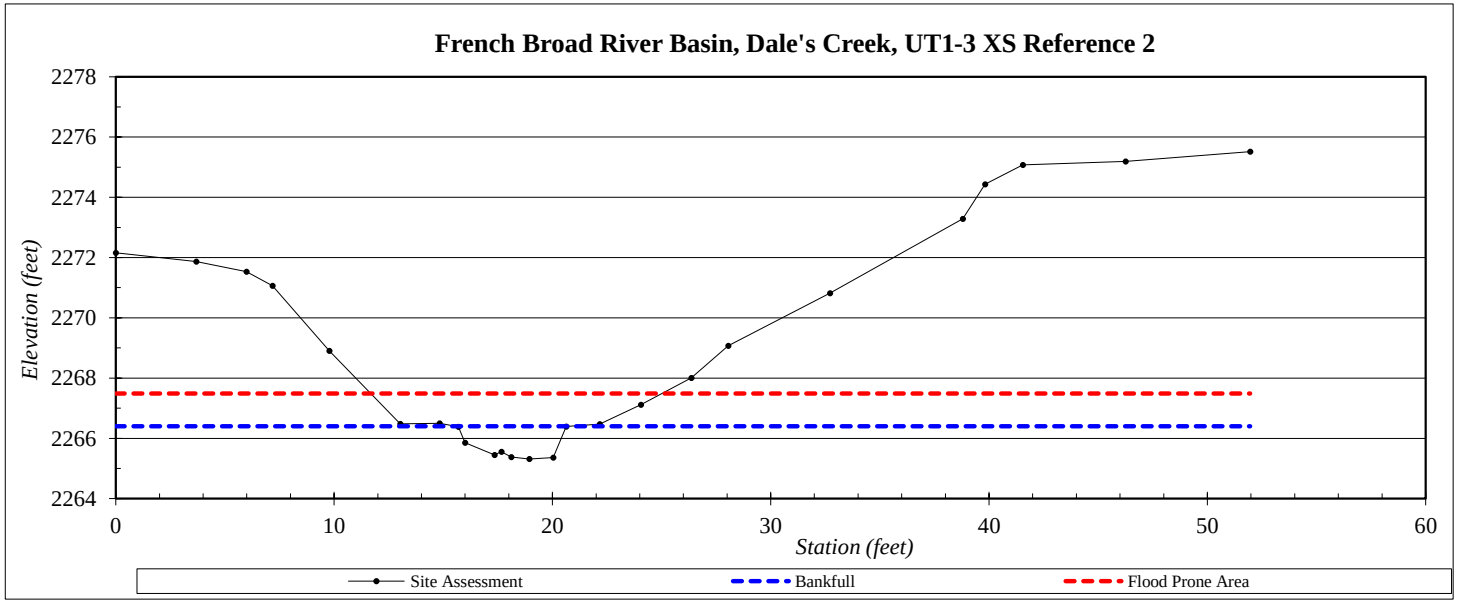
SUMMARY DATA	
Bankfull Elevation (ft):	2332.7
Bankfull Cross-Sectional Area (ft^2):	3.4
Bankfull Width (ft):	7.7
Flood Prone Area Elevation (ft):	2333.3
Flood Prone Width (ft):	13.7
Max Depth at Bankfull (ft):	0.6
Mean Depth at Bankful (ft)l:	0.4
W / D Ratio:	17.4
Entrenchment Ratio:	1.8
Bank Height Ratio:	1.0



River Basin:	French Broad
Site	Dale's Creek
XS ID	UT1-3 XS Reference 2
Drainage Area (sq mi):	0.19
Date:	10/22/2019
Field Crew:	T. Seelinger, J. Sullivan

Station	Elevation
0.0	2272.16
3.7	2271.87
6.0	2271.53
7.2	2271.07
9.8	2268.91
13.0	2266.48
14.8	2266.50
15.7	2266.38
16.0	2265.86
17.4	2265.45
17.7	2265.56
18.1	2265.38
18.9	2265.31
20.0	2265.36
20.6	2266.40
22.2	2266.47
24.1	2267.11
26.4	2268.01
28.0	2269.07
32.7	2270.82
38.8	2273.29
39.8	2274.44
41.5	2275.08
46.2	2275.20
52.0	2275.52

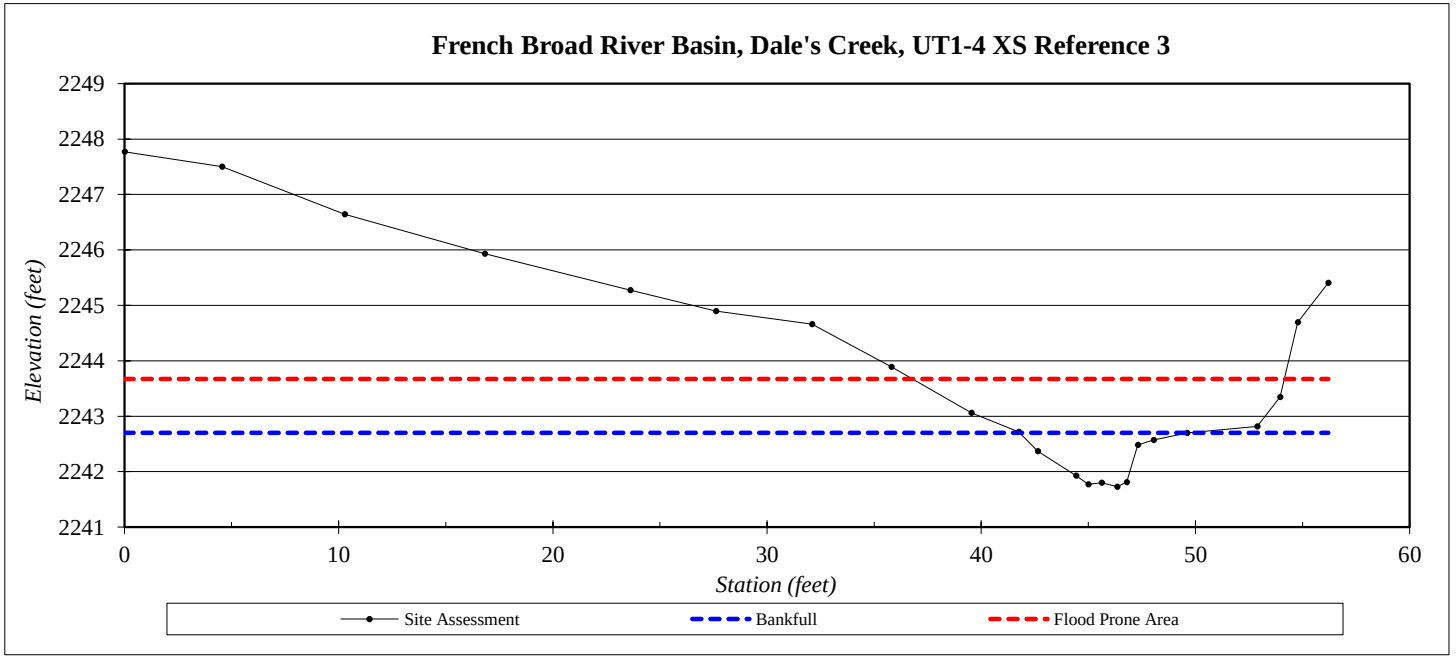
SUMMARY DATA	
Bankfull Elevation (ft):	2266.4
Bankfull Cross-Sectional Area (ft^2):	4.1
Bankfull Width (ft):	5.1
Flood Prone Area Elevation (ft):	2267.5
Flood Prone Width (ft):	13.3
Max Depth at Bankfull (ft):	1.1
Mean Depth at Bankful (ft)l:	0.8
W / D Ratio:	6.3
Entrenchment Ratio:	2.6
Bank Height Ratio:	1.0



River Basin:	French Broad
Site	Dale's Creek
XS ID	UT1-4 XS Reference 3
Drainage Area (sq mi):	0.21
Date:	10/22/2019
Field Crew:	T. Seelinger, J. Sullivan

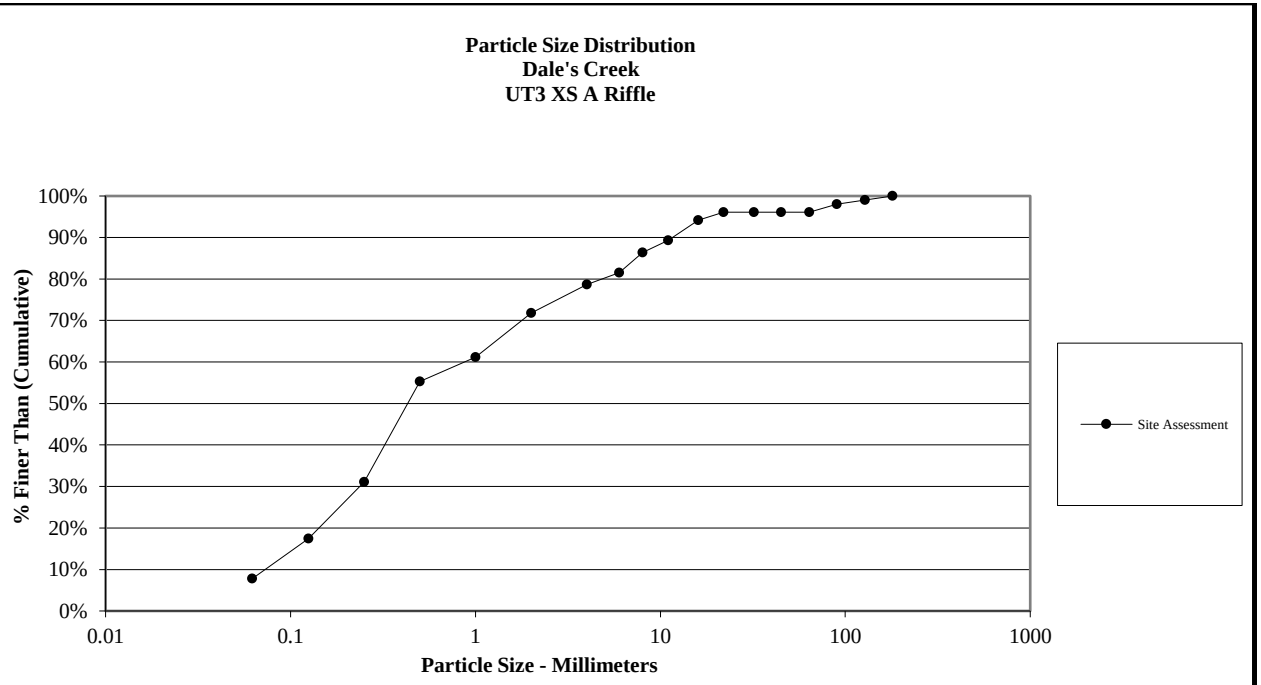
Station	Elevation
0.0	2247.77
4.5	2247.50
10.3	2246.64
16.8	2245.93
23.6	2245.28
27.6	2244.90
32.1	2244.66
35.8	2243.89
39.5	2243.06
41.7	2242.72
42.6	2242.37
44.4	2241.93
45.0	2241.77
45.6	2241.80
46.3	2241.73
46.8	2241.81
47.3	2242.48
48.0	2242.57
49.6	2242.70
52.9	2242.82
53.9	2243.35
54.8	2244.69
56.2	2245.41

SUMMARY DATA	
Bankfull Elevation (ft):	2242.7
Bankfull Cross-Sectional Area (ft^2):	3.8
Bankfull Width (ft):	7.8
Flood Prone Area Elevation (ft):	2243.7
Flood Prone Width (ft):	17.4
Max Depth at Bankfull (ft):	1.0
Mean Depth at Bankful (ft)l:	0.5
W / D Ratio:	16.1
Entrenchment Ratio:	2.2
Bank Height Ratio:	1.0



UT3 Cross-Section A Riffle - Site Assessment			
Particle	Millimeter		Count
Silt/Clay	< 0.062	S/C	8
Very Fine	.062 - .125	S	10
Fine	.125 - .25	A	14
Medium	.25 - .50	N	25
Coarse	.50 - 1	D	6
Very Coarse	1 - 2	S	11
Very Fine	2 - 4		7
Fine	4 - 5.7	G	3
Fine	5.7 - 8	R	5
Medium	8 - 11.3	A	3
Medium	11.3 - 16	V	5
Coarse	16 - 22.6	E	2
Coarse	22.6 - 32	L	
Very Coarse	32 - 45	S	
Very Coarse	45 - 64		
Small	64 - 90	C	2
Small	90 - 128	O	1
Large	128 - 180	B	1
Large	180 - 256	L	
Small	256 - 362	B	
Small	362 - 512	L	
Medium	512 - 1024	D	
Lrg- Very Lrg	1024 - 2048	R	
Bedrock	>2048	BDRK	
		Total	103

Note:



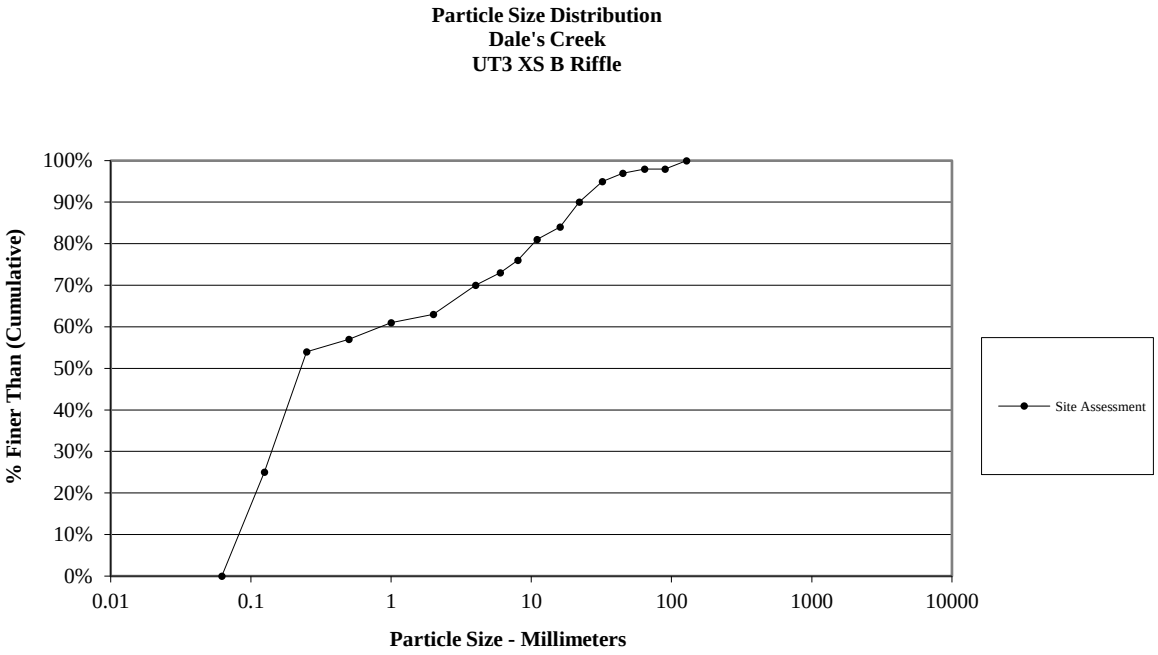
Size (mm)	
D16	0.11
D35	0.28
D50	0.43
D65	1.3
D84	6.9
D95	18

Size Distribution	
mean	0.9
dispersion	10.0
skewness	0.23

Type	
silt/clay	8%
sand	64%
gravel	24%
cobble	3%
boulder	0%
bedrock	0%
hardpan	0%
wood/det	0%
artificial	0%

UT3 Cross-Section B Riffle - Site Assessment			
Particle	Millimeter		Count
Silt/Clay	< 0.062	S/C	
Very Fine	.062 - .125	S	25
Fine	.125 - .25	A	29
Medium	.25 - .50	N	3
Coarse	.50 - 1	D	4
Very Coarse	1 - 2	S	2
Very Fine	2 - 4		7
Fine	4 - 5.7	G	3
Fine	5.7 - 8	R	3
Medium	8 - 11.3	A	5
Medium	11.3 - 16	V	3
Coarse	16 - 22.6	E	6
Coarse	22.6 - 32	L	5
Very Coarse	32 - 45	S	2
Very Coarse	45 - 64		1
Small	64 - 90	C	
Small	90 - 128	O	2
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:



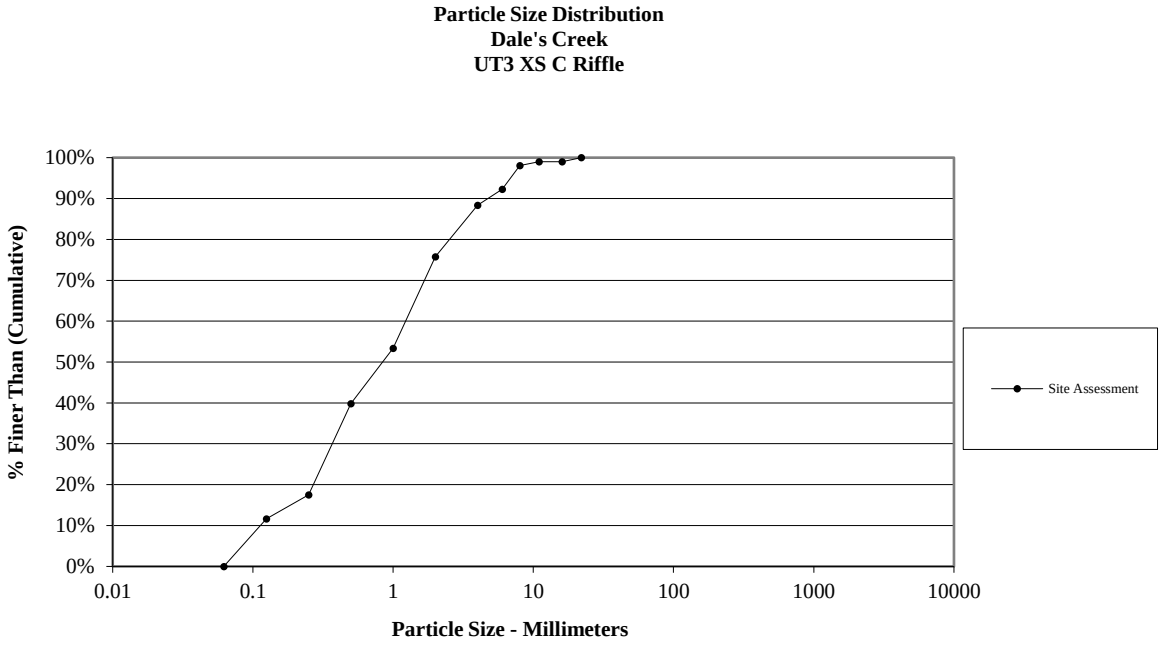
Size (mm)	
D16	0.097
D35	0.16
D50	0.23
D65	2.4
D84	16
D95	32

Size Distribution	
mean	1.2
dispersion	36.0
skewness	0.49

Type	
silt/clay	0%
sand	63%
gravel	35%
cobble	2%
boulder	0%
bedrock	0%
hardpan	0%
wood/det	0%
artificial	0%

UT3 Cross-Section C Riffle - Site Assessment			
Particle	Millimeter		Count
Silt/Clay	< 0.062	S/C	
Very Fine	.062 - .125	S	12
Fine	.125 - .25	A	6
Medium	.25 - .50	N	23
Coarse	.50 - 1	D	14
Very Coarse	1 - 2	S	23
Very Fine	2 - 4		13
Fine	4 - 5.7	G	4
Fine	5.7 - 8	R	6
Medium	8 - 11.3	A	1
Medium	11.3 - 16	V	
Coarse	16 - 22.6	E	1
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	103

Note:



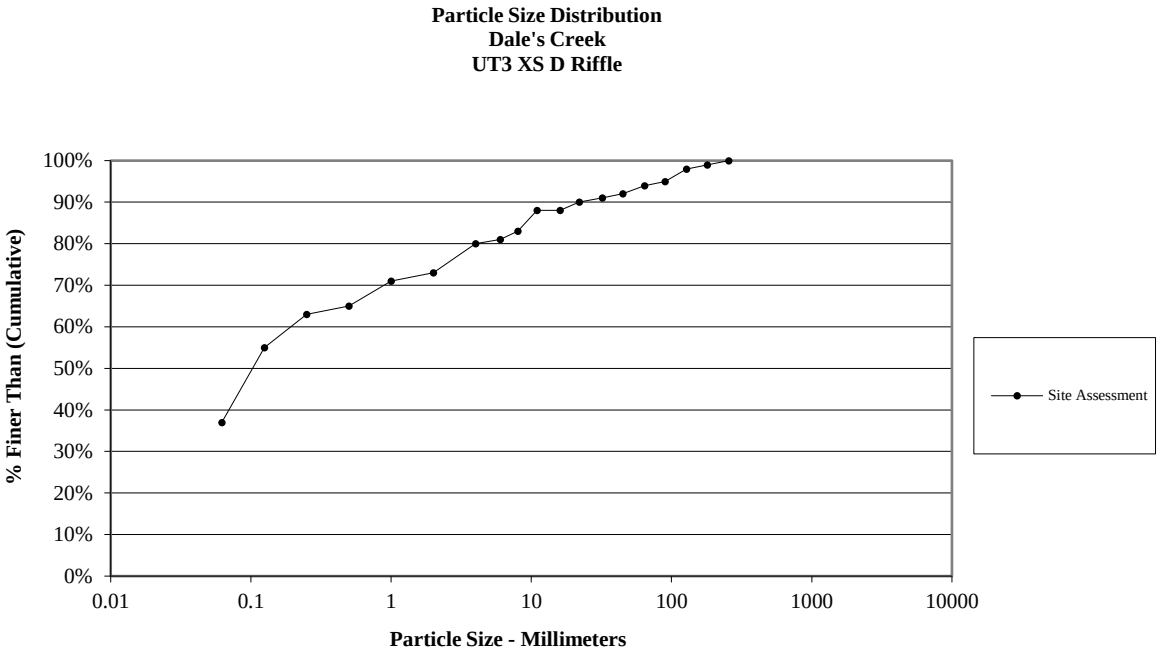
Size (mm)	
D16	0.21
D35	0.43
D50	0.84
D65	1.4
D84	3.2
D95	6.9

Size Distribution	
mean	0.8
dispersion	3.9
skewness	-0.01

Type	
silt/clay	0%
sand	76%
gravel	24%
cobble	0%
boulder	0%
bedrock	0%
hardpan	0%
wood/det	0%
artificial	0%

UT3 Cross-Section D Riffle - Site Assessment			
Particle	Millimeter		Count
Silt/Clay	< 0.062	S/C	37
Very Fine	.062 - .125	S	18
Fine	.125 - .25	A	8
Medium	.25 - .50	N	2
Coarse	.50 - 1	D	6
Very Coarse	1 - 2	S	2
Very Fine	2 - 4		7
Fine	4 - 5.7	G	1
Fine	5.7 - 8	R	2
Medium	8 - 11.3	A	5
Medium	11.3 - 16	V	
Coarse	16 - 22.6	E	2
Coarse	22.6 - 32	L	1
Very Coarse	32 - 45	S	1
Very Coarse	45 - 64		2
Small	64 - 90	C	1
Small	90 - 128	O	3
Large	128 - 180	B	1
Large	180 - 256	L	1
Small	256 - 362	B	
Small	362 - 512	L	
Medium	512 - 1024	D	
Lrg- Very Lrg	1024 - 2048	R	
Bedrock	>2048	BDRK	
		Total	100

Note:



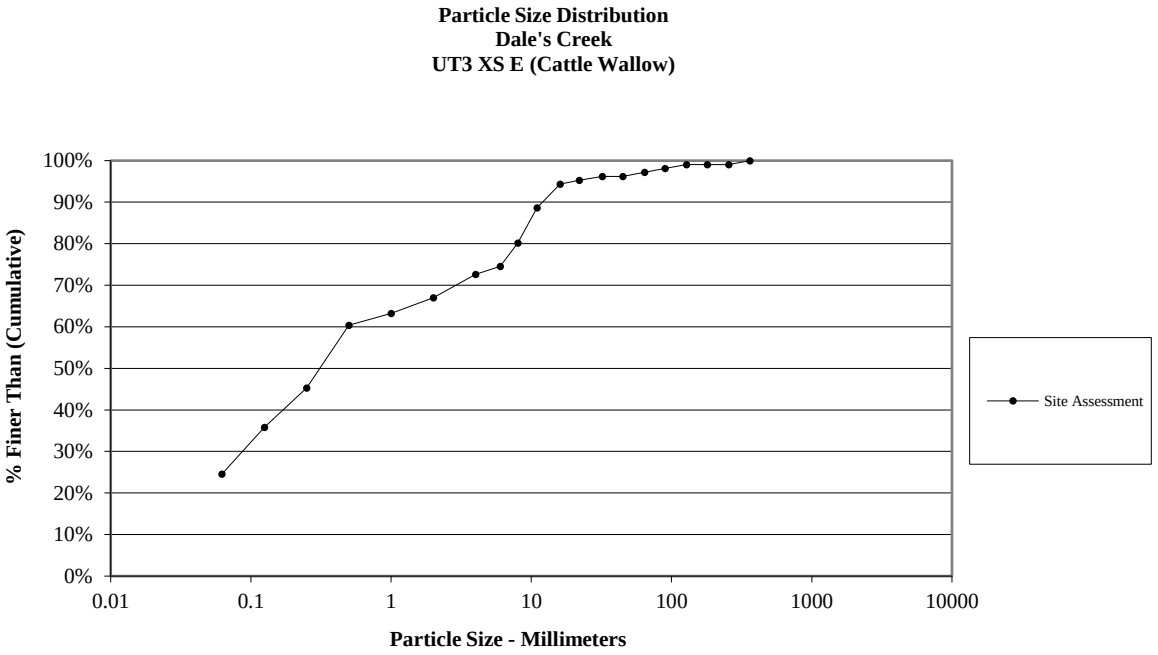
Size (mm)	
D16	0.062
D35	0.062
D50	0.1
D65	0.5
D84	8.5
D95	90

Size Distribution	
mean	0.7
dispersion	43.3
skewness	0.59

Type	
silt/clay	37%
sand	36%
gravel	21%
cobble	5%
boulder	0%
bedrock	0%
hardpan	0%
wood/det	0%
artificial	0%

UT3 Cross-Section E - Site Assessment			
Particle	Millimeter		Count
Silt/Clay	< 0.062	S/C	26
Very Fine	.062 - .125	S	12
Fine	.125 - .25	A	10
Medium	.25 - .50	N	16
Coarse	.50 - 1	D	3
Very Coarse	1 - 2	S	4
Very Fine	2 - 4		6
Fine	4 - 5.7	G	2
Fine	5.7 - 8	R	6
Medium	8 - 11.3	A	9
Medium	11.3 - 16	V	6
Coarse	16 - 22.6	E	1
Coarse	22.6 - 32	L	1
Very Coarse	32 - 45	S	
Very Coarse	45 - 64		1
Small	64 - 90	C	1
Small	90 - 128	O	1
Large	128 - 180	B	
Large	180 - 256	L	
Small	256 - 362	B	1
Small	362 - 512	L	
Medium	512 - 1024	D	
Lrg- Very Lrg	1024 - 2048	R	
Bedrock	>2048	BDRK	
		Total	106

Note:



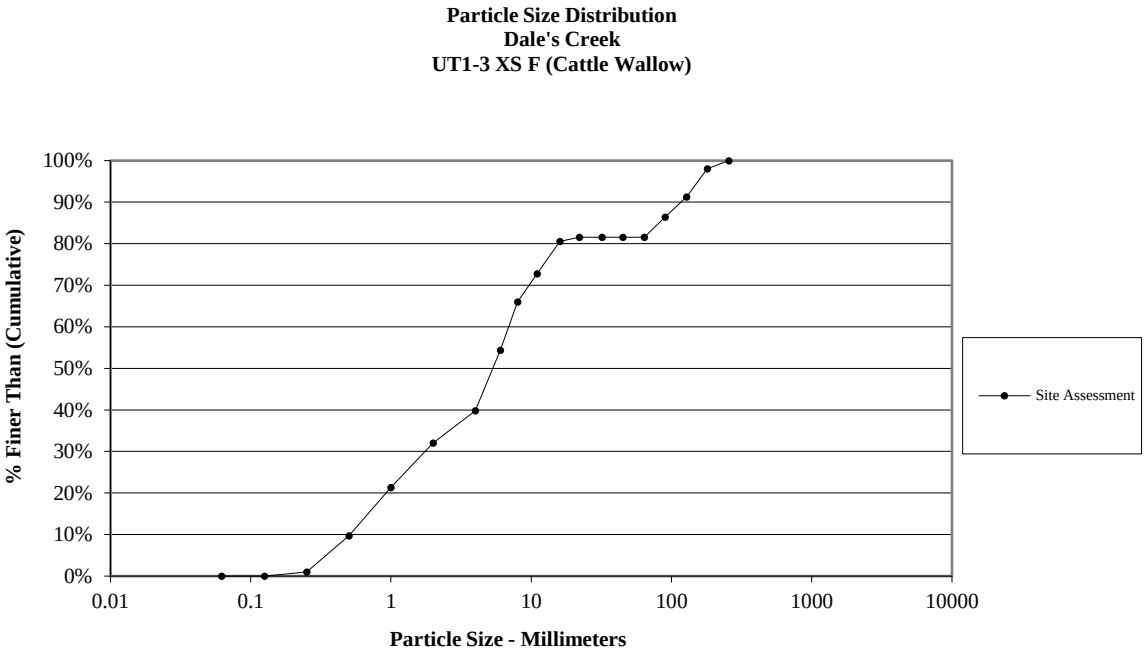
Size (mm)	
D16	0.062
D35	0.12
D50	0.31
D65	1.4
D84	9.2
D95	20

Size Distribution	
mean	0.8
dispersion	17.3
skewness	0.26

Type	
silt/clay	25%
sand	42%
gravel	30%
cobble	2%
boulder	1%
bedrock	0%
hardpan	0%
wood/det	0%
artificial	0%

UT1-3 Cross-Section F - Site Assessment			
Particle	Millimeter		Count
Silt/Clay	< 0.062	S/C	
Very Fine	.062 - .125	S	
Fine	.125 - .25	A	1
Medium	.25 - .50	N	9
Coarse	.50 - 1	D	12
Very Coarse	1 - 2	S	11
Very Fine	2 - 4		8
Fine	4 - 5.7	G	15
Fine	5.7 - 8	R	12
Medium	8 - 11.3	A	7
Medium	11.3 - 16	V	8
Coarse	16 - 22.6	E	1
Coarse	22.6 - 32	L	
Very Coarse	32 - 45	S	
Very Coarse	45 - 64		
Small	64 - 90	C	5
Small	90 - 128	O	5
Large	128 - 180	B	7
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	103

Note:



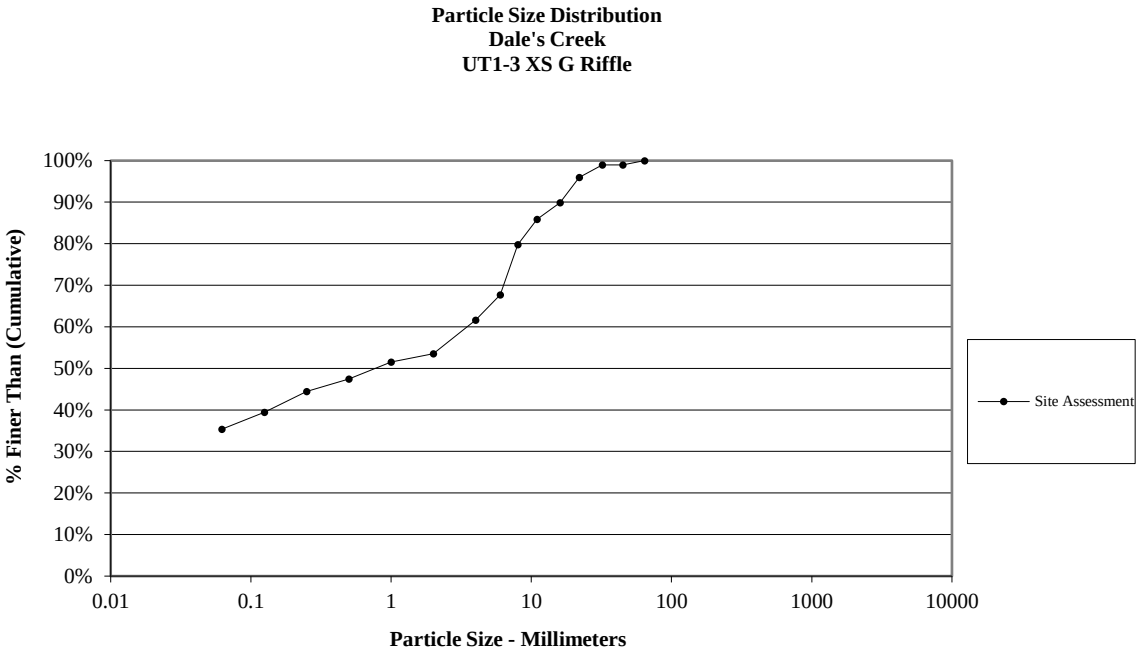
Size (mm)	
D16	0.73
D35	2.6
D50	5.3
D65	7.8
D84	76
D95	150

Size Distribution	
mean	7.4
dispersion	10.8
skewness	0.10

Type	
silt/clay	0%
sand	32%
gravel	50%
cobble	18%
boulder	0%
bedrock	0%
hardpan	0%
wood/det	0%
artificial	0%

UT1-3 Cross-Section G Riffle - Site Assessment			
Particle	Millimeter		Count
Silt/Clay	< 0.062	S/C	36
Very Fine	.062 - .125	S	4
Fine	.125 - .25	A	5
Medium	.25 - .50	N	3
Coarse	.50 - 1	D	4
Very Coarse	1 - 2	S	2
Very Fine	2 - 4		8
Fine	4 - 5.7	G	6
Fine	5.7 - 8	R	12
Medium	8 - 11.3	A	6
Medium	11.3 - 16	V	4
Coarse	16 - 22.6	E	6
Coarse	22.6 - 32	L	3
Very Coarse	32 - 45	S	
Very Coarse	45 - 64		1
Small	64 - 90	C	
Small	90 - 128	O	
Large	128 - 180	B	
Large	180 - 256	L	
Small	256 - 362	B	
Small	362 - 512	L	
Medium	512 - 1024	D	
Lrg- Very Lrg	1024 - 2048	R	
Bedrock	>2048	BDRK	
		Total	100

Note:



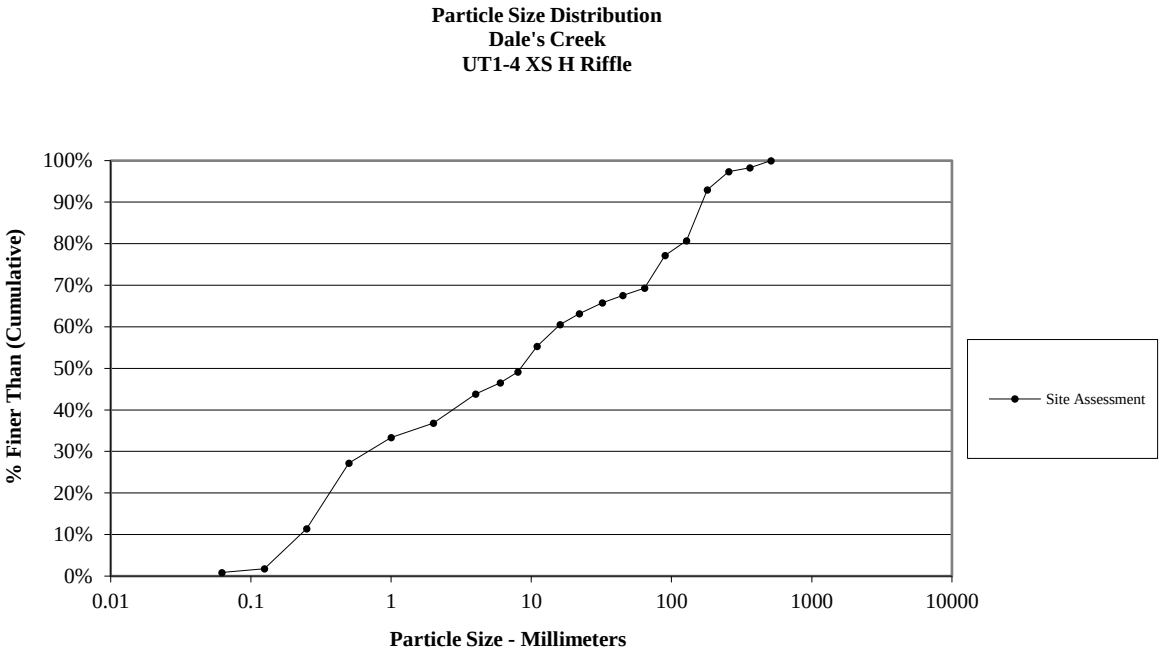
Size (mm)	
D16	0.062
D35	0.062
D50	0.71
D65	4.9
D84	9.9
D95	21

Size Distribution	
mean	0.8
dispersion	12.7
skewness	0.03

Type	
silt/clay	36%
sand	18%
gravel	46%
cobble	0%
boulder	0%
bedrock	0%
hardpan	0%
wood/det	0%
artificial	0%

UT1-4 Cross-Section H Riffle - Site Assessment			
Particle	Millimeter		Count
Silt/Clay	< 0.062	S/C	1
Very Fine	.062 - .125	S	1
Fine	.125 - .25	A	11
Medium	.25 - .50	N	18
Coarse	.50 - 1	D	7
Very Coarse	1 - 2	S	4
Very Fine	2 - 4		8
Fine	4 - 5.7	G	3
Fine	5.7 - 8	R	3
Medium	8 - 11.3	A	7
Medium	11.3 - 16	V	6
Coarse	16 - 22.6	E	3
Coarse	22.6 - 32	L	3
Very Coarse	32 - 45	S	2
Very Coarse	45 - 64		2
Small	64 - 90	C	9
Small	90 - 128	O	4
Large	128 - 180	B	14
Large	180 - 256	L	5
Small	256 - 362	B	1
Small	362 - 512	L	2
Medium	512 - 1024	D	
Lrg- Very Lrg	1024 - 2048	R	
Bedrock	>2048	BDRK	
		Total	114

Note:



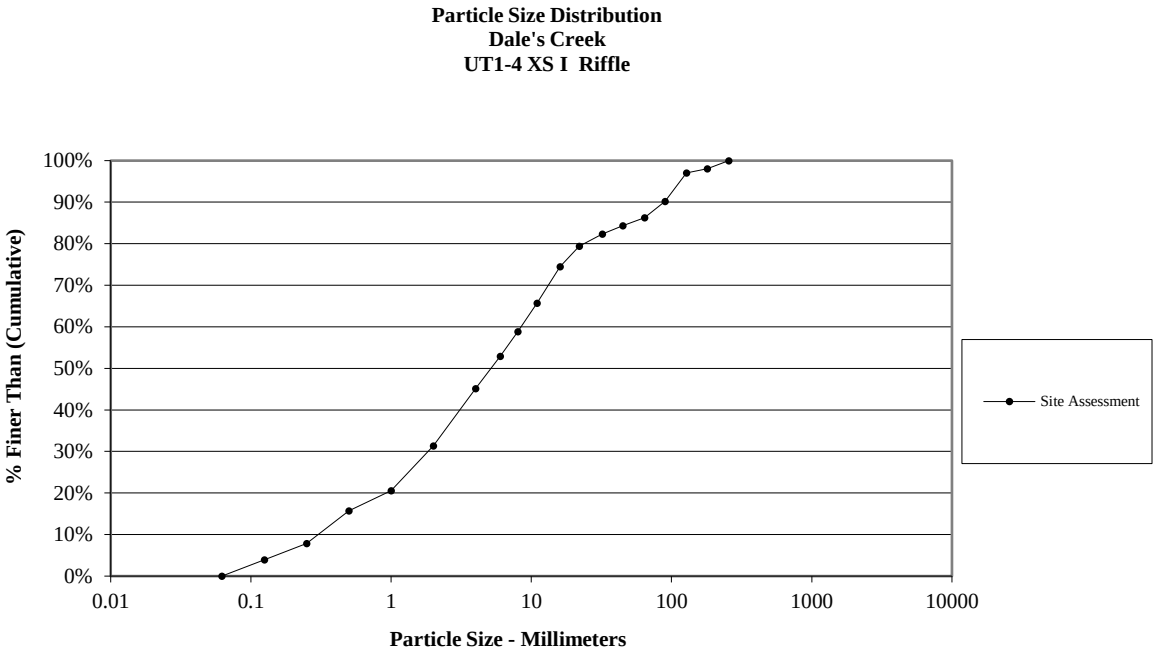
Size (mm)	
D16	0.31
D35	1.4
D50	8.4
D65	29
D84	140
D95	210

Size Distribution	
mean	6.6
dispersion	21.9
skewness	-0.06

Type	
silt/clay	1%
sand	36%
gravel	32%
cobble	28%
boulder	3%
bedrock	0%
hardpan	0%
wood/det	0%
artificial	0%

UT1-4 Cross-Section I Riffle - Site Assessment			
Particle	Millimeter		Count
Silt/Clay	< 0.062	S/C	
Very Fine	.062 - .125	S	4
Fine	.125 - .25	A	4
Medium	.25 - .50	N	8
Coarse	.50 - 1	D	5
Very Coarse	1 - 2	S	11
Very Fine	2 - 4		14
Fine	4 - 5.7	G	8
Fine	5.7 - 8	R	6
Medium	8 - 11.3	A	7
Medium	11.3 - 16	V	9
Coarse	16 - 22.6	E	5
Coarse	22.6 - 32	L	3
Very Coarse	32 - 45	S	2
Very Coarse	45 - 64		2
Small	64 - 90	C	4
Small	90 - 128	O	7
Large	128 - 180	B	1
Large	180 - 256	L	2
Small	256 - 362	B	
Small	362 - 512	L	
Medium	512 - 1024	D	
Lrg- Very Lrg	1024 - 2048	R	
Bedrock	>2048	BDRK	
		Total	102

Note:



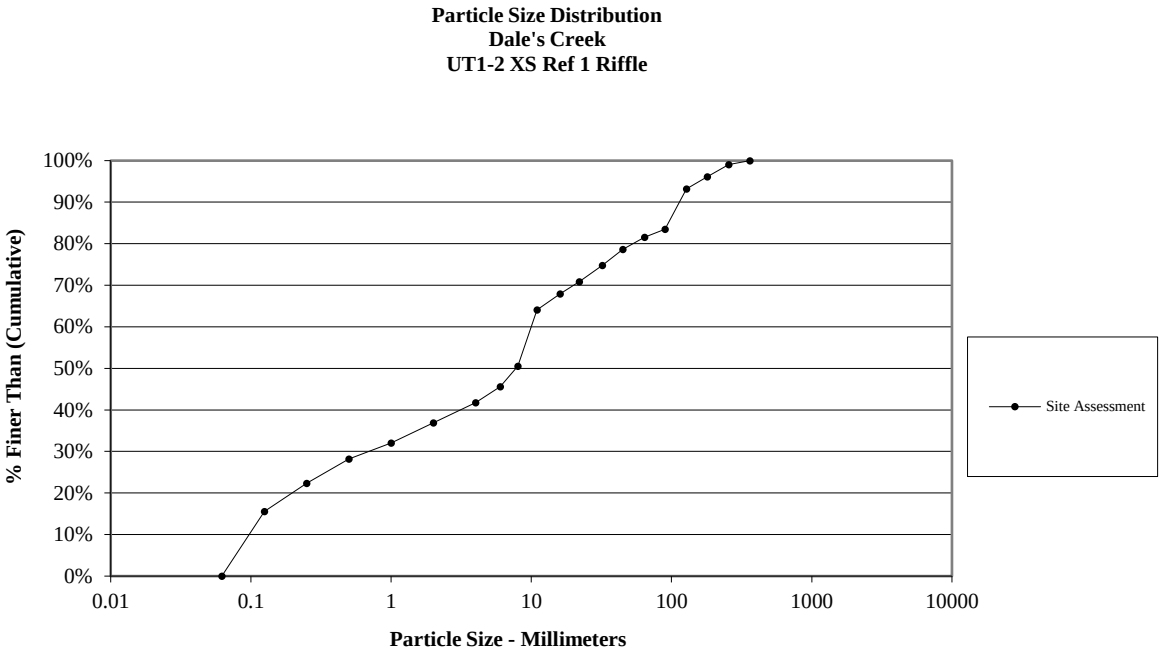
Size (mm)	
D16	0.52
D35	2.4
D50	5.2
D65	11
D84	43
D95	120

Size Distribution	
mean	4.7
dispersion	9.1
skewness	-0.03

Type	
silt/clay	0%
sand	31%
gravel	55%
cobble	14%
boulder	0%
bedrock	0%
hardpan	0%
wood/det	0%
artificial	0%

UT1-2 Cross-Section Ref 1 Riffle - Site Assessment			
Particle	Millimeter		Count
Silt/Clay	< 0.062	S/C	
Very Fine	.062 - .125	S	16
Fine	.125 - .25	A	7
Medium	.25 - .50	N	6
Coarse	.50 - 1	D	4
Very Coarse	1 - 2	S	5
Very Fine	2 - 4		5
Fine	4 - 5.7	G	4
Fine	5.7 - 8	R	5
Medium	8 - 11.3	A	14
Medium	11.3 - 16	V	4
Coarse	16 - 22.6	E	3
Coarse	22.6 - 32	L	4
Very Coarse	32 - 45	S	4
Very Coarse	45 - 64		3
Small	64 - 90	C	2
Small	90 - 128	O	10
Large	128 - 180	B	3
Large	180 - 256	L	3
Small	256 - 362	B	1
Small	362 - 512	L	
Medium	512 - 1024	D	
Lrg- Very Lrg	1024 - 2048	R	
Bedrock	>2048	BDRK	
		Total	103

Note:



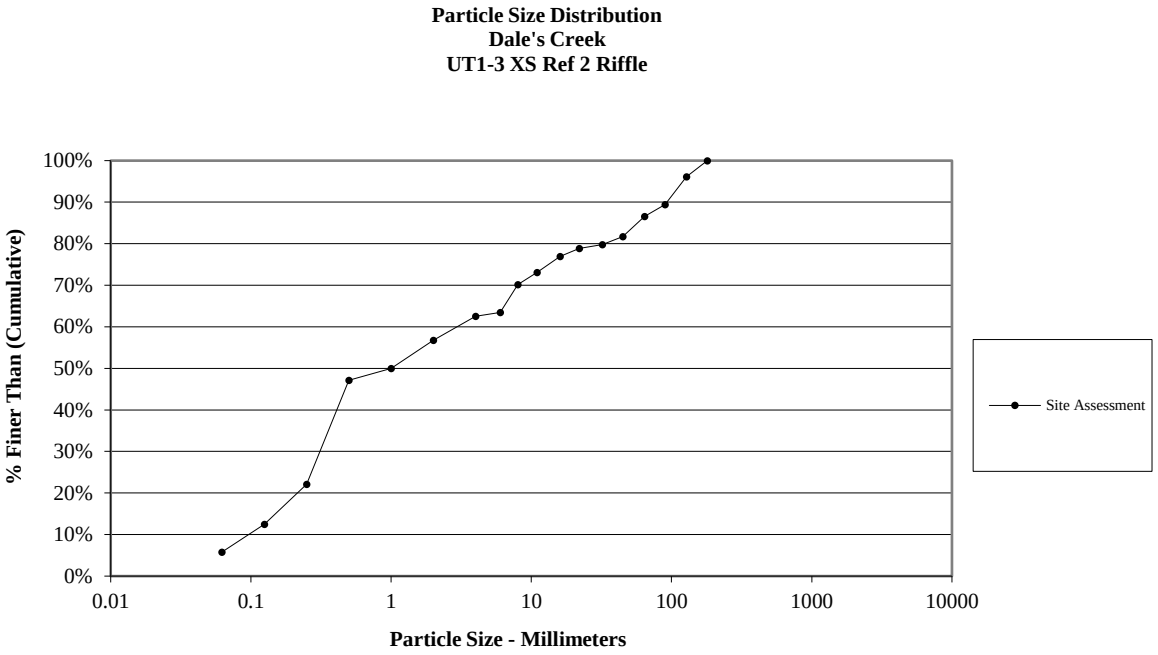
Size (mm)	
D16	0.13
D35	1.5
D50	7.8
D65	12
D84	92
D95	160

Size Distribution	
mean	3.5
dispersion	35.9
skewness	-0.21

Type	
silt/clay	0%
sand	37%
gravel	45%
cobble	17%
boulder	1%
bedrock	0%
hardpan	0%
wood/det	0%
artificial	0%

UT1-3 Cross-Section Ref 2 Riffle - Site Assessment			
Particle	Millimeter		Count
Silt/Clay	< 0.062	S/C	6
Very Fine	.062 - .125	S	7
Fine	.125 - .25	A	10
Medium	.25 - .50	N	26
Coarse	.50 - 1	D	3
Very Coarse	1 - 2	S	7
Very Fine	2 - 4		6
Fine	4 - 5.7	G	1
Fine	5.7 - 8	R	7
Medium	8 - 11.3	A	3
Medium	11.3 - 16	V	4
Coarse	16 - 22.6	E	2
Coarse	22.6 - 32	L	1
Very Coarse	32 - 45	S	2
Very Coarse	45 - 64		5
Small	64 - 90	C	3
Small	90 - 128	O	7
Large	128 - 180	B	4
Large	180 - 256	L	
Small	256 - 362	B	
Small	362 - 512	L	
Medium	512 - 1024	D	
Lrg- Very Lrg	1024 - 2048	R	
Bedrock	>2048	BDRK	
		Total	104

Note:



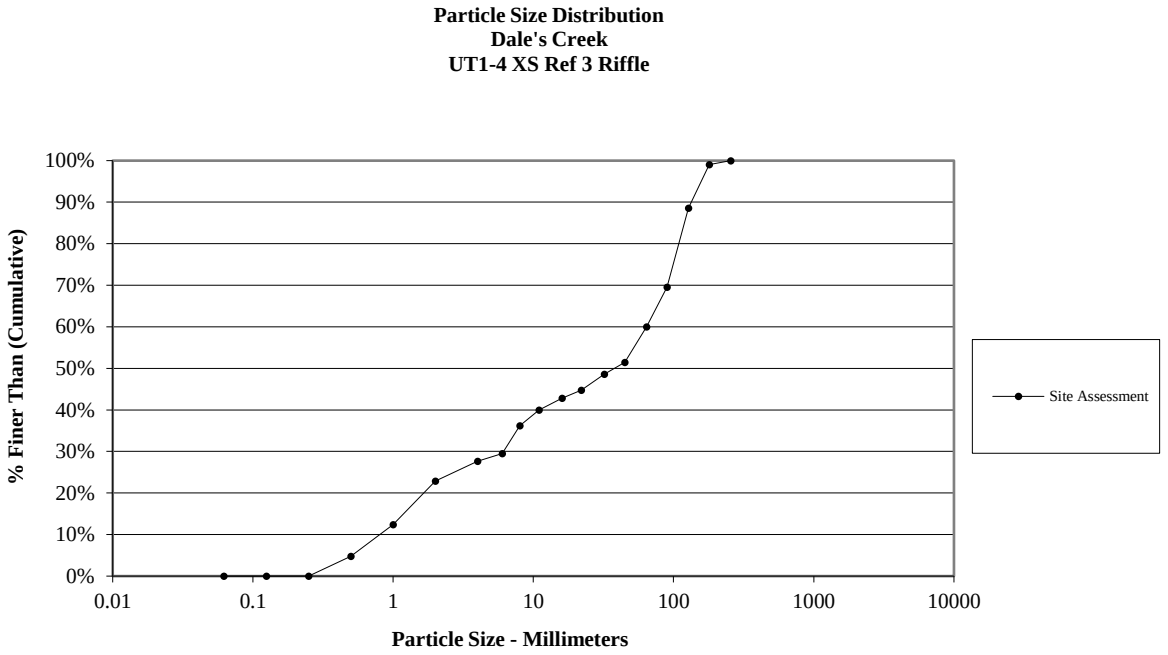
Size (mm)	
D16	0.16
D35	0.36
D50	1
D65	6.4
D84	53
D95	120

Size Distribution	
mean	2.9
dispersion	29.6
skewness	0.29

Type	
silt/clay	6%
sand	51%
gravel	30%
cobble	13%
boulder	0%
bedrock	0%
hardpan	0%
wood/det	0%
artificial	0%

UT1-4 Cross-Section Ref 3 - Site Assessment			
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	8
Very Coarse	1 - 2	S	11
Very Fine	2 - 4		5
Fine	4 - 5.7	G	2
Fine	5.7 - 8	R	7
Medium	8 - 11.3	A	4
Medium	11.3 - 16	V	3
Coarse	16 - 22.6	E	2
Coarse	22.6 - 32	L	4
Very Coarse	32 - 45	S	3
Very Coarse	45 - 64		9
Small	64 - 90	C	10
Small	90 - 128	O	20
Large	128 - 180	B	11
Large	180 - 256	L	1
Small	256 - 362	B	
Small	362 - 512	L	
Medium	512 - 1024	D	
Lrg- Very Lrg	1024 - 2048	R	
Bedrock	>2048	BDRK	
		Total	105

Note:



Size (mm)	
D16	1.3
D35	7.6
D50	38
D65	77
D84	120
D95	160

Size Distribution	
mean	12.5
dispersion	16.2
skewness	-0.34

Type	
silt/clay	0%
sand	23%
gravel	37%
cobble	40%
boulder	0%
bedrock	0%
hardpan	0%
wood/det	0%
artificial	0%

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

Party: A. French, T. Seelinger, J. Sullivan

Location: riffle at bottom of UT1

Date: 10/24/2019

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)	
	0.79		0.91		1.19		1.25		1.33		1.36		1.36		1.30					
	Sample Weights		Sample Weights		Sample Weights		Sample Weights		Sample Weights		Sample Weights		Sample Weights		Sample Weights		Sample Weights		Sample Weights	
	Total	Net	Total	Net	Total	Net	Total	Net	Total	Net	Total	Net	Total	Net	Total	Net	Total	Net	Total	Net
1	1.9	1.1	1.5	0.6	1.7	0.5	1.9	0.7	2.2	0.9	2.6	1.2	2.8	1.4	4.5	3.2				
2																				
3																				
4																				
5																				
6																				
7																				
8																				
9																				
10																				
11																				
12																				
13																				
14																				
15																				
Net Wt. Total	1.1			0.6		0.5		0.7		0.9		1.2		1.4		3.2		0.0		0.0	9.6
% Grand Tot.	11.2%			5.9%		5.3%		7.1%		9.4%		12.9%		14.7%		33.5%		0.0%		0.0%	
Accum. % =<	11.2%	→		17.1%	→	22.4%	→	29.4%	→	38.8%	→	51.8%	→	66.5%	→	100.0%	→	100.0%	→	100.0%	

SURFACE MATERIALS DATA
(Two Largest Particles)

No.	Dia.	WT.
1	90mm	0.91 kg
2	109mm	0.34 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											

Morphological Criteria

		Existing Channel			Stable Design Ratios	Restored Reaches		
		UT1-Reach3 XS F, G	UT1-Reach4 XS H, I, ref2, ref3	UT3 XS A through XS E		UT1-Reach3	UT1-Reach4	UT3
Stream Type (Rosgen)		G4/B4a	G4/B4a	G4	B4	B4a	B4a	B4a
Drainage Area (mi^2)		0.16	0.19, 0.21, 0.19, 0.21	0.02, 0.02, 0.02, 0.03, 0.03	~	0.16	0.21	0.03
Bankfull Width (W_{bkf}) (ft)		22.2, 4.6	7.0, 7.5, 5.1, 7.8	2.9, 2.2, 3.4, 2.0, 6.3	~	6.8	8.0	5.0
Bankfull Mean Depth (D_{bkf}) (ft)		0.3, 0.8	0.6, 0.7, 0.8, 0.5	0.4, 0.5, 0.3, 0.5, 0.3	~	0.5	0.6	0.4
Bankfull Cross-Sectional Area (A_{bkf}) (ft^2)		6.3, 3.5	4.3, 5.3, 4.1, 3.8	1.2, 1.0, 1.2, 1.1, 1.6	~	3.4	4.8	1.9
Width / Depth Ratio (W_{bkf} / D_{bkf})		77.7, 6.0	11.5, 10.8, 6.3, 16.1	7.1, 4.8, 9.7, 3.8, 24.6	12 -- 18	13.5	13.2	13.5
Maximum Depth (d_{mbkf}) (ft)		0.4, 1.2	1.0, 1.1, 1.1, 1.0	0.5, 0.7, 0.5, 0.8, 0.4	~	0.8	0.9	0.6
Width of Flood Prone Area (W_{fpa}) (ft)		26.0, 8.9	10.1, 12.3, 13.3, 17.4	3.5, 3.0, 5.5, 6.8, 12.6	~	18.3	20	15.5
Entrenchment Ratio (ER)		1.2, 2.0	1.4, 1.6, 2.6, 2.2	1.2, 1.3, 1.6, 3.3, 2.0	1.4 -- 2.2	2.7	2.5	3.1
Sinuosity (stream length/valley length) (K)		1.1	1.1	1.1	1.1 -- 1.2	1.1	1.1	1.1
Dimension	Pool Mean Depth (ft)	*	*	*	~	1.2	N/A	1.0
	Riffle Mean Depth (ft) (Dbkf)	0.3, 0.8	0.6, 0.7, 0.8, 0.5	0.4, 0.5, 0.3, 0.5, 0.3	~	0.5	0.6	0.4
	Pool Width (ft)	*	*	*	~	8.8	N/A	7.0
	Riffle Width (ft)	22.2, 4.6	7.0, 7.5, 5.1, 7.8	2.9, 2.2, 3.4, 2.0, 6.3	~	6.8	8.0	5.0
	Pool XS Area (sf)	*	*	*	~	10.3	N/A	7.2
	Riffle XS Area (sf)	6.3, 3.5	4.3, 5.3, 4.1, 3.8	1.2, 1.0, 1.2, 1.1, 1.6	~	3.4	4.8	1.9
	Pool Width / Riffle Width	*	*	*	1.1 -- 1.5	1.3	N/A	1.4
	Pool Max Depth / D_{bkf}	*	*	*	2.0 -- 3.5	1.8	N/A	1.6
	Bank Height Ratio	1.7, 3.8	6.0, 1.4, 1.0, 1.0	4.9, 3.1, 1.0, 1.1, 1.9	1.0 -- 1.1	1.0	1.0	1.0
	Mean Bankfull Velocity (V) (fps)	3.7, 7.0	6.5, 5.4, 6.4, 4.8	4.8, 5.9, 5.8, 6.5, 4.5	4.0 -- 6.0	7.2	6.4	7.0
	Bankfull Discharge (Q) (cfs)	23.6, 24.5	27.7, 28.4, 26.7, 18.2	5.8, 6.2, 6.7, 7.0, 7.3	~	24.7	31.2	12.9
Pattern	Radius of Curvature (Rc) (ft)	*	*	*	~	*	*	*
	Belt Width (Wblt) (ft)	*	*	*	~	*	*	*
	Meander Length (Lm) (ft)	*	*	*	~	*	*	*
	Radius of Curvature / Bankfull Width	*	*	*	n/a	*	*	*
	Meander Width Ratio (Wblt / Wbkf)	*	*	*	n/a	*	*	*
	Meander Length / Bankfull Width	*	*	*	n/a	*	*	*
Profile	Valley slope	0.079	0.054	0.114	0.020 -- 0.030	0.079	0.054	0.113
	Average water surface slope	0.074	0.048	0.104	~	0.074	0.048	0.105
	Riffle slope	*	*	*	~	N/A	N/A	0.104--0.180
	Pool slope	*	*	*	~	0	0	0
	Pool to pool spacing	*	*	*	~	N/A	N/A	23--30
	Pool length	*	*	*	~	N/A	N/A	6.3-8.8
	Riffle Slope / Avg. Water Surface Slope	*	*	*	1.1 -- 1.8	N/A	N/A	1.0--1.7
	Pool Slope / Avg. Water Surface Slope	*	*	*	0 -- 0.4	0	0	0
	Pool to Pool Spacing / Bankfull Width	*	*	*	0.5 -- 5.0	N/A	N/A	4.6--6.0

* : no data shown for pools, radius of curvature or meanders in existing stream due 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	5.736562	293
TP	4.23	5.736562	24

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	30.9	2,341
TP	4.88	30.9	151

Total Estimated Nitrogen and Phosphorus Reduction from Exclusion and Buffer

	Cattle Exclusion	Buffer	Total Reduction (lbs/year)
TN	293	2,341	**2,634**
TP	24	151	**175**

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
cows	20	1500	30,000	30
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	30	0.085	5.610E+11	2.048E+14	1.024E+14

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	1.024E+14
Buffer Filtration	1.472E+11
Total (col/year)	**1.025E+14**

3. Site Protection Instrument

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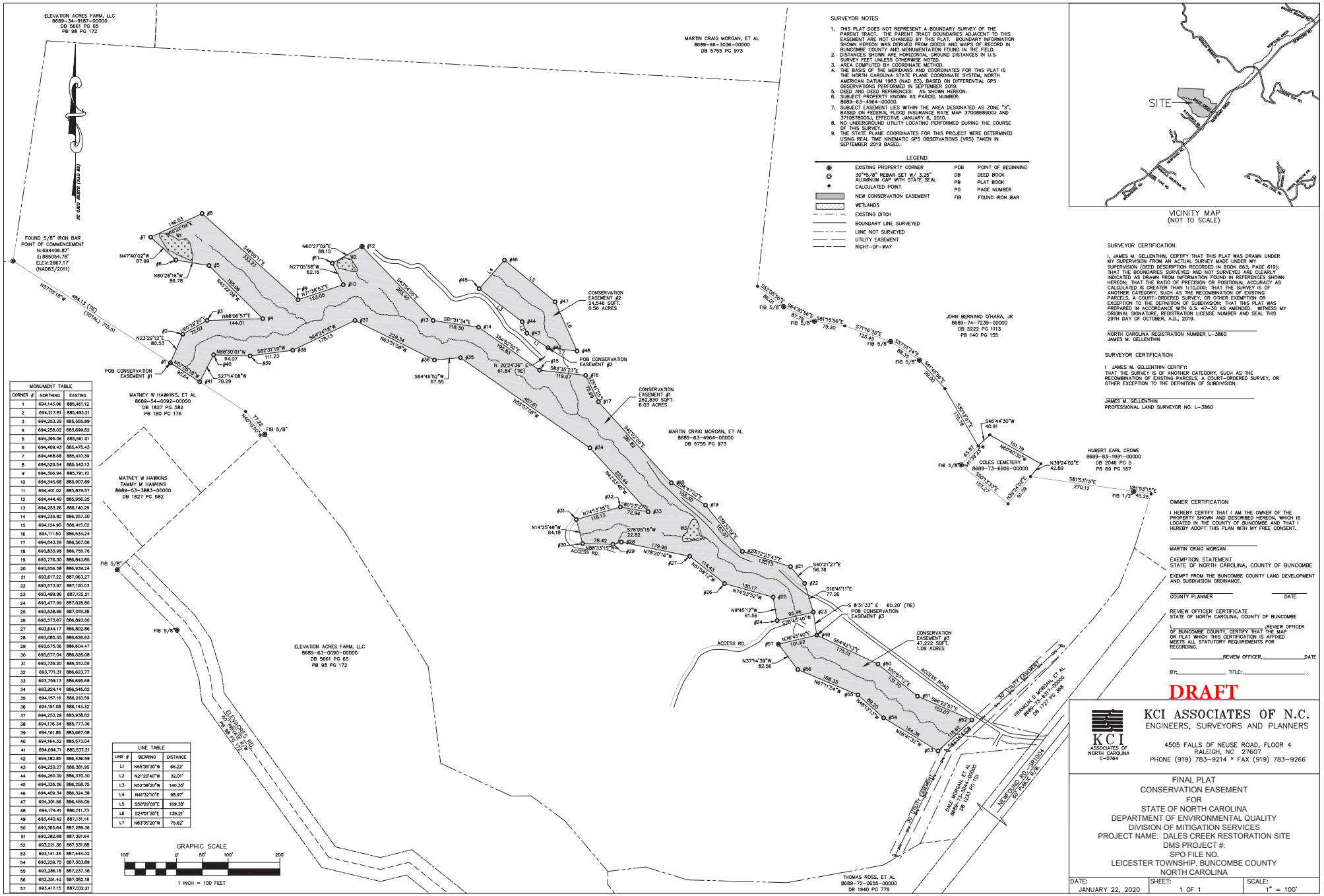

SURVEYOR NOTES

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 SEPTEMBER 2019.
5. DEED AND DEED REFERENCES: AS SHOWN HEREON.
6. SUBJECT PROPERTY KNOWN AS PARCEL NUMBER: 8689-83-4964-00000.
7. SUBJECT EASEMENT LIES WITHIN THE AREA DESIGNATED AS ZONE "X", BASED ON FEDERAL FLOOD INSURANCE RATE MAP 3700968900J AND 3710878000J, EFFECTIVE JANUARY 6, 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 SEPTEMBER 2019 BASED.

LEGEND

◉	EXISTING PROPERTY CORNER	POB	POINT OF BEGINNING
◎	30"x5/8" REBAR SET W/ 3.25" ALUMINUM CAP WITH STATE SEAL	DB	DEED BOOK
•	CALCULATED POINT	PB	PLAT BOOK
	NEW CONSERVATION EASEMENT	PG	PAGE NUMBER
	WETLANDS	FIB	FOUND IRON BAR
	EXISTING DITCH		
	BOUNDARY LINE SURVEYED		
	LINE NOT SURVEYED		
	UTILITY EASEMENT		
	RIGHT-OF-WAY		

MONUMENT TABLE		
CORNER #	NORTHING	EASTING
1	694,143.96	885,461.12
2	694,217.81	885,493.21
3	694,253.29	885,555.89
4	694,258.02	885,699.82
5	694,395.06	885,561.01
6	694,409.43	885,475.43
7	694,468.68	885,410.39
8	694,529.54	885,543.13
9	694,306.94	885,791.10
10	694,345.68	885,907.89
11	694,401.02	885,879.57
12	694,444.49	885,956.25
13	694,253.26	886,140.29
14	694,235.82	886,257.30
15	694,124.90	886,415.02
16	694,111.50	886,534.24
17	694,043.29	886,567.06
18	693,833.98	886,755.76
19	693,776.30	886,843.85
20	693,656.58	886,939.24
21	693,617.22	887,063.27
22	693,573.97	887,100.03
23	693,499.96	887,122.21
24	693,477.99	887,028.60
25	693,538.66	887,018.38
26	693,573.67	886,893.00
27	693,644.17	886,802.86
28	693,680.55	886,626.63
29	693,675.06	886,604.47
30	693,677.04	886,526.08
31	693,739.20	886,510.09
32	693,771.31	886,623.77
33	693,759.13	886,695.68
34	693,924.14	886,545.02
35	694,157.16	886,210.59
36	694,151.08	886,143.32
37	694,253.29	885,938.02
38	694,176.34	885,777.36
39	694,161.86	885,667.08
40	694,164.32	885,573.04
41	694,094.71	885,537.21
42	694,182.85	886,436.59
43	694,220.27	886,381.95
44	694,250.09	886,370.30
45	694,335.26	886,258.75
46	694,409.34	886,324.38
47	694,301.56	886,455.05
48	694,174.41	886,511.73
49	693,440.42	887,131.14
50	693,365.64	887,289.36
51	693,282.68	887,391.64
52	693,221.36	887,531.88
53	693,141.34	887,444.32
54	693,226.75	887,303.89
55	693,286.18	887,237.36
56	693,351.43	887,082.18
57	693,417.15	887,032.21

LINE TABLE		
LINE #	BEARING	DISTANCE
L1	N56°35'30"W	66.22'
L2	N21°20'40"W	32.01'
L3	N52°38'20"W	140.35'
L4	N41°32'10"E	98.97'
L5	S50°29'00"E	169.38'
L6	S24°01'30"E	139.21'
L7	N83°35'20"W	75.62'

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

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.

NORTH CAROLINA REGISTRATION NUMBER L-3860
JAMES M. GELLENTHIN

SURVEYOR CERTIFICATION

I JAMES M. GELLENTHIN CERTIFY:
THAT THE SURVEY IS OF ANOTHER CATEGORY, SUCH AS THE RECOMBINATION OF EXISTING PARCELS, A COURT-ORDERED SURVEY, OR OTHER EXCEPTION TO THE DEFINITION OF SUBDIVISION;

JAMES M. GELLENTHIN
PROFESSIONAL LAND SURVEYOR NO. L-3860

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.

MARTIN CRAIG MORGAN

EXEMPTION STATEMENT
STATE OF NORTH CAROLINA, COUNTY OF BUNCOMBE

EXEMPT FROM THE BUNCOMBE COUNTY LAND DEVELOPMENT AND SUBDIVISION ORDINANCE.

COUNTY PLANNER DATE

REVIEW OFFICER CERTIFICATE
STATE OF NORTH CAROLINA, COUNTY OF BUNCOMBE

I, ,REVIEW OFFICER OF BUNCOMBE COUNTY, CERTIFY THAT THE MAP OR PLAT WHICH THIS CERTIFICATION IS AFFIXED MEETS ALL STATUTORY REQUIREMENTS FOR RECORDING.

REVIEW OFFICER, DATE

BY: TITLE:

DRAFT

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

FINAL PLAT
CONSERVATION EASEMENT
FOR
STATE OF NORTH CAROLINA
DEPARTMENT OF ENVIRONMENTAL QUALITY
DIVISION OF MITIGATION SERVICES
PROJECT NAME: DALES CREEK RESTORATION SITE
DMS PROJECT #:
SPO FILE NO.
LEICESTER TOWNSHIP, BUNCOMBE COUNTY
NORTH CAROLINA

DATE:	SHEET:	SCALE:
JANUARY 22, 2020	1 OF 1	1" = 100'

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4. Credit Release Schedule

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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 without prior written approval of the DE upon satisfactory completion of the following activities:

a. Approval of the final Mitigation Plan
b. Recordation of the preservation mechanism, as well as a title opinion acceptable to the USACE covering the property
c. Completion of project construction (the initial physical and biological improvements to the mitigation site) pursuant to the mitigation plan; Per the NCDMS Instrument, construction means that a mitigation site has been constructed in its entirety, to include planting, and an as-built report has been produced. As-built reports must be sealed by an engineer prior to project closeout, if appropriate but not prior to the initial allocation of released credits.
d. Receipt of necessary DA permit authorization or written DA approval for projects where DA permit issuance is not required

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

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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.

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6. Maintenance Plan

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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 Section 12.9 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.

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

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UT 5

NC DWQ Stream Identification Form Version 4.11

Date: 2/5/2018	**Project/Site:** Dale's Creek	**Latitude:** 35.6000
Evaluator: J. Sullivan	**County:** Buncombe	**Longitude:** -82.7494
Total Points: *Stream is at least intermittent if ≥ 19 or perennial if ≥ 30** 19.5	**Stream Determination (circle one)** Ephemeral **Intermittent** Perennial	**Other** *e.g. Quad Name*:

A. Geomorphology (Subtotal = 7)	Absent	Weak	Moderate	Strong
1[a]. Continuity of channel bed and bank	0	1	2	3
2. Sinuosity of channel along thalweg	0	1	2	3
3. In-channel structure: ex. riffle-pool, step-pool, ripple-pool sequence	0	1	2	3
4. Particle size of stream substrate	0	1	2	3
5. Active/relict floodplain	0	1	2	3
6. Depositional bars or benches	0	1	2	3
7. Recent alluvial deposits	0	1	2	3
8. Headcuts	0	1	2	3
9. Grade control	0	0.5	1	1.5
10. Natural valley	0	0.5	1	1.5
11. Second or greater order channel	No = 0		Yes = 3	

[a] artificial ditches are not rated; see discussions in manual

B. Hydrology (Subtotal = 6.5)				
12. Presence of Baseflow	0	1	2	3
13. Iron oxidizing bacteria	0	1	2	3
14. Leaf litter	1.5	1	0.5	0
15. Sediment on plants or debris	0	0.5	1	1.5
16. Organic debris lines or piles	0	0.5	1	1.5
17. Soil-based evidence of high water table?	No = 0		Yes = 3	

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

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

Notes:

Sketch:

NC DWQ Stream Identification Form Version 4.11

Date: 2/5/2018	**Project/Site:** Dale's Creek	**Latitude:** 35.5982
Evaluator: J. Sullivan	**County:** Buncombe	**Longitude:** -82.7453
Total Points: *Stream is at least intermittent if ≥ 19 or perennial if ≥ 30** 34.5	**Stream Determination (circle one)** Ephemeral Intermittent **Perennial**	**Other** *e.g. Quad Name*:

A. Geomorphology (Subtotal = 18)	Absent	Weak	Moderate	Strong
1[a]. Continuity of channel bed and bank	0	1	**2**	3
2. Sinuosity of channel along thalweg	0	1	**2**	3
3. In-channel structure: ex. riffle-pool, step-pool, ripple-pool sequence	0	1	**2**	3
4. Particle size of stream substrate	0	1	**2**	3
5. Active/relict floodplain	0	1	**2**	3
6. Depositional bars or benches	0	**1**	2	3
7. Recent alluvial deposits	0	**1**	2	3
8. Headcuts	0	**1**	2	3
9. Grade control	0	0.5	**1**	1.5
10. Natural valley	0	0.5	**1**	1.5
11. Second or greater order channel	No = 0		**Yes = 3**	

[a] artificial ditches are not rated; see discussions in manual

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

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

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

Notes:

Sketch:

NC DWQ Stream Identification Form Version 4.11

UT 1 Top

Date: 10/23/2019	**Project/Site:** Dale's Creek	**Latitude:** 35.5993
Evaluator: J. Sullivan	**County:** Buncombe	**Longitude:** -82.7501
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 = 12.5)	Absent	Weak	Moderate	Strong
1[a]. Continuity of channel bed and bank	0	1	**2**	3
2. Sinuosity of channel along thalweg	0	1	**2**	3
3. In-channel structure: ex. riffle-pool, step-pool, ripple-pool sequence	0	1	**2**	3
4. Particle size of stream substrate	0	1	**2**	3
5. Active/relict floodplain	0	**1**	2	3
6. Depositional bars or benches	**0**	1	2	3
7. Recent alluvial deposits	0	**1**	2	3
8. Headcuts	0	**1**	2	3
9. Grade control	0	0.5	**1**	1.5
10. Natural valley	0	**0.5**	1	1.5
11. Second or greater order channel		**No = 0**	Yes = 3	

[a] artificial ditches are not rated; see discussions in manual

B. Hydrology (Subtotal = 3.5)				
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 = 6.5)				
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: Two juvenile salimanders were found.

Although it scores out as intermittent, it appears to be fed by groundwater and exhibits perennial flow

Sketch:

UT 2

NC DWQ Stream Identification Form Version 4.11

Date: 2/5/2018	**Project/Site:** Dale's Creek	**Latitude:** 35.5984
Evaluator: J. Sullivan	**County:** Buncombe	**Longitude:** -82.7462
Total Points: *Stream is at least intermittent if ≥ 19 or perennial if ≥ 30** 20	**Stream Determination (circle one)** Ephemeral **Intermittent** Perennial	**Other** *e.g. Quad Name*:

A. Geomorphology (Subtotal = 8)	Absent	Weak	Moderate	Strong
1[a]. Continuity of channel bed and bank	0	1	2	3
2. Sinuosity of channel along thalweg	0	1	2	3
3. In-channel structure: ex. riffle-pool, step-pool, ripple-pool sequence	0	1	2	3
4. Particle size of stream substrate	0	1	2	3
5. Active/relict floodplain	0	1	2	3
6. Depositional bars or benches	0	1	2	3
7. Recent alluvial deposits	0	1	2	3
8. Headcuts	0	1	2	3
9. Grade control	0	0.5	1	1.5
10. Natural valley	0	0.5	1	1.5
11. Second or greater order channel	No = 0		Yes = 3	

[a] artificial ditches are not rated; see discussions in manual

B. Hydrology (Subtotal = 7)				
12. Presence of Baseflow	0	1	2	3
13. Iron oxidizing bacteria	0	1	2	3
14. Leaf litter	1.5	1	0.5	0
15. Sediment on plants or debris	0	0.5	1	1.5
16. Organic debris lines or piles	0	0.5	1	1.5
17. Soil-based evidence of high water table?	No = 0		Yes = 3	

C. Biology (Subtotal = 5)				
18. Fibrous roots in streambed	3	2	1	0
19. Rooted upland plants in streambed	3	2	1	0
20. Macrobenthos (note diversity and abundance)	0	1	2	3
21. Aquatic Mollusks	0	1	2	3
22. Fish	0	0.5	1	1.5
23. Crayfish	0	0.5	1	1.5
24. Amphibians	0	0.5	1	1.5
25. Algae	0	0.5	1	1.5
26. Wetland plants in streambed	FACW = 0.75; OBL = 1.5 Other = 0			

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

Notes:

Sketch:

UT 2 - Above HC

NC DWQ Stream Identification Form Version 4.11

Date: 10/23/2019	**Project/Site:** Dale's Creek	**Latitude:** 35.5983
Evaluator: J. Sullivan	**County:** Buncombe	**Longitude:** -82.7467
Total Points: *Stream is at least intermittent if ≥ 19 or perennial if ≥ 30** 16	**Stream Determination (circle one)** **Ephemeral** Intermittent Perennial	**Other** *e.g. Quad Name*:

A. Geomorphology (Subtotal = 8.5)	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 = 3.5)				
12. Presence of Baseflow	0	1	2	3
13. Iron oxidizing bacteria	0	1	2	3
14. Leaf litter	1.5	1	0.5	0
15. Sediment on plants or debris	0	0.5	1	1.5
16. Organic debris lines or piles	0	0.5	1	1.5
17. Soil-based evidence of high water table?	No = 0		Yes = 3	

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

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

Notes:

Sketch:

UT 3

NC DWQ Stream Identification Form Version 4.11

Date: 2/5/2018	**Project/Site:** Dale's Creek	**Latitude:** 35.5995
Evaluator: J. Sullivan	**County:** Buncombe	**Longitude:** -82.7467
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 = 9.5)	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 = 6)				
18. Fibrous roots in streambed	**3**	2	1	0
19. Rooted upland plants in streambed	**3**	2	1	0
20. Macrobenthos (note diversity and abundance)	**0**	1	2	3
21. Aquatic Mollusks	**0**	1	2	3
22. Fish	**0**	0.5	1	1.5
23. Crayfish	**0**	0.5	1	1.5
24. Amphibians	**0**	0.5	1	1.5
25. Algae	**0**	0.5	1	1.5
26. Wetland plants in streambed	FACW = 0.75; OBL = 1.5 **Other = 0**			

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

Notes:

Sketch:

NC DWQ Stream Identification Form Version 4.11

Date: 2/5/2018	**Project/Site:** Dale's Creek	**Latitude:** 35.6000
Evaluator: J. Sullivan	**County:** Buncombe	**Longitude:** -82.7485
Total Points: *Stream is at least intermittent if ≥ 19 or perennial if ≥ 30** 19	**Stream Determination (circle one)** Ephemeral **Intermittent** Perennial	**Other** *e.g. Quad Name*:

A. Geomorphology (Subtotal = 7)	Absent	Weak	Moderate	Strong
1[a]. Continuity of channel bed and bank	0	1	2	3
2. Sinuosity of channel along thalweg	0	1	2	3
3. In-channel structure: ex. riffle-pool, step-pool, ripple-pool sequence	0	1	2	3
4. Particle size of stream substrate	0	1	2	3
5. Active/relict floodplain	0	1	2	3
6. Depositional bars or benches	0	1	2	3
7. Recent alluvial deposits	0	1	2	3
8. Headcuts	0	1	2	3
9. Grade control	0	0.5	1	1.5
10. Natural valley	0	0.5	1	1.5
11. Second or greater order channel	No = 0		Yes = 3	

[a] artificial ditches are not rated; see discussions in manual

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

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

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

Notes:

Sketch:

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): Dale's Creek Creek Restoration Site
2. Date of evaluation: 10/23/2019
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: Newfound Creek
7. River basin: French Broad
8. Site coordinates (decimal degrees, at lower end of assessment reach): 35.5984 / -82.7463

STREAM INFORMATION: (depth and width can be approximations)

9. Site number (show on attached map): UT2
10. Length of assessment reach evaluated (feet): 50
11. Channel depth from bed (in riffle, if present) to top of bank (feet): 1 ☐Unable to assess channel depth.
12. Channel width at top of bank (feet): 2
13. Is assessment reach a swamp steam? ☐Yes ☐No
14. Feature type: ☐Perennial flow ☒Intermittent flow ☐Tidal Marsh Stream

STREAM CATEGORY INFORMATION:

15. NC SAM Zone: ☒ Mountains (M) ☐ Piedmont (P) ☐ Inner Coastal Plain (I) ☐ Outer Coastal Plain (O)
16. Estimated geomorphic valley shape (**skip for Tidal Marsh Stream**):
☐A  (more sinuous stream, flatter valley slope)
☒B  (less sinuous stream, steeper valley slope)
17. Watershed size: **(skip for Tidal Marsh Stream**) ☒Size 1 (< 0.1 mi^2) ☐Size 2 (0.1 to < 0.5 mi^2) ☐Size 3 (0.5 to < 5 mi^2) ☐Size 4 (≥ 5 mi^2)

ADDITIONAL INFORMATION:

18. Were regulatory considerations evaluated? ☒Yes ☐No If Yes, check all that apply to the assessment area.
☐Section 10 water ☐Classified Trout Waters ☐Water Supply Watershed (☐I ☐II ☐III ☐IV ☐V)
☐Essential Fish Habitat ☐Primary Nursery Area ☐ High Quality Waters/Outstanding Resource Waters
☐Publicly owned property ☐NCDWR Riparian buffer rule in effect ☐Nutrient Sensitive Waters
☐Anadromous fish ☐303(d) List ☐CAMA Area of Environmental Concern (AEC)
☐Documented presence of a federal and/or state listed protected species within the assessment area.
List species:
☐Designated Critical Habitat (list species)
19. Are additional stream information/supplementary measurements included in "Notes/Sketch" section or attached? ☒Yes ☐No

1. Channel Water – assessment reach metric (skip for Size 1 streams and Tidal Marsh Streams)
- ☒A Water throughout assessment reach.
- ☐B No flow, water in pools only.
- ☐C No water in assessment reach.

2. Evidence of Flow Restriction – assessment reach metric
- ☐A At least 10% of assessment reach in-stream habitat or riffle-pool sequence is severely affected by a flow restriction or fill to the point of obstructing flow or a channel choked with aquatic macrophytes or ponded water or impoundment on flood or ebb within the assessment reach (examples: undersized or perched culverts, causeways that constrict the channel, tidal gates, debris jams, beaver dams).
- ☒B Not A

3. Feature Pattern – assessment reach metric
- ☒A A majority of the assessment reach has altered pattern (examples: straightening, modification above or below culvert).
- ☐B Not A

4. Feature Longitudinal Profile – assessment reach metric
- ☐A Majority of assessment reach has a substantially altered stream profile (examples: channel down-cutting, existing damming, over widening, active aggradation, dredging, and excavation where appropriate channel profile has not reformed from any of these disturbances).
- ☒B Not A

5. Signs of Active Instability – assessment reach metric

Consider only current instability, not past events from which the stream has currently recovered. Examples of instability include active bank failure, active channel down-cutting (head-cut), active widening, and artificial hardening (such as concrete, gabion, rip-rap).
- ☒A < 10% of channel unstable
- ☐B 10 to 25% of channel unstable
- ☐C > 25% of channel unstable

6. Streamside Area Interaction – streamside area metric
Consider for the Left Bank (LB) and the Right Bank (RB).

LB	RB	
☒A	☒A	Little or no evidence of conditions that adversely affect reference interaction
☐B	☐B	Moderate evidence of conditions (examples: berms, levees, down-cutting, aggradation, dredging) that adversely affect reference interaction (examples: limited streamside area access, disruption of flood flows through streamside area, leaky or intermittent bulkheads, causeways with floodplain constriction, minor ditching [including mosquito ditching])
☐C	☐C	Extensive evidence of conditions that adversely affect reference interaction (little to no floodplain/intertidal zone access [examples: causeways with floodplain and channel constriction, bulkheads, retaining walls, fill, stream incision, disruption of flood flows through streamside area] or too much floodplain/intertidal zone access [examples: impoundments, intensive mosquito ditching]) or floodplain/intertidal zone unnaturally absent or assessment reach is a man-made feature on an interstream divide

7. Water Quality Stressors – assessment reach/intertidal zone metric
Check all that apply.

- ☐A Discolored water in stream or intertidal zone (milky white, blue, unnatural water discoloration, oil sheen, stream foam)
- ☐B Excessive sedimentation (burying of stream features or intertidal zone)
- ☐C Noticeable evidence of pollutant discharges entering the assessment reach and causing a water quality problem
- ☐D Odor (not including natural sulfide odors)
- ☐E Current published or collected data indicating degraded water quality in the assessment reach. Cite source in "Notes/Sketch" section.
- ☒F Livestock with access to stream or intertidal zone
- ☐G Excessive algae in stream or intertidal zone
- ☐H Degraded marsh vegetation in the intertidal zone (removal, burning, regular mowing, destruction, etc)
- ☐I Other: _____ (explain in "Notes/Sketch" section)
- ☐J Little to no stressors

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

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

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

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

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

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

Check for Tidal Marsh Streams Only

- ☐F 5% oysters or other natural hard bottoms
- ☐G Submerged aquatic vegetation
- ☐H Low-tide refugia (pools)
- ☐I Sand bottom
- ☐J 5% vertical bank along the marsh
- ☐K Little or no habitat

************************************REMAINING QUESTIONS ARE NOT APPLICABLE FOR TIDAL MARSH STREAMS******************************

11. Bedform and Substrate – assessment reach metric (skip for Size 4 Coastal Plain streams and Tidal Marsh Streams)

11a. ☒Yes ☐No Is assessment reach in a natural sand-bed stream? **(skip for Coastal Plain streams)**

11b. Bedform evaluated. **Check the appropriate box(es).**

- ☒A Riffle-run section **(evaluate 11c)**
- ☒B Pool-glide section **(evaluate 11d)**
- ☐C Natural bedform absent **(skip to Metric 12, Aquatic Life)**

11c. In riffle sections, check all that occur below the normal wetted perimeter of the assessment reach – whether or not submerged. **Check at least one box in each row (skip for Size 4 Coastal Plain streams and Tidal Marsh Streams)**. Not Present (NP) = absent, Rare (R) = present but ≤ 10%, Common (C) = > 10-40%, Abundant (A) = > 40-70%, Predominant (P) = > 70%. Cumulative percentages should not exceed 100% for each assessment reach.

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

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

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

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

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

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

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

LB	RB	
☒A	☒A	Little or no alteration to water storage capacity over a majority of the streamside area
☐B	☐B	Moderate alteration to water storage capacity over a majority of the streamside area
☐C	☐C	Severe alteration to water storage capacity over a majority of the streamside area (examples: ditches, fill, soil compaction, livestock disturbance, buildings, man-made levees, drainage pipes)

14. Streamside Area Water Storage – streamside area metric (skip for Size 1 streams, Tidal Marsh Streams, and B valley types)
Consider for the Left Bank (LB) and the Right Bank (RB) of the streamside area.

LB	RB	
☐A	☐A	Majority of streamside area with depressions able to pond water ≥ 6 inches deep
☐B	☐B	Majority of streamside area with depressions able to pond water 3 to 6 inches deep
☒C	☒C	Majority of streamside area with depressions able to pond water < 3 inches deep

15. Wetland Presence – streamside area metric (skip for Tidal Marsh Streams)
Consider for the Left Bank (LB) and the Right Bank (RB). Do not consider wetlands outside of the streamside area or within the normal wetted perimeter of assessment reach.

LB	RB	
☐Y	☐Y	Are wetlands present in the streamside area?
☒N	☒N	

16. Baseflow Contributors – assessment reach metric (skip for Size 4 streams and Tidal Marsh Streams)
Check all contributors within the assessment reach or within view of <u>and</u> draining to the assessment reach.

☐A	Streams and/or springs (jurisdictional discharges)
☐B	Ponds (include wet detention basins; do not include sediment basins or dry detention basins)
☐C	Obstruction passing flow during low-flow periods within the assessment area (beaver dam, leaky dam, bottom-release dam, weir)
☐D	Evidence of bank seepage or sweating (iron in water indicates seepage)
☒E	Stream bed or bank soil reduced (dig through deposited sediment if present)
☐F	None of the above

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

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

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

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

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

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

Vegetated		Wooded		
LB	RB	LB	RB	
☒A	☒A	☐A	☐A	≥ 100 feet wide or extends to the edge of the watershed
☐B	☐B	☐B	☐B	From 50 to < 100 feet wide
☐C	☐C	☐C	☒C	From 30 to < 50 feet wide
☐D	☐D	☐D	☐D	From 10 to < 30 feet wide
☐E	☐E	☒E	☐E	< 10 feet wide or no trees

20. Buffer Structure – streamside area metric (skip for Tidal Marsh Streams)

Consider for left bank (LB) and right bank (RB) for Metric 19 ("Vegetated" Buffer Width).

LB	RB	
☐A	☐A	Mature forest
☐B	☒B	Non-mature woody vegetation or modified vegetation structure
☒C	☐C	Herbaceous vegetation with or without a strip of trees < 10 feet wide
☐D	☐D	Maintained shrubs
☐E	☐E	Little or no vegetation

21. Buffer Stressors – streamside area metric (skip for Tidal Marsh Streams)

Check all appropriate boxes for left bank (LB) and right bank (RB). Indicate if listed stressor abuts stream (Abuts), does not abut but is within 30 feet of stream (< 30 feet), or is between 30 to 50 feet of stream (30-50 feet).

If none of the following stressors occurs on either bank, check here and skip to Metric 22: ☐

Abuts		< 30 feet		30-50 feet		
LB	RB	LB	RB	LB	RB	
☐A	☐A	☐A	☐A	☐A	☐A	Row crops
☐B	☐B	☐B	☐B	☐B	☐B	Maintained turf
☐C	☐C	☐C	☐C	☐C	☐C	Pasture (no livestock)/commercial horticulture
☒D	☐D	☐D	☐D	☐D	☒D	Pasture (active livestock use)

22. Stem Density – streamside area metric (skip for Tidal Marsh Streams)

Consider for left bank (LB) and right bank (RB) for Metric 19 ("Wooded" Buffer Width).

LB	RB	
☐A	☒A	Medium to high stem density
☐B	☐B	Low stem density
☒C	☐C	No wooded riparian buffer or predominantly herbaceous species or bare ground

23. Continuity of Vegetated Buffer – streamside area metric (skip for Tidal Marsh Streams)

Consider whether vegetated buffer is continuous along stream (parallel). Breaks are areas lacking vegetation > 10 feet wide.

LB	RB	
☒A	☒A	The total length of buffer breaks is < 25 percent.
☐B	☐B	The total length of buffer breaks is between 25 and 50 percent.
☐C	☐C	The total length of buffer breaks is > 50 percent.

24. Vegetative Composition – streamside area metric (skip for Tidal Marsh Streams)

Evaluate the dominant vegetation within 100 feet of each bank or to the edge of the watershed (whichever comes first) as it contributes to assessment reach habitat.

LB	RB	
☐A	☐A	Vegetation is close to undisturbed in species present and their proportions. Lower strata composed of native species, with non-native invasive species absent or sparse.
☐B	☒B	Vegetation indicates disturbance in terms of species diversity or proportions, but is still largely composed of native species. This may include communities of weedy native species that develop after clear-cutting or clearing or communities with non-native invasive species present, but not dominant, over a large portion of the expected strata or communities missing understory but retaining canopy trees.
☒C	☐C	Vegetation is severely disturbed in terms of species diversity or proportions. Mature canopy is absent or communities with non-native invasive species dominant over a large portion of expected strata or communities composed of planted stands of non-characteristic species or communities inappropriately composed of a single species or no vegetation.

25. Conductivity – assessment reach metric (skip for all Coastal Plain streams)

25a. ☐Yes ☒No Was conductivity measurement recorded?
If No, select one of the following reasons. ☐No Water ☐Other: _____

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

Notes/Sketch:
Cattle have access to the stream

Draft NC SAM Stream Rating Sheet
Accompanies User Manual Version 2.1

Stream Site Name	Dale's Creek Creek Restoration Site	Date of Assessment	10/23/2019
Stream Category	Mb1	Assessor Name/Organization	J. Sullivan / KCI

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

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

NC SAM FIELD ASSESSMENT RESULTS
Accompanies User Manual Version 2.1

USACE AID #: NCDWR #:

INSTRUCTIONS: Attach a sketch of the assessment area and photographs. Attach a copy of the USGS 7.5-minute topographic quadrangle, and circle the location of the stream reach under evaluation. If multiple stream reaches will be evaluated on the same property, identify and number all reaches on the attached map, and include a separate form for each reach. See the NC SAM User Manual for detailed descriptions and explanations of requested information. Record in the "Notes/Sketch" section if supplementary measurements were performed. See the NC SAM User Manual for examples of additional measurements that may be relevant.

NOTE EVIDENCE OF STRESSORS AFFECTING THE ASSESSMENT AREA (do not need to be within the assessment area).

PROJECT/SITE INFORMATION:

1. Project name (if any): Dale's Creek Creek Restoration Site
2. Date of evaluation: 10/23/2019
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: Newfound Creek
7. River basin: French Broad
8. Site coordinates (decimal degrees, at lower end of assessment reach): 35.5996 / -82.7468

STREAM INFORMATION: (depth and width can be approximations)

9. Site number (show on attached map): UT3
10. Length of assessment reach evaluated (feet): 50
11. Channel depth from bed (in riffle, if present) to top of bank (feet): 3 ☐Unable to assess channel depth.
12. Channel width at top of bank (feet): 3
13. Is assessment reach a swamp steam? ☐Yes ☐No
14. Feature type: ☐Perennial flow ☒Intermittent flow ☐Tidal Marsh Stream

STREAM CATEGORY INFORMATION:

15. NC SAM Zone: ☒ Mountains (M) ☐ Piedmont (P) ☐ Inner Coastal Plain (I) ☐ Outer Coastal Plain (O)
16. Estimated geomorphic valley shape (**skip for Tidal Marsh Stream**):
    ☐A  (more sinuous stream, flatter valley slope)
    ☒B  (less sinuous stream, steeper valley slope)
17. Watershed size: **(skip for Tidal Marsh Stream**) ☒Size 1 (< 0.1 mi^2) ☐Size 2 (0.1 to < 0.5 mi^2) ☐Size 3 (0.5 to < 5 mi^2) ☐Size 4 (≥ 5 mi^2)

ADDITIONAL INFORMATION:

18. Were regulatory considerations evaluated? ☒Yes ☐No If Yes, check all that apply to the assessment area.
    - ☐Section 10 water
    - ☐Classified Trout Waters
    - ☐Water Supply Watershed (☐I ☐II ☐III ☐IV ☐V)
    - ☐Essential Fish Habitat
    - ☐Primary Nursery Area
    - ☐ High Quality Waters/Outstanding Resource Waters
    - ☐Publicly owned property
    - ☐NCDWR Riparian buffer rule in effect
    - ☐Nutrient Sensitive Waters
    - ☐Anadromous fish
    - ☐303(d) List
    - ☐CAMA Area of Environmental Concern (AEC)
    - ☐Documented presence of a federal and/or state listed protected species within the assessment area. List species:
    - ☐Designated Critical Habitat (list species)
19. Are additional stream information/supplementary measurements included in "Notes/Sketch" section or attached? ☒Yes ☐No

1. Channel Water – assessment reach metric (skip for Size 1 streams and Tidal Marsh Streams)

- ☒A Water throughout assessment reach.
- ☐B No flow, water in pools only.
- ☐C No water in assessment reach.

2. Evidence of Flow Restriction – assessment reach metric

- ☐A At least 10% of assessment reach in-stream habitat or riffle-pool sequence is severely affected by a flow restriction or fill to the point of obstructing flow or a channel choked with aquatic macrophytes or ponded water or impoundment on flood or ebb within the assessment reach (examples: undersized or perched culverts, causeways that constrict the channel, tidal gates, debris jams, beaver dams).
- ☒B Not A

3. Feature Pattern – assessment reach metric

- ☒A A majority of the assessment reach has altered pattern (examples: straightening, modification above or below culvert).
- ☐B Not A

4. Feature Longitudinal Profile – assessment reach metric

- ☒A Majority of assessment reach has a substantially altered stream profile (examples: channel down-cutting, existing damming, over widening, active aggradation, dredging, and excavation where appropriate channel profile has not reformed from any of these disturbances).
- ☐B Not A

5. Signs of Active Instability – assessment reach metric

Consider only current instability, not past events from which the stream has currently recovered. Examples of instability include active bank failure, active channel down-cutting (head-cut), active widening, and artificial hardening (such as concrete, gabion, rip-rap).

- ☐A < 10% of channel unstable
- ☒B 10 to 25% of channel unstable
- ☐C > 25% of channel unstable

6. Streamside Area Interaction – streamside area metric
Consider for the Left Bank (LB) and the Right Bank (RB).

LB	RB	
☐A	☐A	Little or no evidence of conditions that adversely affect reference interaction
☐B	☐B	Moderate evidence of conditions (examples: berms, levees, down-cutting, aggradation, dredging) that adversely affect reference interaction (examples: limited streamside area access, disruption of flood flows through streamside area, leaky or intermittent bulkheads, causeways with floodplain constriction, minor ditching [including mosquito ditching])
☒C	☒C	Extensive evidence of conditions that adversely affect reference interaction (little to no floodplain/intertidal zone access [examples: causeways with floodplain and channel constriction, bulkheads, retaining walls, fill, stream incision, disruption of flood flows through streamside area] or too much floodplain/intertidal zone access [examples: impoundments, intensive mosquito ditching]) or floodplain/intertidal zone unnaturally absent or assessment reach is a man-made feature on an interstream divide

7. Water Quality Stressors – assessment reach/intertidal zone metric
Check all that apply.

- ☐A Discolored water in stream or intertidal zone (milky white, blue, unnatural water discoloration, oil sheen, stream foam)
- ☐B Excessive sedimentation (burying of stream features or intertidal zone)
- ☐C Noticeable evidence of pollutant discharges entering the assessment reach and causing a water quality problem
- ☐D Odor (not including natural sulfide odors)
- ☐E Current published or collected data indicating degraded water quality in the assessment reach. Cite source in "Notes/Sketch" section.
- ☒F Livestock with access to stream or intertidal zone
- ☐G Excessive algae in stream or intertidal zone
- ☐H Degraded marsh vegetation in the intertidal zone (removal, burning, regular mowing, destruction, etc)
- ☐I Other: _____ (explain in "Notes/Sketch" section)
- ☐J Little to no stressors

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

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

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

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

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

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

Check for Tidal Marsh Streams Only

- ☐F 5% oysters or other natural hard bottoms
- ☐G Submerged aquatic vegetation
- ☐H Low-tide refugia (pools)
- ☐I Sand bottom
- ☐J 5% vertical bank along the marsh
- ☐K Little or no habitat

************************************REMAINING QUESTIONS ARE NOT APPLICABLE FOR TIDAL MARSH STREAMS******************************

11. Bedform and Substrate – assessment reach metric (skip for Size 4 Coastal Plain streams and Tidal Marsh Streams)

11a. ☒Yes ☐No Is assessment reach in a natural sand-bed stream? **(skip for Coastal Plain streams)**

11b. Bedform evaluated. **Check the appropriate box(es).**

- ☒A Riffle-run section **(evaluate 11c)**
- ☒B Pool-glide section **(evaluate 11d)**
- ☐C Natural bedform absent **(skip to Metric 12, Aquatic Life)**

11c. In riffle sections, check all that occur below the normal wetted perimeter of the assessment reach – whether or not submerged. **Check at least one box in each row (skip for Size 4 Coastal Plain streams and Tidal Marsh Streams)**. Not Present (NP) = absent, Rare (R) = present but ≤ 10%, Common (C) = > 10-40%, Abundant (A) = > 40-70%, Predominant (P) = > 70%. Cumulative percentages should not exceed 100% for each assessment reach.

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

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

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

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

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

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

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

LB	RB	
☐A	☐A	Little or no alteration to water storage capacity over a majority of the streamside area
☒B	☒B	Moderate alteration to water storage capacity over a majority of the streamside area
☐C	☐C	Severe alteration to water storage capacity over a majority of the streamside area (examples: ditches, fill, soil compaction, livestock disturbance, buildings, man-made levees, drainage pipes)

14. Streamside Area Water Storage – streamside area metric (skip for Size 1 streams, Tidal Marsh Streams, and B valley types)
Consider for the Left Bank (LB) and the Right Bank (RB) of the streamside area.

LB	RB	
☐A	☐A	Majority of streamside area with depressions able to pond water ≥ 6 inches deep
☐B	☐B	Majority of streamside area with depressions able to pond water 3 to 6 inches deep
☒C	☒C	Majority of streamside area with depressions able to pond water < 3 inches deep

15. Wetland Presence – streamside area metric (skip for Tidal Marsh Streams)
Consider for the Left Bank (LB) and the Right Bank (RB). Do not consider wetlands outside of the streamside area or within the normal wetted perimeter of assessment reach.

LB	RB	
☐Y	☐Y	Are wetlands present in the streamside area?
☒N	☒N	

16. Baseflow Contributors – assessment reach metric (skip for Size 4 streams and Tidal Marsh Streams)
Check all contributors within the assessment reach or within view of <u>and</u> draining to the assessment reach.

- ☐A Streams and/or springs (jurisdictional discharges)
- ☐B Ponds (include wet detention basins; do not include sediment basins or dry detention basins)
- ☐C Obstruction passing flow during low-flow periods within the assessment area (beaver dam, leaky dam, bottom-release dam, weir)
- ☐D Evidence of bank seepage or sweating (iron in water indicates seepage)
- ☒E Stream bed or bank soil reduced (dig through deposited sediment if present)
- ☐F None of the above

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

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

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

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

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

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

Vegetated		Wooded		
LB	RB	LB	RB	
☒A	☒A	☐A	☒A	≥ 100 feet wide or extends to the edge of the watershed
☐B	☐B	☐B	☐B	From 50 to < 100 feet wide
☐C	☐C	☒C	☐C	From 30 to < 50 feet wide
☐D	☐D	☐D	☐D	From 10 to < 30 feet wide
☐E	☐E	☐E	☐E	< 10 feet wide or no trees

20. Buffer Structure – streamside area metric (skip for Tidal Marsh Streams)

Consider for left bank (LB) and right bank (RB) for Metric 19 ("Vegetated" Buffer Width).

LB	RB	
☐A	☐A	Mature forest
☐B	☐B	Non-mature woody vegetation or modified vegetation structure
☒C	☒C	Herbaceous vegetation with or without a strip of trees < 10 feet wide
☐D	☐D	Maintained shrubs
☐E	☐E	Little or no vegetation

21. Buffer Stressors – streamside area metric (skip for Tidal Marsh Streams)

Check all appropriate boxes for left bank (LB) and right bank (RB). Indicate if listed stressor abuts stream (Abuts), does not abut but is within 30 feet of stream (< 30 feet), or is between 30 to 50 feet of stream (30-50 feet).

If none of the following stressors occurs on either bank, check here and skip to Metric 22: ☐

Abuts		< 30 feet		30-50 feet		
LB	RB	LB	RB	LB	RB	
☐A	☐A	☐A	☐A	☐A	☐A	Row crops
☐B	☐B	☐B	☐B	☐B	☐B	Maintained turf
☐C	☐C	☐C	☐C	☐C	☐C	Pasture (no livestock)/commercial horticulture
☒D	☒D	☐D	☐D	☐D	☐D	Pasture (active livestock use)

22. Stem Density – streamside area metric (skip for Tidal Marsh Streams)

Consider for left bank (LB) and right bank (RB) for Metric 19 ("Wooded" Buffer Width).

LB	RB	
☐A	☐A	Medium to high stem density
☐B	☐B	Low stem density
☒C	☒C	No wooded riparian buffer or predominantly herbaceous species or bare ground

23. Continuity of Vegetated Buffer – streamside area metric (skip for Tidal Marsh Streams)

Consider whether vegetated buffer is continuous along stream (parallel). Breaks are areas lacking vegetation > 10 feet wide.

LB	RB	
☒A	☒A	The total length of buffer breaks is < 25 percent.
☐B	☐B	The total length of buffer breaks is between 25 and 50 percent.
☐C	☐C	The total length of buffer breaks is > 50 percent.

24. Vegetative Composition – streamside area metric (skip for Tidal Marsh Streams)

Evaluate the dominant vegetation within 100 feet of each bank or to the edge of the watershed (whichever comes first) as it contributes to assessment reach habitat.

LB	RB	
☐A	☐A	Vegetation is close to undisturbed in species present and their proportions. Lower strata composed of native species, with non-native invasive species absent or sparse.
☐B	☐B	Vegetation indicates disturbance in terms of species diversity or proportions, but is still largely composed of native species. This may include communities of weedy native species that develop after clear-cutting or clearing or communities with non-native invasive species present, but not dominant, over a large portion of the expected strata or communities missing understory but retaining canopy trees.
☒C	☒C	Vegetation is severely disturbed in terms of species diversity or proportions. Mature canopy is absent or communities with non-native invasive species dominant over a large portion of expected strata or communities composed of planted stands of non-characteristic species or communities inappropriately composed of a single species or no vegetation.

25. Conductivity – assessment reach metric (skip for all Coastal Plain streams)

25a. ☐Yes ☒No Was conductivity measurement recorded?
If No, select one of the following reasons. ☐No Water ☐Other: _____

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

Notes/Sketch:
Cattle have access to the stream

Draft NC SAM Stream Rating Sheet
Accompanies User Manual Version 2.1

Stream Site Name	Dale's Creek Creek Restoration Site	Date of Assessment	10/23/2019
Stream Category	Mb1	Assessor Name/Organization	J. Sullivan / KCI

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

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

NC SAM FIELD ASSESSMENT RESULTS
Accompanies User Manual Version 2.1

USACE AID #: NCDWR #:

INSTRUCTIONS: Attach a sketch of the assessment area and photographs. Attach a copy of the USGS 7.5-minute topographic quadrangle, and circle the location of the stream reach under evaluation. If multiple stream reaches will be evaluated on the same property, identify and number all reaches on the attached map, and include a separate form for each reach. See the NC SAM User Manual for detailed descriptions and explanations of requested information. Record in the "Notes/Sketch" section if supplementary measurements were performed. See the NC SAM User Manual for examples of additional measurements that may be relevant.

NOTE EVIDENCE OF STRESSORS AFFECTING THE ASSESSMENT AREA (do not need to be within the assessment area).

PROJECT/SITE INFORMATION:

1. Project name (if any): Dale's Creek Creek Restoration Site
2. Date of evaluation: 10/23/2019
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: Newfound Creek
7. River basin: French Broad
8. Site coordinates (decimal degrees, at lower end of assessment reach): 35.6003 / -82.7499

STREAM INFORMATION: (depth and width can be approximations)

9. Site number (show on attached map): UT5 & UT4 ENH
10. Length of assessment reach evaluated (feet): 50
11. Channel depth from bed (in riffle, if present) to top of bank (feet): 2 ☐Unable to assess channel depth.
12. Channel width at top of bank (feet): 2
13. Is assessment reach a swamp steam? ☐Yes ☐No
14. Feature type: ☐Perennial flow ☒Intermittent flow ☐Tidal Marsh Stream

STREAM CATEGORY INFORMATION:

15. NC SAM Zone: ☒ Mountains (M) ☐ Piedmont (P) ☐ Inner Coastal Plain (I) ☐ Outer Coastal Plain (O)
16. Estimated geomorphic valley shape (**skip for Tidal Marsh Stream**):
☐A  (more sinuous stream, flatter valley slope)
☒B  (less sinuous stream, steeper valley slope)
17. Watershed size: **(skip for Tidal Marsh Stream**) ☒Size 1 (< 0.1 mi^2) ☐Size 2 (0.1 to < 0.5 mi^2) ☐Size 3 (0.5 to < 5 mi^2) ☐Size 4 (≥ 5 mi^2)

ADDITIONAL INFORMATION:

18. Were regulatory considerations evaluated? ☒Yes ☐No If Yes, check all that apply to the assessment area.
☐Section 10 water ☐Classified Trout Waters ☐Water Supply Watershed (☐I ☐II ☐III ☐IV ☐V)
☐Essential Fish Habitat ☐Primary Nursery Area ☐ High Quality Waters/Outstanding Resource Waters
☐Publicly owned property ☐NCDWR Riparian buffer rule in effect ☐Nutrient Sensitive Waters
☐Anadromous fish ☐303(d) List ☐CAMA Area of Environmental Concern (AEC)
☐Documented presence of a federal and/or state listed protected species within the assessment area.
List species:
☐Designated Critical Habitat (list species)
19. Are additional stream information/supplementary measurements included in "Notes/Sketch" section or attached? ☒Yes ☐No

1. Channel Water – assessment reach metric (skip for Size 1 streams and Tidal Marsh Streams)
☒A Water throughout assessment reach.
☐B No flow, water in pools only.
☐C No water in assessment reach.

2. Evidence of Flow Restriction – assessment reach metric
☐A At least 10% of assessment reach in-stream habitat or riffle-pool sequence is severely affected by a flow restriction or fill to the point of obstructing flow or a channel choked with aquatic macrophytes or ponded water or impoundment on flood or ebb within the assessment reach (examples: undersized or perched culverts, causeways that constrict the channel, tidal gates, debris jams, beaver dams).
☒B Not A

3. Feature Pattern – assessment reach metric
☐A A majority of the assessment reach has altered pattern (examples: straightening, modification above or below culvert).
☒B Not A

4. Feature Longitudinal Profile – assessment reach metric
☐A Majority of assessment reach has a substantially altered stream profile (examples: channel down-cutting, existing damming, over widening, active aggradation, dredging, and excavation where appropriate channel profile has not reformed from any of these disturbances).
☒B Not A

5. Signs of Active Instability – assessment reach metric
Consider only current instability, not past events from which the stream has currently recovered. Examples of instability include active bank failure, active channel down-cutting (head-cut), active widening, and artificial hardening (such as concrete, gabion, rip-rap).
☒A < 10% of channel unstable
☐B 10 to 25% of channel unstable
☐C > 25% of channel unstable

6. Streamside Area Interaction – streamside area metric
Consider for the Left Bank (LB) and the Right Bank (RB).

LB	RB	
☐A	☐A	Little or no evidence of conditions that adversely affect reference interaction
☒B	☒B	Moderate evidence of conditions (examples: berms, levees, down-cutting, aggradation, dredging) that adversely affect reference interaction (examples: limited streamside area access, disruption of flood flows through streamside area, leaky or intermittent bulkheads, causeways with floodplain constriction, minor ditching [including mosquito ditching])
☐C	☐C	Extensive evidence of conditions that adversely affect reference interaction (little to no floodplain/intertidal zone access [examples: causeways with floodplain and channel constriction, bulkheads, retaining walls, fill, stream incision, disruption of flood flows through streamside area] or too much floodplain/intertidal zone access [examples: impoundments, intensive mosquito ditching]) or floodplain/intertidal zone unnaturally absent or assessment reach is a man-made feature on an interstream divide

7. Water Quality Stressors – assessment reach/intertidal zone metric
Check all that apply.

- ☐A Discolored water in stream or intertidal zone (milky white, blue, unnatural water discoloration, oil sheen, stream foam)
- ☐B Excessive sedimentation (burying of stream features or intertidal zone)
- ☐C Noticeable evidence of pollutant discharges entering the assessment reach and causing a water quality problem
- ☐D Odor (not including natural sulfide odors)
- ☐E Current published or collected data indicating degraded water quality in the assessment reach. Cite source in "Notes/Sketch" section.
- ☒F Livestock with access to stream or intertidal zone
- ☐G Excessive algae in stream or intertidal zone
- ☐H Degraded marsh vegetation in the intertidal zone (removal, burning, regular mowing, destruction, etc)
- ☐I Other: _____ (explain in "Notes/Sketch" section)
- ☐J Little to no stressors

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

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

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

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

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

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

Check for Tidal Marsh Streams Only

- ☐F 5% oysters or other natural hard bottoms
- ☐G Submerged aquatic vegetation
- ☐H Low-tide refugia (pools)
- ☐I Sand bottom
- ☐J 5% vertical bank along the marsh
- ☐K Little or no habitat

**************************************REMAINING QUESTIONS ARE NOT APPLICABLE FOR TIDAL MARSH STREAMS*********************************

11. Bedform and Substrate – assessment reach metric (skip for Size 4 Coastal Plain streams and Tidal Marsh Streams)

11a. ☒Yes ☐No Is assessment reach in a natural sand-bed stream? **(skip for Coastal Plain streams)**

11b. Bedform evaluated. **Check the appropriate box(es).**

- ☒A Riffle-run section **(evaluate 11c)**
- ☒B Pool-glide section **(evaluate 11d)**
- ☐C Natural bedform absent **(skip to Metric 12, Aquatic Life)**

11c. In riffle sections, check all that occur below the normal wetted perimeter of the assessment reach – whether or not submerged. **Check at least one box in each row (skip for Size 4 Coastal Plain streams and Tidal Marsh Streams)**. Not Present (NP) = absent, Rare (R) = present but ≤ 10%, Common (C) = > 10-40%, Abundant (A) = > 40-70%, Predominant (P) = > 70%. Cumulative percentages should not exceed 100% for each assessment reach.

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

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

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

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

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

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

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

LB	RB	
☐A	☐A	Little or no alteration to water storage capacity over a majority of the streamside area
☒B	☒B	Moderate alteration to water storage capacity over a majority of the streamside area
☐C	☐C	Severe alteration to water storage capacity over a majority of the streamside area (examples: ditches, fill, soil compaction, livestock disturbance, buildings, man-made levees, drainage pipes)

14. Streamside Area Water Storage – streamside area metric (skip for Size 1 streams, Tidal Marsh Streams, and B valley types)
Consider for the Left Bank (LB) and the Right Bank (RB) of the streamside area.

LB	RB	
☐A	☐A	Majority of streamside area with depressions able to pond water ≥ 6 inches deep
☐B	☐B	Majority of streamside area with depressions able to pond water 3 to 6 inches deep
☒C	☒C	Majority of streamside area with depressions able to pond water < 3 inches deep

15. Wetland Presence – streamside area metric (skip for Tidal Marsh Streams)
Consider for the Left Bank (LB) and the Right Bank (RB). Do not consider wetlands outside of the streamside area or within the normal wetted perimeter of assessment reach.

LB	RB	
☐Y	☒Y	Are wetlands present in the streamside area?
☒N	☐N	

16. Baseflow Contributors – assessment reach metric (skip for Size 4 streams and Tidal Marsh Streams)
Check all contributors within the assessment reach or within view of <u>and</u> draining to the assessment reach.

- ☐A Streams and/or springs (jurisdictional discharges)
- ☐B Ponds (include wet detention basins; do not include sediment basins or dry detention basins)
- ☐C Obstruction passing flow during low-flow periods within the assessment area (beaver dam, leaky dam, bottom-release dam, weir)
- ☐D Evidence of bank seepage or sweating (iron in water indicates seepage)
- ☒E Stream bed or bank soil reduced (dig through deposited sediment if present)
- ☐F None of the above

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

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

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

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

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

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

Vegetated		Wooded		
LB	RB	LB	RB	
☒A	☒A	☐A	☐A	≥ 100 feet wide or extends to the edge of the watershed
☐B	☐B	☐B	☐B	From 50 to < 100 feet wide
☐C	☐C	☐C	☐C	From 30 to < 50 feet wide
☐D	☐D	☒D	☒D	From 10 to < 30 feet wide
☐E	☐E	☐E	☐E	< 10 feet wide or no trees

20. Buffer Structure – streamside area metric (skip for Tidal Marsh Streams)

Consider for left bank (LB) and right bank (RB) for Metric 19 ("Vegetated" Buffer Width).

LB	RB	
☐A	☐A	Mature forest
☐B	☒B	Non-mature woody vegetation or modified vegetation structure
☒C	☐C	Herbaceous vegetation with or without a strip of trees < 10 feet wide
☐D	☐D	Maintained shrubs
☐E	☐E	Little or no vegetation

21. Buffer Stressors – streamside area metric (skip for Tidal Marsh Streams)

Check all appropriate boxes for left bank (LB) and right bank (RB). Indicate if listed stressor abuts stream (Abuts), does not abut but is within 30 feet of stream (< 30 feet), or is between 30 to 50 feet of stream (30-50 feet).

If none of the following stressors occurs on either bank, check here and skip to Metric 22: ☐

Abuts		< 30 feet		30-50 feet		
LB	RB	LB	RB	LB	RB	
☐A	☐A	☐A	☐A	☐A	☐A	Row crops
☐B	☐B	☐B	☐B	☐B	☐B	Maintained turf
☐C	☐C	☐C	☐C	☐C	☐C	Pasture (no livestock)/commercial horticulture
☒D	☒D	☐D	☐D	☐D	☐D	Pasture (active livestock use)

22. Stem Density – streamside area metric (skip for Tidal Marsh Streams)

Consider for left bank (LB) and right bank (RB) for Metric 19 ("Wooded" Buffer Width).

LB	RB	
☐A	☒A	Medium to high stem density
☐B	☐B	Low stem density
☒C	☐C	No wooded riparian buffer or predominantly herbaceous species or bare ground

23. Continuity of Vegetated Buffer – streamside area metric (skip for Tidal Marsh Streams)

Consider whether vegetated buffer is continuous along stream (parallel). Breaks are areas lacking vegetation > 10 feet wide.

LB	RB	
☒A	☒A	The total length of buffer breaks is < 25 percent.
☐B	☐B	The total length of buffer breaks is between 25 and 50 percent.
☐C	☐C	The total length of buffer breaks is > 50 percent.

24. Vegetative Composition – streamside area metric (skip for Tidal Marsh Streams)

Evaluate the dominant vegetation within 100 feet of each bank or to the edge of the watershed (whichever comes first) as it contributes to assessment reach habitat.

LB	RB	
☐A	☐A	Vegetation is close to undisturbed in species present and their proportions. Lower strata composed of native species, with non-native invasive species absent or sparse.
☒B	☒B	Vegetation indicates disturbance in terms of species diversity or proportions, but is still largely composed of native species. This may include communities of weedy native species that develop after clear-cutting or clearing or communities with non-native invasive species present, but not dominant, over a large portion of the expected strata or communities missing understory but retaining canopy trees.
☐C	☐C	Vegetation is severely disturbed in terms of species diversity or proportions. Mature canopy is absent or communities with non-native invasive species dominant over a large portion of expected strata or communities composed of planted stands of non-characteristic species or communities inappropriately composed of a single species or no vegetation.

25. Conductivity – assessment reach metric (skip for all Coastal Plain streams)

25a. ☐Yes ☒No Was conductivity measurement recorded?
If No, select one of the following reasons. ☐No Water ☐Other: _____

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

Notes/Sketch:
Cattle have access to the stream

Draft NC SAM Stream Rating Sheet
Accompanies User Manual Version 2.1

Stream Site Name	Dale's Creek Creek Restoration Site	Date of Assessment	10/23/2019
Stream Category	Mb1	Assessor Name/Organization	J. Sullivan / KCI

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

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

NC SAM FIELD ASSESSMENT RESULTS
Accompanies User Manual Version 2.1

USACE AID #: NCDWR #:

INSTRUCTIONS: Attach a sketch of the assessment area and photographs. Attach a copy of the USGS 7.5-minute topographic quadrangle, and circle the location of the stream reach under evaluation. If multiple stream reaches will be evaluated on the same property, identify and number all reaches on the attached map, and include a separate form for each reach. See the NC SAM User Manual for detailed descriptions and explanations of requested information. Record in the "Notes/Sketch" section if supplementary measurements were performed. See the NC SAM User Manual for examples of additional measurements that may be relevant.

NOTE EVIDENCE OF STRESSORS AFFECTING THE ASSESSMENT AREA (do not need to be within the assessment area).

PROJECT/SITE INFORMATION:

1. Project name (if any): Dale's Creek Creek Restoration Site
2. Date of evaluation: 10/23/2019
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: Newfound Creek
7. River basin: French Broad
8. Site coordinates (decimal degrees, at lower end of assessment reach): 35.5981 / -82.7450

STREAM INFORMATION: (depth and width can be approximations)

9. Site number (show on attached map): UT1 ENH1
10. Length of assessment reach evaluated (feet): 50
11. Channel depth from bed (in riffle, if present) to top of bank (feet): 4.5 ☐Unable to assess channel depth.
12. Channel width at top of bank (feet): 8
13. Is assessment reach a swamp steam? ☐Yes ☐No
14. Feature type: ☒Perennial flow ☐Intermittent flow ☐Tidal Marsh Stream

STREAM CATEGORY INFORMATION:

15. NC SAM Zone: ☒ Mountains (M) ☐ Piedmont (P) ☐ Inner Coastal Plain (I) ☐ Outer Coastal Plain (O)
16. Estimated geomorphic valley shape (**skip for Tidal Marsh Stream**):
☐A  (more sinuous stream, flatter valley slope)
☒B  (less sinuous stream, steeper valley slope)
17. Watershed size: **(skip for Tidal Marsh Stream**) ☐Size 1 (< 0.1 mi^2) ☒Size 2 (0.1 to < 0.5 mi^2) ☐Size 3 (0.5 to < 5 mi^2) ☐Size 4 (≥ 5 mi^2)

ADDITIONAL INFORMATION:

18. Were regulatory considerations evaluated? ☒Yes ☐No If Yes, check all that apply to the assessment area.
☐Section 10 water ☐Classified Trout Waters ☐Water Supply Watershed (☐I ☐II ☐III ☐IV ☐V)
☐Essential Fish Habitat ☐Primary Nursery Area ☐ High Quality Waters/Outstanding Resource Waters
☐Publicly owned property ☐NCDWR Riparian buffer rule in effect ☐Nutrient Sensitive Waters
☐Anadromous fish ☐303(d) List ☐CAMA Area of Environmental Concern (AEC)
☐Documented presence of a federal and/or state listed protected species within the assessment area.
List species:
☐Designated Critical Habitat (list species)
19. Are additional stream information/supplementary measurements included in "Notes/Sketch" section or attached? ☒Yes ☐No

1. Channel Water – assessment reach metric (skip for Size 1 streams and Tidal Marsh Streams)
- ☒A Water throughout assessment reach.
- ☐B No flow, water in pools only.
- ☐C No water in assessment reach.

2. Evidence of Flow Restriction – assessment reach metric
- ☐A At least 10% of assessment reach in-stream habitat or riffle-pool sequence is severely affected by a flow restriction or fill to the point of obstructing flow or a channel choked with aquatic macrophytes or ponded water or impoundment on flood or ebb within the assessment reach (examples: undersized or perched culverts, causeways that constrict the channel, tidal gates, debris jams, beaver dams).
- ☒B Not A

3. Feature Pattern – assessment reach metric
- ☒A A majority of the assessment reach has altered pattern (examples: straightening, modification above or below culvert).
- ☐B Not A

4. Feature Longitudinal Profile – assessment reach metric
- ☒A Majority of assessment reach has a substantially altered stream profile (examples: channel down-cutting, existing damming, over widening, active aggradation, dredging, and excavation where appropriate channel profile has not reformed from any of these disturbances).
- ☐B Not A

5. Signs of Active Instability – assessment reach metric

Consider only current instability, not past events from which the stream has currently recovered. Examples of instability include active bank failure, active channel down-cutting (head-cut), active widening, and artificial hardening (such as concrete, gabion, rip-rap).
- ☐A < 10% of channel unstable
- ☒B 10 to 25% of channel unstable
- ☐C > 25% of channel unstable

6. Streamside Area Interaction – streamside area metric
Consider for the Left Bank (LB) and the Right Bank (RB).

LB	RB	
☐A	☐A	Little or no evidence of conditions that adversely affect reference interaction
☒B	☒B	Moderate evidence of conditions (examples: berms, levees, down-cutting, aggradation, dredging) that adversely affect reference interaction (examples: limited streamside area access, disruption of flood flows through streamside area, leaky or intermittent bulkheads, causeways with floodplain constriction, minor ditching [including mosquito ditching])
☐C	☐C	Extensive evidence of conditions that adversely affect reference interaction (little to no floodplain/intertidal zone access [examples: causeways with floodplain and channel constriction, bulkheads, retaining walls, fill, stream incision, disruption of flood flows through streamside area] or too much floodplain/intertidal zone access [examples: impoundments, intensive mosquito ditching]) or floodplain/intertidal zone unnaturally absent or assessment reach is a man-made feature on an interstream divide

7. Water Quality Stressors – assessment reach/intertidal zone metric
Check all that apply.

- ☐A Discolored water in stream or intertidal zone (milky white, blue, unnatural water discoloration, oil sheen, stream foam)
- ☐B Excessive sedimentation (burying of stream features or intertidal zone)
- ☐C Noticeable evidence of pollutant discharges entering the assessment reach and causing a water quality problem
- ☐D Odor (not including natural sulfide odors)
- ☐E Current published or collected data indicating degraded water quality in the assessment reach. Cite source in "Notes/Sketch" section.
- ☒F Livestock with access to stream or intertidal zone
- ☐G Excessive algae in stream or intertidal zone
- ☐H Degraded marsh vegetation in the intertidal zone (removal, burning, regular mowing, destruction, etc)
- ☐I Other: _____ (explain in "Notes/Sketch" section)
- ☐J Little to no stressors

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

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

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

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

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

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

Check for Tidal Marsh Streams Only

- ☐F 5% oysters or other natural hard bottoms
- ☐G Submerged aquatic vegetation
- ☐H Low-tide refugia (pools)
- ☐I Sand bottom
- ☐J 5% vertical bank along the marsh
- ☐K Little or no habitat

**************************************REMAINING QUESTIONS ARE NOT APPLICABLE FOR TIDAL MARSH STREAMS*********************************

11. Bedform and Substrate – assessment reach metric (skip for Size 4 Coastal Plain streams and Tidal Marsh Streams)

11a. ☒Yes ☐No Is assessment reach in a natural sand-bed stream? **(skip for Coastal Plain streams)**

11b. Bedform evaluated. **Check the appropriate box(es).**

- ☒A Riffle-run section **(evaluate 11c)**
- ☒B Pool-glide section **(evaluate 11d)**
- ☐C Natural bedform absent **(skip to Metric 12, Aquatic Life)**

11c. In riffle sections, check all that occur below the normal wetted perimeter of the assessment reach – whether or not submerged. **Check at least one box in each row (skip for Size 4 Coastal Plain streams and Tidal Marsh Streams)**. Not Present (NP) = absent, Rare (R) = present but ≤ 10%, Common (C) = > 10-40%, Abundant (A) = > 40-70%, Predominant (P) = > 70%. Cumulative percentages should not exceed 100% for each assessment reach.

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

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

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

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

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

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

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

LB	RB	
☐A	☐A	Little or no alteration to water storage capacity over a majority of the streamside area
☐B	☐B	Moderate alteration to water storage capacity over a majority of the streamside area
☒C	☒C	Severe alteration to water storage capacity over a majority of the streamside area (examples: ditches, fill, soil compaction, livestock disturbance, buildings, man-made levees, drainage pipes)

14. Streamside Area Water Storage – streamside area metric (skip for Size 1 streams, Tidal Marsh Streams, and B valley types)
Consider for the Left Bank (LB) and the Right Bank (RB) of the streamside area.

LB	RB	
☐A	☐A	Majority of streamside area with depressions able to pond water ≥ 6 inches deep
☐B	☐B	Majority of streamside area with depressions able to pond water 3 to 6 inches deep
☒C	☒C	Majority of streamside area with depressions able to pond water < 3 inches deep

15. Wetland Presence – streamside area metric (skip for Tidal Marsh Streams)
Consider for the Left Bank (LB) and the Right Bank (RB). Do not consider wetlands outside of the streamside area or within the normal wetted perimeter of assessment reach.

LB	RB	
☐Y	☐Y	Are wetlands present in the streamside area?
☒N	☒N	

16. Baseflow Contributors – assessment reach metric (skip for Size 4 streams and Tidal Marsh Streams)
Check all contributors within the assessment reach or within view of <u>and</u> draining to the assessment reach.

☐A	Streams and/or springs (jurisdictional discharges)
☐B	Ponds (include wet detention basins; do not include sediment basins or dry detention basins)
☐C	Obstruction passing flow during low-flow periods within the assessment area (beaver dam, leaky dam, bottom-release dam, weir)
☐D	Evidence of bank seepage or sweating (iron in water indicates seepage)
☒E	Stream bed or bank soil reduced (dig through deposited sediment if present)
☐F	None of the above

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

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

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

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

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

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

Vegetated LB	Vegetated RB	Wooded LB	Wooded RB	
☐A	☒A	☐A	☐A	≥ 100 feet wide or extends to the edge of the watershed
☐B	☐B	☐B	☐B	From 50 to < 100 feet wide
☒C	☐C	☐C	☐C	From 30 to < 50 feet wide
☐D	☐D	☐D	☐D	From 10 to < 30 feet wide
☐E	☐E	☒E	☒E	< 10 feet wide or no trees

20. Buffer Structure – streamside area metric (skip for Tidal Marsh Streams)

Consider for left bank (LB) and right bank (RB) for Metric 19 ("Vegetated" Buffer Width).

LB	RB	
☐A	☐A	Mature forest
☐B	☐B	Non-mature woody vegetation or modified vegetation structure
☒C	☒C	Herbaceous vegetation with or without a strip of trees < 10 feet wide
☐D	☐D	Maintained shrubs
☐E	☐E	Little or no vegetation

21. Buffer Stressors – streamside area metric (skip for Tidal Marsh Streams)

Check all appropriate boxes for left bank (LB) and right bank (RB). Indicate if listed stressor abuts stream (Abuts), does not abut but is within 30 feet of stream (< 30 feet), or is between 30 to 50 feet of stream (30-50 feet).

If none of the following stressors occurs on either bank, check here and skip to Metric 22: ☐

Abuts LB	Abuts RB	< 30 feet LB	< 30 feet RB	30-50 feet LB	30-50 feet RB	
☐A	☐A	☐A	☐A	☐A	☐A	Row crops
☐B	☐B	☐B	☐B	☐B	☐B	Maintained turf
☐C	☐C	☐C	☐C	☐C	☐C	Pasture (no livestock)/commercial horticulture
☒D	☒D	☐D	☐D	☐D	☐D	Pasture (active livestock use)

22. Stem Density – streamside area metric (skip for Tidal Marsh Streams)

Consider for left bank (LB) and right bank (RB) for Metric 19 ("Wooded" Buffer Width).

LB	RB	
☐A	☐A	Medium to high stem density
☐B	☐B	Low stem density
☒C	☒C	No wooded riparian buffer or predominantly herbaceous species or bare ground

23. Continuity of Vegetated Buffer – streamside area metric (skip for Tidal Marsh Streams)

Consider whether vegetated buffer is continuous along stream (parallel). Breaks are areas lacking vegetation > 10 feet wide.

LB	RB	
☒A	☒A	The total length of buffer breaks is < 25 percent.
☐B	☐B	The total length of buffer breaks is between 25 and 50 percent.
☐C	☐C	The total length of buffer breaks is > 50 percent.

24. Vegetative Composition – streamside area metric (skip for Tidal Marsh Streams)

Evaluate the dominant vegetation within 100 feet of each bank or to the edge of the watershed (whichever comes first) as it contributes to assessment reach habitat.

LB	RB	
☐A	☐A	Vegetation is close to undisturbed in species present and their proportions. Lower strata composed of native species, with non-native invasive species absent or sparse.
☐B	☐B	Vegetation indicates disturbance in terms of species diversity or proportions, but is still largely composed of native species. This may include communities of weedy native species that develop after clear-cutting or clearing or communities with non-native invasive species present, but not dominant, over a large portion of the expected strata or communities missing understory but retaining canopy trees.
☒C	☒C	Vegetation is severely disturbed in terms of species diversity or proportions. Mature canopy is absent or communities with non-native invasive species dominant over a large portion of expected strata or communities composed of planted stands of non-characteristic species or communities inappropriately composed of a single species or no vegetation.

25. Conductivity – assessment reach metric (skip for all Coastal Plain streams)

25a. ☐Yes ☒No Was conductivity measurement recorded?
If No, select one of the following reasons. ☐No Water ☐Other: _____

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

Notes/Sketch:
Cattle have full access to the stream and are impacting it.

Draft NC SAM Stream Rating Sheet
Accompanies User Manual Version 2.1

Stream Site Name	Dale's Creek Creek Restoration Site	Date of Assessment	10/23/2019
Stream Category	Mb2	Assessor Name/Organization	J. Sullivan / KCI

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

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

NC SAM FIELD ASSESSMENT RESULTS
Accompanies User Manual Version 2.1

USACE AID #: NCDWR #:

INSTRUCTIONS: Attach a sketch of the assessment area and photographs. Attach a copy of the USGS 7.5-minute topographic quadrangle, and circle the location of the stream reach under evaluation. If multiple stream reaches will be evaluated on the same property, identify and number all reaches on the attached map, and include a separate form for each reach. See the NC SAM User Manual for detailed descriptions and explanations of requested information. Record in the "Notes/Sketch" section if supplementary measurements were performed. See the NC SAM User Manual for examples of additional measurements that may be relevant.

NOTE EVIDENCE OF STRESSORS AFFECTING THE ASSESSMENT AREA (do not need to be within the assessment area).

PROJECT/SITE INFORMATION:

1. Project name (if any): Dale's Creek Creek Restoration Site
2. Date of evaluation: 10/23/2019
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: Newfound Creek
7. River basin: French Broad
8. Site coordinates (decimal degrees, at lower end of assessment reach): 35.5994 / -82.7471

STREAM INFORMATION: (depth and width can be approximations)

9. Site number (show on attached map): UT1 ENH2
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): 4
13. Is assessment reach a swamp steam? ☐Yes ☐No
14. Feature type: ☒Perennial flow ☐Intermittent flow ☐Tidal Marsh Stream

STREAM CATEGORY INFORMATION:

15. NC SAM Zone: ☒ Mountains (M) ☐ Piedmont (P) ☐ Inner Coastal Plain (I) ☐ Outer Coastal Plain (O)
16. Estimated geomorphic valley shape (**skip for Tidal Marsh Stream**):
☐A  (more sinuous stream, flatter valley slope)
☒B  (less sinuous stream, steeper valley slope)
17. Watershed size: **(skip for Tidal Marsh Stream**) ☐Size 1 (< 0.1 mi^2) ☒Size 2 (0.1 to < 0.5 mi^2) ☐Size 3 (0.5 to < 5 mi^2) ☐Size 4 (≥ 5 mi^2)

ADDITIONAL INFORMATION:

18. Were regulatory considerations evaluated? ☒Yes ☐No If Yes, check all that apply to the assessment area.
☐Section 10 water ☐Classified Trout Waters ☐Water Supply Watershed (☐I ☐II ☐III ☐IV ☐V)
☐Essential Fish Habitat ☐Primary Nursery Area ☐ High Quality Waters/Outstanding Resource Waters
☐Publicly owned property ☐NCDWR Riparian buffer rule in effect ☐Nutrient Sensitive Waters
☐Anadromous fish ☐303(d) List ☐CAMA Area of Environmental Concern (AEC)
☐Documented presence of a federal and/or state listed protected species within the assessment area.
List species:
☐Designated Critical Habitat (list species)
19. Are additional stream information/supplementary measurements included in "Notes/Sketch" section or attached? ☒Yes ☐No

1. Channel Water – assessment reach metric (skip for Size 1 streams and Tidal Marsh Streams)
☒A Water throughout assessment reach.
☐B No flow, water in pools only.
☐C No water in assessment reach.

2. Evidence of Flow Restriction – assessment reach metric
☐A At least 10% of assessment reach in-stream habitat or riffle-pool sequence is severely affected by a flow restriction or fill to the point of obstructing flow or a channel choked with aquatic macrophytes or ponded water or impoundment on flood or ebb within the assessment reach (examples: undersized or perched culverts, causeways that constrict the channel, tidal gates, debris jams, beaver dams).
☒B Not A

3. Feature Pattern – assessment reach metric
☐A A majority of the assessment reach has altered pattern (examples: straightening, modification above or below culvert).
☒B Not A

4. Feature Longitudinal Profile – assessment reach metric
☐A Majority of assessment reach has a substantially altered stream profile (examples: channel down-cutting, existing damming, over widening, active aggradation, dredging, and excavation where appropriate channel profile has not reformed from any of these disturbances).
☒B Not A

5. Signs of Active Instability – assessment reach metric
Consider only current instability, not past events from which the stream has currently recovered. Examples of instability include active bank failure, active channel down-cutting (head-cut), active widening, and artificial hardening (such as concrete, gabion, rip-rap).
☒A < 10% of channel unstable
☐B 10 to 25% of channel unstable
☐C > 25% of channel unstable

6. Streamside Area Interaction – streamside area metric
Consider for the Left Bank (LB) and the Right Bank (RB).

LB	RB	
☒A	☒A	Little or no evidence of conditions that adversely affect reference interaction
☐B	☐B	Moderate evidence of conditions (examples: berms, levees, down-cutting, aggradation, dredging) that adversely affect reference interaction (examples: limited streamside area access, disruption of flood flows through streamside area, leaky or intermittent bulkheads, causeways with floodplain constriction, minor ditching [including mosquito ditching])
☐C	☐C	Extensive evidence of conditions that adversely affect reference interaction (little to no floodplain/intertidal zone access [examples: causeways with floodplain and channel constriction, bulkheads, retaining walls, fill, stream incision, disruption of flood flows through streamside area] or too much floodplain/intertidal zone access [examples: impoundments, intensive mosquito ditching]) or floodplain/intertidal zone unnaturally absent or assessment reach is a man-made feature on an interstream divide

7. Water Quality Stressors – assessment reach/intertidal zone metric
Check all that apply.

- ☐A Discolored water in stream or intertidal zone (milky white, blue, unnatural water discoloration, oil sheen, stream foam)
- ☐B Excessive sedimentation (burying of stream features or intertidal zone)
- ☐C Noticeable evidence of pollutant discharges entering the assessment reach and causing a water quality problem
- ☐D Odor (not including natural sulfide odors)
- ☐E Current published or collected data indicating degraded water quality in the assessment reach. Cite source in "Notes/Sketch" section.
- ☒F Livestock with access to stream or intertidal zone
- ☐G Excessive algae in stream or intertidal zone
- ☐H Degraded marsh vegetation in the intertidal zone (removal, burning, regular mowing, destruction, etc)
- ☐I Other: _____ (explain in "Notes/Sketch" section)
- ☐J Little to no stressors

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

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

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

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

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

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

Check for Tidal Marsh Streams Only

- ☐F 5% oysters or other natural hard bottoms
- ☐G Submerged aquatic vegetation
- ☐H Low-tide refugia (pools)
- ☐I Sand bottom
- ☐J 5% vertical bank along the marsh
- ☐K Little or no habitat

**************************************REMAINING QUESTIONS ARE NOT APPLICABLE FOR TIDAL MARSH STREAMS*********************************

11. Bedform and Substrate – assessment reach metric (skip for Size 4 Coastal Plain streams and Tidal Marsh Streams)

11a. ☒Yes ☐No Is assessment reach in a natural sand-bed stream? **(skip for Coastal Plain streams)**

11b. Bedform evaluated. **Check the appropriate box(es).**

- ☒A Riffle-run section **(evaluate 11c)**
- ☒B Pool-glide section **(evaluate 11d)**
- ☐C Natural bedform absent **(skip to Metric 12, Aquatic Life)**

11c. In riffle sections, check all that occur below the normal wetted perimeter of the assessment reach – whether or not submerged. **Check at least one box in each row (skip for Size 4 Coastal Plain streams and Tidal Marsh Streams)**. Not Present (NP) = absent, Rare (R) = present but ≤ 10%, Common (C) = > 10-40%, Abundant (A) = > 40-70%, Predominant (P) = > 70%. Cumulative percentages should not exceed 100% for each assessment reach.

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

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

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

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

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

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

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

LB	RB	
☒A	☒A	Little or no alteration to water storage capacity over a majority of the streamside area
☐B	☐B	Moderate alteration to water storage capacity over a majority of the streamside area
☐C	☐C	Severe alteration to water storage capacity over a majority of the streamside area (examples: ditches, fill, soil compaction, livestock disturbance, buildings, man-made levees, drainage pipes)

14. Streamside Area Water Storage – streamside area metric (skip for Size 1 streams, Tidal Marsh Streams, and B valley types)
Consider for the Left Bank (LB) and the Right Bank (RB) of the streamside area.

LB	RB	
☐A	☐A	Majority of streamside area with depressions able to pond water ≥ 6 inches deep
☐B	☐B	Majority of streamside area with depressions able to pond water 3 to 6 inches deep
☒C	☒C	Majority of streamside area with depressions able to pond water < 3 inches deep

15. Wetland Presence – streamside area metric (skip for Tidal Marsh Streams)
Consider for the Left Bank (LB) and the Right Bank (RB). Do not consider wetlands outside of the streamside area or within the normal wetted perimeter of assessment reach.

LB	RB	
☐Y	☐Y	Are wetlands present in the streamside area?
☒N	☒N	

16. Baseflow Contributors – assessment reach metric (skip for Size 4 streams and Tidal Marsh Streams)
Check all contributors within the assessment reach or within view of <u>and</u> draining to the assessment reach.

- ☐A Streams and/or springs (jurisdictional discharges)
- ☐B Ponds (include wet detention basins; do not include sediment basins or dry detention basins)
- ☐C Obstruction passing flow during low-flow periods within the assessment area (beaver dam, leaky dam, bottom-release dam, weir)
- ☐D Evidence of bank seepage or sweating (iron in water indicates seepage)
- ☒E Stream bed or bank soil reduced (dig through deposited sediment if present)
- ☐F None of the above

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

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

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

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

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

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

Vegetated		Wooded		
LB	RB	LB	RB	
☒A	☒A	☐A	☒A	≥ 100 feet wide or extends to the edge of the watershed
☐B	☐B	☐B	☐B	From 50 to < 100 feet wide
☐C	☐C	☐C	☐C	From 30 to < 50 feet wide
☐D	☐D	☐D	☐D	From 10 to < 30 feet wide
☐E	☐E	☒E	☐E	< 10 feet wide or no trees

20. Buffer Structure – streamside area metric (skip for Tidal Marsh Streams)

Consider for left bank (LB) and right bank (RB) for Metric 19 ("Vegetated" Buffer Width).

LB	RB	
☐A	☒A	Mature forest
☐B	☐B	Non-mature woody vegetation or modified vegetation structure
☒C	☐C	Herbaceous vegetation with or without a strip of trees < 10 feet wide
☐D	☐D	Maintained shrubs
☐E	☐E	Little or no vegetation

21. Buffer Stressors – streamside area metric (skip for Tidal Marsh Streams)

Check all appropriate boxes for left bank (LB) and right bank (RB). Indicate if listed stressor abuts stream (Abuts), does not abut but is within 30 feet of stream (< 30 feet), or is between 30 to 50 feet of stream (30-50 feet).

If none of the following stressors occurs on either bank, check here and skip to Metric 22: ☐

Abuts		< 30 feet		30-50 feet		
LB	RB	LB	RB	LB	RB	
☐A	☐A	☐A	☐A	☐A	☐A	Row crops
☐B	☐B	☐B	☐B	☐B	☐B	Maintained turf
☐C	☐C	☐C	☐C	☐C	☐C	Pasture (no livestock)/commercial horticulture
☒D	☒D	☐D	☐D	☐D	☐D	Pasture (active livestock use)

22. Stem Density – streamside area metric (skip for Tidal Marsh Streams)

Consider for left bank (LB) and right bank (RB) for Metric 19 ("Wooded" Buffer Width).

LB	RB	
☐A	☒A	Medium to high stem density
☐B	☐B	Low stem density
☒C	☐C	No wooded riparian buffer or predominantly herbaceous species or bare ground

23. Continuity of Vegetated Buffer – streamside area metric (skip for Tidal Marsh Streams)

Consider whether vegetated buffer is continuous along stream (parallel). Breaks are areas lacking vegetation > 10 feet wide.

LB	RB	
☒A	☒A	The total length of buffer breaks is < 25 percent.
☐B	☐B	The total length of buffer breaks is between 25 and 50 percent.
☐C	☐C	The total length of buffer breaks is > 50 percent.

24. Vegetative Composition – streamside area metric (skip for Tidal Marsh Streams)

Evaluate the dominant vegetation within 100 feet of each bank or to the edge of the watershed (whichever comes first) as it contributes to assessment reach habitat.

LB	RB	
☐A	☒A	Vegetation is close to undisturbed in species present and their proportions. Lower strata composed of native species, with non-native invasive species absent or sparse.
☐B	☐B	Vegetation indicates disturbance in terms of species diversity or proportions, but is still largely composed of native species. This may include communities of weedy native species that develop after clear-cutting or clearing or communities with non-native invasive species present, but not dominant, over a large portion of the expected strata or communities missing understory but retaining canopy trees.
☒C	☐C	Vegetation is severely disturbed in terms of species diversity or proportions. Mature canopy is absent or communities with non-native invasive species dominant over a large portion of expected strata or communities composed of planted stands of non-characteristic species or communities inappropriately composed of a single species or no vegetation.

25. Conductivity – assessment reach metric (skip for all Coastal Plain streams)

25a. ☐Yes ☒No Was conductivity measurement recorded?
If No, select one of the following reasons. ☐No Water ☐Other: _____

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

Notes/Sketch:
Cattle have full access to the stream and are impacting it.

Draft NC SAM Stream Rating Sheet
Accompanies User Manual Version 2.1

Stream Site Name	Dale's Creek Creek Restoration Site	Date of Assessment	10/23/2019
Stream Category	Mb2	Assessor Name/Organization	J. Sullivan / KCI

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

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

NC SAM FIELD ASSESSMENT RESULTS
Accompanies User Manual Version 2.1

USACE AID #: NCDWR #:

INSTRUCTIONS: Attach a sketch of the assessment area and photographs. Attach a copy of the USGS 7.5-minute topographic quadrangle, and circle the location of the stream reach under evaluation. If multiple stream reaches will be evaluated on the same property, identify and number all reaches on the attached map, and include a separate form for each reach. See the NC SAM User Manual for detailed descriptions and explanations of requested information. Record in the "Notes/Sketch" section if supplementary measurements were performed. See the NC SAM User Manual for examples of additional measurements that may be relevant.

NOTE EVIDENCE OF STRESSORS AFFECTING THE ASSESSMENT AREA (do not need to be within the assessment area).

PROJECT/SITE INFORMATION:

1. Project name (if any): Dale's Creek Creek Restoration Site
2. Date of evaluation: 10/23/2019
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: Newfound Creek
7. River basin: French Broad
8. Site coordinates (decimal degrees, at lower end of assessment reach): 35.5997 / -82.7480

STREAM INFORMATION: (depth and width can be approximations)

9. Site number (show on attached map): UT1 Preservation
10. Length of assessment reach evaluated (feet): 50
11. Channel depth from bed (in riffle, if present) to top of bank (feet): 6 ☐Unable to assess channel depth.
12. Channel width at top of bank (feet): 4
13. Is assessment reach a swamp steam? ☐Yes ☐No
14. Feature type: ☒Perennial flow ☐Intermittent flow ☐Tidal Marsh Stream

STREAM CATEGORY INFORMATION:

15. NC SAM Zone: ☒ Mountains (M) ☐ Piedmont (P) ☐ Inner Coastal Plain (I) ☐ Outer Coastal Plain (O)
16. Estimated geomorphic valley shape (**skip for Tidal Marsh Stream**):
☐A  (more sinuous stream, flatter valley slope)
☒B  (less sinuous stream, steeper valley slope)
17. Watershed size: **(skip for Tidal Marsh Stream**) ☒Size 1 (< 0.1 mi^2) ☐Size 2 (0.1 to < 0.5 mi^2) ☐Size 3 (0.5 to < 5 mi^2) ☐Size 4 (≥ 5 mi^2)

ADDITIONAL INFORMATION:

18. Were regulatory considerations evaluated? ☒Yes ☐No If Yes, check all that apply to the assessment area.
☐Section 10 water ☐Classified Trout Waters ☐Water Supply Watershed (☐I ☐II ☐III ☐IV ☐V)
☐Essential Fish Habitat ☐Primary Nursery Area ☐ High Quality Waters/Outstanding Resource Waters
☐Publicly owned property ☐NCDWR Riparian buffer rule in effect ☐Nutrient Sensitive Waters
☐Anadromous fish ☐303(d) List ☐CAMA Area of Environmental Concern (AEC)
☐Documented presence of a federal and/or state listed protected species within the assessment area.
List species:
☐Designated Critical Habitat (list species)
19. Are additional stream information/supplementary measurements included in "Notes/Sketch" section or attached? ☒Yes ☐No

1. Channel Water – assessment reach metric (skip for Size 1 streams and Tidal Marsh Streams)

☒A Water throughout assessment reach.
☐B No flow, water in pools only.
☐C No water in assessment reach.

2. Evidence of Flow Restriction – assessment reach metric

☐A At least 10% of assessment reach in-stream habitat or riffle-pool sequence is severely affected by a flow restriction or fill to the point of obstructing flow or a channel choked with aquatic macrophytes or ponded water or impoundment on flood or ebb within the assessment reach (examples: undersized or perched culverts, causeways that constrict the channel, tidal gates, debris jams, beaver dams).
☒B Not A

3. Feature Pattern – assessment reach metric

☐A A majority of the assessment reach has altered pattern (examples: straightening, modification above or below culvert).
☒B Not A

4. Feature Longitudinal Profile – assessment reach metric

☐A Majority of assessment reach has a substantially altered stream profile (examples: channel down-cutting, existing damming, over widening, active aggradation, dredging, and excavation where appropriate channel profile has not reformed from any of these disturbances).
☒B Not A

5. Signs of Active Instability – assessment reach metric

Consider only current instability, not past events from which the stream has currently recovered. Examples of instability include active bank failure, active channel down-cutting (head-cut), active widening, and artificial hardening (such as concrete, gabion, rip-rap).

☒A < 10% of channel unstable
☐B 10 to 25% of channel unstable
☐C > 25% of channel unstable

6. Streamside Area Interaction – streamside area metric
Consider for the Left Bank (LB) and the Right Bank (RB).

LB	RB	
☒A	☒A	Little or no evidence of conditions that adversely affect reference interaction
☐B	☐B	Moderate evidence of conditions (examples: berms, levees, down-cutting, aggradation, dredging) that adversely affect reference interaction (examples: limited streamside area access, disruption of flood flows through streamside area, leaky or intermittent bulkheads, causeways with floodplain constriction, minor ditching [including mosquito ditching])
☐C	☐C	Extensive evidence of conditions that adversely affect reference interaction (little to no floodplain/intertidal zone access [examples: causeways with floodplain and channel constriction, bulkheads, retaining walls, fill, stream incision, disruption of flood flows through streamside area] or too much floodplain/intertidal zone access [examples: impoundments, intensive mosquito ditching]) or floodplain/intertidal zone unnaturally absent or assessment reach is a man-made feature on an interstream divide

7. Water Quality Stressors – assessment reach/intertidal zone metric
Check all that apply.

- ☐A Discolored water in stream or intertidal zone (milky white, blue, unnatural water discoloration, oil sheen, stream foam)
- ☐B Excessive sedimentation (burying of stream features or intertidal zone)
- ☐C Noticeable evidence of pollutant discharges entering the assessment reach and causing a water quality problem
- ☐D Odor (not including natural sulfide odors)
- ☐E Current published or collected data indicating degraded water quality in the assessment reach. Cite source in "Notes/Sketch" section.
- ☐F Livestock with access to stream or intertidal zone
- ☐G Excessive algae in stream or intertidal zone
- ☐H Degraded marsh vegetation in the intertidal zone (removal, burning, regular mowing, destruction, etc)
- ☐I Other: _____ (explain in "Notes/Sketch" section)
- ☒J Little to no stressors

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

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

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

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

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

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

Check for Tidal Marsh Streams Only

- ☐F 5% oysters or other natural hard bottoms
- ☐G Submerged aquatic vegetation
- ☐H Low-tide refugia (pools)
- ☐I Sand bottom
- ☐J 5% vertical bank along the marsh
- ☐K Little or no habitat

************************************REMAINING QUESTIONS ARE NOT APPLICABLE FOR TIDAL MARSH STREAMS****************************

11. Bedform and Substrate – assessment reach metric (skip for Size 4 Coastal Plain streams and Tidal Marsh Streams)

11a. ☒Yes ☐No Is assessment reach in a natural sand-bed stream? **(skip for Coastal Plain streams)**

11b. Bedform evaluated. **Check the appropriate box(es).**

- ☒A Riffle-run section **(evaluate 11c)**
- ☒B Pool-glide section **(evaluate 11d)**
- ☐C Natural bedform absent **(skip to Metric 12, Aquatic Life)**

11c. In riffle sections, check all that occur below the normal wetted perimeter of the assessment reach – whether or not submerged. **Check at least one box in each row (skip for Size 4 Coastal Plain streams and Tidal Marsh Streams)**. Not Present (NP) = absent, Rare (R) = present but ≤ 10%, Common (C) = > 10-40%, Abundant (A) = > 40-70%, Predominant (P) = > 70%. Cumulative percentages should not exceed 100% for each assessment reach.

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

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

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

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

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

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

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

LB	RB	
☒A	☒A	Little or no alteration to water storage capacity over a majority of the streamside area
☐B	☐B	Moderate alteration to water storage capacity over a majority of the streamside area
☐C	☐C	Severe alteration to water storage capacity over a majority of the streamside area (examples: ditches, fill, soil compaction, livestock disturbance, buildings, man-made levees, drainage pipes)

14. Streamside Area Water Storage – streamside area metric (skip for Size 1 streams, Tidal Marsh Streams, and B valley types)
Consider for the Left Bank (LB) and the Right Bank (RB) of the streamside area.

LB	RB	
☐A	☐A	Majority of streamside area with depressions able to pond water ≥ 6 inches deep
☐B	☐B	Majority of streamside area with depressions able to pond water 3 to 6 inches deep
☒C	☒C	Majority of streamside area with depressions able to pond water < 3 inches deep

15. Wetland Presence – streamside area metric (skip for Tidal Marsh Streams)
Consider for the Left Bank (LB) and the Right Bank (RB). Do not consider wetlands outside of the streamside area or within the normal wetted perimeter of assessment reach.

LB	RB	
☐Y	☐Y	Are wetlands present in the streamside area?
☒N	☒N	

16. Baseflow Contributors – assessment reach metric (skip for Size 4 streams and Tidal Marsh Streams)
Check all contributors within the assessment reach or within view of <u>and</u> draining to the assessment reach.

- ☐A Streams and/or springs (jurisdictional discharges)
- ☐B Ponds (include wet detention basins; do not include sediment basins or dry detention basins)
- ☐C Obstruction passing flow during low-flow periods within the assessment area (beaver dam, leaky dam, bottom-release dam, weir)
- ☐D Evidence of bank seepage or sweating (iron in water indicates seepage)
- ☒E Stream bed or bank soil reduced (dig through deposited sediment if present)
- ☐F None of the above

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

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

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

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

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

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

Vegetated		Wooded		
LB	RB	LB	RB	
☒A	☒A	☐A	☒A	≥ 100 feet wide or extends to the edge of the watershed
☐B	☐B	☐B	☐B	From 50 to < 100 feet wide
☐C	☐C	☒C	☐C	From 30 to < 50 feet wide
☐D	☐D	☐D	☐D	From 10 to < 30 feet wide
☐E	☐E	☐E	☐E	< 10 feet wide or no trees

20. Buffer Structure – streamside area metric (skip for Tidal Marsh Streams)

Consider for left bank (LB) and right bank (RB) for Metric 19 ("Vegetated" Buffer Width).

LB	RB	
☐A	☒A	Mature forest
☒B	☐B	Non-mature woody vegetation or modified vegetation structure
☐C	☐C	Herbaceous vegetation with or without a strip of trees < 10 feet wide
☐D	☐D	Maintained shrubs
☐E	☐E	Little or no vegetation

21. Buffer Stressors – streamside area metric (skip for Tidal Marsh Streams)

Check all appropriate boxes for left bank (LB) and right bank (RB). Indicate if listed stressor abuts stream (Abuts), does not abut but is within 30 feet of stream (< 30 feet), or is between 30 to 50 feet of stream (30-50 feet).

If none of the following stressors occurs on either bank, check here and skip to Metric 22: ☒

Abuts		< 30 feet		30-50 feet		
LB	RB	LB	RB	LB	RB	
☐A	☐A	☐A	☐A	☐A	☐A	Row crops
☐B	☐B	☐B	☐B	☐B	☐B	Maintained turf
☐C	☐C	☐C	☐C	☐C	☐C	Pasture (no livestock)/commercial horticulture
☒D	☐D	☐D	☐D	☐D	☒D	Pasture (active livestock use)

22. Stem Density – streamside area metric (skip for Tidal Marsh Streams)

Consider for left bank (LB) and right bank (RB) for Metric 19 ("Wooded" Buffer Width).

LB	RB	
☒A	☐A	Medium to high stem density
☐B	☒B	Low stem density
☐C	☐C	No wooded riparian buffer or predominantly herbaceous species or bare ground

23. Continuity of Vegetated Buffer – streamside area metric (skip for Tidal Marsh Streams)

Consider whether vegetated buffer is continuous along stream (parallel). Breaks are areas lacking vegetation > 10 feet wide.

LB	RB	
☒A	☒A	The total length of buffer breaks is < 25 percent.
☐B	☐B	The total length of buffer breaks is between 25 and 50 percent.
☐C	☐C	The total length of buffer breaks is > 50 percent.

24. Vegetative Composition – streamside area metric (skip for Tidal Marsh Streams)

Evaluate the dominant vegetation within 100 feet of each bank or to the edge of the watershed (whichever comes first) as it contributes to assessment reach habitat.

LB	RB	
☐A	☒A	Vegetation is close to undisturbed in species present and their proportions. Lower strata composed of native species, with non-native invasive species absent or sparse.
☒B	☐B	Vegetation indicates disturbance in terms of species diversity or proportions, but is still largely composed of native species. This may include communities of weedy native species that develop after clear-cutting or clearing or communities with non-native invasive species present, but not dominant, over a large portion of the expected strata or communities missing understory but retaining canopy trees.
☐C	☐C	Vegetation is severely disturbed in terms of species diversity or proportions. Mature canopy is absent or communities with non-native invasive species dominant over a large portion of expected strata or communities composed of planted stands of non-characteristic species or communities inappropriately composed of a single species or no vegetation.

25. Conductivity – assessment reach metric (skip for all Coastal Plain streams)

25a. ☐Yes ☒No Was conductivity measurement recorded?
If No, select one of the following reasons. ☐No Water ☐Other: _____

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

Notes/Sketch:

Cattle have full access to the streamside areas, but the speep sloped woods prevent direct impacts

Draft NC SAM Stream Rating Sheet
Accompanies User Manual Version 2.1

Stream Site Name	Dale's Creek Creek Restoration Site	Date of Assessment	10/23/2019
Stream Category	Mb1	Assessor Name/Organization	J. Sullivan / KCI

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

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

WETLAND DETERMINATION DATA FORM – Eastern Mountains and Piedmont Region

Project/Site: Dale's Creek City/County: Buncombe Sampling Date: 10/23/2019

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

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

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

Subregion (LRR or MLRA): N-130B Lat: 35.6003 Long: -82.7502 Datum: NAD83

Soil Map Unit Name: Toecane - Tusquitee Complex 15-30% Slope 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:
Area impacted by cattle grazing.

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)
- ___ 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): 5"
Saturation Present? (includes capillary fringe)	Yes X	No _____	Depth (inches): 3"

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. Paulownia tomentosa	5	Yes	UPL
2.			
3.			
4.			
5.			
6.			
7.			
	5 = Total Cover		

50% of total cover: 2.5 20% of total cover: =1

Sapling/Shrub Stratum (Plot size: Entire)			
1. None			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
	0 = Total Cover		

50% of total cover: 0 20% of total cover: 0

Herb Stratum (Plot size: Entire)			
1. Juncus effusus	40	Yes	FACW
2. Carex sp.	40	Yes	FACW
3. Polygonum pensylvanicum	5	No	FACW
4. Eutrochium purpureum	5	No	FAC
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	90 = Total Cover		

50% of total cover: 45 20% of total cover: 18

Woody Vine Stratum (Plot size: Entire)			
1. None	0		
2.			
3.			
4.			
5.			
	0 = 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
0-4	10YR 3/1	95	7.5YR 3/4	5	C	PL	L	
4-8	10YR 3/1	95	7.5YR 3/4	5	C	PL	SCL	
8-14	10YR 4/2	90	7.5YR 4/4	10	C	MPL	SCL	
14-18+	10YR 4/3	70	7.5YR 4/4	30	C	M	SC	

[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)
- X 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: Water table present at 5".

WETLAND DETERMINATION DATA FORM – Eastern Mountains and Piedmont Region

Project/Site: Dale's Creek City/County: Buncombe Sampling Date: 10/23/2019

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

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

Landform (hillslope, terrace, etc.): Seep Local relief (concave, convex, none): none Slope (%): 7

Subregion (LRR or MLRA): N-130B Lat: 35.6004 Long: -82.7502 Datum: NAD83

Soil Map Unit Name: Toecane - Tusquitee Complex 15-30% Slope 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: Area impacted by cattle grazing.

HYDROLOGY

Wetland Hydrology Indicators:

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

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

Secondary Indicators (minimum of two required)

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

Field Observations:

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

Wetland Hydrology Present? Yes _____ No X

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

Remarks:

VEGETATION (Four Strata) – Use scientific names of plants. Sampling Point: W1 Up

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1. Juglans nigra	20	Yes	FACU
2.			
3.			
4.			
5.			
6.			
7.			
	20 = Total Cover		

50% of total cover: 10 20% of total cover: 4

Sapling/Shrub Stratum (Plot size: 15)			
1. Ligustrum sinense	10	Yes	FACU
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
	10 = Total Cover		

50% of total cover: 5 20% of total cover: 2

Herb Stratum (Plot size: 5)			
1. Festuca arundinacea	60	Yes	FACU
2. Trifolium sp.	30	No	FACU
3. Rubus argutus	10	No	FACU
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	100 = Total Cover		

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

Woody Vine Stratum (Plot size: 30)			
1. None			
2.			
3.			
4.			
5.			
	0 = Total Cover		

50% of total cover: 0 20% of total cover: 0

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)

Total Number of Dominant Species Across All Strata: 3 (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
0-4	10YR 3/4	100					L	
4-18+	10YR 3/3	100					CL	

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

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10) **(LRR N)**
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1) **(LRR N, MLRA 147, 148)**
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7)
- ___ Polyvalue Below Surface (S8) **(MLRA 147, 148)**
- ___ Thin Dark Surface (S9) **(MLRA 147, 148)**
- ___ Loamy Gleyed Matrix (F2)
- ___ 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 WAM FIELD ASSESSMENT FORM
Accompanies User Manual Version 5.0

USACE AID #		NCDWR#	
Project Name	Dale's Creek Restoration Site	Date of Evaluation	10/23/2019
Applicant/Owner Name	KCI	Wetland Site Name	W1 & W2
Wetland Type	Seep	Assessor Name/Organization	J. Sullivan / KCI
Level III Ecoregion	Blue Ridge Mountains	Nearest Named Water Body	Newfound Creek
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)	35.6003 / -82.7502

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)

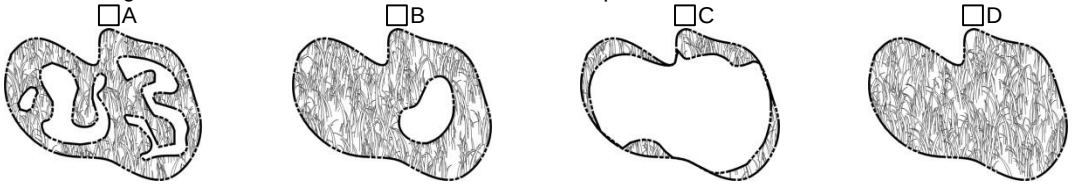
Include both natural debris and man-placed natural debris.

☐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	W1 & W2	Date of Assessment	10/23/2019
Wetland Type	Seep	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)	NO
Assessment area is on a coastal island (Y/N)	NO

Sub-function Rating Summary

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

Function Rating Summary

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

Overall Wetland Rating **MEDIUM**

NC WAM FIELD ASSESSMENT FORM
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USACE AID #		NCDWR#	
Project Name	Dale's Creek Restoration Site	Date of Evaluation	11/20/2019
Applicant/Owner Name	KCI	Wetland Site Name	W3
Wetland Type	Bottomland Hardwood Forest	Assessor Name/Organization	J. Sullivan / KCI
Level III Ecoregion	Blue Ridge Mountains	Nearest Named Water Body	Newfound Creek
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)	35.5984 / -82.7456

Evidence of stressors affecting the assessment area (may not be within the assessment area)

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

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

Is the assessment area intensively managed? ☐ Yes ☒ No

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

5. Discharge into Wetland – opportunity metric

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Answer for assessment area dominant landform.

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

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

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

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

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

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

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

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

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

13. Connectivity to Other Natural Areas – landscape condition metric

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

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

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

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

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

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

☐A 0
☐B 1 to 4
☒C 5 to 8

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

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

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

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

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

17a. Is vegetation present?
☒Yes ☐No If Yes, continue to 17b. If No, skip to Metric 18.

17b. Evaluate percent coverage of assessment area vegetation **for all marshes only**. Skip to 17c for non-marsh wetlands.
☒A ≥ 25% coverage of vegetation
☐B < 25% coverage of vegetation

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

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

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

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

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

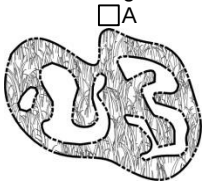
☐A Majority of canopy trees have stems > 6 inches in diameter at breast height (DBH); many large trees (> 12 inches DBH) are present.
☐B Majority of canopy trees have stems between 6 and 12 inches DBH, few are > 12 inch DBH.
☒C Majority of canopy trees are < 6 inches DBH or no trees.

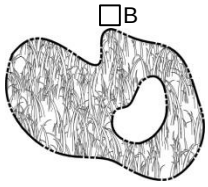
20. Large Woody Debris – wetland type condition metric (skip for all marshes)

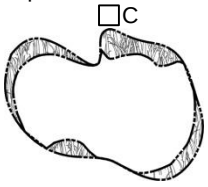
Include both natural debris and man-placed natural debris.
☐A Large logs (more than one) are visible (> 12 inches in diameter, or large relative to species present and landscape stability).
☒B Not A

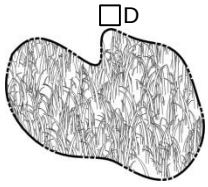
21. Vegetation/Open Water Dispersion – wetland type/open water condition metric (evaluate for Non-Tidal Freshwater Marsh only)

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

☐A 

☐B 

☐C 

☐D 

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

Examples of activities that may severely alter hydrologic connectivity include intensive ditching, fill, sedimentation, channelization, diversion, man-made berms, beaver dams, and stream incision. Documentation required if evaluated as B, C, or D.
☐A Overbank and overland flow are not severely altered in the assessment area.
☒B Overbank flow is severely altered in the assessment area.
☐C Overland flow is severely altered in the assessment area.
☐D Both overbank and overland flow are severely altered in the assessment area.

Notes
Cattle have severely impacted the wetland

NC WAM Wetland Rating Sheet
Accompanies User Manual Version 5.0

Wetland Site Name	W3	Date of Assessment	11/20/2019
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)	NO
Assessment area is located within 50 feet of a natural tributary or other open water (Y/N)	YES
Assessment area is substantially altered by beaver (Y/N)	NO
Assessment area experiences overbank flooding during normal rainfall conditions (Y/N)	NO
Assessment area is on a coastal island (Y/N)	NO

Sub-function Rating Summary

Function	Sub-function	Metrics	Rating
Hydrology	Surface Storage and Retention	Condition	**LOW**
	Sub-surface Storage and Retention	Condition	**LOW**
Water Quality	Pathogen Change	Condition	**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**

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8. Approved Jurisdictional Determination

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U.S. ARMY CORPS OF ENGINEERS
WILMINGTON DISTRICT

Action Id. **2019-00834** County: **Buncombe** U.S.G.S. Quad: **NC- Enka**

NOTIFICATION OF JURISDICTIONAL DETERMINATION

Requestor: **Don E. Morgan Living Trust**
Address: **321 Morgan Branch Road**
Leicester, NC 28749

Size (acres) **8.13**
Nearest Waterway **Newfound Creek**
USGS HUC **06010105**

Nearest Town **Asheville**
River Basin **French Broad-Holston**
Coordinates Latitude: **35.5986**
Longitude: **-82.7458**

Location description: **The site is located at 321 Morgan Branch Road, Leicester, NC 28748.**

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 labeled **Figure 3** and dated **12/23/2019**. 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: See the preliminary jurisdictional determination form dated 12/23/2019.

D. Remarks: Site visit was conducted on 11/20/19 in which revisions were made and are reflected in attached map labeled Figure 3: Potential Waters of the U.S., Dale's Creek Restoration Site. Please note this determination only applies to those areas outlined in the Project Area and this determination does not apply or make any Clean Water Act jurisdictional determinations on the remaining portions of the property which may or may not have waters subject to Section 404 of the Clean Water Act.

E. Attention USDA Program Participants

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

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

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

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

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

Corps Regulatory Official: FUEMMELER.AMANDA.JONES.1242835090 Digitally signed by FUEMMELER.AMANDA.JONES.1242835090 Date: 2019.12.23 14:25:41 -05'00'

Date of JD: **12/23/2019** Expiration Date of JD: **Not applicable**

NOTIFICATION OF ADMINISTRATIVE APPEAL OPTIONS AND PROCESS AND REQUEST FOR APPEAL

Applicant: **Don E. Morgan Living Trust**	File Number: **2019-00834**	Date: **12/23/2019**

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. Phillip Shannin, Administrative Appeal Review Officer CESAD-PDO U.S. Army Corps of Engineers, South Atlantic Division 60 Forsyth Street, Room 10M15 Atlanta, Georgia 30303-8801 Phone: (404) 562-5137	
RIGHT OF ENTRY: Your signature below grants the right of entry to Corps of Engineers personnel, and any government consultants, to conduct investigations of the project site during the course of the appeal process. You will be provided a 15 day notice of any site investigation, and will have the opportunity to participate in all site investigations.		
_____ Signature of appellant or agent.	Date:	Telephone number:

For appeals on Initial Proffered Permits send this form to:

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

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

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

Copies Furnished:
KCI Technologies, Inc., Attn: Joe Sullivan (via email)

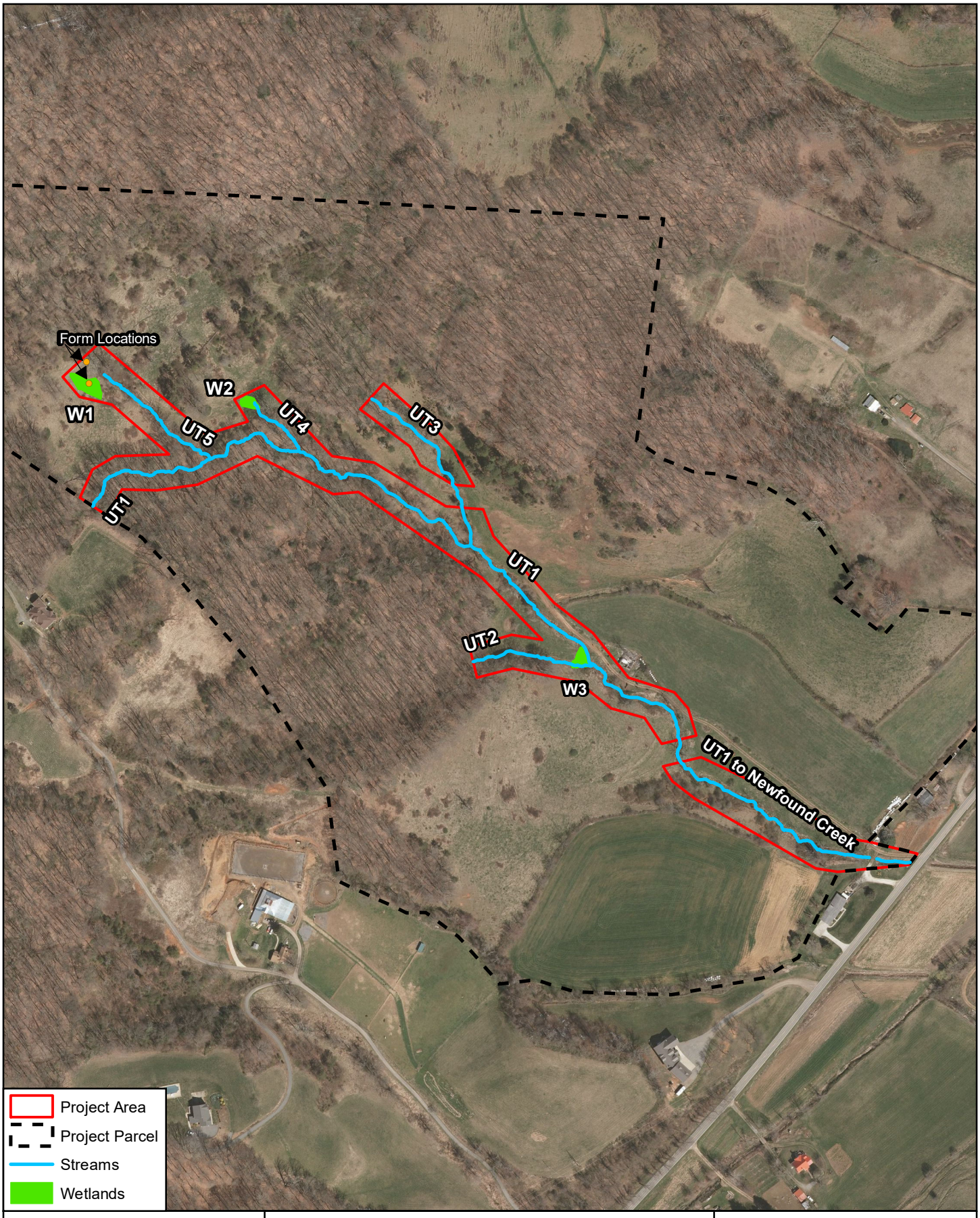

FIGURE 3. POTENTIAL WATERS OF THE U.S.
DALES CREEK RESTORATION SITE
BUNCOMBE COUNTY, NC

12/23/19

Source: NC OneMap Orthoimagery, 2015.

Appendix 2 - PRELIMINARY JURISDICTIONAL DETERMINATION (PJD) FORM

BACKGROUND INFORMATION

A. REPORT COMPLETION DATE FOR PJD: 12/23/19

B. NAME AND ADDRESS OF PERSON REQUESTING PJD: Joseph Sullivan, 4505 Falls of Neuse Rd; Suite 400, Raleigh, NC 27609

C. DISTRICT OFFICE, FILE NAME, AND NUMBER: CESAW-RG-A / Dales Creek Mitigation Bank Site/ AID 2019-00834

D. PROJECT LOCATION(S) AND BACKGROUND INFORMATION:
(USE THE TABLE BELOW TO DOCUMENT MULTIPLE AQUATIC RESOURCES AND/OR AQUATIC RESOURCES AT DIFFERENT SITES)

State: NC County/parish/borough: Buncombe City: Leicester

Center coordinates of site (lat/long in degree decimal format):

Lat.: 35.5986 Long.: -82.7458

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): 11/20/19

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 resource in review area (acreage and linear feet, if applicable)	Type of aquatic resource (i.e., wetland vs. non-wetland waters)	Geographic authority to which the aquatic resource "may be" subject (i.e., Section 404 or Section 10/404)
see	attached	table			
UT1-5				non-wetland	Section 404
W1-3				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:

- [x] Maps, plans, plots or plat submitted by or on behalf of the PJD requestor:
  Map: Vicinity Map.
- [x] Data sheets prepared/submitted by or on behalf of the PJD requestor.
  - [x] Office concurs with data sheets/delineation report.
  - [ ] Office does not concur with data sheets/delineation report. Rationale: _____.
- [ ] Data sheets prepared by the Corps: _____.
- [ ] Corps navigable waters' study: _____.
- [ ] U.S. Geological Survey Hydrologic Atlas: _____.
  - [ ] USGS NHD data.
  - [ ] USGS 8 and 12 digit HUC maps.
- [x] U.S. Geological Survey map(s). Cite scale & quad name: Canton & Enka 1:24K.
- [ ] Natural Resources Conservation Service Soil Survey. Citation: _____.
- [ ] National wetlands inventory map(s). Cite name: _____.
- [ ] State/local wetland inventory map(s): _____.
- [ ] FEMA/FIRM maps: _____.
- [ ] 100-year Floodplain Elevation is: _____.(National Geodetic Vertical Datum of 1929)
- [x] Photographs: [x] Aerial (Name & Date): 2015 Statewide Aerial Photographs.
  or [ ] Other (Name & Date): _____.
- [ ] Previous determination(s). File no. and date of response letter: _____.
- [ ] Other information (please specify): _____.

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

FUEMMELER.AMANDA.JONES.1242835090 Digitally signed by FUEMMELER.AMANDA.JONES.1242835090 Date: 2019.12.23 12:26:45 -05'00'

Signature and date of Regulatory staff member completing PJD

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

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

Table 1.

Stream Name	Stream Status	Bankfull Height (Feet)	Bankfull Width (Feet)	Length (Feet)	DWQ Score	Lat	Long
UT1 to Newfound Creek	Perennial	4.5	10	2,918	22.5/34.5	35.5982	-82.7453
UT2	Intermittent	2	3	348	20	35.5984	-82.7432
UT3	Intermittent	3	3	526	22.5	35.5995	-82.7467
UT4	Intermittent	2	3	190	19	35.6000	-82.7485
UT5	Intermittent	2	3	389	19.5	35.6000	-82.7494

Table 2.

Wetland ID	NCWAM	Class		Isolated	Size	USACE Forms		Lat	Long
		Hydrologic	Cowardin	Yes/No	(Acres)	WET	UP		
W1	Seep	Riparian	PEM	No	0.07	X	X	35.6003	-82.7501
W2	Seep	Riparian	PEM	No	0.03	W1	W1	35.6002	-82.7487
W3	Bottomland Hardwood Forest	Riparian	PEM	No	0.04	W1	W1	35.5984	-82.7456

Palustrine Emergent
X = Data form completed

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9. Invasive Species

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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. One anticipated treatment is that existing undesirable pasture grasses will be sprayed with herbicide and left fallow until full mortality is achieved during the construction/planting phase. 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. Any other 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)

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10. Approved FHWA Categorical Exclusion

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Categorical Exclusion Form for Division of Mitigation Services Projects
Version 2

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

Part 1: General Project Information	
Project Name:	**Dale's Creek Restoration Site**
County Name:	**Buncombe**
DMS Number:	**100128**
Project Sponsor:	**KCI**
Project Contact Name:	**Charlie Morgan**
Project Contact Address:	**4505 Falls of Neuse Road Suite 400 Raleigh NC 27609**
Project Contact E-mail:	**charlie.morgan@kci.com**
DMS Project Manager:	**Harry Tsomides**

Project Description

The Dale's Creek Restoration Site (DCRS) 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 riparian buffer. This site offers the chance to restore streams impacted by pasture and agriculture to a stable headwater ecosystem with a functional riparian buffer and floodplain access, while also reducing incoming nutrients from livestock.

For Official Use Only

Reviewed By:

3/31/2020 — **Date**

Harry Tsomides — **DMS Project Manager**

Conditional Approved By:

Date

For Division Administrator FHWA

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

Final Approval By:

4-15-20 — **Date**

Donald W. Brew — **For Division Administrator FHWA**

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

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

Executive Order 13007 (Indian Sacred Sites)	
1. Is the project located on Federal lands that are within a county claimed as "territory" by the EBCI?	☐ Yes ☑ No
2. Has the EBCI indicated that Indian sacred sites may be impacted by the proposed project?	☐ Yes ☐ No ☑ N/A
3. Have accommodations been made for access to and ceremonial use of Indian sacred sites?	☐ Yes ☐ No ☑ N/A
Farmland Protection Policy Act (FPPA)	
1. Will real estate be acquired?	☑ Yes ☐ No
2. Has NRCS determined that the project contains prime, unique, statewide or locally important farmland?	☑ Yes ☐ No ☐ N/A
3. Has the completed Form AD-1006 been submitted to NRCS?	☑ Yes ☐ No ☐ N/A
Fish and Wildlife Coordination Act (FWCA)	
1. Will the project impound, divert, channel deepen, or otherwise control/modify any water body?	☑ Yes ☐ No
2. Have the USFWS and the NCWRC been consulted?	☑ Yes ☐ No ☐ N/A
Land and Water Conservation Fund Act (Section 6(f))	
1. Will the project require the conversion of such property to a use other than public, outdoor recreation?	☐ Yes ☑ No
2. Has the NPS approved of the conversion?	☐ Yes ☐ No ☑ N/A
Magnuson-Stevens Fishery Conservation and Management Act (Essential Fish Habitat)	
1. Is the project located in an estuarine system?	☐ Yes ☑ No
2. Is suitable habitat present for EFH-protected species?	☐ Yes ☐ No ☑ N/A
3. Is sufficient design information available to make a determination of the effect of the project on EFH?	☐ Yes ☐ No ☑ N/A
4. Will the project adversely affect EFH?	☐ Yes ☐ No ☑ N/A
5. Has consultation with NOAA-Fisheries occurred?	☐ Yes ☐ No ☑ N/A
Migratory Bird Treaty Act (MBTA)	
1. Does the USFWS have any recommendations with the project relative to the MBTA?	☐ Yes ☑ No
2. Have the USFWS recommendations been incorporated?	☐ Yes ☐ No ☑ N/A
Wilderness Act	
1. Is the project in a Wilderness area?	☐ Yes ☑ No
2. Has a special use permit and/or easement been obtained from the maintaining federal agency?	☐ Yes ☐ No ☑ N/A

11. Agency Correspondence

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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: July 23, 2019

Attendees: Paul Wiesner, NC Division of Mitigation Services
Harry Tsomides, NC D Division of Mitigation Services
Kirsten Ullman, NC D Division of Mitigation Services
Periann Russell, NC D Division of Mitigation Services
Mac Haupt, NC Division of Water Resources
Erin Davis, Division of Water Resources
Andrea Leslie, NC Wildlife Resources Commission
Todd Tugwell, US Army Corps of Engineers
Kim Browning, US Army Corps of Engineers
Tim Morris, KCI Technologies, Inc.
Charlie Morgan, KCI Technologies, Inc.
Adam Spiller, KCI Technologies, Inc.

From: Tim Morris, Project Manager
KCI Technologies, Inc.

Subject: Dales Creek Restoration Site
Post Contract IRT Site Review Meeting
French Broad 05
Buncombe County, North Carolina
Contract No. #7910
DMS Project #100128

An IRT field review was conducted for the above referenced project on July 23rd starting at approximately 11:30 am. Weather was overcast with periods of heavy rain during the site visit. All project tributaries that were evaluated were flowing during the meeting.

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. All project reaches and approaches will need to be justified in the mitigation plan; project reaches, including adding any creditable reaches upstream, would be contingent upon an approved jurisdictional determination.

UT1 Newfound Creek

- Todd Tugwell and Mac Haupt commented on the large number of crossings in the small project, especially on the main channel. A meeting has been scheduled with the landowners to determine the feasibility of reducing the number of crossings. Specifically the first crossing from the bottom

of the project and the crossing of UT2 will be the crossings targeted for removal or relocation. Details will be provided in the mitigation plan.

- Several IRT members were curious about why the easement was terminated at UT1 when it continued to flow upstream. Pending landowner consent, KCI will continue the UT1 easement to the property line at the same 5-1 ratio proposed for the reach below.
- Kim Browning mentioned that restoration of this reach may be applicable in the area proposed for E1 on UT1. KCI will evaluate a full restoration approach in this area but believes that the primary need for the channel in this area are cross section adjustments and targeted structure placement to ensure the long term stability of this reach.

UT2

- The area upstream of the headcut and what is shown on the attached figure as the terminus of UT2 was flowing at the time of the meeting. Benthic macroinvertebrates were found in the upper section of this reach indicative of longer duration of flow than was determined during the proposal assessment period. IRT indicated that expansion of this E2 reach to cover this upstream area would be beneficial (pursuant to a favorable Jurisdictional Determination) to the project, especially considering the cattle were active in these areas.
- Pending landowner approval, KCI will expand the easement upstream of the UT2 head-cut to incorporate the intermittent section of UT2 where cattle have access.
- The IRT recommended a BMP above the terminus of UT2 if cattle could not be excluded from the upstream reach.
- KCI will look into moving the UT2 crossing upstream where an existing crossing is located. This will be discussed at the landowner meeting noted above.

Attachments:

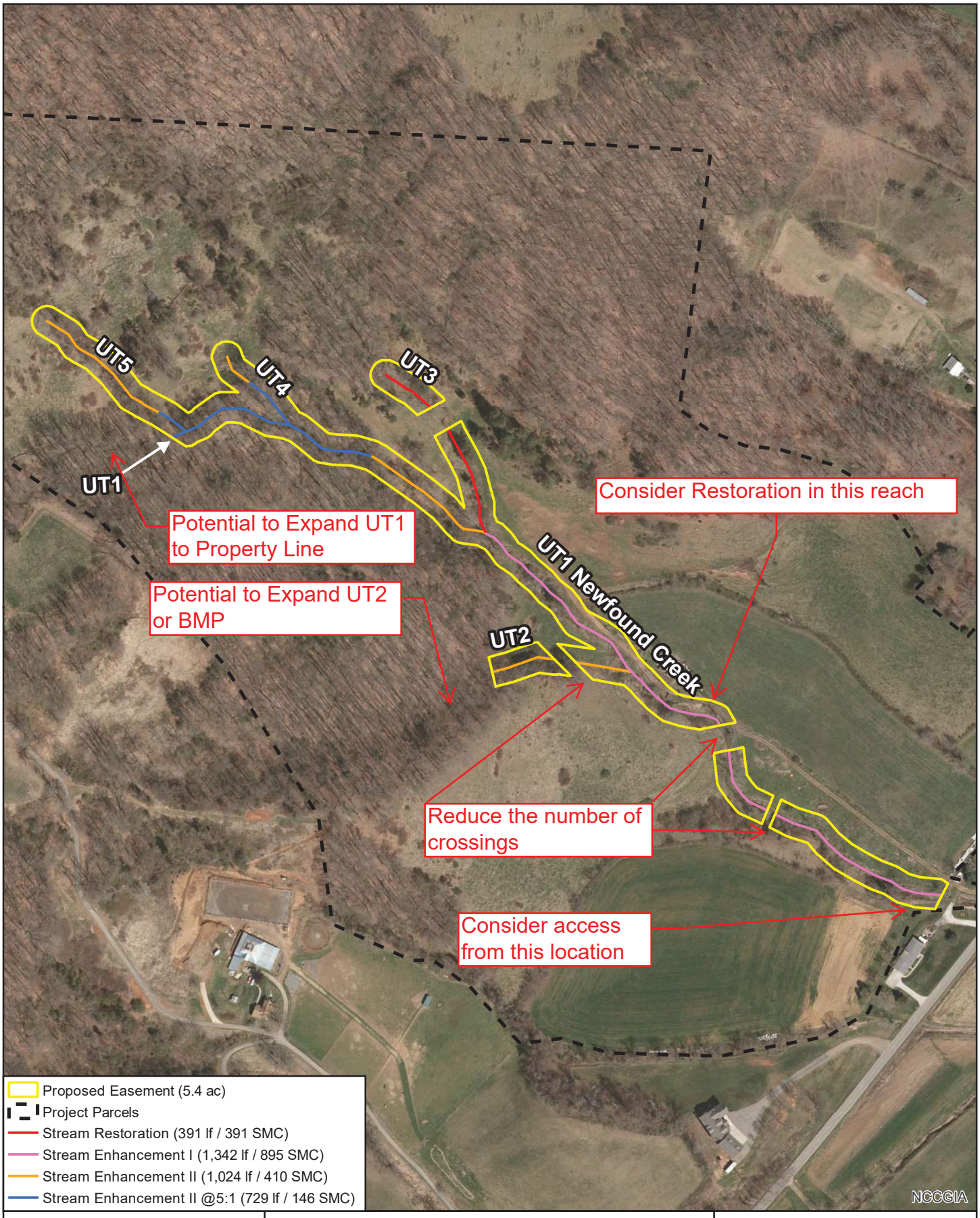
Figure 11
Figure 11 (with edits)

0 150 300 Feet

FIGURE 11. PROPOSED MITIGATION TYPE AND EXTENT
DALES CREEK RESTORATION SITE
BUNCOMBE COUNTY, NC

N

Image Source: NC Statewide Orthoimagery, 2015



0 150 300 Feet

FIGURE 11. PROPOSED MITIGATION TYPE AND EXTENT
DALES CREEK RESTORATION SITE
BUNCOMBE COUNTY, NC

N

Image Source: NC Statewide Orthoimagery, 2015