

Blair Creek Mitigation Project

Mitigation Plan – FINAL

Clay County, North Carolina

Hiwassee River Basin: 06020002

DMS Project ID No. 100047, DEQ Contract No. 7415, DMS RFP #16-007278

USACE Action ID No. SAW-2018-00449, DWR# 20201094



Prepared for:

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

January 2021



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

November 30, 2020

Regulatory Division

Re: NCIRT Review and USACE Approval of the NCDMS Blair Creek Mitigation Site / Clay Co./
SAW-2018-00449/ NCDMS Project # 100047

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 Blair Creek Draft Mitigation Plan, which closed on October 11, 2020. These comments are attached for your review.

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

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

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

Sincerely,

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

Enclosures

Electronic Copies Furnished:

NCIRT Distribution List

Matthew Reid, Paul Wiesner—NCDMS

Scott King—Michael Baker Engineering Inc.

January 15, 2021

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 Blair Creek Mitigation Plan Draft review
Blair Creek Mitigation Project, Clay County
USACE AID# SAW-2018-00449
Hiwassee River Basin: 06020002
DMS Project #100047, DEQ Contract #7415

Ms. Browning:

Please find enclosed our responses to the NC Interagency Review Team (NCIRT) Mitigation Plan Review comments dated November 9, 2020 in reference to the Blair Creek Mitigation Project's Draft Mitigation Plan. We have revised the Draft document in response to the referenced review comments as outlined below.

WRC Comments, Andrea Leslie:

1. The 1990 third approximation of the Natural Communities of North Carolina is used to develop a planting plan – the most recent fourth approximation (Schafale's 2012 Natural Communities of NC) should be used instead. We recommend finding a nearby reference reach and wetland for the vegetation community and using these to tailor the planting list.

Response: Michael Baker has revised the document to include the use of the fourth approximation. At the time this plan was prepared we were not aware of an accessible, reference quality wetland site, so our species selection approach focused on using ecosystem and plant community guidance documents as well as past planted species that provided project success. However, we generally agree with the suggested approach and will continue to look for reference plant community information for this geographic area. Recently we were made aware of a wetland in Clay County that has been studied for several years and we have contacted these researchers to obtain a plant community list for the site. This information will be used to evaluate our planting list and make adjustments as appropriate. At this wetland site is an endangered pitcher plant and we will be asking the USFWS to consider using the Blair Creek restoration site to start another population in the area if that is a goal for this species.

2. The planting list includes Yellow Birch, which is a higher elevation species, and we recommend replacing this with Sweet Birch. Willow Oak, Overcup Oak, Cherrybark Oak, and Swamp Chestnut Oak are all piedmont species, and unless they are found in the area, they should be replaced with montane species.

Response: The site essentially exists in an intermediate, transitional zone between the upper piedmont and the lower blue ridge, within the Broad Basins Ecoregion described as an intermountain basin area of low mountains and rolling foothills with broad valleys. The site elevation places it at the lowermost end of the elevation range for this ecoregion. Thus, the planting plan was intended to reflect the transitional

nature of the ecoregion and includes a mix of species from both communities. However, Michael Baker acknowledges the primarily piedmont location of the cited oak species and has removed them all from the planted species list as requested. Consequently, we have both increased the percentages of some of the currently listed species and also substituted with small percentages (5%) of more appropriate mountain species in order to maintain the broad diversity of the plan.

Additionally, sweet birch was added to the planting plan as recommended. Michael Baker debated the relative merits between planting yellow birch vs. sweet birch. Yellow birch was originally selected as it is clearly more suited for wetter conditions and is tolerant of poor drainage. While it may typically be found at higher elevations it is described in its NRCS Plant Guide as 'reaching its maximum importance in the transition zone between low elevation forests and montane forests' and can be found 'along stream banks and in swampy woods.' Thus, it seemed a good fit for the project and has been kept at a low percentage (5%) in the wetland planted zone.

3. Silver maple exists on site and as it will likely come in on its own, we recommend that it be eliminated from the plan or kept to a very small proportion (5%) of planted stems on site.

Response: Michael Baker has reduced silver maple to 5% as suggested.

EPA Comments, Todd Bowers:

1. This site has many good features and I have no issues with the stream restoration approach in general. However, one of the biggest shortcomings of the site plan is the width of the riparian zone and lack of wetland inclusion which severely limits the site functional uplift potential. Understandably, due to either cost or landowner constraints, the provider is adhering to the minimum standard of a 30-foot wide riparian buffer, however there are many reasons why this minimum width is ecologically unsuitable for this site.

Response: Given the overlapping nature of many the following comments (and Michael Baker's subsequent responses), Michael Baker has provided a single summary response after comment #7 below.

2. The 30-foot wide buffer (based on top of bank) creates some issues with continued connection and protection of adjacent wetlands. Jurisdictional wetlands outside of the CE will remain under threat of agricultural use and runoff which will diminish the functional lift of the wetlands being enhanced or restored within the CE.

3. A wider riparian buffer of 50 feet would be less susceptible and more effective to deal with nutrient rich runoff from the adjacent agriculture fields. It would also increase the effectiveness to filter runoff from livestock if the landowner decides to introduce them to the fields.

4. The thin riparian buffer width is more susceptible to invasive species encroachment as the border to interior area ratio remains small and easily invaded.

5. With a wider riparian buffer, more of the adjacent wetland function can be enhanced and protected by the stream restoration work to restore floodplain connectivity to those wetlands currently outside the proposed CE.

6. A wider riparian buffer would be more resilient to beaver encroachment. The provider has stated that beaver and dams will be removed during the monitoring period. This is understandable to allow the streams to stabilize and vegetation to thrive without the continued threat of herbivory from beaver. Stream credits can also be released for mitigation purposes during this period. However, beavers will almost certainly return to the site following the monitoring period and continue to be an issue into long-term management. I recommend that the provider consider a site plan that will be more beaver resilient beyond the 7-year monitoring period. This would include adding a significantly wider riparian buffer to the streams and a wider conservation easement to include more existing and potential wetland.

7. The site plan would be enhanced by wider riparian buffers in including the adjacent existing wetlands and by planting the hydric soils contained in the lower field between the North Fork Lower Reach and the South Fork of Blair Creek. According to the soil survey and associated borings there is significant potential for restoring wetland function to this area (Arkaqua loam mapping unit). Converting this area into wetland and inclusion in the conservation easement would make the site more resilient to flooding either by storms or by backwater from Blair Creek caused by beaver.

Summary Response: Michael Baker understands and shares the IRT's desire for wider buffers, but please consider that the final easement boundary is what was originally proposed and negotiated with the landowner, which was prior to the addition of wetland credits being considered for the site after the IRT field meeting. We *did* approach the landowner about expanding the width of the buffers, but he was not interested and could not be convinced. An expansion would have provided more wetland credits and so would clearly have been to our benefit as well as the IRT's, so we made a sincere effort to expand the buffer and wetland area.

Based on many of the IRT's comments, Michael Baker would also like to emphasize that the project as currently designed unquestionably provides for functional uplift and improved conditions to a degraded stream and wetland system. It will restore ~4,300-ft of cold-water stream, reconnecting it to the floodplain, stabilizing eroding banks, improving bedform diversity and habitat, while also restoring, rehabilitating, or enhancing ~6-ac of immediately adjacent riparian buffer. The wetlands make up approximately 60% of the total easement area, making for a particularly valuable and highly effective riparian buffer capable of significantly reducing groundwater pollutant loading. Michael Baker certainly considers the addition of these wetlands to be an outstanding net benefit to the site and hopes that all the positive qualities of the project aren't lost amidst the discussion of the additional wetlands that were not obtainable. We agree that wider buffers are better, but this is not always possible given that you are working with private individuals who feel they are giving up a lot to do what is required.

8. Page 3-5: Recommend including mention of the on-site rain gauge as it was on page 7-4.

Response: As Section 3 specifically pertains to the site Existing Conditions, Michael Baker prefers to keep discussion of any proposed gauges to be installed to the later monitoring sections of the report.

9. Page 6-4: Where are riparian buffers "in excess of 30 feet" on R1 other than on the inside bends of the restored meandering stream? Riparian buffer width should be determined based on stream belt width which is barely established by the site plan. I recommend a minimum of a 50-foot riparian buffer based on restored stream beltwidth. This will also allow random placement of square 10 x 10 m vegetation plots in any location within the conservation easement.

Response: In the process of streamlining easement boundary corners around the stream design beltwidths, the final easements almost always extend out past the required widths in numerous locations on a project, though usually by only a few feet. That is what that statement is referencing. The comment regarding the overall project buffer width has been addressed above.

10. Page 6-5/Table 6.2a: The contributing drainage area is listed (erroneously) in square miles and not acres.

Response: The design tables have been corrected to show the drainage areas in acres, not square miles. Both units were used on Figure 6.

11. Page 6-6: Sinuosity would not be constrained to 1.14 if the conservation easement was wider and the riparian buffers were 50 feet wide from the stream beltwidth.

Response: That assessment is correct but again, the easement has been finalized at its present boundary.

12. Page 6-6: Where are riparian buffers “in excess of 30 feet” on R2 other than on the inside bends of the restored meandering stream? Riparian buffer width should be determined based on stream belt width which is barely established by the site plan. I recommend a minimum of a 50-foot riparian buffer based on restored stream beltwidth. This will also allow random placement of square 10 x 10 m vegetation plots in any location within the conservation easement. A wider buffer will enhance the beaver resiliency of the lower end of R2 as well.

Response: Please see previous response to comment #9.

13. Page 6-7/Table 6.2b: The contributing drainage area is listed (erroneously) in square miles and not acres. Recommend a proposed Bank Height Ratio of 1.0.

Response: Baker has corrected the drainage areas in the design tables to show them in acres. BHR was corrected to 1.0, the 1.1 was simply a typographical error.

14. Page 6-8: Where are riparian buffers “in excess of 30 feet” on R3 and UT1 other than on the inside bends of the restored meandering stream? Riparian buffer width should be determined based on stream belt width which is barely established by the site plan. I recommend a minimum of a 50-foot riparian buffer based on restored stream beltwidth.

Response: Please see previous response to comment #9.

15. Page 6-13: I recommend expanding the conservation easement to include adjacent wetlands, hydric soils with wetland inclusion and buried hydric soils. Less than half of the existing wetlands in the vicinity (in the floodplain) of the site are being protected by the CE. None of the proposed wetlands included in the CE for credit have an upland buffer component and many have boundaries that extend well outside of the proposed CE.

Response: Please see summary response for comment #7 above.

16. Page 6-15: Planting dates are well defined and suitable. Recommend not planting beyond the date listed unless an emergency situation exists and proper MY1 monitoring can continue 180-days post planting.

Response: Michael Baker agrees with and appreciates this clarification.

17. Page 6-16: Excellent planting list with lots of diversity. Recommend remaining flexible with species and percentages in case primary desired species are not available at planting.

Response: Thank you. One of Michael Baker’s intentions behind the diverse plant list with a wide variety of species is to allow for exactly that situation, were we run into a lack of availability at the time of planting.

18. Page 6-18: Recommend designing a site that can accommodate beaver or make it resilient to beaver activity rather than making it a site constraint.

Response: Michael Baker is unsure what is exactly meant by beaver resiliency or what that might specifically entail in a restoration design (outside of the aforementioned wider buffers) but would be happy to address this on future projects after further discussion on the subject with the IRT. From our experience beavers would cause a loss of trees and damage to stream banks from burrowing; however, we will follow guidance from the IRT on what is desired.

19. Page 7-3: Make sure that vegetation plot species are noted in the baseline/as-built report following planting to determine that the desire species were installed and at the proposed percentages.

Response: Michael Baker will make every attempt to identify each of the planted species at the time of veg plot installation for this exact purpose.

20. Page 8-1: Recommend adding a basic measurement of large woody debris in each restored reach to demonstrate that the goal of improving aquatic habitat is being achieved. No connection to performance standards is recommended at this time but some data to demonstrate that the objective of “increasing woody debris” is carried out and that the functional lift of aquatic habitat is realized.

Response: In lieu of any formal assessment methodology for such a feature, Michael Baker can readily demonstrate an increase in the amount of large woody debris in the channel by virtue of the sizable number of woody structures installed in-stream or along the banks as root-wads or toe-wood. Such woody material is entirely absent in the existing condition.

DWR Comments, Erin Davis:

1. Section 3 – I may have missed it, but please discuss the pond east of R1 and any hydrologic connection it may have with the project. If there is a connection, please discuss how it will tie-in to the proposed restoration approach in Section 6.0. Is this feature the same as the old quarry discussed in the IRT meeting minutes?

Response: The pond is the same feature as the old quarry. The quarry was created by the DOT in past years to provide road building material. Once this was completed the site was flooded by ground water seepage and perhaps a spring. There are periods of time when evapotranspiration or lowered ground water eliminate any outflow from the pond. During wet periods there is a small amount of runoff through an existing 6” pipe that releases water onto the floodplain, where it flows downhill to the stream. During construction this “overflow channel” will be extended to the new channel and stabilized with stone. Flow will continue to run into the stream over this small stabilized channel. This information was added to 3.1.1 and is shown on the plan sheets.

2. Page 3-7, Section 3.1.2 – Was there discussion with the utility company about the feasibility of relocating the utility line to run along the driveway in an effort to reduce site fragmentation and increase the potential functional uplift?

Response: There was no discussion with the utility company about relocating the power line. The conservation easement has already been purchased and this break was included in the original easement arrangement as shown in the proposal. The break represents a very small portion of the overall reach and will still have a full Priority 1 Restoration approach conducted for the stream section within it, reconnecting the reach to the floodplain and stabilizing the currently eroding banks. The buffer will still be fully vegetated and planted with native shrubs and grasses, but not trees. Yes, the utility company will still have the right to manage that vegetation through periodic cutting and/or spraying but they will not eradicate all vegetation, just maintain it as a short shrub system, which is still a valuable type of ecosystem for a variety of plant and animal species that do not thrive under forested conditions.

3. Page 3-6, Section 3.1.2 (and Section 4.0) – Is any DOT work anticipated in the vicinity of the project? Regarding future potential watershed and adjacent area land use changes for design consideration and encroachment risk, consultation with local/regional planning documents and/or agencies is encouraged.

Response: No known DOT work is anticipated in the vicinity of the project, beyond the ongoing upgrade to NC-69. Baker will attempt to conduct additional agency coordination in the future for any potential changes to the watershed.

4. Page 6-5, Table 6.2a (and Table 6.2b) – Should the drainage area units be square miles rather than acres?

Response: These design tables are newly prescribed by DMS (as of their October 2020 template) and the units for drainage area are requested in acres. Baker originally had the design values listed in square miles but has corrected that (see previous comment #10 and response above). Both units were used on Figure 6.

5. Page 6-18, Section 6.8 – Please provide more discussion regarding beaver activity. Based on past activity, this is significant concern in maintaining long-term function uplift. Please identify specific risks and potential damage to the project related to beaver activity. Was beaver resiliency a design consideration? Have there been long-term management discussions with the landowner(s) and stewardship?

Response: Baker has proposed to monitor activity and remove any beaver found on site, and to repair damage they may cause. Additional text listing specific examples of damage has been added to the beaver section. Stewardship has not brought up any modifications to this rather standard approach in recent discussions specifically about beaver issues. Baker is unsure what is exactly meant by beaver resiliency or what that might specifically entail in a restoration design but would be happy to address this on future projects after further discussions with the IRT on the subject. The landowners have been managing the beaver on their own for years now and will be free to continue removing encroaching individuals and their dams in the future as this activity is allowed within the restrictions of the conservation easement. If the IRT is changing their thoughts on beaver activity and management at mitigation sites, Michael Baker will be glad to discuss alternatives as long as they do not cause impacts to existing cooperating landowners.

6. Page 7-3, Section 7.2 –

a. DWR does not support early termination of monitoring activities.

Response: Baker acknowledges DWR's position on this issue.

b. Please identify the specific overstory species being requested for exemption of the vigor standard. DWR is ok exempting the shrub species proposed.

Response: None of the overstory species are being requested for exemption, only the understory/shrub species.

7. Page 8-2, Section 8.0 – In the baseline monitoring report, please include red-line drawings showing construction deviations from the final mitigation plan design sheets, including species substitutions and/or quantity changes.

Response: For the baseline monitoring report, Baker will certainly provide red-line drawings on the as-built construction sheets and will note any species changes.

8. Page 10-1, Section 10 – DWR recommends annual inspections to confirm compliance with easement conditions.

Response: In practice, during the monitoring period we routinely inspect for easement violations with every site visit. This means that inspections are done at least annually but normally more often. Sites with many gauges to download (particularly wetland wells) are typically visited more frequently than others and thus get additional inspections. However, we understand this section 10.0 to deal with long-term management, that is management beyond the monitoring period and after closeout. The frequency of monitoring at that point is not within the responsibility of Baker but rather the NCDEQ Stewardship Program.

9. Figure 4 – What does the blue diamond indicate?

Response: The light blue diamonds in Figure 4 represent field drain pipe inlets and outlets, as noted in the Legend. However, if they are not shown there, it might be an issue with the printed pdf in the hardcopy or with some aspect of the digital file transfer (zip-file problems), as happens from time to time. We will check and correct the issue if this is the case.

10. Figure 11 –

a. DWR requests an additional veg plot and groundwater well within the proposed wetland rehabilitation area.

Response: Baker has added an additional veg plot and groundwater well within the proposed wetland rehabilitation area.

b. Based on the figure scale and icon size, it's difficult to determine approximate distances from the proposed well locations to easement boundary and stream bank lines. Since wetland credit extends from easement boundary to stream bank, DWR requests that a representative number of wells be located close to the easement boundary and stream bank edges.

Response: Baker will ensure that the installed well locations are distributed across the floodplain in a representative fashion as described.

c. Please indicated proposed fix photo points. In addition to veg plots and cross sections, DWR requests photo points at the proposed stream crossings.

Response: Baker is certainly aware that the IRT wants to see routine photographs taken of crossings and culverts on all sites. We have even begun to show them retroactively on projects in the middle of the monitoring phase. Baker will absolutely collect annual photos of these features for the monitoring reports and will show all photo-point locations with the as-built report.

11. Appendix K – Why weren't pre-construction baseline groundwater wells installed in proposed wetland credit areas as Mac suggested? With over two years between the post contract walk and draft mitigation plan submittal, it would have been helpful data to have for this review.

Response: Wells have since been installed and will capture the most important early-spring water table fluctuations in 2021, the results of which will be provided in the as-built report.

12. Sheet 1-A – Please update the legend symbols to be consistent with provided details (e.g. log jam).

Response: We updated these symbols and or removed details that did not apply to this project.

13. Sheet 2 – Please indicate where bankfull benches are proposed and confirm that all constructed benches will be greater than 30 feet wide as noted. Proposed wetland credits generated within the bench areas are being requested, correct? Beyond berm removal, what is the anticipated cut to create the benches?

Response: Because this project is using a Priority I restoration approach, there will only need to be benches constructed at the beginning of R1 and R2 and to some degree at the end of the project where the bankfull elevation transitions to the existing ground. In between these transition areas the existing valley floor will serve as the floodplain. In the transition area at the tops of R1 and R2 the stream bed will have a low slope as the channel bottom rises so that the valley floor is at the bankfull elevation. Over this length grading to provide for a bankfull floodplain will be done as needed. These transitions will need to go from the existing ground at the beginning of the project to a point that provides the bankfull elevation over a gentle slope (10:1 at beginning and end and 5:1 along right and left bank). The profile sheets best

demonstrate where this transition will take place. These transitional zones where benching will be done will not be 30 feet in width since transitional slopes will also have to be established between existing ground along the easement and the excavated bench. Sheet 2 has been revised accordingly. However, the width of these transitional zones will be maximized to the extent possible. Beyond these transition zones the valley floor will be the stream floodplain and will be at least 30 feet in width. There may be some minor cut and fill along the floodplain to ensure the maximum width.

And yes, there are credited wetlands proposed within these transitional zones where benching will be performed. However, if the IRT is concerned about cutting down into dense, nutrient-poor subsoil that might make for poor wetland areas, be advised that the soils along the floodplains of the project reaches were observed to be quite deep, with clearly hydric and loamy soils at depths equal to the proposed benching.

14. Sheet 2A –

- a. Anecdotally we have been seeing some sills/steps with drops where aquatic passage is a concern. During construction please continue to have aquatic passage as a consideration in structure installation.

Response: We are always mindful of aquatic passage as we construct stream structures and try to keep drops to 6 inches or less.

- b. Please call out the proposed location(s) of the plunge pool.

Response: The only application of the plunge pool detail is at the outlet of the DOT pipe on Cherry Road for UT1. This will be called out.

15. Sheet 2D –

- a. The permanent stream crossing does not show the floodplain pipes as described in the plan. (Same for Sheet 2F Boulder Headwall)

Response: The Permanent Stream Crossing detail has been changed to show the floodplain pipes.

- b. Please call out the proposed location(s) of the outlet protection.

Response: This detail has been removed.

16. Sheet 2E – Based on the fence and gate details, I'm assuming that at least a section of the project will be fenced. Please provide a proposed fencing plan with approximate gate locations.

Response: There is no fencing on this project since there are no livestock. These details have been removed.

17. Sheet 2G – Please include a typical detail for the proposed log cross vane.

Response: This detail has been added.

18. Sheet 4 –

- a. Can the proposed wetland re-establishment, rehabilitation and enhancement areas please be shown on a separate sheet set. It is difficult to see the existing contour, proposed contour and limit of disturbance lines under all of the hatching.

Response: While Baker is certainly sympathetic that it can be a bit challenging to read the plans in some locations with the various wetland areas shown, we have found that it often proves invaluable during construction to have the wetlands clearly shown on the main plan sheets. For example, it is particularly helpful in working with the contractors to avoid impacts to existing wetlands.

b. The existing field ditches/swales indicated on Figure 4 are not shown on the design sheets. Please provide call outs and/or shading to indicate proposed filling. Also, please callout of the removal of the old bridge.

Response: The old bridge to be removed will be called out. Most of the low areas shown on Figure 4 as ditches/swales were already shown as filled or were no longer intercepting the channel since it is being moved. However, fill has been added to two additional low areas.

19. Sheet 6 – There appears to be a 6-inch PVC pipe entering the conservation easement (likely from the adjacent pond). Please confirm that pipe will be removed from the easement. Also, please indicate any proposed grading or treatment/structure for handling flow from the pond within the project area wetland and stream.

Response: A more thorough explanation about this pipe and proposed pond drainage has been added to the document in Section 3.1.1 and on the plan sheets (as explained in more detail in the response to the previous comment #1 above).

20. Sheet 8 – Please confirm the constructed riffle is sufficient bed stabilization for the utility easement break. A stabilized access path and/or bank treatment are not necessary to allow for vehicle crossing?

Response: There is no vehicle crossing planned by Baker for the easement opening on R2. This break in the easement is only to accommodate the utility line right of way. We believe that what is shown is sufficient to stabilize this section and continue the proposed improvements through the easement break. However, since this area is outside of the easement, we have no control over what the landowner might do there in time. They could install a crossing but based on our conversations they have no plans to do so.

21. In reviewing the IRT meeting minutes, DWR appreciates the inclusion of wetlands in the project's functional uplift. However, based on the existing wetland and extended hydric soil areas adjacent to the project, it's seems a lost opportunity that the buffer/CE wasn't widened to capture more wetlands and reduce or eliminate the sinuosity constraint noted for Reach R2.

Response: As previously noted, Baker understands and shares the IRT's desire for wider buffers, but please consider that the final easement boundary is what was originally proposed and negotiated with the landowner, which was prior to the addition of wetland credits being considered for the site after the IRT field meeting. We *did* approach the landowner about expanding the width of the buffers but he was not interested and could not be convinced. An expansion would clearly have been to our benefit as well as the IRT's so please do not feel that we didn't make a sincere effort to do so.

USACE Comments, Kim Browning:

1. In areas proposed for wetland rehabilitation along Reach R1 where the proposed functional uplift is to improve groundwater hydrology through priority 1 stream restoration and vegetation establishment, please place a wetland gauge in the rehabilitation area. Additionally, in order to show functional uplift there should be pre-construction groundwater wells installed to show baseline data and justify improved groundwater hydrology.

Response: An additional wetland groundwater well has been added to the wetland rehabilitation area. Pre-construction wells have now been installed and the data showing the results from the winter and spring of 2021 will be included with the baseline report.

2. Please move one of the veg plots to the wetland rehabilitation area along Reach R1.

Response: An additional veg plot has been added to the wetland rehabilitation area.

3. Section 3.2.3: The claim that the project will restore resource function such that features are rated as “high” in their respective assessments is admirable, but I think it should be a goal, rather than a statement. It will be interesting to see the results of the functional assessment at project close-out.

Response: Text has been revised in this section accordingly.

4. Section 6.8: I appreciate the inclusion of this section and the thought that goes into it. There is significant concern regarding the potential for beaver to impact the site given the recent beaver activity.

a. Given that there are currently field drains in adjacent wetlands, is there concern that the landowner will ditch/drain adjacent to the newly restored wetlands in the event that the agricultural fields become too wet to farm? This is particularly of concern due to the amount of wetlands adjacent to the conservation easement that were not captured in this project.

Response: The landowner is aware of the restrictions required by the conservation easement and is aware he cannot ditch, drain, or make any kind of alteration to the features within the easement area. The majority of the existing wetlands outside the easement are currently used for hay production and are only seasonally wet. It is anticipated that despite any increase in hydrology they will still be dry enough during the late spring and summer months to continue being used for hay.

b. I would also add discussion regarding culvert/bridge replacement on the upstream reaches of R1 and R2. **Response: To be clear, these crossings are located outside of the easement area. Text regarding the replacement or repair of the bridges at the upstream ends of R1 and R2 (used as driveways by the landowners) has been added to this section.**

c. Utility line maintenance would also be helpful to include in this section. **Response: Potential utility line easement violations are mentioned in the ‘Easement Encroachment’ section, which is what any utility maintenance that occurs within the conservation easement would be considered and would be addressed as described.**

5. Section 7.2: Vegetation monitoring will take place for seven years.

a. It’s acceptable to exclude the understory/shrub species from the height standard; however, the overstory species will still be subject to the vigor standards. Additionally, vegetative success will be measured based on the planted species. You may evaluate additional plant community indices, but the success of planted stems will be used to measure success.

Response: Baker understands, agrees with, and accepts all of the comments made here.

6. Figure 11: Please indicate the location of the rain gauge mentioned on page 7-4.

Response: The proposed rain gauge location has been added to Figure 11.

7. Table 8.1, page 8-2: Please add a height standard of 6’ for MY5 and 8’ for MY7 for vegetation. [Note: this question was revised by Kim Browning by email on 11/18/20]

Response: Table revised as requested.

8. Design Sheet 1A: General Note 3 should be corrected from 2019.

Response: The date in General Note 3 has been revised.

9. Is the utility crossing a ford crossing with pipes under? RCP pipes were mentioned but it was unclear if both crossings were culverts.

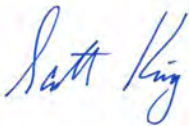
Response: The utility crossing in the upper portion of Reach 2 is just a break in the conservation easement to accommodate the powerline and utility ROW, and will not be a pipe culvert or ford crossing. Priority 1 Restoration is being conducted through this easement break. The text in this section has been revised for clarity. The RCP pipes mentioned will be installed in both the channel and floodplain at the existing culverted crossing located in the middle of Reach 1.

10. Page 6.6: Will the farm path within the buffer be removed and planted? If so, a veg plot should be in this area to address compaction concerns.

Response: The old farm path and its ford crossing are located within the conservation easement and will be removed during the restoration. The ford will be buried when that section of old channel is relocated while the adjacent path will be loosened, ripped/disked if necessary, and prepped with stockpiled topsoil as with all other sections of planted buffer. Haul roads and heavy equipment paths used during construction will be successfully ameliorated in this way and Baker is confident that the old path (which is only the width of a tractor) can be addressed this way too. All portions of the planted buffer will be required to meet the stated success criteria, and while Baker does not believe an additional veg plot is warranted for this narrow path (most plants identified in a plot would be outside the old path's alignment anyway), we will look closely at this area at the time of planting to confirm that soil compaction is not a concern here. Additionally, a veg transect can be conducted directly along the old path's location at MY1 to confirm plant survival rates are acceptable.

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

Sincerely,



Scott King, LSS, PWS
Project Manager

August 24, 2020

Matthew Reid, PM
NCDENR, Division of Mitigation Services
5 Ravenscroft Dr. – Suite 102
Asheville, NC 28801

Subject: Response to DMS Comments for Draft Mitigation Plan Review (dated 7/15/20)
Blair Creek Mitigation Project, Clay County
Hiwassee River Basin: 06020002
DMS Project #100047, DEQ Contract #7415

Mr. Reid:

Please find enclosed our responses to the NC Division of Mitigation Services (DMS) review comments dated July 15, 2020 in reference to the Blair Creek Mitigation Project's Draft Mitigation Plan. We have revised the Draft document in response to the referenced review comments as outlined below.

Table of Contents:

- Monitoring Plan is currently shown as being in section 8-4. This should be 8-1.

Response: Revision made.

1.0 Project Introduction:

- Third paragraph states the project will restore by rehabilitation or enhance wetlands. Please also add restore by reestablishment.

Response: Revision made.

2.0 Watershed Approach and Site Selection:

- The first bullet point discussing how the Blair Creek project will address goals of the RBRP mentions "restoring a natural geomorphology". The term "restoring a natural geomorphology" is imprecise. Is the goal to "restore natural stream processes"?

Response: Revision made as suggested, though the original language was taken directly from the RBRP.

Table 3.1 Project Attributes for Existing Conditions:

- Please revise table to follow the required Project Background Information template. A copy of the required table .xlsx is attached. The table generally follows the template, but there are several deviations.
- Please provide wetland summary information for each wetland (example attached).

Response: Table revised and expanded as requested.

3.1.3 Watershed Disturbance and Response:

- Second to last sentence in second paragraph is unclear. "A lack of deep rooted woody vegetation with high storm flow..." Is the intent "A lack of deep rooted woody vegetation along with high storm flow..."? Please update.

Response: That assumption is correct. Revision made as suggested.

4.1 Project Constraints:

- The second sentence in this paragraph is not clear, the diverse biology available to induce recolonization would likely mitigate the upstream/offsite affects.

Response: The constraint is whether or not a diverse stream biology exists off-site (up or down stream) to recolonize the project streams post-construction. The text in that sentence only uses the term 'upstream' however, and has been revised for clarity.

Table 5.1:

- How will monitoring cross sections measure the improve habitat goal? In the monitoring plan, Baker states using inventory comparisons will be used. Please clarify what method will be used and update as necessary

Response: Monitoring stream cross sections will demonstrate whether or not the surveyed riffles and pools are maintaining form (i.e. not eroding/scouring out or aggrading/filling with sediment) and thus providing the improved habitat as intended. An inventory comparison will be used to demonstrate that the quantity and quality of habitat features constructed are an improvement to the existing conditions.

6.2 Design Morphological Parameters:

- Reach R1, R2 and R3: Please describe how Baker will construct the Priority 2 sections. Will topsoil be stockpiled? Minimum bench and side slopes? Since establishment of vegetative cover and vigor can be a challenge on Priority 2 banks and benches, please include a discussion on how the soil restoration will be addressed during construction and reference potential adaptive management. Please elaborate for clarity.

Response: These sections aren't truly proper Priority 2, but really just relatively short, transitional sections of channel, located only at the very top of Reaches 1 and 2 and at their confluence going into Reach 3. At the top of R1 and R2, the stream bed elevation will be held to a very low slope over the beginning of the profile, until it rises to a point where the existing valley floor (the new floodplain) can be accessed at a bankfull flow. And between the beginning of the conservation easement and the point where the stream can fully access the floodplain, the stream banks will also be cut down. These cut banks will have a gradual slope (10:1) beginning at the existing ground elevation, and with the maximum cut being to the point that approximates the bankfull elevation relative to the new stream riffle elevation, thus providing increased access to the floodplain until the bed elevation can be fully raised. At their downstream ends, R1 and R2 will transition at their confluence by dropping in elevation relative to the floodplain as they enter R3. R3 is relatively short and within this reach the channel will return to the existing channel elevation. These drops in elevation will occur over grade control structures which will maintain stability and allow for dissipation of energy. Within all of these transitional areas topsoil will be stockpiled prior to necessary bank grading. Soil amendments will be applied as appropriate to the exposed subsoil, which will be loosened prior to having stockpiled topsoil placed on the surface. Text has been revised to provide these additional details. The existing adaptive management and maintenance plans fully apply to these areas with regards to the establishment of vegetation. They will be held to the same standards and require any necessary maintenance/repair work as any other.

- UT1: For the culvert that will remain, please include a discussion regarding the current condition, confirm that sizing is appropriate and that it is not perched, buried or otherwise inhibiting aquatic passage.

Response: The culvert above Reach UT1 is outside the Conservation Easement by ~20 ft and is located under a 2-lane DOT highway. As such, Baker has no control over this culvert. It does appear to be slightly perched with a shallow, though stable, pool below it. And while the adjacent banks alongside the culvert are not bare nor actively eroding, they do lack woody vegetation. We are proposing to place a boulder

step structure below the culvert's existing scour pool near the conservation easement boundary to provide additional grade control, and will livestake along the bank to provide additional stability.

Tables 6.2a and 6.2b:

- Please use the Geomorphic Essential Parameter Table found in the required table spreadsheet for the report body. The full morphology table can be provided as part of the digital submission.

Response: The smaller geomorphic essential parameter table was inserted in place of the original full table, though Baker will include the full table in Appendix A. Baker feels it is important to have the complete design tables located within the mitigation plan as they can more easily be referenced by designers and reviewers within and between providers, regulators, academia, etc. They would likely become difficult if not impossible to obtain if they are only part of a separate digital submission.

6.3.2 Bankfull Hydraulic Geometry Relationships:

- “Although bankfull stage verification was sometimes challenging in the field for some sections of the reaches under their current conditions, the consistent values returned for each of the primary Reaches R1 and R2 cross-sections provides confidence in the existing conditions estimates. The two regional curves both predict a significantly larger bankfull area, which indicates substantial degradation of the existing channels.” These statements are unclear. Consistent values returned from measurement or equations? Why does Baker assume the larger predicted Q ranges compared to measured/estimated Q can be explained by disturbance? How was the design Q determined?

Response: The cited text was intended to explain that the degraded existing conditions made field bankfull verification challenging, as is a common issue. The bankfull indicators for each of the primary reaches R1 and R2 cross-sections consistently indicate that the bankfull elevation is somewhat below the regional curves. As noted in the text, the drainage areas for all the streams place them on the lowest end of the regional curves, which likely accounts for some the observed differences. Other projects completed within this general area also found that bankfull is below the regional curves. The design parameters ultimately selected for the reaches are slightly below the referenced regional curves, but not to the extent indicated by the existing condition cross-section data. We believe this recognizes that the project-specific area bankfull parameters may fall slightly below what may be found in the broader geographic area, while still being conservative in our design approach. The design Q was determined by using the Manning's Equation from stream type methodology based on the new design channel parameters. The text in these sections has been revised to clarify these points.

6.4 Sediment Transport Analysis:

- “Field conditions also show that aggradation is not a significant problem, except in portions of lower R1 and R3 where the presence of historic beaver dams have led to substantial sediment deposition.” This statement contradicts statements of aggradation mentioned previously in the document. Please clarify.

Response: The aggradation observed at the bottom of the project in lower R1 and R3 in response to old beaver dams is more significant (with a couple feet of sediment in locations) as compared to the deposition found in sections of the rest of R1 and R2, which we would characterize as having a bed that is dominated by excess sand in pools and some riffle sections, but without the significant bar formations as in R3. The descriptions in the plan have been revised for clarity.

- The sediment transport analyses does not adequately address the upstream sediment source, especially given that sediment deposition is previously stated (and is contradictory) as both minimal and problematic. Please clarify how upstream sediment will affect the project reaches. Is sediment an issue or not? Will there be available storage in bars and/or floodplains? If the finer fraction of sediment is mixed with the larger

sizes, transport of the larger sizes is usually more frequent. While the competency estimates are clear, the overall sediment transport is not clear. Please explain Baker's confidence in sediment transport analysis.

Response: While there is some minor upstream sediment coming onto the project, it is not considered problematic, and the dominant source of sediment in the system is from the eroding stream banks of the project itself. The text has been revised for clarity on this point. And while there are existing sections of significant deposition within the project streams (as described above in the previous response), they will be buried during the construction of the new channel alignments, and the primary source of sediment (eroding project stream banks) will be eliminated through the establishment of stable, sloping banks. By restoring a natural pattern and profile to the streams, and by reconnecting them to their natural floodplain, Baker is confident there will be ample sediment storage capability in the restored system.

6.5.1 Wetland Restoration and Enhancement:

- The sentence in the first paragraph that indicates that wetland re-establishment is based on soil determinations and rainfall data is a bit unclear. Please elaborate how rainfall data contributes to the re-establishment approach.

Response: The rainfall data was used during the wetland delineation and site assessment for restoration potential. During such assessments, investigators should certainly be aware of both the very recent and more long-term rainfall histories (say, the preceding several months) for the area, as such information can provide evidence of the presence of wetlands and also help indicate areas prime for restoration. However, that is a needlessly technical and specific addition to the paragraph and was ultimately just a small part of the overall investigation summarized in this section. It was therefore removed from the text for clarity.

6.6.2 Proposed Riparian Vegetation Plantings:

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

Response: The Revegetation Plan Sheets 15 and 16 in the plan set were revised to distinguish between the two planting zones.

Table 6.7 Proposed Bare-Root and Live Stake Species:

- Green Ash is currently listed as 5% of the total planted species. The IRT has requested that Green Ash account for no more than 5% of the planted species on site. Please keep this in mind if species are unavailable or substitutions are made during planting.

Response: Baker is certainly aware of the IRT's strong stance on Green Ash and will ensure that no more than 5% of the planted stems on site are of that species.

6.8 Project Risks and Uncertainties:

- How high is the potential for upstream land use development? Are there current plans to develop? Is the area currently experiencing increases in development? The 'methods to address' do not address and are overstated as well. Restoration will likely reduce the temporal and spatial magnitude of disturbance, but it will not likely protect against disturbance.

Response: Baker is unaware of any current plans to develop upstream of the project. The general area has experienced a slight increase in development with the population of nearby Hayesville (the city limits of which are ~0.5 mile from the project drainage) having increased over the past 20 years from 297 residents to 483. However, the project drainage area itself does not appear to have significantly changed much during that time, consisting largely of forested area, farms, and rural housing. Thus the potential for land use development for the project is considered low. And while no restoration project can

completely protect against any impact from future disturbance, Baker sincerely believes that by raising the streams to reconnect them to their natural floodplains; by stabilizing vertical, eroding banks; by establishing functioning vegetated buffers; and by restoring or enhancing adjacent riparian wetlands, the project can certainly ‘help protect from further degradation and downstream impacts’ usually associated with development, especially compared to the existing condition.

• “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.” Baker previously states that beaver ponding is related to sediment deposition in R1 and R2; DMS suggests Baker’s observation is evidence of beaver activity.

Response: The statement quoted was commenting on the presence of *currently active* beaver on the project, of which there is none. The recent *past presence* of beaver along the lower portion of the project was noted elsewhere in this report, but they have had their dams removed and blown out during heavy storm events over the past couple of years and have not returned. The sediment deposition noted in the report was from this previous beaver activity.

7.1.1 Bankfull Events and Flooding Functions:

• Please clarify that three constant stage gauges (pressure transducers) will be installed on the floodplain 5 – 10’ from the channel banks to document overbank events. Assume that data that will be submitted to document this performance standard will be depth of overbank events as measured from soil surface in floodplain during overbank events.

Response: Yes, three crest gauges consisting of continuous/constant stage recorders using pressure transducer loggers will be installed as described and the resulting data will be presented as evidence of overbank events as described. Text was revised to be more clear about these issues.

7.1.4 Visual Assessment:

• Please include photo points at culverts and crossings in the monitoring plan.

Response: Monitoring photo points will include all culverts and crossings. Text was revised accordingly.

7.2 Vegetation Monitoring:

• Please note that the inclusion of invasive and exotic species stems is a required component of the fixed and random vegetation plots. Visual inspection of entire site for invasive species is also required.

Response: Text was added in this section to emphasize these points.

7.3 Wetland Monitoring:

• Arkaqua soils are noted in the 2016 USACE Guidance Document as being non-hydric; and have a recommended target hydrology performance standard of 7 – 9%. The 12% proposed for success criteria seems to indicate a preponderance of Toxaway inclusions in the mapped Arkaqua. Please verify that 12% is the intended standard.

Response: Yes, a 12% wetland hydrology performance target is the intended standard.

• Suggest noting that precipitation normal will be presented using method proposed in 2016 USACE Guidance Document (Sprecher & Warne 2000); 30-day rolling total.

Response: As this is a new presentation method that Baker has never implemented before, we would prefer not to make any statements about it at this time. However, we are certainly open to using this method at a later date once we are more familiar with it. We have frequently updated our monitoring report tables/figures in the past in a similar fashion.

8.0 Monitoring Plan:

- Table 8.1: Improved habitat is stated as a goal and a performance measure. Please clarify how an inventory will be used and repeated during the monitoring period to measure habitat.

Response: Improved aquatic habitat will be demonstrated by using a comparison of the quantity and quality of the post-construction in-stream structures and features as compared to the existing stream conditions (see earlier response to comment on Table 5.1). The continued stability and functionality of the constructed structures and habitat features will then be evaluated throughout the monitoring phase through surveyed cross-sections, pebble counts, and visual assessments.

Table 8.2 Monitoring Requirements & Schedule:

- Suggest revising “crest gauge” in surface water hydrology description if a crest gauge will not be used.

Response: Crest gauges as described in Section 7.1.1 (as addressed in previous DMS comment above) will be used as listed in Table 8.2.

Figure 4 Existing Conditions and Features:

- Please label wetlands.

Response: Wetlands were labeled as requested.

- Consider adding a dashed line to indicate the ditching in the fields.

Response: The field ditching is currently shown in the figure as light blue-green lines as noted in the legend. They were revised to be shown as dashed lines as requested.

- There is a yellow diamond near the bottom of R1. This may be incorrectly labeled as it is not shown on the legend. Revise as necessary.

Response: The yellow diamond on R1 represents ‘exposed bedrock locations’ in the channel as noted in the legend.

Figure 11 Proposed Monitoring Features:

- Suggest revising groundwater gauge placement to include gauge adjacent to re-establishment along R3 and placing a gauge in the re-habilitation wetland since hydrological improvements in these areas are proposed.

Response: Baker is confident that the nine groundwater wells for ~5 acres of wetland re-establishment are more than adequate to assess the restored hydrology of the wetland system. The rehabilitation wetlands (current jurisdictional) are noticeably wetter than the restoration areas and it stands to reason that if the adjacent restoration areas observe an increase in groundwater hydrology then they would as well. Plus, there is a well placed along the restoration/rehabilitation boundary so as to capture data relevant for both areas.

Digital Deliverables:

- The following spatial features have feature lengths or areas that do not match the values reported in the asset table, described below as the feature length or area vs. reported length or area:

o Reach 2 (1,479.3 ft vs. 1,473.9 ft)

o Reach 3 (113.1 ft vs. 118.9 ft)

o UT1 (189.7 ft vs. 176.9 ft)

o W3 (0.405 ac vs. 0.184 ac)

Please provide DMS with updated features that accurately represent the values reported in the asset table.

Response: The GIS shapefiles were revised to match asset table. The stream layer required a few small adjustments, while the wetland layer simply needed to have its acreages recalculated. Baker would like to reiterate the fact that the design CAD files as shown on the plan sheets are the legal, sealed documents by which the project assets are determined and built, and those files are provided to DMS. Baker only uses GIS shapefiles to make figures.

- Please provide DMS with proposed monitoring features displayed in Figure 11 (i.e. groundwater well, crest gauge, cross sections, etc).

Response: Additional shapefiles provided as requested.

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

Sincerely,

A handwritten signature in blue ink that reads "Scott King". The signature is written in a cursive, flowing style.

Scott King, LSS, PWS
Project Manager

Blair Creek Mitigation Project Stream Mitigation Plan – FINAL

Clay County, North Carolina

Hiwassee River Basin: 06020002

DMS Project ID No. 100047, DEQ Contract No. 7415, DMS RFP #16-007278

USACE Action ID No. SAW-2018-00449, DWR # 20201094

Prepared for:

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

Prepared by:



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.

January 2021

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1.0 PROJECT INTRODUCTION

The Blair Creek Mitigation Project (project) is located on five abutting parcels of an active farm in Clay County, North Carolina, approximately 1.5 miles south of the Town of Hayesville as shown on the Project Vicinity Map (Figure 1). The primary project site entrance is a farm road located 0.5 miles down Waldroup Road on the left, where the road curves sharply to the right. Coordinates for the approximate center of the project are 35.026069 N Latitude, -83.831862 W Longitude.

The project area lies within the Hiwassee River Basin, Hydrologic Unit Code (HUC) 06020002-060010 (named the Hiwassee River/Sweetwater Creek Watershed), which is identified as a Targeted Local Watershed (TLW) in the NC Division of Mitigation Services' (DMS) 2018 *Hiwassee River Basin Restoration Priorities 2018* (RBRP) report. The project is located in the Blue Ridge Physiographic Region, within the Broad Basins Level IV ecoregion. The project watershed drains into Blair Creek, which flows into the Hiwassee River approximately 1.4 miles downstream, ultimately emptying into the Tennessee River. Blair Creek and its tributaries are classified by NCDWR as Class "WS-IV" waters (NCDWR, 2016).

The project will restore 4,368 linear feet (LF) of stream along sections of both the North and South Forks of Blair Creek and after their confluence, Blair Creek itself, and will enhance 176 LF of existing unnamed tributary to the South Fork. Additionally, the project will restore-by-reestablishment, restore-by-rehabilitation, or enhance approximately 6.095 total acres of riparian wetlands.

Historic agricultural use on the project site has predominantly been for a dairy operation and is currently utilized for row crop and hay production. These activities have negatively impacted both water quality and streambank stability along the project streams. The resulting observed stressors include streambank erosion, sedimentation, excess nutrient input, channel modification, wetland drainage, and the loss of riparian buffers.

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

- Reconnect stream reaches to their floodplains,
- Restore or improve hydrology to adjacent hydric soils and riparian wetlands,
- Improve stream stability,
- Improve aquatic habitat,
- Reestablish forested riparian buffers, and
- Permanently protect the project in a conservation easement.

The project is anticipated to generate a total of 4,363.37 cold stream mitigation credits and 5.772 wetland mitigation credits, and will be protected by a 10.02-acre permanent conservation easement (Appendix B).

2.0 WATERSHED APPROACH AND SITE SELECTION

The Blair Creek Mitigation Project is located in Clay County within the Hiwassee River/Sweetwater Creek Watershed (06020002-060010) of the Hiwassee River Basin (Figure 1) which is identified as a TLW in DMS's 2008 (amended 2018) *Hiwassee River Basin Restoration Priorities* (RBRP) report. The RBRP describes the TLW as being heavily agricultural (primarily cattle pasture), with numerous degraded streams due to cattle access, and with many streams lacking a forested buffer. It also states that a majority of the streams in this TLW are classified as Water Supply Waters and that it is the restoration priority watershed of the Hiwassee River Watershed Coalition (now a part of MountainTrue).

The RBRP also includes five specific river basin restoration goals that reflect DMS' focus on restoring stream and wetland functions such as enhancing water quality, restoring hydrology, and improving fish and wildlife habitat. The Blair Creek project will directly address three of those goals including:

- The implementation of a stream and wetland restoration project that will reduce sources of sediment and nutrient input into streams by restoring riparian buffer vegetation, stabilizing banks, and restoring natural stream processes.
- The restoration and protection of habitat for priority aquatic species in the basin
- Working with landowners to protect and restore watersheds through restoration and preservation

This mitigation plan proposes to accomplish these goals by restoring natural stream geomorphology; stabilizing eroding stream banks; restoring riparian buffer vegetation; restoring or enhancing riparian wetlands; restoring and protecting habitat for priority fish, mussel, snail, amphibian, and crayfish species; and by working directly with the project's landowners to restore and protect the streams and wetlands.

The NC Wildlife Resources Commission (WRC) 2015 Wildlife Action Plan (WRC 2015) identifies the project as being located within a Tier 1 Priority watershed for wildlife conservation. It notes that there are 24 Species of Greatest Conservation Need (SGCN) in the watershed including 2 aquatic amphibian species, 2 aquatic snail species, 5 crayfish species, 10 freshwater fish species, and 5 freshwater mussel species. It further notes that USFWS has identified the Hiwassee River as one of the highest priority stream systems in the region and identified five imperiled fishes occurring in the Hiwassee River Basin in North Carolina: the Sicklefin Redhorse, Greenside Darter, Redline Darter, Olive Darter, and Smoky Dace. The report details that each of these species needs clean streams with little sedimentation over rocky riffles to thrive.

The NC Division of Water Resources (DWR) Hiwassee River Basinwide 2012 Water Quality Plan (DWR 2012) identifies the project as being located within the Sweetwater Creek subwatershed of the Hiwassee basin. It states that Blair Creek and the South Fork of Blair Creek are known contributors to both water quality and habitat degradation, primarily from excess nutrient and sediment losses due to agriculture and poor stormwater controls. It recommends the implementation of practices that reduce soil loss and sedimentation in the streams within this subwatershed.

In addition, the protection and restoration of the Blair Creek site will assist in providing a geographical connection with surrounding conservation features such as the Land Trust for the Little Tennessee Preserve and the Nantahala National Forest (Tusquitee Ranger District), along with improving the general integrity of the encompassing Water Supply Watershed (Figure 3).

Thus, the Blair Creek project will directly and indirectly address the priority resource issues targeted in the watershed planning documents discussed above, through the implementation of many of their recommended management practices and will permanently protect the entire project area within a conservation easement. Therefore, the proposed project location and restoration approaches align well with the overall goals and implementation needs outlined by DMS.

3.0 BASELINE AND EXISTING CONDITIONS

The Blair Creek Mitigation Project is located 1.5 miles south of the town of Hayesville in Clay County, North Carolina, within the Hiwassee River Basin. The following sections will describe the existing conditions found at the project site and includes 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.

Table 3.1. Project Attributes for Existing Conditions				
Blair Creek Mitigation Project – NCDMS Project No. 100047				
Project Information				
Project Name		Blair Creek Mitigation Project		
County		Clay		
Project area within easement (acres)		10.02		
Project Coordinates (latitude and longitude)		35.026069 N, -83.831862 W		
Planted Acreage (woody stems to be planted)		8.3		
Project Watershed Summary Information				
Physiographic Province		Level III: Blue Ridge, Level IV: Broad Basins		
River Basin		Hiwassee		
USGS Hydrologic Unit 8-digit	06020002	USGS Hydrologic Unit 14-digit	06020002-060010	
DWR Sub-basin		04-05-01		
Project Drainage Area (acres)		1,862 acres / 2.94 square miles (at confluence in Blair Creek)		
Project Drainage Area Percentage of Impervious Area		1.7% impervious area		
CGIA Land Use Classification ¹		12.6% developed (predominantly rural residential), 55.7% forested, 29.8% cultivated crops and pasture/hay, 1.2% shrub/scrub, and 0.7% herbaceous.		
Reach Summary Information				
Parameters	Reach 1 (North Fork)	Reach 2 (South Fork)	Reach 3 (Blair Creek)	UT1
Existing length of reach (linear feet)	2,399	1,468	185	195
Valley confinement (Confined, moderately confined, unconfined)	Unconfined	Moderately Confined	Moderately Confined	Moderately Confined
Drainage area (acres)	983	880	1,864	22
Perennial, Intermittent, Ephemeral	Perennial	Perennial	Perennial	Intermittent
NCDWR Water Quality Classification	WS-IV	WS-IV	WS-IV	N/A
Stream Classification (existing)	B-E4	E4	F4	B
Stream Classification (proposed)	C4	C4	C4	B
Evolutionary trend (Simon, 1989)	IV – Degradation and Widening	IV – Degradation and Widening	V – Aggradation and Widening	III – Degradation
FEMA classification	Zone X	Zone X	Zone AE	Zone X
Wetland Summary Information				
Parameters	W-B	W-C	W-D	W-E
Size of Wetland within CE (acres)	0.512	0.051	0.153	0.024

Wetland Type	Riparian	Riparian	Riparian	Riparian
Mapped Soil Series	Arkaqua ²	Arkaqua	Arkaqua	Arkaqua
Drainage Class	SPD	SPD	SPD	SPD
Soil Hydric Status	Yes	Yes	Yes	Yes
Source of Hydrology	Groundwater	Groundwater	Groundwater	Groundwater
Restoration or Enhancement Method	Vegetation	Vegetation	Vegetation	Vegetation
Parameters	W-F	W-K	W-L	W-M
Size of Wetland within CE (acres)	0.010	0.035	0.059	0.014
Wetland Type	Riparian	Riparian	Riparian	Riparian
Mapped Soil Series	Arkaqua	Arkaqua	Arkaqua	Arkaqua
Drainage Class	SPD	SPD	SPD	SPD
Soil Hydric Status	Yes	Yes	Yes	Yes
Source of Hydrology	Groundwater	Groundwater	Groundwater	Groundwater
Restoration or Enhancement Method	Vegetation	Vegetation	Vegetation	Vegetation
Parameters	W-N	W-O	W-P	W-S
Size of Wetland within CE (acres)	0.009	0.004	0.132	0.013
Wetland Type	Riparian	Riparian	Riparian	Riparian
Mapped Soil Series	Arkaqua	Arkaqua	Arkaqua	Arkaqua
Drainage Class	SPD	SPD	SPD	SPD
Soil Hydric Status	Yes	Yes	Yes	Yes
Source of Hydrology	Groundwater	Groundwater	Groundwater	Groundwater
Restoration or Enhancement Method	Vegetation	Vegetation	Vegetation	Vegetation
Parameters	W-T			
Size of Wetland within CE (acres)	0.015			
Wetland Type	Riparian			
Mapped Soil Series	Arkaqua			
Drainage Class	SPD			
Soil Hydric Status	Yes			
Source of Hydrology	Groundwater			
Restoration or Enhancement Method	Vegetation			
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: ¹ Source: USGS National Land Cover Database (NLCD) for 2016, ² Arkaqua loam (0-2% slopes, frequently flooded)				

3.1 Watershed Processes and Resource Conditions

3.1.1 Landscape Characteristics

The Blair Creek Mitigation Project is situated in the Blue Ridge Physiographic Region, within the Broad Basins Level IV ecoregion typified by intermountain basins with low mountains, rolling foothills, and moderately broad mountain valleys. The smaller streams in this ecoregion have moderate gradients typically with a cobble and boulder substrate, while the larger rivers have low to moderate gradients with a cobble, sand and bedrock substrate. This ecoregion tends to be drier and warmer and with lower elevations and less relief as compared to most of the other more mountainous Blue Ridge ecoregions. Soils are more similar to the Piedmont than the rest of Blue Ridge with predominately deep and well-drained loamy to clayey Ultisols; with distinct variations between uplands, terraces and floodplains. The dominant vegetation in the region is composed of a mix of oaks, hickories, and pines, which is also more similar to the Piedmont. Much of the region remains forested, though overall it has more pasture and developed land use than other Blue Ridge ecoregions. (Griffith et. al., 2002).

Jurisdictional Streams and Wetlands

Field evaluations for the presence of jurisdictional features on the project site were conducted on May 1-3 and on June 14, 2018, and included the determination of intermittent/perennial stream status, wetland delineations, and both stream and wetland qualitative assessments. These evaluations were based on the *NC DWR Methodology for Identification of Intermittent and Perennial Streams and Their Origins (v 4.11, 2010)*, the *US Army Corps of Engineers Wetlands Delineation Manual (1987)*, the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Eastern Mountains and Piedmont Region (v2.0, April 2012)*, the *NC Stream Assessment Methodology (2015)*, and the *NC Wetland Assessment Methodology (2016)*. Results from these field reviews indicate that there are approximately 4,247 linear feet of jurisdictional stream and 4.174 acres of jurisdictional wetland located within the project boundary and its surrounding vicinity (Figure 4). Tables 3.2 and 3.3 below present the summary findings of the stream and wetland classifications and assessment ratings. These field assessments were subsequently confirmed by the USACE in the Preliminary JD received on 7/19/2018. Copies of all the completed assessment forms and PJD confirmation can be found in Appendices F, G, and H.

The three larger streams confirmed on site are identified as Reaches R1, R2 and R3 (named North Fork Blair Creek, South Fork Blair Creek and Blair Creek, respectively) and are all denoted as “blue-line” streams on the USGS Topographic Map (Hayesville Quadrangle, Figure 2) and are all clearly perennial. One additional tributary was identified (Reach UT1) that flows into the upper section of R2. Due to the large drainage area and obvious perennial status, a stream form was not completed for Reach 3 (Blair Creek), though forms were completed for Reaches 1 and 2 and for UT1. There is a small pond on the left bank of R1 that has an outfall that enters R1 just downstream of the culvert crossing. This was a quarry site used by DOT in past years to provide road building material. Once this was completed the site was flooded by ground water seepage and perhaps a spring. There are periods of time when evapotranspiration or lowered ground water eliminate any outflow from the pond. During wet periods there is a small amount of runoff through an existing 6” pipe that releases water onto the floodplain, where it flows downhill to the stream. During construction this “overflow channel” will be extended to the new channel and stabilized with stone. Flow will continue to run into the stream over this small stabilized channel.

Reaches R1 and R2 have been straightened, ditched and dredged in the past and as a result are incised and have long sections of eroding banks, with excess sediment deposition present in portions of the bed, and a noted overall lack of good riffle-pool morphology. Field ditching and drainage pipes are also present in the upper half of Reach R1, impacting buffer hydrology. Additionally, the reaches lack appropriate riparian buffers, with absent or narrow buffers of predominantly invasive Chinese privet (*Ligustrum sinense*) along the majority of the banks. Given the level of degradation, Reach R1 rated as ‘Low’ in the NC-SAM assessment, while Reach R2 rated as ‘Medium’ due primarily to the fact that its channel bed doesn’t have as much sediment deposition present and it scored better for the aquatic biological indicators. Reach R3 has had impacts from the historic (though intermittent) presence of large beaver dams located at the downstream end. It has been effectively ponded for short periods of time resulting in a channel that is

significantly over-wide and with substantial sediment deposition present. Large sections of bank are vertical and actively eroding, and virtually all of the buffer is managed herbaceous vegetation. As a result, Reach R3 rated a ‘Low’ in NC-SAM. Reach UT1 begins at a perched culvert outfall under Cherry Rd (a hydrologic disconnect) and flows into a scour pool and on into an incised stream with a slightly degraded channel bed with a mostly managed herbaceous buffer before flowing into R2. However, the reach banks are relatively stable and aquatic biological indicators were moderate. As a result, Reach UT1 rated a ‘Medium’ in NC-SAM.

Table 3.2. Summary of Field Investigations to Determine Stream Intermittent/Perennial Status
Blair Creek Site Mitigation Project – NCDMS Project No. 100047

Project Reach Designation	Existing Project Reach Length (ft)	NCDWR Stream Classification Score	NCSAM Rating	Watershed Drainage Area (acres) ¹	Stream Status
R1 – North Fork Blair Creek	2,357	42	Low	983	Perennial
R2 – South Fork Blair Creek	1,320	44.5	Medium	880	Perennial
R3 – Blair Creek	196	N/A (clear perennial)	Low	1,864	Perennial
UT1	145	23.75	Medium	22	Intermittent

Note¹: 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.

Twenty separate wetland areas were also found scattered throughout the floodplain, and while all are technically classified as bottomland hardwood forest in NC-WAM, they have almost entirely been cleared for agricultural use as hay fields. Thus, they generally classify as emergent wetlands in the Cowardin system. Wetlands located in the upper section of Reach R1 have also been historically drained with numerous field ditches and pipe drains observed, and all have been hydrologically impacted by the incision of the adjacent stream channels. Given the significant level of degradation observed in these floodplain wetlands, the majority rated as ‘Low’ in the NC-WAM assessment. However, three wetlands located at the bottom of R1 (W-L, W-M, and N-P) appeared to have less hydrologic impact and had more vegetation present (though some is invasive) and so rated as ‘Medium’ in the assessment. Further information and discussion of the jurisdictional features can be found in Section 3.2.3.

Table 3.3. Summary of Field Investigations on Jurisdictional Wetlands

Blair Creek Mitigation Project – NCDMS Project No. 100047

Project Wetland Designation	Existing Wetland Area		Classification		
	Total (ac)	Within Conservation Easement (ac)	NCWAM Classification	NCWAM Rating	Cowardin
W-A	0.781	-	Bottomland Hardwood Forest	Low	PEM1
W-B	1.060	0.512	Bottomland Hardwood Forest	Low	PEM1
W-C	0.201	0.051	Bottomland Hardwood Forest	Low	PEM1
W-D	0.674	0.153	Bottomland Hardwood Forest	Low	PEM1
W-E	0.451	0.024	Bottomland Hardwood Forest	Low	PEM1
W-F	0.411	0.010	Bottomland Hardwood Forest	Low	PEM1
W-G	0.036	-	Bottomland Hardwood Forest	Low	PEM1
W-H	0.030	-	Bottomland Hardwood Forest	Low	PEM1
W-I	0.083	-	Bottomland Hardwood Forest	Low	PEM1
W-J	0.021	-	Bottomland Hardwood Forest	Low	PEM1
W-K	0.040	0.035	Bottomland Hardwood Forest	Low	PEM1
W-L	0.073	0.059	Bottomland Hardwood Forest	Medium	PEM1b
W-M	0.014	0.014	Bottomland Hardwood Forest	Medium	PSS1b
W-N	0.065	0.009	Bottomland Hardwood Forest	Low	PEM1

W-O	0.007	0.004	Bottomland Hardwood Forest	Low	PEM1
W-P	0.132	0.132	Bottomland Hardwood Forest	Medium	PSS1b
W-Q	0.004	-	Bottomland Hardwood Forest	Low	PEM1b
W-R	0.054	-	Bottomland Hardwood Forest	Low	PEM1
W-S	0.022	0.013	Bottomland Hardwood Forest	Low	PEM1
W-T	0.015	0.015	Bottomland Hardwood Forest	Low	PEM1
	4.174	1.032			

Climatic Conditions

The Murphy 4ESE, NC weather station in Cherokee County is located approximately 8 miles northwest of project site. As reported in the AgACIS (Agricultural Applied Climate Information System) database generated for this station, the WETS table (Appendix A) lists the average annual rainfall for the surrounding area as 59.11 inches, based on data from 1990-2019 as shown below in Table 3.4 along with the monthly historic averages. This station will be used to determine departures from normal rainfall amounts throughout the project. The WETS table also reports the growing season for the site as 210 days in length and beginning on April 2 and ending on October 29, using the 50% probability data for a temperature of 28° F or higher (<http://agacis.rcc-acis.org/?fips=37039>).

Month	Murphy 4ESE Station Average Monthly Precipitation (in)	30% Probability Precipitation is less than (in)	30% Probability Precipitation is more than (in)
January	5.70	4.13	6.72
February	5.10	3.66	6.02
March	5.19	3.93	6.05
April	4.69	3.55	5.47
May	4.85	3.57	5.69
June	5.08	3.64	6.00
July	5.41	4.09	6.31
August	4.47	3.00	5.35
September	4.47	2.78	5.40
October	3.39	1.55	4.13
November	4.70	3.29	5.58
December	6.06	4.37	7.16
Total	59.11		
Annual Averages		53.55	64.89

Geology and Soils

Geologically, the Blair Creek Site is located within the Ocoee Supergroup portion of the Blue Ridge Belt, consisting primarily of sedimentary and metamorphic rock (NCGS, 1985) as shown in Figure 5. The Ocoee Supergroup has been cut and deformed by numerous faults resulting in repeated sections and obscured stratigraphic relationships. The project area is further underlain by the Metasandstone, Metagraywacke, Metasiltstone, and Mica schist Formation, and commonly contains beds and lenses of abundant calc-silicate rock, with garnet, staurolite, and cross-biotite porphyroblasts common in the fine-grained layers. The formation includes host rocks of large sulfide deposits and as sediments were commonly deposited under reducing conditions in the formation of the sedimentary rock in this region. Iron sulfides are a common constituent in much of the present rock, along with the soils derived from them.

The project site is located within the Broad Basin, River Terrace, and Flood Plain Soil System of the Mountain Soil Region of North Carolina (Daniels et al., 1999), consisting of low rounded mountains, discontinuous river terraces, and wide river valleys and floodplains. Soils found on the Blair Creek site are almost entirely dominated by Arkaqua loams (0-2% slope, frequently flooded) located throughout

the floodplain as determined through the National Resource Conservation Service (NRCS) Soil Survey data for Clay County (Figure 7). Arkaqua loams (fine-loamy, mixed, active, mesic Fluvaquentic Dystrudepts) are frequently flooded, somewhat poorly drained, moderately permeable soils found on nearly level floodplains along creeks and rivers in the Southern Appalachian, Blue Ridge, and Great Smokey Mountain regions. They are listed as hydric soils for Clay County by the NRCS and commonly contain inclusions of Toxaway loams, another listed hydric soil. The adjacent, more upland areas outside the project floodplain are dominated by Dillard loam, Hayesville clay loam, Tate loam, and Evard-Cowee complex soils. These soils tend to be deep to very deep, moderately to well drained soils found along stream slopes and terraces of the Southern Appalachian mountains and upper Piedmont region.

Topography

The general topography within the project's 2.91 square mile drainage area is typical of much of the low elevation Blue Ridge region, which has lower elevations and less relief than the other more mountainous Blue Ridge regions. The average elevation of the project drainage area is about 2,000 feet, with a minimum of 1,830 feet and a maximum of 2,490 feet, though the project site itself is found in a relatively flat floodplain confluence at an elevation of roughly 1,900 feet. The project valley slopes vary for each reach valley, with Reach R1 having a 0.9% slope and R2 having a 1.2%, while the much shorter reaches R3 and UT1 having valley slopes of 1.1% and 2.4%, respectively. Figure 2 depicts the topography for the project site and its immediate surrounding area.

Existing Vegetation:

Vegetation on the project site itself has been heavily disturbed from years of agricultural use, particularly from cattle and dairy operations. Currently the site is predominantly managed as cropland for corn and hay production. The row crop areas have rotational corn and cover crops planted throughout, while the hay fields largely consist of a range of typical hay pasture grasses (fescue, orchard grass, 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 officinale*), with soft rush (*Juncus effusus*), blunt spike rush (*Eleocharis obtusa*), shallow sedge (*Carex lurida*), and jewelweed (*Impatiens capensis*) found in wetter areas. A very narrow buffer of shrubs (predominately privet) and a few trees is present along reaches R1-3, while UT1 has little to no buffer. The shrubs present on site are largely made up of invasive species, consisting primarily of Chinese privet (*Ligustrum sinense*), with some multi-flora rose (*Rosa multiflora*), Japanese honeysuckle (*Lonicera japonica*) and Oriental bittersweet (*Celastrus orbiculatus*) found scattered throughout. Trees present are sparse and consist primarily of silky dogwood (*Cornus amomum*) and box elder (*Acer negundo*), black cherry (*Prunus serotina*) with a few silver maple (*Acer saccharinum*) and tulip poplar (*Liriodendron tulipifera*).

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 and dairy operations as well as row crops. Reaches R1 and R2 were ditched, straightened, and moved to the edge of the valley decades ago (in the early 1950s by his recollection), and numerous field drains were also installed in the past to help drain the adjacent wetlands. 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, loss or reduction of wetland hydrology, and the loss of functioning riparian buffers.

The USGS National Land Cover Database (NLCD) for 2016 shows that the entire 2.9 square mile (1,864 acres) project drainage area was 12.6% developed (with 1.7% impervious), 55.7% forested,

29.8% cultivated crops and pasture/hay, 1.2% shrub/scrub, and 0.7% herbaceous. By comparison, the 2001 NLCD data states that the area was 11.3% developed (with 1.3% impervious), 60.0% forested, 24.9% cultivated crops and pasture/hay, 2.4% shrub/scrub and 1.1% herbaceous. Thus, it appears that an increase in the clearing of forested land for development and agriculture has occurred over that 15-year period. However, while the percent of forested land within the watershed appears to be slowly decreasing and the percent of developed and agricultural area slowly increasing, the watershed as a whole did not show any dramatic changes in overall land use. The future for the project watershed will likely remain largely undeveloped and rural in nature with significant amounts of forested cover included in an agricultural landscape. For further comparison, the 2008 Hiwassee RBRP describes the larger, overall Hiwassee River – Sweetwater Creek watershed (27 square mile) as being somewhat similar in land use to the project watershed, with approximately 71% forested area and 20% in total agriculture. This larger watershed for the surrounding area has seen a slight increase in recent development (largely for vacation homes) but also includes significant National Forest land as well, and is so also expected to remain predominantly rural in nature.

Historic aerial photographs from 1957, 1975, and 1993 and 2006 were reviewed for the project and its surrounding area (Figures 9A, 9B, 9C, and 9D). The project area itself is readily identifiable in all historic aerials with little change over the past sixty-two years. 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. Based on these historical aerials, the lack of sinuosity, and the level of channel incision throughout much of the stream, it is highly likely that R1 and R2 were channelized prior to 1957 and have lacked a wooded buffer since that time. Based on landowner discussion, these reaches were ditched and straightened in the early 1950s.

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, wetland, and riparian habitats and functions.

Currently, the project is an active farm for corn and hay production with approximately 15 acres of row crop production and 22 acres of hay field. The upstream extents of both R1 and R2 begin at small bridge crossings located on farm roads. The upstream extent of UT1 begins at the outfall of a culvert beneath Cherry Road. The remnants of multiple old beaver dams (largely destroyed by recent storm events) are present in the lower portion of Reach R1 and on R3, which caused backwater conditions in these sections as well as having resulted in damage to buffer vegetation from historic beaver feeding activity. One overhead utility line is located within the project area, running perpendicularly from Cherry Road, crossing over R2 and continuing northwest across the property. The utility line is being avoided via a break in the conservation easement along R2.

3.1.3 Watershed Disturbance and Response

The watershed disturbances are described above and include the removal of wooded buffers, channelization, ditching, field drains in wetland areas, the remnants of old beaver dams, and the installation of culverts. The project reaches have responded to these disturbances by becoming severely incised and eroding laterally. Streambanks are mostly vertical with large areas of scour and mass wasting exacerbated by lack of adequate vegetation. The lack of woody and deep rooting vegetation along project reaches have allowed for accelerated bank migration. The installation of field drains, along with the channel incision and associated decrease in overbank flooding frequency has also resulted in a lowered water table, negatively affecting the adjacent riparian wetlands.

The project reaches have been heavily impacted from historic land use practices, predominantly livestock and row crop production. Within the project area, all of the reaches have inadequate (less than 30 feet wide) riparian buffers of low quality containing very sparse, mostly immature trees, and extensive invasive species. Figure 4 shows the most recent aerial photography with clearly narrow and/or absent riparian buffers. A lack of deep rooted woody vegetation along with high 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 other 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 Blair Creek Mitigation Project was approved by FHWA and NCDMS on July 12, 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 Blair Creek Mitigation project is partially within FEMA Zone X and FEMA Zone AE as noted on the Clay County Flood Insurance Rate Map Panel 3700545900J (Figure 8). However, the project site does not have a regulated floodway present, and Clay County only requires hydraulic modelling and a no-rise certification if work is being conducted within a regulated floodway (see memo in Appendix K). Restoration work is being proposed in the regulated Zone AE floodplain along Reach R3 and so a floodplain development permit will be obtained from Clay County prior to beginning construction. The topography of the site and location in the upper watershed supports the project design without creating the potential for hydrologic trespass as confirmed by the HEC-RAS modeling. Appendix K contains a memo detailing the FEMA permitting discussion with Clay County.

3.2.3 Section 404 / 401 Permitting

The proposed project area was reviewed for the presence of jurisdictional wetlands and waters of the United States in accordance with the provisions on Executive Order 11990, the Clean Water Act, and subsequent federal regulations and guidance. In fulfillment of the project's Section 404 / 401 permitting requirement, a Pre-Construction Notification (PCN) will be submitted for a Nationwide Permit (NWP) 27: Aquatic Habitat Restoration, Enhancement, and Establishment Activities. As discussed previously in Section 3.1.1, the project area was evaluated in the field for the presence of these resource features in May and June of 2018. The evaluation confirmed the presence of four jurisdictional streams and twenty jurisdictional wetlands, thirteen of which are at least partially located within the conservation easement. These results were subsequently confirmed in the field by the USACE and a PJD was received on 7/19/18 (Appendix H).

The proposed mitigation design will avoid or minimize all disturbance or impacts to the existing stream and wetland features during project construction wherever practicable. Due to the inherent nature of the project, a complete avoidance of all impacts to jurisdictional features is not possible. However, any impacts to stream or wetland resources from construction (both temporary and permanent) will be more than offset by the ultimate restoration of stream and wetland resources both in their overall length or area and in the resource functional uplift. Existing streams are currently rated as 'Low' (R1, UT1) or 'Medium' (R2, R3) in NC-SAM, while the majority of the wetlands are rated as 'Low' (with a few rated 'Medium') in NC-WAM. Ultimately, the project is expected to restore resource function such that all features are rated as 'High' in their respective assessments. A copy of the Pre-Construction Notification (PCN) will be provided with the Final Mitigation Plan, which will include figures detailing the areas of temporary and permanent impacts.

4.0 FUNCTIONAL UPLIFT POTENTIAL

Current stream and watershed conditions within the project site, as well as throughout the whole of the Blair Creek watershed described in previous sections, clearly calls for functional improvements at this site. Channel incision, dredging, and straightening; removal of riparian buffers; draining adjacent wetlands with field drains; and adjacent agricultural production impacts are all dominant impairments within the project reaches. Each have contributed significantly to the overall degradation of the local ecosystem due to the resulting lack of floodplain connectivity, minimal bedform variation, high levels of sediment inputs from bank erosion, and a poorly functioning riparian buffer and wetlands.

The uplift for these project reaches will primarily be achieved at the hydraulic and geomorphological functional levels. Hydraulic improvements will come from reintroduction of bankfull flows to the historic floodplain through Priority 1 Restoration along Reaches R1 and R2. This approach will elevate the stream beds and add an appropriate meandering sinuosity to the channels. 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. This will also raise the adjacent groundwater table, which along with the removal of field drains from the adjacent fields within the easement, will further assist with the hydraulic restoration or improvement in the adjacent hydric soils and existing wetlands. The complete removal of old remnant beaver dams (largely destroyed by recent storms) in the downstream section of the project will fully eliminate any minor backwater effect observed there and return a more natural flow regime to the channels.

Geomorphological functional uplift will be achieved through channels sized to the bankfull flow, a planform and profile design emphasizing improved bedform variation with high amounts of woody debris for bank protection and habitat, and the reestablishment of a forested riparian corridor. As a result, bank migration and lateral stability will be restored to a sustainable level and the banks and bed will accommodate design flows in a stable manner. Sediment inputs will decrease due to reduced bank erosion and sediment transport can return to a stable level that will accommodate watershed inputs. Riparian plantings will further support geomorphological functionality by increasing bank stability.

Consideration of future impacts to the area that could limit functional uplift opportunities is important when assessing project potential. As mentioned in previous sections, the project exists within a predominantly rural area where agriculture is the primary land use. Substantial changes to the surrounding area are a potential, given ongoing road improvements and second home development within the watershed. While the watershed is likely to experience some increase in development in the future based on previous land use changes over time, the area will still remain predominately rural and therefore the hydrology of the site will likely remain relatively 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 or off-site water quality issues include nutrient and sediment loading and the presence of diverse biology near the site to repopulate the improved habitat. Additional project constraints are the necessity of stream crossings and easement breaks. There is one power line easement that transects the project in the upper section of Reach R2. As such, a conservation easement break has been incorporated in this area to allow for the exclusion of the power line easement. Though no credit is being sought for this section, full restoration measures will continue on Reach R2 through the break to ensure the long-term success of the project. A second easement break is located in the middle of Reach R1 at an existing culverted road crossing. No additional crossings or conservation easement breaks are proposed.

Two existing bridge crossings are located at the top of Reaches R1 and R2, while pipe culverts are located at the top of UT1 and in the middle of R1 at the crossing (all are outside of the easement). In order to maintain aquatic passage while allowing for the implementation of stabilization measures, transitional sections will be implemented in these locations as appropriate to tie the proposed streambed elevations into the existing elevations. Because R3 is short and located at the lower end of the project, it will be within a transitional area from the Priority I restoration work on R1 and R2 connecting to the existing channel below the project.

4.2 Functional Uplift Summary

Substantial functional uplift for the Blair Creek Mitigation project is expected and is described in more 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 Blair 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 presented here 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			
Blair Creek Mitigation Project - NCDMS Project No. 100047			
Goals	Objectives	Functional Level	Monitoring Measurement Tool
Reconnect stream reaches to their floodplains	To raise channel beds by utilizing a Priority I Restoration approach with transitional sections at the top and bottom of the reaches.	Hydraulics	Flood Frequency Cross-Sectional Survey
Restore or improve hydrology to adjacent hydric soils and riparian wetlands	To raise adjacent channel beds and remove field drains within the easement area to raise groundwater tables within the buffer.	Hydraulics	Groundwater Wells
Improve stream stability	To construct streams of appropriate dimensions, pattern and profile in restored reaches, slope stream banks and provide bankfull benches on the enhanced reach, 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, established regional curve 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 completed NC mountain and upper piedmont 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 were 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 similar successful past projects and one from the NCDOT database. These reference reaches have successfully been used on similar stream restoration projects within the low mountains 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 three named reference sites used for the design of this project are similar in landscape setting as the Blair Creek Project site. Both the Contreras and Martins Creek projects are located in neighboring Cherokee County and are also found within the Blue Ridge Physiographic Region and Broad Basins Level IV ecoregions, as is Blair Creek. The Big Branch site is located in Surry County on the border between the Northern Inner Piedmont and the Blue Ridge ecoregions. These three sites were used to compare to Baker Composite Reference Data in determining design criteria for all restored project reaches.

Parameter	Contreras		Big Branch		Martins Creek		Baker Composite Reference Data	
	Min	Max	Min	Max	Min	Max	Min	Max
County	Cherokee		Surry		Cherokee			
Stream Type	C		E4		B/C		C4	
Drainage Area – square miles	0.8		1.9		0.17			
Bankfull Width (w_{bkf}) – feet	14.4	15.0	19.3	21.5	7.7	8.5		
Bankfull Mean Depth (d_{bkf}) – feet	1.1	1.2	1.8	2.1	0.54	0.71		
Width/Depth Ratio (w/d ratio)	12.5	12.5	9.2	11.9	12.0	14.3	10.0	15.0
Cross Sectional Area (A_{bkf}) – SF	16.5	18.0	39.6	39.9	4.1	6.0		
Bankfull Mean Velocity (v_{bkf}) - fps	3.5	4.2	N/P		3.9	4.3	3.5	5.0
Bankfull Discharge (Q_{bkf}) – cfs	55	60	N/P		16	26		
Bankfull Max Depth (d_{mbkf}) - feet	1.4	2.1	2.5	2.7	0.7	0.9		

Table 6.1 Reference Reach Parameters Used to Inform Design

Blair Creek Mitigation Project - NCDMS Project No. 100047

Parameter	Contreras		Big Branch		Martins Creek		Baker Composite Reference Data	
	Min	Max	Min	Max	Min	Max	Min	Max
d_{mbkf} / d_{bkf} ratio	1.3	1.4	N/P		1.3	1.3	1.2	1.5
Low Bank Height to d_{mbkf} Ratio	1.4	1.7	N/P		1.0	1.0	1.0	
Floodprone Area Width (w_{fpa}) – feet	50	100	130		16	100		
Entrenchment Ratio (ER)	3.5	6.7	6.05	6.74	2	11.8		
Meander length (L_m) – feet	101	180	185	260	15	30		
Ratio of meander length to bankfull width (L_m / w_{bkf})	7.0	12.0	9.1	12.8	1.8	3.8	7.0	14.0
Radius of curvature (R_c) – feet	26	53	42.3	63.1	30	40		
Ratio of radius of curvature to bankfull width (R_c / w_{bkf})	1.8	3.5	2.1	3.1	3.8	4.7	2.0	3.0
Belt width (w_{blt}) – feet	22	60	30.5	44	40	40		
Meander Width Ratio (w_{blt} / W_{bkf})	1.5	4.0	1.5	2.2	4.7	4.7	3.5	8.0
Sinuosity (K) Stream Length/ Valley Distance	1.5		1.1		1.05	1.4	1.2	1.4
Valley Slope – feet per foot	0.0087		N/P		0.016	0.06	0.005	0.015
Channel Slope ($S_{channel}$) – feet per foot	0.0058		0.009		0.01	0.057		
Pool Slope (S_{pool}) – feet per foot	0.0	0.0012	N/P		-	-		
Ratio of Pool Slope to Average Slope ($S_{pool} / S_{channel}$)	0.0	0.2	N/P		-	-	0.00	0.20
Maximum Pool Depth (d_{pool}) – feet	2.3	3.6	3.5	4.1	1.6	2.0		
Ratio of Pool Depth to Average Bankfull Depth (d_{pool} / d_{bkf})	2.0	3.0	1.79	2.1	2.8	2.9	1.5	3.5
Pool Width (w_{pool}) – feet	18.7	25.5	19.7	18.5	12	13		
Ratio of Pool Width to Bankfull Width (w_{pool} / w_{bkf})	1.3	1.7	0.91	0.97	-	-	1.2	1.7
Pool Area (A_{pool}) – square feet	-	-	51	54.5	11.5	14.3		
Ratio of Pool Area to Bankfull Area (A_{pool} / A_{bkf})	-		1.33		1.9	2.4		
Pool-to-Pool Spacing – feet	57	105	97.5	179.8	12	45		
Ratio of Pool-to-Pool Spacing to Bankfull Width ($p-p / w_{bkf}$)	4.0	7.0	4.78	8.81	1.5	5.8	3.5	7.0
Riffle Slope (S_{riffle}) – feet per foot	0.014		0.015	0.019	0.01	0.16		
Ratio of Riffle Slope to Average Slope (S_{riffle} / S_{bkf})	2.4		1.67	2.11	1.1	3.5	1.2	1.5
d_{16} – mm	-		.13		.70		-	
d_{35} – mm	-		.3		3.2		-	
d_{50} – mm	-		1.9		6.2		-	
d_{84} – mm	-		50		22.0		-	
d_{95} – mm	-		100		84.5		-	

Notes:

Big Branch data 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.

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/Mountain Bottomland Forest or 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 essential design stream morphology parameters proposed for the restoration approach described for each reach. These 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. The complete design morphology parameter tables can be found in Appendix A. 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 R1 Restoration

Reach R1 (North Fork Blair Creek) extends from the upstream northern terminus of the project at an existing driveway bridge and flows southeast approximately 2,399 feet to its confluence with Reach R2 (South Fork Blair Creek) to form Reach R3 (Blair Creek mainstem). R1 is a perennial channel with a valley slope of 0.63 percent and a drainage area of 1.53 square miles (983 acres). R1 is very incised with bank height ratios (BHR) greater than 1.5 throughout all of its length and higher than 2.0 on many sections. This reach is exhibiting bank scour ranging from 50-60 percent in the upper reach, 40-50 percent in the middle of the reach, and 60-70 percent in the downstream end of the reach. Mass wasting is occurring on approximately 15-20 percent of the reach as a whole.

The bed material is predominantly composed of medium gravel ($d_{50} = 21$ mm), but with extensive sections of high sand deposition, particularly in lower section. This sand is due to areas of localized bank erosion and the lack of appropriate depositional features. The reach lacks deep pools and is almost entirely composed of riffles or runs. As a result, habitat is almost uniform throughout the reach. R1 is currently classified as an incised B to E4 stream type with a stream slope of approximately 0.65 percent and a very low sinuosity of 1.06.

Reach R1 has a narrow buffer of approximately 10 feet or less and is almost entirely composed of Chinese privet (*Ligustrum sinense*), though the downstream ~150 foot section does also have a few silky dogwood (*Cornus amomum*) and boxelder (*Acer negundo*) saplings mixed in as well. Outside of this thin invasive buffer

is managed hay pasture. Historic, periodic beaver activity has been present on the downstream end of R1 and dams have until recently impounded water throughout the bottom approximately 20 percent of this reach, though currently these dams are largely destroyed, having been breached by the landowner and then blown out during storm events. Nevertheless, their presence has resulted in excess sediment deposition in the lower section, impacted vegetation, led to channel widening at the bottom, and ultimately to bank erosion and instability. Numerous field drains are also present in the upper section and are emptying into R1, which bypass any filtration of runoff through buffer vegetation.

There is one existing culverted crossing along R1 near the middle of the reach, which along with one bedrock knickpoint, is helping to control stream bed grade. This culvert will be replaced with an appropriately sized culvert and adjacent floodplain pipes to improve hydraulic functions and channel stability. This crossing represents the break between the upper and lower sections of R1 used for design purposes.

A Priority Level I restoration approach was selected for R1 to fully restore stream and associated buffer functions. The channel will be raised to reconnect the stream to its historic floodplain. This will promote more frequent over bank flooding thus reducing erosive stream energies during storm events greater than the bankfull discharge, and will also improve adjacent groundwater hydrology. The floodplain area will also act as a sediment sink providing storage of sediment from upstream sources instead of sending all the sediment load downstream. The very top of the reach will include a relatively short transitional section of channel where the stream bed elevation is being raised to a point where the existing valley floor (the new floodplain) can be accessed at a bankfull flow. And between the beginning of the conservation easement and the point where the stream can fully access the floodplain, the stream banks will also be cut down. These cut banks will have a gradual slope (10:1) beginning at the existing ground elevation, and with the maximum cut being to the point that approximates the bankfull elevation relative to the new stream riffle elevation, thus providing some increased access to the floodplain until the bed elevation can be fully raised. At its downstream end, another transitional section will begin near the confluence with R3 by dropping bed elevation relative to the floodplain, with stream bank sloping again being conducted as described above. Soil amendments will be applied as appropriate to the exposed subsoil on the sloped banks, which will be loosened prior to having stockpiled topsoil replaced to the surface.

The reach will be designed as a Rosgen C4 stream type and will be restored using appropriate riffle-pool morphology, which will restore appropriate channel meander geometry and incorporate deep pools. This will greatly improve habitat throughout this reach. The design width-to-depth ratio for the channel will be 14-15, 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 significantly greater than 2.2 as the adjacent flood-prone width allows, while the sinuosity will be increased to 1.22. Channel banks will be graded to stable slopes, and bankfull benches (where necessary) will provide floodplain access, promote stability, and provide sediment storage.

In-stream structures such as constructed riffles, cross-vanes, log jams, and j-hooks will be constructed using boulder, stone, brush, and log materials. This technique will provide the appropriate bedform morphology, protect stream banks, improve aquatic habitat, and ensure grade control along this reach. Bioengineering techniques such as geolifts, root wads, toe wood, brush layers, and live stakes are also proposed to protect restored stream banks and to promote woody vegetation growth along the stream banks. Sections of the old channel not incorporated into the new channel alignment will be completely filled using suitable material up to the floodplain elevation.

The riparian buffer for this reach lacks mature native woody vegetation. The existing vegetation, as described above, is composed mostly of Chinese privet (*Ligustrum sinense*). The few mature trees that are present will be retained to the extent possible. Riparian buffers in excess of 30 feet and consisting of appropriate native species will be restored and protected along all of R1. The invasive vegetation will be mechanically removed during construction and will be chemically treated thereafter throughout the monitoring phase. Additionally,

the lower end of this reach has also been impacted by historic beaver activity as described above. Should beavers return during the monitoring period, they will be removed and their dams destroyed.

Table 6.2a Reach R1 Stream Design Morphology Parameters Blair Creek Mitigation Project - NCDMS Project No. 100047				
Parameter	Existing Condition (Upper – Lower)	Reference Condition	Proposed	
			R1 Upper	R1 Lower
Valley Width (ft)	350' – 700'			
Contributing Drainage Area (acres)	883 – 983		883	983
Channel/Reach Classification	B-E	C4	C4	C4
Discharge Width (ft)	8.59 – 8.57		16.5	17.0
Discharge Depth (ft)	1.43 -1.48		1.1	1.2
Discharge Area (ft ²)	12.3 – 12.7		18.2	20.4
Discharge Velocity (ft/s)	3.1 – 3.2	3.5 - 5.0	3.1	3.2
Discharge (cfs) ¹	38.7 – 40.7		55.68	65.72
Water Surface Slope	0.0065		0.0047	0.0070
Sinuosity	1.06		1.22	1.22
Width/Depth Ratio	6.01 – 5.79	10.0 - 15.0	15	14.2
Bank Height Ratio	2.7 – 1.8	1.0 - 1.1	1.0	1.0
Entrenchment Ratio	1.5 – 4.05		3.6	3.5
d16 / d35 / d50 / d84 / d95 / dip / disp (mm) ²	10.5 / 16.9 / 21.1 / 37.6 / 59.8 / 218 / 60			

¹Existing Condition Discharge calculated by Manning’s Equation for the degraded existing stream channel parameters, Proposed Discharge calculated by Manning’s Equation for the proposed design conditions (as described in Section 6.3.3)

²The ‘dip’ and ‘disp’ represent the single largest particle found in the pavement and subpavement samples respectively.

Reach R2 Restoration

R2 is on the South Fork of Blair Creek and begins just below a bridge at the landowner’s driveway and extends downstream approximately 1,468 feet to the confluence with North Fork of Blair Creek. R2 is a perennial channel with a drainage area of 1.38 square miles (880 acres) and has a valley slope of 0.64 percent. Like R1, the R2 channel is very incised and has an average BHR of at least 2.0 over most of the channel length. There are a few small areas where BHRs are closer to 1.0, but they appear to be where the banks have failed and the collapsed sediment has built a small bankfull bench, but these areas are very limited in extent. Bank scour is common, occurring along approximately 30-40 percent of the streambank length, and often a result of the shallow rooted invasive species being undercut. Significant bank failures are also observed in locations where the stream tries to meander, with mass wasting occurring on approximately 20-30 percent of the reach as a whole.

The bed material is predominantly composed of medium gravel (d50 = 22 mm), but with sections of high sand deposition. This sand is due to areas of localized bank erosion and the lack of appropriate depositional features. The reach lacks deep pools and is almost entirely composed of riffles or runs. As a result, habitat is almost uniform throughout the reach. R2 is currently classified as a low sinuosity E4 stream type with a stream slope of 0.60 percent and a sinuosity of 1.12.

The width of riparian buffer along R1 is variable, but overall quite narrow, averaging less than 10 feet along most of its length. It is largely composed of dense stands of invasive Chinese privet (*Ligustrum sinense*),

though there are scattered mature trees along sections of the reach and they will be preserved during construction if possible. Outside of this thin invasive buffer is managed hay pasture to the north and both hay pasture and row crops to the south. There is a farm path present within the buffer along the right bank of this reach and a ford crossing was built in the lower section some years ago. Both of these will be removed during the restoration. There is also a break in the conservation easement in the upper section of Reach 2 at the location of an existing powerline.

Historic, periodic beaver activity has been present on the downstream Reach R3, which has impacted the lower approximately 20 percent of this reach, by impounding water flow. These dams are not currently in place as they were breached by the landowner and further washed out by storm events. Nevertheless, their presence has resulted in excess sediment deposition in the lower section, impacted vegetation, led to channel widening at the bottom, and ultimately to bank erosion and instability.

A Priority Level I restoration approach is proposed for R2 to fully restore stream and associated buffer functions and will be very similar to that described above for R1. The channel will be raised to reconnect the stream to its historic floodplain. This will promote more frequent overbank flooding thus reducing erosive stream energies during storm events greater than the bankfull discharge and will also improve adjacent groundwater hydrology. The floodplain area will also act as a sediment sink providing storage of sediment from upstream sources instead of sending all the sediment load downstream. The very top of the reach will include a relatively short transitional section of channel where the stream bed elevation is being raised to a point where the existing valley floor (the new floodplain) can be accessed at a bankfull flow. And between the beginning of the conservation easement and the point where the stream can fully access the floodplain, the stream banks will also be cut down. These cut banks will have a gradual slope (10:1) beginning at the existing ground elevation, and with the maximum cut being to the point that approximates the bankfull elevation relative to the new stream riffle elevation, thus providing some increased access to the floodplain until the bed elevation can be fully raised. At its downstream end, another transitional section will begin near the confluence with R3 by dropping bed elevation relative to the floodplain, with stream bank sloping again being conducted as described above. Soil amendments will be applied as appropriate to the exposed subsoil on the sloped banks, which will be loosened prior to having stockpiled topsoil replaced to the surface.

The reach will be designed as a Rosgen C4 stream type and will be restored using an appropriate meandering riffle-pool morphology, which will restore appropriate channel meander geometry and incorporate deep pools. This will greatly improve habitat throughout this reach. The design width-to-depth ratio for the channel will be 14, 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 significantly greater than 2.2 as the adjacent flood-prone width allows. Sinuosity will be increased to the greatest extent possible given easement constraints to a 1.14. Channel banks will be graded to stable slopes, and bankfull benches (where necessary) will provide floodplain access, promote stability, and provide sediment storage.

In-stream structures such as constructed riffles, cross-vanes, log jams, and j-hooks will be constructed using boulder, stone, brush, and log materials. This technique will provide the appropriate bedform morphology, protect stream banks, improve aquatic habitat, and ensure grade control along this reach. Bioengineering techniques such as geolifts, root wads, toe wood, brush layers, and live stakes are also proposed to protect restored stream banks and to promote woody vegetation growth along the stream banks. Sections of the old channel not incorporated into the new channel alignment will be completely filled using suitable material up to the floodplain elevation.

The riparian buffer for this reach lacks mature native woody vegetation. The existing vegetation, as described above, is largely composed of Chinese privet. Riparian buffers in excess of 30 feet and consisting of appropriate native species will be restored and protected along all of R2. The invasive vegetation will be mechanically removed during construction and will be chemically treated thereafter throughout the monitoring

phase. Additionally, the lower end of this reach has also been impacted by historic beaver activity as described above. Should beavers establish on R2 during the monitoring period, they will be removed and their dams destroyed.

Parameter	Existing Condition (Upper – Lower)	Reference Condition	Proposed
Valley Width (ft)	310' – 460'		
Contributing Drainage Area (acres)	826 – 880		880
Channel/Reach Classification	E4 (low sinuosity)	C4	C4
Discharge Width (ft)	9.82 - 11.26		17
Discharge Depth (ft)	1.54 – 1.33		1.2
Discharge Area (ft ²)	15.16 – 15.01		20.4
Discharge Velocity (ft/s)	3.21 – 3.03	3.5 - 5.0	3.0
Discharge (cfs) ¹	48.68 – 45.51		61.85
Water Surface Slope	0.0060	0.005 - 0.015	0.0062
Sinuosity	1.12	1.2 - 1.4	1.14
Width/Depth Ratio	6.38 – 8.47	10.0 - 15.0	14.2
Bank Height Ratio	2.0 – 2.3	1.0 - 1.1	1.0
Entrenchment Ratio	2.61 – 2.36		3.5
d16 / d35 / d50 / d84 / d95 / dip / disp (mm) ¹	12.8 / 18.1 / 22.9 / 41.8 / 130 / 218 / 55		

¹ Existing Condition Discharge calculated by Manning’s Equation for the degraded existing stream channel parameters, Proposed Discharge calculated by Manning’s Equation for the proposed design conditions (as described in Section 6.3.3)

² The ‘dip’ and ‘disp’ represent the single largest particle found in the pavement and subpavement samples respectively.

Reach R3 Restoration

Reach R3 (Blair Creek) begins at the confluence of Reaches R1 and R2 (the North and South Forks of Blair Creek respectively) and flows east for approximately 185 feet, ending at a right-of-way for an overhead utility line. The drainage area for Reach R3 is approximately 2.91 square miles (1,864 acres). The stream bed of R3 is primarily gravel, but there are extensive sections of substantial sand deposition caused by severe bank erosion and slumping, as well as from historic beaver activity which impounded the flow throughout the reach. The reach is overly wide, also a result of the beaver activity, and as a result has a Rosgen stream type classification of F4. It is also incised with an average BHR of about 2.0 and has a low sinuosity of approximately 1.07.

While some scattered, mature trees are present along the left bank of this reach, the riparian buffer area is certainly sparse, contains substantial invasive Chinese privet (*Ligustrum sinense*) and not of sufficient width. Row crop activity is present outside the narrow buffer on both the north and south sides.

Historic, periodic beaver activity has been present on Reach R3, which has impacted the entire length of the reach by impounding water flow. The dams are currently gone however, having been breached by the landowner and further washed out during storm events. Nevertheless, their presence has resulted in excess sediment deposition in the lower section, has lead to the channel becoming substantially overly wide, has impacted vegetation, and has ultimately lead to bank erosion and instability.

The Priority Level I approach that is described above for R1 and R2 is proposed to be carried through to this reach. The confluence of R1 and R2 will be further down into R3 and within this reach there will be a transition back to the existing channel elevation. A new stream channel alignment will be built with appropriate dimensions; however, the alignment will be similar to the existing. The existing vertical, eroding banks will be replaced with stable, sloping banks. The design reach will be slightly shorter than in the existing condition as a result of the elongated confluence design arrangement for R1 and R2 to create a more natural and stable alignment. Given the relatively short length of R3 before it transitions back into the existing channel, the stream bed elevation will be dropping to match the existing elevation. These drops in elevation will occur over grade control structures which will maintain stability and allow for dissipation of energy. Soil amendments will be applied as appropriate to any exposed subsoil on cut/graded banks, which will be loosened prior to having stockpiled topsoil replaced to the surface.

The reach will be restored as a Rosgen C stream type using a meandering riffle-pool morphology, which will restore appropriate channel meander geometry and incorporate deep pools. In-stream structures such as constructed riffles, a rock cross-vane, and a log vane will be constructed using boulder, stone, brush, and log materials. This technique will provide the appropriate bedform morphology, protect stream banks, improve aquatic habitat, and ensure grade control along this reach. Bioengineering techniques such as geolifts, toe wood, brush layers, and live stakes are also proposed to protect restored stream banks and to promote stabilizing woody vegetation growth along the stream banks.

The riparian buffer for this reach lacks mature native woody vegetation. The existing vegetation, as described above, contains a large amount of Chinese privet. Riparian buffers in excess of 30 feet and consisting of appropriate native species will be restored and protected along all of R3. The invasive vegetation will be mechanically removed during construction and will be chemically treated thereafter throughout the monitoring phase. Additionally, this reach has also been impacted by historic beaver activity as described above. Should beavers establish on R3 during the monitoring period, they will be removed and their dams destroyed.

Reach UT1 Enhancement Level II

Reach UT1 begins at a culvert under Cherry Road and continues down slope 195 feet to its confluence with Reach R2 (South Fork Blair Creek) on the right bank. UT1 is an intermittent channel with a well-defined bank and bed composed primarily of gravel and sand (with some excess sand deposition found in sections). It classifies as a B5 stream type. Bank erosion along UT1 appeared to be minimal overall at the time of our field evaluation; however, this likely changes in the winter months when herbaceous vegetation dies back. There is no woody vegetation along the stream buffer, except around the confluence with R2. The channel is incised for approximately 30 feet below the culvert opening, and then has relatively low incision. Channel bed scour is significant at the culvert opening but appears to be relatively minimal for the rest of the channel length.

Work along UT1 will involve common Enhancement Level II practices to re-establish a woody buffer and to maintain the stability of the channel. Several in-stream structures will be installed to improve bedform diversity and stabilize the channel as it drops down slope. A few areas of steep and eroding stream bank will be sloped back, matted, and live-staked. The outfall of the culvert under Cherry Road will also be stabilized, though it is located just outside the easement. And finally, woody riparian buffers in excess of 30 feet will be restored and protected along the entire reach.

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 R1, R2, R3, and UT1. 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 project, the existing cross-sections

correlate very well with one another. For additional assurance, regional curve relationships (based on drainage areas) from two well developed curves and previous design experience within this region were also used to assess the bankfull discharge estimates for the project reaches and ultimately utilize the Manning’s Equation for a design discharge as detailed below in Section 6.3.2.

6.3.2 Bankfull Hydraulic Geometry Relationships (Regional Curve Predictions)

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

Table 6.3 NC Rural Regional Curve Equations Blair Creek Mitigation Project - NCDMS Project No. 100047	
NC Rural Mountain Regional Curve Equations (Harman, 2000)	NC Rural Mountain and Piedmont Regional Curve Equations, Revised (Walker, 2018)
$Q_{bkf} = 100.64 A_w^{0.76}$	$Q_{bkf} = 55.33 A_w^{0.79}$
$A_{bkf} = 21.61 A_w^{0.68}$	$A_{bkf} = 19.13 A_w^{0.65}$
$W_{bkf} = 19.05 A_w^{0.37}$	$W_{bkf} = 17.41 A_w^{0.37}$
$D_{bkf} = 1.11 A_w^{0.31}$	$D_{bkf} = 1.10 A_w^{0.28}$

Table 6.4 Comparison of Bankfull Areas Blair Creek Mitigation Project - NCDMS Project No. 100047				
Reach Section	DA (sq mi)	Bankfull Area Estimates from 2000 / 2018 Regional Curves (sq ft)	Bankfull Area Measured at Bankfull Indicator (sq ft)	Design Bankfull (sq ft)
R1 (Upper)	1.38	26.9 / 23.6	12.3, 13.0	18.2
R1 (Lower)	1.53	28.8 / 25.3	12.7	20.4
R2 (Upper)	1.29	25.7 / 22.6	15.2	20.4
R2 (Lower)	1.37	26.8 / 23.5	15.0	20.4
R3	2.91	44.7 / 38.5	24.2	N/A*
UT1	0.033	2.1 / 2.1	0.43	N/A*

Notes:
*Channel cross-sectional dimensions are not being redesigned or rebuilt for these reaches given their approach.
-See Figure 4 for exact locations of existing condition cross-sections

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 sections of the reaches under their current degraded conditions, consistent values were returned for each of the Reaches R1 and R2 cross-sections, which provides confidence in the existing conditions estimates. These field measured bankfull cross-sectional areas were below both of the two regional curve predictions. The drainage areas for all the streams place them on the lowest end of the regional curves, which likely accounts for some of the observed differences. Other projects completed within this general area have also found that bankfull is below the regional curves. The design parameters ultimately selected for the reaches are below the regional curves, though not to the extent indicated by the existing condition cross-section data. This was done in recognition

that project area bankfull parameters should fall slightly below what may be found in the broader geographic area, while still being conservative in our design approach. So despite the variations, the existing cross-sectional area data used for the above regional curve comparisons are within an acceptable range of values for stream systems their size, with the understanding that the regional curves are considered to be overestimating their required cross-sectional area for this specific region. Comparisons with reference stream projects of similar size and designer experience and professional judgement were also used in the final design values as explained previously in Section 6.2.

6.3.3 Bankfull Discharge Summary

Table 6.5 below provides a summary of the bankfull discharge and velocity analysis summary based on the selected regional curve and the bankfull design parameters discussed above. The design discharge and velocity estimates were determined using the Manning’s ‘n’ from stream type methodology based on the design bankfull cross-sectional parameters. The estimated values are, like the dimension parameters discussed above, slightly less than those predicted by the regional curve but greater than those estimated by existing conditions surveys. These values best approximate what is to be expected post-construction and will provide for a stable stream channel. Above bankfull flows, the reaches will have access to their floodplain, thus reducing stream scour potential and improving streambank stability.

Reach Section	DA (sq mi)	Bankfull Discharge from Regional Curve (cfs)	Bankfull Discharge from Existing Condition and Design (cfs)	Bankfull Velocity from Regional Curve (ft/sec)	Bankfull Velocity from Existing Condition and Design (ft/sec)
R1 (Upper)	1.38	72.29	38.72 / 55.68	3.0	3.2 / 3.1
R1 (Lower)	1.53	77.32	40.70 / 65.72	3.1	3.2 / 3.2
R2 (Upper)	1.29	67.61	48.68 / 61.85	2.9	3.2 / 3.0
R2 (Lower)	1.37	70.89	45.51 / 61.85	2.9	3.0 / 3.0

Note: No data is reported here for Reaches UT1 and R3. UT1 will not have its channel dimensions altered to any significant degree, while R3 is a relatively short transitional reach.

6.4 Sediment Transport Analysis

For this project, a qualitative sediment supply analysis was conducted from visual inspections of the project reaches and from aerial photography of the watershed. Current sediment supply appears to be primarily from localized bank erosion, with relatively minor sediment transported from upstream. Historic and current agricultural operations (particularly livestock), along with historic ditching/dredging of channels have likely caused accelerated bank erosion. The condition of the agricultural areas and draining streams within the project watershed appear to be relatively similar to the project site conditions, though many upstream sections are partially to fully forested, particularly in their headwaters. Field conditions show that aggradation is an issue for sections of all project reaches primarily due to areas of localized bank erosion, including sediment-filled pools and buried riffles, but do not exhibit significant bar formations except in lower R1 and throughout R3 where the presence of historic beaver dams have led to channel widening and substantial sediment deposition. 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 focus of this project’s sediment transport analysis will focus on competency.

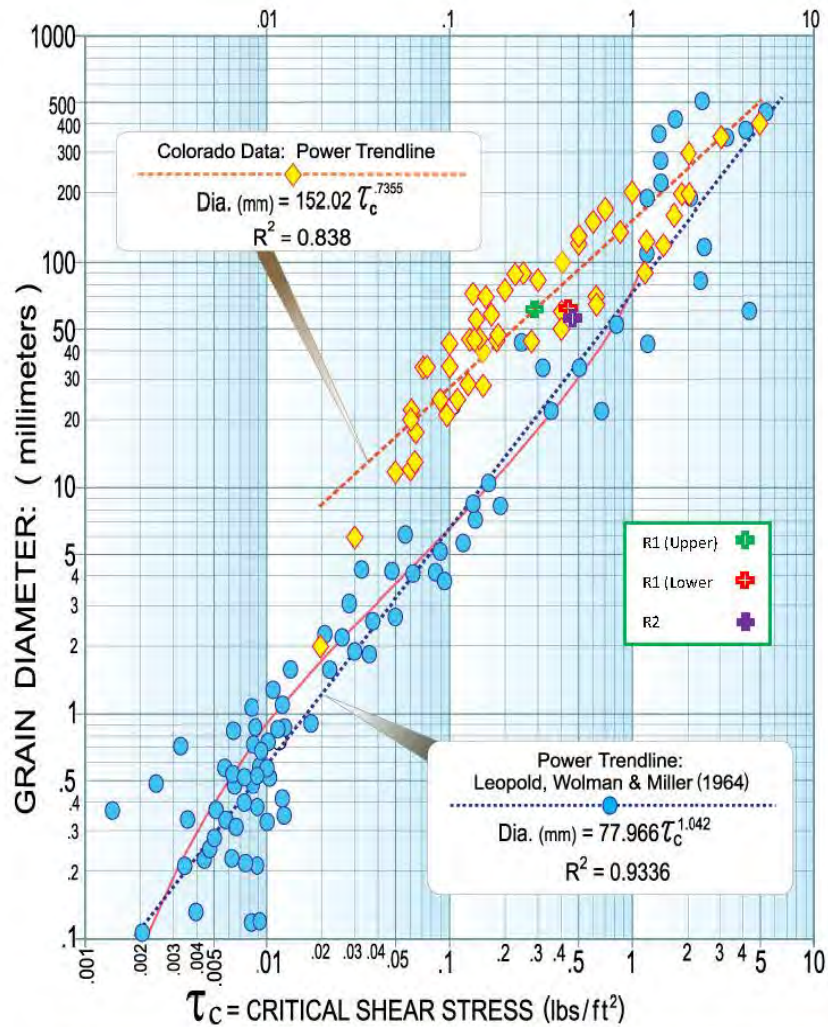
6.4.1 Sediment Competency Analysis

To conduct the sediment competency analyses, pavement/pebble counts (Wolman, 1957) and subpavement sediment samples were taken on Reaches R1 and R2 at surveyed riffle cross sections. 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) and the Shield's Curve is based on laboratory and field data compiled from various sources (Leopold, Wolman, and Miller, 1964). The Results from the analysis are presented below in Table 6.6.

Table 6.6 Sediment Competence Analysis			
Blair Creek Mitigation Project - NCDMS Project No. 100047			
Parameter	R1 (Upper)	R1 (Lower)	R2
Design Channel Slope (ft/ft)	0.0047	0.0070	0.0062
Design Mean Depth (ft)	1.10	1.20	1.20
D50 Pavement (mm)	21.1	21.1	22.9
D50 Subpavement (mm)	9.0	9.0	9.8
D100 Subpavement (mm)	60.0	60.0	55.0
Critical Dimensionless Shear	0.0152	0.0152	0.0177
Required Mean Depth from Dimensionless Analysis (ft)	1.05	0.71	0.85
Required Slope from Dimensionless Analysis (ft/ft)	0.0045	0.0041	0.0044
Dimensional Shear (lbs./sq-ft)	0.29	0.46	0.41
Largest Movable Particle (mm) (Mod. Shields Curve)	60.5	85.8	78.5
Largest Movable Particle (mm) (Shield's Curve)	21.1	34.7	30.5
Predicted Shear Stress to move D100 (lbs./sq-ft) (Mod. Shield's Curve)	0.30	0.30	0.25
Predicted Shear Stress to move D100 (lbs./sq-ft) (Shield's Curve)	0.90	0.90	0.82
Predicted mean depth to move D100 (ft) (Mod. Shield's Curve)	1.02	0.69	0.65
Predicted mean depth to move D100 (ft) (Shield's Curve)	3.07	2.06	2.12
Predicted slope to move D100 (ft/ft) (Mod. Shield's Curve)	0.0044	0.0040	0.0033
Predicted slope to move D100 (ft/ft) (Shield's Curve)	0.0131	0.0120	0.0110

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 in Table 6.6 show that the design bankfull slopes and mean depth values fall between the predicted values from both the Shield's and Modified Shield's curves. The design

shear stress ranges from 0.29 to 0.46 pounds per square foot and the largest particles in the sub pavement samples range from 55 to 60 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 lends evidence that the results that fall between the two curves are 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.

- Leopold, Wolman & Miller (1964)
- ◆ Colorado Data (Wildland Hydrology)

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

6.5 Wetland Mitigation Design Approach

6.5.1 Wetland Restoration and Enhancement

The wetland mitigation design component of the project consists of three approaches: restoration by re-establishment, restoration by rehabilitation, and wetland enhancement, each conducted in accordance with the Federal Mitigation Rule (33CFR Part 332.2/40 CFR 230.92) as described in DWR's wetland mitigation consistency guidance memo (DWR 2013). The goal of wetland re-establishment is to restore natural historic functions in areas where evidence of hydric soil conditions are present but appropriate wetland hydrology and vegetation are not, thus resulting in a gain in both wetland resource area and in wetland functions. This restoration approach will not be conducted in existing jurisdictional wetlands but is based on a detailed soil analysis and hydric soil delineation conducted by a licensed soil scientist (Appendix J). Six main activities will be employed to restore on-site wetlands:

- Connecting adjacent stream channels to their relic floodplains through Priority I stream restoration,
- Planting native wetland species to reforest the wetlands,
- Removing invasive species from wetlands,
- Minor grading in limited areas to remove dredge spoil berms located along stream banks from buried hydric soil layers, this grading is anticipated to be less than 6 inches in all proposed wetland restoration areas,
- Removal of field ditches and drain pipes from wetland areas along Reach R1,
- Permanently protect wetlands within a conservation easement.

As a result of raising the adjacent streambeds and reconnecting the streams to their relic floodplains, significant hydrologic lift will occur across the project area, raising the local water table and restoring wetland hydrology to drained hydric soils adjacent to the stream and wetland system. Additionally, drainage ditches will be filled and field drain pipes will be removed from the buffer within the easement, further improving hydrology to the wetlands. All wetlands will be planted with appropriate species to re-establish a wetland vegetation community, and all invasive plants will be treated or removed. Thus, this approach will restore the appropriate wetland resource hydrology and vegetation functions, and will also expand the total wetland resource area present on the project.

The goal of wetland restoration through rehabilitation is to restore most, if not all, the historic natural functions to a heavily degraded, but still existing jurisdictional wetland resource. The areas proposed for this approach (portions of wetlands W-A, W-B, W-D, W-E, W-K, W-N, and W-S) were determined to be jurisdictional by the USACE (Appendix H), but are heavily degraded with clear impacts to both the hydrology and vegetation resource functions. The wetlands are adjacent to incised streams and most have field ditches and/or drain pipes installed nearby, and all have had their natural vegetation replaced with either hay field or managed turfgrass. Thus, this rehabilitation approach will result in significant improvements to both the wetland hydrology and vegetation functions, but will not result in a gain in wetland resource area.

The goal of wetland enhancement is to improve or intensify a specific degraded wetland function within an existing jurisdictional wetland. The areas proposed for wetland enhancement (portions of wetlands W-C, W-L, W-M, W-P, and W-T) were determined to be jurisdictional by the USACE (Appendix H), but have experienced some level of degradation, in particular to their vegetation function. Enhancement of these wetlands will primarily involve their revegetation with appropriate wetland community species, along with treatment or removal of all invasive vegetation present. Thus, this enhancement approach will primarily result in an improvement to the wetland vegetation function, but will not result in any gain in wetland resource area.

6.5.2 Target Wetland Types

The mitigation approaches described above for the riparian wetland restoration and enhancement areas will target the ultimate restoration of a “Bottomland Hardwood Forest” wetland type as identified by the North Carolina Wetland Assessment Method (NCWAM 2016); a Palustrine, Forested, Broadleaved Deciduous (PFO1) wetland type (Cowardin et al. 1979); and the wetlands commonly found within both the “Montane Alluvial Forest” community (Schafale 2012) and the Southern Appalachian Small River Floodplain Forest (CEGL007143) community (NatureServe 2020). The hydrology of this riparian system will be seasonally to intermittently flooded and saturated.

6.6 Vegetation and Planting Plan

6.6.1 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 for row crops and hay production. The row crops are in a corn/soy bean rotation while the hay fields largely consist of a range of typical pasture grasses (fescues, orchard grass, and clovers) with scattered weeds and other common herbaceous species present such as buttercups (*Ranunculus spp.*), bittercress (*Cardamine hirsute*), hairy vetch (*Vicia villosa*), docks (*Rumex spp.*), horseweed (*Conyza canadensis*), common violet (*Viola sororia*), chickweed (*Stellaria media*), goldenrod (*Solidago spp.*), plantains (*Plantago spp.*), and dandelions (*Taraxacum officinale*), with soft rush (*Juncus effusus*), blunt spike rush (*Eleocharis obtusa*), a mix of sedges (*Carex spp.*), jewelweed (*Impatiens capensis*), and sphagnum moss found in the highly disturbed wetland areas.

A narrow buffer of shrubs and small trees is present along most of the lengths of Reaches R1, R2, and R3. It consists overwhelmingly of Chinese privet (*Ligustrum sinense*), with scattered multi-flora rose (*Rosa multiflora*) present as well. Additional species observed include tag alder (*Alnus serrulate*), silky dogwood (*Cornus amomum*), box elder (*Acer negundo*), elderberry (*Sambucus canadensis*), black cherry (*Prunus serotina*), silver maple (*Acer saccharinum*) and blackberry (*Rubus spp.*).

However, the riparian areas along the project reaches and wetlands of the project would naturally be comprised of species more consistent with those found in the Montane Alluvial Forest plant community, with some likely overlap with the Piedmont Alluvial Forest community as well (Schafale 2012) based on soils, elevation, climate, and ecoregion. The site exists in an intermediate, transitional zone between the upper piedmont and the lower blue ridge, within the Broad Basins Ecoregion described as an intermountain basin area of low mountains and rolling foothills with broad valleys. The site elevation places it at the lowermost end of the elevation range for this ecoregion. Thus, the planting plan was intended to reflect the transitional nature of the ecoregion and includes a mix of species from both communities, though all selected species are found in the mountain region of North Carolina. Additionally, the general ecological communities being restored for the project include both the South-Central Interior Small Stream and Riparian (CES202.706) and Southern Appalachian Small River Floodplain Forest (CEGL007143) ecosystems (NatureServe 2020).

Notable invasive species found on the site include extensive areas of dense Chinese privet (*Ligustrum sinense*) located on long segments of the stream banks, with some multi-flora rose (*Rosa multiflora*), Japanese honeysuckle (*Lonicera japonica*), bur cucumber (*Sicyos angulatus*), and Oriental bittersweet (*Celastrus orbiculatus*) also found scattered along the banks and within portions of the riparian buffers of the project.

6.6.2 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 L. 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 locations, the buffer width will be in excess of 30 feet along one or both streambanks and will encompass significant portions of restored or enhanced adjacent 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 and March 15th. The anticipated planted area for the project is approximately 8.3 acres.

Selected species for hardwood revegetation planting are presented in Table 6.7. Riparian zone species wetness tolerance will generally 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 restored and enhanced 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

Blair Creek Mitigation Project - NCDMS Project No. 100047

Botanical Name	Common Name	% Planted by Species	Wetland Tolerance
All Buffer Plantings at 680 stems/acre using 8' X 8' spacing			
General Riparian Zone – Overstory/Canopy Species			
<i>Betula nigra</i>	River Birch	10%	FACW
<i>Platanus occidentalis</i>	Sycamore	10%	FACW
<i>Liriodendron tulipifera</i>	Tulip Poplar	10%	FACU
<i>Betula lenta</i>	Sweet Birch	10%	FACU
<i>Quercus imbricaria</i>	Shingle Oak	10%	FAC
<i>Tilia americana</i>	American Basswood	5%	FACU
<i>Nyssa sylvatica</i>	Blackgum	5%	FAC
<i>Fraxinus pennsylvanica</i>	Green Ash	5%	FACW
<i>Diospyros virginiana</i>	Persimmon	5%	FAC
<i>Ulmus americana</i>	American Elm	5%	FACW
General Riparian Zone – Understory/Shrub Species			
<i>Rhododendron maximum</i>	Rosebay	5%	FAC
<i>Lindera benzoin</i>	Spicebush	5%	FAC
<i>Halesia carolina</i>	Carolina Silverbell	5%	FAC
<i>Ilex verticillata</i>	Winterberry	2.5%	FACW
<i>Carpinus caroliniana</i>	American Hornbeam	2.5%	FAC
<i>Sambucus canadensis</i>	Elderberry	2.5%	FAC
<i>Magnolia tripetala</i>	Umbrella Tree	2.5%	FACU
Wetland Zone – Overstory/Canopy Species			
<i>Betula nigra</i>	River Birch	15%	FACW
<i>Platanus occidentalis</i>	Sycamore	15%	FACW
<i>Quercus imbricaria</i>	Shingle Oak	10%	FAC
<i>Populus deltoides</i>	Eastern Cottonwood	5%	FAC
<i>Nyssa sylvatica</i>	Blackgum	5%	FAC
<i>Betula alleghaniensis</i>	Yellow Birch	5%	FAC
<i>Acer saccharinum</i>	Silver Maple	5%	FACW
<i>Fraxinus pennsylvanica</i>	Green Ash	5%	FACW
<i>Ulmus americana</i>	American Elm	5%	FACW
Wetland Zone – Understory/Shrub Species			
<i>Alnus serrulata</i>	Tag Alder	10%	OBL
<i>Ilex verticillata</i>	Winterberry	5%	FACW
<i>Acer negundo</i>	Box Elder	5%	FAC
<i>Cephalanthus occidentalis</i>	Buttonbush	2.5%	OBL
<i>Cornus amomum</i>	Silky Dogwood	2.5%	FACW
<i>Xanthorhiza simplicissima</i>	Yellow-root	2.5%	FACW
<i>Aronia arbutifolia</i>	Red Chokeberry	2.5%	FACW
Streambank Live Stake Plantings			
<i>Salix sericea</i>	Silky Willow	25%	OBL

Table 6.7 Proposed Bare-Root and Live Stake Species Blair Creek Mitigation Project - NCDMS Project No. 100047			
Botanical Name	Common Name	% Planted by Species	Wetland Tolerance
<i>Sambucus canadensis</i>	Elderberry	20%	FACW
<i>Cephalanthus occidentalis</i>	Buttonbush	10%	OBL
<i>Cornus amomum</i>	Silky Dogwood	25%	FACW
<i>Salix nigra</i>	Black Willow	20%	OBL

Table 6.8 Proposed Permanent Seed Mixture Blair Creek Mitigation Project - NCDMS Project No. 100047				
Botanical Name	Common Name	% Planted by Species	Density (lbs/ac)	Wetland Tolerance
<i>Agrostis alba</i>	Redtop	10%	1.5	FACW
<i>Elymus virginicus</i>	Virginia Wildrye	15%	2.25	FACW
<i>Panicum virgatum</i>	Switchgrass	15%	2.25	FAC
<i>Tripsacum dactyloides</i>	Eastern Gamma Grass	5%	0.75	FACW
<i>Polygonum pennsylvanicum</i>	Pennsylvania Smartweed	5%	0.75	FACW
<i>Schizachyrium scoparium</i>	Little Blue Stem	5%	0.75	FACU
<i>Juncus effusus</i>	Soft Rush	5%	0.75	FACW
<i>Bidens frondosa (or aristosa)</i>	Beggars Tick	5%	0.75	FACW
<i>Coreopsis lanceolata</i>	Lance-Leaved Tick Seed	10%	1.5	FACU
<i>Dichanthelium clandestinum</i>	Tioga Deer Tongue	15%	2.25	FAC
<i>Andropogon gerardii</i>	Big Blue Stem	5%	0.75	FAC
<i>Sorghastrum nutans</i>	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.

6.7 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 design plan sheets can be found in Appendix L.

6.8 Project Risks and Uncertainties

Due to the rural and primarily forested nature of the project watershed, the overall project risk for the Blair 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, adjacent bridge repair/replacement, 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. Of note, any repair or replacement of the driveway bridges located the tops of R1 and R2 would be required to be conducted outside the easement.

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 currently active beaver 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 beaver populations from the project site during the monitoring phase and repair any damage they may cause, including but not limited to stream bank damage/alteration, vegetation removal in the riparian buffer, and in-stream structure damage.

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 R1, R2, and R3 will implement a full Restoration design approach, while Reach UT1 will implement an Enhancement Level II approach with a focus on stream bed/bank stabilization. For all project reaches, the geomorphic monitoring methods and specific success criteria components and evaluation methods are described below. The report documentation will follow DMS' 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 11 shows the approximate locations of the proposed monitoring devices throughout the project site.

7.1.1 Bankfull Events and Flooding Functions

The occurrence of bankfull events within the monitoring period will be documented using crest gauges consisting of continuous stage recorders (using pressure transducers) and photographs. Gauges will be installed in the floodplain within five to ten feet (horizontal) from the top of stream bank along the upper portions of Reaches R1 and R2, and another at the confluence of R1 and R2 (at the start of Reach 3). An in-stream flow gauge will also be installed in Reach UT1 to document 30-day consecutive flow. Additionally, 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, along all reaches 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. Fifteen total cross sections are proposed for this project. Each cross section will be marked on both streambanks with permanent monuments using rebar cemented in place to establish the exact transect used. A common benchmark will be used for cross sections and to facilitate easy comparison of year-to-year data. The cross section surveys will occur in years one, two, three, five, and seven, and must include measurements of Bank Height Ratio (BHR) and Entrenchment Ratio (ER). The monitoring survey will include points measured at all breaks in slope, including top of streambanks, bankfull, inner berm, edge of water, and thalweg, if the features are present. Riffle cross sections will be classified using the Rosgen Stream Classification System. 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) defined for channels of the design stream type. Given the smaller channel sizes and meander geometry of the proposed streams, bank pins will not be installed unless monitoring results indicate active lateral erosion. The cross sections will document stability in the surveyed riffle or pool to confirm they are maintaining appropriate form for that feature and are not eroding/scouring or aggrading/filling with sediment, and thus are continuing to provide improved habitat as intended.

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

7.1.3 Longitudinal Profile and Pattern

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

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

7.1.4 Visual Assessment

Visual monitoring assessments of all stream sections will be conducted at least once per monitoring year following the requirements described in the DMS monitoring guidance documents. Photographs will be used to visually document system performance and any areas of concern related to streambank stability, condition of in-stream structures, channel migration, headcuts, channel aggradation (bar formation) or degradation, live stake mortality, impacts from invasive plant species or animal species, riparian vegetation success, condition of pools and riffles, culvert and crossing stability, 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 et al., 2008). These vegetation plots shall consist of both permanent and random plots, totaling a minimum of 2% of the planted portion of the site established within the planted riparian buffer areas per CVS Monitoring Levels 1 and 2. Six permanent plots and two random plots are proposed to monitor vegetation for this project. The size of each individual plot will be 100 square meters. No plots will be established within any undisturbed wooded areas within the project boundary.

Vegetation monitoring will occur in the fall, prior to the loss of leaves. Data from the permanent vegetation plots will include: species, height, planted vs. volunteer, and age (based on the year the stem was planted, or

first observed if a volunteer). Data from the random plots will include only the species and height. Both plot types will include invasive and exotic species stem data, if present. Plot densities will also be calculated for each plot. Individual plant stems will be marked such that they can be found in succeeding monitoring years in the permanent plots. Mortality will be determined from the difference between the previous year's living, planted stems and the current year's living, planted stems.

At the end of the first full growing season from baseline (MY0), after a minimum of 180 days, species composition, heights, stem density, and survival will be evaluated for monitoring year one (MY1). Vegetation plots shall subsequently be monitored in years 2, 3, 5 and 7 or until the final success criteria are achieved. The interim measure of vegetative success for the site will require the survival of at least 320 stems per acre at the end of the Year 3 monitoring period. At Year 5, density must be no less than 260 stems per acre. The final vegetative success criteria will be the survival of 210 stems per acre at the end of the Year 7 monitoring period. 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 numerous slower growing species such as a mix of six oak species and 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 an as-needed basis, and may include actions such as: replanting more wet/drought tolerant species vegetation as appropriate, conducting beaver management/dam removal, and the treatment of undesirable/invasive species vegetation, etc. Any necessary remedial action will continue to be monitored as part of the vegetation performance assessment until the corrective action demonstrates that it is trending towards or again meeting the standard requirement. Invasive species will be treated such that they compose no more than 5% of the easement area, and a visual inspection of the entire site for the presence of invasives species will be conducted at least annually. Existing mature woody vegetation will be visually monitored during annual site visits to document any mortality, due to construction activities or changes to the water table, that negatively impact existing forest cover or favorable buffer vegetation.

Additionally, 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.

7.3 Wetland Monitoring

All wetland restoration and enhancement areas will be monitored for a minimum of seven years post-construction or until wetland success criteria are met. Hydroperiod performance criteria for restored wetland areas will be met when the site is saturated within twelve inches of the soil surface for a consecutive period equal to twelve percent of the growing season. The WETS table for the Murphy 4ESE weather station located approximately 8 miles northwest of the project site in Cherokee County reports that for the years 1990-2019, the growing season for the site is 210 days in length and begins on April 2 and ends on October

29, using the 50% probability data for a temperature of 28° F or higher (generated in AgACIS database, <http://agacis.rcc-acis.org/?fips=37039>). Twelve percent of 210 days is 25.2 days.

To determine if the rainfall is normal for the given year, monthly rainfall amounts will be tallied from an onsite rain gauge and compared to the Murphy 4ESE station, the recently installed Hayesville 1NE weather station, and/or the Multi-Sensor Precipitation Estimate (MPE) tool from the State Climate Office of North Carolina.

After construction is complete, groundwater monitoring wells will be installed and their coordinate locations and ground level elevations will be recorded. A soil profile description will be sampled at each gauge installation site and a soil boring profile will be recorded, noting profile descriptions of the soil horizons present, color, texture, and redoximorphic features. Ten gauges are proposed for the wetland restoration areas. This number of gauges adequately characterizes the vegetation communities and surface topographic variations that are found across the site. Installation and monitoring of the groundwater stations will follow the USACE standard methods outlined in the *ERDC TNWRAP-05-2* (USACE, 2005). Water table depths will be recorded daily. See Figure 11 for locations of the proposed post-construction monitoring wells.

Periodic visual inspections will also be conducted for both the wetland restoration and enhancement areas. Visual inspection of proposed wetland areas will be conducted to document any visual indicators that would be typical of jurisdictional wetlands. This could include, but is not limited to, vegetation types present, surface flow patterns, stained leaves, and ponded water. Wetland plant establishment will be documented along with other visual indicators noted above, and as part of the general vegetation monitoring protocol as described in section 7.3.

8.0 MONITORING PLAN

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

Table 8.1 Monitoring Plan Overview					
Blair Creek Mitigation Project - NCDMS Project No. 100047					
Goal	Objective	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.	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.
Restore or improve hydrology to adjacent hydric soils and riparian wetlands.	To raise adjacent channel beds and remove field drains to raise groundwater tables within the buffer.	Water table for restored wetlands raised to within 12" of the surface for a consecutive 12% of the growing season. Enhanced wetlands will meet vegetation requirements.	Groundwater monitoring wells in restored wetland areas	Established, functioning wetlands of appropriate hydrology and vegetated with appropriate wet species.	Restored or improved wetland habitat, increased nitrogen removal by denitrification, increased carbon sequestration in soil, improved flood water storage capacity
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), 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	N/A	Inventory comparisons of in-stream structures and features from existing conditions and as-built project	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.

Table 8.1 Monitoring Plan Overview					
Blair Creek Mitigation Project - NCDMS Project No. 100047					
Goal	Objective	Performance Standards	Monitoring Metric	Outcome	Likely Functional Uplift
	sedimentation within riffles.		surveys and assessments.		
Reestablish forested riparian buffers.	Plant appropriate native hardwood tree and shrub species on streambanks and in the riparian buffer at a 30-foot minimum width in all areas within the conservation easement where established native trees and shrubs do not exist.	Interim survival rates of 320 stems/acre at MY3 and 260 stems/acre at MY5, with final rate of 210 stems/acre at MY7. Height standards of 6' at MY5 and 8' at MY7 apply.	Vegetation monitoring plots (100 m ² each covering 2% of the total planted area).	At the end of monitoring, a vegetated riparian buffer will be established at a minimum 30-foot width and at a minimum 210 stems/acre of native species, including volunteers (with IRT approval).	Improved riparian corridor habitat for native species, improved stabilization of stream floodplain (reducing sediment loss), increased 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				
Blair Creek Mitigation Project - NCDMS Project No. 100047				
Required	Parameter	Frequency	Number/Locations	Notes
X	Pattern	Baseline/As-built (MY0)	For Reaches R1, R2, and R3	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

Table 8.2 Monitoring Requirements and Schedule

Blair Creek Mitigation Project - NCDMS Project No. 100047

Required	Parameter	Frequency	Number/Locations	Notes
				only if there are visual indications or cross section survey data that suggest significant changes have occurred.
X	Dimension	Monitoring Years 1, 2, 3, 5 and 7	15 cross sections: 8 on Reach R1, 5 on R2, 1 on R3, and 1 on UT1.	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 R1, R2, R3, and UT1	For all reach 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 crest gauge each on R1 floodplain, R2 floodplain, and at confluence of R1 and R2; and 1 in-stream flow gauge on UT1	The devices will be inspected on a quarterly/semi-annual basis to document the occurrence of bankfull events and flow.
X	Groundwater Hydrology	Annually	10 groundwater monitoring wells in wetland restoration locations	The devices will be inspected and downloaded on a quarterly basis to document groundwater hydrology in wetland restoration areas.
X	Vegetation	Monitoring Years 1, 2, 3, 5 and 7	8 total vegetation plots: 6 permanent and 2 random plots.	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 removed 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 maintenance of any fencing that might be required to fulfill the conditions of the conservation easement.

11.0 DETERMINATION OF CREDITS

The determination of all stream assets and credits for the Blair Creek Site are detailed below in Table 11.1, and are shown in Figure 12. They have been calculated according to all applicable DMS, IRT, and DEQ guidance documents. The Credit Release Table can be found in Appendix C.

Table 11.1 Project Assets and Components

Blair Creek Mitigation Project - NCDMS Project No. 100047

Project Segment	Existing Footage or Acreage	Mitigation Plan Footage or Acreage*	Mitigation Category	Restoration Level	Priority Level	Mitigation Ratio (X:1)
Reach 1	2,399	2,699.76	Cold	R	1	1.0
Reach 2	1,468	1,473.91	Cold	R	1	1.0
Reach 3	185	118.94	Cold	R	1	1.0
Reach UT1	195	176.9	Cold	EII	N/A	2.5
W1	5.218	5.218	Riparian	R	Re-establishment	1.0
W2	0.693	0.693	Riparian	R	Rehabilitation	1.5
W3	0.184	0.184	Riparian	E	Enhancement	2.0

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

Table 11.2 Project Credits

Blair Creek Mitigation Project - NCDMS Project No. 100047

Restoration Level	Stream			Riparian Wetland		Non-Rip Wetland	Coastal Marsh
	Warm	Cool	Cold	Riverine	Non-Riv		
Restoration			4292.610				
Re-establishment				5.218			
Rehabilitation				0.462			
Enhancement				0.092			
Enhancement I							
Enhancement II			70.760				
Creation							
Preservation							
Totals			4,363.370	5.772			

12.0 REFERENCES

- Arcement, G.J., and V.R. Schneider. 1989. Guide for Selecting Manning's Roughness Coefficients for Natural Channels and Floodplains. United States Geological Survey Water-Supply Paper 2339. <http://pubs.usgs.gov/wsp/2339/report.pdf>
- Cowardin, Lewis M., Virginia Carter, Francis Golet, and Edward LaRoe. 1979. Classification of Wetlands and Deepwater Habitats of the United States. US Dept. of Interior – Fish and Wildlife Service. Washington DC.
- Federal Geographic Data Committee (FGDC). 2013. Classification of wetlands and deepwater habitats of the United States. FGDC-STD-004-2013. Second Edition. Wetlands Subcommittee, Federal Geographic Data Committee and U.S. Fish and Wildlife Service, Washington, DC.
- Daniels et al. 1999. Soils Systems of North Carolina. Technical Bulletin 314. North Carolina State University, Dept. of Soil Science. Raleigh, NC.
- Dunne, T. and L.B. Leopold. 1978. Water in Environmental Planning. W.H. Freeman and Company, New York.
- Griffith, G.E., Omernik, J.M., Comstock, J.A., Schafale, M.P., McNab, W.H., Lenat, D.R., MacPherson, T.F., Glover, J.B., and Shelburne, V.B. 2002. Ecoregions of North Carolina and South Carolina, (color poster with map, descriptive text, summary tables, and photographs): Reston, Virginia, U.S. Geological Survey (map scale 1:1,500,000).
- Harman, W.H. et al. 2000. Bankfull Regional Curves for North Carolina Mountain Streams. In: Kane, D.L. (Ed.). Proc. AWRA Conf. Water Resources in Extreme Environments, Anchorage, AK. Pp. 185-190. Available online at: <https://web.archive.org/web/20170705004308/https://www.bae.ncsu.edu/programs/extension/wqg/srp/mtnpaper.html>
- Harman, W., R. Starr, M. Carter, K. Tweedy, M. Clemmons, K. Suggs, C. Miller. 2012. *A Function-Based Framework for Stream Assessment and Restoration Projects*. US Environmental Protection Agency, Office of Wetlands, Oceans, and Watersheds, Washington, DC EPA 843-K-12-006.
- Lane, E. W. 1955. Design of stable channels. Transactions of the American Society of Civil Engineers. Paper No. 2776: 1234-1279.
- Leopold, L.B. 1994. *A View of the River*. Harvard University Press. Cambridge, MA.
- Leopold, L.B. and T. Maddock, Jr. 1953. The Hydraulic Geometry of Stream Channels and Some Physiographic Implications. Geological Survey Professional Paper 252. US Dept of Interior, Washington, D.C.
- Leopold, L. B., M.G. Wolman, and J.P. Miller. 1964. *Fluvial Processes in Geomorphology*. San Francisco, CA. (151).
- National Resource Conservation Service (NRCS). 1998. Soil Survey of Clay County, North Carolina.
- National Oceanic and Atmospheric Association (NOAA). 2020. Agricultural Applied Climate Information System (AgACIS) for Cherokee County. WETS Station Murphy 4ESE, NC (Coop ID 316001). Website Cited on April 26, 2020. <http://agacis.rcc-acis.org/?fips=37039>
- NatureServe. 2020. NatureServe Explorer web application. NatureServe, Arlington, Virginia. Available <https://explorer.natureserve.org/>. (Accessed: December 29, 2020).
- North Carolina Division of Water Resources (DWR). 2012. Hiwassee River Basinwide Water Quality Plan, North Carolina Department of Environmental Quality, Raleigh, NC. Available at URL:

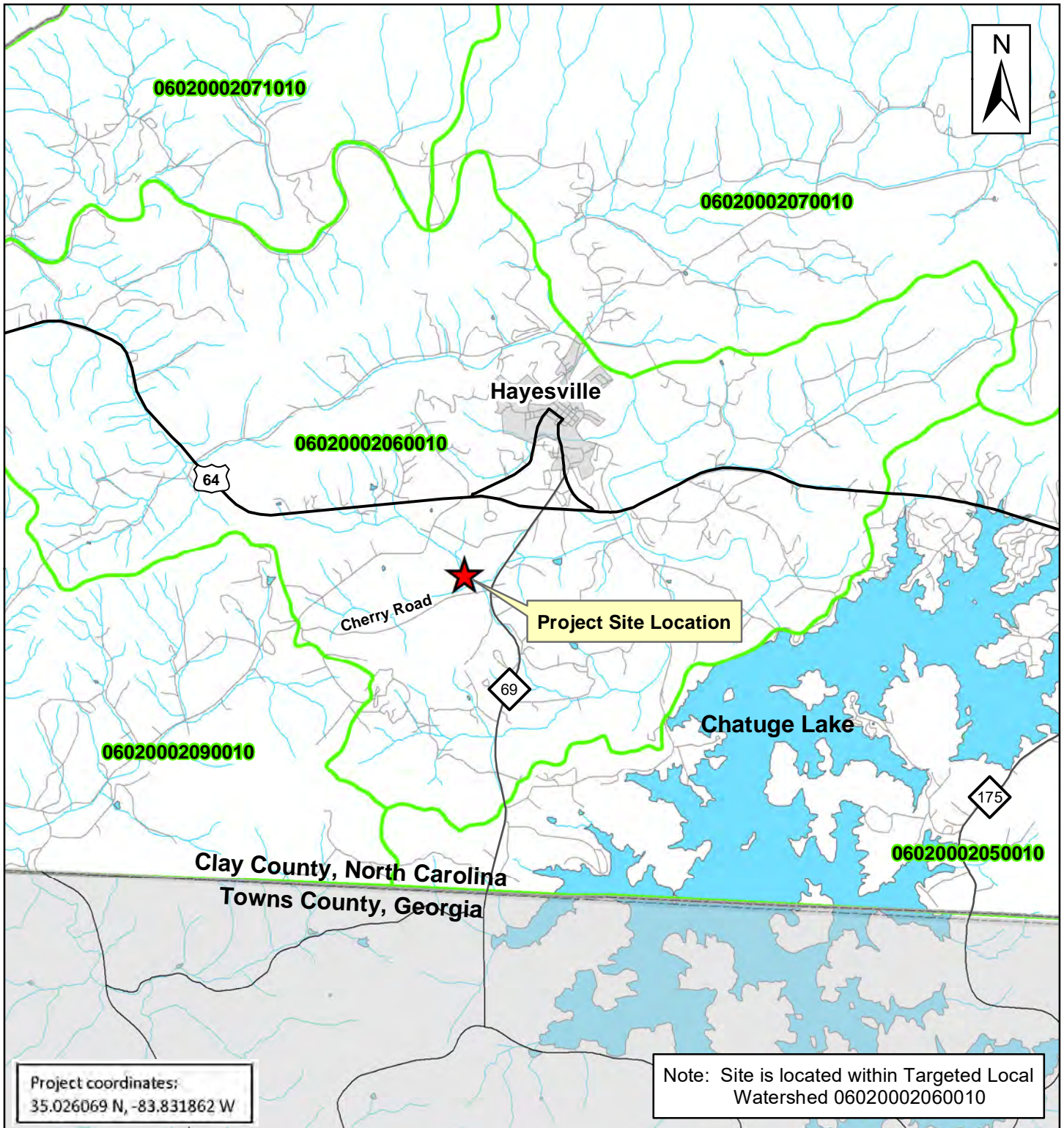
<https://deq.nc.gov/about/divisions/water-resources/planning/basin-planning/water-resource-plans/hiawasee-2012>

- North Carolina Division of Water Resources. 2016. Hiwassee River Basin Classification Schedule. Updated 2016. NC Department of Environmental Quality. Raleigh, NC. Available at: <https://deq.nc.gov/river-basin-classification-schedule>
- North Carolina Division of Water Quality (now Water Resources). 2010. Methodology for Identification of Intermittent and Perennial Streams and Their Origins (Version 4.11). Effective Date: September 1, 2010.
- North Carolina Division of Water Quality (now Water Resources). 2013. Memorandum: Consistency between Federal and State Wetland Mitigation Requirements. July 30, 2013.
- North Carolina Department of Transportation. 2003. Reference Reach Database. *In publication*.
- North Carolina Division of Mitigation Services. 2008. Hiwassee River Basin Restoration Priorities (Amended 2018). NC Department of Environmental Quality. Raleigh, NC.
- North Carolina Floodplain Mapping Program. 2018. [Online WWW]. Available URL: www.ncfloodmaps.com Also available as ArcGIS Server feature at: <http://hazards.fema.gov/gis/nfhl/services>.
- North Carolina Geological Survey, 1985. Geologic Map of North Carolina. Raleigh, North Carolina Department of Natural Resources and Community Development, Geological Survey Section. Scale 1:500,000. Map is available for download as a GIS feature at: <http://data.nconemap.gov/downloads/vector/geol.zip>.
- North Carolina Natural Heritage Data Explorer North Carolina Department of Natural and Cultural Resources, Natural Heritage Program. Raleigh, NC. September 2017. Data Explorer (<https://ncnhde.natureserve.org/>)
- North Carolina Stream Functional Assessment Team. 2015. North Carolina Stream Assessment Method. V2.1, September 2015.
- North Carolina Wetland Functional Assessment Team. 2016. North Carolina Wetland Assessment Method. V5.0, February 2016.
- North Carolina Wildlife Resources Commission. 2015. North Carolina Wildlife Action Plan. Raleigh, NC. Online version of the NC Wildlife Action Plan: <http://www.ncwildlife.org/plan.aspx>
- Rosgen, D. L., 1994. A classification of natural rivers. *Catena* 22:169-199.
- _____. 1996. *Applied River Morphology*. Wildland Hydrology Books, Pagosa Springs, Colo.
- _____. 2001. A Stream Channel Stability Assessment Methodology. *Proceedings of the Seventh Federal Interagency Sedimentation Conference*, Vol. 2, pp. II - 18-26, March 25-29, 2001, Reno, NV: Subcommittee on Sedimentation.
- _____. 2009. *Watershed Assessment of River Stability and Sediment Supply (WARSSS)*. Wildland Hydrology Books, Fort Collins, CO. (648).
- Schafale, M. P. 2012. Classification of the Natural Communities of North Carolina, fourth approximation. North Carolina Dept. of Natural and Cultural Resources, Natural Heritage Program. Raleigh, NC.
- Simon, A. 1989. *A model of channel response in disturbed alluvial channels*. *Earth Surface Processes and Landforms* 14(1):11-26.

- United States Army Corps of Engineers. 1987. Corps of Engineers Wetlands Delineation Manual. Technical Report Y-87-1. Environmental Laboratory. US Army Engineer Waterways Experiment Station. Vicksburg, MS.
- _____. 2003. Stream Mitigation Guidelines, April 2003, U.S. Army Corps of Engineers. Wilmington District.
- _____. 2005. "Technical Standard for Water-Table Monitoring of Potential Wetland Sites," WRAP Technical Notes Collection (ERDC TNWRAP-05-2), U. S. Army Engineer Research and Development Center, Vicksburg, MS.
- _____. 2012. *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Eastern Mountains and Piedmont Region Version 2.0.* ed. J.F. Berkowitz, J.S. Wakeley, R.W. Lichvar, C.V. Noble. ERDC/EL TR-12-9. Vicksburg, MS: US Army Engineer Research and Development Center.
- _____. 2016. Wilmington District Stream and Wetland Compensatory Mitigation Update. North Carolina Interagency Review Team – October 24, 2016. Wilmington District.
- United States Fish and Wildlife Service (USFWS). Updated 04-06-2020. Endangered Species, Threatened Species, Federal Species of Concern and Candidate Species, Clay County, NC. Available online at: <https://www.fws.gov/raleigh/species/cntylist/clay.html>
- United States Fish and Wildlife Service (USFWS). 2017. Official Species List. Blair Creek Site, NC. Asheville, NC. ECOS-IPaC website. September 18, 2017. Consultation Code: 04EN1000-2017-SLE-0596.
- United States Geological Service (USGS). 2016. National Land Cover Database. Available online at: <https://www.mrlc.gov/nlcd2016.php>.
- United States Geological Service (USGS). 2012. The StreamStats web program for North Carolina. Available online at: https://water.usgs.gov/osw/streamstats/north_carolina.html.
- Walker, A. 2018. NC Rural Mountain and Piedmont Regional Curve. Unpublished, NRCS. Personal Communication.
- Wolman, W.G., and L.B. Leopold. 1957. River Flood-plains – Some Observations on their Formation. U.S. Geological Survey Professional Paper 282C: 87-109

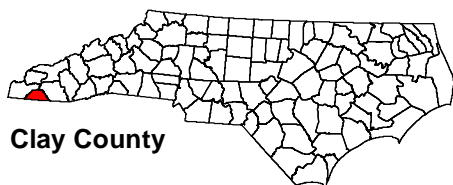
APPENDIX A: FIGURES, PHOTOS, AND SUPPLEMENTARY DATA





Project coordinates:
35.026069 N, -83.831862 W

Note: Site is located within Targeted Local Watershed 06020002060010



Clay County

Hiwassee River Basin

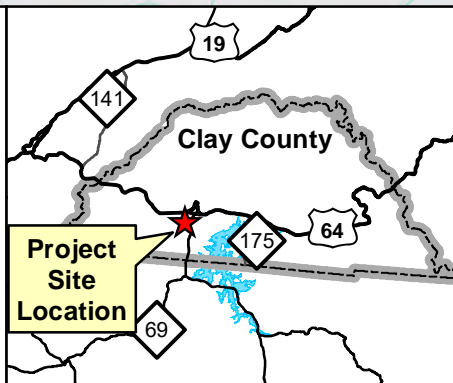
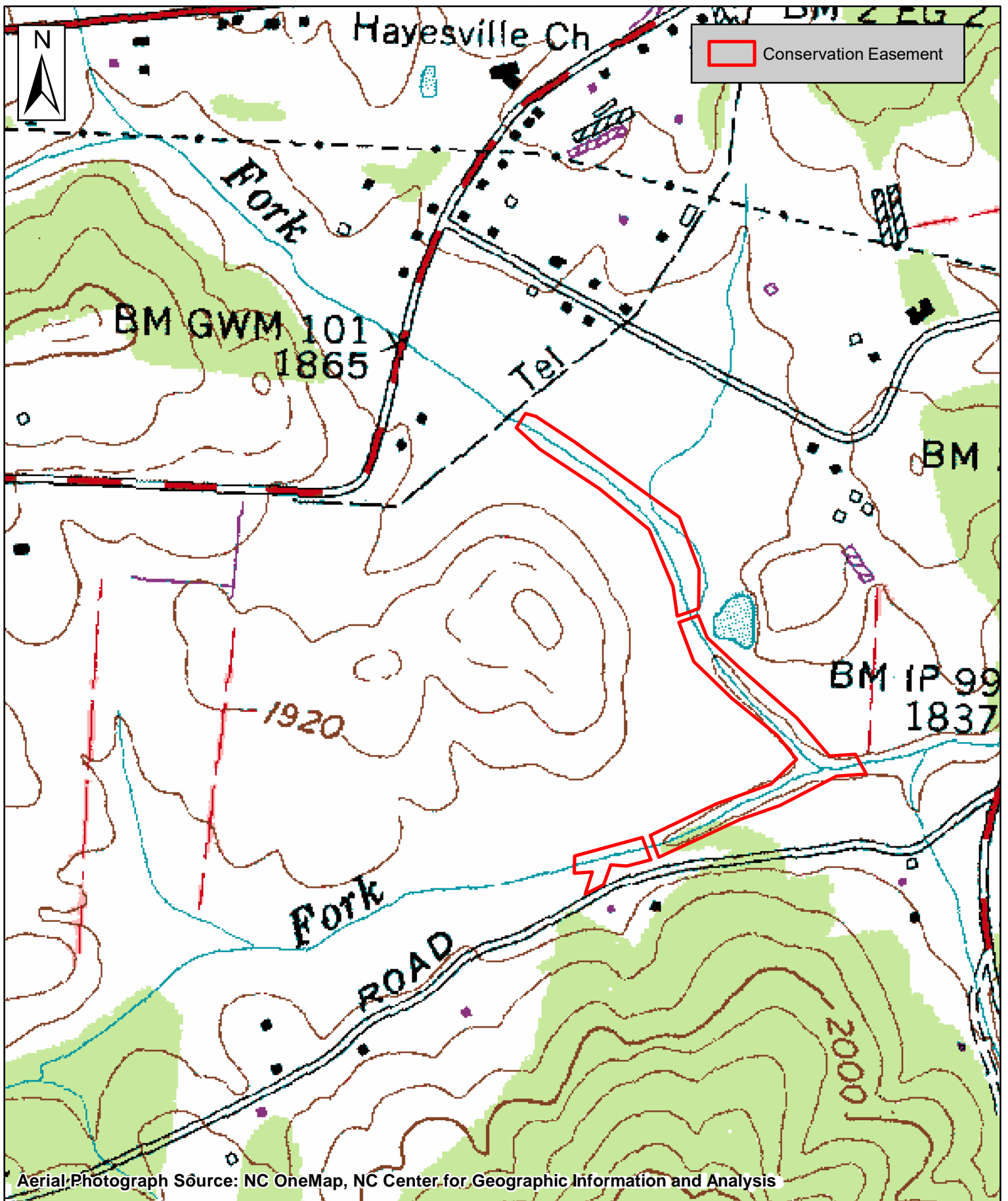
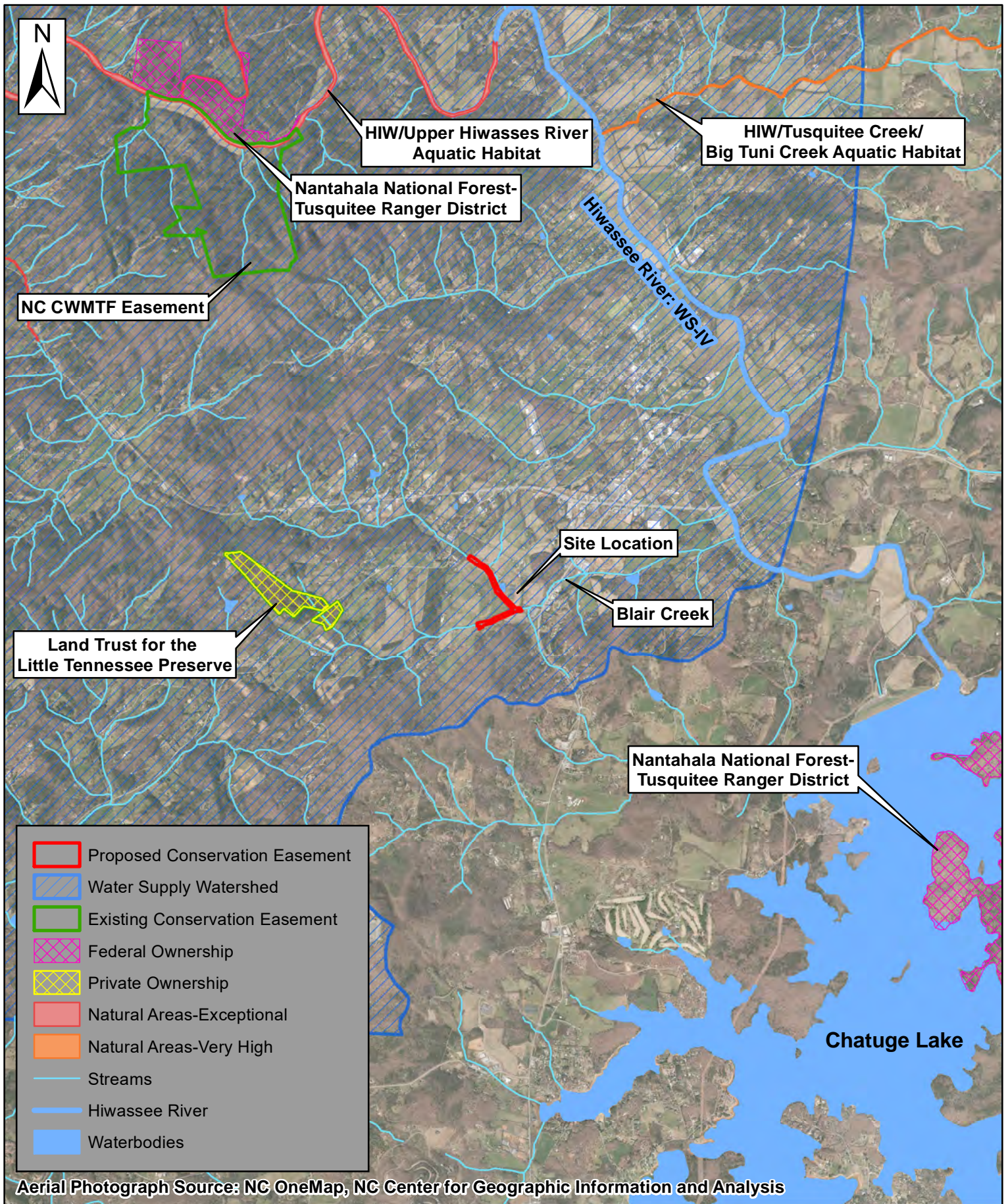


Figure 1
Project Vicinity Map
Blair Creek Mitigation Project

Michael Baker
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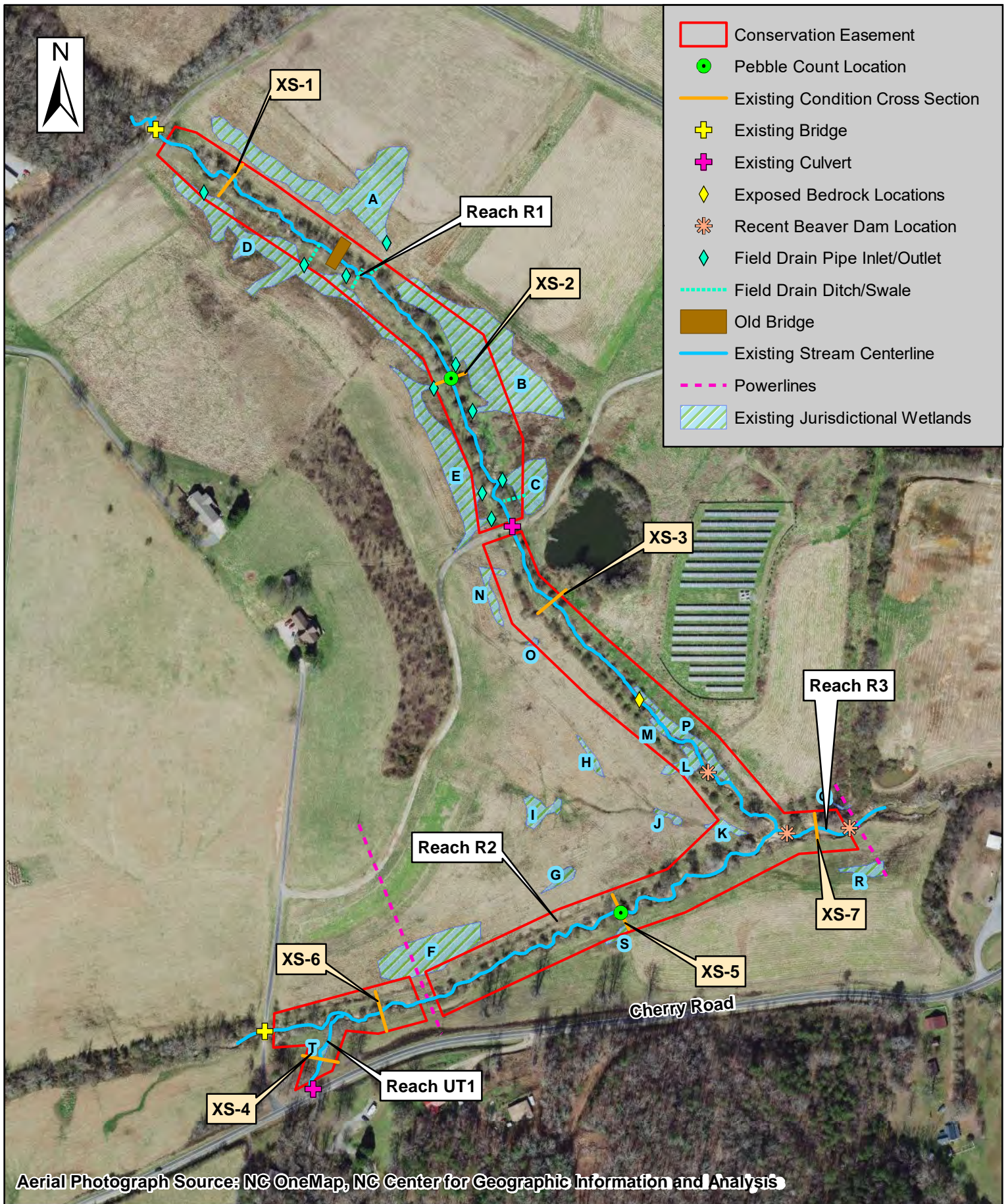






Aerial Photograph Source: NC OneMap, NC Center for Geographic Information and Analysis

	<p>North Carolina Division of Mitigation Services DMS Proj. No. 100047</p>		<p>Figure 3. Adjacent Planning Elements Map Blair Creek Mitigation Project Clay County, NC</p>
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Aerial Photograph Source: NC OneMap, NC Center for Geographic Information and Analysis

<p>Michael Baker INTERNATIONAL</p>	<p>North Carolina Division of Mitigation Services DMS Proj. No. 100047</p>	<p>0 150 300 600 Feet 1 inch = 300 feet</p>	<p>Figure 4 Existing Conditions and Features Blair Creek Mitigation Project Clay County, NC</p>
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Znt, Murphy Belt
Nantahala Formation: Slate and metasiltstone

Zd, Blue Ridge Belt
Dean Formation: Sericite schist


Zhha, Blue Ridge Belt
Metasandstone, Metagraywacke, Metasiltstone, and Mica schist

Project Location

Zwe, Blue Ridge Belt
Wehuddy Formation: Slate to schist

Zch, Blue Ridge Belt
Copper Hill Formation: Metagraywacke

ZYbn, Blue Ridge Belt
Biotite gneiss

 Proposed Conservation Easement

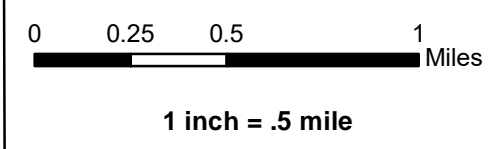
Geologic Formation

-  ZYbn
-  Zch
-  Zd
-  Zhha
-  Znt
-  Zwe

2015 Aerial Photograph Source: NC OneMap, NC Center for Geographic Information and Analysis

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North Carolina
Division of
Mitigation Services
DMS Proj. No. 100047



**Figure 5. Geologic Map
Blair Creek Mitigation Project
Clay County, NC**



- Reach UT1
- Reach R2 (South Fork Blair Creek)
- Reach R1 (North Fork Blair Creek)
- Reach R3 (Blair Creek mainstem)
- Conservation Easement

Reach 1:
983 acres/1.53 SqMi

Reach 2:
880 acres/1.38 SqMi

Reach R3:
1,864 acres
2.91 SqMi

Reach UT1:
22 acres

Project Watershed Land Use (USGS National Land Cover Database 2016)	
Developed (impervious)	12.6% (1.7%)
Cultivated Crops	1.8%
Pasture/Hay	28.0%
Herbaceous	0.7%
Shrub/Scrub	1.2%
Forested	55.7%

NC Center for Geographic Information and Analysis



North Carolina
Division of
Mitigation Services
DMS Proj. No. 100047

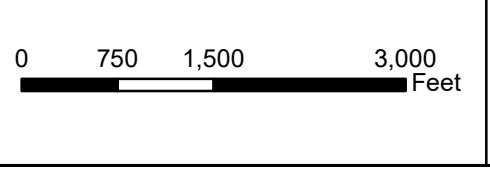
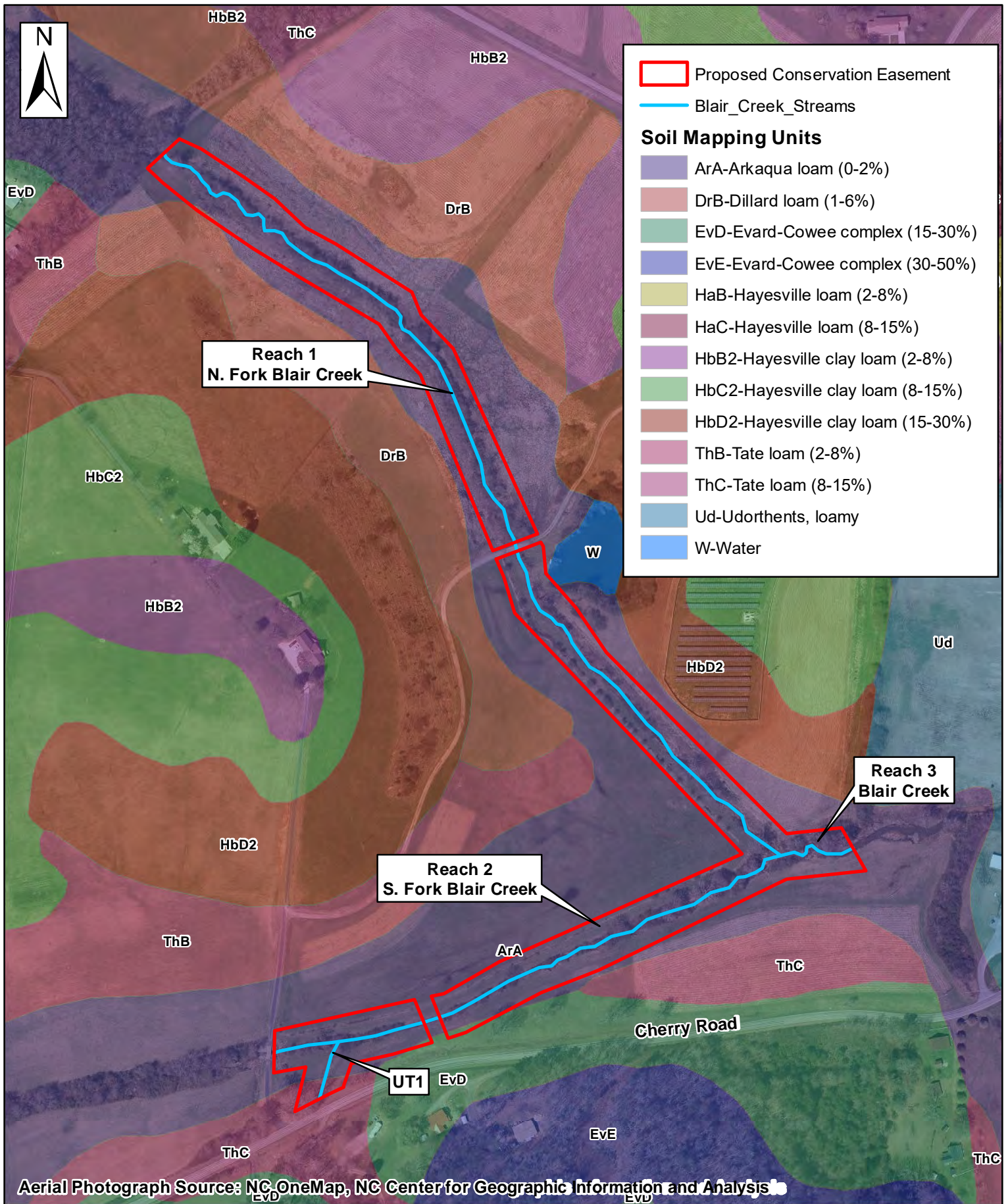


Figure 6. Drainage Area and Land Use Map
Blair Creek Mitigation Project
Clay County, NC



Proposed Conservation Easement

Blair_Creek_Streams

Soil Mapping Units

- ArA-Arkaqua loam (0-2%)
- DrB-Dillard loam (1-6%)
- EvD-Evard-Cowee complex (15-30%)
- EvE-Evard-Cowee complex (30-50%)
- HaB-Hayesville loam (2-8%)
- HaC-Hayesville loam (8-15%)
- HbB2-Hayesville clay loam (2-8%)
- HbC2-Hayesville clay loam (8-15%)
- HbD2-Hayesville clay loam (15-30%)
- ThB-Tate loam (2-8%)
- ThC-Tate loam (8-15%)
- Ud-Udorthents, loamy
- W-Water

Aerial Photograph Source: NC OneMap, NC Center for Geographic Information and Analysis


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North Carolina
Division of
Mitigation Services
DMS Proj. No. 100047

0 145 290 580 Feet
1 inch = 300 feet




**Figure 7. Soils Map
Blair Creek Mitigation Project
Clay County, NC**

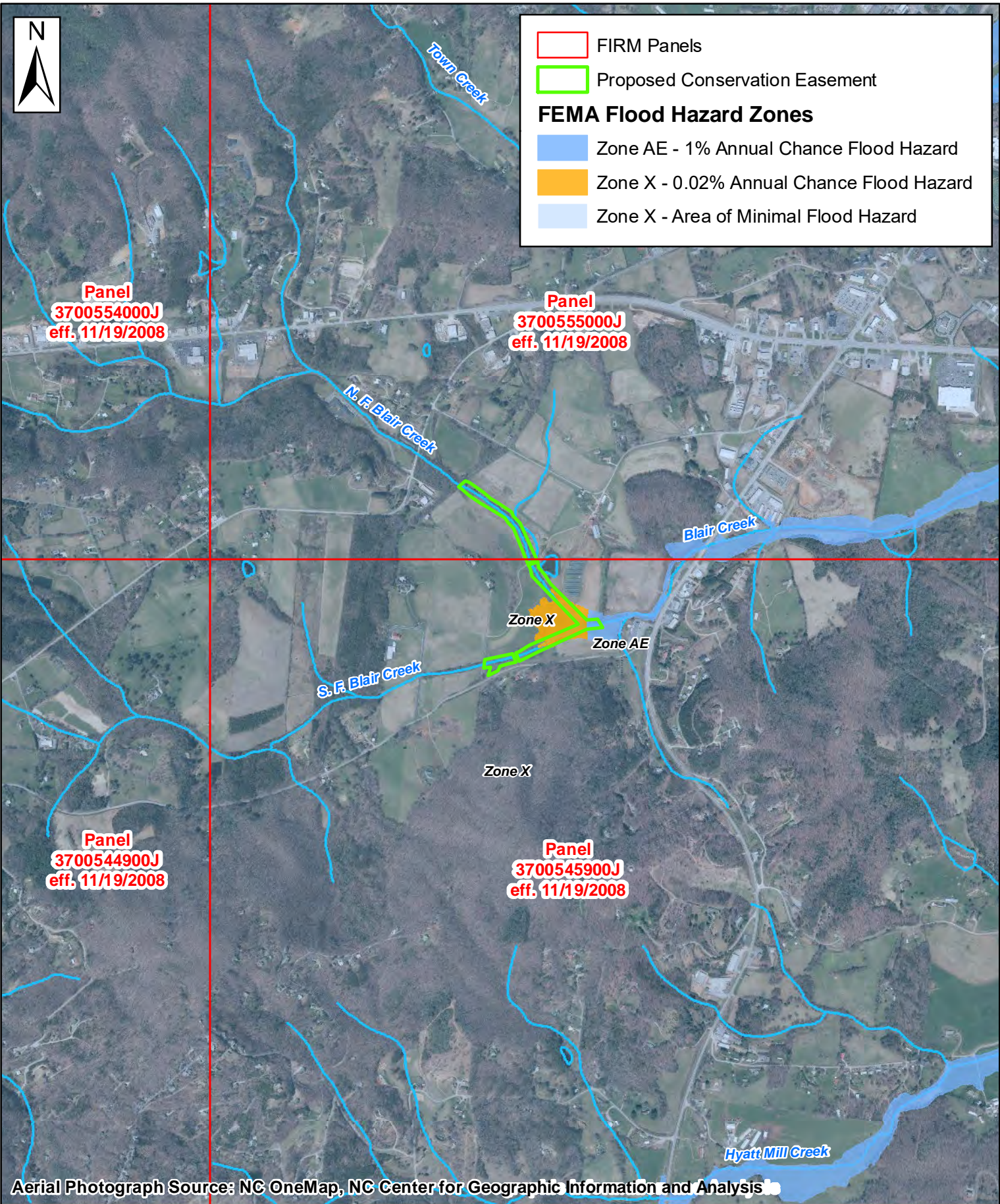


 FIRM Panels

 Proposed Conservation Easement

FEMA Flood Hazard Zones

-  Zone AE - 1% Annual Chance Flood Hazard
-  Zone X - 0.02% Annual Chance Flood Hazard
-  Zone X - Area of Minimal Flood Hazard



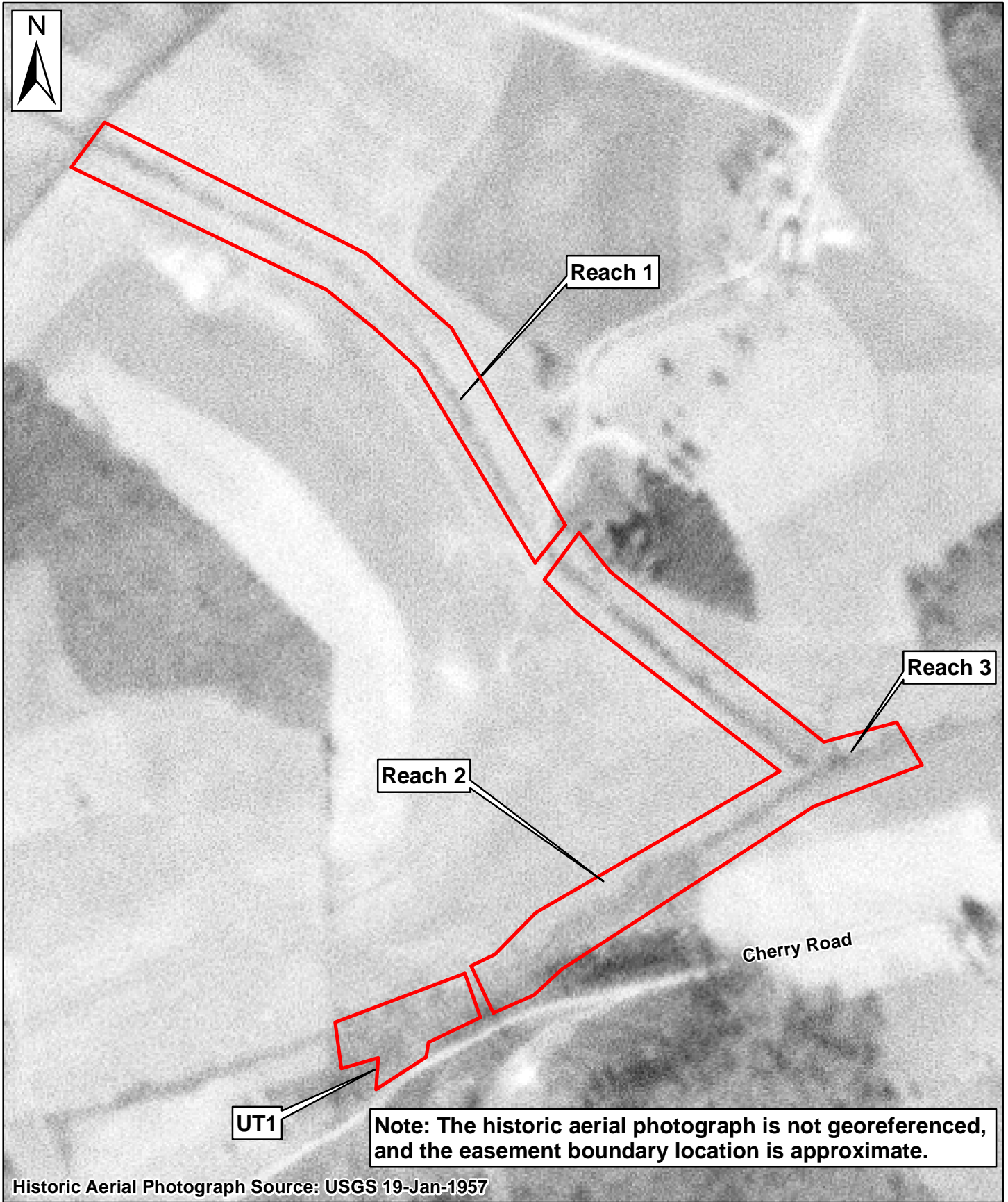
Aerial Photograph Source: NC OneMap, NC Center for Geographic Information and Analysis

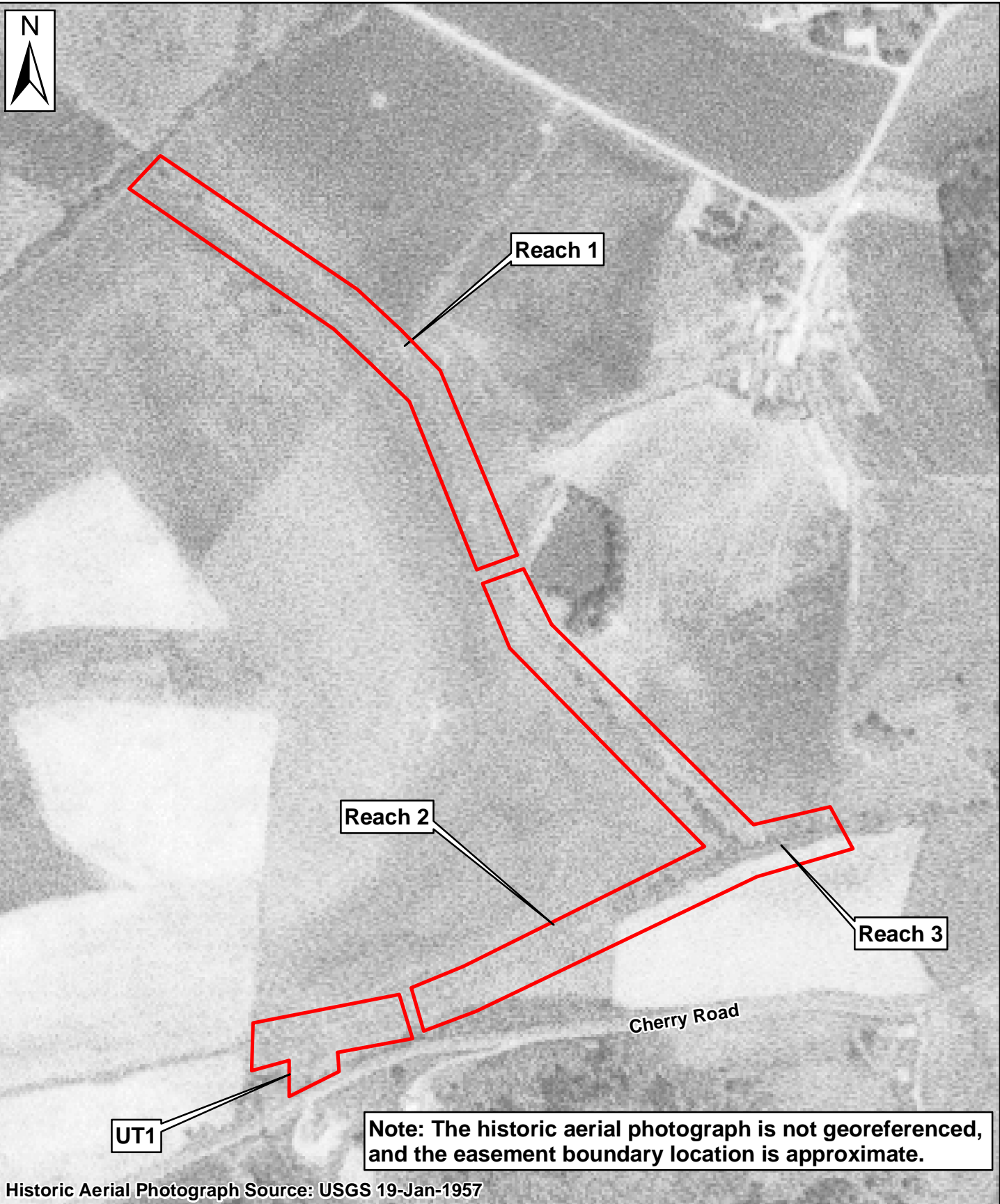
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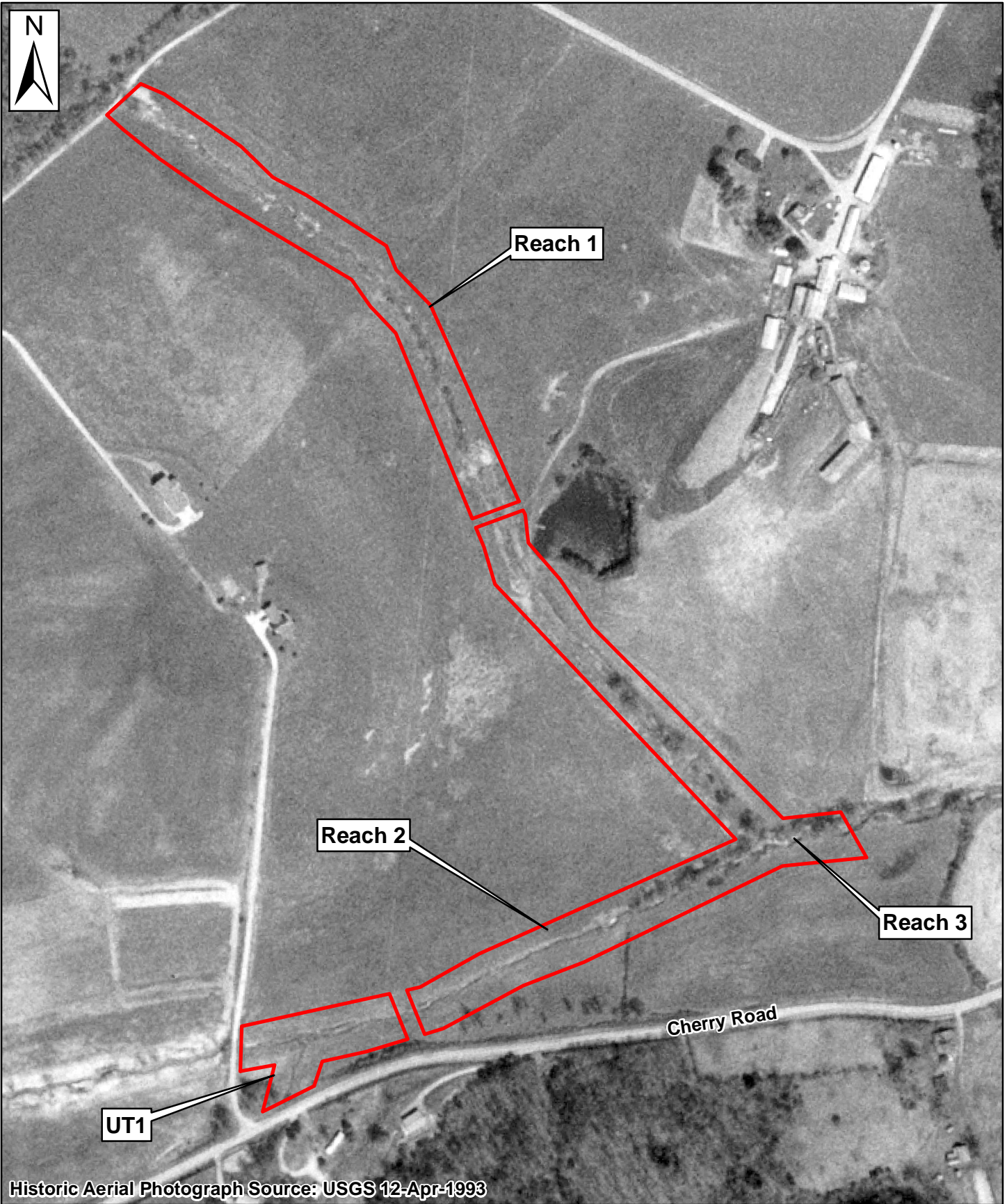
North Carolina
Division of
Mitigation Services
DMS Proj. No. 100047

0 750 1,500 3,000 Feet
1 inch = 1,500 feet

**Figure 8. FEMA
Floodplain Map
Blair Creek Mitigation Project
Clay County, NC**







Historic Aerial Photograph Source: USGS 12-Apr-1993

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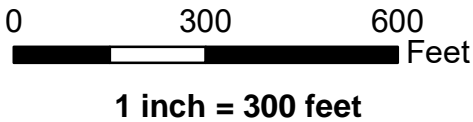
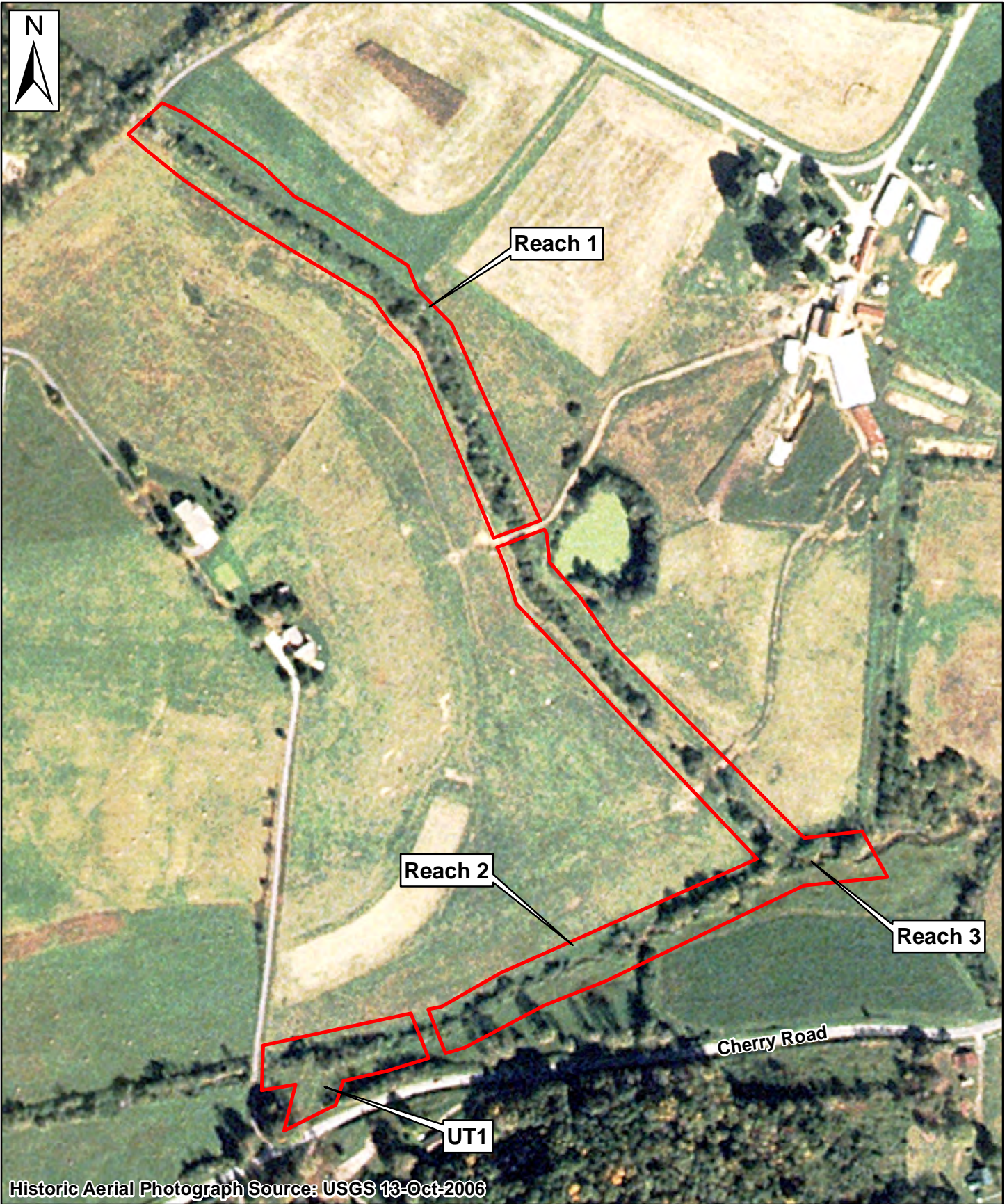


Figure 9C Historic
Aerial 1993
Blair Creek Mitigation Project



Historic Aerial Photograph Source: USGS 13-Oct-2006

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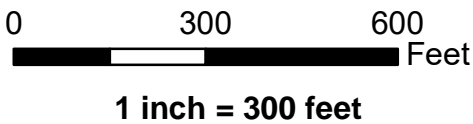


Figure 9D Historic
Aerial 2006
Blair Creek Mitigation Project

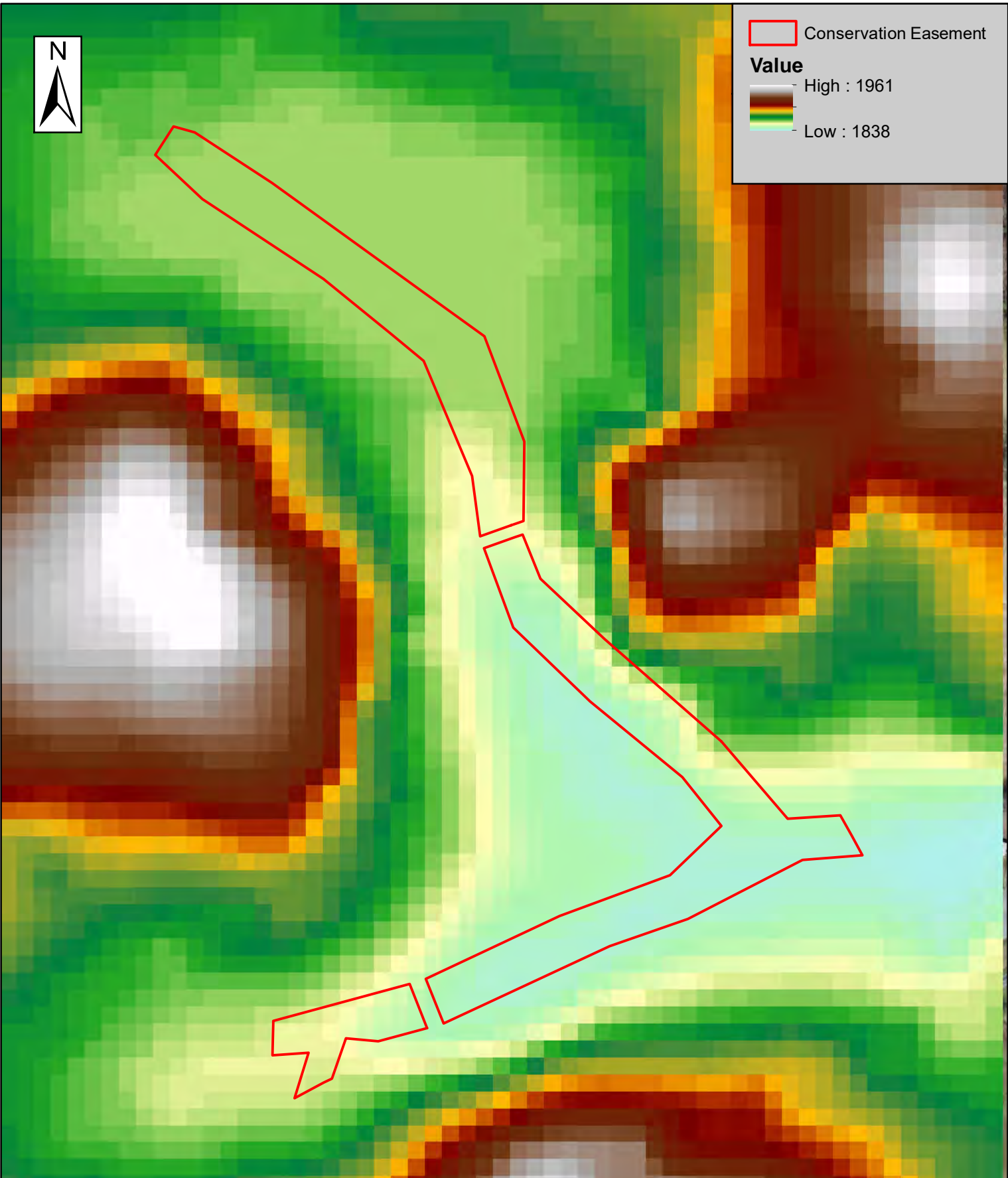


Conservation Easement

Value

High : 1961

Low : 1838



Aerial Photograph Source: NC OneMap, NC Center for Geographic Information and Analysis

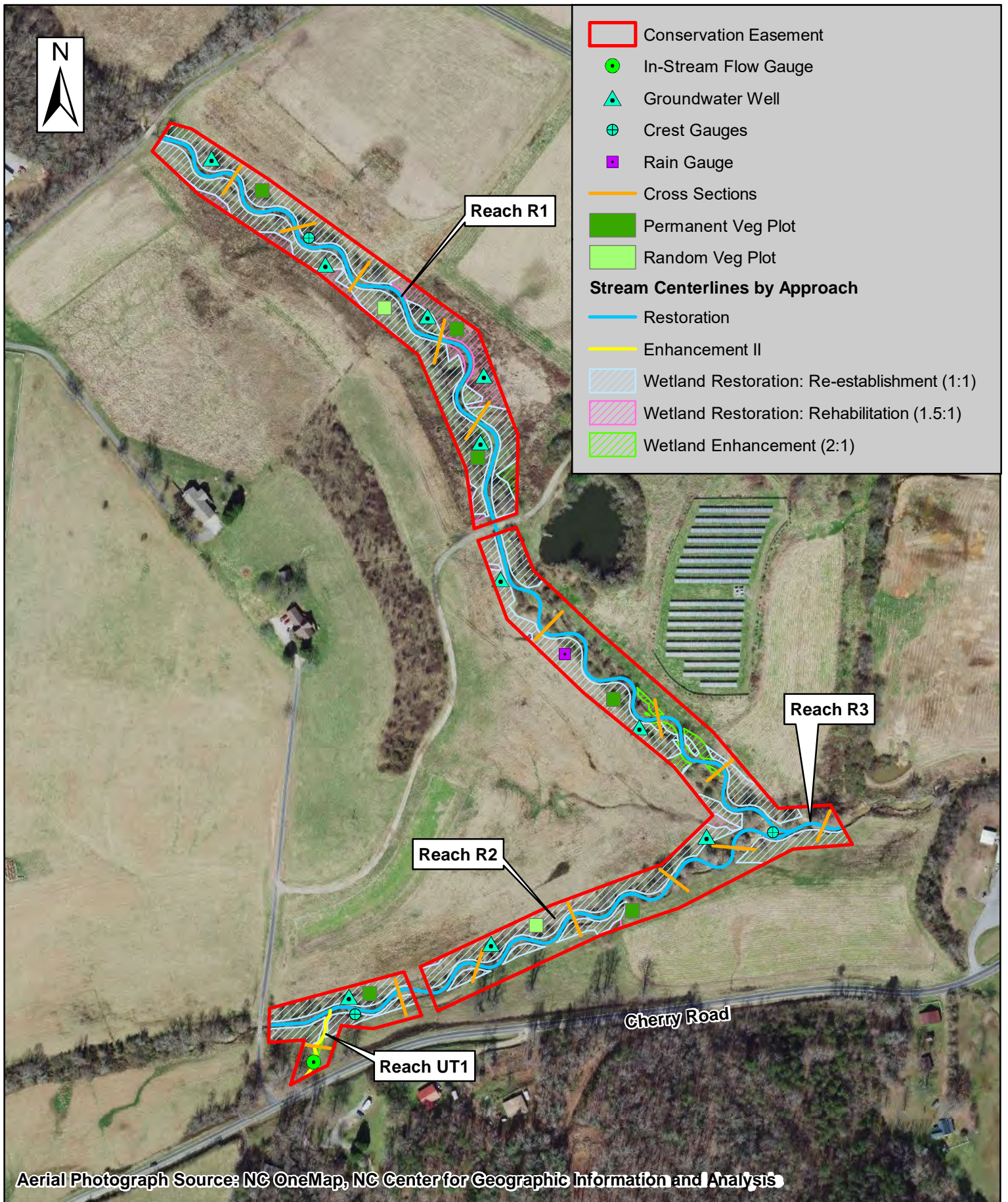
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Mitigation Services
DMS Proj. No. 100047

0 150 300 600 Feet

1 inch = 300 feet

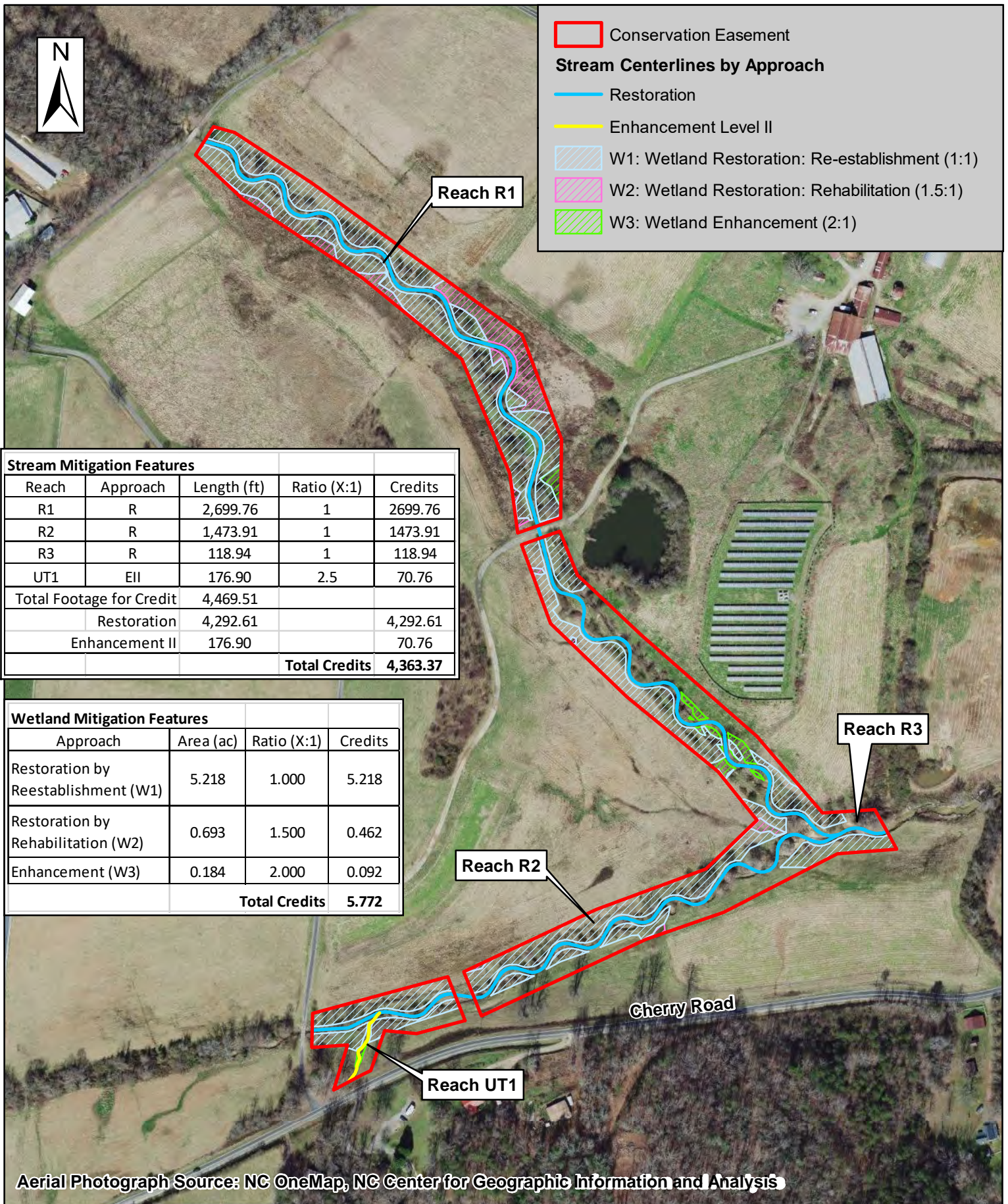
Figure 10 LiDAR Map
Blair Creek Mitigation Project
Clay County, NC



- Conservation Easement
- In-Stream Flow Gauge
- ▲ Groundwater Well
- ⊕ Crest Gauges
- Rain Gauge
- Cross Sections
- Permanent Veg Plot
- Random Veg Plot
- Stream Centerlines by Approach**
- Restoration
- Enhancement II
- Wetland Restoration: Re-establishment (1:1)
- Wetland Restoration: Rehabilitation (1.5:1)
- Wetland Enhancement (2:1)

Aerial Photograph Source: NC OneMap, NC Center for Geographic Information and Analysis

	<p>North Carolina Division of Mitigation Services DMS Proj. No. 100047</p>	<p>1 inch = 300 feet</p>	<p>Figure 11 Proposed Monitoring Features Blair Creek Mitigation Project Clay County, NC</p>
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Conservation Easement

Stream Centerlines by Approach

- Restoration
- Enhancement Level II
- W1: Wetland Restoration: Re-establishment (1:1)
- W2: Wetland Restoration: Rehabilitation (1.5:1)
- W3: Wetland Enhancement (2:1)

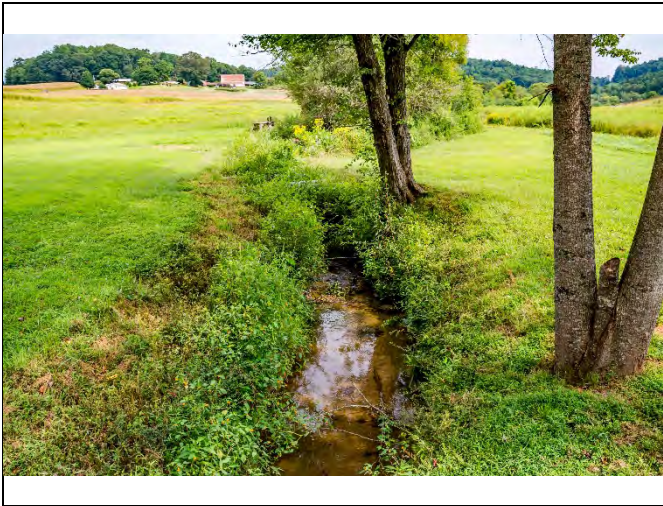
Stream Mitigation Features				
Reach	Approach	Length (ft)	Ratio (X:1)	Credits
R1	R	2,699.76	1	2699.76
R2	R	1,473.91	1	1473.91
R3	R	118.94	1	118.94
UT1	EII	176.90	2.5	70.76
Total Footage for Credit		4,469.51		
Restoration		4,292.61		4,292.61
Enhancement II		176.90		70.76
			Total Credits	4,363.37

Wetland Mitigation Features			
Approach	Area (ac)	Ratio (X:1)	Credits
Restoration by Reestablishment (W1)	5.218	1.000	5.218
Restoration by Rehabilitation (W2)	0.693	1.500	0.462
Enhancement (W3)	0.184	2.000	0.092
Total Credits			5.772

Aerial Photograph Source: NC OneMap, NC Center for Geographic Information and Analysis

	<p>North Carolina Division of Mitigation Services DMS Proj. No. 100047</p>	<p>1 inch = 300 feet</p>	<p>Figure 12: Project Asset and Credit Map Blair Creek Mitigation Project Clay County, NC</p>
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Blair Creek Existing Conditions Photographs



Upper Reach 1, downstream (Aug 2017)



Upper Reach R1, left bank (Aug 2017)



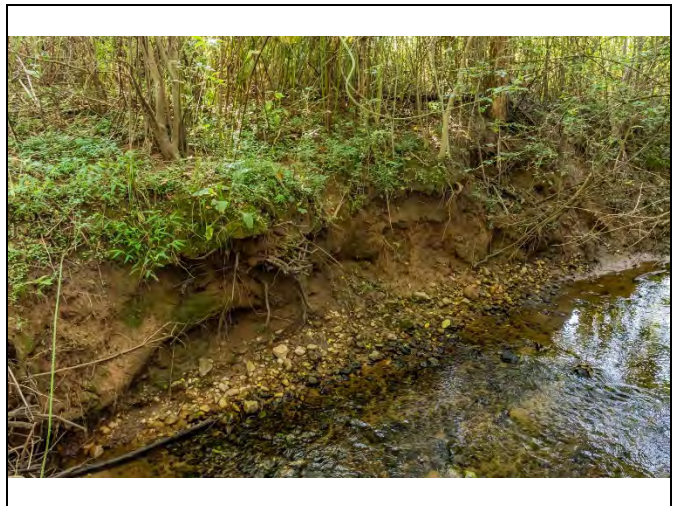
Upper Reach R1, right bank (Aug 2017)



Upper Reach R1, downstream (Aug 2017)



Upper Reach R1, upstream at old bridge (Aug 2017)



Upper Reach R1, right bank (Aug 2017)

Blair Creek Existing Conditions Photographs



Upper Reach R1, right bank (Aug 2017)



Upper Reach R1, drain pipe outfall (Aug 2017)



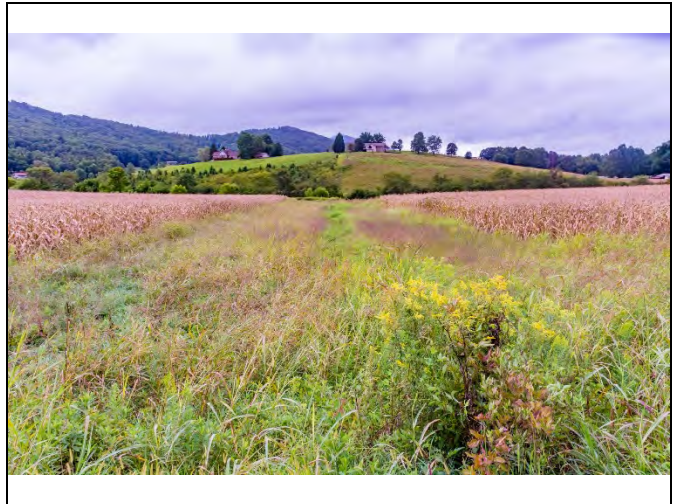
Upper Reach R1, drain pipe outfall (Aug 2017)



Upper Reach R1, left bank (Aug 2017)



Upper Reach R1, drain pipe outfall (Aug 2017)



Upper Reach R1, adjacent field drain into right bank (Aug 2017)

Blair Creek Existing Conditions Photographs



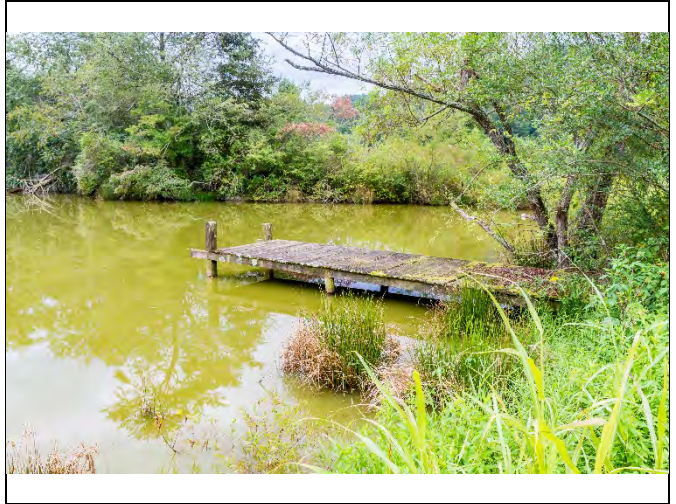
Upper Reach R1, adjacent field drain into left bank (Aug 2017)



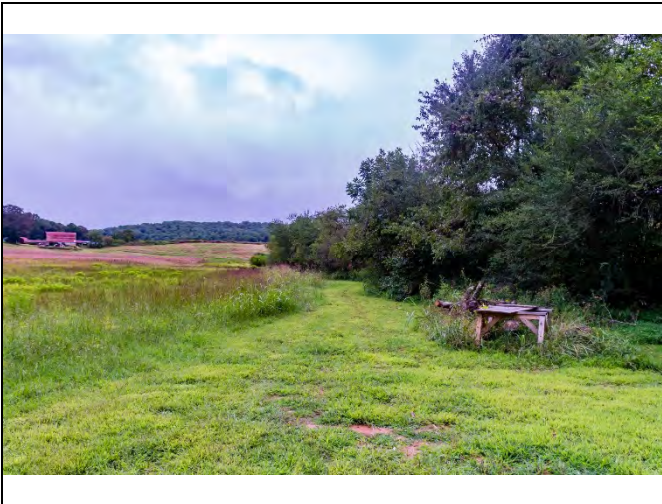
Upper Reach R1, drain outfall into left bank (Sept 2017)



Mid Reach R1, culvert crossing (Aug 2017)



Mid Reach R1, farm pond (Aug 2017)



Reach R1, mowed buffer in left floodplain (Aug 2017)



Lower Reach R1, dense privet along stream bank (Aug 2017)

Blair Creek Existing Conditions Photographs



Lower Reach R1, upstream (Aug 2017)



Lower Reach R1, downstream at a beaver dam (4/21/20)



Lower Reach R1, downstream (4/21/20)



Lower Reach R1, upstream (4/21/20)



Lower Reach R1, downstream (4/21/20)



Lower Reach R1, downstream (4/21/20)

Blair Creek Existing Conditions Photographs



Lower Reach R1, upstream above confluence with R2/R3 (4/21/20)



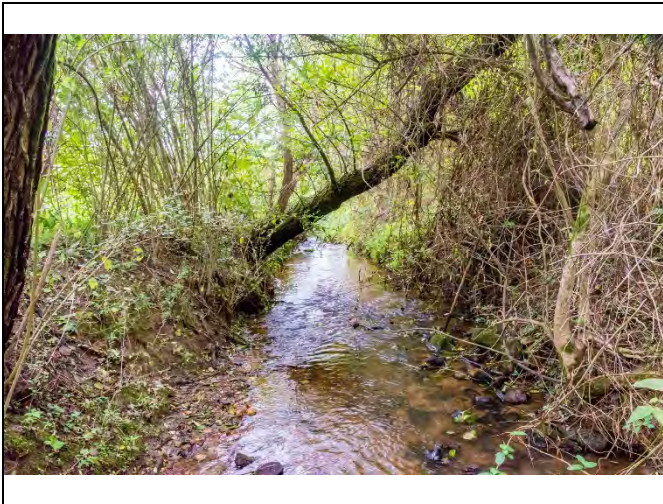
Upper Reach R2, right bank (Aug 2017)



Upper Reach R2, left bank (Aug 2017)



Upper Reach R2, left bank (Aug 2017)



Upper Reach R2, downstream (Aug 2017)

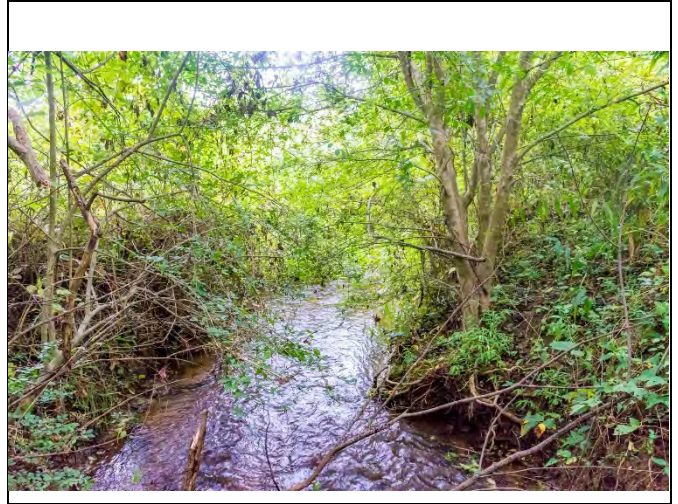


Upper Reach R2, upstream (Aug 2017)

Blair Creek Existing Conditions Photographs



Upper Reach R2, right bank (Aug 2017)



Lower Reach R2, downstream (Aug 2017)



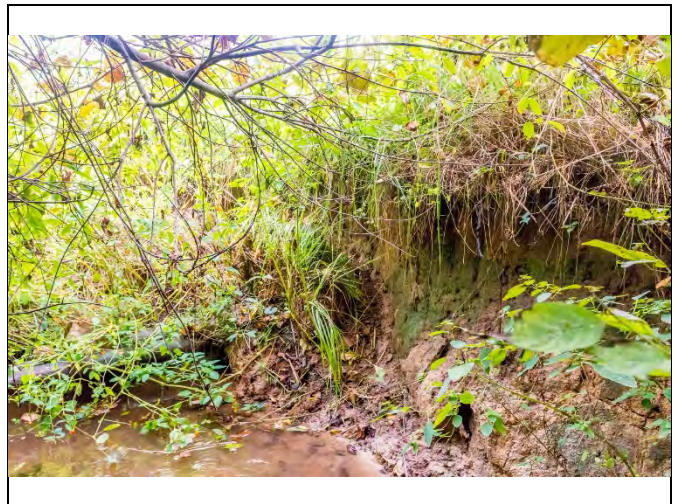
Lower Reach R2, downstream (Aug 2017)



Lower Reach R2, left bank (Aug 2017)



Lower Reach R2, left bank (Aug 2017)



Lower Reach R2, right bank (Aug 2017)

Blair Creek Existing Conditions Photographs



Lower Reach R2, downstream (4/21/20)



Lower Reach R2, upstream (4/21/20)



Lower Reach R2, right bank (4/21/20)



Lower R2, field drain pipe outfall into left bank (6/14/18)



Lower Reach R2 at confluence with R1/R3 (4/21/20)



Reach R3, downstream (4/21/20)

Blair Creek Existing Conditions Photographs



Reach R3, downstream (4/21/20)



Reach R3, right bank (4/21/20)



Reach R3, downstream (4/21/20)



Reach R3, upstream (4/21/20)



Reach UT1, culvert origin under Cherry Rd (4/21/20)



Reach UT1, downstream (4/21/20)

Blair Creek Existing Conditions Photographs



Reach UT1, upstream (4/21/20)



Reach UT1, upstream (4/21/20)

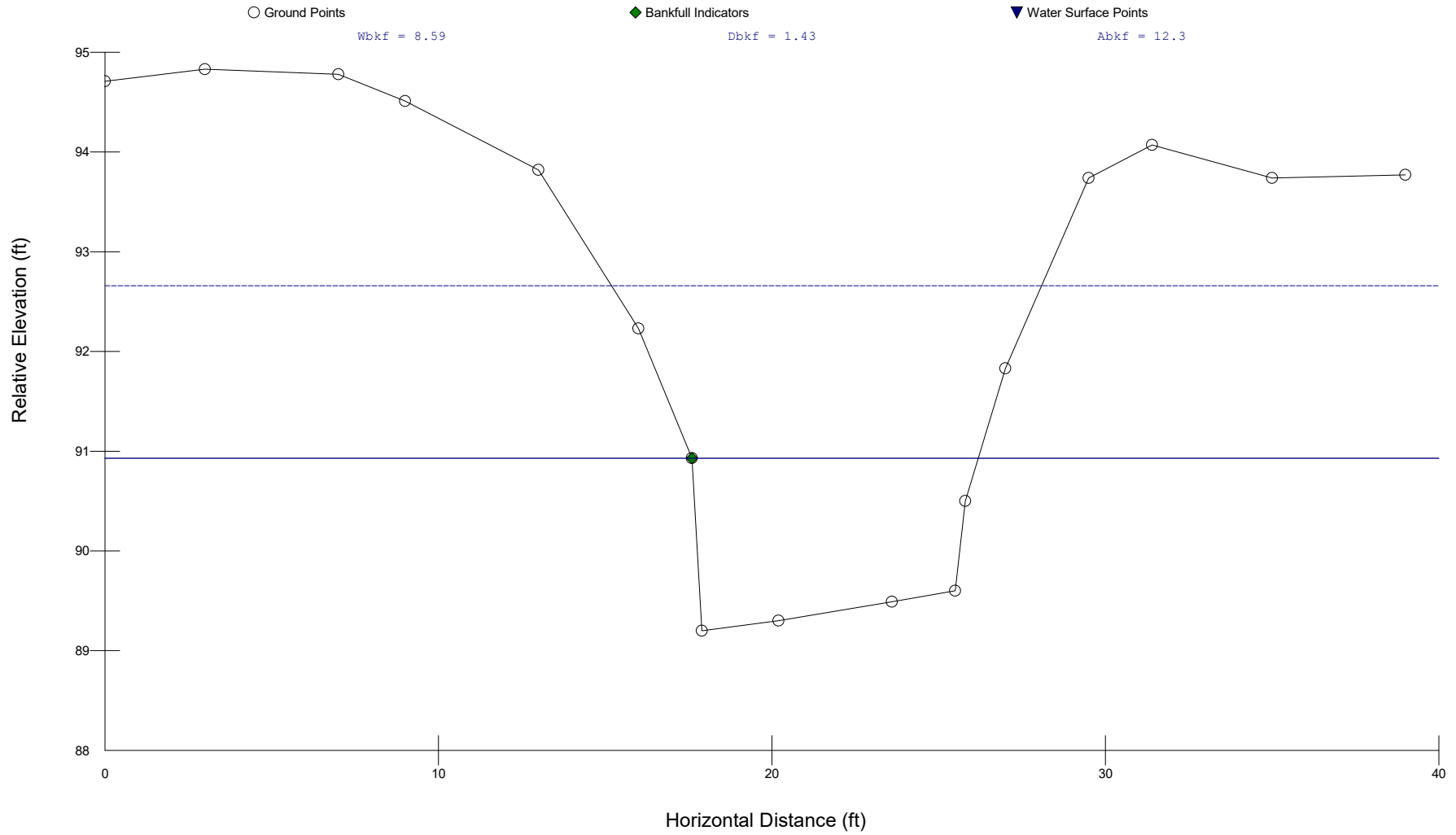


Reach UT1, upstream (4/21/20)



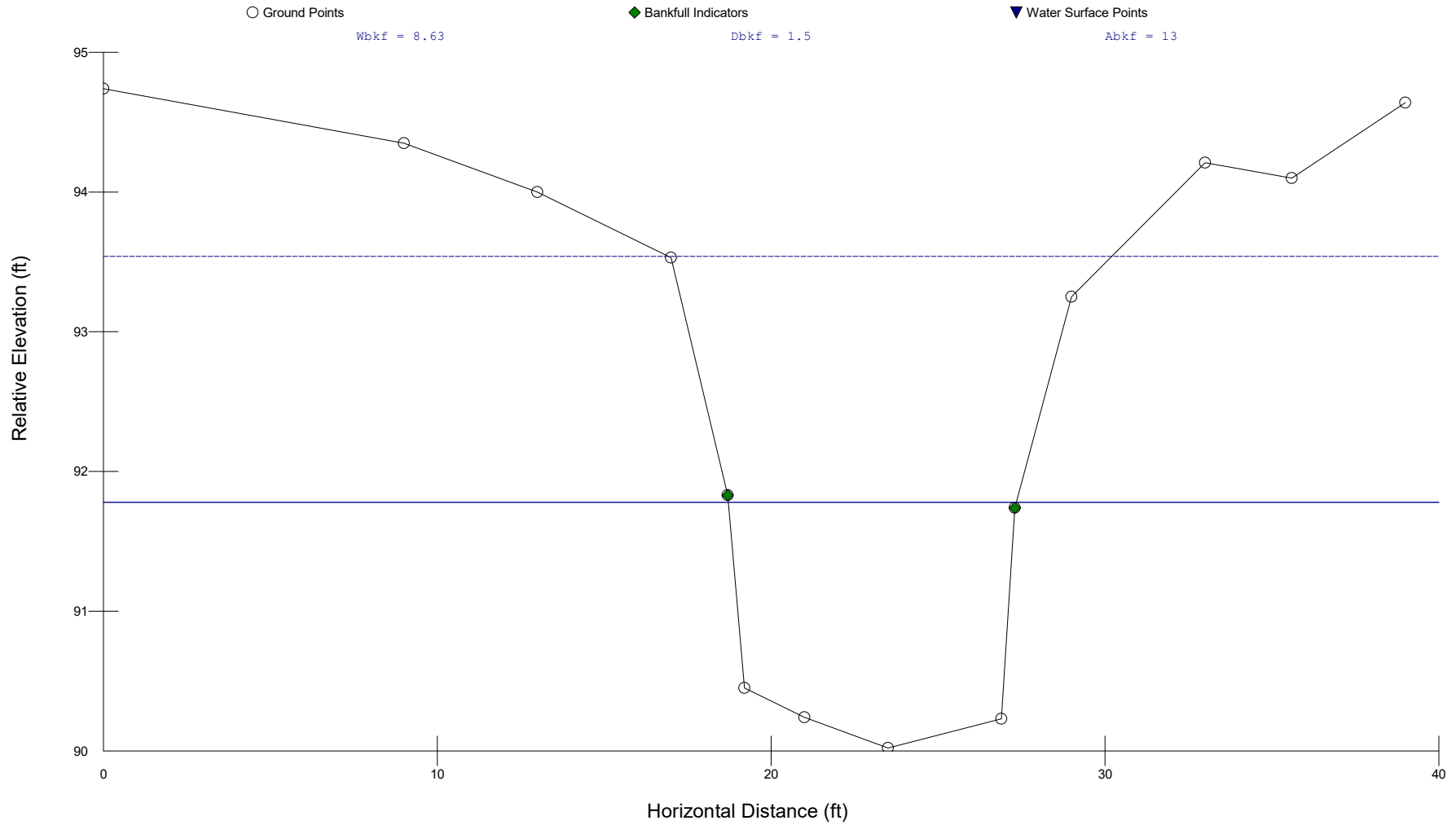
Bottom of Reach UT at confluence with R2 looking upstream (4/21/20)

XS-1 on Upper Reach 1 (North Fork Blair Creek)



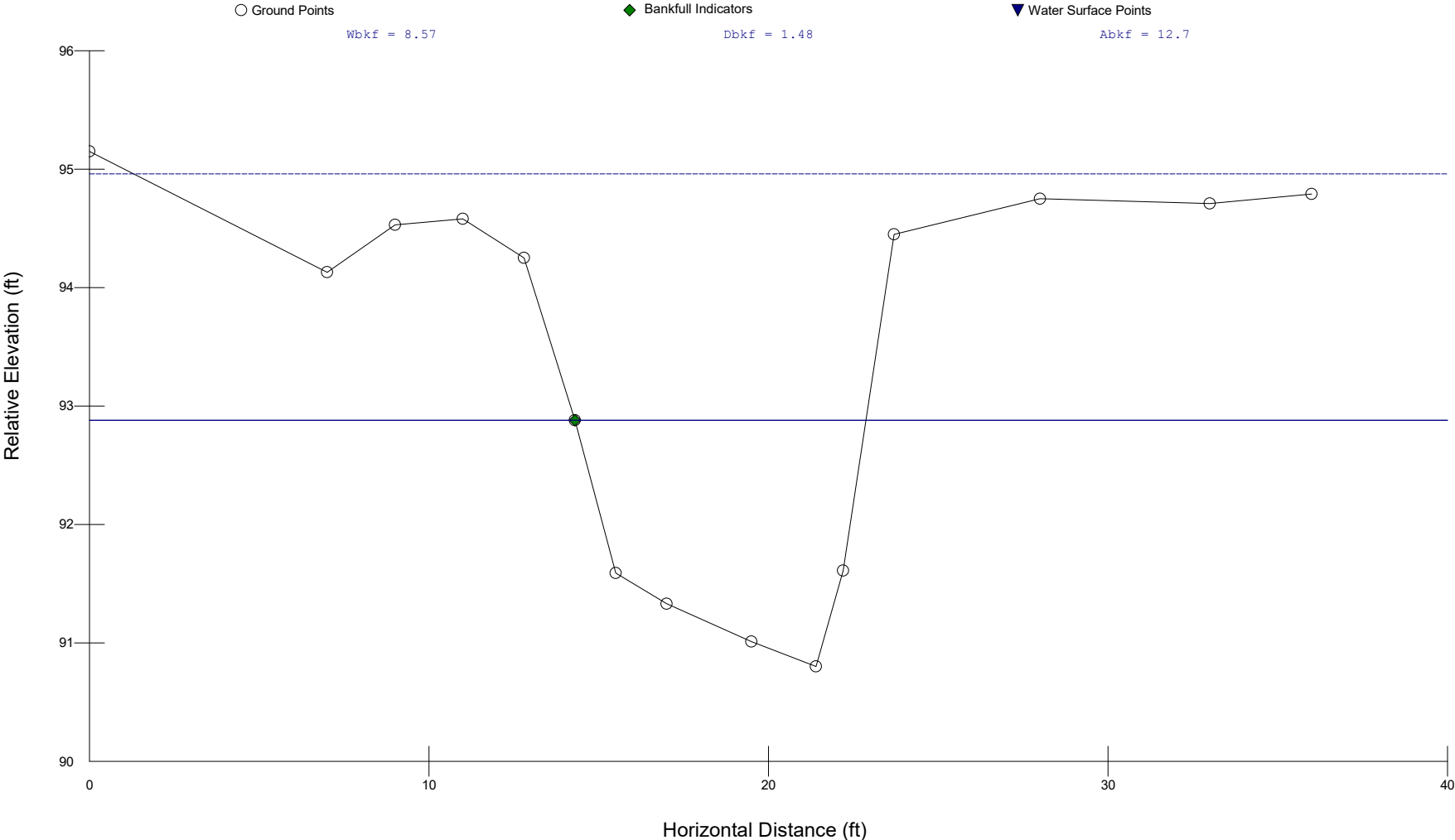
Feature	Stream Type	BKF Area	BKF Width	BKF Depth	Max BKF Depth	W/D	BH Ratio	ER
Riffle	B	12.3	8.6	1.4	1.7	6.0	2.7	1.5

XS-2 on Middle Reach R1 (North Fork Blair Creek)



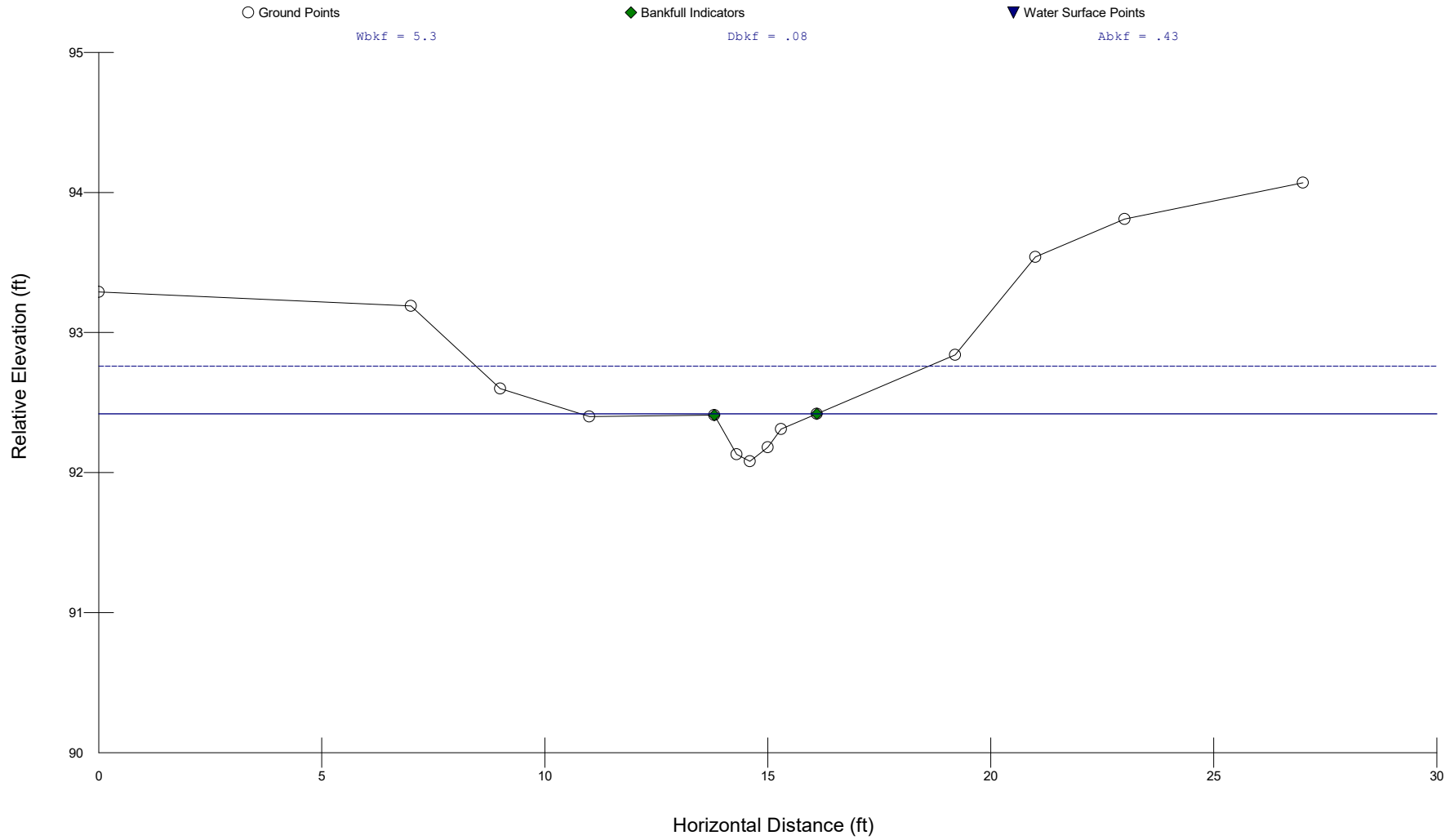
Feature	Stream Type	BKF Area	BKF Width	BKF Depth	Max BKF Depth	W/D	BH Ratio	ER
Riffle	B	13.0	8.6	1.5	1.8	5.8	2.0	1.5

XS-3 on Lower Reach 1 (North Fork Blair Creek)



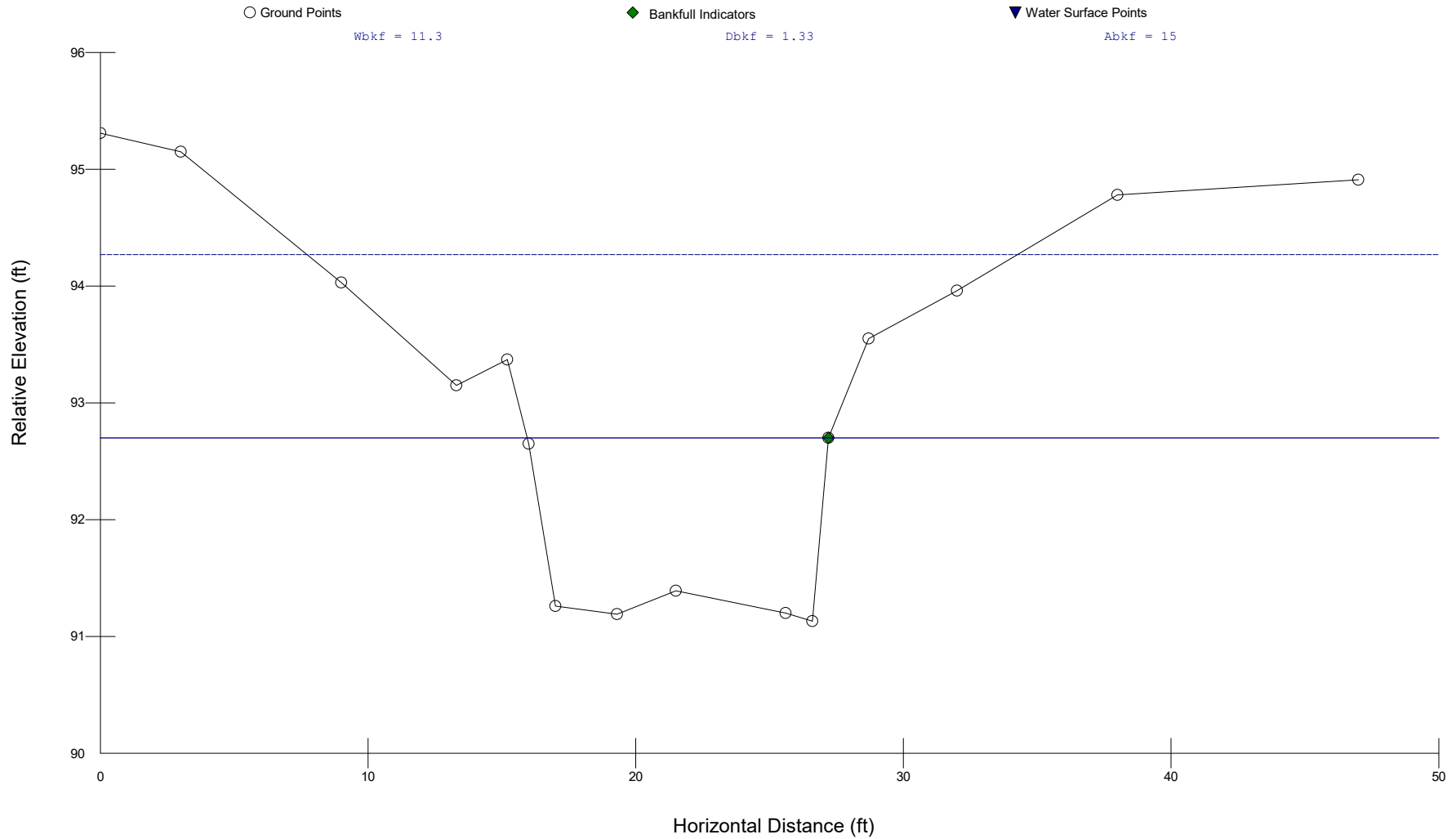
Feature	Stream Type	BKF Area	BKF Width	BKF Depth	Max BKF Depth	W/D	BH Ratio	EP
Riffle	E	12.7	8.6	1.5	2.1	5.8	1.8	4.1

XS-4 on Reach UT1



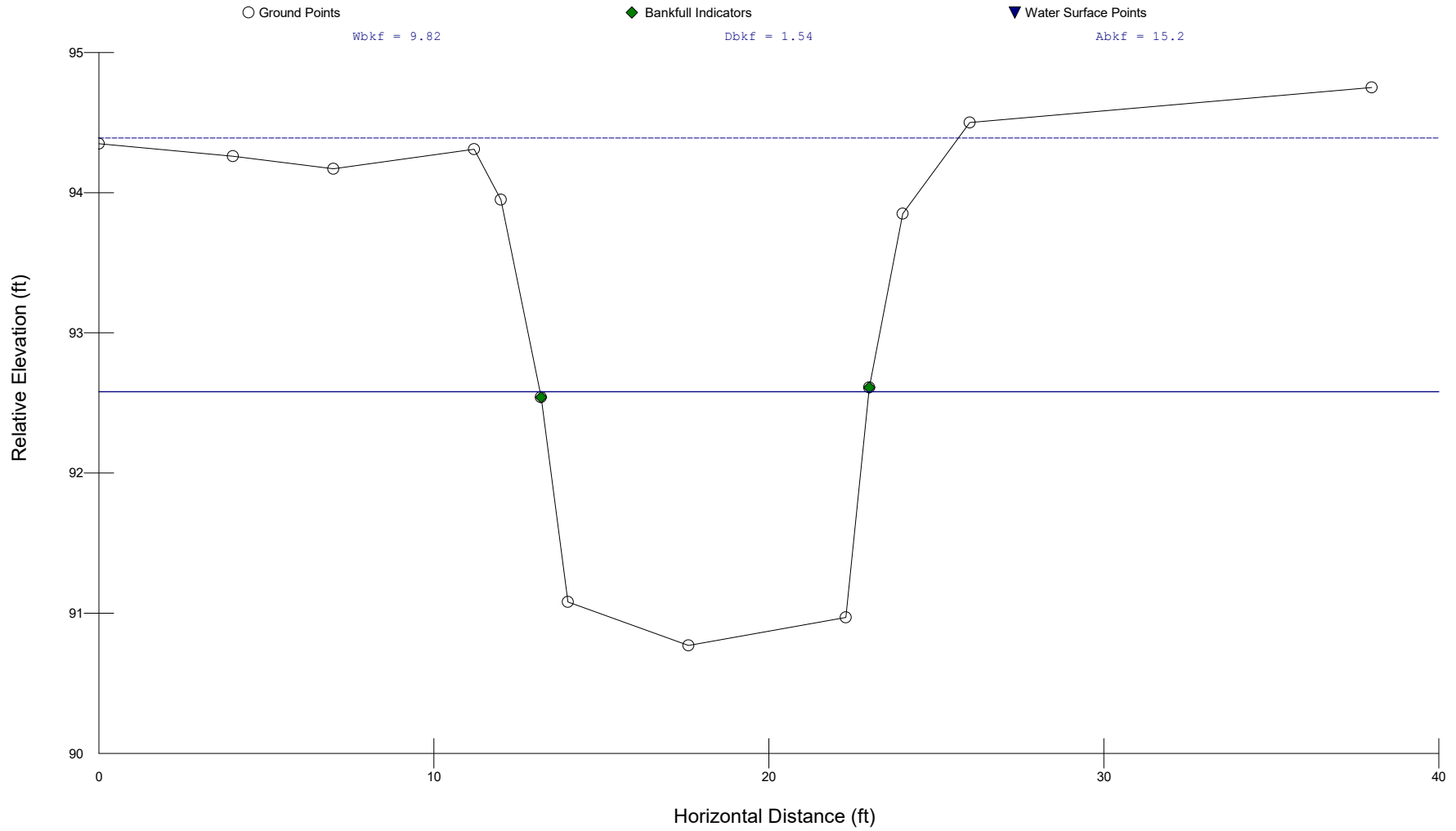
Feature	Stream Type	BKF Area	BKF Width	BKF Depth	Max BKF Depth	W/D	BH Ratio	ER
Riffle	B	0.4	5.3	0.1	0.3	66.3	3.3	1.9

XS-5 on Lower Reach 2 (South Fork Blair Creek)



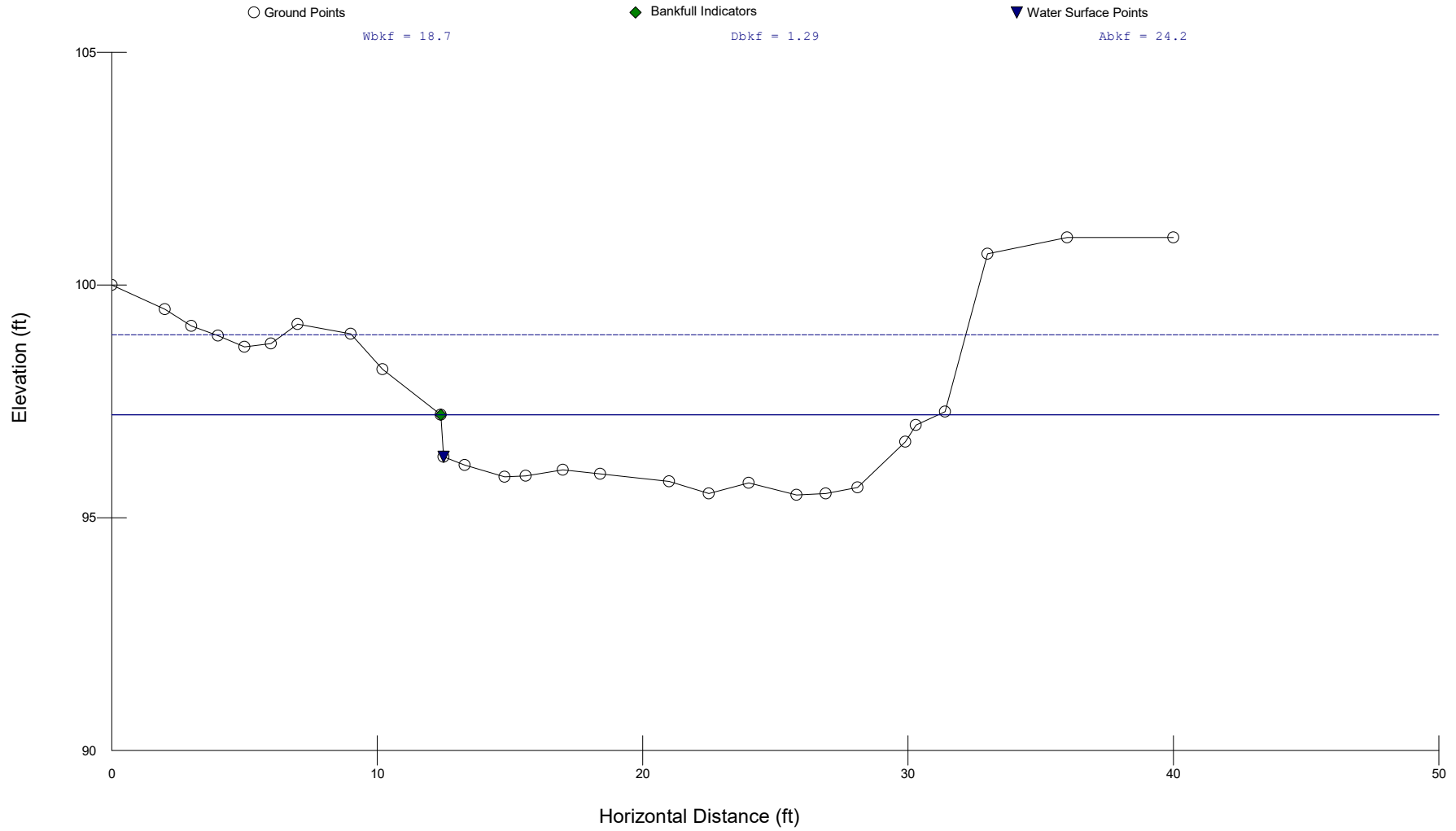
Feature	Stream Type	BKF Area	BKF Width	BKF Depth	Max BKF Depth	W/D	BH Ratio	ER
Riffle	E	15.0	11.3	1.3	1.6	8.5	2.3	2.4

XS-6 on Upper Reach R2 (South Fork Blair Creek)



Feature	Stream Type	BKF Area	BKF Width	BKF Depth	Max BKF Depth	W/D	BH Ratio	ER
Riffle	E	15.2	9.8	1.5	1.8	6.4	2.0	2.6

XS-7 on Reach R3 (Blair Creek)

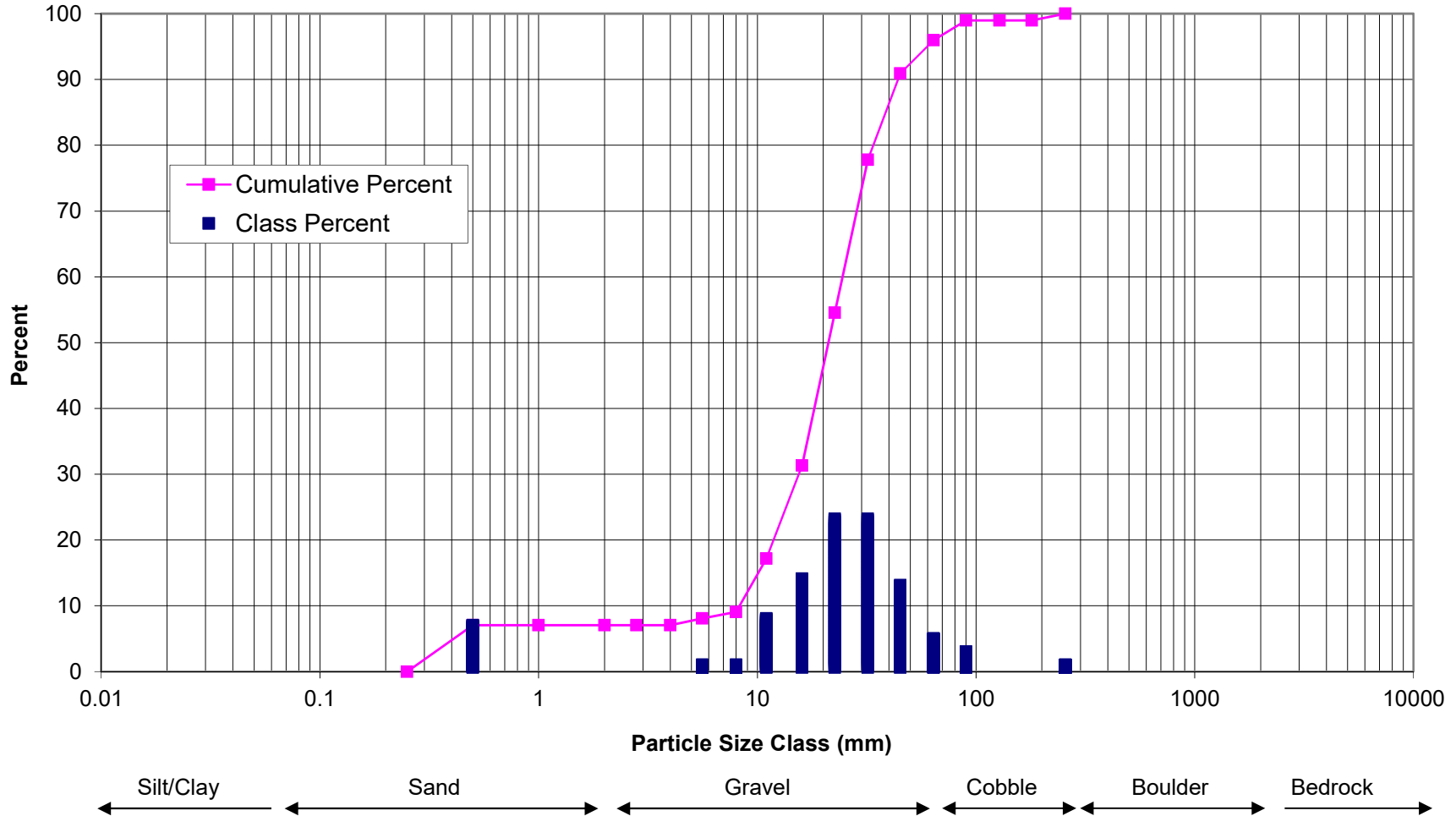


Feature	Stream Type	BKF Area	BKF Width	BKF Depth	Max BKF Depth	W/D	BH Ratio	ER
Riffle	F	24.2	18.7	1.3	1.7	14.5	2.0	1.4

Reach R1: Sediment Distribution

Blair Creek - Pebble Count #1 on Reach 1 (North Fork Blair Creek)

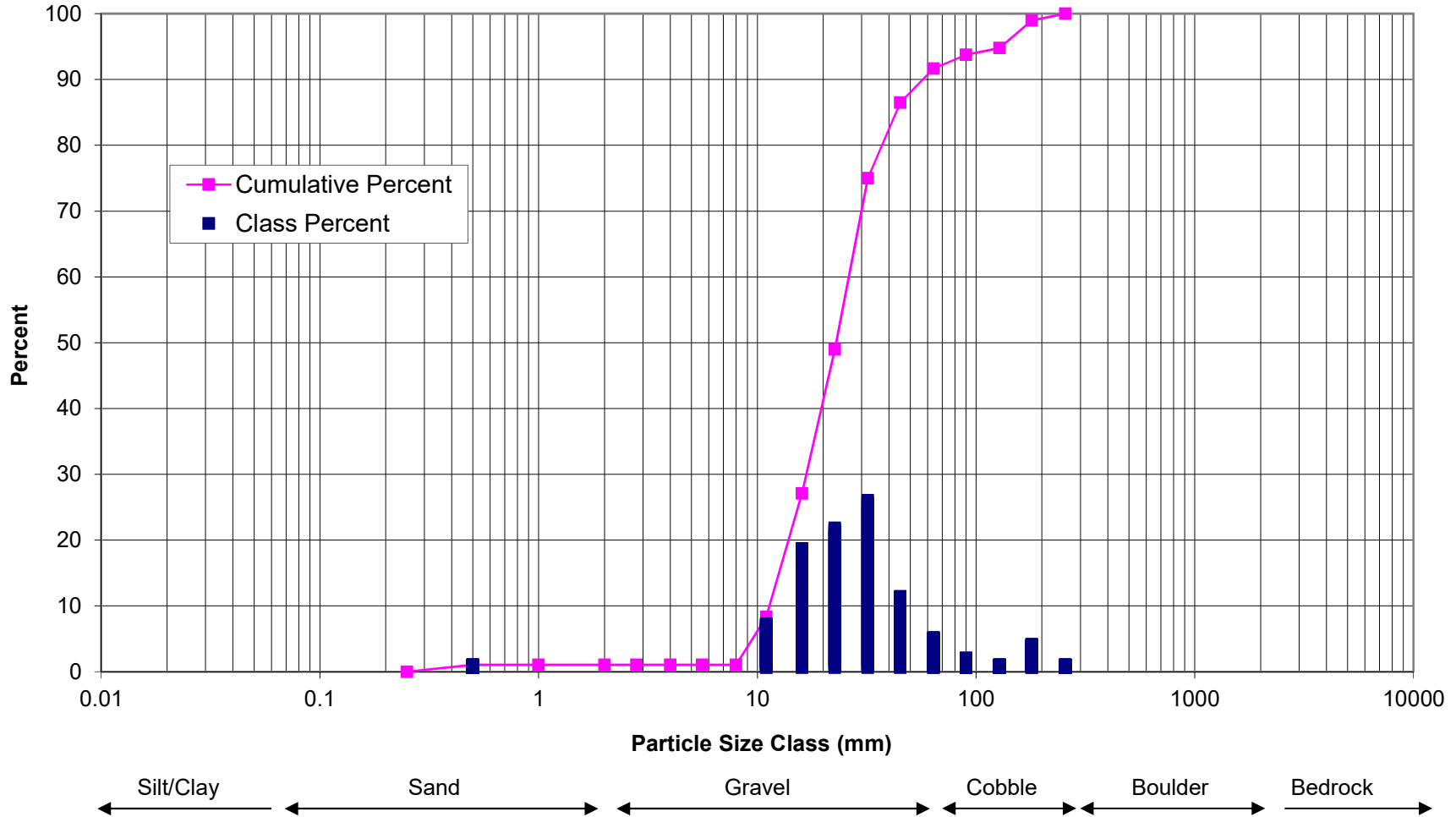
Cummulative	
Channel materials	
D_{15} =	10.50
D_{25} =	16.90
D_{50} =	21.12
D_{84} =	37.61
D_{95} =	59.86
D_{100} =	180 - 256



Reach R2: Sediment Distribution

Blair Creek - Pebble Count #2 on Reach R2 (South Fork Blair Creek)

Cumulative	
Channel materials	
D_{10}	= 12.82
D_{25}	= 18.13
D_{50}	= 22.92
D_{75}	= 41.63
D_{90}	= 130.20
D_{100}	= 180 - 256



WETS Table

WETS Station: MURPHY 4ESE, NC								
Requested years: 1990 - 2019								
Month	Avg Max Temp	Avg Min Temp	Avg Mean Temp	Avg Precip	30% chance precip less than	30% chance precip more than	Avg number days precip 0.10 or more	Avg Snowfall
Jan	49.9	26.4	38.1	5.70	4.13	6.72	9	1.1
Feb	53.8	29.1	41.4	5.10	3.66	6.02	8	1.4
Mar	61.5	34.6	48.0	5.19	3.93	6.05	9	0.2
Apr	70.8	42.2	56.5	4.69	3.55	5.47	8	0.0
May	77.5	51.6	64.6	4.85	3.57	5.69	9	0.0
Jun	83.5	60.0	71.8	5.08	3.64	6.00	9	0.0
Jul	86.5	64.0	75.3	5.41	4.09	6.31	9	0.0
Aug	86.0	63.0	74.5	4.47	3.00	5.35	8	0.0
Sep	81.3	56.8	69.0	4.47	2.78	5.40	6	0.0
Oct	71.8	44.2	58.0	3.39	1.55	4.13	5	0.0
Nov	61.4	33.6	47.5	4.70	3.29	5.58	7	0.1
Dec	52.9	29.6	41.2	6.06	4.37	7.16	10	1.3
Annual:					53.55	64.89		
Average	69.7	44.6	57.2	-	-	-	-	-
Total	-	-	-	59.11			95	4.1

GROWING SEASON DATES

Years with missing data:	24 deg = 7	28 deg = 6	32 deg = 4
Years with no occurrence:	24 deg = 0	28 deg = 0	32 deg = 0
Data years used:	24 deg = 23	28 deg = 24	32 deg = 26
Probability	24 F or higher	28 F or higher	32 F or higher
50 percent *	3/17 to 11/16: 244 days	4/2 to 10/29: 210 days	4/18 to 10/21: 186 days
70 percent *	3/12 to 11/21: 254 days	3/29 to 11/2: 218 days	4/15 to 10/24: 192 days

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

STATS TABLE - total precipitation (inches)													
Yr	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annl
1872	M0.43	15.10	M0.70	4.40	2.70	8.20	7.50	6.80	3.80	T	5.30	M12.50	67.43
1873			M5.50	M1.30	M3.90	4.50	M7.81	M4.60	3.30	2.50	2.60	M0.48	36.49
1874	M0.51	6.70	9.00	15.30	M0.10	5.80	4.20	13.20	3.90	2.00	6.80	3.50	71.01
1875	M8.00	12.10	14.10	5.40	1.20	6.40	M9.40		4.90	2.90	M4.00	M15.30	83.70
1876	4.70	4.70	M3.60	M11.30	10.50	M3.00	5.90					4.80	48.50
1877	7.10		M5.70	6.90	1.40	5.10	7.80	3.30		3.40	M9.10	3.50	53.30
1878	4.00	M0.90	3.40	M3.80	1.80	M0.73	M4.30	M3.30	1.60	5.70	4.00	M3.20	36.73
1879	M5.10	M4.80	M3.00	M2.30		2.10	6.50	6.70	0.70	5.30	M6.40	M4.80	47.70

Table 6.2a Reach R1 Stream Design Morphology Parameters (Complete)

Blair Creek Mitigation Project - NCDMS Project No. 100047

Parameter	Existing Stream Values		Design Stream Values R1 Upper		Design Stream Values R1 Lower		Reference Data	
	Upper	Lower	MIN	MAX	MIN	MAX	MIN	MAX
Drainage Area, DA (sq mi)	1.38	1.53	1.38		1.53			
Stream Type (Rosgen)	B-E		C4		C4		C4	
Bankfull Discharge, Qbkf (cfs)	38.72	40.7	55.68		65.72			
Bankfull Riffle XSEC Area, Abkf (sq ft)	12.3	12.7	18.2		20.4			
Bankfull Mean Velocity, Vbkf (ft/s)	3.15	3.2	3.1		3.2		3.5	5
Bankfull Riffle Width, Wbkf (ft)	8.59	8.57	16.5		17			
Bankfull Riffle Mean Depth, Dbkf (ft)	1.43	1.48	1.1		1.2			
Width to Depth Ratio, W/D (ft/ft)	6.01	5.79	15		14.2		10	15
Width Floodprone Area, Wfpa (ft)	5.9	34.7	60	60	60	60		
Entrenchment Ratio, Wfpa/Wbkf (ft/ft)	1.50	4.05	3.6	3.6	3.5	3.5		
Riffle Max Depth @ bkf, Dmax (ft)	1.74	2.08	1.4		1.8			
Riffle Max Depth Ratio, Dmax/Dbkf	1.22	1.41	1.3		1.5		1.2	1.5
Max Depth @ tob, Dmax _{tob} (ft)	4.7	3.74	1.4		1.8			
Bank Height Ratio, Dtob/Dmax (ft/ft)	2.7	1.8	1.0		1.0		1.0	1.1
Meander Length, Lm (ft)	120	140	115	230	120	235		
Meander Length Ratio, Lm/Wbkf	14	16.3	7	13.9	7.1	13.8	7.0	14
Radius of Curvature, Rc (ft)	24	40	33	50	34	51		
Rc Ratio, Rc/Wbkf	2.8	4.7	2.0	3.0	2.0	3.0	2.0	3.0
Belt Width, Wblt (ft)	37	54.6	58	132	60	135		
Meander Width Ratio, Wblt/Wbkf	4.31	6.37	3.5	8.0	3.5	7.9	3.5	8.0
Sinuosity, K Sval/Schan	1.06		1.22		1.22		1.2	1.4
Valley Slope, Sval (ft/ft)	0.0063		0.0063		0.0063			
Channel Slope, Schan	0.0065		0.0047		0.0070		0.005	0.015
Slope Riffle, Srif (ft/ft)	0.0260	0.0430	0.006	0.007	0.009	0.010		
Riffle Slope Ratio, Srif/Schan	4.00	6.62	1.28	1.49	1.29	1.43	1.2	1.5
Slope Pool, Spool (ft/ft)	0.0000	0.0040	0.0000	0.0010	0.0000	0.0014		
Pool Slope Ratio, Spool/Schan	0.00	0.62	0.00	0.21	0.00	0.20	0	0.2
Pool Max Depth, Dmax _{pool} (ft)	1.14	2.77	1.7	3.8	1.8	4.2		
Pool Max Depth Ratio, Dmax _{pool} /Dbkf	0.77	1.87	1.5	3.5	1.5	3.5	1.5	3.5
Pool Width, Wpool (ft)	8.0	9.0	20	26	20	28		
Pool Width Ratio, Wpool/Wbkf	0.93	1.05	1.2	1.6	1.2	1.6	1.2	1.7
Pool-Pool Spacing, Lps (ft)	35.0	80.0	58	115	60	119		
Pool-Pool Spacing Ratio, Lps/Wbkf	4.08	9.33	3.5	7.0	3.5	7.0	3.5	7.0

Notes:

Table 6.2b Reach R2 Stream Design Morphology Parameters (Complete)

Blair Creek Mitigation Project - NCDMS Project No. 100047

Parameter	Existing Stream Values		Design Stream Values		Reference Data	
	Upper	Lower	MIN	MAX	MIN	MAX
Drainage Area, DA (sq mi)	1.29	1.37	1.37			
Stream Type (Rosgen)	E4 (low sinuosity)		C4		C4	
Bankfull Discharge, Qbkf (cfs)	48.68	45.51	61.85			
Bankfull Riffle XSEC Area, Abkf (sq ft)	15.16	15.01	20.4			
Bankfull Mean Velocity, Vbkf (ft/s)	3.21	3.03	3		3.5	5
Bankfull Riffle Width, Wbkf (ft)	9.82	11.26	17			
Bankfull Riffle Mean Depth, Dbkf (ft)	1.54	1.33	1.2			
Width to Depth Ratio, W/D (ft/ft)	6.38	8.47	14.2		10	15
Width Floodprone Area, Wfpa (ft)	25.66	26.55	60	60		
Entrenchment Ratio, Wfpa/Wbkf (ft/ft)	2.61	2.36	3.5	3.5		
Riffle Max Depth @ bkf, Dmax (ft)	1.81	1.57	1.4			
Riffle Max Depth Ratio, Dmax/Dbkf	1.18	1.18	1.2		1.2	1.5
Max Depth @ tob, Dmax _{tob} (ft)	3.54	3.61	1.5			
Bank Height Ratio, D _{tob} /Dmax (ft/ft)	1.96	2.3	1.1		1.0	1.1
Meander Length, L _m (ft)	57	132	125	235		
Meander Length Ratio, L _m /Wbkf	5.8	11.72	7.4	13.8	7.0	14
Radius of Curvature, R _c (ft)	25	40.5	34	50		
R _c Ratio, R _c /Wbkf	2.5	3.6	2.0	2.9	2.0	3.0
Belt Width, W _{blt} (ft)	45	59	65	135		
Meander Width Ratio, W _{blt} /Wbkf	4.6	5.2	3.8	7.9	3.5	8
Sinuosity, K S _{val} /S _{chan}	1.12		1.14		1.2	1.4
Valley Slope, S _{val} (ft/ft)	0.0064		0.0064			
Channel Slope, S _{chan}	0.0060		0.0062		0.005	0.015
Slope Riffle, S _{rif} (ft/ft)	0.0260	0.0430	0.0075	0.0093		
Riffle Slope Ratio, S _{rif} /S _{chan}	4.33	7.17	1.21	1.5	1.2	1.5
Slope Pool, S _{pool} (ft/ft)	0.0000	0.0040	0.0000	0.0012		
Pool Slope Ratio, S _{pool} /S _{chan}	0.00	0.67	0.00	0.19	0.0	0.2
Pool Max Depth, D _{maxpool} (ft)	1.14	2.77	1.8	4.2		
Pool Max Depth Ratio, D _{maxpool} /Dbkf	0.86	2.08	1.5	3.5	1.5	3.5
Pool Width, W _{pool} (ft)	8	9	20	29		
Pool Width Ratio, W _{pool} /Wbkf	0.71	0.80	1.2	1.7	1.2	1.7
Pool-Pool Spacing, L _{ps} (ft)	35	80	60	118		
Pool-Pool Spacing Ratio, L _{ps} /Wbkf	3.11	7.10	3.5	6.9	3.5	7.0

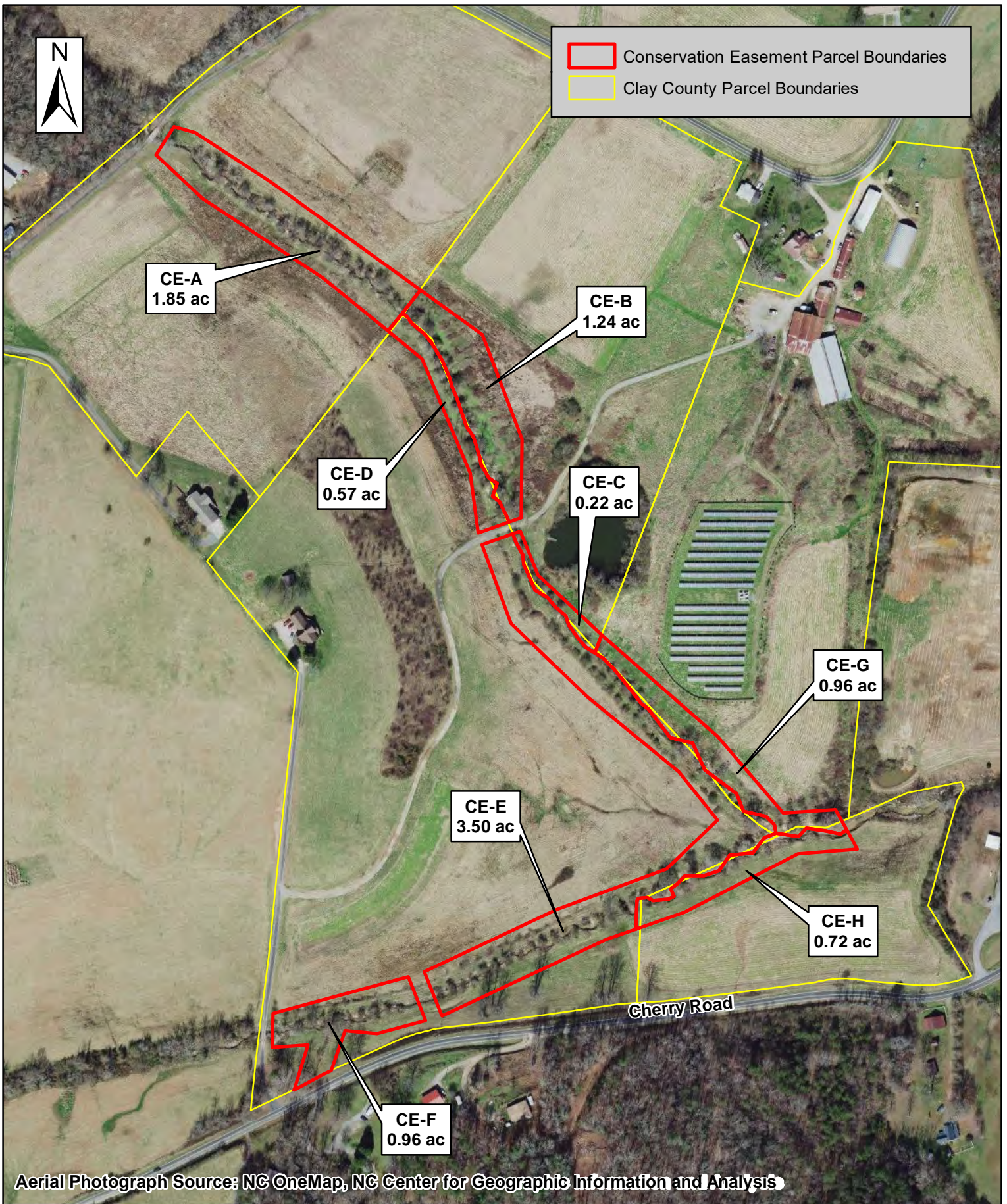
Notes:

APPENDIX B: SITE PROTECTION INSTRUMENT

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

Table B.1 Site Protection Instrument Summary						
Blair Creek Mitigation Project - NCDMS Project No. 100047						
Parcel	Landowner	PIN	County	Site Protection Instrument	Deed Book and Page Numbers	Acreage Protected
A	Tommie B. Waldroup	5550-41-3626	Clay	Conservation Easement	Book 43, Page 36	1.85
B	Lynn E. Waldroup & wife, Gail P. Waldroup	5550-30-9497	Clay	Conservation Easement	Book 158, Page 101	1.24
C	Lynn E. Waldroup & wife, Gail P. Waldroup	5550-30-9497	Clay	Conservation Easement	Book 158, Page 101	0.22
D	Wal-Ford Farm, Inc Lynn E. Waldroup, President	5459-39-7402	Clay	Conservation Easement	Book 159, Page 218	0.57
E	Wal-Ford Farm, Inc Lynn E. Waldroup, President	5459-39-7402	Clay	Conservation Easement	Book 159, Page 218	3.50
F	Wal-Ford Farm, Inc Lynn E. Waldroup, President	5459-39-7402	Clay	Conservation Easement	Book 159, Page 218	0.96
G	Wal-Ford Farm, Inc Lynn E. Waldroup, President	5459-49-3689	Clay	Conservation Easement	Book 159, Page 218	0.96
H	Lynn E. Waldroup & wife, Gail P. Waldroup	5459-49-5013	Clay	Conservation Easement	Book 276, Page 13	0.72

A conservation easement has been obtained and recorded from the current landowners for the entire project. The easement and survey plat documents were reviewed and approved by NCDMS and State Property Office (SPO) and will be held by the State of North Carolina. The easement and survey plat (Book P6, Page 189) were recorded at the Clay County Register of Deeds on May 20, 2020. The secured conservation easement allows Baker to proceed with the restoration project and restricts the land use in perpetuity.



Aerial Photograph Source: NC OneMap, NC Center for Geographic Information and Analysis

<p>Michael Baker INTERNATIONAL</p>	<p>North Carolina Division of Mitigation Services DMS Proj. No. 100047</p>	<p>0 150 300 600 Feet 1 inch = 300 feet</p>	<p>Figure B.1 Site Protection Instrument Map Blair Creek Mitigation Project Clay County, NC</p>
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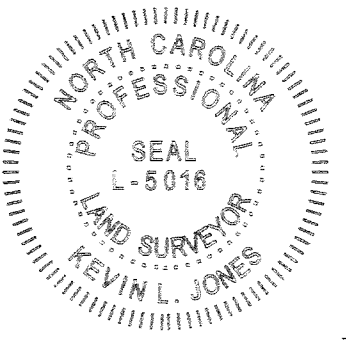
CERTIFICATE OF SURVEY AND ACCURACY:

I, KEVIN L. JONES, CERTIFY THAT THIS PLAT WAS DRAWN UNDER MY SUPERVISION FROM AN ACTUAL SURVEY MADE UNDER MY SUPERVISION FROM DEED DESCRIPTION(S) RECORDED IN DB: 43, PG: 36, DB: 158, PG: 101, DB: 159, PG: 218, & DB: 276, PG: 13...

I ALSO HEREBY CERTIFY THAT THIS PLAT IS OF ONE OF THE FOLLOWING: GS 47-30 F(11) D; THAT THE SURVEY IS OF ANOTHER CATEGORY, SUCH AS THE RECOMBINATION OF EXISTING PARCELS, A COURT-ORDERED SURVEY, OR OTHER EXEMPTION OR EXCEPTION TO THE REQUIREMENTS OF SUBDIVISION.

GPS METADATA CLASS OF SURVEY: HORIZONTAL; FIELD PROCEDURE: STATIC NETWORK; DATES: 07/23/18-08/03/18; DATUM: NAD83(2011); EPOCH: 2010; GEOD: 12B; AVERAGE COMBINED FACTOR: 0.99979631; POSITIONAL ACCURACY: HORIZONTAL: 0.04'; UNITS: USFT; CORS USED: NGS1, NCRB, NCMU, NCBG

WITNESS MY ORIGINAL SIGNATURE, LICENSE NUMBER, & SEAL THIS 6TH DAY OF MAY 2020



Kevin L. Jones, PLS L-5016

CLAY COUNTY, NORTH CAROLINA

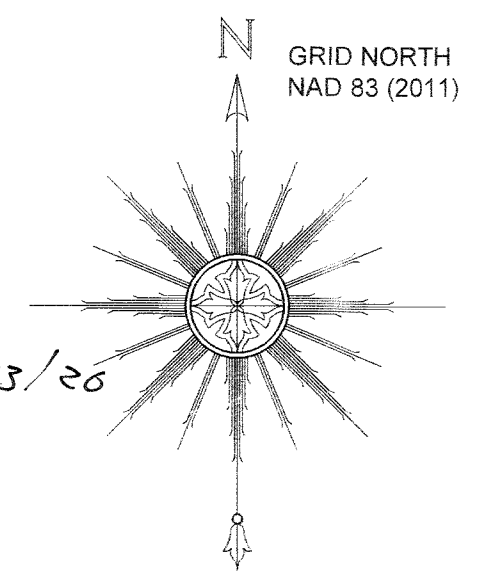
THIS PLAT DOES NOT CREATE A SUBDIVISION OF PROPERTY. THE PURPOSE OF THIS SURVEY IS TO IDENTIFY THE CONSERVATION EASEMENT AREAS ONLY. NO TRANSFER OF PROPERTY IS TAKING PLACE.

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

REVIEW OFFICER: TOMMIE B. WALDROUP, DATE: 5/13/20; REGISTER OF DEEDS

CERTIFICATE OF OWNERSHIP AND DEDICATION: I, WE, THE UNDERSIGNED, CERTIFY THAT I/WE ARE THE OWNER(S) OF THE PROPERTY SHOWN AND DESCRIBED HEREON AND ACCEPT AND ADOPT THIS PLAT AND THE CONSERVATION EASEMENTS WITH OUR FREE CONSENT AND ADJACENT PROPERTY AND CONVEY AN EASEMENT OVER OUR ADJACENT GRANT FOR ACCESS TO AND FROM THE CONSERVATION EASEMENTS SET FORTH HEREIN.

Tom B. Waldroup, Lynn E. Waldroup, Gail P. Waldroup, Lynn E. Waldroup, Wal-Ford Farm, Inc. Signatures and dates.



GRID TIE INFORMATION CONTROL POINT 5/8" RBCC (501) STATE PLANE COORDINATES N: 500939.92 E: 553412.83 CF: 0.99979592

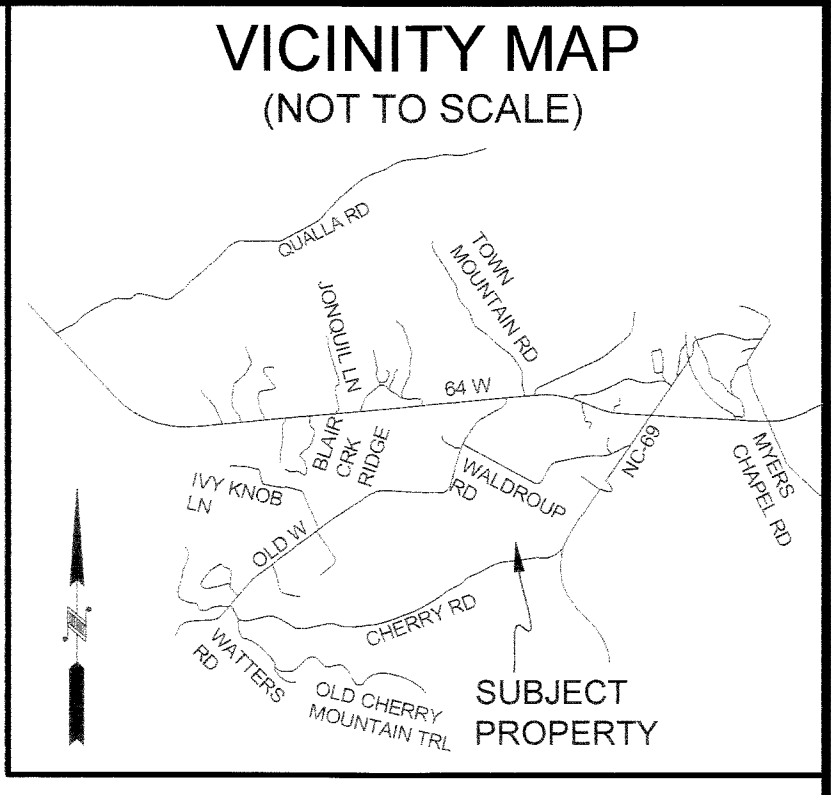
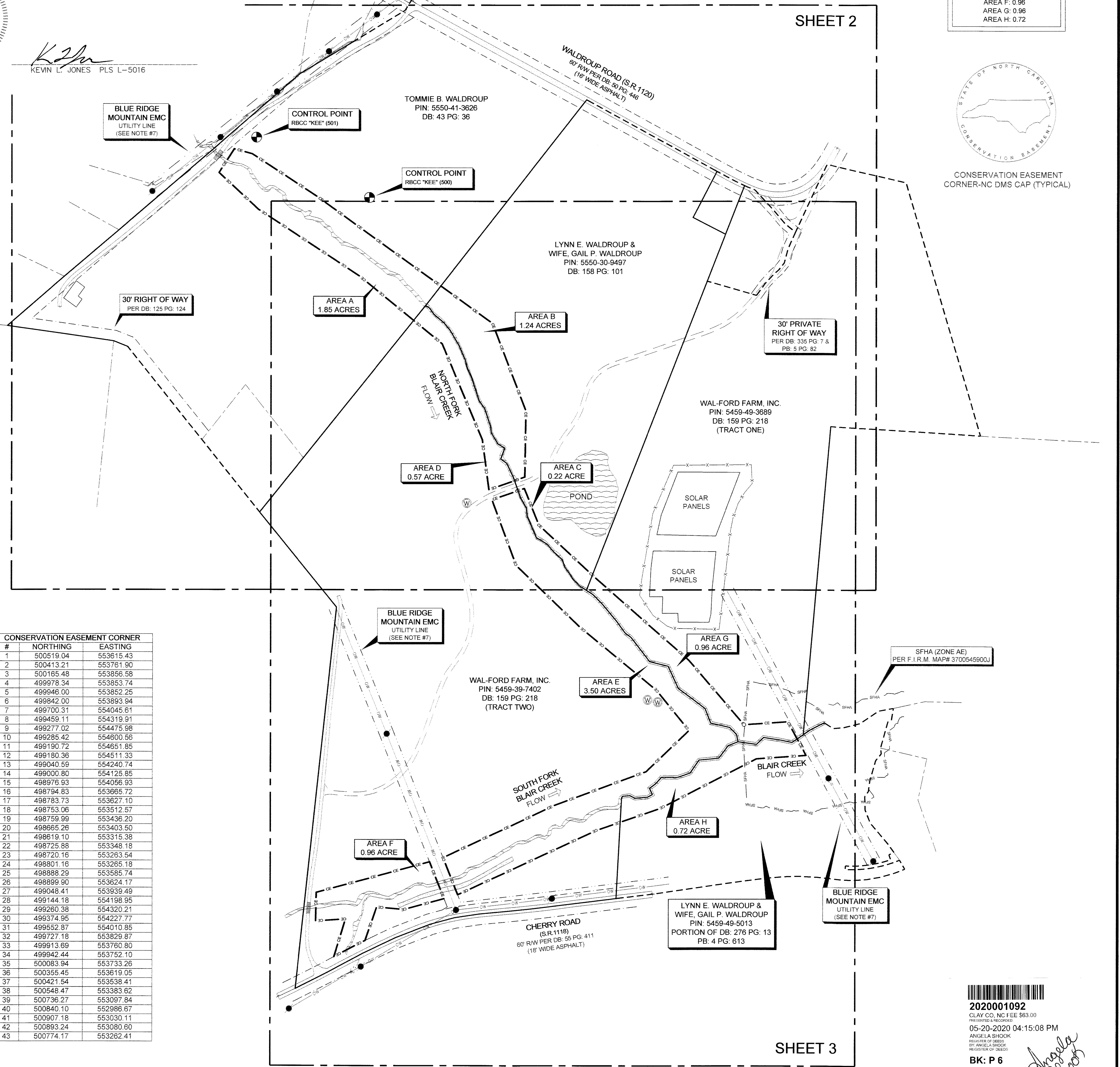


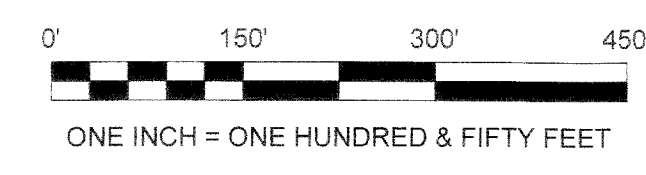
Table with 2 columns: Area, Acres. Rows include Area A (1.85), Area B (1.24), Area C (0.22), Area D (0.57), Area E (3.50), Area F (0.96), Area G (0.96), Area H (0.72).



CONSERVATION EASEMENT CORNER table with columns: #, NORTHING, EASTING. Lists 43 corner points with their coordinates.

- 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.

LEGEND: Symbols for control points, utility lines, fences, easements, and various materials like gravel, asphalt, and stream/water.



Metadata table for the survey, including parcel identification numbers, current owners (Lynn E. Waldroup & Wife, Gail P. Waldroup, Tommie B. Waldroup & Wal-Ford Farm, Inc.), and survey details.

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

WITNESS MY ORIGINAL SIGNATURE, LICENSE NUMBER, & SEAL THIS _____ DAY OF _____ 2023.

Kevin L. Jones
 KEVIN L. JONES PLS L-5016

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



CONSERVATION EASEMENT CORNER-NC DMS CAP (TYPICAL)

TOTAL CONSERVATION EASEMENT AREA
 AREA A: 1.85 ACRES
 AREA B: 1.24 ACRES
 AREA C: 0.22 ACRES

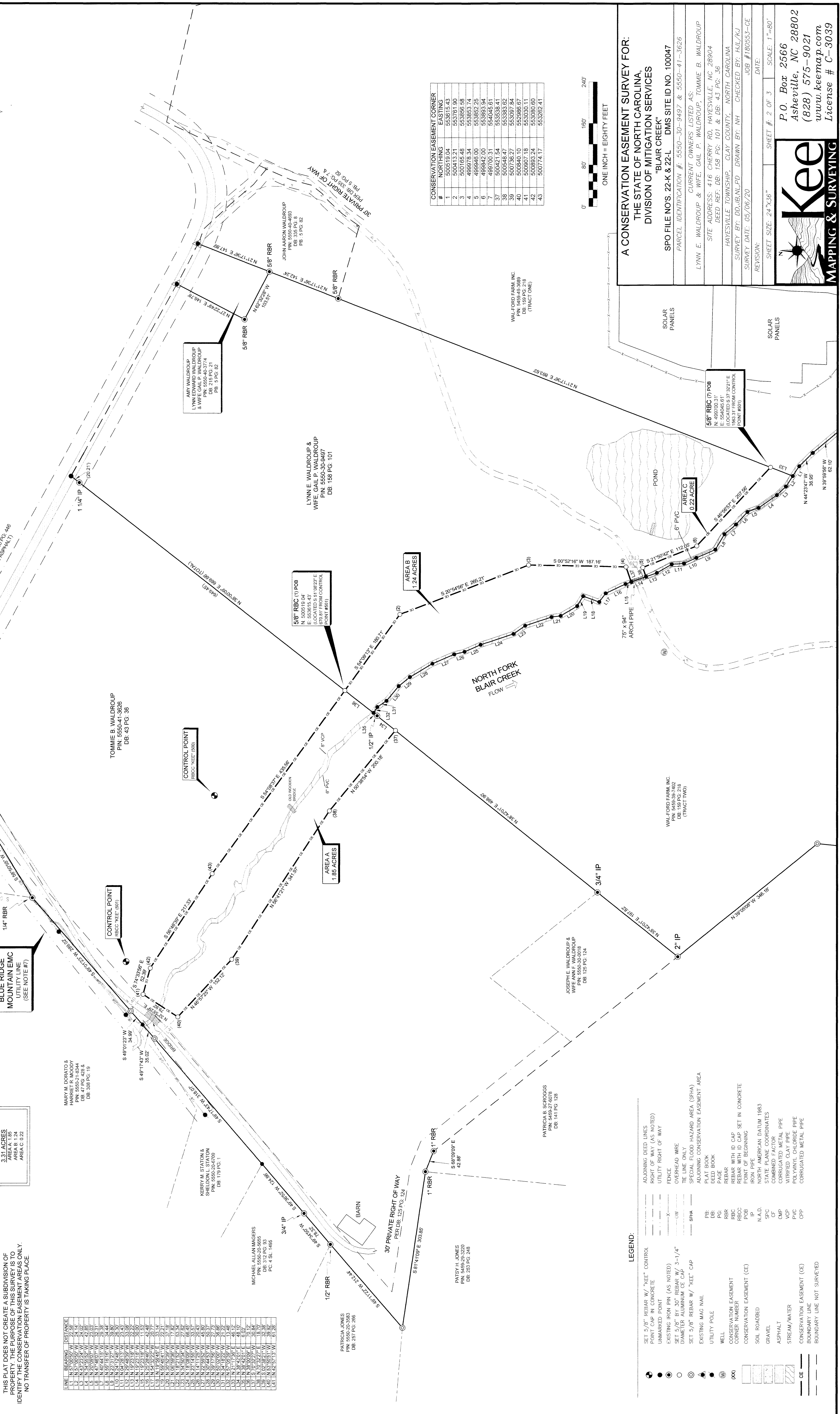
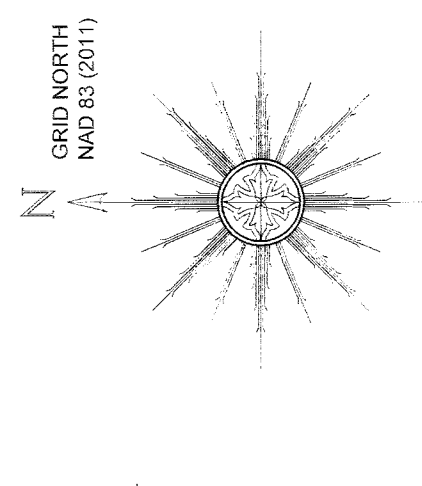
LINE	BEARING	DISTANCE
L1	N 7°00'00" W	22.56
L2	N 23°23'24" W	24.02
L3	N 34°55'52" W	42.85
L4	N 47°46'07" W	32.31
L5	N 49°44'15" W	29.35
L6	N 23°12'27" W	39.80
L7	N 23°12'27" W	26.30
L8	N 29°48'33" W	33.06
L9	N 19°23'18" W	30.06
L10	N 15°23'18" W	11.53
L11	N 24°23'24" W	26.77
L12	N 19°56'45" E	33.14
L13	N 09°56'26" W	17.82
L14	N 05°56'26" W	37.18
L15	N 34°55'52" W	27.62
L16	N 34°55'52" W	27.62
L17	N 34°55'52" W	27.62
L18	N 34°55'52" W	27.62
L19	N 34°55'52" W	27.62
L20	N 34°55'52" W	27.62
L21	N 34°55'52" W	27.62
L22	N 34°55'52" W	27.62
L23	N 34°55'52" W	27.62
L24	N 34°55'52" W	27.62
L25	N 34°55'52" W	27.62
L26	N 34°55'52" W	27.62
L27	N 34°55'52" W	27.62
L28	N 34°55'52" W	27.62
L29	N 34°55'52" W	27.62
L30	N 34°55'52" W	27.62
L31	N 34°55'52" W	27.62
L32	N 34°55'52" W	27.62
L33	N 34°55'52" W	27.62
L34	N 34°55'52" W	27.62
L35	N 34°55'52" W	27.62
L36	N 34°55'52" W	27.62
L37	N 34°55'52" W	27.62
L38	N 34°55'52" W	27.62
L39	N 34°55'52" W	27.62
L40	N 34°55'52" W	27.62
L41	N 34°55'52" W	27.62
L42	N 34°55'52" W	27.62
L43	N 34°55'52" W	27.62
L44	N 34°55'52" W	27.62
L45	N 34°55'52" W	27.62

GRID TIE INFORMATION

CONTROL POINT
 58" RECC (501)
 STATE PLANE COORDINATES
 N: 550933.08
 E: 55312.83
 CF: 0.99979592

CONTROL POINT
 58" RECC (600)
 STATE PLANE COORDINATES
 N: 550933.08
 E: 55312.83
 CF: 0.99979592

*POINT 501 BEING LOCATED N 62°00'39" W A GRID DISTANCE OF 362.10 FROM POINT #500



CONSERVATION EASEMENT CORNER

#	NORTHING	EASTING
1	500519.04	553615.43
2	500519.04	553615.43
3	500519.04	553615.43
4	499978.34	553853.24
5	499946.00	553853.25
6	499946.00	553853.25
7	489700.31	554045.61
37	500421.54	553538.61
38	500546.47	553538.62
39	500736.27	553538.62
40	500940.10	553538.62
41	501143.93	553538.62
42	501347.76	553538.62
43	501551.59	553538.62
44	501755.42	553538.62
45	501959.25	553538.62
46	502163.08	553538.62
47	502366.91	553538.62
48	502570.74	553538.62
49	502774.57	553538.62
50	502978.40	553538.62
51	503182.23	553538.62
52	503386.06	553538.62
53	503589.89	553538.62
54	503793.72	553538.62
55	503997.55	553538.62
56	504201.38	553538.62
57	504405.21	553538.62
58	504609.04	553538.62
59	504812.87	553538.62
60	505016.70	553538.62
61	505220.53	553538.62
62	505424.36	553538.62
63	505628.19	553538.62
64	505832.02	553538.62
65	506035.85	553538.62
66	506239.68	553538.62
67	506443.51	553538.62
68	506647.34	553538.62
69	506851.17	553538.62
70	507055.00	553538.62
71	507258.83	553538.62
72	507462.66	553538.62
73	507666.49	553538.62
74	507870.32	553538.62
75	508074.15	553538.62
76	508277.98	553538.62
77	508481.81	553538.62
78	508685.64	553538.62
79	508889.47	553538.62
80	509093.30	553538.62
81	509297.13	553538.62
82	509500.96	553538.62
83	509704.79	553538.62
84	509908.62	553538.62
85	510112.45	553538.62
86	510316.28	553538.62
87	510520.11	553538.62
88	510723.94	553538.62
89	510927.77	553538.62
90	511131.60	553538.62
91	511335.43	553538.62
92	511539.26	553538.62
93	511743.09	553538.62
94	511946.92	553538.62
95	512150.75	553538.62
96	512354.58	553538.62
97	512558.41	553538.62
98	512762.24	553538.62
99	512966.07	553538.62
100	513169.90	553538.62
101	513373.73	553538.62
102	513577.56	553538.62
103	513781.39	553538.62
104	513985.22	553538.62
105	514189.05	553538.62
106	514392.88	553538.62
107	514596.71	553538.62
108	514800.54	553538.62
109	515004.37	553538.62
110	515208.20	553538.62
111	515412.03	553538.62
112	515615.86	553538.62
113	515819.69	553538.62
114	516023.52	553538.62
115	516227.35	553538.62
116	516431.18	553538.62
117	516635.01	553538.62
118	516838.84	553538.62
119	517042.67	553538.62
120	517246.50	553538.62
121	517450.33	553538.62
122	517654.16	553538.62
123	517857.99	553538.62
124	518061.82	553538.62
125	518265.65	553538.62
126	518469.48	553538.62
127	518673.31	553538.62
128	518877.14	553538.62
129	519080.97	553538.62
130	519284.80	553538.62
131	519488.63	553538.62
132	519692.46	553538.62
133	519896.29	553538.62
134	520100.12	553538.62
135	520303.95	553538.62
136	520507.78	553538.62
137	520711.61	553538.62
138	520915.44	553538.62
139	521119.27	553538.62
140	521323.10	553538.62
141	521526.93	553538.62
142	521730.76	553538.62
143	521934.59	553538.62
144	522138.42	553538.62
145	522342.25	553538.62
146	522546.08	553538.62
147	522749.91	553538.62
148	522953.74	553538.62
149	523157.57	553538.62
150	523361.40	553538.62
151	523565.23	553538.62
152	523769.06	553538.62
153	523972.89	553538.62
154	524176.72	553538.62
155	524380.55	553538.62
156	524584.38	553538.62
157	524788.21	553538.62
158	524992.04	553538.62
159	525195.87	553538.62
160	525399.70	553538.62
161	525603.53	553538.62
162	525807.36	553538.62
163	526011.19	553538.62
164	526215.02	553538.62
165	526418.85	553538.62
166	526622.68	553538.62
167	526826.51	553538.62
168	527030.34	553538.62
169	527234.17	553538.62
170	527438.00	553538.62
171	527641.83	553538.62
172	527845.66	553538.62
173	528049.49	553538.62
174	528253.32	553538.62
175	528457.15	553538.62
176	528660.98	553538.62
177	528864.81	553538.62
178	529068.64	553538.62
179	529272.47	553538.62
180	529476.30	553538.62
181	529680.13	553538.62
182	529883.96	553538.62
183	530087.79	553538.62
184	530291.62	553538.62
185	530495.45	553538.62
186	530699.28	553538.62
187	530903.11	553538.62
188	531106.94	553538.62
189	531310.77	553538.62
190	531514.60	553538.62
191	531718.43	553538.62
192	531922.26	553538.62
193	532126.09	553538.62
194	532329.92	553538.62
195	532533.75	553538.62
196	532737.58	553538.62
197	532941.41	553538.62
198	533145.24	553538.62
199	533349.07	553538.62
200	533552.90	553538.62
201	533756.73	553538.62
202	533960.56	553538.62
203	534164.39	553538.62
204	534368.22	553538.62
205	534572.05	553538.62
206	534775.88	553538.62
207	534979.71	553538.62
208	535183.54	553538.62
209	535387.37	553538.62
210	535591.20	553538.62
211	535795.03	553538.62
212	535998.86	553538.62
213	536202.69	553538.62
214	536406.52	553538.62
215	536610.35	553538.62
216	536814.18	553538.62
217	537018.01	553538.62
218	537221.84	553538.62
219	537425.67	553538.62
220	537629.50	553538.62
221	537833.33	553538.62
222	538037.16	553538.62
223	538240.99	553538.62
224	538444.82	553538.62
225	538648.65	553538.62
226	538852.48	553538.62
227	539056.31	553538.62
228	539260.14	553538.62
229	539463.97	553538.62
230	539667.80	553538.62
231	539871.63	553538.62
232	540075.46	553538.62
233	540279.29	553538.62
234	540483.12	553538.62
235	540686.95	553538.62
236	540890.78	553538.62
237	541094.61	553538.62
238	541298.44	553538.62
239	541502.27	553538.62
240	541706.10	553538.62
241	541909.93	553538.62
242	542113.76	553538.62
243	542317.59	553538.62
244	542521.42	553538.62
245	542725.25	553538.62
246	542929.08	553538.62
247	543132.91	553538.62
248	543336.74	553538.62
249	543540.57	553538.62
250	543744.40	553538.62
251	543948.23	553538.62
252	544152.06	553538.62
253	544355.89	553538.62
254	544559.72	553538.62
255	544763.55	553538.62
256	544967.38	553538.62
257	545171.21	553538.62
258	545375.04	553538.62
259	545578.87	553538.62
260	545782.70	553538.62
261	545986.53	553538.62
262	546190.36	553538.62
263	546394.19	553538.62
264	546598.02	553538.62
265	546801.85	553538.62
266	547005.68	553538.62
267	547209.51	553538.62
268	547413.34	553538.62
269	547617.17	553538.62
270		

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 Blair Creek Mitigation Project - NCDMS Project No. 100047			
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 twice 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	
Blair Creek Mitigation Project - NCDMS Project No. 100047	
Component/Feature	Maintenance through project close-out
Stream	Routine channel maintenance and repair activities may include modifying in-stream structures to prevent piping, securing loose coir matting, and supplemental installations of live stakes and other target vegetation along the project reaches. Areas of concentrated stormwater and floodplain flows that intercept the channel may also require maintenance to prevent streambank failures and head-cutting until vegetation becomes established.
Vegetation	Vegetation will be maintained to ensure the health and vigor of the targeted plant community. Routine vegetation maintenance and repair activities may include supplemental planting, pruning, and fertilizing. Exotic invasive plant species will be treated by mechanical and/or chemical methods. Any invasive plant species control requiring herbicide application will be performed in accordance with NC Department of Agriculture (NCDA) rules and regulations.
Site Boundary	Site boundaries will be demarcated in the field to ensure clear distinction between the mitigation site and adjacent properties. Boundaries shall be identified by fence, marker, bollard, post, or other means as allowed by site conditions and/or conservation easement. Boundary markers disturbed, damaged, or destroyed will be repaired and/or replaced on an as needed basis.
Farm Road Crossing	The farm road crossings within the site may be maintained only as allowed by the recorded Conservation Easement, deed restrictions, rights of way, or corridor agreements. Culverts and fords located at crossings outside the easement will be maintained for stability and flow whenever possible with respect to these restrictions.
Beaver Management	Routine maintenance and repair activities caused by beaver activity may include supplemental planting, pruning, and dam breeching, dewatering, and/or removal. Beaver management will be performed in accordance with US Department of Agriculture (USDA) rules and regulations using accepted trapping and removal techniques only within the project boundary.

APPENDIX F: DWR STREAM IDENTIFICATION FORMS



NC DWQ Stream Identification Form Version 4.11

Date: 5/2/18	Project/Site: Blair Creek	Latitude: 35.0273
Evaluator: S. King, D. Powers, R. Myers	County: Clay	Longitude: -83.8329
Total Points: Stream is at least intermittent if ≥ 19 or perennial if $\geq 30^*$ 42	Stream Determination (circle one) Ephemeral Intermittent <u>Perennial</u>	Other USGS Hayesville e.g. Quad Name: Quad

A. Geomorphology (Subtotal = 19)

	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 = 10.5)

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	

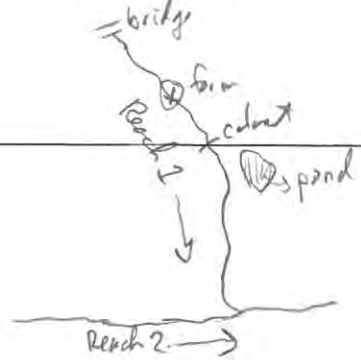
C. Biology (Subtotal = 12.5)

18. Fibrous roots in streambed	3	2	1	0
19. Rooted upland plants in streambed	3	2	1	0
20. Macroinvertebrates (note diversity and abundance)	0	1	2	3
21. Aquatic Mollusks snails	0	1	2	3
22. Fish many minnows + large fish	0	0.5	1	1.5
23. Crayfish	0	0.5	1	1.5
24. Amphibians numerous frogs	0	0.5	1	1.5
25. Algae low on side banks	0	0.5	1	1.5
26. Wetland plants in streambed	FACW = 0.75; OBL = 1.5 Other = 0			

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

Notes: 20) many caddisfly, some mayfly

Sketch: - USGS Quad names this reach as North Fork of Blair Creek.
- Reach has been straightened + dredged in the past.



Reach 2

NC DWQ Stream Identification Form Version 4.11

Date: 5/2/18	Project/Site: Blair Creek	Latitude: 35.0237
Evaluator: S King, D Powers, R. Myer-	County: Clay	Longitude: -83.8336
Total Points: Stream is at least intermittent if ≥ 19 or perennial if $\geq 30^*$ 44.5	Stream Determination (circle one) Ephemeral Intermittent (Perennial)	Other USGS Haystack Quad e.g. Quad Name: Quad

A. Geomorphology (Subtotal = 21.5)

	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 = 10.5)

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	

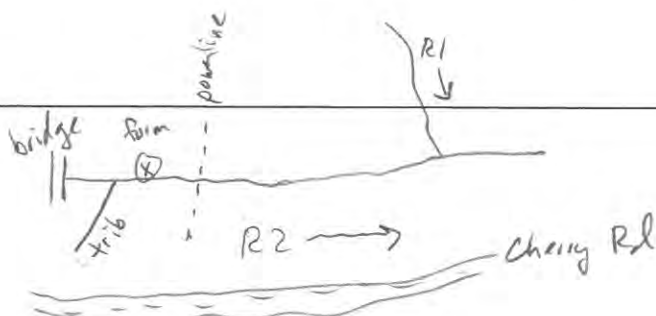
C. Biology (Subtotal = 12.5)

18. Fibrous roots in streambed	3	2	1	0
19. Rooted upland plants in streambed	3	2	1	0
20. Macroinvertebrates (note diversity and abundance)	0	1	2	3
21. Aquatic Mollusks <i>snails</i>	0	1	2	3
22. Fish <i>numerous</i>	0	0.5	1	1.5
23. Crayfish	0	0.5	1	1.5
24. Amphibians <i>frogs</i>	0	0.5	1	1.5
25. Algae <i>on banks & on rocks in bed</i>	0	0.5	1	1.5
26. Wetland plants in streambed	FACW = 0.75; OBL = 1.5 Other = 0			

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

Notes: many caddisflies, some mayflies

Sketch: - USGS Quad names this reach the South Fork of Blair Creek
- Reach has historically been dredged + straightened



NC DWQ Stream Identification Form Version 4.11

Date: 9/15/17	Project/Site: Bluff CR / UT1	Latitude:
Evaluator: SP	County: Clay	Longitude:
Total Points: Stream is at least intermittent if ≥ 19 or perennial if $\geq 30^*$ 23.75	Stream Determination (circle one) Ephemeral Intermittent Perennial	Other e.g. Quad Name: Haysville

A. Geomorphology (Subtotal = 14)

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

^a artificial ditches are not rated; see discussions in manual

B. Hydrology (Subtotal = 5)

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


C. Biology (Subtotal = 4.75)

18. Fibrous roots in streambed	3	2	1	0
19. Rooted upland plants in streambed	3	2	1	0
20. Macroinvertebrates (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	Assigned FACW = 0.75; OBL = 1.5 Other = 0			



*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

USACE AID #:	NCDWR #:		
<p>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.</p> <p>NOTE EVIDENCE OF STRESSORS AFFECTING THE ASSESSMENT AREA (do not need to be within the assessment area).</p> <p>PROJECT/SITE INFORMATION:</p>			
1. Project name (if any):	<u>Blair Creek Site - Reach 1</u>	2. Date of evaluation:	<u>5/2/18</u>
3. Applicant/owner name:	<u>Baker Engineering</u>	4. Assessor name/organization:	<u>SK, RM, DP / Baker</u>
5. County:	<u>Clay</u>	6. Nearest named water body	
7. River basin:	<u>Hiwassee</u>	on USGS 7.5-minute quad:	<u>Blair Creek Quad</u>
8. Site coordinates (decimal degrees, at lower end of assessment reach): _____			
STREAM INFORMATION: (depth and width can be approximations)			
9. Site number (show on attached map):	<u>Reach 1</u>	10. Length of assessment reach evaluated (feet):	<u>100</u>
11. Channel depth from bed (in riffle, if present) to top of bank (feet):	<u>3</u>	<input type="checkbox"/> Unable to assess channel depth.	
12. Channel width at top of bank (feet):	<u>12</u>	13. Is assessment reach a swamp steam?	<input type="checkbox"/> Yes <input type="checkbox"/> No
14. Feature type: <input checked="" type="checkbox"/> Perennial flow <input type="checkbox"/> Intermittent flow <input type="checkbox"/> Tidal Marsh Stream			
STREAM CATEGORY INFORMATION:			
15. NC SAM Zone:	<input checked="" type="checkbox"/> Mountains (M)	<input type="checkbox"/> Piedmont (P)	<input type="checkbox"/> Inner Coastal Plain (I) <input type="checkbox"/> Outer Coastal Plain (O)
16. Estimated geomorphic valley shape (skip for Tidal Marsh Stream):	<input type="checkbox"/> A 	<input checked="" type="checkbox"/> B 	
	(more sinuous stream, flatter valley slope)	(less sinuous stream, steeper valley slope)	
17. Watershed size: (skip for Tidal Marsh Stream)	<input type="checkbox"/> Size 1 (< 0.1 mi ²)	<input type="checkbox"/> Size 2 (0.1 to < 0.5 mi ²)	<input checked="" type="checkbox"/> Size 3 (0.5 to < 5 mi ²) <input type="checkbox"/> Size 4 (≥ 5 mi ²)
ADDITIONAL INFORMATION:			
18. Were regulatory considerations evaluated? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No If Yes, check all that apply to the assessment area.			
<input type="checkbox"/> Section 10 water	<input type="checkbox"/> Classified Trout Waters	<input checked="" type="checkbox"/> Water Supply Watershed (<input type="checkbox"/> I <input type="checkbox"/> II <input type="checkbox"/> III <input checked="" type="checkbox"/> IV <input type="checkbox"/> V)	
<input type="checkbox"/> Essential Fish Habitat	<input type="checkbox"/> Primary Nursery Area	<input type="checkbox"/> High Quality Waters/Outstanding Resource Waters	
<input type="checkbox"/> Publicly owned property	<input type="checkbox"/> NCDWR Riparian buffer rule in effect	<input type="checkbox"/> Nutrient Sensitive Waters	
<input type="checkbox"/> Anadromous fish	<input type="checkbox"/> 303(d) List	<input type="checkbox"/> CAMA Area of Environmental Concern (AEC)	
<input type="checkbox"/> Documented presence of a federal and/or state listed protected species within the assessment area.			
List species: _____			
<input type="checkbox"/> Designated Critical Habitat (list species) _____			
19. Are additional stream information/supplementary measurements included in "Notes/Sketch" section or attached? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> 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 | |
| <input type="checkbox"/> A | <input type="checkbox"/> A | Little or no evidence of conditions that adversely affect reference interaction |
| <input type="checkbox"/> B | <input type="checkbox"/> 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]) |
| <input checked="" type="checkbox"/> C | <input checked="" type="checkbox"/> C | Extensive evidence of conditions that adversely affect reference interaction (little to no floodplain/intertidal zone access [examples: causeways with floodplain and channel constriction, bulkheads, retaining walls, fill, stream incision, disruption of flood flows through streamside area] <u>or</u> too much floodplain/intertidal zone access [examples: impoundments, intensive mosquito ditching]) <u>or</u> floodplain/intertidal zone unnaturally absent <u>or</u> assessment reach is a man-made feature on an interstream divide |

7. Water Quality Stressors – assessment reach/intertidal zone metric

Check all that apply.

- A Discolored water in stream or intertidal zone (milky white, blue, unnatural water discoloration, oil sheen, stream foam)
- 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)

- | | | |
|--|------------------------------------|---|
| <input type="checkbox"/> A Multiple aquatic macrophytes and aquatic mosses (include liverworts, lichens, and algal mats) | Check for Tidal Marsh Streams Only | <input type="checkbox"/> F 5% oysters or other natural hard bottoms |
| <input type="checkbox"/> B Multiple sticks and/or leaf packs and/or emergent vegetation | | <input type="checkbox"/> G Submerged aquatic vegetation |
| <input type="checkbox"/> C Multiple snags and logs (including lap trees) | | <input type="checkbox"/> H Low-tide refugia (pools) |
| <input checked="" type="checkbox"/> D 5% undercut banks and/or root mats and/or roots in banks extend to the normal wetted perimeter | | <input type="checkbox"/> I Sand bottom |
| <input type="checkbox"/> E Little or no habitat | | <input type="checkbox"/> J 5% vertical bank along the marsh |
| | | <input type="checkbox"/> 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 | |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Bedrock/saprolite |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Boulder (256 – 4096 mm) |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Cobble (64 – 256 mm) |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | Gravel (2 – 64 mm) |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | Sand (.062 – 2 mm) |
| <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Silt/clay (< 0.062 mm) |
| <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Detritus |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 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 | |
|---------------------------------------|---------------------------------------|--|
| <input type="checkbox"/> A | <input type="checkbox"/> A | Little or no alteration to water storage capacity over a majority of the streamside area |
| <input type="checkbox"/> B | <input type="checkbox"/> B | Moderate alteration to water storage capacity over a majority of the streamside area |
| <input checked="" type="checkbox"/> C | <input checked="" type="checkbox"/> 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 | |
|---------------------------------------|---------------------------------------|--|
| <input type="checkbox"/> A | <input type="checkbox"/> A | Majority of streamside area with depressions able to pond water \geq 6 inches deep |
| <input type="checkbox"/> B | <input type="checkbox"/> B | Majority of streamside area with depressions able to pond water 3 to 6 inches deep |
| <input checked="" type="checkbox"/> C | <input checked="" type="checkbox"/> 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 | |
|---------------------------------------|---------------------------------------|--|
| <input checked="" type="checkbox"/> Y | <input checked="" type="checkbox"/> Y | Are wetlands present in the streamside area? |
| <input type="checkbox"/> N | <input type="checkbox"/> N | |

16. Baseflow Contributors – assessment reach metric (skip for Size 4 streams and Tidal Marsh Streams)

Check all contributors within the assessment reach or within view of and draining to the assessment reach.

- A Streams and/or springs (jurisdictional discharges)
- B Ponds (include wet detention basins; do not include sediment basins or dry detention basins)
- C Obstruction 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 (\geq 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	
<input checked="" type="checkbox"/> A	<input checked="" type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A	≥ 100 feet wide <u>or</u> extends to the edge of the watershed
<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	From 50 to < 100 feet wide
<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	From 30 to < 50 feet wide
<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D	From 10 to < 30 feet wide
<input type="checkbox"/> E	<input type="checkbox"/> E	<input checked="" type="checkbox"/> E	<input checked="" type="checkbox"/> E	< 10 feet wide <u>or</u> 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	
<input type="checkbox"/> A	<input type="checkbox"/> A	Mature forest
<input type="checkbox"/> B	<input type="checkbox"/> B	Non-mature woody vegetation <u>or</u> modified vegetation structure
<input checked="" type="checkbox"/> C	<input checked="" type="checkbox"/> C	Herbaceous vegetation with or without a strip of trees < 10 feet wide
<input type="checkbox"/> D	<input type="checkbox"/> D	Maintained shrubs
<input type="checkbox"/> E	<input type="checkbox"/> 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	
<input type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A	Row crops
<input type="checkbox"/> B	<input type="checkbox"/> B	<input checked="" type="checkbox"/> B	<input checked="" type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	Maintained turf
<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	Pasture (no livestock)/commercial horticulture
<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> 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	
<input checked="" type="checkbox"/> A	<input checked="" type="checkbox"/> A	Medium to high stem density
<input type="checkbox"/> B	<input type="checkbox"/> B	Low stem density
<input type="checkbox"/> C	<input type="checkbox"/> C	No wooded riparian buffer <u>or</u> predominantly herbaceous species <u>or</u> 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	
<input checked="" type="checkbox"/> A	<input checked="" type="checkbox"/> A	The total length of buffer breaks is < 25 percent.
<input type="checkbox"/> B	<input type="checkbox"/> B	The total length of buffer breaks is between 25 and 50 percent.
<input type="checkbox"/> C	<input type="checkbox"/> 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	
<input type="checkbox"/> A	<input type="checkbox"/> 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.
<input type="checkbox"/> B	<input type="checkbox"/> 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 <u>or</u> communities with non-native invasive species present, but not dominant, over a large portion of the expected strata <u>or</u> communities missing understory but retaining canopy trees.
<input checked="" type="checkbox"/> C	<input checked="" type="checkbox"/> C	Vegetation is severely disturbed in terms of species diversity or proportions. Mature canopy is absent <u>or</u> communities with non-native invasive species dominant over a large portion of expected strata <u>or</u> communities composed of planted stands of non-characteristic species <u>or</u> communities inappropriately composed of a single species <u>or</u> 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 Blair Creek Site - Reach 1 Date of Assessment 5/2/18
 Stream Category Mb3 Assessor Name/Organization SK, RM, DP / Baker

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	LOW	
(4) Microtopography	NA	
(3) Stream Stability	LOW	
(4) Channel Stability	LOW	
(4) Sediment Transport	MEDIUM	
(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	HIGH	
(3) Upland Pollutant Filtration	HIGH	
(3) Thermoregulation	HIGH	
(2) Indicators of Stressors	YES	
(2) Aquatic Life Tolerance	HIGH	
(2) Intertidal Zone Filtration	NA	
(1) Habitat	LOW	
(2) In-stream Habitat	LOW	
(3) Baseflow	HIGH	
(3) Substrate	MEDIUM	
(3) Stream Stability	LOW	
(3) In-stream Habitat	LOW	
(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	

USACE AID #:	NCDWR #:																																
<p>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.</p> <p>NOTE EVIDENCE OF STRESSORS AFFECTING THE ASSESSMENT AREA (do not need to be within the assessment area).</p> <p>PROJECT/SITE INFORMATION:</p> <table style="width:100%; border: none;"> <tr> <td style="width:50%;">1. Project name (if any): <u>Blair Creek Site - Reach 2</u></td> <td style="width:50%;">2. Date of evaluation: <u>5/2/18</u></td> </tr> <tr> <td>3. Applicant/owner name: <u>Baker Engineering</u></td> <td>4. Assessor name/organization: <u>SK, RM, DP / Baker</u></td> </tr> <tr> <td>5. County: <u>Clay</u></td> <td>6. Nearest named water body on USGS 7.5-minute quad: <u>Blair Creek Quad</u></td> </tr> <tr> <td>7. River basin: <u>Hiwassee</u></td> <td></td> </tr> <tr> <td colspan="2">8. Site coordinates (decimal degrees, at lower end of assessment reach): _____</td> </tr> </table> <p>STREAM INFORMATION: (depth and width can be approximations)</p> <table style="width:100%; border: none;"> <tr> <td style="width:50%;">9. Site number (show on attached map): <u>Reach 2</u></td> <td style="width:50%;">10. Length of assessment reach evaluated (feet): <u>100</u></td> </tr> <tr> <td>11. Channel depth from bed (in riffle, if present) to top of bank (feet): <u>4</u></td> <td><input type="checkbox"/> Unable to assess channel depth.</td> </tr> <tr> <td>12. Channel width at top of bank (feet): <u>15</u></td> <td>13. Is assessment reach a swamp steam? <input type="checkbox"/> Yes <input type="checkbox"/> No</td> </tr> <tr> <td colspan="2">14. Feature type: <input checked="" type="checkbox"/> Perennial flow <input type="checkbox"/> Intermittent flow <input type="checkbox"/> Tidal Marsh Stream</td> </tr> </table> <p>STREAM CATEGORY INFORMATION:</p> <p>15. NC SAM Zone: <input checked="" type="checkbox"/> Mountains (M) <input type="checkbox"/> Piedmont (P) <input type="checkbox"/> Inner Coastal Plain (I) <input type="checkbox"/> Outer Coastal Plain (O)</p> <p>16. Estimated geomorphic valley shape (skip for Tidal Marsh Stream):</p> <table style="width:100%; border: none;"> <tr> <td style="width:50%; vertical-align: top;"> <input type="checkbox"/> A  (more sinuous stream, flatter valley slope) </td> <td style="width:50%; vertical-align: top;"> <input checked="" type="checkbox"/> B  (less sinuous stream, steeper valley slope) </td> </tr> </table> <p>17. Watershed size: (skip for Tidal Marsh Stream)</p> <p><input type="checkbox"/> Size 1 (< 0.1 mi²) <input type="checkbox"/> Size 2 (0.1 to < 0.5 mi²) <input checked="" type="checkbox"/> Size 3 (0.5 to < 5 mi²) <input type="checkbox"/> Size 4 (≥ 5 mi²)</p> <p>ADDITIONAL INFORMATION:</p> <p>18. Were regulatory considerations evaluated? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No If Yes, check all that apply to the assessment area.</p> <table style="width:100%; border: none;"> <tr> <td><input type="checkbox"/> Section 10 water</td> <td><input type="checkbox"/> Classified Trout Waters</td> <td><input checked="" type="checkbox"/> Water Supply Watershed (<input type="checkbox"/> I <input type="checkbox"/> II <input type="checkbox"/> III <input checked="" type="checkbox"/> IV <input type="checkbox"/> V)</td> </tr> <tr> <td><input type="checkbox"/> Essential Fish Habitat</td> <td><input type="checkbox"/> Primary Nursery Area</td> <td><input type="checkbox"/> High Quality Waters/Outstanding Resource Waters</td> </tr> <tr> <td><input type="checkbox"/> Publicly owned property</td> <td><input type="checkbox"/> NCDWR Riparian buffer rule in effect</td> <td><input type="checkbox"/> Nutrient Sensitive Waters</td> </tr> <tr> <td><input type="checkbox"/> Anadromous fish</td> <td><input type="checkbox"/> 303(d) List</td> <td><input type="checkbox"/> CAMA Area of Environmental Concern (AEC)</td> </tr> </table> <p><input type="checkbox"/> Documented presence of a federal and/or state listed protected species within the assessment area. List species: <u>none</u></p> <p><input type="checkbox"/> Designated Critical Habitat (list species) _____</p> <p>19. Are additional stream information/supplementary measurements included in "Notes/Sketch" section or attached? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No</p>		1. Project name (if any): <u>Blair Creek Site - Reach 2</u>	2. Date of evaluation: <u>5/2/18</u>	3. Applicant/owner name: <u>Baker Engineering</u>	4. Assessor name/organization: <u>SK, RM, DP / Baker</u>	5. County: <u>Clay</u>	6. Nearest named water body on USGS 7.5-minute quad: <u>Blair Creek Quad</u>	7. River basin: <u>Hiwassee</u>		8. Site coordinates (decimal degrees, at lower end of assessment reach): _____		9. Site number (show on attached map): <u>Reach 2</u>	10. Length of assessment reach evaluated (feet): <u>100</u>	11. Channel depth from bed (in riffle, if present) to top of bank (feet): <u>4</u>	<input type="checkbox"/> Unable to assess channel depth.	12. 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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
C C Extensive evidence of conditions that adversely affect reference interaction

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
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.

Table with 5 columns (NP, R, C, A, P) and 7 rows of habitat types: 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 | |
|---------------------------------------|---------------------------------------|--|
| <input type="checkbox"/> A | <input type="checkbox"/> A | Little or no alteration to water storage capacity over a majority of the streamside area |
| <input type="checkbox"/> B | <input checked="" type="checkbox"/> B | Moderate alteration to water storage capacity over a majority of the streamside area |
| <input checked="" type="checkbox"/> C | <input type="checkbox"/> 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 | |
|---------------------------------------|---------------------------------------|--|
| <input type="checkbox"/> A | <input type="checkbox"/> A | Majority of streamside area with depressions able to pond water \geq 6 inches deep |
| <input type="checkbox"/> B | <input type="checkbox"/> B | Majority of streamside area with depressions able to pond water 3 to 6 inches deep |
| <input checked="" type="checkbox"/> C | <input checked="" type="checkbox"/> 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 | |
|---------------------------------------|---------------------------------------|--|
| <input type="checkbox"/> Y | <input type="checkbox"/> Y | Are wetlands present in the streamside area? |
| <input checked="" type="checkbox"/> N | <input checked="" type="checkbox"/> N | |

16. Baseflow Contributors – assessment reach metric (skip for Size 4 streams and Tidal Marsh Streams)

Check all contributors within the assessment reach or within view of and draining to the assessment reach.

- A Streams and/or springs (jurisdictional discharges)
- B Ponds (include wet detention basins; do not include sediment basins or dry detention basins)
- C Obstruction 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 (\geq 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	
<input checked="" type="checkbox"/> A	<input checked="" type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A	≥ 100 feet wide <u>or</u> extends to the edge of the watershed
<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	From 50 to < 100 feet wide
<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	From 30 to < 50 feet wide
<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D	<input checked="" type="checkbox"/> D	From 10 to < 30 feet wide
<input type="checkbox"/> E	<input type="checkbox"/> E	<input checked="" type="checkbox"/> E	<input type="checkbox"/> E	< 10 feet wide <u>or</u> 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	
<input type="checkbox"/> A	<input type="checkbox"/> A	Mature forest
<input type="checkbox"/> B	<input checked="" type="checkbox"/> B	Non-mature woody vegetation <u>or</u> modified vegetation structure
<input checked="" type="checkbox"/> C	<input type="checkbox"/> C	Herbaceous vegetation with or without a strip of trees < 10 feet wide
<input type="checkbox"/> D	<input type="checkbox"/> D	Maintained shrubs
<input type="checkbox"/> E	<input type="checkbox"/> 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	
<input type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A	Row crops
<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	<input checked="" type="checkbox"/> B	Maintained turf
<input checked="" type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	Pasture (no livestock)/commercial horticulture
<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> 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	
<input type="checkbox"/> A	<input checked="" type="checkbox"/> A	Medium to high stem density
<input type="checkbox"/> B	<input type="checkbox"/> B	Low stem density
<input checked="" type="checkbox"/> C	<input type="checkbox"/> C	No wooded riparian buffer <u>or</u> predominantly herbaceous species <u>or</u> 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	
<input checked="" type="checkbox"/> A	<input checked="" type="checkbox"/> A	The total length of buffer breaks is < 25 percent.
<input type="checkbox"/> B	<input type="checkbox"/> B	The total length of buffer breaks is between 25 and 50 percent.
<input type="checkbox"/> C	<input type="checkbox"/> 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	
<input type="checkbox"/> A	<input type="checkbox"/> 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.
<input type="checkbox"/> B	<input type="checkbox"/> 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 <u>or</u> communities with non-native invasive species present, but not dominant, over a large portion of the expected strata <u>or</u> communities missing understory but retaining canopy trees.
<input checked="" type="checkbox"/> C	<input checked="" type="checkbox"/> C	Vegetation is severely disturbed in terms of species diversity or proportions. Mature canopy is absent <u>or</u> communities with non-native invasive species dominant over a large portion of expected strata <u>or</u> communities composed of planted stands of non-characteristic species <u>or</u> communities inappropriately composed of a single species <u>or</u> 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 Blair Creek Site - Reach 2 Date of Assessment 5/2/18
 Stream Category Mb3 Assessor Name/Organization SK, RM, DP / Baker

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	LOW	
(4) Microtopography	NA	
(3) Stream Stability	LOW	
(4) Channel Stability	LOW	
(4) Sediment Transport	HIGH	
(4) Stream Geomorphology	LOW	
(2) Stream/Intertidal Zone Interaction	NA	
(2) Longitudinal Tidal Flow	NA	
(2) Tidal Marsh Stream Stability	NA	
(3) Tidal Marsh Channel Stability	NA	
(3) Tidal Marsh Stream Geomorphology	NA	
(1) Water Quality	MEDIUM	
(2) Baseflow	HIGH	
(2) Streamside Area Vegetation	MEDIUM	
(3) Upland Pollutant Filtration	LOW	
(3) Thermoregulation	HIGH	
(2) Indicators of Stressors	NO	
(2) Aquatic Life Tolerance	MEDIUM	
(2) Intertidal Zone Filtration	NA	
(1) Habitat	HIGH	
(2) In-stream Habitat	HIGH	
(3) Baseflow	HIGH	
(3) Substrate	HIGH	
(3) Stream Stability	LOW	
(3) In-stream Habitat	HIGH	
(2) Stream-side Habitat	MEDIUM	
(3) Stream-side Habitat	LOW	
(3) Thermoregulation	HIGH	
(2) Tidal Marsh In-stream Habitat	NA	
(3) Flow Restriction	NA	
(3) Tidal Marsh Stream Stability	NA	
(4) Tidal Marsh Channel Stability	NA	
(4) Tidal Marsh Stream Geomorphology	NA	
(3) Tidal Marsh In-stream Habitat	NA	
(2) Intertidal Zone	NA	
Overall	MEDIUM	

USACE AID #:	NCDWR #:		
<p>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.</p> <p>NOTE EVIDENCE OF STRESSORS AFFECTING THE ASSESSMENT AREA (do not need to be within the assessment area).</p> <p>PROJECT/SITE INFORMATION:</p>			
1. Project name (if any):	<u>Blair Creek Site - Reach 3</u>	2. Date of evaluation:	<u>4/21/20</u>
3. Applicant/owner name:	<u>Baker Engineering</u>	4. Assessor name/organization:	<u>HY, JY / Baker</u>
5. County:	<u>Clay</u>	6. Nearest named water body	
7. River basin:	<u>Hiwassee</u>	on USGS 7.5-minute quad:	<u>Hayesville Quad</u>
8. Site coordinates (decimal degrees, at lower end of assessment reach):	<u>35.02366 N, -83.83394 W</u>		
STREAM INFORMATION: (depth and width can be approximations)			
9. Site number (show on attached map):	<u>Reach R3</u>	10. Length of assessment reach evaluated (feet):	<u>350</u>
11. Channel depth from bed (in riffle, if present) to top of bank (feet):	<u>5.5</u>	<input type="checkbox"/> Unable to assess channel depth.	
12. Channel width at top of bank (feet):	<u>30</u>	13. Is assessment reach a swamp stream?	<input type="checkbox"/> Yes <input type="checkbox"/> No
14. Feature type:	<input checked="" type="checkbox"/> Perennial flow <input type="checkbox"/> Intermittent flow <input type="checkbox"/> Tidal Marsh Stream		
STREAM CATEGORY INFORMATION:			
15. NC SAM Zone:	<input checked="" type="checkbox"/> Mountains (M) <input type="checkbox"/> Piedmont (P) <input type="checkbox"/> Inner Coastal Plain (I) <input type="checkbox"/> Outer Coastal Plain (O)		
16. Estimated geomorphic valley shape (skip for Tidal Marsh Stream):	<div style="display: flex; justify-content: space-around;"> <div style="text-align: center;"> <input type="checkbox"/> A  (more sinuous stream, flatter valley slope) </div> <div style="text-align: center;"> <input checked="" type="checkbox"/> B  (less sinuous stream, steeper valley slope) </div> </div>		
17. Watershed size: (skip for Tidal Marsh Stream)	<input type="checkbox"/> Size 1 (< 0.1 mi ²) <input type="checkbox"/> Size 2 (0.1 to < 0.5 mi ²) <input checked="" type="checkbox"/> Size 3 (0.5 to < 5 mi ²) <input type="checkbox"/> Size 4 (≥ 5 mi ²)		
ADDITIONAL INFORMATION:			
18. Were regulatory considerations evaluated? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No If Yes, check all that apply to the assessment area.			
<input type="checkbox"/> Section 10 water <input type="checkbox"/> Classified Trout Waters <input checked="" type="checkbox"/> Water Supply Watershed (<input type="checkbox"/> I <input type="checkbox"/> II <input type="checkbox"/> III <input checked="" type="checkbox"/> IV <input type="checkbox"/> V)			
<input type="checkbox"/> Essential Fish Habitat <input type="checkbox"/> Primary Nursery Area <input type="checkbox"/> High Quality Waters/Outstanding Resource Waters			
<input type="checkbox"/> Publicly owned property <input type="checkbox"/> NCDWR Riparian buffer rule in effect <input type="checkbox"/> Nutrient Sensitive Waters			
<input type="checkbox"/> Anadromous fish <input type="checkbox"/> 303(d) List <input type="checkbox"/> CAMA Area of Environmental Concern (AEC)			
<input type="checkbox"/> Documented presence of a federal and/or state listed protected species within the assessment area. List species: <u>none</u>			
<input type="checkbox"/> Designated Critical Habitat (list species) _____			
19. Are additional stream information/supplementary measurements included in "Notes/Sketch" section or attached? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> 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 | |
| <input type="checkbox"/> A | <input type="checkbox"/> A | Little or no evidence of conditions that adversely affect reference interaction |
| <input checked="" type="checkbox"/> B | <input checked="" type="checkbox"/> 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]) |
| <input type="checkbox"/> C | <input type="checkbox"/> C | Extensive evidence of conditions that adversely affect reference interaction (little to no floodplain/intertidal zone access [examples: causeways with floodplain and channel constriction, bulkheads, retaining walls, fill, stream incision, disruption of flood flows through streamside area] <u>or</u> too much floodplain/intertidal zone access [examples: impoundments, intensive mosquito ditching]) <u>or</u> floodplain/intertidal zone unnaturally absent <u>or</u> assessment reach is a man-made feature on an interstream divide |

7. Water Quality Stressors – assessment reach/intertidal zone metric

Check all that apply.

- A Discolored water in stream or intertidal zone (milky white, blue, unnatural water discoloration, oil sheen, stream foam)
- 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)**

- | | | |
|--|------------------------------------|---|
| <input type="checkbox"/> A Multiple aquatic macrophytes and aquatic mosses (include liverworts, lichens, and algal mats) | Check for Tidal Marsh Streams Only | <input type="checkbox"/> F 5% oysters or other natural hard bottoms |
| <input type="checkbox"/> B Multiple sticks and/or leaf packs and/or emergent vegetation | | <input type="checkbox"/> G Submerged aquatic vegetation |
| <input checked="" type="checkbox"/> C Multiple snags and logs (including lap trees) | | <input type="checkbox"/> H Low-tide refugia (pools) |
| <input checked="" type="checkbox"/> D 5% undercut banks and/or root mats and/or roots in banks extend to the normal wetted perimeter | | <input type="checkbox"/> I Sand bottom |
| <input type="checkbox"/> E Little or no habitat | | <input type="checkbox"/> J 5% vertical bank along the marsh |
| | | <input type="checkbox"/> 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.

- | | | | | | |
|-------------------------------------|-------------------------------------|--------------------------|-------------------------------------|-------------------------------------|--------------------------------------|
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Bedrock/saprolite |
| <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Boulder (256 – 4096 mm) |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | Cobble (64 – 256 mm) |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | Gravel (2 – 64 mm) |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | Sand (.062 – 2 mm) |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Silt/clay (< 0.062 mm) |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Detritus |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 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 | |
| <input type="checkbox"/> A | <input type="checkbox"/> A | Little or no alteration to water storage capacity over a majority of the streamside area |
| <input checked="" type="checkbox"/> B | <input checked="" type="checkbox"/> B | Moderate alteration to water storage capacity over a majority of the streamside area |
| <input type="checkbox"/> C | <input type="checkbox"/> 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 | |
| <input type="checkbox"/> A | <input type="checkbox"/> A | Majority of streamside area with depressions able to pond water \geq 6 inches deep |
| <input type="checkbox"/> B | <input type="checkbox"/> B | Majority of streamside area with depressions able to pond water 3 to 6 inches deep |
| <input checked="" type="checkbox"/> C | <input checked="" type="checkbox"/> 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 | |
| <input type="checkbox"/> Y | <input type="checkbox"/> Y | Are wetlands present in the streamside area? |
| <input checked="" type="checkbox"/> N | <input checked="" type="checkbox"/> N | |

16. Baseflow Contributors – assessment reach metric (skip for Size 4 streams and Tidal Marsh Streams)

Check all contributors within the assessment reach or within view of and draining to the assessment reach.

- A Streams and/or springs (jurisdictional discharges)
- B Ponds (include wet detention basins; do not include sediment basins or dry detention basins)
- C Obstruction 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 (\geq 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	
<input type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A	≥ 100 feet wide <u>or</u> extends to the edge of the watershed
<input checked="" type="checkbox"/> B	<input checked="" type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	From 50 to < 100 feet wide
<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	From 30 to < 50 feet wide
<input type="checkbox"/> D	<input type="checkbox"/> D	<input checked="" type="checkbox"/> D	<input type="checkbox"/> D	From 10 to < 30 feet wide
<input type="checkbox"/> E	<input type="checkbox"/> E	<input type="checkbox"/> E	<input checked="" type="checkbox"/> E	< 10 feet wide <u>or</u> 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	
<input type="checkbox"/> A	<input type="checkbox"/> A	Mature forest
<input checked="" type="checkbox"/> B	<input type="checkbox"/> B	Non-mature woody vegetation <u>or</u> modified vegetation structure
<input type="checkbox"/> C	<input checked="" type="checkbox"/> C	Herbaceous vegetation with or without a strip of trees < 10 feet wide
<input type="checkbox"/> D	<input type="checkbox"/> D	Maintained shrubs
<input type="checkbox"/> E	<input type="checkbox"/> 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	
<input type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A	Row crops
<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	Maintained turf
<input checked="" type="checkbox"/> C	<input checked="" type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	<input checked="" type="checkbox"/> C	Pasture (no livestock)/commercial horticulture
<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> 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	
<input checked="" type="checkbox"/> A	<input type="checkbox"/> A	Medium to high stem density
<input type="checkbox"/> B	<input type="checkbox"/> B	Low stem density
<input type="checkbox"/> C	<input checked="" type="checkbox"/> C	No wooded riparian buffer <u>or</u> predominantly herbaceous species <u>or</u> 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	
<input checked="" type="checkbox"/> A	<input type="checkbox"/> A	The total length of buffer breaks is < 25 percent.
<input type="checkbox"/> B	<input type="checkbox"/> B	The total length of buffer breaks is between 25 and 50 percent.
<input type="checkbox"/> C	<input checked="" type="checkbox"/> 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	
<input type="checkbox"/> A	<input type="checkbox"/> 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.
<input checked="" type="checkbox"/> B	<input type="checkbox"/> 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 <u>or</u> communities with non-native invasive species present, but not dominant, over a large portion of the expected strata <u>or</u> communities missing understory but retaining canopy trees.
<input type="checkbox"/> C	<input checked="" type="checkbox"/> C	Vegetation is severely disturbed in terms of species diversity or proportions. Mature canopy is absent <u>or</u> communities with non-native invasive species dominant over a large portion of expected strata <u>or</u> communities composed of planted stands of non-characteristic species <u>or</u> communities inappropriately composed of a single species <u>or</u> 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:



High sand deposition and actively eroding banks on outer bends. Right bank lacks veg other than herbaceous.

Draft NC SAM Stream Rating Sheet
Accompanies User Manual Version 2.1

Stream Site Name Blair Creek Site - Reach 3 Date of Assessment 4/21/20
 Stream Category Mb3 Assessor Name/Organization HY, JY / Baker

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	LOW	
(4) Stream Geomorphology	LOW	
(2) Stream/Intertidal Zone Interaction	NA	
(2) Longitudinal Tidal Flow	NA	
(2) Tidal Marsh Stream Stability	NA	
(3) Tidal Marsh Channel Stability	NA	
(3) Tidal Marsh Stream Geomorphology	NA	
(1) Water Quality	LOW	
(2) Baseflow	HIGH	
(2) Streamside Area Vegetation	LOW	
(3) Upland Pollutant Filtration	LOW	
(3) Thermoregulation	MEDIUM	
(2) Indicators of Stressors	YES	
(2) Aquatic Life Tolerance	HIGH	
(2) Intertidal Zone Filtration	NA	
(1) Habitat	LOW	
(2) In-stream Habitat	LOW	
(3) Baseflow	HIGH	
(3) Substrate	LOW	
(3) Stream Stability	LOW	
(3) In-stream Habitat	MEDIUM	
(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	

USACE AID #:	NCDWR #:		
<p>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.</p> <p>NOTE EVIDENCE OF STRESSORS AFFECTING THE ASSESSMENT AREA (do not need to be within the assessment area).</p> <p>PROJECT/SITE INFORMATION:</p>			
1. Project name (if any):	<u>Blair Creek Site - Reach UT1</u>	2. Date of evaluation:	<u>4/21/20</u>
3. Applicant/owner name:	<u>Baker Engineering</u>	4. Assessor name/organization:	<u>VY, JY / Baker</u>
5. County:	<u>Clay</u>	6. Nearest named water body	
7. River basin:	<u>Hiwassee</u>	on USGS 7.5-minute quad:	<u>Hayesville Quad</u>
8. Site coordinates (decimal degrees, at lower end of assessment reach): _____			
STREAM INFORMATION: (depth and width can be approximations)			
9. Site number (show on attached map):	<u>Reach UT1</u>	10. Length of assessment reach evaluated (feet):	<u>190</u>
11. Channel depth from bed (in riffle, if present) to top of bank (feet):	<u>2-3'</u>	<input type="checkbox"/> Unable to assess channel depth.	
12. Channel width at top of bank (feet):	<u>6-8'</u>	13. Is assessment reach a swamp steam?	<input type="checkbox"/> Yes <input type="checkbox"/> No
14. Feature type: <input type="checkbox"/> Perennial flow <input checked="" type="checkbox"/> Intermittent flow <input type="checkbox"/> Tidal Marsh Stream			
STREAM CATEGORY INFORMATION:			
15. NC SAM Zone: <input checked="" type="checkbox"/> Mountains (M) <input type="checkbox"/> Piedmont (P) <input type="checkbox"/> Inner Coastal Plain (I) <input type="checkbox"/> Outer Coastal Plain (O)			
16. Estimated geomorphic valley shape (skip for Tidal Marsh Stream):	<input type="checkbox"/> A 	<input checked="" type="checkbox"/> B 	
	(more sinuous stream, flatter valley slope)	(less sinuous stream, steeper valley slope)	
17. Watershed size: (skip for Tidal Marsh Stream)	<input checked="" type="checkbox"/> Size 1 (< 0.1 mi ²)	<input type="checkbox"/> Size 2 (0.1 to < 0.5 mi ²)	<input type="checkbox"/> Size 3 (0.5 to < 5 mi ²) <input type="checkbox"/> Size 4 (≥ 5 mi ²)
ADDITIONAL INFORMATION:			
18. Were regulatory considerations evaluated? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No If Yes, check all that apply to the assessment area.			
<input type="checkbox"/> Section 10 water	<input type="checkbox"/> Classified Trout Waters	<input checked="" type="checkbox"/> Water Supply Watershed (<input type="checkbox"/> I <input type="checkbox"/> II <input type="checkbox"/> III <input checked="" type="checkbox"/> IV <input type="checkbox"/> V)	
<input type="checkbox"/> Essential Fish Habitat	<input type="checkbox"/> Primary Nursery Area	<input type="checkbox"/> High Quality Waters/Outstanding Resource Waters	
<input type="checkbox"/> Publicly owned property	<input type="checkbox"/> NCDWR Riparian buffer rule in effect	<input type="checkbox"/> Nutrient Sensitive Waters	
<input type="checkbox"/> Anadromous fish	<input type="checkbox"/> 303(d) List	<input type="checkbox"/> CAMA Area of Environmental Concern (AEC)	
<input type="checkbox"/> Documented presence of a federal and/or state listed protected species within the assessment area.			
List species: <u>none</u>			
<input type="checkbox"/> Designated Critical Habitat (list species) _____			
19. Are additional stream information/supplementary measurements included in "Notes/Sketch" section or attached? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> 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 | |
| <input checked="" type="checkbox"/> A | <input checked="" type="checkbox"/> A | Little or no evidence of conditions that adversely affect reference interaction |
| <input type="checkbox"/> B | <input type="checkbox"/> 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]) |
| <input type="checkbox"/> C | <input type="checkbox"/> C | Extensive evidence of conditions that adversely affect reference interaction (little to no floodplain/intertidal zone access [examples: causeways with floodplain and channel constriction, bulkheads, retaining walls, fill, stream incision, disruption of flood flows through streamside area] <u>or</u> too much floodplain/intertidal zone access [examples: impoundments, intensive mosquito ditching]) <u>or</u> floodplain/intertidal zone unnaturally absent <u>or</u> assessment reach is a man-made feature on an interstream divide |

7. Water Quality Stressors – assessment reach/intertidal zone metric

Check all that apply.

- A Discolored water in stream or intertidal zone (milky white, blue, unnatural water discoloration, oil sheen, stream foam)
- 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)**

- | | | |
|--|------------------------------------|---|
| <input type="checkbox"/> A Multiple aquatic macrophytes and aquatic mosses (include liverworts, lichens, and algal mats) | Check for Tidal Marsh Streams Only | <input type="checkbox"/> F 5% oysters or other natural hard bottoms |
| <input type="checkbox"/> B Multiple sticks and/or leaf packs and/or emergent vegetation | | <input type="checkbox"/> G Submerged aquatic vegetation |
| <input type="checkbox"/> C Multiple snags and logs (including lap trees) | | <input type="checkbox"/> H Low-tide refugia (pools) |
| <input checked="" type="checkbox"/> D 5% undercut banks and/or root mats and/or roots in banks extend to the normal wetted perimeter | | <input type="checkbox"/> I Sand bottom |
| <input type="checkbox"/> E Little or no habitat | | <input type="checkbox"/> J 5% vertical bank along the marsh |
| | | <input type="checkbox"/> 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 | |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Bedrock/saprolite |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Boulder (256 – 4096 mm) |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Cobble (64 – 256 mm) |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | Gravel (2 – 64 mm) |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | Sand (.062 – 2 mm) |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Silt/clay (< 0.062 mm) |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Detritus |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 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 | |
| <input checked="" type="checkbox"/> A | <input checked="" type="checkbox"/> A | Little or no alteration to water storage capacity over a majority of the streamside area |
| <input type="checkbox"/> B | <input type="checkbox"/> B | Moderate alteration to water storage capacity over a majority of the streamside area |
| <input type="checkbox"/> C | <input type="checkbox"/> 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 | |
| <input type="checkbox"/> A | <input type="checkbox"/> A | Majority of streamside area with depressions able to pond water \geq 6 inches deep |
| <input checked="" type="checkbox"/> B | <input checked="" type="checkbox"/> B | Majority of streamside area with depressions able to pond water 3 to 6 inches deep |
| <input type="checkbox"/> C | <input type="checkbox"/> 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 | |
| <input checked="" type="checkbox"/> Y | <input checked="" type="checkbox"/> Y | Are wetlands present in the streamside area? |
| <input type="checkbox"/> N | <input type="checkbox"/> N | |

16. Baseflow Contributors – assessment reach metric (skip for Size 4 streams and Tidal Marsh Streams)

Check all contributors within the assessment reach or within view of and draining to the assessment reach.

- A Streams and/or springs (jurisdictional discharges)
- B Ponds (include wet detention basins; do not include sediment basins or dry detention basins)
- C Obstruction 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 (\geq 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	
<input type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A	≥ 100 feet wide <u>or</u> extends to the edge of the watershed
<input checked="" type="checkbox"/> B	<input checked="" type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	From 50 to < 100 feet wide
<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	From 30 to < 50 feet wide
<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D	From 10 to < 30 feet wide
<input type="checkbox"/> E	<input type="checkbox"/> E	<input checked="" type="checkbox"/> E	<input checked="" type="checkbox"/> E	< 10 feet wide <u>or</u> 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	
<input type="checkbox"/> A	<input type="checkbox"/> A	Mature forest
<input type="checkbox"/> B	<input type="checkbox"/> B	Non-mature woody vegetation <u>or</u> modified vegetation structure
<input checked="" type="checkbox"/> C	<input checked="" type="checkbox"/> C	Herbaceous vegetation with or without a strip of trees < 10 feet wide
<input type="checkbox"/> D	<input type="checkbox"/> D	Maintained shrubs
<input type="checkbox"/> E	<input type="checkbox"/> 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
<input type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A
<input checked="" type="checkbox"/> B	<input checked="" type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	<input checked="" type="checkbox"/> B
<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C
<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D
					Row crops
					Maintained turf
					Pasture (no livestock)/commercial horticulture
					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	
<input type="checkbox"/> A	<input type="checkbox"/> A	Medium to high stem density
<input type="checkbox"/> B	<input type="checkbox"/> B	Low stem density
<input checked="" type="checkbox"/> C	<input checked="" type="checkbox"/> C	No wooded riparian buffer <u>or</u> predominantly herbaceous species <u>or</u> 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	
<input checked="" type="checkbox"/> A	<input checked="" type="checkbox"/> A	The total length of buffer breaks is < 25 percent.
<input type="checkbox"/> B	<input type="checkbox"/> B	The total length of buffer breaks is between 25 and 50 percent.
<input type="checkbox"/> C	<input type="checkbox"/> 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	
<input type="checkbox"/> A	<input type="checkbox"/> 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.
<input checked="" type="checkbox"/> B	<input checked="" type="checkbox"/> 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 <u>or</u> communities with non-native invasive species present, but not dominant, over a large portion of the expected strata <u>or</u> communities missing understory but retaining canopy trees.
<input type="checkbox"/> C	<input type="checkbox"/> C	Vegetation is severely disturbed in terms of species diversity or proportions. Mature canopy is absent <u>or</u> communities with non-native invasive species dominant over a large portion of expected strata <u>or</u> communities composed of planted stands of non-characteristic species <u>or</u> communities inappropriately composed of a single species <u>or</u> 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:

Culvert origin at head of project reach UT1 is perched and has holes in the bottom.

Draft NC SAM Stream Rating Sheet
Accompanies User Manual Version 2.1

Stream Site Name	Blair Creek Site - Reach UT1	Date of Assessment	4/21/20
Stream Category	Mb1	Assessor Name/Organization	VY, JY / Baker

Notes of Field Assessment Form (Y/N)	YES
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)	Intermittent

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

USACE AID #		NCDWR#	
Project Name	Blair Creek Site	Date of Evaluation	5/2/18
Applicant/Owner Name	Baker Engineering	Wetland Site Name	W-D (and others in floodplain)
Wetland Type	Bottomland Hardwood Forest	Assessor Name/Organization	SK,DP,RM / Baker
Level III Ecoregion	Blue Ridge Mountains	Nearest Named Water Body	North Fork Blair Creek
River Basin	Hiwassee	USGS 8-Digit Catalogue Unit	0602002
County	Clay	NCDWR Region	Asheville
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Precipitation within 48 hrs?	Latitude/Longitude (deci-degrees)	35.0289, -83.8351

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 | |
| <input type="checkbox"/> A | <input type="checkbox"/> A | Not severely altered |
| <input checked="" type="checkbox"/> B | <input checked="" type="checkbox"/> 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 | |
| <input type="checkbox"/> A | <input type="checkbox"/> A | Water storage capacity and duration are not altered. |
| <input type="checkbox"/> B | <input type="checkbox"/> B | Water storage capacity or duration are altered, but not substantially (typically, not sufficient to change vegetation). |
| <input checked="" type="checkbox"/> C | <input checked="" type="checkbox"/> 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. | <input type="checkbox"/> A | <input type="checkbox"/> A | Majority of wetland with depressions able to pond water > 1 deep |
| | <input type="checkbox"/> B | <input type="checkbox"/> B | Majority of wetland with depressions able to pond water 6 inches to 1 foot deep |
| | <input type="checkbox"/> C | <input type="checkbox"/> C | Majority of wetland with depressions able to pond water 3 to 6 inches deep |
| | <input checked="" type="checkbox"/> D | <input checked="" type="checkbox"/> D | Depressions able to pond water < 3 inches deep |
| 3b. | <input type="checkbox"/> A | | Evidence that maximum depth of inundation is greater than 2 feet |
| | <input type="checkbox"/> B | | Evidence that maximum depth of inundation is between 1 and 2 feet |
| | <input checked="" type="checkbox"/> 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 | |
| <input checked="" type="checkbox"/> A | <input checked="" type="checkbox"/> A | Little or no evidence of pollutants or discharges entering the assessment area |
| <input type="checkbox"/> B | <input type="checkbox"/> B | Noticeable evidence of pollutants or discharges entering the wetland and stressing, but not overwhelming the treatment capacity of the assessment area |
| <input type="checkbox"/> C | <input type="checkbox"/> 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 | |
| <input type="checkbox"/> A | <input type="checkbox"/> A | <input type="checkbox"/> A | ≥ 10% impervious surfaces |
| <input type="checkbox"/> B | <input type="checkbox"/> B | <input type="checkbox"/> B | Confined animal operations (or other local, concentrated source of pollutants) |
| <input type="checkbox"/> C | <input type="checkbox"/> C | <input type="checkbox"/> C | ≥ 20% coverage of pasture |
| <input type="checkbox"/> D | <input type="checkbox"/> D | <input type="checkbox"/> D | ≥ 20% coverage of agricultural land (regularly plowed land) |
| <input checked="" type="checkbox"/> E | <input checked="" type="checkbox"/> E | <input checked="" type="checkbox"/> E | ≥ 20% coverage of maintained grass/herb |
| <input type="checkbox"/> F | <input type="checkbox"/> F | <input type="checkbox"/> F | ≥ 20% coverage of clear-cut land |
| <input type="checkbox"/> G | <input type="checkbox"/> G | <input type="checkbox"/> G | Little or no opportunity to improve water quality. Lack of opportunity may result from little or no disturbance in the watershed <u>or</u> hydrologic alterations that prevent drainage <u>and/or</u> 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 | |
| <input type="checkbox"/> A | <input type="checkbox"/> A | ≥ 100 feet |
| <input type="checkbox"/> B | <input type="checkbox"/> B | From 80 to < 100 feet |
| <input type="checkbox"/> C | <input type="checkbox"/> C | From 50 to < 80 feet |
| <input type="checkbox"/> D | <input type="checkbox"/> D | From 40 to < 50 feet |
| <input type="checkbox"/> E | <input type="checkbox"/> E | From 30 to < 40 feet |
| <input type="checkbox"/> F | <input type="checkbox"/> F | From 15 to < 30 feet |
| <input type="checkbox"/> G | <input checked="" type="checkbox"/> G | From 5 to < 15 feet |
| <input type="checkbox"/> H | <input type="checkbox"/> 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) |
|---------------------------------------|---------------------------------------|--|
| <input type="checkbox"/> A | <input type="checkbox"/> A | <input type="checkbox"/> A ≥ 500 acres |
| <input type="checkbox"/> B | <input type="checkbox"/> B | <input type="checkbox"/> B From 100 to < 500 acres |
| <input type="checkbox"/> C | <input type="checkbox"/> C | <input type="checkbox"/> C From 50 to < 100 acres |
| <input type="checkbox"/> D | <input type="checkbox"/> D | <input type="checkbox"/> D From 25 to < 50 acres |
| <input type="checkbox"/> E | <input type="checkbox"/> E | <input type="checkbox"/> E From 10 to < 25 acres |
| <input type="checkbox"/> F | <input type="checkbox"/> F | <input type="checkbox"/> F From 5 to < 10 acres |
| <input type="checkbox"/> G | <input type="checkbox"/> G | <input type="checkbox"/> G From 1 to < 5 acres |
| <input checked="" type="checkbox"/> H | <input checked="" type="checkbox"/> H | <input type="checkbox"/> H From 0.5 to < 1 acre |
| <input type="checkbox"/> I | <input type="checkbox"/> I | <input type="checkbox"/> I From 0.1 to < 0.5 acre |
| <input type="checkbox"/> J | <input type="checkbox"/> J | <input type="checkbox"/> J From 0.01 to < 0.1 acre |
| <input type="checkbox"/> K | <input type="checkbox"/> K | <input checked="" type="checkbox"/> K < 0.01 acre <u>or</u> 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 |
|---------------------------------------|--|
| <input type="checkbox"/> A | <input type="checkbox"/> A ≥ 500 acres |
| <input type="checkbox"/> B | <input type="checkbox"/> B From 100 to < 500 acres |
| <input type="checkbox"/> C | <input type="checkbox"/> C From 50 to < 100 acres |
| <input type="checkbox"/> D | <input type="checkbox"/> D From 10 to < 50 acres |
| <input type="checkbox"/> E | <input type="checkbox"/> E < 10 acres |
| <input checked="" type="checkbox"/> F | <input checked="" type="checkbox"/> 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	<input type="checkbox"/> A	<input type="checkbox"/> A	Canopy closed, or nearly closed, with natural gaps associated with natural processes
	<input type="checkbox"/> B	<input type="checkbox"/> B	Canopy present, but opened more than natural gaps
	<input checked="" type="checkbox"/> C	<input checked="" type="checkbox"/> C	Canopy sparse or absent
Mid-Story	<input type="checkbox"/> A	<input type="checkbox"/> A	Dense mid-story/sapling layer
	<input type="checkbox"/> B	<input type="checkbox"/> B	Moderate density mid-story/sapling layer
	<input checked="" type="checkbox"/> C	<input checked="" type="checkbox"/> C	Mid-story/sapling layer sparse or absent
Shrub	<input type="checkbox"/> A	<input type="checkbox"/> A	Dense shrub layer
	<input type="checkbox"/> B	<input type="checkbox"/> B	Moderate density shrub layer
	<input checked="" type="checkbox"/> C	<input checked="" type="checkbox"/> C	Shrub layer sparse or absent
Herb	<input checked="" type="checkbox"/> A	<input checked="" type="checkbox"/> A	Dense herb layer
	<input type="checkbox"/> B	<input type="checkbox"/> B	Moderate density herb layer
	<input type="checkbox"/> C	<input type="checkbox"/> 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 interspersions between vegetation and open water in the growing season. Patterned areas indicate vegetated areas, while solid white areas indicate open water.



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
 For #22, significant surface and subsurface drainage is present (surface ditches, field drain pipes), and adjacent stream has been straightened and ditched/dredged and is subsequently incised/entrenched. Also extensive streamside spoil berms from dredging also present.

USACE AID #		NCDWR#	
Project Name	Blair Creek Site	Date of Evaluation	5/2/18
Applicant/Owner Name	Baker Engineering	Wetland Site Name	W-L, W-M, W-P
Wetland Type	Bottomland Hardwood Forest	Assessor Name/Organization	SK,DP,RM / Baker
Level III Ecoregion	Blue Ridge Mountains	Nearest Named Water Body	North Fork Blair Creek
River Basin	Hiwassee	USGS 8-Digit Catalogue Unit	0602002
County	Clay	NCDWR Region	Asheville
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Precipitation within 48 hrs?	Latitude/Longitude (deci-degrees)	35.0257, -83.8313

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 | |
| <input type="checkbox"/> A | <input type="checkbox"/> A | Not severely altered |
| <input checked="" type="checkbox"/> B | <input checked="" type="checkbox"/> 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 | |
| <input type="checkbox"/> A | <input type="checkbox"/> A | Water storage capacity and duration are not altered. |
| <input checked="" type="checkbox"/> B | <input checked="" type="checkbox"/> B | Water storage capacity or duration are altered, but not substantially (typically, not sufficient to change vegetation). |
| <input type="checkbox"/> C | <input type="checkbox"/> 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. | <input type="checkbox"/> A | <input type="checkbox"/> A | Majority of wetland with depressions able to pond water > 1 deep |
| | <input type="checkbox"/> B | <input type="checkbox"/> B | Majority of wetland with depressions able to pond water 6 inches to 1 foot deep |
| | <input type="checkbox"/> C | <input type="checkbox"/> C | Majority of wetland with depressions able to pond water 3 to 6 inches deep |
| | <input checked="" type="checkbox"/> D | <input checked="" type="checkbox"/> D | Depressions able to pond water < 3 inches deep |
| 3b. | <input type="checkbox"/> A | | Evidence that maximum depth of inundation is greater than 2 feet |
| | <input type="checkbox"/> B | | Evidence that maximum depth of inundation is between 1 and 2 feet |
| | <input checked="" type="checkbox"/> 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 | |
| <input checked="" type="checkbox"/> A | <input checked="" type="checkbox"/> A | Little or no evidence of pollutants or discharges entering the assessment area |
| <input type="checkbox"/> B | <input type="checkbox"/> B | Noticeable evidence of pollutants or discharges entering the wetland and stressing, but not overwhelming the treatment capacity of the assessment area |
| <input type="checkbox"/> C | <input type="checkbox"/> 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 | |
| <input type="checkbox"/> A | <input type="checkbox"/> A | <input type="checkbox"/> A | ≥ 10% impervious surfaces |
| <input type="checkbox"/> B | <input type="checkbox"/> B | <input type="checkbox"/> B | Confined animal operations (or other local, concentrated source of pollutants) |
| <input type="checkbox"/> C | <input type="checkbox"/> C | <input type="checkbox"/> C | ≥ 20% coverage of pasture |
| <input type="checkbox"/> D | <input type="checkbox"/> D | <input type="checkbox"/> D | ≥ 20% coverage of agricultural land (regularly plowed land) |
| <input checked="" type="checkbox"/> E | <input checked="" type="checkbox"/> E | <input checked="" type="checkbox"/> E | ≥ 20% coverage of maintained grass/herb |
| <input type="checkbox"/> F | <input type="checkbox"/> F | <input type="checkbox"/> F | ≥ 20% coverage of clear-cut land |
| <input type="checkbox"/> G | <input type="checkbox"/> G | <input type="checkbox"/> G | Little or no opportunity to improve water quality. Lack of opportunity may result from little or no disturbance in the watershed <u>or</u> hydrologic alterations that prevent drainage <u>and/or</u> 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 | |
| <input type="checkbox"/> A | <input type="checkbox"/> A | ≥ 100 feet |
| <input type="checkbox"/> B | <input type="checkbox"/> B | From 80 to < 100 feet |
| <input type="checkbox"/> C | <input type="checkbox"/> C | From 50 to < 80 feet |
| <input type="checkbox"/> D | <input type="checkbox"/> D | From 40 to < 50 feet |
| <input type="checkbox"/> E | <input type="checkbox"/> E | From 30 to < 40 feet |
| <input type="checkbox"/> F | <input checked="" type="checkbox"/> F | From 15 to < 30 feet |
| <input type="checkbox"/> G | <input type="checkbox"/> G | From 5 to < 15 feet |
| <input type="checkbox"/> H | <input type="checkbox"/> 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) |
|---------------------------------------|---------------------------------------|---|
| <input type="checkbox"/> A | <input type="checkbox"/> A | <input type="checkbox"/> A ≥ 500 acres |
| <input type="checkbox"/> B | <input type="checkbox"/> B | <input type="checkbox"/> B From 100 to < 500 acres |
| <input type="checkbox"/> C | <input type="checkbox"/> C | <input type="checkbox"/> C From 50 to < 100 acres |
| <input type="checkbox"/> D | <input type="checkbox"/> D | <input type="checkbox"/> D From 25 to < 50 acres |
| <input type="checkbox"/> E | <input type="checkbox"/> E | <input type="checkbox"/> E From 10 to < 25 acres |
| <input type="checkbox"/> F | <input type="checkbox"/> F | <input type="checkbox"/> F From 5 to < 10 acres |
| <input type="checkbox"/> G | <input type="checkbox"/> G | <input type="checkbox"/> G From 1 to < 5 acres |
| <input type="checkbox"/> H | <input type="checkbox"/> H | <input type="checkbox"/> H From 0.5 to < 1 acre |
| <input checked="" type="checkbox"/> I | <input checked="" type="checkbox"/> I | <input type="checkbox"/> I From 0.1 to < 0.5 acre |
| <input type="checkbox"/> J | <input type="checkbox"/> J | <input checked="" type="checkbox"/> J From 0.01 to < 0.1 acre |
| <input type="checkbox"/> K | <input type="checkbox"/> K | <input type="checkbox"/> K < 0.01 acre <u>or</u> 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 |
|---------------------------------------|--|
| <input type="checkbox"/> A | <input type="checkbox"/> A ≥ 500 acres |
| <input type="checkbox"/> B | <input type="checkbox"/> B From 100 to < 500 acres |
| <input type="checkbox"/> C | <input type="checkbox"/> C From 50 to < 100 acres |
| <input type="checkbox"/> D | <input type="checkbox"/> D From 10 to < 50 acres |
| <input type="checkbox"/> E | <input type="checkbox"/> E < 10 acres |
| <input checked="" type="checkbox"/> F | <input checked="" type="checkbox"/> 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	<input type="checkbox"/> A	<input type="checkbox"/> A	Canopy closed, or nearly closed, with natural gaps associated with natural processes
	<input type="checkbox"/> B	<input type="checkbox"/> B	Canopy present, but opened more than natural gaps
	<input checked="" type="checkbox"/> C	<input checked="" type="checkbox"/> C	Canopy sparse or absent
Mid-Story	<input type="checkbox"/> A	<input type="checkbox"/> A	Dense mid-story/sapling layer
	<input checked="" type="checkbox"/> B	<input type="checkbox"/> B	Moderate density mid-story/sapling layer
	<input type="checkbox"/> C	<input checked="" type="checkbox"/> C	Mid-story/sapling layer sparse or absent
Shrub	<input type="checkbox"/> A	<input type="checkbox"/> A	Dense shrub layer
	<input checked="" type="checkbox"/> B	<input checked="" type="checkbox"/> B	Moderate density shrub layer
	<input type="checkbox"/> C	<input type="checkbox"/> C	Shrub layer sparse or absent
Herb	<input type="checkbox"/> A	<input checked="" type="checkbox"/> A	Dense herb layer
	<input checked="" type="checkbox"/> B	<input type="checkbox"/> B	Moderate density herb layer
	<input type="checkbox"/> C	<input type="checkbox"/> 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.

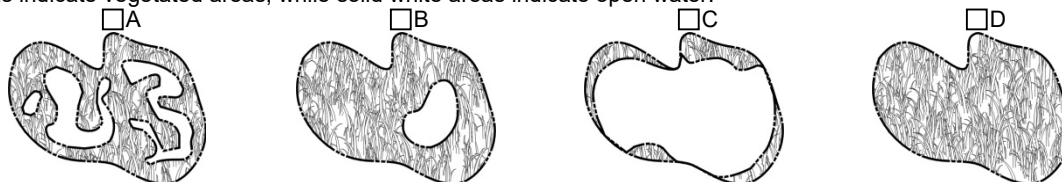
20. Large Woody Debris – wetland type condition metric (skip for all marshes)

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 interspersed between vegetation and open water in the growing season. Patterned areas indicate vegetated areas, while solid white areas indicate open water.



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-P Date of Assessment 5/2/18
 Wetland Type Bottomland Hardwood Forest Assessor Name/Organization SK,DP,RM / Baker

Notes on Field Assessment Form (Y/N) NO
 Presence of regulatory considerations (Y/N) NO
 Wetland is intensively managed (Y/N) NO
 Assessment area is located within 50 feet of a natural tributary or other open water (Y/N) YES
 Assessment area is substantially altered by beaver (Y/N) YES
 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 Sub-surface Storage and Retention	Condition	MEDIUM	
		Condition	MEDIUM	
Water Quality	Pathogen Change	Condition	HIGH	
		Condition/Opportunity	HIGH	
		Opportunity Presence (Y/N)	NO	
	Particulate Change	Condition	MEDIUM	
		Condition/Opportunity	MEDIUM	
		Opportunity Presence (Y/N)	NO	
	Soluble Change	Condition	Condition	HIGH
			Condition/Opportunity	HIGH
			Opportunity Presence (Y/N)	NO
		Physical Change	Condition	HIGH
			Condition/Opportunity	HIGH
			Opportunity Presence (Y/N)	YES
Pollution Change	Condition	NA		
	Condition/Opportunity	NA		
	Opportunity Presence (Y/N)	NA		
Habitat	Physical Structure	Condition	LOW	
	Landscape Patch Structure	Condition	LOW	
	Vegetation Composition	Condition	MEDIUM	

Function Rating Summary

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

Overall Wetland Rating MEDIUM

APPENDIX H: APPROVED JD AND WETLAND FORMS



**U.S. ARMY CORPS OF ENGINEERS
WILMINGTON DISTRICT**

Action ID: SAW-2018-00449 County: Clay U.S.G.S. Quad: Hayesville

NOTIFICATION OF JURISDICTIONAL DETERMINATION

Property Owner: Michael Baker Engineering, Inc. / Attn.: Scott King
Address: 8000 Regency Parkway, Suite 600
Cary, NC 27518
Telephone Number: 919-463-5488

Size (acres): 8.0 Nearest Town: Hayesville
Nearest Waterway: UTs South Fork Blair Creek,
South Fork Blair Creek, North
Fork Blair Creek, and Blair Creek Coordinates: 35.02676 N, 83.83256 W
River Basin/ HUC: Hiwassee (06020002)

Location description: The project site is located on a tract of land (parcel nos. 5550 0041 3626, 5550 0030 9497, 5459 0049 5013, 5459 0049 3689, and 5459 0039 7402) approximately 0.15 mile west of the intersection of Cherry Road and N.C. Highway 69, between 416 Cherry Road and 767 Waldroup Road in Hayesville, Clay County, North Carolina.

Indicate Which of the Following Apply:

A. Preliminary Determination

- There are waters, including wetlands, on the above described project area, that may be subject to Section 404 of the Clean Water Act (CWA)(33 USC § 1344) and/or Section 10 of the Rivers and Harbors Act (RHA) (33 USC § 403). The waters, including wetlands, have been delineated, and the delineation has been verified by the Corps to be sufficiently accurate and reliable. Therefore this preliminary jurisdiction determination may be used in the permit evaluation process, including determining compensatory mitigation. For purposes of computation of impacts, compensatory mitigation requirements, and other resource protection measures, a permit decision made on the basis of a preliminary JD will treat all waters and wetlands that would be affected in any way by the permitted activity on the site as if they are jurisdictional waters of the U.S. This preliminary determination is not an appealable action under the Regulatory Program Administrative Appeal Process (Reference 33 CFR Part 331). However, you may request an approved JD, which is an appealable action, by contacting the Corps district for further instruction.
- There are wetlands on the above described property, that may be subject to Section 404 of the Clean Water Act (CWA)(33 USC § 1344) and/or Section 10 of the Rivers and Harbors Act (RHA) (33 USC § 403). However, since the waters, including wetlands, have not been properly delineated, this preliminary jurisdiction determination may not be used in the permit evaluation process. Without a verified wetland delineation, this preliminary determination is merely an effective presumption of CWA/RHA jurisdiction over all of the waters, including wetlands, at the project area, which is not sufficiently accurate and reliable to support an enforceable permit decision. We recommend that you have the waters of the U.S. on your property delineated. As the Corps may not be able to accomplish this wetland delineation in a timely manner, you may wish to obtain a consultant to conduct a delineation that can be verified by the Corps.

B. Approved Determination

- There are Navigable Waters of the United States within the above described property subject to the permit requirements of Section 10 of the Rivers and Harbors Act (RHA) (33 USC § 403) and Section 404 of the Clean Water Act (CWA)(33 USC § 1344). Unless there is a change in the law or our published regulations, this determination may be relied upon for a period not to exceed five years from the date of this notification.
- There are waters of the U.S. including wetlands on the above described property subject to the permit requirements of Section 404 of the Clean Water Act (CWA)(33 USC § 1344). Unless there is a change in the law or our published regulations, this determination may be relied upon for a period not to exceed five years from the date of this notification.
- We recommend you have the waters of the U.S. on your property delineated. As the Corps may not be able to accomplish this wetland delineation in a timely manner, you may wish to obtain a consultant to conduct a delineation that can be verified by the Corps.

— The waters of the U.S. including wetlands on your project area have been delineated and the delineation has been verified by the Corps. If you wish to have the delineation surveyed, the Corps can review and verify the survey upon completion. Once verified, this survey will provide an accurate depiction of all areas subject to CWA and/or RHA jurisdiction on your property which, provided there is no change in the law or our published regulations, may be relied upon for a period not to exceed five years.

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

- There are no waters of the U.S., to include wetlands, present on the above described project area which are subject to the permit requirements of Section 404 of the Clean Water Act (33 USC 1344). Unless there is a change in the law or our published regulations, this determination may be relied upon for a period not to exceed five years from the date of this notification.
- The property is located in one of the 20 Coastal Counties subject to regulation under the Coastal Area Management Act (CAMA). You should contact the Division of Coastal Management to determine their requirements.

Placement of dredged or fill material within waters of the US and/or wetlands without a Department of the Army permit may constitute a violation of Section 301 of the Clean Water Act (33 USC § 1311). Placement of dredged or fill material, construction or placement of structures, or work within navigable waters of the United States without a Department of the Army permit may constitute a violation of Sections 9 and/or 10 of the Rivers and Harbors Act (33 USC § 401 and/or 403). If you have any questions regarding this determination and/or the Corps regulatory program, please contact **David Brown** at 828-271-7980, ext. 4232 or david.w.brown@usace.army.mil.

C. Basis for Determination:

See attached preliminary jurisdictional determination form.

D. Remarks:

The potential waters of the U.S., at this site, were verified on-site by the Corps on June 14, 2018, and are as approximately depicted on the attached *Potential Jurisdictional Features Blair Creek Site* and *Potential Jurisdictional Features within Project Area Blair Creek Site* figures submitted by Michael Baker Engineering in June 2018.

E. Attention USDA Program Participants

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

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

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

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

In order for an RFA to be accepted by the Corps, the Corps must determine that it is complete, that it meets the criteria for appeal under 33 CFR part 331.5, and that it has been received by the Division Office within 60 days of the date of the NAP. Should you decide to submit an RFA form, it must be received at the above address by, N/A (Preliminary-JD).

It is not necessary to submit an RFA form to the Division Office if you do not object to the determination in this correspondence.

Corps Regulatory Official: 
David Brown

Issue Date of JD: **July 19, 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:
None

**NOTIFICATION OF ADMINISTRATIVE APPEAL OPTIONS AND PROCESS AND
REQUEST FOR APPEAL**

Applicant: Michael Baker Engineering, Inc. / Attn.: Scott King		File Number: SAW-2018-00449	Date: July 19, 2018
Attached is:		See Section below	
<input type="checkbox"/>	INITIAL PROFFERED PERMIT (Standard Permit or Letter of permission)	A	
<input type="checkbox"/>	PROFFERED PERMIT (Standard Permit or Letter of permission)	B	
<input type="checkbox"/>	PERMIT DENIAL	C	
<input type="checkbox"/>	APPROVED JURISDICTIONAL DETERMINATION	D	
<input checked="" type="checkbox"/>	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:

<p>If you have questions regarding this decision and/or the appeal process you may contact: District Engineer, Wilmington Regulatory Division, Attn: David Brown 151 Patton Avenue, Room 208 Asheville, North Carolina 28801-5006 828-271-7980, ext. 4232</p>	<p>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</p>
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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.

<p>_____ Signature of appellant or agent.</p>	<p>Date:</p>	<p>Telephone number:</p>
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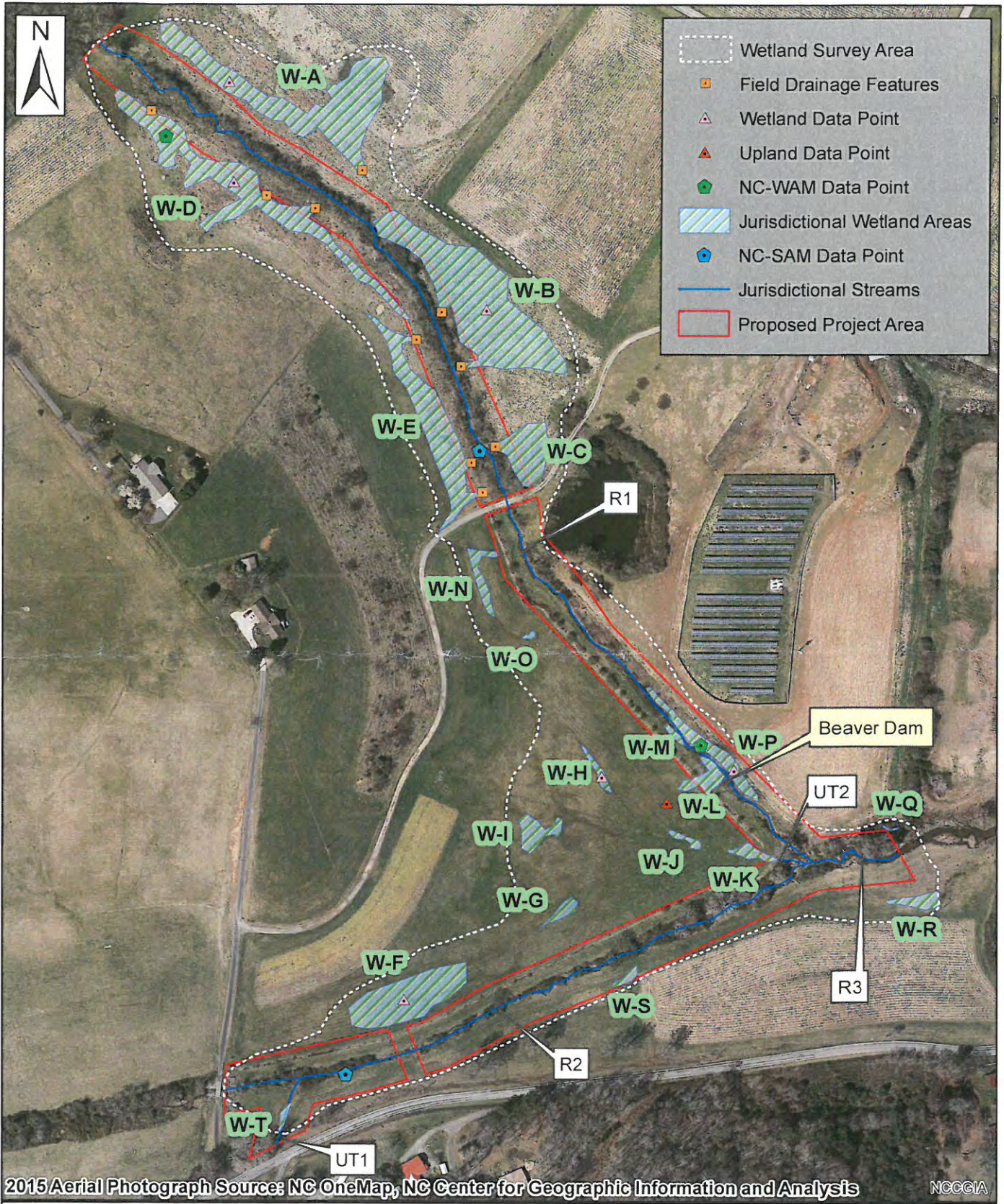
For appeals on Initial Proffered Permits send this form to:

District Engineer, Wilmington Regulatory Division, Attn.: David Brown, 69 Darlington Avenue, Wilmington, North Carolina 28403

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

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

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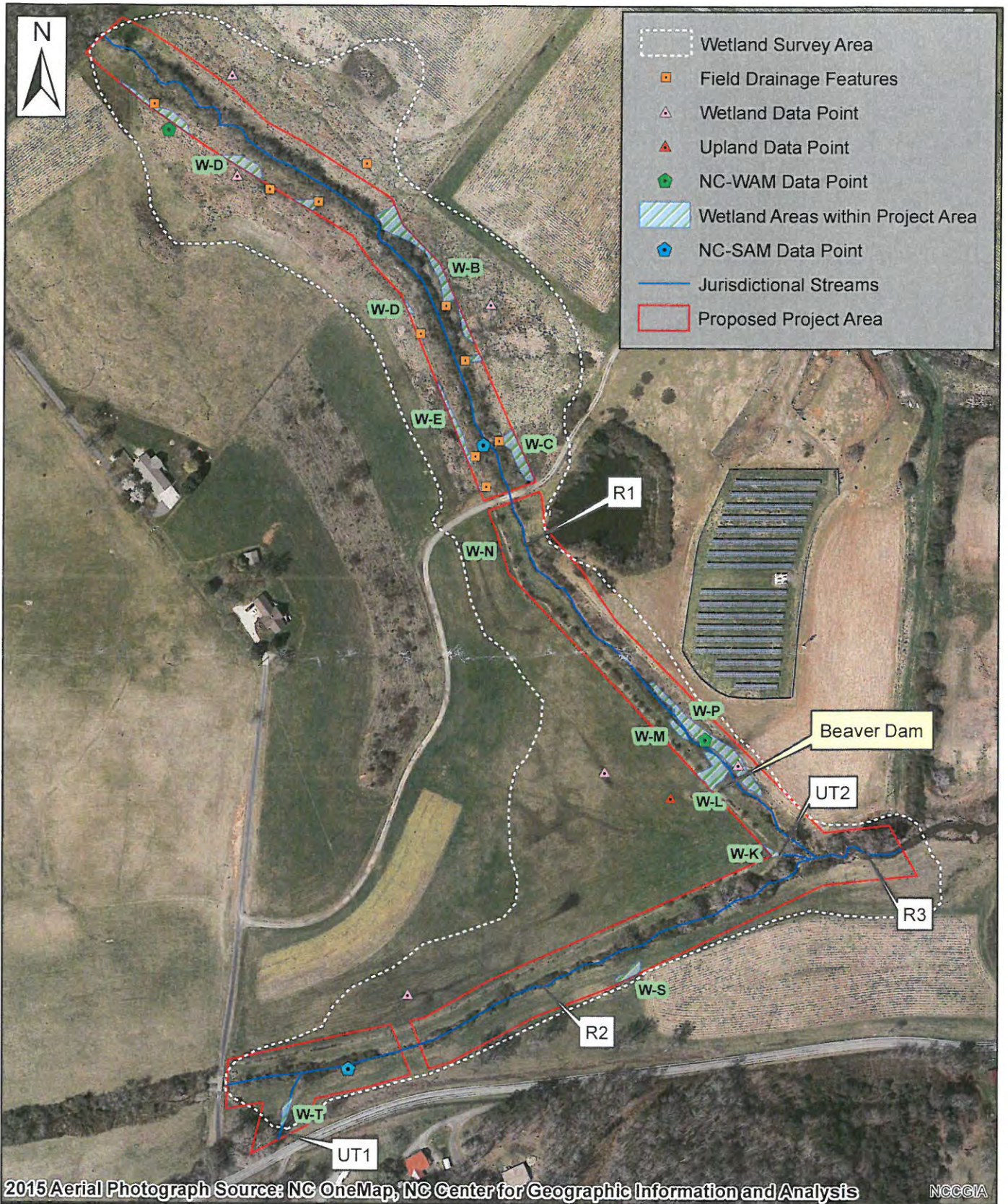
2015 Aerial Photograph Source: NC OneMap, NC Center for Geographic Information and Analysis

NCCGIA

Michael Baker
INTERNATIONAL



Potential Jurisdictional
Features
Blair Creek Site



NCCGIA

Michael Baker
INTERNATIONAL



Potential Jurisdictional Features Within Project Area
Blair Creek Site

**PRELIMINARY JURISDICTIONAL DETERMINATION (JD) FORM
U.S. Army Corps of Engineers**

BACKGROUND INFORMATION

A. REPORT COMPLETION DATE FOR PRELIMINARY JD: July 19, 2018

B. NAME AND ADDRESS OF PERSON REQUESTING PRELIMINARY JD:

Michael Baker Engineering, Inc. / Attn.: Scott King
8000 Regency Parkway, Suite 600
Cary, NC 27518

C. DISTRICT OFFICE, FILE NAME, AND NUMBER:

CESAW-RG-A, SAW-2018-00449, Blair Creek DMS Site

D. PROJECT LOCATION(S) AND BACKGROUND INFORMATION:

The project site is located on a tract of land (parcel nos. 5550 0041 3626, 5550 0030 9497, 5459 0049 5013, 5459 0049 3689, and 5459 0039 7402) approximately 0.15 mile west of the intersection of Cherry Road and N.C. Highway 69, between 416 Cherry Road and 767 Waldroup Road in Hayesville, Clay County, North Carolina.

State: **NC** County/parish/borough: **Clay** City: **Hayesville**
Center coordinates of site (lat/long in degree decimal format): **35.02676 N, 83.83256 W**
Universal Transverse Mercator: **N/A**
Name of nearest waterbody: **UTs South Fork Blair Creek, South Fork Blair Creek, North Fork Blair Creek, and Blair Creek**

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

- Office (Desk) Determination. Date: **July 19, 2018**
 Field Determination. Date(s): **June 14, 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/ID	Centered Coordinates (decimal degrees)		Estimated Amount of Aquatic Resource in Review Area (linear feet-lf or acre-ac)	Type of Aquatic Resources	Geographic Authority to Which Aquatic Resource "May Be" Subject
	Latitude	Longitude			
Streams and Wetlands within Project Area Easement					
R1 (North Fork Blair Creek)	35.02696	-83.83268	2,353 lf	Non-wetland Waters	Section 404
R2 (South Fork Blair Creek)	35.02434	-83.83206	1,320 lf	Non-wetland Waters	Section 404
R3 (Blair Creek)	35.02510	-83.83025	196 lf	Non-wetland Waters	Section 404
UT1 (UT S. Fork Blair Creek)	35.02350	-83.83394	145 lf	Non-wetland Waters	Section 404
UT2 (UT S. Fork Blair Creek)	35.02500	-83.83064	58 lf	Non-wetland Waters	Section 404
W-B	35.02825	-83.83334	0.135 ac	Wetland	Section 404

W-C	35.02721	-83.83263	0.054 ac	Wetland	Section 404
W-D	35.02880	-83.83471	0.099 ac	Wetland	Section 404
W-E	35.02735	-83.83305	0.039 ac	Wetland	Section 404
W-K	35.02507	-83.83075	0.007 ac	Wetland	Section 404
W-L	35.02550	-83.83118	0.057 ac	Wetland	Section 404
W-M	35.02572	-83.83143	0.014 ac	Wetland	Section 404
W-N	35.02668	-83.83270	0.0002 ac	Wetland	Section 404
W-P	35.02566	-83.83120	0.142 ac	Wetland	Section 404
W-S	35.02435	-83.83167	0.021 ac	Wetland	Section 404
W-T	35.02348	-83.83397	0.015ac	Wetland	Section 404
Wetlands Within Survey Area (Wetland Area Inside and Outside Easement)					
W-A	35.02918	-83.83421	0.781 ac	Wetland	Section 404
W-B	35.02809	-83.83294	1.060 ac	Wetland	Section 404
W-C	35.02726	-83.83254	0.201 ac	Wetland	Section 404
W-D	35.02866	-83.83462	0.674 ac	Wetland	Section 404
W-E	35.02739	-83.83319	0.451 ac	Wetland	Section 404
W-F	35.02418	-83.83316	0.411 ac	Wetland	Section 404
W-G	35.02471	-83.83213	0.036 ac	Wetland	Section 404
W-H	35.02550	-83.83194	0.030 ac	Wetland	Section 404
W-I	35.02514	-83.83234	0.083 ac	Wetland	Section 404
W-J	35.02514	-83.83131	0.021 ac	Wetland	Section 404
W-K	35.02509	-83.83086	0.040 ac	Wetland	Section 404
W-L	35.02549	-83.83121	0.073 ac	Wetland	Section 404

W-M	35.02572	-83.83143	0.014 ac	Wetland	Section 404
W-N	35.02656	-83.83280	0.065 ac	Wetland	Section 404
W-O	35.02624	-83.83246	0.007 ac	Wetland	Section 404
W-P	35.02566	-83.83120	0.142 ac	Wetland	Section 404
W-Q	35.02526	-83.82995	0.004 ac	Wetland	Section 404
W-R	35.02486	-83.82973	0.054 ac	Wetland	Section 404
W-S	35.02435	-83.83167	0.022 ac	Wetland	Section 404
W-T	35.02348	-83.83397	0.015 ac	Wetland	Section 404

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

SUPPORTING DATA

Data reviewed for preliminary JD (check all that apply) - Checked items should be included in subject file. Appropriately reference sources below where indicated for all checked items:

- Maps, plans, plots or plat submitted by or on behalf of preliminary JD requester: **Michael Baker Engineering, Inc.**
- Data sheets prepared/submitted by or on behalf of preliminary JD requester: **Michael Baker Engineering, Inc.**
- Office concurs with data sheets/delineation report.
- Office does not concur with data sheets/delineation report. Rational:
- Data sheets prepared by the Corps:
- Corps navigable waters' study:
- U.S. Geological Survey (USGS) Hydrologic Atlas:
- USGS NHD data.
- USGS 8 and 12 digit HUC maps.
- USGS map(s). Cite scale & quad name: **Hayesville.**
- Natural Resources Conservation Service (NRCS) Soil Survey.
Citation: **Clay County, NC**
- National wetlands inventory (NWI) map(s). Cite name:
- State/Local wetland inventory map(s):
- Federal Emergency Management Agency (FEMA) / Flood Insurance Rate Map (FIRM) maps: **Map No. 3700545900J, effective date Nov. 19, 2008**
- 100-year Floodplain Elevation is: (National Geodetic Vertical Datum of 1929)
- Photographs: Aerial (Name & Date): **Google Earth Pro, Oct. 2015, Apr. 2013, May 2009, Jun. 2008, Jun. 2006, May 2006, Mar. 1998, and Mar. 1993**
- or Other (Name & Date):
- Previous determination(s). File no. and date of response letter:
- Applicable/supporting scientific literature:
- Other information (please specify): **The site contains wetlands as determined by the 1987 Corps of Engineers Wetland Delineation Manual and the Regional Supplement to the Corps of Engineers Wetlands Delineation Manual: Eastern Mountain and Piedmont Region (Version 2.0). These wetlands are abutting to stream channels located at the site and flow into the channels. Wetland hydrology is enhanced with the abutting stream channels via normal down gradient flows and periods of high water.**

The streams on the property are UTs South Fork Blair, South Fork Blair Creek, North Fork Blair Creek, and Blair Creek. These streams exhibit physical ordinary high water mark (OHWM) indicators including, break in slope; developed bed and bank; changes in sediment texture and soil character; natural line impressed on the bank; shelving; absence of vegetation; leaf litter washed away; sediment deposition and sorting; presence of aquatic life; water staining; presence of debris; and scour. South Fork Blair Creek, North Fork Blair Creek and Blair Creek are depicted as solid blue lines on the USGS 7.5 minute quadrangle map Hayesville and the most current Natural Resource Conservation Service Soil Survey for Clay County. Solid blue line features on these mapping conventions typically represent perennial streams.

UTs South Fork Blair Creek flow into South Fork Blair Creek, which flows into Blair Creek. North Fork Blair Creek flows into Blair Creek, which flows into the Hiwassee River, a traditional navigable water (TNW). The Hiwassee River flows into the Tennessee River, which flows into the Ohio River, and then to the Mississippi River before entering the Gulf of Mexico.

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



David Brown, July 19, 2018
Signature and date of Regulatory
staff member completing
preliminary JD



Michael Baker Engineering, Inc. / Attn.: Scott King
(per Agent Authorization)
Signature and date of person requesting
preliminary JD (REQUIRED, unless obtaining the
signature is impracticable)

Two copies of this Preliminary JD Form have been provided. Please sign both copies. Keep one signed copy for your record and return a signed copy to the Asheville Regulatory Field Office by mail or e-mail.

*US Army Corps of Engineers-Wilmington District
Asheville Regulatory Field Office
151 Patton Avenue, Room 208
Asheville, NC 28801-5006*

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

W-A

WETLAND DETERMINATION DATA FORM - Eastern Mountains and Piedmont Region

Project/Site: Blair Creek Site City/County: Clay Sampling Date: 5/3/18
Applicant/Owner: Balle Engineering State: NC Sampling Point: W-A
Investigator(s): S King, R Myers Section, Township, Range:
Landform (hillslope, terrace, etc.): Floodplain Local relief (concave, convex, none): Concave Slope (%): 10%
Subregion (LRR or MLRA): N-130B Lat: 35.029250 Long: -83.834716 Datum: NAD 83 (SP-ft)
Soil Map Unit Name: Arlaga loam NWI classification:
Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No
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
Hydic Soil Present? Yes X No
Wetland Hydrology Present? Yes X No
Is the Sampled Area within a Wetland? Yes X No
Remarks: wetland is mowed & managed for hay & adjacent to upslope row crop field.

HYDROLOGY

Wetland Hydrology Indicators: Primary Indicators (minimum of one is required; check all that apply)
Secondary Indicators (minimum of two required)
Surface Soil Cracks (B6)
Sparsely Vegetated Concave Surface (B8)
Drainage Patterns (B10) In many spots
Water-Stained Leaves (B9)
Microtopographic Relief (D4)
Field Observations: Surface Water Present? No Depth (inches):
Water Table Present? No Depth (inches):
Saturation Present? Yes X Depth (inches): ~8"
Wetland Hydrology Present? Yes X No
Remarks: A shallow, depressional wetland on the floodplain of upper R1 that ponds water seasonally. The bottom of the wetland ends into a drainage pipe inlet that runs underground to the stream.

VEGETATION (Five Strata) – Use scientific names of plants.

Sampling Point: W-A

Tree Stratum (Plot size: <u> </u>)	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: <u> </u>)	Absolute % Cover	Dominant Species?	Indicator Status
1. _____	_____	_____	_____
2. _____	_____	_____	_____
3. _____	_____	_____	_____
4. _____	_____	_____	_____
5. _____	_____	_____	_____
6. _____	_____	_____	_____
_____ = Total Cover			
50% of total cover: _____ 20% of total cover: _____			

Shrub Stratum (Plot size: <u> </u>)	Absolute % Cover	Dominant Species?	Indicator Status
1. _____	_____	_____	_____
2. _____	_____	_____	_____
3. _____	_____	_____	_____
4. _____	_____	_____	_____
5. _____	_____	_____	_____
6. _____	_____	_____	_____
_____ = Total Cover			
50% of total cover: _____ 20% of total cover: _____			

Herb Stratum (Plot size: <u> </u>)	Absolute % Cover	Dominant Species?	Indicator Status
1. <i>Juncus effusus</i>	50	Y	FACW
2. <i>Carex lurida</i>	30	Y	OBL
3. <i>Sphagnum moss</i>	5	N	-
4. <i>Eleocharis obtusa</i> (blunt spikegrass)	15	N	OBL
5. <i>Dandelion sensibilis</i>	5	N	FACW
6. <i>Tribolium repens</i>	10	N	FACU
7. <i>Fescue</i> (armyknave?)	30	Y	FAC
8. <i>Ranunculus sardous</i>	5	N	FAC
9. _____	_____	_____	_____
10. _____	_____	_____	_____
11. _____	_____	_____	_____
190 = Total Cover			
50% of total cover: 95 20% of total cover: 38			

Woody Vine Stratum (Plot size: <u> </u>)	Absolute % Cover	Dominant Species?	Indicator Status
1. _____	_____	_____	_____
2. _____	_____	_____	_____
3. _____	_____	_____	_____
4. _____	_____	_____	_____
5. _____	_____	_____	_____
_____ = Total Cover			
50% of total cover: _____ 20% of total cover: _____			

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

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 2 (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 ≤3.0¹
 - ___ 4 - Morphological Adaptations¹ (Provide supporting data in Remarks or on a separate sheet)
 - ___ Problematic Hydrophytic Vegetation¹ (Explain)
- ¹Indicators 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 mowed + managed for hay, but has many species present due to hydric conditions

Hydrophytic Vegetation Present? Yes No

SOIL

Sampling Point: W-A

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

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²		
0-5	10YR 8/3 A7		5YR 4/4	3	C	M	silt clay loam	
5-12+	10YR 4/2 85		2.5YR 4/8	15	C	M	silt clay loam	

¹Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. ²Location: PL=Pore Lining, M=Matrix.

- | | | |
|--|--|--|
| <p>Hydric Soil Indicators:</p> <ul style="list-style-type: none"> <input type="checkbox"/> Histosol (A1) <input type="checkbox"/> Histic Epipedon (A2) <input type="checkbox"/> Black Histic (A3) <input type="checkbox"/> Hydrogen Sulfide (A4) <input type="checkbox"/> Stratified Layers (A5) <input type="checkbox"/> 2 cm Muck (A10) (LRR N) <input type="checkbox"/> Depleted Below Dark Surface (A11) <input type="checkbox"/> Thick Dark Surface (A12) <input type="checkbox"/> Sandy Mucky Mineral (S1) (LRR N, MLRA 147, 148) <input type="checkbox"/> Sandy Gleyed Matrix (S4) <input type="checkbox"/> Sandy Redox (S5) <input type="checkbox"/> Stripped Matrix (S6) | <ul style="list-style-type: none"> <input type="checkbox"/> Dark Surface (S7) <input type="checkbox"/> Polyvalue Below Surface (S8) (MLRA 147, 148) <input type="checkbox"/> Thin Dark Surface (S9) (MLRA 147, 148) <input checked="" type="checkbox"/> Loamy Gleyed Matrix (F2) <input checked="" type="checkbox"/> Depleted Matrix (F3) <input type="checkbox"/> Redox Dark Surface (F6) <input type="checkbox"/> Depleted Dark Surface (F7) <input type="checkbox"/> Redox Depressions (F8) <input type="checkbox"/> Iron-Manganese Masses (F12) (LRR N, MLRA 136) <input type="checkbox"/> Umbric Surface (F13) (MLRA 136, 122) <input type="checkbox"/> Piedmont Floodplain Soils (F19) (MLRA 148) <input type="checkbox"/> Red Parent Material (F21) (MLRA 127, 147) | <p>Indicators for Problematic Hydric Soils³:</p> <ul style="list-style-type: none"> <input type="checkbox"/> 2 cm Muck (A10) (MLRA 147) <input type="checkbox"/> Coast Prairie Redox (A16) (MLRA 147, 148) <input type="checkbox"/> Piedmont Floodplain Soils (F19) (MLRA 136, 147) <input type="checkbox"/> Very Shallow Dark Surface (TF12) <input type="checkbox"/> Other (Explain in Remarks) |
|--|--|--|

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

<p>Restrictive Layer (if observed):</p> <p>Type: _____</p> <p>Depth (inches): _____</p>	<p>Hydric Soil Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/></p>
--	---

Remarks:

W-B

WETLAND DETERMINATION DATA FORM - Eastern Mountains and Piedmont Region

Project/Site: Blair Creek City/County: Clay County Sampling Date: 5/3/18
Applicant/Owner: Bala Engineering State: NC Sampling Point: W-B
Investigator(s): R Myers S King Section, Township, Range:
Landform (hillslope, terrace, etc.): hillslope Local relief (concave, convex, none): concave Slope (%): 1%
Subregion (LRR or MLRA): N-130B Lat: 35.028049 Long: -83.382871 Datum: NAD83
Soil Map Unit Name: Arkagua loam NWI classification:
Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No
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
Hydric Soil Present? Yes X No
Wetland Hydrology Present? Yes X No
Is the Sampled Area within a Wetland? Yes X No
Remarks: Wetland adjacent to managed row crops, spring fed at top

HYDROLOGY

Wetland Hydrology Indicators: Primary Indicators (minimum of one is required; check all that apply)
Secondary Indicators (minimum of two required)
Field Observations: Surface Water Present? Yes X No Depth (inches): 1"
Water Table Present? # Yes X No Depth (inches): to surface
Saturation Present? Yes X No Depth (inches):
Wetland Hydrology Present? Yes X No
Remarks: # presence of surface water made WT depth difficult to determine. Two ditches drain this wetland into Reach R1

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

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 5 (A)

Total Number of Dominant Species Across All Strata: 6 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 83% (A/B)

Sapling Stratum (Plot size: _____)

	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
6.			

_____ = Total Cover

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 = _____

Shrub Stratum (Plot size: _____)

	Absolute % Cover	Dominant Species?	Indicator Status
1. <i>Muhlenbergia rose</i>	15	Y	FACU
2. <i>Forest</i>	5	N	-
3. <i>Black willow</i>	10	Y	OBL
4. <i>Blackberry</i>	10	Y	FAC
5.			
6.			

_____ = Total Cover

- Hydrophytic Vegetation Indicators:**
- ___ 1 - Rapid Test for Hydrophytic Vegetation
 - ___ 2 - Dominance Test is >50%
 - ___ 3 - Prevalence Index is ≤3.0¹
 - ___ 4 - Morphological Adaptations¹ (Provide supporting data in Remarks or on a separate sheet)
 - ___ Problematic Hydrophytic Vegetation¹ (Explain)
- ¹Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Herb Stratum (Plot size: _____)

	Absolute % Cover	Dominant Species?	Indicator Status
1. <i>Pasture grasses (lesser?)</i>	50	N	-
2. <i>Small green & red grasses</i>	50	N	-
3. <i>Cattails</i>	60	Y	OBL
4. <i>Juncus effusus</i>	60	Y	FACW
5. <i>Sedges → Carex lurida</i>	60	Y	OBL
6. <i>Jewelweed</i>	10	N	-
7. <i>Sphagnum moss</i>	15	N	-
8.			
9.			
10.			
11.			

_____ = Total Cover

- 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.

Woody Vine Stratum (Plot size: _____)

	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			

_____ = Total Cover

Area has historically been managed for hay production + mow

Hydrophytic Vegetation Present? Yes No

Remarks: (Include photo numbers here or on a separate sheet.)
 very wet, cattails, in standing water, Brown grasses layed over

SOIL

Sampling Point: _____

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

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²		
0-2	10YR 3/4		5YR 3/4	10			Silty loam	
2-12 ⁺	10YR 3/3		5YR 4/3	15			Silty clay loam	

¹Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. ²Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:	Indicators for Problematic Hydric Soils ³ :
<input type="checkbox"/> Histosol (A1)	<input type="checkbox"/> 2 cm Muck (A10) (MLRA 147)
<input type="checkbox"/> Histic Epipedon (A2)	<input type="checkbox"/> Coast Prairie Redox (A16) (MLRA 147, 148)
<input type="checkbox"/> Black Histic (A3)	<input type="checkbox"/> Piedmont Floodplain Soils (F19) (MLRA 136, 147)
<input type="checkbox"/> Hydrogen Sulfide (A4)	<input type="checkbox"/> Very Shallow Dark Surface (TF12)
<input type="checkbox"/> Stratified Layers (A5)	<input type="checkbox"/> Other (Explain in Remarks)
<input type="checkbox"/> 2 cm Muck (A10) (LRR N)	
<input type="checkbox"/> Depleted Below Dark Surface (A11)	
<input type="checkbox"/> Thick Dark Surface (A12)	
<input type="checkbox"/> Sandy Mucky Mineral (S1) (LRR N, MLRA 147, 148)	
<input type="checkbox"/> Sandy Gleyed Matrix (S4)	
<input type="checkbox"/> Sandy Redox (S5)	
<input type="checkbox"/> Stripped Matrix (S6)	
<input type="checkbox"/> Dark Surface (S7)	
<input type="checkbox"/> Polyvalue Below Surface (S8) (MLRA 147, 148)	
<input type="checkbox"/> Thin Dark Surface (S9) (MLRA 147, 148)	
<input type="checkbox"/> Loamy Gleyed Matrix (F2)	
<input checked="" type="checkbox"/> Depleted Matrix (F3)	
<input type="checkbox"/> Redox Dark Surface (F6)	
<input type="checkbox"/> Depleted Dark Surface (F7)	
<input type="checkbox"/> Redox Depressions (F8)	
<input type="checkbox"/> Iron-Manganese Masses (F12) (LRR N, MLRA 136)	
<input type="checkbox"/> Umbric Surface (F13) (MLRA 136, 122)	
<input type="checkbox"/> Piedmont Floodplain Soils (F19) (MLRA 148)	
<input type="checkbox"/> Red Parent Material (F21) (MLRA 127, 147)	

³Indicators 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

Remarks: - Flecks of mica, soil saturated

W-D

WETLAND DETERMINATION DATA FORM – Eastern Mountains and Piedmont Region

Project/Site: Blain Creek City/County: Clay Sampling Date: 5/3/18
Applicant/Owner: Baker Engineering State: NC Sampling Point: W-D
Investigator(s): R Myers, J King Section, Township, Range: -
Landform (hillslope, terrace, etc.): Floodplain Local relief (concave, convex, none): Concave Slope (%): -
Subregion (LRR or MLRA): N-130B Lat: 35.028692 Long: -83.834644 Datum: NA083
Soil Map Unit Name: Arkava loam + Dillard 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 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 <u>X</u> No <u>-</u>	Is the Sampled Area within a Wetland? Yes <u>X</u> No <u>-</u>
Hydric Soil Present? Yes <u>X</u> No <u>-</u>	
Wetland Hydrology Present? Yes <u>X</u> No <u>-</u>	

Remarks:
Wetland is located in shallow depressional area in the floodplain of upper R1 and is managed for hay production. There are 2 drainage ditches and 1 subsurface pipe drain in this wetland.

HYDROLOGY

Wetland Hydrology Indicators:	Secondary Indicators (minimum of two required)
Primary Indicators (minimum of one is required; check all that apply)	
<input type="checkbox"/> Surface Water (A1)	<input type="checkbox"/> Surface Soil Cracks (B6)
<input type="checkbox"/> High Water Table (A2)	<input checked="" type="checkbox"/> Sparsely Vegetated Concave Surface (B8)
<input type="checkbox"/> Saturation (A3)	<input checked="" type="checkbox"/> Drainage Patterns (B10) <i>by some spots</i>
<input type="checkbox"/> Water Marks (B1)	<input type="checkbox"/> Moss Trim Lines (B16)
<input type="checkbox"/> Sediment Deposits (B2)	<input type="checkbox"/> Dry-Season Water Table (C2)
<input type="checkbox"/> Drift Deposits (B3)	<input type="checkbox"/> Crayfish Burrows (C8)
<input type="checkbox"/> Algal Mat or Crust (B4)	<input type="checkbox"/> Saturation Visible on Aerial Imagery (C9)
<input type="checkbox"/> Iron Deposits (B5)	<input type="checkbox"/> Stunted or Stressed Plants (D1)
<input type="checkbox"/> Inundation Visible on Aerial Imagery (B7)	<input type="checkbox"/> Geomorphic Position (D2)
<input checked="" type="checkbox"/> Water-Stained Leaves (B9)	<input type="checkbox"/> Shallow Aquitard (D3)
<input type="checkbox"/> Aquatic Fauna (B13)	<input checked="" type="checkbox"/> Microtopographic Relief (D4)
<input type="checkbox"/> True Aquatic Plants (B14)	<input type="checkbox"/> FAC-Neutral Test (D5)
<input type="checkbox"/> Hydrogen Sulfide Odor (C1)	
<input type="checkbox"/> Oxidized Rhizospheres on Living Roots (C3)	
<input type="checkbox"/> Presence of Reduced Iron (C4)	
<input type="checkbox"/> Recent Iron Reduction in Tilled Soils (C6)	
<input type="checkbox"/> Thin Muck Surface (C7)	
<input type="checkbox"/> Other (Explain in Remarks)	

Field Observations:	
Surface Water Present? Yes <u>-</u> No <u>X</u> Depth (inches): <u>-</u>	
Water Table Present? Yes <u>-</u> No <u>X</u> Depth (inches): <u>-</u>	
Saturation Present? (includes capillary fringe) Yes <u>X</u> No <u>-</u> Depth (inches): <u>~10"</u>	
Wetland Hydrology Present? Yes <u>X</u> No <u>-</u>	

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

Remarks:
There are 2 cut surface drainage ditches (<12" deep) and 1 subsurface pipe drain inlet located in this wetland that each empty into the adjacent R1. (perhaps other drainages exist too but were not observed)

VEGETATION (Five Strata) – Use scientific names of plants.

Sampling Point: W-D

	Absolute % Cover	Dominant Species?	Indicator Status	
Tree Stratum (Plot size: <u> </u>)				Dominance Test worksheet: Number of Dominant Species That Are OBL, FACW, or FAC: <u>3</u> (A) Total Number of Dominant Species Across All Strata: <u>4</u> (B) Percent of Dominant Species That Are OBL, FACW, or FAC: <u>75%</u> (A/B)
1. _____				
2. _____				
3. _____				
4. _____				
5. _____				
6. _____				
_____ = Total Cover				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 = _____
50% of total cover: _____ 20% of total cover: _____				
Sapling Stratum (Plot size: <u> </u>)				
1. _____				
2. _____				
3. _____				
4. _____				
5. _____				
6. _____				
_____ = Total Cover				
50% of total cover: _____ 20% of total cover: _____				
Shrub Stratum (Plot size: <u> </u>)				Hydrophytic Vegetation Indicators: <input type="checkbox"/> 1 - Rapid Test for Hydrophytic Vegetation <input type="checkbox"/> 2 - Dominance Test is >50% <input type="checkbox"/> 3 - Prevalence Index is ≤3.0 ¹ <input type="checkbox"/> 4 - Morphological Adaptations ¹ (Provide supporting data in Remarks or on a separate sheet) <input type="checkbox"/> Problematic Hydrophytic Vegetation ¹ (Explain) ¹ Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.
1. <u>J</u>				
2. _____				
3. _____				
4. _____				
5. _____				
6. _____				
_____ = Total Cover				
50% of total cover: _____ 20% of total cover: _____				
Herb Stratum (Plot size: <u> </u>)				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.
1. <u>Juncus effusus</u>	<u>50</u>	<u>Y</u>	<u>FACW</u>	
2. <u>Carex lurida</u>	<u>15</u>	<u>-</u>	<u>OBL</u>	
3. <u>Kelsoa rotunda</u>	<u>15</u>	<u>-</u>	<u>OBL</u>	
4. <u>Ficus (arbutinacea?)</u>	<u>50</u>	<u>Y</u>	<u>FAC</u>	
5. <u>Vida serotia</u>	<u>30</u>	<u>Y</u>	<u>FAC</u>	
6. <u>Coryza canadensis</u>	<u>30</u>	<u>Y</u>	<u>N/A</u>	
7. <u>Scleria triglomerata</u>	<u>30</u>	<u>Y</u>	<u>FAC</u>	
8. _____				
9. _____				
10. _____				
11. _____				
<u>220</u> = Total Cover				
50% of total cover: <u>110</u> 20% of total cover: <u>44</u>				
Woody Vine Stratum (Plot size: <u> </u>)				Area is mowed + managed for hay Hydrophytic Vegetation Present? Yes <input checked="" type="checkbox"/> No _____
1. _____				
2. _____				
3. _____				
4. _____				
5. _____				
_____ = Total Cover				
50% of total cover: _____ 20% of total cover: _____				
Remarks: (Include photo numbers here or on a separate sheet.)				

SOIL

Sampling Point: W-D

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

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²		
0-2	10YR 3/3	100	-				silt loam	
2-8	10YR 4/2	90	2.5YR 3/6	10	C	M	silty clay loam	
8-12+	10YR 3/1	85	5YR 4/4	15	C	M	silty clay loam	

¹Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. ²Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:		Indicators for Problematic Hydric Soils³:	
<input type="checkbox"/> Histic Epipedon (A2)	<input type="checkbox"/> Dark Surface (S7)	<input type="checkbox"/> 2 cm Muck (A10) (MLRA 147)	
<input type="checkbox"/> Black Histic (A3)	<input type="checkbox"/> Polyvalue Below Surface (S8) (MLRA 147, 148)	<input type="checkbox"/> Coast Prairie Redox (A16) (MLRA 147, 148)	
<input type="checkbox"/> Hydrogen Sulfide (A4)	<input type="checkbox"/> Thin Dark Surface (S9) (MLRA 147, 148)	<input type="checkbox"/> Piedmont Floodplain Soils (F19) (MLRA 136, 147)	
<input type="checkbox"/> Stratified Layers (A5)	<input checked="" type="checkbox"/> Loamy Gleyed Matrix (F2)	<input type="checkbox"/> Very Shallow Dark Surface (TF12)	
<input type="checkbox"/> 2 cm Muck (A10) (LRR N)	<input checked="" type="checkbox"/> Depleted Matrix (F3)	<input type="checkbox"/> Other (Explain in Remarks)	
<input type="checkbox"/> Depleted Below Dark Surface (A11)	<input type="checkbox"/> Redox Dark Surface (F6)		
<input type="checkbox"/> Thick Dark Surface (A12)	<input type="checkbox"/> Depleted Dark Surface (F7)		
<input type="checkbox"/> Sandy Mucky Mineral (S1) (LRR N, MLRA 147, 148)	<input type="checkbox"/> Redox Depressions (F8)		
<input type="checkbox"/> Sandy Gleyed Matrix (S4)	<input type="checkbox"/> Iron-Manganese Masses (F12) (LRR N, MLRA 136)		
<input type="checkbox"/> Sandy Redox (S5)	<input type="checkbox"/> Umbric Surface (F13) (MLRA 136, 122)		
<input type="checkbox"/> Stripped Matrix (S6)	<input type="checkbox"/> Piedmont Floodplain Soils (F19) (MLRA 148)		
	<input type="checkbox"/> Red Parent Material (F21) (MLRA 127, 147)		

³Indicators 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

Remarks:

Obvious hydric soils present

WETLAND DETERMINATION DATA FORM – Eastern Mountains and Piedmont Region

W-F

Project/Site: Blair Cr. City/County: Clay Sampling Date: 5/3/18
 Applicant/Owner: Baker Engineering State: NC Sampling Point: W-F
 Investigator(s): ZM, SK Section, Township, Range: -
 Landform (hillslope, terrace, etc.): Floodplain Local relief (concave, convex, none): concave Slope (%): -
 Subregion (LRR or MLRA): N-130 B Lat: 35.029170 Long: -83.833187 Datum: NA083
 Soil Map Unit Name: Arkappa loam NWI classification: -
 Are climatic / hydrologic conditions on the site typical for this time of year? Yes No (If no, explain in Remarks.)
 Are Vegetation , Soil , or Hydrology significantly disturbed? Are "Normal Circumstances" present? Yes 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 <input checked="" type="checkbox"/> No <input type="checkbox"/> Hydric Soil Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	Is the Sampled Area within a Wetland? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
Remarks: <p style="font-size: 1.2em; margin: 0;">wetland is located in a shallow depressional area in the floodplain of R2. Currently managed for hay production.</p>	

HYDROLOGY

Wetland Hydrology Indicators: <u>Primary Indicators (minimum of one is required; check all that apply)</u> ___ Surface Water (A1) ___ True Aquatic Plants (B14) ___ High Water Table (A2) ___ Hydrogen Sulfide Odor (C1) <input checked="" type="checkbox"/> Saturation (A3) ___ Oxidized Rhizospheres on Living Roots (C3) ___ Water Marks (B1) ___ Presence of Reduced Iron (C4) ___ Sediment Deposits (B2) ___ Recent Iron Reduction in Tilled Soils (C6) ___ Drift Deposits (B3) ___ Thin Muck Surface (C7) ___ Algal Mat or Crust (B4) ___ Other (Explain in Remarks) ___ Iron Deposits (B5) ___ ___ Inundation Visible on Aerial Imagery (B7) <input checked="" type="checkbox"/> Water-Stained Leaves (B9) ___ Aquatic Fauna (B13)	<u>Secondary Indicators (minimum of two required)</u> ___ Surface Soil Cracks (B6) <input checked="" type="checkbox"/> 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) <input checked="" type="checkbox"/> Microtopographic Relief (D4) ___ FAC-Neutral Test (D5)
---	--

Field Observations: Surface Water Present? Yes ___ No <input checked="" type="checkbox"/> Depth (inches): ___ Water Table Present? Yes ___ No <input checked="" type="checkbox"/> Depth (inches): ___ Saturation Present? Yes <input checked="" type="checkbox"/> No ___ Depth (inches): <u>~8"</u> (includes capillary fringe)	Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No ___
--	---

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

Remarks:
 Depressional feature in managed hay field ~50' from SE of stream. Could possibly be drained via subsurface pipe to field, may have collapsed.

W-F

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. _____			

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 3 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

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

_____ = Total Cover

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

Sapling Stratum (Plot size: _____)

1. _____	2. _____	3. _____	4. _____	5. _____	6. _____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____

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 = _____

_____ = Total Cover

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

Shrub Stratum (Plot size: _____)

1. _____	2. _____	3. _____	4. _____	5. _____	6. _____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____

- Hydrophytic Vegetation Indicators:**
- ___ 1 - Rapid Test for Hydrophytic Vegetation
 - ___ 2 - Dominance Test is >50%
 - ___ 3 - Prevalence Index is ≤3.0¹
 - ___ 4 - Morphological Adaptations¹ (Provide supporting data in Remarks or on a separate sheet)
 - ___ Problematic Hydrophytic Vegetation¹ (Explain)
- ¹Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

_____ = Total Cover

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

Herb Stratum (Plot size: _____)

1. <u>Juncus effusus</u>	<u>20</u>	<u>Y</u>	<u>FACW</u>
2. <u>Blunt spike rush (Eleocharis obtusa)</u>	<u>30</u>	<u>N</u>	<u>-</u>
3. <u>Washie grass (Festuca arundinacea)</u>	<u>70</u>	<u>Y</u>	<u>FAC</u>
4. <u>Buttercups (Ranunculus sardous)</u>	<u>10</u>	<u>N</u>	<u>-</u>
5. <u>Carex linida (?)</u>	<u>70</u>	<u>Y</u>	<u>OBL</u>
6. _____			
7. _____			
8. _____			
9. _____			
10. _____			
11. _____			

_____ = Total Cover

50% of total cover: 130 20% of total cover: 52

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.

_____ = Total Cover

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

Woody Vine Stratum (Plot size: _____)

1. _____	2. _____	3. _____	4. _____	5. _____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____

_____ = Total Cover

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

Area mowed + managed as a hay field

Hydrophytic Vegetation Present? Yes X No _____

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

Sphagnum moss also present!

W-F

SOIL

Sampling Point: _____

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

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²		
0-4	10 YR 4/1	80	2.5 YR 4/6	20	C	M	Silty clay loam	
4-12+	10 YR 4/2	85	5 YR 5/3	15	C	M	Clay loam	

¹Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. ²Location: PL=Pore Lining, M=Matrix.

- | | | |
|--|--|---|
| Hydric Soil Indicators: | | Indicators for Problematic Hydric Soils³: |
| <input type="checkbox"/> Histosol (A1) | <input type="checkbox"/> Dark Surface (S7) | <input type="checkbox"/> 2 cm Muck (A10) (MLRA 147) |
| <input type="checkbox"/> Histic Epipedon (A2) | <input type="checkbox"/> Polyvalue Below Surface (S8) (MLRA 147, 148) | <input type="checkbox"/> Coast Prairie Redox (A16) |
| <input type="checkbox"/> Black Histic (A3) | <input type="checkbox"/> Thin Dark Surface (S9) (MLRA 147, 148) | <input type="checkbox"/> (MLRA 147, 148) |
| <input type="checkbox"/> Hydrogen Sulfide (A4) | <input type="checkbox"/> Loamy Gleyed Matrix (F2) | <input type="checkbox"/> Piedmont Floodplain Soils (F19) |
| <input type="checkbox"/> Stratified Layers (A5) | <input checked="" type="checkbox"/> Depleted Matrix (F3) | <input type="checkbox"/> (MLRA 136, 147) |
| <input type="checkbox"/> 2 cm Muck (A10) (LRR N) | <input type="checkbox"/> Redox Dark Surface (F6) | <input type="checkbox"/> Very Shallow Dark Surface (TF12) |
| <input type="checkbox"/> Depleted Below Dark Surface (A11) | <input type="checkbox"/> Depleted Dark Surface (F7) | <input type="checkbox"/> Other (Explain in Remarks) |
| <input type="checkbox"/> Thick Dark Surface (A12) | <input type="checkbox"/> Redox Depressions (F8) | |
| <input type="checkbox"/> Sandy Mucky Mineral (S1) (LRR N, MLRA 147, 148) | <input type="checkbox"/> Iron-Manganese Masses (F12) (LRR N, MLRA 136) | |
| <input type="checkbox"/> Sandy Gleyed Matrix (S4) | <input type="checkbox"/> Umbric Surface (F13) (MLRA 136, 122) | |
| <input type="checkbox"/> Sandy Redox (S5) | <input type="checkbox"/> Piedmont Floodplain Soils (F19) (MLRA 148) | |
| <input type="checkbox"/> Stripped Matrix (S6) | <input type="checkbox"/> Red Parent Material (F21) (MLRA 127, 147) | |

³Indicators 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

Remarks: *Obvious hydric soils to surface*

Wetland H

WETLAND DETERMINATION DATA FORM – Eastern Mountains and Piedmont Region

Project/Site: Blair Creek City/County: Clay Sampling Date: 5/3/18
 Applicant/Owner: Baker Engineering State: NC Sampling Point: W-H
 Investigator(s): R Myers, S King Section, Township, Range: _____
 Landform (hillslope, terrace, etc.): flood plain Local relief (concave, convex, none): concave Slope (%): 1.06
 Subregion (LRR or MLRA): N-130B Lat: 35.025472 Long: -83.821918 Datum: NAD83
 Soil Map Unit Name: Arkapa loam + Tala loam NWI classification: _____
 Are climatic / hydrologic conditions on the site typical for this time of year? Yes No _____ (If no, explain in Remarks.)
 Are Vegetation Soil _____ or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes 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 <input checked="" type="checkbox"/> No _____ Hydric Soil Present? Yes <input checked="" type="checkbox"/> No _____ Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No _____	Is the Sampled Area within a Wetland? Yes <input checked="" type="checkbox"/> No _____
Remarks: <p style="font-size: 1.2em; margin: 0;">Wetland located within a shallow depression in the floodplain of R1 and is managed for hay.</p>	

HYDROLOGY

Wetland Hydrology Indicators: <u>Primary Indicators (minimum of one is required; check all that apply)</u> <input type="checkbox"/> Surface Water (A1) <input type="checkbox"/> True Aquatic Plants (B14) <input type="checkbox"/> High Water Table (A2) <input type="checkbox"/> Hydrogen Sulfide Odor (C1) <input checked="" type="checkbox"/> Saturation (A3) <input type="checkbox"/> Oxidized Rhizospheres on Living Roots (C3) <input type="checkbox"/> Water Marks (B1) <input type="checkbox"/> Presence of Reduced Iron (C4) <input type="checkbox"/> Sediment Deposits (B2) <input type="checkbox"/> Recent Iron Reduction in Tilled Soils (C6) <input type="checkbox"/> Drift Deposits (B3) <input type="checkbox"/> Thin Muck Surface (C7) <input checked="" type="checkbox"/> Algal Mat or Crust (B4) <input type="checkbox"/> Other (Explain in Remarks) <input type="checkbox"/> Iron Deposits (B5) <input type="checkbox"/> Inundation Visible on Aerial Imagery (B7) <input checked="" type="checkbox"/> Water-Stained Leaves (B9) <input type="checkbox"/> Aquatic Fauna (B13)	<u>Secondary Indicators (minimum of two required)</u> <input type="checkbox"/> Surface Soil Cracks (B6) <input checked="" type="checkbox"/> Sparsely Vegetated Concave Surface (B8) <input type="checkbox"/> Drainage Patterns (B10) <i>in a few spots</i> <input type="checkbox"/> Moss Trim Lines (B16) <input type="checkbox"/> Dry-Season Water Table (C2) <input type="checkbox"/> Crayfish Burrows (C8) <input type="checkbox"/> Saturation Visible on Aerial Imagery (C9) <input type="checkbox"/> Stunted or Stressed Plants (D1) <input checked="" type="checkbox"/> Geomorphic Position (D2) ? <input type="checkbox"/> Shallow Aquitard (D3) <input checked="" type="checkbox"/> Microtopographic Relief (D4) <input type="checkbox"/> FAC-Neutral Test (D5)
Field Observations: Surface Water Present? Yes _____ No <input checked="" type="checkbox"/> Depth (inches): _____ Water Table Present? Yes _____ No <input checked="" type="checkbox"/> Depth (inches): _____ Saturation Present? Yes <input checked="" type="checkbox"/> No _____ Depth (inches): <u>0"</u> <small>(includes capillary fringe) <i>sub to surface</i></small>	Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No _____
Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:	
Remarks: <p style="font-size: 1.2em; margin: 0;">Depressional feature in a managed hay field</p>	

VEGETATION (Five Strata) – Use scientific names of plants.

Sampling Point: W-H

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:)

	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
6.			

_____ = Total Cover

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

Shrub 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: _____

Herb Stratum (Plot size:)

	Absolute % Cover	Dominant Species?	Indicator Status
1. <u>Juncus effusus</u>	<u>80</u>	<u>Y</u>	<u>FACW</u>
2. <u>Blunt spike rush (Eleocharis obesa)</u>	<u>40</u>	<u>Y</u>	<u>OBL</u>
3. <u>Redtop grass - fescue (airmoor?)</u>	<u>30</u>	<u>-</u>	<u>FAC</u>
4. <u>Hue grass</u>	<u>5%</u>	<u>-</u>	
5. <u>Small oval swardgrass</u>	<u>15</u>	<u>-</u>	
6.			
7.			
8.			
9.			
10.			
11.			

170 = Total Cover

50% of total cover: 85 20% of total cover: 34

Woody Vine Stratum (Plot size:)

	Absolute % Cover	Dominant Species?	Indicator Status
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: 2 (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 ≤3.0¹
- 4 - Morphological Adaptations¹ (Provide supporting data in Remarks or on a separate sheet)
- Problematic Hydrophytic Vegetation¹ (Explain)

¹Indicators 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 mowed + managed for hay.

Hydrophytic Vegetation Present? Yes No

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

W-H

SOIL

Sampling Point: _____

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

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²		
0-6	10YR 4/1	85	5YR 4/6	15	C	M	Silty Clay Loam	
6-12+	10YR 4/1	90	5YR 4/6	10	C	M	Clay loam	(Increasing clay)

¹Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. ²Location: 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 Soils³:**
- 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)
- ³Indicators 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

Remarks: *Obvious hydric soil to surface*

W-P

WETLAND DETERMINATION DATA FORM – Eastern Mountains and Piedmont Region

Project/Site: Blair Creek City/County: Clay Sampling Date: 5/3/18
Applicant/Owner: Baker Engineering State: NC Sampling Point: W-P
Investigator(s): R Myers, S King Section, Township, Range:
Landform (hillslope, terrace, etc.): fringe floodplain Local relief (concave, convex, none): concave flat Slope (%): <10%
Subregion (LRR or MLRA): N-130B Lat: 35.025548 Long: -83.831016 Datum: NAD 83
Soil Map Unit Name: Arkagua loam NWI classification:
Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No
Are Vegetation, 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
Hydric Soil Present? Yes X No
Wetland Hydrology Present? Yes X No
Is the Sampled Area within a Wetland? Yes X No
Remarks: Wetland located immediately adjacent to stream channel just outside its top-of-bank.

HYDROLOGY

Wetland Hydrology Indicators: Primary Indicators (minimum of one is required; check all that apply) Secondary Indicators (minimum of two required)
X Surface Water (A1) True Aquatic Plants (B14) X Sparsely Vegetated Concave Surface (B8)
High Water Table (A2) Hydrogen Sulfide Odor (C1) Drainage Patterns (B10)
X Saturation (A3) Oxidized Rhizospheres on Living Roots (C3) Moss Trim Lines (B16)
Water Marks (B1) Presence of Reduced Iron (C4) Dry-Season Water Table (C2)
Sediment Deposits (B2) Recent Iron Reduction in Tilled Soils (C6) Crayfish Burrows (C8)
Drift Deposits (B3) Thin Muck Surface (C7) Saturation Visible on Aerial Imagery (C9)
Algal Mat or Crust (B4) Other (Explain in Remarks) Stunted or Stressed Plants (D1)
Iron Deposits (B5) Geomorphic Position (D2)
Inundation Visible on Aerial Imagery (B7) Shallow Aquitard (D3)
X Water-Stained Leaves (B9) X Microtopographic Relief (D4)
X Aquatic Fauna (B13) FAC-Neutral Test (D5)
Field Observations: Surface Water Present? Yes X No Depth (inches): ~2"
Water Table Present? Yes X No Depth (inches): surface (?)
Saturation Present? Yes X No Depth (inches):
Wetland Hydrology Present? Yes X No
Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:
Remarks: - Tadpoles
Riparian wetland 10-25' wide, standing water. On LB of stream, right at toe of slope up to solar ponds.
- Very marshy/mucky + wet!

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: _____)	Absolute % Cover	Dominant Species?	Indicator Status
1. _____			
2. _____			
3. _____			
4. _____			
5. _____			
6. _____			
_____ = Total Cover			
50% of total cover: _____ 20% of total cover: _____			

Shrub Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status
1. <u>Silky dogwood - <i>Cornus amomum</i></u> 15	15	Y	FACW
2. <u>Pine - <i>Liquidum sinese</i></u> 15	15	Y	FACU
3. <u>Box elder</u> 5	5	-	
4. <u>Blackberry - <i>Rubus argutus</i></u> 15	15	Y	FAC
5. <u>Elderberry</u> 10	10	-	
6. _____			
60 = Total Cover			
50% of total cover: 30 20% of total cover: 12			

Herb Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status
1. <u><i>Juncus effusus</i></u> 95	95	Y	FACW
2. <u>Sedges - <i>Carex lurida</i></u> 50	50	Y	OBL
3. <u>Yellow flowers (<i>Ranunculus scidois</i>)</u> 5	5	-	
4. <u>Various grasses (<i>Festuca acuminata</i>)</u> 40	40	Y	FAC
5. _____			
6. _____			
7. _____			
8. _____			
9. _____			
10. _____			
11. _____			
190 = Total Cover			
50% of total cover: 95 20% of total cover: 38			

Woody Vine Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status
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: 5 (A)

Total Number of Dominant Species Across All Strata: 6 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 83% (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 ≤3.0¹
 - 4 - Morphological Adaptations¹ (Provide supporting data in Remarks or on a separate sheet)
 - Problematic Hydrophytic Vegetation¹ (Explain)
- ¹Indicators 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.

Marshy area that is not managed.

Hydrophytic Vegetation Present? Yes No

Remarks: (Include photo numbers here or on a separate sheet.)
-Some of the pine has died off, possibly due to high water

SOIL

Sampling Point: _____

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

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²		
0-4	10 YR 3/3		2.5 YR 5/6	5	C	M	Silt/Loam	
4-8	10 YR 3/2		2.5 YR 4/6	10	C	M	Silty Clay loam	
8-12+	10 YR 3/2		2.5 YR 4/6	20	C	M	Silty Clay loam	

¹Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. ²Location: 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 Soils³:

- 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)

³Indicators 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

Remarks:

soils very wet

Up

WETLAND DETERMINATION DATA FORM - Eastern Mountains and Piedmont Region

Project/Site: Blain Creek City/County: Clay Sampling Date: 5/3/18
Applicant/Owner: Baker Engineering State: NC Sampling Point: Upland
Investigator(s): R Myers, J King Section, Township, Range:
Landform (hillslope, terrace, etc.): floodplain Local relief (concave, convex, none): flat Slope (%): 14%
Subregion (LRR or MLRA): N-130B Lat: 35.025346 Long: -83.831462 Datum: NAD83
Soil Map Unit Name: Arkagea loam NWI classification:
Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No
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
Hydric Soil Present? Yes No X
Wetland Hydrology Present? Yes No X
Is the Sampled Area within a Wetland? Yes No X
Remarks: Area is typical of the non-hydric areas on site

HYDROLOGY

Wetland Hydrology Indicators: Primary Indicators (minimum of one is required; check all that apply)
Secondary Indicators (minimum of two required)
Surface Water (A1) True Aquatic Plants (B14) Surface Soil Cracks (B6)
High Water Table (A2) Hydrogen Sulfide Odor (C1) Sparsely Vegetated Concave Surface (B8)
Saturation (A3) Oxidized Rhizospheres on Living Roots (C3) Drainage Patterns (B10)
Water Marks (B1) Presence of Reduced Iron (C4) Moss Trim Lines (B16)
Sediment Deposits (B2) Recent Iron Reduction in Tilled Soils (C6) Dry-Season Water Table (C2)
Drift Deposits (B3) Thin Muck Surface (C7) Crayfish Burrows (C8)
Algal Mat or Crust (B4) Other (Explain in Remarks) Saturation Visible on Aerial Imagery (C9)
Iron Deposits (B5) Stunted or Stressed Plants (D1)
Inundation Visible on Aerial Imagery (B7) Geomorphic Position (D2)
Water-Stained Leaves (B9) Shallow Aquitard (D3)
Aquatic Fauna (B13) 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 present

VEGETATION (Five Strata) – Use scientific names of plants.

Sampling Point: Up

Tree Stratum (Plot size: <u> </u>)	Absolute % Cover	Dominant Species?	Indicator Status	
1. _____				Dominance Test worksheet: Number of Dominant Species That Are OBL, FACW, or FAC: <u>1</u> (A) Total Number of Dominant Species Across All Strata: <u>2</u> (B) Percent of Dominant Species That Are OBL, FACW, or FAC: <u>50%</u> (A/B)
2. _____				
3. _____				
4. _____				
5. _____				
6. _____				
_____ = Total Cover				Prevalence Index worksheet: Total % Cover of: Multiply by: OBL species <u>0</u> x 1 = <u>0</u> FACW species <u>0</u> x 2 = <u>0</u> FAC species <u>4</u> x 3 = <u>12</u> FACU species <u>2</u> x 4 = <u>8</u> UPL species <u>0</u> x 5 = <u>0</u> Column Totals: <u>6</u> (A) <u>20</u> (B) Prevalence Index = B/A = <u>3.33</u>
50% of total cover: _____		20% of total cover: _____		
Sapling Stratum (Plot size: <u> </u>)				
1. _____				
2. _____				
3. _____				
4. _____				
5. _____				
6. _____				
_____ = Total Cover				
50% of total cover: _____		20% of total cover: _____		
Shrub Stratum (Plot size: <u> </u>)				
1. _____				
2. _____				
3. _____				
4. _____				
5. _____				
6. _____				
_____ = Total Cover				
50% of total cover: _____		20% of total cover: _____		
Herb Stratum (Plot size: <u> </u>)				
1. <i>Festuca (arundinaceae?)</i>	<u>95</u>	<u>Y</u>	<u>FAC</u>	
2. <i>Taraxacum officinale</i>	<u>15</u>	<u>Y</u>	<u>FACU</u>	
3. <i>Coma canadensis</i>	<u>10</u>	<u>N</u>	<u>N/A</u>	
4. <i>Ranunculus sardous</i>	<u>5</u>	<u>N</u>	<u>FAC</u>	
5. <i>Vicia villosa</i>	<u>2</u>	<u>N</u>	<u>N/A</u>	
6. <i>Solidago rugosa</i>	<u>5</u>	<u>N</u>	<u>FAC</u>	
7. <i>Erigeron annuus</i>	<u>2</u>	<u>N</u>	<u>FACU</u>	
8. <i>Rumex crispus</i>	<u>5</u>	<u>N</u>	<u>FAC</u>	
9. _____				
10. _____				
11. _____				
_____ = Total Cover				
50% of total cover: <u>69</u>		20% of total cover: <u>27</u>		
Woody Vine Stratum (Plot size: <u> </u>)				
1. _____				
2. _____				
3. _____				
4. _____				
5. _____				
_____ = Total Cover				
50% of total cover: _____		20% of total cover: _____		
Remarks: (Include photo numbers here or on a separate sheet.)				

- Hydrophytic Vegetation Indicators:**
- 1 - Rapid Test for Hydrophytic Vegetation
 - 2 - Dominance Test is >50% no
 - 3 - Prevalence Index is $\leq 3.0^1$ no
 - 4 - Morphological Adaptations¹ (Provide supporting data in Remarks or on a separate sheet)
 - Problematic Hydrophytic Vegetation¹ (Explain)

¹Indicators 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 managed for hay production

Hydrophytic Vegetation Present? Yes _____ No X

SOIL

Sampling Point: Up

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

12" →

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²		
0-4	10YR 4/3		—				silt loam	
4-7	10YR 4/3		5YR 5/6	2%	C	M	silt loam	
7-12	10YR 4/3		5YR 5/6	5%	C	M	silty clay loam	
12-16	10YR 3/1		10YR 5/6	5%	C	M	silty clay loam	

¹Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. ²Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:		Indicators for Problematic Hydric Soils ³ :
<input type="checkbox"/> Histosol (A1)	<input type="checkbox"/> Dark Surface (S7)	<input type="checkbox"/> 2 cm Muck (A10) (MLRA 147)
<input type="checkbox"/> Histic Epipedon (A2)	<input type="checkbox"/> Polyvalue Below Surface (S8) (MLRA 147, 148)	<input type="checkbox"/> Coast Prairie Redox (A16) (MLRA 147, 148)
<input type="checkbox"/> Black Histic (A3)	<input type="checkbox"/> Thin Dark Surface (S9) (MLRA 147, 148)	<input type="checkbox"/> Piedmont Floodplain Soils (F19) (MLRA 136, 147)
<input type="checkbox"/> Hydrogen Sulfide (A4)	<input type="checkbox"/> Loamy Gleyed Matrix (F2)	<input type="checkbox"/> Very Shallow Dark Surface (TF12)
<input type="checkbox"/> Stratified Layers (A5)	<input type="checkbox"/> Depleted Matrix (F3)	<input type="checkbox"/> Other (Explain in Remarks)
<input type="checkbox"/> 2 cm Muck (A10) (LRR N)	<input type="checkbox"/> Redox Dark Surface (F6)	
<input type="checkbox"/> Depleted Below Dark Surface (A11)	<input type="checkbox"/> Depleted Dark Surface (F7)	
<input type="checkbox"/> Thick Dark Surface (A12)	<input type="checkbox"/> Redox Depressions (F8)	
<input type="checkbox"/> Sandy Mucky Mineral (S1) (LRR N, MLRA 147, 148)	<input type="checkbox"/> Iron-Manganese Masses (F12) (LRR N, MLRA 136)	
<input type="checkbox"/> Sandy Gleyed Matrix (S4)	<input type="checkbox"/> Umbric Surface (F13) (MLRA 136, 122)	
<input type="checkbox"/> Sandy Redox (S5)	<input type="checkbox"/> Piedmont Floodplain Soils (F19) (MLRA 148)	
<input type="checkbox"/> Stripped Matrix (S6)	<input type="checkbox"/> Red Parent Material (F21) (MLRA 127, 147)	

³Indicators 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:
 Indicators show up below required thresholds.
 No hydric soil present

APPENDIX I: APPROVED FHWA CATEGORICAL EXCLUSION FORMS

(Complete Categorical Exclusion included in electronic submittal)





Appendix A

Categorical Exclusion Form for Ecosystem Enhancement
Program Projects

Version 1.4

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

Part 1: General Project Information	
Project Name:	Blair Creek Site Mitigation Project
County Name:	Clay
EEP Number:	100047
Project Sponsor:	FHWA
Project Contact Name:	Micky Clemmons / Michael Baker Engineering, Inc.
Project Contact Address:	797 Haywood Road, Suite 201, Asheville, NC
Project Contact E-mail:	Mclemmons@mbakerintl.com
EEP Project Manager:	Matthew Reid (matthew.reid@ncdenr.gov)
Project Description	
<p>The Blair Creek Site Mitigation Project is located in Clay County, North Carolina approximately 1.2 miles southwest of Hayesville. The project site is located in the Hiwassee River Basin (06020002) and the NC DMS Targeted Local Watershed (TLW) 06020002-060010. The project is located on the United States Geological Survey's (USGS) Hayesville Topographic Quadrangle. The center of the project area is located at 35.0261 N and -83.8319 W. The site is located on five abutting parcels that lie east of NC-69 between Waldroup Road and Cherry Road.</p> <p>The existing stream reaches have been significantly impacted by past unrestricted livestock access, current row crop production, and removal of riparian buffers. The project stream reaches are unstable, incised and exhibit active bank erosion.</p> <p>The project will involve the restoration and enhancement of 4 stream reaches, totaling approximately 4,015 linear feet (LF), and the re-establishment, rehabilitation, and enhancement of approximately 5.7 acres of riparian wetland within the Blair Creek drainage area. A conservation easement will be implemented along all project reaches with riparian buffers extending in excess of 30 feet from the top of bank and will incorporate wetland features. The conservation easement will protect the entire project area in perpetuity. Livestock will be excluded from the conservation easement with permanent fencing.</p>	
For Official Use Only	
Reviewed By:	
Date	7/13/2018
Conditional Approved By:	
Date	
<input type="checkbox"/> Check this box if there are outstanding issues	
Final Approval By:	
Date	7-12-18
	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?		<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
2. Does the project involve ground-disturbing activities within a CAMA Area of Environmental Concern (AEC)?		<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A
3. Has a CAMA permit been secured?		<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A
4. Has NCDPCM agreed that the project is consistent with the NC Coastal Management Program?		<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A
Comprehensive Environmental Response, Compensation and Liability Act (CERCLA)		
1. Is this a "full-delivery" project?		<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
2. Has the zoning/land use of the subject property and adjacent properties ever been designated as commercial or industrial?		<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> 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?		<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> 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?		<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A
5. As a result of a Phase II Site Assessment, are there known or potential hazardous waste sites within the project area?		<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A
6. Is there an approved hazardous mitigation plan?		<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> 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?		<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
2. Does the project affect such properties and does the SHPO/THPO concur?		<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A
3. If the effects are adverse, have they been resolved?		<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A
Uniform Relocation Assistance and Real Property Acquisition Policies Act (Uniform Act)		
1. Is this a "full-delivery" project?		<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
2. Does the project require the acquisition of real estate?		<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A
3. Was the property acquisition completed prior to the intent to use federal funds?		<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> 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?		<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> 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?		<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
2. Is the site of religious importance to American Indians?		<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A
3. Is the project listed on, or eligible for listing on, the National Register of Historic Places?		<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A
4. Have the effects of the project on this site been considered?		<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A
Antiquities Act (AA)		
1. Is the project located on Federal lands?		<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
2. Will there be loss or destruction of historic or prehistoric ruins, monuments or objects of antiquity?		<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A
3. Will a permit from the appropriate Federal agency be required?		<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A
4. Has a permit been obtained?		<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A
Archaeological Resources Protection Act (ARPA)		
1. Is the project located on federal or Indian lands (reservation)?		<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
2. Will there be a loss or destruction of archaeological resources?		<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A
3. Will a permit from the appropriate Federal agency be required?		<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A
4. Has a permit been obtained?		<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A
Endangered Species Act (ESA)		
1. Are federal Threatened and Endangered species and/or Designated Critical Habitat listed for the county?		<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
2. Is Designated Critical Habitat or suitable habitat present for listed species?		<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A
3. Are T&E species present or is the project being conducted in Designated Critical Habitat?		<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A
4. Is the project "likely to adversely affect" the specie and/or "likely to adversely modify" Designated Critical Habitat?		<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A
5. Does the USFWS/NOAA-Fisheries concur in the effects determination?		<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A
6. Has the USFWS/NOAA-Fisheries rendered a "jeopardy" determination?		<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> 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?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
2. Has the EBCI indicated that Indian sacred sites may be impacted by the proposed project?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A
3. Have accommodations been made for access to and ceremonial use of Indian sacred sites?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A
Farmland Protection Policy Act (FPPA)	
1. Will real estate be acquired?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
2. Has NRCS determined that the project contains prime, unique, statewide or locally important farmland?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A
3. Has the completed Form AD-1006 been submitted to NRCS?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A
Fish and Wildlife Coordination Act (FWCA)	
1. Will the project impound, divert, channel deepen, or otherwise control/modify any water body?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
2. Have the USFWS and the NCWRC been consulted?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> 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?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
2. Has the NPS approved of the conversion?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A
Magnuson-Stevens Fishery Conservation and Management Act (Essential Fish Habitat)	
1. Is the project located in an estuarine system?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
2. Is suitable habitat present for EFH-protected species?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A
3. Is sufficient design information available to make a determination of the effect of the project on EFH?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A
4. Will the project adversely affect EFH?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A
5. Has consultation with NOAA-Fisheries occurred?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A
Migratory Bird Treaty Act (MBTA)	
1. Does the USFWS have any recommendations with the project relative to the MBTA?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
2. Have the USFWS recommendations been incorporated?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A
Wilderness Act	
1. Is the project in a Wilderness area?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
2. Has a special use permit and/or easement been obtained from the maintaining federal agency?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A

Blair Creek Site / Categorical Exclusion – Summary

Hiwassee River Basin – CU# 06020002 – Clay County, NC
NCDMS Project ID No. 100047; NCDEQ Contract No. 007415

Project Background

The Blair Creek Site Mitigation project is proposing to restore and enhance approximately 4,015 linear feet (LF) of existing stream and re-establish, rehabilitate, and enhance approximately 5.7 acres of riparian wetland within the Blair Creek drainage area for the purpose of obtaining stream and wetland 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 unrestricted livestock access, current row crop production, and removal of riparian buffers. The project stream reaches are unstable, incised and exhibit active bank erosion.

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

Comprehensive Environmental Response, Compensation and Liability Act (CERCLA)

A preliminary review of the project and adjacent parcels zoning/land use status was conducted on April 12, 2018 using the Clay County, NC GIS Tax Mapping application (<http://clayconc.com/taxes/tax-mapping/>). Results from the online review showed that there was one commercial designation within the project parcels, and multiple commercial designations among parcels abutting or adjacent to the project area. Based on these results, an addition search of environment records was conducted on April 11, 2018 by Environmental Data Resources, Inc (EDR). Results from the EDR's Radius Map Report did not find any listed government environmental records for any of the project area or adjoining parcels. However, it did find three listed parcels within a one-mile radius of the project area. They are C&L Surplus, Cherry's Gas Station, and Hubert & Carol's Store.

C&L Surplus is listed as a State Hazardous Waste Site (SHWS) and is located at 1868 US-64 W Hayesville, NC. Since this location is approximately one mile from the project area, this property should not pose any adverse effect on the project site.

Cherry's Gas Station was located less than one-quarter mile from the project area and housed three on-site underground storage tanks (UST) for fuel. In 2002, all three tanks were removed and the business was closed; therefore, this property should not pose any hazardous waste risks to the project site.

Hubert & Carol's Store is listed in the NC State Trust Fund Database for leaking underground storage tanks. This database contains information about claims against the State Trust Funds for reimbursements for expenses incurred while remediating Leaking USTs. The EDR report was unable to map the location of the Hubert & Carol's Store because of inadequate database address information. However, upon further review of the facility detail report, it seems that all claims have been closed, as well as, the site. Therefore, this site should pose no any adverse effects to the project. A copy of the detailed facility report is included in the Appendix.

National Historic Preservation Act (Section 106)

Michael Baker Engineering, Inc. (Baker) requested a review and comment from the State Historic Preservation Office (SHPO) and the Eastern Band of Cherokee Indians' (EBCI) Tribal Historic Preservation

Office (THPO) on any possible issues that might emerge with respect to architectural, archaeological, and/or cultural resources from the restoration project on April 13, 2018, and April 16, 2018, respectively. On May 2, 2018, Baker received a response letter from SHPO requesting an archaeological review of the project area, based on a high probability for the presence of prehistoric or historic archeological sites. On May 14, 2018, Baker received a letter from EBCI THPO with the finding that no cultural resources important to the Cherokee people should be adversely impacted by the proposed project.

Upon receipt of the request from SHPO, Baker contacted Archaeological Consultants of the Carolinas (ACC) to review the project area and conduct an archaeological survey. After reviewing the project’s site conditions, ACC concluded that an archeological survey would not be beneficial; whereas, Baker authorized the ACC to consult with SHPO about the possibility of rescinding the archaeological survey request. On May 21, 2018, the ACC sent a letter to SHPO, on Baker’s behalf, formally requesting SHPO to negate their requirement for a comprehensive archaeological survey. On June 21, 2018, Baker received a SHPO’s response from ACC’s request to rescind the requirement for an archaeological survey, upon which they concurred with ACC’s findings with the following statement. “Since the proposed development is to take place in areas where hydric soils dominate, it is unlikely that significant archaeological resources will be affected. We, therefore, recommend that no archaeological investigation be conducted in connection with this project [sic].” 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. A copy of each Option Agreement with this acknowledgement highlighted in yellow is included in the Appendix.

Endangered Species Act (ESA)

Michael Baker Engineering, Inc. (Baker) conducted an on-line review of the project area with the use of the United States Fish and Wildlife Service (USFWS) IPAC website (<https://ecos.fws.gov/ipac/>), on April 16, 2018. This review generated an *Official Species List* (OSL), which identifies threatened, endangered, proposed and candidate species, as well as proposed and final designated critical habitat, that may occur within the boundary of the proposed project and/or may be affected by proposed project. Results from review, found the following five federally listed species. No USFWS designated critical habitats were located within the project boundaries.

Scientific Name	Common Name	Federal Status	Habitat Present	Biological Conclusion
<i>Myotis grisescens</i>	Gray Bat	E	No	No Effect
<i>Myotis sodalis</i>	Indiana Bat	E	No	No Effect
<i>Myotis septentrionalis</i>	Northern long-eared bat	T	No	No Effect
<i>Sarracenia oreophila</i>	Green Pitcher plant	E	Yes	No Effect
<i>Gymnoderma lineare</i>	Rock Gnome Lichen	E	No	No Effect

Baker conducted a two-mile radius search using the Natural Heritage Program (NCNHP) Data Explorer (<https://ncnhde.natureserve.org/>) on April 16, 2018. Results from this search and found no known occurrences of any of the above referenced species within two miles of the project site. Based on our review, field surveys, and FHWA consultation, Baker has developed the following determinations for the above referenced species.

***Myotis grisescens* (Gray Bat) – Endangered**

USFWS optimal survey window: May15-August 15 (summer); January 15-February 15 (winter)

The gray bat is the largest member of its genus in the eastern United States, and is easily distinguishable from all other bats within its range by its mono-colored fur. Following molt in July or August, gray bats are dark gray, but they often bleach to chestnut brown or russet between molts (especially apparent in reproductive females during May and June). The wing membrane connects to the foot at the ankle rather than at the base of the first toe, as in other species of *Myotis*.

Gray bats roost predominantly in caves year-round. Most winter caves are deep and vertical, while cave types vary during the spring and fall transient periods. In summer, maternity colonies prefer caves that act as warm air traps or that provide restricted rooms or domed ceilings that are capable of trapping the combined body heat from thousands of clustered individuals, and are located within one half mile of a river or reservoir, which provides foraging habitat.

No critical habitat has been designated for this species.

Biological Conclusion: No Effect

The project site is not located within a 0.5 mile of a river or reservoir nor have any caves that would provide roosting habitat been found within the study area. Additionally, a review of NCNHP records conducted on April 16, 2018 did not indicate known gray bat occurrence within 2.0 miles of the study area. Therefore, since no roosting habitat nor foraging habitat will be impacted, the proposed project is anticipated to have “No Effect” on the gray bat.

Myotis sodalists (Indiana Bat) – Endangered

USFWS optimal survey window: May15 - August 15 (summer)

The Indiana bat is a medium-sized bat, with a head and body length ranging from 1.6 – 1.9 in. The species closely resembles the little brown bat (*Myotis lucifugus*) and the northern long-eared bat (*Myotis septentrionalis*). Its hind feet tend to be small and delicate with fewer, shorter hairs than other bats of the *Myotis* genus. The fur lacks luster. The ears and wing membranes have a dull appearance and flat coloration that does not contrast with the fur. The fur of the chest and belly is lighter than the pinkish-brown fur on the back, but does not contrast as strongly as does that of the little brown or northern long-eared bats.

Indiana bats winter in caves or mines with stable, but not freezing, cold temperatures. In summer they generally roost in the loose bark of trees, either dead trees with peeling bark, or live trees with shaggy bark, such as white oak and some hickories.

Critical Habitat for the Indiana Bat was designated on September 24, 1976. Based on the IPAC Official Species List generated, the project lies outside the critical habitat.

Biological Conclusion: No Effect

A review of NCNHP records does not indicate known NLEB bat populations or occurrences within 2.0 within two miles of the Project area, nor are there any caves within the project area that would provide hibernation habitat. On May 11, 2018, a field review conducted within the project area found that there were no shagbark hickory or similar type trees nor are there any abandoned buildings or structures located within the construction area that would provide roosting habitat, and no bridges will be disturbed. In addition, the project design has minimized tree clearing, with all larger trees having been surveyed to avoid impacts wherever possible. All disturbed areas will be replanted with native species, ultimately increasing the forested acreage along the creek. Therefore, since no hibernation nor roosting habitat will be impacted, the proposed project is anticipated to have “No Effect” on the on the Indiana bat.

Myotis septentrionalis (Northern long-eared bat) – Threatened

In North Carolina, the Northern long-eared bat (NLEB) occurs in the mountains, with scattered records in the Piedmont and coastal plain. In western North Carolina, NLEB spend winter hibernating in caves and mines. Since this species is not known to be a long-distance migrant, and caves and subterranean mines are extremely rare in eastern North Carolina, it is uncertain whether or where NLEB hibernate in eastern NC. During the summer, NLEB roost singly or in colonies underneath bark, in cavities, or in crevices of both

live and dead trees (typically ≥ 3 inches dbh). This bat also been found, rarely, roosting in structures like barns and sheds, under eaves of buildings, behind window shutters, in bridges, and in bat houses. Pregnant females give birth from late May to late July. Foraging occurs on forested hillsides and ridges, and occasionally over forest clearings, over water, and along tree-lined corridors. Mature forests may be an important habitat type for foraging.

No critical habitat has been designated for this species.

Biological Conclusion: No Effect

A review of NCNHP records does not indicate known NLEB bat populations or occurrences within 2.0 within two miles of the Project area, nor are there any caves within the project area that would provide hibernation habitat. On May 11, 2018, a field review conducted within the project area found that there were no shagbark hickory or similar type trees nor are there any abandoned buildings or structures located within the construction area that would provide roosting habitat, and no bridges will be disturbed. In addition, the project design has minimized tree clearing, with all larger trees having been surveyed to avoid impacts wherever possible. All disturbed areas will be replanted with native species, ultimately increasing the forested acreage along the creek. Therefore, since no hibernation nor roosting habitat will be impacted, the proposed project is anticipated to have “No Effect” on the on the NLEB.

Sarracenia oreophila (Green Pitcher Plant) – Endangered

USFWS Optimal Survey Window: late April – October

The green pitcher plant is a carnivorous perennial herb with yellowish-green, hollow, pitcher-shaped leaves that contain liquid and enzymes used to digest its prey. Its habitat varies from moist upland areas and seepage bogs to boggy stream banks with a limited range of occurrence in North Carolina to Clay County. The species reproduces both by seed and root extensions. Flowering occurs from mid-April to early June. Seedlings require high soil moisture content and sunny open areas especially during the first year of growth.

No critical habitat has been designated for this species.

Biological Conclusion: No Effect

Because suitable habitat for the green pitcher plant is present within the proposed project area, an on-site field survey was conducted on May 11, 2018. No individuals or populations of the species were documented during the on-site review; therefore, should have “No Effect” on the green pitcher plant.

Gymnoderma lineare (Rock Gnome Lichen) – Endangered

USFWS Optimal Survey Window: year round

The rock gnome lichen occurs in high elevation coniferous forests (particularly those dominated by red spruce and Fraser fir) usually on rocky outcrop or cliff habitats. This squamulose lichen only grows in areas with a great deal of humidity, such as high elevations greater than 5,000 feet AMSL where there is often fog, or on boulders and large outcrops in deep river gorges at lower elevations. Habitat is primarily limited to vertical rock faces where seepage water from forest soils above flows only at very wet times. The species requires a moderate amount of sunlight, but cannot tolerate high-intensity solar radiation. The lichen does well on moist, generally open sites with northern exposures, but requires at least partial canopy coverage on southern or western aspects because of its intolerance to high solar radiation.

No critical habitat has been designated for this species.

Biological Conclusion: No Effect

The study area does not occur at the proper elevation to support habitat for rock gnome lichen. Elevations within the study area are approximately 1,850 feet AMSL and does not contain the high elevation rock face habitat preferred by rock gnome lichen. A review of NCNHP records, conducted on April 16, 2018, did not

indicate known rock gnome lichen occurrence within 2.0 mile of the study area. Therefore, since habitat is not present, “No Effect” to rock gnome lichen is anticipated to occur as a result of the proposed project.

Farmland Protection Policy Act (FPPA)

On April 17, 2018, Baker submitted the AD-1006 form for the Blair Creek Site Mitigation Project to the North Carolina State Natural Resources Conservation Service (NRCS) Office. The NRCS responded on May 24, 2018 with the determination that implementation of this restoration project would result in the conversion of 8.9 acres of prime farmland soils. Baker submitted the completed AD-1006 form to the NRCS Assistant State Soil Scientist May 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 May 14, 2018 requesting their comment and review on the Blair Creek Site Mitigation Project. On June 13, 2018, Baker received a response letter from the NCWRC with following comments and/or recommendations:

- To observe the trout moratorium between January 1 and April 15 and
- To reestablish the riparian buffer as wide as possible, given the site constraints and landowner needs, with a recommendation of 100-feet on perennial streams.

On June 18, 2018, Baker sent an email to the NCWRC, requesting the agency to “reconsider imposing the modified trout moratorium...during the period January 1 to April 15”, based on an included list of site specific conditions. On June 21, 2018, Baker received a reply email from the NCWRC explaining that additional construction specific information and design details would be needed for review before the NCWRC could “make a call about whether we will require or lift the moratorium for the project”. Baker responded to NCWRC in a reply email on June 22, 2018. Baker responded with the acknowledgement of the need for additional information; however, because the project is currently in the planning stage detailed site plans have yet to be developed. Therefore, at this time Baker will assume that there may be a trout moratorium in affect and will revisit the request during the permitting stage of the project when more detailed site plans and project information are available.

As of June 25, 2018, Baker has not received a response from 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 May 14, 2018 requesting their comment and review on the Blair Creek Site Mitigation Project in relation to migratory birds. As of June 25, 2018, Baker has not received any comments from the USFWS on this issue. All correspondence with the USFWS is included in the Appendix.

Blair Creek Site Mitigation Project

416 Cherry Road
Hayesville, NC 28904

Inquiry Number: 5254503.2s
April 11, 2018

The EDR Radius Map™ Report



6 Armstrong Road, 4th floor
Shelton, CT 06484
Toll Free: 800.352.0050
www.edrnet.com

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GEOCHECK ADDENDUM

GeoCheck - Not Requested

Thank you for your business.
Please contact EDR at 1-800-352-0050
with any questions or comments.

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EXECUTIVE SUMMARY

A search of available environmental records was conducted by Environmental Data Resources, Inc (EDR). The report was designed to assist parties seeking to meet the search requirements of EPA's Standards and Practices for All Appropriate Inquiries (40 CFR Part 312), the ASTM Standard Practice for Environmental Site Assessments (E 1527-13), the ASTM Standard Practice for Environmental Site Assessments for Forestland or Rural Property (E 2247-16), the ASTM Standard Practice for Limited Environmental Due Diligence: Transaction Screen Process (E 1528-14) or custom requirements developed for the evaluation of environmental risk associated with a parcel of real estate.

TARGET PROPERTY INFORMATION

ADDRESS

416 CHERRY ROAD
HAYESVILLE, NC 28904

COORDINATES

Latitude (North): 35.0261000 - 35° 1' 33.96"
Longitude (West): 83.8319000 - 83° 49' 54.84"
Universal Transverse Mercator: Zone 17
UTM X (Meters): 241624.4
UTM Y (Meters): 3879406.5
Elevation: 1839 ft. above sea level

USGS TOPOGRAPHIC MAP ASSOCIATED WITH TARGET PROPERTY

Target Property Map: 5946649 HAYESVILLE, NC
Version Date: 2013

AERIAL PHOTOGRAPHY IN THIS REPORT

Portions of Photo from: 20141019
Source: USDA

MAPPED SITES SUMMARY

Target Property Address:
416 CHERRY ROAD
HAYESVILLE, NC 28904

Click on Map ID to see full detail.

MAP ID	SITE NAME	ADDRESS	DATABASE ACRONYMS	RELATIVE ELEVATION	DIST (ft. & mi.) DIRECTION
1	CHERRYS GAS STATION	266 CHERRYWOOD CIRCL	UST	Higher	1078, 0.204, ESE
2	C & L SURPLUS	1868 HWY 64 W	SHWS	Higher	5125, 0.971, WNW

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

EXECUTIVE SUMMARY

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 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

VCP..... Responsible Party Voluntary Action Sites

INDIAN VCP..... Voluntary Cleanup Priority Listing

State and tribal Brownfields sites

BROWNFIELDS..... Brownfields Projects Inventory

ADDITIONAL ENVIRONMENTAL RECORDS

Local Brownfield lists

US BROWNFIELDS..... A Listing of Brownfields Sites

Local Lists of Landfill / Solid Waste Disposal Sites

HIST LF..... Solid Waste Facility Listing

SWRCY..... Recycling Center Listing

INDIAN ODI..... Report on the Status of Open Dumps on Indian Lands

DEBRIS REGION 9..... Torres Martinez Reservation Illegal Dump Site Locations

ODI..... Open Dump Inventory

EXECUTIVE SUMMARY

IHS OPEN DUMPS..... Open Dumps on Indian Land

Local Lists of Hazardous waste / Contaminated Sites

US HIST CDL..... Delisted National Clandestine Laboratory Register
US CDL..... National Clandestine Laboratory Register

Local Land Records

LIENS 2..... CERCLA Lien Information

Records of Emergency Release Reports

HMIRS..... Hazardous Materials Information Reporting System
SPILLS..... Spills Incident Listing
IMD..... Incident Management Database
SPILLS 90..... SPILLS 90 data from FirstSearch
SPILLS 80..... SPILLS 80 data from FirstSearch

Other Ascertainable Records

RCRA NonGen / NLR..... RCRA - Non Generators / No Longer Regulated
FUDS..... Formerly Used Defense Sites
DOD..... Department of Defense Sites
SCRD DRYCLEANERS..... State Coalition for Remediation of Drycleaners Listing
US FIN ASSUR..... Financial Assurance Information
EPA WATCH LIST..... EPA WATCH LIST
2020 COR ACTION..... 2020 Corrective Action Program List
TSCA..... Toxic Substances Control Act
TRIS..... Toxic Chemical Release Inventory System
SSTS..... Section 7 Tracking Systems
ROD..... Records Of Decision
RMP..... Risk Management Plans
RAATS..... RCRA Administrative Action Tracking System
PRP..... Potentially Responsible Parties
PADS..... PCB Activity Database System
ICIS..... Integrated Compliance Information System
FTTS..... FIFRA/ TSCA Tracking System - FIFRA (Federal Insecticide, Fungicide, & Rodenticide Act)/TSCA (Toxic Substances Control Act)
MLTS..... Material Licensing Tracking System
COAL ASH DOE..... Steam-Electric Plant Operation Data
COAL ASH EPA..... Coal Combustion Residues Surface Impoundments List
PCB TRANSFORMER..... PCB Transformer Registration Database
RADINFO..... Radiation Information Database
HIST FTTS..... FIFRA/TSCA Tracking System Administrative Case Listing
DOT OPS..... Incident and Accident Data
CONSENT..... Superfund (CERCLA) Consent Decrees
INDIAN RESERV..... Indian Reservations
FUSRAP..... Formerly Utilized Sites Remedial Action Program
UMTRA..... Uranium Mill Tailings Sites
LEAD SMELTERS..... Lead Smelter Sites
US AIRS..... Aerometric Information Retrieval System Facility Subsystem
US MINES..... Mines Master Index File
ABANDONED MINES..... Abandoned Mines
FINDS..... Facility Index System/Facility Registry System

EXECUTIVE SUMMARY

DOCKET HWC.....	Hazardous Waste Compliance Docket Listing
UXO.....	Unexploded Ordnance Sites
ECHO.....	Enforcement & Compliance History Information
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 Historical Auto Stations
EDR Hist Cleaner.....	EDR Exclusive Historical Cleaners

EDR RECOVERED GOVERNMENT ARCHIVES

Exclusive Recovered Govt. Archives

RGA HWS.....	Recovered Government Archive State Hazardous Waste Facilities List
RGA LF.....	Recovered Government Archive Solid Waste Facilities List
RGA LUST.....	Recovered Government Archive Leaking Underground Storage Tank

SURROUNDING SITES: SEARCH RESULTS

Surrounding sites were 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 - equivalent CERCLIS

SHWS: The State Hazardous Waste Sites 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. The data come from the Department of Environment & Natural Resources' Inactive Hazardous Sites Program.

A review of the SHWS list, as provided by EDR, and dated 12/01/2017 has revealed that there is 1 SHWS

EXECUTIVE SUMMARY

site within approximately 1 mile of the target property.

<u>Equal/Higher Elevation</u>	<u>Address</u>	<u>Direction / Distance</u>	<u>Map ID</u>	<u>Page</u>
C & L SURPLUS Facility Id: NONCD0001099	1868 HWY 64 W	WNW 1/2 - 1 (0.971 mi.)	2	9

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 02/02/2018 has revealed that there is 1 UST site within approximately 0.25 miles of the target property.

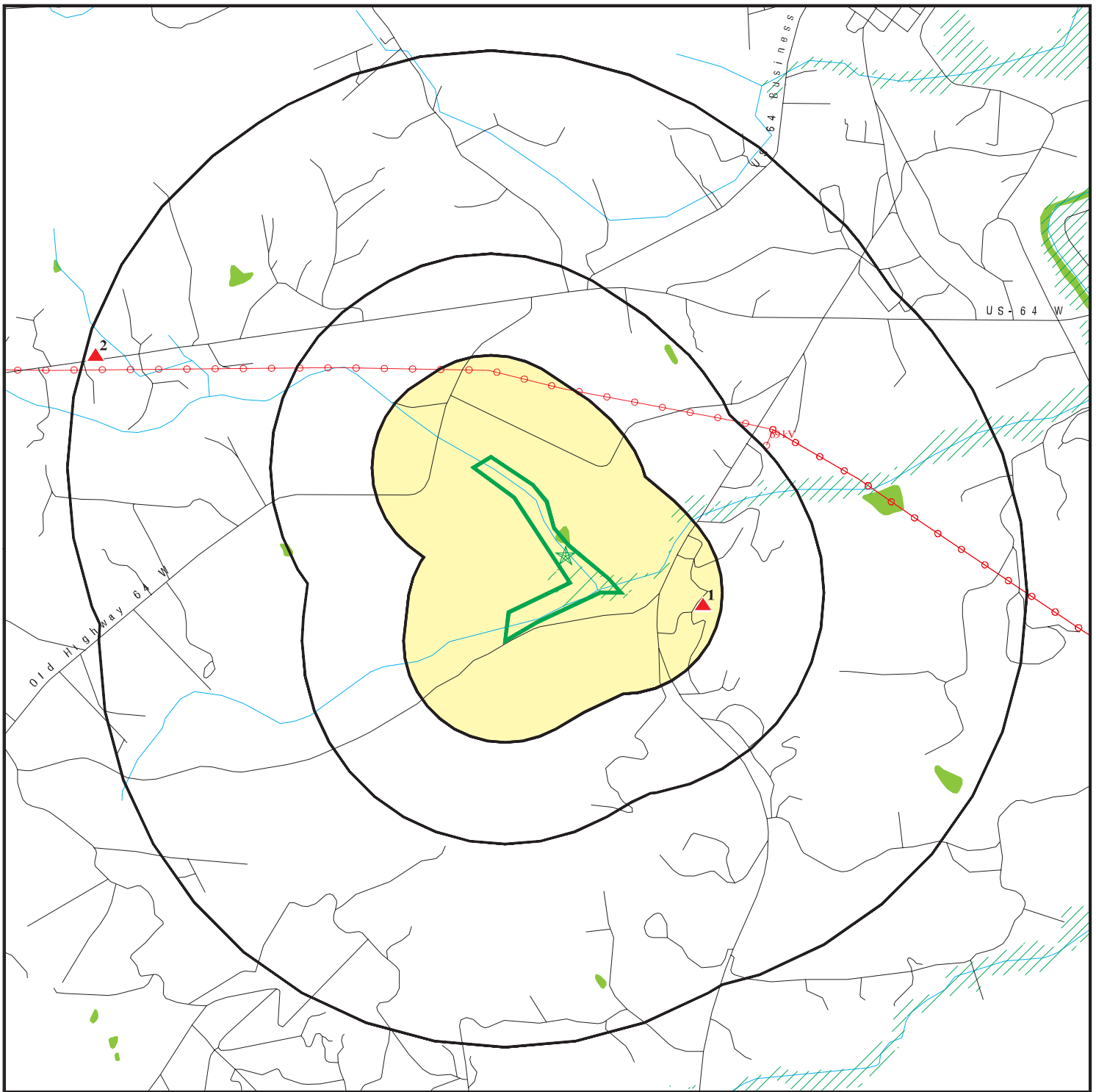
<u>Equal/Higher Elevation</u>	<u>Address</u>	<u>Direction / Distance</u>	<u>Map ID</u>	<u>Page</u>
CHERRYS GAS STATION Tank Status: Removed Facility Id: 00-0-0000035078	266 CHERRYWOOD CIRCL	ESE 1/8 - 1/4 (0.204 mi.)	1	8

EXECUTIVE SUMMARY

Due to poor or inadequate address information, the following sites were not mapped. Count: 1 records.

<u>Site Name</u>	<u>Database(s)</u>
HUBERT & CAROL'S STORE	LUST TRUST

OVERVIEW MAP - 5254503.2S



Target Property

Sites at elevations higher than or equal to the target property

Sites at elevations lower than the target property

Manufactured Gas Plants

National Priority List Sites

Dept. Defense Sites



Indian Reservations BIA

Power transmission lines

100-year flood zone

500-year flood zone

National Wetland Inventory

State Wetlands

Upgradient Area

Hazardous Substance Disposal Sites

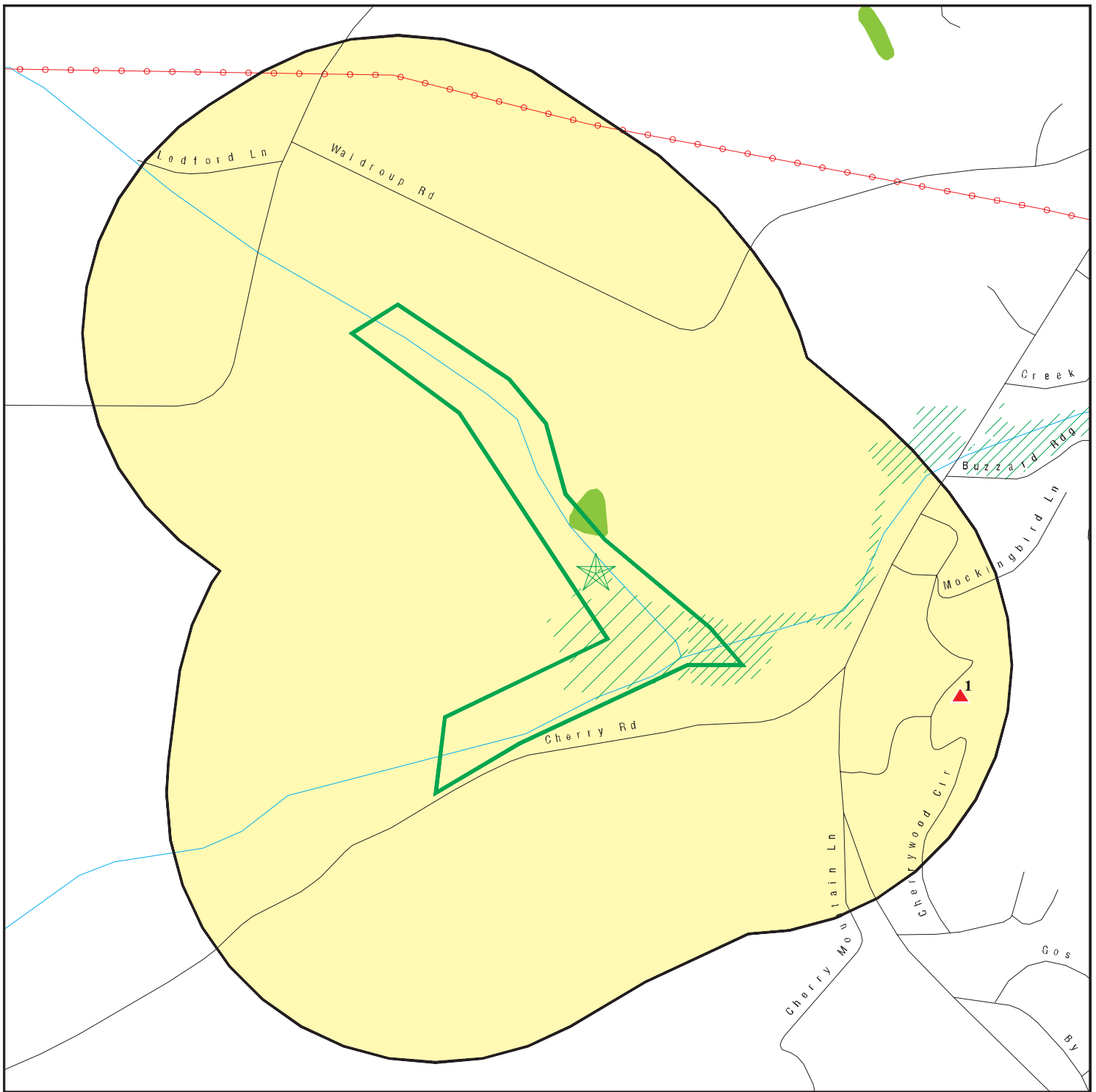


This report includes Interactive Map Layers to display and/or hide map information. The legend includes only those icons for the default map view.

SITE NAME: Blair Creek Site Mitigation Project
 ADDRESS: 416 Cherry Road
 Hayesville NC 28904
 LAT/LONG: 35.0261 / 83.8319

CLIENT: Michael Baker Engineering, Inc.
 CONTACT: Kristi Suggs
 INQUIRY #: 5254503.2s
 DATE: April 11, 2018 9:34 am

DETAIL MAP - 5254503.2S



- | | | | |
|---|--------------------------|----------------------------|------------------------------------|
| Target Property | | Indian Reservations BIA | Hazardous Substance Disposal Sites |
| Sites at elevations higher than or equal to the target property | Power transmission lines | 100-year flood zone | |
| Sites at elevations lower than the target property | 500-year flood zone | National Wetland Inventory | |
| Manufactured Gas Plants | State Wetlands | | |
| Sensitive Receptors | | | |
| National Priority List Sites | | | |
| Dept. Defense 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: Blair Creek Site Mitigation Project
 ADDRESS: 416 Cherry Road
 Hayesville NC 28904
 LAT/LONG: 35.0261 / 83.8319

CLIENT: Michael Baker Engineering, Inc.
 CONTACT: Kristi Suggs
 INQUIRY #: 5254503.2s
 DATE: April 11, 2018 9:35 am

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								
<i>Federal NPL site list</i>								
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
<i>Federal Delisted NPL site list</i>								
Delisted NPL	1.000		0	0	0	0	NR	0
<i>Federal CERCLIS list</i>								
FEDERAL FACILITY	0.500		0	0	0	NR	NR	0
SEMS	0.500		0	0	0	NR	NR	0
<i>Federal CERCLIS NFRAP site list</i>								
SEMS-ARCHIVE	0.500		0	0	0	NR	NR	0
<i>Federal RCRA CORRACTS facilities list</i>								
CORRACTS	1.000		0	0	0	0	NR	0
<i>Federal RCRA non-CORRACTS TSD facilities list</i>								
RCRA-TSDF	0.500		0	0	0	NR	NR	0
<i>Federal RCRA generators list</i>								
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
<i>Federal institutional controls / engineering controls registries</i>								
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
<i>Federal ERNS list</i>								
ERNS	TP		NR	NR	NR	NR	NR	0
<i>State- and tribal - equivalent NPL</i>								
NC HSDS	1.000		0	0	0	0	NR	0
<i>State- and tribal - equivalent CERCLIS</i>								
SHWS	1.000		0	0	0	1	NR	1
<i>State and tribal landfill and/or solid waste disposal site lists</i>								
SWF/LF	0.500		0	0	0	NR	NR	0
OLI	0.500		0	0	0	NR	NR	0
<i>State and tribal leaking storage tank lists</i>								
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								
VCP	0.500		0	0	0	NR	NR	0
INDIAN 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								
HIST LF	0.500		0	0	0	NR	NR	0
SWRCY	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		0	0	NR	NR	NR	0
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
UXO	1.000		0	0	0	0	NR	0
ECHO	TP		NR	NR	NR	NR	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

<u>Database</u>	<u>Search Distance (Miles)</u>	<u>Target Property</u>	<u>< 1/8</u>	<u>1/8 - 1/4</u>	<u>1/4 - 1/2</u>	<u>1/2 - 1</u>	<u>> 1</u>	<u>Total Plotted</u>
RGA LF	TP		NR	NR	NR	NR	NR	0
RGA LUST	TP		NR	NR	NR	NR	NR	0
- Totals --		0	0	1	0	1	0	2

NOTES:

TP = Target Property

NR = Not Requested at this Search Distance

Sites may be listed in more than one database

MAP FINDINGS

Map ID
 Direction
 Distance
 Elevation

Site

Database(s) EDR ID Number
 EPA ID Number

1
ESE
1/8-1/4
0.204 mi.
1078 ft.

CHERRYS GAS STATION
266 CHERRYWOOD CIRCLE
HAYESVILLE, NC 28904

UST **U003138420**
N/A

Relative:
Higher
Actual:
1909 ft.

UST:
 Facility Id: 00-0-0000035078
 Contact: J. C. CHERRY
 Contact Address1: 266 CHERRYWOOD CIRCLE
 Contact Address2: Not reported
 Contact City/State/Zip: HAYESVILLE, NC 28904-7368
 FIPS County Desc: Clay
 Latitude: 0
 Longitude: 0

Tank Id: 1
 Tank Status: Removed
 Installed Date: 10/01/1985
 Perm Close Date: 09/23/2002
 Product Name: Gasoline, Gas Mix
 Tank Capacity: 8000
 Root Tank Id: Not reported
 Main Tank: No
 Compartment Tank: No
 Manifold Tank: Not reported
 Commercial: Yes
 Regulated: Yes
 Other CP Tank: Not reported
 Overfill Protection Name: Auto Shutoff Device
 Spill Protection Name: Catchment Basin
 Leak Detection Name: Unknown
 Decode for TCONS_KEY: Single Wall Steel
 Decode for PCONS_KEY: Other
 Decode for PSYS_KEY: Unknown

Tank Id: 2
 Tank Status: Removed
 Installed Date: 10/01/1985
 Perm Close Date: 09/23/2002
 Product Name: Gasoline, Gas Mix
 Tank Capacity: 6000
 Root Tank Id: Not reported
 Main Tank: No
 Compartment Tank: No
 Manifold Tank: Not reported
 Commercial: Yes
 Regulated: Yes
 Other CP Tank: Not reported
 Overfill Protection Name: Auto Shutoff Device
 Spill Protection Name: Catchment Basin
 Leak Detection Name: Unknown
 Decode for TCONS_KEY: Single Wall Steel
 Decode for PCONS_KEY: Other
 Decode for PSYS_KEY: Unknown

Tank Id: 3

Map ID
Direction
Distance
Elevation

MAP FINDINGS

Site

Database(s)

EDR ID Number
EPA ID Number

CHERRYS GAS STATION (Continued)

U003138420

Tank Status: Removed
Installed Date: 10/01/1985
Perm Close Date: 09/23/2002
Product Name: Gasoline, Gas Mix
Tank Capacity: 4000
Root Tank Id: Not reported
Main Tank: No
Compartment Tank: No
Manifold Tank: Not reported
Commercial: Yes
Regulated: Yes
Other CP Tank: Not reported
Overfill Protection Name: Auto Shutoff Device
Spill Protection Name: Catchment Basin
Leak Detection Name: Unknown
Decode for TCONS_KEY: Single Wall Steel
Decode for PCONS_KEY: Other
Decode for PSYS_KEY: Unknown

2
WNW
1/2-1
0.971 mi.
5125 ft.

C & L SURPLUS
1868 HWY 64 W
HAYESVILLE, NC

SHWS S105899480
N/A

Relative:
Higher
Actual:
1952 ft.

SHWS:
EPAID: NONCD0001099
Lat/Longitude: 35.033316 / -83.851823
Geolocation Method: On Screen Placement On Georeferenced Map

Count: 1 records.

ORPHAN SUMMARY

<u>City</u>	<u>EDR ID</u>	<u>Site Name</u>	<u>Site Address</u>	<u>Zip</u>	<u>Database(s)</u>
HAYESVILLE	S105218746	HUBERT & CAROL'S STORE	OLD HIGHWAY 64		LUST TRUST

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: 12/11/2017	Source: EPA
Date Data Arrived at EDR: 12/22/2017	Telephone: N/A
Date Made Active in Reports: 01/05/2018	Last EDR Contact: 04/06/2018
Number of Days to Update: 14	Next Scheduled EDR Contact: 07/16/2018
	Data Release Frequency: Quarterly

NPL Site Boundaries

Sources:

EPA's Environmental Photographic Interpretation Center (EPIC)
Telephone: 202-564-7333

EPA Region 1
Telephone 617-918-1143

EPA Region 6
Telephone: 214-655-6659

EPA Region 3
Telephone 215-814-5418

EPA Region 7
Telephone: 913-551-7247

EPA Region 4
Telephone 404-562-8033

EPA Region 8
Telephone: 303-312-6774

EPA Region 5
Telephone 312-886-6686

EPA Region 9
Telephone: 415-947-4246

EPA Region 10
Telephone 206-553-8665

Proposed NPL: Proposed National Priority List Sites

A site that has been proposed for listing on the National Priorities List through the issuance of a proposed rule in the Federal Register. EPA then accepts public comments on the site, responds to the comments, and places on the NPL those sites that continue to meet the requirements for listing.

Date of Government Version: 12/11/2017	Source: EPA
Date Data Arrived at EDR: 12/22/2017	Telephone: N/A
Date Made Active in Reports: 01/05/2018	Last EDR Contact: 04/06/2018
Number of Days to Update: 14	Next Scheduled EDR Contact: 07/16/2018
	Data Release Frequency: Quarterly

NPL LIENS: Federal Superfund Liens

Federal Superfund Liens. Under the authority granted the USEPA by CERCLA of 1980, the USEPA has the authority to file liens against real property in order to recover remedial action expenditures or when the property owner received notification of potential liability. USEPA compiles a listing of filed notices of Superfund Liens.

Date of Government Version: 10/15/1991	Source: EPA
Date Data Arrived at EDR: 02/02/1994	Telephone: 202-564-4267
Date Made Active in Reports: 03/30/1994	Last EDR Contact: 08/15/2011
Number of Days to Update: 56	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: 12/11/2017	Source: EPA
Date Data Arrived at EDR: 12/22/2017	Telephone: N/A
Date Made Active in Reports: 01/05/2018	Last EDR Contact: 04/06/2018
Number of Days to Update: 14	Next Scheduled EDR Contact: 07/16/2018
	Data Release Frequency: Quarterly

Federal CERCLIS list

FEDERAL FACILITY: Federal Facility Site Information listing

A listing of National Priority List (NPL) and Base Realignment and Closure (BRAC) sites found in the Comprehensive Environmental Response, Compensation and Liability Information System (CERCLIS) Database where EPA Federal Facilities Restoration and Reuse Office is involved in cleanup activities.

Date of Government Version: 11/07/2016	Source: Environmental Protection Agency
Date Data Arrived at EDR: 01/05/2017	Telephone: 703-603-8704
Date Made Active in Reports: 04/07/2017	Last EDR Contact: 04/06/2018
Number of Days to Update: 92	Next Scheduled EDR Contact: 07/16/2018
	Data Release Frequency: Varies

SEMS: Superfund Enterprise Management System

SEMS (Superfund Enterprise Management System) tracks hazardous waste sites, potentially hazardous waste sites, and remedial activities performed in support of EPA's Superfund Program across the United States. The list was formerly known 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: 12/11/2017	Source: EPA
Date Data Arrived at EDR: 12/22/2017	Telephone: 800-424-9346
Date Made Active in Reports: 01/12/2018	Last EDR Contact: 02/06/2018
Number of Days to Update: 21	Next Scheduled EDR Contact: 04/30/2018
	Data Release Frequency: Quarterly

Federal CERCLIS NFRAP site list

SEMS-ARCHIVE: Superfund Enterprise Management System Archive

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

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: 12/11/2017	Source: EPA
Date Data Arrived at EDR: 12/22/2017	Telephone: 800-424-9346
Date Made Active in Reports: 01/12/2018	Last EDR Contact: 02/06/2018
Number of Days to Update: 21	Next Scheduled EDR Contact: 04/30/2018
	Data Release Frequency: Quarterly

Federal RCRA CORRACTS facilities list

CORRACTS: Corrective Action Report

CORRACTS identifies hazardous waste handlers with RCRA corrective action activity.

Date of Government Version: 12/11/2017	Source: EPA
Date Data Arrived at EDR: 12/26/2017	Telephone: 800-424-9346
Date Made Active in Reports: 02/09/2018	Last EDR Contact: 03/28/2018
Number of Days to Update: 45	Next Scheduled EDR Contact: 07/09/2018
	Data Release Frequency: Quarterly

Federal RCRA non-CORRACTS TSD facilities list

RCRA-TSDF: RCRA - Treatment, Storage and Disposal

RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Transporters are individuals or entities that move hazardous waste from the generator offsite to a facility that can recycle, treat, store, or dispose of the waste. TSDFs treat, store, or dispose of the waste.

Date of Government Version: 12/11/2017	Source: Environmental Protection Agency
Date Data Arrived at EDR: 12/26/2017	Telephone: (404) 562-8651
Date Made Active in Reports: 02/09/2018	Last EDR Contact: 03/28/2018
Number of Days to Update: 45	Next Scheduled EDR Contact: 07/09/2018
	Data Release Frequency: Quarterly

Federal RCRA generators list

RCRA-LQG: RCRA - Large Quantity Generators

RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Large quantity generators (LQGs) generate over 1,000 kilograms (kg) of hazardous waste, or over 1 kg of acutely hazardous waste per month.

Date of Government Version: 12/11/2017	Source: Environmental Protection Agency
Date Data Arrived at EDR: 12/26/2017	Telephone: (404) 562-8651
Date Made Active in Reports: 02/09/2018	Last EDR Contact: 03/28/2018
Number of Days to Update: 45	Next Scheduled EDR Contact: 07/09/2018
	Data Release Frequency: Quarterly

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

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: 12/11/2017	Source: Environmental Protection Agency
Date Data Arrived at EDR: 12/26/2017	Telephone: (404) 562-8651
Date Made Active in Reports: 02/09/2018	Last EDR Contact: 03/28/2018
Number of Days to Update: 45	Next Scheduled EDR Contact: 07/09/2018
	Data Release Frequency: Quarterly

RCRA-CESQG: RCRA - Conditionally Exempt Small Quantity Generators

RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Conditionally exempt small quantity generators (CESQGs) generate less than 100 kg of hazardous waste, or less than 1 kg of acutely hazardous waste per month.

Date of Government Version: 12/11/2017	Source: Environmental Protection Agency
Date Data Arrived at EDR: 12/26/2017	Telephone: (404) 562-8651
Date Made Active in Reports: 02/09/2018	Last EDR Contact: 03/28/2018
Number of Days to Update: 45	Next Scheduled EDR Contact: 07/09/2018
	Data Release Frequency: Quarterly

Federal institutional controls / engineering controls registries

LUCIS: Land Use Control Information System

LUCIS contains records of land use control information pertaining to the former Navy Base Realignment and Closure properties.

Date of Government Version: 05/22/2017	Source: Department of the Navy
Date Data Arrived at EDR: 06/13/2017	Telephone: 843-820-7326
Date Made Active in Reports: 09/15/2017	Last EDR Contact: 02/09/2018
Number of Days to Update: 94	Next Scheduled EDR Contact: 05/28/2018
	Data Release Frequency: Varies

US ENG CONTROLS: Engineering Controls Sites List

A listing of sites with engineering controls in place. Engineering controls include various forms of caps, building foundations, liners, and treatment methods to create pathway elimination for regulated substances to enter environmental media or effect human health.

Date of Government Version: 11/13/2017	Source: Environmental Protection Agency
Date Data Arrived at EDR: 11/27/2017	Telephone: 703-603-0695
Date Made Active in Reports: 02/09/2018	Last EDR Contact: 02/27/2018
Number of Days to Update: 74	Next Scheduled EDR Contact: 06/11/2018
	Data Release Frequency: Varies

US INST CONTROL: Sites with Institutional Controls

A listing of sites with institutional controls in place. Institutional controls include administrative measures, such as groundwater use restrictions, construction restrictions, property use restrictions, and post remediation care requirements intended to prevent exposure to contaminants remaining on site. Deed restrictions are generally required as part of the institutional controls.

Date of Government Version: 11/13/2017	Source: Environmental Protection Agency
Date Data Arrived at EDR: 11/27/2017	Telephone: 703-603-0695
Date Made Active in Reports: 02/09/2018	Last EDR Contact: 02/27/2018
Number of Days to Update: 74	Next Scheduled EDR Contact: 06/11/2018
	Data Release Frequency: Varies

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

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: 01/16/2018
Date Data Arrived at EDR: 01/19/2018
Date Made Active in Reports: 03/23/2018
Number of Days to Update: 63

Source: National Response Center, United States Coast Guard
Telephone: 202-267-2180
Last EDR Contact: 03/27/2018
Next Scheduled EDR Contact: 07/09/2018
Data Release Frequency: Quarterly

State- and tribal - equivalent NPL

HSDS: Hazardous Substance Disposal Site

Locations of uncontrolled and unregulated hazardous waste sites. The file includes sites on the National Priority List as well as those on the state priority list.

Date of Government Version: 08/09/2011
Date Data Arrived at EDR: 11/08/2011
Date Made Active in Reports: 12/05/2011
Number of Days to Update: 27

Source: North Carolina Center for Geographic Information and Analysis
Telephone: 919-754-6580
Last EDR Contact: 01/23/2018
Next Scheduled EDR Contact: 05/07/2018
Data Release Frequency: Biennially

State- and tribal - equivalent CERCLIS

SHWS: Inactive Hazardous Sites Inventory

State Hazardous Waste Sites. State hazardous waste site records are the states' equivalent to CERCLIS. These sites may or may not already be listed on the federal CERCLIS list. Priority sites planned for cleanup using state funds (state equivalent of Superfund) are identified along with sites where cleanup will be paid for by potentially responsible parties. Available information varies by state.

Date of Government Version: 12/01/2017
Date Data Arrived at EDR: 12/13/2017
Date Made Active in Reports: 01/05/2018
Number of Days to Update: 23

Source: Department of Environment, Health and Natural Resources
Telephone: 919-508-8400
Last EDR Contact: 03/15/2018
Next Scheduled EDR Contact: 06/25/2018
Data Release Frequency: Quarterly

State and tribal landfill and/or solid waste disposal site lists

SWF/LF: List of Solid Waste Facilities

Solid Waste Facilities/Landfill Sites. SWF/LF type records typically contain an inventory of solid waste disposal facilities or landfills in a particular state. Depending on the state, these may be active or inactive facilities or open dumps that failed to meet RCRA Subtitle D Section 4004 criteria for solid waste landfills or disposal sites.

Date of Government Version: 09/28/2017
Date Data Arrived at EDR: 09/28/2017
Date Made Active in Reports: 10/19/2017
Number of Days to Update: 21

Source: Department of Environment and Natural Resources
Telephone: 919-733-0692
Last EDR Contact: 03/30/2018
Next Scheduled EDR Contact: 07/09/2018
Data Release Frequency: Varies

OLI: Old Landfill Inventory

Old landfill inventory location information. (Does not include no further action sites and other agency lead sites).

Date of Government Version: 08/15/2017
Date Data Arrived at EDR: 10/11/2017
Date Made Active in Reports: 12/14/2017
Number of Days to Update: 64

Source: Department of Environment & Natural Resources
Telephone: 919-733-4996
Last EDR Contact: 01/12/2018
Next Scheduled EDR Contact: 04/23/2018
Data Release Frequency: Varies

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

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: 02/02/2018	Source: Department of Environment & Natural Resources
Date Data Arrived at EDR: 02/07/2018	Telephone: 877-623-6748
Date Made Active in Reports: 03/01/2018	Last EDR Contact: 02/07/2018
Number of Days to Update: 22	Next Scheduled EDR Contact: 05/21/2018
	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: 02/02/2018	Source: Department of Environment and Natural Resources
Date Data Arrived at EDR: 02/07/2018	Telephone: 919-733-1308
Date Made Active in Reports: 03/01/2018	Last EDR Contact: 02/07/2018
Number of Days to Update: 22	Next Scheduled EDR Contact: 05/21/2018
	Data Release Frequency: Quarterly

INDIAN LUST R10: Leaking Underground Storage Tanks on Indian Land

LUSTs on Indian land in Alaska, Idaho, Oregon and Washington.

Date of Government Version: 04/25/2017	Source: EPA Region 10
Date Data Arrived at EDR: 11/07/2017	Telephone: 206-553-2857
Date Made Active in Reports: 12/08/2017	Last EDR Contact: 01/23/2018
Number of Days to Update: 31	Next Scheduled EDR Contact: 05/07/2018
	Data Release Frequency: Varies

INDIAN LUST R9: Leaking Underground Storage Tanks on Indian Land

LUSTs on Indian land in Arizona, California, New Mexico and Nevada

Date of Government Version: 04/13/2017	Source: Environmental Protection Agency
Date Data Arrived at EDR: 07/27/2017	Telephone: 415-972-3372
Date Made Active in Reports: 10/13/2017	Last EDR Contact: 01/23/2018
Number of Days to Update: 78	Next Scheduled EDR Contact: 05/07/2018
	Data Release Frequency: Varies

INDIAN LUST R8: Leaking Underground Storage Tanks on Indian Land

LUSTs on Indian land in Colorado, Montana, North Dakota, South Dakota, Utah and Wyoming.

Date of Government Version: 05/01/2017	Source: EPA Region 8
Date Data Arrived at EDR: 07/27/2017	Telephone: 303-312-6271
Date Made Active in Reports: 10/13/2017	Last EDR Contact: 01/23/2018
Number of Days to Update: 78	Next Scheduled EDR Contact: 05/07/2018
	Data Release Frequency: Varies

INDIAN LUST R7: Leaking Underground Storage Tanks on Indian Land

LUSTs on Indian land in Iowa, Kansas, and Nebraska

Date of Government Version: 04/14/2017	Source: EPA Region 7
Date Data Arrived at EDR: 07/27/2017	Telephone: 913-551-7003
Date Made Active in Reports: 10/06/2017	Last EDR Contact: 01/23/2018
Number of Days to Update: 71	Next Scheduled EDR Contact: 05/07/2018
	Data Release Frequency: Varies

INDIAN LUST R4: Leaking Underground Storage Tanks on Indian Land

LUSTs on Indian land in Florida, Mississippi and North Carolina.

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

Date of Government Version: 10/14/2016	Source: EPA Region 4
Date Data Arrived at EDR: 01/27/2017	Telephone: 404-562-8677
Date Made Active in Reports: 05/05/2017	Last EDR Contact: 01/19/2018
Number of Days to Update: 98	Next Scheduled EDR Contact: 05/07/2018
	Data Release Frequency: Semi-Annually

INDIAN LUST R1: Leaking Underground Storage Tanks on Indian Land
A listing of leaking underground storage tank locations on Indian Land.

Date of Government Version: 04/14/2017	Source: EPA Region 1
Date Data Arrived at EDR: 07/27/2017	Telephone: 617-918-1313
Date Made Active in Reports: 10/06/2017	Last EDR Contact: 01/23/2018
Number of Days to Update: 71	Next Scheduled EDR Contact: 05/07/2018
	Data Release Frequency: Varies

INDIAN LUST R5: Leaking Underground Storage Tanks on Indian Land
Leaking underground storage tanks located on Indian Land in Michigan, Minnesota and Wisconsin.

Date of Government Version: 04/26/2017	Source: EPA, Region 5
Date Data Arrived at EDR: 07/27/2017	Telephone: 312-886-7439
Date Made Active in Reports: 10/13/2017	Last EDR Contact: 01/23/2018
Number of Days to Update: 78	Next Scheduled EDR Contact: 05/07/2018
	Data Release Frequency: Varies

INDIAN LUST R6: Leaking Underground Storage Tanks on Indian Land
LUSTs on Indian land in New Mexico and Oklahoma.

Date of Government Version: 04/24/2017	Source: EPA Region 6
Date Data Arrived at EDR: 07/27/2017	Telephone: 214-665-6597
Date Made Active in Reports: 10/06/2017	Last EDR Contact: 01/23/2018
Number of Days to Update: 71	Next Scheduled EDR Contact: 05/07/2018
	Data Release Frequency: Varies

LUST TRUST: State Trust Fund Database

This database contains information about claims against the State Trust Funds for reimbursements for expenses incurred while remediating Leaking USTs.

Date of Government Version: 12/29/2017	Source: Department of Environment and Natural Resources
Date Data Arrived at EDR: 01/10/2018	Telephone: 919-733-1315
Date Made Active in Reports: 03/01/2018	Last EDR Contact: 01/10/2018
Number of Days to Update: 50	Next Scheduled EDR Contact: 04/23/2018
	Data Release Frequency: Quarterly

State and tribal registered storage tank lists

FEMA UST: Underground Storage Tank Listing

A listing of all FEMA owned underground storage tanks.

Date of Government Version: 05/15/2017	Source: FEMA
Date Data Arrived at EDR: 05/30/2017	Telephone: 202-646-5797
Date Made Active in Reports: 10/13/2017	Last EDR Contact: 01/09/2018
Number of Days to Update: 136	Next Scheduled EDR Contact: 04/23/2018
	Data Release Frequency: Varies

UST: Petroleum Underground Storage Tank Database

Registered Underground Storage Tanks. UST's are regulated under Subtitle I of the Resource Conservation and Recovery Act (RCRA) and must be registered with the state department responsible for administering the UST program. Available information varies by state program.

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

Date of Government Version: 02/02/2018
Date Data Arrived at EDR: 02/07/2018
Date Made Active in Reports: 03/01/2018
Number of Days to Update: 22

Source: Department of Environment and Natural Resources
Telephone: 919-733-1308
Last EDR Contact: 02/07/2018
Next Scheduled EDR Contact: 05/21/2018
Data Release Frequency: Quarterly

AST: AST Database

Facilities with aboveground storage tanks that have a capacity greater than 21,000 gallons.

Date of Government Version: 12/05/2017
Date Data Arrived at EDR: 12/19/2017
Date Made Active in Reports: 01/05/2018
Number of Days to Update: 17

Source: Department of Environment and Natural Resources
Telephone: 919-715-6183
Last EDR Contact: 03/15/2018
Next Scheduled EDR Contact: 07/02/2018
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: 04/14/2017
Date Data Arrived at EDR: 07/27/2017
Date Made Active in Reports: 10/06/2017
Number of Days to Update: 71

Source: EPA, Region 1
Telephone: 617-918-1313
Last EDR Contact: 01/23/2018
Next Scheduled EDR Contact: 05/07/2018
Data Release Frequency: Varies

INDIAN UST R10: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 10 (Alaska, Idaho, Oregon, Washington, and Tribal Nations).

Date of Government Version: 04/25/2017
Date Data Arrived at EDR: 07/27/2017
Date Made Active in Reports: 10/13/2017
Number of Days to Update: 78

Source: EPA Region 10
Telephone: 206-553-2857
Last EDR Contact: 01/23/2018
Next Scheduled EDR Contact: 05/07/2018
Data Release Frequency: Varies

INDIAN UST R4: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 4 (Alabama, Florida, Georgia, Kentucky, Mississippi, North Carolina, South Carolina, Tennessee and Tribal Nations)

Date of Government Version: 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: 01/19/2018
Next Scheduled EDR Contact: 05/07/2018
Data Release Frequency: Semi-Annually

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: 05/01/2017
Date Data Arrived at EDR: 07/27/2017
Date Made Active in Reports: 10/13/2017
Number of Days to Update: 78

Source: EPA Region 8
Telephone: 303-312-6137
Last EDR Contact: 01/23/2018
Next Scheduled EDR Contact: 05/07/2018
Data Release Frequency: Varies

INDIAN UST R7: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 7 (Iowa, Kansas, Missouri, Nebraska, and 9 Tribal Nations).

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

Date of Government Version: 05/02/2017
Date Data Arrived at EDR: 07/27/2017
Date Made Active in Reports: 10/06/2017
Number of Days to Update: 71

Source: EPA Region 7
Telephone: 913-551-7003
Last EDR Contact: 01/23/2018
Next Scheduled EDR Contact: 05/07/2018
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: 04/24/2017
Date Data Arrived at EDR: 07/27/2017
Date Made Active in Reports: 12/08/2017
Number of Days to Update: 134

Source: EPA Region 6
Telephone: 214-665-7591
Last EDR Contact: 01/23/2018
Next Scheduled EDR Contact: 05/07/2018
Data Release Frequency: Varies

INDIAN UST R5: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 5 (Michigan, Minnesota and Wisconsin and Tribal Nations).

Date of Government Version: 04/26/2017
Date Data Arrived at EDR: 07/27/2017
Date Made Active in Reports: 10/06/2017
Number of Days to Update: 71

Source: EPA Region 5
Telephone: 312-886-6136
Last EDR Contact: 01/23/2018
Next Scheduled EDR Contact: 05/07/2018
Data Release Frequency: Varies

INDIAN UST R9: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 9 (Arizona, California, Hawaii, Nevada, the Pacific Islands, and Tribal Nations).

Date of Government Version: 04/13/2017
Date Data Arrived at EDR: 07/27/2017
Date Made Active in Reports: 10/13/2017
Number of Days to Update: 78

Source: EPA Region 9
Telephone: 415-972-3368
Last EDR Contact: 01/23/2018
Next Scheduled EDR Contact: 05/07/2018
Data Release Frequency: Varies

State and tribal institutional control / engineering control registries

INST CONTROL: No Further Action Sites With Land Use Restrictions Monitoring

A land use restricted site is a property where there are limits or requirements on future use of the property due to varying levels of cleanup possible, practical, or necessary at the site.

Date of Government Version: 12/01/2017
Date Data Arrived at EDR: 12/13/2017
Date Made Active in Reports: 01/05/2018
Number of Days to Update: 23

Source: Department of Environment, Health and Natural Resources
Telephone: 919-508-8400
Last EDR Contact: 03/15/2018
Next Scheduled EDR Contact: 06/25/2018
Data Release Frequency: Quarterly

State and tribal voluntary cleanup sites

VCP: Responsible Party Voluntary Action Sites

Responsible Party Voluntary Action site locations.

Date of Government Version: 12/01/2017
Date Data Arrived at EDR: 12/13/2017
Date Made Active in Reports: 01/05/2018
Number of Days to Update: 23

Source: Department of Environment and Natural Resources
Telephone: 919-508-8400
Last EDR Contact: 03/15/2018
Next Scheduled EDR Contact: 06/25/2018
Data Release Frequency: Quarterly

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

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	Source: EPA, Region 1
Date Data Arrived at EDR: 09/29/2015	Telephone: 617-918-1102
Date Made Active in Reports: 02/18/2016	Last EDR Contact: 03/21/2018
Number of Days to Update: 142	Next Scheduled EDR Contact: 07/09/2018
	Data Release Frequency: Varies

INDIAN VCP R7: Voluntary Cleanup Priority Listing

A listing of voluntary cleanup priority sites located on Indian Land located in Region 7.

Date of Government Version: 03/20/2008	Source: EPA, Region 7
Date Data Arrived at EDR: 04/22/2008	Telephone: 913-551-7365
Date Made Active in Reports: 05/19/2008	Last EDR Contact: 04/20/2009
Number of Days to Update: 27	Next Scheduled EDR Contact: 07/20/2009
	Data Release Frequency: Varies

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 liability control.

Date of Government Version: 12/01/2017	Source: Department of Environment and Natural Resources
Date Data Arrived at EDR: 01/03/2018	Telephone: 919-733-4996
Date Made Active in Reports: 03/01/2018	Last EDR Contact: 04/05/2018
Number of Days to Update: 57	Next Scheduled EDR Contact: 07/16/2018
	Data Release Frequency: Quarterly

ADDITIONAL ENVIRONMENTAL RECORDS

Local Brownfield lists

US BROWNFIELDS: A Listing of Brownfields Sites

Brownfields are real property, the expansion, redevelopment, or reuse of which may be complicated by the presence or potential presence of a hazardous substance, pollutant, or contaminant. Cleaning up and reinvesting in these properties takes development pressures off of undeveloped, open land, and both improves and protects the environment. Assessment, Cleanup and Redevelopment Exchange System (ACRES) stores information reported by EPA Brownfields grant recipients on brownfields properties assessed or cleaned up with grant funding as well as information on Targeted Brownfields Assessments performed by EPA Regions. A listing of ACRES Brownfield sites is obtained from Cleanups in My Community. Cleanups in My Community provides information on Brownfields properties for which information is reported back to EPA, as well as areas served by Brownfields grant programs.

Date of Government Version: 01/19/2018	Source: Environmental Protection Agency
Date Data Arrived at EDR: 01/19/2018	Telephone: 202-566-2777
Date Made Active in Reports: 02/09/2018	Last EDR Contact: 03/21/2018
Number of Days to Update: 21	Next Scheduled EDR Contact: 07/02/2018
	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: 08/18/2017	Source: Department of Environment & Natural Resources
Date Data Arrived at EDR: 08/22/2017	Telephone: 919-707-8137
Date Made Active in Reports: 09/25/2017	Last EDR Contact: 01/29/2018
Number of Days to Update: 34	Next Scheduled EDR Contact: 05/14/2018
	Data Release Frequency: Varies

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

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: 01/30/2018
Next Scheduled EDR Contact: 05/14/2018
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: 01/22/2018
Next Scheduled EDR Contact: 05/07/2018
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 Services, Indian Health Service
Telephone: 301-443-1452
Last EDR Contact: 02/02/2018
Next Scheduled EDR Contact: 05/14/2018
Data Release Frequency: Varies

Local Lists of Hazardous waste / Contaminated Sites

US HIST CDL: National Clandestine Laboratory Register

A listing of clandestine drug lab locations that have been removed from the DEAs National Clandestine Laboratory Register.

Date of Government Version: 01/19/2018
Date Data Arrived at EDR: 01/24/2018
Date Made Active in Reports: 02/09/2018
Number of Days to Update: 16

Source: Drug Enforcement Administration
Telephone: 202-307-1000
Last EDR Contact: 02/27/2018
Next Scheduled EDR Contact: 06/11/2018
Data Release Frequency: No Update Planned

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

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: 01/09/2018	Source: Drug Enforcement Administration
Date Data Arrived at EDR: 01/24/2018	Telephone: 202-307-1000
Date Made Active in Reports: 02/09/2018	Last EDR Contact: 02/27/2018
Number of Days to Update: 16	Next Scheduled EDR Contact: 06/11/2018
	Data Release Frequency: Quarterly

Local Land Records

LIENS 2: CERCLA Lien Information

A Federal CERCLA ("Superfund") lien can exist by operation of law at any site or property at which EPA has spent Superfund monies. These monies are spent to investigate and address releases and threatened releases of contamination. CERCLIS provides information as to the identity of these sites and properties.

Date of Government Version: 12/11/2017	Source: Environmental Protection Agency
Date Data Arrived at EDR: 12/22/2017	Telephone: 202-564-6023
Date Made Active in Reports: 01/12/2018	Last EDR Contact: 02/06/2018
Number of Days to Update: 21	Next Scheduled EDR Contact: 05/21/2018
	Data Release Frequency: Semi-Annually

Records of Emergency Release Reports

HMIRS: Hazardous Materials Information Reporting System

Hazardous Materials Incident Report System. HMIRS contains hazardous material spill incidents reported to DOT.

Date of Government Version: 01/19/2018	Source: U.S. Department of Transportation
Date Data Arrived at EDR: 01/19/2018	Telephone: 202-366-4555
Date Made Active in Reports: 03/23/2018	Last EDR Contact: 03/27/2018
Number of Days to Update: 63	Next Scheduled EDR Contact: 07/09/2018
	Data Release Frequency: Quarterly

SPILLS: Spills Incident Listing

A listing spills, hazardous material releases, sanitary sewer overflows, wastewater treatment plant bypasses and upsets, citizen complaints, and any other environmental emergency calls reported to the agency.

Date of Government Version: 12/13/2017	Source: Department of Environment & Natural Resources
Date Data Arrived at EDR: 12/14/2017	Telephone: 919-807-6308
Date Made Active in Reports: 01/05/2018	Last EDR Contact: 03/07/2018
Number of Days to Update: 22	Next Scheduled EDR Contact: 06/25/2018
	Data Release Frequency: Quarterly

IMD: Incident Management Database

Groundwater and/or soil contamination incidents

Date of Government Version: 07/21/2006	Source: Department of Environment and Natural Resources
Date Data Arrived at EDR: 08/01/2006	Telephone: 919-733-3221
Date Made Active in Reports: 08/23/2006	Last EDR Contact: 07/01/2011
Number of Days to Update: 22	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.

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

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: 12/11/2017
Date Data Arrived at EDR: 12/26/2017
Date Made Active in Reports: 02/09/2018
Number of Days to Update: 45

Source: Environmental Protection Agency
Telephone: (404) 562-8651
Last EDR Contact: 03/28/2018
Next Scheduled EDR Contact: 07/09/2018
Data Release Frequency: Quarterly

FUDS: Formerly Used Defense Sites

The listing includes locations of Formerly Used Defense Sites properties where the US Army Corps of Engineers is actively working or will take necessary cleanup actions.

Date of Government Version: 01/31/2015
Date Data Arrived at EDR: 07/08/2015
Date Made Active in Reports: 10/13/2015
Number of Days to Update: 97

Source: U.S. Army Corps of Engineers
Telephone: 202-528-4285
Last EDR Contact: 02/21/2018
Next Scheduled EDR Contact: 06/04/2018
Data Release Frequency: Varies

DOD: Department of Defense Sites

This data set consists of federally owned or administered lands, administered by the Department of Defense, that have any area equal to or greater than 640 acres of the United States, Puerto Rico, and the U.S. Virgin Islands.

Date of Government Version: 12/31/2005
Date Data Arrived at EDR: 11/10/2006
Date Made Active in Reports: 01/11/2007
Number of Days to Update: 62

Source: USGS
Telephone: 888-275-8747
Last EDR Contact: 10/13/2017
Next Scheduled EDR Contact: 01/22/2018
Data Release Frequency: Semi-Annually

FEDLAND: Federal and Indian Lands

Federally and Indian administrated lands of the United States. Lands included are administrated by: Army Corps of Engineers, Bureau of Reclamation, National Wild and Scenic River, National Wildlife Refuge, Public Domain Land, Wilderness, Wilderness Study Area, Wildlife Management Area, Bureau of Indian Affairs, Bureau of Land Management, Department of Justice, Forest Service, Fish and Wildlife Service, National Park Service.

Date of Government Version: 12/31/2005
Date Data Arrived at EDR: 02/06/2006
Date Made Active in Reports: 01/11/2007
Number of Days to Update: 339

Source: U.S. Geological Survey
Telephone: 888-275-8747
Last EDR Contact: 10/11/2017
Next Scheduled EDR Contact: 01/22/2018
Data Release Frequency: N/A

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

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	Source: Environmental Protection Agency
Date Data Arrived at EDR: 02/03/2017	Telephone: 615-532-8599
Date Made Active in Reports: 04/07/2017	Last EDR Contact: 02/16/2018
Number of Days to Update: 63	Next Scheduled EDR Contact: 05/28/2018
	Data Release Frequency: Varies

US FIN ASSUR: Financial Assurance Information

All owners and operators of facilities that treat, store, or dispose of hazardous waste are required to provide proof that they will have sufficient funds to pay for the clean up, closure, and post-closure care of their facilities.

Date of Government Version: 01/11/2018	Source: Environmental Protection Agency
Date Data Arrived at EDR: 01/19/2018	Telephone: 202-566-1917
Date Made Active in Reports: 03/02/2018	Last EDR Contact: 03/27/2018
Number of Days to Update: 42	Next Scheduled EDR Contact: 07/09/2018
	Data Release Frequency: Quarterly

EPA WATCH LIST: EPA WATCH LIST

EPA maintains a "Watch List" to facilitate dialogue between EPA, state and local environmental agencies on enforcement matters relating to facilities with alleged violations identified as either significant or high priority. Being on the Watch List does not mean that the facility has actually violated the law only that an investigation by EPA or a state or local environmental agency has led those organizations to allege that an unproven violation has in fact occurred. Being on the Watch List does not represent a higher level of concern regarding the alleged violations that were detected, but instead indicates cases requiring additional dialogue between EPA, state and local agencies - primarily because of the length of time the alleged violation has gone unaddressed or unresolved.

Date of Government Version: 08/30/2013	Source: Environmental Protection Agency
Date Data Arrived at EDR: 03/21/2014	Telephone: 617-520-3000
Date Made Active in Reports: 06/17/2014	Last EDR Contact: 01/31/2018
Number of Days to Update: 88	Next Scheduled EDR Contact: 05/21/2018
	Data Release Frequency: Quarterly

2020 COR ACTION: 2020 Corrective Action Program List

The EPA has set ambitious goals for the RCRA Corrective Action program by creating the 2020 Corrective Action Universe. This RCRA cleanup baseline includes facilities expected to need corrective action. The 2020 universe contains a wide variety of sites. Some properties are heavily contaminated while others were contaminated but have since been cleaned up. Still others have not been fully investigated yet, and may require little or no remediation. Inclusion in the 2020 Universe does not necessarily imply failure on the part of a facility to meet its RCRA obligations.

Date of Government Version: 04/22/2013	Source: Environmental Protection Agency
Date Data Arrived at EDR: 03/03/2015	Telephone: 703-308-4044
Date Made Active in Reports: 03/09/2015	Last EDR Contact: 02/08/2018
Number of Days to Update: 6	Next Scheduled EDR Contact: 05/21/2018
	Data Release Frequency: Varies

TSCA: Toxic Substances Control Act

Toxic Substances Control Act. TSCA identifies manufacturers and importers of chemical substances included on the TSCA Chemical Substance Inventory list. It includes data on the production volume of these substances by plant site.

Date of Government Version: 12/31/2016	Source: EPA
Date Data Arrived at EDR: 06/21/2017	Telephone: 202-260-5521
Date Made Active in Reports: 01/05/2018	Last EDR Contact: 03/23/2018
Number of Days to Update: 198	Next Scheduled EDR Contact: 07/02/2018
	Data Release Frequency: Every 4 Years

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

TRIS: Toxic Chemical Release Inventory System

Toxic Release Inventory System. TRIS identifies facilities which release toxic chemicals to the air, water and land in reportable quantities under SARA Title III Section 313.

Date of Government Version: 12/31/2016	Source: EPA
Date Data Arrived at EDR: 01/10/2018	Telephone: 202-566-0250
Date Made Active in Reports: 01/12/2018	Last EDR Contact: 02/23/2018
Number of Days to Update: 2	Next Scheduled EDR Contact: 06/04/2018
	Data Release Frequency: Annually

SSTS: Section 7 Tracking Systems

Section 7 of the Federal Insecticide, Fungicide and Rodenticide Act, as amended (92 Stat. 829) requires all registered pesticide-producing establishments to submit a report to the Environmental Protection Agency by March 1st each year. Each establishment must report the types and amounts of pesticides, active ingredients and devices being produced, and those having been produced and sold or distributed in the past year.

Date of Government Version: 12/31/2009	Source: EPA
Date Data Arrived at EDR: 12/10/2010	Telephone: 202-564-4203
Date Made Active in Reports: 02/25/2011	Last EDR Contact: 04/09/2018
Number of Days to Update: 77	Next Scheduled EDR Contact: 05/07/2018
	Data Release Frequency: Annually

ROD: Records Of Decision

Record of Decision. ROD documents mandate a permanent remedy at an NPL (Superfund) site containing technical and health information to aid in the cleanup.

Date of Government Version: 12/11/2017	Source: EPA
Date Data Arrived at EDR: 12/22/2017	Telephone: 703-416-0223
Date Made Active in Reports: 01/12/2018	Last EDR Contact: 03/09/2018
Number of Days to Update: 21	Next Scheduled EDR Contact: 06/18/2018
	Data Release Frequency: Annually

RMP: Risk Management Plans

When Congress passed the Clean Air Act Amendments of 1990, it required EPA to publish regulations and guidance for chemical accident prevention at facilities using extremely hazardous substances. The Risk Management Program Rule (RMP Rule) was written to implement Section 112(r) of these amendments. The rule, which built upon existing industry codes and standards, requires companies of all sizes that use certain flammable and toxic substances to develop a Risk Management Program, which includes a(n): Hazard assessment that details the potential effects of an accidental release, an accident history of the last five years, and an evaluation of worst-case and alternative accidental releases; Prevention program that includes safety precautions and maintenance, monitoring, and employee training measures; and Emergency response program that spells out emergency health care, employee training measures and procedures for informing the public and response agencies (e.g the fire department) should an accident occur.

Date of Government Version: 11/02/2017	Source: Environmental Protection Agency
Date Data Arrived at EDR: 11/17/2017	Telephone: 202-564-8600
Date Made Active in Reports: 12/08/2017	Last EDR Contact: 01/19/2018
Number of Days to Update: 21	Next Scheduled EDR Contact: 05/07/2018
	Data Release Frequency: Varies

RAATS: RCRA Administrative Action Tracking System

RCRA Administration Action Tracking System. RAATS contains records based on enforcement actions issued under RCRA pertaining to major violators and includes administrative and civil actions brought by the EPA. For administration actions after September 30, 1995, data entry in the RAATS database was discontinued. EPA will retain a copy of the database for historical records. It was necessary to terminate RAATS because a decrease in agency resources made it impossible to continue to update the information contained in the database.

Date of Government Version: 04/17/1995	Source: EPA
Date Data Arrived at EDR: 07/03/1995	Telephone: 202-564-4104
Date Made Active in Reports: 08/07/1995	Last EDR Contact: 06/02/2008
Number of Days to Update: 35	Next Scheduled EDR Contact: 09/01/2008
	Data Release Frequency: No Update Planned

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

PRP: Potentially Responsible Parties

A listing of verified Potentially Responsible Parties

Date of Government Version: 10/25/2013	Source: EPA
Date Data Arrived at EDR: 10/17/2014	Telephone: 202-564-6023
Date Made Active in Reports: 10/20/2014	Last EDR Contact: 02/06/2018
Number of Days to Update: 3	Next Scheduled EDR Contact: 05/21/2018
	Data Release Frequency: Quarterly

PADS: PCB Activity Database System

PCB Activity Database. PADS Identifies generators, transporters, commercial storers and/or brokers and disposers of PCB's who are required to notify the EPA of such activities.

Date of Government Version: 06/01/2017	Source: EPA
Date Data Arrived at EDR: 06/09/2017	Telephone: 202-566-0500
Date Made Active in Reports: 10/13/2017	Last EDR Contact: 01/12/2018
Number of Days to Update: 126	Next Scheduled EDR Contact: 04/23/2018
	Data Release Frequency: Annually

ICIS: Integrated Compliance Information System

The Integrated Compliance Information System (ICIS) supports the information needs of the national enforcement and compliance program as well as the unique needs of the National Pollutant Discharge Elimination System (NPDES) program.

Date of Government Version: 11/18/2016	Source: Environmental Protection Agency
Date Data Arrived at EDR: 11/23/2016	Telephone: 202-564-2501
Date Made Active in Reports: 02/10/2017	Last EDR Contact: 04/09/2018
Number of Days to Update: 79	Next Scheduled EDR Contact: 07/23/2018
	Data Release Frequency: Quarterly

FTTS: FIFRA/ TSCA Tracking System - FIFRA (Federal Insecticide, Fungicide, & Rodenticide Act)/TSCA (Toxic Substances Control Act)

FTTS tracks administrative cases and pesticide enforcement actions and compliance activities related to FIFRA, TSCA and EPCRA (Emergency Planning and Community Right-to-Know Act). To maintain currency, EDR contacts the Agency on a quarterly basis.

Date of Government Version: 04/09/2009	Source: EPA/Office of Prevention, Pesticides and Toxic Substances
Date Data Arrived at EDR: 04/16/2009	Telephone: 202-566-1667
Date Made Active in Reports: 05/11/2009	Last EDR Contact: 08/18/2017
Number of Days to Update: 25	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	Source: EPA
Date Data Arrived at EDR: 04/16/2009	Telephone: 202-566-1667
Date Made Active in Reports: 05/11/2009	Last EDR Contact: 08/18/2017
Number of Days to Update: 25	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	Source: Nuclear Regulatory Commission
Date Data Arrived at EDR: 09/08/2016	Telephone: 301-415-7169
Date Made Active in Reports: 10/21/2016	Last EDR Contact: 01/19/2018
Number of Days to Update: 43	Next Scheduled EDR Contact: 05/21/2018
	Data Release Frequency: Quarterly

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

COAL ASH DOE: Steam-Electric Plant Operation Data

A listing of power plants that store ash in surface ponds.

Date of Government Version: 12/31/2005	Source: Department of Energy
Date Data Arrived at EDR: 08/07/2009	Telephone: 202-586-8719
Date Made Active in Reports: 10/22/2009	Last EDR Contact: 03/09/2018
Number of Days to Update: 76	Next Scheduled EDR Contact: 06/18/2018
	Data Release Frequency: Varies

COAL ASH EPA: Coal Combustion Residues Surface Impoundments List

A listing of coal combustion residues surface impoundments with high hazard potential ratings.

Date of Government Version: 07/01/2014	Source: Environmental Protection Agency
Date Data Arrived at EDR: 09/10/2014	Telephone: N/A
Date Made Active in Reports: 10/20/2014	Last EDR Contact: 03/06/2018
Number of Days to Update: 40	Next Scheduled EDR Contact: 06/18/2018
	Data Release Frequency: Varies

PCB TRANSFORMER: PCB Transformer Registration Database

The database of PCB transformer registrations that includes all PCB registration submittals.

Date of Government Version: 05/24/2017	Source: Environmental Protection Agency
Date Data Arrived at EDR: 11/30/2017	Telephone: 202-566-0517
Date Made Active in Reports: 12/15/2017	Last EDR Contact: 01/26/2018
Number of Days to Update: 15	Next Scheduled EDR Contact: 05/07/2018
	Data Release Frequency: Varies

RADINFO: Radiation Information Database

The Radiation Information Database (RADINFO) contains information about facilities that are regulated by U.S. Environmental Protection Agency (EPA) regulations for radiation and radioactivity.

Date of Government Version: 10/02/2017	Source: Environmental Protection Agency
Date Data Arrived at EDR: 10/05/2017	Telephone: 202-343-9775
Date Made Active in Reports: 10/13/2017	Last EDR Contact: 04/05/2018
Number of Days to Update: 8	Next Scheduled EDR Contact: 07/16/2018
	Data Release Frequency: Quarterly

HIST FTTS: FIFRA/TSCA Tracking System Administrative Case Listing

A complete administrative case listing from the FIFRA/TSCA Tracking System (FTTS) for all ten EPA regions. The information was obtained from the National Compliance Database (NCDB). NCDB supports the implementation of FIFRA (Federal Insecticide, Fungicide, and Rodenticide Act) and TSCA (Toxic Substances Control Act). Some EPA regions are now closing out records. Because of that, and the fact that some EPA regions are not providing EPA Headquarters with updated records, it was decided to create a HIST FTTS database. It included records that may not be included in the newer FTTS database updates. This database is no longer updated.

Date of Government Version: 10/19/2006	Source: Environmental Protection Agency
Date Data Arrived at EDR: 03/01/2007	Telephone: 202-564-2501
Date Made Active in Reports: 04/10/2007	Last EDR Contact: 12/17/2007
Number of Days to Update: 40	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.

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

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 Transportation, 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 Transportation, Office of Pipeline Safety
Telephone: 202-366-4595
Last EDR Contact: 01/19/2018
Next Scheduled EDR Contact: 05/14/2018
Data Release Frequency: Varies

CONSENT: Superfund (CERCLA) Consent Decrees

Major legal settlements that establish responsibility and standards for cleanup at NPL (Superfund) sites. Released periodically by United States District Courts after settlement by parties to litigation matters.

Date of Government Version: 09/30/2017
Date Data Arrived at EDR: 11/10/2017
Date Made Active in Reports: 01/12/2018
Number of Days to Update: 63

Source: Department of Justice, Consent Decree Library
Telephone: Varies
Last EDR Contact: 04/06/2018
Next Scheduled EDR Contact: 07/02/2018
Data Release Frequency: Varies

BRS: Biennial Reporting System

The Biennial Reporting System is a national system administered by the EPA that collects data on the generation and management of hazardous waste. BRS captures detailed data from two groups: Large Quantity Generators (LQG) and Treatment, Storage, and Disposal Facilities.

Date of Government Version: 12/31/2015
Date Data Arrived at EDR: 02/22/2017
Date Made Active in Reports: 09/28/2017
Number of Days to Update: 218

Source: EPA/NTIS
Telephone: 800-424-9346
Last EDR Contact: 02/23/2018
Next Scheduled EDR Contact: 06/04/2018
Data Release Frequency: Biennially

INDIAN RESERV: Indian Reservations

This map layer portrays Indian administered lands of the United States that have any area equal to or greater than 640 acres.

Date of Government Version: 12/31/2014
Date Data Arrived at EDR: 07/14/2015
Date Made Active in Reports: 01/10/2017
Number of Days to Update: 546

Source: USGS
Telephone: 202-208-3710
Last EDR Contact: 01/09/2018
Next Scheduled EDR Contact: 04/23/2018
Data Release Frequency: Semi-Annually

FUSRAP: Formerly Utilized Sites Remedial Action Program

DOE established the Formerly Utilized Sites Remedial Action Program (FUSRAP) in 1974 to remediate sites where radioactive contamination remained from Manhattan Project and early U.S. Atomic Energy Commission (AEC) operations.

Date of Government Version: 12/23/2016
Date Data Arrived at EDR: 12/27/2016
Date Made Active in Reports: 02/17/2017
Number of Days to Update: 52

Source: Department of Energy
Telephone: 202-586-3559
Last EDR Contact: 01/19/2018
Next Scheduled EDR Contact: 05/21/2018
Data Release Frequency: Varies

UMTRA: Uranium Mill Tailings Sites

Uranium ore was mined by private companies for federal government use in national defense programs. When the mills shut down, large piles of the sand-like material (mill tailings) remain after uranium has been extracted from the ore. Levels of human exposure to radioactive materials from the piles are low; however, in some cases tailings were used as construction materials before the potential health hazards of the tailings were recognized.

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

Date of Government Version: 06/23/2017
Date Data Arrived at EDR: 10/11/2017
Date Made Active in Reports: 11/03/2017
Number of Days to Update: 23

Source: Department of Energy
Telephone: 505-845-0011
Last EDR Contact: 02/23/2018
Next Scheduled EDR Contact: 06/04/2018
Data Release Frequency: Varies

LEAD SMELTER 1: Lead Smelter Sites

A listing of former lead smelter site locations.

Date of Government Version: 01/09/2018
Date Data Arrived at EDR: 02/06/2018
Date Made Active in Reports: 03/02/2018
Number of Days to Update: 24

Source: Environmental Protection Agency
Telephone: 703-603-8787
Last EDR Contact: 04/06/2018
Next Scheduled EDR Contact: 07/16/2018
Data Release Frequency: Varies

LEAD SMELTER 2: Lead Smelter Sites

A list of several hundred sites in the U.S. where secondary lead smelting was done from 1931 and 1964. These sites may pose a threat to public health through ingestion or inhalation of contaminated soil or dust

Date of Government Version: 04/05/2001
Date Data Arrived at EDR: 10/27/2010
Date Made Active in Reports: 12/02/2010
Number of Days to Update: 36

Source: American Journal of Public Health
Telephone: 703-305-6451
Last EDR Contact: 12/02/2009
Next Scheduled EDR Contact: N/A
Data Release Frequency: No Update Planned

US AIRS (AFS): Aerometric Information Retrieval System Facility Subsystem (AFS)

The database is a sub-system of Aerometric Information Retrieval System (AIRS). AFS contains compliance data on air pollution point sources regulated by the U.S. EPA and/or state and local air regulatory agencies. This information comes from source reports by various stationary sources of air pollution, such as electric power plants, steel mills, factories, and universities, and provides information about the air pollutants they produce. Action, air program, air program pollutant, and general level plant data. It is used to track emissions and compliance data from industrial plants.

Date of Government Version: 10/12/2016
Date Data Arrived at EDR: 10/26/2016
Date Made Active in Reports: 02/03/2017
Number of Days to Update: 100

Source: EPA
Telephone: 202-564-2496
Last EDR Contact: 09/26/2017
Next Scheduled EDR Contact: 01/08/2018
Data Release Frequency: Annually

US AIRS MINOR: Air Facility System Data

A listing of minor source facilities.

Date of Government Version: 10/12/2016
Date Data Arrived at EDR: 10/26/2016
Date Made Active in Reports: 02/03/2017
Number of Days to Update: 100

Source: EPA
Telephone: 202-564-2496
Last EDR Contact: 09/26/2017
Next Scheduled EDR Contact: 01/08/2018
Data Release Frequency: Annually

US MINES: Mines Master Index File

Contains all mine identification numbers issued for mines active or opened since 1971. The data also includes violation information.

Date of Government Version: 10/29/2017
Date Data Arrived at EDR: 11/28/2017
Date Made Active in Reports: 01/12/2018
Number of Days to Update: 45

Source: Department of Labor, Mine Safety and Health Administration
Telephone: 303-231-5959
Last EDR Contact: 02/28/2018
Next Scheduled EDR Contact: 06/11/2018
Data Release Frequency: Semi-Annually

US MINES 2: Ferrous and Nonferrous Metal Mines Database Listing

This map layer includes ferrous (ferrous metal mines are facilities that extract ferrous metals, such as iron ore or molybdenum) and nonferrous (Nonferrous metal mines are facilities that extract nonferrous metals, such as gold, silver, copper, zinc, and lead) metal mines in the United States.

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

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: 03/02/2018
Next Scheduled EDR Contact: 06/11/2018
Data Release Frequency: Varies

US MINES 3: Active Mines & Mineral Plants Database Listing

Active Mines and Mineral Processing Plant operations for commodities monitored by the Minerals Information Team of the USGS.

Date of Government Version: 04/14/2011
Date Data Arrived at EDR: 06/08/2011
Date Made Active in Reports: 09/13/2011
Number of Days to Update: 97

Source: USGS
Telephone: 703-648-7709
Last EDR Contact: 03/02/2018
Next Scheduled EDR Contact: 06/11/2018
Data Release Frequency: Varies

ABANDONED MINES: Abandoned Mines

An inventory of land and water impacted by past mining (primarily coal mining) is maintained by OSMRE to provide information needed to implement the Surface Mining Control and Reclamation Act of 1977 (SMCRA). The inventory contains information on the location, type, and extent of AML impacts, as well as, information on the cost associated with the reclamation of those problems. The inventory is based upon field surveys by State, Tribal, and OSMRE program officials. It is dynamic to the extent that it is modified as new problems are identified and existing problems are reclaimed.

Date of Government Version: 12/20/2017
Date Data Arrived at EDR: 12/21/2017
Date Made Active in Reports: 03/23/2018
Number of Days to Update: 92

Source: Department of Interior
Telephone: 202-208-2609
Last EDR Contact: 03/07/2018
Next Scheduled EDR Contact: 06/25/2018
Data Release Frequency: Quarterly

FINDS: Facility Index System/Facility Registry System

Facility Index System. FINDS contains both facility information and 'pointers' to other sources that contain more detail. EDR includes the following FINDS databases in this report: PCS (Permit Compliance System), AIRS (Aerometric Information Retrieval System), DOCKET (Enforcement Docket used to manage and track information on civil judicial enforcement cases for all environmental statutes), FURS (Federal Underground Injection Control), C-DOCKET (Criminal Docket System used to track criminal enforcement actions for all environmental statutes), FFIS (Federal Facilities Information System), STATE (State Environmental Laws and Statutes), and PADS (PCB Activity Data System).

Date of Government Version: 02/21/2018
Date Data Arrived at EDR: 02/23/2018
Date Made Active in Reports: 03/23/2018
Number of Days to Update: 28

Source: EPA
Telephone: (404) 562-9900
Last EDR Contact: 02/23/2018
Next Scheduled EDR Contact: 06/18/2018
Data Release Frequency: Quarterly

ECHO: Enforcement & Compliance History Information

ECHO provides integrated compliance and enforcement information for about 800,000 regulated facilities nationwide.

Date of Government Version: 01/13/2018
Date Data Arrived at EDR: 01/19/2018
Date Made Active in Reports: 03/02/2018
Number of Days to Update: 42

Source: Environmental Protection Agency
Telephone: 202-564-2280
Last EDR Contact: 03/07/2018
Next Scheduled EDR Contact: 06/18/2018
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: 06/27/2017
Date Data Arrived at EDR: 11/21/2017
Date Made Active in Reports: 01/12/2018
Number of Days to Update: 52

Source: Environmental Protection Agency
Telephone: 202-564-0527
Last EDR Contact: 03/02/2018
Next Scheduled EDR Contact: 06/11/2018
Data Release Frequency: Varies

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

UXO: Unexploded Ordnance Sites

A listing of unexploded ordnance site locations

Date of Government Version: 09/30/2016	Source: Department of Defense
Date Data Arrived at EDR: 10/31/2017	Telephone: 703-704-1564
Date Made Active in Reports: 01/12/2018	Last EDR Contact: 01/02/2018
Number of Days to Update: 73	Next Scheduled EDR Contact: 04/30/2018
	Data Release Frequency: Varies

FUELS PROGRAM: EPA Fuels Program Registered Listing

This listing includes facilities that are registered under the Part 80 (Code of Federal Regulations) EPA Fuels Programs. All companies now are required to submit new and updated registrations.

Date of Government Version: 02/20/2018	Source: EPA
Date Data Arrived at EDR: 02/21/2018	Telephone: 800-385-6164
Date Made Active in Reports: 03/23/2018	Last EDR Contact: 02/21/2018
Number of Days to Update: 30	Next Scheduled EDR Contact: 06/04/2018
	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	Source: Department of Environment & Natural Resources
Date Data Arrived at EDR: 02/23/2016	Telephone: 919-807-6359
Date Made Active in Reports: 05/18/2016	Last EDR Contact: 03/01/2018
Number of Days to Update: 85	Next Scheduled EDR Contact: 05/14/2018
	Data Release Frequency: Varies

DRYCLEANERS: Drycleaning Sites

Potential and known drycleaning sites, active and abandoned, that the Drycleaning Solvent Cleanup Program has knowledge of and entered into this database.

Date of Government Version: 04/04/2017	Source: Department of Environment & Natural Resources
Date Data Arrived at EDR: 06/20/2017	Telephone: 919-508-8400
Date Made Active in Reports: 08/10/2017	Last EDR Contact: 03/21/2018
Number of Days to Update: 51	Next Scheduled EDR Contact: 07/02/2018
	Data Release Frequency: Varies

Financial Assurance 1: Financial Assurance Information Listing

A listing of financial assurance information for underground storage tank facilities. Financial assurance is intended to ensure that resources are available to pay for the cost of closure, post-closure care, and corrective measures if the owner or operator of a regulated facility is unable or unwilling to pay.

Date of Government Version: 02/02/2018	Source: Department of Environment & Natural Resources
Date Data Arrived at EDR: 02/07/2018	Telephone: 919-733-1322
Date Made Active in Reports: 03/01/2018	Last EDR Contact: 02/07/2018
Number of Days to Update: 22	Next Scheduled EDR Contact: 05/21/2018
	Data Release Frequency: Quarterly

Financial Assurance 2: Financial Assurance Information Listing

Information for solid waste facilities. Financial assurance is intended to ensure that resources are available to pay for the cost of closure, post-closure care, and corrective measures if the owner or operator of a regulated facility is unable or unwilling to pay.

Date of Government Version: 10/02/2012	Source: Department of Environmental & Natural Resources
Date Data Arrived at EDR: 10/03/2012	Telephone: 919-508-8496
Date Made Active in Reports: 10/26/2012	Last EDR Contact: 03/21/2018
Number of Days to Update: 23	Next Scheduled EDR Contact: 07/09/2018
	Data Release Frequency: Varies

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

Financial Assurance 3: Financial Assurance Information Hazardous waste financial assurance information.

Date of Government Version: 09/11/2017	Source: Department of Environment & Natural Resources
Date Data Arrived at EDR: 09/12/2017	Telephone: 919-707-8222
Date Made Active in Reports: 10/11/2017	Last EDR Contact: 03/07/2018
Number of Days to Update: 29	Next Scheduled EDR Contact: 06/25/2018
	Data Release Frequency: Varies

NPDES: NPDES Facility Location Listing

General information regarding NPDES(National Pollutant Discharge Elimination System) permits.

Date of Government Version: 01/01/2018	Source: Department of Environment & Natural Resources
Date Data Arrived at EDR: 01/31/2018	Telephone: 919-733-7015
Date Made Active in Reports: 03/01/2018	Last EDR Contact: 01/31/2018
Number of Days to Update: 29	Next Scheduled EDR Contact: 05/14/2018
	Data Release Frequency: Varies

UIC: Underground Injection Wells Listing

A listing of uncerground injection wells locations.

Date of Government Version: 12/05/2017	Source: Department of Environment & Natural Resources
Date Data Arrived at EDR: 12/06/2017	Telephone: 919-807-6412
Date Made Active in Reports: 01/05/2018	Last EDR Contact: 03/01/2018
Number of Days to Update: 30	Next Scheduled EDR Contact: 06/18/2018
	Data Release Frequency: Quarterly

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	Source: EDR, Inc.
Date Data Arrived at EDR: N/A	Telephone: N/A
Date Made Active in Reports: N/A	Last EDR Contact: N/A
Number of Days to Update: N/A	Next Scheduled EDR Contact: N/A
	Data Release Frequency: No Update Planned

EDR Hist Auto: EDR Exclusive Historical Auto Stations

EDR has searched selected national collections of business directories and has collected listings of potential gas station/filling station/service station sites that were available to EDR researchers. EDR's review was limited to those categories of sources that might, in EDR's opinion, include gas station/filling station/service station establishments. The categories reviewed included, but were not limited to gas, gas station, gasoline station, filling station, auto, automobile repair, auto service station, service station, etc. This database falls within a category of information EDR classifies as "High Risk Historical Records", or HRHR. EDR's HRHR effort presents unique and sometimes proprietary data about past sites and operations that typically create environmental concerns, but may not show up in current government records searches.

Date of Government Version: N/A	Source: EDR, Inc.
Date Data Arrived at EDR: N/A	Telephone: N/A
Date Made Active in Reports: N/A	Last EDR Contact: N/A
Number of Days to Update: N/A	Next Scheduled EDR Contact: N/A
	Data Release Frequency: Varies

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

EDR Hist Cleaner: EDR Exclusive Historical Cleaners

EDR has searched selected national collections of business directories and has collected listings of potential dry cleaner sites that were available to EDR researchers. EDR's review was limited to those categories of sources that might, in EDR's opinion, include dry cleaning establishments. The categories reviewed included, but were not limited to dry cleaners, cleaners, laundry, laundromat, cleaning/laundry, wash & dry etc. This database falls within a category of information EDR classifies as "High Risk Historical Records", or HRHR. EDR's HRHR effort presents unique and sometimes proprietary data about past sites and operations that typically create environmental concerns, but may not show up in current government records searches.

Date of Government Version: N/A	Source: EDR, Inc.
Date Data Arrived at EDR: N/A	Telephone: N/A
Date Made Active in Reports: N/A	Last EDR Contact: N/A
Number of Days to Update: 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	Source: Department of Environment, Health and Natural Resources
Date Data Arrived at EDR: 07/01/2013	Telephone: N/A
Date Made Active in Reports: 12/24/2013	Last EDR Contact: 06/01/2012
Number of Days to Update: 176	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	Source: Department of Environment, Health and Natural Resources
Date Data Arrived at EDR: 07/01/2013	Telephone: N/A
Date Made Active in Reports: 01/13/2014	Last EDR Contact: 06/01/2012
Number of Days to Update: 196	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	Source: Department of Environment, Health and Natural Resources
Date Data Arrived at EDR: 07/01/2013	Telephone: N/A
Date Made Active in Reports: 12/20/2013	Last EDR Contact: 06/01/2012
Number of Days to Update: 172	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.

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

CT MANIFEST: Hazardous Waste Manifest Data

Facility and manifest data. Manifest is a document that lists and tracks hazardous waste from the generator through transporters to a tsd facility.

Date of Government Version: 01/03/2018
Date Data Arrived at EDR: 02/14/2018
Date Made Active in Reports: 03/22/2018
Number of Days to Update: 36

Source: Department of Energy & Environmental Protection
Telephone: 860-424-3375
Last EDR Contact: 02/14/2018
Next Scheduled EDR Contact: 05/28/2018
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: 04/10/2018
Next Scheduled EDR Contact: 07/23/2018
Data Release Frequency: Annually

NY MANIFEST: Facility and Manifest Data

Manifest is a document that lists and tracks hazardous waste from the generator through transporters to a TSD facility.

Date of Government Version: 12/31/2017
Date Data Arrived at EDR: 01/31/2018
Date Made Active in Reports: 03/09/2018
Number of Days to Update: 37

Source: Department of Environmental Conservation
Telephone: 518-402-8651
Last EDR Contact: 01/31/2018
Next Scheduled EDR Contact: 05/14/2018
Data Release Frequency: Quarterly

PA MANIFEST: Manifest Information

Hazardous waste manifest information.

Date of Government Version: 12/31/2016
Date Data Arrived at EDR: 07/25/2017
Date Made Active in Reports: 09/25/2017
Number of Days to Update: 62

Source: Department of Environmental Protection
Telephone: 717-783-8990
Last EDR Contact: 01/16/2018
Next Scheduled EDR Contact: 04/30/2018
Data Release Frequency: Annually

RI MANIFEST: Manifest information

Hazardous waste manifest information

Date of Government Version: 12/31/2017
Date Data Arrived at EDR: 02/23/2018
Date Made Active in Reports: 04/09/2018
Number of Days to Update: 45

Source: Department of Environmental Management
Telephone: 401-222-2797
Last EDR Contact: 02/21/2018
Next Scheduled EDR Contact: 06/04/2018
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: 03/08/2018
Next Scheduled EDR Contact: 06/25/2018
Data Release Frequency: Annually

Oil/Gas Pipelines

Source: PennWell Corporation

Petroleum Bundle (Crude Oil, Refined Products, Petrochemicals, Gas Liquids (LPG/NGL), and Specialty Gases (Miscellaneous)) N = Natural Gas Bundle (Natural Gas, Gas Liquids (LPG/NGL), and Specialty Gases (Miscellaneous)). This map includes information copyrighted by PennWell Corporation. This information is provided on a best effort basis and PennWell Corporation does not guarantee its accuracy nor warrant its fitness for any particular purpose. Such information has been reprinted with the permission of PennWell.

Electric Power Transmission Line Data

Source: PennWell Corporation

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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

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HUBERT & CAROL'S STORE
OLD HIGHWAY 64
HAYESVILLE, NC

Inquiry Number:
April 13, 2018

EDR Site Report™



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TABLE OF CONTENTS

The EDR-Site Report™ is a comprehensive presentation of government filings on a facility identified in a search of federal, state and local environmental databases. The report is divided into three sections:

Section 1: Facility Summary Page 3

Summary of facility filings including a review of the following areas: waste management, waste disposal, multi-media issues, and Superfund liability.

Section 2: Facility Detail Reports Page 4

All available detailed information from databases where sites are identified.

Section 3: Databases and Update Information. Page 8

Name, source, update dates, contact phone number and description of each of the databases for this report.

Thank you for your business.
Please contact EDR at 1-800-352-0050
with any questions or comments.

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SECTION 1: FACILITY SUMMARY

FACILITY	FACILITY 1 HUBERT & CAROL'S STORE OLD HIGHWAY 64 HAYESVILLE, NC EDR ID #S105218746
AREA	
WASTE MANAGEMENT Facility generates hazardous waste (RCRA)	NO
Facility treats, stores, or disposes of hazardous waste on-site (RCRA/TSD)	NO
Facility has received Notices of Violations (RCRA/VIOL)	NO
Facility has been subject to RCRA administrative actions (RAATS)	NO
Facility has been subject to corrective actions (CORRACTS)	NO
Facility handles PCBs (PADS)	NO
Facility uses radioactive materials (MLTS)	NO
Facility is a FUSRAP Site	NO
Facility is a UXO Site	NO
Facility is a FUELS Site	NO
Facility is an DockHWC/ECHO Site	NO
Facility manages registered aboveground storage tanks (AST)	NO
Facility manages registered underground storage tanks (UST)	NO
Facility has reported leaking underground storage tank incidents (LUST)	NO
Facility has reported emergency releases to the soil (ERNS)	NO
Facility has reported hazardous material incidents to DOT (HMIRS)	NO
WASTE DISPOSAL Facility is a Superfund Site (NPL)	NO
Facility has a known or suspect abandoned, inactive or uncontrolled hazardous waste site (SEMS)	NO
Facility has a reported Superfund Lien on it (LIENS)	NO
Facility is listed as a state hazardous waste site (SHWS)	NO
Facility has disposed of solid waste on-site (SWF/LF)	NO
MULTIMEDIA Facility uses toxic chemicals and has notified EPA under SARA Title III, Section 313 (TRIS)	NO
Facility produces pesticides and has notified EPA under Section 7 of FIFRA (SSTS)	NO
Facility manufactures or imports toxic chemicals on the TSCA list (TSCA)	NO
Facility has inspections under FIFRA, TSCA or EPCRA (FTTS)	NO
Facility is listed in EPA's index system (FINDS)	NO
Facility is listed in other database records (OTHER)	YES - p4
POTENTIAL SUPERFUND LIABILITY Facility has a list of potentially responsible parties PRP	NO
TOTAL (YES)	1

SECTION 2: FACILITY DETAIL REPORTS

MULTIMEDIA

Facility is listed in other database records

DATABASE: Other Database Records (OTHER)

HUBERT & CAROL'S STORE
OLD HIGHWAY 64
HAYESVILLE, NC
EDR ID #S105218746

LUST TRUST:

Facility ID: 0-012477
Site ID: 11539
Site Note: Site closed
Site Eligible?: True
Commercial Find: 100% Commercial
Priority Rank: Not reported
REIM Type: Not reported
Cleanup Phase: Not reported
50% Reimbursement Amt Commercial Fund: Not reported
50% Reimbursement Check # Commercial Fund: Not reported
Final Reimbursement Amt Commercial Fund: Not reported
Final Reimbursement Check # Commercial Fund: Not reported
50% Reimbursement Amt Non-Commercial Fund: Not reported
50% Reimbursement Check # Non-Commercial Fund: Not reported
Final Reimbursement Amt Non-Commercial Fund: Not reported
Final Reimbursement Check # Non-Commercial Fund: Not reported

Date of Work (starting): Not reported
Date of Work (ending): Not reported
Owner ID Number: 944
Consultant ID Number: 0
Archived: False
CD Number: Not reported

Claim Id: 1
Claim Notes: THIS CLAIM WAS DELAYED IN ELIGIBILITY.

Owner/Consultant: OWNER
Company Name: Hackney Petroleum, Inc.
Name: Lisa Youngblood
Mailing Address: PO Box 50038
Mailing City,St,Zip: Knoxville, TN 379210038
Fed ID or SS Num: 0
Phone Number: 865-584-9600
REIM Type: Not reported
Cleanup Phase: Not reported
50% Reimbursement Amt Commercial Fund: Not reported
50% Reimbursement Check # Commercial Fund: Not reported
Final Reimbursement Amt Commercial Fund: Not reported
Final Reimbursement Check # Commercial Fund: Not reported
50% Reimbursement Amt Non-Commercial Fund: Not reported
50% Reimbursement Check # Non-Commercial Fund: Not reported
Final Reimbursement Amt Non-Commercial Fund: Not reported
Final Reimbursement Check # Non-Commercial Fund: Not reported

Date of Work (starting): Not reported
Date of Work (ending): Not reported
Owner ID Number: 944
Consultant ID Number: 0
Archived: False
CD Number: Not reported

Claim Id: 2
Claim Notes: THIS CLAIM CANNOT BE PROCESSED UNTIL PROOF OF PAYMENT IS RECIEVED.
ONCE POP IS RECEIVED CLAIM WILL BE PROCESSED.

Owner/Consultant: OWNER
Company Name: Hackney Petroleum, Inc.
Name: Lisa Youngblood
Mailing Address: PO Box 50038
Mailing City,St,Zip: Knoxville, TN 379210038
Fed ID or SS Num: 0
Phone Number: 865-584-9600
Reason for Editing Claim: cd
User Name: TammyB
Edit Date: 5/19/1998 9:29:32 AM
Reason for Editing Claim: cd
User Name: TammyB
Edit Date: 5/19/1998 9:30:14 AM
Deductable Amount: 20000
3rd Party Deductable Amt: 0
Sum 3rd Party Amt Applied: 0
Deductible Reason Code: 0
Reason Desc: Not reported
Unique number: 1153920

SECTION 2: FACILITY DETAIL REPORTS

...Continued...

Site name: Hubert & Carol's Store
Deductable Amount: 20000
Location: Claim Closed
Tract date: 1/30/1997 12:15:04 PM
Requested amount: 18375
Amount approved: 0
Final Reimbursement Check # Commercial Fund: Not reported
Final Reimbursement Amt Commercial Fund: Not reported
Final Reimbursement Amt Non-Commercial Fund: Not reported
Final Reimbursement Check # Non-Commercial Fund: Not reported
50% Reimbursement Amt Commercial Fund: Not reported
50% Reimbursement Amt Non-Commercial Fund: Not reported
50% Reimbursement Check # Commercial Fund: Not reported
50% Reimbursement Check # Non-Commercial Fund: Not reported
Unique number: 1153910
Site name: Hubert & Carol's Store
Deductable Amount: 20000
Location: Claim Closed
Tract date: 12/21/1994 12:00:20 PM
Requested amount: 35427.57
Amount approved: 17039.97
Final Reimbursement Check # Commercial Fund: Not reported
Final Reimbursement Amt Commercial Fund: Not reported
Final Reimbursement Amt Non-Commercial Fund: Not reported
Final Reimbursement Check # Non-Commercial Fund: Not reported
50% Reimbursement Amt Commercial Fund: Not reported
50% Reimbursement Amt Non-Commercial Fund: Not reported
50% Reimbursement Check # Commercial Fund: Not reported
50% Reimbursement Check # Non-Commercial Fund: Not reported
Unique number: 1153920
Site name: Hubert & Carol's Store
Deductable Amount: 20000
Location: Initial Review
Tract date: 11/28/1994
Requested amount: 18375
Amount approved: 0
Final Reimbursement Check # Commercial Fund: Not reported
Final Reimbursement Amt Commercial Fund: Not reported
Final Reimbursement Amt Non-Commercial Fund: Not reported
Final Reimbursement Check # Non-Commercial Fund: Not reported
50% Reimbursement Amt Commercial Fund: Not reported
50% Reimbursement Amt Non-Commercial Fund: Not reported
50% Reimbursement Check # Commercial Fund: Not reported
50% Reimbursement Check # Non-Commercial Fund: Not reported
Unique number: 1153920
Site name: Hubert & Carol's Store
Deductable Amount: 20000
Location: Final Audit
Tract date: 11/18/1994 12:00:04 PM
Requested amount: 18375
Amount approved: 0
Final Reimbursement Check # Commercial Fund: Not reported
Final Reimbursement Amt Commercial Fund: Not reported
Final Reimbursement Amt Non-Commercial Fund: Not reported
Final Reimbursement Check # Non-Commercial Fund: Not reported
50% Reimbursement Amt Commercial Fund: Not reported
50% Reimbursement Amt Non-Commercial Fund: Not reported
50% Reimbursement Check # Commercial Fund: Not reported
50% Reimbursement Check # Non-Commercial Fund: Not reported
Unique number: 1153920
Site name: Hubert & Carol's Store
Deductable Amount: 20000
Location: Regional Office Review
Tract date: 11/17/1994 12:00:03 PM
Requested amount: 18375
Amount approved: 0
Final Reimbursement Check # Commercial Fund: Not reported
Final Reimbursement Amt Commercial Fund: Not reported
Final Reimbursement Amt Non-Commercial Fund: Not reported
Final Reimbursement Check # Non-Commercial Fund: Not reported
50% Reimbursement Amt Commercial Fund: Not reported
50% Reimbursement Amt Non-Commercial Fund: Not reported
50% Reimbursement Check # Commercial Fund: Not reported
50% Reimbursement Check # Non-Commercial Fund: Not reported
Unique number: 1153920
Site name: Hubert & Carol's Store
Deductable Amount: 20000
Location: Regional Office Review
Tract date: 10/21/1994 12:00:03 PM
Requested amount: 18375
Amount approved: 0
Final Reimbursement Check # Commercial Fund: Not reported
Final Reimbursement Amt Commercial Fund: Not reported
Final Reimbursement Amt Non-Commercial Fund: Not reported
Final Reimbursement Check # Non-Commercial Fund: Not reported

SECTION 2: FACILITY DETAIL REPORTS

...Continued...

50% Reimbursement Amt Commercial Fund: Not reported
50% Reimbursement Amt Non-Commercial Fund: Not reported
50% Reimbursement Check # Commercial Fund: Not reported
50% Reimbursement Check # Non-Commercial Fund: Not reported
Unique number: 1153920
Site name: Hubert & Carol's Store
Deductable Amount: 20000
Location: Regional Office Review
Tract date: 10/10/1994 12:00:03 PM
Requested amount: 18375
Amount approved: 0
Final Reimbursement Check # Commercial Fund: Not reported
Final Reimbursement Amt Commercial Fund: Not reported
Final Reimbursement Amt Non-Commercial Fund: Not reported
Final Reimbursement Check # Non-Commercial Fund: Not reported
50% Reimbursement Amt Commercial Fund: Not reported
50% Reimbursement Amt Non-Commercial Fund: Not reported
50% Reimbursement Check # Commercial Fund: Not reported
50% Reimbursement Check # Non-Commercial Fund: Not reported
Unique number: 1153920
Site name: Hubert & Carol's Store
Deductable Amount: 20000
Location: Regional Office Review
Tract date: 9/8/1994 12:00:03 PM
Requested amount: 18375
Amount approved: 0
Final Reimbursement Check # Commercial Fund: Not reported
Final Reimbursement Amt Commercial Fund: Not reported
Final Reimbursement Amt Non-Commercial Fund: Not reported
Final Reimbursement Check # Non-Commercial Fund: Not reported
50% Reimbursement Amt Commercial Fund: Not reported
50% Reimbursement Amt Non-Commercial Fund: Not reported
50% Reimbursement Check # Commercial Fund: Not reported
50% Reimbursement Check # Non-Commercial Fund: Not reported
Unique number: 1153920
Site name: Hubert & Carol's Store
Deductable Amount: 20000
Location: Regional Office Review
Tract date: 9/2/1994 12:00:03 PM
Requested amount: 18375
Amount approved: 0
Final Reimbursement Check # Commercial Fund: Not reported
Final Reimbursement Amt Commercial Fund: Not reported
Final Reimbursement Amt Non-Commercial Fund: Not reported
Final Reimbursement Check # Non-Commercial Fund: Not reported
50% Reimbursement Amt Commercial Fund: Not reported
50% Reimbursement Amt Non-Commercial Fund: Not reported
50% Reimbursement Check # Commercial Fund: Not reported
50% Reimbursement Check # Non-Commercial Fund: Not reported
Unique number: 1153920
Site name: Hubert & Carol's Store
Deductable Amount: 20000
Location: Original Claim Form Receipt
Tract date: 8/29/1994 12:00:01 PM
Requested amount: 18375
Amount approved: 0
Final Reimbursement Check # Commercial Fund: Not reported
Final Reimbursement Amt Commercial Fund: Not reported
Final Reimbursement Amt Non-Commercial Fund: Not reported
Final Reimbursement Check # Non-Commercial Fund: Not reported
50% Reimbursement Amt Commercial Fund: Not reported
50% Reimbursement Amt Non-Commercial Fund: Not reported
50% Reimbursement Check # Commercial Fund: Not reported
50% Reimbursement Check # Non-Commercial Fund: Not reported
Unique number: 1153910
Site name: Hubert & Carol's Store
Deductable Amount: 20000
Location: Original Claim Form Receipt
Tract date: 5/17/1994 12:00:01 PM
Requested amount: 35427.57
Amount approved: 17039.97
Final Reimbursement Check # Commercial Fund: Not reported
Final Reimbursement Amt Commercial Fund: Not reported
Final Reimbursement Amt Non-Commercial Fund: Not reported
Final Reimbursement Check # Non-Commercial Fund: Not reported
50% Reimbursement Amt Commercial Fund: Not reported
50% Reimbursement Amt Non-Commercial Fund: Not reported
50% Reimbursement Check # Commercial Fund: Not reported
50% Reimbursement Check # Non-Commercial Fund: Not reported
Task Id: -1
Task Description: task number used to store requested and approved adjustments
Requested Amnt: 0
Amnt Approved: 0
Task Notes: Not reported
Task Id: 0

SECTION 2: FACILITY DETAIL REPORTS

...Continued...

Task Description: Null Task
Requested Amnt: 35427.57
Amnt Approved: 17039.97
Task Notes: Not reported
Task Id: -1
Task Description: task number used to store requested and approved adjustments
Requested Amnt: 0
Amnt Approved: 0
Task Notes: Not reported
Task Id: 0
Task Description: Null Task
Requested Amnt: 18375
Amnt Approved: 0
Task Notes: Not reported
Track date: 1994-05-17 12:00:01
Location: Original Claim Form Receipt
Status Code: Not Reported
Track User: Convert
Track Code: 2
Track date: 1994-12-21 12:00:20
Location: Claim Closed
Status Code: Not Reported
Track User: Convert
Track Code: 2
Track date: 1994-08-29 12:00:01
Location: Original Claim Form Receipt
Status Code: Not Reported
Track User: Convert
Track Code: 2
Track date: 1994-09-02 12:00:03
Location: Regional Office Review
Status Code: Submitted to
Track User: Convert
Track Code: 2
Track date: 1994-09-08 12:00:03
Location: Regional Office Review
Status Code: Started in
Track User: Convert
Track Code: 2
Track date: 1994-10-10 12:00:03
Location: Regional Office Review
Status Code: Additional Information Requested in
Track User: Convert
Track Code: 2
Track date: 1994-10-21 12:00:03
Location: Regional Office Review
Status Code: Additional Information Received in
Track User: Convert
Track Code: 2
Track date: 1994-11-17 12:00:03
Location: Regional Office Review
Status Code: Completed in
Track User: Convert
Track Code: 2
Track date: 1994-11-18 12:00:04
Location: Final Audit
Status Code: Submitted to
Track User: Convert
Track Code: 2
Track date: 1994-11-28 00:00:00
Location: Initial Review
Status Code: Claim Returned in
Track User: Convert
Track Code: 2
Track date: 1997-01-30 12:15:04
Location: Claim Closed
Status Code: Not Reported
Track User: SueC
Track Code: 2

SECTION 3: DATABASES AND UPDATE DATES

To maintain currency of the following federal, state and local databases, EDR contacts the appropriate government agency on a monthly or quarterly basis as required.

Elapsed ASTM days: Provides confirmation that this report meets or exceeds the 90-day updating requirement of the ASTM standard.

DATABASES FOUND IN THIS REPORT

NC LUST TRUST: State Trust Fund Database

Source: Department of Environment and Natural Resources

Telephone: 919-733-1315

This database contains information about claims against the State Trust Funds for reimbursements for expenses incurred while remediating Leaking USTs.

Date of Government Version: 12/29/2017
Database Release Frequency: Quarterly

Date of Last EDR Contact: 04/11/2018
Date of Next Scheduled Update: 07/23/2018

April 12, 2018

Renee Gledhill-Earley, Environmental Review Coordinator
State Historic Preservation Office
4617 Mail Service Center
Raleigh, NC 27699-4617
Email: Environmental.Review@ncdcr.gov

**RE: Project Review Request
Blair Creek Site Mitigation Project
Clay County, North Carolina
Hiwassee River Basin (Catalog Unit - 06020002)**

Dear Ms. Gledhill-Earley:

Michael Baker Engineering, Inc. (Baker) is contracted by the North Carolina Division of Mitigation Services (NCDMS) to conduct stream and/or wetland restoration/enhancement activities for the above-referenced project. We are requesting an office review of the attached documentation and comment on any possible issues that may emerge with respect to archaeological or cultural resources associated with the proposed stream and/or wetland restoration/enhancement project.

The project area is located in Clay County, North Carolina approximately 1.2 miles southwest of Hayesville. The project is located on the United States Geological Survey's (USGS) Hayesville Topographic Quadrangle. The center of the project area is located at 35.0261 N and -83.8319 W. The site is located on five abutting parcels that lie east of NC-69 between Waldroup Road and Cherry Road. Please see the enclosed Vicinity and USGS Topographic Maps for a depiction of the project site location.

The Blair Creek Site was identified to provide compensatory mitigation for unavoidable stream and/or wetland impacts. The existing stream reaches have been significantly impacted by past unrestricted livestock access, current row crop production, and removal of riparian buffers. The project stream reaches are unstable, incised and exhibit active bank erosion. The project will involve the restoration, enhancement, and preservation of 4 stream reaches, totaling approximately 4,407 linear feet (LF) within the Blair Creek drainage area. 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 enclosed Project Site Map displays the areas proposed for restoration/enhancement.

An on-line search was conducted using the HPOWEB GIS Map Service to identify any historic properties listed on the National Register of Historic Places that lie within a one-mile radius of the project site. Results from the search identified the fifteen places, including Cherry Farm.

On-site investigations and discussions with landowners have not revealed any potential cultural resources within the proposed easement areas. No archeological artifacts have been observed or noted during preliminary surveys of the site for restoration purposes, and no existing structures are located within the areas proposed for restoration or enhancement. The majority of the site has historically been disturbed due to past and current management for pasture grazing, livestock rearing, and crop production.

Baker appreciates your timely attention to this matter. If we do not hear from you within 30 days, we will assume that there are no comments with regard to the project area and archaeological and cultural resources. Please feel free to contact us if you have any questions regarding this project or the extent of proposed disturbance. I can be reached at (704) 579-4828 or via my email address at ksuggs@mbakerintl.com.

Sincerely,

A handwritten signature in black ink, appearing to read "Kristi Suggs". The signature is fluid and cursive, with the first name "Kristi" and the last name "Suggs" clearly distinguishable.

Kristi Suggs

Enclosures: Vicinity Map
USGS Topographic Map
Project Site Map

Cc: File

April 16, 2018

Holly Austin
Section 106 Assistant
Eastern Band of Cherokee Indians
P.O. Box 455
Cherokee, NC 28719
Email: hollymaustin@gmail.com

**RE: Project Review Request
Blair Creek Site Mitigation Project
Clay County, North Carolina
Hiwassee River Basin (Catalog Unit - 06020002)**

Dear Ms. Austin:

Michael Baker Engineering, Inc. (Baker) is contracted by the North Carolina Division of Mitigation Services (NCDMS) to conduct stream and/or wetland restoration/enhancement activities for the above-referenced project. We are requesting an office review of the attached documentation and comment on any possible issues that may emerge with respect to archaeological or cultural resources associated with the proposed stream and/or wetland restoration/enhancement project.

The project is located in Clay County, North Carolina approximately 1.2 miles southwest of Hayesville, on the United States Geological Survey's (USGS) Hayesville Topographic Quadrangle. The center of the project area is at 35.0261 N and -83.8319 W. The site resides on five abutting parcels that lie east of NC-69 between Waldroup Road and Cherry Road. Please see the enclosed Vicinity and USGS Topographic Maps for a depiction of the project site location.

The Blair Creek Site was identified to provide compensatory mitigation for unavoidable stream and/or wetland impacts. The existing stream reaches have been significantly impacted by past unrestricted livestock access, current row crop production, and removal of riparian buffers. The project stream reaches are unstable, incised and exhibit active bank erosion. The project will involve the restoration, enhancement, and preservation of 4 stream reaches, totaling approximately 4,407 linear feet (LF) within the Blair Creek drainage area. 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 enclosed Project Site Map displays the areas proposed for restoration/enhancement.

On-site investigations and discussions with landowners have not revealed any potential cultural resources within the proposed easement areas. No archeological artifacts have been observed or noted during preliminary surveys of the site for restoration purposes, and no existing structures are located within the areas proposed for restoration or enhancement. The majority of the site has historically been disturbed due to past and current management for pasture grazing, livestock rearing, and crop production.

Baker appreciates your timely attention to this matter. If we do not hear from you within 30 days, we will assume that there are no comments with regard to the project area or archaeological or cultural resources.

Please feel free to contact us if you have any questions regarding this project or the extent of proposed disturbance. I can be reached at (704) 579-4828 or via my email address at ksuggs@mbakerintl.com.

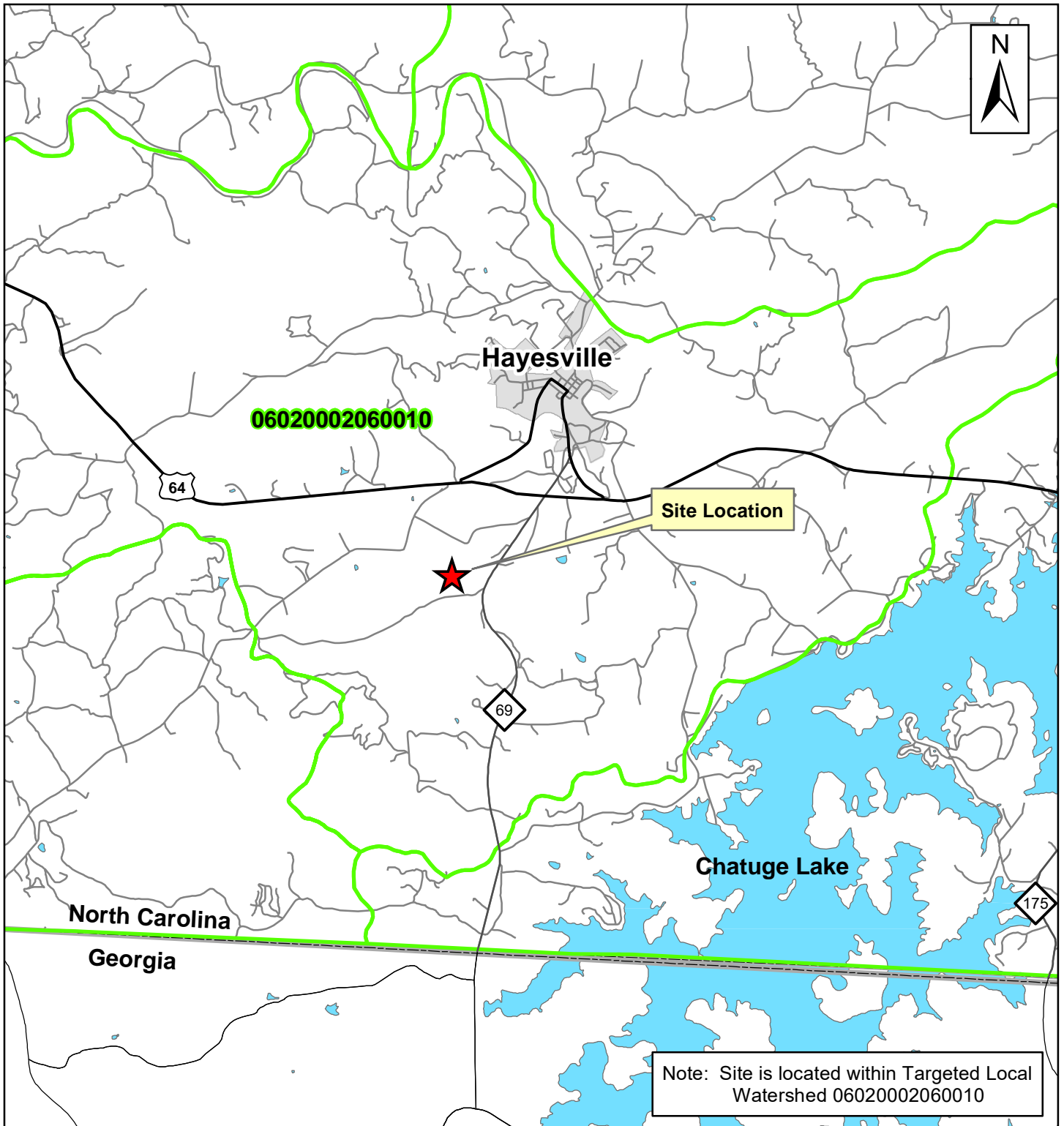
Sincerely,

A handwritten signature in black ink, appearing to read "Kristi Suggs". The signature is fluid and cursive, with the first name "Kristi" written in a larger, more prominent script than the last name "Suggs".

Kristi Suggs

Enclosures: Vicinity Map
USGS Topographic Map
Project Site Map

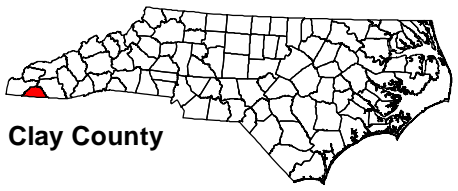
Cc: NC State Historic Preservation Office (SHPO)
File



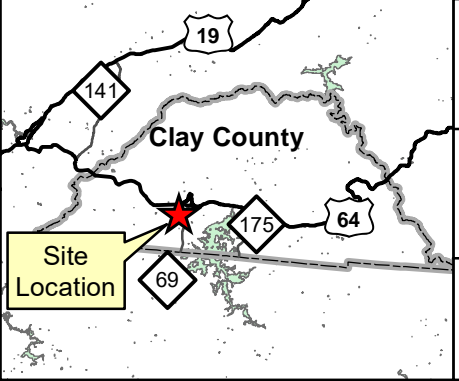
Note: Site is located within Targeted Local Watershed 06020002060010

Figure 1
Project Vicinity Map
Blair Creek Mitigation Project

Michael Baker
 INTERNATIONAL



Clay County



Site Location

Clay County



Proposed Conservation Easement



Copyright © 2013 National Geographic Society, i-cubed

Michael Baker
INTERNATIONAL

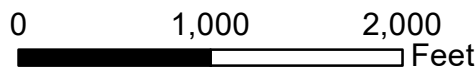
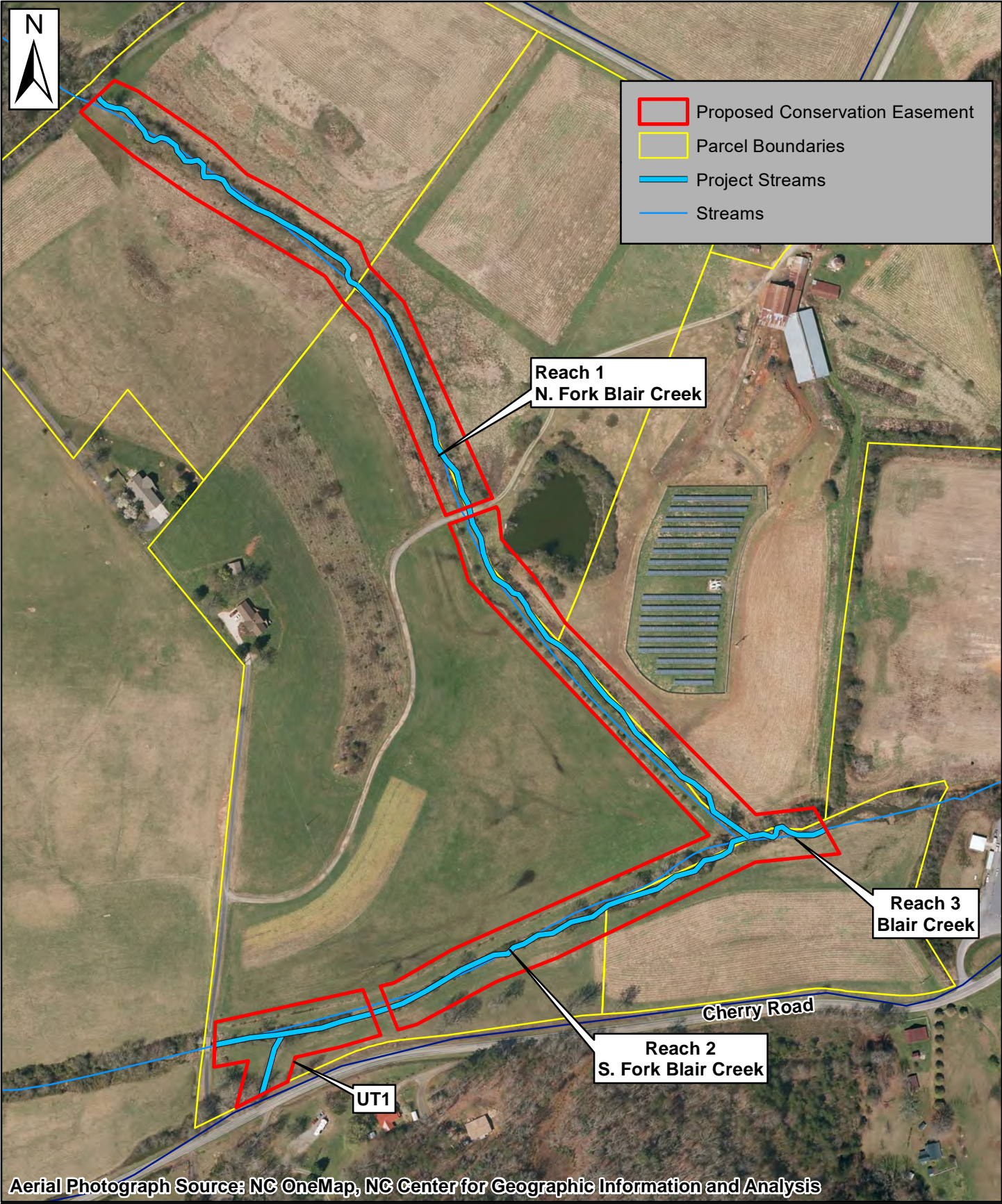
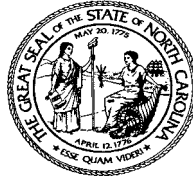


Figure 2
USGS Topographic Map
(Hayesville Quadrangle)
Blair Creek Mitigation Project





North Carolina Department of Natural and Cultural Resources
State Historic Preservation Office

Ramona M. Bartos, Administrator

Governor Roy Cooper
Secretary Susi H. Hamilton

Office of Archives and History
Deputy Secretary Kevin Cherry

May 2, 2018

Kristi Suggs
Michael Baker International
15720 Brixham Hill Avenue, Suite 300
Charlotte, NC 28277

Re: Blair Creek Mitigation Site, Hayesville, Clay County, ER 18-0777

Dear Ms. Suggs:

Thank you for your letter of April 12, 2018, concerning the above project.

There are no known recorded archaeological sites within the project boundaries. However, the project area has never been systematically surveyed to determine the location or significance of archaeological resources. Based on the topographic and hydrological situation and the density of archaeological sites in the area, there is a high probability for the presence of prehistoric or historic archaeological sites.

We recommend that a comprehensive survey be conducted by an experienced archaeologist to identify and evaluate the significance of archaeological remains that may be damaged or destroyed by the proposed project. Potential effects on unknown resources must be assessed prior to the initiation of construction activities.

Two paper copies and one digital copy of the resulting archaeological survey report, as well as two copies of the appropriate site forms, should be forwarded to us for review and comment as soon as they are available and well in advance of any construction activities.

A list of archaeological consultants who have conducted or expressed an interest in contract work in North Carolina is available at www.archaeology.ncdcr.gov/ncarch/resource/consultants.htm. The archaeologists listed, or any other experienced archaeologist, may be contacted to conduct the recommended survey. The consulting archaeologist must contact Western Office staff archaeologist, Linda Hall, at 828/296-7230 or linda.hall@ncdcr.gov, prior to initiating field work.

We have determined that the project as proposed will not have an effect on any historic structures.

The above comments are made pursuant to Section 106 of the National Historic Preservation Act and the Advisory Council on Historic Preservation's Regulations for Compliance with Section 106 codified at 36 CFR Part 800.

Thank you for your cooperation and consideration. If you have questions concerning the above comment, contact Renee Gledhill-Earley, environmental review coordinator, at 919-807-6579 or environmental.review@ncdcr.gov. In all future communication concerning this project, please cite the above referenced tracking number.

Sincerely,



for Ramona M. Bartos



121 E. First Street, Clayton, North Carolina 27520
(919) 553-9007 fax (919) 553-9077
archcon.org

May 21, 2018

Ms. Linda Hall
Archaeologist
North Carolina Department of Natural and Cultural Resources
176 Riceville Road
Asheville, NC 28805

RE: Phase I Archaeological Investigation Recommendation - Blair Creek Restoration, Clay County, North Carolina (ER18-0777)

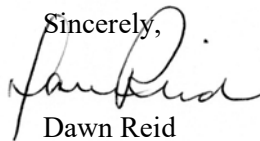
Dear Linda:

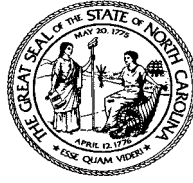
Thank you for the opportunity to provide you with a detailed description of the proposed Blair Creek Restoration project area. As you are aware, information on this project was submitted to the North Carolina Department of Natural and Cultural Resources for review and a comprehensive survey was recommended (letter dated May 2, 2018). I was approached by Micky Clemmons with Michael Baker International regarding conducting this survey. However, after reviewing the conditions in the project area, it is my view that an archaeological survey would not be productive. Mr. Clemmons has authorized me to consult with you regarding possibly rescinding the survey requirement.

The proposed Blair Creek restoration area extends along the north and south forks of Blair Creek for a total length of 1,098 meters. The project corridor itself is 30 meters wide, 15 meters on each side of the waterway centerline. Per the USDA, the soils in the entire corridor are Arkaqua loam and are frequently flooded. Michael Baker employed a soil scientist to conduct soil boring along the project corridor. This boring resulted in the confirmation that the soils in the project corridor, with few exceptions, are hydric or buried hydric. Those soil bores that exposed "upland" soils near the confluence of the two forks and near the pond contained Rosman fine sandy loam. This soil type forms from recent alluvium beside stream beds and can contain as much as 15 percent gravel grading to cobbles at an average depth of 1.0 meter. Shallow rock was exposed near the pond. Jurisdictional wetlands have also been defined at a number of areas along the project corridor. There is little to no topographic relief within the project corridor.

Due to the discrete nature of the project area and the conditions within that corridor, we would consider this project area to have very low potential for the presence of intact significant archaeological deposits. On behalf of my client, I would appreciate it if you would review the attached maps showing the project corridor and the results of the soil boring and consider negating the requirement for a comprehensive archaeological survey.

Thank you for your attention to this matter, Please don't hesitate to call me at (919) 553-9007 if you require additional information on this proposed stream restoration project.

Sincerely,

Dawn Reid
President



**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

June 21, 2018

Kristi Suggs
Michael Baker International
15720 Brixham Hill Avenue, Suite 300
Charlotte, NC 28277

Re: Blair Creek Mitigation Site, Hayesville, Clay County, ER 18-0777

Dear Ms. Suggs:

We have received additional information concerning the above project from Dawn Reid, Archaeological Consultants of the Carolinas.

Since the proposed development is to take place in areas where hydric soils dominate, it is unlikely that significant archaeological resources will be affected. We, therefore, recommend that no archaeological investigation be conducted in connection with this project.

The above comments are made pursuant to Section 106 of the National Historic Preservation Act and the Advisory Council on Historic Preservation's Regulations for Compliance with Section 106 codified at 36 CFR Part 800.

Thank you for your cooperation and consideration. If you have questions concerning the above comment, contact Renee Gledhill-Earley, environmental review coordinator, at 919-807-6579 or environmental.review@ncdcr.gov. In all future communication concerning this project, please cite the above referenced tracking number.

Sincerely,

A handwritten signature in blue ink that reads "Renee Gledhill-Earley".

for Ramona M. Bartos

OPTION TO PURCHASE CONSERVATION EASEMENT

THIS OPTION TO PURCHASE CONSERVATION EASEMENT (the "Option") is made and entered into this 19th day of September, 2017 (the "Effective Date"), by and among Mrs. Eugene Tommie B Waldroup (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 Clay County, North Carolina, containing 69.22 acres (PIN 555000413626), 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 Thirty-Six (36) months after the Effective Date (the "Term"), unless extended by the parties, in writing. A Memorandum of Option to Purchase Easement in the form attached as Exhibit D shall be executed by both parties simultaneously with this Option and recorded at Baker's sole discretion and expense in the county where the Property is located to provide record notice of this Option. In no event shall this Option be recorded or filed in the public records.

3. Exclusivity of Option. Grantor covenants and agrees that it will take no action to sell or transfer the Easement during the Term, and that Grantor will not encumber the Property in a manner that would impair the intended use of the Easement hereunder, it being intended and agreed that the Option is exclusive to Baker and Baker's successors and assigns.

4. Exercise of Option. At any time prior to the expiration of the Term, Baker may exercise this Option by giving Grantor no less than thirty (30) days prior written notice of the date Baker desires to consummate the purchase of the Easement under this Option (the "Closing"). Closing shall take place at a time and place reasonably acceptable to both parties. The terms of the purchase and sale of the Easement at Closing shall be as follows:

a. Purchase Price. The total purchase price for the Easement shall be _____ per acre (the "Purchase Price") included in the Easement as determined by the Survey prepared pursuant to Paragraph 4(b), below. The Option Deposit shall be credited towards the Purchase Price at Closing.

b. Survey. Prior to Closing, Baker shall obtain, at Baker's expense, a survey prepared by a registered land surveyor duly licensed in the State of North Carolina showing the boundary of the Easement as well as all easements, rights-of-way, encroachments and improvements located thereon, and the exact acreage of the Easement (the "Survey"), and that Baker shall have consulted with Grantor and taken in to account Grantor's concerns as to the exact delineation of boundaries of the Easement. Following consultation with Grantor and the completion of the Survey, a new legal description of the Easement shall be prepared from the Survey. The new legal description shall be substituted for the description currently attached hereto as Exhibit B, and all references contained herein to the "Easement" shall be deemed to refer to the new description prepared from the Survey.

c. Prorations, Costs and Expenses of Closing. At Closing, ad valorem taxes for the current year for the Easement area shall be prorated, and Grantor shall remain responsible for all other ad valorem taxes applicable to the remainder of the Property subsequent to Closing. At Closing, Grantor shall pay any outstanding ad valorem taxes for prior years on Grantor's real or personal property, any late list penalties, revenue stamps or transfer taxes applicable to the Easement, and any mortgages or liens with respect to the Property. At Closing, Baker shall pay any costs related to the Survey, any title examination expenses, title insurance premiums, recording costs for the deed conveying the Easement, costs of recordation of any recorded plats showing the Easement, as well as any engineering or site plan costs. Each party shall bear its own accounting and attorney fees.

d. Closing Documents and Title. At Closing, Grantor shall deliver (i) a deed substantially in the form of the attached Exhibit E (the "Deed") conveying the Easement to Baker or to a legally qualified non-profit organization or government agency as contained in N.C.G.S. §121-35(2) designated by Baker, provided, that the final form of the Deed shall be in form mutually acceptable to Baker and Grantor so long as such form is consistent with the provisions of Article 4, The Conservation and Historic Preservation Agreements Act as contained in N.C.G.S. §121-34 through 42. The Deed shall convey good, marketable and insurable title to the Easement, free and clear from all mortgages, liens, easements, covenants, restrictions and other encumbrances, except those previously accepted by Baker in writing; (ii) lien affidavits warranting and holding harmless any title insurance company insuring title to the Easement, from and against unpaid mechanics and

materialmen's liens; and (iv) any other documents and papers necessary or appropriate in connection with the consummation of the transaction contemplated by this Option.

At Closing, Baker shall deliver (i) a Settlement Statement setting forth each party's costs, expenses, prorations and other financial analysis of the purchase and sale of the Easement as contemplated hereby; (ii) the Note as defined in item 4(e), below; and (iii) any other documents necessary to consummate the transaction contemplated by the Option.

e. Payment. It is understood that funding for the purchase of the Easement shall be provided by the State of North Carolina pursuant to the Division of Mitigation Services of DEQ and that such funding is made subsequent to recording of the Easement and subsequent to Closing. Therefore, at Closing, Baker shall deliver to Grantor a promissory note in the amount of the Purchase Price, less the Option Deposit and closing costs, mortgage pay-offs, expenses, and prorations applicable to Grantor, which promissory note shall bear interest at Zero Percent (0%) per annum on the unpaid balance until paid or until default and which promissory note shall be due and payable in full on the date ninety (90) days after the Closing (the "Note"). At the time of Closing, Baker shall record the Deed and any plat referenced in the Deed and deliver copies of the recorded documents to the State Property Office for review and funding. The Note shall contain an express provision that if the DEQ fails to fund the purchase of the Easement in the amount of the Purchase Price thereby causing Baker to fail to pay the Note in full on or before the maturity date, then Baker, as Grantor's sole remedy, shall be liable to Grantor for all reasonable costs and expenses, including reasonable attorney fees, required to have the Easement removed and the title to the Property returned to the condition it was prior to the imposition of the Easement, at which point the Note, this Option, and all duties, responsibilities and liabilities with respect thereto shall be null and void. Otherwise, Baker shall pay the Note in full upon receipt of funding by the State of North Carolina.

f. Condition of Property; Intended Use. Prior to Closing, Grantor shall remove all rubbish and trash, including any hazardous waste or harmful chemical substances, from the Easement but shall otherwise keep the Property in the same condition as of the Effective Date, reasonable wear and tear excepted. Grantor shall prevent and refrain from any use of the Property for any purpose or in any manner that would diminish the value of the Easement or adversely affect Baker's intended use of the land for the Easement, which use is to provide the Division of Mitigation Services within DEQ with wetland, stream, and/or buffer mitigation credits. Grantor acknowledges that Baker will enter into an agreement with DEQ to provide these credits, and Grantor agrees not to undertake or permit any activities on the Property that would diminish Baker's ability to obtain such credits. If any adverse change occurs in the condition of the Easement prior to Closing, whether such change is caused by Grantor or by forces beyond Grantor's reasonable control, Baker may elect to (i) refuse to accept the Easement at Closing; (ii) accept the Property at Closing, or a portion thereof with a corresponding adjustment of the Purchase Price; or (iii) terminate this Option and the transaction itself and declare this Option null and void.

g. Warranty of Title. Grantor covenants, represents and warrants that, as of the Effective Date and Closing: (i) Grantor is the sole owner(s) of the Property and is seized of the Property in fee simple absolute; (ii) Grantor has the right and authority to convey this Option and the Easement and Grantor will hold the grantee of the Easement harmless from any failure in Grantor's right and authority to convey the Easement, including issues of title; (iii) there is legal access to the Property and to the Easement; (iv) the Easement is free from any and all encumbrances, except those accepted by Baker in writing; (v) Grantor

will defend title to the Easement against all lawful claims of other parties; (vi) that the Property is free of any hazardous wastes.

5. Right of Entry and Inspections. Baker, and its agents and employees or other authorized representatives, may enter upon the Property during the Term for the purpose of making surveys, conducting soil, engineering, geological and other subsoil or environmental tests to determine the suitability of the Property for the Easement. Baker shall repair or pay for any damage done to the Property caused while such tests are being made. Baker shall advise Grantor at least twenty-four hours in advance of any entry upon the Property for the purposes of surveying, testing or inspecting as set forth herein. Baker shall be permitted during the Term to obtain land use permits or other approvals relating to any part of the Easement, and Grantor agrees to execute such documents, petitions, and authorizations as may be appropriate or required in order to obtain such land use permits and approvals. Grantor shall join with Baker in applications and any non-judicial or non-administrative proceedings to obtain such approvals if necessary. After Closing, Baker reserves the right to perform periodic inspections of the Easement to ensure compliance with easement restrictions contained in the Deed. If Baker does not duly exercise this Option and purchase the Easement, Baker shall return the Property to the condition in which it existed prior to any investigations undertaken by Baker, its agents, employees or contractors pursuant to this Option.

6. Permanent Access and Construction Easements. In connection with this Option and delivery of the Easement, Grantor shall also:

(a) convey and grant to Baker, its successors, assigns, contractors and agents, a non-exclusive temporary construction easement, the location of which shall be determined in the sole discretion of Grantor, for ingress, egress and regress on, over and upon Grantor's Property, sufficient to allow Baker, its agents and contractors to construct and restore the Easement area to stream and/or wetland conditions required by DEQ, said temporary construction easement to include sufficient access to allow heavy equipment to access the Property and the Easement, as necessary; and

(b) convey and grant to Baker, its successors and assigns, a non-exclusive permanent easement for ingress and egress to the Easement, the location of which shall be determined in the sole discretion of Grantor, in order that Baker, its successors and assigns, may have a permanent means of adequately accessing the area covered by the Easement. The permanent access easement referred to herein shall be set forth in an accurate survey, the legal description of which shall be included in a recorded permanent access easement which shall run with the land.

7. Indemnification. Baker agrees to indemnify and save harmless Grantor from and against any loss, claim, damage, cost or expense (including reasonable attorney's fees) suffered or incurred by Grantor by reason of any injury to person or damage to property on or about the Property to the extent caused by Baker, its officers, employees, agents, invitees, contractors, or subcontractors entering or conducting work upon the Property, except for any loss, claim, damage, cost or expense suffered or incurred as a result of the negligence or intentional misconduct of Grantor or Grantor's employees, agents or invitees.

8. Notices. Unless otherwise set forth, any notice or other communication required or permitted hereunder shall be in writing and (a) delivered by overnight courier; (b) sent by facsimile transmission, or (c) mailed by Registered or Certified Mail, postage prepaid, addressed as follows (or to such other address for a party as shall be specified by like notice; provided that notice of change of address shall be effective only upon receipt thereof);

If to Baker: Jake Byers
Michael Baker Engineering
797 Haywood Rd. Suite 201
Asheville, NC 28806

If to the Grantor: Mrs. ~~Eugene~~ Tommie B Waldroup
452 Waldroup Road
Hayesville, NC 28904

And

Mr. Joseph & Ann Waldroup
767 Waldroup Road
Hayesville, NC 28904

9. Miscellaneous.

- a. This Option, together with the exhibits attached hereto which are incorporated herein by reference, contains the entire understanding of the parties hereto with respect to the subject matter contained herein. No amendment, modification, or discharge of this Option, and no waiver hereunder, shall be valid or binding unless set forth in writing and duly executed by the parties hereto.
- b. Any provision of this Option that shall be found to be contrary to applicable law or otherwise unenforceable shall not affect the remaining terms of this Option, which shall be construed as if the unenforceable provision or clause were absent from this Option.
- c. This Option shall be binding upon and inure to the benefit of the parties and their respective heirs, personal representatives, successors, and assigns.
- d. This Option shall be governed by and construed in accordance with the laws of the State of North Carolina without application of its conflicts of laws provisions.
- e. No act or failure to act by either party shall be deemed a waiver of its rights hereunder, and no waiver in any one circumstance or of any one provision shall be deemed a waiver in other circumstances or of other provisions.
- f. Grantor agrees to not mow or otherwise damage vegetation within Easement area after Baker plants or replants the same. If Grantor or Grantor's agents or invitees damage vegetation within the Easement, Grantor will replace the lost or damaged vegetation at their expense.
- g. Baker shall ensure that access to portions of the Grantor's property shall not be impeded by the proposed.
- j. This Option shall not be assignable by Baker, except to another entity acquiring at least fifty-one percent (51%) interest in Baker or Baker's business or to an entity qualified to be the grantee of a conservation easement under N.C.G.S § 121-35.

IN WITNESS WHEREOF, the parties have duly executed this Option as of the date first above written.

GRANTOR:

By: Joseph E. Waldroup now for Tommie B. Waldroup

Print Name: Joseph E. Waldroup

Title: Land Owner

GRANTOR:

By: _____

Print Name: _____

Title: Land Owner

MICHAEL BAKER ENGINEERING, INC.:

By: Dwan Hartaway

Print Name: Dwan Hartaway

Title: VICE PRESIDENT

Parcel Boundaries

Note: This map is not a certified survey.



Tommie B.
Waldroup
PIN 555000413626
452 Waldroup Rd.
HAYESVILLE NC 28904

Hiwassee 06020002

Michael Baker
INTERNATIONAL

0 100 200 400
Feet

Exhibit A
Landowner(s):
Waldroup, Tommie B.

OPTION TO PURCHASE CONSERVATION EASEMENT

THIS OPTION TO PURCHASE CONSERVATION EASEMENT (the "Option") is made and entered into this 8th day of September, 2017 (the "Effective Date"), by and among Mr. Lynn E. Waldroup and Mrs. Gail P. Waldroup (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 Clay County, North Carolina, containing 70.85 acres (PINs 545900397402, 545900495013, 545900493689, 555000309497), 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 Thirty-Six (36) months after the Effective Date (the "Term"), unless extended by the parties, in writing. A Memorandum of Option to Purchase Easement in the form attached as Exhibit D shall be executed by both parties simultaneously with this Option and recorded at Baker's sole discretion and expense in the county where the Property is located to provide record notice of this Option. In no event shall this Option be recorded or filed in the public records.

3. Exclusivity of Option. Grantor covenants and agrees that it will take no action to sell or transfer the Easement during the Term, and that Grantor will not encumber the Property in a manner that would impair the intended use of the Easement hereunder, it being intended and agreed that the Option is exclusive to Baker and Baker's successors and assigns.

4. Exercise of Option. At any time prior to the expiration of the Term, Baker may exercise this Option by giving Grantor no less than thirty (30) days prior written notice of the date Baker desires to consummate the purchase of the Easement under this Option (the "Closing"). Closing shall take place at a time and place reasonably acceptable to both parties. The terms of the purchase and sale of the Easement at Closing shall be as follows:

a. Purchase Price. The total purchase price for the Easement shall be _____ per acre (the "Purchase Price") included in the Easement as determined by the Survey prepared pursuant to Paragraph 4(b), below. The Option Deposit shall be credited towards the Purchase Price at Closing.

b. Survey. Prior to Closing, Baker shall obtain, at Baker's expense, a survey prepared by a registered land surveyor duly licensed in the State of North Carolina showing the boundary of the Easement as well as all easements, rights-of-way, encroachments and improvements located thereon, and the exact acreage of the Easement (the "Survey"), and that Baker shall have consulted with Grantor and taken in to account Grantor's concerns as to the exact delineation of boundaries of the Easement. Following consultation with Grantor and the completion of the Survey, a new legal description of the Easement shall be prepared from the Survey. The new legal description shall be substituted for the description currently attached hereto as Exhibit B, and all references contained herein to the "Easement" shall be deemed to refer to the new description prepared from the Survey.

c. Prorations, Costs and Expenses of Closing. At Closing, ad valorem taxes for the current year for the Easement area shall be prorated, and Grantor shall remain responsible for all other ad valorem taxes applicable to the remainder of the Property subsequent to Closing. At Closing, Grantor shall pay any outstanding ad valorem taxes for prior years on Grantor's real or personal property, any late list penalties, revenue stamps or transfer taxes applicable to the Easement, and any mortgages or liens with respect to the Property. At Closing, Baker shall pay any costs related to the Survey, any title examination expenses, title insurance premiums, recording costs for the deed conveying the Easement, costs of recordation of any recorded plats showing the Easement, as well as any engineering or site plan costs. Each party shall bear its own accounting and attorney fees.

d. Closing Documents and Title. At Closing, Grantor shall deliver (i) a deed substantially in the form of the attached Exhibit E (the "Deed") conveying the Easement to Baker or to a legally qualified non-profit organization or government agency as contained in N.C.G.S. §121-35(2) designated by Baker, provided, that the final form of the Deed shall be in form mutually acceptable to Baker and Grantor so long as such form is consistent with the provisions of Article 4, The Conservation and Historic Preservation Agreements Act as contained in N.C.G.S. §121-34 through 42. The Deed shall convey good, marketable and insurable title to the Easement, free and clear from all mortgages, liens, easements, covenants, restrictions and other encumbrances, except those previously accepted by Baker in writing; (ii) lien affidavits warranting and holding harmless any title insurance company insuring title to the Easement, from and against unpaid mechanics and

materialmen's liens; and (iv) any other documents and papers necessary or appropriate in connection with the consummation of the transaction contemplated by this Option.

At Closing, Baker shall deliver (i) a Settlement Statement setting forth each party's costs, expenses, prorations and other financial analysis of the purchase and sale of the Easement as contemplated hereby; (ii) the Note as defined in item 4(e), below; and (iii) any other documents necessary to consummate the transaction contemplated by the Option.

e. Payment. It is understood that funding for the purchase of the Easement shall be provided by the State of North Carolina pursuant to the Division of Mitigation Services of DEQ and that such funding is made subsequent to recording of the Easement and subsequent to Closing. Therefore, at Closing, Baker shall deliver to Grantor a promissory note in the amount of the Purchase Price, less the Option Deposit and closing costs, mortgage pay-offs, expenses, and prorations applicable to Grantor, which promissory note shall bear interest at Zero Percent (0%) per annum on the unpaid balance until paid or until default and which promissory note shall be due and payable in full on the date ninety (90) days after the Closing (the "Note"). At the time of Closing, Baker shall record the Deed and any plat referenced in the Deed and deliver copies of the recorded documents to the State Property Office for review and funding. The Note shall contain an express provision that if the DEQ fails to fund the purchase of the Easement in the amount of the Purchase Price thereby causing Baker to fail to pay the Note in full on or before the maturity date, then Baker, as Grantor's sole remedy, shall be liable to Grantor for all reasonable costs and expenses, including reasonable attorney fees, required to have the Easement removed and the title to the Property returned to the condition it was prior to the imposition of the Easement, at which point the Note, this Option, and all duties, responsibilities and liabilities with respect thereto shall be null and void. Otherwise, Baker shall pay the Note in full upon receipt of funding by the State of North Carolina.

f. Condition of Property; Intended Use. Prior to Closing, Grantor shall remove all rubbish and trash, including any hazardous waste or harmful chemical substances, from the Easement but shall otherwise keep the Property in the same condition as of the Effective Date, reasonable wear and tear excepted. Grantor shall prevent and refrain from any use of the Property for any purpose or in any manner that would diminish the value of the Easement or adversely affect Baker's intended use of the land for the Easement, which use is to provide the Division of Mitigation Services within DEQ with wetland, stream, and/or buffer mitigation credits. Grantor acknowledges that Baker will enter into an agreement with DEQ to provide these credits, and Grantor agrees not to undertake or permit any activities on the Property that would diminish Baker's ability to obtain such credits. If any adverse change occurs in the condition of the Easement prior to Closing, whether such change is caused by Grantor or by forces beyond Grantor's reasonable control, Baker may elect to (i) refuse to accept the Easement at Closing; (ii) accept the Property at Closing, or a portion thereof with a corresponding adjustment of the Purchase Price; or (iii) terminate this Option and the transaction itself and declare this Option null and void.

g. Warranty of Title. Grantor covenants, represents and warrants that, as of the Effective Date and Closing: (i) Grantor is the sole owner(s) of the Property and is seized of the Property in fee simple absolute; (ii) Grantor has the right and authority to convey this Option and the Easement and Grantor will hold the grantee of the Easement harmless from any failure in Grantor's right and authority to convey the Easement, including issues of title; (iii) there is legal access to the Property and to the Easement; (iv) the Easement is free from any and all encumbrances, except those accepted by Baker in writing; (v) Grantor

will defend title to the Easement against all lawful claims of other parties; (vi) that the Property is free of any hazardous wastes.

5. Right of Entry and Inspections. Baker, and its agents and employees or other authorized representatives, may enter upon the Property during the Term for the purpose of making surveys, conducting soil, engineering, geological and other subsoil or environmental tests to determine the suitability of the Property for the Easement. Baker shall repair or pay for any damage done to the Property caused while such tests are being made. Baker shall advise Grantor at least twenty-four hours in advance of any entry upon the Property for the purposes of surveying, testing or inspecting as set forth herein. Baker shall be permitted during the Term to obtain land use permits or other approvals relating to any part of the Easement, and Grantor agrees to execute such documents, petitions, and authorizations as may be appropriate or required in order to obtain such land use permits and approvals. Grantor shall join with Baker in applications and any non-judicial or non-administrative proceedings to obtain such approvals if necessary. After Closing, Baker reserves the right to perform periodic inspections of the Easement to ensure compliance with easement restrictions contained in the Deed. If Baker does not duly exercise this Option and purchase the Easement, Baker shall return the Property to the condition in which it existed prior to any investigations undertaken by Baker, its agents, employees or contractors pursuant to this Option.

6. Permanent Access and Construction Easements. In connection with this Option and delivery of the Easement, Grantor shall also:

(a) convey and grant to Baker, its successors, assigns, contractors and agents, a non-exclusive temporary construction easement, the location of which shall be determined in the sole discretion of Grantor, for ingress, egress and regress on, over and upon Grantor's Property, sufficient to allow Baker, its agents and contractors to construct and restore the Easement area to stream and/or wetland conditions required by DEQ, said temporary construction easement to include sufficient access to allow heavy equipment to access the Property and the Easement, as necessary; and

(b) convey and grant to Baker, its successors and assigns, a non-exclusive permanent easement for ingress and egress to the Easement, the location of which shall be determined in the sole discretion of Grantor, in order that Baker, its successors and assigns, may have a permanent means of adequately accessing the area covered by the Easement. The permanent access easement referred to herein shall be set forth in an accurate survey, the legal description of which shall be included in a recorded permanent access easement which shall run with the land.

7. Indemnification. Baker agrees to indemnify and save harmless Grantor from and against any loss, claim, damage, cost or expense (including reasonable attorney's fees) suffered or incurred by Grantor by reason of any injury to person or damage to property on or about the Property to the extent caused by Baker, its officers, employees, agents, invitees, contractors, or subcontractors entering or conducting work upon the Property, except for any loss, claim, damage, cost or expense suffered or incurred as a result of the negligence or intentional misconduct of Grantor or Grantor's employees, agents or invitees.

8. Notices. Unless otherwise set forth, any notice or other communication required or permitted hereunder shall be in writing and (a) delivered by overnight courier; (b) sent by facsimile transmission, or (c) mailed by Registered or Certified Mail, postage prepaid, addressed as follows (or to such other address for a party as shall be specified by like notice; provided that notice of change of address shall be effective only upon receipt thereof);

If to Baker: Jake Byers
 Michael Baker Engineering
 797 Haywood Rd. Suite 201
 Asheville, NC 28806

If to the Grantor: Mr. and Mrs. Lynn Waldroup
 416 Cherry Road
 Hayesville, NC 28904

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.

IN WITNESS WHEREOF, the parties have duly executed this Option as of the date first above written.

GRANTOR:

By: Lynn Waldroup

Print Name: ^{Lynn}
~~Lynn~~ Waldroup

Title: Land Owner

GRANTOR:

By: Gail Waldroup

Print Name: Gail Waldroup

Title: Land Owner

MICHAEL BAKER ENGINEERING, INC.:

By: Dwain Hathaway

Print Name: Dwain Hathaway

Title: VICE PRESIDENT

Parcel Boundaries

Note: This map is not a certified survey.



Lynn E & Gail P
Waldroup
PIN 555000309497
CHERRY RD
HAYESVILLE NC 28904

Lynn Waldroup
PIN 545900493689
416 CHERRY RD
HAYESVILLE NC 28904

Lynn Waldroup
PIN 5459000397402
416 CHERRY RD
HAYESVILLE NC 28904

Lynn E & Gail P Waldroup
PIN 545900495013
416 CHERRY RD
HAYESVILLE NC 28904

Cherry Road

Hiwassee 06020002

Michael Baker
INTERNATIONAL



Exhibit A
Landowner(s):
Waldroup, Lynn and Gail



**North Carolina Department of Natural and Cultural Resources
Natural Heritage Program**

Governor Roy Cooper

Secretary Susi H. Hamilton

NCNHDE-5805

April 16, 2018

Kristi Suggs
Michael Baker Engineering, Inc.
Ballantyne One - 15720 Brixham Hill Ave.
Charlotte, NC 28277
RE: Blair Creek Site Mitigation Project; 166274

Dear Kristi Suggs:

The North Carolina Natural Heritage Program (NCNHP) appreciates the opportunity to provide information about natural heritage resources for the project referenced above.

A query of the NCNHP database indicates that there are records for rare species, important natural communities, natural areas, or conservation/managed areas within the proposed project boundary. These results are presented in the attached 'Documented Occurrences' tables and map.

The attached 'Potential Occurrences' table summarizes rare species and natural communities that have been documented within a one-mile radius of the property boundary. The proximity of these records suggests that these natural heritage elements may potentially be present in the project area if suitable habitat exists and is included for reference. Tables of natural areas and conservation/managed area within a one-mile radius of the project area, if any, are also included in this report.

Please note that natural heritage element data are maintained for the purposes of conservation planning, project review, and scientific research, and are not intended for use as the primary criteria for regulatory decisions. Information provided by the NCNHP database may not be published without prior written notification to the NCNHP, and the NCNHP must be credited as an information source in these publications. Maps of NCNHP data may not be redistributed without permission.

Also please note that the NC Natural Heritage Program may follow this letter with additional correspondence if a Dedicated Nature Preserve (DNP), Registered Heritage Area (RHA), Clean Water Management Trust Fund (CWMTF) easement, or an occurrence of a Federally-listed species is documented near the project area.

If you have questions regarding the information provided in this letter or need additional assistance, please contact Rodney A. Butler at rodney.butler@ncdcr.gov or 919.707.8603.

Sincerely,
NC Natural Heritage Program

Natural Heritage Element Occurrences, Natural Areas, and Managed Areas Intersecting the Project Area
Blair Creek Site Mitigation Project
Project No. 166274
April 16, 2018
NCNHDE-5805

Element Occurrences Documented Within Project Area

Taxonomic Group	EO ID	Scientific Name	Common Name	Last Observation Date	Element Occurrence Rank	Accuracy	Federal Status	State Status	Global Rank	State Rank
Amphibian	19183	Eurycea junaluska	Junaluska Salamander	2000	E	3-Medium	Species of Concern	Threatened	G3	S1S2
Amphibian	37783	Plethodon chattahoochee	Chattahoochee Slimy Salamander	1984-10-27	H?	3-Medium	---	Significantly Rare	G3	S1
Freshwater Fish	27447	Clinostomus sp. 1	Smoky Dace	2009-07-27	E	3-Medium	Species of Concern	Special Concern	G5T3Q	S2
Vascular Plant	22827	Dichanthelium annulum	Ringed Witch Grass	1956-06-02	H	3-Medium	---	Significantly Rare Peripheral	GNR	S1

No Natural Areas are Documented within the Project Area

Managed Areas Documented Within Project Area *

Managed Area Name	Owner	Owner Type
Mainspring Conservation Trust Easement	Land Trust for the Little Tennessee	Private
Mainspring Conservation Trust Preserve	Land Trust for the Little Tennessee	Private

*NOTE: If the proposed project intersects with a conservation/managed area, please contact the landowner directly for additional information. If the project intersects with a Dedicated Nature Preserve (DNP), Registered Natural Heritage Area (RHA), or Federally-listed species, NCNHP staff may provide additional correspondence regarding the project.

Definitions and an explanation of status designations and codes can be found at <https://ncnhde.natureserve.org/content/help>. Data query generated on April 16, 2018; source: NCNHP, Q2 April 2018. Please resubmit your information request if more than one year elapses before project initiation as new information is continually added to the NCNHP database.

Natural Heritage Element Occurrences, Natural Areas, and Managed Areas Within a One-mile Radius of the Project Area
Blair Creek Site Mitigation Project
Project No. 166274
April 16, 2018
NCNHDE-5805

Element Occurrences Documented Within a One-mile Radius of the Project Area

Taxonomic Group	EO ID	Scientific Name	Common Name	Last Observation Date	Element Occurrence Rank	Accuracy	Federal Status	State Status	Global Rank	State Rank
Amphibian	19183	Eurycea junaluska	Junaluska Salamander	2000	E	3-Medium	Species of Concern	Threatened	G3	S1S2
Amphibian	37783	Plethodon chattahoochee	Chattahoochee Slimy Salamander	1984-10-27	H?	3-Medium	---	Significantly Rare	G3	S1
Dragonfly or Damselfly	33719	Somatochlora elongata	Ski-tipped Emerald	2004-Pre	H?	5-Very Low	---	Significantly Rare	G5	S2S3
Freshwater Fish	27447	Clinostomus sp. 1	Smoky Dace	2009-07-27	E	3-Medium	Species of Concern	Special Concern	G5T3Q	S2
Vascular Plant	22827	Dichanthelium annulum	Ringed Witch Grass	1956-06-02	H	3-Medium	---	Significantly Rare Peripheral	GNR	S1
Vascular Plant	23931	Hackelia virginiana	Virginia Stickseed	1968-Pre	H	5-Very Low	---	Significantly Rare Peripheral	G5	S2
Vascular Plant	1745	Platanthera flava var. herbiola	Northern Rein Orchid	1956-06-02	H	4-Low	---	Significantly Rare Peripheral	G4?T4 Q	S1?
Vascular Plant	2095	Sceptridium jenmanii	Alabama Grape-fern	1977	H	4-Low	---	Special Concern Vulnerable	G3G4	S2
Vascular Plant	10881	Sceptridium jenmanii	Alabama Grape-fern	1977-08	H	4-Low	---	Special Concern Vulnerable	G3G4	S2

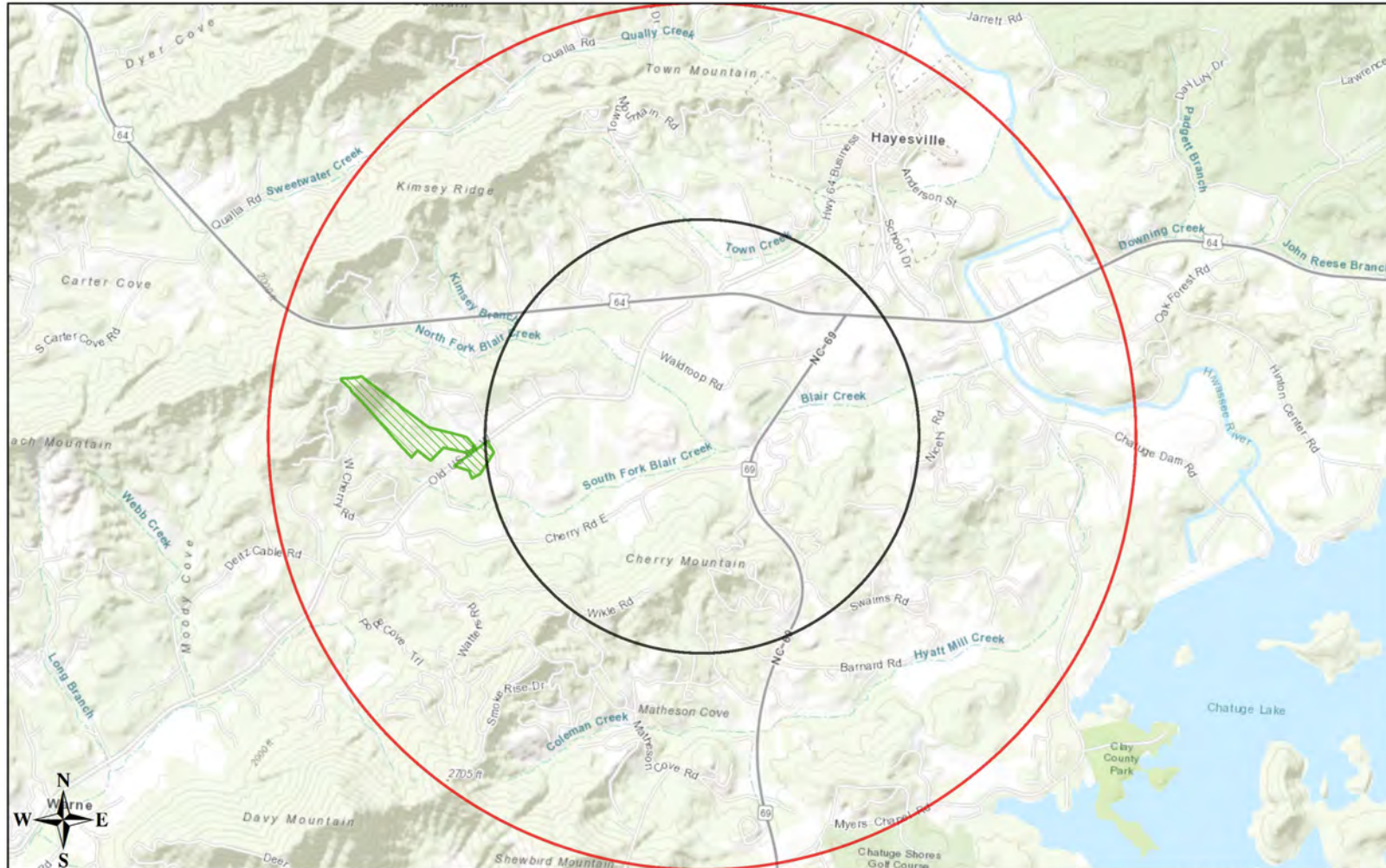
No Natural Areas are Documented Within a One-mile Radius of the Project Area

Managed Areas Documented Within a One-mile Radius of the Project Area

Managed Area Name	Owner	Owner Type
Mainspring Conservation Trust Easement	Land Trust for the Little Tennessee	Private
Mainspring Conservation Trust Preserve	Land Trust for the Little Tennessee	Private

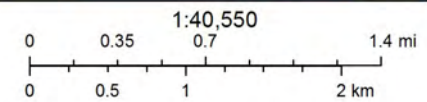
Definitions and an explanation of status designations and codes can be found at <https://ncnhde.natureserve.org/content/help>. Data query generated on April 16, 2018; source: NCNHP, Q2 April 2018. Please resubmit your information request if more than one year elapses before project initiation as new information is continually added to the NCNHP database.

NCNHDE-5805: Blair Creek Site Mitigation Project



April 16, 2018

- Project Boundary
- Buffered Project Boundary
- Managed Area (MAREA)



Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, © OpenStreetMap contributors, and the GIS User Community



United States Department of the Interior



FISH AND WILDLIFE SERVICE
Asheville Ecological Services Field Office
160 Zillicoa Street
Asheville, NC 28801-1082
Phone: (828) 258-3939 Fax: (828) 258-5330
<http://www.fws.gov/nc-es/es/countyfr.html>

In Reply Refer To:
Consultation Code: 04EN1000-2018-SLI-0352
Event Code: 04EN1000-2018-E-01045
Project Name: Blair Creek Site Mitigation Project

April 16, 2018

Subject: List of threatened and endangered species that may occur in your proposed project location, and/or may be affected by your proposed project

To Whom It May Concern:

The attached species list identifies threatened, endangered, proposed and candidate species, as well as proposed and final designated critical habitat, that may occur within the boundary of your proposed project and/or may be affected by your proposed project. Although not required by section 7, many agencies request species lists to start the informal consultation process and begin their fulfillment of the requirements under section 7(c) of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 *et seq.*).

This list, along with other helpful resources, is also available on the U.S. Fish and Wildlife Service (Service) Asheville Field Office's (AFO) website: https://www.fws.gov/raleigh/species/cntylist/nc_counties.html. The AFO website list includes “species of concern” species that could potentially be placed on the federal list of threatened and endangered species in the future. Also available are:

Design and Construction Recommendations

https://www.fws.gov/asheville/htmls/project_review/Recommendations.html

Optimal Survey Times for Federally Listed Plants

https://www.fws.gov/nc-es/plant/plant_survey.html

Northern long-eared bat Guidance

https://www.fws.gov/asheville/htmls/project_review/NLEB_in_WNC.html

Predictive Habitat Model for Aquatic Species

<https://www.fws.gov/asheville/htmls/Maxent/Maxent.html>

New information based on updated surveys, changes in the abundance and distribution of species, changed habitat conditions, or other factors could require modifications of these lists. Please note that under 50 CFR 402.12(e) of the regulations implementing section 7 of the Act, the accuracy of the species lists should be verified after 90 days. This verification can be completed formally or informally as desired. The Service recommends that verification be completed by visiting the ECOS-IPaC website or the AFO website (the AFO website dates each county list with the day of the most recent update/change) at regular intervals during project planning and implementation for updates to species lists and information. An updated list may be requested through the ECOS-IPaC system by completing the same process used to receive the enclosed list or by going to the AFO website.

The purpose of the Act is to provide a means whereby threatened and endangered species and the ecosystems upon which they depend may be conserved. Under sections 7(a)(1) and 7(a)(2) of the Act and its implementing regulations (50 CFR 402 *et seq.*), Federal agencies are required to utilize their authorities to carry out programs for the conservation of threatened and endangered species and to determine whether projects may affect threatened and endangered species and/or designated critical habitat.

A Biological Assessment is required for construction projects (or other undertakings having similar physical impacts) that are major Federal actions significantly affecting the quality of the human environment as defined in the National Environmental Policy Act (42 U.S.C. 4332(2) (c)). For projects other than major construction activities, the Service suggests that a Biological Evaluation similar to a Biological Assessment be prepared to determine whether the project may affect listed or proposed species and/or designated or proposed critical habitat. Recommended contents of a Biological Assessment are described at 50 CFR 402.12 and on our office's website at https://www.fws.gov/asheville/htmls/project_review/assessment_guidance.html.

If a Federal agency (or their non-federal representative) determines, based on the Biological Assessment or Biological Evaluation, that listed species and/or designated critical habitat may be affected by the proposed project, the agency is required to consult with the Service pursuant to 50 CFR 402. In addition, the Service recommends that candidate species, proposed species, and proposed critical habitat be addressed within the consultation. More information on the regulations and procedures for section 7 consultation, including the role of permit or license applicants, can be found in the "Endangered Species Consultation Handbook" at: <http://www.fws.gov/endangered/esa-library/pdf/TOC-GLOS.PDF>.

Though the bald eagle is no longer protected under the Endangered Species Act, please be aware that bald and golden eagles are protected under the Bald and Golden Eagle Protection Act (16 U.S.C. 668 *et seq.*), and projects affecting these species may require additional consultation (see <https://www.fws.gov/southeast/our-services/permits/eagles/>). Wind energy projects should follow the wind energy guidelines (<http://www.fws.gov/windenergy/>) for minimizing impacts to migratory birds (including bald and golden eagles) and bats.

Guidance for minimizing impacts to migratory birds for projects including communications towers (e.g., cellular, digital television, radio, and emergency broadcast) can be found at: <http://>

www.fws.gov/migratorybirds/CurrentBirdIssues/Hazards/towers/towers.htm;
<http://www.towerkill.com>; and <http://www.fws.gov/migratorybirds/CurrentBirdIssues/Hazards/towers/comtow.html>.

We appreciate your concern for threatened and endangered species. The Service encourages Federal agencies to include conservation of threatened and endangered species into their project planning to further the purposes of the Act. Please include the Consultation Tracking Number in the header of this letter with any request for consultation or correspondence about your project that you submit to our office.

Attachment(s):

- Official Species List
 - Migratory Birds
 - Wetlands
-

Official Species List

This list is provided pursuant to Section 7 of the Endangered Species Act, and fulfills the requirement for Federal agencies to "request of the Secretary of the Interior information whether any species which is listed or proposed to be listed may be present in the area of a proposed action".

This species list is provided by:

Asheville Ecological Services Field Office

160 Zillicoa Street

Asheville, NC 28801-1082

(828) 258-3939

Project Summary

Consultation Code: 04EN1000-2018-SLI-0352

Event Code: 04EN1000-2018-E-01045

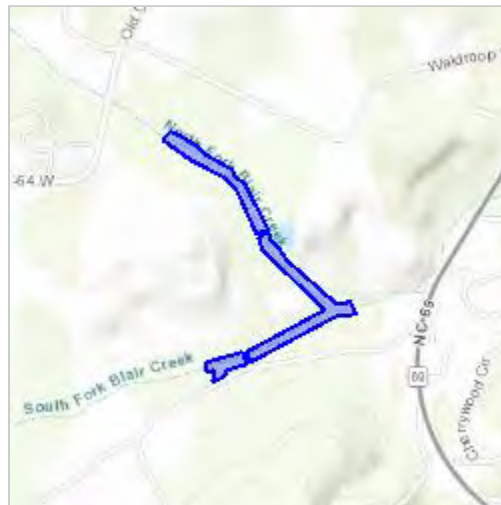
Project Name: Blair Creek Site Mitigation Project

Project Type: STREAM / WATERBODY / CANALS / LEVEES / DIKES

Project Description: The Blair Creek Site Mitigation project is proposing to restore, enhance, and preserve approximately 4,407 linear feet (LF) jurisdictional stream within the Blair Creek drainage area 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 unrestricted livestock access, current row crop production, and removal of riparian buffers. The project stream reaches are unstable, incised and exhibit active bank erosion.

Project Location:

Approximate location of the project can be viewed in Google Maps: <https://www.google.com/maps/place/35.02361532560269N83.83397089245747W>



Counties: Clay, NC

Endangered Species Act Species

There is a total of 5 threatened, endangered, or candidate species on this species list.

Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species.

IPaC does not display listed species or critical habitats under the sole jurisdiction of NOAA Fisheries¹, as USFWS does not have the authority to speak on behalf of NOAA and the Department of Commerce.

See the "Critical habitats" section below for those critical habitats that lie wholly or partially within your project area under this office's jurisdiction. Please contact the designated FWS office if you have questions.

-
1. [NOAA Fisheries](#), also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

Mammals

NAME	STATUS
Gray Bat <i>Myotis grisescens</i> No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/6329	Endangered
Indiana Bat <i>Myotis sodalis</i> There is final critical habitat for this species. Your location is outside the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/5949	Endangered
Northern Long-eared Bat <i>Myotis septentrionalis</i> No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/9045	Threatened

Flowering Plants

NAME	STATUS
Green Pitcher-plant <i>Sarracenia oreophila</i> No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/2896	Endangered

Lichens

NAME	STATUS
Rock Gnome Lichen <i>Gymnoderma lineare</i> No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/3933	Endangered

Critical habitats

THERE ARE NO CRITICAL HABITATS WITHIN YOUR PROJECT AREA UNDER THIS OFFICE'S JURISDICTION.

Migratory Birds

Certain birds are protected under the Migratory Bird Treaty Act¹ and the Bald and Golden Eagle Protection Act².

Any person or organization who plans or conducts activities that may result in impacts to migratory birds, eagles, and their habitats should follow appropriate regulations and consider implementing appropriate conservation measures, as described [below](#).

-
1. The [Migratory Birds Treaty Act](#) of 1918.
 2. The [Bald and Golden Eagle Protection Act](#) of 1940.
 3. 50 C.F.R. Sec. 10.12 and 16 U.S.C. Sec. 668(a)

The birds listed below are birds of particular concern either because they occur on the [USFWS Birds of Conservation Concern](#) (BCC) list or warrant special attention in your project location. To learn more about the levels of concern for birds on your list and how this list is generated, see the FAQ [below](#). This is not a list of every bird you may find in this location, nor a guarantee that every bird on this list will be found in your project area. To see maps of where birders and the general public have sighted birds in and around your project area, visit E-bird tools such as the [E-bird data mapping tool](#) (search for the name of a bird on your list to see specific locations where that bird has been reported to occur within your project area over a certain timeframe) and the [E-bird Explore Data Tool](#) (perform a query to see a list of all birds sighted in your county or region and within a certain timeframe). For projects that occur off the Atlantic Coast, additional maps and models detailing the relative occurrence and abundance of bird species on your list are available. Links to additional information about Atlantic Coast birds, and other important information about your migratory bird list can be found [below](#).

For guidance on when to schedule activities or implement avoidance and minimization measures to reduce impacts to migratory birds on your list, click on the PROBABILITY OF PRESENCE SUMMARY at the top of your list to see when these birds are most likely to be present and breeding in your project area.

NAME	BREEDING SEASON
Bald Eagle <i>Haliaeetus leucocephalus</i> This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities. https://ecos.fws.gov/ecp/species/1626	Breeds Sep 1 to Aug 31

NAME	BREEDING SEASON
<p>Cerulean Warbler <i>Dendroica cerulea</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/2974</p>	Breeds Apr 27 to Jul 20
<p>Eastern Whip-poor-will <i>Antrostomus vociferus</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.</p>	Breeds May 1 to Aug 20
<p>Golden-winged Warbler <i>Vermivora chrysoptera</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/8745</p>	Breeds May 1 to Jul 20
<p>Kentucky Warbler <i>Oporornis formosus</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.</p>	Breeds Apr 20 to Aug 20
<p>Prairie Warbler <i>Dendroica discolor</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.</p>	Breeds May 1 to Jul 31
<p>Red-headed Woodpecker <i>Melanerpes erythrocephalus</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.</p>	Breeds May 10 to Sep 10
<p>Rusty Blackbird <i>Euphagus carolinus</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.</p>	Breeds elsewhere
<p>Wood Thrush <i>Hylocichla mustelina</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.</p>	Breeds May 10 to Aug 31
<p>Yellow-bellied Sapsucker <i>sphyrapicus varius</i> This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA https://ecos.fws.gov/ecp/species/8792</p>	Breeds May 10 to Jul 15

Probability Of Presence Summary

The graphs below provide our best understanding of when birds of concern are most likely to be present in your project area. This information can be used to tailor and schedule your project activities to avoid or minimize impacts to birds.

Probability of Presence (■)

Each green bar represents the bird's relative probability of presence in your project's counties during a particular week of the year. (A year is represented as 12 4-week months.) A taller bar indicates a higher probability of species presence. The survey effort (see below) can be used to establish a level of confidence in the presence score. One can have higher confidence in the presence score if the corresponding survey effort is also high.

How is the probability of presence score calculated? The calculation is done in three steps:

1. The probability of presence for each week is calculated as the number of survey events in the week where the species was detected divided by the total number of survey events for that week. For example, if in week 12 there were 20 survey events and the Spotted Towhee was found in 5 of them, the probability of presence of the Spotted Towhee in week 12 is 0.25.
2. To properly present the pattern of presence across the year, the relative probability of presence is calculated. This is the probability of presence divided by the maximum probability of presence across all weeks. For example, imagine the probability of presence in week 20 for the Spotted Towhee is 0.05, and that the probability of presence at week 12 (0.25) is the maximum of any week of the year. The relative probability of presence on week 12 is $0.25/0.25 = 1$; at week 20 it is $0.05/0.25 = 0.2$.
3. The relative probability of presence calculated in the previous step undergoes a statistical conversion so that all possible values fall between 0 and 10, inclusive. This is the probability of presence score.

Breeding Season (■)

Yellow bars denote a very liberal estimate of the time-frame inside which the bird breeds across its entire range. If there are no yellow bars shown for a bird, it does not breed in your project area.

Survey Effort (|)

Vertical black lines superimposed on probability of presence bars indicate the number of surveys performed for that species in the counties of your project area. The number of surveys is expressed as a range, for example, 33 to 64 surveys.

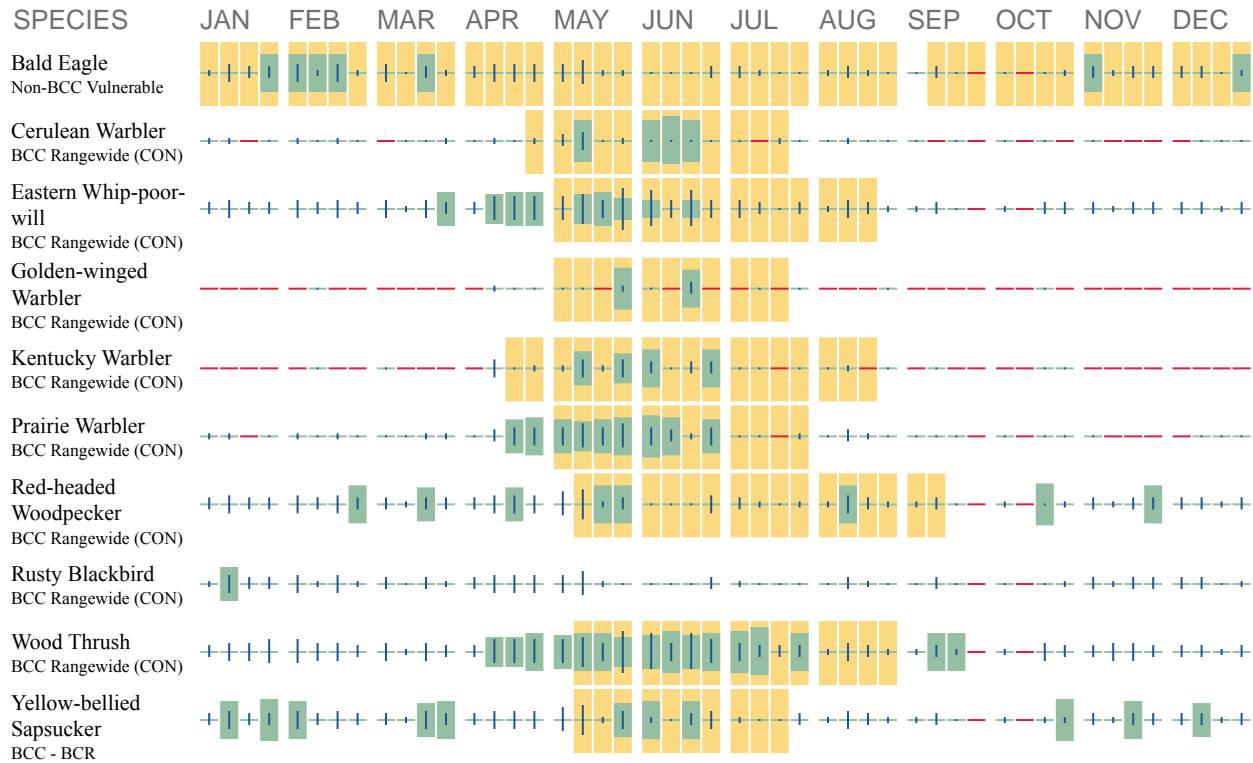
No Data (—)

A week is marked as having no data if there were no survey events for that week.

Survey Timeframe

Surveys from only the last 10 years are used in order to ensure delivery of currently relevant information.

■ probability of presence ■ breeding season | survey effort — no data



Additional information can be found using the following links:

- Birds of Conservation Concern <http://www.fws.gov/birds/management/managed-species/birds-of-conservation-concern.php>
- Measures for avoiding and minimizing impacts to birds <http://www.fws.gov/birds/management/project-assessment-tools-and-guidance/conservation-measures.php>
- Nationwide conservation measures for birds <http://www.fws.gov/migratorybirds/pdf/management/nationwidestandardconservationmeasures.pdf>

Migratory Birds FAQ

Tell me more about conservation measures I can implement to avoid or minimize impacts to migratory birds.

[Nationwide Conservation Measures](#) describes measures that can help avoid and minimize impacts to all birds at any location year round. Implementation of these measures is particularly important when birds are most likely to occur in the project area. When birds may be breeding in the area, identifying the locations of any active nests and avoiding their destruction is a very helpful impact minimization measure. To see when birds are most likely to occur and be breeding in your project area, view the Probability of Presence Summary. [Additional measures](#) and/or [permits](#) may be advisable depending on the type of activity you are conducting and the type of infrastructure or bird species present on your project site.

What does IPaC use to generate the migratory birds potentially occurring in my specified location?

The Migratory Bird Resource List is comprised of USFWS [Birds of Conservation Concern \(BCC\)](#) and other species that may warrant special attention in your project location.

The migratory bird list generated for your project is derived from data provided by the [Avian Knowledge Network \(AKN\)](#). The AKN data is based on a growing collection of [survey, banding, and citizen science datasets](#) and is queried and filtered to return a list of those birds reported as occurring in the counties which your project intersects, and that have been identified as warranting special attention because they are a BCC species in that area, an eagle ([Eagle Act](#) requirements may apply), or a species that has a particular vulnerability to offshore activities or development.

Again, the Migratory Bird Resource list includes only a subset of birds that may occur in your project area. It is not representative of all birds that may occur in your project area. To get a list of all birds potentially present in your project area, please visit the [E-bird Explore Data Tool](#).

What does IPaC use to generate the probability of presence graphs for the migratory birds potentially occurring in my specified location?

The probability of presence graphs associated with your migratory bird list are based on data provided by the [Avian Knowledge Network \(AKN\)](#). This data is derived from a growing collection of [survey, banding, and citizen science datasets](#).

Probability of presence data is continuously being updated as new and better information becomes available. To learn more about how the probability of presence graphs are produced and how to interpret them, go the Probability of Presence Summary and then click on the "Tell me about these graphs" link.

How do I know if a bird is breeding, wintering, migrating or present year-round in my project area?

To see what part of a particular bird's range your project area falls within (i.e. breeding, wintering, migrating or year-round), you may refer to the following resources: The [The Cornell Lab of Ornithology All About Birds Bird Guide](#), or (if you are unsuccessful in locating the bird of interest there), the [Cornell Lab of Ornithology Neotropical Birds guide](#). If a bird entry on your migratory bird species list indicates a breeding season, it is probable that the bird breeds in your project's counties at some point within the timeframe specified. If "Breeds elsewhere" is indicated, then the bird likely does not breed in your project area.

What are the levels of concern for migratory birds?

Migratory birds delivered through IPaC fall into the following distinct categories of concern:

1. "BCC Rangewide" birds are [Birds of Conservation Concern](#) (BCC) that are of concern throughout their range anywhere within the USA (including Hawaii, the Pacific Islands, Puerto Rico, and the Virgin Islands);
 2. "BCC - BCR" birds are BCCs that are of concern only in particular Bird Conservation Regions (BCRs) in the continental USA; and
-

3. "Non-BCC - Vulnerable" birds are not BCC species in your project area, but appear on your list either because of the [Eagle Act](#) requirements (for eagles) or (for non-eagles) potential susceptibilities in offshore areas from certain types of development or activities (e.g. offshore energy development or longline fishing).

Although it is important to try to avoid and minimize impacts to all birds, efforts should be made, in particular, to avoid and minimize impacts to the birds on this list, especially eagles and BCC species of rangewide concern. For more information on conservation measures you can implement to help avoid and minimize migratory bird impacts and requirements for eagles, please see the FAQs for these topics.

Details about birds that are potentially affected by offshore projects

For additional details about the relative occurrence and abundance of both individual bird species and groups of bird species within your project area off the Atlantic Coast, please visit the [Northeast Ocean Data Portal](#). The Portal also offers data and information about other taxa besides birds that may be helpful to you in your project review. Alternately, you may download the bird model results files underlying the portal maps through the [NOAA NCCOS Integrative Statistical Modeling and Predictive Mapping of Marine Bird Distributions and Abundance on the Atlantic Outer Continental Shelf](#) project webpage.

Bird tracking data can also provide additional details about occurrence and habitat use throughout the year, including migration. Models relying on survey data may not include this information. For additional information on marine bird tracking data, see the [Diving Bird Study](#) and the [nanotag studies](#) or contact [Caleb Spiegel](#) or [Pam Loring](#).

What if I have eagles on my list?

If your project has the potential to disturb or kill eagles, you may need to [obtain a permit](#) to avoid violating the BGEPA should such impacts occur.

Wetlands

Impacts to [NWI wetlands](#) and other aquatic habitats may be subject to regulation under Section 404 of the Clean Water Act, or other State/Federal statutes.

For more information please contact the Regulatory Program of the local [U.S. Army Corps of Engineers District](#).

Please note that the NWI data being shown may be out of date. We are currently working to update our NWI data set. We recommend you verify these results with a site visit to determine the actual extent of wetlands on site.

OTHER

- [PUSC_x](#)
-

April 17, 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, Blair Creek Site Mitigation Project
Clay 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 Clay County, North Carolina approximately 1.2 miles southwest of the town of Hayesville. The project is located on the Hayesville, NC USGS Topographic Quadrangle. The center of the project area is located at 35.0261 N and -83.8319 W. The site is located on five abutting parcels that lie east of NC-69 between Waldroup Road and Cherry Road. Please see the enclosed USGS Topographic Map for a depiction of the project site location.

The existing stream reaches have been significantly impacted by past unrestricted livestock access, current row crop production, and removal of riparian buffers. The project stream reaches are unstable, incised and exhibit active bank erosion. Baker conducted a review of the project area using the US Department of Agriculture Natural Resources Conservation Service's (USDA NRCS) Web Soil Survey. The following Farmland Classification Report and Map outlines the soils that are present within the proposed conservation easement. Based on the data determined from this review, there are a total of 8.9 acres of Prime Farmland within the project area.

Please feel free to contact me if you have any questions regarding this project or need any additional information. I can be reached at (704) 579-4828 or via my email address at ksuggs@mbakerintl.com.

Sincerely,

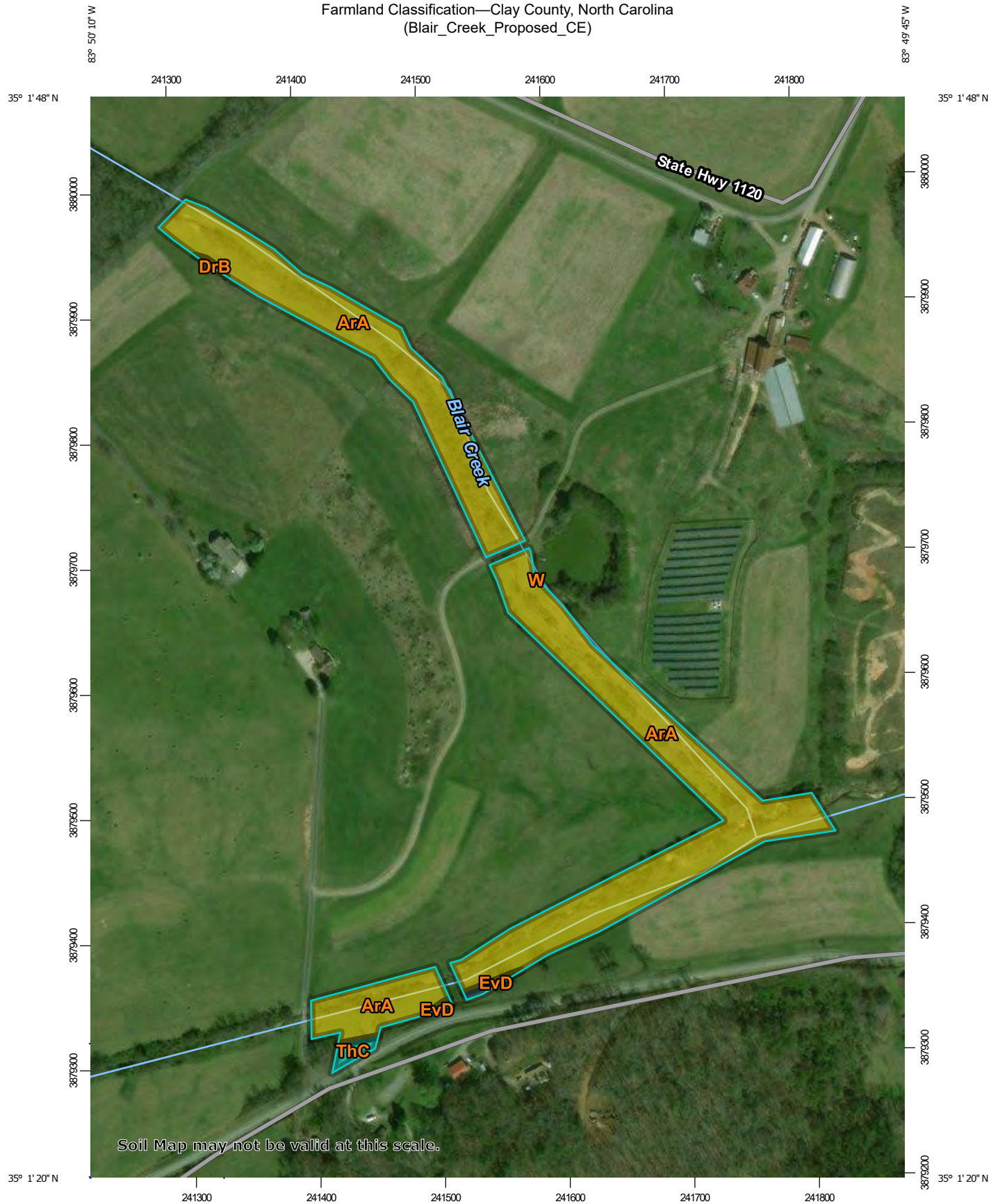


Kristi Suggs

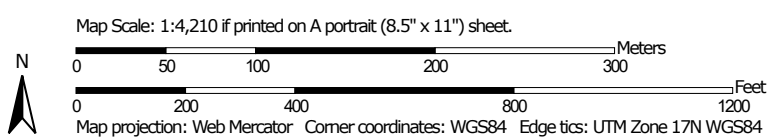
Enclosures: USGS Topographic Map
NRCS Farmland Classification Report & Map
FFPA Form AD-1006

Cc: File

Farmland Classification—Clay County, North Carolina
(Blair_Creek_Proposed_CE)




Soil Map may not be valid at this scale.



Farmland Classification—Clay County, North Carolina
(Blair_Creek_Proposed_CE)









MAP LEGEND








Area of Interest (AOI)

 Area of Interest (AOI)




Soils








Soil Rating Polygons






-  Not prime farmland
-  All areas are prime farmland
-  Prime farmland if drained
-  Prime farmland if protected from flooding or not frequently flooded during the growing season
-  Prime farmland if irrigated
-  Prime farmland if drained and either protected from flooding or not frequently flooded during the growing season
-  Prime farmland if irrigated and drained
-  Prime farmland if irrigated and either protected from flooding or not frequently flooded during the growing season

-  Prime farmland if subsoiled, completely removing the root inhibiting soil layer
-  Prime farmland if irrigated and the product of I (soil erodibility) x C (climate factor) does not exceed 60
-  Prime farmland if irrigated and reclaimed of excess salts and sodium
-  Farmland of statewide importance
-  Farmland of local importance
-  Farmland of unique importance
-  Not rated or not available







Soil Rating Lines










-  Not prime farmland
-  All areas are prime farmland
-  Prime farmland if drained

-  Prime farmland if protected from flooding or not frequently flooded during the growing season
-  Prime farmland if irrigated
-  Prime farmland if drained and either protected from flooding or not frequently flooded during the growing season
-  Prime farmland if irrigated and drained
-  Prime farmland if irrigated and either protected from flooding or not frequently flooded during the growing season
-  Prime farmland if subsoiled, completely removing the root inhibiting soil layer
-  Prime farmland if irrigated and the product of I (soil erodibility) x C (climate factor) does not exceed 60

-  Prime farmland if irrigated and reclaimed of excess salts and sodium
-  Farmland of statewide importance
-  Farmland of local importance
-  Farmland of unique importance
-  Not rated or not available


Soil Rating Points

-  Not prime farmland
-  All areas are prime farmland
-  Prime farmland if drained
-  Prime farmland if protected from flooding or not frequently flooded during the growing season
-  Prime farmland if irrigated
-  Prime farmland if drained and either protected from flooding or not frequently flooded during the growing season

-  Prime farmland if irrigated and drained
-  Prime farmland if irrigated and either protected from flooding or not frequently flooded during the growing season
-  Prime farmland if subsoiled, completely removing the root inhibiting soil layer
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Water Features

MAP INFORMATION

 Streams and Canals

Transportation

 Rails


 Interstate Highways

 US Routes

 Major Roads

 Local Roads

Background

 Aerial Photography

The soil surveys that comprise your AOI were mapped at 1:12,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service

Web Soil Survey URL:

Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Clay County, North Carolina

Survey Area Data: Version 13, Sep 26, 2017

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Oct 20, 2012—Mar 15, 2017

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Farmland Classification

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
ArA	Arkaqua loam, 0 to 2 percent slopes, frequently flooded	Prime farmland if drained and either protected from flooding or not frequently flooded during the growing season	8.9	97.8%
DrB	Dillard loam, 1 to 6 percent slopes, rarely flooded	All areas are prime farmland	0.0	0.2%
EvD	Evard-Cowee complex, 15 to 30 percent slopes	Farmland of local importance	0.1	0.7%
ThC	Tate loam, 8 to 15 percent slopes	Farmland of statewide importance	0.1	1.3%
W	Water	Not prime farmland	0.0	0.0%
Totals for Area of Interest			9.1	100.0%

Description

Farmland classification identifies map units as prime farmland, farmland of statewide importance, farmland of local importance, or unique farmland. It identifies the location and extent of the soils that are best suited to food, feed, fiber, forage, and oilseed crops. NRCS policy and procedures on prime and unique farmlands are published in the "Federal Register," Vol. 43, No. 21, January 31, 1978.

Rating Options

Aggregation Method: No Aggregation Necessary

Tie-break Rule: Lower



Natural Resources
Conservation Service

May 24, 2018

North Carolina
State Office

4407 Bland Road
Suite 117
Raleigh, NC 27609
Voice 919-873-2171
Fax 844-325-6833

Kristi Suggs
Michael Baker International Inc.
Ballantyne One, 15720 Brixham Hill Avenue
Charlotte, NC 28277

Subject: Prime and Important Farmland Soils, NCDMS, Blair Creek Site
Mitigation Project, Clay County, NC

Dear Kristi Suggs:

The following guidance is provided for your information.

Projects are subject to the Farmland Protection Policy Act (FPPA) requirements if they may irreversibly convert farmland (directly or indirectly) to non-agricultural use and are completed by a federal agency or with assistance from a federal agency. Farmland means prime or unique farmlands as defined in section 1540(c)(1) of the FPPA or farmland that is determined by the appropriate state or unit of local government agency or agencies with concurrence of the Secretary of Agriculture to be farmland of statewide local importance.

For the purpose of FPPA, farmland includes prime farmland, unique farmland, and land of statewide or local importance. Farmland subject to FPPA requirements does not have to be currently used for cropland. It can be forestland, pastureland, cropland, or other land, but not water or urban built-up land.

Farmland does not include land already in or committed to urban development or water storage. Farmland already in urban development or water storage includes all such land with a density of 30 structures per 40-acre area. Farmland already in urban development also includes lands identified as urbanized area (UA) on the Census Bureau Map, or as urban area mapped with a tint overprint on the United States Geological Survey (USGS) topographical maps, or as urban-built-up on the United States Department of Agriculture (USDA) Important Farmland Maps.

The area in question meets one or more of the above criteria for Farmland. Farmland area will be affected or converted. Enclosed is the Farmland Conversion Impact Rating form AD1006 with PARTS II, IV and V completed by NRCS. The corresponding agency will need to complete the evaluation, according to the Code of Federal Regulation 7CFR 658, Farmland Protection Policy Act.

The Natural Resources Conservation Service
is an agency of the Department of Agriculture's
Natural Resources mission.

An Equal Opportunity Provider, Employer, and Lender

Kristi Suggs
Page 2

If you have any questions, please contact us at 919-873-2171 or by email:
milton.cortes@nc.usda.gov.

Again, thank you for writing. If we can be of further assistance, please do not
hesitate to contact us.

Sincerely,

Milton Cortes

Milton Cortes
Acting State Soil Scientist

FARMLAND CONVERSION IMPACT RATING

PART I <i>(To be completed by Federal Agency)</i>		Date Of Land Evaluation Request			
Name of Project		Federal Agency Involved			
Proposed Land Use		County and State			
PART II <i>(To be completed by NRCS)</i>		Date Request Received By NRCS		Person Completing Form:	
Does the site contain Prime, Unique, Statewide or Local Important Farmland? <i>(If no, the FPPA does not apply - do not complete additional parts of this form)</i>		YES <input type="checkbox"/>	NO <input type="checkbox"/>	Acres Irrigated	Average Farm Size
Major Crop(s)	Farmable Land In Govt. Jurisdiction Acres: %	Amount of Farmland As Defined in FPPA Acres: %			
Name of Land Evaluation System Used	Name of State or Local Site Assessment System	Date Land Evaluation Returned by NRCS			
PART III <i>(To be completed by Federal Agency)</i>		Alternative Site Rating			
		Site A	Site B	Site C	Site D
A. Total Acres To Be Converted Directly					
B. Total Acres To Be Converted Indirectly					
C. Total Acres In Site					
PART IV <i>(To be completed by NRCS)</i> Land Evaluation Information					
A. Total Acres Prime And Unique Farmland					
B. Total Acres Statewide Important or Local Important Farmland					
C. Percentage Of Farmland in County Or Local Govt. Unit To Be Converted					
D. Percentage Of Farmland in Govt. Jurisdiction With Same Or Higher Relative Value					
PART V <i>(To be completed by NRCS)</i> Land Evaluation Criterion Relative Value of Farmland To Be Converted (Scale of 0 to 100 Points)					
PART VI <i>(To be completed by Federal Agency)</i> Site Assessment Criteria <i>(Criteria are explained in 7 CFR 658.5 b. For Corridor project use form NRCS-CPA-106)</i>		Maximum Points	Site A	Site B	Site C
1. Area In Non-urban Use		(15)			
2. Perimeter In Non-urban Use		(10)			
3. Percent Of Site Being Farmed		(20)			
4. Protection Provided By State and Local Government		(20)			
5. Distance From Urban Built-up Area		(15)			
6. Distance To Urban Support Services		(15)			
7. Size Of Present Farm Unit Compared To Average		(10)			
8. Creation Of Non-farmable Farmland		(10)			
9. Availability Of Farm Support Services		(5)			
10. On-Farm Investments		(20)			
11. Effects Of Conversion On Farm Support Services		(10)			
12. Compatibility With Existing Agricultural Use		(10)			
TOTAL SITE ASSESSMENT POINTS		160			
PART VII <i>(To be completed by Federal Agency)</i>					
Relative Value Of Farmland <i>(From Part V)</i>		100			
Total Site Assessment <i>(From Part VI above or local site assessment)</i>		160			
TOTAL POINTS <i>(Total of above 2 lines)</i>		260			
Site Selected:	Date Of Selection	Was A Local Site Assessment Used? YES <input type="checkbox"/> NO <input type="checkbox"/>			
Reason For Selection:					
Name of Federal agency representative completing this form:					Date:

May 14, 2018

United States Fish and Wildlife Service
Asheville Ecological Services Field Office
Attn: Marella Buncick, Endangered Species Biologist
160 Zillicoa Street
Asheville, NC 28801

RE: Categorical Exclusion for Blair Creek Site Mitigation Project,
NCDEQ DMS Full-Delivery Project ID #100047, Clay County, NC
Hiwassee River Basin Cataloging Unit 06020002

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 Blair Creek Site Mitigation Project. Please note that this request is in support of the development of the Categorical Exclusion (CE) for the referenced project.

The Blair 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 Hiwassee River Basin, Cataloging Unit 06020002. The project is located in Clay County and the NC DMS Targeted Local Watershed (TLW) 06020002-060010. The site is located on five abutting parcels that lie east of NC-69 between Waldroup Road and Cherry Road.

The existing stream reaches have been significantly impacted by past unrestricted livestock access, current row crop production, and removal of riparian buffers. The project stream reaches are unstable, incised and exhibit active bank erosion. The project will involve the restoration and enhancement of approximately 4,015 linear feet (LF) of existing stream within the Blair Creek drainage area. 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.

In addition, degraded riparian wetlands will be restored or enhanced by implementing Priority Level 1 restoration and revegetation of the riparian buffer. 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. Existing functional wetlands will be incorporated inside the conservation easement. The conservation easement will protect the entire project area in perpetuity and will be held by the State of North Carolina. Livestock will remain excluded from the conservation easement with permanent fencing.

Data Review and Analysis

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/clay.html>) and the North Carolina Wildlife Resources Commission (NCWRC) there are six federally-listed species in Clay County. Baker conducted an additional on-line review of the project area with the use of the United States Fish and Wildlife Service (USFWS) IPAC website (<https://ecos.fws.gov/ipac/>), on April 16, 2018. This review generated an *Official Species List* (OSL), which identifies threatened, endangered, proposed and candidate

species, as well as proposed and final designated critical habitat, that may occur within the boundary of the proposed project and/or may be affected by proposed project. Results from review, found the following five federally listed species. No USFWS designated critical habitats were located within the project boundaries.

Scientific Name	Common Name	Federal Status
<i>Myotis grisescens</i>	Gray Bat	Endangered
<i>Myotis sodalis</i>	Indiana Bat	Endangered
<i>Myotis septentrionalis</i>	Northern long-eared bat	Threatened
<i>Sarracenia orephila</i>	Green Pitcher plant	Endangered
<i>Gymnoderma lineare</i>	Rock Gnome Lichen	Endangered

Baker conducted a two-mile radius search using the Natural Heritage Program (NCNHP) Data Explorer (<https://ncnhde.natureserve.org/>) on April 16, 2018 for the above referenced species. Results from this search and found no known occurrences of any of the above referenced species within two miles of the project site.

***Myotis grisescens* (Gray Bat) – Endangered**

USFWS optimal survey window: May15-August 15 (summer); January 15-February 15 (winter)

The gray bat is the largest member of its genus in the eastern United States, and is easily distinguishable from all other bats within its range by its mono-colored fur. Following molt in July or August, gray bats are dark gray, but they often bleach to chestnut brown or russet between molts (especially apparent in reproductive females during May and June). The wing membrane connects to the foot at the ankle rather than at the base of the first toe, as in other species of *Myotis*.

Gray bats roost predominantly in caves year-round. Most winter caves are deep and vertical, while cave types vary during the spring and fall transient periods. In summer, maternity colonies prefer caves that act as warm air traps or that provide restricted rooms or domed ceilings that are capable of trapping the combined body heat from thousands of clustered individuals, and are located within one half mile of a river or reservoir, which provides foraging habitat.

No critical habitat has been designated for this species.

***Myotis sodalist* (Indiana Bat) – Endangered**

USFWS optimal survey window: May15 - August 15 (summer)

The Indiana bat is a medium-sized bat, with a head and body length ranging from 1.6 – 1.9 in. The species closely resembles the little brown bat (*Myotis lucifugus*) and the northern long-eared bat (*Myotis septentrionalis*). Its hind feet tend to be small and delicate with fewer, shorter hairs than other bats of the *Myotis* genus. The fur lacks luster. The ears and wing membranes have a dull appearance and flat coloration that does not contrast with the fur. The fur of the chest and belly is lighter than the pinkish-brown fur on the back, but does not contrast as strongly as does that of the little brown or northern long-eared bats.

Indiana bats winter in caves or mines with stable, but not freezing, cold temperatures. In summer they generally roost in the loose bark of trees, either dead trees with peeling bark, or live trees with shaggy bark, such as white oak and some hickories.

Critical Habitat for the Indiana Bat was designated on September 24, 1976. Based on the IPAC Official Species List generated, the project lies outside the critical habitat.

***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. No critical habitat has been designated for this species.

***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: File

Enclosures

May 14, 2018

NC Wildlife Resources Commission
Division of Inland Fisheries
Attn: Shannon Deaton
Shannon.deaton@ncwildlife.org

RE: Categorical Exclusion for Blair Creek Site Mitigation Project,
NCDEQ DMS Full-Delivery Project ID #100047, Clay County, NC
Hiwassee River Basin Cataloging Unit 06020002

Dear Ms. Deaton:

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The Blair 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 Hiwassee River Basin, Cataloging Unit 06020002. The project is located in Clay County and the NC DMS Targeted Local Watershed (TLW) 06020002-060010. The site is located on five abutting parcels that lie east of NC-69 between Waldroup Road and Cherry Road.

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affected by proposed project. Results from review, found the following five federally listed species. No USFWS designated critical habitats were located within the project boundaries.

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Gray bats roost predominantly in caves year-round. Most winter caves are deep and vertical, while cave types vary during the spring and fall transient periods. In summer, maternity colonies prefer caves that act as warm air traps or that provide restricted rooms or domed ceilings that are capable of trapping the combined body heat from thousands of clustered individuals, and are located within one half mile of a river or reservoir, which provides foraging habitat.

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The Indiana bat is a medium-sized bat, with a head and body length ranging from 1.6 – 1.9 in. The species closely resembles the little brown bat (*Myotis lucifugus*) and the northern long-eared bat (*Myotis septentrionalis*). Its hind feet tend to be small and delicate with fewer, shorter hairs than other bats of the *Myotis* genus. The fur lacks luster. The ears and wing membranes have a dull appearance and flat coloration that does not contrast with the fur. The fur of the chest and belly is lighter than the pinkish-brown fur on the back, but does not contrast as strongly as does that of the little brown or northern long-eared bats.

Indiana bats winter in caves or mines with stable, but not freezing, cold temperatures. In summer they generally roost in the loose bark of trees, either dead trees with peeling bark, or live trees with shaggy bark, such as white oak and some hickories.

Critical Habitat for the Indiana Bat was designated on September 24, 1976. Based on the IPAC Official Species List generated, the project lies outside the critical habitat.

***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

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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: File

Enclosures



⊠ North Carolina Wildlife Resources Commission ⊠

Gordon Myers, Executive Director

June 13, 2018

Kristi Suggs
Michael Baker International
15720 Brixham Hill Ave, Suite 300, Office 318
Charlotte, NC 28277

SUBJECT: Blair Creek Site Mitigation Project
Blair Creek & tributaries, Clay County

Dear Ms. Suggs:

Biologists with the North Carolina Wildlife Resources Commission (NCWRC) received your May 14, 2018 letter regarding plans for a stream restoration project on Blair Creek, North Fork Blair Creek, and South Fork Blair Creek in Clay County. You requested review and comment on the project. Our comments on this project are offered for your consideration under provisions of the Clean Water Act of 1977 (33 U.S.C. 466 et. seq.) and Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S.C. 661-667d).

The project will involve stream restoration on 4,015 ft of stream. It is anticipated that degraded riparian wetlands will be restored or enhanced with the Priority 1 stream restoration strategy. Cattle will be fenced from the easement.

The project drains to the Hiwassee River, which has a wild Rainbow Trout population, and a moratorium between January 1 and April 15 will need to be observed.

We recommend that riparian buffers that are to be reestablished be as wide as possible, given site constraints and landowner needs. NCWRC generally recommends a woody buffer of 100 feet on perennial streams in order to maximize the benefits of buffers, including bank stability, stream shading, treatment of overland runoff, and wildlife habitat.

Thank you for the opportunity to review and comment on this project. Please contact me at (828) 803-6054 if you have any questions about these comments.

Sincerely,

Andrea Leslie
Mountain Region Coordinator
Habitat Conservation Program

From: Clemmons, Micky
Sent: Friday, June 22, 2018 8:43 AM
To: 'Leslie, Andrea J' <andrea.leslie@ncwildlife.org>
Subject: RE: EXTERNAL: RE: [External] Blair Creek Site Mitigation Project; Blair Creek & tributaries, Clay County

Andrea,
I appreciate your further consideration of this issue and understand that this is a difficult situation. I agree that the information that you have requested would provide a better opportunity to evaluate potential impacts. Unfortunately, at this point we are just beginning to develop plans for this site. We will not have survey information for the site until August, so until we have that we cannot begin to develop detailed site plans. At this point in time we hope to complete planning, document prep, permitting and the various reviews that are needed to begin construction in the spring, but any significant delays and we would not be able to start until after the moratorium anyway. I think at this point the best thing to do is for Baker to assume that there may be a moratorium and we all deal with it during permitting when we have better project specifics. No need to waste energy on it now if we aren't going to be ready for construction during the moratorium time period. I will touch base with you when we get to that point if it looks like there is going to be a conflict.
Again, thanks for taking another look,
Micky

PS: Sorry I missed you call yesterday, I was up in Mitchell County chasing the next project – a never ending process!

From: Leslie, Andrea J [mailto:andrea.leslie@ncwildlife.org]
Sent: Thursday, June 21, 2018 10:23 AM
To: Clemmons, Micky <Mclemmons@mbakerintl.com>
Cc: Suggs, Kristi <KSuggs@mbakerintl.com>; Wheeler, A. Powell <powell.wheeler@ncwildlife.org>
Subject: EXTERNAL: RE: [External] Blair Creek Site Mitigation Project; Blair Creek & tributaries, Clay County

Micky,

I spoke with Powell about your request. A RBT moratorium for the project would possibly be imposed to protect spawning in the Hiwassee River, which has a robust RBT population. We are sympathetic to the want to work during the growing season, as this does enable better vegetative survival. However, given the information we have about the project at this point, we cannot make a call about whether we will require or lift the moratorium for the project. We have observed numerous restoration projects that have resulted in sediment loss downstream, whether due to storm events, mistakes, or project design. There are a few pieces of information that will inform our decision, which include the following:

- * Details on the project. Up to this point, we have seen no plans for the project. We would need these to evaluate the risk of sediment loss. Information on how the project would be staged, including the timing of the project would need to be included. In addition, we'd need to know what specific measures you would take to control sediment that are above and beyond to minimize risk from this particular project.
- * What is the timing of this project and when a decision on the moratorium needed? When will you be applying for a permit?
- * Currently, there is a warmwater release from Lake Chatuge due to problems at the dam. This may impact the RBT population in the Hiwassee River and our need for a moratorium. NCWRC will monitor the trout population in the river to determine the impacts of this warmwater release.

Any questions, please feel free to call or email.

Andrea

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

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From: Clemmons, Micky [mailto:Mclemmons@mbakerintl.com]
Sent: Monday, June 18, 2018 3:21 PM
To: Leslie, Andrea J <andrea.leslie@ncwildlife.org>
Cc: Suggs, Kristi <KSuggs@mbakerintl.com>
Subject: [External] Blair Creek Site Mitigation Project; Blair Creek & tributaries, Clay County

CAUTION: External email. Do not click links or open attachments unless verified. Send all suspicious email as an attachment to Report Spam.

Andrea,
Baker received your letter of June 13, 2018 in response to our request for NCWRC comments on our recently contracted Blair Creek Mitigation Site in Clay County. I am writing to request that you reconsider imposing the modified trout moratorium which would require that we not do any construction during the period January 1 to April 15. I completely understand the consideration behind requesting this moratorium and would not object if I thought that our project would impact a trout population. However, I believe that it is overly cautious to impose this restriction at this particular project site for a few reasons. Please consider the following:

1. The project site is 1.47 miles from the Hiwassee River (see attached map) which is the closest viable population in the course of this watershed. Given that we observe strict erosion control practices, such as grading offline whenever possible, pumping any stream flow around active work in the existing channel and daily stabilization activities such as mulching, seeding and placement of erosion control matting, we do not believe that any sedimentation from this project will move off site. Given these practices even turbidity will be minimal and will not be present as far downstream as the Hiwassee River.
2. The landowner that we are working with has never seen trout in Blair Creek at the project site, which is understandable given the sand and silt that make up most of the stream bed. He has seen some warm-water species that he felt had moved upstream from the river, but not cold-water species.
3. Blair Creek between the project site and the Hiwassee River either flows through areas developed as commercial business property or pastures. The stream likely suffers from rapid rise in stage during winter storms due to the impervious surface area along highway 69. Most of the 1.47 miles is livestock pasture and only has a minimal vegetated buffer.
4. I do not believe that trout can successfully spawn in this stream given both temperature (a

springtime problem but potentially to high) and limited spawning gravel. I would not be surprised if trout from the river attempt to spawn, but I would be very surprised if any eggs or fry that might be produced could survive. Particularly, given the winter impacts of livestock on the stream banks.

5. Lastly, given that the moratorium is designed to protect eggs and fry that are in the gravel during the specified time of year, it is unlikely that any turbidity from the site would come in contact with eggs or fry. I feel safe in saying this since it is doubtful that trout reproduction occurs in the river channel proper and as stated there is little or no spawning habitat in Blair Creek.

In summary, I am asking for you to reconsider your requirement that we observe the rainbow trout moratorium at the Blair Creek site given the poor stream and buffer habitat that exists between the project site and the Hiwassee River and the significant distance over this reach. While we normally support the protection that the moratorium provides to cold-water resources, we feel that this site is too marginal for it to be applied and potentially limit our ability to improve habitat conditions right before and during spring when plant growth is most vigorous. While we are not sure of our construction window of time right now, we would like to have the latitude to work during the specified period, if needed. If this you feel that this request should be submitted in writing through the Habitat Conservation Office I will be glad to do that; however, I thought I would get you thoughts on these points and the overall request before doing that. I appreciate your consideration of this request and if I have missed an important point regarding this situation please let me know or if there is sample data that proves my thoughts here are wrong, I would appreciate being corrected.

Thank you,
Micky

Micky Clemmons | Project Manager - Ecosystem Restoration | Michael Baker International
797 Haywood Road, Suite 201 | Asheville, NC 28806 | [O] 828-412-6100 | [M] 828-734-7445
mcllemmons@mbakerintl.com | www.mbakerintl.com

APPENDIX J: HYDRIC SOILS REPORT



**Hydric Soils Investigation
Blair Creek Mitigation Project**

Clay County, NC

Prepared by:

Michael Baker
I N T E R N A T I O N A L

Michael Baker Engineering, Inc.
8000 Regency Parkway – Suite 600
Cary, NC 27518

Scott E King



The seal is circular with a serrated border. It features a central triangle containing a sunburst and the letters 'PWS'. The triangle is surrounded by the words 'EDUCATION', 'EXPERIENCE', and 'ETHICS'. The outer ring of the seal contains the text 'SWS' on the left, 'PCP' on the right, and 'PROFESSIONAL WETLAND SCIENTIST' at the bottom. The name 'SCOTT E. KING' and the year '1908' are also inscribed within the seal.

Scott E. King, LSS #1301

May 29, 2018

Introduction

Michael Baker Engineering, Inc. conducted a hydric soils investigation along the floodplains of the North Fork of Blair Creek (Reach R1), South Fork of Blair Creek (Reach R2), to the upper portion of the mainstem of Blair Creek itself (Reach R3) in Clay County, NC for the purpose of identifying potential opportunities for historic wetland restoration as part of a proposed mitigation project for the NC Division of Mitigation Services (DMS). More specifically, the investigation was to confirm of the presence and location of any hydric soils found on site. Currently, the approximately 10-acre subject area (represented by a potential conservation easement boundary) is mostly managed as hay pasture with a narrow buffer of dense privet located along the majority of the stream length.

Methodology

Prior to the field investigation, the NRCS soils layer was reviewed for the site (Figure 1), along with the NRCS' most recent compilation of hydric soils for Clay County, North Carolina (Dec. 2015). Arkaqua loam (0-2% slopes, frequently flooded) was found to be mapped throughout the floodplains of the subject area, with Dillard loam (1-6% slopes) mapped outside of the Arkaqua on the upper and middle portions of Reach R1. Both the Arkaqua and Dillard soil series are recognized NRCS-listed Hydric Soils for Clay County. Arkaqua loams are taxonomically categorized Fine-loamy, mixed, active, mesic Fluvaquentic Dystrudepts, while Dillard loams are categorized as Fine-loamy, mixed, semiactive, mesic Aquic Hapludults. Additionally, Toxaway silt loam (Fine-loamy, mixed, superactive, nonacid, mesic Cumulic Humaquepts) is listed as a component soil series of Arkaqua in the NRCS descriptions, and Hemphill clay loam (Fine, mixed, active, mesic Umbric Endoaqualfs) is listed as a component of Dillard. Both Toxaway and Hemphill are also listed as Hydric Soils for Clay County.

The USGS map for the subject area (Hayesville Quad) was also reviewed (Figure 2). It identifies the North Fork of Blair Creek, the South Fork of Blair Creek, and Blair Creek itself as being named blue-line streams ultimately flowing east through the project site. A significant flowing unnamed tributary (Reach UT1) was also discovered in the field flowing into the upper section of the South Fork of Blair Creek, but is not shown on the USGS map. Additionally, NWI data from the USFWS was reviewed for the site but did not reveal the presence of any previously identified wetlands located along the floodplain of the site.

Hand-turned soil auger borings and soils analyses were conducted throughout the subject area, and the hydric soil boundary was marked using the 133 GPS points subsequently captured with a TopCon Tesla Real Time Kinematic (RTK) GNSS Receiver. This device collects survey data to a minimum Class B Horizontal Accuracy and all points were georeferenced to the NAD83 State Plane Coordinate System in US Survey Feet. This survey system is capable of collecting point data with an accuracy of less than one tenth of a foot. Hydric soils were identified using the NRCS document "Field Indicators of Hydric Soils in the United States: A Guide for Identifying

and Delineating Hydric Soils, Version 7.0, 2010". Nine representative boring descriptions are provided in this report.

Results and Conclusions

The on-site field investigation was conducted in May of 2018. Extensive areas of hydric soils and buried hydric soils (predominantly located under dredged spoil berms) were discovered throughout the floodplain, totaling 13.7 acres, as shown in Figure 3. Arkaqua loams with pockets of Toxaway silt loam soils were confirmed as being present throughout the project assessment area.

Soils meeting hydric status were described by one or more of the following hydric soil indicators described below:

F3 Depleted Matrix:

A layer that has a depleted matrix with 60 percent or more chroma of 2 or less and that has a minimum thickness of either:

- a. 5 cm (2 inches) if the 5 cm is entirely within the upper 15 cm (6 inches) of the soil, or
- b. 15 cm (6 inches), starting within 25 cm (10 inches) of the soil surface.

F6 Redox Dark Surface:

A layer that is at least 10 cm (4 inches) thick, is entirely within the upper 30 cm (12 inches) of the mineral soil, and has:

- a. Matrix value of 3 or less and chroma of 1 or less and 2 percent or more distinct or prominent redox concentrations occurring as soft masses or pore linings, or
- b. Matrix value of 3 or less and chroma of 2 or less and 5 percent or more distinct or prominent redox concentrations occurring as soft masses or pore linings.

F8 Redox Depressions:

In closed depressions subject to ponding, 5 percent or more distinct or prominent redox concentrations occurring as soft masses or pore linings in a layer that is 5 cm (2 inches) or more thick and is entirely within the upper 15 cm (6 inches) of the soil.

Furthermore, with regards to mitigation potential, three categories of hydric soil were discovered on site:

1. Hydric soils appropriate for restoration. These are the areas that meet one or more hydric soil indicators and appear to have been hydrologically impacted by stream downcutting and/or the ditching or straightening of various stream sections and connecting tributaries, and by the installation of drainage ditches and buried field drain pipes. They have also been significantly impacted by the removal of natural wetland vegetation as they are currently managed as hay pasture, or have dense privet. They are suitable for wetland restoration through re-establishment, presumably as part of a Priority Level I restoration of the North and South Forks of Blair Creek, and by the removal of the existing field ditches and drainage pipes. That will

restore groundwater hydrology and increase flooding frequency to these areas. Additionally, the planting of a full riparian buffer would restore the appropriate vegetation to the wetlands. This hydric soil category accounts for 6.1 acres of the total hydric soil identified for the site, 2.6 acres of which are located within the currently proposed conservation easement.

2. Buried hydric soils. These are hydric soil areas that have had human-deposited fill material placed on their surface in the form of dredge spoil taken from the stream and placed along the stream bank as a berm, or as upland soil fill placed in low-lying wetter areas to make them more suitable for agricultural use. While a range of fill depths were observed, the average depth of removal required to restore hydric soils was roughly 0.5 ft, and all areas were less than 1.0 ft. Clear spoil berms from dredged stream material were found along lengthy sections of both banks of Reaches 1 and 3, and along the left bank for Reach R2. The removal of these spoil berms should be addressed in any mitigation design plan, but they are suitable for restoration through re-establishment with this spoil removal. Additional fill areas were discovered in the low-lying hay field between Reaches R1 and R2 before their confluence, but this area is largely located outside the proposed conservation easement. This hydric soil category accounts for 3.5 acres of the total hydric soil identified for the site, 2.5 acres of which are located within the currently proposed conservation easement

3. Hydric soils located within existing wetland areas. The existing wetlands are found in scattered pockets throughout the floodplain of all reaches, many of which overlap with the proposed conservation easement. These soils account for approximately 4.1 acres of the total hydric soil identified, roughly 0.88 acres of which lie within the currently proposed easement. These estimates are approximate until the wetland areas are confirmed by the Corps of Engineers. The wetlands appear suitable for a mix of either restoration-by-rehabilitation or enhancement depending on the differing levels of impact observed to each area.

References

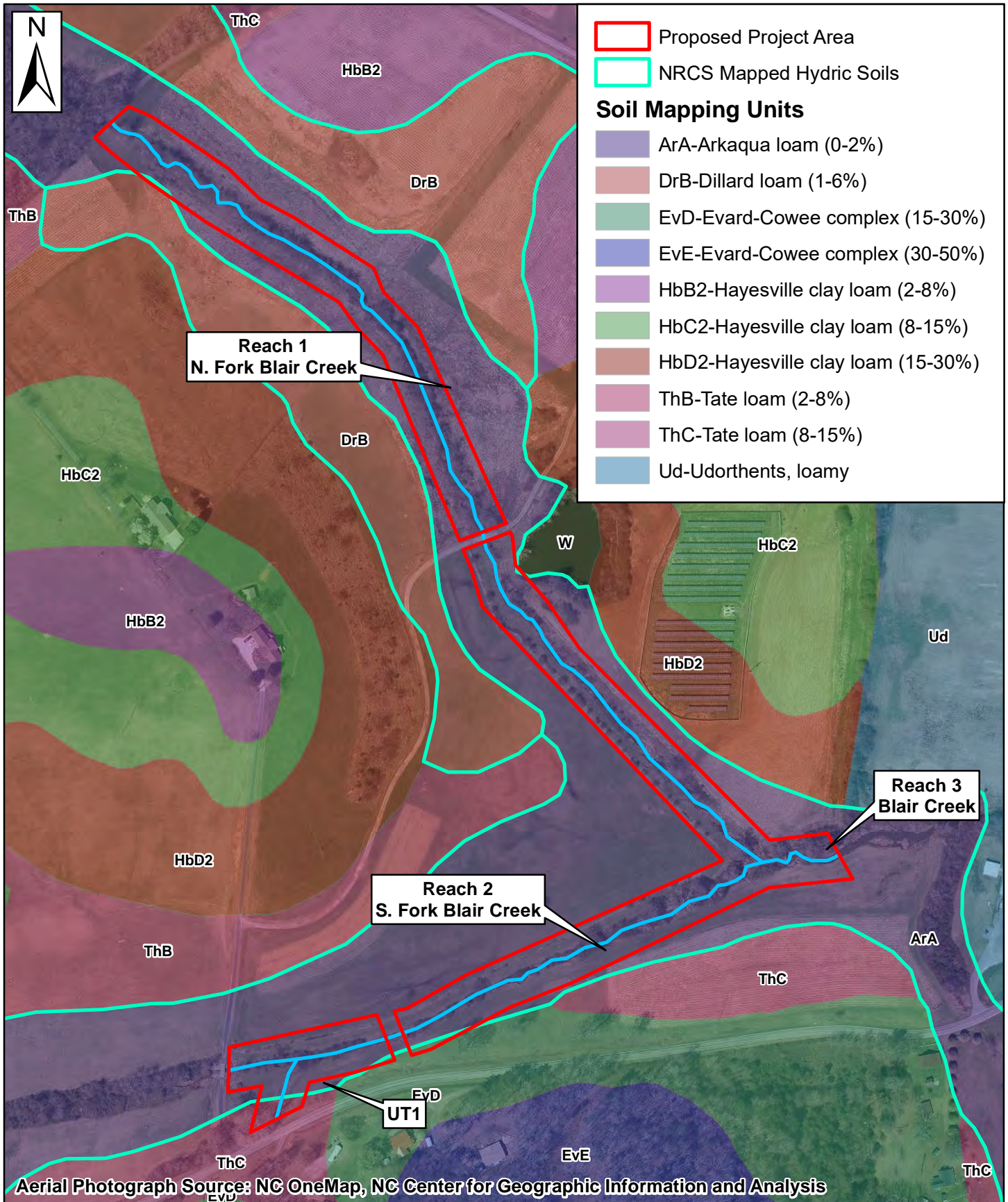
Soil Survey Staff. Gridded Soil Survey Geographic (gSSURGO) Database for North Carolina. United States Department of Agriculture, Natural Resources Conservation Service. Available online at <https://gdg.sc.egov.usda.gov/>. (FY2016 official release).

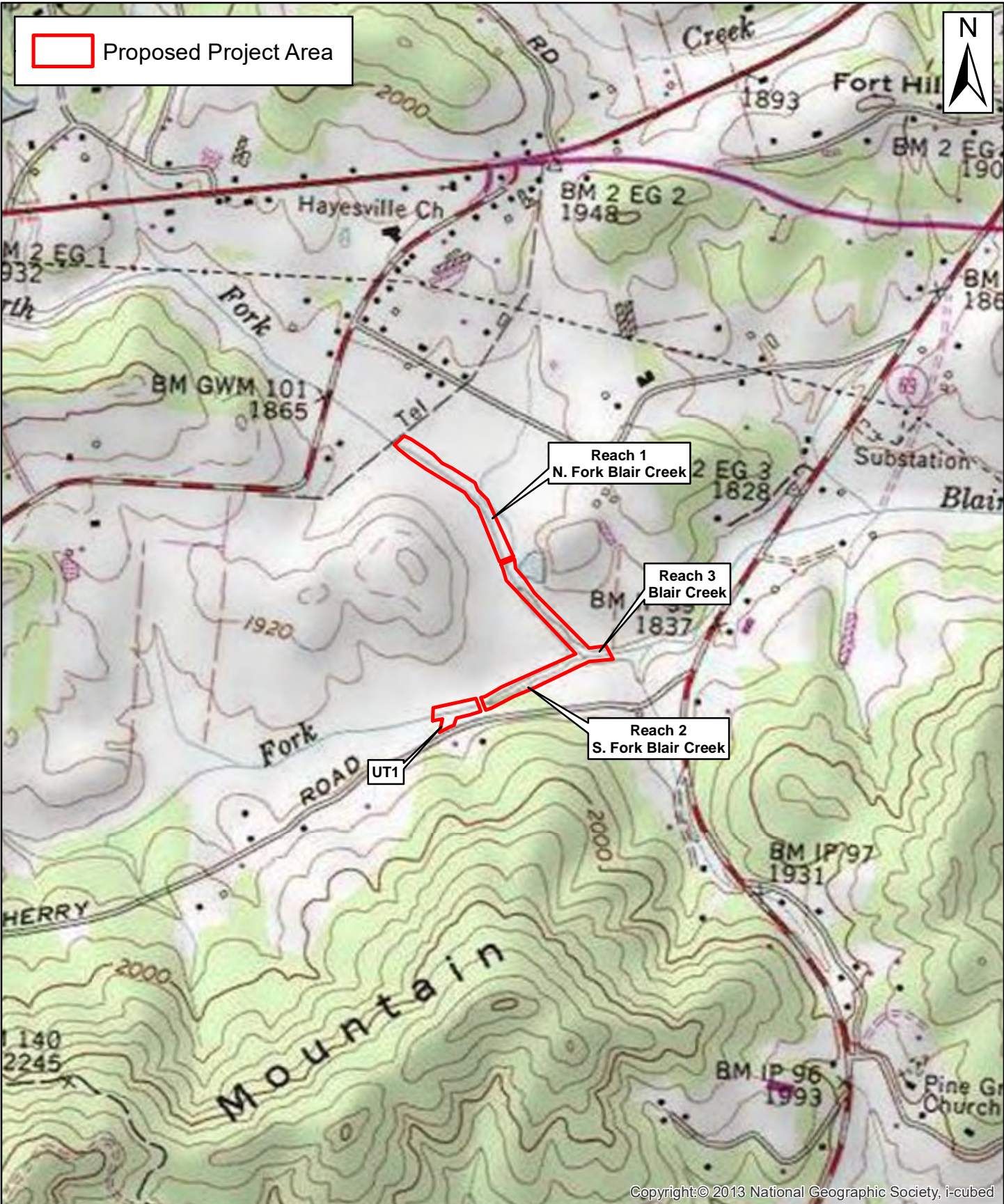
Soil Survey Staff, Natural Resources Conservation Service, United States Department of Agriculture. Web Soil Survey. Available online at <http://websoilsurvey.nrcs.usda.gov/>. Accessed 04/18/2016.

Natural Resource Conservation Service (NRCS) National List of Hydric Soils of the United States, December 2015 revision.

United States Department of Agriculture, Natural Resources Conservation Service. 2010. *Field Indicators of Hydric Soils in the United States*, Version 7.0. L.M. Vasilas, G.W. Hurt, and C.V. Noble (eds.). USDA, NRCS, in cooperation with the National Technical Committee for Hydric Soils.

United States Fish and Wildlife Service. Publication date (23 September 2016). National Wetlands Inventory website. U.S. Department of the Interior, Fish and Wildlife Service, Washington, D.C. <http://www.fws.gov/wetlands/>





Michael Baker
INTERNATIONAL

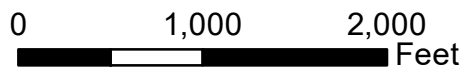
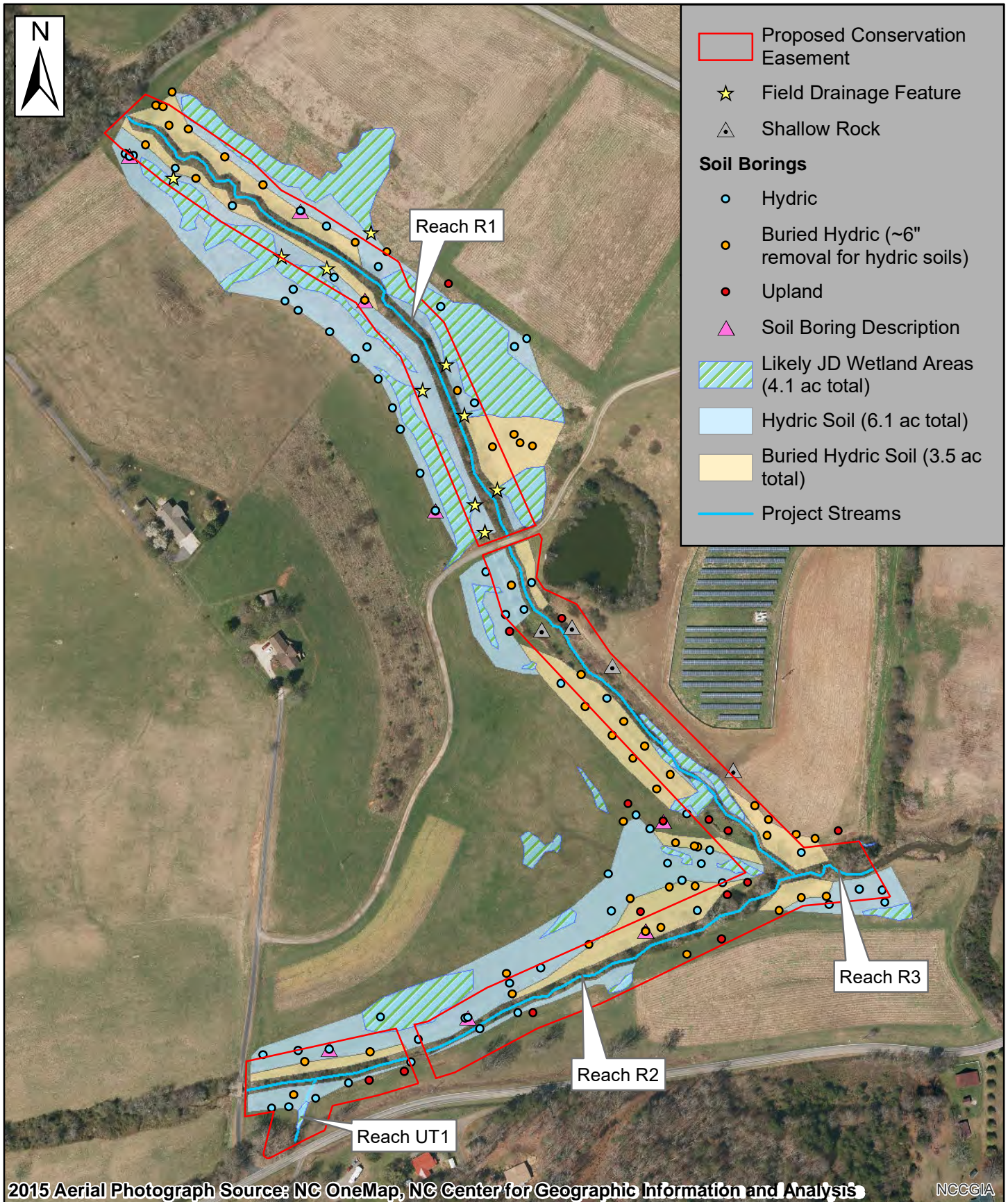


Figure 2
USGS Topographic Map
(Hayesville Quadrangle)
Blair Creek Site



Soil Description Form

Project: Blair Cr

County: Clay

Date:

Staff: SK



Boring	Horizon	Depth	Texture / Structure / Consistence	Matrix Color	Mottle Color(s) (Quantity / Size / Contrast)
① W-1 walked H	A	0-1	Silt Loam	10YR 3/3	—
	B1	1-6	Silt Loam	10YR 4/1	5YR 4/6 - 15%
	B2	6-12+	Silty Clay Loam Ox ^{rh}	10YR 5/1	5YR 4/6 15%
② HS-1		0-6	silty clay loam	10YR 3/2	5YR 5/6
		6-8	sandy clay loam	10YR 4/3	5YR 5/6
		8-12+	Silt ^c loam	10YR 4/2	5YR 4/6 10% Ox ^{rh}
③ HS-2		0-1		10YR 3/2	5YR 4/6 - 5%
		1-8	Silt loam	10YR 4/1	5YR 5/6 - 15% redox
		8-12+	Silty clay loam	10YR 4/1	5YR 5/6 - 25% redox many obs.
④ HB-1		0-4	silt loam	10YR 4/3	
		4-7	Silt loam	10YR 4/3	5YR 5/6 - 2%
		7-12	Silty clay loam	10YR 4/3	5YR 5/6 - 5% ↑ redox
		12-16	Silty clay loam	10YR 3/1	10YR 5/6 - 5%
⑤ HS-3		0-4	Silt loam	10YR 3/2	5YR 5/6 = 5%
		4-8	Silt. loam	10YR 4/2	5YR 5/6 - 15%
		8-12+	loam	10YR 4/1	5YR 4/6 - 15% Micro Mn
⑥ HS-4		0-8	Silty loam	10YR 4/3	
		8-12	Silty loam	10YR 2/1 60%	10YR 6/4 20% / 10YR 4/6 20%
		12-18	silt clay loam	10YR 3/3	10% 7.5YR 5/6
		18+"	silt clay loam	10YR 5/1	5% 10YR 3/1 o.m. 20% 10YR 5/6
⑦ HS-5		0-3	Silty loam	10YR 4/2	5YR 4/6 - 10%
		4-12	Silty clay loam	10YR 4/1	5YR 4/6 - 10% 8-12" redox depletes Mn appears
⑧ HS-6		0-3	silt loam	10YR 3/2	
		4-12+	Silt loam	10YR 4/1	5YR 5/6 5% ↑ clay w/ depth mica + Mn present

9)

HB-2	0-3	Silt loam	10 yr $3/2$	Syr $5/4$ 2% redox
	3-6	Silt loam	10 yr $4/3$	Syr $5/4$ 5% redox
	6-10	Sandy loam	10 yr $4/3$ 50%	10 yr $5/4$ 50%
	10-16	Sandy loam	10 yr $4/2$	Syr 5% redox
	16-22+	Silt loam	10 yr $4/1$	Syr $4/6$ 10% redox

Blair Creek Hydric Soils Report



Hydric Soil along Upper Reach 1



Hydric Soil along Upper Reach R1



Old Field Drain Pipe along Reach R1



Hydric Soil along Upper Reach R1



Hydric Soil along Mid-Reach R1



Floodplain wetland in Mid-Reach R1

Blair Creek Hydric Soils Report



Hydric Soil along Mid-Reach R1



Hydric Soil along Lower Reach R1



Hydric Soil along Lower Reach R1



Hydric Soil along Reach R2



Hydric Soil along Reach R2



Hydric Soil along Reach R2

APPENDIX K: CORRESPONDENCE MEMOS

Memo Regarding Blair Creek Post Contract IRT Field Meeting

Memo Date: 3/29/18

Meeting Held: 3/28/18 from 9:00 to ~11:00 A.M.

This memo and all responses will be included in the Mitigation Plan to serve as a record of field discussions including crediting ratios and approaches.

Attendees: Jake Byers and Micky Clemmons (Baker), David Brown, Steve Kichefski (Corps of Engineers), Paul Wiesner and Matthew Reid (DMS), Mac Haupt, Zan Price (DWR), and Todd Bowers (EPA).

The following provides a summary of procedures, discussions, and conclusions reached by the group.

The group met at the barn off Waldroup Road in Hayesville, NC in Clay County. A general site overview and map orientation was provided by Micky. The group was shuttled down to the top of Reach 1 (N. Fork of Blair Creek). The group noted the incised nature of the stream and the fact that the existing woody bank vegetation was composed almost entirely of privet. Different members of the group walked within the channel while others chose to inspect at various locations from the top of the stream banks. Numerous areas of bank erosion were noted. Mac, David, and Steve all bored holes in various locations (along this reach and within the riparian area of the entire site) to inspect the soils in the floodplain and noted the strong hydric indicators. Jake stated that the soils are NRCS mapped as Arkaqua loam which is listed as a hydric soil for Clay County. Numerous pockets of likely jurisdictional wetlands were also noted. The group proceeded down to the existing culvert along Reach 1 where the old quarry was also inspected. Zan asked what Baker's plans are for the existing culvert. Jake stated that culvert would be analyzed during the design phase of the project. If it was determined that the culvert is not appropriately sized or that the alignment of the design stream would not allow for the use of the existing culvert in its current location, an alternative crossing would be provided. The opportunity of the site producing wetland mitigation credits was introduced and very much encouraged by multiple members of the group. Through priority 1 stream restoration and establishment of a native wetland vegetation community, a very high amount of functional uplift would be provided by this project. David noted that this type of opportunity is exceedingly rare in this region and would encourage the generation of as many wetland credits as possible by this site. Other members of the group agreed. A discussion of what would qualify as re-establishment, rehabilitation, and enhancement was held. It was made clear that jurisdictional wetlands could be restored through rehabilitation by improving groundwater hydrology through priority 1 stream restoration and vegetation establishment. Jake had incorrectly assumed that jurisdictional wetlands were only appropriate for wetland enhancement level credits through planting. A JD and detailed hydric soils delineation will be required to determine what areas would be appropriate for each wetland mitigation approach. Jake stated that if the contract was amended to include wetland mitigation, a Baker LSS would conduct a detailed hydric soils investigation and provide a sealed hydric soils report in the mitigation plan. A JD would also be completed whether or not the contract was amended and submitted to the appropriate agency personnel. Mac suggested that

existing conditions monitoring wells be installed within areas that will potentially provide mitigation credit to provide baseline data for comparison with post-construction wetland monitoring data to assess success, particularly for rehabilitation wetlands. This will be contingent on the contract being amended. DMS staff stated that they agreed with adding wetland credit to the contract but would need to get approval from contracting and management staff in Raleigh. This approval would likely be contingent on the estimated need for wetland credits in this service area and how the project was being funded (NCDOT vs in-lieu fee program). David also mentioned the potential for an expanded service area due to the difficulty in finding and procuring wetland mitigation in this region. Steve stated that it would be important to try and locate and deal with existing drain tiles to the extent possible if wetland mitigation is proposed. David encouraged deeper borings during the soils investigations to provide evidence of buried hydric soils that would still be eligible for restoration by removing the upland soils. All wetland mitigation on this site is understood to be contingent on DMS' ability to amend the existing Baker contract and no assumptions or changes in scope have been made at this point. DMS will contact Baker once it is determined if wetland mitigation can be added to the existing contract. All members of the group agreed that adding wetland mitigation to the project would improve the overall project and functional uplift while simultaneously providing difficult to obtain wetland mitigation credits in this basin.

The group continued downstream to the confluence of Reach 1 and Reach 2 (S. Fork Blair Creek) noting the presence of beaver dams and impoundments and the invasive species. Jake stated that invasive species vegetation and beaver management would likely be on-going activities throughout the monitoring period for this project. Little was noted about Reach 3 which is a short section downstream of the confluence of Reaches 1 and 2, but there was a question about how Baker would address removing the beaver dam or other beaver issues which are below the lower project boundary. Micky answered that the any work could be done from the right bank of the stream which is not a part of the project, but is owned by one of the project landowners. The group then proceeded upstream along Reach 2. The consensus was that the condition of this reach was similar to Reach 1 though not quite as incised. Some of the group asked about an existing ford-crossing and if it would continue to be used. Micky responded that if that landowner required a crossing below the driveway bridge we would install a crossing at the location of the utility line Right-of-Way. However, discussions with the landowner have indicated that a crossing will not be necessary. Jake pointed out the overhead utility and associated Right-of-Way that will be excluded from the conservation easement.

The group then inspected UT1. Jake stated that this reach was proposed for Enhancement Level 2 practices and included planting of the riparian buffer, and likely installing a structure at the downstream confluence with Reach 2 to ensure long-term stability.

The group then proceeded to the bridge at the downstream extent of Reach 2. The question of what thermal regime these streams are was asked. Jake stated the these were cold water streams and believed that all streams within the Hiawassee basin were cold except for the Hiawassee River. David Brown stated that an Archeology survey would be required at this site. David also stated, "I like it" in reference to the site and the proposed approaches. Mac stated that lots of banks needed work and the stream had obviously been straightened. After a brief general discussion of the site conditions and proposed approaches, it was determined that the group agreed with the approaches and ratios presented in the technical proposal and encouraged the addition of wetland mitigation credits if possible. The group was shuttled back to their vehicles at the barn and the site visit was adjourned.

The proposed approaches and ratios for each Reach are provided in the following Tables. These are the approaches and ratios agreed upon at this IRT field visit and will be utilized in the mitigation plan and throughout the life of the project.

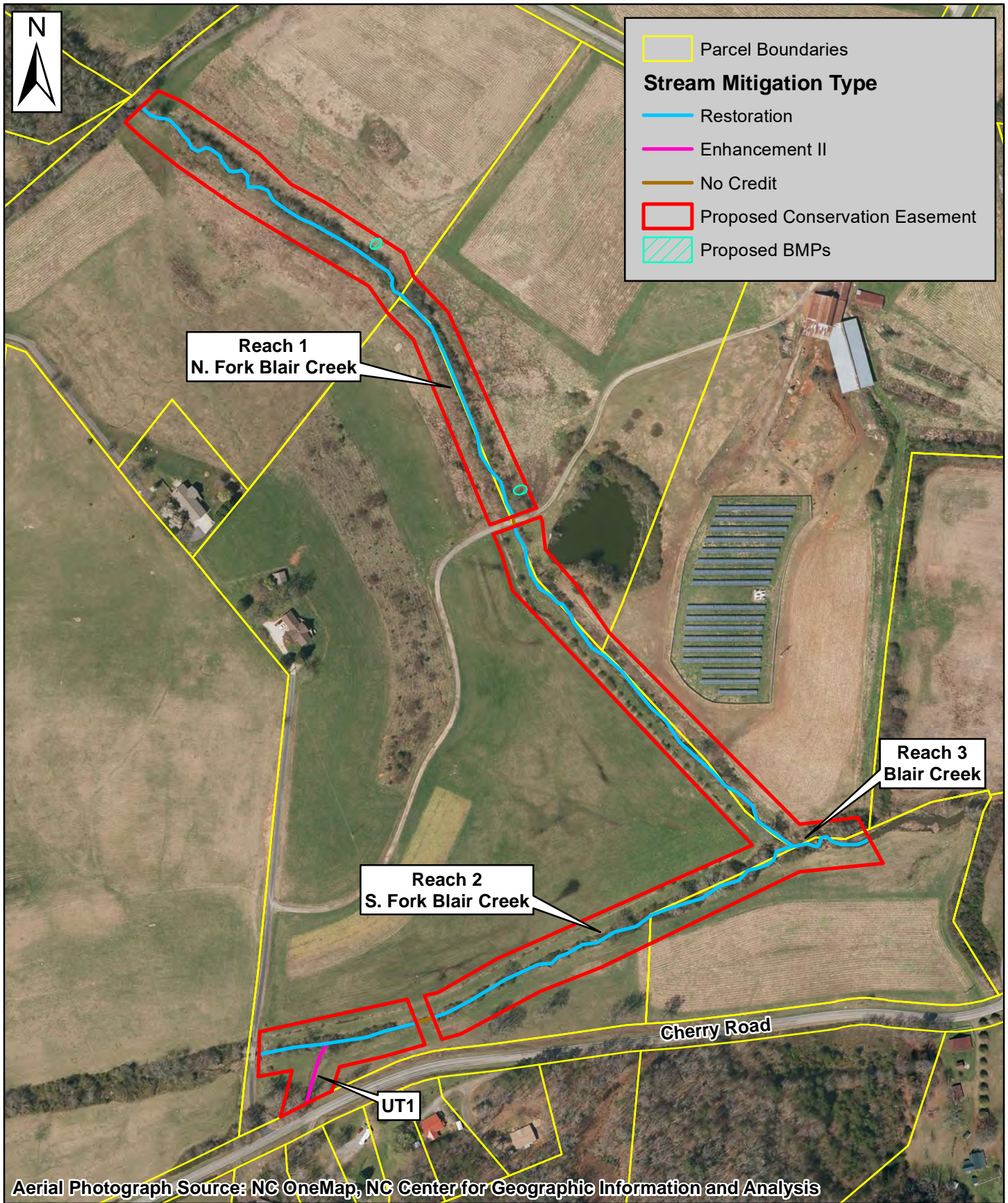
Reach Name	Approach	Approximate Length	Ratio	Credits
Reach 1	R	2,565	1:1	2,565
Reach 2	R	1,472	1:1	1,472
Reach 3	R	225	1:1	225
UT1	EII	145	2.5:1	58
Total		4,407		4,320

Please let me know if you feel any of the above information is not presented as discussed in the field.

Sincerely,



Jake Byers, PE



Michael Baker
INTERNATIONAL

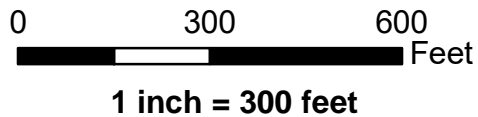


Figure 9
Proposed Mitigation Features
Blair Creek Mitigation Project

Memo To File

Blair Creek Mitigation Project

DMS Project ID. 100047
 NC DEQ Contract# 7415
 USACE Action ID: SAW-2018-00449
 Niwassee River Basin: 06020002-060010

Date Prepared:	April 24, 2020
Subject:	Blair Creek FEMA/HEC-RAS/No-Rise Permitting Summary
Recorded By:	Victoria Hoyland, PE

Floodplain Permitting:

A portion of Reach 3 is located within the FEMA Zone AE designated floodplain. Clay County requires a floodplain development permit for all projects proposing land disturbance and/or development in the floodplain. If the affected stream has a designated *floodway* however, a hydraulic modelling evaluation must be conducted by a licensed professional engineer to demonstrate that the proposed project will not produce a rise in the published base flood elevations (No-Rise), or else a letter of map revision (LOMR) must be applied for. As Blair Creek does **not** have a designated floodway in the project area, a hydraulic modelling study is not needed. This was confirmed with the Clay County floodplain manager Mr. Anthony Stillwell by telephone on April 16, 2020.

Modelling for Bankfull Confirmation:

HEC-RAS analysis was used to verify field bankfull determinations and selection of a bankfull discharge. Field cross-section data was correlated with survey data and entered into HEC-RAS. Two flow scenarios were modelled, the regional curve bankfull flow and the two-year storm from StreamStats reports. Overall, the results of the regional curve discharge modelling indicate that the cross-sectional area output from HEC-RAS is very close to what the regional curve equations predict. Bankfull width was narrower and bankfull depth was greater than the regional curve prediction, however, likely due to channel incision. Channel incision was further evidenced by the regional curve bankfull flow not reaching the top of banks in most of the modelled cross-sections. The 2-year flow did overflow banks in a few cross-sections, however.

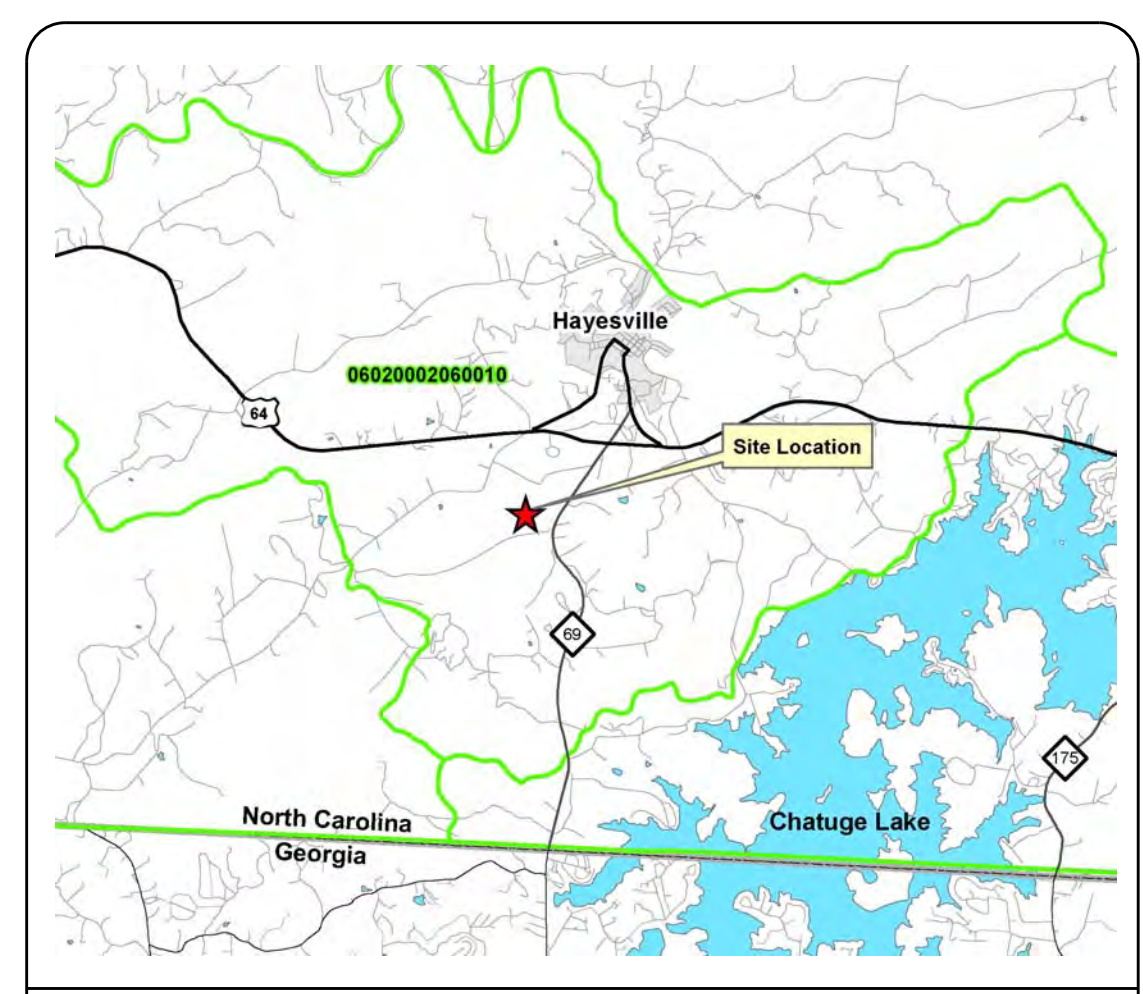
APPENDIX L: PLAN SHEETS



PROJECT: 166274 BLAIR CREEK

NORTH CAROLINA
DIVISION OF MITIGATION SERVICES
CLAY COUNTY

STATE	BAKER PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
NC	166274	1	32

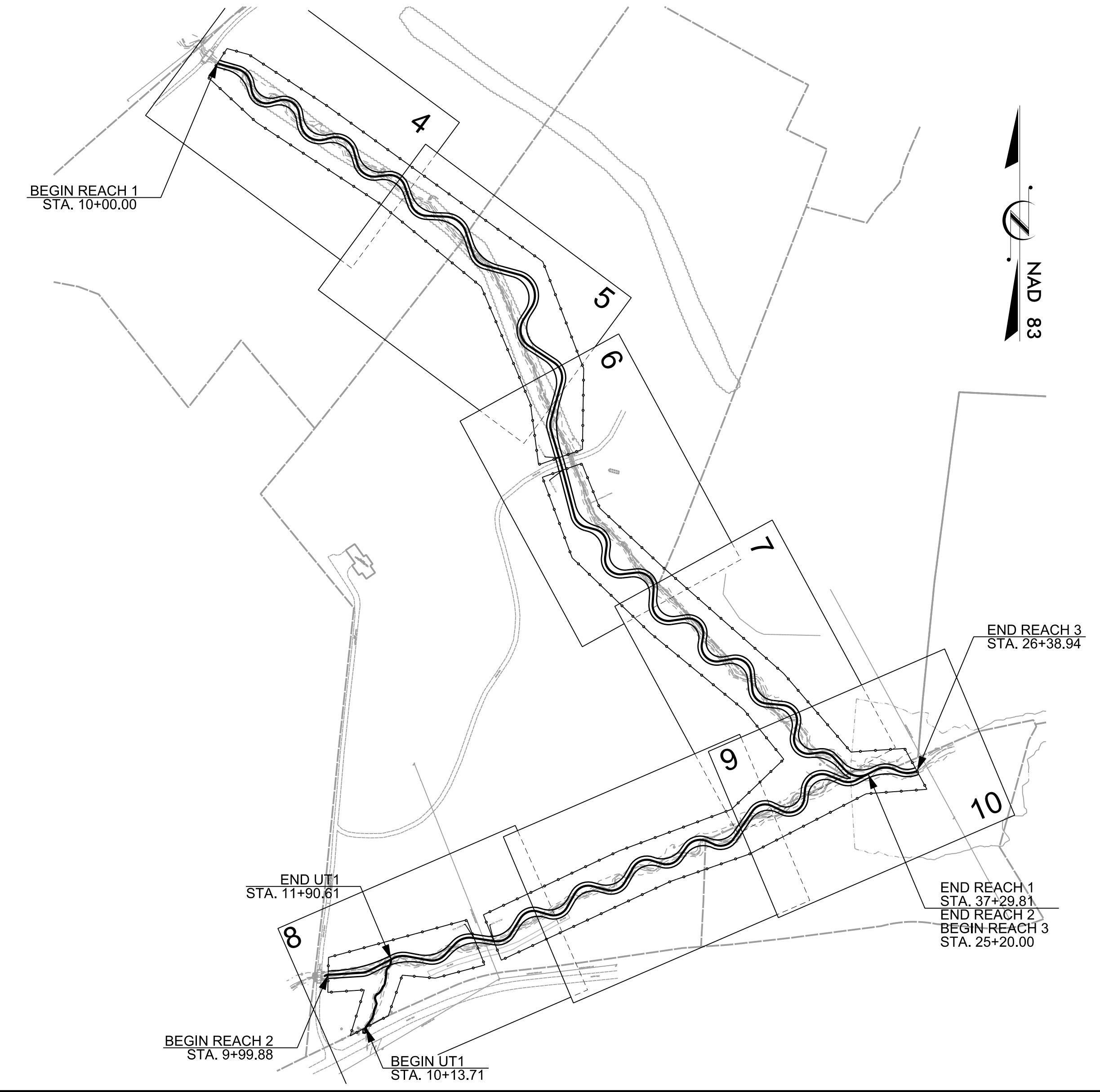


VICINITY MAP

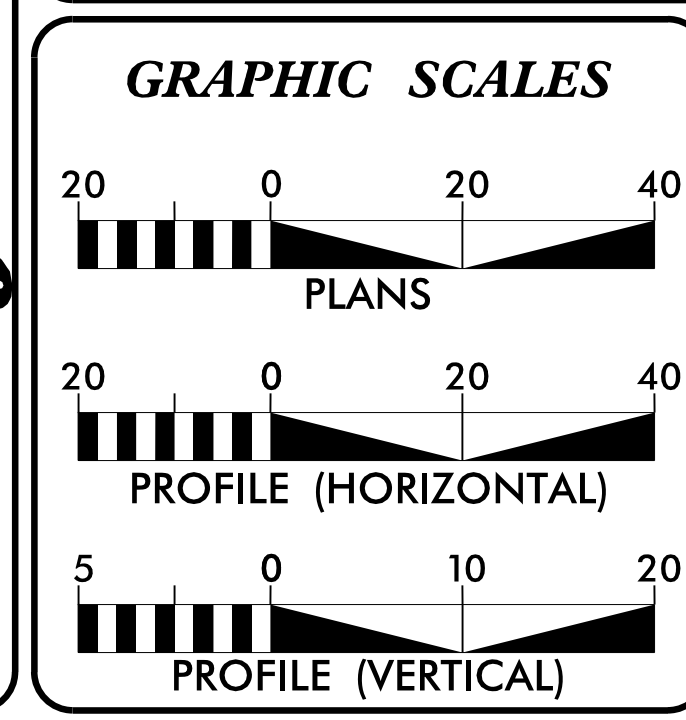
INDEX OF SHEETS

1	.....	TITLE SHEET
1-A	.....	STREAM CONVENTIONAL SYMBOLS GENERAL NOTES STANDARD SPECIFICATIONS VEGETATION SELECTION
1-B	.....	NCDOT CONVENTIONAL SYMBOLS
2-2F	.....	DETAILS
3	.....	GENERAL CONSTRUCTION SEQUENCE
4-10	.....	PLAN VIEW
11-14	.....	PROFILES
15-16	.....	RE-VEGEGATION PLAN
EC-1 - EC-4	.....	EROSION & SEDIMENTATION CONTROL PLAN

**LOCATION: 0.15 MILE WEST OF CHERRY ROAD AND
 NC HIGHWAY 69 IN HAYESVILLE, NC**
TYPE OF WORK: STREAM RESTORATION & ENHANCEMENT



NCDMS ID NO. 100047



MITIGATION SUMMARY

STREAMS:	REACH	STREAM RESTORATION	STREAM ENHANCEMENT	RATIO	CREDITS
	Reach 1	2,699.76	-	1:1	2,699.76
	Reach 2	1,473.91	-	1:1	1,473.91
	Reach 3	118.94	-	1:1	118.94
	UT 1	-	176.90	2.5:1	70.76
	TOTAL	4,292.61	176.9		4,363.37

WETLANDS:	APPROACH	AREA (ac)	RATIO	CREDITS
	Restoration by Reestablishment	5.218	1:1	5.218
	Restoration by Rehabilitation	0.693	1.5:1	0.462
	Enhancement	0.184	2:1	0.092
	TOTAL WETLAND CREDITS			5.772

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

LETTING DATE: _____

KATHLEEN M. MCKEITHAN, PE
 PROJECT ENGINEER






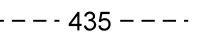

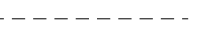

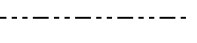

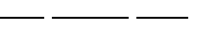



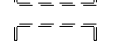















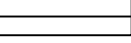

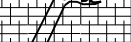



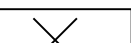

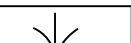


P.E.

PROJECT ENGINEER

PROGRESS DRAWING
 FOR REVIEW PURPOSES ONLY
 DO NOT USE FOR CONSTRUCTION

SIGNATURE: _____

STREAM CONVENTIONAL SYMBOLS SUPERCEDES SHEET 1-B

 J-HOOK VANE	 100 YEAR FLOOD PLAIN	
 GRADE CONTROL J-HOOK VANE	 CONSERVATION EASEMENT	
 ROCK VANE	 EXISTING MAJOR CONTOUR	
 OUTLET PROTECTION	 EXISTING MINOR CONTOUR	
 ROCK CROSS VANE	 LIMITS OF DISTURBANCE	
 DOUBLE DROP ROCK CROSS VANE	 PROPERTY LINE	
 LOG AND ROCK STEP / POOL	 FOOT BRIDGE	
 TEMPORARY ROCK DAM	 TEMPORARY STREAM CROSSING	
 ROOT WAD	 PERMANENT STREAM CROSSING	
 LOG J-HOOK VANE	 TRANSPLANTED VEGETATION	
 GRADE CONTROL LOG J-HOOK VANE	 TREE REMOVAL	
 LOG VANE	 TREE PROTECTION	
 LOG STEP	 DITCH PLUG	
 LOG CROSS VANE	 CHANNEL FILL	
 LOG ROLLER	 SOD MAT WITH WOOD TOE	
 CONSTRUCTED RIFFLE	 GEOLIFT WITH BRUSH TOE	
 BOULDER CLUSTER	 ROOT WAD REVETMENT WITH LIVE BRUSH	
 BOULDER STEP	 ROCK TOE PROTECTION	
 SAFETY FENCE	 PROPOSED WETLAND RE-ESTABLISHMENT	
 TAPE FENCE	 PROPOSED WETLAND ENHANCEMENT	
 JURISDICTIONAL WETLAND BOUNDARY	 PROPOSED WETLAND REHABILITATION	

**NOTE: ALL ITEMS ABOVE MAY NOT BE USED ON THIS PROJECT

STANDARD SPECIFICATIONS

NORTH CAROLINA EROSION AND SEDIMENT CONTROL PLANNING AND DESIGN MANUAL MARCH 2009 (REV 2013)

- 6.06 TEMPORARY GRAVEL CONSTRUCTION ENTRANCE
- 6.24 RIPARIAN AREA SEEDING
- 6.60 TEMPORARY SEDIMENT TRAP
- 6.62 TEMPORARY SILT FENCE
- 6.63 TEMPORARY ROCK DAM
- 6.70 TEMPORARY STREAM CROSSING

PROJECT REFERENCE NO. 166274	SHEET NO. 1-A
PROGRESS DRAWING FOR REVIEW PURPOSES ONLY DO NOT USE FOR CONSTRUCTION	
Michael Baker International Michael Baker Engineering Inc. 8000 Regency Parkway, Suite 500 Cary, NORTH CAROLINA 27518 Phone: 919.463.5488 Fax: 919.463.5490 License #: F-1084	
NCDMS ID NO. 100047	

GENERAL NOTES

1. THE CONTRACTOR IS REQUIRED TO INSTALL IN-STREAM STRUCTURES USING A TRACK HOE WITH A HYDRAULIC THUMB OF SUFFICIENT SIZE TO PLACE BOULDERS (3'x2'x2), LOGS AND ROOTWADS.
2. WORK IS BEING PERFORMED AS AN ENVIRONMENTAL RESTORATION PLAN. THE CONTRACTOR SHOULD MAKE ALL REASONABLE EFFORTS TO REDUCE SEDIMENT LOSS AND MINIMIZE DISTURBANCE OF THE SITE WHILE PERFORMING THE CONSTRUCTION WORK.
3. CONSTRUCTION IS SCHEDULED FOR THE SPRING OF 2021.
4. CONTRACTOR SHOULD CALL NORTH CAROLINA "ONE-CALL" BEFORE EXCAVATION STARTS. (1-800-632-4949)
5. BOULDER SIZES FOR IN-STREAM STRUCTURES SHALL BE A MINIMUM OF 3'x2'x1' AND CAN BE CHANGED PER STRUCTURE OR THE DIRECTION OF THE ENGINEER.
6. ALL ON-SITE ALLUVIUM SHALL BE HARVESTED AND STOCKPILED PRIOR TO FILLING ABANDONED CHANNELS.
7. TOPSOIL SHALL BE EXCAVATED TO A DEPTH OF 8" AND STOCKPILED SEPARATELY FROM UNDERCUT SOIL. 6" OF TOPSOIL SHALL BE PLACED ON ALL BANKFULL BENCHES AND AS DIRECTED BY THE ENGINEER.
8. ALL DISTURBED EMBANKMENTS SHALL BE MATTED WITH COIR FIBER MATTING OR AS DIRECTED BY THE ENGINEER.
9. ALL STREAM BANKS SHALL BE LIVE STAKED.
10. UNLESS THE ALIGNMENT IS BEING ALTERED, THE EXISTING CHANNEL DIMENSIONS ARE TO REMAIN UNLESS OTHERWISE NOTED.
11. CONTRACTOR WILL ENSURE THAT FENCING IS INSTALLED ON OR OUTSIDE THE CONSERVATION EASEMENT AS SHOWN ON THE PLANS BUT NO MORE THAN 1' OUTSIDE.
12. WHERE PROPOSED FENCE CROSSES EXISTING STREAMS, THE CONTRACTOR SHALL UTILIZE A SECTION OF BREAK AWAY FENCE, A FLOOD GATE, OR ELECTRIFIED CHAINS AS DIRECTED BY THE ENGINEER.

VEGETATION SELECTION

Proposed Bare-Root and Live Stake Species			
Botanical Name	Common Name	% Planted by Species	Wetland Tolerance
All Buffer Plantings at 680 stems/acre using 8' X 8' spacing			
General Riparian Zone – Overstory/Canopy Species			
<i>Betula nigra</i>	River Birch	10%	FACW
<i>Platanus occidentalis</i>	Sycamore	10%	FACW
<i>Liriodendron tulipifera</i>	Tulip Poplar	10%	FACU
<i>Betula alleghaniensis</i>	Yellow Birch	10%	FAC
<i>Quercus lyrata</i>	Overcup Oak	10%	OBL
<i>Quercus phellos</i>	Willow Oak	5%	FAC
<i>Quercus imbricaria</i>	Shingle Oak	5%	FAC
<i>Fraxinus pennsylvanica</i>	Green Ash	5%	FACW
<i>Diospyros virginiana</i>	Persimmon	5%	FAC
<i>Ulmus americana</i>	American Elm	5%	FACW
General Riparian Zone – Understory/Shrub Species			
<i>Rhododendron maximum</i>	Rosebay	5%	FAC
<i>Lindera benzoin</i>	Spicebush	5%	FAC
<i>Ilex verticillata</i>	Winterberry	5%	FACW
<i>Carpinus caroliniana</i>	American Hornbeam	2.50%	FAC
<i>Sambucus canadensis</i>	Elderberry	2.50%	FAC
<i>Magnolia tripetala</i>	Umbrella Tree	2.50%	FACU
<i>Halesia carolina</i>	Carolina Silverbell	2.50%	FAC

Proposed Bare-Root and Live Stake Species			
Botanical Name	Common Name	% Planted by Species	Wetland Tolerance
All Buffer Plantings at 680 stems/acre using 8' X 8' spacing			
Wetland Zone – Overstory/Canopy Species			
<i>Betula nigra</i>	River Birch	15%	FACW
<i>Platanus occidentalis</i>	Sycamore	15%	FACW
<i>Quercus lyrata</i>	Overcup Oak	10%	OBL
<i>Quercus pagoda</i>	Cherrybark Oak	10%	FACW
<i>Acer saccharinum</i>	Silver Maple	10%	FACW
<i>Quercus michauxii</i>	Swamp Chestnut Oak	5%	FACW
<i>Fraxinus pennsylvanica</i>	Green Ash	5%	FACW
<i>Ulmus americana</i>	American Elm	5%	FACW
Wetland Zone – Understory/Shrub Species			
<i>Alnus serrulata</i>	Tag Alder	5%	OBL
<i>Ilex verticillata</i>	Winterberry	5%	FACW
<i>Acer negundo</i>	Box Elder	5%	FAC
<i>Cephalanthus occidentalis</i>	Buttonbush	2.50%	OBL
<i>Cornus amomum</i>	Silky Dogwood	2.50%	FACW
<i>Xanthorhiza simplicissima</i>	Yellow-root	2.50%	FACW
<i>Aronia arbutifolia</i>	Red Chokeberry	2.50%	FACW
Streambank Live Stake Plantings			
<i>Salix sericea</i>	Silky Willow	25%	OBL
<i>Sambucus canadensis</i>	Elderberry	20%	FACW
<i>Cephalanthus occidentalis</i>	Buttonbush	10%	OBL
<i>Cornus amomum</i>	Silky Dogwood	25%	FACW
<i>Salix nigra</i>	Black Willow	20%	OBL

Proposed Permanent Seed Mixture				
Botanical Name	Common Name	% Planted by Species	Density (lbs/ac)	Wetland Tolerance
<i>Agrostis alba</i>	Redtop	10%	1.5	FACW
<i>Elymus virginicus</i>	Virginia Wildrye	15%	2.25	FACW
<i>Panicum virgatum</i>	Switchgrass	15%	2.25	FAC
<i>Tripsacum dactyloides</i>	Eastern Gamma Grass	5%	0.75	FACW
<i>Polygonum pennsylvanicum</i>	Pennsylvania Smartweed	5%	0.75	FACW
<i>Schizachyrium scoparium</i>	Little Blue Stem	5%	0.75	FACU
<i>Juncus effusus</i>	Soft Rush	5%	0.75	FACW
<i>Bidens frondosa (or aristosa)</i>	Beggars Tick	5%	0.75	FACW
<i>Coreopsis lanceolata</i>	Lance-Leaved Tick Seed	10%	1.5	FACU
<i>Dichanthelium clandestinum</i>	Tioga Deer Tongue	15%	2.25	FAC
<i>Andropogon gerardii</i>	Big Blue Stem	5%	0.75	FAC
<i>Sorghastrum nutans</i>	Indian Grass	5%	0.75	FACU
Total		100%	15	

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

CONVENTIONAL SYMBOLS

*S.U.E = SUBSURFACE UTILITY ENGINEER

BOUNDARIES AND PROPERTY:

State Line	-----
County Line	-----
Township Line	-----
City Line	-----
Reservation Line	-----
Property Line	-----
Existing Iron Pin	○ EP
Property Corner	-----
Property Monument	□ ECM
Parcel/Sequence Number	②③
Existing Fence Line	-x-x-x-
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	▬
False Sump	▽

RAILROADS:

Standard Gauge	-----
RR Signal Milepost	○
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	-----
Proposed Right of Way Line with Iron Pin and Cap Marker	○
Proposed Right of Way Line with Concrete or Granite Marker	△
Existing Control of Access	○
Proposed Control of Access	○
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	Ⓢ
Storm Sewer	S

UTILITIES:

POWER:	
Existing Power Pole	●
Proposed Power Pole	○
Existing Joint Use Pole	●
Proposed Joint Use Pole	○
Power Manhole	Ⓟ
Power Line Tower	⊠
Power Transformer	⊠
U/G Power Cable Hand Hole	PH
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	Ⓣ
Telephone Booth	Ⓣ
Telephone Pedestal	Ⓣ
Telephone Cell Tower	Ⓣ
U/G Telephone Cable Hand Hole	PH
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	Ⓜ
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	Ⓣ
TV Tower	⊗
U/G TV Cable Hand Hole	PH
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:

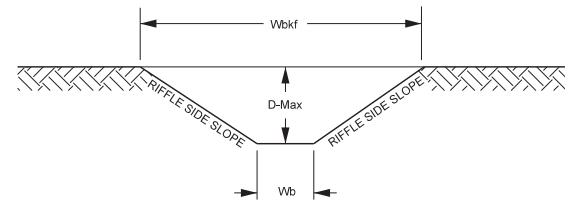
Sanitary Sewer Manhole	Ⓢ
Sanitary Sewer Cleanout	⊕
U/G Sanitary Sewer Line	-SS-
Above Ground Sanitary Sewer	-A/G Sanitary Sewer-
Recorded SS Forced Main Line	-FSS-
Designated SS Forced Main Line (S.U.E.*)	-FSS-

MISCELLANEOUS:

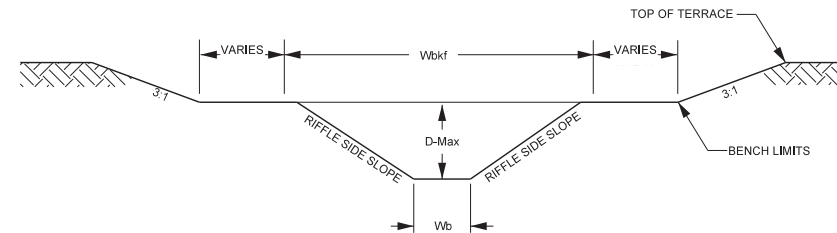
Utility Pole	●
Utility Pole with Base	□
Utility Located Object	○
Utility Traffic Signal Box	Ⓢ
Utility Unknown U/G Line	-U/L-
U/G Tank; Water, Gas, Oil	□
A/G Tank; Water, Gas, Oil	□
U/G Test Hole (S.U.E.*)	⊕
Abandoned According to Utility Records	AATUR
End of Information	E.O.I.

2/26/03
 R:\166274\Bior-Creek\Design\Plans\166274_PSH-01B.dgn
 166274

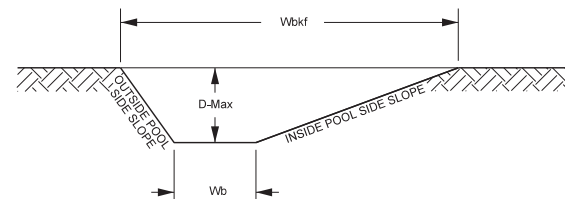
TYPICAL RIFFLE, POOL, AND BANKFULL BENCH CROSS SECTIONS



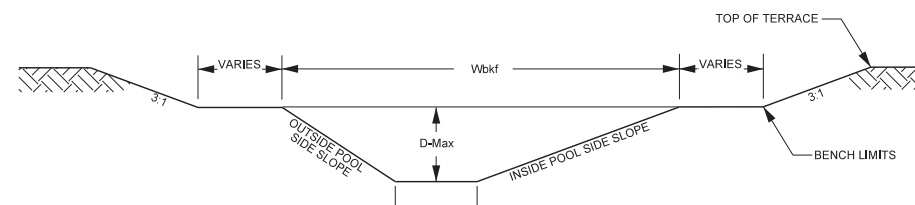
RIFFLE



RIFFLE WITH BANKFULL BENCH



POOL



POOL WITH BANKFULL BENCH

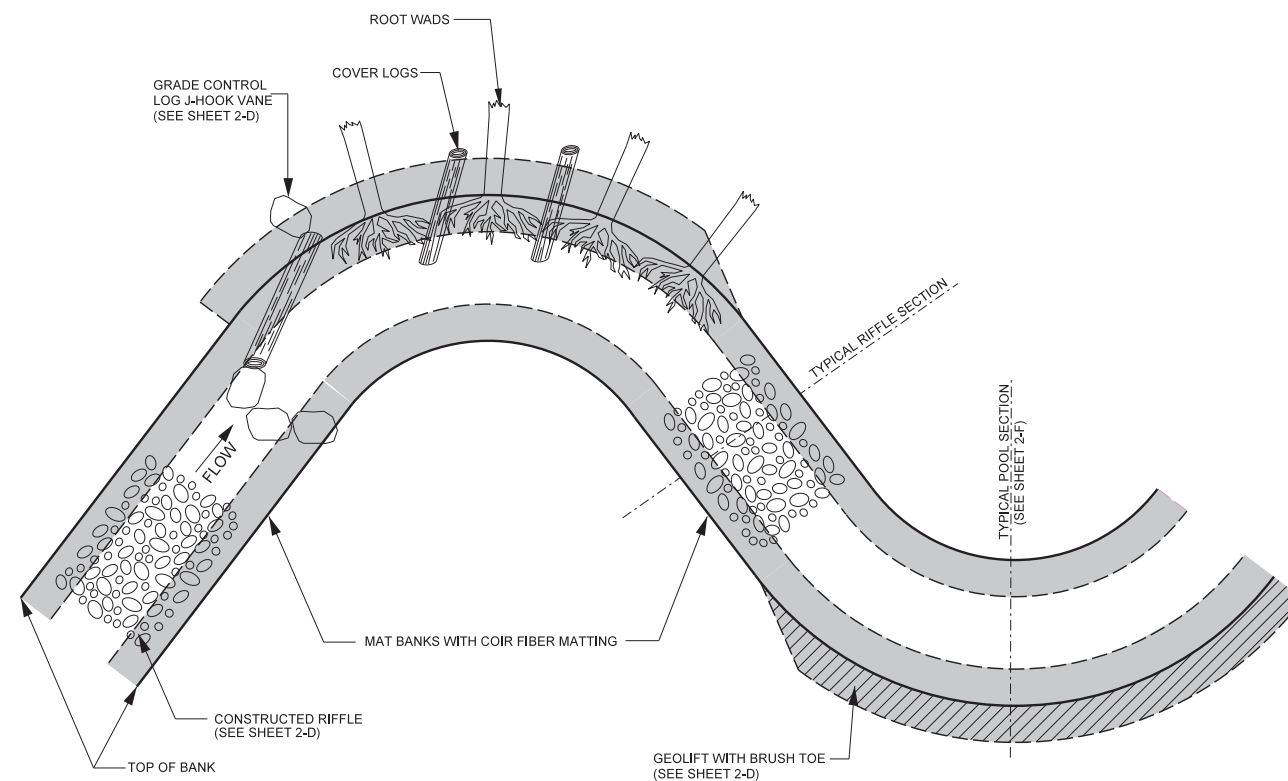
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NCDMS ID NO. 100047

	North Fork Blair REACH 1 Upstream of Farm Road		North Fork Blair REACH 1 Downstream of Farm Road		South Fork Blair REACH 2		Blair Creek REACH 3		UT1	
	RIFFLE	POOL	RIFFLE	POOL	RIFFLE	POOL	RIFFLE	POOL	RIFFLE	POOL
WIDTH OF BANKFULL (Wbkf)	16.5	23.0	17.0	23.0	17.0	23.0	24.0	35.0	4.7	7.25
MAXIMUM DEPTH (Dmax)	1.3	2.5	1.4	2.5	1.4	2.5	1.9	4.0	0.5	1.0
W/D (Wbkf/Dbkf)	15.0	14.2	14.2	14.5	14.2	14.2	15.0	13.9	12.5	12.4
BANKFULL AREA (Abkf)	18.2	37.2	20.4	39.7	20.4	37.2	38.4	88.0	1.8	4.3
BOTTOM WIDTH (Wb)	11.3	6.8	11.2	7.8	11.2	6.8	16.4	9.0	2.8	1.3
RIFFLE SIDE SLOPE (X:1)	2.0	-	2.0	-	2.0	-	2.0	-	2.0	-
INSIDE POOL SIDE SLOPE	5.0	-	5.0	-	5.0	-	5.0	-	3.0	-
OUTSIDE POOL SIDE SLOPE	1.5	-	1.5	-	1.5	-	1.5	-	3.0	-

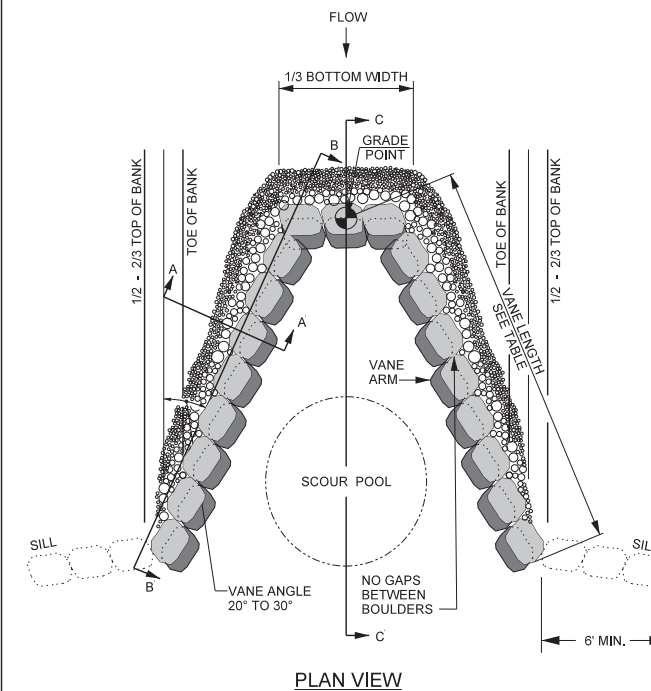
TYPICAL STRUCTURE PLACEMENT



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

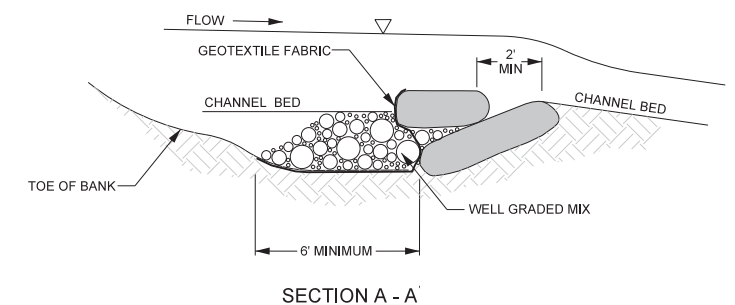


PLAN VIEW

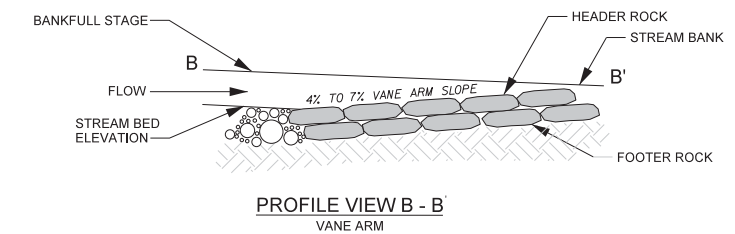
REACH	VANE LENGTH	BOULDER SIZE
REACH 1	15'	2'x3'x4'
REACH 2	15'	2'x3'x4'
REACH 3	21'	2'x3'x4'

NOTES FOR ALL VANE STRUCTURES:

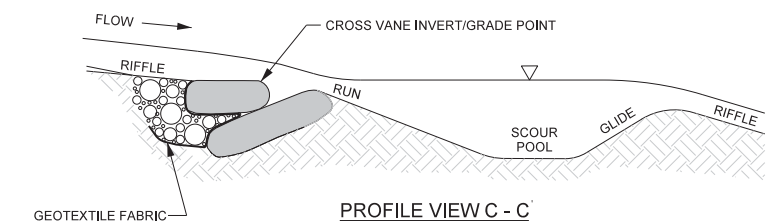
1. INSTALL FILTER FABRIC FOR DRAINAGE BEGINNING AT THE MIDDLE OF THE HEADER ROCKS AND EXTEND DOWNWARD TO THE DEPTH OF THE BOTTOM FOOTER ROCK, AND THEN UPSTREAM TO A MINIMUM OF SIX FEET.
2. DIG A TRENCH BELOW THE BED FOR FOOTER ROCKS AND PLACE FILL ON UPSTREAM SIDE OF VANE ARM. BETWEEN THE ARM AND STREAMBANK.
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

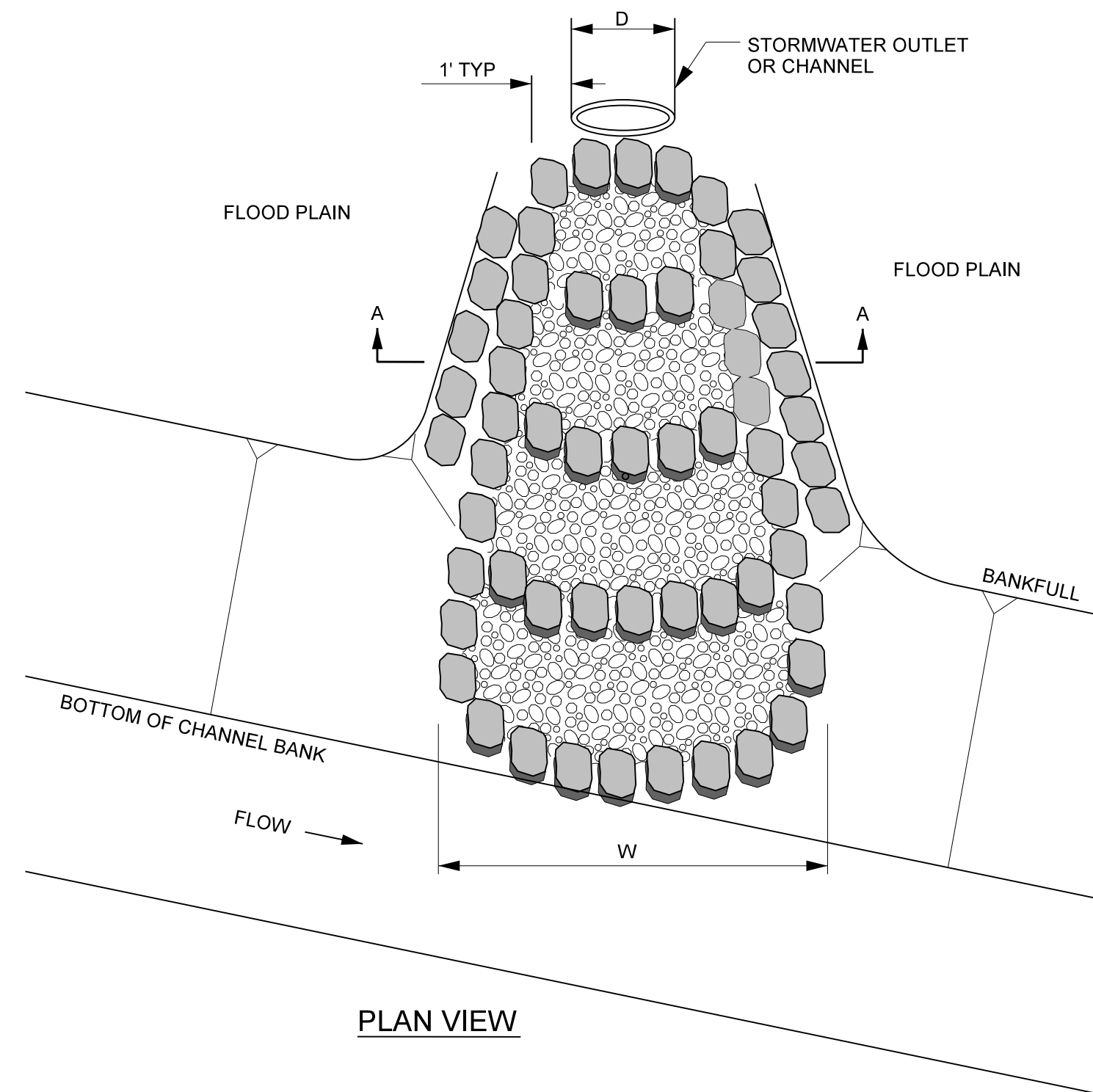


PROFILE VIEW B - B
VANE ARM

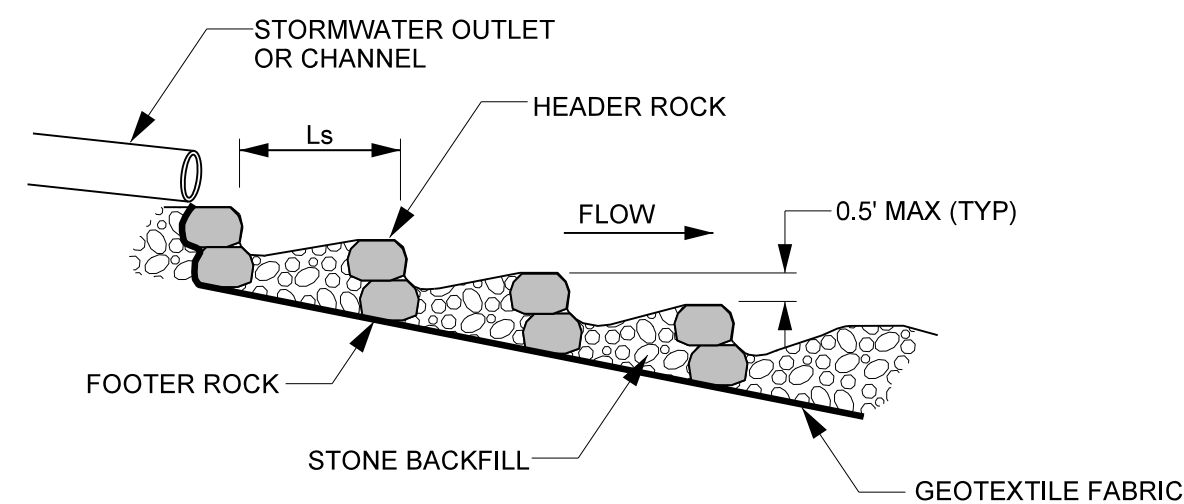


PROFILE VIEW C - C

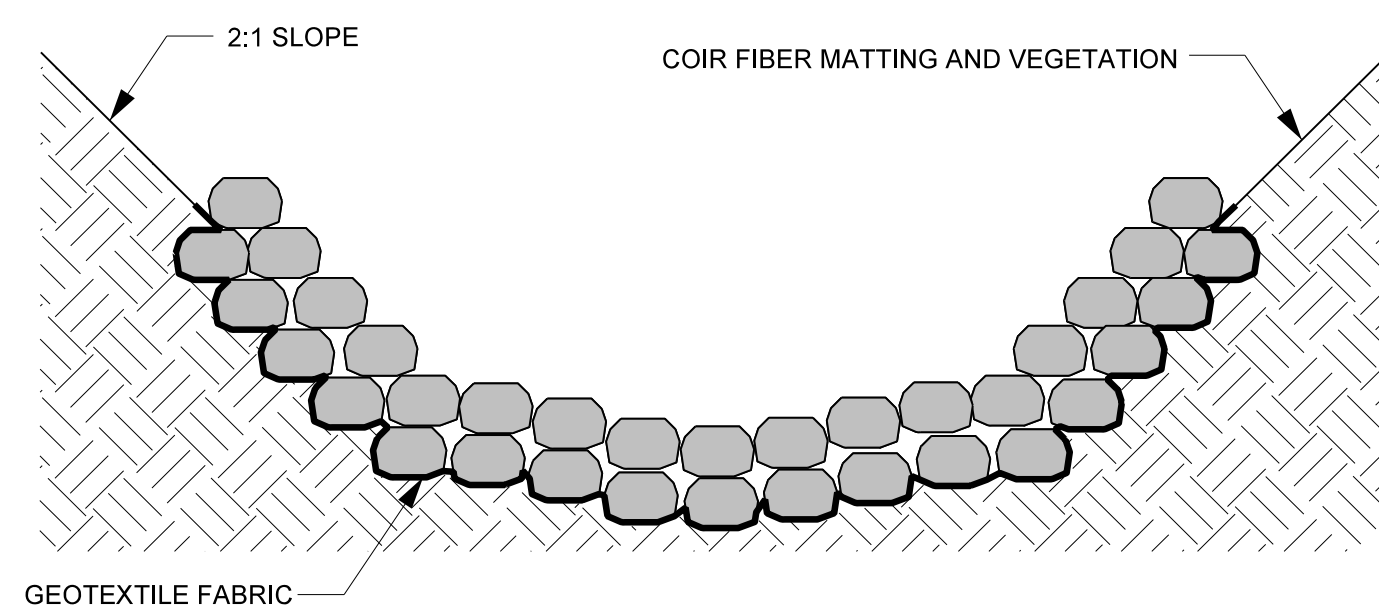
OUTLET PROTECTION



PLAN VIEW

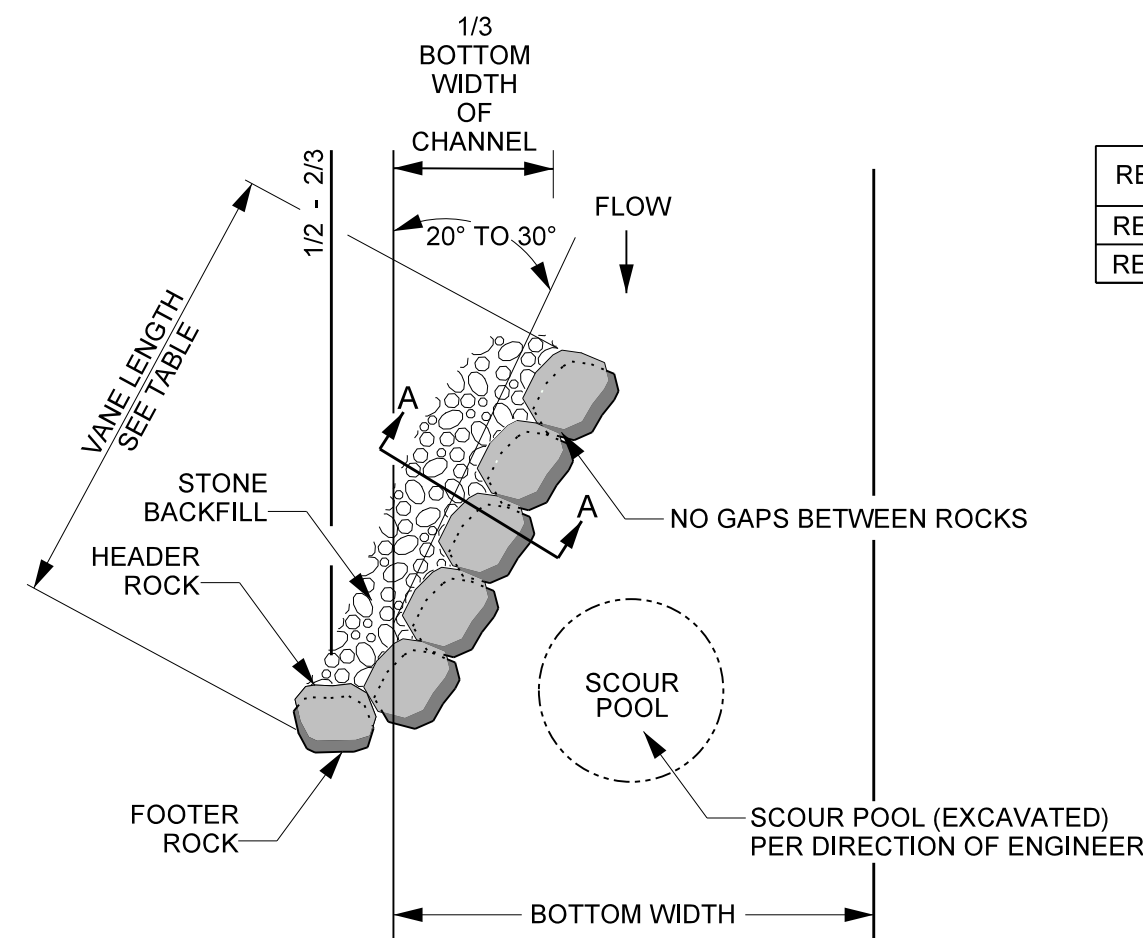


PROFILE VIEW



CROSS SECTION A - A

ROCK VANE

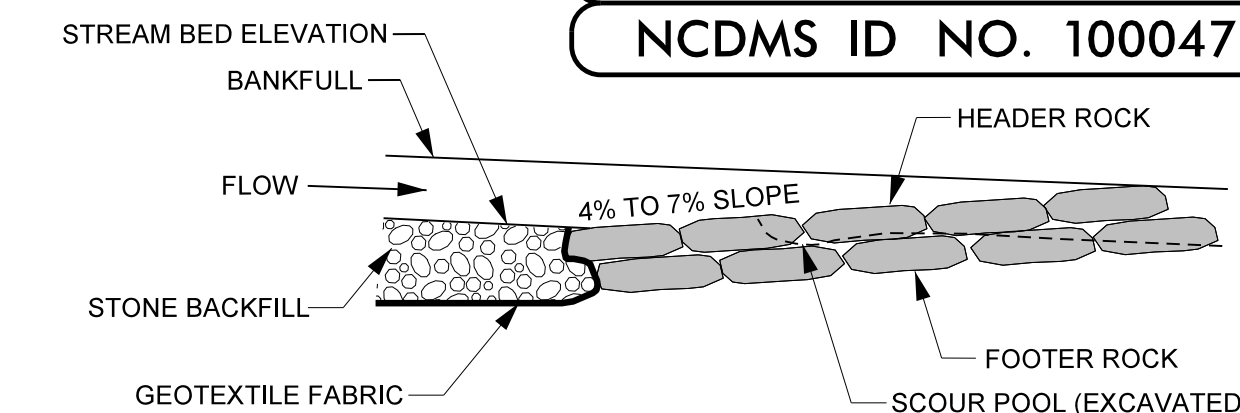


PLAN VIEW

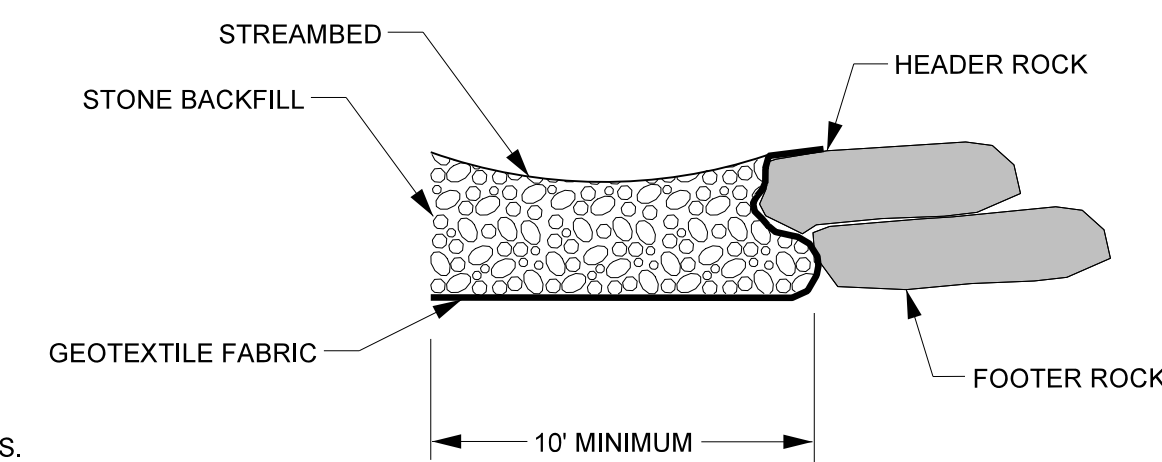
REACH	VANE LENGTH	BOULDER SIZE
REACH 1	15'	2'x3'x4'
REACH 2	15'	2'x3'x4'

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.

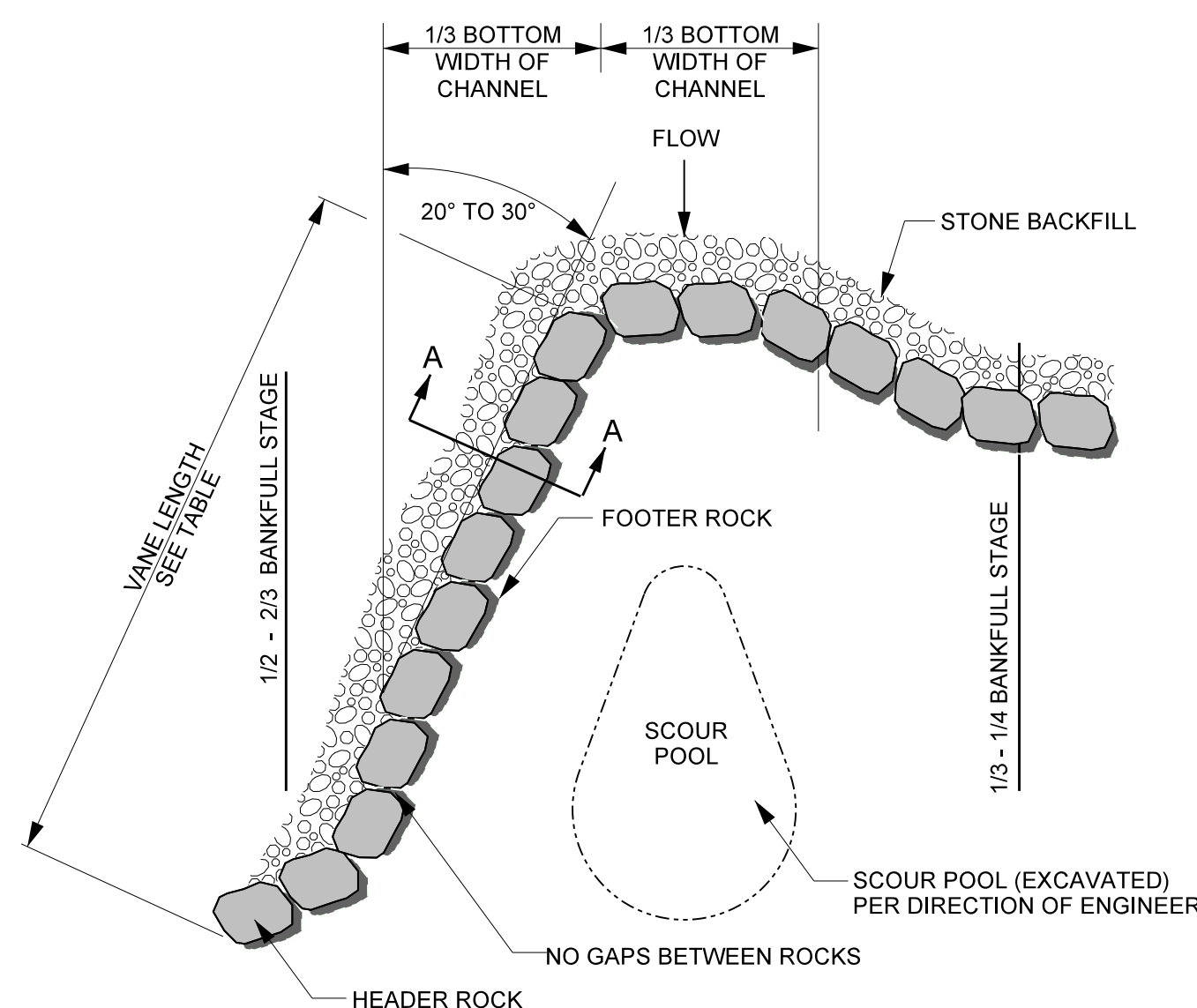


PROFILE VIEW

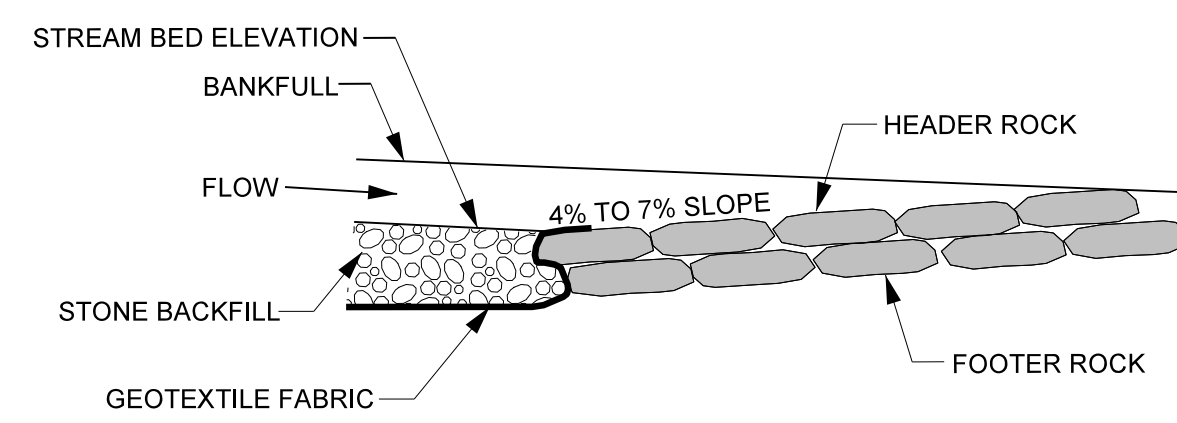


SECTION A - A

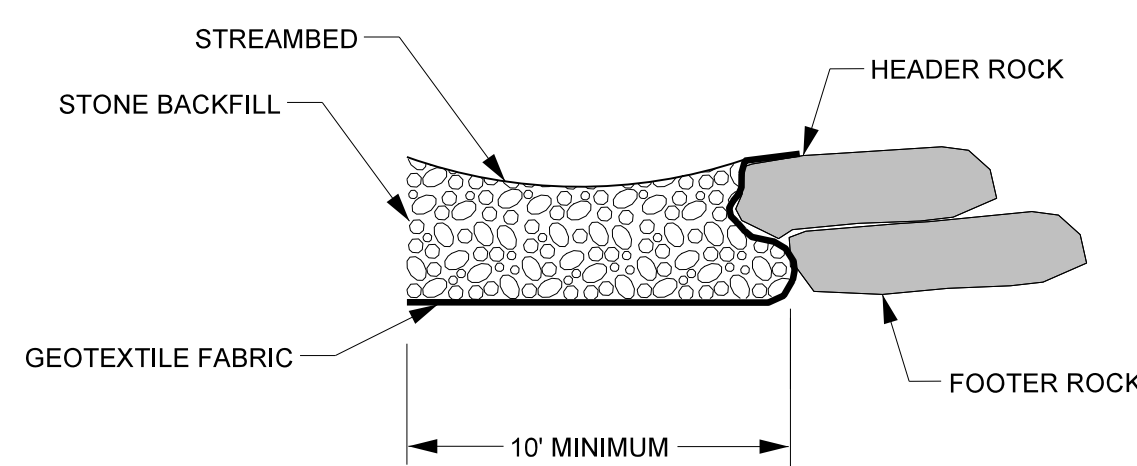
GRADE CONTROL J-HOOK VANE



PLAN VIEW



PROFILE VIEW



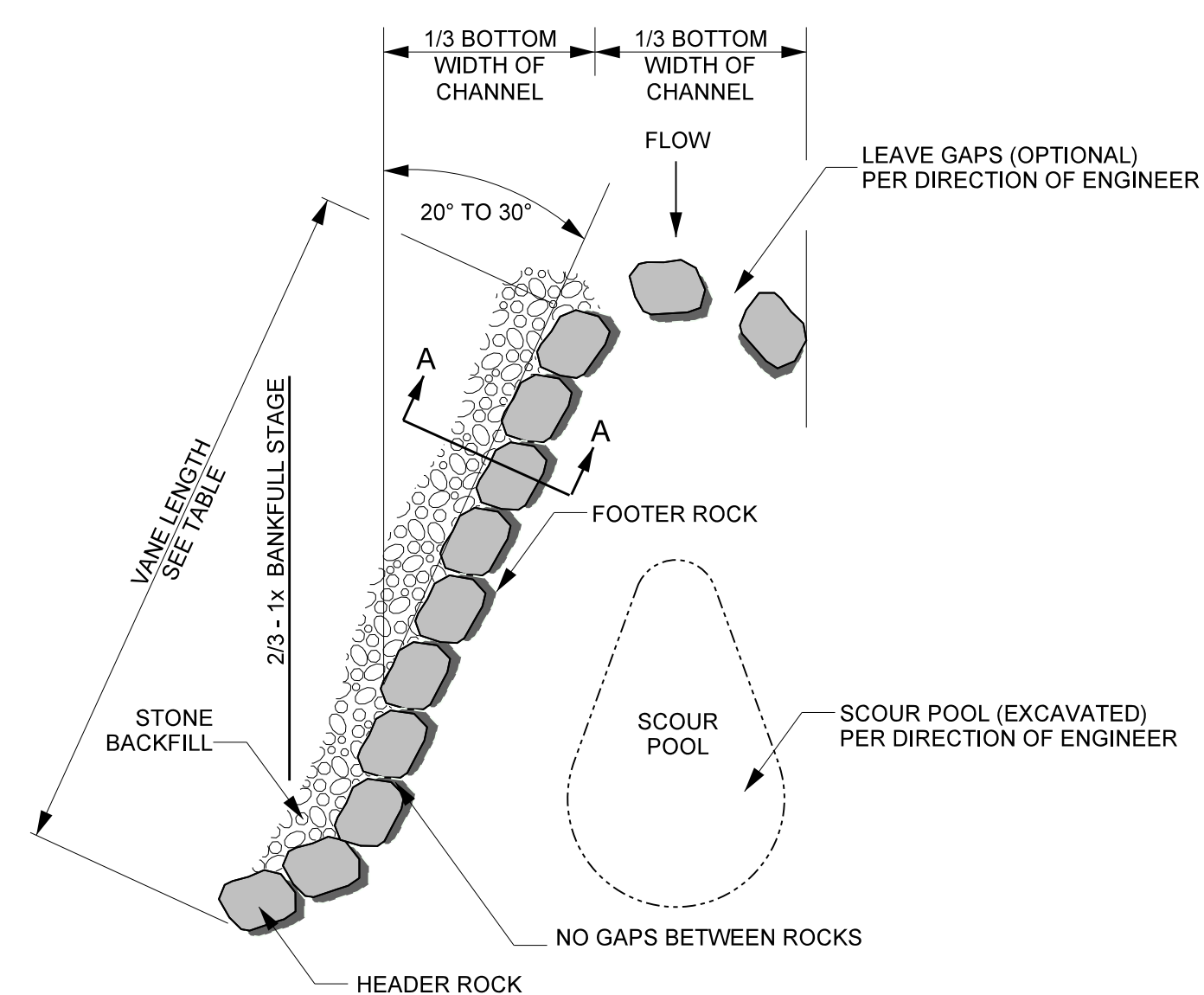
SECTION A - A

REACH	VANE LENGTH	BOULDER SIZE
REACH 1	15'	2'x3'x4'
REACH 2	15'	2'x3'x4'

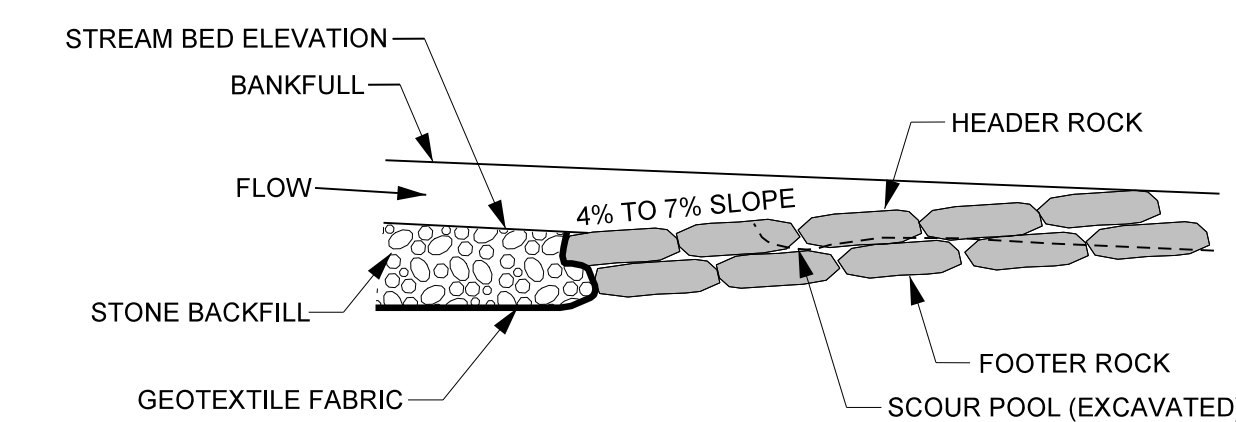
NOTES FOR ALL VANE STRUCTURES:

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'.

J-HOOK VANE

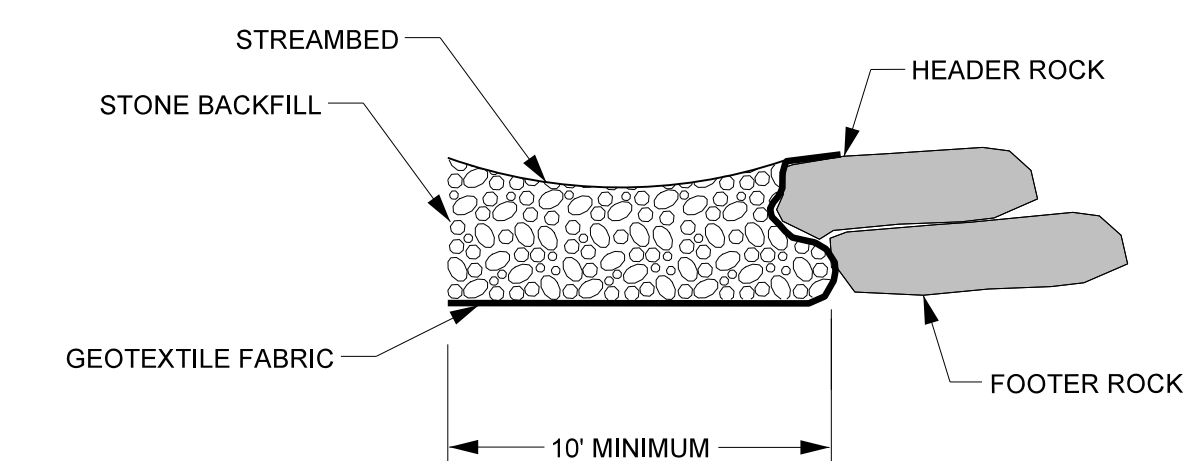


PLAN VIEW



PROFILE VIEW

REACH	VANE LENGTH	BOULDER SIZE
REACH 1	15'	2'x3'x4'
REACH 2	15'	2'x3'x4'



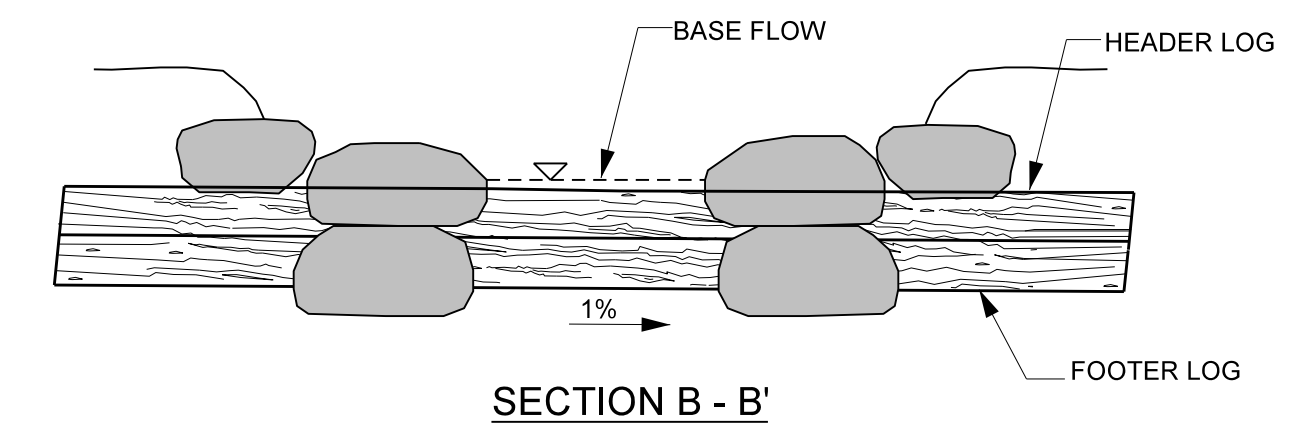
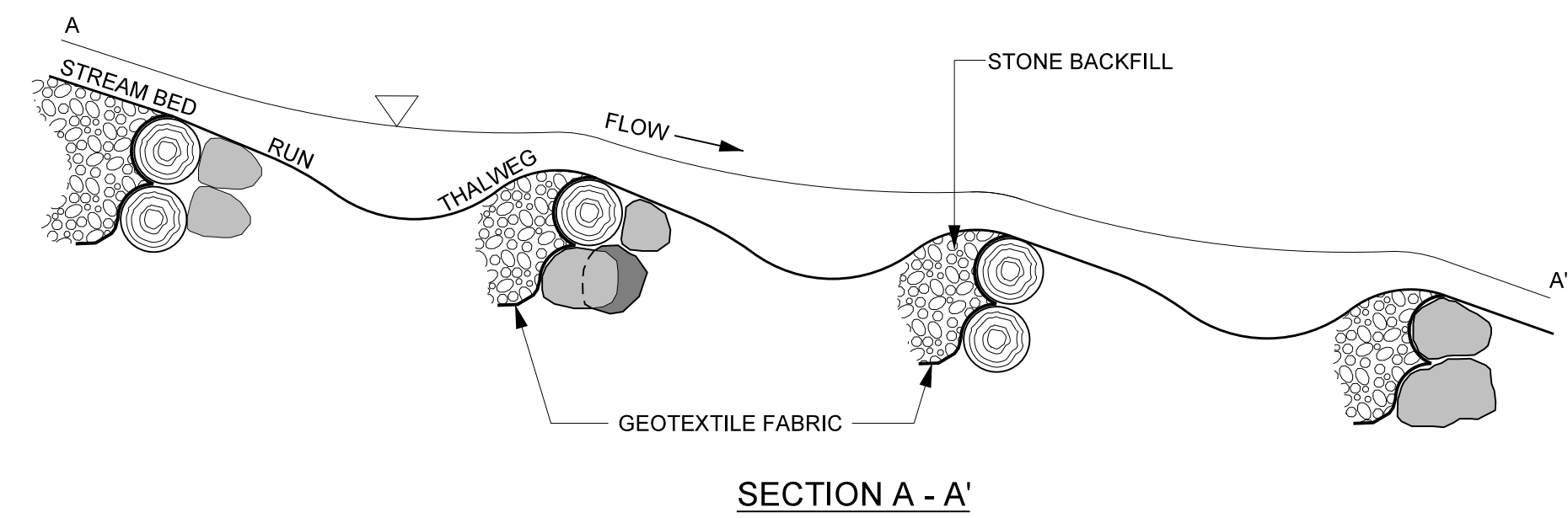
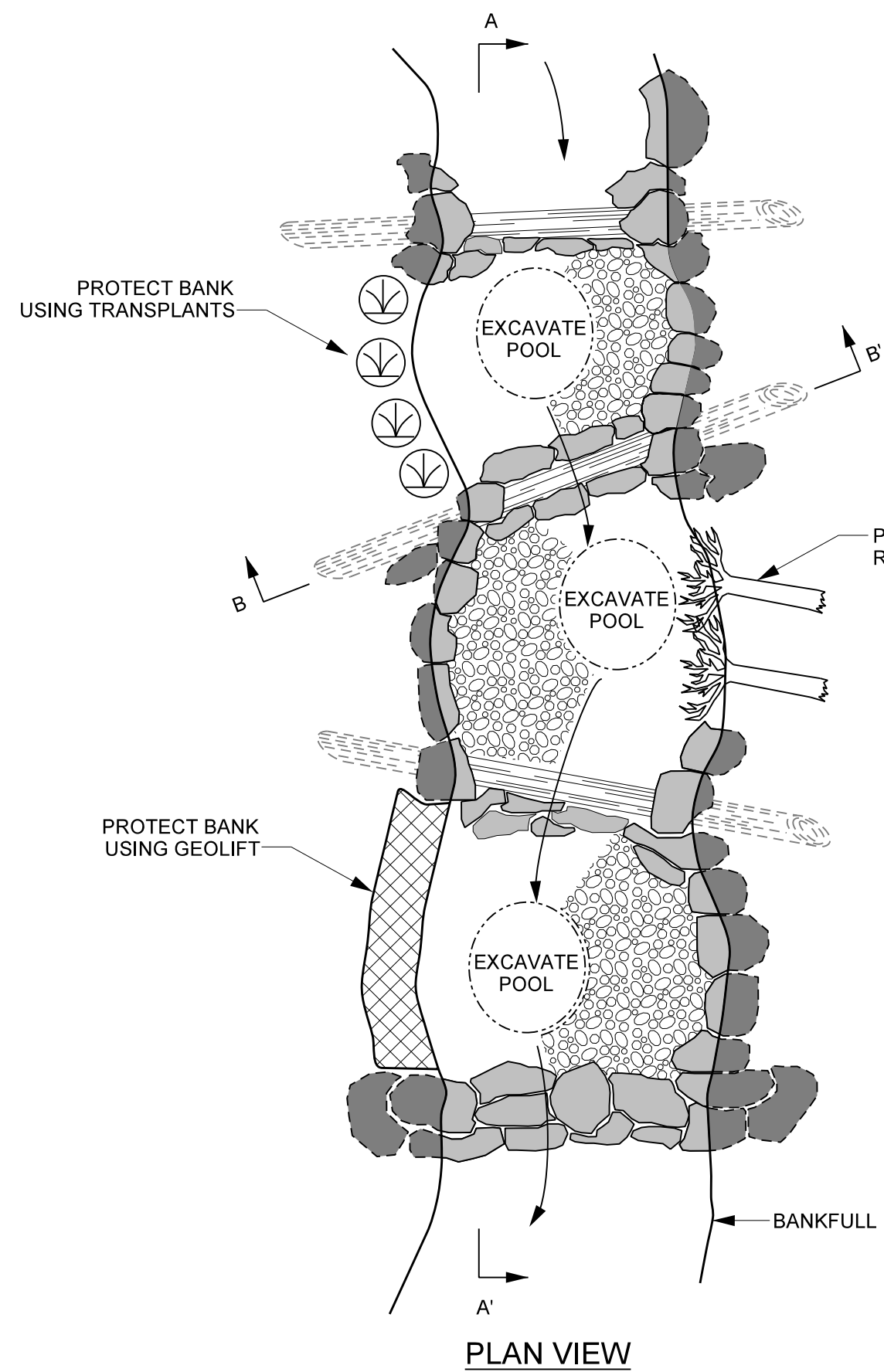
SECTION A - A

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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NCDS ID NO. 100047	

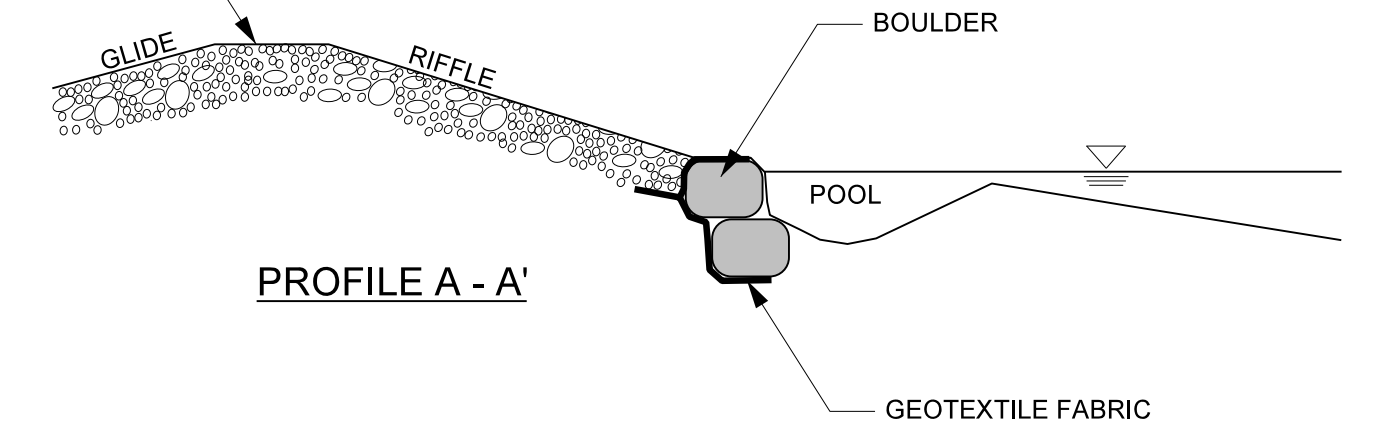
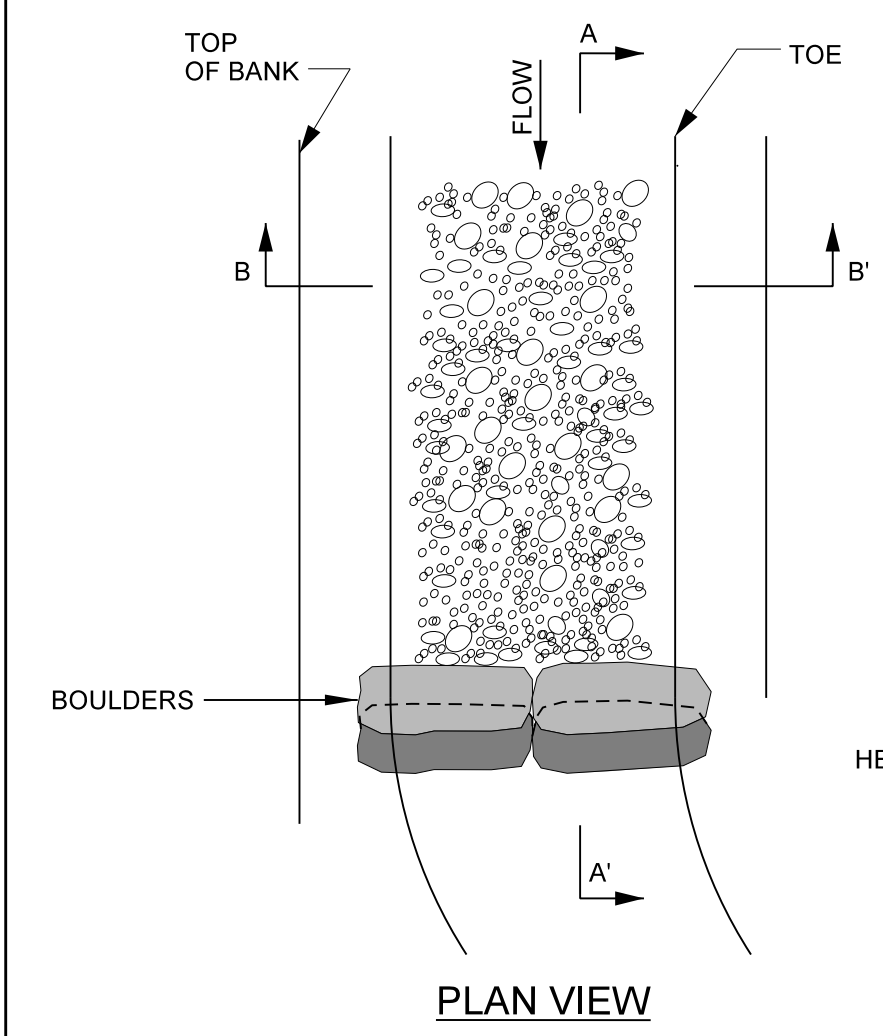
LOG AND ROCK STEP / POOL



REACH	BOULDER SIZE
REACH 1	2'x3'x4'
REACH 2	2'x3'x4'

- NOTES:**
- LOGS SHOULD BE AT LEAST 10" IN DIAMETER, RELATIVELY STRAIGHT, HARDWOOD, AND RECENTLY HARVESTED AND EXTENDING INTO THE BANK 5' ON EACH SIDE.
 - SOIL SHOULD BE COMPACTED WELL AROUND BURIED PORTIONS OF LOG.
 - GEOTEXTILE FABRIC SHOULD BE NAILED TO THE LOG BELOW THE BACKFILL.
 - BOULDERS SHOULD BE PLACED ON TOP OF HEADER LOG FOR ANCHORING.
 - TRANSPLANTS CAN BE USED INSTEAD OF BOULDERS, PER DIRECTION OF ENGINEER.
 - 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.

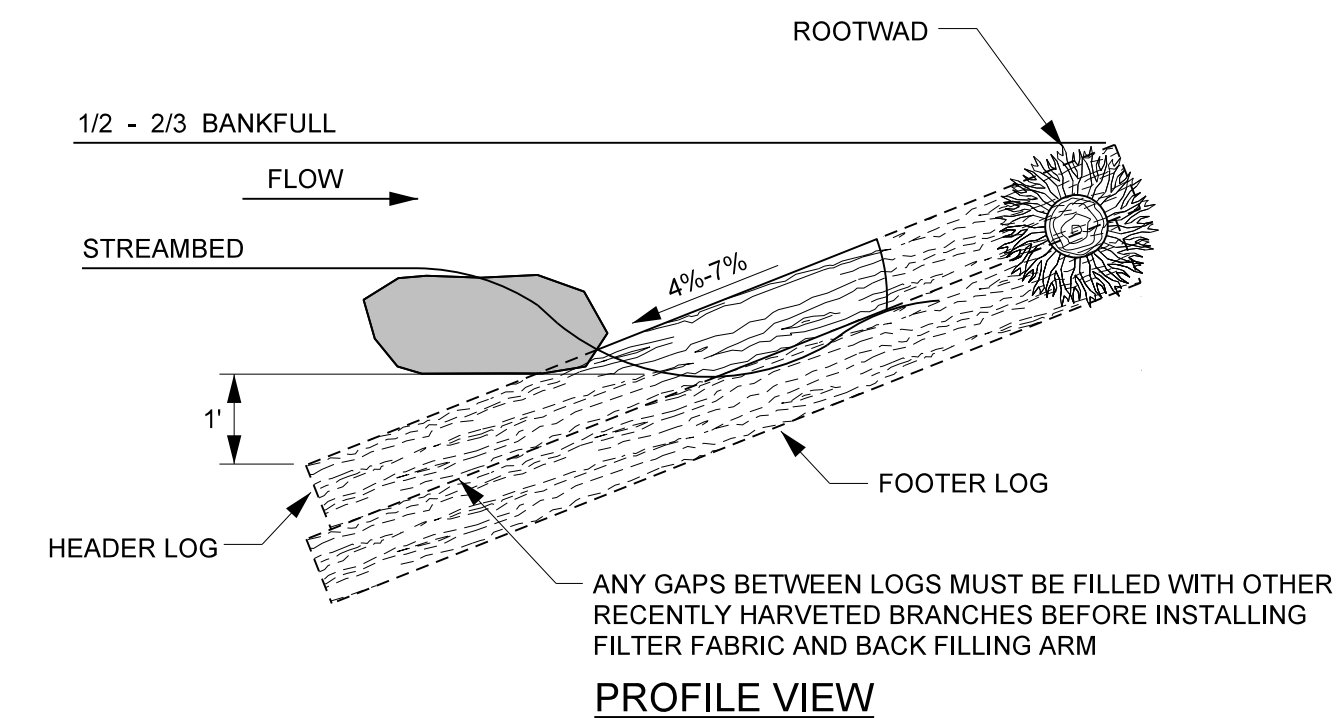
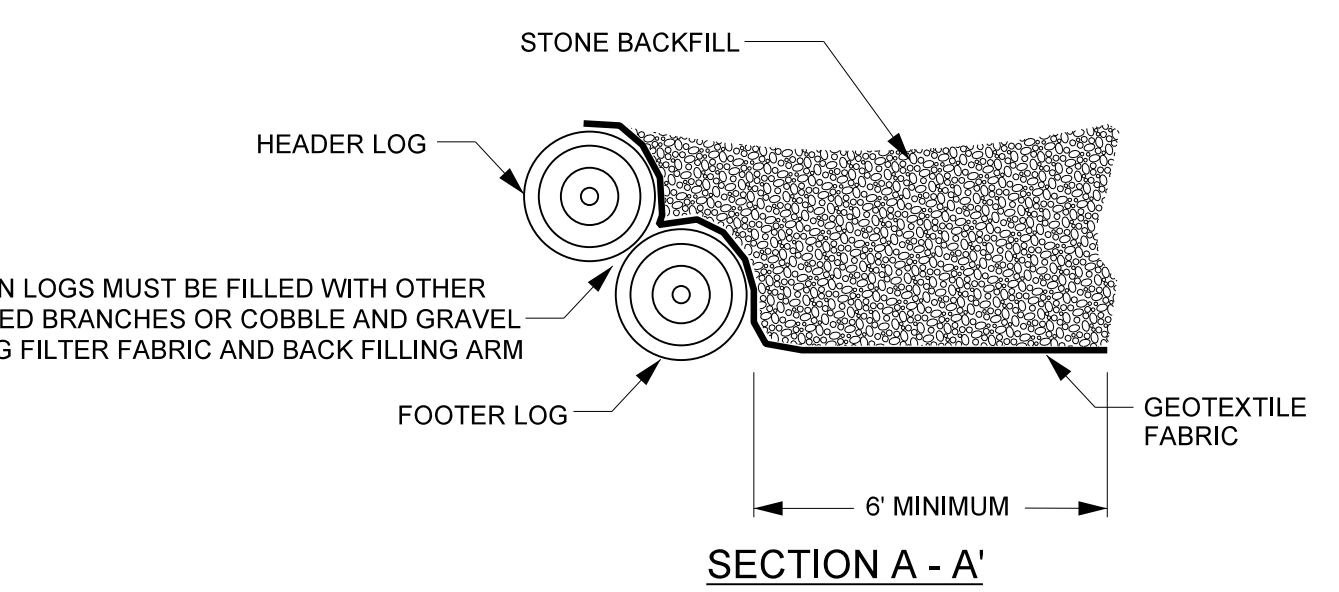
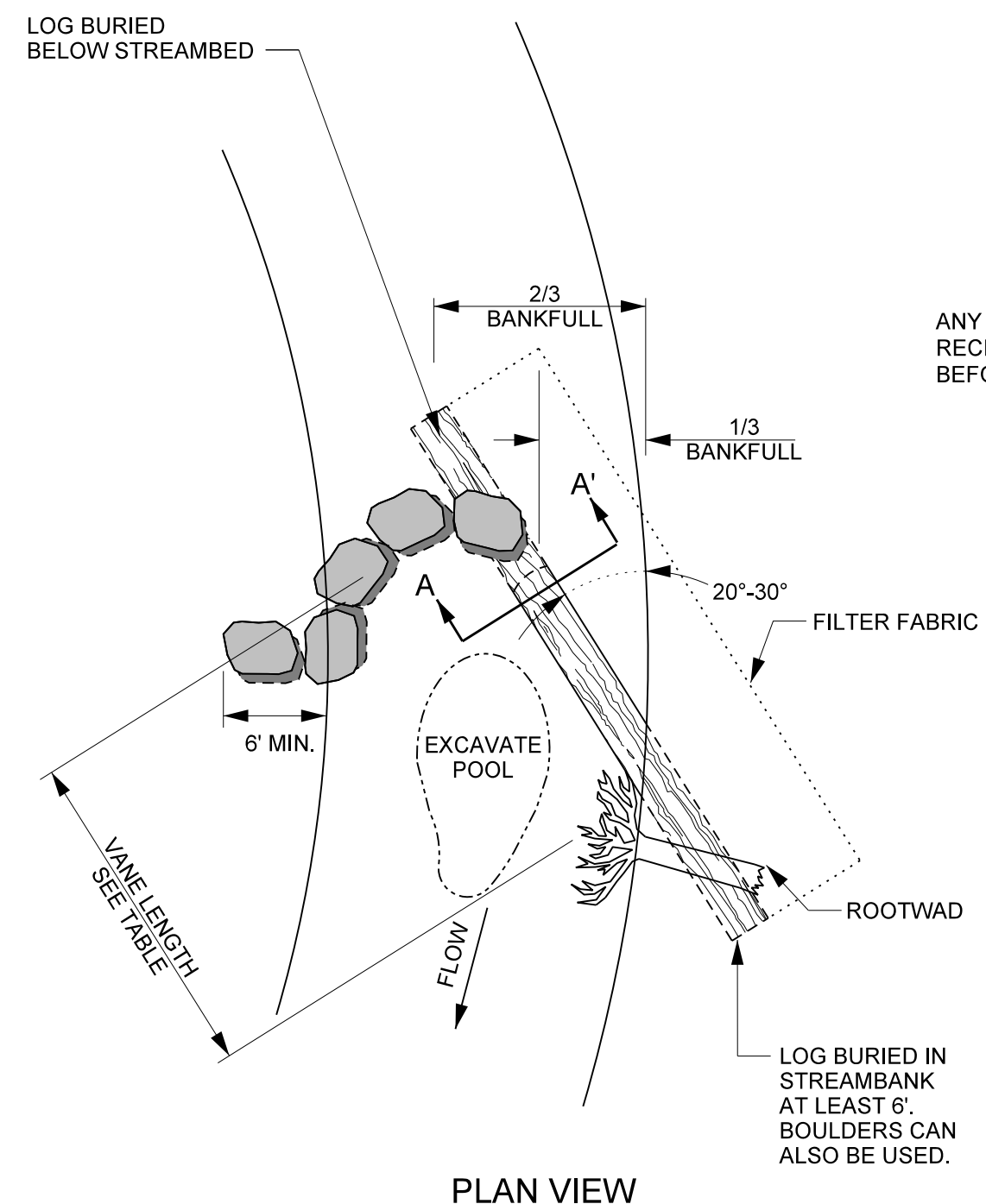
BOULDER STEP



REACH	BOULDER SIZE
REACH 1	2'x3'x4'
REACH 2	2'x3'x4'
UT 1	1'x2'x3'

- NOTES:**
- FOOTERS SHALL BE INSTALLED SUCH THAT 1/4 TO 1/3 OF THE LENGTH IS DOWNSTREAM OF THE HEADER.
 - SOIL SHALL BE WELL COMPACTED AROUND BURIED PORTION OF FOOTERS WITH THE BUCKET OF EXCAVATOR.
 - INSTALL NON-WOVEN FILTER FABRIC UNDERNEATH FOOTER BOULDERS.
 - UNDERCUT THE RIFFLE ELEVATION 12 INCHES TO ALLOW FOR A LAYER OF STONE.
 - 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.
 - FILL TRENCH WITH GRADED MIX OF CLASS A, CLASS B, AND #57 STONE TO THE BED ELEVATION OF THE CHANNEL.
 - BOULDER STEPS MUST BE EXTENDED TO A MINIMUM OF 2' INTO THE BANK. USE SILL BOULDERS IF NECESSARY.
 - THALWEG AND STEP INVERT WILL BE CONCAVE AND SHAPED PER DIRECTION OF THE DESIGNER.

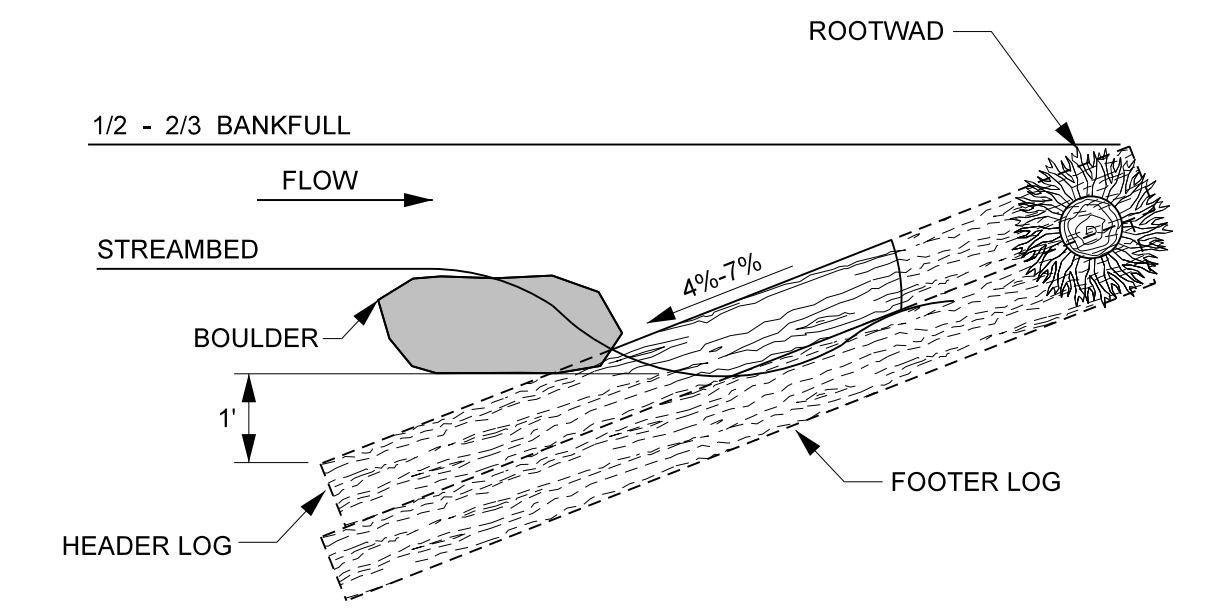
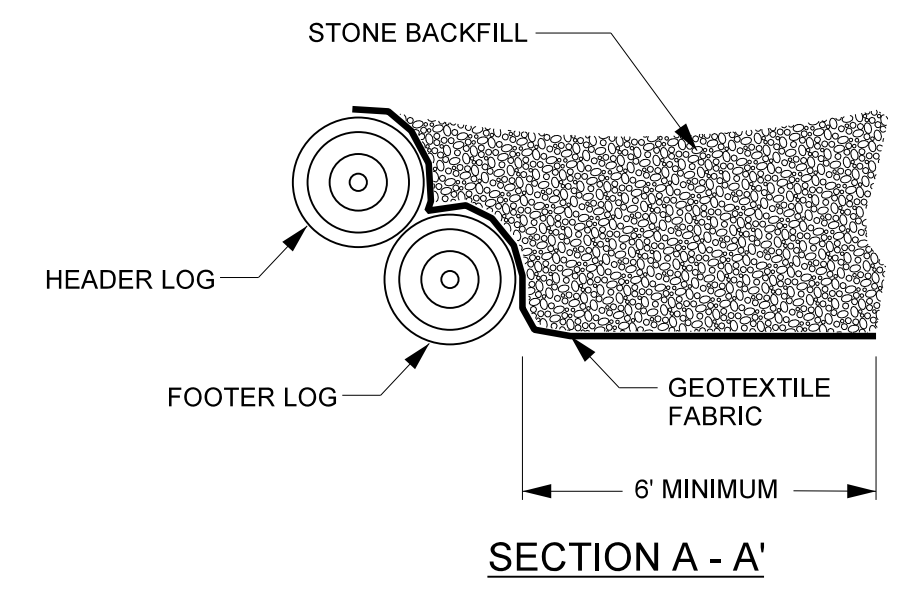
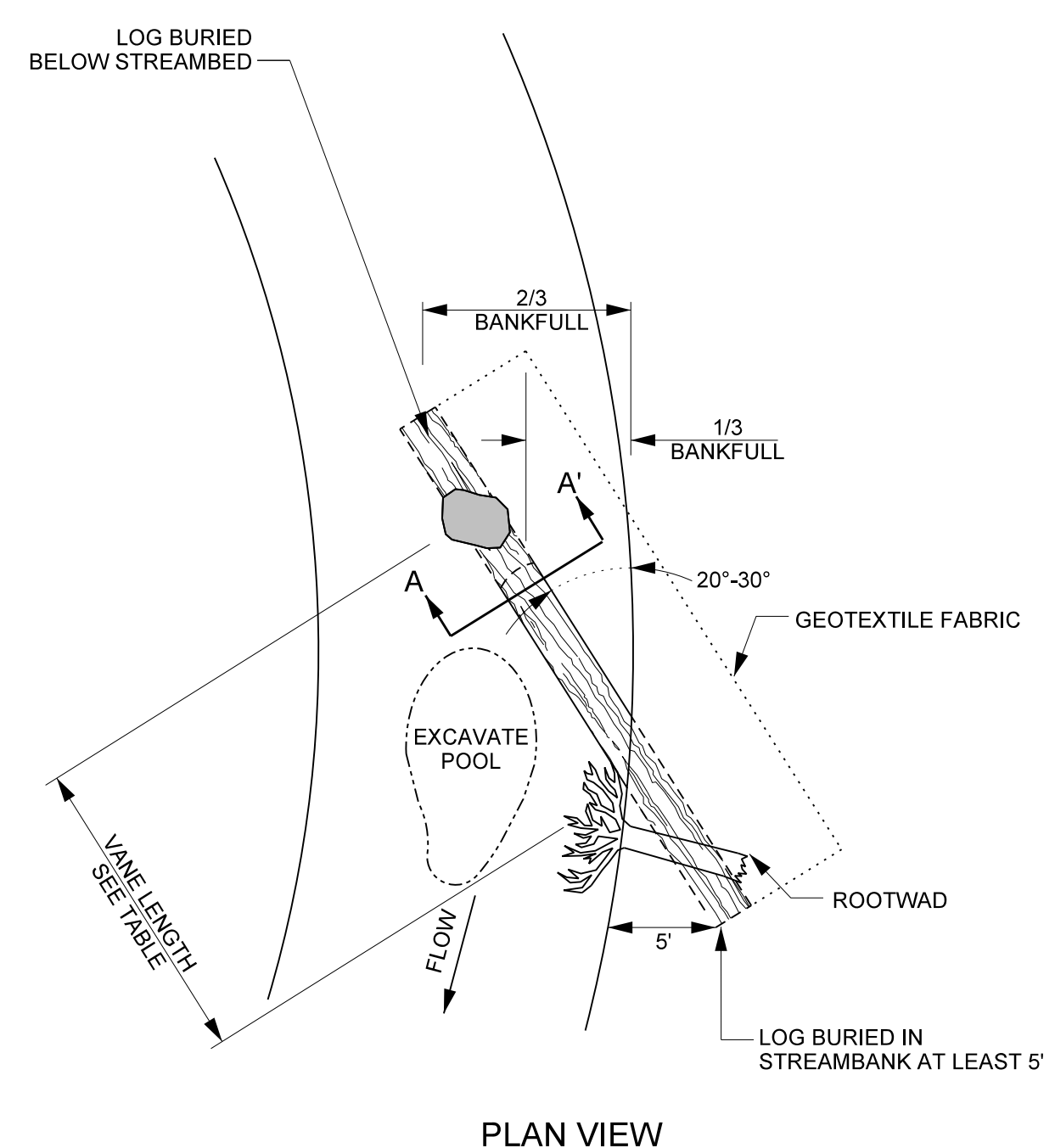
GRADE CONTROL LOG J-HOOK VANE



REACH	VANE LENGTH	BOULDER SIZE
REACH 1	15'	2'x3'x4'
REACH 2	15'	2'x3'x4'

- NOTES:**
- LOGS SHOULD BE AT LEAST 10" IN DIAMETER, RELATIVELY STRAIGHT, HARDWOOD, RECENTLY HARVESTED, AND FOOTERED.
 - BOULDERS MUST BE OF SUFFICIENT SIZE TO ANCHOR LOGS.
 - SOIL SHOULD BE COMPACTED WELL AROUND BURIED PORTIONS OF LOG.
 - ROOTWADS SHOULD BE PLACED BENEATH THE HEADER LOG AND PLACED SO THAT IT LOCKS THE HEADER LOG INTO THE BANK. SEE ROOTWAD DETAIL.
 - BOULDERS SHOULD BE PLACED ON TOP OF HEADER LOG FOR ANCHORING.
 - HEADER BOULDERS TO BE PLACED 0.5 TO 0.75 FEET APART.
 - FILTER FABRIC SHOULD BE NAILED TO THE LOG BELOW THE BACKFILL.
 - TRANSPLANTS OR BOULDERS CAN BE USED INSTEAD OF ROOTWADS, PER DIRECTION OF ENGINEER.
 - BOULDER SILL MUST BE A MINIMUM OF 5'.
 - AFTER ALL STONE BACKFILL HAS BEEN PLACED, FILL IN THE UPSTREAM SIDE OF THE STRUCTURE WITH WELL GRADED MIX OF CLASS B, CLASS A, & #57 STONE TO THE ELEVATION OF THE TOP OF THE HEADER ROCK. INCORPORATE ON-SITE ALLUVIUM WHERE AVAILABLE.

LOG VANE



REACH	VANE LENGTH	BOULDER SIZE
REACH 1	15'	2'x3'x4'
REACH 2	15'	2'x3'x4'

- NOTES:**
- LOGS SHOULD BE AT LEAST 10" IN DIAMETER, RELATIVELY STRAIGHT, HARDWOOD, AND RECENTLY HARVESTED.
 - BOULDERS MUST BE OF SUFFICIENT SIZE TO ANCHOR LOGS.
 - SOIL SHOULD BE COMPACTED WELL AROUND BURIED PORTIONS OF LOGS.
 - ROOTWADS SHOULD BE PLACED BENEATH THE HEADER LOG AND PLACED SO THAT IT LOCKS THE HEADER LOG INTO THE BANK. SEE ROOTWAD DETAIL.
 - BOULDER SHOULD BE PLACED ON TOP OF HEADER LOG FOR ANCHORING.
 - GEOTEXTILE FABRIC SHOULD BE NAILED TO THE LOG BELOW THE BACKFILL.
 - TRANSPLANTS CAN BE USED INSTEAD OF ROOTWADS, PER DIRECTION OF ENGINEER.
 - AFTER ALL STONE BACKFILL HAS BEEN PLACED, FILL IN THE UPSTREAM SIDE OF THE STRUCTURE WITH WELL GRADED MIX OF CLASS B, CLASS A, & #57 STONE TO THE ELEVATION OF THE TOP OF THE HEADER ROCK. INCORPORATE ON-SITE ALLUVIUM WHERE AVAILABLE.

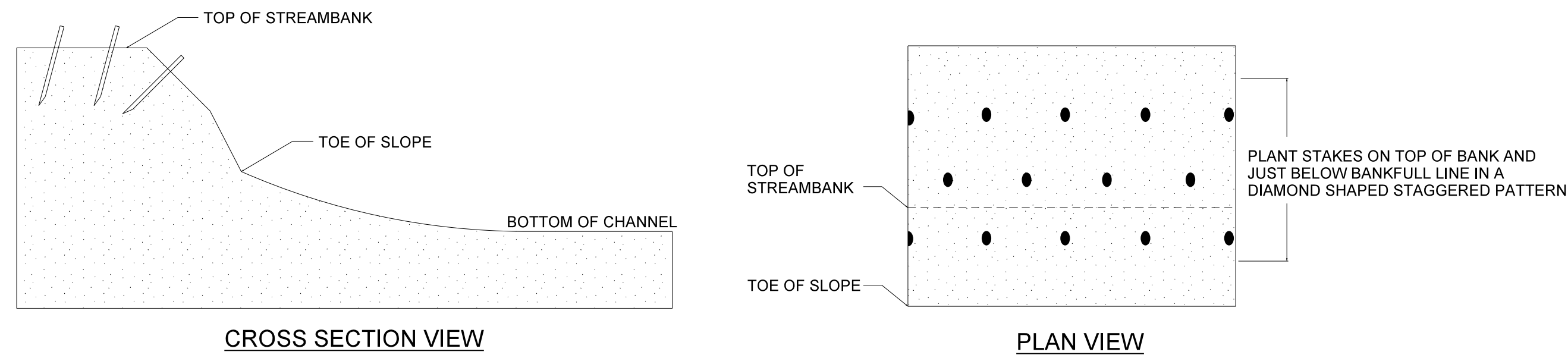
PROJECT REFERENCE NO. 166274 SHEET NO. 2B

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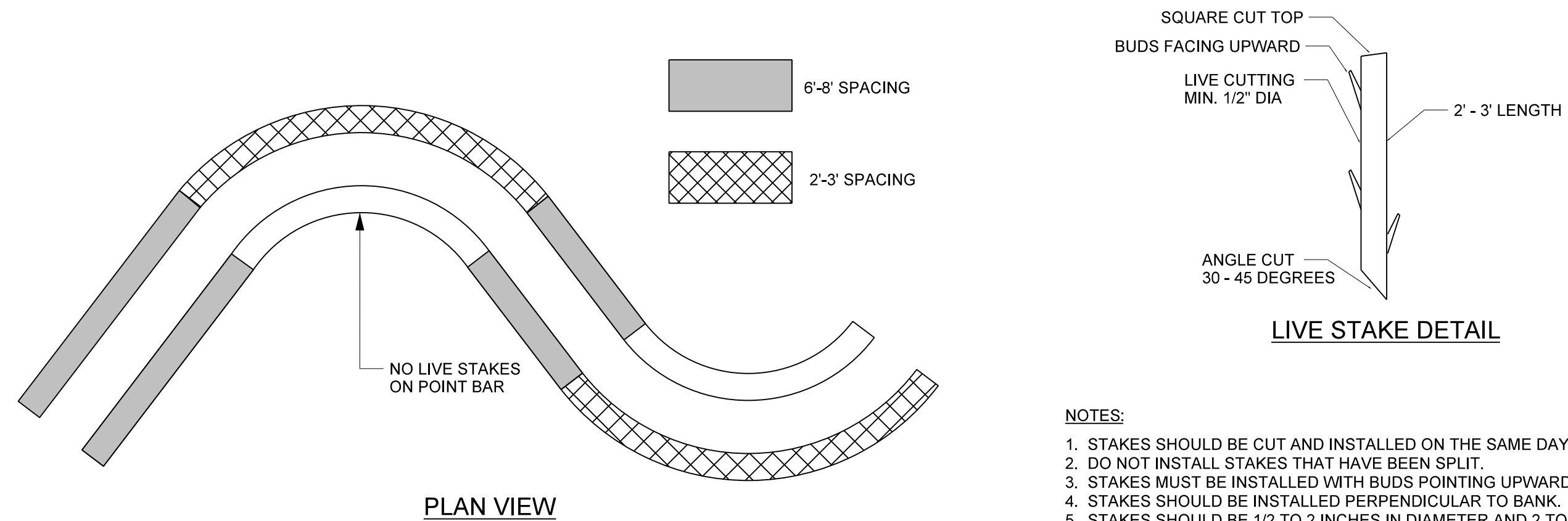
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LIVE STAKING



CROSS SECTION VIEW

PLAN VIEW

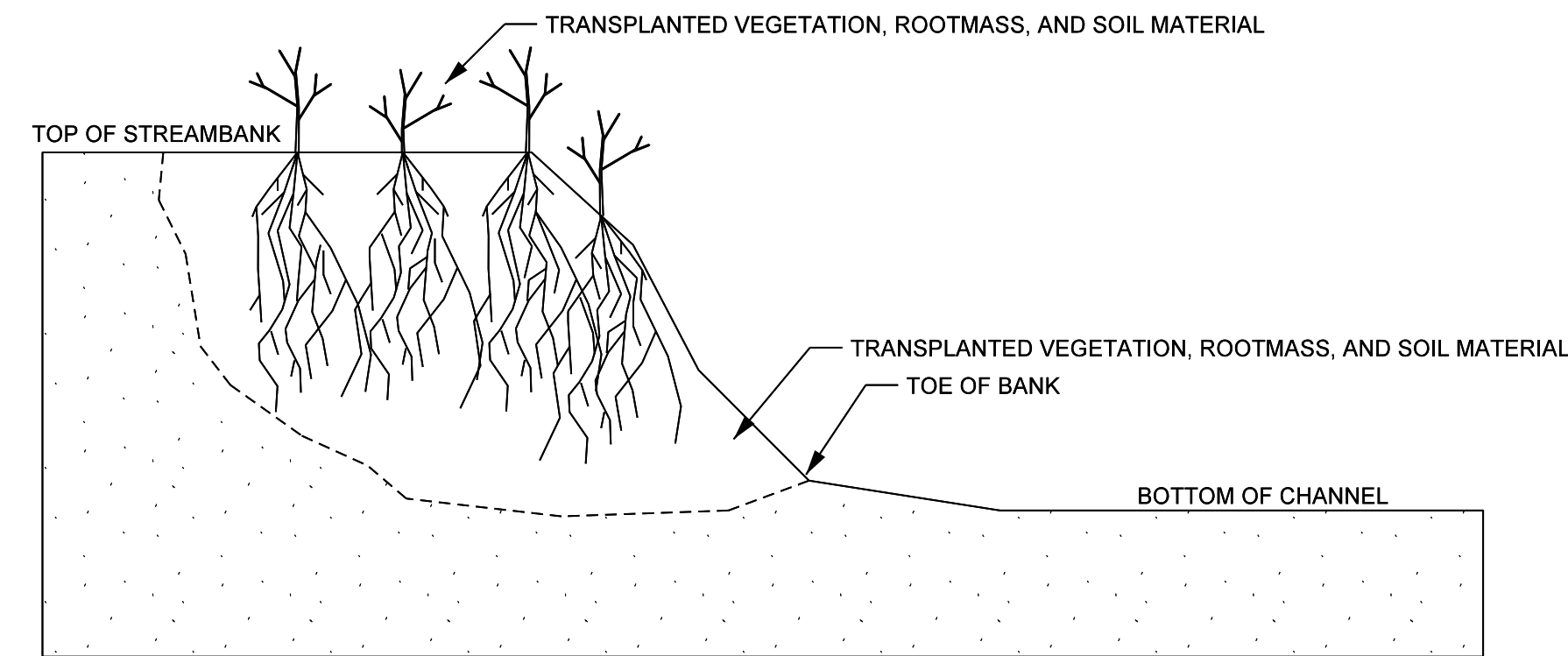


PLAN VIEW

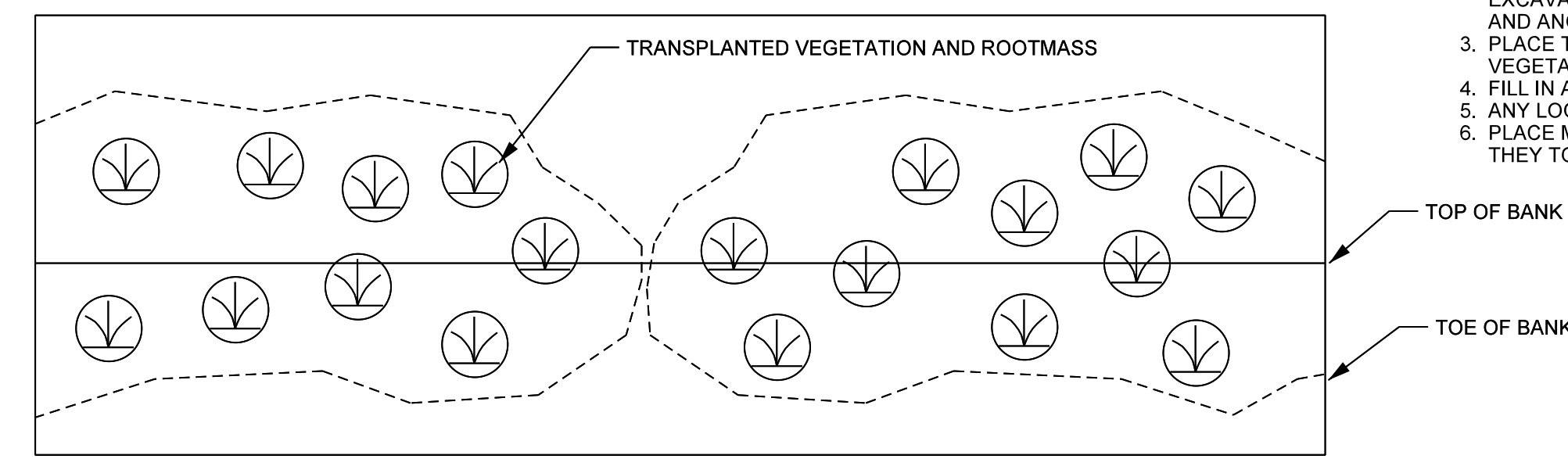
LIVE STAKE DETAIL

- 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

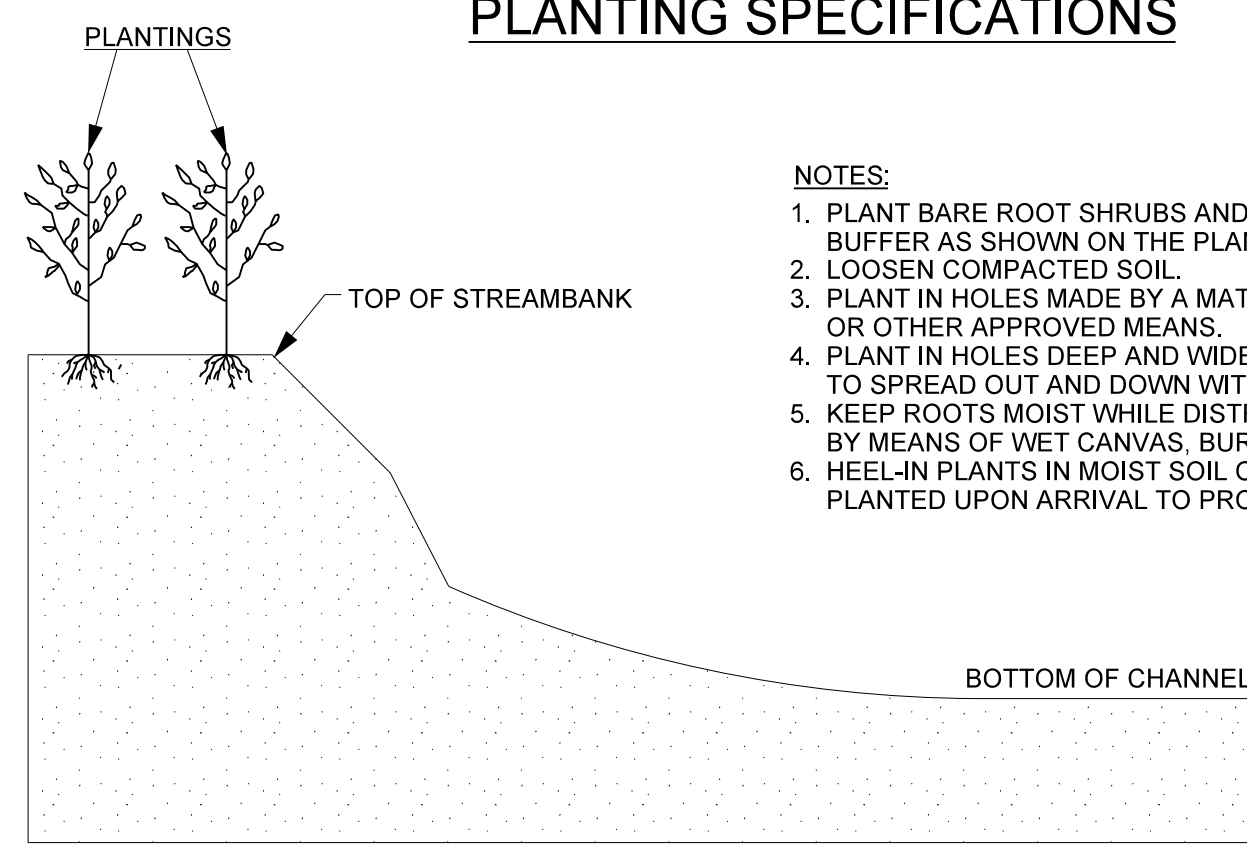


PLAN VIEW

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 EXCAVATED 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.

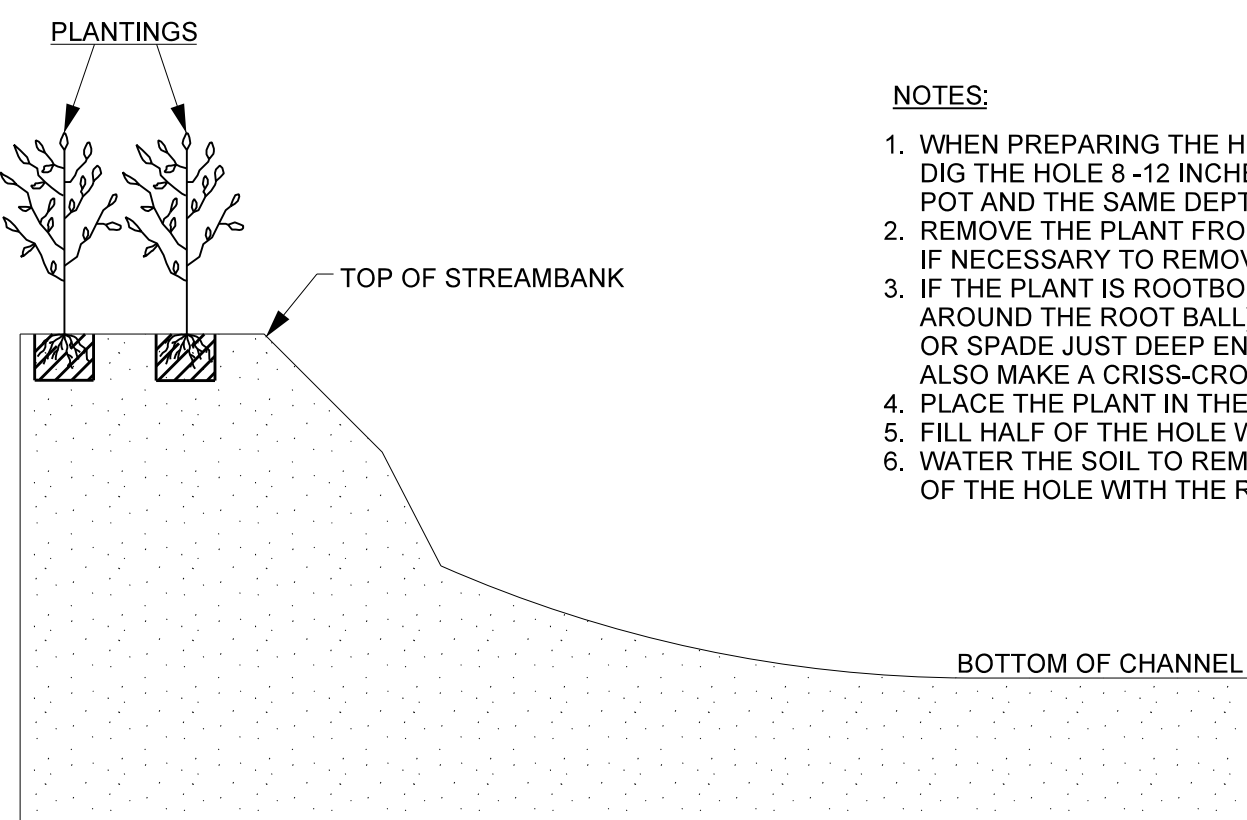
PLANTING SPECIFICATIONS



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.

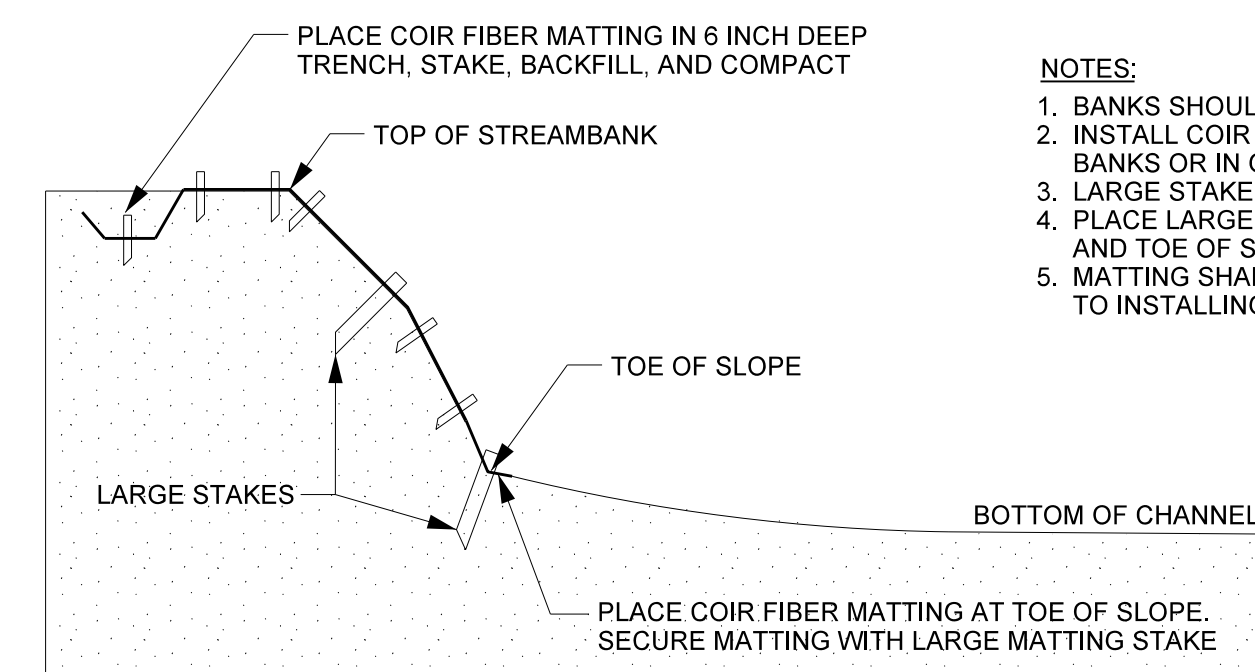


CROSS SECTION VIEW OF CONTAINER PLANTING

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.

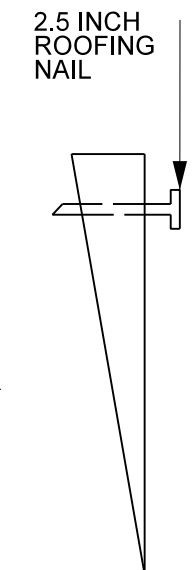
COIR FIBER MATTING



CROSS SECTION VIEW

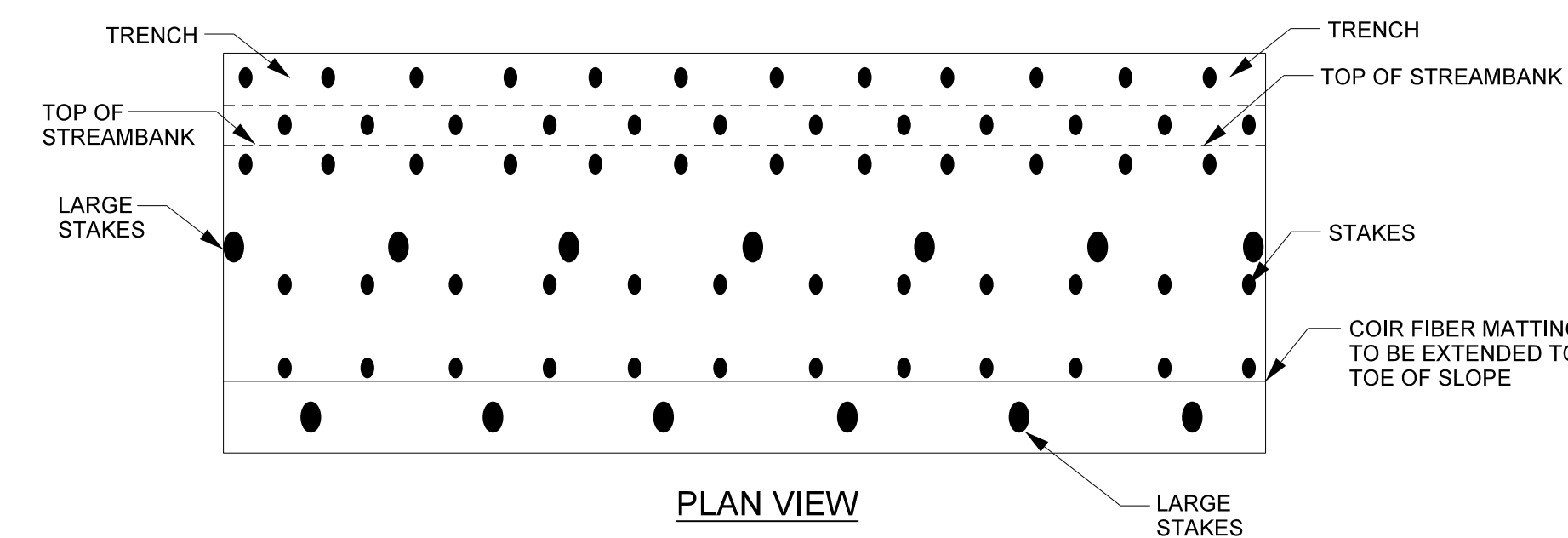
NOTES:

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.

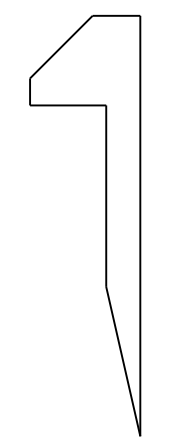


TYPICAL LARGE MATTING STAKE

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

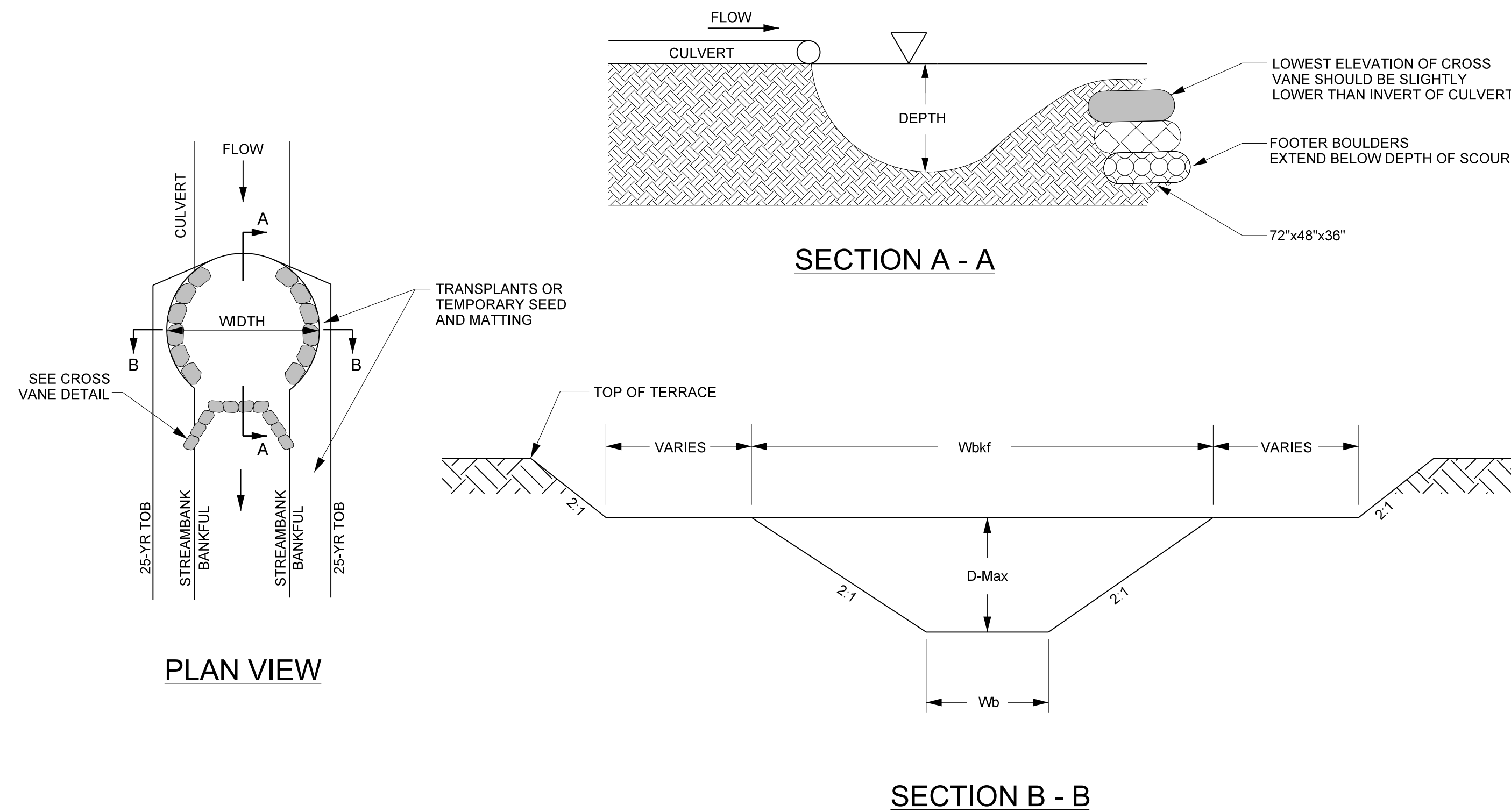


TYPICAL SMALL MATTING STAKE

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)

PROJECT REFERENCE NO.	SHEET NO.
166274	2C
PROGRESS DRAWING FOR REVIEW PURPOSES ONLY DO NOT USE FOR CONSTRUCTION	
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NCDMS ID NO. 100047	

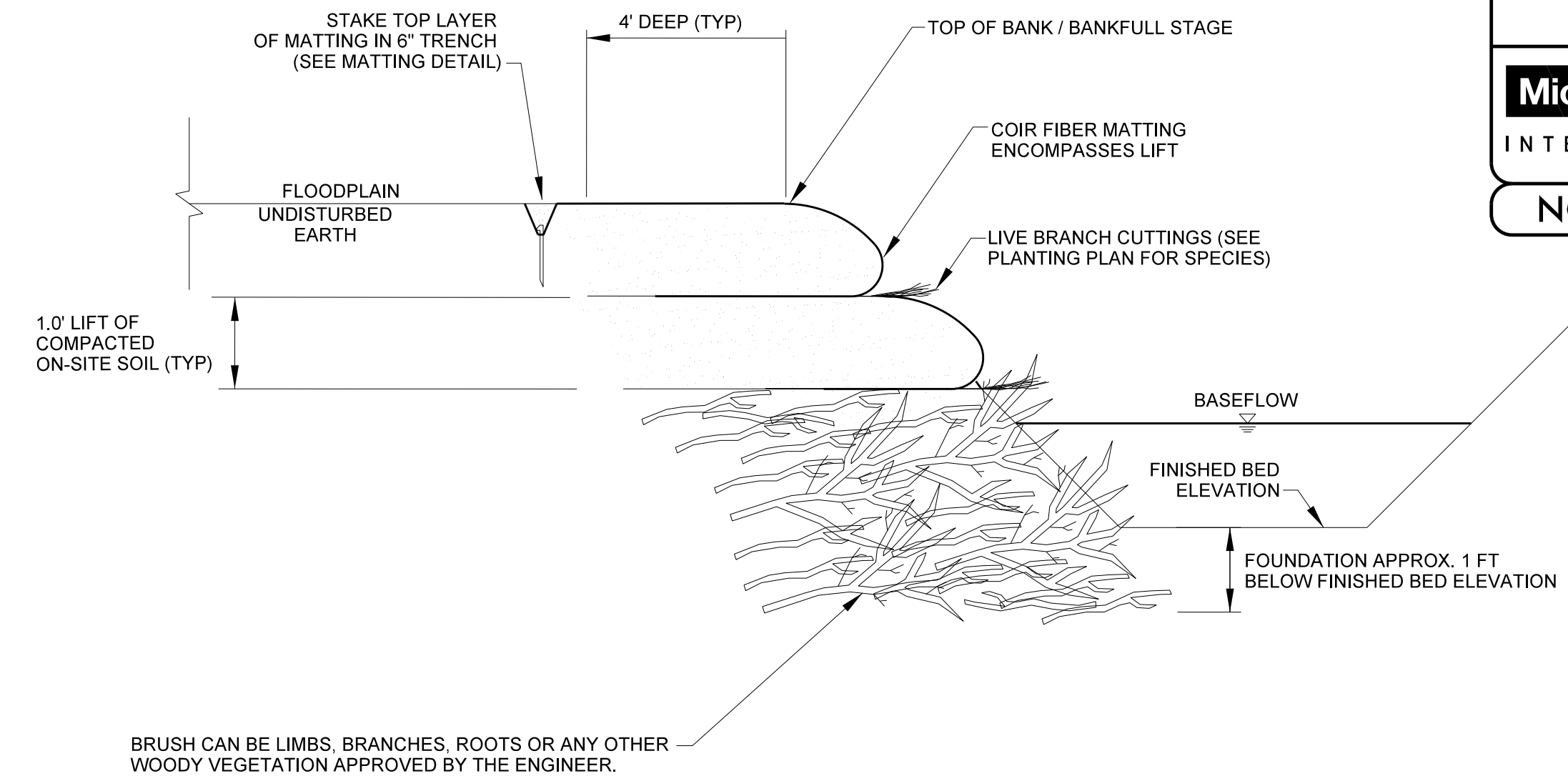
PLUNGE POOL



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 1 STONE MAY BE USED AT THE DIRECTION OF THE ENGINEER TO BUILD THE FOUNDATION IN LIEU OF BRUSH MATERIAL.

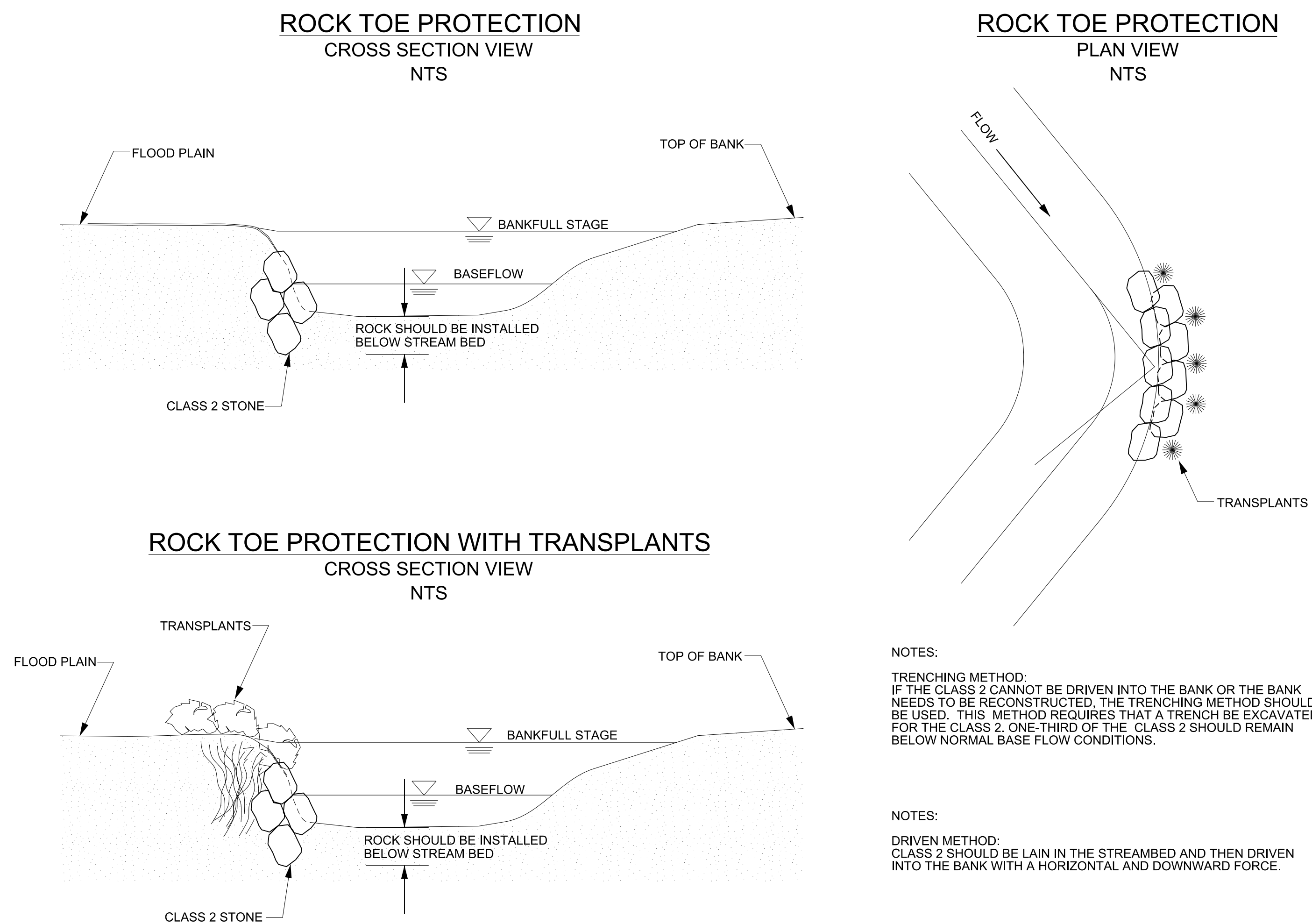


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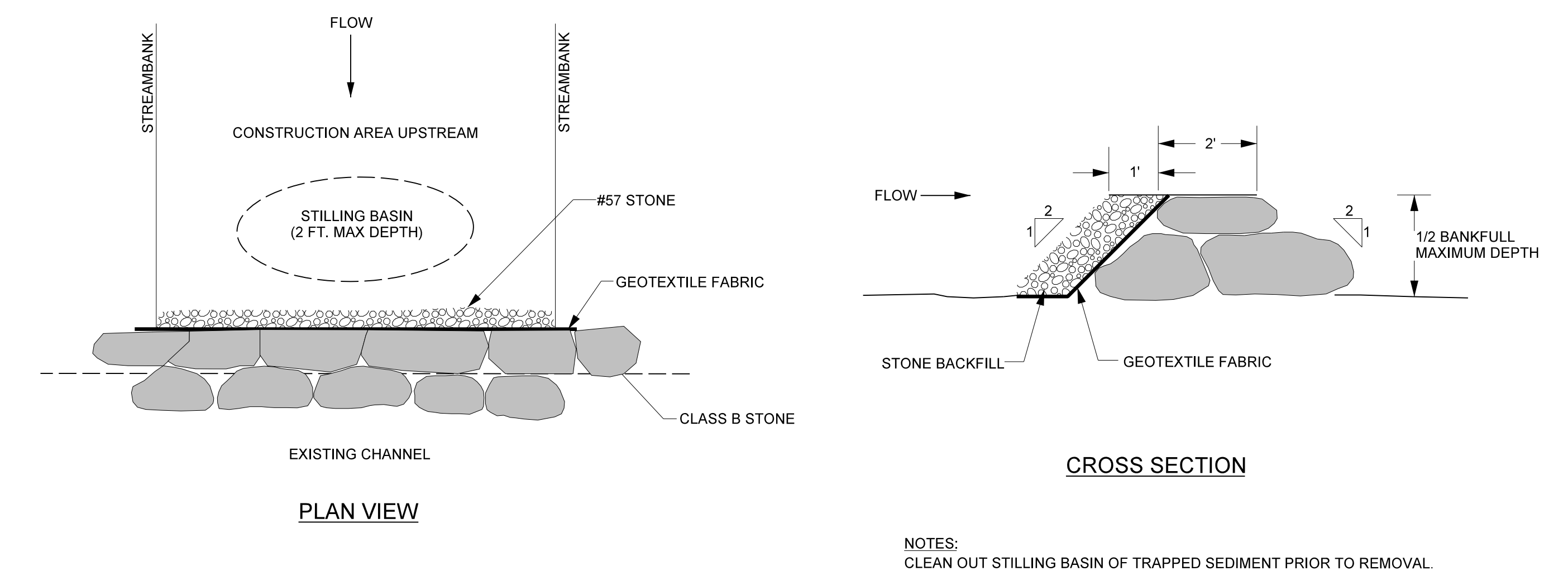
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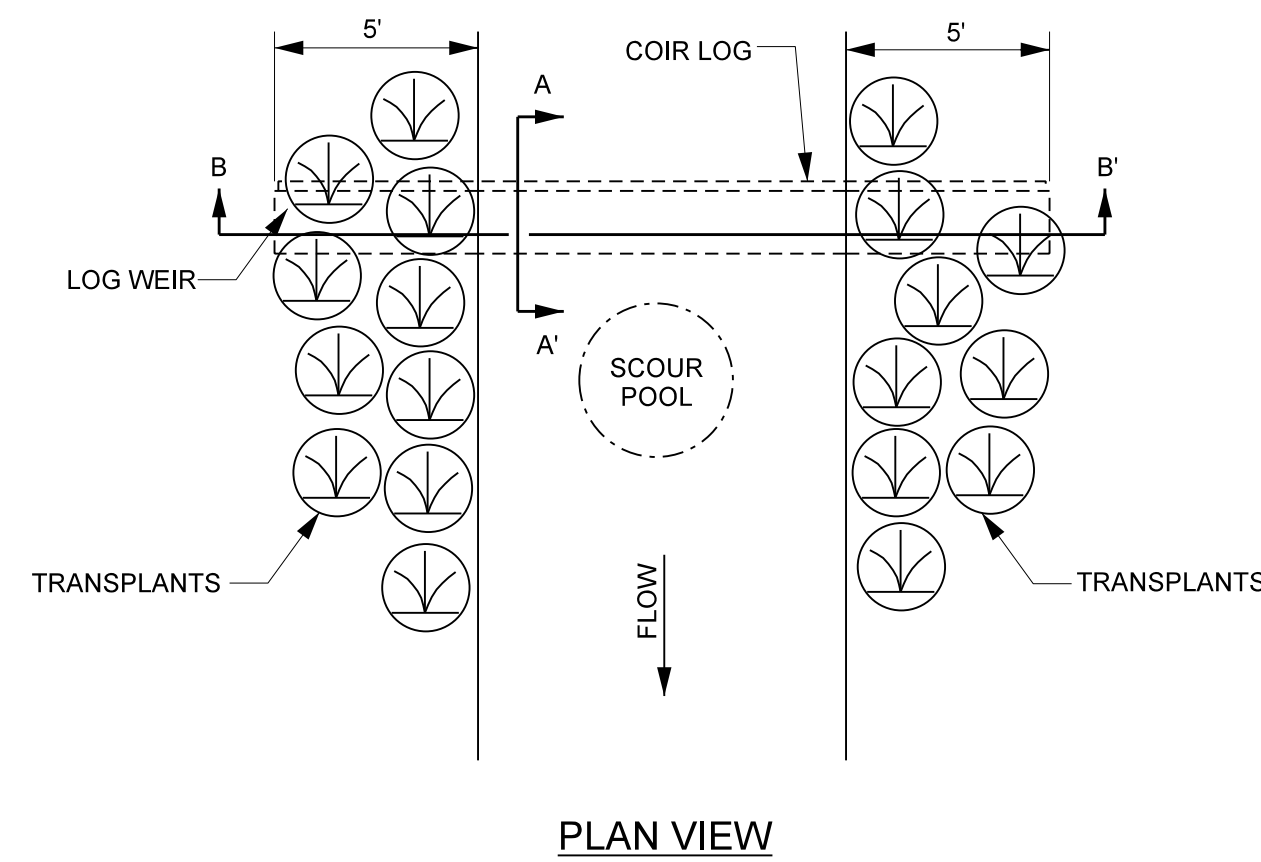
ROCK TOE PROTECTION



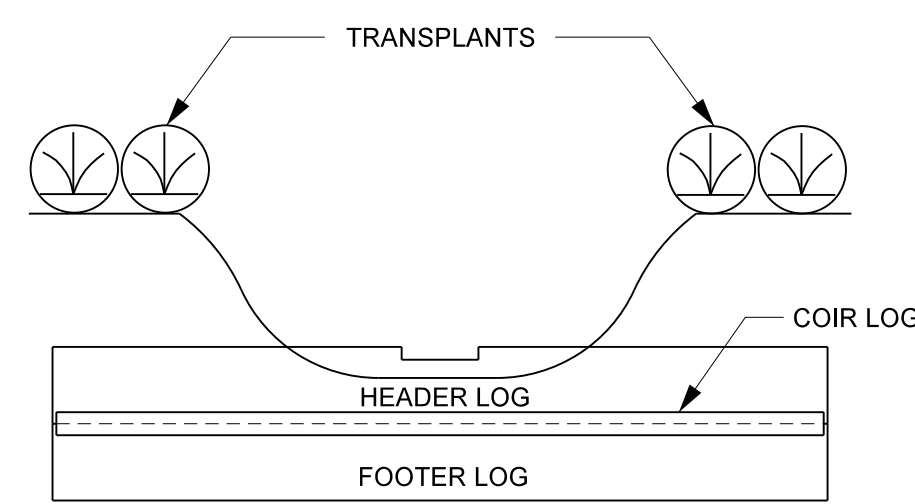
ROCK DAM



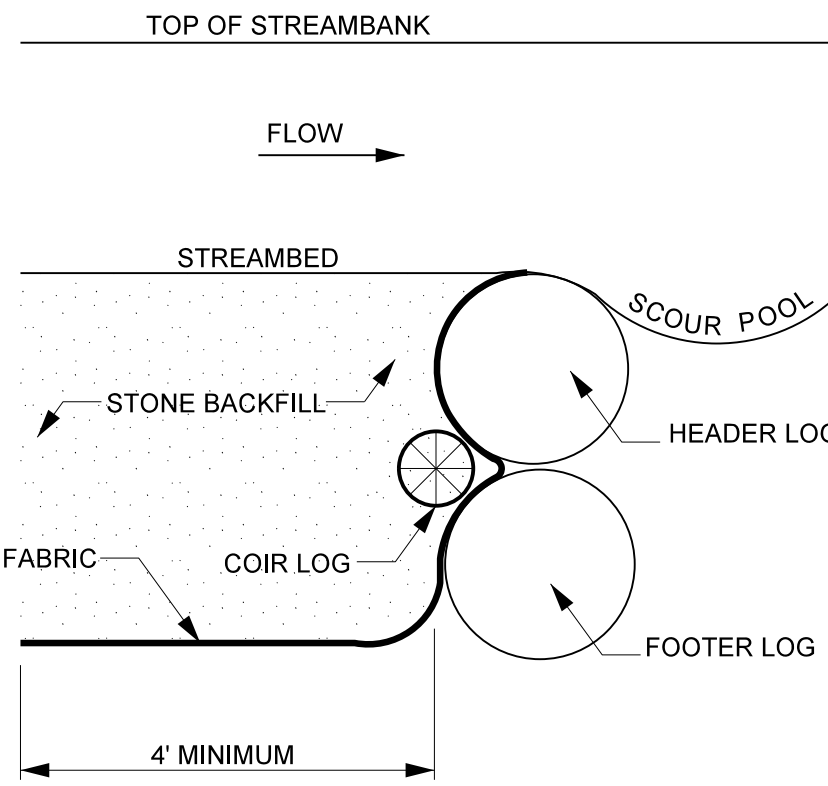
LOG STEP



PLAN VIEW



CROSS SECTION VIEW B - B'

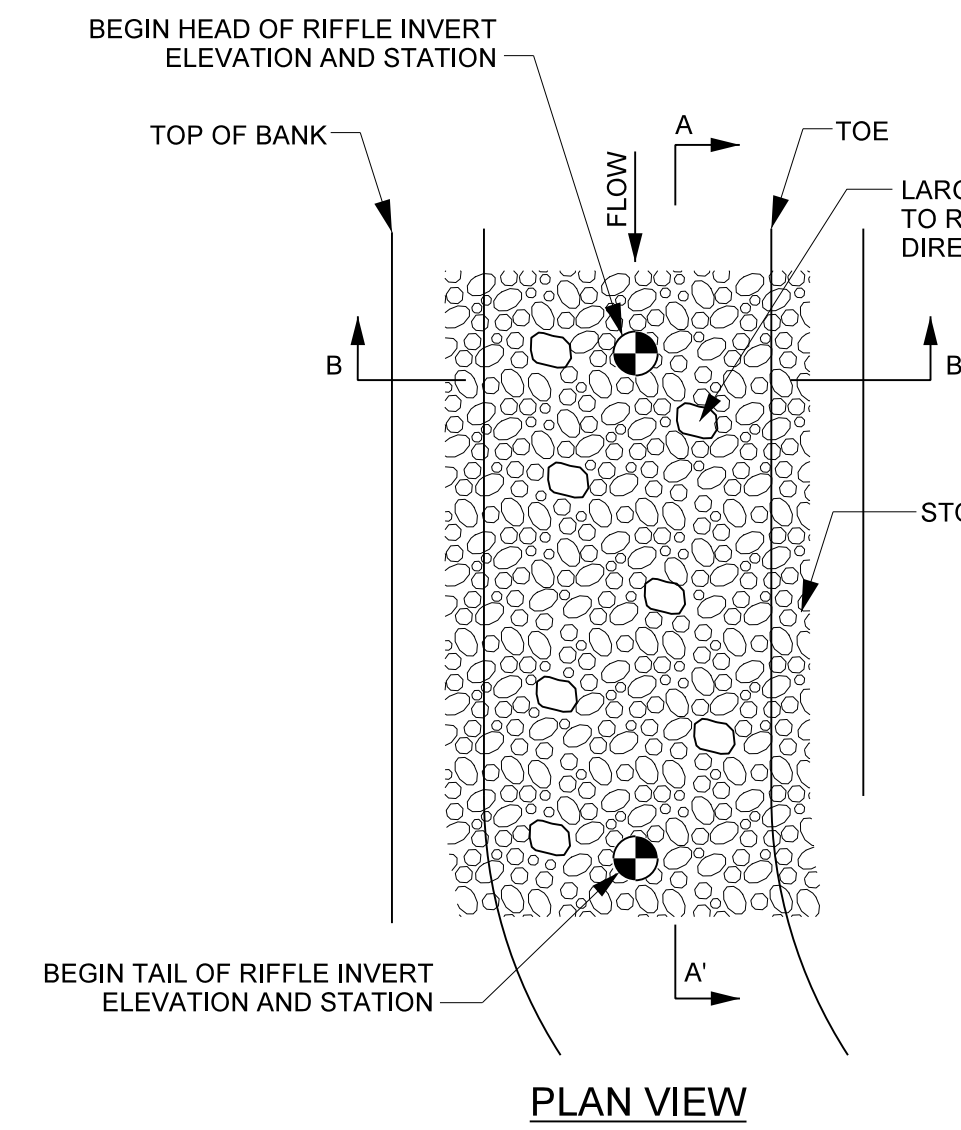


SECTION A - A'

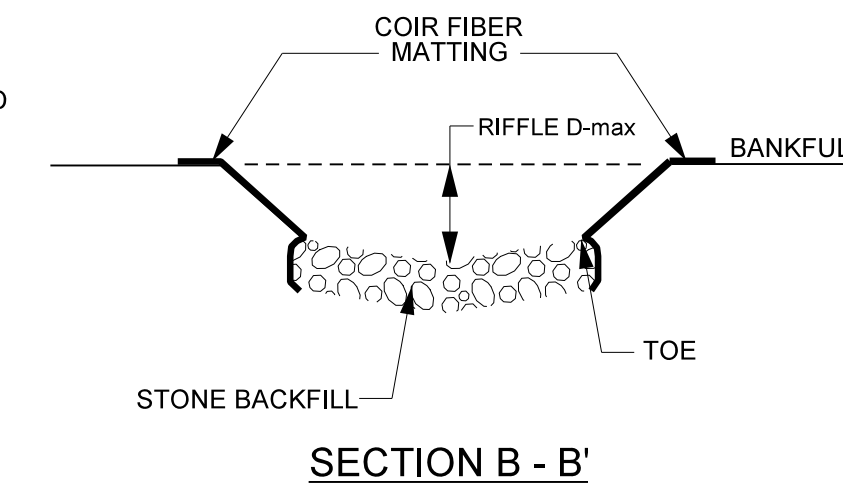
NOTES:

- LOGS SHOULD BE AT LEAST 10 INCHES IN DIAMETER, RELATIVELY STRAIGHT, HARDWOOD, AND RECENTLY HARVESTED.
- TOP OF HEADER LOG SHOULD BE SET AT SAME ELEVATION AS THE STREAMBED.
- DIAMETER OF COIR LOG SHOULD BE APPROXIMATELY 1/2 DIAMETER OF LOGS.
- USE GEOTEXTILE FABRIC WITH COIR LOGS TO SEAL GAPS BETWEEN LOGS.
- PLACE TRANSPLANTS ALONG BANKS TO PROTECT AGAINST BANK EROSION.
- THE HEADER LOG SHOULD BE NOTCHED 2 - 3 INCHES DEEP IN THE CENTER AND FOR 20 - 30% OF THE CHANNEL WIDTH.

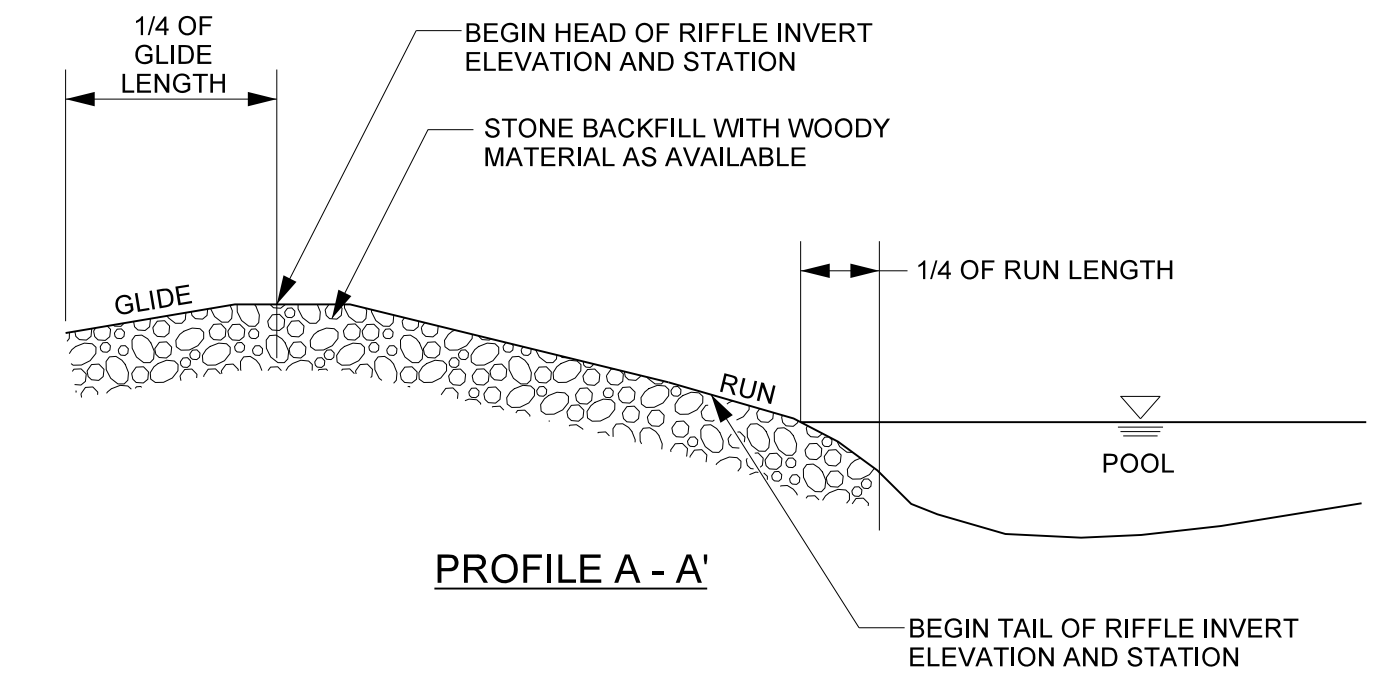
CONSTRUCTED RIFFLE



PLAN VIEW



SECTION B - B'



PROFILE A - A'

NOTES: NATURAL ALLUVIUM RIFFLE

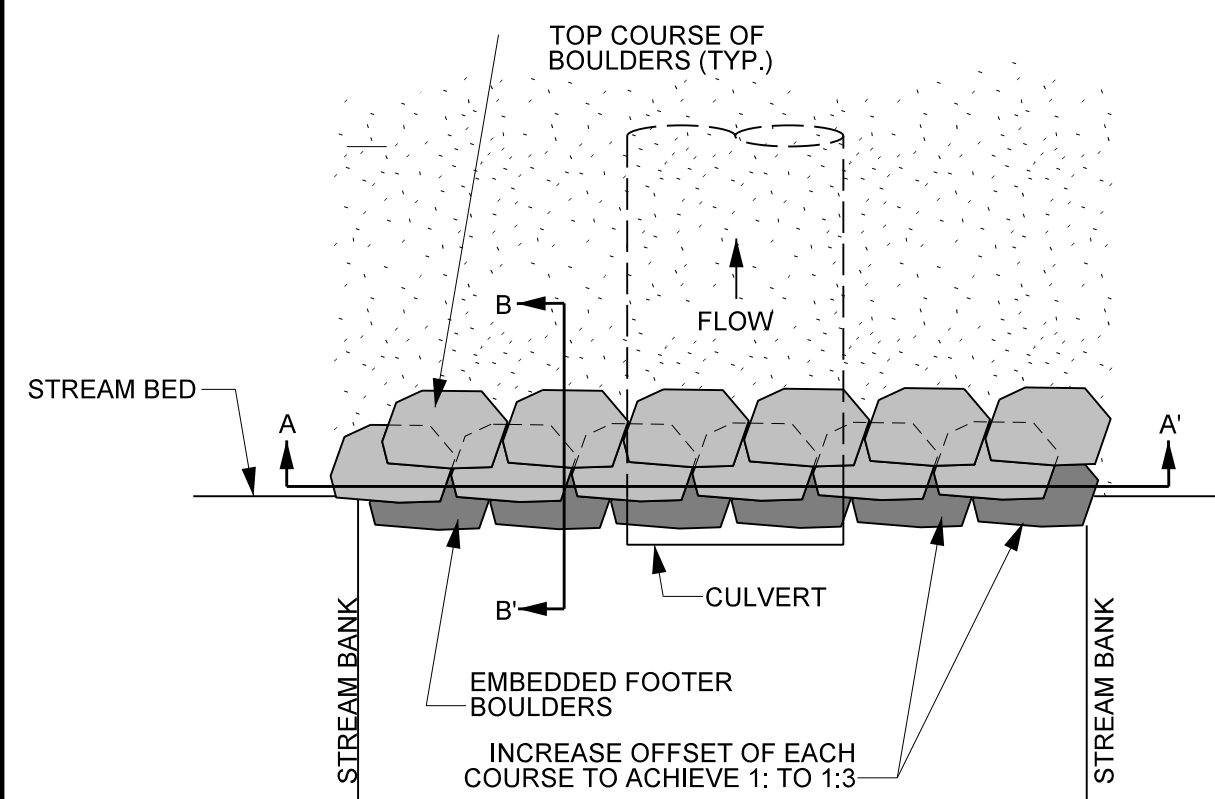
- STOCK PILE NATURAL ALLUVIUM FROM SECTIONS OF CHANNEL THAT ARE BEING ABANDONED AND FILLED.
- APPLY NATURAL ALLUVIUM BED MATERIAL IN THOSE RIFFLES WHERE STONE IS NOT INDICATED.
- ANY WATER LOGGED WOODY MATERIAL COLLECTED SHOULD BE INSTALLED WITH BED MATERIAL.

NOTES: STONE CONSTRUCTED RIFFLE

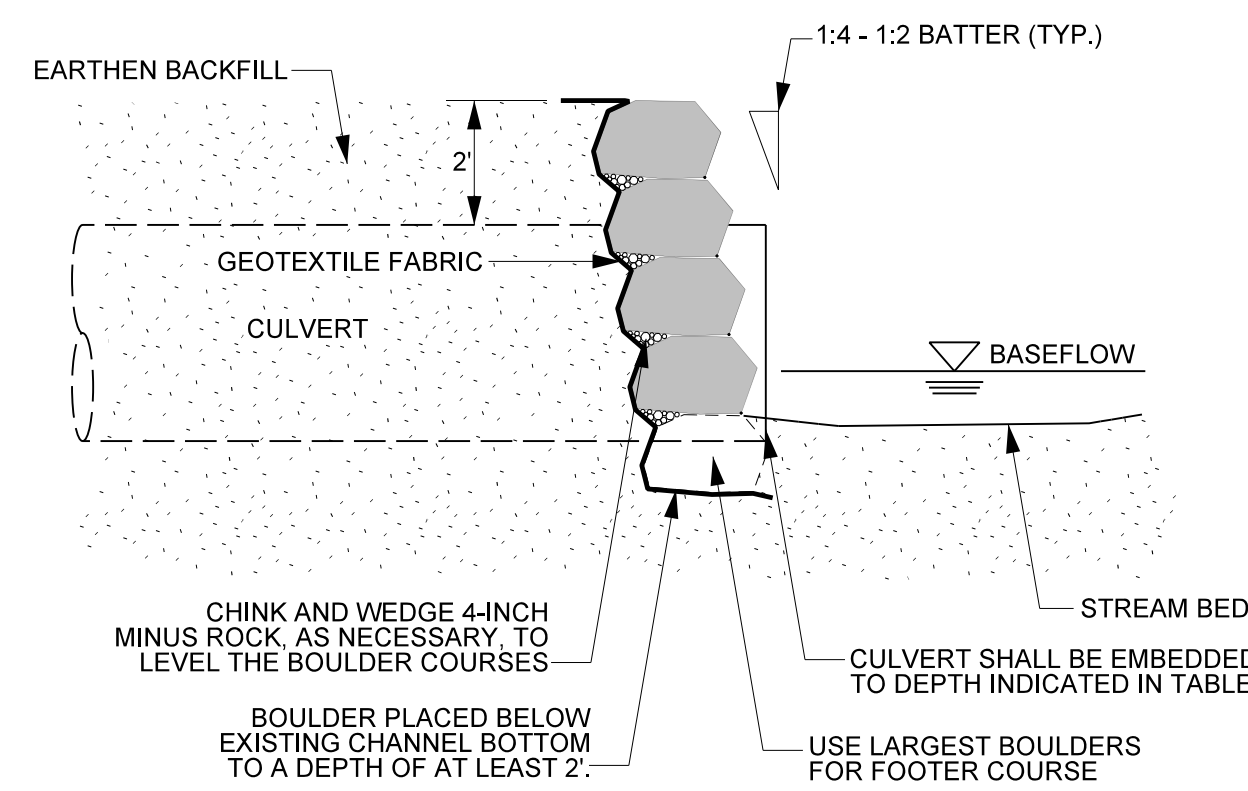
- UNDERCUT CHANNEL BED ELEVATION AS NEEDED TO ALLOW FOR LAYERS OF STONE TO ACHIEVE FINAL GRADE.
- INSTALL COIR FIBER MATTING ALONG COMPLETED BANKS SUCH THAT THE EROSION CONTROL MATTING AT THE TOE OF THE BANK EXTENDS DOWN TO THE UNDERCUT ELEVATION.
- INSTALL STONE BACKFILL, COMPACTED TO GRADE.
- FINAL 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.
- CONSTRUCTED RIFFLES SHALL BE 12" THICK.
- CHANNEL BED SHALL INCLUDE WOODY MATERIAL AS AVAILABLE ON-SITE LAYERED IN WITH STONE BACKFILL.

REACH	STONE BACKFILL MIX
APPLIES TO ALL REACHES	10% CLASS I RIPRAP 20% CLASS B RIPRAP 40% CLASS A RIPRAP 30% ON-SITE ALLUVIUM

BOULDER HEADWALL / ENDWALL



PLAN VIEW



SECTION B - B'

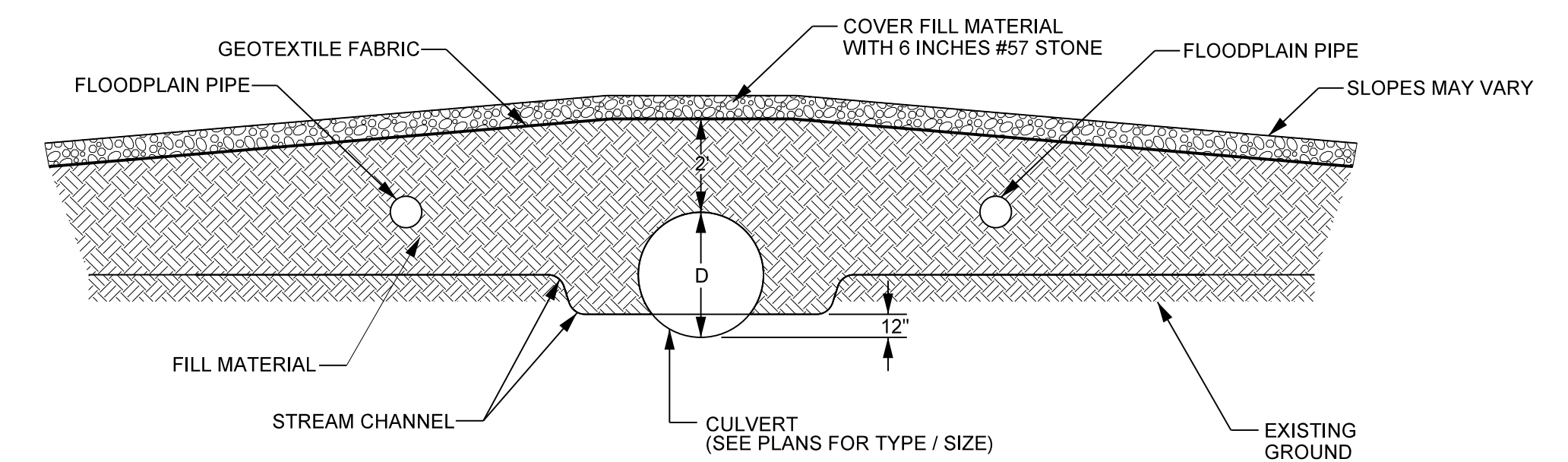
REACH	BOULDER SIZE	CULVERT SIZE	EMBEDMENT
REACH 1	2'x3'x4'	24 LF x 79" x 117" CMP (*SEE BELOW)	12"

* ALSO THERE WILL BE TWO 24 LF x 24" RCP FLOODPLAIN PIPES EITHER SIDE OF THE CULVERT PIPE

NOTES:

- BOULDERS SHALL BE TOUCHING SO THAT VOID SPACE IS MINIMAL.
- BOULDERS SHOULD EXTEND BELOW SCOUR DEPTH. FOOTER BOULDERS SHALL BE AT LEAST 2' BELOW THE EXISTING BED
- GEOTEXTILE MATTING SHOULD BE PLACED BETWEEN BOULDERS AND SOIL.
- BOULDERS SHOULD BE BACKFILLED AND COMPACTED. VOID SPACE BETWEEN FABRIC AND BOULDER OR ROCK FILL MATERIAL, SHOULD BE MINIMIZED.
- BOULDERS SHOULD NOT BE HIGHER THAN THE TOP OF CROSSING ELEVATION.
- FILTER FABRIC SHOULD BE PLACED BEHIND BOULDERS, BURIED BELOW BOULDER DEPTH, AND EXTEND INTO THE BANK.

PERMANENT STREAM CROSSING



CROSS SECTION VIEW

NOTES:

- SIZE DIMENSIONS SHOWN ON PLANS.
- APPLY SUFFICIENT FILL (2' MIN) OVER CULVERT TO PREVENT COLLAPSE.
- STABILIZE SIDE SLOPES WITH EROSION CONTROL MATTING AND FILL AROUND CULVERTS WITH CLASS II STONE.
- INSTALL HEADWALLS AND ENDWALLS AS SHOWN ON THE PLANS.

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NCDMS ID NO. 100020

GENERAL CONSTRUCTION SEQUENCE

A general construction sequence is provided below for the Blair 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.

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INTERNATIONAL

NCDMS ID NO. 100047

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>).

2/26/2023

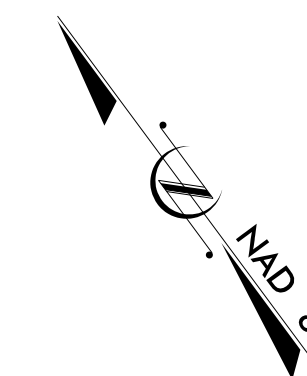
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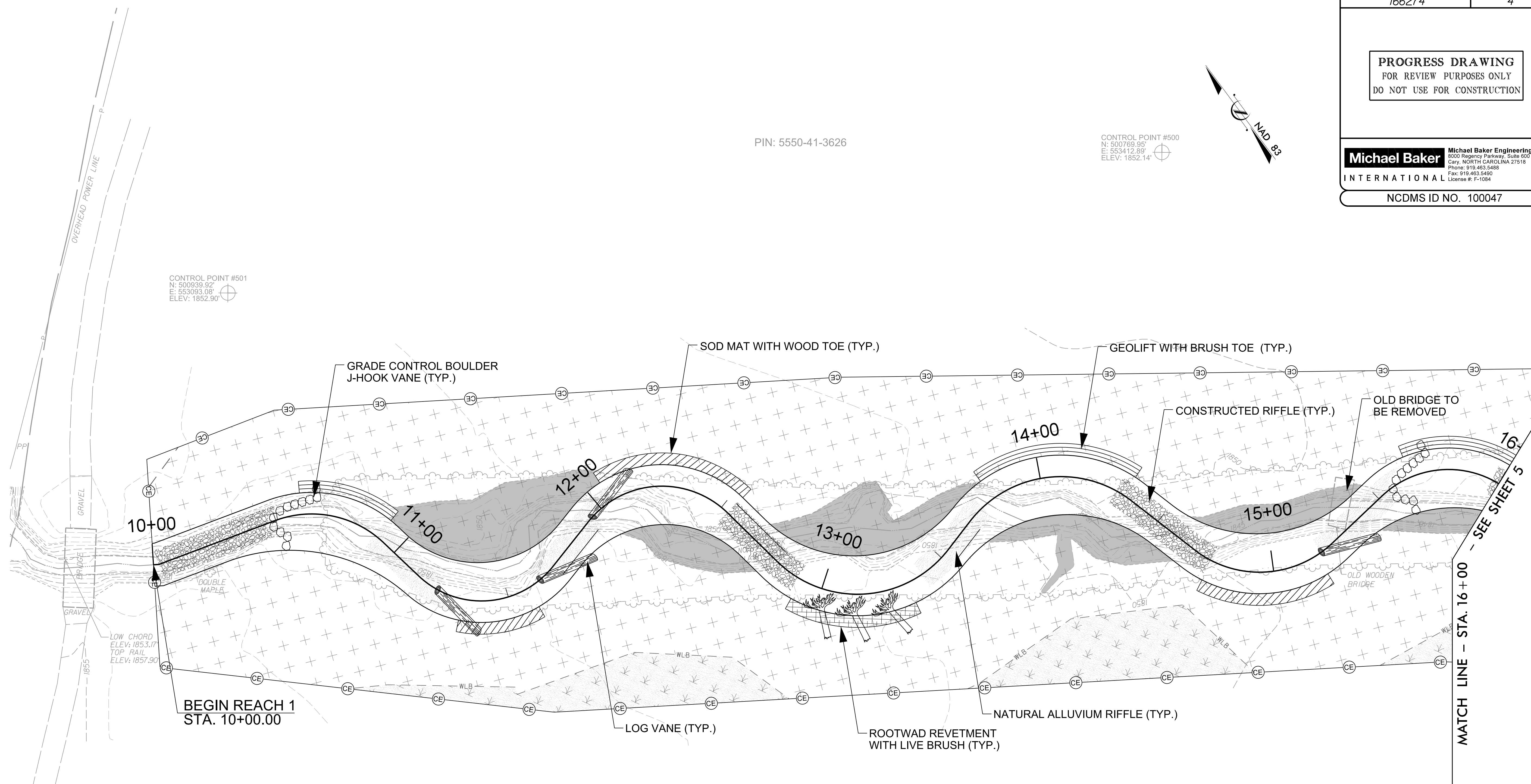
NCDMS ID NO. 100047

PIN: 5550-41-3626

CONTROL POINT #500
N: 500769.95'
E: 553412.89'
ELEV: 1852.14'








CONTROL POINT #501
N: 500939.92'
E: 553093.08'
ELEV: 1852.90'



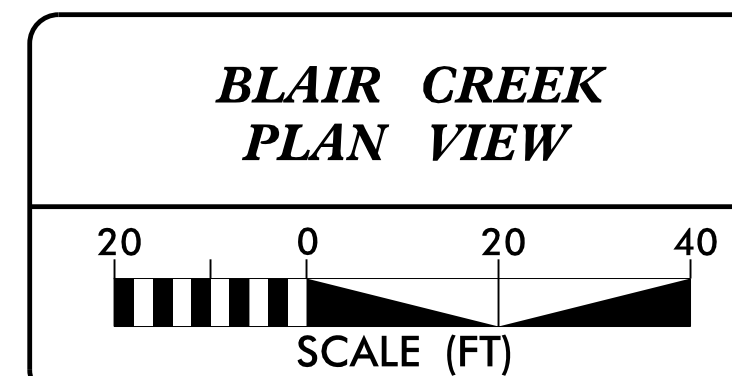
BEGIN REACH 1
STA. 10+00.00

PIN: 5550-41-3626

-  PROPOSED WETLAND RE-ESTABLISHMENT
-  PROPOSED WETLAND ENHANCEMENT
-  PROPOSED WETLAND REHABILITATION
-  FILL EXISTING CHANNEL
-  DITCH PLUG

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.

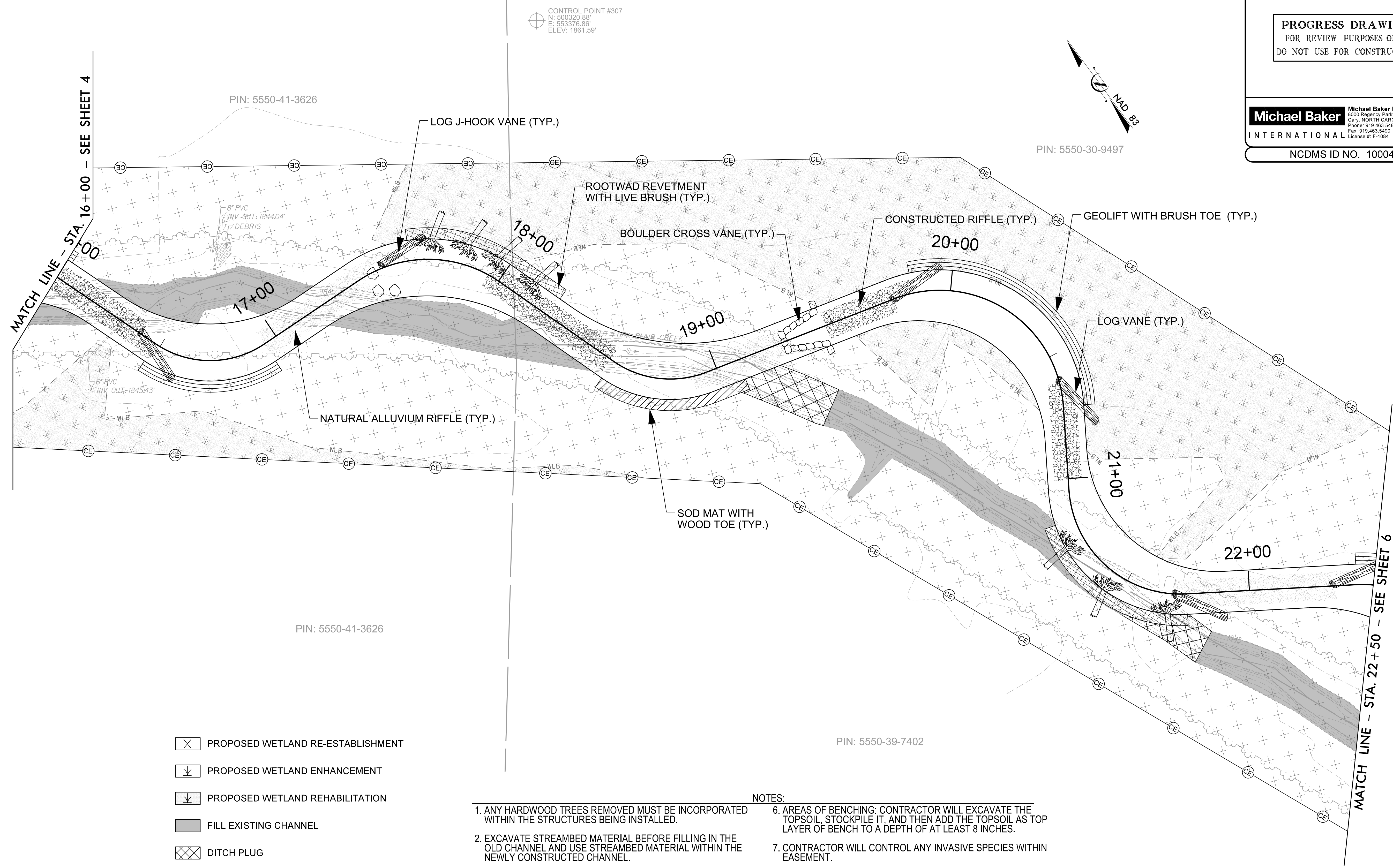







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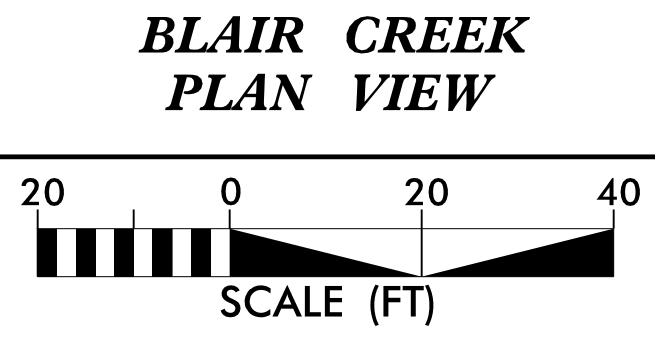
2/26/2013
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-  PROPOSED WETLAND RE-ESTABLISHMENT
-  PROPOSED WETLAND ENHANCEMENT
-  PROPOSED WETLAND REHABILITATION
-  FILL EXISTING CHANNEL
-  DITCH PLUG

CONTROL POINT #307
N: 500320.88'
E: 553376.86'
ELEV: 1861.59'

- NOTES:**
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2/26/2023

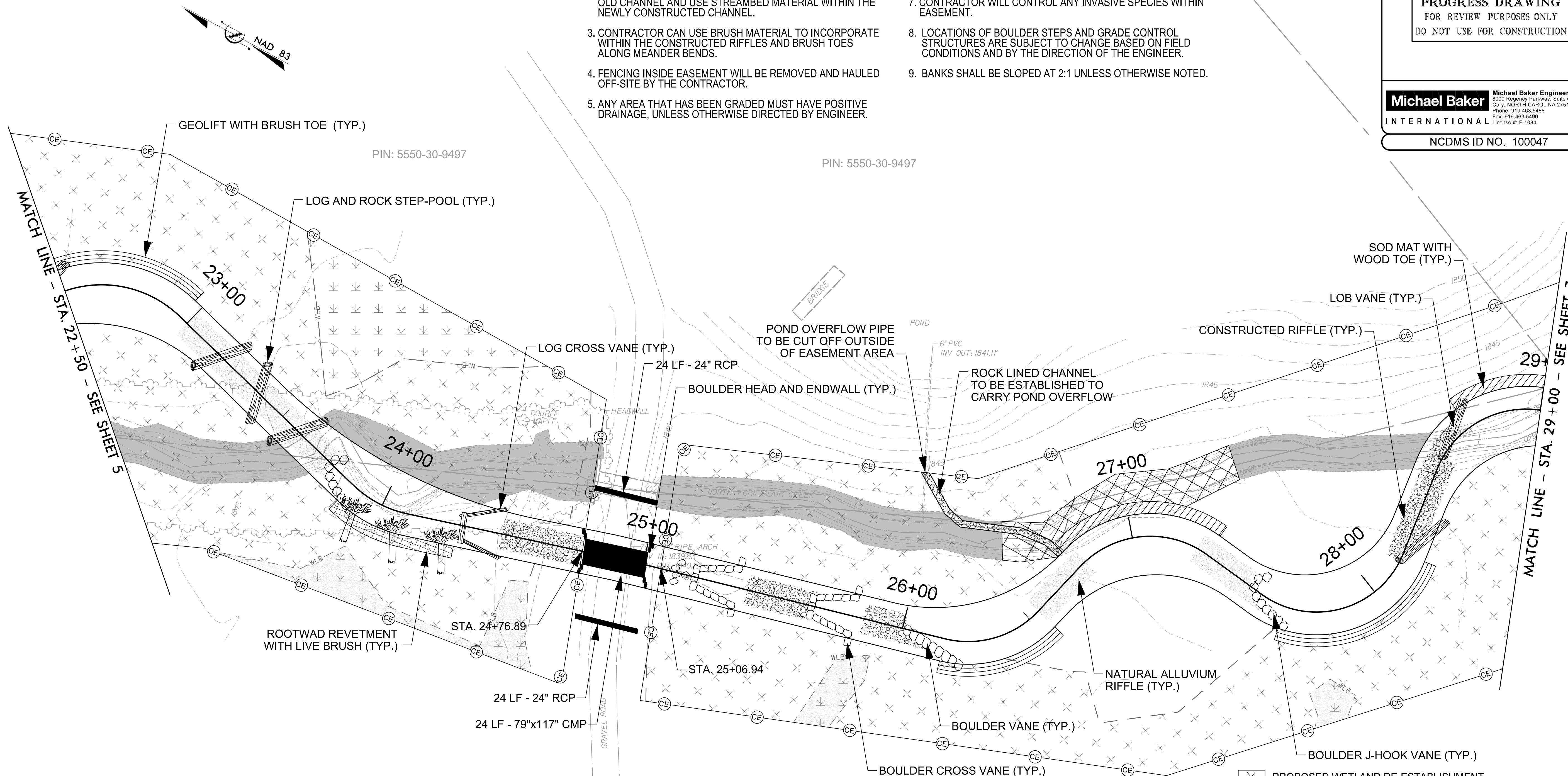
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- PROPOSED WETLAND RE-ESTABLISHMENT
- PROPOSED WETLAND ENHANCEMENT
- PROPOSED WETLAND REHABILITATION
- FILL EXISTING CHANNEL
- DITCH PLUG

**BLAIR CREEK
PLAN VIEW**

SCALE (FT)

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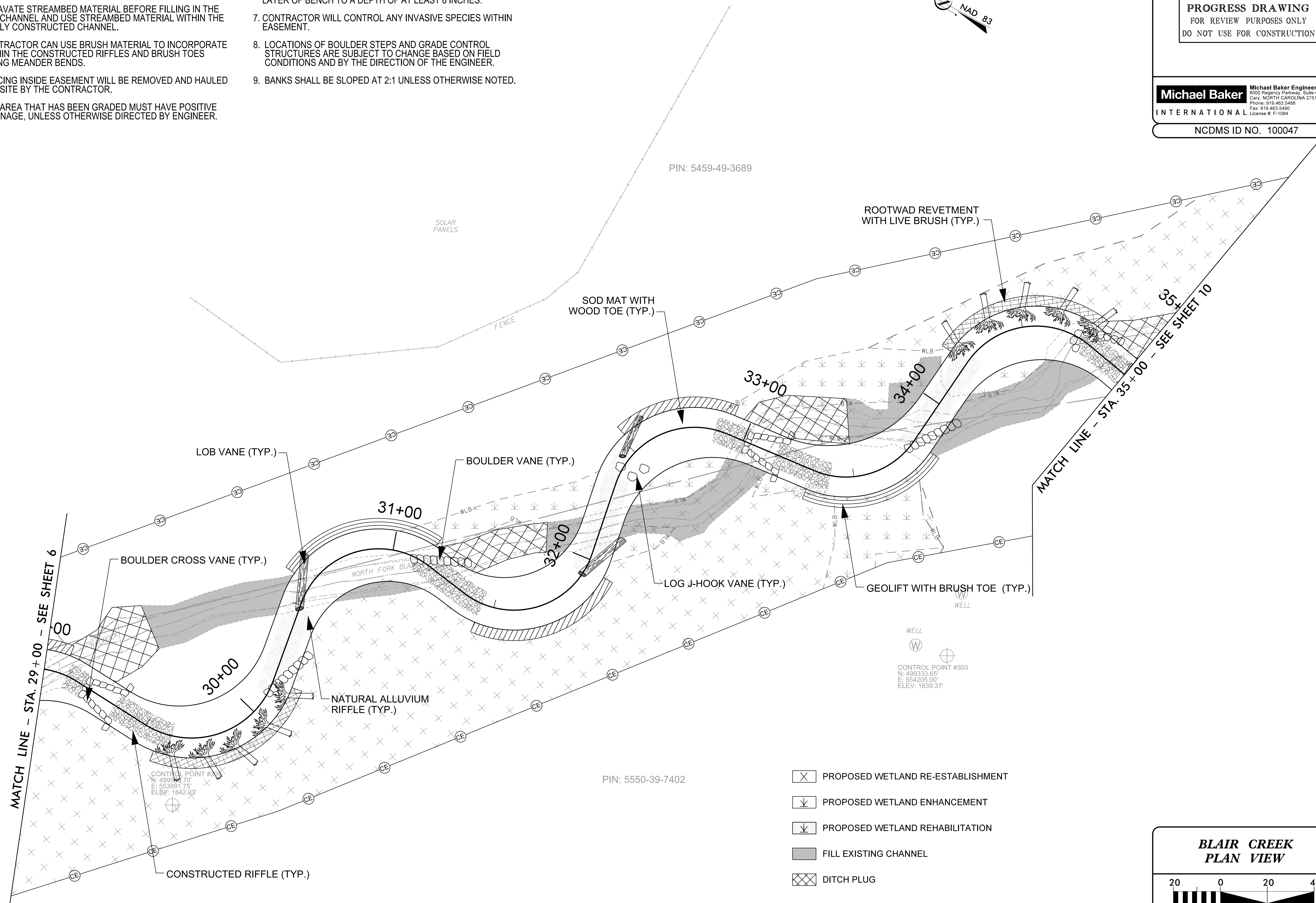
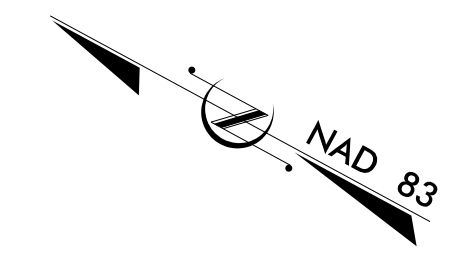
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PIN: 5459-49-3689

SOLAR PANELS

FENCE

SOD MAT WITH WOOD TOE (TYP.)

ROOTWAD REVETMENT WITH LIVE BRUSH (TYP.)

LOB VANE (TYP.)

BOULDER VANE (TYP.)

BOULDER CROSS VANE (TYP.)

LOG J-HOOK VANE (TYP.)

GEOLIFT WITH BRUSH TOE (TYP.)

NATURAL ALLUVIUM RIFFLE (TYP.)

CONTROL POINT #303
N: 439333.70
E: 553991.75
ELEV: 1842.03'

CONTROL POINT #303
N: 439333.65
E: 554205.00
ELEV: 1839.37'

PIN: 5550-39-7402

- PROPOSED WETLAND RE-ESTABLISHMENT
- PROPOSED WETLAND ENHANCEMENT
- PROPOSED WETLAND REHABILITATION
- FILL EXISTING CHANNEL
- DITCH PLUG

MATCH LINE - STA. 29+00 - SEE SHEET 6

MATCH LINE - STA. 35+00 - SEE SHEET 10

**BLAIR CREEK
PLAN VIEW**



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27/26/2023

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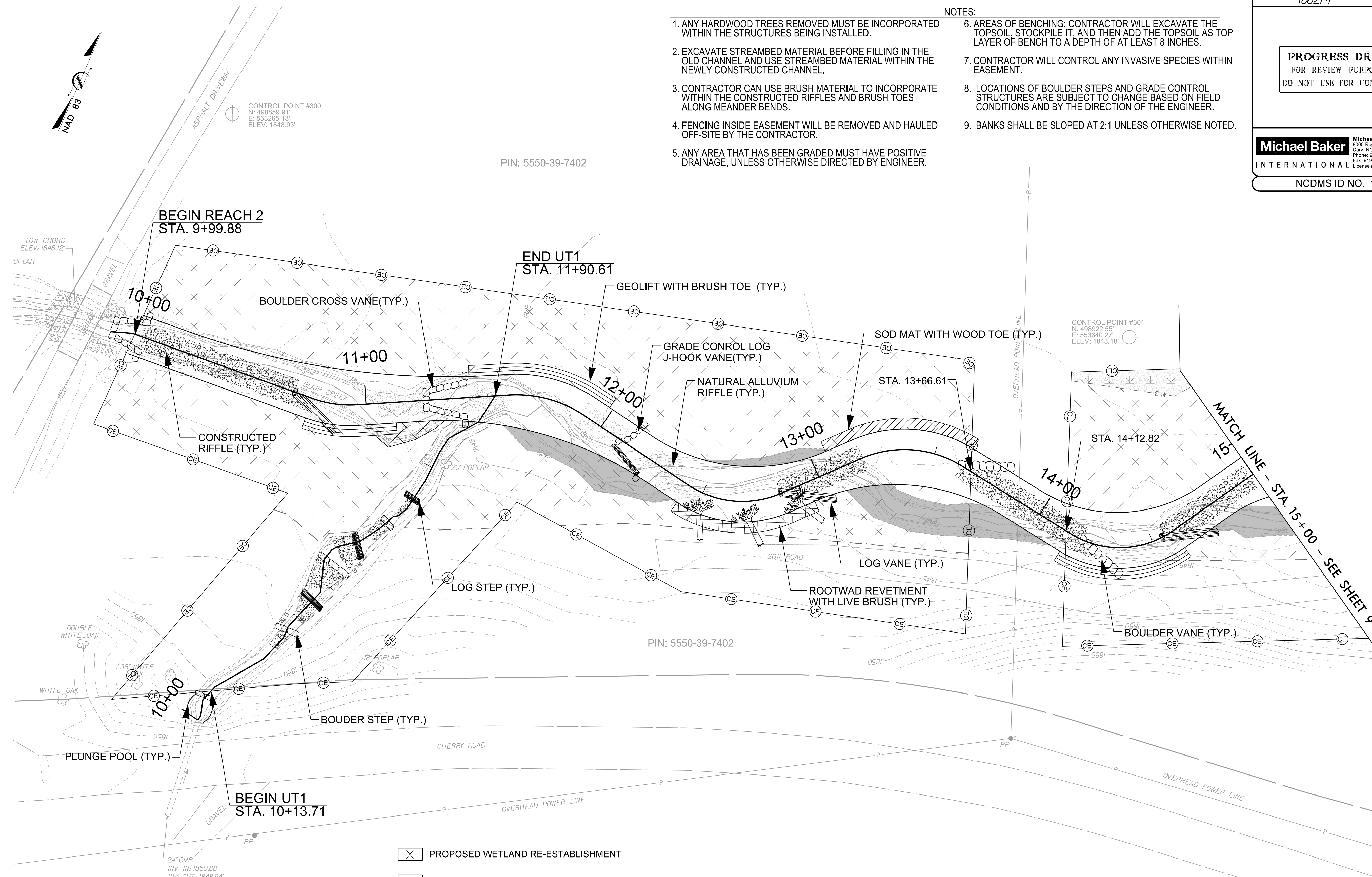
NCDMS ID NO. 100047

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.

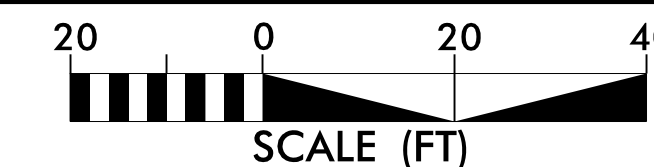
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PIN: 5550-39-7402



MATCH LINE - STA. 15+00 - SEE SHEET 9

**BLAIR CREEK
PLAN VIEW**



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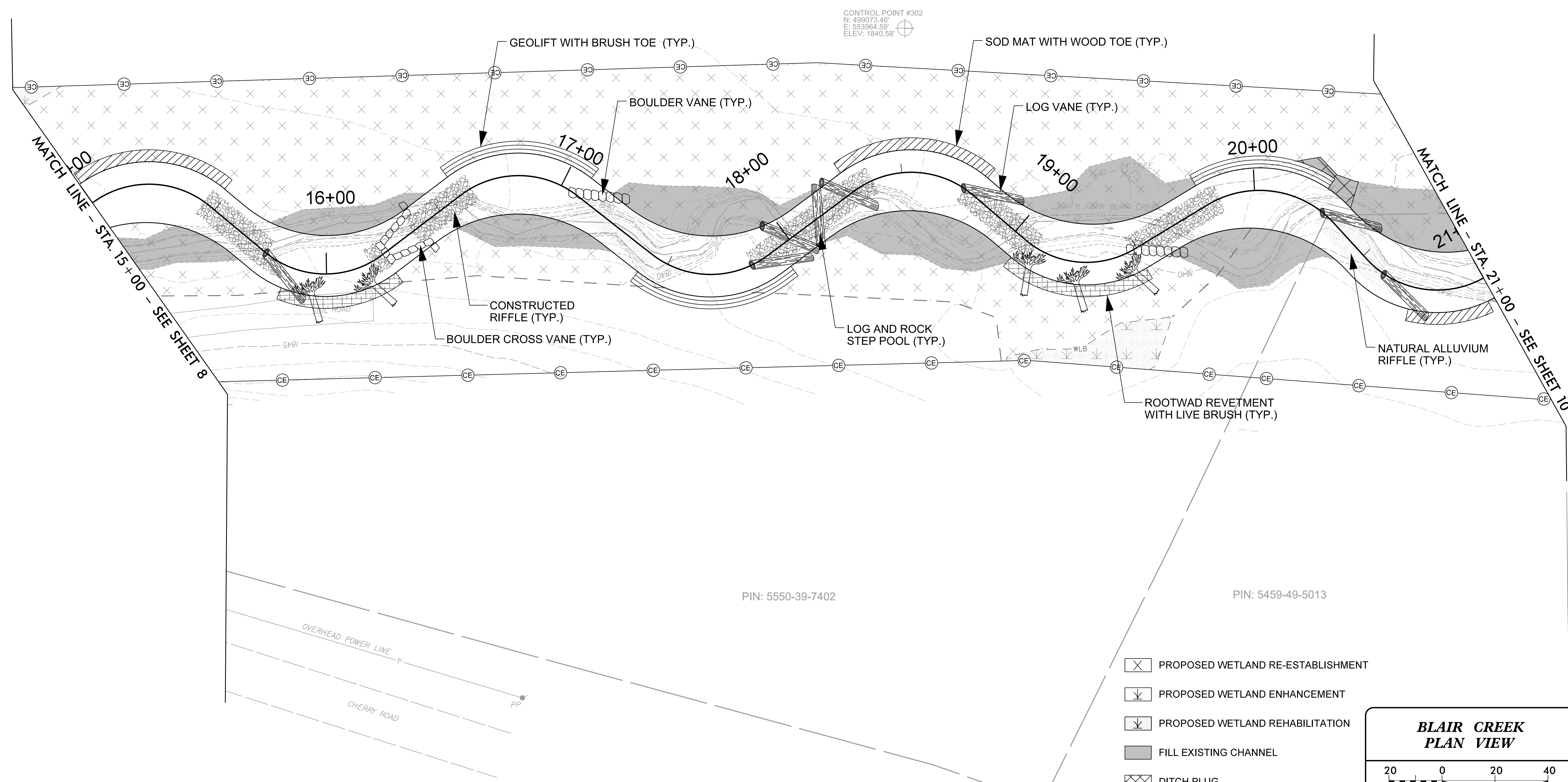
Michael Baker INTERNATIONAL
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Cary, NORTH CAROLINA 27518
Phone: 919.453.5488
Fax: 919.453.5490
License #: F-1084

NCDMS ID NO. 100047



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PIN: 5550-39-7402



PIN: 5550-39-7402

PIN: 5459-49-5013

- PROPOSED WETLAND RE-ESTABLISHMENT
- PROPOSED WETLAND ENHANCEMENT
- PROPOSED WETLAND REHABILITATION
- FILL EXISTING CHANNEL
- DITCH PLUG

**BLAIR CREEK
PLAN VIEW**

SCALE (FT)

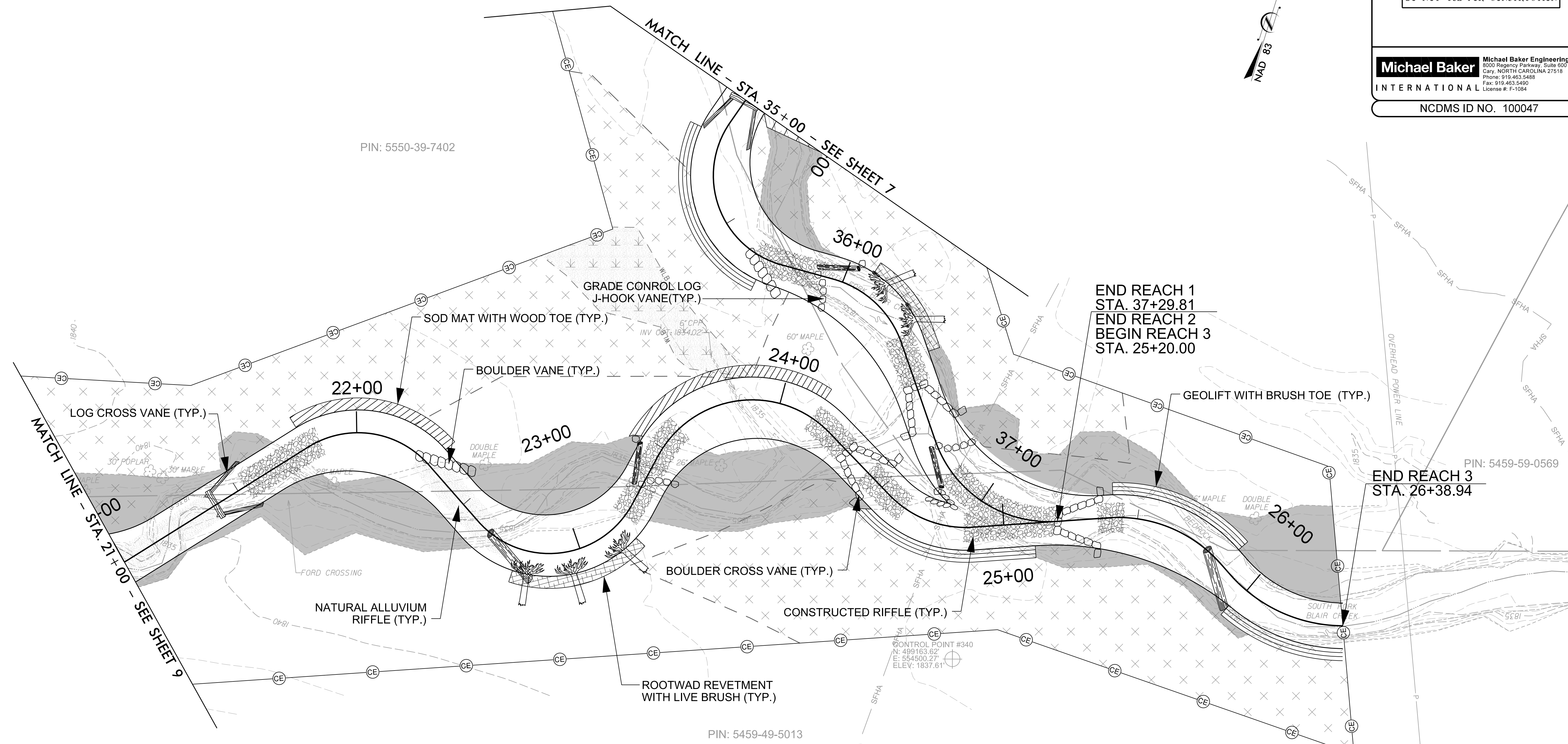
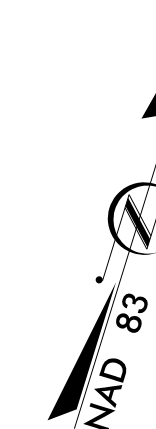
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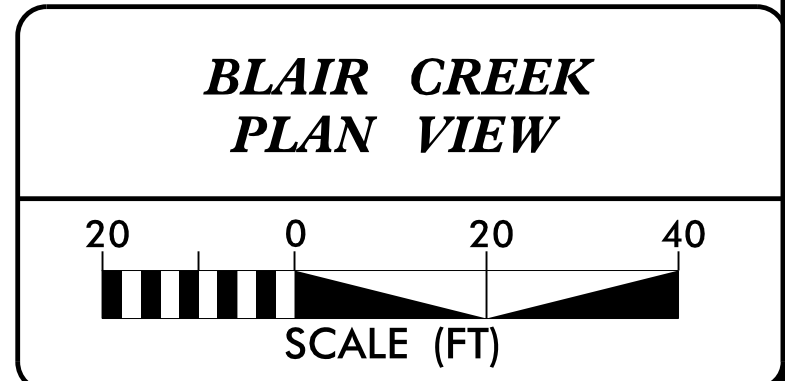
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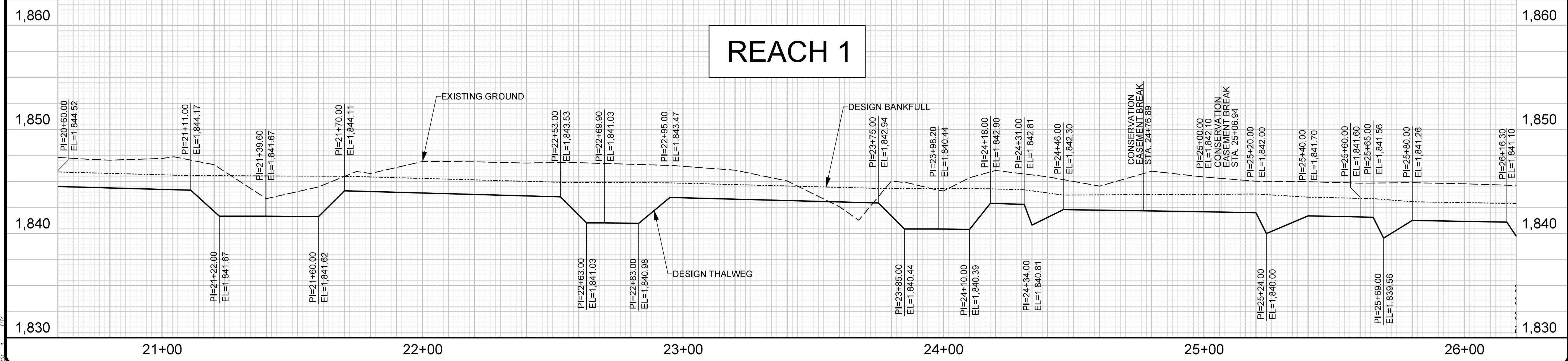
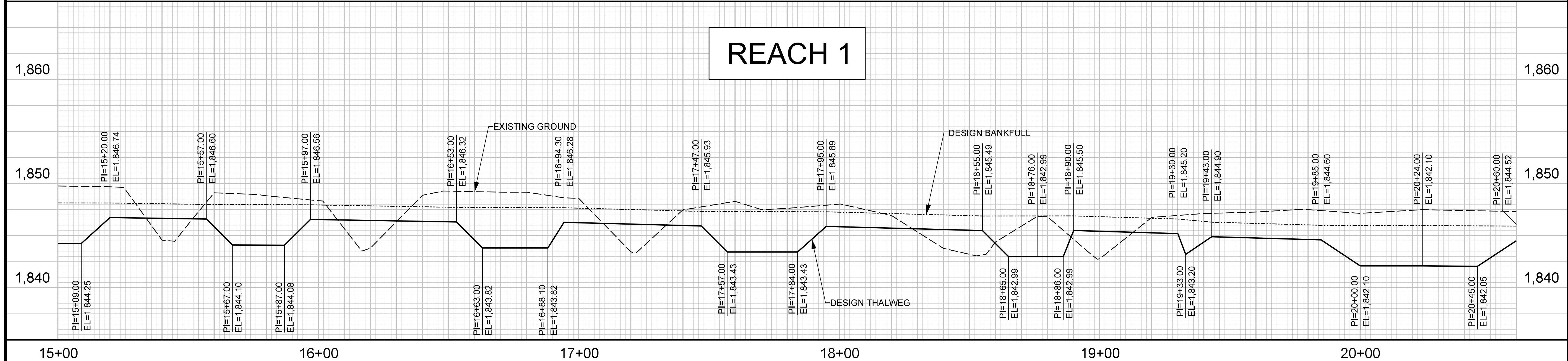
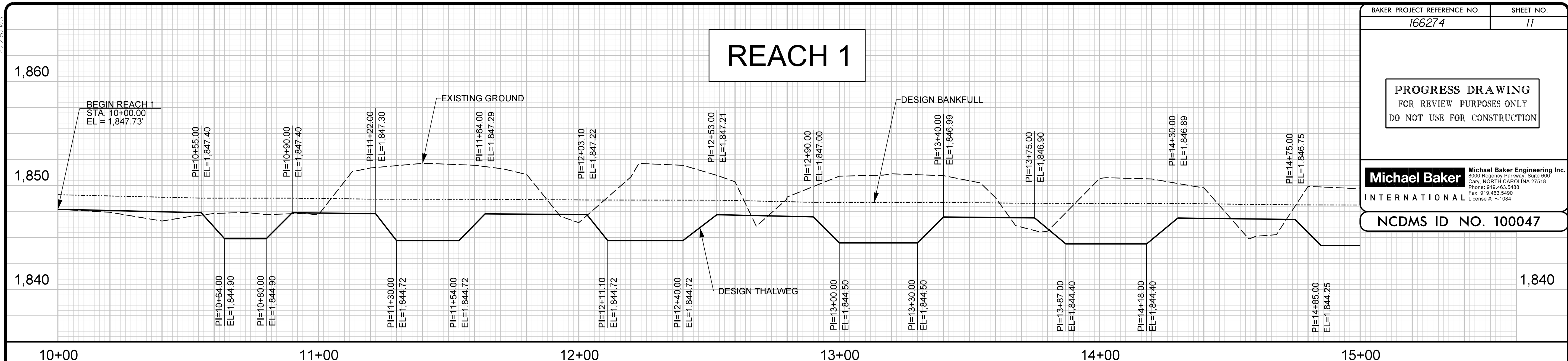
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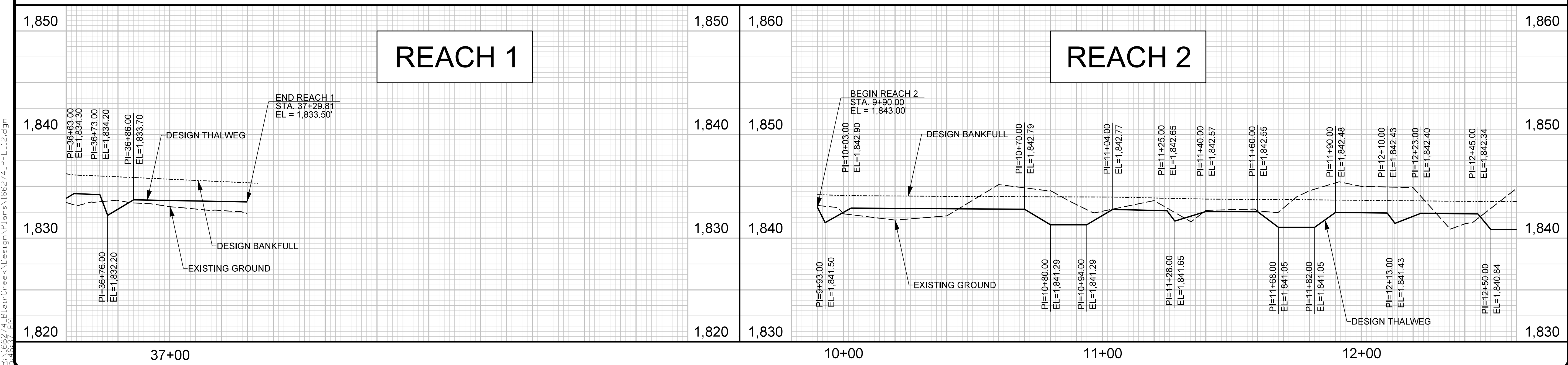
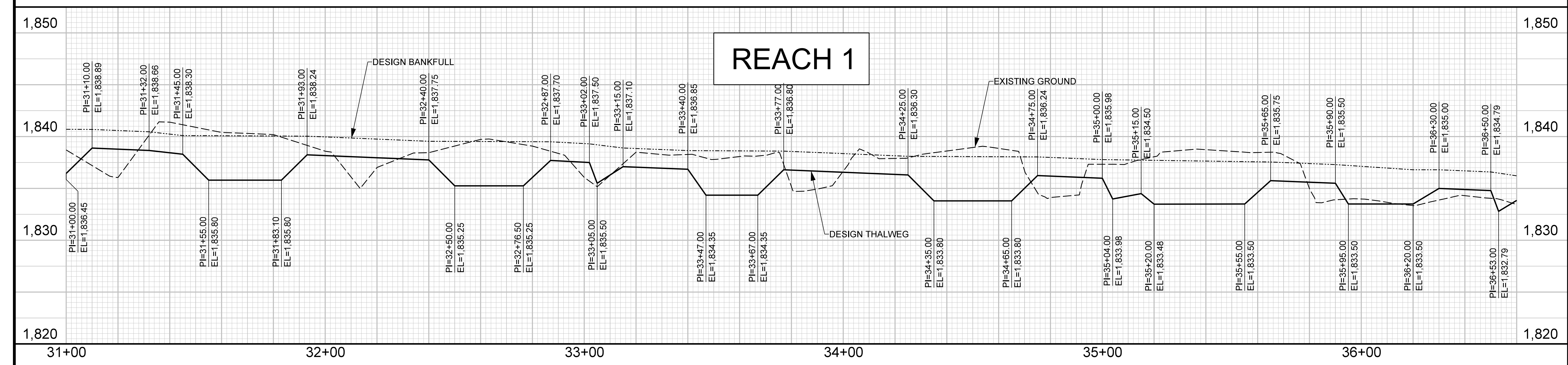
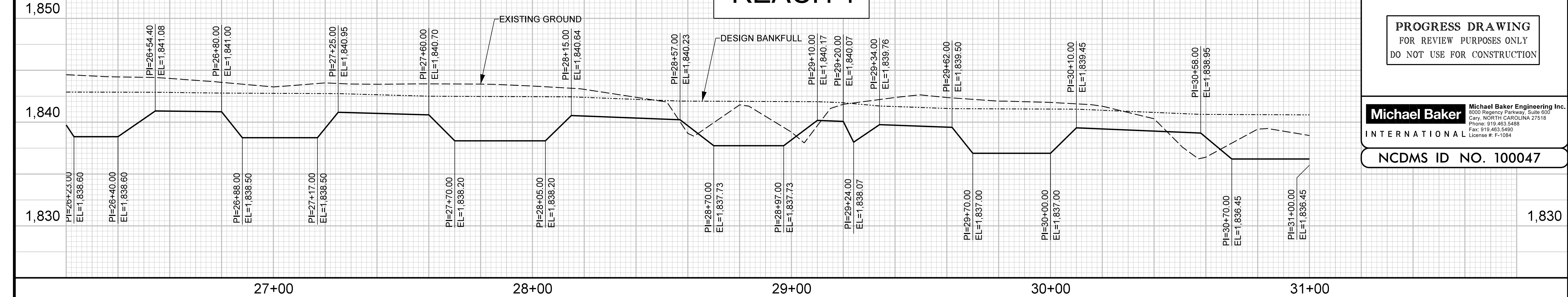
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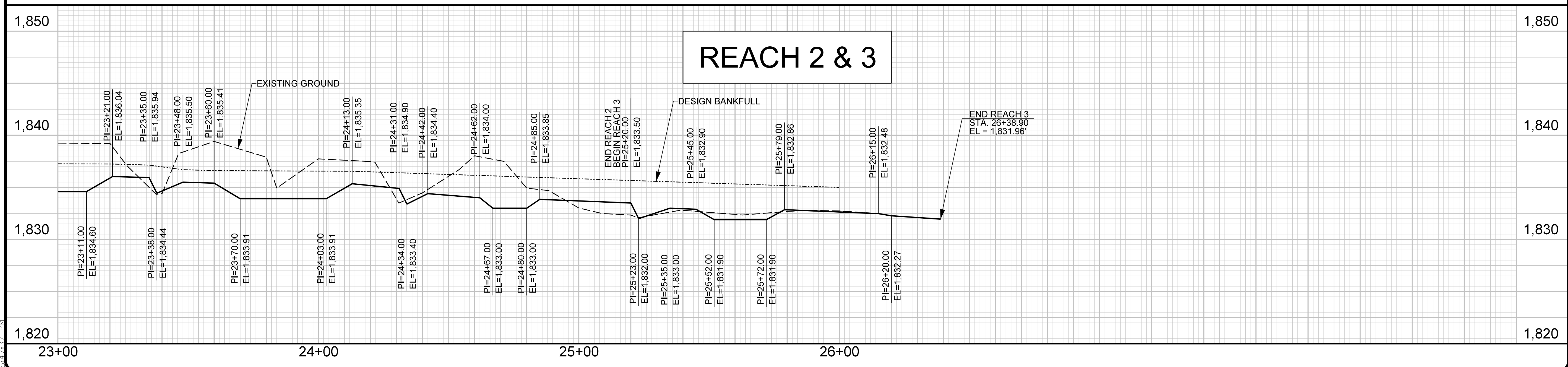
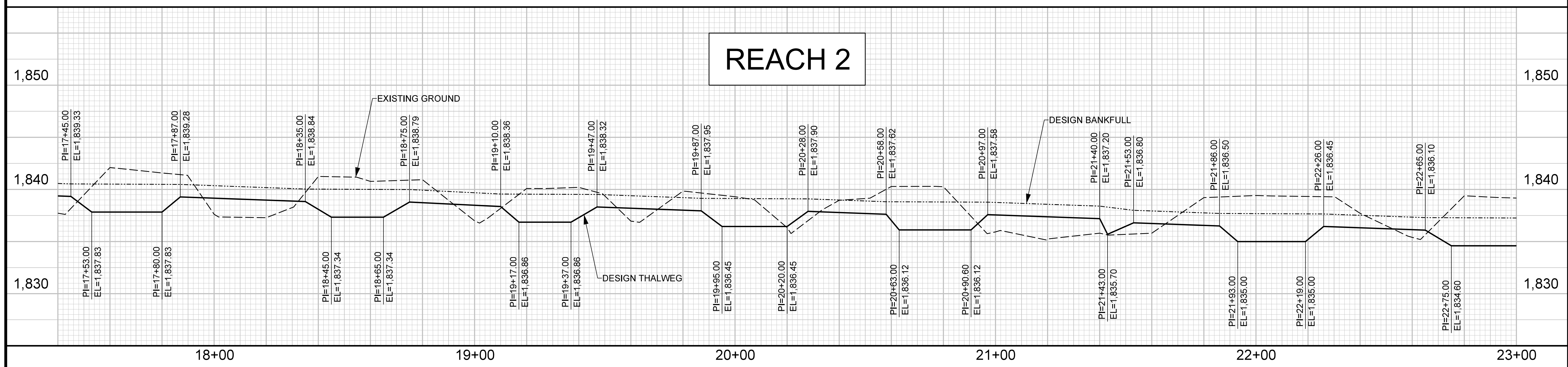
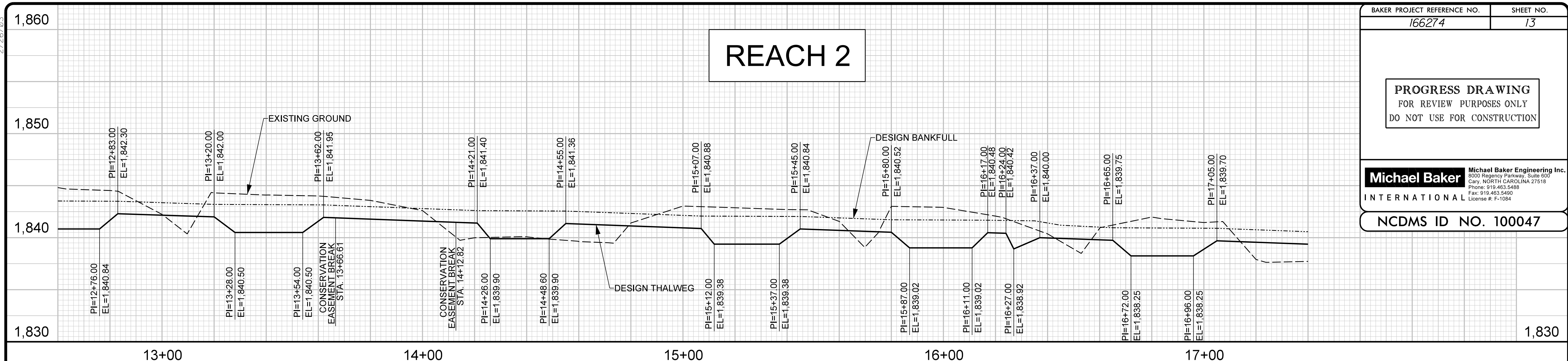
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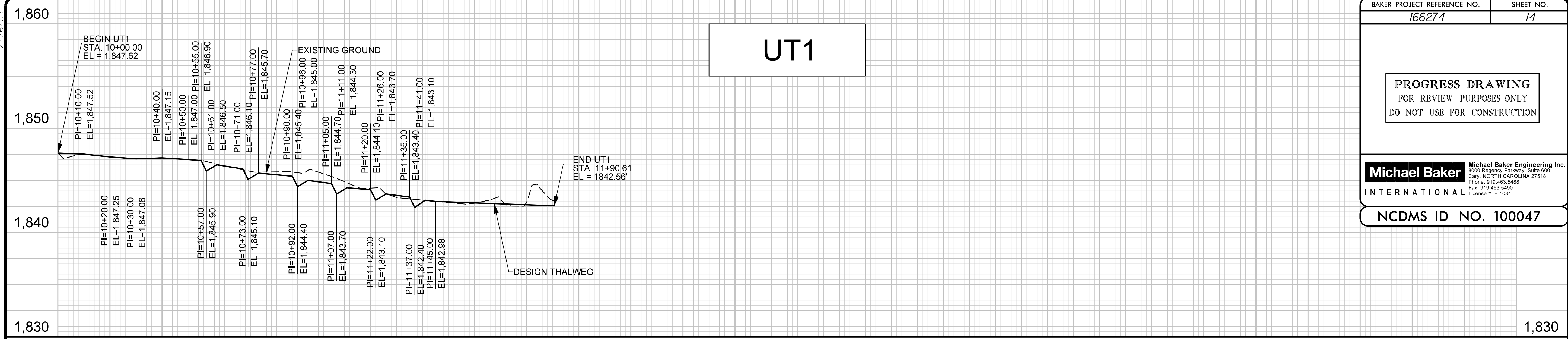
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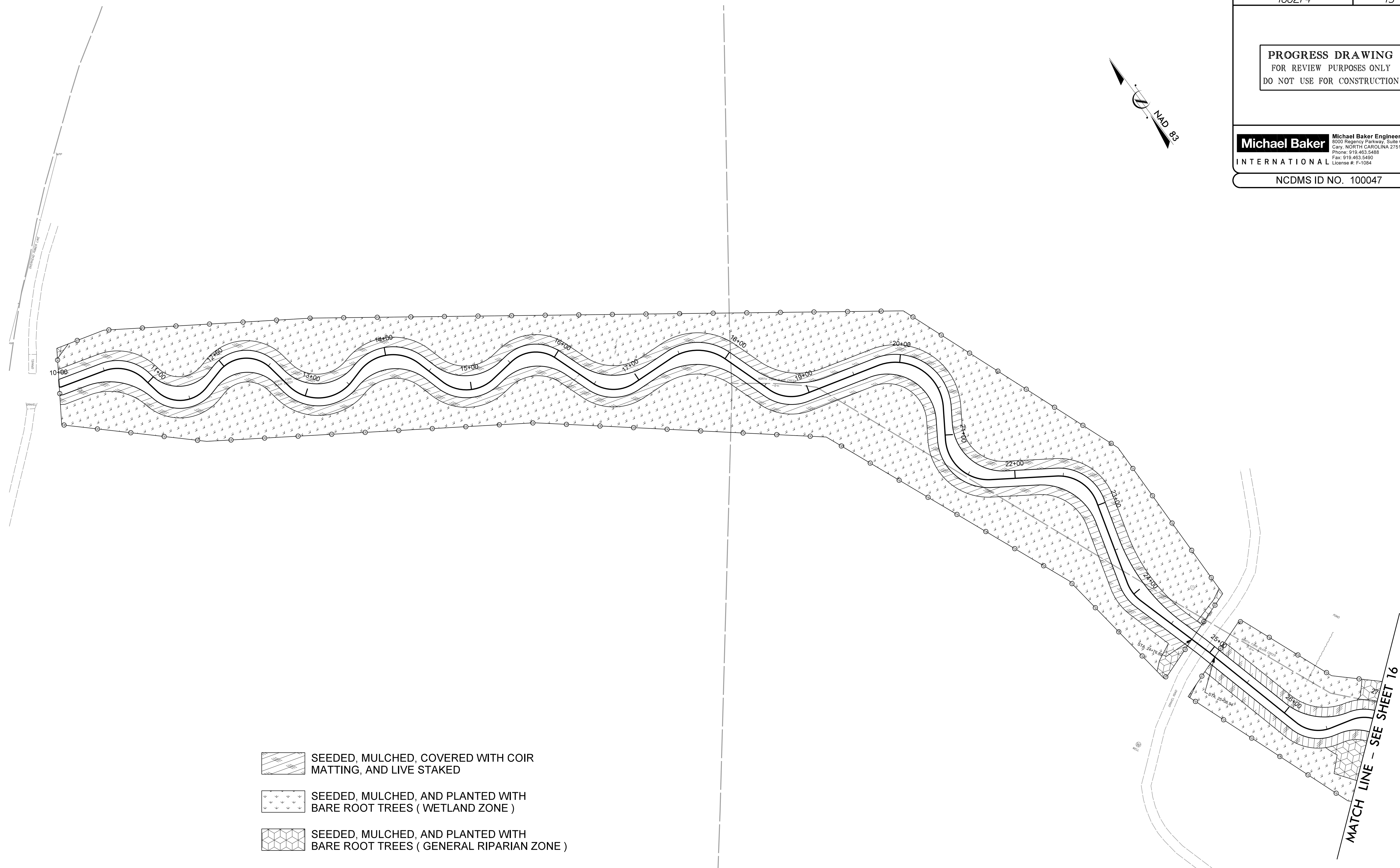
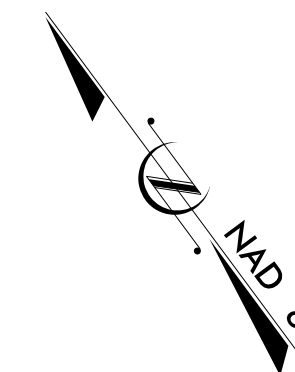
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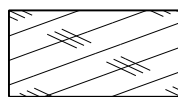
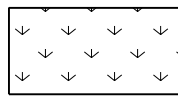
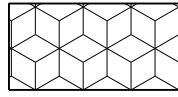
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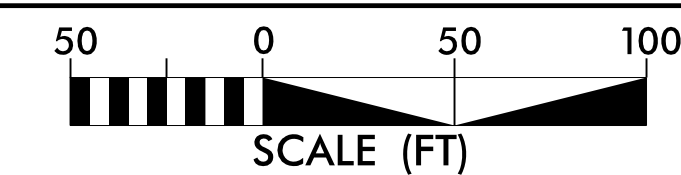
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License #: F-1084

NCDMS ID NO. 100047



-  SEEDED, MULCHED, COVERED WITH COIR MATTING, AND LIVE STAKED
-  SEEDED, MULCHED, AND PLANTED WITH BARE ROOT TREES (WETLAND ZONE)
-  SEEDED, MULCHED, AND PLANTED WITH BARE ROOT TREES (GENERAL RIPARIAN ZONE)

**BLAIR CREEK
REVEGETATION PLAN**



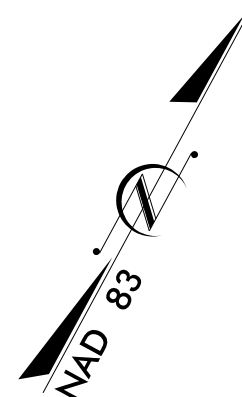
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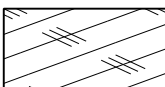
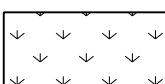
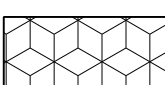
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MATCH LINE - SEE SHEET 15

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-  SEEDED, MULCHED, AND PLANTED WITH BARE ROOT TREES (GENERAL RIPARIAN ZONE)



**BLAIR CREEK
REVEGETATION PLAN**



SCALE (FT)

8/19/2020

PROJECT: 166274 BLAIR CREEK

**NORTH CAROLINA
DIVISION OF MITIGATION SERVICES**

STATE	BAKER PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
NC	166274	EC-1	8

EROSION & SEDIMENTATION CONTROL PLAN

**LOCATION: 0.15 MILE WEST OF CHERRY ROAD AND
NC HIGHWAY 69 IN HAYESVILLE, NC**

TYPE OF WORK: STREAM RESTORATION & ENHANCEMENT

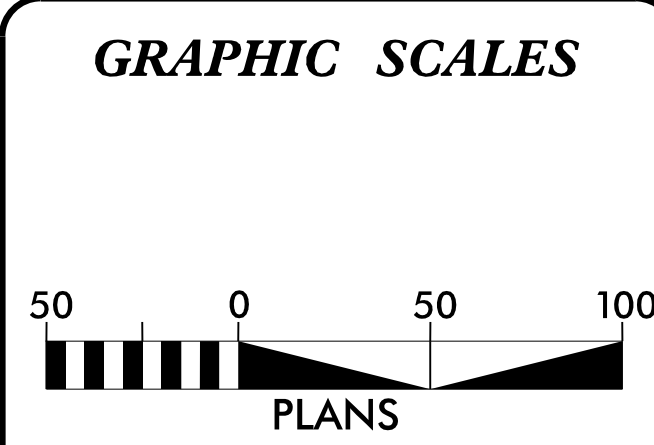
MAINTENANCE PLAN:

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 FOUND 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. 100047



**THIS PROJECT CONTAINS
EROSION CONTROL PLANS
FOR ALL PHASES OF
CONSTRUCTION.**

TOTAL DISTURBED AREA = ???.? Acres

PROJECT STANDARDS

THE FOLLOWING STANDARDS AS THEY APPEAR IN THE "NC EROSION CONTROL PLANNING AND DESIGN MANUAL" AND ARE APPLICABLE TO THIS PROJECT AND ANY REFERENCE HEREIN ARE CONSIDERED PART OF THE PLANS.

- 6.06 TEMPORARY GRAVEL CONSTRUCTION ACCESS
- 6.20 TEMPORARY DIVERSION
- 6.24 RIPARIAN AREA SEEDING
- 6.62 SILT FENCE
- 6.63 TEMPORARY ROCK DAM

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LETTING DATE:

KATHLEEN M. MCKEITHAN, PE
PROJECT ENGINEER

PROJECT ENGINEER

**PROGRESS DRAWING
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SIGNATURE: _____ P.E.

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NCDS ID NO. 100047

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
<ul style="list-style-type: none"> 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 	<ul style="list-style-type: none"> 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

- Select flocculants that are appropriate for the soils being exposed during construction, selecting from the NC DWR List of Approved PAMS/Flocculants.
- Apply flocculants at or before the inlets to Erosion and Sediment Control Measures.
- Apply flocculants at the concentrations specified in the NC DWR List of Approved PAMS/Flocculants and in accordance with the manufacturer's instructions.
- Provide ponding area for containment of treated Stormwater before discharging offsite.
- Store flocculants in leak-proof containers that are kept under storm-resistant cover or surrounded by secondary containment structures.

EQUIPMENT AND VEHICLE MAINTENANCE

- Maintain vehicles and equipment to prevent discharge of fluids.
- Provide drip pans under any stored equipment.
- Identify leaks and repair as soon as feasible, or remove leaking equipment from the project.
- Collect all spent fluids, store in separate containers and properly dispose as hazardous waste (recycle when possible).
- Remove leaking vehicles and construction equipment from service until the problem has been corrected.
- 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

- Never bury or burn waste. Place litter and debris in approved waste containers.
- Provide a sufficient number and size of waste containers (e.g dumpster, trash receptacle) on site to contain construction and domestic wastes.
- Locate waste containers at least 50 feet away from storm drain inlets and surface waters unless no other alternatives are reasonably available.
- 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.
- Cover waste containers at the end of each workday and before storm events or provide secondary containment. Repair or replace damaged waste containers.
- Anchor all lightweight items in waste containers during times of high winds.
- Empty waste containers as needed to prevent overflow. Clean up immediately if containers overflow.
- Dispose waste off-site at an approved disposal facility.
- On business days, clean up and dispose of waste in designated waste containers.

PAINT AND OTHER LIQUID WASTE

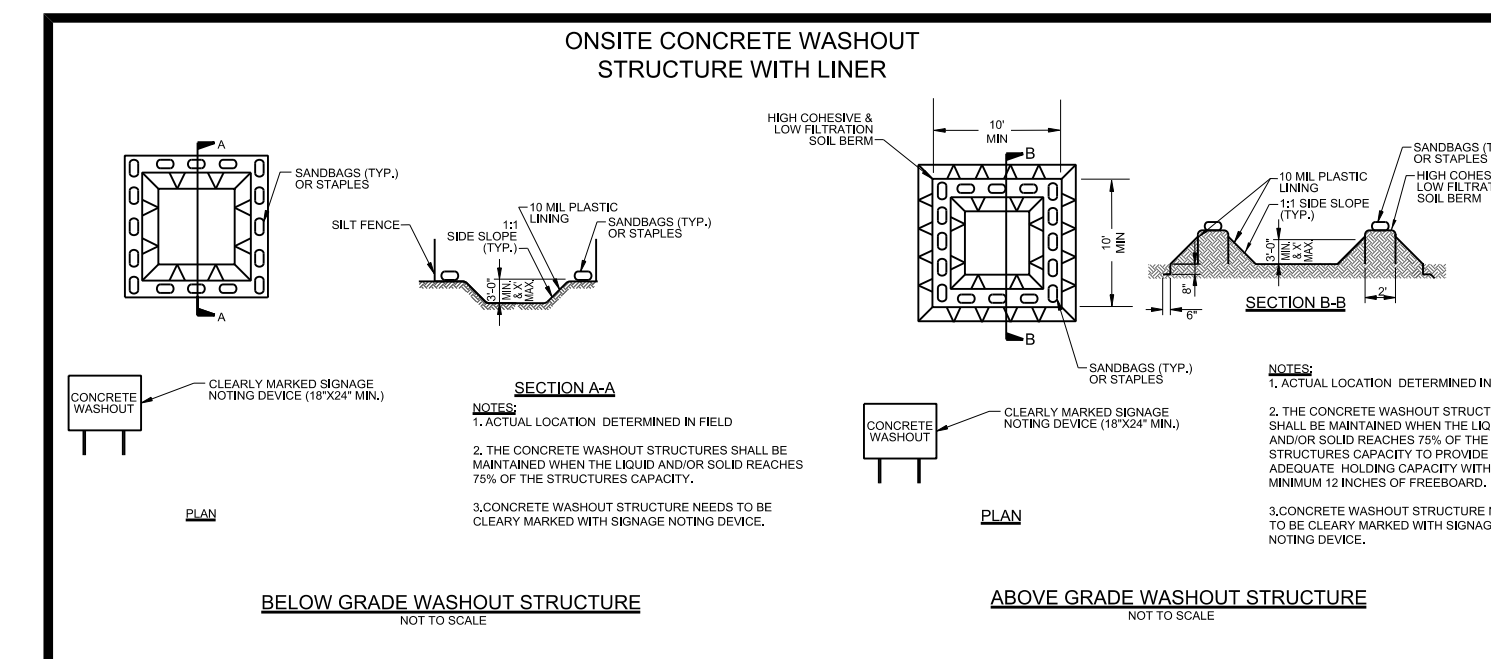
- Do not dump paint and other liquid waste into storm drains, streams or wetlands.
- Locate paint washouts at least 50 feet away from storm drain inlets and surface waters unless no other alternatives are reasonably available.
- Contain liquid wastes in a controlled area.
- Containment must be labeled,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

PORTABLE TOILETS

- 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.
- Provide staking or anchoring of portable toilets during periods of high winds or in high foot traffic areas.
- 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

- 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.
- Protect stockpile with silt fence installed along toe of slope with a minimum offset of five feet from the toe of stockpile.
- Provide stable stone access point when feasible.
- Stabilize stockpile within the timeframes provided on this sheet and in accordance with the approved plan and any additional requirements. Soil stabilization is defined as vegetative, physical or chemical coverage techniques that will restrain accelerated erosion on disturbed soils for temporary or permanent control needs.



CONCRETE WASHOUTS

- Do not discharge concrete or cement slurry from the site.
- Dispose of, or recycle settled, hardened concrete residue in accordance with local and state solid waste regulations and at an approved facility.
- 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.
- 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.
- 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.
- 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.
- 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.
- 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.
- 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.
- 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

- Store and apply herbicides, pesticides and rodenticides in accordance with label restrictions.
- 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.
- 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.
- Do not stockpile these materials onsite.

HAZARDOUS AND TOXIC WASTE

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

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NC DMS ID NO. 100047

**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 unattended days (and this will determine if a site inspection is needed). Days on which no rainfall occurred shall be recorded as "zero." The permittee may use another rain-monitoring device approved by the Division.
(2) E&SC Measures	At least once per 7 calendar days and within 24 hours of a rain event ≥ 1.0 inch in 24 hours	1. Identification of the measures inspected, 2. Date and time of the inspection, 3. Name of the person performing the inspection, 4. Indication of whether the measures were operating properly, 5. Description of maintenance needs for the measure, 6. Description, evidence, and date of corrective actions taken.
(3) Stormwater discharge outfalls (SDOs)	At least once per 7 calendar days and within 24 hours of a rain event ≥ 1.0 inch in 24 hours	1. Identification of the discharge outfalls inspected, 2. Date and time of the inspection, 3. Name of the person performing the inspection, 4. Evidence of indicators of stormwater pollution such as oil sheen, floating or suspended solids or discoloration, 5. Indication of visible sediment leaving the site, 6. Description, evidence, and date of corrective actions taken.
(4) Perimeter of site	At least once per 7 calendar days and within 24 hours of a rain event ≥ 1.0 inch in 24 hours	If visible sedimentation is found outside site limits, then a record of the following shall be made: 1. Actions taken to clean up or stabilize the sediment that has left the site limits, 2. Description, evidence, and date of corrective actions taken, and 3. An explanation as to the actions taken to control future releases.
(5) Streams or wetlands onsite or offsite (where accessible)	At least once per 7 calendar days and within 24 hours of a rain event ≥ 1.0 inch in 24 hours	If the stream or wetland has increased visible sedimentation or a stream has visible increased turbidity from the construction activity, then a record of the following shall be made: 1. Description, evidence and date of corrective actions taken, and 2. Records of the required reports to the appropriate Division Regional Office per Part III, Section C, Item (2)(a) of this permit.
(6) Ground stabilization measures	After each phase of grading	1. The phase of grading (installation of perimeter E&SC measures, clearing and grubbing, installation of storm drainage facilities, completion of all land-disturbing activity, construction or redevelopment, permanent ground cover). 2. Documentation that the required ground stabilization measures have been provided within the required timeframe or an assurance that they will be provided as soon as possible.

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

**PART III
SELF-INSPECTION, RECORDKEEPING AND REPORTING**

SECTION B: RECORDKEEPING

1. E&SC Plan Documentation

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

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

2. Additional Documentation to be Kept on Site

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

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

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

3. Documentation to be Retained for Three Years

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

**PART III
SELF-INSPECTION, RECORDKEEPING AND REPORTING**

SECTION C: REPORTING

1. Occurrences that Must be Reported

Permittees shall report the following occurrences:

- (a) Visible sediment deposition in a stream or wetland.
- (b) Oil spills if:
 - They are 25 gallons or more,
 - They are less than 25 gallons but cannot be cleaned up within 24 hours,
 - They cause sheen on surface waters (regardless of volume), or
 - They are within 100 feet of surface waters (regardless of volume).
- (c) Releases of hazardous substances in excess of reportable quantities under Section 311 of the Clean Water Act (Ref: 40 CFR 110.3 and 40 CFR 117.3) or Section 102 of CERCLA (Ref: 40 CFR 302.4) or G.S. 143-215.85.
- (d) Anticipated bypasses and unanticipated bypasses.
- (e) Noncompliance with the conditions of this permit that may endanger health or the environment.

2. Reporting Timeframes and Other Requirements

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

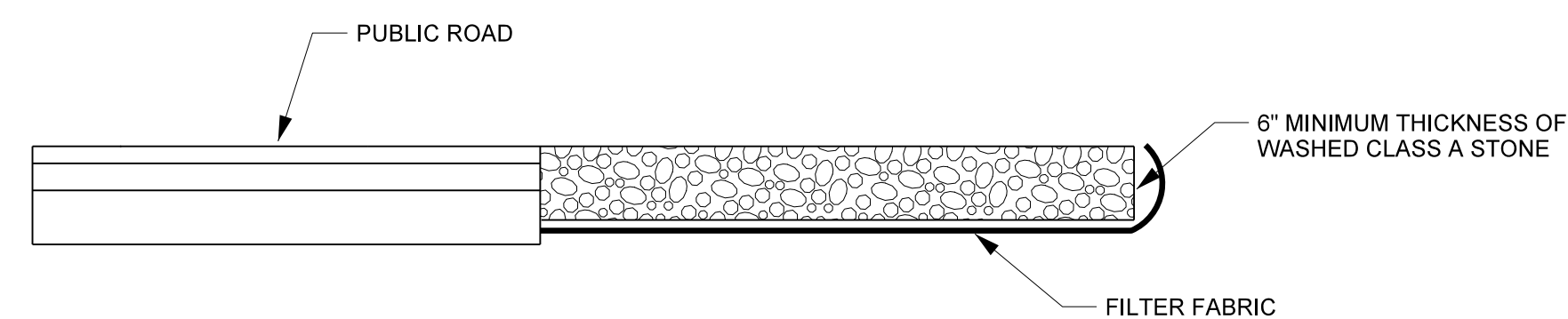
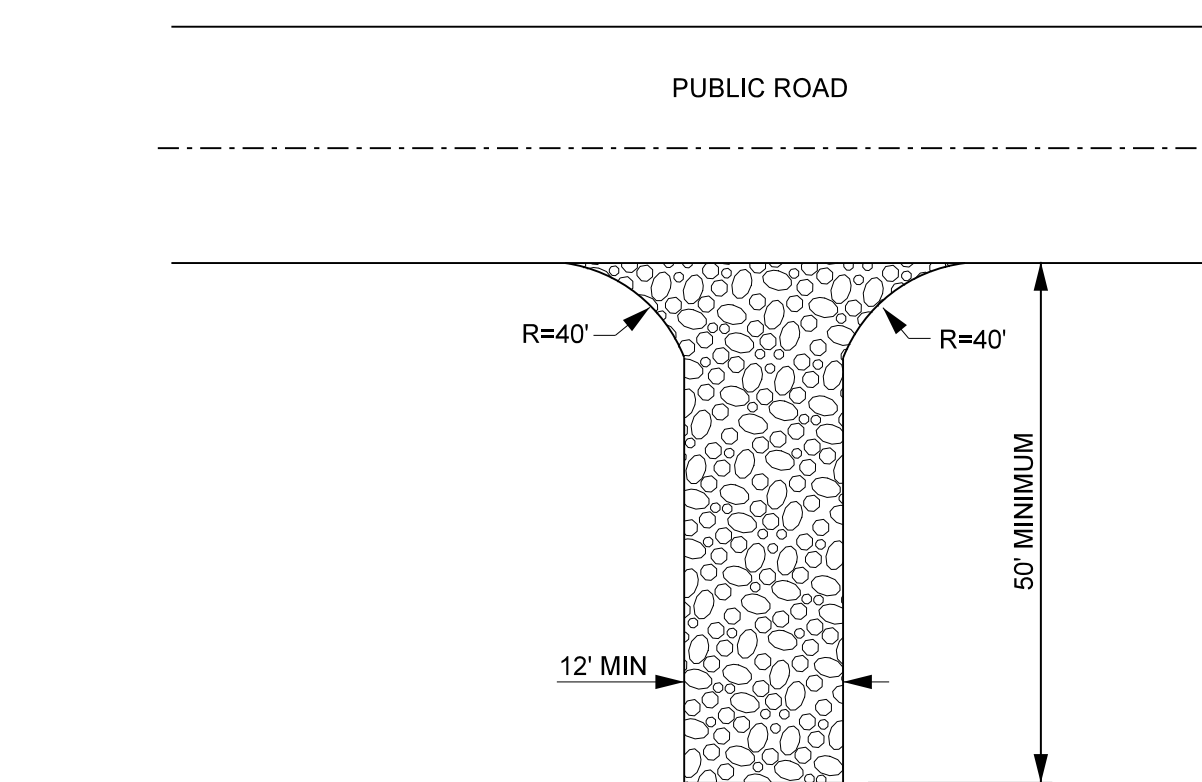
Occurrence	Reporting Timeframes (After Discovery) and Other Requirements
(a) Visible sediment deposition in a stream or wetland	<ul style="list-style-type: none"> • Within 24 hours, an oral or electronic notification. • Within 7 calendar days, a report that contains a description of the sediment and 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	<ul style="list-style-type: none"> • 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)]	<ul style="list-style-type: none"> • 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)]	<ul style="list-style-type: none"> • 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)]	<ul style="list-style-type: none"> • 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.

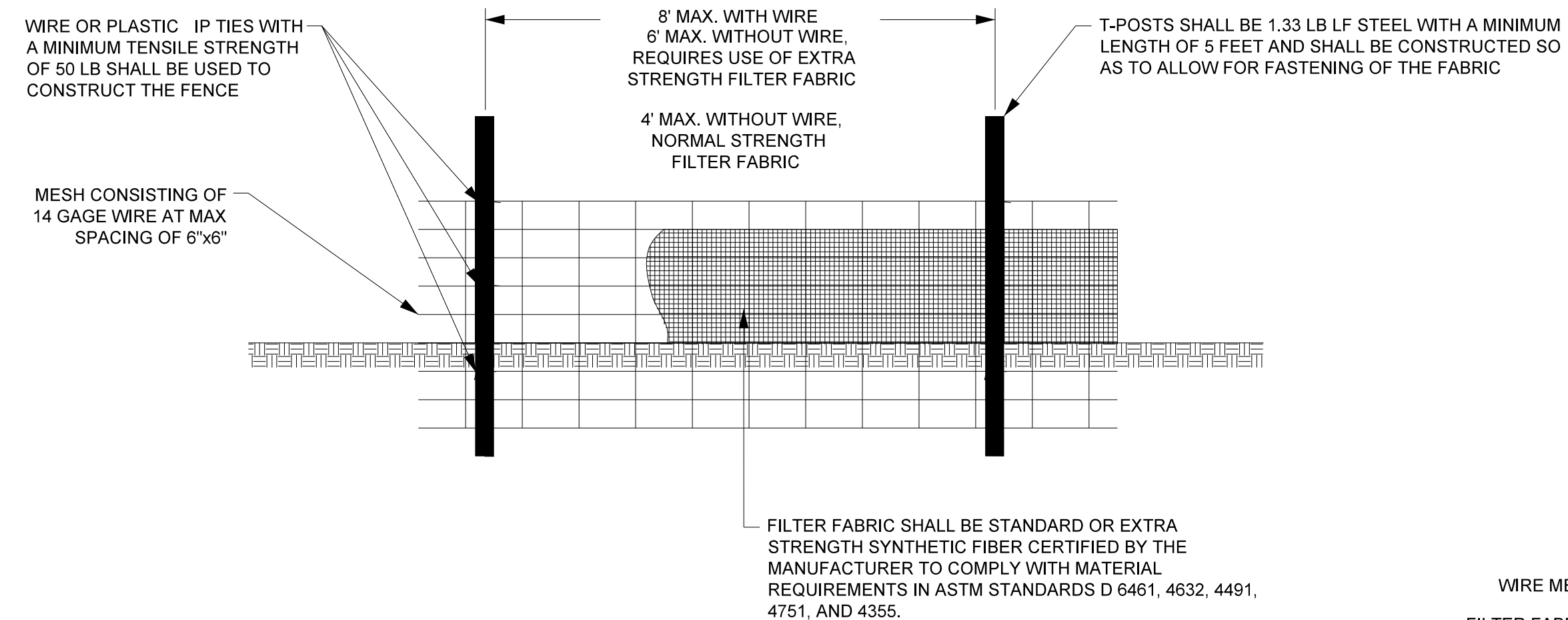
TEMPORARY GRAVEL CONSTRUCTION ENTRANCE EXIT



NOTES:

SPECIFICATION NO. 6.06 - CONSTRUCTION ACCESS "N.C. EROSION AND SEDIMENT CONTROL PLANNING AND DESIGN MANUAL MARCH 2009"

TEMPORARY SILT FENCE

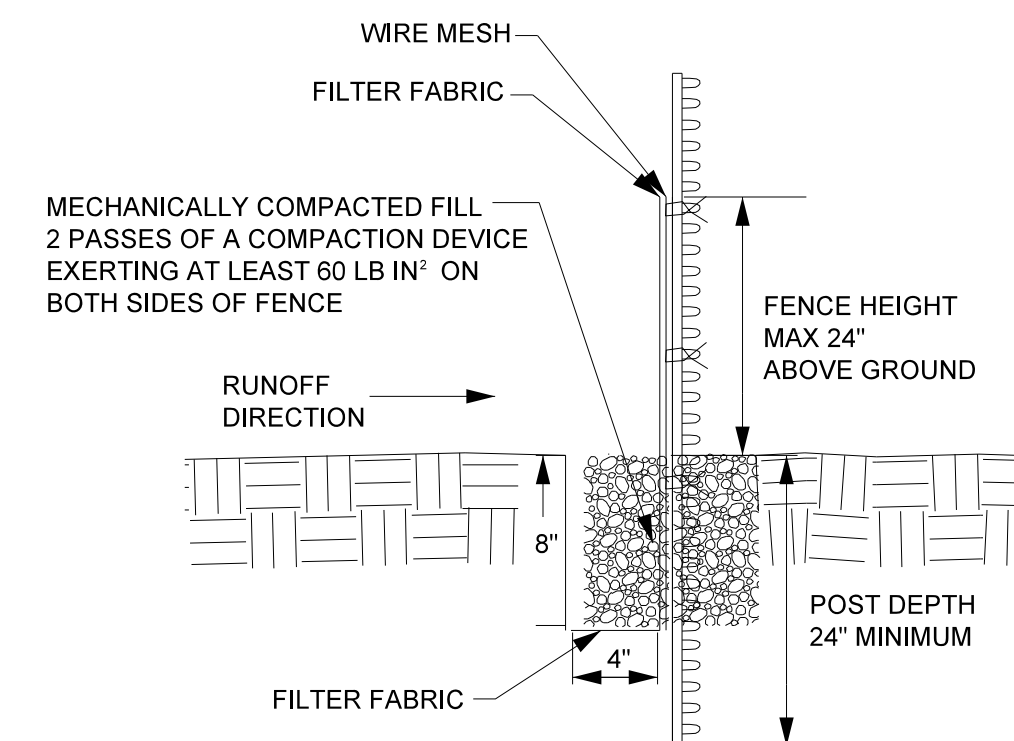


NOTES:

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.

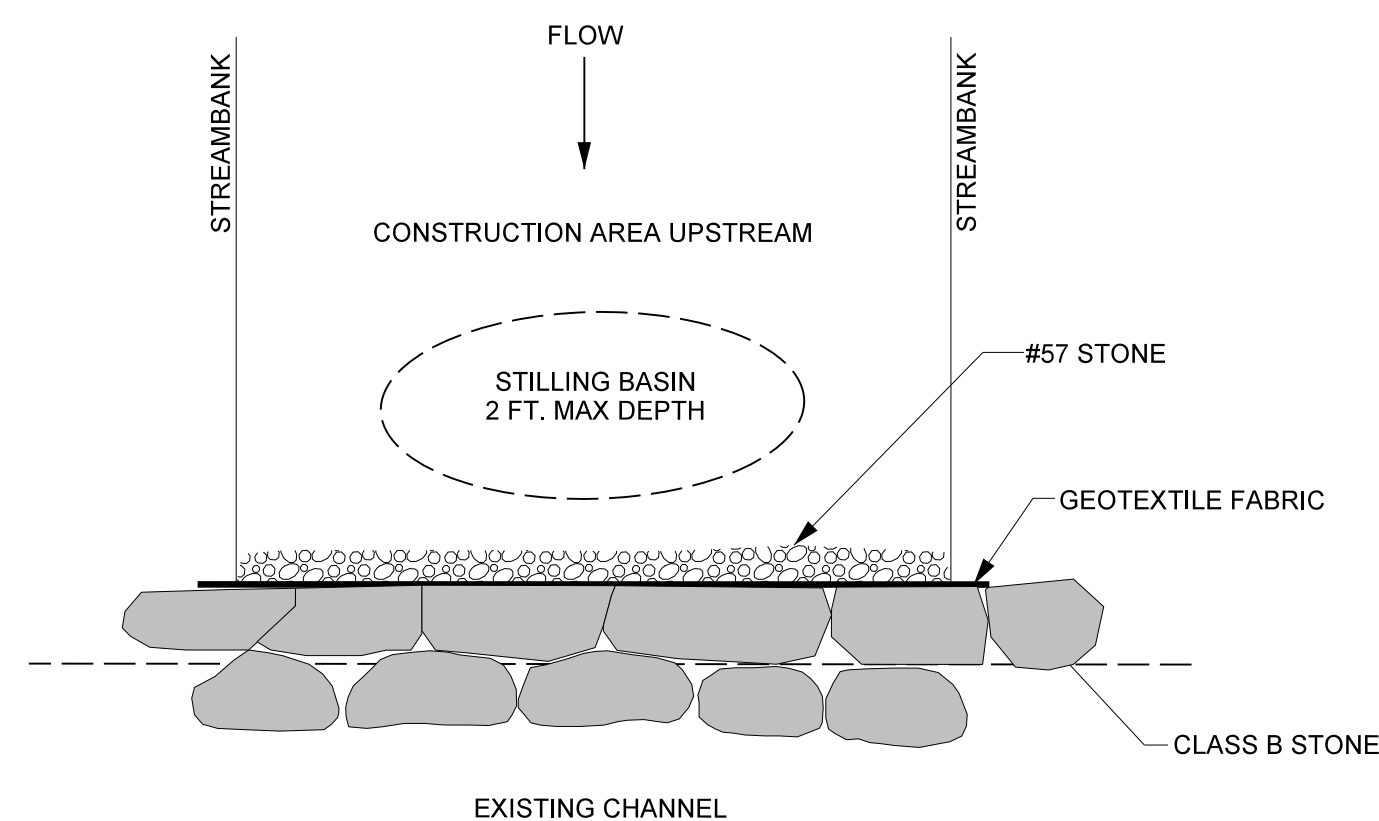
MAINTENANCE NOTES:

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.

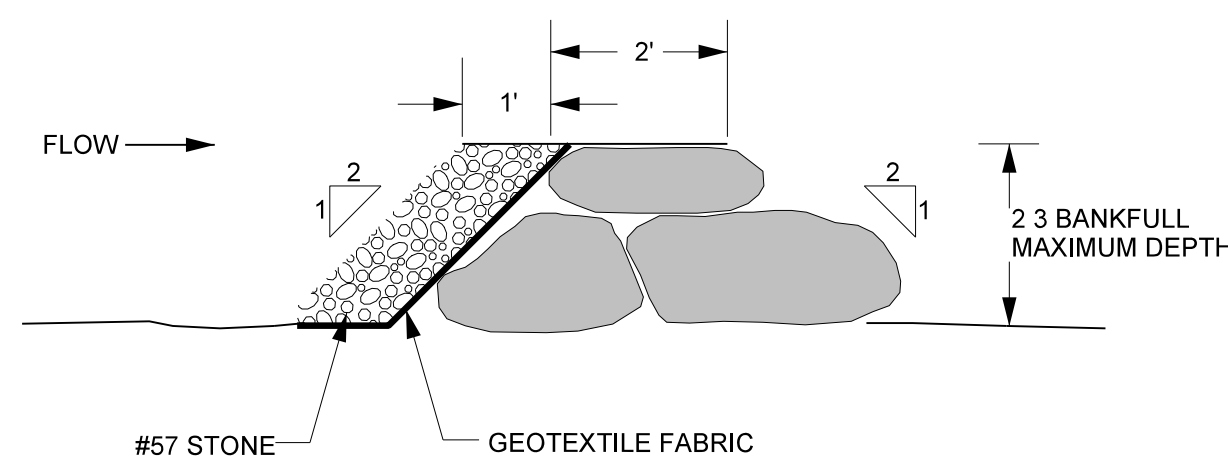


PROJECT REFERENCE NO. 166274	SHEET NO. EC 2
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NCDMS ID No. 100047	

TEMPORARY ROCK DAM



PLAN VIEW

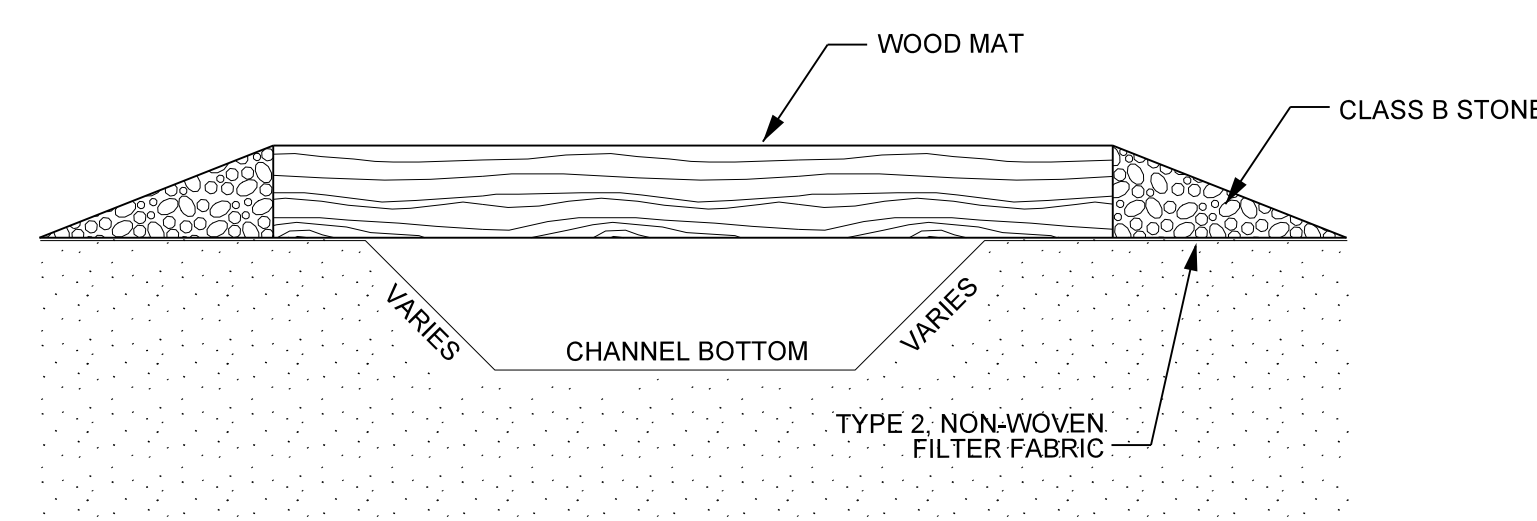


CROSS SECTION

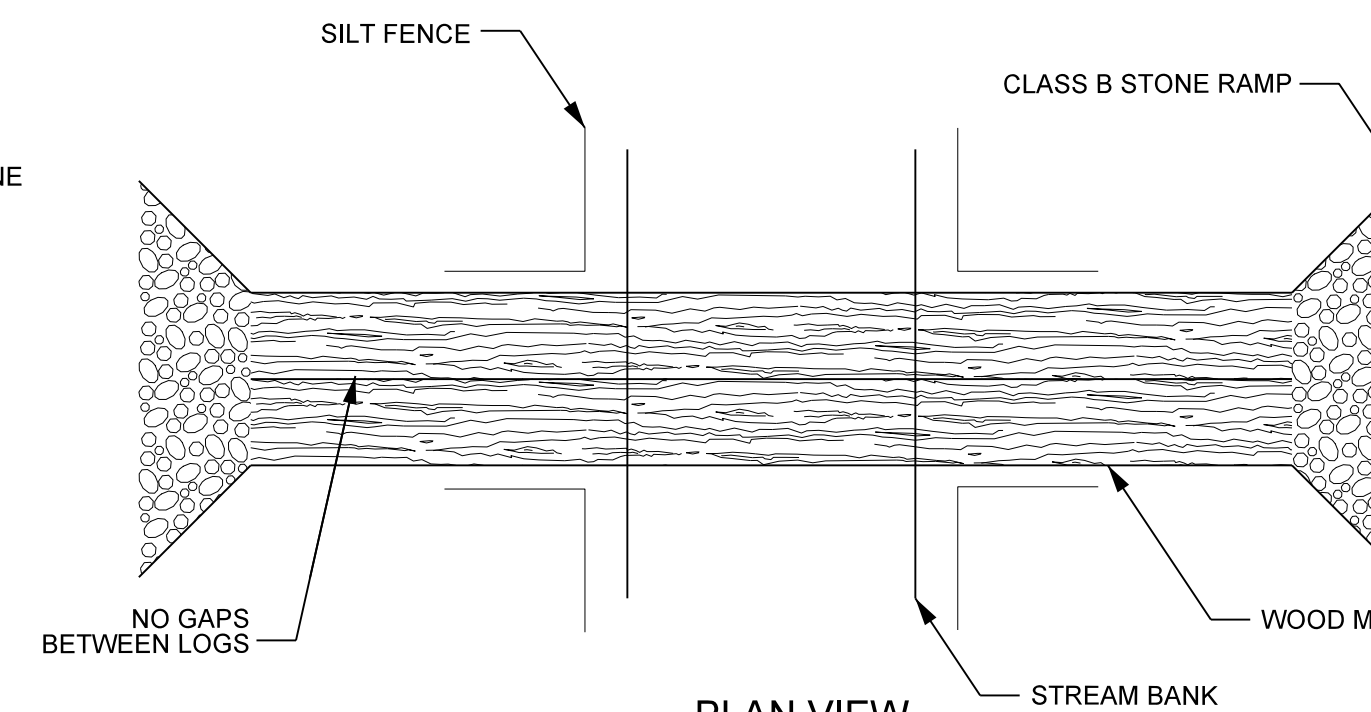
NOTES:

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

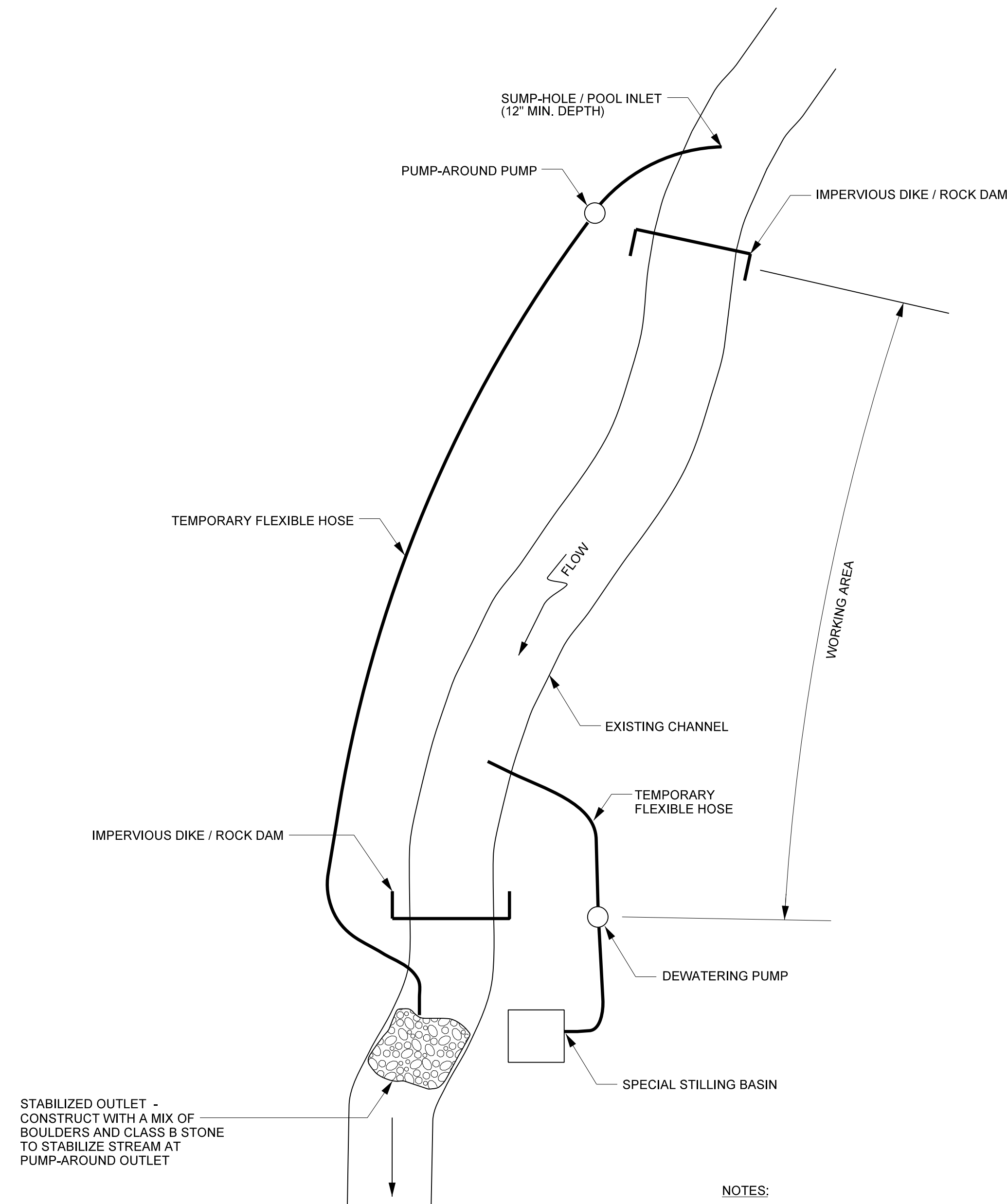
NOTES:

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 WOOD 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.

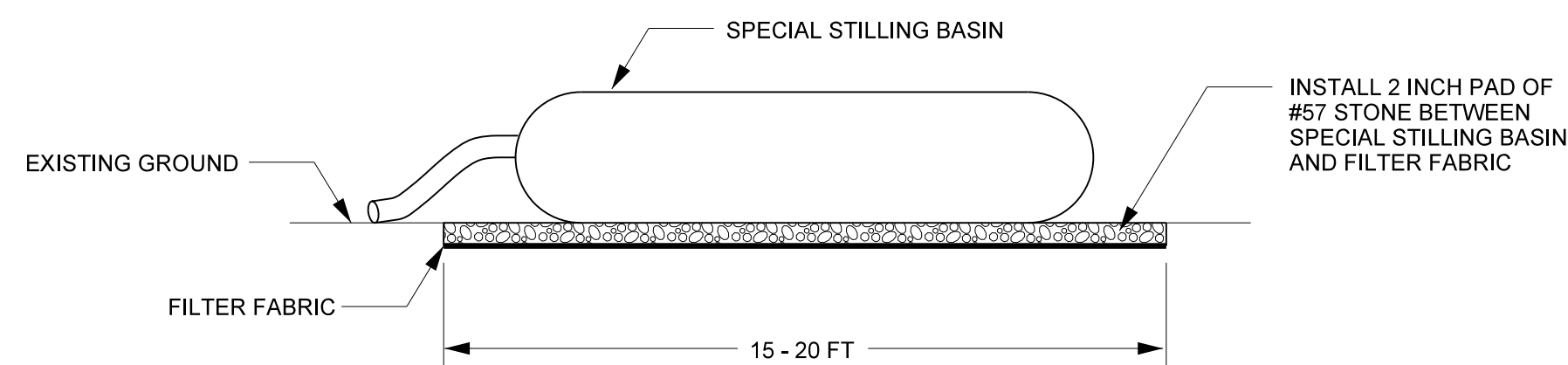
TEMPORARY STREAM CROSSING MAINTENANCE NOTES:

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.

TYPICAL PUMP-AROUND OPERATION



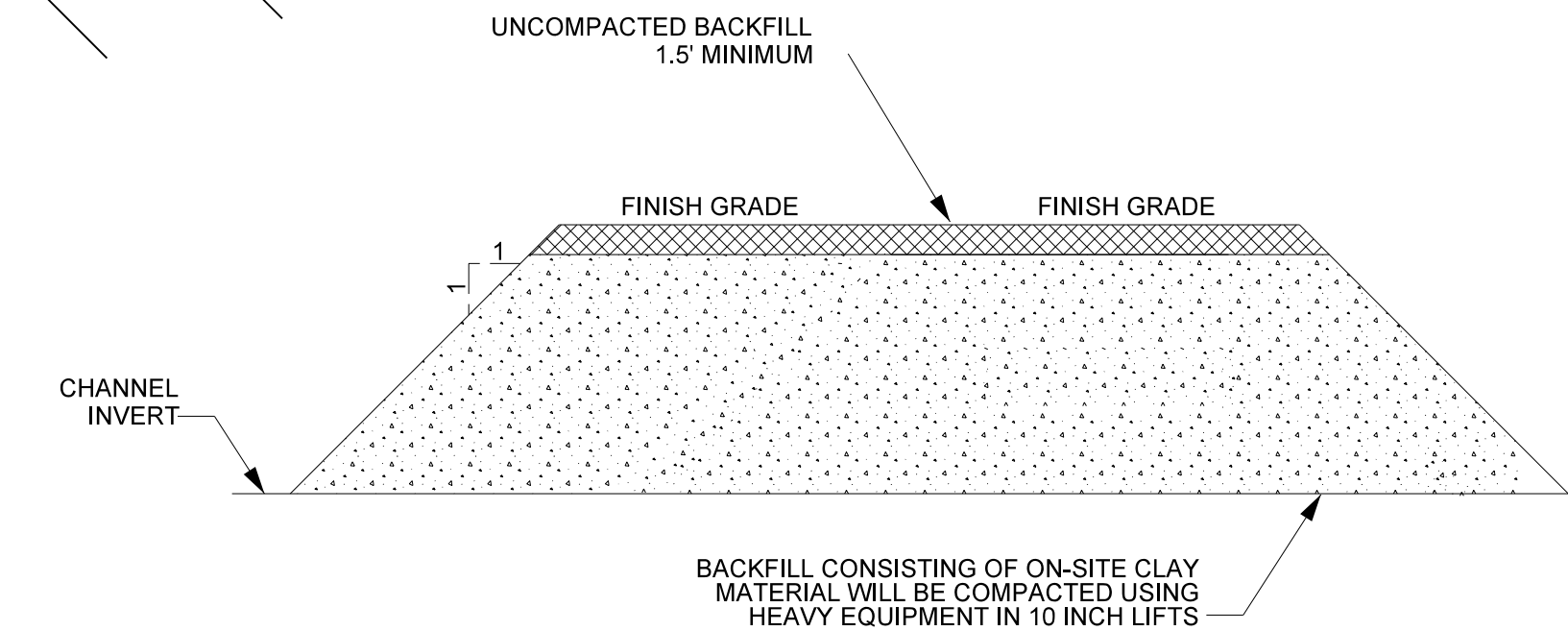
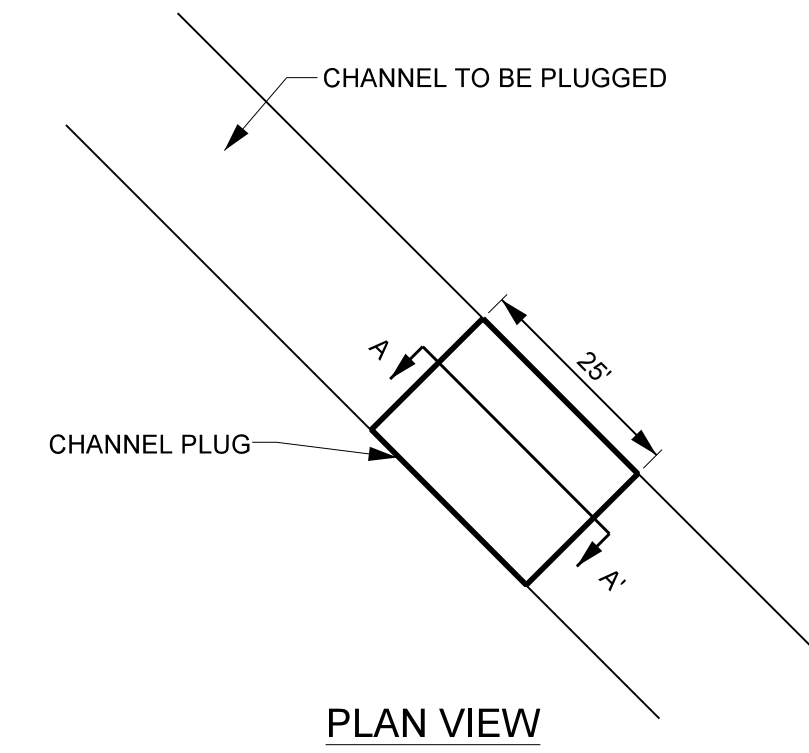
- NOTES:**
- EXCAVATION SHALL BE PERFORMED IN ONLY DRY SECTIONS OF CHANNEL.
 - IMPERVIOUS DIKES SHOULD BE USED TO ISOLATE WORK AREAS FROM STREAM FLOW.
 - THE CONTRACTOR SHALL NOT DISTURB MORE AREA THAN CAN BE STABILIZED IN ONE WORKING DAY.
 - THE PUMP-AROUND PUMP SHOULD ADEQUATELY CONVEY 1 CFS (450 GALLONS PER MINUTE).



SEQUENCE OF CONSTRUCTION FOR TYPICAL PUMP AROUND

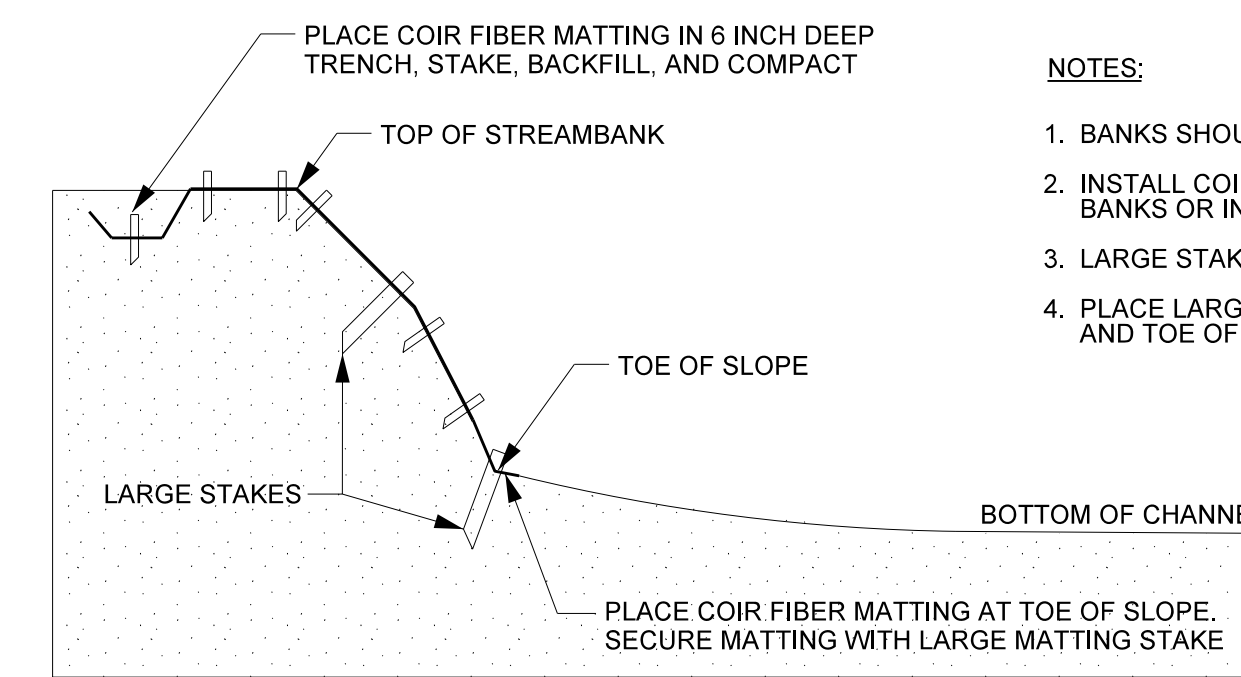
- INSTALL STABILIZED OUTLET AT THE DOWNSTREAM END OF THE DESIGNATED PROJECT WORKING AREA.
- THE CONTRACTOR WILL INSTALL THE PUMP AROUND PUMP AND THE TEMPORARY FLEXIBLE HOSE THAT WILL CONVEY THE BASE FLOW FROM UPSTREAM OF THE WORK SITE TO THE SPECIAL STILLING BASIN OR STABILIZED OUTLET.
- INSTALL UPSTREAM IMPERVIOUS DIKE AND BEGIN PUMPING OPERATIONS FOR STREAM DIVERSION.
- 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.
- THE CONTRACTOR WILL PERFORM STREAM RESTORATION WORK IN ACCORDANCE WITH THE PLAN AND FOLLOWING THE GENERAL CONSTRUCTION SEQUENCE.
- 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.
- THE CONTRACTOR WILL COMPLETE ALL GRADING AND STABILIZATION IN ONE DAY WITHIN THE PUMP AROUND AREA BETWEEN THE IMPERVIOUS DIKES.
- ONCE THE WORKING AREA IS COMPLETED, REMOVE THE SPECIAL STILLING BASIN AND STABILIZED OUTLET AND STABILIZE DISTURBED AREAS WITH SEED AND MULCH.

CHANNEL PLUG



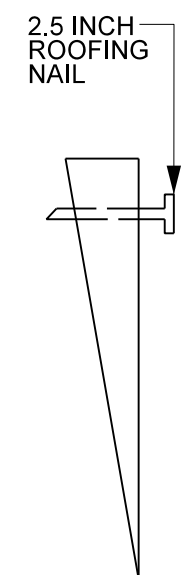
- NOTE:**
- BACKFILL CONSISTING OF ON-SITE CLAY MATERIAL WILL BE COMPACTED USING HEAVY EQUIPMENT IN 10 INCH LIFTS.
 - THE REMAINDER OF THE EXISTING CHANNEL TO BE PLUGGED WILL BE COMPLETED FILLED TO THE NEW TOP-OF-BANK ELEVATION.

COIR FIBER MATTING



NOTES:

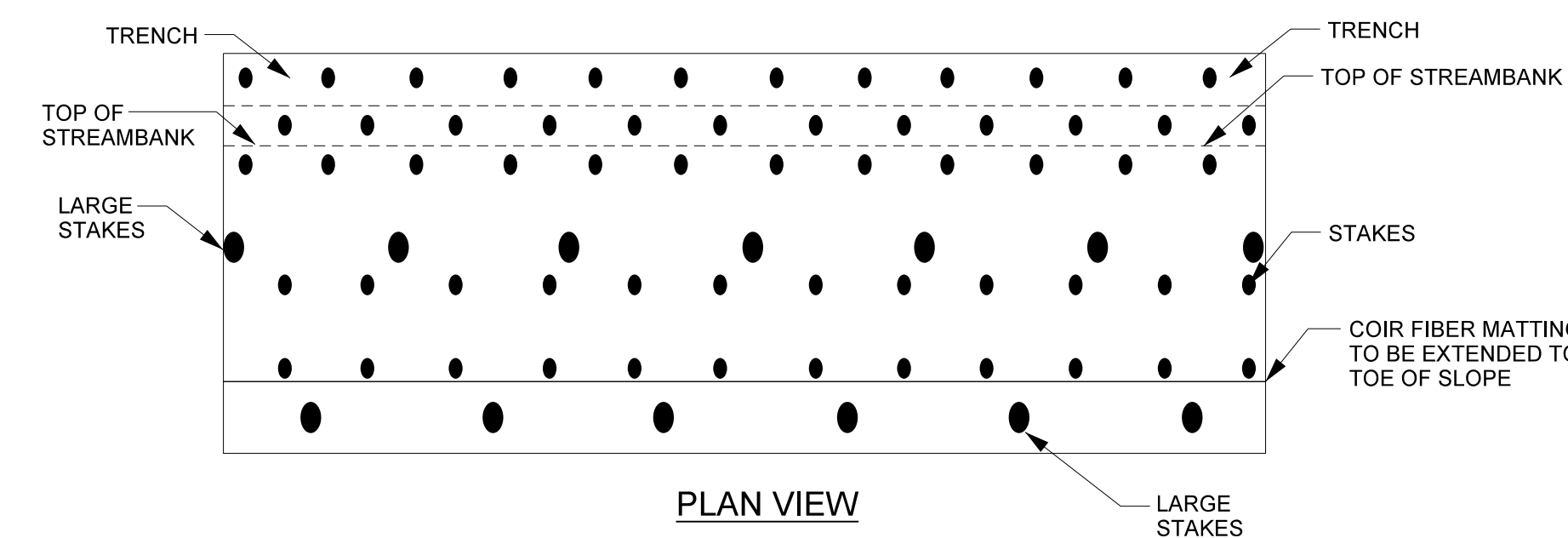
- BANKS SHOULD BE SEEDED PRIOR TO PLACEMENT OF MATTING.
- INSTALL COIR FIBER MATTING PER SPECIFICATIONS ALONG STREAM BANKS OR IN OTHERS LOCATIONS SPECIFIED BY ENGINEER.
- LARGE STAKES SHOULD NOT BE SPACED FURTHER THAN 36" APART.
- PLACE LARGE STAKES ALONG ALL SEAMS, IN THE CENTER OF BANK AND TOE OF SLOPE.



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)



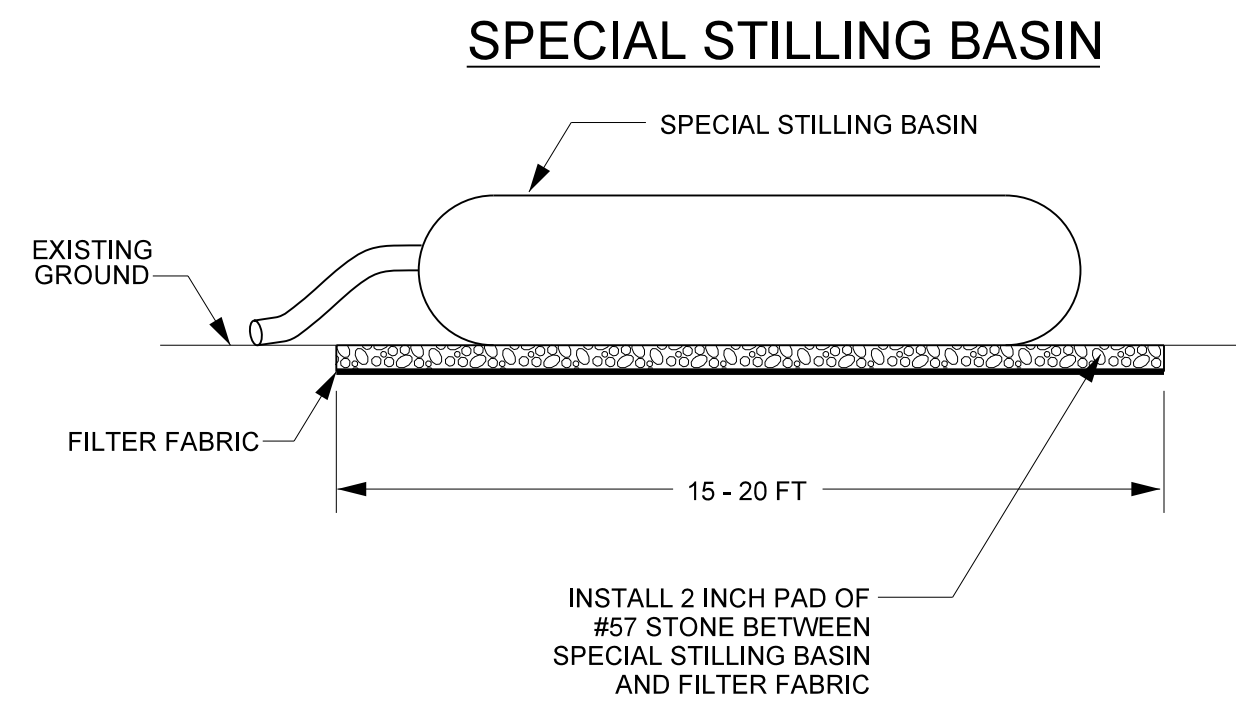
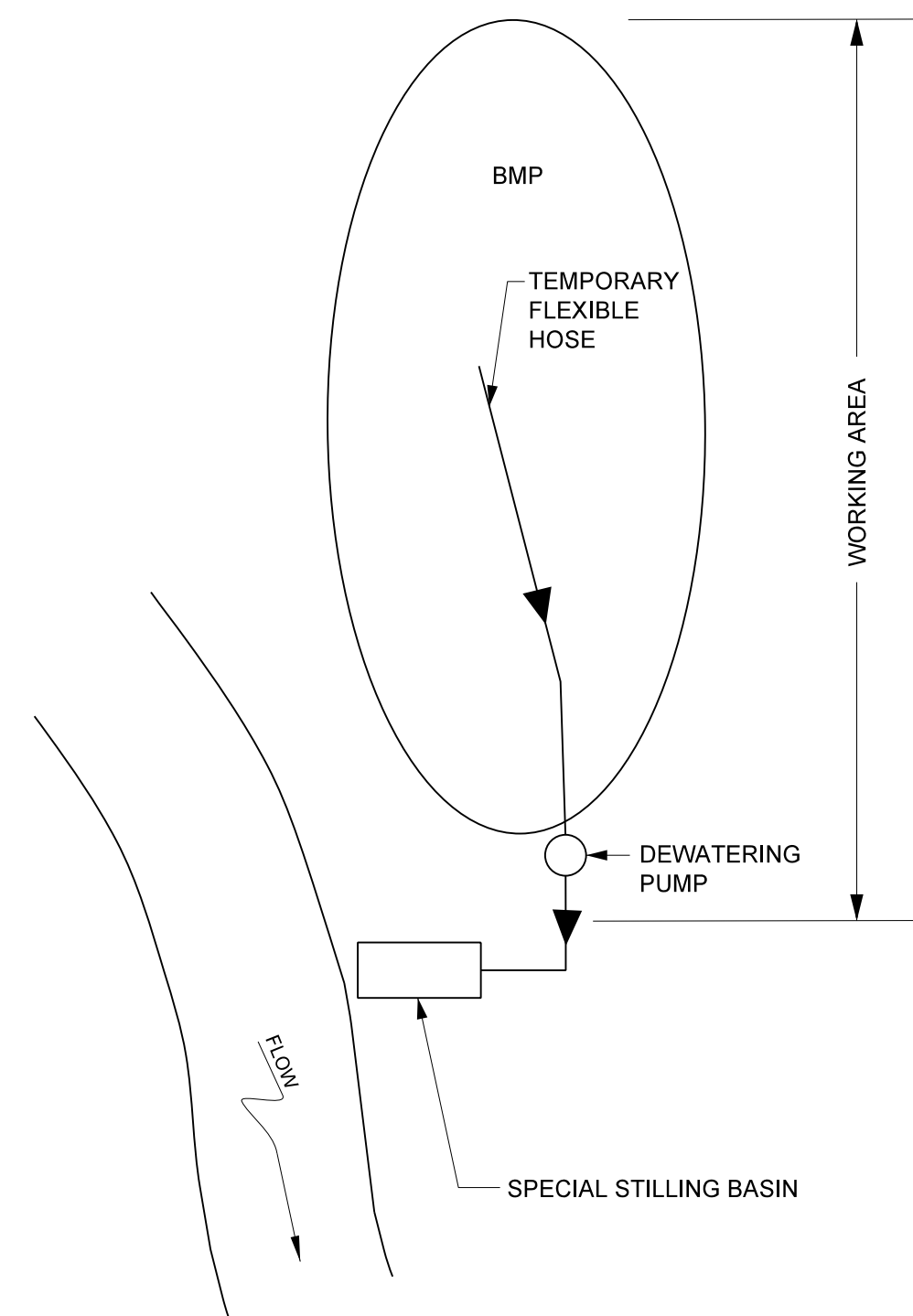
TYPICAL SMALL MATTING STAKE

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)

2/26/03

DEWATERING PUMP



1. INSTALL SPECIAL STILLING 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.

SPECIAL STILLING BASIN

TEMPORARY SEEDING SELECTION AND APPLICATION RATES

Common Name	Scientific Name	Application Time	Application Rate	Total (lbs/acre)
Cereal rye	<i>Secale cereale</i>	Sept - March	3 lb/1,000 sq ft.	130 lbs/acre
Browntop millet	<i>Panicum ramosum</i>	April - Aug	1 lb/1,000 sq ft.	44 lbs/acre

TEMPORARY STABILIZATION TIMEFRAMES

SITE AREA DESCRIPTION	STABILIZATION	TIME FRAME EXCEPTIONS
PERIMETER 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.

166274 EC-2B

PROJECT ENGINEER

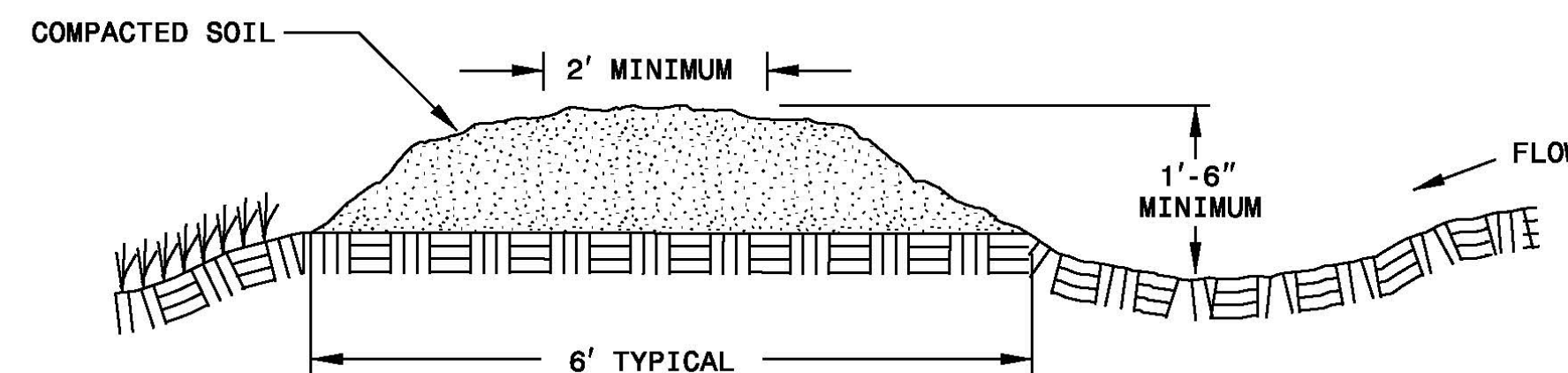
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NCDMS ID No. 100047

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.

ENGLISH STANDARD DRAWING FOR
TEMPORARY DIVERSION

SHEET 1 OF 1
1630.05

STATE OF NORTH CAROLINA
DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
RALEIGH, N.C.

ENGLISH STANDARD DRAWING FOR
TEMPORARY DIVERSION

SHEET 1 OF 1
1630.05

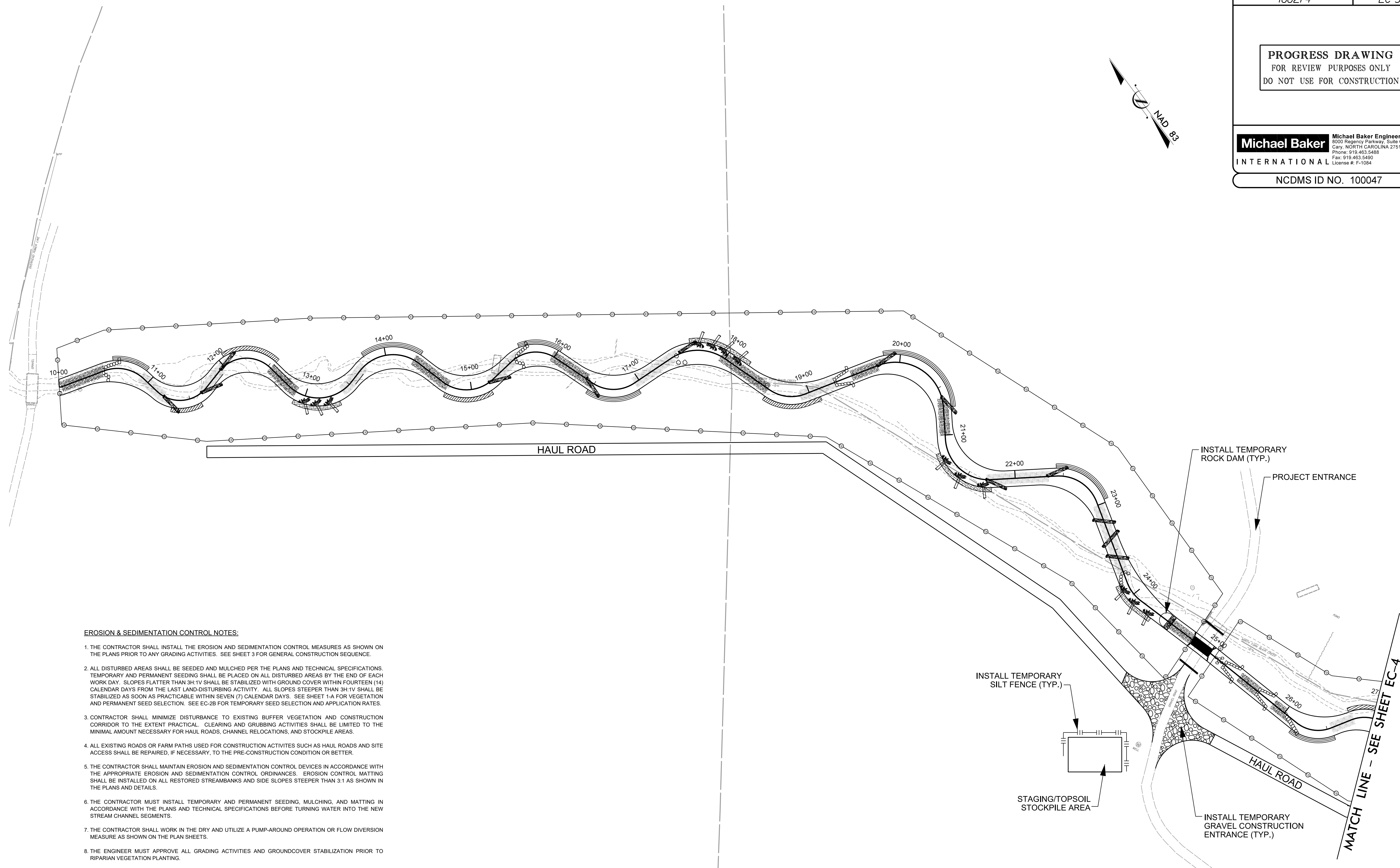
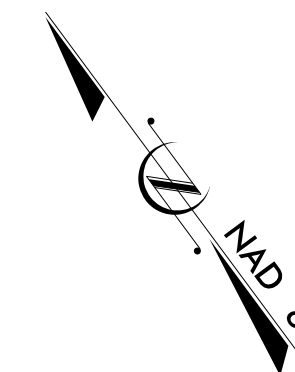
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2/26/03

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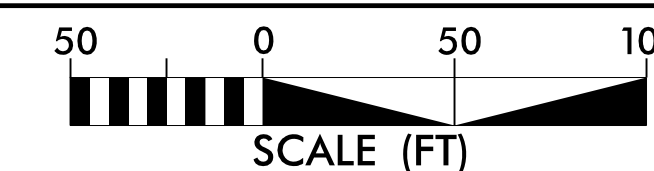
NCDMS ID NO. 100047



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 ACTIVITIES 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 GROUND COVER 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.

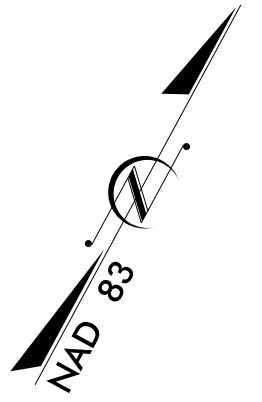
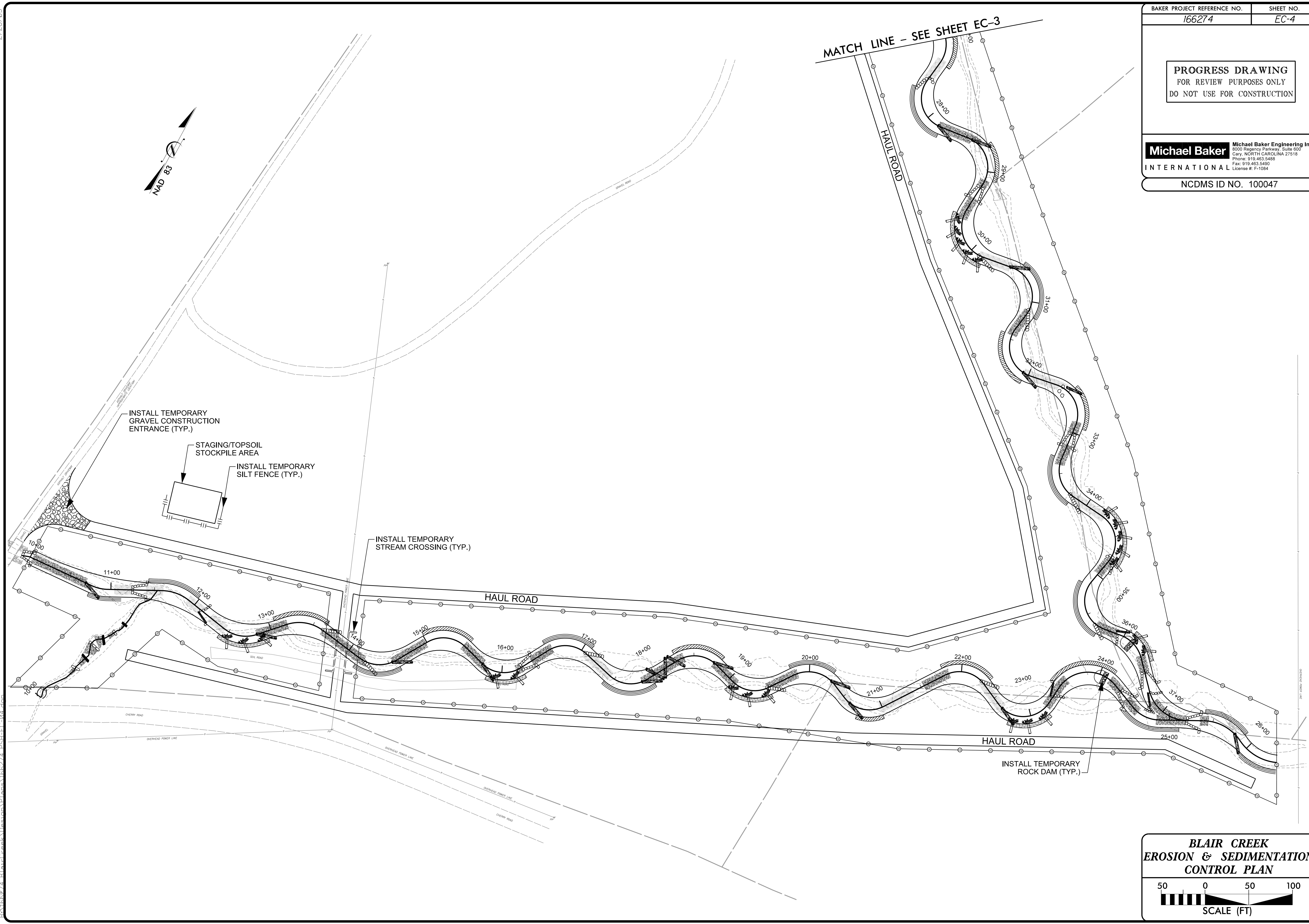
**BLAIR CREEK
EROSION & SEDIMENTATION
CONTROL PLAN**



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12/7/2020



BAKER PROJECT REFERENCE NO. 166274	SHEET NO. EC-4
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PROGRESS DRAWING
FOR REVIEW PURPOSES ONLY
DO NOT USE FOR CONSTRUCTION

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EROSION & SEDIMENTATION
CONTROL PLAN**

SCALE (FT)

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 12/7/2020