Mitigation Plan – FINAL
Whittier Creek Site – Option D Mitigation Project

Surry County, North Carolina

Yadkin River Basin: 03040101-110040

DMS Project ID No. 100020, DEQ Contract No. 7182, DEQ RFP #16-006993

USACE Action ID No. SAW-2017-01503

Prepared for:

NC Department of Environmental Quality (DEQ)
NC Division of Mitigation Services (DMS)
1652 Mail Service Center
Raleigh, North Carolina 27699-1652

March 2020

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

REPLY TO
ATTENTION OF:

January 8, 2020

Regulatory Division

Re: NCIRT Review and USACE Approval of the NCDMS Whittier Creek Mitigation Site / Surry Co./ SAW-2017-01503/ NCDMS Project # 100020

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 Whittier Creek Draft Mitigation Plan, which closed on November 30, 2019. These comments are attached for your review.

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

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

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

Sincerely,

Kim Browning
Mitigation Project Manager
for Tyler Crumbley

Enclosures

Electronic Copies Furnished:

NCIRT Distribution List
Matthew Reid, Paul Wiesner– NCDMS
Scott King—Michael Baker Engineering

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

REPLY TO
ATTENTION OF:

CESAW-RG/Browning December 23, 2019

MEMORANDUM FOR RECORD

SUBJECT: Whittier Creek Mitigation Site - NCIRT Comments during 30-day Mitigation Plan Review

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

NCDMS Project Name: Whittier Creek Mitigation Site, Surry County, NC

USACE AID#: SAW-2017-01503
NCDMS #: 100020
30-Day Comment Deadline: November 28, 2019

DWR Comments, Mac Haupt & Erin Davis:

1. Page 3-3, Section 3.1.1 - DWR would like to see the NCSAM and NCWAM scores included in Tables 3.2 and 3.3 and/or a brief discussion in of the assessment results.
2. Page 4-1, Section 4 – What available planning documents were reviewed and/or local and state agencies consulted for potential future land development projects in the surrounding area?
3. Page 4-1, Section 4.1
   a. Are there any anticipated NCDOT roadway or culvert upgrades planned for Rock Hill Church Road? What are the existing conditions of the culvert structures?
   b. In order to reduce site fragmentation, can the proposed crossings on UT4 and UT5 be relocated to the top of reaches near the roadway? Has outreach to the utility provider been completed?
4. Page 6-5, Section 6.2 Reach R7 - Since establishment of vegetative cover and vigor can be a challenge on Priority II restoration banks/benches, please include a discussion on how the soil restoration will be addressed during construction and reference potential adaptive management.
5. Page 6-16, Section 6.5.2 – As per the 2016 Mitigation Update Guidance, planting should be completed by March 15th.
6. Page 6-17, Table 6.7
   a. DWR requests capping the proposed percentage of green ash (*Fraxinus pennsylvanica*) to be planted at 5% since emerald ash borer (*Agrilus planipennis*) has been detected in Surry county and has the potential to impact long-term tree density and canopy cover.
   b. Since black walnut is allelopathic, DWR would not recommend including it on the planting list. Based on the target community, have species of elm, oak or hickory been considered?
7. Page 7-1, Section 7.1.1
   a. Bankfull events should be documented on each reach, not only Reach R7.

b. Reach UT5 was identified in Table 3.1 as a perennial stream and as such the 30-day consecutive flow requirement does not apply since continuous flow is expected (in a typical weather year).

8. Page 8-3, Section 7.2
   a. DWR does not support early termination of the vegetation monitoring period.
   b. Rather than exclude willow oak and persimmon from the vigor performance standard, DWR recommends use of the mountain counties height thresholds of 6 feet in year 5 and 8 feet in year 7 (2016 Mitigation Update Guidance).
9. Page 8-4, Table 8.1
   a. Please note that bankfull events are to occur in separate years.
   b. Table 5.1 lists cross sectional surveys as the monitoring measurement tool for aquatic habitat. Please confirm and make tables consistent.
   c. Please include the vegetation vigor performance standard.
   d. Note that only volunteer species that are included on the approved mitigation plan plant list may count toward the vegetation performance standard.
10. Page 8-6, Table 8.2
   a. DWR recommends quarterly inspection of stage recorders and flow gauges to reduce the risk of data loss due to instrument malfunction.
   b. DWR recommends treating invasives at a minimum annually rather than a “case-by-case” basis.
   c. Please also include visual monitoring photo locations at proposed crossings.
11. Page 11-1, Table 11 – There’s a difference of 152 feet between restored and creditable stream footage for Reach R7. What is the stationing number start of the creditable stream footage? What is the proposed crossing width?
12. Figure 12 - Please show existing onsite wetlands on Figure 12, as well as future monitoring report figures.
13. Sheet 1A
   a. Please use consistent structure terms in the Stream Conventional Symbols and Details.
   b. General Note #7 states that six inches of topsoil will be placed on bankfull benches; however, Sheet 4-9 Note #6 states topsoil placement of at least eight inches. Please update for consistency.
14. Sheet 2A – Is the outlet protection detail being proposed for this project?
15. Sheet 2C – What species are anticipated to be transplanted onsite?
16. Sheet 2F
   a. DWR requests plugs be a minimum of 50 feet wide.
   b. Please include a channel fill detail. If partial ditch filling is proposed, please include a separate detail and indicate the maximum depth from top of bank to be filled.
17. Sheet 4
   a. Similar to DMS’ comment, DWR is concerned about the long-term stability of the first meander, particularly since the easement boundary bisects the meander.
   b. The Reach R7 easement break does not include a proposed ford or culvert structure. DWR has concerns about long-term stability of this stream segment without a reinforced/ protective crossing structure. If is ford will be proposed, please include a typical detail.
   c. DWR is concerned about potential impacts from livestock crossings if the easement break is not fenced.
18. Sheet 5 – As DMS noted, there is a large meander designed at the downstream end of UT4b as it enters R7. DWR is concerned about long-term bank stability at this confluence.
19. Sheet 7
   a. DWR recommends a 30-foot setback of the proposed easement from the road culvert to avoid potential future transportation encroachment requests.
   b. The UT4A utility easement break does not include a proposed ford or culvert crossing. DWR has concerns about long-term stability of this stream segment without a reinforced/protective

crossing structure. Additionally, will the proposed live stake installation be considered an access barrier by the utility provider?

20. Sheet 8 – The stream restoration design for UT4b and UT5 appears to impact wetlands W-B and W-D. In the final mitigation plan please describe how the site's total wetland area will be maintained and no net loss of wetland will be documented.
21. Sheet 15 & 16 – Section 6.5.2 notes the planting of adjacent wetland areas within the easement; however, the planting plan does not currently indicate wetland planting. Please update the planting plan to reflect wetland area planting.
22. Please include a fencing specific sheet showing existing and proposed fencing, as well as anticipated locations of gates for site access by regulatory and stewardship staff.
23. For future site submittals, please show the plan view and corresponding profile on the same design sheet.

USACE Comments, Kim Browning:

1. The correct USACE Action ID is SAW-2017-01503. Please correct the cover page.
2. Page 1-1: Please specify whether the 3,060 SMUs are cold, cool, or warm.
3. Please add a veg plot along UT4B, near the confluence with UT5, in the existing wetland area.
4. Section 4.1: Please specify if a culverted crossing will be installed in the powerline crossing on UT4A.
5. Section 6.5.2: Please add a description of how fescue will be treated.
6. Section 6.7: This section would benefit if it contained more details. Attached is an example of project risks and uncertainties. I'm not suggesting that all of these will potentially affect your project, but this is the type of detail requested.
7. Section 7.1.1: The four bankfull events in separate years must be documented on all reaches, not just R7. 30-days consecutive flow only applies to intermittent streams. Near continuous flow is expected on perennial streams.
8. Section 7.1.2: It may be beneficial to add a cross-section on UT5, north of the culvert crossing.
9. Section 7.1.2: Reach UT5 is described on page 6-9 as being a B-type channel. Please include a statement that the Entrenchment Ratio (ER) shall be no less than 1.4 for all measured riffle cross-sections on a given reach (for B channels). Please update Table 8.1 as well.
10. Section 7.1.3: Why are pattern measurements only being calculated on R7? It appears that meanders/pattern are proposed on UT4B.
11. Section 7.2: The vigor standard for mountain counties is 6' for monitoring year 5 and 8' for year 7. Since Table 6.7 indicates that Willow Oak and Persimmon will only account for 20% of the planted stems, so these species should be averaged into the plot data.
    a. Given that privet is heavy in some areas, please specify that invasive species will be treated so that they compose no more than 5% of the easement area.
    b. Vegetation monitoring must be conducted for 7 years. Please remove the statement regarding monitoring may be terminated by year 5.
    c. Individual plot data for volunteer species should be provided separately. Volunteers will only be counted if they're on the approved planting list, and are present for at least two growing seasons.
    d. Please add a statement that any single species can only account for up to 50% of the required number of stems within a veg plot, and stems in excess of 50% will not count towards success.
12. Table 8.1: The Outcome of Reestablish forested riparian buffers-- Volunteers will only be counted if they're on the approved planting list, and are present for at least two growing seasons.
13. Appendix E: Please include maintenance of the culvert crossings and the ford.

14. The approach proposed on UT4A indicates that bank shaping will occur on 25% of the reach, and some in-stream structures will be installed. Please add a statement regarding bedform diversity in order to justify the functional uplift and a credit ratio of 1.5:1. Considering there is a lot of sand and silt in this system, the addition of wood would be beneficial.
15. There is an existing wetland along UT5, south of the crossing. Will this entire wetland be within the easement? If not, will this area be fenced out from livestock to prevent them from wallowing in it and causing runoff into the easement?
16. The large meander on UT4B near the confluence with R7 is concerning. I understand the reason for the tie-in at the riffle, but that much sinuosity in a flat area may cause overbank flow during heavy rain events, and may form a more direct approach towards R7.
17. When submitting the PCN, please include an estimate of the number of trees, or acres, to be cleared for the NLEB 4(d) Rule.

Kim Browning
Mitigation Project Manager
Regulatory Division

Michael Baker
INTERNATIONAL

Michael Baker Engineering, Inc.
8000 Regency Parkway, Ste. 600 | Cary, North Carolina 27518
Office: 919.463.5488 | Fax: 919.463.5490

March 3, 2020

Kimberly Browning, Mitigation Project Manager
US Army Corps of Engineers – Wilmington District
69 Darlington Ave
Wilmington, NC 28403-1343

Subject: Response to NCIRT Comments on Whittier Creek Mitigation Plan Review (dated 12/23/19)
Whittier Creek Mitigation Site, Surry County, NC (Yadkin River Basin: 03040101)
USACE AID# SAW-2017-01503, DMS Project #100020, DEQ Contract #7182

Ms. Browning:

Please find enclosed our responses to the NC Interagency Review Team (NCIRT) Mitigation Plan Review comments dated December 23, 2019 in reference to the Whittier Creek – Option D project site. We have revised the Draft document in response to the referenced review comments as outlined below.

DWR Comments, Mac Haupt & Erin Davis:

1. Page 3-3, Section 3.1.1 - DWR would like to see the NCSAM and NCWAM scores included in Tables 3.2 and 3.3 and/or a brief discussion in of the assessment results.
   Response: Baker added the NCSAM and NCWAM ratings in Tables 3.2 and 3.3 and provided a brief mention of the scores in the relevant text sections.

2. Page 4-1, Section 4 – What available planning documents were reviewed and/or local and state agencies consulted for potential future land development projects in the surrounding area?
   Response: Baker reviewed all of the applicable planning documents available from DMS including the Upper Yadkin Pee-Dee River Basin Restoration Priorities (2009 revision), the Ararat River & Upper Yadkin Local Watershed Plan documents (2008), as well as DWR's 2008 Yadkin-Pee Dee River Basin Basinwide Water Quality Plan, and 2009 Integrated Analysis Report of Water Quality for the Ararat River Watershed. Specific future land development projects in the immediately surrounding area of the restoration site itself were not addressed.

3. Page 4-1, Section 4.1
   a. Are there any anticipated NCDOT roadway or culvert upgrades planned for Rock Hill Church Road? What are the existing conditions of the culvert structures?
   Response: Baker is unaware of any NCDOT upgrades planned for Rock Hill Church Rd. The existing culverts are in good condition with stable rock outlets and outfall pools. They are clearly *not* perched and are set fairly deep such that the bottoms of each culvert have some basic stream bed features with rock and sediment within them.

   b. In order to reduce site fragmentation, can the proposed crossings on UT4 and UT5 be relocated to the top of reaches near the roadway? Has outreach to the utility provider been completed?

Michael Baker
INTERNATIONAL

Michael Baker Engineering, Inc.
8000 Regency Parkway, Ste. 600 | Cary, North Carolina 27518
Office: 919.463.5488 | Fax: 919.463.5490

Response: The conservation easement has already been purchased, though from recent conversations with the IRT Baker understands the emphasis being placed on site fragmentation reduction and will work to reduce such easement breaks in the future.

3. Page 6-5, Section 6.2 Reach R7 - Since establishment of vegetative cover and vigor can be a challenge on Priority II restoration banks/benches, please include a discussion on how the soil restoration will be addressed during construction and reference potential adaptive management.
   Response: Baker is certainly aware of the particular challenges in establishing vegetation with this approach. The extent of benching and the especially good topsoil present on site will fortunately help with this effort as it will provide significantly greater topsoil (in both quantity and quality) than usual for placement onto new stream benches and banks. Extensive soil testing will be conducted on the deeper soil horizons where planting will ultimately occur after benching, and all recommended soil amendments will be put out at various stages during construction as appropriate. As requested, text discussion has been added to the report to elaborate on these measures.

4. Page 6-16, Section 6.5.2 – As per the 2016 Mitigation Update Guidance, planting should be completed by March 15th.
   Response: Baker has amended that section to state March 15th completion date.

5. Page 6-17, Table 6.7
   a. DWR requests capping the proposed percentage of green ash (*Fraxinus pennsylvanica*) to be planted at 5% since emerald ash borer (*Agrilus planipennis*) has been detected in Surry county and has the potential to impact long-term tree density and canopy cover.
   Response: Green ash will be reduced to 5% of the planted species as requested.

   b. Since black walnut is allelopathic, DWR would not recommend including it on the planting list. Based on the target community, have species of elm, oak or hickory been considered?
   Response: Baker is happy to add American elm (*Ulmus americana*) and overcup oak (*Quercus lyrata*) to the planted species list, but we have had very high mortality rates with bareroot planted hickories (a common observation we are told) and do not wish to plant them post-construction. However, we routinely plant potted hickories in appropriate locations on sites in later years as part of supplemental planting efforts. Also, as black walnut is list as being part of the plant community species and a few specimens are present in the existing vegetation, Baker still wishes to include it as a planted species at only 5% of the total.

6. Page 7-1, Section 7.1.1
   a. Bankfull events should be documented on each reach, not only Reach R7.
   Response: Text revised as requested.

   b. Reach UT5 was identified in Table 3.1 as a perennial stream and as such the 30-day consecutive flow requirement does not apply since continuous flow is expected (in a typical weather year).
   Response: The text was revised in this section as per the comment.

8. Page 8-3, Section 7.2
   a. DWR does not support early termination of the vegetation monitoring period.
   Response: Baker understands that DWR does not support early termination but wishes to keep the language in the document to allow for that option in the event that DWR changes their mind. The text

Michael Baker
INTERNATIONAL

Michael Baker Engineering, Inc.
8000 Regency Parkway, Ste. 600 | Cary, North Carolina 27518
Office: 919.463.5488 | Fax: 919.463.5490

only provides an opportunity for a potential request, which can be denied by any of the agencies at their discretion.

b. Rather than exclude willow oak and persimmon from the vigor performance standard, DWR recommends use of the mountain counties height thresholds of 6 feet in year 5 and 8 feet in year 7 (2016 Mitigation Update Guidance).
Response: Baker has revised this section to use the mountain county thresholds as recommended. However, we still maintain that any understory/shrub species planted would not be expected to obtain those heights and should be excluded from the average calculation. Baker also notes that the oaks and the persimmon are traditionally slower growing and would hope that a certain leniency might be applied to their height requirements in the future.

9. Page 8-4, Table 8.1
   a. Please note that bankfull events are to occur in separate years.
   Response: Revised as recommended.

   b. Table 5.1 lists cross sectional surveys as the monitoring measurement tool for aquatic habitat. Please confirm and make tables consistent.
   Response: Cross-sectional surveys will be used to monitor the stability of the newly created pools and riffles; to confirm that pools are maintaining an appropriate depth and that riffles are not aggrading with sediment and burying the rock or wood substrate (i.e. that each of these distinct habitat features are being properly maintained).

   c. Please include the vegetation vigor performance standard.
   Response: The mountain vegetation vigor performance standards have been added to the text in Section 7.2 and to Table 8.1.

   d. Note that only volunteer species that are included on the approved mitigation plan plant list may count toward the vegetation performance standard.
   Response: This statement was added to the text, though in previous conversations with the IRT it had been stated that other species might be also allowed at the IRT's discretion provided they were considered appropriate for the vegetative community.

10. Page 8-6, Table 8.2
    a. DWR recommends quarterly inspection of stage recorders and flow gauges to reduce the risk of data loss due to instrument malfunction.
    Response: Baker agrees and in practice routinely inspects and downloads all gauges during quarterly site walkovers.

    b. DWR recommends treating invasives at a minimum annually rather than a "case-by-case" basis.
    Response: Baker will inspect for invasives at every site visit and will treat annually and as needed.

    c. Please also include visual monitoring photo locations at proposed crossings.
    Response: Baker will include visual inspections and photos at all crossings.

Michael Baker
INTERNATIONAL

Michael Baker Engineering, Inc.
8000 Regency Parkway, Ste. 600 | Cary, North Carolina 27518
Office: 919.463.5488 | Fax: 919.463.5490

11. Page 11-1, Table 11 – There's a difference of 152 feet between restored and creditable stream footage for Reach R7. What is the stationing number start of the creditable stream footage? What is the proposed crossing width?
Response: While the restoration work on Reach R7 begins at the very top at Station 10+00, the credited stream section begins at the easement boundary at Station 11+39.62, while the crossing width is 12 ft. Thus, the 152 ft difference between restored and creditable lengths.

12. Figure 12 - Please show existing onsite wetlands on Figure 12, as well as future monitoring report figures.
Response: The existing wetlands have been added to Figure 12 and will be shown in future monitoring report figures.

13. Sheet 1A
a. Please use consistent structure terms in the Stream Conventional Symbols and Details.
Response: Baker has revised structure terms for consistency.

b. General Note #7 states that six inches of topsoil will be placed on bankfull benches; however, Sheet 4-9 Note #6 states topsoil placement of at least eight inches. Please update for consistency.
Response: Topsoil will be placed out onto benches at a depth of 8 inches. The 'General Notes' on Sheet 1A was revised accordingly.

14. Sheet 2A – Is the outlet protection detail being proposed for this project?
Response: There is an outlet protection structure located on lower Reach R7 at Station 23+00 at a point of concentrated runoff from the adjacent field.

15. Sheet 2C – What species are anticipated to be transplanted onsite?
Response: Tag alder is present in the small wooded pocket on upper Reach UT4B that Baker anticipates being able to transplant onsite.

16. Sheet 2F
a. DWR requests plugs be a minimum of 50 feet wide.
Response: The channel plugs are a minimum of 25 ft wide, as that is the width of the channel they are plugging, but are much wider in numerous locations on the project as appropriate. The plugs are located in the old channel at locations where the new alignment departs from the old channel alignment. But to be clear, the entire channel will be filled. Baker is confident that the channel plugs are appropriate as designed.

b. Please include a channel fill detail. If partial ditch filling is proposed, please include a separate detail and indicate the maximum depth from top of bank to be filled.
Response: Partial filling of the old channel is *not* being proposed here. It will be completely filled. A separate channel detail seems unnecessary and wouldn't show much useful information anyway, but an additional note has been added to the channel plug detail stating that the remainder of the channel will be completely filled. If this question is due to concern that deep pools are the design intention (as has been commented on during recent IRT meetings), that is not the case here.

Michael Baker
INTERNATIONAL

Michael Baker Engineering, Inc.
8000 Regency Parkway, Ste. 600 | Cary, North Carolina 27518
Office: 919.463.5488 | Fax: 919.463.5490

17. Sheet 4

a. Similar to DMS' comment, DWR is concerned about the long-term stability of the first meander [on R7], particularly since the easement boundary bisects the meander.
Response: The first meander at the top of Reach R7 is located in a transitional section and is being elongated to create a more gentle bend from its current sharp-angled alignment, and has significant benching being established on the right bank. The new sinuosity designed here is in line with that rest of this reach. This section also has rock cross vane at the top to hold grade and a log vane at the start of the bend, and the meander is being heavily planted with a geolift that will establish thick root mass. These are all being done outside the easement to create a more stable, start to the credited section of reach below. Baker is confident these stream features will stabilize and provide long-term benefit to the project downstream. And of course it will be monitored for 7 years, giving us time to make any adjustment to any issues that come up, but we believe we have designed a stable meander.

b. The Reach R7 easement break does not include a proposed ford or culvert structure. DWR has concerns about long-term stability of this stream segment without a reinforced/ protective crossing structure. If is ford will be proposed, please include a typical detail.
Response: Reach R7 is a sizeable stream and as such the riffle rock proposed here will contain a mix of rock sizes (including some Class I stone), which should be more than adequate for any potential cattle crossing located here. The landowners are not currently pasturing cattle in the field to northwest and the crossing was added in the event that they do and thus need to rotate them down to the southern pasture. The previously assumed crossing location for such a pasture rotation would have been at the top of R7 outside the easement (the area discussed in the previous comment), which is within a bend and not an ideal location for such activity. Baker will monitor this break for any instability and make adjustments accordingly.

c. DWR is concerned about potential impacts from livestock crossings if the easement break is not fenced.
Response: Reach R7 is a sizeable stream and any permanent fencing installed within the crossing is certain to be periodically destroyed during significant rain events. This is an unfortunate side effect of working on larger streams. Baker discussed this issue at length with the landowners and their family who operate the farm (one of whom is an NRCS agent in Wilkes County) and they much prefer to use temporary fencing for any future potential cattle crossings during pasture rotation efforts. Baker will make sure the easement break boundary is clearly marked for this use.

18. Sheet 5 – As DMS noted, there is a large meander designed at the downstream end of UT4b as it enters R7. DWR is concerned about long-term bank stability at this confluence.
Response: Baker acknowledges the concerns presented by reviewers but is confident that both the meander size and its alignment before and at the confluence with R7 is necessary to the long-term stability of the reach. As noted in the response to DMS, this meander falls on the cut floodplain of the new mainstem and crosses the existing old (very wide) channel where it will be filled. The outer (pool) bend of UT4b at Station ~20+25 has been aligned perpendicular to the old filled channel and will have a geo-lift structure installed for increased stability at this important location. The alignment of the channel relative to R7 prior to the confluence, as well as the riffle tie-in location were deliberate choices meant to increase stability of this confluence.

Michael Baker
INTERNATIONAL

Michael Baker Engineering, Inc.
8000 Regency Parkway, Ste. 600 | Cary, North Carolina 27518
Office: 919.463.5488 | Fax: 919.463.5490

19. Sheet 7

a. DWR recommends a 30-foot setback of the proposed easement from the road culvert to avoid potential future transportation encroachment requests.
Response: The conservation easement has already been purchased with the existing 15-foot setback from the road. Based on recent conversations with the IRT, Baker will work to include greater setbacks along roadways on future projects to help with DOT encroachment issues.

b. The UT4A utility easement break does not include a proposed ford or culvert crossing. DWR has concerns about long-term stability of this stream segment without a reinforced/protective crossing structure. Additionally, will the proposed live stake installation be considered an access barrier by the utility provider?
Response: The section of UT4A located along the utility easement break has a lot of exposed bedrock in the stream bed and should remain quite stable. Currently the stream banks here are fairly vegetated and stable and so there's no reason to believe that with deliberate effort we couldn't get them fully vegetated and stable after we excavate the bankfull bench. Baker has certainly established livestakes along streams within utility easements on other projects.

20. Sheet 8 – The stream restoration design for UT4b and UT5 appears to impact wetlands W-B and W-D. In the final mitigation plan please describe how the site's total wetland area will be maintained and no net loss of wetland will be documented.
Response: The project as a whole is certainly expected to significantly increase the total area of wetlands both from the raising of stream bed elevations in sections of Priority 1 restoration, and from the extensive bench cutting in sections of Priority 2 restoration. The two largest wetlands on the project, W-A and W-C, will have no permanent impacts to them, and all wetland areas not directly impacted from the new stream alignment are currently fescue pasture and will be planted and protected within the conservation easement.

The PCN will detail the exact extent and location of direct wetland impacts, but they'll be very minimal at around 1,061 ft^2 (or 0.02 ac). That includes W-D and the lower portion of W-B, both of which are located within the existing stream top-of-banks and appear to be old shallow stream benches that have been pulverized by cattle into muck. It seems entirely likely that with cattle exclusion alone these areas would naturally recover their form and likely lose JD features and their wetland status anyway.

21. Sheet 15 & 16 – Section 6.5.2 notes the planting of adjacent wetland areas within the easement; however, the planting plan does not currently indicate wetland planting. Please update the planting plan to reflect wetland area planting.
Response: Virtually all of the species in the planting list are entirely suitable for planting in these small floodplain wetlands (black walnut being the only exception), and the total planted portions of the wetlands are only about 3,000 ft^2 (0.07 acres). Thus, a separate planting plan seems unnecessary. However, in practice, Baker routinely plants a number of different species in niche habitat locations on projects during supplemental plantings during the monitoring years. For example: hickories, holly, and hazelnut in isolated higher/drier areas, or buttonbush, yellow-root, and sweetspire in low/wet areas.

22. Please include a fencing specific sheet showing existing and proposed fencing, as well as anticipated locations of gates for site access by regulatory and stewardship staff.
Response: The existing and proposed fencing is currently shown on the plan sheets. The existing fence (shown in gray) is old and in disrepair, and only exists in broken sections along R7 and no longer

Michael Baker
INTERNATIONAL

Michael Baker Engineering, Inc.
8000 Regency Parkway, Ste. 600 | Cary, North Carolina 27518
Office: 919.463.5488 | Fax: 919.463.5490

functions to exclude cattle from the stream. The proposed fence is shown in black. The location of installed gates will be clearly marked in the as-built plan sheets for future reference.

23. For future site submittals, please show the plan view and corresponding profile on the same design sheet.
Response: Baker will take that suggestion into consideration for future submittals.

USACE Comments, Kim Browning:

1. The correct USACE Action ID is SAW-2017-01503. Please correct the cover page.
Response: Cover page was corrected. Please be advised that the USACE JD documentation lists the project as Action ID SAW-2018-00849, which is where the incorrect number came from.

2. Page 1-1: Please specify whether the 3,060 SMUs are cold, cool, or warm.
Response: The text now states that the project provides cool stream credits, but note that the original RFP requested either warm or cool stream credits.

3. Please add a veg plot along UT4B, near the confluence with UT5, in the existing wetland area.
Response: The area of that particular wetland (a linear drain swale) is only 600 ft^2 and is actually smaller than a veg plot. However, temporary vegetation transects can easily be run here periodically, and a random vegetation plot can be placed in this area for one of the monitoring years. Text was also revised in Section 3.2.3 to specifically acknowledge visual vegetation monitoring will be conducted in all pre-construction JD wetlands.

4. Section 4.1: Please specify if a culverted crossing will be installed in the powerline crossing on UT4A
Response: As explained above in DWR Question 19b, no culvert will be installed at this location and the text was revised accordingly.

5. Section 6.5.2: Please add a description of how fescue will be treated.
Response: Fescue will be sprayed prior to or concurrent with construction, as appropriate. Text has been revised accordingly.

6. Section 6.7: This section would benefit if it contained more details. Attached is an example of project risks and uncertainties. I'm not suggesting that all of these will potentially affect your project, but this is the type of detail requested.
Response: This section has been expanded as requested, though it appears most of these potential risks and provider responses had been addressed in other sections of the report such as in the Maintenance Plan found in Appendix E.

7. Section 7.1.1: The four bankfull events in separate years must be documented on all reaches, not just R7. 30-days consecutive flow only applies to intermittent streams. Near continuous flow is expected on perennial streams.
Response: This section was revised as requested.

8. Section 7.1.2: It may be beneficial to add a cross-section on UT5, north of the culvert crossing.

Michael Baker
INTERNATIONAL

Michael Baker Engineering, Inc.
8000 Regency Parkway, Ste. 600 | Cary, North Carolina 27518
Office: 919.463.5488 | Fax: 919.463.5490

Response: Reach UT5 is a fairly small stream and Baker is confident that visual monitoring of this upper section will be adequate to confirm stability. Additional monitoring measures can be added should it prove necessary.

9. Section 7.1.2: Reach UT5 is described on page 6-9 as being a B-type channel. Please include a statement that the Entrenchment Ratio (ER) shall be no less than 1.4 for all measured riffle cross-sections on a given reach (for B channels). Please update Table 8.1 as well.
   Response: These sections were revised as requested.

10. Section 7.1.3: Why are pattern measurements only being calculated on R7? It appears that meanders/pattern are proposed on UT4B.
    Response: This was an oversight and the text was revised to include UT4b as well.

11. Section 7.2: The vigor standard for mountain counties is 6' for monitoring year 5 and 8' for year 7. Since Table 6.7 indicates that Willow Oak and Persimmon will only account for 20% of the planted stems, so these species should be averaged into the plot data. **Response: The revised species list now includes the addition of another slower growing tree (overcup oak), which when added with the willow oak and persimmon account for 25% of the planted species. Baker would consider that a significant enough portion of the overall planted stems that we would still request that they be removed from the height average assessment. The text was revised to simply acknowledge the slower growing species.**

    a. Given that privet is heavy in some areas, please specify that invasive species will be treated so that they compose no more than 5% of the easement area. **Response: Text revised as requested.**

    b. Vegetation monitoring must be conducted for 7 years. Please remove the statement regarding monitoring may be terminated by year 5. **Response: Baker opts to keep this statement here to provide the IRT with the potential future option to terminate early. It implies no obligation on anyone's part.**

    c. Individual plot data for volunteer species should be provided separately. Volunteers will only be counted if they're on the approved planting list, and are present for at least two growing seasons. **Response: The vegetation success tables provided in the monitoring reports do provide volunteer species data separately from the planted species. Text was revised to acknowledge the caveats for counting volunteers as well.**

    d. Please add a statement that any single species can only account for up to 50% of the required number of stems within a veg plot, and stems in excess of 50% will not count towards success. **Response: Text revised as requested.**

12. Table 8.1: The Outcome of Reestablish forested riparian buffers - Volunteers will only be counted if they're on the approved planting list, and are present for at least two growing seasons.
    Response: Table was revised.

13. Appendix E: Please include maintenance of the culvert crossings and the ford.
    Response: Text revised as requested within the 'Farm Road Crossing' section.

14. The approach proposed on UT4A indicates that bank shaping will occur on 25% of the reach, and some in-stream structures will be installed. Please add a statement regarding bedform diversity in order to justify the functional uplift and a credit ratio of 1.5:1. Considering there is a lot of sand and silt in this system, the addition of wood would be beneficial.

Michael Baker
INTERNATIONAL

Michael Baker Engineering, Inc.
8000 Regency Parkway, Ste. 600 | Cary, North Carolina 27518
Office: 919.463.5488 | Fax: 919.463.5490

Response: The discussion of the proposed enhancement of UT4a in Section 6.2 does mention the installation of in-stream structures for the purpose of improving bedform diversity through the promotion of pool formation. As the profile view for this reach shows, it's essentially one long riffle and the structures will provide for several deep pools. Additionally, Baker intends to incorporate woody debris in with the short sections of rock riffle to be built above the boulder step structures. This was used very effectively on other recent projects (most notably at Lochill Farm).

15. There is an existing wetland along UT5, south of the crossing. Will this entire wetland be within the easement? If not, will this area be fenced out from livestock to prevent them from wallowing in it and causing runoff into the easement?
Response: Only about a quarter of this wetland is located within the easement. The remainder will not be fenced, though this wetland area does not have standing water and livestock do no currently congregate there, so it seems unlikely they would do so post-construction. Further, there is no concentrated flow present from this wetland going into the adjacent stream and the restored buffer should act as a treatment feature for any diffuse runoff from the adjacent pasture.

16. The large meander on UT4B near the confluence with R7 is concerning. I understand the reason for the tie-in at the riffle, but that much sinuosity in a flat area may cause overbank flow during heavy rain events, and may form a more direct approach towards R7.
Response: Please see the response to similar question #18 from DWR above. But to your direct concern, during heavy rain events the dominant factor in any potential scouring or new channel formation would be the flooding from the much larger Reach R7. As such, the alignment of the meander on UT4B relative to both the old and new R7 channel locations provide it with improved stability compared to other potential design options here.

17. When submitting the PCN, please include an estimate of the number of trees, or acres, to be cleared for the NLEB 4(d) Rule.

Response: Baker will provide that estimate with the PCN submission (See Section F of the PCN Additional Information form).

This letter serves as the formal response to the NCIRT comments and shall be submitted in conjunction with the Final Mitigation Plan and the Pre-Construction Notification (PCN) for the Nationwide Permit (NWP) 27 application approval. If you any additional questions concerning the Final Mitigation Plan, please do not hesitate to contact me at 919-481-5731 or Scott.King@mbakerintl.com. As per DMS direction, we have included with this submittal two (2) full hardcopy sets of both the revised Final Mitigation Plan with IRT comments (including design plan sheets) and the completed PCN application, and will provide a full electronic copy via flash drive as well.

Sincerely,

Scott King, LSS, PWS
Project Manager

Stream Mitigation Plan – FINAL
Whittier Creek Site – Option D Mitigation Project

Surry County, North Carolina

Yadkin River Basin: 03040101-110040

DMS Project ID No. 100020, DEQ Contract No. 7182, DEQ RFP #16-006993

USACE Action ID No. SAW-2017-01503

Prepared for:

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

Prepared by:

Michael Baker
INTERNATIONAL

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.

March 2020

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1.0 PROJECT INTRODUCTION

The Whittier Creek Site – Option D Mitigation Project (project) is located on two abutting parcels of an active cattle farm in Surry County, North Carolina, approximately 7 miles east of the Town of Dobson in the Ararat community as shown on the Project Vicinity Map (Figure 1). To access the site from Raleigh, take Interstate I-40 West to Winston-Salem. Take Exit 206 for I-40 Business/US 421 N toward Kernersville/Winston-Salem Downtown. Continue to follow I-40 Business/US 421 N toward Kernersville/Winston-Salem Downtown 12.4 miles. Take Exit 6B. Merge onto NC-8 N/US-11N/US-52 N toward Mount Airy/Smith Reynolds/Airport. Continue to follow US-52 N for 25.1 miles. Take Exit 134 toward S Key Street. At the first traffic circle, take the 3rd exit onto S Key Street. At the next traffic circle, take the 1st exit onto NC-268 W/S Key Street. Continue to follow NC-268 W for 6.4 miles. Turn right onto Eldora Road. Follow Eldora Road for 0.6 miles and turn left onto Nurse Road. Follow Nurse Road for 1.8 miles and turn right onto Rock Hill Church Road. The project site will be located immediately on the right just past the intersection on Rock Hill Church Road. Coordinates for the center of the project are 36.3779 N Latitude, -80.5999 W Longitude.

The project area lies within the Yadkin River Basin, Hydrologic Unit Code (HUC) 03040101-110040 (named the Bull Creek - Ararat River Watershed), which is identified as a Targeted Local Watershed (TLW) in the NC Division of Mitigation Services'(DMS) 2009 *Upper Yadkin Pee-Dee River Basin Restoration Priorities* (RBRP) report (Figure 2). The project is also located in the Division of Water Resources' (DWR) Sub-basin 03-07-03. The project is located on the edge of the Piedmont Physiographic Region, within the Northern Inner Piedmont ecoregion. The project watershed drains into Whittier Creek, which flows into Bull Creek, then into the Ararat River, which ultimately empties into the Yadkin River, which is a major drinking water source for downstream communities, counties, and urban areas. Whittier Creek and its tributaries are classified by NCDWR as Class "C" waters (NCDWR, 2019).

The project will restore 3,073 linear feet (LF) of existing stream and enhance 328 LF of existing stream along a section of Whittier Creek and Unnamed Tributaries (UTs) to Whittier Creek in the Yadkin River Watershed.

Historic agricultural use on the project site has been predominantly cattle and crop production. These activities have negatively impacted both water quality and streambank stability along the project stream and its tributaries. The resulting observed stressors include excess nutrient input, streambank erosion, sedimentation, livestock access to streams, channel modification, and the loss of riparian buffers.

The outcomes of this project include:

- Establishment of geomorphically stable conditions along all project reaches,
- Address local water quality stressors by reducing nutrient and sediment inputs,
- Restoration of natural stream and floodplain interactions,
- Enhancement of riparian wetland functions,
- Restoration and protection of riparian buffer functions and corridor habitat,
- Improvement of in-stream aquatic habitat, and
- Establishment of a permanent conservation easement on the entire project.

The project is anticipated to generate a total of 3,060 cool stream mitigation credits (contracted for 3,000) and the site will be protected by a 6.97-acre permanent conservation easement (Appendix B).

2.0 WATERSHED APPROACH AND SITE SELECTION

The Whittier Creek Site – Option D Mitigation project is located in Surry County within the Bull Creek - Ararat River Watershed (03040101-110040) of the Yadkin River Basin (Figure 1), which is identified as a TLW (Figure 2) in DMS' 2009 *Upper Yadkin Pee-Dee RBRP*. The RBRP describes numerous aquatic stressors and habitat degradation from environmental conditions within the watershed, including: naturally erodible soils, erosion from land-disturbing activities (e.g. agriculture, logging, new home construction), excessive stormwater flow in urban and suburban areas, turbidity and fecal coliform violations from agriculture, and nonexistent or degraded riparian buffers along streams. The RBRP then outlines several primary watershed restoration goals to address these water quality stressors and habitat degradation. The Whittier Creek project will address three of these stated goals: the restoration of water quality and aquatic habitat in impaired stream segments; collaborative efforts with willing landowners to implement new stream, riparian buffer, and wetland restoration, enhancement, and preservation projects within TLWs; and the implementation of agricultural BMPs in order to limit inputs of sediment, nutrients and fecal coliform to streams from active farming operations.

Additionally, the project is located within one of the ten watersheds identified in DMS' Ararat-Pilot Mountain Local Watershed Plan (LWP). The 2013 Watershed Management Plan for the LWP identified five major stressors to watershed functions: excess sediment in streams, lack of riparian buffers, excess stormwater runoff, excess nutrient inputs, and fecal coliform bacteria. The report then provides a list of management recommendations for each stressor. This project will implement several of those recommendations, including: stream, buffer, and wetlands restoration/enhancement projects; implementation of agricultural BMPs (especially livestock exclusion); the restoration and enhancement of riparian buffer corridors; and the protection of headwater streams.

Thus, the Whittier Creek project will directly and/or indirectly address several of the priority stressors identified in the watershed planning documents discussed above, through the implementation of their recommended management practices. The project will reduce erosion and sedimentation by stabilizing eroding stream banks and reestablishing a floodplain to reduce scour pressure, will reduce nutrient and fecal coliform inputs through the exclusion of all livestock from the streams, will improve riparian buffer habitat with the establishment of a minimum 30-foot wide forested riparian corridor, and will enhance and preserve several wetland areas located within the floodplain. The entire project area will then be permanently protected through the establishment of a 6.97-acre conservation easement.

In addition, the protection and restoration of the Whittier Creek site will assist in providing a geographical connection with three existing DMS projects, several other designated conservation areas, and numerous NC Natural Heritage Program (NHP) Significant Natural Areas, including the biodiversity priority area Pilot Mountain State Park (Figure 3).

Therefore, the proposed project location aligns well with the overall goals and implementation needs outlined in DMS' RBRP and LWP planning documents.

3.0 BASELINE AND EXISTING CONDITIONS

The Whittier Creek Site – Option D Mitigation Project is located in the Ararat community near the Town of Dobson in Surry County, North Carolina, within the Upper Yadkin Pee-Dee 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 piped stream length.

Table 3.1. Project Attributes for Existing Conditions
Whittier Creek Site – Option D Mitigation Project – NCDMS Project No. 100020

Project Information				
Project Name	Whittier Creek Site – Option D Mitigation Project			
County	Surry			
Project Area (acres)	6.97			
Project Coordinates (latitude and longitude)	36.3779 N, -80.5999 W			
Project Watershed Summary Information				
Physiographic Province	Northern Inner Piedmont			
River Basin	Yadkin Pee-Dee			
USGS Hydrologic Unit 8-digit 03040101	USGS Hydrologic Unit 14-digit 03040101-110040			
DWR Sub-basin	03-07-03			
Project Drainage Area (acres)	1,722 acres / 2.69 square miles (at downstream end of R7)			
Project Drainage Area Percentage of Impervious Area	0.95% impervious area			
USGS National Land Cover Database (NLCD) for 2011	8.2% developed (predominantly rural residential), 41.6% cultivated crops and hay, 6.9% grass/pasture, 4.8% shrub/scrub, and 38.3% forested.			
Reach Summary Information				
Parameters	**Reach R7**	**UT4a**	**UT4b**	**UT5**
Existing length of reach (linear feet)	1,462	338	764	765
Valley confinement (Confined, moderately confined, unconfined)	Unconfined	Moderately Confined	Unconfined	Moderately Confined
Drainage area (acres)	1,722	225	305	72
Perennial, Intermittent, Ephemeral	Perennial	Perennial	Perennial	Perennial
NCDWR Water Quality Classification	C	C	C	C
Stream Classification (existing / proposed)	G4 & F4/C4	E4b/E4b	E4 & G4c/C4	B4 & E4b/C4b
Evolutionary trend (Simon)	IV – Degradation and Widening	III – Degradation	IV – Degradation and Widening	III – Degrading
FEMA classification	Zone X	Zone X	Zone X	Zone X
Regulatory Considerations				

Regulatory Considerations			
Parameters	**Applicable?**	**Resolved?**	**Supporting Docs?**
Water of the United States - Section 404	Yes	Yes	PCN
Water of the United States - Section 401	Yes	Yes	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
Notes:			

3.1 Watershed Processes and Resource Conditions

3.1.1 Landscape Characteristics

The Whittier Creek Site – Option D Mitigation Project (project) is located on an active cattle farm in Surry County within the Bull Creek – Ararat River watershed of the Yadkin River Basin. The project is situated on the edge of the Piedmont Physiographic Region, within the EPA's Level IV Ecoregion 45e: Northern Inner Piedmont ecoregion (Griffith et al., 2002). This ecoregion tends to have higher elevations, more rugged topography, and more monadnocks than other areas of the Piedmont. Vegetation is dominated with pine forests on old field sites and pine plantations and mixed oak forests in more natural/less disturbed areas. Unlike nearby Ecoregions 45b and 45c, this region tends to contain more Virginia Pine (*P. virginiana*) and Chestnut Oak (*Q. montana*) and fewer shortleaf pines (*P. echinata*). Streams in this region also tend to have higher gradients and contain many mountain-type macroinvertebrate species than those found in the outer Piedmont, with cobble and gravel substrates more commonly observed. Elevations vary dramatically across this region, from 360 feet in the eastern portion to 2,035 feet along the western boundary with the Blue Ridge mountains, though this project is located in roughly the middle of that range at an elevation of approximately 1,000 feet.

Field evaluations of intermittent/perennial stream status were conducted in the winter of 2016 and the spring of 2018. Wetland delineations were conducted on the site in April 2018. Results from these field reviews indicate that there are 3,329 linear feet of jurisdictional stream and approximately 0.153 acres of jurisdictional wetland located within the project boundary and surrounding vicinity. Wetlands are classified as either headwater forest or bottomland hardwood forest (NC Wetland Functional Assessment Team, 2010). Differences between the two types of classifications are the result of the first and second-order nature of their adjacent streams. Wetlands are located in the floodplain and/or along the toe of adjacent slopes. Further information on the jurisdictional features can be found in Section 3.2.3 and in Appendix H.

Field evaluations were based on the NCDWQ (now NCDWR) *Methodology for Identification of Intermittent and Perennial Streams and Their Origins (v 4.11)*, the *Corps of Engineers Wetlands Delineation Manual* (1987), and the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Eastern Mountains and Piedmont Region (v2.0)*. Project Reach R7 is denoted as solid "blue-line" stream on the USGS Topographic Map (Mount Airy South and Siloam Quadrangles). Due to the large drainage area and obvious perennial status, a stream form was not completed for this reach. Table 3.2 and 3.3 present the assessed stream and wetland classifications for the project. See Figure 4 for a depiction of the Jurisdictional Waters. Field assessments were confirmed by the USACE in the Preliminary JD received on 6/27/2018 (See Appendix H). Copies of the completed classification forms are in Appendix F.

Table 3.2. Summary of Field Investigations to Determine Intermittent/Perennial Status
Whittier Creek Site – Option D Mitigation Project – NCDMS Project No. 100020

Project Reach Designation	Existing Project Reach Length (ft)	NCDWR Stream Classification Score	NCSAM Rating	Watershed Drainage Area (acres) [1]	Stream Status Based on Field Analyses
R7	1,462	-	Medium	1,722	Perennial
UT4 (a & b)	1,102	38	Low	305	Perennial
UT5	765	34.5	Low	72	Perennial

Note [1]: 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 to Jurisdictional Wetlands
Whittier Creek Site – Option D Mitigation Project – NCDMS Project No. 100020

Project Wetland Designation	Existing Wetland Area		Classification		
	Total (ac)	Within Conservation Easement (ac)	NCWAM Classification	NCWAM Rating	Cowardin
W-A	0.068	0.016	Headwater Forest	Low	PEM1
W-B	0.041	0.039	Bottomland Hardwood Forest	Low	PEM1
W-C	0.039	0.029	Bottomland Hardwood Forest	Low	PEM1
W-D	0.006	0.006	Headwater Forest	Low	PEM1

(NC Wetland Functional Assessment Team, 2010 & FGDC, 2013)

Climatic Conditions

The Mt Airy 2W (Station ID 315890) weather station in Surry County is located approximately 11.5 miles northwest of project site. This Station lists the average annual rainfall for the surrounding area as 49.05 inches, based on data collected from 1998 – 2018 as shown below in Table 3.4 along with the monthly historic averages. This station, along with another nearby station (CoCoRaHS: NC-SR-2 – Dobson 2.3 SE) will be used to determine departures from normal rainfall amounts throughout the project. As reported in the Surry County Soil Survey, the growing season for the site is 200 days in length and begins on April 8 and ends on October 26, using the 50% probability data for a temperature of 28° F or higher (NRCS, 2007).

Table 3.4. Comparison of Monthly Rainfall Amounts for Project Site and Long-term Averages
Whittier Creek Site – Option D Mitigation Project – NCDMS Project No. 100020

Month-Year	Mount Airy Station Average Monthly Precipitation (in)	30% Probability Precipitation is less than (in)	30% Probability Precipitation is more than (in)
January	3.68	2.41	4.42
February	2.70	1.81	3.23
March	3.96	2.84	4.68
April	4.24	2.96	5.03
May	4.54	2.84	5.49
June	4.79	3.21	5.74
July	5.35	3.56	6.41
August	4.77	3.32	5.67
September	4.53	3.41	5.29
October	3.33	2.20	3.99
November	3.11	1.82	3.78

December	4.06	2.99	4.76
SUM	49.05	43.77	53.29

Geology and Soils

Geologically, the Whittier Creek Site is located within the Sauratown Mountain Anticlinorium of the Inner Piedmont Belt (NCGS, 1985) as shown in Figure 5. This inner belt is the most intensely deformed and metamorphosed portion of the Piedmont and contains highly metamorphic rock formations that have been bent and folded into synclines and anticlines, while the Sauratown Mountain Anticlinorium is a northeast-trending foliation arch composed of several smaller formations. The Whittier Creek site is underlain by a formation consisting of metagraywacke (biotite gneiss) interlayered and gradational with amphibolite and kyanite schist, along with minor ultramafic and granitic rock intrusions. Deeper below the site a banded gneiss formation can be found interlayered with calc-silicate rock, metaconglomerate, amphibolite, sillimanite-mica schist, and granitic rock.

The geology underlying a stream can influence its chemical composition, as a significant volume of stream discharge originates as groundwater, especially during periods of low precipitation. The groundwater originating from the biotite gneiss found beneath the Whittier Creek Site is generally expected to be slightly alkaline with moderate levels of dissolved solids from the minerals in the formation (Daniel and Dahlen, 2002).

The project site is located within the Felsic Crystalline Soil System of the Piedmont Soil Region of North Carolina (Daniels et al., 1999), formed primarily in residium saprolite from the underlying bedrock metamorphic or igneous parent materials. In this northwestern portion of the Piedmont, silty to clayey saprolite and micaceous-clay to silty-clay saprolite are commonly found from the weathered gneiss, schists, and amphibolite of the underlying bedrock. Topographically, broad gently sloping uplands are common in this region with moderately to steeply sloping areas with narrow convex ridges and steep valley slopes along branching, dendritic stream patterns. Finer-textured soils typically dominate the uplands, while more coarse-loamy soils are commonly found throughout the floodplains.

The specific soils located on the Whittier Creek Site as determined though the Natural Resources Conservation Service (NRCS) Soil Survey for Surry County are dominated by Colvard fine sandy loam (Typic Udifluvents) and Suches loam soils (Fluventic Dystrudepts) found throughout the floodplains of the project (Figure 7). Both of these are common series consisting of very deep, well drained soils more frequently found in the floodplains of the southern Appalachian Mountains, but certainly not unusual to be found in the far western portion of the Piedmont. Neither series is an NRCS-listed hydric soil for Surry County. The adjacent uplands are dominated by Fairview sandy clay loam soils (Typic Kanhapludults), another common series consisting of very deep, well drained soils frequently containing cobbles, found along the hills and ridges of the Piedmont uplands. Other upland soils found adjacent to the site include the Rhodhiss-Bannertown complex and the Toast-Bannertown complex. These soils are also deep, well drained loams or coarse sandy loams commonly found throughout the Piedmont uplands.

Visual inspections of the stream substrate materials were conducted for the entire site, while bed material sample collection and analysis was conducted along Reaches R7, UT4a, UT4b, and UT5 in the locations of surveyed cross sections. The project streams consist primarily of a mix of fine to medium sand to large cobble. The D50 values across the site range from 6.4 mm to 40.6 mm, with an average D50 of 24.4 mm, as explained in further detail in Section 6.4. Due to channelization and the resulting downcutting from headcut migration, Reach UT4a has bedrock knickpoint controlling the channel grade and defines the reach break at UT4b.

Topography

The general topography within the project's 2.69 square mile drainage area is typical of much of the western portion of the inner Piedmont. The surrounding terrain is rugged with steep hills and ridges overlooking fairly narrow stream valleys. The average elevation of the drainage area is 1,130 feet,

with a minimum elevation of 987 feet and a maximum elevation of 1,310 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 slope varies for each reach valley as R7 (Whittier Creek) is fairly gentle with a 0.6% slope, while the valley slopes for UT4a, UT4b, and UT5 are significantly steeper with 2.6%, 1.9% and 2.6% slopes respectively. The project area within the easement has a high-point elevation of 1,016 feet and a low-point elevation of 987 feet. Figures 10 and 11 depict the topography for the project site and the surrounding drainage area.

Existing Vegetation:

Vegetation on the project site itself has been heavily disturbed from years of use in agriculture. Currently the site is predominantly managed as cattle pasture and some cropland and largely consists of a range of typical pasture grasses (fescues and clovers) with scattered weeds and other common herbaceous species present such as bittercress (*Cardamine hirsute*), docks (*Rumex spp.*), common violet (*Viola sororia*), chickweed (*Stellaria media*), lyre sage (*Salvia lyrata*), plantains (*Plantago spp.*), and dandelions (*Taraxacum officiniale*), with soft rush (*Juncus effusus*) and jewelweed (*Impatiens capensis*) found in wetter areas. A very narrow buffer of trees is present along most of Reach R7 (Whittier Creek) and along a short section of Reach UT4b. The trees present on site consist primarily of chinaberry (*Melia azedarach*), Chinese privet (*Ligustrum sinense*), sycamore (*Platanus occidentalis*), green ash (*Fraxinus pennsylvanica*), black willow (*Salix nigra*), and tulip poplar (*Liriodendron tulipifera*), along with some scattered black walnut (*Juglans nigra*), persimmon (*Diospyros virginiana*), river birch (*Betula nigra*), red maple (*Acer rubrum*), red cedar (*Juniperus virginiana*), and black cherry (*Prunus serotina*). Blackberry (*Rubus spp.*), multi-flora rose (*Rosa multiflora*), and elderberry (*Sambucus canadensis*) are found scattered throughout the understory as well.

Looking farther out at the entire project drainage area, the existing vegetative community outside the cultivated agricultural land is dominated by Dry-Mesic Oak-Hickory Forest (Schafale and Weakley, 1990) comprised of a mixture of white oak (*Quercus alba*), northern red oak (*Quercus rubra*), black oak (*Quercus Velutina*), mockernut hickory (*Carya tomentosa*), red hickory (*Carya ovalis*), and pignut hickory (*Carya glabra*), with various pines (*Pinus spp.*), tulip poplar (*Liriodendron tulipifera*), and sweetgum (*Liquidambar styraciflua*) also found. Common understory species include Red maple (*Acer rubrum*), American Holly (*Ilex opaca*), Blackgum (*Nyssa sylvatica*), sourwood (*Oxydendrum arboreum*), and American beech (*Fagus grandifolia*), along with various *Viburnums* and *Vaccinium* shrub species. Along the warmer and drier south-facing slopes in the area, additional species may also be found, including post oak (*Quercus stellata*), Virginia pine (*Pinus virginiana*), shortleaf pine (*Pinus echinata*), white ash (*Fraxinus americana*), and red cedar (*Juniperus virginiana*).

Notable invasive species present on the site include Chinaberry (*Melia azedarach*), Chinese privet (*Ligustrum sinense*), and multi-flora rose (*Rosa multiflora*) found scattered along the banks and within the riparian buffers of the project streams.

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 included cattle production and row crops. 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, sedimentation, livestock access to streams, channel modification, and the loss of riparian buffers.

The USGS National Land Cover Database (NLCD) for 2011 shows that the entire 2.69 square mile (1,722 acres) project drainage area was 8.2% developed (with 0.95% being impervious surface), 41.6% cultivated crops and hay, 6.9% grass/pasture, 4.8% shrub/scrub, and 38.3% forested as shown in Figure

6. The 1992 NLCD data states that the area was 43.7% cultivated crops and hay, and 56.1% forested. The percentage of all developed land-use categories combined was rated as 2.5% in the 1992 evaluation. Thus, it appears that an increase in the clearing of forested land for development and agriculture occurred over that 19-year period. For comparison, the 2009 Upper Yadkin Pee-Dee RBRP describes the overall, Bull Creek – Ararat River watershed (16 square mile) as being similar with approximately 34% forested area and 44% in total agriculture, and 22% non-forested riparian areas. Thus, it appears that the greater watershed is similar to the project drainage area, but with increased development at the expense of forested land.

Historic aerial photographs from 1950, 1972, and 1993 were reviewed for the project and its surrounding area (Figures 9A, 9B, and 9C). They reveal a project area that has been cleared and streams that have been straightened with consistent agricultural land use activities dating back to the earliest photograph. The project area itself is readily identifiable in all historic aerials with little change over the past sixty-nine years, other than R7 trying to reestablish a sinuous pattern and slight conversion of various forested areas to individual agriculture fields. Based on these historical aerials, the lack of sinuosity, and the level of channel incision throughout much of stream, it is highly likely that Reach R7 (Whittier Creek) was channelized prior to 1950 and has lacked a wooded buffer since that time. The tributaries to Reach R7 have also been historically impacted. These impacts range from the removal of stream buffer, installation of culverts, and livestock impacts. These reaches have also likely been straitened and moved to the edge of the valley. While the percent of forested land within the watershed is decreasing and the percent of developed and agricultural lands are increasing, the watershed as a whole did not show any dramatic changes in overall land use since the earliest photo from 1950. It was, and remains, a predominantly rural area with slightly changing land uses over time.

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 is an active farm with approximately 14.3 acres of crop production and 19 acres of pasture. Livestock have unrestricted access to the entire length of UT5 and approximately 50% of both R7 and UT4b. The upstream extents of each of the project reaches begins at a North Carolina Department of Transportation culvert. Two overhead utility lines are located within the project area. One of them runs parallel to Nurse Road and crosses Reach R7 at the upstream extent. The other crosses UT4 at the reach break between UT4a and UT4b and then midway along UT5. However, their locations lie either outside the easement boundary or within easement breaks and should not affect the project.

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

3.1.3 Watershed Disturbance and Response

The watershed disturbances are described above and include the removal of wooded buffers, livestock impacts, channelization, ditching and installation of culverts. Whittier Creek (R7) has responded to these disturbances by becoming severely incised and is laterally eroding as well. UT4 and UT5 have also become unstable. The upstream extents of these reaches are not as incised as the downstream ends. However, they still exhibit active bank erosion. Streambanks are mostly vertical with large areas of scour and mass wasting exacerbated by cattle impacts. The lack of woody and deep rooting vegetation along project reaches have allowed for accelerated bank migration. The channel incision and associated decrease in overbank flooding frequency has likely resulted in a lowered water table.

The project reaches have been heavily impacted from historic land use practices, predominantly livestock production and other agricultural uses. Within the project area, all of the reaches have inadequate (less than 30 feet wide), low quality riparian buffers containing sparse, immature trees, and invasive species. Figure 4 shows the most recent aerial photography with clearly narrow and/or absent riparian buffers. Livestock hoof shear, lack of deep-rooted woody vegetation, and storm flow shear

stresses have severely impacted the stream banks along the project stream reaches. From visual inspections both on the ground and from aerial photography, many of the streams within this watershed are in a similar condition.

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 Whittier Creek Site – Option D Mitigation Project was approved by FHWA and NCDMS on February 5, 2018. The Cat-Ex summarized impacts to natural, cultural, and historical resources and documented coordination with stakeholders and federal and state agencies. All documentation for the Cat Ex is included in Appendix I.

3.2.2 FEMA Regulated Floodplain Compliance

The Whittier Creek Site – Option D Mitigation project is in FEMA Zone X as noted on the Surry County Flood Insurance Rate Map Panels 3710592600J and 3710592400J (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 of Executive Order 11990, the Clean Water Act, and subsequent federal regulations and guidance. The areas in the project boundaries that displayed one or more wetland characteristics were reviewed to determine the presence of wetlands. The wetland characteristics include the prevalence of hydrophytic vegetation, permanent to periodic inundation or saturation, and the presence of hydric soils.

Following a desktop review of the National Wetland Inventory (NWI), NRCS soil survey, and USGS quadrangle maps, the project area was evaluated in the field for the presence of jurisdictional features. Baker wetland scientists conducted field surveys of the project area on April 9, 2018 to investigate potential wetlands, while field surveys had previously been conducted on December 12, 2016 to confirm the perennial and intermittent status of jurisdictional streams in the project area. In total, the field surveys confirmed the jurisdictional status of the three project streams (four reaches), along with four separate jurisdictional wetland areas, which were subsequently flagged, surveyed, and mapped as shown in the documentation found in Appendix H. All wetland areas have had impacts to vegetation and are almost entirely devoid of trees, each scoring a 'Low' rating in NCWAM. These jurisdictional features were confirmed in the field by the USACE in May of 2018, and a Preliminary Jurisdictional Determination (PJD) letter was received on June 27, 2018. A copy of the PJD is provided in Appendix H, along with all the associated USACE wetland data forms. The NCDWR stream identification forms are provided in Appendix F.

The proposed mitigation design will enhance the identified jurisdictional wetlands areas through the restoration of a more natural flooding regime, planting native wetland vegetation, and by raising their water table. The design avoids or minimizes disturbance or impacts to the wetlands during project construction wherever possible. Wetland credit is not being sought for this project. Any ecological and/or hydrologic uplift to wetland features will be perceived solely as a positive outcome for the

overall project's success. Visual inspection of the pre-construction JD wetlands will be conducted throughout the monitoring period to evaluate the success of the re-establishment of vegetation. A copy of the Pre-Construction Notification (PCN) will also be provided with the Final Mitigation Plan.

4.0 FUNCTIONAL UPLIFT POTENTIAL

Current stream and watershed conditions within the project site as well as throughout the Whittier 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, and high amounts of sediment inputs from bank erosion.

The uplift for these project reaches will be achieved at the hydraulic and geomorphological functional levels. Hydraulic improvements will come from reintroducing bankfull flows to the historic floodplain through Priority I Restoration along UT4b and UT5, and by excavating a bankfull bench along R7 through a Priority II Restoration. Reestablishing floodplain connectivity will allow stream flows to access the floodprone area more frequently and return a hydraulic routing system through this stream corridor that will distribute flood flows through a broader area instead of within a confined channel. Geomorphological functional uplift will be achieved through channels sized to the bankfull flow, a planform and profile design emphasizing bedform variation with 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 rural area where agriculture is the primary land use. Substantial changes to the surrounding area are not expected. The watershed will experience minimal change in the future; therefore, the hydrology of the site will likely remain unchanged as well.

4.1 Project Constraints

The principle constraints to achieving 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 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 stream crossings and easement breaks. There are two power line easements that transect the project. One crosses at the downstream extent of UT4a and mid-way along UT5. Conservation easement breaks will be incorporated in these areas to allow for the exclusion of the power line easement. In order to minimize additional breaks in the conservation easement, a culverted crossing will be installed within the power line easement along UT5. 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. The crossing at UT4a is located in a section of stream with substantial bedrock present in the bed to help ensure long-term channel stability. The other power line easement crosses R7 in the upstream extent just below Nurse Road and will be also excluded from the conservation area. One ford crossing will be installed on R7 upstream of the confluence with UT4b to allow for cattle rotation between pastures. Though no credit is being sought for any of these breaks, restoration and enhancement measures will continue through these sections to ensure the long-term success of the project. No additional crossings or conservation easement breaks are proposed.

Existing NCDOT culverts are located at the head of R7, UT4a, and UT5. In order to maintain aquatic passage while allowing for the implementation of stabilization measures, Priority II transitions will be implemented to tie the proposed streambed elevations into the existing elevations as appropriate.

4.2 Functional Uplift Summary

Substantial functional uplift for the Whittier Creek Site – Option D 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 Whittier Creek Site 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 and 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
Whittier Creek Site – Option D Mitigation Project – NCDMS Project No. 100020

Goals	Objectives	Functional Level	Monitoring Measurement Tool
Reconnect stream reaches to their floodplains	To raise channel beds or excavate bankfull floodplains by utilizing either a Priority I Restoration approach, Priority II Restoration approach, or an Enhancement Level I approach.	Hydraulics	Flood Frequency
Improve stream stability	To construct streams of appropriate dimensions, pattern and profile in restored reaches, slope stream banks and provide bankfull benches on enhanced streams, 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, log vanes/weirs, root wads, 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 applicable streams from a reference database, regime equations, evaluation of monitoring results from numerous past projects, and best professional judgment. Evaluating data from previous reference reach surveys and the monitoring results from multiple NC Foothills 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 reference reaches from the NCDOT database. These reference reaches have successfully been used on similar stream restoration projects within the low mountains and foothills of North Carolina. 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.

The reference sites used for the design of this project are similar in landscape setting as the Whittier Creek Project site. As with the Whittier Creek site, both the Basin Creek and Big Branch sites are situated close to the border between the Piedmont and Blue Ridge ecoregions. More specifically, both Whittier Creek and Big Branch are located within the Northern Inner Piedmont ecoregion, while Basin Creek is within the Southern Crystalline Ridges and Mountains ecoregion of the Blue Ridge. The Basin Creek site is in neighboring Wilkes County and the Big Branch Site is in Surry County. These two reference sites were used to compare to the Baker Composite Reference Data in determining design criteria for reaches R7, UT4b, and UT5.

Table 6.1a Reference Reach Parameters Used to Inform Design
Whittier Creek Site – Option D Mitigation Project – NCDMS Project No. 100020

Parameter	Basin Creek		Big Branch		Baker Composite Reference Data	
	Min	Max	Min	Max	Min	Max
County	Wilkes		Surry			
Stream Type	C4		E4		C4	
Drainage Area – square miles	7.2		1.9			
Bankfull Width (w_{bkf}) – feet	29.5	36.9	19.3	21.5		
Bankfull Mean Depth (d_{bkf}) – feet	1.9	2.2	1.8	2.1		
Width/Depth Ratio (w/d ratio)	13.4	19.42	9.2	11.9	10.0	15.0
Cross sectional Area (A_{bkf}) – SF	64.9	71.9	39.6	39.9		
Bankfull Mean Velocity (v_{bkf}) - fps	5.5		N/P		3.5	5.0
Bankfull Discharge (Q_{bkf}) – cfs	375		N/P			
Bankfull Max Depth (d_{mbkf}) - feet	3.0	3.2	2.5	2.7		

Table 6.1a Reference Reach Parameters Used to Inform Design
Whittier Creek Site – Option D Mitigation Project – NCDMS Project No. 100020

Parameter	Basin Creek		Big Branch		Baker Composite Reference Data	
	Min	Max	Min	Max	Min	Max
d_{mbkf} / d_{bkf} ratio	N/P		N/P		1.2	1.5
Low Bank Height to d_{mbkf} Ratio	N/P		N/P		1.0	
Floodprone Area Width (w_{fpa}) – feet	329		130			
Entrenchment Ratio (ER)	8.92		6.05	6.74		
Meander length (L_m) – feet	350		185	260		
Ratio of meander length to bankfull width (L_m/w_{bkf})	10.54		9.1	12.8	7.0	14.0
Radius of curvature (R_c) – feet	40.1	69.3	42.3	63.1		
Ratio of radius of curvature to bankfull width (R_c / w_{bkf})	1.54		2.1	3.1	2.0	3.0
Belt width (w_{blt}) – feet	59	75	30.5	44		
Meander Width Ratio (w_{blt}/W_{bkf})	1.78	2.26	1.5	2.2	3.5	8.0
Sinuosity (K) Stream Length/ Valley Distance	N/P		1.1		1.2	1.4
Valley Slope – feet per foot	N/P		N/P		0.005	0.015
Channel Slope ($s_{channel}$) – feet per foot	.0144		0.009			
Pool Slope (s_{pool}) – feet per foot	.0019		N/P			
Ratio of Pool Slope to Average Slope (s_{pool} / $s_{channel}$)	0.13		N/P		0.00	0.20
Maximum Pool Depth (d_{pool}) – feet	4.1	5.2	3.5	4.1		
Ratio of Pool Depth to Average Bankfull Depth (d_{pool}/d_{bkf})	2.0	2.54	1.79	2.1	1.5	3.5
Pool Width (w_{pool}) – feet	35	68	19.7	18.5		
Ratio of Pool Width to Bankfull Width (w_{pool} / w_{bkf})	1.52		0.91	0.97	1.2	1.7
Pool Area (A_{pool}) – square feet	89.3	132.5	51	54.5		
Ratio of Pool Area to Bankfull Area (A_{pool}/A_{bkf})	1.6		1.33			
Pool-to-Pool Spacing – feet	271	334	97.5	179.8		
Ratio of Pool-to-Pool Spacing to Bankfull Width (p-p/w_{bkf})	8.16	10.06	4.78	8.81	3.5	7.0
Riffle Slope (s_{riffle}) – feet per foot	0.02		0.015	0.019		
Ratio of Riffle Slope to Average Slope (s_{riffle}/ s_{bkf})	1.39		1.67	2.11	1.2	1.5
d_{16} – mm	0.17		0.13			
d_{35} – mm	29		0.3			
d_{50} – mm	58		1.9			
d_{84} – mm	180		50			
d_{95} – mm	300		100			

Notes:
Basin Creek and Big Branch from NC Department of Transportation, Reference Reach Database
N/P: Data was not provided in the NCDOT reference reach database
Values in this chart were rounded and may differ very slightly from actual values.

Additionally, some profile reference reach parameters were taken from the Micky Reach site, which is a B4 stream type. While no project reaches will be designed as strictly B stream types, UT5 is designed as a C4b and the facet slopes and pool to pool spacing for a B stream type are appropriate to use for a C4b. The Micky Reach site is a tributary to the Mitchell River located in Surry County. Like the Whittier Creek site, Micky Reach is also within the Northern Inner Piedmont ecoregion. It was a restoration site constructed in 2003. The as-built field surveys for Micky Reach were completed in 2003 and the site was visited annually for monitoring purposes until 2007, though periodic field visits have been made since. It was determined that the site has remained stable and is a viable reference reach site. The survey data shown here were used to evaluate the natural channel parameters describing the dimension, pattern, and profile of the reach for design parameter consideration purposes.

Table 6.1b Reference Reach Parameters Used to Inform Design
Whittier Creek Site – Option D Mitigation Project – NCDMS Project No. 100020

Parameter	Micky Reach		Baker Composite Reference Data	
	Min	Max	Min	Max
County	Surry			
Stream Type	B4		B4	
Drainage Area – square miles	0.45			
Bankfull Width (w_{bkf}) – feet	11.7	21.7		
Bankfull Mean Depth (d_{bkf}) – feet	0.6	1.0		
Width/Depth Ratio (w/d ratio)	10.7	17.0	12.0	18.0
Cross sectional Area (A_{bkf}) – SF	13.1	16.2		
Bankfull Mean Velocity (v_{bkf}) - fps	N/P		4.0	6.0
Bankfull Discharge (Q_{bkf}) – cfs	N/P			
Bankfull Max Depth (d_{mbkf}) - feet	0.9	2.5		
d_{mbkf} / d_{bkf} ratio	1.1	3.1	1.2	1.3
Low Bank Height to d_{mbkf} Ratio	1.0		1.0	
Floodprone Area Width (w_{fpa}) – feet	20.0	410.0		
Entrenchment Ratio (ER)	1.7	32.0		
Meander length (L_m) – feet	N/A	N/A		
Ratio of meander length to bankfull width (L_m/w_{bkf})	N/A	N/A	N/A	N/A
Radius of curvature (R_c) – feet	N/A		N/A	
Ratio of radius of curvature to bankfull width (R_c / w_{bkf})	N/A		N/A	N/A
Belt width (w_{blt}) – feet	N/A	N/A		
Meander Width Ratio (w_{blt}/W_{bkf})	N/A	N/A	N/A	N/A
Sinuosity (K) Stream Length/ Valley Distance	1.19		1.1	1.3
Valley Slope – feet per foot	0.04		0.005	0.015
Channel Slope ($s_{channel}$) – feet per foot	0.033			
Pool Slope (s_{pool}) – feet per foot	0.00	0.005		
Ratio of Pool Slope to Average Slope (s_{pool} / $s_{channel}$)	0.0	0.15	0.00	0.40
Maximum Pool Depth (d_{pool}) – feet	2.2	2.5		
Ratio of Pool Depth to Average Bankfull Depth (d_{pool}/d_{bkf})	2.0	4.0	2.0	3.5
Pool Width (w_{pool}) – feet	14.3	14.6		
Ratio of Pool Width to Bankfull Width (w_{pool} / w_{bkf})	0.9		1.1	1.5
Pool Area (A_{pool}) – square feet	14.8	15.9		
Ratio of Pool Area to Bankfull Area (A_{pool}/A_{bkf})	1.1	1.2		
Pool-to-Pool Spacing – feet	48.0	231.0		

Table 6.1b Reference Reach Parameters Used to Inform Design Whittier Creek Site – Option D Mitigation Project – NCDMS Project No. 100020				
Parameter	**Micky Reach**		**Baker Composite Reference Data**	
	Min	**Max**	**Min**	**Max**
Ratio of Pool-to-Pool Spacing to Bankfull Width (p-p/w_{bkf})	3.0	7.0	0.5	5.0
Riffle Slope (s_{riffle}) – feet per foot	0.006	0.063		
Ratio of Riffle Slope to Average Slope (s_{riffle}/ s_{bkf})	0.2	1.9	1.1	1.8
d_{16} – mm	5.6			
d_{35} – mm	14.3			
d_{50} – mm	30.8			
d_{84} – mm	88.4			
d_{95} – mm	110.0			
Notes: Micky Reach from NC Department of Transportation, Reference Reach Database N/A: Channel had minimal meander geometry - no pattern measured N/P: Data was not provided in the NCDOT reference reach database Values in this chart were rounded and may differ very slightly from actual values.				

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, vegetation, and soils on site indicate that the project area most likely functioned in the past as a Piedmont/Low Mountain Alluvial Forest. Therefore, 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 stream channels were divided into reaches as described previously in Table 3.1. The selected design approaches chosen for each reach were based on the maximum potential for functional uplift as determined during the site field assessments as previously described in Section 4. The specific design parameters were developed based on those approaches 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 these design parameters as conservative values for the selected stream types and to allow natural variability in stream dimension, facet slope, and bed features to 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 Level I reaches as needed. The proposed stream 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, 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 some natural channel adjustment following construction.

Reach R7 Restoration

Reach R7 is on Whittier Creek proper at the southern extent of the project area. The reach runs easterly across the valley floor at a slope of 0.6%. R7 begins at the western property boundary of the Holcomb parcel just downstream of Nurse Road and an existing power right-of-way. It has been historically impacted and altered through the removal of riparian vegetation, channelization, and agricultural activities. As a result, the channel is experiencing active erosion for well over 50 percent of the streambank length and is an extremely incised (BHR > 2) and highly unstable G4/F4.

A Priority Level II Restoration approach was selected for R7 as there is not enough length along the reach to raise the bed fully and reconnect to the historic floodplain. As such, bankfull benches will be excavated along the entire length of R7 as the primary means of reestablishing an active floodplain. The stream bed itself will only be very slightly raised. This reach is appropriate for a meandering riffle-pool morphology and will be designed as a Rosgen C4 stream type. This reach lacks mature woody vegetation; however, any existing isolated trees or shrubs will be protected or transplanted if possible. A new meandering channel will be constructed, and the floodplain will be planted with a mix of native hardwood species. The abandoned channel will be completely filled and/or plugged using suitable fill material excavated from construction of the newly restored channels. Thorough soil testing will be conducted on the newly constructed floodplain benches, which will have all the necessary soil amendments put out at various stages of construction as appropriate. Additionally, the topsoil cut from the bench construction will be stored separately and placed out onto the floodplain prior to permanent seeding and planting.

The design width-to-depth ratio for the channel will be 12, 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.). The entrenchment ratio for the majority of R7 will range between 5.8 and 6.8 as the adjacent flood-prone width allows, though in the lowermost transitional section where it connects back into the existing channel that value lowers to 2.3. Channel banks will be graded to stable slopes, and bankfull benches will provide floodplain access, 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 channel incision. These structures will include rock cross vanes, grade control J-hook vanes, grade control log jams, constructed riffles, and log/rock step pools for grade control and habitat, as well as rock and log vanes for increased bank stability and habitat diversity. Bioengineering techniques such as geolifts, 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.

Riparian buffers in excess of 30 feet will be restored and protected along all of R7. Invasive species found scattered along the banks and within the riparian buffers of the reach will be removed and/or treated. Additionally, permanent fencing will be installed to exclude livestock and reduce sediment, fecal coliform, and nutrient inputs.

Table 6.2a Reach R7 Stream Design Morphology Parameters
Whittier Creek Site – Option D Mitigation Project – NCDMS Project No. 100020

Parameter	Existing Stream Values		Design Stream Values		Reference Data	
	XS-6 or MIN	XS-7 or MAX	MIN	MAX	MIN	MAX
Drainage Area, DA (sq mi)	2.69		2.69			
Stream Type (Rosgen)	G4\F4		C4		C4	
Bankfull Discharge, Qbkf (cfs)	190		190			
Bankfull Riffle XSEC Area, Abkf (sq ft)	33.5	38.8	41.0			

Bankfull Mean Velocity, Vbkf (ft/s)	5.7	4.9	4.6		3.5	5.0
Bankfull Riffle Width, Wbkf (ft)	18.5	21.7	22.2			
Bankfull Riffle Mean Depth, Dbkf (ft)	1.8	1.8	1.8			
Width to Depth Ratio, W/D (ft/ft)	10.2	12.1	12.3		12	15
Width Floodprone Area, Wfpa (ft)	22.0	24.0	50	150		
Entrenchment Ratio, Wfpa/Wbkf (ft/ft)	1.2	1.1	2.3	6.8		
Riffle Max Depth @ bkf, Dmax (ft)	2.2	2.3	2.3			
Riffle Max Depth Ratio, Dmax/Dbkf	1.2	1.3	1.3		1.2	1.5
Max Depth @ tob, Dmaxtob (ft)	6.9	6.4	2.3			
Bank Height Ratio, Dtob/Dmax (ft/ft)	3.2	2.8	1.0		1.0	1.1
Meander Length, Lm (ft)	61	188	160	200		
Meander Length Ratio, Lm/Wbkf	2.8	8.0	6.3	12.6	7.0	14.0
Radius of Curvature, Rc (ft)	25	53	36	60		
Rc Ratio, Rc/Wbkf	1.2	2.3	1.6	3.1	2.0	3.0
Belt Width, Wblt (ft)	45	65	80	120		
Meander Width Ratio, Wblt/Wbkf	2.1	2.8	3.6	5.4	3.5	8.0
Sinuosity, K Sval/Schan	1.29		1.17			
Valley Slope, Sval (ft/ft)	0.0065		0.0065		0.0050	0.0150
Channel Slope	0.0051		0.0056			
Slope Riffle, Srif (ft/ft)	0.0030	0.0120	0.0057	0.0089		
Riffle Slope Ratio, Srif/Schan	0.59	2.37	1.03	1.6	1.2	1.5
Slope Pool, Spool (ft/ft)	0.0020	0.0060	0.0000	0.0010		
Pool Slope Ratio, Spool/Schan	0.4	1.2	0.0	0.2	0.0	0.2
Pool Max Depth, Dmaxpool (ft)	3.3	5.0	4.0			
Pool Max Depth Ratio, Dmaxpool/Dbkf	1.8	2.3	2.2		1.5	3.5
Pool Width, Wpool (ft)	17.0	26.0	30.0			
Pool Width Ratio, Wpool/Wbkf	0.8	1.1	1.4		1.2	1.7
Pool-Pool Spacing, Lps (ft)	36	172	78	155		
Pool-Pool Spacing Ratio, Lps/Wbkf	1.5	7.4	3.5	7.0	3.5	7.0
Note: The Existing Stream Values columns represent two separate cross-sections or min/max values as applicable						

Reach UT4a Enhancement Level I

Reach UT4a begins at an existing road side culvert along Rockhill Church Road within the Holcomb parcel. The reach runs southeast and down valley for approximately 328 feet to a bedrock knickpoint near the upstream side of a 40-foot wide power line right-of-way. This reach is classified as a E4b stream type. It has no woody buffer and is exhibiting erosion on approximately 25 percent of its streambanks.

Work conducted along UT4a will implement Enhancement Level I practices to improve the bank stability and bedform diversity of the channel. Baker proposes to excavate bankfull benches, slope streambanks, install in-stream structures to promote scour pool formation and protect streambanks, mat and live stake the stream banks, and plant a riparian buffer. All existing trees along this reach will be preserved to the maximum extent possible. There is one break in the easement at the downstream extent of Reach UT4a at an existing power line right-of-way. While no credit will be generated through this area, enhancement and restoration activities

will continue throughout this area. The downstream bedrock knickpoint will serve as the bed elevation to begin Priority I restoration downstream along UT4b.

Riparian buffers in excess of 30 feet will be restored and protected along all of UT4a and native vegetation will be re-established in all disturbed areas. Permanent fencing will be installed to exclude livestock from the project area. Invasive species treatment will also be conducted throughout the reach and the riparian buffer. A full table of design morphology parameters is provided below. These are for reference only as the channel geometry will mostly be changed through bench excavation, bank sloping, and installation of in-stream structures and features.

Table 6.2b Reach UT4a Stream Design Morphology Parameters
Whittier Creek Site – Option D Mitigation Project – NCDMS Project No. 100020

Parameter	Existing Stream Values		Design Stream Values		Reference Data	
	MIN	MAX	MIN	MAX	MIN	MAX
Drainage Area, DA (sq mi)	0.35		0.35			
Stream Type (Rosgen)	E4b		E4b		C4/B4[1]	
Bankfull Discharge, Qbkf (cfs)	50		50			
Bankfull Riffle XSEC Area, Abkf (sq ft)	9.9		10.0			
Bankfull Mean Velocity, Vbkf (ft/s)	5.0		5.0		4.0	6.0
Bankfull Riffle Width, Wbkf (ft)	7.3		11.0			
Bankfull Riffle Mean Depth, Dbkf (ft)	1.4		0.9			
Width to Depth Ratio, W/D (ft/ft)	5.4		12.2		10	15
Width Floodprone Area, Wfpa (ft)	20.0		30.0			
Entrenchment Ratio, Wfpa/Wbkf (ft/ft)	2.7		2.7			
Riffle Max Depth @ bkf, Dmax (ft)	1.60		1.20			
Riffle Max Depth Ratio, Dmax/Dbkf	1.2		1.3		1.2	1.5
Max Depth @ tob, Dmaxtob (ft)	2.1		1.2			
Bank Height Ratio, Dtob/Dmax (ft/ft)	1.3		1.0		1.0	1.1
Meander Length, Lm (ft)	N/A		N/A			
Meander Length Ratio, Lm/Wbkf	N/A		N/A		N/A	N/A
Radius of Curvature, Rc (ft)	N/A		N/A			
Rc Ratio, Rc/Wbkf	N/A		N/A		N/A	N/A
Belt Width, Wblt (ft)	N/A		N/A			
Meander Width Ratio, Wblt/Wbkf	N/A		N/A		N/A	N/A
Sinuosity, K Sval/Schan	1.1		1.1		1.1	1.2
Valley Slope, Sval (ft/ft)	0.0257		0.0257		0.0200	0.0390
Channel Slope, Schan (ft/ft)	0.0242		0.0242			
Slope Riffle, Srif (ft/ft)	0.0260	0.0430	0.0260	0.0430		
Riffle Slope Ratio, Srif/Schan	1.07	1.78	1.07	1.78	1.1	1.8
Slope Pool, Spool (ft/ft)	0.0000	0.0040	0.0000	0.0040		
Pool Slope Ratio, Spool/Schan	0.00	0.17	0.00	0.17	0	0.4
Pool Max Depth, Dmaxpool (ft)	1.14	2.77	2.0			
Pool Max Depth Ratio, Dmaxpool/Dbkf	0.84	2.04	2.2		2.0	3.5
Pool Width, Wpool (ft)	8.00	9.00	15.0			

Table 6.2b Reach UT4a Stream Design Morphology Parameters Whittier Creek Site – Option D Mitigation Project – NCDMS Project No. 100020						
Parameter	**Existing Stream Values**		**Design Stream Values**		**Reference Data**	
	MIN	**MAX**	**MIN**	**MAX**	**MIN**	**MAX**
Pool Width Ratio, Wpool/Wbkf	1.10	1.23	1.4		1.1	1.5
Pool-Pool Spacing, Lps (ft)	35.00	80.00	38.0	77.0		
Pool-Pool Spacing Ratio, Lps/Wbkf	4.79	10.96	3.5	7.0	3.5	7
Note: [1]Cross sectional geometry parameters are from C4 stream types while profile parameters are from B4 stream types.						

Reach UT4b Restoration

Reach UT4b begins at a bedrock knickpoint at the downstream extent of UT4a within a power line right-of-way. The reach continues down valley for approximately 764 linear feet to its confluence with Reach R7 (Whittier Creek). The reach has been historically impacted and altered through channelization, the removal of riparian vegetation and agricultural activities, and is actively eroding with cattle access to more than fifty percent of the reach. This reach is classified as an incised E4 stream type in its upper extent and a G4 stream type towards its confluence with R7.

A Priority Level I Restoration approach was selected for this reach. The restored channel will be designed as a Rosgen C4 stream type. The channel will tie to the existing bedrock knickpoint which will facilitate bringing the bed elevation up and tying the channel to its historic floodplain. This reach is also appropriate for a meandering riffle-pool morphology sequence and will incorporate similar structures as R7. Channel banks will be graded to stable slopes and the adjacent floodplain will be re-connected to promote stability and improve ground water hydrology. 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 design width-to-depth ratio for the channel will be approximately 13, 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.). The entrenchment ratio will be greater than 2.2 as the adjacent flood-prone width allows. Channel banks will be graded to stable, 2:1 or flatter slopes.

Riparian buffers in excess of 30 feet will be restored and protected along all of UT4b and native vegetation will be re-established in all disturbed areas and in the adjacent open pasture within the easement. Invasive species treatment will also be conducted along the reach and within the riparian buffer. Permanent fencing will be installed to exclude livestock from the project area.

Table 6.2c Reach UT4b Stream Design Morphology Parameters Whittier Creek Site – Option D Mitigation Project – NCDMS Project No. 100020						
Parameter	**Existing Stream Values**		**Design Stream Values**		**Reference Data**	
	XS-3 or MIN	**XS-4 or MAX**	**MIN**	**MAX**	**MIN**	**MAX**
Drainage Area, DA (sq mi)	0.48		0.48			
Stream Type (Rosgen)	E4/G4		C4		C4	
Bankfull Discharge, Qbkf (cfs)	65		65			
Bankfull Riffle XSEC Area, Abkf (sq ft)	14.0	9.5	13.0			

Bankfull Mean Velocity, Vbkf (ft/s)	4.7	6.9	5.0		3.5	5.0
Bankfull Riffle Width, Wbkf (ft)	10.1	9.5	12.7			
Bankfull Riffle Mean Depth, Dbkf (ft)	1.4	1.0	1.0			
Width to Depth Ratio, W/D (ft/ft)	7.3	9.6	12.7		12	15
Width Floodprone Area, Wfpa (ft)	23	13	30	60		
Entrenchment Ratio, Wfpa/Wbkf (ft/ft)	2.27	1.33	2.4	4.7		
Riffle Max Depth @ bkf, Dmax (ft)	2.21	1.21	1.2			
Riffle Max Depth Ratio, Dmax/Dbkf	1.60	1.22	1.2		1.2	1.5
Max Depth @ tob, Dmaxtob (ft)	4.71	2.40	1.2			
Bank Height Ratio, Dtob/Dmax (ft/ft)	2.13	1.98	1.0		1.0	1.1
Meander Length, Lm (ft)	N/A	N/A	119	165		
Meander Length Ratio, Lm/Wbkf	N/A	N/A	9.4	13.0	7.0	14.0
Radius of Curvature, Rc (ft)	N/A	N/A	25	77		
Rc Ratio, Rc/Wbkf	N/A	N/A	2.0	6.1	2.0	3.0
Belt Width, Wblt (ft)	N/A	N/A	45	50		
Meander Width Ratio, Wblt/Wbkf	N/A	N/A	3.5	3.9	3.5	8.0
Sinuosity, K Sval/Schan	1.13		1.32			
Valley Slope, Sval (ft/ft)	0.0186		0.0186		0.005	0.15
Channel Slope	0.0165		0.0141			
Slope Riffle, Srif (ft/ft)	0.0150	0.0400	0.0114	0.0249		
Riffle Slope Ratio, Srif/Schan	0.9	2.4	0.8	1.8	1.2	1.5
Slope Pool, Spool (ft/ft)	0.0000	0.0020	0.0000	0.0033		
Pool Slope Ratio, Spool/Schan	0.0	0.1	0.0	0.2	0.0	0.2
Pool Max Depth, Dmaxpool (ft)	2.4	4.3	2.5			
Pool Max Depth Ratio, Dmaxpool/Dbkf	2.4	4.3	2.5		1.5	3.5
Pool Width, Wpool (ft)	14.3	24.0	18.0			
Pool Width Ratio, Wpool/Wbkf	1.5	2.5	1.4		1.2	1.7
Pool-Pool Spacing, Lps (ft)	30.0	90.0	45.0	89.0		
Pool-Pool Spacing Ratio, Lps/Wbkf	3.0	9.5	3.5	7.0	3.5	7.0
Note: The Existing Stream Values columns represent two separate cross-sections or min/max values as applicable						

Reach UT5 Restoration

Reach UT5 begins at an existing culvert along Rockhill Church Road within the Meadow's parcel. The reach runs southwest and down valley for approximately 765 feet to its confluence with Reach UT4b. Cattle have access to this entire reach. In addition, the reach has no woody buffer and is exhibiting bank erosion on over 50 percent of its streambanks with multiple headcuts and areas of mass wasting. This reach is classified as a B4. An existing 40-foot power line right-of-way crosses this reach and a break in the conservation easement has been incorporated at this location.

Like UT4b, a Priority Level I Restoration approach was selected for this reach, and the restored channel will be designed as a Rosgen B4 stream type. However, as the stream nears its confluence with UT4b, the valley opens up and the floodprone width increases which makes the entrenchment ratio higher than 2.2. This will not cause any detrimental issues and the stream will function as designed. Due to the existing valley slope and valley floor width, this reach will be restored with appropriate riffle-step-pool morphology. Pattern adjustments will be incorporated to ensure stability and promoted diversity. A riffle-step-pool channel will

be constructed using boulder and log grade control structures and constructed riffles. Channel banks will be graded to stable slopes and the adjacent floodplain will be re-connected to promote stability and improve ground water hydrology. 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. One culvert stream crossing will be installed to coincide with the location of the power easement along UT5.

Riparian buffers in excess of 30 feet will be restored and protected along all of UT5 and native vegetation will be re-established in all disturbed areas. Permanent fencing will be installed to exclude livestock from the project area. Invasive species treatment will also be conducted along the reach.

Table 6.2d Reach UT5 Stream Design Morphology Parameters
Whittier Creek Site – Option D Mitigation Project – NCDMS Project No. 100020

Parameter	Existing Stream Values		Design Stream Values		Reference Data	
	XS-1 or MIN	XS-2 or MAX	MIN	MAX	MIN	MAX
Drainage Area, DA (sq mi)	0.11		0.11			
Stream Type (Rosgen)	B4		B4		B4	
Bankfull Discharge, Qbkf (cfs)	20		20			
Bankfull Riffle XSEC Area, Abkf (sq ft)	5.5	5.1	5.0			
Bankfull Mean Velocity, Vbkf (ft/s)	3.6	3.9	4.0		4.0	6.0
Bankfull Riffle Width, Wbkf (ft)	8.0	7.8	8.1			
Bankfull Riffle Mean Depth, Dbkf (ft)	0.7	0.7	0.6			
Width to Depth Ratio, W/D (ft/ft)	11.8	11.8	13.0		12	18
Width Floodprone Area, Wfpa (ft)	19.1	15.4	14.0	20.0		
Entrenchment Ratio, Wfpa/Wbkf (ft/ft)	2.4	2.0	1.7	2.5		
Riffle Max Depth @ bkf, Dmax (ft)	1.3	1.6	1.2			
Riffle Max Depth Ratio, Dmax/Dbkf	1.8	2.4	1.3		1.2	1.5
Max Depth @ tob, Dmaxtob (ft)	2.8	2.3	0.8			
Bank Height Ratio, Dtob/Dmax (ft/ft)	2.2	1.4	1.0		1.0	1.1
Meander Length, Lm (ft)	N/A	N/A	N/A	N/A		
Meander Length Ratio, Lm/Wbkf	N/A	N/A	N/A	N/A	N/A	N/A
Radius of Curvature, Rc (ft)	N/A	N/A	N/A	N/A		
Rc Ratio, Rc/Wbkf	N/A	N/A	N/A	N/A	N/A	N/A
Belt Width, Wblt (ft)	N/A	N/A	N/A	N/A		
Meander Width Ratio, Wblt/Wbkf	N/A	N/A	N/A	N/A	N/A	N/A
Sinuosity, K Sval/Schan	1.03		1.05		1.10	1.2
Valley Slope, Sval (ft/ft)	0.0256		0.0256		0.02	0.03
Channel Slope	0.0250		0.0244			
Slope Riffle, Srif (ft/ft)	0.0260	0.0410	0.0130	0.0370		
Riffle Slope Ratio, Srif/Schan	1.0	1.6	0.5	1.5	1.2	1.5
Slope Pool, Spool (ft/ft)	0.0000	0.0030	0.0000	0.0090		
Pool Slope Ratio, Spool/Schan	0.0	0.1	0.0	0.4	0.0	0.4
Pool Max Depth, Dmaxpool (ft)	1.6	2.3	1.5			

Pool Max Depth Ratio, Dmaxpool/Dbkf	2.4	3.4	2.4		2.0	3.5
Pool Width, Wpool (ft)	8.0	14.0	10.5			
Pool Width Ratio, Wpool/Wbkf	1.0	1.7	1.3		1.5	1.5
Pool-Pool Spacing, Lps (ft)	22.0	139.0	5.0	40.0		
Pool-Pool Spacing Ratio, Lps/Wbkf	2.8	17.3	0.6	4.9	0.5	5.0
Note: The Existing Stream Values columns represent two separate cross-sections or min/max values as applicable						

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 R7, UT4a, UT4b, and UT5. However, on 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) were also used to develop the bankfull discharge estimates for the project reaches. The curve relationships were compared to stable representative cross sections 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 Piedmont Regional Curve (Harman, 1999) and the unpublished NC Rural Mountain and Piedmont Regional Curve developed by the Natural Resources Conservation Service (Walker, 2012) were used for comparison with other site-specific methods of estimating bankfull discharge. Baker has successfully implemented a significant number of stream restoration projects in North Carolina using this curve data. 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. For these reaches, accurately estimating the bankfull discharge and associate bankfull cross sectional area was crucial in designing the correct bankfull geometry.

Table 6.3 NC Rural Regional Curve Equations
Whittier Creek Site – Option D Mitigation Project – NCDMS Project No. 100020

NC Rural Piedmont Regional Curve Equations (Harman et al., 1999)	NC Rural Mountain and Piedmont Regional Curve Equations - (Walker, 2012)
$Q_{bkf} = 89.04\ A_w^{0.72}$	$Q_{bkf} = 55.32\ A_w^{0.79}$
$A_{bkf} = 21.43\ A_w^{0.68}$	$A_{bkf} = 19.13\ A_w^{0.65}$
$W_{bkf} = 11.89\ A_w^{0.43}$	$W_{bkf} = 17.41\ A_w^{0.37}$
$D_{bkf} = 1.5\ A_w^{0.32}$	$D_{bkf} = 1.10\ A_w^{0.29}$

Table 6.4 Comparison of Bankfull Areas Whittier Creek Site – Option D Mitigation Project – NCDMS Project No. 100020			
Reach	**DA (sq mi)**	**Bankfull Area Estimates from 1999 / 2012 Regional Curves (sq ft)**	**Measured at Bankfull Indicator (sq ft)**
R7	2.69	42.0 / 36.5	33.5[1], 38.8[2]
UT4a	0.35	10.5 / 9.7	9.93
UT4b	0.48	12.9 / 11.8	9.5[3], 14.0
UT5	0.11	4.9 / 4.6	5.5, 5.1

Notes:
1. Cross section is above the confluence with UT4b.
2. Cross section is below the confluence with UT4b.
3. Cross section was taken above the confluence with UT5. This drainage area is closer to the drainage area for UT4a.

6.3.3 Bankfull Discharge Summary and Conclusions

As described above Rosgen's stream classification system (Rosgen, 1996) and Natural Channel Design Methodologies depend on the proper field identification of consistent geomorphic features related to the active floodplain. Although bankfull stage verification was sometimes challenging in the field for some sections of the reaches under their current conditions, the cross-section data used for the above regional curve comparisons are within an acceptable range of values and match closely with the regional curves.

Table 6.5 provides a bankfull discharge analysis based on the regional curves, the Manning's equation discharges calculated from the representative cross sections for each reach, and the bankfull design discharge estimation methods. Manning's roughness (*n*) was estimated using friction factor and relative roughness, and by stream type (WARSSS, 2006). Design velocity estimates are based on the estimated bankfull discharge and the design cross sectional area.

Table 6.5 Bankfull Discharge Analysis Summary Whittier Creek Site – Option D Mitigation Project – NCDMS Project No. 100020		
Estimating Method	**Bankfull Velocity (ft/sec)**	**Bankfull Discharge (cfs)**
	Reach R7	
NC Rural Piedmont Regional Curve[1]	4.2	182
NRCS NC Rural Mountain and Piedmont Regional Curve[2]	2.8	120
Friction Factor to Relative Roughness Ratio method[3]	4.7	203
Manning's "n" from friction factor and relative roughness[3]	5.4	234
Manning's "n" from stream type[3]	2.9	125
Design Estimate	4.6	190
	Reach UT4a	
NC Rural Piedmont Regional Curve[1]	4.2	42
NRCS NC Rural Mountain and Piedmont Regional Curve[2]	2.4	24
Friction Factor to Relative Roughness Ratio method[3]	5.3	53
Manning's "n" from friction factor and relative roughness[3]	5.9	58
Manning's "n" from stream type[3]	4.8	47
Design Estimate	5.0	50

Table 6.5 Bankfull Discharge Analysis Summary Whittier Creek Site – Option D Mitigation Project – NCDMS Project No. 100020		
Estimating Method	**Bankfull Velocity (ft/sec)**	**Bankfull Discharge (cfs)**
	Reach UT4b	
NC Rural Piedmont Regional Curve[1]	3.7	52
NRCS NC Rural Mountain and Piedmont Regional Curve[2]	2.2	31
Friction Factor to Relative Roughness Ratio method[3]	4.7	66
Manning's "n" from friction factor and relative roughness[3]	5.3	74
Manning's "n" from stream type[3]	4.2	59
Design Estimate	5	65
	Reach UT5	
NC Rural Piedmont Regional Curve[1]	3.4	18
NRCS NC Rural Mountain and Piedmont Regional Curve[2]	1.8	10
Friction Factor to Relative Roughness Ratio method[3]	5.8	21
Manning's "n" from friction factor and relative roughness[3]	5.9	21
Manning's "n" from stream type[3]	4.3	15
Design Estimate	4.0	20
Notes: [1]NC Rural Piedmont Regional Curve (Harman et al., 1999). [2] Revised NC Rural Piedmont and Mountain Regional Curve developed by NRCS (Walker, 2012). [3]WARSSS, 2006 spreadsheet. Bankfull discharge estimates vary based on Manning's Equation for the riffle cross section.		

6.4 Sediment Transport Analysis

For this project, a qualitative sediment supply analysis was conducted from visual inspections of the project reaches themselves, from inspections upstream of the project reaches, and from aerial photography. Current supply appears to be from both localized bank erosion and transported from upstream. Some livestock operations exist within the watershed that likely cause accelerated bank erosion. The condition of the streams within the agricultural areas within the watershed are similar to the condition to the project streams. Field conditions also show that aggradation is not a significant problem; for example, the project stream channels do not exhibit significant bar formations. Once the project is complete, on-site sediment sources from bank erosion will be stabilized. Stream power was calculated but does not provide significant useful information since a sediment rating curve has not been developed for the site. The primary emphasis of this project's sediment transport analysis will focus on competency.

6.4.1 Sediment Competency Analysis

To conduct the sediment competency analyses, pavement (pebble count) and subpavement sediment samples were taken on reaches UT4b, UT5, and R7 at surveyed riffle cross sections (see Appendix A). 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. Analysis was conducted using critical dimensionless shear stress and dimensional shear stress methodologies where applicable. Dimensionless shear stress analysis provides a critical depth and slope to entrain the largest particle in the sediment sample while the dimensional analysis

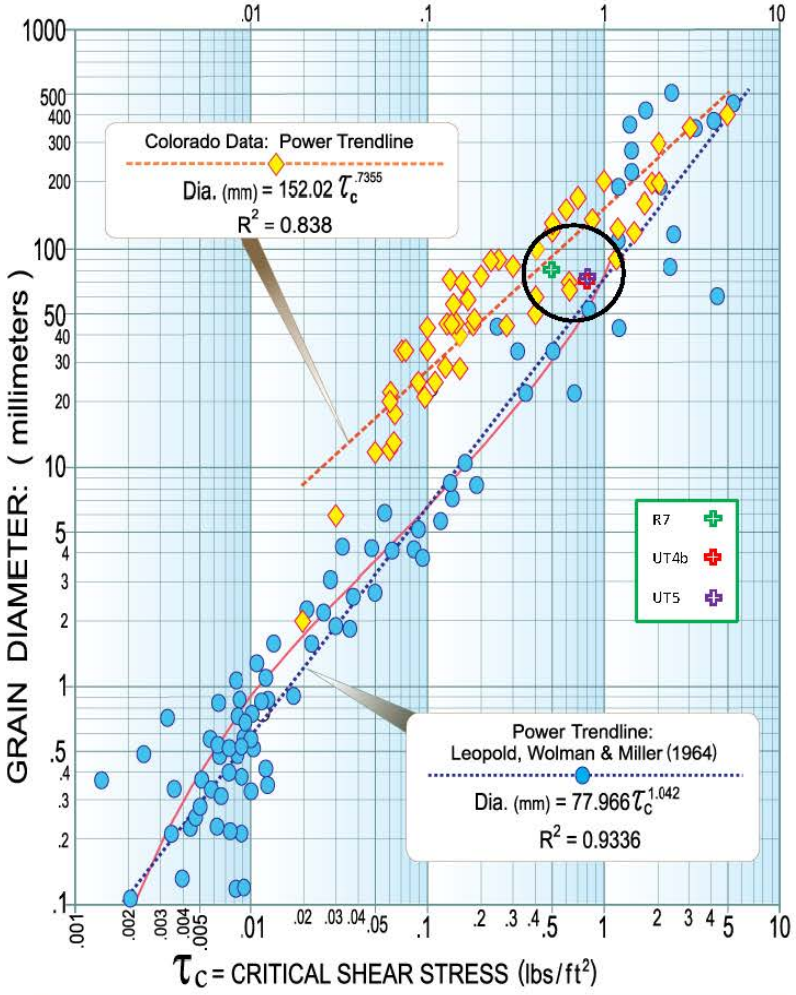
uses the Shield's curve to compare the shear stress value to the size particle able to be entrained by that shear stress. The Modified Shield's curve based on Colorado field data (WARSSS, 2006) while the Shield's Curve is based on laboratory and field data compiled from various sources (Leopold, Wolman, and Miller, 1964). The Results from the analysis are presented below in Table 6.6.

Table 6.6 Competence Analysis
Whittier Creek Site – Option D Mitigation Project – NCDMS Project No. 100020

Parameter	R7	UT4b	UT5
Design Bankfull Slope (ft/ft)	0.0056	0.0141	0.0244
Design Mean Depth (ft)	1.8	1.0	0.6
D50 Pavement (mm)	25.6	26.4	20.5
D50 Subpavement (mm)	13.0	11.2	20.6
D100 Subpavement (mm)	81.0	71.0	74.0
Critical Dimensionless Shear[1]	N/A	0.0160	N/A
Required Mean Depth from Dimensionless Analysis (ft)	N/A	0.43	N/A
Required Slope from Dimensionless Analysis (ft/ft)	N/A	0.0061	N/A
Dimensional Design Shear Stress (lbs./sq-ft)	0.55	0.78	0.82
Largest Movable Particle (mm) (Mod. Shields Curve)	98	127	131
Largest Movable Particle (mm) (Shield's Curve)	42	60	63
Predicted Shear Stress to move D100 (lbs./sq-ft) (Mod. Shield's Curve)	0.4	0.4	0.4
Predicted Shear Stress to move D100 (lbs./sq-ft) (Shield's Curve)	1.0	0.9	1.0
Predicted mean depth to move D100 (ft) (Mod. Shield's Curve)	1.2	0.4	0.2
Predicted mean depth to move D100 (ft) (Shield's Curve)	2.9	1.0	0.6
Predicted slope to move D100 (ft/ft) (Mod. Shield's Curve)	0.0038	0.0057	0.0100
Predicted slope to move D100 (ft/ft) (Shield's Curve)	0.0092	0.0146	0.0254

[1]Listings of N/A means that the dimensionless shear equations were not valid based on sediment size ratios.

The sediment transport analysis using the design geometry and profile matches well with the predicted values lending confidence that the stream will move the bed load that is supplied. As can be seen from the figure below, design shear stress values plotted against the measured D100 values match quite well within the scatter of the data points. The results presented above in Table 6.6 show that the design bankfull slopes and mean depth values generally fall between the predicted values from both the Shield's and Modified Shield's curves. The design shear stress ranges from 0.55 to 0.82 pounds per square foot and the largest particles in the subpavement samples range from 71 to 81 mm. The data points used to generate these individual curves have significant scatter and overlap in these ranges of shear stress and particle size which can lend evidence that the results that fall between the two curves applicable. These results show that the design values are within an acceptable range to provide the correct sediment transport of the stream's sediment supply.



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

(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 the site is predominantly managed as cattle pasture and largely consists of a range of typical pasture grasses (fescues and clovers) with scattered weeds and other common herbaceous species present such as bittercress (*Cardamine hirsute*), docks (*Rumex spp.*), common violet (*Viola sororia*), chickweed (*Stellaria media*), lyre sage (*Salvia lyrata*), plantains (*Plantago spp.*), and dandelions (*Taraxacum officiniale*), with soft rush (*Juncus effusus*) and jewelweed (*Impatiens capensis*) found in wetter areas. A very narrow buffer of trees is present along most of Reach R7 (Whittier Creek) and along a short section of Reach UT4b. The trees present on site consist primarily of chinaberry (*Melia azedarach*), Chinese privet (*Ligustrum sinense*), sycamore (*Platanus occidentalis*), green ash (*Fraxinus pennsylvanica*), black willow (*Salix nigra*), and tulip poplar (*Liriodendron tulipifera*), along with some scattered black walnut (*Juglans nigra*), persimmon (*Diospyros virginiana*), river birch (*Betula nigra*), red maple (*Acer rubrum*), red cedar (*Juniperus virginiana*), and black cherry (*Prunus serotina*). Blackberry (*Rubus spp.*), multi-flora rose (*Rosa multiflora*), and elderberry (*Sambucus canadensis*) are found scattered throughout the understory as well. Existing wetland vegetation is highly disturbed and dominated by fescues interspersed with soft rush (*Juncus effusus*), a mix of sedges (*Carex spp.*), and jewelweed (*Impatiens capensis*).

However, the riparian areas along the project reaches and wetlands of the project would naturally consist of species more consistent with those of a Piedmont/Low Mountain Alluvial Forest (Schafale and Weakley 1990). These communities often include a mixture of bottomland and mesophytic trees in the canopy, including river birch (*Betula nigra)*, sycamore (*Platanus occidentalis)*, tulip poplar (*Liriodendron tulipifera)*, sweetgum (*Liquidambar styraciflua)*, American elm (*Ulmus americana)*, southern sugarberry (*Celtis laevigata)*, black walnut (*Juglans nigra)*, green ash (*Fraxinus pennsylvanica)*, bitternut hickory (*Carya cordiformis)*, shagbark hickory (*Carya ovata)*, shingle oak (*Quercus imbricaria)*, red maple (*Acer rubrum)*, white ash (*Fraxinus Americana)*, and silverbell (*Halesia tetraptera)*. Understory trees may include boxelder (*Acer negundo*), southern sugar maple (*Acer floridanum*), red maple (*Acer rubrum*), pawpaw (*Asimina triloba*), American holly (*Ilex opaca*), and ironwood (*Carpinus caroliniana*). The shrub layer commonly contains spicebush (*Lindera benzoin*), strawberry bush (*Euonymus Americana*), painted buckeye (*Aesculus sylvatica*), fetterbush (*Leucothoe recurva*), hazelnut (*Corylus cornuta*), and silky dogwood (*Cornus amomum*). As such, the restoration approach for the planted riparian buffers for the project will target many of these species.

Notable non-native invasive species present on the site include Chinaberry (*Melia azedarach*), Chinese privet (*Ligustrum sinense*), and multi-flora rose (*Rosa multiflora*), found scattered along the banks and within the riparian buffers of the project streams.

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 encompass 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 mid-November to March 15th.

Selected species for hardwood revegetation planting are presented in Table 6.7 and approximate those found in the Piedmont / Low Mountain Alluvial Forest plant community described above. 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 will 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 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 at appropriate intervals, 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 in meander bends 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.

Permanent seed mixtures will be applied to all disturbed areas of the project site. Table 6.8 lists the species, mixtures, and application rates that will be used. A mixture is provided that is suitable for streambank, riparian, and wetland areas. Mixtures will also include temporary seeding (rye grain or browntop millet) to allow for application with mechanical broadcast spreaders. To provide rapid growth of herbaceous ground cover and biological habitat value, the permanent seed mixture specified will be applied to all areas within the conservation easement from the toe of the stream banks to the easement boundary excluding areas that are already forested. The species provided are deep-rooted and have been shown to proliferate along restored stream channels, providing long-term stability.

Final species selection may change due to refinement or 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
Whittier Creek Site – Option D Mitigation Project – NCDMS Project No. 100020

Botanical Name	Common Name	% Planted by Species	Wetland Tolerance
All Buffer Plantings at 680 stems/acre using 8' X 8' spacing Riparian Zone – Overstory Species			
Betula nigra	River Birch	10%	FACW
Juglans nigra	Black Walnut	5%	FACU
Platanus occidentalis	Sycamore	15%	FACW
Liriodendron tulipifera	Tulip Poplar	15%	FACU
Fraxinus pennsylvanica	Green Ash	5%	FACW
Quercus lyrata	Overcup Oak	10%	OBL
Quercus phellos	Willow Oak	10%	FAC
Ulmus americana	American Elm	5%	FACW
Diospyros virginiana	Persimmon	5%	FAC

Table 6.7 Proposed Bare-Root and Live Stake Species
Whittier Creek Site – Option D Mitigation Project – NCDMS Project No. 100020

Botanical Name	Common Name	% Planted by Species	Wetland Tolerance
Riparian Zone – Understory/Shrub Species			
Hamamelis virginiana	Witch Hazel	5%	FACU
Lindera benzoin	Spicebush	5%	FAC
Carpinus caroliniana	American Hornbeam	5%	FAC
Acer negundo	Box Elder	5%	FAC
Streambank Live Stake Plantings			
Salix sericea	Silky Willow	30%	OBL
Cornus amomum	Silky Dogwood	30%	FACW
Sambucus canadensis	Elderberry	20%	FACW
Salix nigra	Black Willow	20%	OBL

Table 6.8 Proposed Permanent Seed Mixture
Whittier Creek Site – Option D Mitigation Project – NCDMS Project No. 100020

Botanical Name	Common Name	% Planted by Species	Density (lbs/ac)	Wetland Tolerance
Agrostis alba	Redtop	10%	1.5	FACW
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%**	**15.00**	

Note: Final species selection may change due to refinement or 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 Whittier Creek Site is considered low. The anticipated potential project risks are described below:

Land Use Development: There is the potential for increased land use development 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 and 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 R7, UT4b, and UT5 will implement a Restoration design approach, while Reach UT4a will implement an Enhancement Level I design approach with stream bed/bank stabilization and structure installation. For these reaches, geomorphic monitoring methods are described below. Specific success criteria components and evaluation methods are described below and report documentation will follow the NCDMS's templates *As-Built Baseline Monitoring Report Format, Data Requirements, and Content Requirement* (June 2017), and the *Annual Monitoring Report Format, Data Requirements, and Content Guidance* (June 2017).

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 12 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 continuous stage recorders (using pressure transducers) and photographs. The continuous stage recorders will be installed in the channels of both Reach R7 and in the downstream portion of UT4b to collect flow depth and duration data for near-overbank events as well as for overbank flood events. Additionally, an in-stream flow gauge will be installed in Reach UT5 to record water depth and flow duration. Photographs will also be used to document the occurrence of debris lines and sediment deposition on the floodplain during monitoring site visits.

Four bankfull events must be documented, in separate years, for Reaches R7, UT4, and UT5 within the seven-year monitoring period. Otherwise, monitoring will continue until the required four bankfull events have been documented.

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. Eleven cross sections are proposed for this project; five in Reach R7, one in UT4a, three in UT4b, and two in UT5. 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. 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 2.2 for 'C' stream types or 1.4 for 'B' stream types) defined for channels of the design stream 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.

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 on R7 and UT4b 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, the condition of pools and riffles, 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. Four 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 the undisturbed wooded areas 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. 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. However, if the performance standards are met by year 5 and stem densities are greater than 260 stem/acre, then the vegetation monitoring may be terminated with approval by the USACE and the NCIRT. 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, using the mountain counties requirement, the average height of the vegetation should be 6 feet tall at year 5, and average 8 feet tall in year 7. 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 the slower growing species *Quercus phellos* (willow oak), *Quercus lyrata* (overcup oak) and *Diospyros virginiana* (persimmon) at a combined total of 25% of the planted stems.

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.

Required remedial action will be provided on a case-by-case basis, such as: replanting more wet/drought tolerant species vegetation as appropriate, conducting beaver management/dam removal, and the treatment of undesirable/invasive species vegetation, and will continue to monitor vegetation performance until the corrective actions demonstrate that the site is trending towards or meeting the standard requirement. Invasive species will be treated such that they compose no more than 5% of the easement area. 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, herbaceous vegetation, primarily native species 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.

8.0 MONITORING PLAN

The monitoring plan for the Whittier Creek Site – Option D 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 12.

Table 8.1 Monitoring Plan Overview
Whittier Creek Site – Option D Mitigation Project – NCDMS Project No. 100020

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 during the 7-year monitoring period (in separate years).	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 2.2 (C type) or 1.4 (B 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	Interim survival rates of 320 stems/acre at MY3 and 260 steams/acre at MY5, with final rate of	Vegetation monitoring plots (100 m2 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	Improved riparian corridor habitat for native species, improved stabilization of stream floodplain (reducing sediment loss), increased

Table 8.1 Monitoring Plan Overview
Whittier Creek Site – Option D Mitigation Project – NCDMS Project No. 100020

Goal	Treatment	Performance Standards	Monitoring Metric	Outcome	Likely Functional Uplift
	riparian buffer at a 30-foot minimum width in all areas within the conservation easement where established native trees and shrubs do not exist.	210 stems/acre at MY7. Average heights of 6 ft at MY5 and 8 ft at MY7.		at a minimum 210 stems/acre of native species, including volunteers (with IRT approval).	woody and organic 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 *As-Built Baseline Monitoring Report Format, Data, and Content Requirement* (June 2017). The annual monitoring reports will follow the *Annual Monitoring Report Format, Data Requirements, and Content Guidance* (June 2017), 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
Whittier Creek Site – Option D Mitigation Project – NCDMS Project No. 100020

Required	Parameter	Frequency	Number/Locations	Notes
X	Pattern	Baseline/As-built (MY0)	Reach R7	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.

Table 8.2 Monitoring Requirements and Schedule
Whittier Creek Site – Option D Mitigation Project – NCDMS Project No. 100020

Required	Parameter	Frequency	Number/Locations	Notes
X	Dimension	Monitoring Years 1, 2, 3, 5 and 7	11 cross sections. 5 within Reach R7, 1 on UT4a, 3 on UT4b, 2 on UT5. See Figure 12	Cross sections to be monitored over seven (7) years and shall include assessment of bank height ratio (BHR) and entrenchment ratio (ER).
X	Longitudinal Profile	Baseline/As-built (MY0)	Reaches R7, UT4a, UT4b, and UT5	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	1 continuous stage recorder in Reach R7 channel, 1 in UT4b channel, and 1 in-stream flow gauge on Reach UT5	The devices will be inspected on a quarterly/semi-annual basis to document the occurrence of flow depth, duration, and bankfull events on the project.
X	Vegetation	Monitoring Years 1, 2, 3, 5 and 7	4 permanent vegetation plots will be established throughout the planted area, with 1 additional random plot each year (5 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 photos 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.

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 Whittier Creek Site – Option D Mitigation Project are detailed below in Tables 11.1, 11.2, and 11.3, and are shown in Figure 13. 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 Components and Mitigation Credits
Whittier Creek Site – Option D Mitigation Project – NCDMS Project No. 100020

Project Component (reach ID, etc.)	Wetland Position and Hydro Type	Existing Footage or Acreage	Stationing	Restored Footage, Acreage, or SF	Creditable Footage, Acreage or SF[1]	Restoration Level	Approach Priority Level	Mitigation Ratio (X:1)	Mitigation Credits
Reach R7		1,462	10+00.00 – 24+84.07	1,484	1,332	R	PII	1	1,332
Reach UT4a		338	10+00.00 – 13+28.44	328	328	E	LI	1.5	219
Reach UT4b		764	13+28.44 – 21+29.12	801	761	R	PI	1	761
Reach UT5		765	10+00.00 – 17+87.56	788	748	R	PI	1	748
Notes: 1. Creditable Footage: The creditable lengths for each reach after all exclusions are accounted for, such as easement breaks, utility impacts, stream crossings, etc.									
W1									
W2									
W3									
Buffer Group 1 (BG1)									
Buffer Group 2 (BG2)									
Buffer Group 3 (BG3)									

Table 11.2 Length and Area Summations by Mitigation Category
Whittier Creek Site – Option D Mitigation Project – NCDMS Project No. 100020

Restoration Level	Stream (LF)	Riparian Wetland (AC)		Non-riparian Wetland (AC)	Credited Buffer (FT^2)
		Riverine	Non-Riverine		
Restoration	3,073				
Enhancement					
Enhancement I	328				
Enhancement II					
Creation					
Preservation					
High Quality Preservation					

Table 11.3 Overall Assets Summary
Whittier Creek Site – Option D Mitigation Project – NCDMS Project No. 100020

Asset Category	Overall Credits
Stream	**3,060**
RP Wetland	
NR Wetland	
Buffer	

12.0 REFERENCES

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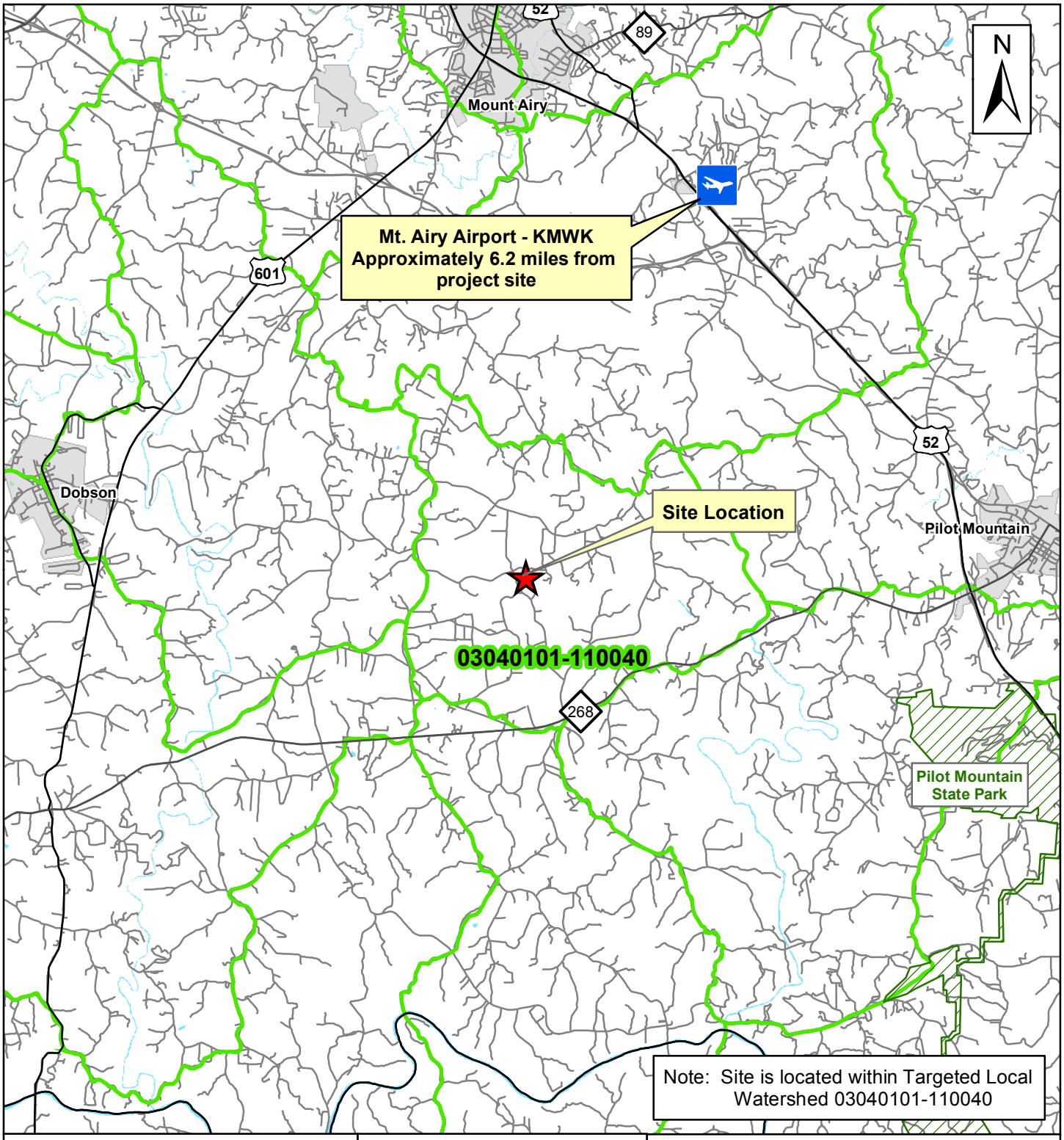
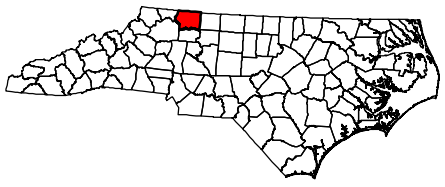
APPENDIX A: (FIGURES, MAPS, AND SUPPLEMENTARY INFORMATION)





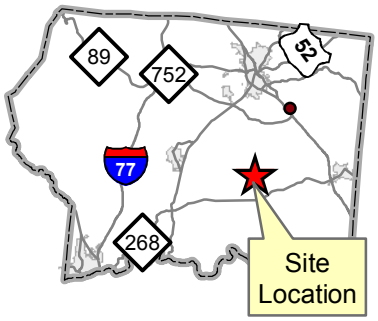
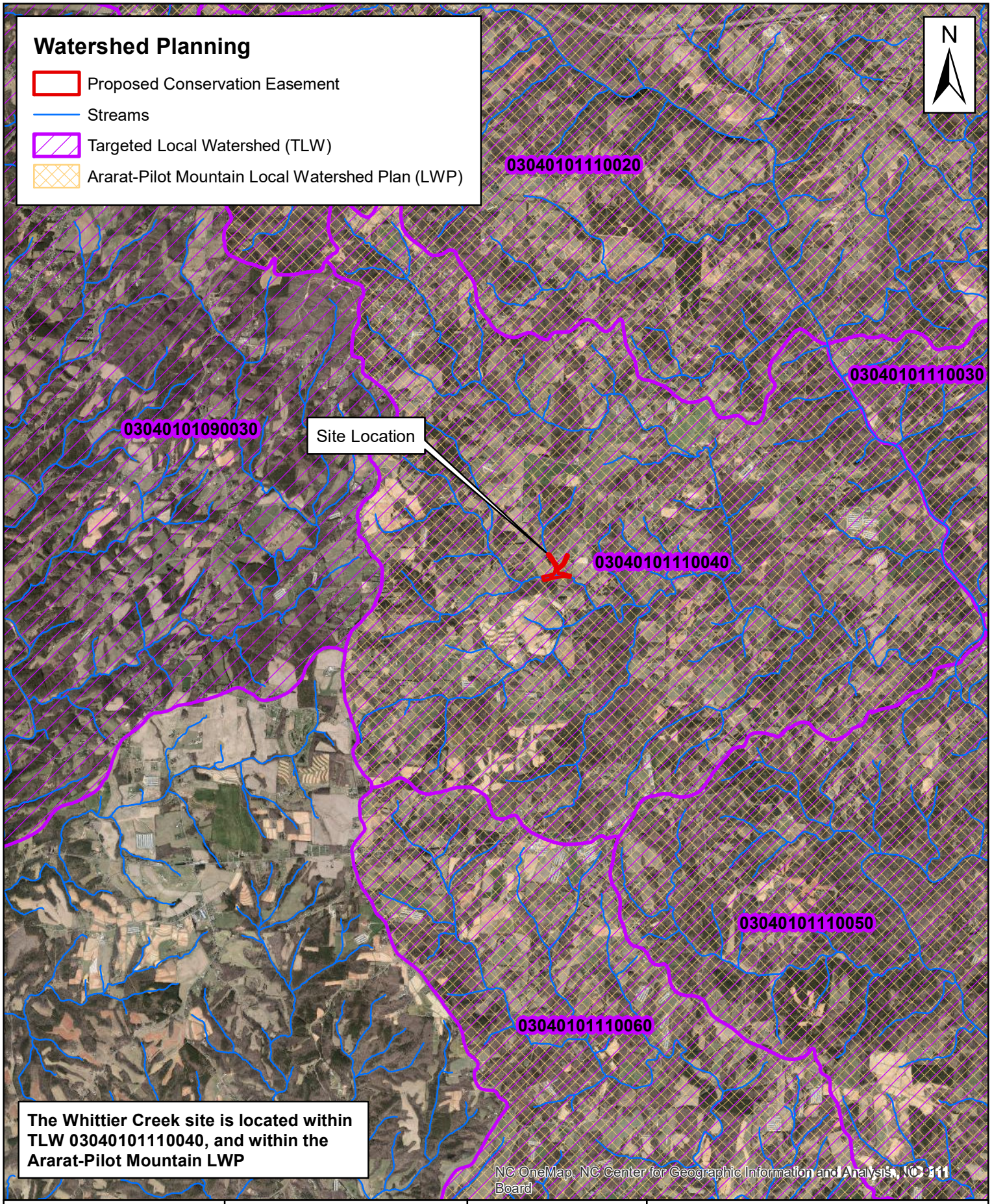


Figure 1.Project Vicinity Map
Whittier Creek Mitigation Project - Opt. D
DMS Project No. 100020 - Surry County, NC

Michael Baker
INTERNATIONAL

0 1 2 4 Miles

1 inch = 2 miles



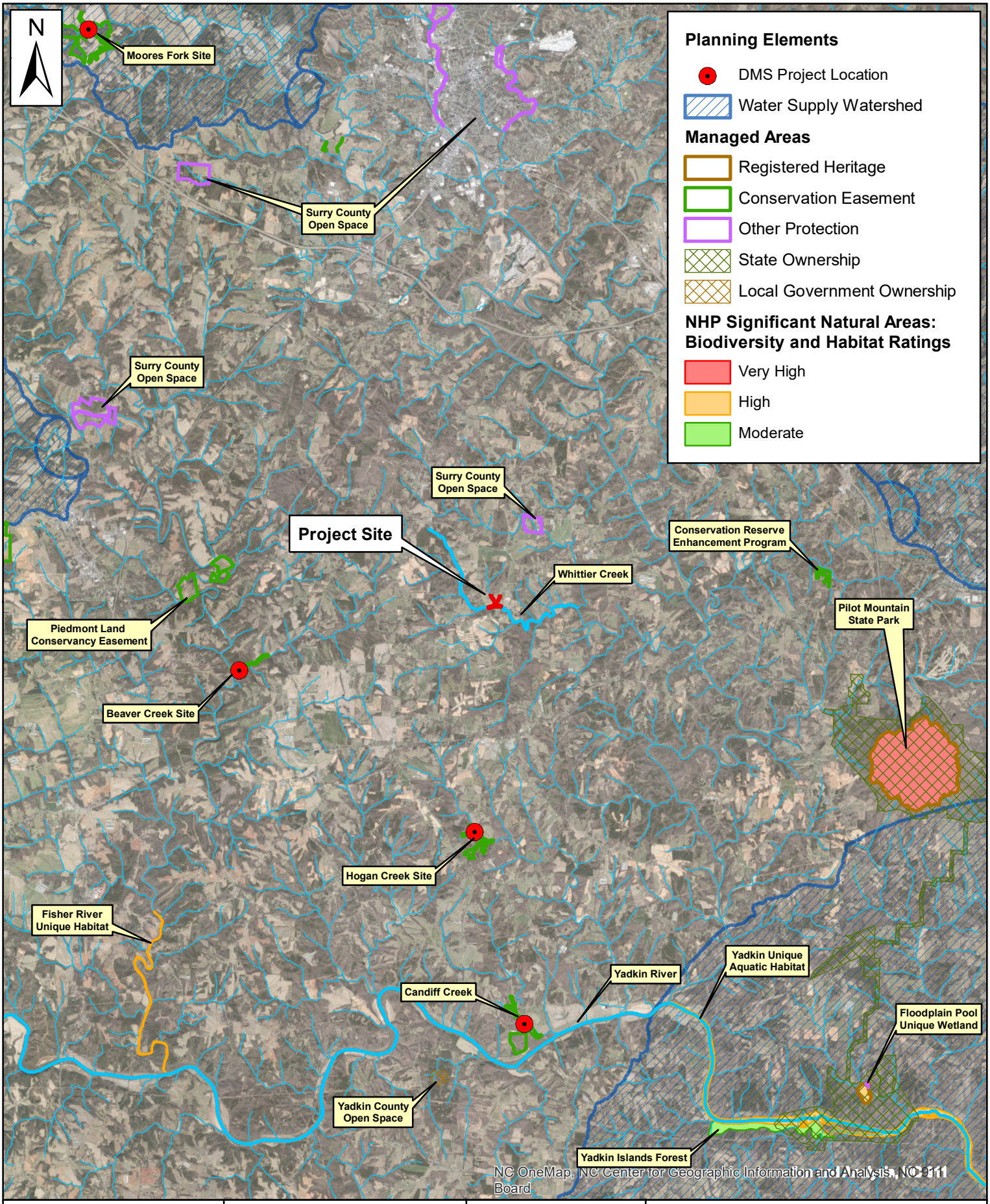
Michael Baker INTERNATIONAL

0 0.5 1 Miles

1 inch = 1 mile

North Carolina
Division of
Mitigation Services
DMS Project No. 100020

Figure 2. Watershed Planning Elements Map
Whittier Creek Mitigation Project - Opt. D
Surry County, NC



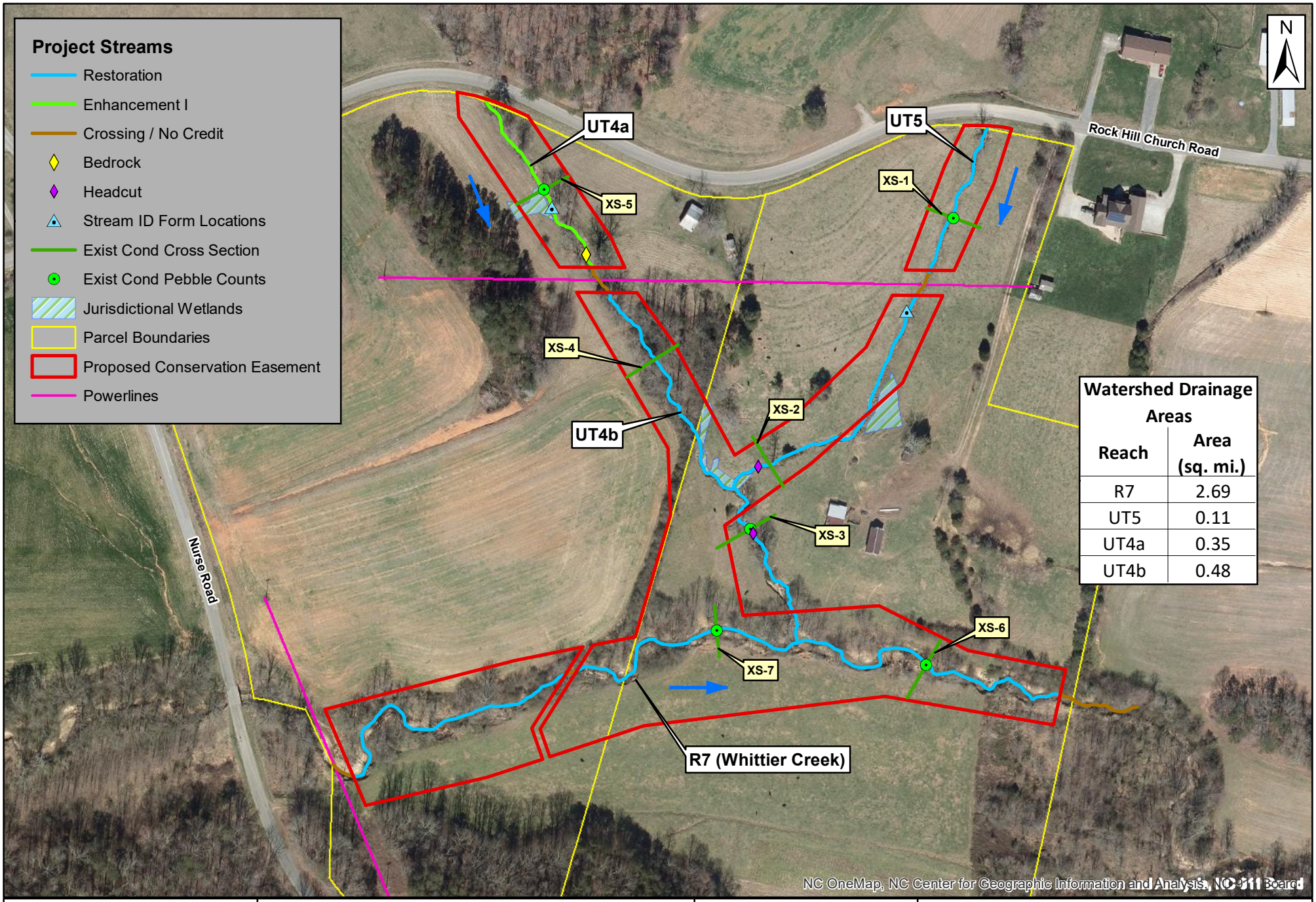
Michael Baker INTERNATIONAL

0 1 2 Miles

1 inch = 2 miles

North Carolina
Division of
Mitigation Services
DMS Project No. 100020

Figure 3. Adjacent Planning Elements
Whittier Creek Mitigation Project - Opt. D
Surry County, NC



Michael Baker INTERNATIONAL

0 100 200 400 Feet

1 inch = 200 feet

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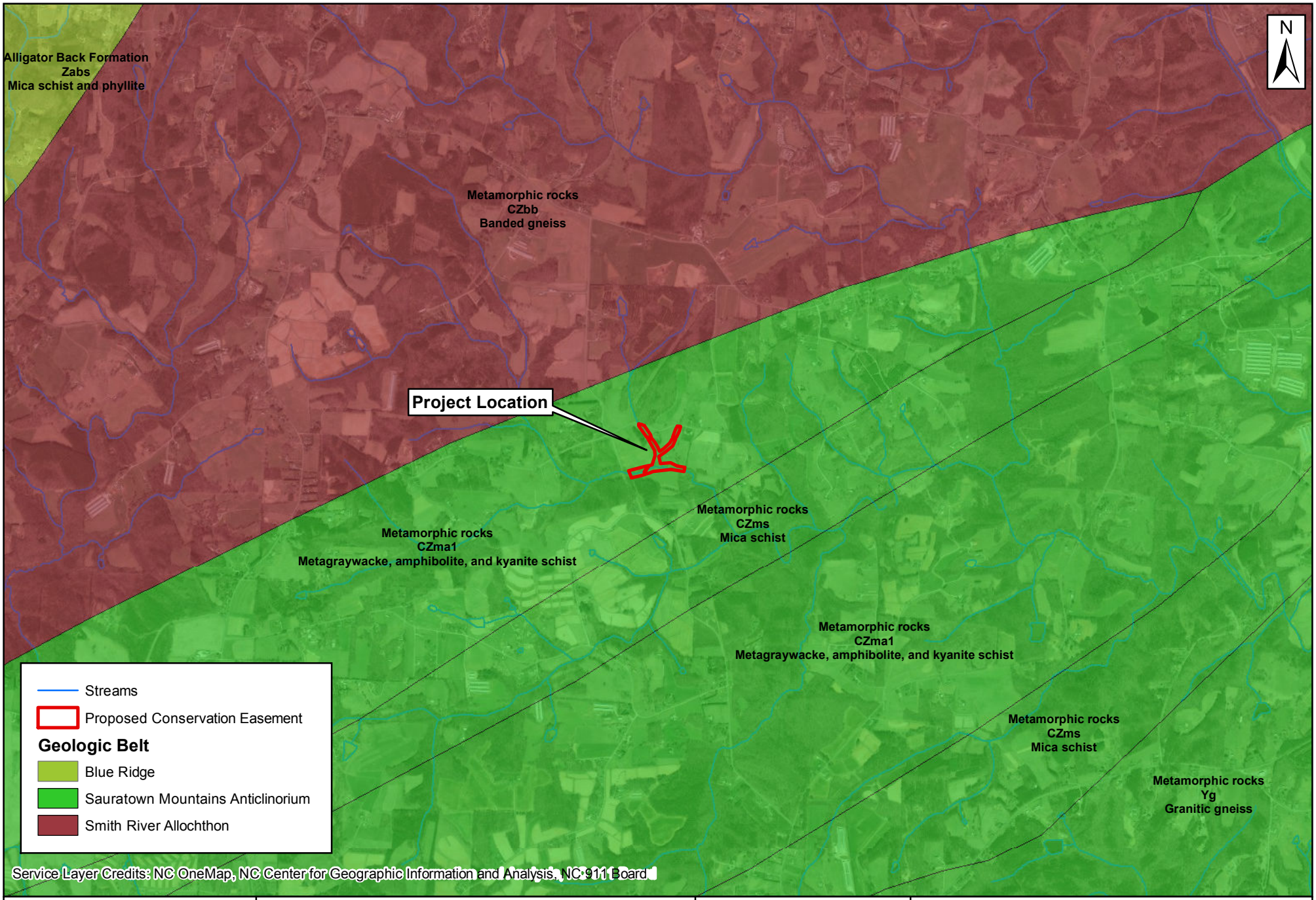
Mitigation Services
DMS Project No. 100020

Figure 4. Existing Conditions and Features
Whittier Creek Mitigation Project - Opt. D
Surry County, NC



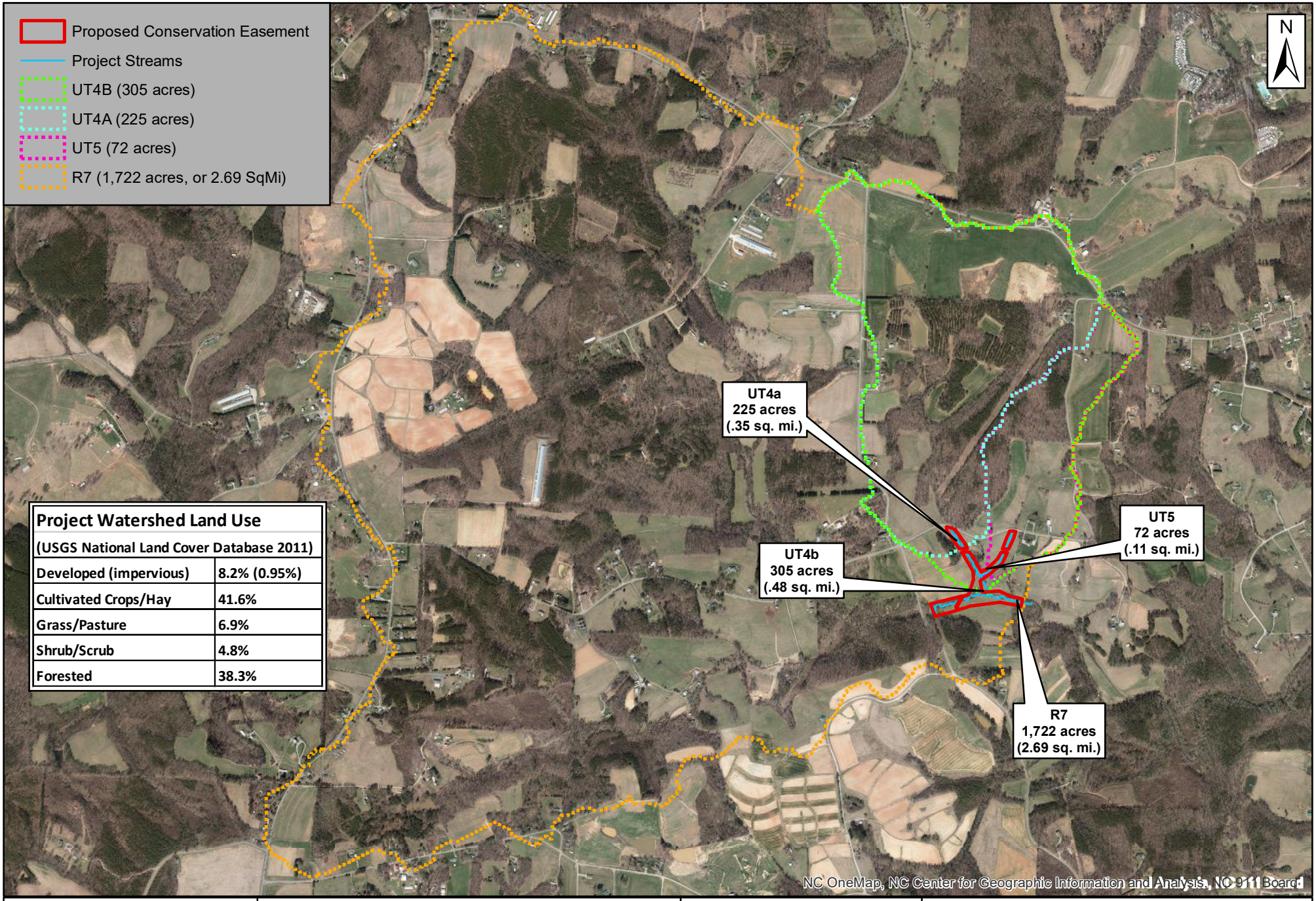
Michael Baker INTERNATIONAL

0 0.25 0.5 1 Miles

1 inch = 1.5 mile

North Carolina
Division of
Mitigation Services
DMS Project No. 100020

Figure 5. Geologic Map
Whittier Creek Mitigation Project - Opt. D
Surry County, NC



Project Watershed Land Use (USGS National Land Cover Database 2011)	
Developed (impervious)	8.2% (0.95%)
Cultivated Crops/Hay	41.6%
Grass/Pasture	6.9%
Shrub/Scrub	4.8%
Forested	38.3%

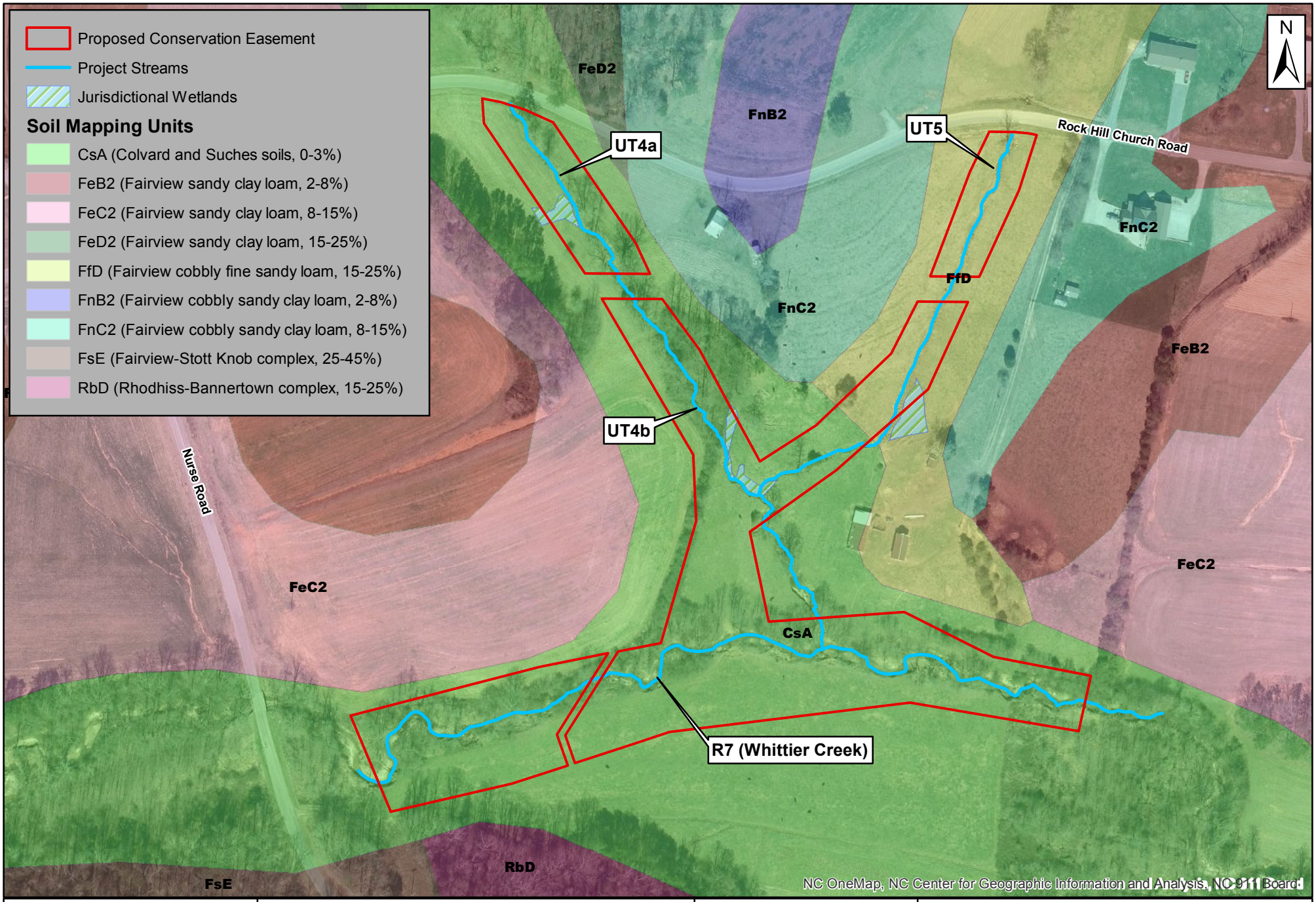
Michael Baker INTERNATIONAL

0 800 1,600 3,200 Feet

1 inch = 1600 feet

North Carolina
Division of
Mitigation Services
DMS Project No. 100020

Figure 6. Drainage Area and Land Use Map
Whittier Creek Mitigation Project - Opt. D
Surry County, NC



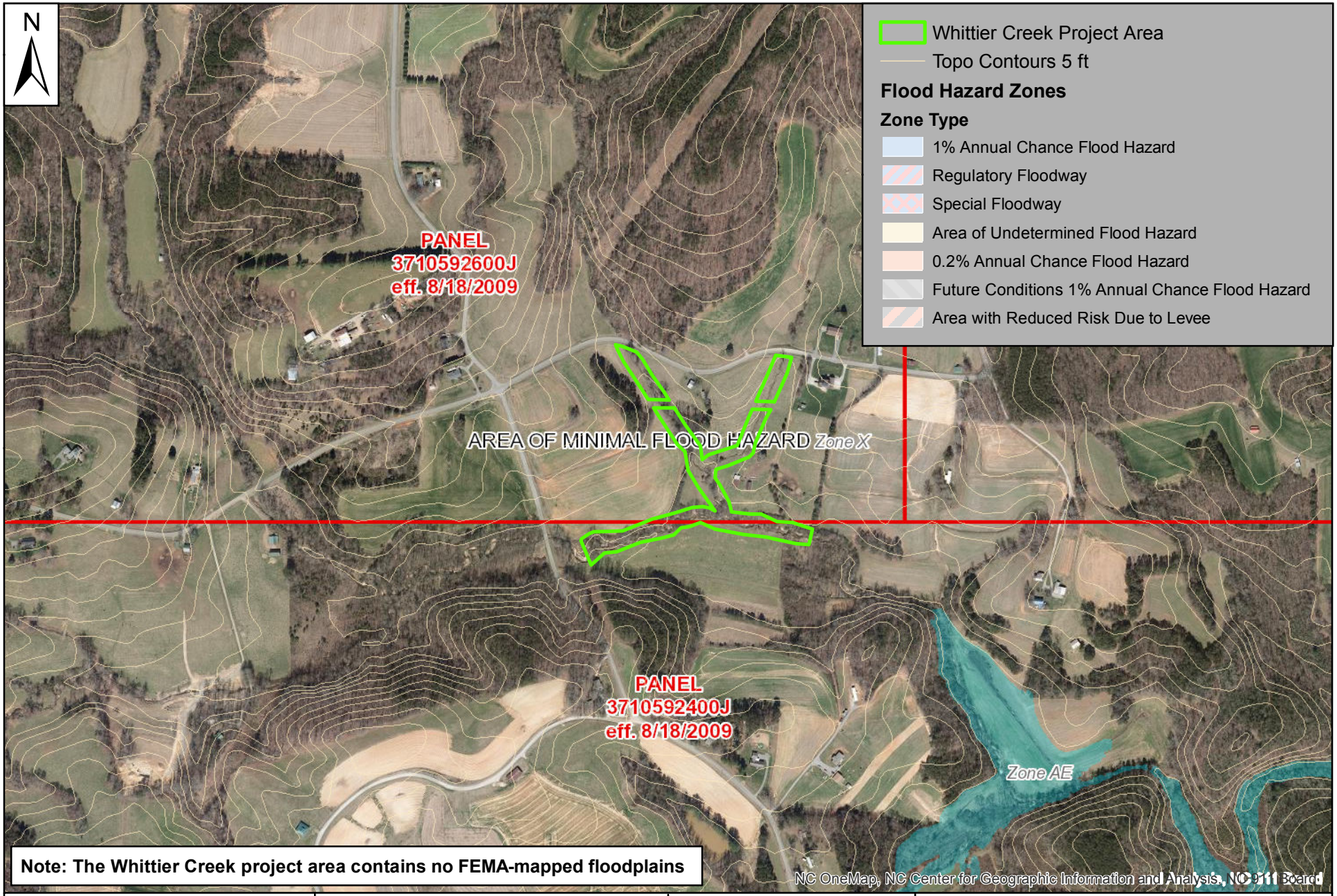
Michael Baker INTERNATIONAL

0 100 200 400 Feet

1 inch = 200 feet

North Carolina
Division of
Mitigation Services
DMS Project No. 100020

Figure 7. Soils Map
Whittier Creek Mitigation Project - Opt. D
Surry County, NC



Michael Baker INTERNATIONAL

0 300 600 1,200 Feet

North Carolina
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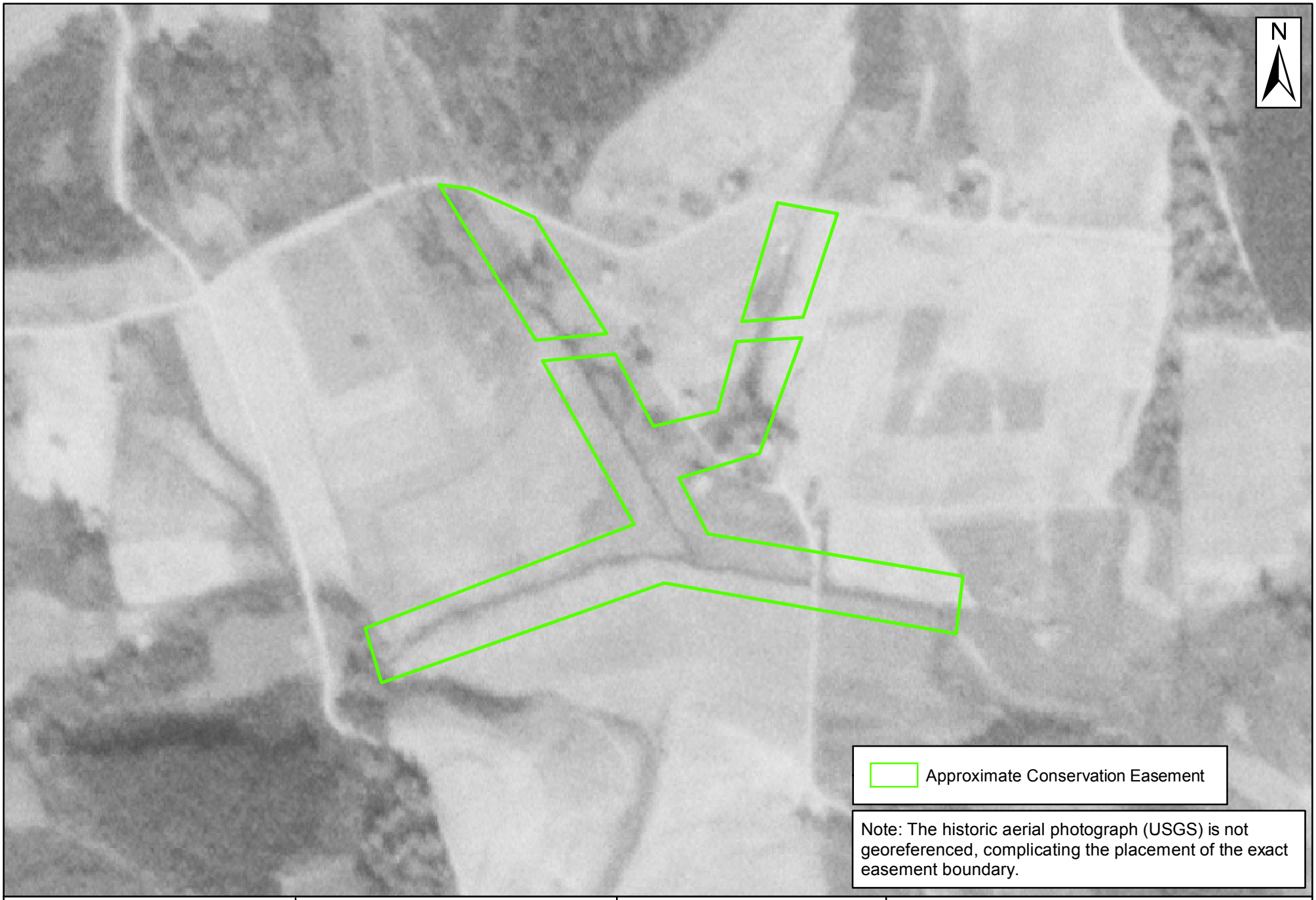
DMS Project No. 100020

Figure 8. FEMA Floodplain Map
Whittier Creek Mitigation Project - Opt. D
Surry County, NC

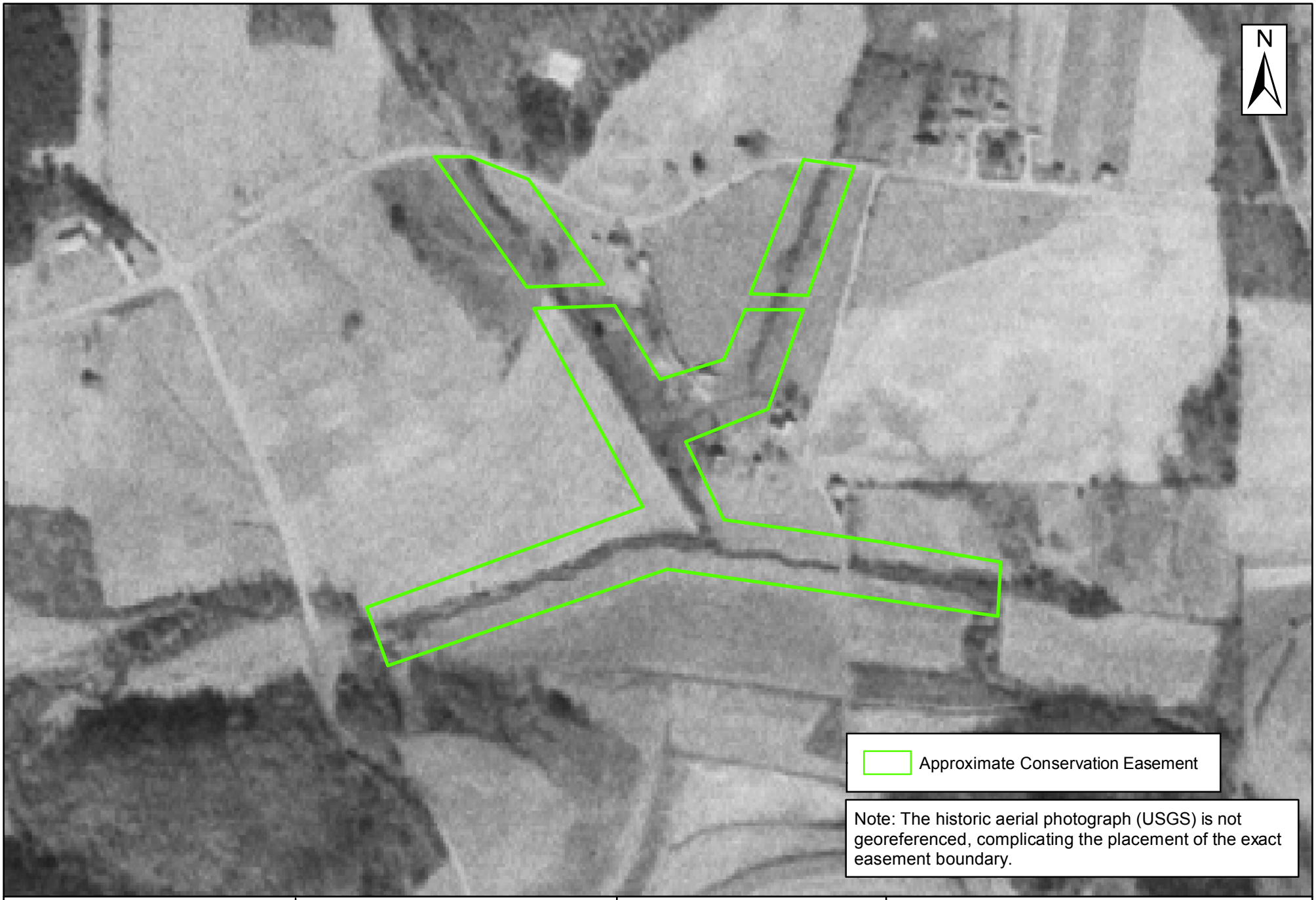


Michael Baker INTERNATIONAL

Not to Scale

North Carolina Division of Mitigation Services
DMS Project No. 100020

Figure 9A. Historic Aerial Image - 1950
Whittier Creek Mitigation Project - Opt. D
Surry County, NC

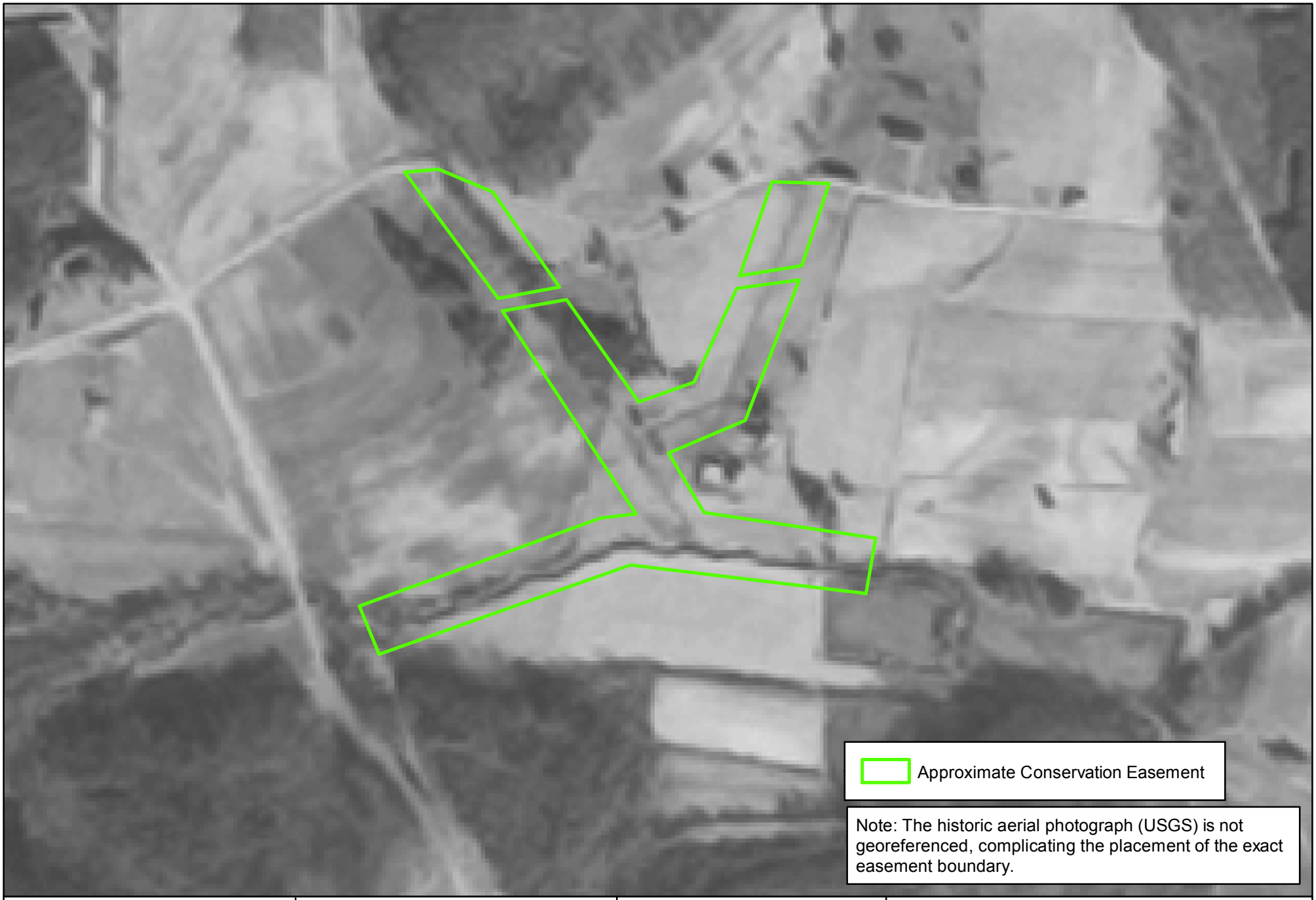


Michael Baker INTERNATIONAL

Not to Scale

North Carolina Division of Mitigation Services
DMS Project No. 100020

Figure 9B. Historic Aerial Image - 1976
Whittier Creek Mitigation Project - Opt. D
Surry County, NC

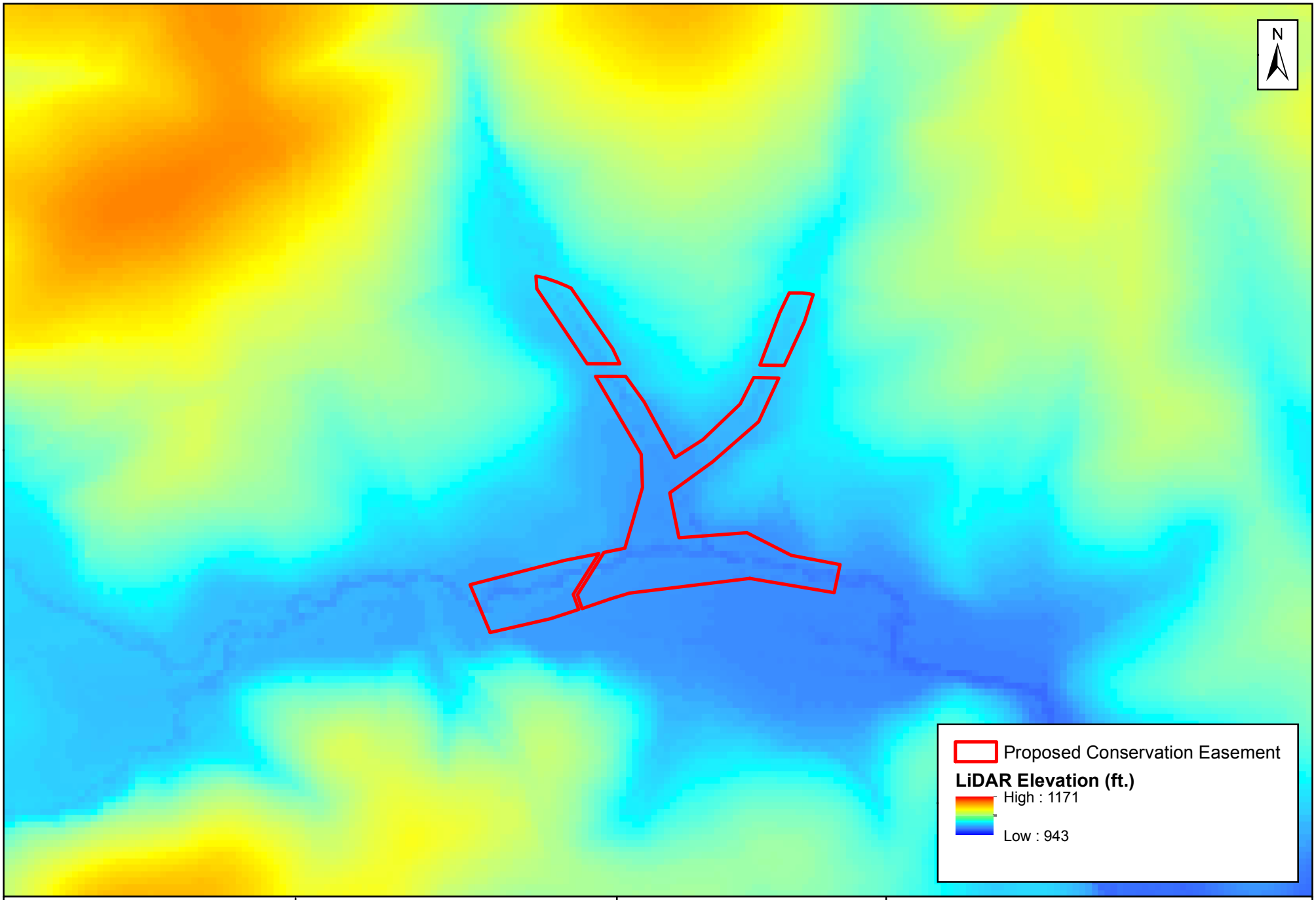


Michael Baker INTERNATIONAL

Not to Scale

North Carolina Division of Mitigation Services
DMS Project No. 100020

Figure 9C. Historic Aerial Image - 1993
Whittier Creek Mitigation Project - Opt. D
Surry County, NC



Michael Baker INTERNATIONAL

0 200 400 800 Feet

1 inch = 400 feet

North Carolina
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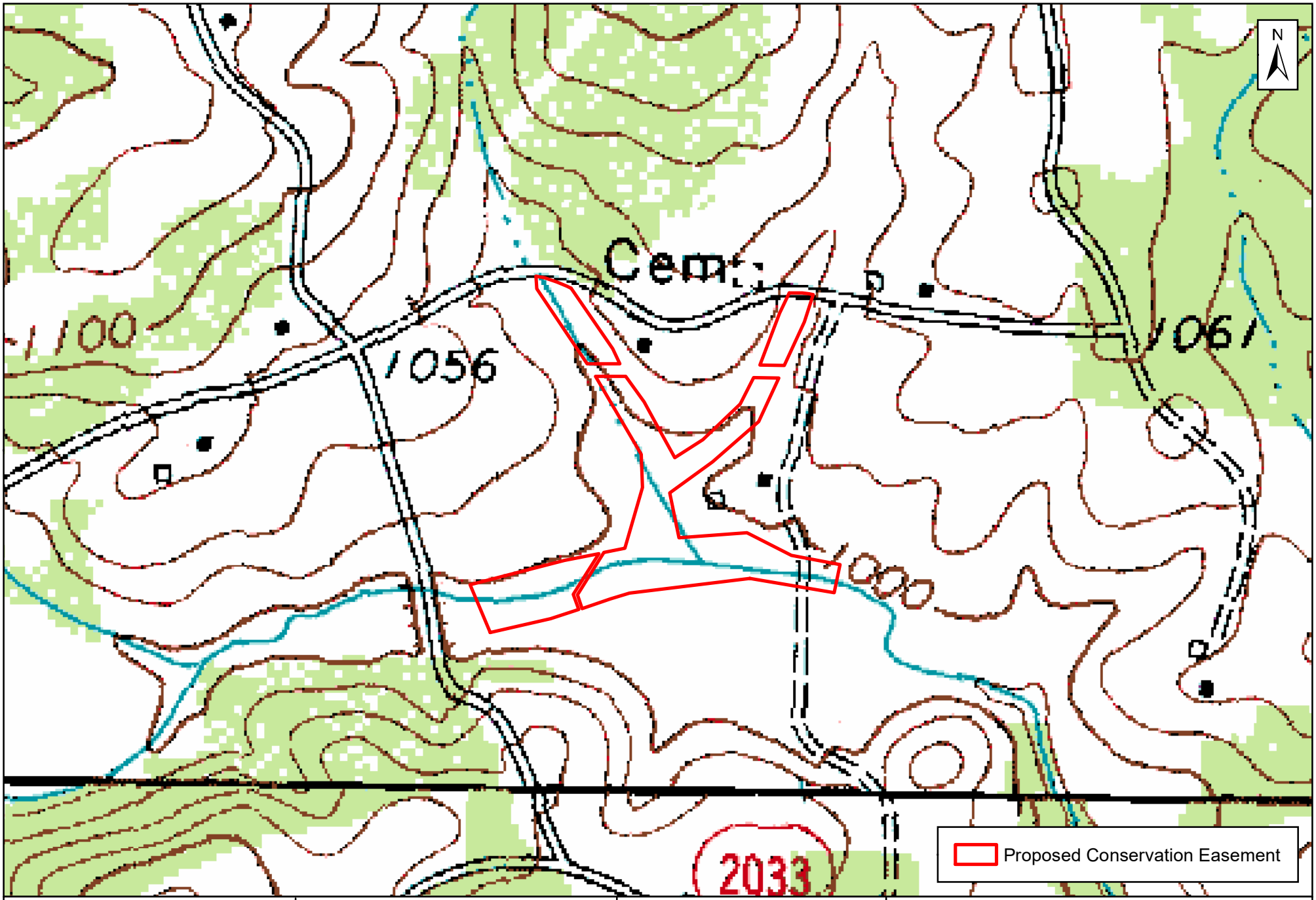
Mitigation Services
DMS Project No. 100020

Figure 10. LiDAR Map
Whittier Creek Mitigation Project - Opt. D
Surry County, NC



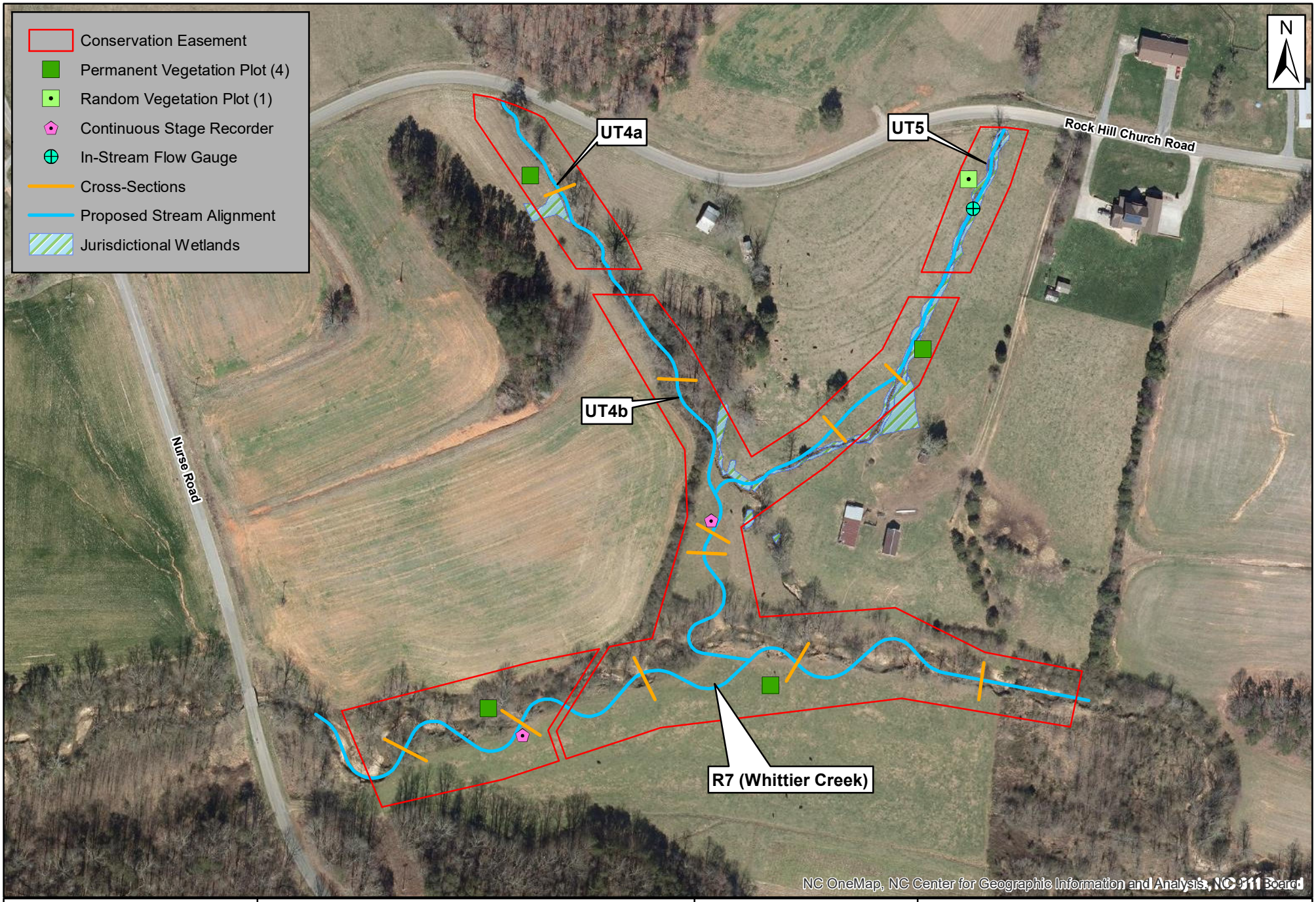
Michael Baker INTERNATIONAL

0 200 400 800 Feet

1 inch = 400 feet

North Carolina
Division of
Mitigation Services
DMS Project No. 100020

Figure 11. USGS Topographic Map
(Mount Airy South Quad, Siloam Quad)
Whittier Creek Mitigation Project - Opt. D
Surry County, NC



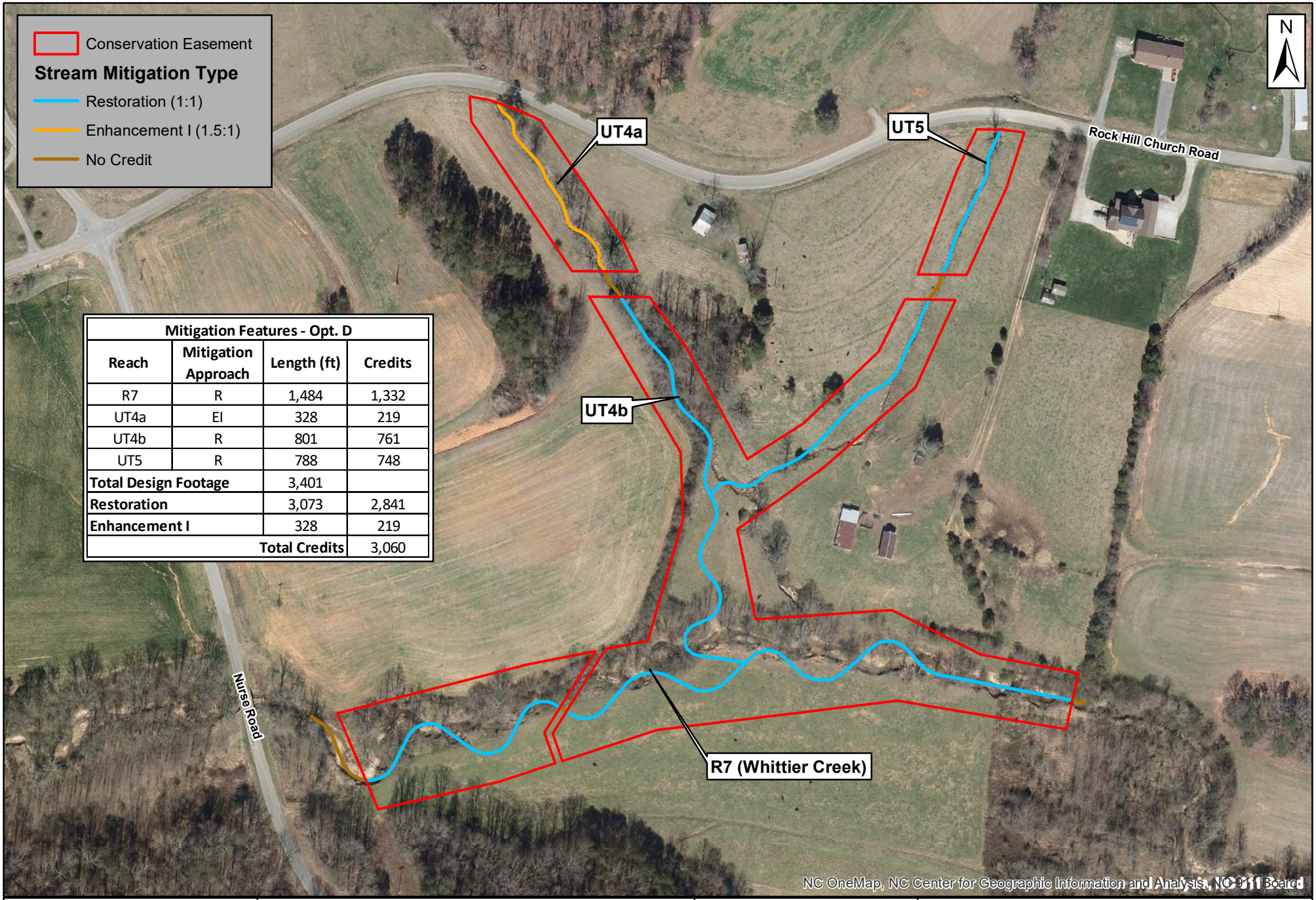
Michael Baker INTERNATIONAL

0 100 200 400 Feet

1 inch = 200 feet

North Carolina
Division of
Mitigation Services
DMS Project No. 100020

Figure 12. Proposed Monitoring Features
Whittier Creek Mitigation Project - Opt. D
Surry County, NC



Mitigation Features - Opt. D			
Reach	Mitigation Approach	Length (ft)	Credits
R7	R	1,484	1,332
UT4a	EI	328	219
UT4b	R	801	761
UT5	R	788	748
Total Design Footage		3,401	
Restoration		3,073	2,841
Enhancement I		328	219
		Total Credits	3,060

Michael Baker INTERNATIONAL

0 100 200 400 Feet

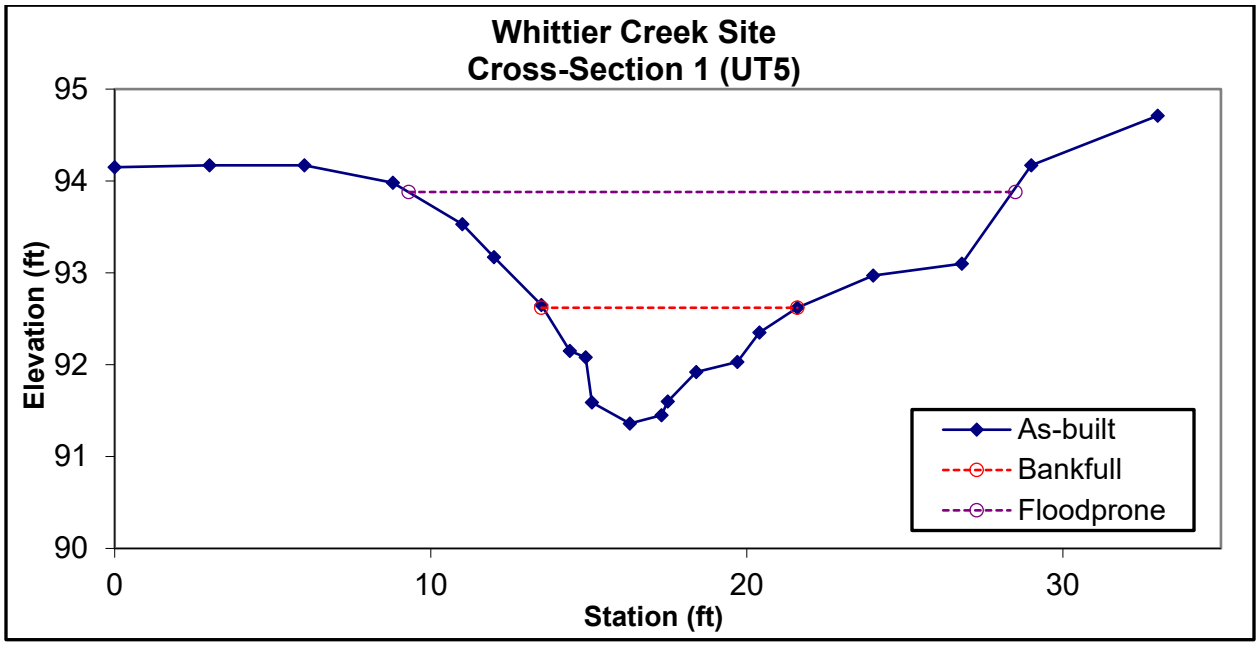
1 inch = 200 feet

North Carolina
Division of
Mitigation Services
DMS Project No. 100020

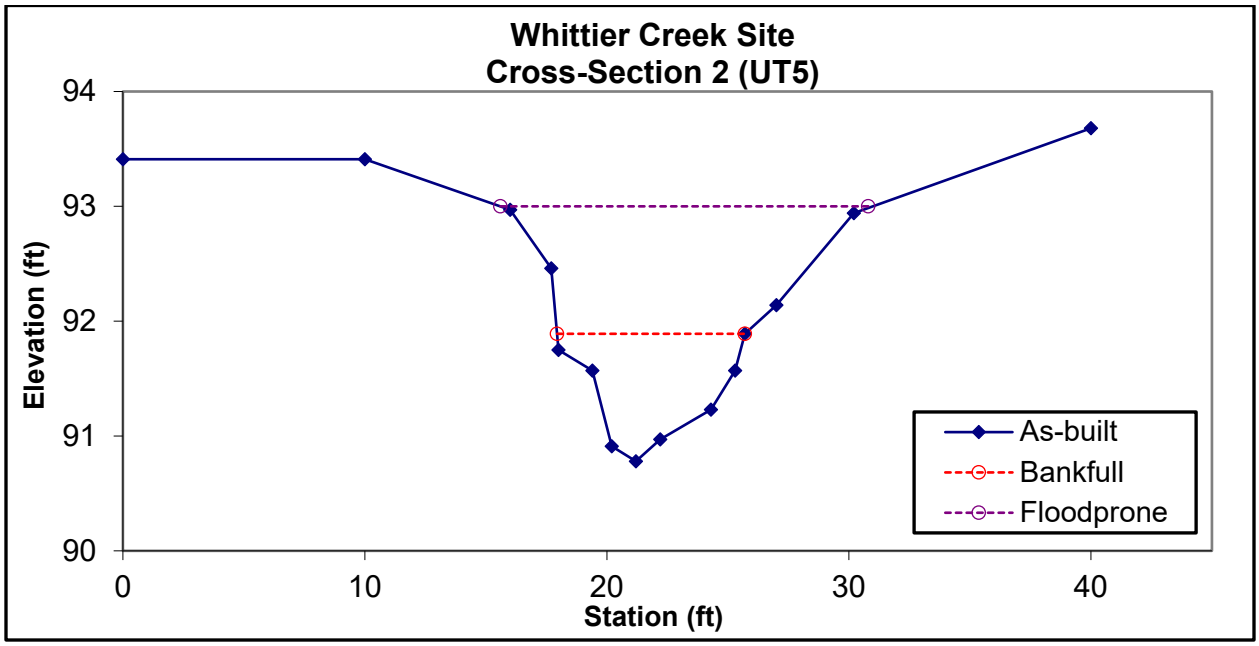
Figure 13. Project Asset and Credit Map
Whittier Creek Mitigation Project - Opt. D
Surry County, NC

Whittier Creek Cross-Section Graphs

Feature	Stream Type	BKF Area	BKF Width	BKF Depth	Max BKF Depth	W/D	BH Ratio	ER	BKF Elev	TOB Elev
Riffle	B4	5.49	8.05	0.68	1.26	11.8	2.2	2.38	92.62	93.17

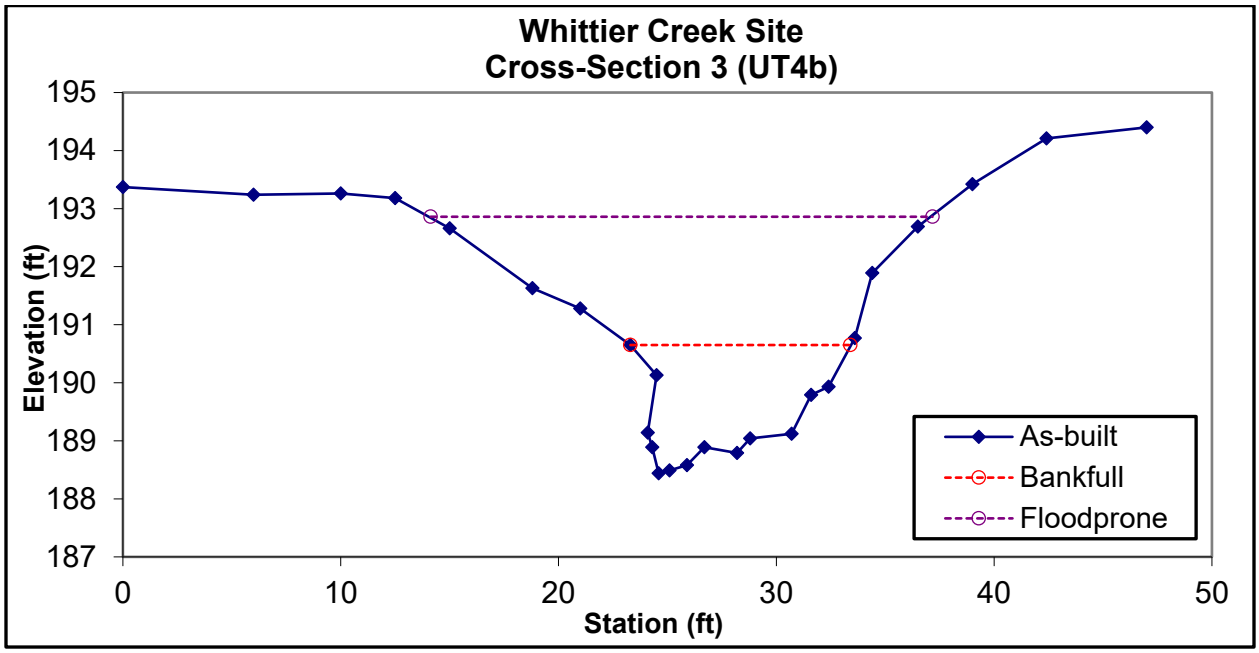


Feature	Stream Type	BKF Area	BKF Width	BKF Depth	Max BKF Depth	W/D	BH Ratio	ER	BKF Elev	TOB Elev
Riffle	B4	5.12	7.76	0.66	1.6	11.76	1.4	1.99	91.89	92.46

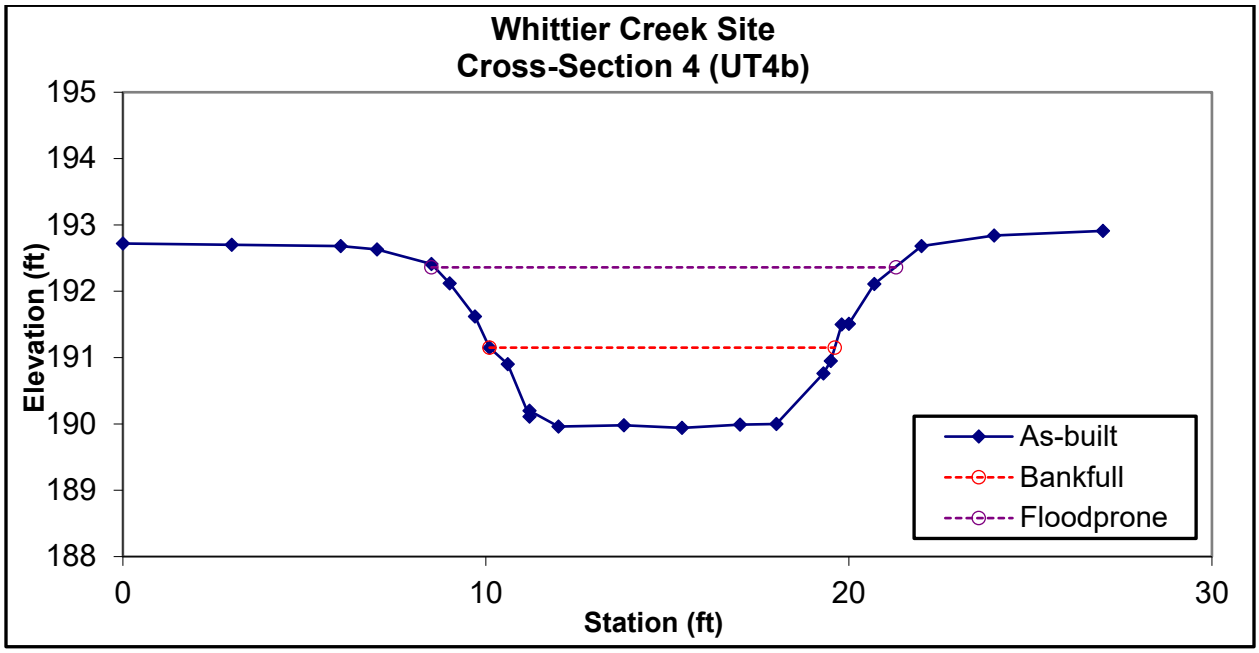


Whittier Creek Cross-Section Graphs

Feature	Stream Type	BKF Area	BKF Width	BKF Depth	Max BKF Depth	W/D	BH Ratio	ER	BKF Elev	TOB Elev
Riffle	E4	13.96	10.13	1.38	2.21	7.34	2.13	2.28	190.65	193.18

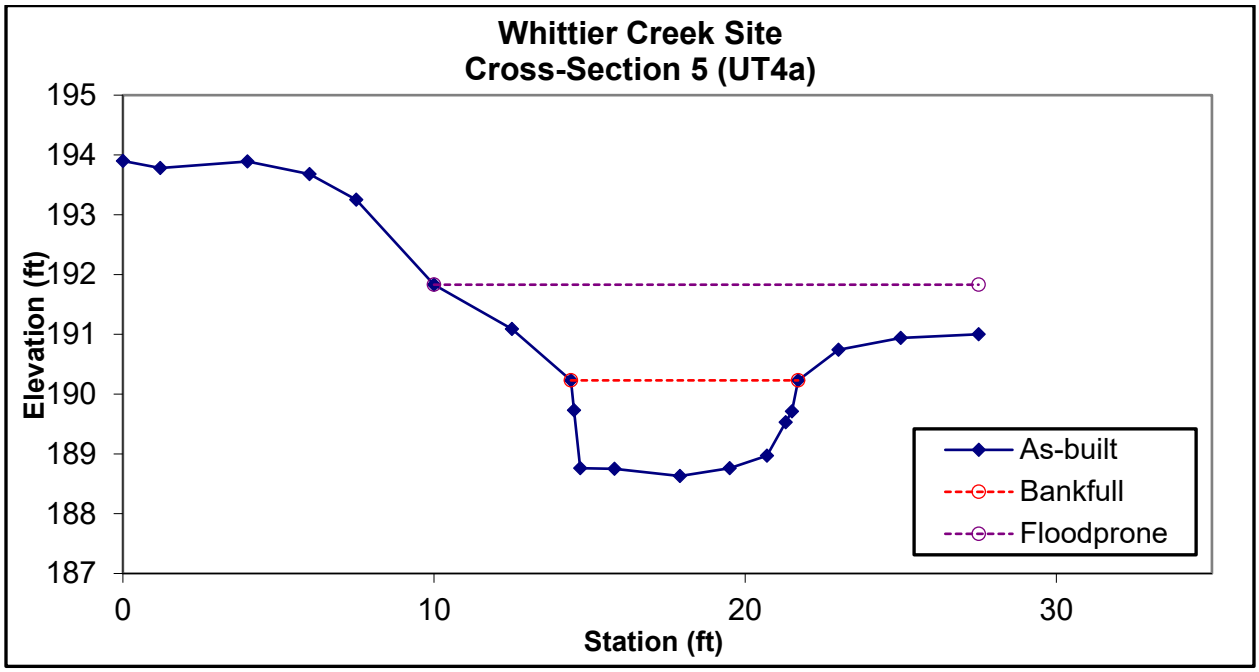


Feature	Stream Type	BKF Area	BKF Width	BKF Depth	Max BKF Depth	W/D	BH Ratio	ER	BKF Elev	TOB Elev
Riffle	G4	9.46	9.51	0.99	1.21	9.6	2.2	1.33	191.15	192.63

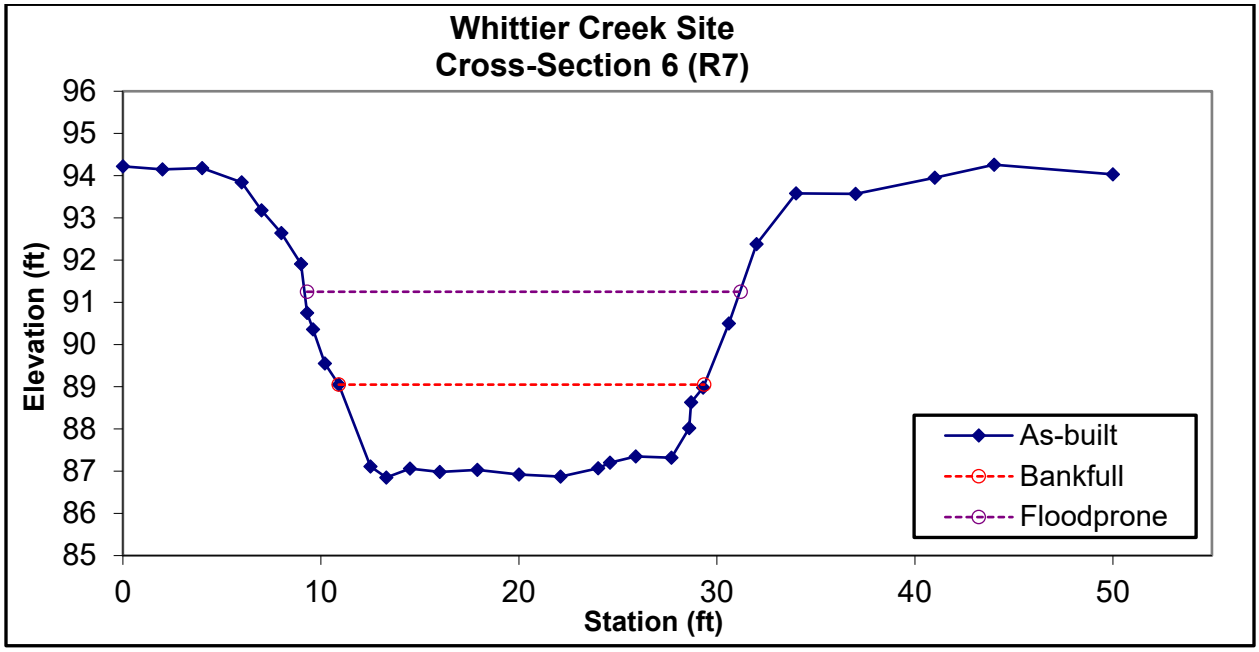


Whittier Creek Cross-Section Graphs

Feature	Stream Type	BKF Area	BKF Width	BKF Depth	Max BKF Depth	W/D	BH Ratio	ER	BKF Elev	TOB Elev
Riffle	E4b	9.93	7.3	1.36	1.6	5.37	1.3	2.4	190.23	190.74

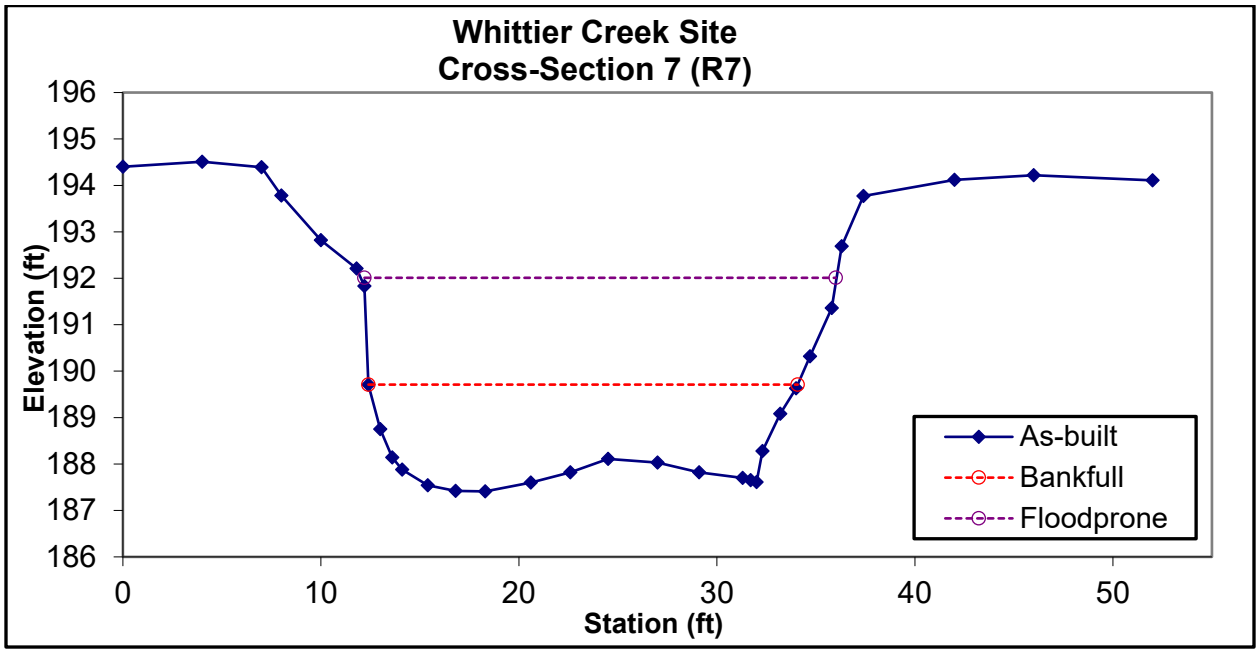


Feature	Stream Type	BKF Area	BKF Width	BKF Depth	Max BKF Depth	W/D	BH Ratio	ER	BKF Elev	TOB Elev
Riffle	G4	33.49	18.46	1.8	2.2	10.2	3.1	1.19	89.05	93.58



Whittier Creek Cross-Section Graphs

Feature	Stream Type	BKF Area	BKF Width	BKF Depth	Max BKF Depth	W/D	BH Ratio	ER	BKF Elev	TOB Elev
Riffle	F4	38.77	21.68	1.79	2.3	12.11	3.0	1.11	189.71	194.39



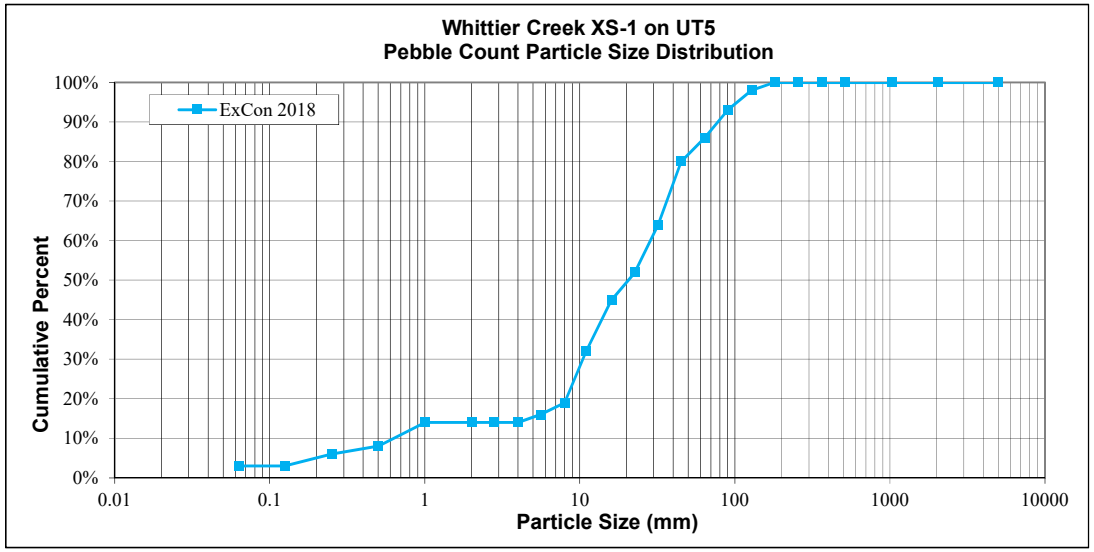
Pebble Count: Existing Conditions

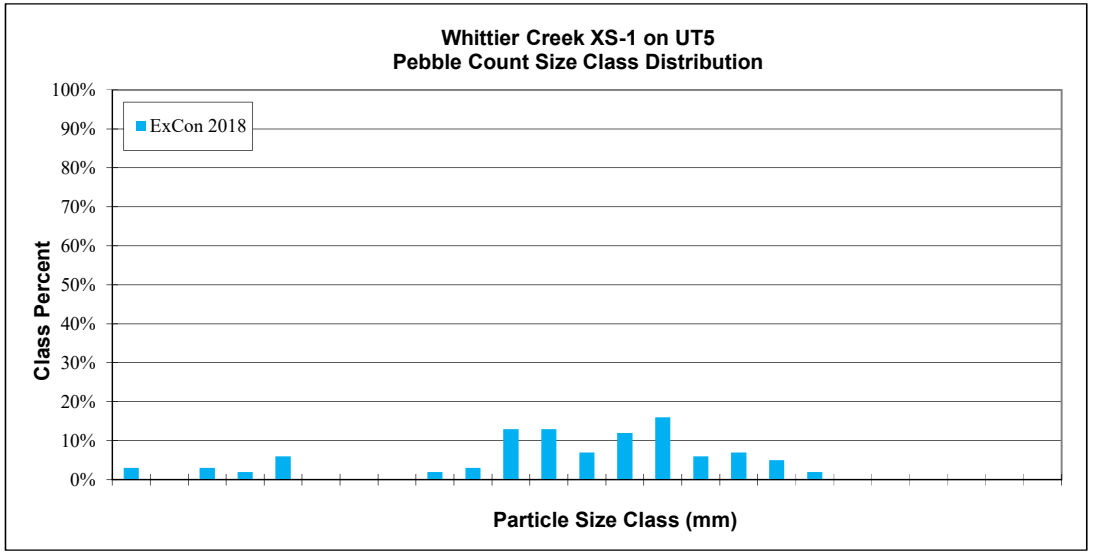
Whittier Creek Mitigation Project, DMS# 100020

SITE OR PROJECT:	Whittier Creek
REACH/LOCATION:	XS-1 on UT5
FEATURE:	Riffle
DATE:	04/09/2018

			ExCon 2018			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			3%	0.125
	Fine	.125 - .25	3	3%	6%	0.25
	Medium	.25 - .50	2	2%	8%	0.50
	Coarse	.50 - 1.0	6	6%	14%	1.0
	Very Coarse	1.0 - 2.0			14%	2.0
Gravel	Very Fine	2.0 - 2.8			14%	2.8
	Very Fine	2.8 - 4.0			14%	4.0
	Fine	4.0 - 5.6	2	2%	16%	5.6
	Fine	5.6 - 8.0	3	3%	19%	8.0
	Medium	8.0 - 11.0	13	13%	32%	11.0
	Medium	11.0 - 16.0	13	13%	45%	16.0
	Coarse	16 - 22.6	7	7%	52%	22.6
	Coarse	22.6 - 32	12	12%	64%	32
	Very Coarse	32 - 45	16	16%	80%	45
	Very Coarse	45 - 64	6	6%	86%	64
Cobble	Small	64 - 90	7	7%	93%	90
	Small	90 - 128	5	5%	98%	128
	Large	128 - 180	2	2%	100%	180
	Large	180 - 256			100%	256
Boulder	Small	256 - 362			100%	362
	Small	362 - 512			100%	512
	Medium	512 - 1024			100%	1024
	Large-Very Large	1024 - 2048			100%	2048
Bedrock	Bedrock	> 2048			100%	5000
Total % of whole count			100	100%		

Summary Data			
Channel materials			
D16 =	5.6	D84 =	56.9
D35 =	12.0	D95 =	103.6
D50 =	20.5	D100 =	128 - 180





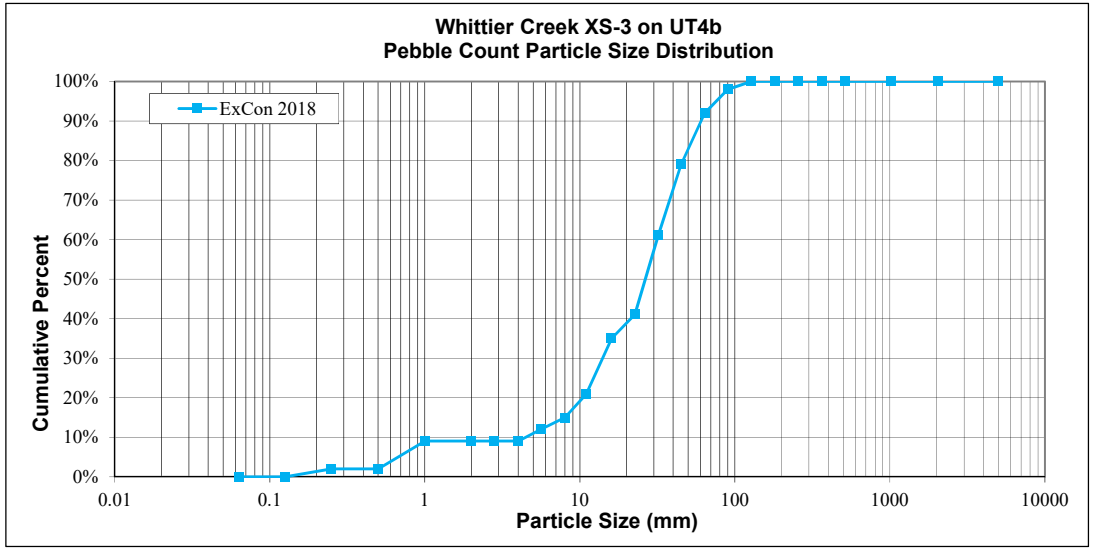
Pebble Count: Existing Conditions

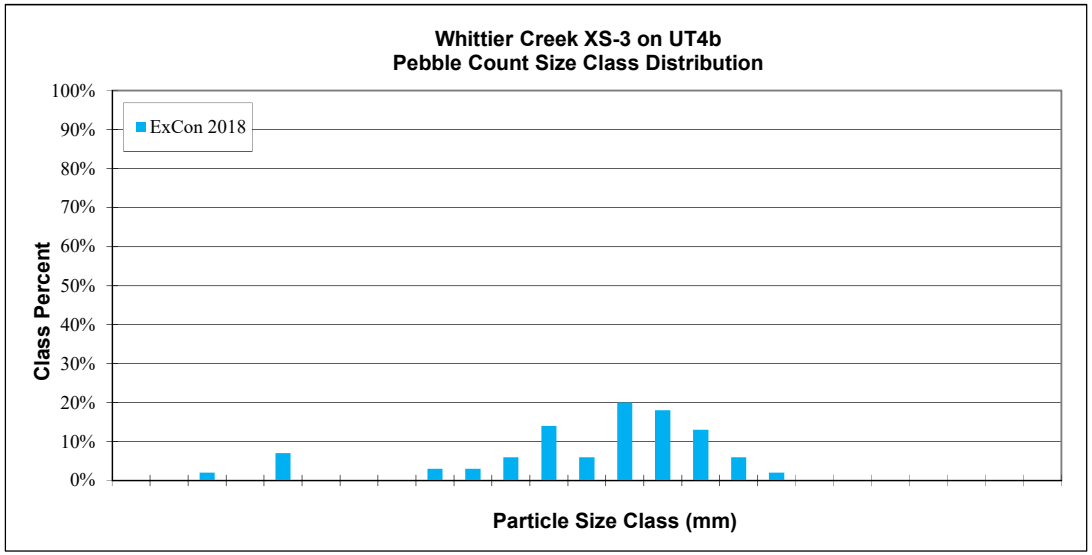
Whittier Creek Mitigation Project, DMS# 100020

SITE OR PROJECT:	Whittier Creek
REACH/LOCATION:	XS-3 on UT4b
FEATURE:	Riffle
DATE:	04/09/2018

			ExCon 2018			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	2	2%	2%	0.25
	Medium	.25 - .50			2%	0.50
	Coarse	.50 - 1.0	7	7%	9%	1.0
	Very Coarse	1.0 - 2.0			9%	2.0
Gravel	Very Fine	2.0 - 2.8			9%	2.8
	Very Fine	2.8 - 4.0			9%	4.0
	Fine	4.0 - 5.6	3	3%	12%	5.6
	Fine	5.6 - 8.0	3	3%	15%	8.0
	Medium	8.0 - 11.0	6	6%	21%	11.0
	Medium	11.0 - 16.0	14	14%	35%	16.0
	Coarse	16 - 22.6	6	6%	41%	22.6
	Coarse	22.6 - 32	20	20%	61%	32
	Very Coarse	32 - 45	18	18%	79%	45
	Very Coarse	45 - 64	13	13%	92%	64
Cobble	Small	64 - 90	6	6%	98%	90
	Small	90 - 128	2	2%	100%	128
	Large	128 - 180			100%	180
	Large	180 - 256			100%	256
Boulder	Small	256 - 362			100%	362
	Small	362 - 512			100%	512
	Medium	512 - 1024			100%	1024
	Large-Very Large	1024 - 2048			100%	2048
Bedrock	Bedrock	> 2048			100%	5000
Total % of whole count			100	100%		

Summary Data			
Channel materials			
D16 =	8.4	D84 =	51.5
D35 =	16.0	D95 =	75.9
D50 =	26.4	D100 =	90 - 128





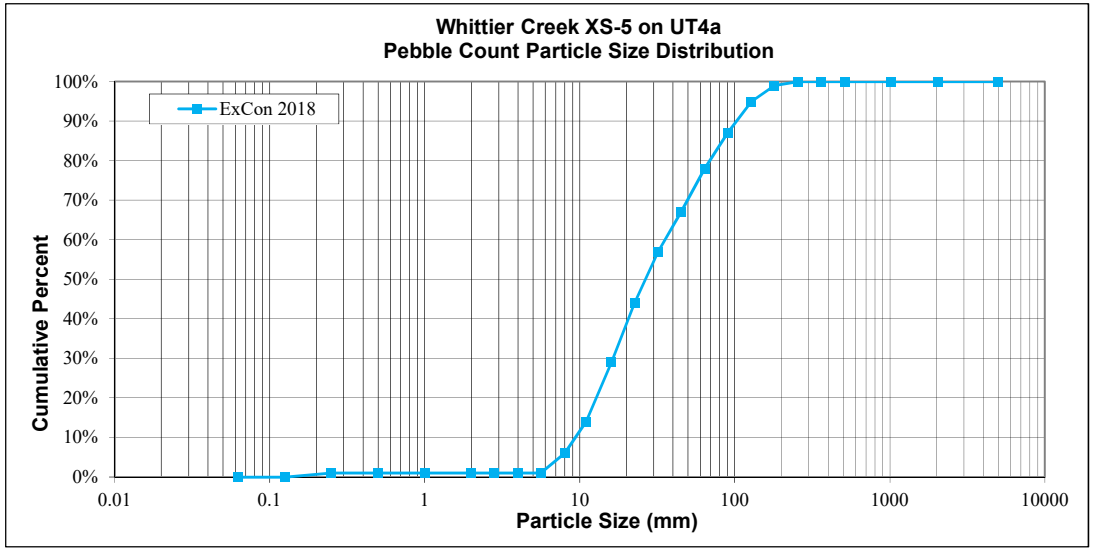
Pebble Count: Existing Conditions

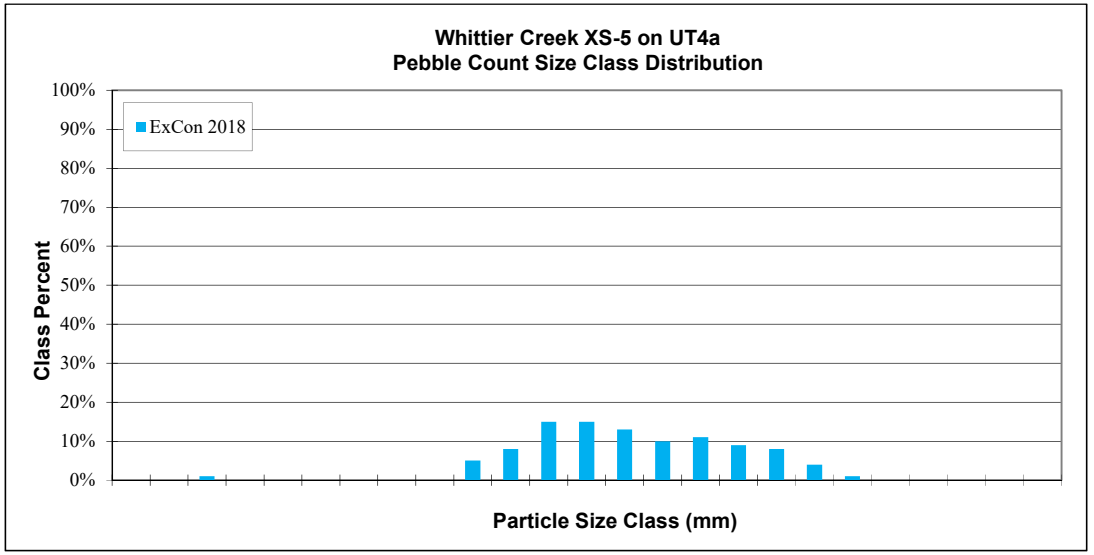
Whittier Creek Mitigation Project, DMS# 100020

SITE OR PROJECT:	Whittier Creek
REACH/LOCATION:	XS-5 on UT4a
FEATURE:	Riffle
DATE:	04/09/2018

			ExCon 2018			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	1	1%	1%	0.25
	Medium	.25 - .50			1%	0.50
	Coarse	.50 - 1.0			1%	1.0
	Very Coarse	1.0 - 2.0			1%	2.0
Gravel	Very Fine	2.0 - 2.8			1%	2.8
	Very Fine	2.8 - 4.0			1%	4.0
	Fine	4.0 - 5.6			1%	5.6
	Fine	5.6 - 8.0	5	5%	6%	8.0
	Medium	8.0 - 11.0	8	8%	14%	11.0
	Medium	11.0 - 16.0	15	15%	29%	16.0
	Coarse	16 - 22.6	15	15%	44%	22.6
	Coarse	22.6 - 32	13	13%	57%	32
	Very Coarse	32 - 45	10	10%	67%	45
	Very Coarse	45 - 64	11	11%	78%	64
Cobble	Small	64 - 90	9	9%	87%	90
	Small	90 - 128	8	8%	95%	128
	Large	128 - 180	4	4%	99%	180
	Large	180 - 256	1	1%	100%	256
Boulder	Small	256 - 362			100%	362
	Small	362 - 512			100%	512
	Medium	512 - 1024			100%	1024
	Large-Very Large	1024 - 2048			100%	2048
Bedrock	Bedrock	> 2048			100%	5000
Total % of whole count			100	100%		

Summary Data			
Channel materials			
D16 =	11.6	D84 =	80.3
D35 =	18.4	D95 =	128.0
D50 =	26.5	D100 =	180 - 256





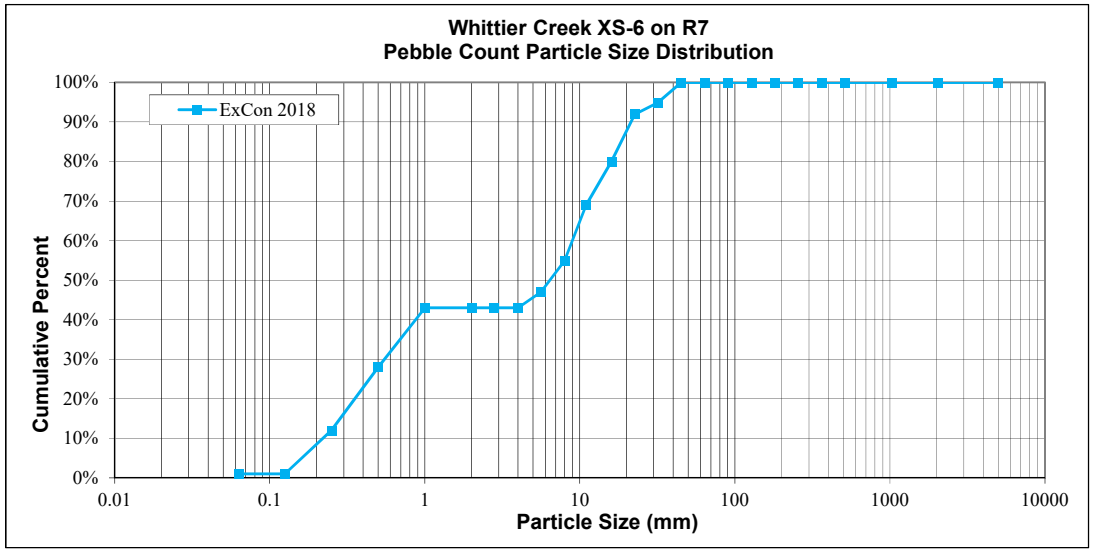
Pebble Count: Existing Conditions

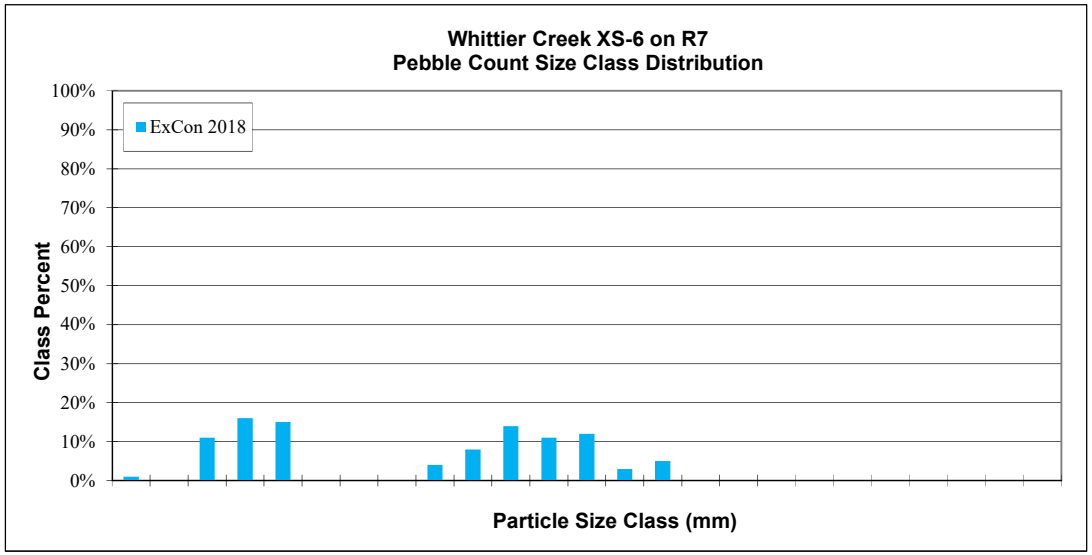
Whittier Creek Mitigation Project, DMS# 100020

SITE OR PROJECT:	Whittier Creek
REACH/LOCATION:	XS-6 on R7
FEATURE:	Riffle
DATE:	04/09/2018

			ExCon 2018			Distribution
MATERIAL	**PARTICLE**	**SIZE (mm)**	**Total**	**Class %**	**% Cum**	**Plot Size (mm)**
Silt/Clay	Silt / Clay	< .063	1	1%	1%	0.063
Sand	Very Fine	.063 - .125			1%	0.125
	Fine	.125 - .25	11	11%	12%	0.25
	Medium	.25 - .50	16	16%	28%	0.50
	Coarse	.50 - 1.0	15	15%	43%	1.0
	Very Coarse	1.0 - 2.0			43%	2.0
Gravel	Very Fine	2.0 - 2.8			43%	2.8
	Very Fine	2.8 - 4.0			43%	4.0
	Fine	4.0 - 5.6	4	4%	47%	5.6
	Fine	5.6 - 8.0	8	8%	55%	8.0
	Medium	8.0 - 11.0	14	14%	69%	11.0
	Medium	11.0 - 16.0	11	11%	80%	16.0
	Coarse	16 - 22.6	12	12%	92%	22.6
	Coarse	22.6 - 32	3	3%	95%	32
	Very Coarse	32 - 45	5	5%	100%	45
	Very Coarse	45 - 64			100%	64
Cobble	Small	64 - 90			100%	90
	Small	90 - 128			100%	128
	Large	128 - 180			100%	180
	Large	180 - 256			100%	256
Boulder	Small	256 - 362			100%	362
	Small	362 - 512			100%	512
	Medium	512 - 1024			100%	1024
	Large-Very Large	1024 - 2048			100%	2048
Bedrock	Bedrock	> 2048			100%	5000
Total % of whole count			100	100%		

Summary Data			
Channel materials			
D16 =	0.3	D84 =	18.0
D35 =	0.7	D95 =	32.0
D50 =	6.4	D100 =	32 - 45





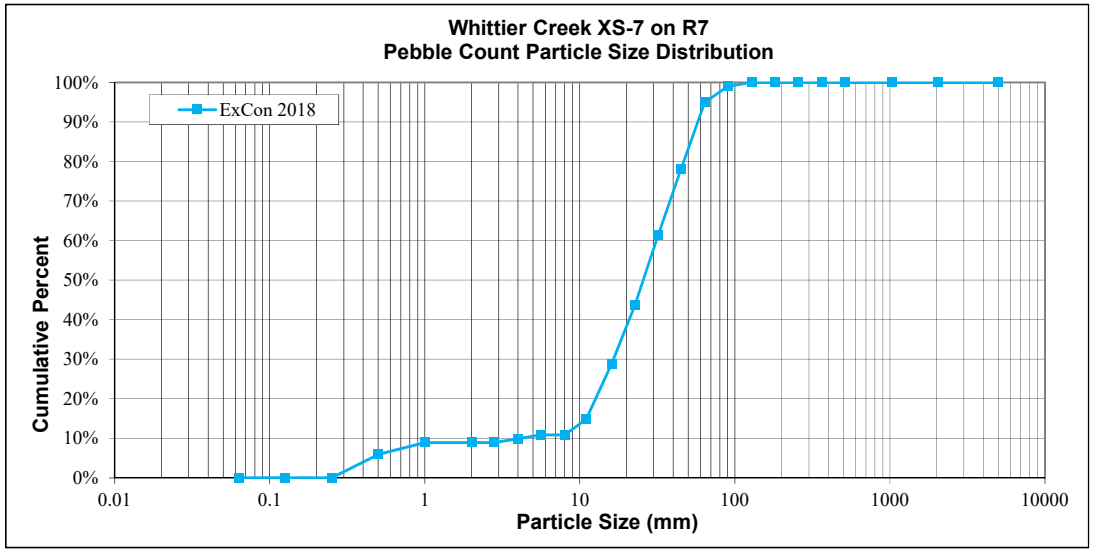
Pebble Count: Existing Conditions

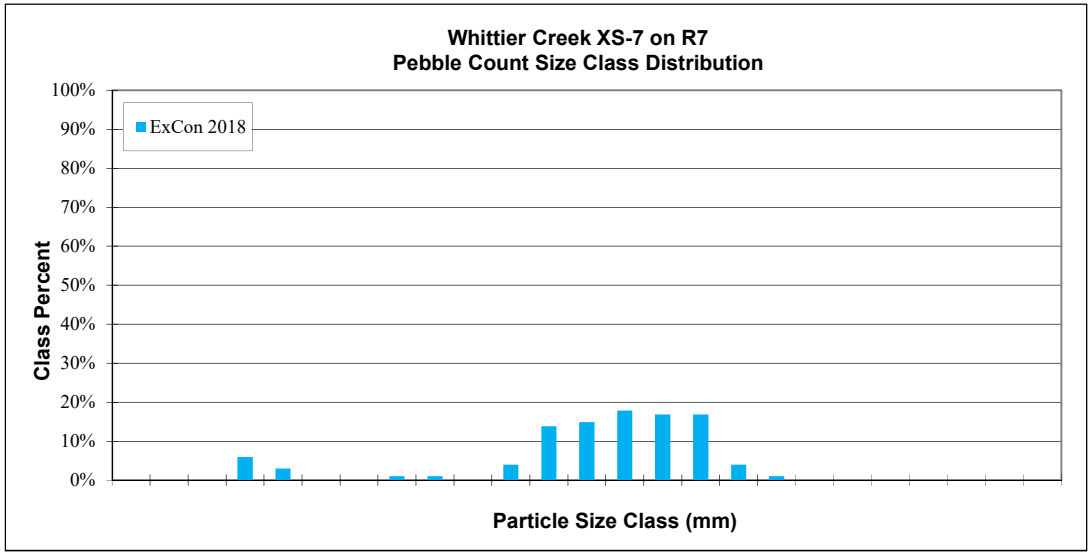
Whittier Creek Mitigation Project, DMS# 100020

SITE OR PROJECT:	Whittier Creek
REACH/LOCATION:	XS-7 on R7
FEATURE:	Riffle
DATE:	04/09/2018

			ExCon 2018			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	6	6%	6%	0.50
	Coarse	.50 - 1.0	3	3%	9%	1.0
	Very Coarse	1.0 - 2.0			9%	2.0
Gravel	Very Fine	2.0 - 2.8			9%	2.8
	Very Fine	2.8 - 4.0	1	1%	10%	4.0
	Fine	4.0 - 5.6	1	1%	11%	5.6
	Fine	5.6 - 8.0			11%	8.0
	Medium	8.0 - 11.0	4	4%	15%	11.0
	Medium	11.0 - 16.0	14	14%	29%	16.0
	Coarse	16 - 22.6	15	15%	44%	22.6
	Coarse	22.6 - 32	18	18%	61%	32
	Very Coarse	32 - 45	17	17%	78%	45
	Very Coarse	45 - 64	17	17%	95%	64
Cobble	Small	64 - 90	4	4%	99%	90
	Small	90 - 128	1	1%	100%	128
	Large	128 - 180			100%	180
	Large	180 - 256			100%	256
Boulder	Small	256 - 362			100%	362
	Small	362 - 512			100%	512
	Medium	512 - 1024			100%	1024
	Large-Very Large	1024 - 2048			100%	2048
Bedrock	Bedrock	> 2048			100%	5000
Total % of whole count			101	100%		

Summary Data			
Channel materials			
D16 =	11.3	D84 =	50.8
D35 =	18.5	D95 =	63.9
D50 =	25.6	D100 =	90 - 128





Whittier Creek Existing Conditions Photographs

Upper UT5, upstream (8/3/18)

Upper UT5 at XS-1, downstream (4/9/18)

Middle UT5, downstream (4/9/18)

Lower UT5 at XS-2, upstream (4/9/18)

Lower UT5, upstream (12/12/17)

Lower UT5, downstream (12/12/17)

Whittier Creek Existing Conditions Photographs

Top of UT4a, downstream (12/12/17)

UT4a, upstream (12/12/17)

UT4a at XS-5, downstream (4/9/18)

UT4a, downstream (12/12/17)

Lower UT4a at bedrock, downstream (12/12/17)

Upper UT4b, left bank (12/12/17)

Whittier Creek Existing Conditions Photographs

Upper UT4b, downstream (12/12/17)

Middle UT4b, downstream (12/12/17)

Lower UT4b, downstream (4/9/18)

Lower UT4b, upstream (4/9/18)

Lower UT4b, downstream (4/9/18)

Upper R7, upstream (12/12/17)

Whittier Creek Existing Conditions Photographs

Upper R7, downstream (12/12/17)

Upper R7, downstream (12/12/17)

Upper R7, downstream (12/12/17)

Upper R7, upstream (12/12/17)

Middle R7, right bank (12/12/17)

Middle R7, downstream (12/12/17)

Whittier Creek Existing Conditions Photographs

Middle R7, upstream (12/12/17)

Middle R7, right bank (4/9/18)

Middle R7, downstream (4/9/18)

Middle R7 at XS-7, downstream (4/9/18)

Middle R7 at confluence with UT4b (4/9/18)

Lower R7, left bank (4/9/18)

Whittier Creek Existing Conditions Photographs

Lower R7, downstream (4/9/18)

Lower R7 at XS-6, downstream (4/9/18)

Lower R7, downstream (4/9/18)

Lower R7, upstream (4/9/18)

Lower R7, downstream (4/9/18)

Lower R7, left bank (4/9/18)

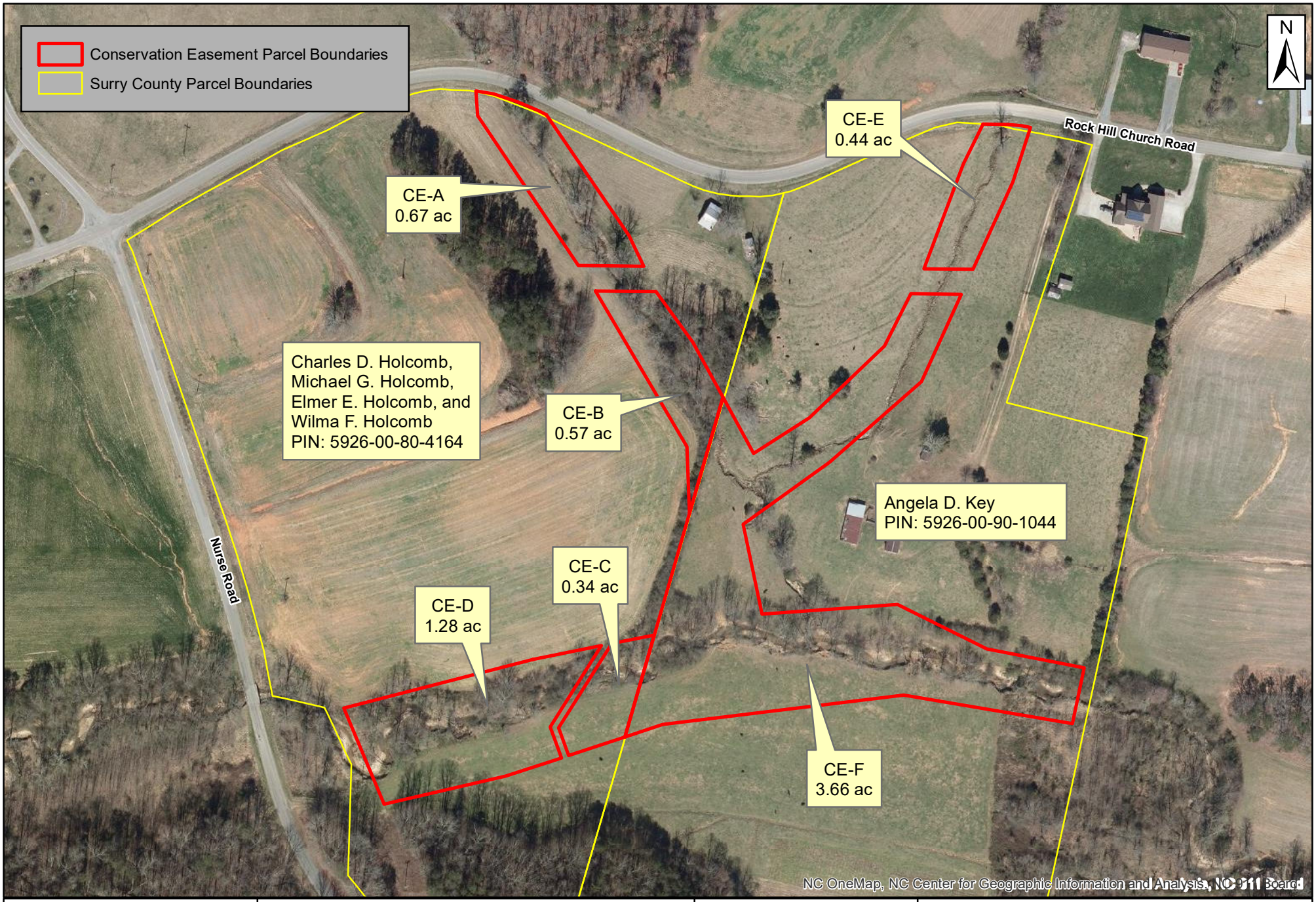
APPENDIX B: (SITE PROTECTION INSTRUMENT)

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 copies of the recorded survey plat are provided below.

Table B.1 Site Protection Instrument Summary
Whittier Creek Site – Option D Mitigation Project – NCDMS Project No. 100020

Parcel Number	Landowners	PIN	County	Site Protection Instrument	Deed Book and Page Numbers	Acreage Protected
CE-A	Charles D. Holcomb, Michael G. Holcomb, Elmer E. Holcomb, and Wilma F. Holcomb	592600804164	Surry	Conservation Easement	Book 1655, Pages 43-57	0.67
CE-B	Charles D. Holcomb, Michael G. Holcomb, Elmer E. Holcomb, and Wilma F. Holcomb	592600804164	Surry	Conservation Easement	Book 1655, Pages 43-57	0.57
CE-C	Charles D. Holcomb, Michael G. Holcomb, Elmer E. Holcomb, and Wilma F. Holcomb	592600804164	Surry	Conservation Easement	Book 1655, Pages 43-57	0.34
CE-D	Charles D. Holcomb, Michael G. Holcomb, Elmer E. Holcomb, and Wilma F. Holcomb	592600804164	Surry	Conservation Easement	Book 1655, Pages 43-57	1.28
CE-E	Angela D. Key	592600901044	Surry	Conservation Easement	Book 1655, Pages 58-70	0.44
CE-F	Angela D. Key	592600901044	Surry	Conservation Easement	Book 1655, Pages 58-70	3.66

A conservation easement has been obtained and recorded from the current landowners for the entire project. The easement and survey plat was reviewed and approved by NCDMS and State Property Office (SPO) and is now held by the State of North Carolina. The easements were recorded into Deed Book 1655 Pages 43-70 and the surveyed plat was recorded into Plat Book 35 Page 166 at the Surry County Register of Deeds on December 20, 2018. The secured conservation easement allows Baker to proceed with the restoration project and restricts the land use in perpetuity.



Michael Baker INTERNATIONAL

0 100 200 400 Feet

1 inch = 200 feet

North Carolina
Division of
Mitigation Services
DMS Project No. 100020

Figure B.1 Site Protection Instrument Map
Whittier Creek Mitigation Project - Opt. D
Surry County, NC

PLAT BOOK: 35 PAGE: 166

SURRY COUNTY, NORTH CAROLINA

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

I, Adrienne Gardner REVIEW OFFICER FOR SURRY 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.

Adrienne Gardner 12/20/2018
REVIEW OFFICER DATE

REGISTERED THIS THE 20 DAY OF December, 2018 AT 2:50 pm AND RECORDED IN PLAT BOOK 35 PAGE 166 BY:

Jennifer H. Crater
DEPUTY

Carolyn M. Comer
REGISTER OF DEEDS

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: 1489, PG: 874, DB: 1153, PG: 678, AND PB: 9, PG: 64; THAT THE BOUNDARIES NOT SURVEYED ARE INDICATED AS DRAWN FROM INFORMATION AS REFERENCED; THAT THE RATIO OF PRECISION AS CALCULATED DOES NOT EXCEED 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 EXCEPTION TO THE DEFINITION OF SUBDIVISION.

GPS METADATA
CLASS OF SURVEY: HORIZONTAL: A VERTICAL: C
FIELD PROCEDURE: STATIC NETWORK
DATES: 01/17/18-01/18/18
DATUM: NAD83(2011) NAVD 88
EPOCH: 2010
GEOID: 12B
AVERAGE COMBINED FACTOR: 1.00002263
POSITIONAL ACCURACY: HORIZONTAL: 0.03 VERTICAL: 0.06
UNITS: USFT
CORS USED: DOBS, NCSR, NCWC, NCST

WITNESS MY ORIGINAL SIGNATURE, LICENSE NUMBER, AND SEAL THIS 3RD DAY OF DECEMBER, 2018, A.D.

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

Hampton James Lark
HAMPTON JAMES LARK, PLS L-2865

CERTIFICATE OF OWNERSHIP AND DEDICATION:

WE, THE UNDERSIGNED, CERTIFY THAT WE ARE THE OWNER OF THE PROPERTY SHOWN AND DESCRIBED HEREON AND ACCEPT AND ADOPT THIS PLAT AND THE CONSERVATION EASEMENTS WITH OUR FREE CONSENT AND DEDICATE, GRANT AND CONVEY AN EASEMENT OVER OUR ADJACENT PROPERTY FOR ACCESS TO AND FROM THE CONSERVATION EASEMENTS SET FORTH HEREIN.

Charles Dean Holcomb 12-13-18
CHARLES DEAN HOLCOMB DATE

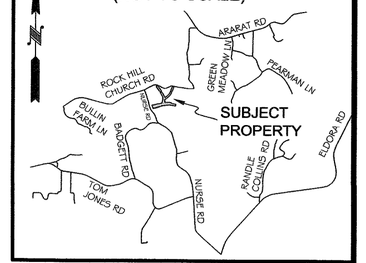
Michael Gene Holcomb 12/13/18
MICHAEL GENE HOLCOMB DATE

Elmer E Holcomb 12/13/18
ELMER E. HOLCOMB DATE

Wilma F. Holcomb 12/13/18
WILMA F. HOLCOMB DATE

Angela D. Key 12-13-18
ANGELA D. KEY DATE

VICINITY MAP
(NOT TO SCALE)



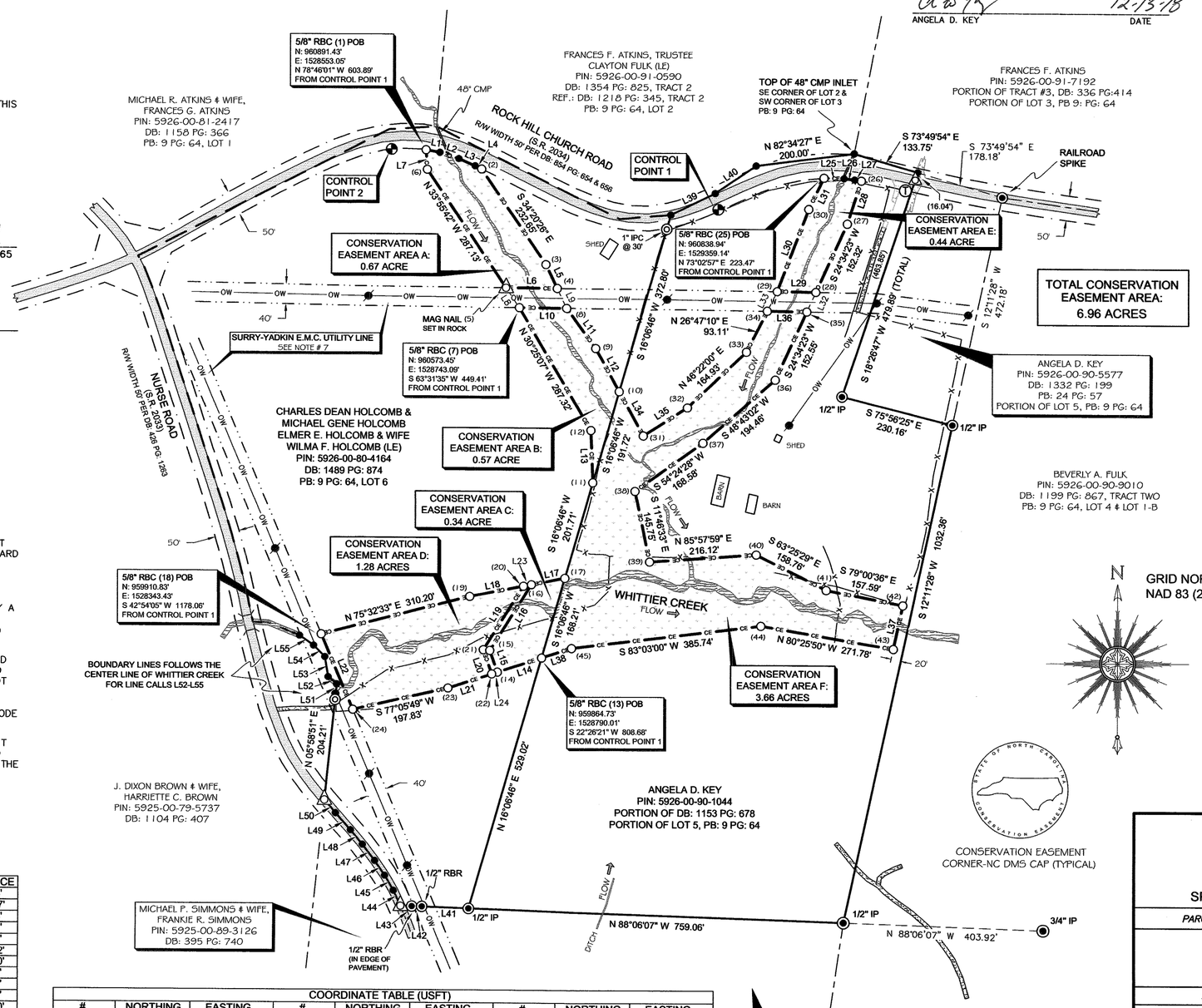
SURVEYOR'S NOTES:

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. SURRY 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# 3710592600J & 3710592400J DATED 8/18/2009.
7. 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 SURRY-YADKIN E.M.C. SEE DB: 295 PG: 917 IN WHICH NO WIDTH IS GIVEN.
8. 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.
9. PROPERTY IS ZONED RA. REFER TO SURRY COUNTY, NC CODE OF ORDINANCES.
10. ALL EXISTING FENCES WITHIN THE CONSERVATION EASEMENT AREAS ARE TO BE REMOVED AND NEW FENCING INSTALLED FOR LIVESTOCK EXCLUSION IS TO BE PLACED OUTSIDE OF THE CONSERVATION EASEMENT.

0' 180' 360' 540'

ONE INCH = ONE HUNDRED EIGHTY FEET

LINE	BEARING	DISTANCE	LINE	BEARING	DISTANCE
L1	S 79°55'20" E	28.55'	L29	N 85°20'29" W	78.08'
L2	S 72°05'51" E	40.33'	L30	N 20°47'52" E	178.17'
L3	S 66°37'03" E	36.02'	L31	N 25°51'04" E	70.68'
L4	S 64°12'23" E	14.53'	L32	S 24°34'23" W	43.76'
L5	S 25°27'35" E	53.61'	L33	S 26°47'10" W	44.55'
L6	N 89°35'55" W	103.92'	L34	S 28°39'05" E	101.72'
L7	N 03°57'02" W	39.64'	L35	N 57°20'40" E	105.70'
L8	S 33°55'42" E	48.44'	L36	S 89°20'29" E	79.96'
L9	S 25°27'35" E	44.45'	L37	S 12°11'28" W	90.38'
L10	S 89°35'55" E	96.00'	L38	S 71°48'45" W	63.48'
L11	S 36°05'33" E	100.02'	L39	N 63°54'33" E	100.00'
L12	S 28°39'05" E	99.87'	L40	N 55°34'27" E	100.00'
L13	N 02°14'07" W	105.63'	L41	N 88°06'07" W	100.53'
L14	S 71°48'45" W	94.28'	L42	N 88°06'07" W	27.58'
L15	N 19°31'56" W	46.50'	L43	N 88°06'07" W	9.79'
L16	N 32°09'33" E	158.12'	L44	N 24°55'36" W	34.39'
L17	N 78°50'11" E	68.95'	L45	N 29°54'12" W	35.16'
L18	N 78°50'11" E	111.17'	L46	N 34°08'54" W	36.08'
L19	S 32°09'33" W	152.61'	L47	N 37°15'36" W	41.16'
L20	S 19°31'56" E	52.03'	L48	N 40°01'49" W	37.77'
L21	S 71°48'45" W	93.23'	L49	N 41°38'20" W	45.93'
L22	N 22°49'23" W	165.50'	L50	N 40°46'04" W	34.78'
L23	N 78°50'11" E	16.49'	L51	N 05°58'51" E	31.46'
L24	S 71°48'45" W	12.00'	L52	N 49°33'02" W	22.93'
L25	S 88°56'25" E	40.42'	L53	N 09°34'18" W	41.06'
L26	S 83°42'44" E	21.64'	L54	N 44°54'18" W	32.59'
L27	S 80°29'46" E	13.74'	L55	N 54°47'27" W	34.89'
L28	S 17°53'40" W	91.58'			



COORDINATE TABLE (USFT)								
#	NORTHING	EASTING	#	NORTHING	EASTING	#	NORTHING	EASTING
1	960891.43	1528553.05	17	960026.34	1528836.70	33	960485.89	1529203.02
2	960853.42	1528665.68	18	959910.83	1528343.43	34	960569.01	1529244.98
3	960661.32	1528796.93	19	959988.27	1528643.81	35	960568.09	1529324.94
4	960612.91	1528819.97	20	960009.80	1528752.87	36	960429.35	1529261.49
5	960613.64	1528716.05	21	959880.60	1528671.64	37	960301.05	1529115.36
6	960851.89	1528555.78	22	959831.56	1528689.03	38	960202.93	1528978.28
7	960573.45	1528743.09	23	959802.46	1528600.46	39	960060.25	1529008.02
8	960572.78	1528839.08	24	959758.28	1528407.63	40	960075.45	1529223.61
9	960491.96	1528898.00	25	960838.94	1529359.14	41	960004.43	1529365.60
10	960404.32	1528945.89	26	960833.56	1529434.61	42	959974.39	1529520.30
11	960220.13	1528892.68	27	960746.40	1529406.47	43	959886.04	1529501.21
12	960325.68	1528888.56	28	960607.88	1529343.13	44	959931.22	1529233.22
13	959864.73	1528790.01	29	960608.78	1529265.06	45	959884.55	1528850.32
14	959835.31	1528700.44	30	960775.34	1529328.32			
15	959879.13	1528684.89	31	960315.05	1528994.66			
16	960012.99	1528769.05	32	960372.08	1529083.65			

LEGEND:

⊕	5/8" RBR W/CAP SET IN CONCRETE
●	UNMARKED POINT
○	SET 5/8" REBAR W/ "CE" CAP
◎	SET 1" IRON PIPE W/ "KEE" CAP
△	SET MAG NAIL
◉	EXISTING IRON PIN (AS NOTED)
⌀	UTILITY POLE
Ⓣ	TELEPHONE PEDESTAL
	NOT TO SCALE (NTS)
CE	CONSERVATION EASEMENT LINE
	BOUNDARY LINE NOT SURVEYED
	BOUNDARY LINE SURVEYED
	NCDOT RIGHT OF WAY (R/W) TYPICAL
	UTILITY RIGHT OF WAY (R/W) TYPICAL
	TIE LINE ONLY
	ADJOINING DEED LINES
X	FENCE
OW	OVERHEAD WIRE
	ASPHALT
	GRAVEL
	BRIDGE
	STREAM
	CONCRETE DRIVE
	SOIL ROADBED
	CONSERVATION EASEMENT AREA
PB:	PLAT BOOK
DB:	DEED BOOK
PG:	PAGE
RBR	REBAR
RBC	REBAR WITH ID CAP
IP	IRON PIPE
IPC	IRON PIPE WITH CAP
R/W	RIGHT OF WAY
NAD	NORTH AMERICAN DATUM 1983
NAVD	NORTH AMERICAN VERTICAL DATUM
SPC	STATE PLANE COORDINATES
NGS	NATIONAL GEODETIC SURVEY
CF	COMBINED FACTOR
CE	CONSERVATION EASEMENT
POB	POINT OF BEGINNING
CMP	CORRUGATED METAL PIPE

N GRID NORTH NAD 83 (2011)

STATE OF NORTH CAROLINA CONSERVATION EASEMENT

CONSERVATION EASEMENT CORNER-NC DMS CAP (TYPICAL)

GRID TIE INFORMATION

CONTROL POINT #1	CONTROL POINT #2
RBC "KEE"	RBC "KEE"
STATE PLANE COORDINATES	STATE PLANE COORDINATES
N: 960773.79'	N: 960892.43'
E: 1529145.38'	E: 1528483.52'
ELEV: 1033.76'	ELEV: 1013.19'
CF: 1.00002209	CF: 1.00002317

*CONTROL POINT #1 BEING LOCATED S 79°50'14" E A GRID DISTANCE OF 672.41 FEET FROM CONTROL POINT #2

A CONSERVATION EASEMENT SURVEY FOR THE STATE OF NORTH CAROLINA, NCDEQ: DIVISION OF MITIGATION SERVICES

"WHITTIER CREEK"

SPO FILE NO'S. 86 BI & 86-BH DMS SITE ID NO. 100020

PARCEL IDENTIFICATION #'S: 5926-00-80-4164 & 5926-00-90-1044

CURRENT OWNER(S) LISTED AS:
CHARLES DEAN HOLCOMB & MICHAEL GENE HOLCOMB,
ELMER E. HOLCOMB & WILMA F. HOLCOMB (LIFE ESTATE)
ANGELA D. MEADOWS

SITE ADDRESS: ROCK HILL CHURCH ROAD, ARARAT, NC 27007

DEED REFERENCES:
DEED BOOK: 1489 PAGE: 874 PLAT BOOK 9 PAGE 64, LOT 6
DEED BOOK: 1153 PAGE: 678 PLAT BOOK 9 PAGE 64, LOT 5
ELDORA TOWNSHIP, SURRY COUNTY, NORTH CAROLINA

SURVEY BY: CB,JB,JN,DD DRAWN BY: LDP/NH CHECKED BY: HJL
SURVEY DATES: 04/17/18-10/23/18 JOB #180104-CE

REVISION: DATE:

SHEET SIZE: 18"X24" SHEET #: 1 OF 1 SCALE: 1"=180'

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

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
Whittier Creek Site – Option D Mitigation Project – NCDMS Project No. 100020

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
Whittier Creek Site – Option D Mitigation Project – NCDMS Project No. 100020

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 of the easement will be maintained for stability and to maintain 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)

Form #1
Reach UT5

NC DWQ Stream Identification Form Version 4.11 Meadows Parcel

Date: 12/12/16	**Project/Site:** Whittier Creek	**Latitude:** 36.3787
Evaluator: S King, R Myers	**County:** Surry	**Longitude:** -80.5989
Total Points: *Stream is at least intermittent if ≥ 19 or perennial if ≥ 30** 34.5	**Stream Determination (circle one)** Ephemeral Intermittent (Perennial)	**Other** Mt Airy South *e.g. Quad Name:* USGS Quad

A. Geomorphology (Subtotal = 15.5)	Absent	Weak	Moderate	Strong
1[a]. Continuity of channel bed and bank	0	1	2	(3)
2. Sinuosity of channel along thalweg	0	(1)	2	3
3. In-channel structure: ex. riffle-pool, step-pool, ripple-pool sequence	0	1	2	3
4. Particle size of stream substrate	0	1	2	3
5. Active/relict floodplain	0	1	(2)	3
6. Depositional bars or benches	0	1	(2)	3
7. Recent alluvial deposits	0	(1)	2	3
8. Headcuts	0	(1)	2	3
9. Grade control	0	(0.5)	1	1.5
10. Natural valley	0	0.5	(1)	1.5
11. Second or greater order channel	(No = 0)		Yes = 3	

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

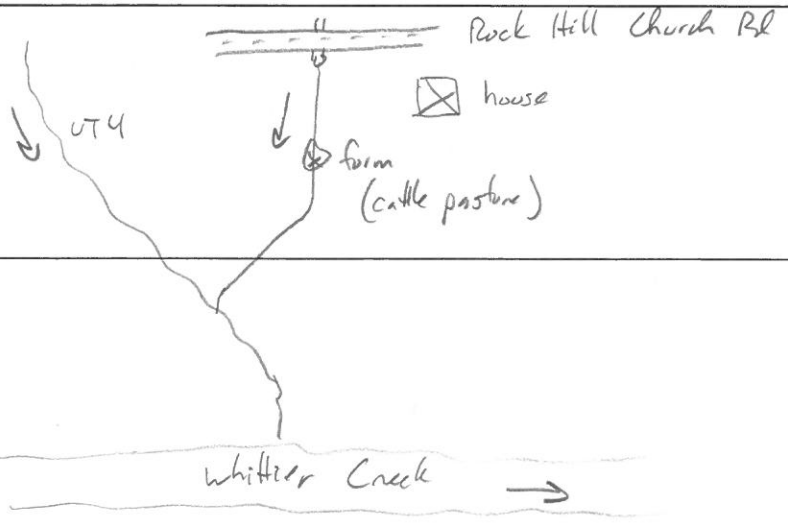
B. Hydrology (Subtotal = 9.5)				
12. Presence of Baseflow	0	1	2	(3)
13. Iron oxidizing bacteria	0	1	(2)	3
14. Leaf litter	1.5	(1)	0.5	0
15. Sediment on plants or debris	0	(0.5)	1	1.5
16. Organic debris lines or piles	(0)	0.5	1	1.5
17. Soil-based evidence of high water table?	No = 0		(Yes = 3)	

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 lots of snails	0	1	2	3
22. Fish minnows in uppermost section	0	(0.5)	1	1.5
23. Crayfish dead crayfish in adjacent field	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 (none)			

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

Notes:

Sketch:



Form #2
Reach UT4

NC DWQ Stream Identification Form Version 4.11 Holmes parcel

Date: 12/12/16	**Project/Site:** Whittier Creek	**Latitude:** 36.3791
Evaluator: S King, R Myers	**County:** Surry	**Longitude:** -80.6001
Total Points: *Stream is at least intermittent if ≥ 19 or perennial if ≥ 30** 38	**Stream Determination (circle one)** Ephemeral Intermittent (Perennial)	**Other** Mt Airy South *e.g. Quad Name:* USGS Quad

A. Geomorphology (Subtotal = 20)	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 bedrock exposed	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 *	

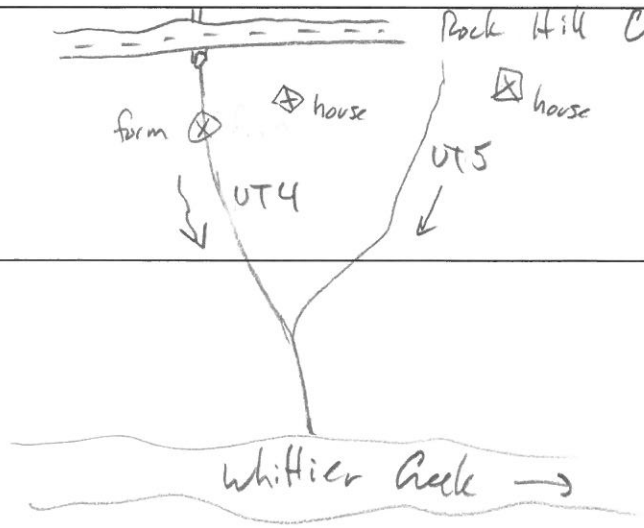
* bed very rocky but banks @ edge of water show hydric soils

C. Biology (Subtotal = 10)				
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) none			

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

Notes:

Sketch:



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

NC SAM FIELD ASSESSMENT FORM
Accompanies User Manual Version 2.1

R7 (Whittier Creek)

USACE AID #: NCDWR #:

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

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

PROJECT/SITE INFORMATION:

1. Project name (if any): Whittier Creek
2. Date of evaluation: 4/9/2018
3. Applicant/owner name: Baker Engineering
4. Assessor name/organization: Scott King / Kristi Suggs
5. County: Surry
6. Nearest named water body on USGS 7.5-minute quad: Ararat River
7. River basin: Yadkin
8. Site coordinates (decimal degrees, at lower end of assessment reach): 36.3770, -80.5980

STREAM INFORMATION: (depth and width can be approximations)

9. Site number (show on attached map): R7 (Whittier Creek)
10. Length of assessment reach evaluated (feet): 1,598
11. Channel depth from bed (in riffle, if present) to top of bank (feet): 6 ☐Unable to assess channel depth.
12. Channel width at top of bank (feet): 21
13. Is assessment reach a swamp steam? ☐Yes ☐No
14. Feature type: ☒Perennial flow ☐Intermittent flow ☐Tidal Marsh Stream

STREAM CATEGORY INFORMATION:

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

ADDITIONAL INFORMATION:

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

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

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

2. Evidence of Flow Restriction – assessment reach metric

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

3. Feature Pattern – assessment reach metric

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

4. Feature Longitudinal Profile – assessment reach metric

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

5. Signs of Active Instability – assessment reach metric

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

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

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

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

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

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

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

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

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

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

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

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

Check for Tidal Marsh Streams Only

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Notes/Sketch:

Draft NC SAM Stream Rating Sheet
Accompanies User Manual Version 2.1

Stream Site Name	Whittier Creek	Date of Assessment	4/9/2018
Stream Category	Pb3	Assessor Name/Organization	Scott King / Kristi Suggs

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

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

NC SAM FIELD ASSESSMENT FORM
Accompanies User Manual Version 2.1

Reach UT4

USACE AID #: NCDWR #:

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

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

PROJECT/SITE INFORMATION:

1. Project name (if any): Whittier Creek
2. Date of evaluation: 4/9/2018
3. Applicant/owner name: Baker Engineering
4. Assessor name/organization: Scott King / Kristi Suggs
5. County: Surry
6. Nearest named water body on USGS 7.5-minute quad: Ararat River
7. River basin: Yadkin
8. Site coordinates (decimal degrees, at lower end of assessment reach): 36.3773, -80.5995

STREAM INFORMATION: (depth and width can be approximations)

9. Site number (show on attached map): UT4
10. Length of assessment reach evaluated (feet): 1,101
11. Channel depth from bed (in riffle, if present) to top of bank (feet): 4.5 ☐Unable to assess channel depth.
12. Channel width at top of bank (feet): 12
13. Is assessment reach a swamp steam? ☐Yes ☐No
14. Feature type: ☒Perennial flow ☐Intermittent flow ☐Tidal Marsh Stream

STREAM CATEGORY INFORMATION:

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

ADDITIONAL INFORMATION:

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

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

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

2. Evidence of Flow Restriction – assessment reach metric

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

3. Feature Pattern – assessment reach metric

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

4. Feature Longitudinal Profile – assessment reach metric

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

5. Signs of Active Instability – assessment reach metric

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

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

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

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

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

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

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

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

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

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

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

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

Check for Tidal Marsh Streams Only

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Notes/Sketch:

Draft NC SAM Stream Rating Sheet
Accompanies User Manual Version 2.1

Stream Site Name	Whittier Creek	Date of Assessment	4/9/2018
Stream Category	Pb3	Assessor Name/Organization	Scott King / Kristi Suggs

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

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

NC SAM FIELD ASSESSMENT FORM
Accompanies User Manual Version 2.1

Reach UT5

USACE AID #: NCDWR #:

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

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

PROJECT/SITE INFORMATION:

1. Project name (if any): Whittier Creek
2. Date of evaluation: 4/9/2018
3. Applicant/owner name: Baker Engineering
4. Assessor name/organization: Scott King / Kristi Suggs
5. County: Surry
6. Nearest named water body on USGS 7.5-minute quad: Ararat River
7. River basin: Yadkin
8. Site coordinates (decimal degrees, at lower end of assessment reach): 36.3779, -80.5999

STREAM INFORMATION: (depth and width can be approximations)

9. Site number (show on attached map): UT5
10. Length of assessment reach evaluated (feet): 765
11. Channel depth from bed (in riffle, if present) to top of bank (feet): 2.5 ☐Unable to assess channel depth.
12. Channel width at top of bank (feet): 11
13. Is assessment reach a swamp steam? ☐Yes ☐No
14. Feature type: ☒Perennial flow ☐Intermittent flow ☐Tidal Marsh Stream

STREAM CATEGORY INFORMATION:

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

ADDITIONAL INFORMATION:

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

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

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

2. Evidence of Flow Restriction – assessment reach metric

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

3. Feature Pattern – assessment reach metric

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

4. Feature Longitudinal Profile – assessment reach metric

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

5. Signs of Active Instability – assessment reach metric

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

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

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

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

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

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

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

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

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

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

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

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

Check for Tidal Marsh Streams Only:

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Notes/Sketch:

Draft NC SAM Stream Rating Sheet
Accompanies User Manual Version 2.1

Stream Site Name	Whittier Creek	Date of Assessment	4/9/2018
Stream Category	Pb2	Assessor Name/Organization	Scott King / Kristi Suggs

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

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

NC WAM FIELD ASSESSMENT FORM
Accompanies User Manual Version 5.0

W-B and W-C

USACE AID #		NCDWR#	
Project Name	Whittier Creek	Date of Evaluation	4/9/2018
Applicant/Owner Name	Baker Engineering	Wetland Site Name	W-B and W-C
Wetland Type	Bottomland Hardwood Forest	Assessor Name/Organization	Scott King / Kristi Suggs
Level III Ecoregion	Piedmont	Nearest Named Water Body	Ararat River
River Basin	Yadkin-PeeDee	USGS 8-Digit Catalogue Unit	03040101
County	Surry	NCDWR Region	Winston-Salem
☐ Yes ☒ No	Precipitation within 48 hrs?	Latitude/Longitude (deci-degrees)	36.3791, -80.6009

Evidence of stressors affecting the assessment area (may not be within the assessment area)

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

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

Is the assessment area intensively managed? ☒ Yes ☐ No

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

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

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

☐ Blackwater
☐ Brownwater
☐ Tidal (if tidal, check one of the following boxes) ☐ Lunar ☐ Wind ☐ Both

Is the assessment area on a coastal island? ☐ Yes ☒ No

Is the assessment area's surface water storage capacity or duration substantially altered by beaver? ☐ Yes ☒ No

Does the assessment area experience overbank flooding during normal rainfall conditions? ☒ Yes ☐ No

1. Ground Surface Condition/Vegetation Condition – assessment area condition metric

Check a box in each column. Consider alteration to the ground surface (GS) in the assessment area and vegetation structure (VS) in the assessment area. Compare to reference wetland if applicable (see User Manual). If a reference is not applicable, then rate the assessment area based on evidence an effect.

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

2. Surface and Sub-Surface Storage Capacity and Duration – assessment area condition metric

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

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

3. Water Storage/Surface Relief – assessment area/wetland type condition metric (skip for all marshes)

Check a box in each column. Select the appropriate storage for the assessment area (AA) and the wetland type (WT).

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

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

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

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

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

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

4c.
- ☒A No peat or muck presence
- ☐B A peat or muck presence

5. Discharge into Wetland – opportunity metric

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

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

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

Check all that apply (at least one box in each column). Evaluation involves a GIS effort with field adjustment. Consider sources draining to assessment area within entire upstream watershed (WS), within 5 miles and within the watershed draining to the assessment area (5M), and within 2 miles and within the watershed draining to the assessment area (2M).

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

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

7a. Is assessment area within 50 feet of a tributary or other open water?
☒Yes ☐No If Yes, continue to 7b. If No, skip to Metric 8.
Wetland buffer need only be present on one side of the water body. Make buffer judgment based on the average width of wetland. Record a note if a portion of the buffer has been removed or disturbed.

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

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

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

7e. Is stream or other open water sheltered or exposed?
☒Sheltered – adjacent open water with width < 2500 feet and no regular boat traffic.
☐Exposed – adjacent open water with width ≥ 2500 feet or regular boat traffic.

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

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

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

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

Answer for assessment area dominant landform.

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

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

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

☒A Sediment deposition is not excessive, but at approximately natural levels.
☐B Sediment deposition is excessive, but not overwhelming the wetland.
☐C Sediment deposition is excessive and is overwhelming the wetland.

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

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

WT	WC	FW (if applicable)	
☐A	☐A	☐A	≥ 500 acres
☐B	☐B	☐B	From 100 to < 500 acres
☐C	☐C	☐C	From 50 to < 100 acres
☐D	☐D	☐D	From 25 to < 50 acres
☐E	☐E	☐E	From 10 to < 25 acres
☐F	☐F	☐F	From 5 to < 10 acres
☐G	☐G	☐G	From 1 to < 5 acres
☐H	☐H	☐H	From 0.5 to < 1 acre
☐I	☐I	☐I	From 0.1 to < 0.5 acre
☒J	☒J	☐J	From 0.01 to < 0.1 acre
☐K	☐K	☒K	< 0.01 acre or assessment area is clear-cut

12. Wetland Intactness – wetland type condition metric (evaluate for Pocosins only)

☐A Pocosin is the full extent (≥ 90%) of its natural landscape size.
☐B Pocosin type is < 90% of the full extent of its natural landscape size.

13. Connectivity to Other Natural Areas – landscape condition metric

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

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

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

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

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

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

☐A 0
☐B 1 to 4
☒C 5 to 8

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

☐A Vegetation is close to reference condition in species present and their proportions. Lower strata composed of appropriate species, with exotic plants absent or sparse within the assessment area.
☐B Vegetation is different from reference condition in species diversity or proportions, but still largely composed of native species characteristic of the wetland type. This may include communities of weedy native species that develop after clearcutting or clearing. It also includes communities with exotics present, but not dominant, over a large portion of the expected strata.
☒C Vegetation severely altered from reference in composition, or expected species are unnaturally absent (planted stands of non-characteristic species or at least one stratum inappropriately composed of a single species), or exotic species are dominant in at least one stratum.

16. Vegetative Diversity – assessment area condition metric (evaluate for Non-tidal Freshwater Marsh only)

☐A Vegetation diversity is high and is composed primarily of native species (< 10% cover of exotics).
☐B Vegetation diversity is low or has > 10% to 50% cover of exotics.
☒C Vegetation is dominated by exotic species (> 50 % cover of exotics).

17. Vegetative Structure – assessment area/wetland type condition metric

17a. Is vegetation present?
☒Yes ☐No If Yes, continue to 17b. If No, skip to Metric 18.

17b. Evaluate percent coverage of assessment area vegetation **for all marshes only**. Skip to 17c for non-marsh wetlands.
☐A ≥ 25% coverage of vegetation
☐B < 25% coverage of vegetation

17c. **Check a box in each column for each stratum**. Evaluate this portion of the metric **for non-marsh wetlands**. Consider structure in airspace above the assessment area (AA) and the wetland type (WT) separately.

	AA	WT	
Canopy	☐A	☒A	Canopy closed, or nearly closed, with natural gaps associated with natural processes
	☐B	☐B	Canopy present, but opened more than natural gaps
	☒C	☐C	Canopy sparse or absent
Mid-Story	☐A	☐A	Dense mid-story/sapling layer
	☐B	☒B	Moderate density mid-story/sapling layer
	☒C	☐C	Mid-story/sapling layer sparse or absent
Shrub	☐A	☐A	Dense shrub layer
	☐B	☐B	Moderate density shrub layer
	☒C	☒C	Shrub layer sparse or absent
Herb	☒A	☐A	Dense herb layer
	☐B	☐B	Moderate density herb layer
	☐C	☒C	Herb layer sparse or absent

18. Snags – wetland type condition metric (skip for all marshes)

☐A Large snags (more than one) are visible (> 12 inches DBH, or large relative to species present and landscape stability).
☒B Not A

19. Diameter Class Distribution – wetland type condition metric (skip for all marshes)

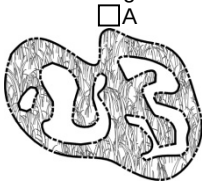
☐A Majority of canopy trees have stems > 6 inches in diameter at breast height (DBH); many large trees (> 12 inches DBH) are present.
☐B Majority of canopy trees have stems between 6 and 12 inches DBH, few are > 12 inch DBH.
☒C Majority of canopy trees are < 6 inches DBH or no trees.

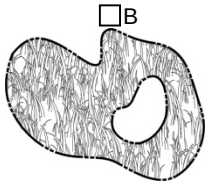
20. Large Woody Debris – wetland type condition metric (skip for all marshes)

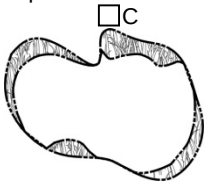
Include both natural debris and man-placed natural debris.
☐A Large logs (more than one) are visible (> 12 inches in diameter, or large relative to species present and landscape stability).
☒B Not A

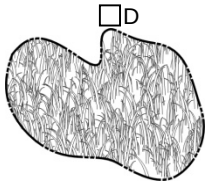
21. Vegetation/Open Water Dispersion – wetland type/open water condition metric (evaluate for Non-Tidal Freshwater Marsh only)

Select the figure that best describes the amount of interspersion between vegetation and open water in the growing season. Patterned areas indicate vegetated areas, while solid white areas indicate open water.

☐A 

☐B 

☐C 

☐D 

22. Hydrologic Connectivity – assessment area condition metric (evaluate for riparian wetlands and Salt/Brackish Marsh only)

Examples of activities that may severely alter hydrologic connectivity include intensive ditching, fill, sedimentation, channelization, diversion, man-made berms, beaver dams, and stream incision. Documentation required if evaluated as B, C, or D.
☒A Overbank and overland flow are not severely altered in the assessment area.
☐B Overbank flow is severely altered in the assessment area.
☐C Overland flow is severely altered in the assessment area.
☐D Both overbank and overland flow are severely altered in the assessment area.

Notes

NC WAM Wetland Rating Sheet
Accompanies User Manual Version 5.0

Wetland Site Name	W-B, W-C, W-E, and W-F	Date of Assessment	4/9/2018
Wetland Type	Bottomland Hardwood Forest	Assessor Name/Organization	Scott King / Kristi Suggs

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)	YES
Assessment area is on a coastal island (Y/N)	NO

Sub-function Rating Summary

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

Overall Wetland Rating **LOW**

NC WAM FIELD ASSESSMENT FORM
Accompanies User Manual Version 5.0

W-A and W-D

USACE AID #		NCDWR#	
Project Name	Whittier Creek	Date of Evaluation	4/9/2018
Applicant/Owner Name	Baker Engineering	Wetland Site Name	W-A and W-D
Wetland Type	Headwater Forest	Assessor Name/Organization	Scott King / Kristi Suggs
Level III Ecoregion	Piedmont	Nearest Named Water Body	Ararat River
River Basin	Yadkin-PeeDee	USGS 8-Digit Catalogue Unit	03040101
County	Surry	NCDWR Region	Winston-Salem
☐ Yes ☒ No	Precipitation within 48 hrs?	Latitude/Longitude (deci-degrees)	36.3783, -80.5991

Evidence of stressors affecting the assessment area (may not be within the assessment area)

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

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

Is the assessment area intensively managed? ☒ Yes ☐ No

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

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

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

☐ Blackwater
☐ Brownwater
☐ Tidal (if tidal, check one of the following boxes) ☐ Lunar ☐ Wind ☐ Both

Is the assessment area on a coastal island? ☐ Yes ☒ No

Is the assessment area's surface water storage capacity or duration substantially altered by beaver? ☐ Yes ☒ No

Does the assessment area experience overbank flooding during normal rainfall conditions? ☒ Yes ☐ No

1. Ground Surface Condition/Vegetation Condition – assessment area condition metric

Check a box in each column. Consider alteration to the ground surface (GS) in the assessment area and vegetation structure (VS) in the assessment area. Compare to reference wetland if applicable (see User Manual). If a reference is not applicable, then rate the assessment area based on evidence an effect.

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

2. Surface and Sub-Surface Storage Capacity and Duration – assessment area condition metric

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

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

3. Water Storage/Surface Relief – assessment area/wetland type condition metric (skip for all marshes)

Check a box in each column. Select the appropriate storage for the assessment area (AA) and the wetland type (WT).

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

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

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

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

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

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

4c.
- ☒A No peat or muck presence
- ☐B A peat or muck presence

5. Discharge into Wetland – opportunity metric

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

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

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

Check all that apply (at least one box in each column). Evaluation involves a GIS effort with field adjustment. Consider sources draining to assessment area within entire upstream watershed (WS), within 5 miles and within the watershed draining to the assessment area (5M), and within 2 miles and within the watershed draining to the assessment area (2M).

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

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

7a. Is assessment area within 50 feet of a tributary or other open water?
☒Yes ☐No If Yes, continue to 7b. If No, skip to Metric 8.
Wetland buffer need only be present on one side of the water body. Make buffer judgment based on the average width of wetland. Record a note if a portion of the buffer has been removed or disturbed.

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

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

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

7e. Is stream or other open water sheltered or exposed?
☒Sheltered – adjacent open water with width < 2500 feet and no regular boat traffic.
☐Exposed – adjacent open water with width ≥ 2500 feet or regular boat traffic.

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

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

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

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

Answer for assessment area dominant landform.

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

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

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

☒A Sediment deposition is not excessive, but at approximately natural levels.
☐B Sediment deposition is excessive, but not overwhelming the wetland.
☐C Sediment deposition is excessive and is overwhelming the wetland.

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

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

WT	WC	FW (if applicable)	
☐A	☐A	☐A	≥ 500 acres
☐B	☐B	☐B	From 100 to < 500 acres
☐C	☐C	☐C	From 50 to < 100 acres
☐D	☐D	☐D	From 25 to < 50 acres
☐E	☐E	☐E	From 10 to < 25 acres
☐F	☐F	☐F	From 5 to < 10 acres
☐G	☐G	☐G	From 1 to < 5 acres
☒H	☒H	☐H	From 0.5 to < 1 acre
☐I	☐I	☐I	From 0.1 to < 0.5 acre
☐J	☐J	☐J	From 0.01 to < 0.1 acre
☐K	☐K	☒K	< 0.01 acre or assessment area is clear-cut

12. Wetland Intactness – wetland type condition metric (evaluate for Pocosins only)

☐A Pocosin is the full extent (≥ 90%) of its natural landscape size.
☐B Pocosin type is < 90% of the full extent of its natural landscape size.

13. Connectivity to Other Natural Areas – landscape condition metric

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

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

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

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

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

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

☐A 0
☐B 1 to 4
☒C 5 to 8

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

☐A Vegetation is close to reference condition in species present and their proportions. Lower strata composed of appropriate species, with exotic plants absent or sparse within the assessment area.
☐B Vegetation is different from reference condition in species diversity or proportions, but still largely composed of native species characteristic of the wetland type. This may include communities of weedy native species that develop after clearcutting or clearing. It also includes communities with exotics present, but not dominant, over a large portion of the expected strata.
☒C Vegetation severely altered from reference in composition, or expected species are unnaturally absent (planted stands of non-characteristic species or at least one stratum inappropriately composed of a single species), or exotic species are dominant in at least one stratum.

16. Vegetative Diversity – assessment area condition metric (evaluate for Non-tidal Freshwater Marsh only)

☐A Vegetation diversity is high and is composed primarily of native species (< 10% cover of exotics).
☐B Vegetation diversity is low or has > 10% to 50% cover of exotics.
☒C Vegetation is dominated by exotic species (> 50 % cover of exotics).

17. Vegetative Structure – assessment area/wetland type condition metric

17a. Is vegetation present?
☒Yes ☐No If Yes, continue to 17b. If No, skip to Metric 18.

17b. Evaluate percent coverage of assessment area vegetation **for all marshes only**. Skip to 17c for non-marsh wetlands.
☐A ≥ 25% coverage of vegetation
☐B < 25% coverage of vegetation

17c. **Check a box in each column for each stratum**. Evaluate this portion of the metric **for non-marsh wetlands**. Consider structure in airspace above the assessment area (AA) and the wetland type (WT) separately.

	AA	WT	
Canopy	☐A	☒A	Canopy closed, or nearly closed, with natural gaps associated with natural processes
	☐B	☐B	Canopy present, but opened more than natural gaps
	☒C	☐C	Canopy sparse or absent
Mid-Story	☐A	☐A	Dense mid-story/sapling layer
	☐B	☒B	Moderate density mid-story/sapling layer
	☒C	☐C	Mid-story/sapling layer sparse or absent
Shrub	☐A	☐A	Dense shrub layer
	☐B	☐B	Moderate density shrub layer
	☒C	☒C	Shrub layer sparse or absent
Herb	☒A	☐A	Dense herb layer
	☐B	☐B	Moderate density herb layer
	☐C	☒C	Herb layer sparse or absent

18. Snags – wetland type condition metric (skip for all marshes)

☐A Large snags (more than one) are visible (> 12 inches DBH, or large relative to species present and landscape stability).
☒B Not A

19. Diameter Class Distribution – wetland type condition metric (skip for all marshes)

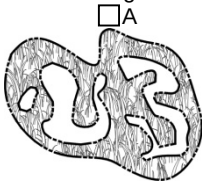
☐A Majority of canopy trees have stems > 6 inches in diameter at breast height (DBH); many large trees (> 12 inches DBH) are present.
☐B Majority of canopy trees have stems between 6 and 12 inches DBH, few are > 12 inch DBH.
☒C Majority of canopy trees are < 6 inches DBH or no trees.

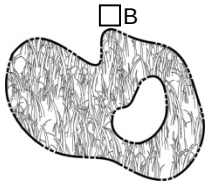
20. Large Woody Debris – wetland type condition metric (skip for all marshes)

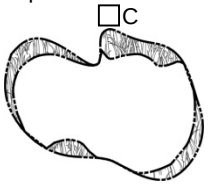
Include both natural debris and man-placed natural debris.
☐A Large logs (more than one) are visible (> 12 inches in diameter, or large relative to species present and landscape stability).
☒B Not A

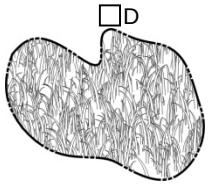
21. Vegetation/Open Water Dispersion – wetland type/open water condition metric (evaluate for Non-Tidal Freshwater Marsh only)

Select the figure that best describes the amount of interspersion between vegetation and open water in the growing season. Patterned areas indicate vegetated areas, while solid white areas indicate open water.

☐A 

☐B 

☐C 

☐D 

22. Hydrologic Connectivity – assessment area condition metric (evaluate for riparian wetlands and Salt/Brackish Marsh only)

Examples of activities that may severely alter hydrologic connectivity include intensive ditching, fill, sedimentation, channelization, diversion, man-made berms, beaver dams, and stream incision. Documentation required if evaluated as B, C, or D.
☒A Overbank and overland flow are not severely altered in the assessment area.
☐B Overbank flow is severely altered in the assessment area.
☐C Overland flow is severely altered in the assessment area.
☐D Both overbank and overland flow are severely altered in the assessment area.

Notes

NC WAM Wetland Rating Sheet
Accompanies User Manual Version 5.0

Wetland Site Name	W-A, W-D, W-G, and W-H	Date of Assessment	4/9/2018
Wetland Type	Headwater Forest	Assessor Name/Organization	Scott King / Kristi Suggs

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)	YES
Assessment area is on a coastal island (Y/N)	NO

Sub-function Rating Summary

Function	Sub-function	Metrics	Rating
Hydrology	Surface Storage and Retention	Condition	**LOW**
	Sub-surface Storage and Retention	Condition	**HIGH**
Water Quality	Pathogen Change	Condition	**HIGH**
		Condition/Opportunity	**HIGH**
		Opportunity Presence (Y/N)	**YES**
	Particulate Change	Condition	**LOW**
		Condition/Opportunity	NA
		Opportunity Presence (Y/N)	NA
	Soluble Change	Condition	**MEDIUM**
		Condition/Opportunity	**HIGH**
		Opportunity Presence (Y/N)	**YES**
	Physical Change	Condition	**LOW**
		Condition/Opportunity	**LOW**
		Opportunity Presence (Y/N)	**YES**
	Pollution Change	Condition	NA
		Condition/Opportunity	NA
		Opportunity Presence (Y/N)	NA
Habitat	Physical Structure	Condition	**LOW**
	Landscape Patch Structure	Condition	**LOW**
	Vegetation Composition	Condition	**LOW**

Function Rating Summary

Function	Metrics	Rating
Hydrology	Condition	**MEDIUM**
Water Quality	Condition	**LOW**
	Condition/Opportunity	**HIGH**
	Opportunity Presence (Y/N)	**YES**
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-2018-00849** County: **Surry** U.S.G.S. Quad: **Mount Airy South**

NOTIFICATION OF JURISDICTIONAL DETERMINATION

Property Owner: **Scott King**
Address: **8000 Regency Parkway - Suite 600**
Cary , NC 27518
Telephone Number: **919-481-5731**

Size (acres): **6 acres** Nearest Town: **Ararat**

Nearest Waterway: **Beaver Branch** Coordinates: **36.3779, -80.5999**
River Basin/ HUC: **Upper Catawba**

Location description: **948 Rock Hill Church Rd. Ararat, 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 **William Elliott** at **828-271-7980, ext. 4225** or **amanda.jones@usace.army.mil.**

C. Basis for Determination:

See attached preliminary jurisdictional determination form.

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 adjacent to stream channels located on the property that exhibit indicators of ordinary high water marks. The stream channel on the property is an unnamed tributary (UT) to **Beaver Branch** which flows into the **Upper Catawba** River.

D. Remarks: None

E. Attention USDA Program Participants

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

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

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

US Army Corps of Engineers
South Atlantic Division
Attn: 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: William Elliott

William Elliott

Issue Date of JD: **June 27, 2018** 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:
Angela Key, 948 Rock Hill Church Road, Ararat NC, 27007,

Wilma & Elmer Holcomb, 172 Jane Sowers Rd. Stateville, NC 28625

NOTIFICATION OF ADMINISTRATIVE APPEAL OPTIONS AND PROCESS AND REQUEST FOR APPEAL		
Applicant: **Scott King**	File Number: **SAW-SAW-2018-00849**	Date: **June 27, 2018**

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: William Elliott** **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.: William Elliott, 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: June 27, 2018**

B. **NAME AND ADDRESS OF PERSON REQUESTING PRELIMINARY JD:**
Scott King
8000 Regency Parkway - Suite 600
Cary , NC 27518

C. **DISTRICT OFFICE, FILE NAME, AND NUMBER:**
CESAW-RG-A, SAW-2018-00849,

D. **PROJECT LOCATION(S) AND BACKGROUND INFORMATION:**
948 Rock Hill Church Rd. Ararat, North Carolina

State: **NC** County/parish/borough: **Surry** City: **Ararat**
Center coordinates of site (lat/long in degree decimal format): **36.3779, -80.5999**
Universal Transverse Mercator: **N/A**
Name of nearest waterbody: **Bull Creek**

E. **REVIEW PERFORMED FOR SITE EVALUATION (CHECK ALL THAT APPLY):**
☐ Office (Desk) Determination. Date: **June 27, 2018**
☒ Field Determination. Date(s): **5/30/2018**

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) Latitude	Longitude	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
				☐ Wetland ☐ Non-wetland Waters	☐ Section 404 ☐ Section 10/404
	Please see tables attached for Aquatic Resources			☐ Wetland ☐ Non-wetland Waters	☐ Section 404 ☐ Section 10/404
				☐ Wetland ☐ Non-wetland Waters	☐ Section 404 ☐ Section 10/404
				☐ Wetland ☐ Non-wetland Waters	☐ Section 404 ☐ Section 10/404
				☐ Wetland ☐ Non-wetland Waters	☐ Section 404 ☐ Section 10/404
				☐ Wetland ☐ Non-wetland Waters	☐ Section 404 ☐ Section 10/404
				☐ 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 make an official determination whether geographic jurisdiction exists over aquatic resources in the review area, or to provide an official delineation of jurisdictional aquatic resources in the review area, the Corps will provide an AJD to accomplish that result, as soon as is practicable. This PJD finds that there *"may be"* waters of the U.S. and/or that there *"may be"* navigable waters of the U.S. on the subject review area, and identifies all aquatic features in the review area that could be affected by the proposed activity, based on the following information:

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

Checked items should be included in subject file. Appropriately reference sources below where indicated for all checked items:

- [x] Maps, plans, plots or plat submitted by or on behalf of the PJD requestor:
  Map: Vicinity Map, USGS, Soils, NHD/NWI, LiDAR, FEMA, Drainage Areas.
- [x] Data sheets prepared/submitted by or on behalf of the PJD requestor.
  - [ ] Office concurs with data sheets/delineation report.
  - [ ] Office does not concur with data sheets/delineation report. Rationale: _____.
- [ ] Data sheets prepared by the Corps: _____.
- [ ] Corps navigable waters' study: _____.
- [x] U.S. Geological Survey Hydrologic Atlas: from GIS shapefiles.
  - [x] USGS NHD data.
  - [ ] USGS 8 and 12 digit HUC maps.
- [x] U.S. Geological Survey map(s). Cite scale & quad name: Mt Airy South Quad.
- [x] Natural Resources Conservation Service Soil Survey. Citation: Surry County, 2007.
- [x] National wetlands inventory map(s). Cite name: from GIS Shapefiles.
- [ ] State/local wetland inventory map(s): _____.
- [x] FEMA/FIRM maps: (See FEMA map for FIRM ID number).
- [x] 100-year Floodplain Elevation is: project outside of Zone X.(National Geodetic Vertical Datum of 1929)
- [x] Photographs: [x] Aerial (Name & Date): NCOneMap Orthoimagery, 2014.
  or [ ] Other (Name & Date): _____.
- [ ] Previous determination(s). File no. and date of response letter: _____.
- [x] Other information (please specify): Surry County LiDAR map, Reach drainage area map.

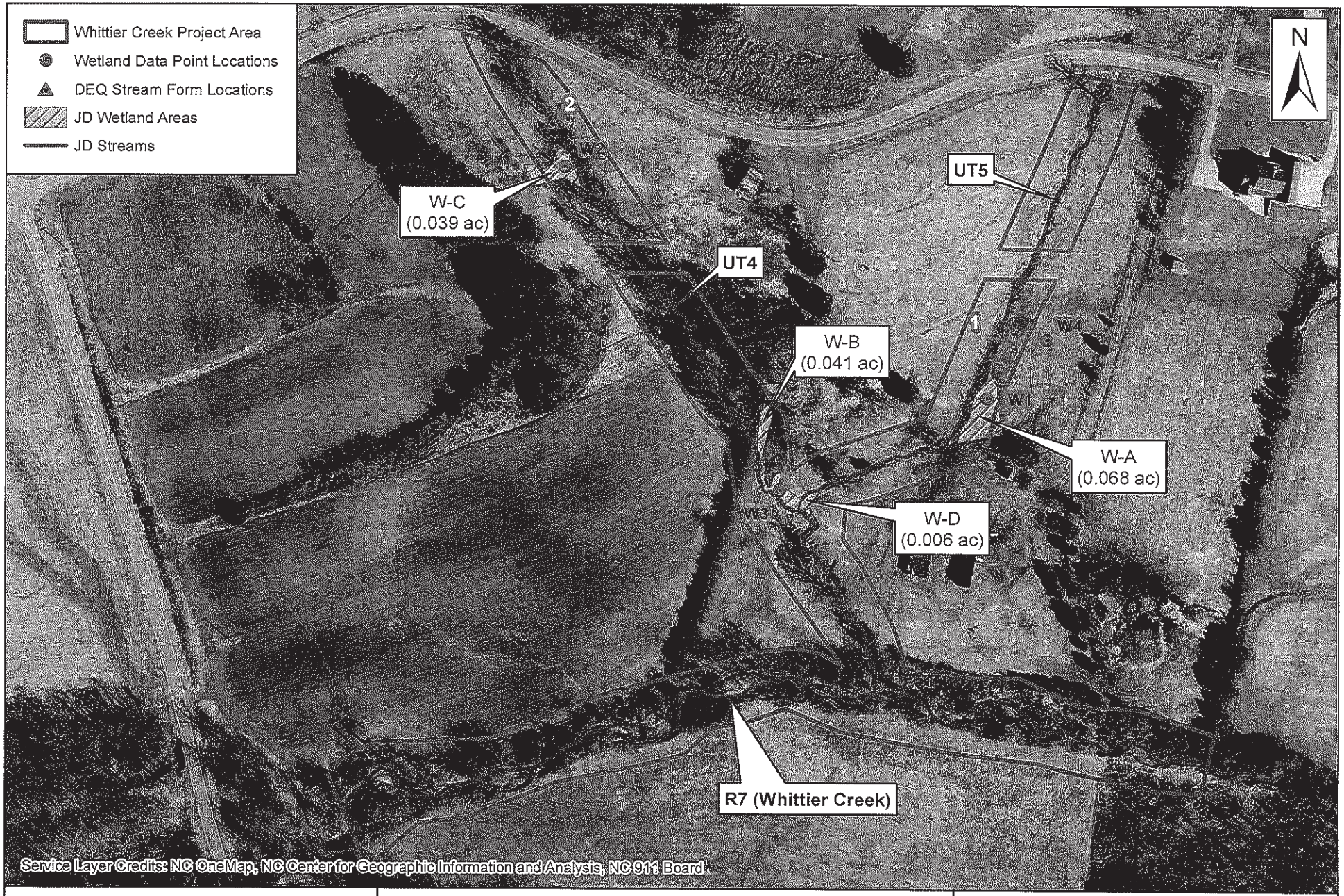
IMPORTANT NOTE: The information recorded on this form has not necessarily been verified by the Corps and should not be relied upon for later jurisdictional determinations.

William Elliott
Signature and date of
Regulatory staff member
completing PJD
6/27/18

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

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

CORRECTED



Michael Baker INTERNATIONAL

0 125 250 500 Feet

Jurisdictional Features Map
Whittier Creek Mitigation Project

Table 1. Whittier Creek Aquatic Resources: Stream ID

Reach ID	Drainage Area (acres / SqMi)	Length (ft)	Stream Status	Cowardin Class	Resource Class
UT4	529 ac / 0.83 SqMi	1,101	Perennial	R3SB3	Non-Section 10, non-wetland
UT5	72 ac / 0.11 SqMi	765	Perennial	R3SB3/4	Non-Section 10, non-wetland
R7 (Whittier Creek)	1,722 ac / 2.69 SqMi	1,598	Perennial	R3SB3	Non-Section 10, non-wetland

CORRECTED

Table 2. Whittier Creek Aquatic Resources: Wetlands ID

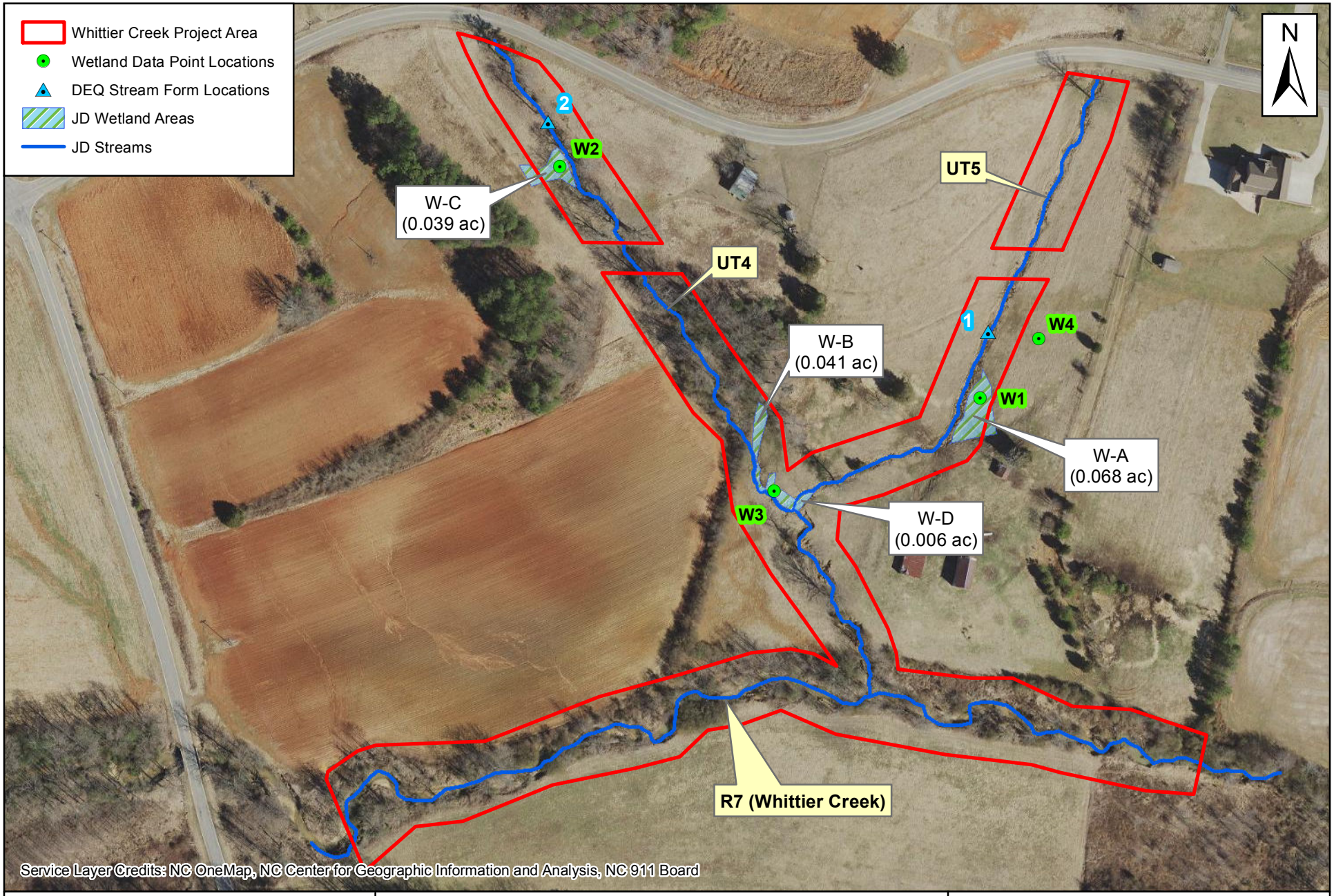
		Classification		Centerpoint Location	
Wetland ID	Area (acres)	NCWAM	Cowardin	Latitude	Longitude
W-A	0.068	Headwater Forest	PEM1	36.378240	-80.599068
W-B	0.041	Bottomland Hardwood Forest	PEM1	36.378058	-80.600004
W-C	0.039	Bottomland Hardwood Forest	PEM1	36.379098	-80.600999
W-D	0.006	Headwater Forest	PEM1	36.377915	-80.599842

Notes:

-All wetlands are Non-section 10 features

-Wetland Area B has some seep flow contributing to the source hydrology

-The NCWAM wetland type classifications provided above best describe their natural, undisturbed conditions. Currently, the wetlands are managed for pature or hay production and are mostly cleared. Differences between Headwater Forest and Bottomland Hardwood Forest are the result of the first and second-order nature of their adjacent streams.



Michael Baker INTERNATIONAL

0 125 250 500 Feet

Jurisdictional Features Map
Whittier Creek Mitigation Project

Data Point W-1

WETLAND DETERMINATION DATA FORM – Eastern Mountains and Piedmont Region

Project/Site: Whittier Creek City/County: Surry County Sampling Date: 4/9/18
Applicant/Owner: Michael Baker Int'l State: NC Sampling Point: W-1
Investigator(s): S King, K Suggs Section, Township, Range: —
Landform (hillslope, terrace, etc.): floodplain + toe of slope Local relief (concave, convex, none): slightly concave Slope (%): <1%
Subregion (LRR or MLRA): P-136 Lat: 36.3783 Long: -80.5991 Datum: NAD83 (SP-ft)
Soil Map Unit Name: Fairview fine sandy loam, strong NWI classification: —
Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ____ (If no, explain in Remarks.)
Are Vegetation X, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes X No ____
Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

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

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

Remarks:
Wetland is located in a managed pasture for cattle. Adjacent stream has likely been straightened + dredged in the past. Wetland is in the floodplain of the stream along the toe-of-slope of an adjacent hillslope.

HYDROLOGY

Wetland Hydrology Indicators:

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

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

Secondary Indicators (minimum of two required)

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

Field Observations:

Surface Water Present?* Yes ____ No X Depth (inches): ____
Water Table Present? Yes ____ No X Depth (inches): ____
Saturation Present? (includes capillary fringe) Yes X No ____ Depth (inches): ~3"

Wetland Hydrology Present? Yes X No ____

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

Remarks:
* note: a few small depressional areas were observed with standing water (≤ 1" deep). Located on the toe-of-slope of an adjacent hill in the floodplain of a stream this wetland collects water that drains into the stream. A small seep may also feed the wetland hydrology here. Area is wet + marshy.

VEGETATION (Five Strata) – Use scientific names of plants. Sampling Point: W-1

Tree Stratum (Plot size: —)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
6.			
	= Total Cover		

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

Sapling Stratum (Plot size: —)			
1.			
2.			
3.			
4.			
5.			
6.			
	= Total Cover		

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

Shrub Stratum (Plot size: —)			
1.			
2.			
3.			
4.			
5.			
6.			
	= Total Cover		

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

Herb Stratum (Plot size: 15')			
1. Fescue sp (likely arundinacea)	90	Y	FAC
2. Juncus effusus	15	N	FACW
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	105 = Total Cover		

50% of total cover: 52 20% of total cover: 21

Woody Vine Stratum (Plot size: —)			
1.			
2.			
3.			
4.			
5.			
	= Total Cover		

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

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100% (A/B)

Prevalence Index worksheet:

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

Prevalence Index = B/A = _____

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

___ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

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

___ Problematic Hydrophytic Vegetation[1] (Explain)

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

Definitions of Five Vegetation Strata:

Tree – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and 3 in. (7.6 cm) or larger in diameter at breast height (DBH).

Sapling – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and less than 3 in. (7.6 cm) DBH.

Shrub – Woody plants, excluding woody vines, approximately 3 to 20 ft (1 to 6 m) in height.

Herb – All herbaceous (non-woody) plants, including herbaceous vines, regardless of size, and woody plants, except woody vines, less than approximately 3 ft (1 m) in height.

Woody vine – All woody vines, regardless of height.

Area heavily managed so species are not naturally representative. Presence of Juncus here deemed indicative of wetland area.

Hydrophytic Vegetation Present? Yes X No _____

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

SOIL

Sampling Point: W-1

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

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-1	10YR 3/3	100	–				loam	top soil
1-5	10YR 5/4	60	10YR 6/3	40	D	M	sandy clay loam	
5-12+	10YR 6/1	80	7.5YR 5/6	20	C	M	sandy clay loam, pebbles noted	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

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

Indicators for Problematic Hydric Soils[3]:

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

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

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes X No ___

Remarks:

Clear hydric soils observed

Data Point W-2

WETLAND DETERMINATION DATA FORM – Eastern Mountains and Piedmont Region

Project/Site: Whitley Creek City/County: Surry County Sampling Date: 4/9/18
Applicant/Owner: Michael Baker Engineering State: NC Sampling Point: W-2
Investigator(s): S King, K Suggs Section, Township, Range: —
Landform (hillslope, terrace, etc.): floodplain Local relief (concave, convex, none): slightly concave Slope (%): ~1%
Subregion (LRR or MLRA): P-136 Lat: 36.3791 Long: -80.6010 Datum: NAD83 (SP-ft)
Soil Map Unit Name: Colvard + Suches soils, 0-3% slopes NWI classification: —
Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ____ (If no, explain in Remarks.)
Are Vegetation X, Soil ____, or Hydrology X significantly disturbed? Are "Normal Circumstances" present? Yes X No ____
Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

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

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

Remarks:
Wetland is in a managed field used for hay production. Adjacent stream has likely been straightened + dredged out in the past.

HYDROLOGY

Wetland Hydrology Indicators:

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

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

Secondary Indicators (minimum of two required)

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

Field Observations:

Surface Water Present? Yes ____ No X Depth (inches): ____
Water Table Present? Yes X No ____ Depth (inches): ~6"
Saturation Present? (includes capillary fringe) Yes X No ____ Depth (inches): ~4"

Wetland Hydrology Present? Yes X No ____

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

Remarks:
Wetland is in a slightly-lower elevation drainage pattern thru a managed field in the floodplain of an adjacent stream. High water table observed.

VEGETATION (Five Strata) – Use scientific names of plants. Sampling Point: W-2

Tree Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1. –			
2.			
3.			
4.			
5.			
6.			
	= Total Cover		

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

Sapling Stratum (Plot size:)			
1. –			
2.			
3.			
4.			
5.			
6.			
	= Total Cover		

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

Shrub Stratum (Plot size:)			
1. –			
2.			
3.			
4.			
5.			
6.			
	= Total Cover		

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

Herb Stratum (Plot size: 15')			
1. Fescue sp. (likely arundinacea)	90	Y	FAC
2. Juncus effusus	20	Y	FACW
3. Carex lurida	10	N	OBL
4. scattered weeds (?)	2	N	–
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	122 = Total Cover		

50% of total cover: 61 20% of total cover: 24

Woody Vine Stratum (Plot size:)			
1. –			
2.			
3.			
4.			
5.			
	= Total Cover		

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

Dominance Test worksheet:

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

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 66 % (A/B)

Prevalence Index worksheet:

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

Prevalence Index = B/A = _____

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

___ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

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

___ Problematic Hydrophytic Vegetation[1] (Explain)

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

Definitions of Five Vegetation Strata:

Tree – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and 3 in. (7.6 cm) or larger in diameter at breast height (DBH).

Sapling – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and less than 3 in. (7.6 cm) DBH.

Shrub – Woody plants, excluding woody vines, approximately 3 to 20 ft (1 to 6 m) in height.

Herb – All herbaceous (non-woody) plants, including herbaceous vines, regardless of size, and woody plants, except woody vines, less than approximately 3 ft (1 m) in height.

Woody vine – All woody vines, regardless of height.

Hydrophytic Vegetation Present? Yes X No _____

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

Area is managed field, often used for hay production

SOIL

Sampling Point: W-2

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

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-4	10YR 4/3	100	–				loam	micaceous, saturated
4-10	10YR 4/2	50	5YR 4/6	30	C	M	sandy loam	micaceous, water table here
10+	10YR 5/1	75	10YR 4/2	10	C	M	sandy loam	micaceous, pebbles
			+ 5YR 4/6	15	C	M	sandy loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

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

Indicators for Problematic Hydric Soils[3]:

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

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

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes X No ___

Remarks:

Clear hydric soil present, water table observed at ~6"

Data Point W-3

WETLAND DETERMINATION DATA FORM – Eastern Mountains and Piedmont Region

Project/Site: Whittier Creek City/County: Surry Sampling Date: 4/9/18
Applicant/Owner: Michael Baker Intl State: NC Sampling Point: W-4
Investigator(s): S King, K Suggs Section, Township, Range: –
Landform (hillslope, terrace, etc.): floodplain Local relief (concave, convex, none): slightly concave Slope (%): 1%
Subregion (LRR or MLRA): P-136 Lat: 36.3779 Long: -80.6000 Datum: NAD 83
Soil Map Unit Name: Colvard + Suches soils NWI classification: –
Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ____ (If no, explain in Remarks.)
Are Vegetation X, Soil ____, or Hydrology X significantly disturbed? Are "Normal Circumstances" present? Yes X No ____
Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

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

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

Remarks:
Wetland area is in floodplain of a pasture managed for cattle.

HYDROLOGY

Wetland Hydrology Indicators:

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

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

Secondary Indicators (minimum of two required)

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

Field Observations:

Surface Water Present? Yes ____ No X Depth (inches): ____
Water Table Present? Yes ____ No X Depth (inches): ____
Saturation Present? (includes capillary fringe) Yes X No ____ Depth (inches): 6"

Wetland Hydrology Present? Yes X No ____

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

Remarks:
There are two small seeps in the floodplain adjacent to stream UT4 that contribute to the hydrology here, but primarily a riparian system.

Data Point W-3

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

Tree Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
6.			
	= Total Cover		

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

Sapling Stratum (Plot size: —)			
1.			
2.			
3.			
4.			
5.			
6.			
	= Total Cover		

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

Shrub Stratum (Plot size:)			
1. Rosa multiflora	5	Y	FACU
2.			
3.			
4.			
5.			
6.			
	5 = Total Cover		

50% of total cover: 3 20% of total cover: 1

Herb Stratum (Plot size:)			
1. Festuca sp (arundinacea)	80	Y	FAC
2. Juncus effusus	10	Y	FACW
3. Impatiens capensis	5	N	FACW
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	95 = Total Cover		

50% of total cover: 48 20% of total cover: 19

Woody Vine Stratum (Plot size: —)			
1.			
2.			
3.			
4.			
5.			
	= Total Cover		

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

Dominance Test worksheet:

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

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 66% (A/B)

Prevalence Index worksheet:

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

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

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

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

Definitions of Five Vegetation Strata:

Tree – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and 3 in. (7.6 cm) or larger in diameter at breast height (DBH).

Sapling – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and less than 3 in. (7.6 cm) DBH.

Shrub – Woody plants, excluding woody vines, approximately 3 to 20 ft (1 to 6 m) in height.

Herb – All herbaceous (non-woody) plants, including herbaceous vines, regardless of size, and woody plants, except woody vines, less than approximately 3 ft (1 m) in height.

Woody vine – All woody vines, regardless of height.

Area is heavily disturbed + managed as cattle pasture.

Hydrophytic Vegetation Present? Yes X No

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

Data Point W-3

SOIL

Sampling Point: _____

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

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-2	10YR 4/3	100	-				loam	rich topsoil
2-6	10YR 5/4	50	10YR 6/3	50	D	M	sandy loam	+ saturation @ 6"
6-12	10YR 6/1	90	7.5YR 5/6	10	C	M	clay loam	some mica

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

Hydric Soil Indicators:

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

Indicators for Problematic Hydric Soils[3]:

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

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

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes X No ____

Remarks:

Clear hydric soil present. Saturation noted at ≈ 6"

Data Point W-4

WETLAND DETERMINATION DATA FORM – Eastern Mountains and Piedmont Region

(upland point)

Project/Site: Whittier Creek City/County: Surry County Sampling Date: 4/9/18
Applicant/Owner: Michael Baker Intl State: _____ Sampling Point: W-5
Investigator(s): S King, L Suggs Section, Township, Range: —
Landform (hillslope, terrace, etc.): terrace Local relief (concave, convex, none): moderate slope Slope (%): 5%
Subregion (LRR or MLRA): P-136 Lat: 36.3785 Long: -80.5988 Datum: NAD 83
Soil Map Unit Name: Fairview sandy clay loam NWI classification: —
Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No _____ (If no, explain in Remarks.)
Are Vegetation X, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes X No _____
Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

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

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

Remarks:
Data point located in upland pasture area ≈ 60' from stream bank on moderately steep slope along a terrace.

HYDROLOGY

Wetland Hydrology Indicators:

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

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

Secondary Indicators (minimum of two required)

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

Field Observations:

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

Wetland Hydrology Present? Yes _____ No X

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

Remarks:
No indicators of hydrology observed

Data Point W-4

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

	Absolute % Cover	Dominant Species?	Indicator Status
Tree Stratum (Plot size: —)			
1.			
2.			
3.			
4.			
5.			
6.			
= Total Cover			
50% of total cover: ____ 20% of total cover: ____			
Sapling Stratum (Plot size: —)			
1.			
2.			
3.			
4.			
5.			
6.			
= Total Cover			
50% of total cover: ____ 20% of total cover: ____			
Shrub Stratum (Plot size: —)			
1.			
2.			
3.			
4.			
5.			
6.			
= Total Cover			
50% of total cover: ____ 20% of total cover: ____			
Herb Stratum (Plot size: 20')			
1. Fescue sp (arundinacea)	85	Y	FAC
2. Trifolium repens	10	Y	FACU
3. Stellaria media	5	Y	UPL
4. Taraxacum officide	2	N	FACU
5. Geranium maculatum	2	N	FACU
6.			
7.			
8.			
9.			
10.			
11.			
104 = Total Cover			
50% of total cover: 52 20% of total cover: 3			
Woody Vine Stratum (Plot size: —)			
1.			
2.			
3.			
4.			
5.			
= Total Cover			
50% of total cover: ____ 20% of total cover: ____			

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 33% (A/B)

Prevalence Index worksheet:

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

Prevalence Index = B/A = ____

Hydrophytic Vegetation Indicators:

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

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

Definitions of Five Vegetation Strata:

Tree – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and 3 in. (7.6 cm) or larger in diameter at breast height (DBH).

Sapling – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and less than 3 in. (7.6 cm) DBH.

Shrub – Woody plants, excluding woody vines, approximately 3 to 20 ft (1 to 6 m) in height.

Herb – All herbaceous (non-woody) plants, including herbaceous vines, regardless of size, and woody plants, except woody vines, less than approximately 3 ft (1 m) in height.

Woody vine – All woody vines, regardless of height.

Area is heavily disturbed vegetation-wise. Currently in use as cattle pasture. Non-native species present.

Hydrophytic Vegetation Present? Yes ____ No X

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

Data Point W-4

SOIL

Sampling Point: _____

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

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-1	10YR 3/3	100	–				loam	rich topsoil
1-8	10YR 4/4	100	–				sandy loam	(mica)
8-12	10YR 4/6	100	–				sandy loam	(mica + pebbles)
12+	5YR 5/8	100	–				clay loam	(mica + pebbles)

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

Hydric Soil Indicators:

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

Indicators for Problematic Hydric Soils[3]:

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

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

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes _____ No X

Remarks:

Hydric soil not present

APPENDIX I: (APPROVED FHWA CATEGORICAL EXCLUSION FORMS)

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:	Whittier Creek Site – Option D
County Name:	Surry
EEP Number:	100020
Project Sponsor:	FHWA
Project Contact Name:	Jake Byers, PE / Michael Baker Engineering, Inc.
Project Contact Address:	797 Haywood Road, Suite 201, Asheville, NC
Project Contact E-mail:	JByers@mbakerintl.com
EEP Project Manager:	Matthew Reid (matthew.reid@ncdenr.gov)

Project Description

The Whittier Creek Site - Option D is located in Surry County near the town of Dobson, NC in the Ararat community. The project site is located in the Yadkin River Basin (03040101) and the NC DMS Targeted Local Watershed (TLW) 03040101110040. The site is located on two abutting parcels just southeast of the intersection of Rockhill Church Road and Nurse Road.

The existing stream reaches and riparian wetlands within the project area have been significantly impacted by past and present unrestricted livestock access and/or channelization used to promote drainage and maximize agricultural acreage for cattle pastures. The project will involve the restoration and enhancement of approximately 3,594 linear feet of perennial stream along Whittier Creek and several UTs to Whittier Creek, which is a tributary to Bull Creek. A conservation easement will be implemented along all project reaches with riparian buffers extending in an excess of 30 feet from the top of bank. The conservation easement will protect the entire project area in perpetuity. Livestock will be permanently excluded from the conservation easement with permanent fencing.

For Official Use Only

Reviewed By:

2/5/2018
Date

EEP Project Manager

Conditional Approved By:

Date

For Division Administrator
FHWA

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

Final Approval By:

2-5-18
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

Whittier Creek Site – Option D / Categorical Exclusion – Summary

Yadkin River Basin – CU# 03040101 – Surry County, NC
NCDMS Project ID No. 100020; NCDEQ Contract No. 007182

Project Background

The Whittier Creek Site – Option D stream restoration project is proposing to restore, enhance, and protect approximately 3,594 linear feet of existing perennial streams along Whittier Creek and several UTs to Whittier Creek in Surry County, NC for the purpose of obtaining stream mitigation credit for the NC Division of Mitigation Services (DMS). The existing stream reaches and riparian wetlands within the project area have been significantly impacted by past and present unrestricted livestock access and/or channelization used to promote drainage and maximize agricultural acreage for cattle pastures.

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)

Environmental Data Resources, Inc (EDR) prepared the following reports: a Radius Map Report on September 14, 2017. Based on this report, there are two properties on or adjacent to the project site had been designated as commercial or industrial, John Flinchum's Grocery and Slate Sand Company, Inc., respectively.

John Flinchum's Grocery was located less than one-half mile from the project area and housed three on-site underground storage tanks (UST) for fuel. In 1990, all three tanks were removed and the business was closed; therefore, this property should not pose any hazardous waste risks to the project site.

The enclosed EDR report listed an active mining site located on one of the project parcels and is operated by Slate Sand Company, Inc. However, these results did not concur with current county zoning parcel data, historical aerial reviews, nor previous discussions with the current property owner. Based on these investigations and discussions, the property in question has always been a zoned as rural and has been an active farm since its purchase in 2006. Therefore, to verify these findings, Baker contacted Charles Turney, the Vice President of Slate Sand Company, Inc., on October 2, 2017. On October 3, 2017, replied to our request for verification about the project parcel stating that Slate Sand Company, Inc. has never done any mining on the project site or within the surrounding town of Ararat, NC. A copy of this correspondence and the EDR reports are included in the Appendix.

National Historic Preservation Act (Section 106)

DMS requested a review and comment from the State Historic Preservation Office (SHPO) on any possible issues that might emerge with respect to architectural or archaeological resources from the restoration project on August 9, 2017. SHPO's review of the project on August 23, 2017 found no historic resources that 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 the Option Agreement are included in the Appendix.

Endangered Species Act (ESA)

Michael Baker Engineering, Inc. (Baker) reviewed both the NC Natural Heritage Program (NCNHP) and the US Fish and Wildlife Service (USFWS) lists of federally protected animal and plant species and found that the following four species are federally-listed in Surry County.

Scientific Name	Common Name	Federal Status
Glyptemys muhlenbergii	Bog Turtle	Threatened Similarity of Appearance (S/A)
Myotis septentrionalis	Northern long-eared bat	Threatened
Helianthus schweinitzii	Schweinitz's sunflower	Endangered
Isotria medeoloides	Small whorled pogonia	Threatened

Baker conducted a two-mile radius search using the NHP's Data Explorer (https://ncnhde.natureserve.org/) on September 26, 2017 and found no known occurrences of the above referenced species within two miles of the project site. However, the project is located within Surry County, a Northern long-eared bat (NLEB) White Nose Syndrome (WNS) zone, and is therefore subject to the USFWS's Final 4(d) rule to maintain section 7(a)(2) compliance. The following additional supporting documentation has been included for reference: a Project Vicinity Map, a USGS Topographic Map, and a Project Site Map.

Based on our review, field surveys, and FHWA consultation, Baker has developed the following determinations for the above referenced species.

***Glyptemys muhlenbergii* (Bog turtle) – Biological Conclusion: No Effect**

Bog turtles live in the mud, grass and sphagnum mosses found in bogs, swamps, and marshy meadows usually fed by cool surface springs. There are two distinct populations of the species, a northern population and a southern population. The southern population which is found in western North Carolina, including Alexander County, NC is listed as threated due to "similarity of appearance" as stated in the November 4, 1997, *62 FR 59605 59623*. Because the southern population has not experienced the habitat loss of the northern population, the southern population is not subject to Section 7 consultation requirements of the Endangered Species Act. Therefore, the project will have "No Effect".

***Myotis septentrionalis* (Northern long-eared bat)**

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.

Forested habitats containing trees at least 3-inch dbh in the project area provide suitable habitat for NLEB. Due to the decline of the NLEB population from the WNS, the USFWS has issued the finalization of a special rule under section 4(d) of the ESA to addresses the effects to the NLEB resulting from purposeful and incidental take based on the occurrence of WNS. Because the project is located within a WNS zone and will include the removal/clearing of trees, it is subject to the final 4(d) ruling. As previously stated, a review of NCNHP records did not indicate any known NLEB populations within 2.0 mile of the study area; therefore, the project is eligible to use the NLEB 4(d) Rule Streamlined Consultation Form to meet regulatory requirements for section 7(a)(2) compliance 4(d) consultation.

To meet regulatory requirements, a letter requesting comment from the USFWS was sent on September 26, 2017. No response from the USFWS was received within the 30-day response period. Therefore, the signing of the NLEB 4(d) Rule Streamlined Consultation Form by the FHWA determines that this project

may affect the NLEB, but that any resulting incidental take of the NLEB is not prohibited by the final 4(d) rule. A FHWA signed 4(d) consultation form and the correspondence associated with this determination are included in the Appendix.

***Helianthus schweinitzii* (Schweinitz's sunflower) – Biological Conclusion: No Effect**
Schweinitz's sunflower is a rhizomatous perennial herb that grows approximately 6.5 feet in height with purplish stems and produces small yellow flowers from late August until frost. This species is endemic to the Piedmont of North and South Carolina, and the few sites where it occurs in relatively natural conditions consist of Xeric Hardpan Forests. The species is also found along roadside rights-of-way, maintained power lines and other utility rights-of-way, edges of thickets and old pastures, clearings and edges of upland oak-pine-hickory woods and Piedmont longleaf pine forests, and other sunny or semi-sunny habitats where disturbances (e.g., mowing, clearing, grazing, blow downs, storms, frequent fire) help create open or partially open areas for sunlight. It is intolerant of full shade and excessive competition from other vegetation. It is generally found growing on shallow sandy soils with high gravel content; shallow, poor, clayey hardpans; or shallow rocky soils, especially those derived from mafic rocks. Because marginal to suitable habitat for Schweinitz's sunflower occurs along field edges and utility easements adjacent to the project area, Baker conducted a field survey on September 25th, 2017. No populations or individuals were documented during the on-site review; therefore, the project will have "No Effect" on the species.

***Isotria medeoloides* (Small whorled pogonia) – Biological Conclusion: No Effect**
Small whorled pogonia is a member of the orchid family. 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 urban expansion, forestry practices, recreational activities, and trampling. The project site consists of open and active cattle pasture with a narrow line of predominantly first successional woody vegetation along the top of the stream bank. Existing stream reaches, riparian corridors, and open fields at the project site have been significantly impacted by past and present unrestricted livestock access. Since habitat suitable for the species is not present within the project area, the project will have "No Effect" on the species.

Farmland Protection Policy Act (FPPA)

On January 29, 2018, Baker submitted the AD-1006 form for the Whittier Creek Site – Option D to the North Carolina State Natural Resources Conservation Service (NRCS) Office. The NRCS responded on January 29, 2018 with the determination that implementation of this restoration project would result in the conversion of 4.8 acres of prime farmland soils. Baker submitted the completed AD-1006 form to the NRCS Assistant State Soil Scientist January 29, 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 September 26, 2017 requesting their comment and review on the Whittier Creek Site – Option D Restoration Project. As of January 29, 2018, Baker has not received any comments from either the NCWRC or the USFWS. Copies of all correspondence are included in Appendix.

Migratory Bird Treaty Act (MBTA)

A letter was sent by Baker to the USFWS on September 26, 2017 requesting their comment and review on the Whittier Creek Site – Option D Restoration Project in relation to migratory birds. As of January 29, 2018, Baker has not received any comments from the USFWS on this issue. All correspondence with the USFWS is included in the Appendix.

APPENDIX

Whittier Creek Site - Option D
Rockhill Church Road / Nurse Road
Ararat, NC 27007

Inquiry Number: 5050221.2s
September 14, 2017

The EDR Radius Map™ Report

6 Armstrong Road, 4th floor
Shelton, CT 06484
Toll Free: 800.352.0050
www.edrnet.com

TABLE OF CONTENTS

Thank you for your business.
Please contact EDR at 1-800-352-0050
with any questions or comments.

EXECUTIVE SUMMARY

A search of available environmental records was conducted by Environmental Data Resources, Inc (EDR). The report was designed to assist parties seeking to meet the search requirements of EPA's Standards and Practices for All Appropriate Inquiries (40 CFR Part 312), the ASTM Standard Practice for Environmental Site Assessments (E 1527-13) or custom requirements developed for the evaluation of environmental risk associated with a parcel of real estate.

TARGET PROPERTY INFORMATION

ADDRESS

ROCKHILL CHURCH ROAD / NURSE ROAD
ARARAT, NC 27007

COORDINATES

Latitude (North):	36.3789000 - 36° 22' 44.04''
Longitude (West):	80.6034000 - 80° 36' 12.24''
Universal Tranverse Mercator:	Zone 17
UTM X (Meters):	535573.8
UTM Y (Meters):	4025846.8
Elevation:	1030 ft. above sea level

USGS TOPOGRAPHIC MAP ASSOCIATED WITH TARGET PROPERTY

Target Property Map:	6045899 MOUNT AIRY SOUTH, NC
Version Date:	2014
Southeast Map:	5947737 SILOAM, NC
Version Date:	2013
Southwest Map:	5947699 COPELAND, NC
Version Date:	2013
Northwest Map:	5947705 DOBSON, NC
Version Date:	2013

AERIAL PHOTOGRAPHY IN THIS REPORT

Portions of Photo from:	20140524
Source:	USDA

MAPPED SITES SUMMARY

Target Property Address:
ROCKHILL CHURCH ROAD / NURSE ROAD
ARARAT, NC 27007

Click on Map ID to see full detail.

MAP ID	SITE NAME	ADDRESS	DATABASE ACRONYMS	RELATIVE ELEVATION	DIST (ft. & mi.) DIRECTION
1	SLATE SAND COMPANY I		US MINES	Lower	1 ft.
2	JOHN FLINCHUM'S GROC	ROUTE 1	UST	Higher	754, 0.143, NE

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
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

US AIRS ---- Aerometric Information Retrieval System Facility Subsystem
ABANDONED MINES ---- Abandoned Mines
FINDS ---- Facility Index System/Facility Registry System
DOCKET HWC ---- Hazardous Waste Compliance Docket Listing
ECHO ---- Enforcement & Compliance History Information
UXO ---- Unexploded Ordnance Sites
FUELS PROGRAM ---- EPA Fuels Program Registered Listing
COAL ASH ---- Coal Ash Disposal Sites
DRYCLEANERS ---- Drycleaning Sites
Financial Assurance ---- Financial Assurance Information Listing
NPDES ---- NPDES Facility Location Listing
UIC ---- Underground Injection Wells Listing

EDR HIGH RISK HISTORICAL RECORDS

EDR Exclusive Records

EDR MGP ---- EDR Proprietary Manufactured Gas Plants
EDR Hist Auto ---- EDR Exclusive Historic Gas Stations
EDR Hist Cleaner ---- EDR Exclusive Historic Dry 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 identified in the following databases.

Elevations have been determined from the USGS Digital Elevation Model and should be evaluated on a relative (not an absolute) basis. Relative elevation information between sites of close proximity should be field verified. Sites with an elevation equal to or higher than the target property have been differentiated below from sites with an elevation lower than the target property.
Page numbers and map identification numbers refer to the EDR Radius Map report where detailed data on individual sites can be reviewed.

Sites listed in ***bold italics*** are in multiple databases.

Unmappable (orphan) sites are not considered in the foregoing analysis.

STANDARD ENVIRONMENTAL RECORDS

State and tribal registered storage tank lists

UST: The Underground Storage Tank database contains registered USTs. USTs are regulated under Subtitle I of the Resource Conservation and Recovery Act (RCRA). The data come from the Department of Environment & Natural Resources' Petroleum Underground Storage Tank Database.

A review of the UST list, as provided by EDR, and dated 09/30/2016 has revealed that there is 1 UST

site within approximately 0.25 miles of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
JOHN FLINCHUM'S GROC Tank Status: Removed Facility Id: 00-0-0000031662	ROUTE 1	NE 1/8 - 1/4 (0.143 mi.)	2	12

ADDITIONAL ENVIRONMENTAL RECORDS

Other Ascertainable Records

US MINES: Mines Master Index File. The source of this database is the Dept. of Labor, Mine Safety and Health Administration.

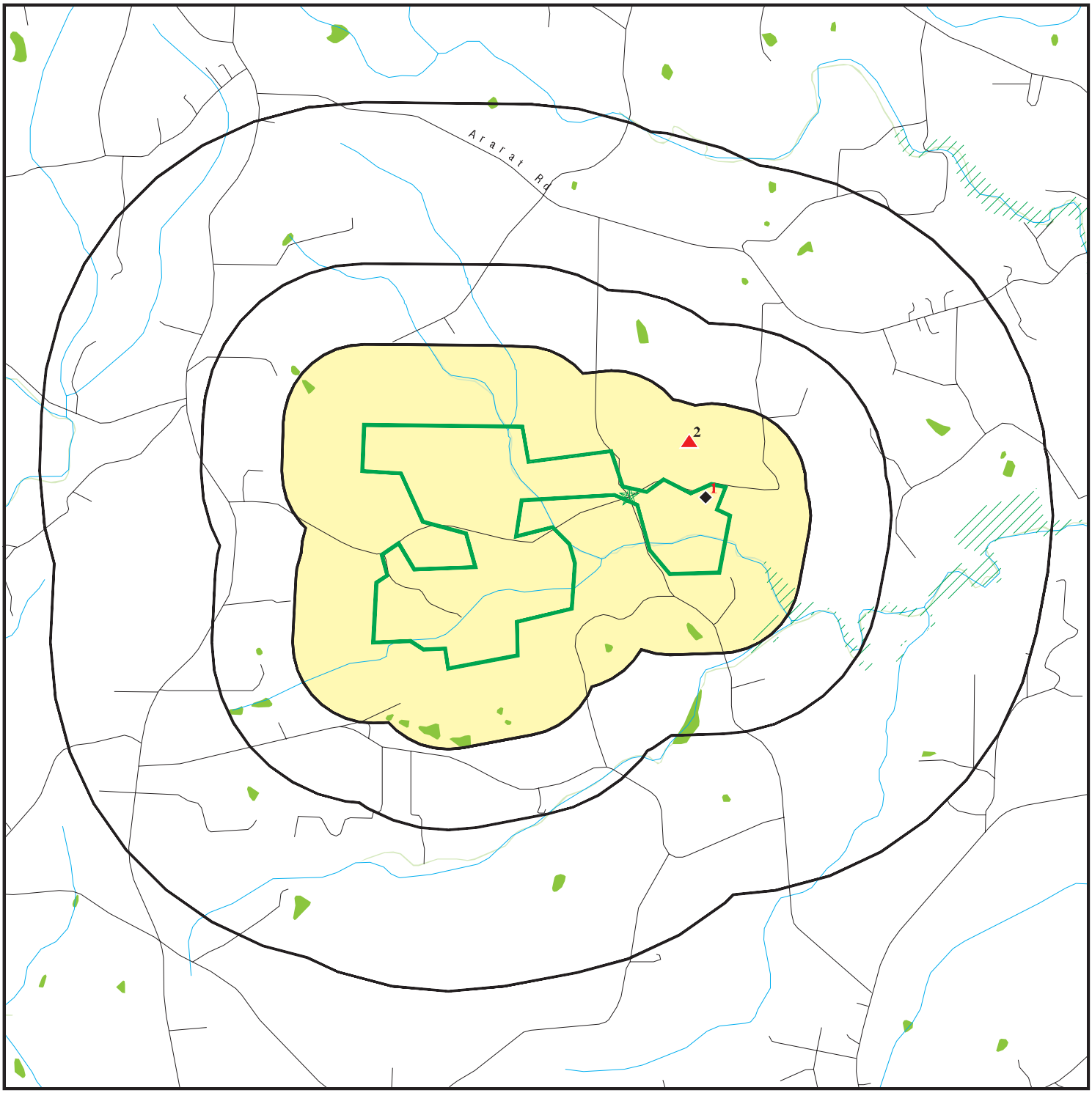
A review of the US MINES list, as provided by EDR, has revealed that there is 1 US MINES site within approximately 0.25 miles of the target property.

Lower Elevation	Address	Direction / Distance	Map ID	Page
SLATE SAND COMPANY I Database: US MINES, Date of Government Version: 02/08/2017		0 - 1/8 (0.000 mi.)	1	8

EXECUTIVE SUMMARY

There were no unmapped sites in this report.

OVERVIEW MAP - 5050221.2S



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

0 1/4 1/2 1 Miles

Indian Reservations BIA

100-year flood zone

500-year flood zone

National Wetland Inventory

State Wetlands

Upgradient Area

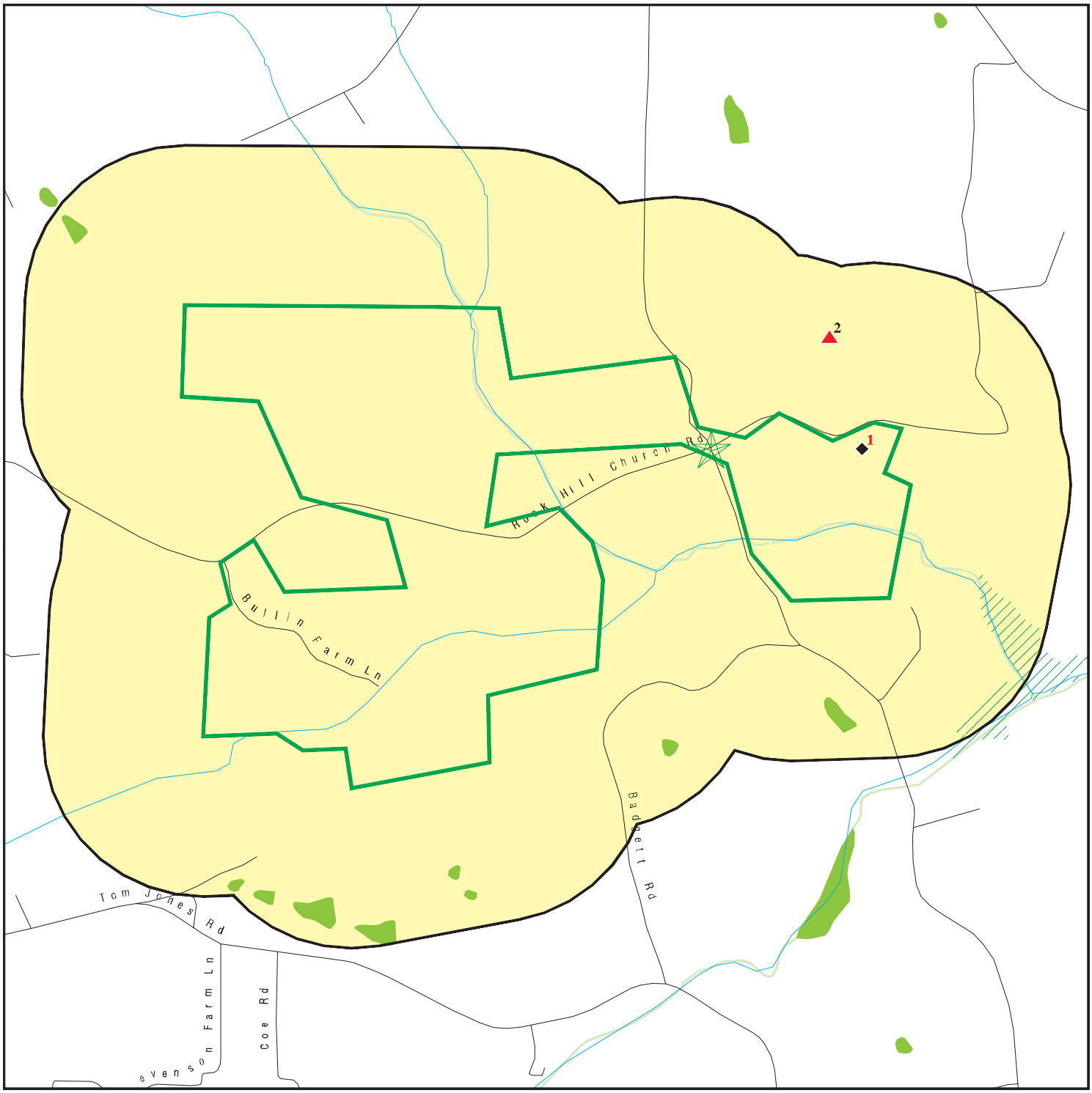
Hazardous Substance Disposal Sites

N

This report includes Interactive Map Layers to display and/or hide map information. The legend includes only those icons for the default map view.

SITE NAME:	Whittier Creek Site - Option D	CLIENT:	Michael Baker Engineering, Inc.
ADDRESS:	Rockhill Church Road / Nurse Road Ararat NC 27007	CONTACT:	Kristi Suggs
		INQUIRY #:	5050221.2s
LAT/LONG:	36.3789 / 80.6034	DATE:	September 14, 2017 4:15 pm

DETAIL MAP - 5050221.2S



0 1/8 1/4 1/2 Miles

- 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
- Indian Reservations BIA
- 100-year flood zone
- 500-year flood zone
- National Wetland Inventory
- State Wetlands
- 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:	Whittier Creek Site - Option D	CLIENT:	Michael Baker Engineering, Inc.
ADDRESS:	Rockhill Church Road / Nurse Road Ararat NC 27007	CONTACT:	Kristi Suggs
		INQUIRY #:	5050221.2s
LAT/LONG:	36.3789 / 80.6034	DATE:	September 14, 2017 4:23 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	TP		NR	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	TP		NR	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	1	NR	NR	NR	1
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	TP		NR	NR	NR	NR	NR	0
US CDL	TP		NR	NR	NR	NR	NR	0
Local Land Records								
LIENS 2	TP		NR	NR	NR	NR	NR	0
Records of Emergency Release Reports								
HMIRS	TP		NR	NR	NR	NR	NR	0
SPILLS	TP		NR	NR	NR	NR	NR	0
IMD	0.500		0	0	0	NR	NR	0
SPILLS 90	TP		NR	NR	NR	NR	NR	0
SPILLS 80	TP		NR	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	TP		NR	NR	NR	NR	NR	0
EPA WATCH LIST	TP		NR	NR	NR	NR	NR	0
2020 COR ACTION	0.250		0	0	NR	NR	NR	0
TSCA	TP		NR	NR	NR	NR	NR	0
TRIS	TP		NR	NR	NR	NR	NR	0
SSTS	TP		NR	NR	NR	NR	NR	0
ROD	1.000		0	0	0	0	NR	0
RMP	TP		NR	NR	NR	NR	NR	0
RAATS	TP		NR	NR	NR	NR	NR	0
PRP	TP		NR	NR	NR	NR	NR	0
PADS	TP		NR	NR	NR	NR	NR	0
ICIS	TP		NR	NR	NR	NR	NR	0
FTTS	TP		NR	NR	NR	NR	NR	0
MLTS	TP		NR	NR	NR	NR	NR	0
COAL ASH DOE	TP		NR	NR	NR	NR	NR	0
COAL ASH EPA	0.500		0	0	0	NR	NR	0
PCB TRANSFORMER	TP		NR	NR	NR	NR	NR	0
RADINFO	TP		NR	NR	NR	NR	NR	0
HIST FTTS	TP		NR	NR	NR	NR	NR	0
DOT OPS	TP		NR	NR	NR	NR	NR	0
CONSENT	1.000		0	0	0	0	NR	0
INDIAN RESERV	1.000		0	0	0	0	NR	0
FUSRAP	1.000		0	0	0	0	NR	0
UMTRA	0.500		0	0	0	NR	NR	0
LEAD SMELTERS	TP		NR	NR	NR	NR	NR	0
US AIRS	TP		NR	NR	NR	NR	NR	0
US MINES	0.250		1	0	NR	NR	NR	1
ABANDONED MINES	0.250		0	0	NR	NR	NR	0
FINDS	TP		NR	NR	NR	NR	NR	0
DOCKET HWC	TP		NR	NR	NR	NR	NR	0
ECHO	TP		NR	NR	NR	NR	NR	0
UXO	1.000		0	0	0	0	NR	0
FUELS PROGRAM	0.250		0	0	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	TP		NR	NR	NR	NR	NR	0
NPDES	TP		NR	NR	NR	NR	NR	0
UIC	TP		NR	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
EDR Hist Cleaner	0.125		0	NR	NR	NR	NR	0
EDR RECOVERED GOVERNMENT ARCHIVES								
Exclusive Recovered Govt. Archives								
RGA HWS	TP		NR	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
RGA LF	TP		NR	NR	NR	NR	NR	0
RGA LUST	TP		NR	NR	NR	NR	NR	0
- Totals --		0	1	1	0	0	0	2

NOTES:

TP = Target Property

NR = Not Requested at this Search Distance

Sites may be listed in more than one database

1 **SLATE SAND COMPANY INC** **US MINES** **1016953103**
N/A

< 1/8
1 ft. **SURRY (County), NC**

Relative:
Lower

Actual:
996 ft.

US MINES:

Mine ID:	3101989
SIC code(s):	144200 000000 000000 000000 000000 000000
Entity name:	SLATE SAND
Company:	SLATE SAND COMPANY INC
Status:	1
Status date:	20031105
Operation Class:	non-Coal Mining
Number of shops:	0
Number of plants:	0
Latitude:	36 22 44
Longitude:	080 35 57

Violations Details:

Violation Number:	6130886
Date Issued:	12/14/2006
Mine Status:	Active
Status Date:	11/05/2003
Action Type:	104(a)
Date Abated:	12/14/2006
Citation/Order:	Citation
Sig and Sub Designation:	N
Proposed Penalty:	60.00
Paid Penalty:	60.00
Assessment Status code:	Closed
Assess. Case Status code:	Proposed
Assessment Amount:	60.00
Year:	2006

Violation Number:	6130887
Date Issued:	12/14/2006
Mine Status:	Active
Status Date:	11/05/2003
Action Type:	104(a)
Date Abated:	12/27/2006
Citation/Order:	Citation
Sig and Sub Designation:	N
Proposed Penalty:	60.00
Paid Penalty:	60.00
Assessment Status code:	Closed
Assess. Case Status code:	Proposed
Assessment Amount:	60.00
Year:	2006

Violation Number:	6127810
Date Issued:	11/05/2003
Mine Status:	Active
Status Date:	11/05/2003
Action Type:	104(a)
Date Abated:	11/05/2003
Citation/Order:	Citation
Sig and Sub Designation:	N
Proposed Penalty:	60
Paid Penalty:	60

SLATE SAND COMPANY INC (Continued) **1016953103**

Assessment Status code: Closed
Assess. Case Status code: Proposed
Assessment Amount: 60
Year: 2003

Violation Number: 6510618
Date Issued: 07/22/2009
Mine Status: Active
Status Date: 11/05/2003
Action Type: 104(a)
Date Abated: 07/22/2009
Citation/Order: Citation
Sig and Sub Designation: N
Proposed Penalty: 100.00
Paid Penalty: 100.00
Assessment Status code: Closed
Assess. Case Status code: Proposed
Assessment Amount: 100.00
Year: 2009

Violation Number: 6510619
Date Issued: 07/22/2009
Mine Status: Active
Status Date: 11/05/2003
Action Type: 104(a)
Date Abated: 07/23/2009
Citation/Order: Citation
Sig and Sub Designation: N
Proposed Penalty: 100.00
Paid Penalty: 100.00
Assessment Status code: Closed
Assess. Case Status code: Proposed
Assessment Amount: 100.00
Year: 2009

Violation Number: 6597163
Date Issued: 06/24/2010
Mine Status: Active
Status Date: 11/05/2003
Action Type: 104(a)
Date Abated: 07/15/2010
Citation/Order: Citation
Sig and Sub Designation: N
Proposed Penalty: 100.00
Paid Penalty: 100.00
Assessment Status code: Closed
Assess. Case Status code: Proposed
Assessment Amount: 100.00
Year: 2010

Violation Number: 6130308
Date Issued: 06/20/2006
Mine Status: Active
Status Date: 11/05/2003
Action Type: 104(a)
Date Abated: 06/22/2006
Citation/Order: Citation

SLATE SAND COMPANY INC (Continued) **1016953103**

Sig and Sub Designation: Y
Proposed Penalty: 107.00
Paid Penalty: 107.00
Assessment Status code: Closed
Assess. Case Status code: Proposed
Assessment Amount: 107.00
Year: 2006

Violation Number: 6130309
Date Issued: 06/20/2006
Mine Status: Active
Status Date: 11/05/2003
Action Type: 104(a)
Date Abated: 06/20/2006
Citation/Order: Citation
Sig and Sub Designation: N
Proposed Penalty: 60.00
Paid Penalty: 60.00
Assessment Status code: Closed
Assess. Case Status code: Proposed
Assessment Amount: 60.00
Year: 2006

Violation Number: 6130307
Date Issued: 06/20/2006
Mine Status: Active
Status Date: 11/05/2003
Action Type: 104(a)
Date Abated: 06/22/2006
Citation/Order: Citation
Sig and Sub Designation: Y
Proposed Penalty: 144.00
Paid Penalty: 144.00
Assessment Status code: Closed
Assess. Case Status code: Proposed
Assessment Amount: 144.00
Year: 2006

Violation Number: 8719431
Date Issued: 05/03/2012
Mine Status: Active
Status Date: 11/05/2003
Action Type: 104(a)
Date Abated: 05/03/2012
Citation/Order: Citation
Sig and Sub Designation: N
Proposed Penalty: 100
Paid Penalty: 100
Assessment Status code: Closed
Assess. Case Status code: Proposed
Assessment Amount: 100
Year: 2012

Violation Number: 8637505
Date Issued: 04/28/2011
Mine Status: Active
Status Date: 11/05/2003

SLATE SAND COMPANY INC (Continued) **1016953103**

Action Type:	104(a)
Date Abated:	04/28/2011
Citation/Order:	Citation
Sig and Sub Designation:	N
Proposed Penalty:	100.00
Paid Penalty:	100.00
Assessment Status code:	Closed
Assess. Case Status code:	Proposed
Assessment Amount:	100.00
Year:	2011

Violation Number:	6084271
Date Issued:	04/17/2008
Mine Status:	Active
Status Date:	11/05/2003
Action Type:	104(a)
Date Abated:	04/17/2008
Citation/Order:	Citation
Sig and Sub Designation:	N
Proposed Penalty:	100.00
Paid Penalty:	100.00
Assessment Status code:	Closed
Assess. Case Status code:	Proposed
Assessment Amount:	100.00
Year:	2008

Violation Number:	6105500
Date Issued:	02/09/2009
Mine Status:	Active
Status Date:	11/05/2003
Action Type:	104(a)
Date Abated:	02/23/2009
Citation/Order:	Citation
Sig and Sub Designation:	N
Proposed Penalty:	100.00
Paid Penalty:	100.00
Assessment Status code:	Closed
Assess. Case Status code:	Proposed
Assessment Amount:	100.00
Year:	2009

Violation Number:	8725619
Date Issued:	01/28/2013
Mine Status:	Active
Status Date:	11/05/2003
Action Type:	104(a)
Date Abated:	02/12/2013
Citation/Order:	Citation
Sig and Sub Designation:	N
Proposed Penalty:	100
Paid Penalty:	100
Assessment Status code:	Closed
Assess. Case Status code:	Proposed
Assessment Amount:	100
Year:	2013

Violation Number:	6516905

SLATE SAND COMPANY INC (Continued) **1016953103**

Date Issued:	01/19/2011
Mine Status:	Active
Status Date:	11/05/2003
Action Type:	104(a)
Date Abated:	01/19/2011
Citation/Order:	Citation
Sig and Sub Designation:	N
Proposed Penalty:	100.00
Paid Penalty:	100.00
Assessment Status code:	Closed
Assess. Case Status code:	Proposed
Assessment Amount:	100.00
Year:	2011

Violation Number:	8810454
Date Issued:	01/17/2014
Mine Status:	Active
Status Date:	11/05/2003
Action Type:	104(a)
Date Abated:	02/03/2014
Citation/Order:	Citation
Sig and Sub Designation:	N
Proposed Penalty:	100.00
Paid Penalty:	0.00
Assessment Status code:	Closed
Assess. Case Status code:	Vacated
Assessment Amount:	0.00
Year:	2014

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2 **JOHN FLINCHUM'S GROCERY** **UST** **U000831449**
NE **ROUTE 1** **N/A**
1/8-1/4 **ARARATI, NC 27007**
0.143 mi.
754 ft.

Relative:
Higher

Actual:
1079 ft.

UST:

Facility Id:	00-0-0000031662
Contact:	HARRELL OIL CO OF MOUNT AIRY
Contact Address1:	PO BOX 1947 / 814-16 FORREST DR
Contact Address2:	Not reported
Contact City/State/Zip:	MOUNT AIRY, NC 27030-1947
FIPS County Desc:	Surry
Latitude:	0
Longitude:	0

Tank Id:	1
Tank Status:	Removed
Installed Date:	01/01/1964
Perm Close Date:	04/30/1990
Product Key:	3
Product Name:	Gasoline, Gas Mix
Tank Capacity:	550
Root Tank Id:	Not reported
Main Tank:	No
Compartment Tank:	No
Manifold Tank:	Not reported
Commercial:	Yes
Regulated:	Yes

JOHN FLINCHUM'S GROCERY (Continued) **U000831449**

Tank Construction:	Single Wall Steel
Piping Construction:	Single Wall Steel
Piping System Key:	Unknown
Other CP Tank:	Not reported
Overfill Protection Key:	1
Overfill Protection Name:	Unknown
Spill Protection Key:	1
Spill Protection Name:	Unknown
Leak Detection Key:	-1
Leak Detection Name:	Unknown
Decode for TCONS_KEY:	Single Wall Steel
Decode for PCONS_KEY:	Single Wall Steel
Decode for PSYS_KEY:	Unknown

Tank Id:	2
Tank Status:	Removed
Installed Date:	01/01/1964
Perm Close Date:	04/30/1990
Product Key:	3
Product Name:	Gasoline, Gas Mix
Tank Capacity:	550
Root Tank Id:	Not reported
Main Tank:	No
Compartment Tank:	No
Manifold Tank:	Not reported
Commercial:	Yes
Regulated:	Yes
Tank Construction:	Single Wall Steel
Piping Construction:	Single Wall Steel
Piping System Key:	Unknown
Other CP Tank:	Not reported
Overfill Protection Key:	1
Overfill Protection Name:	Unknown
Spill Protection Key:	1
Spill Protection Name:	Unknown
Leak Detection Key:	-1
Leak Detection Name:	Unknown
Decode for TCONS_KEY:	Single Wall Steel
Decode for PCONS_KEY:	Single Wall Steel
Decode for PSYS_KEY:	Unknown

Tank Id:	3
Tank Status:	Removed
Installed Date:	01/01/1964
Perm Close Date:	04/30/1990
Product Key:	8
Product Name:	Kerosene, Kero Mix
Tank Capacity:	275
Root Tank Id:	Not reported
Main Tank:	No
Compartment Tank:	No
Manifold Tank:	Not reported
Commercial:	Yes
Regulated:	Yes
Tank Construction:	Single Wall Steel

JOHN FLINCHUM'S GROCERY (Continued) **U000831449**

Piping Construction:	Single Wall Steel
Piping System Key:	Unknown
Other CP Tank:	Not reported
Overfill Protection Key:	1
Overfill Protection Name:	Unknown
Spill Protection Key:	1
Spill Protection Name:	Unknown
Leak Detection Key:	-1
Leak Detection Name:	Unknown
Decode for TCONS_KEY:	Single Wall Steel
Decode for PCONS_KEY:	Single Wall Steel
Decode for PSYS_KEY:	Unknown

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: 04/05/2017
Date Data Arrived at EDR: 04/21/2017
Date Made Active in Reports: 05/12/2017
Number of Days to Update: 21

Source: EPA
Telephone: N/A
Last EDR Contact: 07/07/2017
Next Scheduled EDR Contact: 10/16/2017
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: 04/05/2017
Date Data Arrived at EDR: 04/21/2017
Date Made Active in Reports: 05/12/2017
Number of Days to Update: 21

Source: EPA
Telephone: N/A
Last EDR Contact: 07/07/2017
Next Scheduled EDR Contact: 10/16/2017
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

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

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: 04/05/2017
Date Data Arrived at EDR: 04/21/2017
Date Made Active in Reports: 05/12/2017
Number of Days to Update: 21

Source: EPA
Telephone: N/A
Last EDR Contact: 07/07/2017
Next Scheduled EDR Contact: 10/16/2017
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: 07/07/2017
Next Scheduled EDR Contact: 10/16/2017
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: 02/07/2017
Date Data Arrived at EDR: 04/19/2017
Date Made Active in Reports: 05/05/2017
Number of Days to Update: 16

Source: EPA
Telephone: 800-424-9346
Last EDR Contact: 07/21/2017
Next Scheduled EDR Contact: 10/30/2017
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: 02/07/2017
Date Data Arrived at EDR: 04/19/2017
Date Made Active in Reports: 05/05/2017
Number of Days to Update: 16

Source: EPA
Telephone: 800-424-9346
Last EDR Contact: 07/28/2017
Next Scheduled EDR Contact: 10/30/2017
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: 12/12/2016
Date Data Arrived at EDR: 12/28/2016
Date Made Active in Reports: 02/10/2017
Number of Days to Update: 44

Source: EPA
Telephone: 800-424-9346
Last EDR Contact: 08/11/2017
Next Scheduled EDR Contact: 10/09/2017
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: 12/12/2016
Date Data Arrived at EDR: 12/28/2016
Date Made Active in Reports: 02/10/2017
Number of Days to Update: 44

Source: Environmental Protection Agency
Telephone: (404) 562-8651
Last EDR Contact: 08/11/2017
Next Scheduled EDR Contact: 10/09/2017
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: 12/12/2016
Date Data Arrived at EDR: 12/28/2016
Date Made Active in Reports: 02/10/2017
Number of Days to Update: 44

Source: Environmental Protection Agency
Telephone: (404) 562-8651
Last EDR Contact: 08/11/2017
Next Scheduled EDR Contact: 10/09/2017
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: 12/12/2016
Date Data Arrived at EDR: 12/28/2016
Date Made Active in Reports: 02/10/2017
Number of Days to Update: 44

Source: Environmental Protection Agency
Telephone: (404) 562-8651
Last EDR Contact: 08/11/2017
Next Scheduled EDR Contact: 10/09/2017
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: 12/12/2016
Date Data Arrived at EDR: 12/28/2016
Date Made Active in Reports: 02/10/2017
Number of Days to Update: 44

Source: Environmental Protection Agency
Telephone: (404) 562-8651
Last EDR Contact: 08/11/2017
Next Scheduled EDR Contact: 10/09/2017
Data Release Frequency: Varies

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: 12/28/2016
Date Data Arrived at EDR: 01/04/2017
Date Made Active in Reports: 04/07/2017
Number of Days to Update: 93

Source: Department of the Navy
Telephone: 843-820-7326
Last EDR Contact: 08/10/2017
Next Scheduled EDR Contact: 11/27/2017
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: 02/13/2017
Date Data Arrived at EDR: 02/28/2017
Date Made Active in Reports: 06/09/2017
Number of Days to Update: 101

Source: Environmental Protection Agency
Telephone: 703-603-0695
Last EDR Contact: 08/30/2017
Next Scheduled EDR Contact: 12/11/2017
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: 02/13/2017
Date Data Arrived at EDR: 02/28/2017
Date Made Active in Reports: 06/09/2017
Number of Days to Update: 101

Source: Environmental Protection Agency
Telephone: 703-603-0695
Last EDR Contact: 08/30/2017
Next Scheduled EDR Contact: 12/11/2017
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: 09/26/2016
Date Data Arrived at EDR: 09/29/2016
Date Made Active in Reports: 11/11/2016
Number of Days to Update: 43

Source: National Response Center, United States Coast Guard
Telephone: 202-267-2180
Last EDR Contact: 06/28/2017
Next Scheduled EDR Contact: 10/09/2017
Data Release Frequency: Annually

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: 07/26/2017
Next Scheduled EDR Contact: 11/08/2017
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: 10/07/2016
Date Data Arrived at EDR: 12/15/2016
Date Made Active in Reports: 03/06/2017
Number of Days to Update: 81

Source: Department of Environment, Health and Natural Resources
Telephone: 919-508-8400
Last EDR Contact: 09/13/2017
Next Scheduled EDR Contact: 12/25/2017
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: 11/17/2016
Date Data Arrived at EDR: 12/28/2016
Date Made Active in Reports: 03/08/2017
Number of Days to Update: 70

Source: Department of Environment and Natural Resources
Telephone: 919-733-0692
Last EDR Contact: 06/29/2017
Next Scheduled EDR Contact: 10/09/2017
Data Release Frequency: Semi-Annually

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: 08/08/2016
Date Data Arrived at EDR: 01/17/2017
Date Made Active in Reports: 03/08/2017
Number of Days to Update: 50

Source: Department of Environment & Natural Resources
Telephone: 919-733-4996
Last EDR Contact: 04/14/2017
Next Scheduled EDR Contact: 07/24/2017
Data Release Frequency: Varies

State and tribal leaking storage tank lists

LAST: Leaking Aboveground Storage Tanks
A listing of leaking aboveground storage tank site locations.

Date of Government Version: 10/07/2016
Date Data Arrived at EDR: 11/09/2016
Date Made Active in Reports: 03/06/2017
Number of Days to Update: 117
Source: Department of Environment & Natural Resources
Telephone: 877-623-6748
Last EDR Contact: 08/10/2017
Next Scheduled EDR Contact: 11/20/2017
Data Release Frequency: Quarterly

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: 11/07/2016
Date Data Arrived at EDR: 11/09/2016
Date Made Active in Reports: 03/06/2017
Number of Days to Update: 117
Source: Department of Environment and Natural Resources
Telephone: 919-733-1308
Last EDR Contact: 08/10/2017
Next Scheduled EDR Contact: 11/20/2017
Data Release Frequency: Quarterly

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: 11/14/2016
Date Data Arrived at EDR: 01/26/2017
Date Made Active in Reports: 05/05/2017
Number of Days to Update: 99
Source: EPA, Region 5
Telephone: 312-886-7439
Last EDR Contact: 07/27/2017
Next Scheduled EDR Contact: 11/08/2017
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: 11/14/2016
Date Data Arrived at EDR: 01/26/2017
Date Made Active in Reports: 05/05/2017
Number of Days to Update: 99
Source: EPA Region 1
Telephone: 617-918-1313
Last EDR Contact: 07/27/2017
Next Scheduled EDR Contact: 11/08/2017
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: 10/14/2016
Date Data Arrived at EDR: 01/27/2017
Date Made Active in Reports: 05/05/2017
Number of Days to Update: 98
Source: EPA Region 4
Telephone: 404-562-8677
Last EDR Contact: 07/28/2017
Next Scheduled EDR Contact: 11/08/2017
Data Release Frequency: Semi-Annually

INDIAN LUST R10: Leaking Underground Storage Tanks on Indian Land
LUSTs on Indian land in Alaska, Idaho, Oregon and Washington.

Date of Government Version: 10/07/2016
Date Data Arrived at EDR: 01/26/2017
Date Made Active in Reports: 05/05/2017
Number of Days to Update: 99
Source: EPA Region 10
Telephone: 206-553-2857
Last EDR Contact: 07/27/2017
Next Scheduled EDR Contact: 11/08/2017
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: 10/06/2016
Date Data Arrived at EDR: 01/26/2017
Date Made Active in Reports: 05/05/2017
Number of Days to Update: 99

Source: Environmental Protection Agency
Telephone: 415-972-3372
Last EDR Contact: 07/27/2017
Next Scheduled EDR Contact: 11/08/2017
Data Release Frequency: Quarterly

INDIAN LUST R6: Leaking Underground Storage Tanks on Indian Land
LUSTs on Indian land in New Mexico and Oklahoma.

Date of Government Version: 10/01/2016
Date Data Arrived at EDR: 01/26/2017
Date Made Active in Reports: 05/05/2017
Number of Days to Update: 99

Source: EPA Region 6
Telephone: 214-665-6597
Last EDR Contact: 07/27/2017
Next Scheduled EDR Contact: 11/08/2017
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: 09/01/2016
Date Data Arrived at EDR: 01/26/2017
Date Made Active in Reports: 05/05/2017
Number of Days to Update: 99

Source: EPA Region 7
Telephone: 913-551-7003
Last EDR Contact: 07/27/2017
Next Scheduled EDR Contact: 11/08/2017
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: 10/17/2016
Date Data Arrived at EDR: 01/26/2017
Date Made Active in Reports: 05/05/2017
Number of Days to Update: 99

Source: EPA Region 8
Telephone: 303-312-6271
Last EDR Contact: 07/27/2017
Next Scheduled EDR Contact: 11/08/2017
Data Release Frequency: Quarterly

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: 01/06/2017
Date Data Arrived at EDR: 01/12/2017
Date Made Active in Reports: 03/06/2017
Number of Days to Update: 53

Source: Department of Environment and Natural Resources
Telephone: 919-733-1315
Last EDR Contact: 07/13/2017
Next Scheduled EDR Contact: 10/23/2017
Data Release Frequency: Semi-Annually

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: 01/01/2010
Date Data Arrived at EDR: 02/16/2010
Date Made Active in Reports: 04/12/2010
Number of Days to Update: 55

Source: FEMA
Telephone: 202-646-5797
Last EDR Contact: 07/14/2017
Next Scheduled EDR Contact: 10/23/2017
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: 09/30/2016
Date Data Arrived at EDR: 11/09/2016
Date Made Active in Reports: 03/06/2017
Number of Days to Update: 117

Source: Department of Environment and Natural Resources
Telephone: 919-733-1308
Last EDR Contact: 08/10/2017
Next Scheduled EDR Contact: 11/20/2017
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: 09/26/2016
Date Data Arrived at EDR: 12/30/2016
Date Made Active in Reports: 03/06/2017
Number of Days to Update: 66

Source: Department of Environment and Natural Resources
Telephone: 919-715-6183
Last EDR Contact: 06/19/2017
Next Scheduled EDR Contact: 10/02/2017
Data Release Frequency: Semi-Annually

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: 10/07/2016
Date Data Arrived at EDR: 01/26/2017
Date Made Active in Reports: 05/05/2017
Number of Days to Update: 99

Source: EPA Region 10
Telephone: 206-553-2857
Last EDR Contact: 07/27/2017
Next Scheduled EDR Contact: 11/08/2017
Data Release Frequency: Quarterly

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: 10/17/2016
Date Data Arrived at EDR: 01/26/2017
Date Made Active in Reports: 05/05/2017
Number of Days to Update: 99

Source: EPA Region 8
Telephone: 303-312-6137
Last EDR Contact: 07/27/2017
Next Scheduled EDR Contact: 11/08/2017
Data Release Frequency: Quarterly

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: 09/01/2016
Date Data Arrived at EDR: 01/26/2017
Date Made Active in Reports: 05/05/2017
Number of Days to Update: 99

Source: EPA Region 7
Telephone: 913-551-7003
Last EDR Contact: 07/27/2017
Next Scheduled EDR Contact: 11/08/2017
Data Release Frequency: Varies

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: 10/01/2016
Date Data Arrived at EDR: 01/26/2017
Date Made Active in Reports: 05/05/2017
Number of Days to Update: 99

Source: EPA Region 6
Telephone: 214-665-7591
Last EDR Contact: 07/27/2017
Next Scheduled EDR Contact: 11/08/2017
Data Release Frequency: Semi-Annually

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: 01/14/2017
Date Data Arrived at EDR: 01/26/2017
Date Made Active in Reports: 05/05/2017
Number of Days to Update: 99

Source: EPA Region 5
Telephone: 312-886-6136
Last EDR Contact: 07/27/2017
Next Scheduled EDR Contact: 11/08/2017
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: 10/14/2016
Date Data Arrived at EDR: 01/27/2017
Date Made Active in Reports: 05/05/2017
Number of Days to Update: 98

Source: EPA Region 4
Telephone: 404-562-9424
Last EDR Contact: 07/28/2017
Next Scheduled EDR Contact: 11/08/2017
Data Release Frequency: Semi-Annually

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: 11/14/2016
Date Data Arrived at EDR: 01/26/2017
Date Made Active in Reports: 05/05/2017
Number of Days to Update: 99

Source: EPA, Region 1
Telephone: 617-918-1313
Last EDR Contact: 07/27/2017
Next Scheduled EDR Contact: 11/08/2017
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: 10/06/2016
Date Data Arrived at EDR: 01/26/2017
Date Made Active in Reports: 05/05/2017
Number of Days to Update: 99

Source: EPA Region 9
Telephone: 415-972-3368
Last EDR Contact: 07/27/2017
Next Scheduled EDR Contact: 11/08/2017
Data Release Frequency: Quarterly

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: 10/07/2016
Date Data Arrived at EDR: 12/15/2016
Date Made Active in Reports: 03/06/2017
Number of Days to Update: 81

Source: Department of Environment, Health and Natural Resources
Telephone: 919-508-8400
Last EDR Contact: 09/13/2017
Next Scheduled EDR Contact: 12/25/2017
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: 06/27/2017
Next Scheduled EDR Contact: 10/09/2017
Data Release Frequency: Varies

VCP: Responsible Party Voluntary Action Sites
Responsible Party Voluntary Action site locations.

Date of Government Version: 10/07/2016
Date Data Arrived at EDR: 12/15/2016
Date Made Active in Reports: 03/08/2017
Number of Days to Update: 83
Source: Department of Environment and Natural Resources
Telephone: 919-508-8400
Last EDR Contact: 09/13/2017
Next Scheduled EDR Contact: 12/25/2017
Data Release Frequency: Semi-Annually

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: 01/03/2017
Date Data Arrived at EDR: 01/06/2017
Date Made Active in Reports: 03/06/2017
Number of Days to Update: 59
Source: Department of Environment and Natural Resources
Telephone: 919-733-4996
Last EDR Contact: 07/07/2017
Next Scheduled EDR Contact: 10/16/2017
Data Release Frequency: Varies

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: 03/02/2017
Date Data Arrived at EDR: 03/02/2017
Date Made Active in Reports: 04/07/2017
Number of Days to Update: 36
Source: Environmental Protection Agency
Telephone: 202-566-2777
Last EDR Contact: 06/20/2017
Next Scheduled EDR Contact: 10/02/2017
Data Release Frequency: Semi-Annually

Local Lists of Landfill / Solid Waste Disposal Sites

SWRCY: Recycling Center Listing
A listing of recycling center locations.

Date of Government Version: 11/30/2016
Date Data Arrived at EDR: 12/05/2016
Date Made Active in Reports: 03/08/2017
Number of Days to Update: 93
Source: Department of Environment & Natural Resources
Telephone: 919-707-8137
Last EDR Contact: 05/01/2017
Next Scheduled EDR Contact: 08/14/2017
Data Release Frequency: Varies

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

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: 08/01/2017
Next Scheduled EDR Contact: 11/13/2017
Data Release Frequency: Varies

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: 07/24/2017
Next Scheduled EDR Contact: 11/08/2017
Data Release Frequency: No Update Planned

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

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: 08/29/2017
Next Scheduled EDR Contact: 11/13/2017
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: 02/09/2017
Date Data Arrived at EDR: 03/08/2017
Date Made Active in Reports: 06/09/2017
Number of Days to Update: 93
Source: Drug Enforcement Administration
Telephone: 202-307-1000
Last EDR Contact: 08/30/2017
Next Scheduled EDR Contact: 12/11/2017
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: 02/09/2017
Date Data Arrived at EDR: 03/08/2017
Date Made Active in Reports: 06/09/2017
Number of Days to Update: 93

Source: Drug Enforcement Administration
Telephone: 202-307-1000
Last EDR Contact: 08/30/2017
Next Scheduled EDR Contact: 12/11/2017
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: 02/18/2014
Date Data Arrived at EDR: 03/18/2014
Date Made Active in Reports: 04/24/2014
Number of Days to Update: 37

Source: Environmental Protection Agency
Telephone: 202-564-6023
Last EDR Contact: 07/26/2017
Next Scheduled EDR Contact: 11/08/2017
Data Release Frequency: Varies

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: 12/28/2016
Date Data Arrived at EDR: 12/28/2016
Date Made Active in Reports: 02/03/2017
Number of Days to Update: 37

Source: U.S. Department of Transportation
Telephone: 202-366-4555
Last EDR Contact: 06/28/2017
Next Scheduled EDR Contact: 10/09/2017
Data Release Frequency: Annually

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: 12/14/2016
Date Data Arrived at EDR: 12/16/2016
Date Made Active in Reports: 03/08/2017
Number of Days to Update: 82

Source: Department of Environment & Natural Resources
Telephone: 919-807-6308
Last EDR Contact: 09/08/2017
Next Scheduled EDR Contact: 12/25/2017
Data Release Frequency: Varies

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: 12/12/2016
Date Data Arrived at EDR: 12/28/2016
Date Made Active in Reports: 02/10/2017
Number of Days to Update: 44

Source: Environmental Protection Agency
Telephone: (404) 562-8651
Last EDR Contact: 08/11/2017
Next Scheduled EDR Contact: 10/09/2017
Data Release Frequency: Varies

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: 08/25/2017
Next Scheduled EDR Contact: 12/04/2017
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: 07/12/2017
Next Scheduled EDR Contact: 10/23/2017
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: 07/14/2017
Next Scheduled EDR Contact: 10/23/2017
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: 08/18/2017
Next Scheduled EDR Contact: 11/27/2017
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: 02/13/2017
Date Data Arrived at EDR: 02/15/2017
Date Made Active in Reports: 05/12/2017
Number of Days to Update: 86

Source: Environmental Protection Agency
Telephone: 202-566-1917
Last EDR Contact: 08/11/2017
Next Scheduled EDR Contact: 10/09/2017
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: 08/07/2017
Next Scheduled EDR Contact: 11/20/2017
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: 04/22/2013
Date Data Arrived at EDR: 03/03/2015
Date Made Active in Reports: 03/09/2015
Number of Days to Update: 6

Source: Environmental Protection Agency
Telephone: 703-308-4044
Last EDR Contact: 08/24/2017
Next Scheduled EDR Contact: 11/20/2017
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: 12/31/2012
Date Data Arrived at EDR: 01/15/2015
Date Made Active in Reports: 01/29/2015
Number of Days to Update: 14

Source: EPA
Telephone: 202-260-5521
Last EDR Contact: 06/21/2017
Next Scheduled EDR Contact: 10/02/2017
Data Release Frequency: Every 4 Years

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: 12/31/2014
Date Data Arrived at EDR: 11/24/2015
Date Made Active in Reports: 04/05/2016
Number of Days to Update: 133

Source: EPA
Telephone: 202-566-0250
Last EDR Contact: 08/23/2017
Next Scheduled EDR Contact: 12/04/2017
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: 07/28/2017
Next Scheduled EDR Contact: 11/08/2017
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: 11/25/2013
Date Data Arrived at EDR: 12/12/2013
Date Made Active in Reports: 02/24/2014
Number of Days to Update: 74

Source: EPA
Telephone: 703-416-0223
Last EDR Contact: 09/08/2017
Next Scheduled EDR Contact: 12/18/2017
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: 02/01/2017
Date Data Arrived at EDR: 02/09/2017
Date Made Active in Reports: 04/07/2017
Number of Days to Update: 57

Source: Environmental Protection Agency
Telephone: 202-564-8600
Last EDR Contact: 07/24/2017
Next Scheduled EDR Contact: 11/08/2017
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: 08/08/2017
Next Scheduled EDR Contact: 11/20/2017
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: 01/20/2016
Date Data Arrived at EDR: 04/28/2016
Date Made Active in Reports: 09/02/2016
Number of Days to Update: 127
Source: EPA
Telephone: 202-566-0500
Last EDR Contact: 04/10/2017
Next Scheduled EDR Contact: 07/24/2017
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: 07/28/2017
Next Scheduled EDR Contact: 10/23/2017
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: 08/01/2017
Next Scheduled EDR Contact: 11/20/2017
Data Release Frequency: Quarterly

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: 09/08/2017
Next Scheduled EDR Contact: 12/18/2017
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: 09/08/2017
Next Scheduled EDR Contact: 12/18/2017
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: 02/01/2011
Date Data Arrived at EDR: 10/19/2011
Date Made Active in Reports: 01/10/2012
Number of Days to Update: 83
Source: Environmental Protection Agency
Telephone: 202-566-0517
Last EDR Contact: 07/28/2017
Next Scheduled EDR Contact: 11/08/2017
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: 01/04/2017
Date Data Arrived at EDR: 01/06/2017
Date Made Active in Reports: 02/10/2017
Number of Days to Update: 35
Source: Environmental Protection Agency
Telephone: 202-343-9775
Last EDR Contact: 07/12/2017
Next Scheduled EDR Contact: 10/16/2017
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: 08/01/2017
Next Scheduled EDR Contact: 11/13/2017
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: 09/30/2016
Date Data Arrived at EDR: 11/18/2016
Date Made Active in Reports: 02/03/2017
Number of Days to Update: 77

Source: Department of Justice, Consent Decree Library
Telephone: Varies
Last EDR Contact: 06/21/2017
Next Scheduled EDR Contact: 10/09/2017
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: 12/31/2013
Date Data Arrived at EDR: 02/24/2015
Date Made Active in Reports: 09/30/2015
Number of Days to Update: 218

Source: EPA/NTIS
Telephone: 800-424-9346
Last EDR Contact: 08/25/2017
Next Scheduled EDR Contact: 12/04/2017
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: 07/11/2017
Next Scheduled EDR Contact: 10/23/2017
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: 08/03/2017
Next Scheduled EDR Contact: 11/20/2017
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: 09/14/2010
Date Data Arrived at EDR: 10/07/2011
Date Made Active in Reports: 03/01/2012
Number of Days to Update: 146

Source: Department of Energy
Telephone: 505-845-0011
Last EDR Contact: 08/22/2017
Next Scheduled EDR Contact: 12/04/2017
Data Release Frequency: Varies

LEAD SMELTER 1: Lead Smelter Sites

A listing of former lead smelter site locations.

Date of Government Version: 12/05/2016
Date Data Arrived at EDR: 01/05/2017
Date Made Active in Reports: 02/10/2017
Number of Days to Update: 36

Source: Environmental Protection Agency
Telephone: 703-603-8787
Last EDR Contact: 07/07/2017
Next Scheduled EDR Contact: 10/16/2017
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: 08/11/2017
Next Scheduled EDR Contact: 10/09/2017
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: 08/11/2017
Next Scheduled EDR Contact: 10/09/2017
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: 02/08/2017
Date Data Arrived at EDR: 02/28/2017
Date Made Active in Reports: 04/07/2017
Number of Days to Update: 38

Source: Department of Labor, Mine Safety and Health Administration
Telephone: 303-231-5959
Last EDR Contact: 08/30/2017
Next Scheduled EDR Contact: 12/11/2017
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: 09/01/2017
Next Scheduled EDR Contact: 12/11/2017
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: 09/01/2017
Next Scheduled EDR Contact: 12/11/2017
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: 03/14/2017
Date Data Arrived at EDR: 03/17/2017
Date Made Active in Reports: 04/07/2017
Number of Days to Update: 21

Source: Department of Interior
Telephone: 202-208-2609
Last EDR Contact: 09/07/2017
Next Scheduled EDR Contact: 12/25/2017
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: 04/04/2017
Date Data Arrived at EDR: 04/07/2017
Date Made Active in Reports: 05/12/2017
Number of Days to Update: 35

Source: EPA
Telephone: (404) 562-9900
Last EDR Contact: 09/06/2017
Next Scheduled EDR Contact: 12/18/2017
Data Release Frequency: Quarterly

DOCKET HWC: Hazardous Waste Compliance Docket Listing

A complete list of the Federal Agency Hazardous Waste Compliance Docket Facilities.

Date of Government Version: 06/02/2016
Date Data Arrived at EDR: 06/03/2016
Date Made Active in Reports: 09/02/2016
Number of Days to Update: 91

Source: Environmental Protection Agency
Telephone: 202-564-0527
Last EDR Contact: 08/24/2017
Next Scheduled EDR Contact: 12/11/2017
Data Release Frequency: Varies

UXO: Unexploded Ordnance Sites

A listing of unexploded ordnance site locations

Date of Government Version: 10/25/2015
Date Data Arrived at EDR: 01/29/2016
Date Made Active in Reports: 04/05/2016
Number of Days to Update: 67

Source: Department of Defense
Telephone: 571-373-0407
Last EDR Contact: 07/17/2017
Next Scheduled EDR Contact: 10/30/2017
Data Release Frequency: Varies

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

ECHO: Enforcement & Compliance History Information

ECHO provides integrated compliance and enforcement information for about 800,000 regulated facilities nationwide.

Date of Government Version: 03/19/2017
Date Data Arrived at EDR: 03/21/2017
Date Made Active in Reports: 05/12/2017
Number of Days to Update: 52

Source: Environmental Protection Agency
Telephone: 202-564-2280
Last EDR Contact: 09/06/2017
Next Scheduled EDR Contact: 12/18/2017
Data Release Frequency: Quarterly

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: 02/22/2017
Date Data Arrived at EDR: 02/22/2017
Date Made Active in Reports: 05/12/2017
Number of Days to Update: 79

Source: EPA
Telephone: 800-385-6164
Last EDR Contact: 08/17/2017
Next Scheduled EDR Contact: 12/04/2017
Data Release Frequency: Quarterly

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: 07/31/2017
Next Scheduled EDR Contact: 11/13/2017
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: 04/04/2017
Date Data Arrived at EDR: 06/20/2017
Date Made Active in Reports: 08/10/2017
Number of Days to Update: 51

Source: Department of Environment & Natural Resources
Telephone: 919-508-8400
Last EDR Contact: 06/20/2017
Next Scheduled EDR Contact: 10/02/2017
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: 09/30/2016
Date Data Arrived at EDR: 11/09/2016
Date Made Active in Reports: 03/06/2017
Number of Days to Update: 117

Source: Department of Environment & Natural Resources
Telephone: 919-733-1322
Last EDR Contact: 08/10/2017
Next Scheduled EDR Contact: 11/20/2017
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: 06/23/2017
Next Scheduled EDR Contact: 10/09/2017
Data Release Frequency: Varies

Financial Assurance 3: Financial Assurance Information
Hazardous waste financial assurance information.

Date of Government Version: 09/14/2016
Date Data Arrived at EDR: 09/16/2016
Date Made Active in Reports: 10/05/2016
Number of Days to Update: 19

Source: Department of Environment & Natural Resources
Telephone: 919-707-8222
Last EDR Contact: 09/08/2017
Next Scheduled EDR Contact: 12/25/2017
Data Release Frequency: Varies

NPDES: NPDES Facility Location Listing
General information regarding NPDES(National Pollutant Discharge Elimination System) permits.

Date of Government Version: 02/17/2016
Date Data Arrived at EDR: 02/19/2016
Date Made Active in Reports: 05/03/2016
Number of Days to Update: 74

Source: Department of Environment & Natural Resources
Telephone: 919-733-7015
Last EDR Contact: 08/03/2017
Next Scheduled EDR Contact: 11/13/2017
Data Release Frequency: Varies

UIC: Underground Injection Wells Listing
A listing of uncerground injection wells locations.

Date of Government Version: 12/07/2016
Date Data Arrived at EDR: 12/09/2016
Date Made Active in Reports: 03/08/2017
Number of Days to Update: 89

Source: Department of Environment & Natural Resources
Telephone: 919-807-6412
Last EDR Contact: 08/31/2017
Next Scheduled EDR Contact: 12/18/2017
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 Historic Gas 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 Historic Dry 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: 07/30/2013
Date Data Arrived at EDR: 08/19/2013
Date Made Active in Reports: 10/03/2013
Number of Days to Update: 45

Source: Department of Energy & Environmental Protection
Telephone: 860-424-3375
Last EDR Contact: 08/18/2017
Next Scheduled EDR Contact: 11/27/2017
Data Release Frequency: No Update Planned

NJ MANIFEST: Manifest Information

Hazardous waste manifest information.

Date of Government Version: 12/31/2016
Date Data Arrived at EDR: 04/11/2017
Date Made Active in Reports: 07/27/2017
Number of Days to Update: 107

Source: Department of Environmental Protection
Telephone: N/A
Last EDR Contact: 07/10/2017
Next Scheduled EDR Contact: 10/23/2017
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: 01/30/2017
Date Data Arrived at EDR: 02/01/2017
Date Made Active in Reports: 02/13/2017
Number of Days to Update: 12

Source: Department of Environmental Conservation
Telephone: 518-402-8651
Last EDR Contact: 08/03/2017
Next Scheduled EDR Contact: 11/13/2017
Data Release Frequency: Annually

PA MANIFEST: Manifest Information

Hazardous waste manifest information.

Date of Government Version: 12/31/2015
Date Data Arrived at EDR: 07/22/2016
Date Made Active in Reports: 11/22/2016
Number of Days to Update: 123

Source: Department of Environmental Protection
Telephone: 717-783-8990
Last EDR Contact: 07/17/2017
Next Scheduled EDR Contact: 10/30/2017
Data Release Frequency: Annually

RI MANIFEST: Manifest information

Hazardous waste manifest information

Date of Government Version: 12/31/2013
Date Data Arrived at EDR: 06/19/2015
Date Made Active in Reports: 07/15/2015
Number of Days to Update: 26

Source: Department of Environmental Management
Telephone: 401-222-2797
Last EDR Contact: 08/21/2017
Next Scheduled EDR Contact: 12/04/2017
Data Release Frequency: Annually

WI MANIFEST: Manifest Information

Hazardous waste manifest information.

Date of Government Version: 12/31/2016
Date Data Arrived at EDR: 04/13/2017
Date Made Active in Reports: 07/14/2017
Number of Days to Update: 92

Source: Department of Natural Resources
Telephone: N/A
Last EDR Contact: 09/11/2017
Next Scheduled EDR Contact: 12/25/2017
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

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GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

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

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

STREET AND ADDRESS INFORMATION

Suggs, Kristi

From: Charles Turney <charles.slatesand@yahoo.com>
Sent: Tuesday, October 03, 2017 1:18 PM
To: Suggs, Kristi
Subject: Re: Slate Sand Company, Inc. - Location Verification for Sand Mine in Surry County, NC

Follow Up Flag: Follow up
Flag Status: Flagged

We have never done any mining in Ararat, N.C.
You can not mine a creek with a dredge and pipe line.
Please to not contact us over this again.

Thank You,
Charles Turney VP
Slate Sand Inc.
Office:336-325-2182
Cell:336-374-0769

On Monday, October 2, 2017 2:07 PM, "Suggs, Kristi" <KSuggs@mbakerintl.com> wrote:

Dear Mr. Turney,

Last week I spoke with Beverly Largen, an employee at Slate Sand Company, Inc., in regards to a land use data search that I had conducted on properties located within 1-mile of a current stream restoration project on Whittier Creek, located off Rockhill Church Road in Surry County, NC. Results from that data search listed the geographic coordinates (36.378889N, -80.599444W) of Slate Sand Company, Inc. within one of the project parcels. Because these results did not concur with previous discussions of from the current property owner nor coincide with historical aerial reviews, Baker decided to contact Slate Sand Company and verify if the geographic coordinates from land use data search were accurate. Upon discussion with Beverly Largen on 9/25/17, on your behalf, she stated that Slate Sand Company, Inc. does not currently, nor in the past, has owned or operated the company off Rockhill Church Road (36.378889N, -80.599444W) in Surry County, NC. In order for me document this conversation, I am requesting an email reply from you to verify whether or not I have correctly recorded the results from that conversation. Please confirm/or refute. Thank you very much for your assistance!

Sincerely,

Kristi Suggs

Kristi Suggs | Environmental Specialist II | Michael Baker Engineering, Inc. a Michael Baker International Company
9716-B Rea Road #56 | Charlotte | NC | 28277 | [O] 704-665-2206 | [C] 704-579-4828
ksuggs@mbakerintl.com | www.mbakerintl.com

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

August 23, 2017

Kimberly Browning
U.S. Army Corps of Engineers
Wilmington District
69 Darlington Avenue
Wilmington, NC 28403

Kimberly.d.browning@usace.army.mil

Re: Whittier Creek Mitigation Site, Surry County, ER 17-1506

Dear Ms. Browning:

Thank you for your letter of August 9, 2017, 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, please contact Renee Gledhill-Earley, environmental review coordinator, at 919-807-6579 or renee.gledhill-earley@ncdcr.gov. In all future communication concerning this project, please cite the above-referenced tracking number.

Sincerely,

R Gledhill-Earley

Ramona M. Bartos

OPTION TO PURCHASE CONSERVATION EASEMENT

THIS OPTION TO PURCHASE CONSERVATION EASEMENT (the "Option") is made and entered into this 12th day of December, 2016 (the "Effective Date"), by and among Angela Key (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 Surry County, North Carolina, containing 22.72 acres (PIN 5926-00-90-1044), 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 TWENTY-FOUR (24) 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:

1. 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.

2. 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: Angela Key
948 Rock Hill Church Road
Ararat, NC 27007

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

h. Baker shall install (1) well & watering devices

IN WITNESS WHEREOF, the parties have duly executed this Option as of the date first above written.

GRANTOR:

By: Angela D Key

Print Name: ANGELA D. KEY

Title: _____

GRANTOR:

By: _____

Print Name: _____

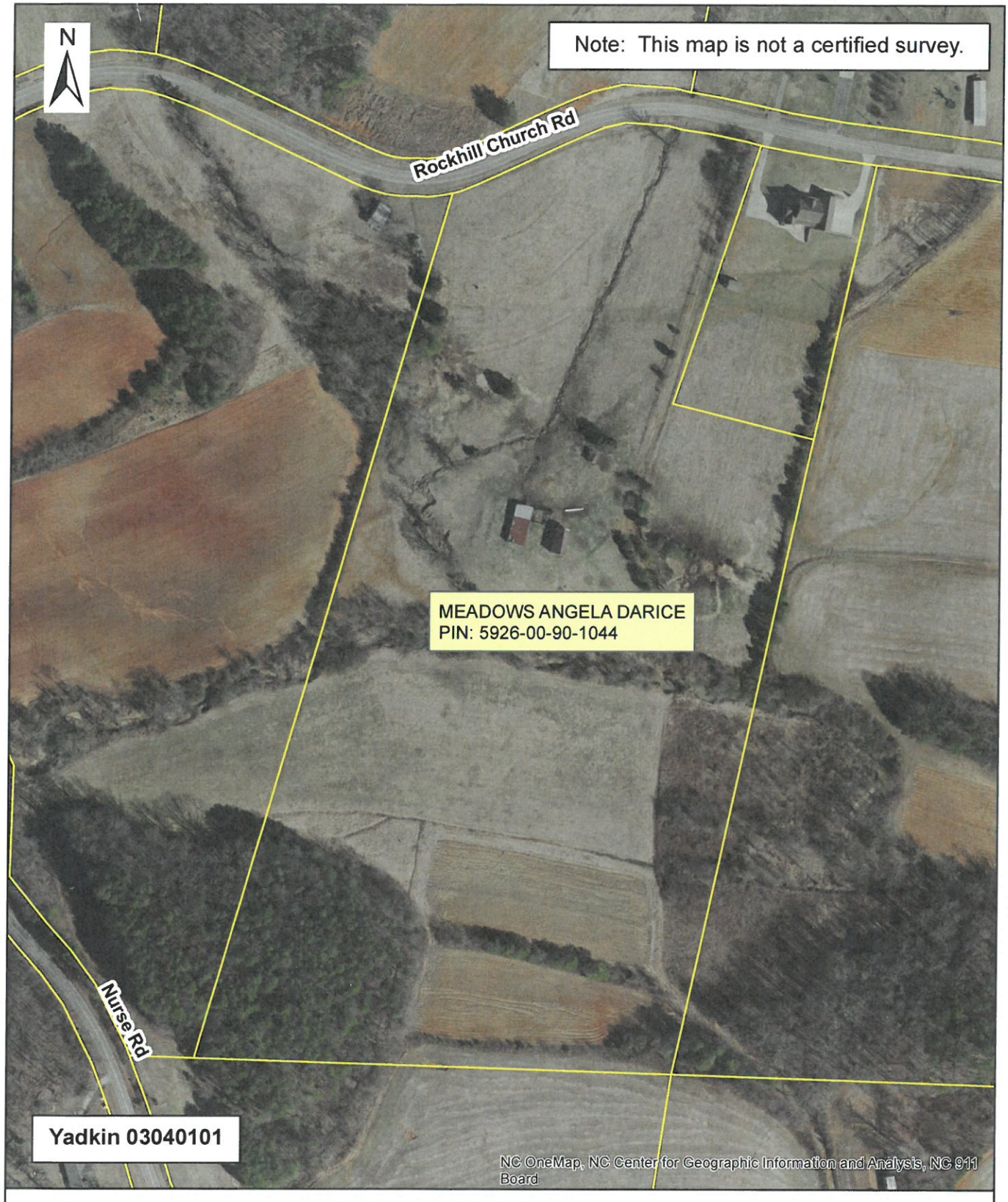
Title: _____

MICHAEL BAKER ENGINEERING, INC.:

By: _____

Print Name: Jacob Byess

Title: NC Ecosystem Manager



Michael Baker INTERNATIONAL

0 100 200 300 Feet

Exhibit A
Landowner(s):
MEADOWS ANGELA DARICE

Michael Baker INTERNATIONAL

0 50 100 150 Feet

Exhibit A
Landowner(s):
MEADOWS ANGELA D

OPTION TO PURCHASE CONSERVATION EASEMENT

THIS OPTION TO PURCHASE CONSERVATION EASEMENT (the "Option") is made and entered into this _____day of _____(the "Effective Date"), by and among Elmer E Holcomb, Wilma F. Holcomb, Charles Dean Holcomb, and Michael Gene Holcomb (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 Surry County, North Carolina, containing __24.44__ acres (PIN 5926-00-80-4164), 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 _____ (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 TWENTY-FOUR (24) 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:

1. 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.

2. 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: 172 Jane Sowers
Statesville, NC 28625

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. Baker shall install high tensile fence along conservation easement to exclude livestock.

j. Baker shall install one well and two drinker boxes on the property.

k. Baker shall provide funds for the remaining balance (25% up to $900.00) not covered by the NCACSP for crop land conversion.

IN WITNESS WHEREOF, the parties have duly executed this Option as of the date first above written.

GRANTOR:

By: Elmer E Holcomb

Print Name: Elmer E. Holcomb

Title: _____

Grantor:

By Wilma F. Holcomb

Print Wilma F. Holcomb

Title _____

GRANTOR:

By: Michael G. Holcomb

Print Name: Michael G. Holcomb

Title: _____

Grantor:

By Charles D. Holcomb

print Charles D. Holcomb

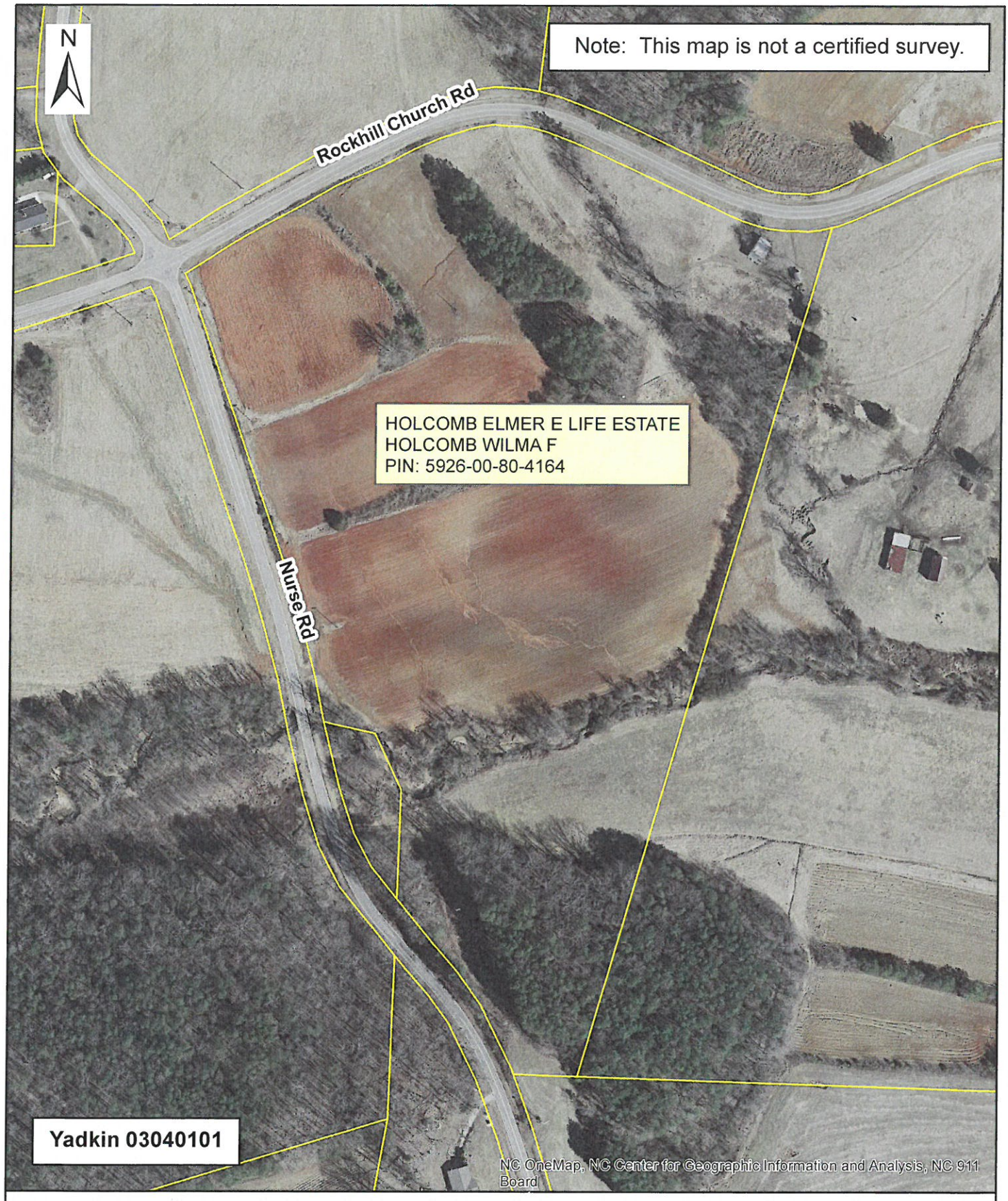
Title _____

MICHAEL BAKER ENGINEERING, INC.:

By: _____

Print Name: Jacob Byers

Title: NL Ecosystem manager



Michael Baker INTERNATIONAL

0 100 200 300 Feet

Exhibit A
Landowner(s):
HOLCOMB ELMER E LIFE ESTATE
HOLCOMB WILMA F

Suggs, Kristi

From: Suggs, Kristi
Sent: Tuesday, September 26, 2017 2:58 PM
To: Marella Buncick (marella_buncick@fws.gov)
Subject: Request for Comment for Categorical Exclusion on the Whittier Creek Site - Option D (DMS Full Delivery Project #100020)
Attachments: 162039_WhittierCreek_USFWS_SubmittalPackage_09262017.pdf

Dear Ms. Buncick,

I have included the attached letter and supporting documentation requesting comment from the USFWS about the above referenced project. Please let me know if you need any additional information.

Thank you in advance for your assistance!

Kristi Suggs

Kristi Suggs | Environmental Specialist II | Michael Baker Engineering, Inc. a Michael Baker International Company
9716-B Rea Road #56 | Charlotte | NC | 28277 | [O] 704-665-2206 | [C] 704-579-4828
ksuggs@mbakerintl.com | www.mbakerintl.com

Michael Baker
INTERNATIONAL

We Make a Difference

September 26, 2017

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 Whittier Creek Site – Option D Stream Mitigation Project,
NCDEQ DMS Full-Delivery Project ID #100020, Surry County, NC
Yadkin River Basin Cataloging Unit 03040101

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 Whittier Creek Site – Option D Stream Mitigation Project. Please note that this request is in support of the development of the Categorical Exclusion (CE) for the referenced project.

The Whittier Creek Site – Option D is a full-delivery project for the NCDEQ Division of Mitigation Services (DMS) identified and contracted to provide stream mitigation credits for permitted, unavoidable impacts in the Yadkin River Basin, Cataloging Unit 03040101. The project is located in Surry County and the NC DMS Targeted Local Watershed (TLW) 03040101-110040. The site is located in the Ararat community on two abutting parcels southeast of the intersection of Rockhill Church Road and Nurse Road, approximately 7 miles east of Dobson, NC.

The project will involve the restoration and enhancement of approximately 3,130 linear feet of existing perennial streams along Whittier Creek and several UTs to Whittier Creek, which is a tributary to Bull Creek. In addition, a conservation easement will be implemented along all project reaches with riparian buffers extending in an excess of 30 feet from the top of bank of the restored channel and will protected in perpetuity by the State of North Carolina.

The existing stream reaches and riparian wetlands within the project area have been significantly impacted by past and present unrestricted livestock access and/or channelization used to promote drainage and maximize agricultural acreage for cattle pastures. The proposed restoration project not only has the potential to provide stream mitigation credits, but will also provide significant ecological improvements and functional uplift through habitat restoration, and through decreasing nutrient and sediment loads from the project watershed.

Based on review of the most current information from the United States Fish and Wildlife Service (USFWS) website (https://www.fws.gov/raleigh/species/cntylist/surry.html) and the North Carolina Wildlife Resources Commission (NCWRC) the following species are considered federally-listed species in Surry County:

Michael Baker Engineering, Inc.
9716-B Rea Road #56
Charlotte, NC 28277 | Office: 704.665.2200

Scientific Name	Common Name	Federal Status
Myotis septentrionalis	Northern long-eared bat	Threatened
Glyptemys muhlenbergii	Bog Turtle	Threatened Similarity of Appearance (S/A)
Helianthus schweinitzii	Schweinitz's sunflower	Endangered
Isotria medeoloides	Small whorled pogonia	Threatened

Data Review and Analysis

Baker conducted a two-mile radius search using the Natural Heritage Program's Data Explorer (https://ncnhde.natureserve.org/) on September 26, 2017 and found no known occurrences of the above referenced species within two miles of the Project site. However, the Project is located within Surry County, a Northern long-eared bat (NLEB) White Nose Syndrome (WNS) zone, and is therefore subject to the US Fish and Wildlife Service's Final 4(d) rule to maintain section 7(a)(2) compliance.

***Myotis septentrionalis* (Northern long-eared bat) – Threatened**

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.

Forested habitats containing trees at least 3-inch dbh in the project area provide suitable habitat for NLEB. Due to the decline of the NLEB population from the WNS, the USFWS has issued the finalization of a special rule under section 4(d) of the ESA to addresses the effects to the NLEB resulting from purposeful and incidental take based on the occurrence of WNS. Because the project is located within a WNS zone and will include the removal/clearing of trees, it is subject to the final 4(d) ruling. As previously stated, a review of NCNHP records did not indicate any known NLEB populations within 2.0 mile of the study area; therefore, the project is eligible to use the NLEB 4(d) Rule Streamlined Consultation Form to meet regulatory requirements for section 7(a)(2) compliance 4(d) consultation.

***Glyptemys muhlenbergii* (Bog turtle) - Threatened Similarity of Appearance (S/A)**

Bog turtles live in the mud, grass and sphagnum mosses found in bogs, swamps, and marshy meadows usually fed by cool surface springs. There are two distinct populations of the species, a northern population and a southern population. The southern population which is found in western North Carolina, including Alexander County, NC is listed as threated due to "similarity of appearance" as stated in the November 4, 1997, *62 FR 59605 59623*. Because the southern population has not experienced the habitat loss of the northern population, the southern population is not subject to Section 7 consultation requirements of the Endangered Species Act.

***Helianthus schweinitzii* (Schweinitz's sunflower) – Endangered**

Schweinitz's sunflower is a rhizomatous perennial herb that grows approximately 6.5 feet in height with purplish stems and produces small yellow flowers from late August until frost. This species is endemic to the Piedmont of North and South Carolina, and the few sites where it occurs in relatively natural conditions consist of Xeric Hardpan Forests. The species is also found along roadside rights-of-way, maintained power lines and other utility rights-of-way, edges of thickets and old pastures, clearings and edges of upland oak-pine-hickory woods and Piedmont longleaf pine forests, and other sunny or semi-sunny habitats where

disturbances (e.g., mowing, clearing, grazing, blow downs, storms, frequent fire) help create open or partially open areas for sunlight. It is intolerant of full shade and excessive competition from other vegetation. It is generally found growing on shallow sandy soils with high gravel content; shallow, poor, clayey hardpans; or shallow rocky soils, especially those derived from mafic rocks. Because marginal to suitable habitat for Schweinitz's sunflower occurs along field edges and utility easements adjacent to the project area, Baker conducted a field survey on September 25th, 2017. No populations or individuals were documented during the on-site review.

***Isotria medeoloides* (Small whorled pogonia) – Threatened**

Small whorled pogonia is a member of the orchid family. 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 urban expansion, forestry practices, recreational activities, and trampling. The project site consists of open and active cattle pasture with a narrow line of predominantly first successional woody vegetation along the top of the stream bank. Existing stream reaches, riparian corridors, and open fields at the project site have been significantly impacted by past and present unrestricted livestock access; therefore, habitat suitable for the species is not present within the project site.

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.

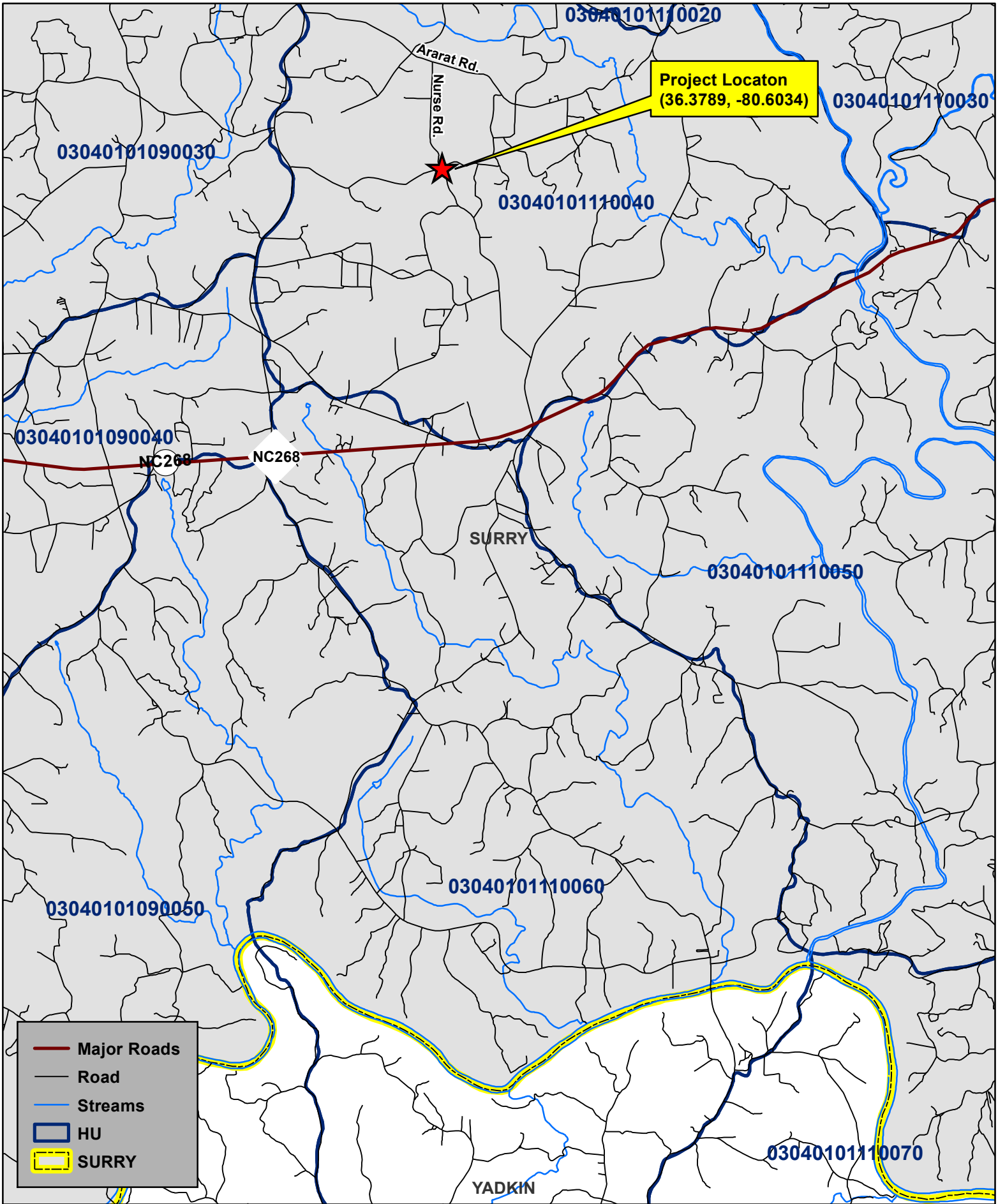
We thank you in advance for your timely response, input, and cooperation. Please contact me if you have any further questions or comments. I can be reached at (704) 579-4828 or via my email address at ksuggs@mbakerintl.com.

Sincerely,

Kristi Suggs

Cc: Matthew Reid, NCDMS
File

Enclosures



Michael Baker INTERNATIONAL

North Carolina Division of Mitigation Services
DMS Project No. 100020

Vicinity Map

0 0.5 1 Miles
1" = 1 Mile

Whittier Creek Site - Option D
(Surry County, NC)

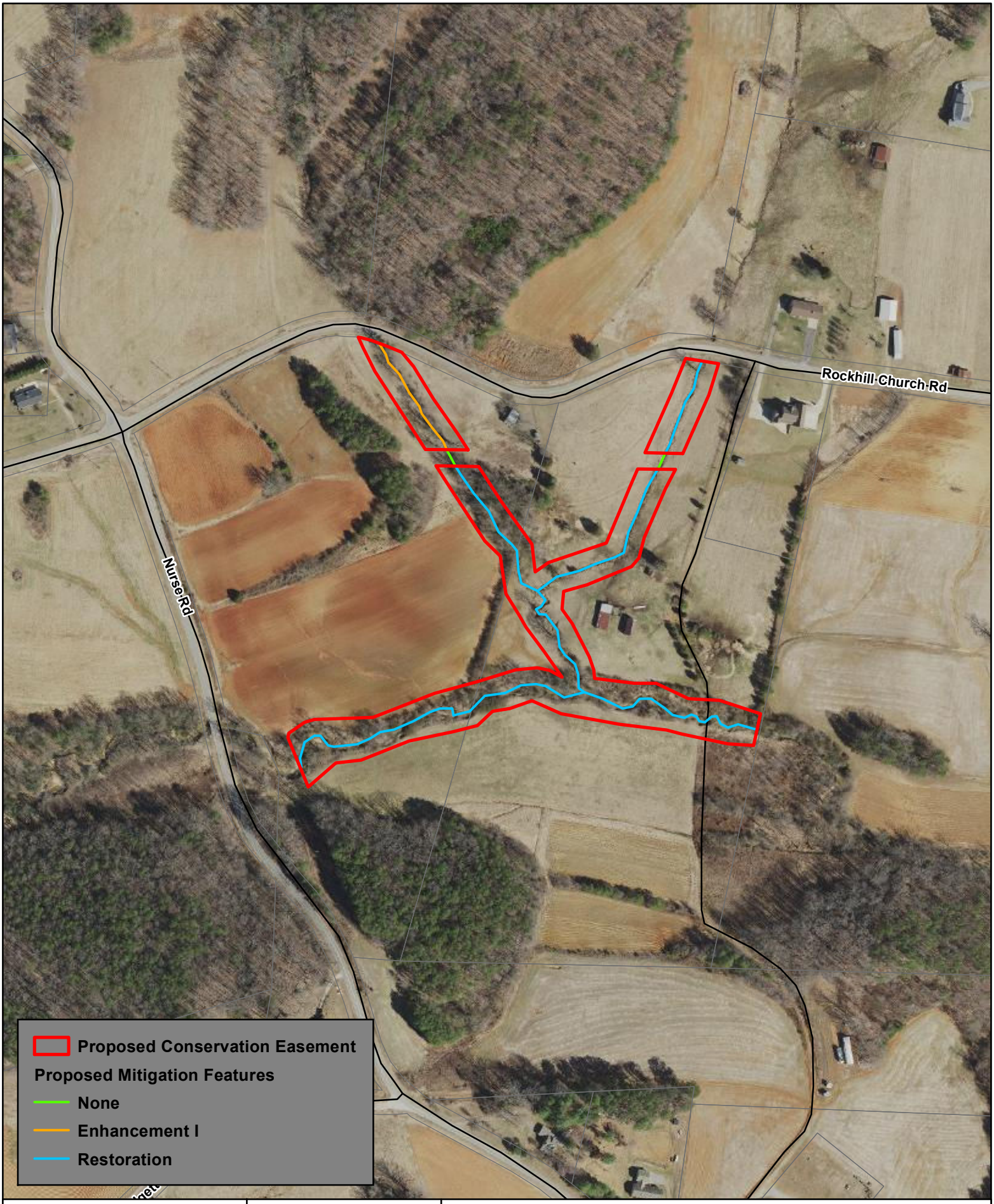
Michael Baker INTERNATIONAL

North Carolina Division of Mitigation Services
DMS Project No. 100020

USGS Topographic Map
(Mount Airy South Quad, Siloam Quad)

0 200 400 Feet
1" = 400'

Whittier Creek Site - Option D
(Surry County, NC)



Michael Baker INTERNATIONAL

North Carolina Division of Mitigation Services
DMS Project No. 100020

Project Site Map

0 150 300 Feet
1" = 300'

Whittier Creek Site - Option D
(Surry County, NC)

North Carolina Department of Natural and Cultural Resources
Natural Heritage Program

Governor Roy Cooper

Secretary Susi H. Hamilton

NCNHDE-4393

September 26, 2017

Kristi Suggs
Michael Baker Engineering, Inc.
9716 - B Rea Rd., 56
Charlotte, NC 28277
RE: Whittier Creek Site - Option D; 162039

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, based on the project area mapped with your request, indicates that there are no records for rare species, important natural communities, natural areas, or conservation/managed areas within the proposed project boundary, or within a one-mile radius of the project boundary.

Please note that although there may be no documentation of natural heritage elements within or near the project boundary, it does not imply or confirm their absence; the area may not have been surveyed. The results of this query should not be substituted for field surveys where suitable habitat exists. In the event that rare species are found within the project area, please contact the NCNHP so that we may update our records.

Please also 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 also not be redistributed without permission.

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,

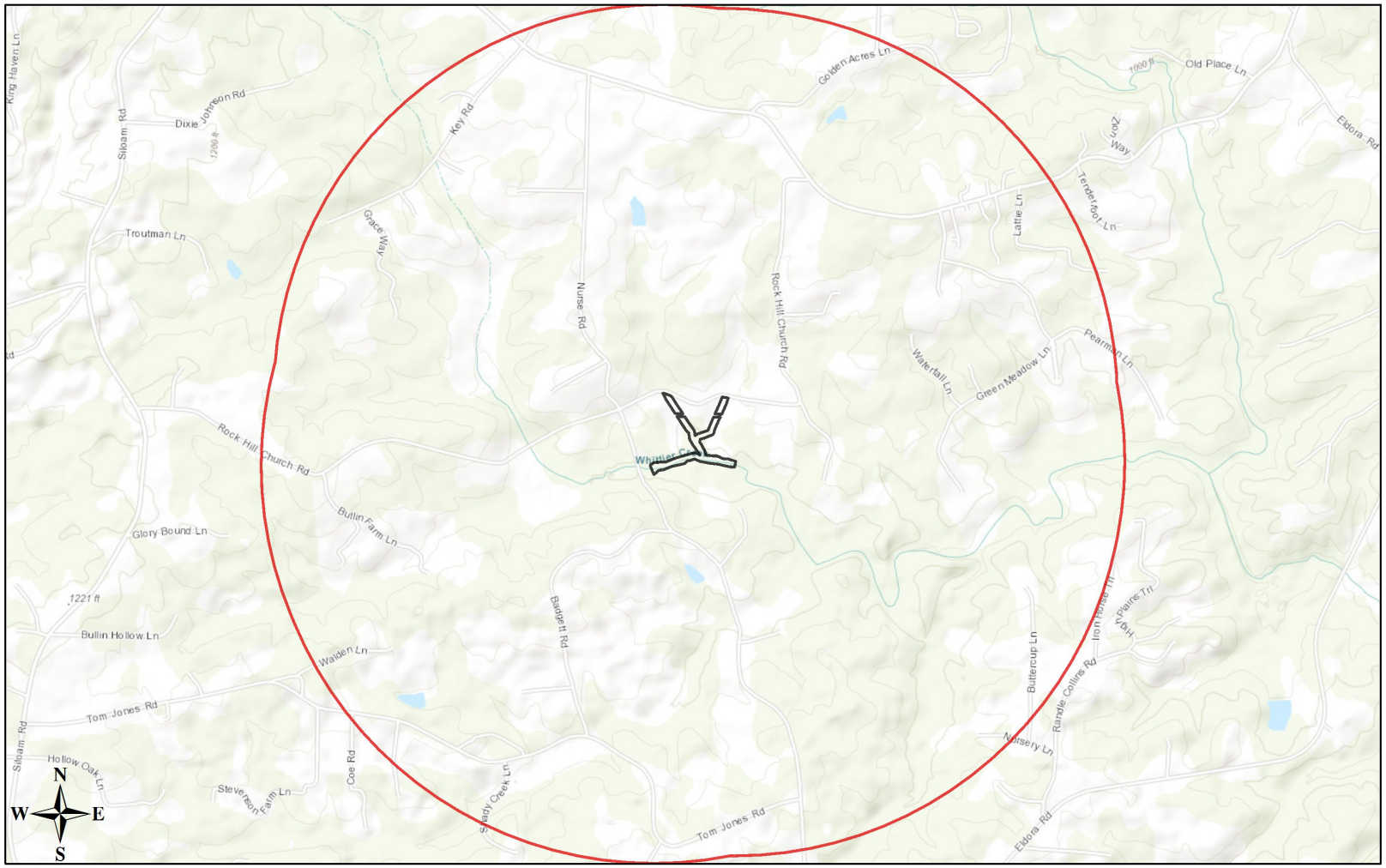
NC Natural Heritage Program

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

NCNHDE-4393: Whittier Creek Site - Option D



September 26, 2017

Project Boundary

Buffered Project Boundary

1:22,400

0 0.175 0.35 0.7 mi

0 0.3 0.6 1.2 km

Sources: Esri, HERE, DeLorme, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community

Suggs, Kristi

From: Brew, Donnie (FHWA) <Donnie.Brew@dot.gov>
Sent: Friday, February 02, 2018 4:39 PM
To: Marella_Buncick@fws.gov
Cc: Wiesner, Paul; Reid, Matthew; Suggs, Kristi
Subject: EXTERNAL: Whittier Creek Mit Proj_NLEB 4(d) rule consultation
Attachments: Whittier Creek NLEB 4(d) rule form 2-2-18.pdf; Whittier Creek project maps.pdf

Follow Up Flag: Follow up
Flag Status: Flagged

Good afternoon Marella,

The purpose of this message is to notify your office that FHWA will use the streamlined consultation framework for the Whittier Creek Mitigation Site in Surry County, NC.

Attached is a completed NLEB 4(d) Rule Streamlined Consultation form, in addition site maps/figures.

Thank you and have a great weekend,

Donnie

Notifying the Service Under the Framework

Northern Long-Eared Bat 4(d) Rule Streamlined Consultation Form

Federal agencies (or designated non-federal representatives) should use the Northern Long-Eared Bat 4(d) Rule Streamlined Consultation form to notify the Service of their project and meet the requirements of the framework.

Northern Long-Eared Bat 4(d) Rule Streamlined Consultation Form (Word document)

Information requested in the Northern Long-Eared Bat 4(d) Rule Streamlined Consultation Form serves to

(1) notify the field office that an action agency will use the streamlined framework;

(2) describe the project with sufficient detail to support the required determination; and

(3) enable the USFWS to track effects and determine if reinitiation of consultation for the 4(d) rule is required. This form requests the minimum amount of information required for the Service to be able to track this information.

Providing information in the Streamlined Consultation Form does not address section 7(a)(2) compliance for any other listed species.

Donnie Brew
Preconstruction & Environment Engineer

Federal Highway Administration
310 New Bern Ave, Suite 410
Raleigh, NC 27601
donnie.brew@dot.gov
919-747-7017

Please consider the environment before printing this email.

Northern Long-Eared Bat 4(d) Rule Streamlined Consultation Form

Federal agencies should use this form for the optional streamlined consultation framework for the northern long-eared bat (NLEB). This framework allows federal agencies to rely upon the U.S. Fish and Wildlife Service's (USFWS) January 5, 2016, intra-Service Programmatic Biological Opinion (BO) on the final 4(d) rule for the NLEB for section 7(a)(2) compliance by: (1) notifying the USFWS that an action agency will use the streamlined framework; (2) describing the project with sufficient detail to support the required determination; and (3) enabling the USFWS to track effects and determine if reinitiation of consultation is required per 50 CFR 402.16.

This form is not necessary if an agency determines that a proposed action will have no effect to the NLEB or if the USFWS has concurred in writing with an agency's determination that a proposed action may affect, but is not likely to adversely affect the NLEB (i.e., the standard informal consultation process). Actions that may cause prohibited incidental take require separate formal consultation. Providing this information does not address section 7(a)(2) compliance for any other listed species.

Information to Determine 4(d) Rule Compliance:	**YES**	**NO**
1. Does the project occur wholly outside of the WNS Zone[1]?	☐	☒
2. Have you contacted the appropriate agency[2] to determine if your project is near known hibernacula or maternity roost trees?	☒	☐
3. Could the project disturb hibernating NLEBs in a known hibernaculum?	☐	☒
4. Could the project alter the entrance or interior environment of a known hibernaculum?	☐	☒
5. Does the project remove any trees within 0.25 miles of a known hibernaculum at any time of year?	☐	☒
6. Would the project cut or destroy known occupied maternity roost trees, or any other trees within a 150-foot radius from the maternity roost tree from June 1 through July 31.	☐	☒

You are eligible to use this form if you have answered yes to question #1 **or** yes to question #2 **and** no to questions 3, 4, 5 and 6. The remainder of the form will be used by the USFWS to track our assumptions in the BO.

Agency and Applicant[3] (Name, Email, Phone No.): Donnie Brew, Federal Highway Administration (FHWA), Donnie.Brew@dot.gov, 919-747-7017 & Kristi Suggs, Michael Baker Engineering, Inc., ksuggs@mbakerintl.com, 704-579-4828

Project Name: Whittier Creek Site – Option D

Project Location (include coordinates if known): The project site is located in Surry County, North Carolina, near the Town of Dobson, in the Ararat community. The project site is located in the Yadkin River Basin (03040101) and the NC DMS Targeted Local Watershed (TLW) 03040101110040. The site is located on two abutting parcels just southeast of the intersection of Rockhill Church Road and Nurse Road. The coordinates at the intersection of Rockhill Church Road and Nurse Road are (36.3789, -80.6034).

Basic Project Description (provide narrative below or attach additional information):

[1] http://www.fws.gov/midwest/endangered/mammals/nleb/pdf/WNSZone.pdf
[2] See http://www.fws.gov/midwest/endangered/mammals/nleb/nhisites.html
[3] If applicable - only needed for federal actions with applicants (e.g., for a permit, etc.) who are party to the consultation.

The Whittier Creek Site is a full-delivery project for the NCDEQ Division of Mitigation Services (DMS) identified and contracted to provide stream mitigation credits for permitted, unavoidable impacts in the Yadkin River Basin, Cataloging Unit 03040101. The project will involve the restoration and enhancement and permanent protection of approximately 3,130 linear feet of existing perennial stream along Whittier Creek and several UTs to Whittier Creek, which is a tributary to Bull Creek. In addition, a conservation easement will be implemented along all project reaches with riparian buffers extending in an excess of 30 feet from the top of bank and will protected in perpetuity by the State of North Carolina.

The existing stream reaches and riparian wetlands within the project area have been significantly impacted by past and present unrestricted livestock access and/or channelization used to promote drainage and maximize agricultural acreage for cattle pastures. The proposed restoration project not only has the potential to provide stream mitigation credits, but will also provide significant ecological improvements and functional uplift through habitat restoration, and through decreasing nutrient and sediment loads from the project watershed.

The following additional supporting documentation has been included for reference: a Project Vicinity Map, a USGS Topographic Map, and a Project Site Map.

General Project Information

	YES	NO
Does the project occur within 0.25 miles of a known hibernaculum?	☐	☒
Does the project occur within 150 feet of a known maternity roost tree?	☐	☒
Does the project include forest conversion[4]? (if yes, report acreage below)	☒	☐
Estimated total acres of forest conversion	3.0	
If known, estimated acres[5] of forest conversion from April 1 to October 31	3.0	
If known, estimated acres of forest conversion from June 1 to July 31[6]	0.0	
Does the project include timber harvest? (if yes, report acreage below)	☐	☒
Estimated total acres of timber harvest		
If known, estimated acres of timber harvest from April 1 to October 31		
If known, estimated acres of timber harvest from June 1 to July 31		
Does the project include prescribed fire? (if yes, report acreage below)	☐	☒
Estimated total acres of prescribed fire		
If known, estimated acres of prescribed fire from April 1 to October 31		
If known, estimated acres of prescribed fire from June 1 to July 31		
Does the project install new wind turbines? (if yes, report capacity in MW below)	☐	☒
Estimated wind capacity (MW)		

Agency Determination:

By signing this form, the action agency determines that this project may affect the NLEB, but that any resulting incidental take of the NLEB is not prohibited by the final 4(d) rule.

If the USFWS does not respond within 30 days from submittal of this form, the action agency may presume that its determination is informed by the best available information and that its project responsibilities under 7(a)(2) with respect to the NLEB are fulfilled through the USFWS January 5, 2016, Programmatic BO. The action agency will update this determination annually for multi-year activities.

[4] Any activity that temporarily or permanently removes suitable forested habitat, including, but not limited to, tree removal from development, energy production and transmission, mining, agriculture, etc. (see page 48 of the BO).
[5] If the project removes less than 10 trees and the acreage is unknown, report the acreage as less than 0.1 acre.
[6] If the activity includes tree clearing in June and July, also include those acreage in April to October.

The action agency understands that the USFWS presumes that all activities are implemented as described herein. The action agency will promptly report any departures from the described activities to the appropriate USFWS Field Office. The action agency will provide the appropriate USFWS Field Office with the results of any surveys conducted for the NLEB. Involved parties will promptly notify the appropriate USFWS Field Office upon finding a dead, injured, or sick NLEB.

Signature: _____ Date Submitted: 2-2-18

Michael Baker
INTERNATIONAL

We Make a Difference

January 29, 2018

Mr. 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, Whittier Creek Site – Option D, Stream Mitigation Project
Surry 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 Surry County, North Carolina approximately 7 miles east of Dobson, NC. The project is located on both the Mount Airy and Siloam, North Carolina 7.5-minute topographic maps from the United States Geological Survey (USGS). The center of the project area is located at 36.3779N, -80.59988W. The site is located on two abutting parcels southeast of the intersection of Rockhill Church Road and Nurse Road in Ararat, NC. Please see the enclosed USGS Topographic Map for a depiction of the project site location.

The majority of the site has historically been disturbed due to past and current management for pasture grazing and livestock rearing. 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 table outlines the soils that are present within the proposed conservation. Based on the data determined from this review, there are a total of 4.8 acres of Prime Farmland within the project area.
The enclosed Soils Maps depicts their locations within the easement.

Farmland Classification— Summary by Map Unit — Surry County, North Carolina (NC171)

Map unit symbol	Map unit name	Rating	Acres in Conservation Easement	Percent of Area in Conservation Easement
CsA	Colvard and Suches soils, 0 to 3 percent slopes, occasionally flooded	Prime farmland	4.8	83.4%
FfD	Fairview cobbly fine sandy loam, 15 to 25 percent slopes, stony	Not prime farmland	1.0	16.6%
Totals for Area of Interest			**5.8**	**100.00%**

Michael Baker Engineering, Inc.
Ballantyne One, 15720 Brixham Hill Avenue
Suite 300, Room 318
Charlotte, NC 28277 | Office: 704.665.2200

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

Cc: Matthew Reid, NCDMS
File

U.S. Department of Agriculture

FARMLAND CONVERSION IMPACT RATING

PART I *(To be completed by Federal Agency)*	Date Of Land Evaluation Request Septembre 22, 2017
Name of Project Whittier Creek Site - Option D	Federal Agency Involved FHWA
Proposed Land Use Stream Mitigation	County and State Surry County, North Carolina
PART II *(To be completed by NRCS)*	Date Request Received By NRCS January 29, 2018 / Person Completing Form: Milton Cortes NRCS NC

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: 101 acres
Major Crop(s): CORN	Farmable Land In Govt. Jurisdiction Acres: 54 % % 187,236 acres	Amount of Farmland As Defined in FPPA Acres: 44.8 %% 155,337 acres	
Name of Land Evaluation System Used: Surry County, NC LESA	Name of State or Local Site Assessment System: N/A	Date Land Evaluation Returned by NRCS: January 29, 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	5.8			
B. Total Acres To Be Converted Indirectly	0			
C. Total Acres In Site	5.8			
PART IV *(To be completed by NRCS)* Land Evaluation Information				
A. Total Acres Prime And Unique Farmland	4.8			
B. Total Acres Statewide Important or Local Important Farmland	0			
C. Percentage Of Farmland in County Or Local Govt. Unit To Be Converted	0.0031			
D. Percentage Of Farmland in Govt. Jurisdiction With Same Or Higher Relative Value	6.6%			
PART V (To be completed by NRCS) Land Evaluation Criterion Relative Value of Farmland To Be Converted (Scale of 0 to 100 Points)	74			

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)	0			
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	109	0	0	0
PART VII ***(To be completed by Federal Agency)***					
Relative Value Of Farmland *(From Part V)*	100	74	0	0	0
Total Site Assessment *(From Part VI above or local site assessment)*	160	109	0	0	0
TOTAL POINTS ***(Total of above 2 lines)***	260	183	0	0	0

Site Selected:	Date Of Selection	Was A Local Site Assessment Used? YES ☐ NO ☐

Reason For Selection:

Name of Federal agency representative completing this form: ANTHONY W. HIGH, SEC - USDA RD | Date: 11/27/2017

(See Instructions on reverse side) **Form AD-1006 (03-02)**

Suggs, Kristi

From: Cortes, Milton - NRCS, Raleigh, NC <Milton.Cortes@nc.usda.gov>
Sent: Monday, January 29, 2018 3:08 PM
To: Suggs, Kristi
Subject: RE: EXTERNAL: RE: Farmland Conversion Impact Rating Submittal - Whittier Creek Site Option D, Surry County, NC

Thank you very much!!

Milton C.

From: Suggs, Kristi [mailto:KSuggs@mbakerintl.com]
Sent: Monday, January 29, 2018 3:06 PM
To: Cortes, Milton - NRCS, Raleigh, NC <Milton.Cortes@nc.usda.gov>
Subject: RE: EXTERNAL: RE: Farmland Conversion Impact Rating Submittal - Whittier Creek Site Option D, Surry County, NC

Mr. Cortes,

Attached is the completed AD1006 Form for the Whittier Creek Site Option D Mitigation Project. Please let me know if you need any additional information. Thank you!

Kristi Suggs

PLEASE NOTE MY CHANGE OF ADDRESS BELOW IN THE SIGNATURE LINE.

Kristi Suggs | Environmental Specialist II | Michael Baker International
Ballantyne One, 15720 Brixham Hill Avenue, Suite 300, Office 318 | Charlotte | NC | 28277 | [O] 704-665-2206 | [C] 704-579-4828
ksuggs@mbakerintl.com | www.mbakerintl.com

From: Cortes, Milton - NRCS, Raleigh, NC [mailto:Milton.Cortes@nc.usda.gov]
Sent: Monday, January 29, 2018 1:37 PM
To: Suggs, Kristi <KSuggs@mbakerintl.com>
Subject: EXTERNAL: RE: Farmland Conversion Impact Rating Submittal - Whittier Creek Site Option D, Surry County, NC
Importance: High

Kristi;

Please find attached the Farmland Conversion Impact Rating evaluation for NCDMS, Whittier Creek Site – Option D, Stream Mitigation Project Surry County, NC.

If I can be of further assistance please let us know.

Cordially;

Milton Cortes
Assistant State Soil Scientist
USDA Natural Resources Conservation Service
4407 Bland Rd, Suite 117
Raleigh, NC 27609
Phone: 919-873-2171
milton.cortes@nc.usda.gov

From: Suggs, Kristi [mailto:KSuggs@mbakerintl.com]
Sent: Monday, January 29, 2018 10:33 AM
To: Cortes, Milton - NRCS, Raleigh, NC <Milton.Cortes@nc.usda.gov>
Subject: Farmland Conversion Impact Rating Submittal - Whittier Creek Site Option D, Surry County, NC

Dear Mr. Cortes,

Please see the attached submittal package for the Farmland Protection Policy Act. Please let me know if you have any questions or need any additional information. Thank you very much!

Sincerely,

Kristi Suggs

PLEASE NOTE MY CHANGE OF ADDRESS BELOW IN THE SIGNATURE LINE.

Kristi Suggs | Environmental Specialist II | Michael Baker International
Ballantyne One, 15720 Brixham Hill Avenue, Suite 300, Office 318 | Charlotte | NC | 28277 | [O] 704-665-2206 | [C] 704-579-4828
ksuggs@mbakerintl.com | www.mbakerintl.com

Suggs, Kristi

From: Suggs, Kristi
Sent: Tuesday, September 26, 2017 2:59 PM
To: shannon.deaton@ncwildlife.org
Subject: Request for Comment for Categorical Exclusion on the Whittier Creek Site - Option D (DMS Full Delivery Project #100020)
Attachments: 162039_WhittierCreek_NCWRC_SubmittalPackage_09262017.pdf

Dear Ms. Deaton,

I have included the attached letter and supporting documentation requesting comment from the NC WRC about the above referenced project. Please let me know if you need any additional information.

Thank you in advance for your assistance!

Kristi Suggs

Kristi Suggs | Environmental Specialist II | Michael Baker Engineering, Inc. a Michael Baker International Company
9716-B Rea Road #56 | Charlotte | NC | 28277 | [O] 704-665-2206 | [C] 704-579-4828
ksuggs@mbakerintl.com | www.mbakerintl.com

Michael Baker
INTERNATIONAL

We Make a Difference

September 26, 2017

NC Wildlife Resources Commission
Division of Inland Fisheries
Attn: Shannon Deaton
Shannon.deaton@ncwildlife.org

RE: Categorical Exclusion for Whittier Creek Site – Option D Stream Mitigation Project,
NCDEQ DMS Full-Delivery Project ID #100020, Surry County, NC
Yadkin River Basin Cataloging Unit 03040101

Dear Ms. Deaton:

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 Whittier Creek Site – Option D Stream Mitigation Project. Please note that this request is in support of the development of the Categorical Exclusion (CE) for the referenced project.

The Whittier Creek Site – Option D is a full-delivery project for the NCDEQ Division of Mitigation Services (DMS) identified and contracted to provide stream mitigation credits for permitted, unavoidable impacts in the Yadkin River Basin, Cataloging Unit 03040101. The project is located in Surry County and the NC DMS Targeted Local Watershed (TLW) 03040101-110040. The site is located in the Ararat community on two abutting parcels southeast of the intersection of Rockhill Church Road and Nurse Road, approximately 7 miles east of Dobson, NC.

The project will involve the restoration and enhancement of approximately 3,130 linear feet of existing perennial streams along Whittier Creek and several UTs to Whittier Creek, which is a tributary to Bull Creek. In addition, a conservation easement will be implemented along all project reaches with riparian buffers extending in an excess of 30 feet from the top of bank of the restored channel and will protected in perpetuity by the State of North Carolina.

The existing stream reaches and riparian wetlands within the project area have been significantly impacted by past and present unrestricted livestock access and/or channelization used to promote drainage and maximize agricultural acreage for cattle pastures. The proposed restoration project not only has the potential to provide stream mitigation credits, but will also provide significant ecological improvements and functional uplift through habitat restoration, and through decreasing nutrient and sediment loads from the project watershed.

Based on review of the most current information from the United States Fish and Wildlife Service (USFWS) website (https://www.fws.gov/raleigh/species/cntylist/surry.html) and the North Carolina Wildlife Resources Commission (NCWRC) the following species are considered federally-listed species in Surry County:

Michael Baker Engineering, Inc.
9716-B Rea Road #56
Charlotte, NC 28277 | Office: 704.665.2200

Scientific Name	Common Name	Federal Status
Myotis septentrionalis	Northern long-eared bat	Threatened
Glyptemys muhlenbergii	Bog Turtle	Threatened Similarity of Appearance (S/A)
Helianthus schweinitzii	Schweinitz's sunflower	Endangered
Isotria medeoloides	Small whorled pogonia	Threatened

Data Review and Analysis

Baker conducted a two-mile radius search using the Natural Heritage Program's Data Explorer (https://ncnhde.natureserve.org/) on September 26, 2017 and found no known occurrences of the above referenced species within two miles of the Project site. However, the Project is located within Surry County, a Northern long-eared bat (NLEB) White Nose Syndrome (WNS) zone, and is therefore subject to the US Fish and Wildlife Service's Final 4(d) rule to maintain section 7(a)(2) compliance.

***Myotis septentrionalis* (Northern long-eared bat) – Threatened**

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.

Forested habitats containing trees at least 3-inch dbh in the project area provide suitable habitat for NLEB. Due to the decline of the NLEB population from the WNS, the USFWS has issued the finalization of a special rule under section 4(d) of the ESA to addresses the effects to the NLEB resulting from purposeful and incidental take based on the occurrence of WNS. Because the project is located within a WNS zone and will include the removal/clearing of trees, it is subject to the final 4(d) ruling. As previously stated, a review of NCNHP records did not indicate any known NLEB populations within 2.0 mile of the study area; therefore, the project is eligible to use the NLEB 4(d) Rule Streamlined Consultation Form to meet regulatory requirements for section 7(a)(2) compliance 4(d) consultation.

***Glyptemys muhlenbergii* (Bog turtle) - Threatened Similarity of Appearance (S/A)**

Bog turtles live in the mud, grass and sphagnum mosses found in bogs, swamps, and marshy meadows usually fed by cool surface springs. There are two distinct populations of the species, a northern population and a southern population. The southern population which is found in western North Carolina, including Alexander County, NC is listed as threated due to "similarity of appearance" as stated in the November 4, 1997, *62 FR 59605 59623*. Because the southern population has not experienced the habitat loss of the northern population, the southern population is not subject to Section 7 consultation requirements of the Endangered Species Act.

***Helianthus schweinitzii* (Schweinitz's sunflower) – Endangered**

Schweinitz's sunflower is a rhizomatous perennial herb that grows approximately 6.5 feet in height with purplish stems and produces small yellow flowers from late August until frost. This species is endemic to the Piedmont of North and South Carolina, and the few sites where it occurs in relatively natural conditions consist of Xeric Hardpan Forests. The species is also found along roadside rights-of-way, maintained power lines and other utility rights-of-way, edges of thickets and old pastures, clearings and edges of upland oak-pine-hickory woods and Piedmont longleaf pine forests, and other sunny or semi-sunny habitats where

disturbances (e.g., mowing, clearing, grazing, blow downs, storms, frequent fire) help create open or partially open areas for sunlight. It is intolerant of full shade and excessive competition from other vegetation. It is generally found growing on shallow sandy soils with high gravel content; shallow, poor, clayey hardpans; or shallow rocky soils, especially those derived from mafic rocks. Because marginal to suitable habitat for Schweinitz's sunflower occurs along field edges and utility easements adjacent to the project area, Baker conducted a field survey on September 25th, 2017. No populations or individuals were documented during the on-site review.

***Isotria medeoloides* (Small whorled pogonia) – Threatened**

Small whorled pogonia is a member of the orchid family. 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 urban expansion, forestry practices, recreational activities, and trampling. The project site consists of open and active cattle pasture with a narrow line of predominantly first successional woody vegetation along the top of the stream bank. Existing stream reaches, riparian corridors, and open fields at the project site have been significantly impacted by past and present unrestricted livestock access; therefore, habitat suitable for the species is not present within the project site.

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 NC WRC does not have any comment or information relevant to the implementation of this project at the current time.

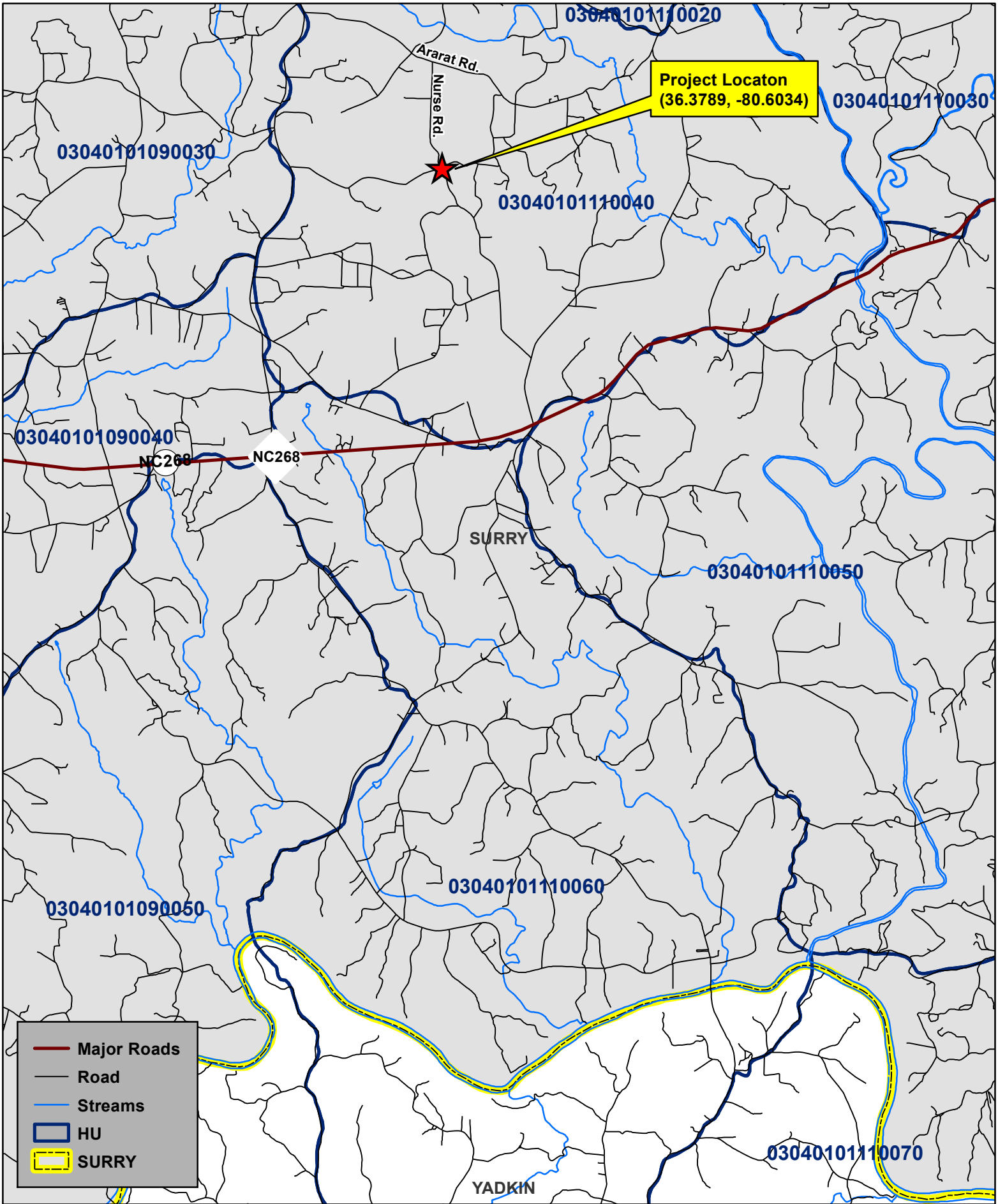
We thank you in advance for your timely response, input, and cooperation. Please contact me if you have any further questions or comments. I can be reached at (704) 579-4828 or via my email address at ksuggs@mbakerintl.com.

Sincerely,

Kristi Suggs

Cc: Matthew Reid, NCDMS
File

Enclosures



Michael Baker INTERNATIONAL

North Carolina Division of Mitigation Services
DMS Project No. 100020

Vicinity Map

0 0.5 1 Miles
1" = 1 Mile

Whittier Creek Site - Option D
(Surry County, NC)

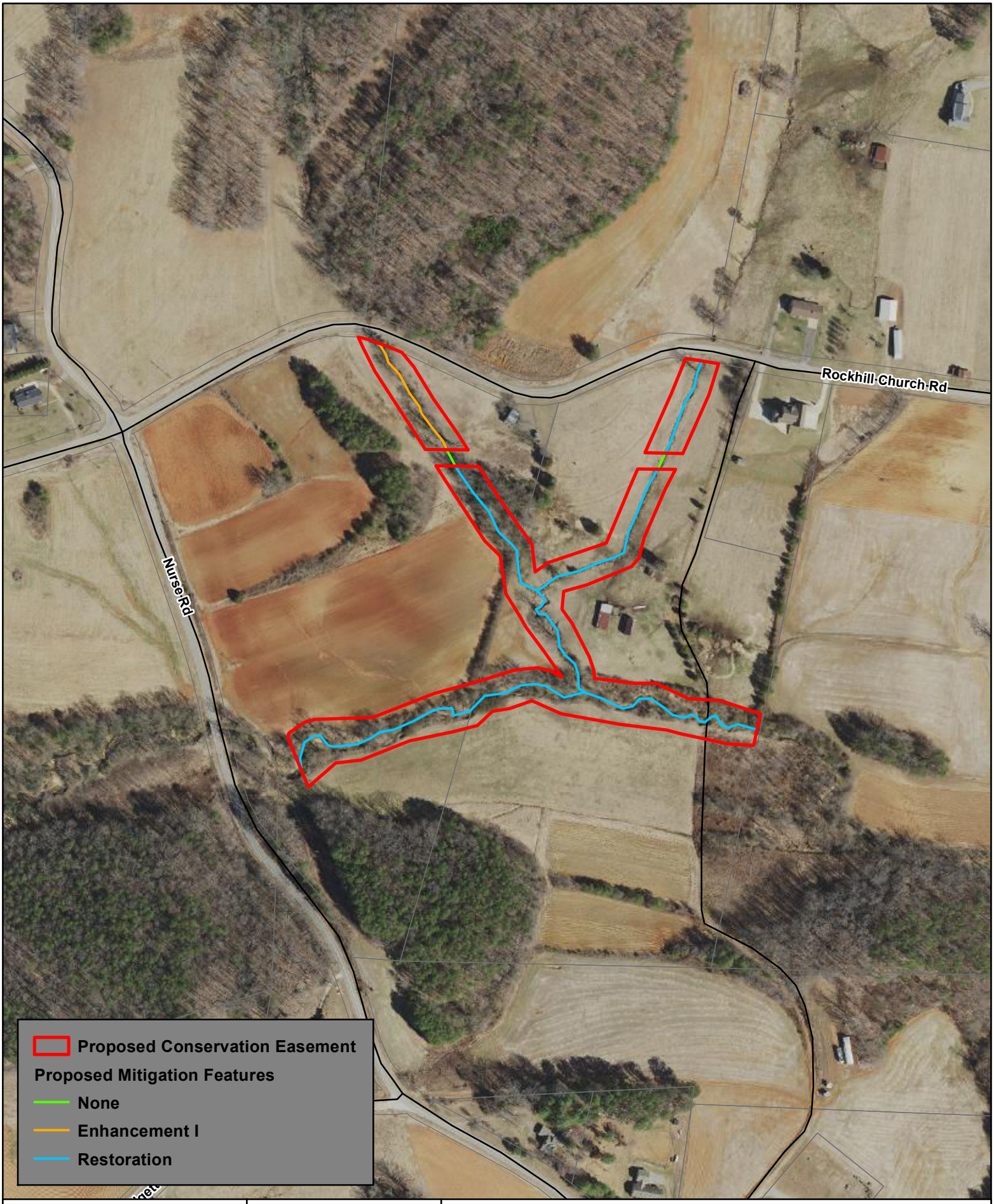
Michael Baker INTERNATIONAL

North Carolina Division of Mitigation Services
DMS Project No. 100020

USGS Topographic Map
(Mount Airy South Quad, Siloam Quad)

0 200 400 Feet
1" = 400'

Whittier Creek Site - Option D
(Surry County, NC)



Michael Baker INTERNATIONAL

North Carolina Division of Mitigation Services
DMS Project No. 100020

Project Site Map

0 150 300 Feet
1" = 300'

Whittier Creek Site - Option D
(Surry County, NC)

APPENDIX J: (IRT CORRESPONDENCE)

Michael Baker
INTERNATIONAL

Memo Regarding Whittier Creek Post Contract IRT Field Meeting

Memo Date: 8/15/17

This memo will be included in the Mitigation Plan to serve as a record of field discussions including crediting ratios and approaches.

Meeting Held: 8/14/17 from 10:00 to 12:00

Attendees: Jake Byers and Russell Myers (Baker); Todd Tugwell (Corps of Engineers); Paul Wiesner and Matthew Reid (DMS), Mac Haupt (DWR), and Andrea Leslie (WRC)

The originally proposed approaches and ratios for each Reach are provided in the following Tables in addition to the revised approaches and credits as applicable. Any modifications and discussions are noted in the text below.

Reach Name	Original Approach	Length	Ratio	Original Credits	Revised Approach	Revised Credits
R7	R	1389	1:1	1389	N/A	N/A

The group suggested that maintaining a sufficient bench and access to the floodplain throughout R7 would be a design priority to make sure it could handle flashy flows. Bioengineering should be used where feasible, IRT agreed that this was suitable. This would be particularly important where UT4 intersects with R7. It was also mentioned that suppressing privet would be a priority along this reach.

No other comments along this reach – Group consensus of approach is accepted as proposed.

Reach Name	Original Approach	Length	Ratio	Original Credits	Revised Approach	Revised Credits
UT5	R	735	1:1	735	N/A	N/A

Group consensus was to accept proposed approach and ratio

Todd inquired about the possibility of moving the powerline to parallel the road and eliminate the need for the two crossings along UT4 and UT5. It would be preferable if there were no crossings. Jake said he would look into the possibility of moving the line.

Andrea commented that the culvert at the top of the reach under Rock Hill Church Road might not allow sufficient water to pass through to support fish populations. She raised the possibility of backwatering the culvert to increase the water depth through the pipe. Concerns were raised about how this might impact the culvert in the long run and affect the stability of the road.

It was mentioned that UT5 was not particularly incised, at least in the upper section. Jake pointed out that incision increases downstream and said we would relocate the stream to match the valley topography and increase sinuosity. Group consensus of this approach is acceptable as proposed.

Reach Name	Original Approach	Length	Ratio	Original Credits	Revised Approach	Revised Credits
UT4a	EI	315	1.5:1	210	N/A	N/A

The group note that UT4 as a whole was difficult to define in regard to mitigation approach. Some sections are much more incised and eroded than others. It was noted by both Todd and Mac that UT4a (and upstream of UT4b) have areas that could be proposed as restoration, EI, or EII. UT4a is proposed as EI, and the group agreed that this was acceptable so long as the work that is proposed matches what is actually done in the field and is justified in the mitigation plan. However, if during analysis and design, it is determined that improved functional lift can be obtained through the implementation of a priority I restoration approach by moving the stream to the low part of the valley, then this reach would be acceptable as a restoration reach at a 1:1 ratio. As of now, the EI approach will remain. If restoration is proposed, it will be well documented and justified in the mitigation plan. It was noted that the culvert at the top of this reach also has the same issue as the culvert on UT5.

Reach Name	Original Approach	Length	Ratio	Original Credits	Revised Approach	Revised Credits
UT4b	R	735	1:1	735	N/A	N/A

It was noted that the short upstream section of this reach already has some buffer, although there is also a good bit of privet. A short section through the buffer was mostly stable but it would be necessary to raise the bed to connect to a knickpoint at the break between UT4a and UT4b. The group agreed, and the approach is accepted as proposed.

Please let me know if any of the above information is not presented as discussed in the field.

Sincerely,

Jake Byers

From: Leslie, Andrea J
To: Haupt, Mac; Tugwell, Todd J CIV USARMY CESAW (US); Byers, Jake
Cc: Wiesner, Paul; Reid, Matthew
Subject: RE: Whittier Creek Full Delivery Project Post Contract IRT Field Meeting Minutes
Date: Friday, September 08, 2017 8:28:18 AM

All--

I also agree that the notes cover what was discussed.

Thank you,
Andrea

Andrea Leslie
Mountain Habitat Conservation Coordinator
NC Wildlife Resources Commission
20830 Great Smoky Mountain Expressway
Waynesville, NC 28786
828-558-6011; 828-400-4223 (cell)
www.ncwildlife.org

-----Original Message-----
From: Haupt, Mac
Sent: Thursday, September 07, 2017 3:07 PM
To: Tugwell, Todd J CIV USARMY CESAW (US) <Todd.Tugwell@usace.army.mil>; Byers, Jake <JByers@mbakerintl.com>; Leslie, Andrea J <andrea.leslie@ncwildlife.org>
Cc: Wiesner, Paul <paul.wiesner@ncdenr.gov>; Reid, Matthew <matthew.reid@ncdenr.gov>
Subject: RE: Whittier Creek Full Delivery Project Post Contract IRT Field Meeting Minutes

Jake, Paul,

Notes covered what was discussed,

Thanks,
Mac

-----Original Message-----
From: Tugwell, Todd J CIV USARMY CESAW (US) [mailto:Todd.Tugwell@usace.army.mil]
Sent: Wednesday, September 06, 2017 9:55 AM
To: Byers, Jake <JByers@mbakerintl.com>; Haupt, Mac <mac.haupt@ncdenr.gov>; Leslie, Andrea J <andrea.leslie@ncwildlife.org>
Cc: Wiesner, Paul <paul.wiesner@ncdenr.gov>; Reid, Matthew <matthew.reid@ncdenr.gov>
Subject: RE: Whittier Creek Full Delivery Project Post Contract IRT Field Meeting Minutes

Jake, the notes look good to me.
Thanks,
Todd

-----Original Message-----
From: Byers, Jake [mailto:JByers@mbakerintl.com]
Sent: Thursday, August 17, 2017 4:09 PM
To: Tugwell, Todd J CIV USARMY CESAW (US) <Todd.Tugwell@usace.army.mil>; Haupt, Mac <mac.haupt@ncdenr.gov>; Andrea. leslie@wildlife. org (andrea.leslie@ncwildlife.org) <andrea.leslie@ncwildlife.org>
Cc: NCDENR NCEEP (Paul.wiesner@ncdenr.gov) <Paul.wiesner@ncdenr.gov>; matthew.reid@ncdenr.gov
Subject: [Non-DoD Source] Whittier Creek Full Delivery Project Post Contract IRT Field Meeting Minutes

Please find attached the meeting minutes from the post contract IRT field visit. Please let me know if there is any disagreement with the minutes as presented.

Thanks,

-Jake

Jacob "Jake" Byers, PE | NC Ecosystem Services Manager | Michael Baker Engineering, Inc., a unit of Michael Baker International
797 Haywood Road, Suite 201 | Asheville, North Carolina 28806 | [O] 828-412-6101 | [M] 919-259-4814
jbyers@mbakerintl.com <mailto:jbyers@mbakerintl.com> | Blockedwww.mbakerintl.com <Blockedhttp://www.mbakerintl.com/>

<Blockedhttp://www.mbakerintl.com/>

APPENDIX K: (PLAN SHEETS)

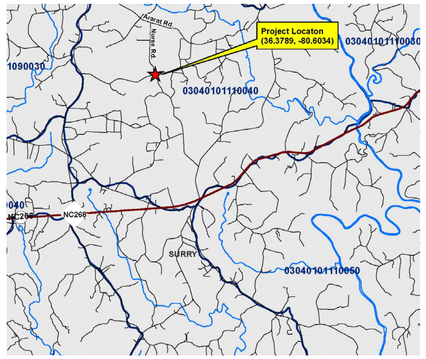
STATE	BAKER PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
NC	162039	1	32

NORTH CAROLINA
DIVISION OF MITIGATION SERVICES

SURRY COUNTY

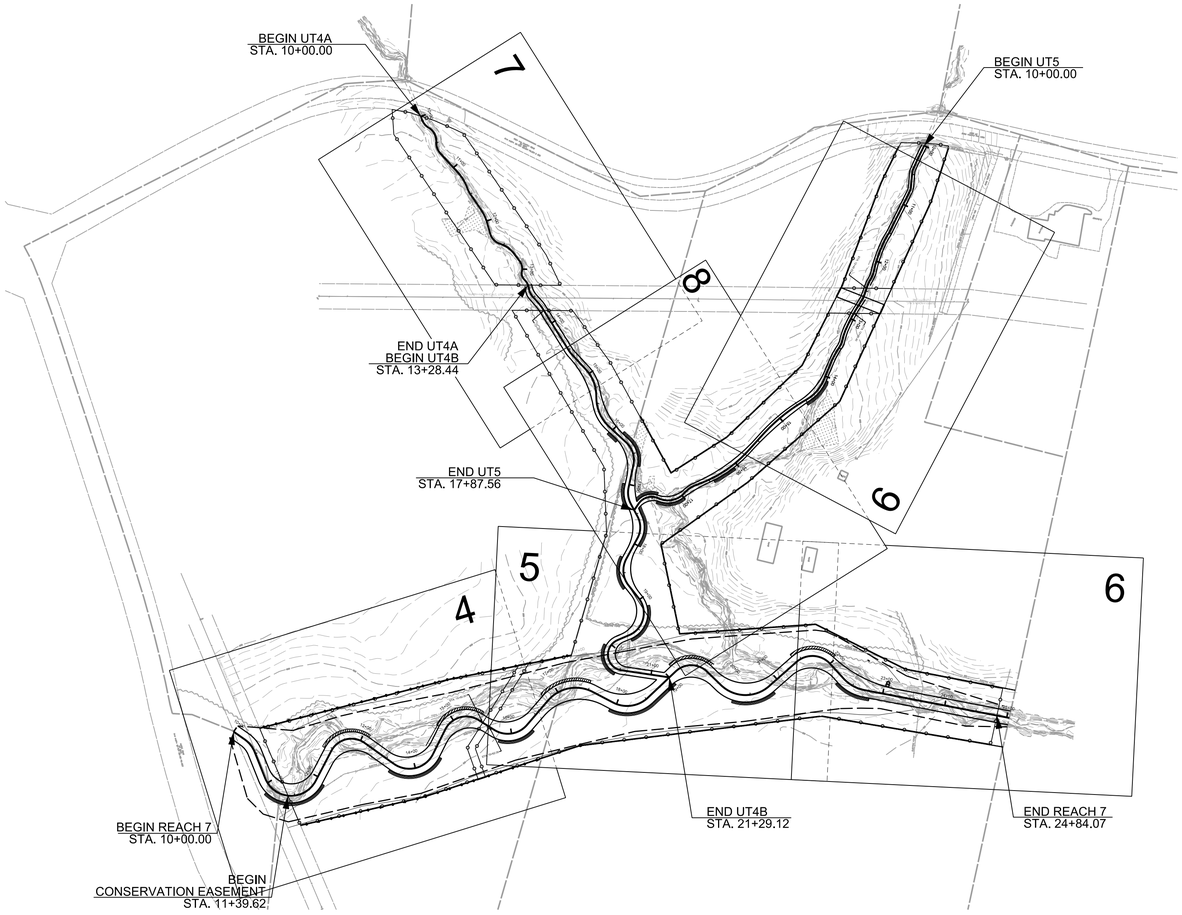
LOCATION: ROCK HILL CHURCH ROAD & NURSE ROAD

TYPE OF WORK: STREAM RESTORATION & ENHANCEMENT



VICINITY MAP

INDEX OF SHEETS

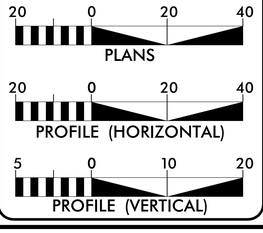


NCDMS ID NO. 100020

PROJECT: 162039

WHITTIER CREEK

GRAPHIC SCALES



REACH SUMMARY

REACH	DESIGN LENGTH *
UT4A	328 LF
UT4B	801 LF
UT5	788 LF
R7	1,484 LF

* DOES NOT EXCLUDE EASEMENT BREAKS

PREPARED FOR THE OFFICE OF:

NCDEQ
DIVISION OF MITIGATION SERVICES
1652 MAIL SERVICE CENTER
RALEIGH, NC 27699-1652

CONTACT: MATTHEW REID
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

SPRING 2020
LETTING DATE:

KATHLEEN M. MCKEITHAN, PE
PROJECT ENGINEER

PROJECT ENGINEER

PROGRESS DRAWING
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DO NOT USE FOR CONSTRUCTION

P.E.
SIGNATURE:

2/26/03

STREAM CONVENTIONAL SYMBOLS

SUPERCEDES SHEET 1-B

- J-HOOK VANE
- ROCK VANE
- OUTLET PROTECTION
- ROCK CROSS VANE
- DOUBLE DROP ROCK CROSS VANE
- SINGLE WING DEFLECTOR
- DOUBLE WING DEFLECTOR
- TEMPORARY SILT CHECK
- ROOT WAD
- GRADE CONTROL LOG J-HOOK VANE
- LOG VANE
- LOG WEIR
- LOG CROSS VANE
- LOG ROLLER
- GRADE CONTROL LOG JAM
- CONSTRUCTED RIFFLE
- BOULDER CLUSTER
- BOULDER STEP
- SAFETY FENCE
- TAPE FENCE
- 100 YEAR FLOOD PLAIN
- CONSERVATION EASEMENT
- 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
- 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

6.62 TEMPORARY SILT FENCE

6.63 TEMPORARY ROCK DAM

PROJECT REFERENCE NO.	SHEET NO.
162039	1-A

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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

NCDMS ID NO. 100020

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, 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 SUMMER OF 2020.
4. CONTRACTOR SHOULD CALL NORTH CAROLINA "ONE-CALL" BEFORE EXCAVATION STARTS. (1-800-632-4949)
5. ALL ON-SITE ALLUVIUM SHALL BE HARVESTED AND STOCKPILED PRIOR TO FILLING ABANDONED CHANNELS.
6. 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.
7. ALL DISTURBED EMBANKMENTS SHALL BE MATTED WITH COIR FIBER MATTING OR AS DIRECTED BY THE ENGINEER.
8. ALL STREAM BANKS SHALL BE LIVE STAKED.
9. UNLESS THE ALIGNMENT IS BEING ALTERED, THE EXISTING CHANNEL DIMENSIONS ARE TO REMAIN UNLESS OTHERWISE NOTED.
10. CONTRACTOR WILL ENSURE THAT FENCING IS INSTALLED OUTSIDE THE CONSERVATION EASEMENT AS SHOWN ON THE PLANS BUT NO MORE THAN 1' OUTSIDE.
11. 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.

PLANTING PLAN VEGETATION SELECTION

Total Planted Area = 5.49 ac. All Buffer Plantings at 747 stems/acre using 8' x 8' spacing			
Scientific Name	**Common Name**	**Percent Planted by Species**	**Wetness Tolerance**
Riparian Zone - Overstory Species			
Betula nigra	River Birch	10%	FACW
Juglans nigra	Black Walnut	5%	FACU
Platanus occidentalis	Sycamore	15%	FACW
Liriodendron tulipifera	Tulip Poplar	15%	FACU
Fraxinus pennsylvanica	Green Ash	5%	FACW
Quercus lyrata	Overcup Oak	10%	OBL
Quercus phellos	Willow Oak	10%	FAC
Ulmus americana	American Elm	5%	FACW
Diospyros virginiana	Persimmon	5%	FAC

Riparian Zone - Understory/Shrub Species			
Hamamelis virginiana	Witch Hazel	5%	FACU
Lindera benzoin	Spicebush	5%	FAC
Carpinus caroliniana	American Hornbeam	5%	FAC
Acer negundo	Box Elder	5%	FAC
Scientific Name	**Common Name**	**Percent Planted by Species**	**Wetness Tolerance**
Streambank Live Stake Planting			
Salix sericea	Silky Willow	30%	OBL
Cornus amomum	Silky Dogwood	30%	FACW
Sambucus canadensis	Elderberry	20%	FACW
Salix nigra	Black Willow	20%	OBL

Permanent seed mixtures for the project site shall be planted throughout the floodplain and riparian buffer areas except the vernal pools. Permanent seed mixtures shall be applied with temporary seed, as defined in the construction specifications.

Scientific Name	Common Name	Percent of Mixture	Seeding Density (lbs/acre)	Wetness Tolerance
Agrostis alba	Redtop	10%	1.5	FACW
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

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

3/6/2020
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mcrea

PROJECT REFERENCE NO.	SHEET NO.
162039	1-B
NCDMS ID NO. 100020	

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.

10/16/2019
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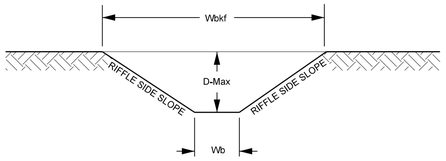
mroberts

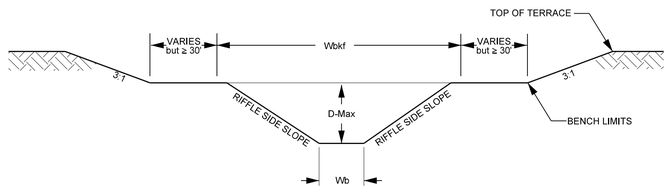
revised 02/02/00

2/26/03

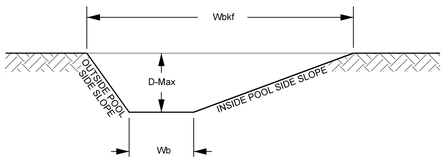
TYPICAL RIFFLE, POOL, AND BANKFULL BENCH CROSS SECTIONS



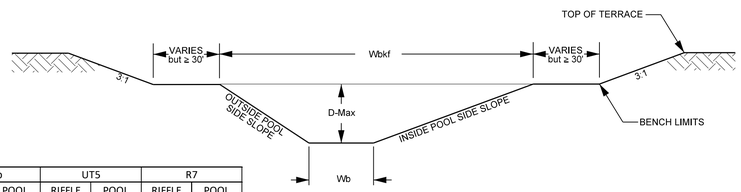
RIFFLE



RIFFLE WITH BANKFULL BENCH



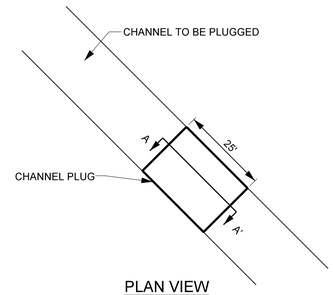
POOL



POOL WITH BANKFULL BENCH

	UT4a		UT4b		UT5		R7	
	RIFFLE	POOL	RIFFLE	POOL	RIFFLE	POOL	RIFFLE	POOL
WIDTH OF BANKFULL (Wbkf)	11.0	15.0	12.7	18.0	8.1	10.5	22.2	30.0
MAXIMUM DETPH (Dmax)	1.2	2.0	1.2	2.5	1.2	1.5	2.3	4.0
W/D (Wbkf/Dbkf)	12.2	N/A	12.7	N/A	13.0	N/A	12.3	N/A
BANKFULL AREA (Abkf)	10.0	18.0	13.0	26.3	5.0	9.0	41.0	75.0
BOTTOM WIDTH (Wb)	6.3	3.0	7.9	3.0	5.0	1.5	12.8	6.0
RIFFLE SIDE SLOPE (X:1)	2.0	N/A	2.0	N/A	2.0	N/A	2.0	N/A
INSIDE POOL SIDE SLOPE	N/A	3.0	N/A	3.0	N/A	3.0	N/A	4.0
OUTSIDE POOL SIDE SLOPE	N/A	3.0	N/A	3.0	N/A	3.0	N/A	2.0

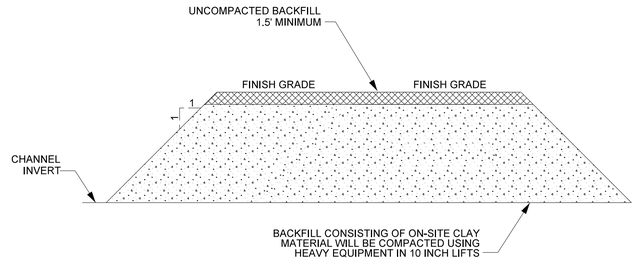
CHANNEL PLUG



PLAN VIEW

NOTE:

BACKFILL CONSISTING OF ON-SITE CLAY MATERIAL WILL BE COMPACTED USING HEAVY EQUIPMENT IN 10 INCH LIFTS



PROJECT REFERENCE NO.	SHEET NO.
162039	2

PROGRESS DRAWING
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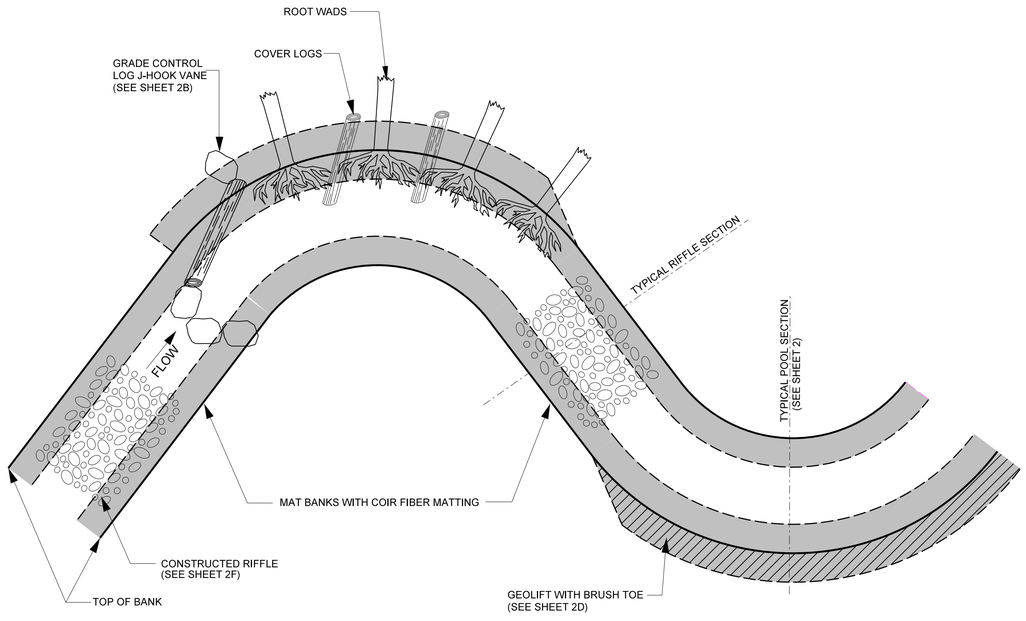
Michael Baker INTERNATIONAL
Michael Baker Engineering Inc.
8000 Regency Parkway, Suite 600
Cary, NORTH CAROLINA 27518
Phone: 919.463.5488
Fax: 919.463.5490
License #: F-1084

NCDMS ID NO. 100020

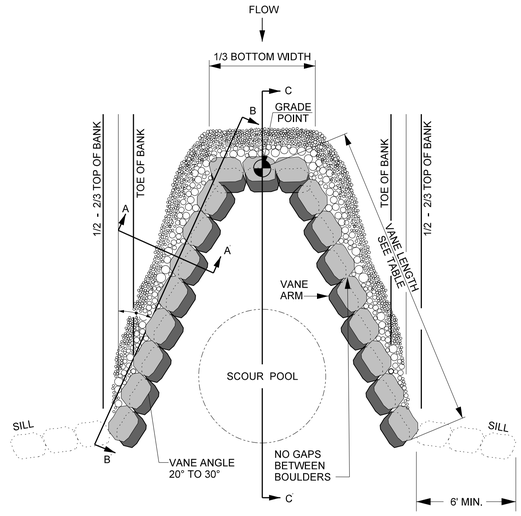
TYPICAL STRUCTURE PLACEMENT



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

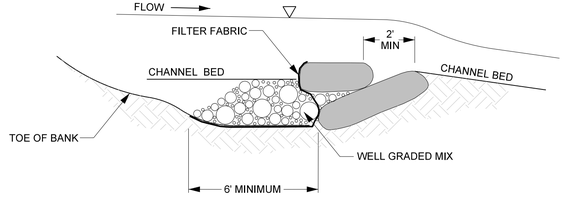


PLAN VIEW

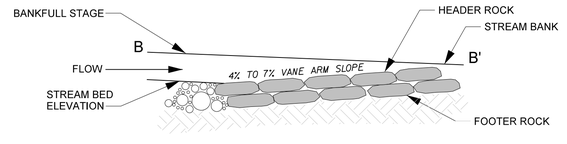
REACH	VANE LENGTH	BOULDER SIZE
UT4A	9'	1'x2'x3'
UT4B	10'	1'x2'x3'
UT5	7'	1'x2'x3'
REACH 7	18'	2'x3'x4'

NOTES FOR ALL VANE STRUCTURES:

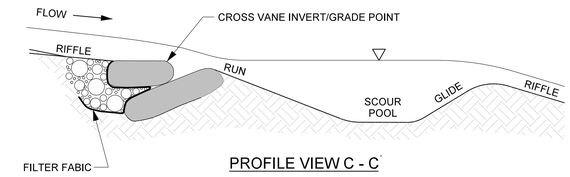
1. INSTALL FILTER FABRIC FOR DRAINAGE BEGINNING AT THE MIDDLE OF THE HEADER ROCKS AND EXTEND DOWNWARD TO THE DEPTH OF THE BOTTOM FOOTER ROCK, AND THEN UPSTREAM TO A MINIMUM OF SIX FEET.
2. DIG A TRENCH BELOW THE BED FOR FOOTER ROCKS AND PLACE FILL ON UPSTREAM SIDE OF VANE ARM, BETWEEN THE ARM AND STREAMBANK.
3. CONSTRUCT ANGLE AND SLOPE SPECIFICATIONS AS SHOWN.
4. BACKFILL VANE ARMS AND INVERT WITH A WELL GRADED MIX OF CLASS B, A, AND #57 STONE.
5. ON-SITE ALLUVIUM SHALL BE INCORPORATED INTO THE STONE BACKFILL WHERE AVAILABLE.
6. BOULDER SILL MUST BE A MINIMUM OF 6' AND WILL INCLUDE FOOTER ROCKS.



SECTION A - A'



PROFILE VIEW B - B'
VANE ARM



PROFILE VIEW C - C'

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PROJECT REFERENCE NO.	SHEET NO.
162039	2A

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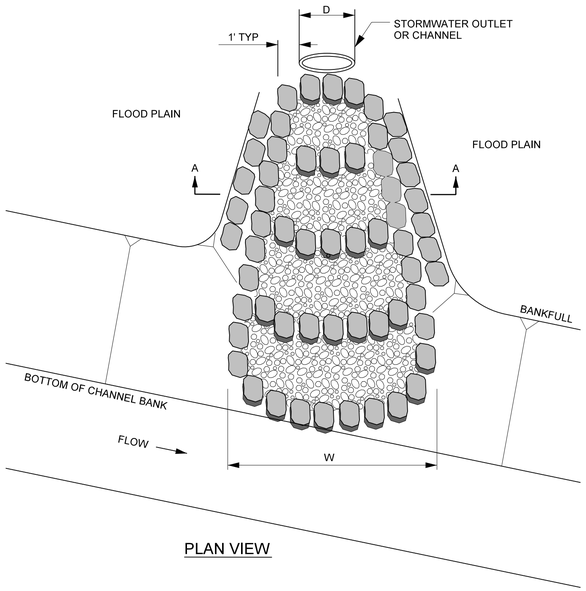
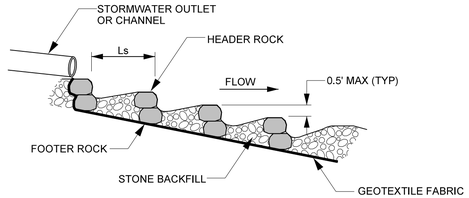
Michael Baker INTERNATIONAL
Michael Baker Engineering Inc.
8000 Regency Parkway, Suite 600
Cary, NORTH CAROLINA 27518
Phone: 919.463.5488
Fax: 919.463.5490
License #: F-1084

NCDMS ID NO. 100020

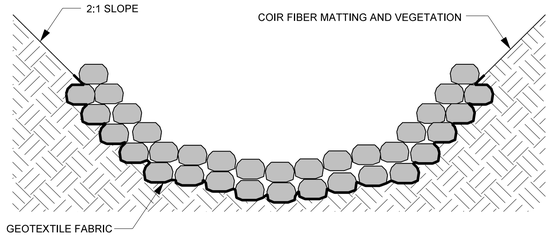
OUTLET PROTECTION



PLAN VIEW

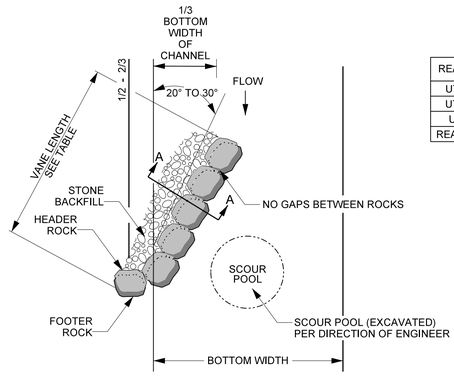


PROFILE VIEW



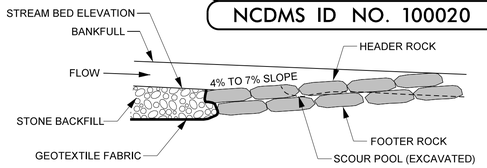
CROSS SECTION A - A

ROCK VANE

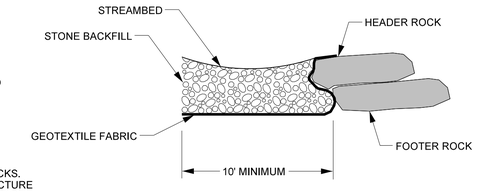


PLAN VIEW

REACH	VANE LENGTH	BOULDER SIZE
UT4A	9'	1'x2'x3'
UT4B	10'	1'x2'x3'
UT5	7'	1'x2'x3'
REACH 7	18'	2'x3'x4'



PROFILE VIEW

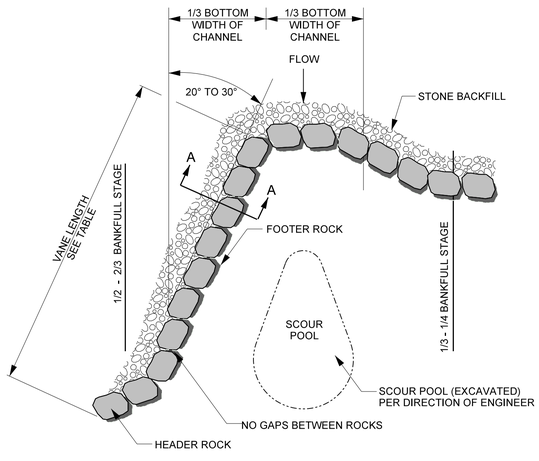


SECTION A - A

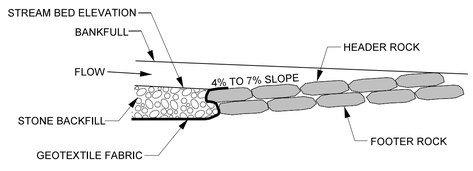
NOTES FOR ALL VANE STRUCTURES:

1. 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 TEN FEET.
2. DIG A TRENCH BELOW THE BED FOR FOOTER ROCKS AND PLACE FILL ON UPSTREAM SIDE OF VANE ARM, BETWEEN THE ARM AND STREAMBANK.
3. START AT BANK AND PLACE FOOTER ROCKS FIRST AND THEN HEADER (TOP) ROCK.
4. CONTINUE WITH STRUCTURE, FOLLOWING ANGLE AND SLOPE SPECIFICATIONS.
5. AN EXTRA ROCK CAN BE PLACED IN SCOUR POOL FOR HABITAT IMPROVEMENT.
6. USE HAND PLACED STONE TO FILL GAPS ON UPSTREAM SIDE OF HEADER AND FOOTER ROCKS.
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 OF THE TOP OF THE HEADER ROCK. INCORPORATE ON-SITE ALLUVIUM WHERE AVAILABLE.
8. START SLOPE AT 2/3 TO 3/4 TIMES THE BANKFULL STAGE.

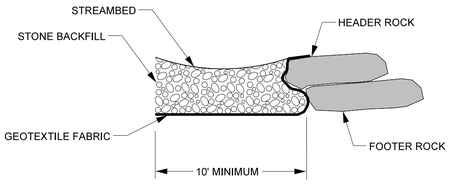
GRADE CONTROL J-HOOK VANE



PLAN VIEW



PROFILE VIEW



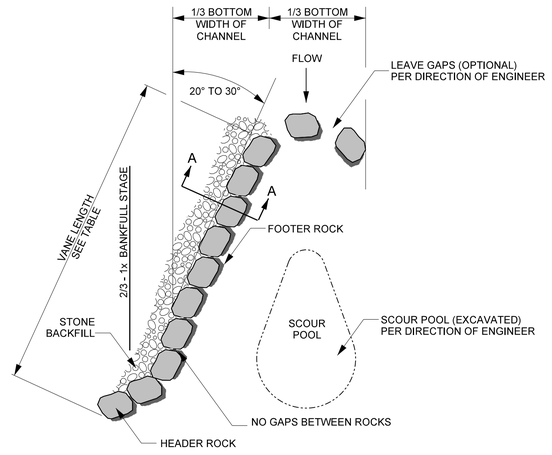
SECTION A - A

NOTES FOR ALL VANE STRUCTURES:

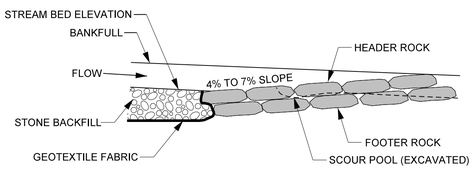
1. INSTALL FILTER FABRIC FOR DRAINAGE BEGINNING AT THE MIDDLE OF THE HEADER ROCKS AND EXTEND DOWNWARD TO THE DEPTH OF THE BOTTOM FOOTER ROCK, AND THEN UPSTREAM TO A MINIMUM OF SIX FEET.
2. DIG A TRENCH BELOW THE BED FOR FOOTER ROCKS AND PLACE FILL ON UPSTREAM SIDE OF VANE ARM, BETWEEN THE ARM AND STREAMBANK.
3. CONSTRUCT ANGLE AND SLOPE SPECIFICATIONS AS SHOWN.
4. BACKFILL VANE ARMS AND INVERT WITH A WELL GRADED MIX OF CLASS B, A, AND #57 STONE.
5. ON-SITE ALLUVIUM SHALL BE INCORPORATED INTO THE STONE BACKFILL WHERE AVAILABLE.
6. BOULDER SILL MUST BE A MINIMUM OF 6'.

REACH	VANE LENGTH	BOULDER SIZE
UT4A	9'	1'x2'x3'
UT4B	10'	1'x2'x3'
UT5	7'	1'x2'x3'
REACH 7	18'	2'x3'x4'

J-HOOK VANE

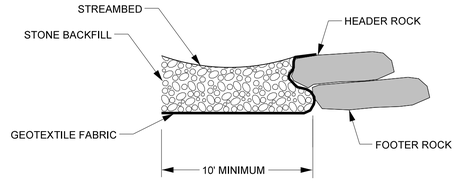


PLAN VIEW



PROFILE VIEW

REACH	VANE LENGTH	BOULDER SIZE
UT4A	9'	1'x2'x3'
UT4B	10'	1'x2'x3'
UT5	7'	1'x2'x3'
REACH 7	18'	2'x3'x4'



SECTION A - A

NOTES FOR ALL VANE STRUCTURES:

1. 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 TEN FEET.
2. DIG A TRENCH BELOW THE BED FOR FOOTER ROCKS AND PLACE FILL ON UPSTREAM SIDE OF VANE ARM, BETWEEN THE ARM AND STREAMBANK.
3. START AT BANK AND PLACE FOOTER ROCKS FIRST AND THEN HEADER (TOP) ROCK.
4. CONTINUE WITH STRUCTURE, FOLLOWING ANGLE AND SLOPE SPECIFICATIONS.
5. AN EXTRA ROCK CAN BE PLACED IN SCOUR POOL FOR HABITAT IMPROVEMENT.
6. USE HAND PLACED STONE TO FILL GAPS ON UPSTREAM SIDE OF HEADER AND FOOTER ROCKS.
7. AFTER ALL STONE BACKFILL HAS BEEN PLACED, FILL IN THE UPSTREAM SIDE OF THE STRUCTURE WITH ON-SITE ALLUVIUM TO THE ELEVATION OF THE TOP OF THE HEADER ROCK.

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PROJECT REFERENCE NO.	SHEET NO.
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Michael Baker INTERNATIONAL
Michael Baker Engineering Inc.
8000 Regency Parkway, Suite 600
Cary, NORTH CAROLINA 27518
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Fax: 919.463.5490
License #: F-1084

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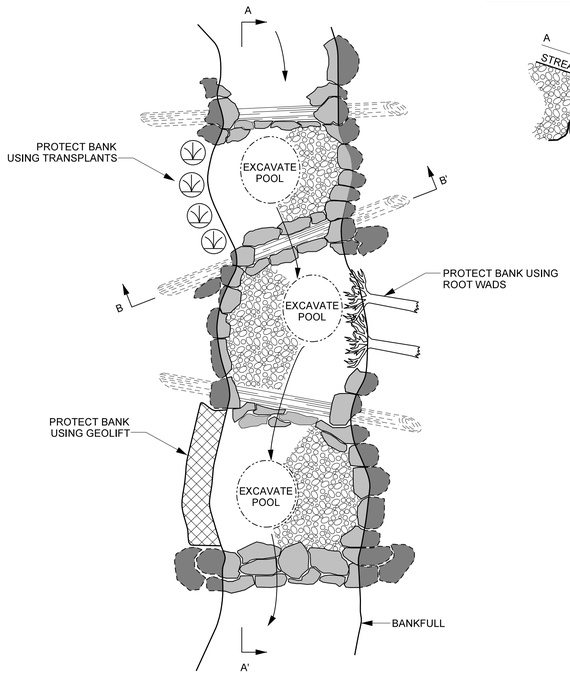
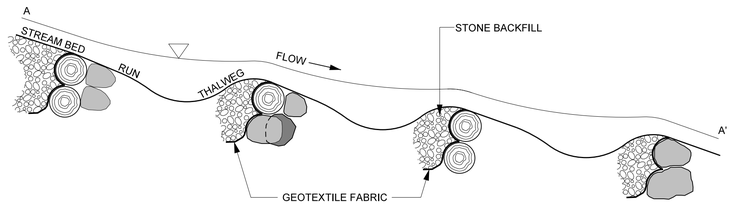
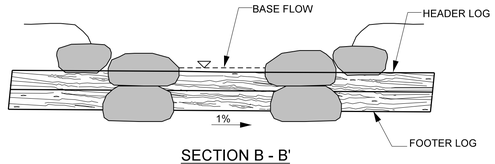
LOG AND ROCK STEP / POOL



PLAN VIEW



SECTION A - A'



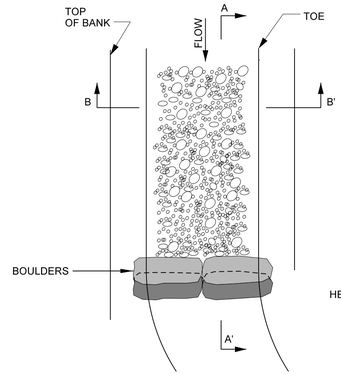
SECTION B - B'

REACH	BOULDER SIZE
UT4A	1'x2'x3'
UT4B	1'x2'x3'
UT5	1'x2'x3'
REACH 7	2'x3'x4'

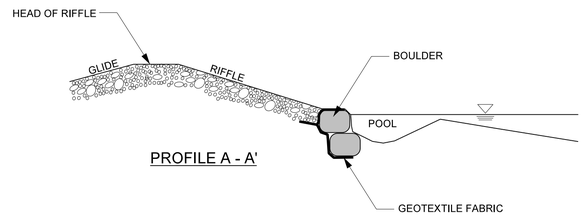
NOTES:

1. LOGS SHOULD BE AT LEAST 10" IN DIAMETER, RELATIVELY STRAIGHT, HARDWOOD, AND RECENTLY HARVESTED AND EXTENDING INTO THE BANK 5' 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 PLACED ON TOP OF HEADER LOG FOR ANCHORING.
5. 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.

BOULDER STEP



PLAN VIEW



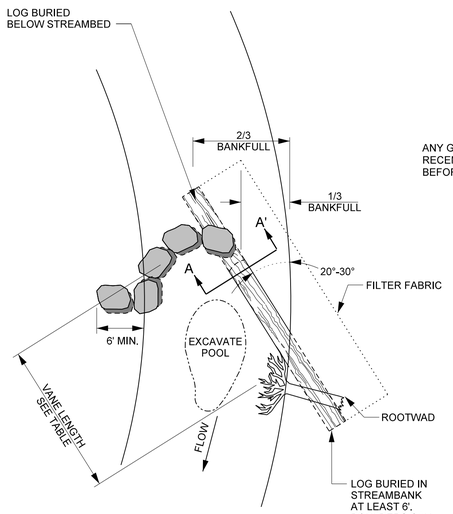
PROFILE A - A'

NOTES:

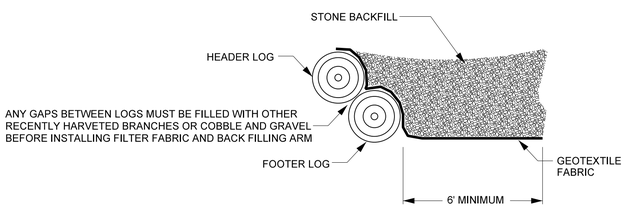
1. FOOTERS SHALL BE INSTALLED SUCH THAT 1/4 TO 1/3 OF THE LENGTH IS DOWNSTREAM OF THE HEADER.
2. SOIL SHALL BE WELL COMPACTED AROUND BURIED PORTION OF FOOTERS WITH THE BUCKET OF EXCAVATOR.
3. INSTALL NON-WOVEN FILTER FABRIC UNDERNEATH FOOTER BOULDERS.
4. UNDERCUT THE RIFFLE ELEVATION 12 INCHES TO ALLOW FOR A LAYER OF STONE.
5. 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.
6. FILL TRENCH WITH GRADED MIX OF CLASS A, CLASS B, AND #57 STONE TO THE BED ELEVATION OF THE CHANNEL.
7. BOULDER STEPS MUST BE EXTENDED TO A MINIMUM OF 2' INTO THE BANK. USE SILL BOULDERS IF NECESSARY.
8. THALWEG AND STEP INVERT WILL BE CONCAVE AND SHAPED PER DIRECTION OF THE DESIGNER.

REACH	BOULDER SIZE
UT4A	1'x2'x3'
UT4B	1'x2'x3'
UT5	1'x2'x3'
REACH 7	2'x3'x4'

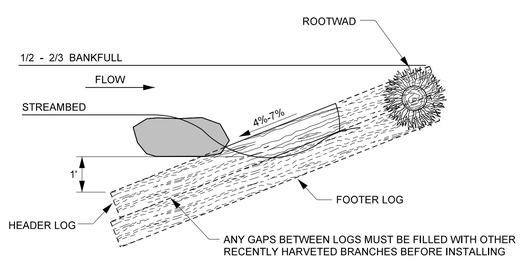
GRADE CONTROL LOG J-HOOK VANE



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.
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.

REACH	VANE LENGTH	BOULDER SIZE
UT4A	9'	1'x2'x3'
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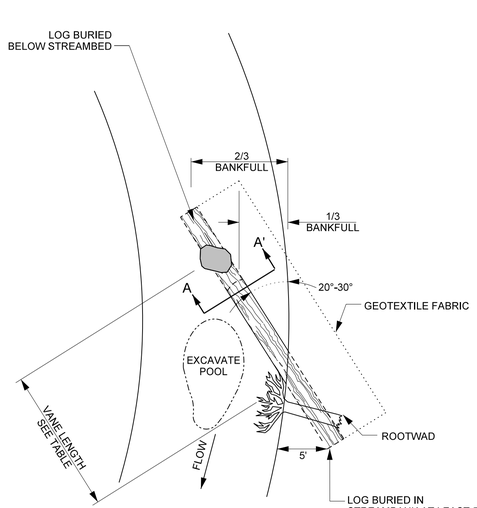
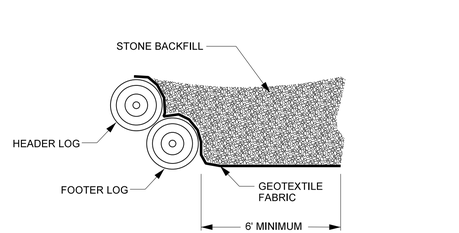
UT5	7'	1'x2'x3'
REACH 7	18'	2'x3'x4'

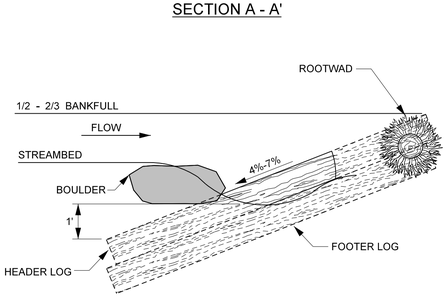
LOG VANE



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. 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.

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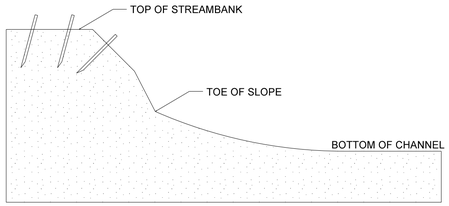
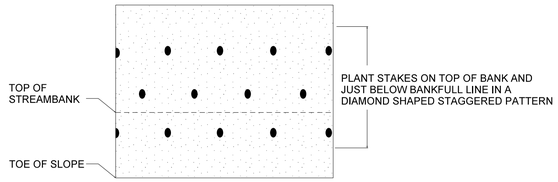
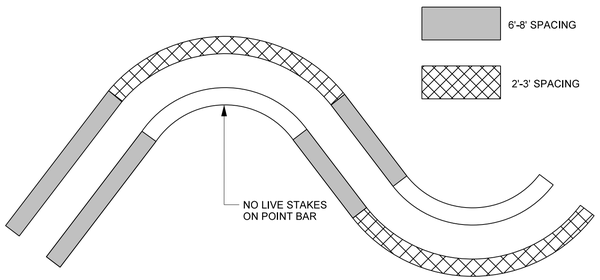
LIVE STAKING



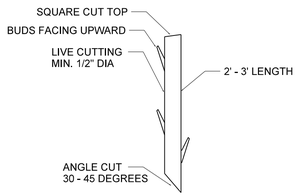
CROSS SECTION VIEW



PLAN VIEW



PLAN VIEW

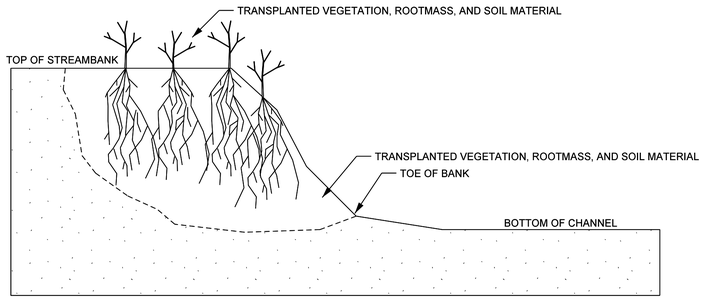


LIVE STAKE DETAIL

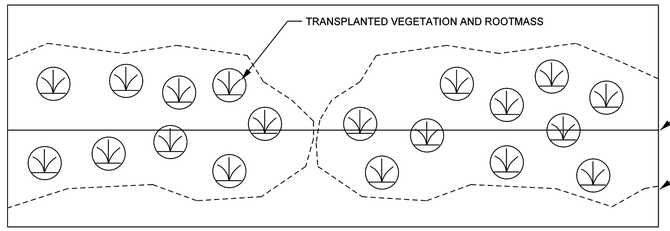
NOTES:

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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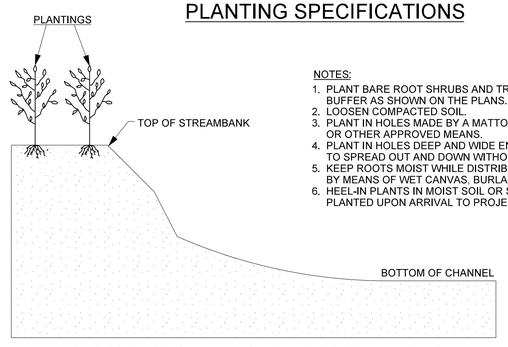
Michael Baker INTERNATIONAL
Michael Baker Engineering Inc.
8000 Regency Parkway, Suite 600
Cary, NORTH CAROLINA 27518
Phone: 919.463.5488
Fax: 919.463.5490
License #: F-1084

NCDMS ID NO. 100020

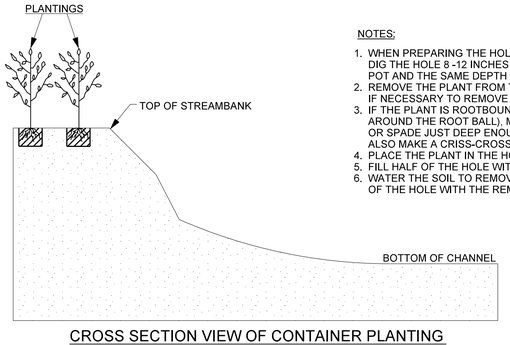
PLANTING SPECIFICATIONS



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.

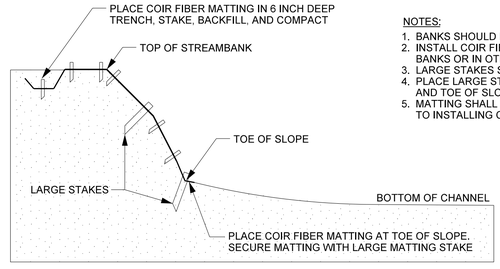


CROSS SECTION VIEW OF CONTAINER PLANTING

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



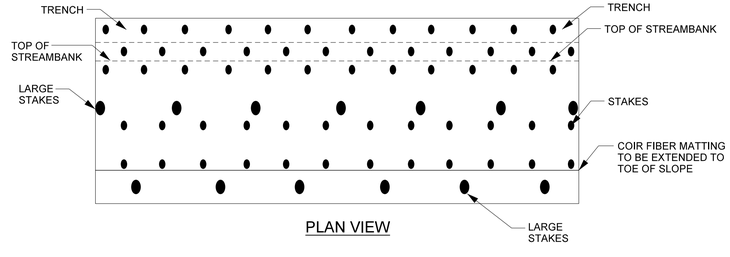
CROSS SECTION VIEW

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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Michael Baker INTERNATIONAL
Michael Baker Engineering Inc.
8000 Regency Parkway, Suite 600
Cary, NORTH CAROLINA 27518
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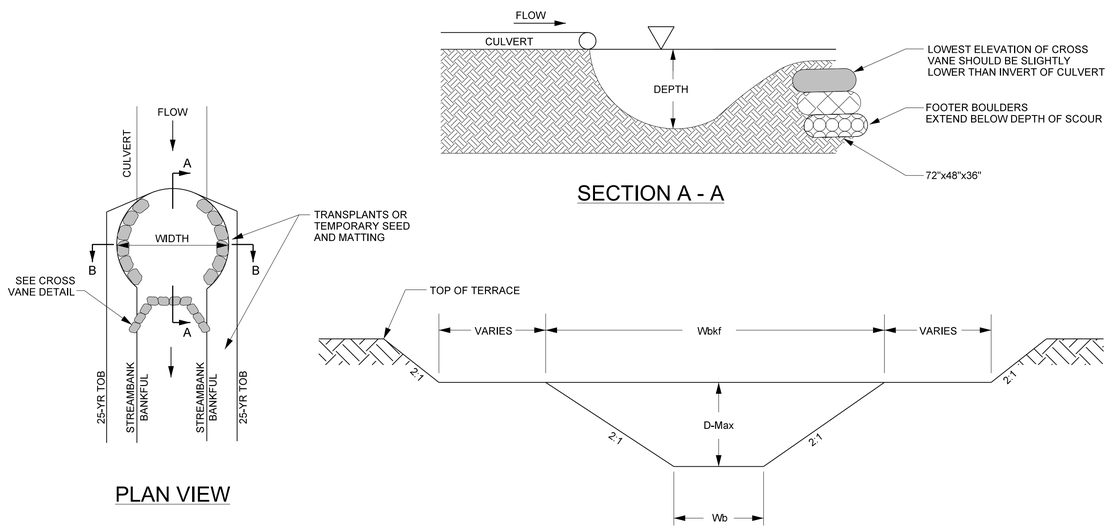
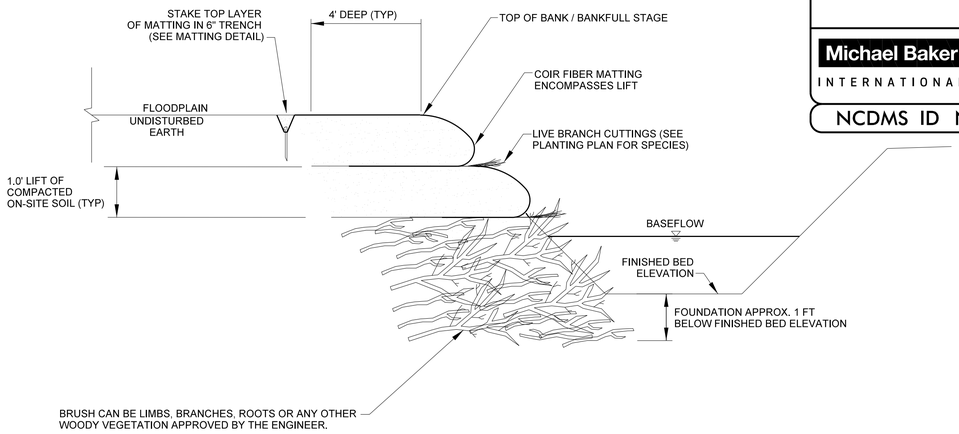
PLUNGE POOL



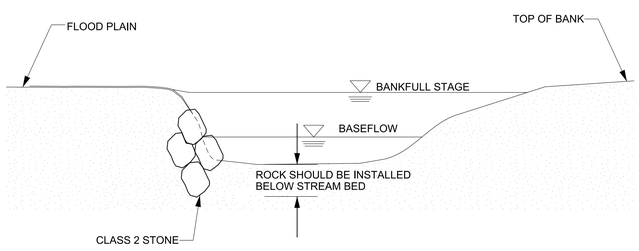
GEOLIFT WITH BRUSH TOE

NOTES:
1. LIVE BRANCH CUTTINGS SHALL BE THE SAME SPECIES AS THE LIVE STAKES AND SHALL BE INSTALLED DURING VEGETATION DORMANCY. IF CONSTRUCTION OCCURS OUTSIDE OF DORMANT SEASON, CONTRACTOR SHALL CONSULT WITH DESIGNER.
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.
4. WHEN GEOLIFTS ARE BUILT ABOVE ROOTWAD CLUSTER, USE LARGE STONE BACKFILL BEHIND ROOT MASS TO BUILT FOUNDATION.
5. CLASS I STONE MAY BE USED AT THE DIRECTION OF THE ENGINEER TO BUILD THE FOUNDATION IN LIEU OF BRUSH MATERIAL.

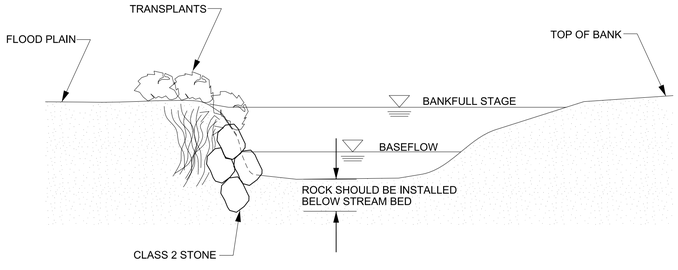


ROCK TOE PROTECTION

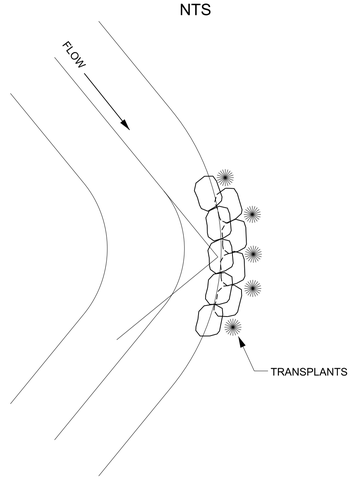
ROCK TOE PROTECTION
CROSS SECTION VIEW
NTS



ROCK TOE PROTECTION WITH TRANSPLANTS
CROSS SECTION VIEW
NTS



ROCK TOE PROTECTION
PLAN VIEW
NTS



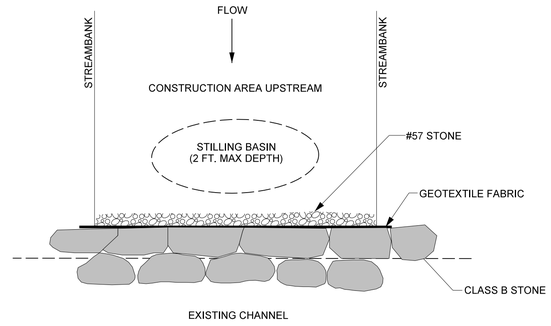
NOTES:

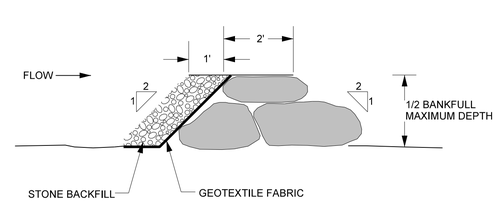
TRENCHING METHOD:
IF THE CLASS 2 CANNOT BE DRIVEN INTO THE BANK OR THE BANK NEEDS TO BE RECONSTRUCTED, THE TRENCHING METHOD SHOULD BE USED. THIS METHOD REQUIRES THAT A TRENCH BE EXCAVATED FOR THE CLASS 2. ONE-THIRD OF THE CLASS 2 SHOULD REMAIN BELOW NORMAL BASE FLOW CONDITIONS.

NOTES:

DRIVEN METHOD:
CLASS 2 SHOULD BE LAIN IN THE STREAMBED AND THEN DRIVEN INTO THE BANK WITH A HORIZONTAL AND DOWNWARD FORCE.

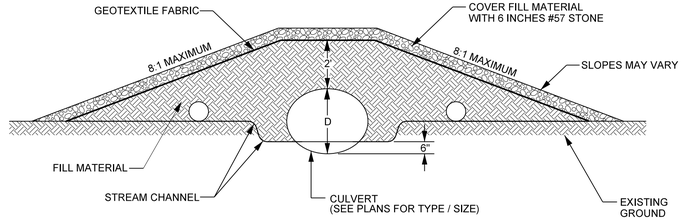
ROCK DAM





NOTES:
CLEAN OUT STILLING BASIN OF TRAPPED SEDIMENT PRIOR TO REMOVAL.

PERMANENT STREAM CROSSING



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 UNDERLAIN WITH GEOTEXTILE FABRIC.

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Michael Baker INTERNATIONAL
Michael Baker Engineering Inc.
8000 Regency Parkway, Suite 600
Cary, NORTH CAROLINA 27518
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Fax: 919.463.5490
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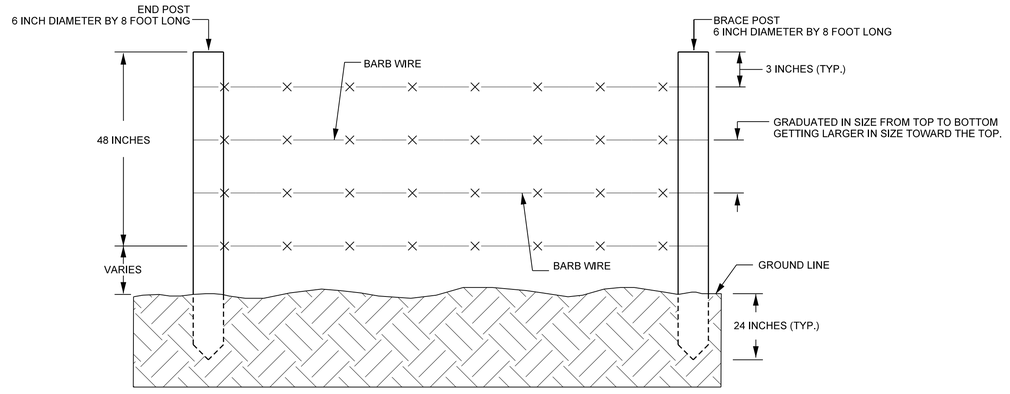
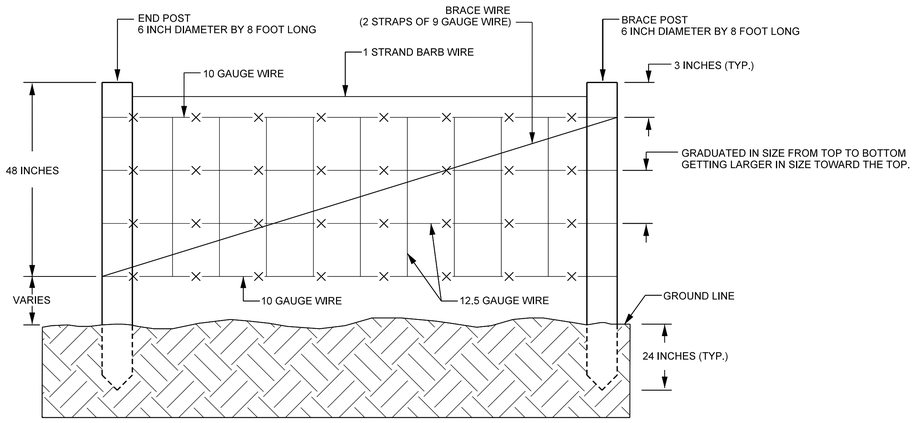
BARB WIRE FIELD FENCE



NOTE:

1. END POSTS SHALL BE INSTALLED AT A SPACING OF 10-15 FEET.

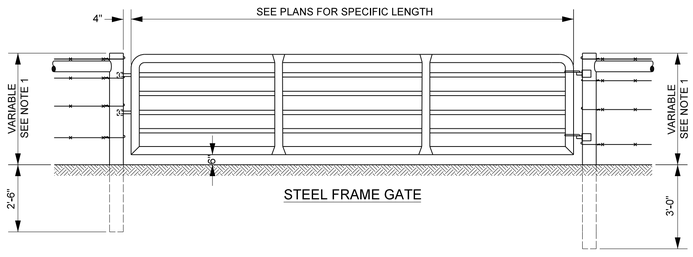
WOVEN WIRE FENCE



NOTE:

1. END POSTS SHALL BE INSTALLED AT A SPACING OF 10-15 FEET.

STEEL GATES

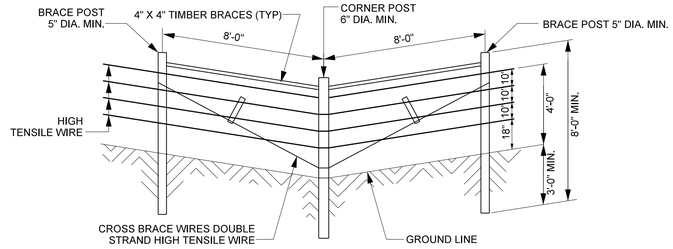


STEEL FRAME GATE

NOTES:

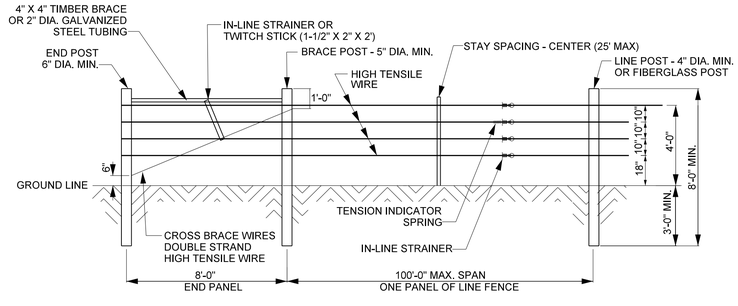
1. POST HEIGHT DIMENSION SHALL BE THE SAME AS REQUIRED FOR THE ADJACENT FENCE.
2. CONSTRUCT AN END OR STRESS PANEL, AS REQUIRED IN THE SPECIFICATION, ON EACH SIDE OF GATE.
3. HINGES AND LOCKS SHALL BE INSTALLED AS SPECIFIED BY GATE MANUFACTURER.

4 STRAND - HIGH TENSILE FENCING

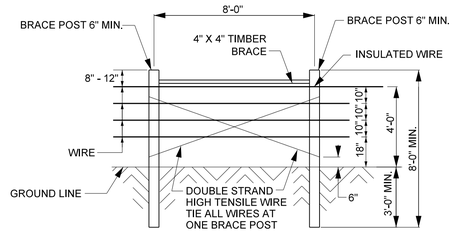


CORNER AND VERICAL CHANGE BRACING

INSTALL AT ALL POINTS WHERE FENCE ALIGNMENT CHANGES 15 DEGREES OR MORE

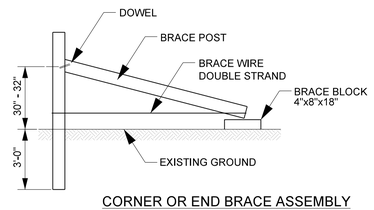


END ASSEMBLY AND LINE FENCE SECTION



PULL POST ASSEMBLY

PLACE IN FENCE LINE SO THAT MAXIMUM DISTANCE BETWEEN BRACED POSTS DOES NOT EXCEED 1320 FEET



CORNER OR END BRACE ASSEMBLY

OPTIONAL FIGURE 4

NOTES:

1. NOTCH POSTS 3/4" FOR 4" X 4" TIMBER BRACES.
2. DOWELS TO BE 1/2" DIA. X 5" PLAIN STEEL RODS. DRIVE DOWELS IN 7/16" DIA. HOLES, 2-1/2" INTO EACH POST AND TIMBER BRACE.
3. STAPLE CROSS-BRACE WIRES TO BRACE AND CORNER POSTS AT QUARTER POINTS OF THE POSTS.
4. HIGH TENSILE WIRE WILL BE NEW AND SMOOTH AND WILL MEET THE FOLLOWING 1) TENSILE STRENGTH - 110,000 PSI 2) GALVANIZING - TYPE III 3) GAGE - 12-1/2.
5. ALL CORNER POSTS, BRACE POSTS, BRACES, AND STAY SPACERS, SHALL BE PRESSURE TREATED. PRESSURE TREATMENT SHALL CONFORM TO FEDERAL SPECIFICATION TT-W-571. (1-1/4" LONG FOR HARD WOODS).
6. AT CORNER POSTS, STAPLE EACH WIRE AT QUARTER POINTS OF POSTS. AT BRACE POSTS, DOUBLE STAPLE EACH WIRE. AT LINE POSTS, SECURE EACH WIRE WITH STANDARD CLAMPS.
7. FIBERGLASS MAY BE USED FOR LINE POSTS. THESE WILL CONSIST OF MARBLE, FIBERGLASS, AND POLYMER RESINS WHICH HAVE BEEN TREATED BY THERMOSETTINGS (HEAT TREATMENT). POSTS MUST BE DRIVEN IN THE SOIL AT LEAST 18 INCHES.
8. 2" DIAMETER PIPE DIAGONAL BRACE MAY BE USED IN PLACE OF HORIZONTAL TIMBER BRACE AND DIAGONAL WIRES.
9. MINIMUM NET RETENTION OF CHROMATED COPPER ARSENATE (CCA) FOR WOOD FENCE POSTS SHALL BE 0.40 POUNDS PER CUBIC FOOT.
10. A SINGLE 12 FOOT LONG, 6 INCH MINIMUM DIAMETER POST MAY BE SUBSTITUTED FOR END PANEL, CORNER AND VERTICAL CHANGE BRACING, AND PULL POST ASSEMBLY. THE 12 FOOT LONG POSTS SHALL EXTEND A MINIMUM OF 7.5 FEET INTO THE GROUND AND BE BACKFILLED WITH GRAVEL.
11. FOR FURTHER DETAILS ON APPROVED METHODS OF FENCE INSTALLATION, SEE NATURAL RESOURCE SERVICE'S CONSERVATION PRACTICE MATERIALS AND CONSTRUCTION SPECIFICATIONS FOR FENCING (CODE 382) BY NRCS NORTH CAROLINA (FEBRUARY 2008).

2/26/03

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Michael Baker INTERNATIONAL
Michael Baker Engineering Inc.
8000 Regency Parkway, Suite 600
Cary, NORTH CAROLINA 27518
Phone: 919.463.5488
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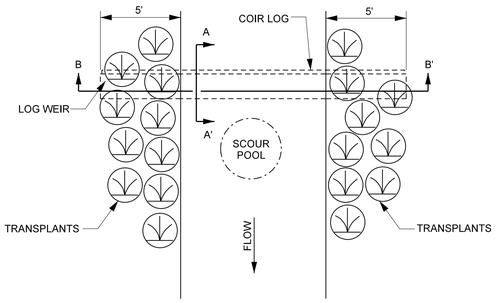
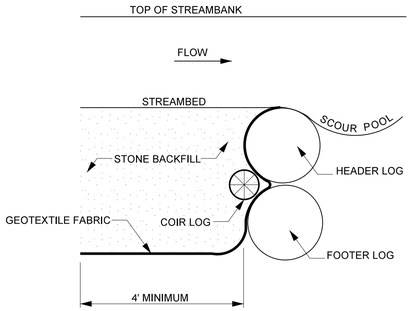
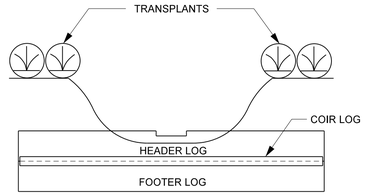
LOG DROP



PLAN VIEW



SECTION A - A'

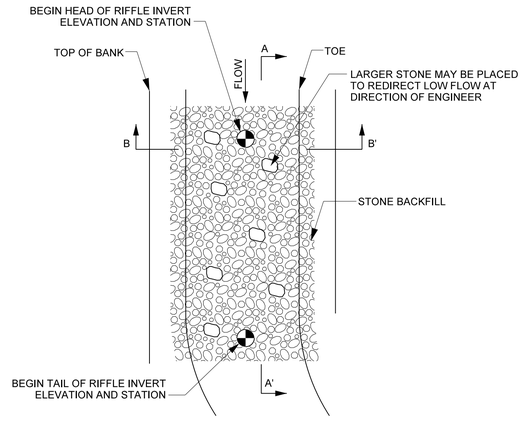


CROSS SECTION VIEW B - B'

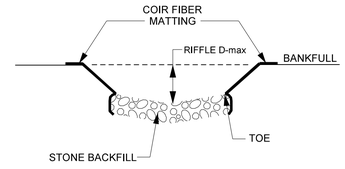
NOTES:

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. DIAMETER OF COIR LOG SHOULD BE APPROXIMATELY 1/2 DIAMETER OF LOGS.
4. USE GEOTEXTILE FABRIC WITH COIR LOGS TO SEAL GAPS BETWEEN LOGS.
5. PLACE TRANSPLANTS ALONG BANKS TO PROTECT AGAINST BANK EROSION.
6. THE HEADER LOG SHOULD BE NOTCHED 2 - 3 INCHES DEEP IN THE CENTER AND FOR 20 - 30% OF THE CHANNEL WIDTH.

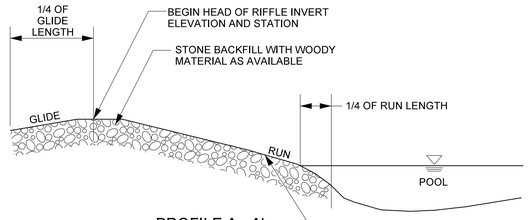
CONSTRUCTED RIFFLE



PLAN VIEW



SECTION B - B'



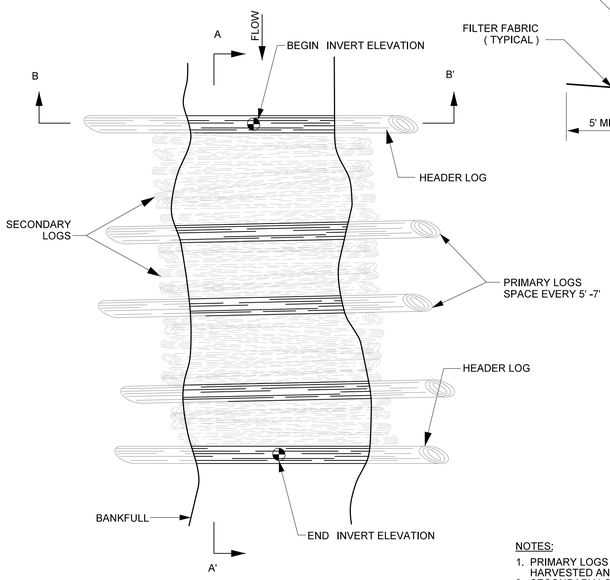
PROFILE A - A'

NOTES:

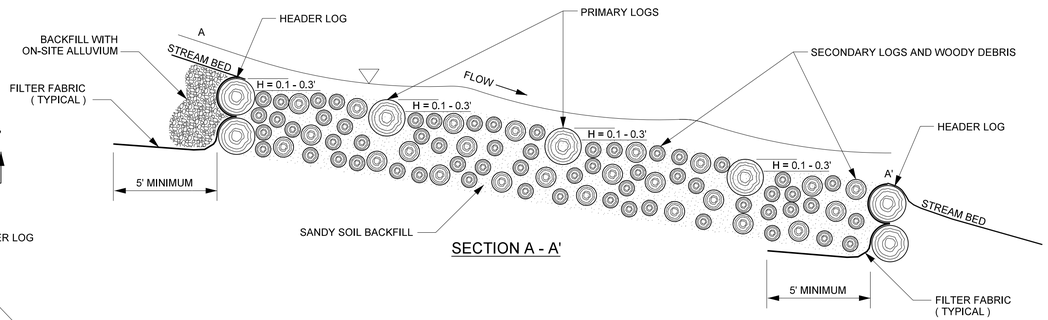
1. UNDERCUT CHANNEL BED ELEVATION AS NEEDED TO ALLOW FOR LAYERS OF STONE TO ACHIEVE FINAL GRADE.
2. INSTALL COIR FIBER MATTING ALONG COMPLETED BANKS SUCH THAT THE EROSION CONTROL MATTING AT THE TOE OF THE BANK EXTENDS DOWN TO THE UNDERCUT ELEVATION.
3. INSTALL STONE BACKFILL, COMPACTED TO GRADE.
4. FINAL CHANNEL BED SHAPE SHOULD BE ROUNDED, SMOOTH, AND CONCAVE, WITH THE ELEVATION OF THE BED 0.2 FT DEEPER IN THE CENTER THAN AT THE EDGES.
5. CONSTRUCTED RIFFLES SHALL BE 12" THICK.
6. CHANNEL BED SHALL INCLUDE WOODY MATERIAL AS AVAILABLE ON-SITE LAYERED IN WITH STONE BACKFILL.

REACH	STONE BACKFILL MIX
APPLIES	10% CLASS I RIPRAP
TO	20% CLASS B RIPRAP
ALL	40% CLASS A RIPRAP
REACHES	30% ON-SITE ALLUVIUM

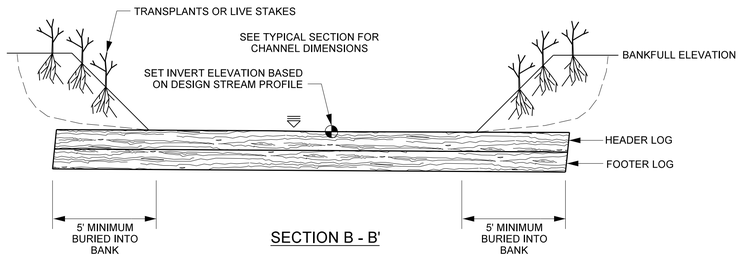
GRADE CONTROL LOG JAM



PLAN VIEW



SECTION A - A'

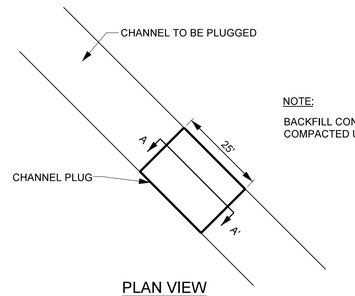


SECTION B - B'

NOTES:

1. PRIMARY LOGS SHOULD BE AT LEAST 10" OR MORE IN DIAMETER, RELATIVELY STRAIGHT, HARDWOOD PREFERRED, AND RECENTLY HARVESTED AND EXTENDING INTO THE BANK 5' ON EACH SIDE.
2. SECONDARY LOGS SHOULD BE AT LEAST 1" IN DIAMETER AND NO LARGER THAN 10", AND EXTEND INTO THE BANK 2 FEET ON EACH SIDE. WOOD MATERIAL SHALL BE VARYING DIAMETER TO ALLOW MATERIAL TO BE COMPACTED.
3. FILTER FABRIC SHOULD BE NAILED TO THE HEADER LOG BELOW THE BACKFILL.
4. ROOTWADS AND COIR FIBER MATTING CAN BE USED INSTEAD OF TRANSPLANTS OR LIVE STAKES, PER DIRECTION OF ENGINEER.
5. AFTER TRENCH HAS BEEN EXCAVATED A LAYER OF SECONDARY LOGS AND WOODY DEBRIS SHOULD BE PLACED WITH MINIMAL GAPS. A LAYER OF ON-SITE ALLUVIUM SHOULD BE APPLIED TO FILL VOIDS BETWEEN SECONDARY LOGS BEFORE ADDITIONAL LAYERS ARE PLACED.

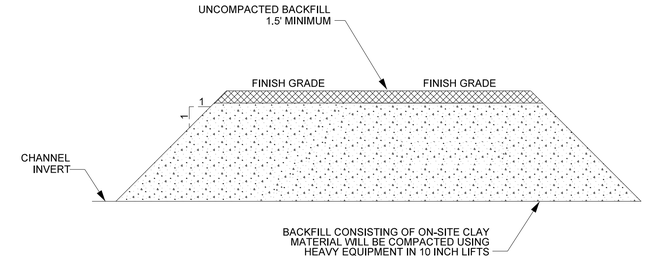
CHANNEL PLUG



PLAN VIEW

NOTE:

BACKFILL CONSISTING OF ON-SITE CLAY MATERIAL WILL BE COMPACTED USING HEAVY EQUIPMENT IN 10 INCH LIFTS



SECTION A - A'

2/26/03

GENERAL CONSTRUCTION SEQUENCE

A general construction sequence is provided below for the Whittier 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 install temporary rock dams at locations indicated on the plans.
7. 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.
8. The Contractor shall construct only the portion of channel that can be completed and stabilized within the same day.
9. The Contractor shall apply temporary seed and mulch to all disturbed areas at the end of each work day.
10. 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.
11. 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.
12. 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 after approval by the Engineer.
13. 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.
14. 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.
15. 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.
16. 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.
17. All disturbed areas should be seeded and mulched before leaving the project. Remove temporary stream crossings and any in-stream temporary rock dams.
18. The Contractor shall treat areas of invasive species vegetation throughout the project area according to the plans and specifications prior to demobilization.
19. 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.
20. The Contractor shall ensure that the site is free of trash and leftover materials prior to demobilization of equipment from the site.

PROJECT REFERENCE NO.	SHEET NO.
162039	3

PROGRESS DRAWING
FOR REVIEW PURPOSES ONLY
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Michael Baker Engineering Inc.
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Cary, NORTH CAROLINA 27518
Phone: 919.463.5488
Fax: 919.463.5490
License #: F-1084

NCDMS ID NO. 100020

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).

BAKER PROJECT REFERENCE NO.	SHEET NO.
162039	4

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2/26/13

NAD 83

SURRY-YADKIN E.M.C. UTILITY LINE

NURSE ROAD
SR 2033
R/W WIDTH 50' PER DB:426 PG:263

CHARLES DEAN HOLCOMB AND MICHAEL GENE HOLCOMB
ELMER E. HOLCOMB & WIFE WILMA F. HOLCOMB (LE)
PIN: 5926-00-80-4164
DB: 1489 PG: 874
PB: 9 PG: 64, LOT 6

J. DIXON BROWN & WIFE,
HARRIETTE C. BROWN
PIN: 5925-00-79-5737
DB: 1104 PG: 407

BEGIN REACH 7
STA. 10+00.00

BEGIN
CONSERVATION EASEMENT
STA. 11+39.62

BENCH LIMIT (TYP.)

INSTALL BRUSH TOE WITH
LIVE STAKES (TYP.)

INSTALL HIGH TENSILE
ELECTRIC FENCE (TYP.)

INSTALL ROCK
CROSS VANE (TYP.)

INSTALL CONSTRUCTED
RIFFLE (TYP.)

REMOVE EXIST. FENCE WITHIN
CONSERVATION EASEMENT (TYP.)

INSTALL GRADE CONTROL
LOG JAM (TYP.)

STA. 15+50.00

INSTALL LOG VANE (TYP.)

INSTALL GEOLIFT WITH
BRUSH TOE (TYP.)

INSTALL 16' GATE

STA. 15+62.00

INSTALL GRADE
CONTROL ROCK
J-HOOK VANE (TYP.)

END HIGH TENSILE ELECTRIC FENCE
BEGIN BARB WIRE FENCE

10+00 11+00 12+00 13+00 14+00 15+00 16+00

MATCH LINE – SEE SHEET 5

CONTROL POINT #305
N: 959739.22'
E: 1528409.31'
ELEV: 997.25'

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.
3. CONTRACTOR CAN USE BRUSH MATERIAL TO INCORPORATE WITHIN THE CONSTRUCTED RIFFLES AND BRUSH TOES ALONG MEANDER BENDS.
4. FENCING INSIDE EASEMENT WILL BE REMOVED AND HAULED OFF-SITE BY THE CONTRACTOR.
5. ANY AREA THAT HAS BEEN GRADED MUST HAVE POSITIVE DRAINAGE, UNLESS OTHERWISE DIRECTED BY ENGINEER.
6. AREAS OF BENCHING: CONTRACTOR WILL EXCAVATE THE TOPSOIL, STOCKPILE IT, AND THEN ADD THE TOPSOIL AS TOP LAYER OF BENCH TO A DEPTH OF AT LEAST 8 INCHES.
7. CONTRACTOR WILL CONTROL ANY INVASIVE SPECIES WITHIN EASEMENT.
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

WHITTIER CREEK
PLAN VIEW

20 0 20 40
SCALE (FT)

10/16/2013
R:\162039_Whittier_Creek\Design\Plans\162039_PSH-04.dgn

2/26/03

NOTES:

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BAKER PROJECT REFERENCE NO.	SHEET NO.
162039	5

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NAD 83

MATCH LINE – SEE SHEET 8

INSTALL CONSTRUCTED RIFFLE (TYP.)
INSTALL GEOLIFT WITH BRUSH TOE (TYP.)
INSTALL ROCK CROSS VANE (TYP.)
INSTALL ROCK VANE (TYP.)
INSTALL HIGH TENSILE ELECTRIC FENCE (TYP.)
INSTALL ROCK GRADE CONTROL J-HOOK VANE (TYP.)
INSTALL 16' GATE
INSTALL BARB WIRE FENCE (TYP.)
BENCH LIMIT (TYP.)
INSTALL BRUSH TOE WITH LIVE STAKES (TYP.)
INSTALL LOG AND ROCK STEP POOL (TYP.)
INSTALL GRADE CONTROL LOG JAM (TYP.)
INSTALL LOG VANE (TYP.)
INSTALL GEOLIFT WITH BRUSH TOE (TYP.)
REMOVE EXIST. FENCE WITHIN CONSERVATION EASEMENT (TYP.)
INSTALL CONSTRUCTED RIFFLE (TYP.)
INSTALL BOULDER STEP (TYP.)
BENCH LIMIT (TYP.)
INSTALL BARB WIRE FENCE (TYP.)

17+00
18+00
19+00
20+00
21+00
22+00

END UT4B
STA. 21+29.12

CHARLES DEAN HOLCOMB AND
MICHAEL GENE HOLCOMB
ELMER E. HOLCOMB & WIFE
WILMA F. HOLCOMB (LE)
PIN: 5926-00-80-4164
DB: 1489 PG: 874
PB: 9 PG: 64, LOT 6

ANGELA D. MEADOWS
PIN: 5926-00-90-1044
PORTION OF DB: 1153 PG: 678
PORTION OF LOT 5, PB: 9 PG: 64

CONTROL POINT #351
N: 960118.80'
E: 1529146.05'
ELEV: 998.85'

CONTROL POINT #304
N: 959901.05'
E: 1528946.04'
ELEV: 992.68'

MATCH LINE – SEE SHEET 4
MATCH LINE – SEE SHEET 6

CHANNEL PLUG
FILL EXISTING CHANNEL

WHITTIER CREEK PLAN VIEW

20 0 20 40
SCALE (FT)

10/16/2019
I:\2016\162039_Whittier_Creek\Design\Plans\162039_PSH-05.dgn
mpeden

2/26/03

BAKER PROJECT REFERENCE NO.	SHEET NO.
162039	6

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License #: F-1084

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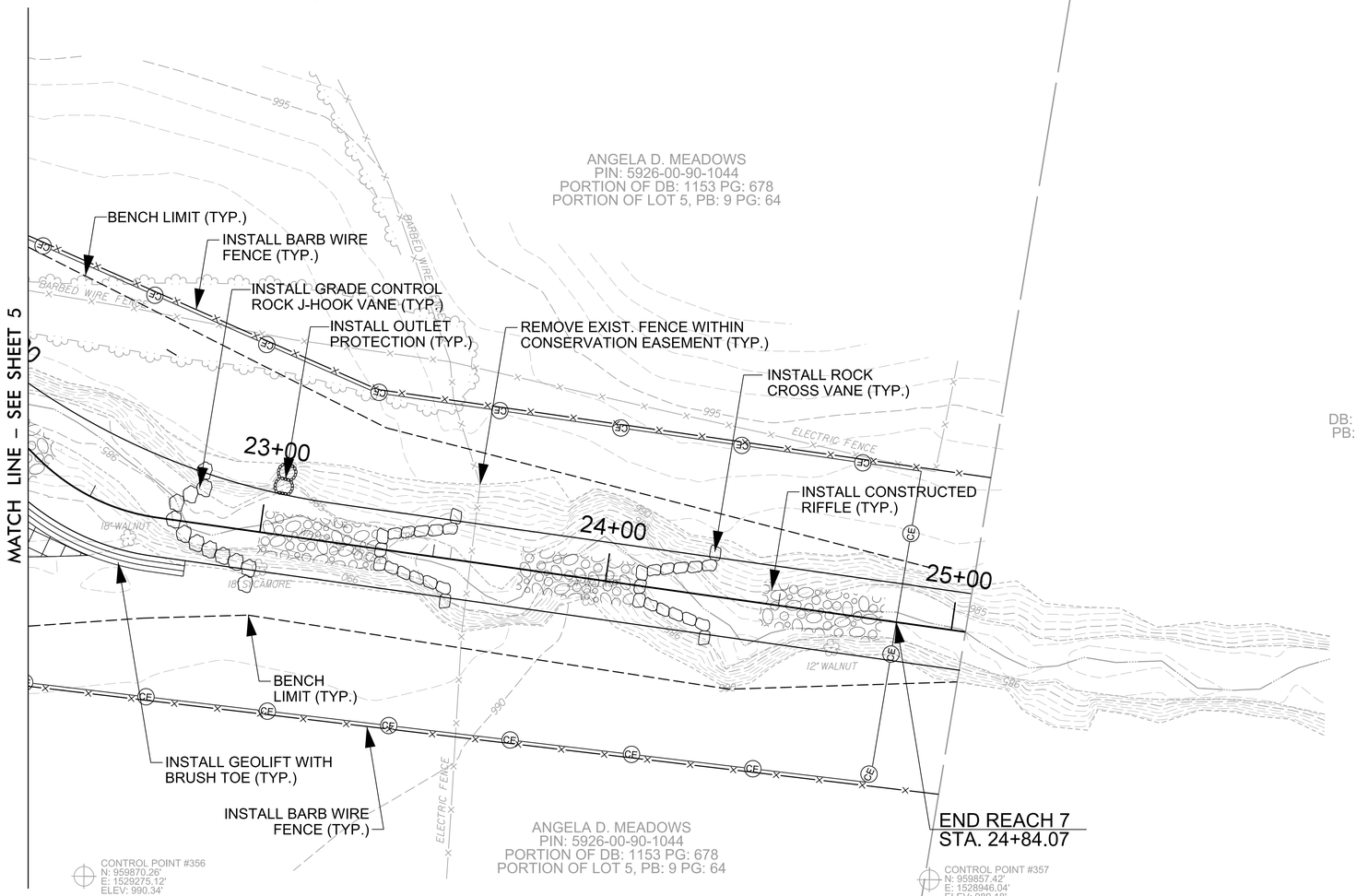
NAD 83



FILL EXISTING CHANNEL

CHANNEL PLUG

WHITTIER CREEK PLAN VIEW

20 0 20 40
SCALE (FT)

10/16/2019
R:\162039_Whittier_Creek\Design\Plans\162039_PSH-06.dgn
mcoffey

2/26/03

NOTES:

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BAKER PROJECT REFERENCE NO.	SHEET NO.
162039	7

PROGRESS DRAWING
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Fax: 919.463.5490
License #: F-1084

NAD 83

FRANCES F. ATKINS
CLAYTON FULK (LE)
PIN: 5926-00-91-0590
DB: 1218 PG: 345, TRACT 2
PB: 9 PG: 64, LOT 2

ROCK HILL CHURCH ROAD
SR 2034
R/W WIDTH 50' PER DB:854 PG:654 & 656

CHARLES DEAN HOLCOMB AND MICHAEL GENE HOLCOMB
ELMER E. HOLCOMB & WIFE WILMA F. HOLCOMB (LE)
PIN: 5926-00-80-4164
DB: 1489 PG: 874
PB: 9 PG: 64, LOT 6

SLOPE BANKS AT 3:1
INSTALL BOULDER STEP (TYP.)
INSTALL BOULDER TOE
USE BOULDERS AND EXISTING BEDROCK TO CREATE A STEP
INSTALL ROCK J-HOOK VANE
EXCAVATE BANKFULL BENCH
INSTALL ROCK GRADE CONTROL J-HOOK VANE (TYP.)
SLOPE BANKS AT 3:1
13+76.55
EXCAVATE BANKFULL BENCH

10+00 11+00 12+00 13+00 14+00

BEGIN UT4A
STA. 10+00.00

END UT4A
BEGIN UT4B
STA. 13+28.44

MATCH LINE – SEE SHEET 8

48" CMP
INV. IN: 1007.43'
INV. OUT: 1005.82'

CABLE PED

18" MAPLE
DOUBLE MAPLE
18" POPLAR
24" POPLAR
72" POPLAR
12" MAPLE
15" CHERRY
15" DOUBLE MAPLE
BEDROCK

CONTROL POINT #501
N: 960892.43'
E: 1528483.53'
ELEV: 1013.19'

CONTROL POINT #301
N: 960656.92'
E: 1528646.29'
ELEV: 1006.49'

SURRY-YADKIN E.M.C. UTILITY LINE

CHARLES DEAN HOLCOMB AND MICHAEL GENE HOLCOMB
ELMER E. HOLCOMB & WIFE WILMA F. HOLCOMB (LE)
PIN: 5926-00-80-4164
DB: 1489 PG: 874
PB: 9 PG: 64, LOT 6

FILL EXISTING CHANNEL

CHANNEL PLUG

WHITTIER CREEK PLAN VIEW

20 0 20 40
SCALE (FT)

3/16/2003
R:\162039_Whittier_Creek\Design\Plans\162039_PSH-07.dgn
mpeel

2/26/03

NOTES:

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BAKER PROJECT REFERENCE NO.	SHEET NO.
162039	8

PROGRESS DRAWING
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MATCH LINE – SEE SHEET 9

MATCH LINE – SEE SHEET 7

MATCH LINE – SEE SHEET 5

NAD 83

INSTALL ROCK CROSS VANE (TYP.)

INSTALL LOG AND ROCK STEP POOL (TYP.)

INSTALL LOG DROP (TYP.)

INSTALL BARB WIRE FENCE (TYP.)

INSTALL ROCK GRADE CONTROL J-HOOK VANE (TYP.)

INSTALL GEOLIFT WITH BRUSH TOE (TYP.)

INSTALL LOG VANE (TYP.)

INSTALL BOULDER STEP (TYP.)

INSTALL ROCK VANE (TYP.)

INSTALL LOG & ROCK STEP POOL (TYP.)

INSTALL ROCK J-HOOK VANE (TYP.)

CONTRACTOR SHALL HARVEST BED MATERIAL TO PLACE IN NEW CHANNEL

15+00

16+00

17+00

18+00

END UT5
STA. 17+87.56

INSTALL CONSTRUCTED RIFFLE (TYP.)

CONTROL POINT #300
N: 960297.06'
E: 1529217.20'
ELEV: 1010.47'

CONTROL POINT #302
N: 960463.27'
E: 1528735.15'
ELEV: 1001.42'

CONTROL POINT #303
N: 960229.16'
E: 1528902.99'
ELEV: 994.85'

ANGELA D. MEADOWS
PIN: 5926-00-90-1044
PORTION OF DB: 1153 PG: 678
PORTION OF LOT 5, PB: 9 PG: 64

CHARLES DEAN HOLCOMB AND MICHAEL GENE HOLCOMB
ELMER E. HOLCOMB & WIFE WILMA F. HOLCOMB (LE)
PIN: 5926-00-80-4164
DB: 1489 PG: 874
PB: 9 PG: 64, LOT 6

SHED

BARN

FILL EXISTING CHANNEL

CHANNEL PLUG

WHITTIER CREEK PLAN VIEW

20 0 20 40
SCALE (FT)

10/16/2019
R:\162039_Whittier_Creek\Design\Plans\162039_PSH-08.dgn
mcarey

BAKER PROJECT REFERENCE NO.	SHEET NO.
162039	9

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Fax: 919.463.5490
License #: F-1084

ANGELA D. MEADOWS
PIN: 5926-00-90-5577
DB: 1332 PG: 199
PB: 24 PG: 57
PORTION OF LOT 5, PB: 9 PG: 64

NAD 83

DWELLING
CONCRETE
12" CMP
INV IN: 1027.68'
INV OUT: UNKNOWN
TEL PED
GRAVEL ROAD
SOIL ROAD
BARBED WIRE FENCE
CONTROL POINT #350
N: 960577.74'
E: 1529412.96'
ELEV: 1014.58'
SURRY-YADKIN E.M.C. UTILITY LINE
ROCK HILL CHURCH ROAD SR 2014
BARBED WIRE FENCE
FIBER OPTIC CABLE MARKER
30" POPLAR
WOOD FENCE
CONCRETE HEADWALL
48" CMP
INV IN: 1011.90'
INV OUT: 1010.36'
RIP RAP OUTLET
36" RCP
INV IN: 1014.05'
INV OUT: 1012.93'

INSTALL 16' GATE
INSTALL ROCK GRADE CONTROL J-HOOK VANE (TYP.)
INSTALL BARB WIRE FENCE
INSTALL ROCK CROSS VANE (TYP.)
TIE BARB WIRE FENCE INTO EXISTING FENCE
INSTALL 16' - 48" RCP
INSTALL GEOLIFT WITH BRUSH TOE (TYP.)
LINE PLUNGE POOL WITH CLASS B STONE
STA. 12+90.40
10+00
11+00
12+00
13+00
14+00
MATCH LINE – SEE SHEET 8
STA. 12+45.53
INSTALL ROCK J-HOOK VANE (TYP.)
INSTALL CONSTRUCTED RIFFLE (TYP.)
INSTALL BARB WIRE FENCE
INSTALL BOULDER STEP (TYP.)
INSTALL 16' GATE
INSTALL 16' - 15" CMP AT BANKFULL ON EACH SIDE OF 48" RCP
TIE BARB WIRE FENCE INTO EXISTING FENCE
BEGIN UT5
STA. 10+00.00

ANGELA D. MEADOWS
PIN: 5926-00-90-1044
PORTION OF DB: 1153 PG: 678
PORTION OF LOT 5, PB: 9 PG: 64

FRANCES F. ATKINS
CLAYTON FULK (LE)
PIN: 5926-00-91-0590
DB: 1218 PG: 345, TRACT 2
PB: 9 PG: 64, LOT 2

NOTES:

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9. BANKS SHALL BE SLOPED AT 2:1 UNLESS OTHERWISE NOTED.

FILL EXISTING CHANNEL
CHANNEL PLUG

WHITTIER CREEK PLAN VIEW

20 0 20 40
SCALE (FT)

2/26/03

10/16/2018
R:\162039_Whittier_Creek\Design\Plans\162039_PSH-09.dgn

2/26/03

BAKER PROJECT REFERENCE NO.	SHEET NO.
162039	10

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License #: F-1084

NCDMS ID NO. 100020

REACH 7

BEGIN REACH 7
STA. 11+01.60
EL=990.60

PI=10+40.00 EL=991.00
PI=10+45.00 EL=986.50
PI=10+70.00 EL=990.70
PI=11+10.00 EL=986.70
PI=11+70.00 EL=987.00
PI=11+85.00 EL=990.65
PI=11+88.00 EL=989.15
PI=12+00.00 EL=990.55
PI=12+50.00 EL=989.95
PI=12+60.00 EL=985.95
PI=12+90.00 EL=985.95
PI=13+02.00 EL=989.95
PI=13+05.00 EL=988.45
PI=13+15.00 EL=989.80
PI=13+65.00 EL=989.40
PI=13+75.00 EL=985.40
PI=14+25.00 EL=985.40
PI=14+35.00 EL=989.40
PI=14+80.00 EL=988.90
PI=14+90.00 EL=984.90

EXISTING GROUND
DESIGN THALWEG

1,000 / 990 / 980

10+00 11+00 12+00 13+00 14+00 15+00

REACH 7

EXISTING GROUND

PI=15+25.00 EL=984.90
PI=15+35.00 EL=988.90
PI=15+70.00 EL=988.40
PI=15+80.00 EL=984.40
PI=16+25.00 EL=984.40
PI=16+35.00 EL=988.40
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PI=19+70.00 EL=986.80
PI=19+72.00 EL=985.30
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PI=20+10.00 EL=986.30
PI=20+20.00 EL=982.30

DESIGN THALWEG

1,000 / 990 / 980 / 970

15+00 16+00 17+00 18+00 19+00 20+00

REACH 7

EXISTING GROUND

PI=20+70.00 EL=982.30
PI=20+80.00 EL=986.20
PI=20+82.00 EL=983.70
PI=21+00.00 EL=986.00
PI=21+02.00 EL=983.50
PI=21+20.00 EL=985.80
PI=21+22.00 EL=983.30
PI=21+40.00 EL=985.70
PI=21+45.00 EL=982.20
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PI=21+95.00 EL=985.70
PI=22+35.00 EL=985.22
PI=22+45.00 EL=982.22
PI=22+65.00 EL=982.20
PI=22+75.00 EL=985.00
PI=22+78.00 EL=982.00
PI=23+00.00 EL=984.60
PI=23+35.00 EL=984.40
PI=23+38.00 EL=980.40
PI=23+75.00 EL=983.90
PI=24+10.00 EL=983.70
PI=24+13.00 EL=979.70
PI=24+45.00 EL=983.20

END REACH 7
STA. 24+80.00
EL=983.00

DESIGN THALWEG

1,000 / 990 / 980 / 970

21+00 22+00 23+00 24+00 25+00 26+00

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2/26/03

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162039	11

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Cary, NORTH CAROLINA 27518
Phone: 919.463.5488
Fax: 919.463.5490
License #: F-1084

NCDMS ID NO. 100020

UT4

BEGIN REACH UT4A
STA. 10+00.00
EL=1,005.50

PI=10+48.20 EL=1,005.10
PI=10+60.00 EL=1,004.90
PI=10+50.00 EL=1,003.10
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PI=11+20.00 EL=1,003.10
PI=11+28.00 EL=1,002.60
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PI=12+32.00 EL=1,000.90
PI=12+40.00 EL=1,000.80
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BEGIN UT4B
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1,010 / 1,000 / 990

10+00 11+00 12+00 13+00 14+00 15+00

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PI=15+20.00 EL=995.50
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PI=15+85.00 EL=994.70
PI=16+00.00 EL=994.40
PI=16+16.00 EL=994.10
PI=16+32.52 EL=993.70
PI=16+50.00 EL=992.20
PI=16+69.00 EL=993.30
PI=16+79.00 EL=993.00
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PI=15+22.00 EL=993.50
PI=15+60.00 EL=993.00
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PI=17+18.12 EL=991.10
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DESIGN THALWEG
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1,000 / 990 / 980

15+00 16+00 17+00 18+00 19+00 20+00

UT4

PI=20+72.00 EL=988.50
PI=20+85.00 EL=988.00
PI=21+05.00 EL=987.60
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END REACH UT4B
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EL= 986.90
PI=20+75.00 EL=987.00

1,000 / 990 / 980

21+00

4/2/2020
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UT5

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162039	12

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NCDMS ID NO. 100020

1,020
1,010
1,000
990

PI=10+25.55
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EL=998.00

10+00 11+00 12+00 13+00 14+00 15+00

UT5

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980

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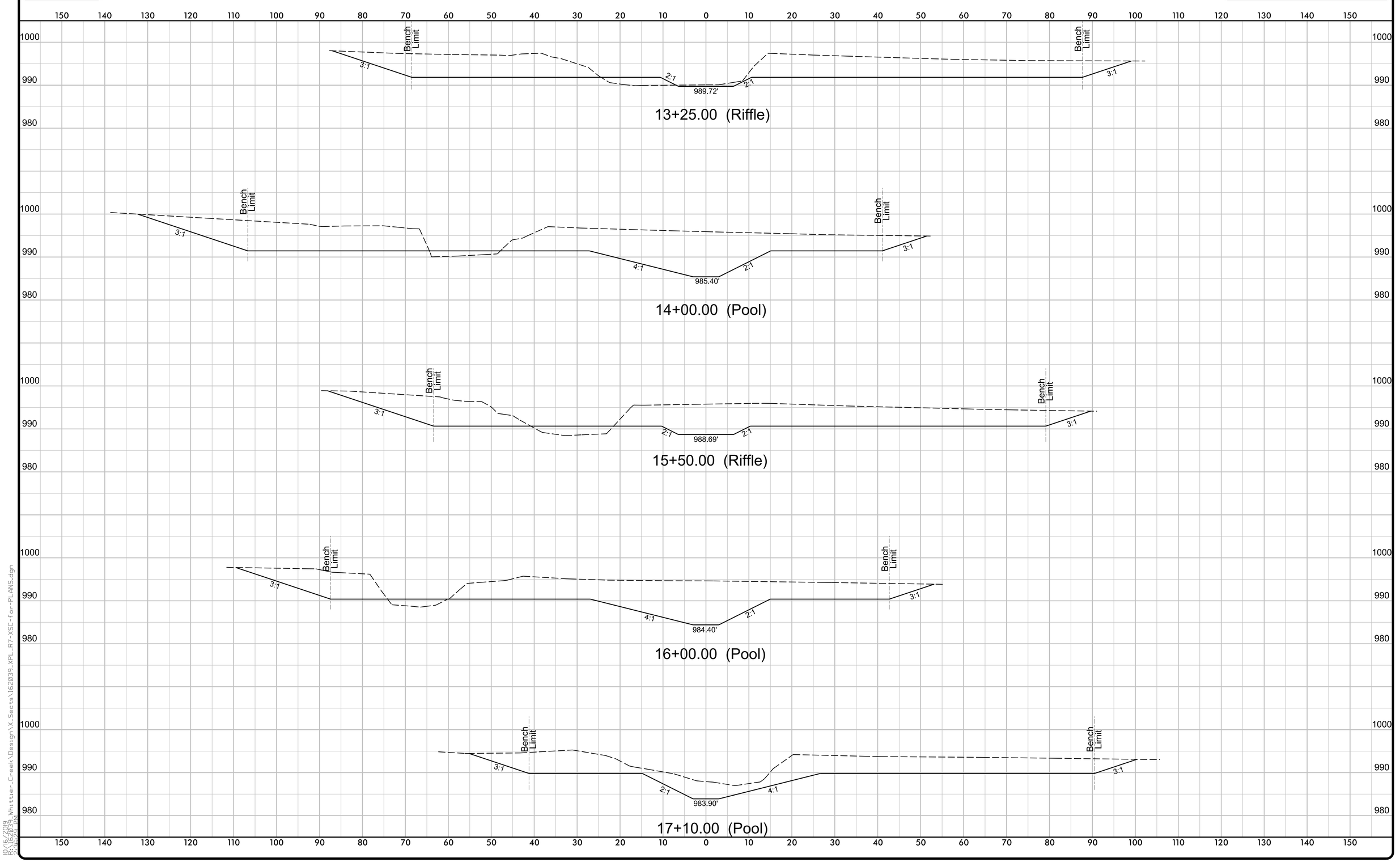
STA. 17+87.56
EL=992.00

15+00 16+00 17+00

REACH 7 CROSS-SECTIONS

BAKER PROJ. REFERENCE NO.	SHEET NO.
162039	13

0 5 10



REACH 7 CROSS-SECTIONS

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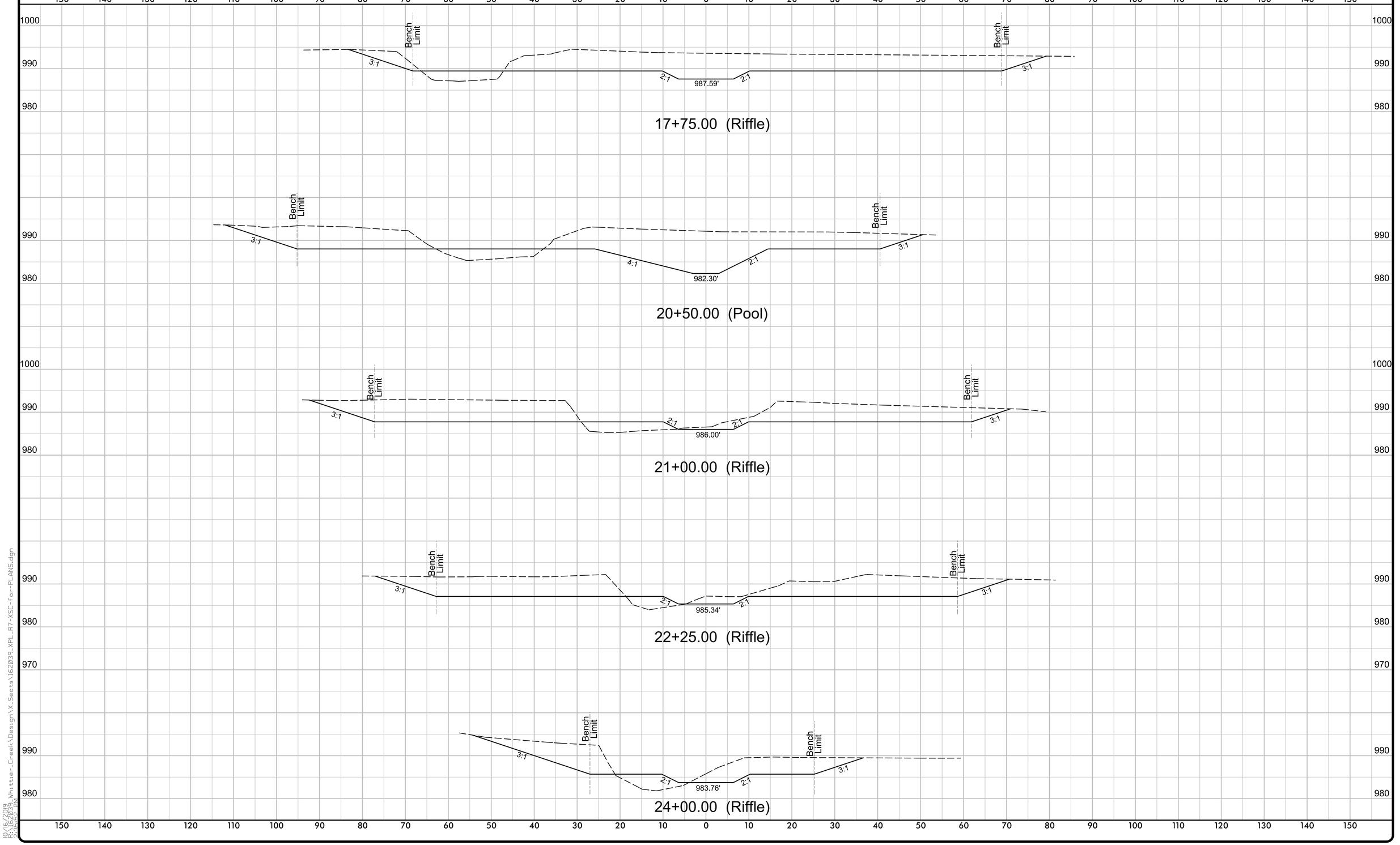
0 5 10



17+75.00 (Riffle)

20+50.00 (Pool)

21+00.00 (Riffle)

22+25.00 (Riffle)

24+00.00 (Riffle)

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MATCH LINE – SEE SHEET 16

NAD 83

MATCH LINE – SEE THIS SHEET

MATCH LINE – SEE THIS SHEET

RIPARIAN PLANTING

WHITTIER CREEK
PLANTING PLAN

40 0 40 80
SCALE (FT)

3/6/2020
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BAKER PROJECT REFERENCE NO.	SHEET NO.
162039	16

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NAD 83

10+00
11+00
12+00
13+00
14+00
15+00
16+00

EXCAVATE BANKFULL BENCH

ROCK HILL CHURCH ROAD
N/A WIDTH 50 FOR SR-1914 Pro.604 & 606

SURRY-YADKIN E.M.C. UTILITY LINE

MATCH LINE – SEE SHEET 15

RIPARIAN PLANTING

WHITTIER CREEK PLANTING PLAN

40 0 40 80
SCALE (FT)

2/26/03

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STATE	BAKER PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
NC	162039	EC-1	8

NORTH CAROLINA
DIVISION OF MITIGATION SERVICES

EROSION & SEDIMENTATION CONTROL PLAN

LOCATION: ROCK HILL CHURCH ROAD & NURSE ROAD

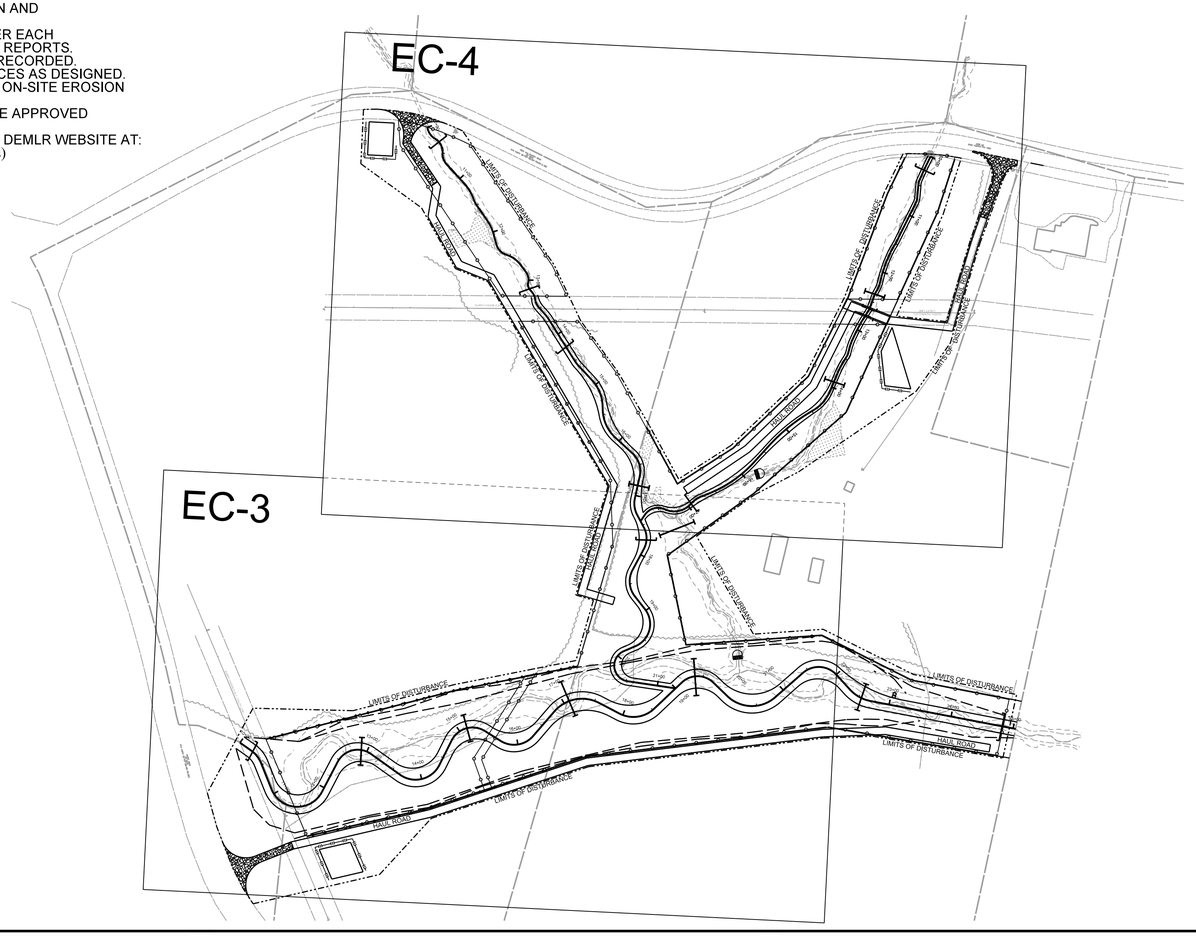
TYPE OF WORK: STREAM RESTORATION & ENHANCEMENT

PROJECT: 162039

WHITTIER CREEK

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. 100020

GRAPHIC SCALES

40 0 40 80
PLANS

THIS PROJECT CONTAINS EROSION CONTROL PLANS FOR ALL PHASES OF CONSTRUCTION.

TOTAL DISTURBED AREA = 11 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:
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-1054

LETTING DATE:

KATHLEEN M. MCKEITHAN, PE
PROJECT ENGINEER

PROJECT ENGINEER

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SIGNATURE: P.E.

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.

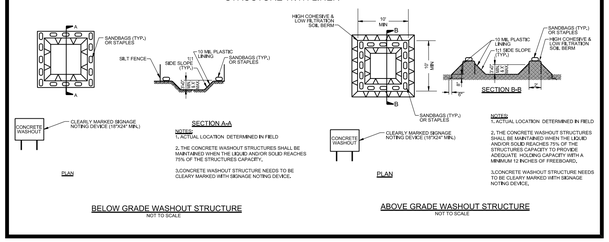
PORTABLE TOILETS

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.
157329	EC-1A

PROJECT ENGINEER

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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

NCDMS ID NO. 100003

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Michael Baker INTERNATIONAL
Michael Baker Engineering Inc.
8000 Regency Parkway, Suite 600
Cary, NORTH CAROLINA 27518
Phone: 919.463.5488
Fax: 919.463.5490
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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.

NCG01 SELF-INSPECTION, RECORDKEEPING AND REPORTING

EFFECTIVE: 04/01/19

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PROJECT REFERENCE NO.	SHEET NO.
162039	EC-2

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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

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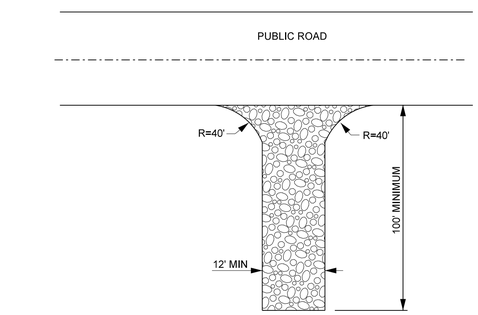
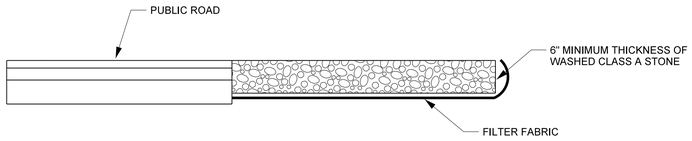
TEMPORARY GRAVEL CONSTRUCTION ENTRANCE /EXIT

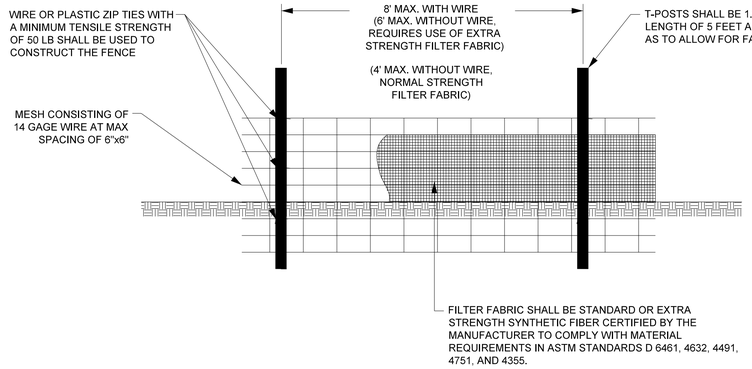




NOTES:

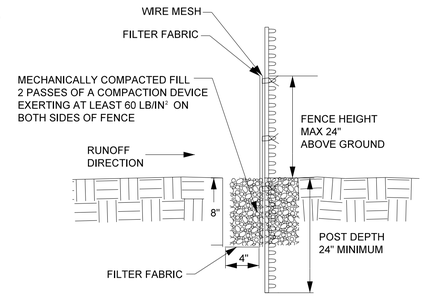
SPECIFICATION NO. 6.06 - CONSTRUCTION ACCESS "N.C. EROSION AND SEDIMENT CONTROL PLANNING AND DESIGN MANUAL MARCH 2009"

TEMPORARY SILT FENCE

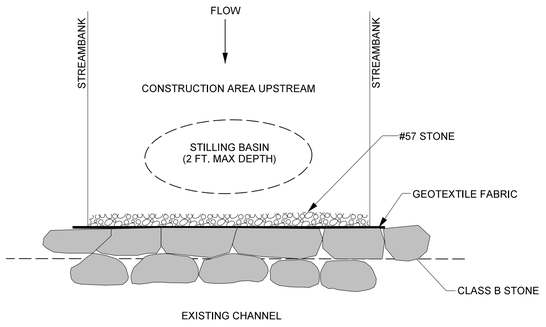


NOTES:
1. AVOID JOINTS, UNAVOIDABLE JOINTS MUST HAVE 4' OF CLOTH OVERLAP AND SHOULD TIE INTO THE NEXT ADJACENT POST.
2. PLACE ON CONTOUR EXCEPT ENDS WHICH SHOULD BE 1' ABOVE GRADE TO PREVENT CUT AROUND.
3. WRAP APPROX. 6" OF FABRIC AROUND END POSTS AND SECURE WITH TIES.
4. REMOVE ONCE AREA IS STABLE.
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.

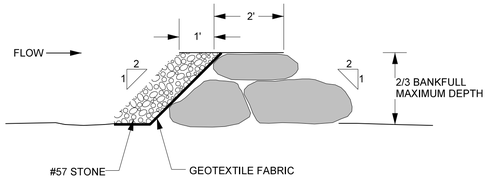
MAINTENANCE NOTES:
1. INSPECT SEDIMENT FENCES AT LEAST ONCE A WEEK AND AFTER EACH RAINFALL. MAKE ANY REQUIRED REPAIRS IMMEDIATELY.
2. SHOULD THE FABRIC OF A SEDIMENT FENCE COLLAPSE, TEAR, DECOMPOSE OR BECOME INEFFECTIVE, REPLACE IT PROMPTLY.
3. REMOVE SEDIMENT DEPOSITS AS NECESSARY TO PROVIDE ADEQUATE 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



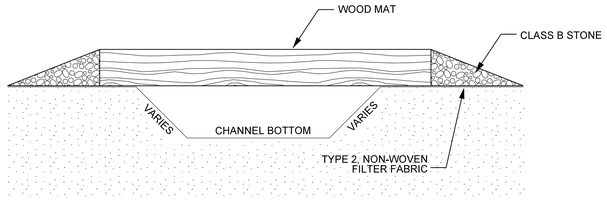
PLAN VIEW



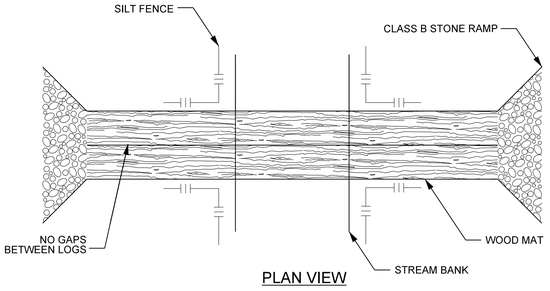
CROSS SECTION

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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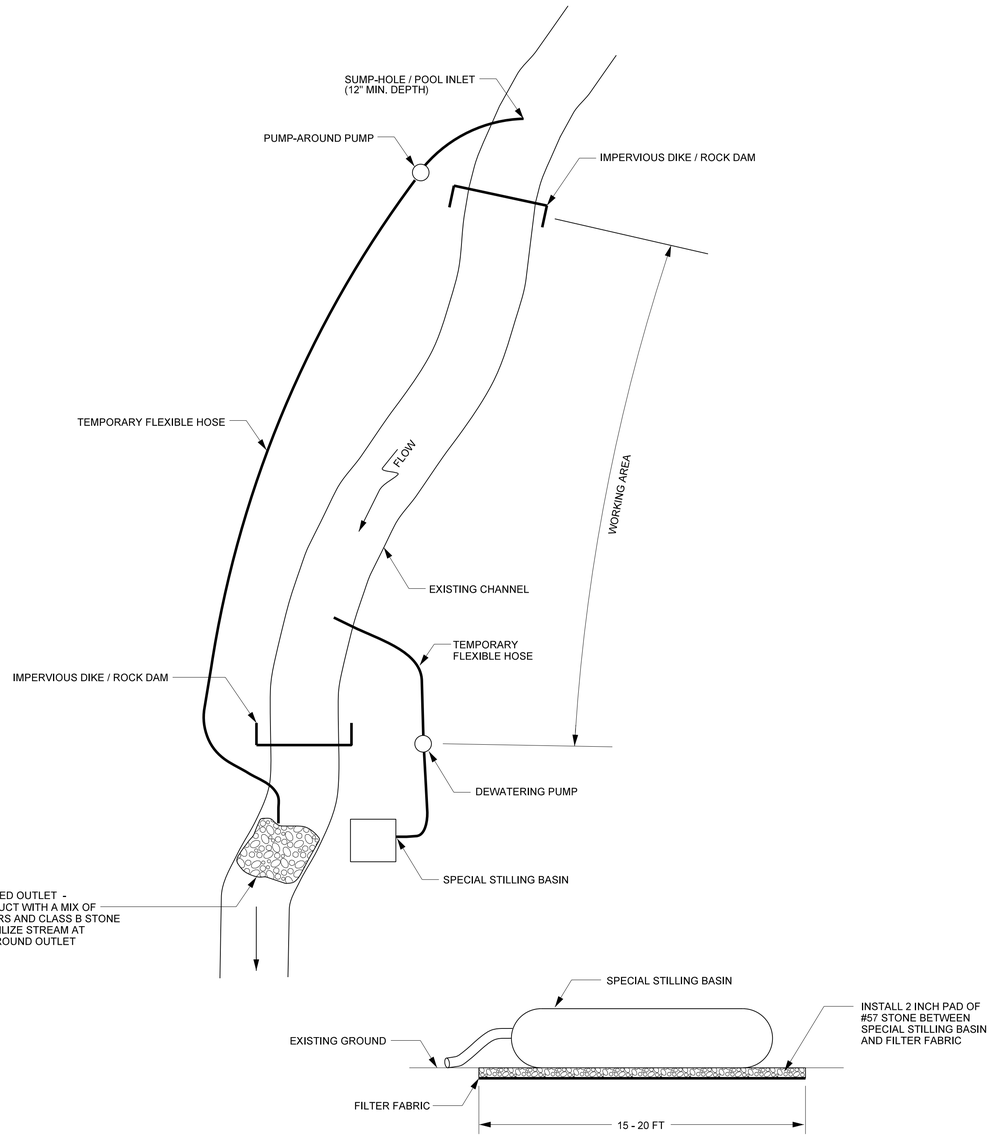
TYPICAL PUMP-AROUND OPERATION



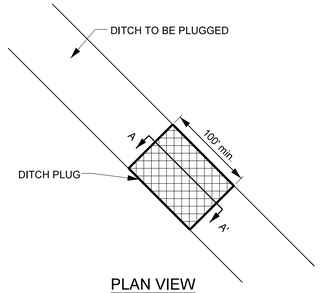
SEQUENCE OF CONSTRUCTION FOR TYPICAL PUMP-AROUND

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.

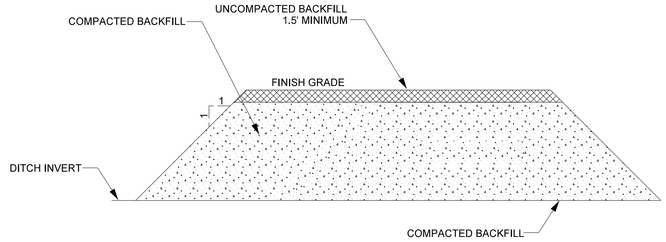
NOTES:

1. EXCAVATION SHALL BE PERFORMED IN ONLY DRY SECTIONS OF CHANNEL.
2. IMPERVIOUS DIKES SHOULD BE USED TO ISOLATE WORK AREAS FROM STREAM FLOW.
3. THE CONTRACTOR SHALL NOT DISTURB MORE AREA THAN CAN BE STABILIZED IN ONE WORKING DAY.
4. THE PUMP-AROUND PUMP SHOULD ADEQUATELY CONVEY BASEFLOW CONDITIONS OF THE STREAM.

DITCH PLUG



PLAN VIEW

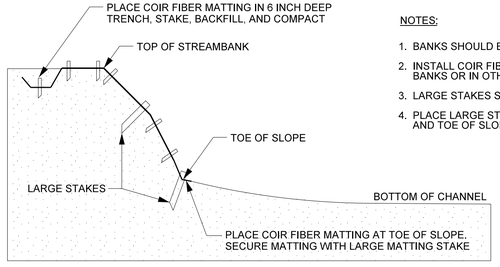


SECTION A - A'

NOTES:

1. COMPACT BACKFILL USING ON-SITE HEAVY EQUIPMENT IN 10 INCH LIFTS.
2. FILL DITCH TO TOP OF BANKS OR AS DIRECTED BY ENGINEER.

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

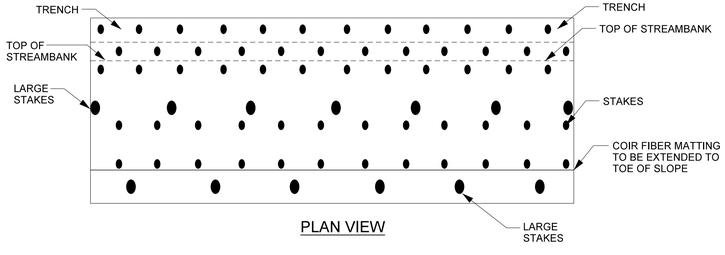
THE WOOD STAKE SHALL HAVE THE FOLLOWING DIMENSIONS:

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)

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)



PLAN VIEW

PROJECT REFERENCE NO.	SHEET NO.
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Michael Baker INTERNATIONAL
Michael Baker Engineering Inc.
8000 Regency Parkway, Suite 600
Cary, NORTH CAROLINA 27518
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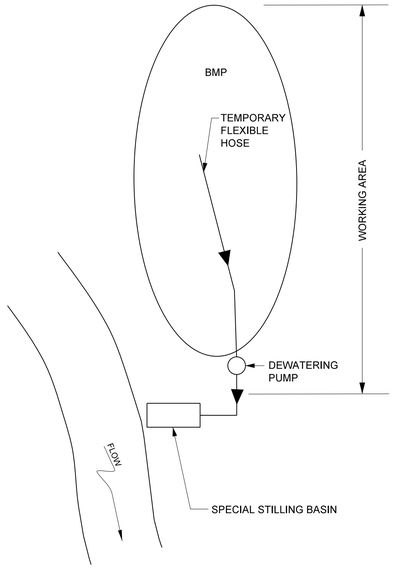
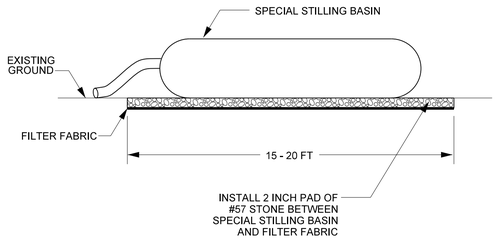
NCDMS ID No. 100020

2/26/03

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.
162039	EC-2B

PROJECT ENGINEER

PROGRESS DRAWING
FOR REVIEW PURPOSES ONLY
DO NOT USE FOR CONSTRUCTION

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

NCDMS ID No. 100020

STATE OF NORTH CAROLINA
DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
RALEIGH, N.C.
1-12

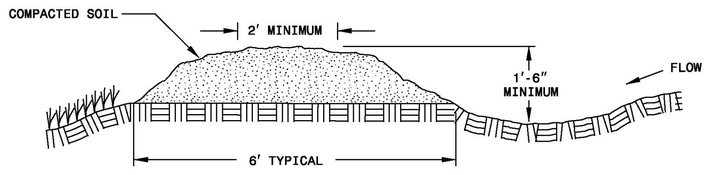
ENGLISH STANDARD DRAWING FOR
TEMPORARY DIVERSION

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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2/26/03

BAKER PROJECT REFERENCE NO.	SHEET NO.
162039	EC-3

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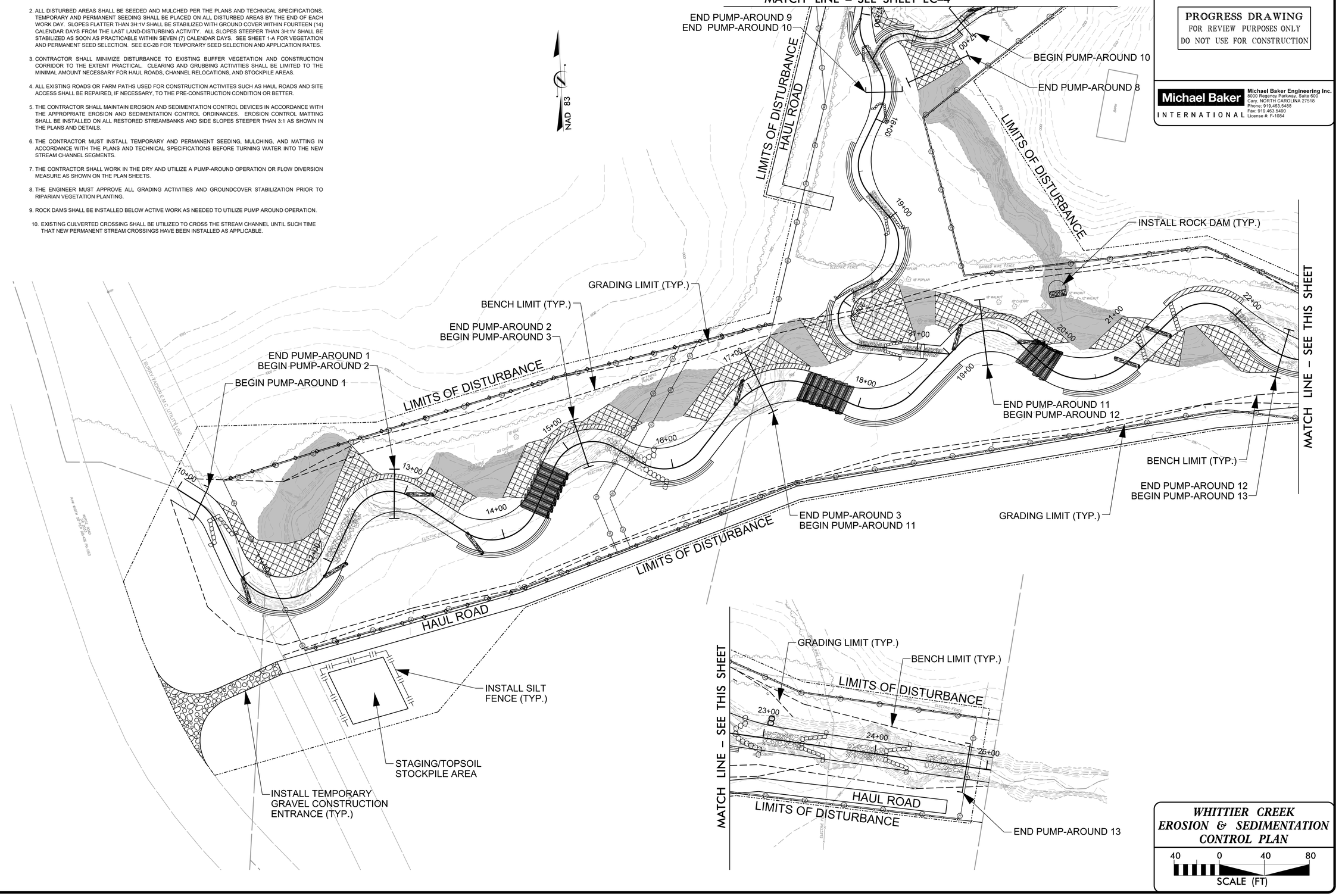
Michael Baker INTERNATIONAL
Michael Baker Engineering Inc.
8000 Regency Parkway, Suite 600
Cary, NORTH CAROLINA 27518
Phone: 919.463.5488
Fax: 919.463.5490
License #: F-1084

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.



WHITTIER CREEK
EROSION & SEDIMENTATION CONTROL PLAN

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SCALE (FT)

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BAKER PROJECT REFERENCE NO.	SHEET NO.
162039	EC-4

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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

2/26/03

STAGING/TOPSOIL STOCKPILE AREA

INSTALL TEMPORARY GRAVEL CONSTRUCTION ENTRANCE (TYP.)

BEGIN PUMP-AROUND 4

INSTALL SILT FENCE (TYP.)

HAUL ROAD

LIMITS OF DISTURBANCE

END PUMP-AROUND 4

BEGIN PUMP-AROUND 5

END PUMP-AROUND 5
BEGIN PUMP-AROUND 9

MATCH LINE – SEE SHEET EC–3

BEGIN PUMP-AROUND 6

INSTALL TEMPORARY GRAVEL CONSTRUCTION ENTRANCE (TYP.)

END PUMP-AROUND 6
BEGIN PUMP-AROUND 7

INSTALL STREAM CROSSING OVER
PROP.16' - 48" RCP
PROP. 2 - 16' - 15" CMP

END PUMP-AROUND 7
BEGIN PUMP-AROUND 8

STAGING/TOPSOIL STOCKPILE AREA

INSTALL SILT FENCE (TYP.)

INSTALL ROCK DAM (TYP.)

NAD 83

EROSION & SEDIMENTATION CONTROL NOTES:

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WHITTIER CREEK EROSION & SEDIMENTATION CONTROL PLAN

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SCALE (FT)

3/19/2020
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