UT to Rush Fork Stream Mitigation Project
Mitigation Plan – Final

Haywood County, North Carolina
French Broad River Basin: 06010106
DMS Project ID No. 100068, DEQ Contract No. 7535, DMS RFP #16-007335
(Issued: 9/8/2017), USACE Action ID No. SAW-2018-01171, DWR# 20181034

Prepared for:

NC Department of Environmental Quality (DEQ)
Division of Mitigation Services (DMS)
217 West Jones St. – Suite 3000A
Raleigh, North Carolina 27603

April 2021

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

REPLY TO
ATTENTION OF:

April 19, 2021

Regulatory Division

Re: NCIRT Review and USACE Approval of the NCDMS UT to Rush Fork Mitigation Site / Haywood Co./ SAW-2018-01171/ NCDMS Project # 100068

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 UT to Rush Fork Draft Mitigation Plan, which closed on March 28, 2021. These comments are attached for your review.

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

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

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

Sincerely,

Kimberly Danielle Browning

Digitally signed by Kimberly Danielle Browning
Date: 2021.04.19 15:08:14 -04'00'

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

Enclosures

Electronic Copies Furnished:

NCIRT Distribution List
Paul Wiesner—NCDMS
Scott King—Michael Baker Engineering, Inc.

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April 29, 2021

Kim Browning, Mitigation Project Manager
Regulatory Division
US Army Corps of Engineers – Wilmington District
69 Darlington Ave
Wilmington, NC 28403

Subject: Response to IRT Comments for Draft Mitigation Plan Review
UT to Rush Fork Stream Mitigation Project, Haywood County, French Broad River Basin,
CU# 06010106, DMS Project #100068, DEQ Contract #7535.

Ms. Browning:

Please find enclosed our responses to the IRT review comments dated March 30, 2021 in reference to the UT to Rush Fork Stream Mitigation Project's Draft Mitigation Plan. We have revised the Draft document in response to the referenced review comments as outlined below.

WRC Comments, Andrea Leslie:

1. As noted in my response to an earlier scoping letter, a trout moratorium does not apply for this project.
Response: Thank you for reiterating this point.

2. I am glad to see culvert specifications include floodplain culverts. The plan set shows site-specific culvert specs. For culvert on UT1-Reach 1, floodplain culverts are noted. However, they are not noted for the culverts on UT1-Reach 4 or UT3. Is this because there will be no floodplain culverts? Seems more important for the larger channel of UT1-Reach 4.
Response: Only the crossing on UT1-R1 will have floodplain culverts installed. It's located at an existing crossing on a noticeably flatter/wider section of reach that is not particularly entrenched (despite the reach overall being a B-type stream), thus the addition of floodplain pipes will provide meaningful benefit here. Reach UT3 is a smaller system overall and as an entrenched B-type stream has a very narrow natural floodplain upon which to place any additional culverts. Similarly, the crossing on UT1-R4 is located in an entrenched and incised section of B-type stream just below NC-209. There simply isn't a floodplain present and the channel bed cannot be raised enough at this point so close to the road, nor can the proposed bank sloping be enough to provide for the practical use of floodplain culverts here. Baker wants to install floodplain pipes but only in locations where they will provide meaningful benefits. Please note that the new culverts being installed are larger than any of the existing culverts being replaced and do represent meaningful hydrologic improvements.

3. The planting list includes canopy and understory species, and in general the list includes a nice mix of rich cove/riparian species found in this general area. However, both river birch and sycamore are much more typical of larger systems, and we recommend eliminating these species from the planting plan. Red maple is included at 5% of the wetland canopy species list, and we recommend eliminating that species, as it will very likely volunteer into the site.
Response: As both river birch and sycamore are specifically listed as being commonly found in the target plant community types of both the Montane Alluvial Forest (small stream subtype) and the South-Central

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Interior Small Stream and Riparian communities, Baker feels strongly that they should remain in the planting plan. They are a part of a fairly wide mix of selected species and should not dominate. Red maple has been reluctantly removed from the planting list, though it would be expected to be a fairly important species in these communities. Baker also understands this WRC comment to imply that any red maple volunteers will be accepted for counting towards closeout density numbers.

4. The plan notes that the existing riparian community is degraded; thus there is no on-site reference. We recommend informing the planting plan by finding nearby riparian/wetland community reference sites.
Response: While there is no direct on-site reference due to degraded conditions, Baker staff investigated the undisturbed stream areas both above and below UT1, as well as riparian areas in the immediately surrounding area, and incorporated the existing mature vegetation into our species selection.

USACE Comments, Kim Browning:
1. Table 6.7: Since red maple is a pioneer species that is more shade tolerant and longer lived than the usual early successional species, please remove red maple from the planting list as it will likely occur naturally.
Response: As noted above, red maple has been removed from the planting list. Baker understands this USACE comment to imply that any red maple volunteers will be accepted for counting towards closeout density numbers.

2. Please move the fixed veg plot on UT1 (just south of UT4) slightly south to encompass the existing wetlands.
Response: That fixed veg plot was moved further south to encompass more of the wetland area as requested.

3. General note: Please do not use green lines on the figures to show streams; It's very difficult to differentiate the line from the pasture in the background.
Response: The green line stream in the figures was changed as requested.

4. Figure 11: Please mark locations of photo points, to include crossings and culverts. If cross-sections are to be used as fixed photo points, please footnote the Figure.
Response: Baker will absolutely include annual monitoring photo points at all crossing and culverts for the project. And while the cross-sections will include photos of both banks, they have never been considered part of the project photo points per se, but simply a part of the cross section assessments. Baker will show all photo point locations on the CCPV with the as-built report.

5. Section 3.2: Please include a discussion on biological and cultural resources, and summarize any agency responses.
Response: Appendix I contains the Categorical Exclusion information, which already includes both a 2-page checklist summary and a 6-page written summary of all agency communications. Baker added a discussion of the biological and cultural resource investigation from those summaries to Section 3.2

6. Section 4: Since this proposed site is adjacent to forested areas, consideration should be given to the possible future conversion of that land to agricultural use and/or timbering. The addition of wider buffers would have been beneficial, especially in upper UT3 and UT1, given the slope of the surrounding forested property. The potential for adjacent timbering would also be helpful to describe in Section 6.7.
Response: Text was added to Sections 4 and 6.7 to specifically acknowledge the potential for upstream land use changes for agriculture and timbering. It should be noted that the upstream drainage area for

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the project consists of very steep slopes and isn't particularly suited for agriculture (even pasture) though timbering remains a possibility as noted. The project will certainly help the stream to remain stable from changes to hydrology caused by timbering (or other development). The restoration includes significant bank stabilization, improved access to the floodplain, restored buffers, and numerous in-stream grade control structures and pool features. Then through the exclusion of livestock from the streams the system will be allowed to fully stabilize and establish itself, thus providing significant protection against any potential damage from upstream changes, particularly as compared to the existing conditions.

7. Section 6.1: Please include a map that shows the reference sites in relation to the project site. You can add these locations to Figure 3 if you prefer.
Response: The UT to Wilkins reference site is now shown on Figure 3, while the other reference reaches used were located approximately 300 ft above and 200 ft below UT1 within stable, mature, wooded areas.

8. Reach UT3: Please ensure there is a photo point between stations 19+20 and 20+60 in the area where the stream becomes braided, as single-channel formation will be a concern.
Response: This area will certainly be monitored with photo points as advised but Baker believes this section is braided primarily due to the particularly intense cattle activity present here. They appear to prefer this section as it a relatively flatter area. Once cattle are excluded, Baker is confident the restored single-thread channel will maintain form.

9. Section 6.2: I appreciate the detail of the existing conditions and proposed approaches. The section describing UT1-R2 indicates that a few locations along the right bank are vertical and will be sloped and stabilized. Please indicate the general area of these on Figure 4, Existing Conditions & Features.
Response: The vertical bank sections along UT1-R2 have been added to Figure 4 as requested.

10. Section 7.1.1: The 30-days of consecutive flow is only applicable to intermittent streams (UT2 & UT4). Since UT3 is perennial, it is expected to have flow throughout the year. I believe the flow gauge on UT3 was requested to document flow in the area that flattens out (comment #8 above). Additionally, UT4, though a very short reach, should have some sort of documentation of flow (whether through a gauge, video or photo) due to its designation as intermittent and the small drainage area. Please revise the performance standard for Bankfull Events and Flooding Functions.
Response: The location of the flow gauge along UT3 has been adjusted to be installed within the previously discussed section that flattens out. Additionally, a flow gauge will be installed within UT4 to confirm flow.

11. Section 7.2: The minimum height standard at monitoring year 7 should be 8 feet, excluding the understory/shrub species.
Response: Revision made as advised.

a. Regarding the statement, "While measuring species density and height is the current accepted methodology for evaluating vegetation success on mitigation projects, species density and height alone may be inadequate for assessing plant community health…." If monitoring suggests that the vegetation is not on a trajectory for success, an adaptive management plan should be submitted that may include the evaluation of native volunteer species and additional plant community indices.
Response: Text was added to this section to include the potential addition of an adaptive management plan as described.

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12. Section 7.3: Stream relocation is estimated to impact existing wetlands within the easement. Though it is anticipated that the total wetland acreage will likely increase as a result of stream restoration, the Corps must still ensure that there is no net loss of wetlands as a result of ecological restoration. Please plan to reverify the extent of jurisdiction at the end of the monitoring period to document that wetland acreage was not lost. Thank you for including this section and the forethought put into it.
Response: We understand the Corps' concern. This section was added to address those very issues.

13. Section 7.1.2 & Table 8.1: Please note that UT4 is proposed as a C-type channel.
Response: Changes made as requested.

14. Sheet 9: It's unclear on the drawing where existing wetlands are. Please clarify this layer throughout the plan sheets. Additionally, please confirm that the entirety of the BMP will not be placed in a jurisdictional feature.
Response: The existing wetland layer boundary has been added to the plan sheets. And to confirm, none of the BMP itself is being placed within any jurisdictional feature (stream or wetland), though there is a narrow rock-lined overflow swale that will go through ~23 ft² of wetland adjacent to the restored stream. This swale is needed to safely convey the BMP overflow down the fairly steep slope and into the stream.

DWR Comments, Erin Davis:
1. Page 6-10, BMP Subsection – A revegetation plan is referenced. Please confirm whether the BMP will be planted/seeded with species proposed for the larger site planting plan or if additional species are proposed specifically for this area. Also, please state whether there is an expectation of long-term maintenance for this BMP design.
Response: The BMP will be held to its own revegetation plan as per the NCDEQ Stormwater Design Manual's minimum design criteria (MDC) as referenced in the BMP design sub-section description and the BMP design memo in Appendix A. Newly added Sheet 17 of the plan set shows the revegetation table of selected species. There is no long-term maintenance expected for this BMP.

2. Page 6-17, Table 6.7 – DWR appreciates the diversity of canopy and understory/shrub species proposed. Since it is a common volunteer species, please remove red maple from the plant list.
Response: As noted above, red maple has been removed from the planting list. Baker understands this DWR comment to imply that any red maple volunteers will be accepted for counting towards closeout density numbers.

3. Page 7-3, Section 7.2
a. The mountain counties tree vigor performance standard applies to this site, so the average tree height in Year 7 should be 8 feet. **Response: Correction made as noted.**
b. Please confirm that only native herbaceous species will be seeded/planted within the conservation easement. **Response: Yes, Baker confirms that only native herbaceous species will be seeded within the easement as part of the permanent seed mixture (see Table 6.8 for details). The text was slightly revised to make that more clear.**

4. Page 8-1, Table 8.1
a. Please note that bankfull events are to occur in separate years.
b. Please include the vegetation vigor performance standard.
Response: Both corrections made as noted.

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5. Page 8-2, Table 8.2 – DWR requires that at minimum a photo point be included along UT4 to document that channel features are maintained. DWR may request a gauge or cross section be added during monitoring in order to support restoration credit if we observe evidence of instability or characteristics trending towards a wetland feature.
Response: Baker will certainly include photo points of this short reach and will look for any indications of instability throughout the monitoring period.

6. Figure 11 – DWR is concerned with the number of mature black walnut proposed to remain within the 300-ft Enhancement II section of UT1 Reach 2. Given that vegetative success is a significant component for EII credit, DWR requires an additional veg plot in this area to document density, vigor, diversity standards are met within the vicinity of the black walnuts.
Response: Based on the level of concern expressed regarding the black walnut in this location from various groups, Baker has elected to remove these few trees and plant the UT1-R2 buffer fresh.

7. Sheet 1-A – Was the "WLB" wetland jurisdictional boundary line show on the plan sheets? If so, please make more visible. If not, please add.
Response: WLB wetland boundary line has been added to the plans.

8. Sheet 2B – Is this Rock Dam being proposed as a permanent structure (different from the Temporary Rock Dam on Sheet EC-2)?
Response: The Rock Dam drawing shown was erroneously included on Sheet 2B and is not being installed as a permanent structure and has been removed. It was an accidental repeat of the Temporary Rock Dam shown on Sheet EC-2 as part of the Erosion Control structures.

9. Sheet 2E – Please include a detail for the proposed stormwater BMP.
Response: A new detail found on Sheet 17 has been added for the stormwater BMP.

10. Sheet 3 – No. 15 notes no roughening of any areas not excavated. Please confirm that any disturbed areas compacted during construction or previously used as farm roads will be de-compacted before seeding and planting.
Response: Yes, Baker confirms we will loosen or rip/disk the soil prior to placing out seed and straw in all areas impacted during construction to include compacted vehicle paths, old farm roads, etc., not just those areas directed graded or excavated.

11. Sheet 4 – DWR appreciates the inclusion of notes relating to invasive treatment and topsoil application. Please confirm the minimum topsoil layer depth as either 8 inches or 6 inches (Sheet 1-A #7).
Response: The note has been revised to show a consistent 8 inch topsoil depth.

12. Sheet 5 – Does the culvert under the adjacent gravel road extend into the conservation easement? If so, the landowner needs to be aware that maintenance coordination with DEQ Stewardship may be required.
Response: Yes, the end of the culvert extends approximately 5 feet into the easement. The landowner will be made aware of the need for coordination with DEQ Stewardship prior to any maintenance work.

13. Sheets 4 & 5 – Please show/callout all proposed stream enhancement construction work areas, including bank grading, along UT1 Reach 2 and UT2.
Response: For these two reaches, Sheets 4 and 5 of the plans set have had the existing conditions tops-of-banks line identified with a label. This should more readily illustrate the location and degree of bank

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work to be performed on these sections through their easy comparison with the proposed design channels.

14. Sheet 6 – Please confirm that no structures or bank treatments are proposed for UT4 and that the restoration reach has been designed for long-term stability as shown on the plan sheet. As noted in the above comment, design sheets should show all proposed work. The Mitigation Plan Table 3.1 identifies this reach as a Cb stream classification, correct?
Response: While no structures are proposed for UT4, a completely new channel and alignment is being constructed for this ~40 ft long reach as shown on the plan sheets. The new channel dimensions are based on regional curve information and are certainly being designed for long-term stability. And yes, the new channel is considered to be a Cb-type, though admittedly it is so short that it is somewhat more difficult to conclusively define as compared to the other reaches. But as UT4 flows onto the floodplain of UT3 prior to their confluence, it will not be particularly entrenched (a defining difference between B and C types) and thus the C-type designation. Further upstream out of the easement, the reach does have characteristics closer to a B-type.

15. Sheets 4-8 & 11 – No existing channel fill or channel plugs are shown on these plan sheets. Please confirm that all the associated stream reaches will be restored/enhanced completely in-place.
Response: That is correct, stream reaches will be restored in place and there is no channel fill or plugs being proposed.

16. Sheets 17-19 – The planting plan shows the entire conservation easement area will be seeded, mulched and planted with lives stakes or bare root trees. The Mitigation Plan Table 3.1 indicates that 7.3 acres of the 8.26 easement with be planted and Page 7-2 notes that plots won't be placed in undisturbed wooded areas onsite. Please make a distinction on the planting plan or a separate figure of areas to be fully planted, partially planted (understory), and not planted.
Response: The planting plan is correct - the entire site is to be fully planted as shown. But of course the streams themselves will not be planted between their tops of banks and when those open water areas are removed from the conservation easement area you arrive at a final 7.3 acre planted area. The statement on Page 7-2 is part of our general description of planting practices.

17. DWR appreciates efforts made to enhance the proposed project, including additional fencing of the upper UT4, installing and fencing a BMP on UT3, collating of the utility and farm access crossing, and additional non-credit work to stabilize stream sections within road/utility ROWs.
Response: Thank you for the positive feedback!

Please do not hesitate to contact me should you have any questions regarding our response submittal.

Sincerely,

Scott King, LSS, PWS
Project Manager

UT to Rush Fork Stream Mitigation Project
Stream Mitigation Plan – Final

Haywood County, North Carolina

French Broad River Basin: 06010106

DMS Project ID No. 100068, DEQ Contract No. 7535, DMS RFP #16-007335 (Issued: 9/8/2017), USACE Action ID No. SAW-2018-01171, DWR# 20181034

Prepared for:
NC Department of Environmental Quality (DEQ)
Division of Mitigation Services (DMS)
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Prepared by:

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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.

April 2021

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APPENDICES

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1.0 PROJECT INTRODUCTION

The UT to Rush Fork Stream Mitigation Project (project) is located on two adjacent parcels of an active cattle farm in Haywood County, North Carolina, halfway between the unincorporated communities of Crabtree and Fines Creek as shown on the Project Vicinity Map (Figure 1). The project site entrance is 5.9 miles down Route 209 on the right at 9503 Rush Fork Road. Coordinates for the approximate center of the project are 35.644607 N Latitude, -82.940170 W Longitude.

The project area lies within the French Broad River Basin, Hydrologic Unit Code (HUC) 06010106-020010 (named the Pigeon River/Crabtree Creek Watershed), which is identified as a Targeted Local Watershed (TLW) in the NC Division of Mitigation Services' (DMS) 2009 *French Broad River Basin Restoration Priorities* (RBRP) report. The project is located in the Blue Ridge Physiographic Region, within the Southern Crystalline and Mountains Level IV ecoregion. The project watershed drains into Rush Fork Creek approximately 700 linear feet (LF) below the project property. Rush Fork flows for approximately 2.8 miles to its confluence with Crabtree Creek which continues for approximately 0.7 miles where it flows into the Pigeon River. All of these tributaries and streams are designated as Class C waters by the DWR surface water classification.

The project will restore 2,865.36 LF and enhance an additional 1,185.64 LF of stream along 7 reaches. Additionally, approximately 0.996 acres of adjacent riparian wetlands will be enhanced and protected within the conservation easement.

Historic and current agricultural use on the project site has predominantly been livestock pasture. These activities have negatively impacted both water quality and streambank stability along the project stream reaches. The resulting observed stressors include streambank erosion, sedimentation, excess nutrient input, channel modification, and the loss of riparian buffers.

To address the observed stressors, the goals of this project include:

- Reconnect stream reaches to their floodplains,
- Improve stream stability,
- Improve aquatic habitat,
- Reestablish forested riparian buffers, and
- Permanently protect the project in a conservation easement.

The project is anticipated to generate a total of 3,533.610 cold-water stream mitigation credits (contracted for 3,000), and the site will be protected by an 8.26 acre permanent conservation easement (Appendix B).

2.0 WATERSHED APPROACH AND SITE SELECTION

The UT to Rush Fork Stream project is located in Haywood County within the Pigeon River/Crabtree Creek subwatershed (06010106-020010) of the French Broad River Basin (Figure 1), which is identified as a TLW in DMS' 2009 *French Broad River Basin Restoration Priorities* (RBRP) report. The report states that this subwatershed has the highest proportion of agricultural land within the larger Pigeon River drainage area, and notably only has 44% of its stream length adequately buffered. The resulting water quality impacts include high nutrient levels, which have impacted the biological community as demonstrated by a reported lack of sensitive species. The RBRP outlines four primary watershed restoration goals to address the water quality stressors and habitat degradation affecting the basin. The UT to Rush Fork project will directly or indirectly address two of these stated goals: to implement wetland and stream restoration projects that reduce sources of sediment and nutrients by restoring riparian buffer vegetation, stabilizing banks, excluding livestock, and restoring natural geomorphology, especially in headwater streams; and to restore and protect habitat for priority fish, mussel, snail, and crayfish species in the basin. Furthermore, the RBRP also lists an additional goal specific to the Pidgeon River watershed: to work with the Haywood Waterways Association to implement their restoration priorities.

The NC Division of Water Resources' (formerly Division of Water Quality) *2011 French Broad River Basinwide Water Quality Plan* (DWR 2011) lists six major stressors affecting watershed functions in the basin, and the UT to Rush Fork project will directly address three of those stressors: pathogens, turbidity, and habitat degradation. Additionally, the Haywood Waterways Association's 2002 *Watershed Action Plan for the Pigeon River Watershed* (updated in 2014) identified sediment as a primary stressor to the Pigeon River, with eroding streambanks as one of the major contributing sediment sources. The action plan also identifies nutrient and sediment loading as a notable problem for Rush Fork Creek, and specifically highlights the need to improve cattle pasture management and to reduce the number of animal access points to Rush Fork to help address the water quality issues in the watershed.

The NC Wildlife Resources Commission (WRC) 2015 Wildlife Action Plan (WRC 2015) identifies the project as being located within a Tier 2 Priority watershed for wildlife conservation. It notes that are 26 Species of Greatest Conservation Need (SGCN) in the basin including 2 amphibian species, 1 crayfish, 19 freshwater fishes, and 4 freshwater mussel species. The report also makes several management practice recommendations for the basin, which includes the conservation and restoration of streams and riparian zones in priority areas. It also encourages working with conservation programs and partnerships, and specifically mentions the Haywood Waterways Association.

In addition, the protection and restoration of the UT to Rush Fork site will assist in providing a geographical connection with surrounding conservation features such as the Raven Cliff and Crabtree Bald Natural Areas, the Southern Appalachian Highlands Conservation Easements and Preserves, the Pisgah National Forest, and the Great Smoky Mountains National Park (Figure 3).

Thus, the UT to Rush Fork project will directly and/or indirectly address several of the priority stressors identified in the watershed planning documents discussed above, through the implementation of many of their recommended management practices, and will permanently protect the entire project area within a conservation easement. Therefore, the proposed project location and restoration approaches align well with the overall goals and implementation needs outlined by DMS.

3.0 BASELINE AND EXISTING CONDITIONS

The UT to Rush Fork Stream Mitigation Project is located along Route 209 halfway between the unincorporated communities of Crabtree and Fines Creek in Haywood County, North Carolina, within the French Broad River Basin. The following sections will describe the existing conditions found on the project and include a description and history of the surrounding landscape and overall watershed land use and conditions, as well as a discussion of the specific environmental impacts and responses they have produced on the project.

Table 3.1 below provides a summary of the key project attributes and individual reach parameters for the existing conditions on site. Existing stream lengths listed below include any piped stream length.

Table 3.1. Project Attributes for Existing Conditions
UT to Rush Fork Stream Mitigation Project – NCDMS Project No. 100068

Project Information				
Project Name	UT to Rush Fork Stream Mitigation Project			
County	Haywood			
Project Area within Easement (acres)	8.26			
Project Coordinates (latitude and longitude)	35.644607 N, -82.940170 W			
Planted Acreage (woody stems to be planted)	7.3			
Project Watershed Summary Information				
Physiographic Province	Blue Ridge			
River Basin	French Broad			
USGS Hydrologic Unit 8-digit	06010106	USGS Hydrologic Unit 14-digit	06010106-020010	
DWR Sub-basin	04-03-05			
Project Drainage Area (acres)	308 acres / 0.48 square miles (at downstream end of UT1)			
Project Stream Thermal Regime	Cold			
Project Drainage Area Percentage of Impervious Area	0.18% impervious area			
CGIA Land Use Classification[1]	79.8% forested, 17.1% hay/pasture, and 2.9% developed (open space).			
Reach Summary Information				
Parameters	**UT1**	**UT2**	**UT3**	**UT4**
Existing length of reach in CE (linear feet)	2,464	99	1,618	18
Valley confinement (Confined, moderately confined, unconfined)	Moderately Confined	Unconfined	Moderately Confined	Unconfined
Drainage area (acres)	308	24	98	27
Perennial, Intermittent, Ephemeral	Perennial	Intermittent	Perennial	Intermittent
NCDWR Water Quality Classification	C	C	C	C
Stream Classification (existing)	B4a	B	A to B4	B
Stream Classification (proposed)	B4a	B	A to B4	Cb
Evolutionary trend (Simon)	IV – Degradation and Widening	III – Degrading	IV – Degradation and Widening	III – Degrading
FEMA classification	Zone X	Zone X	Zone X	Zone X

Regulatory Considerations			
Parameters	**Applicable?**	**Resolved?**	**Supporting Docs?**
Water of the United States - Section 404	Yes	No	PCN
Water of the United States - Section 401	Yes	No	PCN
Endangered Species Act	Yes	Yes	Categorical Exclusion
Historic Preservation Act	Yes	Yes	Categorical Exclusion
Coastal Zone Management Act (CZMA or CAMA)	No	N/A	N/A
FEMA Floodplain Compliance	No	N/A	N/A
Essential Fisheries Habitat	No	N/A	N/A
[1] Source: USGS National Land Cover Database (NLCD) for 2016			

3.1 Watershed Processes and Resource Conditions

3.1.1 Landscape Characteristics

The UT to Rush Fork Stream Mitigation Project (project) is located on an active cattle farm in Haywood County within the Pigeon River/Crabtree Creek Watershed of the French Broad River Basin. The project is situated in the Blue Ridge Physiographic Region, within the EPA's Level IV Ecoregion 66d: Southern Crystalline and Mountains ecoregion (Griffith et al. 2002). This ecoregion is composed of low to high mountains with gently rounded to steep slopes, and narrow valleys with high gradient bedrock and boulder-bottomed cool, clear streams. This region has greater relief and higher elevations than many of the other Blue Ridge systems, with elevations ranging between 1,200-4,500 feet (this project site is located at ~3,000 feet). The region consists of mostly Mesic and Udic moisture regimes with annual averages of 45-60 inches of precipitation and 145-180 frost-free days, though the project is also located in the northern portion of this region which is typically warmer and drier than the southern portion. The region is generally composed of vegetation typical of an Appalachian oak forest and is primarily covered by well-drained, acidic, loamy soils.

Jurisdictional Streams and Wetlands

Field evaluations for the presence of jurisdictional features on the project were conducted on November 20 and December 19, 2017; August 14 and 15, 2018; and April 11, 2019; and included the determination of stream intermittent/perennial status, wetland delineations, and both stream and wetland qualitative assessments. These evaluations were based on the *NCDWR Methodology for Identification of Intermittent and Perennial Streams and Their Origins (v 4.11, 2010)*, the *US Army Corps of Engineers Wetlands Delineation Manual (1987)*, the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Eastern Mountains and Piedmont Region (v2.0, April 2012)*, the *NC Stream Assessment Methodology (2015),* and the *NC Wetland Assessment Methodology (2016)*. Results from these field reviews indicate that there are approximately 4,200 linear feet of jurisdictional stream and approximately 0.966 acres of jurisdictional wetlands located within the proposed project boundary (Figure 4). Tables 3.2 and 3.3 below present the summary findings of the stream and wetland classifications and assessment ratings. These field assessments were subsequently confirmed by USACE in the Preliminary JD received on May 1, 2019. Copies of the all the completed assessment forms and PJD confirmation can be found in Appendices F, G, and H.

Project Reaches UT1 and UT4 are denoted as solid "blue-line" streams on the USGS Topographic Map (Fines Creek Quadrangle, Figure 2), and UT3 is shown as a stream on historic soil surveys (see Appendix A) and the USGS StreamStats website. An additional tributary UT2 was identified in the field flowing into the upper section of UT1. DWR stream forms were completed for all stream reaches in the project area, and all sections of UT1 and UT3 were identified as perennial systems, while the remaining were intermittent.

Reaches UT1, UT3, and UT4 have been straightened, ditched and dredged in the past for agricultural use and currently have access by livestock. As a result, they are incised and have long sections of eroding banks, with excess sediment deposition present in portions of the bed (with filled pools and clogged riffles), and a noted overall lack of good riffle-pool morphology. Reach UT2 has access by livestock and has cut down as a result of having its receiving stream (UT1) incised. Additionally, all the reaches lack appropriate riparian buffers, with either absent or very narrow buffers consisting predominantly of invasive Chinese privet (*Ligustrum sinense*) along the majority of the banks. Thus, given the level of degradation observed, all reaches rated as 'Low' in the NC-SAM assessment.

Thirteen separate wetland areas were also found scattered throughout the project floodplain and headwater drainage areas totaling 1.288 acres (10 areas found within the easement totaling 0.996 acres). They all are classified as either headwater forest or bottomland hardwood forest in the NC-WAM methodology, though they have all been almost entirely cleared for agricultural use as pasture, with current livestock access to each one. Due to this clearing, they generally classify as emergent wetlands in the Cowardin system. The majority of the wetlands have also been hydrologically impacted by the incision of the adjacent stream. Thus, given the significant level of degradation observed in the wetlands, they all rated as 'Low' in the NC-WAM assessment. Further information and discussion of the project's jurisdictional features can be found in Section 3.2.3.

Table 3.2. Summary of Field Investigations to Determine Intermittent/Perennial Status
UT to Rush Fork Stream Mitigation Project – NCDMS Project No. 100068

Project Reach Designation	Existing Project Reach Length (ft)[1]	NCDWR Stream Classification Score	NC-SAM Rating	Watershed Drainage Area (acres)[2]	Stream Status
UT1	2,464	37.0	Low	308	Perennial
UT2	99	24.5	Low	24	Intermittent
UT3	1,618	30.5	Low	98	Perennial
UT4	18	24.25	Low	27	Intermittent

Notes: [1]Existing Reach length within the Conservation Easement, [2]Watershed drainage area was estimated using the online USGS StreamStats program, as well as topographic and LiDAR information at the downstream end of each reach.

Table 3.3. Summary of Field Investigations on Jurisdictional Wetlands
UT to Rush Fork Stream Mitigation Project – NCDMS Project No. 100068

Project Wetland Designation	Existing Wetland Area		Classification		
	Total (ac)	Within Conservation Easement (ac)	NC-WAM Classification	NC-WAM Rating	Cowardin
W-A	0.020	0.020	Headwater Forest	Low	PEM1
W-B	0.009	0.009	Headwater Forest	Low	PEM1
W-C	0.242	0.158	Headwater Forest	Low	PEM1
W-D	0.011	0.011	Bottomland Hardwood Forest	Low	PEM1
W-E	0.308	0.308	Bottomland Hardwood Forest	Low	PEM1
W-F	0.050	-	Headwater Forest	Low	PEM1
W-G	0.393	0.313	Headwater Forest	Low	PEM1
W-H	0.008	-	Headwater Forest	Low	PEM1
W-I	0.023	0.023	Headwater Forest	Low	PSS1
W-J	0.075	0.067	Headwater Forest	Low	PEM1
W-K	0.033	-	Headwater Forest	Low	PEM1
W-L	0.069	0.040	Bottomland Hardwood Forest	Low	PEM1B
W-M	0.047	0.047	Bottomland Hardwood Forest	Low	PEM1B
	1.288	**0.996**			

Climatic Conditions

The Waynesville 1E, NC weather station in Haywood County is located approximately 11 miles south of the project site. As reported in the AgACIS (Agricultural Applied Climate Information System) data generated for this station, the WETS table (Appendix A) lists the average annual rainfall for the surrounding area as 50.24 inches, based on data collected from 1989 – 2019 as shown below in Table 3.4 along with the monthly historic averages. This station will be used to determine departures from normal rainfall amounts throughout the project. The WETS table also reports the growing season for the site as 190 days in length beginning on April 15 and ending on October 22, using the 50% probability data for a temperature of 28° F or higher (http://agacis.rcc-acis.org/?fips=37087).

Table 3.4. Comparison of Monthly Rainfall Amounts for Project Site and Long-term Averages
UT to Rush Fork Stream Mitigation Project – NCDMS Project No. 100068

Month	Waynesville 1E Station Average Monthly Precipitation (in)	30% Probability Precipitation is less than (in)	30% Probability Precipitation is more than (in)
January	4.67	3.39	5.5
February	4.36	3.1	5.17
March	4.55	3.42	5.31
April	4.34	3.23	5.08
May	4.19	3.09	4.92
June	4.28	3.14	5.03
July	4.12	2.89	4.9
August	4.2	2.92	4.99
September	4.22	2.56	5.11
October	2.95	1.46	3.60
November	3.63	2.52	4.32
December	4.74	3.52	5.55
Total	**50.24**		
Annual Averages		**45.09**	**54.59**

Geology and Soils

Geologically, the Rush Fork Site lies within the Blue Ridge Belt, consisting of the sedimentary and metamorphic rock group in the biotite gneiss formation (see Figure 5). Described as migmatitic, it is interlayered and gradational with biotite-garnet gneiss and amphibolite, and with locally abundant quartz and alumino-silicates. The stratigraphic position of the formation is uncertain, as its complex mixture of rocks has been repeatedly squeezed, fractured, faulted, deformed, and twisted into folds over its one to one-half billion-year geologic history. (NSGS, 1985).

The project site is located with the Low and Intermediate Mountain Soil System of the Mountain Soil Region of North Carolina (Daniels et al., 1999), consisting primarily of residium and colluvium of the underlying metamorphic parent material. Topographically, these lower elevation mountain systems commonly have low rounded ridges, moderate to steep valley slopes, and fairly narrow river terraces and wet floodplains. The specific elevation and the aspect/exposure for a given area strongly influence soil development and properties in this system. Yet as compared with higher-elevation mountain systems, the soils found here typically have a thinner A-horizon, with stronger structural development, redder color, and a higher clay content in the B-horizon. Springs and seeps are also commonly found in the colluvial materials of these systems.

The specific soils found on the Rush Fork project site (Figure 7) are entirely dominated by Saunook loams, both with 8-15% slopes throughout the bulk of the floodplain, and with 15-30% slopes found in the upstream/upslope portions of the proposed reaches. Saunook loams are stony, but generally very deep, well drained, moderately permeable soils typically found on benches, fans, and toe slopes in coves and valleys of the Blue Ridge Mountains. Their formal taxonomic classification is: fine-loamy, mixed, superactive, mesic Humic Hapludults. They form from colluvium derived from weathered felsic

to mafic materials, from both igneous and high-grade metamorphic rocks. Slopes range widely from 2% to 60%, while their typical mean annual temperature is 53 degrees and mean annual precipitation is 55 inches. While Saunook loam soils are not listed by the NRCS as being hydric, there are clear pockets of hydric soils and wetlands found in the riparian areas throughout the project site.

Topography

The general topography within the project's 0.48 square mile drainage area is typical of this portion of Blue Ridge region. The surrounding terrain is rugged with steep hills and ridges overlooking narrow stream valleys. The average elevation of the drainage area is 3,360 feet, with a minimum elevation of 2,900 feet and a maximum elevation of 4,290 feet. The topography of the project site itself and its immediate surrounding area is very similar, with adjacent moderate to steeply sloped hills overlooking the project streams and floodplain. The project valley slopes vary for each of the two major project reaches. The valley for UT1 is steep with a 5.7% slope, while the UT3 valley is even steeper with a 7.5% slope. The project area within the easement has a high-point elevation of 3,088 feet and a low-point elevation of 2,912 feet. Figures 2 and 10 depict the topography for the project site and immediate surrounding area.

Existing Vegetation:

Vegetation on the project site itself has been heavily disturbed from years of use in agriculture, currently cattle pasture, but also from historic orchard groves. Currently the site is predominantly managed as pasture for livestock and the buffer of the project streams largely consists of a range of typical pasture grasses (fescues and clovers) with scattered weeds and other common herbaceous species present such as docks (*Rumex spp.*), wild geranium (*Geranium carolinianum*), common violet (*Viola sororia*), buttercup (*Ranunculus spp.*), thistle (*Cirsium vulgare*), goldenrod (*Solidago spp.*), horsenettle (*Solanum carolinense*), plantains (*Plantago spp.*), and dandelions (*Taraxacum officiniale*), with soft rush (*Juncus effusus*), sedges (Carex spp.), and jewelweed (*Impatiens capensis*) found in wetter areas. A very narrow buffer of scattered trees and shrubs is only present along small portions of the project reaches, mostly notable along the upper section of UT1 and UT3. The trees consist primarily of Chinese privet (*Ligustrum sinense*), with a few black walnut (*Juglans nigra*), black cherry (*Prunus serotina*), and tulip poplar (*Liriodendron tulipifera*) also present. A few remnant apple trees (*Malus sp.*) are also present on upper UT3. Thinly scattered shrubs present include multi-flora rose (*Rosa multiflora*), and blackberry (*Rubus spp.*).

Notable invasive species found on the site include Chinese privet (*Ligustrum sinense*) and multi-flora rose (*Rosa multiflora*), which are found scattered within the project buffer as described above.

3.1.2 Land Use / Land Cover, Impacts, Historic, Current and Future

Relevant land use / land cover and their impacts were investigated for the project and surrounding watershed through landowner discussions, a review of historic aerial photographs, GIS analysis using historic datasets, and field reconnaissance.

Based on landowner conversations, historic agricultural uses on the project site itself has included the current cattle pasture as well as orchard groves in the past. These activities have negatively impacted both water quality and streambank stability along the project streams and their tributaries. The resulting stressors include excess nutrient input, streambank erosion and sedimentation, channel modification, and the loss of riparian buffers.

The USGS National Land Cover Database (NLCD) for 2016 shows that the entire 0.48 square mile (308 acres) project drainage area was 79.8% forested, 17.1% hay/pasture, and 2.9% developed (open space), with 0.18% impervious surface. For comparison, the 2009 French Broad RBRP describes the overall Pigeon River / Crabtree Creek watershed (35 square miles) as being somewhat similar with approximately 64% forested area, 30% in total agriculture, and 6% developed. Thus, it appears that the greater watershed is slightly less forested and has more agricultural use.

Historic aerial photographs from 1956 and 1995 were reviewed for the project and its surrounding area (Figures 9A and 9B). The 1956 aerial reveals that the project area itself was once entirely cleared,

along with much of the immediately adjacent watershed drainage area. Large open areas of what appear to be pasture are present throughout these cleared portions. The project stream channels can also be faintly seen, more or less in their current locations, with the same lack of sinuosity and apparent relocation (and likely dredging/channelization). The 1995 aerial reveals significant reforestation within large portions of the previously observed clearings in the adjacent watershed drainage area, though the project area itself remains almost entirely cleared, with only short, narrow sections of buffer consisting of scattered vegetation observed in a few locations. The location and pattern of the channels also remains the same as they are clearly identifiable here as very straight with virtually no sinuosity observed.

By comparison, the most recent aerial from 2019 shows a landscape quite similar to the 1995 aerial. The project site itself remains cleared with only short sections of narrow buffer present. The adjacent watershed is slightly more reforested than in 1995, particularly in the upper drainage areas to both UT2 and UT4. And while the watershed to the north and east of the project have significantly reforested since the 1956 aerial, an extensive network of trails or paths are clearly evident throughout this hilly area in the 2019 aerial. They are likely the logging roads used in timbering activities. Overall, the historic aerial assessment reveals that the project area itself appears to have been highly impacted since at least 1956 with relocated, straightened channels with cleared buffers used for pasture. The larger project watershed area has reforested to a significant degree from the earlier observed clearing, but the area remains virtually undeveloped and has remained in either agriculture or forested land.

Thus, the history of the land use and land cover of the site and surrounding watershed indicates that significant impacts to water quality have occurred, certainly resulting in increases in erosion, sedimentation, and nutrient inputs to the streams, and decreases in stream and riparian habitat and function.

Currently, the project site is used as livestock pasture, and livestock have unrestricted access to all reaches: UT1-R1 (40%), UT1-R2, UT1-R3, UT1-R4, UT2, UT3, and UT4. While UT1-R1 is currently impacted by livestock on 40% of this reach, it has historically had direct livestock impacts throughout. The upstream extent of UT1 begins at the transition from forested land to historical livestock pasture and there is an old crossing near this area that will be reconstructed as part of the restoration project. An overhead utility line crosses both UT3 and UT1 upstream of their confluence. A new stream crossing is proposed on UT3 at the location of the utility line crossing to replace an existing ford further downstream. Downstream of the confluence of UT3 and UT1, the stream passes through a 60-inch culvert under Route 209. Further downstream, a 24-inch culvert allowed passage across the stream below Route 209; however, this culvert was washed out during flooding in early 2020. This culvert will be replaced but located upstream of the easement.

The future for the project watershed will likely remain undeveloped and rural in nature with large amounts of forested cover within a general agricultural and silvicultural landscape.

3.1.3 Watershed Disturbance and Response

The watershed disturbances are described above and include the relocation and straightening/ channelization of project reaches, the removal of forested buffers, livestock impacts, and the installation of culverts. The project reaches have been heavily impacted from these modifications and historic land use practices, predominantly livestock production. The overwhelming majority of reaches have been cleared for pasture and have inadequate, poorly functioning riparian buffers consisting of short, narrow sections of woody vegetation, with a noted lack of deeply rooted vegetation on stream banks. And those few sections of woody vegetation that are present are generally quite sparse and are dominated by invasive species. Figure 4 shows the most recent aerial photography with clearly absent and/or narrow riparian buffers.

The reaches have responded to these disturbances by becoming incised, though the upstream portions of the reaches are generally not as incised as the downstream ends. Large sections of the reaches are laterally eroding, as streambanks are mostly vertical with large areas of scour and some mass wasting, all of which is exacerbated by hoof shear from livestock. The lack of protective woody and deep rooting

vegetation along the project reaches have also contributed to accelerated bank erosion and migration. The channel incision and associated decrease in overbank flooding frequency has also likely resulted in a lowered water table in the adjacent floodplain. Thus, the cumulative effects of the watershed disturbance have severely impacted the functioning of the project reaches and buffers.

3.2 Regulatory Review

3.2.1 Categorical Exclusion

The National Environmental Policy Act of 1969 (NEPA) requires agencies to use an interdisciplinary approach in planning and decision-making for actions that will have an impact on the environment. The Federal Highway Administration (FHWA) and NC Department of Transportation (NCDOT) have determined that DMS projects will not involve significant impacts and therefore a Categorical Exclusion (Cat-Ex) is the appropriate type of environmental document for this project. FHWA has also determined that stream restoration projects are considered land disturbing activities; therefore, Parts 2 and 3 of the DMS Cat-Ex checklist and a summary of the findings applicable to the environmental regulations associated for this project are included.

The Cat-Ex for the UT to Rush Fork Mitigation Project was approved by FHWA and NCDMS on August 17, 2018. The Cat-Ex summarized impacts to natural, cultural, and historical resources and documented coordination with all stakeholders and federal and state agencies. All documentation for the Cat-Ex is included in Appendix I, including a summary of all communications. Below is an additional summary specific to the biological and cultural resources investigation for the project.

Biological Resources

Baker conducted an on-line review of the project area with the use of the United States Fish and Wildlife Service (USFWS) IPAC website (https://ecos.fws.gov/ipac/), on May 21, 2018. This review generated an *Official Species List* (OSL), which identifies threatened, endangered, proposed and candidate species, as well as proposed and final designated critical habitat, that could be affected by the proposed project. Results from the review found the following nine federally listed species. No USFWS designated critical habitats were located within the project boundaries.

Table 3.5. Federally Listed Species
UT to Rush Fork Stream Mitigation Project– NCDMS Project No. 100068

Scientific Name	Common Name	Federal Status	Habitat Present	Biological Conclusion
Glaucomys sabrinus coloratus	Carolina Northern Flying Squirrel	E	No	No Effect
Myotis grisescens	Gray Bat	E	No	No Effect
Myotis sodalis	Indiana Bat	E	No	No Effect
Myotis septentrionalis	Northern Long-eared Bat	T	No	No Effect
Alasmidonta raveneliana	Appalachian Elktoe	E	No	No Effect
Microhexura montivaga	Spruce-fir Moss Spider	E	No	No Effect
Isotria medeoloides	Small Whorled Pogonia	T	Yes	No Effect
Geum radiatum	Spreading Avens	E	No	No Effect
Gymnoderma lineare	Rock Gnome Lichen	E	No	No Effect

Baker also conducted a two-mile radius search using the Natural Heritage Program (NCNHP) Data Explorer (https://ncnhde.natureserve.org/) on May 22, 2018. Results from this search found no known occurrences of any of the above referenced species within two miles of the project site. Based on our review, subsequent field surveys, USFWS and FHWA consultation, Baker reached the Biological Conclusion of 'No Effect' for the above referenced species.

Cultural Resources

Baker also requested a review and comment from the State Historic Preservation Office (SHPO) and the Eastern Band of Cherokee Indians' Tribal Historic Preservation Office (EBCI THPO) on any possible issues that might emerge with respect to architectural, archaeological, and/or cultural resources from the restoration project on June 1, 2018. On June 28, 2018, Baker received a letter from EBCI THPO with the finding that no cultural resources important to the Cherokee people should be adversely impacted by the proposed project. On July 3, 2018, Baker received a response letter from SHPO finding that no historic resources would be affected by the project. All correspondence on this issue is included in the Appendix.

3.2.2 FEMA Regulated Floodplain Compliance

The UT to Rush Fork Stream Mitigation project is in FEMA Zone X as noted on the Haywood County Flood Insurance Rate Map Panels 3700872100J and 3700873100J (Figure 8). The topography of the site and location in the upper watershed supports the design without creating the potential for hydrologic trespass.

3.2.3 Section 404 / 401 Permitting

The proposed project area was reviewed for the presence of jurisdictional wetlands and waters of the United States in accordance with the provisions on Executive Order 11990, the Clean Water Act, and subsequent federal regulations and guidance. In fulfillment of the project's Section 404 / 401 permitting requirement, a Pre-Construction Notification (PCN) will be submitted for a Nationwide Permit (NWP) 27: Aquatic Habitat Restoration, Enhancement, and Establishment Activities. As discussed previously in Section 3.1.1, the project area was evaluated in the field for the presence of these resource features on November 20 and December 19, 2017; August 14 and 15, 2018; and April 11, 2019. The evaluation confirmed the presence of five jurisdictional streams and thirteen jurisdictional wetlands, ten of which are at least partially located within the conservation easement. These results were subsequently confirmed in the field by the USACE and a PJD was received on May 1, 2019 (Appendix H).

The proposed mitigation design will avoid or minimize all disturbance or impacts to the existing stream and wetland features during project construction wherever practicable. Due to the inherent nature of the project, a complete avoidance of all impacts to jurisdictional features is not possible. However, any impacts to stream or wetland resources from construction (both temporary and permanent) will be more than offset by the ultimate restoration and/or enhancement of stream and wetland resources both in their overall length or area and in the resource functional uplift. Though no wetland credits are being sought for this project, the existing wetlands will be enhanced through the restoration of a more natural flooding regime, by raising their water table, and by planting native wetland vegetation. All existing streams are currently rated as 'Low' in NC-SAM, and all existing wetlands are rated as 'Low' in NC-WAM. Ultimately, the project will restore resource function such that all features will be rated higher than their current respective assessments. Approximately 0.25 acres of fringe wetlands located alongside the stream banks are currently anticipated to be impacted from construction activities, almost entirely through necessary bank sloping measures. A copy of the Pre-Construction Notification (PCN) will be provided with the Final Mitigation Plan, which will include figures detailing the areas of temporary and permanent impacts.

4.0 FUNCTIONAL UPLIFT POTENTIAL

Current stream and watershed conditions within the project site as well as throughout the Rush Fork Creek watershed described in previous sections allow for functional improvements at this site. Channel incision, removal of riparian buffer, and livestock impacts are the predominant impairments within the project reaches, and have contributed to the overall degradation of the local ecosystem due to a lack of floodplain connectivity, minimal bedform variation, poorly functioning riparian buffers, and high amounts of sediment inputs from bank erosion.

The uplift for these project reaches will primarily be achieved at the hydraulic and geomorphological functional levels. Hydraulic improvements will come from the reintroduction of bankfull flows to the historic floodplain through a Priority 1 Restoration of UT3 and UT1-R4. This approach will elevate the stream beds and add an appropriate meandering sinuosity to the channels. It will also reestablish floodplain connectivity, which will return a hydraulic routing regime allowing flood stages to access a broader flood prone area more frequently distributing flood flows instead of containing within a confined channel. This should also raise the adjacent groundwater table, which will improve the hydrology of the adjacent pockets of existing wetlands found alongside project streams.

Geomorphological functional uplift will be achieved through channels sized to the bankfull flow, a planform and profile design emphasizing improved bedform variation with high amounts of 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 in a stable manner. Sediment inputs will decrease due to reduced bank erosion and sediment transport can return to a stable level that will accommodate watershed inputs. Riparian plantings will further support geomorphological functionality by increasing bank stability.

Consideration of future impacts to the area that could limit functional uplift opportunities is important when assessing project potential. As mentioned in previous sections, the project exists within a predominantly rural area where agriculture and silviculture are the primary land uses. Substantial changes to the surrounding area are not expected, with the exception of potential periodic timbering activity in the upper watershed drainage area. This upstream area consists of steep slopes unsuited for agriculture (even pasture) and land conversion to this use is considered unlikely. The watershed is also not likely to experience any increase in development in the future based on previous land use changes over time, and the area is almost certain to remain predominately rural. Therefore, the hydrology of the site will likely remain relatively unchanged as well, though the potential for temporary changes to hydrology do exist if significant timbering occurs in the watershed. However, the restoration effort will allow the stream to remain stable during any such temporary change, as the project work includes significant bank stabilization, improved access to the floodplain, restored buffers, and numerous in-stream grade control structures.

4.1 Project Constraints

The principle constraints to achieve maximum uplift potential for the project are related to upstream and off-site issues, as these existing upstream conditions within the project watershed will have significant impacts to potential physicochemical and biological improvements. Examples of upstream of off-site water quality issues include nutrient and sediment loading, and the presence of diverse biology near the site to repopulate the improved habitat. Additional project constraints are the necessity of easement breaks and stream crossings. There is a power line easement that transects the project and crosses both UT1 and UT3. Conservation easement breaks will be incorporated in both these areas to allow for the exclusion of the power line easement. A culverted crossing will be installed within the easement break at the power line along UT3 in an effort to minimize the total number of necessary breaks. This crossing will allow the landowners access to different parts of their properties and rotate livestock without disturbing the restored stream or the riparian areas. Additionally, two other existing but failing crossings will be reconstructed as part of this project across UT1-

R1 and UT1-R4 just below Route 209. Though no credit is being sought for these sections, restoration and enhancement measures will be continue through these sections to ensure the long-term success of the project.

An existing NCDOT culvert is located under Route 209, in roughly the middle of UT1-R4. In order to maintain aquatic passage while allowing for the implementation of stabilization measures, stream transitional sections will be implemented to tie the proposed streambed elevations into the existing culvert elevations.

4.2 Functional Uplift Summary

Substantial functional uplift for the UT to Rush Fork Stream Mitigation project is expected and is described in detail above. Improvements to site hydraulics and geomorphology will be clear and measurable post-construction, while improvements to other functions such as physicochemical and biological may not be as easily determined and can be greatly affected by offsite conditions. Since only the hydraulics and geomorphology of the project streams are being directly measured, project goals are primarily linked to these functions. While project vegetation will also be monitored and can be linked to biological and physicochemical uplift, these parameters are more difficult to directly measure. Table 5.1 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

The goals and objectives for the UT to Rush Fork Stream project are detailed below in Table 5.1. They represent the logical conclusion to the previous discussions of current site conditions and historic use, watershed disturbance and response, and the functional uplift potential for the project. The listed goals are broad statements about intended project accomplishments and are consistent with the identified watershed priorities as outlined in the Watershed Approach and Site Selection discussion in Section 2. By comparison, the objectives and outcomes are intended to be more specific, measurable, and represent direct steps towards accomplishing the associated goal. The project objectives will have performance standards and success criteria associated with them as described later in Section 7 of this report and will be evaluated throughout the monitoring phase of the project.

Table 5.1 Mitigation Project Goals and Objectives
UT to Rush Fork Stream Mitigation Project – NCDMS Project No. 100068

Goals	Objectives	Functional Level	Monitoring Measurement Tool
Reconnect stream reaches to their floodplains	To raise channel beds and/or excavate sloping vegetated floodplains appropriate for a B stream type, by utilizing either a Priority I Restoration approach or an Enhancement Level I approach.	Hydraulics	Flood Frequency Cross-Sectional Survey
Improve stream stability	To construct streams of appropriate dimensions, pattern, and profile in restored reaches, slope stream banks on enhanced streams, install grade control with plunge pools, and utilize bio-engineering to provide long term stability.	Geomorphology	Cross-Sectional Survey Visual Inspection
Improve aquatic habitat	Construct an appropriate channel morphology to all streams increasing the number and depths of pools, increasing the amount of woody debris with structures including geo-lifts with brush toe, woody riffles, log vanes/weirs, cross-vanes, and/or J-hooks.	Geomorphology	Cross-Sectional Survey Visual Inspection
Reestablish forested riparian buffers	Establish riparian buffers at a 30-ft minimum width along all stream reaches, planted with native tree and shrub species.	Geomorphology	Vegetation Plots Visual Inspection
Permanently protect the project	Establish a permanent conservation easement restricting land use in perpetuity. This will prevent site disturbance and allow the project to mature and stabilize.	Geomorphology	Visual Inspection

6.0 DESIGN APPROACH AND MITIGATION WORK PLAN

6.1 Project Design Approach

The selection of project design criteria was based on a combination of approaches, including a review of information from reference streams within the geographic area, regime equations, evaluation of monitoring results from numerous past projects, and best professional judgment. Evaluating data from reference reach surveys and the monitoring results from multiple NC Mountain projects provided the most pertinent background information to determine the appropriate design parameters given the existing conditions and overall site functional uplift potential. The design parameters for the site also took into consideration current guidelines from the USACE and NCDMS.

While reference reach data can be a useful aid in designing channel dimension, pattern, and profile, there are limitations in smaller stream systems. The flow patterns and channel formation for most reference reach quality streams is often controlled by slope, drainage areas, and larger trees and/or other deep-rooted vegetation. Some meander geometry parameters, such as radius of curvature, are particularly affected by vegetation control. Pattern ratios observed in reference reaches may not be applicable or are often adjusted in the design criteria to create more conservative designs that are less likely to erode after construction, before the permanent vegetation is established. Reference reach data was used to provide additional confidence in the design parameters chosen but not used as the only basis for design parameter selection.

Baker selected three reference reaches from stable locations within six miles of the project location. Two reference reaches were along the project stream UT1 itself; one upstream of the project site and one downstream of the site. These reaches are within forested areas and have stable cross-sections. A third reference reach was located on Wilkins Creek, six miles by direct line north-west of the project site and within the Pisgah National Forest (see Figure 3). These reference reaches had drainage areas that were similar to those within the project site. Additionally, reference parameters from Baker's internal database based on successful past projects were consulted and analyzed. The data shown on Table 6.1 helped to provide a basis for evaluating the project site and determining the stream systems that may have been present historically and/or how they may have been influenced by changes within the watershed. These reference reaches are similar in landscape setting and stream type as the UT to Rush Fork Stream Mitigation Project reaches.

Table 6.1 Reference Reach Parameters Used to Inform Design
UT to Rush Fork Stream Mitigation Project – NCDMS Project No. 100068

Parameter	Upstream of UT1 (Off Project Site)	Downstream of UT1 (Off Project Site)	UT to Wilkins Creek
Valley Width (ft)	23	35	30
Contributing Drainage Area (acres)	96	313.6	236.8
Channel/Reach Classification	B4a	B4	Ba
Discharge Width (ft)	9.9	12.88	10.4
Discharge Depth (ft)	0.55	0.87	1.16
Discharge Area (ft^2)	5.42	11.23	12.1
Discharge Velocity (ft/s)	4.40	3.42	6.8
Discharge (cfs)	23.9	38.41	25.3
Water Surface Slope	0.102	0.041	0.045
Sinuosity	1.02	1.14	low
Width/Depth Ratio	18.0	11.94	8.97

Bank Height Ratio	1.0	1.38	1.25
Entrenchment Ratio	1.7	1.47	1.63
d16 / d35 / d50 / d84 / d95 / dip / disp (mm)	5.03/ 18.55/48.46/ 97.33/ 168.14/ 256/ 80	4.13/ 10.14/ 19.02/ 86.04/ 156/ 180/ 100.3	N/A

After examining the assessment data collected at the site and exploring the potential for functional uplift, specific approaches were developed for each reach that would address the restoration or enhancement of stream functions within the project area. Prior to impacts from past channel manipulation, the topography, elevation, adjacent vegetation, and soils on site indicate that the project area most likely functioned in the past as a Montane Alluvial Forest or Piedmont/Low Mountain Alluvial Forest. Therefore, overall design approaches were formulated to best restore and/or enhance this type of system. First, an appropriate stream type for the valley type, slope, and desired stream functions was selected and designed for each reach. Then a design plan was developed to improve the hydrology, geomorphology, and habitat of the project streams.

6.2 Design Morphological Parameters

For design purposes, the selected approaches were based on the maximum potential for functional uplift as determined during the site field assessments and previously described in Section 4. The specific design parameters were developed so that appropriate planform geometry, cross-section dimensions, and reach profiles could be accurately described for developing construction plan documents. The overall design philosophy is to use conservative design parameter values for the constructed stream types and to allow natural variability in stream dimension, facet slope, and bed features form over longer periods of time under the processes of flooding, re-colonization of vegetation, sediment deposition, and other watershed influences.

The following tables present the design stream morphology parameters proposed for Restoration and Enhancement reaches, as needed. The proposed design values and design criteria were selected using existing conditions surveys and bankfull identification, sediment collection and analysis, regional curve analysis, NCDOT reference reach data, site-specific reference reach data, and Baker's internal reference ratios proven to be successful on numerous past projects. Following the initial application of the design criteria, Baker staff made detailed refinements to accommodate the existing valley and channel morphology. This step minimizes unnecessary disturbance of the riparian area and wetlands, makes adjustments around specific features in the field, maximizes the uplift to the ecological resources, and allows for natural channel adjustment following construction.

Reach UT1-R1: Enhancement Level I

Reach UT1-R1 is located at the northeastern, upstream end of the project. This 227-foot long reach is perennial and runs southwesterly and downslope at a slope of 8.76%. The reach has been impacted historically through the removal of riparian vegetation, channelization, and agricultural activities. As a result, the channel is experiencing active erosion on over 50 percent of the streambank upstream of the old crossing. There is an old, degraded ford road crossing in this reach that is silted over and has a headcut on the downstream side. Downstream of this crossing the channel enters a pasture and is impacted by livestock access.

An Enhancement Level 1 approach was selected for this reach. The stream banks upstream of the degraded crossing are unstable due to past livestock use and there is little woody vegetation. This approach will allow for addressing any erosion issues by establishing stable channel dimensions and installing grade control structures. The old ford crossing will be removed, and the correct slope reestablished. A new culverted crossing will be established just upstream of the existing, failing crossing, and will be located within a 20-foot wide easement break. The stream channel will be raised as needed to access the existing floodplain. These channels are B type streams and stream banks thorough this reach will be connected to the existing sloping floodplain where the channel is currently too incised to provide access. Energy dissipation will be over structures that form plunge pools and provide grade control. These structures will also provide a diversity of

habitat types as they support pools and associated riffle grades. This reach lacks mature woody vegetation; however, any existing isolated trees or shrub will be protected or transplanted . The riparian buffer will be planted with native hardwood species and seeded with native herbaceous species.

The design width-to-depth ratio for the channel will be 13.8, though over time the channel may narrow due to deposition of sediment and the growth of streambank vegetation. Channel narrowing will not indicate instability because any narrowing would be in response to stabilizing processes (i.e., vegetation establishment, point bar formation, sequestering of sediment on the floodplain, etc.). The entrenchment ratio will be 1.4 to 2.2 as the adjacent flood-prone width allows and in accordance with the expected entrenchment ratio for B type streams. Channel banks will be graded to a stable slopes and this will promote stability and provide sediment storage.

In-stream structures will be used to control grade, dissipate energy, protect stream banks, and eliminate the potential for upstream head-cutting and channel incision. In-stream structures will include constructed riffles, cross vanes, log or boulder step structures, and grade control j-hook vanes for grade control and habitat. Additionally, rock or log vanes will be used for increased bank stability and habitat diversity. Double drop cross vanes will be used to transition across especially steep sections of channel. Bioengineering techniques such as geolifts, root wads, toe wood, brush layers, and live stakes will also be used to protect restored stream banks and to promote woody vegetation growth along the stream banks. The described stream structures will be utilized on all of the described reaches.

Riparian buffers at least 30 feet in width will be restored and protected along all reaches, except at the stream crossings located outside of the easement or other easement gaps. Any invasive vegetation found scattered along the banks and within the riparian buffer will be removed and/or treated. Permanent fencing will be installed to exclude livestock from the easement and reduce sediment, fecal coliform, and nutrient inputs.

Table 6.2a Upper UT1 (R1, R2, R3) Stream Design Morphology Parameters.
UT to Rush Fork Stream Mitigation Project - NCDMS Project No. 100068

Parameter	Existing Conditions	Design Parameters	Proposed	
	(Upper to Lower Sections)		Upper[3] Section	Lower[3] Section
Valley Width (ft)	15 - 30		15	30
Contributing Drainage Area[1] (acres)	109 – 134		96	134
Channel/Reach Classification	B4a	B4a	B4a	B4a
Discharge Width (ft)	12.2 – 7.1		9.0	10.0
Discharge Depth (ft)	0.27 – 0.89		0.65	0.70
Discharge Area (ft^2)	3.33 – 6.36		5.9	7.0
Discharge Velocity (ft/s)	3.0 – 4.64	3.5 - 5.0	2.15	2.47
Discharge (cfs)[2]	10.0 - 29.5		12.6	17.3
Water Surface Slope	0.082 – 0.051		0.082	0.0510
Sinuosity	1.07 – 1.06		1.05	1.05
Width/Depth Ratio	45.26 - 7.98	10.0 - 15.0	13.8	14.3
Bank Height Ratio	1.86 – 1.0	1.0 - 1.1	1.0	1.1
Entrenchment Ratio	1.15 – 1.71	1.4 – 2.2	1.4	2.2

d16 / d35 / d50 / d84 / d95 / dip / disp (mm)	5.03/18.55/48.46/97.33/ 168.14/256/80			

[1]Existing Condition drainage areas were taken from the surveyed cross-section locations, while the Proposed drainage areas were taken from the downstream end of each section.

[2]Existing Condition Discharge calculated by Manning's Equation for the degraded existing stream channel parameters, Proposed Discharge calculated as described in Section 6.3.3.

[3]Upper Section here includes R1, R2, and R3 upstream of the confluence with U2, while Lower Section includes R3 downstream of UT2 to its confluence with UT3.

Reach UT1-R2: Enhancement Level II

Reach UT1-R2 begins at the end of R1 at Station 13+25. This perennial reach runs southwest and down valley for approximately 275 feet through a short, narrow stand of scattered trees predominately consisting of black walnut (*Juglans nigra*) to a point where the trees end roughly 80 feet upstream of a 40-foot wide power line right-of-way (ROW). This reach is classified as a B stream type and has a slope of 8.64%. The narrow line of trees along the banks of this reach provide greater stability than the area above or below. The channel is not deeply incised here, having a lower left bank and a higher right bank with herbaceous vegetation growing well along the channel. Bank erosion along R2 was minimal in spite of the fact that livestock have access to the reach. and the reach was vertically stable due to larger stones embedded in the channel providing grade control.

Work along R2 will involve common Enhancement Level II practices to re-establish a woody buffer and to maintain the stability of the channel. While no chronic vertical instability has been noted within this reach, if any develops by the time construction begins, grade control structures will be added. Any bank erosion that is identified will be stabilized by grading, seeding, mulching and matting. A few locations along the right stream bank that are vertical will be sloped and stabilized. Riparian buffers at least 30 feet in width will be planted and protected. To help with the successful establishment of the planted vegetation, the black walnut trees noted in this area will be removed.

At the end of this reach on the far-left bank, just outside of the easement, is an old cabin. In order to ensure that this structure will not potentially impact the easement area at some time in the future, Baker has agreed with the landowner to remove this structure during construction. The cabin will be demolished and all debris removed so that it does not interfere with the habitat quality of the easement area.

Reach UT1-R3: Enhancement Level I

UT1-R3 is located immediately downstream of R2 beginning at Station 16+00 and continues for roughly 79 linear feet to a powerline ROW. The conservation easement excludes this 40-foot ROW crossing and R3 begins again after the ROW break, continuing downslope to the confluence with Reach UT3 at Station 22+61. The total reach length is approximately 662 linear feet. While the ROW area is cut out of the conservation easement, stream restoration activities will be conducted through the opening to restore stream stability; however, trees will not be planted within this area. This reach continues southwesterly at a slope of 6.21%, slightly lower than the slope over the upper two reaches. Perhaps because the slope is a bit lower, this reach has suffered more historical impacts through the removal of riparian vegetation, channelization, and agricultural activities. This reach continues to be impacted by livestock access. As a result, the channel is experiencing active erosion for well over 50 percent of the streambank length. The absence of woody vegetation along this reach also contributes to the instability. Stream bank vegetation is pasture grass, a few scattered trees and a stand of multiflora rose along the left bank below the confluence with UT2. Below UT2 the channel is aligned against a steep left bank for approximately 100 feet and any soil eroding from the slope fails directly into the stream.

An Enhancement Level 1 approach was selected for this reach. The stream banks have unstable areas due to livestock access, there is little woody vegetation and the steep left bank causes sedimentation of the stream. The Enhancement I approach will address erosion issues by establishing stable channel dimensions along the reach. These channels are B type streams so where the channel is incised it will be raised to access the sloping

floodplain or the stream banks may be sloped as needed. Establishing an entrenchment value of 1.4 to 2.2 will guide this activity. Grade control is limited through this reach due to an absence of bedrock and roots. Vertical stability and habitat diversity will be improved through the reach by installing grade control structures. These structures will provide energy dissipation and channel depth. They will also be used to raise the stream channel where needed to access the existing floodplain.

The design width-to-depth ratio for the channel will be 13.8, though over time the channel may narrow due to deposition of sediment and the growth of streambank vegetation. Channel narrowing should not cause instability because any narrowing would be in response to stabilizing processes (i.e., vegetation establishment, point bar formation, sequestering of sediment on the banks, etc.). Channel banks will be graded to stable slopes, and connected to existing floodplains, this will promote stability and provide sediment storage. In the area below the UT2 confluence the channel will be moved several feet away from the steep left bank and a bench constructed to eliminate colluvial sedimentation of the stream along that 100-foot section. Stream dimensions increase slightly below the confluence with UT2 to accommodate the increase in drainage area (W_{bkf} goes from 9.0 to 10.0; D_{bkf} from 0.65 to 0.70; A_{bkf} from 5.9 to 7.0).

Reach UT1-R4: Restoration

Reach UT1-R4 extends from the confluence with UT3 downstream to the culvert under Route 209 at station 28+01. The project stream and easement resumes below the road at station 31+14 and continues down valley to Station 37+91 at the end of the project. This results in a break in the conservation easement that runs 313 linear feet The resulting total length of UT1-R4 from its origin at the confluence with UT3 to the end is approximately 1,530 linear feet, though only 1,216 linear feet are located within the conservation easement.

R4 has an overall valley slope of 4.8%, with the upper section (above Route 209) having a slope of 5.8% and the lower section (below Route 209) having a slope of 4.2%. R4 is classified as an incised Ba stream type with a high stream slope and a very low sinuosity of 1.08. The drainage area measured at the lower end of the Reach is 0.48 square miles (308 acres) and at the lower end of the upper section of the reach the drainage area is 0.42 square miles (269 acres). R4 is slightly incised from the UT3 confluence downstream for the first 300 linear feet and becomes more incised as the channel drops to the Route 209 culvert. Below the highway the stream is very incised close to the road, but the incision decreases towards the lower end of the project. Bank height ratios (BHR) greater than 1.5 are common across the reach but are less over the last 200 feet of the project. This reach is exhibiting bank scour ranging from 50-60% over most of the project reach. This was exacerbated by a flood in the winter of 2019/2020 that caused significant scour particularly below the highway. This washed out an existing culvert crossing in this area and caused bank scour in multiple locations. Mass wasting is occurring on approximately 15-20% of the reach as a whole and headcuts are present across the reach.

The bed material is predominantly (75%) composed of very course gravel and smaller (d50 = 19.02 mm) particles. Only 8% is composed of very coarse sand and smaller particle sizes. This was unexpected due to the presence of more sand in upstream reaches but may be explained by the scouring flood flows that this reach experienced in 2020. The high flows may have moved smaller particles through the reach, but they also caused bank failures that contributed larger gravel size particles to the bed, increasing the percentage of these larger particles. The reach has a few deep pools primarily associated with headcuts and is largely composed of riffles or runs. There are also areas of aggraded sediment just downstream of locations where banks have failed, or the channel blockages allowed sediment deposition. As a result, habitat is poor throughout the reach.

Reach R4 has little or no vegetated buffer with only a few scattered trees along the stream, predominantly Chinese privet (*Ligustrum sinense*). For much of the upper part of the reach and at least 50% of the lower part, there is only herbaceous vegetation, primarily pasture grasses. Along the upper section of the reach above Route 209 the stream flows at the foot of a steep slope along the left bank and has extensive wetland areas on the right bank. The valley floor along the upper reach is fairly narrow and becomes narrower as you approach the culvert. The lower reach downstream of the culvert has a wider valley beyond the top of bank that is at least 50' on each side. This lower valley is managed as pasture with livestock having access to the

pasture, stream banks and stream. Once the project is complete the landowners will no longer utilize this lower area as pasture and will allow it to naturalize.

There is one existing easement break within the middle of this reach located between Stations 28+00 and 35+14. The culvert under Route 209 controls stream bed grade across this reach. There was also a second culverted crossing just downstream of the highway that washed out during 2020 flooding. This culvert will be replaced to allow access for forest management on the property. This culvert will be located upstream of the conservation easement line and will be appropriately sized to improve hydraulic functions and channel stability.

A Priority Level I restoration approach will be used for the restoration of R4 in order to fully restore stream and associated buffer functions. The channel will be raised to reconnect the stream to its historic floodplain. This will promote more frequent over bank flooding thus reducing erosive stream energies during storm events greater than the bankfull discharge and will also improve adjacent groundwater hydrology. The design width-to-depth ratio for the channel will be 13.7-13.9, though over time the channel may narrow due to deposition of sediment and streambank vegetation growth. Channel narrowing should not risk downcutting because any narrowing would be in response to stabilizing processes (i.e., vegetation establishment, point bar formation, etc.). These channels are B type streams, and while the channel will be raised to access the sloping floodplain, the stream banks may be sloped where they are excessively steep to achieve a typical B type cross-section. Raising of the stream and sloping of stream banks will be done to establish an entrenchment value of 1.4 to 2.2 and this objective will guide these activities. As a B stream type with significant valley and channel slope this stream will not be a sinuous channel. However, it will not be a straight channel, but have some limited sinuosity constructed (as practicable) to give the stream a natural appearance. This reach will not be a typical riffle/pool type channel but rather a channel that dissipates energy over plunge pools created using drop-type structures. Grade control is limited through this reach due to an absence of bedrock and few tree roots. Vertical stability will be achieved, and habitat improved through the reach by installing grade control structures at regular intervals across the reach. They will also help raise the stream channel as needed to access the existing floodplain. Stream structures will provide a diversity of habitat types as they support pools with connecting riffles. The various structures used will provide energy dissipation, grade control and habitat heterogeneity.

Table 6.2b UT1-R4 Stream Design Morphology Parameters
UT to Rush Fork Stream Mitigation Project - NCDMS Project No. 100068

Parameter	Existing Condition	Design Parameters	Proposed	
	(Upper – Lower Sections)		Upper[3] Section	Lower[3] Section
Valley Width (ft)	25 - 40		30	40
Contributing Drainage Area[1] (acres)	288 - 294		269	308
Channel/Reach Classification	B4	B4	B4	B4
Discharge Width (ft)	13.4 – 8.73		12.5	13.0
Discharge Depth (ft)	0.73 – 1.28		0.90	0.95
Discharge Area (ft^2)	9.86 – 11.10		11.25	12.1
Discharge Velocity (ft/s)	3.17 – 4.04	4.0 - 6.0	3.37	3.17
Discharge (cfs)[2]	31.24 – 44.81		37.88	38.37
Water Surface Slope	0.050 – 0.045		0.050	0.045
Sinuosity	1.14 – 1.08	1.1 – 1.2	1.14	1.08

Width/Depth Ratio	18.36 – 6.82	12.0 - 18.0	13.9	13.7
Bank Height Ratio	1.0 – 1.62	1.0 - 1.1	1.0	1.1
Entrenchment Ratio	1.48 – 3.42	1.4 – 2.2	1.4	2.2
[2]d16 / d35 / d50 / d84 / d95 / dip / disp (mm)	4.13/10.14/19.02/86.04/ 156/180/100.3			

[1]Existing Condition drainage areas were taken from the surveyed cross-section locations, while the Proposed drainage areas were taken from the downstream end of each section.

[2]Existing Condition Discharge calculated by Manning's Equation for the degraded existing stream channel parameters, Proposed Discharge calculated as described in Section 6.3.3.

[3]Upper Section includes R4 from UT3 to its confluence with UT4, while Lower Section includes R4 from UT4 to the end of the project.

Reach UT2: Enhancement Level II

Reach UT2 begins at the outlet of a small culvert located just inside the project easement and crosses under an access road from the adjacent farm property. The intermittent reach runs west from the culvert until its confluence with UT1-R3. This channel drainage area is small (0.04 sq. mi. or 24 acres) and the existing length of channel within the easement is just 99 linear feet. This reach is classified as a B stream type with a slope of 9.7%. There is limited herbaceous vegetation along the right bank and a thick stand of multiflora rose (*Rosa multiflora*) on the left bank. The channel bed has some cobble at the culvert outlet, but practically no channel morphology at that location. As stream flow moves downslope, the channel becomes slightly incised with a bed of silt and sand. This area is regularly and heavily disturbed by livestock. The relatively low stream flow limits erosion along the watercourse but general stability is lacking. Erosion probably increases with high flows and livestock access.

Work along UT2 will involve common Enhancement Level II practices to re-establish a woody buffer and to establish stability of the channel. While no chronic vertical instability has been noted within this reach, if any develops, appropriate grade control structures will be added. Any bank erosion that is identified will be stabilized by grading, seeding, mulching, and matting of the area. This size channel is very difficult to construct with heavy equipment and will require hand tools for spot repair work, but it will be fully stabilized both vertically and horizontally. Removing livestock access and planting the stream banks along this channel will likely provide the greatest benefit and improvement to functionality.

This channel falls within the riparian buffer of UT1 and will have a wide buffer relative to the stream width and greater than 30 feet in width overall. This buffer area will be restored and protected within the conservation easement. Invasive *Rosa multiflora* growing along the left bank of this channel will be mechanically removed during construction and will be chemically treated thereafter, throughout the monitoring phase. The buffer area surrounding this tributary will be planted with native hardwood species and seeded with native herbaceous species. Additionally, permanent fencing will be installed to exclude livestock and reduce sediment, fecal coliform, and nutrient inputs.

Reach UT3: Restoration

Reach UT3 begins at the head of a steeply sloping valley that begins near Rush Fork Gap. This valley parallels Route 209 which goes through this gap and is oriented north to south with the higher elevation to the north and the lower elevation to the south. UT3 is perennial and begins as a series of springs just upstream of the project limits and within the upper 200 feet of the project. Flow has been consistent within the project limits for the last two years that Baker has been visiting this site. Stream flow forms a defined channel within this upper 200 linear feet and it continues down slope almost directly south for 1,664 linear feet. There is one break in this stream reach where a powerline ROW crosses the channel. This ROW required a conservation easement break of 46.4 linear feet. There is an existing ford crossing at the lower end of this reach, just above its confluence with UT1. This crossing, which is required for farming operations, will be moved to the ROW break and will be constructed as a culverted crossing of the stream.

UT3 is a perennial channel with an overall valley slope of 6.58%, with the upper section (above ROW break) having a slope of 7.67 % and the lower section having a slope of 4.1%. UT3 is classified as an incised A to B stream type with a high stream slope and a very low sinuosity of 1.02. The drainage area measured at the lower end of the Reach is 0.15 square miles (98 acres) and for design purposes the upper 650 feet was evaluated separately because the drainage area to that point was 0.10 square miles. UT3 is incised over most of its length; however, there is a section from 19+20 to 20+60 where the valley flattens, and the channel is braided into multiple small paths flowing around and through a thick stand of rushes (*Juncus spp.*). It appears that past land use has caused deposition in this area resulting in a D type channel for a short distance. Once the stream flows beyond this flat feature the slope increases and becomes slightly incised again before reaching the confluence with UT1. Bank height ratios (BHR) greater than 1.5 are common across the reach. This reach is exhibiting varying degrees of bank scour which appears to be dependent on time of year and livestock access. Mass wasting is primarily a problem where the stream is flowing up against a steep bank or where cattle trails cross the stream bank or cattle lounging areas occur.

The bed material for this stream was difficult to determine because most of the channel has thick grassy growth present, though over the upper 450 feet of channel there is significant shading of the channel by riparian trees which limit grass growth in that area. However, the channel through this upper section is relatively small and similar to the other project streams in having mostly gravel where the bed material is undisturbed. Much of the stream bed is disturbed by livestock, which has resulted in many sections of silt and mud deposition in the channel. For these reasons a bed sample was not obtained from this reach. It was assumed that if undisturbed it would be similar to the bed material sample taken from the reference site located upstream of UT1 off the project. The reach has a few deeper pools primarily associated with headcuts or vegetation blockages but is primarily composed of shallow riffle or run type habitat that flows around clumps of grass. In the winter when the grass dies back a more pronounced channel is evident. There are also areas of aggraded sediment where vegetation blocks the channel. As a result, lotic habitat is poor and degraded throughout the reach.

UT3 begins in a partially buffered forested area consisting of a narrow row of tree which extends over the first 450 linear feet of channel. However, after that point it has virtually no woody buffer for the remainder of its length, primarily just herbaceous vegetation consisting mostly of pasture grasses growing on the terrace, banks and channel. In the uppermost section of the reach, the stream flows along the foot of a steep slope on its left bank and has constant sediment inputs coming off this slope. The land along this entire reach is managed as pasture with livestock having access to the pasture, stream banks and stream.

A Priority Level I restoration approach will be used for the restoration of UT3 in order to fully restore stream and associated buffer functions. The channel will be raised to reconnect the stream to its historic floodplain. Where the channel is being raised the subgrade will be filled and compacted to keep hydrology at the surface. This will promote more frequent overbank flooding thus reducing erosive stream energies during storm events greater than the bankfull discharge and will also improve adjacent groundwater hydrology. The design width-to-depth ratio for the channel will be 13.1, though over time the channel may narrow due to deposition of sediment and streambank vegetation growth; however, this is expected to be limited on this steeply sloping channel. Channel narrowing should not risk downcutting because any narrowing would be in response to stabilizing processes (i.e., vegetation establishment, point bar formation, etc.). The channel will be raised to access the sloping floodplain and the stream banks sloped where they are excessively steep to achieve a typical B type cross-section. Raising of the stream and sloping of stream banks will be done to establish an entrenchment value of 1.4 to 2.2. As a B stream type with significant valley and channel slope, this stream will not be a sinuous channel. This channel type loses energy over plunge pools created using drop type structures. Grade control is limited through this reach due to an absence of bedrock and few trees. Vertical stability will be achieved, and habitat improved through the reach by installing grade control structures at regular intervals across the reach. They will also help raise the stream channel as needed to access the existing floodplain. Stream structures will provide a diversity of habitat types as they support pools with connecting riffles. This reach lacks mature woody vegetation; however, any existing isolated trees or shrubs will be

protected or transplanted if possible. From the top of the stream bank out to the conservation easement line the area will be planted with native hardwood species and seeded with native herbaceous species.

Table 6.2c UT3 Stream Design Morphology Parameters
UT to Rush Fork Stream Mitigation Project - NCDMS Project No. 100068

Parameter	Existing Condition	Design Parameters	Proposed	
			Upper Section	Lower Section
Valley Width (ft)	10 – 30		15	30
Contributing Drainage Area[1] (acres)	70		64	98
Channel/Reach Classification	Ba	B4	Ba	Ba
Discharge Width (ft)	6.58		7.5	8.5
Discharge Depth (ft)	0.82		0.57	0.65
Discharge Area (ft^2)	5.4		4.3	6.0
Discharge Velocity (ft/s)	3.48	4.0 - 6.0	4.42	5.0
Discharge (cfs)[2]	18.8		19.0	30.0
Water Surface Slope	0.062		0.079	0.056
Sinuosity	1.05	1.1 – 1.2	1.02	1.02
Width/Depth Ratio	8.02	12.0 - 18.0	13.1	13.1
Bank Height Ratio	1.83	1.0 - 1.1	1.0	1.0
Entrenchment Ratio	2.17	1.4 - 2.2	1.4	2.2
d16 / d35 / d50 / d84 / d95 / dip / disp (mm)	N/A	N/A	N/A	N/A

[1]Existing Condition drainage areas were taken from the surveyed cross-section locations, while the Proposed drainage areas were taken from the downstream end of each section.

[2]Existing Condition Discharge calculated by Manning's Equation for the degraded existing stream channel parameters, Proposed Discharge calculated as described in Section 6.3.3.

Reach UT4: Restoration

Reach UT4 begins at an existing culvert under Route 209, and this short intermittent reach is not included within the conservation easement for most of its length. After exiting the culvert, the stream has been channelized to run due south, parallel to the highway, and into a second culvert that goes under the farm access road and onto the project site, discharging from the culvert directly into UT1-R4. Livestock have access to this entire reach. In addition, the reach has little woody vegetation and has dredge material piled on the left bank. This reach is classified as a B stream type. The existing highway ROW and a power line ROW along the highway exempts this stream from being included in the conservation easement. However, at the point where it enters the conservation easement it will be included in the project. The existing culvert will be replaced so that the farm access road can be moved entirely out of the easement, with the outfall of the culvert placed just outside of the easement boundary. From this new culvert outfall to the new alignment of UT1, a new ~40 linear foot channel will be constructed for UT4 to connect it into UT1-R4.

Given that this will be new channel length, it is considered Restoration and will be constructed to fully access the floodplain along both UT1 and UT4. Stream dimensions for this short reach have been determined based on a regional curve analysis. The W/D ratio will be 12.9, other dimensions that will be used for this channel are W_{bkf} = 5.8; D_{bkf}= 0.45; A_{bkf}=2.6. This size channel is very difficult to construct with heavy equipment and may require hand tools, but it will be stabilized both vertically and horizontally. As with other channels on this project, drop structures may be used to provide vertical energy dissipation and improved habitat quality.

This channel falls within the riparian buffer along UT1 and will have a wide buffer relative to the stream width; greater than 30 feet in width. This buffer area will be restored within the protected easement area. The buffer area surrounding this reach will be planted with native hardwood species and seeded with native herbaceous species. Additionally, permanent fencing will be used to exclude livestock and reduce sediment, fecal coliform, and nutrient inputs. It has been agreed with the landowners that permanent fencing will be added to all of UT4 extending out of the easement and up to Route 209 to exclude livestock from the entire stream and improve the water quality coming from this tributary.

Stormwater Best Management Practice (BMP) on Upper UT3

A stormwater best management practice (BMP) is proposed at the top of UT3 where an existing vegetated drainage swale (an old abandoned roadbed) conveys stormwater flow into the reach. This feature is not being provided for direct mitigation credit, but for the water quality improvement of the receiving stream. The BMP will receive runoff from 4.25 acres of drainage area, including roughly 0.12 acres of impervious area. Sizing of the BMP was completed using a 1-inch design storm rainfall depth, and runoff was calculated using the discrete SCS curve number method. This BMP was designed to meet the stormwater design criteria of a constructed wetland following the North Carolina Stormwater Design Guidance Manual. Most of the minimum design criteria (MDC) were able to be accommodated; however, a few could not be met as outlined below. Even with these limitations, the design will be able to provide significant water quality improvement benefits.

The BMP meets the temporary ponding depth (MDC-1), surface area (MDC-3), and percentage of deep pool, shallow water and temporary inundation zones (MDC 7, 8, and 9). Construction will ensure that any needed soil amendments (MDC-4) are accommodated. Peak attenuation is not proposed for this BMP, therefore MDC-2 is met. The BMP is collecting runoff that is currently conveyed directly to the receiving channel UT3 from the existing drainage swale, allowing the design to meet the requirement for protection of the receiving stream by minimizing hydrologic impacts (MDC-11).

The BMP collects surface runoff along the southern and western side of the proposed BMP and will then discharge runoff through an overflow weir along its northern side. The topography of the site does not allow the inlet and outlet configuration to completely prevent short-circuiting (MDC-5), and a forebay cannot be reasonably accommodated for all inflow (MDC-6). Preventing short-circuiting is not feasible in a BMP of this size and configuration, and the site topography precludes alternative orientations or designs. Forebays are typically required to provide an opportunity for sediment and debris to fall out before reaching the BMP treatment area. Since the BMP will not receive concentrated discharges from stormwater conveyance outfalls and the receiving runoff passes through a vegetated area prior to entering the BMP, a lack of a forebay should not impact treatment efficacy.

The BMP is unable to meet MDC-10, which requires a 2 to 5 day drawdown time between the temporary and permanent pool elevations. For a BMP of this size, meeting this criterion would require an orifice that would likely be subject to frequent clogging in the proposed application. As such, the BMP was designed to accommodate the treatment volume in the permanent pool, instead of in the temporary pool. This design criteria is consistent with the constructed wetland design requirements of other jurisdictions, such as the State of Virginia. A stone weir structure is proposed for the wetland outlet, which also eliminates the need for a trash rack (MDC-17).

The revegetation plan meets the requirements of the landscaping plan (MDC-12), shallow water plantings (MDC-13), temporary inundation zone plantings (MDC-14) and plantings on the perimeter fill slopes (MDC-15).

Agricultural Practices and Crossings in Support of the Restoration Plans

Drinking water is being provided for excluded livestock using a well and two drinking stations. The general location of this well and the drinkers has been indicated in the plans, on Sheet 11. Power will be run from the utility line crossing to a well and waterlines run from the well locations to two different drinking

stations. Each drinking station will have a four-hole drinker and the area around the drinker will be hardened to avoid erosion. The conservation easement will be fenced so that livestock will not have access to site streams. Gates will be installed on both sides of the crossing on UT3 and a gate will be installed on the pasture side of the culvert on UT4 at the pasture entrance. Four-foot gates will be placed in-line with the easement fencing to allow for human access to conduct monitoring or other inspection. These small gates are shown on the plans. The crossing gates on UT3 will be used by the cattleman to divide the pasture into two divided areas and livestock will be moved to rotationally graze the pastures. The field downstream of Route 209 will no longer be used for pasturing livestock.

There are four (4) culverts being installed on this project. Two will replace failed or failing culverts (on UT3 and UT1-R4, below Route 209) and two will replace unstable ford crossings, which are presently located on UT3 just above the confluence and at the top of UT1 within R1. There are no other crossings other than the Route 209 highway crossing, which is outside of the easement. Culverts that are planned for installation have been analyzed and designed by our engineers to ensure they are the appropriate size. All culverts are specified to be installed 12" below the bed of the stream to allow for aquatic species passage as required by Nationwide Permit 27.

6.3 Design Discharge Analysis

6.3.1 Bankfull Stage Discharge

Upon completion of the geomorphic field survey, identification of bankfull stages and corresponding discharges were made at various locations along Reaches UT1 and UT3. However, on degraded, incised streams such as these, discernible indicators can be difficult to obtain, and the reliability of the indicators can be inconsistent due to the altered condition of the stream channels. For this reason, regional curve relationships (based on drainage areas) from two well developed curves were also used to develop the bankfull discharge estimates for the project reaches. The curve relationships were compared to most stable representative cross sections taken on site to confirm the bankfull field calls and to ultimately select an appropriate design discharge estimate.

6.3.2 Bankfull Hydraulic Geometry Relationships (Regional Curve Predictions)

Regional curves are available for a range of stream types and physiographic provinces. The published NC Rural Mountain Regional Curve (Harmon et al., 2000) and the unpublished NC Rural Mountain and Piedmont Regional Curve developed by the Natural Resources Conservation Service (Walker, 2018) were used for comparison with site-specific field methods of estimating bankfull discharge. The regional curve equations developed from the studies are shown below in Table 6.3, while Table 6.4 compares the estimated regional curve bankfull areas for the project reaches with those measured from bankfull indicators in the field. Baker has successfully implemented a significant number of stream restoration projects in North Carolina using both these regional curves, though the general design team preference is for the more recent NRCS equations as they continue to be revised with the addition of new stream data.

Table 6.3 NC Rural Mountain Regional Curve Equations
UT to Rush Fork Stream Mitigation Project – NCDMS Project No. 100068

NC Rural Piedmont Regional Curve Equations (Harman et al., 2000)	NC Rural Mountain and Piedmont Regional Curve Equations, Revised (Walker, 2018)
$Q_{bkf} = 100.64\ A_w^{0.76}$	$Q_{bkf} = 55.33\ A_w^{0.79}$
$A_{bkf} = 21.61\ A_w^{0.68}$	$A_{bkf} = 19.13\ A_w^{0.65}$
$W_{bkf} = 19.05\ A_w^{0.37}$	$W_{bkf} = 17.41\ A_w^{0.37}$
$D_{bkf} = 1.11\ A_w^{0.31}$	$D_{bkf} = 1.10\ A_w^{0.28}$

Table 6.4 Comparison of Bankfull Areas
UT to Rush Fork Stream Mitigation Project – NCDMS Project No. 100068

Reach	DA (sq mi)	Bankfull Area Estimates from 2000 / 2018 Regional Curves (sq ft)	Bankfull Area Measured at Bankfull Indicator (sq ft)	Design Bankfull Area (sq ft)
Upper UT1 (R3)	0.21	7.48 / 6.90	3.33 (XS-4), 6.36 (XS-11)	7.0
Lower UT1 (R4)	0.46	12.74 / 11.51	11.10 (XS-5), 9.86 (XS-12)	12.1
UT3	0.11	4.82 / 4.52	5.4 (XS-1)	6.0

Note: No data is reported here for Reaches UT2 and UT4. UT2 will not have its channel dimensions altered to any significant degree, while UT4 is a very short transitional reach.

The results of the bankfull area comparison as shown above in Table 6.4 reveal that the regional curves are well aligned in their predictions of bankfull area, which subsequently also align fairly well with the field measured estimates. These values were then compared with the off-project reference reaches and stream projects of similar size. Based on this evaluation, the final design values were then selected using past designer experience and best professional judgement.

6.3.3 Bankfull Discharge Summary

Table 6.5 provides a summary of the bankfull discharge and velocity analyses based on the regional curves along with the selected design values, as determined from the lowermost portion of each Reach section unless otherwise noted. The design velocity estimates were determined using the design bankfull discharge with the design cross-sectional areas. Additionally, the discharge was calculated for each reach section using Manning's 'n' associated with Stream Type to compare to the regional curve and reference reach values, and accounted for the fact that these reaches are on the steeper end of the typical range of values for Ba stream types. The design values ultimately selected will provide for stable stream channels, while during above bankfull flows the streams will have improved access to their floodplain, thus reducing stream scour potential and improving streambank stability.

Table 6.5 Bankfull Discharge and Velocity Analysis Summary
UT to Rush Fork Stream Mitigation Project - NCDMS Project No. 100068

Reach Section	DA (mi^2)	Bankfull Discharge from Regional Curves (2000 / 2018) (cfs)	Design Bankfull Discharge (cfs)	Bankfull Velocity from Regional Curves (2000 / 2018) (ft/sec)	Design Bankfull Velocity (ft/sec)
Upper UT1 (R1-R3)	0.21	30.7 / 16.2	17.3	4.1 / 2.4	2.5
Lower UT1 (R4)	0.48	57.6 / 31.1	38.4	4.4 / 2.6	3.2
UT3	0.15	23.8 / 12.4	19.0 to 30.0 (upper to lower section)	4.0 / 2.3	4.4 to 5.0 (upper to lower section)

Note: No data is reported here for Reaches UT2 and UT4. UT2 will not have its channel dimensions altered to any significant degree, while UT4 is a very short transitional reach.

6.4 Sediment Transport Analysis

For this project, a qualitative sediment supply analysis was conducted from visual inspections of the project reaches and from aerial photography of the greater watershed. Current sediment supply appears to be almost entirely from localized bank erosion from within the project reaches themselves. The watershed upstream of

the project is forested and stable and in overall good condition, and the observed bedload sediment supply within it does not appear large enough to result in capacity limited stream channels. Livestock access to the project reaches, along with their historic ditching and relocation, have clearly contributed to accelerated bank erosion. Field inspections reveal that significant aggradation is not a problem for the site; there are no notable bar formations observed for example. However, there are long sections of channel that have sediment-filled pools and embedded riffles found throughout UT1 and UT3. Additionally, UT3 is seasonally filled with herbaceous vegetation, which appears to help capture sand, silt, and livestock manure in the system. During the winter, much of this material washes out once the vegetation dies back. Once the project is complete, on-site sediment sources from bank erosion along all reaches will be stabilized, and reestablished forested buffers should ultimately shade out the in-stream herbaceous vegetation. Stream power was calculated but does not provide significant useful information since a sediment rating curve has not been developed for the site. Thus, the focus of this project's sediment transport analysis will be on competency to demonstrate the ability of the constructed channels to pass the sediment present in the watershed.

6.4.1 Sediment Competency Analysis

To conduct the sediment competency analyses; pebble count, pavement, and subpavement sediment samples were taken at or near surveyed riffle cross sections on upper and lower UT1. The sediment samples were weighed to generate cumulative frequency plots. The sediment competence analysis was conducted using the methodologies presented in WARSSS (2006). Design mean depth and slope were checked against the predicted required depths and slopes to provide confidence that the design streams will be able to transport their sediment supplies. Analyses were conducted using a dimensional shear stress methodology, which utilizes both the Shield's and Modified Shield's/CO Data curves to compare the shear stress value to the size particle able to be entrained by that shear stress. The Modified Shield's curve is based on Colorado field data (WARSSS, 2006) and the Shield's Curve is based on laboratory and field data compiled from various sources (Leopold, Wolman, and Miller, 1964). The results from the analyses are presented below in Table 6.6.

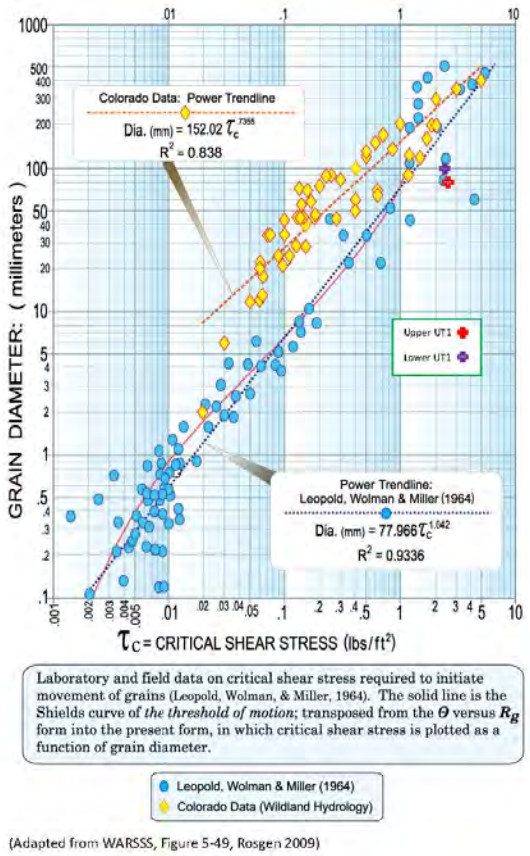
Table 6.6 Sediment Competence Analysis
UT to Rush Fork Stream Mitigation Project – NCDMS Project No. 100068

Parameter	Upper UT1 (R1, R2, R3)	Lower UT1 (R4)
Design Bankfull Slope, average (ft/ft)	0.0690	0.0476
Design Mean Depth (ft)	0.70	0.95
D50 Pavement (mm)	52.9	6.6
D50 Subpavement (mm)	20.3	16.2
D100 Subpavement (mm)	80.0	100.3
D95 Pebble Count (mm)	168.1	155.9
Design Dimensional Shear (lbs./sq-ft)	2.64	2.28
Largest Movable Particle (mm) (Mod. Shield's Curve/CO Data)	310	290
Largest Movable Particle (mm) (Shield's Curve)	214	194
Predicted Shear Stress to move D100 (lbs./sq-ft) (Mod. Shield's Curve/CO Data)	0.4	0.55
Predicted Shear Stress to move D100 (lbs./sq-ft) (Shield's Curve)	1.0	1.4
Predicted mean depth to move D100 (ft) (Mod. Shield's Curve/CO Data)	0.08	0.19
Predicted mean depth to move D100 (ft) (Shield's Curve)	0.19	0.47

Predicted slope to move D100 (ft/ft) (Mod. Shield's Curve/CO Data)	0.0092	0.0093
Predicted slope to move D100 (ft/ft) (Shield's Curve)	0.00229	0.0236

The sediment transport analysis using the design geometry and profile values were compared with their predicted values. As can be seen from the figure below, design shear stress values plotted against the measured D100 Subpavement values match reasonably well within the scatter of the data points, particularly for the Shield's Curve data, lending confidence that the stream will be able to move the existing bed load that is currently supplied. Using the estimated dimensional shear for the design channels, the predicted largest moveable particles based on the curves is significantly larger than the existing D100 subpavement sizes, while the predicted shear stresses required to move the D100 are much lower than those of the design. Further, the predicted depths and slopes required to move the D100 are much less than those of the designed system. All of this again indicates that the designed system should have no difficulty moving the existing bed load, and in fact indicates that excess shear stress is potentially an issue. It should be noted however, that there are much larger particles in the system than the D100 subpavement, as the pebble count values demonstrate.

These are very steep gradient stream systems and the resulting high shear stress values are natural and to be expected. To address any potential negative effects of the excess shear stress, the restoration design has incorporated numerous structures to control grade and increase roughness in the channel as previously discussed in more detail in Section 6.2. The designed riffles will include larger sized materials, including Class I and Class B stone, such that the new channels should not produce enough shear stress to entrain the larger sized particles. Thus, the constructed channel beds will remain stable, while still allowing for the active movement and transport of much of the bed load through the stream system.



(Adapted from WARSSS, Figure 5-49, Rosgen 2009)

6.5 Vegetation and Planting Plan

6.5.1 Existing Vegetation and Plant Community Characterization

Vegetation on the project site itself has been heavily disturbed from years of use in agriculture, currently livestock pasture, but also from historic orchard use too. Currently the site is predominantly managed as pasture for livestock and the buffer of the project streams largely consists of a range of typical pasture grasses (fescues and clovers) with scattered weeds and other common herbaceous species present such as docks (*Rumex spp.*), wild geranium (*Geranium carolinianum*), common violet (*Viola sororia*), buttercup (*Ranunculus spp.*), thistle (*Cirsium vulgare*), goldenrod (*Solidago spp.*), horsenettle (*Solanum carolinense*), plantains (*Plantago spp.*), and dandelions (*Taraxacum officiniale*), with soft rush (*Juncus effusus*), sedges (*Carex spp.*), and jewelweed (*Impatiens capensis*) found in wetter areas. A very narrow buffer of scattered trees and shrubs is only present along small portions of the project reaches, mostly notable along the upper sections of UT1 and UT3. The trees consist primarily of Chinese privet (*Ligustrum sinense*), with a few black walnut (*Juglans nigra*), black cherry (*Prunus serotina*), witch hazel (*Hamamelis virginiana*), and tulip poplar (*Liriodendron tulipifera*) also present. A few remnant apple trees (*Malus sp.*) are also present on upper UT3. Thinly scattered shrubs present include multi-flora rose (*Rosa multiflora*), and blackberry (*Rubus spp.*).

Notable invasive species found on the site include Chinese privet (*Ligustrum sinense*) and multi-flora rose (*Rosa multiflora*), which are found scattered within the project buffer as described above.

However, the riparian areas along the stream reaches and wetlands of the project would naturally consist of species more consistent with those of a Montane Alluvial Forest plant community (Schafale 2012) based on site elevation (~3,000 ft), soil classification (Humic Hapludult), and general ecoregion. However, given that the elevation is within the intermediate height range for its ecoregion (listed as 850 ft to 5,500 ft), it could reasonably be expected to contain species from lower elevation mountain communities as well. Additionally, the general ecological communities being restored for the project include both the South-Central Interior Small Stream and Riparian (CES202.706) and Southern Appalachian Small River Floodplain Forest (CEGL007143) ecosystems (NatureServe 2020).

6.5.2 Proposed Riparian Vegetation Plantings

The vegetative components of this restoration project include streambank and riparian planting zones within the buffer. These planting boundaries will be comprised of species found within native plant communities as presented below in Table 6.7 and shown on the revegetation plan sheets in Appendix K. In addition to the riparian buffer zones noted above, any areas of the site that lack diversity or were disturbed or adversely impacted by the construction process will also be planted. Existing non-native grasses (such as fescue) within the easement will be treated prior to or concurrent with construction, as appropriate.

Bare-root trees and live stakes will be planted within designated areas of the conservation easement, with the objective of establishing a minimum 30-foot buffer along all proposed streambanks for all the stream reaches within the project boundary. In many areas, the buffer width will be in excess of 30 feet along one or both streambanks and will also encompass significant portions of the adjacent jurisdictional wetland areas. In general, bare-root vegetation will be planted at a total target density of 680 stems per acre. Planting will be conducted during the dormant season, with all trees and shrubs installed between November 15th and March 15th. The anticipated planted area for the project is approximately 7.3 acres.

Selected species for hardwood revegetation planting are presented in Table 6.7. Riparian zone species wetness tolerance will range from being at least somewhat tolerant of flooding (FACU) to tolerant (OBL). Observations will be made during construction of the site regarding the relative wetness of areas to be planted as compared to the revegetation plan, which will also incorporate the location of the jurisdictional wetlands to facilitate the accurate planting of appropriate species in their correct planting zone.

Once the vegetative species are transported to the site, they should be planted within two days. Disturbed soils across the site will be prepared by sufficiently loosening to a depth of four inches prior to planting as

described in the technical specifications. Heavily compacted soils (e.g., hardpans or areas that experienced heavy equipment use) will be loosened to a depth of eight to ten inches by disking or ripping to prepare for tree planting. In any areas where excavation depths will exceed ten inches, topsoil shall be separated from rocks, brush, or roots, stockpiled, and placed back over these areas to achieve design grades and create a soil base for vegetation. Trees and shrubs will be planted by manual labor using a dibble bar, mattock, planting bar, or other approved method. Planting holes for the trees will be sufficiently deep to allow the roots to spread out and down without "J-rooting." Soil will be loosely compacted around trees once they have been planted to prevent roots from drying out. Soil tests will be conducted in the riparian buffer areas during construction, and soil amendments such as fertilizer or lime may be added as recommended to improve growing conditions.

Live stakes will be installed at a minimum of 40 stakes per 1,000 square feet and stakes will be spaced two to three feet apart around plunge pools and six to eight feet apart in the riffle sections using triangular spacing along the streambanks between the toe of the streambank and bankfull elevation. Site variations may require slightly different spacing as appropriate.

A permanent seed mixture consisting only of native species will be applied on the project. Table 6.8 lists the species and application rates that will be used. This mixture is designed to be suitable for this project's streambank, riparian, and wetland areas, and will provide rapid growth of herbaceous ground cover and provide biological habitat value. The species selected are deep-rooted and have been shown to proliferate along restored stream channels, providing long-term stability. The mixture will be applied to all areas within the conservation easement from the top of the stream banks to the easement boundary, excluding only those areas that are already forested. Separate seed mixtures for temporary seeding (rye grain or browntop millet) will be also be used to stabilize disturbed areas throughout the project site.

Final species selection may change due to a refinement of site specific conditions during construction or to species availability at the time of planting. If species substitution is required, the planting Contractor will submit a revised planting list to for approval prior to the procurement of plant stock.

Table 6.7 Proposed Bare-Root and Live Stake Species
UT to Rush Fork Mitigation Project - NCDMS Project No. 100068

Botanical Name	Common Name	% Planted by Species	Wetland Tolerance
All Buffer Plantings at 680 stems/acre using 8' X 8' spacing General Riparian Zone – Overstory/Canopy Species			
Betula nigra	River Birch	10%	FACW
Platanus occidentalis	Sycamore	10%	FACW
Liriodendron tulipifera	Tulip Poplar	10%	FACU
Betula lenta	Sweet Birch	10%	FAC
Quercus alba	White Oak	10%	FACU
Tilia americana	American Basswood	5%	FACU
Aesculus flava	Yellow Buckeye	5%	FACU
Nyssa sylvatica	Blackgum	5%	FAC
Fraxinus americana	White Ash	5%	FACU
Diospyros virginiana	Persimmon	5%	FAC
Ulmus americana	American Elm	5%	FACW
General Riparian Zone – Understory/Shrub Species			
Rhododendron maximum	Rosebay	5%	FAC
Lindera benzoin	Spicebush	2.5%	FAC
Ilex verticillata	Winterberry	2.5%	FACW
Carpinus caroliniana	American Hornbeam	2.5%	FAC

Table 6.7 Proposed Bare-Root and Live Stake Species
UT to Rush Fork Mitigation Project - NCDMS Project No. 100068

Botanical Name	Common Name	% Planted by Species	Wetland Tolerance
Sambucus canadensis	Elderberry	2.5%	FAC
Magnolia tripetala	Umbrella Tree	2.5%	FACU
Halesia carolina	Carolina Silverbell	2.5%	FAC
Wetland Zone – Overstory/Canopy Species			
Betula nigra	River Birch	15%	FACW
Platanus occidentalis	Sycamore	15%	FACW
Betula alleghaniensis	Yellow Birch	10%	FAC
Quercus imbricaria	Shingle Oak	5%	FAC
Nyssa sylvatica	Blackgum	5%	FAC
Acer negundo	Box Elder	5%	FAC
Fraxinus pennsylvanica	Green Ash	5%	FACW
Ulmus americana	American Elm	5%	FACW
Wetland Zone – Understory/Shrub Species			
Alnus serrulata	Tag Alder	15%	OBL
Ilex verticillata	Winterberry	5%	FACW
Lindera benzoin	Spicebush	5%	FAC
Cephalanthus occidentalis	Buttonbush	2.5%	OBL
Cornus amomum	Silky Dogwood	2.5%	FACW
Xanthorhiza simplicissima	Yellow-root	2.5%	FACW
Aronia arbutifolia	Red Chokeberry	2.5%	FACW
Streambank Live Stake Plantings			
Salix sericea	Silky Willow	25%	OBL
Sambucus canadensis	Elderberry	20%	FACW
Cephalanthus occidentalis	Buttonbush	10%	OBL
Cornus amomum	Silky Dogwood	25%	FACW
Salix nigra	Black Willow	20%	OBL

Table 6.8 Proposed Permanent Seed Mixture
UT to Rush Fork Stream Mitigation Project – NCDMS Project No. 100068

Botanical Name	Common Name	% Planted by Species	Density (lbs/ac)	Wetland Tolerance
Agrostis perennans	Autumn Bentgrass	10%	1.5	FACU
Elymus virginicus	Virginia Wildrye	15%	2.25	FACW
Panicum virgatum	Switchgrass	15%	2.25	FAC
Tripsacum dactyloides	Eastern Gamma Grass	5%	0.75	FACW
Polygonum pensylvanicum	Pennsylvania Smartweed	5%	0.75	FACW
Schizachyrium scoparium	Little Blue Stem	5%	0.75	FACU
Juncus effusus	Soft Rush	5%	0.75	FACW

Bidens frondosa (or aristosa)	Beggars Tick	5%	0.75	FACW
Coreopsis lanceolata	Lance-Leaved Tick Seed	10%	1.5	FACU
Dichanthelium clandestinum	Tioga Deer Tongue	15%	2.25	FAC
Andropogon gerardii	Big Blue Stem	5%	0.75	FAC
Sorghastrum nutans	Indian Grass	5%	0.75	FACU
	Total	**100%**	**15.00**	
Note: Final species selection may change due to refinement of site conditions or to availability at the time of planting. If species substitution is required, the planting Contractor will submit a revised planting list to Baker for approval prior to the procurement of plant stock.				

6.6 Project Work Plan

The project work plan is included in the plan sheet set for the project and provides a detailed description of proposed construction timing and sequencing, specific in-stream structure and other construction element designs, as well as a description of all grading and planting activities. All work will be conducted using common machinery, tools, equipment, and techniques for the successful implementation of the project. The complete plan sheets can be found in Appendix K.

6.7 Project Risks and Uncertainties

Due to the rural and primarily forested nature of the project watershed, the overall project risk for the UT to Rush Fork site is considered low. The anticipated potential project risks are described below:

Land Use Development: There is the potential for increased land use development (to include timbering and agricultural uses) within the project watershed that could alter the watershed hydrology, particularly to runoff quantity and quality. These changes would be out of the control of the provider.

Methods to Address: While any potential future development within the project watershed is out of the control of the provider, the stream restoration and enhancement techniques being applied to the project reaches will help protect them from further degradation and reduce downstream impacts usually associated with watershed development.

Easement Encroachment: Any encroachment to the conservation easement including livestock access, mowing, utility easement violations, culvert maintenance, etc.

Methods to Address: The landowners are fully aware of the land use restrictions associated with the conservation easement. The easement boundaries will be clearly marked following DMS protocol as specified in the RFP and livestock exclusion fencing (barb-wire type) will be installed. Any encroachments will be appropriately remedied by the provider throughout the monitoring phase.

Drought and Floods: There is the potential for extreme climatic conditions during the monitoring phase of the project. These conditions would be out of the control of the provider.

Methods to Address: The provider will take appropriate measures to address any impacts to the project caused by the extreme climatic conditions. Such measures may include vegetation replanting, channel or structure repair, soil amendments, etc.

Beavers: While there is no evidence of beaver activity currently present on the site, there is the potential for beavers to move onto the project during the monitoring phase. This would be out of the control of the provider.

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

7.0 PERFORMANCE STANDARDS

The performance standards and success criteria for the project will follow the NCIRT guidance document *Wilmington District Stream and Wetland Compensatory Mitigation Update* dated October 24, 2016. Monitoring activities will be conducted for a period of 7 years unless otherwise noted.

Based on the design approaches, different monitoring methods are proposed for the project reaches. Reaches UT1-R4, UT3, and UT4 will implement a Restoration design approach, Reaches UT1-R1 and UT1-R3 will implement an Enhancement Level I approach, while Reaches UT1-R2 and UT2 will implement an Enhancement Level II approach. For all project reaches, geomorphic monitoring methods and specific success criteria components and evaluations are described below. Report documentation will follow the NCDMS's template *Annual Monitoring Report Format, Data, and Content Requirements* (October 2020).

7.1 Stream Monitoring

Geomorphic monitoring of the proposed restoration reaches will be conducted annually following the completion of construction to evaluate the effectiveness of the restoration practices. The methods used and related success criteria for each monitored stream parameter are described below. Figure 11 shows the approximate locations of the proposed monitoring devices throughout the project site.

7.1.1 Bankfull Events and Flooding Functions

The occurrence of bankfull events within the monitoring period will be documented using crest gauges consisting of continuous stage recorders (using pressure transducers) and photographs. Gauges will be installed in the floodplain within five to ten feet (horizontal) from the top of stream bank along the upstream sections of Reaches UT1 and UT3, and another along the downstream section of Reach UT1. Additionally, photographs will also be used to document the occurrence of debris lines and sediment deposition on the floodplain during monitoring site visits. In-stream flow gauges will be installed in Reaches UT2 and UT3 to record water depth and flow duration.

Four bankfull events must be documented, in separate years, along UT1 and UT3 within the seven-year monitoring period. Otherwise, monitoring will continue until the required four bankfull events have been documented. Additionally, 30 days of consecutive flow must be documented annually by the flow gauges located within UT2 and UT3.

7.1.2 Cross Sections

Permanent cross sections will be installed at an approximate rate of one cross section per twenty bankfull widths of restored stream, with approximately half of the cross sections located at riffles and half located at pools. Eighteen cross sections are proposed for this project. Each cross section will be marked on both streambanks with permanent monuments using rebar cemented in place to establish the exact transect used. A common benchmark will be used for cross sections and to facilitate easy comparison of year-to-year data. The cross section surveys will occur in years one, two, three, five, and seven, and must include measurements of Bank Height Ratio (BHR) and Entrenchment Ratio (ER). The monitoring survey will include points measured at all breaks in slope, including top of streambanks, bankfull, inner berm, edge of water, and thalweg, if the features are present. Riffle cross sections will be classified using the Rosgen Stream Classification System (Rosgen 1994 and 1996). The BHR cross section parameter will be calculated following the technical workgroup guidance memo 'Standard Measurement of the BHR Parameter' provided by DMS in 2018, which will apply the as-built bankfull cross sectional area to the current monitoring year channel to determine bankfull elevation. The Low Top of Bank (LTOB) depth will also be provided in the monitoring data table.

There should be little change in as-built cross sections. If changes do take place, they will be documented in the survey data and evaluated to determine if they represent a movement toward a more unstable condition

(e.g., down-cutting or erosion) or a movement toward increased stability (e.g., settling, vegetative changes, deposition along the streambanks, or decrease in width/depth ratio). Using the Rosgen Stream Classification System, all monitored cross sections should fall within the quantitative parameters (i.e. BHR no more than 1.2 and ER no less than 1.4 for 'B' stream types or 2.2 for 'C' stream types) defined for channels of the design stream type (Note: Reach UT4 is proposed as a C-type channel while all others are B-type). Given the smaller channel sizes and meander geometry of the proposed steams, bank pins will not be installed unless monitoring results indicate active lateral erosion. The cross sections will document stability in the surveyed riffle or pool to confirm they are maintaining appropriate form for that feature and are not eroding/scouring or aggrading/filling with sediment, and thus are continuing to provide improved habitat as intended.

Reference photo transects will be taken at each permanent cross section. Lateral photos should not indicate excessive erosion or continuing degradation of the streambanks. The survey tape will be centered in the photographs of the streambanks. Photographers shall try to consistently maintain the same area in each photo over time.

7.1.3 Longitudinal Profile and Pattern

A longitudinal profile will be surveyed for the entire length of constructed channel immediately after construction to document as-built baseline conditions. The survey will be tied to a permanent benchmark and measurements will include thalweg, water surface, bankfull, and top of low bank. Each of these measurements will be taken at the head of each feature (e.g., riffle, pool) and at the maximum pool depth. The longitudinal profile should show that the bedform features installed are consistent with intended design stream type. The longitudinal profile will not be taken during subsequent monitoring years unless vertical channel instability has been documented or remedial actions/repairs are deemed necessary.

Pattern measurements such as sinuosity, radius of curvature, and meander width ratio will be calculated on newly constructed meanders using the plan views from the as-built plan sheets and reported in the as-built baseline document. Subsequent visual monitoring will be conducted annually to document any changes or excessive lateral movement in the plan view of the constructed channel.

7.1.4 Visual Assessment

Visual monitoring assessments of all stream sections will be conducted at least once per monitoring year following the requirements described in the DMS monitoring guidance documents. Photographs will be used to visually document system performance and any areas of concern related to streambank stability, condition of in-stream structures, channel migration, headcuts, channel aggradation (bar formation) or degradation, live stake mortality, impacts from invasive plant species or animal species, riparian vegetation success, condition of pools and riffles, culvert and crossing stability, easement encroachments, and overall stream morphology assessment. All photo locations and any areas of concern will be shown in the Current Condition Plan View (CCPV) figure in the baseline and annual monitoring reports.

7.2 Vegetation Monitoring

Restoration of the riparian vegetation on a site is dependent upon the successful planting and establishment of native woody species, along with the volunteer regeneration of the plant community. To determine if the success criteria are achieved, vegetation monitoring plots will be installed and monitored across the restoration site in accordance with the CVS-DMS Protocol for Recording Vegetation, Version 4.2 (Lee at al., 2008). These vegetation plots shall consist of both permanent and random plots, totaling a minimum of 2% of the planted portion of the site established within the planted riparian buffer areas per CVS Monitoring Levels 1 and 2. Six fixed plots and one random plot are proposed to monitor vegetation for this project. The size of each individual plot will be 100 square meters. No plots will be established within any undisturbed wooded areas found within the project boundary.

Vegetation monitoring will occur in the fall, prior to the loss of leaves. Data from the permanent vegetation plots will include: species, height, planted vs. volunteer, and age (based on the year the stem was planted, or first observed if a volunteer). Data from the random plots will include only the species and height. Both plot types will include invasive and exotic species data, if present. Plot densities will also be calculated for each plot. Individual plant stems will be marked such that they can be found in succeeding monitoring years in the permanent plots. Mortality will be determined from the difference between the previous year's living, planted stems and the current year's living, planted stems.

At the end of the first full growing season from baseline (MY0), after a minimum of 180 days, species composition, heights, stem density, and survival will be evaluated for monitoring year one (MY1). Vegetation plots shall subsequently be monitored in years 2, 3, 5 and 7 or until the final success criteria are achieved. The interim measure of vegetative success for the site will require the survival of at least 320 stems per acre at the end of the year 3 monitoring period. At year 5, density must be no less than 260 stems per acre. The final vegetative success criteria will be the survival of 210 stems per acre at the end of the year 7 monitoring period. Volunteer plants may count towards the vegetation performance standard if they are on the approved planted species list and are present for at least two growing seasons, or at the discretion of the IRT. A single species should only account for up to 50% of the required number of stems to meet success criteria.

Additionally, the height of the vegetation at Year 7 should average 8 feet tall. Certain native species, which are appropriate to plant on-site to provide a diverse vegetation community, do not typically grow to these heights in 7 years and will be excluded from the height performance standard. For this project, these excluded species include all of the understory/shrub species presented in Table 6.7. Baker would also like to note that the overstory planting list contains numerous slower growing species such as a mix of five oak species and persimmon at a combined total of 25% of the planted stems for both the general riparian and wetland planted areas.

While measuring species density and height is the current accepted methodology for evaluating vegetation success on mitigation projects, species density and height alone may be inadequate for assessing plant community health. For this reason, the vegetation monitoring plan may incorporate the evaluation of additional plant community indices, native volunteer species, and the presence of invasive species vegetation to assess overall vegetative success. If monitoring suggests that the vegetation is not on a trajectory for success, an adaptive management plan could be submitted that may include any of these additional evaluation indices.

Required remedial action will be provided on a case-by-case basis, such as: replanting more wet/drought tolerant species as appropriate, conducting beaver management/dam removal, and the treatment of undesirable/ invasive species vegetation, etc. Any necessary remedial action will continue to be monitored as part of the vegetation performance assessment until the corrective action demonstrates that it is trending towards or again meeting the standard requirement. Invasive species will be treated such that they compose no more than 5% of the easement area, and a visual inspection of the entire site for the presence of invasives species will be conducted at least annually. Existing mature woody vegetation will be visually monitored during annual site visits to document any mortality due to construction activities or changes to the water table that negatively impact existing forest cover or favorable buffer vegetation.

Additionally, native species herbaceous vegetation, primarily grasses, will be seeded/planted throughout the site. During and immediately following construction activities, all ground cover at the project site must follow the NC Erosion and Sedimentation Control Ordinance.

7.3 Wetland Monitoring

There are ten existing jurisdictional riparian wetland areas totaling 0.996 acres identified within the project conservation easement. They are primarily located immediately adjacent to the project reaches as a narrow, wet fringe, with a few larger pockets located in low-lying areas of the pasture that drain into the reaches. As previously described, they have been heavily impacted through their clearing and the establishment of pasture.

Enhancement of these wetland areas will be performed through both the reestablishment of a vegetated buffer consisting of appropriate native species, and through the exclusion of livestock. Hydrologic improvement of these wetlands is also anticipated through the restoration of the adjacent reaches, which will raise the stream bed and reestablish a floodplain connection, thus raising the adjacent water tables and increasing flood frequency. It is also expected that through these measures additional floodplain wetlands will naturally reestablish so as to offset the wetland impacts necessary during construction.

Visual inspections will be conducted for the wetland areas periodically throughout the monitoring period and will document any visual indicators that would be typical of jurisdictional wetlands. These include, but are not limited to, vegetation types present, surface flow patterns, stained leaves, and ponded water, etc. A reverification of the extent of jurisdictional wetlands can be conducted at the end of the monitoring period by IRT request. Wetland plant establishment will be documented along with other visual indicators noted above, and as part of the general vegetation monitoring protocol as described in section 7.2.

Please note that these wetland areas are not being presented for mitigation credit but are being documented for both their functional uplift value and for verification of no net wetland loss on the project. Thus, there are no formal performance standards or success criteria being presented for the wetlands.

7.4 Stormwater BMP Monitoring

A stormwater BMP will be constructed as part of the overall restoration approach for Reach UT3 as described in detail in Section 6.2. The BMP will be visually monitored for vegetative survivability, outlet stability, and permanent pool storage capacity using photo documentation throughout the 7-Year monitoring period. Maintenance measures to be implemented during the monitoring may include the replacement of dead vegetation (herbaceous and/or woody) as needed, and the removal of excess sedimentation from the permanent pools, as needed. Additionally, should the outlet of the constructed wetland become unstable during the monitoring period, corrective measures will be implemented to rectify the instability issues.

Please note that this BMP is not being installed for direct mitigation credit, but for the water quality improvement of the adjacent receiving stream. As such, there are no formal performance standards or success criteria being presented for the BMP.

8.0 MONITORING PLAN

The monitoring plan for the UT to Rush Fork Stream Mitigation Project is outlined below in Table 8.1 and describes the measurable connections between the previously stated goals and objectives to the performance standards and expected functional uplift. The approximate post-construction monitoring feature locations can be found in Figure 11.

Table 8.1 Monitoring Plan Overview
UT to Rush Fork Stream Mitigation Project – NCDMS Project No. 100068

Goal	Treatment	Performance Standards	Monitoring Metric	Outcome	Likely Functional Uplift
Reconnect stream reaches to their floodplains.	Restore streams with appropriate channel dimensions and raise stream bed elevations.	Four bankfull events in separate years during the 7-year monitoring period.	Continuous stage recorders used to record bankfull events.	Increased bankfull events, restoring a more natural flooding regime to the system.	A dissipation of damaging high flows during flood events, hydrologic improvement of adjacent wetlands, and increased floodplain access for sediment storage.
Improve stream stability.	Restore streams with appropriate dimensions, pattern, and profile, stabilize streambanks, provide floodplain access, utilize bio-engineering.	Restored streams will maintain bank-height-ratios of less than 1.2 and entrenchment ratios greater than 1.4 (B-type) or 2.2 (C-type) provided visual inspections also reveal stabilization.	Cross section surveys and visual inspections with photographic documentation.	Stable stream banks with appropriate channel dimensions and sediment transport.	A reduction in sediment loss to streams from bank erosion, along with the resulting nutrient loss, increased woody debris and organic material in stream resulting in improved habitat.
Improve aquatic habitat.	Install a variety of in-stream structures, increasing the woody debris and the number and types of pools. Reduce sedimentation within riffles.	N/A	Inventory comparisons of in-stream structures and features from existing conditions and as-built project surveys and assessments.	Increased number of pools and woody structures and debris compared to the existing conditions.	An increase in the quantity and quality of aquatic habitat features for macroinvertebrates and fish.
Reestablish forested riparian buffers.	Plant appropriate native hardwood tree and shrub species on streambanks and in the riparian buffer at a 30-foot minimum	Interim survival rates of 320 stems/acre at MY3 and 260 steams/acre at MY5, with final rate of 210 stems/acre at MY7.	Vegetation monitoring plots (100 m^2 each covering 2% of the total planted area).	At the end of monitoring, a vegetated riparian buffer will be established at a minimum 30-foot width and at a minimum 210 stems/acre of	Improved riparian corridor habitat for native species, improved stabilization of stream floodplain (reducing sediment loss), increased woody and organic

Table 8.1 Monitoring Plan Overview
UT to Rush Fork Stream Mitigation Project – NCDMS Project No. 100068

Goal	Treatment	Performance Standards	Monitoring Metric	Outcome	Likely Functional Uplift
	width in all areas within the conservation easement where established native trees and shrubs do not exist.			native species, including volunteers (with IRT approval). Average height will be 8 ft.	material in buffer/stream system.
Permanently protect the project.	Establish a permanent Conservation Easement (CE) for the entire project.	N/A	Visual inspections to confirm no encroachments into CE.	Restored streams, wetlands, and buffers protected from damaging encroachments.	The functional uplift improvements from the project are maintained and protected in perpetuity.

The as-built / baseline report will be submitted within 90 days of the completion of project construction (to include complete as-built record drawings with all vegetation planted and monitoring devices installed), and will follow the NCDMS guidance document *Annual Monitoring Report Format, Data, and Content Requirements* (October 2020), as will all subsequent annual monitoring reports, while the closeout report will follow the Closeout Report Template – ver. 2.2 (January 2016). There will be at least a minimum of 6 months between the submission of the As-Built Baseline Report and the Year 1 Annual Monitoring Report.

The annual monitoring reports will provide the information defined below within Table 8.2 and will be submitted to NCDMS by December 1st of the year during which the monitoring was conducted. The monitoring reports will provide a project data chronology for NCDMS to document the project status and trends, will assist with the population of NCDMS databases for analysis and research purposes, and will assist in decision making regarding progress towards a successful project close-out. Project success criteria must be met by the final monitoring year prior to project closeout, or monitoring will continue until unmet criteria are successfully met as directed by NCDMS and NCIRT.

Table 8.2 Monitoring Requirements and Schedule
UT to Rush Fork Stream Mitigation Project – NCDMS Project No. 100068

Required	Parameter	Frequency	Number/Locations	Notes
X	Pattern	Baseline/As-built (MY0)	Reaches UT1 and UT3	Pattern measurements will be calculated as part of the as-built/baseline report. Additional pattern data, such as bank erosion pins/arrays, will be collected only if there are visual indications or cross section survey data that suggest significant changes have occurred.
X	Dimension	Monitoring Years 1, 2, 3, 5 and 7	18 total cross sections: 1 on UT-R1, 1 on UT1-R2, 4 on UT1-R3, 5 on UT1-R4, and 7 on UT3. See Figure 11 for locations.	Cross sections to be monitored over seven (7) years and shall include assessment of bank height ratio (BHR) and entrenchment ratio (ER).

Table 8.2 Monitoring Requirements and Schedule
UT to Rush Fork Stream Mitigation Project – NCDMS Project No. 100068

Required	Parameter	Frequency	Number/Locations	Notes
X	Longitudinal Profile	Baseline/As-built (MY0)	Reaches UT1 and UT3	For the Restoration and Enhancement I components of this project, the entire channel length will be surveyed as part of the as-built record drawings.
X	Surface Water Hydrology	Annually	3 crest gauges (pressure transducers) in the floodplain along upper UT1, lower UT1 and UT3, and in-stream pressure transducers in UT2 and UT3	The devices will be inspected on a quarterly/semi-annual basis to document the occurrence of bankfull events and flow duration for UT2 and UT3.
X	Vegetation	Monitoring Years 1, 2, 3, 5 and 7	6 fixed vegetation plots will be established throughout the planted area, with 1 additional random plot each year (7 plots total annually)	Vegetation will be monitored using the Carolina Vegetation Survey (CVS) protocols. Plots will be 100 m^2 in size and total 2% of the planted area.
X	Exotic and Nuisance Vegetation and Animals	Annually and as needed	Project wide	Locations of exotic and nuisance vegetation will be visually assessed, photographed, and mapped. These areas will be treated as needed. Beaver signs and damage will be noted and beaver will be trapped if discovered.
X	Visual Assessment	Annually and as needed	Project wide	Representative photographs will be taken to capture the state of the restored stream, wetland, and vegetated buffer conditions. Stream photo-points will be preferably taken in the same location when the vegetation is minimal to document any areas of concern or to identify trends.
X	Project Boundary	Annually	Complete easement boundary	Locations of fence damage, vegetation damage, boundary encroachments, etc. will be photographed and mapped.
X	Stormwater BMP	Semi-Annually	BMP at top of UT3	Stormwater wetland BMP will be visually monitored for stability and vegetation survival during the 7-year monitoring period.

9.0 ADAPTIVE MANAGEMENT PLAN

Upon completion of site construction, the post-construction monitoring protocols previously defined in this document will be implemented. Project maintenance will be performed as previously described in this document. If, during the course of annual monitoring it is determined the site's ability to achieve site performance standards are jeopardized, DMS will be notified of the need to develop a Plan of Corrective Action. The Plan of Corrective Action may be prepared using in-house technical staff or may require engineering and consulting services. Once the Plan of Corrective Action is prepared and finalized Michael Baker will:

1. Notify the USACE as required by the Nationwide 27 permit general conditions.
2. Notify the NCDWR.
3. Revise performance standards, maintenance requirements, and monitoring requirements as necessary and/or required by the USACE.
4. Obtain other permits as necessary.
5. Implement the Corrective Action Plan.
6. Provide the USACE a Record Drawing of Corrective Actions. This document shall depict the extent and nature of the work performed.

10.0 LONG-TERM MANAGEMENT PLAN

The NC Department of Environmental Quality's Stewardship Program currently houses DMS stewardship endowments within the non-reverting, interest-bearing Conservation Lands Stewardship Endowment Account. The use of funds from the Endowment Account is governed by North Carolina General Statute GS 113A-232(d)(3). Interest gained by the endowment fund may be used only for the purpose of stewardship, monitoring, stewardship administration, and land transaction costs, if applicable. The NCDEQ Stewardship Program intends to manage the account as a non-wasting endowment. Only interest generated from the endowment funds will be used to steward the compensatory mitigation sites. Interest funds not used for those purposes will be re-invested in the Endowment Account to offset losses due to inflation. The site-protection instrument for the site is included in Appendix B.

The project site will be protected and managed under the agreed upon terms outlined in the recorded conservation easement. The appropriate signage will be installed to mark the conservation easement boundary. The long-term manager/steward will be responsible for inspecting the site easement and signage, and for taking any corrective maintenance actions as needed. The landowner shall contact the long-term manager/steward regarding any clarification about easement restrictions and is responsible for maintaining all livestock-excluding fencing and/or permanent crossings. Should land use change in the future, the landowner will be responsible for the installation and maintain of any additional fencing that might be required to fulfill the conditions of the conservation easement.

11.0 DETERMINATION OF CREDITS

The determination of stream credits for the UT to Rush Fork Stream Mitigation Project are detailed below in Tables 11.1 and 11.2 and are shown in Figure 12. They have been calculated according to all applicable DMS, IRT, and DEQ guidance documents. The Credit Release Table can be found in Appendix C.

Table 11.1. Project Mitigation Quantities and Credits

UT to Rush Fork Stream Mitigation Project - NCDMS Project No. 100068

Project Segment	Original Mitigation Plan* Ft/Ac	As-Built Ft/Ac	Original Mitigation Category	Original Restoration Level	Original Mitigation Ratio (X:1)	Credits		Comments
Stream								
Reach UT1-R1	206.20	-	Cold	EI	1.5	137.467		
Reach UT1-R2	275.00	-	Cold	EII	2.5	110.000		
Reach UT1-R3	612.10	-	Cold	EI	1.5	408.067		
Reach UT1-R4	1,216.33	-	Cold	R	1.0	1,216.330		
Reach UT2	86.24	-	Cold	EII	2.5	34.496		
Reach UT3	1,584.45	-	Cold	R	1.0	1,584.450		
Reach UT4	42.80	-	Cold	R	1.0	42.800		
					Total:	**3,533.610**		
Wetland								
N/A	-	-	-	-	-	-		
					Total:	**N/A**		

*The lengths shown for each reach are the creditable lengths and were calculated after all exclusions were accounted for, such as easement breaks, utility impacts, stream crossings, etc.

Table 11.2. Project Credits

UT to Rush Fork Stream Mitigation Project - NCDMS Project No. 100068

	Stream			Riparian	Non-Rip	Coastal
Restoration Level	Warm	Cool	Cold	Wetland	Wetland	Marsh
Restoration	-	-	2,843.580	-	-	-
Re-establishment				-	-	-
Rehabilitation				-	-	-
Enhancement				-	-	-
Enhancement I	-	-	545.533			
Enhancement II	-	-	144.496			
Creation				-	-	-
Preservation	-	-	-	-	-	
Totals			**3,533.610**			

Total Stream Credit	**3,533.610**
Total Wetland Credit	**-**

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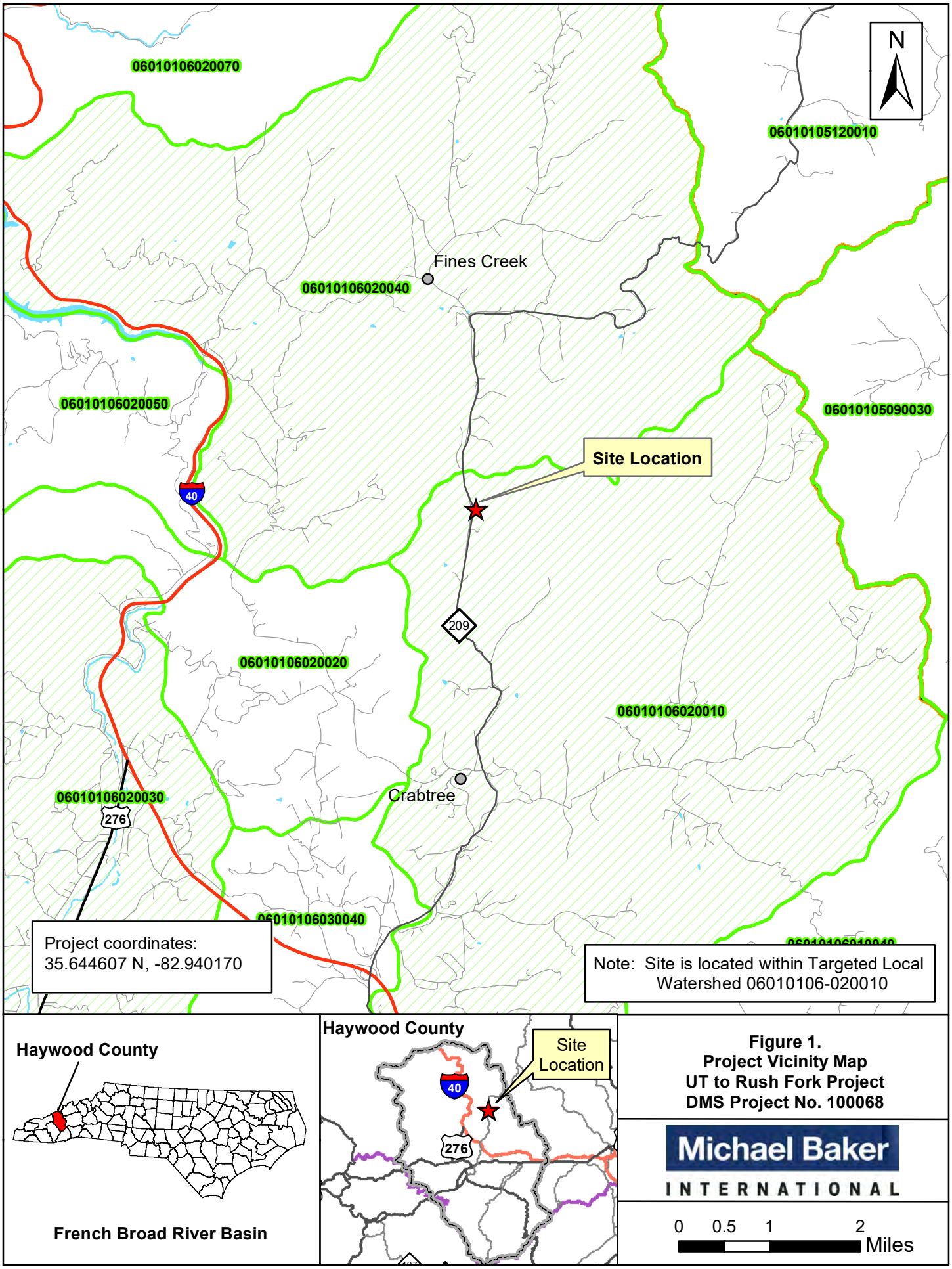
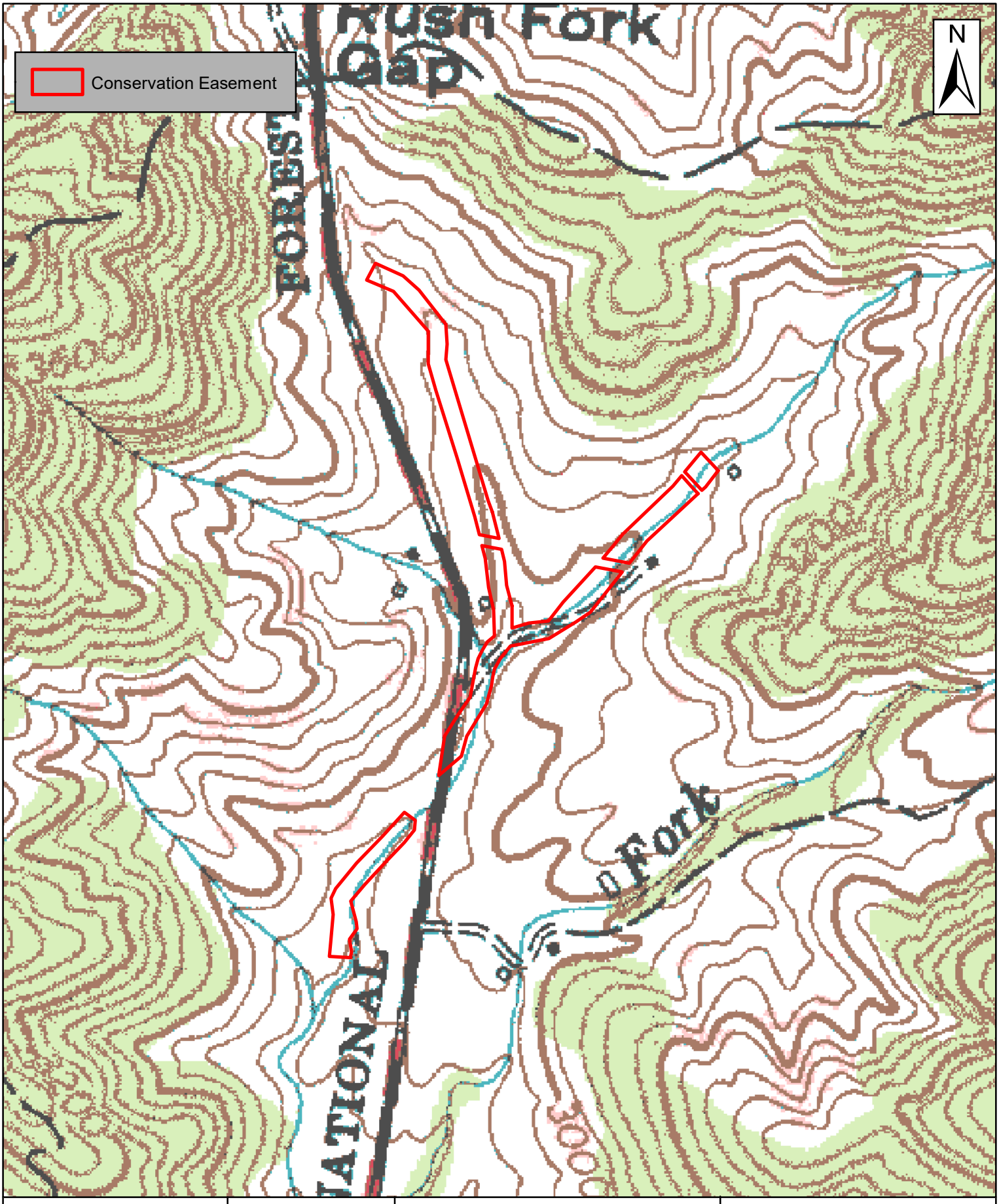
APPENDIX A: FIGURES, PHOTOS, AND SUPPLEMENTARY DATA


N
06010106020070
06010105120010
Fines Creek
06010106020040
06010106020050
06010105090030
Site Location
40
209
06010106020020
06010106020010
Crabtree
06010106020030
276
06010106030040
Project coordinates:
35.644607 N, -82.940170
Note: Site is located within Targeted Local Watershed 06010106-020010
Haywood County
French Broad River Basin
Haywood County
Site Location
40
276
Figure 1.
Project Vicinity Map
UT to Rush Fork Project
DMS Project No. 100068
Michael Baker
INTERNATIONAL
0 0.5 1 2
Miles



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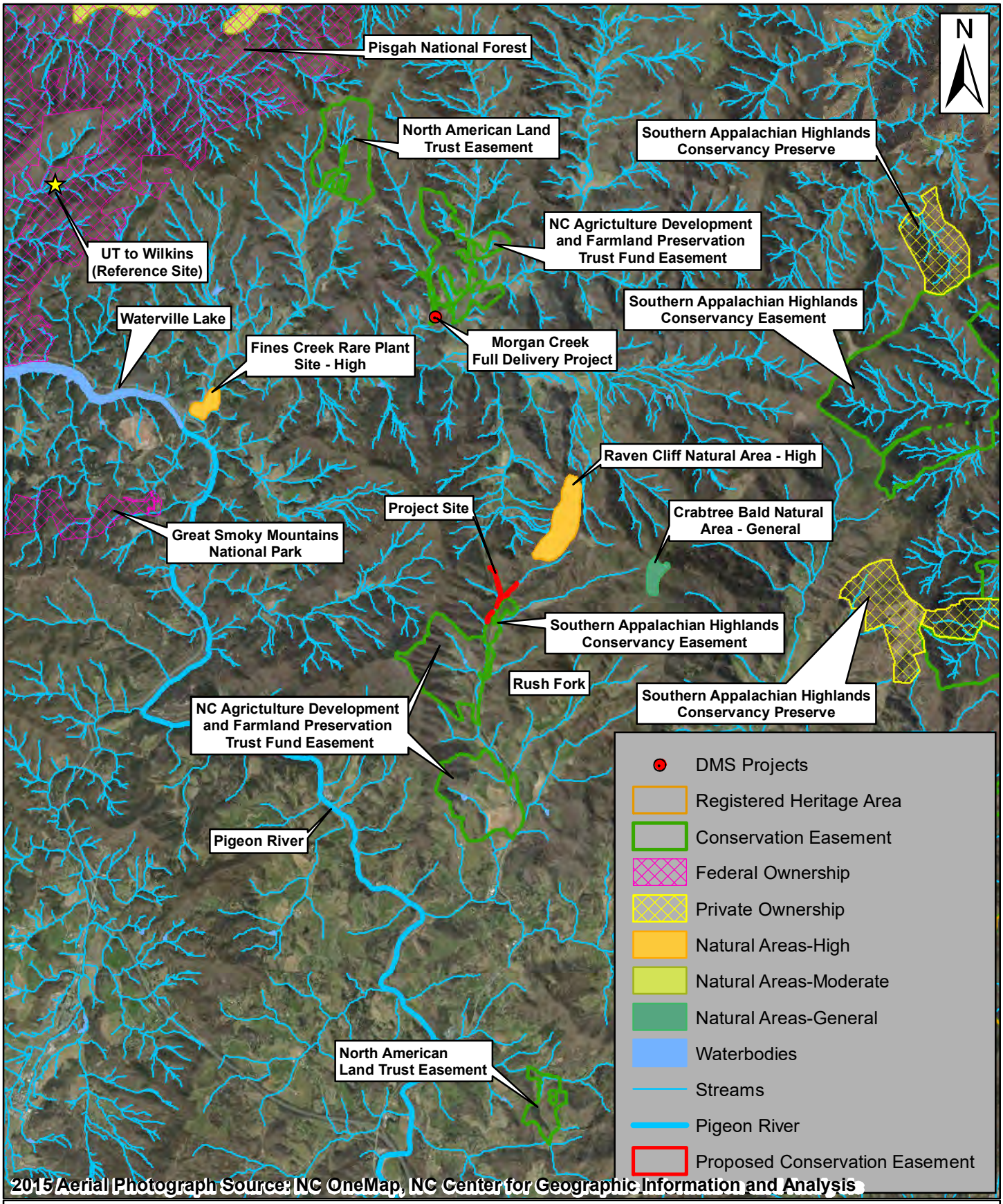
North Carolina
Division of
Mitigation Services
DMS Proj. No. 100068

0 250 500 1,000 Feet

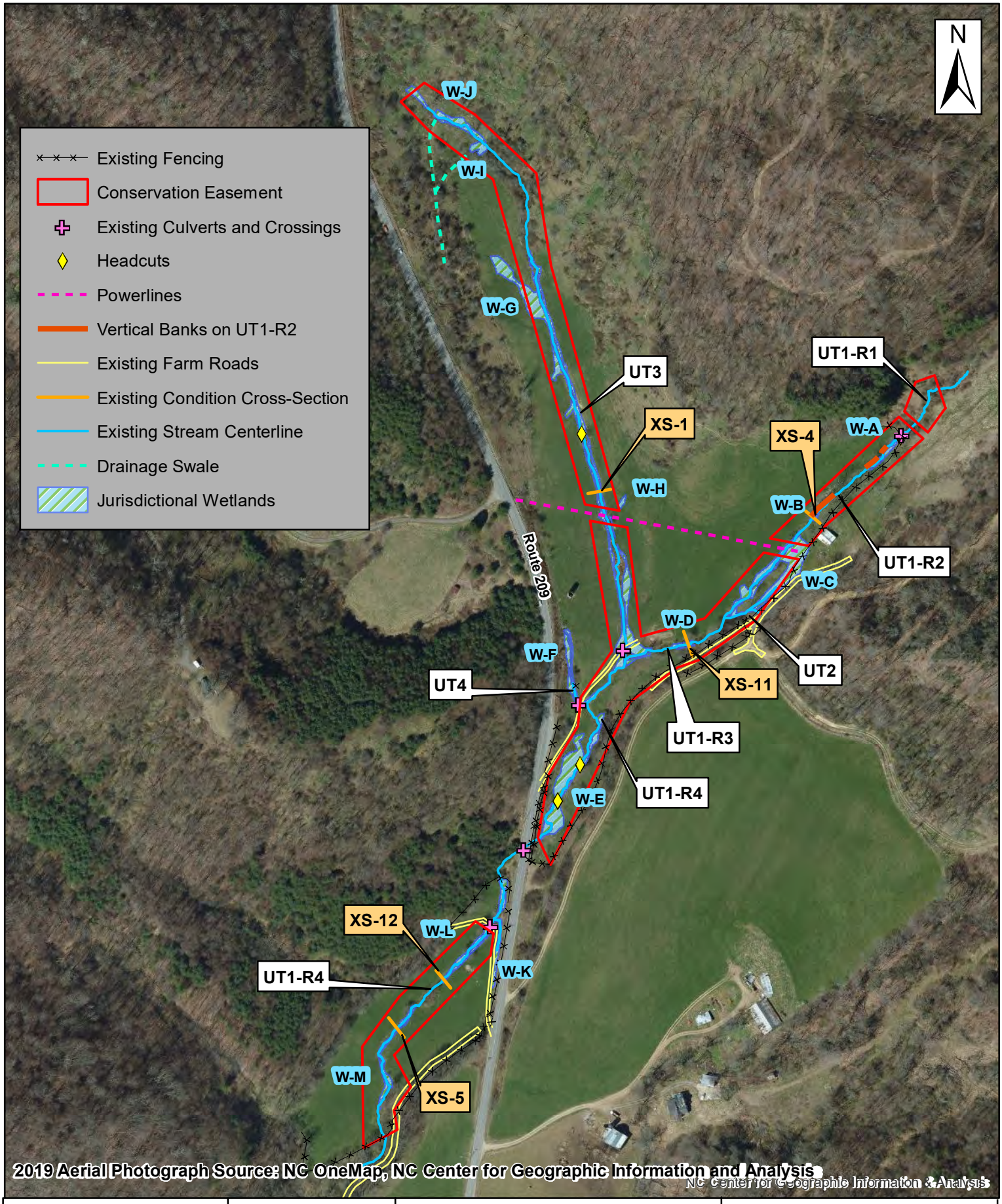
Figure 2. USGS Map
(Fines Creek Quad)
UT to Rush Fork Project
Haywood County



Michael Baker INTERNATIONAL

0 1 2 Miles

Figure 3. Adjacent and Proximal Planning Elements Map
UT to Rush Fork Project
Haywood County

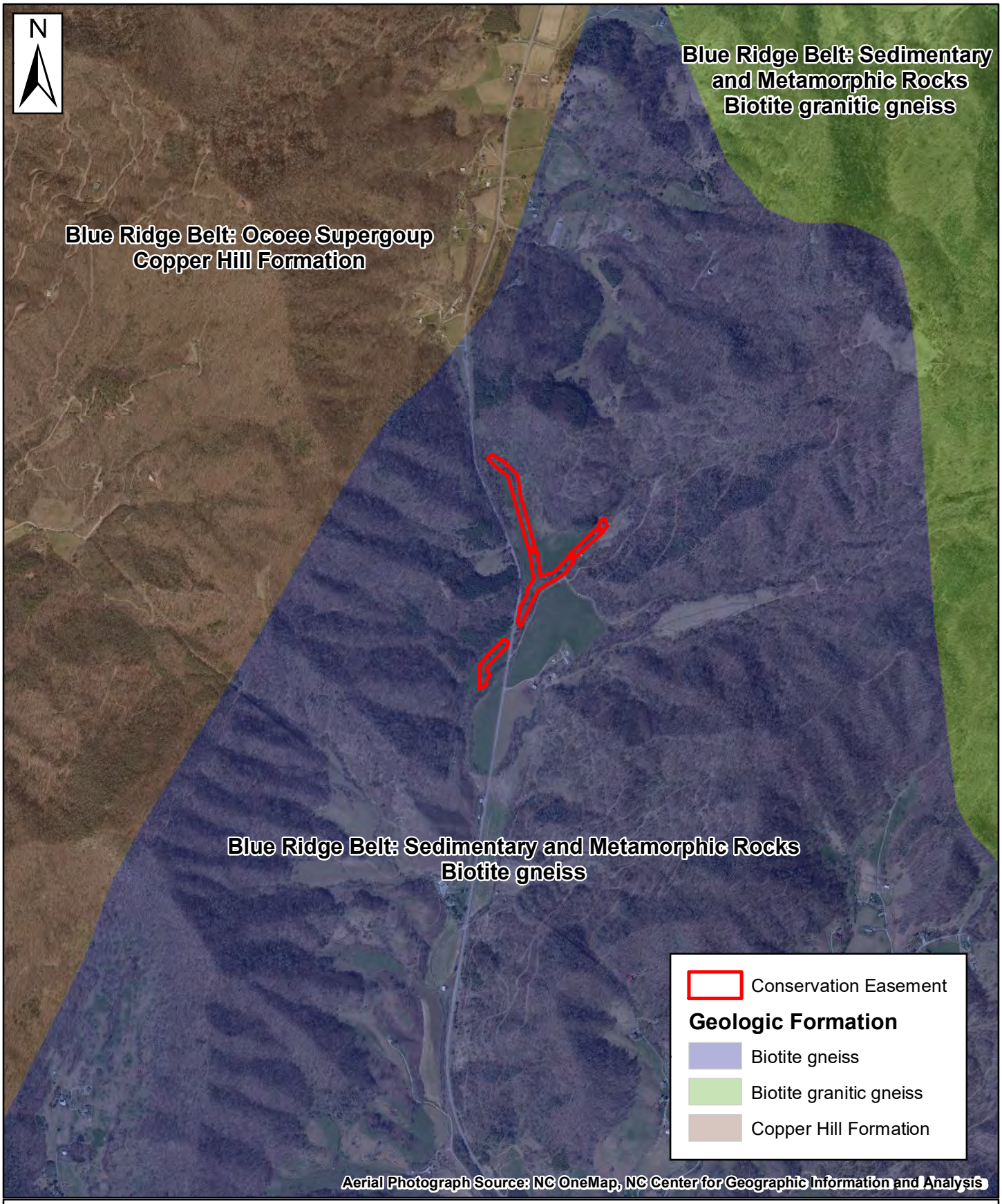


Michael Baker INTERNATIONAL

North Carolina Division of Mitigation Services
DMS Proj. No. 100068

0 125 250 500 Feet

Figure 4. Existing Conditions and Features
UT to Rush Fork Project
Haywood County



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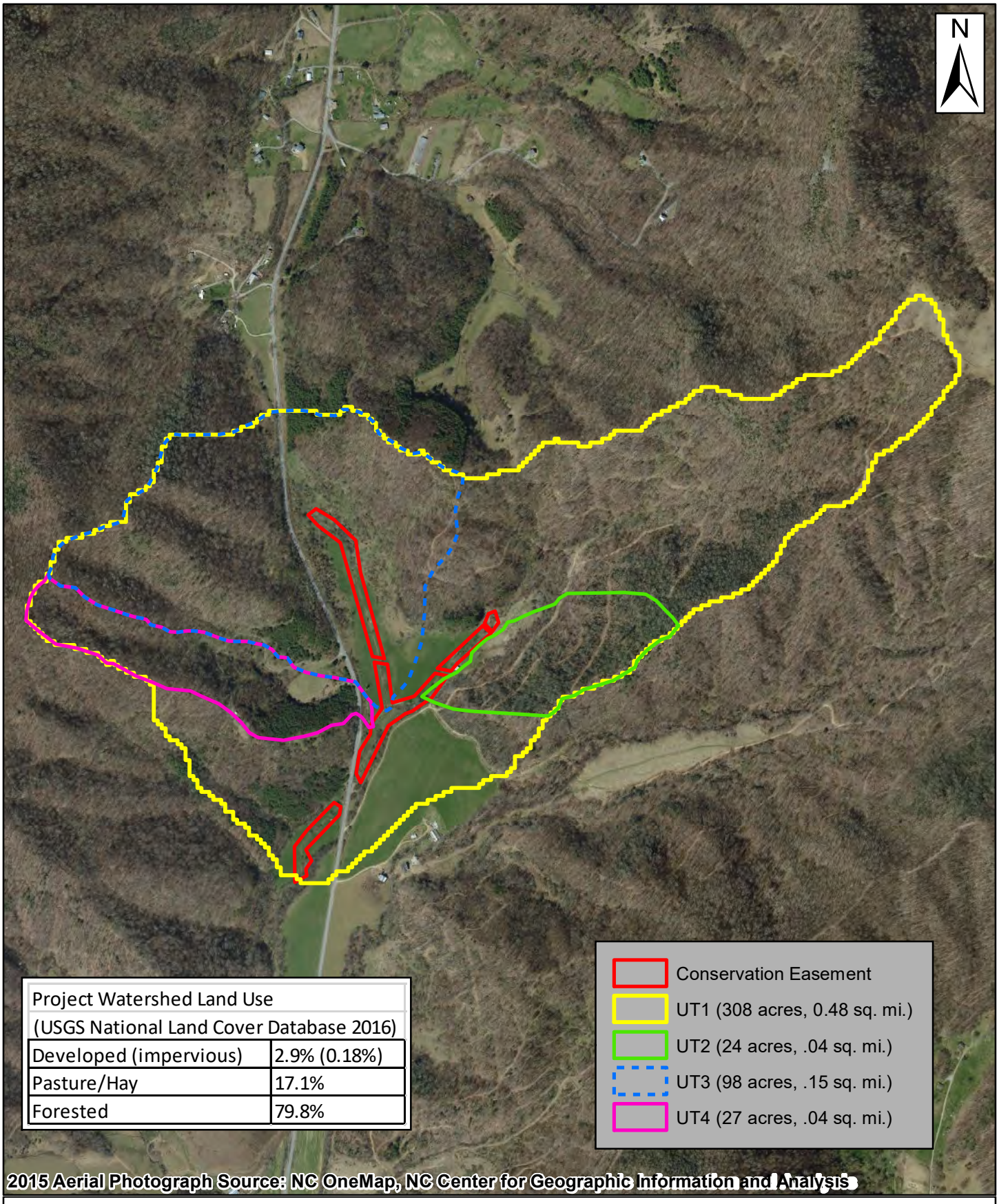
0 0.25 0.5 Miles

Figure 5.
Geologic Features
UT to Rush Fork Project
Haywood County



Project Watershed Land Use (USGS National Land Cover Database 2016)	
Developed (impervious)	2.9% (0.18%)
Pasture/Hay	17.1%
Forested	79.8%

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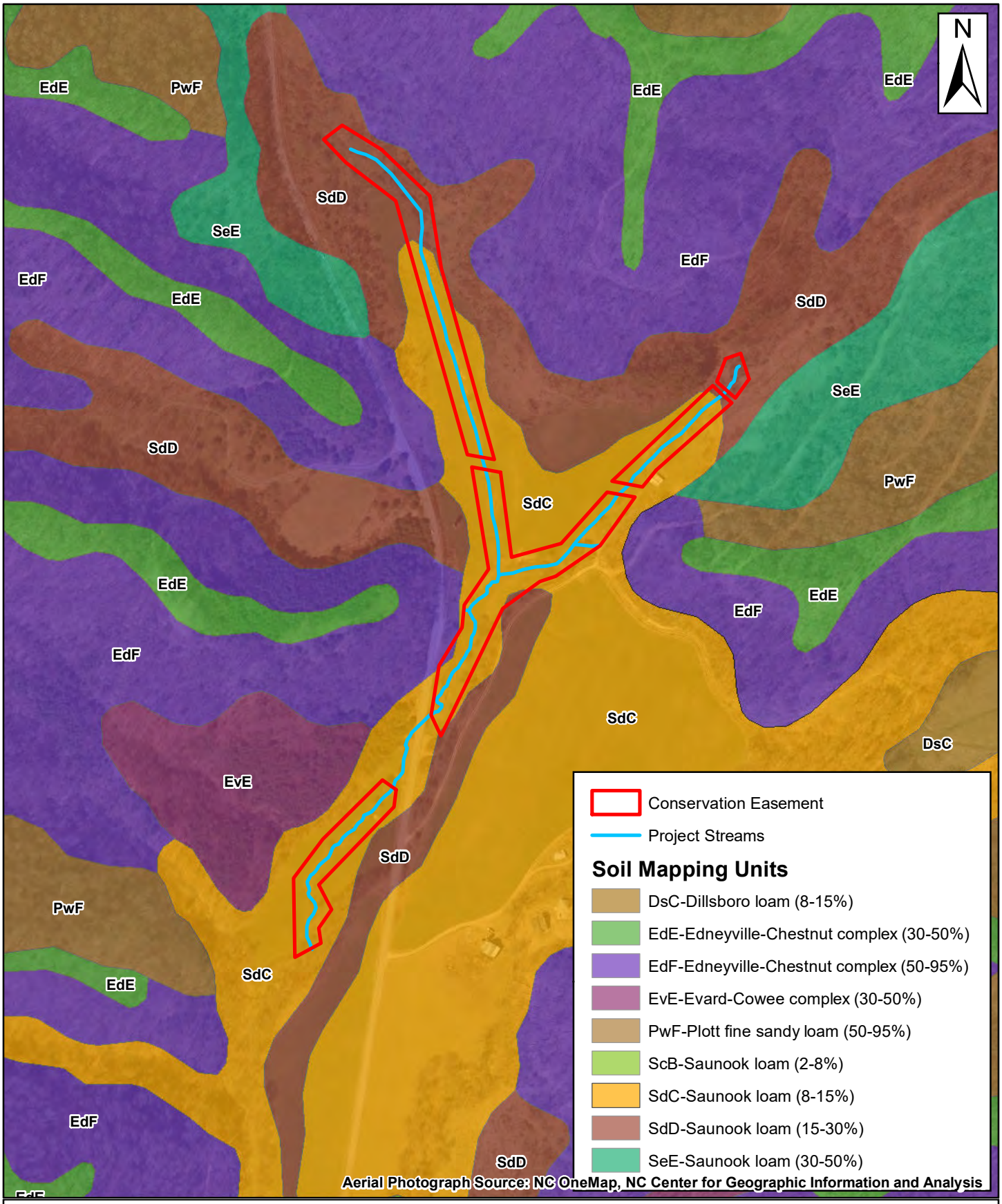
0 0.25 0.5 Miles

Figure 6. Drainage Area and Land Use Map UT to Rush Fork Project Haywood County



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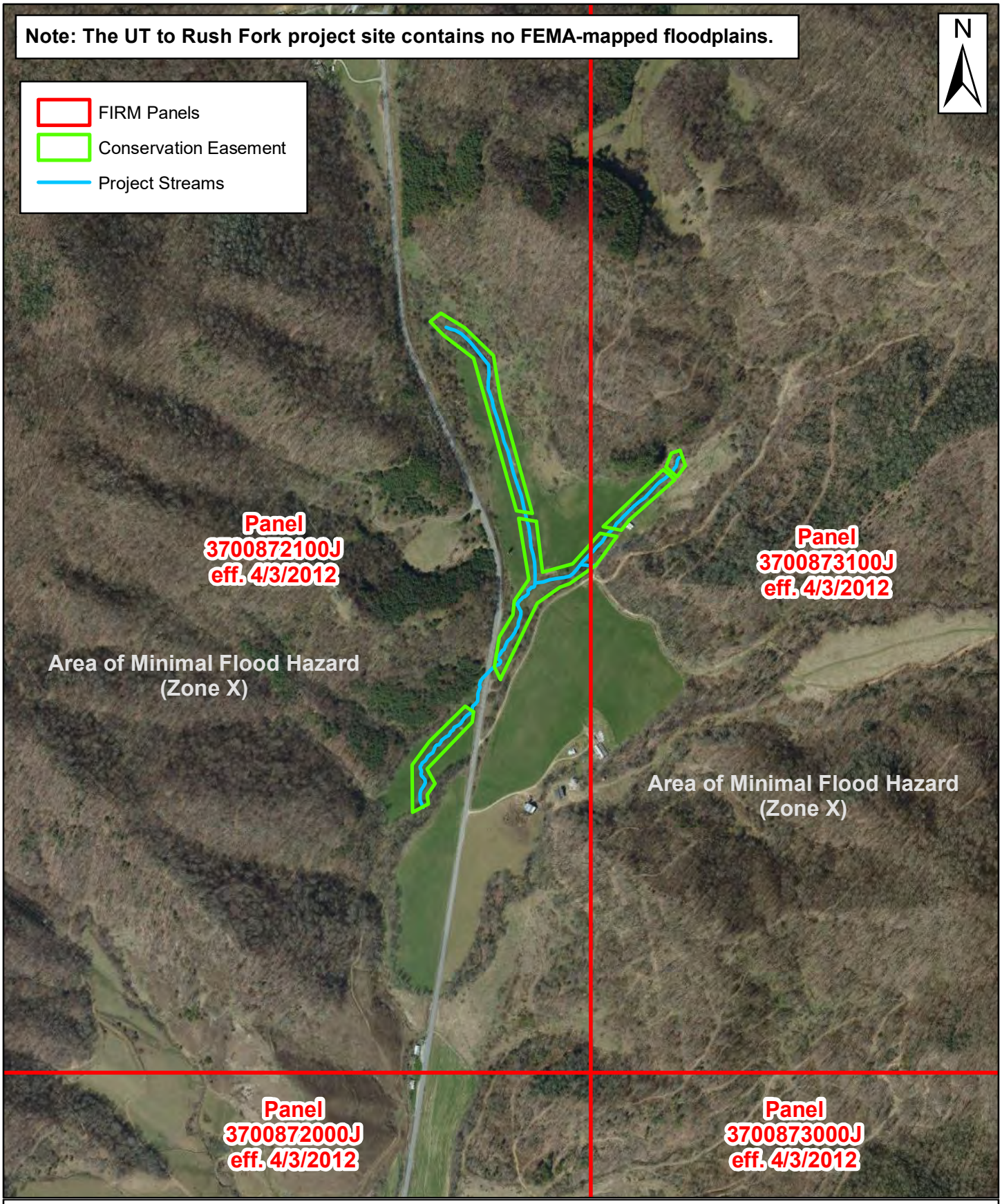
0 500 1,000 Feet

Figure 7. NRCS Soils Map
UT to Rush Fork Project
Haywood County



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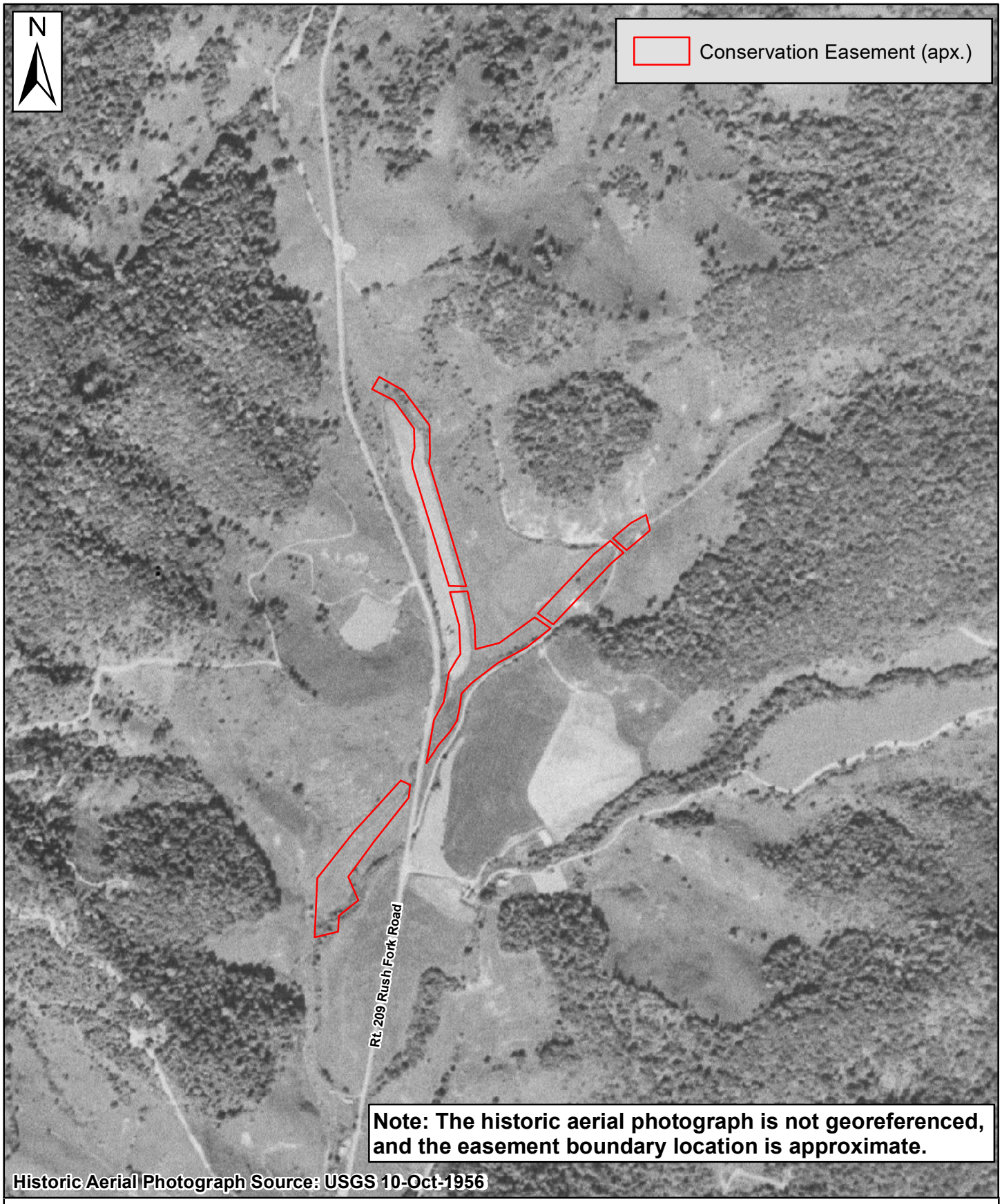
0 750 1,500 Feet

Figure 8.
FEMA Floodplain Map
UT to Rush Fork Project
Haywood County



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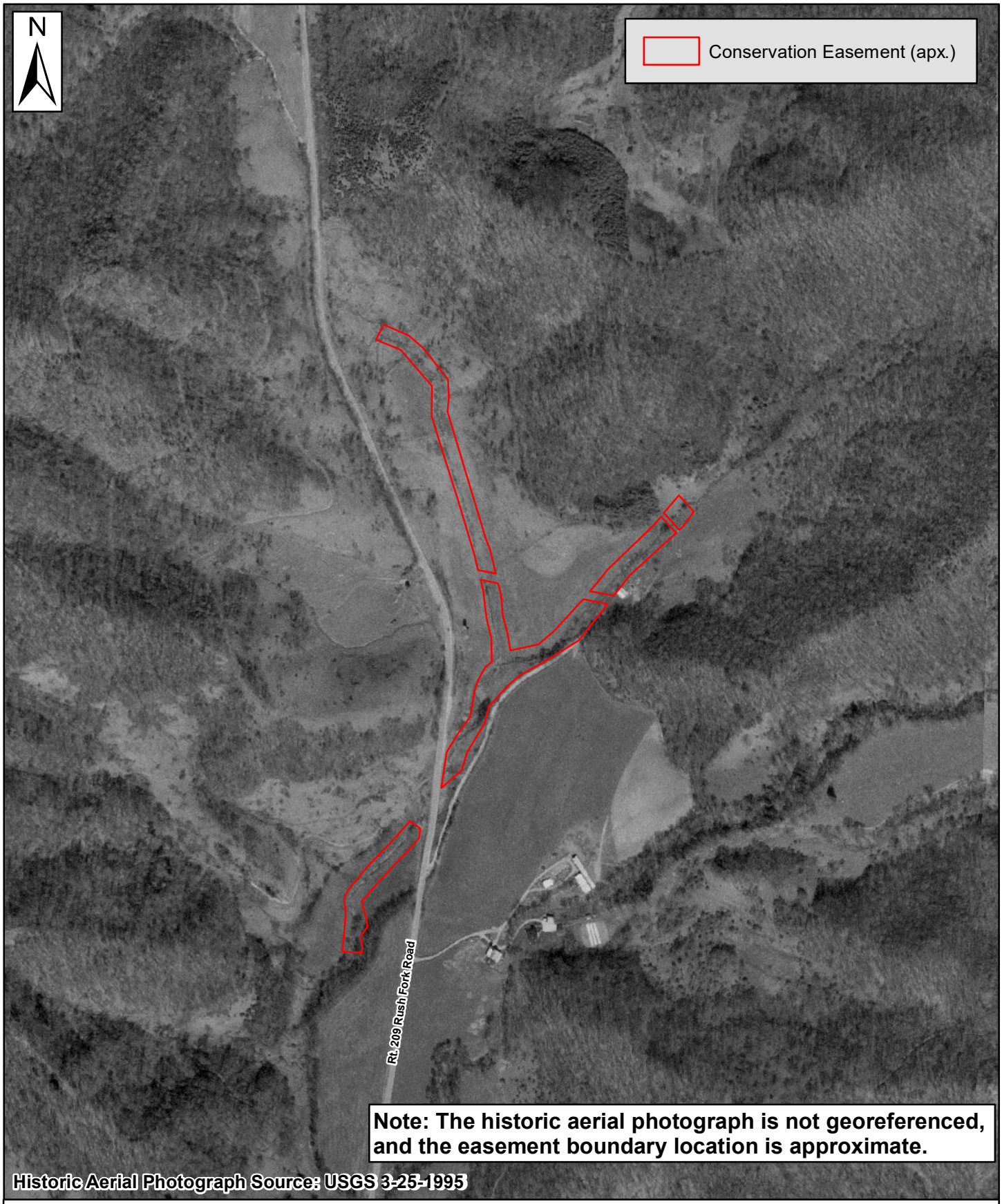
Not to Scale

Figure 9A.
Historic Aerial 1956
UT to Rush Fork Project
Haywood County



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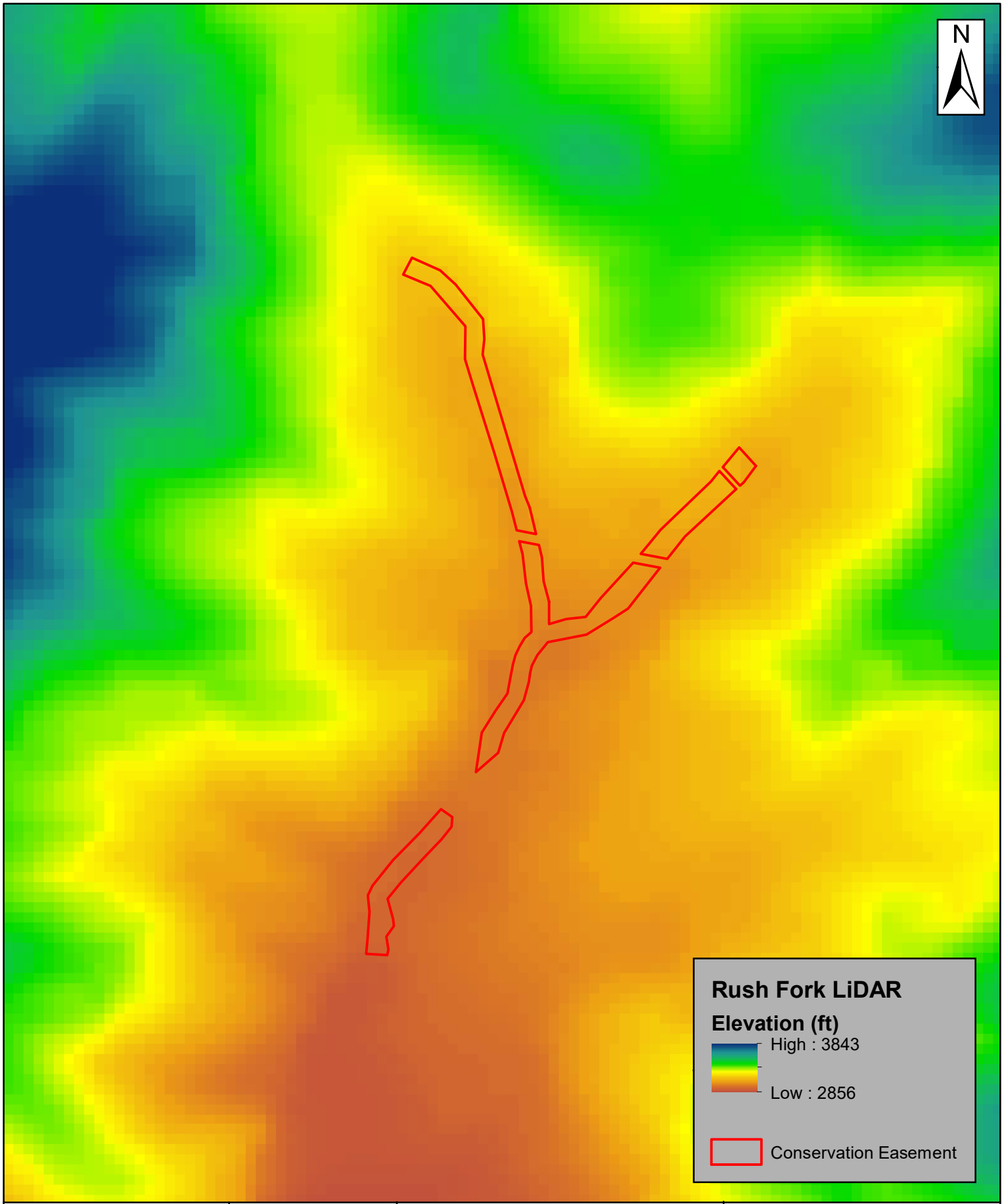
Not to Scale

Figure 9B.
Historic Aerial 1995
UT to Rush Fork Project
Haywood County



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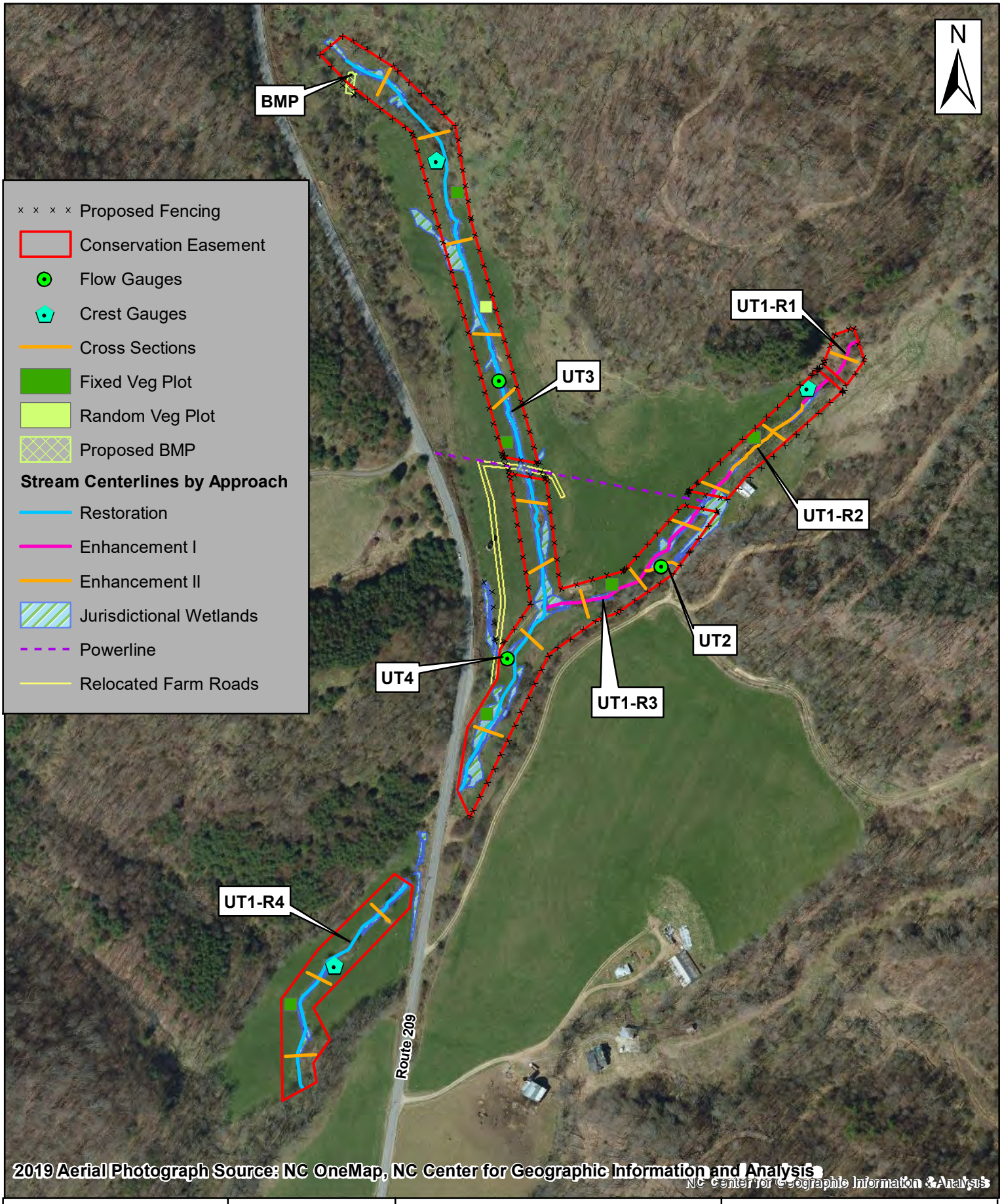
North Carolina Division of Mitigation Services
DMS Proj. No. 100068

0 250 500 1,000 Feet

Figure 10. LiDAR Map
UT to Rush Fork Project
Haywood County

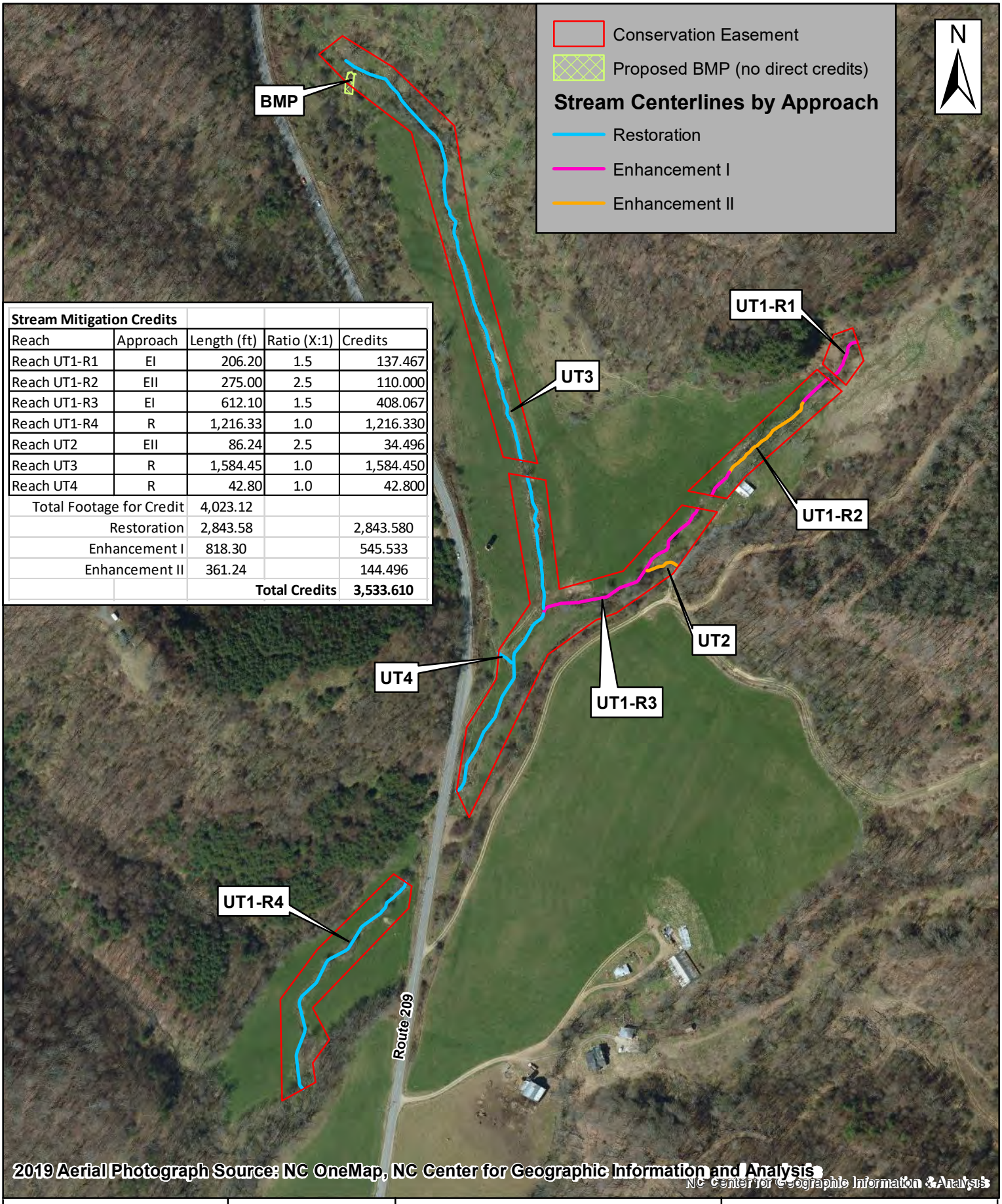


Michael Baker INTERNATIONAL

North Carolina Division of Mitigation Services
DMS Proj. No. 100068

0 125 250 500 Feet

Figure 11. Proposed Monitoring Features
UT to Rush Fork Project
Haywood County



Stream Mitigation Credits				
Reach	Approach	Length (ft)	Ratio (X:1)	Credits
Reach UT1-R1	EI	206.20	1.5	137.467
Reach UT1-R2	EII	275.00	2.5	110.000
Reach UT1-R3	EI	612.10	1.5	408.067
Reach UT1-R4	R	1,216.33	1.0	1,216.330
Reach UT2	EII	86.24	2.5	34.496
Reach UT3	R	1,584.45	1.0	1,584.450
Reach UT4	R	42.80	1.0	42.800
Total Footage for Credit		4,023.12		
Restoration		2,843.58		2,843.580
Enhancement I		818.30		545.533
Enhancement II		361.24		144.496
			Total Credits	**3,533.610**

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North Carolina Division of Mitigation Services
DMS Proj. No. 100068

0 125 250 500 Feet

Figure 12. Project Asset and Credit Map
UT to Rush Fork Project
Haywood County

UT to Rush Fork: Existing Conditions Photographs

UT1-R4, Left Bank (June 2020)

UT1-R4, Privet in riparian buffer (June 2020)

UT1-R4, upstream at dislodged culvert (Jan. 2020)

UT1-R4, downstream at dislodged culvert (Jan 2020)

UT1 R4, left bank (Jan. 2020)

UT1 R4, left bank upstream (Jan. 2020)

UT to Rush Fork: Existing Conditions Photographs

UT1-R4, downstream (Jan. 2020)

UT1-R4, culverted crossing wash-out upstream (Jan. 2020)

UT1-R4, culverted crossing wash-out downstream (Jan. 2020)

UT1-R4, cattle impacts (Jan. 2020)

UT1-R4, upstream incised (Jan. 2020)

UT1-R3, cattle crossing (Jan. 2020)

UT to Rush Fork: Existing Conditions Photographs

UT1-R3, old culvert (Jan. 2020)

UT1-R2, top of R2 downstream (Jan. 2020)

UT1-R1, upstream (Jan. 2020)

UT2, downstream (Aug. 2020)

UT2, upstream (Aug. 2020)

UT2, mid-reach (Aug. 2020)

UT to Rush Fork: Existing Conditions Photographs

Upper UT3, downstream (Nov. 2017)

Upper UT3, upstream (Nov. 2017)

Upper UT3, crossing above confluence (Nov. 2017)

Upper UT3, straight channel in field (Dec. 2019)

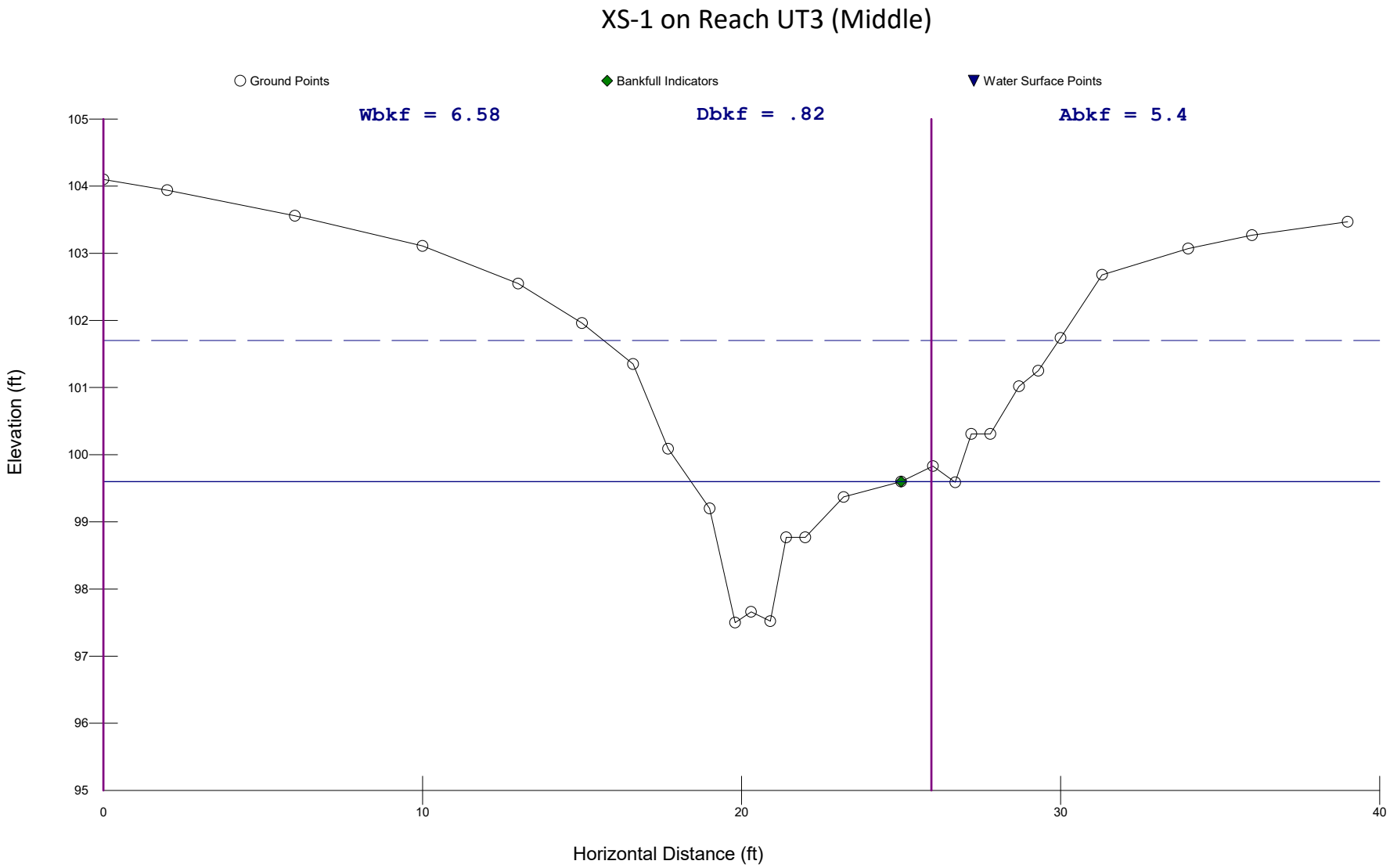
UT3, mid-reach downstream (June 2020)

UT3, mid-reach upstream (June 2020)

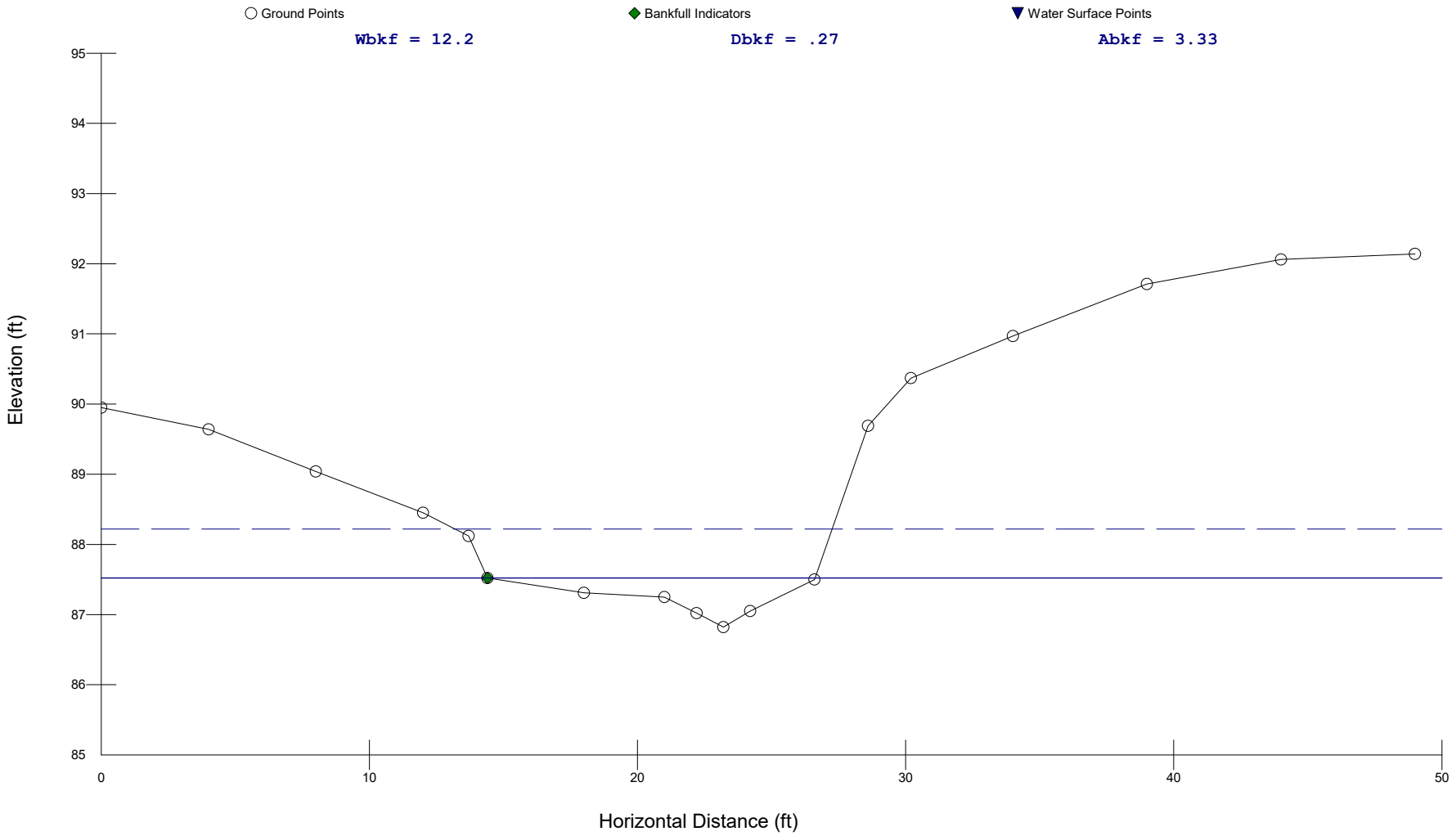
UT to Rush Fork: Existing Conditions Photographs

UT4, upstream (Aug. 2020)

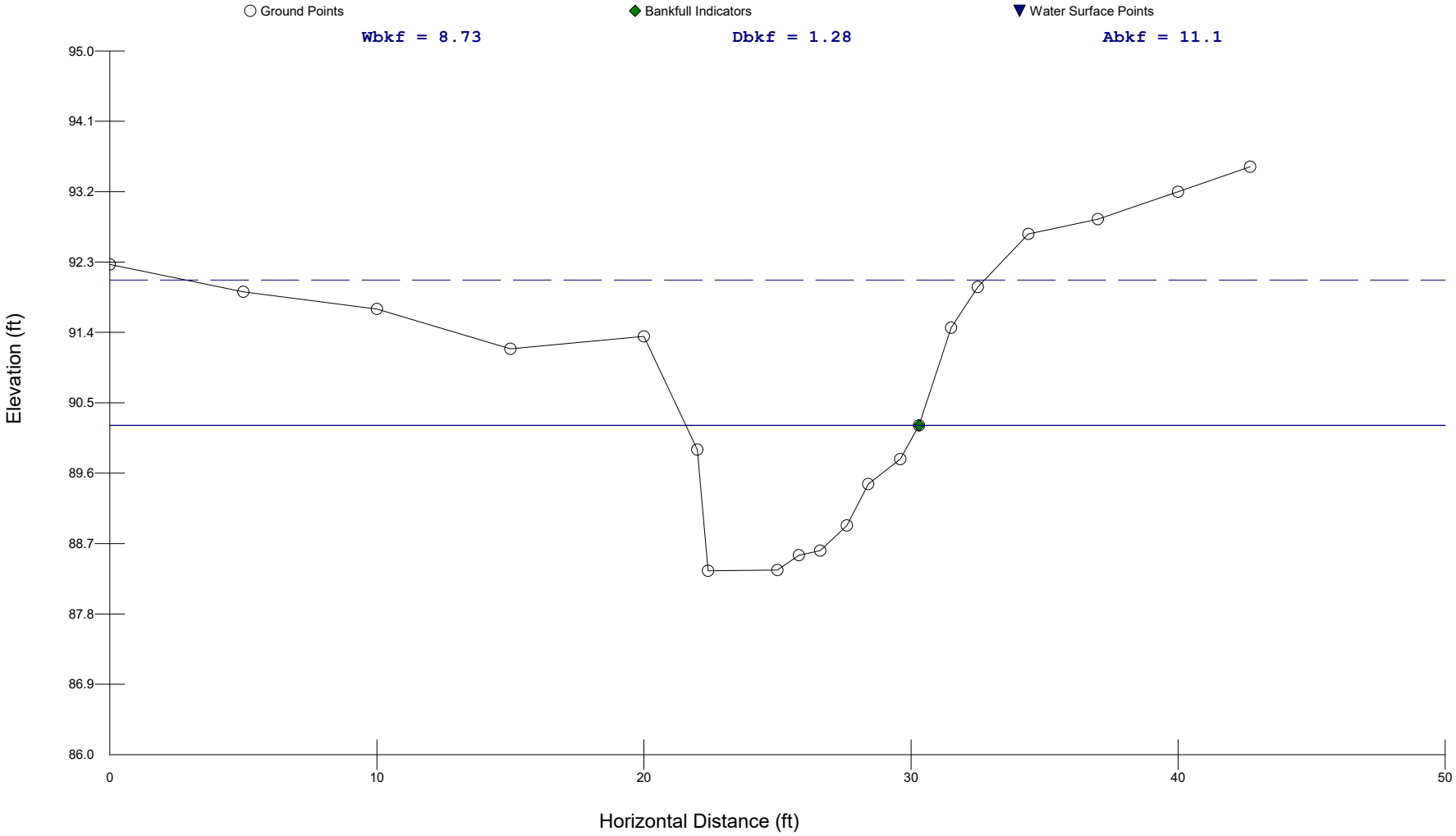
UT4, upstream (Aug. 2020)


XS-1 on Reach UT3 (Middle)
Ground Points
Bankfull Indicators
Water Surface Points
Wbkf = 6.58
Dbkf = .82
Abkf = 5.4
Elevation (ft)
105
104
103
102
101
100
99
98
97
96
95
0
10
20
30
40
Horizontal Distance (ft)

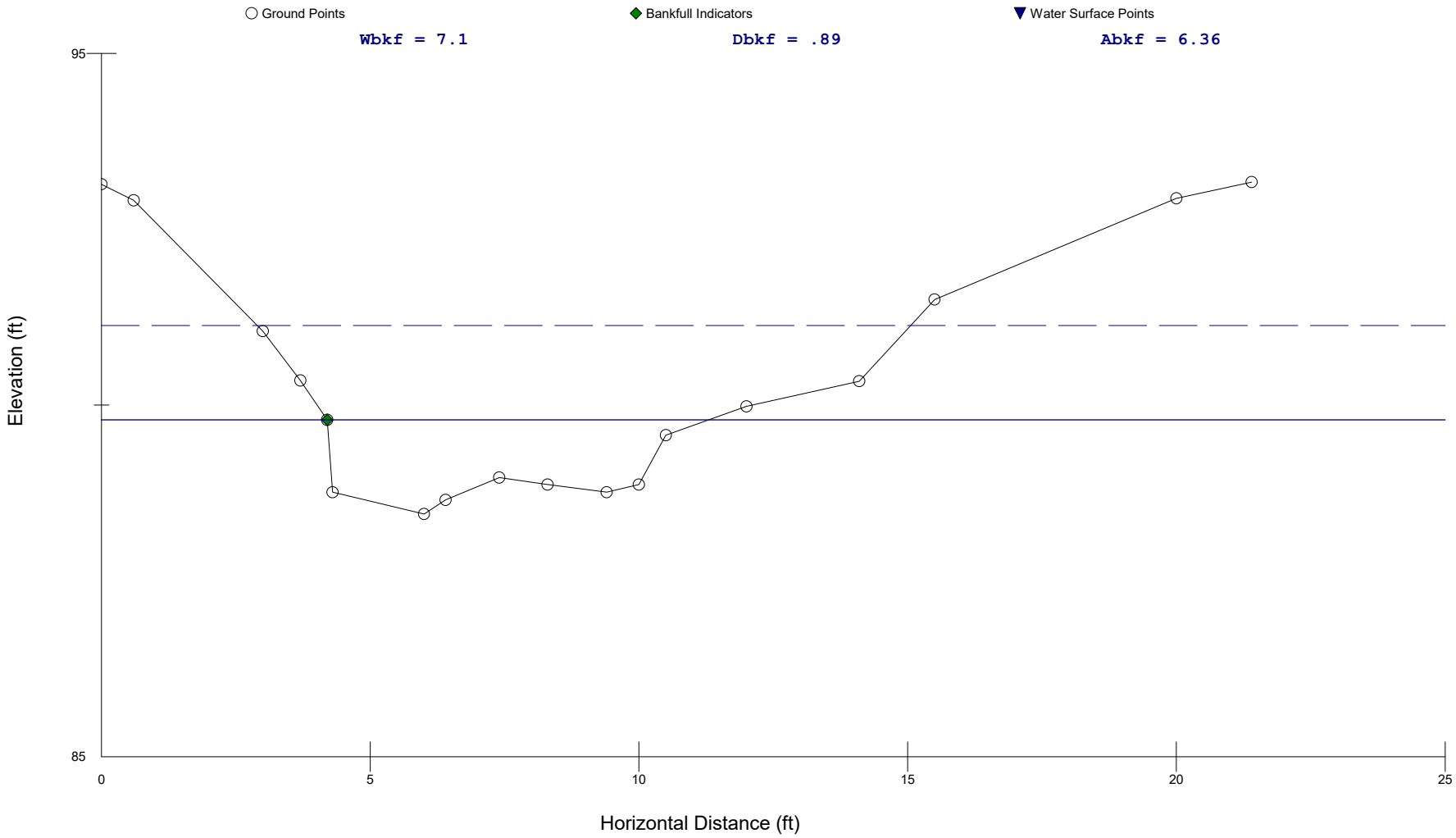
XS-4 on Reach UT1 (Upper)



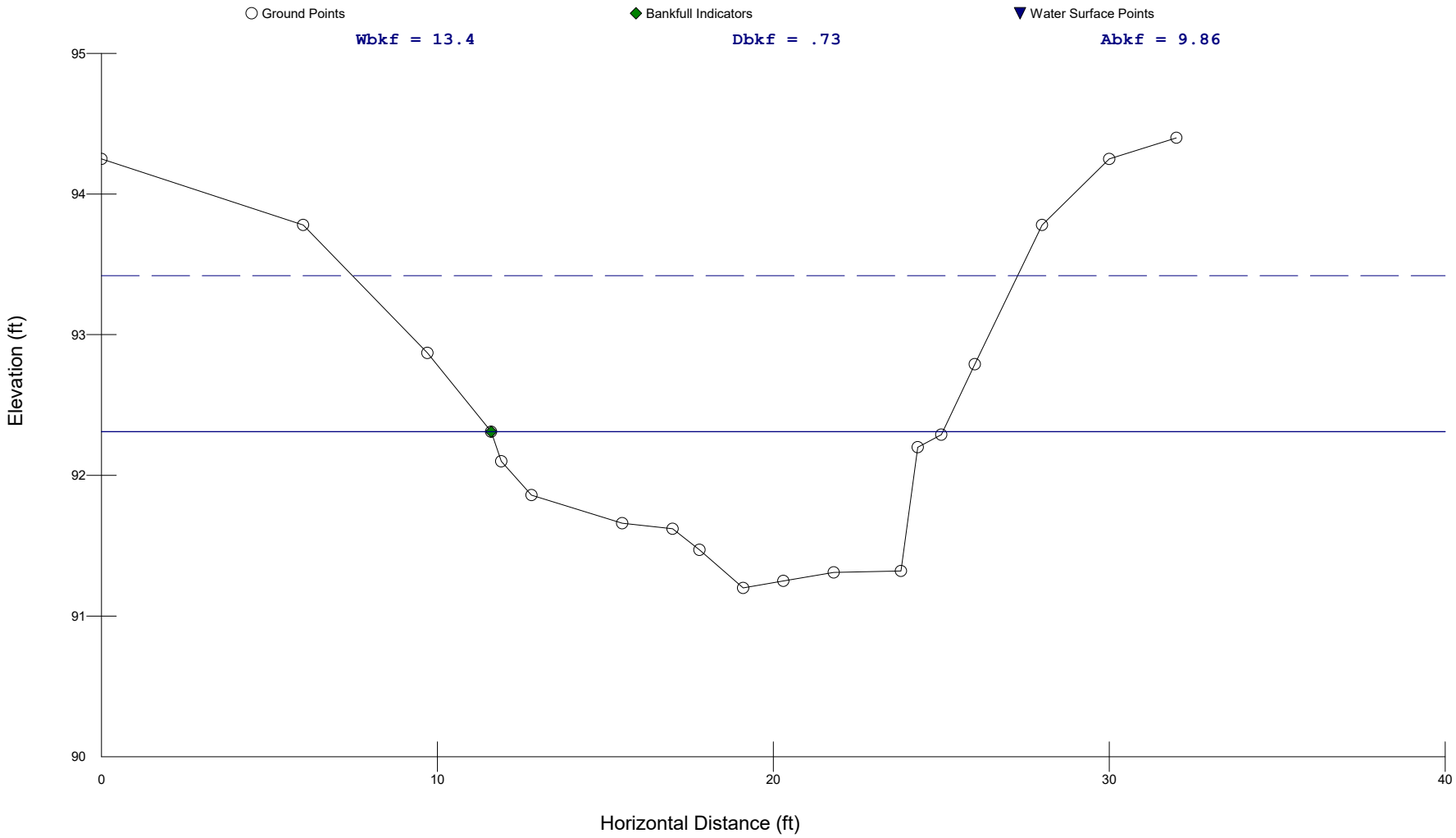
XS-5 on Reach UT1 (Lower)



XS-11 on Reach UT1 (Middle)



XS-12 on Reach UT1 (Lower)

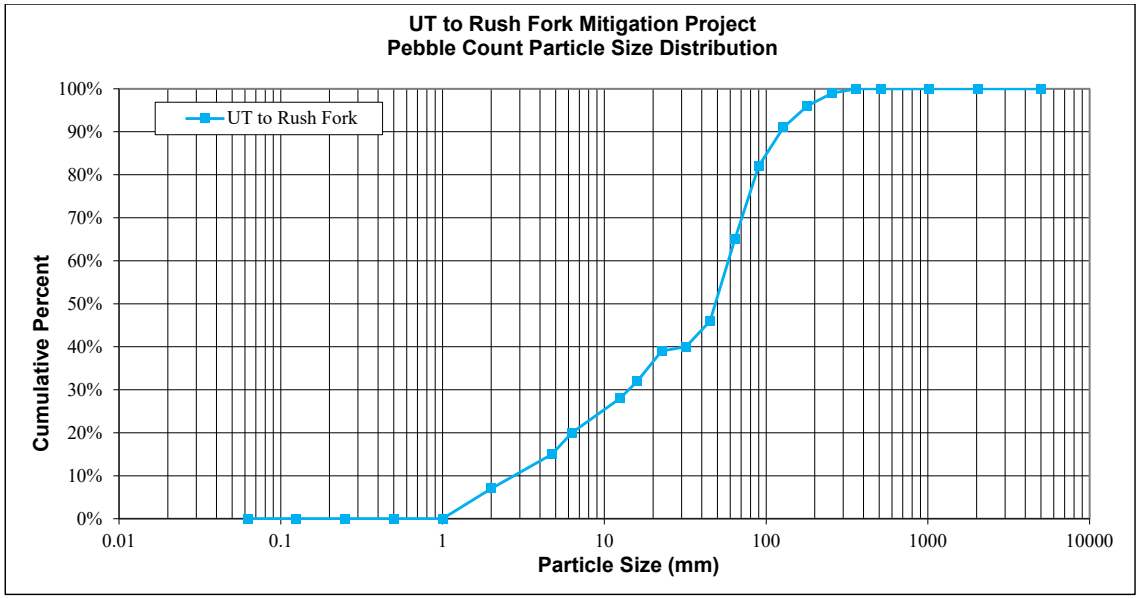


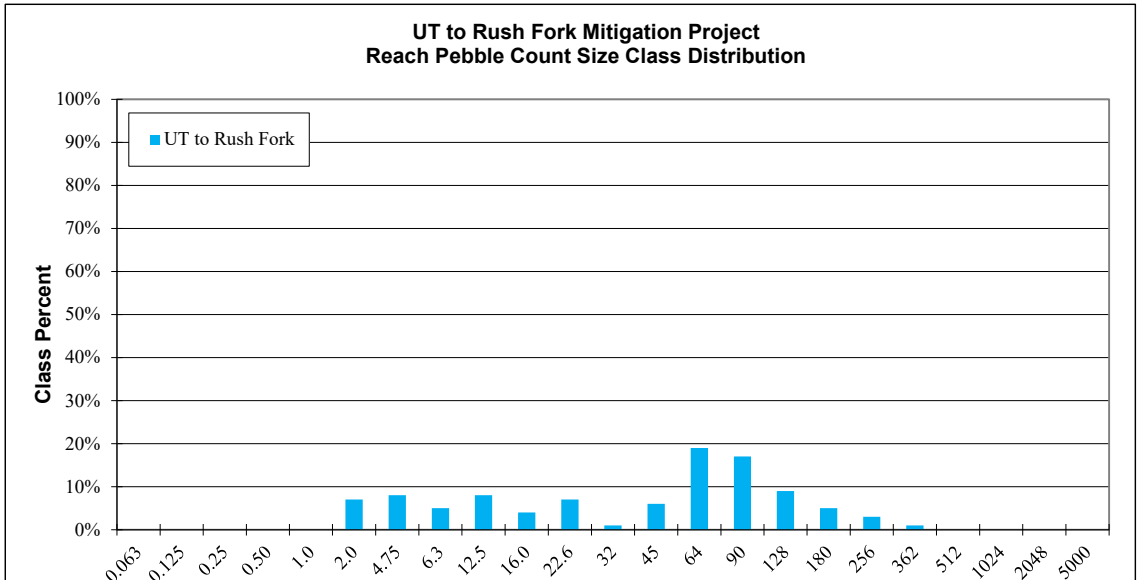
Pebble Count

SITE OR PROJECT:	UT to Rush Fork
REACH/LOCATION:	Reach UT1 (Upper)
FEATURE:	05-Sep-19
DATE:	JY, VH

			UT to Rush Fork			Distribution
MATERIAL	PARTICLE	SIZE (mm)	Total	Class %	% Cum	Plot Size (mm)
Silt/Clay	Silt / Clay	< .063			0%	0.063
Sand	Very Fine	.063 - .125			0%	0.125
	Fine	.125 - .25			0%	0.25
	Medium	.25 - .50			0%	0.50
	Coarse	.50 - 1.0			0%	1.0
	Very Coarse	1.0 - 2.0	7	7%	7%	2.0
Gravel	Very Fine	2.0 - 4.75	8	8%	15%	4.75
	Fine	4.75 - 6.3	5	5%	20%	6.3
	Medium	6.3 - 12.5	8	8%	28%	12.5
	Medium	12.5 - 16.0	4	4%	32%	16.0
	Coarse	16 - 22.6	7	7%	39%	22.6
	Coarse	22.6 - 32	1	1%	40%	32
	Very Coarse	32 - 45	6	6%	46%	45
	Very Coarse	45 - 64	19	19%	65%	64
Cobble	Small	64 - 90	17	17%	82%	90
	Small	90 - 128	9	9%	91%	128
	Large	128 - 180	5	5%	96%	180
	Large	180 - 256	3	3%	99%	256
Boulder	Small	256 - 362	1	1%	100%	362
	Small	362 - 512			100%	512
	Medium	512 - 1024			100%	1024
	rge-Very La	1024 - 2048			100%	2048
Bedrock	Bedrock	> 2048			100%	5000
Total % of whole count			100	100%		

Summary Data			
Channel materials			
D16 =	5.03	D84 =	97.33
D35 =	18.55	D95 =	168.14
D50 =	48.46	D100 =	256 - 362



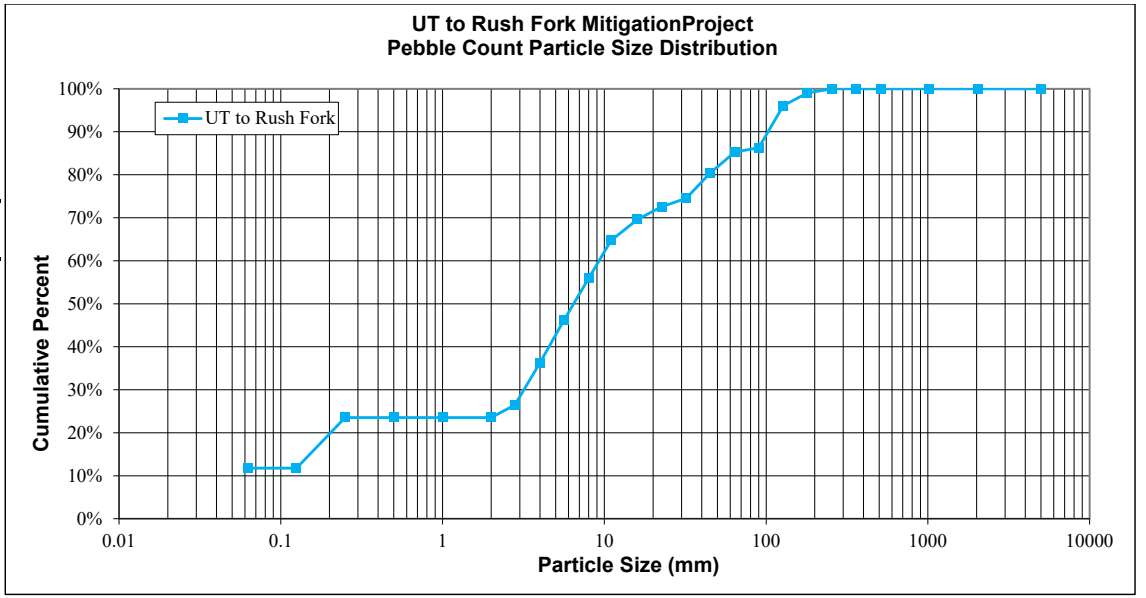


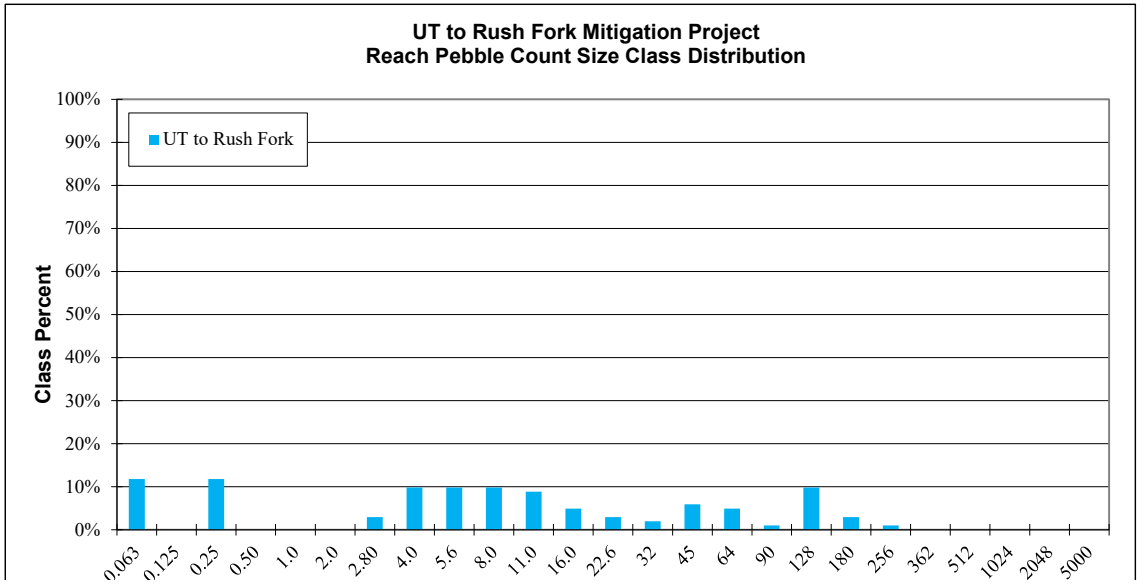
Cross-Section Pebble Count

SITE OR PROJECT:	UT to Rush Fork
REACH/LOCATION:	Reach UT1 (Lower) at XS-12
FEATURE:	08-Sep-20
DATE:	JY, MC

			UT to Rush Fork			Distribution
MATERIAL	PARTICLE	SIZE (mm)	Total	Class %	% Cum	Plot Size (mm)
Silt/Clay	Silt / Clay	< .063	12	12%	12%	0.063
Sand	Very Fine	.063 - .125	0	0%	12%	0.125
	Fine	.125 - .25	12	12%	24%	0.25
	Medium	.25 - .50	0	0%	24%	0.50
	Coarse	.50 - 1.0	0	0%	24%	1.0
	Very Coarse	1.0 - 2.0	0	0%	24%	2.0
Gravel	Very Fine	2.0 - 2.8	3	3%	26%	2.80
	Very Fine	2.8 - 4.0	10	10%	36%	4.0
	Fine	4.0 - 5.6	10	10%	46%	5.6
	Medium	5.6 - 8.0	10	10%	56%	8.0
	Medium	8.0 - 11.0	9	9%	65%	11.0
	Medium	11.0 - 16.0	5	5%	70%	16.0
	Coarse	16 - 22.6	3	3%	73%	22.6
	Coarse	22.6 - 32	2	2%	75%	32
	Very Coarse	32 - 45	6	6%	80%	45
	Very Coarse	45 - 64	5	5%	85%	64
Cobble	Small	64 - 90	1	1%	86%	90
	Small	90 - 128	10	10%	96%	128
	Large	128 - 180	3	3%	99%	180
	Large	180 - 256	1	1%	100%	256
Boulder	Small	256 - 362	0	0%	100%	362
	Small	362 - 512	0	0%	100%	512
	Medium	512 - 1024	0	0%	100%	1024
	rge-Very La	1024 - 2048	0	0%	100%	2048
Bedrock	Bedrock	> 2048	0	0%	100%	5000
Total % of whole count			102	100%		

Summary Data			
Channel materials			
D16 =	0.16	D84 =	58.98
D35 =	3.28	D95 =	123.35
D50 =	6.57	D100 =	180 - 256



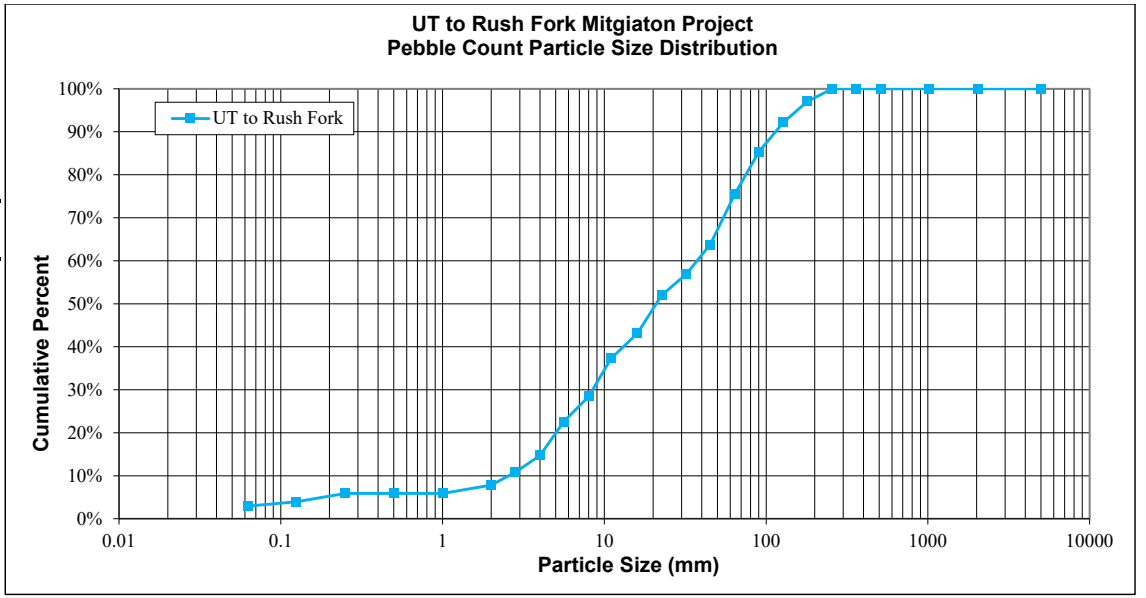


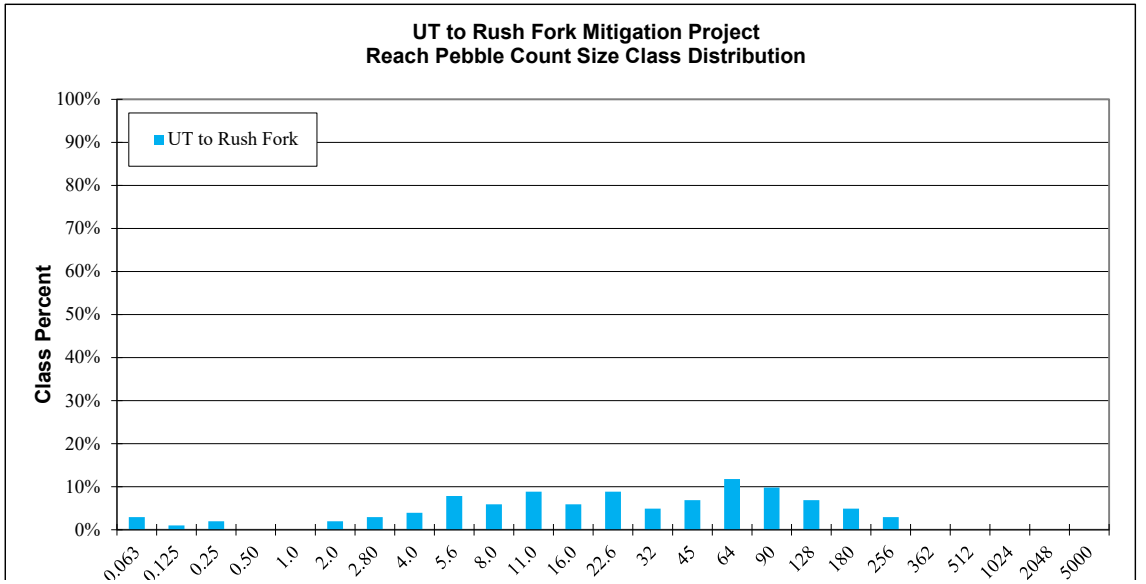
Pebble Count

SITE OR PROJECT:	UT to Rush Fork
REACH/LOCATION:	Reach UT1 (Lower) at XS-5
FEATURE:	08-Sep-20
DATE:	JY, MC

			UT to Rush Fork			Distribution
MATERIAL	PARTICLE	SIZE (mm)	Total	Class %	% Cum	Plot Size (mm)
Silt/Clay	Silt / Clay	< .063	3	3%	3%	0.063
Sand	Very Fine	.063 - .125	1	1%	4%	0.125
	Fine	.125 - .25	2	2%	6%	0.25
	Medium	.25 - .50	0	0%	6%	0.50
	Coarse	.50 - 1.0	0	0%	6%	1.0
	Very Coarse	1.0 - 2.0	2	2%	8%	2.0
Gravel	Very Fine	2.0 - 2.8	3	3%	11%	2.80
	Very Fine	2.8 - 4.0	4	4%	15%	4.0
	Fine	4.0 - 5.6	8	8%	23%	5.6
	Medium	5.6 - 8.0	6	6%	28%	8.0
	Medium	8.0 - 11.0	9	9%	37%	11.0
	Medium	11.0 - 16.0	6	6%	43%	16.0
	Coarse	16 - 22.6	9	9%	52%	22.6
	Coarse	22.6 - 32	5	5%	57%	32
	Very Coarse	32 - 45	7	7%	64%	45
	Very Coarse	45 - 64	12	12%	75%	64
Cobble	Small	64 - 90	10	10%	85%	90
	Small	90 - 128	7	7%	92%	128
	Large	128 - 180	5	5%	97%	180
	Large	180 - 256	3	3%	100%	256
Boulder	Small	256 - 362	0	0%	100%	362
	Small	362 - 512	0	0%	100%	512
	Medium	512 - 1024	0	0%	100%	1024
	rge-Very La	1024 - 2048	0	0%	100%	2048
Bedrock	Bedrock	> 2048	0	0%	100%	5000
Total % of whole count			102	100%		

Summary Data			
Channel materials			
D16 =	4.13	D84 =	86.04
D35 =	10.14	D95 =	155.99
D50 =	19.02	D100 =	180 - 256





WETS Table

WETS Station: WAYNESVILLE 1 E, NC

Requested years: 1989 - 2019

Month	Avg Max Temp	Avg Min Temp	Avg Mean Temp	Avg Precip	30% chance precip less than	30% chance precip more than	Avg number days precip 0.10 or more	Avg Snowfall
Jan	48.9	24.0	36.5	4.67	3.39	5.50	8	3.4
Feb	52.4	26.6	39.5	4.36	3.10	5.17	7	2.3
Mar	58.7	32.1	45.4	4.55	3.42	5.31	8	2.9
Apr	67.6	39.5	53.5	4.34	3.23	5.08	8	0.6
May	74.7	48.1	61.4	4.19	3.09	4.92	8	0.3
Jun	80.3	56.1	68.2	4.28	3.14	5.03	9	0.0
Jul	83.0	59.9	71.4	4.12	2.89	4.90	9	0.0
Aug	82.1	58.8	70.5	4.20	2.92	4.99	8	0.0
Sep	77.3	52.7	65.0	4.22	2.56	5.11	7	0.0
Oct	68.8	40.6	54.7	2.95	1.46	3.60	5	0.0
Nov	59.2	30.5	44.9	3.63	2.52	4.32	6	0.5
Dec	51.7	26.3	39.0	4.74	3.52	5.55	8	2.4
Annual:					45.09	54.59		
Average	67.1	41.3	54.2	-	-	-	-	-
Total	-	-	-	50.24			91	12.2

GROWING SEASON DATES

Years with missing data:	24 deg = 0	28 deg = 0	32 deg = 0
Years with no occurrence:	24 deg = 0	28 deg = 0	32 deg = 0
Data years used:	24 deg = 31	28 deg = 31	32 deg = 31
Probability	24 F or higher	28 F or higher	32 F or higher
50 percent *	4/3 to 10/31: 211 days	4/15 to 10/22: 190 days	5/3 to 10/10: 160 days
70 percent *	3/31 to 11/4: 218 days	4/11 to 10/26: 198 days	4/30 to 10/14: 167 days

* Percent chance of the growing season occurring between the Beginning and Ending dates.

STATS TABLE - total precipitation (inches)

Yr	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annl
1894					M3.60	M2.53	3.84	4.35	1.88	2.63	0.29	5.29	24.41
1895	6.97	1.86	5.92	3.09	5.97	4.46	4.15	7.05	0.64	2.02	2.30	3.30	47.73
1896	M1.91	M4.31	M2.83	1.81	6.11	5.14	M12.08	0.79	4.14	0.71	M5.90	0.79	46.52
1897	M2.93	5.70	9.23	5.08	0.99	5.89	4.89	2.73	0.19	1.67	1.33	M3.67	44.30
1898	4.36	M0.50	5.48	3.95	1.96	M2.85	5.02	7.35	3.66	5.45	M2.42	2.26	45.26
1899	3.52	M10.73	13.01	3.00	3.01	2.11	2.66	3.27	2.60	2.89	1.19	3.51	51.50
1900	M2.38	M6.97	6.00	6.41	1.01	7.64	3.55	2.25	2.49	2.12	3.57	4.08	48.47
1901	4.83	1.40	7.07	6.12	9.63	4.05	2.94	M8.76	2.31	0.52	0.61	9.56	57.80
1902	2.12	7.99	4.57	2.40	2.81	3.62	3.00	1.43	5.	1.	3.36	2.52	40.

Michael Baker
INTERNATIONAL

Memo

Subject: Rush Fork BMP Design Summary

Author(s): Victoria Hoyland, P.E.

Date: August 10, 2020

A stormwater best management practice (BMP) is proposed at the top of UT3. This BMP will receive stormwater runoff from 4.25 acres of drainage area, including 0.12 acres of impervious area. Sizing of the BMP was completed using a 1-inch design storm rainfall depth, and runoff was calculation using the discrete SCS curve number method. This BMP was designed to meet the stormwater design criteria of a constructed wetland following the North Carolina Stormwater Design Guidance Manual. Most of the minimum design criteria (MDC) were able to be accommodated; however, a few could not be met as outlined below. Even with these limitations, the design will be able to provide water quality improvement benefits.

The BMP meets the temporary ponding depth (MDC-1), surface area (MDC-3), and percentage of deep pool, shallow water and temporary inundation zones (MDC7, 8, and 9). Construction will ensure that any need soil amendments (MDC-4) are accommodated. Peak attenuation is not proposed for this BMP, therefore MDC-2 is met. Similarly, the BMP is collected runoff that is currently conveyed to the receiving channel UT3 at this location due to the old roadbed berm, allowing the design to meet the requirement for protection of the receiving stream by minimizing hydrologic impacts (MDC-11).

The BMP collects surface runoff along the southern and western side of the proposed wetland, and then discharges runoff through an overflow weir along the northern side. The topography of the site does not allow the inlet and outlet configuration to completely prevent short-circuiting (MDC-5), and a forebay cannot be reasonably accommodated for all inflow (MDC-6). Preventing short-circuiting is not feasible in a BMP of this size and configuration, and the site topography precludes alternative orientations or designs. Forebays are typically required to provide an opportunity for sediment and debris to fall out before reaching the BMP treatment area. Since the BMP does not receive concentrated discharges from stormwater conveyance outfalls and the runoff passes through vegetated area prior to entering the BMP, a lack of a forebay should not impact treatment efficacy.

The BMP is unable to meet MDC-10, which requires a 2-5 day drawdown time between the temporary and permanent pool elevations. For a BMP of this size, meeting this criterion would require an orifice that would likely be subject to frequent clogging in the propose application. As such, the BMP was designed to accommodate the treatment volume in the permanent pool, instead of in the temporary pool. This design criteria is consistent with the constructed wetland design requirements of other jurisdictions, such as the State of Virginia. A low maintenance stone weir structure is proposed for the wetland outlet, which also eliminates the need for a trash rack (MDC-17).

The revegetation plan meets the requirements of a landscaping plan (MDC-12), shallow water plantings (MDC-13), temporary inundation zone plantings (MDC-14) and plantings on the perimeter fill slopes (MDC-15).

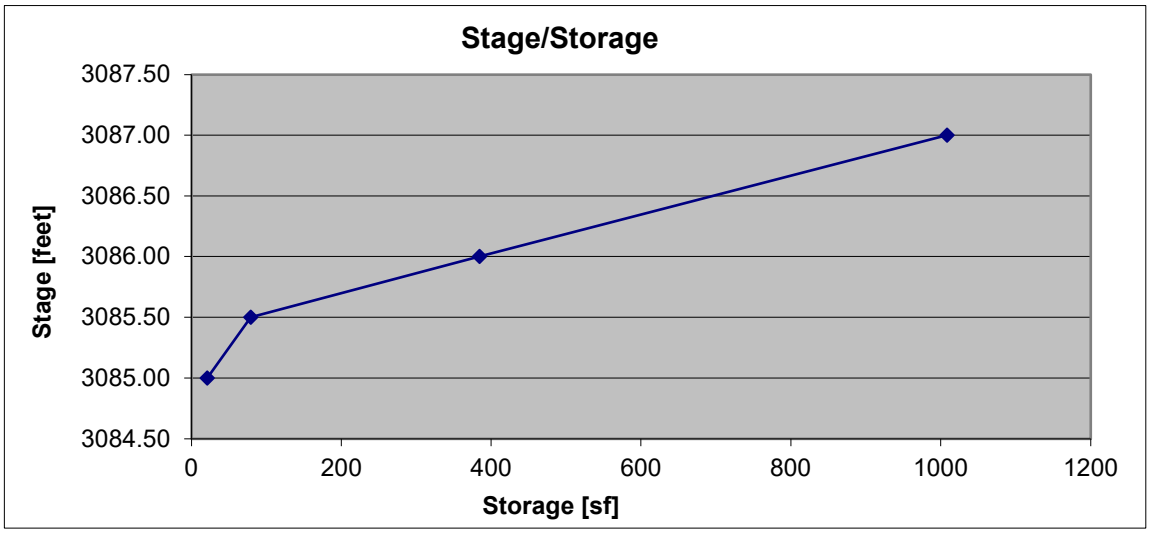
UT to Rush Fork Stream Mitigation Project

Calcs by: VWH
Checked by:_____

BMP Stage/Storage, Volume, and Surface Area Calculations

Elevation	Area (sf)	Avg. Area (sf)	Height (ft)	Inc vol (cf)	Acc vol (ft3)	Notes
3084.50	14					
3085.00	70	42	0.5	21	21	
3085.50	162	116	0.5	58	79	
3086.00	449	306	1	306	**385**	
3087.00	799	624	1	624	1009	

Deep Water Surface Area	116	sf
% Deep Pool	14.5%	
Shallow Water Surface Area	333	sf
% Shallow Water	41.7%	
Temporary Ponding Surface Area	350	sf
% Temporary Ponding	43.8%	



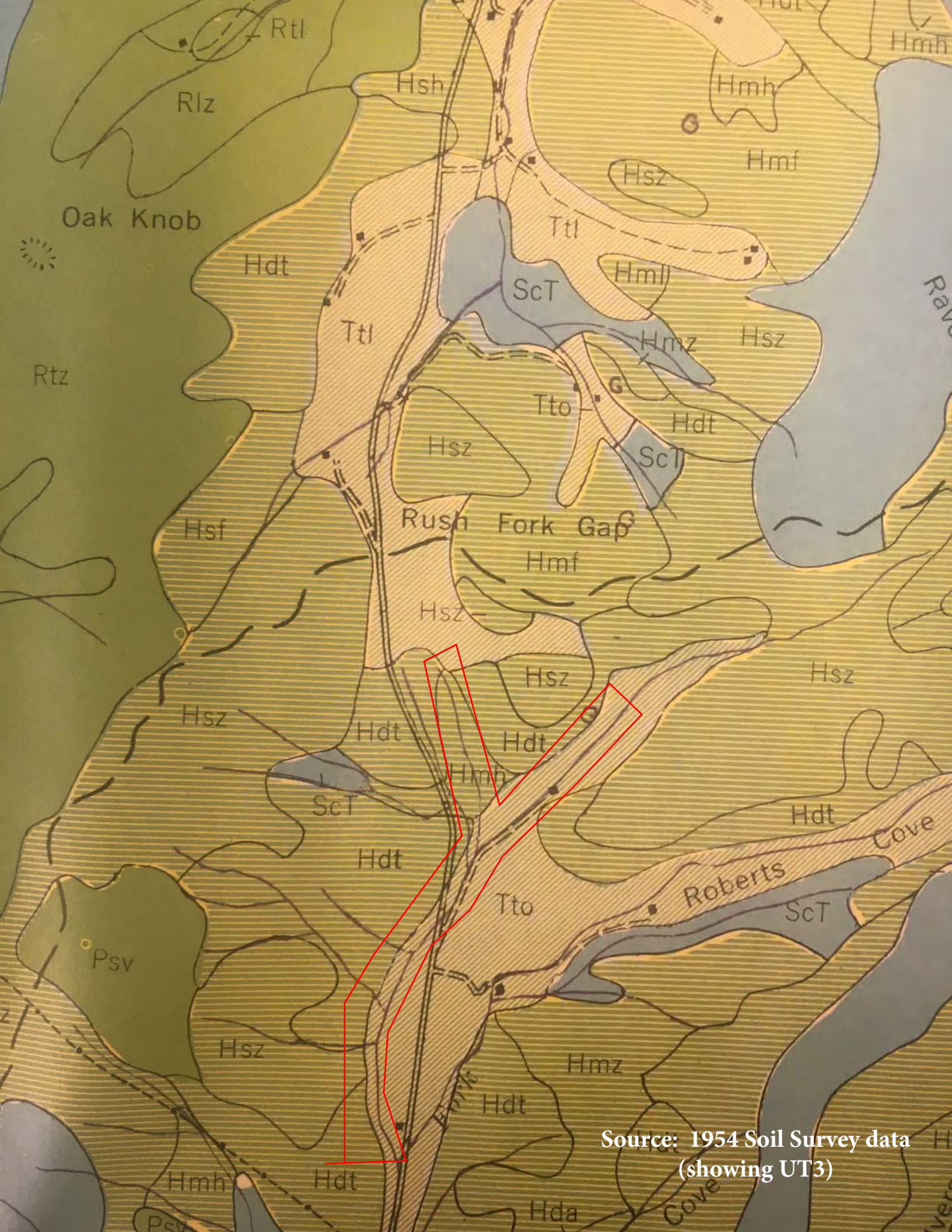
UT to Rush Fork Stream Mitigation Project

Calcs by: VWH
Checked by: ____

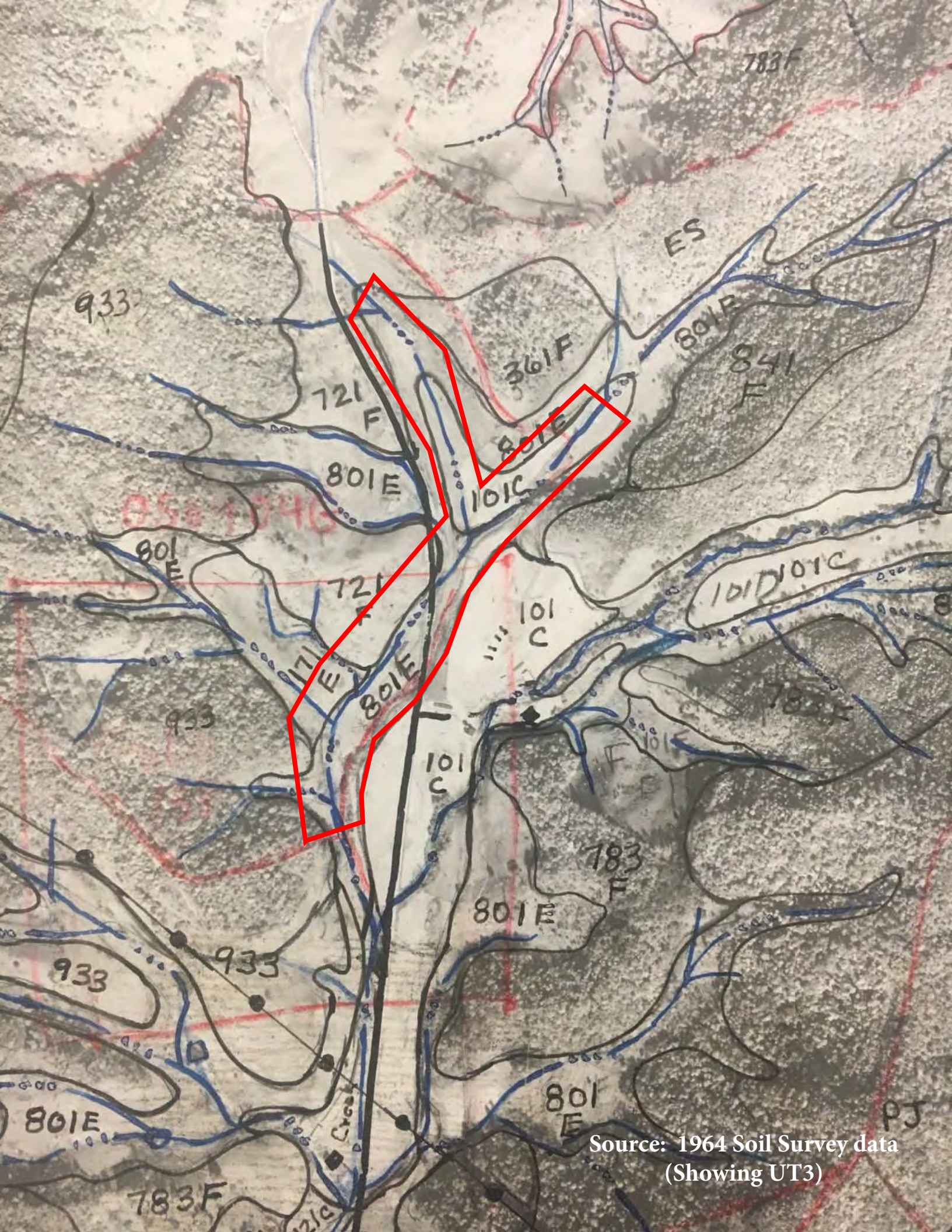
Stormwater BMP Sizing Calculations

Pervious Area	4.25	(ac)
Impervious Area	0.12	(ac)
Discrete SCS Curve Number Method		
Q* = (P - 0.2S)^2 / (P + 0.8S)		
Q* (From Impervious)	0.79	Runoff depth (in)
P	1.0	Rainfall depth (in) (Typically 1.0" or 1.5")
S	0.20	Potential maximum retention after rainfall begins (in)
S = (1000 / CN) - 10	0.20	S is related to the soil and surface characteristics through the curve number (CN)
CN (Impervious)	98	Related to hydrologic soil group and ground cover. (Refer to DWQ Design Manual for CN Tables and explanation)
S = (1000 / CN) - 10	4.49	
CN (Pervious)	69.00	
Q* (From Pervious)	0.00224	
P	1.00	
S	4.49	
Q*total	0.793	(in)
Soil Type	SdD Saunook loam, basin, 15 to 30 percent slopes, stony	http://websoilsurvey.nrcs.usda.gov/app/
Hydrologic Soil Group SCS (1986)	B	Refer to DWQ Design Manual after the soil series in the area of interest is identified
BMP Sizing		
V = A(Q*)	0.1060	SCS Method Volume of Runoff (ac-in) Required Storage Volume
DV	**385**	SCS Method Volume of Runoff (cubic feet) Required Storage Volume
Wetland Parameters		
Required Ponding Depth	6.00	Depends on desired vegetation type and inundation time. Usually 6-12" (in)
Required BMP Surface Area	0.018	(ac) SCS Method
Required BMP Surface Area	769	(ft^2) SCS Method
Actual Wetland Surface Area	0.023	(ac) Measured in Cadd, GIS or by hand.
Actual Wetland Surface Area	1001	(ft^2)
Actual Wetland Storage Volume	481	(ft^3)

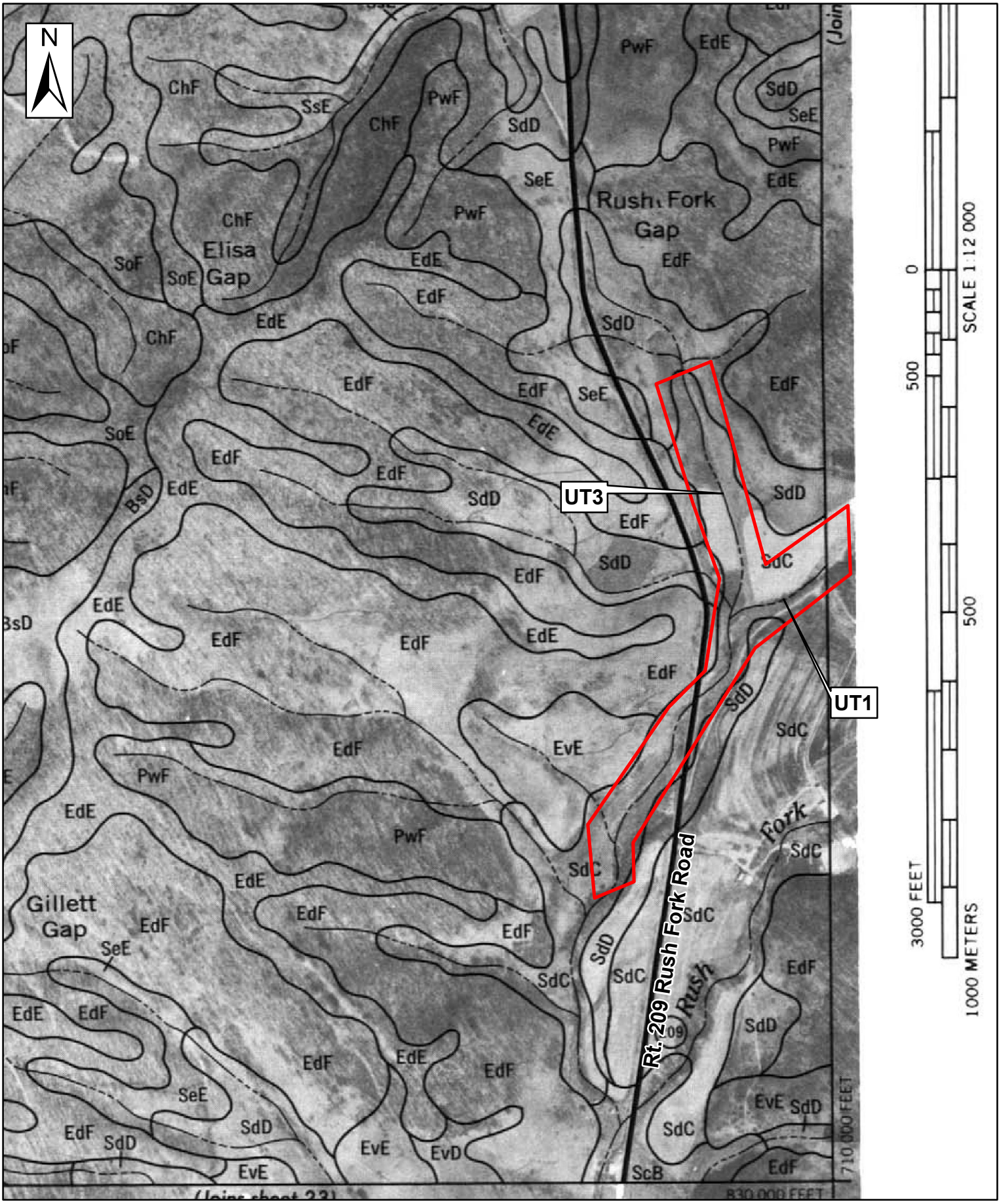
Historic Soil Survey Maps Showing Presence of Project Reaches (in particular for Reach UT3)



Source: 1954 Soil Survey data (showing UT3)



Source: 1964 Soil Survey data
(Showing UT3)



Source: Haywood County Soil Survey Manual map (1997)

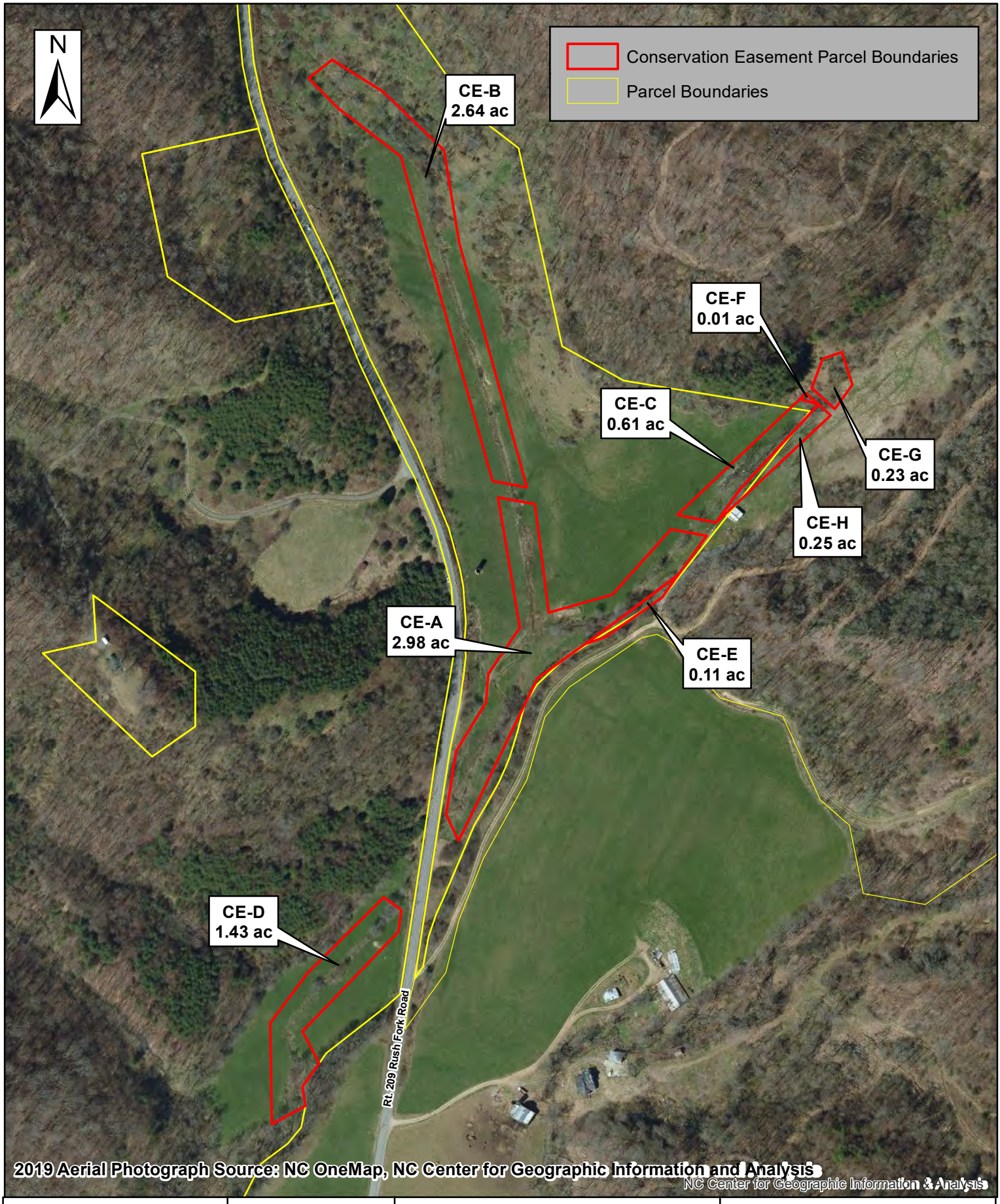
APPENDIX B: SITE PROTECTION INSTRUMENT

The land required for the construction, management, and stewardship of this mitigation project includes portions of the parcels listed below in Table B.1. The conservation easement boundaries are shown in Figure B.1, and a copy of the recorded survey plat is provided below.

Table B.1 Site Protection Instrument Summary
UT to Rush Fork Stream Mitigation Project – NCDMS Project No. 100068

CE Areas in Parcel	Landowner	Parcel Number	County	Site Protection Instrument	Deed Book and Page Numbers	Total Acreage Protected
A, B, C, and D	Anne Palmer Family Properties, L.P.	8721-72-6837	Haywood	Conservation Easement	Book 489, Page 1683	7.66
E, F, G, and H	WE Kirk Farms North, LLC	8731-33-5998	Haywood	Conservation Easement	Book 838, Page 400	0.60

A conservation easement has been obtained and recorded from the current landowners for the entire project. The easement and survey plat documents were reviewed and approved by NCDMS and State Property Office (SPO) and is now held by the State of North Carolina. The easement and survey plat (Deed Book: RB 1006, Pages 2031-2044, and Deed Book: RB 1006, Pages 2018-2030) was recorded at the Haywood County Register of Deeds on September 8, 2020. The secured conservation easement allows Baker to proceed with the restoration project and restricts the land use in perpetuity.



Michael Baker INTERNATIONAL	North Carolina Division of Mitigation Services DMS Proj. No. 100068	0 125 250 500 Feet	Figure B-1. Site Protection Instrument Map UT to Rush Fork Project Haywood County

Instrument# 2020008788 B

CERTIFICATE OF SURVEY AND ACCURACY:

I, HAMPTON JAMES LARK, CERTIFY THAT THIS PLAT WAS DRAWN UNDER MY SUPERVISION FROM AN ACTUAL SURVEY MADE UNDER MY SUPERVISION FROM DEED DESCRIPTION(S) RECORDED IN DB: 489 PG: 1683 & DB: 838 PG: 400; THAT THE BOUNDARIES NOT SURVEYED ARE INDICATED AS DRAWN FROM INFORMATION AS REFERENCED; THAT THE RATIO OF PRECISION AS CALCULATED IS GREATER THAN 1:10,000; THAT THE GPS PORTION OF THIS PROJECT WAS TO PERFORM A GRID TIE TO THE NC STATE PLANE COORDINATE SYSTEM AND INFORMATION USED IS SHOWN & NOTED HEREON; THAT THIS PLAT WAS PREPARED IN ACCORDANCE WITH G.S. 47-30 AS AMENDED.

I ALSO HEREBY CERTIFY THAT THIS PLAT IS OF ONE OF THE FOLLOWING: GS 47-30 F(11) D; 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.

GPS METADATA
CLASS OF SURVEY: HORIZONTAL: A
FIELD PROCEDURE: STATIC NETWORK
DATES: 10/04/18-10/05/18
DATUM: NAD83(2011)
EPOCH: 2010
GEOID: 12B
AVERAGE COMBINED FACTOR: 0.99975704
POSITIONAL ACCURACY: HORIZONTAL: 0.03'
UNITS: USFT
CORS USED: NCMA, NCSW, NCSY, TN13

WITNESS MY ORIGINAL SIGNATURE, LICENSE NUMBER, & SEAL THIS 27TH DAY OF AUGUST, 2020.

NORTH CAROLINA PROFESSIONAL SEAL L-2865 LAND SURVEYOR HAMPTON JAMES LARK

Hampton James Lark
HAMPTON JAMES LARK PLS L-2865

HAYWOOD COUNTY, NORTH CAROLINA

THIS PLAT DOES NOT CREATE A SUBDIVISION OF PROPERTY IN HAYWOOD COUNTY. THE PURPOSE OF THIS SURVEY IS TO IDENTIFY THE CONSERVATION EASEMENT AREAS ONLY. NO TRANSFER OF PROPERTY IS TAKING PLACE.

I, Stephanie S. Perkins REVIEW OFFICER FOR HAYWOOD COUNTY, CERTIFY THAT THE MAP OR PLAT TO WHICH THIS CERTIFICATION IS AFFIXED MEETS ALL STATUTORY REQUIREMENTS FOR RECORDING FOR WHICH THE REVIEW OFFICER HAS RESPONSIBILITY AS PROVIDED BY LAW.

Stephanie S. Perkins by: 9-8-2020
REVIEW OFFICER DATE

REGISTERED THIS THE ____ DAY OF _____,

20____ AT _____ AND RECORDED IN

PLAT BOOK _____ PAGE _____ BY:

_____
DEPUTY

_____
REGISTER OF DEEDS

CERTIFICATE OF OWNERSHIP AND DEDICATION:

WE HEREBY CERTIFY THAT WE ARE THE OWNERS OF THE PROPERTY AS SHOWN AND DESCRIBED HEREON. WE ALSO HEREBY ACCEPT AND ADOPT THIS RECORD PLAT AND CONSERVATION EASEMENT WITH OUR FREE CONSENT AND DEDICATE ALL EASEMENTS, RIGHT-OF-WAYS, AND ACCESS ROADS TO PUBLIC AND/OR PRIVATE USE AS NOTED ON SAID PLAT.

Anne Palmer Collier 9-4-2020
ANNE PALMER FAMILY PROPERTIES, L.P. DATE
RUSSEL P. LOVE, REGISTERED AGENT

James Weaver Kirkpatrick 9-4-2020
WE KIRK FARMS NORTH, LLC. DATE
JAMES WEAVER KIRKPATRICK, JR., MANAGER

SURVEYOR'S NOTES:

1. ALL DISTANCES AND COORDINATES ARE GROUND MEASUREMENTS IN US SURVEY FEET UNLESS OTHERWISE NOTED.
2. AREAS CALCULATED BY THE COORDINATE METHOD.
3. PROPERTY SUBJECT TO ALL EASEMENTS, RIGHT OF WAYS AND RESTRICTIONS THAT ARE RECORDED, UNRECORDED, WRITTEN AND UNWRITTEN.
4. HAYWOOD COUNTY GIS WEBSITE USED TO IDENTIFY ADJOINING PROPERTY OWNERS.
5. THE PROFESSIONAL SURVEYOR HAS MADE NO INVESTIGATION OR INDEPENDENT SEARCH FOR EASEMENTS, RIGHT OF WAYS, ENCUMBRANCES, RESTRICTIVE COVENANTS, CORRECT OWNERSHIP OR ANY OTHER FACTS THAT AN ACCURATE AND CURRENT TITLE SEARCH MAY DISCLOSE. A NC LICENSED ATTORNEY SHOULD BE CONSULTED.
6. BY GRAPHIC DETERMINATION, NO PORTION OF THE SUBJECT PROPERTY APPEARS TO LIE WITHIN A SPECIAL FLOOD HAZARD AREA (SFHA) AS DETERMINED BY THE F.E.M.A. MAP#'s 3700873100J & 3700872100J DATED 4/3/2012.
7. UTILITIES WERE LOCATED BASED ON VISIBLE ABOVE GROUND STRUCTURES, THEREFORE THE LOCATION OF UNDERGROUND UTILITIES ARE APPROXIMATE OR MAY BE PRESENT AND NOT SHOWN HEREON. CALL 1-800-632-4949 BEFORE DIGGING.
8. THE RIGHT OF WAY WIDTH REQUIRED FOR OVERHEAD DISTRIBUTION POWER LINES OF ANY VOLTAGE IS NORMALLY A 40-FOOT CORRIDOR (20 FEET ON EACH SIDE) PER HAYWOOD E.M.C. (FORMERLY CRUSO E.M.C.). SEE DB: 110 PG: 100 AND DB: 110 PG: 135, IN WHICH NO WIDTH IS GIVEN.
9. NO DEED WAS FOUND GRANTING A RIGHT OF WAY FOR N.C. HIGHWAY 209, A PRIMARY ROUTE, TO THE NORTH CAROLINA DEPARTMENT OF TRANSPORTATION. IT IS ADVISABLE, HOWEVER, TO PLAN FOR NO IMPROVEMENTS CLOSER THAN THIRTY FEET FROM THE PRESENT ROAD CENTERLINE.
10. THE SURVEYOR HAS MADE NO DETERMINATION TO THE RIGHTS OR INTEREST OTHERS MAY HAVE IN THE OLD CRABTREE ROAD AND WAS UNABLE TO FIND ANY EASEMENTS OR RIGHT OF WAYS, UNLESS OTHERWISE NOTED. A NC LICENSED ATTORNEY SHOULD BE CONSULTED.
11. THE STATE OF NORTH CAROLINA, ITS EMPLOYEES AND AGENTS, SUCCESSORS AND ASSIGNS, RECEIVE A PERPETUAL RIGHT OF ACCESS TO THE EASEMENT AREA OVER THE PROPERTY AT REASONABLE TIMES TO UNDERTAKE ANY ACTIVITIES TO RESTORE, CONSTRUCT, MANAGE, MAINTAIN, ENHANCE, AND MONITOR THE STREAM, WETLAND AND ANY OTHER RIPARIAN RESOURCES IN THE EASEMENT AREA, IN ACCORDANCE WITH RESTORATION ACTIVITIES OR A LONG-TERM MANAGEMENT PLAN AS DESCRIBED IN SECTION II OF THE CONSERVATION EASEMENT AGREEMENT.
12. ALL EXISTING FENCES WITHIN THE CONSERVATION EASEMENT AREAS ARE TO BE REMOVED.
13. FIELD WORK WAS CONDUCTED BETWEEN THE DATES OF 10/04/18 AND 08/17/20.

LEGEND:

- SET 5/8" REBAR W/ "KEE" CONTROL POINT CAP IN CONCRETE
- NCGS CONTROL MONUMENT (BRASS DISC IN ROCK OUTCROP)
- UNMARKED POINT
- EXISTING IRON PIN (AS NOTED)
- SET 5/8" BY 30" REBAR W/ 3-1/4" DIAMETER ALUMINUM CE CAP
- SET 5/8" REBAR W/ "KEE" CAP
- UTILITY POLE
- GUY ANCHOR
- TELEPHONE PEDESTAL
- (XX) CONSERVATION EASEMENT CORNER NUMBER
- CONSERVATION EASEMENT (CE)
- SOIL ROAD
- GRAVEL
- ASPHALT
- STREAM/WATER
- CE — CONSERVATION EASEMENT (CE)
- BOUNDARY LINE
- BOUNDARY LINE NOT SURVEYED
- ADJOINING DEED LINES
- UTILITY RIGHT OF WAY (AS NOTED)
- FENCE
- OW — OVERHEAD WIRE
- TIE LINE ONLY

PC: PLAT CABINET
DB: DEED BOOK
PG: PAGE
SL: SLOT
RBR REBAR
RBC REBAR WITH ID CAP
RBCC REBAR WITH ID CAP SET IN CONCRETE
POB POINT OF BEGINNING
IP IRON PIPE
NCGS NORTH CAROLINA GEODETIC SURVEY
N.A.D. NORTH AMERICAN DATUM 1983
SPC STATE PLANE COORDINATES
CF COMBINED FACTOR
RCP REINFORCED CONCRETE PIPE
CMP CORRUGATED METAL PIPE
CPP CORRUGATED PLASTIC PIPE
NTS NOT TO SCALE

NCGS MONUMENT "WALKER"
STATE PLANE COORDINATES
N: 714960.21'
E: 829018.24'
CF: 0.99974389
(LOCATED N 15°39'49" W A GRID DISTANCE OF 2186.36' FROM CONTROL POINT #500)

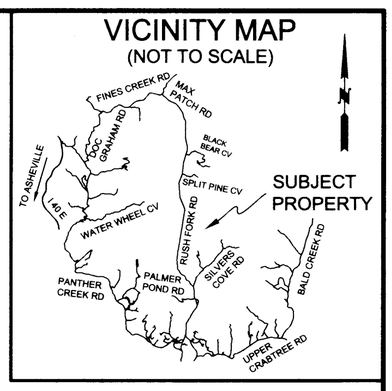
GRID TIE INFORMATION

CONTROL POINT	CONTROL POINT
5/8" RBCC (500)	5/8" RBCC (502)
STATE PLANE COORDINATES	STATE PLANE COORDINATES
N: 712855.04'	N: 712296.84'
E: 829608.53'	E: 829522.61'
CF: 0.99975765	CF: 0.99975891

*POINT 500 BEING LOCATED N 08°44'59" E A GRID DISTANCE OF 564.78' FROM POINT #502

GRID NORTH
NAD 83 (2011)

VICINITY MAP
(NOT TO SCALE)



TOTAL CONSERVATION EASEMENT AREA
8.26 ACRES
AREA A: 2.98
AREA B: 2.64
AREA C: 0.61
AREA D: 1.43
AREA E: 0.11
AREA F: 0.01
AREA G: 0.23
AREA H: 0.25

CONSERVATION EASEMENT CORNER		
#	NORTHING	EASTING
1	712929.29	830072.21
2	712869.62	830029.43
3	712765.55	829879.70
4	712746.79	829825.39
5	712655.25	829698.66
6	712223.75	829489.27
7	712294.81	829455.95
8	712462.11	829482.95
9	712591.10	829561.42
10	712667.50	829568.49
11	712790.03	829651.39
12	713135.22	829593.72
13	713178.40	829579.39
14	714039.61	829336.70
15	714169.49	829166.79
16	714247.14	829091.92
17	714296.12	829153.85
18	714212.21	829288.36
19	714056.17	829451.11
20	713811.62	829490.34
21	713162.12	829670.68
22	713117.76	829691.60
23	712829.32	829728.93
24	712877.08	829896.98
25	713050.80	830053.16
26	713088.45	830069.42
27	713411.60	830411.09
28	713425.43	830425.63
29	713503.12	830455.10
30	713521.03	830505.87
31	713433.98	830534.14
32	713370.30	830487.37
33	713353.67	830475.97
35	713069.16	830172.54
36	713033.28	830146.80
37	711634.72	829119.16
38	711571.81	829074.76
39	711520.90	829082.80
40	711472.11	828993.60
41	711740.76	828990.01
42	711873.52	829087.91
43	712073.77	829290.26
44	712041.01	829337.76
45	711983.06	829329.91
46	711718.72	829074.81

JAMES C. OAKLEY & WIFE
JULIE D. OAKLEY
PIN: 8721-84-1681
DB: 672 PG: 2421
PC: A SL: 125A TRACT 2

TATER PATCH &
CLYDE PROPERTIES, L.L.C.
PIN: 8721-95-1349
DB: 734 PG: 581
PC: A SL: 125A TRACT 1

SHEET 2

SOIL ROADBED IN GENERAL LOCATION OF OLD CRABTREE ROAD (NOT OPEN)
(SEE NOTE #10)

WE KIRK
FARMS NORTH, LLC
PIN: 8731-33-5998
DB: 838 PG: 400 (TRACT IV)
REFERENCE: DB: 562 PG: 286 (TRACT II)
AND DB: 158 PG: 305
PC: C SL: 6260

HAYWOOD E.M.C. UTILITY LINE
(SEE NOTE #8)

N.C. HIGHWAY 209
(SEE NOTE #9)
21' WIDE ASPHALT PAVEMENT

SHEET 3

AREA B
2.64 ACRES

AREA G
0.23 ACRE

AREA F
0.01 ACRE

AREA C
0.61 ACRE

AREA H
0.25 ACRE

SOIL ROAD

ANNE PALMER
FAMILY PROPERTIES, L.P.
PIN: 8721-72-6837
DB: 489 PG: 1683
REFERENCE: UNRECORDED SURVEY ENTITLED "PROPERTY OF ANNE PALMER FAMILY PROPERTIES, L.P.", DATED 01/26/2010, DWG. NO. 01-B-11-10-68, BY ROBERT H. MOORE, L-1168

HAYWOOD E.M.C. UTILITY LINE
(SEE NOTE #8)

CABIN IS TO BE REMOVED

AREA A
2.98 ACRES

GRAVEL ROAD

SILO RUINS

CONTROL POINT
RBCC "KEE" #500

12" CMP

WE KIRK
FARMS NORTH, LLC
PIN: 8731-33-5998
DB: 838 PG: 400 (TRACT IV)
REFERENCE: DB: 562 PG: 286 (TRACT II)
AND DB: 158 PG: 305
PC: C SL: 6260

AREA E
0.11 ACRE

ANNE PALMER
FAMILY PROPERTIES, L.P.
PIN: 8721-72-6837
DB: 489 PG: 1683
REFERENCE: UNRECORDED SURVEY ENTITLED "PROPERTY OF ANNE PALMER FAMILY PROPERTIES, L.P.", DATED 01/26/2010, DWG. NO. 01-B-11-10-68, BY ROBERT H. MOORE, L-1168

24" RCP

WE KIRK
FARMS SOUTH, LLC
PIN: 8730-09-3258
DB: 838 PG: 404
REFERENCE: DB: 562 PG: 286 (TRACT II)
AND DB: 158 PG: 305
PC: C SL: 6260 & PC: C SL: 7314

SOUTHERN APPALACHIAN HIGHLANDS CONSERVANCY
(CONSERVATION EASEMENT)
DB: 917 PG: 978
PC: C SL: 7314

CONTROL POINT
RBCC "KEE" #502

60" CMP

18" CPP
24" CMP

AREA D
1.43 ACRES

SOIL ROAD

SOIL ROADBED IN GENERAL LOCATION OF OLD CRABTREE ROAD (NOT OPEN)
(SEE NOTE #10)

HAYWOOD E.M.C. UTILITY LINE
SEE NOTE #8

CONSERVATION EASEMENT CORNER-NC DMS CAP (TYPICAL)

2020008788
HAYWOOD CO, NC FEE $63.00
PRESENTED & RECORDED:
09-08-2020 02:16:43 PM
SHERRI C. ROGERS
REGISTER OF DEEDS
BY: TARA E. REINHOLD
DEPUTY

BK: MAP CABD
PG: 874-876

A CONSERVATION EASEMENT SURVEY FOR:
THE STATE OF NORTH CAROLINA,
DIVISION OF MITIGATION SERVICES
"UT TO RUSH FORK STREAM MITIGATION PROJECT"
SPO FILE NO'S. 44-AV & 44-AW DMS SITE ID NO. 100068

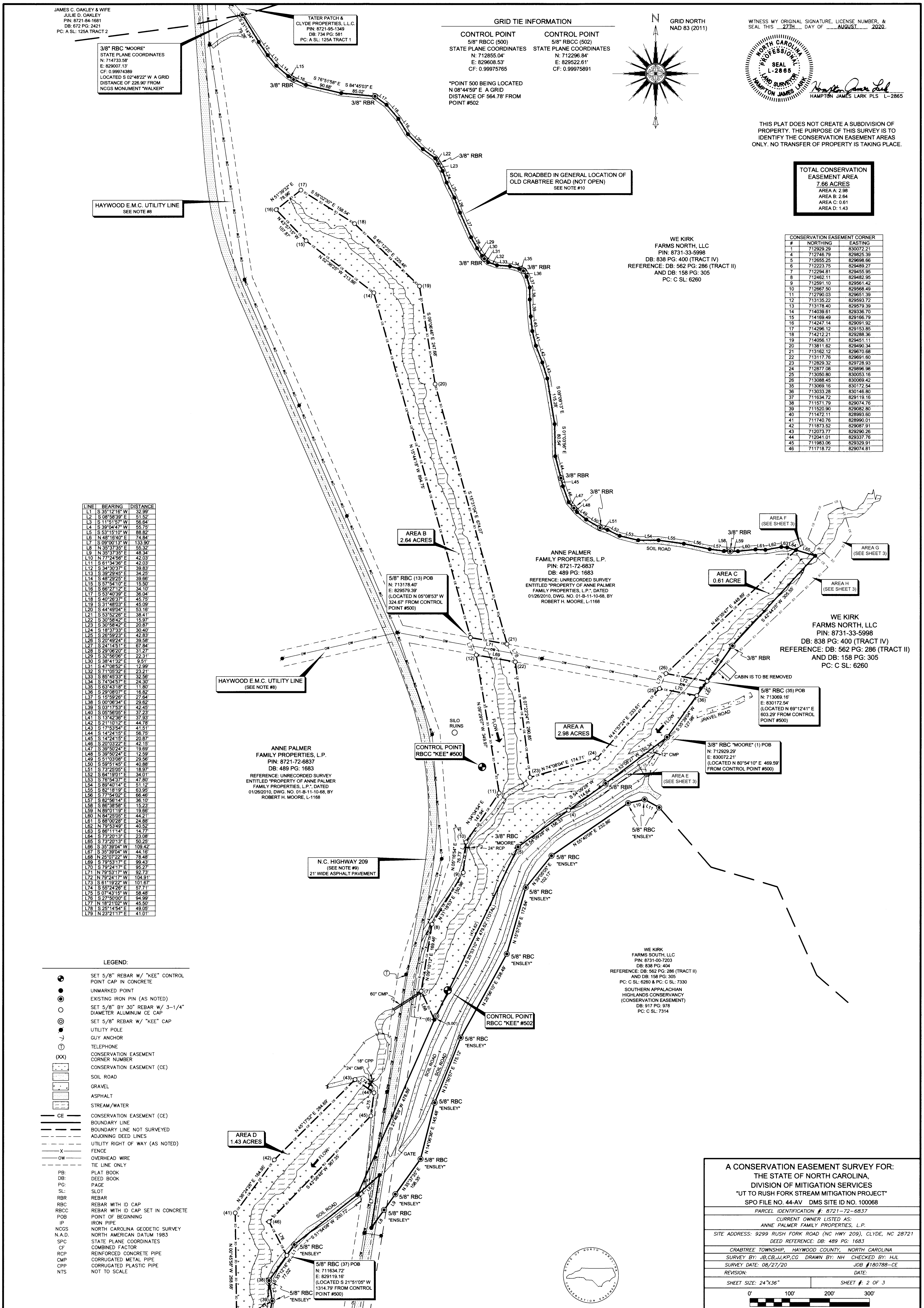
PARCEL IDENTIFICATION #: 8721-72-6837 & 8731-33-5998
CURRENT OWNERS LISTED AS:
ANNE PALMER FAMILY PROPERTIES, L.P. & WE KIRK FARMS NORTH, LLC
SITE ADDRESS: 9299 RUSH FORK ROAD (NC HWY 209), CLYDE, NC 28721
DEED REFERENCES: DB: 489 PG: 1683, DB: 838 PG: 400
CRABTREE TOWNSHIP, HAYWOOD COUNTY, NORTH CAROLINA
SURVEY BY: JB,CB,JJ,KP,CG DRAWN BY: NH CHECKED BY: HJL
SURVEY DATE: 08/27/20 JOB #180788-CE
REVISION: DATE:
SHEET SIZE: 24"X36" SHEET #: 1 OF 3

0' 120' 240' 360'
ONE INCH = ONE HUNDRED AND TWENTY FEET

Kee MAPPING & SURVEYING
P.O. Box 2566
Asheville, NC 28802
(828) 575-9021
www.keemap.com
License # C-3039

CA6D/874

Instrument# 2020008788 B



GRID TIE INFORMATION

CONTROL POINT	CONTROL POINT
5/8" RBCC (500)	5/8" RBCC (502)
STATE PLANE COORDINATES	STATE PLANE COORDINATES
N: 712855.04'	N: 712296.84'
E: 829608.53'	E: 829522.61'
CF: 0.99975765	CF: 0.99975891

*POINT 500 BEING LOCATED N 08°44'59" E A GRID DISTANCE OF 564.78' FROM POINT #502

WITNESS MY ORIGINAL SIGNATURE, LICENSE NUMBER, & SEAL THIS 27TH DAY OF AUGUST, 2020.

NORTH CAROLINA PROFESSIONAL SEAL L-2865 LAND SURVEYOR HAMPTON JAMES LARK

HAMPTON JAMES LARK PLS L-2865

THIS PLAT DOES NOT CREATE A SUBDIVISION OF PROPERTY. THE PURPOSE OF THIS SURVEY IS TO IDENTIFY THE CONSERVATION EASEMENT AREAS ONLY. NO TRANSFER OF PROPERTY IS TAKING PLACE.

TOTAL CONSERVATION EASEMENT AREA
7.66 ACRES
AREA A: 2.98
AREA B: 2.64
AREA C: 0.61
AREA D: 1.43

CONSERVATION EASEMENT CORNER

#	NORTHING	EASTING
1	712929.29	830072.21
4	712746.79	829825.39
5	712655.25	829698.66
6	712223.75	829489.27
7	712294.81	829455.95
8	712462.11	829482.95
9	712591.10	829561.42
10	712667.50	829568.49
11	712790.03	829651.39
12	713135.22	829593.72
13	713178.40	829579.39
14	714039.61	829336.70
15	714169.49	829166.79
16	714247.14	829091.92
17	714296.12	829153.85
18	714212.21	829288.36
19	714056.17	829451.11
20	713811.62	829490.34
21	713162.12	829670.68
22	713117.76	829691.60
23	712829.32	829728.93
24	712877.08	829896.98
25	713050.80	830053.16
26	713088.45	830069.42
35	713069.16	830172.54
36	713033.28	830146.80
37	711634.72	829119.16
38	711571.79	829074.76
39	711520.90	829082.80
40	711472.11	828993.60
41	711740.76	828990.01
42	711873.52	829087.91
43	712073.77	829290.26
44	712041.01	829337.76
45	711983.06	829329.91
46	711718.72	829074.81

LINE	BEARING	DISTANCE
L1	S 35°12'16" W	32.99'
L2	S 08°58'39" E	51.52'
L3	S 11°51'57" W	56.64'
L4	S 39°04'47" W	55.75'
L5	S 53°15'10" W	88.82'
L6	N 48°16'40" E	74.84'
L7	S 09°00'13" W	133.90'
L8	N 35°37'35" E	55.32'
L9	N 35°37'35" E	48.34'
L10	N 77°24'56" E	42.03'
L11	S 61°34'36" E	42.03'
L12	S 34°30'37" E	39.83'
L13	S 39°29'45" E	34.25'
L14	S 48°29'25" E	39.66'
L15	S 57°54'10" E	15.50'
L16	S 66°27'12" E	34.10'
L17	S 53°40'39" E	36.04'
L18	S 40°26'37" E	45.75'
L19	S 31°48'03" E	45.09'
L20	S 44°49'04" E	53.16'
L21	S 53°52'26" E	38.41'
L22	S 30°58'42" E	15.97'
L23	S 30°58'42" E	20.87'
L24	S 18°37'33" E	30.40'
L25	S 26°59'23" E	42.83'
L26	S 20°49'24" E	39.58'
L27	S 24°14'51" E	67.84'
L28	S 29°06'20" E	31.27'
L29	S 32°56'06" E	22.31'
L30	S 38°41'32" E	9.51'
L31	S 47°08'52" E	12.99'
L32	S 71°05'32" E	23.21'
L33	S 85°45'33" E	32.56'
L34	S 74°04'57" E	24.30'
L35	S 63°43'18" E	11.80'
L36	S 29°08'07" E	16.82'
L37	S 15°59'26" E	27.64'
L38	S 00°06'34" E	29.62'
L39	S 03°17'53" E	42.45'
L40	S 05°56'05" E	37.23'
L41	S 13°42'36" E	37.93'
L42	S 21°10'12" E	44.78'
L43	S 17°53'54" E	41.51'
L44	S 14°24'15" E	56.75'
L45	S 14°24'15" E	20.87'
L46	S 20°03'22" E	42.15'
L47	S 39°50'24" E	19.69'
L48	S 39°50'24" E	12.59'
L49	S 51°03'08" E	29.56'
L50	S 59°51'45" E	40.88'
L51	S 73°25'05" E	18.97'
L52	S 64°19'01" E	34.01'
L53	S 76°54'37" E	47.80'
L54	S 89°40'14" E	51.12'
L55	S 82°18'19" E	63.95'
L56	S 77°54'02" E	66.46'
L57	S 82°56'14" E	36.10'
L58	S 86°38'58" E	15.23'
L59	N 89°01'19" E	19.66'
L60	N 84°25'05" E	44.21'
L61	S 88°00'28" E	24.88'
L62	N 79°53'49" E	40.52'
L63	S 86°11'14" E	14.77'
L64	S 73°20'13" E	23.08'
L65	S 73°20'13" E	50.25'
L66	S 35°39'04" W	109.42'
L67	S 35°39'04" W	44.16'
L68	N 25°07'22" W	78.48'
L69	S 79°53'17" E	99.43'
L70	S 79°24'17" E	95.27'
L71	N 79°53'17" W	92.73'
L72	N 79°24'17" W	104.91'
L73	S 61°19'22" W	101.67'
L74	S 55°24'26" E	57.71'
L75	S 07°43'15" W	58.48'
L76	S 27°50'00" E	94.99'
L77	N 18°21'02" W	45.50'
L78	S 25°14'54" E	49.05'
L79	N 23°21'17" E	41.01'

LEGEND:

SET 5/8" REBAR W/ "KEE" CONTROL POINT CAP IN CONCRETE
UNMARKED POINT
EXISTING IRON PIN (AS NOTED)
SET 5/8" BY 30" REBAR W/ 3-1/4" DIAMETER ALUMINUM CE CAP
SET 5/8" REBAR W/ "KEE" CAP
UTILITY POLE
GUY ANCHOR
TELEPHONE
(XX) CONSERVATION EASEMENT CORNER NUMBER
CONSERVATION EASEMENT (CE)
SOIL ROAD
GRAVEL
ASPHALT
STREAM/WATER
CONSERVATION EASEMENT (CE)
BOUNDARY LINE
BOUNDARY LINE NOT SURVEYED
ADJOINING DEED LINES
UTILITY RIGHT OF WAY (AS NOTED)
FENCE
OVERHEAD WIRE
TIE LINE ONLY

PB:	PLAT BOOK
DB:	DEED BOOK
PG:	PAGE
SL:	SLOT
RBR	REBAR
RBC	REBAR WITH ID CAP
RBCC	REBAR WITH ID CAP SET IN CONCRETE
POB	POINT OF BEGINNING
IP	IRON PIPE
NCGS	NORTH CAROLINA GEODETIC SURVEY
N.A.D.	NORTH AMERICAN DATUM 1983
SPC	STATE PLANE COORDINATES
CF	COMBINED FACTOR
RCP	REINFORCED CONCRETE PIPE
CMP	CORRUGATED METAL PIPE
CPP	CORRUGATED PLASTIC PIPE
NTS	NOT TO SCALE

STATE OF NORTH CAROLINA CONSERVATION EASEMENT

CONSERVATION EASEMENT CORNER-NC DMS CAP (TYPICAL)

A CONSERVATION EASEMENT SURVEY FOR:
THE STATE OF NORTH CAROLINA,
DIVISION OF MITIGATION SERVICES
"UT TO RUSH FORK STREAM MITIGATION PROJECT"
SPO FILE NO. 44-AV DMS SITE ID NO. 100068

PARCEL IDENTIFICATION #: 8721-72-6837
CURRENT OWNER LISTED AS: ANNE PALMER FAMILY PROPERTIES, L.P.
SITE ADDRESS: 9299 RUSH FORK ROAD (NC HWY 209), CLYDE, NC 28721
DEED REFERENCE: DB: 489 PG: 1683
CRABTREE TOWNSHIP, HAYWOOD COUNTY, NORTH CAROLINA
SURVEY BY: JB,CB,JJ,KP,CG DRAWN BY: NH CHECKED BY: HJL
SURVEY DATE: 08/27/20 JOB #180788-CE
REVISION: DATE:
SHEET SIZE: 24"X36" SHEET #: 2 OF 3

0' 100' 200' 300'
ONE INCH = ONE HUNDRED FEET

Kee MAPPING & SURVEYING
P.O. Box 2566
Asheville, NC 28802
(828) 575-9021
www.keemap.com
License # C-3039

CabD/875

GRID TIE INFORMATION

CONTROL POINT	CONTROL POINT
5/8" RBCC (500)	5/8" RBCC (502)
STATE PLANE COORDINATES	STATE PLANE COORDINATES
N: 712855.04'	N: 712296.84'
E: 829608.53'	E: 829522.61'
CF: 0.99975765	CF: 0.99975891

*POINT 500 BEING LOCATED N 08°44'59" E A GRID DISTANCE OF 564.78' FROM POINT #502

GRID NORTH
NAD 83 (2011)

WITNESS MY ORIGINAL SIGNATURE, LICENSE NUMBER, & SEAL THIS 27TH DAY OF AUGUST, 2020.

NORTH CAROLINA PROFESSIONAL SEAL L-2865 LAND SURVEYOR HAMPTON JAMES LARK

HAMPTON JAMES LARK PLS L-2865

THIS PLAT DOES NOT CREATE A SUBDIVISION OF PROPERTY. THE PURPOSE OF THIS SURVEY IS TO IDENTIFY THE CONSERVATION EASEMENT AREAS ONLY. NO TRANSFER OF PROPERTY IS TAKING PLACE.

S 01°03'56" E 80.54'
S 14°24'15" E 56.75'
3/8" RBR
L1
S 20°05'22" E 42.15'
L2
3/8" RBR
L3
S 51°03'08" E 29.56'
S 59°51'45" E 40.88'
3/8" RBR
L4
S 64°19'01" E 34.01'
S 76°54'37" E 47.80'
S 89°40'14" E 51.12'
S 82°18'19" E 63.95'
S 77°54'02" E 66.46'
S 82°56'14" E 36.10'
3/8" RBR
L5
L6
N 84°25'05" E 44.21'
L7
N 79°53'49" E 40.52'
L8
L9
L11
L12
L10
L14
SOIL ROAD

SOIL ROADBED IN GENERAL LOCATION OF OLD CRABTREE ROAD (NOT OPEN)
SEE NOTE #10

WE KIRK
FARMS NORTH, LLC
PIN: 8731-33-5998
DB: 838 PG: 400 (TRACT IV)
REFERENCE: DB: 562 PG: 286 (TRACT II)
AND DB: 158 PG: 305
PC: C SL: 6260

5/8" RBC (28) POB
N: 713425.43'
E: 830425.63'
(LOCATED N 55°04'58" E 996.49' FROM CONTROL POINT #500)

5/8" RBC (27) POB
N: 713411.60'
E: 830411.09'
(LOCATED N 55°15'35" E 976.66' FROM CONTROL POINT #500)

AREA F
0.01 ACRE

AREA G
0.23 ACRE

AREA H
0.25 ACRE

(29) N 70°34'07" E 53.84' (30)
N 20°46'29" E 83.09'
S 17°59'34" E 91.52' (31)
N 48°14'18" W 82.77' (32)
S 36°17'52" W 79.01'
(33)

ANNE PALMER
FAMILY PROPERTIES, L.P.
PIN: 8721-72-6837
DB: 489 PG: 1683
REFERENCE: UNRECORDED SURVEY ENTITLED "PROPERTY OF ANNE PALMER FAMILY PROPERTIES, L.P.", DATED 01/26/2010, DWG. NO. 01-B-11-10-68, BY ROBERT H. MOORE, L-1168

AREA C
(SEE SHEET 2)

S 42°44'25" W 305.55'
S 46°50'37" W 415.95'

WE KIRK
FARMS NORTH, LLC
PIN: 8731-33-5998
DB: 838 PG: 400 (TRACT IV)
REFERENCE: DB: 562 PG: 286 (TRACT II)
AND DB: 158 PG: 305
PC: C SL: 6260

HAYWOOD E.M.C. UTILITY LINE
(SEE NOTE #8)

3/8" RBR
S 35°39'04" W 109.42'
CABIN
PORCH
CABIN IS TO BE REMOVED
S 35°39'04" W 44.16'
5/8" RBC (35) POB
N: 713069.16'
E: 830172.54'
(LOCATED N 69°12'41" E 603.29' FROM CONTROL POINT #500)
(36)

AREA A
(SEE SHEET 2)

FLOW

S 35°39'04" W 127.98'
GRAVEL ROAD

3/8" RBC "MOORE" (1) POB
N: 712929.29'
E: 830072.21'
(LOCATED N 80°54'10" E 469.59' FROM CONTROL POINT #500)

S 53°38'25" W 73.42'
12" CMP
(2)

AREA E
0.11 ACRE

5/8" RBR
S 53°08'27" W 192.34'
S 55°11'47" W 182.34'
S 54°09'28" W 114.64'
(3)
S 70°56'46" W 57.47'
(4)

N 77°24'56" E 42.03'
S 61°34'36" E 42.03'
5/8" RBC "ENSLEY"

SOIL ROAD
SOIL ROAD
N 55°40'08" E 232.86'

5/8" RBC "ENSLEY"

WE KIRK
FARMS SOUTH, LLC
PIN: 8731-00-7203
DB: 838 PG: 404
REFERENCE: DB: 562 PG: 286 (TRACT II)
AND DB: 158 PG: 305
PC: C SL: 6260 & PC: C SL: 7330

SOUTHERN APPALACHIAN HIGHLANDS CONSERVANCY
(CONSERVATION EASEMENT)
DB: 917 PG: 978
PC: C SL: 7314

LEGEND:

- SET 5/8" REBAR W/ "KEE" CONTROL POINT CAP IN CONCRETE
- UNMARKED POINT
- EXISTING IRON PIN (AS NOTED)
- SET 5/8" BY 30" REBAR W/ 3-1/4" DIAMETER ALUMINUM CE CAP
- SET 5/8" REBAR W/ "KEE" CAP
- UTILITY POLE
- GUY ANCHOR
- (XX) CONSERVATION EASEMENT CORNER NUMBER
- CONSERVATION EASEMENT (CE)
- SOIL ROAD
- GRAVEL
- STREAM/WATER
- CE — CONSERVATION EASEMENT (CE)
- BOUNDARY LINE
- BOUNDARY LINE NOT SURVEYED
- UTILITY RIGHT OF WAY (AS NOTED)
- FENCE
- OW — OVERHEAD WIRE
- TIE LINE ONLY
- PB: PLAT BOOK
- DB: DEED BOOK
- PG: PAGE
- SL: SLOT
- RBR REBAR
- RBC REBAR WITH ID CAP
- RBCC REBAR WITH ID CAP SET IN CONCRETE
- POB POINT OF BEGINNING
- IP IRON PIPE
- N.A.D. NORTH AMERICAN DATUM 1983
- SPC STATE PLANE COORDINATES
- CF COMBINED FACTOR
- NTS NOT TO SCALE

LINE	BEARING	DISTANCE
L1	S 14°24'15" E	20.87'
L2	S 39°50'24" E	19.69'
L3	S 39°50'24" E	12.59'
L4	S 73°25'05" E	18.97'
L5	S 86°38'58" E	15.23'
L6	N 89°01'19" E	19.66'
L7	S 88°00'28" E	24.88'
L8	S 86°11'14" E	14.77'
L9	S 73°20'13" E	23.08'
L10	S 73°20'13" E	50.25'
L11	N 46°35'47" E	21.39'
L12	S 48°14'18" E	43.70'
L13	S 48°14'18" E	43.27'
L14	N 46°25'53" E	20.07'
L15	S 34°25'49" W	20.16'

CONSERVATION EASEMENT CORNER		
#	NORTHING	EASTING
1	712929.29	830072.21
2	712869.62	830029.43
3	712765.55	829879.70
4	712746.79	829825.39
27	713411.60	830411.09
28	713425.43	830425.63
29	713503.12	830455.10
30	713521.03	830505.87
31	713433.98	830534.14
32	713370.30	830487.37
33	713353.67	830475.97
35	713069.16	830172.54

TOTAL CONSERVATION EASEMENT AREA
0.60 ACRE
AREA E: 0.11
AREA F: 0.01
AREA G: 0.23
AREA H: 0.25

CONSERVATION EASEMENT CORNER-NC DMS CAP (TYPICAL)

A CONSERVATION EASEMENT SURVEY FOR:
THE STATE OF NORTH CAROLINA, DIVISION OF MITIGATION SERVICES
"UT TO RUSH FORK STREAM MITIGATION PROJECT"
SPO FILE NO. 44-AW DMS SITE ID NO. 100068

PARCEL IDENTIFICATION #: 8731-33-5998

CURRENT OWNER LISTED AS:
WE KIRK FARMS NORTH, LLC

SITE ADDRESS: 9299 RUSH FORK ROAD (NC HWY 209), CLYDE, NC 28721
DEED REFERENCE: DB: 838 PG: 400

CRABTREE TOWNSHIP, HAYWOOD COUNTY, NORTH CAROLINA

SURVEY BY: JB,CB,JJ,KP,CG DRAWN BY: NH CHECKED BY: HJL

SURVEY DATE: 08/27/20 JOB #180788-CE

REVISION: DATE:

SHEET SIZE: 24"X36" SHEET #: 3 OF 3

0' 40' 80' 120'

ONE INCH = FORTY FEET

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Cab D/876

APPENDIX C: CREDIT RELEASE SCHEDULE

All credit releases will be based on the total credits generated as reported by the as-built survey of the mitigation site. Under no circumstances shall any mitigation project be debited until the necessary Department of the Army (DA) authorization has been received for its construction or the District Engineer (DE) has otherwise provided written approval for the project in the case where no DA authorization is required for construction of the mitigation project. The DE, in consultation with the NCIRT, will determine if performance standards have been satisfied sufficiently to meet the requirements of the release schedules below. In cases where some performance standards have not been met, credits may still be released depending on the specifics of the case. Monitoring may be required to restart or be extended, depending on the extent to which the site fails to meet the specified performance standard. The release of project credits will be subject to the criteria described in Table C.1 as follows:

Table C.1 Stream Credit Release Schedule
UT to Rush Fork Stream Mitigation Project – NCDMS Project No. 100068

Credit Release Milestone	Release Activity	ILF/NCDMS	
		Interim Release	Total Released
1	Site Establishment	0%	0%
2	Completion of all initial physical and biological improvements made pursuant to the Mitigation Plan	30%	30%
3	Year 1 monitoring report demonstrates that channels are stable and interim performance standards have been met	10%	40%
4	Year 2 monitoring report demonstrates that channels are stable and interim performance standards have been met	10%	50%
5	Year 3 monitoring report demonstrates that channels are stable and interim performance standards have been met	10%	60%
6*	Year 4 monitoring report demonstrates that channels are stable and interim performance standards have been met	5%	65% (75%**)
7	Year 5 monitoring report demonstrates that channels are stable and interim performance standards have been met	10%	75% (85%**)
8*	Year 6 monitoring report demonstrates that channels are stable and interim performance standards have been met	5%	80% (90%**)
9	Year 7 monitoring report demonstrates that channels are stable, and performance standards have been met and project has been approved for closeout	10%	90% (100%**)

* Please note that vegetation data may not be required with monitoring reports submitted during these monitoring years unless otherwise required by the Mitigation Plan or directed by the NCIRT.
**10% reserve of credits to be held back until the bankfull event performance standard has been met.

The following conditions apply to all the credit release schedules:

a. A reserve of 10% of a site's total stream credits will be released after four bankfull events have occurred, in separate years, provided the channel is stable and all other performance standards are met. In the event that less than four bankfull events occur during the monitoring period, release of these reserve credits is at the discretion of the NCIRT.

b. After the second milestone, the credit releases are scheduled to occur on an annual basis, assuming that the annual monitoring report has been provided to the USACE in accordance with Section IV (General Monitoring Requirements) of the 2016 Wilmington District Stream and Wetland Compensatory Mitigation Update, and that the monitoring report demonstrates that interim performance standards are being met and that no other concerns have been identified on-site during the visual monitoring. All credit releases require written approval from the USACE.

c. The credits associated with the final credit release milestone will be released only upon a determination by the USACE, in consultation with the NCIRT, of functional success as defined in the Mitigation Plan.

APPENDIX D: FINANCIAL ASSURANCE

Pursuant to Section IV H and Appendix III of the NC Division of Mitigation Services' In-Lieu Fee Instrument dated July 28, 2010, the North Carolina Department of Environmental Quality has provided the USACE-Wilmington District with a formal commitment to fund projects to satisfy mitigation requirements assumed by NCDMS. This commitment provides financial assurance for all mitigation projects implemented by the program.

APPENDIX E: MAINTENANCE PLAN

The site will be monitored on a regular basis and a physical inspection of the site will be performed at least once a year throughout the post-construction monitoring period until performance standards are met. These site inspections may identify issues that require routine maintenance. Routine maintenance is most likely to be expected in the first two years following site construction and may include the following components as described below in Table E.1:

Table E.1 Routine Maintenance Components
UT to Rush Fork Stream Mitigation Project – NCDMS Project No. 100068

Component/Feature	Maintenance through project close-out
Stream	Routine channel maintenance and repair activities may include modifying in-stream structures to prevent piping, securing loose coir matting, and supplemental installations of live stakes and other target vegetation along the project reaches. Areas of concentrated stormwater and floodplain flows that intercept the channel may also require maintenance to prevent streambank failures and head-cutting until vegetation becomes established.
Vegetation	Vegetation will be maintained to ensure the health and vigor of the targeted plant community. Routine vegetation maintenance and repair activities may include supplemental planting, pruning, and fertilizing. Exotic invasive plant species will be treated by mechanical and/or chemical methods. Any invasive plant species control requiring herbicide application will be performed in accordance with NC Department of Agriculture (NCDA) rules and regulations.
Site Boundary	Site boundaries will be demarcated in the field to ensure clear distinction between the mitigation site and adjacent properties. Boundaries shall be identified by fence, marker, bollard, post, or other means as allowed by site conditions and/or conservation easement. Boundary markers disturbed, damaged, or destroyed will be repaired and/or replaced on an as needed basis.
Farm Road Crossing	The farm road crossings within the site may be maintained only as allowed by the recorded Conservation Easement, deed restrictions, rights of way, or corridor agreements. Culverts and fords located at crossings outside the easement will be maintained for stability and flow whenever possible with respect to these restrictions.
Beaver Management	Routine maintenance and repair activities caused by beaver activity may include supplemental planting, pruning, and dam breeching, dewatering, and/or removal. Beaver management will be performed in accordance with US Department of Agriculture (USDA) rules and regulations using accepted trapping and removal techniques only within the project boundary.

APPENDIX F: DWR STREAM IDENTIFICATION FORMS

D

Top of UT1 at property line

Reach UT1 (Upper)

NC DWQ Stream Identification Form Version 4.11

Date: 11/30/17	**Project/Site:** Rush Fork	**Latitude:** 35.64632
Evaluator: JB	**County:** Haywood	**Longitude:** -82.93776
Total Points: 37 *Stream is at least intermittent if ≥ 19 or perennial if ≥ 30**	**Stream Determination (circle one)** Ephemeral Intermittent (Perennial)	**Other** Fines Creek *e.g. Quad Name:*

A. Geomorphology (Subtotal = 21)	Absent	Weak	Moderate	Strong
1[a]. Continuity of channel bed and bank	0	1	(2)	3
2. Sinuosity of channel along thalweg	0	1	2	(3)
3. In-channel structure: ex. riffle-pool, step-pool, ripple-pool sequence	0	1	2	(3)
4. Particle size of stream substrate	0	1	(2)	3
5. Active/relict floodplain	0	1	2	(3)
6. Depositional bars or benches	0	1	(2)	3
7. Recent alluvial deposits	0	1	(2)	3
8. Headcuts	0	1	(2)	3
9. Grade control	0	0.5	(1)	1.5
10. Natural valley	0	0.5	(1)	1.5
11. Second or greater order channel	(No = 0)		Yes = 3	

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

B. Hydrology (Subtotal = 9)				
12. Presence of Baseflow	0	1	2	(3)
13. Iron oxidizing bacteria	(0)	1	2	3
14. Leaf litter	1.5	(1)	0.5	0
15. Sediment on plants or debris	0	0.5	(1)	1.5
16. Organic debris lines or piles	0	0.5	(1)	1.5
17. Soil-based evidence of high water table?	No = 0		(Yes = 3)	

C. Biology (Subtotal = 7)				
18. Fibrous roots in streambed	3	2	(1)	0
19. Rooted upland plants in streambed	3	2	(1)	0
20. Macrobenthos (note diversity and abundance)	0	1	2	(3)
21. Aquatic Mollusks	(0)	1	2	3
22. Fish	(0)	0.5	1	1.5
23. Crayfish	0	0.5	(1)	1.5
24. Amphibians	0	0.5	(1)	1.5
25. Algae	(0)	0.5	1	1.5
26. Wetland plants in streambed	FACW = 0.75; OBL = 1.5 (Other = 0)			

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

Notes:

Sketch:

C

Trib on right bank below house from across the old road

UT2

Reach UT2

NC DWQ Stream Identification Form Version 4.11

Date: 11/30/17	**Project/Site:** Rush Fork	**Latitude:** 35.64498
Evaluator: JB	**County:** Haywood	**Longitude:** -82.93912
Total Points: 24.5 *Stream is at least intermittent if ≥ 19 or perennial if ≥ 30**	**Stream Determination (circle one)** Ephemeral **Intermittent** Perennial	**Other** Fines Creek *e.g. Quad Name:*

A. Geomorphology (Subtotal = 11.5)	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 = 9)				
12. Presence of Baseflow	0	1	(2)	3
13. Iron oxidizing bacteria	0	(1)	2	3
14. Leaf litter	1.5	1	(0.5)	0
15. Sediment on plants or debris	0	(0.5)	1	1.5
16. Organic debris lines or piles	0	0.5	(1)	1.5
17. Soil-based evidence of high water table?	No = 0		Yes = 3	

C. Biology (Subtotal = 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: Snails, mayflies

Sketch:

Reach UT2-1

NC DWQ Stream Identification Form Version 4.11

UT2-1

Form H

Date: 8-14-18	**Project/Site:** UT Rush Fork	**Latitude:** 35.64514
Evaluator: KS & RM	**County:** Haywood	**Longitude:** -82.93886
Total Points: *Stream is at least intermittent if ≥ 19 or perennial if ≥ 30** 22.25	**Stream Determination (circle one)** Ephemeral (Intermittent) Perennial	**Other** *e.g. Quad Name:* Fines Creek

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

C. Biology (Subtotal = 7.25)				
18. Fibrous roots in streambed	3	(2)	1	0
19. Rooted upland plants in streambed	(3)	2	1	0
20. Macrobenthos (note diversity and abundance)	0	(1)	2	3
21. Aquatic Mollusks	(0)	1	2	3
22. Fish	(0)	0.5	1	1.5
23. Crayfish	0	(0.5)	1	1.5
24. Amphibians	(0)	0.5	1	1.5
25. Algae	(0)	0.5	1	1.5
26. Wetland plants in streambed	FACW = (0.75) OBL = 1.5 Other = 0			

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

Notes: Originates from wetland seep

Sketch:

See WC (W3) for depiction w/ landscape & wetland complex

E

UT3 at lower end of trees near top

Reach UT3 (Upper)

NC DWQ Stream Identification Form Version 4.11

Date: 11/30/17	**Project/Site:** Rush Fork	**Latitude:** 35.64783
Evaluator: JB	**County:** Haywood	**Longitude:** -82.94115
Total Points: *Stream is at least intermittent if ≥ 19 or perennial if ≥ 30** 30.5	**Stream Determination (circle one)** Ephemeral Intermittent **Perennial**	**Other** Fines Creek *e.g. Quad Name:*

A. Geomorphology (Subtotal = 14)	Absent	Weak	Moderate	Strong
1[a]. Continuity of channel bed and bank	0	1	(2)	3
2. Sinuosity of channel along thalweg	0	1	(2)	3
3. In-channel structure: ex. riffle-pool, step-pool, ripple-pool sequence	0	(1)	2	3
4. Particle size of stream substrate	0	1	(2)	3
5. Active/relict floodplain	0	(1)	2	3
6. Depositional bars or benches	0	(1)	2	3
7. Recent alluvial deposits	0	(1)	2	3
8. Headcuts	0	1	(2)	3
9. Grade control	0	(0.5)	1	1.5
10. Natural valley	0	0.5	1	(1.5)
11. Second or greater order channel	(No = 0)		Yes = 3	

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

B. Hydrology (Subtotal = 8)				
12. Presence of Baseflow	0	1	(2)	3
13. Iron oxidizing bacteria	0	(1)	2	3
14. Leaf litter	1.5	(1)	0.5	0
15. Sediment on plants or debris	0	0.5	(1)	1.5
16. Organic debris lines or piles	(0)	0.5	1	1.5
17. Soil-based evidence of high water table?	No = 0		(Yes = 3)	

C. Biology (Subtotal = 9.5)				
18. Fibrous roots in streambed	3	(2)	1	0
19. Rooted upland plants in streambed	(3)	2	1	0
20. Macrobenthos (note diversity and abundance)	0	(1)	2	3
21. Aquatic Mollusks	(0)	1	2	3
22. Fish	(0)	0.5	1	1.5
23. Crayfish	0	0.5	(1)	1.5
24. Amphibians	0	0.5	(1)	1.5
25. Algae	0	(0.5)	1	1.5
26. Wetland plants in streambed	FACW = 0.75; OBL = 1.5 (Other = 0)			

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

Notes: Snails, water pennies

Sketch:

Reach UT4

Form F

NC DWQ Stream Identification Form Version 4.11

Date:	12/19/17	**Project/Site:**	UT4	**Latitude:**	35.64473
Evaluator:	RM	**County:**	Haywood	**Longitude:**	-82.94064
Total Points: *Stream is at least intermittent if ≥ 19 or perennial if ≥ 30**	24.25	**Stream Determination (circle one)** Ephemeral (Intermittent) Perennial		**Other** *e.g. Quad Name:*	Fines Creek

A. Geomorphology (Subtotal = 14)

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

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

B. Hydrology (Subtotal = 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 = 3.75)

18. Fibrous roots in streambed	3	2	1	(0)
19. Rooted upland plants in streambed	(3)	2	1	0
20. Macrobenthos (note diversity and abundance) No Sub to examine	(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:

(A)

Lowest trib just above prop line

Reach UT1 (Lower)

NC DWQ Stream Identification Form Version 4.11

Date: 11/30/17	**Project/Site:** Rush Fork	**Latitude:**
Evaluator: JB	**County:** Haywood	**Longitude:**
Total Points: *Stream is at least intermittent if ≥ 19 or perennial if ≥ 30** 30	**Stream Determination (circle one)** Ephemeral Intermittent Perennial	**Other** *e.g. Quad Name:*

A. Geomorphology (Subtotal = 14)	Absent	Weak	Moderate	Strong
1[a]. Continuity of channel bed and bank	0	1	2	(3)
2. Sinuosity of channel along thalweg	0	(1)	2	3
3. In-channel structure: ex. riffle-pool, step-pool, ripple-pool sequence	0	1	(2)	3
4. Particle size of stream substrate	0	1	(2)	3
5. Active/relict floodplain	0	(1)	2	3
6. Depositional bars or benches	(0)	1	2	3
7. Recent alluvial deposits	0	(1)	2	3
8. Headcuts	0	(1)	2	3
9. Grade control	0	0.5	1	(1.5)
10. Natural valley	0	0.5	1	(1.5)
11. Second or greater order channel	No = 0		Yes = 3	

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

B. Hydrology (Subtotal = 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 = 9.5)				
18. Fibrous roots in streambed	3	2	(1)	0
19. Rooted upland plants in streambed	(3)	2	1	0
20. Macrobenthos (note diversity and abundance)	0	1	2	(3)
21. Aquatic Mollusks	(0)	1	2	3
22. Fish	(0)	0.5	1	1.5
23. Crayfish	0	0.5	(1)	1.5
24. Amphibians	0	0.5	1	(1.5)
25. Algae	(0)	0.5	1	1.5
26. Wetland plants in streambed	FACW = 0.75; OBL = 1.5 (Other = 0)			

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

Notes: Caddis, Mayflies, Snails

Sketch:

Photos 2722, 2733

Kirkpatrick Property just below confluence

Reach UT1 (Mid)

NC DWQ Stream Identification Form Version 4.11

Date: 12/19	**Project/Site:**	**Latitude:**
Evaluator:	**County:**	**Longitude:**
Total Points: *Stream is at least intermittent if ≥ 19 or perennial if ≥ 30** 43.25	**Stream Determination (circle one)** Ephemeral Intermittent (Perennial)	**Other** *e.g. Quad Name:*

A. Geomorphology (Subtotal = 24)	Absent	Weak	Moderate	Strong
1[a]. Continuity of channel bed and bank	0	1	2	(3)
2. Sinuosity of channel along thalweg	0	1	(2)	3
3. In-channel structure: ex. riffle-pool, step-pool, ripple-pool sequence	0	1	2	(3)
4. Particle size of stream substrate	0	1	2	(3)
5. Active/relict floodplain	0	(1)	2	3
6. Depositional bars or benches	0	1	(2)	3
7. Recent alluvial deposits	0	1	(2)	3
8. Headcuts	0	1	(2)	3
9. Grade control	0	0.5	1	(1.5)
10. Natural valley	0	0.5	1	(1.5)
11. Second or greater order channel	No = 0		Yes = (3)	

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

B. Hydrology (Subtotal = 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 = 10.75)				
18. Fibrous roots in streambed	3	(2)	1	0
19. Rooted upland plants in streambed	(3)	2	1	0
20. Macrobenthos (note diversity and abundance)	0	1	2	(3)
21. Aquatic Mollusks	(0)	1	2	3
22. Fish	(0)	0.5	1	1.5
23. Crayfish	0	0.5	(1)	1.5
24. Amphibians	0	0.5	(1)	1.5
25. Algae	(0)	0.5	1	1.5
26. Wetland plants in streambed	(FACW = 0.75; OBL = 1.5 Other = 0)			

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

Notes:

Sketch:

(B)

Reach UT1 (Lower)

Second trib from bottom by lower pasture

NC DWQ Stream Identification Form Version 4.11

Date: 11/30/17	**Project/Site:** Rush Fork	**Latitude:**
Evaluator: JB	**County:** Haywood	**Longitude:**
Total Points: *Stream is at least intermittent if ≥ 19 or perennial if ≥ 30** 33.5	**Stream Determination (circle one)** Ephemeral Intermittent Perennial	**Other** *e.g. Quad Name:*

A. Geomorphology (Subtotal = 16.5)	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 = 9)				
12. Presence of Baseflow	0	1	2	(3)
13. Iron oxidizing bacteria	(0)	1	2	3
14. Leaf litter	1.5	(1)	0.5	0
15. Sediment on plants or debris	0	0.5	(1)	1.5
16. Organic debris lines or piles	0	0.5	(1)	1.5
17. Soil-based evidence of high water table?	No = 0		(Yes = 3)	

C. Biology (Subtotal = 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: Mayflies, caddisflies.

Sketch:

APPENDIX G: NC-SAM AND NC-WAM ASSESSMENT FORMS

Reaches UT1 and UT3

NC SAM FIELD ASSESSMENT FORM
Accompanies User Manual Version 2.1

USACE AID #: NCDWR #:

INSTRUCTIONS: Attach a sketch of the assessment area and photographs. Attach a copy of the USGS 7.5-minute topographic quadrangle, and circle the location of the stream reach under evaluation. If multiple stream reaches will be evaluated on the same property, identify and number all reaches on the attached map, and include a separate form for each reach. See the NC SAM User Manual for detailed descriptions and explanations of requested information. Record in the "Notes/Sketch" section if any supplementary measurements were performed. See the NC SAM User Manual for examples of additional measurements that may be relevant.
NOTE EVIDENCE OF STRESSORS AFFECTING THE ASSESSMENT AREA (do not need to be within the assessment area).

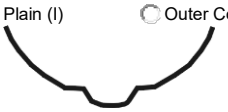
PROJECT / SITE INFORMATION:

1. Project name (if any): UT to Rush Fork
2. Date of evaluation: 8/14 - 8/15/2018
3. Applicant/owner name: Michael Baker
4. Assessor name/organization: KS & RM
5. County: Haywood
6. Nearest named water body on USGS 7.5-minute quad: Rush Fork
7. River Basin: French Broad
8. Site coordinates (decimal degrees, at lower end of assessment reach): See Stream ID Forms

STREAM INFORMATION: (depth and width can be approximations)

9. Site number (show on attached map): UT1, UT3
10. Length of assessment reach evaluated (feet): 3,471
11. Channel depth from bed (in riffle, if present) to top of bank (feet): 1.5 - 2.5 ☐ Unable to assess channel depth.
12. Channel width at top of bank (feet): 5 - 10 feet (varies)
13. Is assessment reach a swamp stream? ○ Yes ○ No
14. Feature type: ◉ Perennial flow ○ Intermittent flow ○ Tidal Marsh Stream

STREAM RATING INFORMATION:

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

ADDITIONAL INFORMATION:

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

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

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

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

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

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

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

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

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

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

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

- ( ) A Drought conditions <u>and</u> no rainfall or rainfall not exceeding 1 inch within the last 48 hours
- ( ) B Drought conditions <u>and</u> rainfall exceeding 1 inch within the last 48 hours
- (•) C No drought conditions

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

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

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

- [ ] A Multiple aquatic macrophytes and aquatic mosses (include liverworts, lichens, and algal mats)
- [ ] B Multiple sticks and/or leaf packs and/or emergent vegetation
- [ ] 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
- [x] E Little or no habitat

Check for Tidal Marsh Streams only

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

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

11. Bedform and Substrate – assessment reach metric (skip for Size 4 Coastal Plain streams and Tidal Marsh Streams)
11a. ( ) Yes (•) No Is assessment reach in a natural sand-bed stream? **(skip for Coastal Plain streams)**

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

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

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

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

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

12. Aquatic Life – assessment reach metric (skip for Size 4 Coastal Plain streams and Tidal Marsh Streams)

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

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

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

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

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

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

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

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

LB	RB	
(●) Y	(●) Y	Are wetlands present in the streamside area?
( ) N	( ) N	

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

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

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

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

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

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

19. Buffer Width – streamside area metric (skip for Tidal Marsh Streams)
Consider "vegetated buffer" and "wooded buffer" separately for left bank (LB) and right bank (RB) starting at the top of bank out to the first break.

Vegetated		Wooded		
LB	RB	LB	RB	
○ A	○ A	○ A	○ A	≥ 100-feet wide 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 – First 100 feet of streamside area metric (skip for Tidal Marsh Streams)
Evaluate the dominant vegetation within 100 feet of each bank or to the edge of the watershed (whichever comes first) as it contributes to assessment reach habitat.

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

25. Conductivity – assessment reach metric (skip for all Coastal Plain streams)
25a. ○ Yes ● No Was a conductivity measurement recorded?
If No, select one of the following reasons. ○ No Water ● Other: _____

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

Notes/Sketch:

Rating: LOW

NC SAM Stream Rating Sheet
Accompanies User Manual Version 2.1

Stream Site Name: UT to Rush Fork
Stream Category: Mb2
Date of Evaluation: 8/14 - 8/15/2018
Assessor Name/Organization: KS & RM

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

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

Reaches UT2, UT2-1, and UT4

NC SAM FIELD ASSESSMENT FORM
Accompanies User Manual Version 2.1

USACE AID #: NCDWR #:

INSTRUCTIONS: Attach a sketch of the assessment area and photographs. Attach a copy of the USGS 7.5-minute topographic quadrangle, and circle the location of the stream reach under evaluation. If multiple stream reaches will be evaluated on the same property, identify and number all reaches on the attached map, and include a separate form for each reach. See the NC SAM User Manual for detailed descriptions and explanations of requested information. Record in the "Notes/Sketch" section if any supplementary measurements were performed. See the NC SAM User Manual for examples of additional measurements that may be relevant.
NOTE EVIDENCE OF STRESSORS AFFECTING THE ASSESSMENT AREA (do not need to be within the assessment area).

PROJECT / SITE INFORMATION:

1. Project name (if any): UT to Rush Fork
2. Date of evaluation: 8/14 - 8/15/2018
3. Applicant/owner name: Michael Baker
4. Assessor name/organization: KS & RM
5. County: Haywood
6. Nearest named water body on USGS 7.5-minute quad: Rush Fork
7. River Basin: French Broad
8. Site coordinates (decimal degrees, at lower end of assessment reach): See Stream ID Forms

STREAM INFORMATION: (depth and width can be approximations)

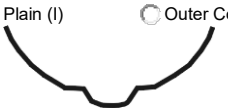
9. Site number (show on attached map): UT2, UT2-1, UT4
10. Length of assessment reach evaluated (feet): 413.6
11. Channel depth from bed (in riffle, if present) to top of bank (feet): 1 - 1.5 ☐ Unable to assess channel depth.
12. Channel width at top of bank (feet): 3 - 5 feet (varies)
13. Is assessment reach a swamp stream? ○ Yes ○ No
14. Feature type: ○ Perennial flow ◉ Intermittent flow ○ Tidal Marsh Stream

STREAM RATING INFORMATION:

15. NC SAM Zone: ◉ Mountains (M) ○ Piedmont (P) ○ Inner Coastal Plain (I) ○ Outer Coastal Plain (O)

16. Estimated geomorphic valley shape **(skip for Tidal Marsh Stream):**

○ a (more sinuous stream, flatter valley slope)



◉ b (less sinuous stream, steeper valley slope)

17. Watershed size: **(skip for Tidal Marsh Stream)** ◉ Size 1 (< 0.1 mi^2) ○ Size 2 (0.1 to < 0.5 mi^2) ○ Size 3 (0.5 to < 5 mi^2) ○ Size 4 (≥ 5 mi^2)

ADDITIONAL INFORMATION:

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

19. Are additional stream information/supplementary measurements included in "Notes/Sketch" section or attached? ◉ Yes ○ No

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

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

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

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

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

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

LB	RB	
○	○	A Little or no evidence of conditions that adversely affect reference interaction
●	●	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 Extensive evidence of conditions that adversely affect reference interaction (little to no floodplain/intertidal zone access [examples: causeways with floodplain and channel constriction, bulkheads, retaining walls, fill, stream incision, disruption of flood flows through streamside area] or too much floodplain/intertidal zone access [examples: impoundments, intensive mosquito ditching]) or floodplain/intertidal zone unnaturally absent or assessment reach is a man-made feature on an interstream divide

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

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

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

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

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

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

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

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

Check for Tidal Marsh Streams only

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

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

11. Bedform and Substrate – assessment reach metric (skip for Size 4 Coastal Plain streams and Tidal Marsh Streams)
11a. ○ Yes ● No Is assessment reach in a natural sand-bed stream? **(skip for Coastal Plain streams)**

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

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

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

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

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

12. Aquatic Life – assessment reach metric (skip for Size 4 Coastal Plain streams and Tidal Marsh Streams)

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

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

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

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

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

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

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

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

LB	RB	
◉ Y	◉ Y	Are wetlands present in the streamside area?
○ N	○ N	

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

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

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

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

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

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

19. Buffer Width – streamside area metric (skip for Tidal Marsh Streams)
Consider "vegetated buffer" and "wooded buffer" separately for left bank (LB) and right bank (RB) starting at the top of bank out to the first break.

Vegetated		Wooded		
LB	RB	LB	RB	
○ A	○ A	○ A	○ A	≥ 100-feet wide 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 – First 100 feet of streamside area metric (skip for Tidal Marsh Streams)
Evaluate the dominant vegetation within 100 feet of each bank or to the edge of the watershed (whichever comes first) as it contributes to assessment reach habitat.

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

25. Conductivity – assessment reach metric (skip for all Coastal Plain streams)
25a. ○ Yes ● No Was a conductivity measurement recorded?
If No, select one of the following reasons. ○ No Water ● Other: _____

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

Notes/Sketch:

Rating: LOW

NC SAM Stream Rating Sheet
Accompanies User Manual Version 2.1

Stream Site Name: UT to Rush Fork
Stream Category: Mb1
Date of Evaluation: 8/14 - 8/15/2018
Assessor Name/Organization: KS & RM

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

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

WA, WB, WC

NC WAM WETLAND ASSESSMENT FORM
Accompanies User Manual Version 5

USACE AID#:		NCDWR #:	
Project Name	UT to Rush Fork	Date of Evaluation	8/15/18
Applicant/Owner Name	Baker	Wetland Site Name	WA,WB,WC
Wetland Type	Bottomland Hardwood Forest	Assessor Name/Organization	KS & RM
Level III Ecoregion	Blue Ridge Mountains	Nearest Named Water Body	Rush Fork
River Basin	French Broad	USGS 8-Digit Catalogue Unit	06010106
County	Haywood	NCDWR Region	Asheville
(●) Yes ( ) No	Precipitation within 48 hrs?	Latitude/Longitude (deci-degrees)	See Wetland data forms

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

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

Is the assessment area intensively managed? (●) Yes ( ) No

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

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

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

- ( ) Blackwater
- (●) Brownwater
- [ ] Tidal (if tidal, check one of the following boxes) ( ) Lunar ( ) Wind ( ) Both

Is the assessment area on a coastal island? ( ) Yes (●) No

Is the assessment area's surface water storage capacity or duration substantially altered by beaver? ( ) Yes (●) No

Does the assessment area experience overbank flooding during normal rainfall conditions? ( ) Yes (●) No

1. **Ground Surface Condition/Vegetation Condition – assessment area condition metric**
Check a box in each column. Consider alteration to the ground surface (GS) in the assessment area and vegetation structure (VS) in the assessment area. Compare to reference wetland if applicable (see User Manual). If a reference is not applicable, then rate the assessment area based on evidence of an effect.

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

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

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

3. **Water Storage/Surface Relief – assessment area/wetland type condition metric (skip for all marshes)**
Check a box in each column for each group below. Select the appropriate storage for the assessment area (AA) and the wetland type (WT).

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

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

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

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

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

4b.
- ◉ A Soil ribbon < 1 inch
- ○ B Soil ribbon ≥ 1 inch

4c.
- ◉ A No peat or muck presence
- ○ B A peat or muck presence

5. Discharge into Wetland – opportunity metric

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

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

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

Check all that apply (at least one box in each column). Evaluation involves a GIS effort with field adjustment. Consider sources draining to assessment area within entire upstream watershed (WS), within 5 miles and within the watershed draining to the assessment area (5M), and within 2 miles and within the watershed draining to the assessment area (2M). Effective riparian buffers are considered to be 50 feet wide in the Coastal Plain and Piedmont ecoregions and 30 feet wide in the Blue Ridge Mountains ecoregion.

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

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

7a. Is assessment area within 50 feet of a tributary or other open water?
◉ Yes ○ No If Yes, continue to 7b. If No, skip to Metric 8.

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

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

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

7e. Is tributary or other open water sheltered or exposed?
- ◉ Sheltered – adjacent open water with width < 2500 feet and no regular boat traffic.
- ○ Exposed – adjacent open water with width ≥ 2500 feet or regular boat traffic.

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

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

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

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

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

10. Indicators of Deposition – assessment area condition metric (skip for non-riparian wetlands and all marshes)
Consider recent deposition only (no plant growth since deposition).

- ◉ A Sediment deposition is not excessive, but at approximately natural levels.
- ○ B Sediment deposition is excessive, but not overwhelming the wetland.
- ○ C Sediment deposition is excessive and is overwhelming the wetland.

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

WT	WC	FW (if applicable)	
○ A	○ A	○ A	≥ 500 acres
○ B	○ B	○ B	From 100 to < 500 acres
○ C	○ C	○ C	From 50 to < 100 acres
○ D	○ D	○ D	From 25 to < 50 acres
○ E	○ E	○ E	From 10 to < 25 acres
○ F	○ F	○ F	From 5 to < 10 acres
○ G	○ G	○ G	From 1 to < 5 acres
○ H	○ H	○ H	From 0.5 to < 1 acre
○ I	◉ I	○ I	From 0.1 to < 0.5 acre
◉ J	○ J	○ J	From 0.01 to < 0.1 acre
○ K	○ K	◉ K	< 0.01 acre 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 is < 90% of the full extent of its natural landscape size.

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

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

13b. **Evaluate for marshes only**.
○ Yes ○ No Wetland type has a surface hydrology connection to open waters/stream or tidal wetlands.

14. Edge Effect – wetland type condition metric (skip for all marshes and Estuarine Woody Wetland)
May involve a GIS effort with field adjustment. Estimate distance from wetland type boundary to artificial edges. Artificial edges include non-forested areas ≥ 40 feet wide such as fields, development, roads, regularly maintained utility line corridors and clear-cuts. Consider the eight main points of the compass. Artificial edge occurs within 150 feet in how many directiions? If the assessment area is clear-cut, select option "C."

- ○ A 0
- ○ B 1 to 4
- ◉ C 5 to 8

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

- ○ A Vegetation is close to reference condition in species present and their proportions. Lower strata composed of appropriate species, with exotic plants absent or sparse within the assessment area.
- ○ B Vegetation is different from reference condition in species diversity or proportions, but still largely composed of native species characteristic of the wetland type. This may include communities of weedy native species that develop after clearcutting or clearing. It also includes communities with exotics present, but not dominant, over a large portion of the expected strata.
- ◉ C Vegetation severely altered from reference in composition, 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.

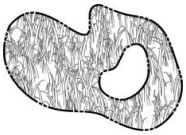
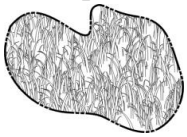
20. Large Woody Debris – wetland type condition metric (skip for all marshes)

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

Rating: LOW

NC WAM Wetland Rating Sheet
Accompanies User Manual Version 5.0

Wetland Site Name	WA,WB,WC	Date	8/15/18
Wetland Type	Bottomland Hardwood Forest	Assessor Name/Organization	KS & RM

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

Sub-function Rating Summary

Function	Sub-function	Metrics	Rating
Hydrology	Surface Storage and Retention	Condition	**LOW**
	Sub-Surface Storage and Retention	Condition	**MEDIUM**
Water Quality	Pathogen Change	Condition	**LOW**
		Condition/Opportunity	**LOW**
		Opportunity Presence? (Y/N)	**NO**
	Particulate Change	Condition	**MEDIUM**
		Condition/Opportunity	**MEDIUM**
		Opportunity Presence? (Y/N)	**NO**
	Soluble Change	Condition	**LOW**
		Condition/Opportunity	**LOW**
		Opportunity Presence? (Y/N)	**NO**
	Physical Change	Condition	**HIGH**
		Condition/Opportunity	**HIGH**
		Opportunity Presence? (Y/N)	**NO**
	Pollution Change	Condition	NA
		Condition/Opportunity	NA
		Opportunity Presence? (Y/N)	NA
Habitat	Physical Structure	Condition	**LOW**
	Landscape Patch Structure	Condition	**LOW**
	Vegetation Composition	Condition	**LOW**

Function Rating Summary

Function	Metrics/Notes	Rating
Hydrology	Condition	**LOW**
Water Quality	Condition	**LOW**
	Condition/Opportunity	**LOW**
	Opportunity Presence? (Y/N)	**NO**
Habitat	Condition	**LOW**

Overall Wetland Rating **LOW**

WD, WE, WL, WM

NC WAM WETLAND ASSESSMENT FORM
Accompanies User Manual Version 5

USACE AID#:		NCDWR #:	
Project Name	UT to Rush Fork	Date of Evaluation	8/15/18
Applicant/Owner Name	Baker	Wetland Site Name	WD, WE, WL, WM
Wetland Type	Bottomland Hardwood Forest	Assessor Name/Organization	KS & RM
Level III Ecoregion	Blue Ridge Mountains	Nearest Named Water Body	Rush Fork
River Basin	French Broad	USGS 8-Digit Catalogue Unit	06010106
County	Haywood	NCDWR Region	Asheville
(●) Yes ( ) No	Precipitation within 48 hrs?	Latitude/Longitude (deci-degrees)	See Wetland data forms

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

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

Is the assessment area intensively managed? (●) Yes ( ) No

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

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

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

- ( ) Blackwater
- (●) Brownwater
- [ ] Tidal (if tidal, check one of the following boxes) ( ) Lunar ( ) Wind ( ) Both

Is the assessment area on a coastal island? ( ) Yes (●) No

Is the assessment area's surface water storage capacity or duration substantially altered by beaver? ( ) Yes (●) No

Does the assessment area experience overbank flooding during normal rainfall conditions? ( ) Yes (●) No

1. **Ground Surface Condition/Vegetation Condition – assessment area condition metric**
Check a box in each column. Consider alteration to the ground surface (GS) in the assessment area and vegetation structure (VS) in the assessment area. Compare to reference wetland if applicable (see User Manual). If a reference is not applicable, then rate the assessment area based on evidence of an effect.

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

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

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

3. **Water Storage/Surface Relief – assessment area/wetland type condition metric (skip for all marshes)**
Check a box in each column for each group below. Select the appropriate storage for the assessment area (AA) and the wetland type (WT).

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

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

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

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

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

4b.
- ○ A Soil ribbon < 1 inch
- ○ B Soil ribbon ≥ 1 inch

4c.
- ○ A No peat or muck presence
- ◉ B A peat or muck presence

5. Discharge into Wetland – opportunity metric

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

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

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

Check all that apply (at least one box in each column). Evaluation involves a GIS effort with field adjustment. Consider sources draining to assessment area within entire upstream watershed (WS), within 5 miles and within the watershed draining to the assessment area (5M), and within 2 miles and within the watershed draining to the assessment area (2M). Effective riparian buffers are considered to be 50 feet wide in the Coastal Plain and Piedmont ecoregions and 30 feet wide in the Blue Ridge Mountains ecoregion.

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

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

7a. Is assessment area within 50 feet of a tributary or other open water?
◉ Yes ○ No If Yes, continue to 7b. If No, skip to Metric 8.

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

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

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

7e. Is tributary or other open water sheltered or exposed?
- ◉ Sheltered – adjacent open water with width < 2500 feet and no regular boat traffic.
- ○ Exposed – adjacent open water with width ≥ 2500 feet or regular boat traffic.

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

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

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

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

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

10. Indicators of Deposition – assessment area condition metric (skip for non-riparian wetlands and all marshes)
Consider recent deposition only (no plant growth since deposition).

- ◉ A Sediment deposition is not excessive, but at approximately natural levels.
- ○ B Sediment deposition is excessive, but not overwhelming the wetland.
- ○ C Sediment deposition is excessive and is overwhelming the wetland.

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

WT	WC	FW (if applicable)	
○ A	○ A	○ A	≥ 500 acres
○ B	○ B	○ B	From 100 to < 500 acres
○ C	○ C	○ C	From 50 to < 100 acres
○ D	○ D	○ D	From 25 to < 50 acres
○ E	○ E	○ E	From 10 to < 25 acres
○ F	○ F	○ F	From 5 to < 10 acres
○ G	○ G	○ G	From 1 to < 5 acres
○ H	○ H	○ H	From 0.5 to < 1 acre
○ I	○ I	○ I	From 0.1 to < 0.5 acre
○ J	○ J	○ J	From 0.01 to < 0.1 acre
◉ K	◉ K	◉ K	< 0.01 acre 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 is < 90% of the full extent of its natural landscape size.

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

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

13b. **Evaluate for marshes only**.
○ Yes ○ No Wetland type has a surface hydrology connection to open waters/stream or tidal wetlands.

14. Edge Effect – wetland type condition metric (skip for all marshes and Estuarine Woody Wetland)
May involve a GIS effort with field adjustment. Estimate distance from wetland type boundary to artificial edges. Artificial edges include non-forested areas ≥ 40 feet wide such as fields, development, roads, regularly maintained utility line corridors and clear-cuts. Consider the eight main points of the compass. Artificial edge occurs within 150 feet in how many directiions? If the assessment area is clear-cut, select option "C."

- ○ A 0
- ○ B 1 to 4
- ◉ C 5 to 8

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

- ○ A Vegetation is close to reference condition in species present and their proportions. Lower strata composed of appropriate species, with exotic plants absent or sparse within the assessment area.
- ○ B Vegetation is different from reference condition in species diversity or proportions, but still largely composed of native species characteristic of the wetland type. This may include communities of weedy native species that develop after clearcutting or clearing. It also includes communities with exotics present, but not dominant, over a large portion of the expected strata.
- ◉ C Vegetation severely altered from reference in composition, 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.

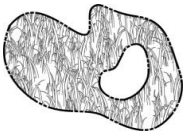
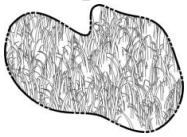
20. Large Woody Debris – wetland type condition metric (skip for all marshes)

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

Rating: LOW

NC WAM Wetland Rating Sheet
Accompanies User Manual Version 5.0

Wetland Site Name		Date of Assessment	
Wetland Type	Bottomland Hardwood Forest	Assessor Name/Organization	

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

Sub-function Rating Summary

Function	Sub-function	Metrics	Rating
Hydrology	Surface Storage and Retention	Condition	**LOW**
	Sub-surface Storage and Retention	Condition	**LOW**
Water Quality	Pathogen Change	Condition	**LOW**
		Condition/Opportunity	**LOW**
		Opportunity Presence (Y/N)	**NO**
	Particulate Change	Condition	**MEDIUM**
		Condition/Opportunity	**MEDIUM**
		Opportunity Presence (Y/N)	**NO**
	Soluble Change	Condition	**HIGH**
		Condition/Opportunity	**HIGH**
		Opportunity Presence (Y/N)	**NO**
	Physical Change	Condition	**HIGH**
		Condition/Opportunity	**HIGH**
		Opportunity Presence (Y/N)	**YES**
	Pollution Change	Condition	NA
		Condition/Opportunity	NA
		Opportunity Presence (Y/N)	NA
Habitat	Physical Structure	Condition	**LOW**
	Landscape Patch Structure	Condition	**LOW**
	Vegetation Composition	Condition	**LOW**

Function Rating Summary

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

Overall Wetland Rating **LOW**

NC WAM WETLAND ASSESSMENT FORM
Accompanies User Manual Version 5

WF, WK

USACE AID#:		NCDWR #:	
Project Name	UT to Rush Fork	Date of Evaluation	8/15/18
Applicant/Owner Name	Baker	Wetland Site Name	WF,WK
Wetland Type	Headwater Forest	Assessor Name/Organization	KS & RM
Level III Ecoregion	Blue Ridge Mountains	Nearest Named Water Body	Rush Fork
River Basin	French Broad	USGS 8-Digit Catalogue Unit	06010106
County	Haywood	NCDWR Region	Asheville
(●) Yes ( ) No	Precipitation within 48 hrs?	Latitude/Longitude (deci-degrees)	See Wetland data forms

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

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

Is the assessment area intensively managed? (●) Yes ( ) No

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

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

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

- ( ) Blackwater
- (●) Brownwater
- [ ] Tidal (if tidal, check one of the following boxes) ( ) Lunar ( ) Wind ( ) Both

Is the assessment area on a coastal island? ( ) Yes (●) No

Is the assessment area's surface water storage capacity or duration substantially altered by beaver? ( ) Yes (●) No

Does the assessment area experience overbank flooding during normal rainfall conditions? ( ) Yes (●) No

1. **Ground Surface Condition/Vegetation Condition – assessment area condition metric**
Check a box in each column. Consider alteration to the ground surface (GS) in the assessment area and vegetation structure (VS) in the assessment area. Compare to reference wetland if applicable (see User Manual). If a reference is not applicable, then rate the assessment area based on evidence of an effect.

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

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

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

3. **Water Storage/Surface Relief – assessment area/wetland type condition metric (skip for all marshes)**
Check a box in each column for each group below. Select the appropriate storage for the assessment area (AA) and the wetland type (WT).

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

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

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

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

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

4b.
- ◉ A Soil ribbon < 1 inch
- ○ B Soil ribbon ≥ 1 inch

4c.
- ○ A No peat or muck presence
- ◉ B A peat or muck presence

5. Discharge into Wetland – opportunity metric

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

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

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

Check all that apply (at least one box in each column). Evaluation involves a GIS effort with field adjustment. Consider sources draining to assessment area within entire upstream watershed (WS), within 5 miles and within the watershed draining to the assessment area (5M), and within 2 miles and within the watershed draining to the assessment area (2M). Effective riparian buffers are considered to be 50 feet wide in the Coastal Plain and Piedmont ecoregions and 30 feet wide in the Blue Ridge Mountains ecoregion.

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

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

7a. Is assessment area within 50 feet of a tributary or other open water?
◉ Yes ○ No If Yes, continue to 7b. If No, skip to Metric 8.

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

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

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

7e. Is tributary or other open water sheltered or exposed?
- ◉ Sheltered – adjacent open water with width < 2500 feet and no regular boat traffic.
- ○ Exposed – adjacent open water with width ≥ 2500 feet or regular boat traffic.

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

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

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

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

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

10. Indicators of Deposition – assessment area condition metric (skip for non-riparian wetlands and all marshes)
Consider recent deposition only (no plant growth since deposition).

- ◉ A Sediment deposition is not excessive, but at approximately natural levels.
- ○ B Sediment deposition is excessive, but not overwhelming the wetland.
- ○ C Sediment deposition is excessive and is overwhelming the wetland.

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

WT	WC	FW (if applicable)	
○ A	○ A	○ A	≥ 500 acres
○ B	○ B	○ B	From 100 to < 500 acres
○ C	○ C	○ C	From 50 to < 100 acres
○ D	○ D	○ D	From 25 to < 50 acres
○ E	○ E	○ E	From 10 to < 25 acres
○ F	○ F	○ F	From 5 to < 10 acres
○ G	○ G	○ G	From 1 to < 5 acres
○ H	○ H	○ H	From 0.5 to < 1 acre
○ I	◉ I	○ I	From 0.1 to < 0.5 acre
◉ J	○ J	○ J	From 0.01 to < 0.1 acre
○ K	○ K	◉ K	< 0.01 acre 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 is < 90% of the full extent of its natural landscape size.

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

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

13b. **Evaluate for marshes only**.
○ Yes ○ No Wetland type has a surface hydrology connection to open waters/stream or tidal wetlands.

14. Edge Effect – wetland type condition metric (skip for all marshes and Estuarine Woody Wetland)
May involve a GIS effort with field adjustment. Estimate distance from wetland type boundary to artificial edges. Artificial edges include non-forested areas ≥ 40 feet wide such as fields, development, roads, regularly maintained utility line corridors and clear-cuts. Consider the eight main points of the compass. Artificial edge occurs within 150 feet in how many directiions? If the assessment area is clear-cut, select option "C."

- ○ A 0
- ○ B 1 to 4
- ◉ C 5 to 8

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

- ○ A Vegetation is close to reference condition in species present and their proportions. Lower strata composed of appropriate species, with exotic plants absent or sparse within the assessment area.
- ○ B Vegetation is different from reference condition in species diversity or proportions, but still largely composed of native species characteristic of the wetland type. This may include communities of weedy native species that develop after clearcutting or clearing. It also includes communities with exotics present, but not dominant, over a large portion of the expected strata.
- ◉ C Vegetation severely altered from reference in composition, 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.

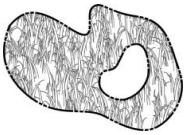
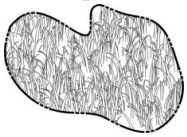
20. Large Woody Debris – wetland type condition metric (skip for all marshes)

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

Rating: LOW

NC WAM Wetland Rating Sheet
Accompanies User Manual Version 5.0

Wetland Site Name	WF,WK	Date	8/15/18
Wetland Type	Headwater Forest	Assessor Name/Organization	KS & RM

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

Sub-function Rating Summary

Function	Sub-function	Metrics	Rating
Hydrology	Surface Storage and Retention	Condition	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	**LOW**
	Landscape Patch Structure	Condition	**LOW**
	Vegetation Composition	Condition	**LOW**

Function Rating Summary

Function	Metrics/Notes	Rating
Hydrology	Condition	**LOW**
Water Quality	Condition	**LOW**
	Condition/Opportunity	NA
	Opportunity Presence? (Y/N)	NA
Habitat	Condition	**LOW**

Overall Wetland Rating **LOW**

NC WAM WETLAND ASSESSMENT FORM **WG**
Accompanies User Manual Version 5

USACE AID#:		NCDWR #:	
Project Name	UT to Rush Fork	Date of Evaluation	8/15/18
Applicant/Owner Name	Baker	Wetland Site Name	WG
Wetland Type	Headwater Forest	Assessor Name/Organization	KS & RM
Level III Ecoregion	Blue Ridge Mountains	Nearest Named Water Body	Rush Fork
River Basin	French Broad	USGS 8-Digit Catalogue Unit	06010106
County	Haywood	NCDWR Region	Asheville
(●) Yes ( ) No	Precipitation within 48 hrs?	Latitude/Longitude (deci-degrees)	See Wetland data forms

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

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

Is the assessment area intensively managed? (●) Yes ( ) No

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

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

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

- ( ) Blackwater
- (●) Brownwater
- [ ] Tidal (if tidal, check one of the following boxes) ( ) Lunar ( ) Wind ( ) Both

Is the assessment area on a coastal island? ( ) Yes (●) No

Is the assessment area's surface water storage capacity or duration substantially altered by beaver? ( ) Yes (●) No

Does the assessment area experience overbank flooding during normal rainfall conditions? ( ) Yes (●) No

1. **Ground Surface Condition/Vegetation Condition – assessment area condition metric**
Check a box in each column. Consider alteration to the ground surface (GS) in the assessment area and vegetation structure (VS) in the assessment area. Compare to reference wetland if applicable (see User Manual). If a reference is not applicable, then rate the assessment area based on evidence of an effect.

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

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

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

3. **Water Storage/Surface Relief – assessment area/wetland type condition metric (skip for all marshes)**
Check a box in each column for each group below. Select the appropriate storage for the assessment area (AA) and the wetland type (WT).

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

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

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

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

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

4b.
- ○ A Soil ribbon < 1 inch
- ○ B Soil ribbon ≥ 1 inch

4c.
- ○ A No peat or muck presence
- ◉ B A peat or muck presence

5. Discharge into Wetland – opportunity metric

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

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

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

Check all that apply (at least one box in each column). Evaluation involves a GIS effort with field adjustment. Consider sources draining to assessment area within entire upstream watershed (WS), within 5 miles and within the watershed draining to the assessment area (5M), and within 2 miles and within the watershed draining to the assessment area (2M). Effective riparian buffers are considered to be 50 feet wide in the Coastal Plain and Piedmont ecoregions and 30 feet wide in the Blue Ridge Mountains ecoregion.

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

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

7a. Is assessment area within 50 feet of a tributary or other open water?
◉ Yes ○ No If Yes, continue to 7b. If No, skip to Metric 8.

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

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

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

7e. Is tributary or other open water sheltered or exposed?
- ◉ Sheltered – adjacent open water with width < 2500 feet and no regular boat traffic.
- ○ Exposed – adjacent open water with width ≥ 2500 feet or regular boat traffic.

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

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

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

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

Answer for assessment area dominant landform.

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

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

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

- ◉ A Sediment deposition is not excessive, but at approximately natural levels.
- ○ B Sediment deposition is excessive, but not overwhelming the wetland.
- ○ C Sediment deposition is excessive and is overwhelming the wetland.

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

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

WT	WC	FW (if applicable)	
○ A	○ A	○ A	≥ 500 acres
○ B	○ B	○ B	From 100 to < 500 acres
○ C	○ C	○ C	From 50 to < 100 acres
○ D	○ D	○ D	From 25 to < 50 acres
○ E	○ E	○ E	From 10 to < 25 acres
○ F	○ F	○ F	From 5 to < 10 acres
○ G	○ G	○ G	From 1 to < 5 acres
○ H	○ H	○ H	From 0.5 to < 1 acre
○ I	○ I	○ I	From 0.1 to < 0.5 acre
◉ J	◉ J	○ J	From 0.01 to < 0.1 acre
○ K	○ K	◉ K	< 0.01 acre 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 is < 90% of the full extent of its natural landscape size.

13. Connectivity to Other Natural Areas – landscape condition metric

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

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

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

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

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

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

- ○ A 0
- ○ B 1 to 4
- ◉ C 5 to 8

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

- ○ A Vegetation is close to reference condition in species present and their proportions. Lower strata composed of appropriate species, with exotic plants absent or sparse within the assessment area.
- ○ B Vegetation is different from reference condition in species diversity or proportions, but still largely composed of native species characteristic of the wetland type. This may include communities of weedy native species that develop after clearcutting or clearing. It also includes communities with exotics present, but not dominant, over a large portion of the expected strata.
- ◉ C Vegetation severely altered from reference in composition, 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	( )	( )	Canopy closed, or nearly closed, with natural gaps associated with natural processes
	B	( )	(●)	Canopy present, but opened more than natural gaps
	C	( )	( )	Canopy sparse or absent
Mid-Story	A	( )	( )	Dense mid-story/sapling layer
	B	( )	(●)	Moderate density mid-story/sapling layer
	C	( )	( )	Mid-story/sapling layer sparse or absent
Shrub	A	( )	( )	Dense shrub layer
	B	( )	( )	Moderate density shrub layer
	C	( )	( )	Shrub layer sparse or absent
Herb	A	( )	( )	Dense herb layer
	B	(●)	(●)	Moderate density herb layer
	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.

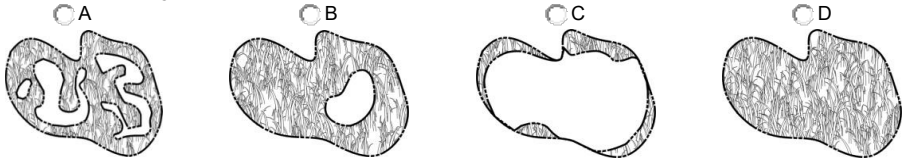
( ) A Large logs (more than one) are visible (> 12 inches in diameter, or large relative to species present and landscape stability).

(●) 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

Rating: LOW

NC WAM Wetland Rating Sheet
Accompanies User Manual Version 5.0

Wetland Site Name	WG	Date	8/15/18
Wetland Type	Headwater Forest	Assessor Name/Organization	KS & RM

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

Sub-function Rating Summary

Function	Sub-function	Metrics	Rating
Hydrology	Surface Storage and Retention	Condition	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	**LOW**
	Landscape Patch Structure	Condition	**LOW**
	Vegetation Composition	Condition	**LOW**

Function Rating Summary

Function	Metrics/Notes	Rating
Hydrology	Condition	**LOW**
Water Quality	Condition	**LOW**
	Condition/Opportunity	NA
	Opportunity Presence? (Y/N)	NA
Habitat	Condition	**LOW**

Overall Wetland Rating **LOW**

NC WAM WETLAND ASSESSMENT FORM
Accompanies User Manual Version 5

WH, WI, WJ

USACE AID#:		NCDWR #:	
Project Name	UT to Rush Fork	Date of Evaluation	8/15/18
Applicant/Owner Name	Baker	Wetland Site Name	WI,WJ,WH
Wetland Type	Headwater Forest	Assessor Name/Organization	KS & RM
Level III Ecoregion	Blue Ridge Mountains	Nearest Named Water Body	Rush Fork
River Basin	French Broad	USGS 8-Digit Catalogue Unit	06010106
County	Haywood	NCDWR Region	Asheville
(•) Yes ( ) No	Precipitation within 48 hrs?	Latitude/Longitude (deci-degrees)	See Wetland data forms

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

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

Is the assessment area intensively managed? (•) Yes ( ) No

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

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

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

- ( ) Blackwater
- (•) Brownwater
- [ ] Tidal (if tidal, check one of the following boxes) ( ) Lunar ( ) Wind ( ) Both

Is the assessment area on a coastal island? ( ) Yes (•) No

Is the assessment area's surface water storage capacity or duration substantially altered by beaver? ( ) Yes (•) No

Does the assessment area experience overbank flooding during normal rainfall conditions? ( ) Yes (•) No

1. **Ground Surface Condition/Vegetation Condition – assessment area condition metric**
Check a box in each column. Consider alteration to the ground surface (GS) in the assessment area and vegetation structure (VS) in the assessment area. Compare to reference wetland if applicable (see User Manual). If a reference is not applicable, then rate the assessment area based on evidence of an effect.

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

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

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

3. **Water Storage/Surface Relief – assessment area/wetland type condition metric (skip for all marshes)**
Check a box in each column for each group below. Select the appropriate storage for the assessment area (AA) and the wetland type (WT).

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

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

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

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

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

4b.
- ◉ A Soil ribbon < 1 inch
- ○ B Soil ribbon ≥ 1 inch

4c.
- ◉ A No peat or muck presence
- ○ B A peat or muck presence

5. Discharge into Wetland – opportunity metric

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

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

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

Check all that apply (at least one box in each column). Evaluation involves a GIS effort with field adjustment. Consider sources draining to assessment area within entire upstream watershed (WS), within 5 miles and within the watershed draining to the assessment area (5M), and within 2 miles and within the watershed draining to the assessment area (2M). Effective riparian buffers are considered to be 50 feet wide in the Coastal Plain and Piedmont ecoregions and 30 feet wide in the Blue Ridge Mountains ecoregion.

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

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

7a. Is assessment area within 50 feet of a tributary or other open water?
- ◉ Yes ○ No If Yes, continue to 7b. If No, skip to Metric 8.

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

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

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

7e. Is tributary or other open water sheltered or exposed?
- ◉ Sheltered – adjacent open water with width < 2500 feet and no regular boat traffic.
- ○ Exposed – adjacent open water with width ≥ 2500 feet or regular boat traffic.

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

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

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

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

Answer for assessment area dominant landform.

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

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

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

- ◉ A Sediment deposition is not excessive, but at approximately natural levels.
- ○ B Sediment deposition is excessive, but not overwhelming the wetland.
- ○ C Sediment deposition is excessive and is overwhelming the wetland.

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

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

WT	WC	FW (if applicable)	
○ A	○ A	○ A	≥ 500 acres
○ B	○ B	○ B	From 100 to < 500 acres
○ C	○ C	○ C	From 50 to < 100 acres
○ D	○ D	○ D	From 25 to < 50 acres
○ E	○ E	○ E	From 10 to < 25 acres
○ F	○ F	○ F	From 5 to < 10 acres
○ G	○ G	○ G	From 1 to < 5 acres
○ H	○ H	○ H	From 0.5 to < 1 acre
○ I	◉ I	○ I	From 0.1 to < 0.5 acre
◉ J	○ J	○ J	From 0.01 to < 0.1 acre
○ K	○ K	◉ K	< 0.01 acre 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 is < 90% of the full extent of its natural landscape size.

13. Connectivity to Other Natural Areas – landscape condition metric

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

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

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

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

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

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

- ○ A 0
- ○ B 1 to 4
- ◉ C 5 to 8

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

- ○ A Vegetation is close to reference condition in species present and their proportions. Lower strata composed of appropriate species, with exotic plants absent or sparse within the assessment area.
- ○ B Vegetation is different from reference condition in species diversity or proportions, but still largely composed of native species characteristic of the wetland type. This may include communities of weedy native species that develop after clearcutting or clearing. It also includes communities with exotics present, but not dominant, over a large portion of the expected strata.
- ◉ C Vegetation severely altered from reference in composition, 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.

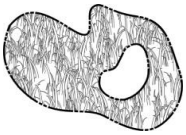
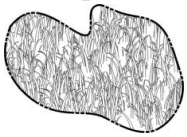
20. Large Woody Debris – wetland type condition metric (skip for all marshes)

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

Rating: LOW

NC WAM Wetland Rating Sheet
Accompanies User Manual Version 5.0

Wetland Site Name	WI,WJ,WH	Date	8/15/18
Wetland Type	Headwater Forest	Assessor Name/Organization	KS & RM

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

Sub-function Rating Summary

Function	Sub-function	Metrics	Rating
Hydrology	Surface Storage and Retention	Condition	**LOW**
	Sub-Surface Storage and Retention	Condition	**HIGH**
Water Quality	Pathogen Change	Condition	**LOW**
		Condition/Opportunity	**LOW**
		Opportunity Presence? (Y/N)	**NO**
	Particulate Change	Condition	**LOW**
		Condition/Opportunity	NA
		Opportunity Presence? (Y/N)	NA
	Soluble Change	Condition	**MEDIUM**
		Condition/Opportunity	**MEDIUM**
		Opportunity Presence? (Y/N)	**NO**
	Physical Change	Condition	**HIGH**
		Condition/Opportunity	**HIGH**
		Opportunity Presence? (Y/N)	**NO**
	Pollution Change	Condition	NA
		Condition/Opportunity	NA
		Opportunity Presence? (Y/N)	NA
Habitat	Physical Structure	Condition	**LOW**
	Landscape Patch Structure	Condition	**LOW**
	Vegetation Composition	Condition	**LOW**

Function Rating Summary

Function	Metrics/Notes	Rating
Hydrology	Condition	**MEDIUM**
Water Quality	Condition	**LOW**
	Condition/Opportunity	**MEDIUM**
	Opportunity Presence? (Y/N)	**NO**
Habitat	Condition	**LOW**

Overall Wetland Rating **LOW**

APPENDIX H: APPROVED JD AND WETLAND FORMS

U.S. ARMY CORPS OF ENGINEERS
WILMINGTON DISTRICT

Action ID: **SAW-2018-01171** County: **Haywood** U.S.G.S. Quad: **Fines Creek**

NOTIFICATION OF JURISDICTIONAL DETERMINATION

Property Owner: **Michael Baker International / Attn.: Micky Clemmons**
Address: **797 Haywood Road, Suite 201**
Asheville, NC 28806
Telephone Number: **828-412-6100**

Size (acres): **7.01 acre portion of larger tract**
Nearest Waterway: **UTs Rush Fork**
River Basin/ HUC: **Pigeon (06010106)**
Nearest Town: **Crabtree Community**
Coordinates: **35.64454 N, 82.94008 W**

Location description: **The project site is located on a tract of land (PINs 8721-72-6837 and 8731-33-5998) at 9503 Rush Fork Road in the Crabtree community of Haywood County, North Carolina.**

Indicate Which of the Following Apply:

A. Preliminary Determination

X There are waters, including wetlands, on the above described project area, 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. 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 are wetlands on the above described 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 of the U.S. on your 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 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 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 waters of the U.S. including wetlands on the above described 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 of the U.S. on your 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 of the U.S. including wetlands on your project area have been delineated and the delineation has been verified by the Corps. If you wish to have the delineation surveyed, the Corps can review and verify the survey upon completion. Once verified, this survey will provide an accurate depiction of all areas subject to CWA and/or RHA

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 of the U.S. including wetlands have been delineated and surveyed and are accurately depicted on the plat signed by the Corps Regulatory Official identified below on_____. 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 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 to determine their requirements.

Placement of dredged or fill material within waters of the US and/or 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 **David Brown** at **828-271-7980, ext. 4232** or **david.w.brown@usace.army.mil**.

C. Basis for Determination:

See attached preliminary jurisdictional determination form.

D. Remarks:

The potential waters of the U.S., at this site, were verified on-site by the Corps on April 11, 2019, and are as approximately depicted on the attached *Hydrologic Features Map (Figures 8, 8A.1, 8B, 8C, 8D.1, and 8E)* submitted by Michael Baker International.

E. Attention USDA Program Participants

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

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

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

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

In order for an RFA to be accepted by the Corps, the Corps must determine that it is complete, that it meets the criteria for appeal under 33 CFR part 331.5, and that it has been received by the Division Office within 60 days of the date of the NAP. Should you decide to submit an RFA form, it must be received at the above address by, N/A (Preliminary-JD).

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: 

David Brown

Issue Date of JD: **May 1, 2019** Expiration Date: N/A Preliminary JD

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

Copy furnished:
Anne Palmer Family Properties, L.P., 6624 Yacht Club Road, Flowery Branch, GA 30542

WE Kirk Farms North, LLC, 448 Little Mountain Road, Waynesville, NC 28786

Blank Page

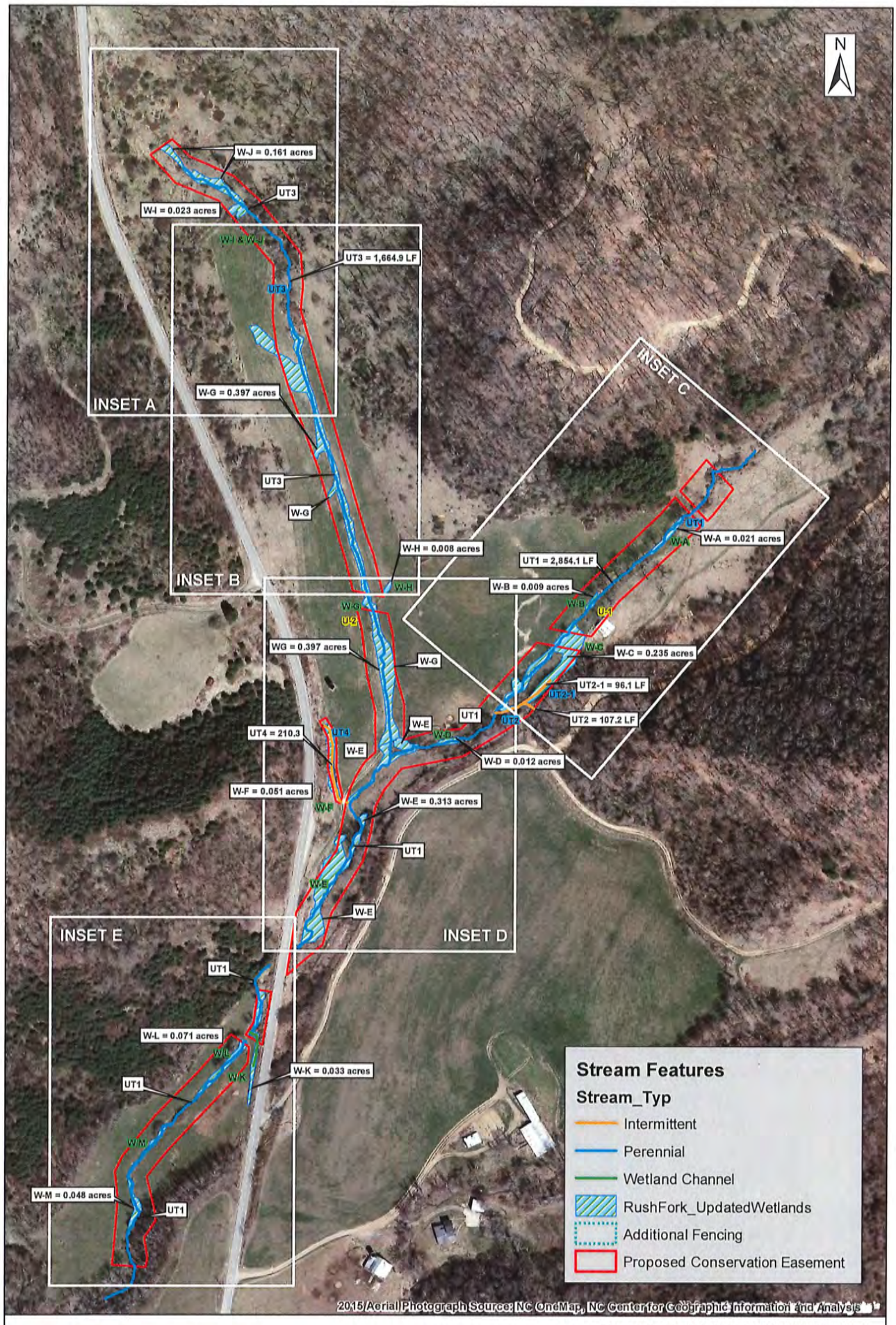
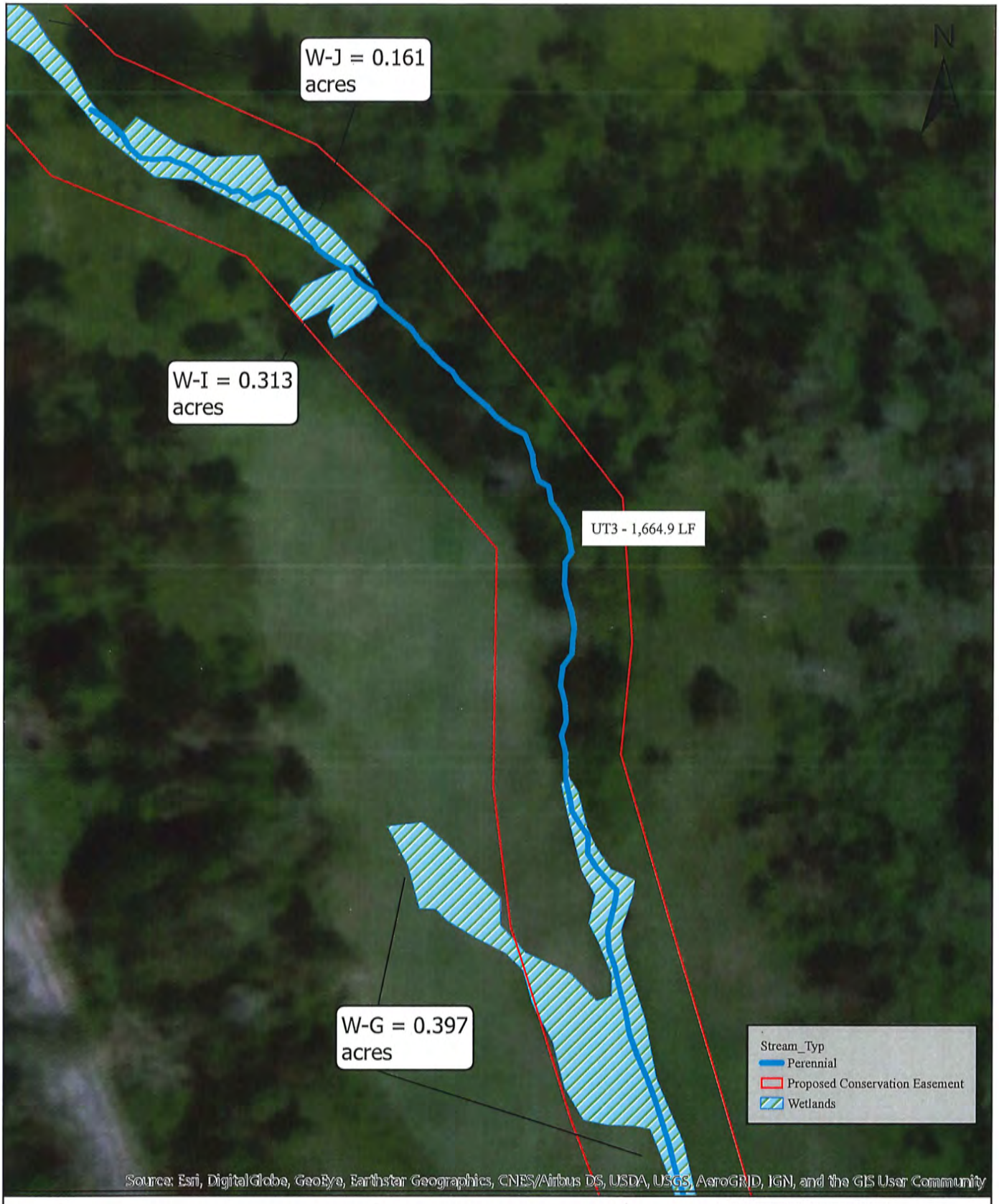


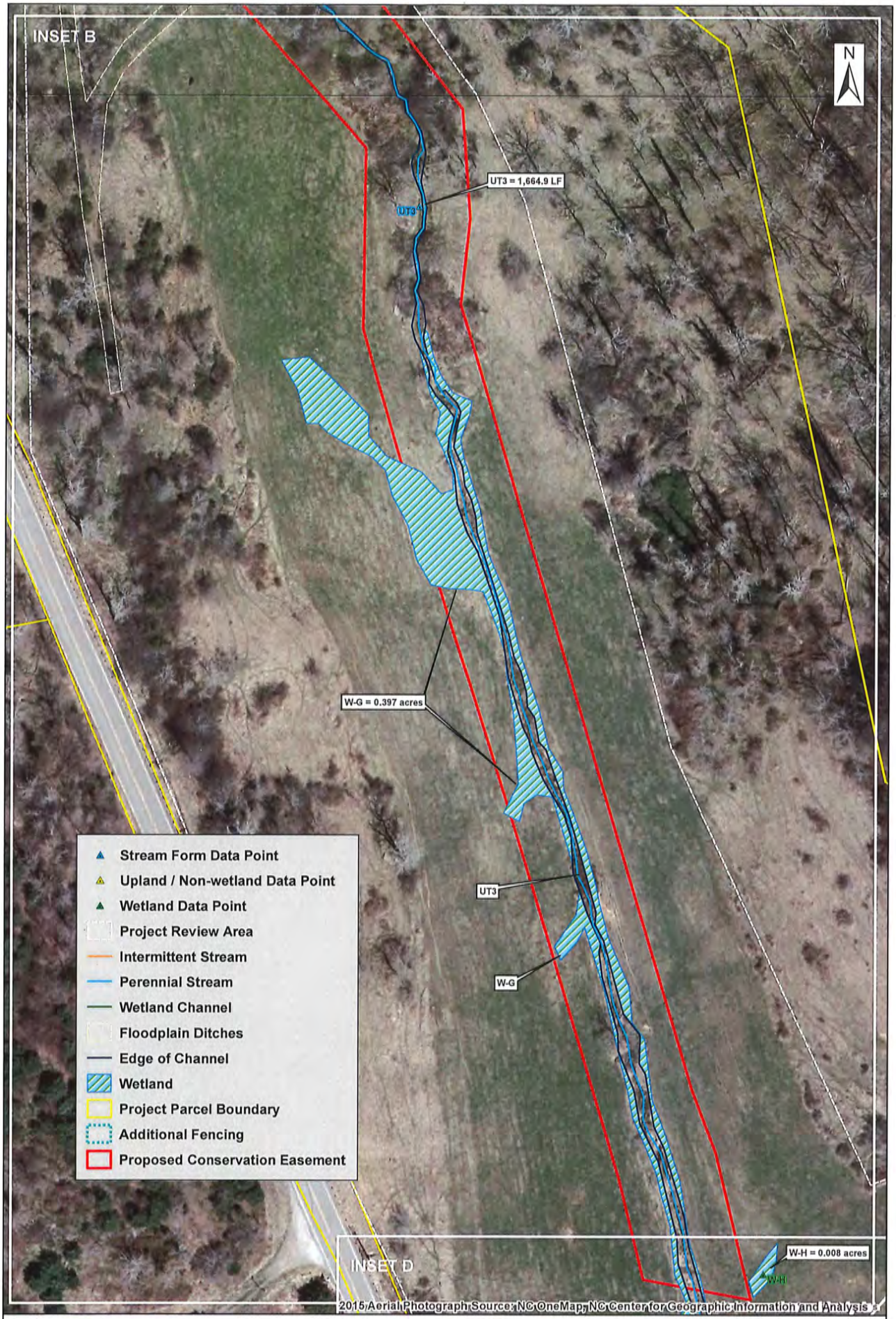
Figure 8 - Updated as of 4/11/19 Site Visit
Hydrologic Features Overview Map
UT to Rush Fork
Stream Mitigation Project



Michael Baker INTERNATIONAL

0 30 60 120 Feet

Additional Figure 8A.1
Hydrologic Features Map - Post Field Verification 4/11/19
UT to Rush Fork - Stream Mitigation Project

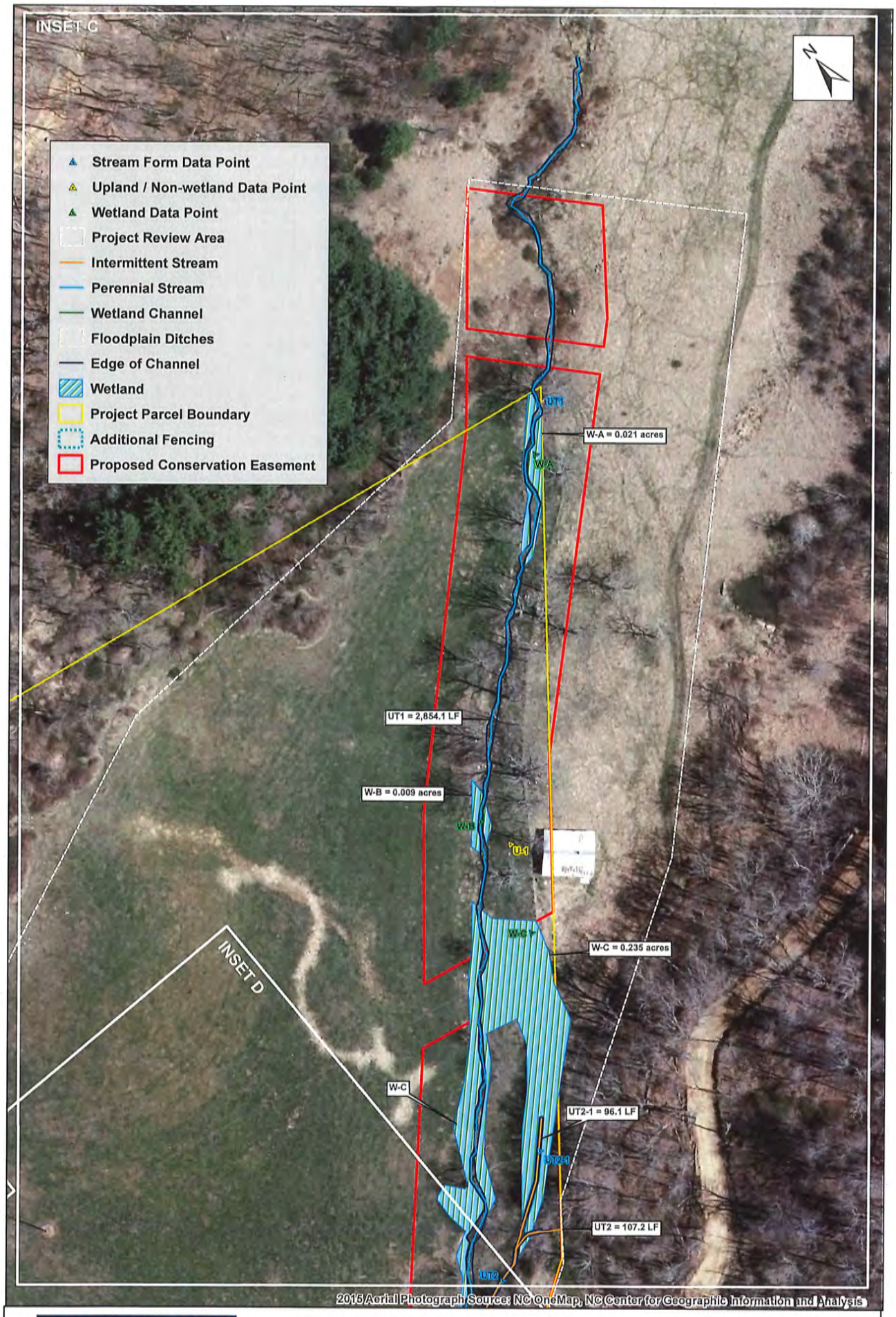


Michael Baker INTERNATIONAL

0 30 60 120 Feet

1 inch = 60 feet

Figure 8B
Hydrologic Features Map - INSET B
UT to Rush Fork
Stream Mitigation Project

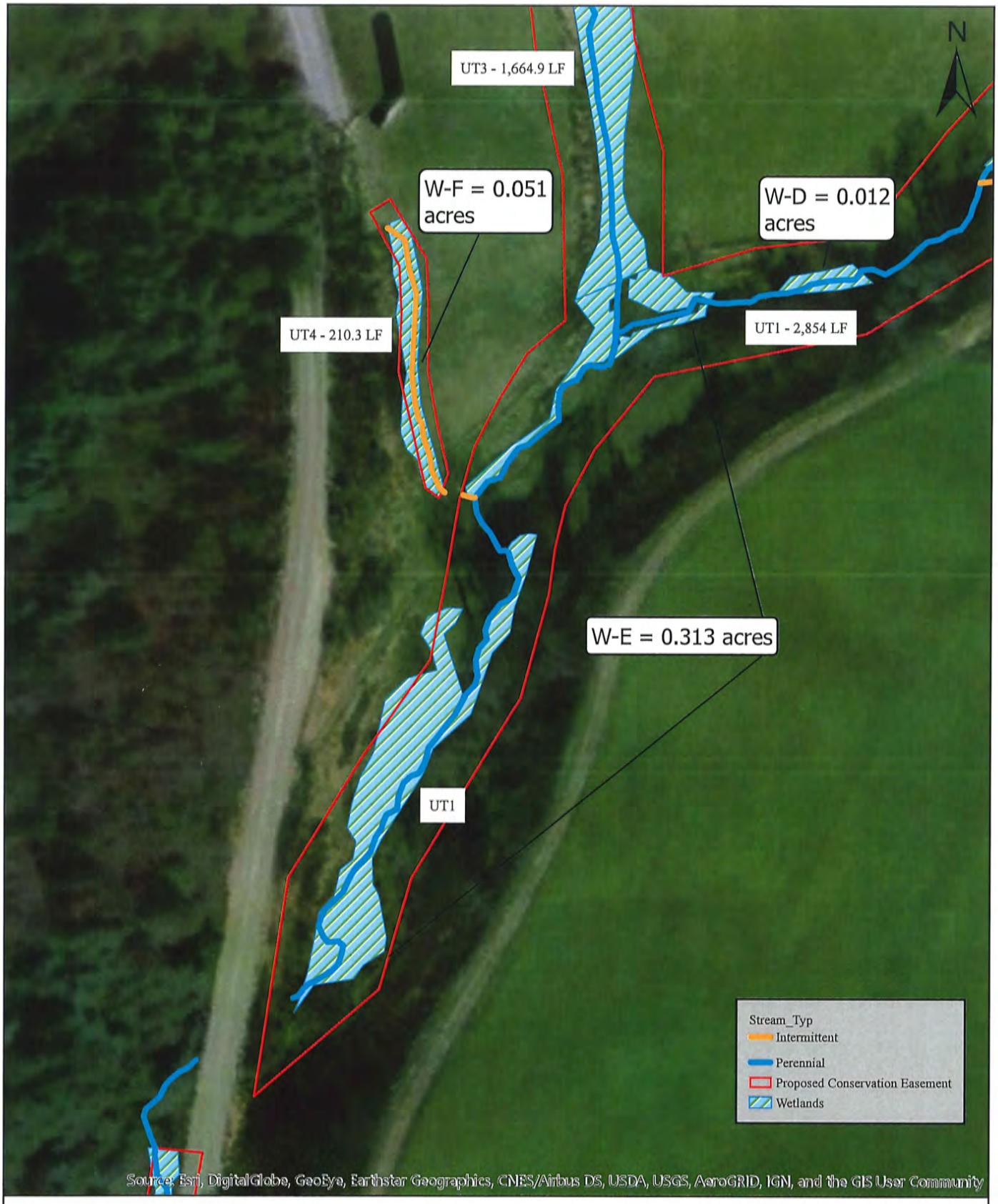


Michael Baker INTERNATIONAL

0 30 60 120 Feet

1 inch = 60 feet

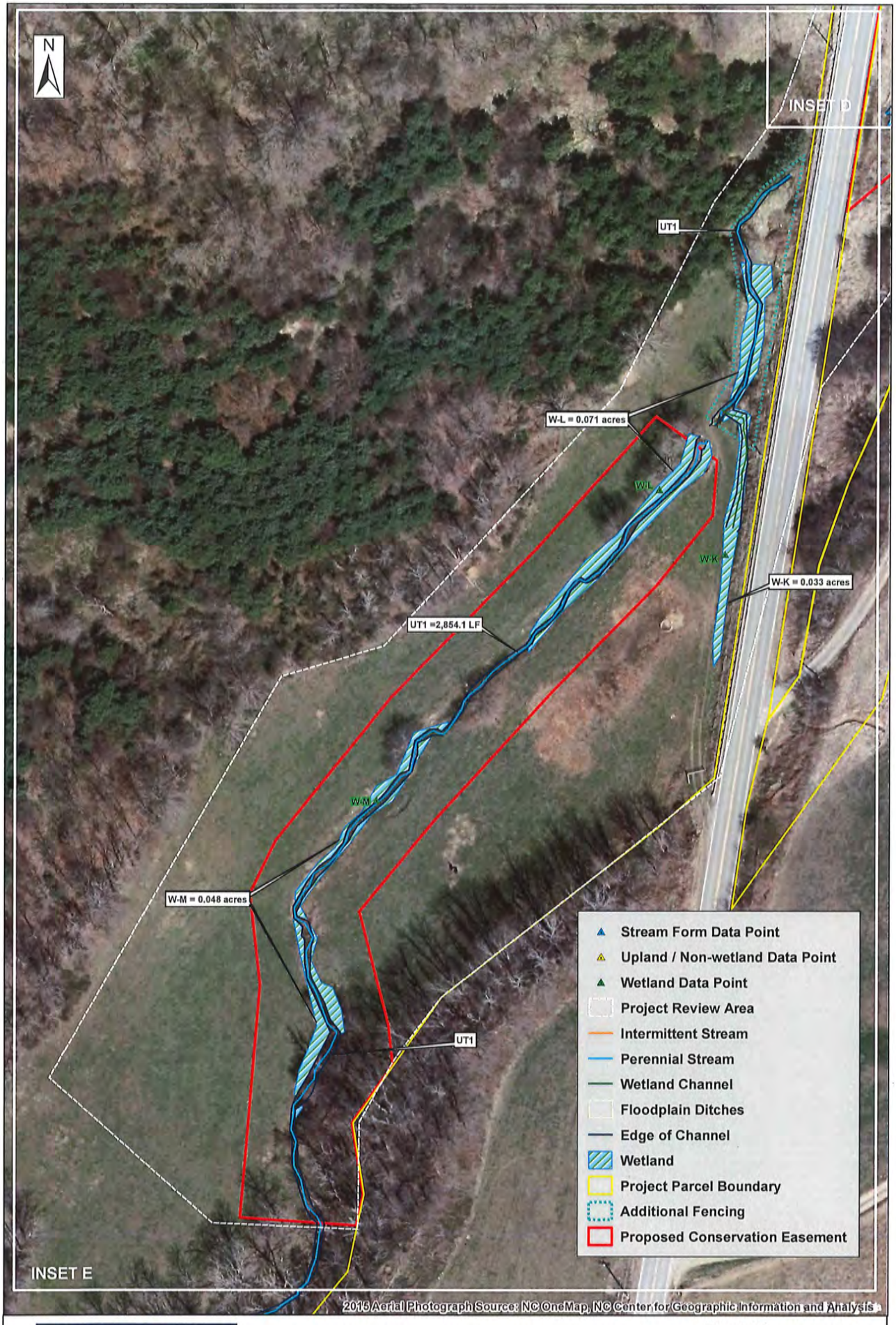
Figure 8C
Hydrologic Features Map - INSET C
UT to Rush Fork
Stream Mitigation Project



Michael Baker INTERNATIONAL

0 37.5 75 150 Feet

Additional Figure 8D.1
Hydrologic Features Map - Post Field Verification 4/11/19
UT to Rush Fork - Stream Mitigation Project



Michael Baker INTERNATIONAL

0 30 60 120 Feet

1 inch = 60 feet

Figure 8E
Hydrologic Features Map - INSET E
UT to Rush Fork
Stream Mitigation Project

NOTIFICATION OF ADMINISTRATIVE APPEAL OPTIONS AND PROCESS AND REQUEST FOR APPEAL		
Applicant: **Michael Baker International / Attn.: Micky Clemmons**	File Number: **SAW-2018-01171**	Date: **May 1, 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 http://www.usace.army.mil/Missions/CivilWorks/RegulatoryProgramandPermits.aspx or 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: David Brown** **151 Patton Avenue, Room 208** **Asheville, North Carolina 28801-5006** **828-271-7980, ext. 4232**	If you only have questions regarding the appeal process you may also contact: Mr. Jason Steele, Administrative Appeal Review Officer CESAD-PDO U.S. Army Corps of Engineers, South Atlantic Division 60 Forsyth Street, Room 10M15 Atlanta, Georgia 30303-8801 Phone: (404) 562-5137

RIGHT OF ENTRY: Your signature below grants the right of entry to Corps of Engineers personnel, and any government consultants, to conduct investigations of the project site during the course of the appeal process. You will be provided a 15 day notice of any site investigation, and will have the opportunity to participate in all site investigations.

_____ Signature of appellant or agent.	Date:	Telephone number:

For appeals on Initial Proffered Permits send this form to:

District Engineer, Wilmington Regulatory Division, Attn.: David Brown, 69 Darlington Avenue, Wilmington, North Carolina 28403

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

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

PRELIMINARY JURISDICTIONAL DETERMINATION (JD) FORM
U.S. Army Corps of Engineers

BACKGROUND INFORMATION

A. REPORT COMPLETION DATE FOR PRELIMINARY JD: May 1, 2019

B. NAME AND ADDRESS OF PERSON REQUESTING PRELIMINARY JD:
Michael Baker International / Attn.: Micky Clemmons
797 Haywood Road, Suite 201
Asheville, NC 28806

C. DISTRICT OFFICE, FILE NAME, AND NUMBER:
CESAW-RG-A, SAW-2018-01171, NCDMS ILF – UTs Rush Fork Mitigation Site

D. PROJECT LOCATION(S) AND BACKGROUND INFORMATION:
The project site is located on a tract of land (PINs 8721-72-6837 and 8731-33-5998) at 9503 Rush Fork Road in the Crabtree community of Haywood County, North Carolina.

State: **NC** County/parish/borough: **Haywood** City: **Crabtree Community**
Center coordinates of site (lat/long in degree decimal format): **35.64454 N, 82.94008 W**
Universal Transverse Mercator: **N/A**
Name of nearest waterbody: **UTs Rush Fork**

E. REVIEW PERFORMED FOR SITE EVALUATION (CHECK ALL THAT APPLY):
☒ Office (Desk) Determination. Date: **May 1, 2019**
☒ Field Determination. Date(s): **April 11, 2019**

Use the table below to document aquatic resources and/or aquatic resources at different sites

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

Site Number	Centered Coordinates (decimal degrees)		Estimated Amount of Aquatic Resource in Review Area (linear feet or acre)	Type of Aquatic Resources	Geographic Authority to Which Aquatic Resource "May Be" Subject
	Latitude	Longitude			
UT1 (UT Rusk Fork)	35.6463	-82.9378	2,854 lf	☐ Wetland ☒ Non-wetland Waters	☒ Section 404 ☐ Section 10/404
UT2 (UT Rusk Fork)	35.6450	-82.9391	107 lf	☐ Wetland ☒ Non-wetland Waters	☒ Section 404 ☐ Section 10/404
UT2-1 (UT Rusk Fork)	35.6451	-82.9389	96 lf	☐ Wetland ☒ Non-wetland Waters	☒ Section 404 ☐ Section 10/404
UT3 (UT Rusk Fork)	35.6478	-82.9412	1,665 lf	☐ Wetland ☒ Non-wetland Waters	☒ Section 404 ☐ Section 10/404
UT4 (UT Rusk Fork)	35.6447	-82.9406	210 lf	☐ Wetland ☒ Non-wetland Waters	☒ Section 404 ☐ Section 10/404
W-A	35.6462	-82.9378	0.021 ac	☒ Wetland ☐ Non-wetland Waters	☒ Section 404 ☐ Section 10/404
W-B	35.6457	-82.9385	0.009 ac	☒ Wetland ☐ Non-wetland Waters	☒ Section 404 ☐ Section 10/404

W-C	35.6455	-82.9386	0.235 ac	☒ Wetland ☐ Non-wetland Waters	☒ Section 404 ☐ Section 10/404
W-D	35.6447	-82.9397	0.012 ac	☒ Wetland ☐ Non-wetland Waters	☒ Section 404 ☐ Section 10/404
W-E	35.6443	-82.9406	0.313 ac	☒ Wetland ☐ Non-wetland Waters	☒ Section 404 ☐ Section 10/404
W-F	35.6443	-82.9406	0.051 ac	☒ Wetland ☐ Non-wetland Waters	☒ Section 404 ☐ Section 10/404
W-G	35.6457	-82.9404	0.397 ac	☒ Wetland ☐ Non-wetland Waters	☒ Section 404 ☐ Section 10/404
W-H	35.6457	-82.9402	0.008 ac	☒ Wetland ☐ Non-wetland Waters	☒ Section 404 ☐ Section 10/404
W-I	35.6482	-82.9414	0.023 ac	☒ Wetland ☐ Non-wetland Waters	☒ Section 404 ☐ Section 10/404
W-J	35.6482	-82.9414	0.161 ac *	☒ Wetland ☐ Non-wetland Waters	☒ Section 404 ☐ Section 10/404
W-K	35.6424	-82.9411	0.033 ac	☒ Wetland ☐ Non-wetland Waters	☒ Section 404 ☐ Section 10/404
W-L	35.6425	-82.9413	0.071 ac	☒ Wetland ☐ Non-wetland Waters	☒ Section 404 ☐ Section 10/404
W-M	35.6419	-82.9419	0.048 ac	☒ Wetland ☐ Non-wetland Waters	☒ Section 404 ☐ Section 10/404

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

*** Note: W-J is erroneously reported here as 0.161 acres. This was actually the originally submitted area, which was subsequently reduced during the field visit with COE regulatory staff. However, the submitted revised maps (included here with this PJD), while showing the wetland boundary adjustment, did not recalculate the new wetland area, which should be 0.075 acres.**

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 preliminary JD (check all that apply) - Checked items should be included in subject file. Appropriately reference sources below where indicated for all checked items:

☒ Maps, plans, plots or plat submitted by or on behalf of preliminary JD requester: **Michael Baker International**
☒ Data sheets prepared/submitted by or on behalf of preliminary JD requester. **Michael Baker International**
  ☒ Office concurs with data sheets/delineation report.
  ☐ Office does not concur with data sheets/delineation report. Rational:
☐ Data sheets prepared by the Corps:
☐ Corps navigable waters' study:
☐ U.S. Geological Survey (USGS) Hydrologic Atlas:
  ☐ USGS NHD data.
  ☐ USGS 8 and 12 digit HUC maps.
☒ USGS map(s). Cite scale & quad name: **Fines Creek.**
☒ Natural Resources Conservation Service (NRCS) Soil Survey.
  Citation: **Haywood County, NC**
☐ National wetlands inventory (NWI) map(s). Cite name:
☐ State/Local wetland inventory map(s):
☒ Federal Emergency Management Agency (FEMA) / Flood Insurance Rate Map (FIRM) maps: **Map Nos. 3700872100J and 3700873100J, effective date Apr. 3, 2012**
☐ 100-year Floodplain Elevation is: (National Geodectic Vertical Datum of 1929)
☒ Photographs: ☒ Aerial (Name & Date): **Google Earth Pro, Nov. 2017, Oct. 2015, Mar. 2013, Jun. 2008, Jun. 2006, Apr. 1998, and Apr. 1995**
  or ☐ Other (Name & Date):
☐ Previous determination(s). File no. and date of response letter:
☐ Applicable/supporting scientific literature:
☒ Other information (please specify): **The site contains wetlands as determined by the *1987 Corps of Engineers Wetland Delineation Manual* and the *Regional Supplement to the Corps of Engineers Wetlands Delineation Manual: Eastern Mountain and Piedmont Region (Version 2.0)*. These wetlands are abutting to stream channels located at the site and flow into the channels. Wetland hydrology is enhanced with the abutting stream channels via normal down gradient flows and periods of high water.**

The streams on the property are UTs Rush Fork, which all exhibit physical ordinary high water mark (OHWM) indicators including, break in slope; developed bed and bank; changes in sediment texture and soil character; natural line impressed on the bank; shelving; absence of vegetation; leaf litter washed away; sediment deposition and sorting; presence of aquatic life; water staining; presence of debris; and scour. Some of the streams are depicted as solid blue lines on the USGS 7.5 minute quadrangle map Fines Creek and the most current Natural Resource Conservation Service Soil Survey for Haywood County. Solid blue line features on these mapping conventions typically represent perennial streams.

The UTs Rush Fork flow into Rush Fork, which flows into Crabtree Creek, and then into the Pigeon River, a traditional navigable water and Section 10 waters below Waterville Dam. The Pigeon River flows into the French Broad River and merges with the Holston River to form the Tennessee River. The Tennessee River drains into the Mississippi River before entering the Gulf of Mexico.

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.

David Brown, May 1, 2019
Signature and date of Regulatory staff member completing preliminary JD

Michael Baker International / Micky Clemmons
(per Agent Authorization)
Signature and date of person requesting preliminary JD (REQUIRED, unless obtaining the signature is impracticable)

Two copies of this Preliminary JD Form have been provided. Please sign both copies. Keep one signed copy for your record and return a signed copy to the Asheville Regulatory Field Office by mail or e-mail.

US Army Corps of Engineers-Wilmington District
Asheville Regulatory Field Office
151 Patton Avenue, Room 208
Asheville, NC 28801-5006

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

APPENDIX I: APPROVED FHWA CATEGORICAL EXCLUSION FORMS

(Complete Categorical Exclusion included in electronic submittal)

Appendix A

Categorical Exclusion Form for Ecosystem Enhancement Program Projects
Version 1.4

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

Part 1: General Project Information	
Project Name:	UT to Rush Fork Stream Mitigation Project
County Name:	Haywood
EEP Number:	DMS# 100068; Contract# 00735
Project Sponsor:	Michael Baker Engineering, Inc.
Project Contact Name:	Micky Clemmons
Project Contact Address:	797 Haywood Road, Suite 201, Asheville, NC
Project Contact E-mail:	Mclemmons@mbakerintl.com
EEP Project Manager:	Paul Wiesner (paul.wiesner@ncdenr.gov)

Project Description

The UT to Rush Fork Stream Mitigation Project is located in the Crabtree Community of Haywood County, NC. The project site is located in the French Broad River Basin (06010106) and the NC DMS Targeted Local Watershed (TLW) 06010106020010. The project site is bisected by Rush Fork Road approximately 1.8 miles north of its intersection with Silvers Coves Road.

The existing stream reaches have been significantly impacted by unrestricted livestock access and removal of riparian buffers. Most of the project reaches have cleared banks with a mix of small scattered trees and stands of invasive species located at the top of bank. Currently, the project reaches are unstable, incised, and exhibit active bank erosion from both high flows and livestock access.

The project will involve the restoration and enhancement of approximately 5,300 LF of existing stream. A Best Management Practice (BMP) will also be implemented at the head of one of the tributaries to treat nutrient and sediment laden run-off from the surrounding pasture area. Degraded riparian wetlands will be restored and/or enhanced with the implementation of Priority Level 1 restoration, livestock exclusion, and native riparian buffer plantings. At this time, no wetland credit is being sought for the project. A conservation easement will be implemented along all project reaches in an excess of 30 feet from the top of bank and will incorporate existing functional wetlands. The conservation easement will protect the entire project area in perpetuity. Livestock will be excluded from the conservation easement with permanent fencing.

For Official Use Only

Reviewed By:

8/16/18
Date

EEP Project Manager

Conditional Approved By:

Date

For Division Administrator
FHWA

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

Final Approval By:

8-17-18
Date

For Division Administrator
FHWA

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

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

UT to Rush Fork Stream Mitigation Project – Option A / Categorical Exclusion – Summary

French Broad River Basin – CU# 06010106 – Haywood County, NC
NCDMS Project ID No. 100068; NCDEQ Contract No. 007535

Project Background

The UT to Rush Fork Stream Mitigation project is proposing to restore and enhance approximately 5,300 linear feet (LF) jurisdictional stream within the Pigeon River Basin for the purpose of obtaining stream mitigation credit for the NC Division of Mitigation Services (DMS). Project reaches have been significantly impacted by unrestricted livestock access and removal of riparian buffers. Stream banks consist of heavily grazed pasture grass with some small scattered trees, mixed with pockets of invasive species. Project reaches are unstable, incised and exhibit active bank erosion from both high flows and livestock access. Livestock will be permanently excluded from all project areas. Buffers in excess of 30 feet will be established along all proposed reaches. In addition, most of the existing functional wetlands will be incorporated inside the conservation easement to protect them in perpetuity.

The National Environmental Policy Act of 1969 (NEPA) requires agencies to use an interdisciplinary approach in planning and decision-making for actions that will have an impact on the environment. The Federal Highway Administration (FHWA) and NC Department of Transportation (NCDOT) have determined that DMS projects will not involve significant impacts and therefore a Categorical Exclusion (CE) is the appropriate type of environmental document for this project. FHWA has also determined that stream restoration projects are considered land disturbing activities; therefore, Parts 2 and 3 of the DMS CE checklist and a summary of the findings applicable to the environmental regulations associated for this project are included. Supporting documentation is included in the Appendix.

Comprehensive Environmental Response, Compensation and Liability Act (CERCLA)

A preliminary review of the project and adjacent parcels zoning/land use status was conducted on June 1, 2018 using the Haywood County, NC GIS mapping application (http://maps.haywoodnc.net/gisweb/default.htm). Results from the online review showed that there are no commercial or industrial designated parcels within the project area, nor are there any commercial or industrial designated parcels abutting, adjacent to, or within one mile of the project area. All properties are zoned either as open land, wooded, or homesite. A search of environmental records for the project area was conducted on August 13, 2018 by Environmental Data Resources, Inc (EDR). Results from the EDR's Radius Map Report did not find any current nor historic hazardous waste records for any properties within or adjacent to the project review area. See the Appendix for full EDR report. Based on these results, no additional documentation is required to meet regulatory compliance for CERCLA.

National Historic Preservation Act (Section 106)

Michael Baker Engineering, Inc. (Baker) requested a review and comment from the State Historic Preservation Office (SHPO) and the Eastern Band of Cherokee Indians' Tribal Historic Preservation Office (EBCI THPO) on any possible issues that might emerge with respect to architectural, archaeological, and/or cultural resources from the restoration project on June 1, 2018. On June 28, 2018, Baker received a letter from EBCI THPO with the finding that no cultural resources important to the Cherokee people should be adversely impacted by the proposed project. On July 3, 2018, Baker received a response letter from SHPO finding that no historic resources would be affected by the project. All correspondence on this issue is included in the Appendix.

Uniform Relocation Assistance and Real Property Act

Prior to signing the Option Agreement for the Conservation Easement, each property owner of the land involved in the restoration project was notified that Baker does not have condemnation authority and as to the fair market value of the land involved. Copies of each Option Agreement is included in the Appendix.

Endangered Species Act (ESA)

Michael Baker Engineering, Inc. (Baker) conducted an on-line review of the project area with the use of the United States Fish and Wildlife Service (USFWS) IPAC website (https://ecos.fws.gov/ipac/), on May 21, 2018. This review generated an *Official Species List* (OSL), which identifies threatened, endangered, proposed and candidate species, as well as proposed and final designated critical habitat, that may occur within the boundary of the proposed project and/or may be affected by proposed project. Results from review, found the following nine federally listed species. No USFWS designated critical habitats were located within the project boundaries.

Scientific Name	Common Name	Federal Status	Habitat Present	Biological Conclusion
Glaucomys sabrinus coloratus	Carolina Northern Flying Squirrel	E	No	No Effect
Myotis grisescens	Gray Bat	E	No	No Effect
Myotis sodalis	Indiana Bat	E	No	No Effect
Myotis septentrionalis	Northern Long-eared Bat	T	No	No Effect
Alasmidonta raveneliana	Appalachian Elktoe	E	No	No Effect
Microhexura montivaga	Spruce-fir Moss Spider	E	No	No Effect
Isotria medeoloides	Small Whorled Pogonia	T	Yes	No Effect
Geum radiatum	Spreading Avens	E	No	No Effect
Gymnoderma lineare	Rock Gnome Lichen	E	No	No Effect

Baker conducted a two-mile radius search using the Natural Heritage Program (NCNHP) Data Explorer (https://ncnhde.natureserve.org/) on May 22, 2018. Results from this search found no known occurrences of any of the above referenced species within two miles of the project site.

Based on our review, field surveys, USFWS and FHWA consultation, Baker has developed the following determinations for the above referenced species.

Glaucomys sabrinus coloratus (Carolina Northern Flying Squirrel) – Endangered

USFWS optimal survey window: May-October

The endangered Carolina northern flying squirrel is a subspecies of the northern flying squirrel. The northern flying squirrel is a small nocturnal gliding mammal usually 10 to 12 inches in length and 3-5 ounces in weight. It possesses a long, broad, flattened tail which encompasses approximate 80 percent of head and body length, prominent eyes, and dense, silky fur. The broad tail and folds of skin between the wrist and ankle form the aerodynamic surface used for gliding. Adults are gray with a brownish, tan, or reddish wash on the back, and their fur fades to a buff white on the belly.

There are several isolated populations of the Carolina northern flying squirrel in the mountains of North Carolina. These populations are typically found in areas where northern hardwoods, such as yellow birch, beech, maple, hemlock, red oak, and buckeye, are adjacent to the higher-elevation red spruce-Fraser fir forests, typically at elevations greater than 4,500 feet above mean sea level (AMSL). In some instances, the squirrels may be found on narrow, north-facing valleys greater than 4,000 feet AMSL. Both forest types are used to search for food and the hardwood forest is used for nesting sites. Mature forests with a thick evergreen understory and numerous snags are most preferable. In winter, squirrels inhabit tree cavities in older hardwoods, particularly yellow birch.

No critical habitat has been designated for this species.

Biological Conclusion: No Effect

The study area does not occur at the proper elevation to support habitat for the Carolina northern flying squirrel. Elevations within the study area range from approximately 2,900 to 3,100 feet AMSL. A review of NCNHP records conducted on May 22, 2018 does not indicate known Carolina northern flying squirrel occurrence within 2.0 miles of the study area. Therefore, since no habitat is present, the proposed project is anticipated to have "No Effect" on the Carolina northern flying squirrel.

***Myotis grisescens* (Gray Bat) – Endangered**

USFWS optimal survey window: May15-August 15 (summer); January 15-February 15 (winter)

The gray bat is the largest member of its genus in the eastern United States, and is easily distinguishable from all other bats within its range by its mono-colored fur. Following molt in July or August, gray bats are dark gray, but they often bleach to chestnut brown or russet between molts (especially apparent in reproductive females during May and June). The wing membrane connects to the foot at the ankle rather than at the base of the first toe, as in other species of *Myotis*.

Gray bats roost predominantly in caves year-round. Most winter caves are deep and vertical, while cave types vary during the spring and fall transient periods. In summer, maternity colonies prefer caves that act as warm air traps or that provide restricted rooms or domed ceilings that are capable of trapping the combined body heat from thousands of clustered individuals and are located within one half mile of a river or reservoir, which provides foraging habitat.

No critical habitat has been designated for this species.

Biological Conclusion: No Effect

The project site is not located within a 0.5 mile of a river or reservoir nor have any caves, that would provide roosting habitat, been found within the study area. Additionally, a review of NCNHP records conducted on May 22, 2018 did not indicate known gray bat occurrence within 2.0 miles of the study area. Therefore, since no roosting habitat nor foraging habitat will be impacted, the proposed project is anticipated to have No Effect on the gray bat.

***Myotis sodalist* (Indiana Bat) – Endangered**

USFWS optimal survey window: May15 - August 15 (summer)

The Indiana bat is a medium-sized bat, with a head and body length ranging from 1.6 – 1.9 in. The species closely resembles the little brown bat (*Myotis lucifugus*) and the northern long-eared bat (*Myotis septentrionalis*). Its hind feet tend to be small and delicate with fewer, shorter hairs than other bats of the Myotis genus. The fur lacks luster. The ears and wing membranes have a dull appearance and flat coloration that does not contrast with the fur. The fur of the chest and belly is lighter than the pinkish-brown fur on the back, but does not contrast as strongly as does that of the little brown or northern long-eared bats.

Indiana bats winter in caves or mines with stable, but not freezing, cold temperatures. In summer they generally roost in the loose bark of trees, either dead trees with peeling bark, or live trees with shaggy bark, such as white oak and some hickories.

Critical Habitat for the Indiana Bat was designated on September 24, 1976. Based on the IPAC Official Species List generated, the project lies outside the critical habitat.

Biological Conclusion: No Effect

The IPAC Official Species List generated on May 21, 2018, stated that the presence of the species may be affected by the proposed project; therefore, Baker conducted a two-mile radius search using the Natural Heritage Program's Data Explorer (https://ncnhde.natureserve.org/) on May 22, 2018 and found no known occurrences of the Indiana bat within two miles of the Project site, nor are there any caves within the project area that would provide hibernation habitat. Because the project will include the removal/clearing of trees, Baker conducted a field review on May 23, 2018 to determine the presence or absence of roosting habitat for the species within the project area. Results of the field review found that there were no shagbark hickory

or similar type trees within the project area that would provide roosting habitat for the Indian bat; therefore, no suitable habitat will be removed nor cleared as result of the project. Based on these findings, the biological opinion criteria outlined in the *Range-wide Programmatic Consultation for Indiana Bat and Northern Long-eared Bat* (Version 5.0, February 2018) deems that the project will meet Section 7(a)(2) requirements of the ESA with the use of the 2018 programmatic biological opinion of "No Effect" for the Indiana bat. A copy of the Consistency letter (TAILS 04EN1000-2018-R-0426) associated with the project determination is included in the Appendix.

***Myotis septentrionalis* (Northern Long-Eared Bat) – Threatened**

USFWS optimal survey window: June 1- August 15

In North Carolina, the NLEB occurs in the mountains, with scattered records in the Piedmont and coastal plain. In western North Carolina, NLEB spend winter hibernating in caves and mines. Since this species is not known to be a long-distance migrant, and caves and subterranean mines are extremely rare in eastern North Carolina, it is uncertain whether or where NLEB hibernate in eastern NC. During the summer, NLEB roost singly or in colonies underneath bark, in cavities, or in crevices of both live and dead trees (typically ≥3 inches dbh). This bat also been found, rarely, roosting in structures like barns and sheds, under eaves of buildings, behind window shutters, in bridges, and in bat houses. Pregnant females give birth from late May to late July. Foraging occurs on forested hillsides and ridges, and occasionally over forest clearings, over water, and along tree-lined corridors. Mature forests may be an important habitat type for foraging.

No critical habitat has been designated for this species.

Biological Conclusion: No Effect

The IPAC Official Species List generated on May 21, 2018, stated that the presence of the species may be affected by the proposed project; therefore, Baker conducted a two-mile radius search using the Natural Heritage Program's Data Explorer (https://ncnhde.natureserve.org/) on May 22, 2018 and found no known occurrences of the NLEB within two miles of the Project site, nor are there any caves within the project area that would provide hibernation habitat. Because the project will include the removal/clearing of trees, Baker conducted a field review on May 23, 2018 to determine the presence or absence of roosting habitat for the species within the project area. Results of the field review found that there were no shagbark hickory or similar type trees within the project area that would provide roosting habitat for the NLEB; therefore, no suitable habitat will be removed nor cleared as result of the project. Based on these findings, the biological opinion criteria outlined in the *Range-wide Programmatic Consultation for Indiana Bat and Northern Long-eared Bat* (Version 5.0, February 2018) deems that the project will meet Section 7(a)(2) requirements of the ESA with the use of the 2018 programmatic biological opinion of "No Effect" for the NLEB. A copy of the Consistency letter (TAILS 04EN1000-2018-R-0426) associated with the project determination is included in the Appendix.

***Alasmidonta raveneliana* (Appalachian Elktoe) – Endangered**

USFWS optimal survey window: year round

The Appalachian elktoe has a thin, kidney-shaped shell, extending to about 4 inches. Juveniles generally have a yellowish-brown outer shell surface, while the adults outer shell is usually dark brown to greenish-black. Although rays are prominent on some shells, particularly in the posterior portion of the shell, many individuals have only obscure greenish rays. The inside shell surface is shiny, often white to bluish-white, changing to a salmon, pinkish, or brownish color in the central and beak cavity portions of the shell; some specimens may be marked with irregular brownish blotches.

The species has been reported from relatively shallow, medium-sized creeks and rivers with cool, clean, well-oxygenated, moderate- to fast-flowing water. The species is most often found in riffles, runs, and shallow flowing pools with stable, relatively silt-free, coarse sand and gravel substrate associated with cobble, boulders, and/or bedrock. Stability of the substrate appears to be critical to the Appalachian elktoe,

and the species is seldom found in stream reaches with accumulations of silt or shifting sand, gravel, or cobble. Additional factors known to have contributed to the decline and loss of populations of the Appalachian elktoe and threaten the remaining populations include habitat loss and alteration associated with impoundments, channelization, and dredging operations; and the run-off of silt, fertilizers, pesticides, and other pollutants from poorly implemented land-use/farm activities.

Known current Appalachian elktoe distributions occur in Haywood County as well as in portions of the Pigeon River system. Critical Habitat for the Appalachian elktoe was designated on September 27, 2002. Based on the IPAC Official Species List generated, the project lies outside the critical habitat. Additionally, a two-mile radius search using the Natural Heritage Program's Data Explorer (https://ncnhde.natureserve.org/) on May 22, 2018 found no known occurrences of the Appalachian elktoe within two miles of the Project site.

Biological Conclusion: No Effect

Project streams are located within active agricultural pastures and receives drainage from Rush Fork Road. As stated previously, stream bank conditions and/riparian conditions along the project reach and downstream of the project are poor. Areas of active erosion, cattle access, and historical ditching have caused most of the project reaches and downstream receiving waters to become overwide, to lose continuity of bed and bank in areas of low slope, and to exhibit erosive features in areas where slopes are steeper. These conditions have allowed riffles to become embedded with silts and fines and flow velocities to widely vary within streams; therefore, providing no suitable habitat for the species. Since suitable habitat is not present, the project will have "No Effect" of the Appalachian elktoe.

Microhexura montivaga **(Spruce-fir Moss Spider) – Endangered**

USFWS Recommended Survey Window: May - August

The spruce-fir moss spider is one of the smallest members of the primitive suborder of spiders popularly referred to as "tarantulas." Adults of this species measure only 0.10 to 0.15 inch (about the size of a BB). Coloration of the spruce-fir moss spider ranges from light brown to yellow-brown to a darker reddish brown, and there are no markings on its abdomen. This species lives on the highest mountain peaks in spruce-fir forests of the Appalachian Mountains of western North Carolina, eastern Tennessee, and southwest Virginia. The spruce-fir moss spider occurs in well-drained moss and liverwort mats growing on rocks or boulders. These mats are found in well-shaded areas in mature, high elevation (> 5,000 feet AMSL) Fraser fir and red spruce forests. The spruce-fir moss spider is very sensitive to desiccation and requires environments of high and constant humidity. The need for humidity relates to the moss mats, which cannot become too parched or else the mats become dry and loose. Likewise, the moss mats cannot be too wet because large drops of water can also pose a threat to the spider. The spider constructs its tube-shaped webs in the interface between the moss mat and the rock surface. Some webs have been found to extend into the interior of the moss mat.

Critical Habitat for the Spruce-fir Moss Spider was designated on July 6, 2001. Based on the IPAC Official Species List generated, the project lies outside the critical habitat.

Biological Conclusion: No Effect

The study area does not occur at the proper elevation to support habitat for spruce-fir moss spider. Elevations within the study area range from approximately 2,900 to 3,100 feet AMSL and does not contain the high elevation Fraser fir and red spruce forest habitat preferred by spruce-fir moss spider. A review of NCNHP records on May 22, 2018 found no known occurrences of the spruce-fir moss spider within 2.0 miles of the study area. Therefore, since habitat is not present there should be "No Effect" to the spruce-fir moss spider a result of the proposed project.

Isotria medeoloides **(Small whorled pogonia) – Threatened**

USFWS Recommended Survey Window: mid-May – early July

Small whorled pogonia is a member of the orchid family and blooms from Mid-May through Early-July. It is named for the whorl of five or six leaves near the top of a single stem and beneath the small greenish-yellow flower. The plant occurs in predominantly mature (2nd or 3rd successional growth) mixed-deciduous or mixed-deciduous/coniferous forests with minimal ground cover and long persistent breaks in the forest canopy. The species prefers moist, acidic soils that lack nutrient diversity. Primary threats to the small whorled pogonia include habitat loss and degradation from commercial and residential development, forestry practices, recreational activities, and trampling.

No critical habitat has been designated for this species.

Biological Conclusion: No Effect

A review of NCNHP records conducted on May 22, 2018 did not indicate any known occurrences of the small whorled pogonia within 2.0 miles of the study area. However, small areas of acidic soils and a few small pockets of open wooded area occur along the top of the stream bank within the project site. Since these conditions may provide marginal habitat for the species, a project site review was conducted on May 23, 2018. No populations or individuals of the species were identified during the site review. The project will have "No Effect" on the species.

***Geum radiatum* (Spreading Avens) - Endangered**

USFWS Optimal Survey Window: June - September

Spreading avens is a tall perennial herb (eight to 20 inches) in the rose family. Its distinctive bright yellow flowers (generally up to 1 inch across) appear from June through September, and fruits form and ripen from August through October. Spreading avens is known to occur only on high mountain peaks in Western North Carolina and Eastern Tennessee. This species grows in full sun on the shallow acidic soils of high-elevation cliffs (above 4,200 feet), rocky outcrops, steep slopes, and on gravelly talus. This perennial herb also occurs in thin, gravelly soils of grassy balds near summit outcrops. The species prefers a northwest aspect, but can be found on west-southwest through north-northeast aspects. Forests surrounding known occurrences are generally dominated by either red spruce-Fraser fir, northern hardwoods with scattered spruce, or high-elevation red oaks. Spreading avens typically occurs in shallow, acidic soil (such as the Burton series) in cracks and crevices of igneous, metamorphic, or metasedimentary rocks. Soils may be well drained but almost continuously wet, with soils at some known occurrences subject to drying out in summer due to exposure to sun and shallow depths. Known populations occur at elevations ranging from 4,296 to 6,268 feet AMSL.

No critical habitat has been designated for this species.

Biological Conclusion: No Effect

The high elevation cliff, outcrop, and talus habitats preferred by spreading avens are not present within the study area. A review of NCNHP records conducted on May 22, 2018 did not indicate any known occurrences of the spreading avens within 2.0 miles of the study area. Therefore, since suitable habitat is not present within the study area, the proposed project will have "No Effect" on species.

***Gymnoderma lineare* (Rock Gnome Lichen) – Endangered**

USFWS Optimal Survey Window: year round

The rock gnome lichen occurs in dense colonies of narrow strap-like lobes that are about 1 millimeter across and generally one to two centimeters long. These lobes are blue gray on the terminal upper surface, and generally shiny white on the lower surface, grading to black near the base. Fruiting bodies are black and have been found from July through September on the tips of these lobes; however, the primary means of propagation appears to be asexual, with colonies spreading clonally. The rock gnome lichen occurs in high elevation coniferous forests (particularly those dominated by red spruce and Fraser fir) usually on rocky outcrop or cliff habitats. This squamulose lichen only grows in areas with a great deal of humidity, such as

high elevations greater than 5,000 feet AMSL where there is often fog, or on boulders and large outcrops in deep river gorges at lower elevations. Habitat is primarily limited to vertical rock faces where seepage water from forest soils above flows only at very wet times. The species requires a moderate amount of sunlight, but cannot tolerate high-intensity solar radiation. The lichen does well on moist, generally open sites with northern exposures, but requires at least partial canopy coverage on southern or western aspects because of its intolerance to high solar radiation.

No critical habitat has been designated for this species.

Biological Conclusion: No Effect

The study area does not occur at the proper elevation to support habitat for rock gnome lichen. Elevations within the study area are approximately 2,900 to 3,100 feet AMSL and does not contain the high elevation rock face habitat preferred by rock gnome lichen. A review of NCNHP records, conducted on May 22, 2018, did not indicate a known rock gnome lichen occurrence within 2.0 mile of the study area. Therefore, since habitat is not present, "No Effect" to rock gnome lichen is anticipated to occur as a result of the proposed project.

Farmland Protection Policy Act (FPPA)

On June 5, 2018, Baker submitted the AD-1006 form for the UT to Rush Fork Stream Mitigation Project to the North Carolina State Natural Resources Conservation Service (NRCS) Office. The NRCS responded on June 28, 2018 with the determination that implementation of this restoration project would result in the conversion of 7.0 acres of prime farmland soils. Baker submitted the completed AD-1006 form to the NRCS Assistant State Soil Scientist July 16, 2018. The completed AD-1006 form and all correspondence on this issue is included in the Appendix.

Fish and Wildlife Coordination Act (FWCA)

A letter was sent by Baker to the NC Wildlife Resources Commission (NCWRC) and the USFWS on June 5, 2018 requesting their comment and review on the UT to Rush Fork Stream Mitigation Project. On June 14, 2018, Baker received a response letter from the NCWRC stating that they "do not anticipate any impacts to wild trout" as a result of the proposed project and that "a moratorium will likely not need to be observed". As of July 11, 2018, Baker has not received any comments from the USFWS. Copies of all correspondence are included in the Appendix.

Migratory Bird Treaty Act (MBTA)

A letter was sent by Baker to the USFWS on June 5, 2018 requesting their comment and review on the UT to Rush Fork Stream Mitigation Project in relation to migratory birds. As of July 11, 2018, Baker has not received any comments from the USFWS on this issue. All correspondence with the USFWS is included in the Appendix.

APPENDIX

UT To Rush Fork Mitigation Project
Rush Fork Road
Clyde, NC 28721

Inquiry Number: 5390710.2s
August 13, 2018

The EDR Radius Map™ Report

6 Armstrong Road, 4th floor
Shelton, CT 06484
Toll Free: 800.352.0050
www.edrnet.com

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Thank you for your business.
Please contact EDR at 1-800-352-0050
with any questions or comments.

EXECUTIVE SUMMARY

A search of available environmental records was conducted by Environmental Data Resources, Inc (EDR). The report was designed to assist parties seeking to meet the search requirements of EPA's Standards and Practices for All Appropriate Inquiries (40 CFR Part 312), the ASTM Standard Practice for Environmental Site Assessments (E 1527-13), the ASTM Standard Practice for Environmental Site Assessments for Forestland or Rural Property (E 2247-16), the ASTM Standard Practice for Limited Environmental Due Diligence: Transaction Screen Process (E 1528-14) or custom requirements developed for the evaluation of environmental risk associated with a parcel of real estate.

TARGET PROPERTY INFORMATION

ADDRESS

RUSH FORK ROAD
CLYDE, NC 28721

COORDINATES

Latitude (North):	35.6446000 - 35° 38' 40.56''
Longitude (West):	82.9402000 - 82° 56' 24.72''
Universal Tranverse Mercator:	Zone 17
UTM X (Meters):	324338.2
UTM Y (Meters):	3946064.8
Elevation:	2970 ft. above sea level

USGS TOPOGRAPHIC MAP ASSOCIATED WITH TARGET PROPERTY

Target Property Map:	5948484 FINES CREEK, NC
Version Date:	2013
South Map:	5948476 CLYDE, NC
Version Date:	2013

AERIAL PHOTOGRAPHY IN THIS REPORT

Portions of Photo from:	20141019
Source:	USDA

MAPPED SITES SUMMARY

Target Property Address:
RUSH FORK ROAD
CLYDE, NC 28721

Click on Map ID to see full detail.

MAP ID	SITE NAME	ADDRESS	DATABASE ACRONYMS	RELATIVE ELEVATION	DIST (ft. & mi.) DIRECTION

NO MAPPED SITES FOUND

EXECUTIVE SUMMARY

TARGET PROPERTY SEARCH RESULTS

The target property was not listed in any of the databases searched by EDR.

DATABASES WITH NO MAPPED SITES

No mapped sites were found in EDR's search of available ("reasonably ascertainable ") government records either on the target property or within the search radius around the target property for the following databases:

STANDARD ENVIRONMENTAL RECORDS

Federal NPL site list

NPL ---------- National Priority List
Proposed NPL ---------- Proposed National Priority List Sites
NPL LIENS ---------- Federal Superfund Liens

Federal Delisted NPL site list

Delisted NPL ---------- National Priority List Deletions

Federal CERCLIS list

FEDERAL FACILITY ---------- Federal Facility Site Information listing
SEMS ---------- Superfund Enterprise Management System

Federal CERCLIS NFRAP site list

SEMS-ARCHIVE ---------- Superfund Enterprise Management System Archive

Federal RCRA CORRACTS facilities list

CORRACTS ---------- Corrective Action Report

Federal RCRA non-CORRACTS TSD facilities list

RCRA-TSDF ---------- RCRA - Treatment, Storage and Disposal

Federal RCRA generators list

RCRA-LQG ---------- RCRA - Large Quantity Generators
RCRA-SQG ---------- RCRA - Small Quantity Generators
RCRA-CESQG ---------- RCRA - Conditionally Exempt Small Quantity Generator

Federal institutional controls / engineering controls registries

LUCIS ---------- Land Use Control Information System
US ENG CONTROLS ---------- Engineering Controls Sites List

US INST CONTROL ---------- Sites with Institutional Controls

Federal ERNS list

ERNS ---------- Emergency Response Notification System

State- and tribal - equivalent NPL

NC HSDS ---------- Hazardous Substance Disposal Site

State- and tribal - equivalent CERCLIS

SHWS ---------- Inactive Hazardous Sites Inventory

State and tribal landfill and/or solid waste disposal site lists

SWF/LF ---------- List of Solid Waste Facilities
OLI ---------- Old Landfill Inventory

State and tribal leaking storage tank lists

LAST ---------- Leaking Aboveground Storage Tanks
LUST ---------- Regional UST Database
INDIAN LUST ---------- Leaking Underground Storage Tanks on Indian Land
LUST TRUST ---------- State Trust Fund Database

State and tribal registered storage tank lists

FEMA UST ---------- Underground Storage Tank Listing
UST ---------- Petroleum Underground Storage Tank Database
AST ---------- AST Database
INDIAN UST ---------- Underground Storage Tanks on Indian Land

State and tribal institutional control / engineering control registries

INST CONTROL ---------- No Further Action Sites With Land Use Restrictions Monitoring

State and tribal voluntary cleanup sites

INDIAN VCP ---------- Voluntary Cleanup Priority Listing
VCP ---------- Responsible Party Voluntary Action Sites

State and tribal Brownfields sites

BROWNFIELDS ---------- Brownfields Projects Inventory

ADDITIONAL ENVIRONMENTAL RECORDS

Local Brownfield lists

US BROWNFIELDS ---------- A Listing of Brownfields Sites

Local Lists of Landfill / Solid Waste Disposal Sites

SWRCY ---------- Recycling Center Listing

HIST LF	Solid Waste Facility Listing
INDIAN ODI	Report on the Status of Open Dumps on Indian Lands
DEBRIS REGION 9	Torres Martinez Reservation Illegal Dump Site Locations
ODI	Open Dump Inventory
IHS OPEN DUMPS	Open Dumps on Indian Land

Local Lists of Hazardous waste / Contaminated Sites

US HIST CDL	Delisted National Clandestine Laboratory Register
US CDL	National Clandestine Laboratory Register

Local Land Records

LIENS 2	CERCLA Lien Information

Records of Emergency Release Reports

HMIRS	Hazardous Materials Information Reporting System
SPILLS	Spills Incident Listing
IMD	Incident Management Database
SPILLS 90	SPILLS 90 data from FirstSearch
SPILLS 80	SPILLS 80 data from FirstSearch

Other Ascertainable Records

RCRA NonGen / NLR	RCRA - Non Generators / No Longer Regulated
FUDS	Formerly Used Defense Sites
DOD	Department of Defense Sites
SCRD DRYCLEANERS	State Coalition for Remediation of Drycleaners Listing
US FIN ASSUR	Financial Assurance Information
EPA WATCH LIST	EPA WATCH LIST
2020 COR ACTION	2020 Corrective Action Program List
TSCA	Toxic Substances Control Act
TRIS	Toxic Chemical Release Inventory System
SSTS	Section 7 Tracking Systems
ROD	Records Of Decision
RMP	Risk Management Plans
RAATS	RCRA Administrative Action Tracking System
PRP	Potentially Responsible Parties
PADS	PCB Activity Database System
ICIS	Integrated Compliance Information System
FTTS	FIFRA/ TSCA Tracking System - FIFRA (Federal Insecticide, Fungicide, & Rodenticide Act)/TSCA (Toxic Substances Control Act)
MLTS	Material Licensing Tracking System
COAL ASH DOE	Steam-Electric Plant Operation Data
COAL ASH EPA	Coal Combustion Residues Surface Impoundments List
PCB TRANSFORMER	PCB Transformer Registration Database
RADINFO	Radiation Information Database
HIST FTTS	FIFRA/TSCA Tracking System Administrative Case Listing
DOT OPS	Incident and Accident Data
CONSENT	Superfund (CERCLA) Consent Decrees
INDIAN RESERV	Indian Reservations
FUSRAP	Formerly Utilized Sites Remedial Action Program
UMTRA	Uranium Mill Tailings Sites
LEAD SMELTERS	Lead Smelter Sites

EXECUTIVE SUMMARY

US AIRS ---------- Aerometric Information Retrieval System Facility Subsystem
US MINES ---------- Mines Master Index File
ABANDONED MINES ---------- Abandoned Mines
FINDS ---------- Facility Index System/Facility Registry System
ECHO ---------- Enforcement & Compliance History Information
DOCKET HWC ---------- Hazardous Waste Compliance Docket Listing
UXO ---------- Unexploded Ordnance Sites
FUELS PROGRAM ---------- EPA Fuels Program Registered Listing
AIRS ---------- Air Quality Permit Listing
ASBESTOS ---------- ASBESTOS
COAL ASH ---------- Coal Ash Disposal Sites
DRYCLEANERS ---------- Drycleaning Sites
Financial Assurance ---------- Financial Assurance Information Listing
NPDES ---------- NPDES Facility Location Listing
UIC ---------- Underground Injection Wells Listing
AOP ---------- Animal Operation Permits Listing

EDR HIGH RISK HISTORICAL RECORDS

EDR Exclusive Records

EDR MGP ---------- EDR Proprietary Manufactured Gas Plants
EDR Hist Auto ---------- EDR Exclusive Historical Auto Stations
EDR Hist Cleaner ---------- EDR Exclusive Historical Cleaners

EDR RECOVERED GOVERNMENT ARCHIVES

Exclusive Recovered Govt. Archives

RGA HWS ---------- Recovered Government Archive State Hazardous Waste Facilities List
RGA LF ---------- Recovered Government Archive Solid Waste Facilities List
RGA LUST ---------- Recovered Government Archive Leaking Underground Storage Tank

SURROUNDING SITES: SEARCH RESULTS

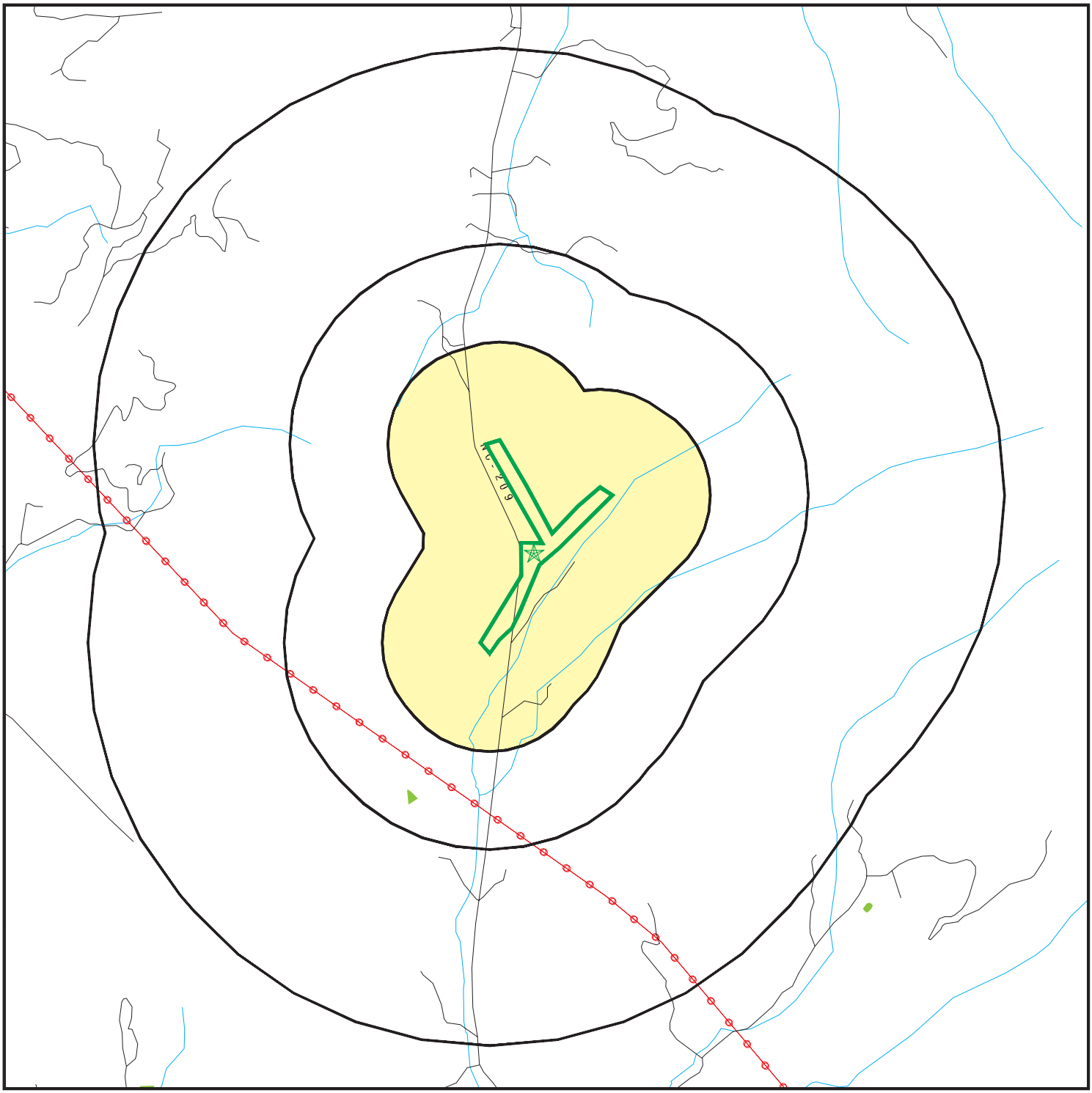
Surrounding sites were not identified.

Unmappable (orphan) sites are not considered in the foregoing analysis.

EXECUTIVE SUMMARY

There were no unmapped sites in this report.

OVERVIEW MAP - 5390710.2S

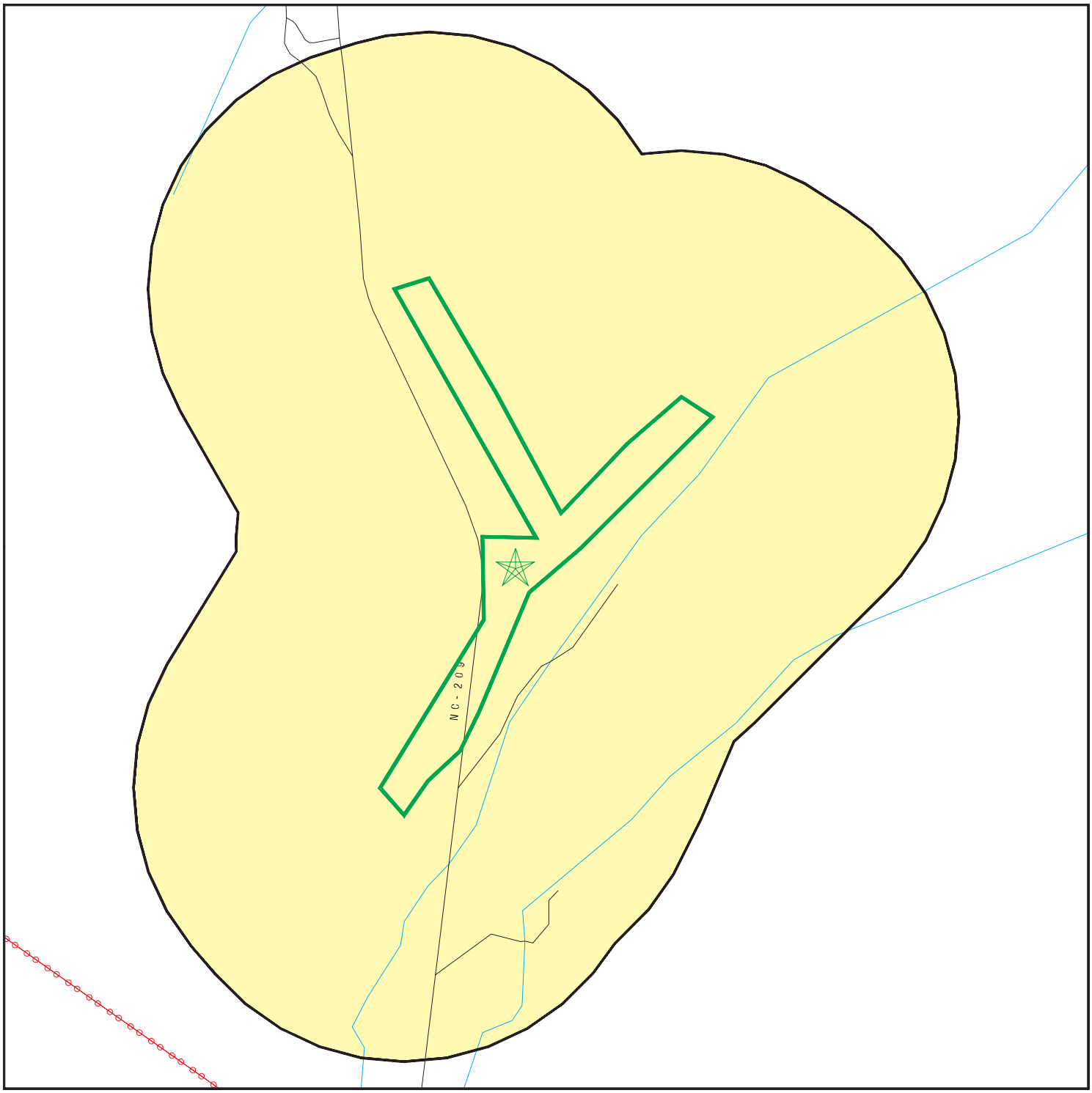


- Target Property
- Sites at elevations higher than or equal to the target property
- Sites at elevations lower than the target property
- Manufactured Gas Plants
- National Priority List Sites
- Dept. Defense Sites
- Indian Reservations BIA
- Power transmission lines
- National Wetland Inventory
- State Wetlands
- Upgradient Area
- Hazardous Substance Disposal Sites

This report includes Interactive Map Layers to display and/or hide map information. The legend includes only those icons for the default map view.

SITE NAME:	UT To Rush Fork Mitigation Project	CLIENT:	Michael Baker Engineering, Inc.
ADDRESS:	Rush Fork Road Clyde NC 28721	CONTACT:	Kristi Suggs
LAT/LONG:	35.6446 / 82.9402	INQUIRY #:	5390710.2s
		DATE:	August 13, 2018 5:13 pm

DETAIL MAP - 5390710.2S



Target Property

Sites at elevations higher than or equal to the target property

Sites at elevations lower than the target property

Manufactured Gas Plants

Sensitive Receptors

National Priority List Sites

Dept. Defense Sites

0 1/8 1/4 1/2 Miles

Indian Reservations BIA

Power transmission lines

Hazardous Substance Disposal Sites

This report includes Interactive Map Layers to display and/or hide map information. The legend includes only those icons for the default map view.

SITE NAME:	UT To Rush Fork Mitigation Project	CLIENT:	Michael Baker Engineering, Inc.
ADDRESS:	Rush Fork Road Clyde NC 28721	CONTACT:	Kristi Suggs
		INQUIRY #:	5390710.2s
LAT/LONG:	35.6446 / 82.9402	DATE:	August 13, 2018 5:16 pm

MAP FINDINGS SUMMARY

Database	Search Distance (Miles)	Target Property	< 1/8	1/8 - 1/4	1/4 - 1/2	1/2 - 1	> 1	Total Plotted
STANDARD ENVIRONMENTAL RECORDS								
Federal NPL site list								
NPL	1.000		0	0	0	0	NR	0
Proposed NPL	1.000		0	0	0	0	NR	0
NPL LIENS	0.001		0	NR	NR	NR	NR	0
Federal Delisted NPL site list								
Delisted NPL	1.000		0	0	0	0	NR	0
Federal CERCLIS list								
FEDERAL FACILITY	0.500		0	0	0	NR	NR	0
SEMS	0.500		0	0	0	NR	NR	0
Federal CERCLIS NFRAP site list								
SEMS-ARCHIVE	0.500		0	0	0	NR	NR	0
Federal RCRA CORRACTS facilities list								
CORRACTS	1.000		0	0	0	0	NR	0
Federal RCRA non-CORRACTS TSD facilities list								
RCRA-TSDF	0.500		0	0	0	NR	NR	0
Federal RCRA generators list								
RCRA-LQG	0.250		0	0	NR	NR	NR	0
RCRA-SQG	0.250		0	0	NR	NR	NR	0
RCRA-CESQG	0.250		0	0	NR	NR	NR	0
Federal institutional controls / engineering controls registries								
LUCIS	0.500		0	0	0	NR	NR	0
US ENG CONTROLS	0.500		0	0	0	NR	NR	0
US INST CONTROL	0.500		0	0	0	NR	NR	0
Federal ERNS list								
ERNS	0.001		0	NR	NR	NR	NR	0
State- and tribal - equivalent NPL								
NC HSDS	1.000		0	0	0	0	NR	0
State- and tribal - equivalent CERCLIS								
SHWS	1.000		0	0	0	0	NR	0
State and tribal landfill and/or solid waste disposal site lists								
SWF/LF	0.500		0	0	0	NR	NR	0
OLI	0.500		0	0	0	NR	NR	0
State and tribal leaking storage tank lists								
LAST	0.500		0	0	0	NR	NR	0

MAP FINDINGS SUMMARY

Database	Search Distance (Miles)	Target Property	< 1/8	1/8 - 1/4	1/4 - 1/2	1/2 - 1	> 1	Total Plotted
LUST	0.500		0	0	0	NR	NR	0
INDIAN LUST	0.500		0	0	0	NR	NR	0
LUST TRUST	0.500		0	0	0	NR	NR	0
State and tribal registered storage tank lists								
FEMA UST	0.250		0	0	NR	NR	NR	0
UST	0.250		0	0	NR	NR	NR	0
AST	0.250		0	0	NR	NR	NR	0
INDIAN UST	0.250		0	0	NR	NR	NR	0
State and tribal institutional control / engineering control registries								
INST CONTROL	0.500		0	0	0	NR	NR	0
State and tribal voluntary cleanup sites								
INDIAN VCP	0.500		0	0	0	NR	NR	0
VCP	0.500		0	0	0	NR	NR	0
State and tribal Brownfields sites								
BROWNFIELDS	0.500		0	0	0	NR	NR	0
ADDITIONAL ENVIRONMENTAL RECORDS								
Local Brownfield lists								
US BROWNFIELDS	0.500		0	0	0	NR	NR	0
Local Lists of Landfill / Solid Waste Disposal Sites								
SWRCY	0.500		0	0	0	NR	NR	0
HIST LF	0.500		0	0	0	NR	NR	0
INDIAN ODI	0.500		0	0	0	NR	NR	0
DEBRIS REGION 9	0.500		0	0	0	NR	NR	0
ODI	0.500		0	0	0	NR	NR	0
IHS OPEN DUMPS	0.500		0	0	0	NR	NR	0
Local Lists of Hazardous waste / Contaminated Sites								
US HIST CDL	0.001		0	NR	NR	NR	NR	0
US CDL	0.001		0	NR	NR	NR	NR	0
Local Land Records								
LIENS 2	0.001		0	NR	NR	NR	NR	0
Records of Emergency Release Reports								
HMIRS	0.001		0	NR	NR	NR	NR	0
SPILLS	0.001		0	NR	NR	NR	NR	0
IMD	0.500		0	0	0	NR	NR	0
SPILLS 90	0.001		0	NR	NR	NR	NR	0
SPILLS 80	0.001		0	NR	NR	NR	NR	0
Other Ascertainable Records								
RCRA NonGen / NLR	0.250		0	0	NR	NR	NR	0

MAP FINDINGS SUMMARY

Database	Search Distance (Miles)	Target Property	< 1/8	1/8 - 1/4	1/4 - 1/2	1/2 - 1	> 1	Total Plotted
FUDS	1.000		0	0	0	0	NR	0
DOD	1.000		0	0	0	0	NR	0
SCRD DRYCLEANERS	0.500		0	0	0	NR	NR	0
US FIN ASSUR	0.001		0	NR	NR	NR	NR	0
EPA WATCH LIST	0.001		0	NR	NR	NR	NR	0
2020 COR ACTION	0.250		0	0	NR	NR	NR	0
TSCA	0.001		0	NR	NR	NR	NR	0
TRIS	0.001		0	NR	NR	NR	NR	0
SSTS	0.001		0	NR	NR	NR	NR	0
ROD	1.000		0	0	0	0	NR	0
RMP	0.001		0	NR	NR	NR	NR	0
RAATS	0.001		0	NR	NR	NR	NR	0
PRP	0.001		0	NR	NR	NR	NR	0
PADS	0.001		0	NR	NR	NR	NR	0
ICIS	0.001		0	NR	NR	NR	NR	0
FTTS	0.001		0	NR	NR	NR	NR	0
MLTS	0.001		0	NR	NR	NR	NR	0
COAL ASH DOE	0.001		0	NR	NR	NR	NR	0
COAL ASH EPA	0.500		0	0	0	NR	NR	0
PCB TRANSFORMER	0.001		0	NR	NR	NR	NR	0
RADINFO	0.001		0	NR	NR	NR	NR	0
HIST FTTS	0.001		0	NR	NR	NR	NR	0
DOT OPS	0.001		0	NR	NR	NR	NR	0
CONSENT	1.000		0	0	0	0	NR	0
INDIAN RESERV	0.001		0	NR	NR	NR	NR	0
FUSRAP	1.000		0	0	0	0	NR	0
UMTRA	0.500		0	0	0	NR	NR	0
LEAD SMELTERS	0.001		0	NR	NR	NR	NR	0
US AIRS	0.001		0	NR	NR	NR	NR	0
US MINES	0.250		0	0	NR	NR	NR	0
ABANDONED MINES	0.001		0	NR	NR	NR	NR	0
FINDS	0.001		0	NR	NR	NR	NR	0
ECHO	0.001		0	NR	NR	NR	NR	0
DOCKET HWC	0.001		0	NR	NR	NR	NR	0
UXO	1.000		0	0	0	0	NR	0
FUELS PROGRAM	0.250		0	0	NR	NR	NR	0
AIRS	0.001		0	NR	NR	NR	NR	0
ASBESTOS	0.001		0	NR	NR	NR	NR	0
COAL ASH	0.500		0	0	0	NR	NR	0
DRYCLEANERS	0.250		0	0	NR	NR	NR	0
Financial Assurance	0.001		0	NR	NR	NR	NR	0
NPDES	0.001		0	NR	NR	NR	NR	0
UIC	0.001		0	NR	NR	NR	NR	0
AOP	0.001		0	NR	NR	NR	NR	0
EDR HIGH RISK HISTORICAL RECORDS								
EDR Exclusive Records								
EDR MGP	1.000		0	0	0	0	NR	0
EDR Hist Auto	0.125		0	NR	NR	NR	NR	0

MAP FINDINGS SUMMARY

Database	Search Distance (Miles)	Target Property	< 1/8	1/8 - 1/4	1/4 - 1/2	1/2 - 1	> 1	Total Plotted
EDR Hist Cleaner	0.125		0	NR	NR	NR	NR	0
EDR RECOVERED GOVERNMENT ARCHIVES								
Exclusive Recovered Govt. Archives								
RGA HWS	0.001		0	NR	NR	NR	NR	0
RGA LF	0.001		0	NR	NR	NR	NR	0
RGA LUST	0.001		0	NR	NR	NR	NR	0
- Totals --		0	0	0	0	0	0	0

NOTES:

TP = Target Property

NR = Not Requested at this Search Distance

Sites may be listed in more than one database

MAP FINDINGS

Map ID Direction Distance Elevation	Site	Database(s)	EDR ID Number EPA ID Number

NO SITES FOUND

Count: 0 records. ORPHAN SUMMARY

City	EDR ID	Site Name	Site Address	Zip	Database(s)
		NO SITES FOUND			

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

To maintain currency of the following federal and state databases, EDR contacts the appropriate governmental agency on a monthly or quarterly basis, as required.

Number of Days to Update: Provides confirmation that EDR is reporting records that have been updated within 90 days from the date the government agency made the information available to the public.

STANDARD ENVIRONMENTAL RECORDS

Federal NPL site list

NPL: National Priority List

National Priorities List (Superfund). The NPL is a subset of CERCLIS and identifies over 1,200 sites for priority cleanup under the Superfund Program. NPL sites may encompass relatively large areas. As such, EDR provides polygon coverage for over 1,000 NPL site boundaries produced by EPA's Environmental Photographic Interpretation Center (EPIC) and regional EPA offices.

Date of Government Version: 05/13/2018
Date Data Arrived at EDR: 05/30/2018
Date Made Active in Reports: 06/22/2018
Number of Days to Update: 23

Source: EPA
Telephone: N/A
Last EDR Contact: 08/09/2018
Next Scheduled EDR Contact: 10/15/2018
Data Release Frequency: Quarterly

NPL Site Boundaries

Sources:

EPA's Environmental Photographic Interpretation Center (EPIC)
Telephone: 202-564-7333

EPA Region 1
Telephone 617-918-1143

EPA Region 6
Telephone: 214-655-6659

EPA Region 3
Telephone 215-814-5418

EPA Region 7
Telephone: 913-551-7247

EPA Region 4
Telephone 404-562-8033

EPA Region 8
Telephone: 303-312-6774

EPA Region 5
Telephone 312-886-6686

EPA Region 9
Telephone: 415-947-4246

EPA Region 10
Telephone 206-553-8665

Proposed NPL: Proposed National Priority List Sites

A site that has been proposed for listing on the National Priorities List through the issuance of a proposed rule in the Federal Register. EPA then accepts public comments on the site, responds to the comments, and places on the NPL those sites that continue to meet the requirements for listing.

Date of Government Version: 05/13/2018
Date Data Arrived at EDR: 05/30/2018
Date Made Active in Reports: 06/22/2018
Number of Days to Update: 23

Source: EPA
Telephone: N/A
Last EDR Contact: 08/09/2018
Next Scheduled EDR Contact: 10/15/2018
Data Release Frequency: Quarterly

NPL LIENS: Federal Superfund Liens

Federal Superfund Liens. Under the authority granted the USEPA by CERCLA of 1980, the USEPA has the authority to file liens against real property in order to recover remedial action expenditures or when the property owner received notification of potential liability. USEPA compiles a listing of filed notices of Superfund Liens.

Date of Government Version: 10/15/1991
Date Data Arrived at EDR: 02/02/1994
Date Made Active in Reports: 03/30/1994
Number of Days to Update: 56

Source: EPA
Telephone: 202-564-4267
Last EDR Contact: 08/15/2011
Next Scheduled EDR Contact: 11/28/2011
Data Release Frequency: No Update Planned

Federal Delisted NPL site list

Delisted NPL: National Priority List Deletions

The National Oil and Hazardous Substances Pollution Contingency Plan (NCP) establishes the criteria that the EPA uses to delete sites from the NPL. In accordance with 40 CFR 300.425.(e), sites may be deleted from the NPL where no further response is appropriate.

Date of Government Version: 05/13/2018
Date Data Arrived at EDR: 05/30/2018
Date Made Active in Reports: 06/22/2018
Number of Days to Update: 23

Source: EPA
Telephone: N/A
Last EDR Contact: 08/09/2018
Next Scheduled EDR Contact: 10/15/2018
Data Release Frequency: Quarterly

Federal CERCLIS list

FEDERAL FACILITY: Federal Facility Site Information listing

A listing of National Priority List (NPL) and Base Realignment and Closure (BRAC) sites found in the Comprehensive Environmental Response, Compensation and Liability Information System (CERCLIS) Database where EPA Federal Facilities Restoration and Reuse Office is involved in cleanup activities.

Date of Government Version: 11/07/2016
Date Data Arrived at EDR: 01/05/2017
Date Made Active in Reports: 04/07/2017
Number of Days to Update: 92

Source: Environmental Protection Agency
Telephone: 703-603-8704
Last EDR Contact: 07/06/2018
Next Scheduled EDR Contact: 10/15/2018
Data Release Frequency: Varies

SEMS: Superfund Enterprise Management System

SEMS (Superfund Enterprise Management System) tracks hazardous waste sites, potentially hazardous waste sites, and remedial activities performed in support of EPA's Superfund Program across the United States. The list was formerly know as CERCLIS, renamed to SEMS by the EPA in 2015. The list contains data on potentially hazardous waste sites that have been reported to the USEPA by states, municipalities, private companies and private persons, pursuant to Section 103 of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). This dataset also contains sites which are either proposed to or on the National Priorities List (NPL) and the sites which are in the screening and assessment phase for possible inclusion on the NPL.

Date of Government Version: 05/18/2018
Date Data Arrived at EDR: 05/30/2018
Date Made Active in Reports: 06/22/2018
Number of Days to Update: 23

Source: EPA
Telephone: 800-424-9346
Last EDR Contact: 08/09/2018
Next Scheduled EDR Contact: 10/29/2018
Data Release Frequency: Quarterly

Federal CERCLIS NFRAP site list

SEMS-ARCHIVE: Superfund Enterprise Management System Archive

SEMS-ARCHIVE (Superfund Enterprise Management System Archive) tracks sites that have no further interest under the Federal Superfund Program based on available information. The list was formerly known as the CERCLIS-NFRAP, renamed to SEMS ARCHIVE by the EPA in 2015. EPA may perform a minimal level of assessment work at a site while it is archived if site conditions change and/or new information becomes available. Archived sites have been removed and archived from the inventory of SEMS sites. Archived status indicates that, to the best of EPA's knowledge, assessment at a site has been completed and that EPA has determined no further steps will be taken to list the site on the National Priorities List (NPL), unless information indicates this decision was not appropriate or other considerations require a recommendation for listing at a later time. The decision does not necessarily mean that there is no hazard associated with a given site; it only means that. based upon available information, the location is not judged to be potential NPL site.

Date of Government Version: 05/18/2018
Date Data Arrived at EDR: 05/30/2018
Date Made Active in Reports: 06/22/2018
Number of Days to Update: 23

Source: EPA
Telephone: 800-424-9346
Last EDR Contact: 08/09/2018
Next Scheduled EDR Contact: 10/29/2018
Data Release Frequency: Quarterly

Federal RCRA CORRACTS facilities list

CORRACTS: Corrective Action Report

CORRACTS identifies hazardous waste handlers with RCRA corrective action activity.

Date of Government Version: 03/01/2018
Date Data Arrived at EDR: 03/28/2018
Date Made Active in Reports: 06/22/2018
Number of Days to Update: 86

Source: EPA
Telephone: 800-424-9346
Last EDR Contact: 06/28/2018
Next Scheduled EDR Contact: 10/08/2018
Data Release Frequency: Quarterly

Federal RCRA non-CORRACTS TSD facilities list

RCRA-TSDF: RCRA - Treatment, Storage and Disposal

RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Transporters are individuals or entities that move hazardous waste from the generator offsite to a facility that can recycle, treat, store, or dispose of the waste. TSDFs treat, store, or dispose of the waste.

Date of Government Version: 03/01/2018
Date Data Arrived at EDR: 03/28/2018
Date Made Active in Reports: 06/22/2018
Number of Days to Update: 86

Source: Environmental Protection Agency
Telephone: (404) 562-8651
Last EDR Contact: 06/28/2018
Next Scheduled EDR Contact: 10/08/2018
Data Release Frequency: Quarterly

Federal RCRA generators list

RCRA-LQG: RCRA - Large Quantity Generators

RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Large quantity generators (LQGs) generate over 1,000 kilograms (kg) of hazardous waste, or over 1 kg of acutely hazardous waste per month.

Date of Government Version: 03/01/2018
Date Data Arrived at EDR: 03/28/2018
Date Made Active in Reports: 06/22/2018
Number of Days to Update: 86

Source: Environmental Protection Agency
Telephone: (404) 562-8651
Last EDR Contact: 06/28/2018
Next Scheduled EDR Contact: 10/08/2018
Data Release Frequency: Quarterly

RCRA-SQG: RCRA - Small Quantity Generators

RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Small quantity generators (SQGs) generate between 100 kg and 1,000 kg of hazardous waste per month.

Date of Government Version: 03/01/2018
Date Data Arrived at EDR: 03/28/2018
Date Made Active in Reports: 06/22/2018
Number of Days to Update: 86

Source: Environmental Protection Agency
Telephone: (404) 562-8651
Last EDR Contact: 06/28/2018
Next Scheduled EDR Contact: 10/08/2018
Data Release Frequency: Quarterly

RCRA-CESQG: RCRA - Conditionally Exempt Small Quantity Generators

RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Conditionally exempt small quantity generators (CESQGs) generate less than 100 kg of hazardous waste, or less than 1 kg of acutely hazardous waste per month.

Date of Government Version: 03/01/2018
Date Data Arrived at EDR: 03/28/2018
Date Made Active in Reports: 06/22/2018
Number of Days to Update: 86

Source: Environmental Protection Agency
Telephone: (404) 562-8651
Last EDR Contact: 06/28/2018
Next Scheduled EDR Contact: 10/08/2018
Data Release Frequency: Quarterly

Federal institutional controls / engineering controls registries

LUCIS: Land Use Control Information System

LUCIS contains records of land use control information pertaining to the former Navy Base Realignment and Closure properties.

Date of Government Version: 05/14/2018
Date Data Arrived at EDR: 05/18/2018
Date Made Active in Reports: 07/20/2018
Number of Days to Update: 63

Source: Department of the Navy
Telephone: 843-820-7326
Last EDR Contact: 07/16/2018
Next Scheduled EDR Contact: 11/26/2018
Data Release Frequency: Varies

US ENG CONTROLS: Engineering Controls Sites List

A listing of sites with engineering controls in place. Engineering controls include various forms of caps, building foundations, liners, and treatment methods to create pathway elimination for regulated substances to enter environmental media or effect human health.

Date of Government Version: 02/13/2018
Date Data Arrived at EDR: 02/27/2018
Date Made Active in Reports: 05/11/2018
Number of Days to Update: 73

Source: Environmental Protection Agency
Telephone: 703-603-0695
Last EDR Contact: 05/29/2018
Next Scheduled EDR Contact: 09/10/2018
Data Release Frequency: Varies

US INST CONTROL: Sites with Institutional Controls

A listing of sites with institutional controls in place. Institutional controls include administrative measures, such as groundwater use restrictions, construction restrictions, property use restrictions, and post remediation care requirements intended to prevent exposure to contaminants remaining on site. Deed restrictions are generally required as part of the institutional controls.

Date of Government Version: 02/13/2018
Date Data Arrived at EDR: 02/27/2018
Date Made Active in Reports: 05/11/2018
Number of Days to Update: 73

Source: Environmental Protection Agency
Telephone: 703-603-0695
Last EDR Contact: 05/29/2018
Next Scheduled EDR Contact: 09/10/2018
Data Release Frequency: Varies

Federal ERNS list

ERNS: Emergency Response Notification System

Emergency Response Notification System. ERNS records and stores information on reported releases of oil and hazardous substances.

Date of Government Version: 03/19/2018
Date Data Arrived at EDR: 03/27/2018
Date Made Active in Reports: 06/08/2018
Number of Days to Update: 73

Source: National Response Center, United States Coast Guard
Telephone: 202-267-2180
Last EDR Contact: 06/27/2018
Next Scheduled EDR Contact: 10/08/2018
Data Release Frequency: Quarterly

State- and tribal - equivalent NPL

HSDS: Hazardous Substance Disposal Site

Locations of uncontrolled and unregulated hazardous waste sites. The file includes sites on the National Priority List as well as those on the state priority list.

Date of Government Version: 08/09/2011
Date Data Arrived at EDR: 11/08/2011
Date Made Active in Reports: 12/05/2011
Number of Days to Update: 27

Source: North Carolina Center for Geographic Information and Analysis
Telephone: 919-754-6580
Last EDR Contact: 07/18/2018
Next Scheduled EDR Contact: 11/05/2018
Data Release Frequency: Biennially

State- and tribal - equivalent CERCLIS

SHWS: Inactive Hazardous Sites Inventory

State Hazardous Waste Sites. State hazardous waste site records are the states' equivalent to CERCLIS. These sites may or may not already be listed on the federal CERCLIS list. Priority sites planned for cleanup using state funds (state equivalent of Superfund) are identified along with sites where cleanup will be paid for by potentially responsible parties. Available information varies by state.

Date of Government Version: 05/01/2018
Date Data Arrived at EDR: 06/14/2018
Date Made Active in Reports: 07/25/2018
Number of Days to Update: 41

Source: Department of Environment, Health and Natural Resources
Telephone: 919-508-8400
Last EDR Contact: 06/14/2018
Next Scheduled EDR Contact: 09/24/2018
Data Release Frequency: Quarterly

State and tribal landfill and/or solid waste disposal site lists

SWF/LF: List of Solid Waste Facilities

Solid Waste Facilities/Landfill Sites. SWF/LF type records typically contain an inventory of solid waste disposal facilities or landfills in a particular state. Depending on the state, these may be active or inactive facilities or open dumps that failed to meet RCRA Subtitle D Section 4004 criteria for solid waste landfills or disposal sites.

Date of Government Version: 04/18/2018
Date Data Arrived at EDR: 06/27/2018
Date Made Active in Reports: 07/25/2018
Number of Days to Update: 28

Source: Department of Environment and Natural Resources
Telephone: 919-733-0692
Last EDR Contact: 06/27/2018
Next Scheduled EDR Contact: 10/08/2018
Data Release Frequency: Varies

OLI: Old Landfill Inventory

Old landfill inventory location information. (Does not include no further action sites and other agency lead sites).

Date of Government Version: 08/15/2017
Date Data Arrived at EDR: 10/11/2017
Date Made Active in Reports: 12/14/2017
Number of Days to Update: 64

Source: Department of Environment & Natural Resources
Telephone: 919-733-4996
Last EDR Contact: 07/13/2018
Next Scheduled EDR Contact: 10/22/2018
Data Release Frequency: Varies

State and tribal leaking storage tank lists

LUST: Regional UST Database

This database contains information obtained from the Regional Offices. It provides a more detailed explanation of current and historic activity for individual sites, as well as what was previously found in the Incident Management Database. Sites in this database with Incident Numbers are considered LUSTs.

Date of Government Version: 05/04/2018
Date Data Arrived at EDR: 05/08/2018
Date Made Active in Reports: 06/11/2018
Number of Days to Update: 34

Source: Department of Environment and Natural Resources
Telephone: 919-733-1308
Last EDR Contact: 08/07/2018
Next Scheduled EDR Contact: 11/19/2018
Data Release Frequency: Quarterly

LAST: Leaking Aboveground Storage Tanks

A listing of leaking aboveground storage tank site locations.

Date of Government Version: 05/04/2018
Date Data Arrived at EDR: 05/08/2018
Date Made Active in Reports: 06/11/2018
Number of Days to Update: 34

Source: Department of Environment & Natural Resources
Telephone: 877-623-6748
Last EDR Contact: 08/07/2018
Next Scheduled EDR Contact: 11/19/2018
Data Release Frequency: Quarterly

INDIAN LUST R9: Leaking Underground Storage Tanks on Indian Land

LUSTs on Indian land in Arizona, California, New Mexico and Nevada

Date of Government Version: 04/10/2018
Date Data Arrived at EDR: 05/18/2018
Date Made Active in Reports: 07/20/2018
Number of Days to Update: 63

Source: Environmental Protection Agency
Telephone: 415-972-3372
Last EDR Contact: 07/27/2018
Next Scheduled EDR Contact: 11/05/2018
Data Release Frequency: Varies

INDIAN LUST R10: Leaking Underground Storage Tanks on Indian Land

LUSTs on Indian land in Alaska, Idaho, Oregon and Washington.

Date of Government Version: 04/12/2018
Date Data Arrived at EDR: 05/18/2018
Date Made Active in Reports: 07/20/2018
Number of Days to Update: 63

Source: EPA Region 10
Telephone: 206-553-2857
Last EDR Contact: 07/27/2018
Next Scheduled EDR Contact: 11/05/2018
Data Release Frequency: Varies

INDIAN LUST R8: Leaking Underground Storage Tanks on Indian Land

LUSTs on Indian land in Colorado, Montana, North Dakota, South Dakota, Utah and Wyoming.

Date of Government Version: 04/25/2018
Date Data Arrived at EDR: 05/18/2018
Date Made Active in Reports: 07/20/2018
Number of Days to Update: 63

Source: EPA Region 8
Telephone: 303-312-6271
Last EDR Contact: 07/27/2018
Next Scheduled EDR Contact: 11/05/2018
Data Release Frequency: Varies

INDIAN LUST R6: Leaking Underground Storage Tanks on Indian Land

LUSTs on Indian land in New Mexico and Oklahoma.

Date of Government Version: 04/01/2018
Date Data Arrived at EDR: 05/18/2018
Date Made Active in Reports: 07/20/2018
Number of Days to Update: 63

Source: EPA Region 6
Telephone: 214-665-6597
Last EDR Contact: 07/27/2018
Next Scheduled EDR Contact: 11/05/2018
Data Release Frequency: Varies

INDIAN LUST R4: Leaking Underground Storage Tanks on Indian Land

LUSTs on Indian land in Florida, Mississippi and North Carolina.

Date of Government Version: 05/08/2018
Date Data Arrived at EDR: 05/18/2018
Date Made Active in Reports: 07/20/2018
Number of Days to Update: 63

Source: EPA Region 4
Telephone: 404-562-8677
Last EDR Contact: 07/27/2018
Next Scheduled EDR Contact: 11/05/2018
Data Release Frequency: Varies

INDIAN LUST R1: Leaking Underground Storage Tanks on Indian Land
A listing of leaking underground storage tank locations on Indian Land.

Date of Government Version: 04/13/2018
Date Data Arrived at EDR: 05/18/2018
Date Made Active in Reports: 07/20/2018
Number of Days to Update: 63

Source: EPA Region 1
Telephone: 617-918-1313
Last EDR Contact: 07/27/2018
Next Scheduled EDR Contact: 11/05/2018
Data Release Frequency: Varies

INDIAN LUST R5: Leaking Underground Storage Tanks on Indian Land
Leaking underground storage tanks located on Indian Land in Michigan, Minnesota and Wisconsin.

Date of Government Version: 04/12/2018
Date Data Arrived at EDR: 05/18/2018
Date Made Active in Reports: 07/20/2018
Number of Days to Update: 63

Source: EPA, Region 5
Telephone: 312-886-7439
Last EDR Contact: 07/27/2018
Next Scheduled EDR Contact: 11/05/2018
Data Release Frequency: Varies

INDIAN LUST R7: Leaking Underground Storage Tanks on Indian Land
LUSTs on Indian land in Iowa, Kansas, and Nebraska

Date of Government Version: 04/24/2018
Date Data Arrived at EDR: 05/18/2018
Date Made Active in Reports: 07/20/2018
Number of Days to Update: 63

Source: EPA Region 7
Telephone: 913-551-7003
Last EDR Contact: 07/27/2018
Next Scheduled EDR Contact: 11/05/2018
Data Release Frequency: Varies

LUST TRUST: State Trust Fund Database
This database contains information about claims against the State Trust Funds for reimbursements for expenses incurred while remediating Leaking USTs.

Date of Government Version: 04/06/2018
Date Data Arrived at EDR: 04/11/2018
Date Made Active in Reports: 06/11/2018
Number of Days to Update: 61

Source: Department of Environment and Natural Resources
Telephone: 919-733-1315
Last EDR Contact: 07/12/2018
Next Scheduled EDR Contact: 10/22/2018
Data Release Frequency: Quarterly

State and tribal registered storage tank lists

FEMA UST: Underground Storage Tank Listing
A listing of all FEMA owned underground storage tanks.

Date of Government Version: 05/15/2017
Date Data Arrived at EDR: 05/30/2017
Date Made Active in Reports: 10/13/2017
Number of Days to Update: 136

Source: FEMA
Telephone: 202-646-5797
Last EDR Contact: 07/11/2018
Next Scheduled EDR Contact: 10/22/2018
Data Release Frequency: Varies

UST: Petroleum Underground Storage Tank Database
Registered Underground Storage Tanks. UST's are regulated under Subtitle I of the Resource Conservation and Recovery Act (RCRA) and must be registered with the state department responsible for administering the UST program. Available information varies by state program.

Date of Government Version: 05/04/2018
Date Data Arrived at EDR: 05/08/2018
Date Made Active in Reports: 06/11/2018
Number of Days to Update: 34

Source: Department of Environment and Natural Resources
Telephone: 919-733-1308
Last EDR Contact: 08/07/2018
Next Scheduled EDR Contact: 11/19/2018
Data Release Frequency: Quarterly

AST: AST Database

Facilities with aboveground storage tanks that have a capacity greater than 21,000 gallons.

Date of Government Version: 05/30/2018
Date Data Arrived at EDR: 06/19/2018
Date Made Active in Reports: 07/25/2018
Number of Days to Update: 36

Source: Department of Environment and Natural Resources
Telephone: 919-715-6183
Last EDR Contact: 06/14/2018
Next Scheduled EDR Contact: 10/01/2018
Data Release Frequency: Semi-Annually

INDIAN UST R6: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 6 (Louisiana, Arkansas, Oklahoma, New Mexico, Texas and 65 Tribes).

Date of Government Version: 04/01/2018
Date Data Arrived at EDR: 05/18/2018
Date Made Active in Reports: 07/20/2018
Number of Days to Update: 63

Source: EPA Region 6
Telephone: 214-665-7591
Last EDR Contact: 07/27/2018
Next Scheduled EDR Contact: 11/05/2018
Data Release Frequency: Varies

INDIAN UST R1: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 1 (Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, Vermont and ten Tribal Nations).

Date of Government Version: 04/13/2018
Date Data Arrived at EDR: 05/18/2018
Date Made Active in Reports: 07/20/2018
Number of Days to Update: 63

Source: EPA, Region 1
Telephone: 617-918-1313
Last EDR Contact: 07/27/2018
Next Scheduled EDR Contact: 11/05/2018
Data Release Frequency: Varies

INDIAN UST R4: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 4 (Alabama, Florida, Georgia, Kentucky, Mississippi, North Carolina, South Carolina, Tennessee and Tribal Nations)

Date of Government Version: 05/08/2018
Date Data Arrived at EDR: 05/18/2018
Date Made Active in Reports: 07/20/2018
Number of Days to Update: 63

Source: EPA Region 4
Telephone: 404-562-9424
Last EDR Contact: 07/27/2018
Next Scheduled EDR Contact: 11/05/2018
Data Release Frequency: Varies

INDIAN UST R5: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 5 (Michigan, Minnesota and Wisconsin and Tribal Nations).

Date of Government Version: 04/12/2018
Date Data Arrived at EDR: 05/18/2018
Date Made Active in Reports: 07/20/2018
Number of Days to Update: 63

Source: EPA Region 5
Telephone: 312-886-6136
Last EDR Contact: 07/27/2018
Next Scheduled EDR Contact: 11/05/2018
Data Release Frequency: Varies

INDIAN UST R10: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 10 (Alaska, Idaho, Oregon, Washington, and Tribal Nations).

Date of Government Version: 04/12/2018
Date Data Arrived at EDR: 05/18/2018
Date Made Active in Reports: 07/20/2018
Number of Days to Update: 63

Source: EPA Region 10
Telephone: 206-553-2857
Last EDR Contact: 07/27/2018
Next Scheduled EDR Contact: 11/05/2018
Data Release Frequency: Varies

INDIAN UST R7: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 7 (Iowa, Kansas, Missouri, Nebraska, and 9 Tribal Nations).

Date of Government Version: 04/24/2018
Date Data Arrived at EDR: 05/18/2018
Date Made Active in Reports: 07/20/2018
Number of Days to Update: 63

Source: EPA Region 7
Telephone: 913-551-7003
Last EDR Contact: 07/27/2018
Next Scheduled EDR Contact: 11/05/2018
Data Release Frequency: Varies

INDIAN UST R8: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 8 (Colorado, Montana, North Dakota, South Dakota, Utah, Wyoming and 27 Tribal Nations).

Date of Government Version: 04/25/2018
Date Data Arrived at EDR: 05/18/2018
Date Made Active in Reports: 07/20/2018
Number of Days to Update: 63

Source: EPA Region 8
Telephone: 303-312-6137
Last EDR Contact: 07/27/2018
Next Scheduled EDR Contact: 11/05/2018
Data Release Frequency: Varies

INDIAN UST R9: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 9 (Arizona, California, Hawaii, Nevada, the Pacific Islands, and Tribal Nations).

Date of Government Version: 04/10/2018
Date Data Arrived at EDR: 05/18/2018
Date Made Active in Reports: 07/20/2018
Number of Days to Update: 63

Source: EPA Region 9
Telephone: 415-972-3368
Last EDR Contact: 07/27/2018
Next Scheduled EDR Contact: 11/05/2018
Data Release Frequency: Varies

State and tribal institutional control / engineering control registries

INST CONTROL: No Further Action Sites With Land Use Restrictions Monitoring

A land use restricted site is a property where there are limits or requirements on future use of the property due to varying levels of cleanup possible, practical, or necessary at the site.

Date of Government Version: 05/01/2018
Date Data Arrived at EDR: 06/14/2018
Date Made Active in Reports: 07/25/2018
Number of Days to Update: 41

Source: Department of Environment, Health and Natural Resources
Telephone: 919-508-8400
Last EDR Contact: 06/14/2018
Next Scheduled EDR Contact: 09/24/2018
Data Release Frequency: Quarterly

State and tribal voluntary cleanup sites

INDIAN VCP R7: Voluntary Cleanup Priority Lisitng

A listing of voluntary cleanup priority sites located on Indian Land located in Region 7.

Date of Government Version: 03/20/2008
Date Data Arrived at EDR: 04/22/2008
Date Made Active in Reports: 05/19/2008
Number of Days to Update: 27

Source: EPA, Region 7
Telephone: 913-551-7365
Last EDR Contact: 04/20/2009
Next Scheduled EDR Contact: 07/20/2009
Data Release Frequency: Varies

INDIAN VCP R1: Voluntary Cleanup Priority Listing
A listing of voluntary cleanup priority sites located on Indian Land located in Region 1.

Date of Government Version: 07/27/2015
Date Data Arrived at EDR: 09/29/2015
Date Made Active in Reports: 02/18/2016
Number of Days to Update: 142

Source: EPA, Region 1
Telephone: 617-918-1102
Last EDR Contact: 06/22/2018
Next Scheduled EDR Contact: 10/08/2018
Data Release Frequency: Varies

VCP: Responsible Party Voluntary Action Sites
Responsible Party Voluntary Action site locations.

Date of Government Version: 05/01/2018
Date Data Arrived at EDR: 06/14/2018
Date Made Active in Reports: 07/25/2018
Number of Days to Update: 41

Source: Department of Environment and Natural Resources
Telephone: 919-508-8400
Last EDR Contact: 06/14/2018
Next Scheduled EDR Contact: 09/24/2018
Data Release Frequency: Quarterly

State and tribal Brownfields sites

BROWNFIELDS: Brownfields Projects Inventory
A brownfield site is an abandoned, idled, or underused property where the threat of environmental contamination has hindered its redevelopment. All of the sites in the inventory are working toward a brownfield agreement for cleanup and liabitliy control.

Date of Government Version: 06/01/2018
Date Data Arrived at EDR: 07/05/2018
Date Made Active in Reports: 07/25/2018
Number of Days to Update: 20

Source: Department of Environment and Natural Resources
Telephone: 919-733-4996
Last EDR Contact: 07/05/2018
Next Scheduled EDR Contact: 10/15/2018
Data Release Frequency: Quarterly

ADDITIONAL ENVIRONMENTAL RECORDS

Local Brownfield lists

US BROWNFIELDS: A Listing of Brownfields Sites
Brownfields are real property, the expansion, redevelopment, or reuse of which may be complicated by the presence or potential presence of a hazardous substance, pollutant, or contaminant. Cleaning up and reinvesting in these properties takes development pressures off of undeveloped, open land, and both improves and protects the environment. Assessment, Cleanup and Redevelopment Exchange System (ACRES) stores information reported by EPA Brownfields grant recipients on brownfields properties assessed or cleaned up with grant funding as well as information on Targeted Brownfields Assessments performed by EPA Regions. A listing of ACRES Brownfield sites is obtained from Cleanups in My Community. Cleanups in My Community provides information on Brownfields properties for which information is reported back to EPA, as well as areas served by Brownfields grant programs.

Date of Government Version: 03/19/2018
Date Data Arrived at EDR: 03/21/2018
Date Made Active in Reports: 06/08/2018
Number of Days to Update: 79

Source: Environmental Protection Agency
Telephone: 202-566-2777
Last EDR Contact: 06/20/2018
Next Scheduled EDR Contact: 10/01/2018
Data Release Frequency: Semi-Annually

Local Lists of Landfill / Solid Waste Disposal Sites

HIST LF: Solid Waste Facility Listing
A listing of solid waste facilities.

Date of Government Version: 11/06/2006
Date Data Arrived at EDR: 02/13/2007
Date Made Active in Reports: 03/02/2007
Number of Days to Update: 17

Source: Department of Environment & Natural Resources
Telephone: 919-733-0692
Last EDR Contact: 01/19/2009
Next Scheduled EDR Contact: N/A
Data Release Frequency: No Update Planned

SWRCY: Recycling Center Listing
A listing of recycling center locations.

Date of Government Version: 05/03/2018
Date Data Arrived at EDR: 05/03/2018
Date Made Active in Reports: 05/10/2018
Number of Days to Update: 7

Source: Department of Environment & Natural Resources
Telephone: 919-707-8137
Last EDR Contact: 07/25/2018
Next Scheduled EDR Contact: 11/12/2018
Data Release Frequency: Varies

INDIAN ODI: Report on the Status of Open Dumps on Indian Lands
Location of open dumps on Indian land.

Date of Government Version: 12/31/1998
Date Data Arrived at EDR: 12/03/2007
Date Made Active in Reports: 01/24/2008
Number of Days to Update: 52

Source: Environmental Protection Agency
Telephone: 703-308-8245
Last EDR Contact: 07/30/2018
Next Scheduled EDR Contact: 11/12/2018
Data Release Frequency: Varies

ODI: Open Dump Inventory
An open dump is defined as a disposal facility that does not comply with one or more of the Part 257 or Part 258 Subtitle D Criteria.

Date of Government Version: 06/30/1985
Date Data Arrived at EDR: 08/09/2004
Date Made Active in Reports: 09/17/2004
Number of Days to Update: 39

Source: Environmental Protection Agency
Telephone: 800-424-9346
Last EDR Contact: 06/09/2004
Next Scheduled EDR Contact: N/A
Data Release Frequency: No Update Planned

DEBRIS REGION 9: Torres Martinez Reservation Illegal Dump Site Locations
A listing of illegal dump sites location on the Torres Martinez Indian Reservation located in eastern Riverside County and northern Imperial County, California.

Date of Government Version: 01/12/2009
Date Data Arrived at EDR: 05/07/2009
Date Made Active in Reports: 09/21/2009
Number of Days to Update: 137

Source: EPA, Region 9
Telephone: 415-947-4219
Last EDR Contact: 07/17/2018
Next Scheduled EDR Contact: 11/05/2018
Data Release Frequency: No Update Planned

IHS OPEN DUMPS: Open Dumps on Indian Land
A listing of all open dumps located on Indian Land in the United States.

Date of Government Version: 04/01/2014
Date Data Arrived at EDR: 08/06/2014
Date Made Active in Reports: 01/29/2015
Number of Days to Update: 176

Source: Department of Health & Human Serivces, Indian Health Service
Telephone: 301-443-1452
Last EDR Contact: 08/03/2018
Next Scheduled EDR Contact: 11/12/2018
Data Release Frequency: Varies

Local Lists of Hazardous waste / Contaminated Sites

US HIST CDL: National Clandestine Laboratory Register
A listing of clandestine drug lab locations that have been removed from the DEAs National Clandestine Laboratory Register.

Date of Government Version: 02/22/2018
Date Data Arrived at EDR: 03/01/2018
Date Made Active in Reports: 05/11/2018
Number of Days to Update: 71

Source: Drug Enforcement Administration
Telephone: 202-307-1000
Last EDR Contact: 05/30/2018
Next Scheduled EDR Contact: 09/10/2018
Data Release Frequency: No Update Planned

US CDL: Clandestine Drug Labs

A listing of clandestine drug lab locations. The U.S. Department of Justice ("the Department") provides this web site as a public service. It contains addresses of some locations where law enforcement agencies reported they found chemicals or other items that indicated the presence of either clandestine drug laboratories or dumpsites. In most cases, the source of the entries is not the Department, and the Department has not verified the entry and does not guarantee its accuracy. Members of the public must verify the accuracy of all entries by, for example, contacting local law enforcement and local health departments.

Date of Government Version: 02/22/2018
Date Data Arrived at EDR: 03/01/2018
Date Made Active in Reports: 05/11/2018
Number of Days to Update: 71

Source: Drug Enforcement Administration
Telephone: 202-307-1000
Last EDR Contact: 05/30/2018
Next Scheduled EDR Contact: 09/10/2018
Data Release Frequency: Quarterly

Local Land Records

LIENS 2: CERCLA Lien Information

A Federal CERCLA ('Superfund') lien can exist by operation of law at any site or property at which EPA has spent Superfund monies. These monies are spent to investigate and address releases and threatened releases of contamination. CERCLIS provides information as to the identity of these sites and properties.

Date of Government Version: 05/13/2018
Date Data Arrived at EDR: 05/30/2018
Date Made Active in Reports: 06/29/2018
Number of Days to Update: 30

Source: Environmental Protection Agency
Telephone: 202-564-6023
Last EDR Contact: 08/09/2018
Next Scheduled EDR Contact: 11/05/2018
Data Release Frequency: Semi-Annually

Records of Emergency Release Reports

HMIRS: Hazardous Materials Information Reporting System

Hazardous Materials Incident Report System. HMIRS contains hazardous material spill incidents reported to DOT.

Date of Government Version: 03/26/2018
Date Data Arrived at EDR: 03/27/2018
Date Made Active in Reports: 06/08/2018
Number of Days to Update: 73

Source: U.S. Department of Transportation
Telephone: 202-366-4555
Last EDR Contact: 03/27/2018
Next Scheduled EDR Contact: 07/09/2018
Data Release Frequency: Quarterly

SPILLS: Spills Incident Listing

A listing spills, hazardous material releases, sanitary sewer overflows, wastewater treatment plant bypasses and upsets, citizen complaints, and any other environmental emergency calls reported to the agency.

Date of Government Version: 06/12/2018
Date Data Arrived at EDR: 06/15/2018
Date Made Active in Reports: 07/25/2018
Number of Days to Update: 40

Source: Department of Environment & Natural Resources
Telephone: 919-807-6308
Last EDR Contact: 06/07/2018
Next Scheduled EDR Contact: 09/24/2018
Data Release Frequency: Quarterly

IMD: Incident Management Database

Groundwater and/or soil contamination incidents

Date of Government Version: 07/21/2006
Date Data Arrived at EDR: 08/01/2006
Date Made Active in Reports: 08/23/2006
Number of Days to Update: 22

Source: Department of Environment and Natural Resources
Telephone: 919-733-3221
Last EDR Contact: 07/01/2011
Next Scheduled EDR Contact: 10/17/2011
Data Release Frequency: No Update Planned

SPILLS 90: SPILLS90 data from FirstSearch

Spills 90 includes those spill and release records available exclusively from FirstSearch databases. Typically, they may include chemical, oil and/or hazardous substance spills recorded after 1990. Duplicate records that are already included in EDR incident and release records are not included in Spills 90.

Date of Government Version: 09/27/2012
Date Data Arrived at EDR: 01/03/2013
Date Made Active in Reports: 03/06/2013
Number of Days to Update: 62

Source: FirstSearch
Telephone: N/A
Last EDR Contact: 01/03/2013
Next Scheduled EDR Contact: N/A
Data Release Frequency: No Update Planned

SPILLS 80: SPILLS80 data from FirstSearch

Spills 80 includes those spill and release records available from FirstSearch databases prior to 1990. Typically, they may include chemical, oil and/or hazardous substance spills recorded before 1990. Duplicate records that are already included in EDR incident and release records are not included in Spills 80.

Date of Government Version: 06/14/2001
Date Data Arrived at EDR: 01/03/2013
Date Made Active in Reports: 03/06/2013
Number of Days to Update: 62

Source: FirstSearch
Telephone: N/A
Last EDR Contact: 01/03/2013
Next Scheduled EDR Contact: N/A
Data Release Frequency: No Update Planned

Other Ascertainable Records

RCRA NonGen / NLR: RCRA - Non Generators / No Longer Regulated

RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Non-Generators do not presently generate hazardous waste.

Date of Government Version: 03/01/2018
Date Data Arrived at EDR: 03/28/2018
Date Made Active in Reports: 06/22/2018
Number of Days to Update: 86

Source: Environmental Protection Agency
Telephone: (404) 562-8651
Last EDR Contact: 06/28/2018
Next Scheduled EDR Contact: 10/08/2018
Data Release Frequency: Quarterly

FUDS: Formerly Used Defense Sites

The listing includes locations of Formerly Used Defense Sites properties where the US Army Corps of Engineers is actively working or will take necessary cleanup actions.

Date of Government Version: 01/31/2015
Date Data Arrived at EDR: 07/08/2015
Date Made Active in Reports: 10/13/2015
Number of Days to Update: 97

Source: U.S. Army Corps of Engineers
Telephone: 202-528-4285
Last EDR Contact: 05/25/2018
Next Scheduled EDR Contact: 09/03/2018
Data Release Frequency: Varies

DOD: Department of Defense Sites

This data set consists of federally owned or administered lands, administered by the Department of Defense, that have any area equal to or greater than 640 acres of the United States, Puerto Rico, and the U.S. Virgin Islands.

Date of Government Version: 12/31/2005
Date Data Arrived at EDR: 11/10/2006
Date Made Active in Reports: 01/11/2007
Number of Days to Update: 62

Source: USGS
Telephone: 888-275-8747
Last EDR Contact: 07/11/2018
Next Scheduled EDR Contact: 10/22/2018
Data Release Frequency: Semi-Annually

FEDLAND: Federal and Indian Lands

Federally and Indian administrated lands of the United States. Lands included are administrated by: Army Corps of Engineers, Bureau of Reclamation, National Wild and Scenic River, National Wildlife Refuge, Public Domain Land, Wilderness, Wilderness Study Area, Wildlife Management Area, Bureau of Indian Affairs, Bureau of Land Management, Department of Justice, Forest Service, Fish and Wildlife Service, National Park Service.

Date of Government Version: 12/31/2005
Date Data Arrived at EDR: 02/06/2006
Date Made Active in Reports: 01/11/2007
Number of Days to Update: 339

Source: U.S. Geological Survey
Telephone: 888-275-8747
Last EDR Contact: 07/13/2018
Next Scheduled EDR Contact: 10/22/2018
Data Release Frequency: N/A

SCRD DRYCLEANERS: State Coalition for Remediation of Drycleaners Listing

The State Coalition for Remediation of Drycleaners was established in 1998, with support from the U.S. EPA Office of Superfund Remediation and Technology Innovation. It is comprised of representatives of states with established drycleaner remediation programs. Currently the member states are Alabama, Connecticut, Florida, Illinois, Kansas, Minnesota, Missouri, North Carolina, Oregon, South Carolina, Tennessee, Texas, and Wisconsin.

Date of Government Version: 01/01/2017
Date Data Arrived at EDR: 02/03/2017
Date Made Active in Reports: 04/07/2017
Number of Days to Update: 63

Source: Environmental Protection Agency
Telephone: 615-532-8599
Last EDR Contact: 05/15/2018
Next Scheduled EDR Contact: 08/27/2018
Data Release Frequency: Varies

US FIN ASSUR: Financial Assurance Information

All owners and operators of facilities that treat, store, or dispose of hazardous waste are required to provide proof that they will have sufficient funds to pay for the clean up, closure, and post-closure care of their facilities.

Date of Government Version: 03/01/2018
Date Data Arrived at EDR: 03/27/2018
Date Made Active in Reports: 06/22/2018
Number of Days to Update: 87

Source: Environmental Protection Agency
Telephone: 202-566-1917
Last EDR Contact: 06/27/2018
Next Scheduled EDR Contact: 10/08/2018
Data Release Frequency: Quarterly

EPA WATCH LIST: EPA WATCH LIST

EPA maintains a "Watch List" to facilitate dialogue between EPA, state and local environmental agencies on enforcement matters relating to facilities with alleged violations identified as either significant or high priority. Being on the Watch List does not mean that the facility has actually violated the law only that an investigation by EPA or a state or local environmental agency has led those organizations to allege that an unproven violation has in fact occurred. Being on the Watch List does not represent a higher level of concern regarding the alleged violations that were detected, but instead indicates cases requiring additional dialogue between EPA, state and local agencies - primarily because of the length of time the alleged violation has gone unaddressed or unresolved.

Date of Government Version: 08/30/2013
Date Data Arrived at EDR: 03/21/2014
Date Made Active in Reports: 06/17/2014
Number of Days to Update: 88

Source: Environmental Protection Agency
Telephone: 617-520-3000
Last EDR Contact: 08/03/2018
Next Scheduled EDR Contact: 11/19/2018
Data Release Frequency: Quarterly

2020 COR ACTION: 2020 Corrective Action Program List

The EPA has set ambitious goals for the RCRA Corrective Action program by creating the 2020 Corrective Action Universe. This RCRA cleanup baseline includes facilities expected to need corrective action. The 2020 universe contains a wide variety of sites. Some properties are heavily contaminated while others were contaminated but have since been cleaned up. Still others have not been fully investigated yet, and may require little or no remediation. Inclusion in the 2020 Universe does not necessarily imply failure on the part of a facility to meet its RCRA obligations.

Date of Government Version: 09/30/2017
Date Data Arrived at EDR: 05/08/2018
Date Made Active in Reports: 07/20/2018
Number of Days to Update: 73

Source: Environmental Protection Agency
Telephone: 703-308-4044
Last EDR Contact: 08/10/2018
Next Scheduled EDR Contact: 11/19/2018
Data Release Frequency: Varies

TSCA: Toxic Substances Control Act

Toxic Substances Control Act. TSCA identifies manufacturers and importers of chemical substances included on the TSCA Chemical Substance Inventory list. It includes data on the production volume of these substances by plant site.

Date of Government Version: 12/31/2016
Date Data Arrived at EDR: 06/21/2017
Date Made Active in Reports: 01/05/2018
Number of Days to Update: 198

Source: EPA
Telephone: 202-260-5521
Last EDR Contact: 06/22/2018
Next Scheduled EDR Contact: 10/01/2018
Data Release Frequency: Every 4 Years

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

TRIS: Toxic Chemical Release Inventory System

Toxic Release Inventory System. TRIS identifies facilities which release toxic chemicals to the air, water and land in reportable quantities under SARA Title III Section 313.

Date of Government Version: 12/31/2016
Date Data Arrived at EDR: 01/10/2018
Date Made Active in Reports: 01/12/2018
Number of Days to Update: 2

Source: EPA
Telephone: 202-566-0250
Last EDR Contact: 05/25/2018
Next Scheduled EDR Contact: 09/03/2018
Data Release Frequency: Annually

SSTS: Section 7 Tracking Systems

Section 7 of the Federal Insecticide, Fungicide and Rodenticide Act, as amended (92 Stat. 829) requires all registered pesticide-producing establishments to submit a report to the Environmental Protection Agency by March 1st each year. Each establishment must report the types and amounts of pesticides, active ingredients and devices being produced, and those having been produced and sold or distributed in the past year.

Date of Government Version: 12/31/2009
Date Data Arrived at EDR: 12/10/2010
Date Made Active in Reports: 02/25/2011
Number of Days to Update: 77

Source: EPA
Telephone: 202-564-4203
Last EDR Contact: 07/27/2018
Next Scheduled EDR Contact: 11/05/2018
Data Release Frequency: Annually

ROD: Records Of Decision

Record of Decision. ROD documents mandate a permanent remedy at an NPL (Superfund) site containing technical and health information to aid in the cleanup.

Date of Government Version: 05/13/2018
Date Data Arrived at EDR: 05/30/2018
Date Made Active in Reports: 06/29/2018
Number of Days to Update: 30

Source: EPA
Telephone: 703-416-0223
Last EDR Contact: 08/09/2018
Next Scheduled EDR Contact: 10/15/2018
Data Release Frequency: Annually

RMP: Risk Management Plans

When Congress passed the Clean Air Act Amendments of 1990, it required EPA to publish regulations and guidance for chemical accident prevention at facilities using extremely hazardous substances. The Risk Management Program Rule (RMP Rule) was written to implement Section 112(r) of these amendments. The rule, which built upon existing industry codes and standards, requires companies of all sizes that use certain flammable and toxic substances to develop a Risk Management Program, which includes a(n): Hazard assessment that details the potential effects of an accidental release, an accident history of the last five years, and an evaluation of worst-case and alternative accidental releases; Prevention program that includes safety precautions and maintenance, monitoring, and employee training measures; and Emergency response program that spells out emergency health care, employee training measures and procedures for informing the public and response agencies (e.g the fire department) should an accident occur.

Date of Government Version: 11/02/2017
Date Data Arrived at EDR: 11/17/2017
Date Made Active in Reports: 12/08/2017
Number of Days to Update: 21

Source: Environmental Protection Agency
Telephone: 202-564-8600
Last EDR Contact: 07/20/2018
Next Scheduled EDR Contact: 11/05/2018
Data Release Frequency: Varies

RAATS: RCRA Administrative Action Tracking System

RCRA Administration Action Tracking System. RAATS contains records based on enforcement actions issued under RCRA pertaining to major violators and includes administrative and civil actions brought by the EPA. For administration actions after September 30, 1995, data entry in the RAATS database was discontinued. EPA will retain a copy of the database for historical records. It was necessary to terminate RAATS because a decrease in agency resources made it impossible to continue to update the information contained in the database.

Date of Government Version: 04/17/1995
Date Data Arrived at EDR: 07/03/1995
Date Made Active in Reports: 08/07/1995
Number of Days to Update: 35

Source: EPA
Telephone: 202-564-4104
Last EDR Contact: 06/02/2008
Next Scheduled EDR Contact: 09/01/2008
Data Release Frequency: No Update Planned

PRP: Potentially Responsible Parties
A listing of verified Potentially Responsible Parties

Date of Government Version: 10/25/2013
Date Data Arrived at EDR: 10/17/2014
Date Made Active in Reports: 10/20/2014
Number of Days to Update: 3
Source: EPA
Telephone: 202-564-6023
Last EDR Contact: 08/09/2018
Next Scheduled EDR Contact: 11/19/2018
Data Release Frequency: Quarterly

PADS: PCB Activity Database System
PCB Activity Database. PADS Identifies generators, transporters, commercial storers and/or brokers and disposers of PCB's who are required to notify the EPA of such activities.

Date of Government Version: 06/01/2017
Date Data Arrived at EDR: 06/09/2017
Date Made Active in Reports: 10/13/2017
Number of Days to Update: 126
Source: EPA
Telephone: 202-566-0500
Last EDR Contact: 07/13/2018
Next Scheduled EDR Contact: 10/22/2018
Data Release Frequency: Annually

ICIS: Integrated Compliance Information System
The Integrated Compliance Information System (ICIS) supports the information needs of the national enforcement and compliance program as well as the unique needs of the National Pollutant Discharge Elimination System (NPDES) program.

Date of Government Version: 11/18/2016
Date Data Arrived at EDR: 11/23/2016
Date Made Active in Reports: 02/10/2017
Number of Days to Update: 79
Source: Environmental Protection Agency
Telephone: 202-564-2501
Last EDR Contact: 07/09/2018
Next Scheduled EDR Contact: 10/22/2018
Data Release Frequency: Quarterly

FTTS: FIFRA/ TSCA Tracking System - FIFRA (Federal Insecticide, Fungicide, & Rodenticide Act)/TSCA (Toxic Substances Control Act)
FTTS tracks administrative cases and pesticide enforcement actions and compliance activities related to FIFRA, TSCA and EPCRA (Emergency Planning and Community Right-to-Know Act). To maintain currency, EDR contacts the Agency on a quarterly basis.

Date of Government Version: 04/09/2009
Date Data Arrived at EDR: 04/16/2009
Date Made Active in Reports: 05/11/2009
Number of Days to Update: 25
Source: EPA/Office of Prevention, Pesticides and Toxic Substances
Telephone: 202-566-1667
Last EDR Contact: 08/18/2017
Next Scheduled EDR Contact: 12/04/2017
Data Release Frequency: Quarterly

FTTS INSP: FIFRA/ TSCA Tracking System - FIFRA (Federal Insecticide, Fungicide, & Rodenticide Act)/TSCA (Toxic Substances Control Act)
A listing of FIFRA/TSCA Tracking System (FTTS) inspections and enforcements.

Date of Government Version: 04/09/2009
Date Data Arrived at EDR: 04/16/2009
Date Made Active in Reports: 05/11/2009
Number of Days to Update: 25
Source: EPA
Telephone: 202-566-1667
Last EDR Contact: 08/18/2017
Next Scheduled EDR Contact: 12/04/2017
Data Release Frequency: Quarterly

MLTS: Material Licensing Tracking System
MLTS is maintained by the Nuclear Regulatory Commission and contains a list of approximately 8,100 sites which possess or use radioactive materials and which are subject to NRC licensing requirements. To maintain currency, EDR contacts the Agency on a quarterly basis.

Date of Government Version: 08/30/2016
Date Data Arrived at EDR: 09/08/2016
Date Made Active in Reports: 10/21/2016
Number of Days to Update: 43
Source: Nuclear Regulatory Commission
Telephone: 301-415-7169
Last EDR Contact: 07/23/2018
Next Scheduled EDR Contact: 11/05/2018
Data Release Frequency: Quarterly

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

COAL ASH DOE: Steam-Electric Plant Operation Data
A listing of power plants that store ash in surface ponds.

Date of Government Version: 12/31/2005
Date Data Arrived at EDR: 08/07/2009
Date Made Active in Reports: 10/22/2009
Number of Days to Update: 76

Source: Department of Energy
Telephone: 202-586-8719
Last EDR Contact: 06/07/2018
Next Scheduled EDR Contact: 09/17/2018
Data Release Frequency: Varies

COAL ASH EPA: Coal Combustion Residues Surface Impoundments List
A listing of coal combustion residues surface impoundments with high hazard potential ratings.

Date of Government Version: 07/01/2014
Date Data Arrived at EDR: 09/10/2014
Date Made Active in Reports: 10/20/2014
Number of Days to Update: 40

Source: Environmental Protection Agency
Telephone: N/A
Last EDR Contact: 06/04/2018
Next Scheduled EDR Contact: 09/17/2018
Data Release Frequency: Varies

PCB TRANSFORMER: PCB Transformer Registration Database
The database of PCB transformer registrations that includes all PCB registration submittals.

Date of Government Version: 05/24/2017
Date Data Arrived at EDR: 11/30/2017
Date Made Active in Reports: 12/15/2017
Number of Days to Update: 15

Source: Environmental Protection Agency
Telephone: 202-566-0517
Last EDR Contact: 07/27/2018
Next Scheduled EDR Contact: 11/05/2018
Data Release Frequency: Varies

RADINFO: Radiation Information Database
The Radiation Information Database (RADINFO) contains information about facilities that are regulated by U.S. Environmental Protection Agency (EPA) regulations for radiation and radioactivity.

Date of Government Version: 04/03/2018
Date Data Arrived at EDR: 04/05/2018
Date Made Active in Reports: 06/29/2018
Number of Days to Update: 85

Source: Environmental Protection Agency
Telephone: 202-343-9775
Last EDR Contact: 07/05/2018
Next Scheduled EDR Contact: 10/15/2018
Data Release Frequency: Quarterly

HIST FTTS: FIFRA/TSCA Tracking System Administrative Case Listing
A complete administrative case listing from the FIFRA/TSCA Tracking System (FTTS) for all ten EPA regions. The information was obtained from the National Compliance Database (NCDB). NCDB supports the implementation of FIFRA (Federal Insecticide, Fungicide, and Rodenticide Act) and TSCA (Toxic Substances Control Act). Some EPA regions are now closing out records. Because of that, and the fact that some EPA regions are not providing EPA Headquarters with updated records, it was decided to create a HIST FTTS database. It included records that may not be included in the newer FTTS database updates. This database is no longer updated.

Date of Government Version: 10/19/2006
Date Data Arrived at EDR: 03/01/2007
Date Made Active in Reports: 04/10/2007
Number of Days to Update: 40

Source: Environmental Protection Agency
Telephone: 202-564-2501
Last EDR Contact: 12/17/2007
Next Scheduled EDR Contact: 03/17/2008
Data Release Frequency: No Update Planned

HIST FTTS INSP: FIFRA/TSCA Tracking System Inspection & Enforcement Case Listing
A complete inspection and enforcement case listing from the FIFRA/TSCA Tracking System (FTTS) for all ten EPA regions. The information was obtained from the National Compliance Database (NCDB). NCDB supports the implementation of FIFRA (Federal Insecticide, Fungicide, and Rodenticide Act) and TSCA (Toxic Substances Control Act). Some EPA regions are now closing out records. Because of that, and the fact that some EPA regions are not providing EPA Headquarters with updated records, it was decided to create a HIST FTTS database. It included records that may not be included in the newer FTTS database updates. This database is no longer updated.

Date of Government Version: 10/19/2006
Date Data Arrived at EDR: 03/01/2007
Date Made Active in Reports: 04/10/2007
Number of Days to Update: 40

Source: Environmental Protection Agency
Telephone: 202-564-2501
Last EDR Contact: 12/17/2008
Next Scheduled EDR Contact: 03/17/2008
Data Release Frequency: No Update Planned

DOT OPS: Incident and Accident Data

Department of Transporation, Office of Pipeline Safety Incident and Accident data.

Date of Government Version: 07/31/2012
Date Data Arrived at EDR: 08/07/2012
Date Made Active in Reports: 09/18/2012
Number of Days to Update: 42

Source: Department of Transporation, Office of Pipeline Safety
Telephone: 202-366-4595
Last EDR Contact: 08/09/2018
Next Scheduled EDR Contact: 11/12/2018
Data Release Frequency: Varies

CONSENT: Superfund (CERCLA) Consent Decrees

Major legal settlements that establish responsibility and standards for cleanup at NPL (Superfund) sites. Released periodically by United States District Courts after settlement by parties to litigation matters.

Date of Government Version: 03/31/2018
Date Data Arrived at EDR: 04/16/2018
Date Made Active in Reports: 06/29/2018
Number of Days to Update: 74

Source: Department of Justice, Consent Decree Library
Telephone: Varies
Last EDR Contact: 07/09/2018
Next Scheduled EDR Contact: 10/01/2018
Data Release Frequency: Varies

BRS: Biennial Reporting System

The Biennial Reporting System is a national system administered by the EPA that collects data on the generation and management of hazardous waste. BRS captures detailed data from two groups: Large Quantity Generators (LQG) and Treatment, Storage, and Disposal Facilities.

Date of Government Version: 12/31/2015
Date Data Arrived at EDR: 02/22/2017
Date Made Active in Reports: 09/28/2017
Number of Days to Update: 218

Source: EPA/NTIS
Telephone: 800-424-9346
Last EDR Contact: 06/28/2018
Next Scheduled EDR Contact: 09/03/2018
Data Release Frequency: Biennially

INDIAN RESERV: Indian Reservations

This map layer portrays Indian administered lands of the United States that have any area equal to or greater than 640 acres.

Date of Government Version: 12/31/2014
Date Data Arrived at EDR: 07/14/2015
Date Made Active in Reports: 01/10/2017
Number of Days to Update: 546

Source: USGS
Telephone: 202-208-3710
Last EDR Contact: 07/11/2018
Next Scheduled EDR Contact: 10/22/2018
Data Release Frequency: Semi-Annually

FUSRAP: Formerly Utilized Sites Remedial Action Program

DOE established the Formerly Utilized Sites Remedial Action Program (FUSRAP) in 1974 to remediate sites where radioactive contamination remained from Manhattan Project and early U.S. Atomic Energy Commission (AEC) operations.

Date of Government Version: 12/23/2016
Date Data Arrived at EDR: 12/27/2016
Date Made Active in Reports: 02/17/2017
Number of Days to Update: 52

Source: Department of Energy
Telephone: 202-586-3559
Last EDR Contact: 08/01/2018
Next Scheduled EDR Contact: 11/19/2018
Data Release Frequency: Varies

UMTRA: Uranium Mill Tailings Sites

Uranium ore was mined by private companies for federal government use in national defense programs. When the mills shut down, large piles of the sand-like material (mill tailings) remain after uranium has been extracted from the ore. Levels of human exposure to radioactive materials from the piles are low; however, in some cases tailings were used as construction materials before the potential health hazards of the tailings were recognized.

Date of Government Version: 06/23/2017
Date Data Arrived at EDR: 10/11/2017
Date Made Active in Reports: 11/03/2017
Number of Days to Update: 23

Source: Department of Energy
Telephone: 505-845-0011
Last EDR Contact: 05/18/2018
Next Scheduled EDR Contact: 09/03/2018
Data Release Frequency: Varies

LEAD SMELTER 1: Lead Smelter Sites

A listing of former lead smelter site locations.

Date of Government Version: 05/13/2018
Date Data Arrived at EDR: 05/30/2018
Date Made Active in Reports: 06/29/2018
Number of Days to Update: 30

Source: Environmental Protection Agency
Telephone: 703-603-8787
Last EDR Contact: 08/09/2018
Next Scheduled EDR Contact: 10/15/2018
Data Release Frequency: Varies

LEAD SMELTER 2: Lead Smelter Sites

A list of several hundred sites in the U.S. where secondary lead smelting was done from 1931and 1964. These sites may pose a threat to public health through ingestion or inhalation of contaminated soil or dust

Date of Government Version: 04/05/2001
Date Data Arrived at EDR: 10/27/2010
Date Made Active in Reports: 12/02/2010
Number of Days to Update: 36

Source: American Journal of Public Health
Telephone: 703-305-6451
Last EDR Contact: 12/02/2009
Next Scheduled EDR Contact: N/A
Data Release Frequency: No Update Planned

US AIRS (AFS): Aerometric Information Retrieval System Facility Subsystem (AFS)

The database is a sub-system of Aerometric Information Retrieval System (AIRS). AFS contains compliance data on air pollution point sources regulated by the U.S. EPA and/or state and local air regulatory agencies. This information comes from source reports by various stationary sources of air pollution, such as electric power plants, steel mills, factories, and universities, and provides information about the air pollutants they produce. Action, air program, air program pollutant, and general level plant data. It is used to track emissions and compliance data from industrial plants.

Date of Government Version: 10/12/2016
Date Data Arrived at EDR: 10/26/2016
Date Made Active in Reports: 02/03/2017
Number of Days to Update: 100

Source: EPA
Telephone: 202-564-2496
Last EDR Contact: 09/26/2017
Next Scheduled EDR Contact: 01/08/2018
Data Release Frequency: Annually

US AIRS MINOR: Air Facility System Data

A listing of minor source facilities.

Date of Government Version: 10/12/2016
Date Data Arrived at EDR: 10/26/2016
Date Made Active in Reports: 02/03/2017
Number of Days to Update: 100

Source: EPA
Telephone: 202-564-2496
Last EDR Contact: 09/26/2017
Next Scheduled EDR Contact: 01/08/2018
Data Release Frequency: Annually

US MINES: Mines Master Index File

Contains all mine identification numbers issued for mines active or opened since 1971. The data also includes violation information.

Date of Government Version: 05/03/2018
Date Data Arrived at EDR: 05/31/2018
Date Made Active in Reports: 06/29/2018
Number of Days to Update: 29

Source: Department of Labor, Mine Safety and Health Administration
Telephone: 303-231-5959
Last EDR Contact: 05/31/2018
Next Scheduled EDR Contact: 09/10/2018
Data Release Frequency: Semi-Annually

US MINES 2: Ferrous and Nonferrous Metal Mines Database Listing

This map layer includes ferrous (ferrous metal mines are facilities that extract ferrous metals, such as iron ore or molybdenum) and nonferrous (Nonferrous metal mines are facilities that extract nonferrous metals, such as gold, silver, copper, zinc, and lead) metal mines in the United States.

Date of Government Version: 12/05/2005
Date Data Arrived at EDR: 02/29/2008
Date Made Active in Reports: 04/18/2008
Number of Days to Update: 49

Source: USGS
Telephone: 703-648-7709
Last EDR Contact: 05/30/2018
Next Scheduled EDR Contact: 09/10/2018
Data Release Frequency: Varies

US MINES 3: Active Mines & Mineral Plants Database Listing

Active Mines and Mineral Processing Plant operations for commodities monitored by the Minerals Information Team of the USGS.

Date of Government Version: 04/14/2011
Date Data Arrived at EDR: 06/08/2011
Date Made Active in Reports: 09/13/2011
Number of Days to Update: 97

Source: USGS
Telephone: 703-648-7709
Last EDR Contact: 05/30/2018
Next Scheduled EDR Contact: 09/10/2018
Data Release Frequency: Varies

ABANDONED MINES: Abandoned Mines

An inventory of land and water impacted by past mining (primarily coal mining) is maintained by OSMRE to provide information needed to implement the Surface Mining Control and Reclamation Act of 1977 (SMCRA). The inventory contains information on the location, type, and extent of AML impacts, as well as, information on the cost associated with the reclamation of those problems. The inventory is based upon field surveys by State, Tribal, and OSMRE program officials. It is dynamic to the extent that it is modified as new problems are identified and existing problems are reclaimed.

Date of Government Version: 03/08/2018
Date Data Arrived at EDR: 03/13/2018
Date Made Active in Reports: 06/08/2018
Number of Days to Update: 87

Source: Department of Interior
Telephone: 202-208-2609
Last EDR Contact: 06/20/2018
Next Scheduled EDR Contact: 09/24/2018
Data Release Frequency: Quarterly

FINDS: Facility Index System/Facility Registry System

Facility Index System. FINDS contains both facility information and 'pointers' to other sources that contain more detail. EDR includes the following FINDS databases in this report: PCS (Permit Compliance System), AIRS (Aerometric Information Retrieval System), DOCKET (Enforcement Docket used to manage and track information on civil judicial enforcement cases for all environmental statutes), FURS (Federal Underground Injection Control), C-DOCKET (Criminal Docket System used to track criminal enforcement actions for all environmental statutes), FFIS (Federal Facilities Information System), STATE (State Environmental Laws and Statutes), and PADS (PCB Activity Data System).

Date of Government Version: 02/21/2018
Date Data Arrived at EDR: 02/23/2018
Date Made Active in Reports: 03/23/2018
Number of Days to Update: 28

Source: EPA
Telephone: (404) 562-9900
Last EDR Contact: 06/06/2018
Next Scheduled EDR Contact: 09/17/2018
Data Release Frequency: Quarterly

ECHO: Enforcement & Compliance History Information

ECHO provides integrated compliance and enforcement information for about 800,000 regulated facilities nationwide.

Date of Government Version: 02/25/2018
Date Data Arrived at EDR: 03/17/2018
Date Made Active in Reports: 06/08/2018
Number of Days to Update: 83

Source: Environmental Protection Agency
Telephone: 202-564-2280
Last EDR Contact: 06/06/2018
Next Scheduled EDR Contact: 09/17/2018
Data Release Frequency: Quarterly

UXO: Unexploded Ordnance Sites

A listing of unexploded ordnance site locations

Date of Government Version: 09/30/2016
Date Data Arrived at EDR: 10/31/2017
Date Made Active in Reports: 01/12/2018
Number of Days to Update: 73

Source: Department of Defense
Telephone: 703-704-1564
Last EDR Contact: 07/13/2018
Next Scheduled EDR Contact: 10/29/2018
Data Release Frequency: Varies

DOCKET HWC: Hazardous Waste Compliance Docket Listing
A complete list of the Federal Agency Hazardous Waste Compliance Docket Facilities.

Date of Government Version: 01/04/2018
Date Data Arrived at EDR: 01/19/2018
Date Made Active in Reports: 04/13/2018
Number of Days to Update: 84
Source: Environmental Protection Agency
Telephone: 202-564-0527
Last EDR Contact: 06/01/2018
Next Scheduled EDR Contact: 09/10/2018
Data Release Frequency: Varies

FUELS PROGRAM: EPA Fuels Program Registered Listing
This listing includes facilities that are registered under the Part 80 (Code of Federal Regulations) EPA Fuels Programs. All companies now are required to submit new and updated registrations.

Date of Government Version: 02/20/2018
Date Data Arrived at EDR: 02/21/2018
Date Made Active in Reports: 03/23/2018
Number of Days to Update: 30
Source: EPA
Telephone: 800-385-6164
Last EDR Contact: 05/23/2018
Next Scheduled EDR Contact: 09/03/2018
Data Release Frequency: Quarterly

AIRS: Air Quality Permit Listing
A listing of facilities with air quality permits.

Date of Government Version: 06/11/2018
Date Data Arrived at EDR: 06/14/2018
Date Made Active in Reports: 07/25/2018
Number of Days to Update: 41
Source: Department of Environmental Quality
Telephone: 919-707-8726
Last EDR Contact: 06/14/2018
Next Scheduled EDR Contact: 09/24/2018
Data Release Frequency: Varies

ASBESTOS: ASBESTOS
Asbestos notification sites

Date of Government Version: 10/15/2016
Date Data Arrived at EDR: 03/01/2018
Date Made Active in Reports: 04/18/2018
Number of Days to Update: 48
Source: Department of Health & Human Services
Telephone: 919-707-5973
Last EDR Contact: 08/02/2018
Next Scheduled EDR Contact: 11/05/2018
Data Release Frequency: Varies

COAL ASH: Coal Ash Disposal Sites
A listing of coal combustion products distribution permits issued by the Division for the treatment, storage, transportation, use and disposal of coal combustion products.

Date of Government Version: 12/14/2015
Date Data Arrived at EDR: 02/23/2016
Date Made Active in Reports: 05/18/2016
Number of Days to Update: 85
Source: Department of Environment & Natural Resources
Telephone: 919-807-6359
Last EDR Contact: 07/30/2018
Next Scheduled EDR Contact: 11/12/2018
Data Release Frequency: Varies

DRYCLEANERS: Drycleaning Sites
Potential and known drycleaning sites, active and abandoned, that the Drycleaning Solvent Cleanup Program has knowledge of and entered into this database.

Date of Government Version: 04/23/2018
Date Data Arrived at EDR: 06/20/2018
Date Made Active in Reports: 07/25/2018
Number of Days to Update: 35
Source: Department of Environment & Natural Resources
Telephone: 919-508-8400
Last EDR Contact: 06/20/2018
Next Scheduled EDR Contact: 10/01/2018
Data Release Frequency: Varies

Financial Assurance 1: Financial Assurance Information Listing
A listing of financial assurance information for underground storage tank facilities. Financial assurance is intended to ensure that resources are available to pay for the cost of closure, post-closure care, and corrective measures if the owner or operator of a regulated facility is unable or unwilling to pay.

Date of Government Version: 05/04/2018
Date Data Arrived at EDR: 05/08/2018
Date Made Active in Reports: 06/11/2018
Number of Days to Update: 34

Source: Department of Environment & Natural Resources
Telephone: 919-733-1322
Last EDR Contact: 08/07/2018
Next Scheduled EDR Contact: 11/19/2018
Data Release Frequency: Quarterly

Financial Assurance 2: Financial Assurance Information Listing

Information for solid waste facilities. Financial assurance is intended to ensure that resources are available to pay for the cost of closure, post-closure care, and corrective measures if the owner or operator of a regulated facility is unable or unwilling to pay.

Date of Government Version: 10/02/2012
Date Data Arrived at EDR: 10/03/2012
Date Made Active in Reports: 10/26/2012
Number of Days to Update: 23

Source: Department of Environmental & Natural Resources
Telephone: 919-508-8496
Last EDR Contact: 06/22/2018
Next Scheduled EDR Contact: 10/08/2018
Data Release Frequency: Varies

Financial Assurance 3: Financial Assurance Information

Hazardous waste financial assurance information.

Date of Government Version: 06/11/2018
Date Data Arrived at EDR: 06/12/2018
Date Made Active in Reports: 07/25/2018
Number of Days to Update: 43

Source: Department of Environment & Natural Resources
Telephone: 919-707-8222
Last EDR Contact: 06/07/2018
Next Scheduled EDR Contact: 09/24/2018
Data Release Frequency: Varies

NPDES: NPDES Facility Location Listing

General information regarding NPDES(National Pollutant Discharge Elimination System) permits.

Date of Government Version: 04/02/2018
Date Data Arrived at EDR: 05/04/2018
Date Made Active in Reports: 06/11/2018
Number of Days to Update: 38

Source: Department of Environment & Natural Resources
Telephone: 919-733-7015
Last EDR Contact: 08/01/2018
Next Scheduled EDR Contact: 11/12/2018
Data Release Frequency: Varies

UIC: Underground Injection Wells Listing

A listing of uncerground injection wells locations.

Date of Government Version: 06/01/2018
Date Data Arrived at EDR: 06/05/2018
Date Made Active in Reports: 07/25/2018
Number of Days to Update: 50

Source: Department of Environment & Natural Resources
Telephone: 919-807-6412
Last EDR Contact: 06/01/2018
Next Scheduled EDR Contact: 09/17/2018
Data Release Frequency: Quarterly

AOP: Animal Operation Permits Listing

This listing includes animal operations that are required to be permitted by the state.

Date of Government Version: 01/26/2018
Date Data Arrived at EDR: 03/09/2018
Date Made Active in Reports: 06/07/2018
Number of Days to Update: 90

Source: Department of Environmental Quality
Telephone: 919-707-9129
Last EDR Contact: 06/15/2018
Next Scheduled EDR Contact: 09/24/2018
Data Release Frequency: Varies

EDR HIGH RISK HISTORICAL RECORDS

EDR Exclusive Records

EDR MGP: EDR Proprietary Manufactured Gas Plants

The EDR Proprietary Manufactured Gas Plant Database includes records of coal gas plants (manufactured gas plants) compiled by EDR's researchers. Manufactured gas sites were used in the United States from the 1800's to 1950's to produce a gas that could be distributed and used as fuel. These plants used whale oil, rosin, coal, or a mixture of coal, oil, and water that also produced a significant amount of waste. Many of the byproducts of the gas production, such as coal tar (oily waste containing volatile and non-volatile chemicals), sludges, oils and other compounds are potentially hazardous to human health and the environment. The byproduct from this process was frequently disposed of directly at the plant site and can remain or spread slowly, serving as a continuous source of soil and groundwater contamination.

Date of Government Version: N/A
Date Data Arrived at EDR: N/A
Date Made Active in Reports: N/A
Number of Days to Update: N/A

Source: EDR, Inc.
Telephone: N/A
Last EDR Contact: N/A
Next Scheduled EDR Contact: N/A
Data Release Frequency: No Update Planned

EDR Hist Auto: EDR Exclusive Historical Auto Stations

EDR has searched selected national collections of business directories and has collected listings of potential gas station/filling station/service station sites that were available to EDR researchers. EDR's review was limited to those categories of sources that might, in EDR's opinion, include gas station/filling station/service station establishments. The categories reviewed included, but were not limited to gas, gas station, gasoline station, filling station, auto, automobile repair, auto service station, service station, etc. This database falls within a category of information EDR classifies as "High Risk Historical Records", or HRHR. EDR's HRHR effort presents unique and sometimes proprietary data about past sites and operations that typically create environmental concerns, but may not show up in current government records searches.

Date of Government Version: N/A
Date Data Arrived at EDR: N/A
Date Made Active in Reports: N/A
Number of Days to Update: N/A

Source: EDR, Inc.
Telephone: N/A
Last EDR Contact: N/A
Next Scheduled EDR Contact: N/A
Data Release Frequency: Varies

EDR Hist Cleaner: EDR Exclusive Historical Cleaners

EDR has searched selected national collections of business directories and has collected listings of potential dry cleaner sites that were available to EDR researchers. EDR's review was limited to those categories of sources that might, in EDR's opinion, include dry cleaning establishments. The categories reviewed included, but were not limited to dry cleaners, cleaners, laundry, laundromat, cleaning/laundry, wash & dry etc. This database falls within a category of information EDR classifies as "High Risk Historical Records", or HRHR. EDR's HRHR effort presents unique and sometimes proprietary data about past sites and operations that typically create environmental concerns, but may not show up in current government records searches.

Date of Government Version: N/A
Date Data Arrived at EDR: N/A
Date Made Active in Reports: N/A
Number of Days to Update: N/A

Source: EDR, Inc.
Telephone: N/A
Last EDR Contact: N/A
Next Scheduled EDR Contact: N/A
Data Release Frequency: Varies

EDR RECOVERED GOVERNMENT ARCHIVES

Exclusive Recovered Govt. Archives

RGA HWS: Recovered Government Archive State Hazardous Waste Facilities List

The EDR Recovered Government Archive State Hazardous Waste database provides a list of SHWS incidents derived from historical databases and includes many records that no longer appear in current government lists. Compiled from Records formerly available from the Department of Environment, Health and Natural Resources in North Carolina.

Date of Government Version: N/A
Date Data Arrived at EDR: 07/01/2013
Date Made Active in Reports: 12/24/2013
Number of Days to Update: 176

Source: Department of Environment, Health and Natural Resources
Telephone: N/A
Last EDR Contact: 06/01/2012
Next Scheduled EDR Contact: N/A
Data Release Frequency: Varies

RGA LF: Recovered Government Archive Solid Waste Facilities List

The EDR Recovered Government Archive Landfill database provides a list of landfills derived from historical databases and includes many records that no longer appear in current government lists. Compiled from Records formerly available from the Department of Environment, Health and Natural Resources in North Carolina.

Date of Government Version: N/A
Date Data Arrived at EDR: 07/01/2013
Date Made Active in Reports: 01/13/2014
Number of Days to Update: 196

Source: Department of Environment, Health and Natural Resources
Telephone: N/A
Last EDR Contact: 06/01/2012
Next Scheduled EDR Contact: N/A
Data Release Frequency: Varies

RGA LUST: Recovered Government Archive Leaking Underground Storage Tank

The EDR Recovered Government Archive Leaking Underground Storage Tank database provides a list of LUST incidents derived from historical databases and includes many records that no longer appear in current government lists. Compiled from Records formerly available from the Department of Environment, Health and Natural Resources in North Carolina.

Date of Government Version: N/A
Date Data Arrived at EDR: 07/01/2013
Date Made Active in Reports: 12/20/2013
Number of Days to Update: 172

Source: Department of Environment, Health and Natural Resources
Telephone: N/A
Last EDR Contact: 06/01/2012
Next Scheduled EDR Contact: N/A
Data Release Frequency: Varies

OTHER DATABASE(S)

Depending on the geographic area covered by this report, the data provided in these specialty databases may or may not be complete. For example, the existence of wetlands information data in a specific report does not mean that all wetlands in the area covered by the report are included. Moreover, the absence of any reported wetlands information does not necessarily mean that wetlands do not exist in the area covered by the report.

CT MANIFEST: Hazardous Waste Manifest Data

Facility and manifest data. Manifest is a document that lists and tracks hazardous waste from the generator through transporters to a tsd facility.

Date of Government Version: 01/03/2018
Date Data Arrived at EDR: 02/14/2018
Date Made Active in Reports: 03/22/2018
Number of Days to Update: 36

Source: Department of Energy & Environmental Protection
Telephone: 860-424-3375
Last EDR Contact: 08/09/2018
Next Scheduled EDR Contact: 11/26/2018
Data Release Frequency: No Update Planned

NJ MANIFEST: Manifest Information

Hazardous waste manifest information.

Date of Government Version: 12/31/2017
Date Data Arrived at EDR: 07/13/2018
Date Made Active in Reports: 08/01/2018
Number of Days to Update: 19

Source: Department of Environmental Protection
Telephone: N/A
Last EDR Contact: 07/13/2018
Next Scheduled EDR Contact: 10/22/2018
Data Release Frequency: Annually

NY MANIFEST: Facility and Manifest Data

Manifest is a document that lists and tracks hazardous waste from the generator through transporters to a TSD facility.

Date of Government Version: 04/30/2018
Date Data Arrived at EDR: 05/03/2018
Date Made Active in Reports: 06/07/2018
Number of Days to Update: 35

Source: Department of Environmental Conservation
Telephone: 518-402-8651
Last EDR Contact: 08/01/2018
Next Scheduled EDR Contact: 11/12/2018
Data Release Frequency: Quarterly

PA MANIFEST: Manifest Information

Hazardous waste manifest information.

Date of Government Version: 12/31/2016
Date Data Arrived at EDR: 07/25/2017
Date Made Active in Reports: 09/25/2017
Number of Days to Update: 62

Source: Department of Environmental Protection
Telephone: 717-783-8990
Last EDR Contact: 07/12/2018
Next Scheduled EDR Contact: 10/29/2018
Data Release Frequency: Annually

RI MANIFEST: Manifest information
Hazardous waste manifest information

Date of Government Version: 12/31/2017
Date Data Arrived at EDR: 02/23/2018
Date Made Active in Reports: 04/09/2018
Number of Days to Update: 45

Source: Department of Environmental Management
Telephone: 401-222-2797
Last EDR Contact: 05/21/2018
Next Scheduled EDR Contact: 09/03/2018
Data Release Frequency: Annually

WI MANIFEST: Manifest Information
Hazardous waste manifest information.

Date of Government Version: 12/31/2017
Date Data Arrived at EDR: 06/15/2018
Date Made Active in Reports: 07/09/2018
Number of Days to Update: 24

Source: Department of Natural Resources
Telephone: N/A
Last EDR Contact: 06/11/2018
Next Scheduled EDR Contact: 09/24/2018
Data Release Frequency: Annually

Oil/Gas Pipelines
Source: PennWell Corporation
Petroleum Bundle (Crude Oil, Refined Products, Petrochemicals, Gas Liquids (LPG/NGL), and Specialty Gases (Miscellaneous)) N = Natural Gas Bundle (Natural Gas, Gas Liquids (LPG/NGL), and Specialty Gases (Miscellaneous)). This map includes information copyrighted by PennWell Corporation. This information is provided on a best effort basis and PennWell Corporation does not guarantee its accuracy nor warrant its fitness for any particular purpose. Such information has been reprinted with the permission of PennWell.

Electric Power Transmission Line Data
Source: PennWell Corporation
This map includes information copyrighted by PennWell Corporation. This information is provided on a best effort basis and PennWell Corporation does not guarantee its accuracy nor warrant its fitness for any particular purpose. Such information has been reprinted with the permission of PennWell.

Sensitive Receptors: There are individuals deemed sensitive receptors due to their fragile immune systems and special sensitivity to environmental discharges. These sensitive receptors typically include the elderly, the sick, and children. While the location of all sensitive receptors cannot be determined, EDR indicates those buildings and facilities - schools, daycares, hospitals, medical centers, and nursing homes - where individuals who are sensitive receptors are likely to be located.

AHA Hospitals:
Source: American Hospital Association, Inc.
Telephone: 312-280-5991
The database includes a listing of hospitals based on the American Hospital Association's annual survey of hospitals.

Medical Centers: Provider of Services Listing
Source: Centers for Medicare & Medicaid Services
Telephone: 410-786-3000
A listing of hospitals with Medicare provider number, produced by Centers of Medicare & Medicaid Services, a federal agency within the U.S. Department of Health and Human Services.

Nursing Homes
Source: National Institutes of Health
Telephone: 301-594-6248
Information on Medicare and Medicaid certified nursing homes in the United States.

Public Schools
Source: National Center for Education Statistics
Telephone: 202-502-7300
The National Center for Education Statistics' primary database on elementary and secondary public education in the United States. It is a comprehensive, annual, national statistical database of all public elementary and secondary schools and school districts, which contains data that are comparable across all states.

Private Schools
Source: National Center for Education Statistics
Telephone: 202-502-7300
The National Center for Education Statistics' primary database on private school locations in the United States.

Daycare Centers: Child Care Facility List
Source: Department of Health & Human Services
Telephone: 919-662-4499

Flood Zone Data: This data was obtained from the Federal Emergency Management Agency (FEMA). It depicts 100-year and 500-year flood zones as defined by FEMA. It includes the National Flood Hazard Layer (NFHL) which incorporates Flood Insurance Rate Map (FIRM) data and Q3 data from FEMA in areas not covered by NFHL.
Source: FEMA
Telephone: 877-336-2627
Date of Government Version: 2003, 2015

NWI: National Wetlands Inventory. This data, available in select counties across the country, was obtained by EDR in 2002, 2005 and 2010 from the U.S. Fish and Wildlife Service.

State Wetlands Data: Wetland Inventory
Source: US Fish & Wildlife Service
Telephone: 703-358-2171

Current USGS 7.5 Minute Topographic Map
Source: U.S. Geological Survey

STREET AND ADDRESS INFORMATION

Michael Baker
INTERNATIONAL

We Make a Difference

June 1, 2018

Renee Gledhill-Earley, Environmental Review Coordinator
State Historic Preservation Office
4617 Mail Service Center
Raleigh, NC 27699-4617
Email: Environmental.Review@ncdcr.gov

RE: Project Review Request
UT to Rush Fork Stream Mitigation Project
Haywood County, North Carolina
French Broad River Basin (Catalog Unit - 06010106)

Dear Ms. Gledhill-Earley:

Michael Baker Engineering, Inc. (Baker) is contracted by the North Carolina Division of Mitigation Services (NCDMS) to conduct stream and/or wetland restoration/enhancement activities for the above-referenced project. We are requesting an office review of the attached documentation and comment on any possible issues that may emerge with respect to archaeological or cultural resources associated with the proposed stream and/or wetland restoration/enhancement project.

The project area is located in the Crabtree Community in Haywood County, North Carolina approximately 3 miles south of the Township of Fines Creek. The project is located on the United States Geological Survey's (USGS) Fines Creek Topographic Quadrangle. The center of the project area is located at 35.6446 N and -82.9402 W. The project site flows southwesterly and is bisected by Rush Fork Road approximately 1.8 miles north of its intersection with Silvers Coves Road. Please see the enclosed Vicinity and USGS Topographic Maps for a depiction of the project site location.

The UT to Rush Fork site was identified to provide compensatory mitigation for unavoidable stream and/or wetland impacts. The existing stream reaches have been significantly impacted by unrestricted livestock access and the removal of riparian buffers. Most of the project reaches have cleared banks with a mix of small scattered trees and stands of invasive species located at the top of bank in non-grazed areas. Currently, the project reaches are unstable, incised, and exhibit active bank erosion from both high flows and livestock access.

The project will involve the restoration and enhancement of approximately 5,300 LF of existing stream. A Best Management Practice (BMP) will also be implemented at the head of one of the tributaries to treat nutrient and sediment laden run-off from the surrounding pasture area. Degraded riparian wetlands will be restored and/or enhanced with the implementation of Priority Level 1 restoration, livestock exclusion, and native riparian buffer plantings. At this time, no wetland credit is being sought for the project. A conservation easement will be implemented along all project reaches in an excess of 30 feet from the top of bank and will incorporate existing functional wetlands. The conservation easement will protect the entire project area in perpetuity. Livestock will be excluded from the conservation easement with permanent fencing.

Michael Baker Engineering, Inc.
Ballantyne One, 15720 Brixham Ave., Suite 300, Office 318
Charlotte, NC 28277 | Office: 704.665.2200

An on-line search was conducted on June 1, 2018 using the HPOWEB GIS Map Service to identify any historic properties listed on the National Register of Historic Places that lie within a one-mile radius of the project site. Results from the search identified the two places: Walker Log House (Site ID HW0515) and a surveyed log house (Site ID HW0477). Please refer to the enclosed SHPO Map for a depiction of the project area's location relative to the historic properties.

On-site investigations and discussions with landowners have not revealed any potential cultural resources within the proposed easement areas. No archeological artifacts have been observed or noted during preliminary surveys of the site for restoration purposes, and no existing structures are located within the areas proposed for restoration or enhancement. The majority of the site has historically been disturbed due to past and current management for pasture grazing and livestock production.

Baker appreciates your timely attention to this matter. If we do not hear from you within 30 days, we will assume that there are no comments with regard to the project area and archaeological and cultural resources. Please feel free to contact us if you have any questions regarding this project or the extent of proposed disturbance. I can be reached at (704) 579-4828 or via my email address at ksuggs@mbakerintl.com.

Sincerely,

Kristi Suggs

Enclosures: Vicinity Map
USGS Topographic Map
SHPO Map

Cc: File

Michael Baker
INTERNATIONAL

We Make a Difference

June 1, 2018

Holly Austin
Section 106 Assistant
Eastern Band of Cherokee Indians
P.O. Box 455
Cherokee, NC 28719
Email: hollymaustin@gmail.com

RE: Project Review Request
UT to Rush Fork Stream Mitigation Project
Haywood County, North Carolina
French Broad River Basin (Catalog Unit - 06010106)

Dear Ms. Austin:

Michael Baker Engineering, Inc. (Baker) is contracted by the North Carolina Division of Mitigation Services (NCDMS) to conduct stream and/or wetland restoration/enhancement activities for the above-referenced project. We are requesting an office review of the attached documentation and comment on any possible issues that may emerge with respect to archaeological or cultural resources associated with the proposed stream and/or wetland restoration/enhancement project.

The project area is located in the Crabtree Community in Haywood County, North Carolina approximately 3 miles south of the Township of Fines Creek. The project is located on the United States Geological Survey's (USGS) Fines Creek Topographic Quadrangle. The center of the project area is located at 35.6446 N and -82.9402 W. The project site flows southwesterly and is bisected by Rush Fork Road approximately 1.8 miles north of its intersection with Silvers Coves Road. Please see the enclosed Vicinity and USGS Topographic Maps for a depiction of the project site location.

The UT to Rush Fork site was identified to provide compensatory mitigation for unavoidable stream and/or wetland impacts. The existing stream reaches have been significantly impacted by unrestricted livestock access and the removal of riparian buffers. Most of the project reaches have cleared banks with a mix of small scattered trees and stands of invasive species located at the top of bank in non-grazed areas. Currently, the project reaches are unstable, incised, and exhibit active bank erosion from both high flows and livestock access.

The project will involve the restoration and enhancement of approximately 5,300 LF of existing stream. A Best Management Practice (BMP) will also be implemented at the head of one of the tributaries to treat nutrient and sediment laden run-off from the surrounding pasture area. Degraded riparian wetlands will be restored and/or enhanced with the implementation of Priority Level 1 restoration, livestock exclusion, and native riparian buffer plantings. At this time, no wetland credit is being sought for the project. A conservation easement will be implemented along all project reaches in an excess of 30 feet from the top of bank and will incorporate existing functional wetlands. The conservation easement will protect the entire project area in perpetuity. Livestock will be excluded from the conservation easement with permanent fencing.

On-site investigations and discussions with landowners have not revealed any potential cultural resources within the proposed easement areas. No archeological artifacts have been observed or noted during preliminary surveys of the site for restoration purposes, and no existing structures are located within the areas proposed for restoration or enhancement. The majority of the site has historically been disturbed due to past and current management for pasture grazing and livestock production.

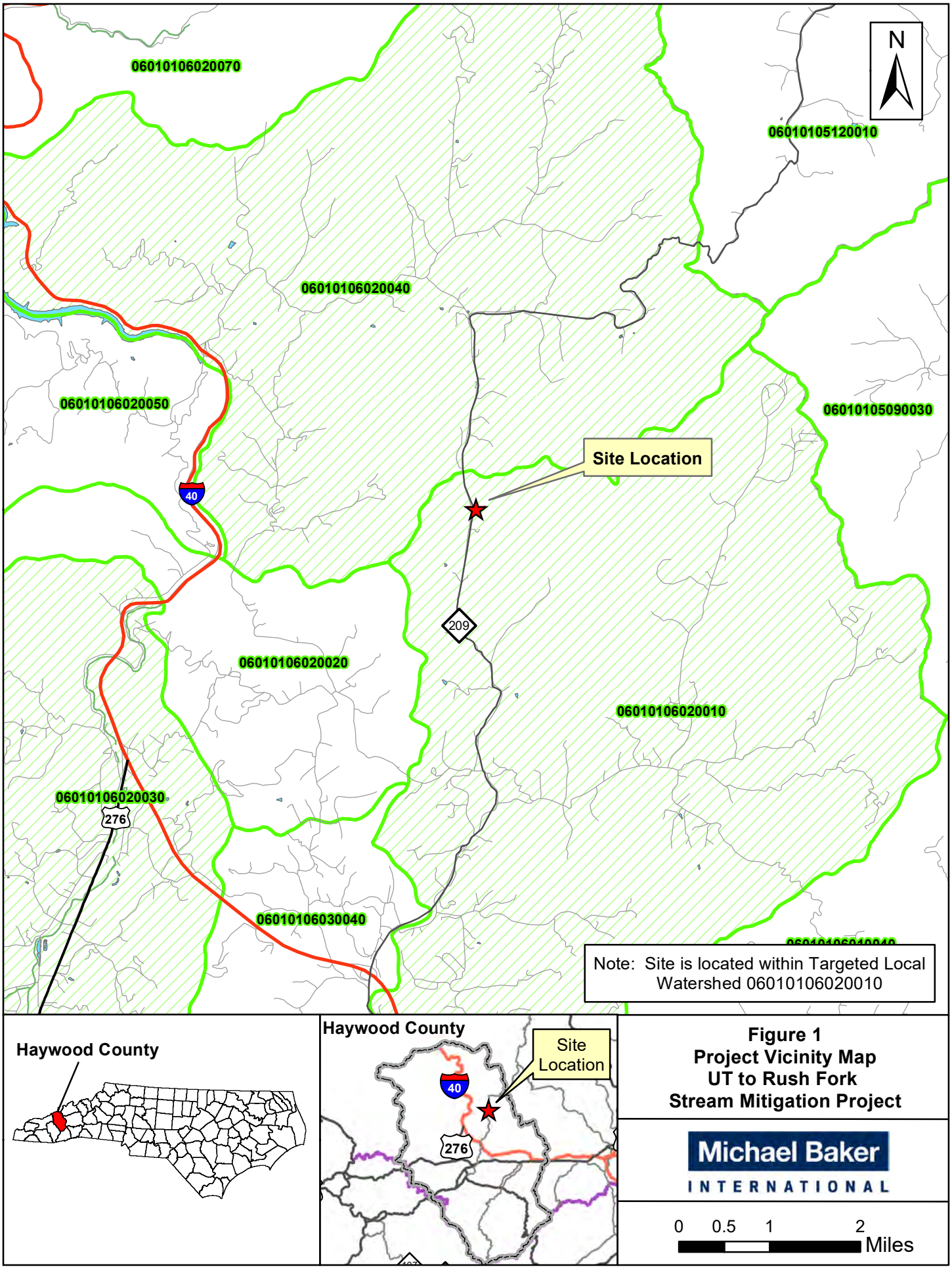
Baker appreciates your timely attention to this matter. If we do not hear from you within 30 days, we will assume that there are no comments with regard to the project area or archaeological or cultural resources. Please feel free to contact us if you have any questions regarding this project or the extent of proposed disturbance. I can be reached at (704) 579-4828 or via my email address at ksuggs@mbakerintl.com.

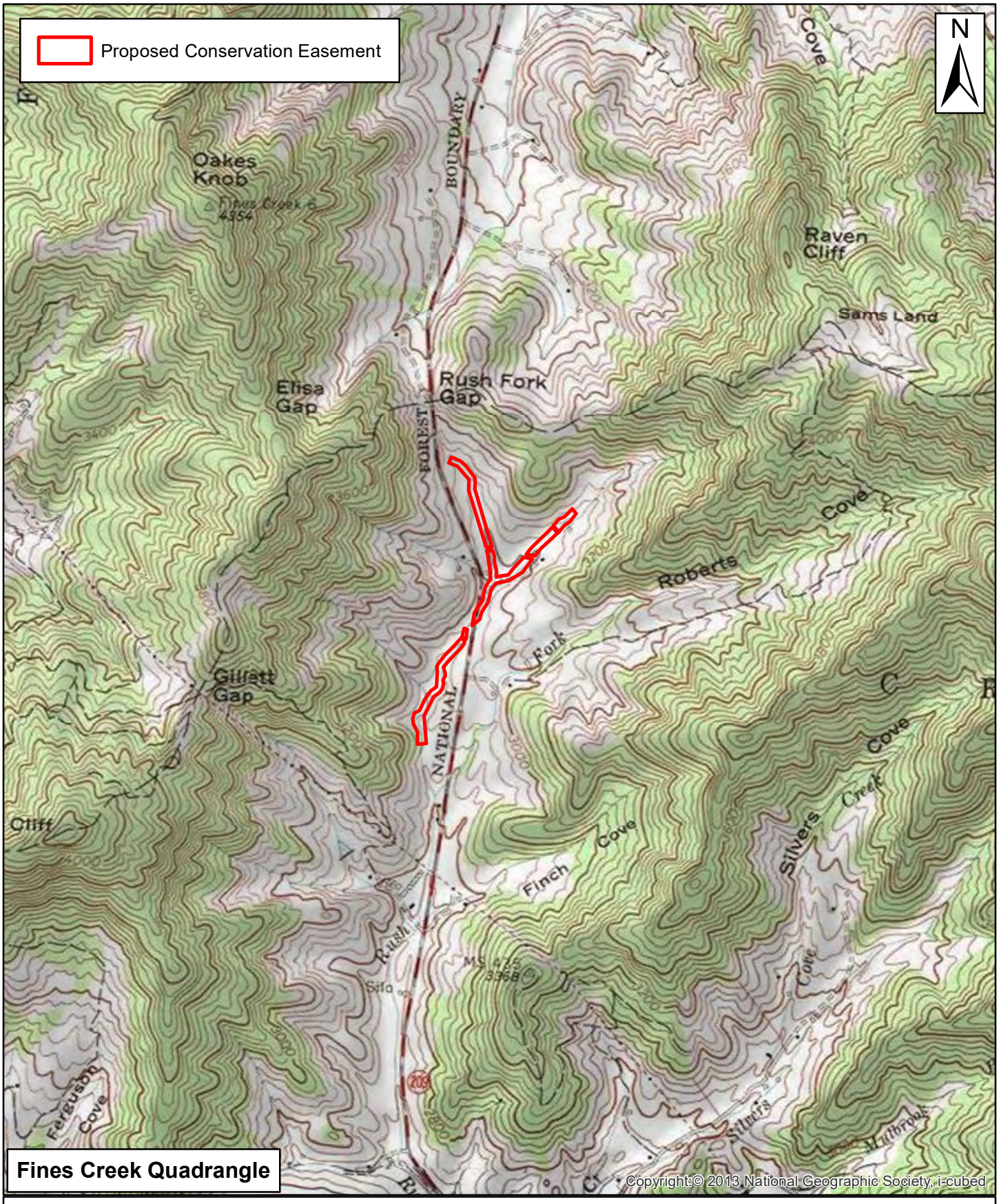
Sincerely,

Kristi Suggs

Enclosures: Vicinity Map
USGS Topographic Map
Project Area Map

Cc: NC State Historic Preservation Office (SHPO)
File


N
06010106020070
06010105120010
06010106020040
06010106020050
06010105090030
Site Location
40
209
06010106020020
06010106020010
06010106020030
276
06010106030040
Note: Site is located within Targeted Local Watershed 06010106020010
Haywood County
Haywood County
Site Location
40
276
Figure 1
Project Vicinity Map
UT to Rush Fork
Stream Mitigation Project
Michael Baker
INTERNATIONAL
0 0.5 1 2
Miles

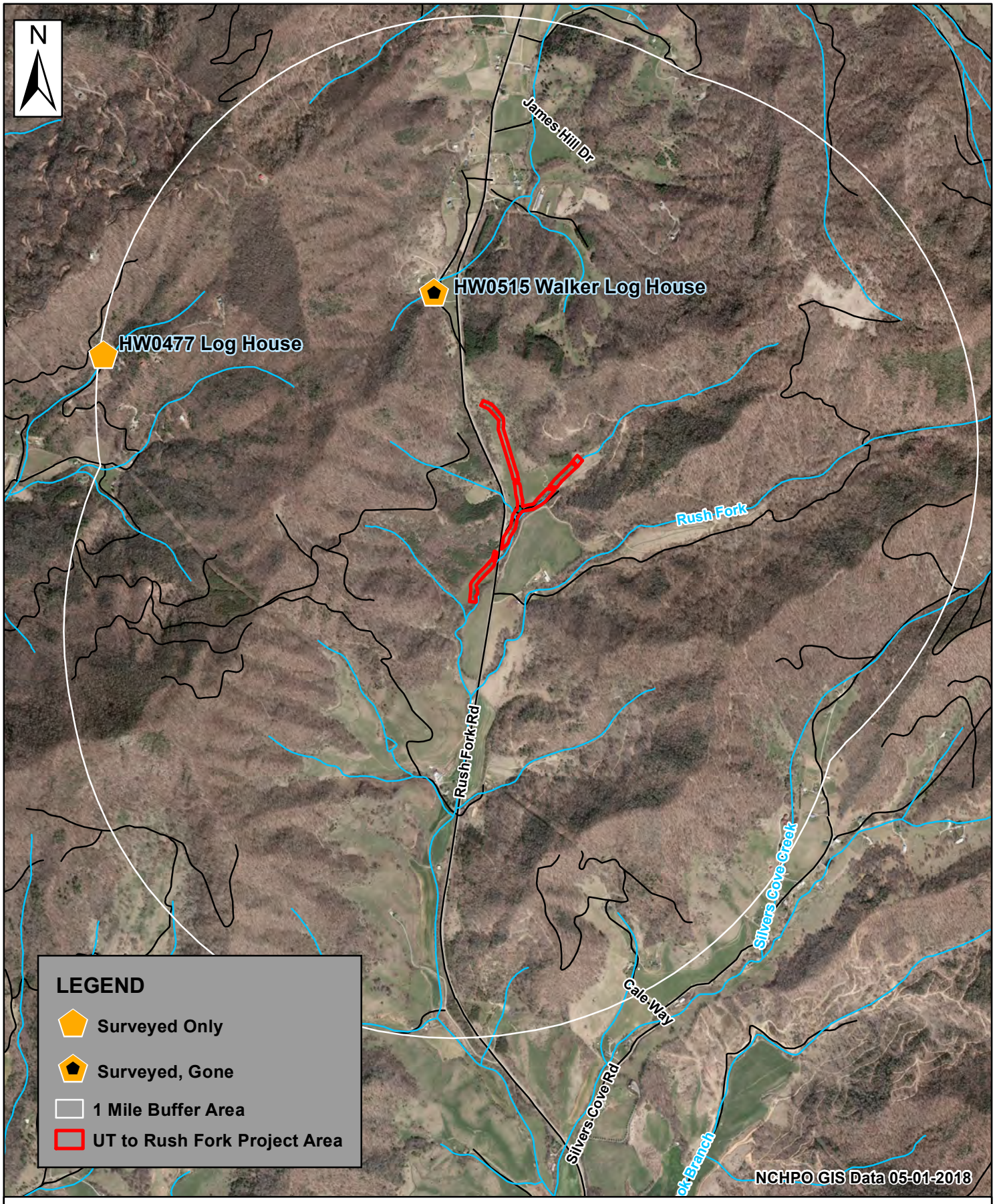


Michael Baker INTERNATIONAL

0 1,600 3,200 Feet

1 inch = 1,600 feet

Figure 2
USGS Topographic Map
UT to Rush Fork
Stream Mitigation Project

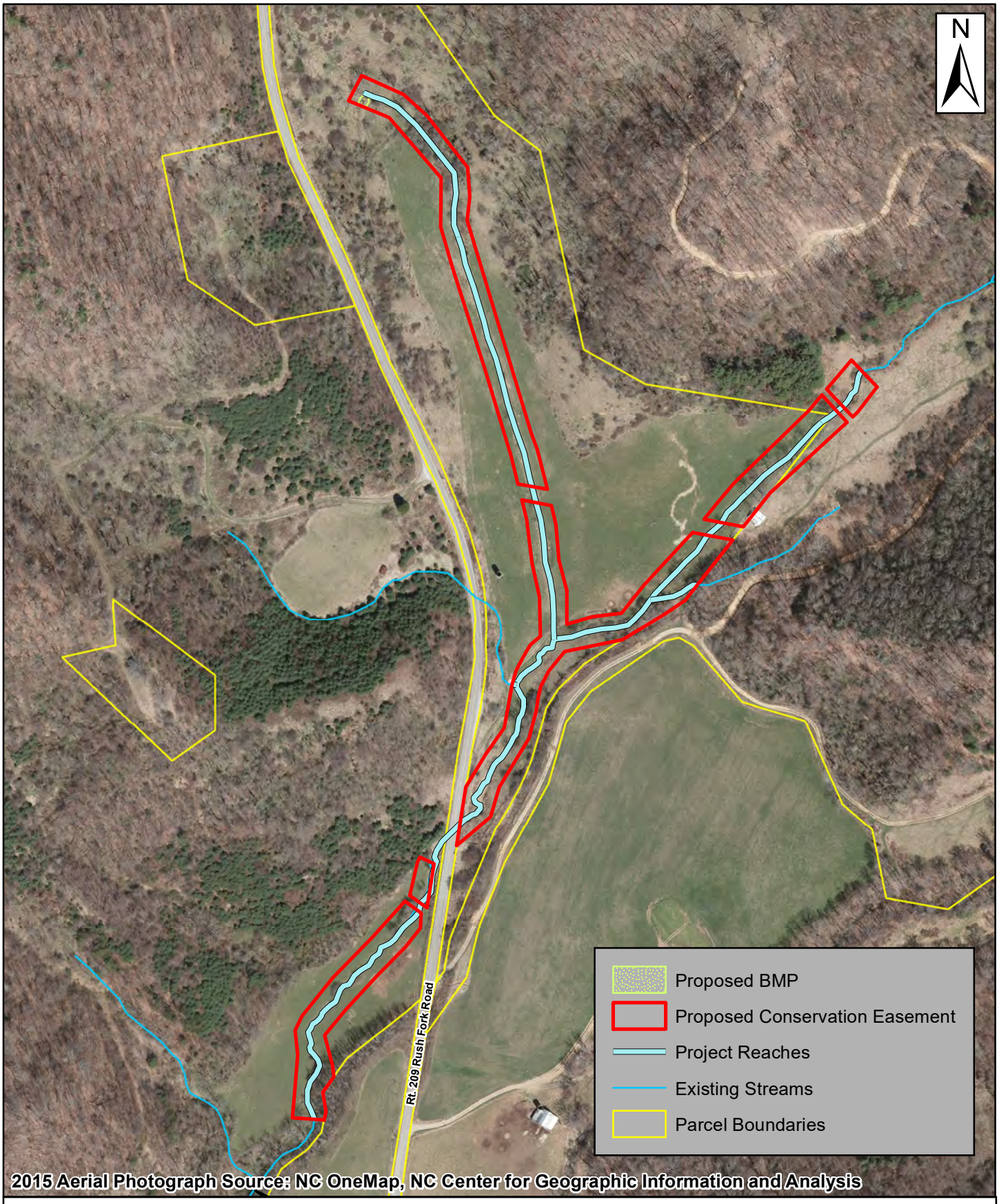


Michael Baker INTERNATIONAL

0 0.334 0.668 Miles

1" = 1/3 Miles

Figure 3
SHPO Map
UT to Rush Fork
Stream Mitigation Project



Michael Baker INTERNATIONAL

0 350 700 Feet

1 inch = 350 feet

Fig.3 Project Area Map
UT to Rush Fork
Mitigation Project

North Carolina Department of Natural and Cultural Resources

State Historic Preservation Office

Ramona M. Bartos, Administrator

Governor Roy Cooper
Secretary Susi H. Hamilton

Office of Archives and History
Deputy Secretary Kevin Cherry

July 3, 2018

Kristi Suggs
Michael Baker Engineering, Inc.
Ballantyne One
15720 Brixham Avenue, Suite 300, Office 318
Charlotte, NC 28277

Re: UT to Rush Fork Stream Mitigation Project, Crabtree, Haywood County, ER 18-1299

Dear Ms. Suggs:

Thank you for your letter of June 1, 2018, concerning the above project.

We have conducted a review of the project and are aware of no historic resources which would be affected by the project. Therefore, we have no comment on the project as proposed.

The above comments are made pursuant to Section 106 of the National Historic Preservation Act and the Advisory Council on Historic Preservation's Regulations for Compliance with Section 106 codified at 36 CFR Part 800.

Thank you for your cooperation and consideration. If you have questions concerning the above comment, contact Renee Gledhill-Earley, environmental review coordinator, at 919-807-6579 or environmental.review@ncdcr.gov. In all future communication concerning this project, please cite the above referenced tracking number.

Sincerely,

Renee Gledhill-Earley

for Ramona M. Bartos

Eastern Band of Cherokee Indians
Tribal Historic Preservation Office
P.O. Box 455
Cherokee, NC 28719
Ph: 828-359-6854 Fax 828-359-0424

DATE: 28 – June – 2018

TO: Michael Baker International
ATTN: Kristi Suggs
Ballantyne One
15720 Brixham Hill Avenue, Suite 300, Office 318
Charlotte, NC 28277

PROJECT: UT to Rush Fork Stream Mitigation Project, Haywood County, North Carolina.

Ms. Suggs:

The Tribal Historic Preservation Office of the Eastern Band of Cherokee Indians (EBCI THPO) accepts the invitation to comment on these proposed section 106 activities under §36CFR800.

It is the opinion of the EBCI THPO that no cultural resources important to the Cherokee people should be adversely impacted by these proposed federal undertakings. As such, these proposed undertakings may proceed as planned. In the event that project design plans change, or cultural resources or human remains are inadvertently discovered during site prep and construction phase, the EBCI THPO requests that all work cease and be notified so we may continue the nation-to-nation consultation process as stipulated under §36CFR800.

If we can be of further service, or if you have any comments or questions, please feel free to contact me at (828) 359-6854.

Sincerely,

Holly Austin
Tribal Historical Preservation Office
Eastern Band of Cherokee Indians

OPTION TO PURCHASE CONSERVATION EASEMENT

THIS OPTION TO PURCHASE CONSERVATION EASEMENT (the "Option") is made and entered into this 18th day of January, 2018 (the "Effective Date"), by and among WE KIRK FARMS NORTH, LLC (the "Grantor"), and **MICHAEL BAKER ENGINEERING, INC.**, a corporation organized in the State of New York with offices at 797 Haywood Rd., Suite 201, Asheville, North Carolina 28806 ("Baker").

WITNESSETH:

WHEREAS, Grantor is the owner of that certain real property located in Haywood County, North Carolina, containing 594.6 acres (PIN 8731-33-5998), more or less, as more particularly described on Exhibit A attached hereto and incorporated herein by reference, together with the improvements thereon and all appurtenances thereto belonging and appertaining, and all creeks, streams, rights-of-way, roads, streets and ways bounding said real property (collectively the "Property"); and

WHEREAS, Grantor has agreed to convey to Baker, an exclusive right and option to acquire a conservation easement, as more particularly described on the attached Exhibit B (the "Easement"), over the Property in accordance with the terms of this Option; and

WHEREAS, Baker is interested in acquiring the Easement in order to develop and construct a full delivery wetland, stream, and/or buffer restoration project over the lands covered by the Easement (the "Work") in conjunction with requests for proposals issued under the Division of Mitigation Services (formerly the Ecosystem Enhancement Program and Wetlands Restoration Program) within the North Carolina Department of Environmental Quality ("DEQ") and Baker has agreed to undertake such Work with respect to the Easement in accordance with the scope of work set forth in Exhibit C, attached hereto; and

WHEREAS, in accordance with the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, Baker hereby notifies Grantor that: (i) Baker believes the fair market value of the Easement is the Purchase Price, pursuant to Paragraph 4(a), together with the value of the environmental improvements to be made to the Easement by Baker in performing the Work on the Easement; and (ii) Baker does not possess the power of eminent domain;

NOW THEREFORE, in consideration of the sum of [redacted] (the "Signing Date Option Deposit") and for other good and valuable consideration, the receipt and sufficiency of which is hereby acknowledged, the parties hereto agree as follows:

1. Grant of Option. Grantor hereby grants unto Baker, its successors and assigns, which shall be limited to a third-party designated by Baker qualified to be the grantee of a conservation easement under N.C.G.S. §121-35(2), the exclusive right and option to purchase the Easement in accordance with and subject to the terms and conditions set forth in this Option.

2. Term. The term of this Option shall commence on the Effective Date and shall expire THIRTY-SIX (36) months after the Effective Date (the "Term"), unless extended by the parties, in writing. A Memorandum of Option to Purchase Easement in the form attached as Exhibit D shall be executed by both parties simultaneously with this Option and recorded at Baker's sole discretion and expense in the county where the Property is located to provide record notice of this Option. In no event shall this Option be recorded or filed in the public records.

materialmen's liens; and (iv) any other documents and papers necessary or appropriate in connection with the consummation of the transaction contemplated by this Option.

At Closing, Baker shall deliver (i) a Settlement Statement setting forth each party's costs, expenses, prorations and other financial analysis of the purchase and sale of the Easement as contemplated hereby; (ii) the Note as defined in item 4(e), below; and (iii) any other documents necessary to consummate the transaction contemplated by the Option.

e. Payment. It is understood that funding for the purchase of the Easement shall be provided by the State of North Carolina pursuant to the Division of Mitigation Services of DEQ and that such funding is made subsequent to recording of the Easement and subsequent to Closing. Therefore, at Closing, Baker shall deliver to Grantor a promissory note in the amount of the Purchase Price, less the Option Deposit and closing costs, mortgage pay-offs, expenses, and prorations applicable to Grantor, which promissory note shall bear interest at Zero Percent (0%) per annum on the unpaid balance until paid or until default and which promissory note shall be due and payable in full on the date ninety (90) days after the Closing (the "Note"). At the time of Closing, Baker shall record the Deed and any plat referenced in the Deed and deliver copies of the recorded documents to the State Property Office for review and funding. The Note shall contain an express provision that if the DEQ fails to fund the purchase of the Easement in the amount of the Purchase Price thereby causing Baker to fail to pay the Note in full on or before the maturity date, then Baker, as Grantor's sole remedy, shall be liable to Grantor for all reasonable costs and expenses, including reasonable attorney fees, required to have the Easement removed and the title to the Property returned to the condition it was prior to the imposition of the Easement, at which point the Note, this Option, and all duties, responsibilities and liabilities with respect thereto shall be null and void. Otherwise, Baker shall pay the Note in full upon receipt of funding by the State of North Carolina.

f. Condition of Property; Intended Use. Prior to Closing, Grantor shall remove all rubbish and trash, including any hazardous waste or harmful chemical substances, from the Easement but shall otherwise keep the Property in the same condition as of the Effective Date, reasonable wear and tear excepted. Grantor shall prevent and refrain from any use of the Property for any purpose or in any manner that would diminish the value of the Easement or adversely affect Baker's intended use of the land for the Easement, which use is to provide the Division of Mitigation Services within DEQ with wetland, stream, and/or buffer mitigation credits. Grantor acknowledges that Baker will enter into an agreement with DEQ to provide these credits, and Grantor agrees not to undertake or permit any activities on the Property that would diminish Baker's ability to obtain such credits. If any adverse change occurs in the condition of the Easement prior to Closing, whether such change is caused by Grantor or by forces beyond Grantor's reasonable control, Baker may elect to (i) refuse to accept the Easement at Closing; (ii) accept the Property at Closing, or a portion thereof with a corresponding adjustment of the Purchase Price; or (iii) terminate this Option and the transaction itself and declare this Option null and void.

g. Warranty of Title. Grantor covenants, represents and warrants that, as of the Effective Date and Closing: (i) Grantor is the sole owner(s) of the Property and is seized of the Property in fee simple absolute; (ii) Grantor has the right and authority to convey this Option and the Easement and Grantor will hold the grantee of the Easement harmless from any failure in Grantor's right and authority to convey the Easement, including issues of title; (iii) there is legal access to the Property and to the Easement; (iv) the Easement is free from any and all encumbrances, except those accepted by Baker in writing; (v) Grantor

If to Baker: Jake Byers
Michael Baker Engineering
797 Haywood Rd. Suite 201
Asheville, NC 28806

If to the Grantor: WE KIRK FARMS NORTH, LLC
448 Little Mountain Road
Waynesville, NC 28786

9. Miscellaneous.

a. This Option, together with the exhibits attached hereto which are incorporated herein by reference, contains the entire understanding of the parties hereto with respect to the subject matter contained herein. No amendment, modification, or discharge of this Option, and no waiver hereunder, shall be valid or binding unless set forth in writing and duly executed by the parties hereto.

b. Any provision of this Option that shall be found to be contrary to applicable law or otherwise unenforceable shall not affect the remaining terms of this Option, which shall be construed as if the unenforceable provision or clause were absent from this Option.

c. This Option shall be binding upon and inure to the benefit of the parties and their respective heirs, personal representatives, successors, and assigns.

d. This Option shall be governed by and construed in accordance with the laws of the State of North Carolina without application of its conflicts of laws provisions.

e. No act or failure to act by either party shall be deemed a waiver of its rights hereunder, and no waiver in any one circumstance or of any one provision shall be deemed a waiver in other circumstances or of other provisions.

f. Grantor agrees to not mow or otherwise damage vegetation within Easement area after Baker plants or replants the same. If Grantor or Grantor's agents or invitees damage vegetation within the Easement, Grantor will replace the lost or damaged vegetation at their expense.

g. Baker shall ensure that access to portions of the Grantor's property shall not be impeded by the proposed.

h. This Option shall not be assignable by Baker, except to another entity acquiring at least fifty-one percent (51%) interest in Baker or Baker's business or to an entity qualified to be the grantee of a conservation easement under N.C.G.S § 121-35

i. Grantor shall be provided access at or near the location of the old road at or near the boundary line between the Palmer Tract and the Grantor's tract.

IN WITNESS WHEREOF, the parties have duly executed this Option as of the date first above written.

GRANTOR:

By: _____

Print Name: WE KIRK FARM NORTH, LLC;
James Weaver Kirkpatrick, Jr.

Title: General Partner

MICHAEL BAKER ENGINEERING, INC.:

By: _____

Print Name: Dwain Hathaway

Title: Vice President/ NC Office Executive

2018000542
HAYWOOD CO, NC FEE $26.00
PRESENTED & RECORDED:
01-22-2018 03:57:12 PM
SHERRI C. ROGERS
REGISTER OF DEEDS
BY: HAVEN MUSE
DEPUTY

BK: RB 944
PG: 1754-1757

EXHIBIT D

Prepared by and Return:

Jake Byers
Michael Baker Engineering, Inc.
797 Haywood Rd, Suite 201
Asheville, NC 28806

MEMORANDUM OF OPTION TO PURCHASE CONSERVATION EASEMENT

THIS MEMORANDUM FOR OPTION TO PURCHASE CONSERVATION EASEMENT ("Memorandum") is made and entered into this 18th day of January, 2018, by and between WE KIRK FARMS NORTH, LLC, private landowner ("Grantor") and **MICHAEL BAKER ENGINEERING, INC.,** a corporation organized in the state of New York with offices at 797 Haywood Rd., Suite 201, Asheville, NC 28806 ("Baker").

WHEREAS, Grantor and Baker have entered into a certain Option to Purchase Conservation Easement (the "Option") dated January 18, 2017, pursuant to which Grantor granted to Baker, its successors and assigns, an option to purchase a conservation easement (the "Easement") over certain real property located in Haywood County, North Carolina, which property is more particularly described on the attached Exhibit D1 (the "Property") and

WHEREAS, The parties enter into this Memorandum for the purpose of setting forth certain terms and conditions of the Option and to provide constructive notice of the Option;

NOW, THEREFORE, in consideration of the foregoing, the parties hereby agree as follows.

1. The term of the Option commenced on January 18, 2018 and shall expire on January 18, 2021.

2. All of the provisions set forth in the Option are incorporated in this Memorandum by reference.

3. The Option shall be binding upon and inure to the benefit of the parties and their respective heirs, successors and assigns.

[SIGNATURES AND NOTARY ACKNOWLEDGMENTS APPEAR ON FOLLOWING PAGES]

IN WITNESS WHEREOF, the parties have duly executed this Memorandum as of the date first above written.

GRANTEE:

By: _____

Print Name: Dwain Hathaway

Title: Vice President & NC Office Executive

STATE OF NORTH CAROLINA

COUNTY OF WAKE

I, KATHLEEN M MCKEITHAN, a Notary Public of the County and State aforesaid, do hereby certify that DWAIN HATHAWAY personally came before me this day and acknowledged that he/she is VICE PRESIDENT & NC Office Executive of Michael Baker Engineering, Inc. a North Carolina professional corporation, and that he acknowledged to me that he voluntarily signed the foregoing document for the purposes therein expressed and in the representative capacity so stated. I have received satisfactory evidence of the person's identity in the form of personal knowledge.

Witness my hand and official seal, this the 19TH day of Janvary, 2018.

_____
Official Signature of Notary

Printed Name: Kathleen M McKeithan Notary Public

My Commission Expires: 2·26·19

[AFFIX NOTARIAL STAMP-SEAL]

GRANTOR:

By: J Weaver Kirkpatrick

Print Name: J Weaver Kirkpatrick, Jr.

Title: Manager

STATE OF NORTH CAROLINA

COUNTY OF Haywood

I, Cynthia K. Reagan, the undersigned Notary Public of the County and State aforesaid, certify that J. Weaver Kirkpatrick, Jr. personally appeared before me this day, acknowledging to me that he/she voluntarily signed and executed the foregoing document. I have received satisfactory evidence of the person's identity in the form of Driver License.

Witness my hand and Notarial stamp or seal, this 18 day of January, 2018.

Cynthia K. Reagan

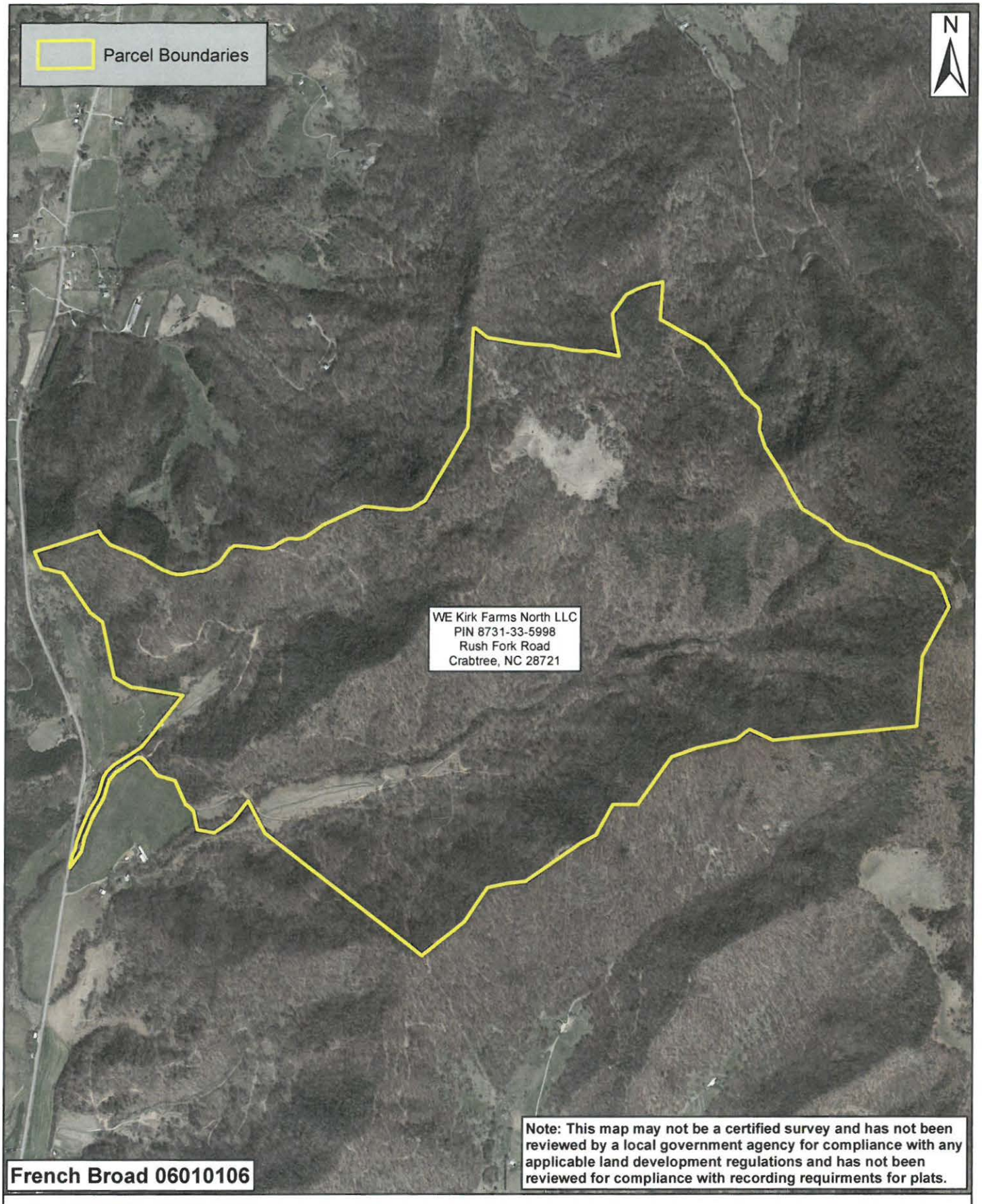
Official Signature of Notary

Printed Name: Cynthia K. Reagan, Notary Public

My Commission Expires: 01/26/2019

[AFFIX NOTARIAL STAMP-SEAL]

CYNTHIA K. REAGAN
Notary Public
Haywood County
My Commission Expires
01/26/2019
NORTH CAROLINA



Michael Baker INTERNATIONAL

0 500 1,000 2,000 Feet

Exhibit D1
Landowner(s):
WE Kirk Farms North LLC

OPTION TO PURCHASE CONSERVATION EASEMENT

THIS OPTION TO PURCHASE CONSERVATION EASEMENT (the "Option") is made and entered into this 26th day of October, 2017 (the "Effective Date"), by and among Anne Palmer Family Properties, LP (the "Grantor"), and **MICHAEL BAKER ENGINEERING, INC.**, a corporation organized in the State of New York with offices at 797 Haywood Rd., Suite 201, Asheville, North Carolina 28806 ("Baker").

WITNESSETH:

WHEREAS, Grantor is the owner of that certain real property located in Haywood County, North Carolina, containing 235.3 acres (PIN 8721-72-6837), more or less, as more particularly described on Exhibit A attached hereto and incorporated herein by reference, together with the improvements thereon and all appurtenances thereto belonging and appertaining, and all creeks, streams, rights-of-way, roads, streets and ways bounding said real property (collectively the "Property"); and

WHEREAS, Grantor has agreed to convey to Baker, an exclusive right and option to acquire a conservation easement, as more particularly described on the attached Exhibit B (the "Easement"), over the Property in accordance with the terms of this Option; and

WHEREAS, Baker is interested in acquiring the Easement in order to develop and construct a full delivery wetland, stream, and/or buffer restoration project over the lands covered by the Easement (the "Work") in conjunction with requests for proposals issued under the Division of Mitigation Services (formerly the Ecosystem Enhancement Program and Wetlands Restoration Program) within the North Carolina Department of Environmental Quality ("DEQ") and Baker has agreed to undertake such Work with respect to the Easement in accordance with the scope of work set forth in Exhibit C, attached hereto; and

WHEREAS, in accordance with the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, Baker hereby notifies Grantor that: (i) Baker believes the fair market value of the Easement is the Purchase Price, pursuant to Paragraph 4(a), together with the value of the environmental improvements to be made to the Easement by Baker in performing the Work on the Easement; and (ii) Baker does not possess the power of eminent domain;

NOW THEREFORE, in consideration of the sum of [redacted] (the "Signing Date Option Deposit") and for other good and valuable consideration, the receipt and sufficiency of which is hereby acknowledged, the parties hereto agree as follows:

1. Grant of Option. Grantor hereby grants unto Baker, its successors and assigns, which shall be limited to a third-party designated by Baker qualified to be the grantee of a conservation easement under N.C.G.S. §121-35(2), the exclusive right and option to purchase the Easement in accordance with and subject to the terms and conditions set forth in this Option.

2. Term. The term of this Option shall commence on the Effective Date and shall expire THIRTY-SIX (36) months after the Effective Date (the "Term"), unless extended by the parties, in writing. A Memorandum of Option to Purchase Easement in the form attached as Exhibit D shall be executed by both parties simultaneously with this Option and recorded at Baker's sole discretion and expense in the county where the Property is located to provide record notice of this Option. In no event shall this Option be recorded or filed in the public records.

3. Exclusivity of Option. Grantor covenants and agrees that it will take no action to sell or transfer the Easement during the Term, and that Grantor will not encumber the Property in a manner that would impair the intended use of the Easement hereunder, it being intended and agreed that the Option is exclusive to Baker and Baker's successors and assigns.

4. Exercise of Option. At any time prior to the expiration of the Term, Baker may exercise this Option by giving Grantor no less than thirty (30) days prior written notice of the date Baker desires to consummate the purchase of the Easement under this Option (the "Closing"). Closing shall take place at a time and place reasonably acceptable to both parties. The terms of the purchase and sale of the Easement at Closing shall be as follows:

a. Purchase Price. The total purchase price for the Easement shall be [redacted] per acre (the "Purchase Price") included in the Easement as determined by the Survey prepared pursuant to Paragraph 4(b), below. The Option Deposit shall be credited towards the Purchase Price at Closing.

b. Survey. Prior to Closing, Baker shall obtain, at Baker's expense, a survey prepared by a registered land surveyor duly licensed in the State of North Carolina showing the boundary of the Easement as well as all easements, rights-of-way, encroachments and improvements located thereon, and the exact acreage of the Easement (the "Survey"), and that Baker shall have consulted with Grantor and taken in to account Grantor's concerns as to the exact delineation of boundaries of the Easement. Following consultation with Grantor and the completion of the Survey, a new legal description of the Easement shall be prepared from the Survey. The new legal description shall be substituted for the description currently attached hereto as Exhibit B, and all references contained herein to the "Easement" shall be deemed to refer to the new description prepared from the Survey.

c. Prorations, Costs and Expenses of Closing. At Closing, ad valorem taxes for the current year for the Easement area shall be prorated, and Grantor shall remain responsible for all other ad valorem taxes applicable to the remainder of the Property subsequent to Closing. At Closing, Grantor shall pay any outstanding ad valorem taxes for prior years on Grantor's real or personal property, any late list penalties, revenue stamps or transfer taxes applicable to the Easement, and any mortgages or liens with respect to the Property. At Closing, Baker shall pay any costs related to the Survey, any title examination expenses, title insurance premiums, recording costs for the deed conveying the Easement, costs of recordation of any recorded plats showing the Easement, as well as any engineering or site plan costs. Each party shall bear its own accounting and attorney fees.

d. Closing Documents and Title. At Closing, Grantor shall deliver (i) a deed substantially in the form of the attached Exhibit E (the "Deed") conveying the Easement to Baker or to a legally qualified non-profit organization or government agency as contained in N.C.G.S. §121-35(2) designated by Baker, provided, that the final form of the Deed shall be in form mutually acceptable to Baker and Grantor so long as such form is consistent with the provisions of Article 4, The Conservation and Historic Preservation Agreements Act as contained in N.C.G.S. §121-34 through 42. The Deed shall convey good, marketable and insurable title to the Easement, free and clear from all mortgages, liens, easements, covenants, restrictions and other encumbrances, except those previously accepted by Baker in writing; (ii) lien affidavits warranting and holding harmless any title insurance company insuring title to the Easement, from and against unpaid mechanics and

materialmen's liens; and (iv) any other documents and papers necessary or appropriate in connection with the consummation of the transaction contemplated by this Option.

At Closing, Baker shall deliver (i) a Settlement Statement setting forth each party's costs, expenses, prorations and other financial analysis of the purchase and sale of the Easement as contemplated hereby; (ii) the Note as defined in item 4(e), below; and (iii) any other documents necessary to consummate the transaction contemplated by the Option.

e. Payment. It is understood that funding for the purchase of the Easement shall be provided by the State of North Carolina pursuant to the Division of Mitigation Services of DEQ and that such funding is made subsequent to recording of the Easement and subsequent to Closing. Therefore, at Closing, Baker shall deliver to Grantor a promissory note in the amount of the Purchase Price, less the Option Deposit and closing costs, mortgage pay-offs, expenses, and prorations applicable to Grantor, which promissory note shall bear interest at Zero Percent (0%) per annum on the unpaid balance until paid or until default and which promissory note shall be due and payable in full on the date ninety (90) days after the Closing (the "Note"). At the time of Closing, Baker shall record the Deed and any plat referenced in the Deed and deliver copies of the recorded documents to the State Property Office for review and funding. The Note shall contain an express provision that if the DEQ fails to fund the purchase of the Easement in the amount of the Purchase Price thereby causing Baker to fail to pay the Note in full on or before the maturity date, then Baker, as Grantor's sole remedy, shall be liable to Grantor for all reasonable costs and expenses, including reasonable attorney fees, required to have the Easement removed and the title to the Property returned to the condition it was prior to the imposition of the Easement, at which point the Note, this Option, and all duties, responsibilities and liabilities with respect thereto shall be null and void. Otherwise, Baker shall pay the Note in full upon receipt of funding by the State of North Carolina.

f. Condition of Property; Intended Use. Prior to Closing, Grantor shall remove all rubbish and trash, including any hazardous waste or harmful chemical substances, from the Easement but shall otherwise keep the Property in the same condition as of the Effective Date, reasonable wear and tear excepted. Grantor shall prevent and refrain from any use of the Property for any purpose or in any manner that would diminish the value of the Easement or adversely affect Baker's intended use of the land for the Easement, which use is to provide the Division of Mitigation Services within DEQ with wetland, stream, and/or buffer mitigation credits. Grantor acknowledges that Baker will enter into an agreement with DEQ to provide these credits, and Grantor agrees not to undertake or permit any activities on the Property that would diminish Baker's ability to obtain such credits. If any adverse change occurs in the condition of the Easement prior to Closing, whether such change is caused by Grantor or by forces beyond Grantor's reasonable control, Baker may elect to (i) refuse to accept the Easement at Closing; (ii) accept the Property at Closing, or a portion thereof with a corresponding adjustment of the Purchase Price; or (iii) terminate this Option and the transaction itself and declare this Option null and void.

g. Warranty of Title. Grantor covenants, represents and warrants that, as of the Effective Date and Closing: (i) Grantor is the sole owner(s) of the Property and is seized of the Property in fee simple absolute; (ii) Grantor has the right and authority to convey this Option and the Easement and Grantor will hold the grantee of the Easement harmless from any failure in Grantor's right and authority to convey the Easement, including issues of title; (iii) there is legal access to the Property and to the Easement; (iv) the Easement is free from any and all encumbrances, except those accepted by Baker in writing; (v) Grantor

will defend title to the Easement against all lawful claims of other parties; (vi) that the Property is free of any hazardous wastes.

5. Right of Entry and Inspections. Baker, and its agents and employees or other authorized representatives, may enter upon the Property during the Term for the purpose of making surveys, conducting soil, engineering, geological and other subsoil or environmental tests to determine the suitability of the Property for the Easement. Baker shall repair or pay for any damage done to the Property caused while such tests are being made. Baker shall advise Grantor at least twenty-four hours in advance of any entry upon the Property for the purposes of surveying, testing or inspecting as set forth herein. Baker shall be permitted during the Term to obtain land use permits or other approvals relating to any part of the Easement, and Grantor agrees to execute such documents, petitions, and authorizations as may be appropriate or required in order to obtain such land use permits and approvals. Grantor shall join with Baker in applications and any non-judicial or non-administrative proceedings to obtain such approvals if necessary. After Closing, Baker reserves the right to perform periodic inspections of the Easement to ensure compliance with easement restrictions contained in the Deed. If Baker does not duly exercise this Option and purchase the Easement, Baker shall return the Property to the condition in which it existed prior to any investigations undertaken by Baker, its agents, employees or contractors pursuant to this Option.

6. Permanent Access and Construction Easements. In connection with this Option and delivery of the Easement, Grantor shall also:

(a) convey and grant to Baker, its successors, assigns, contractors and agents, a non-exclusive temporary construction easement, the location of which shall be determined in the sole discretion of Grantor, for ingress, egress and regress on, over and upon Grantor's Property, sufficient to allow Baker, its agents and contractors to construct and restore the Easement area to stream and/or wetland conditions required by DEQ, said temporary construction easement to include sufficient access to allow heavy equipment to access the Property and the Easement, as necessary; and

(b) convey and grant to Baker, its successors and assigns, a non-exclusive permanent easement for ingress and egress to the Easement, the location of which shall be determined in the sole discretion of Grantor, in order that Baker, its successors and assigns, may have a permanent means of adequately accessing the area covered by the Easement. The permanent access easement referred to herein shall be set forth in an accurate survey, the legal description of which shall be included in a recorded permanent access easement which shall run with the land.

7. Indemnification. Baker agrees to indemnify and save harmless Grantor from and against any loss, claim, damage, cost or expense (including reasonable attorney's fees) suffered or incurred by Grantor by reason of any injury to person or damage to property on or about the Property to the extent caused by Baker, its officers, employees, agents, invitees, contractors, or subcontractors entering or conducting work upon the Property, except for any loss, claim, damage, cost or expense suffered or incurred as a result of the negligence or intentional misconduct of Grantor or Grantor's employees, agents or invitees.

8. Notices. Unless otherwise set forth, any notice or other communication required or permitted hereunder shall be in writing and (a) delivered by overnight courier; (b) sent by facsimile transmission, or (c) mailed by Registered or Certified Mail, postage prepaid, addressed as follows (or to such other address for a party as shall be specified by like notice; provided that notice of change of address shall be effective only upon receipt thereof);

If to Baker: Jake Byers
Michael Baker Engineering
797 Haywood Rd. Suite 201
Asheville, NC 28806

If to the Grantor: Anne Palmer Family Properties, LP
6624 Yacht Club Road
Flowery Branch, GA 30542

9. Miscellaneous.

a. This Option, together with the exhibits attached hereto which are incorporated herein by reference, contains the entire understanding of the parties hereto with respect to the subject matter contained herein. No amendment, modification, or discharge of this Option, and no waiver hereunder, shall be valid or binding unless set forth in writing and duly executed by the parties hereto.

b. Any provision of this Option that shall be found to be contrary to applicable law or otherwise unenforceable shall not affect the remaining terms of this Option, which shall be construed as if the unenforceable provision or clause were absent from this Option.

c. This Option shall be binding upon and inure to the benefit of the parties and their respective heirs, personal representatives, successors, and assigns.

d. This Option shall be governed by and construed in accordance with the laws of the State of North Carolina without application of its conflicts of laws provisions.

e. No act or failure to act by either party shall be deemed a waiver of its rights hereunder, and no waiver in any one circumstance or of any one provision shall be deemed a waiver in other circumstances or of other provisions.

f. Grantor agrees to not mow or otherwise damage vegetation within Easement area after Baker plants or replants the same. If Grantor or Grantor's agents or invitees damage vegetation within the Easement, Grantor will replace the lost or damaged vegetation at their expense.

g. Baker shall ensure that access to portions of the Grantor's property shall not be impeded by the proposed.

j. This Option shall not be assignable by Baker, except to another entity acquiring at least fifty-one percent (51%) interest in Baker or Baker's business or to an entity qualified to be the grantee of a conservation easement under N.C.G.S § 121-35

IN WITNESS WHEREOF, the parties have duly executed this Option as of the date first above written.

GRANTOR:

By: Anne Palmer Collier

Print Name: Anne Palmer Family Properties, LP;
Anne P Collier,

Title: General Partner

MICHAEL BAKER ENGINEERING, INC.:

By: _____

Print Name: Dwain Hathaway

Title: Vice President/ NC Office Executive

IN WITNESS WHEREOF, the parties have duly executed this Option as of the date first above written.

GRANTOR:

By: _____

Print Name: Anne Palmer Family Properties, LP;
Anne P Collier,

Title: General Partner

MICHAEL BAKER ENGINEERING, INC.:

By: _____

Print Name: Dwain Hathaway

Title: Vice President/ NC Office Executive

2018000151
HAYWOOD CO, NC FEE $26.00
PRESENTED & RECORDED
01-08-2018 09:06:32 AM
SHERRI C. ROGERS
REGISTER OF DEEDS
BY: TARA E. REINHOLD
DEPUTY

BK: RB 943
PG: 2338-2341

Prepared by and Return:

Jake Byers
Michael Baker Engineering, Inc.
797 Haywood Rd, Suite 201
Asheville, NC 28806

MEMORANDUM OF OPTION TO PURCHASE CONSERVATION EASEMENT

THIS MEMORANDUM FOR OPTION TO PURCHASE CONSERVATION EASEMENT ("Memorandum") is made and entered into this 26th day of October, 2017, by and between Anne Palmer Family Properties, LP, private landowner ("Grantor") and **MICHAEL BAKER ENGINEERING, INC.**, a corporation organized in the state of New York with offices at 797 Haywood Rd., Suite 201, Asheville, NC 28806 ("Baker").

WHEREAS, Grantor and Baker have entered into a certain Option to Purchase Conservation Easement (the "Option") dated October 26, 2017, pursuant to which Grantor granted to Baker, its successors and assigns, an option to purchase a conservation easement (the "Easement") over certain real property located in Haywood County, North Carolina, which property is more particularly described on the attached Exhibit D1 (the "Property") and

WHEREAS, The parties enter into this Memorandum for the purpose of setting forth certain terms and conditions of the Option and to provide constructive notice of the Option;

NOW, THEREFORE, in consideration of the foregoing, the parties hereby agree as follows.

1. The term of the Option commenced on October 26, 2017 and shall expire on October 26, 2020.

2. All of the provisions set forth in the Option are incorporated in this Memorandum by reference.

3. The Option shall be binding upon and inure to the benefit of the parties and their respective heirs, successors and assigns.

[SIGNATURES AND NOTARY ACKNOWLEDGMENTS APPEAR ON FOLLOWING PAGES]

IN WITNESS WHEREOF, the parties have duly executed this Memorandum as of the date first above written.

GRANTEE:

By: _____

Print Name: Dwain Hathaway

Title: Vice President & NC Office Executive

STATE OF NC

COUNTY OF Wake

I, Kathleen M McKeithan, a Notary Public of the County and State aforesaid, do hereby certify that Dwain Hathaway personally came before me this day and acknowledged that he/she is Vice President/NC Office Executive of Michael Baker Engineering, Inc. a North Carolina professional corporation, and that he acknowledged to me that he voluntarily signed the foregoing document for the purposes therein expressed and in the representative capacity so stated. I have received satisfactory evidence of the person's identity in the form of drivers license.

Witness my hand and official seal, this the 25TH day of October, ~~2016.~~ 2017

Kathleen M McKeithan
Official Signature of Notary

Printed Name: Kathleen M McKeithan Notary Public

My Commission Expires: 2·26·19

[AFFIX NOTARIAL STAMP-SEAL]

Kathleen M McKeithan NOTARY PUBLIC MY COMMISSION EXPIRES 2·26·19 WAKE COUNTY, NC

GRANTOR:

By: Anne Palmer Collier

Print Name: Anne Palmer Family Properties, LP; Anne P Collier,

Title: General Partner

STATE OF NORTH CAROLINA

COUNTY OF Haywood

I, Vicki T. Smith, the undersigned Notary Public of the County and State aforesaid, certify that Anne Palmer Collier personally appeared before me this day, acknowledging to me that he/she voluntarily signed and executed the foregoing document. I have received satisfactory evidence of the person's identity in the form of GADL.

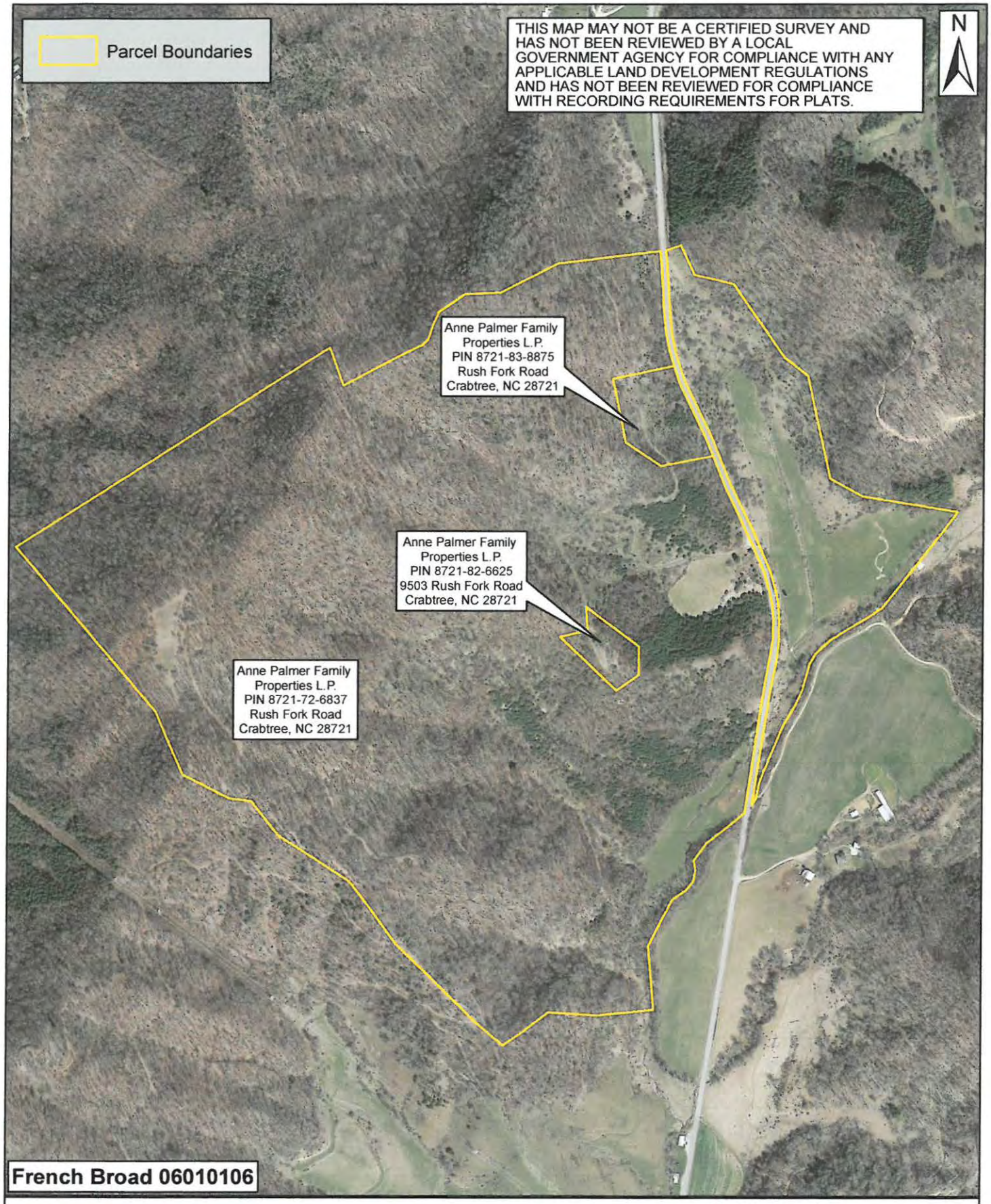
Witness my hand and Notarial stamp or seal, this 26th day of October, ~~2016.~~ 2017

Vicki J. Smith
Official Signature of Notary

Printed Name: Vicki T. Smith, Notary Public

My Commission Expires: May 14, 2021

[AFFIX NOTARIAL STAMP-SEAL]



Michael Baker INTERNATIONAL

0 250 500 1,000 Feet

Exhibit D1
Landowner(s):
Anne Palmer Family Properties L.P.

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Asheville Ecological Services Field Office
160 Zillicoa Street
Asheville, NC 28801-1082
Phone: (828) 258-3939 Fax: (828) 258-5330
http://www.fws.gov/nc-es/es/countyfr.html

In Reply Refer To: May 21, 2018
Consultation Code: 04EN1000-2018-SLI-0426
Event Code: 04EN1000-2018-E-01237
Project Name: UT to Rush Fork Stream Mitigation Project

Subject: List of threatened and endangered species that may occur in your proposed project location, and/or may be affected by your proposed project

To Whom It May Concern:

The attached species list identifies threatened, endangered, proposed and candidate species, as well as proposed and final designated critical habitat, that may occur within the boundary of your proposed project and/or may be affected by your proposed project. Although not required by section 7, many agencies request species lists to start the informal consultation process and begin their fulfillment of the requirements under section 7(c) of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 *et seq.*).

This list, along with other helpful resources, is also available on the U.S. Fish and Wildlife Service (Service) Asheville Field Office's (AFO) website: https://www.fws.gov/raleigh/species/cntylist/nc_counties.html. The AFO website list includes "species of concern" species that could potentially be placed on the federal list of threatened and endangered species in the future. Also available are:

Design and Construction Recommendations
https://www.fws.gov/asheville/htmls/project_review/Recommendations.html

Optimal Survey Times for Federally Listed Plants
https://www.fws.gov/nc-es/plant/plant_survey.html

Northern long-eared bat Guidance
https://www.fws.gov/asheville/htmls/project_review/NLEB_in_WNC.html

Predictive Habitat Model for Aquatic Species
https://www.fws.gov/asheville/htmls/Maxent/Maxent.html

New information based on updated surveys, changes in the abundance and distribution of species, changed habitat conditions, or other factors could require modifications of these lists. Please note that under 50 CFR 402.12(e) of the regulations implementing section 7 of the Act, the accuracy of the species lists should be verified after 90 days. This verification can be completed formally or informally as desired. The Service recommends that verification be completed by visiting the ECOS-IPaC website or the AFO website (the AFO website dates each county list with the day of the most recent update/change) at regular intervals during project planning and implementation for updates to species lists and information. An updated list may be requested through the ECOS-IPaC system by completing the same process used to receive the enclosed list or by going to the AFO website.

The purpose of the Act is to provide a means whereby threatened and endangered species and the ecosystems upon which they depend may be conserved. Under sections 7(a)(1) and 7(a)(2) of the Act and its implementing regulations (50 CFR 402 *et seq.*), Federal agencies are required to utilize their authorities to carry out programs for the conservation of threatened and endangered species and to determine whether projects may affect threatened and endangered species and/or designated critical habitat.

A Biological Assessment is required for construction projects (or other undertakings having similar physical impacts) that are major Federal actions significantly affecting the quality of the human environment as defined in the National Environmental Policy Act (42 U.S.C. 4332(2)(c)). For projects other than major construction activities, the Service suggests that a Biological Evaluation similar to a Biological Assessment be prepared to determine whether the project may affect listed or proposed species and/or designated or proposed critical habitat. Recommended contents of a Biological Assessment are described at 50 CFR 402.12 and on our office's website at https://www.fws.gov/asheville/htmls/project_review/assessment_guidance.html.

If a Federal agency (or their non-federal representative) determines, based on the Biological Assessment or Biological Evaluation, that listed species and/or designated critical habitat may be affected by the proposed project, the agency is required to consult with the Service pursuant to 50 CFR 402. In addition, the Service recommends that candidate species, proposed species, and proposed critical habitat be addressed within the consultation. More information on the regulations and procedures for section 7 consultation, including the role of permit or license applicants, can be found in the "Endangered Species Consultation Handbook" at: http://www.fws.gov/endangered/esa-library/pdf/TOC-GLOS.PDF.

Though the bald eagle is no longer protected under the Endangered Species Act, please be aware that bald and golden eagles are protected under the Bald and Golden Eagle Protection Act (16 U.S.C. 668 *et seq.*), and projects affecting these species may require additional consultation (see https://www.fws.gov/southeast/our-services/permits/eagles/). Wind energy projects should follow the wind energy guidelines (http://www.fws.gov/windenergy/) for minimizing impacts to migratory birds (including bald and golden eagles) and bats.

Guidance for minimizing impacts to migratory birds for projects including communications towers (e.g., cellular, digital television, radio, and emergency broadcast) can be found at: http://

www.fws.gov/migratorybirds/CurrentBirdIssues/Hazards/towers/towers.htm; http://www.towerkill.com; and http://www.fws.gov/migratorybirds/CurrentBirdIssues/Hazards/towers/comtow.html.

We appreciate your concern for threatened and endangered species. The Service encourages Federal agencies to include conservation of threatened and endangered species into their project planning to further the purposes of the Act. Please include the Consultation Tracking Number in the header of this letter with any request for consultation or correspondence about your project that you submit to our office.

Attachment(s):

- Official Species List
- Migratory Birds
- Wetlands

Official Species List

This list is provided pursuant to Section 7 of the Endangered Species Act, and fulfills the requirement for Federal agencies to "request of the Secretary of the Interior information whether any species which is listed or proposed to be listed may be present in the area of a proposed action".

This species list is provided by:

Asheville Ecological Services Field Office
160 Zillicoa Street
Asheville, NC 28801-1082
(828) 258-3939

Project Summary

Consultation Code: 04EN1000-2018-SLI-0426

Event Code: 04EN1000-2018-E-01237

Project Name: UT to Rush Fork Stream Mitigation Project

Project Type: STREAM / WATERBODY / CANALS / LEVEES / DIKES

Project Description: The UT to Rush Fork Stream Mitigation project is proposing to restore and enhance approximately 5,300 linear feet (LF) jurisdictional stream within the Pigeon River Basin for the purpose of obtaining stream mitigation credit for the NC Division of Mitigation Services (DMS). Project reaches have been significantly impacted by unrestricted livestock access and removal of riparian buffers. Stream banks consist of heavily grazed pasture grass with some small scattered trees, mixed with pockets of invasive species (mostly in non-grazed areas). Project reaches are unstable, incised and exhibit active bank erosion from both high flows and livestock access. Project reaches are unstable, incised and exhibit active bank erosion from both high flows and livestock access. Livestock will be permanently excluded from all project areas. Buffers in excess of 30 feet will be established along all proposed reaches. In addition, existing functional wetlands will be incorporated inside the conservation easement to protect them in perpetuity.

Project Location:

Approximate location of the project can be viewed in Google Maps: https://www.google.com/maps/place/35.64671696194294N82.93734090693435W

Counties: Haywood, NC

Endangered Species Act Species

There is a total of 9 threatened, endangered, or candidate species on this species list.

Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species.

IPaC does not display listed species or critical habitats under the sole jurisdiction of NOAA Fisheries[1], as USFWS does not have the authority to speak on behalf of NOAA and the Department of Commerce.

See the "Critical habitats" section below for those critical habitats that lie wholly or partially within your project area under this office's jurisdiction. Please contact the designated FWS office if you have questions.

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1. NOAA Fisheries, also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

Mammals

NAME	STATUS
Carolina Northern Flying Squirrel *Glaucomys sabrinus coloratus* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/2657	Endangered
Gray Bat *Myotis grisescens* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/6329	Endangered
Indiana Bat *Myotis sodalis* There is **final** critical habitat for this species. Your location is outside the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/5949	Endangered
Northern Long-eared Bat *Myotis septentrionalis* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/9045	Threatened

Clams

NAME	STATUS
Appalachian Elktoe *Alasmidonta raveneliana* There is **final** critical habitat for this species. Your location is outside the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/5039	Endangered

Arachnids

NAME	STATUS
Spruce-fir Moss Spider *Microhexura montivaga*	Endangered

There is **final** critical habitat for this species. Your location is outside the critical habitat.
Species profile: https://ecos.fws.gov/ecp/species/4801

Flowering Plants

NAME	STATUS
Small Whorled Pogonia *Isotria medeoloides*	Threatened

No critical habitat has been designated for this species.
Species profile: https://ecos.fws.gov/ecp/species/1890

NAME	STATUS
Spreading Avens *Geum radiatum*	Endangered

No critical habitat has been designated for this species.
Species profile: https://ecos.fws.gov/ecp/species/6854

Lichens

NAME	STATUS
Rock Gnome Lichen *Gymnoderma lineare*	Endangered

No critical habitat has been designated for this species.
Species profile: https://ecos.fws.gov/ecp/species/3933

Critical habitats

THERE ARE NO CRITICAL HABITATS WITHIN YOUR PROJECT AREA UNDER THIS OFFICE'S JURISDICTION.

Migratory Birds

Certain birds are protected under the Migratory Bird Treaty Act[1] and the Bald and Golden Eagle Protection Act[2].

Any person or organization who plans or conducts activities that may result in impacts to migratory birds, eagles, and their habitats should follow appropriate regulations and consider implementing appropriate conservation measures, as described below.

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1. The Migratory Birds Treaty Act of 1918.
2. The Bald and Golden Eagle Protection Act of 1940.
3. 50 C.F.R. Sec. 10.12 and 16 U.S.C. Sec. 668(a)

The birds listed below are birds of particular concern either because they occur on the USFWS Birds of Conservation Concern (BCC) list or warrant special attention in your project location. To learn more about the levels of concern for birds on your list and how this list is generated, see the FAQ below. This is not a list of every bird you may find in this location, nor a guarantee that every bird on this list will be found in your project area. To see exact locations of where birders and the general public have sighted birds in and around your project area, visit the E-bird data mapping tool (Tip: enter your location, desired date range and a species on your list). For projects that occur off the Atlantic Coast, additional maps and models detailing the relative occurrence and abundance of bird species on your list are available. Links to additional information about Atlantic Coast birds, and other important information about your migratory bird list, including how to properly interpret and use your migratory bird report, can be found below.

For guidance on when to schedule activities or implement avoidance and minimization measures to reduce impacts to migratory birds on your list, click on the PROBABILITY OF PRESENCE SUMMARY at the top of your list to see when these birds are most likely to be present and breeding in your project area.

NAME	BREEDING SEASON
Bobolink *Dolichonyx oryzivorus* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds May 20 to Jul 31

Probability Of Presence Summary

The graphs below provide our best understanding of when birds of concern are most likely to be present in your project area. This information can be used to tailor and schedule your project activities to avoid or minimize impacts to birds. Please make sure you read and understand the

FAQ “Proper Interpretation and Use of Your Migratory Bird Report” before using or attempting to interpret this report.

Probability of Presence (■)

Each green bar represents the bird's relative probability of presence in the 10km grid cell(s) your project overlaps during a particular week of the year. (A year is represented as 12 4-week months.) A taller bar indicates a higher probability of species presence. The survey effort (see below) can be used to establish a level of confidence in the presence score. One can have higher confidence in the presence score if the corresponding survey effort is also high.

How is the probability of presence score calculated? The calculation is done in three steps:

1. The probability of presence for each week is calculated as the number of survey events in the week where the species was detected divided by the total number of survey events for that week. For example, if in week 12 there were 20 survey events and the Spotted Towhee was found in 5 of them, the probability of presence of the Spotted Towhee in week 12 is 0.25.
2. To properly present the pattern of presence across the year, the relative probability of presence is calculated. This is the probability of presence divided by the maximum probability of presence across all weeks. For example, imagine the probability of presence in week 20 for the Spotted Towhee is 0.05, and that the probability of presence at week 12 (0.25) is the maximum of any week of the year. The relative probability of presence on week 12 is 0.25/0.25 = 1; at week 20 it is 0.05/0.25 = 0.2.
3. The relative probability of presence calculated in the previous step undergoes a statistical conversion so that all possible values fall between 0 and 10, inclusive. This is the probability of presence score.

Breeding Season (■)

Yellow bars denote a very liberal estimate of the time-frame inside which the bird breeds across its entire range. If there are no yellow bars shown for a bird, it does not breed in your project area.

Survey Effort (|)

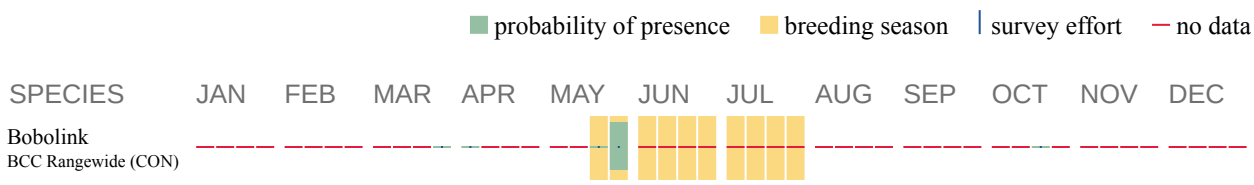
Vertical black lines superimposed on probability of presence bars indicate the number of surveys performed for that species in the 10km grid cell(s) your project area overlaps. The number of surveys is expressed as a range, for example, 33 to 64 surveys.

No Data (–)

A week is marked as having no data if there were no survey events for that week.

Survey Timeframe

Surveys from only the last 10 years are used in order to ensure delivery of currently relevant information. The exception to this is areas off the Atlantic coast, where bird returns are based on all years of available data, since data in these areas is currently much more sparse.



Additional information can be found using the following links:

- Birds of Conservation Concern http://www.fws.gov/birds/management/managed-species/birds-of-conservation-concern.php
- Measures for avoiding and minimizing impacts to birds http://www.fws.gov/birds/management/project-assessment-tools-and-guidance/conservation-measures.php
- Nationwide conservation measures for birds http://www.fws.gov/migratorybirds/pdf/management/nationwidestandardconservationmeasures.pdf

Migratory Birds FAQ

Tell me more about conservation measures I can implement to avoid or minimize impacts to migratory birds.
Nationwide Conservation Measures describes measures that can help avoid and minimize impacts to all birds at any location year round. Implementation of these measures is particularly important when birds are most likely to occur in the project area. When birds may be breeding in the area, identifying the locations of any active nests and avoiding their destruction is a very helpful impact minimization measure. To see when birds are most likely to occur and be breeding in your project area, view the Probability of Presence Summary. Additional measures and/or permits may be advisable depending on the type of activity you are conducting and the type of infrastructure or bird species present on your project site.

What does IPaC use to generate the migratory birds potentially occurring in my specified location?
The Migratory Bird Resource List is comprised of USFWS Birds of Conservation Concern (BCC) and other species that may warrant special attention in your project location.

The migratory bird list generated for your project is derived from data provided by the Avian Knowledge Network (AKN). The AKN data is based on a growing collection of survey, banding, and citizen science datasets and is queried and filtered to return a list of those birds reported as occurring in the 10km grid cell(s) which your project intersects, and that have been identified as warranting special attention because they are a BCC species in that area, an eagle (Eagle Act requirements may apply), or a species that has a particular vulnerability to offshore activities or development.

Again, the Migratory Bird Resource list includes only a subset of birds that may occur in your project area. It is not representative of all birds that may occur in your project area. To get a list of all birds potentially present in your project area, please visit the E-bird Explore Data Tool.

What does IPaC use to generate the probability of presence graphs for the migratory birds potentially occurring in my specified location?
The probability of presence graphs associated with your migratory bird list are based on data provided by the Avian Knowledge Network (AKN). This data is derived from a growing collection of survey, banding, and citizen science datasets .

Probability of presence data is continuously being updated as new and better information becomes available. To learn more about how the probability of presence graphs are produced and how to interpret them, go the Probability of Presence Summary and then click on the "Tell me about these graphs" link.

How do I know if a bird is breeding, wintering, migrating or present year-round in my project area?
To see what part of a particular bird's range your project area falls within (i.e. breeding, wintering, migrating or year-round), you may refer to the following resources: The Cornell Lab of Ornithology All About Birds Bird Guide, or (if you are unsuccessful in locating the bird of interest there), the Cornell Lab of Ornithology Neotropical Birds guide. If a bird on your migratory bird species list has a breeding season associated with it, if that bird does occur in your project area, there may be nests present at some point within the timeframe specified. If "Breeds elsewhere" is indicated, then the bird likely does not breed in your project area.

What are the levels of concern for migratory birds?
Migratory birds delivered through IPaC fall into the following distinct categories of concern:

1. "BCC Rangewide" birds are Birds of Conservation Concern (BCC) that are of concern throughout their range anywhere within the USA (including Hawaii, the Pacific Islands, Puerto Rico, and the Virgin Islands);
2. "BCC - BCR" birds are BCCs that are of concern only in particular Bird Conservation Regions (BCRs) in the continental USA; and
3. "Non-BCC - Vulnerable" birds are not BCC species in your project area, but appear on your list either because of the Eagle Act requirements (for eagles) or (for non-eagles) potential susceptibilities in offshore areas from certain types of development or activities (e.g. offshore energy development or longline fishing).

Although it is important to try to avoid and minimize impacts to all birds, efforts should be made, in particular, to avoid and minimize impacts to the birds on this list, especially eagles and BCC species of rangewide concern. For more information on conservation measures you can implement to help avoid and minimize migratory bird impacts and requirements for eagles, please see the FAQs for these topics.

Details about birds that are potentially affected by offshore projects

For additional details about the relative occurrence and abundance of both individual bird species and groups of bird species within your project area off the Atlantic Coast, please visit the Northeast Ocean Data Portal. The Portal also offers data and information about other taxa besides birds that may be helpful to you in your project review. Alternately, you may download the bird model results files underlying the portal maps through the NOAA NCCOS Integrative Statistical Modeling and Predictive Mapping of Marine Bird Distributions and Abundance on the Atlantic Outer Continental Shelf project webpage.

Bird tracking data can also provide additional details about occurrence and habitat use throughout the year, including migration. Models relying on survey data may not include this information. For additional information on marine bird tracking data, see the Diving Bird Study and the nanotag studies or contact Caleb Spiegel or Pam Loring.

What if I have eagles on my list?
If your project has the potential to disturb or kill eagles, you may need to obtain a permit to avoid violating the Eagle Act should such impacts occur.

Proper Interpretation and Use of Your Migratory Bird Report
The migratory bird list generated is not a list of all birds in your project area, only a subset of birds of priority concern. To learn more about how your list is generated, and see options for identifying what other birds may be in your project area, please see the FAQ “What does IPaC use to generate the migratory birds potentially occurring in my specified location”. Please be aware this report provides the “probability of presence” of birds within the 10 km grid cell(s) that overlap your project; not your exact project footprint. On the graphs provided, please also look carefully at the survey effort (indicated by the black vertical bar) and for the existence of the “no data” indicator (a red horizontal bar). A high survey effort is the key component. If the survey effort is high, then the probability of presence score can be viewed as more dependable. In contrast, a low survey effort bar or no data bar means a lack of data and, therefore, a lack of certainty about presence of the species. This list is not perfect; it is simply a starting point for identifying what birds of concern have the potential to be in your project area, when they might be there, and if they might be breeding (which means nests might be present). The list helps you know what to look for to confirm presence, and helps guide you in knowing when to implement conservation measures to avoid or minimize potential impacts from your project activities, should presence be confirmed. To learn more about conservation measures, visit the FAQ “Tell me about conservation measures I can implement to avoid or minimize impacts to migratory birds” at the bottom of your migratory bird trust resources page.

Wetlands

Impacts to NWI wetlands and other aquatic habitats may be subject to regulation under Section 404 of the Clean Water Act, or other State/Federal statutes.

For more information please contact the Regulatory Program of the local U.S. Army Corps of Engineers District.

Please note that the NWI data being shown may be out of date. We are currently working to update our NWI data set. We recommend you verify these results with a site visit to determine the actual extent of wetlands on site.

THERE ARE NO WETLANDS WITHIN YOUR PROJECT AREA.

North Carolina Department of Natural and Cultural Resources
Natural Heritage Program

Governor Roy Cooper | Secretary Susi H. Hamilton

NCNHDE-6091

May 22, 2018

Kristi Suggs
Michael Baker Engineering, Inc.
Ballantyne One - 15720 Brixham Hill Ave.
Charlotte, NC 28277
RE: UT to Rush Fork Stream Mitigation Project; 166680

Dear Kristi Suggs:

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

A query of the NCNHP database indicates that there are records for rare species, important natural communities, natural areas, and/or conservation/managed areas within the proposed project boundary. These results are presented in the attached 'Documented Occurrences' tables and map.

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

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

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

Also please note that the NC Natural Heritage Program may follow this letter with additional correspondence if a Dedicated Nature Preserve, Registered Heritage Area, Clean Water Management Trust Fund easement, or an occurrence of a Federally-listed species is documented near the project area.

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

Sincerely,
NC Natural Heritage Program

MAILING ADDRESS:
1651 Mail Service Center
Raleigh, NC 27699-1651

Telephone: (919) 707-8107
www.ncnhp.org

LOCATION:
121 West Jones Street
Raleigh, NC 27603

Natural Heritage Element Occurrences, Natural Areas, and Managed Areas Intersecting the Project Area
UT to Rush Fork Stream Mitigation Project
Project No. 166680
May 22, 2018
NCNHDE-6091

Element Occurrences Documented Within Project Area

Taxonomic Group	EO ID	Scientific Name	Common Name	Last Observation Date	Element Occurrence Rank	Accuracy	Federal Status	State Status	Global Rank	State Rank
Natural Community	17387	Low Elevation Basic Glade (Montane Subtype)	---	1995-06-28	A?	3-Medium	---	---	G2	S2
Natural Community	7457	Montane Cliff (Mafic Subtype)	---	1995-06-28	A?	3-Medium	---	---	G3	S3
Natural Community	2892	Montane Oak--Hickory Forest (Basic Subtype)	---	2010	BC	3-Medium	---	---	G3	S3

Natural Areas Documented Within Project Area

Site Name	Representational Rating	Collective Rating
Raven Cliff	R3 (High)	C4 (Moderate)

Managed Areas Documented Within Project Area*

Managed Area Name	Owner	Owner Type
Southern Appalachian Highlands Conservancy Easement	Southern Appalachian Highlands Conservancy	Private
NC Agricultural Development and Farmland Preservation Trust Fund Easement	NC Department of Agriculture	State

*NOTE: If the proposed project intersects with a conservation/managed area, please contact the landowner directly for additional information. If the project intersects with a Dedicated Nature Preserve (DNP), Registered Natural Heritage Area (RHA), or Federally-listed species, NCNHP staff may provide additional correspondence regarding the project.

Definitions and an explanation of status designations and codes can be found at https://ncnhde.natureserve.org/content/help. Data query generated on May 22, 2018; source: NCNHP, Q2 April 2018. Please resubmit your information request if more than one year elapses before project initiation as new information is continually added to the NCNHP database.

Natural Heritage Element Occurrences, Natural Areas, and Managed Areas Within a One-mile Radius of the Project Area
UT to Rush Fork Stream Mitigation Project
Project No. 166680
May 22, 2018
NCNHDE-6091

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

Taxonomic Group	EO ID	Scientific Name	Common Name	Last Observation Date	Element Occurrence Rank	Accuracy	Federal Status	State Status	Global Rank	State Rank
Natural Community	10854	High Elevation Rocky Summit (Typic Subtype)	---	1991-07-16	C?	3-Medium	---	---	G2	S2
Natural Community	17387	Low Elevation Basic Glade (Montane Subtype)	---	1995-06-28	A?	3-Medium	---	---	G2	S2
Natural Community	7457	Montane Cliff (Mafic Subtype)	---	1995-06-28	A?	3-Medium	---	---	G3	S3
Natural Community	2892	Montane Oak--Hickory Forest (Basic Subtype)	---	2010	BC	3-Medium	---	---	G3	S3
Vascular Plant	23933	Hackelia virginiana	Virginia Stickseed	1968-Pre	H	5-Very Low	---	Significantly Rare Peripheral	G5	S2
Vascular Plant	23969	Orbexilum onobrychis	Lanceleaf Scurfpea	1891-07-17	H	5-Very Low	---	Special Concern Historical	G5	SH

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

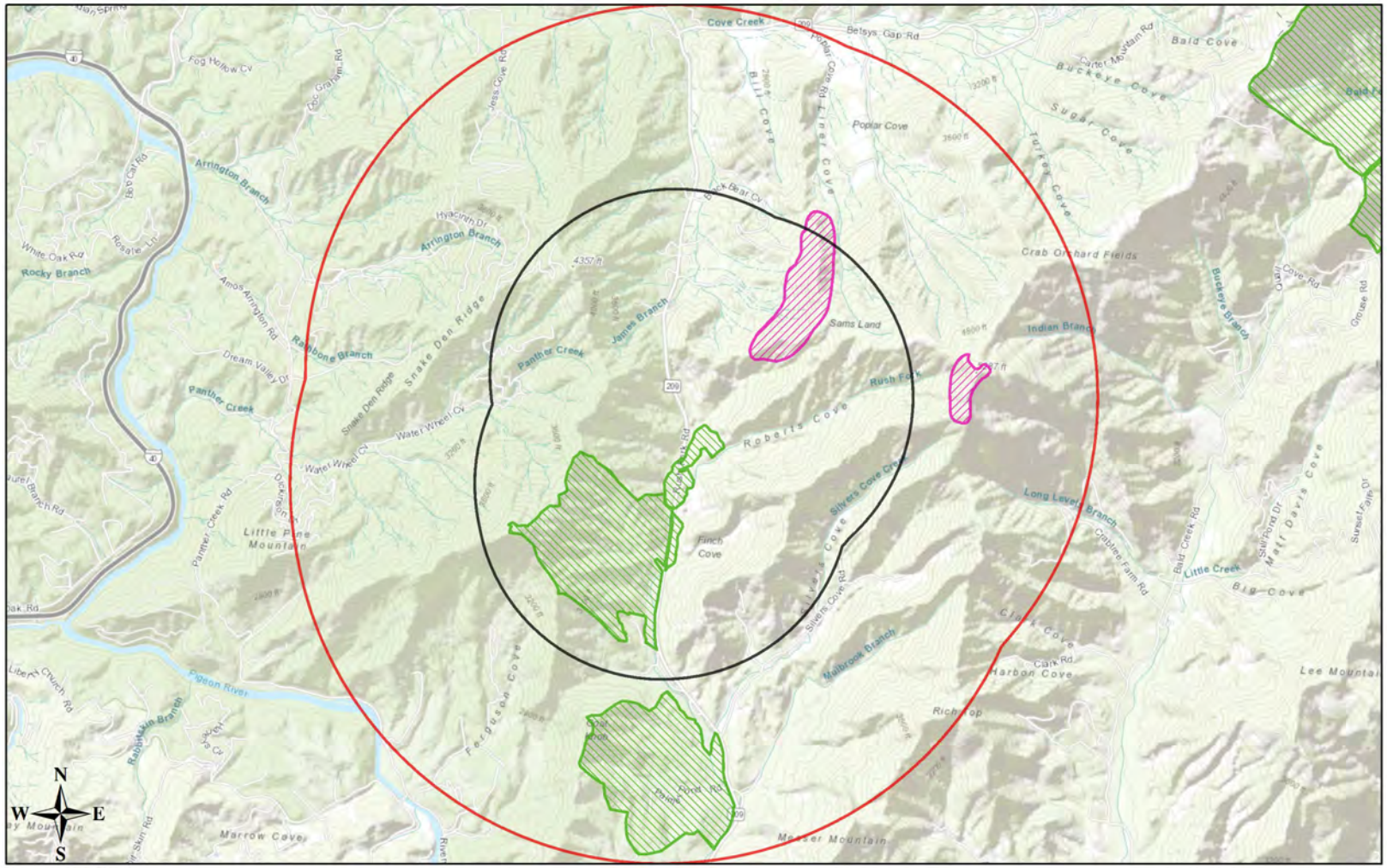
Site Name	Representational Rating	Collective Rating
Raven Cliff	R3 (High)	C4 (Moderate)
Crabtree Bald	R5 (General)	C5 (General)

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

Managed Area Name	Owner	Owner Type
Southern Appalachian Highlands Conservancy Easement	Southern Appalachian Highlands Conservancy	Private
NC Agricultural Development and Farmland Preservation Trust Fund Easement	NC Department of Agriculture	State

Definitions and an explanation of status designations and codes can be found at https://ncnhde.natureserve.org/content/help. Data query generated on May 22, 2018; source: NCNHP, Q2 April 2018. Please resubmit your information request if more than one year elapses before project initiation as new information is continually added to the NCNHP database.

NCNHDE-6091: UT to Rush Fork Stream Mitigation Project



May 22, 2018

- Project Boundary
- Buffered Project Boundary
- NHP Natural Area (NHNA)
- Managed Area (MAREA)

1:47,210

0 0.4 0.8 1.6 mi

0 0.5 1 2 km

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

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Asheville Ecological Services Field Office
160 Zillicoa Street
Asheville, NC 28801-1082
Phone: (828) 258-3939 Fax: (828) 258-5330
http://www.fws.gov/nc-es/es/countyfr.html

IPaC Record Locator: 856-13335214 July 23, 2018

Subject: Consistency letter for the 'UT to Rush Fork Stream Mitigation Project' project (TAILS 04EN1000-2018-R-0426) under the revised February 5, 2018, FHWA, FRA, FTA Programmatic Biological Opinion for Transportation Projects within the Range of the Indiana Bat and Northern Long-eared Bat.

To whom it may concern:

The U.S. Fish and Wildlife Service (Service) has received your request dated to verify that the **UT to Rush Fork Stream Mitigation Project** (Proposed Action) may rely on the revised February 5, 2018, FHWA, FRA, FTA Programmatic Biological Opinion for Transportation Projects within the Range of the Indiana Bat and Northern Long-eared Bat (PBO) to satisfy requirements under Section 7(a)(2) of the Endangered Species Act of 1973 (ESA) (87 Stat.884, as amended; 16 U.S.C. 1531 *et seq.*).

Based on the information you provided (Project Description shown below), you have determined that the Proposed Action will have no effect on the endangered Indiana bat (*Myotis sodalis*) or the threatened Northern long-eared bat (*Myotis septentrionalis*). If the Proposed Action is not modified, **no consultation is required for these two species.**

For Proposed Actions that include bridge/structure removal, replacement, and/or maintenance activities: If your initial bridge/structure assessments failed to detect Indiana bats, but you later detect bats during construction, please submit the Post Assessment Discovery of Bats at Bridge/Structure Form (User Guide Appendix E) to this Service Office. In these instances, potential incidental take of Indiana bats may be exempted provided that the take is reported to the Service.

If the Proposed Action may affect any other federally-listed or proposed species and/or designated critical habitat, additional consultation between the lead Federal action agency and this Service Office is required. If the proposed action has the potential to take bald or golden eagles, additional coordination with the Service under the Bald and Golden Eagle Protection Act may also be required. In either of these circumstances, please advise the lead Federal action agency for the Proposed Action accordingly.

The following species may occur in your project area and **are not** covered by this determination:

- Appalachian Elktoe, *Alasmidonta raveneliana* (Endangered)
- Carolina Northern Flying Squirrel, *Glaucomys sabrinus coloratus* (Endangered)
- Gray Bat, *Myotis grisescens* (Endangered)
- Rock Gnome Lichen, *Gymnoderma lineare* (Endangered)
- Small Whorled Pogonia, *Isotria medeoloides* (Threatened)
- Spreading Avens, *Geum radiatum* (Endangered)
- Spruce-fir Moss Spider, *Microhexura montivaga* (Endangered)

Project Description

The following project name and description was collected in IPaC as part of the endangered species review process.

Name

UT to Rush Fork Stream Mitigation Project

Description

The UT to Rush Fork Stream Mitigation project is proposing to restore and enhance approximately 5,300 linear feet (LF) jurisdictional stream within the Pigeon River Basin for the purpose of obtaining stream mitigation credit for the NC Division of Mitigation Services (DMS). Project reaches have been significantly impacted by unrestricted livestock access and removal of riparian buffers. Stream banks consist of heavily grazed pasture grass with some small scattered trees, mixed with pockets of invasive species (mostly in non-grazed areas). Project reaches are unstable, incised and exhibit active bank erosion from both high flows and livestock access. Project reaches are unstable, incised and exhibit active bank erosion from both high flows and livestock access. Livestock will be permanently excluded from all project areas. Buffers in excess of 30 feet will be established along all proposed reaches. In addition, existing functional wetlands will be incorporated inside the conservation easement to protect them in perpetuity.

Determination Key Result

Based on the information you provided, you have determined that the Proposed Action will have no effect on the endangered Indiana bat and/or the threatened Northern long-eared bat. Therefore, no consultation with the U.S. Fish and Wildlife Service pursuant to Section 7(a)(2) of the Endangered Species Act of 1973 (ESA) (87 Stat. 884, as amended 16 U.S.C. 1531 *et seq.*) is required for these two species.

Qualification Interview

1. Is the project within the range of the Indiana bat[1]?

   [1] See Indiana bat species profile

   Automatically answered
   Yes

2. Is the project within the range of the Northern long-eared bat[1]?

   [1] See Northern long-eared bat species profile

   Automatically answered
   Yes

3. Which Federal Agency is the lead for the action?

   A) Federal Highway Administration (FHWA)

4. Are *all* project activities limited to non-construction[1] activities only? (examples of non-construction activities include: bridge/abandoned structure assessments, surveys, planning and technical studies, property inspections, and property sales)

   [1] Construction refers to activities involving ground disturbance, percussive noise, and/or lighting.

   No

5. Does the project include *any* activities that are **greater than** 300 feet from existing road/rail surfaces[1]?

   [1] Road surface is defined as the actively used [e.g. motorized vehicles] driving surface and shoulders [may be pavement, gravel, etc.] and rail surface is defined as the edge of the actively used rail ballast.

   Yes

6. Are *all* project activities **greater than** 300 feet from existing road/rail surfaces[1]?

   [1] Road surface is defined as the actively used [e.g. motorized vehicles] driving surface and shoulders [may be pavement, gravel, etc.] and rail surface is defined as the edge of the actively used rail ballast.

   No

7. Does the project include *any* activities **within** 0.5 miles of an Indiana bat and/or NLEB hibernaculum[1]?

   [1] For the purpose of this consultation, a hibernaculum is a site, most often a cave or mine, where bats hibernate during the winter (see suitable habitat), but could also include bridges and structures if bats are found to be hibernating there during the winter.

   No

8. Is the project located **within** a karst area?

   No

9. Is there *any* suitable[1] summer habitat for Indiana Bat or NLEB **within** the project action area[2]? (includes any trees suitable for maternity, roosting, foraging, or travelling habitat)

   [1] See the Service's summer survey guidance for our current definitions of suitable habitat.

   [2] The action area is defined as all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action (50 CFR Section 402.02). Further clarification is provided by the national consultation FAQs.

   No

10. Does the project include maintenance of the surrounding landscape at existing facilities (e.g., rest areas, stormwater detention basins)?

    No

11. Does the project include wetland or stream protection activities associated with compensatory wetland mitigation?

    Yes

12. Does the project include slash pile burning?

    No

13. Does the project include *any* bridge removal, replacement, and/or maintenance activities (e.g., any bridge repair, retrofit, maintenance, and/or rehabilitation work)?

    No

14. Does the project include the removal, replacement, and/or maintenance of *any* structure other than a bridge? (e.g., rest areas, offices, sheds, outbuildings, barns, parking garages, etc.)

    No

15. Will the project involve the use of **temporary** lighting *during* the active season?

    No

16. Will the project install new or replace existing **permanent** lighting?

    No

17. Will the project raise the road profile **above the tree canopy**?

    No

18. Is the location of this project consistent with a No Effect determination in this key?

    Automatically answered

    Yes, because the project action area is outside of suitable Indiana bat and/or NLEB summer habitat

Determination Key Description: FHWA, FRA, FTA Programmatic Consultation For Transportation Projects Affecting NLEB Or Indiana Bat

This key was last updated in IPaC on March 16, 2018. Keys are subject to periodic revision.

This decision key is intended for projects/activities funded or authorized by the Federal Highway Administration (FHWA), Federal Railroad Administration (FRA), and/or Federal Transit Administration (FTA), which require consultation with the U.S. Fish and Wildlife Service (Service) under Section 7 of the Endangered Species Act (ESA) for the endangered **Indiana bat** (*Myotis sodalis*) and the threatened **Northern long-eared bat** (NLEB) (*Myotis septentrionalis*).

This decision key should only be used to verify project applicability with the Service's February 5, 2018, FHWA, FRA, FTA Programmatic Biological Opinion for Transportation Projects. The programmatic biological opinion covers limited transportation activities that may affect either bat species, and addresses situations that are both likely and not likely to adversely affect either bat species. This decision key will assist in identifying the effect of a specific project/activity and applicability of the programmatic consultation. The programmatic biological opinion is not intended to cover all types of transportation actions. Activities outside the scope of the programmatic biological opinion, or that may affect ESA-listed species other than the Indiana bat or NLEB, or any designated critical habitat, may require additional ESA Section 7 consultation.

Michael Baker
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We Make a Difference

June 5, 2018

Milton Cortes, Assistant State Soil Scientist
USDA Natural Resources Conservation Service
4407 Bland Rd., Suite 117
Raleigh, NC 27609

RE: Prime and Important Farmland Soils
NCDMS, UT to Rush Fork Stream Mitigation Project
Haywood County, NC

Dear Mr. Cortes:

Michael Baker Engineering, Inc. (Baker) is contracted by the North Carolina Division of Mitigation Services (NCDMS) to conduct stream restoration/enhancement activities for the above-referenced project. The project area is located in the Crabtree Community in Haywood County, North Carolina approximately 3 miles south of the Township of Fines Creek. The project is located on the United States Geological Survey's (USGS) Fines Creek Topographic Quadrangle. The center of the project area is located at 35.6446 N and -82.9402 W. The project site flows southwesterly and is bisected by Rush Fork Road approximately 1.8 miles north of its intersection with Silvers Coves Road. Please see the enclosed USGS Topographic Map for a depiction of the project site location.

The UT to Rush Fork site was identified to provide compensatory mitigation for unavoidable stream impacts. The existing stream reaches have been significantly impacted by unrestricted livestock access and the removal of riparian buffers. Most of the project reaches have cleared banks with a mix of small scattered trees and stands of invasive species located at the top of bank in non-grazed areas. Currently, the project reaches are unstable, incised, and exhibit active bank erosion from both high flows and livestock access.

Baker conducted a review of the project area using the US Department of Agriculture Natural Resources Conservation Service's (USDA NRCS) Web Soil Survey. The following Farmland Classification Report and Map outlines the soils that are present within the proposed conservation easement. Based on the data determined from this review, there are a total of 7.0 acres of Prime Farmland within the project area.

Please feel free to contact me if you have any questions regarding this project or need any additional information. I can be reached at (704) 579-4828 or via my email address at ksuggs@mbakerintl.com.

Sincerely,

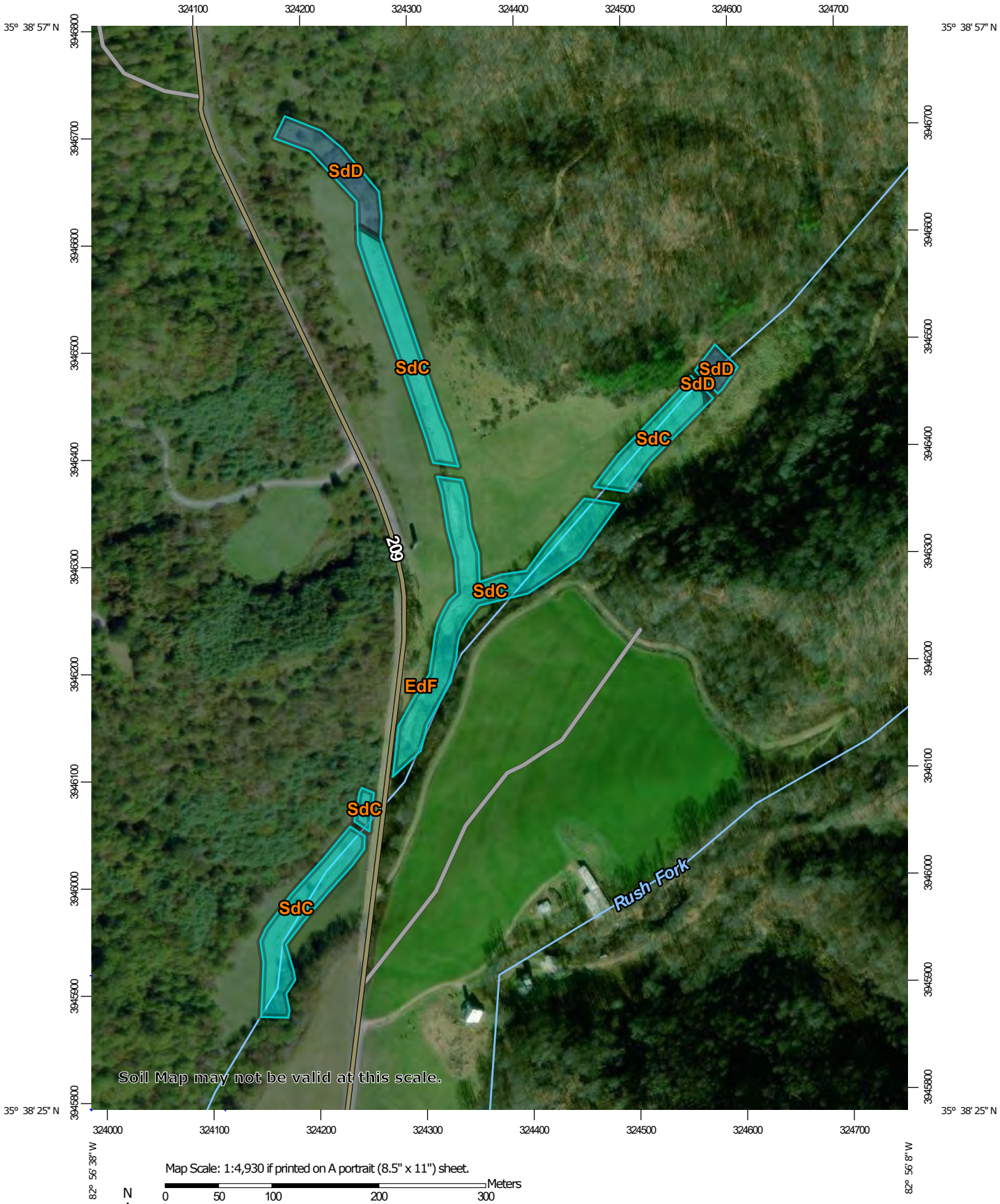
Kristi Suggs

Enclosures: USGS Topographic Map
NRCS Farmland Classification Report & Map
FFPA Form AD-1006

Cc: File

Michael Baker Engineering, Inc.
Ballantyne One, 15720 Brixham Hill Avenue
Suite 300, Room 318
Charlotte, NC 28277 | Office: 704.665.2200

Farmland Classification—Haywood County Area, North Carolina
(UT to Rush Fork Stream Mitigation Project)



Map Scale: 1:4,930 if printed on A portrait (8.5" x 11") sheet.

N

Meters
0 50 100 200 300

Feet
0 200 400 800 1200

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 17N WGS84

MAP LEGEND

Area of Interest (AOI)

- Area of Interest (AOI)

Soils

Soil Rating Polygons

- Not prime farmland
- All areas are prime farmland
- Prime farmland if drained
- Prime farmland if protected from flooding or not frequently flooded during the growing season
- Prime farmland if irrigated
- Prime farmland if drained and either protected from flooding or not frequently flooded during the growing season
- Prime farmland if irrigated and drained
- Prime farmland if irrigated and either protected from flooding or not frequently flooded during the growing season
- Prime farmland if subsoiled, completely removing the root inhibiting soil layer
- Prime farmland if irrigated and the product of I (soil erodibility) x C (climate factor) does not exceed 60
- Prime farmland if irrigated and reclaimed of excess salts and sodium
- Farmland of statewide importance
- Farmland of local importance
- Farmland of unique importance
- Not rated or not available

Soil Rating Lines

- Not prime farmland
- All areas are prime farmland
- Prime farmland if drained
- Prime farmland if protected from flooding or not frequently flooded during the growing season
- Prime farmland if irrigated
- Prime farmland if drained and either protected from flooding or not frequently flooded during the growing season
- Prime farmland if irrigated and drained
- Prime farmland if irrigated and either protected from flooding or not frequently flooded during the growing season
- Prime farmland if subsoiled, completely removing the root inhibiting soil layer
- Prime farmland if irrigated and the product of I (soil erodibility) x C (climate factor) does not exceed 60
- Prime farmland if irrigated and reclaimed of excess salts and sodium
- Farmland of statewide importance
- Farmland of local importance
- Farmland of unique importance
- Not rated or not available

Soil Rating Points

- Not prime farmland
- All areas are prime farmland
- Prime farmland if drained
- Prime farmland if protected from flooding or not frequently flooded during the growing season
- Prime farmland if irrigated
- Prime farmland if drained and either protected from flooding or not frequently flooded during the growing season
- Prime farmland if irrigated and drained
- Prime farmland if irrigated and either protected from flooding or not frequently flooded during the growing season
- Prime farmland if subsoiled, completely removing the root inhibiting soil layer
- Prime farmland if irrigated and the product of I (soil erodibility) x C (climate factor) does not exceed 60
- Prime farmland if irrigated and reclaimed of excess salts and sodium
- Farmland of statewide importance
- Farmland of local importance
- Farmland of unique importance
- Not rated or not available

Water Features

MAP INFORMATION

Streams and Canals

Transportation

Rails

Interstate Highways

US Routes

Major Roads

Local Roads

Background

Aerial Photography

The soil surveys that comprise your AOI were mapped at 1:12,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Haywood County Area, North Carolina
Survey Area Data: Version 16, Oct 3, 2017

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Nov 23, 2011—Nov 28, 2017

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Farmland Classification

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
EdF	Edneyville-Chestnut complex, 50 to 95 percent slopes, stony	Not prime farmland	0.0	0.0%
SdC	Saunook loam, 8 to 15 percent slopes, stony	Farmland of statewide importance	6.0	85.1%
SdD	Saunook loam, 15 to 30 percent slopes, stony	Farmland of local importance	1.0	14.9%
Totals for Area of Interest			**7.0**	**100.0%**

Description

Farmland classification identifies map units as prime farmland, farmland of statewide importance, farmland of local importance, or unique farmland. It identifies the location and extent of the soils that are best suited to food, feed, fiber, forage, and oilseed crops. NRCS policy and procedures on prime and unique farmlands are published in the "Federal Register," Vol. 43, No. 21, January 31, 1978.

Rating Options

Aggregation Method: No Aggregation Necessary

Tie-break Rule: Lower

U.S. Department of Agriculture

FARMLAND CONVERSION IMPACT RATING

PART I *(To be completed by Federal Agency)*	Date Of Land Evaluation Request 6/5/2018
Name of Project UT to Rush Fork Stream Mitigation Projec	Federal Agency Involved FHWA
Proposed Land Use Stream Mitigation	County and State Haywood Co, NC
PART II *(To be completed by NRCS)*	Date Request Received By NRCS 6/5/2018 / Person Completing Form: Milton Cortes NC NRCS

Does the site contain Prime, Unique, Statewide or Local Important Farmland? *(If no, the FPPA does not apply - do not complete additional parts of this form)*	YES ☑ NO ☐	Acres Irrigated: none	Average Farm Size: 82 acres
Major Crop(s): CORN	Farmable Land In Govt. Jurisdiction Acres: 41.3% % 89,523 acres	Amount of Farmland As Defined in FPPA Acres: 28.1% % 74,865 acres	
Name of Land Evaluation System Used: Haywood Co. NC LESA	Name of State or Local Site Assessment System: N/A	Date Land Evaluation Returned by NRCS: June 28, 2018 by eMail	

PART III *(To be completed by Federal Agency)*	Alternative Site Rating Site A	Site B	Site C	Site D
A. Total Acres To Be Converted Directly	7.0			
B. Total Acres To Be Converted Indirectly	0			
C. Total Acres In Site	7.0			
PART IV *(To be completed by NRCS)* Land Evaluation Information				
A. Total Acres Prime And Unique Farmland	0			
B. Total Acres Statewide Important or Local Important Farmland	7			
C. Percentage Of Farmland in County Or Local Govt. Unit To Be Converted	0.0094			
D. Percentage Of Farmland in Govt. Jurisdiction With Same Or Higher Relative Value	6.3%			
PART V (To be completed by NRCS) Land Evaluation Criterion Relative Value of Farmland To Be Converted (Scale of 0 to 100 Points)	83			

PART VI *(To be completed by Federal Agency)* Site Assessment Criteria *(Criteria are explained in 7 CFR 658.5 b. For Corridor project use form NRCS-CPA-106)*	**Maximum Points**	Site A	Site B	Site C	Site D
1. Area In Non-urban Use	(15)	15			
2. Perimeter In Non-urban Use	(10)	10			
3. Percent Of Site Being Farmed	(20)	20			
4. Protection Provided By State and Local Government	(20)	20			
5. Distance From Urban Built-up Area	(15)	15			
6. Distance To Urban Support Services	(15)	15			
7. Size Of Present Farm Unit Compared To Average	(10)	5			
8. Creation Of Non-farmable Farmland	(10)	0			
9. Availability Of Farm Support Services	(5)	4			
10. On-Farm Investments	(20)	10			
11. Effects Of Conversion On Farm Support Services	(10)	0			
12. Compatibility With Existing Agricultural Use	(10)	0			
TOTAL SITE ASSESSMENT POINTS	160	114	0	0	0
PART VII *(To be completed by Federal Agency)*					
Relative Value Of Farmland *(From Part V)*	100	83	0	0	0
Total Site Assessment *(From Part VI above or local site assessment)*	160	114	0	0	0
TOTAL POINTS ***(Total of above 2 lines)***	260	197	0	0	0

Site Selected: A	Date Of Selection 7/16/2018	Was A Local Site Assessment Used? YES ☑ NO ☐

Reason For Selection:

Name of Federal agency representative completing this form: FHWA — Date: 7/16/2018

(See Instructions on reverse side) **Form AD-1006 (03-02)**

Michael Baker
INTERNATIONAL

We Make a Difference

June 5, 2018

NC Wildlife Resource Commission
Attn: Andrea Leslie, Mountain Habitat Conservation Coordinator
645 Fish Hatchery Rd., Building B
Marion, NC 28752
Email: andrea.leslie@ncwildlife.org

RE: Categorical Exclusion Project Review Request
UT to Rush Fork Stream Mitigation Project, Haywood County, NC
NCDEQ DMS Full-Delivery Project ID #100068
French Broad River Basin (06010106)

Dear Ms. Leslie:

Michael Baker Engineering, Inc. (Baker) respectfully requests review and comment from the NC Wildlife Resource Commission (WRC) on any possible concerns they may have with regards to the implementation of the UT to Rush Fork Stream Mitigation Project. Please note that this request is in support of the development of the Categorical Exclusion (CE) for the referenced project.

The project area is located in the Crabtree Community in Haywood County, North Carolina approximately 3 miles south of the Township of Fines Creek. The project is located on the United States Geological Survey's (USGS) Fines Creek Topographic Quadrangle. The center of the project area is located at 35.6446 N and -82.9402 W. The project site flows southwesterly and is bisected by Rush Fork Road approximately 1.8 miles north of its intersection with Silvers Coves Road.

The UT to Rush Fork site was identified to provide compensatory mitigation for unavoidable stream impacts. The existing stream reaches have been significantly impacted by unrestricted livestock access and the removal of riparian buffers. Most of the project reaches have cleared banks with a mix of small scattered trees and stands of invasive species located at the top of bank in non-grazed areas. Currently, the project reaches are unstable, incised, and exhibit active bank erosion from both high flows and livestock access.

The project will involve the restoration and enhancement of approximately 5,300 LF of existing stream. A Best Management Practice (BMP) will also be implemented at the head of one of the tributaries to treat nutrient and sediment laden run-off from the surrounding pasture area. Degraded riparian wetlands will be restored and/or enhanced with the implementation of Priority Level 1 restoration, livestock exclusion, and native riparian buffer plantings. At this time, no wetland credit is being sought for the project. A conservation easement will be implemented along all project reaches in an excess of 30 feet from the top of bank and will incorporate existing functional wetlands. The conservation easement will protect the entire project area in perpetuity. Livestock will be excluded from the conservation easement with permanent fencing.

Data Review and Analysis

Michael Baker Engineering, Inc. (Baker) conducted an on-line review of the project area with the use of the United States Fish and Wildlife Service (USFWS) IPAC website (https://ecos.fws.gov/ipac/), on May

Michael Baker Engineering, Inc.
Ballantyne One, 15720 Brixham Hill Ave., Ste. 300 Office 318
Charlotte, NC 28277 | Office: 704.665.2200

21, 2018. This review generated an *Official Species List* (OSL), which identifies threatened, endangered, proposed and candidate species, as well as proposed and final designated critical habitat, that may occur within the boundary of the proposed project and/or may be affected by proposed project. Results from review, found the following nine federally listed species. No USFWS designated critical habitats were located within the project boundaries.

Scientific Name	Common Name	Federal Status
Glaucomys sabrinus coloratus	Carolina Northern Flying Squirrel	Endangered
Myotis grisescens	Gray Bat	Endangered
Myotis sodalis	Indiana Bat	Endangered
Myotis septentrionalis	Northern long-eared bat	Threatened
Alasmidonta raveneliana	Appalachian Elktoe	Endangered
Microhexura montivaga	Spruce-fir Moss Spider	Endangered
Isotria medeoloides	Small Whorled Pogonia	Threatened
Geum radiatum	Spreading Avens	Endangered
Gymnoderma lineare	Rock Gnome Lichen	Endangered

On May 22, 2018, Baker conducted a two-mile radius search using the Natural Heritage Program (NCNHP) Data Explorer (https://ncnhde.natureserve.org/). Results from this search and found no known occurrences of any of the above referenced species within two miles of the project site.

***Glaucomys sabrinus coloratus* (Carolina Northern Flying Squirrel) – Endangered**

USFWS optimal survey window: May-October

The endangered Carolina northern flying squirrel is a subspecies of the northern flying squirrel. The northern flying squirrel is a small nocturnal gliding mammal usually 1O to 12 inches in length and 3-5 ounces in weight. It possesses a long, broad, flattened tail which encompasses approximate 8O percent of head and body length, prominent eyes, and dense, silky fur. The broad tail and folds of skin between the wrist and ankle form the aerodynamic surface used for gliding. Adults are gray with a brownish, tan, or reddish wash on the back, and their fur fades to a buff white on the belly.

There are several isolated populations of the Carolina northern flying squirrel in the mountains of North Carolina and are typically found in areas where northern hardwoods, such as yellow birch, beech, maple, hemlock, red oak, and buckeye, are adjacent to the higher-elevation, typically at elevations greater than 4,500 feet above mean sea level (AMSL), red spruce-Fraser fir forests. In some instances, the squirrels may be found on narrow, north-facing valleys greater than 4,000 feet AMSL. Both forest types are used to search for food and the hardwood forest is used for nesting sites. Mature forests with a thick evergreen understory and numerous snags are most preferable. In winter, squirrels inhabit tree cavities in older hardwoods, particularly yellow birch.

No critical habitat has been designated for this species.

***Myotis grisescens* (Gray Bat) – Endangered**

USFWS optimal survey window: May15-August 15 (summer); January 15-February 15 (winter)

The gray bat is the largest member of its genus in the eastern United States, and is easily distinguishable from all other bats within its range by its mono-colored fur. Following molt in July or August, gray bats are dark gray, but they often bleach to chestnut brown or russet between molts (especially apparent in reproductive females during May and June). The wing membrane connects to the foot at the ankle rather than at the base of the first toe, as in other species of *Myotis*.

Gray bats roost predominantly in caves year-round. Most winter caves are deep and vertical, while cave types vary during the spring and fall transient periods. In summer, maternity colonies prefer caves that act as warm air traps or that provide restricted rooms or domed ceilings that are capable of trapping the combined body heat from thousands of clustered individuals, and are located within one half mile of a river or reservoir, which provides foraging habitat.

No critical habitat has been designated for this species.

***Myotis sodalist* (Indiana Bat) – Endangered**

USFWS optimal survey window: May15 - August 15 (summer)

The Indiana bat is a medium-sized bat, with a head and body length ranging from 1.6 – 1.9 in. The species closely resembles the little brown bat (*Myotis lucifugus*) and the northern long-eared bat (*Myotis septentrionalis*). Its hind feet tend to be small and delicate with fewer, shorter hairs than other bats of the Myotis genus. The fur lacks luster. The ears and wing membranes have a dull appearance and flat coloration that does not contrast with the fur. The fur of the chest and belly is lighter than the pinkish-brown fur on the back, but does not contrast as strongly as does that of the little brown or northern long-eared bats.

Indiana bats winter in caves or mines with stable, but not freezing, cold temperatures. In summer they generally roost in the loose bark of trees, either dead trees with peeling bark, or live trees with shaggy bark, such as white oak and some hickories.

Known current Indiana bat distributions occur in Haywood County. Critical Habitat for the Indiana Bat was designated on September 24, 1976. Based on the IPAC Official Species List generated, the project lies outside the critical habitat. Additionally, a two-mile radius search using the Natural Heritage Program's Data Explorer (https://ncnhde.natureserve.org/) on May 22, 2018 found no known occurrences of the Indiana bat within two miles of the Project site.

***Myotis septentrionalis* (Northern long-eared bat) – Threatened**

In North Carolina, the northern long-eared bat (NLEB) occurs in the mountains, with scattered records in the Piedmont and coastal plain. In western North Carolina, NLEB spend winter hibernating in caves and mines. Since this species is not known to be a long-distance migrant, and caves and subterranean mines are extremely rare in eastern North Carolina, it is uncertain whether or where NLEB hibernate in eastern NC. During the summer, NLEB roost singly or in colonies underneath bark, in cavities, or in crevices of both live and dead trees (typically ≥3 inches dbh). This bat also been found, rarely, roosting in structures like barns and sheds, under eaves of buildings, behind window shutters, in bridges, and in bat houses. Pregnant females give birth from late May to late July. Foraging occurs on forested hillsides and ridges, and occasionally over forest clearings, over water, and along tree-lined corridors. Mature forests may be an important habitat type for foraging.

No critical habitat has been designated for this species and the project site is located outside of a watershed where NLEB maternity trees or hibernation sites are known to occur. Additionally, a two-mile radius search using the Natural Heritage Program's Data Explorer (https://ncnhde.natureserve.org/) on May 22, 2018 found no known occurrences of the NLEB within two miles of the Project site.

No critical habitat has been designated for this species.

***Alasmidonta raveneliana* (Appalachian Elktoe) – Endangered**

USFWS optimal survey window: year round

The Appalachian elktoe has a thin, kidney-shaped shell, extending to about 4 inches. Juveniles generally have a yellowish-brown outer shell surface, while the adults outer shell is usually dark brown to greenish-

black. Although rays are prominent on some shells, particularly in the posterior portion of the shell, many individuals have only obscure greenish rays. The inside shell surface is shiny, often white to bluish-white, changing to a salmon, pinkish, or brownish color in the central and beak cavity portions of the shell; some specimens may be marked with irregular brownish blotches.

The species has been reported from relatively shallow, medium-sized creeks and rivers with cool, clean, well-oxygenated, moderate- to fast-flowing water. The species is most often found in riffles, runs, and shallow flowing pools with stable, relatively silt-free, coarse sand and gravel substrate associated with cobble, boulders, and/or bedrock. Stability of the substrate appears to be critical to the Appalachian elktoe, and the species is seldom found in stream reaches with accumulations of silt or shifting sand, gravel, or cobble. Additional factors known to have contributed to the decline and loss of populations of the Appalachian elktoe and threaten the remaining populations include habitat loss and alteration associated with impoundments, channelization, and dredging operations; and the run-off of silt, fertilizers, pesticides, and other pollutants from poorly implemented land-use/farm related activities.

Known current Appalachian elktoe distributions occur in Haywood County as well as in portions of the Pigeon River system. Critical Habitat for the Appalachian elktoe was designated on September 27, 2002. Based on the IPAC Official Species List generated, the project lies outside the critical habitat. Additionally, a two-mile radius search using the Natural Heritage Program's Data Explorer (https://ncnhde.natureserve.org/) on May 22, 2018 found no known occurrences of the Appalachian elktoe within two miles of the Project site.

***Microhexura montivaga* (Spruce-fir Moss Spider) – Endangered**

USFWS Recommended Survey Window: May - August

The spruce-fir moss spider is one of the smallest members of the primitive suborder of spiders popularly referred to as "tarantulas." Adults of this species measure only 0.10 to 0.15 inch (about the size of a BB). Coloration of the spruce-fir moss spider ranges from light brown to yellow-brown to a darker reddish brown, and there are no markings on its abdomen. This species is lives on the highest mountain peaks in spruce-fir forests of the Appalachian Mountains of western North Carolina, eastern Tennessee, and southwest Virginia. The spruce-fir moss spider occurs in well-drained moss and liverwort mats growing on rocks or boulders. These mats are found in well-shaded areas in mature, high elevation (> 5,000 feet AMSL) Fraser fir and red spruce forests. The spruce-fir moss spider is very sensitive to desiccation and requires environments of high and constant humidity. The need for humidity relates to the moss mats, which cannot become too parched or else the mats become dry and loose. Likewise, the moss mats cannot be too wet because large drops of water can also pose a threat to the spider. The spider constructs its tube-shaped webs in the interface between the moss mat and the rock surface. Some webs have been found to extend into the interior of the moss mat.

Critical Habitat for the Spruce-fir Moss Spider was designated on July 6, 2001. Based on the IPAC Official Species List generated, the project lies outside the critical habitat.

***Isotria medeoloides* (Small whorled pogonia) – Threatened**

USFWS Recommended Survey Window: mid-May – early July

Small whorled pogonia is a member of the orchid family and blooms from Mid-May through Early-July. It is named for the whorl of five or six leaves near the top of a single stem and beneath the small greenish-yellow flower. The plant occurs in predominantly mature (2nd or 3rd successional growth) mixed-deciduous or mixed-deciduous/coniferous forests with minimal ground cover and long persistent breaks in the forest canopy. The species prefers moist, acidic soils that lack nutrient diversity. Primary threats to

the small whorled pogonia include habitat loss and degradation from commercial and residential development, forestry practices, recreational activities, and trampling.

No critical habitat has been designated for this species.

Geum radiatum **(Spreading Avens) - Endangered**

USFWS Optimal Survey Window: June - September

Spreading avens is a tall perennial herb (eight to 20 inches) in the rose family. Its distinctive bright yellow flowers (generally up to 1 inch across) appear from June through September, and fruits form and ripen from August through October. Spreading avens is known to occur only on high mountain peaks in Western North Carolina and Eastern Tennessee. This species grows in full sun on the shallow acidic soils of high-elevation cliffs (above 4,200 feet), rocky outcrops, steep slopes, and on gravelly talus. This perennial herb also occurs in thin, gravelly soils of grassy balds near summit outcrops. The species prefers a northwest aspect, but can be found on west-southwest through north-northeast aspects. Forests surrounding known occurrences are generally dominated by either red spruce-Fraser fir, northern hardwoods with scattered spruce, or high-elevation red oaks. Spreading avens typically occurs in shallow, acidic soil (such as the Burton series) in cracks and crevices of igneous, metamorphic, or metasedimentary rocks. Soils may be well drained but almost continuously wet, with soils at some known occurrences subject to drying out in summer due to exposure to sun and shallow depths. Known populations occur at elevations ranging from 4,296 to 6,268 feet AMSL.

No critical habitat has been designated for this species.

Gymnoderma lineare **(Rock Gnome Lichen) – Endangered**

USFWS Optimal Survey Window: year round

The rock gnome lichen occurs in dense colonies of narrow strap-like lobes that are about 1 millimeter across and generally one to two centimeters long. These lobes are blue gray on the terminal upper surface, and generally shiny white on the lower surface, grading to black near the base. Fruiting bodies are black and have been found from July through September on the tips of these lobes; however, the primary means of propagation appears to be asexual, with colonies spreading clonally. The rock gnome lichen occurs in high elevation coniferous forests (particularly those dominated by red spruce and Fraser fir) usually on rocky outcrop or cliff habitats. This squamulose lichen only grows in areas with a great deal of humidity, such as high elevations greater than 5,000 feet AMSL where there is often fog, or on boulders and large outcrops in deep river gorges at lower elevations. Habitat is primarily limited to vertical rock faces where seepage water from forest soils above flows only at very wet times. The species requires a moderate amount of sunlight, but cannot tolerate high-intensity solar radiation. The lichen does well on moist, generally open sites with northern exposures, but requires at least partial canopy coverage on southern or western aspects because of its intolerance to high solar radiation.

No critical habitat has been designated for this species.

Please provide comments on any possible issues that may arise with respect to the endangered species, migratory birds or other natural resources from the construction of the proposed project. The following additional supporting documentation has been included for reference: Vicinity Map, USGS Topographic Map, and Project Site Map. If Baker has not received response from you within 30 days, we will assume that the NCWRC does not have any comment or information relevant to the implementation of this project at the current time.

We thank you in advance for your timely response, input, and cooperation. Please contact me if you have any further questions or comments. I can be reached at (704) 579-4828 or via my email address at ksuggs@mbakerintl.com.

Sincerely,

Kristi Suggs

Cc: File

Enclosures

Michael Baker
INTERNATIONAL

We Make a Difference

June 4, 2018

United States Fish and Wildlife Service
Asheville Ecological Services Field Office
Attn: Marella Buncick, Endangered Species Biologist
160 Zillicoa Street
Asheville, NC 28801

RE: Categorical Exclusion for UT to Rush Fork Stream Mitigation Project, Haywood County, NC
NCDEQ DMS Full-Delivery Project ID #100068, French Broad River Basin (06010106)
IPAC Consultation Code: 04EN1000-2018-SLI-0426

Dear Ms. Buncick:

Michael Baker Engineering, Inc. (Baker) respectfully requests review and comment from the US Fish and Wildlife Service (USFWS) on any possible concerns they may have with regards to the implementation of the UT to Rush Fork Stream Mitigation Project. Please note that this request is in support of the development of the Categorical Exclusion (CE) for the referenced project.

The project area is located in the Crabtree Community in Haywood County, North Carolina approximately 3 miles south of the Township of Fines Creek. The project is located on the United States Geological Survey's (USGS) Fines Creek Topographic Quadrangle. The center of the project area is located at 35.6446 N and -82.9402 W. The project site flows southwesterly and is bisected by Rush Fork Road approximately 1.8 miles north of its intersection with Silvers Coves Road.

The UT to Rush Fork site was identified to provide compensatory mitigation for unavoidable stream impacts. The existing stream reaches have been significantly impacted by unrestricted livestock access and the removal of riparian buffers. Most of the project reaches have cleared banks with a mix of small scattered trees and stands of invasive species located at the top of bank in non-grazed areas. Currently, the project reaches are unstable, incised, and exhibit active bank erosion from both high flows and livestock access.

The project will involve the restoration and enhancement of approximately 5,300 LF of existing stream. A Best Management Practice (BMP) will also be implemented at the head of one of the tributaries to treat nutrient and sediment laden run-off from the surrounding pasture area. Degraded riparian wetlands will be restored and/or enhanced with the implementation of Priority Level 1 restoration, livestock exclusion, and native riparian buffer plantings. At this time, no wetland credit is being sought for the project. A conservation easement will be implemented along all project reaches in an excess of 30 feet from the top of bank and will incorporate existing functional wetlands. The conservation easement will protect the entire project area in perpetuity. Livestock will be excluded from the conservation easement with permanent fencing.

Data Review and Analysis

Michael Baker Engineering, Inc. (Baker) conducted an on-line review of the project area with the use of the United States Fish and Wildlife Service (USFWS) IPAC website (https://ecos.fws.gov/ipac/), on May

Michael Baker Engineering, Inc.
Ballantyne One, 15720 Brixham Hill Ave., Ste. 300 Office 318
Charlotte, NC 28277 | Office: 704.665.2200

21, 2018. This review generated an *Official Species List* (OSL), which identifies threatened, endangered, proposed and candidate species, as well as proposed and final designated critical habitat, that may occur within the boundary of the proposed project and/or may be affected by proposed project. Results from review, found the following nine federally listed species. No USFWS designated critical habitats were located within the project boundaries.

Scientific Name	Common Name	Federal Status
Glaucomys sabrinus coloratus	Carolina Northern Flying Squirrel	Endangered
Myotis grisescens	Gray Bat	Endangered
Myotis sodalis	Indiana Bat	Endangered
Myotis septentrionalis	Northern long-eared bat	Threatened
Alasmidonta raveneliana	Appalachian Elktoe	Endangered
Microhexura montivaga	Spruce-fir Moss Spider	Endangered
Isotria medeoloides	Small Whorled Pogonia	Threatened
Geum radiatum	Spreading Avens	Endangered
Gymnoderma lineare	Rock Gnome Lichen	Endangered

On May 22, 2018, Baker conducted a two-mile radius search using the Natural Heritage Program (NCNHP) Data Explorer (https://ncnhde.natureserve.org/). Results from this search and found no known occurrences of any of the above referenced species within two miles of the project site.

***Glaucomys sabrinus coloratus* (Carolina Northern Flying Squirrel) – Endangered**

USFWS optimal survey window: May-October

The endangered Carolina northern flying squirrel is a subspecies of the northern flying squirrel. The northern flying squirrel is a small nocturnal gliding mammal usually 1O to 12 inches in length and 3-5 ounces in weight. It possesses a long, broad, flattened tail which encompasses approximate 8O percent of head and body length, prominent eyes, and dense, silky fur. The broad tail and folds of skin between the wrist and ankle form the aerodynamic surface used for gliding. Adults are gray with a brownish, tan, or reddish wash on the back, and their fur fades to a buff white on the belly.

There are several isolated populations of the Carolina northern flying squirrel in the mountains of North Carolina and are typically found in areas where northern hardwoods, such as yellow birch, beech, maple, hemlock, red oak, and buckeye, are adjacent to the higher-elevation, typically at elevations greater than 4,500 feet above mean sea level (AMSL), red spruce-Fraser fir forests. In some instances, the squirrels may be found on narrow, north-facing valleys greater than 4,000 feet AMSL. Both forest types are used to search for food and the hardwood forest is used for nesting sites. Mature forests with a thick evergreen understory and numerous snags are most preferable. In winter, squirrels inhabit tree cavities in older hardwoods, particularly yellow birch.

No critical habitat has been designated for this species.

***Myotis grisescens* (Gray Bat) – Endangered**

USFWS optimal survey window: May15-August 15 (summer); January 15-February 15 (winter)

The gray bat is the largest member of its genus in the eastern United States, and is easily distinguishable from all other bats within its range by its mono-colored fur. Following molt in July or August, gray bats are dark gray, but they often bleach to chestnut brown or russet between molts (especially apparent in reproductive females during May and June). The wing membrane connects to the foot at the ankle rather than at the base of the first toe, as in other species of *Myotis*.

Gray bats roost predominantly in caves year-round. Most winter caves are deep and vertical, while cave types vary during the spring and fall transient periods. In summer, maternity colonies prefer caves that act as warm air traps or that provide restricted rooms or domed ceilings that are capable of trapping the combined body heat from thousands of clustered individuals, and are located within one half mile of a river or reservoir, which provides foraging habitat.

No critical habitat has been designated for this species.

***Myotis sodalist* (Indiana Bat) – Endangered**

USFWS optimal survey window: May15 - August 15 (summer)

The Indiana bat is a medium-sized bat, with a head and body length ranging from 1.6 – 1.9 in. The species closely resembles the little brown bat (*Myotis lucifugus*) and the northern long-eared bat (*Myotis septentrionalis*). Its hind feet tend to be small and delicate with fewer, shorter hairs than other bats of the Myotis genus. The fur lacks luster. The ears and wing membranes have a dull appearance and flat coloration that does not contrast with the fur. The fur of the chest and belly is lighter than the pinkish-brown fur on the back, but does not contrast as strongly as does that of the little brown or northern long-eared bats.

Indiana bats winter in caves or mines with stable, but not freezing, cold temperatures. In summer they generally roost in the loose bark of trees, either dead trees with peeling bark, or live trees with shaggy bark, such as white oak and some hickories.

Known current Indiana bat distributions occur in Haywood County. Critical Habitat for the Indiana Bat was designated on September 24, 1976. Based on the IPAC Official Species List generated, the project lies outside the critical habitat. Additionally, a two-mile radius search using the Natural Heritage Program's Data Explorer (https://ncnhde.natureserve.org/) on May 22, 2018 found no known occurrences of the Indiana bat within two miles of the Project site.

***Myotis septentrionalis* (Northern long-eared bat) – Threatened**

In North Carolina, the northern long-eared bat (NLEB) occurs in the mountains, with scattered records in the Piedmont and coastal plain. In western North Carolina, NLEB spend winter hibernating in caves and mines. Since this species is not known to be a long-distance migrant, and caves and subterranean mines are extremely rare in eastern North Carolina, it is uncertain whether or where NLEB hibernate in eastern NC. During the summer, NLEB roost singly or in colonies underneath bark, in cavities, or in crevices of both live and dead trees (typically ≥3 inches dbh). This bat also been found, rarely, roosting in structures like barns and sheds, under eaves of buildings, behind window shutters, in bridges, and in bat houses. Pregnant females give birth from late May to late July. Foraging occurs on forested hillsides and ridges, and occasionally over forest clearings, over water, and along tree-lined corridors. Mature forests may be an important habitat type for foraging.

No critical habitat has been designated for this species and the project site is located outside of a watershed where NLEB maternity trees or hibernation sites are known to occur. Additionally, a two-mile radius search using the Natural Heritage Program's Data Explorer (https://ncnhde.natureserve.org/) on May 22, 2018 found no known occurrences of the NLEB within two miles of the Project site.

No critical habitat has been designated for this species.

***Alasmidonta raveneliana* (Appalachian Elktoe) – Endangered**

USFWS optimal survey window: year round

The Appalachian elktoe has a thin, kidney-shaped shell, extending to about 4 inches. Juveniles generally have a yellowish-brown outer shell surface, while the adults outer shell is usually dark brown to greenish-

black. Although rays are prominent on some shells, particularly in the posterior portion of the shell, many individuals have only obscure greenish rays. The inside shell surface is shiny, often white to bluish-white, changing to a salmon, pinkish, or brownish color in the central and beak cavity portions of the shell; some specimens may be marked with irregular brownish blotches.

The species has been reported from relatively shallow, medium-sized creeks and rivers with cool, clean, well-oxygenated, moderate- to fast-flowing water. The species is most often found in riffles, runs, and shallow flowing pools with stable, relatively silt-free, coarse sand and gravel substrate associated with cobble, boulders, and/or bedrock. Stability of the substrate appears to be critical to the Appalachian elktoe, and the species is seldom found in stream reaches with accumulations of silt or shifting sand, gravel, or cobble. Additional factors known to have contributed to the decline and loss of populations of the Appalachian elktoe and threaten the remaining populations include habitat loss and alteration associated with impoundments, channelization, and dredging operations; and the run-off of silt, fertilizers, pesticides, and other pollutants from poorly implemented land-use/farm related activities.

Known current Appalachian elktoe distributions occur in Haywood County as well as in portions of the Pigeon River system. Critical Habitat for the Appalachian elktoe was designated on September 27, 2002. Based on the IPAC Official Species List generated, the project lies outside the critical habitat. Additionally, a two-mile radius search using the Natural Heritage Program's Data Explorer (https://ncnhde.natureserve.org/) on May 22, 2018 found no known occurrences of the Appalachian elktoe within two miles of the Project site.

Microhexura montivaga **(Spruce-fir Moss Spider) – Endangered**

USFWS Recommended Survey Window: May - August

The spruce-fir moss spider is one of the smallest members of the primitive suborder of spiders popularly referred to as "tarantulas." Adults of this species measure only 0.10 to 0.15 inch (about the size of a BB). Coloration of the spruce-fir moss spider ranges from light brown to yellow-brown to a darker reddish brown, and there are no markings on its abdomen. This species is lives on the highest mountain peaks in spruce-fir forests of the Appalachian Mountains of western North Carolina, eastern Tennessee, and southwest Virginia. The spruce-fir moss spider occurs in well-drained moss and liverwort mats growing on rocks or boulders. These mats are found in well-shaded areas in mature, high elevation (> 5,000 feet AMSL) Fraser fir and red spruce forests. The spruce-fir moss spider is very sensitive to desiccation and requires environments of high and constant humidity. The need for humidity relates to the moss mats, which cannot become too parched or else the mats become dry and loose. Likewise, the moss mats cannot be too wet because large drops of water can also pose a threat to the spider. The spider constructs its tube-shaped webs in the interface between the moss mat and the rock surface. Some webs have been found to extend into the interior of the moss mat.

Critical Habitat for the Spruce-fir Moss Spider was designated on July 6, 2001. Based on the IPAC Official Species List generated, the project lies outside the critical habitat.

Isotria medeoloides **(Small whorled pogonia) – Threatened**

USFWS Recommended Survey Window: mid-May – early July

Small whorled pogonia is a member of the orchid family and blooms from Mid-May through Early-July. It is named for the whorl of five or six leaves near the top of a single stem and beneath the small greenish-yellow flower. The plant occurs in predominantly mature (2nd or 3rd successional growth) mixed-deciduous or mixed-deciduous/coniferous forests with minimal ground cover and long persistent breaks in the forest canopy. The species prefers moist, acidic soils that lack nutrient diversity. Primary threats to

the small whorled pogonia include habitat loss and degradation from commercial and residential development, forestry practices, recreational activities, and trampling.

No critical habitat has been designated for this species.

Geum radiatum **(Spreading Avens) - Endangered**

USFWS Optimal Survey Window: June - September

Spreading avens is a tall perennial herb (eight to 20 inches) in the rose family. Its distinctive bright yellow flowers (generally up to 1 inch across) appear from June through September, and fruits form and ripen from August through October. Spreading avens is known to occur only on high mountain peaks in Western North Carolina and Eastern Tennessee. This species grows in full sun on the shallow acidic soils of high-elevation cliffs (above 4,200 feet), rocky outcrops, steep slopes, and on gravelly talus. This perennial herb also occurs in thin, gravelly soils of grassy balds near summit outcrops. The species prefers a northwest aspect, but can be found on west-southwest through north-northeast aspects. Forests surrounding known occurrences are generally dominated by either red spruce-Fraser fir, northern hardwoods with scattered spruce, or high-elevation red oaks. Spreading avens typically occurs in shallow, acidic soil (such as the Burton series) in cracks and crevices of igneous, metamorphic, or metasedimentary rocks. Soils may be well drained but almost continuously wet, with soils at some known occurrences subject to drying out in summer due to exposure to sun and shallow depths. Known populations occur at elevations ranging from 4,296 to 6,268 feet AMSL.

No critical habitat has been designated for this species.

Gymnoderma lineare **(Rock Gnome Lichen) – Endangered**

USFWS Optimal Survey Window: year round

The rock gnome lichen occurs in dense colonies of narrow strap-like lobes that are about 1 millimeter across and generally one to two centimeters long. These lobes are blue gray on the terminal upper surface, and generally shiny white on the lower surface, grading to black near the base. Fruiting bodies are black and have been found from July through September on the tips of these lobes; however, the primary means of propagation appears to be asexual, with colonies spreading clonally. The rock gnome lichen occurs in high elevation coniferous forests (particularly those dominated by red spruce and Fraser fir) usually on rocky outcrop or cliff habitats. This squamulose lichen only grows in areas with a great deal of humidity, such as high elevations greater than 5,000 feet AMSL where there is often fog, or on boulders and large outcrops in deep river gorges at lower elevations. Habitat is primarily limited to vertical rock faces where seepage water from forest soils above flows only at very wet times. The species requires a moderate amount of sunlight, but cannot tolerate high-intensity solar radiation. The lichen does well on moist, generally open sites with northern exposures, but requires at least partial canopy coverage on southern or western aspects because of its intolerance to high solar radiation.

No critical habitat has been designated for this species.

Please provide comments on any possible issues that may arise with respect to the endangered species, migratory birds or other natural resources from the construction of the proposed project. The following additional supporting documentation has been included for reference: Vicinity Map, USGS Topographic Map, and Project Site Map. If Baker has not received response from you within 30 days, we will assume that the USFWS does not have any comment or information relevant to the implementation of this project at the current time.

We thank you in advance for your timely response, input, and cooperation. Please contact me if you have any further questions or comments. I can be reached at (704) 579-4828 or via my email address at ksuggs@mbakerintl.com.

Sincerely,

Kristi Suggs

Cc: File

Enclosures

North Carolina Wildlife Resources Commission

Gordon Myers, Executive Director

June 14, 2018

Kristi Suggs
Michael Baker International
15720 Brixham Hill Ave, Suite 300, Office 318
Charlotte, NC 28277

SUBJECT: UT Rush Fork Stream Mitigation Project
UTs to Rush Fork, Haywood County

Dear Ms. Suggs:

Biologists with the North Carolina Wildlife Resources Commission (NCWRC) received your June 5, 2018 letter regarding plans for a stream restoration project on unnamed tributaries (UTs) to Rush Fork in Haywood County. You requested review and comment on the project. Our comments on this project are offered for your consideration under provisions of the Clean Water Act of 1977 (33 U.S.C. 466 et. seq.) and Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S.C. 661-667d).

The project will involve restoration and enhancement on 5,300 ft of stream. It is anticipated that degraded riparian wetlands will be restored or enhanced with the Priority 1 stream restoration strategy. Cattle will be fenced from the easement.

We do not anticipate impacts to wild trout, and a moratorium will likely not need to be observed.

We recommend that riparian buffers that are to be reestablished be as wide as possible, given site constraints and landowner needs. NCWRC generally recommends a woody buffer of 100 feet on perennial streams in order to maximize the benefits of buffers, including bank stability, stream shading, treatment of overland runoff, and wildlife habitat.

Thank you for the opportunity to review and comment on this project. Please contact me at (828) 803-6054 if you have any questions about these comments.

Sincerely,

Andrea Leslie
Mountain Region Coordinator
Habitat Conservation Program

Mailing Address: Habitat Conservation • 1721 Mail Service Center • Raleigh, NC 27699-1721
Telephone: (919) 707-0220 • **Fax:** (919) 707-0028

APPENDIX J: CORRESPONDENCE MEMOS

Michael Baker
INTERNATIONAL

Memo Regarding UT to Rush Fork Creek Post Contract IRT Field Meeting

Memo Date: 8/9/18

Meeting Held: 8/1/18 from 1:30 to 4:00 P.M.

Attendees:

David Brown (Corps of Engineers),
Todd Tugwell (Corps of Engineers),
Mac Haupt (DWR)
Paul Wiesner (DMS),
Matthew Reid (DMS),
Periann Russell (DMS),
Tim Bumgarner (DMS),
Micky Clemmons (Michael Baker),
Katie McKeithan (Michael Baker), and
Russell Myers (Michael Baker).

Meeting Minutes:

This memo and all responses will be included in the Mitigation Plan to serve as a record of field discussions including crediting ratios and approaches.

The following provides a summary of procedures, discussions, and conclusions reached by the group.

The group met at a pull-off on Highway 209 (Rush Fork Road), near the gate into the northern reach. A general site overview and map orientation was provided by Micky. The group walked through the gate into the northern section and moved from the confluence of UT4 upstream along UT1. There was an explanation that UT4 has a few SMUs associated with restoring the confluence of this stream to UT1 after it is restored. The rest of UT4 will have livestock fenced out but will not be included in the easement. The group continued up UT1. We stopped and looked at a section where the stream had meandered against a steep bank and Mac made the observation that substrate was in a good condition at that point. He also asked what Baker's thoughts were relative to restoration there and Micky responded that our thoughts were to move the channel away from the steep bank to the extent that we could construct a bankfull bench.

We continued upstream stopping at the confluence of UT2. Todd asked about the location of UT2 relative to the road and if the water flowing along the fence below the road on the Collier property was part of it. Micky explained that UT2 flows down the Kirkpatrick side of the old road and then enters the Collier property through a culvert under the road. It then flows along and in a patch of Multiflora rose, to a confluence with UT1. Micky also pointed out that the easement on the left bank of UT1 would be wider than 30' since it would run from the channel to the existing fence on the property line. The group continued upstream to the fence below the old road crossing. Micky pointed out the break locations between the proposed EII, EI and restoration sections. Mac and Todd indicated that they were having a difficult time seeing a difference between the restoration area above the confluence with UT3 and the enhancement areas. Micky pointed out the incised channel and indicated that the vegetation present at the time of the visit was masking the instability along the banks. He indicated that DMS staff had seen it when it was much worse. The group did not feel that they needed to proceed across the fence into the

EI area at the top of the project reach on UT1 and were satisfied with the plan for this area. Todd asked about the possibility of removing the road so that the stream bed and banks would be continuous and Micky explained that the landowner required that a culvert be placed at that location to maintain access to his property. The group proceeded back down UT1 and across the pasture to walk up UT3.

The group continued up UT3 observing channel conditions and stopped above the proposed restoration reach and along the stream bank at the lower end of the proposed EI reach. Mac asked what was planned for this EI reach. Micky explained that in this area there would be grade control structures installed, the channel would be brought up in elevation, the crabapples would be removed and native vegetation planted. Mac indicated, and Todd agreed, that this area appeared to need restoration more than the area on the upper reach of UT1. We then walked to the upper end of UT3 where Micky pointed out the point that the reach was considered to be perennial and that there were indicators of flow above this point but that it was most likely intermittent. Mac and others walked up above the indicated perennial point and suggested that Baker may want to reconsider where the reach ended or at least where the easement and fence might end to capture any areas that could contribute significant sediment and nutrients to the reach. Micky pointed out the location of a planned BMP at the lower end of a swale (abandoned roadbed) that runs along the toe of the Hwy 209 slope. The group then walked back down UT3 noting the location of possible wetland areas along the banks of the reach. It was suggested that as much of the wetland areas as possible be included in the conservation easement. At the lower end of the reach Micky pointed out the changes in slope along this reach and how the stream flow appeared to be moving to the left bank in one area where the valley was slightly lower. The group then continued down UT1. Micky pointed out to Mac areas that he considered unstable and incised in the area around the confluence of UT3 and UT1. Mac indicated that he could see a need for restoration in this area. Todd indicated that he was concerned that this same area may not rise to the level of need for restoration. We looked at UT1 down to below the entrance gate along the wetland areas noting erosion and headcuts in that area.

The group then walked down Hwy 209 to the southern parcel where UT1 continued. Micky asked Todd to look at the upper area of this reach from Hwy 209 to consider what would be impacted by the utility right-of-way. Micky acknowledged that this area would not have the full buffer width and said that we had accounted for that in our 5% calculation. Micky's question to him was, "would it be better to include this area in the easement, even though it would not generate credit, or leave it out and seek to exclude livestock by a fence". Todd indicated that he would prefer to see it not included in the conservation easement since he was seeing issues arise in locations where NCDOT was expanding roadway widths and taking areas where mitigation work had been done. Micky indicated Baker would utilize his advice at this location. The group continued down this lower reach noting incision, erosion and lack of buffer vegetation. At the lower end of the reach the group stopped to summarize thoughts on what they had seen and recommendations on how Baker should proceed. These ideas are summarized in the bullets below:

- The IRT accepted the proposed approach on UT1-R1, UT1-R2, UT1-R3 (above utility crossing), UT2 and UT4.
- The IRT does not agree with the proposed approach for the upper part of UT1-R4 (from the lower end of the utility right-of-way to the confluence with UT3) and feels this should not be restoration. They would like for Baker to pursue an EI approach for this reach. Baker accepts this assessment and will plan accordingly. This reach is now shown as an extension of UT1-R3 on the map from the

lower end of the utility Right of Way to the confluence with UT3. The previous location of the end point of this reach is shown on the attached map.

- The IRT accepted the proposed restoration approach from the confluence of UT1 and UT3 downstream to the end of the project. It was noted that separating UT1-R4 as indicated above was a compromise among IRT members regarding the best approach for this reach.
- The IRT accepted the proposed restoration approach on UT3-R2 with the following additional comments on this reach:
  - The reach will receive no credit if it becomes a wetland and compensation for credits may be withheld. They need to see in the monitoring reports that the channel is remaining stable. The restored stream will need to have a defined bed and bank and will need to be a considered jurisdictional stream to receive mitigation stream credit.
  - Baker is encouraged to include as many of the wetland areas as possible within the conservation easement.
  - Baker needs to look at the potential impact of restoring the stream channel on existing wetlands. These impacts can be quantified as the total wetland area minus the stream channel area that would be planned within the jurisdictional area. Work with David Brown on the PJD.
  - The IRT stated that anticipated wetland impacts would need to be identified in the PCN. This was a point of discussion on UT3 due to the linear wetland/s observed on this reach. The final PJD submittal will need to identify all jurisdictional wetlands on the site. The PCN will need to be submitted accordingly after the final mitigation plan is approved.
- The IRT recommended that Baker pursue a restoration approach on UT3-R1 rather than an EI approach. Baker accepts this assessment and will plan accordingly. Because UT3-R2 and UT3-R1 are both now restoration reaches (see previous break on the attached map) they have been combined on the attached map and considered one reach called UT3.
- Baker will look at the upstream terminus of UT3 and place the end of the reach and fence in a location that balances the best protection of the downstream resources with other considerations such as cost. If the reach is extended to take in areas of intermittent flow this area will be treated as EII. We will consider a flow gauge if this area is added.
- There were no recommendations on the proposed BMP and it was acceptable as proposed.

The proposed approaches and ratios for each reach are provided in the following Table 1 and in the attached map (Attachment A). These are the approaches and ratios agreed upon at this IRT field visit and will be utilized in the mitigation plan and throughout the life of the project. Baker and DMS understand that the final design approach and crediting rationale must be justified in the mitigation plan.

Reach Name	Approach	Approximate Length (LF)	Ratio	Credits
UT1-R1	EI	160	1.5:1	107
UT1-R2	EII	275	2.5:1	110
UT1-R3	EI	621	1.5:1	414
UT1-R4	R	1319	1:1	1319
UT2	EII	90	2.5:1	36
UT3	R	1556	1:1	1556
UT4	R	12	1:1	12
Total		4,033*		3,554

*Actual stream footage will likely change when a survey is completed.

Please let me know if you feel any of the above information is not presented as discussed in the field.

Sincerely,

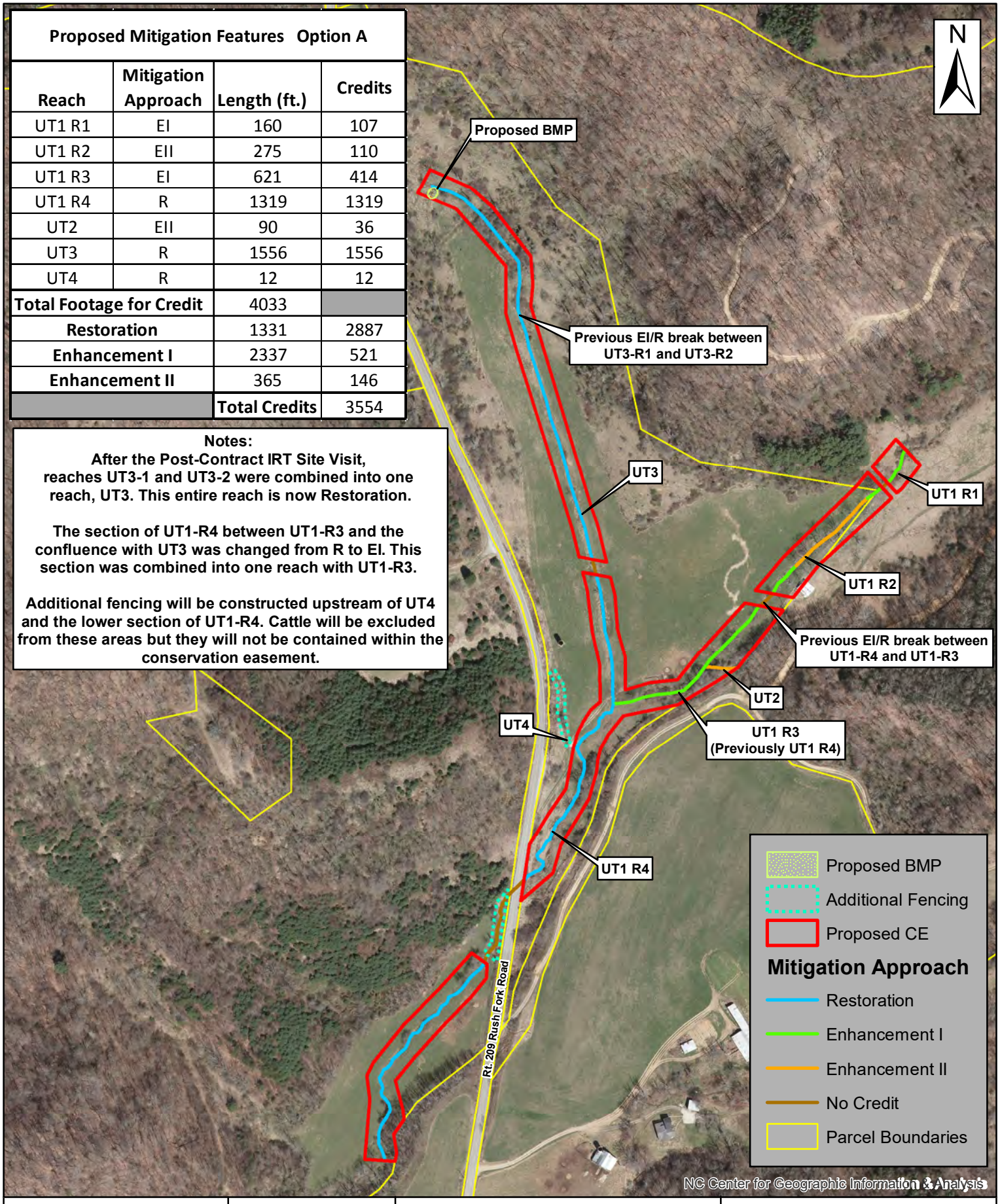
Micky Clemmons, PM

Proposed Mitigation Features Option A			
Reach	Mitigation Approach	Length (ft.)	Credits
UT1 R1	EI	160	107
UT1 R2	EII	275	110
UT1 R3	EI	621	414
UT1 R4	R	1319	1319
UT2	EII	90	36
UT3	R	1556	1556
UT4	R	12	12
Total Footage for Credit		4033	
Restoration		1331	2887
Enhancement I		2337	521
Enhancement II		365	146
		Total Credits	3554

Notes:
After the Post-Contract IRT Site Visit, reaches UT3-1 and UT3-2 were combined into one reach, UT3. This entire reach is now Restoration.

The section of UT1-R4 between UT1-R3 and the confluence with UT3 was changed from R to EI. This section was combined into one reach with UT1-R3.

Additional fencing will be constructed upstream of UT4 and the lower section of UT1-R4. Cattle will be excluded from these areas but they will not be contained within the conservation easement.



Michael Baker INTERNATIONAL

North Carolina Division of Mitigation Services
DMS Proj. No. 100068

0 175 350 700 Feet

1 inch = 350 feet

Attachment A
Proposed Mitigation Features
Post-Contract IRT Site Visit
UT to Rush Fork - Option A
Mitigation Project

APPENDIX K: PLAN SHEETS

STATE	BAKER PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
NC	166680	1	37

NORTH CAROLINA
DIVISION OF MITIGATION SERVICES

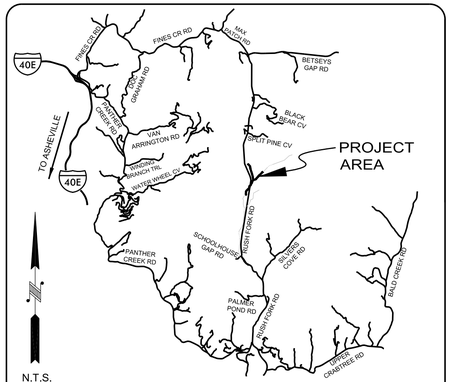
HAYWOOD COUNTY

LOCATION: FROM EXIT 24 ON INTERSTATE 40, TRAVEL NORTH FOR 5.75 MILES ON NC HWY 209 RUSH FORK ROAD

TYPE OF WORK: STREAM RESTORATION AND ENHANCEMENT

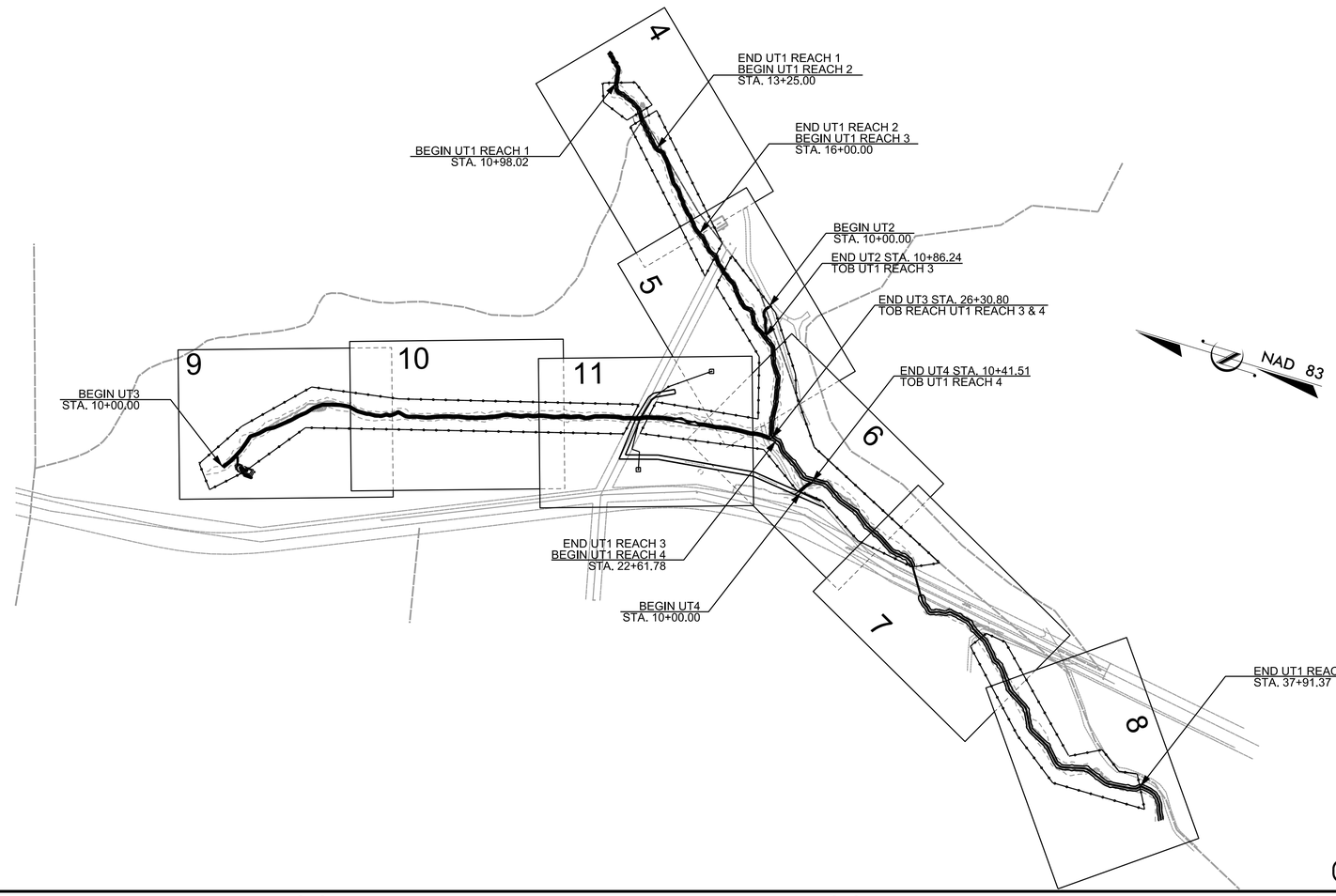
PROJECT: 166680

UT to RUSH FORK



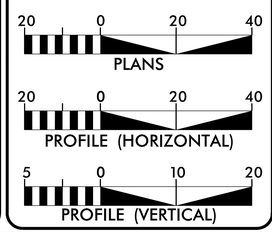
VICINITY MAP

INDEX OF SHEETS



NCDMS ID NO. 100068

GRAPHIC SCALES



MITIGATION SUMMARY

REACH	STREAM RESTORATION	STREAM ENHANCEMENT I	STREAM ENHANCEMENT II	RATIO	CREDITS
UT1 R1	0	206.20	0	1.5:1	137.467
UT1 R2	0	0	275.00	2.5:1	110.00
UT1 R3	0	612.10	0	1.5:1	408.067
UT1 R4	1216.33	0	0	1:1	1216.330
UT2	0	0	86.24	2.5:1	34.496
UT3	1584.45	0	0	1:1	1584.450
UT4	42.80	0	0	1:1	42.800
TOTAL	2843.58	818.30	361.24		3533.610

PREPARED FOR THE OFFICE OF:

NCDEQ
NC DIVISION OF MITIGATION SERVICES
217 WEST JONES STREET, SUTIE 3000a
RALEIGH, NC 27603

CONTACT: PAUL WIESNER
PROJECT MANAGER

Michael Baker INTERNATIONAL
Michael Baker Engineering Inc.
8000 Regency Parkway, Suite 600
Cary, NORTH CAROLINA 27518
Phone: 919.463.5488
Fax: 919.463.5490
License #: F-1084

LETTING DATE:

KATHLEEN M. MCKEITHAN, PE
PROJECT ENGINEER

PROJECT ENGINEER

PROGRESS DRAWING
FOR REVIEW PURPOSES ONLY
DO NOT USE FOR CONSTRUCTION

SIGNATURE: *P.E.*

2/26/03

STREAM CONVENTIONAL SYMBOLS

SUPERCEDES SHEET 1-B

- ROCK J-HOOK
- GRADE CONTROL ROCK J-HOOK
- ROCK VANE
- OUTLET PROTECTION
- ROCK CROSS VANE
- ROCK DOUBLE DROP ROCK CROSS VANE
- SINGLE WING DEFLECTOR
- DOUBLE WING DEFLECTOR
- TEMPORARY SILT CHECK
- ROOT WAD
- LOG J-HOOK
- GRADE CONTROL LOG J-HOOK
- LOG VANE
- LOG DROP
- LOG CROSS VANE
- LOG AND ROCK STEP POOL
- BOULDER STEP
- CONSTRUCTED RIFFLE
- BOULDER CLUSTER
- ROCK STEP POOL

- SAFETY FENCE
- TF — TAPE FENCE
- FP — 100 YEAR FLOOD PLAIN
- CE — CONSERVATION EASEMENT
- 435 — EXISTING MAJOR CONTOUR
- EXISTING MINOR CONTOUR
- LIMITS OF DISTURBANCE
- PROPERTY LINE
- FOOT BRIDGE
- TEMPORARY STREAM CROSSING
- PERMANENT STREAM CROSSING
- TRANSPLANTED VEGETATION
- TREE REMOVAL
- TREE PROTECTION
- CHANNEL PLUG
- CHANNEL FILL
- BRUSH TOE WITH LIVE STAKES
- GEOLIFT WITH BRUSH TOE
- PROPOSED WETLAND RESTORATION
- PROPOSED WETLAND ENHANCEMENT
- WLB — JURISDICTIONAL WETLAND BOUNDARY

**NOTE: ALL ITEMS ABOVE MAY NOT BE USED ON THIS PROJECT

STANDARD SPECIFICATIONS

NORTH CAROLINA
EROSION AND SEDIMENT CONTROL PLANNING AND DESIGN MANUAL
MARCH 2009 (REV 2013)

- 6.06 TEMPORARY GRAVEL CONSTRUCTION ENTRANCE
- 6.24 RIPARIAN AREA SEEDING
- 6.60 TEMPORARY SEDIMENT TRAP
- 6.62 TEMPORARY SILT FENCE
- 6.63 TEMPORARY ROCK DAM
- 6.70 TEMPORARY STREAM CROSSING

PROJECT REFERENCE NO.	SHEET NO.
166680	1-A

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Fax: 919.463.5490
License #: F-1084

NCDMS ID NO. 100068

GENERAL NOTES

1. THE CONTRACTOR IS REQUIRED TO INSTALL IN-STREAM STRUCTURES USING A TRACK HOE WITH A HYDRAULIC THUMB OF SUFFICIENT SIZE TO PLACE BOULDERS (3'x2'x2'), LOGS AND ROOTWADS.
2. WORK IS BEING PERFORMED AS AN ENVIRONMENTAL RESTORATION PLAN. THE CONTRACTOR SHOULD MAKE ALL REASONABLE EFFORTS TO REDUCE SEDIMENT LOSS AND MINIMIZE DISTURBANCE OF THE SITE WHILE PERFORMING THE CONSTRUCTION WORK.
3. CONSTRUCTION IS SCHEDULED FOR THE SPRING OF 2020.
4. CONTRACTOR SHOULD CALL NORTH CAROLINA "ONE-CALL" BEFORE EXCAVATION STARTS. (1-800-632-4949)
5. BOULDER SIZES FOR IN-STREAM STRUCTURES SHALL BE A MINIMUM OF 3'x2'x1' AND CAN BE CHANGED PER STRUCTURE OR THE DIRECTION OF THE ENGINEER.
6. ALL ON-SITE ALLUVIUM SHALL BE HARVESTED AND STOCKPILED PRIOR TO FILLING ABANDONED CHANNELS.
7. TOPSOIL SHALL BE EXCAVATED TO A DEPTH OF 8" AND STOCKPILED SEPARATELY FROM UNDERCUT SOIL. 8" OF TOPSOIL SHALL BE PLACED ON ALL BANKFULL BENCHES AND AS DIRECTED BY THE ENGINEER.
8. ALL DISTURBED EMBANKMENTS SHALL BE MATTED WITH COIR FIBER MATTING OR AS DIRECTED BY THE ENGINEER.
9. ALL STREAM BANKS SHALL BE LIVE STAKED.
10. UNLESS THE ALIGNMENT IS BEING ALTERED, THE EXISTING CHANNEL DIMENSIONS ARE TO REMAIN UNLESS OTHERWISE NOTED.
11. CONTRACTOR WILL ENSURE THAT FENCING IS INSTALLED ON OR OUTSIDE THE CONSERVATION EASEMENT AS SHOWN ON THE PLANS BUT NO MORE THAN 1' OUTSIDE.
12. WHERE PROPOSED FENCE CROSSES EXISTING STREAMS, THE CONTRACTOR SHALL UTILIZE A SECTION OF BREAK AWAY FENCE, A FLOOD GATE, OR ELECTRIFIED CHAINS AS DIRECTED BY THE ENGINEER.

VEGETATION SELECTION

Proposed Bare-Root and Live Stake Species
UT to Rush Fork Mitigation Project - NCDMS Project No. 100068

Botanical Name	Common Name	% Planted by Species	Wetland Tolerance
All Buffer Plantings at 680 stems/acre using 8' X 8' spacing			
General Riparian Zone – Overstory/Canopy Species			
Betula nigra	River Birch	10%	FACW
Platanus occidentalis	Sycamore	10%	FACW
Liriodendron tulipifera	Tulip Poplar	10%	FACU
Betula lenta	Sweet Birch	10%	FAC
Quercus alba	White Oak	10%	FACU
Tilia americana	American Basswood	5%	FACU
Aesculus flava	Yellow Buckeye	5%	FACU
Nyssa sylvatica	Blackgum	5%	FAC
Fraxinus americana	White Ash	5%	FACU
Diospyros virginiana	Persimmon	5%	FAC
Ulmus americana	American Elm	5%	FACW
General Riparian Zone – Understory/Shrub Species			
Rhododendron maximum	Rosebay	5%	FAC
Lindera benzoin	Spicebush	2.50%	FAC
Ilex verticillata	Winterberry	2.50%	FACW
Carpinus caroliniana	American Hornbeam	2.50%	FAC
Sambucus canadensis	Elderberry	2.50%	FAC
Magnolia tripetala	Umbrella Tree	2.50%	FACU
Halesia carolina	Carolina Silverbell	2.50%	FAC

Wetland Zone – Overstory/Canopy Species			
Betula nigra	River Birch	15%	FACW
Platanus occidentalis	Sycamore	15%	FACW
Betula alleghaniensis	Yellow Birch	10%	FAC
Quercus imbricaria	Shingle Oak	5%	FAC
Nyssa sylvatica	Blackgum	5%	FAC
Populus deltoides	Eastern Cottonwood	5%	FAC
Fraxinus pennsylvanica	Green Ash	5%	FACW
Ulmus americana	American Elm	5%	FACW
Wetland Zone – Understory/Shrub Species			
Alnus serrulata	Tag Alder	15%	OBL
Ilex verticillata	Winterberry	5%	FACW
Acer negundo	Box Elder	5%	FAC
Cephalanthus occidentalis	Buttonbush	2.50%	OBL
Cornus amomum	Silky Dogwood	2.50%	FACW
Xanthorhiza simplicissima	Yellow-root	2.50%	FACW
Aronia arbutifolia	Red Chokeberry	2.50%	FACW
Streambank Live Stake Plantings			
Salix sericea	Silky Willow	25%	OBL
Sambucus canadensis	Elderberry	20%	FACW
Cephalanthus occidentalis	Buttonbush	10%	OBL
Cornus amomum	Silky Dogwood	25%	FACW
Salix nigra	Black Willow	20%	OBL

Proposed Permanent Seed Mixture
UT to Rush Fork Stream Mitigation Project – NCDMS Project No. 100068

Botanical Name	Common Name	% Planted by Species	Density (lbs/ac)	Wetland Tolerance
Agrostis perennans	Autumn Bentgrass	10%	1.5	FACU
Elymus virginicus	Virginia Wildrye	15%	2.25	FACW
Panicum virgatum	Switchgrass	15%	2.25	FAC
Tripsacum dactyloides	Eastern Gamma Grass	5%	0.75	FACW
Polygonum pennsylvanicum	Pennsylvania Smartweed	5%	0.75	FACW
Schizachyrium scoparium	Little Blue Stem	5%	0.75	FACU
Juncus effusus	Soft Rush	5%	0.75	FACW
Bidens frondosa (or aristosa)	Beggars Tick	5%	0.75	FACW
Coreopsis lanceolata	Lance-Leaved Tick Seed	10%	1.5	FACU
Dichanthelium clandestinum	Tioga Deer Tongue	15%	2.25	FAC
Andropogon gerardii	Big Blue Stem	5%	0.75	FAC
Sorghastrum nutans	Indian Grass	5%	0.75	FACU
	Total	**100%**	**15**	

Note: Final species selection may change due to refinement of site conditions or to availability at the time of planting. If species substitution is required, the planting Contractor will submit a revised planting list to Baker for approval prior to the procurement of plant stock.

4/15/2021
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PROJECT REFERENCE NO.	SHEET NO.
166680	1-B
NCDMS ID NO. 100068	

2/26/03

*S.U.E = SUBSURFACE UTILITY ENGINEER

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

CONVENTIONAL SYMBOLS

BOUNDARIES AND PROPERTY:

- State Line
- County Line
- Township Line
- City Line
- Reservation Line
- Property Line
- Existing Iron Pin — EIP
- Property Corner
- Property Monument — ECM
- Parcel/Sequence Number — 123
- Existing Fence Line
- Proposed Woven Wire Fence
- Proposed Chain Link Fence
- Proposed Barbed Wire Fence
- Existing Wetland Boundary — WLB
- Proposed Wetland Boundary — WLB
- Existing Endangered Animal Boundary — EAB
- Existing Endangered Plant Boundary — EPB

BUILDINGS AND OTHER CULTURE:

- Gas Pump Vent or U/G Tank Cap
- Sign — S
- Well — W
- Small Mine
- Foundation
- Area Outline
- Cemetery
- Building
- School
- Church
- Dam

HYDROLOGY:

- Stream or Body of Water
- Hydro, Pool or Reservoir
- Jurisdictional Stream — JS
- Buffer Zone 1 — BZ 1
- Buffer Zone 2 — BZ 2
- Flow Arrow
- Disappearing Stream
- Spring
- Wetland
- Proposed Lateral, Tail, Head Ditch — FLOW
- False Sump

RAILROADS:

- Standard Gauge — CSX TRANSPORTATION
- RR Signal Milepost — MILEPOST 35
- Switch — SWITCH
- RR Abandoned
- RR Dismantled

RIGHT OF WAY:

- Baseline Control Point
- Existing Right of Way Marker
- Existing Right of Way Line
- Proposed Right of Way Line — RW
- Proposed Right of Way Line with Iron Pin and Cap Marker — RW
- Proposed Right of Way Line with Concrete or Granite Marker — RW
- Existing Control of Access — CA
- Proposed Control of Access — CA
- Existing Easement Line — E
- Proposed Temporary Construction Easement — E
- Proposed Temporary Drainage Easement — TDE
- Proposed Permanent Drainage Easement — PDE
- Proposed Permanent Utility Easement — PUE
- Proposed Temporary Utility Easement — TUE
- Proposed Permanent Easement with Iron Pin and Cap Marker

ROADS AND RELATED FEATURES:

- Existing Edge of Pavement
- Existing Curb
- Proposed Slope Stakes Cut — C
- Proposed Slope Stakes Fill — F
- Proposed Wheel Chair Ramp — WCR
- Existing Metal Guardrail
- Proposed Guardrail
- Existing Cable Guiderail
- Proposed Cable Guiderail
- Equality Symbol
- Pavement Removal

VEGETATION:

- Single Tree
- Single Shrub
- Hedge
- Woods Line
- Orchard
- Vineyard — Vineyard

EXISTING STRUCTURES:

MAJOR:

- Bridge, Tunnel or Box Culvert — CONC
- Bridge Wing Wall, Head Wall and End Wall — CONC WW

MINOR:

- Head and End Wall — CONC HW
- Pipe Culvert
- Footbridge
- Drainage Box: Catch Basin, DI or JB — CB
- Paved Ditch Gutter
- Storm Sewer Manhole — S
- Storm Sewer — S

UTILITIES:

POWER:

- Existing Power Pole
- Proposed Power Pole
- Existing Joint Use Pole
- Proposed Joint Use Pole
- Power Manhole — P
- Power Line Tower
- Power Transformer
- U/G Power Cable Hand Hole — HH
- H-Frame Pole
- Recorded U/G Power Line — P
- Designated U/G Power Line (S.U.E.*) — P

TELEPHONE:

- Existing Telephone Pole
- Proposed Telephone Pole
- Telephone Manhole — T
- Telephone Booth
- Telephone Pedestal — T
- Telephone Cell Tower
- U/G Telephone Cable Hand Hole — HH
- Recorded U/G Telephone Cable — T
- Designated U/G Telephone Cable (S.U.E.*) — T
- Recorded U/G Telephone Conduit — TC
- Designated U/G Telephone Conduit (S.U.E.*) — TC
- Recorded U/G Fiber Optics Cable — T FO
- Designated U/G Fiber Optics Cable (S.U.E.*) — T FO

WATER:

- Water Manhole — W
- Water Meter
- Water Valve
- Water Hydrant
- Recorded U/G Water Line — W
- Designated U/G Water Line (S.U.E.*) — W
- Above Ground Water Line — A/G Water

TV:

- TV Satellite Dish
- TV Pedestal — C
- TV Tower
- U/G TV Cable Hand Hole — HH
- Recorded U/G TV Cable — TV
- Designated U/G TV Cable (S.U.E.*) — TV
- Recorded U/G Fiber Optic Cable — TV FO
- Designated U/G Fiber Optic Cable (S.U.E.*) — TV FO

GAS:

- Gas Valve
- Gas Meter
- Recorded U/G Gas Line — G
- Designated U/G Gas Line (S.U.E.*) — G
- Above Ground Gas Line — A/G Gas

SANITARY SEWER:

- Sanitary Sewer Manhole
- Sanitary Sewer Cleanout
- U/G Sanitary Sewer Line — SS
- Above Ground Sanitary Sewer — A/G Sanitary Sewer
- Recorded SS Forced Main Line — FSS
- Designated SS Forced Main Line (S.U.E.*) — FSS

MISCELLANEOUS:

- Utility Pole
- Utility Pole with Base
- Utility Located Object
- Utility Traffic Signal Box — S
- Utility Unknown U/G Line — ?UTL
- U/G Tank; Water, Gas, Oil
- A/G Tank; Water, Gas, Oil
- U/G Test Hole (S.U.E.*)
- Abandoned According to Utility Records — AATUR
- End of Information — E.O.I.

3/4/2021
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revised 02/02/00

2/26/03

PROJECT REFERENCE NO.	SHEET NO.
166680	2

PROGRESS DRAWING
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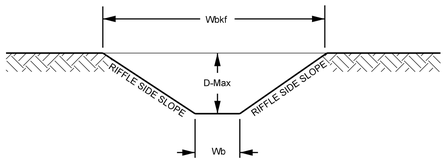
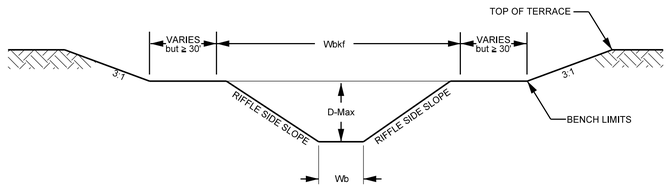
License #: F-1084

NCDMS ID NO. 100068

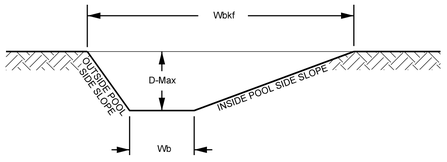
TYPICAL RIFFLE, POOL, AND BANKFULL BENCH CROSS SECTIONS



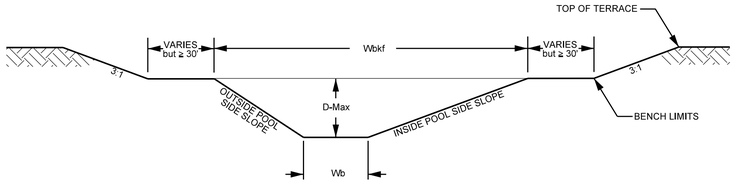
RIFFLE or PLUNGE POOL



RIFFLE WITH BANKFULL BENCH



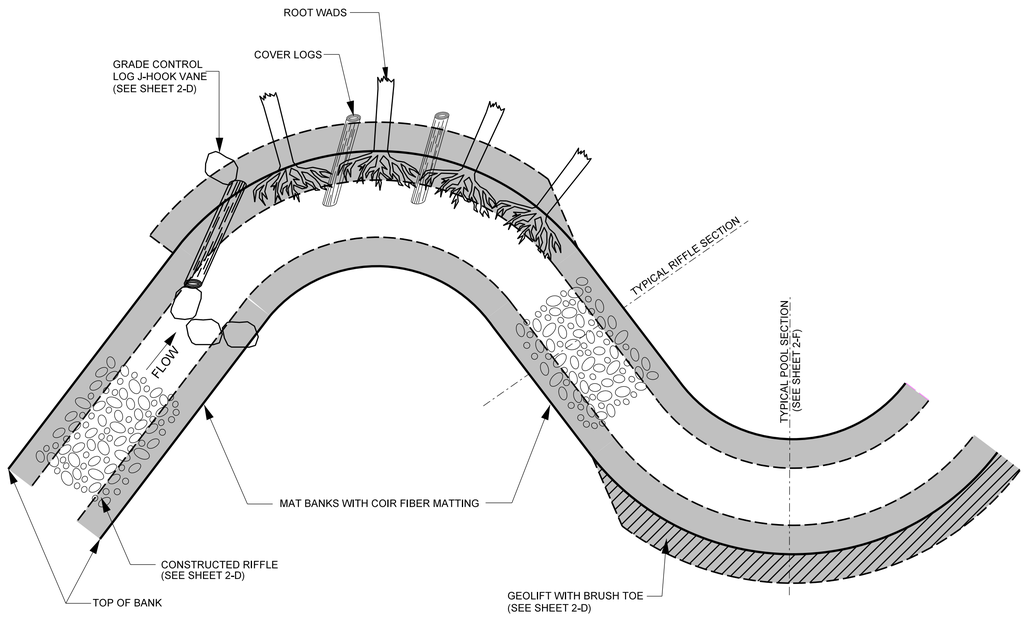
POOL (MEANDER)



POOL WITH BANKFULL BENCH

	UT1 R1, R2, & R3 UPPER 10+00 - 19+50		UT1 R3 LOWER 19+50 - 22+61		UT1 R4 UPPER 22+61 - 28+00		UT1 R4 LOWER 28+00 - 37+95		UT2		UT3 UPPER 11+50 - 16+50		UT3 LOWER 16+50 - 26+45		UT4	
	RIFFLE	POOL	RIFFLE	POOL	RIFFLE	POOL	RIFFLE	POOL	RIFFLE	POOL	RIFFLE	POOL	RIFFLE	POOL	RIFFLE	POOL
WIDTH OF BANKFULL (Wbkf)	9.00	11.50	10.00	12.50	12.50	16.50	13.00	17.50	4.50	6.60	7.50	10.00	8.50	12.00	5.80	7.50
AVERAGE DEPTH	0.65	1.11	0.70	1.40	0.90	1.70	0.95	1.80	0.45	0.70	0.57	1.10	0.65	1.30	0.45	0.70
MAXIMUM DEPTH (Dmax)	0.80	1.50	1.00	2.00	1.20	2.50	1.30	2.50	0.60	1.00	0.70	1.70	0.85	1.80	0.50	1.00
W/D (Wbkf/Dbkf)	13.80	10.40	14.30	9.20	13.90	9.50	13.70	9.80	13.00	9.50	13.10	8.90	13.10	9.50	12.90	10.30
BANKFULL AREA (Abkf)	5.90	12.80	7.00	17.00	11.30	28.80	12.10	31.30	2.20	4.60	4.30	11.20	6.00	15.10	2.60	5.50
BOTTOM WIDTH (Wb)	5.80	5.50	5.00	4.50	8.10	6.50	8.50	7.50	4.00	2.60	4.70	3.20	4.90	4.80	3.60	3.50
RIFFLE SIDE SLOPE (X:1)	2.00	N/A	2.00	N/A	2.00	N/A	2.00	N/A	2.00	N/A	2.00	N/A	2.00	N/A	2.00	N/A
INSIDE POOL SIDE SLOPE	N/A	2.00	N/A	2.00	N/A	2.00	N/A	2.00	N/A	2.00	N/A	2.00	N/A	2.00	N/A	2.00
OUTSIDE POOL SIDE SLOPE	N/A	2.00	N/A	2.00	N/A	2.00	N/A	2.00	N/A	2.00	N/A	2.00	N/A	2.00	N/A	2.00

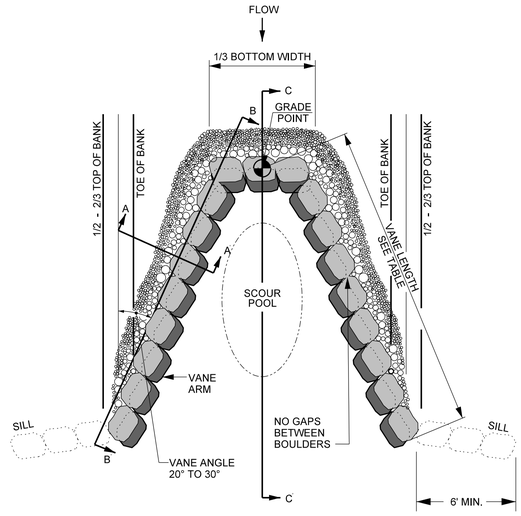
TYPICAL STRUCTURE PLACEMENT



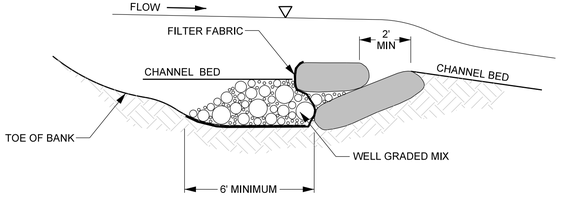
STRUCTURE NOTES:

1. GENERALLY CONSTRUCTED RIFFLES, ROOT WADS, LOG VANES AND COIR FIBER MATTING WILL BE INSTALLED IN THE LOCATION AND SEQUENCE AS SHOWN.
2. ANY CHANGES TO NUMBER OR LOCATION OF STRUCTURES DURING CONSTRUCTION MUST BE APPROVED BY THE DESIGN ENGINEER.
3. COIR FIBER MATTING TO BE INSTALLED ON ALL RESTORED STREAMBANKS, FLOODPLAIN BENCHING, AND TERRACE SLOPES AS DESCRIBED IN THE TECHNICAL SPECIFICATIONS.
4. ROOTWADS MAY BE REPLACED WITH GEOLIFT.

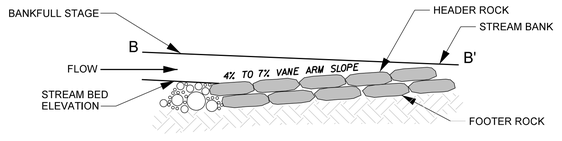
ROCK CROSS VANE



PLAN VIEW



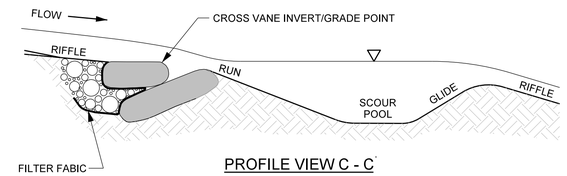
SECTION A - A'



PROFILE VIEW B - B'
VANE ARM

NOTES FOR ALL VANE STRUCTURES:

1. DIG A TRENCH BELOW THE BED FOR FOOTER ROCKS.
2. START AT BANK AND PLACE FOOTER ROCKS FIRST AND THEN HEADER (TOP) ROCK.
3. CONSTRUCT ANGLE AND SLOPE SPECIFICATIONS AS SHOWN.
4. AN EXTRA ROCK CAN BE PLACED IN SCOUR POOL FOR HABITAT IMPROVEMENT.
5. USE HAND PLACED STONE TO FILL GAPS ON UPSTREAM SIDE OF HEADER AND FOOTER ROCKS.
6. INSTALL GEOTEXTILE FABRIC BEGINNING AT THE TOP OF THE HEADER ROCKS AND EXTEND DOWNWARD TO THE DEPTH OF THE BOTTOM FOOTER ROCK, AND THEN UPSTREAM TO A MINIMUM OF SIX FEET.
7. AFTER ALL STONE BACKFILL HAS BEEN PLACED, FILL IN THE UPSTREAM SIDE OF THE STRUCTURE WITH WELL GRADED MIX OF CLASS B, CLASS A, & #57 STONE TO THE ELEVATION 2"-4" BELOW THE THE HEADER ROCK. INCORPORATE ON-SITE ALLUVIUM WHERE AVAILABLE. FILL SHOULD BE CONCAVE BEHIND THE VANE ARM TO ALLOW POOLING OF FLOW.
8. ON-SITE ALLUVIUM SHALL BE INCORPORATED INTO THE STONE BACKFILL WHERE AVAILABLE.
9. START SLOPE AT 2/3 TO 3/4 TIMES THE BANKFULL STAGE.
10. ALL REACHES, BOULDER SIZE 1' x 2' x 3' TO 2' x 2' x 4'.



PROFILE VIEW C - C'

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mcarey

2/26/03

PROJECT REFERENCE NO.	SHEET NO.
166680	2A

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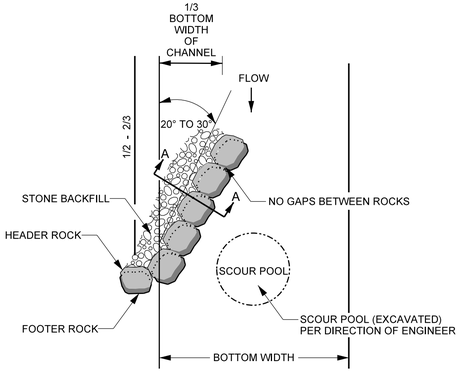
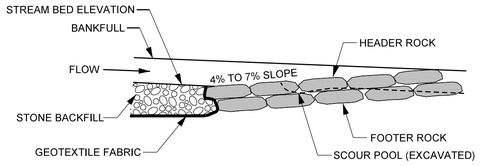
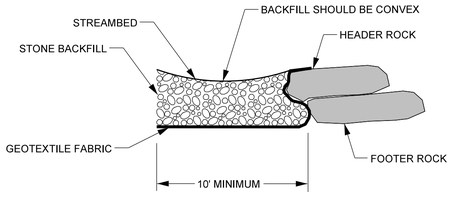
ROCK VANE



PLAN VIEW



PROFILE VIEW

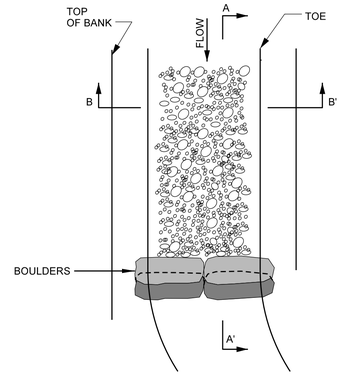


SECTION A - A

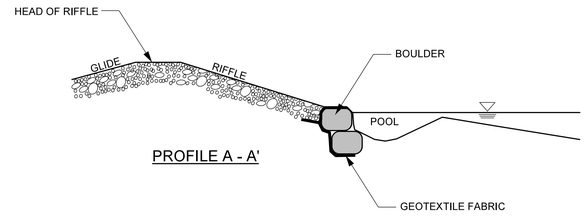
NOTES FOR ALL VANE STRUCTURES:

1. DIG A TRENCH BELOW THE BED FOR FOOTER ROCKS.
2. START AT BANK AND PLACE FOOTER ROCKS FIRST AND THEN HEADER (TOP) ROCK.
3. CONTINUE WITH STRUCTURE, FOLLOWING ANGLE AND SLOPE SPECIFICATIONS.
4. AN EXTRA ROCK CAN BE PLACED IN SCOUR POOL FOR HABITAT IMPROVEMENT.
5. USE HAND PLACED STONE TO FILL GAPS ON UPSTREAM SIDE OF HEADER AND FOOTER ROCKS.
6. INSTALL GEOTEXTILE FABRIC BEGINNING AT THE TOP OF THE HEADER ROCKS AND EXTEND DOWNWARD TO THE DEPTH OF THE BOTTOM FOOTER ROCK, AND THEN UPSTREAM TO A MINIMUM OF SIX FEET.
7. AFTER ALL STONE BACKFILL HAS BEEN PLACED, FILL IN THE UPSTREAM SIDE OF THE STRUCTURE WITH WELL GRADED MIX OF CLASS B, CLASS A, & #57 STONE TO THE ELEVATION 2"-4" BELOW THE THE HEADER ROCK. INCORPORATE ON-SITE ALLUVIUM WHERE AVAILABLE. FILL SHOULD BE CONCAVE BEHIND THE VANE ARM TO ALLOW POOLING OF FLOW.
8. START SLOPE AT 2/3 TO 3/4 TIMES THE BANKFULL STAGE.
9. ALL REACHES, BOULDER SIZE 1' x 2' x 3' TO 2' x 2' x 4'.

BOULDER STEP



PLAN VIEW

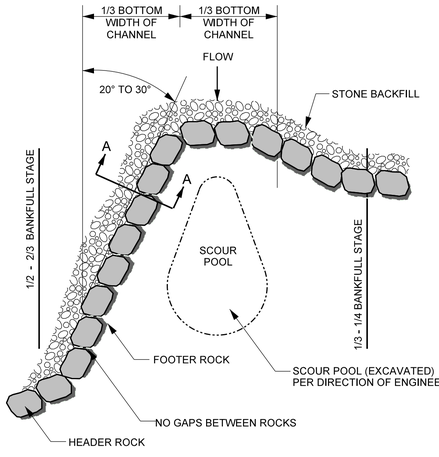


PROFILE A - A'

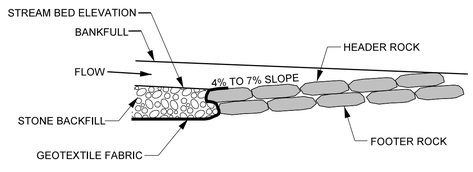
NOTES:

1. HEADER AND FOOTER BOULDERS MUST BE AT LEAST 1' X 2' X 3'.
2. FOOTERS SHALL BE INSTALLED SUCH THAT 1/4 TO 1/3 OF THE LENGTH IS DOWNSTREAM OF THE HEADER.
3. SOIL SHALL BE WELL COMPACTED AROUND BURIED PORTION OF FOOTERS WITH THE BUCKET OF EXCAVATOR.
4. INSTALL NON-WOVEN FILTER FABRIC UNDERNEATH FOOTER BOULDERS.
5. UNDERCUT THE RIFFLE ELEVATION 12 INCHES TO ALLOW FOR A LAYER OF STONE.
6. INSTALL EROSION CONTROL MATTING ALONG COMPLETED BANKS SUCH THAT THE EROSION CONTROL MATTING AT THE TOE OF THE BANK EXTENDS DOWN TO THE UNDERCUT ELEVATION.
7. FILL TRENCH WITH GRADED MIX OF CLASS A, CLASS B, AND #57 STONE TO THE BED ELEVATION OF THE CHANNEL.
8. BOULDER STEPS MUST BE EXTENDED TO A MINIMUM OF 2' INTO THE BANK. USE SILL BOULDERS IF NECESSARY.
9. THALWEG AND STEP INVERT WILL BE CONCAVE AND SHAPED PER DIRECTION OF THE DESIGNER.
10. ALL REACHES, BOULDER SIZE 1' x 2' x 3' TO 2' x 2' x 4'.

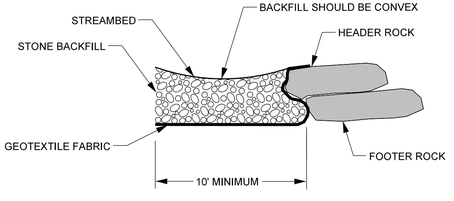
GRADE CONTROL ROCK J-HOOK VANE



PLAN VIEW



PROFILE VIEW

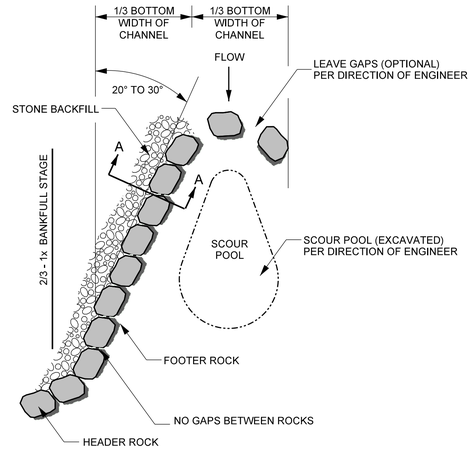


SECTION A - A

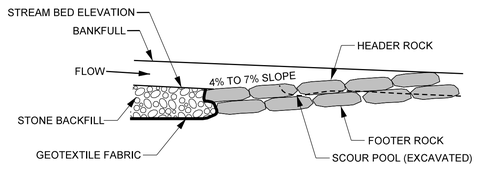
NOTES FOR ALL VANE STRUCTURES:

1. DIG A TRENCH BELOW THE BED FOR FOOTER ROCKS.
2. START AT BANK AND PLACE FOOTER ROCKS FIRST AND THEN HEADER (TOP) ROCK.
3. CONTINUE WITH STRUCTURE, FOLLOWING ANGLE AND SLOPE SPECIFICATIONS.
4. AN EXTRA ROCK CAN BE PLACED IN SCOUR POOL FOR HABITAT IMPROVEMENT.
5. USE HAND PLACED STONE TO FILL GAPS ON UPSTREAM SIDE OF HEADER AND FOOTER ROCKS.
6. INSTALL GEOTEXTILE FABRIC BEGINNING AT THE TOP OF THE HEADER ROCKS AND EXTEND DOWNWARD TO THE DEPTH OF THE BOTTOM FOOTER ROCK, AND THEN UPSTREAM TO A MINIMUM OF SIX FEET.
7. AFTER ALL STONE BACKFILL HAS BEEN PLACED, FILL IN THE UPSTREAM SIDE OF THE STRUCTURE WITH WELL GRADED MIX OF CLASS B, CLASS A, & #57 STONE TO THE ELEVATION 2"-4" BELOW THE THE HEADER ROCK. INCORPORATE ON-SITE ALLUVIUM WHERE AVAILABLE. FILL SHOULD BE CONCAVE BEHIND THE VANE ARM TO ALLOW POOLING OF FLOW.
8. START SLOPE AT 2/3 TO 3/4 TIMES THE BANKFULL STAGE.
9. ALL REACHES, BOULDER SIZE 1' x 2' x 3' TO 2' x 2' x 4'.

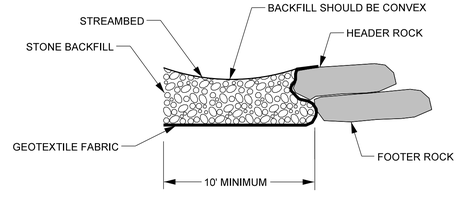
ROCK J-HOOK VANE



PLAN VIEW



PROFILE VIEW



SECTION A - A

NOTES FOR ALL VANE STRUCTURES:

1. DIG A TRENCH BELOW THE BED FOR FOOTER ROCKS.
2. START AT BANK AND PLACE FOOTER ROCKS FIRST AND THEN HEADER (TOP) ROCK.
3. CONTINUE WITH STRUCTURE, FOLLOWING ANGLE AND SLOPE SPECIFICATIONS.
4. AN EXTRA ROCK CAN BE PLACED IN SCOUR POOL FOR HABITAT IMPROVEMENT.
5. USE HAND PLACED STONE TO FILL GAPS ON UPSTREAM SIDE OF HEADER AND FOOTER ROCKS.
6. INSTALL GEOTEXTILE FABRIC BEGINNING AT THE TOP OF THE HEADER ROCKS AND EXTEND DOWNWARD TO THE DEPTH OF THE BOTTOM FOOTER ROCK, AND THEN UPSTREAM TO A MINIMUM OF SIX FEET.
7. AFTER ALL STONE BACKFILL HAS BEEN PLACED, FILL IN THE UPSTREAM SIDE OF THE STRUCTURE WITH WELL GRADED MIX OF CLASS B, CLASS A, & #57 STONE TO THE ELEVATION 2"-4" BELOW THE THE HEADER ROCK. INCORPORATE ON-SITE ALLUVIUM WHERE AVAILABLE. FILL SHOULD BE CONCAVE BEHIND THE VANE ARM TO ALLOW POOLING OF FLOW.
8. START SLOPE AT 2/3 TO 3/4 TIMES THE BANKFULL STAGE.
9. ALL REACHES, BOULDER SIZE 1' x 2' x 3' TO 2' x 2' x 4'.

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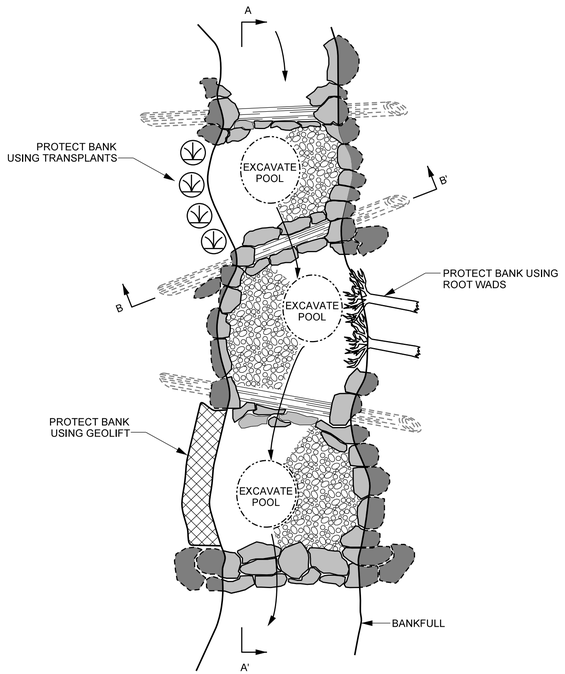
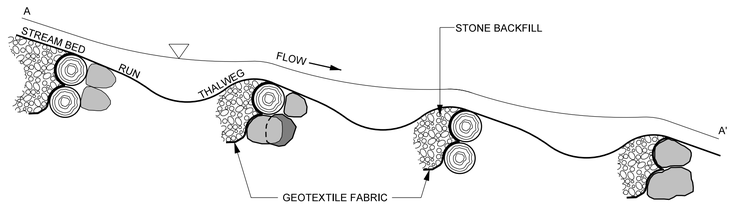
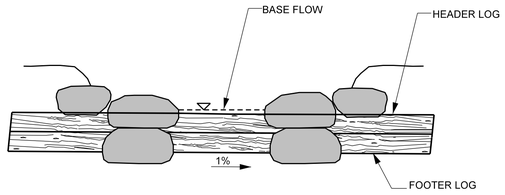
LOG AND ROCK STEP / POOL



PLAN VIEW



SECTION A - A'



SECTION B - B'

NOTES:

1. LOGS SHOULD BE AT LEAST 8" IN DIAMETER, RELATIVELY STRAIGHT, HARDWOOD, AND RECENTLY HARVESTED AND EXTENDING INTO THE BANK 3' ON EACH SIDE.
2. SOIL SHOULD BE COMPACTED WELL AROUND BURIED PORTIONS OF LOG.
3. GEOTEXTILE FABRIC SHOULD BE NAILED TO THE LOG BELOW THE BACKFILL.
4. BOULDERS SHOULD BE 1' X 2' X 3' AND PLACED ON TOP OF HEADER LOG FOR ANCHORING.
5. TOEWOOD OR TRANSPLANTS CAN BE USED INSTEAD OF BOUDERS, PER DIRECTION OF ENGINEER.
6. AFTER ALL STONE BACKFILL HAS BEEN PLACED, FILL IN THE UPSTREAM SIDE OF THE STRUCTURE WITH WELL GRADED MIX OF CLASS B, CLASS A, & #57 STONE TO THE ELEVATION OF THE TOP OF THE HEADER ROCK. INCORPORATE ON-SITE ALLUVIUM WHERE AVAILABLE.

PROJECT REFERENCE NO.	SHEET NO.
166680	2B

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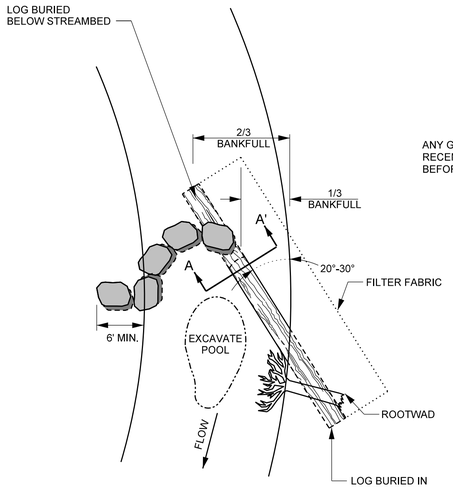
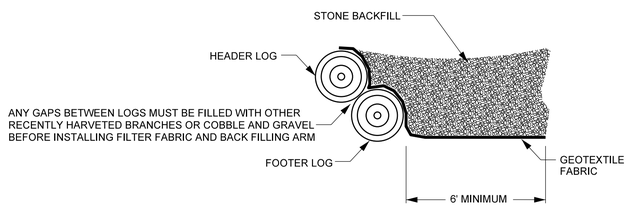
License #: F-1084

NCDMS ID NO. 100068

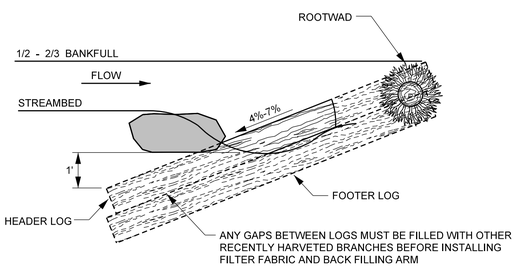
GRADE CONTROL LOG J-HOOK VANE



PLAN VIEW



SECTION A - A'

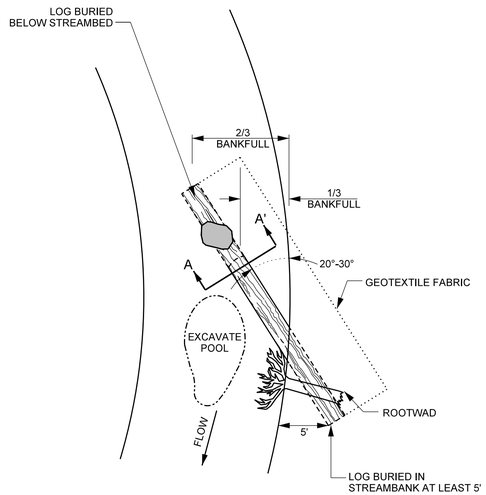


PROFILE VIEW

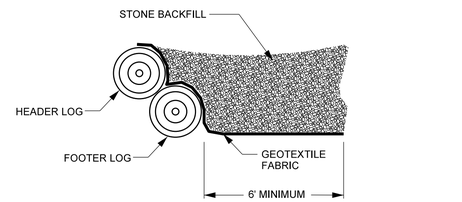
NOTES:

1. LOGS SHOULD BE AT LEAST 10" IN DIAMETER, RELATIVELY STRAIGHT, HARDWOOD, RECENTLY HARVESTED, AND FOOTERED.
2. BOULDERS MUST BE AT LEAST 2' x 2' x 1'.
3. SOIL SHOULD BE COMPACTED WELL AROUND BURIED PORTIONS OF LOG.
4. ROOTWADS SHOULD BE PLACED BENEATH THE HEADER LOG AND PLACED SO THAT IT LOCKS THE HEADER LOG INTO THE BANK, SEE ROOTWAD DETAIL.
5. BOULDERS SHOULD BE PLACED ON TOP OF HEADER LOG FOR ACHORING.
6. HEADER BOULDERS TO BE PLACED 0.5 TO 0.75 FEET APART.
7. FILTER FABRIC SHOULD BE NAILED TO THE LOG BELOW THE BACKFILL.
8. TRANSPLANTS OR BOULDERS CAN BE USED INSTEAD OF ROOWADS, PER DIRECTION OF ENGINEER.
9. BOULDER SILL MUST BE A MINIMUM OF 6'.
10. AFTER ALL STONE BACKFILL HAS BEEN PLACED, FILL IN THE UPSTREAM SIDE OF THE STRUCTURE WITH WELL GRADED MIX OF CLASS B, CLASS A, & #57 STONE TO THE ELEVATION OF THE TOP OF THE HEADER ROCK. INCORPORATE ON-SITE ALLUVIUM WHERE AVAILABLE.

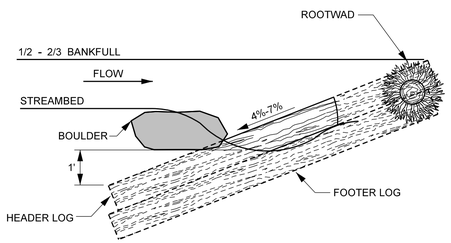
LOG VANE



PLAN VIEW



SECTION A - A'



PROFILE VIEW

NOTES:

1. LOGS SHOULD BE AT LEAST 10" IN DIAMETER, RELATIVELY STRAIGHT, HARDWOOD, AND RECENTLY HARVESTED.
2. BOULDERS MUST BE OF SUFFICIENT SIZE TO ANCHOR LOGS.
3. SOIL SHOULD BE COMPACTED WELL AROUND BURIED PORTIONS OF LOGS.
4. ROOTWADS SHOULD BE PLACED BENEATH THE HEADER LOG AND PLACED SO THAT IT LOCKS THE HEADER LOG INTO THE BANK, SEE ROOTWAD DETAIL.
5. BOULDER SHOULD BE PLACED ON TOP OF HEADER LOG FOR ANCHORING.
6. GEOTEXTILE FABRIC SHOULD BE NAILED TO THE LOG BELOW THE BACKFILL.
7. TOEWOOD OR TRANSPLANTS CAN BE USED INSTEAD OF ROOTWADS, PER DIRECTION OF ENGINEER.
8. AFTER ALL STONE BACKFILL HAS BEEN PLACED, FILL IN THE UPSTREAM SIDE OF THE STRUCTURE WITH WELL GRADED MIX OF CLASS B, CLASS A, & #57 STONE TO THE ELEVATION OF THE TOP OF THE HEADER ROCK. INCORPORATE ON-SITE ALLUVIUM WHERE AVAILABLE.

4/15/2021
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mdeal

2/26/03

PROJECT REFERENCE NO.	SHEET NO.
166680	2C

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License #: F-1084

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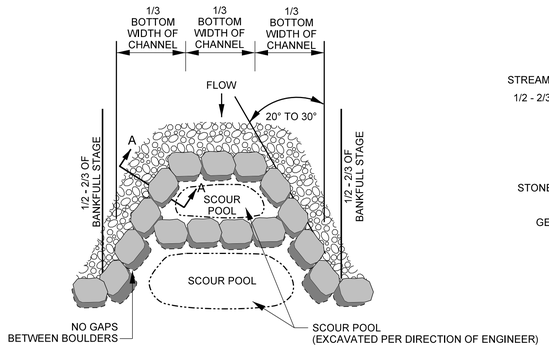
ROCK DOUBLE DROP CROSS VANE



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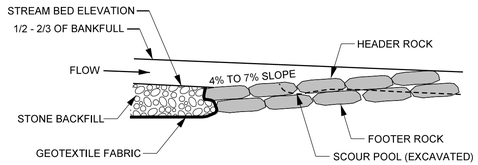
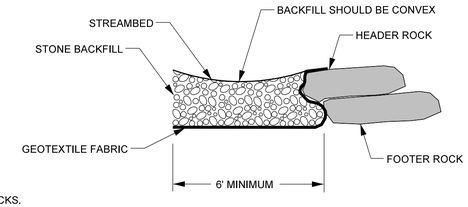


PROFILE VIEW

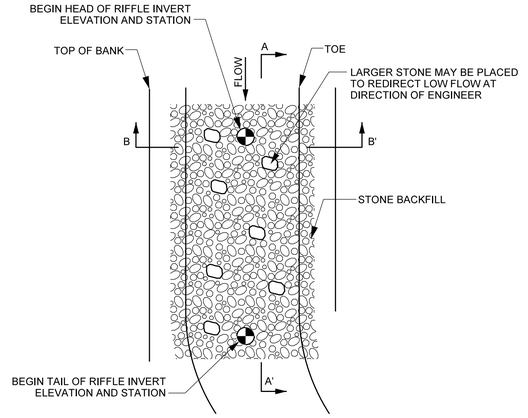


SECTION A - A

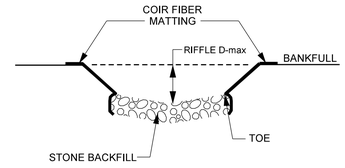
NOTES FOR ALL VANE STRUCTURES:

1. DIG A TRENCH BELOW THE BED FOR FOOTER ROCKS.
2. START AT BANK AND PLACE FOOTER ROCKS FIRST AND THEN HEADER (TOP) ROCK.
3. CONTINUE WITH STRUCTURE, FOLLOWING ANGLE AND SLOPE SPECIFICATIONS.
4. AN EXTRA ROCK CAN BE PLACED IN SCOUR POOL FOR HABITAT IMPROVEMENT.
5. USE HAND PLACED STONE TO FILL GAPS ON UPSTREAM SIDE OF HEADER AND FOOTER ROCKS.
6. INSTALL GEOTEXTILE FABRIC BEGINNING AT THE TOP OF THE HEADER ROCKS AND EXTEND DOWNWARD TO THE DEPTH OF THE BOTTOM FOOTER ROCK, AND THEN UPSTREAM TO A MINIMUM OF SIX FEET.
7. AFTER ALL STONE BACKFILL HAS BEEN PLACED, FILL IN THE UPSTREAM SIDE OF THE STRUCTURE WITH WELL GRADED MIX OF CLASS B, CLASS A, & #57 STONE TO THE ELEVATION 2"-4" BELOW THE THE HEADER ROCK. INCORPORATE ON-SITE ALLUVIUM WHERE AVAILABLE. FILL SHOULD BE CONCAVE BEHIND THE VANE ARM TO ALLOW POOLING OF FLOW.
8. START SLOPE AT 2/3 TO 3/4 TIMES THE BANKFULL STAGE.
9. ALL REACHES, BOULDER SIZE 1' x 2' x 3' TO 2' x 2' x 4'.

CONSTRUCTED RIFFLE



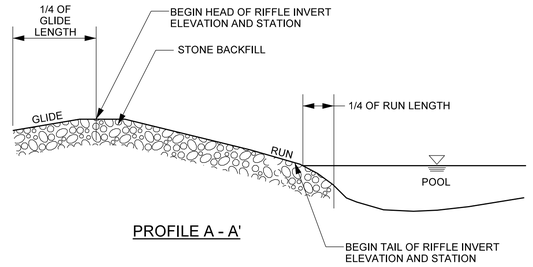
PLAN VIEW



SECTION B - B'

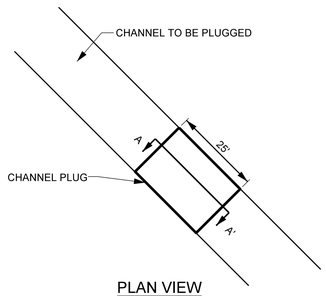
NOTES:

1. UNDERCUT CHANNEL BED ELEVATION AS NEEDED TO ALLOW FOR LAYERS OF STONE TO ACHIEVE FINAL GRADE.
2. INSTALL COIR FIBER MATTING ALONG COMPLETED BANKS SUCH THAT THE EROSION CONTROL MATTING AT THE TOE OF THE BANK EXTENDS DOWN TO THE UNDERCUT ELEVATION.
3. INSTALL STONE BACKFILL, COMPACTED TO GRADE.
4. FINAL CHANNEL BED SHAPE SHOULD HAVE THE ELEVATION OF THE BED 0.2 FT DEEPER IN THE CENTER THAN AT THE EDGES.
5. STONE BACKFILL SHALL CONSIST OF 10% CLASS I, 20% CLASS B, 40% CLASS A, AND 30% ON-SITE ALLUVIUM BY VOLUME OR #57 STONE.
6. CONSTRUCTED RIFFLES SHALL BE 12" THICK.
7. LARGER CLASS I & B STONES MAY EXTEND ABOVE THE BED SURFACE, BUT NO HIGHER THAN HALF BANKFULL AND SHOULD PROVIDE A "NATURAL LOOK". ENGINEER SHALL HAVE FINAL APPROVAL OF EXTENDING ROCK.
8. SATURATED WOODY DEBRIS THAT IS EXISTING WITHIN THE CHANNEL CAN BE RELOCATED INTO THE NEW RIFFLE AREAS.



PROFILE A - A'

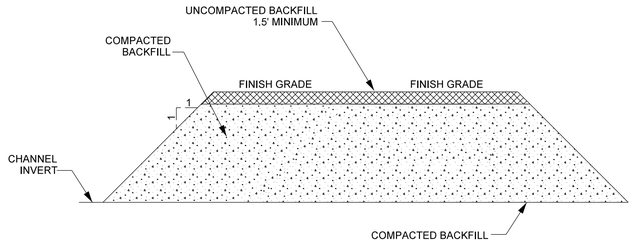
CHANNEL PLUG



PLAN VIEW

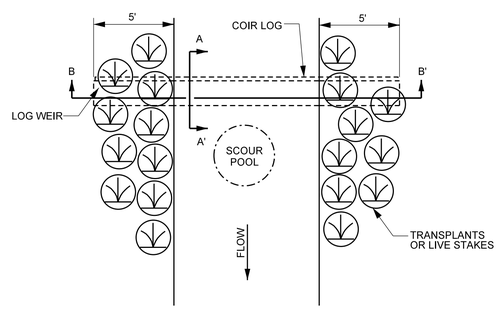
NOTES:

1. COMPACT BACKFILL USING ON-SITE HEAVY EQUIPMENT IN 10 INCH LIFTS.
2. BACKFILL OF PLUGS SHOULD INCORPORATE ANY OF-SITE CLAY AVAILABLE.

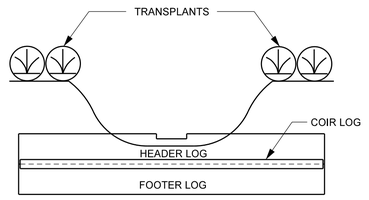


SECTION A - A'

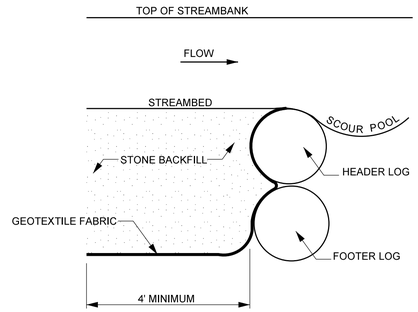
LOG DROP



PLAN VIEW



CROSS SECTION VIEW B - B'



SECTION A - A'

NOTES:

1. LOGS SHOULD BE AT LEAST 10 INCHES IN DIAMETER, RELATIVELY STRAIGHT, HARDWOOD, AND RECENTLY HARVESTED.
2. TOP OF HEADER LOG SHOULD BE SET AT SAME ELEVATION AS THE STREAMBED.
3. USE GEOTEXTILE FABRIC WITH COIR LOGS TO SEAL GAPS BETWEEN LOGS.
4. PLACE TRANSPLANTS ALONG BANKS TO PROTECT AGAINST BANK EROSION.
5. THE HEADER LOG SHOULD BE NOTCHED 2 - 3 INCHES DEEP IN THE CENTER AND FOR 20 - 30% OF THE CHANNEL WIDTH.

3/4/2021
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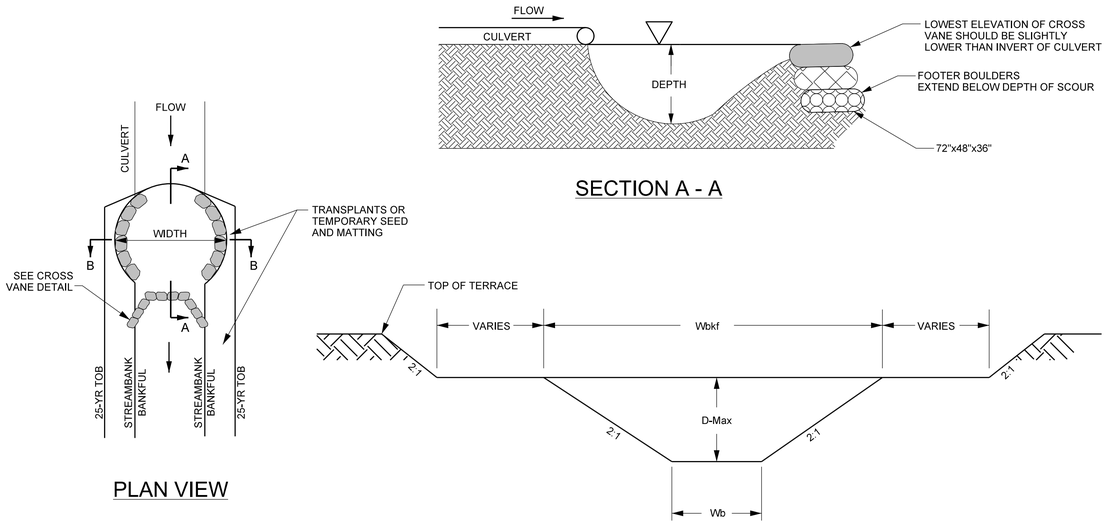
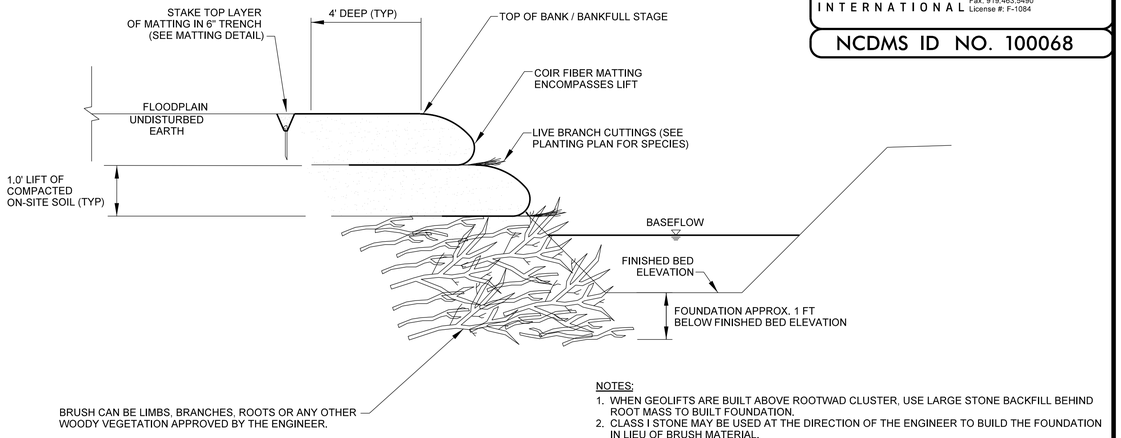
PLUNGE POOL



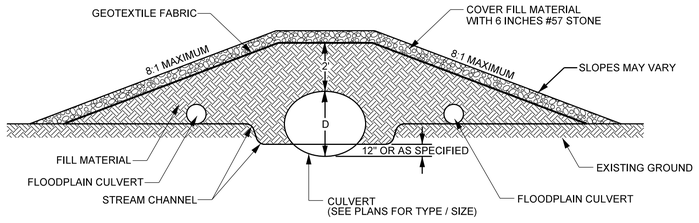
GEOLIFT WITH BRUSH TOE

NOTES:
1. LIVE BRANCH CUTTINGS SHALL BE THE SAME SPECIES AS THE LIVE STAKES AND SHALL BE INSTALLED DURING VEGETATION DORMANCY.
2. LIVE BRANCH CUTTINGS SHALL BE INSTALLED AT A DENSITY OF 20-30 CUTTINGS PER LINEAR FOOT AND A MAXIMUM DIAMETER OF 2.5 INCHES.
3. NUMBER OF SOIL LIFTS MAY VARY. IN GENERAL LIFTS SHALL EXTEND TO THE TOP OF BANK OR BANKFULL STAGE.



NOTES:
1. WHEN GEOLIFTS ARE BUILT ABOVE ROOTWAD CLUSTER, USE LARGE STONE BACKFILL BEHIND ROOT MASS TO BUILT FOUNDATION.
2. CLASS I STONE MAY BE USED AT THE DIRECTION OF THE ENGINEER TO BUILD THE FOUNDATION IN LIEU OF BRUSH MATERIAL.

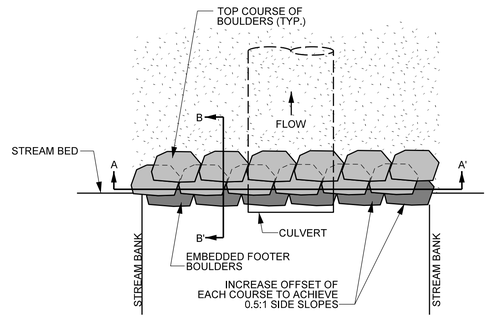
PERMANENT STREAM CROSSING

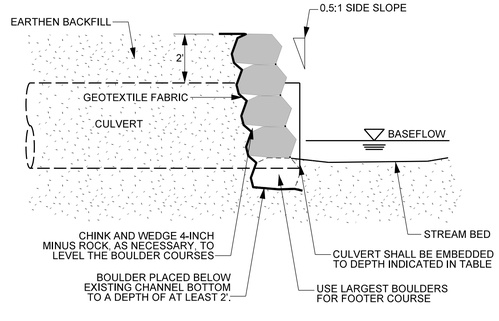


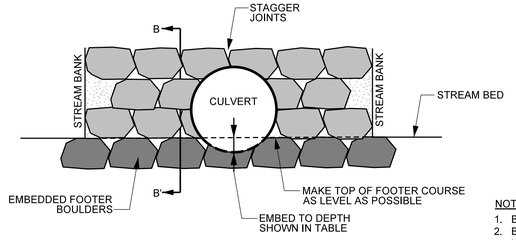
CROSS SECTION VIEW

NOTES:
1. SIZE DIMENSIONS SHOWN ON PLANS.
2. APPLY SUFFICIENT FILL (2' MIN) OVER CULVERT TO PREVENT COLLAPSE.
3. STABILIZE SIDE SLOPES WITH EROSION CONTROL MATTING AND FILL AROUND CULVERTS WITH CLASS II STONE.
4. INSTALL HEADWALLS AND ENDWALLS AS SHOWN ON THE PLANS AND IN THE DETAILS.
5. PRIMARY CULVERT SHOULD BE INSTALLED 12" OR AS SPECIFIED BELOW CHANNEL ELEVATION.

BOULDER HEADWALL / ENDWALL







REACH	BOULDER SIZE	CULVERT SIZE	EMBEDMENT
UT1-R1	1'x2'x2'	4 FT	12 IN
UT1-R4	1'x2'x2'	5 FT	12 IN
UT3	1'x2'x2'	4 FT	9.6 IN
UT4	1'x1'x1'	3 FT	12 IN

NOTES:
1. BOULDERS SHALL BE TOUCHING SO THAT VOID SPACE IS MINIMIZED.
2. BOULDERS SHOULD EXTEND BELOW SCOUR DEPTH. FOOTER BOULDERS SHALL BE AT LEAST 2' BELOW THE EXISTING BED
3. GEOTEXTILE MATTING SHOULD BE PLACED BETWEEN BOULDERS AND SOIL.
4. BOULDERS SHOULD BE BACKFILLED AND COMPACTED. VOID SPACE BETWEEN FABRIC AND BOULDER OR ROCK FILL MATERIAL, SHOULD BE MINIMIZED.
5. BOULDERS SHOULD NOT BE HIGHER THAN THE TOP OF CROSSING ELEVATION.
6. FILTER FABRIC SHOULD BE PLACED BEHIND BOULDERS, BURIED BELOW BOULDER DEPTH, AND EXTEND INTO THE BANK.

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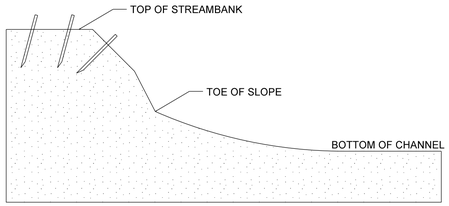
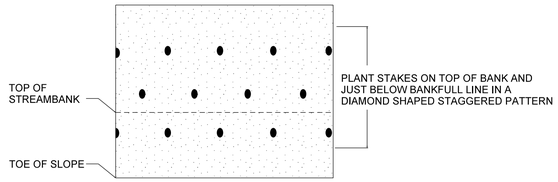
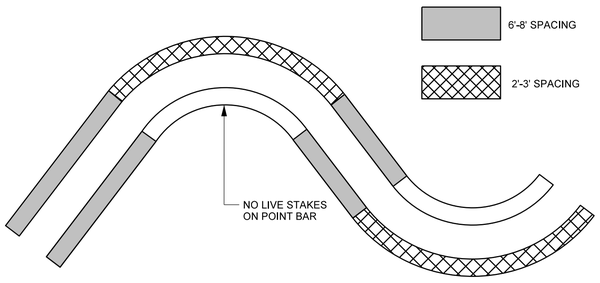
LIVE STAKING



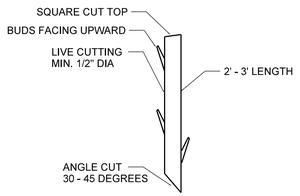
CROSS SECTION VIEW



PLAN VIEW



PLAN VIEW

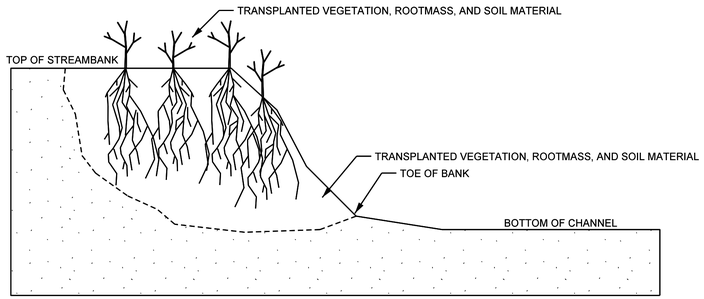


LIVE STAKE DETAIL

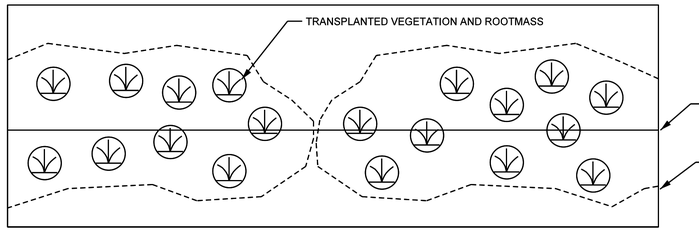
NOTES:

1. STAKES SHOULD BE CUT AND INSTALLED ON THE SAME DAY.
2. DO NOT INSTALL STAKES THAT HAVE BEEN SPLIT.
3. STAKES MUST BE INSTALLED WITH BUDS POINTING UPWARDS.
4. STAKES SHOULD BE INSTALLED PERPENDICULAR TO BANK.
5. STAKES SHOULD BE 1/2 TO 2 INCHES IN DIAMETER AND 2 TO 3 FT LONG.
6. STAKES SHOULD BE INSTALLED LEAVING 1/5 OF STAKE ABOVE GROUND.

TRANSPLANTED VEGETATION



CROSS SECTION VIEW



PLAN VIEW

NOTES:

1. EXCAVATE A HOLE IN THE BANK TO BE STABILIZED THAT WILL ACCOMMODATE THE SIZE OF TRANSPLANT TO BE PLACED. BEGIN EXCAVATION AT THE TOE OF THE BANK.
2. EXCAVATE TRANSPLANT USING A FRONT END LOADER. EXCAVATE THE ENTIRE ROOT MASS AND AS MUCH ADDITIONAL SOIL MATERIAL AS POSSIBLE. IF ENTIRE ROOT MASS CAN NOT BE EXCAVATE IN ONE BUCKET LOAD, THE TRANSPLANT IS TOO LARGE AND ANOTHER SHOULD BE SELECTED.
3. PLACE TRANSPLANT IN THE BANK TO BE STABILIZED SO THAT VEGETATION IS ORIENTATED VERTICALLY.
4. FILL IN ANY HOLES AROUND THE TRANSPLANT AND COMPACT.
5. ANY LOOSE SOIL LEFT IN THE STREAM SHOULD BE REMOVED.
6. PLACE MULTIPLE TRANSPLANTS CLOSE TOGETHER SUCH THAT THEY TOUCH.

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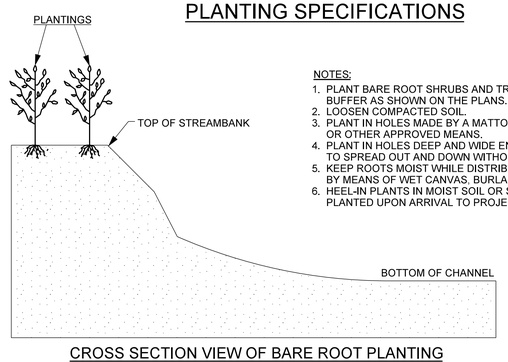
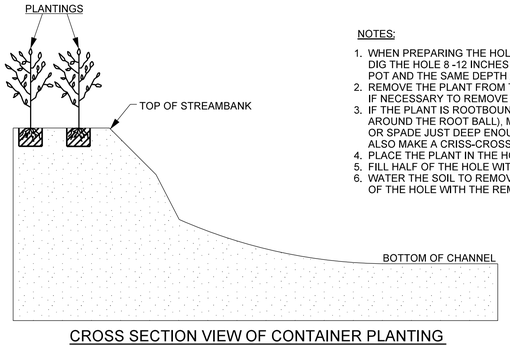
PLANTING SPECIFICATIONS



CROSS SECTION VIEW OF BARE ROOT PLANTING

NOTES:

1. PLANT BARE ROOT SHRUBS AND TREES TO THE WIDTH OF THE BUFFER AS SHOWN ON THE PLANS.
2. LOOSEN COMPACTED SOIL.
3. PLANT IN HOLES MADE BY A MATTOCK, DIBBLE, PLANTING BAR, OR OTHER APPROVED MEANS.
4. PLANT IN HOLES DEEP AND WIDE ENOUGH TO ALLOW THE ROOTS TO SPREAD OUT AND DOWN WITHOUT J-ROOTING.
5. KEEP ROOTS MOIST WHILE DISTRIBUTING OR WAITING TO PLANT BY MEANS OF WET CANVAS, BURLAP, OR STRAW.
6. HEEL-IN PLANTS IN MOIST SOIL OR SAWDUST IF NOT PROMPTLY PLANTED UPON ARRIVAL TO PROJECT SITE.

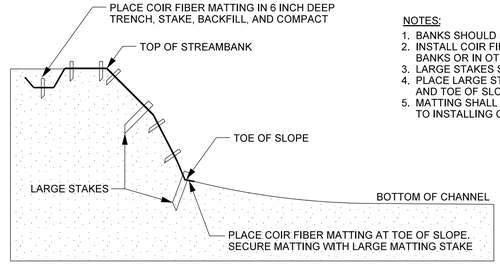


CROSS SECTION VIEW OF CONTAINER PLANTING

NOTES:

1. WHEN PREPARING THE HOLE FOR A POTTED PLANT OR SHRUB DIG THE HOLE 8 -12 INCHES LARGER THAN THE DIAMETER OF THE POT AND THE SAME DEPTH AS THE POT.
2. REMOVE THE PLANT FROM THE POT. LAY THE PLANT ON ITS SIDE IF NECESSARY TO REMOVE THE POT.
3. IF THE PLANT IS ROOTBOUND (ROOTS GROWING IN A SPIRAL AROUND THE ROOT BALL), MAKE VERTICAL CUTS WITH A KNIFE OR SPADE JUST DEEP ENOUGH TO CUT THE NET OF ROOTS. ALSO MAKE A CRISS-CROSS CUT ACROSS THE BOTTOM OF THE BALL.
4. PLACE THE PLANT IN THE HOLE.
5. FILL HALF OF THE HOLE WITH SOIL (SAME SOIL REMOVED FOR BACKFILL).
6. WATER THE SOIL TO REMOVE AIR POCKETS AND FILL THE REST OF THE HOLE WITH THE REMAINING SOIL.

COIR FIBER MATTING



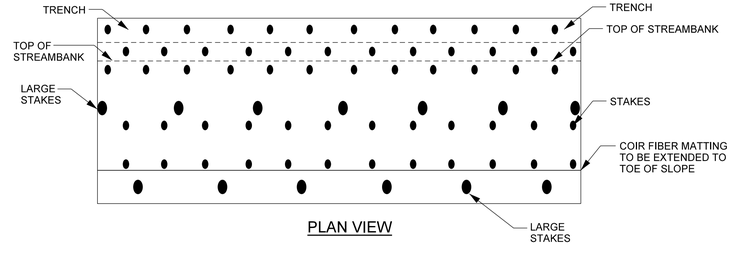
CROSS SECTION VIEW

NOTES:

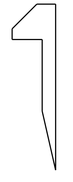
1. BANKS SHOULD BE SEEDED PRIOR TO PLACEMENT OF MATTING.
2. INSTALL COIR FIBER MATTING PER SPECIFICATIONS ALONG STREAM BANKS OR IN OTHERS LOCATIONS SPECIFIED BY ENGINEER.
3. LARGE STAKES SHOULD NOT BE SPACED FURTHER THAN 36" APART.
4. PLACE LARGE STAKES ALONG ALL SEAMS, IN THE CENTER OF BANK, AND TOE OF SLOPE.
5. MATTING SHALL BE PLACED ON BANKS, STAKED, AND TRENCHED PRIOR TO INSTALLING CONSTRUCTED RIFFLE MATERIAL.

TYPICAL LARGE MATTING STAKE

LEG LENGTH	17.00 IN (43.18 CM) (TAPERED TO POINT)
WIDTH	1.5 IN (3.81 CM)
THICKNESS	1.5 IN (3.81 CM)



PLAN VIEW



TYPICAL SMALL MATTING STAKE

LEG LENGTH	11.00 IN (27.94 CM)
HEAD WIDTH	1.25 IN (3.18 CM)
HEAD THICKNESS	0.40 IN (1.02 CM)
LEG WIDTH	0.60 IN (1.52 CM) (TAPERED TO POINT)
LEG THICKNESS	0.40 IN (1.02 CM)
TOTAL LENGTH	12.00 IN (30.48 CM)

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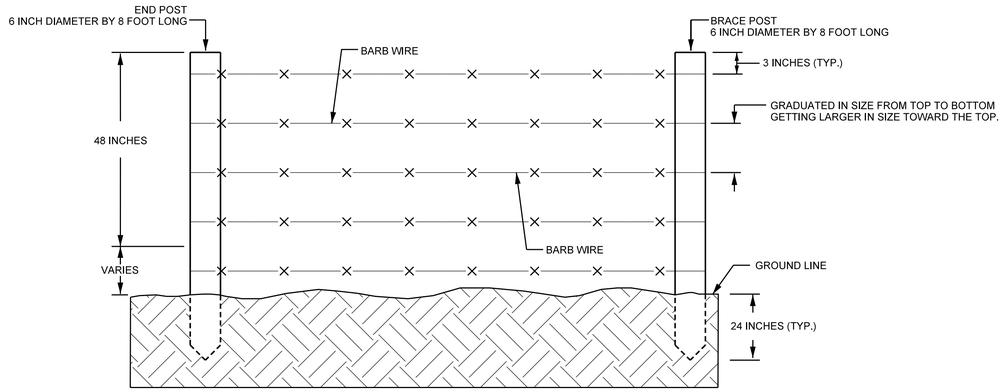
BARB WIRE FIELD FENCE

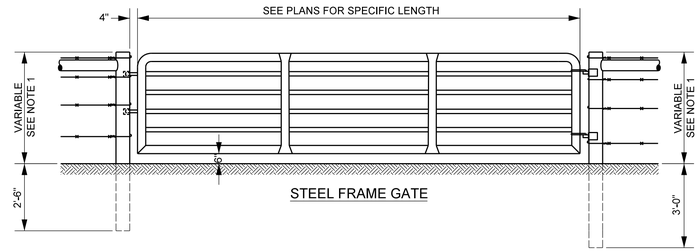


NOTE:

1. END POSTS SHALL BE INSTALLED AT A SPACING OF 10-15 FEET.

2. ALL FENCING AND FENCE POSTS SHOULD BE SET 1-2 FEET OUTSIDE OF THE CONSERVATION EASEMENT FOR FENCE LINE MAINTENANCE (LIKE HERBICIDE SPRAYING).

STEEL GATES



STEEL FRAME GATE

NOTES:

1. POST HEIGHT DIMENSION SHALL BE THE SAME AS REQUIRED FOR THE ADJACENT FENCE.
2. CONSTRUCT AN END OR STRESS PANEL, AS REQUIRED IN THE SPECIFICATION, ON EACH SIDE OF GATE.
3. HINGES AND LOCKS SHALL BE INSTALLED AS SPECIFIED BY GATE MANUFACTURER.

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GENERAL CONSTRUCTION SEQUENCE

A general construction sequence is provided below for the UT to Rush Fork Creek Mitigation Project. The site construction, including grading and planting activities, will be conducted using common machinery, tools, equipment and techniques for successfully implementing the project.

1. Contractor shall contact North Carolina "One Call" Center (1.800.632.4949) before any excavation.
2. Contractor shall prepare stabilized construction entrances and haul roads as indicated on the plans.
3. The Contractor shall mobilize equipment, materials, prepare staging area(s) and stockpile area(s) as shown on the plans.
4. Construction traffic shall be restricted to the area denoted as "Limits of Disturbance" or "Haul Roads" on the plans.
5. The Contractor shall install temporary silt fence around the staging area(s). Temporary silt fencing will also be placed around the temporary stockpile areas as material is stockpiles throughout the construction period.
6. The Contractor shall ensure that the livestock watering system and temporary fencing is installed prior to beginning any stream grading or construction. If no livestock are present at the site this requirement may be waved by the engineer, but these items shall be installed prior to the lessee moving livestock to the site.
7. The Contractor shall install temporary rock dams at locations indicated on the plans.
8. The Contractor shall install all temporary and permanent stream crossings as shown on the plans in accordance with the NC Erosion and Sediment Control Planning and Design Manual. The existing channel and ditches on site will remain open during the initial stages of construction to allow for drainage and to maintain site accessibility.
9. The Contractor shall construct only the portion of channel that can be completed and stabilized within the same day.
10. The Contractor shall apply temporary seed and mulch to all disturbed areas at the end of each work day.
11. The Contractor shall clear and grub, where necessary, an area adequate to construct the stream channel and grading operations after all Sedimentation and Erosion Control practices have been installed and approved. In general, the Contractor shall work from upstream to downstream and construction in a live channel shall utilize a pump-around or flow diversion measure as shown on the plans. Contractor shall not clear and grub more than can be stabilized before rain.
12. Contractor shall begin construction upstream and proceed in a downstream direction until the reach is completed. The Contractor may concurrently work on separate reaches as long as no more is disturbed than can be stabilized in that same day.
13. After excavating the channel to design grades, installing in-stream structures, applying seed and mulch, matting, and installing transplants, the new channel can receive flow. Channel shall not be complete until approved by Engineer.
14. Water will be turned into the constructed channel once the area in and around the new channel has been stabilized. Immediately begin plugging, filling, and grading the abandoned channel, as indicated on plans, moving in a downstream direction to allow for drainage of the old channels. No water shall be turned into any section of channel prior to the channel being completely stabilized with all structures installed.
15. Any grading activities adjacent to the stream channel shall be completed prior to turning water into the new stream channel segments. The Contractor shall not grade or roughen any areas where excavation activities have not been completed.
16. Once a stream work phase is complete, apply temporary seeding, permanent seeding, and mulching to any areas disturbed during construction. Apply permanent seeding mixtures, as shown on the vegetation plan. Temporary seeding shall be applied in all disturbed areas such that ground cover is established within 15 working days following completion of any phase of grading. Permanent ground cover shall be established for all disturbed areas within 15 working days or 90 calendar days (whichever is shorter) following completion of construction.
17. Contractor shall improve and construct the farm roads and crossings by installing culverts, stabilizing side slopes, and modifying any farm roads according to the plans and specifications.
18. All disturbed areas should be seeded and mulched before leaving the project. Remove temporary stream crossings and any in-stream temporary rock dams.
19. The Contractor shall mechanically remove and treat areas of invasive species vegetation throughout the project area according to the plans and specifications prior to demobilization.
20. The Contractor shall plant woody vegetation and live stakes, according to planting details and specifications. The Contractor shall complete the live staking and reforestation (bare-root planting) phase of the project and apply permanent seeding at the appropriate time of the year.
21. The Contractor shall ensure that the site is free of trash and leftover materials at all times and disposed of prior to demobilization of equipment from the site.

MAINTENANCE PLAN

Maintenance Plan:

1. Qualified personnel, on a daily basis will evaluate all temporary erosion and sedimentation control practices for stability and operation.
2. Inspect and maintain all erosion control measures every 7 days and after each significant rainfall (0.5 inches or greater) and document with inspection reports and written logs will be kept.
3. A rain gauge will also be kept on-site and daily rainfall amounts will be recorded.
4. Any repairs needed will be performed immediately to maintain all practices as designed.
5. The contractor shall be responsible for the maintenance of temporary on-site erosion control and sedimentation control measures.
6. The contractor shall be responsible for implementing and following the approved sedimentation and erosion control plan.
7. A copy of the combined self-inspection monitoring form can be found on the DEMLR website at: (http://deq.nc.gov/about/divisions/energy-mineral-land-resources/erosion-sediment-control/forms).

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DB: 838 PG: 400, TRACT IV
REFERENCE: DB: 562 PG: 286, TRACT II
AND DB: 158 PG: 305
PC: C SL: 6260

CONTROL POINT #305
GROUND COORDINATES
N: 713456.03'
E: 830566.09'
ELEV: 3065.15'

INSTALL 16' GATE
16 LF - 48" CSP
INV. IN 3,046.10'
INV. OUT 3,045.30'
BEGIN UT1 REACH 1
STA. 10+98.02
END UT1 REACH 1
BEGIN UT1 REACH 2
STA. 13+25.00
INSTALL BARBED WIRE
FENCE (TYP.)
REMOVE EXISTING FENCE
WITHIN CONSERVATION \
EASEMENT (TYP.)
20" WALNUT
BOULDER
STEP (TYP.)
ROCK DOUBLE DROP
CROSS VANE (TYP.)
LOG AND ROCK
STEP POOL (TYP.)
12+32.59
12+11.81
INSTALL 4' GATE
LOG DROP (TYP.)
GEOLIFT WITH
BRUSH TOE (TYP.)
ROCK CROSS VANE (TYP.)
INSTALL BARBED WIRE
FENCE (TYP.)
GRADE CONTROL ROCK
J-HOOK VANE (TYP.)
INSTALL 4' GATE
INSTALL 16' GATE
2 - 16 LF - 18" CSP
FLOODPLAIN CULVERT
INV. IN 2,989.76'
INV. OUT 2,989.37'
TIE TO EXISTING FENCE
OLD ROAD BED IN GENERAL LOCATION
OF OLD CRABTREE ROAD NOT OPEN
EXIST. TOP OF BANK
TRIPLE WALNUT
18" WALNUT
24" WALNUT
10+00
11+00
12+00
13+00
14+00
15+00
MATCH LINE STA. 16+00.00 – SEE SHEET 5

CONTROL POINT #304
GROUND COORDINATES
N: 713312.24'
E: 830259.50'
ELEV: 3038.02'

ANNE PALMER
FAMILY PROPERTIES, L.P.
PIN: 8721-72-6837
DB: 489 PG: 1683

NOTES:

1. ANY HARDWOOD TREES REMOVED MUST BE INCORPORATED WITHIN THE STRUCTURES BEING INSTALLED.
2. EXCAVATE STREAMBED MATERIAL BEFORE FILLING IN THE OLD CHANNEL AND USE STREAMBED MATERIAL WITHIN THE NEWLY CONSTRUCTED CHANNEL.
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8. LOCATIONS OF BOULDER STEPS AND GRADE CONTROL STRUCTURES ARE SUBJECT TO CHANGE BASED ON FIELD CONDITIONS AND BY THE DIRECTION OF THE ENGINEER.
9. BANKS SHALL BE SLOPED AT 2:1 UNLESS OTHERWISE NOTED.

FILL EXISTING CHANNEL

CHANNEL PLUG

UT to RUSH FORK
UT1 – PLAN VIEW

20 0 20 40
SCALE (FT)

4/28/2021
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mpeloquin

2/26/03

BAKER PROJECT REFERENCE NO.	SHEET NO.
166680	5

PROGRESS DRAWING
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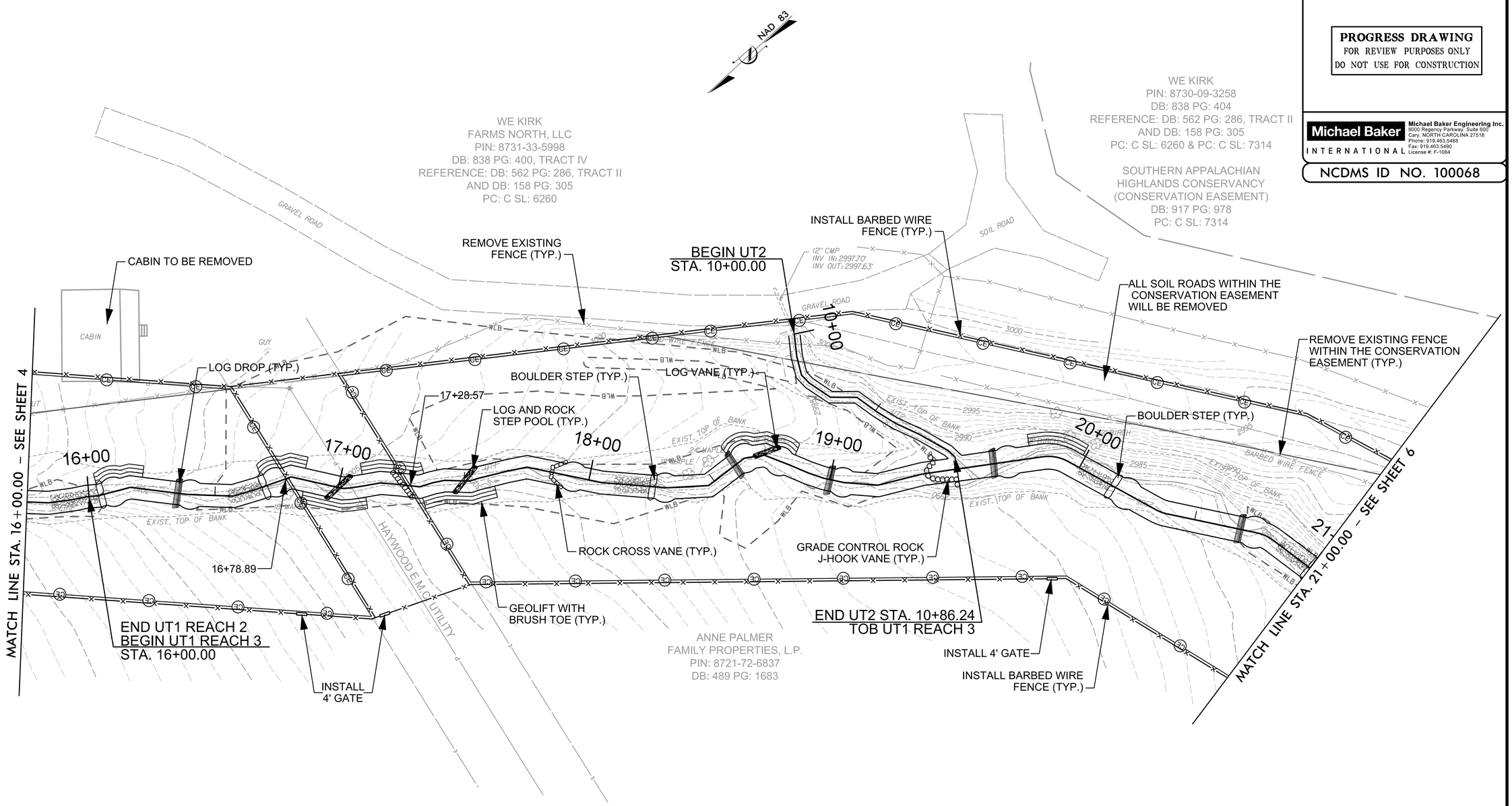
Fax: 919.463.5490
License #: F-1084

NCDMS ID NO. 100068



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FILL EXISTING CHANNEL

CHANNEL PLUG

UT to RUSH FORK
UT1 – PLAN VIEW

20 0 20 40
SCALE (FT)

4/28/2021
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mcarey

2/26/03

BAKER PROJECT REFERENCE NO.	SHEET NO.
166680	6

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Fax: 919.463.5490
License #: F-1084

NCDMS ID NO. 100068

WE KIRK
PIN: 8730-09-3258
DB: 838 PG: 404
REFERENCE: DB: 562 PG: 286, TRACT II
AND DB: 158 PG: 305
PC: C SL: 6260 & PC: C SL: 7314

SOUTHERN APPALACHIAN
HIGHLANDS CONSERVANCY
(CONSERVATION EASEMENT)
DB: 917 PG: 978
PC: C SL: 7314

NAD 83

MATCH LINE STA. 21+00.00 – SEE SHEET 5

REMOVE EXISTING FENCE WITHIN CONSERVATION EASEMENT (TYP.)

INSTALL BARBED WIRE FENCE (TYP.)

REMOVE EXISTING FENCE (TYP.)

ROCK CROSS VANE (TYP.)

LOG DROP (TYP.)

ALL SOIL ROADS WITHIN THE CONSERVATION EASEMENT WILL BE REMOVED

END UT4 STA. 10+42.80
TOB UT1 REACH 4

GEOLIFT WITH BRUSH TOE (TYP.)

GRADE CONTROL ROCK J-HOOK VANE (TYP.)

MATCH LINE STA. 26+75 – SEE SHEET 7

MATCH LINE STA. 25+50 – SEE SHEET 11

END UT1 REACH 3
BEGIN UT1 REACH 4
STA. 22+61.78

END UT3 STA. 26+30.80
TOB REACH UT1 REACH 3 & 4

INSTALL 16' GATE

BOULDER STEP (TYP.)

ROCK VANE (TYP.)

BEGIN UT4
STA. 10+00.00

ANNE PALMER FAMILY PROPERTIES, L.P.
PIN: 8721-72-6837
DB: 489 PG: 1683

PIN: 8721-72-6837

CONTROL POINT #500
STATE PLANE COORDINATES
N: 712855.04'
E: 829608.53'
ELEV: 2989.63'

RELOCATED ACCESS ROAD

INSTALL BARBED WIRE FENCE (TYP.)

16 LF - 36" CSP
INV. IN 2,969.00'
INV. OUT 2,967.08'

24" RCP
INV. IN: 2967.76'
INV. OUT: 2965.26'
(BROKEN)

NC HWY 209
RUSH FORK ROAD

NCDOT R/W

FILL EXISTING CHANNEL

CHANNEL PLUG

NOTES:

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UT to RUSH FORK
UT1 & UT4 – PLAN VIEW

20 0 20 40
SCALE (FT)

4/28/2021
M:\projects\166680_Rush_Fork\Design\Plans\166680_PSH_06.dgn
mdeal

2/26/03

BAKER PROJECT REFERENCE NO.	SHEET NO.
166680	7

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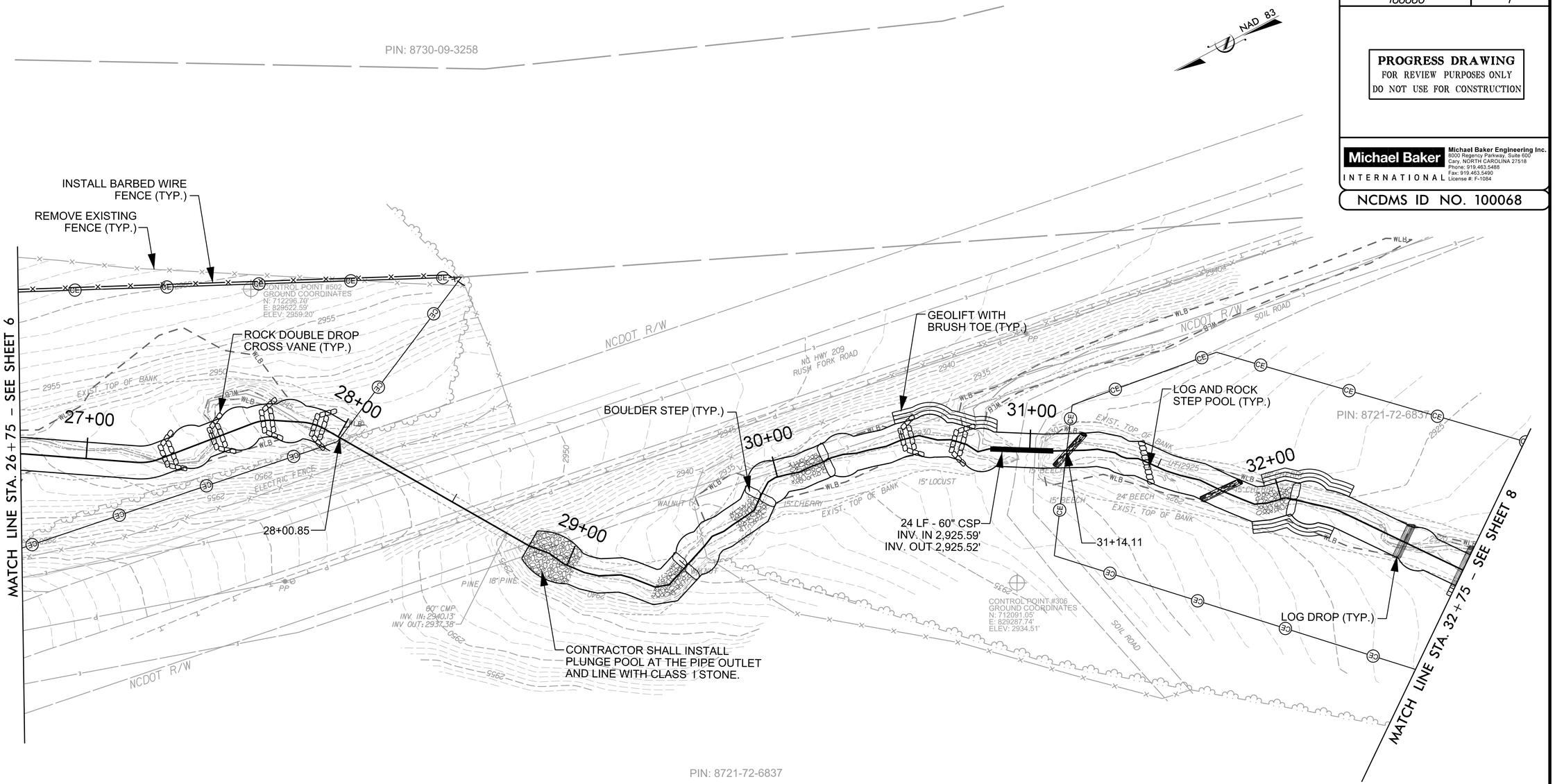
NCDMS ID NO. 100068



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FILL EXISTING CHANNEL

CHANNEL PLUG

UT to RUSH FORK
UT1 – PLAN VIEW

20 0 20 40
SCALE (FT)

4/28/2021
M:\Projects\166680_Rush_Fork\Design\Plans\166680_PSH_07.dgn
mcgee

2/26/03

BAKER PROJECT REFERENCE NO.	SHEET NO.
166680	8

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NAD 83

WE KIRK
PIN: 8730-09-3258
DB: 838 PG: 404
REFERENCE: DB: 562 PG: 286, TRACT II
AND DB: 158 PG: 305
PC: C SL: 6260 & PC: C SL: 7314

SOUTHERN APPALACHIAN
HIGHLANDS CONSERVANCY
(CONSERVATION EASEMENT)
DB: 917 PG: 978
PC: C SL: 7314

PIN: 8721-72-6837

PIN: 8721-72-6837

END UT1 REACH 4
STA. 37+91.37

ALL SOIL ROADS WITHIN THE CONSERVATION EASEMENT WILL BE REMOVED

LOG DROP (TYP.)

ROCK CROSS VANE (TYP.)

GRADE CONTROL ROCK J-HOOK VANE (TYP.)

GEOLIFT WITH BRUSH TOE (TYP.)

ROCK VANE (TYP.)

LOG VANE (TYP.)

ROCK J-HOOK VANE (TYP.)

BOULDER STEP (TYP.)

38+00
39+00
37+00
36+00
35+00
34+00
33+00

NCDOT R/W

SOIL ROAD

EXIST. TOP OF BANK

BARBED WIRE FENCE

22" CHERRY
18" CHERRY
22" LOCUST
20" POPLAR
18" LOCUST
DOUBLE CHERRY
18" POPLAR
18" WALNUT
24" WALNUT
10" TREE
18" TREE
TRIPLE CHERRY

CONTROL POINT #308
GROUND COORDINATES
N: 711505.47'
E: 828898.77'
ELEV: 2918.81'

CONTROL POINT #307
GROUND COORDINATES
N: 711819.21'
E: 829041.22'
ELEV: 2917.97'

MATCH LINE STA. 32+75 – SEE SHEET 7

FILL EXISTING CHANNEL

CHANNEL PLUG

UT to RUSH FORK
UT1 – PLAN VIEW

20 0 20 40
SCALE (FT)

4/28/2021
M:\Projects\166680_Rush_Fork\Design\Plans\166680_PSH_08.dgn

2/26/03

BAKER PROJECT REFERENCE NO.	SHEET NO.
166680	9

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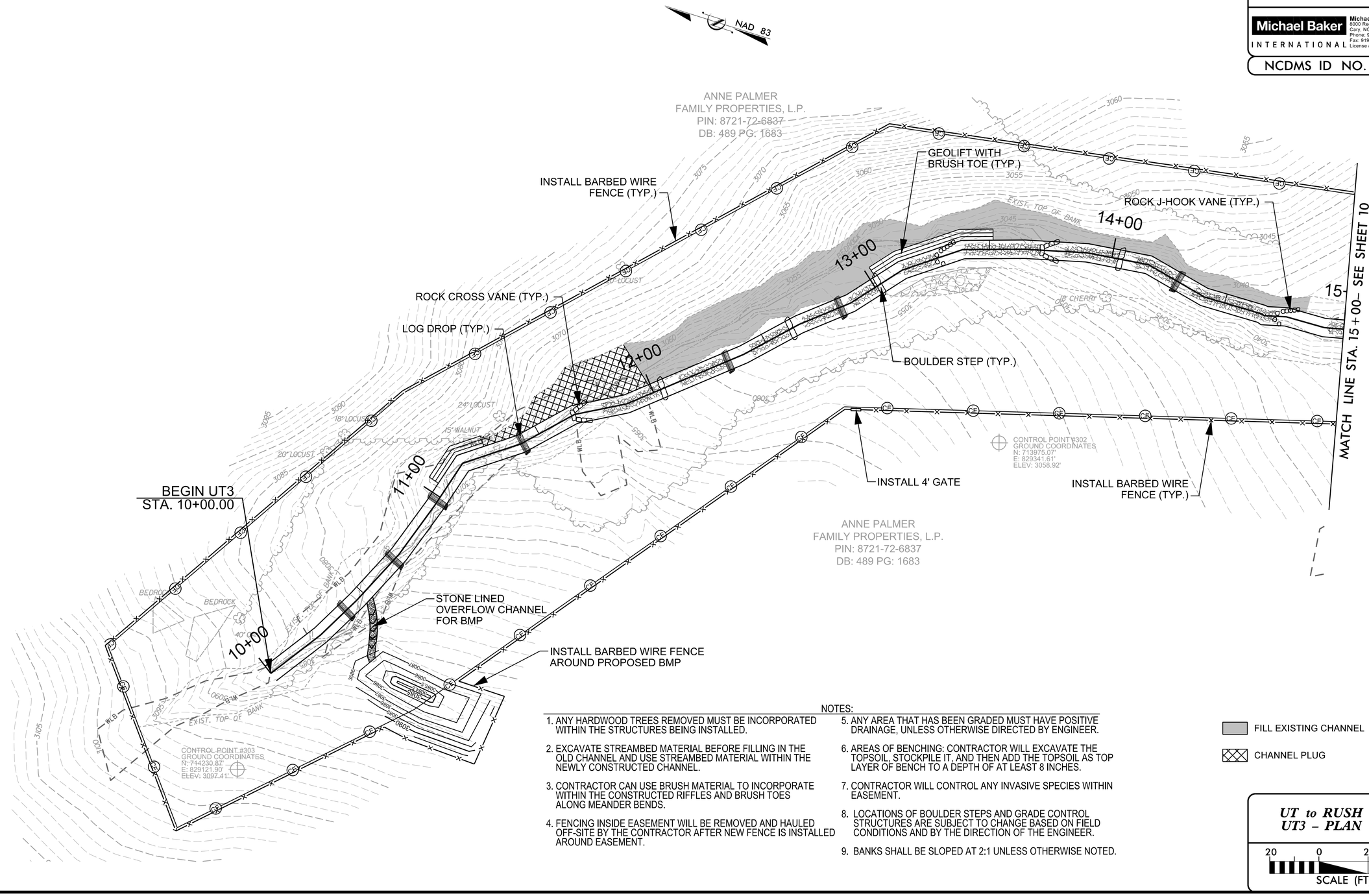

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FILL EXISTING CHANNEL

CHANNEL PLUG

UT to RUSH FORK
UT3 – PLAN VIEW

20 0 20 40
SCALE (FT)

4/28/2021
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mdeal

BAKER PROJECT REFERENCE NO.	SHEET NO.
166680	10

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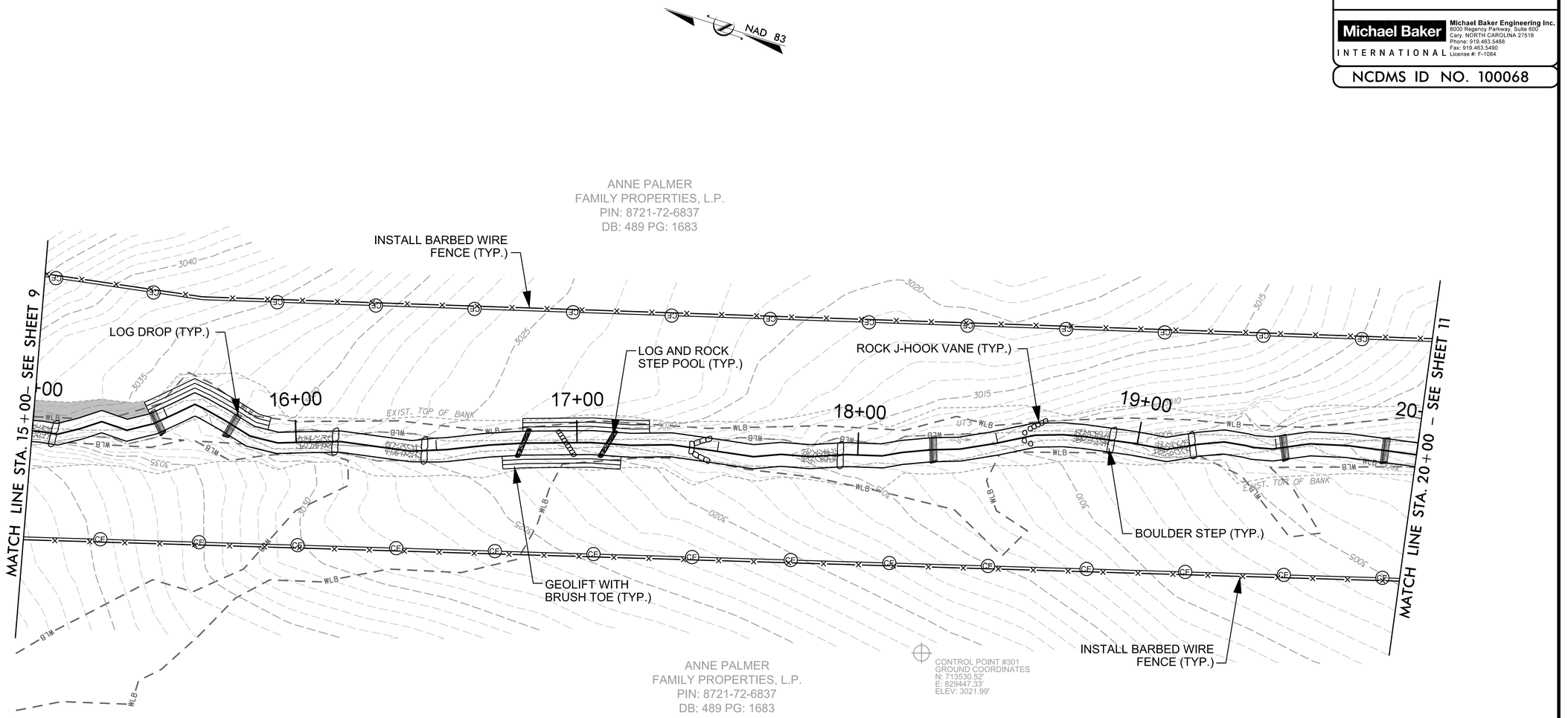

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FILL EXISTING CHANNEL

CHANNEL PLUG

UT to RUSH FORK
UT3 – PLAN VIEW

20 0 20 40
SCALE (FT)

2/26/03

4/28/2021
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mcarey

2/26/03

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166680	11

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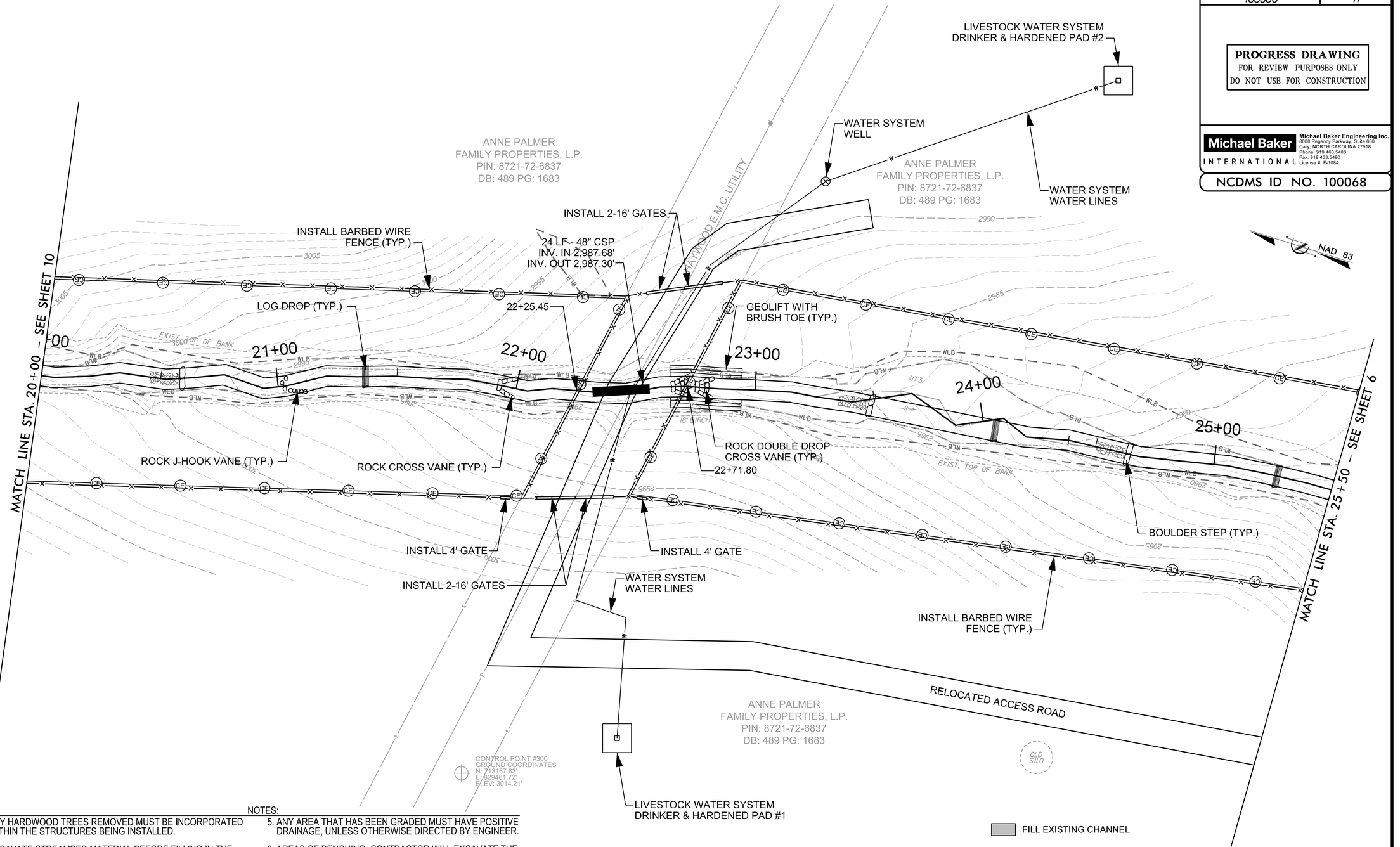

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UT to RUSH FORK
UT3 – PLAN VIEW

20 0 20 40
SCALE (FT)

4/28/2021
N:\Projects\166680_Rush_Fork\Design\Plans\166680_PSH_11.dgn
mcgeary

2/26/03

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166680	12

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License #: F-1084

NCDMS ID NO. 100068

UT1

3,060 / 3,050 / 3,040 / 3,030 / 3,020

10+00 / 11+00 / 12+00 / 13+00 / 14+00 / 15+00

PI=11+09.00 EL=3,055.50
PI=11+03.00 EL=3,055.00
PI=11+25.00 EL=3,053.50
PI=11+28.00 EL=3,052.50
PI=11+34.00 EL=3,053.00
PI=11+50.00 EL=3,051.00
PI=11+53.00 EL=3,050.00
PI=11+59.00 EL=3,050.50
PI=11+80.00 EL=3,049.00
PI=11+83.00 EL=3,048.00
PI=11+89.00 EL=3,048.50
PI=12+30.00 EL=3,046.30
PI=12+35.00 EL=3,046.50
PI=12+38.00 EL=3,045.50
PI=12+44.00 EL=3,046.00
PI=12+55.00 EL=3,044.50
PI=12+58.00 EL=3,043.50
PI=12+64.00 EL=3,044.00
PI=12+70.00 EL=3,042.50
PI=12+73.00 EL=3,041.50
PI=12+79.00 EL=3,042.00
PI=12+90.00 EL=3,040.00
PI=12+93.00 EL=3,039.00
PI=12+99.00 EL=3,039.50
PI=13+10.00 EL=3,037.90
PI=13+13.00 EL=3,036.90
PI=13+19.00 EL=3,037.40
PI=13+35.00 EL=3,035.40
PI=13+38.00 EL=3,034.40
PI=13+44.00 EL=3,034.90
PI=13+69.00 EL=3,032.70

EXISTING GROUND
DESIGN THALWEG
48" CSP
BEGIN UT1 REACH 1
STA. 10+98.02
EL=3,???.??
END UT1 REACH 1
BEGIN UT 1 REACH 2
STA. 13+25.00
EL = 3,036.65
DESIGN BANKFULL

END UT1 REACH 2
BEGIN UT 1 REACH 3
STA. 16+00.00
EL = 3,012.46

UT1

3,020 / 3,010 / 3,000 / 2,990 / 2,980

16+00 / 17+00 / 18+00 / 19+00 / 20+00 / 21+00

PI=15+89.00 EL=3,013.70
PI=16+05.00 EL=3,011.90
PI=16+08.00 EL=3,010.90
PI=16+14.00 EL=3,011.40
PI=16+35.00 EL=3,009.60
PI=16+38.00 EL=3,008.60
PI=16+44.00 EL=3,009.10
PI=16+70.00 EL=3,007.20
PI=16+73.00 EL=3,006.20
PI=16+79.00 EL=3,006.70
PI=17+00.00 EL=3,004.70
PI=17+03.00 EL=3,003.70
PI=17+09.00 EL=3,004.20
PI=17+25.00 EL=3,002.20
PI=17+28.00 EL=3,001.20
PI=17+34.00 EL=3,001.70
PI=17+50.00 EL=3,000.20
PI=17+53.00 EL=2,999.20
PI=17+59.00 EL=2,999.70
PI=17+85.00 EL=2,997.70
PI=17+88.00 EL=2,996.70
PI=17+94.00 EL=2,997.20
PI=18+25.00 EL=2,995.70
PI=18+28.00 EL=2,994.70
PI=18+34.00 EL=2,995.20
PI=18+60.00 EL=2,993.40
PI=18+63.00 EL=2,992.40
PI=18+69.00 EL=2,992.90
PI=19+00.00 EL=2,990.90
PI=19+03.00 EL=2,989.90
PI=19+09.00 EL=2,990.40
PI=19+25.00 EL=2,989.30
PI=19+28.00 EL=2,988.20
PI=19+34.00 EL=2,988.75
PI=19+75.00 EL=2,985.50
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PI=21+00.00 EL=2,979.30
PI=21+03.00 EL=2,978.20
PI=21+09.00 EL=2,978.75

EXISTING GROUND
DESIGN THALWEG
DESIGN BANKFULL

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166680	13

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NCDMS ID NO. 100068

UT1

PI=21+40.00 EL=2,976.80
PI=21+49.00 EL=2,976.25
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BEGIN UT 1 REACH 4
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2,980 2,970 2,960 2,950 2,940

22+00 23+00 24+00 25+00 26+00

UT1

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EXISTING GROUND
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2,960 2,950 2,940 2,930 2,920

27+00 28+00 29+00 30+00 31+00 32+00

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UT1

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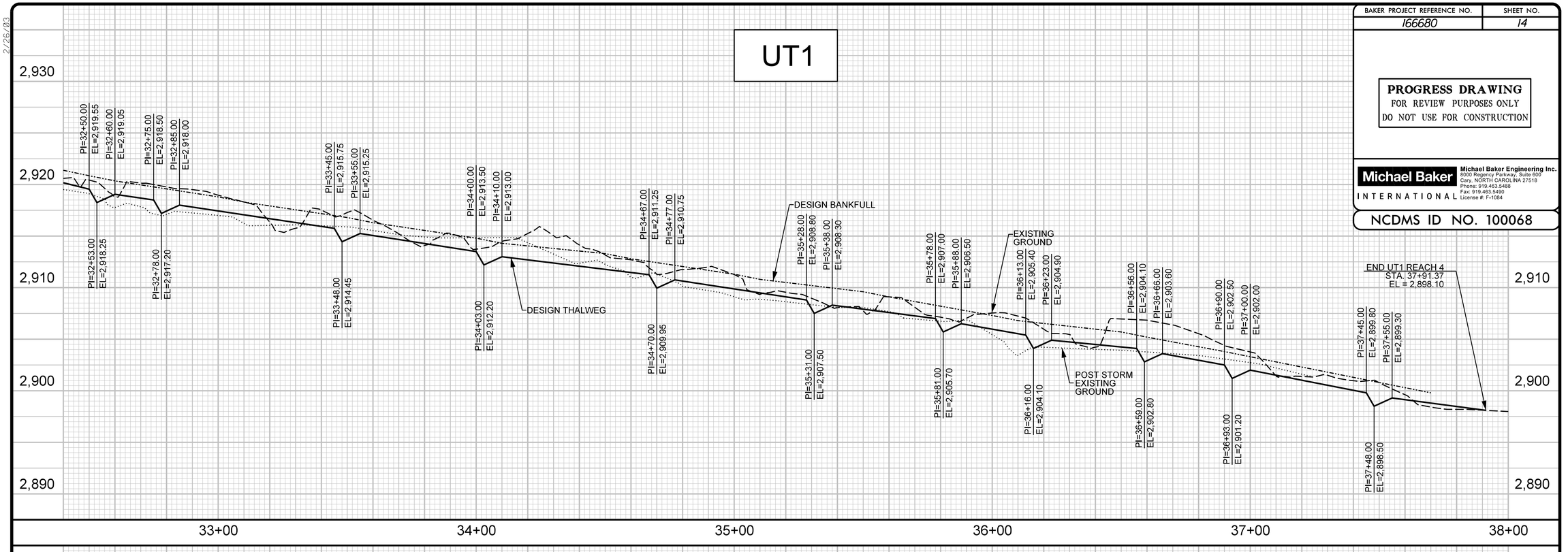

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166680	15

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NCDMS ID NO. 100068

UT3

BEGIN UT3
STA. 10+00.00
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PI=10+25.69
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PI=10+40.05
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3,070
3,060
3,050
3,040

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11+00
12+00
13+00
14+00

UT3

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3,040
3,030
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14+00
15+00
16+00
17+00
18+00

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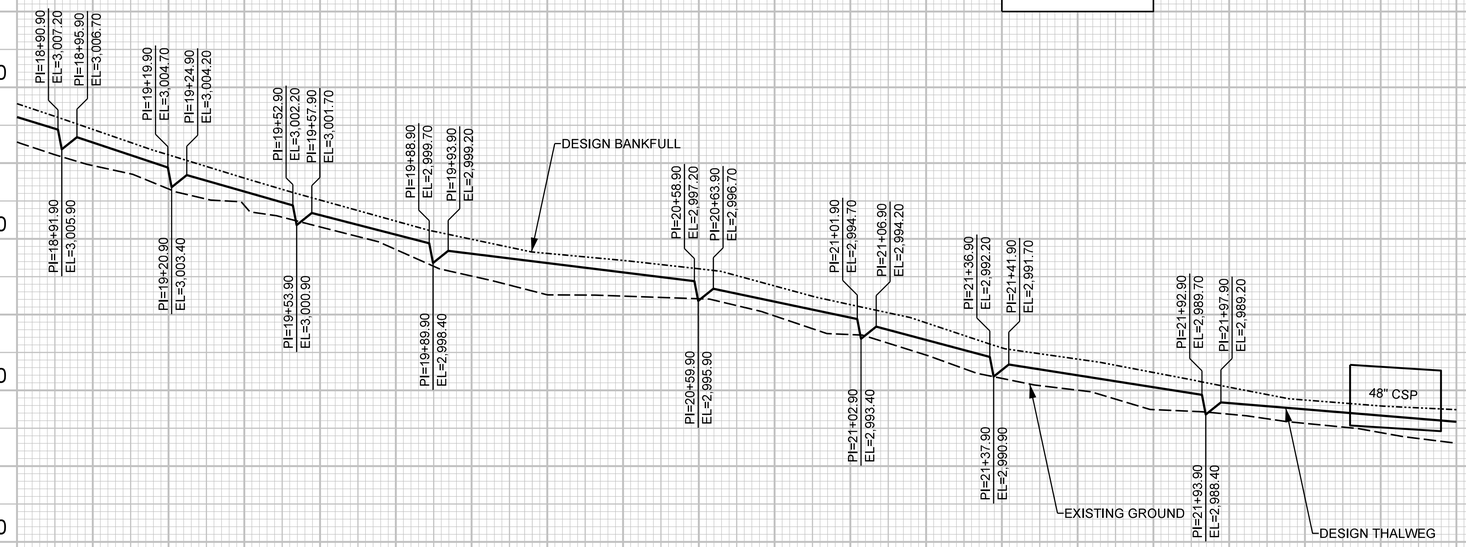

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166680	16

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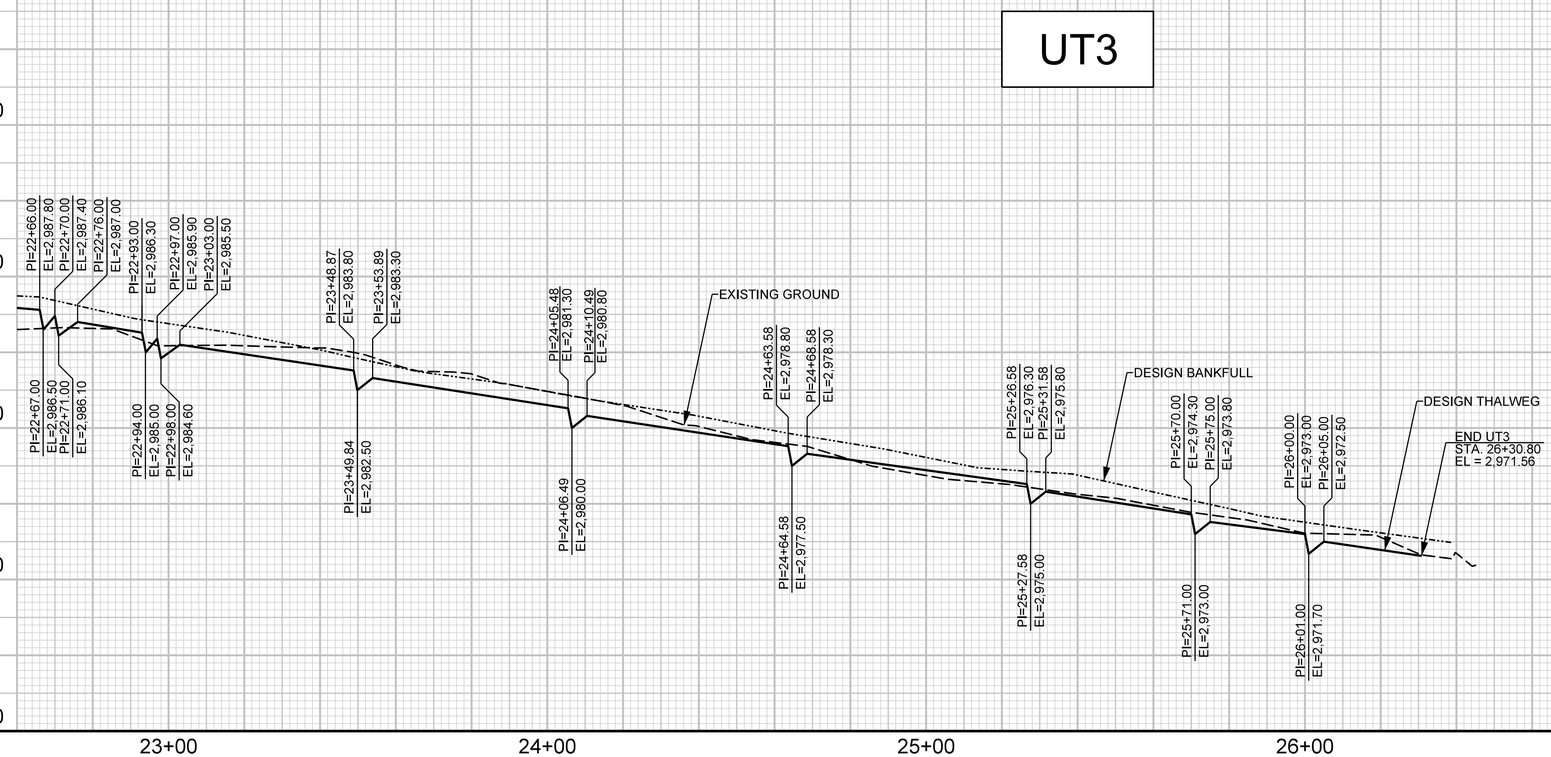
UT3



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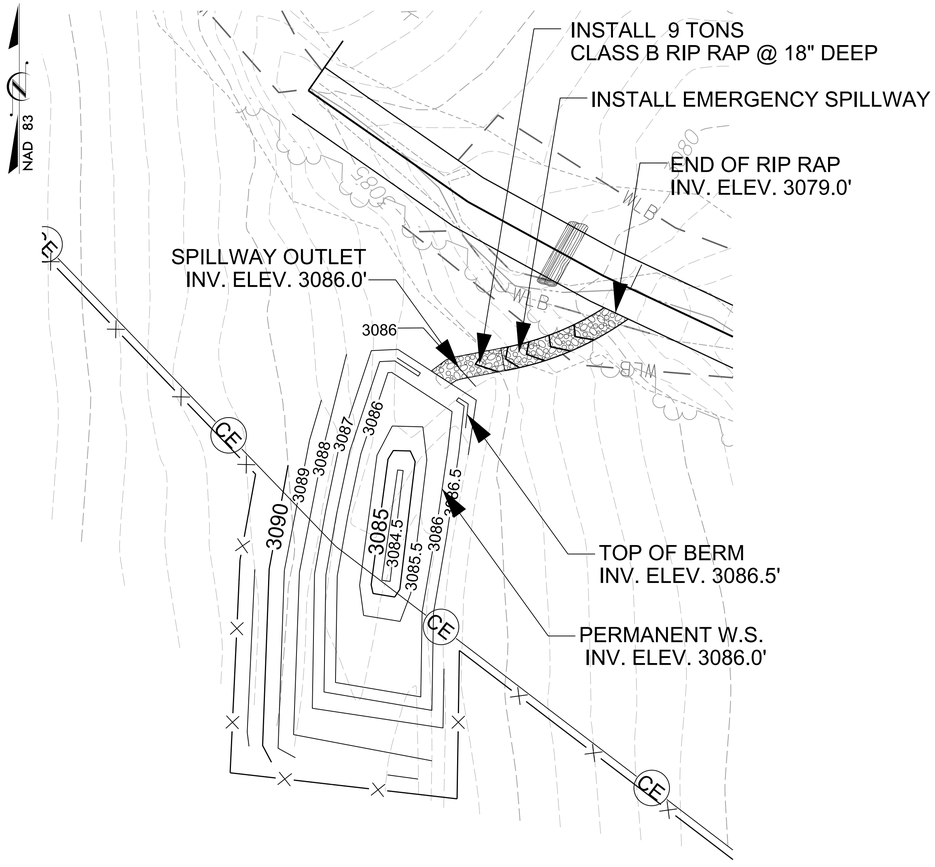

Proposed BMP Planted Species
UT to Rush Fork Mitigation Project - NCDMS Project No. 100068

Botanical Name	Common Name	% Planted by Species	Wetland Tolerance
Shallow Water Zone (50 Herbaceous Plants per 200 ft²)			
Juncus effusus	Common Rush	10%	FACW
Peltandra virginica	Arrow Arum	10%	OBL
Pontederia cordata	Pickerelweed	10%	OBL
Sagittaria latifolia	Broadleaf Arrowhead	10%	OBL
Saururus cernuus	Lizard's Tail	10%	OBL
Scirpus cyperinus	Woolgrass	10%	FACW
Carex vulpinoidea	Fox Sedge	10%	OBL
Sparganium americanum	Bur-reed	10%	FAC
Carex lurida	Shallow Sedge	10%	OBL
Polygonum pensylvanicum	Smartweed	10%	FACW
Temporary Inundation Zone (8 shrubs per 200 ft²)			
Alnus serrulata	Tag Alder	10%	OBL
Cephalanthus occidentalis	Buttonbush	10%	OBL
Cornus amomum	Silky Dogwood	10%	FACW
Ilex verticillata	Winterberry	10%	FACW
Rhododendron viscosum	Swamp Azalea	10%	FACW
Physocarpus opulifolius	Ninebark	10%	FACW
Sambucus canadensis	Elderberry	10%	FACW
Leucothoe fontanesiana	Highland Doghobble	10%	FACW
Vaccinium corymbosum	Highbush Blueberry	10%	FACW
Xanthorhiza simplicissima	Yellowroot	10%	FACW

Notes: -Final species selection may change due to refinement of site conditions or to availability at the time of planting. If species substitution is required, the planting Contractor will submit a revised planting list to Baker for approval prior to the procurement of plant stock.

-Shallow Water planting zone is from basin bottom to elevation 3085.5' while Temporary Inundation planting zone is from elevation 3085.5' to 3086.5'.

-Embankments and perimeter fill slopes will be planted with non-clumping turf grasses (no trees or woody shrubs).

UT to RUSH FORK BMP PLAN VIEW

10 0 10 20
SCALE (FT)

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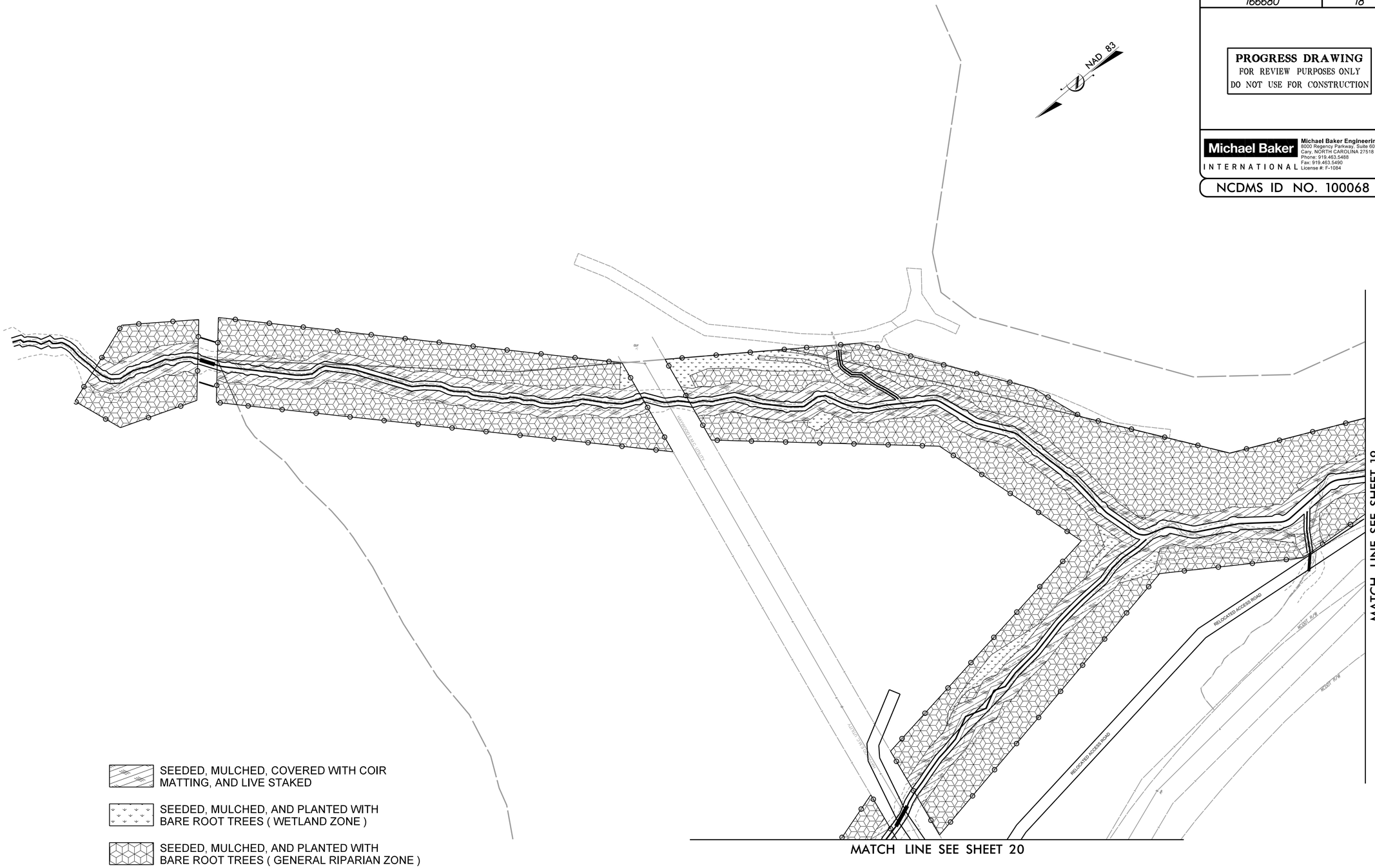

SEEDED, MULCHED, COVERED WITH COIR MATTING, AND LIVE STAKED

SEEDED, MULCHED, AND PLANTED WITH BARE ROOT TREES (WETLAND ZONE)

SEEDED, MULCHED, AND PLANTED WITH BARE ROOT TREES (GENERAL RIPARIAN ZONE)

UT to RUSH FORK REVEGEGATION PLAN

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SCALE (FT)

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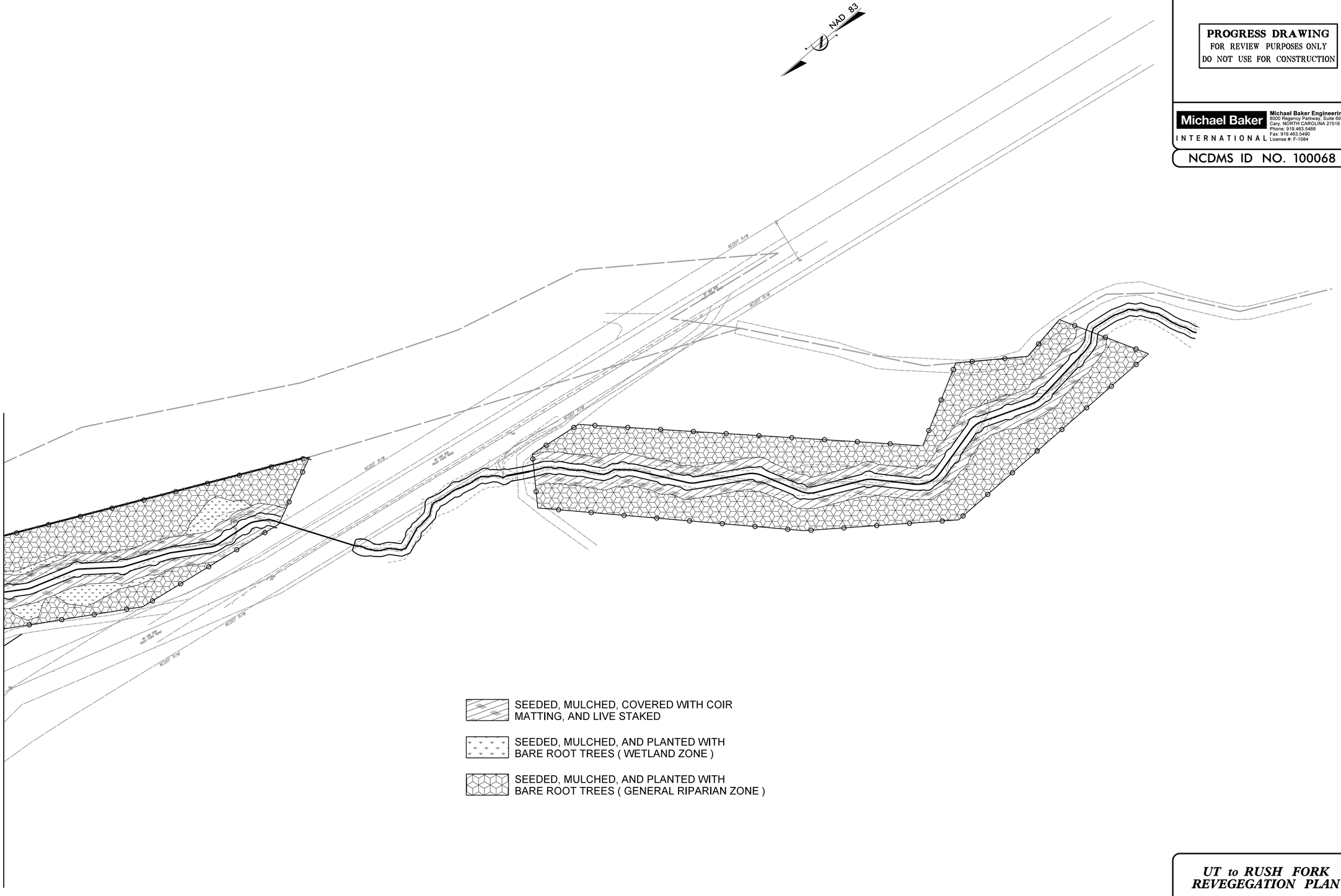

UT to RUSH FORK REVEGEGATION PLAN

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SCALE (FT)

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NCDMS ID NO. 100068

SEEDED, MULCHED, COVERED WITH COIR MATTING, AND LIVE STAKED

SEEDED, MULCHED, AND PLANTED WITH BARE ROOT TREES (WETLAND ZONE)

SEEDED, MULCHED, AND PLANTED WITH BARE ROOT TREES (GENERAL RIPARIAN ZONE)

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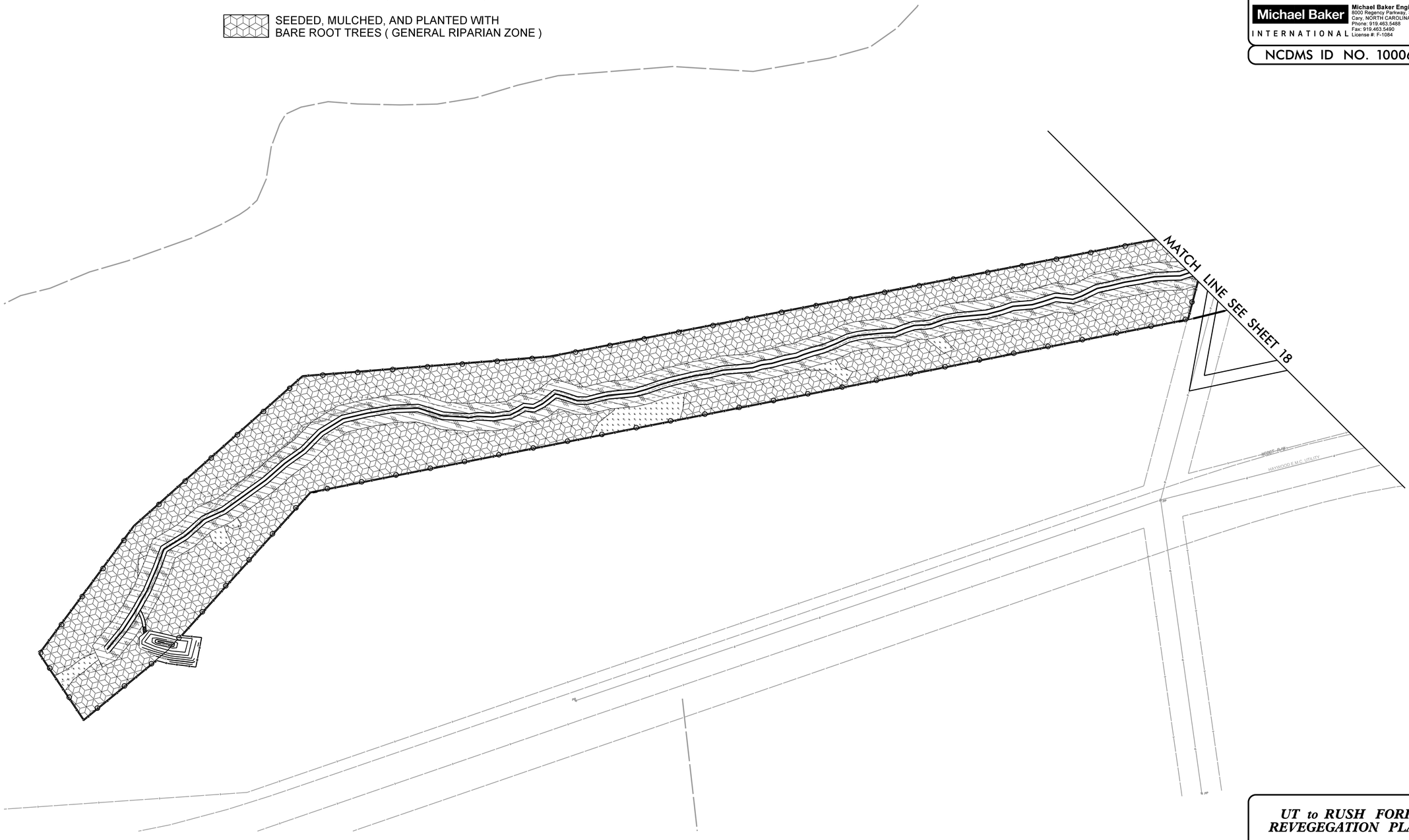

UT to RUSH FORK REVEGEGATION PLAN

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SCALE (FT)

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STATE	BAKER PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
NC	166680	EC-1	9

NORTH CAROLINA
DIVISION OF MITIGATION SERVICES

EROSION & SEDIMENTATION CONTROL PLAN

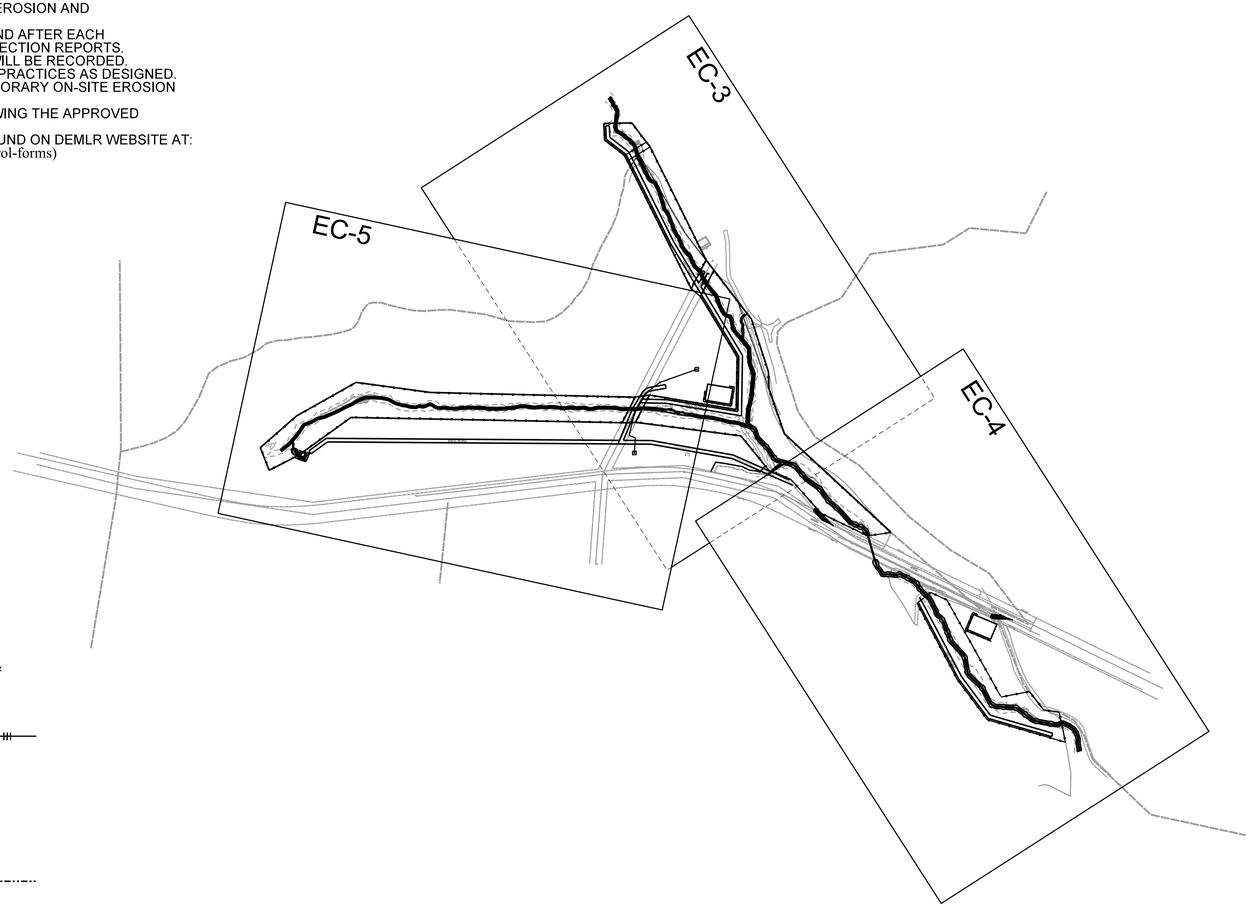
LOCATION: FROM EXIT 24 ON INTERSTATE 40, TRAVEL NORTH FOR 5.75 MILES ON NC–209

TYPE OF WORK: STREAM RESTORATION AND ENHANCEMENT

PROJECT: 166680 UT to RUSH FORK

MAINTENANCE PLAN:

1. QUALIFIED PERSONNEL ON A DAILY BASIS WILL EVALUATE ALL TEMPORARY EROSION AND SEDIMENTATION CONTROL PRACTICES FOR STABILITY AND OPERATION.
2. INSPECT AND MAINTAIN ALL EROSION CONTROL MEASURES EVERY 7 DAYS AND AFTER EACH SIGNIFICANT RAINFALL (1.0 INCHES OR GREATER) AND DOCUMENT WITH INSPECTION REPORTS.
3. A RAIN GAUGE WILL ALSO BE KEPT ON-SITE AND DAILY RAINFALL AMOUNTS WILL BE RECORDED.
4. ANY REPAIRS NEEDED WILL BE PERFORMED IMMEDIATELY TO MAINTAIN ALL PRACTICES AS DESIGNED.
5. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE MAINTENANCE OF TEMPORARY ON-SITE EROSION AND SEDIMENTATION CONTROL MEASURES.
6. THE CONTRACTOR SHALL BE RESPONSIBLE FOR IMPLEMENTING AND FOLLOWING THE APPROVED SEDIMENTATION AND EROSION CONTROL PLAN.
7. A COPY OF THE COMBINED SELF-INSPECTION MONITORING FORM CAN BE DOUND ON DEMLR WEBSITE AT: (http://deq.nc.gov/about/divisions/energy-mineral-land-resources/erosion-sediment-control-forms)



STD. NO.	DESCRIPTION	SYMBOL
6.06	TEMPORARY GRAVEL CONSTRUCTION ACCESS	
6.62	TEMPORARY SILT FENCE	
6.63	TEMPORARY ROCK DAM	
	TEMPORARY STREAM CROSSING	
	TEMPORARY WETLAND MAT	
	LIMITS OF DISTURBANCE	

NCDMS ID NO. 100068

GRAPHIC SCALES

50 0 50 100
PLANS

THIS PROJECT CONTAINS EROSION CONTROL PLANS FOR ALL PHASES OF CONSTRUCTION.

TOTAL DISTURBED AREA = ??.? Acres

PROJECT STANDARDS

THE FOLLOWING STANDARDS AS THEY APPEAR IN THE "NC EROSION CONTROL PLANNING AND DESIGN MANUAL" AND ARE APPLICABLE TO THIS PROJECT AND BY REFERENCE HEREBY ARE CONSIDERED PART OF THE PLANS.

6.06	TEMPORARY GRAVEL CONSTRUCTION ACCESS
6.20	TEMPORARY DIVERION
6.24	RIPARIAN AREA SEEDING
6.62	SILT FENCE
6.63	TEMPORARY ROCK DAM

PREPARED IN THE OFFICE OF:
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Fax: 919.463.5490
License #: F-1084

LETTING DATE:

KATHLEEN M. MCKEITHAN, PE
PROJECT ENGINEER

PROJECT ENGINEER

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SIGNATURE: P.E.

2/26/03

GROUND STABILIZATION AND MATERIALS HANDLING PRACTICES FOR COMPLIANCE WITH THE NCG01 CONSTRUCTION GENERAL PERMIT

Implementing the details and specifications on this plan sheet will result in the construction activity being considered compliant with the Ground Stabilization and Materials Handling sections of the NCG01 Construction General Permit (Sections E and F, respectively). The permittee shall comply with the Erosion and Sediment Control plan approved by the delegated authority having jurisdiction. All details and specifications shown on this sheet may not apply depending on site conditions and the delegated authority having jurisdiction.

SECTION E: GROUND STABILIZATION

Required Ground Stabilization Timeframes		
Site Area Description	**Stabilize within this many calendar days after ceasing land disturbance**	**Timeframe variations**
(a) Perimeter dikes, swales, ditches, and perimeter slopes	7	None
(b) High Quality Water (HQW) Zones	7	None
(c) Slopes steeper than 3:1	7	If slopes are 10' or less in length and are not steeper than 2:1, 14 days are allowed
(d) Slopes 3:1 to 4:1	14	-7 days for slopes greater than 50' in length and with slopes steeper than 4:1 -7 days for perimeter dikes, swales, ditches, perimeter slopes and HQW Zones -10 days for Falls Lake Watershed
(e) Areas with slopes flatter than 4:1	14	-7 days for perimeter dikes, swales, ditches, perimeter slopes and HQW Zones -10 days for Falls Lake Watershed unless there is zero slope

Note: After the permanent cessation of construction activities, any areas with temporary ground stabilization shall be converted to permanent ground stabilization as soon as practicable but in no case longer than 90 calendar days after the last land disturbing activity. Temporary ground stabilization shall be maintained in a manner to render the surface stable against accelerated erosion until permanent ground stabilization is achieved.

GROUND STABILIZATION SPECIFICATION

Stabilize the ground sufficiently so that rain will not dislodge the soil. Use one of the techniques in the table below:

Temporary Stabilization	Permanent Stabilization
• Temporary grass seed covered with straw or other mulches and tackifiers • Hydroseeding • Rolled erosion control products with or without temporary grass seed • Appropriately applied straw or other mulch • Plastic sheeting	• Permanent grass seed covered with straw or other mulches and tackifiers • Geotextile fabrics such as permanent soil reinforcement matting • Hydroseeding • Shrubs or other permanent plantings covered with mulch • Uniform and evenly distributed ground cover sufficient to restrain erosion • Structural methods such as concrete, asphalt or retaining walls • Rolled erosion control products with grass seed

POLYACRYLAMIDES (PAMS) AND FLOCCULANTS

1. Select flocculants that are appropriate for the soils being exposed during construction, selecting from the *NC DWR List of Approved PAMS/Flocculants*.
2. Apply flocculants at or before the inlets to Erosion and Sediment Control Measures.
3. Apply flocculants at the concentrations specified in the *NC DWR List of Approved PAMS/Flocculants* and in accordance with the manufacturer's instructions.
4. Provide ponding area for containment of treated Stormwater before discharging offsite.
5. Store flocculants in leak-proof containers that are kept under storm-resistant cover or surrounded by secondary containment structures.

EQUIPMENT AND VEHICLE MAINTENANCE

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

LITTER, BUILDING MATERIAL AND LAND CLEARING WASTE

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

PAINT AND OTHER LIQUID WASTE

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

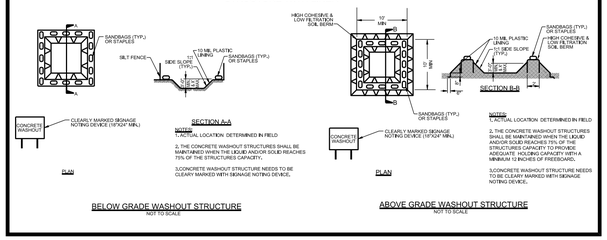
PORTABLE TOILETS

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

EARTHEN STOCKPILE MANAGEMENT

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

ONSITE CONCRETE WASHOUT STRUCTURE WITH LINER



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

BAKER PROJECT REFERENCE NO.	SHEET NO.
166680	EC-1A

PROJECT ENGINEER

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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. Occurences 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.

PART II, SECTION G, ITEM (4)
DRAW DOWN OF SEDIMENT BASINS FOR MAINTENANCE OR CLOSE OUT

Sediment basins and traps that receive runoff from drainage areas of one acre or more shall use outlet structures that withdraw water from the surface when these devices need to be drawn down for maintenance or close out unless this is infeasible. The circumstances in which it is not feasible to withdraw water from the surface shall be rare (for example, times with extended cold weather). Non-surface withdrawals from sediment basins shall be allowed only when all of the following criteria have been met:

(a) The E&SC plan authority has been provided with documentation of the non-surface withdrawal and the specific time periods or conditions in which it will occur. The non-surface withdrawal shall not commence until the E&SC plan authority has approved these items,
(b) The non-surface withdrawal has been reported as an anticipated bypass in accordance with Part III, Section C, Item (2)(c) and (d) of this permit,
(c) Dewatering discharges are treated with controls to minimize discharges of pollutants from stormwater that is removed from the sediment basin. Examples of appropriate controls include properly sited, designed and maintained dewatering tanks, weir tanks, and filtration systems,
(d) Vegetated, upland areas of the sites or a properly designed stone pad is used to the extent feasible at the outlet of the dewatering treatment devices described in Item (c) above,
(e) Velocity dissipation devices such as check dams, sediment traps, and riprap are provided at the discharge points of all dewatering devices, and
(f) Sediment removed from the dewatering treatment devices described in Item (c) above is disposed of in a manner that does not cause deposition of sediment into waters of the United States.

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PROJECT ENGINEER

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2/26/03

PROJECT REFERENCE NO.	SHEET NO.
166680	EC-2

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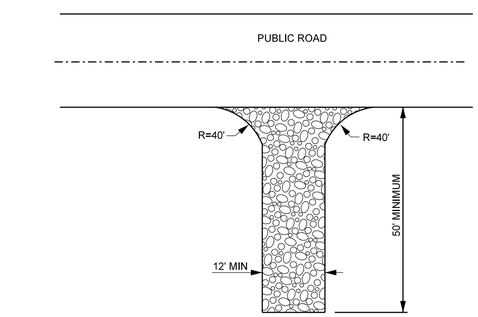
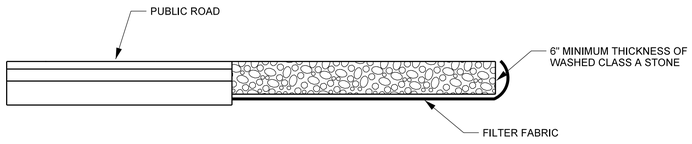
TEMPORARY GRAVEL CONSTRUCTION ENTRANCE /EXIT

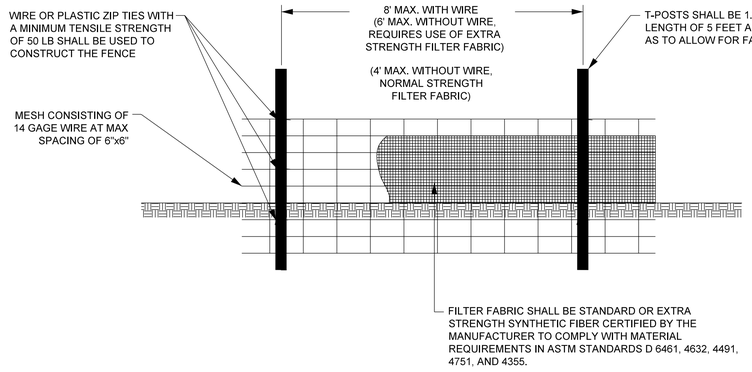




NOTES:

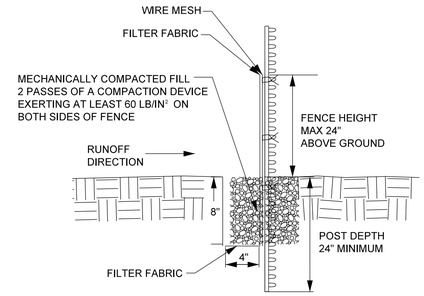
SPECIFICATION NO. 6.06 - CONSTRUCTION ACCESS "N.C. EROSION AND SEDIMENT CONTROL PLANNING AND DESIGN MANUAL MARCH 2009"

TEMPORARY SILT FENCE

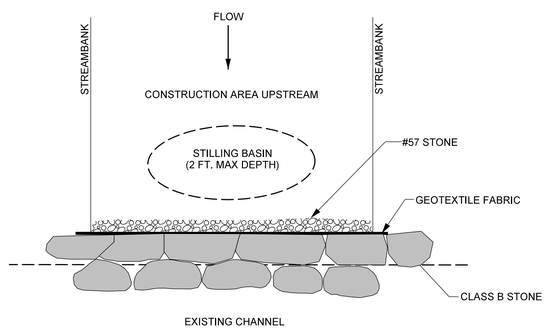


NOTES:
1. AVOID JOINTS, UNAVOIDABLE JOINTS MUST HAVE 4' OF CLOTH OVERLAP AND SHOULD TIE INTO THE NEXT ADJACENT POST.
2. PLACE ON CONTOUR EXCEPT ENDS WHICH SHOULD BE 1' ABOVE GRADE TO PREVENT CUT AROUND.
3. WRAP APPROX. 6" OF FABRIC AROUND END POSTS AND SECURE WITH TIES.
4. REMOVE ONCE AREA IS STABLE.
5. CONTRACTOR SHALL SIDE CAST SPOIL MATERIAL FROM TRENCHING FOR SILT FENCE ONTO HIGH GROUND OR ONTO THE PERMITTED WETLAND IMPACT SIDE TO AVOID UNPERMITTED WETLAND IMPACTS.

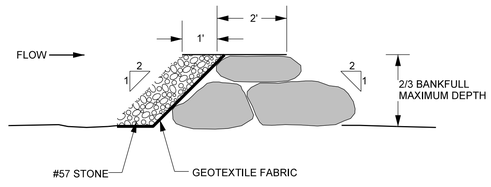
MAINTENANCE NOTES:
1. INSPECT SEDIMENT FENCES AT LEAST ONCE A WEEK AND AFTER EACH RAINFALL. MAKE ANY REQUIRED REPAIRS IMMEDIATELY.
2. SHOULD THE FABRIC OF A SEDIMENT FENCE COLLAPSE, TEAR, DECOMPOSE OR BECOME INEFFECTIVE, REPLACE IT PROMPTLY.
3. REMOVE SEDIMENT DEPOSITS AS NECESSARY TO PROVIDE ADEQUATE STORAGE VOLUME FOR THE NEXT RAIN AND TO REDUCE PRESSURE ON THE FENCE. TAKE CARE TO AVOID UNDERMINING THE FENCE DURING CLEANOUT.
4. REMOVE ALL FENCING MATERIALS AND UNSTABLE SEDIMENT DEPOSITS AND BRING THE AREA TO GRADE AND STABILIZE IT AFTER THE CONTRIBUTING DRAINAGE AREA HAS BEEN PROPERLY STABILIZED.



TEMPORARY ROCK DAM



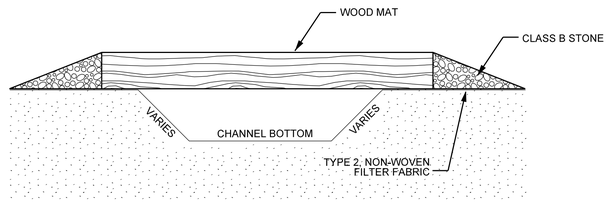
PLAN VIEW



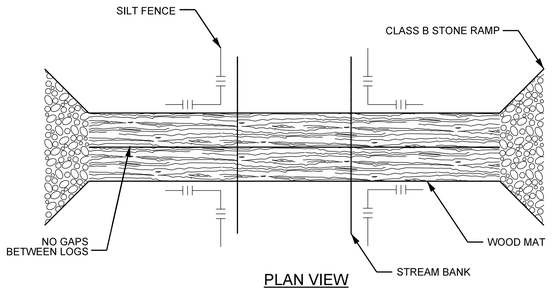
CROSS SECTION

NOTES:
1. TEMPORARY ROCK CHECK DAMS SHALL BE INSTALLED AT THE END OF THE REACH THAT IS UNDER CONSTRUCTION WITHIN THE CURRENT PHASE OF CONSTRUCTION AND/OF AS DESIGNATED ON THE EROSION CONTROL PLANS.
2. THE CONTRACTOR SHALL BE RESPONSIBLE FOR INSPECTING THE TEMPORARY ROCK CHECK DAMS ON A DAILY BASIS AND CLEANING OR REPAIRING THEM AS NEEDED.
3. THE CONTRACTOR SHALL BE REQUIRED TO REMOVE SEDIMENT FROM THE CHECK DAMS ONCE THE DEPTH OF SEDIMENT REACHES 12 INCHES.

TEMPORARY STREAM AND WETLAND CROSSING - WOOD MAT



CROSS SECTION



PLAN VIEW

NOTES:
1. CONSTRUCT STREAM CROSSING WHEN FLOW IS LOW.
2. HAVE ALL NECESSARY MATERIALS AND EQUIPMENT ON-SITE BEFORE WORK BEGINS.
3. MINIMIZE CLEARING AND EXCAVATION OF STREAMBANKS. DO NOT EXCAVATE CHANNEL BOTTOM.
4. LINE STREAMBANK AND ACCESS RAMP AREA WITH NON-WOVEN FILTER FABRIC.
5. INSTALL STREAM CROSSING AT RIGHT ANGLE TO THE FLOW.
6. TRANSPLANT SOD FROM ORIGINAL STREAMBANK ONTO SIDE SLOPES FOR LATER USE.
7. MAINTAIN CROSSING SO THAT RUNOFF IN THE CONSTRUCTION ROAD DOES NOT ENTER EXISTING CHANNEL BY INSTALLING SILT FENCE ON ALL FOUR CORNERS ADJACENT TO THE STREAM. SEE SILT FENCE DETAIL.
8. STABILIZE AN ACCESS RAMP OF CLASS B STONE TO THE EDGE OF THE MUD MAT.
9. THE WOOD MAT SHALL BE OF SUFFICIENT SIZE AND WIDTH TO SUPPORT THE LARGEST VEHICLE CROSSING THE CHANNEL.
10. CONTRACTOR SHALL DETERMINE AN APPROPRIATE RAMP ANGLE ACCORDING TO EQUIPMENT UTILIZED, RECOMMENDED AT A 5:1 SLOPE.

TEMPORARY STREAM CROSSING MAINTENANCE NOTES:
1. INSPECT TEMPORARY STREAM CROSSINGS AFTER RUN-OFF PRODUCING RAINS TO CHECK FOR BLOCKAGE IN CHANNEL, EROSION OF ABUTMENTS, CHANNEL SCOUR, RIPRAP DISPLACEMENT, OR PIPING. MAKE ALL REPAIRS IMMEDIATELY TO PREVENT FURTHER DAMAGE TO THE INSTALLATION.

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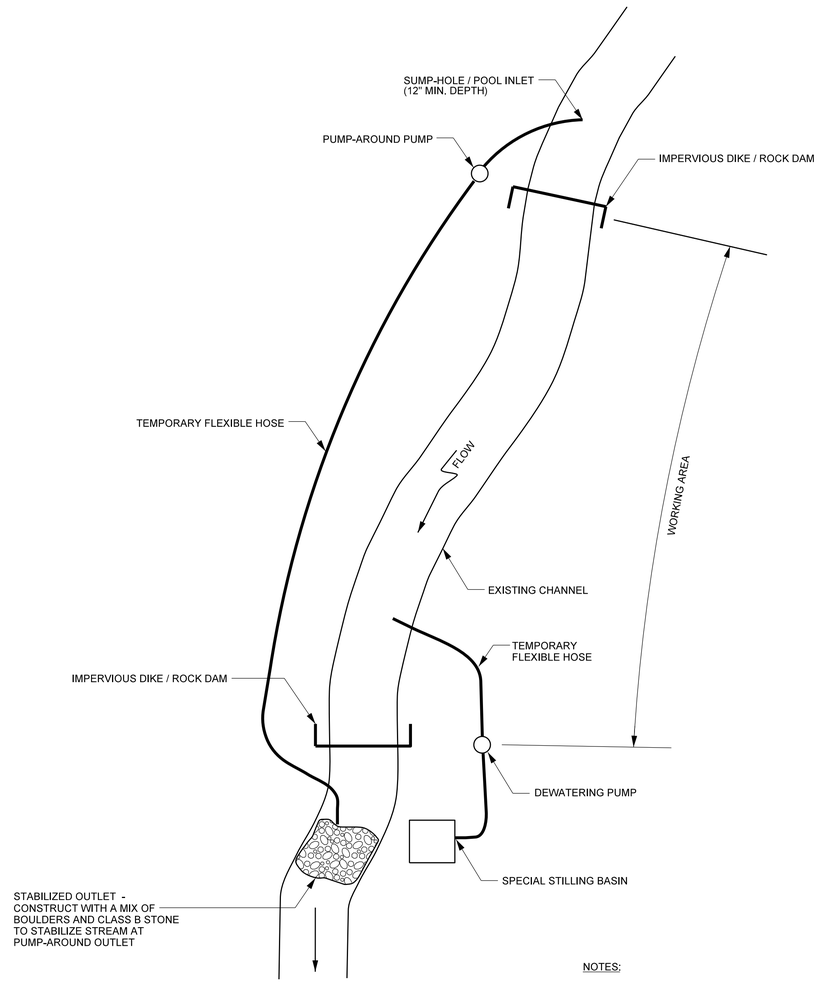
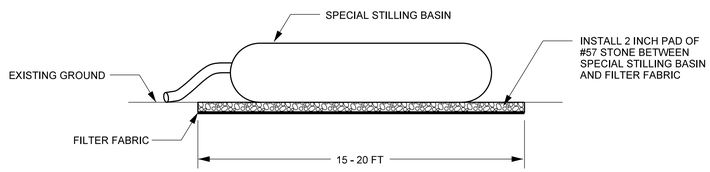
TYPICAL PUMP-AROUND OPERATION



NOTES:

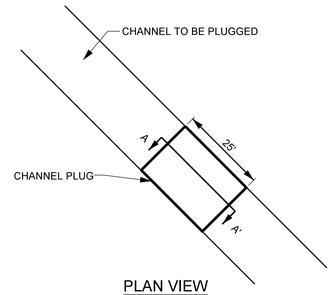
1. EXCAVATION SHALL BE PERFORMED IN ONLY DRY SECTIONS OF CHANNEL.
2. IMPERVIOUS DIKES SHOULD BE USED TO ISOLATE WORK AREAS FROM STREAM FLOW.
3. THE CONTRACTOR SHALL NOT DISTURB MORE AREA THAN CAN BE STABILIZED IN ONE WORKING DAY.
4. THE PUMP-AROUND PUMP SHOULD ADEQUATELY CONVEY 1 CFS (450 GALLONS PER MINUTE).



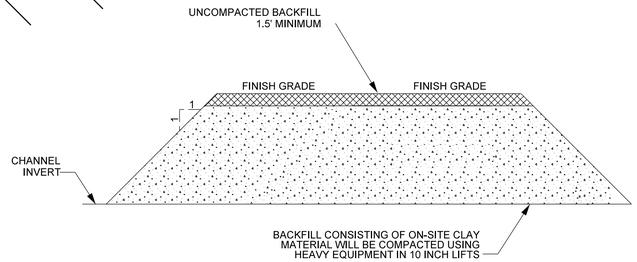
SEQUENCE OF CONSTRUCTION FOR TYPICAL PUMP AROUND

1. INSTALL STABILIZED OUTLET AT THE DOWNSTREAM END OF THE DESIGNATED PROJECT WORKING AREA.
2. THE CONTRACTOR WILL INSTALL THE PUMP AROUND PUMP AND THE TEMPORARY FLEXIBLE HOSE THAT WILL CONVEY THE BASE FLOW FROM UPSTREAM OF THE WORK SITE TO THE SPECIAL STILLING BASIN OR STABILIZED OUTLET.
3. INSTALL UPSTREAM IMPERVIOUS DIKE AND BEGIN PUMPING OPERATIONS FOR STREAM DIVERSION.
4. INSTALL THE DOWNSTREAM IMPERVIOUS DIKE AND PUMPING APPARATUS IF NEEDED TO DEWATER THE ENTRAPPED AREA. THE PUMP AND HOSE FOR THIS PURPOSE SHALL BE OF SUFFICIENT SIZE TO DEWATER THE WORK AREA. THIS WATER WILL FLOW INTO A SPECIAL STILLING BASIN.
5. THE CONTRACTOR WILL PERFORM STREAM RESTORATION WORK IN ACCORDANCE WITH THE PLAN AND FOLLOWING THE GENERAL CONSTRUCTION SEQUENCE.
6. THE CONTRACTOR WILL EXCAVATE ANY ACCUMULATED SILT AND DEWATER BEFORE REMOVAL OF THE IMPERVIOUS DIKE. REMOVE IMPERVIOUS DIKES, PUMPS, AND TEMPORARY FLEXIBLE HOSE STARTING WITH THE DOWNSTREAM DIKE FIRST.
7. THE CONTRACTOR WILL COMPLETE ALL GRADING AND STABILIZATION IN ONE DAY WITHIN THE PUMP AROUND AREA BETWEEN THE IMPERVIOUS DIKES.
8. ONCE THE WORKING AREA IS COMPLETED, REMOVE THE SPECIAL STILLING BASIN AND STABILIZED OUTLET AND STABILIZE DISTURBED AREAS WITH SEED AND MULCH.

CHANNEL PLUG



PLAN VIEW



NOTE:
1. BACKFILL CONSISTING OF ON-SITE CLAY MATERIAL WILL BE COMPACTED USING HEAVY EQUIPMENT IN 10 INCH LIFTS.
2. THE REMAINDER OF THE EXISTING CHANNEL TO BE PLUGGED WILL BE COMPLETED FILLED TO THE NEW TOP-OF-BANK ELEVATION.

PROJECT REFERENCE NO.	SHEET NO.
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PROJECT ENGINEER

PROGRESS DRAWING
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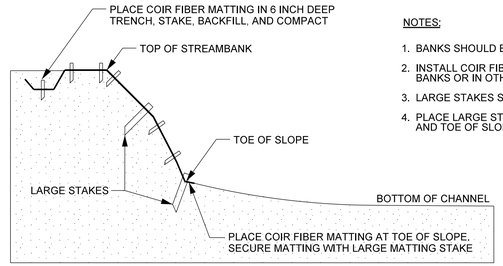
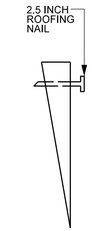
COIR FIBER MATTING



CROSS SECTION VIEW

NOTES:

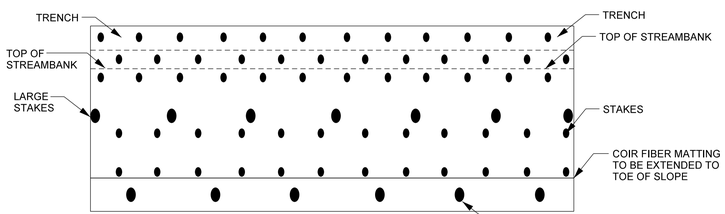
1. BANKS SHOULD BE SEEDED PRIOR TO PLACEMENT OF MATTING.
2. INSTALL COIR FIBER MATTING PER SPECIFICATIONS ALONG STREAM BANKS OR IN OTHERS LOCATIONS SPECIFIED BY ENGINEER.
3. LARGE STAKES SHOULD NOT BE SPACED FURTHER THAN 36" APART.
4. PLACE LARGE STAKES ALONG ALL SEAMS, IN THE CENTER OF BANK, AND TOE OF SLOPE.



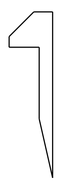
TYPICAL LARGE MATTING STAKE

THE WOOD STAKE SHALL HAVE THE FOLLOWING DIMENSIONS:

LEG LENGTH	17.00 IN (43.18 CM) (TAPERED TO POINT)
WIDTH	1.5 IN (3.81 CM)
THICKNESS	1.5 IN (3.81 CM)



PLAN VIEW



TYPICAL SMALL MATTING STAKE

THE WOOD STAKE SHALL HAVE THE FOLLOWING DIMENSIONS:

LEG LENGTH	11.00 IN (27.94 CM)
HEAD WIDTH	1.25 IN (3.18 CM)
HEAD THICKNESS	0.40 IN (1.02 CM)
LEG WIDTH	0.60 IN (1.52 CM) (TAPERED TO POINT)
LEG THICKNESS	0.40 IN (1.02 CM)
TOTAL LENGTH	12.00 IN (30.48 CM)

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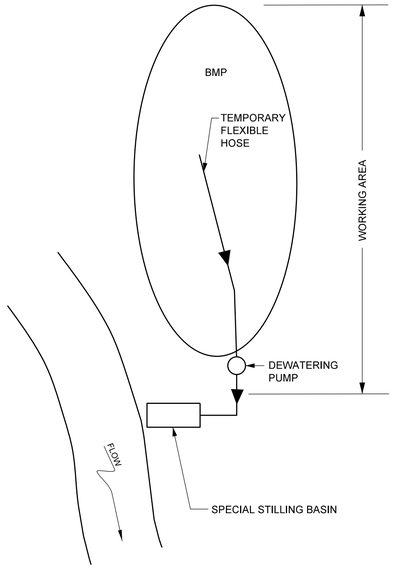
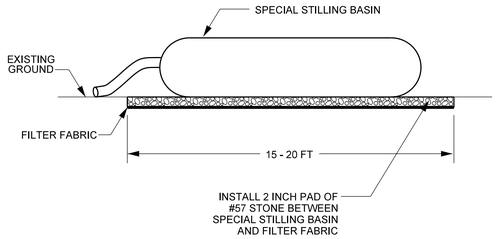
DEWATERING PUMP



SPECIAL STILLING BASIN



1. INSTALL SPECIAL SILLING BASIN OUTSIDE OF THE DESIGNATED PROJECT WORKING AREA.
2. THE CONTRACTOR WILL INSTALL THE DEWATERING PUMP AND THE TEMPORARY FLEXIBLE HOSE THAT WILL CONVEY THE WATER IN THE BMP TO THE SPECIAL STILLING BASIN OR STABILIZED OUTLET.
3. THE CONTRACTOR WILL PERFORM WORK IN ACCORDANCE WITH THE PLAN AND FOLLOWING THE GENERAL CONSTRUCTION SEQUENCE.
4. THE CONTRACTOR WILL EXCAVATE ANY ACCUMULATED SILT, REMOVE PUMPS, AND TEMPORARY FLEXIBLE HOSE.
5. ONCE THE WORKING AREA IS COMPLETED, REMOVE THE SPECIAL STILLING BASIN AND STABILIZE DISTURBED AREAS WITH SEED AND MULCH.

SEQUENCE OF CONSTRUCTION FOR DEWATERING PUMP

1. WHEN NECESSARY, INSTALL THE PUMPING APPARATUS TO DEWATER THE BMP WORK AREA. THE PUMP AND HOSE SHALL BE OF SUFFICIENT SIZE TO DEWATER THE BMP WITHIN 24 HOURS. THE WATER SHALL BE PUMPED FROM THE BMP TO THE SPECIAL STILLING BASIN.
2. THE CONTRACTOR MAY THEN FINISH GRADE AND PLANT THE BMP IN ACCORDANCE WITH THE PLAN AND THE GENERAL CONSTRUCTION SEQUENCE.
3. ONCE GRADING AND PLANTING ARE COMPLETE, REMOVE PUMP AND HOSE.
4. STABILIZE DISTURBED AREAS WITH TEMPORARY SEED AND MULCH.

TEMPORARY SEEDING SELECTION AND APPLICATION RATES				
Common Name	**Scientific Name**	**Application Time**	**Application Rate**	**Total (lbs/acre)**
Cereal rye	*Secale cereale*	Sept - March	3 lb/1,000 sq ft.	130 lbs/acre
Browntop millet	*Panicum ramosum*	April - Aug	1 lb/1,000 sq ft.	44 lbs/acre

TEMPORARY STABILIZATION TIMEFRAMES		
SITE AREA DESCRIPTION	STABILIZATION	TIME FRAME EXCEPTIONS
PERIMITER DIKES, SWALE, DITCHES AND SLOPES	7 DAYS	NONE
HIGH QUALITY WATER (HQW) ZONES	7 DAYS	NONE
SLOPES STEEPER THAN 3:1	7 DAYS	If slopes are 10' or less in length and are not steeper than 2:1, 14 days are allowed.
SLOPES 3:1 OR FLATTER	14 DAYS	7 days for slopes greater than 50' in length
ALL OTHER AREAS WITH SLOPES FLATTER THAN 4:1	14 DAYS	None, except for perimeters and HQW Zones
* ALL CHANNEL WORK MUST BE STABILIZED DAILY		

PROJECT REFERENCE NO.	SHEET NO.
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PROJECT ENGINEER

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STATE OF NORTH CAROLINA
DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
RALEIGH, N.C.
1-12

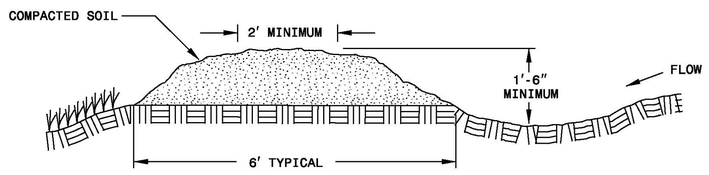
ENGLISH STANDARD DRAWING FOR
TEMPORARY DIVERSION

SHEET 1 OF 1
1630.05

NOTES

EXCAVATE TEMPORARY DIVERSION WITH NON-VERTICAL SIDE SLOPES AND NOT GREATER THAN 1.5:1 SLOPE.

SEED BERM CREATED BY COMPACTED SOIL AS DIRECTED.



CROSS SECTIONAL VIEW

STATE OF NORTH CAROLINA
DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
RALEIGH, N.C.
1-12

ENGLISH STANDARD DRAWING FOR
TEMPORARY DIVERSION

SHEET 1 OF 1
1630.05

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BAKER PROJECT REFERENCE NO.	SHEET NO.
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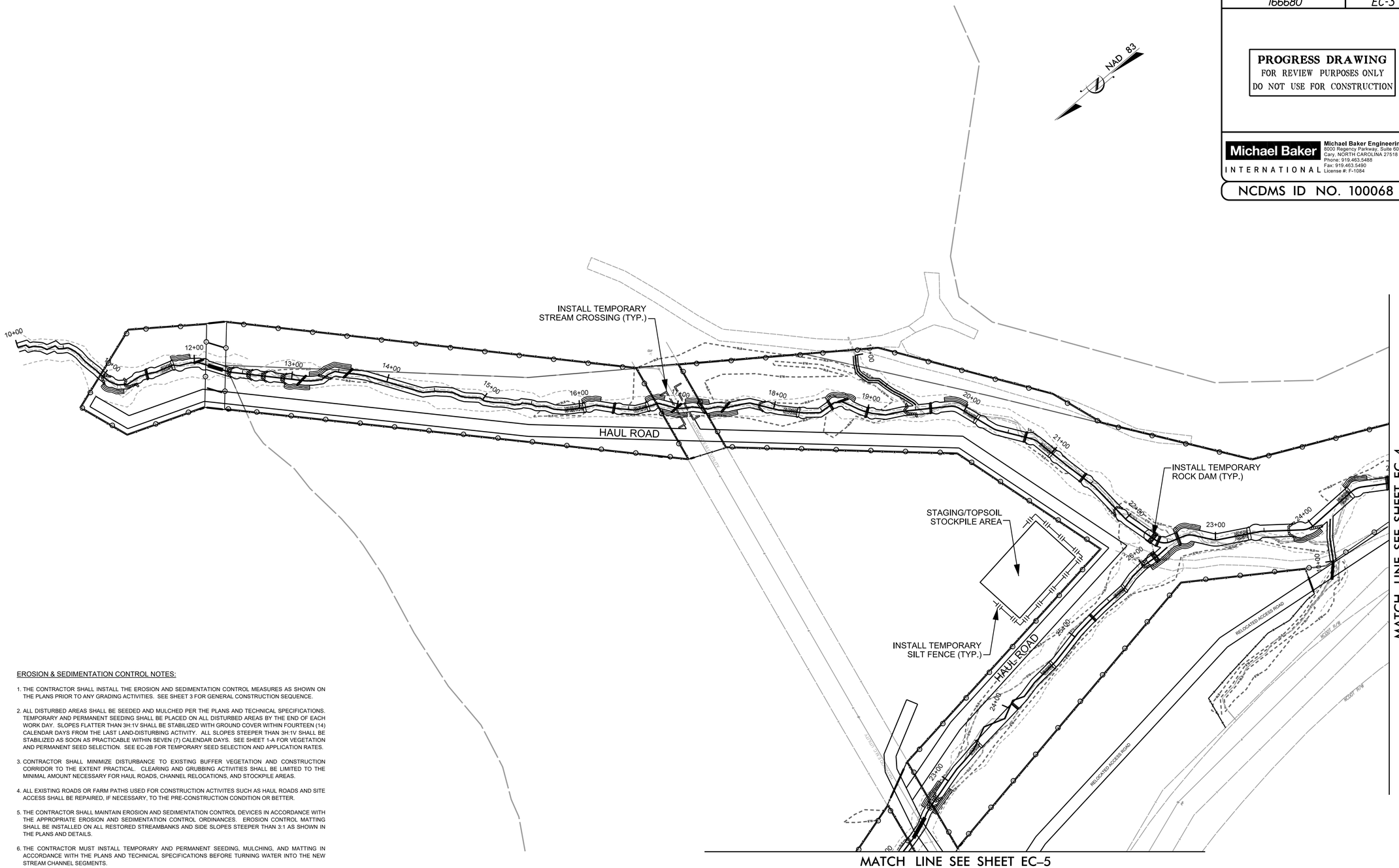

EROSION & SEDIMENTATION CONTROL NOTES:

1. THE CONTRACTOR SHALL INSTALL THE EROSION AND SEDIMENTATION CONTROL MEASURES AS SHOWN ON THE PLANS PRIOR TO ANY GRADING ACTIVITIES. SEE SHEET 3 FOR GENERAL CONSTRUCTION SEQUENCE.
2. ALL DISTURBED AREAS SHALL BE SEEDED AND MULCHED PER THE PLANS AND TECHNICAL SPECIFICATIONS. TEMPORARY AND PERMANENT SEEDING SHALL BE PLACED ON ALL DISTURBED AREAS BY THE END OF EACH WORK DAY. SLOPES FLATTER THAN 3H:1V SHALL BE STABILIZED WITH GROUND COVER WITHIN FOURTEEN (14) CALENDAR DAYS FROM THE LAST LAND-DISTURBING ACTIVITY. ALL SLOPES STEEPER THAN 3H:1V SHALL BE STABILIZED AS SOON AS PRACTICABLE WITHIN SEVEN (7) CALENDAR DAYS. SEE SHEET 1-A FOR VEGETATION AND PERMANENT SEED SELECTION. SEE EC-2B FOR TEMPORARY SEED SELECTION AND APPLICATION RATES.
3. CONTRACTOR SHALL MINIMIZE DISTURBANCE TO EXISTING BUFFER VEGETATION AND CONSTRUCTION CORRIDOR TO THE EXTENT PRACTICAL. CLEARING AND GRUBBING ACTIVITIES SHALL BE LIMITED TO THE MINIMAL AMOUNT NECESSARY FOR HAUL ROADS, CHANNEL RELOCATIONS, AND STOCKPILE AREAS.
4. ALL EXISTING ROADS OR FARM PATHS USED FOR CONSTRUCTION ACTIVITES SUCH AS HAUL ROADS AND SITE ACCESS SHALL BE REPAIRED, IF NECESSARY, TO THE PRE-CONSTRUCTION CONDITION OR BETTER.
5. THE CONTRACTOR SHALL MAINTAIN EROSION AND SEDIMENTATION CONTROL DEVICES IN ACCORDANCE WITH THE APPROPRIATE EROSION AND SEDIMENTATION CONTROL ORDINANCES. EROSION CONTROL MATTING SHALL BE INSTALLED ON ALL RESTORED STREAMBANKS AND SIDE SLOPES STEEPER THAN 3:1 AS SHOWN IN THE PLANS AND DETAILS.
6. THE CONTRACTOR MUST INSTALL TEMPORARY AND PERMANENT SEEDING, MULCHING, AND MATTING IN ACCORDANCE WITH THE PLANS AND TECHNICAL SPECIFICATIONS BEFORE TURNING WATER INTO THE NEW STREAM CHANNEL SEGMENTS.
7. THE CONTRACTOR SHALL WORK IN THE DRY AND UTILIZE A PUMP-AROUND OPERATION OR FLOW DIVERSION MEASURE AS SHOWN ON THE PLAN SHEETS.
8. THE ENGINEER MUST APPROVE ALL GRADING ACTIVITIES AND GROUNDCOVER STABILIZATION PRIOR TO RIPARIAN VEGETATION PLANTING.
9. ROCK DAMS SHALL BE INSTALLED BELOW ACTIVE WORK AS NEEDED TO UTILIZE PUMP AROUND OPERATION.
10. EXISTING CULVERTED CROSSING SHALL BE UTILIZED TO CROSS THE STREAM CHANNEL UNTIL SUCH TIME THAT NEW PERMANENT STREAM CROSSINGS HAVE BEEN INSTALLED AS APPLICABLE.

UT to RUSH FORK
EROSION & SEDIMENTATION CONTROL PLAN

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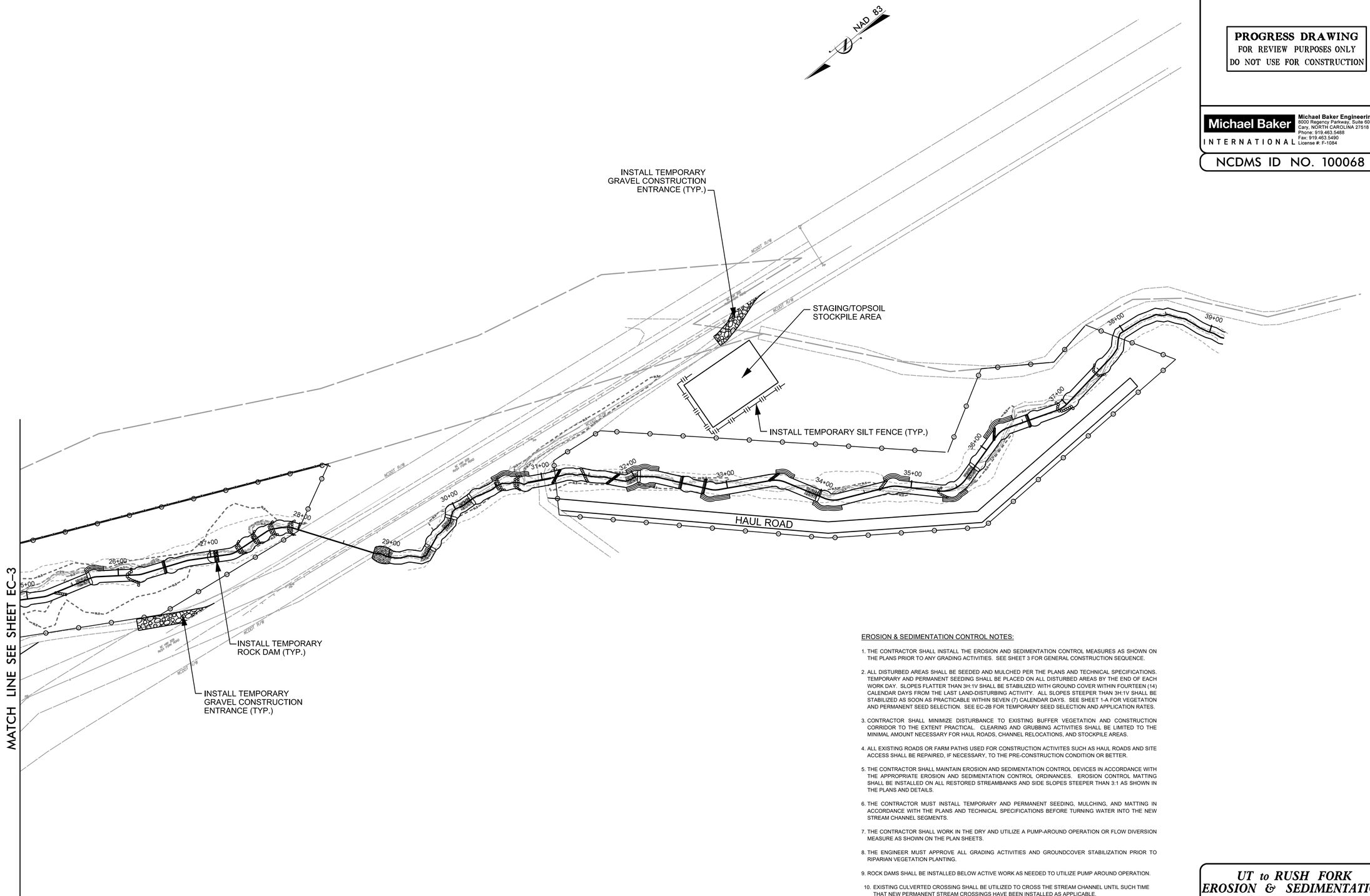

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UT to RUSH FORK EROSION & SEDIMENTATION CONTROL PLAN

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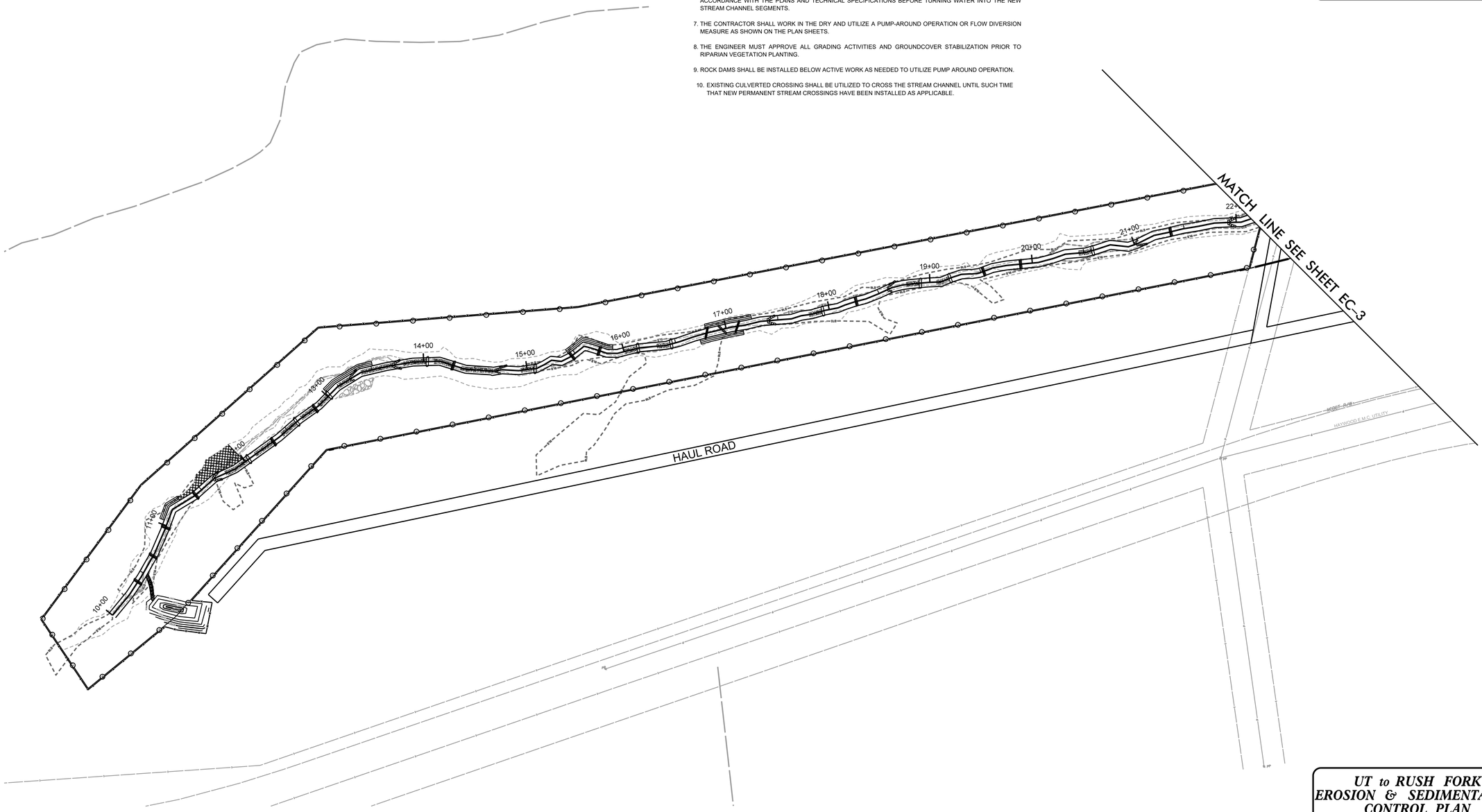

UT to RUSH FORK
EROSION & SEDIMENTATION CONTROL PLAN

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