Final Mitigation Plan
Six Runs Stream and Wetland Mitigation Project

July 2022

DMS #: 100170 | Contract #: 0303-01 | RFP: 16-20190303
USACE Action ID: SAW-2020-01964 | DWR #: 20201798 v1
Cape Fear River Basin | HUC 03030006 | Sampson County, North Carolina

Prepared For:	**Prepared By:**
NC Department of Environmental Quality Division of Mitigation Services 1652 Mail Service Center Raleigh, NC 27699-1652	Resource Environmental Solutions, LLC for Environmental Banc & Exchange (EBX)

This mitigation plan has been written in conformance with the requirements of the following:

- *Federal rule for compensatory mitigation project sites as described in the Federal Register Title 33 Navigation and Navigable Waters Volume 3 Chapter 2 Section § 332.8 paragraphs (c)(2) through (c)(14).*
- *NCDEQ Division of Mitigation Services In-Lieu Fee Instrument signed and dated July 28, 2010*

These documents govern NCDMS operations and procedures for the delivery of compensatory mitigation.

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

REPLY TO
ATTENTION OF:

CESAW-RG/Browning

May 16, 2022

MEMORANDUM FOR RECORD

SUBJECT: NCDMS Six Runs Mitigation Project - NCIRT Comments during 30-day Mitigation Plan Review, Sampson County, NC

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

USACE AID#: SAW-2020-01964
NCDMS #: 100170
NCDWR#: 2020-1798
30-Day Comment Deadline: March 25, 2022

DWR Comments, Erin Davis:

1. Page 3, Section 2 – Please briefly elaborate on urban development as a contributing factor for water quality impairment and habitat degradation in this watershed.
2. Page 5, Table 3 – It would be helpful to have the proposed total planted area identified in the Project Attribute Table.
3. Page 11, Section 3.4.7 – DWR does not consider the installation of in-stream structures to be a temporary stream impact.
4. Pages 33-36, Section 6.2.1 –
    a. Please identify which reaches include segments of Priority 2 Restoration.
    b. There was an IRT meeting minute comment to “ensure DE4 and Brad’s Branch are not running parallel and are appropriately laid out for the site”. Has this been achieved with the proposed design?
    c. Log sills are the only listed grade control structure for intermittent reaches BB-A, BB-B, DE2-B, DE4-B, DE7, and DE8. DWR has observed log sills on intermittent reaches breaking down before the end of the monitoring period. Are there any concerns with long-term stream stability, particularly on higher slope reaches (e.g. DE2-B)?
    d. Since DE3 was determined to be a jurisdictional intermittent stream and work is proposed, please include the description of the treatment plan/design approach to convert it to an emergency spillway channel.
5. Page 41, Table 13 – Please confirm that project reaches, all of which currently have sand or sand/gravel substrate (Table 6), are proposed to have a gravel or cobble substrate (e.g. DE7 is going from sand to cobble).
6. Page 42, Section 6.4 – DWR appreciates the inclusion of multiple reference wetland areas. Was there evidence of beaver at either reference area? Was beaver presence a consideration in developing the target wetland approach discussed in Section 6.4.1?

7. Page 42, Section 6.4.1 – Please confirm that the only proposed grading in wetland credit areas is related to the stream restoration activities as shown on the draft design sheets.
8. Page 45, Section 6.6.1 – Please note that any plant substitutions will need to be approved by the IRT to count toward vegetative performance standards.
9. Page 47, Table 14 – Given the proposed initial planting percentages, DWR requests that green ash not be included in any supplemental planting efforts.
10. Page 48, Section 6.6.2 – Alligator weed was mentioned in the existing vegetation Section 3.2.3. DWR is concerned about the presence of this species onsite based on observations from other mitigation projects. Please include a description of the proposed treatment for this invasive. DWR recommends including additional wetland species to the proposed planting plan as seed or herbaceous plugs that grow in similar hydrologic conditions as alligator weed (e.g. American bur-reed, pickerelweed, arrow arum, arrowhead, *Carex spp., Cyperus spp., Scirpus spp.*).
11. Page 48, Section 6.7 – DWR encourages the placement of woody debris as habitat enhancement in project wetland and floodplain areas.
12. Page 54, Section 7.3 – DWR would be ok with the listed understory/shrub species being exempt from the vigor performance standard to encourage site diversity.
13. Page 56, Section 8.6 – DWR was very pleased at the proposed monitoring of initial supplemental planting areas. Can you please further define “periodic” monitoring?
14. Page 58, Section 9.1 Pond Outflows – The provided Dam Inspection Memo was appreciated and useful. Looking at Sheets 15 and F1, will the recommended tree removal and livestock fencing also be addressed through the project?
15. Page 58, Section 9.1 Channel Aggradation – DWR was glad to see discussion point. Please note that channel maintenance (e.g. sediment removal, in-stream veg control) should be restricted to the first three years of monitoring, with the exception of aquatic invasive species treatment, in order for the IRT to properly evaluate how the system is trending later in monitoring. Also, evolution towards a braided system may effect reach crediting so further discussion of potential adaptive management strategies could be helpful.
16. Page 58, Section 9.1 Inundation Effect – During the IRT site walk we encouraged discussion of a mosaic wetland system. The section appears to focus solely on forested wetland establishment. It may be beneficial to provide more information on “alternative planting measures” and consider alternative monitoring and performance criteria. Additional planning now could potentially avoid a worst case scenario of minimal tree survival and carpet of alligator weed, affecting functional uplift and credit. DWR recommends considering a OBL-FACW wetland seed mix and/or aquatic herbaceous plugs.
17. Figure 12 Monitoring –
    a. DWR requests that the groundwater gauge at southern edge of the reestablishment area be relocated near the south corner of the veg plot in the rehabilitation area (I can provide a map mark-up if requested). DWR also recommends considering adding a reference groundwater gauge in the preservation area.
    b. Please add easement break and culvert crossing to the fixed image locations note.
18. Cover Sheet – Site Map blocks S15 & S16 should be S14 & S15.
19. Sheets S1 & S2 – No bank grading is shown; however, Sections 3.4.7 and 6.2.1 reference bank grading along BB-A and BB-B. Please confirm whether bank grading is proposed for these reaches, and if so please update design sheets to callout all proposed work. DWR cannot fully support the proposed 1.5:1 ratio for 1,014 LF until we review a revised design plan.
20. Sheet S2 – DWR understands that there is a required easement break for the existing overhead electric line and buried water line. Since no bed or bank stabilization is proposed, please confirm that this break is not intended to be used as a livestock or vehicle crossing and that cattle will not have access to the stream.
21. Sheet 5-15 – It appears DE3, DE8 and multiple swales will tie into Brad’s Branch over a bank toe treatment area in the middle of an outer meander bend. Are there any concerns about long term bank stability?

22. Sheet 15 – It appears the riprap pad extends into the conservation easement. Will this feature require periodic long-term maintenance? If so, was access and the scope of allowable maintenance activities discussed with NC Stewardship?
23. Appendix B – The full habitat section and overall score are cut off of the NC SAM rating sheets.
24. Appendix J – Please update to include alligator weed.
25. General comment – I noticed multiple topics the IRT have been bringing up were captured in the plan. I liked the site-specific discussions in the land use (including references) and project risk & uncertainties sections, as well as the detail provided in the existing vegetation and reference wetland sections. Tables 7 and 8, along with all of the reach photos, were helpful in this review. Overall, DWR believes this project has the potential for substantial resource functional uplift.

USACE Comments, Kim Browning:

1. Figure 11: It appears that not all areas that are generating wetland credit were clipped from the buffer calculation. For example, the wetlands along DE4-A and the confluence of DE4-B with Brad's Branch. Please confirm. Also, from what I can gather from figure 3, there should be 7 exempt terminal ends. I'm happy to discuss prior to the final plan submittal.
    a. Do more than 5% of the stream reaches not meet the 50' minimum buffer? Section 6.8.1 indicates a 30-ft minimum buffer.
2. Section 3.4.4: Please reference the NLEB 4(d) rule and the approximate number/acres of trees that will be removed as a result of the project.
3. Section 3.4.7: If in-stream structures are installed, wouldn't they be considered a permanent impact, not temporary as indicated on the enhancement I reaches?
4. Page 17: Are you suggesting that DE8 was the original stream channel prior to the pond being installed and that DE3 is only there as a result of the pond spillway construction? More discussion should be included in the text to explain why a jurisdictional feature is being eliminated.
5. Please confirm that no placement of fill associated with the dam rehab will occur in the wetlands below the dam (WG).
6. Do you anticipate that the pasture north of WC-1 will be too wet for cattle access, or cause wallowing areas to form that add a sediment source to WC-1?
7. All of the existing vegetation and wetland summary were very helpful, particularly Table 8.
8. Are there any concerns with the log sills on intermittent reaches degrading/rotting over time? This is an observation the IRT has made on several close-out sites recently.
9. Section 6.6.3: Please add a discussion of how the Priority 2 cut areas will be addressed.
10. Section 4.1: The functional pyramid is cited to show existing conditions for each category and was used to describe the functional uplift potential of the project, which is fine; however, these principles of the Pyramid Framework are tied to the goals and objectives of this mitigation plan. The text states that it's not practical or feasible to directly measure the physiochemical or biological uplift, and that these benefits are assumed. It's unclear why NCSAM and NCWAM were not addressed in this section, nor were their functional assessments used to target areas for functional uplift. This would be particularly beneficial for the wetlands on-site.
11. Section 4.1.1: This section is contradictory to section 4.1 above where it discusses "The restoration approach at the reach scale of this project will have greatest effect on the hydrology…" Doesn't the Stream Functions Pyramid Framework refer to hydrology on the larger watershed scale?
12. Figure 12: Please ensure that all crossings and culverts are included in photo stations.
13. There is some concern with sediment contributions from the agricultural field above BB-A.
14. Section 9.1: From what I understand, the culvert at E Darden Rd is currently perched. Will it remain as such until NCDOT replaces this?
15. Page 58: I'm glad you considered the effects of inundation on tree growth; however, it seems more appropriate to plant these inundated areas with species that are found in the adjacent

reference area. You may want to consider more herbaceous species and propose alternate performance standards, such as percent cover and species diversity. I would suggest adding an adaptive management section that addresses the potential for a mosaic system, moisture regimes, and beaver management, especially at the bottom of Brad's Branch.

16. Figure 12: At some point during monitoring, please add random vegetation plots or transects in the supplemental planting areas in WA, WB, and WE-1 & 2. WE-2 will be important to document functional uplift (veg monitoring) since hydrology is already at 27%.
17. Surface Flow: The text states that intermittent streams will be monitored using pressure transducers and data loggers to demonstrate a minimum of 30 days consecutive flow. The 30-day metric was established to show success in the Coastal Plain Headwater guidance and was not intended to demonstrate success for intermittent flow. Intermittent streams only dry seasonally and therefore should have flow or the presence of water for periods much longer than 30 days. It is recommended that cameras are also used to monitor flow for both consecutive days and cumulative days.
18. It would be beneficial to add some coarse woody debris to the depressional areas in the buffers and throughout the adjacent wetlands for habitat, and to help store sediment, increase water storage/infiltration, and absorb water energy during overbank events.
19. Section 9.1: Should beaver management be addressed in this section?

Kim Browning
Mitigation Project Manager
Regulatory Division

M E M O R A N D U M

3600 Glenwood Avenue, Suite 100 Raleigh, North Carolina 27612 919.770.5573 tel. 919.829.9913 fax

TO: **Kim Browning – IRT**

FROM: **Brad Breslow, Matt DeAngelo – RES**

DATE: **July 27, 2022**

RE: **Response to Final Draft Mitigation Plan Comments – Six Runs Mitigation Project (DMS #100170) Cape Fear 03030006; Sampson County, NC; Contract No. 0303-01**

Highlights:

- Based on IRT feedback and revisions, the total stream credits for Six Runs Project have increased to **6,724.599 SMU** (previously 6,571.009 SMU in Draft) and attributed to a revised method of performing the NSBW calculation. More details are provided below in the comments and applicable sections of the Final Mitigation Plan.

- There is a new table added to the Final Mitigation Plan, **Table 16** (former Table 16 from the Draft Mitigation Plan is now Table 17).

DWR Comments, Erin Davis:

1. Page 3, Section 2 – Please briefly elaborate on urban development as a contributing factor for water quality impairment and habitat degradation in this watershed.
   Upon revisiting this section, urban development is not a significant contributing factor to watershed impairment for the 03030006 watershed. Whereas agriculture is a major factor. Therefore, the last paragraph has been revised to say, "*Agriculture is the primary stressor and significant contributing factor to hydrologic and water quality impairment and habitat degradation in this watershed. Agricultural impacts such as stream channelization, lack of riparian buffers, and large animal operations contribute to higher peak flows, excessive sediment and nutrient loads, and loss of natural habitat within the 03030006 watershed.*"

2. Page 5, Table 3 – It would be helpful to have the proposed total planted area identified in the Project Attribute Table.
   A row has been added to the table. Note that this is a DMS-required table.

3. Page 11, Section 3.4.7 – DWR does not consider the installation of in-stream structures to be a temporary stream impact.
   Noted. For the purpose of the 404/401 PCN application, RES is proposing that all of reaches BB-A and BB-B, which are Enhancement I, will be temporary impacts due to bank grading and installation of in-stream structures, both of which will involve earthwork associated with the stream channel but will not result in a permanent loss of Waters.

4. Pages 33-36, Section 6.2.1 –
   a. Please identify which reaches include segments of Priority 2 Restoration.
      Only approximately 500 LF of BB-C, just downstream of the DOT crossing on E. Darden Rd., is proposed as Priority 2 restoration. Note that the channel bed through this portion is still being raised 3-6 ft. Restoration Priorities have been added to the treatment descriptions to clarify.

   b. There was an IRT meeting minute comment to "ensure DE4 and Brad's Branch are not running parallel and are appropriately laid out for the site". Has this been achieved with the proposed design?
      The proposed channels of both DE4 and Brad's Branch follow the low areas in the natural valley. As such, their parallel course before their confluence is appropriate for the topography.

   c. Log sills are the only listed grade control structure for intermittent reaches BB-A, BB-B, DE2-B, DE4-B, DE7, and DE8. DWR has observed log sills on intermittent reaches breaking down before the end of the monitoring period. Are there any concerns with long-term stream stability, particularly on higher slope reaches (e.g. DE2-B)?
      RES anticipates the roots of the planted woody species to take over grade control prior to the degradation of the installed log structures.

   d. Since DE3 was determined to be a jurisdictional intermittent stream and work is proposed, please include the description of the treatment plan/design approach to convert it to an emergency spillway channel.
      Section 6.2.1 has been updated to include a write-up of the approach/activities for reach DE3.

5. Page 41, Table 13 – Please confirm that project reaches, all of which currently have sand or sand/gravel substrate (Table 6), are proposed to have a gravel or cobble substrate (e.g. DE7 is going from sand to cobble).

As shown in **Table 13** and **Detail D5**, all proposed restoration reaches will have gravel substrate, except DE7, which will have cobble. Cobble for DE7 is proposed as opposed to sand/gravel to ensure stability as velocities and shear stresses will be high in the steep (12% slope) section of the reach.

6. Page 42, Section 6.4 – DWR appreciates the inclusion of multiple reference wetland areas. Was there evidence of beaver at either reference area? Was beaver presence a consideration in developing the target wetland approach discussed in Section 6.4.1?
   RES did not observe any direct evidence of beaver during project development. However, it is highly likely that beaver activity exists within Six Runs Creek and has at some point influenced hydrology near the Project. This was not a specific consideration in development of the wetland approach, but the planting plan is being revised for the Final Mitigation Plan to include a third planting zone for the wettest area of the site that will hopefully bolster likelihood of vegetative success. More detail on that in responses below and in **Section 6.6** of the Final Mitigation Plan.

7. Page 42, Section 6.4.1 – Please confirm that the only proposed grading in wetland credit areas is related to the stream restoration activities as shown on the draft design sheets.
   All proposed grading through Project wetlands is incidental to providing floodplain access to the restored stream channels.

8. Page 45, Section 6.6.1 – Please note that any plant substitutions will need to be approved by the IRT to count toward vegetative performance standards.
   Noted. RES will notify IRT of any substitutions.

9. Page 47, Table 14 – Given the proposed initial planting percentages, DWR requests that green ash not be included in any supplemental planting efforts.
   Noted. RES will not plant green ash beyond the initial planting phase.

10. Page 48, Section 6.6.2 – Alligator weed was mentioned in the existing vegetation Section 3.2.3. DWR is concerned about the presence of this species onsite based on observations from other mitigation projects. Please include a description of the proposed treatment for this invasive. DWR recommends including additional wetland species to the proposed planting plan as seed or herbaceous plugs that grow in similar hydrologic conditions as alligator weed (e.g. American bur-reed, pickerelweed, arrow arum, arrowhead, Carex spp., Cyperus spp., Scirpus spp.).
    Though identified and included in the existing species inventory for the lower end of the site, alligatorweed was not a dominant species, but swamp smartweed (*persicaria hydropiperoides*) and curlytop knotweed (*Polygonum lapathifolium*) were the obviously

dominant species. There also exists a diverse mix of other herbaceous wetland species intermixed. Therefore, RES feels that spraying this area will result in more harm than good by potentially killing the other vegetation and leaving a more disturbed setting that could promote further spread of alligatorweed or introduce other exotic invasive species. In other words, the herbaceous community is already in fair condition, which is supported by its NWAM sub-function *Vegetation Composition* rating of "Medium". However, RES will monitor all potential invasive species and are prepared to treat as necessary, and all actions and methods will be conveyed in monitoring reports. RES has revised the planting plan for the Project to include another zone (Zone 1-B) in the wettest (downstream) portion of the site. This zone will include the same species presented in Zone 1-A (same as original Zone 1) but will also incorporate various unit types such as containerized trees, live stakes, and long live stake poles for strategic planting in potentially inundated areas. RES is confident that this plan will provide the best chance of tree survival and will reduce the likelihood of adaptive management and/or supplemental plantings.

Section 6.6 has been updated to include the new zone and provides further details. **Table 14** has been revised to include the new zone and indicate which species are anticipated to include containerized and live stake trees (see table footnotes). **Figure 12** and the planting plan sheet in **Appendix D** have been revised with the new planting zone.

11. Page 48, Section 6.7 – DWR encourages the placement of woody debris as habitat enhancement in project wetland and floodplain areas.
    RES proposes to place woody debris in wetland and floodplain areas where feasible; see Sheet W1 for approximate locations.

12. Page 54, Section 7.3 – DWR would be ok with the listed understory/shrub species being exempt from the vigor performance standard to encourage site diversity.
    Noted. RES has added a sentence to the paragraph stating, "*However, height requirements may be omitted for designated understory and shrub species if deemed advantageous*."

13. Page 56, Section 8.6 – DWR was very pleased at the proposed monitoring of initial supplemental planting areas. Can you please further define "periodic" monitoring?
    RES will commit to doing random plots (at least one) in supplemental planting areas each vegetation monitoring year. The sentence in the Final Mitigation Plan has been revised to say, "*These areas will be monitored each monitoring year with random plots to document both existing and planted trees to demonstrate both density and diversity*."

14. Page 58, Section 9.1 Pond Outflows – The provided Dam Inspection Memo was appreciated and useful. Looking at Sheets 15 and F1, will the recommended tree removal and livestock fencing also be addressed through the project?
    Yes, all recommended actions will be addressed through the project. See Sheets F1 and F2 for proposed fencing locations and dam improvements.

15. Page 58, Section 9.1 Channel Aggradation – DWR was glad to see discussion point. Please note that channel maintenance (e.g. sediment removal, in-stream veg control) should be restricted to the first three years of monitoring, with the exception of aquatic invasive species treatment, in order for the IRT to properly evaluate how the system is trending later in monitoring. Also, evolution towards a braided system may effect reach crediting so further discussion of potential adaptive management strategies could be helpful.
    RES understands the concern and that channel maintenance is limited to the first three years of monitoring. The section has been revised to account for potential adaptive measure. The following language was added, "*If excessive aggradation does occur and there is no obvious single-thread channel, RES is prepared to discern a thalweg via drone imagery or ground survey methods. Ultimately, if such a braided system does occur and it is determined that there is no primary flow channel, then a credit adjustment may be appropriate, such as valley length crediting, or as approved by IRT.*"

16. Page 58, Section 9.1 Inundation Effect – During the IRT site walk we encouraged discussion of a mosaic wetland system. The section appears to focus solely on forested wetland establishment. It may be beneficial to provide more information on "alternative planting measures" and consider alternative monitoring and performance criteria. Additional planning now could potentially avoid a worst case scenario of minimal tree survival and carpet of alligator weed, affecting functional uplift and credit. DWR recommends considering a OBL-FACW wetland seed mix and/or aquatic herbaceous plugs.
    Please refer to response to comment #10. Also, a sentence was added to the paragraph to reference the updated planting zone and approach: "*Furthermore, planting Zone 1-B includes containerized, live stake, and long live stake poles that should increase survivability.*"

17. Figure 12 Monitoring –
    a. DWR requests that the groundwater gauge at southern edge of the reestablishment area be relocated near the south corner of the veg plot in the rehabilitation area (I can provide a map mark-up if requested). DWR also recommends considering adding a reference groundwater gauge in the preservation area.

The groundwater gauge has been moved accordingly. Also, an additional proposed reference gauge has been added to the wooded preservation area within WC-2.

b. Please add easement break and culvert crossing to the fixed image locations note.
Note has been revised accordingly.

18. Cover Sheet – Site Map blocks S15 & S16 should be S14 & S15.
Sheet labels have been updated; map blocks and sheet list table now match.

19. Sheets S1 & S2 – No bank grading is shown; however, Sections 3.4.7 and 6.2.1 reference bank grading along BB-A and BB-B. Please confirm whether bank grading is proposed for these reaches, and if so please update design sheets to callout all proposed work. DWR cannot fully support the proposed 1.5:1 ratio for 1,014 LF until we review a revised design plan.
Bank grading along both banks is proposed within the Enhancement I area from STA 3+50 down to STA 11+22; from STA 11+22 to E. Darden Rd., the channel will be restored/realigned. A note has been added to this effect on Sheets S1 and S2 to clarify this work.

20. Sheet S2 – DWR understands that there is a required easement break for the existing overhead electric line and buried water line. Since no bed or bank stabilization is proposed, please confirm that this break is not intended to be used as a livestock or vehicle crossing and that cattle will not have access to the stream.
The fenceline has been updated to extend across the easement break. This is not a crossing nor will cattle have access. The plan sheets and **Figures 10 & 12** have been revised accordingly.

21. Sheet 5-15 – It appears DE3, DE8 and multiple swales will tie into Brad's Branch over a bank toe treatment area in the middle of an outer meander bend. Are there any concerns about long term bank stability?
Long-term stability of the swale tie-ins is not a concern, as flow through the swales will be relatively low. The swales are intended to provide a stable outlet for floodplain depressions to prevent rill formation through the floodplain or channel plugs, and as such, they capture fairly small drainage areas each. Short-term stabilization will be accomplished through coir/curlex matting and herbaceous riparian vegetation, while long-term stability will be provided by the planted trees. As for DE8, the confluence with Brad's Branch will occur over a stone toe structure which will also act as grade control along DE8.

22. Sheet 15 – It appears the riprap pad extends into the conservation easement. Will this feature require periodic long-term maintenance? If so, was access and the scope of allowable maintenance activities discussed with NC Stewardship?
    It is not anticipated that the dissipator pad will require long-term maintenance.

23. Appendix B – The full habitat section and overall score are cut off of the NC SAM rating sheets.
    This has been fixed for all NC SAM rating sheets.

24. Appendix J – Please update to include alligator weed.
    RES' current standpoint is that this species poses a minimal threat to vegetative success based on existing conditions. However, a sentence has been added to **Appendix J** to reference alligatorweed and reads, "*Though it is not currently considered a threat based on pre-restoration conditions, the aquatic alligatorweed (Alternanthera philoxeroides) may be treated if it poses a threat to native wetland species.*"

25. General comment – I noticed multiple topics the IRT have been bringing up were captured in the plan. I liked the site-specific discussions in the land use (including references) and project risk & uncertainties sections, as well as the detail provided in the existing vegetation and reference wetland sections. Tables 7 and 8, along with all of the reach photos, were helpful in this review. Overall, DWR believes this project has the potential for substantial resource functional uplift.
    Thank you. We appreciate the feedback.

USACE Comments, Kim Browning:

1. Figure 11: It appears that not all areas that are generating wetland credit were clipped from the buffer calculation. For example, the wetlands along DE4-A and the confluence of DE4-B with Brad's Branch. Please confirm. Also, from what I can gather from figure 3, there should be 7 exempt terminal ends. I'm happy to discuss prior to the final plan submittal.
   Wetland areas within the standard 50-foot buffer zone were not clipped out of the buffer calculation because there is no additional buffer credit being generated within that 50-foot zone, so these areas still generate wetland credit. As for the 51-150 foot zones, only wetland re-establishment areas were clipped out of the buffer calculation and are represented by the "ineligible polygons." These areas generate wetland credit but do not generate additional NSBW stream credit. For example, the wetlands along DE4-A – wetland enhancement credits are only generated within the standard 50-foot zone, whereas additional NSBW credit is being generated outside of that instead of wetland credit. This is not the same for the wetland re-establishment area however,

where re-establishment credit is being generated within the standard 50-foot zone and outside of that (which is why there is an "ineligible polygon" here, so that it does not generate additional NSBW credit).

NOTE: Upon further discussion between RES and Kim Browning regarding the NSBW comments, it was agreed to redo the NSBW calculations based on the principle that the portion of stream channel that did not have sufficient minimum buffer (which was over 5% of the total Project stream length) was constrained by a NCDOT road (E Darden Road). The rationale is that this portion of stream channel (BB-A and BB-B) is already within its natural valley as it runs parallel to the road and that it is impossible for the sponsor to relocate the channel away from the road and through the hillside in order to attain the minimum buffer. Therefore, it was decided to completely omit the segment of the Project easement that is upstream of the road from the NSBW calculation because, otherwise, the buffer tool calculation would result in an unwarranted, significant loss of SMUs. Further explanation and rationale are explained in the mitigation plan, specifically, **Section 6.8.1** which has updated language and an additional table (new **Table 16**). Also, **Figure 11** was revised accordingly and helps clarify the methodology. The NSBW Calculator Spreadsheet is also revised in **Appendix B**. Please note that the new credit adjustment results in an increase of SMU with a Project total of **6,724.599 SMU** (previously 6,571.009 SMU in Draft Mitigation Plan). New credit amounts were revised throughout the entire Final Mitigation Plan.

As for the terminal ends, due to the revised NSBW method used for this Project, there are now three exempt terminal ends. These are now depicted on **Figure 11**.

a. Do more than 5% of the stream reaches not meet the 50' minimum buffer? Section 6.8.1 indicates a 30-ft minimum buffer.
   Yes, more than 5% of the stream reaches do not meet the 50-foot buffer. The 30-ft reference in the section was a typo and should say 50-foot. This has been revised.

2. Section 3.4.4: Please reference the NLEB 4(d) rule and the approximate number/acres of trees that will be removed as a result of the project.
   NLEB is not on the USFWS "Official Species List" for this Project according to the USFWS section 7 consultation; therefore, 4(d) consultation was not conducted. Likewise, Kathy Matthews from USFW confirmed that NLEB considerations do not apply to this Project. However, for informational purposes, RES anticipates that approximately 5 acres of trees will be removed as part of the Project activities.

3. Section 3.4.7: If in-stream structures are installed, wouldn't they be considered a permanent impact, not temporary as indicated on the enhancement I reaches?
   For the purpose of the 404/401 PCN application, RES is proposing that all of reaches BB-A and BB-B, which are Enhancement I, will be temporary impacts due to bank grading and installation of in-stream structures, both of which will involve earthwork associated with the stream channel but will not result in a permanent loss of Waters. The in-stream structures are all wood (log sills), and the only rock to be added is cobble and gravel behind the structures, as is typical for this type of work.

4. Page 17: Are you suggesting that DE8 was the original stream channel prior to the pond being installed and that DE3 is only there as a result of the pond spillway construction? More discussion should be included in the text to explain why a jurisdictional feature is being eliminated.
   Yes; DE8 follows the path of the well-defined natural valley which begins upstream of the pond. In contrast, DE3 runs across the side slope of Brads Branch's valley and, without the pond redirecting water through it, would only have about 0.6 ac of watershed. As such, DE3 is a jurisdictional feature only because it receives hydrology from the pond outlet, which was installed on the east side of the dam instead of in the natural valley location. This is further evidenced by DE8 showing up on published USGS (1977) and NRCS Soils (1985) maps, but not DE3.

   For clarity, **Section 6.2.1** has been updated to include a write-up of the approach/activities for reach DE3.

5. Please confirm that no placement of fill associated with the dam rehab will occur in the wetlands below the dam (WG).
   There is some fill placement in wetland WG as part of the dam rehab, and this feature will be lost by the dam improvement activities. The feature is a very small seep that exists due to seepage from the pond dam. Unfortunately, this loss is necessary to rehabilitate the compromised dam and ensure its integrity. Ultimately, the loss of this feature (0.015 ac) will be more than made up for by the wetland re-establishment through the rest of the project (6.221 ac).

6. Do you anticipate that the pasture north of WC-1 will be too wet for cattle access, or cause wallowing areas to form that add a sediment source to WC-1?
   RES does not believe that this area will be significantly affected by increased hydrology since there is a natural break in slope along most of the easement boundary. However, there is still a wetland seepage that extends from the adjacent pond into the easement boundary that will continue to be accessible to cattle (outside of the fenceline). Being that this particular area is small and flat, RES does not anticipate that there would be

a significant sediment source even if it were to become a wallowing area. With that said, RES will be sure to monitor this area and report any problems if they should arise.

7. All of the existing vegetation and wetland summary were very helpful, particularly Table 8.
   Thank you. We appreciate the feedback.

8. Are there any concerns with the log sills on intermittent reaches degrading/rotting over time? This is an observation the IRT has made on several close-out sites recently.
   RES anticipates the roots of the planted woody species to take over grade control prior to the degradation of the installed log structures.

9. Section 6.6.3: Please add a discussion of how the Priority 2 cut areas will be addressed.
   In areas of Priority 2 cut and in areas where floodplain cut will exceed 9" to 12", topsoil will be removed and stockpiled. Stockpiled topsoil will then be placed along the floodplain benches. Lime and fertilizer will also be added to these areas as deemed necessary for vegetation survival.

10. Section 4.1: The functional pyramid is cited to show existing conditions for each category and was used to describe the functional uplift potential of the project, which is fine; however, these principles of the Pyramid Framework are tied to the goals and objectives of this mitigation plan. The text states that it's not practical or feasible to directly measure the physiochemical or biological uplift, and that these benefits are assumed. It's unclear why NCSAM and NCWAM were not addressed in this section, nor were their functional assessments used to target areas for functional uplift. This would be particularly beneficial for the wetlands on-site.
    RES appreciates this perspective. We do not directly tie the NC SAM and WAM results to goals and objectives for the Project; however, it is a good tool to help us demonstrate the existing functionality of features and justify potential uplift approaches, even if it is less conveyed in our mitigation plans. With that said, RES would be interested to explore how we can even further integrate NC SAM and WAM into our mitigation plans, especially to provide more insight into wetland-related functions and mitigation approaches.

    As for this mitigation plan, NC SAM-related language has been added to **Section 4.1** and NC WAM-related language has been added to **Section 4.2**.

11. Section 4.1.1: This section is contradictory to section 4.1 above where it discusses "The restoration approach at the reach scale of this project will have greatest effect on the

hydrology…" Doesn't the Stream Functions Pyramid Framework refer to hydrology on the larger watershed scale?
RES understands the confusion. However, the intent is to iterate that hydrology will be significantly improved for the local catchment area, but not so much at the entire watershed-scale. A sentence has been added to the paragraph to help clarify.

12. Figure 12: Please ensure that all crossings and culverts are included in photo stations.
RES will include these photos. The note in **Figure 12** has been revised accordingly.

13. There is some concern with sediment contributions from the agricultural field above BB-A.
This is a valid concern. The design attempts to account for the excess sediment; however, the property upstream is out of our control. Fortunately, the Project incorporates the large wetland restoration area at its downstream extent that that can provide storage and treatment of sediment before it would otherwise drain into Six Runs Creek, thereby providing important water quality functions.

14. Section 9.1: From what I understand, the culvert at E Darden Rd is currently perched. Will it remain as such until NCDOT replaces this?
As shown on Sheet S3, the restored channel of BB-C will be brought up to the existing DOT culvert invert so that it will no longer be perched. In conversations with NCDOT, they have said there are no immediate plans to replace that pipe, but if/when they do, it will be upsized and buried per the current requirements.

15. Page 58: I'm glad you considered the effects of inundation on tree growth; however, it seems more appropriate to plant these inundated areas with species that are found in the adjacent reference area. You may want to consider more herbaceous species and propose alternate performance standards, such as percent cover and species diversity. I would suggest adding an adaptive management section that addresses the potential for a mosaic system, moisture regimes, and beaver management, especially at the bottom of Brad's Branch.
Thank you. As addressed in above responses to comments, RES believes the existing herbaceous layer is adequate, and the Planting Plan has been revised to incorporate a new zone (Zone 1-B) with additional containerized and live stake species to improve the chances of tree establishment (see **Section 6.6**, **Table 14**, and **Figure 12**). Also, **Section 9.1** was updated to include more discussion about risk associated with potential "braided system."

16. Figure 12: At some point during monitoring, please add random vegetation plots or transects in the supplemental planting areas in WA, WB, and WE-1 & 2. WE-2 will be

important to document functional uplift (veg monitoring) since hydrology is already at 27%.
Noted. RES will ensure these areas are monitored for vegetation during the monitoring period.

17. Surface Flow: The text states that intermittent streams will be monitored using pressure transducers and data loggers to demonstrate a minimum of 30 days consecutive flow. The 30-day metric was established to show success in the Coastal Plain Headwater guidance and was not intended to demonstrate success for intermittent flow. Intermittent streams only dry seasonally and therefore should have flow or the presence of water for periods much longer than 30 days. It is recommended that cameras are also used to monitor flow for both consecutive days and cumulative days.
    Noted. RES will continue to adhere to the published guidance; however, we fully anticipate that all streams will have periods of flow much longer than 30 days. RES is currently experimenting with "flow cameras" and will consider implementing them at the Project.

18. It would be beneficial to add some coarse woody debris to the depressional areas in the buffers and throughout the adjacent wetlands for habitat, and to help store sediment, increase water storage/infiltration, and absorb water energy during overbank events.
    RES proposes to place woody debris in wetland and floodplain areas where feasible; see Sheet W1 for approximate locations.

19. Section 9.1: Should beaver management be addressed in this section?
    The last sentence in the Effect of Inundation on Tree Growth in WC-1 of **Section 9.1** references potential beaver management and further references **Table F1, Appendix F** (the Maintenance Plan). As part of the general maintenance plan, beavers will be managed as necessary across the entire Project site.

Mitigation Services
ENVIRONMENTAL QUALITY

ROY COOPER
Governor

ELIZABETH S. BISER
Secretary

November 8, 2021

Via email: kwebber@res.us

Katie Webber
RES

Subject: DMS Comments the Mitigation Plan
Six Runs Project ID #100170, DMS Contract #0303-01

Katie,

After receiving the draft Mitigation Plan, DMS offers the following comments. Please review these comments, make changes as appropriate, or respond to the comments. It was noted by several reviewers that This was very clear, well written, and thoroughly addressed all rules/regulations and guidance. The plan sheets were also well done. Thank you for the effort.

Specific Comments:

1. Table of Contents, check that the List of Appendices includes all items in the appendices, e.g. attribute table.
2. Move Project Attribute Table from appendix to Section 3. Tables for this kind of data are more effective for the reviewer and this table has a specific purpose for the reviewer because it represents basic parameters of the project.
3. Page 5 Drainage area and land cover and Page 5 Surface water classification. Suggest these paragraphs can be deleted since the information is included in the Attribute Table. Providing narrative of these parameters is not necessary to repeat.
4. Page 25, Section 3.6.2 Please note, the inclusion of the National Wetland is not a DMS request or requirement.
5. Page 28 of Section 4.1.1 "Physicochemical" – Livestock exclusion has known water quality benefits, such as reducing nutrient and fecal loading to receiving waters. Suggest including this in the discussion of this section.
6. Page 32+, Please include a morph essential parameters table in Section 6 (from Oct 2020 mitigation plan tables). Table 6 includes part of this table but is incomplete; this table has a specific purpose for the reviewer. The example morph essential parameters table can be found through the following link: Templates and Guidance for Contracted Project Deliverables | NC DEQ
7. Page 49 of Section 6.6.1 – The second sentence of the first paragraph stated "Therefore, to calculate functional uplift credit adjustment …". Should it be "buffer/stream restoration credit" instead of "functional uplift credit?

Figures

1. Figure 10 – There are some significant things missing from this figure that are shown or provided in more detail than the plan sheets. Suggest adding footnote that the Figure 10 doesn't include all proposed work and refers to plan sheets for details.
2. Figure 12 Monitoring. The location of the flow gauge on BB-A should be moved up closer to the top of the reach to show flow above the confluence of MT-2.

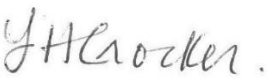
Plan Sheets

1. Provide elevations of pre-restoration groundwater gages if known. Suggest that RES survey specific elevations of groundwater gages at as-built for newly installed gages.
2. The 12% drop over 100' above DE7 will be challenging to maintain stability over the project life, especially with a ford crossing and potential farm traffic. RES should consider this area for future risk, even though it is outside the easement.

Digital Deliverables

1. Submit the zero credit connecting stream features that span easement breaks.
2. Include the stream segments that represent the area from the TOB to the confluence (e.g. BB-C & DE2-B, etc.).
3. The feature for BB-A has a length of 462 ft compared to 452 ft in the asset table. Please review and ensure that the value in the asset table matches the submitted feature length for BB-A.
4. It appears that the cross-section data for all cross sections before Reach MT2-XS1 in the monitoring report are excluded from the SixRuns_CrossSection_Plots_Photos spreadsheet. Please ensure that all cross-section data that is displayed in the report is submitted in this spreadsheet.
5. Include the data for groundwater gauges 1-3.

Thanks for your work,



Lindsay Crocker, DMS

M E M O R A N D U M

3600 Glenwood Avenue, Suite 100 Raleigh, North Carolina 27612 919.770.5573 tel. 919.829.9913 fax

TO: **NCDEQ Division of Mitigation Services (DMS)**

FROM: **Matt DeAngelo – RES**
Katie Webber – RES

DATE: **February 17, 2022**

RE: **Response to Draft Mitigation Plan Comments – Six Runs Mitigation Project (DMS #100170) Cape Fear 03030006; Sampson County, NC; Contract No. 0303-01**

Notes:

In addition to addressing the following DMS comments, RES made some other minor changes to the Six Runs Mitigation Plan. These include:

- Easement was adjusted below the main dam (DE8) in order to account for dam stabilization work (dam inspection report included for review); this resulted in a shortening of DE8 and an alignment adjustment.
- Easement was adjusted near the top of the project (BB-A) in order to accommodate an adjacent parcel constraint.

Based on these adjustments, all relevant changes have been made throughout the plan; including stream length, proposed top of bank (TOB), wetland polygons, Non-Standard Buffer Width (NSBW) calculation, fencing, and planting area. The total Stream Mitigation Units (SMUs) generated onsite decreased to 6,571.009 while WMU amount did not change. Total easement area is now 30.94 acres.

Specific Comments:

1. Table of Contents, check that the List of Appendices includes all items in the appendices, e.g. attribute table.

   The List of Appendices has been revised to list out each item within each appendix. The *Project Attribute Table* has been moved to Section 3, as per the below comment.

2. Move Project Attribute Table from appendix to Section 3. Tables for this kind of data are more effective for the reviewer and this table has a specific purpose for the reviewer because it represents basic parameters of the project.

The *Project Attribute Table* has been moved to Section 3, per the comment. It is now titled **Table 3**. (This replaces the former *Project Watershed Summary Information* table).

3. Page 5 Drainage area and land cover and Page 5 Surface water classification. Suggest these paragraphs can be deleted since the information is included in the Attribute Table. Providing narrative of these parameters is not necessary to repeat.

   Section 3.1.2 Surface Water Classification has been deleted. As for *Section 3.1.1 Drainage Are and Land Cover*, redundant language has been removed; however, some descriptive language remains since RES feels that there is pertinent narrative about the watershed that is not captured in the *Project Attribute Table*.

4. Page 25, Section 3.6.2 Please note, the inclusion of the National Wetland is not a DMS request or requirement.

   Thank you for clarifying. RES prefers to include the information since it is part of our data-gathering process as well as an enclosure for JDs.

5. Page 28 of Section 4.1.1 "Physicochemical" – Livestock exclusion has known water quality benefits, such as reducing nutrient and fecal loading to receiving waters. Suggest including this in the discussion of this section.

   RES agrees. The following language has been added to the paragraph: "…eliminating agricultural practices from riparian buffer areas, especially by permanently excluding livestock throughout**,** and restoring and enhancing hydrology to riparian wetlands. These activities will…decrease nutrient sources by converting farmland to forest, reduce fecal coliform input**,** and…"

6. Page 32+, Please include a morph essential parameters table in Section 6 (from Oct 2020 mitigation plan tables). Table 6 includes part of this table but is incomplete; this table has a specific purpose for the reviewer. The example morph essential parameters table can be found through the following link:

   A table has been added accordingly (now **Table 13**) with both reference and proposed channel data. Please note that table numbers were updated where applicable as a result. In addition, **Table 6** (Existing morph data) was revised to match the format of **Table 13** and in accordance with the DMS template.

7. Page 49 of Section 6.6.1 – The second sentence of the first paragraph stated "Therefore, to calculate functional uplift credit adjustment …". Should it be "buffer/stream restoration credit" instead of "functional uplift credit?

   RES agrees that the wording should be updated. The statement has been revised to say, "…Therefore, to calculate stream credit adjustments based on buffer widths…"

Figures:

1. Figure 10 – There are some significant things missing from this figure that are shown or provided in more detail than the plan sheets. Suggest adding footnote that the Figure 10 doesn't include all proposed work and refers to plan sheets for details.

   A note has been added to the figure accordingly.

2. Figure 12 Monitoring. The location of the flow gauge on BB-A should be moved up closer to the top of the reach to show flow above the confluence of MT-2.

   The flow gauge location has been moved upstream.

Plan Sheets:

1. Provide elevations of pre-restoration groundwater gages if known. Suggest that RES survey specific elevations of groundwater gages at as-built for newly installed gages.

   RES didn't collect elevations and does not typically have a use for that data; if DMS does use those data for their purposes, please let us know and we can collect at as-built. We would find it informative to understand how DMS utilizes the information.

2. The 12% drop over 100' above DE7 will be challenging to maintain stability over the project life, especially with a ford crossing and potential farm traffic. RES should consider this area for future risk, even though it is outside the easement.

   RES acknowledges that there is an inherent stability risk due to the 12% slope of DE7. However, we feel that the risk is minor since the drainage area of DE7 is small (21 ac) and stability concerns should be mitigated with the proposed log/rock cascade structures that are intended and designed for very steep systems. The farm traffic outside of the easement is to be limited to cattle access only, and therefore the proposed ford crossing is intended to act as an armored section for cattle to cross and not for vehicles.

Digital Deliverables:

1. Submit the zero credit connecting stream features that span easement breaks.

   Polyline shapefile has been updated accordingly.

2. Include the stream segments that represent the area from the TOB to the confluence (e.g. BB-C & DE2-B, etc.).

   Polyline shapefile has been updated accordingly.

3. The feature for BB-A has a length of 462 ft compared to 452 ft in the asset table. Please review and ensure that the value in the asset table matches the submitted feature length for BB-A.

   Thank you for the comment. The feature was split incorrectly. It has been revised to match the asset table.

4. It appears that the cross-section data for all cross sections before Reach MT2-XS1 in the monitoring report are excluded from the SixRuns_CrossSection_Plots_Photos spreadsheet. Please ensure that all cross-section data that is displayed in the report is submitted in this spreadsheet.

   The excel spreadsheets for the reference reach cross sections have been added to folder 4.

5. Include the data for groundwater gauges 1-3.

   The data has been added. Please note that additional data was since collected and is reflected in the mitigation plan. Several photos were also added to folder 4.

Table of Contents

FIGURES

APPENDICES

1 PROJECT INTRODUCTION

1.1 Project Components

The Six Runs Stream and Wetland Mitigation Project (Project) is located within Sampson County, approximately six and a half miles west of Faison, NC. The Project lies within the Cape Fear River Basin, North Carolina Department of Water Resources (NCDWR) sub-basin 03-06-19 and United States Geological Survey (USGS) 14-digit hydrologic unit code (HUC) 03030006110010 (Six Runs Creek Watershed; **Figure 1**). The Project is being designed to help meet compensatory mitigation requirements for stream and wetland impacts in the HUC 03030006. The Project proposes to restore 5,788 linear feet (LF) and enhance 1,656 LF of stream as well as re-establish 6.221 acres (ac), rehabilitate 4.913 ac, enhance 1.008 ac, and preserve 1.656 ac of wetlands that will ultimately provide water quality benefits and ecosystem uplift for the Project's 0.89 mi^2 (570 ac) drainage area.

The Project is comprised of a 30.94-acre easement located along Six Runs Creek, encompassing a portion of the Six Runs Creek floodplain and several tributaries. The Project involves Brad's Branch (a colloquial name for the primary tributary feature draining to Six Runs Creek), five of its unnamed tributaries, and riparian wetlands that all drain into Six Runs Creek which eventually drains south to the Black River. The stream and wetland mitigation components are summarized in **Table 1**. The upstream extent of the Project begins at a property boundary upstream of E Darden Road and the downstream extent ends within the Six Runs Creek swamp. The site is easily accessible from E Darden Road. Coordinates for the Project are as follows: 35.0962°, -78.2304°.

1.2 Project Outcomes

The riparian corridors within the Project have been manipulated by agricultural practices over time, thereby adversely impacting both streams and wetlands. Most streams are degraded in varying degrees and will be restored or enhanced to attain higher function. Non-jurisdictional areas of hydric soil within riparian areas will be restored via re-establishment to improve both hydrologic and vegetative functions. Jurisdictional riparian wetland areas that are severely degraded in terms of vegetation and riparian function will be rehabilitated to improve vegetative function and stream interaction. Other jurisdictional wetland areas that are partially forested but degraded from constant cattle pressure will be enhanced to improve vegetative function. A small area of mixed, jurisdictional wetland types, including frequently inundated marsh and forested swamp, within the Thunder Swamp floodplain will be preserved. Importantly, cattle have access to all aquatic resources within the Project. Proposed improvements to the Project will help meet the river basin needs expressed in the Division of Mitigation Services' (DMS) 2009 Cape Fear River Basin Restoration Priorities (RBRP).

Through stream restoration and enhancement, the Project presents 7,444 LF of proposed stream mitigation, generating 6,724.599 Warm Stream Mitigation Units (SMU; **Table 1**). Additionally, the Project presents 13.798 acres of wetland re-establishment, rehabilitation, enhancement, and preservation, generating 10.044 Riparian Wetland Mitigation Units (WMU; **Table 1**). Additional wetland areas amounting to 1.379 acres will not generate mitigation credit but will be protected within the conservation easement. IRT Meeting Minutes were carefully considered in the preparation of this Mitigation Plan. (**Appendix B**).

Table 1. Six Runs Project Components Summary

Stream Mitigation			
Mitigation Approach	**Linear Feet**	**Ratio**	**Warm SMU**
Restoration	5,788	1:1	5,788.000
Enhancement I	1,014	1.5:1	675.999
Enhancement II	341	2.5:1	136.400
Enhancement II	301	5:1	60.200
Total	**7,444**		**6,660.599**
Adjusted Total*			**6,724.599**

SMUs are adjusted in accordance with Section XI(C)- "Wilmington District Stream Buffer Credit Calculator", supplied to Providers in January 2021, from the USACE. A detailed description of the methodology and calculations is described below in **Section 6.6 as well as **Appendix B** and **Figure 11**.*

Wetland Mitigation			
Mitigation Approach	**Area (acres)**	**Ratio**	**WMU**
Re-establishment	6.221	1:1	6.221
Rehabilitation	4.913	1.5:1	3.276
Enhancement (High)	0.597	2:1	0.299
Enhancement (Low)	0.411	5:1	0.082
Preservation	1.656	10:1	0.166
Total**	**13.798**		**10.044**

*** Areas generating wetland credit are either within the proposed 50-foot stream buffer area, are designated as ineligible areas that are not viable for additional stream credit, or are wholly outside of the Non-standard buffer width areas generating additional stream credit (greater than 150 feet); therefore, additional stream credit areas and wetland credit areas do not overlap.*

2 WATERSHED APPROACH

The Project was selected based on its potential to support the objectives and goals of the DMS 2009 Cape Fear River Basin Restoration Priorities (RBRP) and provide functional uplift within Targeted Resource Areas (TRA) which were developed by DMS to identify unique or substantial important assets, opportunities, or functions located within defined areas that are not necessarily defined by a watershed boundary.

The Cape Fear RBRP identified several restoration goals for HUC 03030006. These goals include:

1. *The Completion of a Local Watershed Plan in the Great Coharie Creek headwaters;*
2. *Focusing on water quality improvement in the South and Black Rivers; and*
3. *Continued protection of the Outstanding Resource Waters.*

The TRAs identified within HUC 03030006 include catchment areas that have significant functional uplift potential related to hydrology, water quality, and/or habitat.

Agriculture is the primary stressor and significant contributing factor to hydrologic and water quality impairment and habitat degradation in this watershed. Agricultural impacts such as stream channelization, lack of riparian buffers, and large animal operations contribute to higher peak flows, excessive sediment and nutrient loads, and loss of natural habitat within the 03030006 watershed. The Project will help address these identified stressors as described in **Section 2.1**.

2.1 Site Selection

The Project was identified as a stream and wetland mitigation opportunity to improve hydrology, water quality, and habitat within the Cape Fear River Basin, specifically HUC 03030006. The aquatic resources associated with the Project have been highly manipulated and degraded over time due to agriculture practices, including stream channelization, constructing impoundments, and raising livestock. Project streams have historically been relocated, straightened, and dredged, leading to unstable channels with poor hydraulic function, loss of wetlands, and wetlands with decreased hydrology. Also, the already altered hydrology caused by a large pond impoundment has been exacerbated by the failure of its outlet, leading to highly constricted stream flow and the formation of a dislocated stream channel stemming from the pond's old emergency spillway. Additionally, all Project streams and wetlands are heavily grazed by livestock. Further, forested riparian buffers are either absent, narrow, or lack stem density and understory for almost all stream features throughout the Project. Therefore, the Project presents a great opportunity to improve water quality, hydrologic function, and terrestrial and aquatic habitat connectivity, and decrease non-point pollution from agricultural and livestock practices while also providing tremendous additional uplift to degraded stream-wetland complexes. The Project will directly and indirectly address stressors by reconstructing natural channels within the catchment area; stabilizing eroding stream banks and establishing floodplain connectivity; reducing sediment and nutrient loads; restoring, enhancing, and preserving wetlands; restoring and enhancing riparian buffers; and protecting aquatic resources in perpetuity. Project-specific goals and objectives will be addressed further in **Section 5**. Watershed planning priority boundaries are shown on **Figure 1**, and the Project's drainage areas are shown on **Figure 2**.

The Project supports Cape Fear RBRP Goal #2 for the 03030006 watershed by supporting water quality improvement to the Black River, as Six Runs Creek feeds the Black River. This project also supports Goal #3 because the Project is upstream of sections of Six Runs Creek and Black River that are classified as

Outstanding Resource Waters: by restoring these upstream aquatic resources, including several headwater tributaries and riparian wetlands, water quality improvements can be realized for downstream.

In addition, the Project is within a catchment area that has been identified as a hydrology, water quality, and habitat TRA by DMS. Therefore, this catchment has the significant need for functional uplift related to hydrology, water quality, and habitat, and the Project will address each impairment directly, with proposed improvements to many interrelated functional parameters, as mentioned above.

The land required for the construction, management, and stewardship of this Project includes portions of two parcels in Sampson County with the following ownership in **Table 2 & Figure 3**. Once finalized, a copy of the land protection instrument will be included in **Appendix C**. The Division of Mitigation Services (DMS) Conservation Easement model template will be utilized to draft the site protection instruments.

Table 2. Project Parcel and Landowner Information

Owner of Record	PIN Or Tax Parcel ID#	Stream Reach
Daniel C. Evans	13012570002 03117989601 10337989604 13007989609 13007989608	Brad's Branch-C DE2 DE3 DE4 DE7 DE8
Joan B. Troublefield	13102516012	Brad's Branch-A Brad's Branch-B MT2

3 BASELINE AND EXISTING CONDITIONS

The Project area is comprised of Brad's Branch and five of its unnamed tributaries that flow west into Six Runs Creek, which flows into Black River, which flows to the Cape Fear River. To generally summarize Project background information and information related to watershed, stream reaches, wetlands, and regulatory considerations, A *Project Attribute Table* was prepared and is presented in **Table 3** below.

Table 3. Project Attribute Table

Project Attribute Table																
Project Name	Six Runs Stream and Wetland Mitigation Project															
County	Sampson															
Project Area (acres)	30.94															
Area to be planted (acres)	22.59															
Project Coordinates (latitude and longitude decimal	35.0962°, -78.2304°															
Project Watershed Summary Information																
Physiographic Province	Rolling Coastal Plain															
River Basin	Cape Fear															
USGS Hydrologic Unit 8-	3030006															
DWR Sub-basin	03-06-19															
Project Drainage Area (acres)	570															
Project Drainage Area Percentage of Impervious Area	1%															
Land Use Classification	Agriculture, forest, residential															
Reach Summary Information																
Parameters	**BB-A**	**BB-B**	**BB-C**	**DE2-A**	**DE2-B**	**DE3**	**DE4-A**	**DE4-B**	**DE7**	**DE8**	**MT2**					
Pre-project length (feet)	453	572	4207	231	114	128	301	667	251	61	110					
Post-project (feet)	452	562	4357	231	156	0	301	992	112	171	110					
Valley confinement (Confined, moderately confined, unconfined)	Moderately confined	Moderately confined	Unconfined	Moderately confined	Moderately confined	NA	Unconfined	Unconfined	NA	Moderately confined	Moderately confined					
Drainage area (acres)	93	125	570	N/A	10	26	287	295	21	26	9					
Perennial, Intermittent, Ephemeral	Intermittent	Intermittent	Perennial	Intermittent	Intermittent	Intermittent	Perennial	Perennial	Intermittent	Intermittent	Intermitten					
NCDWR Water Quality Classification	C, Sw	C, Sw	C, Sw	C, Sw	C, Sw	C, Sw	C, Sw	C, Sw	C, Sw	C, Sw	C, Sw					
Dominant Stream Classification (existing)	C4/5	G4/5c	G4/5c - F4/5	E5	E5	F5	C5	G4/5c - F4/5	G5c	F5b	E4/5					
Dominant Stream Classification (proposed)	C4/5	G4/5c	C4/E4	E5	C4b	N/A	C5	C4/E4	B4a to E4	C4/E4	E4/5					
Dominant Evolutionary class (Simon) if applicable	III	III	IV	II	II	III	I	III	III	II	I					
Wetland Summary Information																
Parameters	**WA**	**WB**	**WC-1**	**WC-2**	**WD**	**WE-1**	**WE-2**	**WF**	**WG**	**WH**	**WI**	**WJ**	**WK**	**WL**	**WM**	
Pre-project (acres)	0.081	0.057	5.146	1.656	0.016	0.849	0.767	0.348	0.002	0.057	0.204	0.123	0.034	0	0	
Post-project (acres)	0.081	0.057	4.903	1.656	0.01	0.848	0.689	0.299	0.001	0.057	0.198	0.123	0.034	5.759	0.462	
Wetland Type (non-riparian, riparian)	Riparian	Riparian	Riparian	Riparian	Riparian	Riparian	Riparian	Riparian	Riparian	Riparian	Riparian	Riparian	Riparian	Riparian	Riparian	
Mapped Soil Series	Norfolk loamy sand	Norfolk loamy sand	Bibb and Johnston soils	Bibb and Johnston soils	Bibb and Johnston soils	Bibb and Johnston soils	Bibb and Johnston soils	Bibb and Johnston soils	Bibb and Johnston soils	Bibb and Johnston soils	Bibb and Johnston soils	Bibb and Johnston soils	Bibb and Johnston soils	Bibb and Johnston soils	Bibb and Johnston soils	
Soil Hydric Status	Non-hydric	Non-hydric	Hydric	Hydric	Hydric	Hydric	Hydric	Hydric	Hydric	Hydric	Hydric	Hydric	Hydric	Hydric	Hydric	
Regulatory Considerations																
Parameters	**Applicable?**	**Resolved?**	**Supporting Docs?**													
Water of the United States - Section 404	Yes	No	PCN													
Water of the United States - Section 401	Yes	No	PCN													
Endangered Species Act	Yes	Yes	Appendix K													
Historic Preservation Act	Yes	Yes	Appendix K													
Coastal Zone Management Act (CZMA or CAMA)	No	N/A	N/A													
FEMA Floodplain Compliance	Yes	No	Appendix L													
Essential Fisheries Habitat	No	N/A	N/A													
DOT Right-of-way Permit	Yes	No	N/A													

3.1 Watershed Summary Information

3.1.1 Drainage Area and Land Cover

The Project drainage area originates in a broad flat and confines to drainages that feed the two primary Project stream systems, Brad's Branch and DE4. The total drainage area for the Project is 570 ac (0.89 mi^2). Drainage areas for each Project reach were presented in **Table 3.** The drainage area appears to be bound to the east by Faison Highway. The land uses within the drainage area consist primarily of agriculture (48%) and forest (38%), with minor components of residential (6%), brush (3%), cleared area (1%), roads (1%), open water (<1%), open space (<1%), dirt roads (<1%), and commercial (<1%). Notably within the drainage area, the headwaters of the primary Project streams are not buffered and are active crop fields, leading to high sediment input to downstream watercourses within the Project (Figure 4). All of the land immediately adjacent to the Project is active cow pasture, with a mix of open pasture grassland and wooded pasture, which has ultimately contributed to the degradation of Project streams and wetlands. Additionally, farm ponds and historic wildlife impoundments exist within and adjacent to the Project which affect local watershed hydrology and stream hydraulic function.

3.2 Landscape Characteristics

3.2.1 Physiography and Topography

The Project is located within the Rolling Coastal Plain Level IV ecoregion within the Southeastern Plains Level III ecoregion. Cretaceous or Tertiary-age sands, silts and clays are characteristic of the Southeastern Plains ecoregion. A large portion of the contributing watershed is mostly within the Rolling Coastal Plain where the formation is quaternary sand and clay decomposition residuum. The Rolling Coastal Plain is made up of middle and early Pleistocene marine sand, silt and clay. This ecoregion contains both dissected irregular and smooth plains. Low to moderate gradient sandy-bottomed streams branch from broad interstream divides with steep to moderately gentle side slopes. The Project area has mostly gentle side slopes that are dissected by drainages with elevations ranging from 108 feet to 157 feet (**Figure 2**). Soils in this region are mainly Ultisols (Kandiudults, Paleudults, Hapludults, and Paleaquults) that are thermic/udic and some aquic. The western portion of the Project landscape has a nearly level floodplain with low, gently sloping terraces along Brad's Branch and its tributaries. Surrounding the Project area are a number of impoundments that drain into the stream channel.

The specific landscape characteristics of the Six Runs site are very much representative of the Rolling Coastal Plain with a moderate gradient, sandy tributary system flowing through moderately sloped valleys that drains into the larger, low gradient swamp complex of Six Runs Creek (**Figure 5**).

3.2.2 Geology and Soils

According to geology data from the North Carolina Geologic Survey, published in 1985, the Project is within geologic map unit Kb, occurring in the Coastal Plain Belt. This map unit is associated with sedimentary type rocks of the Black Creek formation that formed in the Cretaceous period within the Mesozoic Era between 63 and 138 million years ago. This formation is composed of gray to black, lignitic clay and contains thin beds and laminae of fine-grained micaceous sand and thick lenses of cross-bedded sand. The upper part includes glauconitic, fossiliferous clayey sand lenses.

Existing soil information from the Natural Resources Conservation Service (NRCS), from Web Soil Survey, shows four map units across the project (NRCS, 2019). Map units include four soil series across the Project and are summarized in **Table 4**. The soil series include Bibb and Johnston soils, Johns fine sandy loam, Marvyn loamy sand, and Norfolk loamy sand (**Figure 6**). However, Bibb and Johnston soils, Marvyn loamy sand, and Norfolk sandy loam make up almost all of the Project area. Notably, Bibb and Johnston soils are hydric, occurring on the Project's floodplains.

Table 4. Mapped Soil Series

Map Unit Symbol	Map Unit Name	Percent Hydric	Drainage Class	Hydrologic Soil Group	Landscape Setting
BH	Bibb and Johnston soils, frequently flooded	100	Poorly drained	A/D	Floodplains
Jo	Johns fine sandy loam	0	Moderately well drained	C	Stream terraces
MaC	Marvyn loamy sand, 6 to 12 percent slopes	0	Well drained	B	Ridges on marine terraces
NoB	Norfolk loamy sand, 2 to 6 percent slopes	0	Well drained	A	Flats on marine terraces, broad interstream divides on marine terraces

A detailed hydric soil evaluation was also conducted to describe and delineate the extent of hydric soils that are potentially suitable for hydrologic restoration, rehabilitation, and re-establishment for wetland mitigation. A detailed soils report is included in **Appendix M**.

3.2.3 Existing Vegetation

Although alterations to the landscape, hydrology, and vegetation have disturbed the local natural communities over time, typical vegetation communities throughout the Project consist of disturbed, mesic mixed hardwood forest; disturbed wetland forest; disturbed emergent wetland marsh; and pasture (**Figure 7**).

Upslope of the Six Runs Creek floodplain, the dominant vegetative community along Brad's Branch and its smaller tributaries, excluding the larger DE4 tributary, most closely resembles a Mesic Mixed Hardwood Forest (Coastal Plain Subtype) as it is composed of a variety of wet to dry tolerant trees, saplings, and shrubs. However, this entire area has been historically impacted by stream channelization, incision, and extensive cattle farming which has substantially affected the natural community composition. Vegetation composition and structure has been directly impacted by historic timbering or thinning as well as being utilized as forested pasture for cattle farming. Indirectly though, the entrenchment of Brad's Branch over time has resulted in almost no floodplain access as well as a lowered local water table, both of which have likely influenced the composition of vegetation species resulting in a drier natural community that resembles a more "upland" community rather than a floodplain community. These forests are not dense and lack structure with very limited understory and herbaceous strata. With that said, the current community is dominated by sweet gum (*Liquidambar styraciflua*), American holly (*Ilex opaca*), red maple (*Acer rubrum*), American beech (*Fagus grandifolia*), American hornbeam (*Carpinus caroliniana*), pine (*Pinus* sp.), white oak (*Quercus alba*), black gum (*Nyssa sylvatica*), water oak (*Quercus nigra*), turkey oak (*Quercus laevis*), willow oak (*Quercus phellos*), and swamp chestnut oak (*Quercus michauxii*). The common shrub species is Chinese privet (*Ligustrum sinense*) with some occasional switch cane (*Arundinaria tecta*). The herbaceous stratum is very limited and composed mostly of Nepalese browntop (*Microstegium vimineum*) and fescue grass (*Festuca* spp.). Vines include greenbriers (*Smilax* spp.) and Japanese honeysuckle (*Lonicera japonica*). There are some small wetland inclusions within this riparian corridor where Pennsylvania smartweed (*Polygonum pennsylvanicum*), common rush (*Juncus effuses*), shallow sedge (*Carex lurida*), jewelweed (*Impatiens capensis*), and New York aster (*Symphiotrichum novi-belgii*) are also present.

The largest tributary of Brad's Branch is reach DE4 which is associated with a partially intact riparian wetland corridor (WE) and a breached historic pond. This area is still degraded, with the lower half (WE-2) being more degraded than the upper half (WE-1), though livestock still access the entire area. The stream is only channelized in the lower half; therefore, there is still some floodplain connectivity and more hydrology in this system, resulting in a more appropriate natural community for the landscape. This forested floodplain community most closely resembles a Coastal Plain Small Stream Swamp, though lacking any bald cypress (*Taxodium distichum*) and tupelo (*Nyssa* spp.). The composition and structure are degraded, but the upper half is denser with trees, while the lower half is less dense and appears to contain a lot of dead snags. With that said, the current community is dominated by canopy level sweetbay magnolia (*Magnolia virginiana*), American hornbeam, sweet gum, swamp chestnut oak, water oak, white oak, American holly, and red maple. Shrubs are limited but consist of elderberry (*Sambucus canadensis*) and switch cane. The herbaceous stratum is composed of Nepalese browntop, common rush, sedges (*Carex* spp.), lizard's tail, jewelweed, wartremoving herb (*Murdannia keisak*), netted chainfern (*Woodwardia areolate*), and cinnamon fern (*Osmunda cinnamomea*).

At the bottom of the Project is a transitional vegetative community where the valley flattens out and Brad's Branch dissipates into the floodplain of Six Runs Creek. This area is also highly manipulated and has involved the relocation of Brad's Branch to the valley edge with subsequent dredging, excavation within the Six Runs Creek floodplain, and ongoing cattle pasture use; not to mention the backwater effects of the Six Runs Creek swamp. The area here is best described as a wetland mosaic with several relatively small, representative natural communities. A small component of this wetland mosaic was historically excavated for agricultural use and can be identified as a Coastal Plain Semipermanent Impoundment (Open Water Subtype), as it is frequently inundated for long durations with seasonal, floating aquatic vegetation. Surrounding that is a larger area that is also frequently inundated but is shallower and contains emergent and aquatic vegetation, and it can be identified a Coastal Plain Semipermanent Impoundment (Typic Marsh Subtype). The most dominant species in this marsh are swamp smartweed (*persicaria hydropiperoides*) and curlytop knotweed (*Polygonum lapathifolium*) along with a diverse mix of wartremoving herb, alligatorweed (*Alternanthera philoxeroides*), lizard's tail, arrow arum (*Peltandra virginica*), duck potato (*Sagittaria latifolia*), common rush, jewelweed, sedges (*Carex* spp.), New York aster, boneset (*Eupatorium perfoliatum*), wingleaf primrose-willow (*Ludwigia decurrens*), valley redstem (*Ammannia coccinea*), whorled pennywort (*Hydrocotyle verticillata*) and some sawtooth blackberry (*Rubus argutus*) patches.

Within the very downstream portion of the Project boundary, there is a small, forested inclusion within the larger marsh community that is also frequently inundated and most closely resembles a disturbed Blackwater Bottomland Hardwoods (Swamp Transition Subtype). The woody vegetation includes stunted clusters of Carolina ash (*Fraxinus caroliniana*), hazel alder (*Alnus serrulata*), red maple, silky willow *(Cornus amomum*), and black willow (*Salix nigra*), while emergent vegetation includes lizard's tail, wartremoving herb, swamp smartweed, and smallspike false nettle (*Boehmeria cylindrica*).

Adjacent to the Project boundary in the relatively undisturbed offsite floodplain of Six Runs Creek, the natural community also appears to be Blackwater Bottomland Hardwoods (Swamp Transition Subtype) and is composed of a more mature forest community, though with limited diversity. Tree species observed in the "reference" community include swamp tupelo (*Nyssa biflora*), Carolina ash, American elm (*Ulmus americana*), river birch (*Betula nigra*), common buttonbush (*Cephalanthus occidentalis*), and red maple. Herbaceous vegetation is limited and includes lizard's tail, false nettle, and netted chainfern.

The remaining land area throughout the Project is utilized as cattle pasture and appears to be actively seeded, with the most dominant grass species being bermudagrass (*Cynodon dactylon*).

3.3 Land Use – Historic, Current, and Future

Historical aerial imagery indicates that the Project area and its headwater drainages were primarily forested until at least 1974; however, much of the adjacent land was in agriculture, including pasture and row crops. The imagery shows that agricultural clearing and expansion began along the Project features within the subject parcel sometime between 1974 and 1983, though some forest remained along the upstream riparian corridors of Brad's Branch and its major tributary, DE4. It is also evident from aerial imagery and site topography that the downstream portion of Brad's Branch was relocated and channelized to the edge of the valley to the south. The wetland area along the edge of Six Runs Creek floodplain was also cleared and converted to agriculture land. Furthermore, sometime between 1983 and 1993, the same wetland area along the edge of Six Runs Creek floodplain was excavated for two open-water features, perhaps as borrow pits, watering holes, and/or hunting use, and one of which is contained within the Project boundary. The three ponds adjacent to the Project, one to the north and two to the south, were also constructed sometime before 1974 and have remained as such, with the pond to the north being an in-line pond on a tributary draining to Brad's Branch. Additionally, a corral and bullpen were constructed within the riparian buffer of the small tributary DE2.

Sometime between 1993 and 2010, a house and other farm buildings were built on the property outside of the proposed easement boundary. Also, between 1993 and 2010, it appears a house was built in the pasture to the east of Brad's Branch above E Darden Road which resulted in the establishment of an overhead power line easement bisecting that portion of Brad's Branch. South of the Project parcel boundary is Hargrove Elementary School which was built prior to 1974 and is well upslope of the Project. Ultimately, land-use within and adjacent to the Project has remained mostly unchanged since at least 1993 (**Figure 8**).

Currently, the entire area within the proposed easement boundary is utilized for cattle farming and livestock have full access throughout, with a mix of grazed forest and managed, open pasture. The corral and bullpen within the riparian buffer of DE2 remain and are actively used. The in-line pond to the north, draining into Brad's Branch, has a degraded outlet and has diverted all flow to its emergency spillway, cutting a new channel downslope. The downstream extent of the channelized portion of Brad's Branch is actively aggrading since it has not been recently dredged. This has led to a stream flow diversion, where some of the flow has routed south, out of the Project, while some flow has spilled into the pasture to the north, within the Project (**Figure 7**).

The future land use for the Project will include an established 30.94-acres conservation easement that will be protected in perpetuity. The conservation easement will encompass 7,469 linear feet of high functioning streams with minimum 50-foot riparian buffers where possible, though much of the buffers will be wider, and at least 13.798 acres of credit-generating riparian wetlands, though the actual protected wetland area will likely be greater. According to the NCDOT "2016 Sampson County Comprehensive Transportation Plan," the future land use adjacent to the Project and in the Project watershed is projected to remain as "Rural Residential/Agriculture".

3.4 Regulatory Considerations and Potential Constraints

Regulatory considerations, potential constraints, and risks and uncertainties of the Project are discussed below, and **Table 5** is a summary of regulatory considerations. All supporting documentation can be found in the Appendices.

3.4.1 Property, Boundary, and Utilities

The proposed Project easement is bound on the east (along Brad's Branch) by a parcel boundary and to the north (along DE4) by another parcel boundary, while the width of the proposed easement is also

constricted in some areas by parcel boundaries as well. The western limit is designed to abut the mature wood line of the Six Runs Creek swamp. The Project also incorporates several crossings and utilities: including a NC Department of Transportation (NCDOT) crossing, farm crossings, and utility lines. Brad's Branch is intersected by the NCDOT road culvert crossing on E Darden Road and collocated with transmission line easements. Slightly further upstream, Brad's Branch is intersected by another overhead transmission line and a water line to the northeast adjacent residence. In addition, further downstream, there is a farm crossing on Brad's Branch and another on DE4. Therefore, the proposed easement will have four easement breaks to accommodate crossings and utilities (**Figure 9**).

3.4.2 Federal Emergency Management Agency (FEMA)/ Hydrologic Trespass

According to the North Carolina Floodplain Mapping Information System, the western, downstream extent of the Project associated the Six Runs Creek floodplain is included within the mapped FEMA 100-year floodplain (Zone AE; FEMA 2021; **Figure 9**). Part of the Project will involve grading in the Federal Emergency Management Agency (FEMA) Special Flood Hazard Area (SFHA) for Six Runs Creek (Map Number: 3720242800J / Panel: 2428; **Figure 9**). This grading is proposed as part of the restoration effort on the main tributary of the Project. Because earthwork will occur within the FEMA SFHA, a No-Rise certification will be obtained prior to construction efforts. Per discussion with the Sampson County Floodplain Administrator (September 21, 2021), the County has not yet adopted a standalone Floodplain Development Permit (FPDP). Therefore, a FPDP will not be included in the No-Rise permit submittal but is anticipated to be completed once the County's Floodplain Administrator makes one available. Finally, no hydrologic trespass will be permitted to adjacent properties upstream or downstream of the Project.

3.4.3 Environmental Screening and Documentation

Because DMS mitigation projects are considered to be a category of activities that do not individually or cumulatively have an impact on the human environment, they do not require preparation of an environmental assessment or environmental impact statement. To ensure that a project meets the "Categorical Exclusion" criteria, the Federal Highways Administration (FHWA) and DMS have developed a categorical exclusion (CE) checklist that is included as part of each mitigation project's Environmental Screening process. The CE Approval Form for the Six Runs Project is included in **Appendix K** and was approved by DMS and FHWA in March 2021.

3.4.4 Threatened and Endangered Species

Plants and animals with a federal classification of endangered or threatened are protected under provisions of Sections 7 and 9 of the Endangered Species Act of 1973, as amended. According to the United States Fish and Wildlife (USFWS) IPAC database review tool (USFWS 2020) and the self-certification process conducted by RES, the list of threatened and endangered species includes the Red-cockaded woodpecker (*Picoides borealis*), the Wood stork (*Mycteria americana*), the American alligator (*Alligator mississippiensis*; due to similarity of appearance), and Pondberry (*Lindera melissifolia*). The Six Runs Mitigation Project does not contain any suitable habitat for any of these species, therefore "no effect" biological conclusions were determined for all species. A self-certification letter was sent to USFWS on December 21st, 2020. This consultation was conducted as part of the CE process and supporting documentation and correspondence can be found in **Appendix K**.

The Fish and Wildlife Coordination Act requires consultation with state fish and wildlife agencies when "waters of any stream or other body of water are proposed or authorized, permitted or licensed to be impounded, diverted…or otherwise controlled or modified. The North Carolina Wildlife Resources Commission (NCWRC) was consulted during the CE process and the NCWRC did not comment on any state or federally listed species; however, they did recommend the use of biodegradable and wildlife-

friendly sediment and erosion control devices and to treat invasive species as part of the Project. Documentation is included in **Appendix K**.

3.4.5 Cultural Resources

A review of North Carolina State Historic Preservation Office (SHPO) GIS Web Service (accessed November 13th, 2020) database did not reveal any listed or potentially eligible historic or archeological resources on the proposed project properties. There are no documented historic sites within a half mile radius of the site. Additionally, no architectural structures or archeological artifacts have been observed or noted during preliminary surveys of the site for restoration purposes. RES consulted with the SHPO during the CE and the SHPO had "conducted a review of the project and are aware of no historic resources which would be affected by the project." Cultural Resources screening met the Categorical Exclusion Criteria for FHWA and DMS projects and documentation is included in **Appendix K**.

3.4.6 Jurisdictional Waters of the U.S.

A survey of potential jurisdictional Waters of the U.S. was performed in February of 2021. Wetland boundaries were delineated using current methodology outlined in the 1987 U.S. Army Corps of Engineers Wetland Delineation Manual (Environmental Laboratory 1987). Soils were characterized and classified using the Field Indicators of Hydric Soils in the United States, Version 7.0 (NRCS, 2010).

A preliminary jurisdictional determination (PJD) request was sent to the USACE on February 19th, 2021, followed by the submission of supplemental materials on April 30th, 2021, as requested by USACE. The USACE performed a desktop review and issued the PJD on July 23rd, 2021. Documentation can be found in **Appendix I**.

The delineation concludes the presence of jurisdictional streams and wetlands in and adjacent to the Project (**Appendix I** & **Figure 7**). Existing stream and wetland conditions will be discussed in detail in **Sections 3.5** and **3.6**.

3.4.7 Clean Water Act – Section 401/404

Impacts to jurisdictional streams and wetlands will be unavoidable due to the restoration and enhancement actives proposed. Although these impacts are unavoidable, the proposed stream and wetland treatment will result in an overall functional uplift of the stream and wetland system, as described in **Section 4**. In general, reaches proposed for Enhancement II (DE2-A and MT2) will not have any stream or wetland impacts. Two reaches, BB-A and BB-B, proposed for Enhancement I, will have temporary stream impacts due to construction activities such as installation of in-stream structures and bank grading. Furthermore, restoration reaches, BB-C, DE2-B, DE4-B, DE7, and DE8, will have permanent impacts due to stream restoration and stream realignment. Reach DE3 will also be permanently impacted, as this feature will be converted to an emergency spillway outflow channel. Wetlands WC, WD, WE, WF, WG, WI, and WK will have permanent and temporary wetland impacts due to stream restoration that will include stream construction and relocation. WA, WB, and WJ may have temporary wetland impacts due to construction haul routes where equipment will be mobile and tree clearing is necessary for stream restoration and enhancement efforts. All stream and wetland impacts will be accounted for in the Pre-Construction Notification (PCN) form, to be submitted after Final Mitigation Plan approval.

Table 5. Regulatory Considerations

Regulation	Applicable?	Resolved?	Supporting Documentation
Waters of the United States - Section 404	Yes	No	*PCN submitted with Final Mitigation Plan*
Waters of the United States - Section 401	Yes	No	*PCN submitted with the Final Mitigation Plan*
Endangered Species Act	Yes	Yes	Appendix K
National Historic Preservation Act	Yes	Yes	Appendix K
Coastal Zone Management Act (CZMA)/Coastal Area Management Act (CAMA)	No	N/A	N/A
FEMA Floodplain Compliance	Yes	No	Appendix L
Magnuson Stevens Act - Essential Fisheries Habitat	No	N/A	N/A
DOT Right-of-way Permit	Yes	No	N/A

3.5 Existing Stream Reach Conditions

The Project streams consist of Brad's Branch and six of its unnamed tributaries (**Figure 6a**). These streams are split into reaches based on existing conditions and proposed mitigation treatment: Brad's Branch is split into BB-A, BB-B, and BB-C; one tributary is split into DE2-A and DE2-B; DE3; another is split into DE4-A and DE4-B; DE7; DE8; and MT2. Existing reach conditions and characteristics based on data collection are discussed in detail in this section and are summarized in **Table 6**. The full suite of morphological parameter data can be found in **Appendix B**.

Table 6. Summary of Existing Channel Characteristics

Parameter	Reach										
	BB-A	**BB-B**	**BB-C (US)**	**BB-C (MS)**	**BB-C (DS)**	**DE2**	**DE4-A**	**DE4-B**	**DE7**	**DE8***	**MT2**
Valley Width (ft)	60	50	70	100	160	15	130	100	NA	50	40
Contributing Drainage Area (acres)	93	125	195	244	570	10	287	295	21	26	9
Channel/Reach Classification	C4/5	G4/5c	G4/5c	G4/5c	F4/5	E5	C5	G4/5c - F4/5	G5c	F5b	E4/5
Discharge Width (ft)	9.0	5.3	8.4	9.4	15.2	2.8	10.5	6.0	3.2	5.5	2.2
Discharge Depth (ft)	0.7	1.1	1.0	1.1	1.2	0.4	0.8	1.0	0.3	0.3	0.3
Discharge Area (ft^2) [1]	6.3	5.7	8.3	10.8	18.0	1.2	8.3	6.3	0.9	1.8	0.8
Discharge Velocity (ft/s)	1.8	2.4	1.9	2.3	1.7	3.3	2.0	2.9	2.3	3.3	2.0
Discharge (cfs)	12	14	16	25	31	4	17	18	2	6	2
Water Surface Slope (ft/ft)	0.004	0.007	0.003 - 0.005	0.004 - 0.007	0.002	0.016 - 0.030	0.001	0.002 - 0.009	0.005 - 0.022	0.038	0.013
Sinuosity	1.04	1.10	1.19	1.26	1.12	1.07	1.58	1.27	1.01	1.11	1.07
Width/Depth Ratio	12.7	4.8	8.6	8.2	12.9	6.4	13.3	5.8	11.8	17.0	6.5
Bank Height Ratio	1.9	1.9	5.0	1.7	1.8	1.5	1.0	1.7	2.9	3.5	2.0
Entrenchment Ratio	2.0	1.6	1.2	1.2	1.7	>2.2	>2.2	1.6	1.3	1.5	1.9
Substrate	Sand / Gravel	Sand / Gravel	Sand / Gravel	Sand / Gravel	Sand / Gravel	Sand	Sand	Sand / Gravel	Sand	Sand	Sand / Gravel

[1] A_{BKF}= cross-sectional area (measured at approximate bankfull stage as estimated using existing conditions data and NC Regional Curve equations where field indicators were not present)
**Reach DE8 is currently disconnected from its historic watershed, which has been routed through DE3. The existing, truncated drainage area for reach DE8 is 1.2 acres.*

3.5.1 Reach Conditions and Channel Morphology

Brad's Branch

Brad's Branch-A & B (BB-A/B)

Brad's Branch is the primary tributary on the project and flows generally southwest to eventually confluence with Six Runs Creek. The portion of the stream above E Darden Road is split into BB-A and BB-B to be consistent with the Proposal reach names. However, there is no distinguishable difference in their existing conditions, so these reaches will be described together. This stream flows southwest from the Project property line, past Reach MT2, to Wetland A where it turns and flows south, parallel with E Darden Road, past Wetland B before turning sharply to enter the NCDOT culvert below E Darden Road. The channel and riparian corridor experiences regular cattle access, which has resulted in active downcutting, unstable and eroding banks, and lack of defined bedform. The riparian buffer is forested; however, cattle grazing has resulted in a lack of understory or herbaceous cover, and the soil structure has been highly manipulated from trampling and wallowing. The invasive Chinese privet is also prevalent throughout. Importantly, the buffer width off the right bank of BB-B is narrow and constrained by the NCDOT right-of-way. This reach is also bisected by an overhead power line and co-located water line that service an adjacent residence. The stream has a high sediment load, which is likely a result of upstream row crop farming and the cattle pressure onsite. As a result, the bed substrate is almost exclusively sand.

Looking upstream along reach BB-A, US of MT2

Looking downstream along reach BB-A, US of MT2

Looking upstream along reach BB-B

Looking downstream along reach BB-B

Brad's Branch-C (BB-C) (Upstream of DE4)

Brad's Branch (BB-C) continues from the outlet of the NCDOT culvert under E Darden and flows generally southwest. The NCDOT culvert is perched approximately 3 feet, and the channel is incised and channelized down to the confluence with DE7. Below the confluence with DE7, the channel appears to retain its natural pattern, and the generous floodplain has allowed for high sinuosity. However, the channel is still incised and lacking in bed diversity, likely due to cattle accessing the stream and the agricultural practices in the watershed. The riparian buffer is forested; however, cattle grazing has resulted in a lack of understory or herbaceous cover and the soil structure has been highly manipulated from trampling and wallowing. The invasive Chinese privet is also prevalent throughout. There are two existing agricultural crossings on this reach; one wooden bridge at approximately STA 23+75 and one culvert crossing at approximately STA 28+75. There are three ponds that drain into BB-C, all of which have degraded drainageways. Notably, the entire stream and riparian area is heavily littered with trash, debris, and scrap materials. Similar to above E Darden Road, the reach has a high sediment load from the upstream land-uses, adjacent land-uses, and channel instability, resulting in the bed substrate being primarily sand, although pea gravel is evident below the top sand layer.

Looking upstream along reach BB-C

Looking downstream along reach BB-C

Looking upstream along reach BB-C

Looking downstream along reach BB-C

Brad's Branch-C (BB-C) (Downstream of DE4)

Downstream of the confluence with DE4, the reach continues to flow southwest to its termination point where it loses a defined bed and bank and dissipates into wetlands associated with the Six Runs Creek floodplain. This segment was historically channelized and relocated to the south valley

toe of slope and has subsequently been dredged, as is evident by the spoil berm lining the right bank of the channel. The top of this reach segment is incised and has no forested buffer; however, as the channel moves downstream, it actively aggrades until the channel eventually disappears and stream flow diverges. At this point, some of the flow routes south, out of the Project, while the rest spills into the pasture and Wetland C to the north. Like the rest of Brad's Branch, this segment has a high sediment load and is completely embedded with sand, resulting in little to no bedform. Planform is also absent, due to the channel relocation and dredging; however, the reach exhibits regular alluvial benches, which appear to be the beginning of an evolution back towards a natural meandering pattern. There is no riparian buffer off the right bank, and cattle have access throughout. Riparian buffer along the left bank consists of mature, hardwood forest.

Looking upstream along reach BB-C

Looking downstream along reach BB-C

Looking upstream along reach BB-C, near the reach end

Looking downstream along reach BB-C, where flow splits

DE2

DE2-A

Reach DE2-A is an intermittent stream originating from a spring and strong hillslope seepage within a tight crenulation and flows southwest. Historically, the landowners have dumped hay bales and other debris at the origin of the stream in an attempt to prevent the stream from further head-cutting into the pasture above. There is a livestock corral and bullpen located adjacent to this reach, within its riparian area, where cattle have free access to the stream channel. The resulting hoof shear, trampling, and wallowing has led to the upper end of this reach lacking channel definition. However, the reach regains definition further downstream, and the lower end of this reach is only slightly oversized. Bed substrate is composed of sand and silt. The riparian buffer is very narrow at the top

and widens downstream; however, like the rest of the Project, the forest is degraded from cattle grazing and lacks vegetative structure.

Looking upstream along reach DE2-A

Looking downstream along reach DE2-A

DE2-B

Reach DE2-B is the continuation of DE2-A and then flows south through an agricultural crossing culvert to confluence with Brad's Branch (BB-C). Near the end of the reach, the channel is cutting down to match Brad's Branch leading to a significantly incised channel with unstable banks. There is little to no bedform, and the bed substrate is sand. The riparian buffer is forested; however, cattle grazing has resulted in a lack of understory or herbaceous cover.

Looking upstream along reach DE2-B

Looking downstream along reach DE2-B

DE3

DE3 originates at a 24" diameter corrugated HDPE pipe and is acting as the primary spillway of the associated pond to the north. The dam for this pond has cut off hydrology from the historic stream channel (reach DE8) and re-routed it through DE3. Therefore, while the reach is classified as an intermittent jurisdictional stream, it is not a natural feature. As the channel was routed across the valley slope, away from its original floodplain, it is now significantly steeper than an equivalently sized natural stream for this region and lacks floodplain connectivity. This has led to a channel that is severely incised, lacks bedform, and significantly lacks in habitat value. Further, the high transport capacity of the channel and lack of upstream substrate supply has left the bed material as mostly clay.

Looking upstream along reach DE3

Looking downstream along reach DE3

DE8

Reach DE8 is the natural feature which was cut off from its watershed by the dam that currently outlets to DE3. This relic channel still receives enough seepage from the dam and surrounding hillslope to maintain intermittent status, but flow is severely inhibited. Despite this, the channel is cutting down to match Brad's Branch, leading to an incised and over-wide channel dimension with evidence of previous bank failures. Cattle access and the resulting hoof shear have accelerated the deterioration of the banks and negatively impacted the surrounding riparian zone. Bed substrate is fine sand. The riparian buffer is forested; however, cattle grazing has resulted in a lack of understory or herbaceous cover.

Looking upstream along reach DE8

Looking downstream along reach DE8

DE7

Reach DE7 is an intermittent stream that originates offsite from a pond to the south of the Project and flows north to the valley toe of slope before sharply turning west to parallel Brad's Branch (BB-C) before confluencing with it. This stream was re-routed from its natural position when the pond dam was constructed and now the upstream portion flows across the valley slope adjacent to its historic natural valley, leading to a relatively high bedslope there. The portion of the reach that parallels Brad's Branch was routed along the valley toe of slope, leading to a much lower slope than upstream. The upstream portion of the channel is small; however, it incises dramatically at the downstream end as it is cutting down to match the bed of Brad's Branch. This is further evident in a headcut at approximately the middle of the reach. The riparian buffer is forested but highly

degraded from cattle grazing. The bed substrate is silt and sand, and the reach is also littered with significant amounts of garbage and debris.

Looking upstream along reach DE7

Looking downstream along reach DE7

DE4

DE4-A

Reach DE4 is the largest tributary of Brad's Branch and has a comparable drainage area to Brad's Branch upstream of the confluence with DE4. DE4-A enters from offsite through a mature, forested wetland corridor and flows south to the reach break with DE4-B, just upstream of a large debris jam and a historic, breached dam feature. Unlike most of the other streams in the Project, this channel is sized appropriately and has adequate floodplain access, as evidenced by recent alluvial deposition and wrack lines. The reach exhibits a clear meandering pattern and an associated riffle-pool sequence typical of a well-functioning single-thread system. Cattle do have access to this reach and its riparian area, and some bank and riparian area impacts are evident, although the level of disturbance is less than the rest of the Project. The forested riparian buffer here has a somewhat developed understory, although cattle grazing has left large gaps and the herbaceous cover is lacking compared to the condition just upstream on the other side of the property fence line. There is a high sediment load coming through the system, most likely due to the row crop farming in its watershed. This sediment load has resulted in the bed substrate consisting mostly of sand.

Looking upstream along reach DE4-A

Looking downstream along reach DE4-A

DE4-B

Reach DE4-B is the continuation of DE4-A and begins just upstream of a large debris jam and historic dam feature that has been breached for some time. This reach flows south through a large, poorly functioning agricultural culvert crossing before confluencing with Brad's Branch (BB-C). The reach above the crossing has been channelized and relocated along the eastern valley toe of slope, resulting in a significantly incised channel with little bedform and shear, unstable banks. The high transport capacity of this portion of the reach has led to some material differentiation, despite the high sediment load from upstream, but substrate is still primarily pea gravel to sand. Below the crossing, the channel widens significantly, likely from heavy cattle traffic and from ongoing dredging, as evidenced by more recent spoil piles lining the bank. The reach here has no bedform and banks continue to be degraded by hoof shear. Substrate is silt to sand. Above the crossing, there is forested buffer along the right bank, but little to no buffer along the left; the buffer along the right bank is highly degraded from cattle grazing and trampling. Below the culvert, there is no riparian buffer off of either bank.

Looking upstream along reach DE4-B, US of the culvert crossing

Looking downstream along reach DE4-B, US of the culvert crossing

Looking upstream along reach DE4-B, DS of the culvert crossing

Looking downstream along reach DE4-B, DS of the culvert crossing

MT2

Reach MT2 is the small, intermittent stream that drains into Brad's Branch (BB-A) near the top of the Project. The channel is sized appropriately, but cattle traffic is heavy and trampling has degraded the channel bed and banks. The channel lacks bedforms and the bed substrate is mostly silt. Like

that of reach BB-A, the riparian buffer is forested; however, cattle grazing has resulted in a lack of understory or herbaceous cover and soil structure has been highly manipulated from trampling. Chinese privet is also prevalent throughout.

Looking upstream along reach MT2

Looking downstream along reach MT2

3.5.2 Stream Channel Classification and Assessment

The streams have been classified as perennial and intermittent streams using the NCDWR Stream Identification Form version 4.11 and are E, C, G and F-stream types as classified using the Rosgen stream classification (Rosgen, 1996). Stream determinations have been verified by the USACE. Additionally, streams were rated using the North Carolina Stream Assessment Method (NCSAM) and the USACE Stream Quality Assessment Worksheet. **Table 7** summarizes the stream parameters. NCSAM rating sheets are included in **Appendix B,** and USACE Stream Quality Assessment Worksheets are included in **Appendix H**.

Table 7. Summary of Stream Parameters

Reach	Reach Length (LF)	Hydrology Status	Stream Determination Score	NCSAM Rating	USACE Stream Quality Assessment Score	Rosgen Stream Classification
BB-A	453	Intermittent	29	Medium	39	C4/5
BB-B	572	Intermittent	29	Low	39	G4/5c
BB-C	4,207	Perennial	41.5	Low	31	G4/5c – F4/5
DE2-A	231	Intermittent	24	High	37	E5
DE2-B	114	Intermittent	24	High	28	E5
DE3	128	Intermittent	19	Low	30	F5
DE4-A	301	Perennial	42.5	High	63	C5
DE4-B	667	Perennial	42.5	Low	35	G4/5c – F4/5
DE7	251	Intermittent	21	Low	34	G5c
DE8	61	Intermittent	23	Low	38	F5b
MT2	110	Intermittent	22.5	Medium	44	E4/5

3.6 Existing Wetland Conditions

3.6.1 Existing Wetlands

Wetland delineation identified the presence of 11 jurisdictional wetland areas within the Project and are labeled as WA (Wetland A) through WK (Wetland K) in Existing Conditions, **Figure 7** & **Appendix I**. There are approximately 9.338 acres of jurisdictional wetlands within the proposed easement area. Note that for the purpose of describing these wetland areas appropriately, WC has been divided into WC-1 and WC-2, and WE has been divided into WE-1 and WE-2. Wetlands were rated using the North Carolina Wetland Assessment Method (NCWAM; **Appendix B**). Existing conditions and areas of each wetland are described below and summarized in **Table 8**.

Wetlands A, B, F, G, H, I, J, K

WA, WB, WF, WG, WH, WI, WJ, and WK are small floodplain wetland pockets occurring within the upper, higher gradient segments of Brad's Branch. They are scattered throughout the floodplain and are highly degraded, though they are most representative of floodplain pool wetlands. All parameters of these wetlands are degraded including hydrology, soils, and vegetation, making some of them difficult to discern and delineate. Hydrology is clearly altered due to the severely incised and entrenched Brad's Branch stream channel, effectively lowering the water table and preventing any out-of-bank flooding within this portion of the floodplain. Therefore, their hydrology source is mostly dependent upon precipitation and groundwater at toe-of-slope. Historic and ongoing cattle pressure have resulted in alterations to the soil structure and composition. Constant trampling has mucked up the surface soil while compacting the subsoil layers, sometimes creating perched pools of unconsolidated material. Cattle trampling (and lack of vegetation) has also degraded the valley slopes along the floodplain where subsequent land erosion occurs and contributes more fine sediment to these wetlands. Finally, vegetation is degraded, although these wetlands still maintain hydrophytes. As mentioned in **Section 3.2.3**, this portion of Brad's Branch floodplain is forested but lacks both understory and herbaceous strata due to cattle grazing. Tree species that do occur within the wetlands are facultative (FAC and FACW) while herbs are facultative or obligate (FACW or OBL).

Wetland C

As detailed in **Section 3.2.3**, the bottom of the Project is a transitional community area where the valley flattens out and Brad's Branch dissipates into the floodplain of Six Runs Creek. Contained within this landscape is a contiguous wetland mosaic that, in combination with natural conditions and anthropogenic alterations, consists of different representative wetland types. Therefore, WC is divided into WC-1 and WC-2 to better describe them.

WC-1

WC-1 is an elongated wetland area that originates within the natural valley associated with Brad's Branch and extends down to WC-2 and into the Six Runs Creek floodplain. The area is highly manipulated and has involved the relocation of Brad's Branch to the valley edge with subsequent dredging and is part of an active cattle pasture. These activities have resulted in significant loss of function, especially in terms of vegetation and stream interaction. This wetland, especially in the upper half, remains in the footprint of the historic location of Brad's Branch, only within the natural valley's lowest elevation. However, by relocating Brad's Branch to the valley edge and lining the right bank with a berm composed of dredge material, the stream and wetland have been completely disconnected and little to no flood interaction occurs. The entire wetland is utilized as cattle pasture and is actively seeded with grasses. However, the period and extent of cattle grazing depends on how wet or inundated the wetland is throughout the year. These effects from cattle farming inhibit natural succession of the wetland as only emergent vegetation can persist. The upper part and the outer fringe along the non-wetland pasture, where it is generally less

wet throughout the year is more accessible to cattle, contributing to limited herbaceous diversity with dominant species mostly composed of smartweeds, knotweeds, and rushes. However, the lower part of the WC-1 wetland, that is wetter and more so sheltered from cattle, has more herbaceous diversity but still lacks woody vegetation. Based on past and current conditions, WC-1 is best represented as a Non-Tidal Freshwater Marsh in terms of NCWAM wetland type, and this area correlates with the Coastal Plain Semipermanent Impoundment (Typic Marsh Subtype) natural community discussed in **Section 3.2.3**. Ultimately, though, based on landscape position, the size of Brad's Branch, and adjacent forested wetland community, WC-1 should be a Bottomland Hardwood Forest in a natural, undisturbed condition.

WC-2

WC-2 is a bowl-shaped wetland at the westernmost extent of the Project and is contiguous with WC-1 and the Six Runs Creek swamp. It is evident that this wetland area was historically excavated for agricultural use and has since been more regularly inundated, especially since it receives groundwater from upslope as well as groundwater and floodwaters of Six Runs Creek. There has likely been beaver activity in Six Runs that has affected the hydrology of this area as well. There is a small stand of transitional forest in the southern portion of WC-2 and a row of transitional woody vegetation that partially extends around the perimeter of the excavated "bowl" in a horseshoe shape. It is likely that these trees took root in areas of spoil from the historic excavation activity. Otherwise, WC-2 is composed of more emergent vegetation within the bowl and then a pocket of open water with some floating aquatic vegetation at its center where the "bowl" is deepest. This wetland, being so wet and sheltered from the rest of the surrounding pasture, does not appear to be accessed by cattle very frequently as there is little appeal for grazing. Because the manipulation of this area can be considered more or less permanent, along with the connection and influence of Six Runs Creek, the resulting wetland form is best represented as a Riverine Swamp Forest in terms of NCWAM wetland types. WC-2 also correlates with the Coastal Plain Semipermanent Impoundment (Open Water Subtype) natural community type as discussed in **Section 3.2.3**.

Wetland E

The largest tributary of Brad's Branch is reach DE4 and is associated with a partially intact riparian wetland corridor (WE). Cattle have access to the entire wetland area. This forested wetland is best represented as a Bottomland Hardwood Forest in terms of NCWAM wetland types and correlates to the Coastal Plain Small Stream Swamp natural community as discussed in **Section3.2.3**. WE is a contiguous wetland, but due to different levels of manipulation and their effects on function, WE is divided into WE-1 and WE-2 to better describe them.

WE-1

WE-1 is the upper portion of WE and is less degraded than the lower half although cattle still access the wetland. The stream reach associated with WE-1, reach DE4-A, is in fair condition with an appropriately sized channel and good sinuosity, allowing for frequent over-bank flood events and maintaining healthy groundwater levels. The flood events do contribute significant sand deposition into the wetland, but not overwhelmingly and appears to be in a dynamic equilibrium. The main, active stressor for this wetland is livestock use. Canopy, understory, and herbaceous strata are all moderate dense, but when compared to the wetland forest just upstream of the property, which is fenced off, it is obviously still degraded.

WE-2

WE-2 is the lower portion of WE and is more degraded than WE-1. The stream reach associated with this wetland, DE4-B, has been channelized and relocated to the toe-of-slope to the east. As a result, the channel has become very incised and no longer contributes over-bank flooding, while also having a narrow

drainage effect on the adjacent soils. Between stream reach DE4-B and the eastern boundary of WE-2, there is a strip of hydric soil that is non-jurisdictional due to the drainage effect of DE4-B that separates the wetland from the channelized stream (more to be discussed later in **Section 3.7**). Within the jurisdictional boundary of WE-2, groundwater still drives sufficient hydrology to the wetland and is consistently wet. The wetland is forested but lacks diversity, and most of the larger diameter trees are dead and exist as snags. The understory is also very sparse with large gaps containing no woody vegetation. The cattle impact here is very significant, with constant tramping destroying soil structure and hoof tracks promoting puddling. This has resulted in long term ponding associated with unconsolidated sediment that is conducive for the growth of the aquatic invasive, wartremoving herb, which is abundant.

Table 8. Existing Wetland Summary Information

Wetland ID	Area (ac)	NCWAM Rating		NCWAM Wetland Type	Vegetation
WA	0.081	Hydrology:	*Low*	Floodplain Pool	Tree Stratum: Sweetgum, American hornbeam, red maple, swamp chestnut oak Sapling Stratum: American hornbeam, red maple Shrub Stratum: Chinese privet Herb Stratum: Common rush, smartweeds, shallow sedge, jewelweed, New York aster Woody Vine Stratum: Laurel greenbrier, muscadine
WB	0.057	Water Quality:	*Low*		
WF	0.348	Habitat:	*Low*		
WG	0.002	Overall:	***Low***		
WH	0.057				
WI	0.204				
WJ	0.123				
WK	0.034				
WC-1	5.146	Hydrology:	*Low*	Non-Tidal Freshwater Marsh	Shrub Stratum: Sawtooth blackberry Herb Stratum: Swamp smartweed, curlytop knotweed wartremoving herb, alligatorweed, lizard's tail, arrow arum, duck potato, common rush, jewelweed, sedges, New York aster, boneset, wingleaf primrose-willow, valley redstem, whorled pennywort
WD	0.016	Water Quality:	*Low*		
		Habitat:	*Low*		
		Overall:	***Low***		
WC-2	1.656	Hydrology:	*Low*	Riverine Swamp Forest	Tree Stratum: Carolina ash, red maple Sapling Stratum: Carolina ash, red maple, silky dogwood, black willow, hazel alder Shrub Stratum: Sawtooth blackberry Herb Stratum: Swamp smartweed, wartremoving herb, lizard's tail, smallspike false nettle
		Water Quality:	*High*		
		Habitat:	*High*		
		Overall:	***High***		

Table 8. Existing Wetland Summary Information (Cont'd)

Wetland ID	Area (ac)	NCWAM Rating		NCWAM Wetland Type	Vegetation
WE-1	0.849	Hydrology: Water Quality: Habitat: Overall:	*High* *High* *Medium* ***High***	Bottomland Hardwood Forest	Tree Stratum: Sweetgum, American hornbeam, swamp chestnut oak, water oak, white oak, sweetbay magnolia Sapling Stratum: American hornbeam, American holly, red maple Shrub stratum: Common elderberry, switch cane Herb Stratum: Nepalese browntop, common rush, sedge, lizard's tail, netted chainfern, cinnamon fern
WE-2	0.767	Hydrology: Water Quality: Habitat: Overall:	*Low* *Low* *Medium* ***Low***	Bottomland Hardwood Forest	Tree Stratum: Sweetgum, red maple Sapling Stratum: American hornbeam, sweetbay magnolia, American holly Shrub stratum: Common elderberry Herb Stratum: Wartremoving herb, Nepalese browntop, common rush, sedge, lizard's tail, jewelweed

3.6.2 National Wetland Inventory

The USFWS National Wetland Inventory Map (NWI) depicts one area of wetland within the project limits; a PEM1C (Palustrine, Emergent, Broad-Leaved Deciduous, Seasonally Flooded) wetland that is contiguous with the larger PFO1C (Palustrine, Forest, Broad-Leaved Deciduous, Seasonally Flooded) wetland complex of the Six Runs Creek floodplain (**Figure 9**).

3.7 Existing Hydric Soil Area Conditions

The entire Project area has been highly manipulated by human alterations that has contributed to the loss of natural hydrology and disturbed natural communities within this Six Runs Creek tributary complex. Particularly, it is evident that the flat, low-lying floodplain of Brad's Branch at its downstream extent was historically a wider riparian wetland corridor as it connected with the Six Runs Creek stream-wetland complex. Since that time, Brad's Branch has been relocated to the valley edge, straightened, and dredged while the landscape has been cleared and converted to livestock pasture. These alterations have resulted in extensive drainage, lack of appropriate vegetation, and soil compaction due to constant cattle trampling; however, there is still a large swath of degraded jurisdictional wetland contained within the larger floodplain footprint. Similarly, there is a large area of drained, hydric soil occurring between the bank of

reach DE4-B and jurisdictional wetland WE, where wetland hydrology has been lost where the stream has been relocated to the valley edge and subsequent incision has promoted even further drainage.

Upon a detailed hydric soil study conducted by a licensed soil scientist, it was determined that these areas contain hydric soils but currently lack sufficient hydrology to produce wetland characteristics due to human alterations. Some of the findings from the study are discussed below, and the detailed hydric soil report can be found in **Appendix M**.

3.7.1 Hydric Soil Indicators

The soil evaluation confirmed the presence of hydric soil indicators throughout large areas of the floodplain onsite. The most common hydric soil indicators based on recorded profiles are A11-Depleted Below Dark Surface, F3-Depleted Matrix, and F6-Redox Dark Surface. Other indicators that were found include A7-Redox Dark Surface and F8-Redox Depressions. These indicators require a dark to black surface. Often redoximorphic concentrations in one or more of the surface horizon or underlying subsoils are also required. To allow accumulation of high organic matter in the surface horizon, long periods of saturation or inundation are required. The F8 indicator is found in shallow depressions and other features where ponding occurs. The disturbance across the site would have destroyed most features of this indicator, but it was likely common across the floodplain (**Appendix M**).

3.7.2 Hydrology

Observed hydrologic alterations impacting local groundwater include relocated and incised stream channels with adjacent spoil and smooth-contoured surfaces to facilitate rapid runoff. The loamy textures observed and moderately high permeability of these soils support a rapid lowering of the groundwater at this site. The groundwater may be at or near the surface for limited portions of the growing season in areas adjacent to toe of slope seeps and in shallow depressions. Along the toe of slope, a few areas exhibited seasonal groundwater discharge. Livestock have unrestricted access to the streams and floodplains. Within the fields, livestock have compacted a shallow restrictive layer near the surface that slows infiltration, potentially enhancing the shallow, temporary ponding observed in the depressional areas. This shallow compacted layer also limits infiltration and increases surface runoff. The spoil berm along the stream bank functionally limits overbank events.

Observations with visible groundwater indicate a water table below 16 inches except in the lowest elevations of the floodplain. The timing of the observations occurred outside of the growing season when ground water is expected to be highest. For observations during the initial investigation in early March 2020, (prior to the growing season), records from the Horticultural Crops Research Station in Clinton show for the three months prior rainfall was above average. The observations in December 2020 (outside of the growing season) followed one month of above average rainfall and the January 2021 observations (outside of the growing season) followed two months of above average rainfall. The observed groundwater during the observation times would be expected to be at or above the ground surface under normal seasonal conditions. The observed depths to a water table supports a significant drainage impact from the drainage modifications. Although the soil water table observations are limited, a deeper water table appears to be representative of large portions of the site (**Appendix M**).

Following the hydric soil evaluation and initial water table observations, groundwater wells were installed in representative locations of the site to document existing hydrology and establish baseline conditions for proposed wetland re-establishment. Two of the wells, GW1 and GW2, were strategically placed as a pair to document the difference in hydrology within a jurisdictional wetland and an adjacent, non-jurisdictional area. Specifically, GW1, was placed in the non-jurisdictional, hydric soil area adjacent to WE-2 (to be proposed as WM) and the other, GW2, was installed within existing, jurisdictional wetland WE-2, perpendicular to GW1. In addition, a third well, GW3, was placed in the non-jurisdictional, hydric soil area

surrounding WC-1, in the Brad's Branch floodplain (to be proposed as WL). These wells were installed in March 2021 and automatic pressure transducers within the wells are currently recording data twice per day. Data collected from the period of March 11th, 2021 to January 6th, 2022 from these wells suggest that the water tables within associated hydric soil areas are indeed low and that desirable growing season hydroperiods were not met. Of the data collected, during the growing season, GW1 only had three and a half consecutive days of water table being within 12 inches of the surface, whereas GW2 had 69.5 consecutive days. GW3 presented 17 consecutive days of the water table within 12 inches of the surface; however, that event occurred at the very start of the growing season when the local climate was wetter than average (as demonstrated by Antecedent Precipitation Tool results of "Moderate Wetness" Drought Index and "Wetter Than Normal" Product). Data from these wells including hydrographs, as well as relevant results of the Antecedent Precipitation Tool, are presented in **Appendix B**. Also, the locations of the wells are depicted on **Figures 7** and **12**.

4 FUNCTIONAL UPLIFT POTENTIAL

4.1 Stream Functional Uplift

In order to thoroughly examine the potential functional uplift to stream systems proposed for restoration and enhancement, the Stream Functions Pyramid Framework (Framework; Harman et. al. 2012) serves as a useful concept to understand streams and their ecological functions. The Framework presents a logical, holistic view of streams that describes the interrelatedness of fundamental stream functions. The Framework defines five stream function categories, ordered into a hierarchy, that demonstrates the dependence of higher-level functions (biology, physicochemical, and geomorphology) on lower-level functions (hydrology and hydraulics). Functions that affect the greatest number of other functions are illustrated at the base of the Pyramid, while functions that have the least effect on other functions are illustrated at the top. Further justifying this hierarchical concept, Fischenich (2006) found that the most critical restoration activities are those that address stream functions related to hydrodynamic processes, sediment transport processes, stream stability, and riparian buffers.

Also, as an informative tool, NC SAM was performed for this Project and gives qualitative ratings for streams in terms of three functional classes: hydrology, water quality, and habitat with more sub-functions under each class. Ratings for each function help interpret the quality of streams by indicating which functions are impaired or not and can aid in thinking about the potential functional uplift to be had. NC SAM rating sheets are provided in **Appendix B**.

Therefore, principles of the Framework and NC SAM are utilized to discuss and communicate the potential functional uplift to streams at the Six Runs project and to propose realistic, attainable goals and objectives. However, the determination of credits and performance standards for the Project follow guidance put forth by the USACE Wilmington District.

The Six Runs Stream and Wetland Mitigation Project will provide numerous ecological and water quality benefits within the Cape Fear River Basin by applying an ecosystem restoration approach. The restoration approach at the reach scale of this project will have the greatest effect on the hydrology, hydraulic, and geomorphology functions of the system and is assumed to ultimately benefit the upper-level functions (physicochemical and biology) over time, and in combination with other projects within the watershed. Within the Project area, functional benefits and improvements related to the Function-Based Pyramid Framework are anticipated by realizing site-specific functional goals and objectives These goals and objectives, as they relate to the Framework, are outlined in **Table 9**.

4.1.1 Anticipated Functional Benefits and Improvements

Hydrology

The Project will locally address several historic hydrologic disturbances, especially drainage alterations including stream relocation, channelization, and pond dam failure. This will lead to significant improvements to hydrology within the Project's local catchment area; however, it is not anticipated that the Project will have a significant effect on hydrology at the large watershed scale.

Hydraulic

The greatest potential uplift at the Project will be achieved through establishing floodplain connectivity. By constructing stream channels back within the natural low of the valley and sizing them to have low bank height ratios and high entrenchment ratios, bankfull events can occur and subsequent flooding will reinvigorate the entire floodplain system. Also, by locating stream channels back to their natural position within the floodplain and raising the channel bed, groundwater/surface water exchange will be rejuvenated and maintained, further benefitting the stream-wetland floodplain complexes where they are intended to exist. Additionally, these stream channels will be designed and constructed with adequate energy dissipation and grade control to achieve and maintain stable flow dynamics.

Geomorphology

Sediment transport will be improved by designing and constructing sinuous channels back within the natural low of the valley-floodplain that maintain stable dimension, plan, and profile to allow for healthy transport of sediment within the channel and floodplain. Channel stability and bedform diversity will be improved by installing log structures to promote a natural riffle-pool sequence, while brush toe bank protection and livestake plantings will further protect stream banks. Transport and storage of woody debris will be improved by direct installation of woody structures such as log vanes, brush bed sills, and brush toes, while increasing channel roughness through plantings and riffle creation will promote storage of woody debris. Furthermore, riparian vegetation condition will be improved by planting trees along reaches that are currently lacking sufficient forested buffer. This will promote riparian buffer processes that will limit sediment to channels, protect stream banks, and contribute woody debris that will ultimately contribute to dynamic equilibrium of the system. All of these functional parameters are interconnected and depend on each other; therefore, improving this wide range of parameters will result in long-term functional geomorphic uplift.

Physicochemical

Although this project would support the overarching goal in the Cape Fear River Basin Priorities to promote nutrient and sediment reduction in agricultural areas, it is difficult to measure nutrient and sediment reduction at this project level because they can be affected by so many variables. Especially, water quality within a project area is highly dependent on upstream water quality that enters the project and can ultimately limit the potential functional uplift realized by a restoration and enhancement project. However, many of the restoration and enhancement activities intended to improve the hydraulic and geomorphology parameters will also directly and indirectly affect the physicochemical parameters of the Project streams over time. The primary activities that will directly affect physicochemical functions are stabilizing banks, planting riparian buffers, eliminating agricultural practices from riparian buffer areas, especially by permanently excluding livestock throughout, and restoring and enhancing hydrology to riparian wetlands. These activities will reduce sediment input by reducing erosion of stream banks and increase physical filtration of sediment through forested riparian buffers, decrease nutrient sources by converting farmland to forest, reduce fecal coliform input, and increase nutrient processing through denitrification and nutrient uptake. Activities that will indirectly benefit physicochemical functions are as follows: Temperature regulation will improve by introducing canopy tree species to riparian buffers that will shade the stream. Oxygen regulation will improve through two actions: first, the temperature of the water directly impacts the

amount of gas held by the water; therefore, by planting trees to shade the channel, water temperature will decrease, and dissolved oxygen will increase. Second, by constructing stable channels that include drop structures, mixing zones will form where oxygen dissolves much faster than the current exchange rate. Organic matter processing will improve once restored riffles are able to catch twigs and branches that then retain leaves and other particulate organic matter. Many of these physicochemical benefits will occur slowly and are dependent on multiple variables within the stream ecosystem. Therefore, it is not practical or feasible to directly measure these parameters within the monitoring time frame of this project. With that said, it is logical to compare existing conditions with ongoing monitoring outcomes using the established stream and wetland performance standards to demonstrate the positive correlation of hydraulic and geomorphic parameters with physicochemical parameters. For example, as riparian buffer trees grow, as represented in annual monitoring reports, it is anticipated that canopy cover is actively shading the stream channel and reducing water temperature. This is not a substitute for direct physicochemical monitoring, but it is a useful tool to help project the long-term benefits of the Project in terms of its functional uplift. Ultimately, any uplift to physicochemical functions at the Project is assumed and is not measured.

Biology

As mentioned for the physicochemical stream function, it will be difficult to measure the functional uplift of the biological functions at this site within the monitoring period of the project. However, since the life histories of many species likely to benefit from stream and wetland restoration are depending on the lower-level functions, the functional uplift from the hydraulic and geomorphic levels would likely have a positive effect on the biology over time and in combination with other projects within the watershed is anticipated. Again, there is no substitute for direct biological monitoring, but it is important to understand the hierarchy of the Stream Functions Pyramid Framework in order to help project long-term benefits of the Project though only hydraulic and geomorphology parameters will be directly measured during the seven-year monitoring period. Ultimately, any functional uplift to biology at the Project is assumed and is not measured.

4.2 Wetland Functional Uplift

The wetlands onsite are degraded, but each wetland has different, specific functions that are affected at varying degrees. This is demonstrated in the functional ratings provided by the NC WAM, which was utilized as a tool to assess each wetland associated with the Project. Like NC SAM, NC WAM gives qualitative ratings for streams in terms of three functional classes: hydrology, water quality, and habitat with more sub-functions under each class. Sub-function ratings identify which particular functions are impaired, and then the overall ratings suggest how each of sub-function affects the entire wetland as a whole. This assessment is especially helpful in justifying potential functional uplift of a wetland as it may relate to hydrology or vegetation or both. NC SAM rating sheets are provided in **Appendix B**.

The stream restoration activities discussed above that will provide stream-related functional uplift will also provide functional uplift to riparian wetlands within the Project. Especially, by constructing appropriately sized, meandering channels back through the natural low of their floodplains and removing berm and spoil material from riparian areas, hydrologic restoration and enhancement can be attained that will provide numerous water quality and soil-related functional uplifts. These include, reestablishment of natural oxidation-reduction cycling, improved nutrient and chemical transformations (especially nitrates), and potential immobilization of phosphorus. Potential sources of these pollutants are present in the watershed. Other benefits include a lower soil and surface water temperature after vegetative establishment, increased organic carbon sequestration, and increases in diversity of beneficial microbial and fungal populations important for soil health. Healthy microbial populations in wetlands are primarily responsible for biochemical transformations of complex organic substances such as ammonia, molecular nitrogen, nitrite, and nitrate. Large scale benefits should include peak flood control, an increase of diverse

wildlife habitat, and greater connectivity to the natural aquatic communities along Brad's Branch and Six Runs Creek (**Appendix M**).

5 MITIGATION PROJECT GOALS AND OBJECTIVES

Through the comprehensive analysis of the Project's maximum functional uplift using the Stream Functions Pyramid Framework and conclusions based on a Site Hydric Soils Detailed Study (**Appendix M**), specific, attainable goals and objectives will be realized by the Project. These goals clearly address the degraded water quality and nutrient input from agricultural practices that were identified as major watershed stressors in the 2009 Cape Fear River RBRP. The Project will address these stressors and support RBRP goals (discussed in **Section 2**).

The Project goals are:

- Re-establish or improve hydrology to historical stream-wetland complexes that have been manipulated by agricultural practices;
- Improve water transport from watershed to channels in a non-erosive manner and improve and maintain a stable water table in riparian floodplain wetlands;
- Improve water quality within the restored and enhanced stream channels and downstream watercourses by reducing sediment and nutrient loads;
- Improve flood flow attenuation on site and downstream by allowing for overbanks flows and connection to the active floodplain;
- Create diverse bedforms and stable channels that achieve healthy dynamic equilibrium and provide suitable habitat for life;
- Improve instream habitat;
- Restore and enhance wetland hydrology and soils;
- Restore, enhance, and preserve native wetland and riparian vegetative communities; and
- Support the life histories of aquatic and riparian plants and animals through stream and wetland restoration activities.

The Project objectives to address the goals are:

- Design and reconstruct stream channels that will convey bankfull flows while maintaining stable dimension, profile, and planform based on modeling, watershed conditions, and reference reach conditions;
- Repair an in-line pond outlet structure;
- Maintain regular, seasonal flow in restored, intermittent stream reaches;
- Permanently exclude livestock from all stream channels, their associated buffers, and wetlands by installing perimeter fencing;
- Add in-stream structures and bank stabilization measures to improve bedform diversity and protect restored and enhanced streams;
- Install habitat features such as brush toes, constructed riffles, woody materials, and pools of varying depths to restored and enhanced streams;
- Reduce bank height ratios and increase entrenchment ratios in restored stream channels;
- Relocate stream channels back within the low of the existing floodplain, raise stream bed elevations, and remove berm and spoil material to restore and enhance wetland hydrology and maintain appropriate hydroperiod for Bibb and Johnston soil series;
- Plant wetland areas and increase forested riparian buffers to at least 50 feet on both sides of the channel along Project streams, where possible, with native, hardwood plant communities;

- Treat exotic invasive species; and
- Establish a permanent conservation easement on the Project that will perpetually protect streams, wetlands, and their associated buffers.

Project goals and objectives, as they relate to the Function Based Pyramid Framework, are outlined in **Table 9**.

Table 9. Functional Benefits and Improvements

Function	Goal	Objective
Hydrology *Transport of water from the watershed to the channel*	To transport water from the watershed to the channel in a non-erosive manner and improve wetland hydrology in riparian wetlands	- Convert land-use of riparian areas to forest - Maintain appropriate hydroperiod for Bibb and Johnston soil series - Repair in-line pond outlet structure
Hydraulic *Transport of water in the channel, on the floodplain, and through the sediments*	To transport water within streams and floodplains in a stable, non-erosive manner	- Improve flood bank connectivity by reducing bank height ratios and increasing entrenchment ratios - Maintain regular, seasonal flow in restored, intermittent streams
Geomorphology *Transport of wood and sediment to create diverse bedforms and dynamic equilibrium*	To create a diverse bedform and stable channels that achieve healthy dynamic equilibrium and provide suitable habitat for life	- Limit erosion rates and increase channel stability to reference reach conditions - Improve bedform diversity (pool spacing, percent riffles, etc.) - Increase buffer width to at least 50 feet
Physicochemical *Temperature and oxygen regulation; processing of organic matter and nutrients*	To promote healthier levels for water temperature, dissolved oxygen concentration, and other important nutrients including but not limited to Nitrogen and Phosphorus through buffer/wetland planting and excluding cattle	- Establish native hardwood riparian buffer to provide canopy shade and absorb nutrients - Install in-stream structures to created aeration zones - Promote sediment filtration, nutrient cycling, and organic accumulation through natural wetland biogeochemical processes
Biology *Biodiversity and life histories of aquatic and riparian life*	To achieve functionality in levels 1-4 to support the life histories of aquatic and riparian plants and animals through stream and wetland restoration/enhancement activities	- Improve aquatic habitat by installing habitat features, constructing pools of varying depths, and planting the riparian buffer and wetlands, and removing cattle

6 MITIGATION WORK PLAN

6.1 Reference Stream

The restoration portions of the Project have been impacted by historic agricultural practices both within and outside of the project area, resulting in poorly functioning stream channels. Physical parameters of the Project were used, as well as other reference materials, to determine the target stream type. The "Classification of the Natural Communities of North Carolina" was also used to narrow the potential community types that would have existed at the Project (Schafale, 2012).

Targeted reference conditions included the following:

- Located within the Physiographic Region and ecoregion,
- Similar watershed size,
- Similar land use on site and in the watershed,
- Similar soil types on site and in the watershed,
- Ideal, undisturbed habitat – several types of woody debris present,
- Similar topography,
- Similar slope,
- Pattern common among Coastal Plain streams, and
- Minimal presence of invasive species.

6.1.1 Reference Watershed Characterization

The reference streams are the enhancement portion of Reach DE4, associated with this Project; UT to Buffalo Creek, associated with the Buffalo Branch Mitigation site; and UT to Hannah Creek, associated with the Hannah Bridge Mitigation Site. The latter two reference reaches are located in the Upper Neuse River Basin. The reaches that were surveyed and analyzed are approximately 301 feet long, 375 feet long, and 275 feet long, respectively, with drainage areas of 0.45 square miles (287 acres), 1.11 square miles (709 acres), and 1.18 square miles (752 acres), respectively. The land-use in the watersheds are all similarly composed with major components of cropland, pasture, and forest, and minor components of developed area and open water. Site photographs of the reference streams are located in **Appendix B**.

6.1.2 Reference Discharge

Several hydrologic models/methods were used to develop a bankfull discharge for these reference reaches. Existing drainage area, land use, slope, roughness, and cross-sectional area were all factors considered when performing the calculations. Using a combination of Coastal and Piedmont Regional Curves, in-house spreadsheet tools, and a project specific regional flood frequency analysis, the existing discharge for DE4 was found to be around 13-18 cubic feet per second (ft^3/s), the existing discharge for UT to Buffalo Creek was found to be 18-21 ft^3/s, and the existing discharge for UT to Hannah Creek was found to be 29-31 ft^3/s. See **Section 6.2** for a more detailed description of the hydrologic analyses performed for this project.

6.2 Design Parameters

6.2.1 Stream Treatment and Design Approach

The stream treatment plan and design approach were developed based on the existing conditions, project goals, and objectives outlined in **Sections 3** and **5**. The Project will include Priority 1 and 2 Restoration, Enhancement Level I, Enhancement Level II, and Enhancement Level II at a lower credit ratio. Stream restoration will incorporate the design of a single-thread, meandering channel with parameters based on data taken from reference reaches, published empirical relationships, regional curves developed from existing project streams, 2-D modeling and NC, SC, and VA Regional Curves. Analytical design techniques

are also a crucial element of the project and were used to determine the design discharge and to verify the overall design. The Conceptual plan is provided in **Figure 10** and **Appendix D.**

The detailed treatment plan and design approach is as follows:

Reaches BB-A and BB-B

An enhancement I approach is proposed for these reaches to address bank erosion and incision, sediment loads and buffer impacts. Enhancement activities will include:

- Installing log sills to raise the bed elevation and improve habitat diversity,
- Stabilizing banks via grading, matting, and live-staking,
- Realigning the channel above the DOT culvert,
- Livestock exclusion,
- Supplemental riparian planting,
- Removing trash and debris located within the proposed easement,
- Invasive vegetation treatment.

Reach BB-C

A mix of offline and inline, Priority I and II restoration is proposed for this reach to address vertical and lateral instabilities, lack of floodplain access, historic channel relocation, and buffer impacts. This reach is split into three segments (US, MS, and DS) based on drainage area. The US portion is defined from E Darden Road to the confluence with DE8; the MS portion from the confluence with DE8 to the confluence with DE4; and the DS portion from the confluence with DE4 to the reach's termination in Wetland C. Restoration activities will include:

- Grading a new single thread channel in the existing floodplain,
- Establishing a riffle-pool sequence throughout the new channel,
- Installing toe protection on meander bends,
- Creating depressional areas no deeper than 14 inches along filled and plugged sections of the abandoned channel,
- Relocating and improving a culvert crossing,
- Relocating the downstream end of the reach off the valley toe of slope to the historic floodplain,
- Reconnecting flow into the wetland at the bottom of the project,
- Stabilizing banks via live-staking,
- Removing trash and debris located within the proposed easement,
- Livestock exclusion,
- Riparian planting,
- Invasive vegetation treatment.

Reach DE2-A

An enhancement II approach is proposed for this reach to address buffer impacts. Enhancement activities will include:

- Installing an Engineered Sediment Pack (ESP) at the top of the reach to capture off-site sediment,
- Livestock exclusion,
- Supplemental riparian planting,
- Invasive vegetation treatment.

Reach DE2-B

A mix of offline and inline, Priority I restoration is proposed for this reach to address channel incision, bank instability, and buffer impacts. Restoration activities will include:

- Grading a new single thread channel in the existing floodplain,
- Establishing a riffle-pool sequence throughout the new channel,
- Installing log sills for grade control,
- Installing toe protection on meander bends,
- Stabilizing banks via live-staking,
- Livestock exclusion,
- Riparian planting,
- Invasive vegetation treatment.

Reach DE3

A stabilization approach without credit generation is proposed to convert this reach back to an emergency pond spillway, as it was originally intended. The primary flow of this reach will be lost as flow will be restored back to the natural valley below the pond, within reach DE8. Activities will include:

- Grading a swale along the existing alignment,
- Installing riprap along the reach,
- Removing the culvert pond outlet.

Reach DE4-A

An enhancement II approach at a lower crediting ratio is proposed for this reach to address buffer impacts. Enhancement activities will include:

- Livestock exclusion,
- Supplemental riparian planting,
- Invasive vegetation treatment.

Reach DE4-B

A mix of offline and inline, Priority I restoration is proposed for this reach to address channel relocation and straightening, bank instability, and buffer impacts. Restoration activities will include:

- Grading a new single thread channel in the existing floodplain and historic valley,
- Establishing a riffle-pool sequence throughout the new channel,
- Installing log sills for grade control,
- Installing toe protection on meander bends,
- Stabilizing banks via live-staking,
- Replacing a culvert crossing,
- Livestock exclusion,
- Riparian planting,
- Invasive vegetation treatment.

Reach DE7

A mix of offline and inline, Priority I restoration is proposed for this reach to address channel incision, bed and bank instability, and buffer impacts. Restoration activities will include:

- Grading a new single thread channel,
- Establishing a step-pool/cascade sequence within the steep upper portion of the reach and a riffle-pool sequence through the floodplain of Brad's Branch,

- Installing log sills for grade control,
- Installing toe protection on meander bends,
- Stabilizing banks via live-staking,
- Filling the existing channel,
- Livestock exclusion,
- Riparian planting,
- Invasive vegetation treatment.

Reach DE8

A mix of offline and inline, Priority I restoration is proposed for this reach to address historic disconnection from its watershed and buffer impacts. Restoration activities will include:

- Installing a siphon system outlet structure, to pull cooler water from lower in the water column, at the center of the pond to reconnect hydrology to the reach,
- Grading a new single thread channel in the existing floodplain,
- Establishing a riffle-pool sequence throughout the new channel,
- Installing log sills for grade control and habitat,
- Installing toe protection on meander bends,
- Stabilizing banks via live-staking,
- Filling and plugging the abandoned sections of channel,
- Livestock exclusion,
- Riparian planting,
- Invasive vegetation treatment.

Reach MT2

An enhancement II approach is proposed for this reach to address buffer impacts. Enhancement activities will include:

- Livestock exclusion,
- Supplemental riparian planting,
- Invasive vegetation treatment.

6.2.2 Data Analysis

Stream Hydrologic Analysis

Hydrologic evaluations were performed for the design reaches using multiple methods to determine and validate the design bankfull discharge and channel geometry required to provide regular floodplain inundation. The use of various methods allows for comparison of results and eliminates reliance on a single model. Peak flows (**Chart 1**, **Table 10**) and corresponding channel cross sectional areas were determined for comparison to design parameters using the following methods:

- Regional Flood Frequency Analysis,
- AutoCAD's Hydraflow Hydrographs, and
- NC, VA, and SC Regional Curves

Regional Flood Frequency Analysis

A flood frequency analysis was completed for the study region using historic gauge data on all nearby USGS gauges with drainage areas ranging from 0.46 to 9.79 mi^2 which passed the Dalrymple homogeneity test (Dalrymple, 1960). This is a subset of gauges used for USGS regression equations. Regional flood frequency equations were developed for the 1.1 and 1.5-year peak discharges based on the gauge data.

Discharges were then computed for the design reaches. These discharges were compared to those predicted by the discharge regional curve and the reference reach discharges.

AutoCAD's Hydraflow Express

Hydraflow Express was used to simulate the rainfall-runoff process and establish peak flows for the watersheds. Rainfall data reflecting a 484 peak shape factor were used along with a SCS 6-hr distribution, and NRCS hydrology (time of concentrations and runoff curve numbers; USDA NRCS, 1986), to simulate the rainfall-runoff process.

Regional Curve Regression Equations

The Rural North Carolina Coastal Plain and Piedmont regional curves by Sweet and Geratz (2003) and Doll et al. (2002), respectively; the Virginia Non-Urban Non-Tidal Coastal Plain regional curves and Non-Urban Piedmont regional curves by Krstolic and Chaplin (2007) and Lotspeich (2009), respectively; and the South Carolina Ecoregion 65 (Southeastern Plains) and 45 (Piedmont) regional curves by Jennings Environmental (2020) were used in part to determine the bankfull discharges for the Project. The final design flows were chosen to roughly average the 1.1- and 1.5-year FFQs, which closely line up with the on-site bankfull estimations. The regional curve discharge equations used for the analysis are:

(1) $Q_{bkf}=8.79*(DA)^{0.76}$ (Sweet and Geratz, 2003)
(2) $Q_{bkf}=91.62*(DA)^{0.71}$ (Doll et al., 2002)
(3) $Q_{bkf}=28.3076*(DA)^{0.59834}$ (Krstolic and Chaplin 2007)
(4) $Q_{bkf}=43.895*(DA)^{0.9472}$ (Lotspeich, 2009)
(5) $Q_{bkf}=9.2*(DA)^{0.83}$ (Jennings Environmental, 2020)
(6) $Q_{bkf}=36.5*(DA)^{0.699}$ (Jennings Environmental, 2020)

Where Q_{bkf}=bankfull discharge (ft^3/s) and DA=drainage area (mi^2).

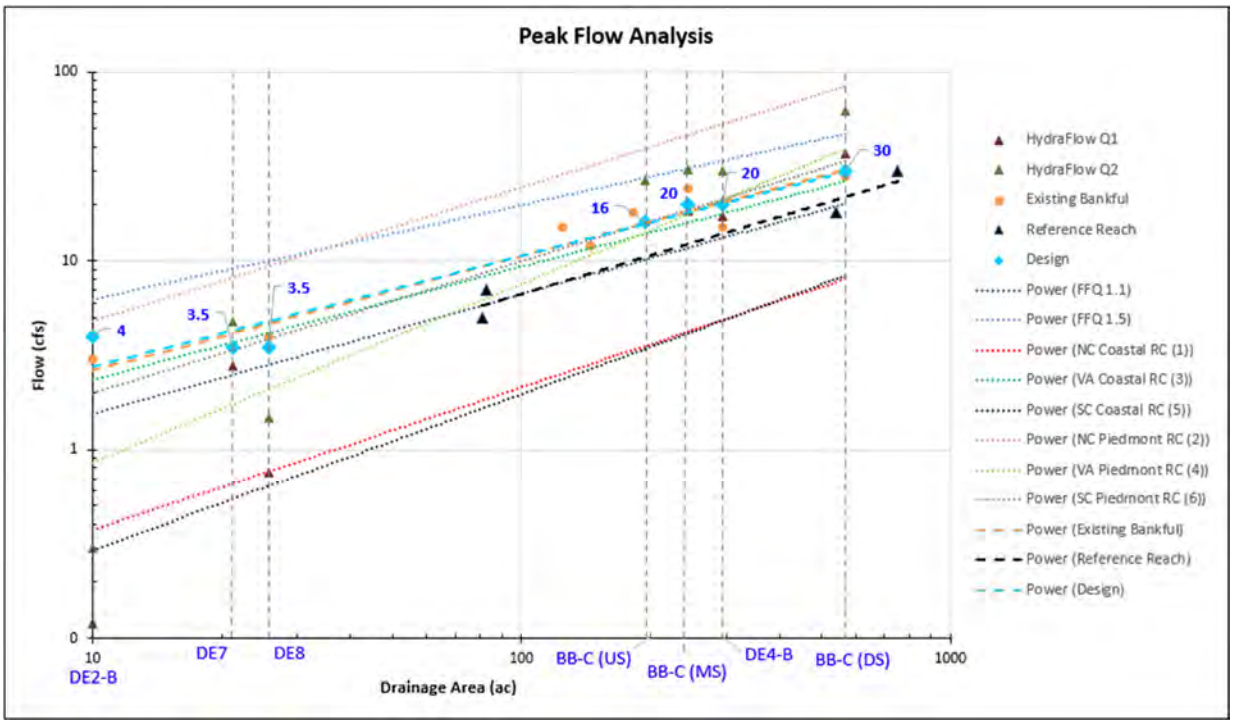


Chart 1. Peak Flow Analysis – Drainage areas were converted to acres for display on the chart. Existing bankfull estimates are based on observed and measured bankfull indicators and Manning's equation. Nearby reference-reach discharges include the sites used for the Project design (UT to Buffalo Creek and UT to Hannah Creek) as well as two other, nearby sites in the Cape Fear River Basin (HUC 03030006) and Neuse River Basin (HUC 03020201). The data summarized in this chart can be found in **Appendix B**.

Table 10. Peak Flow Summary

Reach	Drainage Area (Ac)	Design / Calculated Q (ft^3/s)
BB-C (US)	195	16
BB-C (MS)	244	20
BB-C (DS)	570	30
DE2-B	10	4
DE4-B	295	20
DE7	21	3-4
DE8	26	3-4

Sediment Transport Analysis

An erosion and sedimentation analysis was performed to confirm that the restoration design creates a stable sand and/or gravel bed channel that neither aggrades nor degrades over time. Typically, sediment transport is assessed to determine a stream's ability to move a specific grain size at specified flows. Various sediment transport equations are applied when estimating entrainment for sand and gravel bed streams found in the coastal plain. The US Army Corps of Engineers (USACE) report, *Stability Thresholds for Stream*

Restoration Materials (Fischenich, 2001), was used to obtain permissible shear stresses and velocities. Data found in this document was obtained from multiple sources using different testing conditions. The following methods and published documents were utilized during the sediment transport analysis:

- Permissible Shear Stress Approach, and
- Permissible Velocity Approach.

Shear Stress Approach

Shear stress is a commonly used tool for assessing channel stability. Allowable channel shear stresses are a function of bed slope, channel shape, flows, bed material (shape, size, and gradation), cohesiveness of bank materials, vegetative cover, and incoming sediment load. The shear stress approach compares calculated shear stresses to those found in the literature.

Critical shear stress is the shear stress required to initiate motion of the channels median particle size (D_{50}).

Table 11. Comparison of Allowable and Proposed Shear Stresses

Reach	Proposed Shear Stress at Bankfull Stage (lbs/ft^2)	Existing Critical Shear Stress (lbs/ft^2)	Allowable Shear Stress[1]		
			Fine Gravel (lbs/ft^2)	Medium/Coarse Gravel (lbs/ft^2)	Cobble (lbs/ft^2)
BB-C (US)	0.31	0.004 - 0.12	0.075 to 0.33	0.33 to 0.67	0.7 to 3.3
BB-C (MS)	0.38	0.004 - 0.12	0.075 to 0.33	0.33 to 0.67	0.7 to 3.3
BB-C (DS)	0.32	0.004 - 0.12	0.075 to 0.33	0.33 to 0.67	0.7 to 3.3
DE2-B	0.73	0.002 - 0.03	0.075 to 0.33	0.33 to 0.67	0.7 to 3.3
DE4-B	0.27	0.004 - 0.06	0.075 to 0.33	0.33 to 0.67	0.7 to 3.3
DE7	2.51	0.002 - 0.03	0.075 to 0.33	0.33 to 0.67	0.7 to 3.3
DE8	0.26	0.002 - 0.03	0.075 to 0.33	0.33 to 0.67	0.7 to 3.3

[1]*(Fischenich, 2001)*

Review of the above table shows that the proposed bed shear stresses for the Project design reaches are above the critical shear stress (shear stress required to initiate motion) of the existing channel material. Therefore, all proposed riffles will be supplemented with a substrate mix that has a critical shear stress greater than the proposed bed shear stress at bankfull.

Velocity Approach

Published data are readily available that provide entrainment velocities for different bed and bank materials. A comparison of calculated velocities to these permissible velocities is a simple method to aid

in the verification of channel stability. **Table 12** compares the proposed velocities calculated using Manning's equation with the permissible velocities.

Table 12. Comparison of Allowable and Proposed Velocities

Reach	Manning's "n" Value[1]	Design Velocity (ft/s)	Bed Material	Permissible Velocity[2] (ft/sec)
BB-C (US)	0.05	2.0	Gravel	2.5 - 5
BB-C (MS)	0.05	2.3	Gravel	2.5 - 5
BB-C (DS)	0.05	2.2	Gravel	2.5 - 5
DE2-B	0.05	2.7	Gravel	2.5 - 5
DE4-B	0.05	1.9	Gravel	2.5 - 5
DE7	0.05	5.0	Cobble	3 - 7.5
DE8	0.05	1.6	Gravel	2.5 - 5

[1]*(Chow, 1959)*

[2]*(Fischenich, 2001)*

Sediment Supply

In addition to the stability assessment, a qualitative analysis of sediment supply was performed by characterizing watershed conditions. A combination of field reconnaissance and windshield surveys, existing land use data, and historical aerial photography were analyzed to assess existing and past watershed conditions to determine if any changes occurred that would significantly impact sediment supply. There is significant instability and erosion along the channels, which appear to be a result of cattle access, as well as adjacent agricultural practices. There is also a significant sediment load that appears to be coming from the adjacent and upstream agricultural fields. It is anticipated that sediment supply from agricultural land directly adjacent to the project will decrease as channels are stabilized, cattle are removed from the riparian corridor, and riparian buffers are restored and enhanced. Additionally, sediment supply from the channel itself will decrease as channel entrenchment and stability is improved; however, the sediment loading from upstream land-uses is likely to remain unchanged. To account for this, the design includes multiple features to enhance the sediment storage in the system: larger pools in the proposed reaches, a wide floodplain with shallow depressions, and engineered sediment packs on areas of concentrated flow entering the Project.

6.3 Morphological Parameters

Reference streams and proposed, designed stream channel morphology data are summarized and presented in **Table 13**. The full suite of morphological parameter data can be found in **Appendix B**.

Table 13. Summary of Reference and Proposed Channel Characteristics

Parameter	Reach								
	Buffalo Reference	Hannah Reference	BB-C (US)	BB-C (MS)	BB-C (DS)	DE2-B	DE4-B	DE7	DE8
Valley Width (ft)	200	180	70	100	160	15	90	NA	50
Contributing Drainage Area (acres)	540	752	195	244	570	10	295	21	26
Channel/Reach Classification	E5	E4	C4/E4	C4/E4	C4/E4	C4b	C4/E4	B4a to E4	C4/E4
Discharge Width (ft)	12.3	11.5	9	9.8	11.8	3.8	10.3	3.5	4.5
Discharge Depth (ft)	1.1	1.3	0.9	0.9	1.1	0.4	1.0	0.4	0.4
Discharge Area (ft^2) [1]	12.8	15.2	7.8	9.1	13.0	1.4	10.4	1.3	1.8
Discharge Velocity (ft/s)	1.4	2.0	2.1	2.2	2.3	3.0	1.9	2.8	2.2
Discharge (cfs)	18	30	16	20	30	4	20	3-4	4
Water Surface Slope (ft/ft)	0.0023	0.0027	0.006 - 0.007	0,005 - 0.007	0.005 - 0.006	0.038	0.004 - 0.006	0.012 - 0.120	0.011
Sinuosity	1.22	1.18	1.15	1.17	1.17	1.12	1.18	1.05	1.14
Width/Depth Ratio	12.3	8.7	10.4	10.6	10.7	10.7	10.3	9.8	11.3
Bank Height Ratio	1	1.2	1	1	1	1	1	1	1
Entrenchment Ratio	3.0	>2.2	>2.2	>2.2	>2.2	>2.2	>2.2	>2.2	>2.2
Substrate	Sand	Fine Gravel	Gravel	Gravel	Gravel	Gravel	Gravel	Cobble	Gravel

6.4 Reference Wetlands

There are two wetland areas adjacent to the Project that provide good reference conditions for targeting wetland restoration and enhancement, specifically in terms of vegetation and natural communities. Unfortunately, these wetland areas are outside of the Project parcels; therefore, only qualitative data was collected based on visual observation whereas groundwater hydrology data cannot be measured. One of the wetlands occurs adjacent to Brad's Branch just south of the Project boundary and the other is located upstream of DE4-A and WE-1 just north of the Project boundary on the other side of a fence.

The reference wetland adjacent to Brad's Branch at the bottom of the Project is contiguous with WC and Six Runs Creek swamp but is fenced off and not accessed by cattle. Therefore, this large wetland is minimally disturbed and is a mature Bottomland Hardwood Forest. More specifically, since this wetland transitions to the Six Runs Creek swamp, the natural community type closely resembles a Blackwater Bottomland Hardwoods (Swamp Transition Subtype). Upon observations, the wetland always appears saturated and is likely seasonally flooded, contains dark surface soil with sparse herbaceous cover, and has a mature canopy. As discussed in **Section 3.2.3**, woody tree and shrub species include swamp tupelo, Carolina ash, American elm, river birch, common buttonbush, and red maple. Herbaceous vegetation is limited and includes lizard's tail, false nettle, and netted chainfern.

The reference wetland adjacent to the Project to the north is contiguous with WE but is also fenced off and not accessed by cattle, and the stream channel, like reach DE4-A, is sized appropriately and accesses its floodplain, as is demonstrated by recent alluvial deposition and wrack lines. Therefore, this wetland appears minimally disturbed, and like WE, would be considered a Bottomland Hardwood Forest in terms of NCWAM standards; however, the natural community resembles a Coastal Plain Small Stream Swamp based on stream and valley size and vegetation composition. The wetland area appears to be almost always saturated and is likely only intermittently flooded based on the small to medium sized stream and watershed. The vegetation structure is healthy and contains mature canopy, moderate understory, and moderate herbaceous cover. The species composition is variable with a mix of moisture tolerances, as is consistent with Coastal Plain Small Stream Swamp communities. Trees include sweetbay magnolia, American hornbeam, sweet gum, swamp chestnut oak, water oak, white oak, American holly, and red maple. The only observed shrub was switch cane but is widespread. Herbaceous species include lizard's tail, jewelweed, netted chainfern, and cinnamon fern.

6.4.1 Wetland Treatment and Approach

The Six Runs Project offers a total ecosystem restoration opportunity that will revitalize highly manipulated floodplain forest communities. As such, the wetland restoration and enhancement are closely tied to the stream restoration. Wetland restoration via re-establishment aims to re-establish hydrology and hydrophytic vegetation to currently non-wetland areas that exhibit hydric soil indicators and drained hydrology, while rehabilitation aims to improve vegetation and stream-floodplain connectivity in severely degraded jurisdictional wetland areas that have been disconnected from the stream system. Enhancement areas aim to improve vegetation in already jurisdictional wetland areas. Finally, some preservation will occur where jurisdictional wetland functions are high and have little opportunity for uplift. Very importantly, the entire Project area, including all wetlands, will exclude livestock by installing fencing along the perimeter of the conservation easement. The Project will provide 10.044 Riparian WMUs through a combination of wetland re-establishment, rehabilitation, enhancement, and preservation. Notably, areas generating wetland credit are either within the proposed 50-foot stream buffer area of proposed stream channels or are wholly outside of the non-standard buffer width areas generating additional stream credit (greater than 150 feet). Therefore, wide buffer areas utilized for additional stream credit and wetland credit areas do not overlap (**Figure 10** & **Figure 11**). Note that there are some additional small wetland areas

amounting to a total of 1.379 acres that will not generate mitigation credit but will be protected within the conservation easement.

Re-establishment

Wetland re-establishment with a credit ratio of 1:1 is proposed in two areas of the Project. The area surrounding the jurisdictional wetland boundary of WC, in the downstream portion of Brad's Branch, will be referred to as "WL." The area between reach DE4-B and WE-2 will be referred to as "WM" (**Figure 10**). These areas contain hydric soils but lack sufficient wetland hydrology and a lowered water table due to an altered landscape and drainage modifications, including relocated and incised streams as well as spoil berms associated with channelization and dredging. As mentioned above, the hydrologic restoration of these area will be directly related to the stream restoration activities. Reconstructing Brad's Branch (specifically, the downstream portion of BB-C which has been relocated away from the natural valley) and reach DE4-B with appropriately sized channels back within the low of the existing floodplains along with plugging and filling the incised, abandoned channels, will raise the local groundwater elevations and allow for frequent flooding. Therefore, hydrology can be restored to these historic wetlands, connecting them to the surrounding jurisdictional wetlands, and their riparian functions can be re-established by enabling stream interaction. The re-established wetland areas will be planted with bare root hardwood trees representative of Coastal Plain Small Stream Swamp and Blackwater Hardwood Forest communities. Additionally, livestock will be permanently excluded by installing fencing and establishing a conservation easement.

As mentioned in **Section 3.7.2**, groundwater wells were installed in representative locations of the site to document existing hydrology and establish baseline conditions for proposed wetland re-establishment. Two of the wells, GW1 and GW2, were strategically placed as a pair to document the difference in hydrology within a jurisdictional wetland and an adjacent, non-jurisdictional area. Specifically, GW1, was placed in the non-jurisdictional, hydric soil area adjacent to WE-2 (WM), and the other, GW2, was installed within existing, jurisdictional wetland WE-2, perpendicular to GW1. In addition, a third well, GW3, was placed in the non-jurisdictional, hydric soil area surrounding WC-1, in the Brad's Branch floodplain (WL). These wells were installed in March 2021 and automatic pressure transducers within the wells are currently recording data twice per day. Refer to **Section 3.7.2** for a summary of current findings while detailed data, including hydrographs, are presented in **Appendix B**. Also, the locations of these wells are depicted on **Figures 7** and **12**.

Rehabilitation

Wetland rehabilitation with a credit ratio of 1.5:1 is proposed for wetlands WC-1 and WD (**Figure 10**). The rehabilitation approach is intended to provide uplift to vegetative function and functions related to wetland-stream interactions, especially floodplain connectivity. As discussed in **Section 3.6.1**, this wetland area has been completely disconnected from its historic stream system, Brad's Branch, and is within active pasture that is consistently seeded and grazed by cattle. Nonetheless, the wetland is still jurisdictional and there is a strong groundwater source that maintains a high water table. Like the proposed re-establishment areas, rehabilitation of the area will be directly tied to the stream restoration activities. Reconstructing the downstream portion of Brad's Branch within the footprint of this wetland, which is the natural valley low, with an appropriately sized channel will re-establish riparian wetland functions by enabling stream interaction and frequent flooding. Also, the design for the proposed Brad's Branch stream channel is proposed to end within WC-1. Therefore, it is expected that channelized flow will dissipate below this point and potentially braid into the wetland, creating a more diverse habitat and opportunity for sediment to settle and nutrients to be absorbed before entering Six Runs Creek. Also, the rehabilitation aims to re-establish a Bottomland Hardwood Forest community that historically existed. This will involve planting bare root and live-stake hardwood trees representative of Coastal Plain Small Stream Swamp and

Blackwater Hardwood Forest communities. Additionally, livestock will be permanently excluded by installing fencing and establishing a conservation easement.

Enhancement

Wetland enhancement with a credit ratio of 2:1 is proposed within the existing jurisdictional wetland WE-2 (**Figure 10**). As discussed in **Section 3.6.1**, this jurisdictional wetland has sufficient hydrology and is consistently wet but is disconnected from its stream (reach DE4-B), is forested but has degraded density, composition, and structure, and is severely impacted by cattle. Therefore, the activities proposed to enhance this wetland include stream restoration of DE4-B that will re-establish wetland-stream interaction and riparian function, treat exotic invasive species and plant native bare root trees in order to establish a healthier wetland hardwood forest community, and permanently exclude livestock by installing fencing and establishing a conservation easement.

Wetland enhancement with a credit ratio of 5:1 is proposed within the existing jurisdictional wetland WE-1 (**Figure 10**). As discussed in **Section 3.6.1**, this forested, jurisdictional wetland is less disturbed than WE-2 below and is associated with a healthy stream channel. Cattle still impact the vegetative community though, with canopy, understory, and herbaceous strata all moderately dense, but when compared to the reference wetland forest just upstream of the property, which is fenced off, it is obviously still degraded. Therefore, the activities proposed to enhance this wetland include supplemental planting of native bare root trees in order to establish a healthier wetland hardwood forest community, and permanently exclude livestock by installing fencing and establishing a conservation easement.

Preservation

Wetland preservation with a credit ratio of 10:1 is proposed for jurisdictional wetland WC-2 (**Figure 10**). Although this wetland was historically manipulated by an excavation activity, it has since stabilized as a functioning swamp forest with forest, marsh, and open water components which provides complimentary habitat diversity to the Project within the Six Runs Creek floodplain. Ultimately, little can be done to provide functional uplift to this area. The area will remain as is but will still be fenced and protected by a permanent conservation easement.

6.5 Sediment Control Measures

A suite of sediment control measures will be utilized for the Project to reduce direct effluent inputs, pollutant contamination, and sediment loading. The combination of the following sediment control measures: riparian buffer planting, bank stabilization, stream restoration, engineered sediment packs and livestock exclusion, will ultimately lead to the functional uplift of the site, while still allowing livestock production to persist.

The riparian buffer will be restored along all stream reaches. Restored riparian buffers are established adjacent to and up-gradient from watercourses of water bodies to improve water quality. Buffers will be protected from livestock by installing fencing along the project boundaries.

The Project also involves riparian wetland restoration and enhancement that will increase the size and capacity of wetlands to treat sediment and nutrient input from the watershed.

6.6 Vegetation and Planting Plan

6.6.1 Plant Community Restoration

The restoration of the plant communities is an important aspect of the restoration Project. The selection of plant species is based on what was observed in the forest surrounding the restoration Project and what is typically native to the area. Specifically, species identified within the Project's existing forested areas, adjacent reference wetland forests, and species described in the 2012 Guide to the Natural Communities

of North Carolina, Fourth Approximation (Schafale, 2012) for coastal plain floodplain and mesic communities were used to determine the most appropriate species for the restoration project.

There will be two planting zones at the Project with different target communities. The floodplains and wetland areas will be targeted as a hybrid community characteristic of Blackwater Bottomland Hardwood Forest and Coastal Plain Small Stream Swamp (Zone 1), and the up-gradient areas along the upland hillslopes of the valleys will be targeted as a Mesic Mixed Hardwood Forest (Coastal Plain Subtype; Zone 2). The composition of the proposed tree species list will have some overlap in species, specifically the more facultative species that have a large moisture tolerance range. The proposed tree species list has been developed and can be found in **Table 14**. Please note that the proposed list is intended to present an exhaustive list of appropriate species for the Project that are potentially procurable for large-scale restoration projects. The final compositions of planted trees may differ from this proposed list due to availability; however, the procured trees will ideally be comprised of species from the list.

Zone 1 – Blackwater Bottomland Forest/Coastal Plain Small Stream Swamp

The vegetative community of Zone 1 incorporates species associated with both Blackwater Bottomland Hardwood Forest and Coastal Plain Small Stream Swamp but is split into Zone 1-A and Zone 1-B based on level of potential inundation.

Zone 1-A

Zone 1-A will cover most of the floodplain and wetland areas within the Project that are already wet or are expected to be wetter post-restoration except for the very wettest area. This proposed community represents a diverse community where wet-tolerant hardwoods can establish throughout while very wet species can thrive in more frequently inundated areas. The majority of trees will be bare roots; however, there are several wetland live stake species that may be incorporated into Zone 1-A that have proven to establish and thrive in inundated environments. Also, Zone 1-A incorporates several small tree and shrub species that may contribute to understory development. Zone 1-A is depicted in **Figure 12** and **Appendix D**.

Zone 1-B

Zone 1-B will cover the very wettest area of the Project, specifically the WC-1 wetland area below where the Brad's Branch stream channel terminates and transitions down-gradient into the Six Runs Creek swamp. Zone 1-B will include the same species as Zone 1-A, but in addition to bare roots, will also incorporate containerized bald cypress, swamp tupelo, buttonbush, and overcup oak as well as live stake and/or live stake poles of buttonbush, black willow, and hazel alder. These additional, specialized plantings are expected to establish better in potentially inundated areas and increase survivability and overall vegetative success. Zone 1-B is depicted in **Figure 12** and **Appendix D**

Zone 2 – Mesic Mixed Hardwood Forest (Coastal Plain Subtype)

The vegetative community of Zone 2 incorporates species associated with Mesic Mixed Hardwood Forest (Coastal Plain Subtype). Zone 2 will cover all the area associated with upland hillslopes, up-gradient of the floodplain and wetland areas within the Project. Besides the wide, flat floodplain at the bottom of the Project, the rest of the Project contains narrow valleys with moderately steep slopes and much of the riparian area within the project will include these uplands. Some of these upland areas already contain some mature trees, but a lot of the buffer needs to be widened and there will also need to be some replanting of areas upon stream restoration activities. This proposed community consists of a diverse mix of mesic to dry hardwood species typical of the site and broader coastal plain uplands. Also, Zone 2 incorporates several small tree and shrub species that may contribute to understory development. Zone 2 is depicted in **Figure 12** and **Appendix D**.

In order to maintain integrity of existing forested areas within the proposed stream restoration construction corridors, tree clearing will be limited to the greatest extent practicable. Therefore, where possible, some mature trees may remain within the proposed planting area depicted in **Figure 12** and **Appendix D**. Also, it is anticipated that tree clearing outside the depicted planting area, and possibly outside the easement area, will occur to accommodate construction access. These areas will also be replanted along with the rest of the site.

The restoration of plant communities along the Project will provide stabilization and diversity. For rapid stabilization of the stream banks (primarily outside meanders), black willow (*Salix nigra*), silky dogwood (*Cornus amomum*), and buttonbush (*Cephalanthus occidentalis*) were chosen for live stakes along the restored channel because of their rapid growth patterns and high success rates. Willows grow at a faster rate than the species planted around them, and they stabilize the stream banks. Willows will also be quicker to contribute organic matter to the channel. When the other planted tree species grow bigger, the black willows will slowly stop growing or die out as they are effectively shaded out and outcompeted. The live stake species will be planted along the outside of the meander bends three feet from the top of bank, creating a three-foot section along the top of bank. The live stakes will be spaced one per three linear feet with alternate spacing, vertically.

It is anticipated that the vegetation planting/replanting will be conducted between November 15 and March 15, per the October 2016 USACE/NCIRT monitoring guidance. Furthermore, there will be at least 180 days until the initiation of the first year of monitoring.

Table 14. Proposed Plant List

Planting Zone Tree Species								
Species	**Common Name**	**Wetland Indicator Status***	**Layer**	**Spacing (ft)**	**Unit Type**	**% of Total Species Composition**		
						Zone 1-A	**Zone 1-B**	**Zone 2**
Taxodium distichum	Bald cypress	OBL	Canopy	9X6	Bare Root/Container	10	10[1]	0
Nyssa biflora	Swamp tupelo	OBL	Canopy	9X6	Bare Root/Container	10	10[1]	0
Cephalanthus occidentalis	Buttonbush	OBL	Understory	9X6	Bare Root/Live Stake/Container	10	10[1 2]	0
Quercus lyrata	Overcup oak	OBL	Canopy	9X6	Bare Root/Container	10	10[1]	0
Betula nigra	River birch	FACW	Canopy	9X6	Bare Root	10	10	0
Quercus laurifolia	Laurel oak	FACW	Canopy	9X6	Bare Root	5	5	0
Carya aquatica	Water hickory	OBL	Canopy	9X6	Bare Root	5	5	0
Salix nigra	Black willow	OBL	Understory	9X6	Live Stake/Poles	5	5[2]	0
Alnus serrulata	Hazel alder	FACW	Understory	9X6	Bare Root/Live Stake	5	5[2]	0
Fraxinus pennsylvanica	Green ash	FACW	Canopy	9X6	Bare Root	5	5	5
Platanus occidentalis	American sycamore	FACW	Canopy	9X6	Bare Root	5	5	5
Ulmus American	American elm	FAC	Canopy	9X6	Bare Root	5	5	5
Quercus michauxxi	Swamp chestnut oak	FACW	Canopy	9X6	Bare Root	5	5	10
Quercus phellos	Willow oak	FACW	Canopy	9X6	Bare Root	5	5	10
Morella cerifera	Wax myrtle	FAC	Understory	9X6	Bare Root	5	5	5
Carpinus caroliniana	American hornbeam	FAC	Understory	9X6	Bare Root	0	0	10
Quercus nigra	Water oak	FAC	Canopy	9X6	Bare Root	0	0	10
Quercus alba	White oak	FACU	Canopy	9X6	Bare Root	0	0	15
Quercus rubra	Northern red oak	FACU	Canopy	9X6	Bare Root	0	0	15
Liriodendron tulipifera	Yellow poplar	FACU	Canopy	9X6	Bare Root	0	0	10

Live Staking and Live Cuttings Bundle Tree Species for Stream Banks		
Species	**Common Name**	**% of Total Species Composition**
Salix nigra	Black willow	40
Cornus amomum	Silky dogwood	30
Cephalanthus occidentalis	Buttonbush	30

[1] Species composition will also include containerized trees for Zone 1-B

[2] Species composition will also include live stake and/or live stake poles for Zone 1-B

** Based on NRCS-USDA Wetland Indicator Status for Atlantic and Gulf Coastal Plain*

6.6.2 On-Site Invasive Species Management

Treatment for invasive species will be required within the entire easement area. Invasive species will require different and multiple treatment methods, depending on plant phenology and the location of the species being treated (**Appendix J**). However, based on observed existing conditions observations, the only known woody exotic invasive species that would require treatment is Chinese privet. With that said, pasture grasses will be treated prior to construction as well. All treatment will be conducted as to maximize its effectiveness and reduce chances of detriment to surrounding native vegetation. Treatment methods will include mechanical (cutting with loppers, clippers, or chain saw) and chemical (foliar spray, cut stump, and hack and squirt techniques). Invasive or aggressive plants containing mature, viable seeds will be removed from the Project and properly disposed. All herbicide applicators will be supervised by a certified ground pesticide applicator with a North Carolina Department of Agriculture and Consumer Services (NCDA&CS) license and adhere to all legal and safety requirements according to herbicide labels, and NC and Federal laws. Management records will be kept on the plant species treated, type of treatment employed, type of herbicide used, application technique, and herbicide concentration and quantities used. These records will be included in all reporting documents.

6.6.3 Soil Restoration

Prior to construction activities, pasture grassed will be treated. After construction activities, the subsoil will be scarified and any compaction will be deep tilled before the topsoil is placed back over the Project. Any topsoil that is removed during construction will be stockpiled and placed over the Project during final soil preparation. This process should provide favorable soil conditions for plant growth. Rapid establishment of vegetation will provide natural stabilization for the Project.

6.7 Mitigation Summary

The entire floodplain forest ecosystem, within the Project limits, will be restored and revitalized through stream and wetland restoration, enhancement, and preservation.

Natural channel design techniques have been used to develop the restoration designs described in this document. The combination of the analog and analytical design methods was determined to be appropriate for this project because the watershed is more rural than urban, the causes of disturbance are known and have been abated, and there are minimal infrastructure constraints. The original design parameters were developed from measured analog/reference reach data and applied to the project streams. The parameters were then analyzed and adjusted through an iterative process using analytical tools and numerical simulations of fluvial processes. The designs presented in this report provide for the restoration of natural non-tidal coastal plan silt/loam/gravel-bed channel features and stream bed diversity to improve aquatic habitat. The proposed design will improve water quality by reducing nutrient and sediment loads and will promote regular floodplain flooding and flood flow attenuation that will in turn restore a portion of the hydrology for the existing wetlands.

A large portion of the existing stream will be filled using material excavated from the restoration channel. However, many segments will be left partially filled to provide habitat diversity and minor flood and sediment storage. Maximum depths within these areas will not exceed 14 inches to prevent the formation of permanent pools and to allow the areas to remain seasonally dry. Native woody material will be installed throughout the restored reach to reduce bank stress, provide grade control, and increase habitat diversity.

Forested riparian buffers of at least 50 feet on both sides of the channel will be established along the project reaches. Plant communities will be established to include a diverse mix of species that are characteristic of target natural communities that comply with the local physiography and hydrology. There are two planting zones: Zone 1 incorporates floodplain and wetland areas, and Zone 2 incorporates hillslope upland areas. The plant species list has been developed and can be found in **Table 14**.

Additionally, replanting of native species will occur where any existing buffer is impacted during construction.

Wetland restoration via wetland re-establishment aims to re-establish hydrology and hydrophytic vegetation to currently non-wetland areas that exhibit hydric soil indicators and drained hydrology. Rehabilitation aims to improve vegetation and stream-floodplain connectivity in severely degraded jurisdictional wetland areas that have been disconnected from the stream system. Enhancement areas aim to improve vegetation in already jurisdictional wetland areas. Finally, some preservation will occur where jurisdictional wetland functions are high and have little opportunity for uplift. Very importantly, the entire Project area, including all wetlands, will exclude livestock by installing fencing along the perimeter of the conservation easement.

A combination of sediment control measures will be used on site: wetland restoration, riparian buffer planting, bank stabilization, stream restoration, engineered sediment packs, and livestock exclusions. This combination of sediment control measures will ultimately lead to the functional uplift of the site by minimizing sedimentation, nutrient input, and fecal coliform input from ongoing livestock and agricultural production outside of the conservation easement.

The Project streams have been designed to withstand current watershed stressors using natural channel design and best management practices, and it is anticipated that the Project will prove resilient through potential future land use changes in the watershed. In addition to the stream channel design techniques, a very pronounced benefit of the Project is the incorporation of a wide conservation easement area. By incorporating much of the Brad's Branch floodplain, especially at the downstream riparian wetland, potential future increases in sediment load caused by increased development in the watershed could be absorbed by the system by providing a large, undisturbed setting to store and process sediment through natural processes of the ecosystem and maintain a dynamic equilibrium.

Due to the nature of the project, complete avoidance of stream and wetland impacts is not possible. However, the construction approach and sequencing will be adjusted to minimize impacts and tracking within the existing wetlands to avoid compaction to the extent possible. To achieve this, haul routes will be located and accessed outside of the existing wetlands, and timber mats will be utilized when working within the wetland areas to construct the new channel. Please refer to **Section 3.4.7** for a discussion of Project impacts. Ultimately, the impacts associated with the Project are integral to provide functional uplift to aquatic resources on-site. Furthermore, all impacts will be accounted for in the Pre-Construction Notification (PCN) form.

6.8 Determination of Credits

Mitigation credits presented in **Table 15** are projections based upon site design (**Figure 10** and **Appendix A**). If upon Project completion, there is a large discrepancy between design and as-built conditions an updated plan will be submitted to the District for approval as a project modification. Any deviation from the mitigation plan post approval, including adjustments to credits, will require a request for modification. This will be approved by the USACE. All credits will be released in accordance with credit release schedules outlined in the 2016 Wilmington District Stream and Wetland Compensatory Mitigation Update (**Appendix D**).

Table 15. Six Runs Project (ID-100170) - Mitigation Quantities and Credits

Project Segment	Original Mitigation Plan ft/ac	As-Built ft/ac	Original Mitigation Category	Original Restoration Level	Mitigation Ratio (X:1)	Credits	Notes/Comments
Stream							
BB-A	452	N/A	Warm	E1	1.50000	301.333	Structure installation, supplemental planting, invasives treatment, livestock exclusion
BB-B	562	N/A	Warm	E1	1.50000	374.667	Structure installation, meander stabilization, supplemental planting, invasives treatment, livestock exclusion
BB-C	4,357	N/A	Warm	R	1.00000	4,357.000	Channel restoration, riparian planting, invasives treatment, livestock exclusion
DE2-A	231	N/A	Warm	E2	2.50000	92.400	ESP installation, supplemental planting, invasives treatment, livestock exclusion
DE2-B	156	N/A	Warm	R	1.00000	156.000	Channel restoration, riparian planting, invasives treatment, livestock exclusion
DE4-A	301	N/A	Warm	E2	5.00000	60.200	Supplemental planting, invasives treatment, livestock exclusion
DE4-B	992	N/A	Warm	R	1.00000	992.000	Channel restoration, riparian planting, invasives treatment, livestock exclusion
DE7	112	N/A	Warm	R	1.00000	112.000	Channel restoration, riparian planting, invasives treatment, livestock exclusion
DE8	171	N/A	Warm	R	1.00000	171.000	Hydrologic reconnection, channel restoration, riparian planting, invasives treatment, livestock exclusion
MT2	110	N/A	Warm	E2	2.50000	44.000	Supplemental planting, invasives treatment, livestock exclusion
Wetland							
WC-1	4.903	N/A	R	RH	1.50000	3.269	Reconnect to stream via stream restoration, wetland planting, livestock exclusion
WC-2	1.656	N/A	R	P	10.00000	0.166	Livestock exclusion
WD	0.010	N/A	R	RH	1.50000	0.007	Reconnect to stream via stream restoration, riparian planting, livestock exclusion
WE-1	0.411	N/A	R	E	5.00000	0.082	Supplemental planting, invasives treatment, livestock exclusion
WE-2	0.597	N/A	R	E	2.00000	0.299	Wetland planting, invasives treatment, livestock exclusion
WL	5.759	N/A	R	REE	1.00000	5.759	Stream restoration, spoil/berm removal/grading, native planting, livestock exclusion
WM	0.462	N/A	R	REE	1.00000	0.462	Stream restoration, spoil/berm removal/grading, native planting, livestock exclusion

Project Credits

	Stream			Riparian	Non-riparian	Coastal
Restoration Level	Warm	Cool	Cold	Wetland	Wetland	Marsh
Restoration	5,788.000					
Re-establishment				6.221		
Rehabilitation				3.276		
Enhancement (low)				0.082		
Enhancement (high)				0.299		
Enhancement I	675.999					
Enhancement II (2.5)	136.400					
Enhancement II (5.0)	60.200					
Creation						
Preservation				0.166		
Totals	**6,660.599**					

Non-Standard Buffer Width Adjustment	**+64.00**
Total Stream Credit	**6,724.599**
Total Wetland Credit	**10.044**

6.8.1 Credit Calculations for Non-standard Buffer Widths

Due to property boundary and NCDOT right-of-way constraints, more than five percent of the Project stream length does not contain the minimum 50-foot buffer width that is required by USACE guidance. Specifically, several hundred feet of reaches BB-A and BB-B parallel the NCDOT road with a buffer averaging about 20 feet off the right bank. However, because the stream channel is within its natural valley and the NCDOT road and right-of-way are out of RES' possible control, the entire easement segment upstream of E Darden Rd. will be excluded from Non-standard Buffer Width credit adjustments because otherwise the calculation would result in unwarranted loss of SMU credits. Therefore, to calculate stream credit adjustments based on buffer widths for the rest of the Project's easement area, the Wilmington District Stream Buffer Credit Calculator from the USACE in January 2021 was utilized (**Appendix B**). To perform this calculation, GIS analysis was performed to determine the area (in square feet) of ideal buffer zones and actual buffer zones around all streams within the project, including the area within the arc around stream terminal ends. Minimum standard buffer widths are measured from the top of bank (50 feet in Piedmont and Coastal Plain counties or 30 feet in Mountain counties). The ideal buffers are the maximum potential size (in square feet) of each buffer zone measured around all creditable stream reaches, calculated using GIS, including areas outside of the easement. The actual buffer is the square feet in each buffer zone, as measured by GIS, excluding non-forested areas, all other credit type (e.g., wetland, nutrient offset, buffer), easement exceptions, open water, areas failing to meet the vegetation performance standard, etc. The stream terminal ends are where the streams exit or enter the project boundary, not including internal stream crossings. Terminal ends are exempt when they are located at the edge of a parcel boundary or public road crossing. Additional credit is given to 150 feet in buffer width, so areas within the easement that are more than 150 feet from creditable streams were not included in this measurement. Non-creditable stream reaches within the easement are removed prior to calculating this area with GIS (for both ideal and actual). The stream lengths, mitigation type, number of terminal ends, ideal buffer, and actual buffer are all entered into the calculator. This data is processed, and the resulting credit amounts are totaled for the whole project. Note that because a segment of the Project is not being included in the NSBW calculation, the total creditable stream length and corresponding SMUs inputted into the calculator includes only the stream lengths downstream of E Darden Rd. (6,320 LF and 5,940.600 SMU) and omit the stream length above E Darden Rd. (1,124 LF and 719.999 SMU) for the sake of calculating the NSBW credit adjustment. After the adjusted total was calculated for the viable segment, the SMU amount for the "omitted" segment is added back to calculate the grand total SMUs for the Project (**Table 16**, & **Figure 11**).

Table 16. Summary of NSBW Calculation Rationale

Total Baseline Credit		Credit Loss in Required Buffer	Credit Gain for Additional Buffer	Net Change in Credit from Buffers	Total Credit
Segment above Road	5,940.600	-180.270	244.270	64.000	6,004.600
Segment Below Road	719.999	NA	NA	NA	719.999
				Grand Total	**6,724.599**

As mentioned earlier, areas generating wetland credit are either within the proposed 50-foot stream buffer area, are designated as ineligible areas that are not viable for additional stream credit or are wholly outside of the Non-standard buffer width areas generating additional stream credit (greater than 150 feet); therefore, additional stream credit areas and wetland credit areas do not overlap.

7 PERFORMANCE STANDARDS

The success criteria for the Project will follow the 2016 USACE Wilmington District Stream and Wetland Compensatory Mitigation Update and subsequent agency guidance. Specific success criteria components are presented below.

7.1 Stream Restoration Success Criteria

7.1.1 Bankfull Events

Four bankfull flow events must be documented within the seven-year monitoring period. The bankfull events must occur in separate years. Otherwise, the stream monitoring will continue until four bankfull events have been documented in separate years.

7.1.2 Surface Flow

Intermittent stream reaches generating credit for the Project will be monitored to document intermittent or seasonal surface flow. This will be accomplished through direct observation and the use of automatic-logging pressure transducers with data loggers (flow gauge). Reaches must demonstrate a minimum of 30 consecutive days of flow each year.

7.1.3 Cross Sections

There should be little change in as-built cross sections. If changes do take place, they should be evaluated to determine if they represent a movement toward a less stable condition (for example down-cutting or erosion) or are minor changes that represent an increase in stability (for example settling, vegetative changes, deposition along the banks, or decrease in width/depth ratio). Cross sections shall be classified using the Rosgen stream classification method, and all monitored cross sections should fall within the quantitative parameters defined for channels of the design stream type. Bank height ratio shall not exceed 1.2, and the entrenchment ratio shall be no less than 2.2 within restored riffle cross sections.

7.1.4 Digital Image Stations

Digital images will be used to subjectively evaluate channel aggradation or degradation, bank erosion, success of riparian vegetation, and effectiveness of erosion control measures. Longitudinal images should not indicate the absence of developing bars within the channel or an excessive increase in channel depth. Lateral images should not indicate excessive erosion or continuing degradation of the banks over time. A series of images over time should indicate successional maturation of riparian vegetation.

7.2 Wetland Restoration Success Criteria

7.2.1 Wetland Hydrology Criteria

The Natural Resources Conservation Service (NRCS) has a current WETs table (1991-2020) for Sampson County upon which to base a normal rainfall amount and average growing season. The closest comparable data station was determined to be the WETS station, Clinton 2 NE, in Clinton, NC. This station determines the growing season to be 253 days long, extending from March 14 to November 22, and is based on a daily minimum temperature greater than 28 degrees Fahrenheit occurring in five of ten years.

Based upon field observation across the site, the NRCS mapping units show a good correlation to actual site conditions in areas of the site. Mitigation guidance for soils in the Coastal Plain suggests a hydroperiod for both the Bibb and Johnston soil series of 12 to 16 percent of the growing season. Therefore, hydrology success criterion for the Project is to restore the water table so that it will remain continuously within 12 inches of the soil surface for at least 12 percent of the growing season (approximately 31 days) at each groundwater gauge location throughout the monitoring period.

7.3 Vegetation Success Criteria

Specific and measurable success criteria for plant density within the riparian buffers on the Project will follow IRT Guidance. The interim measures of vegetative success for the Project will be the survival of at least 320 planted three-year old trees per acre at the end of Year 3, 260 five-year old trees at seven feet in height at the end of Year 5, and the final vegetative success criteria will be 210 trees per acre with an average height of ten feet at the end of Year 7. However, height requirements may be omitted for designated understory and shrub species if deemed advantageous. Volunteer trees that are listed on the approved planting list will be counted, identified to species, and included in the yearly monitoring reports, and may be counted towards the success criteria of total planted stems. Moreover, any single species can only account for up to 50 percent of the required number of stems within any vegetation plot. Any stems in excess of 50 percent will be shown in the monitoring table but will not be used to demonstrate success.

8 MONITORING PLAN

Annual monitoring data will be reported using the DMS Monitoring Report Template dated June 2017 and NC IRT monitoring template. The monitoring report shall provide a project data chronology that will facilitate an understanding of project status and trends, research purposes, and assist in decision making regarding project close-out. Monitoring reports will be prepared annually and submitted to DMS. Monitoring of the Project will adhere to metrics and performance standards established by the USACE's April 2003 Wilmington District Stream Mitigation Guidelines and the NC IRT's October 2016 Wilmington District Stream and Wetland Compensatory Mitigation Update. **Table 17** outlines the links between project objectives and treatments and their associated monitoring metrics and performance standards. **Figure 12** depicts the proposed monitoring plan, including approximate numbers and locations of monitoring devices for the Project.

8.1 As-Built Survey

An as-built survey will be conducted following construction to document channel size, condition, and location. The survey will include a complete profile of thalweg, water surface, bankfull, and top of bank to compare with future geomorphic data. Longitudinal profiles will not be required in annual monitoring reports unless requested by USACE.

8.2 Visual Monitoring

Visual monitoring of all mitigation areas will be conducted a minimum of twice per monitoring year (MY) by qualified individuals. The visual assessments will include vegetation density, vigor, invasive species, and easement encroachments. Visual assessments of stream stability will include a complete streamwalk and structure inspection. Digital images will be taken at fixed representative locations to record each monitoring event, as well as any noted problem areas or areas of concern. Fixed image locations will exist at each cross section, vegetation plot, stage recorder, flow gauge, and groundwater well. Results of visual monitoring will be presented in a plan view exhibit with a brief description of problem areas and digital images. Photographs will be used to subjectively evaluate channel aggradation or degradation, bank erosion, success of riparian vegetation, and effectiveness of channel structures. Longitudinal photos should indicate the absence of developing bars within the channel or an excessive increase in channel depth. Lateral photos should not indicate excessive erosion or continuing degradation of the banks over time. A series of photos over time should indicate successional maturation of riparian vegetation.

8.3 Stream Hydrology Events

Continuous stage recorders, devices that utilize automatic-logging pressure transducers that are capable of documenting the height, frequency, and duration of bankfull events, will be installed on perennial Restoration reaches over 1,000 feet in length. Specifically, three stage recorders will be installed at the Project; two on reach BB-C and one on reach DE4-B.

For credit-generating, intermittent streams, monitoring flow gauges will be installed to track the frequency and duration of stream flow events. Specifically, five flow gauges, consisting of automatic-logging pressure transducers, will be installed at the Project; one each on reaches MT2, BB-A/B, DE7, DE2-A/B, and DE8.

8.4 Cross Sections

Permanent cross sections will be installed at a minimum of one per 20 bankfull widths with half in pools and half in riffle on all Restoration and Enhancement I reaches. Morphological data will be measured and recorded for all cross-sections; however, only riffle cross sections will include bank height ratio and entrenchment ratio calculations. A total of 36 cross sections are proposed across the Project. These cross sections will be monitored in Years 1, 2, 3, 5, and 7.

8.5 Wetland Hydrology

Wetland hydrology will be monitored to document hydrologic conditions in the Project's wetland areas. This will be accomplished with automatic recording pressure transducer gauges installed in representative locations across the restoration areas as well as some already jurisdictional wetland areas for reference conditions. These groundwater gauges will be installed in accordance with USACE guidelines and subsequent NCIRT guidance. The gauges will be downloaded quarterly and wetland hydroperiods will be calculated during the growing season. Visual observations of primary and secondary wetland hydrology indicators will also be recorded during quarterly site visits. A total of twelve groundwater gauges are proposed across the Project; seven in re-established wetlands and four in rehabilitated, enhanced, and preserved jurisdictional wetlands, serving as hydrologic references. As mentioned in **Sections 3.7.2** and **6.2.4**, three wetland gauges have already been installed at the Project, GW1, GW2, and GW3, to record pre-construction hydrology in several wetland mitigation features. GW3 will likely need to be relocated during construction since it is located within the designed Brad's Branch channel. As for GW1 and GW2, RES intends to leave them in-place during construction and thereafter; however, if one or both become a hinderance to construction, then they will be relocated as close to their original location as possible. Any relocation of these gauges will be reported in the as-built report.

8.6 Vegetation Monitoring

Vegetation monitoring plots will be a minimum of 0.0247 acres in size and cover a minimum of two percent of the planted area. There will be 19 plots within the planted area (22.59 acres). Plots will be a mixture of fixed and random plots, with 13 fixed plots and six random plots. Planted area indicates all area in the easement that will be planted with trees. Other areas lacking tree density throughout the Project will be planted with supplemental trees. These areas will be monitored each monitoring year with random plots to document both existing and planted trees to demonstrate both density and diversity. The following data will be recorded for all trees in the fixed plots: species, height, planting date (or volunteer), and grid location. For random plots, species and height will be recorded for all woody stems. The location (GPS coordinates and orientation) of the random plots will be identified in the annual monitoring reports. Vegetation will be planted and plots established at least 180 days prior to the initiation of the first year of monitoring. Monitoring will occur in Years 1, 2, 3, 5, and 7 between July 1st and leaf drop. Invasive and noxious species will be monitored so that none become dominant or alter the desired community structure of the Project. If necessary, RES will develop a species-specific treatment plan.

8.7 Scheduling/Reporting

A baseline monitoring report and as-built drawings documenting stream restoration activities will be developed within 60 days of the planting completion on the Project. The report will include all information required by DMS mitigation plan guidelines, including elevations, photographs and sampling plot locations, gauge locations, and a description of initial species composition by community type. The report will also include a list of the species planted and the associated densities. Baseline vegetation monitoring will include species, height, date of planting, and grid location of each stem. The baseline report will follow DMS As-Built Baseline Monitoring Report Template June 2017, USACE guidelines, and the October 2017 Mitigation Credit Calculation Memo.

The monitoring program will be implemented to document system development and progress toward achieving the success criteria. The restored stream morphology will be assessed to determine the success of the mitigation. The monitoring program will be undertaken for seven years or until the final success criteria are achieved, whichever is longer.

Monitoring reports will be prepared in the fall of each year of monitoring and submitted to DMS. The monitoring reports will include all information and be in the format required by USACE.

Table 17. Monitoring Requirements

Objective	Treatment	Monitoring Metric	Success Criteria
Improve the transport of water from the watershed to the Project reaches in a non-erosive way and maintain appropriate wetland hydrology for Bibb and Johnston soil series	Convert land-use of some Project reaches from pasture to riparian forest. Restore and enhance wetland hydrology through stream restoration activities and spoil removal	Groundwater wells with pressure transducers: Downloaded quarterly	Water table within 12 inches of the ground surface for 12% of growing season (approx. 31 days)
Improve flood-bank connectivity by reducing bank height ratios and increase entrenchment ratios Maintain regular, seasonal flow in restored, intermittent streams	Reduce bank height ratios and increase entrenchment ratios by reconstructing channels to mimic reference reach conditions	Stage recorders: Inspected semiannually	Four bankfull events occurring in separate years
		Flow gauges: Inspected quarterly	30+ days of continuous flow each year
		Cross sections: Surveyed in MY 1, 2, 3, 5 and 7	Entrenchment ratio shall be no less than 2.2 within restored reaches
			Bank height ratio shall not exceed 1.2
Limit erosion rates and maintain channel stability Improve bedform diversity (pool spacing, percent riffles, etc. Increase buffer width to 50 feet	Establish a riparian buffer to reduce erosion and sediment transport into project streams. Establish stable banks with livestakes, erosion control matting, and other in stream structures.	As-built stream profile	N/A
		Cross sections: Surveyed in MY 1, 2, 3, 5 and 7	Entrenchment ratio shall be no less than 2.2 within restored reaches
			Bank height ratio shall not exceed 1.2
		Visual monitoring: Performed at least semiannually	Identify and document significant stream problem areas; i.e. erosion, degradation, aggradation, etc.
		Vegetation plots: Surveyed in MY 1, 2, 3, 5 and 7	MY 1-3: ≥320 trees/acre MY 5: ≥260 trees/acre (7 ft. tall) MY 7: ≥210 trees/acre (10 ft. tall)
Promote sediment filtration, nutrient cycling, and organic accumulation through natural wetland biogeochemical processes Establish native hardwood riparian buffer Protect aquatic resources in perpetuity	Restore and enhance wetland hydrology Plant a riparian buffer Establish permanent conservation easement	Groundwater wells with pressure transducers: Downloaded quarterly	Water table within 12 inches of the ground surface for 12% of growing season (approx. 31 days)
		Vegetation plots: Surveyed in MY 1, 2, 3, 5 and 7	MY 1-3: ≥320 trees/acre MY 5: ≥260 trees/acre (7 ft. tall) MY 7: ≥210 trees/acre (10 ft. tall)
		Visual assessment of established fencing and conservation signage: Performed at least semiannually	Inspect fencing and signage. Identify and document any damaged or missing fencing and/or signs

9 ADAPTIVE MANAGEMENT PLAN

In the event the mitigation site or a specific component of the mitigation site fails to achieve the necessary performance standards as specified in the mitigation plan, the sponsor shall notify the members of the IRT and work with the IRT to develop contingency plans and remedial actions. Additionally, routine maintenance activities for the Project are outlined in **Appendix F**.

9.1 Risks and Uncertainties

While RES is committed to restoring the stream and wetland systems throughout the Project, it is acknowledged that potential risks exist and uncertainties may arise. Risks during design and planning have been addressed throughout the design parameters, **Section 6.2** and in the plan sheets found in **Appendix A.** Monitoring of these risks will ensure the success of the Project. General risks that are common in restoration projects are discussed in **Table F1, Appendix F** as they are associated with typical maintenance activities that occur throughout the monitoring period. By understanding and monitoring these risks, RES is better equipped to combat areas of concern not only throughout the Six Runs Mitigation Project, but also future project sites that may require similar considerations.

In addition to the general risks associated with stream and wetland mitigation projects, there are potential project-specific risks:

NCDOT Culvert at E Darden Road

While no work is currently proposed on this culvert through 2029, it is likely that the culvert will require maintenance and/or replacement at some point in the future. For this to occur, Brad's Branch would be impacted within the areas just upstream and downstream of the road, outside of the proposed conservation easement. While it is anticipated that this work would result in temporary stream impacts, long-term impacts are not likely given the proposed grade control structures to be installed just outside the potential impact area.

Offsite Pond Outflows

Three farm ponds drain into Project reaches, and the potential risk from these ponds is a dam failure and the release of stored sediment into the Project. While the project cannot fully account for impacts large storm events may have on features outside of the Project, these ponds have relatively small drainage areas, which reduces the likelihood of their failure. To help mitigate the potential for this risk, the Project proposes to stabilize all the associated pond outlets.

Channel Aggradation on Brad's Branch-C (DS)

The existing channel on Brad's Branch diffuses into the riparian wetlands associated with Six Runs Creek at the bottom of the project. The proposed channel has been designed to mimic this stream-wetland transition, diffusing into Wetland C-1. Given the heavy sediment load from the Project drainage area and the flat slope where Brad's Branch diffuses into WC-1, there is potential for aggradation and an evolution towards a braided system in this section. If excessive aggradation does occur and there is no obvious single-thread channel, RES is prepared to discern a thalweg via drone imagery or ground survey methods. Ultimately, if such a braided system does occur and it is determined that there is no primary flow channel, then a credit adjustment may be appropriate, such as valley length crediting, or as approved by IRT.

Effect of Inundation on Tree Growth in WC-1

During routine site visits and data collection visits, it has been observed multiple times that the lower portion of WC has been inundated with up to 18 inches of water. The lower portion of WC, including WC-

1 and some of WC-2, is strongly influenced by the hydrology of the Six Runs Creek swamp, which is subject to beaver impoundments and larger flood events, especially during wetter-than-normal periods, and can create a backwater effect within the Project. Consequently, this potential for intermittent to seasonal inundation can provide unfavorable growing conditions for trees, thus posing a threat to vegetative success. However, this risk is accounted for and minimized by the proposed planting plan, which intentionally includes the wettest species appropriate for the target community, some of which have proven to grow successfully in prolonged periods of inundation, such as buttonbush, black willow, hazel alder, green ash, bald cypress, swamp tupelo, and water hickory. Furthermore, planting Zone 1-B includes containerized, live stake, and long live stake poles that should increase survivability. Ultimately, if problems related to tree growth do arise in this area, RES will propose remedial actions that may include replanting of water-tolerant species, planting wetland obligate live stake whips, or other alternative planting measures. If the adverse effects are related to beaver activity, RES will monitor and maintain beavers according to **Table F1, Appendix F**.

Remedial actions will be designed to achieve the success criteria specified in the Plan, and will include identification of the causes of failure, remedial design approach, work schedule, and monitoring criteria that will consider physical and climatic conditions.

10 LONG-TERM MANAGEMENT PLAN

The site will be transferred to the NCDEQ Stewardship Program (or 3rd party if approved). This party shall serve as conservation easement holder and long-term steward for the property and will conduct periodic inspection of the site to ensure that restrictions required in the conservation easement are upheld. Funding will be supplied by the responsible party on a yearly basis until such time an endowment is established. The NCDEQ Stewardship Program is developing an endowment system within the nonreverting, interest-bearing Conservation Lands Conservation Fund Account. The use of funds from the Endowment Account will be governed by North Carolina General Statute GS 113A-232(d)(3). Interest gained by the endowment fund may be used for the purpose of stewardship, monitoring, stewardship administration, and land transaction costs, if applicable.

The Stewardship Program will periodically install signage as needed to identify boundary markings as needed. Any livestock or associated fencing or permanent crossings will be the responsibility the owner of the underlying fee to maintain.

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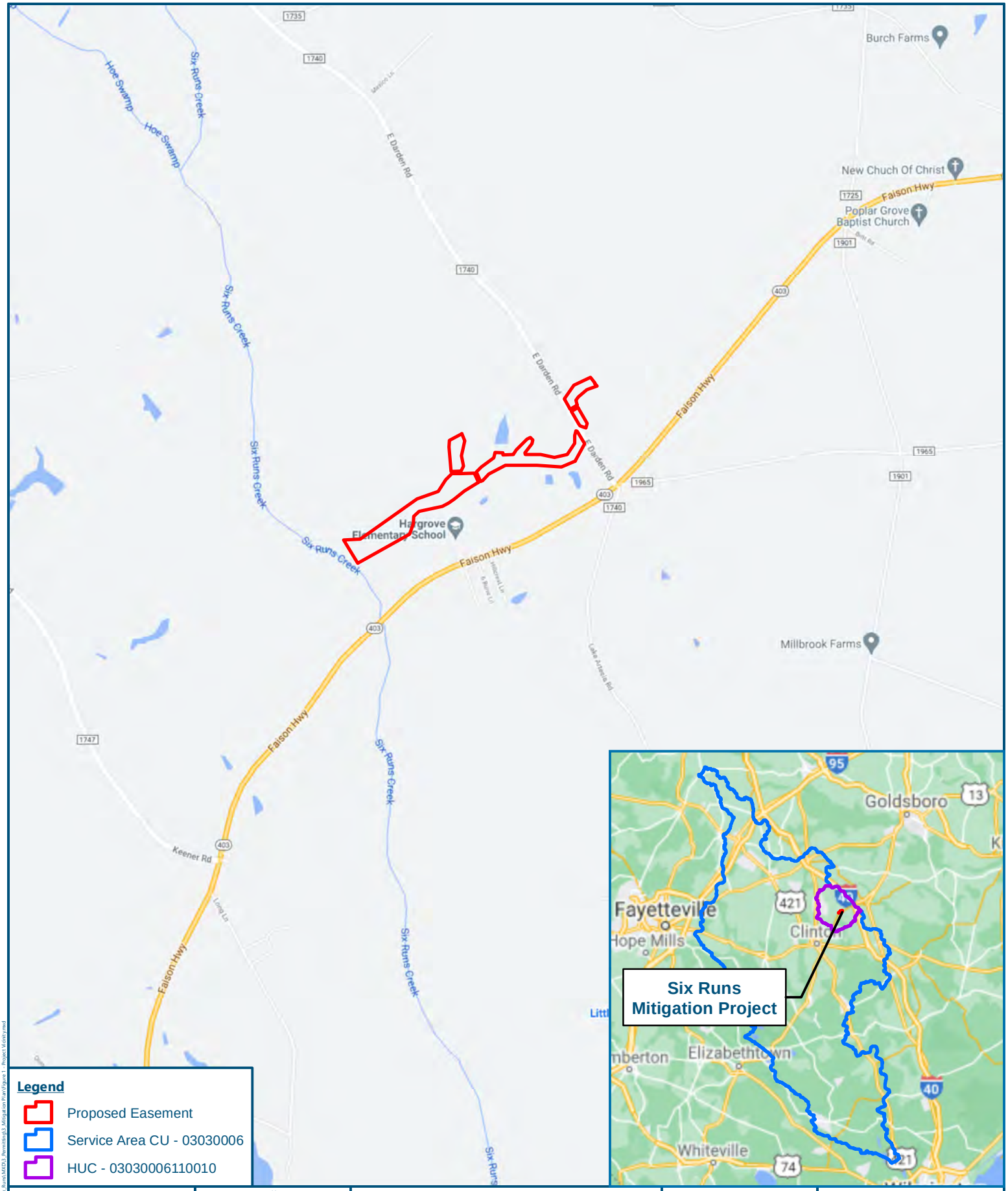

Figure 1 - Project Vicinity

Six Runs Mitigation Project

Sampson County, North Carolina

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Drawn by:	MDD
Checked by:	KAW
	1 inch = 2,000 feet

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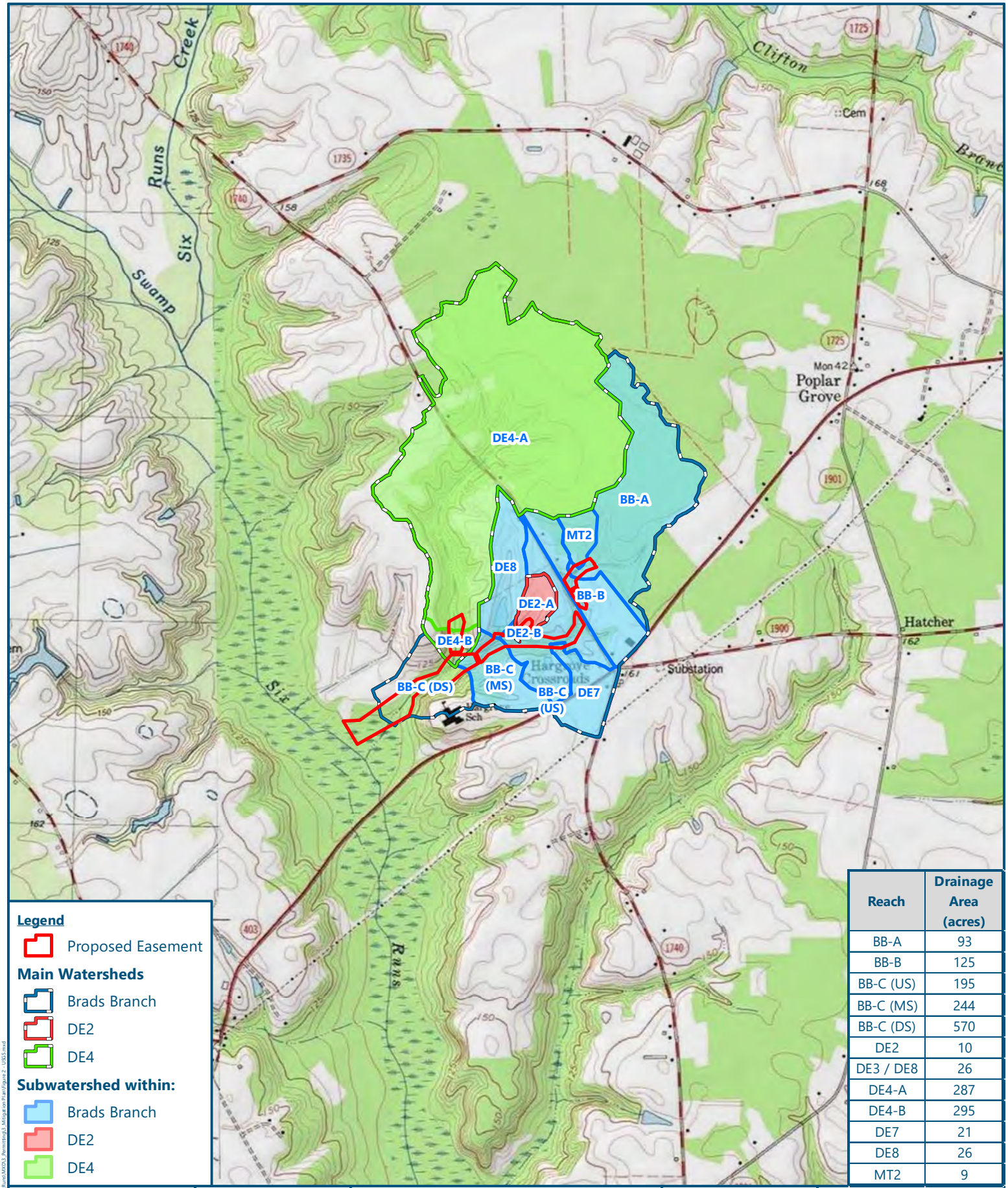

Legend

Proposed Easement

Main Watersheds

Brads Branch

DE2

DE4

Subwatershed within:

Brads Branch

DE2

DE4

Reach	Drainage Area (acres)
BB-A	93
BB-B	125
BB-C (US)	195
BB-C (MS)	244
BB-C (DS)	570
DE2	10
DE3 / DE8	26
DE4-A	287
DE4-B	295
DE7	21
DE8	26
MT2	9

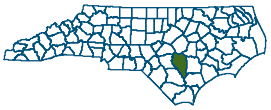

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Figure 2 - USGS Quadrangle

Faison (1977)

Six Runs Mitigation Project

Sampson County, North Carolina

Date: 1/28/2022

Drawn by: SCF

Checked by: KAW

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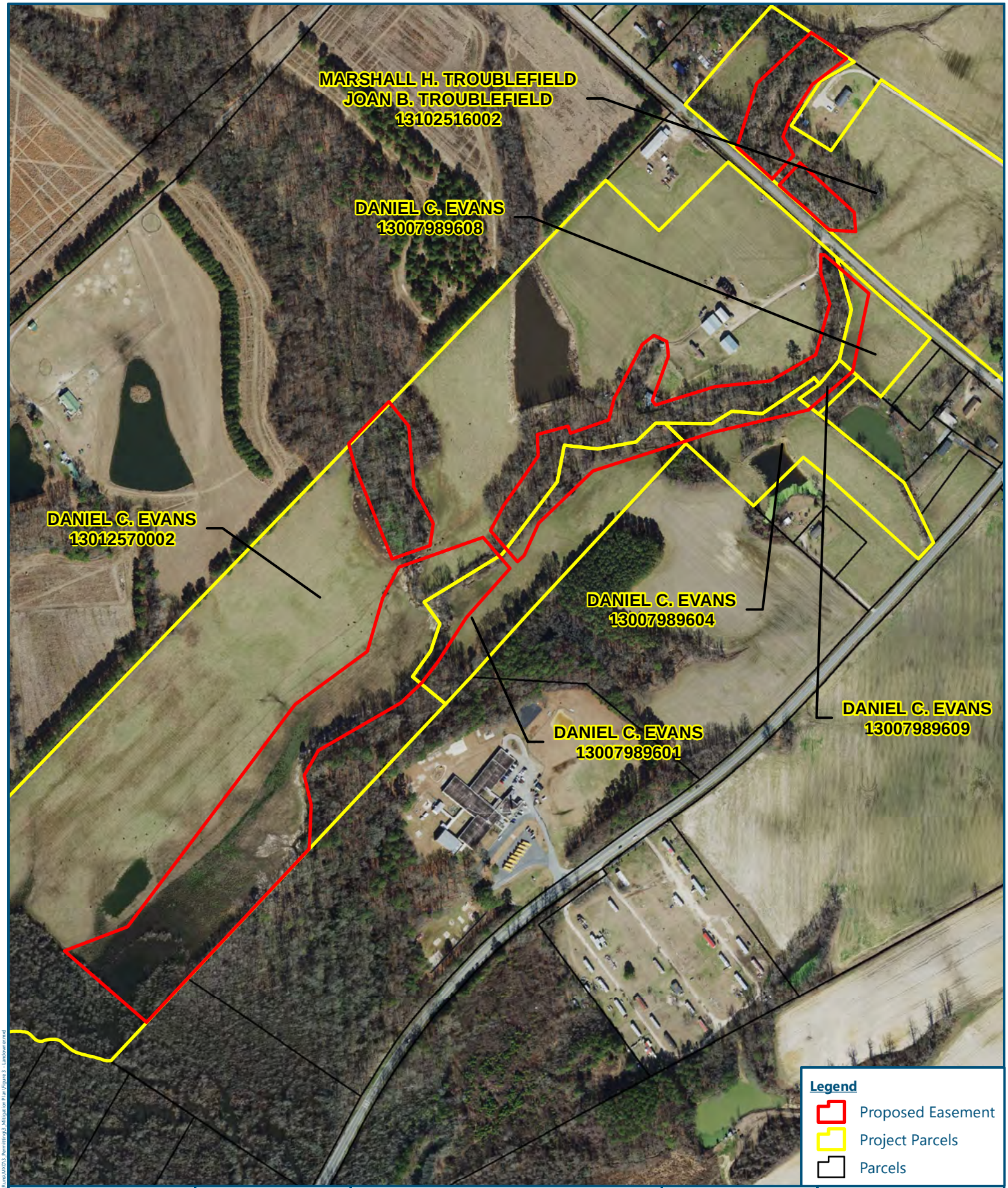

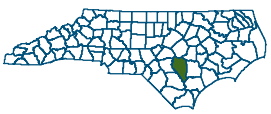

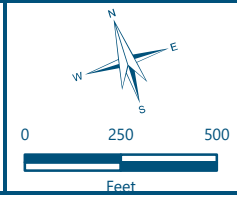

Figure 3 - Landowner Parcels

Six Runs
Mitigation Project

Sampson County, North Carolina

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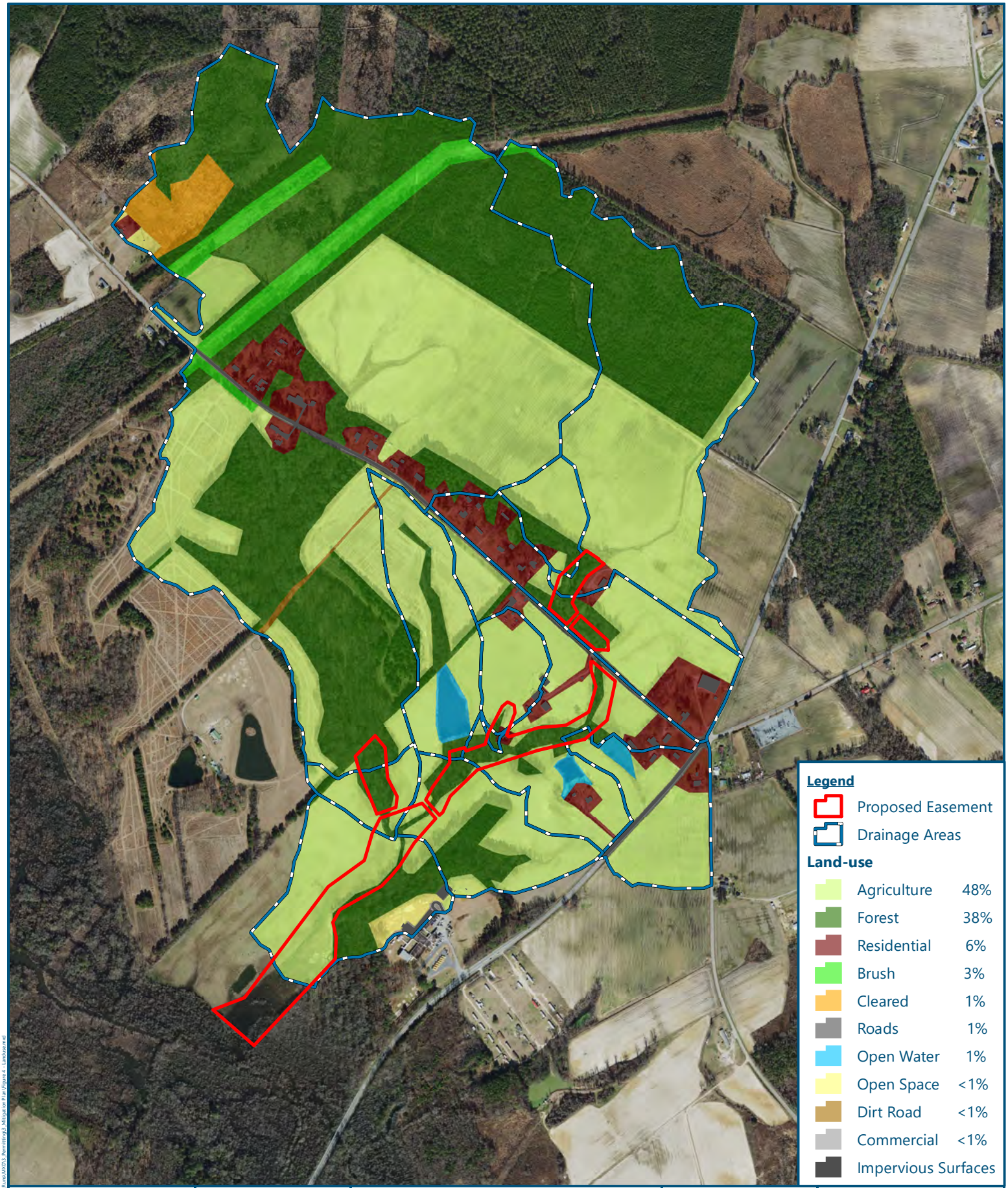

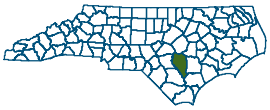

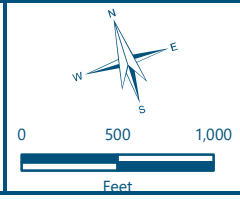

Figure 4 - Land-use

Six Runs
Mitigation Project

Sampson County, North Carolina

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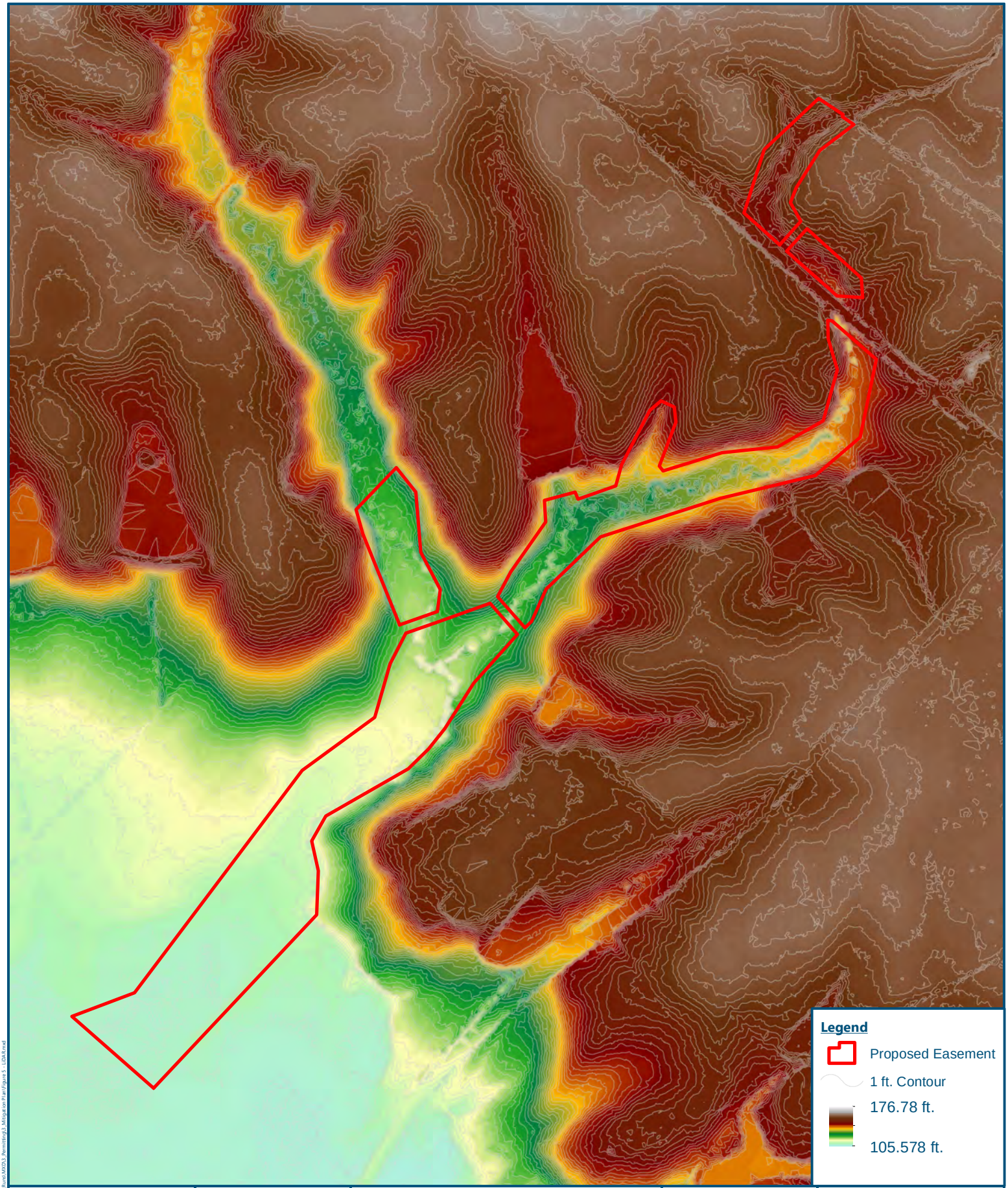

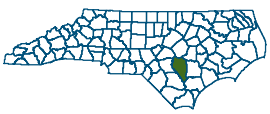

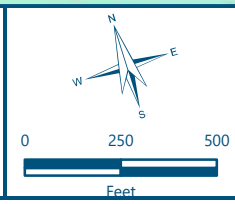

Figure 5 - LiDAR

Six Runs
Mitigation Project

Sampson County, North Carolina

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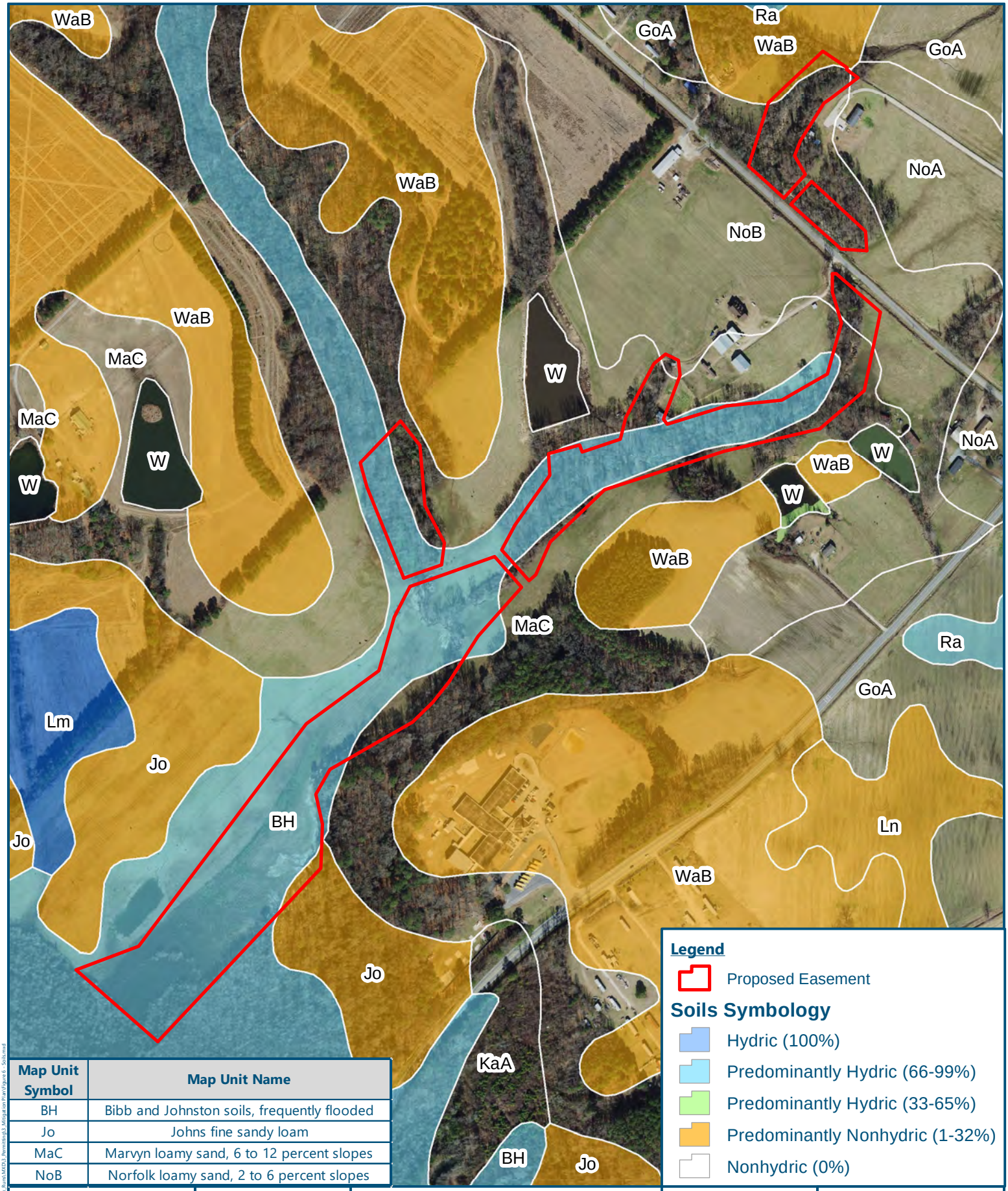


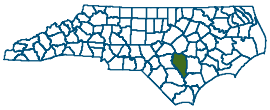
Map Unit Symbol	Map Unit Name
BH	Bibb and Johnston soils, frequently flooded
Jo	Johns fine sandy loam
MaC	Marvyn loamy sand, 6 to 12 percent slopes
NoB	Norfolk loamy sand, 2 to 6 percent slopes

Legend

Proposed Easement

Soils Symbology

- Hydric (100%)
- Predominantly Hydric (66-99%)
- Predominantly Hydric (33-65%)
- Predominantly Nonhydric (1-32%)
- Nonhydric (0%)



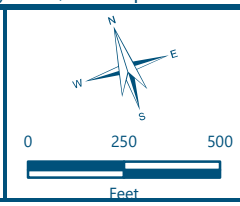


Figure 6 - NRCS Soil Survey

Six Runs Mitigation Project

Sampson County, North Carolina

Date: 1/28/2022

Drawn by: MDD

Checked by: KAW

1 inch = 500 feet

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1 in = 300 feet

0 150 300
Feet

Figure 7 - Existing Conditions

Six Runs Mitigation Project

Sampson County, North Carolina

Drawn by: MDD	Reviewed by: KAW
Date: 1/26/2022	Revision: n/a

Legend

- Proposed Easement
- Existing Wetland
- Existing Hydric Soil Area

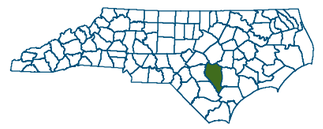
Stream Type

- Intermittent
- Perennial
- Stream ID Form Location
- Existing Cross Section

REFERENCE

1) Horizontal Datum is NAD83 UTM Zone 17N

2) Map Projection is NAD_1983_StatePlane_South_Carolina_FIPS_3200_Feet



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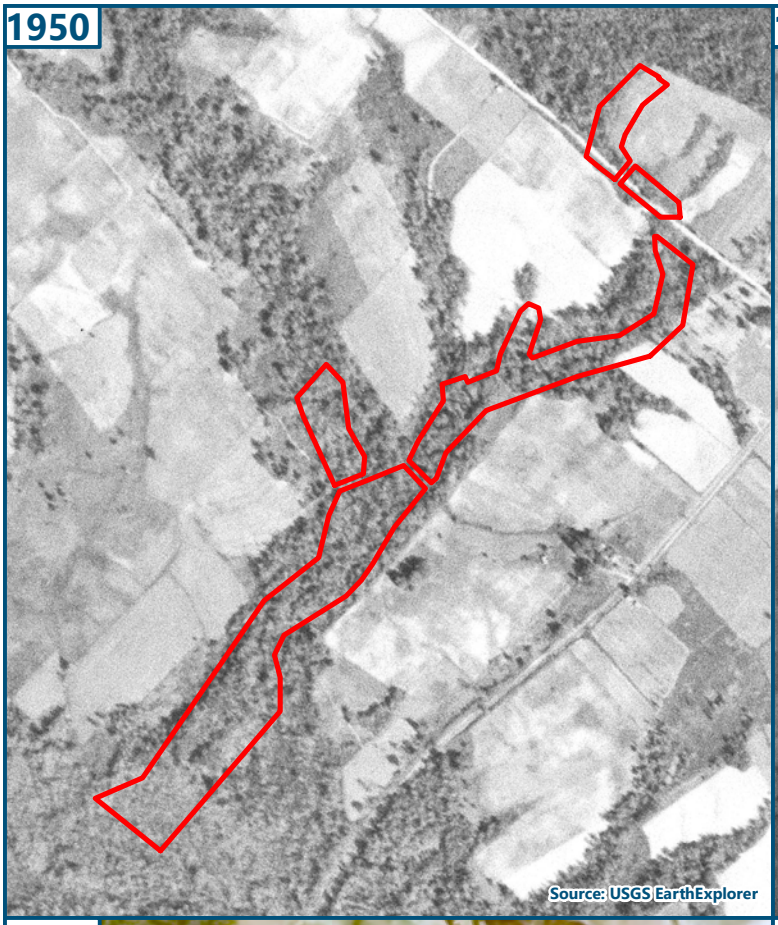

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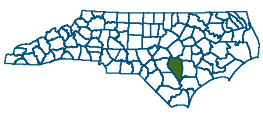
Proposed Easement



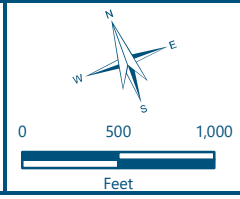


Figure 8 - Historic Imagery

Six Runs Mitigation Project

Sampson County, North Carolina

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Drawn by:	SCF
Checked by:	KAW
	1 inch = 1,000 feet

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Restoring a resilient earth for a modern world

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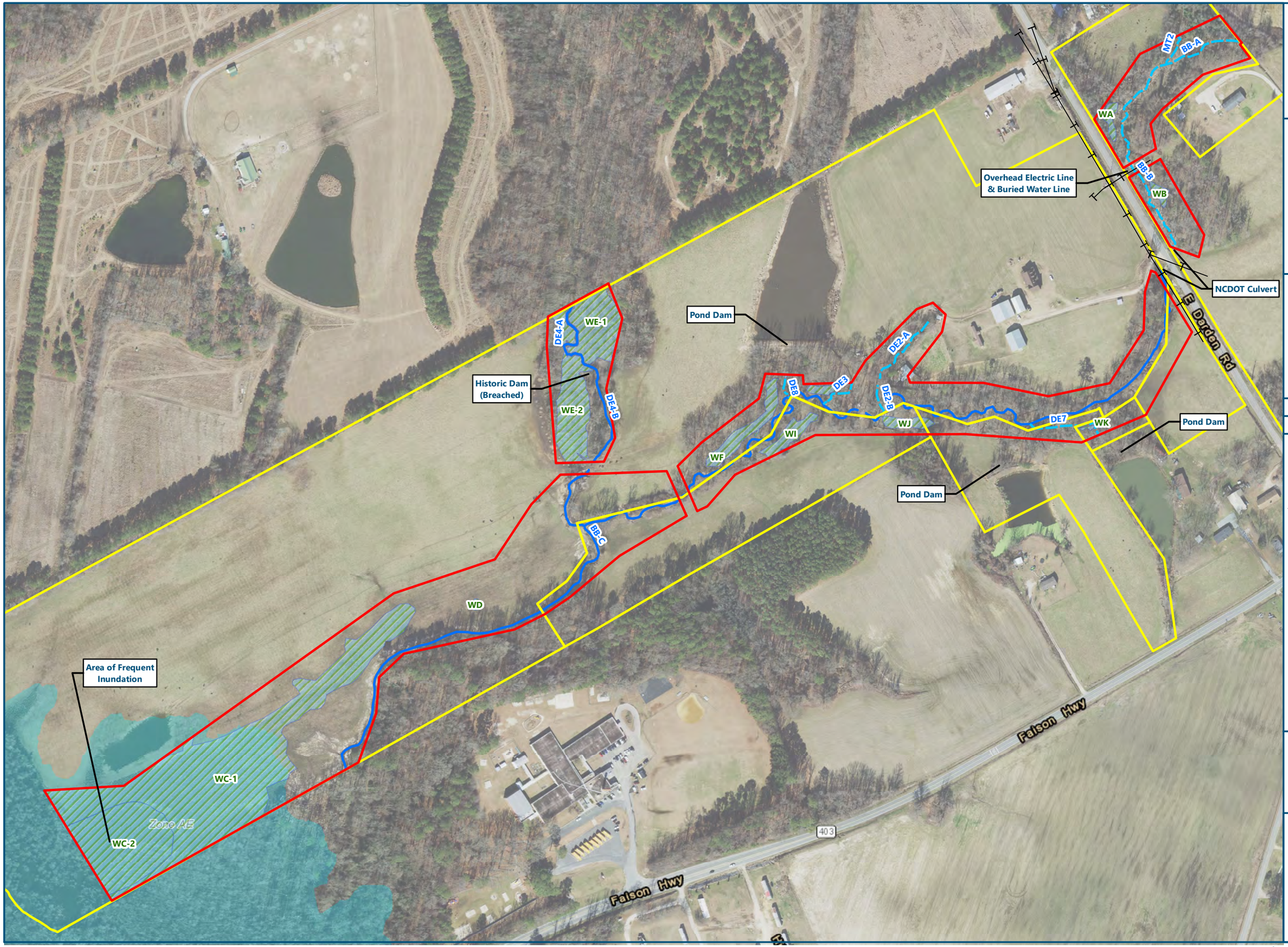

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N
W E
S

1 in = 300 feet

0 150 300
Feet

Figure 9 - Project Constraints

Six Runs Mitigation Project

Sampson County, North Carolina

Drawn by: MDD	Reviewed by: KAW
Date: 1/28/2022	Revision: n/a

Legend

- Proposed Easement
- Project Parcels
- Overhead Electric Line
- Existing Wetland
- NWI Wetlands (USFWS May 2020)
- FEMA Zone AE

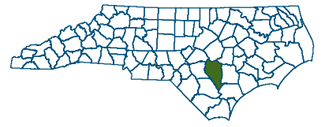
Stream Type

- Intermittent
- Perennial

REFERENCE

1) Horizontal Datum is NAD83 UTM Zone 17N

2) Map Projection is NAD_1983_StatePlane_ South_Carolina_FIPS_3200_Feet



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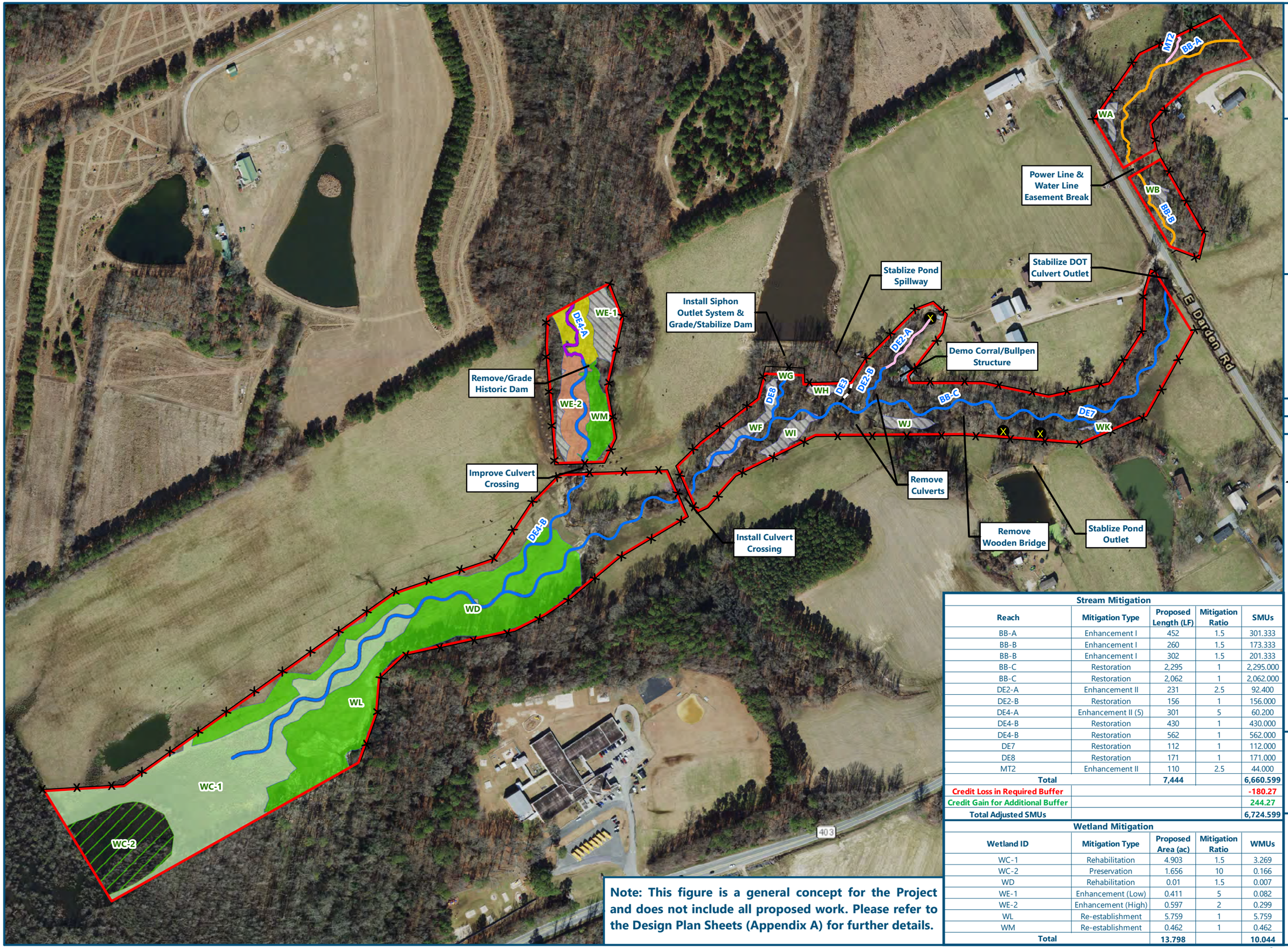

Note: This figure is a general concept for the Project and does not include all proposed work. Please refer to the Design Plan Sheets (Appendix A) for further details.

Stream Mitigation

Reach	Mitigation Type	Proposed Length (LF)	Mitigation Ratio	SMUs
BB-A	Enhancement I	452	1.5	301.333
BB-B	Enhancement I	260	1.5	173.333
BB-B	Enhancement I	302	1.5	201.333
BB-C	Restoration	2,295	1	2,295.000
BB-C	Restoration	2,062	1	2,062.000
DE2-A	Enhancement II	231	2.5	92.400
DE2-B	Restoration	156	1	156.000
DE4-A	Enhancement II (5)	301	5	60.200
DE4-B	Restoration	430	1	430.000
DE4-B	Restoration	562	1	562.000
DE7	Restoration	112	1	112.000
DE8	Restoration	171	1	171.000
MT2	Enhancement II	110	2.5	44.000
Total		**7,444**		**6,660.599**
Credit Loss in Required Buffer				**-180.27**
Credit Gain for Additional Buffer				**244.27**
Total Adjusted SMUs				**6,724.599**

Wetland Mitigation

Wetland ID	Mitigation Type	Proposed Area (ac)	Mitigation Ratio	WMUs
WC-1	Rehabilitation	4.903	1.5	3.269
WC-2	Preservation	1.656	10	0.166
WD	Rehabilitation	0.01	1.5	0.007
WE-1	Enhancement (Low)	0.411	5	0.082
WE-2	Enhancement (High)	0.597	2	0.299
WL	Re-establishment	5.759	1	5.759
WM	Re-establishment	0.462	1	0.462
Total		**13.798**		**10.044**

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N W E S

1 in = 300 feet

0 150 300

Feet

Figure 10 - Conceptual

Six Runs Mitigation Project

Sampson County, North Carolina

Drawn by: MDD	Reviewed by: BPB
Date: 7/15/2022	Revision: n/a

Legend

- Proposed Easement (30.94 ac)
- Proposed Fencing

Stream Approach

- Restoration
- Enhancement I
- Enhancement II
- Enhancement II (5:1)
- No Credit

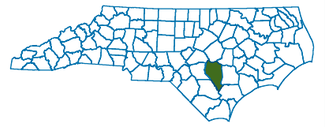
Wetland Approach

- Re-establishment
- Rehabilitation
- Enhancement (High)
- Enhancement (Low)
- Preservation
- No Credit
- Engineered Sediment Pack

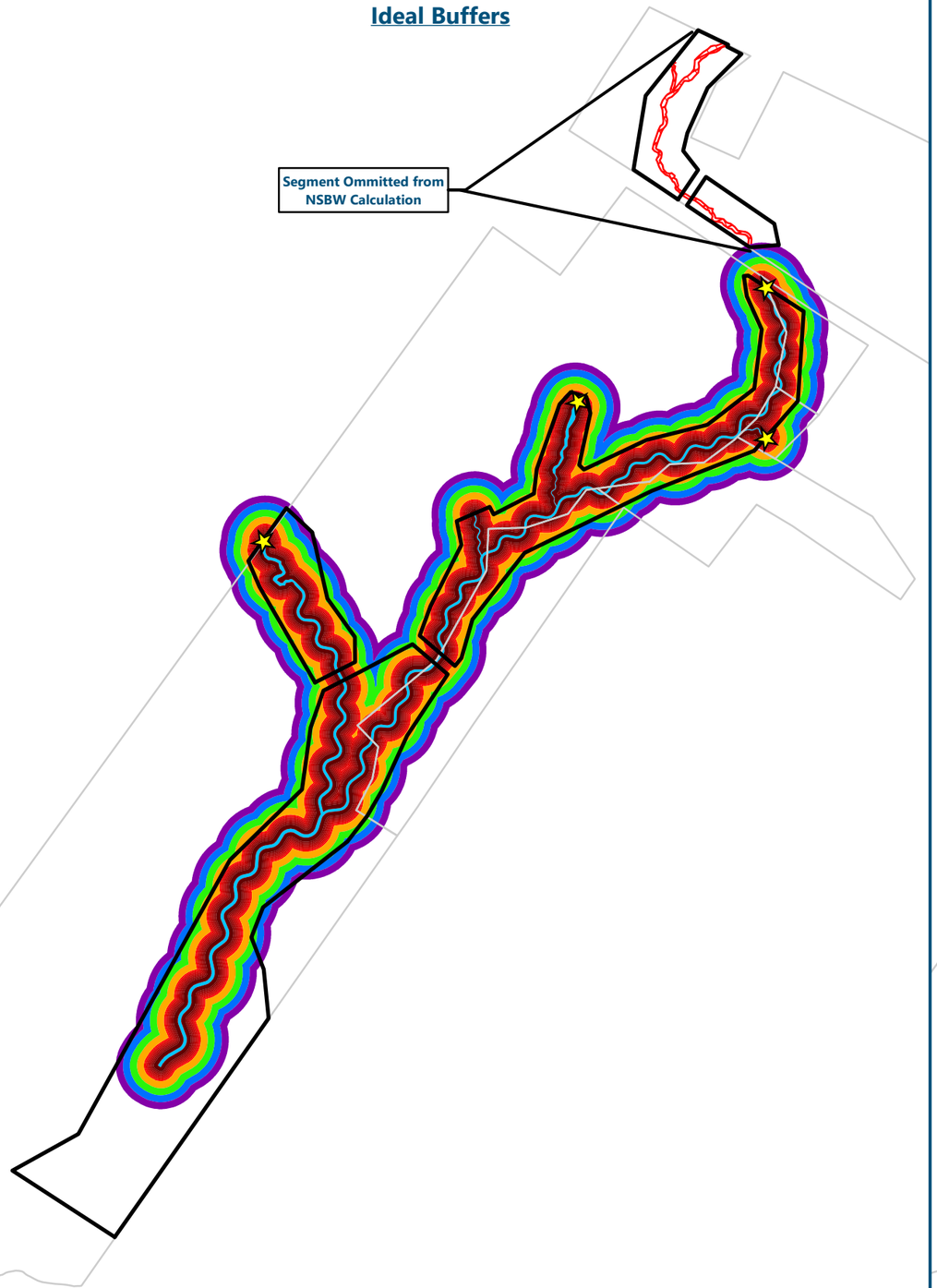
REFERENCE

1) Horizontal Datum is NAD83 UTM Zone 17N

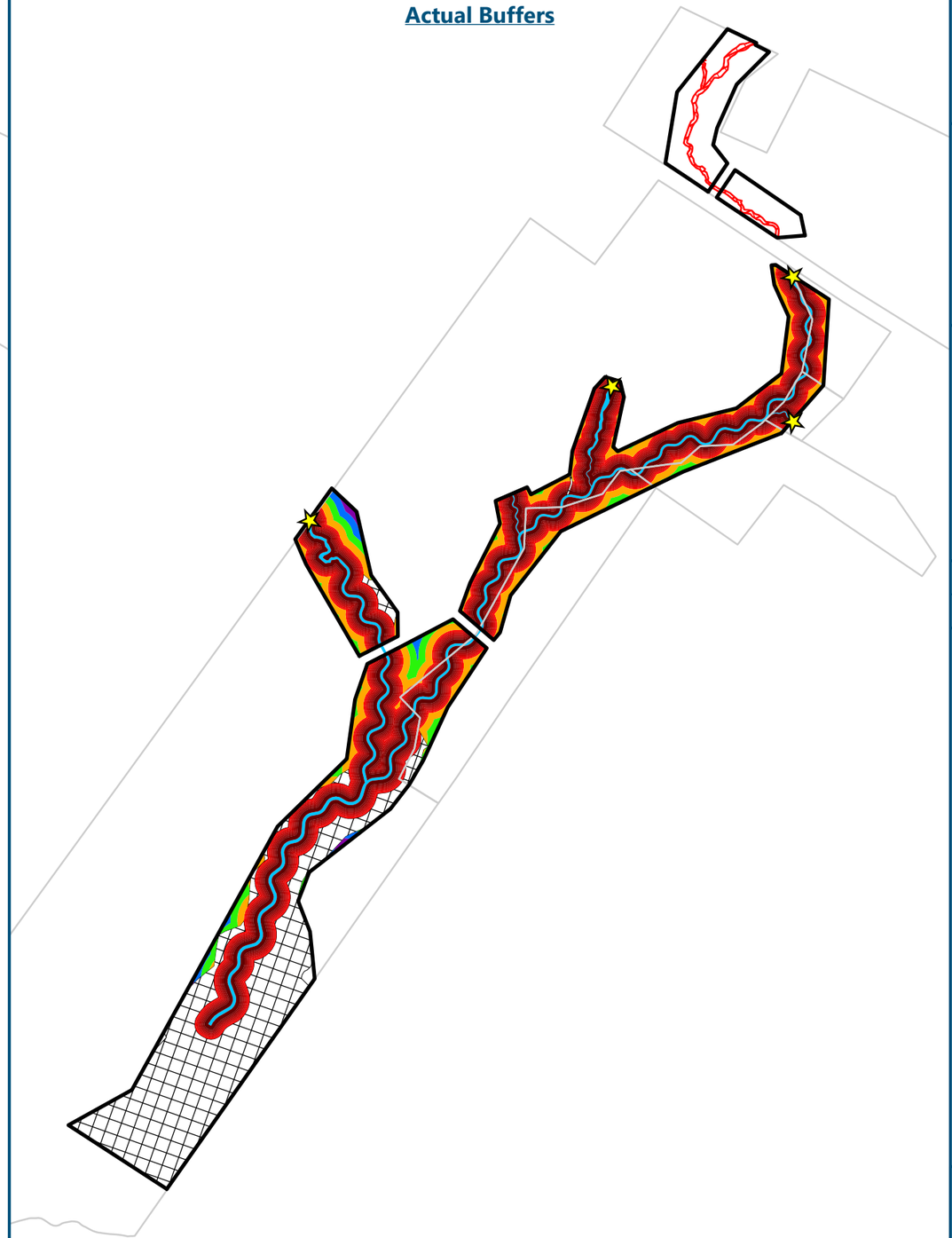
2) Map Projection is NAD_1983_StatePlane_North_Carolina_FIPS_3200_Feet



Ideal Buffers



Actual Buffers



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1 in = 500 feet

0 250 500

Feet

Figure 11 - Non-Standard Buffer Zones

Six Runs Mitigation Project

Sampson County, North Carolina

Drawn by: MDD	Checked by: BPB
Date: 7/15/2022	Revision: 2

Legend

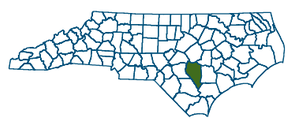
- Proposed Easement
- Parcel Boundary

Proposed TOB

- Included for NSBW
- Ommitted from NSBW

Buffer Zone (ft)

- 0-15
- 16-20
- 21-25
- 26-30
- 31-35
- 36-40
- 41-45
- 46-50
- 51-75
- 76-100
- 101-125
- 126-150
- Ineligible Area
- Exempt Terminal End



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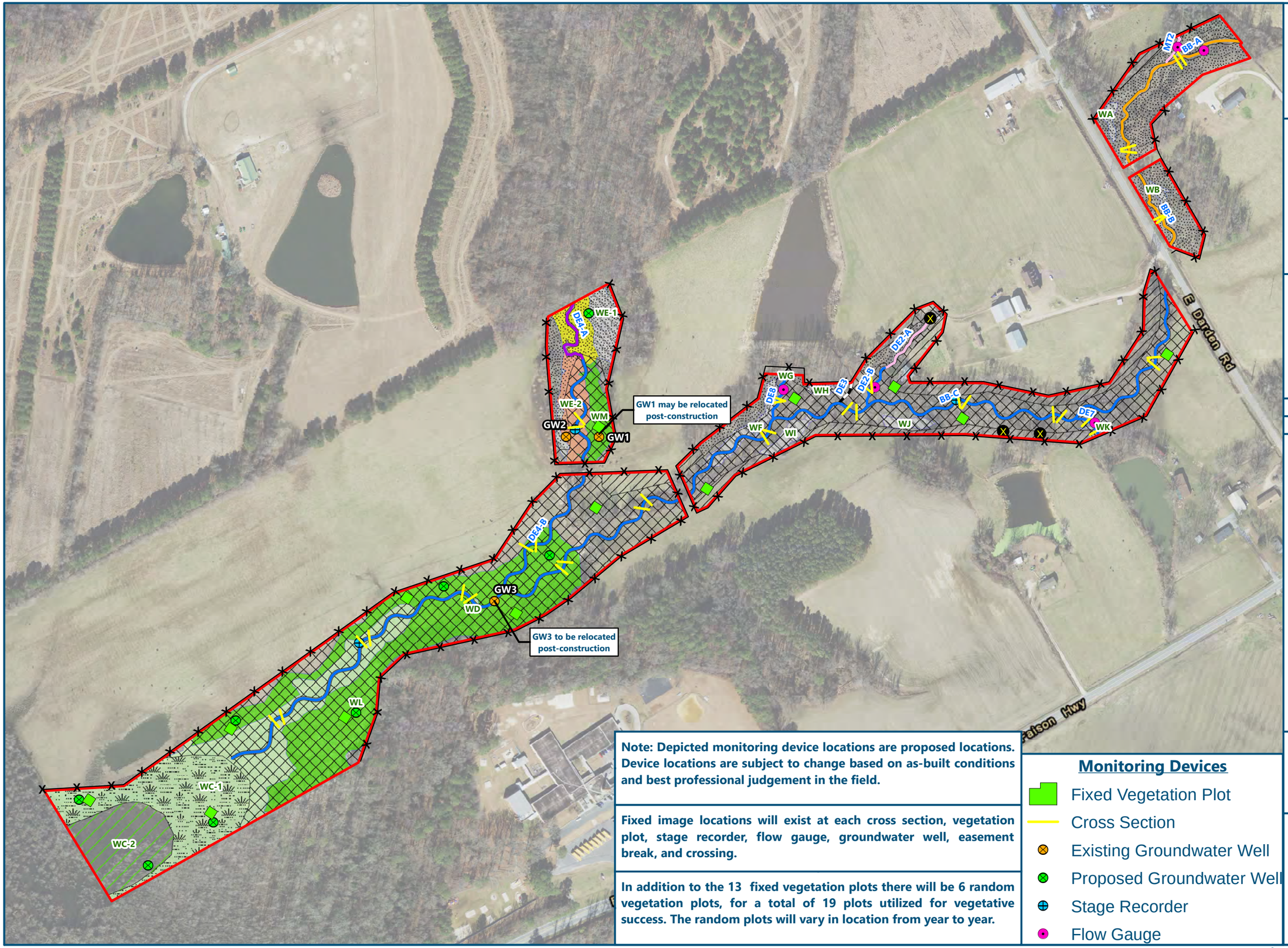

Note: Depicted monitoring device locations are proposed locations. Device locations are subject to change based on as-built conditions and best professional judgement in the field.

Fixed image locations will exist at each cross section, vegetation plot, stage recorder, flow gauge, groundwater well, easement break, and crossing.

In addition to the 13 fixed vegetation plots there will be 6 random vegetation plots, for a total of 19 plots utilized for vegetative success. The random plots will vary in location from year to year.

Monitoring Devices

- Fixed Vegetation Plot
- Cross Section
- Existing Groundwater Well
- Proposed Groundwater Well
- Stage Recorder
- Flow Gauge

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N W E S

1 in = 300 feet

0 150 300

Feet

Figure 12 - Monitoring

Six Runs Mitigation Project

Sampson County, North Carolina

Drawn by: MDD	Reviewed by: BPB
Date: 6/30/2022	Revision: 1

Project Features

- Proposed Easement (30.94 ac)

Planting Area (22.59 ac)

- Zone 1-A (17.07 ac)
- Zone 1-B (2.82 ac)
- Zone 2 (2.70 ac)
- Supplemental

Wetland Approach

- Re-establishment
- Rehabilitation
- Enhancement (High)
- Enhancement (Low)
- Preservation
- No Credit

Stream Approach

- Restoration
- Enhancement I
- Enhancement II
- Enhancement II (5)
- No Credit

- Proposed Fencing
- Engineered Sediment Pack

REFERENCE

1) Horizontal Datum is NAD83 UTM Zone 17N

2) Map Projection is NAD_1983_StatePlane_South_Carolina_FIPS_3200_Feet

Appendix A

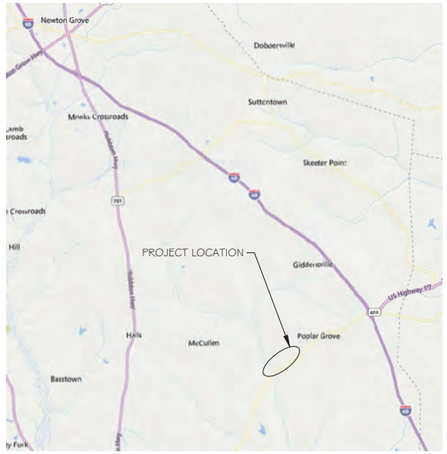
Plan Sheets

SIX RUNS MITIGATION SITE

SAMPSON COUNTY, NORTH CAROLINA
(35.096223, -78.229693)

CAPE FEAR RIVER BASIN/HUC: 03030006110010
JULY 2022

RESOURCE ENVIRONMENTAL SOLUTIONS, LLC
3600 GLENWOOD AVE, SUITE 100
RALEIGH, NC 27612



VICINITY MAP
NTS

Know what's below.
Call before you dig

NOTICE TO CONTRACTOR

PRIOR TO CONSTRUCTION, DIGGING, OR EXCAVATION THE CONTRACTOR IS RESPONSIBLE FOR LOCATING ALL UNDERGROUND UTILITIES (PUBLIC OR PRIVATE) THAT MAY EXIST AND CROSS THROUGH THE AREA(S) OF CONSTRUCTION, WHETHER INDICATED ON THE PLANS OR NOT. CALL "811" A MINIMUM OF 72 HOURS PRIOR TO DIGGING OR EXCAVATING. REPAIRS TO ANY UTILITY DAMAGED RESULTING FROM CONSTRUCTION ACTIVITIES SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR.

PROJECT DIRECTORY

DESIGNED BY:
RESOURCE ENVIRONMENTAL SOLUTIONS, LLC
3600 GLENWOOD AVE, SUITE 100
RALEIGH, NC 27612

DESIGNED FOR:
LINDSAY CROCKER
NC DEPARTMENT OF ENVIRONMENTAL QUALITY
DIVISION OF MITIGATION SERVICES
217 WEST JONES ST., SUITE 300A
RALEIGH, NC 27603

SURVEYED BY:
MATRIX EAST, PLLC
906 N. QUEEN ST., SUITE A
KINSTON, NC 28501

DMS PROJECT #: 100170
CONTRACT #: 0303-01
USACE ACTION ID #: SAW-2020-01964
RFP #: 16-20190303

PROJECT TOPOGRAPHY AND EXISTING CONDITIONS PLANIMETRICS SURVEY WAS PROVIDED BY MATRIX EAST, PLLC (NC FIRM LICENSE NUMBER P-0221, CHRISTOPHER K. PADERICK, NC PLS L-4189), DATED FEBRUARY, 2021

SITE MAP
NTS

Sheet List Table

Sheet Number	Sheet Title
--	COVER
A1	OVERALL AERIAL
E1	NOTES
E2	EXISTING CONDITIONS
S1	REACH BB & MT2
S2	REACH BB
S3	REACH BB
S4	REACH BB
S5	REACH BB
S6	REACH BB
S7	REACH BB
S8	REACH BB
S9	REACH BB
S10	REACH BB
S11	REACH DE2
S12	REACH DE4
S13	REACH DE4
S14	REACH DE7
S15	REACH DE8
X1	FARM CROSSINGS
F1	DAM SIPHON & OUTLET
F2	FENCING PLAN
P1	PLANTING PLAN
W1	WETLAND PLAN
D1	DETAILS
D2	DETAILS
D3	DETAILS
D4	DETAILS
D5	DETAILS
D6	DETAILS

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License: F-1428

SEAL

PLOT DATE: 7/14/2022

REVISIONS:

RELEASED FOR: DRAFT - FOR PERMITTING ONLY

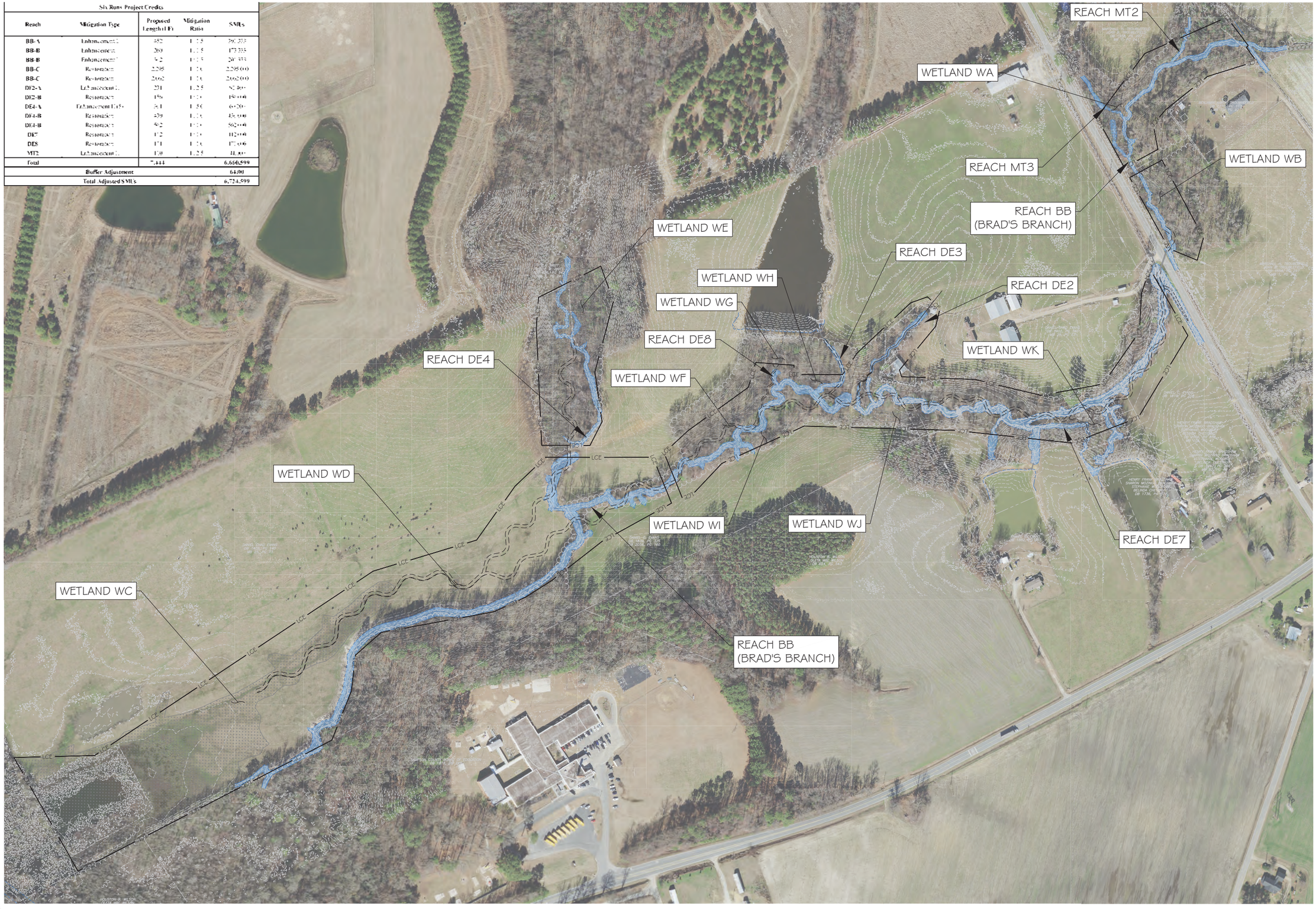
PROJECT NUMBER:	103205
PROJECT MANAGER:	BB
DESIGNED:	AFM
DRAWN:	TRS
CHECKED:	BRC

SHEET NUMBER:

FILE NAME:R:\Resrad\Projects\103205-Six Runs\DWG\103205_SHT_COVER.dwg SAVED BY: Stasking

Six Runs Project Credits

Reach	Mitigation Type	Proposed Length (LF)	Mitigation Ratio	SMUs
BB-A	Enhancement I	552	1.5	368.000
BB-B	Enhancement	260	1.5	173.333
BB-B	Enhancement I	302	1.5	201.333
BB-C	Restoration	2,295	1.0	2,295.000
BB-C	Restoration	2,662	1.0	2,662.000
DE2-A	Enhancement I	221	1.25	92.500
DE2-B	Restoration	195	1.0	195.000
DE4-A	Enhancement I/II	301	1.50	6.050
DE4-B	Restoration	229	1.0	45.000
DE4-B	Restoration	562	1.0	562.000
DE7	Restoration	112	1.0	112.000
DE8	Restoration	171	1.0	171.000
MT2	Enhancement I	130	1.25	41.300
Total		7,344		6,664.599
Buffer Adjustment				64.00
Total Adjusted SMUs				6,724.599



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FULL SCALE: 1" = 150

0 150 300

2" = FULL SCALE
1" = HALF SCALE

PLOT DATE: 7/15/2022

REVISIONS:

RELEASED FOR: DRAFT - FOR PERMITTING ONLY

PROJECT NAME:
SIX RUNS MITIGATION SITE
SAMPSON COUNTY, NORTH CAROLINA

DRAWING TITLE:
OVERALL AERIAL

PROJECT NUMBER:	103205
PROJECT MANAGER:	BB
DESIGNED:	AFM
DRAWN:	TRS
CHECKED:	BRC

SHEET NUMBER:

A1

STREAM CONSTRUCTION NOTES:

1. ALL PROPOSED CHANNELS AND TEMPORARY AND PERMANENT CROSSINGS SHALL BE CONSTRUCTED IN A DRY CONDITION VIA OFFLINE CONSTRUCTION WHERE POSSIBLE. PUMP AROUND OPERATIONS SHOULD BE LIMITED TO AREAS WHERE THE EXISTING AND PROPOSED CHANNEL ALIGNMENTS OVERLAP.
2. ALL IMPERVIOUS DIKES AND PUMPING APPARATUS SHALL BE REMOVED FROM THE STREAM AT THE END OF EACH DAY TO RESTORE NORMAL FLOW BACK TO THE CHANNEL UNLESS OTHERWISE APPROVED BY THE ENGINEER. WITH APPROVAL, A PUMP AROUND MAY BE ALLOWED TO RUN CONTINUOUSLY IF THERE IS NO FORECAST FOR RAIN OVERNIGHT, AND/OR THE PUMP APPARATUS IS MAINTAINED AND MONITORED CONTINUOUSLY.
3. CONSTRUCT UPSTREAM PORTION OF THE CHANNEL FIRST, WORKING IN AN UPSTREAM TO DOWNSTREAM DIRECTION, UNLESS OTHERWISE APPROVED BY THE ENGINEER.
4. REMOVE AND STOCKPILE TOPSOIL WITHIN AREAS THAT ARE TO BE CUT 9" OR MORE BELOW EXISTING GRADE. STOCKPILED TOPSOIL IS TO BE PLACED ALONG THE CORRESPONDING FLOODPLAIN BENCHES.
5. STRUCTURES ARE TO BE INSTALLED IN LOCATIONS SHOWN ON PLAN SHEETS (AS INDICATED ON THE STRUCTURE TABLES) USING METHODS DESCRIBED IN THE DETAIL SHEETS. PRIOR TO FINE GRADING, OBTAIN APPROVAL OF THE ENGINEER ON INSTALLATION OF STRUCTURES.
6. SUBSTRATE MATERIAL SHALL BE INSTALLED ALONG THE BED OF ALL PROPOSED RIFFLE SECTIONS. SEE RIFFLE DETAILS ON SHEET D5 AND D6 FOR RIFFLE MATERIAL COMPOSITION.
7. ALL QUARRY STONE SHALL MEET NCDOT STANDARDS AND SPECIFICATIONS.
8. UPON COMPLETION OF FINE GRADING, INSTALL EROSION CONTROL MATTING (SHEET D1) OR SOD MATS (PER ENGINEER APPROVAL) ALONG CHANNEL BANKS.
9. FILL AND STABILIZE ABANDONED SEGMENTS OF THE EXISTING CHANNEL PER PLAN SHEETS AND DETAIL SHEET D3.

LEGEND

- EXISTING CONTOUR MAJOR
- EXISTING CONTOUR MINOR
- PROPOSED CONTOUR MAJOR
- PROPOSED CONTOUR MINOR
- EXISTING WETLAND
- EXISTING STREAM
- EXISTING TOP OF BANK
- EXISTING BOTTOM OF BANK
- EXISTING OVERHEAD ELECTRIC UTILITY LINE
- PROPERTY LINE
- EXISTING FENCELINE
- EXISTING TREELINE
- EXISTING TREE
- PROPOSED TOP OF BANK
- PROPOSED CENTERLINE OF CHANNEL
- LIMITS OF PROPOSED CONSERVATION EASEMENT
- PROPOSED CHANNEL PLUG (SEE DETAIL D2)
- PROPOSED SWALE (SEE DETAIL D5)
- BRUSH TOE (SEE DETAIL D3)
- STONE TOE (SEE DETAIL D4)
- ENGINEERED SEDIMENT PACK (SEE DETAIL D2)
- LOG SILL (SEE DETAIL D5)
- ROCK SILL (SEE DETAIL D4)
- LOG J-HOOK (SEE DETAIL D4)
- ROCK CROSS VANE (SEE DETAIL D4)
- RIFFLE GRADE CONTROL (SEE DETAIL D6)
- WOODY RIFFLE (SEE DETAIL D6)
- LOG STRUCTURE (PROFILE)
- ROCK STRUCTURE (PROFILE)

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SEAL

PLOT DATE: 7/15/2022

REVISIONS:

RELEASED FOR: DRAFT - FOR PERMITTING ONLY

PROJECT NAME: SIX RUNS MITIGATION SITE
SAMPSON COUNTY, NORTH CAROLINA

DRAWING TITLE: NOTES

PROJECT NUMBER:	103205
PROJECT MANAGER:	BB
DESIGNED:	AFM
DRAWN:	TRS
CHECKED:	BRC

SHEET NUMBER: E1

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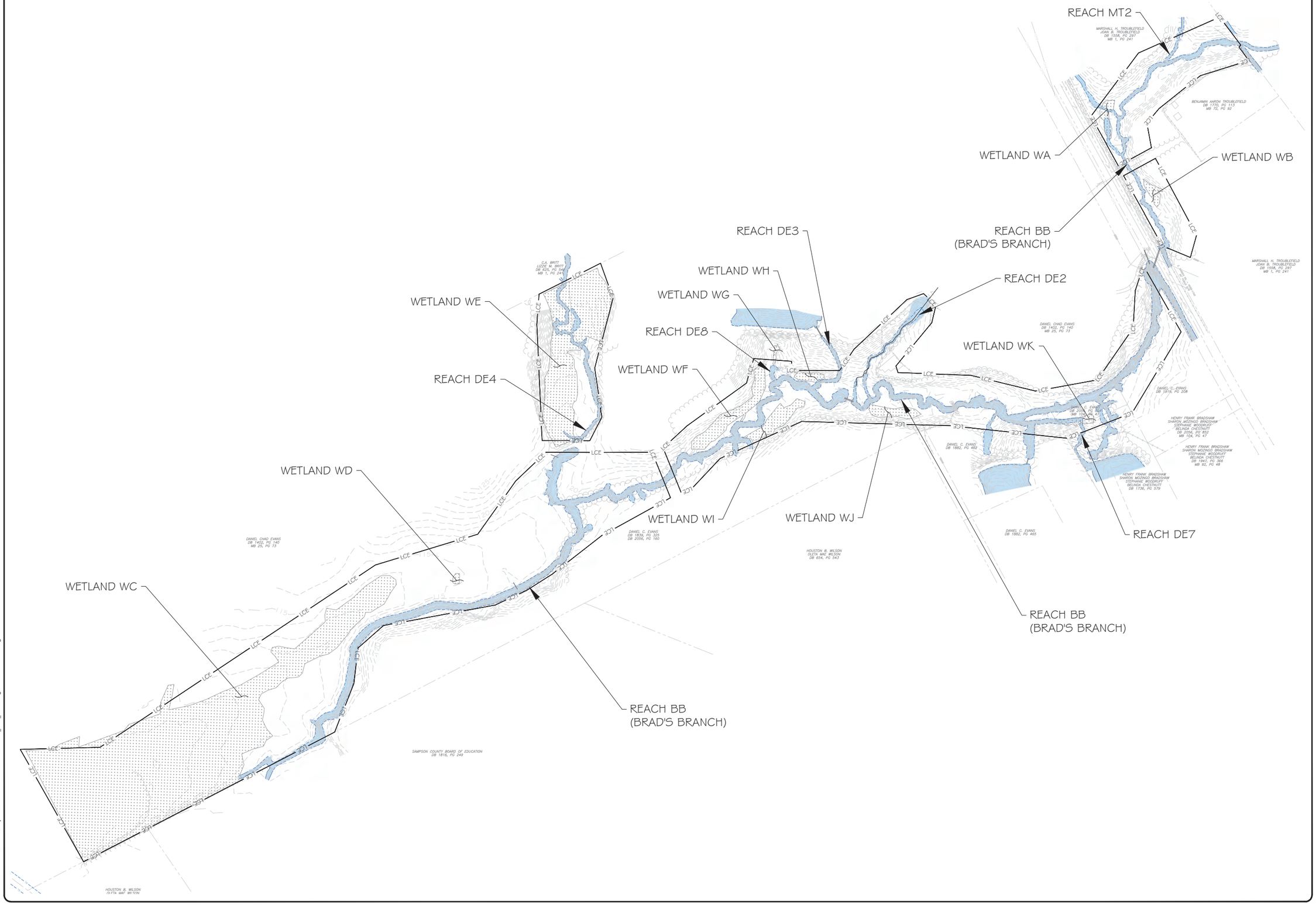

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SEAL

FULL SCALE: 1"=150

0 150 300

2" = FULL SCALE
1" = HALF SCALE

PLOT DATE:
7/14/2022

REVISIONS:

RELEASED FOR:
DRAFT - FOR PERMITTING ONLY

PROJECT NAME:
SIX RUNS MITIGATION SITE
SAMPSON COUNTY, NORTH CAROLINA

DRAWING TITLE:
EXISTING CONDITIONS

PROJECT NUMBER:	103205
PROJECT MANAGER:	BB
DESIGNED:	AFM
DRAWN:	TRS
CHECKED:	BRC

SHEET NUMBER:

E2

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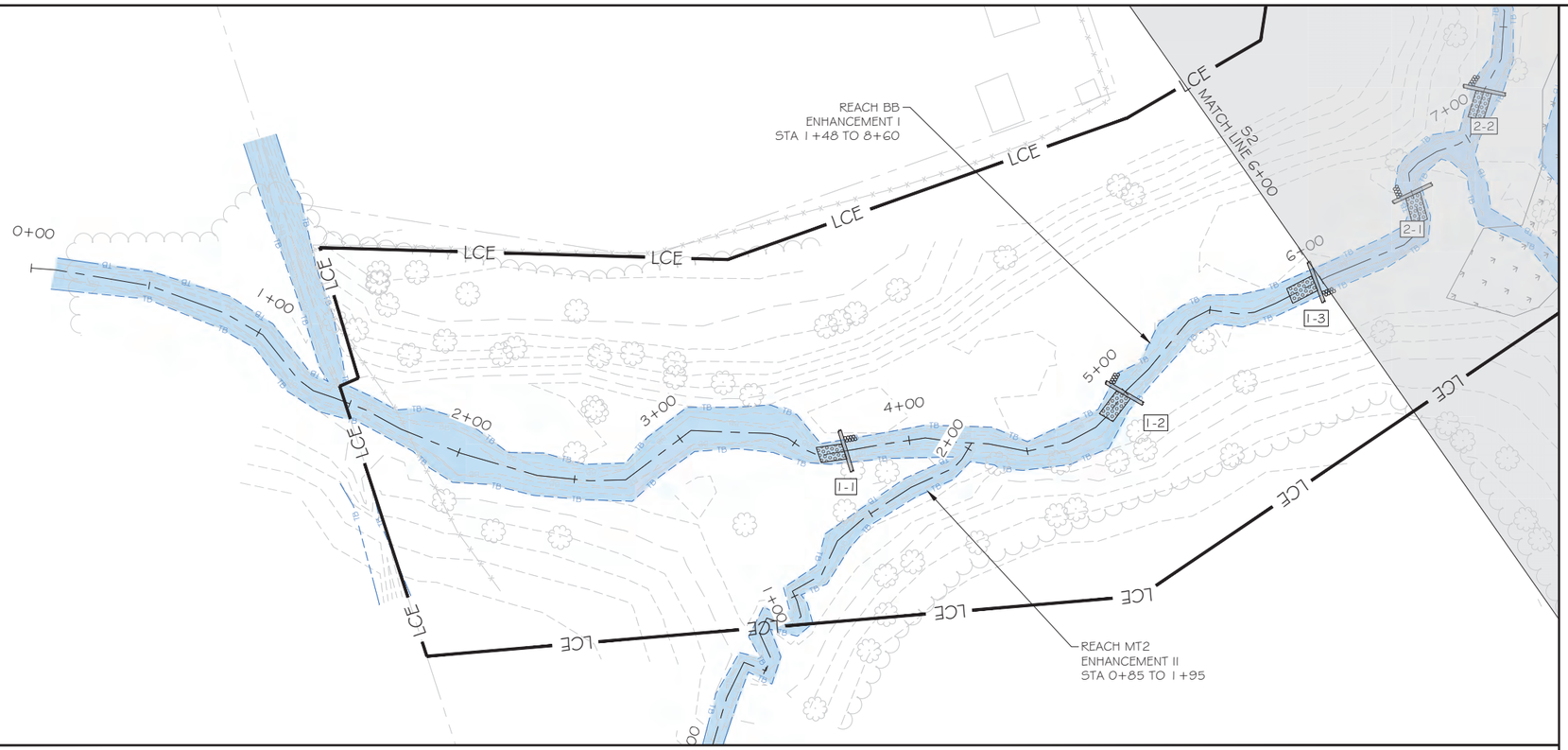

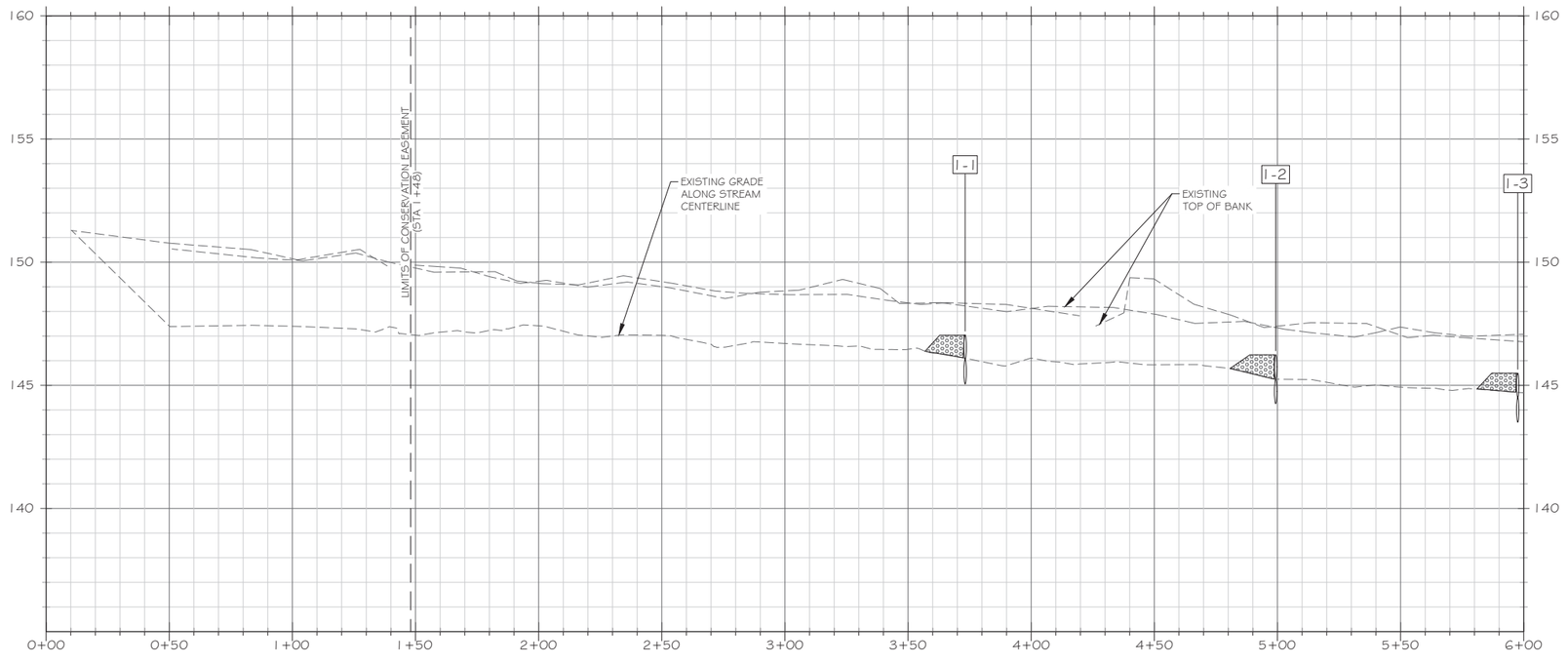

SCALE: HOR 1"=30'; VERT 1"=3'

NOTES:

ENHANCEMENT ACTIVITIES SHALL INCLUDE INVASIVE SPECIES MANAGEMENT, SUPPLEMENTAL PLANTING, INSTALLATION OF LOG SILLS AND BANK GRADING. THE LOCATION AND ELEVATION OF LOG SILLS SHALL BE VERIFIED AND ADJUSTED PER FIELD CONDITIONS BY THE ENGINEER PRIOR TO CONSTRUCTION. BOTH THE RIGHT AND LEFT BANK FROM STA 3+50 TO 11+22 SHALL BE GRADED PER DETAIL D2.

STRUCTURE TABLE			
NO.	TYPE	STA.	ELEV.
1-1	LOG SILL	3+73'	147.05'
1-2	LOG SILL	4+99'	146.25'
1-3	LOG SILL	5+98'	145.50'

TOE PROTECTION TABLE			
BANK	TYPE	FROM STA.	TO STA.
LT	BRUSH TOE	3+73'	3+78'
LT	BRUSH TOE	4+99'	5+03'
RT	BRUSH TOE	5+98'	6+04'

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License: F-1428

SEAL

FULL SCALE: 1"=30

0 30 60

2" = FULL SCALE
1" = HALF SCALE

PLOT DATE: 7/14/2022

REVISIONS:

RELEASED FOR: DRAFT - FOR PERMITTING ONLY

PROJECT NAME: SIX RUNS MITIGATION SITE
SAMPSON COUNTY, NORTH CAROLINA

DRAWING TITLE: REACH BB & MT2

PROJECT NUMBER:	103205
PROJECT MANAGER:	BB
DESIGNED:	AFM
DRAWN:	TRS
CHECKED:	BRC

SHEET NUMBER:

S1

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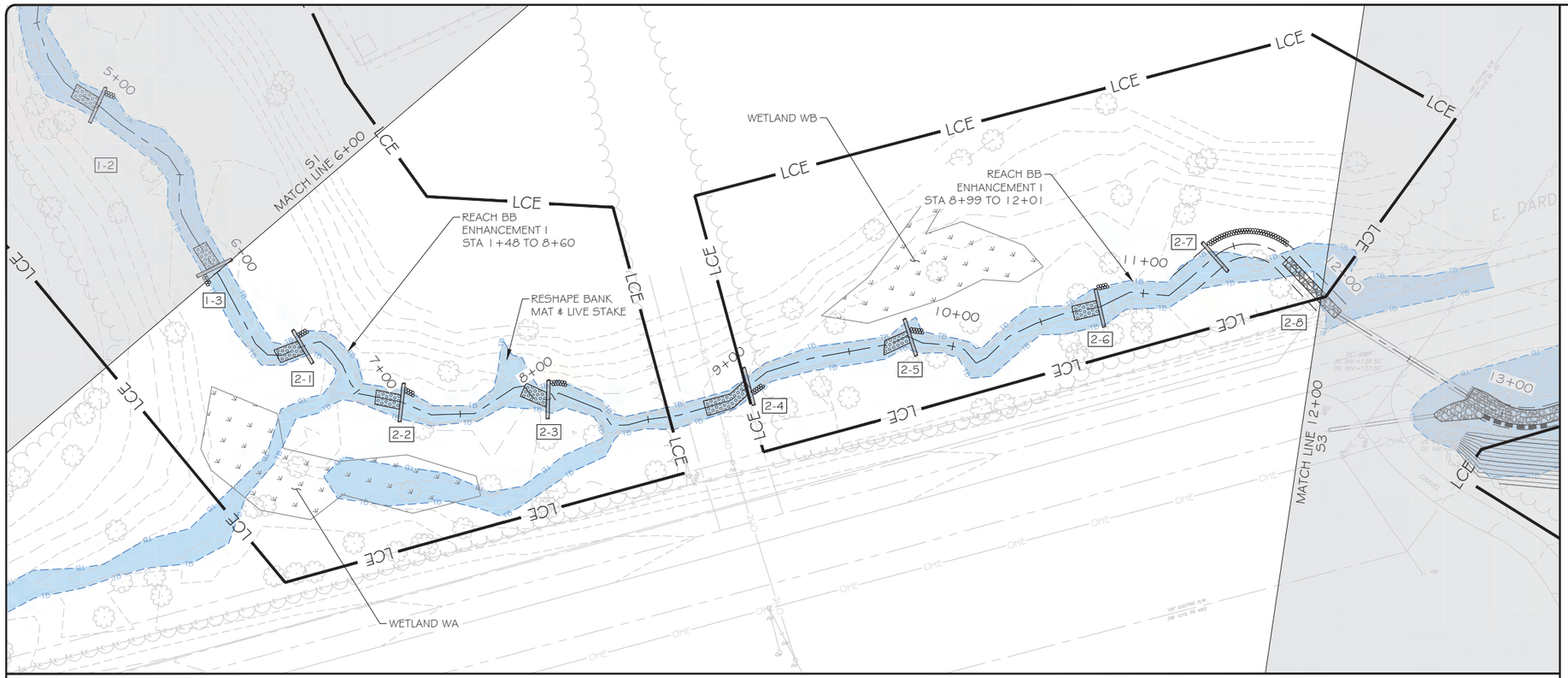
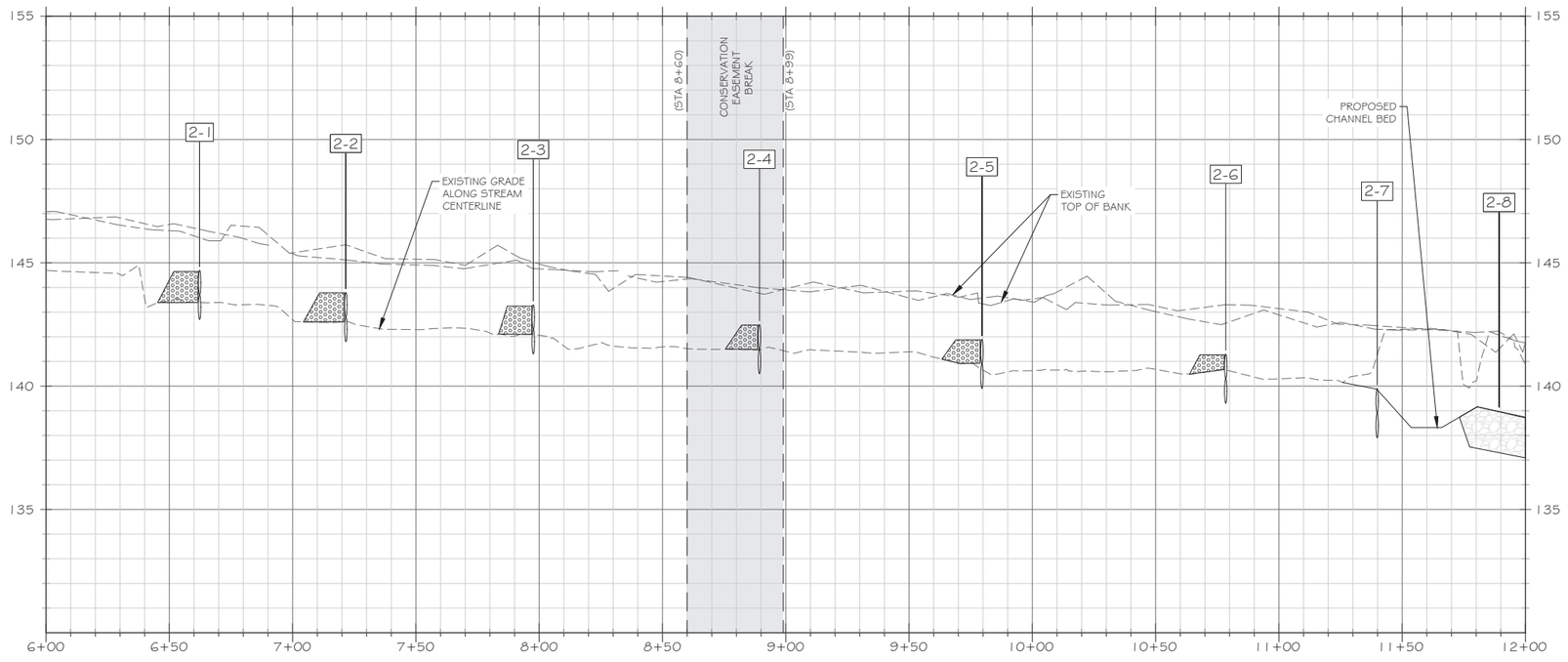
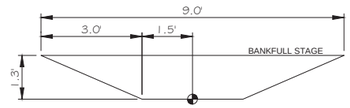




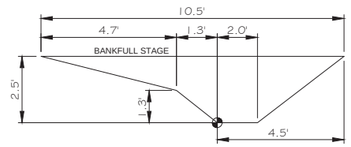
SCALE: HOR 1"=30'; VERT 1"=3'

REACH BB STA 11+22 TO STA 32+07

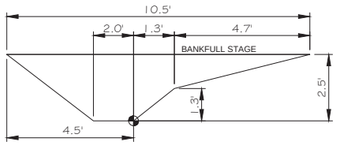
= ALIGNMENT POINT



TYPICAL RIFFLE CROSS SECTION



TYPICAL RIGHT MEANDER CROSS SECTION



TYPICAL LEFT MEANDER CROSS SECTION

NOTES:

ENHANCEMENT ACTIVITIES SHALL INCLUDE INVASIVE SPECIES MANAGEMENT, SUPPLEMENTAL PLANTING, INSTALLATION OF LOG SILLS AND BANK GRADING. THE LOCATION AND ELEVATION OF LOG SILLS SHALL BE VERIFIED AND ADJUSTED PER FIELD CONDITIONS BY THE ENGINEER PRIOR TO CONSTRUCTION. BOTH THE RIGHT AND LEFT BANK FROM STA 3+50 TO 11+22 SHALL BE GRADED PER DETAIL D2.

STRUCTURE TABLE			
NO.	TYPE	STA.	ELEV.
2-1	LOG SILL	6+62'	144.70'
2-2	LOG SILL	7+22'	143.80'
2-3	LOG SILL	7+98'	143.30'
2-4	LOG SILL	8+89'	142.50'
2-5	LOG SILL	9+80'	141.90'
2-6	LOG SILL	10+78'	141.30'
2-7	LOG SILL	11+40'	139.90'
2-8	RIFFLE GRADE CONTROL	SEE PROFILE	

TOE PROTECTION TABLE			
BANK	TYPE	FROM STA.	TO STA.
LT	BRUSH TOE	6+62'	6+66'
LT	BRUSH TOE	7+22'	7+26'
LT	BRUSH TOE	8+02'	8+06'
RT	BRUSH TOE	8+99'	9+06'
RT	BRUSH TOE	9+49'	9+55'
LT	BRUSH TOE	10+81'	10+86'
LT	BRUSH TOE	11+41'	11+73'

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License: F-1428

SEAL

FULL SCALE: 1"=30

0 30 60

2" = FULL SCALE
1" = HALF SCALE

PLOT DATE: 7/14/2022

REVISIONS:

RELEASED FOR: DRAFT - FOR PERMITTING ONLY

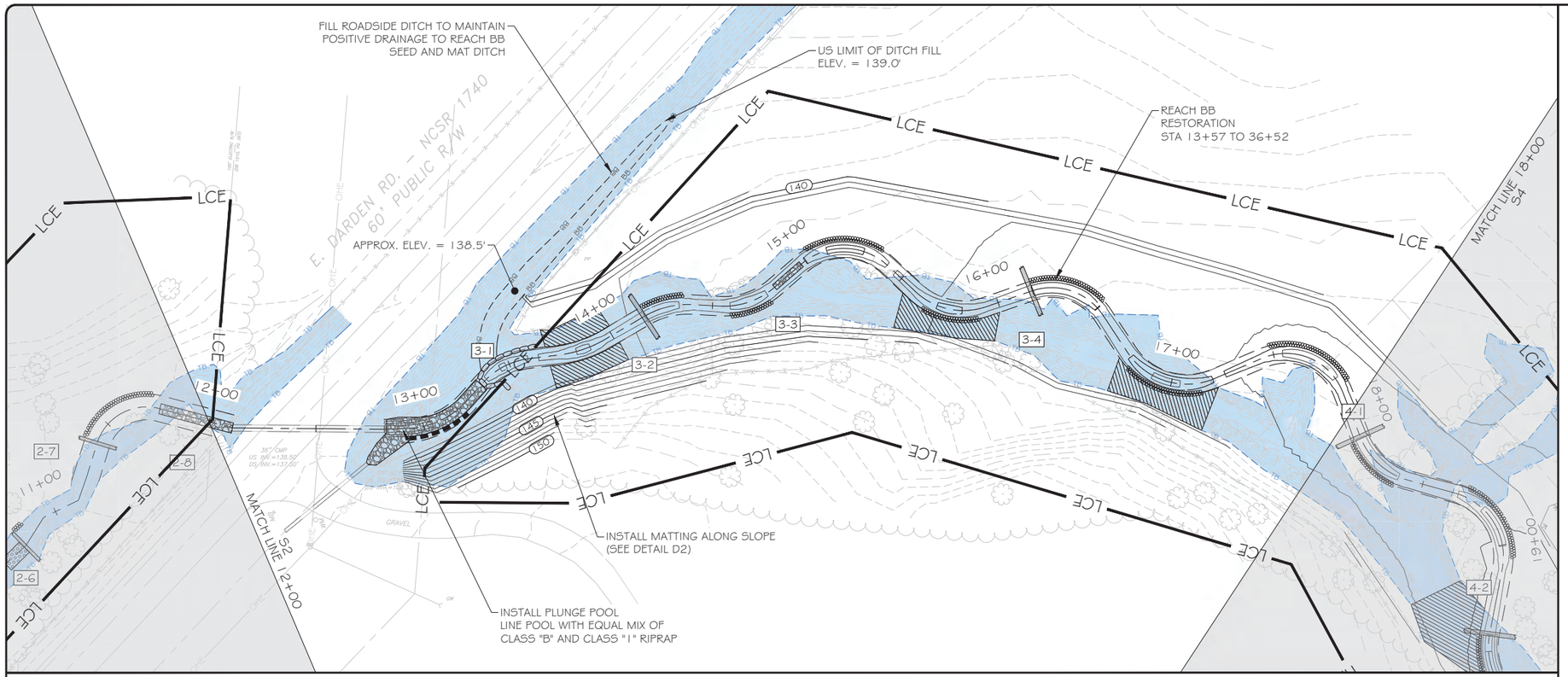
PROJECT NAME: SIX RUNS MITIGATION SITE
SAMPSON COUNTY, NORTH CAROLINA

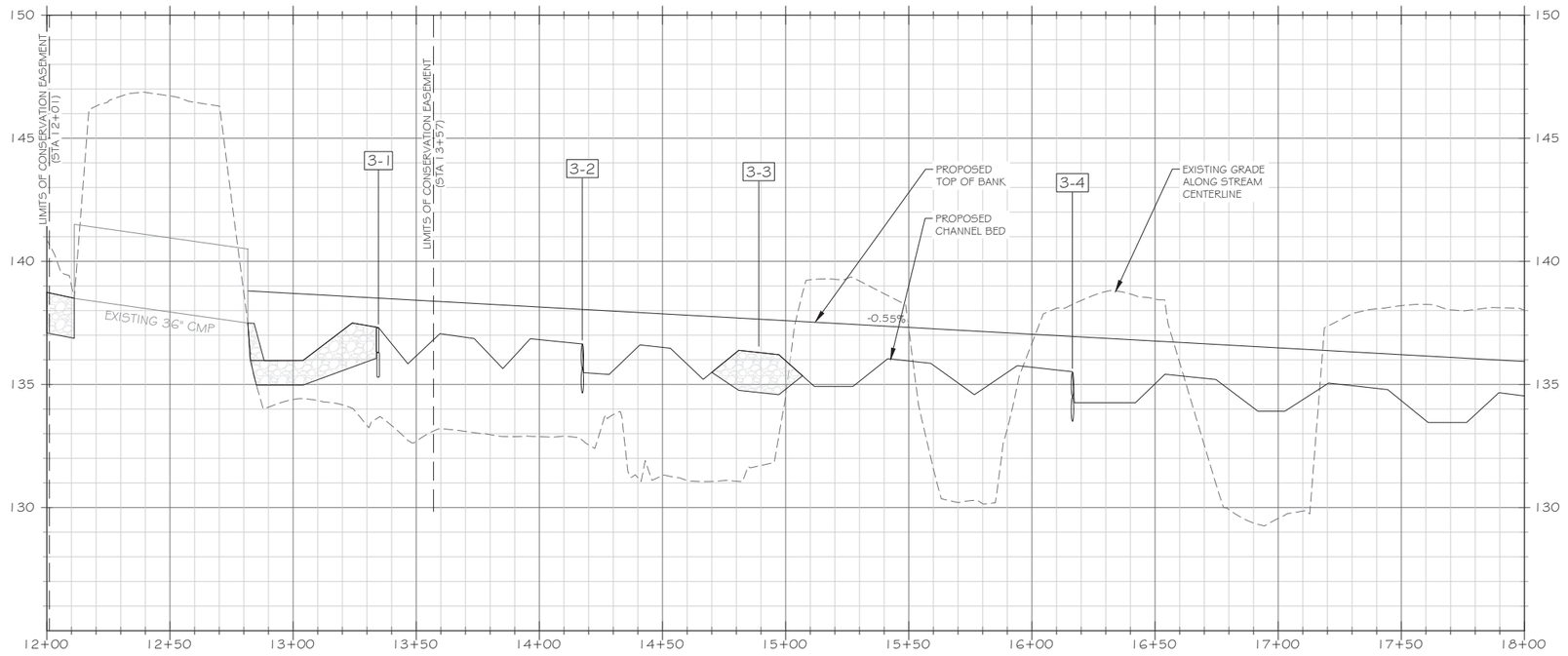
DRAWING TITLE: REACH BB

PROJECT NUMBER:	103205
PROJECT MANAGER:	BB
DESIGNED:	AFM
DRAWN:	TRS
CHECKED:	BRC

SHEET NUMBER: S2

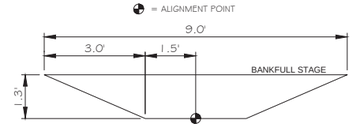
FILE NAME:R:\Resad\Projects\103205-Six Runs\DWG\103205_SHT_BB.dwg SAVED BY: Staaking



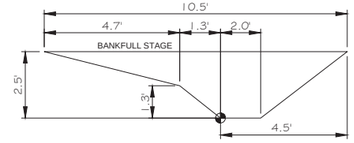


SCALE: HOR 1"=30'; VERT 1"=3'

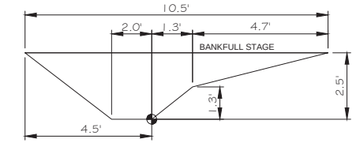
REACH BB STA 11+22 TO STA 32+07



TYPICAL RIFFLE CROSS SECTION



TYPICAL RIGHT MEANDER CROSS SECTION



TYPICAL LEFT MEANDER CROSS SECTION

STRUCTURE TABLE			
NO.	TYPE	STA.	ELEV.
3-1	ROCK CROSS VANE	13+35'	137.30'
3-2	LOG SILL	14+17'	136.65'
3-3	RIFFLE GRADE CONTROL	SEE PROFILE	
3-4	LOG SILL	16+16'	135.50'

TOE PROTECTION TABLE			
BANK	TYPE	FROM STA.	TO STA.
RT	STONE TOE	12+93'	13+20'
LT	BRUSH TOE	14+18'	14+37'
RT	BRUSH TOE	14+58'	14+77'
LT	BRUSH TOE	15+02'	15+36'
RT	BRUSH TOE	15+65'	15+90'
LT	BRUSH TOE	16+17'	16+49'
RT	BRUSH TOE	16+79'	17+14'
LT	BRUSH TOE	17+48'	17+86'

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SEAL

FULL SCALE: 1"=30
0 30 60
2" = FULL SCALE
1" = HALF SCALE

PLOT DATE: 7/14/2022

REVISIONS:

RELEASED FOR: DRAFT - FOR PERMITTING ONLY

PROJECT NAME: SIX RUNS MITIGATION SITE
SAMPSON COUNTY, NORTH CAROLINA

DRAWING TITLE: REACH BB

PROJECT NUMBER:	103205
PROJECT MANAGER:	BB
DESIGNED:	AFM
DRAWN:	TRS
CHECKED:	BRC

SHEET NUMBER: S3

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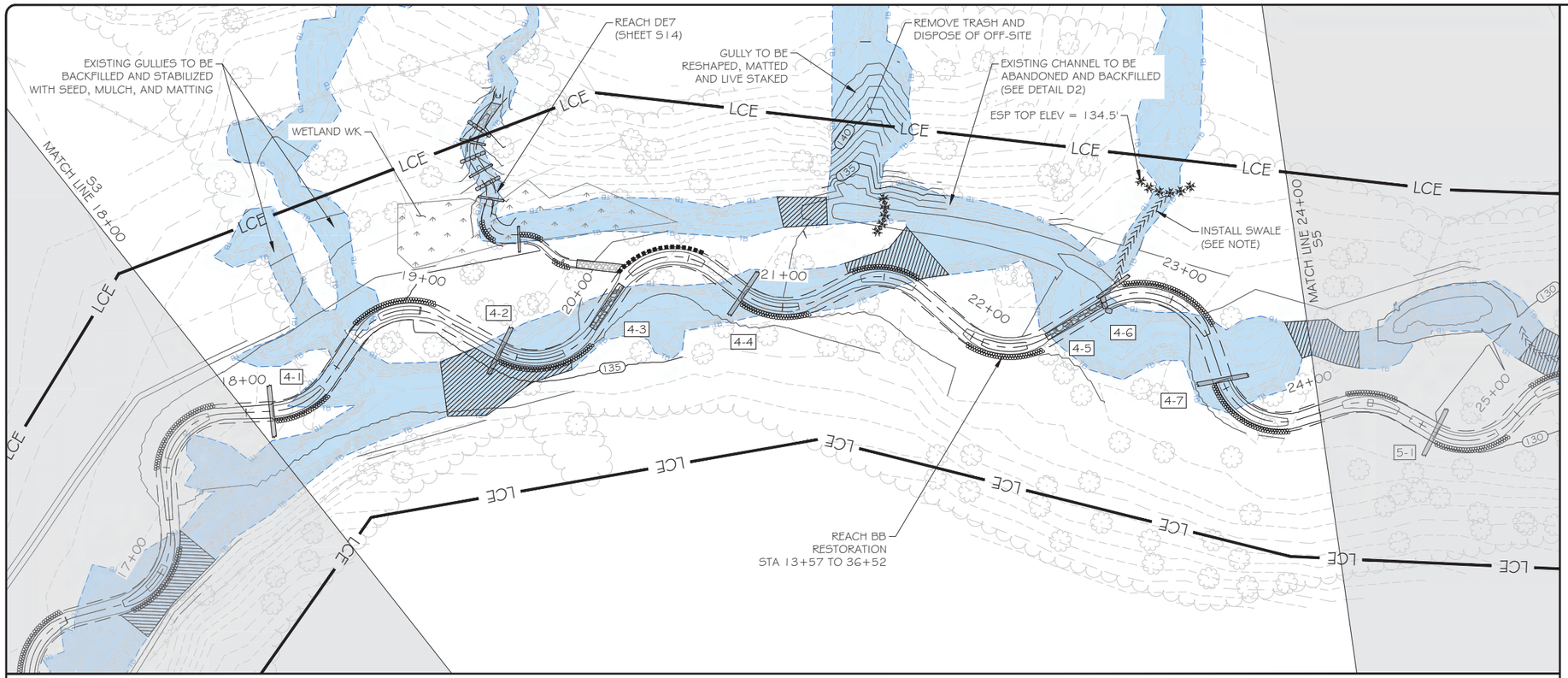
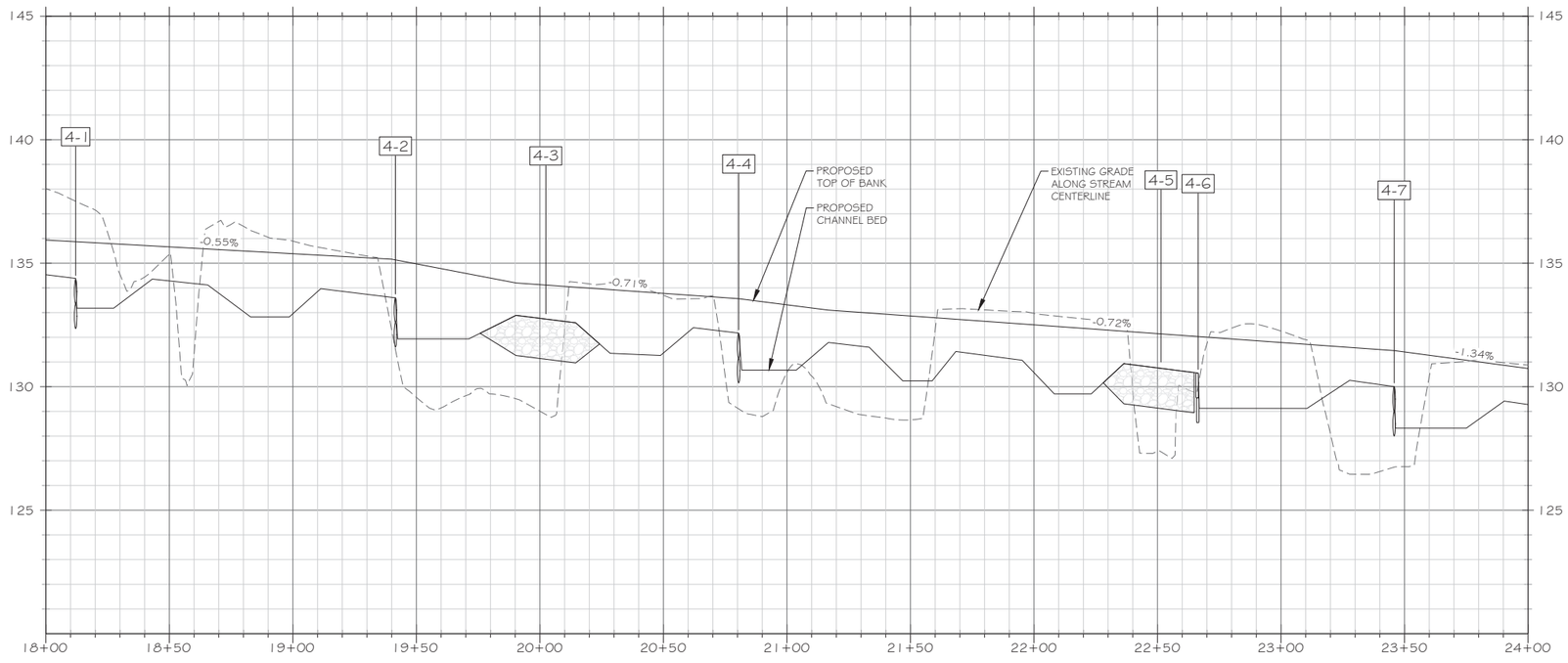
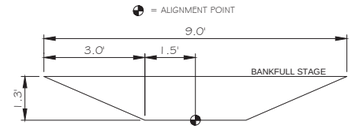


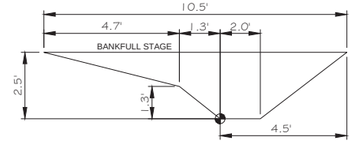


SCALE: HOR 1"=30'; VERT 1"=3'

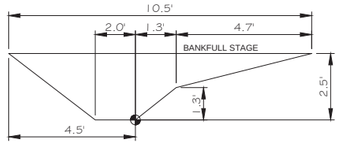
REACH BB STA 11+22 TO STA 32+07



TYPICAL RIFFLE CROSS SECTION



TYPICAL RIGHT MEANDER CROSS SECTION



TYPICAL LEFT MEANDER CROSS SECTION

NOTES:
SWALE DIMENSIONS:
- TOP WIDTH = 5'-6'
- BOTTOM WIDTH = 2'-3'
- DEPTH = 0.5'-0.75'

SWALE TO BE SEEDED, MULCHED, AND MATTED UPON COMPLETION

STRUCTURE TABLE			
NO.	TYPE	STA.	ELEV.
4-1	LOG SILL	18+12'	134.35'
4-2	LOG SILL	19+42'	133.60'
4-3	RIFFLE GRADE CONTROL	SEE PROFILE	
4-4	LOG SILL	20+80'	132.15'
4-5	RIFFLE GRADE CONTROL	SEE PROFILE	
4-6	J-HOOK	22+66'	130.55'
4-7	LOG SILL	23+46'	130.00'

TOE PROTECTION TABLE			
BANK	TYPE	FROM STA.	TO STA.
RT	BRUSH TOE	18+13'	18+38'
LT	BRUSH TOE	18+70'	19+06'
RT	BRUSH TOE	19+43'	19+85'
LT	STONE TOE	20+18'	20+55'
RT	BRUSH TOE	20+82'	21+12'
LT	BRUSH TOE	21+36'	21+64'
RT	BRUSH TOE	22+00'	22+33'
LT	BRUSH TOE	22+78'	23+21'
RT	BRUSH TOE	23+46'	23+85'

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SEAL

FULL SCALE: 1"=30
0 30 60
2" = FULL SCALE
1" = HALF SCALE

PLOT DATE: 7/14/2022

REVISIONS:

RELEASED FOR: DRAFT - FOR PERMITTING ONLY

PROJECT NAME: SIX RUNS MITIGATION SITE
SAMPSON COUNTY, NORTH CAROLINA

DRAWING TITLE: REACH BB

PROJECT NUMBER:	103205
PROJECT MANAGER:	BB
DESIGNED:	AFM
DRAWN:	TRS
CHECKED:	BRC

SHEET NUMBER: S4

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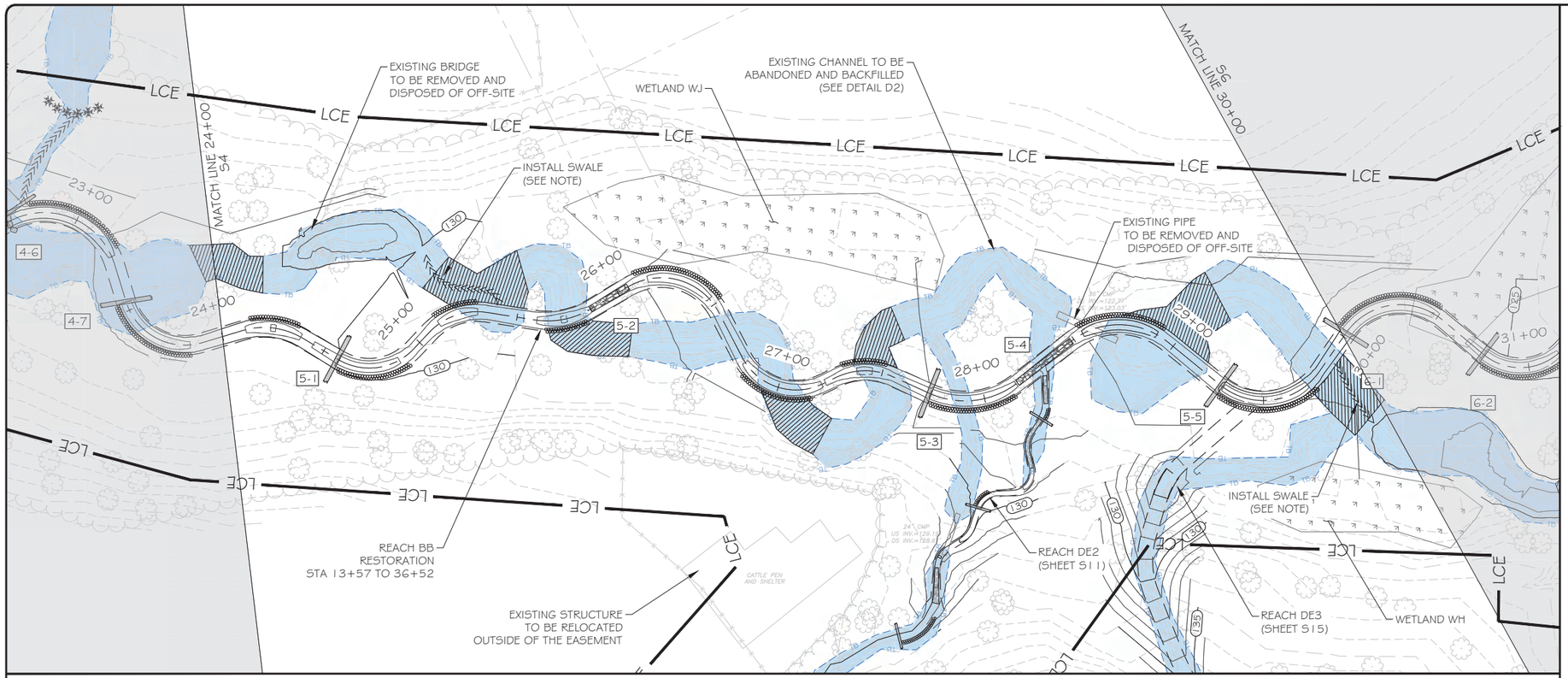
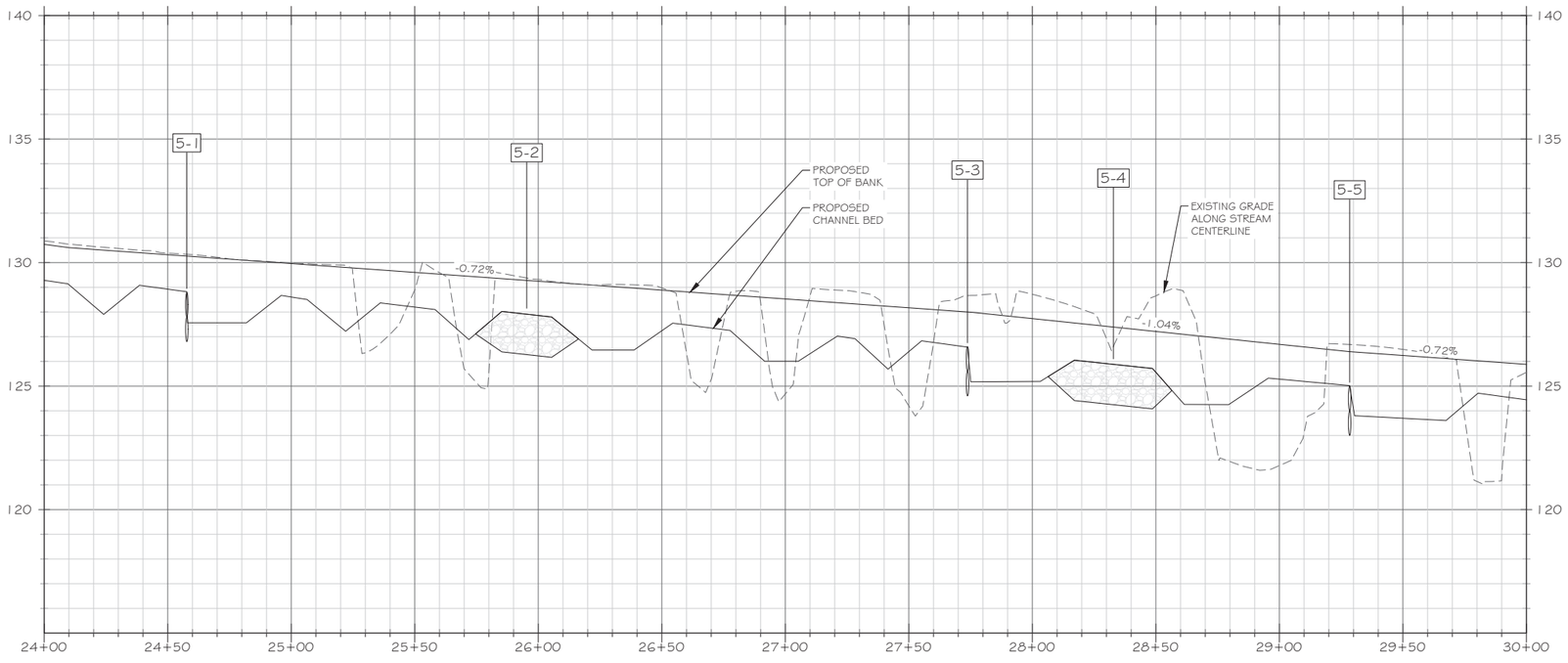
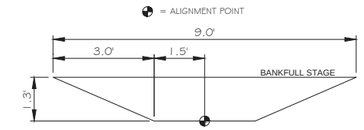


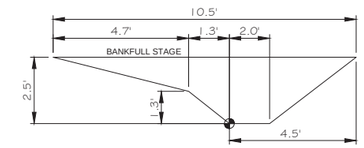


SCALE: HOR 1"=30'; VERT 1"=3'

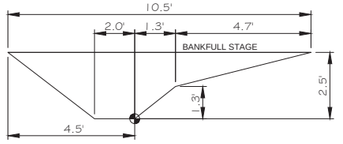
REACH BB STA 11+22 TO STA 32+07



TYPICAL RIFFLE CROSS SECTION



TYPICAL RIGHT MEANDER CROSS SECTION



TYPICAL LEFT MEANDER CROSS SECTION

NOTES:
SWALE DIMENSIONS:
- TOP WIDTH = 5'-6'
- BOTTOM WIDTH = 2'-3'
- DEPTH = 0.5'-0.75'

SWALE TO BE SEEDED, MULCHED, AND MATTED UPON COMPLETION

STRUCTURE TABLE			
NO.	TYPE	STA.	ELEV.
5-1	LOG SILL	24+58'	128.80'
5-2	RIFFLE GRADE CONTROL	SEE PROFILE	
5-3	LOG SILL	27+74'	126.60'
5-4	RIFFLE GRADE CONTROL	SEE PROFILE	
5-5	LOG SILL	29+28'	125.00'

TOE PROTECTION TABLE			
BANK	TYPE	FROM STA.	TO STA.
LT	BRUSH TOE	24+14'	24+35'
RT	BRUSH TOE	24+59'	24+91'
LT	BRUSH TOE	25+12'	25+31'
RT	BRUSH TOE	25+63'	25+82'
LT	BRUSH TOE	26+09'	26+50'
RT	BRUSH TOE	26+83'	27+15'
LT	BRUSH TOE	27+32'	27+51'
RT	BRUSH TOE	27+75'	28+14'
LT	BRUSH TOE	28+54'	28+93'
RT	BRUSH TOE	29+30'	29+75'

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SEAL

FULL SCALE: 1"=30
0 30 60
2" = FULL SCALE
1" = HALF SCALE

PLOT DATE: 7/14/2022

REVISIONS:

RELEASED FOR: DRAFT - FOR PERMITTING ONLY

PROJECT NAME: SIX RUNS MITIGATION SITE
SAMPSON COUNTY, NORTH CAROLINA

DRAWING TITLE: REACH BB

PROJECT NUMBER:	103205
PROJECT MANAGER:	BB
DESIGNED:	AFM
DRAWN:	TRS
CHECKED:	BRC

SHEET NUMBER: S5

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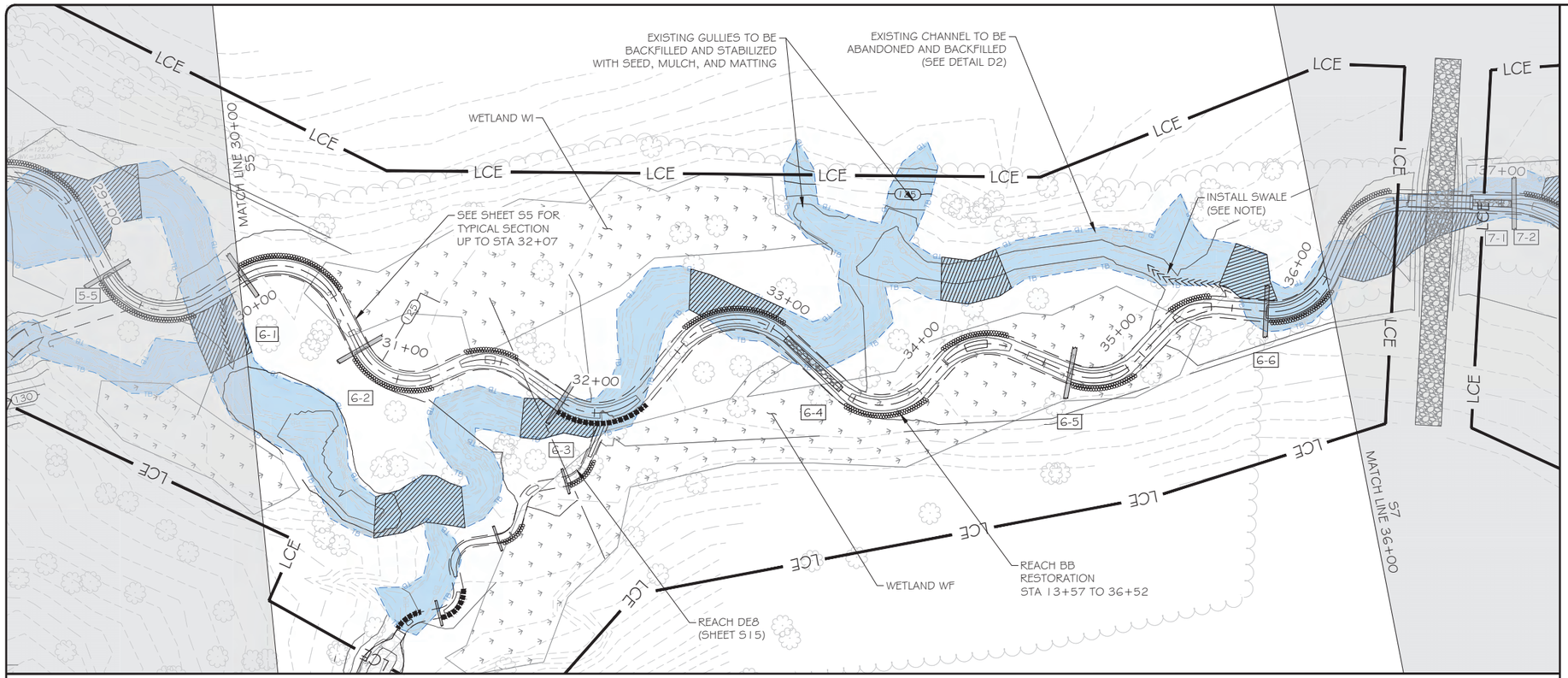
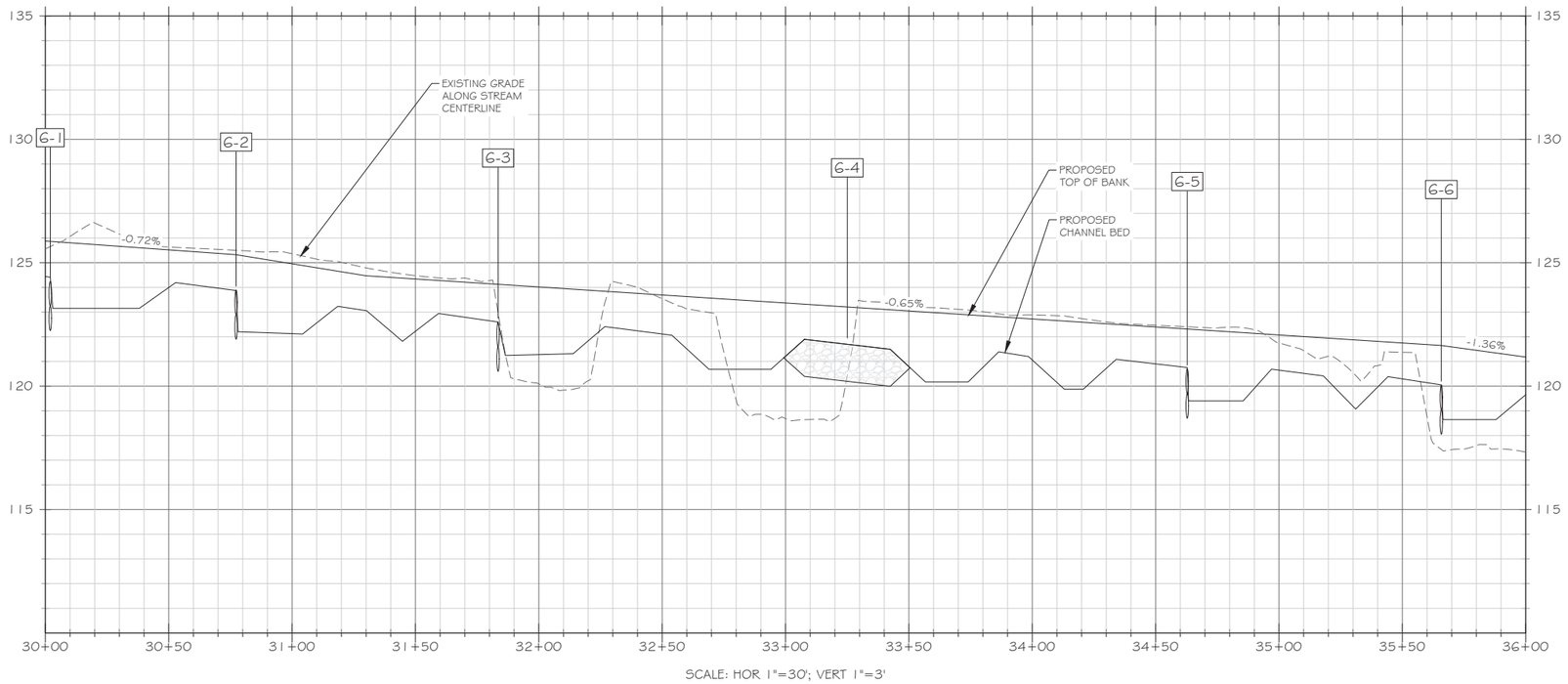
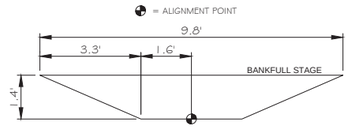


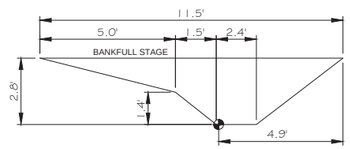


SCALE: HOR 1"=30'; VERT 1"=3'

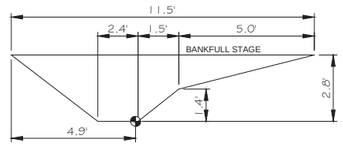
REACH BB STA 32+07 TO STA 44+83



TYPICAL RIFFLE CROSS SECTION



TYPICAL RIGHT MEANDER CROSS SECTION



TYPICAL LEFT MEANDER CROSS SECTION

NOTES:
SWALE DIMENSIONS:
- TOP WIDTH = 5'-6'
- BOTTOM WIDTH = 2'-3'
- DEPTH = 0.5'-0.75'

SWALE TO BE SEEDED, MULCHED, AND MATTED UPON COMPLETION

STRUCTURE TABLE			
NO.	TYPE	STA.	ELEV.
6-1	LOG SILL	30+02'	124.25'
6-2	LOG SILL	30+77'	123.90'
6-3	LOG SILL	31+83'	122.60'
6-4	RIFFLE GRADE CONTROL	SEE PROFILE	
6-5	LOG SILL	34+63'	120.70'
6-6	LOG SILL	35+66'	120.05'

TOE PROTECTION TABLE			
BANK	TYPE	FROM STA.	TO STA.
LT	BRUSH TOE	30+03'	30+49'
RT	BRUSH TOE	30+79'	31+16'
LT	BRUSH TOE	31+34'	31+56'
RT	STONE TOE	31+85'	32+23'
LT	BRUSH TOE	32+59'	33+04'
RT	BRUSH TOE	33+48'	33+83'
LT	BRUSH TOE	34+03'	34+31'
RT	BRUSH TOE	34+65'	34+92'
LT	BRUSH TOE	35+22'	35+41'
RT	BRUSH TOE	35+68'	35+97'

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SEAL

FULL SCALE: 1"=30
0 30 60
2" = FULL SCALE
1" = HALF SCALE

PLOT DATE: 7/14/2022

REVISIONS:

RELEASED FOR: DRAFT - FOR PERMITTING ONLY

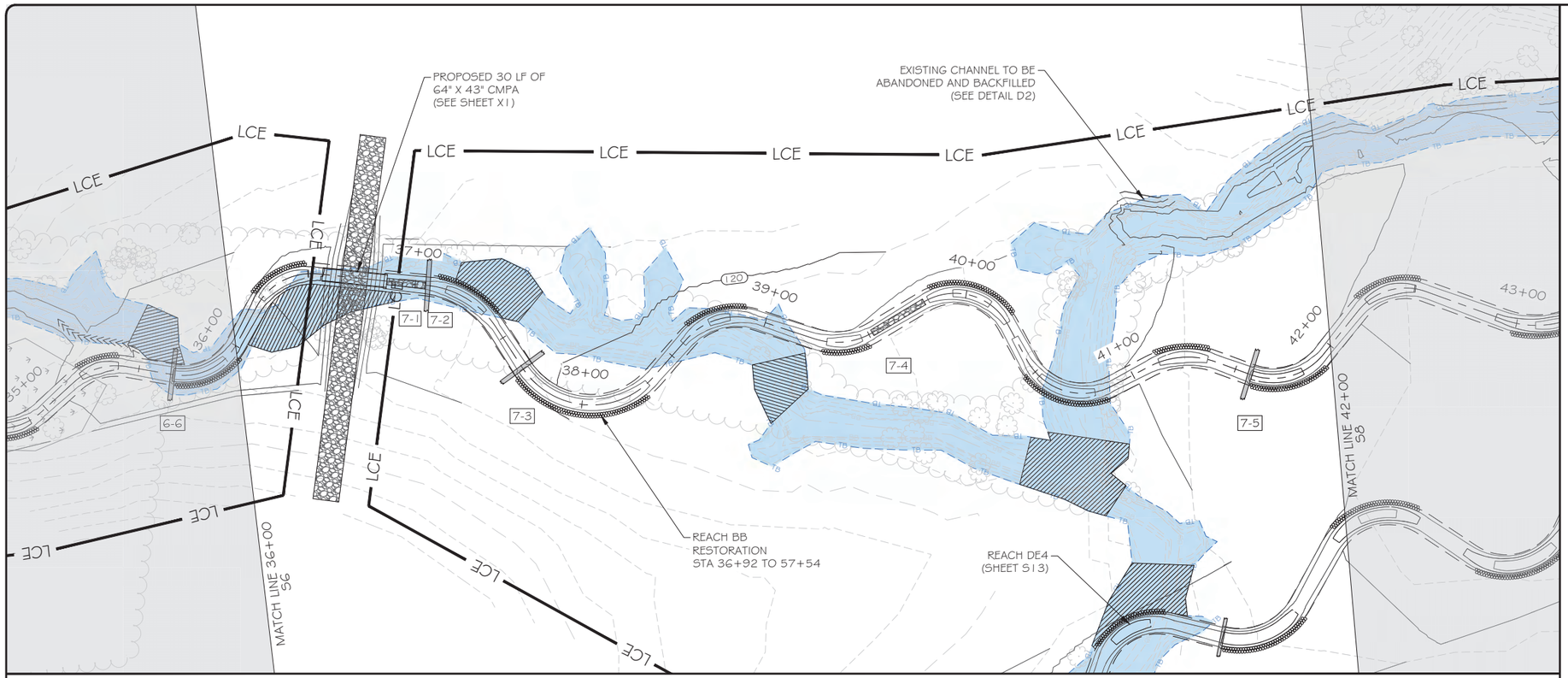
PROJECT NAME: SIX RUNS MITIGATION SITE
SAMPSON COUNTY, NORTH CAROLINA

DRAWING TITLE: REACH BB

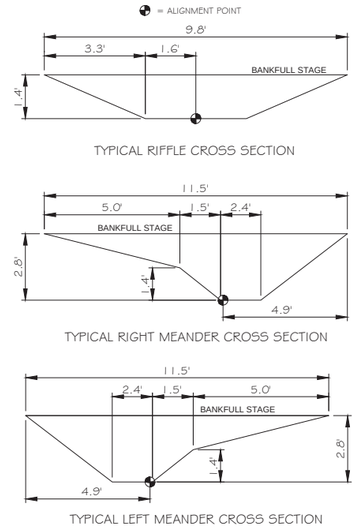
PROJECT NUMBER:	103205
PROJECT MANAGER:	BB
DESIGNED:	AFM
DRAWN:	TRS
CHECKED:	BRC

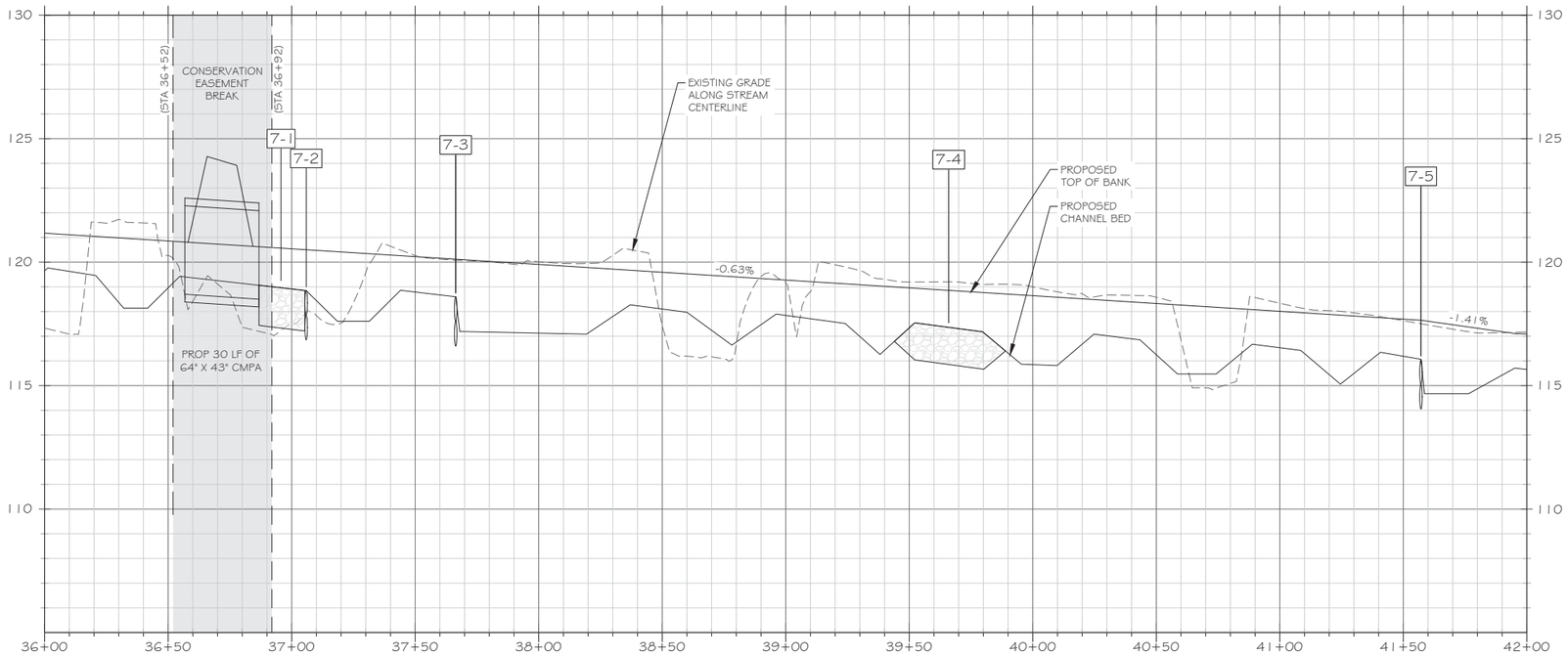
SHEET NUMBER: S6

FILE NAME:R:\Resad\Projects\103205-Six Runs\DWG\103205_SHT_BB.dwg SAVED BY: Stasking



REACH BB STA 32+07 TO STA 44+83





SCALE: HOR 1"=30'; VERT 1"=3'

STRUCTURE TABLE			
NO.	TYPE	STA.	ELEV.
7-1	RIFFLE GRADE CONTROL	SEE PROFILE	
7-2	LOG SILL	37+06'	118.85'
7-3	LOG SILL	37+66'	118.60'
7-4	RIFFLE GRADE CONTROL	SEE PROFILE	
7-5	LOG SILL	41+57'	116.05'

TOE PROTECTION TABLE			
BANK	TYPE	FROM STA.	TO STA.
LT	BRUSH TOE	36+24'	36+50'
LT	BRUSH TOE	37+10'	37+40'
RT	BRUSH TOE	37+68'	38+30'
LT	BRUSH TOE	38+64'	38+90'
RT	BRUSH TOE	39+28'	39+49'
LT	BRUSH TOE	39+84'	40+22'
RT	BRUSH TOE	40+48'	40+86'
LT	BRUSH TOE	41+13'	41+36'
RT	BRUSH TOE	41+59'	41+92'

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SEAL

FULL SCALE: 1"=30
0 30 60
2" = FULL SCALE
1" = HALF SCALE

PLOT DATE: 7/14/2022

REVISIONS:

RELEASED FOR: DRAFT - FOR PERMITTING ONLY

PROJECT NAME: SIX RUNS MITIGATION SITE
SAMPSON COUNTY, NORTH CAROLINA

DRAWING TITLE: REACH BB

PROJECT NUMBER:	103205
PROJECT MANAGER:	BB
DESIGNED:	AFM
DRAWN:	TRS
CHECKED:	BRC

SHEET NUMBER: S7

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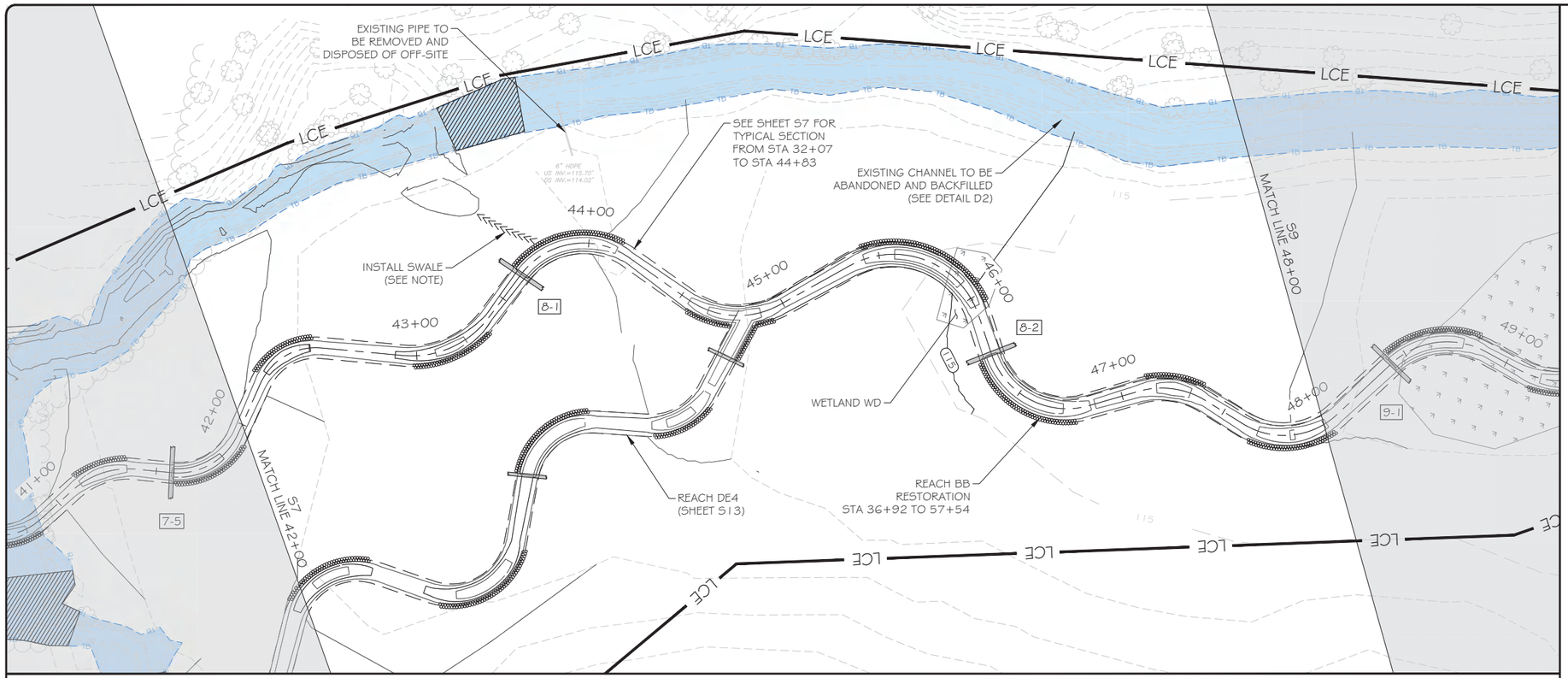
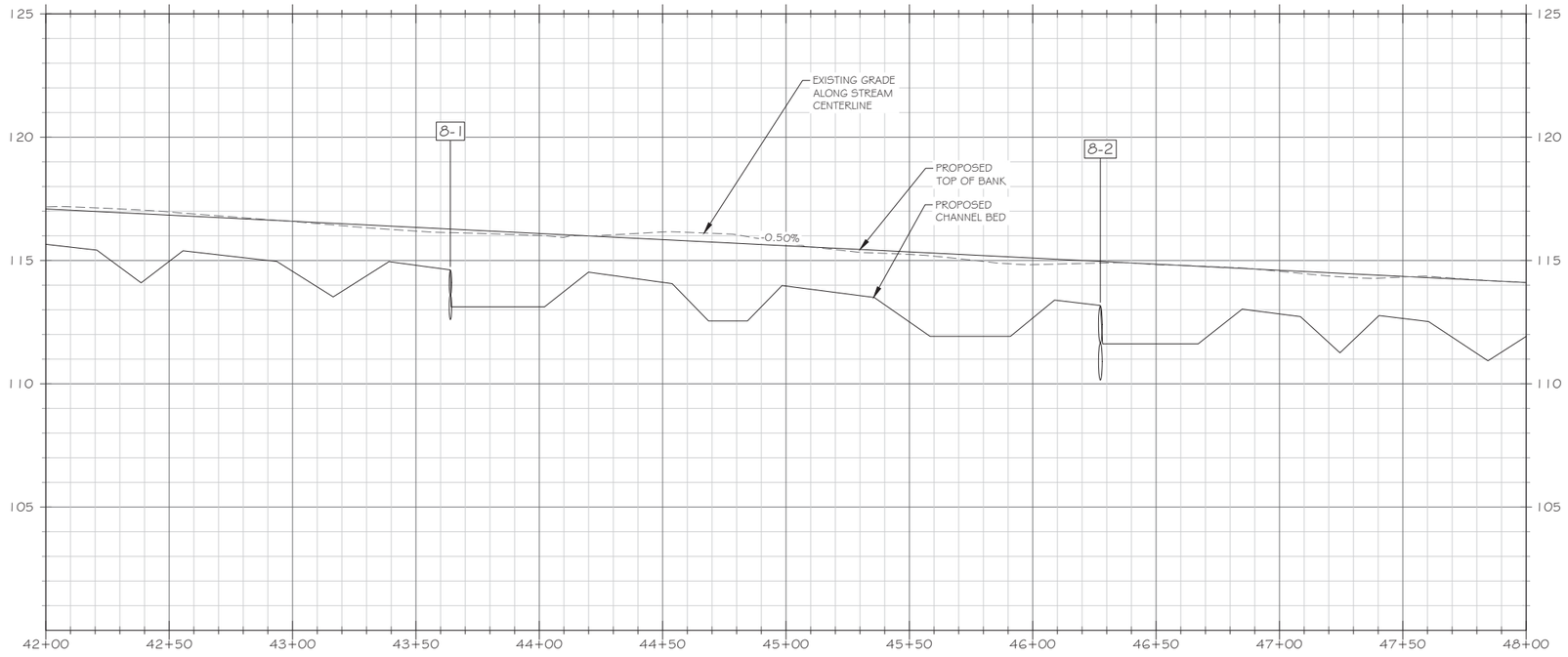
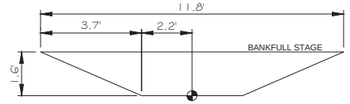




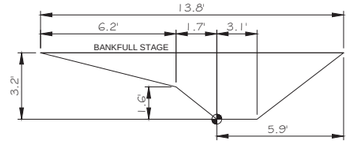
SCALE: HOR 1"=30'; VERT 1"=3'

REACH BB STA 44+83 TO STA 57+54

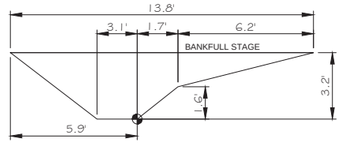
= ALIGNMENT POINT



TYPICAL RIFFLE CROSS SECTION



TYPICAL RIGHT MEANDER CROSS SECTION



TYPICAL LEFT MEANDER CROSS SECTION

NOTES:
SWALE DIMENSIONS:
- TOP WIDTH = 5'-6'
- BOTTOM WIDTH = 2'-3'
- DEPTH = 0.5'-0.75'

SWALE TO BE SEEDED, MULCHED, AND MATTED UPON COMPLETION

STRUCTURE TABLE			
NO.	TYPE	STA.	ELEV.
8-1	LOG SILL	43+64'	114.60'
8-2	LOG SILL	46+27'	113.15'

TOE PROTECTION TABLE			
BANK	TYPE	FROM STA.	TO STA.
LT	BRUSH TOE	42+24'	42+52'
RT	BRUSH TOE	42+98'	43+35'
LT	BRUSH TOE	43+65'	44+15'
RT	BRUSH TOE	44+55'	44+75'
RT	BRUSH TOE	44+86'	44+94'
LT	BRUSH TOE	45+43'	46+04'
RT	BRUSH TOE	46+29'	46+78'
LT	BRUSH TOE	47+12'	47+37'
RT	BRUSH TOE	47+65'	48+03'

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SEAL

FULL SCALE: 1"=30
0 30 60
2" = FULL SCALE
1" = HALF SCALE

PLOT DATE: 7/14/2022

REVISIONS:

RELEASED FOR: DRAFT - FOR PERMITTING ONLY

PROJECT NAME: SIX RUNS MITIGATION SITE
SAMPSON COUNTY, NORTH CAROLINA

DRAWING TITLE: REACH BB

PROJECT NUMBER:	103205
PROJECT MANAGER:	BB
DESIGNED:	AFM
DRAWN:	TRS
CHECKED:	BRC

SHEET NUMBER: S8

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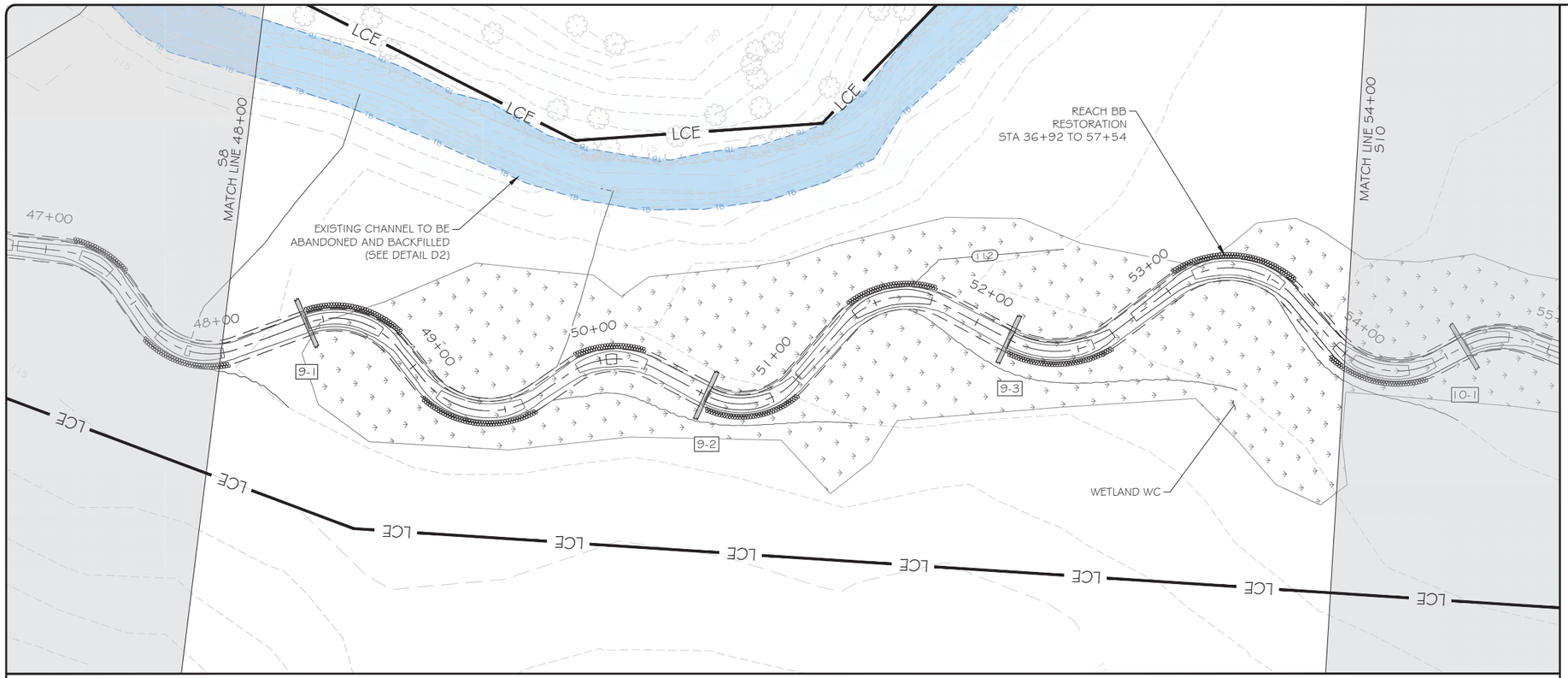
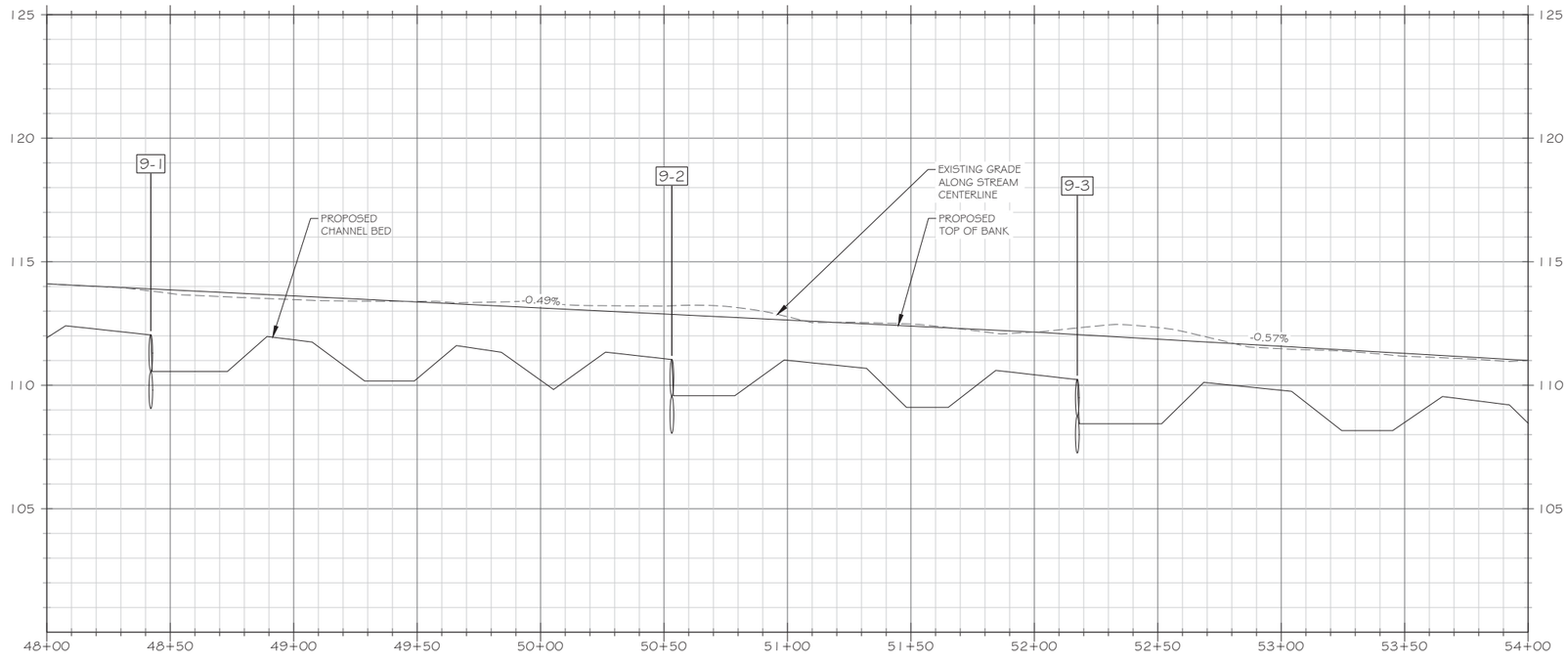
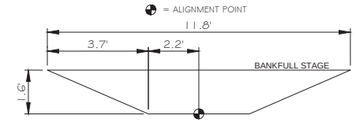


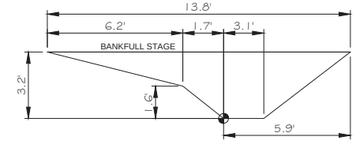


SCALE: HOR 1"=30'; VERT 1"=3'

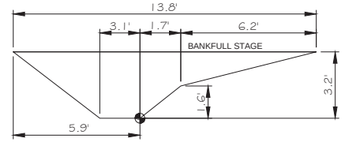
REACH BB STA 44+83 TO STA 57+54



TYPICAL RIFFLE CROSS SECTION



TYPICAL RIGHT MEANDER CROSS SECTION



TYPICAL LEFT MEANDER CROSS SECTION

STRUCTURE TABLE			
NO.	TYPE	STA.	ELEV.
9-1	LOG SILL	48+42'	112.05'
9-2	LOG SILL	50+53'	111.05'
9-3	LOG SILL	52+17'	110.25'

TOE PROTECTION TABLE			
BANK	TYPE	FROM STA.	TO STA.
LT	BRUSH TOE	48+43'	48+85'
RT	BRUSH TOE	49+13'	49+62'
LT	BRUSH TOE	49+90'	50+20'
RT	BRUSH TOE	50+55'	50+94'
LT	BRUSH TOE	51+39'	51+78'
RT	BRUSH TOE	52+19'	52+64'
LT	BRUSH TOE	53+07'	53+60'

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SEAL

FULL SCALE: 1"=30

0 30 60

2" = FULL SCALE
1" = HALF SCALE

PLOT DATE: 7/14/2022

REVISIONS:

RELEASED FOR: DRAFT - FOR PERMITTING ONLY

PROJECT NAME: SIX RUNS MITIGATION SITE
SAMPSON COUNTY, NORTH CAROLINA

DRAWING TITLE: REACH BB

PROJECT NUMBER:	103205
PROJECT MANAGER:	BB
DESIGNED:	AFM
DRAWN:	TRS
CHECKED:	BRC

SHEET NUMBER:

S9

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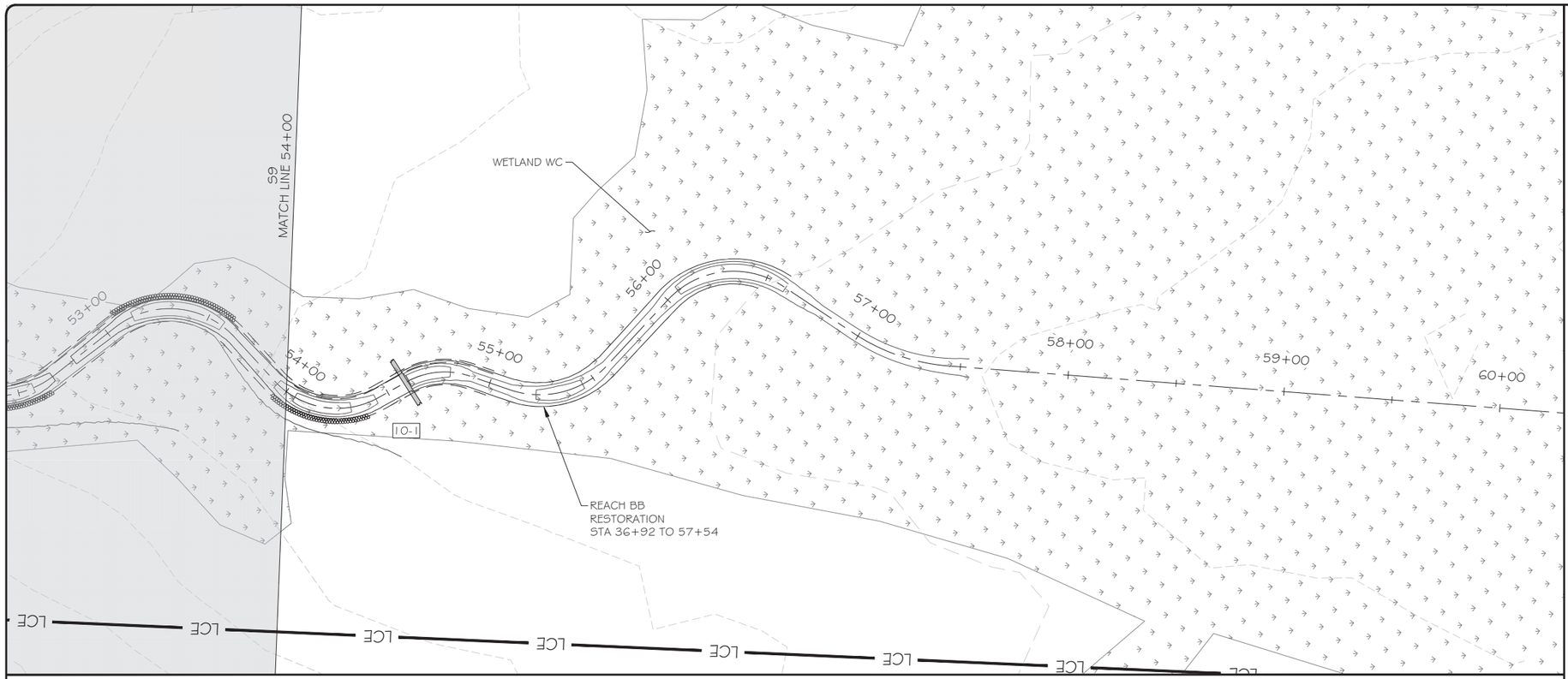
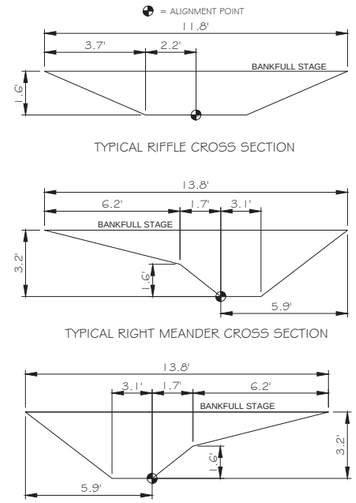
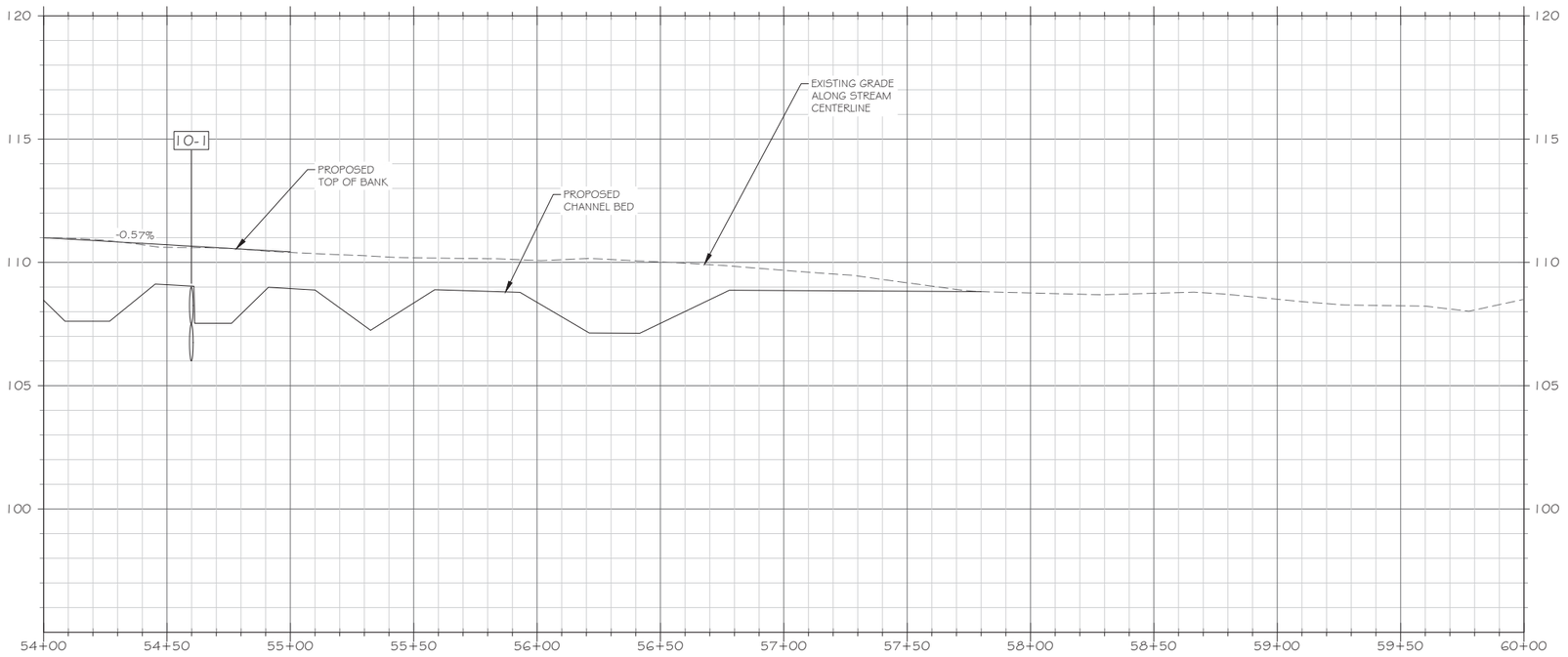


REACH BB STA 44+83 TO STA 57+54





SCALE: HOR 1"=30'; VERT 1"=3'

STRUCTURE TABLE			
NO.	TYPE	STA.	ELEV.
10-1	LOG SILL	54+60'	109.00'

TOE PROTECTION TABLE			
BANK	TYPE	FROM STA.	TO STA.
RT	BRUSH TOE	53+96'	54+38'

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SEAL

FULL SCALE: 1"=30

0 30 60

2" = FULL SCALE
1" = HALF SCALE

PLOT DATE: 7/14/2022

REVISIONS:

RELEASED FOR: DRAFT - FOR PERMITTING ONLY

PROJECT NAME: SIX RUNS MITIGATION SITE
SAMPSON COUNTY, NORTH CAROLINA

DRAWING TITLE: REACH BB

PROJECT NUMBER:	103205
PROJECT MANAGER:	BB
DESIGNED:	AFM
DRAWN:	TRS
CHECKED:	BRC

SHEET NUMBER:

S10

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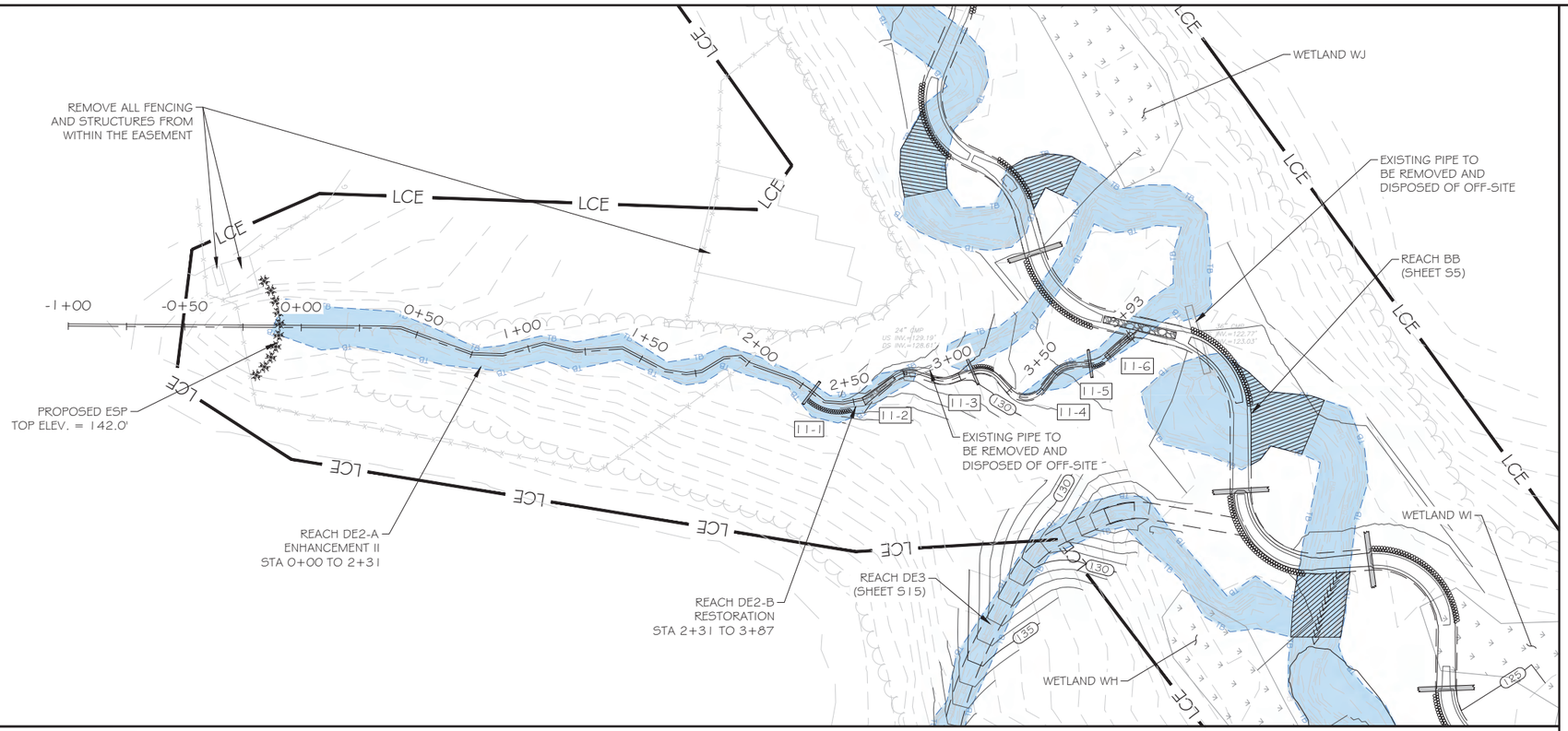
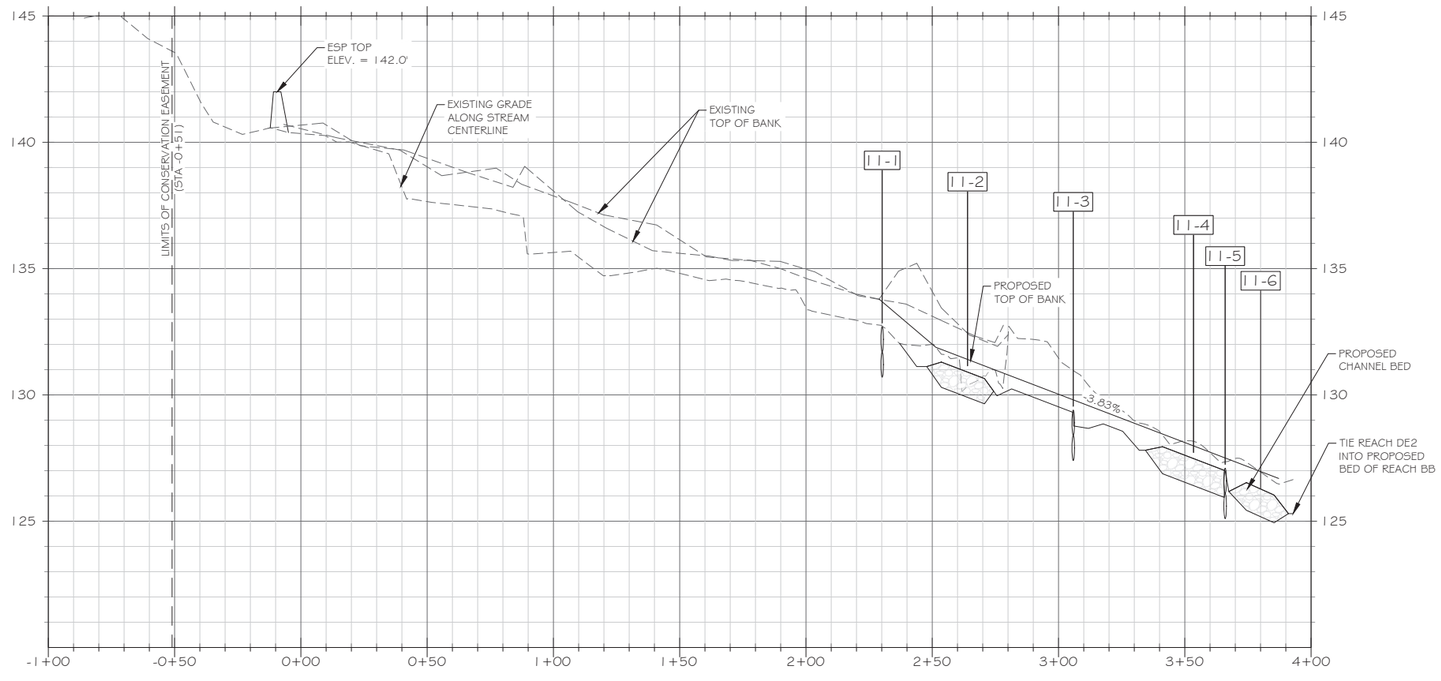
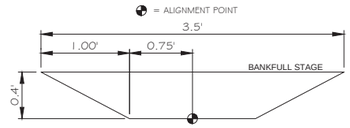


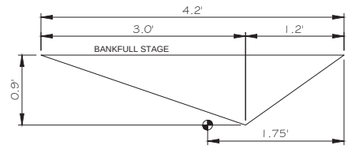


SCALE: HOR 1"=30'; VERT 1"=3'

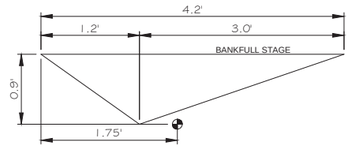
REACH DE2 STA 2+31 TO STA 3+87



TYPICAL RIFFLE CROSS SECTION



TYPICAL RIGHT MEANDER CROSS SECTION



TYPICAL LEFT MEANDER CROSS SECTION

STRUCTURE TABLE			
NO.	TYPE	STA.	ELEV.
11-1	LOG SILL	2+30'	132.70'
11-2	RIFFLE GRADE CONTROL	SEE PROFILE	
11-3	LOG SILL	3+06'	129.40'
11-4	RIFFLE GRADE CONTROL	SEE PROFILE	
11-5	LOG SILL	3+66'	127.10'
11-6	RIFFLE GRADE CONTROL	SEE PROFILE	

TOE PROTECTION TABLE			
BANK	TYPE	FROM STA.	TO STA.
RT	BRUSH TOE	2+31'	2+49'
LT	BRUSH TOE	3+06'	3+15'
RT	BRUSH TOE	3+66'	3+72'

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SEAL

FULL SCALE: 1"=30

0 30 60

2" = FULL SCALE
1" = HALF SCALE

PLOT DATE: 7/14/2022

REVISIONS:

RELEASED FOR: DRAFT - FOR PERMITTING ONLY

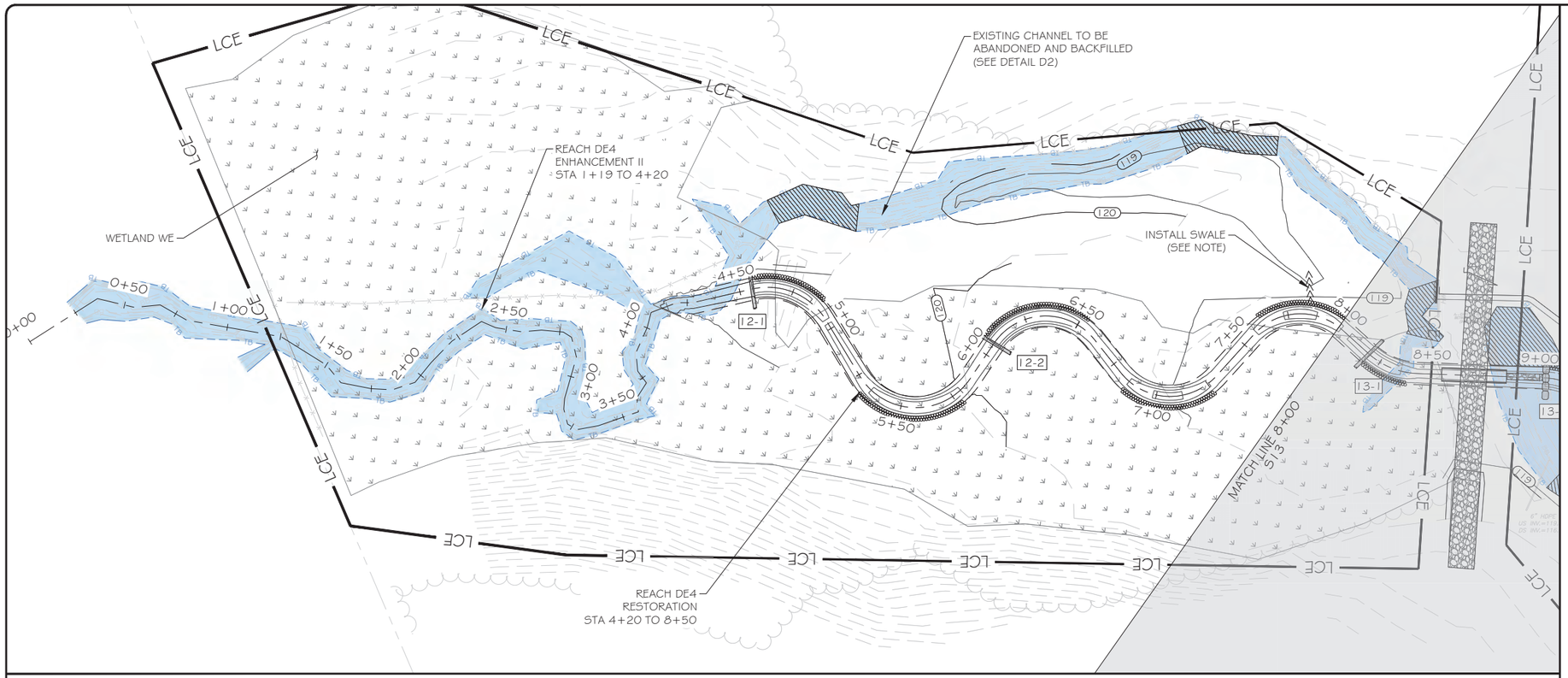
PROJECT NAME: SIX RUNS MITIGATION SITE
SAMPSON COUNTY, NORTH CAROLINA

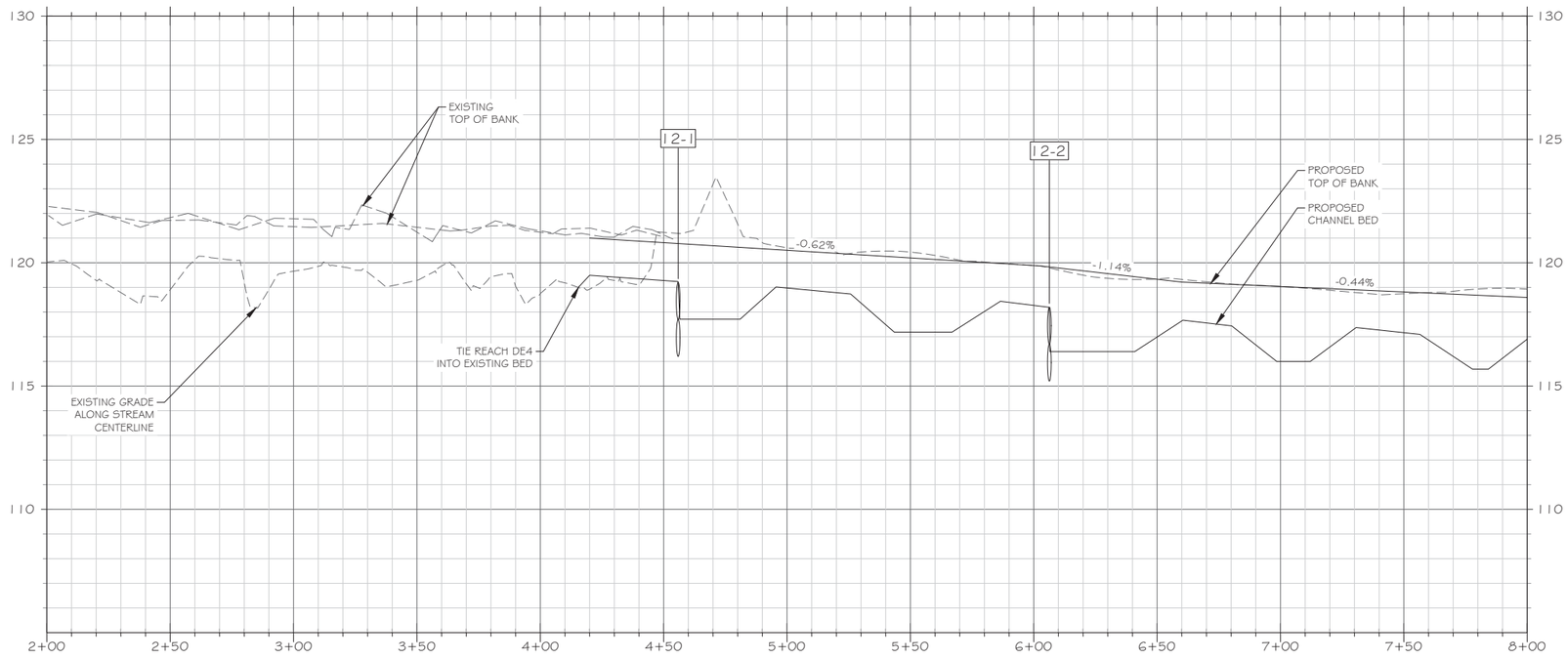
DRAWING TITLE: REACH DE2

PROJECT NUMBER:	103205
PROJECT MANAGER:	BB
DESIGNED:	AFM
DRAWN:	TRS
CHECKED:	BRC

SHEET NUMBER: S11

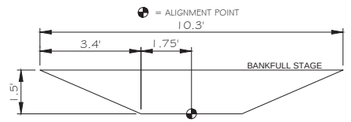
FILE NAME:R:\Resad\Projects\103205-Six Runs\DWG\103205_SHT_DE2.dwg SAVED BY: Stelsking



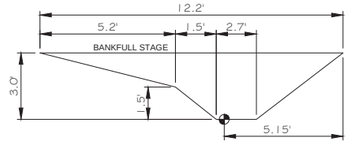


SCALE: HOR 1"=30'; VERT 1"=3'

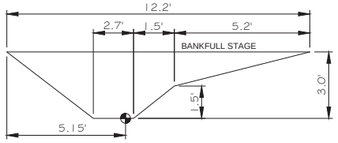
REACH DE4 STA 4+20 TO STA 14+52



TYPICAL RIFFLE CROSS SECTION



TYPICAL RIGHT MEANDER CROSS SECTION



TYPICAL LEFT MEANDER CROSS SECTION

NOTES:
SWALE DIMENSIONS:
- TOP WIDTH = 5'-6'
- BOTTOM WIDTH = 2'-3'
- DEPTH = 0.5'-0.75'

SWALE TO BE SEEDED, MULCHED, AND MATTED UPON COMPLETION

STRUCTURE TABLE			
NO.	TYPE	STA.	ELEV.
12-1	LOG SILL	4+56'	119.20'
12-2	LOG SILL	6+06'	118.20'

TOE PROTECTION TABLE			
BANK	TYPE	FROM STA.	TO STA.
LT	BRUSH TOE	4+57'	4+89'
RT	BRUSH TOE	5+31'	5+78'
LT	BRUSH TOE	6+07'	6+53'
RT	BRUSH TOE	6+85'	7+26'
LT	BRUSH TOE	7+63'	8+00'

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SEAL

FULL SCALE: 1"=30
0 30 60
2" = FULL SCALE
1" = HALF SCALE

PLOT DATE: 7/14/2022

REVISIONS:

RELEASED FOR: DRAFT - FOR PERMITTING ONLY

PROJECT NAME: SIX RUNS MITIGATION SITE
SAMPSON COUNTY, NORTH CAROLINA

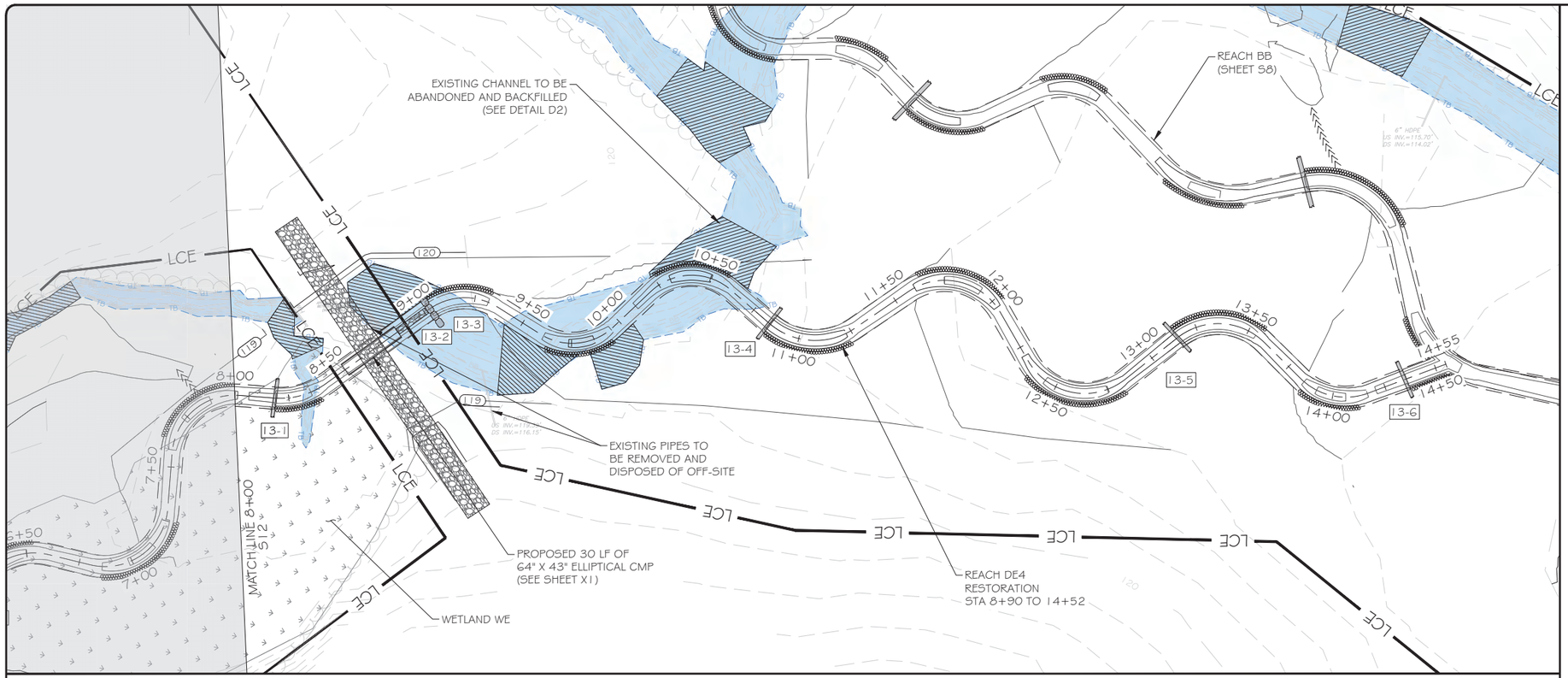
DRAWING TITLE: REACH DE4

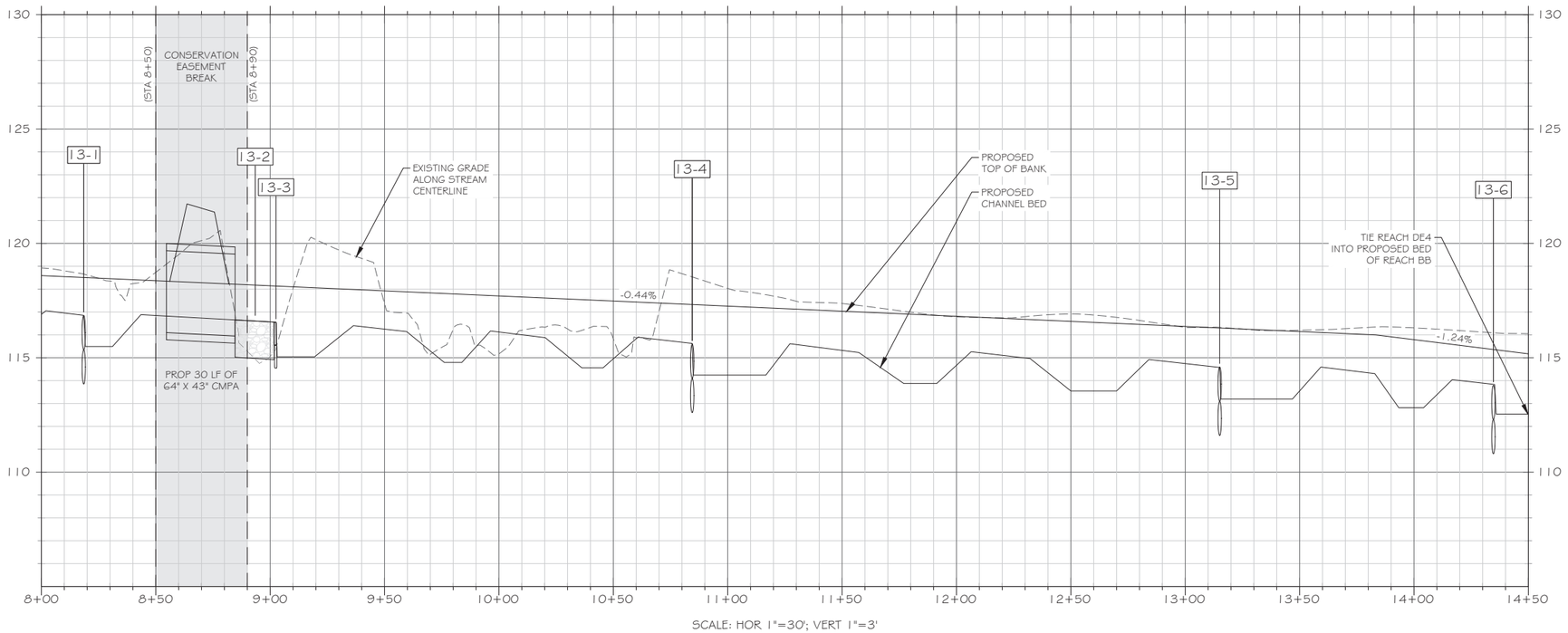
PROJECT NUMBER:	103205
PROJECT MANAGER:	BB
DESIGNED:	AFM
DRAWN:	TRS
CHECKED:	BRC

SHEET NUMBER:

S12

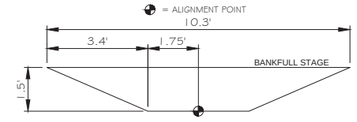
FILE NAME:R:\Res\ed Projects\103205-Six Runs\DWG\103205_SHT_DE4.dwg SAVED BY: Stasking



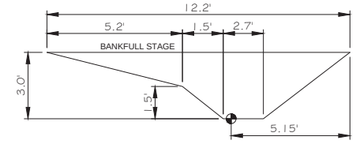


SCALE: HOR 1"=30'; VERT 1"=3'

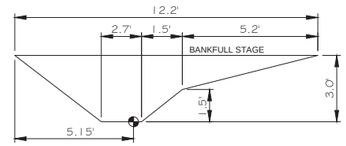
REACH DE4 STA 4+20 TO STA 14+52



TYPICAL RIFFLE CROSS SECTION



TYPICAL RIGHT MEANDER CROSS SECTION



TYPICAL LEFT MEANDER CROSS SECTION

STRUCTURE TABLE			
NO.	TYPE	STA.	ELEV.
13-1	LOG SILL	8+19'	116.85'
13-2	RIFFLE GRADE CONTROL	SEE PROFILE	
13-3	ROCK SILL	9+03'	116.55'
13-4	LOG SILL	10+85'	115.60'
13-5	LOG SILL	13+15'	114.60'
13-6	LOG SILL	14+35'	113.80'

TOE PROTECTION TABLE			
BANK	TYPE	FROM STA.	TO STA.
RT	BRUSH TOE	8+19'	8+39'
LT	BRUSH TOE	9+04'	9+32'
RT	BRUSH TOE	9+64'	9+93'
LT	BRUSH TOE	10+25'	10+57'
RT	BRUSH TOE	10+85'	11+23'
LT	BRUSH TOE	11+64'	12+02'
RT	BRUSH TOE	12+37'	12+82'
LT	BRUSH TOE	13+16'	13+56'
RT	BRUSH TOE	13+86'	14+12'
RT	BRUSH TOE	14+36'	14+55'

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SEAL

FULL SCALE: 1"=30

0 30 60

2" = FULL SCALE
1" = HALF SCALE

PLOT DATE: 7/14/2022

REVISIONS:

RELEASED FOR: DRAFT - FOR PERMITTING ONLY

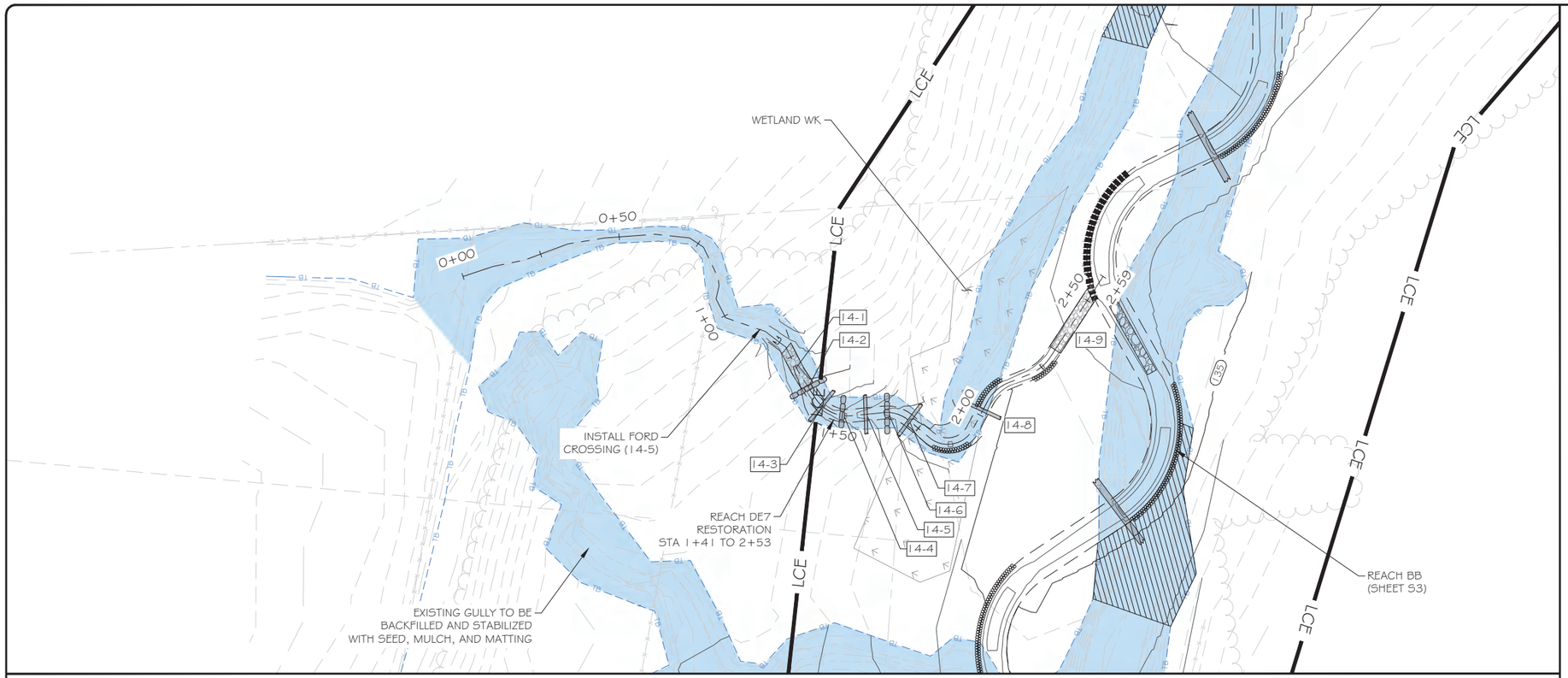
PROJECT NAME: SIX RUNS MITIGATION SITE
SAMPSON COUNTY, NORTH CAROLINA

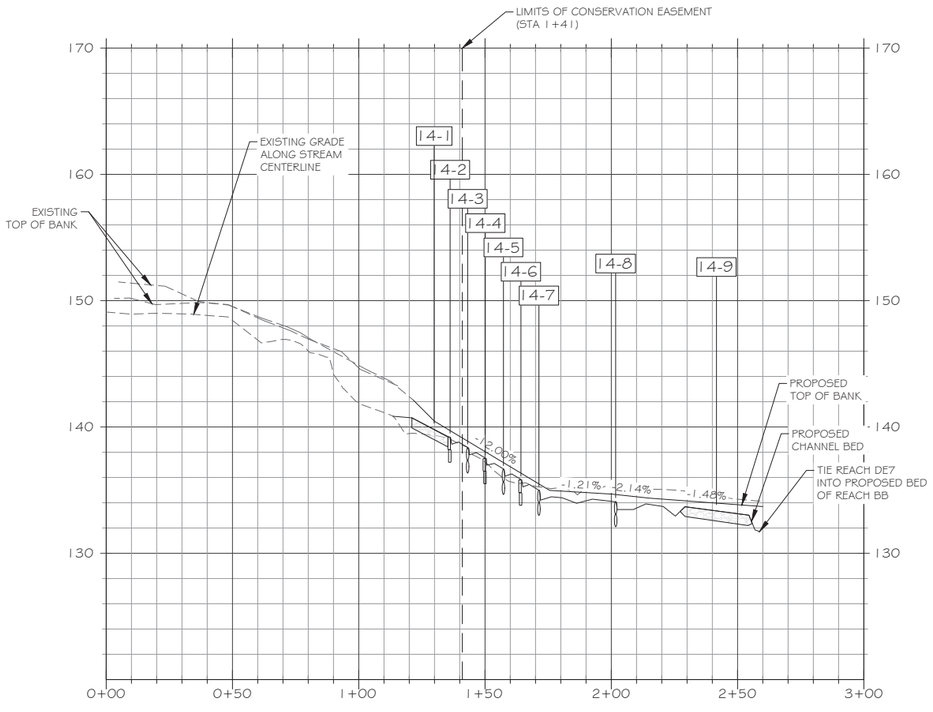
DRAWING TITLE: REACH DE4

PROJECT NUMBER:	103205
PROJECT MANAGER:	BB
DESIGNED:	AFM
DRAWN:	TRS
CHECKED:	BRC

SHEET NUMBER: S13

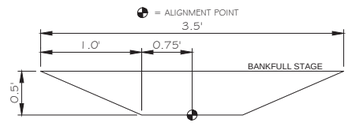
FILE NAME:R:\Res\ed Projects\103205-Six Runs\DWG\103205_SHT_DE4.dwg SAVED BY: Stelsking



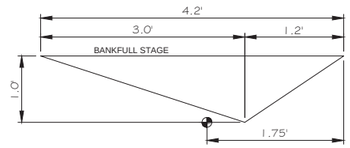


SCALE: HOR 1"=30'; VERT 1"=6'

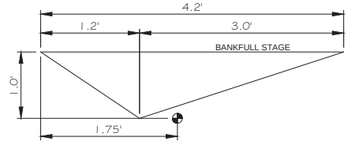
REACH DE7 STA 0+80 TO STA 2+53



TYPICAL RIFFLE CROSS SECTION



TYPICAL RIGHT MEANDER CROSS SECTION



TYPICAL LEFT MEANDER CROSS SECTION

STRUCTURE TABLE			
NO.	TYPE	STA.	ELEV.
14-1	FORD CROSSING	SEE PROFILE	
14-2	ROCK SILL	1+36'	139.20'
14-3	LOG SILL	1+43'	138.35'
14-4	ROCK SILL	1+50'	137.50'
14-5	LOG SILL	1+57'	136.65'
14-6	ROCK SILL	1+64'	135.80'
14-7	LOG SILL	1+71'	135.00'
14-8	LOG SILL	2+02'	134.10'
14-9	RIFFLE GRADE CONTROL	SEE PROFILE	

TOE PROTECTION TABLE			
BANK	TYPE	FROM STA.	TO STA.
RT	BRUSH TOE	1+82'	1+92'
LT	BRUSH TOE	2+02'	2+12'
RT	BRUSH TOE	2+21'	2+29'

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SEAL

FULL SCALE: 1"=20

0 20 40

2" = FULL SCALE
1" = HALF SCALE

PLOT DATE: 7/14/2022

REVISIONS:

RELEASED FOR: DRAFT - FOR PERMITTING ONLY

PROJECT NAME: SIX RUNS MITIGATION SITE
SAMPSON COUNTY, NORTH CAROLINA

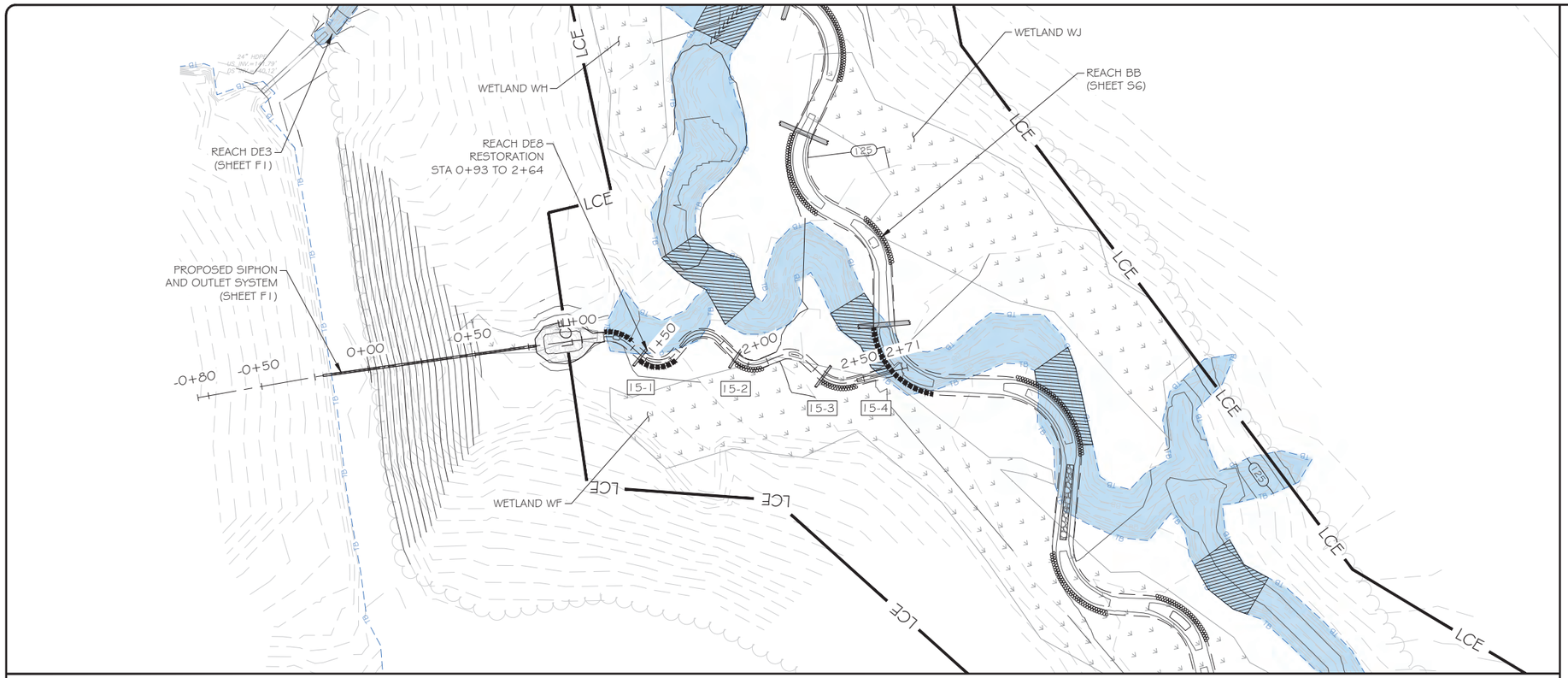
DRAWING TITLE: REACH DE7

PROJECT NUMBER:	103205
PROJECT MANAGER:	BB
DESIGNED:	AFM
DRAWN:	TRS
CHECKED:	BRC

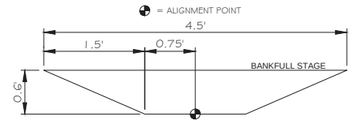
SHEET NUMBER:

S14

FILE NAME:R:\Res\ed Projects\103205-Six Runs\DWG\103205_SHT_DE7.dwg SAVED BY: Stasking



REACH DE8 STA 0+73 TO STA 2+69



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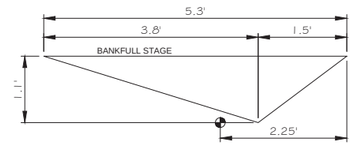
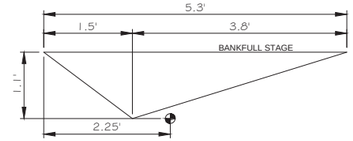
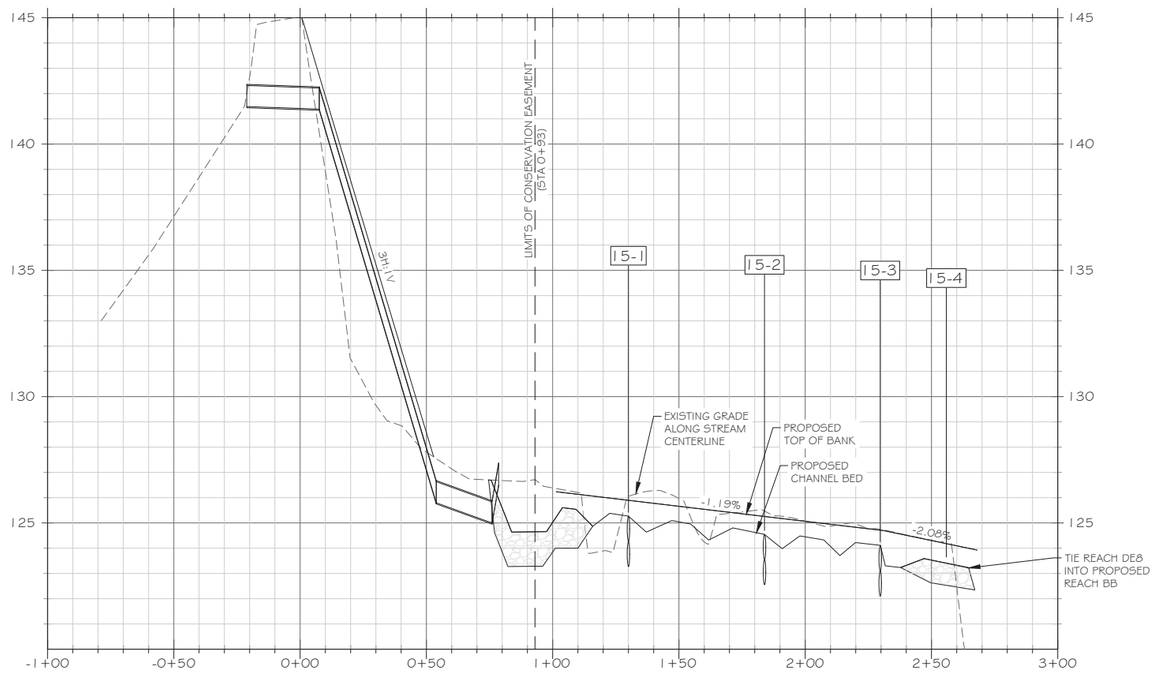


TYPICAL RIGHT MEANDER CROSS SECTION



TYPICAL LEFT MEANDER CROSS SECTION



SCALE: HOR 1"=30'; VERT 1"=3'

STRUCTURE TABLE			
NO.	TYPE	STA.	ELEV.
15-1	LOG SILL	1+30'	125.27'
15-2	LOG SILL	1+84'	124.55'
15-3	LOG SILL	2+30'	124.10'
15-4	RIFFLE GRADE CONTROL	SEE PROFILE	

TOE PROTECTION TABLE			
BANK	TYPE	FROM STA.	TO STA.
LT	STONE TOE	1+11'	1+22'
RT	STONE TOE	1+31'	1+46'
RT	BRUSH TOE	1+86'	1+97'
RT	BRUSH TOE	2+31'	2+46'

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SEAL

FULL SCALE: 1"=30

0 30 60

2" = FULL SCALE
1" = HALF SCALE

PLOT DATE: 7/14/2022

REVISIONS:

RELEASED FOR: DRAFT - FOR PERMITTING ONLY

PROJECT NAME: SIX RUNS MITIGATION SITE
SAMPSON COUNTY, NORTH CAROLINA

DRAWING TITLE: REACH DE8

PROJECT NUMBER:	103205
PROJECT MANAGER:	BB
DESIGNED:	AFM
DRAWN:	TRS
CHECKED:	BRC

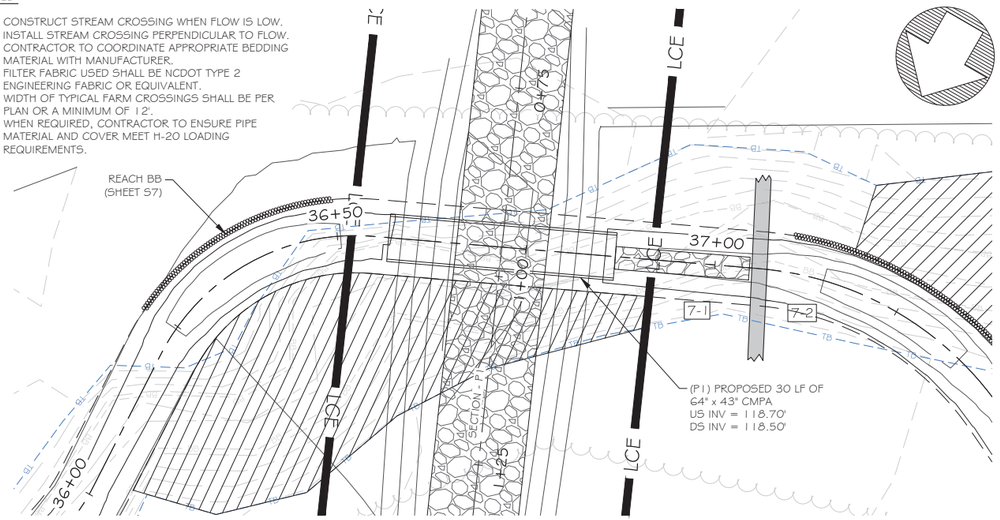
SHEET NUMBER:

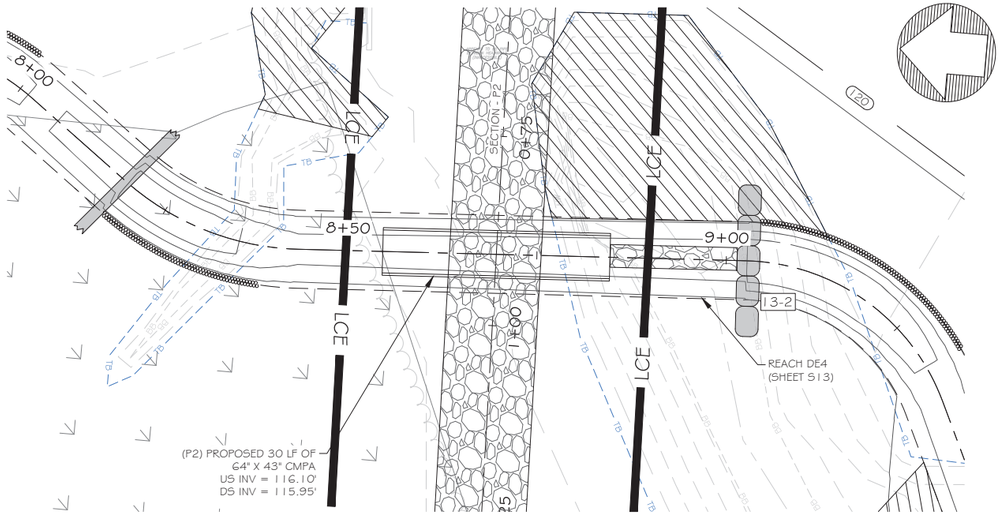
S15

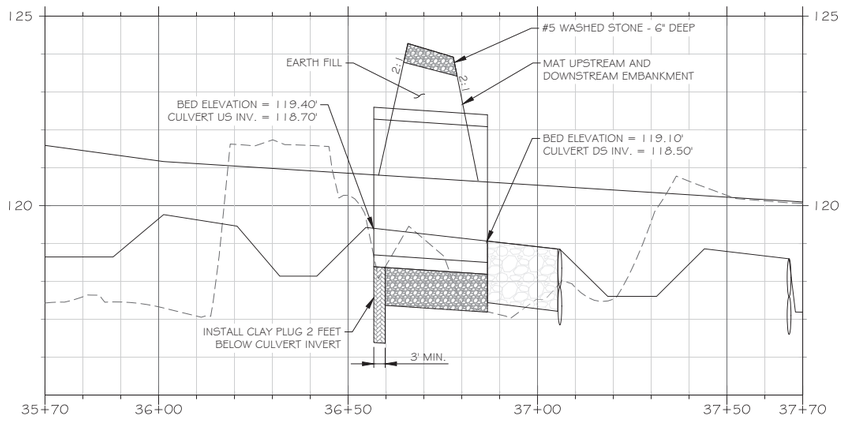
FILE NAME:R:\Res\ed Projects\103205-Six Runs\DWG\103205_SHT_DE8.dwg SAVED BY: Stelking

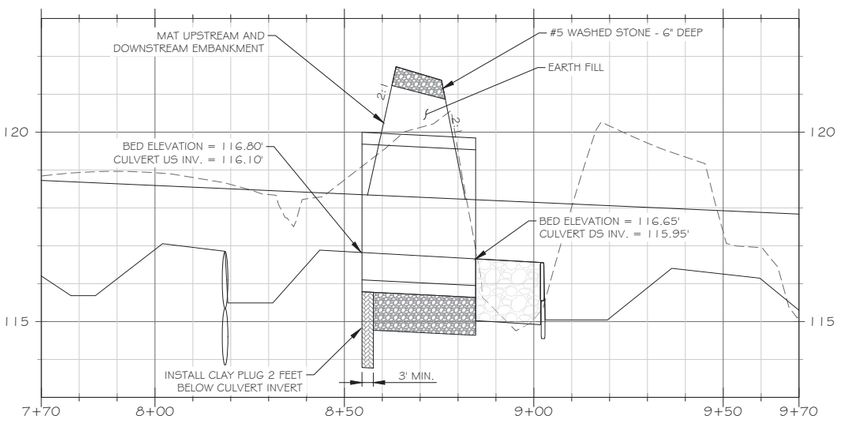
NOTES:

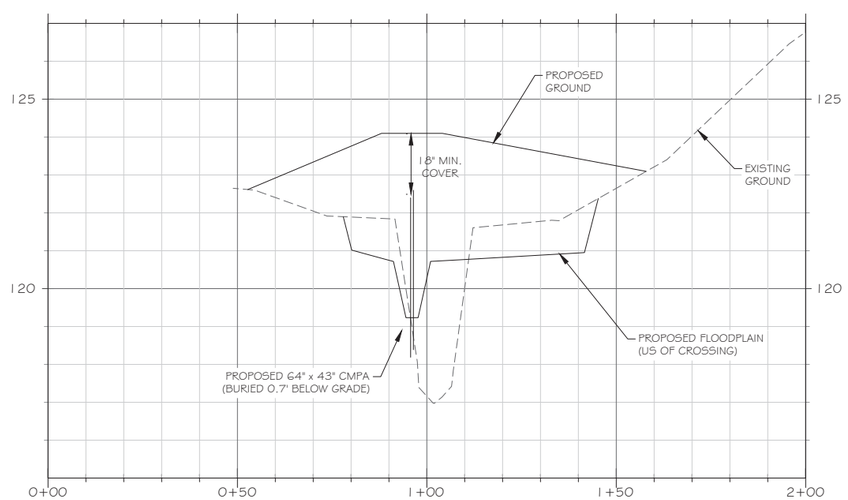
1. CONSTRUCT STREAM CROSSING WHEN FLOW IS LOW.
2. INSTALL STREAM CROSSING PERPENDICULAR TO FLOW.
3. CONTRACTOR TO COORDINATE APPROPRIATE BEDDING MATERIAL WITH MANUFACTURER.
4. FILTER FABRIC USED SHALL BE NCDOT TYPE 2 ENGINEERING FABRIC OR EQUIVALENT.
5. WIDTH OF TYPICAL FARM CROSSINGS SHALL BE PER PLAN OR A MINIMUM OF 12'.
6. WHEN REQUIRED, CONTRACTOR TO ENSURE PIPE MATERIAL AND COVER MEET H-20 LOADING REQUIREMENTS.

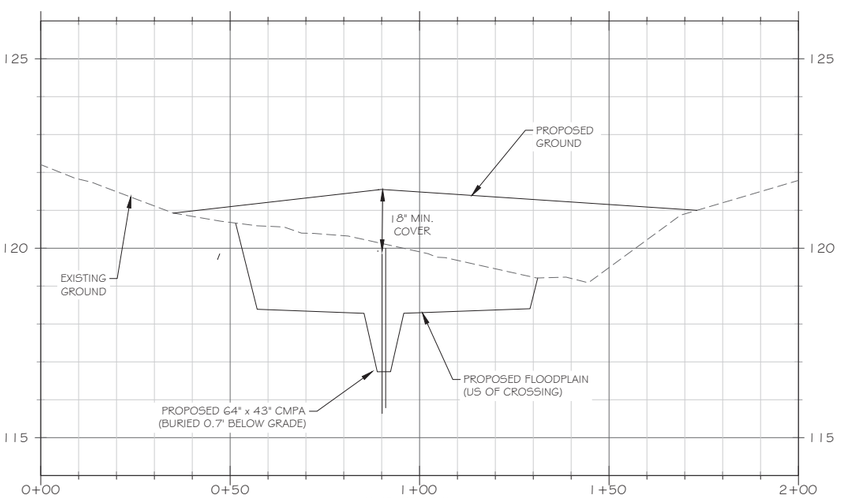












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SEAL

FULL SCALE: 1"=20

0 20 40

2" = FULL SCALE
1" = HALF SCALE

PLOT DATE: 7/14/2022

REVISIONS:

RELEASED FOR: DRAFT - FOR PERMITTING ONLY

PROJECT NAME: SIX RUNS MITIGATION SITE
SAMPSON COUNTY, NORTH CAROLINA

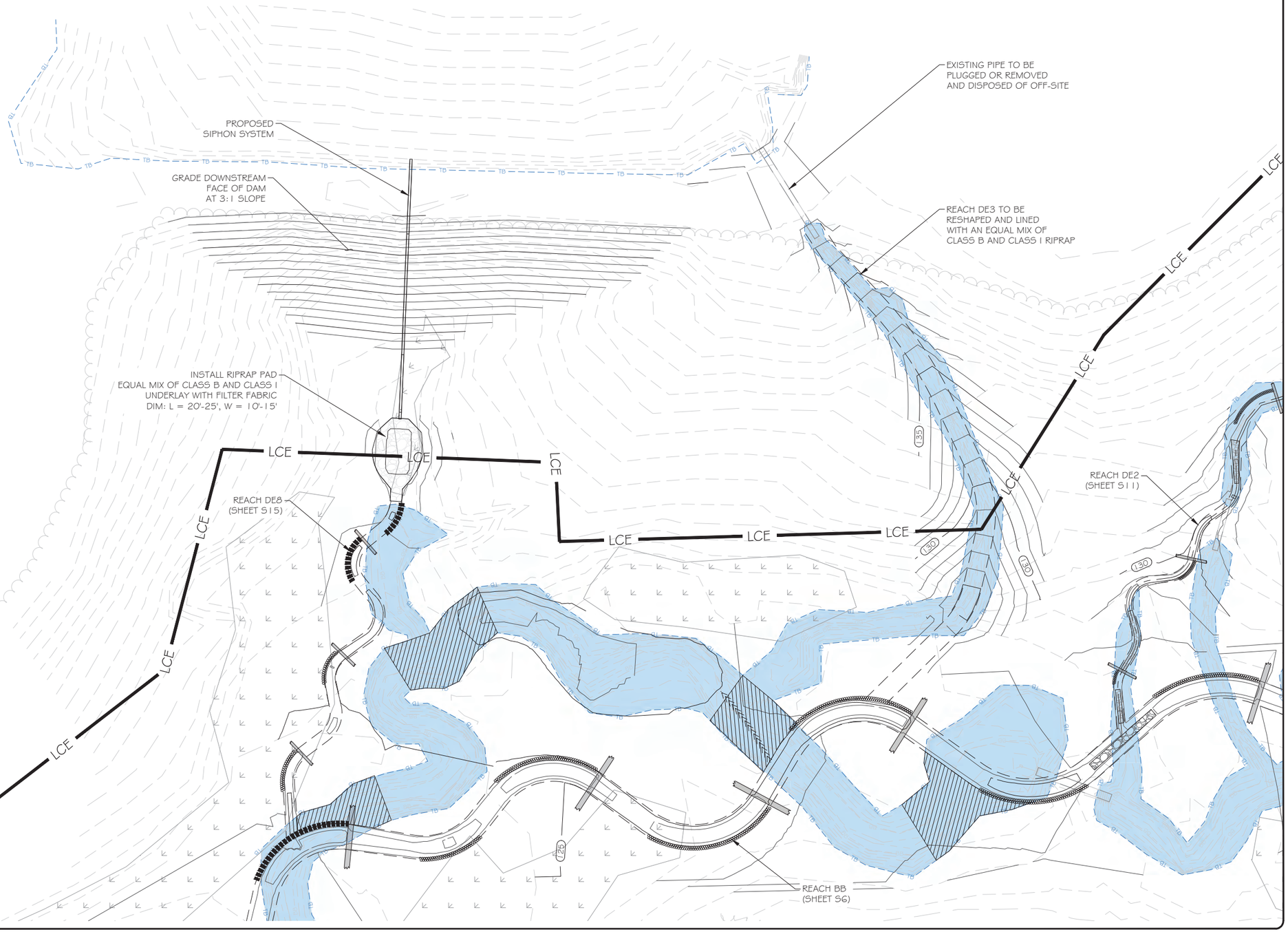
DRAWING TITLE: FARM CROSSINGS

PROJECT NUMBER:	103205
PROJECT MANAGER:	BB
DESIGNED:	AFM
DRAWN:	TRS
CHECKED:	BRC

SHEET NUMBER:

X1

NOTES:
1. DEWATER THE POND USING A SIPHON PRIOR TO PERFORMING ANY GRADING ACTIVITIES ALONG THE DAM. DO NOT ALLOW THE DEWATERING RATE TO LOWER THE IMPOUNDMENT MORE THAN 1.0' PER DAY
2. ALL TRASH AND WOODY VEGETATION ON THE DOWNSTREAM FACE OF THE DAM SHALL BE REMOVED AND REPLACED WITH COMPACTED EMBANKMENT FILL. FOR TREES LESS THAN 6" IN DIAMETER, THE TREES MAY BE CUT FLUSH TO GRADE
3. ADD COMPACTED BACKFILL FREE OF ORGANICS TO THE DOWNSTREAM FACE OF THE DAM TO A SLOPE OF 3H:1V



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SEAL

FULL SCALE: 1"=20

0 20 40

2" = FULL SCALE
1" = HALF SCALE

PLOT DATE: 7/14/2022

REVISIONS:

RELEASED FOR: DRAFT - FOR PERMITTING ONLY

PROJECT NAME: SIX RUNS MITIGATION SITE
SAMPSON COUNTY, NORTH CAROLINA

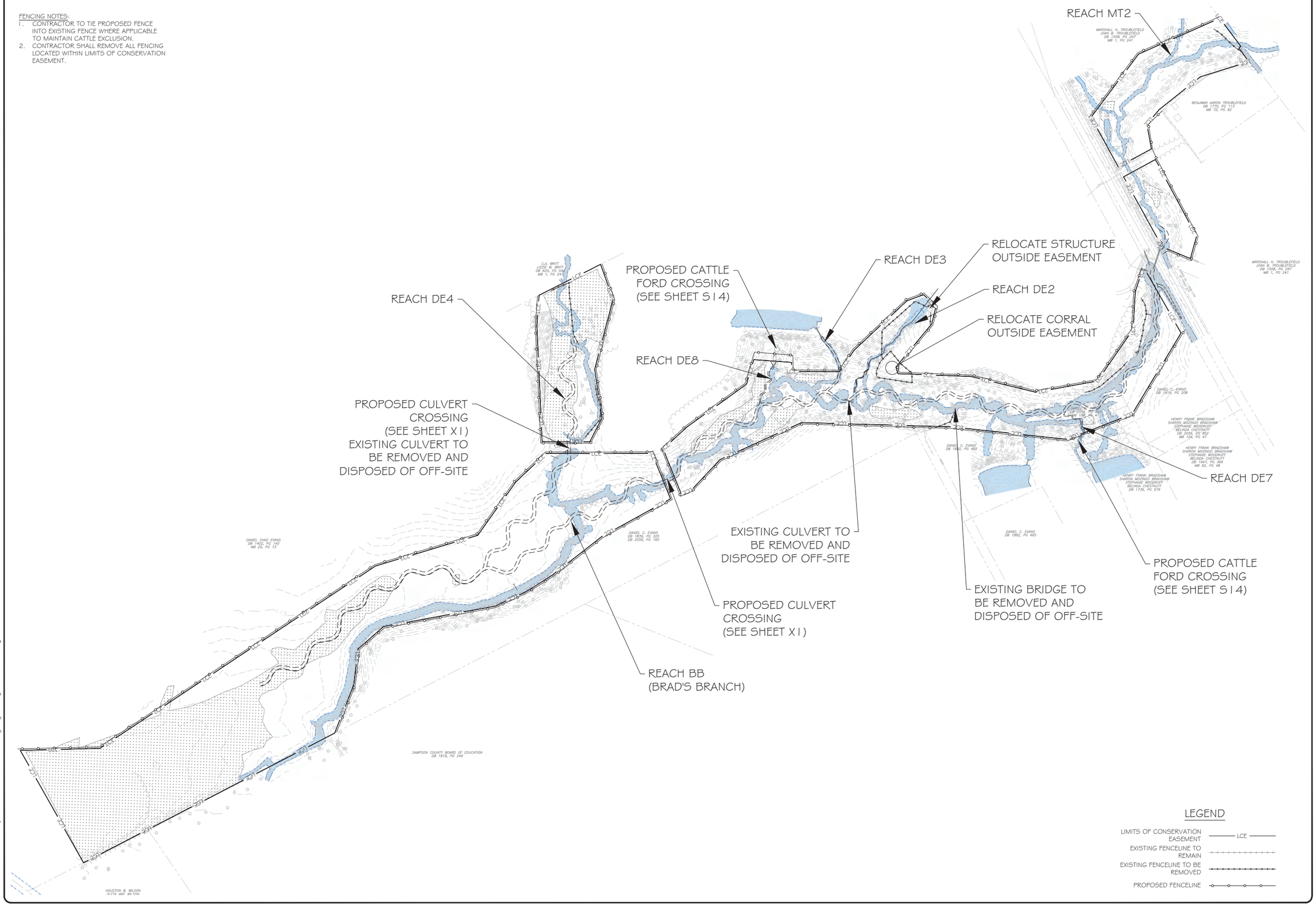
DRAWING TITLE: DAM SIPHON & OUTLET

PROJECT NUMBER:	103205
PROJECT MANAGER:	BB
DESIGNED:	AFM
DRAWN:	TRS
CHECKED:	BRC

SHEET NUMBER:

F1

FENCING NOTES:
1. CONTRACTOR TO TIE PROPOSED FENCE INTO EXISTING FENCE WHERE APPLICABLE TO MAINTAIN CATTLE EXCLUSION.
2. CONTRACTOR SHALL REMOVE ALL FENCING LOCATED WITHIN LIMITS OF CONSERVATION EASEMENT.



LEGEND

LIMITS OF CONSERVATION EASEMENT	LCE
EXISTING FENCELINE TO REMAIN	
EXISTING FENCELINE TO BE REMOVED	
PROPOSED FENCELINE	

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SEAL

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0 150 300

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PLOT DATE: 7/14/2022

REVISIONS:

RELEASED FOR: DRAFT - FOR PERMITTING ONLY

PROJECT NAME: SIX RUNS MITIGATION SITE
SAMPSON COUNTY, NORTH CAROLINA

DRAWING TITLE: FARM IMPROVEMENTS

PROJECT NUMBER:	103205
PROJECT MANAGER:	BB
DESIGNED:	AFM
DRAWN:	TRS
CHECKED:	BRC

SHEET NUMBER:

F2

FILE NAME:R:\Resad\Projects\103205-Six Runs\DWG\103205_SHT_SITE.dwg SAVED BY: Sfasking

PLANTING TABLE

Permanent Riparian Seed Mix		
Common Name	Scientific Name	Percent Composition
Riverbank Wild Rye	*Elymus riparius*	25%
Deertongue	*Dichanthelium clandestinum*	20%
Bur Marigold	*Bidens aristosa*	15%
Fox Sedge	*Carex vulpinoidea*	10%
Redtop Panicgrass	*Panicum rigidulum*	10%
Soft Rush	*Juncus effusus*	10%
Luns Sedge	*Carex lunda*	5%
Hop Sedge	*Carex lupulina*	3%
River Oats	*Chasmanthium latifolium*	2%

Live Staking and Live Cuttings Bundle Tree Species		
Common Name	Scientific Name	Percent Composition
Buttonbush	*Cephalanthus occidentalis*	30%
Silky dogwood	*Cornus amomum*	30%
Black willow	*Salix nigra*	40%

Zone 1a/b: Bare Root Tree Planting Species Blackwater Bottomland Forest/Coastal Plain Stream Swamp		
Common Name	Scientific Name	Percent Composition
Bald cypress	*Taxodium distichum*	10% [1]
Swamp tupelo	*Nyssa biflora*	10% [1]
Buttonbush	*Cephalanthus occidentalis*	10% [1, 2]
Overcup oak	*Quercus lyrata*	10% [1]
River birch	*Betula nigra*	10%
American sycamore	*Platanus occidentalis*	5%
Laurel oak	*Quercus laurifolia*	5%
Water hickory	*Carya aquatica*	5%
American elm	*Ulmus American*	5%
Wax myrtle	*Morella cerifera*	5%
Black willow	*Salix nigra*	5% [2]
Hazel alder	*Alnus serrulata*	5% [2]
Swamp chestnut oak	*Quercus michauxii*	5%
Willow oak	*Quercus phellos*	5%
Green ash	*Fraxinus pennsylvanica*	5%

[1] Species composition will also include containerized trees in Zone 1b
[2] Species composition will also include live stake and/or live stake poles in Zone 1b

Zone 2: Bare Root Tree Planting Species Mesic Mixed Hardwood Forest		
Common Name	Scientific Name	Percent Composition
White oak	*Quercus alba*	15%
Northern red oak	*Quercus rubra*	15%
Swamp chestnut oak	*Quercus michauxii*	10%
Willow oak	*Quercus phellos*	10%
American hornbeam	*Carpinus caroliniana*	10%
Water oak	*Quercus nigra*	10%
Yellow poplar	*Liriodendron tulipifera*	10%
Green ash	*Fraxinus pennsylvanica*	5%
American sycamore	*Platanus occidentalis*	5%
American elm	*Ulmus American*	5%
Wax myrtle	*Morella cerifera*	5%

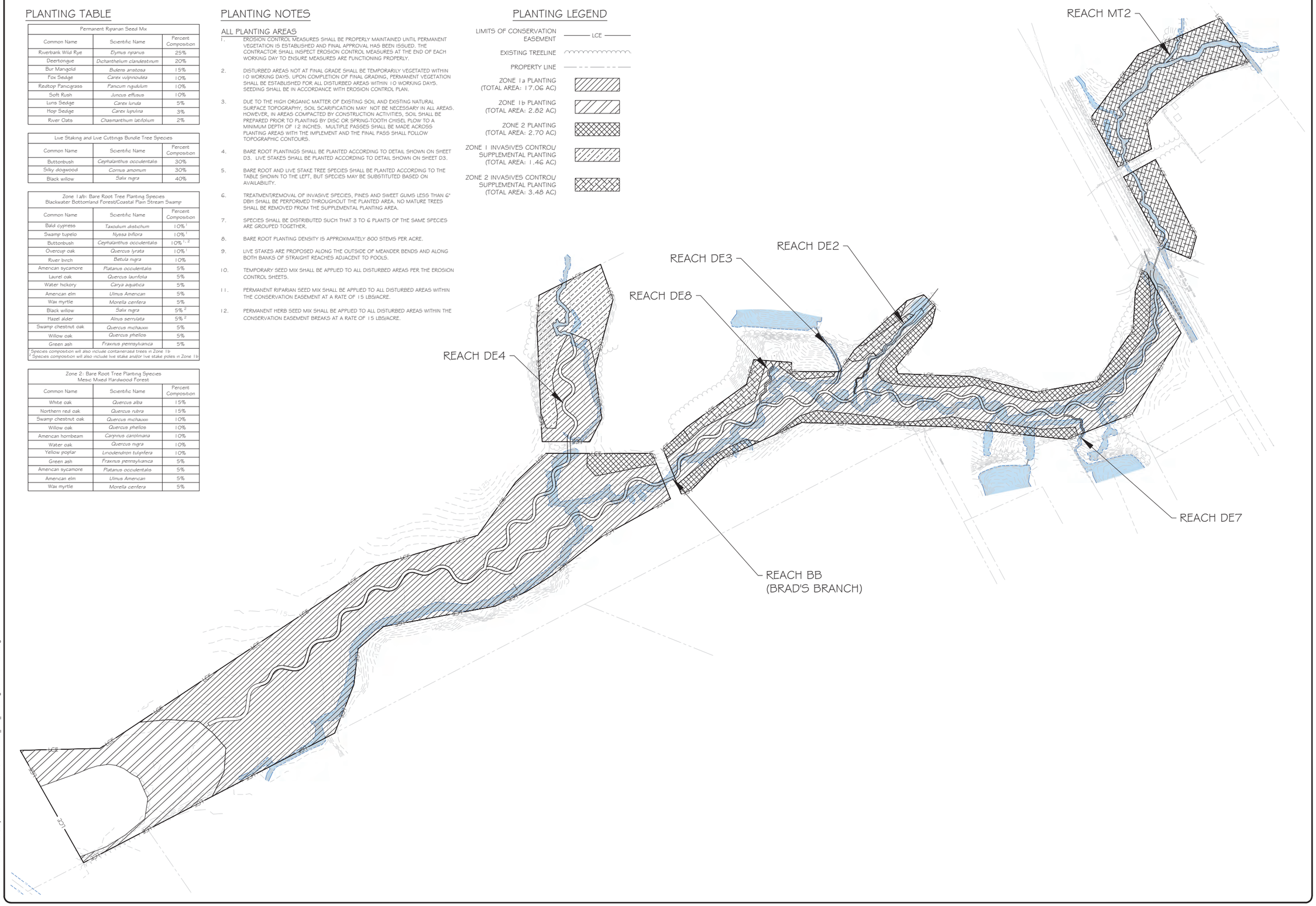
PLANTING NOTES

ALL PLANTING AREAS

1. EROSION CONTROL MEASURES SHALL BE PROPERLY MAINTAINED UNTIL PERMANENT VEGETATION IS ESTABLISHED AND FINAL APPROVAL HAS BEEN ISSUED. THE CONTRACTOR SHALL INSPECT EROSION CONTROL MEASURES AT THE END OF EACH WORKING DAY TO ENSURE MEASURES ARE FUNCTIONING PROPERLY.
2. DISTURBED AREAS NOT AT FINAL GRADE SHALL BE TEMPORARILY VEGETATED WITHIN 10 WORKING DAYS. UPON COMPLETION OF FINAL GRADING, PERMANENT VEGETATION SHALL BE ESTABLISHED FOR ALL DISTURBED AREAS WITHIN 10 WORKING DAYS. SEEDING SHALL BE IN ACCORDANCE WITH EROSION CONTROL PLAN.
3. DUE TO THE HIGH ORGANIC MATTER OF EXISTING SOIL AND EXISTING NATURAL SURFACE TOPOGRAPHY, SOIL SCARIFICATION MAY NOT BE NECESSARY IN ALL AREAS. HOWEVER, IN AREAS COMPACTED BY CONSTRUCTION ACTIVITIES, SOIL SHALL BE PREPARED PRIOR TO PLANTING BY DISC OR SPRING-TOOTH CHISEL PLOW TO A MINIMUM DEPTH OF 12 INCHES. MULTIPLE PASSES SHALL BE MADE ACROSS PLANTING AREAS WITH THE IMPLEMENT AND THE FINAL PASS SHALL FOLLOW TOPOGRAPHIC CONTOURS.
4. BARE ROOT PLANTINGS SHALL BE PLANTED ACCORDING TO DETAIL SHOWN ON SHEET D3. LIVE STAKES SHALL BE PLANTED ACCORDING TO DETAIL SHOWN ON SHEET D3.
5. BARE ROOT AND LIVE STAKE TREE SPECIES SHALL BE PLANTED ACCORDING TO THE TABLE SHOWN TO THE LEFT, BUT SPECIES MAY BE SUBSTITUTED BASED ON AVAILABILITY.
6. TREATMENT/REMOVAL OF INVASIVE SPECIES, PINES AND SWEET GUMS LESS THAN 6" DBH SHALL BE PERFORMED THROUGHOUT THE PLANTED AREA. NO MATURE TREES SHALL BE REMOVED FROM THE SUPPLEMENTAL PLANTING AREA.
7. SPECIES SHALL BE DISTRIBUTED SUCH THAT 3 TO 6 PLANTS OF THE SAME SPECIES ARE GROUPED TOGETHER.
8. BARE ROOT PLANTING DENSITY IS APPROXIMATELY 800 STEMS PER ACRE.
9. LIVE STAKES ARE PROPOSED ALONG THE OUTSIDE OF MEANDER BENDS AND ALONG BOTH BANKS OF STRAIGHT REACHES ADJACENT TO POOLS.
10. TEMPORARY SEED MIX SHALL BE APPLIED TO ALL DISTURBED AREAS PER THE EROSION CONTROL SHEETS.
11. PERMANENT RIPARIAN SEED MIX SHALL BE APPLIED TO ALL DISTURBED AREAS WITHIN THE CONSERVATION EASEMENT AT A RATE OF 15 LBS/ACRE.
12. PERMANENT HERB SEED MIX SHALL BE APPLIED TO ALL DISTURBED AREAS WITHIN THE CONSERVATION EASEMENT BREAKS AT A RATE OF 15 LBS/ACRE.

PLANTING LEGEND

- LIMITS OF CONSERVATION EASEMENT — LCE —
- EXISTING TREELINE
- PROPERTY LINE
- ZONE 1a PLANTING (TOTAL AREA: 17.06 AC)
- ZONE 1b PLANTING (TOTAL AREA: 2.82 AC)
- ZONE 2 PLANTING (TOTAL AREA: 2.70 AC)
- ZONE 1 INVASIVES CONTROL/ SUPPLEMENTAL PLANTING (TOTAL AREA: 1.46 AC)
- ZONE 2 INVASIVES CONTROL/ SUPPLEMENTAL PLANTING (TOTAL AREA: 3.48 AC)



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SEAL

FULL SCALE: 1"=150

0 150 300

2" = FULL SCALE
1" = HALF SCALE

PLOT DATE: 7/14/2022

REVISIONS:

RELEASED FOR: DRAFT - FOR PERMITTING ONLY

PROJECT NAME: SIX RUNS MITIGATION SITE
SAMPSON COUNTY, NORTH CAROLINA

DRAWING TITLE: PLANTING PLAN

PROJECT NUMBER:	103205
PROJECT MANAGER:	BB
DESIGNED:	AFM
DRAWN:	TRS
CHECKED:	BRC

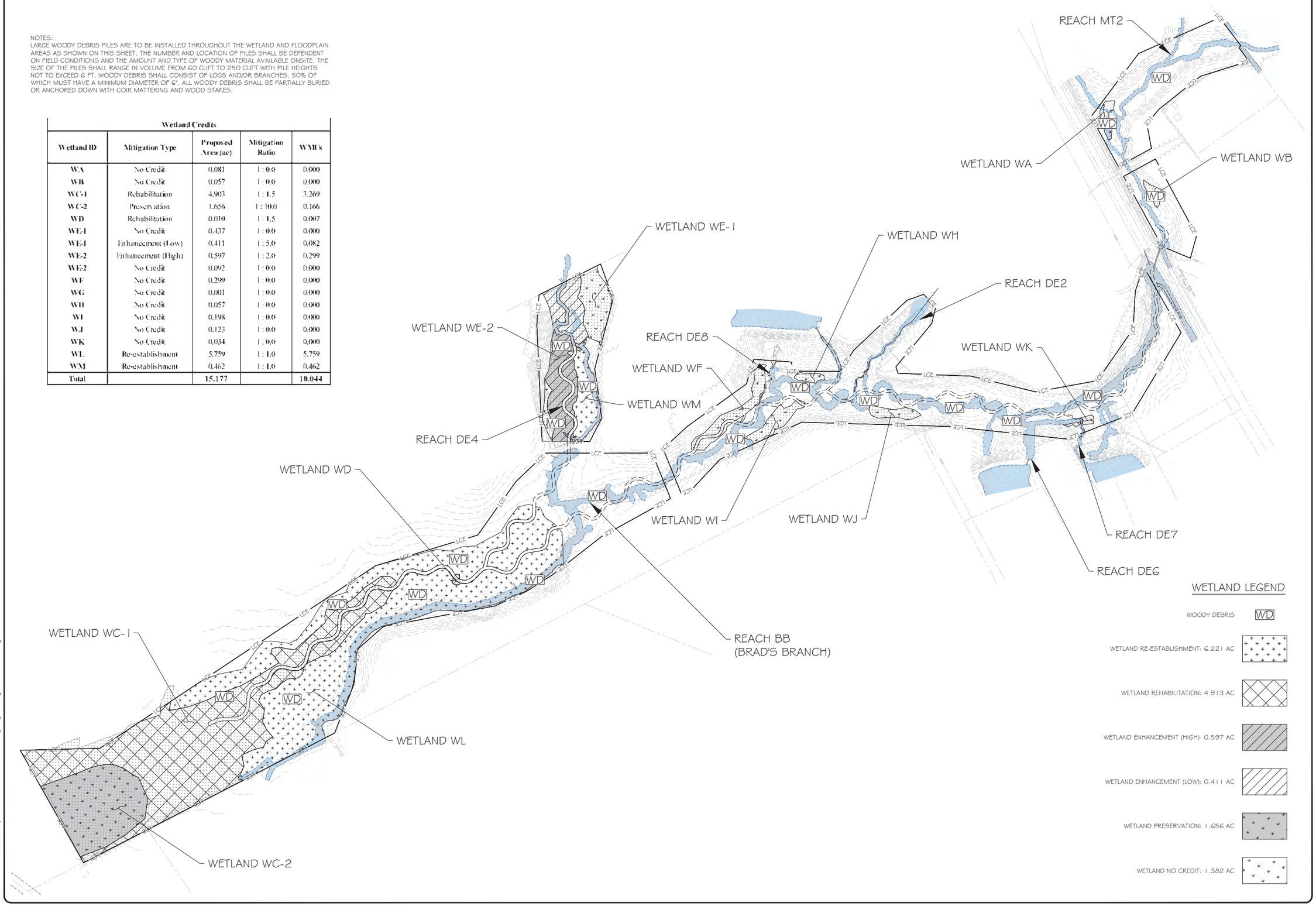
SHEET NUMBER: P1

FILE NAME:R:\Resad\Projects\103205-Six Runs\DWG\103205_SHT_SITE.dwg SAVED BY: Stasking

NOTES:
LARGE WOODY DEBRIS PILES ARE TO BE INSTALLED THROUGHOUT THE WETLAND AND FLOODPLAIN AREAS AS SHOWN ON THIS SHEET. THE NUMBER AND LOCATION OF PILES SHALL BE DEPENDENT ON FIELD CONDITIONS AND THE AMOUNT AND TYPE OF WOODY MATERIAL AVAILABLE ONSITE. THE SIZE OF THE PILES SHALL RANGE IN VOLUME FROM 60 CUFT TO 250 CUFT WITH PILE HEIGHTS NOT TO EXCEED 6 FT. WOODY DEBRIS SHALL CONSIST OF LOGS AND/OR BRANCHES. 50% OF WHICH MUST HAVE A MINIMUM DIAMETER OF 6". ALL WOODY DEBRIS SHALL BE PARTIALLY BURIED OR ANCHORED DOWN WITH COIR MATTERING AND WOOD STAKES.

Wetland Credits

Wetland ID	Mitigation Type	Proposed Area (ac)	Mitigation Ratio	WMUs
WA	No Credit	0.081	1 : 0.0	0.000
WB	No Credit	0.057	1 : 0.0	0.000
WC-1	Rehabilitation	4.903	1 : 1.5	3.269
WC-2	Preservation	1.656	1 : 10.0	0.166
WD	Rehabilitation	0.010	1 : 1.5	0.007
WE-1	No Credit	0.437	1 : 0.0	0.000
WE-1	Enhancement (Low)	0.411	1 : 5.0	0.082
WE-2	Enhancement (High)	0.597	1 : 2.0	0.299
WE-2	No Credit	0.092	1 : 0.0	0.000
WF	No Credit	0.299	1 : 0.0	0.000
WG	No Credit	0.001	1 : 0.0	0.000
WH	No Credit	0.057	1 : 0.0	0.000
WI	No Credit	0.198	1 : 0.0	0.000
WJ	No Credit	0.123	1 : 0.0	0.000
WK	No Credit	0.034	1 : 0.0	0.000
WL	Re-establishment	5.759	1 : 1.0	5.759
WM	Re-establishment	0.462	1 : 1.0	0.462
Total		15.177		10.044



WETLAND LEGEND

- WOODY DEBRIS — WD
- WETLAND RE-ESTABLISHMENT: 6.221 AC
- WETLAND REHABILITATION: 4.913 AC
- WETLAND ENHANCEMENT (HIGH): 0.597 AC
- WETLAND ENHANCEMENT (LOW): 0.411 AC
- WETLAND PRESERVATION: 1.656 AC
- WETLAND NO CREDIT: 1.382 AC

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SEAL

FULL SCALE: 1"=150

0 150 300

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PLOT DATE: 7/14/2022

REVISIONS:

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PROJECT NAME: SIX RUNS MITIGATION SITE
SAMPSON COUNTY, NORTH CAROLINA

DRAWING TITLE: WETLAND PLAN

PROJECT NUMBER:	103205
PROJECT MANAGER:	BB
DESIGNED:	AFM
DRAWN:	TRS
CHECKED:	BRC

SHEET NUMBER:

W1

FILE NAME:R:\Resad\Projects\103205-Six Runs\DWG\103205_SHT_SITE.dwg SAVED BY: Stasking

WHEN AND WHERE TO USE IT
SILT FENCE IS APPLICABLE IN AREAS:

WHERE THE MAXIMUM SHEET OR OVERLAND FLOW PATH LENGTH TO THE FENCE IS 100-FEET.
WHERE THE MAXIMUM SLOPE STEEPNESS (NORMAL [PERPENDICULAR] TO FENCE LINE) IS 2H:1V.
THAT DO NOT RECEIVE CONCENTRATED FLOWS GREATER THAN 0.5 CFS.

DO NOT PLACE SILT FENCE ACROSS CHANNELS OR USE IT AS A VELOCITY CONTROL BMP.

CONSTRUCTION SPECIFICATIONS:

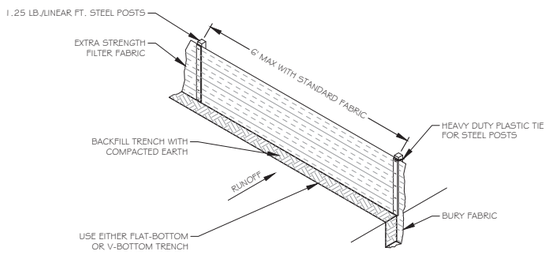
1. USE A SYNTHETIC FILTER FABRIC OF AT LEAST 95% BY WEIGHT OF POLYOLEFINS OR POLYESTER, WHICH IS CERTIFIED BY THE MANUFACTURER OR SUPPLIER AS CONFORMING TO THE REQUIREMENTS IN ASTM D 6461. SYNTHETIC FILTER FABRIC SHOULD CONTAIN ULTRAVIOLET RAY INHIBITORS AND STABILIZERS TO PROVIDE A MINIMUM OF 6 MONTHS OF EXPECTED USABLE CONSTRUCTION LIFE AT A TEMPERATURE RANGE OF 0° TO 120° F.
2. ENSURE THAT POSTS FOR SEDIMENT FENCES ARE 1.33 LB/LINEAR FT STEEL WITH A MINIMUM LENGTH OF 5 FEET. MAKE SURE THAT STEEL POSTS HAVE PROJECTIONS TO FACILITATE FASTENING THE FABRIC.

CONSTRUCTION:

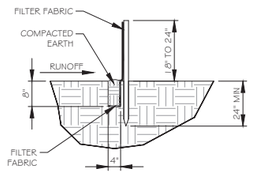
1. CONSTRUCT THE SEDIMENT BARRIER OF EXTRA STRENGTH SYNTHETIC FILTER FABRICS.
2. ENSURE THAT THE HEIGHT OF THE SEDIMENT FENCE DOES NOT EXCEED 24 INCHES ABOVE THE GROUND SURFACE. (HIGHER FENCES MAY IMPOUND VOLUMES OF WATER SUFFICIENT TO CAUSE FAILURE OF THE STRUCTURE.)
3. CONSTRUCT THE FILTER FABRIC FROM A CONTINUOUS ROLL CUT TO THE LENGTH OF THE BARRIER TO AVOID JOINTS. WHEN JOINTS ARE NECESSARY, SECURELY FASTEN THE FILTER CLOTH ONLY AT A SUPPORT POST WITH 4 FEET MINIMUM OVERLAP TO THE NEXT POST.
4. EXTRA STRENGTH FILTER FABRIC WITH 6 FEET POST SPACING DOES NOT REQUIRE WIRE MESH SUPPORT FENCE. SECURELY FASTEN THE FILTER FABRIC DIRECTLY TO POSTS. WIRE OR PLASTIC ZIP TIES SHOULD HAVE MINIMUM 50 POUND TENSILE STRENGTH.
5. EXCAVATE A TRENCH APPROXIMATELY 4 INCHES WIDE AND 8 INCHES DEEP ALONG THE PROPOSED LINE OF POSTS AND UPSLOPE FROM THE BARRIER.
6. PLACE 12 INCHES OF THE FABRIC ALONG THE BOTTOM AND SIDE OF THE TRENCH.
7. BACKFILL THE TRENCH WITH SOIL PLACED OVER THE FILTER FABRIC AND COMPACT. THOROUGH COMPACTION OF THE BACKFILL IS CRITICAL TO SILT FENCE PERFORMANCE.
8. DO NOT ATTACH FILTER FABRIC TO EXISTING TREES.

MAINTENANCE:

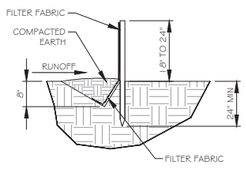
1. INSPECT SEDIMENT FENCES AT LEAST ONCE A WEEK AND AFTER EACH RAINFALL. MAKE ANY REQUIRED REPAIRS IMMEDIATELY.
2. SHOULD THE FABRIC OF A SEDIMENT FENCE COLLAPSE, TEAR, DECOMPOSE OR BECOME INEFFECTIVE, REPLACE IT PROMPTLY.
3. REMOVE SEDIMENT DEPOSITS AS NECESSARY TO PROVIDE ADEQUATE STORAGE VOLUME FOR 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.



SILT FENCE INSTALLATION



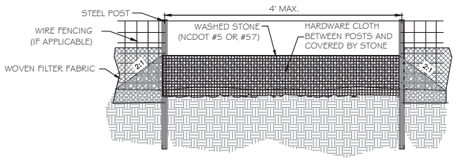
FLAT-BOTTOM TRENCH DETAIL



V-SHAPED TRENCH DETAIL

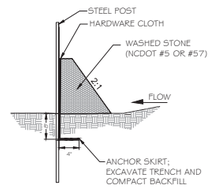
TEMPORARY SILT FENCE

NTS



GENERAL NOTES:

1. SEDIMENT FILTER OUTLET AND HARDWARE CLOTH SHALL BE 16 INCHES HIGH BUT NO TALLER THAN 18 INCHES.
2. HARDWARE CLOTH SHALL BE ANCHORED TO THE STEEL POSTS SECURELY USING APPROPRIATE ANCHORS. HARDWARE CLOTH SHALL BE KEYED IN A MINIMUM OF 12 INCHES IN LENGTH AND BACKFILLED PROPERLY AS SHOWN IN ABOVE DETAIL. HARDWARE CLOTH TO BE SAME AS STD. #30.09 (19 GAUGE, 1/4" SPACING).
3. POSTS SHALL BE NO MORE THAN 4 FEET APART.
4. SITE OUTLETS AT ANY POINT SMALL CONCENTRATED FLOWS ARE ANTICIPATED AND AT THE DIRECTION OF THE INSPECTOR.
5. ONE ACRE MAXIMUM DRAINAGE AREA PER OUTLET.



MAINTENANCE NOTES:

1. FILTER OUTLETS SHALL BE INSPECTED BY THE FINANCIALLY RESPONSIBLE PARTY OR HIS AGENT IMMEDIATELY AFTER EACH RAINFALL AND AT LEAST DAILY DURING PROLONGED RAINFALL. ANY REPAIRS NEEDED SHALL BE MADE IMMEDIATELY.
2. THE STONE SHALL BE REPLACED PROMPTLY AFTER ANY EVENT THAT HAS CLOGGED OR REMOVED IT.
3. SEDIMENT DEPOSITS SHOULD BE REMOVED WHEN DEPOSITS REACH HALF THE HEIGHT OF THE BARRIER. ANY SEDIMENT DEPOSITS REMAINING IN PLACE AFTER THE SILT FENCE OUTLET IS REMOVED SHALL BE DRESSED TO CONFORM TO THE EXISTING GRADE, PREPARED AND SEEDED.

SILT FENCE OUTLET

NTS

INSTALLATION NOTES:

SITE PREPARATION

1. GRADE AND COMPACT AREA.
2. REMOVE ALL ROCKS, CLODS, VEGETATION, AND OBSTRUCTIONS SO THAT MATTING WILL HAVE DIRECT CONTACT WITH THE SOIL.
3. PREPARE SEEDBED BY LOOSENING 3 TO 4 INCHES OF TOPSOIL ABOVE FINAL GRADE.
4. TEST SOILS FOR ANY NUTRIENT DEFICIENCIES AND SUBMIT SOIL TEST RESULTS TO THE ENGINEER. APPLY ANY TREATMENT SUCH AS LIME OR FERTILIZERS TO THE SOIL IF NEEDED.

SEEDING

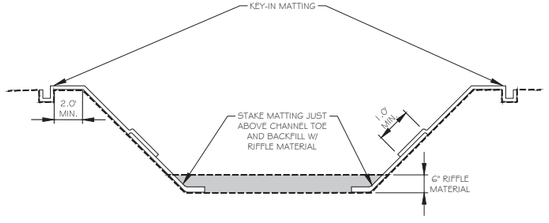
1. SEE PLANTING SHEETS FOR SEEDING REQUIREMENTS.
2. APPLY SEED TO SOIL BEFORE PLACING MATTING.

INSTALLATION - STREAM BANK

1. SEE GRADING NOTES ON PLAN AND PROFILE SHEETS AND DETAIL SHEETS FOR INFORMATION REGARDING WHAT AREAS ARE TO RECEIVE COIR MATTING.
2. OVERLAP ADJACENT MATS 6" (IN DIRECTION PARALLEL TO FLOW) AND ANCHOR EVERY 12" ACROSS THE OVERLAP. THE UPSTREAM MAT SHOULD BE PLACED OVER THE DOWNSTREAM MAT.
3. EDGES SHOULD BE SHINGLED AWAY FROM THE FLOW OF WATER.
4. LAY MAT LOOSE TO ALLOW CONTACT WITH SOIL. DO NOT STRETCH TIGHT.
5. ANCHOR MAT USING BIODEGRADABLE STAKES.
6. EXTEND MAT 2 TO 3 FEET PAST TOP OF BANK.
7. PLACE ADJACENT ROLLS IN THE ANCHOR TRENCH WITH A MINIMUM OF 4" OVERLAP. SECURE WITH BIODEGRADABLE STAKES, BACKFILL ANCHOR TRENCH, AND COMPACT SOIL.
8. STAKE AT 12" INTERVALS ALONG OVERLAP.
9. IF MORE THAN ROLL IS REQUIRED TO COVER THE CHANNEL FROM THE TOP OF BANK DOWN TO THE TOE, THEN OVERLAP MATTING BY A MINIMUM OF 1'.

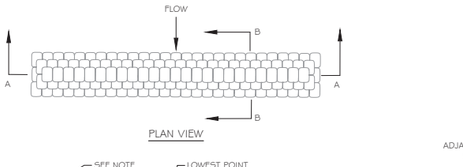
EROSION CONTROL MATTING MUST MEET OR EXCEED THE FOLLOWING REQUIREMENTS:

- 100 % COCONUT FIBER (COIR) TWINE WOVEN INTO A HIGH STRENGTH MATRIX.
- THICKNESS - 0.30 IN. MINIMUM.
- SHEAR STRESS – 4.63 LBS/SQFT
- FLOW VELOCITY- OBSERVED 16 FT/SEC
- WEIGHT - 26.55 OZ/SY
- OPEN AREA - 39%
- SLOPES – UP TO A MAXIMUM OF 1:1

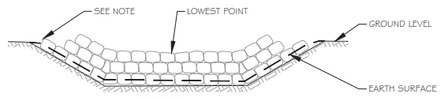


COIR MATTING

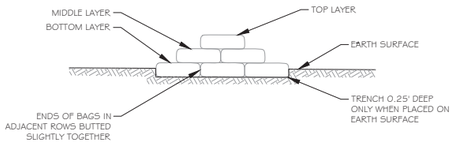
NTS



PLAN VIEW



SECTION A-A



SECTION B-B

MAINTENANCE:

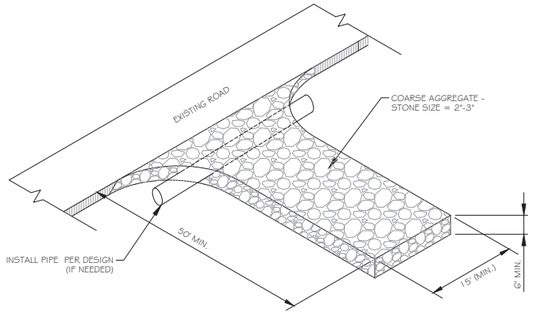
1. PERIODICALLY INSPECT SANDBAG DIKE FOR DAMAGE AND LEAKS AND REPAIR AS NEEDED
2. REMOVE IMPOUNDED TRASH AND SEDIMENT

NOTES:

1. END OF DIKE AT GROUND LEVEL TO BE HIGHER THAN THE LOWEST POINT OF FLOW CHECK
2. SUFFICIENT SANDBAGS ARE TO BE PLACED TO PREVENT SCOURING
3. SANDBAG BARRIERS SHALL BE CONSTRUCTED OF THREE LAYERS OF SANDBAGS. THE BOTTOM LAYER SHALL CONSIST OF 3 ROWS OF BAGS, THE MIDDLE LAYER SHALL CONSIST OF 2 ROWS OF BAGS AND THE TOP LAYER SHALL CONSIST OF 1 ROW OF BAGS
4. THE RECOMMENDED DIMENSION OF A FILLED SANDBAG SHALL BE APPROXIMATELY 0.5 FT X 0.5 FT X 1.5 FT

SANDBAG IMPERVIOUS DIKE

NTS



PURPOSE:

STABILIZED CONSTRUCTION ENTRANCES SHOULD BE USED AT ALL POINTS WHERE TRAFFIC WILL BE LEAVING A CONSTRUCTION SITE AND MOVING DIRECTLY ONTO A PUBLIC ROAD. INSTALL A CULVERT PIPE ACROSS THE ENTRANCE WHEN NEEDED TO PROVIDE POSITIVE DRAINAGE.

CONSTRUCTION SPECIFICATIONS:

1. CLEAR THE ENTRANCE AND EXIT AREA OF ALL VEGETATION, ROOTS, AND OTHER OBJECTIONABLE MATERIAL AND PROPERLY GRADE IT.
2. PLACE THE GRAVEL TO THE SPECIFIC GRADE AND DIMENSIONS SHOWN ON THE DETAIL, AND SMOOTH IT.
3. PROVIDE DRAINAGE TO CARRY WATER TO A SEDIMENT TRAP OR OTHER SUITABLE OUTLET.
4. USE GEOTEXTILE FABRICS BECAUSE THEY IMPROVE STABILITY OF THE FOUNDATION IN LOCATIONS SUBJECT TO SEEPAGE OR HIGH WATER TABLE.

MAINTENANCE:

1. MAINTAIN THE GRAVEL PAD IN A CONDITION TO PREVENT MUD OR SEDIMENT FROM LEAVING THE CONSTRUCTION SITE. THIS MAY REQUIRE PERIODIC TOP DRESSING WITH 2-INCH STONE.
2. AFTER EACH RAINFALL, INSPECT ANY STRUCTURE USED TO TRAP SEDIMENT AND CLEAN IT OUT AS NECESSARY.
3. IMMEDIATELY REMOVE ALL OBJECTIONABLE MATERIALS SPILLED, WASHED, OR TRACKED ONTO PUBLIC ROADWAYS, OR AIRFIELD PAVEMENTS.

TEMPORARY GRAVEL CONSTRUCTION ENTRANCE

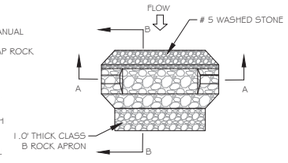
NTS

NOTES:

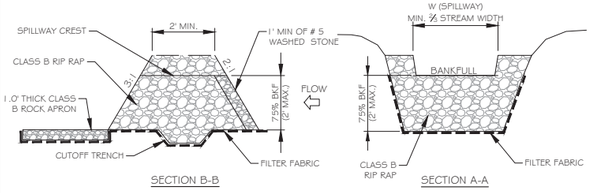
1. CONSTRUCT DAM ACCORDING TO NCDENR EROSION CONTROL MANUAL
2. RIPRAP SHALL BE CLASS I
3. PLACE ROCK DAM AS SHOWN ON PLANS. EXTEND CLASS B RIP RAP ROCK APRON 2 FEET DOWNSTREAM FROM TOE OF ROCK DAM

MAINTENANCE:

1. INSPECT CHECK DAM PERIODICALLY AND AFTER EACH SIGNIFICANT RAINFALL EVENT FOR DAMAGE AND SEDIMENT ACCUMULATION
2. AT A MINIMUM, REMOVE SEDIMENT WHEN ACCUMULATIONS REACH ONE-HALF THE HEIGHT OF THE SEDIMENT CONTROL STONE
3. REPLACE OR CLEAN SEDIMENT CONTROL STONE AS NEEDED TO ALLOW WATER TO DRAIN THROUGH THE DEVICE BETWEEN RAINFALL EVENTS



PLAN



TEMPORARY ROCK CHECK DAM

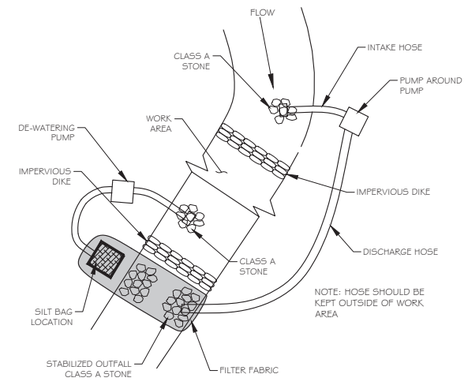
NTS

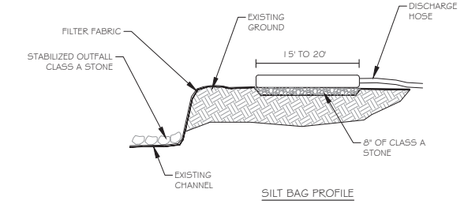
NOTES:

1. EXCAVATION SHALL BE PERFORMED ONLY IN DRY AND/OR ISOLATED SECTIONS OF CHANNEL.
2. IMPERVIOUS DIKES SHOULD BE USED TO ISOLATE WORK AREAS FROM STREAM FLOW.
3. THE CONTRACTOR SHALL NOT DISTURB MORE AREA THAN CAN BE STABILIZED IN ONE WORKING DAY; A MAXIMUM OF 200 FEET MAY BE DISTURBED AT ANY ONE TIME.
4. THE CONTRACTOR SHALL BE RESPONSIBLE FOR DETERMINING PUMP SIZE SUFFICIENT TO PUMP BASE FLOW.
5. DIKE MUST BE CONSTRUCTED OF NON-ERODIBLE MATERIALS SUCH AS SANDBAGS.

SEQUENCE OF CONSTRUCTION:

1. INSTALL STILLING BASIN AND STABILIZED OUTFALL USING CLASS A RIP RAP AT THE DOWNSTREAM END OF THE DESIGNATED PROJECT WORKING AREA.
2. THE CONTRACTOR SHALL INSTALL THE PUMP AROUND PUMP AND THE TEMPORARY PIPING THAT WILL CONVEY THE BASE FLOW FROM UPSTREAM OF THE WORK AREA TO THE STABILIZED OUTFALL.
3. INSTALL UPSTREAM IMPERVIOUS DIKE AND BEGIN PUMPING OPERATIONS FOR STREAM DIVERSION.
4. INSTALL THE DOWNSTREAM IMPERVIOUS DIKE AND DEWATERING 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 ALSO BE PUMPED TO AN OUTFALL STABILIZED WITH CLASS A RIP RAP.
5. THE CONTRACTOR SHALL EXCAVATE ANY ACCUMULATED SILT AND DEWATER BEFORE REMOVAL OF THE IMPERVIOUS DIKE. WHEN DEWATERING AREA, ALL DIRTY WATER MUST BE PUMPED THROUGH A SILT BAG. REMOVE IMPERVIOUS DIKES, PUMPS, AND TEMPORARY FLEXIBLE HOSE/PIPING STARTING WITH THE DOWNSTREAM DIKE FIRST.
6. ONCE THE WORKING AREA IS COMPLETED, REMOVE ALL RIP RAP AND IMPERVIOUS DIKES AND STABILIZE DISTURBED AREAS WITH SEED AND MULCH.
7. ALL WORK IN CHANNEL MUST BE COMPLETED BEFORE REMOVING IMPERVIOUS DIKE.





SILT BAG PROFILE

PUMP AROUND & DEWATERING DETAIL

NTS

3600 Glenwood Ave, Suite 100
Raleigh, NC 27612
Main: 919.829.9909
www.res.us

Engineering Services Provided By:
RES Environmental Operating Company, LLC
License: F-1428

SEAL

PLOT DATE: 7/14/2022

REVISIONS:

RELEASED FOR: DRAFT - FOR PERMITTING ONLY

PROJECT NAME:
SIX RUNS MITIGATION SITE
SAMPSON COUNTY, NORTH CAROLINA

DRAWING TITLE:
DETAILS

PROJECT NUMBER:	103205
PROJECT MANAGER:	BB
DESIGNED:	AFM
DRAWN:	TRS
CHECKED:	BRC

SHEET NUMBER:

D1

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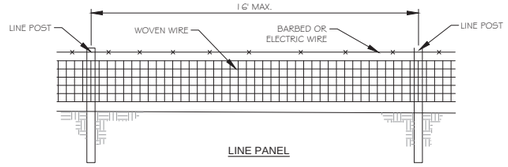
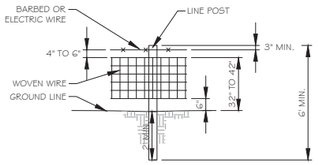


LINE PANEL



WOVEN WIRE:
ASTM CLASS 3 GALVANIZED.
TOP AND BOTTOM WIRES MIN. 12 GAUGE.
INTERMEDIATE AND STAY WIRES MIN.
12 1/2 GAUGE.

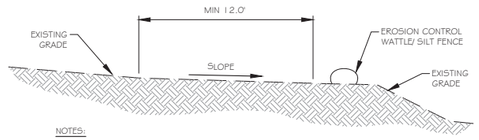
WOVEN WIRE WITH ONE BARB DETAIL

NOTES:

1. LINE POSTS (WOODEN): MIN. 4 IN. DIAM. OR 4 IN. SQUARE.
2. LINE POSTS (STEEL): STUDDED OR PUNCHED T, U, OR Y SHAPED, WITH ANCHOR PLATES.
3. MIN. WEIGHT 1.3 LBS./FT. (EXCLUDING ANCHOR PLATE). POSTS SHALL BE DRIVEN A MINIMUM OF 18" DEEP AND MUST BE AT LEAST 5.5 FT IN LENGTH
4. SPECIES AND TREATMENT FOR ALL WOOD: USE UNTREATED DURABLE POSTS OF SPECIES SUCH AS RED CEDAR, BLACK LOCUST OR OSAGE-ORANGE WITH BARK REMOVED, OR NON-DURABLE WOOD THAT IS PRESERVATIVE PRESSURE TREATED (0.40 LBS./CUBIC FOOT CCA, OR EQUIVALENT NON-CCA TREATMENT). DO NOT USE RED PINE.

WOVEN WIRE FENCE (NRCS DETAIL 382A)

NTS

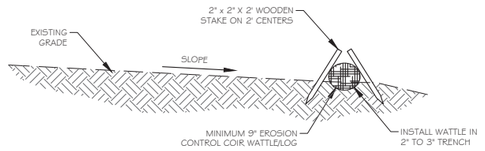


NOTES:

1. MAINTAIN HAUL ROAD DURING CONSTRUCTION
2. RETURN TO ORIGINAL GRADE AT THE COMPLETION OF WORK
3. VEGETATE ALL DISTURBED AREAS
4. REMOVE COMPOST FILTER SOCK UPON ESTABLISHMENT OF VEGETATION

TYPICAL HAUL ROAD

NTS



PROFILE VIEW

MAINTENANCE:

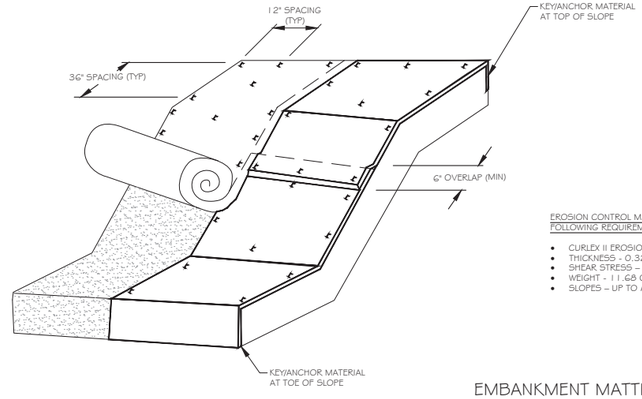
1. INSPECT WATTLE PERIODICALLY AND AFTER EACH SIGNIFICANT RAINFALL EVENT FOR DAMAGE AND SEDIMENT ACCUMULATION
2. REPLACE OR CLEAN WATTLE AS NEEDED TO ALLOW WATER TO DRAIN THROUGH THE NATURAL FIBERS BETWEEN RAINFALL EVENTS

NOTES:

1. EROSION CONTROL WATTLES OR COIR LOGS/WATTLES MAY BE USED IN PLACE OF SILT FENCE
2. INSTLL A MINIMUM OF 2 UPSLOPE STAKES AND 4 DOWNSLOPE STAKES AT AN ANGLE TO WEDGE WATTLE IN PLACE

EROSION CONTROL WATTLE

NTS



NOTES:

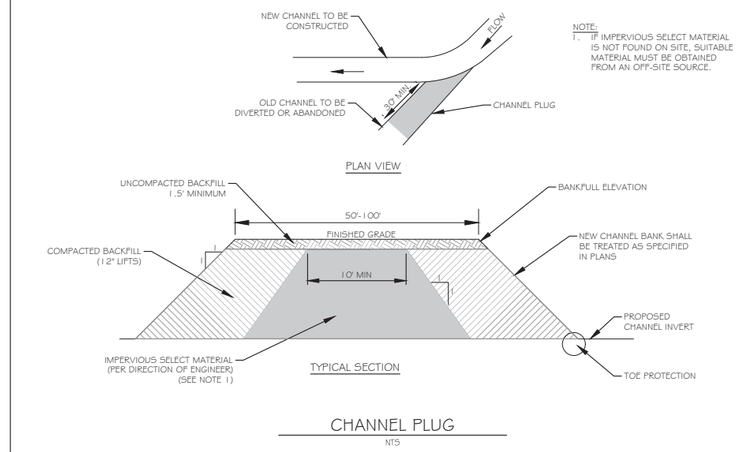
1. LAY BLANKETS LOOSELY AND STAKE OR STAPLE TO MAINTAIN DIRECT CONTACT WITH THE SOIL. DO NOT STRETCH.
2. DIMENSIONS SHOWN ARE MINIMUM. MANUFACTURED PRODUCTS MAY HAVE ADDITIONAL REQUIREMENTS THAT MUST BE MET.
3. SLOPE SURFACE SHALL BE FREE OF ROCKS, SOIL CLODS, STICKS, GRASS. MAT/BLANKETS SHALL HAVE GOOD SOIL CONTACT.
4. THE DETAIL SHOWN IS FOR SLOPE MATTING. FOR CHANNEL MATTING SPECIFICATIONS PLEASE REFER TO COIR MATTING DETAIL.

EROSION CONTROL MATTING MUST MEET OR EXCEED THE FOLLOWING REQUIREMENTS:

- CURLEX II EROSION CONTROL BLANKET (OR EQUIVALENT)
- THICKNESS - 0.327 IN. MINIMUM.
- SHEAR STRESS – 2.25 LBS/SQFT
- WEIGHT - 11.68 OZ/SY
- SLOPES – UP TO A MAXIMUM OF 1.5:1

EMBANKMENT MATTING

NTS

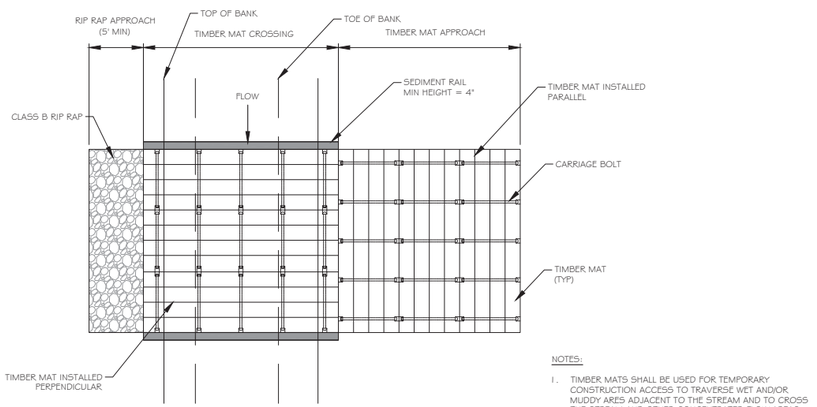


NOTE:

1. IF IMPERVIOUS SELECT MATERIAL IS NOT FOUND ON SITE, SUITABLE MATERIAL MUST BE OBTAINED FROM AN OFF-SITE SOURCE.

CHANNEL PLUG

NTS

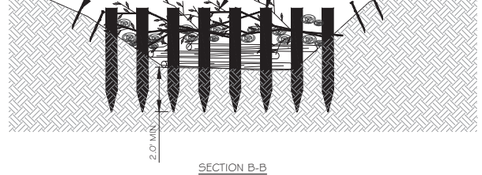


NOTES:

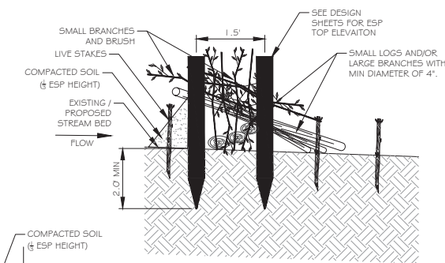
1. TIMBER MATS SHALL BE USED FOR TEMPORARY CONSTRUCTION ACCESS TO TRAVERSE WET AND/OR MUDDY AREAS ADJACENT TO THE STREAM AND TO CROSS THE STREAM AND OTHER CONCENTRATED FLOW AREAS.
2. THE STREAM CROSSING SHALL BE INSTALLED IN A DRY CONDITION WHEN FLOW IS LOW. THERE SHALL BE MINIMAL TO NO DISTURBANCE OF THE CHANNEL BED AND BANKS AS A RESULT OF INSTALLING THE APPROACHES OR CROSSING.
3. THE LENGTH OF TIMBER MAT REQUIRED TO CROSS THE STREAM OR CONCENTRATED FLOW AREAS SHALL BE SUCH THAT THE TIMBER MAT EXTENDS PAST THE TOP OF BANK ON EACH SIDE OF THE CROSSING A SUFFICIENT DISTANCE TO SUPPORT THE MAXIMUM EQUIPMENT SIZE USING THE CROSSING.
4. STREAM CROSSINGS SHALL BE INSTALLED WITH THE TIMBER MAT LENGTHS ORIENTED PERPENDICULAR TO THE TOPS OF THE STREAM BANKS. TIMBER MAT STREAM APPROACHES SHALL BE INSTALLED WITH THE TIMBER MAT LENGTHS ORIENTED PARALLEL TO THE TOPS OF THE STREAM BANKS.
5. TIMBER MATS SHALL HAVE A SOLID DECK WITH NO GAPS OR SPACES ALLOWED BETWEEN THE INDIVIDUAL BOARDS/TIMBERS.
6. A 4" MINIMUM HEIGHT SEDIMENT RAIL SHALL BE PROVIDED AT STREAM CROSSINGS TO PREVENT TRACKED SEDIMENT FROM FALLING INTO THE STREAM BED.
7. STREAM CROSSING APPROACHES FROM DRY AREAS SHALL BE CONSTRUCTED USING CLASS B RIP RAP PLACED OVER FILTER FABRIC.
8. ALL TIMBER MATS, FILTER FABRIC, AND RIP RAP SHALL BE COMPLETELY REMOVED FROM THE SITE WHEN THE CROSSING IS REMOVED.

TIMBER MAT TEMPORARY CROSSING

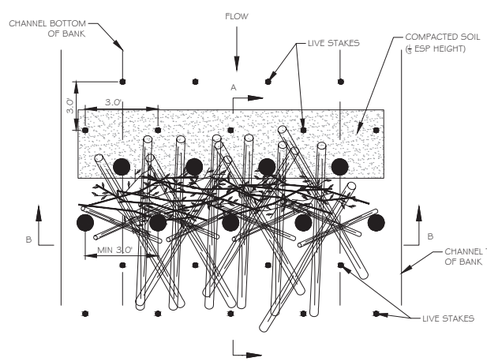
NTS



SECTION B-B



SECTION A-A

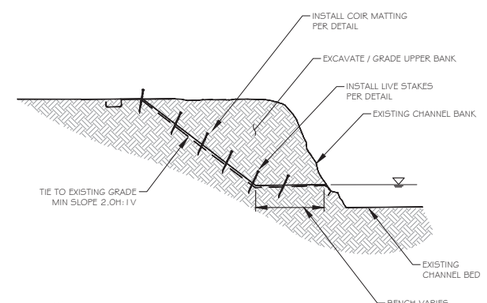


NOTES:

1. DRIVE 2 ROWS OF 4" CEDAR POSTS ON MINIMUN 3' CENTERS PAST MINIMUM DEPTH AS SHOWN.
2. FILL THE VOID BETWEEN POST ROWS W/ AN EVEN MIX OF HARDWOOD LOGS, LIMBS, AND BRUSH AS SHOWN.
3. TOP ELEVATION (SHOWN ON DESIGN SHEETS) SHOULD BE UNIFORM.
4. REDUCE POST SPACING AS NEEDED TO IMPROVE STRUCTURE STABILITY.
5. PLACE AND COMPACT FILL ON UPSTREAM FACE OF THE ESP.
6. FILL SHOULD BE PLACED AT A UNIFORM HEIGHT EQUAL TO ¼ OF THE TOTAL ESP HEIGHT (MEASURED FROM CHANNEL BED).
7. SEE PLANTING TABLE ON SHEET P1 FOR ACCEPTABLE LIVE STAKE SPECIES.

ENGINEERED SEDIMENT PACK (ESP)

NTS



NOTES:

1. SEED AND MULCH ALL BANKS PRIOR TO INSTALLING COIR MATTING.

TYPICAL BANK GRADING

NTS

res
3600 Glenwood Ave, Suite 100
Raleigh, NC 27612
Main: 919.829.9909
www.res.us

Engineering Services Provided By:
RES Environmental Operating Company, LLC
License: F-1428

SEAL

PLOT DATE: 7/14/2022

REVISIONS:

RELEASED FOR: DRAFT - FOR PERMITTING ONLY

PROJECT NAME:
SIX RUNS MITIGATION SITE
SAMPSON COUNTY, NORTH CAROLINA

DRAWING TITLE:
DETAILS

PROJECT NUMBER:	103205
PROJECT MANAGER:	BB
DESIGNED:	AFM
DRAWN:	TRS
CHECKED:	BRC

SHEET NUMBER:

D2

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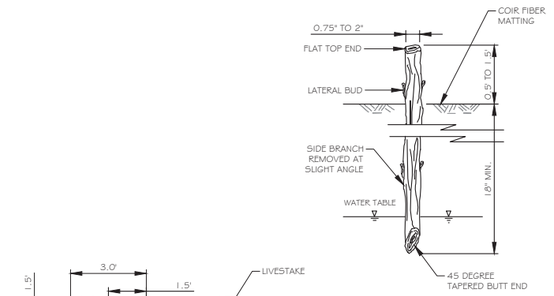
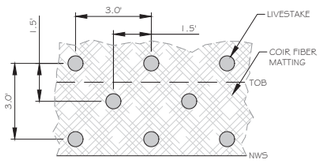
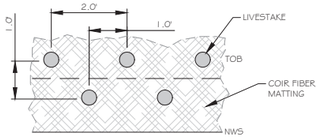
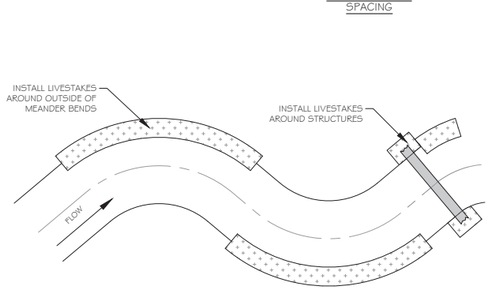




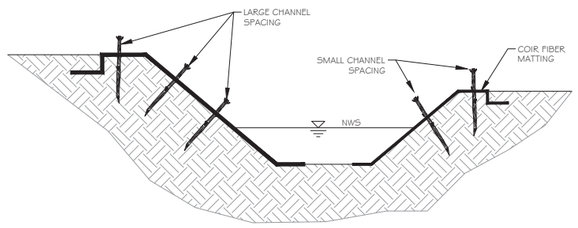
LARGE CHANNEL SPACING



SMALL CHANNEL SPACING



PLAN VIEW



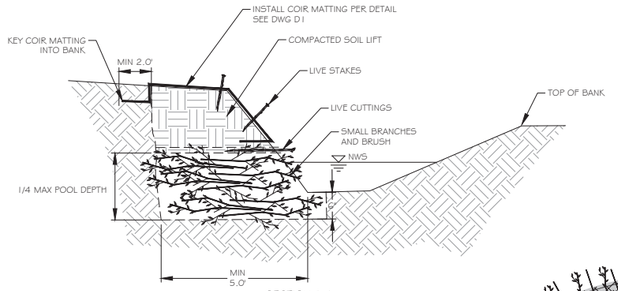
TYPICAL SECTION

NOTES:

1. SEE TABLE ON PLANTING SHEET FOR ACCEPTABLE SPECIES AND COMPOSITION.
2. LIVE STAKES SHOULD BE 2 TO 3 FEET LONG AND 0.75 TO 2 INCHES IN DIAMETER.
3. LIVE STAKES SHALL BE PLANTED ON 1.5' ALTERNATING SPACING ON LARGE CHANNELS (POOL DEPTH > 2FT) AND 1.0' ALTERNATING SPACING ON SMALL CHANNELS (POOL DEPTH < 2FT).
4. LIVE STAKES SHALL BE PLANTED ON ALL RESTORATION REACHES AND ALONG ALL ENHANCEMENT REACHES AS SHOWN ON LIVE STAKE SHEETS.

LIVE STAKING

NTS

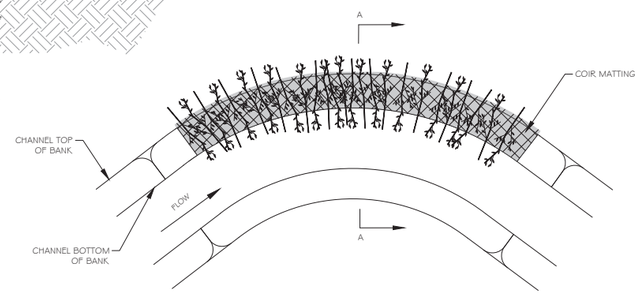


SECTION A-A

* A "SMALL CHANNEL" IS DEFINED AS A CHANNEL WHOSE MAX POOL DEPTH IS LESS THAN 1 FT GREATER THAN THE TYPICAL RIFFLE DEPTH

NOTES:

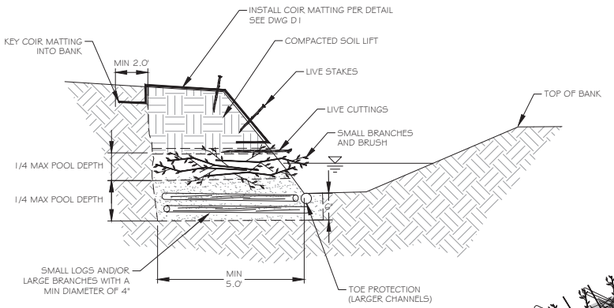
1. OVER EXCAVATE THE OUTSIDE BEND OF THE CHANNEL. INSTALL SMALLER BRANCHES AND BRUSH AND COMPACT LIGHTLY TOGETHER. BACKFILL AND COMPACT TO LOCK IN PLACE.
2. PLACE LIVE CUTTINGS OVER THE SMALL BRANCHES AND BRUSH. SEE TABLE ON PLANTING SHEET FOR ACCEPTABLE LIVE CUTTING AND LIVE STAKE SPECIES AND COMPOSITION. CUTTINGS SHOULD BE RINSED AT CUTTING POINT TO ALLOW BETTER ROOTING.
3. INSTALL EROSION CONTROL (COIR) MATTING OVER COMPACTED SOIL PER DIRECTION OF ENGINEER. COIR MATTING SHOULD BE KEYED INTO TOP OF BANK.
4. INSTALL 1 TO 3 ROWS OF LIVE STAKES ABOVE THE LIVE CUTTINGS LAYER PER DIRECTION OF ENGINEER.



TYPICAL PLAN VIEW

BRUSH TOE (SMALL CHANNEL*)

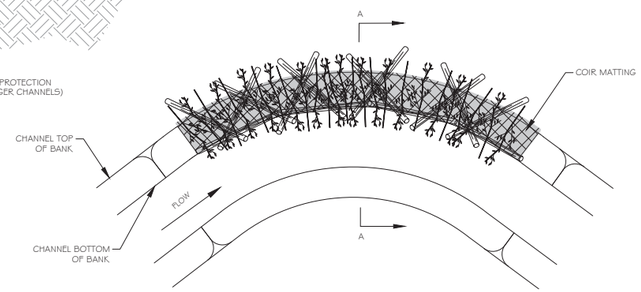
NTS



SECTION A-A

NOTES:

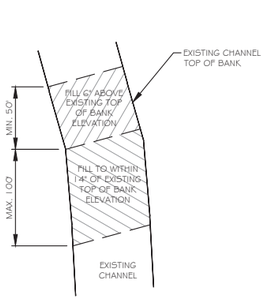
1. OVER EXCAVATE THE OUTSIDE BEND OF THE CHANNEL. PLACE LARGER BRANCHES AND LOGS IN A CRISS-CROSS PATTERN. LOCK IN PLACE WITH FILL COVERING 6" TO 12" OF THE LARGER BRANCHES/SMALL LOGS.
2. PLACE SMALLER BRANCHES AND BRUSH OVER THE LARGER BRANCHES/SMALL LOGS (HARDWOOD SPECIES ONLY) AND COMPACT LIGHTLY TOGETHER. BACKFILL AND COMPACT TO LOCK IN PLACE.
3. PLACE LIVE CUTTINGS OVER THE SMALL BRANCHES AND BRUSH. SEE TABLE ON PLANTING SHEET FOR ACCEPTABLE LIVE CUTTING AND LIVE STAKE SPECIES AND COMPOSITION. CUTTINGS SHOULD BE RINSED AT CUTTING POINT TO ALLOW BETTER ROOTING.
4. INSTALL EROSION CONTROL (COIR) MATTING OVER COMPACTED SOIL PER DIRECTION OF ENGINEER. COIR MATTING SHOULD BE KEYED INTO TOP OF BANK.
5. INSTALL 1 TO 3 ROWS OF LIVE STAKES ABOVE THE LIVE CUTTINGS LAYER PER DIRECTION OF ENGINEER.
6. LIVE CUTTINGS SHOULD NOT EXTEND PAST ½ OF CHANNEL BOTTOM WIDTH.



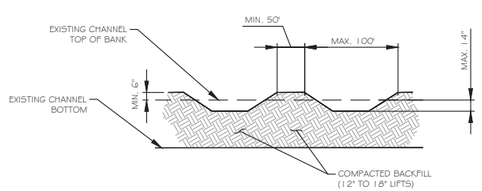
TYPICAL PLAN VIEW

BRUSH TOE

NTS



PLAN VIEW



TYPICAL SECTION

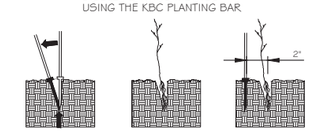
NOTES:

1. IN AREAS WHERE EXISTING CHANNEL IS TO BE ABANDONED, FILL EXISTING CHANNEL TO TOP OF BANK ELEVATION WHEN POSSIBLE.
2. CHANNEL MUST BE FILLED IN 12" TO 18" LIFTS AND COMPACTED ACCORDINGLY.
3. WHEN SPOIL DOES NOT EXIST IN ORDER TO COMPLETELY FILL EXISTING CHANNEL TO TOP OF BANK ELEVATION, FILL CHANNEL TO AN ELEVATION 6" ABOVE TOP OF BANK ELEVATION FOR AT LEAST 50 LF OUT OF EVERY 150 LF SEGMENT. REMAINING CHANNEL SECTIONS ARE TO BE FILLED TO A DEPTH OF NO LESS THAN 14" FROM TOP OF BANK ELEVATION.
4. IN AREAS WHERE THE EXISTING CHANNEL IS LOCATED OUTSIDE OF THE CONSERVATION EASEMENT, THE CHANNEL MUST BE FILLED COMPLETELY IN 12" LIFTS.

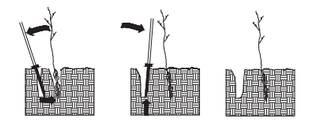
CHANNEL ABANDONMENT AND BACKFILL

NTS

DIBBLE PLANTING METHOD
USING THE KBC PLANTING BAR



1. INSERT PLANTING BAR AS SHOWN AND PULL HANDLE TOWARD PLANTER.
2. REMOVE PLANTING BAR AND PLACE SEEDING AT CORRECT DEPTH.
3. INSERT PLANTING BAR 2 INCHES TOWARD PLANTER FROM SEEDING.



4. PULL HANDLE OF BAR TOWARD PLANTER, FIRMING SOIL AT BOTTOM.
5. PUSH HANDLE FORWARD FIRMING SOIL AT TOP.
6. LEAVE COMPACTION HOLE OPEN. WATER THOROUGHLY.

PLANTING NOTES:

PLANTING BAG
DURING PLANTING, SEEDLINGS SHALL BE KEPT IN A MOIST CANVAS BAG OR SIMILAR CONTAINER TO PREVENT THE ROOT SYSTEMS FROM DRYING.

KBC PLANTING BAR
PLANTING BAR SHALL HAVE A BLADE WITH A TRIANGULAR CROSS SECTION, AND SHALL BE 12 INCHES LONG, 4 INCHES WIDE AND 1 INCH THICK AT CENTER.

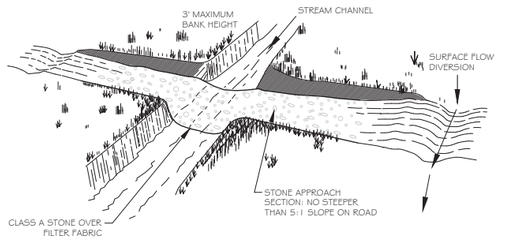
ROOT PRUNING
ALL SEEDLINGS SHALL BE ROOT PRUNED, IF NECESSARY, SO THAT NO ROOTS EXTEND MORE THAN 10 INCHES BELOW THE ROOT COLLAR.

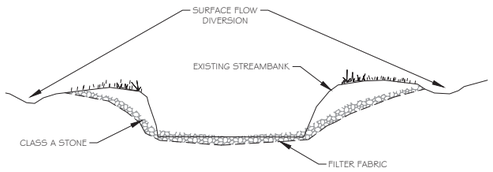
NOTES:

BARE ROOTS SHALL BE PLANTED 6 FT. TO 10 FT. ON CENTER, RANDOM SPACING, AVERAGING 8 FT. ON CENTER. APPROXIMATELY 680 PLANTS PER ACRE.

BARE ROOT PLANTING

NTS





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 STREAM BANKS. DO NOT EXCAVATE CHANNEL BOTTOM. COMPLETE ONE SIDE BEFORE STARTING ON THE OTHER SIDE.
4. INSTALL STREAM CROSSING PERPENDICULAR TO FLOW.
5. GRADE SLOPES NO STEEPER THAN 5:1
6. MAINTAIN CROSSING SO THAT RUNOFF IN THE CONSTRUCTION ROAD DOES NOT ENTER EXISTING CHANNEL
7. A STABILIZED PAD OF NATURAL CLASS A STONE, 6 TO 9 INCHES THICK, LINED WITH FILTER FABRIC SHALL BE USED OVER THE BERM AND ACCESS SLOPES.
8. FILTER FABRIC USED SHALL BE NCDOT TYPE 2 ENGINEERING FABRIC OR EQUIVALENT.
9. WIDTH OF THE CROSSING SHALL BE SUFFICIENT (8' MIN.) TO ACCOMMODATE THE LARGEST VEHICLE CROSSING THE CHANNEL.
10. CONTRACTOR SHALL DETERMINE AN APPROPRIATE RAMP ANGLE ACCORDING TO EQUIPMENT UTILIZED.
11. TEMPORARY CROSSINGS ARE TO BE ABANDONED IN PLACE.

FORD CROSSING

NTS

res
3600 Glenwood Ave, Suite 100
Raleigh, NC 27612
Main: 919.829.9909
www.res.us

Engineering Services Provided By:
RES Environmental Operating Company, LLC
License: F-1428

SEAL

PLOT DATE: 7/14/2022

REVISIONS:

RELEASED FOR: DRAFT - FOR PERMITTING ONLY

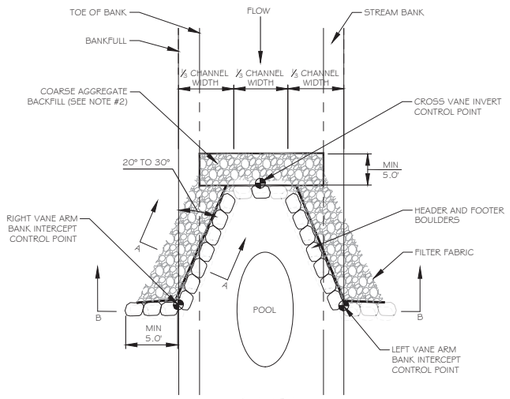
PROJECT NAME: SIX RUNS MITIGATION SITE
SAMPSON COUNTY, NORTH CAROLINA

DRAWING TITLE: DETAILS

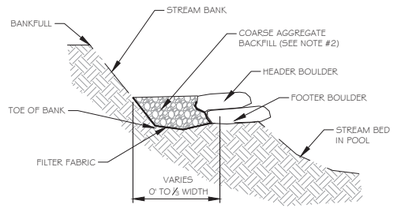
PROJECT NUMBER:	103205
PROJECT MANAGER:	BB
DESIGNED:	AFM
DRAWN:	TRS
CHECKED:	BRC

SHEET NUMBER: D3

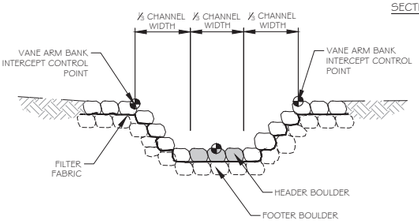
FILE NAME:R:\Respec\Projects\103205-Six Runs\DWG\103205_SHT_DETAILS.dwg SAVED BY: Stasking



PLAN VIEW



SECTION A-A'



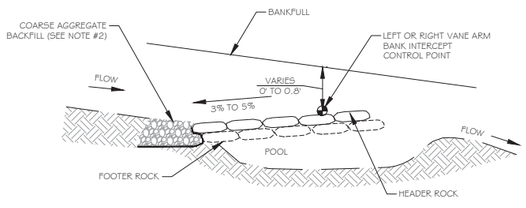
SECTION B-B'

NOTES:

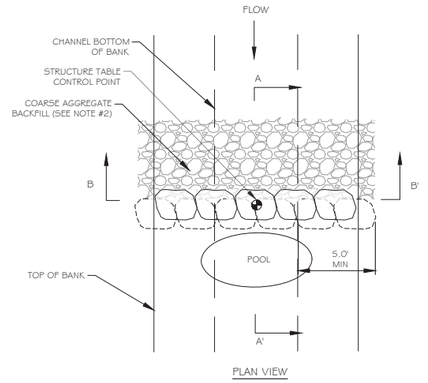
1. SEE STRUCTURE BOULDER SIZE TABLE FOR MINIMUM DIMENSIONS OF BOULDERS. THE UPPER LIMIT FOR BOULDER SIZES SHOULD BE NO MORE THAT 20% OF THE SPECIFIED MINIMUM SIZE AND SHALL BE APPROVED BY THE ENGINEER PRIOR TO INSTALLATION OF THE STRUCTURE.
2. COARSE AGGREGATE BACKFILL SHALL CONSIST OF AN EQUAL MIX OF #57 STONE, SURGE STONE, AND CLASS A RIPRAP. A MIXTURE OF WOODY DEBRIS AND SOIL MAY BE MIXED INTO AGGREGATE BACKFILL IN ORDER TO HELP SEAL STRUCTURE.
3. BOULDERS AT TOE SHALL BE INSTALLED SLIGHTLY HIGHER (APPROX. 0.1') IN ORDER TO PROMOTE LOW FLOW INTO CENTER OF CHANNEL.
4. CROSS VANES SHALL BE CONSTRUCTED SO THAT ADJOINING BOULDERS TAPER IN AN UPSTREAM DIRECTION, FROM THE BANKFULL ELEVATION TO THE STREAM INVERT. THE UPSTREAM END OF THE CROSS VANE IS SET AT AN ANGLE OF 20 TO 30 DEGREES TANGENT TO THE PROJECTED STREAM BANK DIRECTION. THE TOP ELEVATION OF BOTH VANES WILL DECREASE TOWARD THE CENTER OF THE CHANNEL.
5. THE DOWNSTREAM END OF THE CROSS VANE SHALL BE KEYED INTO THE STREAMBANK AT THE BANKFULL ELEVATION. THE CROSS VANE SHALL BE KEYED A MINIMUM OF FIVE FEET INTO THE STREAMBANK. THE UPSTREAM END OF CROSS VANE SHALL BE KEYED INTO THE STREAMBANK AT THE DESIGNED STREAMBED INVERT ELEVATION.
6. VANE BOULDERS SHALL BE PLACED IN A LINEAR FASHION SO AS TO PRODUCE THE SLOPING CROSS VANE, AND SHALL BE PLACED WITH TIGHT, CONTINUOUS SURFACE CONTACT BETWEEN ADJOINING BOULDER. BOULDER SHALL BE PLACE SO AS TO HAVE NO SIGNIFICANT GAPS BETWEEN ADJOINING BOULDER.
7. VANE BOULDERS SHALL BE PLACED SO AS TO HAVE A FINAL SMOOTH SURFACE ALONG THE TOP PLANE OF THE CROSS VANE. NO VANE BOULDER SHALL PROTRUDE HIGHER THAN THE OTHER BOULDER IN THE BOULDER VANE. A COMPLETED CROSS VANE HAS A SMOOTH, CONTINUOUS FINISH GRADE FROM THE BANKFULL ELEVATION TO THE STREAMBED.
8. AS THE CROSS VANE IS CONSTRUCTED, THE CONTRACTOR SHALL CHINK ALL VOIDS BETWEEN THE FOOTER BOULDERS, AND BETWEEN THE FOOTER BOULDERS AND VANE BOULDERS. VOIDS SHALL BE CHINKED WITH SMALLER ROCK SUCH THAT NO VOIDS GREATER THAN FOUR INCHES IN SIZE WILL BE PRESENT.

ROCK CROSS VANE

NTS



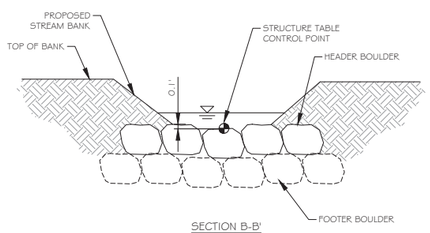
PROFILE VIEW



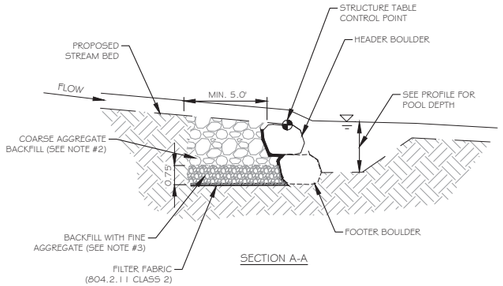
PLAN VIEW

NOTES:

1. SEE STRUCTURE BOULDER SIZE TABLE FOR MINIMUM DIMENSIONS OF BOULDERS. THE UPPER LIMIT FOR BOULDER SIZES SHOULD BE NO MORE THAN 20% GREATER THAN THE SPECIFIED MINIMUM SIZE AND SHALL BE APPROVED BY THE ENGINEER PRIOR TO INSTALLATION OF THE STRUCTURE.
2. COARSE AGGREGATE BACKFILL COMPOSITION SHALL MATCH THE RIFFLE COMPOSITION TABLE PROVIDED IN THE TYPICAL RIFFLE DETAIL. A MIXTURE OF WOODY DEBRIS AND SOIL MAY BE MIXED INTO AGGREGATE BACKFILL IN ORDER TO HELP SEAL STRUCTURE.
3. FINE AGGREGATE BACKFILL SHALL CONSIST OF AN EQUAL MIX OF ABC STONE AND NATIVE MATERIAL.
4. BOULDERS AT TOE OF BANK SHALL BE INSTALLED SLIGHTLY HIGHER (APPROX. 0.1') IN ORDER TO PROMOTE LOW FLOW INTO CENTER OF CHANNEL.
5. THE BOULDER SILL IS GENERALLY CONSTRUCTED AS FOLLOWS:
   A. PLACE FOOTER BOULDERS. A LAYER OF BEDDING MATERIAL UNDER THE FOOTER BOULDERS MAY BE SPECIFIED BY THE DESIGNER. THERE SHALL BE NO GAPS BETWEEN BOULDERS.
   B. INSTALL FILTER FABRIC.
   C. PLACE COURSE BACKFILL BEHIND THE FOOTER BOULDERS.
   D. INSTALL HEADER BOULDERS ON TOP OF AND SET SLIGHTLY BACK FROM THE FOOTER BOULDERS (SUCH THAT PART OF THE HEADER BOULDER IS RESTING ON THE COARSE BACKFILL). HEADER BOULDERS SHALL SPAN THE SEAMS OF THE FOOTER BOULDERS. THERE SHALL NOT BE A SEAM IN THE CENTER OF THE STREAM BED (AT THE THALWEG). THERE SHALL BE NO GAPS BETWEEN BOULDERS.
   E. PLACE COARSE BACKFILL BEHIND HEADER BOULDERS ENSURING THAT ANY VOIDS BETWEEN THE BOULDERS ARE FILLED.
5. BACKFILL SHALL BE COMPACTED IN 12" LIFTS.



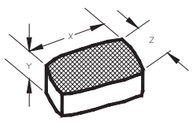
SECTION B-B'



SECTION A-A

ROCK SILL

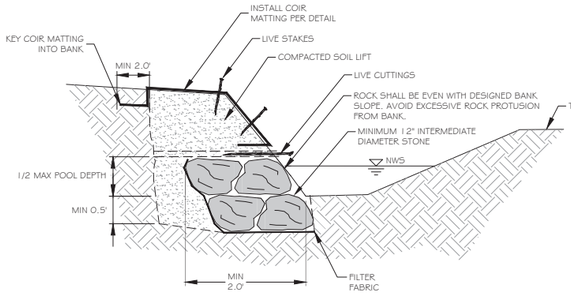
NTS



3 PRIMARY ROCK DIMENSIONS:

X. LONGEST DIMENSION
Y. SHORTEST DIMENSION
Z. INTERMEDIATE DIMENSION

STRUCTURE MINIMUM BOULDER SIZE		
REACH	DIMENSION	LENTGH (IN.)
BB, DE4	X	24
	Y	18
	Z	15
DE2, DE7, DE8	X	18
	Y	12
	Z	18

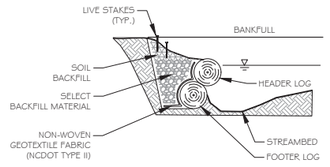


NOTES:

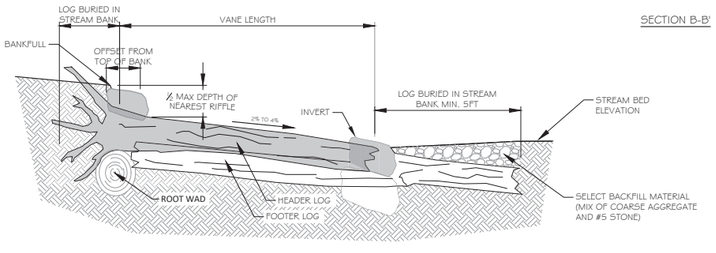
1. OVER EXCAVATE THE OUTSIDE BEND OF THE CHANNEL. INSTALL FILTER FABRIC, BASE STONE LAYER AND COMPACT. INSTALL TOP STONE LAYER, BACKFILL AND COMPACT TO LOCK IN PLACE.
2. PLACE LIVE CUTTINGS OVER THE RIPRAP. ACCEPTABLE LIVE CUTTINGS SPECIES INCLUDE BLACK WILLOW (SALIX NIGRA) AND SILKY WILLOW (SALIX SERICEA). WILLOW CUTTINGS SHOULD BE RINSED AT CUTTING POINT TO ALLOW BETTER ROOTING.
3. INSTALL COMPACTED SOIL LIFT. COIR MATTING SHOULD BE WRAPED UNDER SOIL LIFT AND KEYED INTO TOP OF BANK.
4. INSTALL 1 TO 3 ROWS OF LIVE STAKES ABOVE THE LIVE CUTTINGS LAYER PER DIRECTION OF ENGINEER.
5. FILTER FABRIC SHALL MEET SPECIFICATIONS FOR NCDOT WOVEN FILTER FABRIC.

STONE TOE

NTS



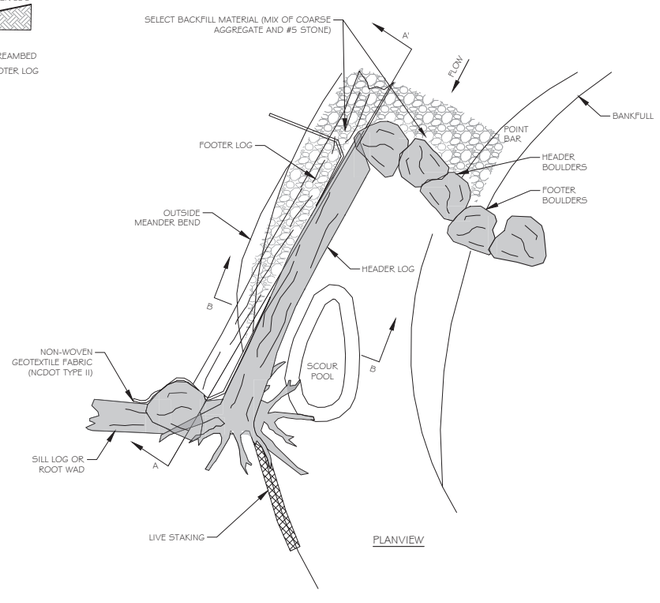
SECTION B-B'



SECTION A-A'

NOTES:

1. LOGS SHALL HAVE MINIMUM DIMENSIONS AS FOLLOWS:
   MIN DIAM = 10"
   MIN LENGTH = 30'
2. ALL LOGS SHALL BE RELATIVELY STRAIGHT, HARDWOOD, AND LIMBS SHALL BE TRIMMED FLUSH.
3. FOOTER LOGS/BOULDERS ARE LOGS/BOULDER PLACED TO PROVIDE A FOUNDATION AND SCOUR PROTECTION FOR THE HEADER LOGS/BOULDERS.
4. HEADER LOGS/BOULDERS SHALL BE UNDERLAIN BY FOOTER LOGS/BOULDERS UNLESS OTHERWISE DIRECTED BY THE ENGINEER.
5. HEADER LOGS ARE THE TOP MOST LOGS USED IN EACH LOG STRUCTURE. ALL HEADER LOGS CAN BE SEEN PROTRUDING FROM THE WATER SURFACE DURING EXTREMELY LOW FLOWS.
6. HEADER LOGS SHALL BE OFFSET SLIGHTLY DOWNSTREAM OF THE FOOTING LOGS WHERE SCOUR POOLS ARE ANTICIPATED TO FORM AS SHOWN IN THE DETAIL.
7. SILL LOGS SHALL BE PLACED PERPENDICULAR TO THE BANKFULL FLOW DIRECTION.
8. THE FOOTER LOGS SHALL EXTEND FROM THE SILL LOG TO THE END OF THE HEADER LOG TOWARD THE BANK.
9. HOOK BOULDERS SHALL EXTEND FROM THE HEADER LOG TO BEYOND BANKFULL WIDTH.
10. SET INVERTS AT ELEVATION SHOWN ON THE PLAN AND PROFILE SHEETS.
11. HEADER LOG SHALL TIE INTO THE STREAM BANK AT A MAXIMUM ELEVATION OF ½ DMAX (MEASURED AT THE NEXT DOWNSTREAM RIFFLE) BELOW BANKFULL ELEVATION AND A MINIMUM ELEVATION OF ½ DMAX (MEASURE AT THE NEXT DOWNSTREAM RIFFLE) BELOW BANKFULL ELEVATION UNLESS OTHERWISE DIRECTED BY THE ENGINEER.
12. CUTTING OF THE SILL LOG ROOTWAD BAY BE REQUIRED TO PREVENT THE ROOTWAD FROM PROTRUDING ABOVE THE BANKFULL ELEVATION.
13. ALL GAPS/VOIDS LARGER THAN 1 INCH BETWEEN THE HEADER AND FOOTING LOGS SHALL BE CHINKED WITH LIMBS AND/OR BRUSH ON THE UPSTREAM SIDE PRIOR TO PLACEMENT OF THE GEOTEXTILE.
14. ALL GAPS/VOIDS LARGER THAN 1 INCH BETWEEN THE HEADER AND FOOTING BOULDERS SHALL BE CHINKED WITH GRAVEL AND COBBLES.
15. ON THE UPSTREAM SIDE OF THE LOGS AND/OR BOULDERS, NON-WOVEN GEOTEXTILE FABRIC SHALL BE PLACED AS SHOWN IN PLANVIEW AND IN SECTION B-B'. PLACE SELECT BACKFILL FOR THE ENTIRE LENGTH OF THE LOG AND BOULDER HOOK.
16. BACKFILL STRUCTURE WITH SELECT BACKFILL MATERIAL AS SHOWN SHOWN IN PLANVIEW AND IN SECTION B-B'.
17. SELECT BACKFILL AND SOIL BACKFILL MATERIAL SHALL BE COMPACTED SUCH THAT FUTURE SETTLEMENT OF THE MATERIAL IS KEPT TO A MINIMUM.
18. NAIL NON-WOVEN GEOTEXTILE USING 3" 10D GALVANIZED COMMON NAIL TO EDGE OF HEADER LOG AND BACKFILL AS SHOWN IN THE GEOTEXTILE PLACEMENT AND SELECT BACKFILL DETAIL.



PLANVIEW

LOG J-HOOK

NTS

3600 Glenwood Ave, Suite 100
Raleigh, NC 27612
Main: 919.829.9909
www.res.us

Engineering Services Provided By:
RES Environmental Operating Company, LLC
License: F-1428

SEAL

PLOT DATE: 7/14/2022

REVISIONS:

RELEASED FOR: DRAFT - FOR PERMITTING ONLY

PROJECT NAME:
SIX RUNS MITIGATION SITE
SAMPSON COUNTY, NORTH CAROLINA

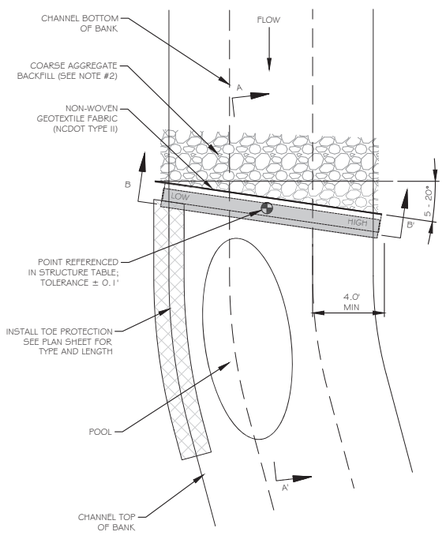
DRAWING TITLE:
DETAILS

PROJECT NUMBER:	103205
PROJECT MANAGER:	BB
DESIGNED:	AFM
DRAWN:	TRS
CHECKED:	BRC

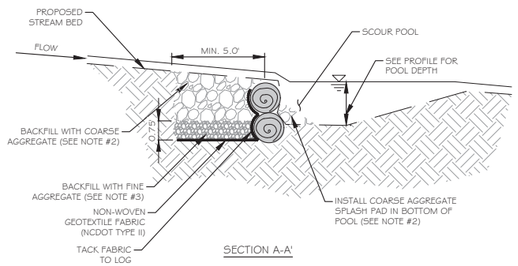
SHEET NUMBER:

D4

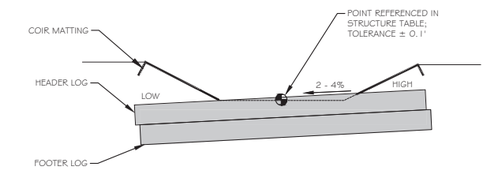
FILE NAME:R:\Res\ed Projects\103205-Six Runs\DWGs\103205_SHT_DETAILS.dwg SAVED BY: Stasking



TYPICAL PLAN VIEW



SECTION A-A'



SECTION B-B'

NOTES:

1. LOGS SHALL BE OF A MINIMUM OF 1.0' IN DIAMETER AND LONG ENOUGH TO EXTEND 4' INTO EACH BANK. LOGS SHALL BE RELATIVELY STRAIGHT HARDWOOD, RECENTLY HARVESTED.
2. COARSE AGGREGATE BACKFILL COMPOSITION SHALL MATCH THE RIFFLE COMPOSITION TABLE PROVIDED IN THE TYPICAL RIFFLE DETAIL. A MIXTURE OF WOODY DEBRIS AND SOIL MAY BE MIXED INTO AGGREGATE BACKFILL IN ORDER TO HELP SEAL STRUCTURE.
3. FINE AGGREGATE BACKFILL SHALL CONSIST OF AN EQUAL MIX OF ABC STONE AND NATIVE MATERIAL.
4. TOE PROTECTION IS TO BE INSTALLED ON THE DOWNSTREAM LOW SIDE OF ALL LOG SILLS AND SHOULD BEGIN AS CLOSE TO THE STRUCTURE AS POSSIBLE.
5. NAIL FILTER FABRIC USING 3" 10D GALVANIZED COMMON NAIL EVERY 1.5' ALONG THE LOG
6. HIGH SIDE OF LOG SHALL BE APPROX. 0.2' HIGHER THAN LOW END

LOG SILL

NTS

EROSION CONTROL BLANKET INSTALLATION NOTES:

SITE PREPARATION

1. GRADE AND COMPACT AREA.
2. REMOVE ALL ROCKS, CLODS, VEGETATION, AND OBSTRUCTIONS SO THAT MATTING WILL HAVE DIRECT CONTACT WITH THE SOIL.
3. PREPARE SEEDBED BY LOOSENING 3 TO 4 INCHES OF TOPSOIL ABOVE FINAL GRADE.
4. TEST SOILS FOR ANY NUTRIENT DEFICIENCIES AND SUBMIT SOIL TEST RESULTS TO THE ENGINEER. APPLY ANY TREATMENT SUCH AS LIME OR FERTILIZERS TO THE SOIL IF NEEDED.

SEEDING

1. SEE PLANTING SHEETS FOR SEEDING REQUIREMENTS.
2. APPLY SEED TO SOIL BEFORE PLACING MATTING.

INSTALLATION - CHANNEL

1. SEE GRADING NOTES ON PLAN AND PROFILE SHEETS AND DETAIL SHEETS FOR INFORMATION REGARDING WHICH AREAS ARE TO RECEIVE MATTING.
2. OVERLAP ADJACENT MATS 6" (IN DIRECTION PARALLEL TO FLOW) AND ANCHOR EVERY 12" ACROSS THE OVERLAP. THE UPSTREAM MAT SHOULD BE PLACED OVER THE DOWNSTREAM MAT.
3. EDGES SHOULD BE SHINGLED AWAY FROM THE FLOW OF WATER.
4. LAY MAT LOOSE TO ALLOW CONTACT WITH SOIL. DO NOT STRETCH TIGHT.
5. ANCHOR MAT USING BIODEGRADABLE STAKES.
6. EXTEND MAT 2 TO 3 FEET PAST TOP OF BANK.
7. PLACE ADJACENT ROLLS IN THE ANCHOR TRENCH WITH A MINIMUM OF 4" OVERLAP. SECURE WITH BIODEGRADABLE STAKES, BACKFILL ANCHOR TRENCH, AND COMPACT SOIL.
8. STAKE AT 12' INTERVALS ALONG OVERLAP.

EROSION CONTROL BLANKET MUST MEET OR EXCEED THE FOLLOWING REQUIREMENTS:

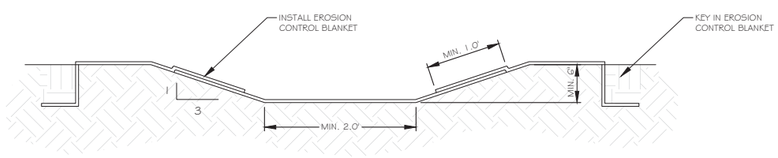
- CURLEX II FIBRENET EROSION CONTROL BLANKET (OR EQUIVALENT)
- THICKNESS - 0.327 IN. MINIMUM.
- SHEAR STRESS – 2.25 LBS/SQFT
- WEIGHT - 11.68 OZ/SY
- SLOPES – UP TO A MAXIMUM OF 1.5:1
- BIO-DEGRADABLE

MAINTENANCE:

1. INSPECT ROLLED EROSION CONTROL PRODUCTS (RECP) AT LEAST WEEKLY AND AFTER EACH SIGNIFICANT (½ INCH OR GREATER) RAIN FALL EVENT, REPAIR IMMEDIATELY.
2. GOOD CONTACT WITH THE GROUND MUST BE MAINTAINED AND EROSION MUST NOT OCCUR BENEATH THE RECP.
3. ANY AREAS OF THE RECP THAT ARE DAMAGED OR NOT IN CLOSE CONTACT WITH THE GROUND SHALL BE REPAIRED AND STAPLED/STAKED.
4. IF EROSION OCCURS DUE TO POORLY CONTROLLED DRAINAGE, THE PROBLEM SHALL BE FIXED AND THE ERODED AREA PROTECTED
5. MONITOR AND REPAIR THE RECP AS NECESSARY UNTIL GROUND COVER IS ESTABLISHED.

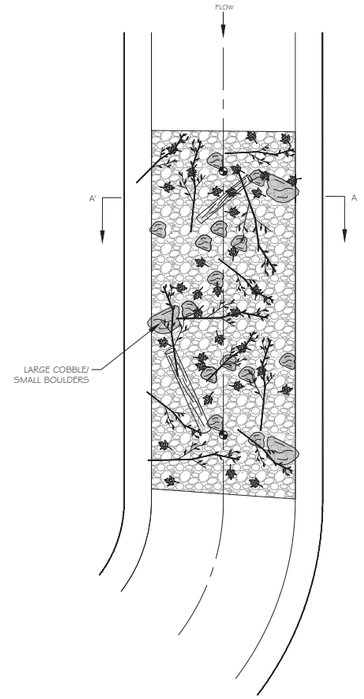
NOTES:

1. INSTALL SWALE AT LOCATIONS SHOWN ON THE PLAN SHEETS. LOCATIONS MAY BE ADJUSTED OR ADDED TO BETTER HANDLE SITE DRAINAGE CONDITIONS DURING CONSTRUCTION ACTIVITIES.
2. INSTALL EROSION CONTROL BLANKETS (ECB) ALONG ALL SWALES PER MANUFACTURER'S INSTRUCTIONS. APPLY BOTH TEMPORARY AND PERMANENT SEED MIX BEFORE ECB INSTALLATION.
3. SWALES SHOULD BE CONSTRUCTED WITH SLOPES NO STEEPER THAN 5%.
4. EROSION CONTROL BLANKET INSTALLTION MUST MEET OR EXCEED THE SPECIFICATIONS OF CURLEX I FIBRENET. COIR MATTING MAY BE USED IN PLACE OF CURLEX PER APPROVAL FROM ENGINEER.
5. ALL SWALES MUST BE STABILIZED WITH SEED, MULCH # MATTING WITHIN 7 DAYS OF LAND DISTURBING ACTIVITIES.

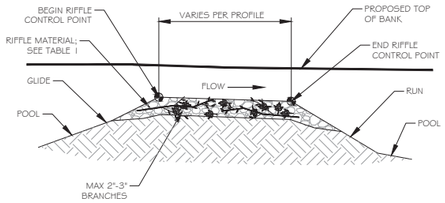


FLOODPLAIN SWALE

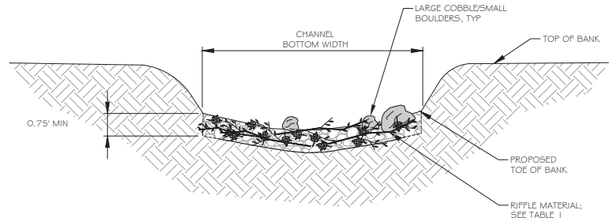
NTS



PLAN VIEW



PROFILE



CROSS SECTION A-A'

TABLE 1 - RIFFLE COMPOSITION		
REACH	STONE SIZE	%
BB, DE4, DE8	1" - 3"	50
	4" - 6"	50
DE2	1" - 3"	33
	4" - 6"	67
DE7	2" - 4"	25
	5" - 8"	50
	9" - 12"	25

NOTES:

1. TYPICAL RIFFLES SHALL BE INSTALLED IN ALL NEWLY GRADED CHANNEL SECTIONS THROUGHOUT THE PROJECT UNLESS OTHERWISE SPECIFIED ON PLAN SHEETS.
2. ELEVATION CONTROL POINTS SHALL BE DESIGNATED AT THE BEGINNING AND END OF RIFFLE POINTS TO ESTABLISH PART OF THE PROFILE OF THE CHANNEL. SURVEY OF CONTROL POINTS SHALL BE REQUIRED TO ESTABLISH ACCURATE RIFFLE INSTALLATION WITHIN A TOLERANCE OF ±0.2'.
3. RIFFLE MATERIAL SHALL BE COMPRISED OF 75% ROCKS AND 25% WOODY MATERIAL. WOODY MATERIAL SHALL CONSIST OF LOGS, BRANCHES, AND BRUSH NO GREATER THAN 3" IN DIAMETER. THE ROCK MATERIAL SHALL CONSIST OF NATIVE SUBSTRATE MATERIAL WHEN POSSIBLE. NATIVE MATERIAL SHALL BE EXCAVATED, STOCKPILED, AND RE-USED FROM ABANDONED CHANNEL SECTIONS. IF A SUITABLE QUANTITY OF NATIVE SUBSTRATE MATERIAL CANNOT BE HARVESTED, CONTRACTOR MAY SUBSTITUTE THE RIFFLE MATERIAL WITH ROCK MATCHING THE COMPOSITION IN TABLE 1.
4. THE PLACEMENT OF RIFFLE MATERIAL SHALL BE DONE IN A MANNER TO CREATE A SMOOTH PROFILE, WITH NO ABRUPT "JUMP" (TRANSITION) BETWEEN THE UPSTREAM POOL-GLIDE AND THE RIFFLE, AND LIKEWISE NO ABRUPT "DROP" (TRANSITION) BETWEEN THE RIFFLE AND THE DOWNSTREAM RUN-POOL. THE FINISHED CROSS SECTION OF THE RIFFLE MATERIAL SHALL GENERALLY MATCH THE SHAPE AND DIMENSIONS SHOWN ON THE RIFFLE TYPICAL SECTION WITH SOME VARIABILITY OF THE THALWEG LOCATION AS A RESULT OF THE SMALL POOLS AND LOGS.
5. THE END OF RIFFLE CONTROL POINT MAY TIE IN TO ANOTHER IN-STREAM STRUCTURE (LOG SILL, J-HOOK, ETC.), NO LOGS SHOULD BE INCLUDED WITHIN THE FOOTPRINT OF THE PROPOSED STRUCTURE.

TYPICAL RIFFLE

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3600 Glenwood Ave, Suite 100
Raleigh, NC 27612
Main: 919.829.9909
www.res.us

Engineering Services Provided By:
RES Environmental Operating Company, LLC
License: F-1428

SEAL

PLOT DATE: 7/14/2022

REVISIONS:

RELEASED FOR: DRAFT - FOR PERMITTING ONLY

PROJECT NAME: SIX RUNS MITIGATION SITE
SAMPSON COUNTY, NORTH CAROLINA

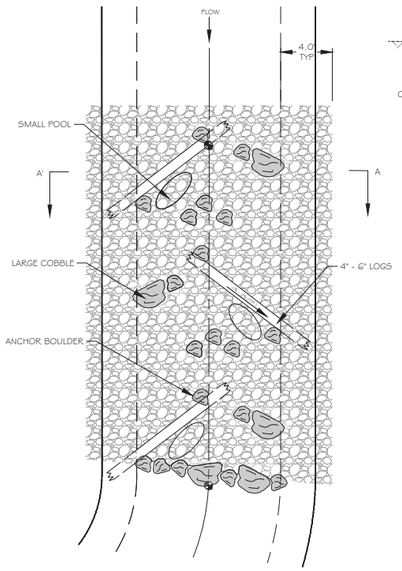
DRAWING TITLE: DETAILS

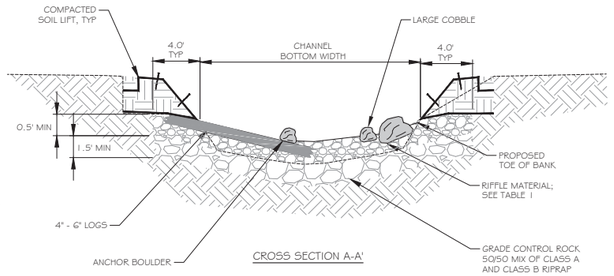
PROJECT NUMBER:	103205
PROJECT MANAGER:	BB
DESIGNED:	AFM
DRAWN:	TRS
CHECKED:	BRC

SHEET NUMBER:

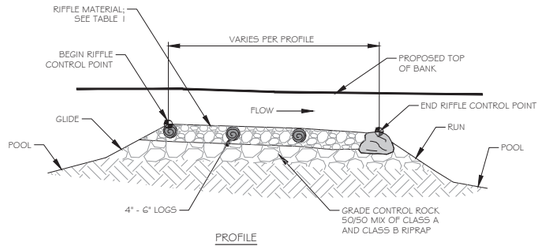
D5

FILE NAME:R:\Respond\Projects\103205-Six Runs\DWG\103205_SHT_DETAILS.dwg SAVED BY: Stasking





CROSS SECTION A-A'



PROFILE

NOTES:

1. RIFFLE GRADE CONTROL STRUCTURES SHALL BE INSTALLED IN NEWLY GRADED CHANNEL SECTIONS, AS SPECIFIED ON THE PLAN SHEETS.
2. ELEVATION CONTROL POINTS SHALL BE DESIGNATED AT THE BEGINNING AND END OF RIFFLE POINTS TO ESTABLISH PART OF THE PROFILE OF THE CHANNEL. SURVEY OF CONTROL POINTS SHALL BE REQUIRED TO ESTABLISH ACCURATE RIFFLE INSTALLATION WITHIN A TOLERANCE OF ±0.2'.
3. GRADE CONTROL ROCK SHALL BE COMPRISED OF A 50/50 MIX OF CLASS A AND B RIPRAP. GRADE CONTROL ROCK SHALL BE PLACED SUCH THAT THE ADDITION OF THE SPECIFIED THICKNESS OF RIFFLE MATERIAL SHALL ACHIEVE THE DESIGNATED GRADES.
4. RIFFLE MATERIAL SHALL BE COMPRISED OF ROCKS AND LOGS. THE ROCK MATERIAL COMPOSITION SHALL MATCH TABLE 1. RIFFLE MATERIAL SHALL BE EXCAVATED, STOCKPILED, AND RE-USED FROM ABANDONED CHANNEL SECTIONS. ROCK RIFFLE MATERIAL OBTAINED OFFSITE SHALL BE SLIGHTLY ROUNDED, "RIVER-TYPE" ROCK, UNLESS OTHER ROCK CHARACTERISTICS ARE APPROPRIATE FOR THE CHANNEL.
5. SPACING AND NUMBER OF LOGS SHOULD BE BASED ON RIFFLE LENGTH AND MAY VARY BASED ON LOG AVAILABILITY. LOGS SHOULD BE SPACED EQUALLY AND ANCHORED TO THE CHANNEL BED WITH BOULDERS.
6. THE PLACEMENT OF GRADE CONTROL ROCK AND/OR RIFFLE MATERIAL SHALL BE DONE IN A MANNER TO CREATE A SMOOTH PROFILE, WITH NO ABRUPT "JUMP" (TRANSITION) BETWEEN THE UPSTREAM POOL-GLIDE AND THE RIFFLE, AND LIKEWISE NO ABRUPT "DROP" (TRANSITION) BETWEEN THE RIFFLE AND THE DOWNSTREAM RUN-POOL. THE FINISHED CROSS SECTION OF THE RIFFLE MATERIAL SHALL GENERALLY MATCH THE SHAPE AND DIMENSIONS SHOWN ON THE RIFFLE TYPICAL SECTION WITH SOME VARIABILITY OF THE THALWEG LOCATION AS A RESULT OF THE SMALL POOLS AND LOGS.
7. THE END OF RIFFLE CONTROL POINT MAY TIE IN TO ANOTHER IN-STREAM STRUCTURE (LOG SILL , J-HOOK, ETC.). NO LOGS SHOULD BE INCLUDED WITHIN THE FOOTPRINT OF THE PROPOSED STRUCTURE.
8. THE CONSTRUCTED RIFFLE SHALL BE KEYED IN TO THE STREAM BANKS AND/OR BED AS DESIGNATED BY THE DESIGNER. THE "KEY" SHALL EXTEND BEYOND THE TOP OF BANK FOR THE LENGTH OF THE RIFFLE.
9. WRAPPED SOIL LIFTS ARE TO BE INSTALLED OVER "KEYED" AREAS IN ORDER TO MAINTAIN BANK STABILITY. INSTALL EROSION CONTROL (COIR) MATTING OVER COMPACTED SOIL WITH 1 TO 3 ROWS OF LIVE STAKES (SEE DETAIL D3). COIR MATTING SHALL BE KEYED INTO TOP OF BANK.

TABLE 1 - RIFFLE COMPOSITION		
REACH	STONE SIZE	%
BB, DE4, DE8	1" - 3"	50
	4" - 6"	50
DE2	1" - 3"	33
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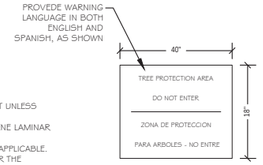
RIFFLE GRADE CONTROL

NTS



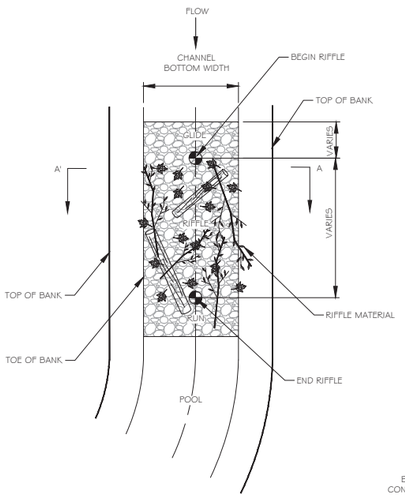
WARNING SIGN DETAIL

NOTES:

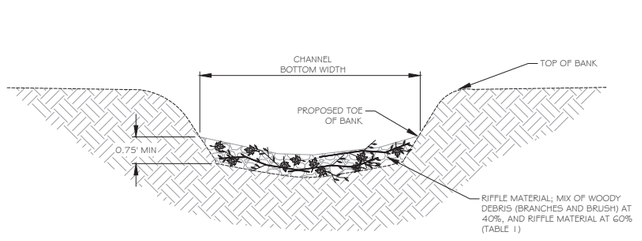
1. TREE PROTECTION FENCING MUST BE INSTALLED AS SHOWN IN PLANS
2. THE TREE PROTECTION FENCING MUST REMAIN IN PLACE FOR THE DURATION OF THE PROJECT UNLESS OTHERWISE APPROVED BY ENGINEER.
3. FENCE MATERIAL SHALL BE ORANGE, UV RESISTANT, HIGH TENSILE STRENGTH POLYETHYLENE LAMINAR BARRICADE FABRIC.
4. APPROVED IMPACT PROTECTION DEVICES MUST BE REMOVED AFTER CONSTRUCTION WHEN APPLICABLE.
5. SIGNS SHALL BE PLACED AT EACH END OF LINEAR TREE PROTECTION AND 50' ON CENTER FOR THE REMAINDER. SIGNS SHALL BE PLACED NO FARTHER APART THAN 300'
6. FOR TREE PROTECTION AREAS LESS THAN 300' IN PERIMETER, PROVIDE NO LESS THAN ONE SIGN PER PROTECTED AREA.
7. ATTACH SIGNS SECURELY TO FENCE POSTS AND FABRIC.
8. SIGNS ARE TO BE MADE OF DURABLE, WEATHERPROOF MATERIAL WITH LETTERS A MINIMUM OF 2 1/2" HIGH, CLEARLY LEGIBLE, AND SPACED AS SHOWN.

TREE PROTECTION FENCING

NTS



PLAN VIEW



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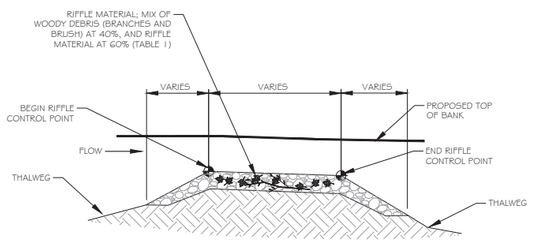

PROFILE

NOTES:

1. WOODY RIFFLES SHALL BE INSTALLED IN NEWLY GRADED CHANNEL SECTIONS, AS SPECIFIED BY THE DESIGNER.
2. ELEVATION CONTROL POINTS SHALL BE DESIGNATED AT THE BEGINNING AND END OF RIFFLE POINTS TO ESTABLISH PART OF THE PROFILE OF THE CHANNEL. SURVEY OF CONTROL POINTS SHALL BE REQUIRED TO ESTABLISH ACCURATE RIFFLE INSTALLATION WITHIN A TOLERANCE OF ±0.2'.
3. RIFFLE MATERIAL SHALL BE COMPRISED OF A 40/60 MIX OF WOODY MATERIAL AND ROCKS. WOODY MATERIAL SHALL CONSIST OF LOGS, BRANCHES, AND BRUSH NO GREATER THAN 4" IN DIAMETER. THE ROCK MATERIAL SHALL CONSIST OF NATIVE SUBSTRATE MATERIAL WHEN POSSIBLE. NATIVE MATERIAL SHALL BE EXCAVATED, STOCKPILED, AND RE-USED FROM ABANDONED CHANNEL SECTIONS. IF A SUITABLE QUANTITY OF NATIVE SUBSTRATE MATERIAL CANNOT BE HARVESTED, CONTRACTOR MAY SUBSTITUTE THE RIFFLE MATERIAL WITH ROCK MATCHING THE COMPOSITION IN TABLE 1.
4. THE PLACEMENT OF RIFFLE MATERIAL SHALL BE DONE IN A MANNER TO CREATE A SMOOTH PROFILE, WITH NO ABRUPT "JUMP" (TRANSITION) BETWEEN THE UPSTREAM POOL-GLIDE AND THE RIFFLE, AND LIKEWISE NO ABRUPT "DROP" (TRANSITION) BETWEEN THE RIFFLE AND THE DOWNSTREAM RUN-POOL. THE FINISHED CROSS SECTION OF THE RIFFLE MATERIAL SHALL GENERALLY MATCH THE SHAPE AND DIMENSIONS SHOWN ON THE RIFFLE TYPICAL SECTION.
5. THE END OF RIFFLE CONTROL POINT MAY TIE IN TO ANOTHER IN-STREAM STRUCTURE (LOG SILL OR J-HOOK).
6. THE CONSTRUCTED RIFFLE SHALL BE KEYED IN TO THE STREAM BANKS AND/OR BED AS DESIGNATED BY THE DESIGNER. THE "KEY" SHALL EXTEND BEYOND THE TOP OF BANK AT THE BEGINNING (CREST) OF THE RIFFLE. WHERE PRESERVATION OF EXISTING STREAM BANK VEGETATION IS A PRIORITY A "KEY" MAY NOT BE USED (OR THE DIMENSIONS MAY BE ADJUSTED) TO LIMIT DISTURBANCE.

WOODY RIFFLE

NTS

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3600 Glenwood Ave, Suite 100
Raleigh, NC 27612
Main: 919.829.9909
www.res.us

Engineering Services Provided By:
RES Environmental Operating Company, LLC
License: F-1428

SEAL

PLOT DATE:
7/14/2022

REVISIONS:

RELEASED FOR:
DRAFT - FOR PERMITTING ONLY

PROJECT NAME:
SIX RUNS MITIGATION SITE
SAMPSON COUNTY, NORTH CAROLINA

DRAWING TITLE:
DETAILS

PROJECT NUMBER:	103205
PROJECT MANAGER:	BB
DESIGNED:	AFM
DRAWN:	TRS
CHECKED:	BRC

SHEET NUMBER:

D6

FILE NAME:R:\Res\ad Projects\103205-Six Runs\DWG\103205_SHT_DETAILS.dwg SAVED BY: Stasking

Appendix B

Data/Analysis/Supplementary Information

3600 Glenwood Avenue, Suite 100
Raleigh NC 27612

To: IRT and NCDMS

From: Katie Webber - RES

Subject: *REVISED* - Six Runs Mitigation Project site visit

Date: Initial Memo January 4, 2021; Revised Memo January 5, 2021

Attendees:

Erin Davis, DWR
Todd Tugwell, USACE
Casey Haywood, USACE
Travis Wilson, NC Wildlife
Lindsay Crocker, NCDMS
Brad Breslow, RES,
Katie Webber, RES
Frasier Mullen, RES
Matt DeAngelo, RES
George Lankford, George K. Lankford, LLC

Summary:

REVISED – additional comments received from the IRT in response to the initial memo are included at the bottom of this memo.

Site visit was held to introduce site to North Carolina Interagency Review Team (IRT) and gain initial support for Six Runs Mitigation Project, which will deliver 6,500 stream mitigation credits (SMUs) and 4.0 wetland mitigation credits (WMUs). The project belongs to the North Carolina Division of Mitigation Services (NCDMS) and is a full-delivery contract with RES. Initial feedback to the proposal from the IRT based on our visit is summarized below:

Overall:

- IRT prefers that crossings are included in the easement where possible.
- Crossings and any dam work will need their own regulatory permitting if necessary; not covered under NWP 27. Crossings may be agricultural or improved and we'll address when we get to that point in project development.
- Discuss beaver management in plan and ensure that management plan is realistic for the site.
- IRT suggests developing distinct planting zones based on reference communities throughout the site.
- IRT suggests reviewing understory plantings during mitigation plan development.
- Anticipate an adaptive management plan that would discuss mosaic systems, moisture regimes, beavers, and etc., especially for the bottom of Brad's Branch.

Above E. Darden Road:

- Determine if power line above E. Darden Road to house can be moved out of easement.
- Ensure 30 days flow is realistic for MT2.
- If DMS/RES pursue wetland credit above the road, address crediting ratio in mit plan (RES-DMS discuss)
- Ag field above BB-A is a concern for sediment contributions. IRT recommends considering in mitigation if whole reach could turn into E1.
- Coordinate with NCDOT regarding ROW and pipe under road (can be difficult but still try)

Below E. Darden Road:

- IRT recommends developing P2-specific vegetative success plan for the portion of Brad's Branch that will be cut down. Ensure the mitigation plan discusses and addresses typical P2 issues.
- IRT recommends ensuring that dam rehab will not result in placement of fill in wetlands below the dam.
- For the wetlands adjacent to DE4, IRT recommends making sure hydro isn't already meeting standards by providing pre-resto hydro (if we say 12%, can't already be 12%)
- Ensure DE4 and Brad's Branch are not running parallel and are appropriately laid out for the site
- IRT suggested running NCWAM to document rehabilitation or enhancement approach for wetlands associated with DE4. Enhancement may be more appropriate than rehabilitation because the area is already wooded and may have sufficient hydro period already.
- Install wells and collect data on DE4 wetlands. IRT recommend a year's worth of data. Several wells will document transitions of wetland hydroperiods.
- Leave wells in during construction.

Bottom of Brad's Branch:

- IRT suggested running NCWAM to document rehabilitation or enhancement approach for wetlands associated with the bottom of Brad's Branch. Rehabilitation may be more appropriate than enhancement because it is going to have significant functional uplift overall.
    - A ratio of 1.5:1 on bottom wetland (rehabilitation area) is realistic, but cut out the wooded areas at the bottom as enhancement.
- IRT suggested exploring giving the trees a year to grow before "turning the water on" for the bottom of the site. This would not accelerate crediting but could potentially enhance vegetative growth outcomes if the bottom will be very wet.
- IRT suggested exploring placement of woody debris, artificial wind throws, and earthen mounds in the bottom to allow for tree success early on.
- Ensure all novel approaches are well documented in mitigation plan.
- At bottom, IRT suggested monitoring with wells before construction would not help support future success criteria because the site is already quite wet and the functional uplift will be based on stream connectivity instead. Therefore, RES may prefer to have stream connectivity standard instead

Thank you for your time and initial support for the project. We look forward to working together with you to develop this site into a successful mitigation bank.

Thank you,

Katie Webber, LSS

Project Manager

ADDITIONAL COMMENTS RECEIVED FROM IRT ON JANUARY 5, 2020:

- Transitional areas from stream to wetland that are identified should be monitored with drone or fixed photo points.
- NW3 for maintenance of dam
- IRT encourages tracking understory vegetation
- JD must be done for all wetlands areas
- IRT recommends an Adaptive management plan if site is too wet

- Evidence of beaver in wetland area- this should be mentioned in MP. If keeping beaver, describe in plan how that would look. If swamp wetland, call it that. Travis notes beaver in sandy system like this not desired- could hit a nick point and cause a mess
- Distinguish open water areas in MP
- IRT encourages variability in site habitats- should all be well documented in MP
- Could have issues with plant growth in the wetland areas cypress. Early plant is fine but final approval before authorization is at the risk of the sponsor, please note in MP.

Project Attribute Table	
Project Name	Six Runs Stream and Wetland Mitigation Project
County	Sampson
Project Area (acres)	30.94
Area to be planted (acres)	22.59
Project Coordinates (latitude and longitude decimal	35.0962°, -78.2304°
Project Watershed Summary Information	
Physiographic Province	Rolling Coastal Plain
River Basin	Cape Fear
USGS Hydrologic Unit 8-	3030006
DWR Sub-basin	03-06-19
Project Drainage Area (acres)	570
Project Drainage Area Percentage of Impervious Area	1%
Land Use Classification	Agriculture, forest, residential

Reach Summary Information

Parameters	BB-A	BB-B	BB-C	DE2-A	DE2-B	DE3	DE4-A	DE4-B	DE7	DE8	MT2
Pre-project length (feet)	453	572	4207	231	114	128	301	667	251	61	110
Post-project (feet)	452	562	4357	231	156	0	301	992	112	171	110
Valley confinement (Confined, moderately confined, unconfined)	Moderately confined	Moderately confined	Unconfined	Moderately confined	Moderately confined	NA	Unconfined	Unconfined	NA	Moderately confined	Moderately confined
Drainage area (acres)	93	125	570	N/A	10	26	287	295	21	26	9
Perennial, Intermittent, Ephemeral	Intermittent	Intermittent	Perennial	Intermittent	Intermittent	Intermittent	Perennial	Perennial	Intermittent	Intermittent	Intermittent
NCDWR Water Quality Classification	C, Sw	C, Sw	C, Sw	C, Sw	C, Sw	C, Sw	C, Sw	C, Sw	C, Sw	C, Sw	C, Sw
Dominant Stream Classification (existing)	C4/5	G4/5c	G4/5c - F4/5	E5	E5	F5	C5	G4/5c - F4/5	G5c	F5b	E4/5
Dominant Stream Classification (proposed)	C4/5	G4/5c	C4/E4	E5	C4b	N/A	C5	C4/E4	B4a to E4	C4/E4	E4/5
Dominant Evolutionary class (Simon) if applicable	III	III	IV	II	II	III	I	III	III	II	I

Wetland Summary Information

Parameters	WA	WB	WC-1	WC-2	WD	WE-1	WE-2	WF	WG	WH	WI	WJ	WK	WL	WM
Pre-project (acres)	0.081	0.057	5.146	1.656	0.016	0.849	0.767	0.348	0.002	0.057	0.204	0.123	0.034	0	0
Post-project (acres)	0.081	0.057	4.903	1.656	0.01	0.848	0.689	0.299	0.001	0.057	0.198	0.123	0.034	5.759	0.462
Wetland Type (non-riparian, riparian)	Riparian	Riparian	Riparian	Riparian	Riparian	Riparian	Riparian	Riparian	Riparian	Riparian	Riparian	Riparian	Riparian	Riparian	Riparian
Mapped Soil Series	Norfolk loamy sand	Norfolk loamy sand	Bibb and Johnston soils	Bibb and Johnston soils	Bibb and Johnston soils	Bibb and Johnston soils	Bibb and Johnston soils	Bibb and Johnston soils	Bibb and Johnston soils	Bibb and Johnston soils	Bibb and Johnston soils	Bibb and Johnston soils	Bibb and Johnston soils	Bibb and Johnston soils	Bibb and Johnston soils
Soil Hydric Status	Non-hydric	Non-hydric	Hydric	Hydric	Hydric	Hydric	Hydric	Hydric	Hydric	Hydric	Hydric	Hydric	Hydric	Hydric	Hydric

Regulatory Considerations

Parameters	Applicable?	Resolved?	Supporting Docs?
Water of the United States - Section 404	Yes	No	PCN
Water of the United States - Section 401	Yes	No	PCN
Endangered Species Act	Yes	Yes	Appendix K
Historic Preservation Act	Yes	Yes	Appendix K
Coastal Zone Management Act (CZMA or CAMA)	No	N/A	N/A
FEMA Floodplain Compliance	Yes	No	Appendix L
Essential Fisheries Habitat	No	N/A	N/A
DOT Right-of-way Permit	Yes	No	N/A

Wilmington District Stream Buffer Credit Calculator

Site Name:	Six Runs
USACE Action ID:	SAW-2020-01964
NCDWR Project Number:	
Sponsor:	EBX
Number of Exempt Terminal Stream Ends[1]:	4
County:	Sampson
Minimum Required Buffer Width[2]:	50

Mitigation Type	Mitigation Ratio Multiplier[3]	Creditable Stream Length[4]	Include in Buffer Calculations	Baseline Stream Credit	Buffered Stream Length	Credit From Buffered Streams
Restoration (1:1)	1	5788	yes	5788.00	5788.00	5788.00
Enhancement I (1.5:1)	1.5		yes			
Enhancement II (2.5:1)	2.5	231	yes	92.40	231.00	92.40
Preservation (5:1)	5					
Other (7.5:1)	7.5					
Other (10:1)	10					
Custom Ratio 1	5	301	yes	60.20	301.00	60.20
Custom Ratio 2						
Custom Ratio 3						
Custom Ratio 4						
Custom Ratio 5						
Totals		**6320.00**		5940.60	6320.00	5940.60

Buffer Width Zone (feet from Ordinary High Water Mark)

Buffer Zones	less than 15 feet	>15 to 20 feet	>20 to 25 feet	>25 to 30 feet	>30 to 35 feet	>35 to 40 feet	>40 to 45 feet	>45 to 50 feet	>50 to 75 feet	>75 to 100 feet	>100 to 125 feet	>125 to 150 feet
Max Possible Buffer (square feet)[5]	191013	64299	64613	64927	65241	65555	65869	66183	335625	343475	351325	359175
Ideal Buffer (square feet)[6]	192378.45	63754.39	63231.61	62493.22	61464.07	60162.19	59314.01	58320.49	281680.42	275550.99	270700.59	267663.06
Actual Buffer (square feet)[7]	187738.93	61494.42	60586.16	59446.95	58062.39	56288.24	54684.09	52693.34	126753.47	40427.07	11392.54	4018.43
Zone Multiplier	50%	10%	10%	10%	5%	5%	5%	5%	7%	5%	4%	4%
Buffer Credit Equivalent	2970.30	594.06	594.06	594.06	297.03	297.03	297.03	297.03	415.84	297.03	237.62	237.62
Percent of Ideal Buffer	98%	97%	97%	96%	96%	95%	94%	93%	45%	15%	4%	2%
Credit Adjustment	-60.95	-16.08	-18.42	-21.04	-11.70	-13.58	-16.88	-21.62	187.12	43.58	10.00	3.57

Total Baseline Credit	Credit Loss in Required Buffer	Credit Gain for Additional Buffer	Net Change in Credit from Buffers	Total Credit
5940.60	**-180.27**	**244.27**	**64.00**	**6004.60**

[1]Number of terminal stream ends, including all points where streams enter or exit the project boundaries, but not including internal crossings even if they are not protected by the easement.

[2]Minimum standard buffer width measured from the top of bank (50 feet in piedmont and coastal plain counties or 30 feet in mountain counties)

[3]Use the Custom Ratio fields to enter non-standard ratios, which are equal to the number of feet in the feet-to-credit mitigation ratio (e.g., for a perservation ratio of 8 feet to 1 credit, the multiplier would be 8).

[4]Equal to the number of feet of stream in each Mitigation Type. If stream reaches are not creditable, they should be excluded from this measurement, even if they fall within the easement.

[5]This amount is the maximum buffer area possible based on the linear footage of stream length if channel were perfectly straight with full buffer width and no internal crossings. This number is not used in calculations, but is provided as a reference.

[6]Maximum potential size (in square feet) of each buffer zone measured around all creditable stream reaches, calculated using GIS, including areas outside of the easement. The inner zone (0-15') should be measured from the top of the OHWM or the edge of the average stream width if OHWM is not known. Non-creditable stream reaches within the easement should be removed prior to calculating this area wtih GIS.

[7]Square feet in each buffer zone, as measured by GIS, excluding non-forested areas, all other credit type (e.g., wetland, nutrient offset, buffer), easement exceptions, open water, areas failing to meet the vegetation performance standard, etc. Additional credit is given to 150 feet in buffer width, so areas within the easement that are more than 150 feet from creditable streams should not be included in this measurement. Non-creditable stream reaches within the easement should be removed prior to calculating this area wtih GIS.

Six Runs Morphological Parameters

	Reference Reach				Existing					
	Buffalo Branch		Hannah Bridge		BB-A		BB-B		BB-C (US)	
Feature	Riffle	Pool	Riffle	Pool	Riffle	Riffle	Riffle	Run	Riffle	Riffle
Drainage Area (ac)	540		752		93		125		195	
Drainage Area (mi^2)	0.84		1.18		0.15		0.20		0.30	
NC Piedmont Regional Curve Discharge (cfs)[2]	81		103		23		29		39	
NC Coastal Regional Curve Discharge (cfs)[3]	8		10		2		3		4	
Design/Calculated Discharge (cfs)[1]	**18**		**30**		-		-		-	
Dimension										
BKF Cross Sectional Area (ft^2)	12.8	11.8	15.2	16.5	6.3	6.4	5.7	6.8	8.3	10.1
BKF Width (ft)	12.3	8.5	11.5	11.4	9.0	5.4	5.3	6.2	8.4	7.3
BKF Mean Depth (ft)	1.1	1.4	1.3	1.4	0.7	1.2	1.1	1.1	1.0	1.4
BKF Max Depth (ft)	1.8	2.2	1.9	2.5	1.0	1.7	1.3	1.4	1.3	1.7
Wetted Perimeter (ft)	13.2	10.1	12.8	13.5	9.4	6.8	6.9	7.4	9.3	9.3
Hydraulic Radius (ft)	1.0	1.2	1.2	1.2	0.7	0.9	0.8	0.9	0.9	1.1
Width/Depth Ratio	33.8	35.6	>50	>50	12.7	4.6	4.8	5.7	8.6	5.3
Floodprone Width (ft)	12.3	6.2	8.7	7.9	17.5	6.5	8.6	31.6	10.4	9.8
Entrenchment Ratio	3.0	4.2	>2.2	>2.2	2.0	1.2	1.6	5.1	1.2	1.3
Bank Height Ratio	1.0	1.1	1.2	1.2	1.9	1.3	1.9	1.7	5.0	2.4
Substrate										
Description (D50)	Sand		Fine Gravel		Sand / Gravel		Sand / Gravel		Sand / Gravel	
D16 (mm)	0.4		0.55		-		-		-	
D50 (mm)	1.6		4.4		-		-		-	
D84 (mm)	5.7		11		-		-		-	
Pattern										
	Min	**Max**	**Min**	**Max**	**Min**	**Max**	**Min**	**Max**	**Min**	**Max**
Channel Beltwidth (ft)	6	28	19	57	-	-	-	-	-	-
Radius of Curvature (ft)	20	25	10	25	-	-	-	-	-	-
Radius of Curvature Ratio	1.6	2.0	0.9	2.1	-	-	-	-	-	-
Meander Wavelength (ft)	43	81	149	170	-	-	-	-	-	-
Meander Width Ratio	0.5	2.3	1.7	5.0	-	-	-	-	-	-
Profile										
	Min	**Max**	**Min**	**Max**	**Min**	**Max**	**Min**	**Max**	**Min**	**Max**
Riffle Length (ft)	7	22	5	22	-	-	-	-	-	-
Run Length (ft)	3	15	10	18	-	-	-	-	-	-
Pool Length (ft)	5	24	5	17	-	-	-	-	-	-
Pool -to-Pool Spacing (ft)	23	53	37	56	-	-	-	-	-	-
Additional Reach Parameters										
Valley Length (ft)	255		842		437		545		1554	
Channel Length (ft)	312		995		453		600		1851	
Sinuosity	1.22		1.18		1.04		1.10		1.19	
Valley Slope (ft/ft)	0.005		0.005		0.007		0.009		0.011	
Channel Slope (ft/ft)	0.002		0.003		0.004		0.007		0.003 - 0.005	
Rosgen Classification	E5		E4		C4/5		G4/5c		G4/5c	

[1] Bankfull stage was estimated using NC Regional Curve equations and existing conditions data

[2] NC Piedmont Regional Curve equations source: Doll et al. (2002)

[3] NC Coastal Regional Curve equations source: Sweet and Geratz (2003)

Six Runs Morphological Parameters Cont.

	Existing											
	BB-C (MS)		BB-C (DS)		DE2		DE3		DE4-A			
Feature	Riffle	Pool	Riffle	Pool	Riffle		Riffle		Riffle	Pool	Riffle	Pool
Drainage Area (ac)	244		570		10		26		287			
Drainage Area (mi^2)	0.38		0.89		0.02		0.04		0.45			
NC Piedmont Regional Curve Discharge (cfs)[2]	46		84		5		9		55			
NC Coastal Regional Curve Discharge (cfs)[3]	4		8		0		1		5			
Design/Calculated Discharge (cfs)[1]	-		-		-		-		-			
Dimension												
BKF Cross Sectional Area (ft^2)	10.8	10.1	18.0	24.5	1.2		0.6		8.3	19.1	9.5	9.2
BKF Width (ft)	9.4	12.1	15.2	23.9	2.8		3.5		10.5	8.1	15.7	7.1
BKF Mean Depth (ft)	1.1	0.8	1.2	1.0	0.4		0.2		0.8	2.4	0.6	1.3
BKF Max Depth (ft)	1.3	1.2	1.9	1.9	0.6		0.3		1.4	3.8	1.4	2.0
Wetted Perimeter (ft)	10.9	12.9	16.5	25.4	3.3		3.6		11.6	12.5	16.8	8.6
Hydraulic Radius (ft)	1.0	0.8	1.1	1.0	0.4		0.2		0.7	1.5	0.6	1.1
Width/Depth Ratio	8.2	14.3	12.9	23.3	6.4		21.7		13.3	3.4	26.1	5.4
Floodprone Width (ft)	11.1	14.5	26.4	42.4	>15		4.0		>50	>50	>50	>50
Entrenchment Ratio	1.2	1.2	1.7	1.8	>2.2		1.1		>2.2	>2.2	>2.2	>2.2
Bank Height Ratio	1.7	2.5	1.8	0.9	1.5		10.2		1.0	1.1	1.0	1.2
Substrate												
Description (D50)	Sand / Gravel		Sand / Gravel		Sand		Sand		Sand			
D16 (mm)	1.5		-		-		-		1.2			
D50 (mm)	7.1		-		-		-		2			
D84 (mm)	14		-		-		-		3.7			
Pattern												
	Min	**Max**	**Min**	**Max**	**Min**	**Max**	**Min**	**Max**	**Min**		**Max**	
Channel Beltwidth (ft)	-	-	-	-	-	-	-	-	18		48	
Radius of Curvature (ft)	-	-	-	-	-	-	-	-	14		32	
Radius of Curvature Ratio	-	-	-	-	-	-	-	-	1.4		3.0	
Meander Wavelength (ft)	-	-	-	-	-	-	-	-	56		106	
Meander Width Ratio	-	-	-	-	-	-	-	-	1.7		4.6	
Profile												
	Min	**Max**	**Min**	**Max**	**Min**	**Max**	**Min**	**Max**	**Min**		**Max**	
Riffle Length (ft)	-	-	-	-	-	-	-	-	3.1		18	
Run Length (ft)	-	-	-	-	-	-	-	-	3.2		3.6	
Pool Length (ft)	-	-	-	-	-	-	-	-	10		23	
Pool -to-Pool Spacing (ft)	-	-	-	-	-	-	-	-	23		25	
Additional Reach Parameters												
Valley Length (ft)	829		1234		360		107		190			
Channel Length (ft)	1043		1386		385		128		301			
Sinuosity	1.26		1.12		1.07		1.20		1.58			
Valley Slope (ft/ft)	0.006		0.005		0.036		0.065		0.005			
Channel Slope (ft/ft)	0.004 - 0.007		0.002		0.016 - 0.030		0.025 - 0.110		0.001			
Rosgen Classification	G4/5c		F4/5		E5		F5		C5			

[1] Bankfull stage was estimated using NC Regional Curve equations and existing conditions data

[2] NC Piedmont Regional Curve equations source: Doll et al. (2002)

[3] NC Coastal Regional Curve equations source: Sweet and Geratz (2003)

Six Runs Morphological Parameters Cont.

	Existing									
	DE4-B			DE7		DE8		MT2		
Feature	Riffle	Pool	Riffle	Riffle		Riffle		Riffle		
Drainage Area (ac)	295			21		26		9		
Drainage Area (mi^2)	0.46			0.03		0.04		0.01		
NC Piedmont Regional Curve Discharge (cfs)[2]	53			8		9		4		
NC Coastal Regional Curve Discharge (cfs)[3]	5			1		1		0		
Design/Calculated Discharge (cfs)[1]	-			-		-		-		
Dimension										
BKF Cross Sectional Area (ft^2)	6.3	8.9	13.9	0.9		1.8		0.8		
BKF Width (ft)	6.0	7.2	21.9	3.2		5.5		2.2		
BKF Mean Depth (ft)	1.0	1.2	0.6	0.3		0.3		0.3		
BKF Max Depth (ft)	1.4	1.6	1.1	0.5		0.6		0.5		
Wetted Perimeter (ft)	7.4	8.7	22.7	3.4		5.7		2.6		
Hydraulic Radius (ft)	0.9	1.0	0.6	0.3		0.3		0.3		
Width/Depth Ratio	5.8	5.8	34.5	11.8		17.0		6.5		
Floodprone Width (ft)	9.6	8.7	>50	4.2		8.5		4.3		
Entrenchment Ratio	1.6	1.2	>2.2	1.3		1.5		1.9		
Bank Height Ratio	1.7	1.7	1.6	2.9		3.5		2.0		
Substrate										
Description (D50)	Sand / Gravel			Sand		Sand		Sand / Gravel		
D16 (mm)	1.4			-		-		-		
D50 (mm)	2.5			-		-		-		
D84 (mm)	4			-		-		-		
Pattern										
	Min		**Max**	**Min**	**Max**	**Min**	**Max**	**Min**	**Max**	
Channel Beltwidth (ft)	-		-	-	-	-	-	-	-	
Radius of Curvature (ft)	-		-	-	-	-	-	-	-	
Radius of Curvature Ratio	-		-	-	-	-	-	-	-	
Meander Wavelength (ft)	-		-	-	-	-	-	-	-	
Meander Width Ratio	-		-	-	-	-	-	-	-	
Profile										
	Min		**Max**	**Min**	**Max**	**Min**	**Max**	**Min**	**Max**	
Riffle Length (ft)	-		-	-	-	-	-	-	-	
Run Length (ft)	-		-	-	-	-	-	-	-	
Pool Length (ft)	-		-	-	-	-	-	-	-	
Pool -to-Pool Spacing (ft)	-		-	-	-	-	-	-	-	
Additional Reach Parameters										
Valley Length (ft)	562			248		55		100		
Channel Length (ft)	715			251		61		107		
Sinuosity	1.27			1.01		1.11		1.07		
Valley Slope (ft/ft)	0.004			0.029		0.038		0.013		
Channel Slope (ft/ft)	0.002 - 0.009			0.005 - 0.022		0.038		0.013		
Rosgen Classification	G4/5c - F4/5			G5c		F5b		E4/5		

[1] Bankfull stage was estimated using NC Regional Curve equations and existing conditions data

[2] NC Piedmont Regional Curve equations source: Doll et al. (2002)

[3] NC Coastal Regional Curve equations source: Sweet and Geratz (2003)

Six Runs Morphological Parameters Cont.

	Design													
	BB-C (US)		**BB-C (MS)**		**BB-C (DS)**		**DE2-B**		**DE4-B**		**DE7**		**DE8**	
Feature	Riffle	Pool	Riffle	Pool	Riffle	Pool	Riffle	Pool	Riffle	Pool	Riffle	Pool	Riffle	Pool
Drainage Area (ac)	195		244		570		10		295		21		26	
Drainage Area (mi^2)	0.30		0.38		0.89		0.02		0.46		0.03		0.04	
NC Piedmont Regional Curve Discharge (cfs)[2]	39		46		84		5		53		8		9	
NC Coastal Regional Curve Discharge (cfs)[3]	4		4		8		0		5		1		1	
Design/Calculated Discharge (cfs)[1]	**16**		**20**		**30**		**4**		**20**		**3-4**		**4**	
Dimension														
BKF Cross Sectional Area (ft^2)	7.8	14.0	9.1	17.0	13.0	23.4	1.4	2.2	10.4	19.6	1.3	2.1	1.8	2.9
BKF Width (ft)	9.0	10.5	9.8	11.5	11.8	13.8	3.8	4.5	10.3	12.2	3.5	4.2	4.5	5.3
BKF Mean Depth (ft)	0.9	1.3	0.9	1.5	1.1	1.7	0.4	0.5	1.0	1.6	0.4	0.5	0.4	0.6
BKF Max Depth (ft)	1.3	2.6	1.4	2.8	1.6	3.2	0.5	1.0	1.5	3.0	0.5	1.0	0.6	1.1
Wetted Perimeter (ft)	9.5	12.3	10.4	13.5	12.5	16.1	4.0	5.0	10.9	14.3	3.7	4.7	4.7	5.8
Hydraulic Radius (ft)	0.8	1.1	0.9	1.3	1.0	1.5	0.3	0.4	0.9	1.4	0.3	0.4	0.4	0.5
Width/Depth Ratio	10.4	7.9	10.6	7.8	10.7	8.1	10.7	9.3	10.3	7.6	9.8	8.4	11.3	9.6
Floodprone Width (ft)	>50	>50	>50	>50	>50	>50	>20	>20	>50	>50	>15	>15	>20	>20
Entrenchment Ratio	>2.2	>2.2	>2.2	>2.2	>2.2	>2.2	>2.2	>2.2	>2.2	>2.2	>2.2	>2.2	>2.2	>2.2
Bank Height Ratio	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Substrate														
Description (D50)	Gravel		Gravel		Gravel		Gravel		Gravel		Cobble		Gravel	
D16 (mm)	-		-		-		-		-		-		-	
D50 (mm)	-		-		-		-		-		-		-	
D84 (mm)	-		-		-		-		-		-		-	
Pattern														
	Min	**Max**	**Min**	**Max**	**Min**	**Max**	**Min**	**Max**	**Min**	**Max**	**Min**	**Max**	**Min**	**Max**
Channel Beltwidth (ft)	8	42	13	45	13	50	4	12	26	42	4	13	5	12
Radius of Curvature (ft)	27	56	27	44	36	45	9	12	28	36	9	14	9	12
Radius of Curvature Ratio	3.0	6.2	2.8	4.5	3.1	3.8	2.4	3.2	2.7	3.5	2.6	4.0	2.0	2.7
Meander Wavelength (ft)	80	135	96	144	108	157	31	36	105	126	31	38	33	38
Meander Width Ratio	0.9	4.7	1.3	4.6	1.1	4.2	1.1	3.2	2.5	4.1	1.1	3.7	1.1	2.7
Profile														
	Min	**Max**	**Min**	**Max**	**Min**	**Max**	**Min**	**Max**	**Min**	**Max**	**Min**	**Max**	**Min**	**Max**
Riffle Length (ft)	7	33	12	38	16	37	7	17	17	36	4	8	7	10
Run Length (ft)	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pool Length (ft)	23	61	26	71	31	61	8	16	25	61	3	14	7	16
Pool -to-Pool Spacing (ft)	38	84	45	88	60	105	14	30	44	84	7	20	17	24
Additional Reach Parameters														
Valley Length (ft)	1606		1088		1085		139		872		107		172	
Channel Length (ft)	1850		1276		1271		156		1032		112		196	
Sinuosity	1.15		1.17		1.17		1.12		1.18		1.05		1.14	
Valley Slope (ft/ft)	0.009		0.008		0.006		0.041		0.007		0.017 - 0.153		0.016	
Channel Slope (ft/ft)	0.006 - 0.007		0,005 - 0.007		0.005 - 0.006		0.038		0.004 - 0.006		0.012 - 0.120		0.011	
Rosgen Classification	C4/E4		C4/E4		C4/E4		C4b		C4/E4		B4a to E4		C4/E4	

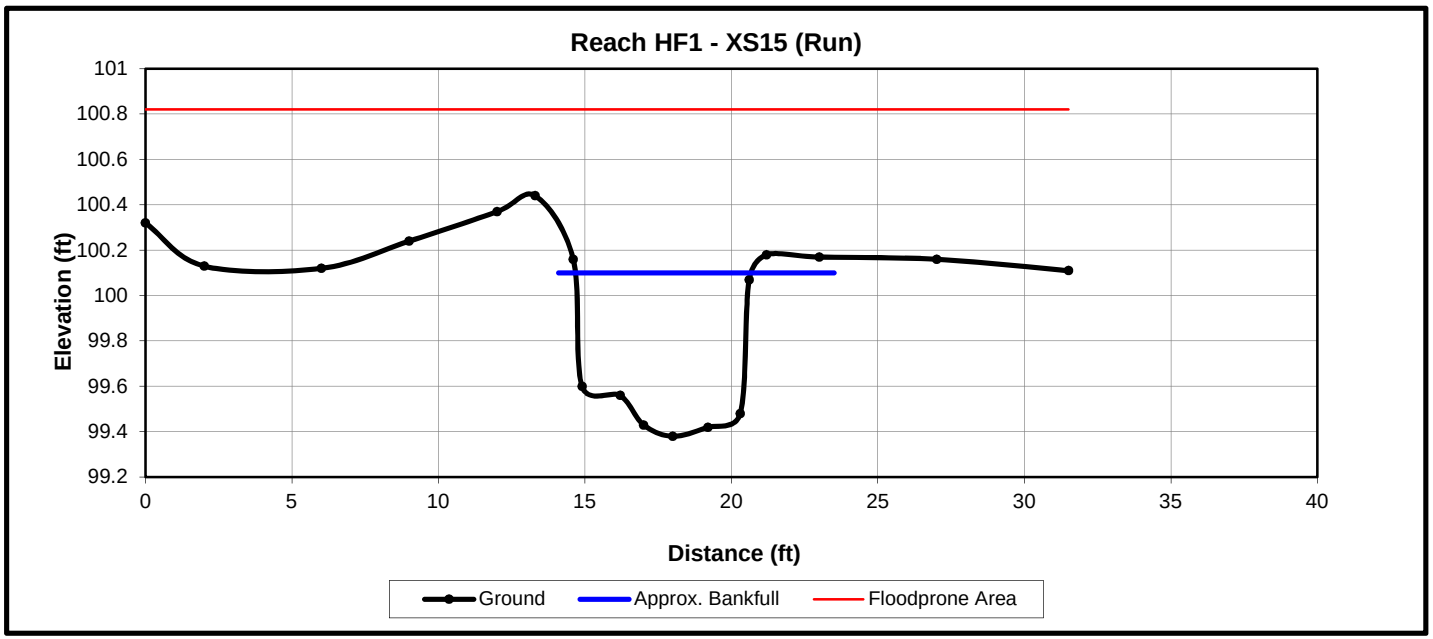
[1] Bankfull stage was estimated using NC Regional Curve equations and existing conditions data

[2] NC Piedmont Regional Curve equations source: Doll et al. (2002)

[3] NC Coastal Regional Curve equations source: Sweet and Geratz (2003)

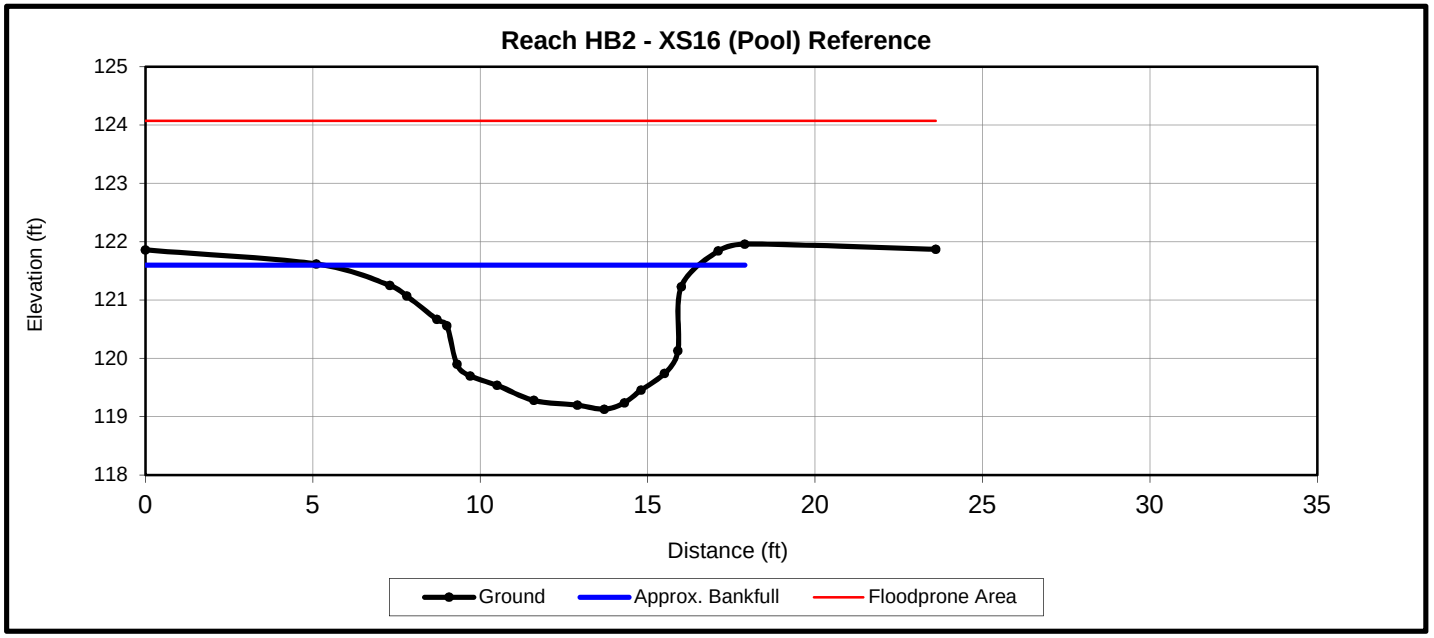
Upstream

Downstream



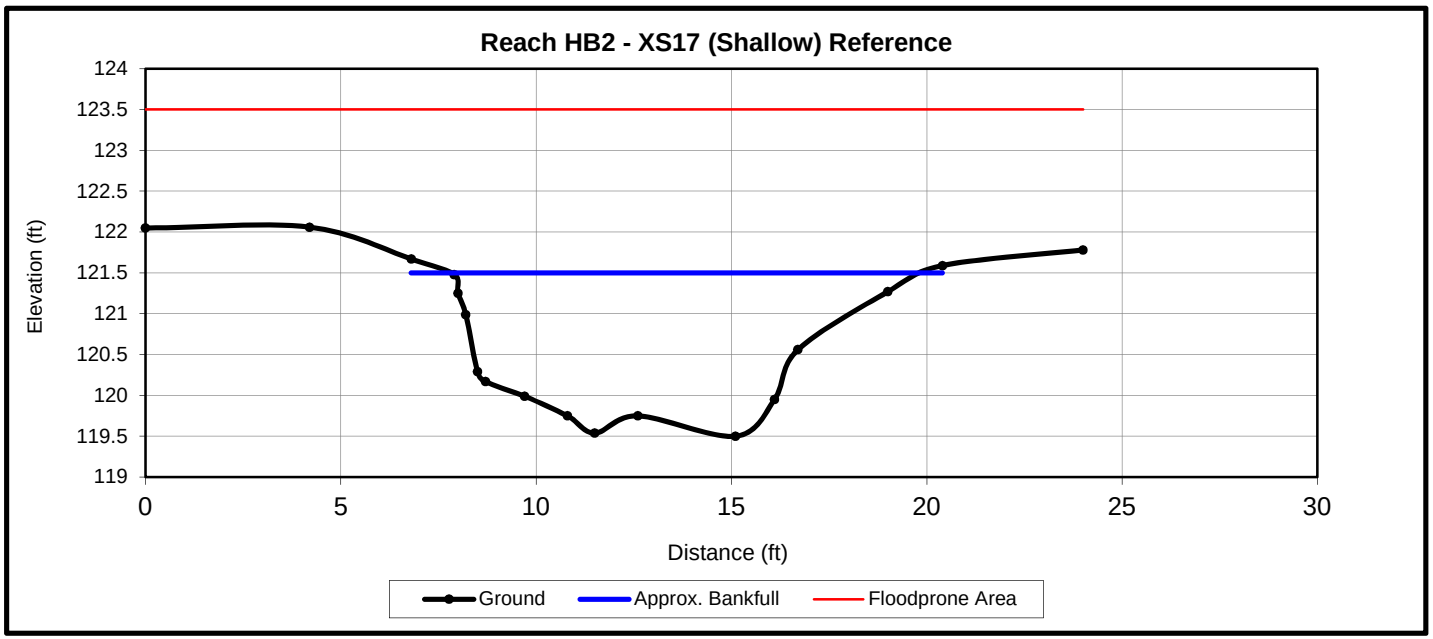
Upstream

Downstream



Upstream

Downstream



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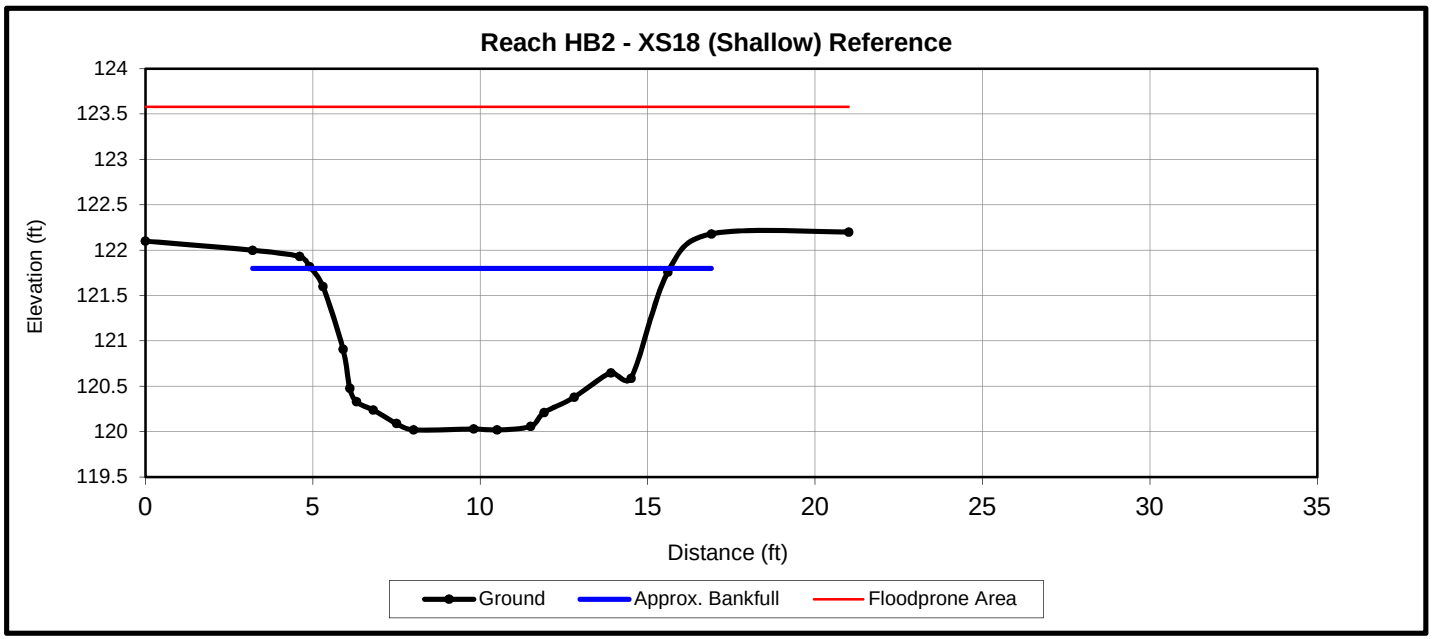
Downstream



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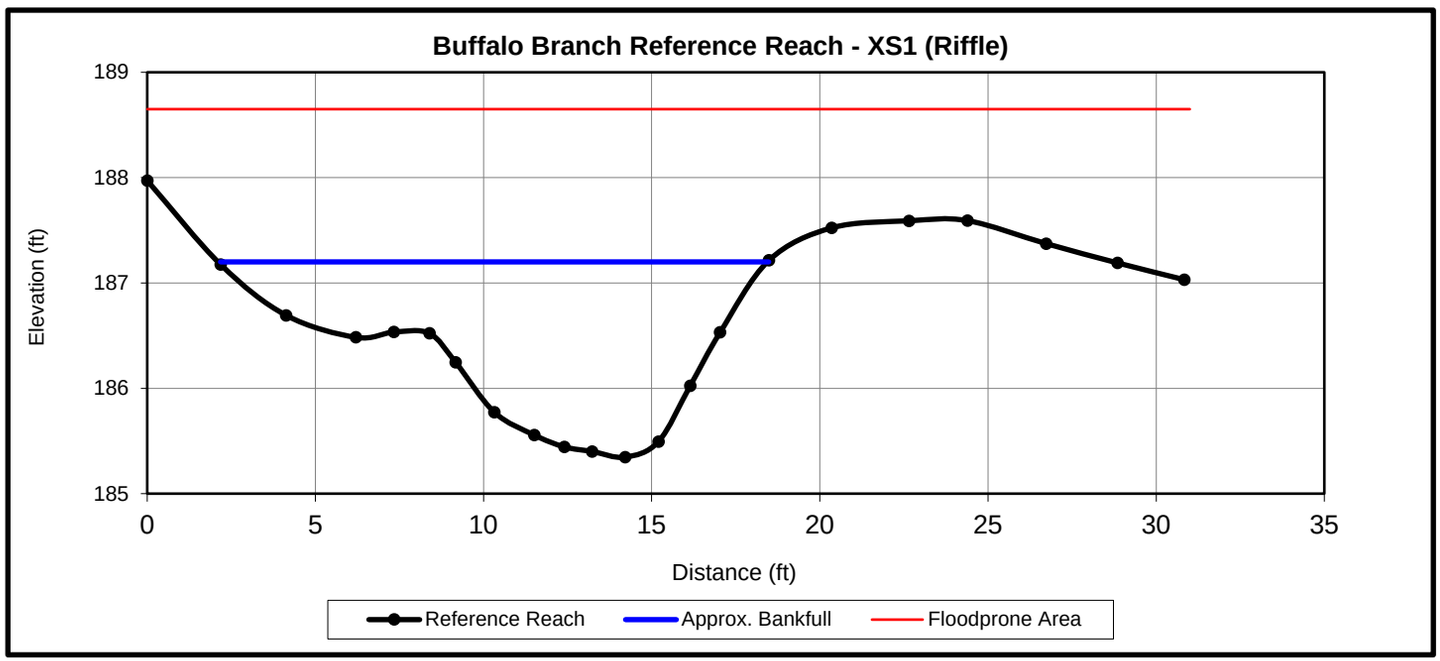

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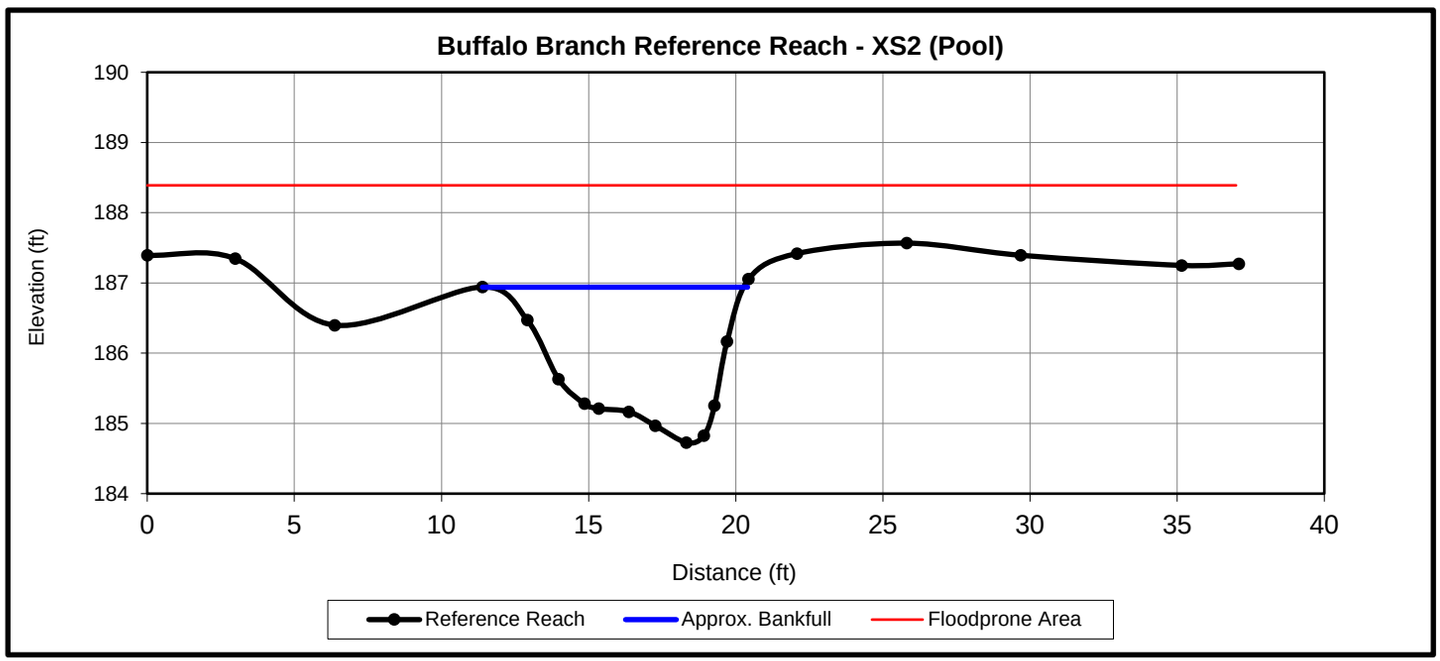

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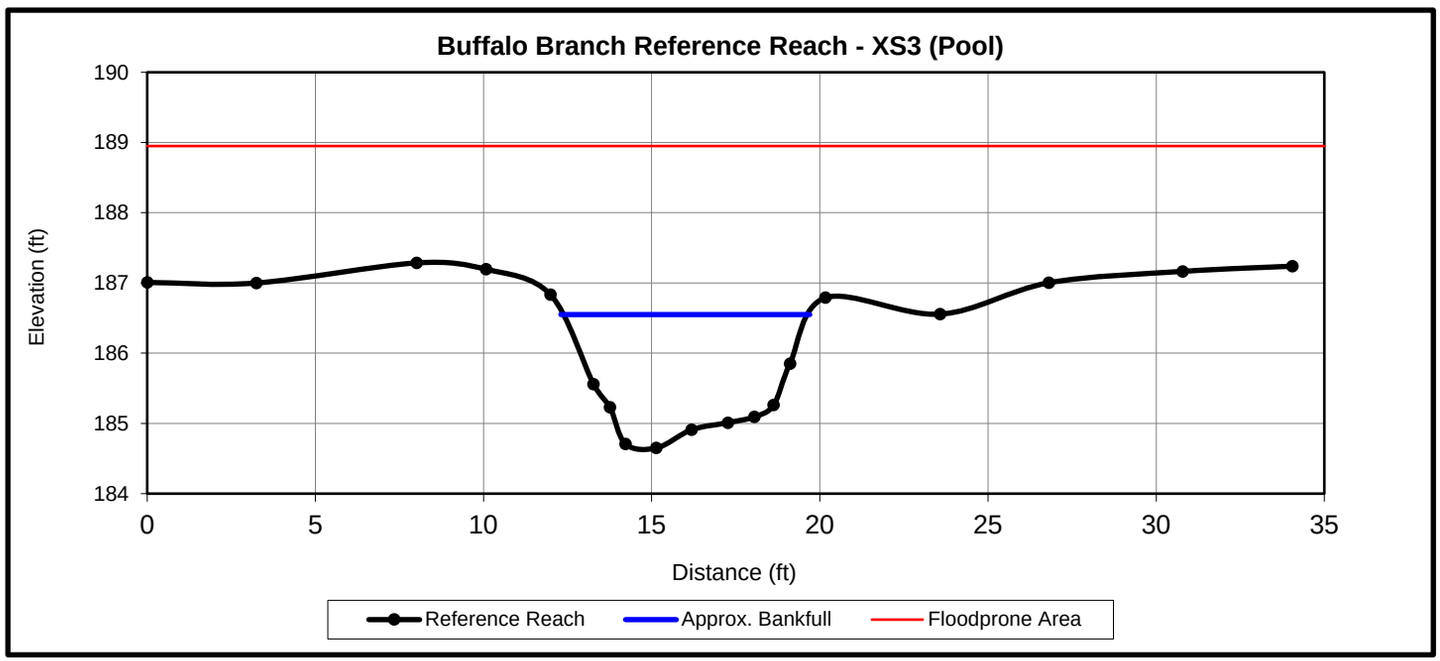

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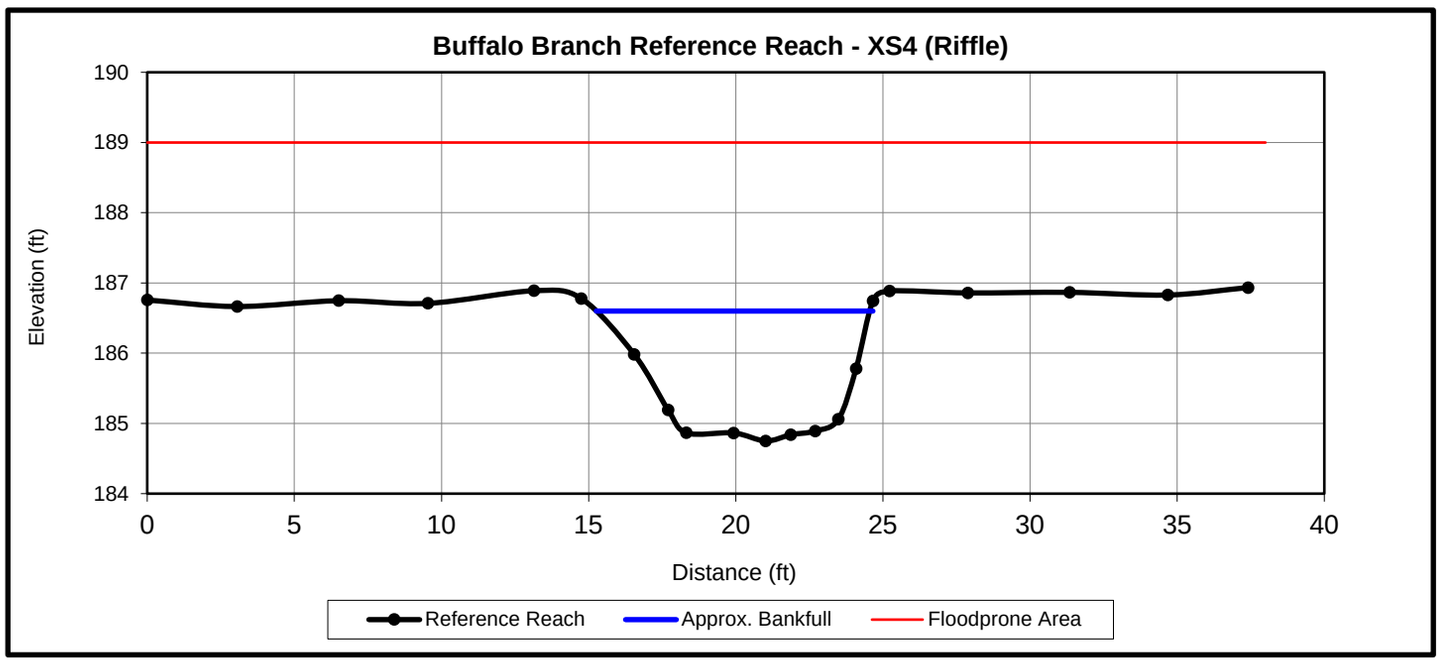

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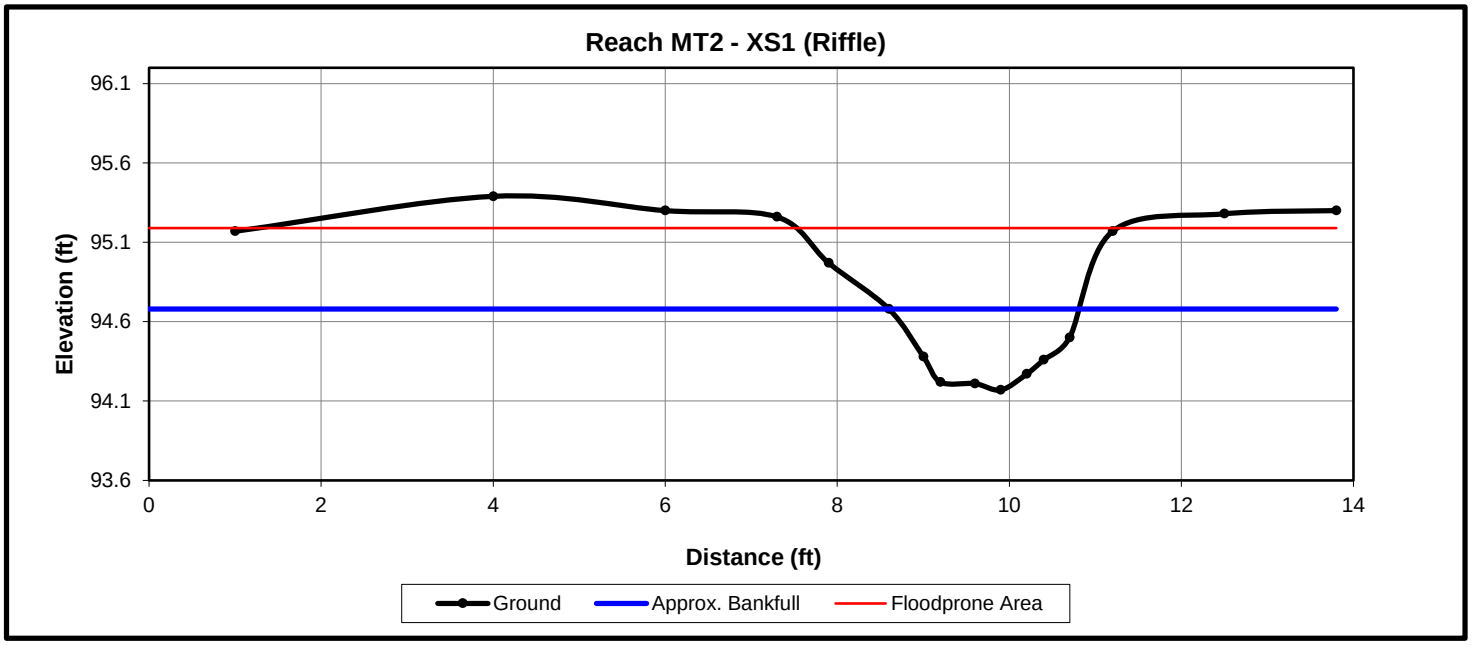

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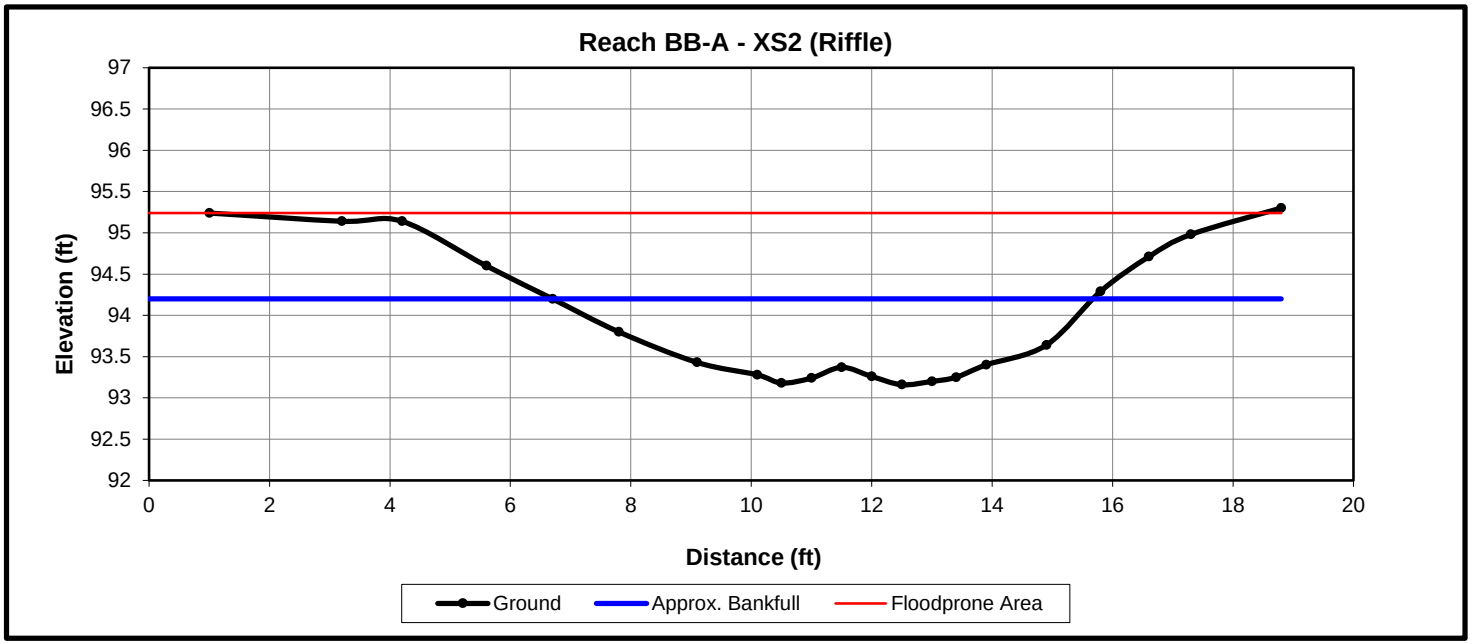
Downstream



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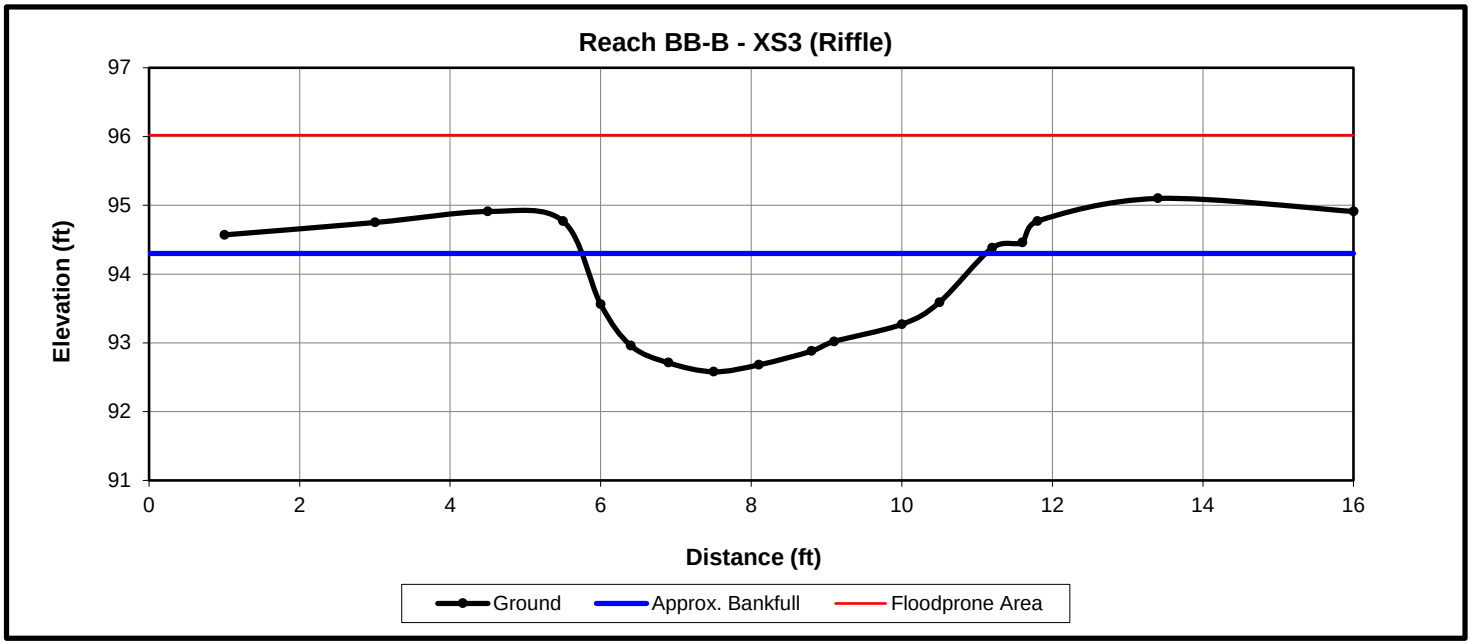
Downstream



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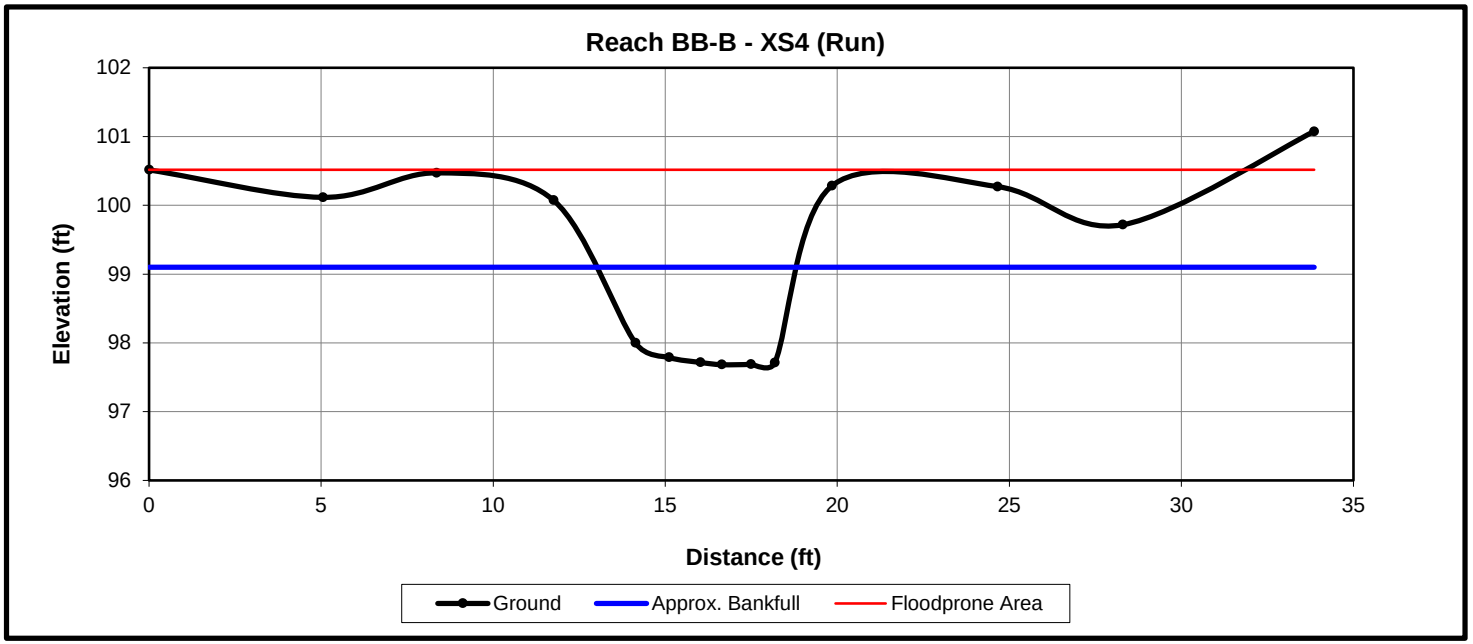

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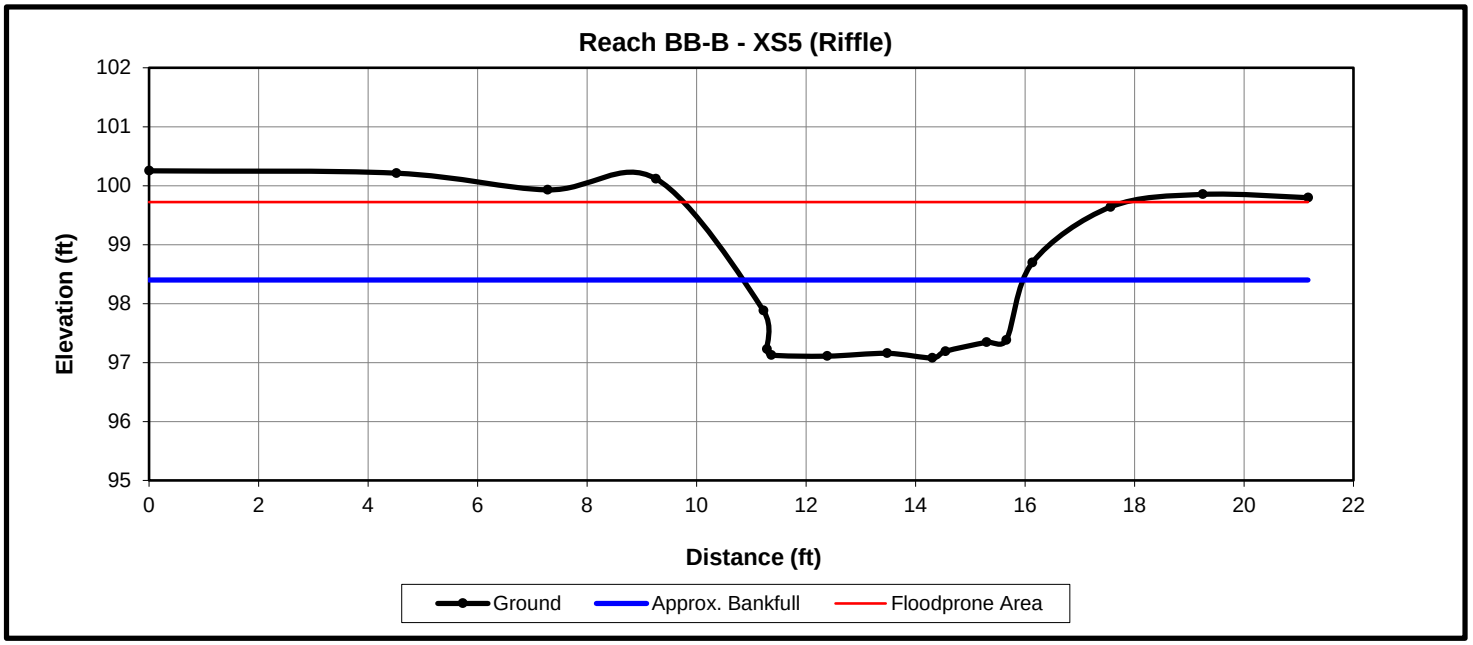

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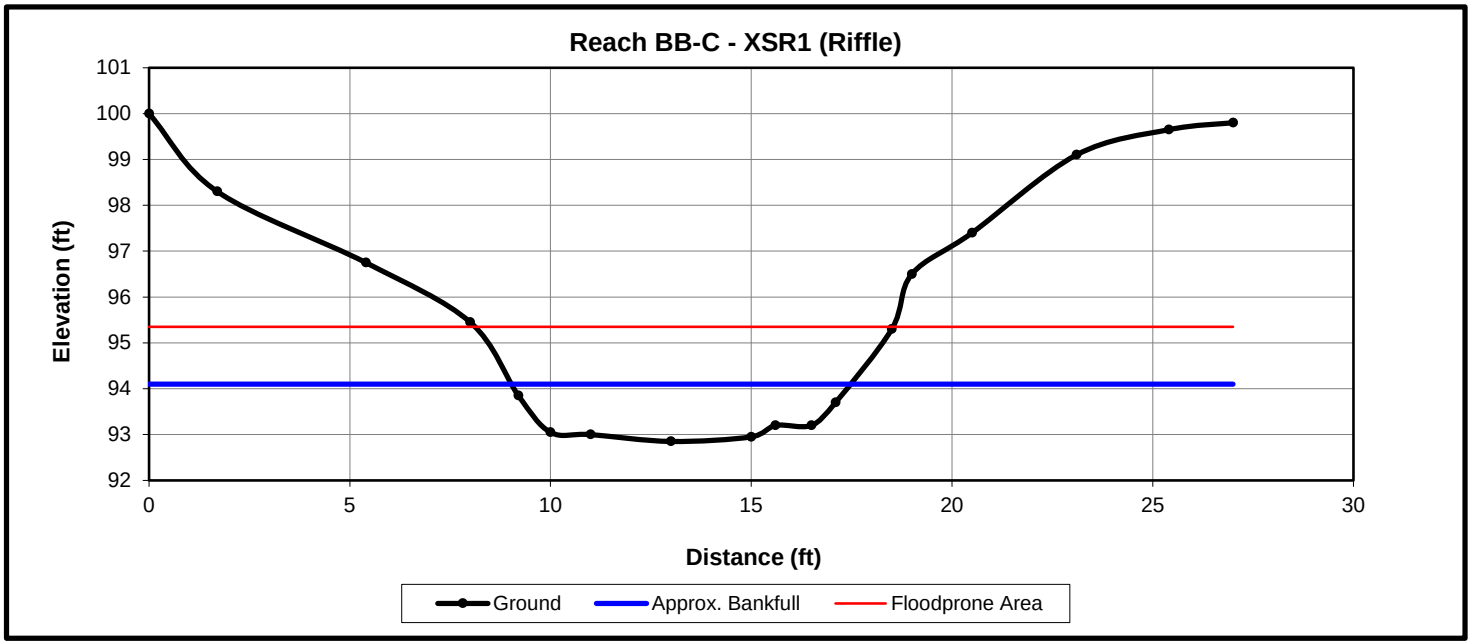
Downstream



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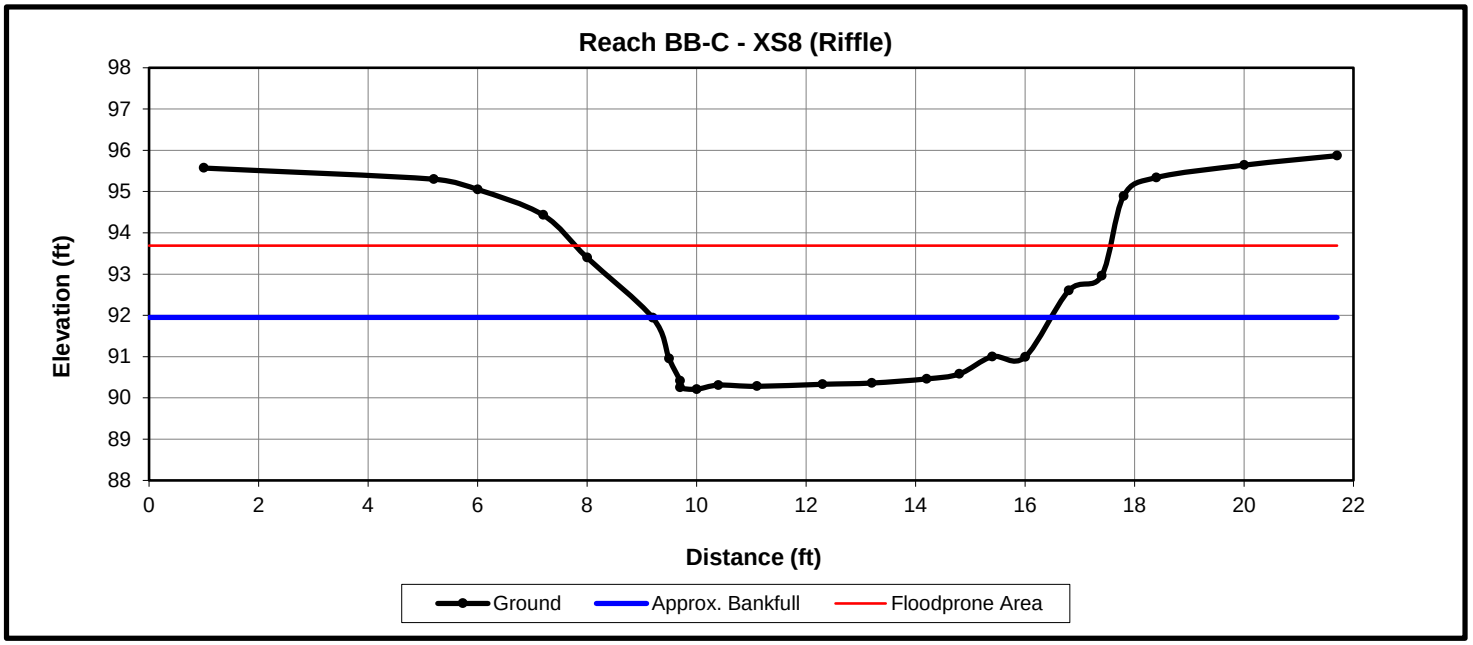
Downstream



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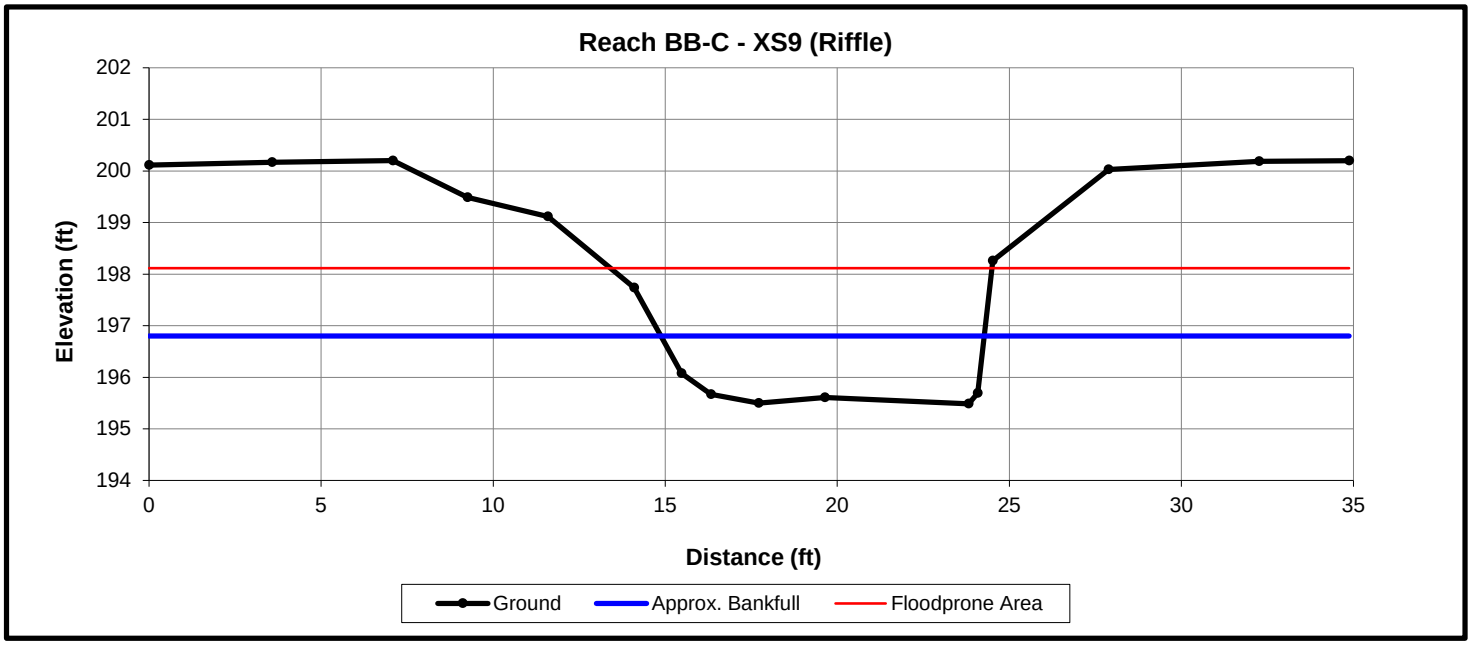
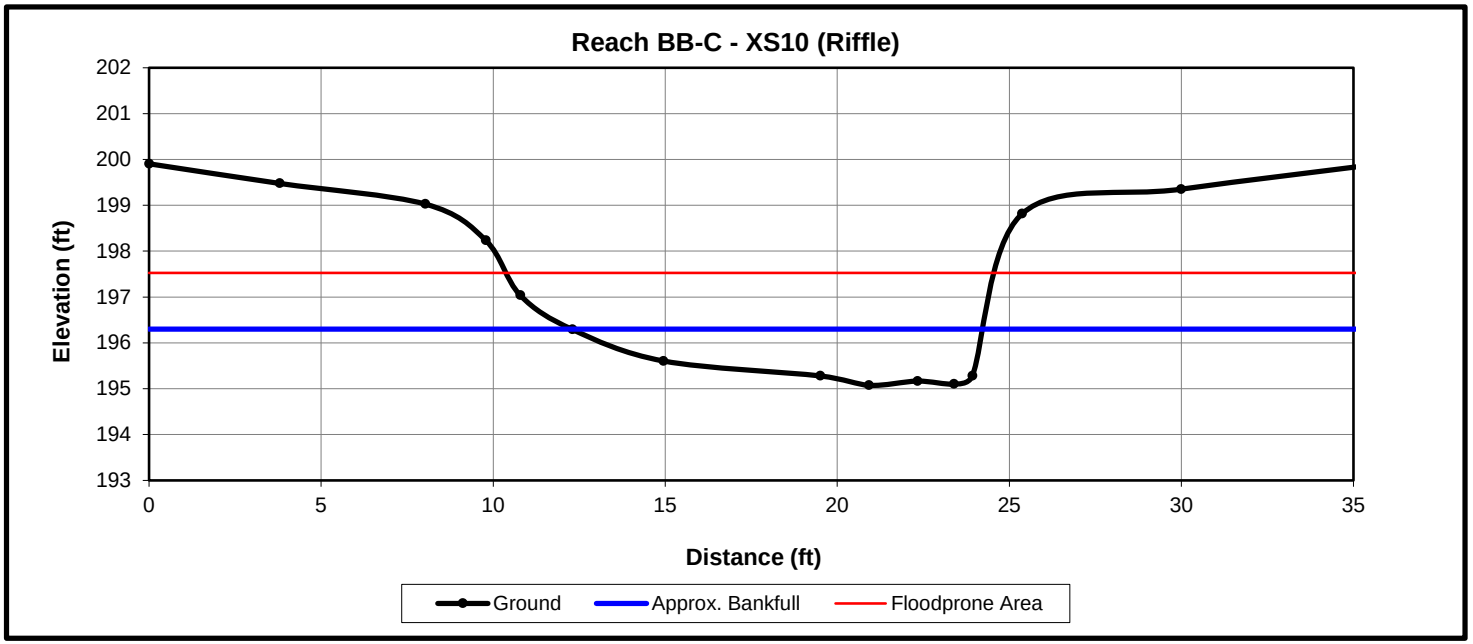
Downstream



Upstream

Downstream



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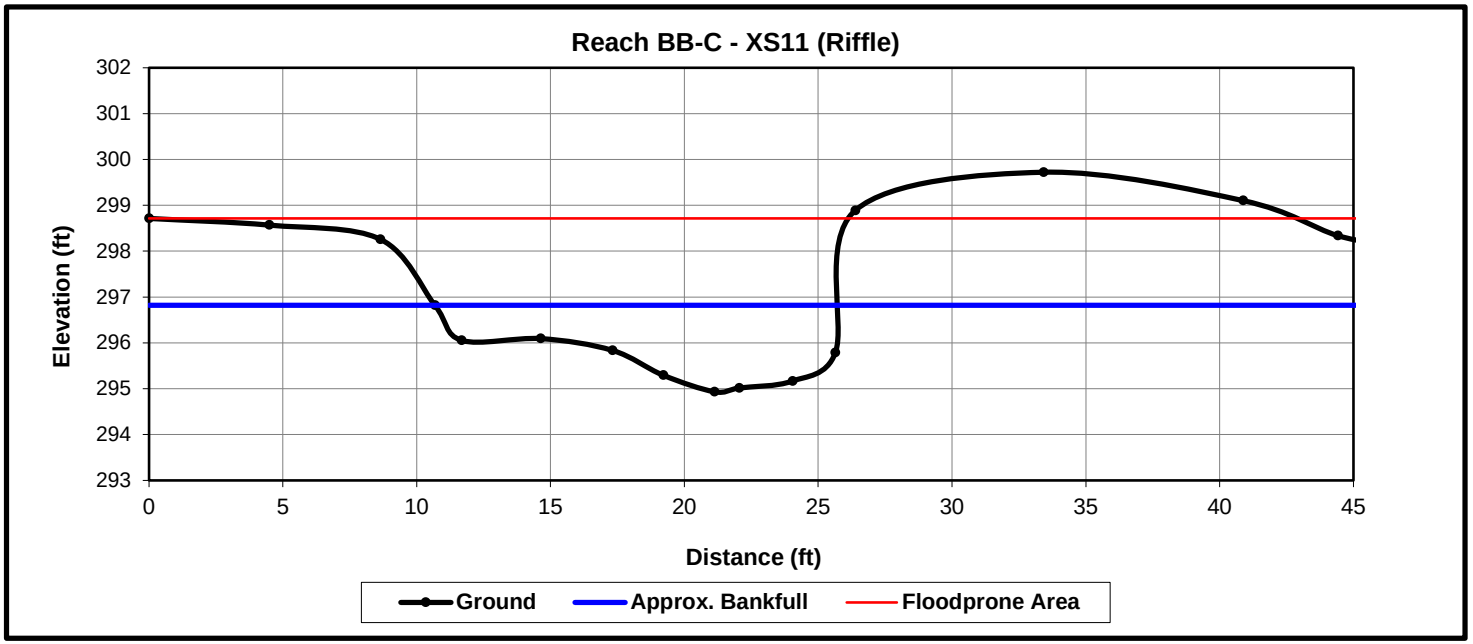
Downstream



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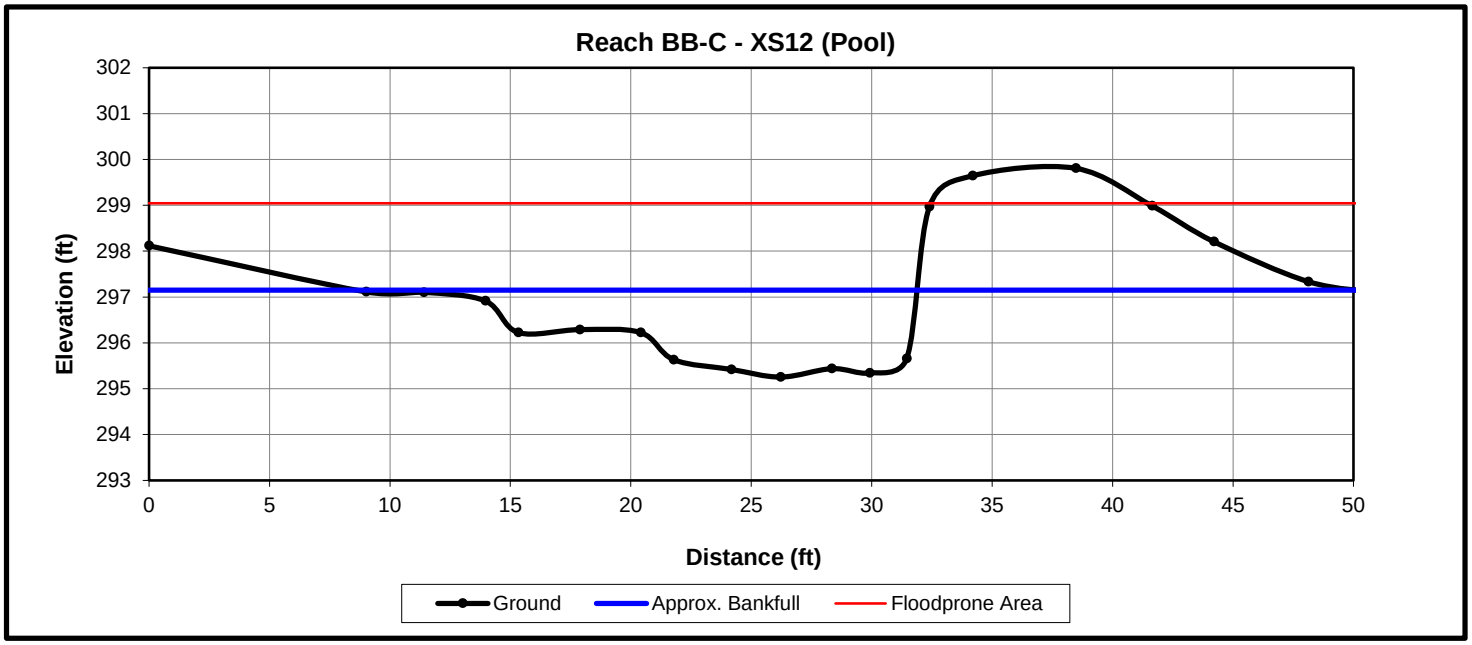
Downstream



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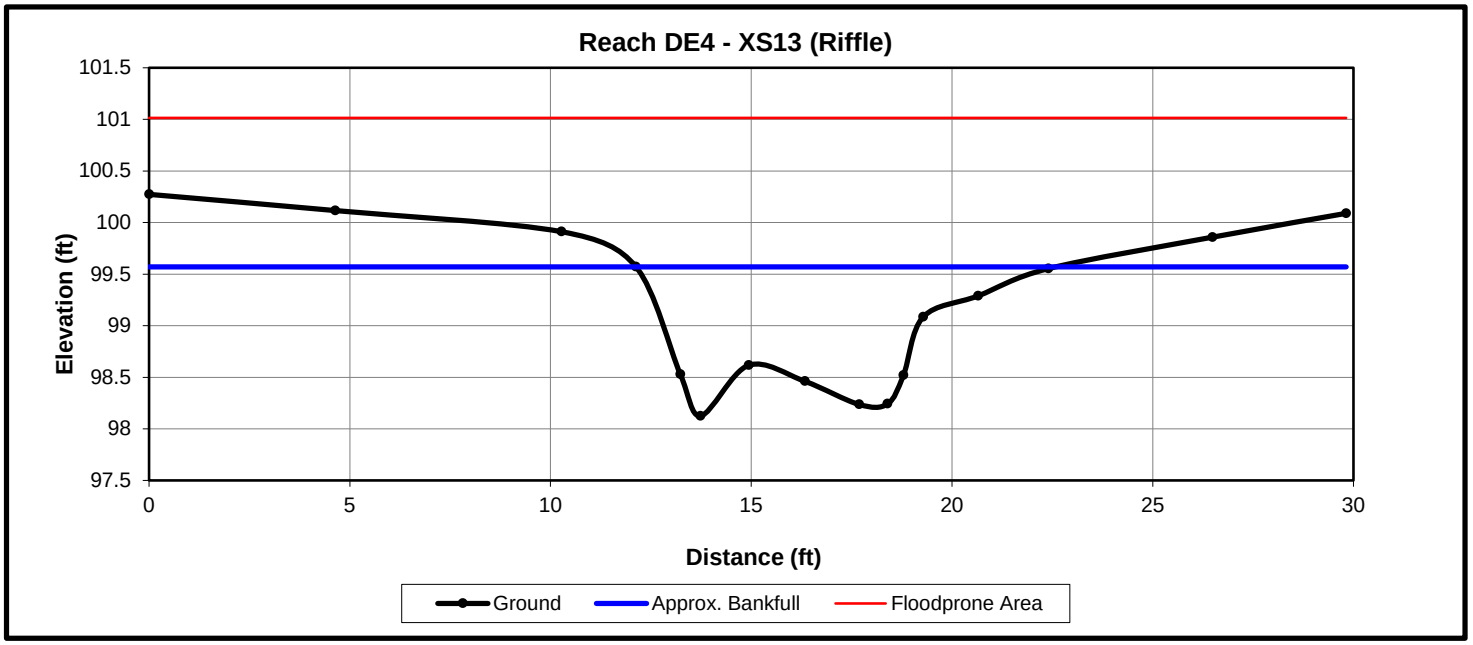
Downstream



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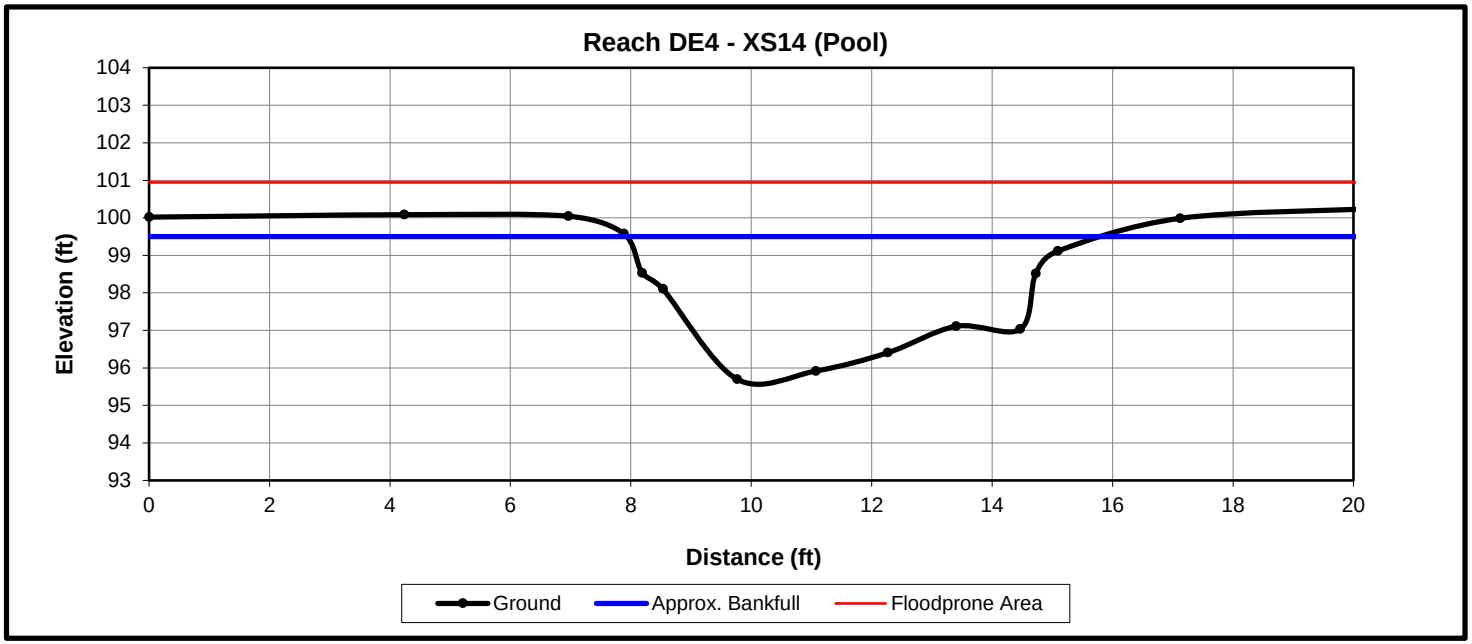

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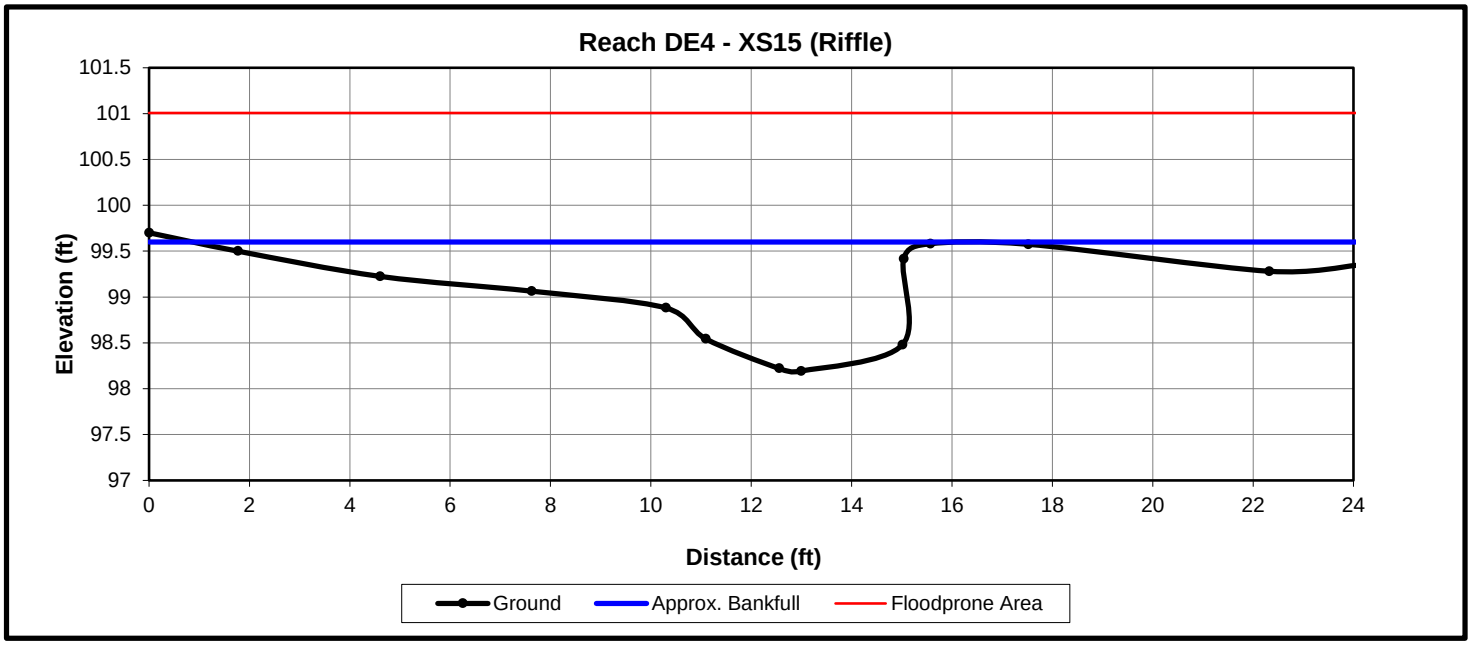

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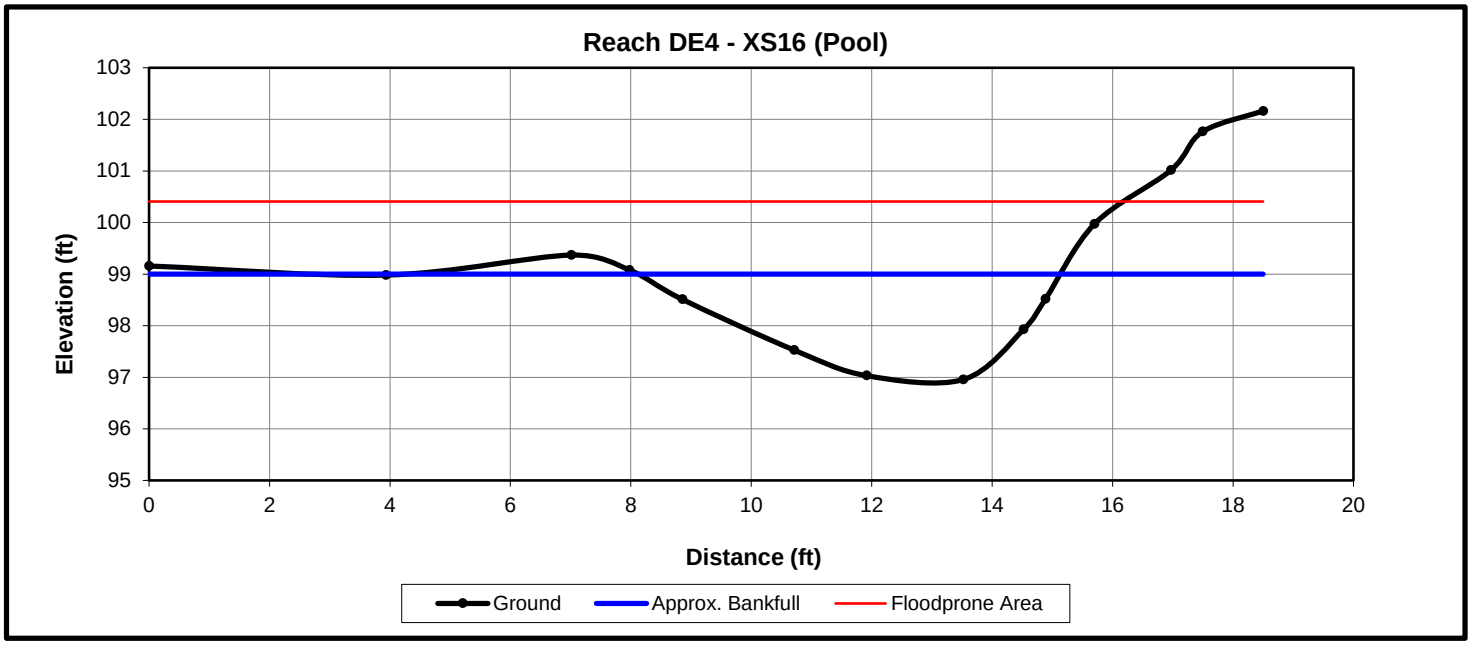

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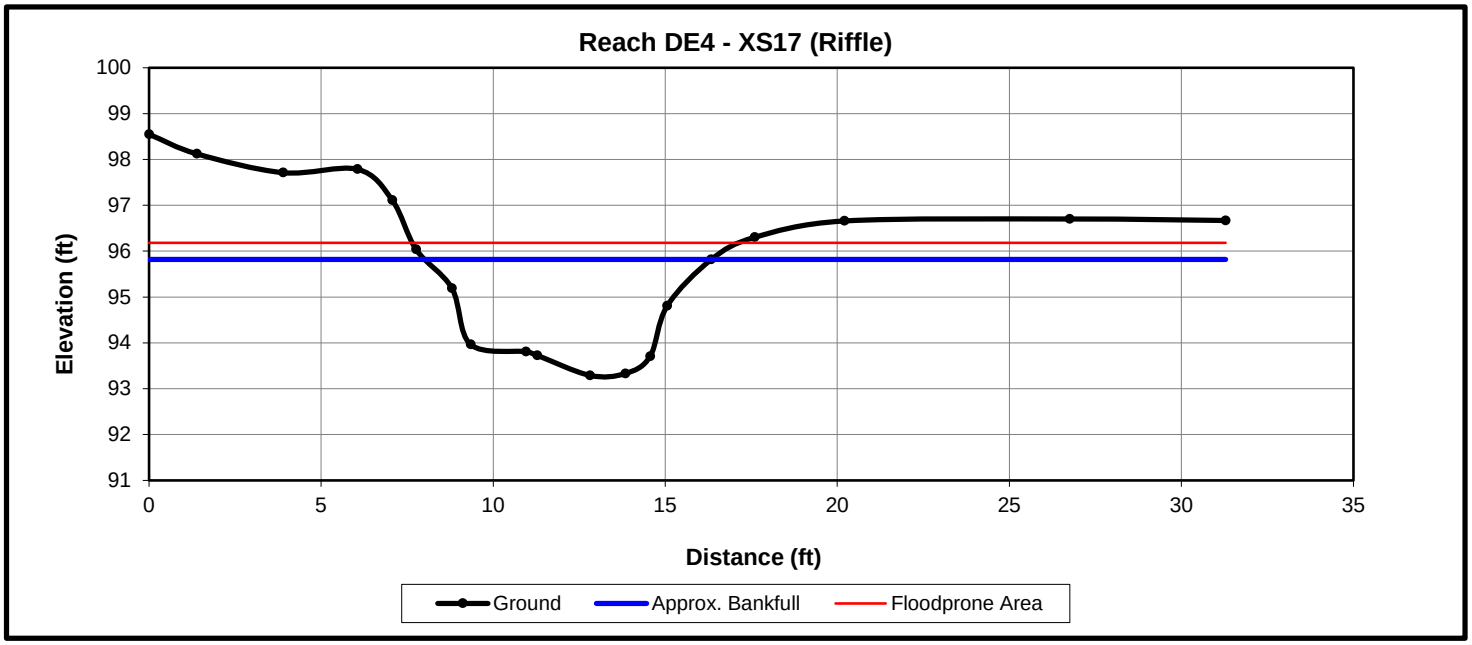

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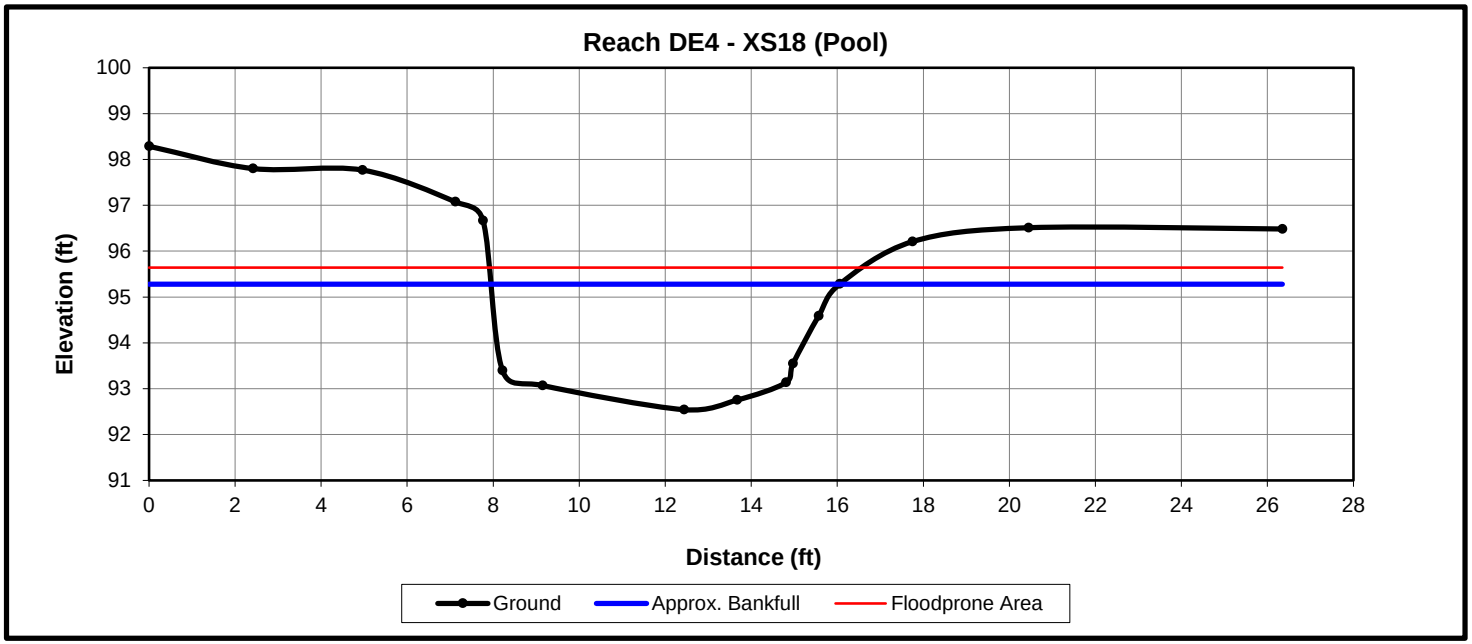

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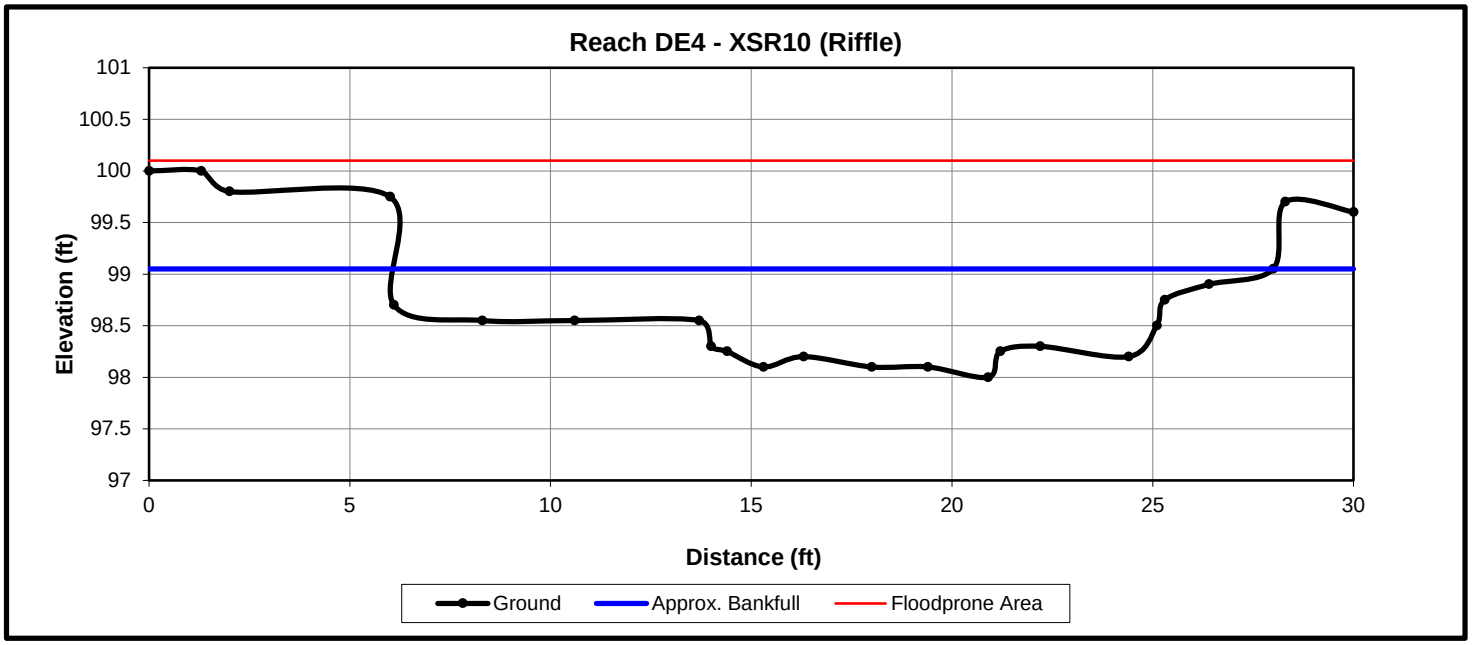

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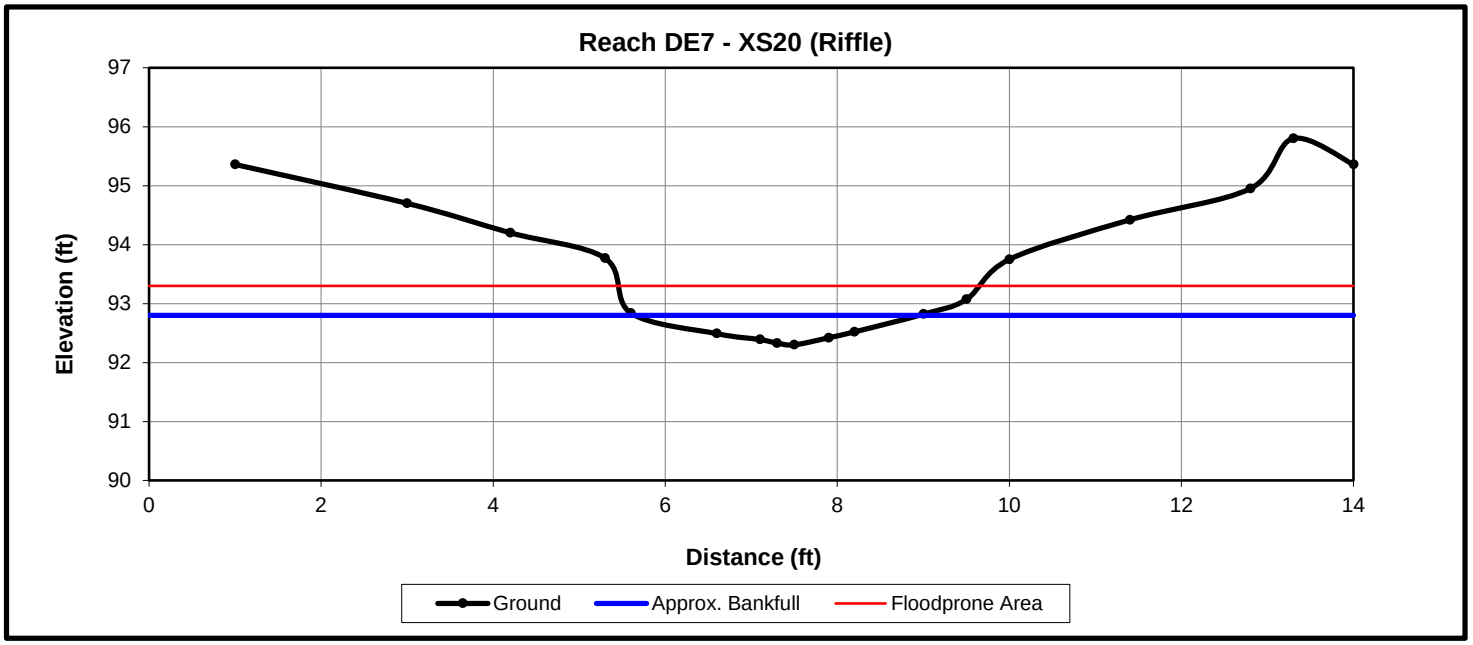

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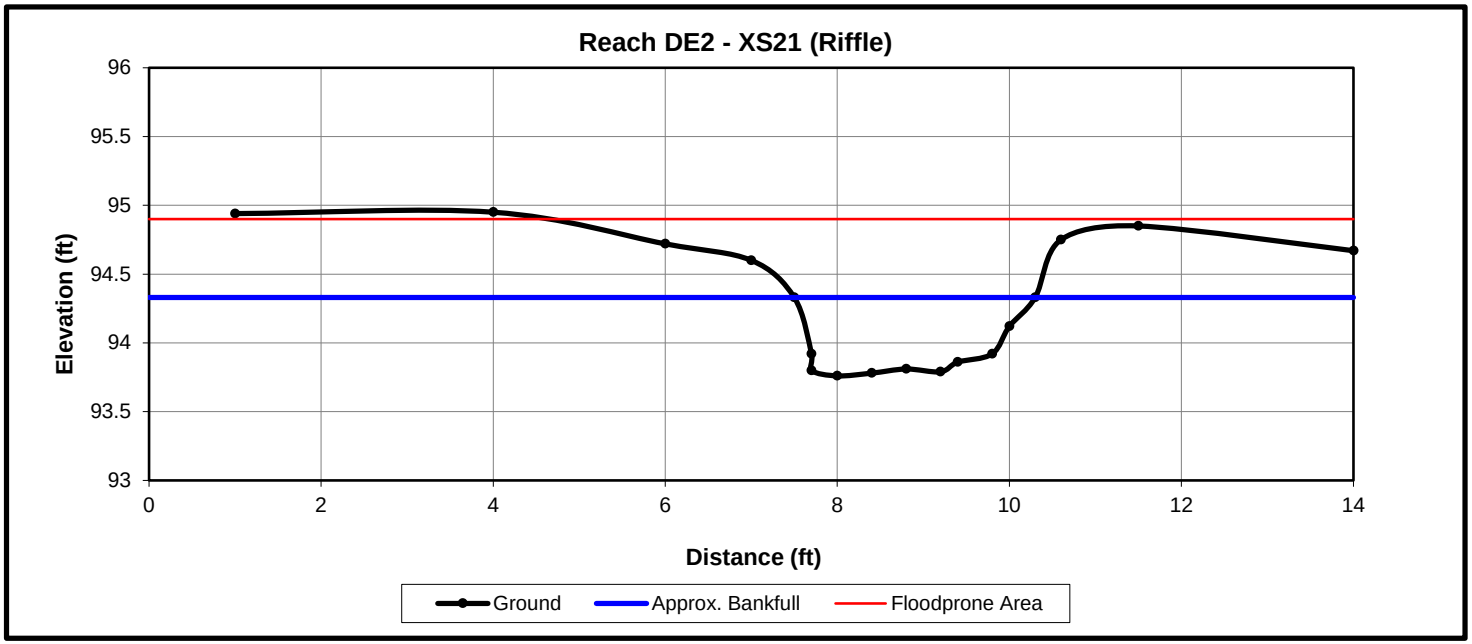

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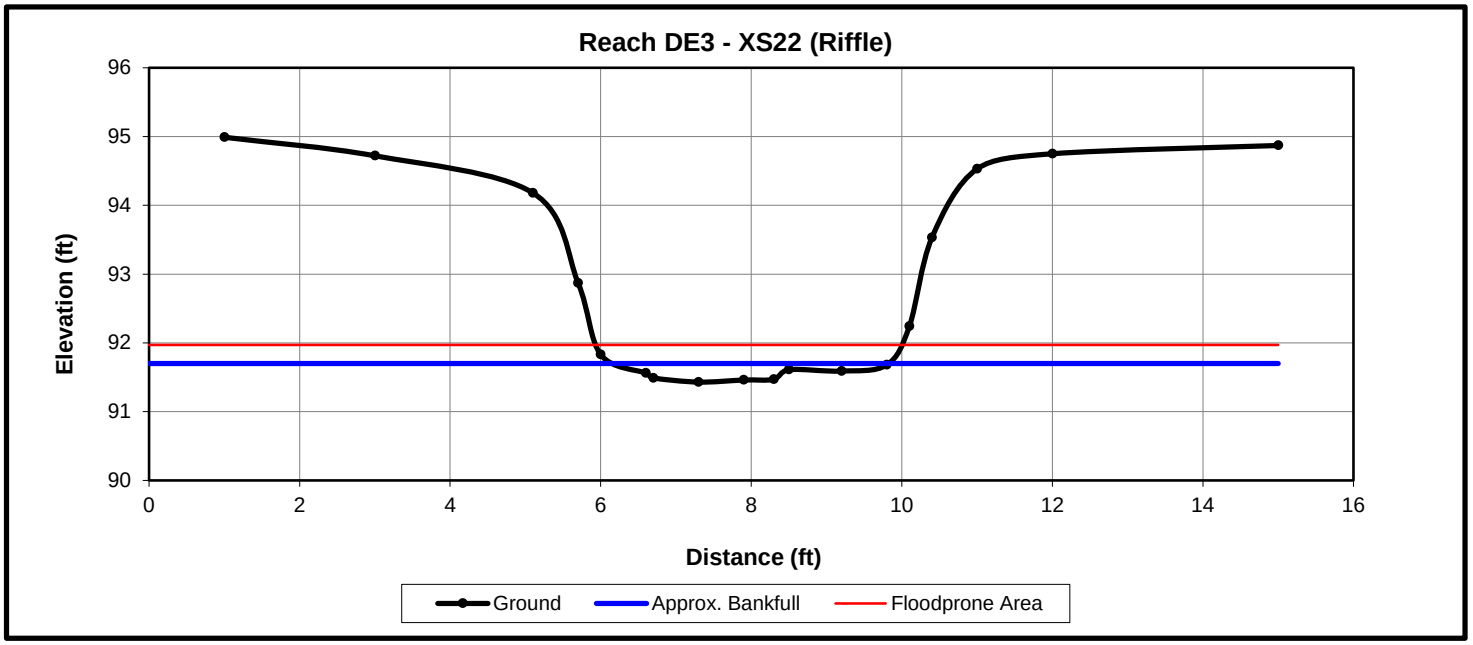

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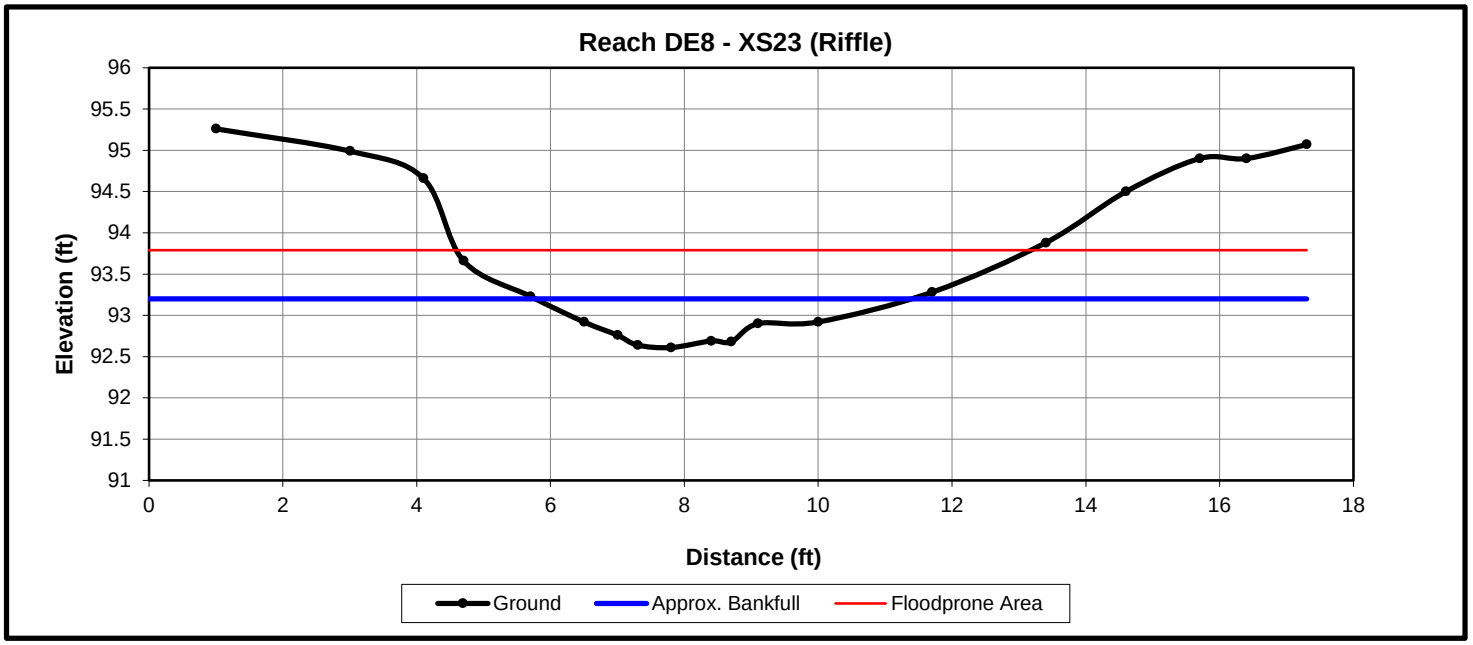
Downstream



Stream Hydrologic Analysis Data

Mitigation Type	P1	P1	P1	P1	P1	P1	P1
Reach	BB (MS) 3	BB (MS) 4	BB (DS)	DE2	DE4	DE7	DE8
DA (ac)	195	244	570	10	295	21	26
DA (sqmi)	0.30	0.38	0.89	0.02	0.46	0.03	0.04
Ex. Conds XSs		9, 10	11, 12	21		20	23, 22 on DE3
~ Q_{BKF}		24	28	3	15	3.5	4
~ Q_{BKF}		23-25	26-31	2-4	7-18	2-5	2-6
~ CSA_{BKF}							
FFQ Analysis							
$Q_{1.1}$	10	12	20	2	13	2	3
$Q_{1.5}$	28	31	47	6	34	9	10
Q_2	40	45	68	10	49	14	15
Q_{10}	132	147	215	35	160	49	53
Rural Coastal Plain Regional Curves							
~ NC BKF_{CSA}	6.6	7.7	13.4	0.9	8.7	1.5	1.7
~ VA BKF_{CSA}	5.6	6.5	11.1	0.8	7.3	1.4	1.5
~ SC 65 BKF_{CSA}	2.6	3.1	5.9	0.3	3.6	0.5	0.5
~ SC 63 BKF_{CSA}	3.1	3.7	7.3	0.3	4.3	0.5	0.6
NC-Q_{BKF}	4	4	8	0	5	1	1
VA-Q_{BKF}	14	16	26	2	18	4	4
SC 65-Q_{BKF}	3	4	8	0	5	1	1
SC 63-Q_{BKF}	3	3	7	0	4	0	0
Rural Piedmont Regional Curves							
NC-Q_{BKF} rev	39	46	84	5	53	8	9
VA-Q_{BKF}	14	18	39	1	21	2	2
SC-Q_{BKF}	16	19	34	2	21	3	4
SCS (Hydraflow Hydraflow with 6 hour duration and a PSF of 200) - Long							
Q_1	12	14	26	0.1	11	2.0	0.7
Q_2	19	22	44	0.3	19	3.1	1.4
Q_5	31	37	74	0.7	34	5.1	2.9
Q_{10}	41	50	101	1.1	48	6.9	4.4
Q_{25}	57	72	141	2.0	68	9.6	6.9
Q_{50}	72	92	175	2.8	86	12	9.3
SCS (Hydraflow Hydraflow with 6 hour duration and a PSF of 200) - Short							
Q_1	14	16	32	0.1	15	2.5	0.8
Q_2	22	25	52	0.3	25	4.2	1.5
Q_5	36	44	88	0.7	43	7.2	3.3
Q_{10}	50	63	121	1.2	60	10	5.3
Q_{25}	72	94	171	2.2	85	14	8.7
Q_{50}	92	121	219	3.2	107	18	12
SCS (Hydraflow Hydrographs with 6 hour duration and a PSF of 484) - Long							
Q_1	16	18	37	0.1	17	2.8	0.8
Q_2	26	30	62	0.3	30	4.8	1.5
Q_5	46	54	110	0.7	55	8.5	3.6
Q_{10}	64	75	155	1.3	78	12	6.2
Q_{25}	92	108	223	2.7	114	17	11
Q_{50}	116	136	283	4.2	146	22	15
SCS (Hydraflow Hydrographs with 6 hour duration and a PSF of 484) - Short							
Q_1	18	20	40	0.1	18	3.7	0.8
Q_2	31	35	71	0.3	34	6.8	1.5
Q_5	55	63	131	0.7	64	12	4.2
Q_{10}	78	90	187	1.4	94	17	7.8
Q_{25}	113	133	275	3.2	140	25	14
Q_{50}	143	175	352	5.0	182	32	20
USGS RR Eqns (Region 4)							
$Q_{2(2001\ EQNS)}$	29	34	60	4	38	7	7
Q_2	28	32	56	4	36	7	8
Q_5	58	67	114	9	76	15	16
Q_{10}	83	96	162	13	108	21	24
Q_{25}	119	136	228	20	153	31	35
Q_{50}	151	173	288	25	194	40	45
$Q_{bnkfull}$	16	20	30	4	20	3-4	3-4

NC SAM Stream Rating Sheet
Accompanies User Manual Version 2.1

Stream Site Name: Six Runs - Reach Brad's Branch-A
Date of Evaluation: 4/2/2021
Stream Category: Ia1
Assessor Name/Organization: RES

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

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

NC SAM Stream Rating Sheet
Accompanies User Manual Version 2.1

Stream Site Name: Six Runs - Reach Brad's Branch-B
Date of Evaluation: 4/2/2021
Stream Category: Ia2
Assessor Name/Organization: RES

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

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

NC SAM Stream Rating Sheet
Accompanies User Manual Version 2.1

Stream Site Name: Six Runs - Reach Brad's Branch-C (DS)
Date of Evaluation: 4/2/2021
Stream Category: Ia3
Assessor Name/Organization: RES

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

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

NC SAM Stream Rating Sheet
Accompanies User Manual Version 2.1

Stream Site Name: Six Runs - Reach Brad's Branch-C (US)
Date of Evaluation: 4/2/2021
Stream Category: Ia3
Assessor Name/Organization: RES

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

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

NC SAM Stream Rating Sheet
Accompanies User Manual Version 2.1

Stream Site Name: Six Runs - Reach DE2
Date of Evaluation: 4/2/2021
Stream Category: Ia1
Assessor Name/Organization: RES

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

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

NC SAM Stream Rating Sheet
Accompanies User Manual Version 2.1

Stream Site Name: Six Runs - Reach DE3
Date of Evaluation: 4/2/2021
Stream Category: Ib1
Assessor Name/Organization: RES

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

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

NC SAM Stream Rating Sheet
Accompanies User Manual Version 2.1

Stream Site Name: Six Runs - Reach DE4-A
Date of Evaluation: 4/2/2021
Stream Category: Ia2
Assessor Name/Organization: RES

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

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

NC SAM Stream Rating Sheet
Accompanies User Manual Version 2.1

Stream Site Name: Six Runs - Reach DE4-B
Date of Evaluation: 4/2/2021
Stream Category: Ia2
Assessor Name/Organization: RES

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

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

NC SAM Stream Rating Sheet
Accompanies User Manual Version 2.1

Stream Site Name: Six Runs - Reach DE7 | Date of Evaluation: 4/2/2021
Stream Category: Ib1 | Assessor Name/Organization: RES

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

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

NC SAM Stream Rating Sheet
Accompanies User Manual Version 2.1

Stream Site Name: Six Runs - Reach DE8
Date of Evaluation: 4/2/2021
Stream Category: Ia1
Assessor Name/Organization: RES

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

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

NC SAM Stream Rating Sheet
Accompanies User Manual Version 2.1

Stream Site Name: Six Runs - Reach MT2 | Date of Evaluation: 4/2/2021
Stream Category: Ia1 | Assessor Name/Organization: RES

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

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

NC WAM Wetland Rating Sheet
Accompanies User Manual Version 5.0

Wetland Site Name	WA,WB,WF,WG,WH,WI,WJ,WK	Date	08/05/2021
Wetland Type	Floodplain Pool	Assessor Name/Organization	Matt DeAngelo/RES

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

Sub-function Rating Summary

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

Function Rating Summary

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

Overall Wetland Rating **LOW**

NC WAM Wetland Rating Sheet
Accompanies User Manual Version 5.0

Wetland Site Name	WC-1	Date	08/05/2021
Wetland Type	Non-Tidal Freshwater Marsh	Assessor Name/Organization	Matt DeAngelo/RES

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

Sub-function Rating Summary

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

Function Rating Summary

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

Overall Wetland Rating **LOW**

NC WAM Wetland Rating Sheet
Accompanies User Manual Version 5.0

Wetland Site Name	WC-2	Date	08/05/2021
Wetland Type	Riverine Swamp Forest	Assessor Name/Organization	Matt DeAngelo/RES

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

Sub-function Rating Summary

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

Function Rating Summary

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

Overall Wetland Rating **HIGH**

NC WAM Wetland Rating Sheet
Accompanies User Manual Version 5.0

Wetland Site Name	WE-1	Date	08/05/2021
Wetland Type	Bottomland Hardwood Forest	Assessor Name/Organization	Matt DeAngelo/RES

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

Sub-function Rating Summary

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

Function Rating Summary

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

Overall Wetland Rating **HIGH**

NC WAM Wetland Rating Sheet
Accompanies User Manual Version 5.0

Wetland Site Name	WE-2	Date	08/05/2021
Wetland Type	Bottomland Hardwood Forest	Assessor Name/Organization	Matt DeAngelo/RES

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

Sub-function Rating Summary

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

Function Rating Summary

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

Overall Wetland Rating **LOW**

WETS Table

WETS Station: CLINTON 2 NE, NC

Requested years: 1991 - 2021

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	53.3	32.0	42.6	3.62	2.47	4.32	7	0.7
Feb	56.5	34.4	45.5	3.23	2.18	3.86	6	0.4
Mar	63.7	40.5	52.1	3.66	2.61	4.34	7	0.0
Apr	73.3	49.1	61.2	3.24	2.08	3.91	5	-
May	80.3	58.1	69.2	3.99	2.64	4.79	7	-
Jun	86.9	66.6	76.8	4.84	3.37	5.76	7	-
Jul	90.0	70.5	80.3	6.01	4.25	7.12	8	-
Aug	88.1	68.9	78.5	6.00	4.12	7.15	8	0.0
Sep	83.1	63.2	73.1	6.67	3.78	8.13	7	0.0
Oct	74.1	50.7	62.4	3.41	1.90	4.16	5	0.0
Nov	64.3	40.8	52.6	3.45	1.97	4.20	5	0.0
Dec	56.6	35.2	45.9	3.41	2.30	4.08	6	0.4
Annual:					47.61	55.70		
Average	72.5	50.9	61.7	-	-	-	-	-
Total	-	-	-	51.54			78	-

GROWING SEASON DATES

Years with missing data:	24 deg = 5	28 deg = 5	32 deg = 5
Years with no occurrence:	24 deg = 0	28 deg = 0	32 deg = 0
Data years used:	24 deg = 26	28 deg = 26	32 deg = 26
Probability	24 F or higher	28 F or higher	32 F or higher
50 percent *	2/23 to 12/12: 292 days	3/14 to 11/22: 253 days	3/27 to 11/9: 227 days
70 percent *	2/18 to 12/17: 302 days	3/8 to 11/28: 265 days	3/23 to 11/14: 236 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
1971	5.37	3.95	6.50	5.56	3.63	4.53	6.81	9.09	3.06	8.48	1.22	1.78	59.98
1972	4.92	4.74	3.49	2.07	5.78	3.17	8.15	6.57	3.93	5.06	5.36	2.95	56.19
1973	3.49	5.56	4.91	6.37	3.58	5.21	4.52	4.57	1.58	0.65	0.26	6.83	47.53
1974	3.97	4.63	4.85	3.77	4.01	3.84	6.74	7.69	3.15	2.40	2.36	3.95	51.36
1975	3.24	3.16	4.71	2.77	6.77	2.05	7.38	1.59	8.48	2.63	2.07	5.10	49.95
1976	4.60	1.58	2.66	0.19	5.07	5.18	3.10	1.34	4.72	2.58	3.74	4.69	39.45
1977	3.62	1.54	5.58	1.95	3.37	5.28	2.06	8.31	3.43	3.99	4.17	4.77	48.07
1978	5.77	1.07	5.30	8.09	1.91	2.58	5.58	5.07	0.19	1.33	5.85	2.23	44.97
1979	4.09	3.89	5.00	2.35	7.21	3.78	6.43	2.70	10.	1.	3.42	1.36	51.

									70	05			98
1980	4.16	1.98	8.01	1.89	3.38	4.09	5.79	0.89	4.94	5.18	2.35	3.23	45.89
1981	1.49	2.07	1.62	0.60	4.25	6.25	3.52	16.71	1.04	1.42	0.90	4.94	44.81
1982	5.67	5.04	1.65	3.59	3.77	4.59	5.81	3.35	3.34	1.98	2.08	4.34	45.21
1983	3.68	6.79	9.09	5.22	1.37	6.43	2.70	2.02	3.44	2.33	3.95	6.03	53.05
1984	2.64	4.93	8.19	3.23	3.48	2.88	8.91	4.66	11.51	0.85	1.08	1.19	53.55
1985	3.74	5.02	1.67	1.43	2.34	2.17	8.79	5.95	1.62	4.02	3.08	0.95	40.78
1986	1.59	2.20	2.19	0.46	4.77	5.37	5.28	6.38	0.67	3.17	2.71	3.97	38.76
1987	7.12	3.98	4.53	4.92	2.59	3.00	3.14	4.37	2.61	0.80	1.68	3.78	42.52
1988	4.00	1.54	2.09	2.11	5.76	5.17	7.80	4.06	4.58	1.57	2.20	0.80	41.68
1989	2.47	3.45	5.92	4.40	4.03	7.74	7.25	3.73	6.86	3.23	3.62	4.40	57.10
1990	2.75	2.01	3.52	2.98	4.77	2.00	3.30	6.33	0.08	8.74	2.14	2.40	41.02
1991	4.40	1.48	4.85	1.97	1.60	2.50	17.47	10.15	4.58	1.32	2.00	2.20	54.52
1992	3.34	1.37	3.91	2.97	2.79	4.99	2.64	14.84	1.93	4.28	5.47	3.13	51.66
1993	6.63	2.05	4.25	4.93	2.04	2.38	9.81	4.60	6.27	4.05	1.48	2.78	51.27
1994	4.12	2.14	5.55	1.26	1.73	7.09	4.45	3.69	3.55	3.44	2.97	2.16	42.15
1995	4.68	5.15	3.75	0.50	3.02	12.87	3.65	1.38	4.34	5.07	3.24	1.91	49.56
1996	3.83	2.58	4.64	2.65	4.07	5.19	8.64	3.17	12.62	5.30	3.84	3.20	59.73
1997	3.87	2.79	3.46	3.28	1.48	1.58	9.82	3.19	6.61	3.42	6.49	4.74	50.73
1998	7.41	7.02	6.66	4.89	5.74	1.84	2.42	7.25	3.23	0.83	1.42	4.46	53.17
1999	7.96	1.54	2.37	4.00	2.71	4.50	4.21	4.24	21.63	6.84	2.52	1.14	63.66
2000	5.46	1.58	4.12	4.29		6.36	5.52	4.77	5.15	0.16	3.00	1.73	42.14
2001	0.67	3.20	4.93	0.60	3.06	6.18	4.89	6.34	2.53	1.29	2.95	0.78	37.42
2002	4.97	2.03	6.12	2.40	2.19	6.00	5.98	8.09	2.46	2.85	4.09	3.20	50.38
2003	1.83	4.75	4.53	4.94	7.06	5.66	11.11	4.34	2.51	3.95	2.00	4.62	57.30
2004	1.17	4.56	0.56	5.47	7.39	4.63	2.51	9.39	3.27	1.40	4.03	1.70	46.08
2005	2.09	2.27	2.75	2.89	4.00	5.37	6.56	4.46	3.46	5.92	3.23	4.37	47.37
2006	3.34	1.63	1.04	3.98	4.45	5.64	4.05	4.18	9.07	3.66	8.04	3.68	52.76
2007	M2.05				1.85			0.99	3.16	M5.86	0.31	6.27	20.49
2008	1.68	5.42	4.10		3.78	1.45	6.63	10.61	9.99	1.41	6.59	1.78	53.44
2009	1.70	1.28	5.44	1.50	3.99	2.87	5.65	8.00	2.26	1.45	5.41	6.10	45.65
2010	4.33	4.22	4.81	0.56	6.70	5.68	2.90	5.62	9.60	1.69	0.88	M1.88	48.87
2011	M1.03	2.81	3.40	3.25	2.50	3.42	M2.53	9.81	5.29	M1.98	2.97	0.66	39.65
2012	2.43	2.30	3.76	1.63	7.91	2.06	6.66	4.26	1.44	1.95	0.64	4.34	39.38
2013	2.21	4.04	1.42	3.65	1.61	10.02	5.45	6.49	M0.	M0.	M2.	M2.	42.

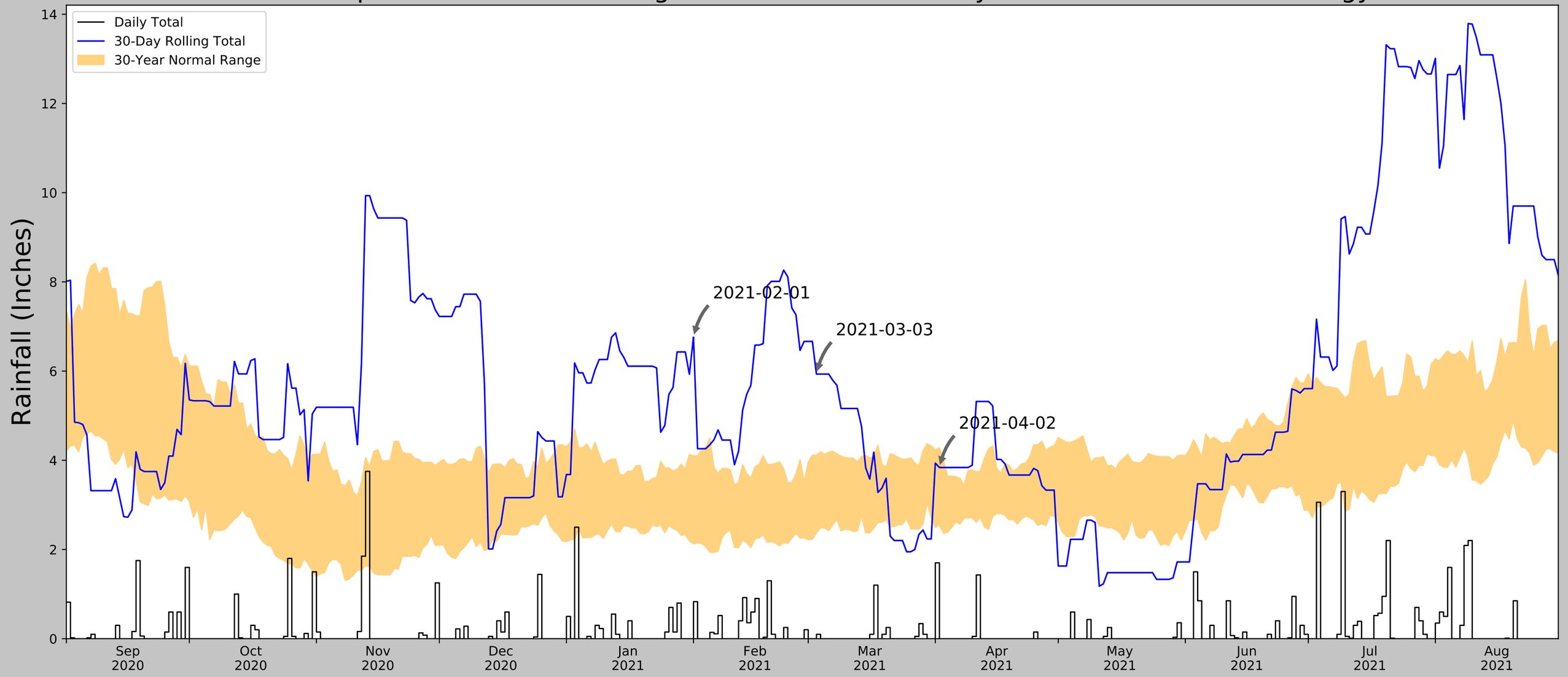
									98	99	87	87	60
2014	1.95	2.53	3.63	M1.49	3.47	M6.14	4.46	5.40	5.02	2.09	3.33	M3.91	43.42
2015	4.44	3.94	4.47	4.79	4.09	5.87	M2.16	3.67	6.05	6.78	6.74	6.49	59.49
2016	2.75	8.27	1.36	2.79	4.87	3.62	5.15	4.09	10.89	10.45	0.78	4.03	59.05
2017	2.97	1.26	2.59	6.44	4.01	6.04	5.43	4.59	5.34	1.91	M1.08	3.92	45.58
2018	3.81	1.82	3.23	4.39	4.34	2.60	7.18	4.85	25.68	1.64	3.98	6.79	70.31
2019	2.60	2.45	3.34	4.67	2.22	3.81	M4.96	10.34	9.44	2.87	3.15	4.29	54.14
2020	3.62	3.76	2.66	2.75	13.35	4.57	3.87	7.40	6.18	5.04	7.37	3.18	63.75
2021	6.43	6.66	2.24	3.33	1.72	5.61	M9.60	M5.76	M0.61				41.96

Notes: Data missing in any month have an "M" flag. A "T" indicates a trace of precipitation.

Data missing for all days in a month or year is blank.

Creation date: 2021-09-14

Antecedent Precipitation vs Normal Range based on NOAA's Daily Global Historical Climatology Network



Coordinates	35.094, -78.238
Observation Date	2021-04-02
Elevation (ft)	115.42
Drought Index (PDSI)	Moderate wetness
WebWIMP H_2O Balance	Wet Season

30 Days Ending	30^{th} %ile (in)	70^{th} %ile (in)	Observed (in)	Wetness Condition	Condition Value	Month Weight	Product
2021-04-02	2.551575	4.279528	3.838583	Normal	2	3	6
2021-03-03	2.374803	4.118898	5.933071	Wet	3	2	6
2021-02-01	2.126378	4.096063	6.759843	Wet	3	1	3
Result							Wetter than Normal - 15

Figure and tables made by the
Antecedent Precipitation Tool
Version 1.0

Written by Jason Deters
U.S. Army Corps of Engineers

Weather Station Name	Coordinates	Elevation (ft)	Distance (mi)	Elevation Δ	Weighted Δ	Days (Normal)	Days (Antecedent)
CLINTON 2 NE	35.025, -78.2761	158.136	5.232	42.716	2.578	11067	90
CLINTON 1.5 NE	35.0172, -78.3142	154.856	6.836	39.436	3.346	16	0
CLINTON 10.6 N	35.1512, -78.3633	179.134	8.109	63.714	4.166	31	0
MOUNT OLIVE 2.4 SW	35.1763, -78.1018	158.136	9.569	42.716	4.715	55	0
WARSAW 5 E	35.0128, -78.0044	109.908	14.354	5.512	6.539	159	0
GARLAND 4 SW	34.7392, -78.3917	56.102	26.015	59.318	13.25	21	0
SMITHFIELD	35.5172, -78.3442	149.934	29.847	34.514	14.461	4	0

Antecedent Precipitation vs Normal Range based on NOAA's Daily Global Historical Climatology Network

Coordinates	35.094, -78.238
Observation Date	2021-08-05
Elevation (ft)	115.42
Drought Index (PDSI)	Mild wetness (2021-07)
WebWIMP H_2O Balance	Dry Season

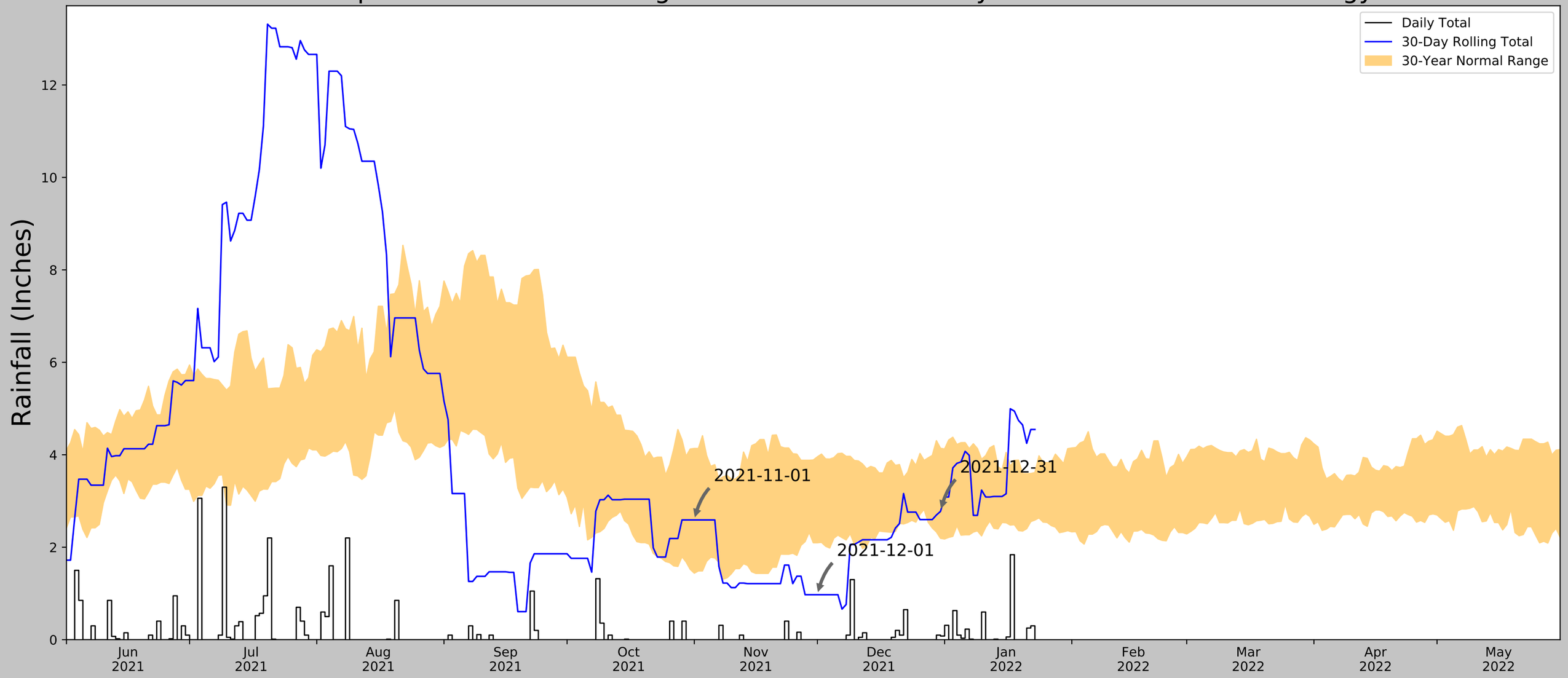
30 Days Ending	30th %ile (in)	70th %ile (in)	Observed (in)	Wetness Condition	Condition Value	Month Weight	Product
2021-08-05	4.019685	6.373229	12.110237	Wet	3	3	9
2021-07-06	3.110236	5.65	6.496063	Wet	3	2	6
2021-06-06	2.209843	4.59252	3.570866	Normal	2	1	2
Result							Wetter than Normal - 17

Figure and tables made by the **Antecedent Precipitation Tool** Version 1.0

Written by Jason Deters
U.S. Army Corps of Engineers

Weather Station Name	Coordinates	Elevation (ft)	Distance (mi)	Elevation Δ	Weighted Δ	Days (Normal)	Days (Antecedent)
CLINTON 2 NE	35.025, -78.2761	158.136	5.232	42.716	2.578	11067	68
CLINTON 1.5 NE	35.0172, -78.3142	154.856	6.836	39.436	3.346	16	16
CLINTON 10.6 N	35.1512, -78.3633	179.134	8.109	63.714	4.166	31	0
MOUNT OLIVE 2.4 SW	35.1763, -78.1018	158.136	9.569	42.716	4.715	55	6
WARSAW 5 E	35.0128, -78.0044	109.908	14.354	5.512	6.539	159	0
GARLAND 4 SW	34.7392, -78.3917	56.102	26.015	59.318	13.25	21	0
SMITHFIELD	35.5172, -78.3442	149.934	29.847	34.514	14.461	4	0

Antecedent Precipitation vs Normal Range based on NOAA's Daily Global Historical Climatology Network



Coordinates	35.094, -78.238
Observation Date	2021-12-31
Elevation (ft)	115.42
Drought Index (PDSI)	Moderate drought
WebWIMP H_2O Balance	Wet Season

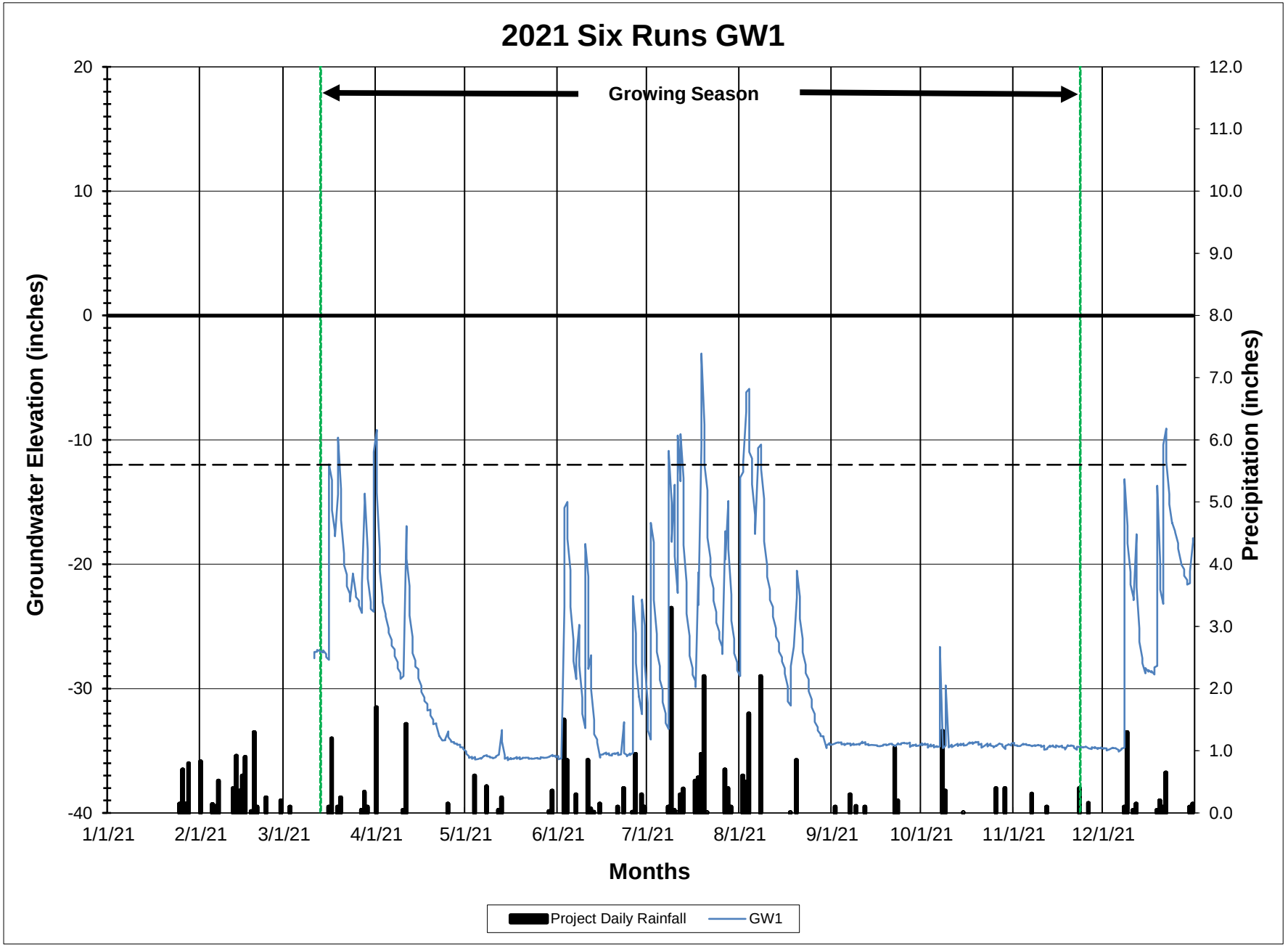
30 Days Ending	30^{th} %ile (in)	70^{th} %ile (in)	Observed (in)	Wetness Condition	Condition Value	Month Weight	Product
2021-12-31	2.192913	4.140158	2.775591	Normal	2	3	6
2021-12-01	2.096457	3.955906	0.972441	Dry	1	2	2
2021-11-01	1.438976	4.136614	2.590551	Normal	2	1	2
Result							Normal Conditions - 10

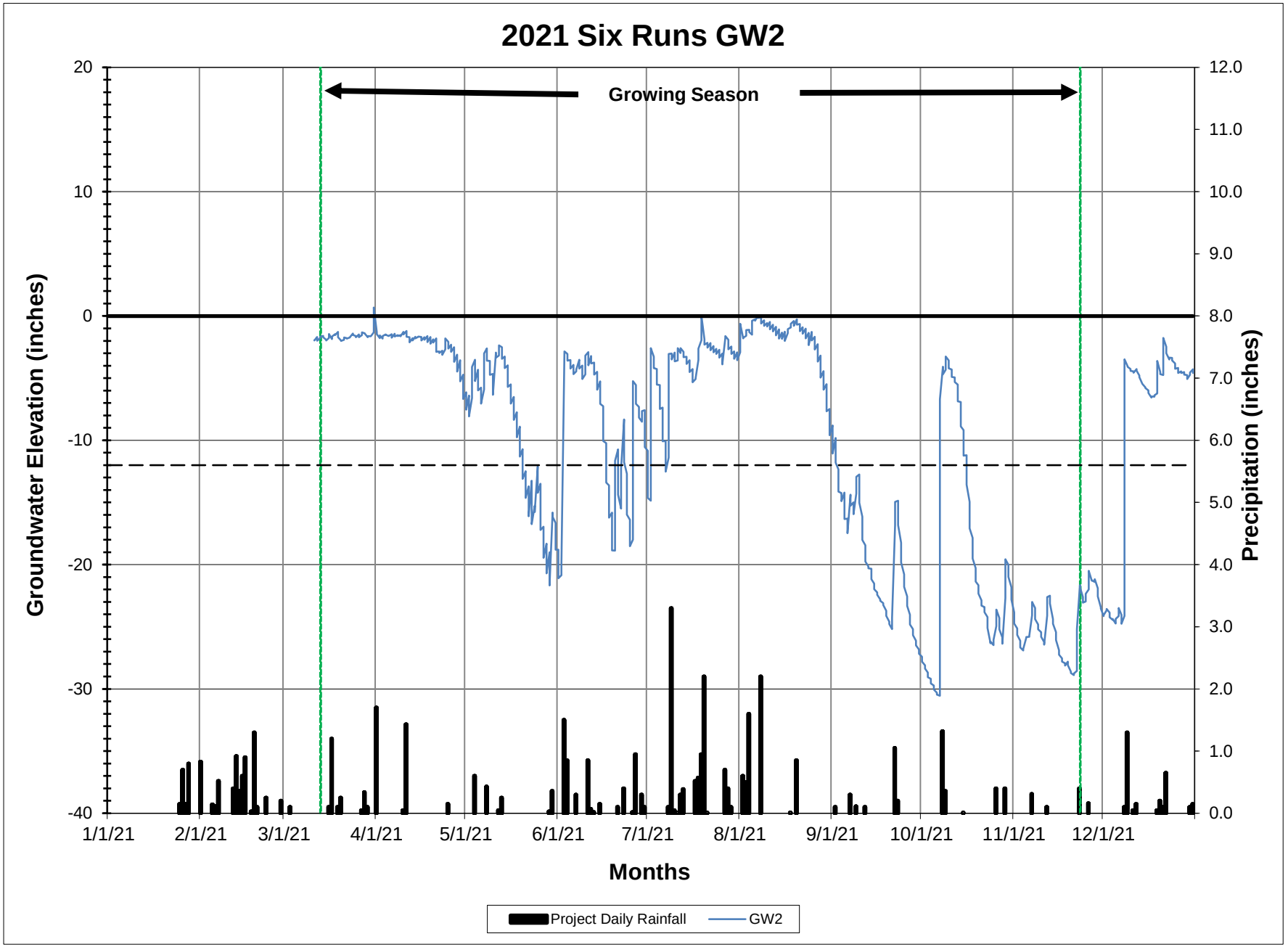
Figure and tables made by the **Antecedent Precipitation Tool** Version 1.0

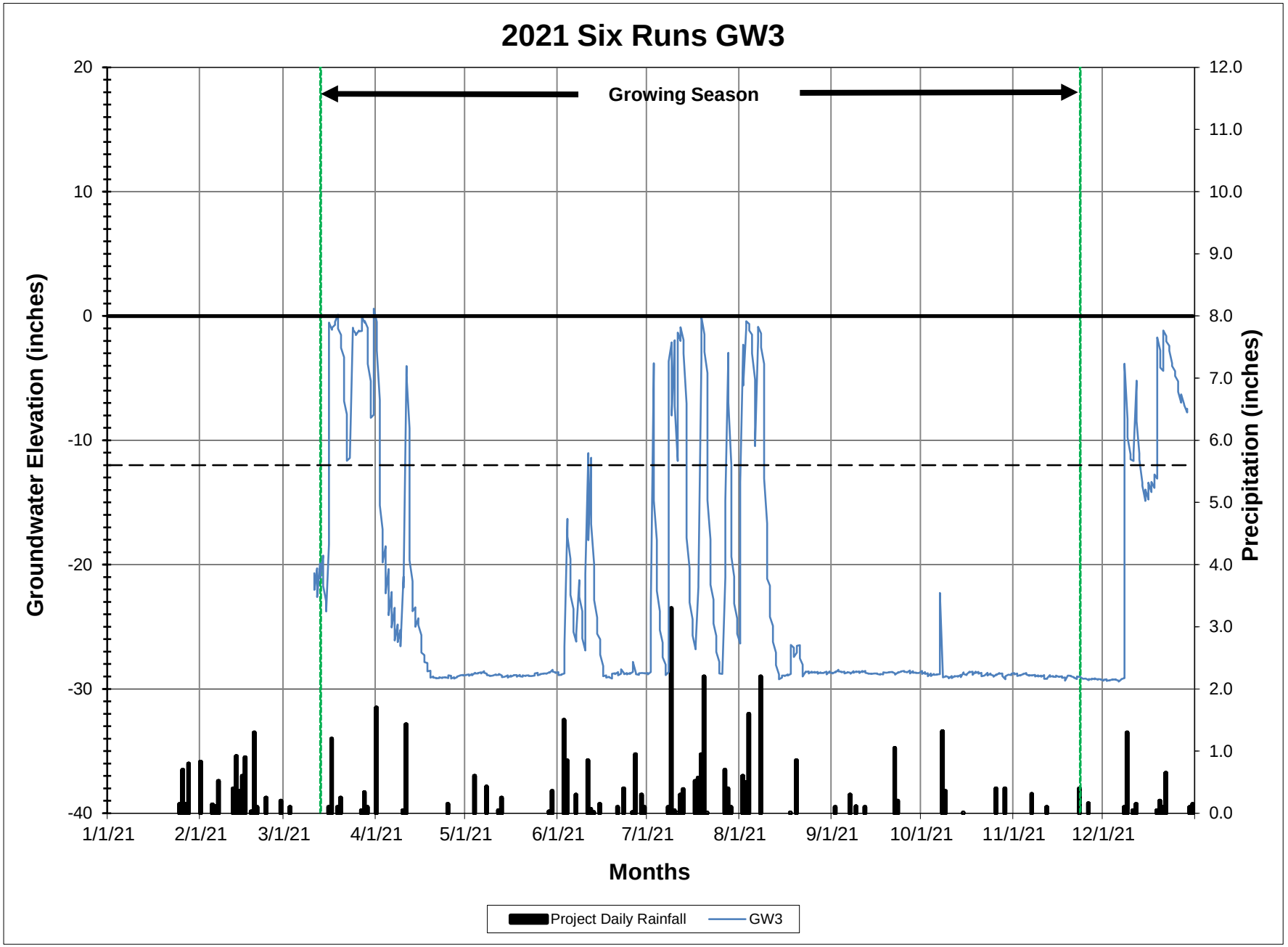
Written by Jason Deters
U.S. Army Corps of Engineers

Weather Station Name	Coordinates	Elevation (ft)	Distance (mi)	Elevation Δ	Weighted Δ	Days (Normal)	Days (Antecedent)
CLINTON 2 NE	35.025, -78.2761	158.136	5.232	42.716	2.578	11065	86
CLINTON 1.5 NE	35.0172, -78.3142	154.856	6.836	39.436	3.346	17	4
CLINTON 10.6 N	35.1512, -78.3633	179.134	8.109	63.714	4.166	31	0
MOUNT OLIVE 2.4 SW	35.1763, -78.1018	158.136	9.569	42.716	4.715	56	0
WARSAW 5 E	35.0128, -78.0044	109.908	14.354	5.512	6.539	159	0
GARLAND 4 SW	34.7392, -78.3917	56.102	26.015	59.318	13.25	21	0
SMITHFIELD	35.5172, -78.3442	149.934	29.847	34.514	14.461	4	0

2021 Max Hydroperiod (Growing Season 14-Mar through 22-Nov, 253 days)					
Well ID	**Consecutive**		**Cumulative**		**Occurrences**
	Days	**Hydroperiod (%)**	**Days**	**Hydroperiod (%)**	
GW1	3.5	1	10.5	4	9
GW2	69.5	27	165.5	65	10
GW3	17.0	7	37.0	15	9


2021 Six Runs GW1
Growing Season
Groundwater Elevation (inches)
Precipitation (inches)
Months
20
10
0
-10
-20
-30
-40
12.0
11.0
10.0
9.0
8.0
7.0
6.0
5.0
4.0
3.0
2.0
1.0
0.0
1/1/21
2/1/21
3/1/21
4/1/21
5/1/21
6/1/21
7/1/21
8/1/21
9/1/21
10/1/21
11/1/21
12/1/21
Project Daily Rainfall
GW1


2021 Six Runs GW2
Growing Season
Groundwater Elevation (inches)
Precipitation (inches)
Months
20
10
0
-10
-20
-30
-40
12.0
11.0
10.0
9.0
8.0
7.0
6.0
5.0
4.0
3.0
2.0
1.0
0.0
1/1/21
2/1/21
3/1/21
4/1/21
5/1/21
6/1/21
7/1/21
8/1/21
9/1/21
10/1/21
11/1/21
12/1/21
Project Daily Rainfall
GW2


2021 Six Runs GW3
Growing Season
Groundwater Elevation (inches)
Precipitation (inches)
Months
20
10
0
-10
-20
-30
-40
12.0
11.0
10.0
9.0
8.0
7.0
6.0
5.0
4.0
3.0
2.0
1.0
0.0
1/1/21
2/1/21
3/1/21
4/1/21
5/1/21
6/1/21
7/1/21
8/1/21
9/1/21
10/1/21
11/1/21
12/1/21
Project Daily Rainfall
GW3

SIX RUNS DAM INSPECTION

TECHNICAL MEMO

for

RESOURCE ENVIRONMENTAL SOLUTIONS

3600 GLENWOOD AVENUE, SUITE 100

RALEIGH, NC 27612

December 2, 2021

WKD # 20210663.00.RA

WK DICKSON

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NC License No. F-0374

Overview

Resource Environmental Solutions requested that WK Dickson investigate the condition of the dam detaining water in a farm pond on the property located at 3562 E. Darden Road, Faison, NC 28341 (see Figure 1, page 4). The dam discharges water to an unnamed tributary approximately 3400 feet upstream of Six Runs Creek. The approximate GPS coordinates of the outfall are 35°5'46.54"N, 78°14'2.47".

The dam appears to be an earthen embankment with one (1) 24" high-density polyethylene (HDPE) pipe as the outfall. No emergency spillway is present. The dam impounds approximately 2.3 acres of water, is approximately 270 feet long, 15 feet wide crest at the top of the dam, and a maximum height of about 12 feet based on the survey data provided by RES and available GIS data. The downstream face of the dam is accessible to grazing cattle. The dam is not listed on the list of regulated dams available from the North Carolina Department of Environment Quality as of 08/25/2021.

The dam was inspected on 10/13/2021 around 2:00 pm, in dry conditions, with a temperature of approximately 80 degrees Fahrenheit. The most recent rainfall prior to the visit was on 10/09/2021 with 1.04 inch recorded at the USGS Cape Fear River rain gauge station at Fayetteville. Photographs from this inspection are included in Appendix A.

Detailed Observations

The upstream (inside) face of the dam (see photos 1-2) appears to have a slope of approximately 1 to 1, rising about 5 feet from the water surface to the top of the dam. The upstream face was well-vegetated with grasses, shrubs and small trees less than 10 feet in height. There appeared to be no evidence of erosion or animal burrows on the upstream face of the dam for the majority of its length (see photo 1). However, sloughing of vertical banks was evident adjacent to the dam face in the vicinity of the outfall pipe (see photo 3). During the inspection, cattle were observed actively accessing the pond from the western banks; however, there was no evidence of cattle approaching the upstream dam face from within the pond.

The top of the dam was found to be grass with defined tire tracks (see photos 2 and 4). The dam appeared to be mostly level, and tire tracks did not appear to be rutting the top of dam. Conversation with the landowner indicated the top of dam is the primary vehicle access route from Darden road to the southwestern limits of the property. A barbed wire fence and gate prevented cattle access to the top of the dam.

The downstream face of the dam appeared to have a slope of approximately 2 to 1, rising about 10-12 feet from the toe at the lowest point. The entirety of the downstream face was thickly vegetated with grasses, shrubs, and many small and large trees (see photos 5 and 6). One large tree on the downstream face was uprooted (see photos 7 and 8). Narrow gulley erosion was occurring along the west abutment contact (approximately 20 feet long, one foot wide and two

feet deep) and may be evidence of a previous overtopping event (see photo 9). Erosion was also occurring along the eastern abutment contact but was less severe (see photo 10).

Standing water was observed in several depressions near the low point of the downstream face. Some standing water at the toe of dam had rusty color (orange and red tint), indicating potential seepage through the dam (see photos 11 and 12). Much of the downstream face was accessible to cattle, which likely contributes to some of the erosion along the toe of dam. A shallow channel has formed approximately 75-100 feet south from the toe of dam at its lowest point (see photo 13). The presence of a bottom drain in this location was considered plausible but could not be confirmed.

There was evidence of previous damage to the downstream face of the dam and subsequent effort to repair it using common refuse, including old tires and loose concrete spoils (see photos 8 and 14). Conversation with the landowner indicated significant damage occurred during Hurricane Matthew in 2016.

The principal outfall is a 24″ HDPE open-ended pipe. A secondary 8″ PVC pipe was observed on the upstream (intake) end but could not be located on the downstream (outfall) end (see photos 15 and 16). No headwall was present on the intake or the outfall. There was a rudimentary triangular trash rack for intake protection (see photo 15). Conversation with the landowner indicated the pipe becomes obstructed on occasion. No active flow was observed, as the water level was approximately one foot below the invert of the outfall pipe. The water level in relation to the invert of the outfall pipe indicates water is otherwise seeping through the dam.

Significant erosion is evident immediately below the outfall. A large headcut approximately 6-8 feet deep has formed about 10 feet downstream of the outfall and threatens the integrity of the dam (see photo 17). The gully was unstable and will likely continue to erode upstream. Further downstream, the gully widened where cattle cross it to access shelter area before its confluence with an unnamed tributary to Six Runs Creek (see photo 18).

No emergency spillway or other drains were identified, although a channel below a possible bottom drain was identified (see photo 13).

Regulatory Concerns

Because the dam is not listed on the NCDEQ list of regulated dams, the hazard classification of the dam in the event of a breach is unknown. This memo does not investigate the hazards or downstream impacts associated with dam failure.

Per North Carolina administrative code 15A NCAC 2K, section .0201(a), a dam owner must file a statement with the director at least 10 days prior to any construction, repair, alteration, or removal. This does not apply to brush removal.

Recommendations

The dam is in poor condition and at risk for potential failure. The most cost-effective solution for mitigating risk of failure is to permanently breach the dam and install a culvert to allow continued vehicular access over the dam. If the property owner needs to continue to impound water at this location, then the following three issues should be addressed:

1) Tree Removal: Large trees are located on the downstream embankment and toe of dam. As shown in Photo 7, when a large tree falls, a significant portion of the dam can be impacted by the root mass impacting the structural integrity of the dam. All woody vegetation on the dam should be removed. For trees greater than 6 inches in diameter, the root mass should be removed and replaced with compacted embankment fill. For trees less than 6 inches in diameter, the trees can be cut flush to grade.
2) Seepage: Based on the present of water at the toe of the dam and the water level located below the elevation of the spillway, it is likely that water is seeping through the dam at a rate that is likely to transport sediment. As sediment is removed from the interior of the dam, the risk of uncontrolled failure of the dam increases. Removing the trees and replacing with compacted backfill free of organics will help reduce the seepage through the dam. Additional considerations included flattening the downstream slope to 3:1 which would also help with slope stability and installing a toe drain which is a cost-effective method for addressing seepage. The toe drain should consist of a HDPE perforated pipe located near the toe of the slope, potentially between the interface of the existing toe and the new fill material. The HDPE pipe should have approximately 6" of gravel (78M stone) on all sides and approximately 6" of sand (2S sand) around the gravel. PVC cleanouts are recommended for maintenance. Refer to Appendix B for a sample detail. Detailed design of the toe drain would be required pending review of the topographic survey, bank improvements, and geotechnical analysis. Geotechnical analysis is recommended to provide additional information on the existing soil conditions of the embankment.
3) Spillway stability: The existing culvert spillway has a significant head cut downstream of the dam. As the head cut propagates upstream, the risk of impact to the dam increases. Two primary options exist to rehabilitate the spillway. One option is to leave the spillway in the current location and install grade control structures to convey water in a stabilized manner through the open channel. The second option would be to replace the spillway with a riser/barrel system, likely located closer to the center of the dam. The riser/barrel solution would likely have higher cost as excavation would need to occur near the bottom of the pond.

Additional recommendations would include providing some additional fencing downstream of the dam to avoid having cattle on the dam and toe area. If the landowner does not want fencing

at this location, then the dam should be periodically inspected for ruts or other impacts to the dam that could cause erosion issues over time.

APPENDIX A

PHOTOGRAPHS

Photographs

Photo 1: Upstream face of the dam taken from western shore, looking east.

Photo 2: Upstream face with defined tire tracks along dam crest, looking east.

Photo 3: Vertical bank sloughing in vicinity of outfall pipe (hidden at right), looking northeast.

Photo 4: Dam crest looking west.

Photo 5: Downstream face heavily vegetated by trees, looking east.

Photo 6: Downstream face heavily vegetated by trees, looking west.

Photo 7: Uprooted tree on downstream face has removed portion of dam embankment.

Photo 8: Uprooted tree on downstream face of dam in area of previous repair using tires and other refuse.

Photo 9: Shallow gully along western abutment contact.

Photo 10: Erosion along eastern abutment contact.

Photo 11: Rust-colored water ponding below downstream face due to seepage through dam embankment.

Photo 12: Ponded water beneath downstream toe of dam.

Photo 13: Shallow channel about 75-100 feet from downstream toe of dam.

Photo 14: Concrete spoils and tires used in previous dam repair attempt.

Photo 15: Upstream intake of 24″ HDPE culvert and 8″ PVC pipe with triangular trash rack.

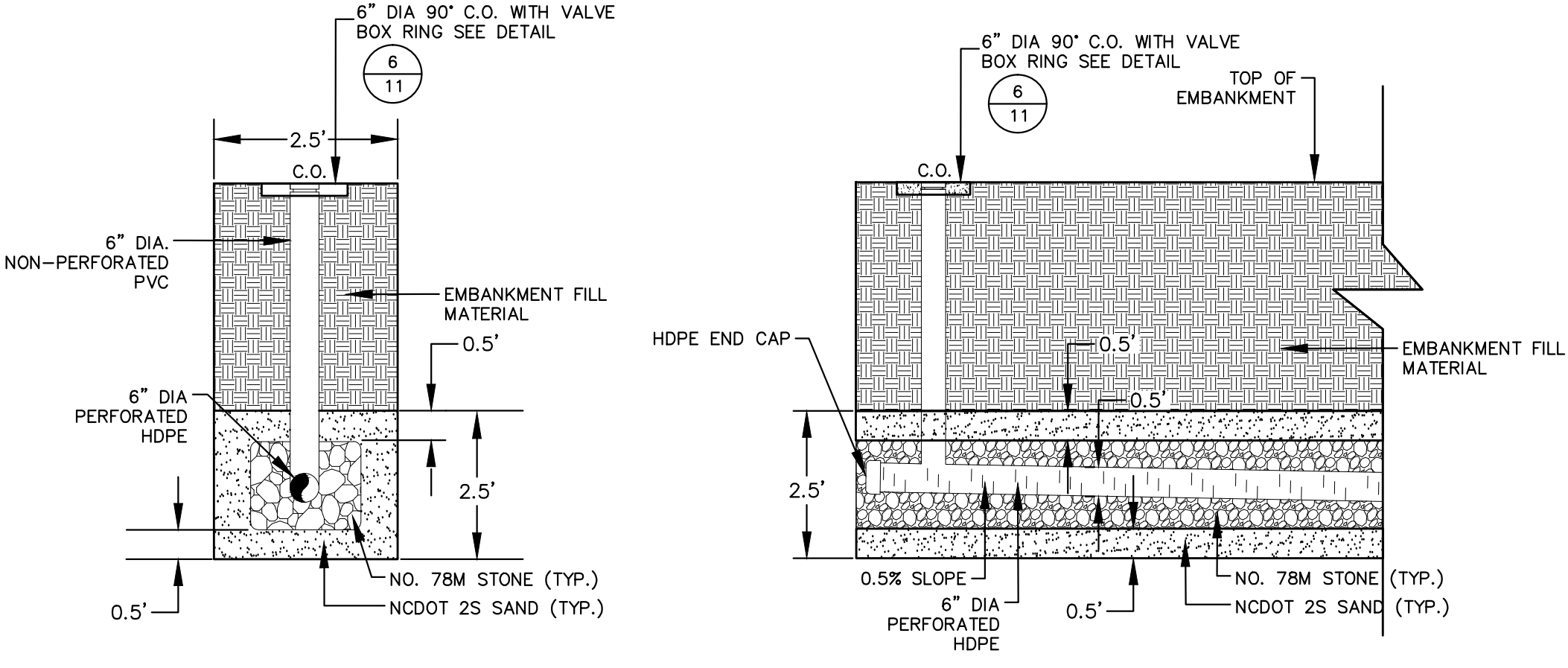
Photo 16: Downstream outfall end of 24″ HPDE culvert with no 8″ PVC pipe visible. Erosion directly beneath outfall continues downstream.

Photo 17: Headcut of 6-8 feet in depth forming about 10 feet downstream of outfall.

Photo 18: Cattle cross large gully immediately downstream of headcut.

APPENDIX B

TOE DRAIN EXAMPLE DETAIL



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TOE DRAIN DETAIL

NTS

Appendix C

Site Protection Instrument

SITE PROTECTION INSTRUMENT

Site Protection Instrument(s) Summary Information

The land required for the construction, management, and stewardship of this mitigation project includes portions of the parcels listed below in **Table C1**. EBX (an entity of RES) will obtain a conservation easement from the current landowners for the project area. The easement deed and survey plat will be submitted to DMS and State Property Office (SPO) for approval and will be held by the State of North Carolina. The easement deed will follow the NCDMS Full Delivery Conservation Easement Template dated May 5, 2017 and included in this appendix. Once recorded, the secured easement will allow EBX to proceed with the project development and protect the mitigation assets in perpetuity. Once finalized, a copy of the land protection instrument(s) will be included in **Appendix C**.

Table C1. Project Parcel and Landowner Information

Owner of Record	PIN	County	Site Protection Instrument	Deed Book and Page Numbers	Acreage Protected
Daniel Chad Evans	13012570002 03117989601 10337989604 13007989609 13007989608	Sampson	Conservation Easement	1402/140 1839/325 1882/462 2056/854 1919/208	~27.76
Marshall H. Troublefield Joan B. Troublefield	13102516002	Sampson	Conservation Easement	1558/297	~3.24

STATE OF NORTH CAROLINA

DEED OF CONSERVATION EASEMENT AND RIGHT OF ACCESS PROVIDED PURSUANT TO FULL DELIVERY MITIGATION CONTRACT

_____ COUNTY

SPO File Number:
DMS Project Number:

Prepared by: Office of the Attorney General
Property Control Section
Return to: NC Department of Administration
State Property Office
1321 Mail Service Center
Raleigh, NC 27699-1321

THIS DEED OF CONSERVATION EASEMENT AND RIGHT OF ACCESS, made this _____day of _____, 20__, by _____*Landowner name goes here*_____, ("**Grantor**"), whose mailing address is _____*Landowner address goes here*_____, to the State of North Carolina, ("**Grantee**"), whose mailing address is State of North Carolina, Department of Administration, State Property Office, 1321 Mail Service Center, Raleigh, NC 27699-1321. The designations of Grantor and Grantee as used herein shall include said parties, their heirs, successors, and assigns, and shall include singular, plural, masculine, feminine, or neuter as required by context.

WITNESSETH:

WHEREAS, pursuant to the provisions of N.C. Gen. Stat. § 143-214.8 et seq., the State of North Carolina has established the Division of Mitigation Services (formerly known as the Ecosystem Enhancement Program and Wetlands Restoration Program) within the Department of Environment and Natural Resources for the purposes of acquiring, maintaining, restoring, enhancing, creating and preserving wetland and riparian resources that contribute to the protection and improvement of water quality, flood prevention, fisheries, aquatic habitat, wildlife habitat, and recreational opportunities; and

WHEREAS, this Conservation Easement from Grantor to Grantee has been negotiated, arranged and provided for as a condition of a full delivery contract between *(insert name and address of full delivery contract provider)* and the North Carolina Department of Environment and Natural Resources, to provide stream, wetland and/or buffer mitigation pursuant to the North Carolina Department of Environment and Natural Resources Purchase and Services Contract Number _____.

WHEREAS, The State of North Carolina is qualified to be the Grantee of a Conservation Easement pursuant to N.C. Gen. Stat. § 121-35; and

WHEREAS, the Department of Environment and Natural Resources and the United States Army Corps of Engineers, Wilmington District entered into a Memorandum of Understanding, (MOU) duly executed by all parties on November 4, 1998. This MOU recognized that the Wetlands Restoration Program was to provide effective compensatory mitigation for authorized impacts to wetlands, streams and other aquatic resources by restoring, enhancing and preserving the wetland and riparian areas of the State; and

WHEREAS, the Department of Environment and Natural Resources, the North Carolina Department of Transportation and the United States Army Corps of Engineers, Wilmington District entered into a Memorandum of Agreement, (MOA) duly executed by all parties in Greensboro, NC on July 22, 2003, which recognizes that the Division of Mitigation Services (formerly Ecosystem Enhancement Program) is to provide for compensatory mitigation by effective protection of the land, water and natural resources of the State by restoring, enhancing and preserving ecosystem functions; and

WHEREAS, the Department of Environment and Natural Resources, the U.S. Army Corps of Engineers, the U.S. Environmental Protection Agency, the U.S. Fish and Wildlife Service, the North Carolina Wildlife Resources Commission, the North Carolina Division of Water Quality, the North Carolina Division of Coastal Management, and the National Marine Fisheries Service entered into an agreement to continue the In-Lieu Fee operations of the North Carolina Department of Natural Resources' Division of Mitigation Services (formerly Ecosystem Enhancement Program) with an effective date of 28 July, 2010, which supersedes and replaces the previously effective MOA and MOU referenced above; and

WHEREAS, the acceptance of this instrument for and on behalf of the State of North Carolina was granted to the Department of Administration by resolution as approved by the Governor and Council of State adopted at a meeting held in the City of Raleigh, North Carolina, on the 8th day of February 2000; and

WHEREAS, the Division of Mitigation Services in the Department of Environment and Natural Resources, which has been delegated the authority authorized by the Governor and Council of State to the Department of Administration, has approved acceptance of this instrument; and

WHEREAS, Grantor owns in fee simple certain real property situated, lying, and being in _____ Township, _____ County, North Carolina (the "**Property**"), and being more particularly described as that certain parcel of land containing approximately _____ acres and being conveyed to the Grantor by deed as recorded in **Deed Book _____ at Page ____** of the _____ County Registry, North Carolina; and

WHEREAS, Grantor is willing to grant a Conservation Easement and Right of Access over the herein described areas of the Property, thereby restricting and limiting the use of the areas of the Property subject to the Conservation Easement to the terms and conditions and purposes hereinafter set forth, and Grantee is willing to accept said Easement and Access Rights. The Conservation Easement shall be for the protection and benefit of the waters of ***if known, insert name of stream, branch, river or waterway here***.

NOW, THEREFORE, in consideration of the mutual covenants, terms, conditions, and restrictions hereinafter set forth, Grantor unconditionally and irrevocably hereby grants and conveys unto Grantee, its successors and assigns, forever and in perpetuity, a Conservation Easement and Right of Access together with an access easement to and from the Conservation Easement Area described below.

The Conservation Easement Area consists of the following:

Tracts Number _____ containing a total of _____ **acres** as shown on the plats of survey entitled "Final Plat, Conservation Easement for North Carolina Division of Mitigation Services, Project Name: _____, SPO File No._____, DMS Site No. _____, Property of _____," dated _____, 20__ by *name of surveyor*, PLS Number _____ and recorded in the _____ County, North Carolina Register of Deeds at **Plat Book _____ Pages _____.**

See attached "**Exhibit A**", Legal Description of area of the Property hereinafter referred to as the "Conservation Easement Area"

The purposes of this Conservation Easement are to maintain, restore, enhance, construct, create and preserve wetland and/or riparian resources in the Conservation Easement Area that contribute to the protection and improvement of water quality, flood prevention, fisheries, aquatic habitat, wildlife habitat, and recreational opportunities; to maintain permanently the Conservation Easement Area in its natural condition, consistent with these purposes; and to prevent any use of the Easement Area that will significantly impair or interfere with these purposes. To achieve these purposes, the following conditions and restrictions are set forth:

I. DURATION OF EASEMENT

Pursuant to law, including the above referenced statutes, this Conservation Easement and Right of Access shall be perpetual and it shall run with, and be a continuing restriction upon the use of, the Property, and it shall be enforceable by the Grantee against the Grantor and against Grantor's heirs, successors and assigns, personal representatives, agents, lessees, and licensees.

II. ACCESS EASEMENT

choose one option based on survey and deed, delete other

[SPECIFIC LOCATION OPTION] Grantor hereby grants and conveys unto Grantee, its employees, agents, successors and assigns, a perpetual, non-exclusive easement for ingress and egress over and upon the Property at all reasonable times and at the location more particularly described on **Exhibit ___** ("Access Easement") attached hereto and incorporated herein by this reference, to access the Conservation Easement Area for the purposes set forth herein. This grant of easement shall not vest any rights in the public and shall not be construed as a public dedication of the Access Easement. Grantor covenants, represents and warrants that it is the sole owner of and is seized of the Property in fee simple and has the right to grant and convey this Access Easement.

[GENERAL LOCATION OPTION] Grantor hereby grants and conveys unto Grantee, its employees, agents, successors and assigns, a perpetual, non-exclusive easement for ingress and egress over and upon the Property at all reasonable times and at such location as practically necessary to access the Conservation Easement Area for the purposes set forth herein ("Access Easement"). This grant of easement shall not vest any rights in the public and shall not be construed as a public dedication of the Access Easement. Grantor covenants, represents and warrants that it is the sole owner of and is seized of the Property in fee simple and has the right to grant and convey this Access Easement.

III. GRANTOR RESERVED USES AND RESTRICTED ACTIVITIES

The Conservation Easement Area shall be restricted from any development or usage that would impair or interfere with the purposes of this Conservation Easement. Unless expressly reserved as a compatible use herein, any activity in, or use of, the Conservation Easement Area by the Grantor is prohibited as inconsistent with the purposes of this Conservation Easement. Any rights not expressly reserved hereunder by the Grantor have been acquired by the Grantee. Any rights not expressly reserved hereunder by the Grantor, including the rights to all mitigation credits, including, but not limited to, stream, wetland, and riparian buffer mitigation units, derived from each site within the area of the Conservation Easement, are conveyed to and belong to the Grantee. Without limiting the generality of the foregoing, the following specific uses are prohibited, restricted, or reserved as indicated:

A. Recreational Uses. Grantor expressly reserves the right to undeveloped recreational uses, including hiking, bird watching, hunting and fishing, and access to the Conservation Easement Area for the purposes thereof.

B. Motorized Vehicle Use. Motorized vehicle use in the Conservation Easement Area is prohibited except within a Crossing Area(s) or Road or Trail as shown on the recorded survey plat**.**

C. Educational Uses. The Grantor reserves the right to engage in and permit others to engage in educational uses in the Conservation Easement Area not inconsistent with this Conservation Easement, and the right of access to the Conservation Easement Area for such purposes including organized educational activities such as site visits and observations. Educational uses of the property shall not alter vegetation, hydrology or topography of the site.

D. **Damage to Vegetation.** Except within Crossing Area(s) as shown on the recorded survey plat and as related to the removal of non-native plants, diseased or damaged trees, or vegetation that destabilizes or renders unsafe the Conservation Easement Area to persons or natural habitat, all cutting, removal, mowing, harming, or destruction of any trees and vegetation in the Conservation Easement Area is prohibited.

E. Industrial, Residential and Commercial Uses. All industrial, residential and commercial uses are prohibited in the Conservation Easement Area.

F. Agricultural Use. All agricultural uses are prohibited within the Conservation Easement Area including any use for cropland, waste lagoons, or pastureland.

G. New Construction. There shall be no building, facility, mobile home, antenna, utility pole, tower, or other structure constructed or placed in the Conservation Easement Area.

H. **Roads and Trails.** There shall be no construction or maintenance of new roads, trails, walkways, or paving in the Conservation Easement.

All existing roads, trails and crossings within the Conservation Easement Area shall be shown on the recorded survey plat.

I. Signs. No signs shall be permitted in the Conservation Easement Area except interpretive signs describing restoration activities and the conservation values of the Conservation Easement Area, signs identifying the owner of the Property and the holder of the Conservation Easement, signs giving directions, or signs prescribing rules and regulations for the use of the Conservation Easement Area.

J. Dumping or Storing. Dumping or storage of soil, trash, ashes, garbage, waste, abandoned vehicles, appliances, machinery, or any other material in the Conservation Easement Area is prohibited.

K. Grading, Mineral Use, Excavation, Dredging. There shall be no grading, filling, excavation, dredging, mining, drilling, hydraulic fracturing; removal of topsoil, sand, gravel, rock, peat, minerals, or other materials.

L. Water Quality and Drainage Patterns. There shall be no diking, draining, dredging, channeling, filling, leveling, pumping, impounding or diverting, causing, allowing or permitting the diversion of surface or underground water in the Conservation Easement Area. No altering or tampering with water control structures or devices, or disruption or alteration of the restored, enhanced, or created drainage patterns is allowed. All removal of wetlands, polluting or discharging into waters, springs, seeps, or wetlands, or use of pesticide or biocides in the Conservation Easement Area is prohibited. In the event of an emergency interruption or shortage of all other water sources, water from within the Conservation Easement Area may temporarily be withdrawn for good cause shown as needed for the survival of livestock on the Property.

M. Subdivision and Conveyance. Grantor voluntarily agrees that no further subdivision, partitioning, or dividing of the Conservation Easement Area portion of the Property owned by the Grantor in fee simple ("fee") that is subject to this Conservation Easement is allowed. Any future transfer of the Property shall be subject to this Conservation Easement and Right of Access and to the Grantee's right of unlimited and repeated ingress and egress over and across the Property to the Conservation Easement Area for the purposes set forth herein.

N. Development Rights. All development rights are permanently removed from the Conservation Easement Area and are non-transferrable.

O. Disturbance of Natural Features. Any change, disturbance, alteration or impairment of the natural features of the Conservation Easement Area or any intentional introduction of non-native plants, trees and/or animal species by Grantor is prohibited.

The Grantor may request permission to vary from the above restrictions for good cause shown, provided that any such request is not inconsistent with the purposes of this Conservation Easement, and the Grantor obtains advance written approval from the Division of Mitigation Services, 1652 Mail Services Center, Raleigh, NC 27699-1652.

IV. GRANTEE RESERVED USES

A. Right of Access, Construction, and Inspection. The Grantee, its employees, agents, successors and assigns, shall have a perpetual Right of Access over and upon the Conservation Easement Area to undertake or engage in any activities necessary to construct, maintain, manage, enhance, repair, restore, protect, monitor and inspect the stream, wetland and any other riparian resources in the Conservation Easement Area for the purposes set forth herein or any long-term management plan for the Conservation Easement Area developed pursuant to this Conservation Easement.

B. Restoration Activities. These activities include planting of trees, shrubs and herbaceous vegetation, installation of monitoring wells, utilization of heavy equipment to grade, fill, and prepare the soil, modification of the hydrology of the site, and installation of natural and manmade materials as needed to direct in-stream, above ground, and subterraneous water flow.

C. Signs. The Grantee, its employees and agents, successors or assigns, shall be permitted to place signs and witness posts on the Property to include any or all of the following: describe the project, prohibited activities within the Conservation Easement, or identify the project boundaries and the holder of the Conservation Easement.

D. Fences. Conservation Easements are purchased to protect the investments by the State (Grantee) in natural resources. Livestock within conservations easements damages the investment and can result in reductions in natural resource value and mitigation credits which would cause financial harm to the State. Therefore, Landowners (Grantor) with livestock are required to restrict livestock access to the Conservation Easement area. Repeated failure to do so may result in the State (Grantee) repairing or installing livestock exclusion devices (fences) within the conservation area for the purpose of restricting livestock access. In such cases, the landowner (Grantor) must provide access to the State (Grantee) to make repairs.

E. Crossing Area(s). The Grantee is not responsible for maintenance of crossing area(s), however, the Grantee, its employees and agents, successors or assigns, reserve the right to repair crossing area(s), at its sole discretion and to recover the cost of such repairs from the Grantor if such repairs are needed as a result of activities of the Grantor, his successors or assigns.

V. ENFORCEMENT AND REMEDIES

A. Enforcement. To accomplish the purposes of this Conservation Easement, Grantee is allowed to prevent any activity within the Conservation Easement Area that is inconsistent with the purposes of this Conservation Easement and to require the restoration of such areas or features in the Conservation Easement Area that may have been damaged by such unauthorized activity or use. Upon any breach of the terms of this Conservation Easement by Grantor, the Grantee shall, except as provided below, notify the Grantor in writing of such breach and the Grantor shall have ninety (90) days after receipt of such notice to correct the damage caused by such breach. If the breach and damage remains uncured after ninety (90) days, the Grantee may enforce this Conservation Easement by bringing appropriate legal proceedings including an action to recover damages, as well as injunctive and other relief. The Grantee shall also have the power and authority, consistent with its statutory authority: (a) to prevent any impairment of the Conservation Easement Area by acts which may be unlawful or in violation of this Conservation Easement; (b) to otherwise preserve or protect its interest in the Property; or (c) to seek damages from any appropriate person or entity. Notwithstanding the foregoing, the Grantee reserves the immediate right, without notice, to obtain a temporary restraining order, injunctive or other appropriate relief, if the breach is or would irreversibly or otherwise materially impair the benefits to be derived from this Conservation Easement, and the Grantor and Grantee acknowledge that the damage would be irreparable and remedies at law inadequate. The rights and remedies of the Grantee provided hereunder shall be in addition to, and not in lieu of, all other rights and remedies available to Grantee in connection with this Conservation Easement.

B. Inspection. The Grantee, its employees and agents, successors and assigns, have the right, with reasonable notice, to enter the Conservation Easement Area over the Property at reasonable times for the purpose of inspection to determine whether the Grantor is complying with the terms, conditions and restrictions of this Conservation Easement.

C. Acts Beyond Grantor's Control. Nothing contained in this Conservation Easement shall be construed to entitle Grantee to bring any action against Grantor for any injury or change in the Conservation Easement Area caused by third parties, resulting from causes beyond the Grantor's control, including, without limitation, fire, flood, storm, and earth movement, or from any prudent action taken in good faith by the Grantor under emergency conditions to prevent, abate, or mitigate significant injury to life or damage to the Property resulting from such causes.

D. Costs of Enforcement. Beyond regular and typical monitoring expenses, any costs incurred by Grantee in enforcing the terms of this Conservation Easement against Grantor, including, without limitation, any costs of restoration necessitated by Grantor's acts or omissions in violation of the terms of this Conservation Easement, shall be borne by Grantor.

E. No Waiver. Enforcement of this Easement shall be at the discretion of the Grantee and any forbearance, delay or omission by Grantee to exercise its rights hereunder in the event of any breach of any term set forth herein shall not be construed to be a waiver by Grantee.

VI. MISCELLANEOUS

A. This instrument sets forth the entire agreement of the parties with respect to the Conservation Easement and supersedes all prior discussions, negotiations, understandings or agreements relating to the Conservation Easement. If any provision is found to be invalid, the remainder of the provisions of the Conservation Easement, and the application of such provision to persons or circumstances other than those as to which it is found to be invalid, shall not be affected thereby.

B. Grantor is responsible for any real estate taxes, assessments, fees, or charges levied upon the Property. Grantee shall not be responsible for any costs or liability of any kind related to the ownership, operation, insurance, upkeep, or maintenance of the Property, except as expressly provided herein. Upkeep of any constructed bridges, fences, or other amenities on the Property are the sole responsibility of the Grantor. Nothing herein shall relieve the Grantor of the obligation to comply with federal, state or local laws, regulations and permits that may apply to the exercise of the Reserved Rights.

C. Any notices shall be sent by registered or certified mail, return receipt requested to the parties at their addresses shown herein or to other addresses as either party establishes in writing upon notification to the other.

D. Grantor shall notify Grantee in writing of the name and address and any party to whom the Property or any part thereof is to be transferred at or prior to the time said transfer is made. Grantor further agrees that any subsequent lease, deed, or other legal instrument by which any interest in the Property is conveyed is subject to the Conservation Easement herein created.

E. The Grantor and Grantee agree that the terms of this Conservation Easement shall survive any merger of the fee and easement interests in the Property or any portion thereof.

F. This Conservation Easement and Right of Access may be amended, but only in writing signed by all parties hereto, or their successors or assigns, if such amendment does not affect the qualification of this Conservation Easement or the status of the Grantee under any applicable laws, and is consistent with the purposes of the Conservation Easement. The owner of the Property shall notify the State Property Office and the U.S. Army Corps of Engineers in writing sixty (60) days prior to the initiation of any transfer of all or any part of the Property or of any request to void or modify this Conservation Easement. Such notifications and modification requests shall be addressed to:

Division of Mitigation Services Program Manager
NC State Property Office
1321 Mail Service Center
Raleigh, NC 27699-1321

and

General Counsel
US Army Corps of Engineers
69 Darlington Avenue
Wilmington, NC 28403

G. The parties recognize and agree that the benefits of this Conservation Easement are in gross and assignable provided, however, that the Grantee hereby covenants and agrees, that in the event it transfers or assigns this Conservation Easement, the organization receiving the interest will be a qualified holder under N.C. Gen. Stat. § 121-34 et seq. and § 170(h) of the Internal Revenue Code, and the Grantee further covenants and agrees that the terms of the transfer or assignment will be such that the transferee or assignee will be required to continue in perpetuity the conservation purposes described in this document.

VII. QUIET ENJOYMENT

Grantor reserves all remaining rights accruing from ownership of the Property, including the right to engage in or permit or invite others to engage in only those uses of the Conservation Easement Area that are expressly reserved herein, not prohibited or restricted herein, and are not inconsistent with the purposes of this Conservation Easement. Without limiting the generality of the foregoing, the Grantor expressly reserves to the Grantor, and the Grantor's invitees and licensees, the right of access to the Conservation Easement Area, and the right of quiet enjoyment of the Conservation Easement Area,

TO HAVE AND TO HOLD, the said rights and easements perpetually unto the State of North Carolina for the aforesaid purposes,

AND Grantor covenants that Grantor is seized of the Property in fee and has the right to convey the permanent Conservation Easement herein granted; that the same is free from encumbrances and that Grantor will warrant and defend title to the same against the claims of all persons whomsoever.

IN TESTIMONY, WHEREOF, the Grantor has hereunto set his hand and seal, the day and year first above written.

_____ (SEAL)

NORTH CAROLINA
COUNTY OF _____

I, _____, a Notary Public in and for the County and State aforesaid, do hereby certify that _____, Grantor, personally appeared before me this day and acknowledged the execution of the foregoing instrument.

IN WITNESS, WHEREOF, I have hereunto set my hand and Notary Seal this the _____ day of _____, 20__.

_____
Notary Public

My commission expires:

_____

Exhibit A

[INSERT LEGAL DESCRIPTION]

Appendix D

Credit Release Schedule

CREDIT RELEASE SCHEDULE

All credit releases will be based on the total credit generated as reported in the approved final mitigation plan, unless there are major discrepancies and then a mitigation plan addendum will be submitted. 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 IRT, will determine if performance standards have been satisfied sufficiently to meet the requirements of the release schedules below. In cases where some performance standards have not been met, credits may still be released depending on the specifics of the case. Monitoring may be required to be restarted or be extended, depending on the extent to which the site fails to meet the specified performance standard. The release of project credits will be subject to the criteria described as follows in **Tables D1** & **D2**.

Table D1. Stream Credit Release Schedule

Credit Release Milestone	Release Activity	Interim Release	Total Release
0	Initial Allocation – see requirements below	30%	30%
1	First year monitoring report demonstrates performance standards are being met	10%	40%
2	Second year monitoring report demonstrates performance standards are being met	10%	50%
3	Third year monitoring report demonstrates performance standards are being met	10%	60%
4*	Fourth year monitoring report demonstrates performance standards are being met	5%	65% (75%**)
5	Fifth year monitoring report demonstrates performance standards are being met	10%	75% (85%**)
6*	Sixth year monitoring report demonstrates performance standards are being met	5%	80% (90%**)
7	Seventh year monitoring report demonstrates performance standards are being met and project has received closeout approval	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 IRT.*

***10% reserve of credits to be held back until the bankfull event performance standard has been met.*

Table D2. Wetland Credit Release Schedule

Credit Release Milestone	Release Activity	Interim Release	Total Release
0	Initial Allocation – see requirements below	30%	30%
1	First year monitoring report demonstrates performance standards are being met	10%	40%
2	Second year monitoring report demonstrates performance standards are being met	10%	50%
3	Third year monitoring report demonstrates performance standards are being met	15%	65%
4*	Fourth year monitoring report demonstrates performance standards are being met	5%	70%
5	Fifth year monitoring report demonstrates performance standards are being met	15%	85%
6*	Sixth year monitoring report demonstrates performance standards are being met	5%	90%
7	Seventh year monitoring report demonstrates performance standards are being met and project has received closeout approval	10%	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 IRT.*

Initial Allocation of Released Credits

The initial allocation of released credits, as specified in the mitigation plan, can be released by DMS without prior written approval of the DE upon satisfactory completion of the following activities:

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

Subsequent Credit Releases

All subsequent credit releases must be approved by the DE, in consultation with the IRT, based on a determination that required performance standards have been achieved. For stream projects a reserve of 10% of a site's total stream credits shall be released after four bankfull events have occurred, in separate years, provided the channel is stable and all other performance standards are met. In the event that less than four bankfull events occur during the monitoring period, release of these reserve credits shall be at the discretion of the IRT. As projects approach milestones associated with credit release, DMS will submit a request for credit release to the DE along with documentation substantiating achievement of criteria required for release to occur. This documentation will be included with the annual monitoring report.

Appendix E

Financial Assurance

FINANCIAL ASSURANCE

Pursuant to Section IV H and Appendix III of the NCDEQ DMS (formerly Ecosystem Enhancement Program) In-Lieu Fee Instrument dated July 28, 2010, the North Carolina Department of Environmental Quality (NCDEQ) has provided the USACE-Wilmington District with a formal commitment to fund projects to satisfy mitigation requirements assumed by NCDEQ DMS. This commitment provides financial assurance for all mitigation projects implemented by the program.

Appendix F

Maintenance Plan

MAINTENANCE PLAN

The site will be monitored on a regular basis and a physical inspection will be conducted a minimum of once per year throughout the post construction monitoring period until performance standards are met. These site inspections may identify site components and features that require routine maintenance. Routine maintenance should be expected most often in the first two years following site construction and may include the following:

F1. Maintenance Plan

Component/Feature	Maintenance through project close-out
Stream	Routine channel maintenance and repair activities may include chinking of in-stream structures to prevent piping, securing of loose coir matting, and supplemental installations of live stakes and other target vegetation along the channel. Areas where stormwater and floodplain flows intercept the channel may also require maintenance to prevent bank failures and head-cutting. Stream maintenance activities will be documented and reported in annual monitoring reports. Stream maintenance will continue through the monitoring period.
Wetland	Routine wetland maintenance and repair activities may include securing of loose coir matting, channel plug maintenance, and supplemental installations of live stakes and other target vegetation within the wetland.
Vegetation	Vegetation shall be maintained to ensure the health and vigor of the targeted plant community. Routine vegetation maintenance and repair activities may include supplemental planting, pruning, mulching, and fertilizing. Exotic invasive plant species shall be treated by mechanical and/or chemical methods. Any vegetation requiring herbicide application will be performed in accordance with NC Department of Agriculture (NCDA) rules and regulations. Vegetation maintenance activities will be documented and reported in annual monitoring reports. Vegetation maintenance will continue through the monitoring period.
Site Boundary	Site boundaries shall be identified in the field to ensure clear distinction between the mitigation site and adjacent properties. Boundaries will be marked with signs identifying the property as a mitigation site, and will include the name of the long-term steward and a contact number. Boundaries may be identified by fence, marker, bollard, post, tree-blazing, or other means as allowed by site conditions and/or conservation easement. Boundary markers disturbed, damaged, or destroyed will be repaired and/or replaced on an as-needed basis. Easement monitoring and staking/signage maintenance will continue in perpetuity as a stewardship activity.
Road Crossing	Road crossings within the site may be maintained only as allowed by conservation easement or existing easement, deed restrictions, rights of way, or corridor agreements. Crossings in easement breaks are the responsibility of the landowner to maintain.
Livestock Fencing	Livestock fencing is to be placed outside the easement limits. Maintenance of fencing is the responsibility of the landowner.
Beaver	Routine site visits and monitoring will be used to determine if beaver management is needed. If beaver activity poses a threat to project stability or vegetative success, RES will trap beavers and remove impoundments as needed. All beaver management activities will be documented and included in annual monitoring reports. Beaver monitoring and management will continue through the monitoring period.

Appendix G

DWR Stream ID Forms

NC DWQ Stream Identification Form Summary

REACH	Brad's Branch A/B	Brad's Branch C (DS)	DE2	DE3	DE4	DE7	DE8	MT3	MT2
A. Geomorphology (Subtotal =)	**16**	**22**	**8.5**	**8**	**24.5**	**7.5**	**7**	**7**	**11.5**
1[a]. Continuity of channel bed and bank	3	3	2	3	3	3	1	2	2
2. Sinuosity of channel along thalweg	2	3	2	2	3	1	1	1	2
3. In-channel structure: ex. riffle-pool, step-pool, ripple-pool sequence	1	2	1	1	2	1	0	1	2
4. Particle size of stream substrate	1	2	1	1	3	1	1	1	1
5. Active/relict floodplain	2	3	1	0	3	0	0	0	1
6. Depositional bars or benches	2	3	0	0	3	0	1	0	0
7. Recent alluvial deposits	1	2	1	0	3	0	1	1	2
8. Headcuts	0	0	0	1	0	1	1	0	0
9. Grade control	0	0	0	0	0	0.5	0	0.5	0.5
10. Natural valley	1	1	0.5	0	1.5	0.5	1	0.5	1
11. Second or greater order channel	3	3	0	0	3	0	0	0	0
B. Hydrology (Subtotal =)	**7**	**12.5**	**9.5**	**5**	**11**	**7.5**	**10**	**3**	**4**
12. Presence of Baseflow	2	3	2	3	3	2	2	1	2
13. Iron oxidizing bacteria	0	3	3	0	1	1	3	0	0
14. Leaf litter	1.5	1.5	1.5	1	1	1	1.5	1	1
15. Sediment on plants or debris	0.5	1	0	0	1.5	0	0	0	0.5
16. Organic debris lines or piles	0	1	0	1	1.5	0.5	0.5	1	0.5
17. Soil-based evidence of high water table?	3	3	3	0	3	3	3	0	0
C. Biology (Subtotal =)	**6**	**7**	**6**	**6**	**7**	**6**	**6**	**5**	**7**
18. Fibrous roots in streambed	3	3	3	3	3	3	3	2	3
19. Rooted upland plants in streambed	3	3	3	3	3	3	3	3	3
20. Macrobenthos (note diversity and abundance)	0	0	0	0	1	0	0	0	1
21. Aquatic Mollusks	0	0	0	0	0	0	0	0	0
22. Fish	0	1	0	0	0	0	0	0	0
23. Crayfish	0	0	0	0	0	0	0	0	0
24. Amphibians	0	0	0	0	0	0	0	0	0
25. Algae	0	0	0	0	0	0	0	0	0
26. Wetland plants in streambed	0	0	0	0	0	0	0	0	0
Total Points (Subtotal=)	**29**	**41.5**	**24**	**19**	**42.5**	**21**	**23**	**15**	**22.5**
Stream Determination	**Intermittent**	**Perennial**	**Intermittent**	**Intermittent**	**Perennial**	**Intermittent**	**Intermittent**	**Ephemeral**	**Intermittent**

MT2

NC DWQ Stream Identification Form Version 4.11

Date: January 26, 2021		**Project/Site:** Six runs	**Latitude:** 35.0991321686667
Evaluator: Heath Hidlay		**County:** Sampson	**Longitude:** -78.2300956288333
Total Points: *if ≥ 19 or perennial if ≥ 30* Stream is at least intermittent*	22.5	**Stream Determination:** Intermittent - ≥19	**Other** *e.g. Quad Name*:

A. Geomorphology (Subtotal = 11.5)	Absent	Weak	Moderate	Strong	RES Score
1[a]. Continuity of channel bed and bank	0	1	2	3	Moderate - 2
2. Sinuosity of channel along thalweg	0	1	2	3	Moderate - 2
3. In-channel Structure: ex. riffle-pool, step-pool, ripple-pool sequence	0	1	2	3	Moderate - 2
4. Particle size of stream substrate	0	1	2	3	Weak - 1
5. Active/relict floodplain	0	1	2	3	Weak - 1
6. Depositional bars or benches	0	1	2	3	Absent - 0
7. Recent alluvial deposits	0	1	2	3	Moderate - 2
8. Headcuts	0	1	2	3	Absent - 0
9. Grade control	0	0.5	1	1.5	Weak - .5
10. Natural valley	0	0.5	1	1.5	Moderate - 1
11. Second or greater order channel	No = 0		Yes = 3		No - 0

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

B. Hydrology (Subtotal = 4)					
12. Presence of Baseflow	0	1	2	3	Moderate - 2
13. Iron oxidizing bacteria	0	1	2	3	Absent - 0
14. Leaf litter	1.5	1	0.5	0	Weak - 1
15. Sediment on plants or debris	0	0.5	1	1.5	Weak - .5
16. Organic debris lines or piles	0	0.5	1	1.5	Weak - .5
17. Soil-based evidence of high water table?	No = 0		Yes = 3		No - 0

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

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

Notes: 2 scud;2 beetle larvae

Sketch:

(Data Collected and Form Generated using ArcGIS Survey123)

MT3

NC DWQ Stream Identification Form Version 4.11

Date: January 26, 2021		**Project/Site:** Six runs	**Latitude:** 35.098436376167
Evaluator: Heath Hidlay		**County:** Sampson	**Longitude:** -78.230904609667
Total Points: *if ≥ 19 or perennial if ≥ 30* Stream is at least intermittent*	15	**Stream Determination:** Ephemeral - <19	**Other** *e.g. Quad Name*:

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

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

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

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

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

Notes:

Sketch:

(Data Collected and Form Generated using ArcGIS Survey123)

NC DWQ Stream Identification Form Version 4.11

Date: February 10, 2021	**Project/Site:** Six Runs	**Latitude:** 35.098
Evaluator: Heath Hidlay	**County:** Sampson	**Longitude:** -78.231
Total Points: *Stream is at least intermittent if ≥ 19 or perennial if ≥ 30** 29	**Stream Determination (circle one)** Ephemeral Intermittent Perennial	**Other** *e.g. Quad Name*:

A. Geomorphology (Subtotal = 16)	Absent	Weak	Moderate	Strong
1[a]. Continuity of channel bed and bank	0	1	2	3
2. Sinuosity of channel along thalweg	0	1	2	3
3. In-channel structure: ex. riffle-pool, step-pool, ripple-pool sequence	0	1	2	3
4. Particle size of stream substrate	0	1	2	3
5. Active/relict floodplain	0	1	2	3
6. Depositional bars or benches	0	1	2	3
7. Recent alluvial deposits	0	1	2	3
8. Headcuts	0	1	2	3
9. Grade control	0	0.5	1	1.5
10. Natural valley	0	0.5	1	1.5
11. Second or greater order channel	No = 0		Yes = 3	

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

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

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

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

Notes:

Sketch:

Brad's Branch C (DS)

NC DWQ Stream Identification Form Version 4.11

Date: February 10, 2020		**Project/Site:** Six Runs	**Latitude:** 35.092247967096
Evaluator: Matt dengelo		**County:** Sampson	**Longitude:** -78.239938309489
Total Points: *if ≥ 19 or perennial if ≥ 30* Stream is at least intermittent*	41.5	**Stream Determination:** Perennial - ≥30	**Other** *e.g. Quad Name*:

A. Geomorphology (Subtotal = 22)	Absent	Weak	Moderate	Strong	RES Score
1[a]. Continuity of channel bed and bank	0	1	2	3	Strong - 3
2. Sinuosity of channel along thalweg	0	1	2	3	Strong - 3
3. In-channel Structure: ex. riffle-pool, step-pool, ripple-pool sequence	0	1	2	3	Moderate - 2
4. Particle size of stream substrate	0	1	2	3	Moderate - 2
5. Active/relict floodplain	0	1	2	3	Strong - 3
6. Depositional bars or benches	0	1	2	3	Strong - 3
7. Recent alluvial deposits	0	1	2	3	Moderate - 2
8. Headcuts	0	1	2	3	Absent - 0
9. Grade control	0	0.5	1	1.5	Absent - 0
10. Natural valley	0	0.5	1	1.5	Moderate - 1
11. Second or greater order channel	No = 0		Yes = 3		Yes - 3

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

B. Hydrology (Subtotal = 12.5)					
12. Presence of Baseflow	0	1	2	3	Strong - 3
13. Iron oxidizing bacteria	0	1	2	3	Strong - 3
14. Leaf litter	1.5	1	0.5	0	Absent - 1.5
15. Sediment on plants or debris	0	0.5	1	1.5	Moderate - 1
16. Organic debris lines or piles	0	0.5	1	1.5	Moderate - 1
17. Soil-based evidence of high water table?	No = 0		Yes = 3		Yes - 3

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

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

Notes:

Sketch:

(Data Collected and Form Generated using ArcGIS Survey123)

DE2

NC DWQ Stream Identification Form Version 4.11

Date: February 10, 2020		**Project/Site:** Six Runs	**Latitude:** 35.0962937945
Evaluator: Matt DeAngelo		**County:** Sampson	**Longitude:** -78.2330719913333
Total Points: *if ≥ 19 or perennial if ≥ 30* Stream is at least intermittent*	24	**Stream Determination:** Intermittent - ≥19	**Other** *e.g. Quad Name*:

A. Geomorphology (Subtotal = 8.5)

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

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

B. Hydrology (Subtotal = 9.5)

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

C. Biology (Subtotal = 6)

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

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

Notes:

Sketch:

(Data Collected and Form Generated using ArcGIS Survey123)

DE3

NC DWQ Stream Identification Form Version 4.11

Date: February 10, 2020		**Project/Site:** Six Runs	**Latitude:** 35.0959595121667
Evaluator: Matt DeAngelo		**County:** Sampson	**Longitude:** -78.2338171893333
Total Points: *if ≥ 19 or perennial if ≥ 30* Stream is at least intermittent*	19	**Stream Determination:** Intermittent - ≥19	**Other** *e.g. Quad Name*:

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

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

B. Hydrology (Subtotal = 5)					
12. Presence of Baseflow	0	1	2	3	Strong - 3
13. Iron oxidizing bacteria	0	1	2	3	Absent - 0
14. Leaf litter	1.5	1	0.5	0	Weak - 1
15. Sediment on plants or debris	0	0.5	1	1.5	Absent - 0
16. Organic debris lines or piles	0	0.5	1	1.5	Moderate - 1
17. Soil-based evidence of high water table?	No = 0		Yes = 3		No - 0

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

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

Notes:

Sketch:

(Data Collected and Form Generated using ArcGIS Survey123)

DE8

NC DWQ Stream Identification Form Version 4.11

Date: February 10, 2020		**Project/Site:** Six Runs	**Latitude:** 35.0958643445
Evaluator: Matt DeAngelo		**County:** Sampson	**Longitude:** -78.2345744691667
Total Points: *if ≥ 19 or perennial if ≥ 30* Stream is at least intermittent*	23	**Stream Determination:** Intermittent - ≥19	**Other** *e.g. Quad Name*:

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

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

B. Hydrology (Subtotal = 10)					
12. Presence of Baseflow	0	1	2	3	Moderate - 2
13. Iron oxidizing bacteria	0	1	2	3	Strong - 3
14. Leaf litter	1.5	1	0.5	0	Absent - 1.5
15. Sediment on plants or debris	0	0.5	1	1.5	Absent - 0
16. Organic debris lines or piles	0	0.5	1	1.5	Weak - .5
17. Soil-based evidence of high water table?	No = 0		Yes = 3		Yes - 3

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

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

Notes:

Sketch:

(Data Collected and Form Generated using ArcGIS Survey123)

NC DWQ Stream Identification Form Version 4.11

Date: February 10, 2021	**Project/Site:** Six Runs	**Latitude:** 35.0955
Evaluator: Matt DeAngelo	**County:** Sampson	**Longitude:** -78.2313
Total Points: *Stream is at least intermittent if ≥ 19 or perennial if ≥ 30** 21	**Stream Determination (circle one)** Ephemeral Intermittent Perennial	**Other** *e.g. Quad Name*:

A. Geomorphology (Subtotal = 7.5)	Absent	Weak	Moderate	Strong
1[a]. Continuity of channel bed and bank	0	1	2	3
2. Sinuosity of channel along thalweg	0	1	2	3
3. In-channel structure: ex. riffle-pool, step-pool, ripple-pool sequence	0	1	2	3
4. Particle size of stream substrate	0	1	2	3
5. Active/relict floodplain	0	1	2	3
6. Depositional bars or benches	0	1	2	3
7. Recent alluvial deposits	0	1	2	3
8. Headcuts	0	1	2	3
9. Grade control	0	0.5	1	1.5
10. Natural valley	0	0.5	1	1.5
11. Second or greater order channel	No = 0		Yes = 3	

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

B. Hydrology (Subtotal = 7.5)				
12. Presence of Baseflow	0	1	2	3
13. Iron oxidizing bacteria	0	1	2	3
14. Leaf litter	1.5	1	0.5	0
15. Sediment on plants or debris	0	0.5	1	1.5
16. Organic debris lines or piles	0	0.5	1	1.5
17. Soil-based evidence of high water table?	No = 0		Yes = 3	

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

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

Notes:

Sketch:

DE4

NC DWQ Stream Identification Form Version 4.11

Date: February 10, 2020		**Project/Site:** Six Runs	**Latitude:** 35.0963384192764
Evaluator: Matt DeAngelo		**County:** Sampson	**Longitude:** -78.2369190641476
Total Points: *if ≥ 19 or perennial if ≥ 30* Stream is at least intermittent*	42.5	**Stream Determination:** Perennial - ≥30	**Other** *e.g. Quad Name*:

A. Geomorphology (Subtotal = 24.5)	Absent	Weak	Moderate	Strong	RES Score
1[a]. Continuity of channel bed and bank	0	1	2	3	Strong - 3
2. Sinuosity of channel along thalweg	0	1	2	3	Strong - 3
3. In-channel Structure: ex. riffle-pool, step-pool, ripple-pool sequence	0	1	2	3	Moderate - 2
4. Particle size of stream substrate	0	1	2	3	Strong - 3
5. Active/relict floodplain	0	1	2	3	Strong - 3
6. Depositional bars or benches	0	1	2	3	Strong - 3
7. Recent alluvial deposits	0	1	2	3	Strong - 3
8. Headcuts	0	1	2	3	Absent - 0
9. Grade control	0	0.5	1	1.5	Absent - 0
10. Natural valley	0	0.5	1	1.5	Strong - 1.5
11. Second or greater order channel	No = 0		Yes = 3		Yes - 3

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

B. Hydrology (Subtotal = 11)					
12. Presence of Baseflow	0	1	2	3	Strong - 3
13. Iron oxidizing bacteria	0	1	2	3	Weak - 1
14. Leaf litter	1.5	1	0.5	0	Weak - 1
15. Sediment on plants or debris	0	0.5	1	1.5	Strong - 1.5
16. Organic debris lines or piles	0	0.5	1	1.5	Strong - 1.5
17. Soil-based evidence of high water table?	No = 0		Yes = 3		Yes - 3

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

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

Notes: Water bug

Sketch:

(Data Collected and Form Generated using ArcGIS Survey123)

Appendix H

USACE District Assessment Forms

Stream Quality Assessment Worksheet Summary

		Reach	MT2	BB-A	BB-B (US)	BB-B(DS)	DE4-A	DE4-B	DE2-A	DE2-B	DE3	DE8	DE7
Physical	1	Presence of flow / persistent pools in stream	4	4	5	5	5	5	3	3	4	2	3
	2	Evidence of past human alteration	2	3	1	0	5	0	4	2	0	3	2
	3	Riparian zone	3	2	2	2	4	2	2	3	4	3	3
	4	Evidence of nutrient or chemical discharges	3	2	2	2	4	3	1	1	4	3	3
	5	Groundwater discharge	2	2	2	3	3	3	2	2	0	2	1
	6	Presence of adjacent floodplain	2	2	2	2	3	2	1	1	0	2	0
	7	Entrenchment / floodplain access	4	2	0	2	4	1	3	1	0	1	1
	8	Presence of adjacent wetlands	0	2	2	3	4	2	1	0	1	3	2
	9	Channel sinuosity	3	2	3	0	4	1	1	1	1	2	1
	10	Sediment input	3	2	0	0	2	2	2	2	4	1	4
	11	Size & diversity of channel bed substrate	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Stability	12	Evidence of channel incision or widening	3	2	0	2	4	1	4	1	0	4	1
	13	Presence of major bank failures	4	2	1	2	4	2	4	2	2	4	2
	14	Root depth and density on banks	1	1	1	1	2	1	1	1	1	1	1
	15	Impact by agriculture, livestock, or timber production	1	1	1	1	2	2	1	1	2	2	2
	16	Presence of riffle-pool/ripple-pool complexes	1	2	1	0	2	1	1	1	1	0	1
Habitat	17	Habitat complexity	2	3	2	1	4	2	2	2	1	1	2
	18	Canopy coverage over streambed	3	3	2	1	3	2	2	2	3	2	3
	19	Substrate embeddedness	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Biology	20	Presence of stream invertebrates	1	0	0	0	1	1	0	0	0	0	0
	21	Presence of amphibians	0	0	0	0	0	0	0	0	0	0	0
	22	Presence of fish	0	0	0	1	0	0	0	0	0	0	0
	23	Evidence of wildlife use	2	2	2	3	3	2	2	2	2	2	2

Total Score:	44	39	29	31	63	35	37	28	30	38	34

Reach MT 2

STREAM QUALITY ASSESSMENT WORKSHEET

	#	CHARACTERISTICS	ECOREGION POINT RANGE			SCORE
			Coastal	Piedmont	Mountain	
PHYSICAL	1	**Presence of flow / persistent pools in stream** (no flow or saturation = 0; strong flow = max points)	0 – 5	0 – 4	0 – 5	4
	2	**Evidence of past human alteration** (extensive alteration = 0; no alteration = max points)	0 – 6	0 – 5	0 – 5	2
	3	**Riparian zone** (no buffer = 0; contiguous, wide buffer = max points)	0 – 6	0 – 4	0 – 5	3
	4	**Evidence of nutrient or chemical discharges** (extensive discharges = 0; no discharges = max points)	0 – 5	0 – 4	0 – 4	3
	5	**Groundwater discharge** (no discharge = 0; springs, seeps, wetlands, etc. = max points)	0 – 3	0 – 4	0 – 4	2
	6	**Presence of adjacent floodplain** (no floodplain = 0; extensive floodplain = max points)	0 – 4	0 – 4	0 – 2	2
	7	**Entrenchment / floodplain access** (deeply entrenched = 0; frequent flooding = max points)	0 – 5	0 – 4	0 – 2	4
	8	**Presence of adjacent wetlands** (no wetlands = 0; large adjacent wetlands = max points)	0 – 6	0 – 4	0 – 2	0
	9	**Channel sinuosity** (extensive channelization = 0; natural meander = max points)	0 – 5	0 – 4	0 – 3	3
	10	**Sediment input** (extensive deposition= 0; little or no sediment = max points)	0 – 5	0 – 4	0 – 4	3
	11	**Size & diversity of channel bed substrate** (fine, homogenous = 0; large, diverse sizes = max points)	NA*	0 – 4	0 – 5	NA
STABILITY	12	**Evidence of channel incision or widening** (deeply incised = 0; stable bed & banks = max points)	0 – 5	0 – 4	0 – 5	3
	13	**Presence of major bank failures** (severe erosion = 0; no erosion, stable banks = max points)	0 – 5	0 – 5	0 – 5	4
	14	**Root depth and density on banks** (no visible roots = 0; dense roots throughout = max points)	0 – 3	0 – 4	0 – 5	1
	15	**Impact by agriculture, livestock, or timber production** (substantial impact =0; no evidence = max points)	0 – 5	0 – 4	0 – 5	1
HABITAT	16	**Presence of riffle-pool/ripple-pool complexes** (no riffles/ripples or pools = 0; well-developed = max points)	0 – 3	0 – 5	0 – 6	1
	17	**Habitat complexity** (little or no habitat = 0; frequent, varied habitats = max points)	0 – 6	0 – 6	0 – 6	2
	18	**Canopy coverage over streambed** (no shading vegetation = 0; continuous canopy = max points)	0 – 5	0 – 5	0 – 5	3
	19	**Substrate embeddedness** (deeply embedded = 0; loose structure = max)	NA*	0 – 4	0 – 4	NA
BIOLOGY	20	**Presence of stream invertebrates** (see page 4) (no evidence = 0; common, numerous types = max points)	0 – 4	0 – 5	0 – 5	1
	21	**Presence of amphibians** (no evidence = 0; common, numerous types = max points)	0 – 4	0 – 4	0 – 4	0
	22	**Presence of fish** (no evidence = 0; common, numerous types = max points)	0 – 4	0 – 4	0 – 4	0
	23	**Evidence of wildlife use** (no evidence = 0; abundant evidence = max points)	0 – 6	0 – 5	0 – 5	2
Total Points Possible			100	100	100	
TOTAL SCORE (also enter on first page)						44

* These characteristics are not assessed in coastal streams.

Brad's Branch-A

STREAM QUALITY ASSESSMENT WORKSHEET

	#	CHARACTERISTICS	ECOREGION POINT RANGE			SCORE
			Coastal	Piedmont	Mountain	
PHYSICAL	1	**Presence of flow / persistent pools in stream** (no flow or saturation = 0; strong flow = max points)	0 – 5	0 – 4	0 – 5	4
	2	**Evidence of past human alteration** (extensive alteration = 0; no alteration = max points)	0 – 6	0 – 5	0 – 5	3
	3	**Riparian zone** (no buffer = 0; contiguous, wide buffer = max points)	0 – 6	0 – 4	0 – 5	2
	4	**Evidence of nutrient or chemical discharges** (extensive discharges = 0; no discharges = max points)	0 – 5	0 – 4	0 – 4	2
	5	**Groundwater discharge** (no discharge = 0; springs, seeps, wetlands, etc. = max points)	0 – 3	0 – 4	0 – 4	2
	6	**Presence of adjacent floodplain** (no floodplain = 0; extensive floodplain = max points)	0 – 4	0 – 4	0 – 2	2
	7	**Entrenchment / floodplain access** (deeply entrenched = 0; frequent flooding = max points)	0 – 5	0 – 4	0 – 2	2
	8	**Presence of adjacent wetlands** (no wetlands = 0; large adjacent wetlands = max points)	0 – 6	0 – 4	0 – 2	2
	9	**Channel sinuosity** (extensive channelization = 0; natural meander = max points)	0 – 5	0 – 4	0 – 3	2
	10	**Sediment input** (extensive deposition= 0; little or no sediment = max points)	0 – 5	0 – 4	0 – 4	2
	11	**Size & diversity of channel bed substrate** (fine, homogenous = 0; large, diverse sizes = max points)	NA*	0 – 4	0 – 5	NA
STABILITY	12	**Evidence of channel incision or widening** (deeply incised = 0; stable bed & banks = max points)	0 – 5	0 – 4	0 – 5	2
	13	**Presence of major bank failures** (severe erosion = 0; no erosion, stable banks = max points)	0 – 5	0 – 5	0 – 5	2
	14	**Root depth and density on banks** (no visible roots = 0; dense roots throughout = max points)	0 – 3	0 – 4	0 – 5	1
	15	**Impact by agriculture, livestock, or timber production** (substantial impact =0; no evidence = max points)	0 – 5	0 – 4	0 – 5	1
HABITAT	16	**Presence of riffle-pool/ripple-pool complexes** (no riffles/ripples or pools = 0; well-developed = max points)	0 – 3	0 – 5	0 – 6	2
	17	**Habitat complexity** (little or no habitat = 0; frequent, varied habitats = max points)	0 – 6	0 – 6	0 – 6	3
	18	**Canopy coverage over streambed** (no shading vegetation = 0; continuous canopy = max points)	0 – 5	0 – 5	0 – 5	3
	19	**Substrate embeddedness** (deeply embedded = 0; loose structure = max)	NA*	0 – 4	0 – 4	NA
BIOLOGY	20	**Presence of stream invertebrates** (see page 4) (no evidence = 0; common, numerous types = max points)	0 – 4	0 – 5	0 – 5	0
	21	**Presence of amphibians** (no evidence = 0; common, numerous types = max points)	0 – 4	0 – 4	0 – 4	0
	22	**Presence of fish** (no evidence = 0; common, numerous types = max points)	0 – 4	0 – 4	0 – 4	0
	23	**Evidence of wildlife use** (no evidence = 0; abundant evidence = max points)	0 – 6	0 – 5	0 – 5	2
Total Points Possible			100	100	100	
TOTAL SCORE (also enter on first page)						39

* These characteristics are not assessed in coastal streams.

Brad's Branch - B (Upstream)

STREAM QUALITY ASSESSMENT WORKSHEET

	#	CHARACTERISTICS	ECOREGION POINT RANGE			SCORE
			Coastal	Piedmont	Mountain	
PHYSICAL	1	**Presence of flow / persistent pools in stream** (no flow or saturation = 0; strong flow = max points)	0 – 5	0 – 4	0 – 5	5
	2	**Evidence of past human alteration** (extensive alteration = 0; no alteration = max points)	0 – 6	0 – 5	0 – 5	1
	3	**Riparian zone** (no buffer = 0; contiguous, wide buffer = max points)	0 – 6	0 – 4	0 – 5	2
	4	**Evidence of nutrient or chemical discharges** (extensive discharges = 0; no discharges = max points)	0 – 5	0 – 4	0 – 4	2
	5	**Groundwater discharge** (no discharge = 0; springs, seeps, wetlands, etc. = max points)	0 – 3	0 – 4	0 – 4	2
	6	**Presence of adjacent floodplain** (no floodplain = 0; extensive floodplain = max points)	0 – 4	0 – 4	0 – 2	2
	7	**Entrenchment / floodplain access** (deeply entrenched = 0; frequent flooding = max points)	0 – 5	0 – 4	0 – 2	0
	8	**Presence of adjacent wetlands** (no wetlands = 0; large adjacent wetlands = max points)	0 – 6	0 – 4	0 – 2	2
	9	**Channel sinuosity** (extensive channelization = 0; natural meander = max points)	0 – 5	0 – 4	0 – 3	3
	10	**Sediment input** (extensive deposition= 0; little or no sediment = max points)	0 – 5	0 – 4	0 – 4	0
	11	**Size & diversity of channel bed substrate** (fine, homogenous = 0; large, diverse sizes = max points)	NA*	0 – 4	0 – 5	NA
STABILITY	12	**Evidence of channel incision or widening** (deeply incised = 0; stable bed & banks = max points)	0 – 5	0 – 4	0 – 5	0
	13	**Presence of major bank failures** (severe erosion = 0; no erosion, stable banks = max points)	0 – 5	0 – 5	0 – 5	1
	14	**Root depth and density on banks** (no visible roots = 0; dense roots throughout = max points)	0 – 3	0 – 4	0 – 5	1
	15	**Impact by agriculture, livestock, or timber production** (substantial impact =0; no evidence = max points)	0 – 5	0 – 4	0 – 5	1
HABITAT	16	**Presence of riffle-pool/ripple-pool complexes** (no riffles/ripples or pools = 0; well-developed = max points)	0 – 3	0 – 5	0 – 6	1
	17	**Habitat complexity** (little or no habitat = 0; frequent, varied habitats = max points)	0 – 6	0 – 6	0 – 6	2
	18	**Canopy coverage over streambed** (no shading vegetation = 0; continuous canopy = max points)	0 – 5	0 – 5	0 – 5	2
	19	**Substrate embeddedness** (deeply embedded = 0; loose structure = max)	NA*	0 – 4	0 – 4	NA
BIOLOGY	20	**Presence of stream invertebrates** (see page 4) (no evidence = 0; common, numerous types = max points)	0 – 4	0 – 5	0 – 5	0
	21	**Presence of amphibians** (no evidence = 0; common, numerous types = max points)	0 – 4	0 – 4	0 – 4	0
	22	**Presence of fish** (no evidence = 0; common, numerous types = max points)	0 – 4	0 – 4	0 – 4	0
	23	**Evidence of wildlife use** (no evidence = 0; abundant evidence = max points)	0 – 6	0 – 5	0 – 5	2
Total Points Possible			100	100	100	
TOTAL SCORE (also enter on first page)						29

* These characteristics are not assessed in coastal streams.

Brad's Branch-B (Downstream)

STREAM QUALITY ASSESSMENT WORKSHEET

	#	CHARACTERISTICS	ECOREGION POINT RANGE			SCORE
			Coastal	Piedmont	Mountain	
PHYSICAL	1	**Presence of flow / persistent pools in stream** (no flow or saturation = 0; strong flow = max points)	0 – 5	0 – 4	0 – 5	5
	2	**Evidence of past human alteration** (extensive alteration = 0; no alteration = max points)	0 – 6	0 – 5	0 – 5	0
	3	**Riparian zone** (no buffer = 0; contiguous, wide buffer = max points)	0 – 6	0 – 4	0 – 5	2
	4	**Evidence of nutrient or chemical discharges** (extensive discharges = 0; no discharges = max points)	0 – 5	0 – 4	0 – 4	2
	5	**Groundwater discharge** (no discharge = 0; springs, seeps, wetlands, etc. = max points)	0 – 3	0 – 4	0 – 4	3
	6	**Presence of adjacent floodplain** (no floodplain = 0; extensive floodplain = max points)	0 – 4	0 – 4	0 – 2	2
	7	**Entrenchment / floodplain access** (deeply entrenched = 0; frequent flooding = max points)	0 – 5	0 – 4	0 – 2	2
	8	**Presence of adjacent wetlands** (no wetlands = 0; large adjacent wetlands = max points)	0 – 6	0 – 4	0 – 2	3
	9	**Channel sinuosity** (extensive channelization = 0; natural meander = max points)	0 – 5	0 – 4	0 – 3	0
	10	**Sediment input** (extensive deposition= 0; little or no sediment = max points)	0 – 5	0 – 4	0 – 4	0
	11	**Size & diversity of channel bed substrate** (fine, homogenous = 0; large, diverse sizes = max points)	NA*	0 – 4	0 – 5	NA
STABILITY	12	**Evidence of channel incision or widening** (deeply incised = 0; stable bed & banks = max points)	0 – 5	0 – 4	0 – 5	2
	13	**Presence of major bank failures** (severe erosion = 0; no erosion, stable banks = max points)	0 – 5	0 – 5	0 – 5	2
	14	**Root depth and density on banks** (no visible roots = 0; dense roots throughout = max points)	0 – 3	0 – 4	0 – 5	1
	15	**Impact by agriculture, livestock, or timber production** (substantial impact =0; no evidence = max points)	0 – 5	0 – 4	0 – 5	1
HABITAT	16	**Presence of riffle-pool/ripple-pool complexes** (no riffles/ripples or pools = 0; well-developed = max points)	0 – 3	0 – 5	0 – 6	0
	17	**Habitat complexity** (little or no habitat = 0; frequent, varied habitats = max points)	0 – 6	0 – 6	0 – 6	1
	18	**Canopy coverage over streambed** (no shading vegetation = 0; continuous canopy = max points)	0 – 5	0 – 5	0 – 5	1
	19	**Substrate embeddedness** (deeply embedded = 0; loose structure = max)	NA*	0 – 4	0 – 4	NA
BIOLOGY	20	**Presence of stream invertebrates** (see page 4) (no evidence = 0; common, numerous types = max points)	0 – 4	0 – 5	0 – 5	0
	21	**Presence of amphibians** (no evidence = 0; common, numerous types = max points)	0 – 4	0 – 4	0 – 4	0
	22	**Presence of fish** (no evidence = 0; common, numerous types = max points)	0 – 4	0 – 4	0 – 4	1
	23	**Evidence of wildlife use** (no evidence = 0; abundant evidence = max points)	0 – 6	0 – 5	0 – 5	3
Total Points Possible			100	100	100	
TOTAL SCORE (also enter on first page)						31

* These characteristics are not assessed in coastal streams.

DE4-A

STREAM QUALITY ASSESSMENT WORKSHEET

	#	CHARACTERISTICS	ECOREGION POINT RANGE			SCORE
			Coastal	Piedmont	Mountain	
PHYSICAL	1	**Presence of flow / persistent pools in stream** (no flow or saturation = 0; strong flow = max points)	0 – 5	0 – 4	0 – 5	5
	2	**Evidence of past human alteration** (extensive alteration = 0; no alteration = max points)	0 – 6	0 – 5	0 – 5	5
	3	**Riparian zone** (no buffer = 0; contiguous, wide buffer = max points)	0 – 6	0 – 4	0 – 5	4
	4	**Evidence of nutrient or chemical discharges** (extensive discharges = 0; no discharges = max points)	0 – 5	0 – 4	0 – 4	4
	5	**Groundwater discharge** (no discharge = 0; springs, seeps, wetlands, etc. = max points)	0 – 3	0 – 4	0 – 4	3
	6	**Presence of adjacent floodplain** (no floodplain = 0; extensive floodplain = max points)	0 – 4	0 – 4	0 – 2	3
	7	**Entrenchment / floodplain access** (deeply entrenched = 0; frequent flooding = max points)	0 – 5	0 – 4	0 – 2	4
	8	**Presence of adjacent wetlands** (no wetlands = 0; large adjacent wetlands = max points)	0 – 6	0 – 4	0 – 2	4
	9	**Channel sinuosity** (extensive channelization = 0; natural meander = max points)	0 – 5	0 – 4	0 – 3	4
	10	**Sediment input** (extensive deposition= 0; little or no sediment = max points)	0 – 5	0 – 4	0 – 4	2
	11	**Size & diversity of channel bed substrate** (fine, homogenous = 0; large, diverse sizes = max points)	NA*	0 – 4	0 – 5	NA
STABILITY	12	**Evidence of channel incision or widening** (deeply incised = 0; stable bed & banks = max points)	0 – 5	0 – 4	0 – 5	4
	13	**Presence of major bank failures** (severe erosion = 0; no erosion, stable banks = max points)	0 – 5	0 – 5	0 – 5	4
	14	**Root depth and density on banks** (no visible roots = 0; dense roots throughout = max points)	0 – 3	0 – 4	0 – 5	2
	15	**Impact by agriculture, livestock, or timber production** (substantial impact =0; no evidence = max points)	0 – 5	0 – 4	0 – 5	2
HABITAT	16	**Presence of riffle-pool/ripple-pool complexes** (no riffles/ripples or pools = 0; well-developed = max points)	0 – 3	0 – 5	0 – 6	2
	17	**Habitat complexity** (little or no habitat = 0; frequent, varied habitats = max points)	0 – 6	0 – 6	0 – 6	4
	18	**Canopy coverage over streambed** (no shading vegetation = 0; continuous canopy = max points)	0 – 5	0 – 5	0 – 5	3
	19	**Substrate embeddedness** (deeply embedded = 0; loose structure = max)	NA*	0 – 4	0 – 4	NA
BIOLOGY	20	**Presence of stream invertebrates** (see page 4) (no evidence = 0; common, numerous types = max points)	0 – 4	0 – 5	0 – 5	1
	21	**Presence of amphibians** (no evidence = 0; common, numerous types = max points)	0 – 4	0 – 4	0 – 4	0
	22	**Presence of fish** (no evidence = 0; common, numerous types = max points)	0 – 4	0 – 4	0 – 4	0
	23	**Evidence of wildlife use** (no evidence = 0; abundant evidence = max points)	0 – 6	0 – 5	0 – 5	3
Total Points Possible			100	100	100	
TOTAL SCORE (also enter on first page)						63

* These characteristics are not assessed in coastal streams.

DE4-B

STREAM QUALITY ASSESSMENT WORKSHEET

	#	CHARACTERISTICS	ECOREGION POINT RANGE			SCORE
			Coastal	Piedmont	Mountain	
PHYSICAL	1	**Presence of flow / persistent pools in stream** (no flow or saturation = 0; strong flow = max points)	0 – 5	0 – 4	0 – 5	5
	2	**Evidence of past human alteration** (extensive alteration = 0; no alteration = max points)	0 – 6	0 – 5	0 – 5	0
	3	**Riparian zone** (no buffer = 0; contiguous, wide buffer = max points)	0 – 6	0 – 4	0 – 5	2
	4	**Evidence of nutrient or chemical discharges** (extensive discharges = 0; no discharges = max points)	0 – 5	0 – 4	0 – 4	3
	5	**Groundwater discharge** (no discharge = 0; springs, seeps, wetlands, etc. = max points)	0 – 3	0 – 4	0 – 4	3
	6	**Presence of adjacent floodplain** (no floodplain = 0; extensive floodplain = max points)	0 – 4	0 – 4	0 – 2	2
	7	**Entrenchment / floodplain access** (deeply entrenched = 0; frequent flooding = max points)	0 – 5	0 – 4	0 – 2	1
	8	**Presence of adjacent wetlands** (no wetlands = 0; large adjacent wetlands = max points)	0 – 6	0 – 4	0 – 2	2
	9	**Channel sinuosity** (extensive channelization = 0; natural meander = max points)	0 – 5	0 – 4	0 – 3	1
	10	**Sediment input** (extensive deposition= 0; little or no sediment = max points)	0 – 5	0 – 4	0 – 4	2
	11	**Size & diversity of channel bed substrate** (fine, homogenous = 0; large, diverse sizes = max points)	NA*	0 – 4	0 – 5	NA
STABILITY	12	**Evidence of channel incision or widening** (deeply incised = 0; stable bed & banks = max points)	0 – 5	0 – 4	0 – 5	1
	13	**Presence of major bank failures** (severe erosion = 0; no erosion, stable banks = max points)	0 – 5	0 – 5	0 – 5	2
	14	**Root depth and density on banks** (no visible roots = 0; dense roots throughout = max points)	0 – 3	0 – 4	0 – 5	1
	15	**Impact by agriculture, livestock, or timber production** (substantial impact =0; no evidence = max points)	0 – 5	0 – 4	0 – 5	2
HABITAT	16	**Presence of riffle-pool/ripple-pool complexes** (no riffles/ripples or pools = 0; well-developed = max points)	0 – 3	0 – 5	0 – 6	1
	17	**Habitat complexity** (little or no habitat = 0; frequent, varied habitats = max points)	0 – 6	0 – 6	0 – 6	2
	18	**Canopy coverage over streambed** (no shading vegetation = 0; continuous canopy = max points)	0 – 5	0 – 5	0 – 5	2
	19	**Substrate embeddedness** (deeply embedded = 0; loose structure = max)	NA*	0 – 4	0 – 4	NA
BIOLOGY	20	**Presence of stream invertebrates** (see page 4) (no evidence = 0; common, numerous types = max points)	0 – 4	0 – 5	0 – 5	1
	21	**Presence of amphibians** (no evidence = 0; common, numerous types = max points)	0 – 4	0 – 4	0 – 4	0
	22	**Presence of fish** (no evidence = 0; common, numerous types = max points)	0 – 4	0 – 4	0 – 4	0
	23	**Evidence of wildlife use** (no evidence = 0; abundant evidence = max points)	0 – 6	0 – 5	0 – 5	2
Total Points Possible			100	100	100	
TOTAL SCORE (also enter on first page)						35

* These characteristics are not assessed in coastal streams.

DE2-A

STREAM QUALITY ASSESSMENT WORKSHEET

	#	CHARACTERISTICS	ECOREGION POINT RANGE			SCORE
			Coastal	Piedmont	Mountain	
PHYSICAL	1	**Presence of flow / persistent pools in stream** (no flow or saturation = 0; strong flow = max points)	0 – 5	0 – 4	0 – 5	3
	2	**Evidence of past human alteration** (extensive alteration = 0; no alteration = max points)	0 – 6	0 – 5	0 – 5	4
	3	**Riparian zone** (no buffer = 0; contiguous, wide buffer = max points)	0 – 6	0 – 4	0 – 5	2
	4	**Evidence of nutrient or chemical discharges** (extensive discharges = 0; no discharges = max points)	0 – 5	0 – 4	0 – 4	1
	5	**Groundwater discharge** (no discharge = 0; springs, seeps, wetlands, etc. = max points)	0 – 3	0 – 4	0 – 4	2
	6	**Presence of adjacent floodplain** (no floodplain = 0; extensive floodplain = max points)	0 – 4	0 – 4	0 – 2	1
	7	**Entrenchment / floodplain access** (deeply entrenched = 0; frequent flooding = max points)	0 – 5	0 – 4	0 – 2	3
	8	**Presence of adjacent wetlands** (no wetlands = 0; large adjacent wetlands = max points)	0 – 6	0 – 4	0 – 2	1
	9	**Channel sinuosity** (extensive channelization = 0; natural meander = max points)	0 – 5	0 – 4	0 – 3	1
	10	**Sediment input** (extensive deposition= 0; little or no sediment = max points)	0 – 5	0 – 4	0 – 4	2
	11	**Size & diversity of channel bed substrate** (fine, homogenous = 0; large, diverse sizes = max points)	NA*	0 – 4	0 – 5	NA
STABILITY	12	**Evidence of channel incision or widening** (deeply incised = 0; stable bed & banks = max points)	0 – 5	0 – 4	0 – 5	4
	13	**Presence of major bank failures** (severe erosion = 0; no erosion, stable banks = max points)	0 – 5	0 – 5	0 – 5	4
	14	**Root depth and density on banks** (no visible roots = 0; dense roots throughout = max points)	0 – 3	0 – 4	0 – 5	1
	15	**Impact by agriculture, livestock, or timber production** (substantial impact =0; no evidence = max points)	0 – 5	0 – 4	0 – 5	1
HABITAT	16	**Presence of riffle-pool/ripple-pool complexes** (no riffles/ripples or pools = 0; well-developed = max points)	0 – 3	0 – 5	0 – 6	1
	17	**Habitat complexity** (little or no habitat = 0; frequent, varied habitats = max points)	0 – 6	0 – 6	0 – 6	2
	18	**Canopy coverage over streambed** (no shading vegetation = 0; continuous canopy = max points)	0 – 5	0 – 5	0 – 5	2
	19	**Substrate embeddedness** (deeply embedded = 0; loose structure = max)	NA*	0 – 4	0 – 4	NA
BIOLOGY	20	**Presence of stream invertebrates** (see page 4) (no evidence = 0; common, numerous types = max points)	0 – 4	0 – 5	0 – 5	0
	21	**Presence of amphibians** (no evidence = 0; common, numerous types = max points)	0 – 4	0 – 4	0 – 4	0
	22	**Presence of fish** (no evidence = 0; common, numerous types = max points)	0 – 4	0 – 4	0 – 4	0
	23	**Evidence of wildlife use** (no evidence = 0; abundant evidence = max points)	0 – 6	0 – 5	0 – 5	2
Total Points Possible			100	100	100	
TOTAL SCORE (also enter on first page)						37

* These characteristics are not assessed in coastal streams.

DE2-B

STREAM QUALITY ASSESSMENT WORKSHEET

	#	CHARACTERISTICS	ECOREGION POINT RANGE			SCORE
			Coastal	Piedmont	Mountain	
PHYSICAL	1	**Presence of flow / persistent pools in stream** (no flow or saturation = 0; strong flow = max points)	0 – 5	0 – 4	0 – 5	3
	2	**Evidence of past human alteration** (extensive alteration = 0; no alteration = max points)	0 – 6	0 – 5	0 – 5	2
	3	**Riparian zone** (no buffer = 0; contiguous, wide buffer = max points)	0 – 6	0 – 4	0 – 5	3
	4	**Evidence of nutrient or chemical discharges** (extensive discharges = 0; no discharges = max points)	0 – 5	0 – 4	0 – 4	1
	5	**Groundwater discharge** (no discharge = 0; springs, seeps, wetlands, etc. = max points)	0 – 3	0 – 4	0 – 4	2
	6	**Presence of adjacent floodplain** (no floodplain = 0; extensive floodplain = max points)	0 – 4	0 – 4	0 – 2	1
	7	**Entrenchment / floodplain access** (deeply entrenched = 0; frequent flooding = max points)	0 – 5	0 – 4	0 – 2	1
	8	**Presence of adjacent wetlands** (no wetlands = 0; large adjacent wetlands = max points)	0 – 6	0 – 4	0 – 2	0
	9	**Channel sinuosity** (extensive channelization = 0; natural meander = max points)	0 – 5	0 – 4	0 – 3	1
	10	**Sediment input** (extensive deposition= 0; little or no sediment = max points)	0 – 5	0 – 4	0 – 4	2
	11	**Size & diversity of channel bed substrate** (fine, homogenous = 0; large, diverse sizes = max points)	NA*	0 – 4	0 – 5	NA
STABILITY	12	**Evidence of channel incision or widening** (deeply incised = 0; stable bed & banks = max points)	0 – 5	0 – 4	0 – 5	1
	13	**Presence of major bank failures** (severe erosion = 0; no erosion, stable banks = max points)	0 – 5	0 – 5	0 – 5	2
	14	**Root depth and density on banks** (no visible roots = 0; dense roots throughout = max points)	0 – 3	0 – 4	0 – 5	1
	15	**Impact by agriculture, livestock, or timber production** (substantial impact =0; no evidence = max points)	0 – 5	0 – 4	0 – 5	1
HABITAT	16	**Presence of riffle-pool/ripple-pool complexes** (no riffles/ripples or pools = 0; well-developed = max points)	0 – 3	0 – 5	0 – 6	1
	17	**Habitat complexity** (little or no habitat = 0; frequent, varied habitats = max points)	0 – 6	0 – 6	0 – 6	2
	18	**Canopy coverage over streambed** (no shading vegetation = 0; continuous canopy = max points)	0 – 5	0 – 5	0 – 5	2
	19	**Substrate embeddedness** (deeply embedded = 0; loose structure = max)	NA*	0 – 4	0 – 4	NA
BIOLOGY	20	**Presence of stream invertebrates** (see page 4) (no evidence = 0; common, numerous types = max points)	0 – 4	0 – 5	0 – 5	0
	21	**Presence of amphibians** (no evidence = 0; common, numerous types = max points)	0 – 4	0 – 4	0 – 4	0
	22	**Presence of fish** (no evidence = 0; common, numerous types = max points)	0 – 4	0 – 4	0 – 4	0
	23	**Evidence of wildlife use** (no evidence = 0; abundant evidence = max points)	0 – 6	0 – 5	0 – 5	2
Total Points Possible			100	100	100	
TOTAL SCORE (also enter on first page)						28

* These characteristics are not assessed in coastal streams.

DE3

STREAM QUALITY ASSESSMENT WORKSHEET

	#	CHARACTERISTICS	ECOREGION POINT RANGE			SCORE
			Coastal	Piedmont	Mountain	
PHYSICAL	1	**Presence of flow / persistent pools in stream** (no flow or saturation = 0; strong flow = max points)	0 – 5	0 – 4	0 – 5	4
	2	**Evidence of past human alteration** (extensive alteration = 0; no alteration = max points)	0 – 6	0 – 5	0 – 5	0
	3	**Riparian zone** (no buffer = 0; contiguous, wide buffer = max points)	0 – 6	0 – 4	0 – 5	4
	4	**Evidence of nutrient or chemical discharges** (extensive discharges = 0; no discharges = max points)	0 – 5	0 – 4	0 – 4	4
	5	**Groundwater discharge** (no discharge = 0; springs, seeps, wetlands, etc. = max points)	0 – 3	0 – 4	0 – 4	0
	6	**Presence of adjacent floodplain** (no floodplain = 0; extensive floodplain = max points)	0 – 4	0 – 4	0 – 2	0
	7	**Entrenchment / floodplain access** (deeply entrenched = 0; frequent flooding = max points)	0 – 5	0 – 4	0 – 2	0
	8	**Presence of adjacent wetlands** (no wetlands = 0; large adjacent wetlands = max points)	0 – 6	0 – 4	0 – 2	1
	9	**Channel sinuosity** (extensive channelization = 0; natural meander = max points)	0 – 5	0 – 4	0 – 3	1
	10	**Sediment input** (extensive deposition= 0; little or no sediment = max points)	0 – 5	0 – 4	0 – 4	4
	11	**Size & diversity of channel bed substrate** (fine, homogenous = 0; large, diverse sizes = max points)	NA*	0 – 4	0 – 5	NA
STABILITY	12	**Evidence of channel incision or widening** (deeply incised = 0; stable bed & banks = max points)	0 – 5	0 – 4	0 – 5	0
	13	**Presence of major bank failures** (severe erosion = 0; no erosion, stable banks = max points)	0 – 5	0 – 5	0 – 5	2
	14	**Root depth and density on banks** (no visible roots = 0; dense roots throughout = max points)	0 – 3	0 – 4	0 – 5	1
	15	**Impact by agriculture, livestock, or timber production** (substantial impact =0; no evidence = max points)	0 – 5	0 – 4	0 – 5	2
HABITAT	16	**Presence of riffle-pool/ripple-pool complexes** (no riffles/ripples or pools = 0; well-developed = max points)	0 – 3	0 – 5	0 – 6	1
	17	**Habitat complexity** (little or no habitat = 0; frequent, varied habitats = max points)	0 – 6	0 – 6	0 – 6	1
	18	**Canopy coverage over streambed** (no shading vegetation = 0; continuous canopy = max points)	0 – 5	0 – 5	0 – 5	3
	19	**Substrate embeddedness** (deeply embedded = 0; loose structure = max)	NA*	0 – 4	0 – 4	NA
BIOLOGY	20	**Presence of stream invertebrates** (see page 4) (no evidence = 0; common, numerous types = max points)	0 – 4	0 – 5	0 – 5	0
	21	**Presence of amphibians** (no evidence = 0; common, numerous types = max points)	0 – 4	0 – 4	0 – 4	0
	22	**Presence of fish** (no evidence = 0; common, numerous types = max points)	0 – 4	0 – 4	0 – 4	0
	23	**Evidence of wildlife use** (no evidence = 0; abundant evidence = max points)	0 – 6	0 – 5	0 – 5	2
Total Points Possible			100	100	100	
TOTAL SCORE (also enter on first page)						30

* These characteristics are not assessed in coastal streams.

DE 8

STREAM QUALITY ASSESSMENT WORKSHEET

	#	CHARACTERISTICS	ECOREGION POINT RANGE			SCORE
			Coastal	Piedmont	Mountain	
PHYSICAL	1	**Presence of flow / persistent pools in stream** (no flow or saturation = 0; strong flow = max points)	0 – 5	0 – 4	0 – 5	2
	2	**Evidence of past human alteration** (extensive alteration = 0; no alteration = max points)	0 – 6	0 – 5	0 – 5	3
	3	**Riparian zone** (no buffer = 0; contiguous, wide buffer = max points)	0 – 6	0 – 4	0 – 5	3
	4	**Evidence of nutrient or chemical discharges** (extensive discharges = 0; no discharges = max points)	0 – 5	0 – 4	0 – 4	3
	5	**Groundwater discharge** (no discharge = 0; springs, seeps, wetlands, etc. = max points)	0 – 3	0 – 4	0 – 4	2
	6	**Presence of adjacent floodplain** (no floodplain = 0; extensive floodplain = max points)	0 – 4	0 – 4	0 – 2	2
	7	**Entrenchment / floodplain access** (deeply entrenched = 0; frequent flooding = max points)	0 – 5	0 – 4	0 – 2	1
	8	**Presence of adjacent wetlands** (no wetlands = 0; large adjacent wetlands = max points)	0 – 6	0 – 4	0 – 2	3
	9	**Channel sinuosity** (extensive channelization = 0; natural meander = max points)	0 – 5	0 – 4	0 – 3	2
	10	**Sediment input** (extensive deposition= 0; little or no sediment = max points)	0 – 5	0 – 4	0 – 4	1
	11	**Size & diversity of channel bed substrate** (fine, homogenous = 0; large, diverse sizes = max points)	NA*	0 – 4	0 – 5	NA
STABILITY	12	**Evidence of channel incision or widening** (deeply incised = 0; stable bed & banks = max points)	0 – 5	0 – 4	0 – 5	4
	13	**Presence of major bank failures** (severe erosion = 0; no erosion, stable banks = max points)	0 – 5	0 – 5	0 – 5	4
	14	**Root depth and density on banks** (no visible roots = 0; dense roots throughout = max points)	0 – 3	0 – 4	0 – 5	1
	15	**Impact by agriculture, livestock, or timber production** (substantial impact =0; no evidence = max points)	0 – 5	0 – 4	0 – 5	2
HABITAT	16	**Presence of riffle-pool/ripple-pool complexes** (no riffles/ripples or pools = 0; well-developed = max points)	0 – 3	0 – 5	0 – 6	0
	17	**Habitat complexity** (little or no habitat = 0; frequent, varied habitats = max points)	0 – 6	0 – 6	0 – 6	1
	18	**Canopy coverage over streambed** (no shading vegetation = 0; continuous canopy = max points)	0 – 5	0 – 5	0 – 5	2
	19	**Substrate embeddedness** (deeply embedded = 0; loose structure = max)	NA*	0 – 4	0 – 4	NA
BIOLOGY	20	**Presence of stream invertebrates** (see page 4) (no evidence = 0; common, numerous types = max points)	0 – 4	0 – 5	0 – 5	0
	21	**Presence of amphibians** (no evidence = 0; common, numerous types = max points)	0 – 4	0 – 4	0 – 4	0
	22	**Presence of fish** (no evidence = 0; common, numerous types = max points)	0 – 4	0 – 4	0 – 4	0
	23	**Evidence of wildlife use** (no evidence = 0; abundant evidence = max points)	0 – 6	0 – 5	0 – 5	2
Total Points Possible			100	100	100	
TOTAL SCORE (also enter on first page)						38

* These characteristics are not assessed in coastal streams.

DE 7

STREAM QUALITY ASSESSMENT WORKSHEET

	#	CHARACTERISTICS	ECOREGION POINT RANGE			SCORE
			Coastal	Piedmont	Mountain	
PHYSICAL	1	**Presence of flow / persistent pools in stream** (no flow or saturation = 0; strong flow = max points)	0 – 5	0 – 4	0 – 5	3
	2	**Evidence of past human alteration** (extensive alteration = 0; no alteration = max points)	0 – 6	0 – 5	0 – 5	2
	3	**Riparian zone** (no buffer = 0; contiguous, wide buffer = max points)	0 – 6	0 – 4	0 – 5	3
	4	**Evidence of nutrient or chemical discharges** (extensive discharges = 0; no discharges = max points)	0 – 5	0 – 4	0 – 4	3
	5	**Groundwater discharge** (no discharge = 0; springs, seeps, wetlands, etc. = max points)	0 – 3	0 – 4	0 – 4	1
	6	**Presence of adjacent floodplain** (no floodplain = 0; extensive floodplain = max points)	0 – 4	0 – 4	0 – 2	0
	7	**Entrenchment / floodplain access** (deeply entrenched = 0; frequent flooding = max points)	0 – 5	0 – 4	0 – 2	1
	8	**Presence of adjacent wetlands** (no wetlands = 0; large adjacent wetlands = max points)	0 – 6	0 – 4	0 – 2	2
	9	**Channel sinuosity** (extensive channelization = 0; natural meander = max points)	0 – 5	0 – 4	0 – 3	1
	10	**Sediment input** (extensive deposition= 0; little or no sediment = max points)	0 – 5	0 – 4	0 – 4	4
	11	**Size & diversity of channel bed substrate** (fine, homogenous = 0; large, diverse sizes = max points)	NA*	0 – 4	0 – 5	NA
STABILITY	12	**Evidence of channel incision or widening** (deeply incised = 0; stable bed & banks = max points)	0 – 5	0 – 4	0 – 5	1
	13	**Presence of major bank failures** (severe erosion = 0; no erosion, stable banks = max points)	0 – 5	0 – 5	0 – 5	2
	14	**Root depth and density on banks** (no visible roots = 0; dense roots throughout = max points)	0 – 3	0 – 4	0 – 5	1
	15	**Impact by agriculture, livestock, or timber production** (substantial impact =0; no evidence = max points)	0 – 5	0 – 4	0 – 5	2
HABITAT	16	**Presence of riffle-pool/ripple-pool complexes** (no riffles/ripples or pools = 0; well-developed = max points)	0 – 3	0 – 5	0 – 6	1
	17	**Habitat complexity** (little or no habitat = 0; frequent, varied habitats = max points)	0 – 6	0 – 6	0 – 6	2
	18	**Canopy coverage over streambed** (no shading vegetation = 0; continuous canopy = max points)	0 – 5	0 – 5	0 – 5	3
	19	**Substrate embeddedness** (deeply embedded = 0; loose structure = max)	NA*	0 – 4	0 – 4	NA
BIOLOGY	20	**Presence of stream invertebrates** (see page 4) (no evidence = 0; common, numerous types = max points)	0 – 4	0 – 5	0 – 5	0
	21	**Presence of amphibians** (no evidence = 0; common, numerous types = max points)	0 – 4	0 – 4	0 – 4	0
	22	**Presence of fish** (no evidence = 0; common, numerous types = max points)	0 – 4	0 – 4	0 – 4	0
	23	**Evidence of wildlife use** (no evidence = 0; abundant evidence = max points)	0 – 6	0 – 5	0 – 5	2
Total Points Possible			100	100	100	
TOTAL SCORE (also enter on first page)						34

* These characteristics are not assessed in coastal streams.

Appendix I

Waters of the US Jurisdictional Determination and Delineation Package

U.S. ARMY CORPS OF ENGINEERS
WILMINGTON DISTRICT

Action Id. **SAW-2021-00392** County: **Sampson** U.S.G.S. Quad: **NC-Faison**

NOTIFICATION OF JURISDICTIONAL DETERMINATION

Requestor: **RES**
Matt DeAngelo
Address: **3600 Glenwood Avenue, Suite 100**
Raleigh, NC 27612
Telephone Number: **757.202.4471**
E-mail: **mdeangelo@res.us**

Size (acres) **35.8**
Nearest Waterway **Six Runs Creek**
USGS HUC **03030006**
Nearest Town **Faison**
River Basin **Cape Fear**
Coordinates Latitude: **35.096035**
Longitude: **-78.231**

Location description: **The project area is located on the east and west sides of East Darden Road, north of the crossroads between Faison Highway, Brewer Road, and Lake Artesia Road in Faison, Sampson County, North Carolina.**

Indicate Which of the Following Apply:

A. Preliminary Determination

☒ There appear to be **waters, including wetlands** on the above described project area/property, that may be subject to Section 404 of the Clean Water Act (CWA)(33 USC § 1344) and/or Section 10 of the Rivers and Harbors Act (RHA) (33 USC § 403). The **waters, including wetlands,** have been delineated, and the delineation has been verified by the Corps to be sufficiently accurate and reliable. The approximate boundaries of these waters are shown on the enclosed delineation map dated **7/23/2021**. Therefore, this preliminary jurisdiction determination may be used in the permit evaluation process, including determining compensatory mitigation. For purposes of computation of impacts, compensatory mitigation requirements, and other resource protection measures, a permit decision made on the basis of a preliminary JD will treat all waters and wetlands that would be affected in any way by the permitted activity on the site as if they are jurisdictional waters of the U.S. This preliminary determination is not an appealable action under the Regulatory Program Administrative Appeal Process (Reference 33 CFR Part 331). However, you may request an approved JD, which is an appealable action, by contacting the Corps district for further instruction.

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

B. Approved Determination

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

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

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

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

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

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

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

☐ The property is located in one of the 20 Coastal Counties subject to regulation under the Coastal Area Management Act (CAMA). You should contact the Division of Coastal Management in **in Wilmington, NC, at (910) 796-7215** to determine their requirements.

Placement of dredged or fill material within waters of the US, including wetlands, without a Department of the Army permit may constitute a violation of Section 301 of the Clean Water Act (33 USC § 1311). Placement of dredged or fill material, construction or placement of structures, or work within navigable waters of the United States without a Department of the Army permit may constitute a violation of Sections 9 and/or 10 of the Rivers and Harbors Act (33 USC § 401 and/or 403). If you have any questions regarding this determination and/or the Corps regulatory program, please contact **Emily Greer at 910.251.4567 or emily.c.greer@usace.army.mil**.

C. Basis For Determination: Basis For Determination: See the preliminary jurisdictional determination form dated 7/23/2021.

D. Remarks: *NA*

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)**

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: Mr. Philip A. Shannin
Administrative Appeal Review Officer
60 Forsyth Street SW, Floor M9
Atlanta, Georgia 30303-8803
PHILIP.A.SHANNIN@USACE.ARMY.MIL

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

Corps Regulatory Official: Emily Greer Digitally signed by Emily Greer Date: 2021.07.23 16:36:35 -07'00'

Date of JD: **7/23/2021** Expiration Date of JD: **Not applicable**

SAW-2021-00392

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 https://regulatory.ops.usace.army.mil/customer-service-survey/.

Copy Furnished:

Property Owner: **Evans Farm Site**
Daniel Chad Evans
Address: **3406 East Darden Road**
Faison, NC 28341

Property Owner: **Joan Troublefield**
826 Faison Highway
Faison, NC 28341

NOTIFICATION OF ADMINISTRATIVE APPEAL OPTIONS AND PROCESS AND REQUEST FOR APPEAL

Applicant: **RES**, **Matt DeAngelo**	File Number: **SAW-2021-00392**	Date: **7/23/2021**

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

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

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

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

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

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

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

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

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

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

SECTION II - REQUEST FOR APPEAL or OBJECTIONS TO AN INITIAL PROFFERED PERMIT

REASONS FOR APPEAL OR OBJECTIONS: (Describe your reasons for appealing the decision or your objections to an initial proffered permit in clear concise statements. You may attach additional information to this form to clarify where your reasons or objections are addressed in the administrative record.)

ADDITIONAL INFORMATION: The appeal is limited to a review of the administrative record, the Corps memorandum for the record of the appeal conference or meeting, and any supplemental information that the review officer has determined is needed to clarify the administrative record. Neither the appellant nor the Corps may add new information or analyses to the record. However, you may provide additional information to clarify the location of information that is already in the administrative record.

POINT OF CONTACT FOR QUESTIONS OR INFORMATION:

If you have questions regarding this decision and/or the appeal process you may contact:	If you only have questions regarding the appeal process you may also contact:
District Engineer, Wilmington Regulatory Division **Attn: Emily Greer** **Wilmington Regulatory Office** **U.S Army Corps of Engineers** **69 Darlington Avenue** **Wilmington, North Carolina 28403**	MR. PHILIP A. SHANNIN ADMINISTRATIVE APPEAL REVIEW OFFICER CESAD-PDS-O 60 FORSYTH STREET SOUTHWEST, FLOOR M9 ATLANTA, GEORGIA 30303-8803 PHONE: (404) 562-5136; FAX (404) 562-5138 EMAIL: PHILIP.A.SHANNIN@USACE.ARMY.MIL

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.

	Date:	Telephone number:
_____ Signature of appellant or agent.		

For appeals on Initial Proffered Permits send this form to:

District Engineer, Wilmington Regulatory Division, Attn: Emily Greer, 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. Philip Shannin, Administrative Appeal Officer, CESAD-PDO, 60 Forsyth Street, Room 10M15, Atlanta, Georgia 30303-8801
Phone: (404) 562-5137

PRELIMINARY JURISDICTIONAL DETERMINATION (PJD) FORM

BACKGROUND INFORMATION

A. **REPORT COMPLETION DATE FOR PJD:** 7/23/2021

B. **NAME AND ADDRESS OF PERSON REQUESTING PJD:** RES, Matt DeAngelo, 3600 Glenwood Avenue, Suite 100, Raleigh, NC 27612

C. **DISTRICT OFFICE, FILE NAME, AND NUMBER:** Wilmington District, Six Runs Mitigation Bank / Faison / Sampson / Daniel Evans, SAW-2021-00392

D. **PROJECT LOCATION(S) AND BACKGROUND INFORMATION:** The project area is located on the east and west sides of East Darden Road, north of the crossroads between Faison Highway, Brewer Road, and Lake Artesia Road in Faison, Sampson County, North Carolina.

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

State: NC County: Sampson City: Faison
Center coordinates of site (lat/long in degree decimal format): Latitude: 35.096035 Longitude: -78.231

Universal Transverse Mercator:

Name of nearest waterbody: Six Runs Creek

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

☒Office (Desk) Determination. Date: 04/03/2021

☐Field Determination. Date(s):

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

Site Number	Latitude (decimal degrees)	Longitude (decimal degrees)	Estimated amount of aquatic resources in review area (acreage and linear feet, if applicable	Type of aquatic resources (i.e., wetland vs. non-wetland waters)	Geographic authority to which the aquatic resource "may be" subject (i.e., Section 404 or Section 10/404)
See Attached Table of Preliminary Waters of the US					

1. The Corps of Engineers believes that there may be jurisdictional aquatic resources in the review area, and the requestor of this PJD is hereby advised of his or her option to request and obtain an approved JD (AJD) for that review area based on an informed decision after having discussed the various types of JDs and their characteristics and circumstances when they may be appropriate.
2. In any circumstance where a permit applicant obtains an individual permit, or a Nationwide General Permit (NWP) or other general permit verification requiring "pre- construction notification" (PCN), or requests verification for a non-reporting NWP or other general permit, and the permit applicant has not requested an AJD for the activity, the permit

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

SUPPORTING DATA. Data reviewed for PJD (check all that apply) Checked items are included in the administrative record and are appropriately cited:

☒Maps, plans, plots or plat submitted by or on behalf of the PJD requestor:
Map: **Six Runs Mitigation Project-Potential Wetland or Non-Wetland of the US**

Map dated 07/23/2021

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

☒Office concurs with data sheets/delineation report.

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

☐Data sheets prepared by the Corps:_____

☐Corps navigable waters' study:

☒U.S. Geological Survey Hydrologic Atlas:

☐USGS NHD data:

☒USGS 8 and 12 digit HUC maps:

☒U.S. Geological Survey map(s). Cite scale & quad name: **1:24k, Faison, NC**

☒Natural Resources Conservation Service Soil Survey. Citation: **NRCS Web Soil Survey**

☒National wetlands inventory map(s). Cite name: **USFWS Online Wetland Mapper**

☐State/local wetland inventory map(s):_____

☒FEMA/FIRM maps: **FEMA.gov**

☐100-year Floodplain Elevation is:_____ (National Geodetic Vertical Datum of 1929)

☒Photographs: ☒ Aerial (Name & Date): **National Regulatory GIS Viewer**

or ☐ Other (Name & Date):

☐Previous determination(s). File no. and date of response letter:_____

☒Other information (please specify): **LiDAR**

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.

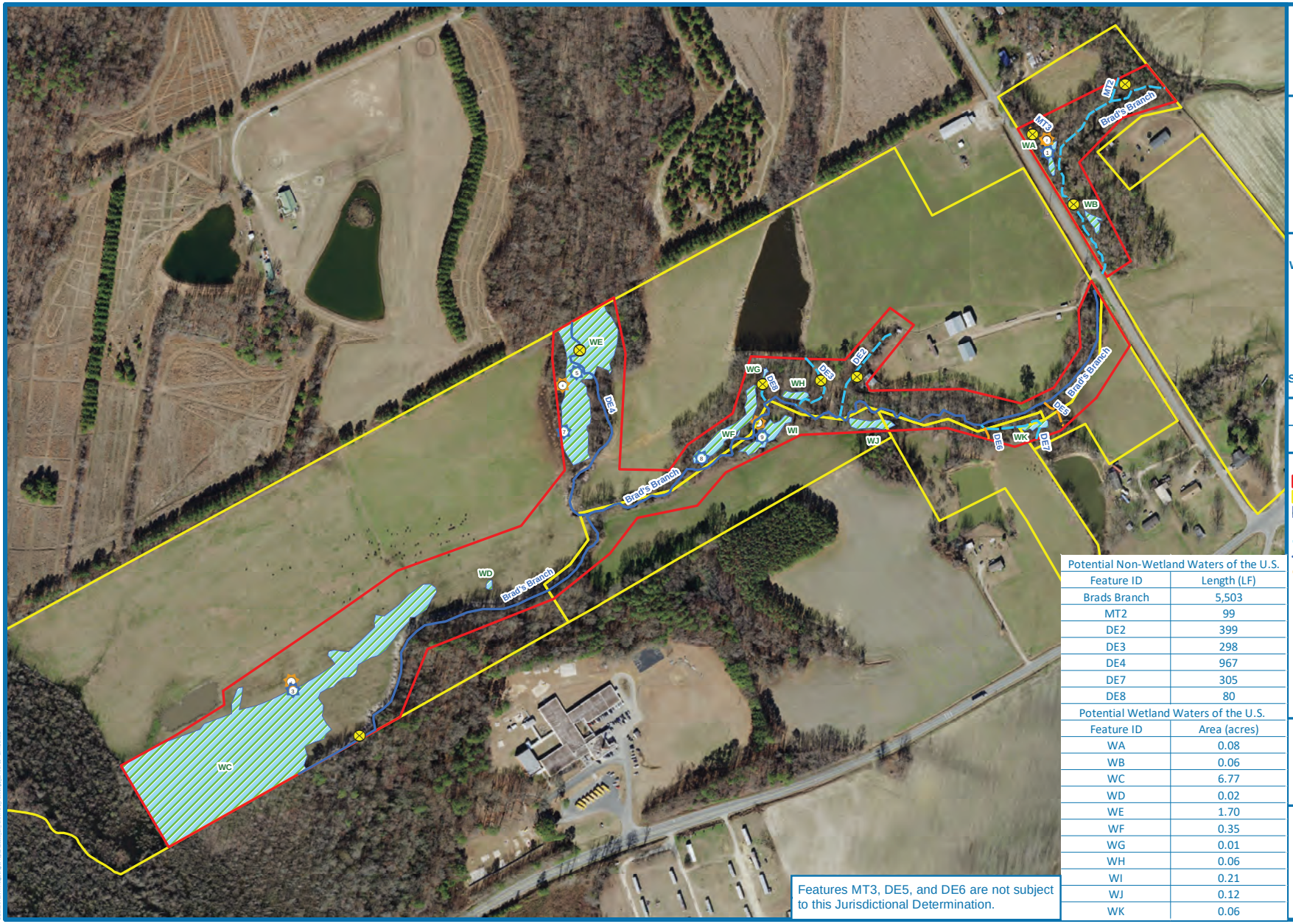
Emily Greer Digitally signed by Emily Greer
Date: 2021.07.23 16:37:22
-07'00'

Signature and date of Regulatory staff member completing PJD
7/23/2021

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

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

Waters_Name	State	Cowardin_Code	HGM_Code	Meas_Type	Amount	Units	Waters_Type	Latitude	Longitude	Local_Waterway
Brad's Branch	NORTH CAROLINA	R3		Linear	5502.8295	FOOT	DELINEATE	35.098836	-78.23029	
MT2	NORTH CAROLINA	R4		Linear	98.821177	FOOT	DELINEATE	35.098918	-78.230097	
DE2	NORTH CAROLINA	R4		Linear	398.504929	FOOT	DELINEATE	35.09655500	-78.23291900	
DE3	NORTH CAROLINA	R4		Linear	297.55517	FOOT	DELINEATE	35.09624500	-78.23403100	
DE4	NORTH CAROLINA	R3		Linear	967.197057	FOOT	DELINEATE	35.09664300	-78.23700300	
DE7	NORTH CAROLINA	R4		Linear	305.462746	FOOT	DELINEATE	35.09511300	-78.23091700	
DE8	NORTH CAROLINA	R4		Linear	80.209888	FOOT	DELINEATE	35.09597100	-78.23456500	
WA	NORTH CAROLINA	PFO		Area	0.080575	ACRE	DELINEATE	35.09835700	-78.23086700	
WB	NORTH CAROLINA	PFO		Area	0.057297	ACRE	DELINEATE	35.09766300	-78.23032000	
WC	NORTH CAROLINA	PEM		Area	6.774087	ACRE	DELINEATE	35.09226600	-78.24117400	
WD	NORTH CAROLINA	PEM		Area	0.016411	ACRE	DELINEATE	35.09389500	-78.23808300	
WE	NORTH CAROLINA	PFO		Area	1.701318	ACRE	DELINEATE	35.09608500	-78.23685500	
WF	NORTH CAROLINA	PFO		Area	0.345838	ACRE	DELINEATE	35.09550800	-78.23501100	
WG	NORTH CAROLINA	PFO		Area	0.01471	ACRE	DELINEATE	35.09607400	-78.23454400	
WH	NORTH CAROLINA	PFO		Area	0.059509	ACRE	DELINEATE	35.09586200	-78.23414800	
WI	NORTH CAROLINA	PFO		Area	0.205121	ACRE	DELINEATE	35.09544600	-78.23452100	
WJ	NORTH CAROLINA	PFO		Area	0.123242	ACRE	DELINEATE	35.09555500	-78.23319200	
WK	NORTH CAROLINA	PFO		Area	0.059952	ACRE	DELINEATE	35.09552300	-78.23110100	



Features MT3, DE5, and DE6 are not subject to this Jurisdictional Determination.

Potential Non-Wetland Waters of the U.S.	
Feature ID	Length (LF)
Brads Branch	5,503
MT2	99
DE2	399
DE3	298
DE4	967
DE7	305
DE8	80
Potential Wetland Waters of the U.S.	
Feature ID	Area (acres)
WA	0.08
WB	0.06
WC	6.77
WD	0.02
WE	1.70
WF	0.35
WG	0.01
WH	0.06
WI	0.21
WJ	0.12
WK	0.06

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1 in = 350 feet

Potential Wetland or Non-Wetland Waters of the U.S. Map

Six Runs Mitigation Project

Sampson County, North Carolina

Date: 7/23/2021	Drawn by: HKH
Revisions: NONE	Checked by: MDD

Legend

- Study Area (35.8 ac)
- Parcels
- Potential Wetland Waters of the US
- Potential Non Wetland Waters of the US
- Intermittent
- Perennial
- Other Drainage Feature
- Wetland Data Point
- Upland Data Point
- Stream ID Form Location

REFERENCE

1) Horizontal Datum is NAD83 UTM Zone 17N.

2) Map Projection is NAD_1983_StatePlane_North_Carolina_FIPS_3200_Feet

Features MT3, DE5, and DE6 are not subject to this Jurisdictional Determination.

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Potential Wetland or Non-Wetland Waters of the U.S. Map

Page 1 of 4

Six Runs Mitigation Project

Sampson County, North Carolina

Date: 7/23/2021	Drawn by: HKH
Revisions: NONE	Checked by: MDD

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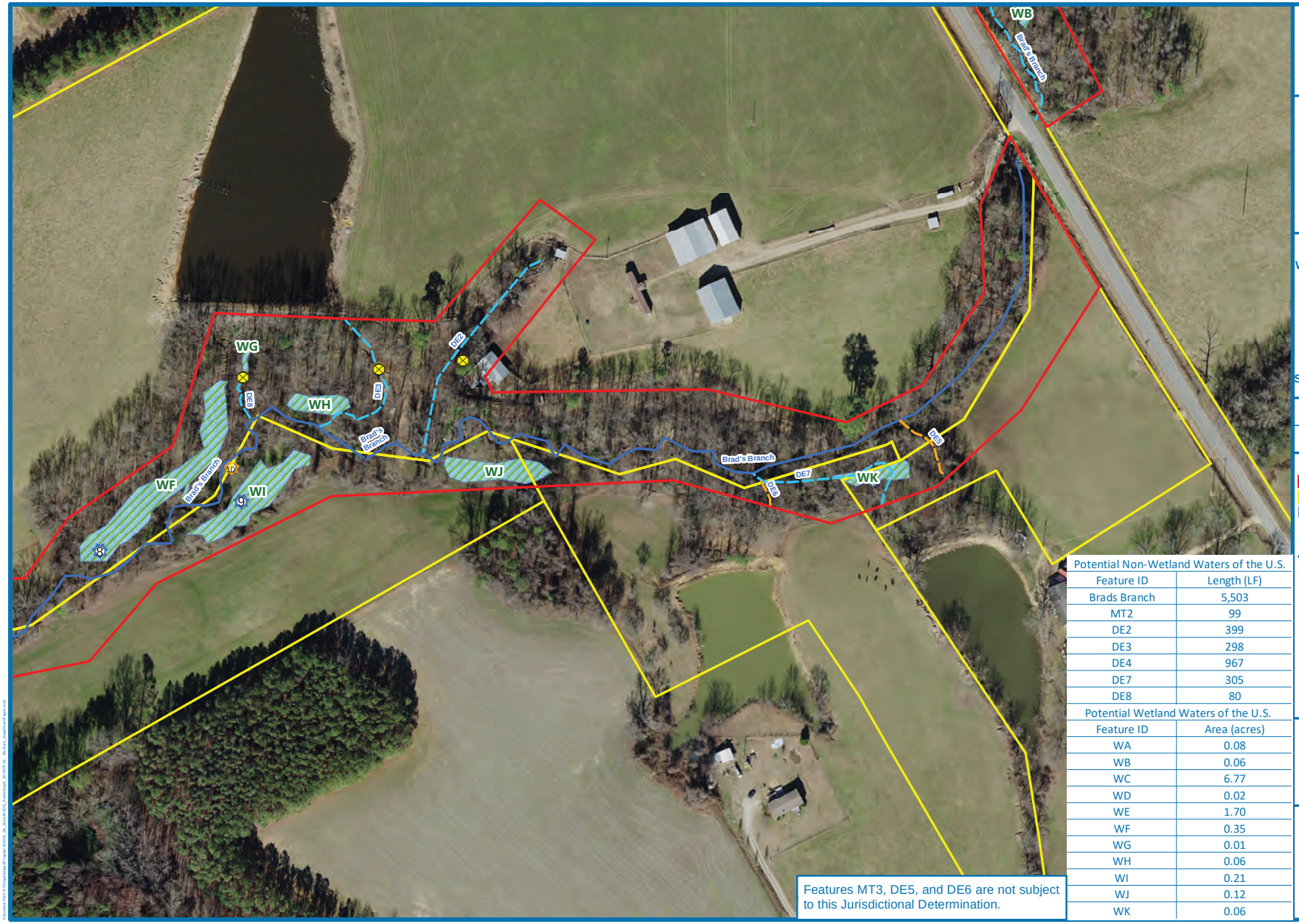

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Potential Wetland or Non-Wetland Waters of the U.S. Map

Page 2 of 4

Six Runs Mitigation Project

Sampson County, North Carolina

Date: 7/23/2021	Drawn by: HKH
Revisions: NONE	Checked by: MDD

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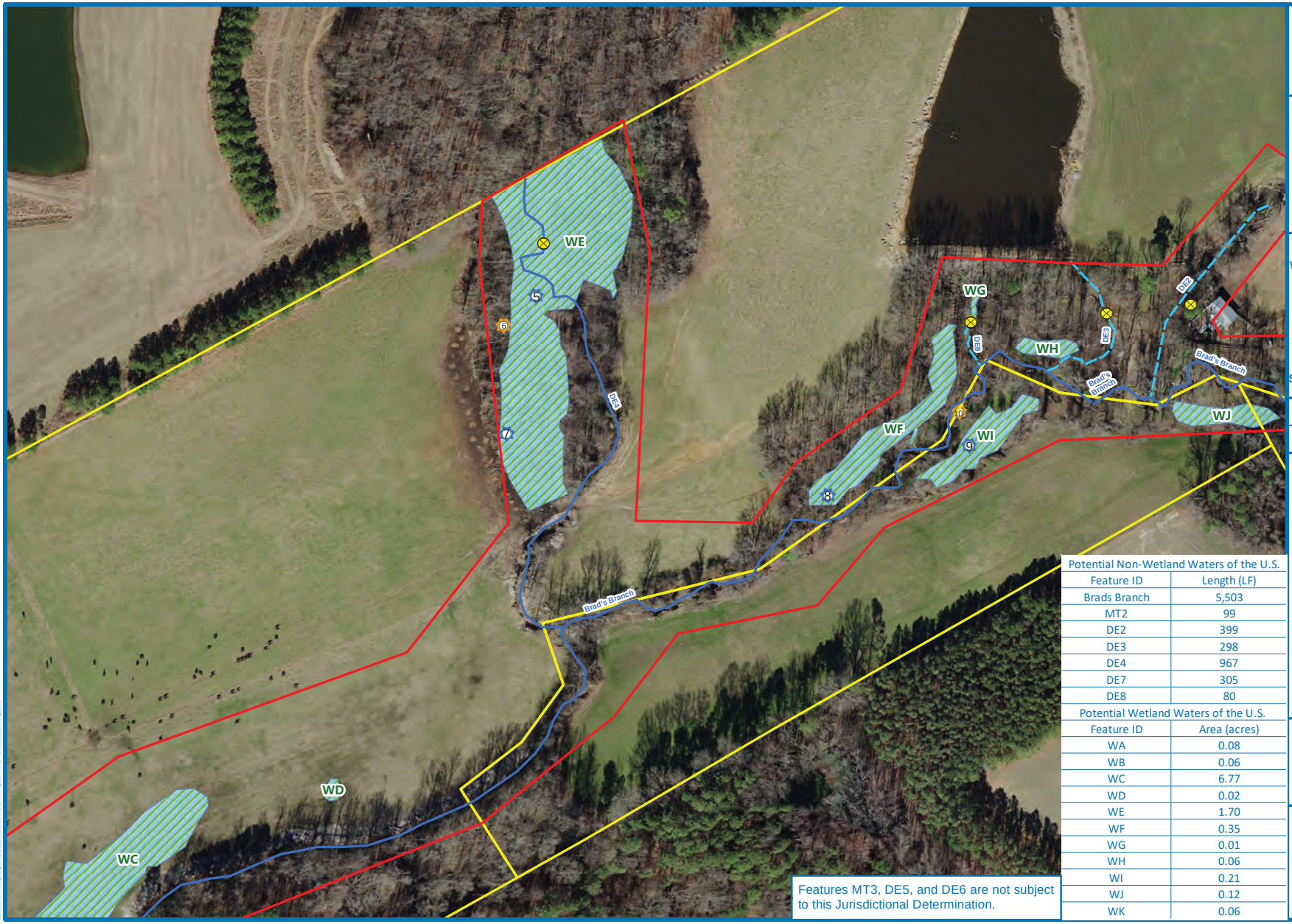

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Feet
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Potential Wetland or Non-Wetland Waters of the U.S. Map

Page 3 of 4

Six Runs Mitigation Project

Sampson County, North Carolina

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Revisions: NONE	Checked by: MDD

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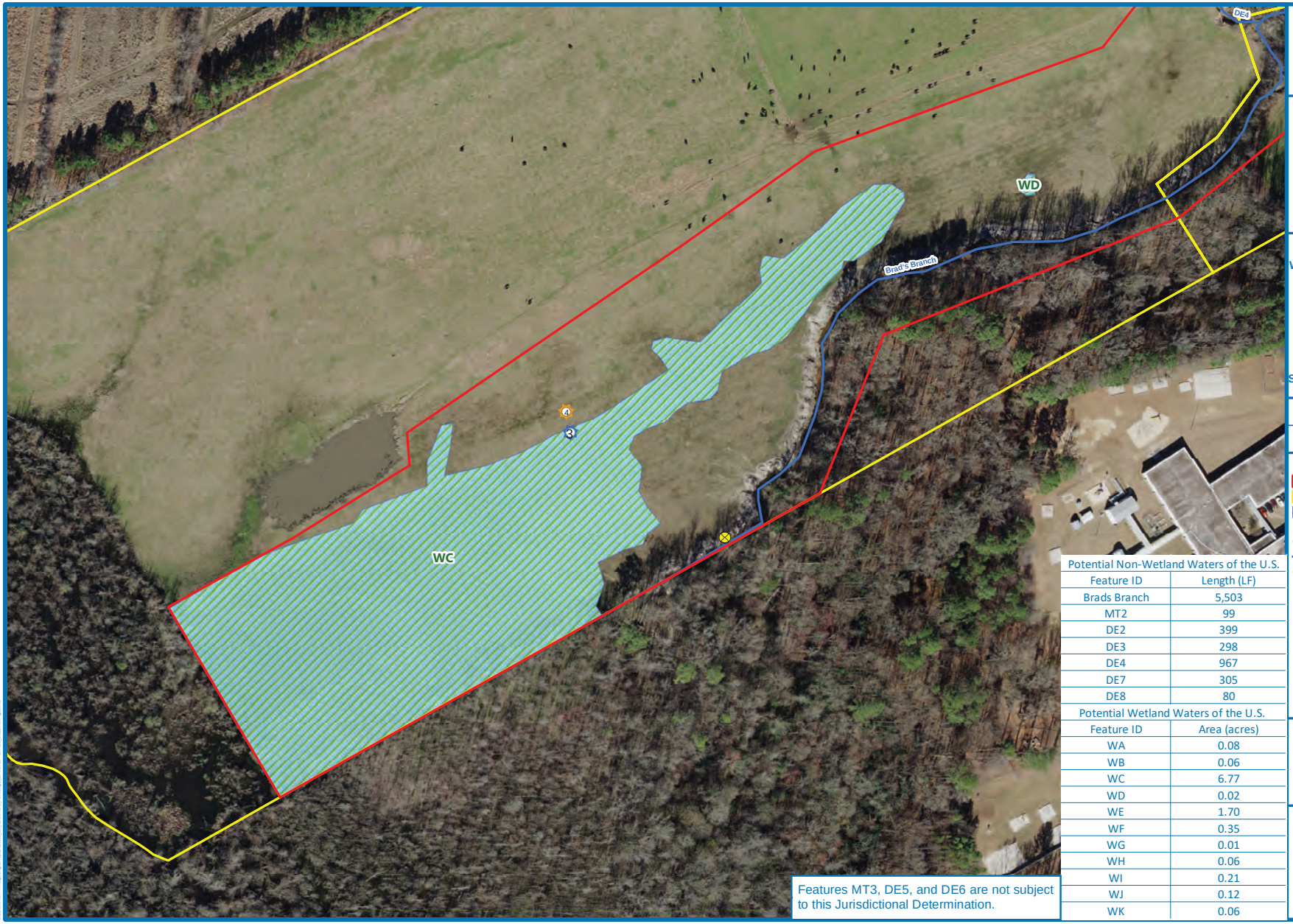

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WF	0.35
WG	0.01
WH	0.06
WI	0.21
WJ	0.12
WK	0.06

res

N
W E
S

0 75 150
Feet
1 in = 150 feet

Potential Wetland or Non-Wetland Waters of the U.S. Map

Page 4 of 4

Six Runs Mitigation Project

Sampson County, North Carolina

Date: 7/23/2021	Drawn by: HKH
Revisions: NONE	Checked by: MDD

Legend

- Study Area (35.8 ac)
- Parcels
- Potential Wetland Waters of the US
- Potential Non Wetland Waters of the US
- Intermittent
- Perennial
- Other Drainage Feature
- Wetland Data Point
- Upland Data Point
- Stream ID Form Location

REFERENCE

1) Horizontal Datum is NAD83 UTM Zone 17N.

2) Map Projection is NAD_1983_StatePlane_North_Carolina_FIPS_3200_Feet

WETLAND DETERMINATION DATA FORM - Atlantic and Gulf Coastal Plain Region

Project/Site: Six Runs **City/County:** Sampson County **Sampling Date:** 26-Jan-21

Applicant/Owner: Resource Environmental Solutions **State:** NC **Sampling Point:** DP-1

Investigator(s): M. DeAngelo, H. Hidlay **Section, Township, Range:** S T R

Landform (hillslope, terrace, etc.): Floodplain **Local relief (concave, convex, none):** concave **Slope:** 0.0 % / 0.0 °

Subregion (LRR or MLRA): MLRA 133A in LRR P **Lat.:** 35.098399 **Long.:** -78.230907 **Datum:** NAD83

Soil Map Unit Name: Norfolk loamy sand, 2 to 6 percent slopes **NWI classification:** PFO

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 ◉ No ○	**Is the Sampled Area within a Wetland?** Yes ◉ No ○
Hydric Soil Present?	Yes ◉ No ○	
Wetland Hydrology Present?	Yes ◉ No ○	

Remarks:
Highly impacted by cattle trampling and grazing

HYDROLOGY

Wetland Hydrology Indicators:

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

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☑ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift Deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Aquatic Fauna (B13)
- ☐ Marl Deposits (B15) (LRR U)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (minimum of 2 required)

- ☐ Surface Soil Cracks (B6)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☑ Drainage Patterns (B10)
- ☐ Moss Trim Lines (B16)
- ☐ Dry Season Water Table (C2)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☑ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☑ FAC-Neutral Test (D5)
- ☐ Sphagnum moss (D8) (LRR T, U)

Field Observations:

Surface Water Present?	Yes ○	No ◉	Depth (inches):
Water Table Present?	Yes ○	No ◉	Depth (inches):
Saturation Present? (includes capillary fringe)	Yes ◉	No ○	Depth (inches): 0

Wetland Hydrology Present? Yes ◉ No ○

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

Remarks:

VEGETATION (Five/Four Strata) - Use scientific names of plants.

Sampling Point: DP-1

	Absolute % Cover	Dominant Species?	Rel.Strat. Cover	Indicator Status
Tree Stratum (Plot size: 30)				
1. Liquidambar styraciflua	15	☑	60.0%	FAC
2. Carpinus caroliniana	5	☑	20.0%	FAC
3. Acer rubrum	5	☑	20.0%	FAC
4.	0	☐	0.0%	
5.	0	☐	0.0%	
6.	0	☐	0.0%	
7.	0	☐	0.0%	
8.	0	☐	0.0%	
50% of Total Cover: 12.5	20% of Total Cover: 5	25	= Total Cover	
Sapling or Sapling/Shrub Stratum (Plot size: 30)				
1. Carpinus caroliniana	15	☑	60.0%	FAC
2. Acer rubrum	10	☑	40.0%	FAC
3.	0	☐	0.0%	
4.	0	☐	0.0%	
5.	0	☐	0.0%	
6.	0	☐	0.0%	
7.	0	☐	0.0%	
8.	0	☐	0.0%	
50% of Total Cover: 12.5	20% of Total Cover: 5	25	= Total Cover	
Shrub Stratum (Plot size: 30)				
1.	0	☐	0.0%	
2.	0	☐	0.0%	
3.	0	☐	0.0%	
4.	0	☐	0.0%	
5.	0	☐	0.0%	
6.	0	☐	0.0%	
50% of Total Cover: 0	20% of Total Cover: 0	0	= Total Cover	
Herb Stratum (Plot size: 30)				
1. Juncus effusus	10	☑	100.0%	OBL
2.	0	☐	0.0%	
3.	0	☐	0.0%	
4.	0	☐	0.0%	
5.	0	☐	0.0%	
6.	0	☐	0.0%	
7.	0	☐	0.0%	
8.	0	☐	0.0%	
9.	0	☐	0.0%	
10.	0	☐	0.0%	
11.	0	☐	0.0%	
12.	0	☐	0.0%	
50% of Total Cover: 5	20% of Total Cover: 2	10	= Total Cover	
Woody Vine Stratum (Plot size: 30)				
1. Smilax laurifolia	5	☑	100.0%	FACW
2.	0	☐	0.0%	
3.	0	☐	0.0%	
4.	0	☐	0.0%	
5.	0	☐	0.0%	
50% of Total Cover: 2.5	20% of Total Cover: 1	5	= Total Cover	

Dominance Test worksheet:

Number of Dominant Species That are OBL, FACW, or FAC: 7 (A)

Total Number of Dominant Species Across All Strata: 7 (B)

Percent of dominant Species That Are OBL, FACW, or FAC: 100.0% (A/B)

Prevalence Index worksheet:

	Total % Cover of:	Multiply by:		
OBL species	10	**x 1 =**	10	
FACW species	5	**x 2 =**	10	
FAC species	50	**x 3 =**	150	
FACU species	0	**x 4 =**	0	
UPL species	0	**x 5 =**	0	
Column Totals:	65	**(A)**	170	**(B)**

Prevalence Index = B/A = 2.615

Hydrophytic Vegetation Indicators:

- ☐ **1 - Rapid Test for Hydrophytic Vegetation**
- ☑ **2 - Dominance Test is > 50%**
- ☑ **3 - Prevalence Index is ≤3.0** [1]
- ☐ **Problematic Hydrophytic Vegetation** [1] **(Explain)**

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

Definition of 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.

Sapling/Shrub - Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1m) tall.

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

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

Woody vine - All woody vines, regardless of height.

Hydrophytic Vegetation Present? Yes ◉ No ○

Remarks: (If observed, list morphological adaptations below).

*Indicator suffix = National status or professional decision assigned because Regional status not defined by FWS.

SOIL

Sampling Point: DP-1

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

Depth (inches)	Matrix Color (moist)		%	Redox Features Color (moist)	%	Type [1]	Loc [2]	Texture	Remarks
0-10	10YR	4/1	100					Silt Loam	
10-18	10YR	5/1	100					Silty Clay Loam	

[1] Type: C=Concentration. D=Depletion. RM=Reduced Matrix, CS=Covered or Coated Sand Grains [2] Location: PL=Pore Lining. M=Matrix

Hydric Soil Indicators:

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5)
- ☐ Organic Bodies (A6) (LRR P, T, U)
- ☐ 5 cm Mucky Mineral (A7) (LRR P, T, U)
- ☐ Muck Presence (A8) (LRR U)
- ☐ 1 cm Muck (A9) (LRR P, T)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Coast Prairie Redox (A16) (MLRA 150A)
- ☐ Sandy Muck Mineral (S1) (LRR O, S)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Dark Surface (S7) (LRR P, S, T, U)
- ☐ Polyvalue Below Surface (S8) (LRR S, T, U)
- ☐ Thin Dark Surface (S9) (LRR S, T, U)
- ☐ Loamy Mucky Mineral (F1) (LRR O)
- ☐ Loamy Gleyed Matrix (F2)
- ☑ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Marl (F10) (LRR U)
- ☐ Depleted Ochric (F11) (MLRA 151)
- ☐ Iron-Manganese Masses (F12) (LRR O, P, T)
- ☐ Umbric Surface (F13) (LRR P, T, U)
- ☐ Delta Ochric (F17) (MLRA 151)
- ☐ Reduced Vertic (F18) (MLRA 150A, 150B)
- ☐ Piedmont Floodplain Soils (F19) (MLRA 149A)
- ☐ Anomalous Bright Loamy Soils (F20) (MLRA 149A, 153C, 153D)

Indicators for Problematic Hydric Soils [3]:

- ☐ 1 cm Muck (A9) (LRR O)
- ☐ 2 cm Muck (A10) (LRR S)
- ☐ Reduced Vertic (F18) (outside MLRA 150A,B)
- ☐ Piedmont Floodplain Soils (F19) (LRR P, S, T)
- ☐ Anomalous Bright Loamy Soils (F20) (MLRA 153B)
- ☐ Red Parent Material (TF2)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ Other (Explain in Remarks)

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

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ◉ No ○

Remarks:

WETLAND DETERMINATION DATA FORM - Atlantic and Gulf Coastal Plain Region

Project/Site: Six Runs **City/County:** Sampson County **Sampling Date:** 26-Jan-21

Applicant/Owner: Resource Environmental Solutions **State:** NC **Sampling Point:** DP-2

Investigator(s): M. DeAngelo, H. Hidlay **Section, Township, Range:** S T R

Landform (hillslope, terrace, etc.): Toeslope **Local relief (concave, convex, none):** flat **Slope:** 0.0 % / 0.0 °

Subregion (LRR or MLRA): MLRA 133A in LRR P **Lat.:** 35.098529 **Long.:** -78.230918 **Datum:** NAD83

Soil Map Unit Name: Norfolk loamy sand, 2 to 6 percent slopes **NWI classification:** Upland

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 ◉ No ○	**Is the Sampled Area within a Wetland?** Yes ○ No ◉
Hydric Soil Present?	Yes ○ No ◉	
Wetland Hydrology Present?	Yes ○ No ◉	

Remarks:
Highly impacted by cattle trampling and grazing

HYDROLOGY

Wetland Hydrology Indicators:

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

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift Deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Aquatic Fauna (B13)
- ☐ Marl Deposits (B15) (LRR U)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (minimum of 2 required)

- ☐ Surface Soil Cracks (B6)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Drainage Patterns (B10)
- ☐ Moss Trim Lines (B16)
- ☐ Dry Season Water Table (C2)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)
- ☐ Sphagnum moss (D8) (LRR T, U)

Field Observations:

Surface Water Present?	Yes ○	No ◉	Depth (inches):
Water Table Present?	Yes ○	No ◉	Depth (inches):
Saturation Present? (includes capillary fringe)	Yes ○	No ◉	Depth (inches):

Wetland Hydrology Present? Yes ○ No ◉

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

Remarks:

VEGETATION (Five/Four Strata) - Use scientific names of plants.

Sampling Point: DP-2

	Absolute % Cover	Dominant Species?	Rel.Strat. Cover	Indicator Status
Tree Stratum (Plot size: 30)				
1. Liquidambar styraciflua	15	☑	75.0%	FAC
2. Ilex opaca	5	☑	25.0%	FAC
3.	0	☐	0.0%	
4.	0	☐	0.0%	
5.	0	☐	0.0%	
6.	0	☐	0.0%	
7.	0	☐	0.0%	
8.	0	☐	0.0%	
50% of Total Cover: 10	20% of Total Cover: 4	20	= Total Cover	
Sapling or Sapling/Shrub Stratum (Plot size: 30)				
1. Ilex opaca	10	☑	100.0%	FAC
2.	0	☐	0.0%	
3.	0	☐	0.0%	
4.	0	☐	0.0%	
5.	0	☐	0.0%	
6.	0	☐	0.0%	
7.	0	☐	0.0%	
8.	0	☐	0.0%	
50% of Total Cover: 5	20% of Total Cover: 2	10	= Total Cover	
Shrub Stratum (Plot size: 30)				
1. Ligustrum sinense	10	☑	100.0%	FAC
2.	0	☐	0.0%	
3.	0	☐	0.0%	
4.	0	☐	0.0%	
5.	0	☐	0.0%	
6.	0	☐	0.0%	
50% of Total Cover: 5	20% of Total Cover: 2	10	= Total Cover	
Herb Stratum (Plot size: 30)				
1. Microstegium vimineum	10	☑	50.0%	FAC
2. Festuca arundinacea	10	☑	50.0%	FAC
3.	0	☐	0.0%	
4.	0	☐	0.0%	
5.	0	☐	0.0%	
6.	0	☐	0.0%	
7.	0	☐	0.0%	
8.	0	☐	0.0%	
9.	0	☐	0.0%	
10.	0	☐	0.0%	
11.	0	☐	0.0%	
12.	0	☐	0.0%	
50% of Total Cover: 10	20% of Total Cover: 4	20	= Total Cover	
Woody Vine Stratum (Plot size: 30)				
1.	0	☐	0.0%	
2.	0	☐	0.0%	
3.	0	☐	0.0%	
4.	0	☐	0.0%	
5.	0	☐	0.0%	
50% of Total Cover: 0	20% of Total Cover: 0	0	= Total Cover	

Dominance Test worksheet:

Number of Dominant Species That are OBL, FACW, or FAC: 6 (A)

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

Percent of dominant Species That Are OBL, FACW, or FAC: 100.0% (A/B)

Prevalence Index worksheet:

	Total % Cover of:	Multiply by:	
OBL species	0	x 1 =	0
FACW species	0	x 2 =	0
FAC species	60	x 3 =	180
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column Totals:	60 (A)		180 (B)

Prevalence Index = B/A = 3.000

Hydrophytic Vegetation Indicators:

- ☐ **1 - Rapid Test for Hydrophytic Vegetation**
- ☑ **2 - Dominance Test is > 50%**
- ☑ **3 - Prevalence Index is ≤3.0** [1]
- ☐ **Problematic Hydrophytic Vegetation** [1] **(Explain)**

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

Definition of 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.

Sapling/Shrub - Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1m) tall.

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

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

Woody vine - All woody vines, regardless of height.

Hydrophytic Vegetation Present? Yes ◉ No ○

Remarks: (If observed, list morphological adaptations below).

*Indicator suffix = National status or professional decision assigned because Regional status not defined by FWS.

SOIL

Sampling Point: DP-2

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

Depth (inches)	Matrix Color (moist)		%	Redox Features Color (moist)	%	Type [1]	Loc [2]	Texture	Remarks
0-2	10YR	2/1	100					Silt Loam	
2-14	10YR	4/2	100					Silt Loam	
14-18	10YR	2/1	100					Silt Loam	

[1] Type: C=Concentration. D=Depletion. RM=Reduced Matrix, CS=Covered or Coated Sand Grains [2] Location: PL=Pore Lining. M=Matrix

Hydric Soil Indicators:

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5)
- ☐ Organic Bodies (A6) (LRR P, T, U)
- ☐ 5 cm Mucky Mineral (A7) (LRR P, T, U)
- ☐ Muck Presence (A8) (LRR U)
- ☐ 1 cm Muck (A9) (LRR P, T)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Coast Prairie Redox (A16) (MLRA 150A)
- ☐ Sandy Muck Mineral (S1) (LRR O, S)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Dark Surface (S7) (LRR P, S, T, U)
- ☐ Polyvalue Below Surface (S8) (LRR S, T, U)
- ☐ Thin Dark Surface (S9) (LRR S, T, U)
- ☐ Loamy Mucky Mineral (F1) (LRR O)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Marl (F10) (LRR U)
- ☐ Depleted Ochric (F11) (MLRA 151)
- ☐ Iron-Manganese Masses (F12) (LRR O, P, T)
- ☐ Umbric Surface (F13) (LRR P, T, U)
- ☐ Delta Ochric (F17) (MLRA 151)
- ☐ Reduced Vertic (F18) (MLRA 150A, 150B)
- ☐ Piedmont Floodplain Soils (F19) (MLRA 149A)
- ☐ Anomalous Bright Loamy Soils (F20) (MLRA 149A, 153C, 153D)

Indicators for Problematic Hydric Soils [3]:

- ☐ 1 cm Muck (A9) (LRR O)
- ☐ 2 cm Muck (A10) (LRR S)
- ☐ Reduced Vertic (F18) (outside MLRA 150A,B)
- ☐ Piedmont Floodplain Soils (F19) (LRR P, S, T)
- ☐ Anomalous Bright Loamy Soils (F20) (MLRA 153B)
- ☐ Red Parent Material (TF2)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ Other (Explain in Remarks)

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

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ○ No ◉

Remarks:

WETLAND DETERMINATION DATA FORM - Atlantic and Gulf Coastal Plain Region

Project/Site: Six Runs **City/County:** Sampson County **Sampling Date:** 26-Jan-21

Applicant/Owner: Resource Environmental Solutions **State:** NC **Sampling Point:** DP-3

Investigator(s): M. DeAngelo, H. Hidlay **Section, Township, Range:** S T R

Landform (hillslope, terrace, etc.): Floodplain **Local relief (concave, convex, none):** flat **Slope:** 0.0 % / 0.0 °

Subregion (LRR or MLRA): MLRA 133A in LRR P **Lat.:** 35.092805 **Long.:** -78.230907 **Datum:** NAD83

Soil Map Unit Name: Bibb and Johnston soils, frequently flooded **NWI classification:** PEM

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 ◉ No ○	**Is the Sampled Area within a Wetland?** **Yes** ◉ **No** ○
Hydric Soil Present?	Yes ◉ No ○	
Wetland Hydrology Present?	Yes ◉ No ○	

Remarks:
Historic manipulation of landscape included channelizing main stream (Brad's Branch), clearing, impoundment, and pasture grazing. Hydrology and soil have mostly recovered in this sampling location, however vegetation remains exclusively emergent.

HYDROLOGY

Wetland Hydrology Indicators:

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

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☑ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift Deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Aquatic Fauna (B13)
- ☐ Marl Deposits (B15) (LRR U)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (minimum of 2 required)

- ☐ Surface Soil Cracks (B6)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Drainage Patterns (B10)
- ☐ Moss Trim Lines (B16)
- ☐ Dry Season Water Table (C2)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☑ FAC-Neutral Test (D5)
- ☐ Sphagnum moss (D8) (LRR T, U)

Field Observations:

Surface Water Present?	Yes ○	No ◉	Depth (inches):
Water Table Present?	Yes ○	No ◉	Depth (inches):
Saturation Present? (includes capillary fringe)	Yes ◉	No ○	Depth (inches): 0

Wetland Hydrology Present? **Yes** ◉ **No** ○

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

Remarks:

VEGETATION (Five/Four Strata) - Use scientific names of plants.

Sampling Point: DP-3

	Absolute % Cover	Dominant Species?	Rel.Strat. Cover	Indicator Status
Tree Stratum (Plot size: 30)				
1.	0	☐	0.0%	
2.	0	☐	0.0%	
3.	0	☐	0.0%	
4.	0	☐	0.0%	
5.	0	☐	0.0%	
6.	0	☐	0.0%	
7.	0	☐	0.0%	
8.	0	☐	0.0%	
50% of Total Cover: 0	20% of Total Cover: 0	0	= Total Cover	
Sapling or Sapling/Shrub Stratum (Plot size: 30)				
1.	0	☐	0.0%	
2.	0	☐	0.0%	
3.	0	☐	0.0%	
4.	0	☐	0.0%	
5.	0	☐	0.0%	
6.	0	☐	0.0%	
7.	0	☐	0.0%	
8.	0	☐	0.0%	
50% of Total Cover: 0	20% of Total Cover: 0	0	= Total Cover	
Shrub Stratum (Plot size: 30)				
1.	0	☐	0.0%	
2.	0	☐	0.0%	
3.	0	☐	0.0%	
4.	0	☐	0.0%	
5.	0	☐	0.0%	
6.	0	☐	0.0%	
50% of Total Cover: 0	20% of Total Cover: 0	0	= Total Cover	
Herb Stratum (Plot size: 30)				
1. Juncus effusus	50	☑	76.9%	OBL
2. Persicaria lapathifolia	15	☑	23.1%	FACW
3.	0	☐	0.0%	
4.	0	☐	0.0%	
5.	0	☐	0.0%	
6.	0	☐	0.0%	
7.	0	☐	0.0%	
8.	0	☐	0.0%	
9.	0	☐	0.0%	
10.	0	☐	0.0%	
11.	0	☐	0.0%	
12.	0	☐	0.0%	
50% of Total Cover: 32.5	20% of Total Cover: 13	65	= Total Cover	
Woody Vine Stratum (Plot size: 30)				
1.	0	☐	0.0%	
2.	0	☐	0.0%	
3.	0	☐	0.0%	
4.	0	☐	0.0%	
5.	0	☐	0.0%	
50% of Total Cover: 0	20% of Total Cover: 0	0	= 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: 100.0% (A/B)

Prevalence Index worksheet:

	Total % Cover of:		Multiply by:	
OBL species	50	**x 1 =**	50	
FACW species	15	**x 2 =**	30	
FAC species	0	**x 3 =**	0	
FACU species	0	**x 4 =**	0	
UPL species	0	**x 5 =**	0	
Column Totals:	65	**(A)**	80	**(B)**

Prevalence Index = B/A = 1.231

Hydrophytic Vegetation Indicators:

- ☑ **1 - Rapid Test for Hydrophytic Vegetation**
- ☑ **2 - Dominance Test is > 50%**
- ☑ **3 - Prevalence Index is ≤3.0** [1]
- ☐ **Problematic Hydrophytic Vegetation** [1] **(Explain)**

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

Definition of 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.

Sapling/Shrub - Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1m) tall.

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

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

Woody vine - All woody vines, regardless of height.

Hydrophytic Vegetation Present? Yes ◉ No ○

Remarks: (If observed, list morphological adaptations below).

Area of sampling is still active cattle pasture and adjacent "upland" is actively seeded.

*Indicator suffix = National status or professional decision assigned because Regional status not defined by FWS.

SOIL

Sampling Point: DP-3

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

Depth (inches)	Matrix Color (moist)		%	Redox Features Color (moist)		%	Type [1]	Loc [2]	Texture	Remarks
0-4	10YR	4/2	100						Silt Loam	
4-12	10YR	5/1	85	10YR	4/8	15	C	PL	Silt Loam	
12-18	N	4/N	85	10YR	4/8	15	C	M	Clay Loam	

[1] Type: C=Concentration. D=Depletion. RM=Reduced Matrix, CS=Covered or Coated Sand Grains [2] Location: PL=Pore Lining. M=Matrix

Hydric Soil Indicators:

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5)
- ☐ Organic Bodies (A6) (LRR P, T, U)
- ☐ 5 cm Mucky Mineral (A7) (LRR P, T, U)
- ☐ Muck Presence (A8) (LRR U)
- ☐ 1 cm Muck (A9) (LRR P, T)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Coast Prairie Redox (A16) (MLRA 150A)
- ☐ Sandy Muck Mineral (S1) (LRR O, S)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Dark Surface (S7) (LRR P, S, T, U)
- ☐ Polyvalue Below Surface (S8) (LRR S, T, U)
- ☐ Thin Dark Surface (S9) (LRR S, T, U)
- ☐ Loamy Mucky Mineral (F1) (LRR O)
- ☑ Loamy Gleyed Matrix (F2)
- ☑ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Marl (F10) (LRR U)
- ☐ Depleted Ochric (F11) (MLRA 151)
- ☐ Iron-Manganese Masses (F12) (LRR O, P, T)
- ☐ Umbric Surface (F13) (LRR P, T, U)
- ☐ Delta Ochric (F17) (MLRA 151)
- ☐ Reduced Vertic (F18) (MLRA 150A, 150B)
- ☐ Piedmont Floodplain Soils (F19) (MLRA 149A)
- ☐ Anomalous Bright Loamy Soils (F20) (MLRA 149A, 153C, 153D)

Indicators for Problematic Hydric Soils [3]:

- ☐ 1 cm Muck (A9) (LRR O)
- ☐ 2 cm Muck (A10) (LRR S)
- ☐ Reduced Vertic (F18) (outside MLRA 150A,B)
- ☐ Piedmont Floodplain Soils (F19) (LRR P, S, T)
- ☐ Anomalous Bright Loamy Soils (F20) (MLRA 153B)
- ☐ Red Parent Material (TF2)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ Other (Explain in Remarks)

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

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ◉ No ○

Remarks:

WETLAND DETERMINATION DATA FORM - Atlantic and Gulf Coastal Plain Region

Project/Site: Six Runs **City/County:** Sampson County **Sampling Date:** 26-Jan-21

Applicant/Owner: Resource Environmental Solutions **State:** NC **Sampling Point:** DP-4

Investigator(s): M. DeAngelo, H. Hidlay **Section, Township, Range:** S T R

Landform (hillslope, terrace, etc.): Floodplain **Local relief (concave, convex, none):** flat **Slope:** 0.0 % / 0.0 °

Subregion (LRR or MLRA): MLRA 133A in LRR P **Lat.:** 35.092899 **Long.:** -78.240628 **Datum:** NAD83

Soil Map Unit Name: Bibb and Johnston soils, frequently flooded **NWI classification:** Upland

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 ○	No ◉	**Is the Sampled Area within a Wetland?** Yes ○ No ◉
Hydric Soil Present?	Yes ◉	No ○	
Wetland Hydrology Present?	Yes ○	No ◉	

Remarks:
Historic manipulation of landscape included channelizing main stream (Brad's Branch), clearing, impoundment, and pasture grazing. Area of sampling is still active cattle pasture and actively seeded.

HYDROLOGY

Wetland Hydrology Indicators:

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

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift Deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Aquatic Fauna (B13)
- ☐ Marl Deposits (B15) (LRR U)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (minimum of 2 required)

- ☐ Surface Soil Cracks (B6)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Drainage Patterns (B10)
- ☐ Moss Trim Lines (B16)
- ☐ Dry Season Water Table (C2)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)
- ☐ Sphagnum moss (D8) (LRR T, U)

Field Observations:

Surface Water Present?	Yes ○	No ◉	Depth (inches):
Water Table Present?	Yes ○	No ◉	Depth (inches):
Saturation Present? (includes capillary fringe)	Yes ○	No ◉	Depth (inches):

Wetland Hydrology Present? Yes ○ No ◉

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

Remarks:

VEGETATION (Five/Four Strata) - Use scientific names of plants.

Sampling Point: DP-4

	Absolute % Cover	Dominant Species?	Rel.Strat. Cover	Indicator Status
Tree Stratum (Plot size: 30)				
1.	0	☐	0.0%	
2.	0	☐	0.0%	
3.	0	☐	0.0%	
4.	0	☐	0.0%	
5.	0	☐	0.0%	
6.	0	☐	0.0%	
7.	0	☐	0.0%	
8.	0	☐	0.0%	
50% of Total Cover: 0	20% of Total Cover: 0	0	= Total Cover	
Sapling or Sapling/Shrub Stratum (Plot size: 30)				
1.	0	☐	0.0%	
2.	0	☐	0.0%	
3.	0	☐	0.0%	
4.	0	☐	0.0%	
5.	0	☐	0.0%	
6.	0	☐	0.0%	
7.	0	☐	0.0%	
8.	0	☐	0.0%	
50% of Total Cover: 0	20% of Total Cover: 0	0	= Total Cover	
Shrub Stratum (Plot size: 30)				
1.	0	☐	0.0%	
2.	0	☐	0.0%	
3.	0	☐	0.0%	
4.	0	☐	0.0%	
5.	0	☐	0.0%	
6.	0	☐	0.0%	
50% of Total Cover: 0	20% of Total Cover: 0	0	= Total Cover	
Herb Stratum (Plot size:)				
1. Cynodon dactylon	50	☑	58.8%	FACU
2. Festuca arundinacea	30	☑	35.3%	FAC
3. Juncus effusus	5	☐	5.9%	OBL
4.	0	☐	0.0%	
5.	0	☐	0.0%	
6.	0	☐	0.0%	
7.	0	☐	0.0%	
8.	0	☐	0.0%	
9.	0	☐	0.0%	
10.	0	☐	0.0%	
11.	0	☐	0.0%	
12.	0	☐	0.0%	
50% of Total Cover: 42.5	20% of Total Cover: 17	85	= Total Cover	
Woody Vine Stratum (Plot size: 30)				
1.	0	☐	0.0%	
2.	0	☐	0.0%	
3.	0	☐	0.0%	
4.	0	☐	0.0%	
5.	0	☐	0.0%	
50% of Total Cover: 0	20% of Total Cover: 0	0	= Total Cover	

Dominance Test worksheet:

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

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of dominant Species That Are OBL, FACW, or FAC: 50.0% (A/B)

Prevalence Index worksheet:

	Total % Cover of:	Multiply by:	
OBL species	5	x 1 =	5
FACW species	0	x 2 =	0
FAC species	30	x 3 =	90
FACU species	50	x 4 =	200
UPL species	0	x 5 =	0
Column Totals:	85 (A)		295 (B)

Prevalence Index = B/A = 3.471

Hydrophytic Vegetation Indicators:

- ☐ **1 - Rapid Test for Hydrophytic Vegetation**
- ☐ **2 - Dominance Test is > 50%**
- ☐ **3 - Prevalence Index is ≤3.0** [1]
- ☐ **Problematic Hydrophytic Vegetation** [1] **(Explain)**

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

Definition of 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.

Sapling/Shrub - Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1m) tall.

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

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

Woody vine - All woody vines, regardless of height.

Hydrophytic Vegetation Present? Yes ○ No ◉

Remarks: (If observed, list morphological adaptations below).

Area of sampling is still active cattle pasture and actively seeded.

*Indicator suffix = National status or professional decision assigned because Regional status not defined by FWS.

SOIL

Sampling Point: DP-4

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

Depth (inches)	Matrix Color (moist)		%	Redox Features Color (moist)		%	Type [1]	Loc [2]	Texture	Remarks
0-2	10YR	4/2	100						Sandy Loam	
2-12	10YR	4/1	90	10YR	4/8	10	C	M	Sandy Loam	
12-18	10YR	5/1	85	10YR	4/8	15	C	M	Silty Clay Loam	

[1] Type: C=Concentration. D=Depletion. RM=Reduced Matrix, CS=Covered or Coated Sand Grains [2] Location: PL=Pore Lining. M=Matrix

Hydric Soil Indicators:

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5)
- ☐ Organic Bodies (A6) (LRR P, T, U)
- ☐ 5 cm Mucky Mineral (A7) (LRR P, T, U)
- ☐ Muck Presence (A8) (LRR U)
- ☐ 1 cm Muck (A9) (LRR P, T)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Coast Prairie Redox (A16) (MLRA 150A)
- ☐ Sandy Muck Mineral (S1) (LRR O, S)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Dark Surface (S7) (LRR P, S, T, U)
- ☐ Polyvalue Below Surface (S8) (LRR S, T, U)
- ☐ Thin Dark Surface (S9) (LRR S, T, U)
- ☐ Loamy Mucky Mineral (F1) (LRR O)
- ☐ Loamy Gleyed Matrix (F2)
- ☑ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Marl (F10) (LRR U)
- ☐ Depleted Ochric (F11) (MLRA 151)
- ☐ Iron-Manganese Masses (F12) (LRR O, P, T)
- ☐ Umbric Surface (F13) (LRR P, T, U)
- ☐ Delta Ochric (F17) (MLRA 151)
- ☐ Reduced Vertic (F18) (MLRA 150A, 150B)
- ☐ Piedmont Floodplain Soils (F19) (MLRA 149A)
- ☐ Anomalous Bright Loamy Soils (F20) (MLRA 149A, 153C, 153D)

Indicators for Problematic Hydric Soils [3]:

- ☐ 1 cm Muck (A9) (LRR O)
- ☐ 2 cm Muck (A10) (LRR S)
- ☐ Reduced Vertic (F18) (outside MLRA 150A,B)
- ☐ Piedmont Floodplain Soils (F19) (LRR P, S, T)
- ☐ Anomalous Bright Loamy Soils (F20) (MLRA 153B)
- ☐ Red Parent Material (TF2)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ Other (Explain in Remarks)

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

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ◉ No ○

Remarks:

WETLAND DETERMINATION DATA FORM - Atlantic and Gulf Coastal Plain Region

Project/Site: Six Runs **City/County:** Sampson County **Sampling Date:** 28-Jan-21

Applicant/Owner: Resource Environmental Solutions **State:** NC **Sampling Point:** DP-5

Investigator(s): M. DeAngelo, H. Hidlay **Section, Township, Range:** S T R

Landform (hillslope, terrace, etc.): Floodplain **Local relief (concave, convex, none):** concave **Slope:** 0.0 % / 0.0 °

Subregion (LRR or MLRA): MLRA 133A in LRR P **Lat.:** 35.09612 **Long.:** -78.236951 **Datum:** NAD83

Soil Map Unit Name: Bibb and Johnston soils, frequently flooded **NWI classification:** PFO

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 ◉ No ○	**Is the Sampled Area within a Wetland?** **Yes** ◉ **No** ○
Hydric Soil Present?	Yes ◉ No ○	
Wetland Hydrology Present?	Yes ◉ No ○	

Remarks:
Many dying trees. Mostly snags. Heavy cattle impacts.

HYDROLOGY

Wetland Hydrology Indicators:

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

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☑ Saturation (A3)
- ☐ Water Marks (B1)
- ☑ Sediment Deposits (B2)
- ☑ Drift Deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Aquatic Fauna (B13)
- ☐ Marl Deposits (B15) (LRR U)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (minimum of 2 required)

- ☐ Surface Soil Cracks (B6)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☑ Drainage Patterns (B10)
- ☐ Moss Trim Lines (B16)
- ☐ Dry Season Water Table (C2)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☑ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☑ FAC-Neutral Test (D5)
- ☐ Sphagnum moss (D8) (LRR T, U)

Field Observations:

Surface Water Present?	Yes ○	No ◉	Depth (inches):
Water Table Present?	Yes ○	No ◉	Depth (inches):
Saturation Present? (includes capillary fringe)	Yes ◉	No ○	Depth (inches): 0

Wetland Hydrology Present? **Yes** ◉ **No** ○

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

Remarks:

VEGETATION (Five/Four Strata) - Use scientific names of plants.

Sampling Point: DP-5

	Absolute % Cover	Dominant Species?	Rel.Strat. Cover	Indicator Status
Tree Stratum (Plot size: 30)				
1. Carpinus caroliniana	10	☑	22.2%	FAC
2. Liquidambar styraciflua	10	☑	22.2%	FAC
3. Quercus michauxii	10	☑	22.2%	FACW
4. Quercus nigra	5	☐	11.1%	FAC
5. Quercus alba	5	☐	11.1%	FACU
6. Magnolia virginiana	5	☐	11.1%	FACW
7.	0	☐	0.0%	
8.	0	☐	0.0%	
50% of Total Cover: 22.5	20% of Total Cover: 9	45	= Total Cover	
Sapling or Sapling/Shrub Stratum (Plot size: 30)				
1. Carpinus caroliniana	10	☑	40.0%	FAC
2. Ilex opaca	10	☑	40.0%	FAC
3. Acer rubrum	5	☑	20.0%	FAC
4.	0	☐	0.0%	
5.	0	☐	0.0%	
6.	0	☐	0.0%	
7.	0	☐	0.0%	
8.	0	☐	0.0%	
50% of Total Cover: 12.5	20% of Total Cover: 5	25	= Total Cover	
Shrub Stratum (Plot size: 30)				
1.	0	☐	0.0%	
2.	0	☐	0.0%	
3.	0	☐	0.0%	
4.	0	☐	0.0%	
5.	0	☐	0.0%	
6.	0	☐	0.0%	
50% of Total Cover: 0	20% of Total Cover: 0	0	= Total Cover	
Herb Stratum (Plot size: 30)				
1. Microstegium vimineum	10	☑	50.0%	FAC
2. Juncus effusus	5	☑	25.0%	OBL
3. Carex lurida	5	☑	25.0%	OBL
4.	0	☐	0.0%	
5.	0	☐	0.0%	
6.	0	☐	0.0%	
7.	0	☐	0.0%	
8.	0	☐	0.0%	
9.	0	☐	0.0%	
10.	0	☐	0.0%	
11.	0	☐	0.0%	
12.	0	☐	0.0%	
50% of Total Cover: 10	20% of Total Cover: 4	20	= Total Cover	
Woody Vine Stratum (Plot size: 30)				
1.	0	☐	0.0%	
2.	0	☐	0.0%	
3.	0	☐	0.0%	
4.	0	☐	0.0%	
5.	0	☐	0.0%	
50% of Total Cover: 0	20% of Total Cover: 0	0	= Total Cover	

Dominance Test worksheet:

Number of Dominant Species That are OBL, FACW, or FAC: 9 (A)

Total Number of Dominant Species Across All Strata: 9 (B)

Percent of dominant Species That Are OBL, FACW, or FAC: 100.0% (A/B)

Prevalence Index worksheet:

	Total % Cover of:		Multiply by:	
OBL species	10	x 1 =	10	
FACW species	15	x 2 =	30	
FAC species	60	x 3 =	180	
FACU species	5	x 4 =	20	
UPL species	0	x 5 =	0	
Column Totals:	90	(A)	240	(B)

Prevalence Index = B/A = 2.667

Hydrophytic Vegetation Indicators:

- ☐ **1 - Rapid Test for Hydrophytic Vegetation**
- ☑ **2 - Dominance Test is > 50%**
- ☑ **3 - Prevalence Index is ≤3.0** [1]
- ☐ **Problematic Hydrophytic Vegetation** [1] **(Explain)**

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

Definition of 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.

Sapling/Shrub - Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1m) tall.

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

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

Woody vine - All woody vines, regardless of height.

Hydrophytic Vegetation Present? Yes ◉ No ○

Remarks: (If observed, list morphological adaptations below).

*Indicator suffix = National status or professional decision assigned because Regional status not defined by FWS.

SOIL

Sampling Point: DP-5

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

Depth (inches)	Matrix Color (moist)		%	Redox Features Color (moist)		%	Type [1]	Loc [2]	Texture	Remarks
0-2	2.5Y	8/3	90	7.5YR	5/8	10	C	M	Sand	
2-8	2.5Y	8/2	75	7.5YR	5/8	10	C	M	Sand	15% black strips 10YR 2/1
8-16	10YR	3/1	100						Loam	

[1] Type: C=Concentration. D=Depletion. RM=Reduced Matrix, CS=Covered or Coated Sand Grains [2] Location: PL=Pore Lining. M=Matrix

Hydric Soil Indicators:

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5)
- ☐ Organic Bodies (A6) (LRR P, T, U)
- ☐ 5 cm Mucky Mineral (A7) (LRR P, T, U)
- ☐ Muck Presence (A8) (LRR U)
- ☐ 1 cm Muck (A9) (LRR P, T)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Coast Prairie Redox (A16) (MLRA 150A)
- ☐ Sandy Muck Mineral (S1) (LRR O, S)
- ☐ Sandy Gleyed Matrix (S4)
- ☑ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Dark Surface (S7) (LRR P, S, T, U)
- ☐ Polyvalue Below Surface (S8) (LRR S, T, U)
- ☐ Thin Dark Surface (S9) (LRR S, T, U)
- ☐ Loamy Mucky Mineral (F1) (LRR O)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Marl (F10) (LRR U)
- ☐ Depleted Ochric (F11) (MLRA 151)
- ☐ Iron-Manganese Masses (F12) (LRR O, P, T)
- ☐ Umbric Surface (F13) (LRR P, T, U)
- ☐ Delta Ochric (F17) (MLRA 151)
- ☐ Reduced Vertic (F18) (MLRA 150A, 150B)
- ☐ Piedmont Floodplain Soils (F19) (MLRA 149A)
- ☐ Anomalous Bright Loamy Soils (F20) (MLRA 149A, 153C, 153D)

Indicators for Problematic Hydric Soils [3]:

- ☐ 1 cm Muck (A9) (LRR O)
- ☐ 2 cm Muck (A10) (LRR S)
- ☐ Reduced Vertic (F18) (outside MLRA 150A,B)
- ☐ Piedmont Floodplain Soils (F19) (LRR P, S, T)
- ☐ Anomalous Bright Loamy Soils (F20) (MLRA 153B)
- ☐ Red Parent Material (TF2)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ Other (Explain in Remarks)

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

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ◉ No ○

Remarks:

Sandy layers are alluvium, but seem well established as surface soil layer.

WETLAND DETERMINATION DATA FORM - Atlantic and Gulf Coastal Plain Region

Project/Site: Six Runs **City/County:** Sampson County **Sampling Date:** 28-Jan-21

Applicant/Owner: Resource Environmental Solutions **State:** NC **Sampling Point:** DP-6

Investigator(s): M. DeAngelo, H. Hidlay **Section, Township, Range:** S T R

Landform (hillslope, terrace, etc.): Hillside **Local relief (concave, convex, none):** flat **Slope:** 0.0 % / 0.0 °

Subregion (LRR or MLRA): MLRA 133A in LRR P **Lat.:** 35.095989 **Long.:** -78.23713 **Datum:** NAD83

Soil Map Unit Name: Bibb and Johnston soils, frequently flooded **NWI classification:** Upland

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 ◉ No ○	**Is the Sampled Area within a Wetland?** Yes ○ No ◉
Hydric Soil Present?	Yes ○ No ◉	
Wetland Hydrology Present?	Yes ○ No ◉	

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

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

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift Deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Aquatic Fauna (B13)
- ☐ Marl Deposits (B15) (LRR U)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (minimum of 2 required)

- ☐ Surface Soil Cracks (B6)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Drainage Patterns (B10)
- ☐ Moss Trim Lines (B16)
- ☐ Dry Season Water Table (C2)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)
- ☐ Sphagnum moss (D8) (LRR T, U)

Field Observations:

Surface Water Present?	Yes ○	No ◉	Depth (inches):
Water Table Present?	Yes ○	No ◉	Depth (inches):
Saturation Present? (includes capillary fringe)	Yes ○	No ◉	Depth (inches):

Wetland Hydrology Present? Yes ○ No ◉

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

Remarks:

VEGETATION (Five/Four Strata) - Use scientific names of plants.

Sampling Point: DP-6

	Absolute % Cover	Dominant Species?	Rel.Strat. Cover	Indicator Status
Tree Stratum (Plot size: 30)				
1. Carpinus caroliniana	10	☑	28.6%	FAC
2. Liquidambar styraciflua	10	☑	28.6%	FAC
3. Quercus nigra	10	☑	28.6%	FAC
4. Quercus alba	5	☐	14.3%	FACU
5.	0	☐	0.0%	
6.	0	☐	0.0%	
7.	0	☐	0.0%	
8.	0	☐	0.0%	
50% of Total Cover: 17.5 20% of Total Cover: 7	35	= Total Cover		
Sapling or Sapling/Shrub Stratum (Plot size: 30)				
1. Carpinus caroliniana	15	☑	75.0%	FAC
2. Ilex opaca	5	☑	25.0%	FAC
3.	0	☐	0.0%	
4.	0	☐	0.0%	
5.	0	☐	0.0%	
6.	0	☐	0.0%	
7.	0	☐	0.0%	
8.	0	☐	0.0%	
50% of Total Cover: 10 20% of Total Cover: 4	20	= Total Cover		
Shrub Stratum (Plot size: 30)				
1.	0	☐	0.0%	
2.	0	☐	0.0%	
3.	0	☐	0.0%	
4.	0	☐	0.0%	
5.	0	☐	0.0%	
6.	0	☐	0.0%	
50% of Total Cover: 0 20% of Total Cover: 0	0	= Total Cover		
Herb Stratum (Plot size: 30)				
1. Festuca arundinacea	10	☑	100.0%	FAC
2.	0	☐	0.0%	
3.	0	☐	0.0%	
4.	0	☐	0.0%	
5.	0	☐	0.0%	
6.	0	☐	0.0%	
7.	0	☐	0.0%	
8.	0	☐	0.0%	
9.	0	☐	0.0%	
10.	0	☐	0.0%	
11.	0	☐	0.0%	
12.	0	☐	0.0%	
50% of Total Cover: 5 20% of Total Cover: 2	10	= Total Cover		
Woody Vine Stratum (Plot size: 30)				
1. Lonicera japonica	5	☑	100.0%	FACU
2.	0	☐	0.0%	
3.	0	☐	0.0%	
4.	0	☐	0.0%	
5.	0	☐	0.0%	
50% of Total Cover: 2.5 20% of Total Cover: 1	5	= Total Cover		

Dominance Test worksheet:

Number of Dominant Species That are OBL, FACW, or FAC: 6 (A)

Total Number of Dominant Species Across All Strata: 7 (B)

Percent of dominant Species That Are OBL, FACW, or FAC: 85.7% (A/B)

Prevalence Index worksheet:

	Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0	
FACW species	0	x 2 =	0	
FAC species	60	x 3 =	180	
FACU species	10	x 4 =	40	
UPL species	0	x 5 =	0	
Column Totals:	70	(A)	220	(B)

Prevalence Index = B/A = 3.143

Hydrophytic Vegetation Indicators:

- ☐ **1 - Rapid Test for Hydrophytic Vegetation**
- ☑ **2 - Dominance Test is > 50%**
- ☐ **3 - Prevalence Index is ≤3.0** [1]
- ☐ **Problematic Hydrophytic Vegetation** [1] **(Explain)**

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

Definition of 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.

Sapling/Shrub - Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1m) tall.

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

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

Woody vine - All woody vines, regardless of height.

Hydrophytic Vegetation Present? Yes ◉ No ○

Remarks: (If observed, list morphological adaptations below).

*Indicator suffix = National status or professional decision assigned because Regional status not defined by FWS.

SOIL

Sampling Point: DP-6

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

Depth (inches)	Matrix Color (moist)		%	Redox Features Color (moist)	%	Type [1]	Loc [2]	Texture	Remarks
0-2	10YR	3/2	100					Loam	
2-5	10YR	3/3	100					Loam	
5-16	10YR	5/8	100					Clay Loam	

[1] Type: C=Concentration. D=Depletion. RM=Reduced Matrix, CS=Covered or Coated Sand Grains [2] Location: PL=Pore Lining. M=Matrix

Hydric Soil Indicators:

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5)
- ☐ Organic Bodies (A6) (LRR P, T, U)
- ☐ 5 cm Mucky Mineral (A7) (LRR P, T, U)
- ☐ Muck Presence (A8) (LRR U)
- ☐ 1 cm Muck (A9) (LRR P, T)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Coast Prairie Redox (A16) (MLRA 150A)
- ☐ Sandy Muck Mineral (S1) (LRR O, S)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Dark Surface (S7) (LRR P, S, T, U)
- ☐ Polyvalue Below Surface (S8) (LRR S, T, U)
- ☐ Thin Dark Surface (S9) (LRR S, T, U)
- ☐ Loamy Mucky Mineral (F1) (LRR O)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Marl (F10) (LRR U)
- ☐ Depleted Ochric (F11) (MLRA 151)
- ☐ Iron-Manganese Masses (F12) (LRR O, P, T)
- ☐ Umbric Surface (F13) (LRR P, T, U)
- ☐ Delta Ochric (F17) (MLRA 151)
- ☐ Reduced Vertic (F18) (MLRA 150A, 150B)
- ☐ Piedmont Floodplain Soils (F19) (MLRA 149A)
- ☐ Anomalous Bright Loamy Soils (F20) (MLRA 149A, 153C, 153D)

Indicators for Problematic Hydric Soils [3]:

- ☐ 1 cm Muck (A9) (LRR O)
- ☐ 2 cm Muck (A10) (LRR S)
- ☐ Reduced Vertic (F18) (outside MLRA 150A,B)
- ☐ Piedmont Floodplain Soils (F19) (LRR P, S, T)
- ☐ Anomalous Bright Loamy Soils (F20) (MLRA 153B)
- ☐ Red Parent Material (TF2)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ Other (Explain in Remarks)

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

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ○ No ◉

Remarks:

WETLAND DETERMINATION DATA FORM - Atlantic and Gulf Coastal Plain Region

Project/Site: Six Runs **City/County:** Sampson County **Sampling Date:** 28-Jan-21

Applicant/Owner: Resource Environmental Solutions **State:** NC **Sampling Point:** DP-7

Investigator(s): M. DeAngelo, H. Hidlay **Section, Township, Range:** S T R

Landform (hillslope, terrace, etc.): Toeslope **Local relief (concave, convex, none):** concave **Slope:** 0.0 % / 0.0 °

Subregion (LRR or MLRA): MLRA 133A in LRR P **Lat.:** 35.095502 **Long.:** -78.237118 **Datum:** NAD83

Soil Map Unit Name: Bibb and Johnston soils, frequently flooded **NWI classification:** PFO

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 ◉ No ○	**Is the Sampled Area within a Wetland?** Yes ◉ No ○
Hydric Soil Present?	Yes ◉ No ○	
Wetland Hydrology Present?	Yes ◉ No ○	

Remarks:
Many dying trees. Mostly snags. Heavy cattle trampling and grazing.

HYDROLOGY

Wetland Hydrology Indicators:

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

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☑ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift Deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Aquatic Fauna (B13)
- ☐ Marl Deposits (B15) (LRR U)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (minimum of 2 required)

- ☐ Surface Soil Cracks (B6)
- ☑ Sparsely Vegetated Concave Surface (B8)
- ☐ Drainage Patterns (B10)
- ☐ Moss Trim Lines (B16)
- ☐ Dry Season Water Table (C2)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☑ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☑ FAC-Neutral Test (D5)
- ☐ Sphagnum moss (D8) (LRR T, U)

Field Observations:

Surface Water Present?	Yes ○	No ◉	Depth (inches):
Water Table Present?	Yes ○	No ◉	Depth (inches):
Saturation Present? (includes capillary fringe)	Yes ◉	No ○	Depth (inches): 0

Wetland Hydrology Present? Yes ◉ No ○

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

Remarks:

VEGETATION (Five/Four Strata) - Use scientific names of plants.

Sampling Point: DP-7

	Absolute % Cover	Dominant Species?	Rel.Strat. Cover	Indicator Status
Tree Stratum (Plot size: 30)				
1. Liquidambar styraciflua	10	☑	66.7%	FAC
2. Acer rubrum	5	☑	33.3%	FAC
3.	0	☐	0.0%	
4.	0	☐	0.0%	
5.	0	☐	0.0%	
6.	0	☐	0.0%	
7.	0	☐	0.0%	
8.	0	☐	0.0%	
50% of Total Cover: 7.5 20% of Total Cover: 3	15	= Total Cover		
Sapling or Sapling/Shrub Stratum (Plot size: 30)				
1. Carpinus caroliniana	15	☑	60.0%	FAC
2. Magnolia virginiana	5	☑	20.0%	FACW
3. Ilex opaca	5	☑	20.0%	FAC
4.	0	☐	0.0%	
5.	0	☐	0.0%	
6.	0	☐	0.0%	
7.	0	☐	0.0%	
8.	0	☐	0.0%	
50% of Total Cover: 12.5 20% of Total Cover: 5	25	= Total Cover		
Shrub Stratum (Plot size: 30)				
1.	0	☐	0.0%	
2.	0	☐	0.0%	
3.	0	☐	0.0%	
4.	0	☐	0.0%	
5.	0	☐	0.0%	
6.	0	☐	0.0%	
50% of Total Cover: 0 20% of Total Cover: 0	0	= Total Cover		
Herb Stratum (Plot size: 30)				
1. Hydrocotyle ranunculoides	60	☑	85.7%	OBL
2. Microstegium vimineum	10	☐	14.3%	FAC
3.	0	☐	0.0%	
4.	0	☐	0.0%	
5.	0	☐	0.0%	
6.	0	☐	0.0%	
7.	0	☐	0.0%	
8.	0	☐	0.0%	
9.	0	☐	0.0%	
10.	0	☐	0.0%	
11.	0	☐	0.0%	
12.	0	☐	0.0%	
50% of Total Cover: 35 20% of Total Cover: 14	70	= Total Cover		
Woody Vine Stratum (Plot size: 30)				
1.	0	☐	0.0%	
2.	0	☐	0.0%	
3.	0	☐	0.0%	
4.	0	☐	0.0%	
5.	0	☐	0.0%	
50% of Total Cover: 0 20% of Total Cover: 0	0	= Total Cover		

Dominance Test worksheet:

Number of Dominant Species That are OBL, FACW, or FAC: 6 (A)

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

Percent of dominant Species That Are OBL, FACW, or FAC: 100.0% (A/B)

Prevalence Index worksheet:

	Total % Cover of:	Multiply by:	
OBL species	60	x 1 =	60
FACW species	5	x 2 =	10
FAC species	45	x 3 =	135
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column Totals:	110 (A)		205 (B)

Prevalence Index = B/A = 1.864

Hydrophytic Vegetation Indicators:

- ☐ **1 - Rapid Test for Hydrophytic Vegetation**
- ☑ **2 - Dominance Test is > 50%**
- ☑ **3 - Prevalence Index is ≤3.0** [1]
- ☐ **Problematic Hydrophytic Vegetation** [1] **(Explain)**

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

Definition of 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.

Sapling/Shrub - Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1m) tall.

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

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

Woody vine - All woody vines, regardless of height.

Hydrophytic Vegetation Present? Yes ◉ No ○

Remarks: (If observed, list morphological adaptations below).

*Indicator suffix = National status or professional decision assigned because Regional status not defined by FWS.

SOIL

Sampling Point: DP-7

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

Depth (inches)	Matrix Color (moist)		%	Redox Features Color (moist)		%	Type [1]	Loc [2]	Texture	Remarks
0-10	10YR	4/1	95	7.5YR	4/6	3	C	M	Loam	Also 2% manganese concentrations
10-18	10YR	5/1	90	7.5YR	4/6	10	C	M	Silty Clay Loam	

[1] Type: C=Concentration. D=Depletion. RM=Reduced Matrix, CS=Covered or Coated Sand Grains [2] Location: PL=Pore Lining. M=Matrix

Hydric Soil Indicators:

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5)
- ☐ Organic Bodies (A6) (LRR P, T, U)
- ☐ 5 cm Mucky Mineral (A7) (LRR P, T, U)
- ☐ Muck Presence (A8) (LRR U)
- ☐ 1 cm Muck (A9) (LRR P, T)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Coast Prairie Redox (A16) (MLRA 150A)
- ☐ Sandy Muck Mineral (S1) (LRR O, S)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Dark Surface (S7) (LRR P, S, T, U)
- ☐ Polyvalue Below Surface (S8) (LRR S, T, U)
- ☐ Thin Dark Surface (S9) (LRR S, T, U)
- ☐ Loamy Mucky Mineral (F1) (LRR O)
- ☐ Loamy Gleyed Matrix (F2)
- ☑ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Marl (F10) (LRR U)
- ☐ Depleted Ochric (F11) (MLRA 151)
- ☐ Iron-Manganese Masses (F12) (LRR O, P, T)
- ☐ Umbric Surface (F13) (LRR P, T, U)
- ☐ Delta Ochric (F17) (MLRA 151)
- ☐ Reduced Vertic (F18) (MLRA 150A, 150B)
- ☐ Piedmont Floodplain Soils (F19) (MLRA 149A)
- ☐ Anomalous Bright Loamy Soils (F20) (MLRA 149A, 153C, 153D)

Indicators for Problematic Hydric Soils [3]:

- ☐ 1 cm Muck (A9) (LRR O)
- ☐ 2 cm Muck (A10) (LRR S)
- ☐ Reduced Vertic (F18) (outside MLRA 150A,B)
- ☐ Piedmont Floodplain Soils (F19) (LRR P, S, T)
- ☐ Anomalous Bright Loamy Soils (F20) (MLRA 153B)
- ☐ Red Parent Material (TF2)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ Other (Explain in Remarks)

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

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ◉ No ○

Remarks:

WETLAND DETERMINATION DATA FORM - Atlantic and Gulf Coastal Plain Region

Project/Site: Six Runs **City/County:** Sampson County **Sampling Date:** 28-Jan-21

Applicant/Owner: Resource Environmental Solutions **State:** NC **Sampling Point:** DP-8

Investigator(s): M. DeAngelo, H. Hidlay **Section, Township, Range:** S T R

Landform (hillslope, terrace, etc.): Toeslope **Local relief (concave, convex, none):** concave **Slope:** 0.0 % / 0.0 °

Subregion (LRR or MLRA): MLRA 133A in LRR P **Lat.:** 35.095213 **Long.:** -78.23536 **Datum:** NAD83

Soil Map Unit Name: Bibb and Johnston soils, frequently flooded **NWI classification:** PFO

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 ◉ No ○	**Is the Sampled Area within a Wetland?** Yes ◉ No ○
Hydric Soil Present?	Yes ◉ No ○	
Wetland Hydrology Present?	Yes ◉ No ○	

Remarks:
Highly impacted by cattle trampling and grazing

HYDROLOGY

Wetland Hydrology Indicators:

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

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☑ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift Deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☑ Water-Stained Leaves (B9)
- ☐ Aquatic Fauna (B13)
- ☐ Marl Deposits (B15) (LRR U)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (minimum of 2 required)

- ☐ Surface Soil Cracks (B6)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Drainage Patterns (B10)
- ☐ Moss Trim Lines (B16)
- ☐ Dry Season Water Table (C2)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)
- ☐ Sphagnum moss (D8) (LRR T, U)

Field Observations:

Surface Water Present?	Yes ○	No ◉	Depth (inches):
Water Table Present?	Yes ○	No ◉	Depth (inches):
Saturation Present? (includes capillary fringe)	Yes ◉	No ○	Depth (inches): 0

Wetland Hydrology Present? Yes ◉ No ○

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

Remarks:

VEGETATION (Five/Four Strata) - Use scientific names of plants.

Sampling Point: DP-8

	Absolute % Cover	Dominant Species?	Rel.Strat. Cover	Indicator Status
Tree Stratum (Plot size: 30)				
1. Liquidambar styraciflua	10	☑	40.0%	FAC
2. Acer rubrum	10	☑	40.0%	FAC
3. Carpinus caroliniana	5	☑	20.0%	FAC
4.	0	☐	0.0%	
5.	0	☐	0.0%	
6.	0	☐	0.0%	
7.	0	☐	0.0%	
8.	0	☐	0.0%	
50% of Total Cover: 12.5 20% of Total Cover: 5	25	= Total Cover		
Sapling or Sapling/Shrub Stratum (Plot size: 30)				
1. Carpinus caroliniana	10	☑	100.0%	FAC
2.	0	☐	0.0%	
3.	0	☐	0.0%	
4.	0	☐	0.0%	
5.	0	☐	0.0%	
6.	0	☐	0.0%	
7.	0	☐	0.0%	
8.	0	☐	0.0%	
50% of Total Cover: 5 20% of Total Cover: 2	10	= Total Cover		
Shrub Stratum (Plot size: 30)				
1.	0	☐	0.0%	
2.	0	☐	0.0%	
3.	0	☐	0.0%	
4.	0	☐	0.0%	
5.	0	☐	0.0%	
6.	0	☐	0.0%	
50% of Total Cover: 0 20% of Total Cover: 0	0	= Total Cover		
Herb Stratum (Plot size: 30)				
1. Microstegium vimineum	20	☑	100.0%	FAC
2.	0	☐	0.0%	
3.	0	☐	0.0%	
4.	0	☐	0.0%	
5.	0	☐	0.0%	
6.	0	☐	0.0%	
7.	0	☐	0.0%	
8.	0	☐	0.0%	
9.	0	☐	0.0%	
10.	0	☐	0.0%	
11.	0	☐	0.0%	
12.	0	☐	0.0%	
50% of Total Cover: 10 20% of Total Cover: 4	20	= Total Cover		
Woody Vine Stratum (Plot size: 30)				
1. Vitis rotundifolia	10	☑	100.0%	FAC
2.	0	☐	0.0%	
3.	0	☐	0.0%	
4.	0	☐	0.0%	
5.	0	☐	0.0%	
50% of Total Cover: 5 20% of Total Cover: 2	10	= Total Cover		

Dominance Test worksheet:

Number of Dominant Species That are OBL, FACW, or FAC: 6 (A)

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

Percent of dominant Species That Are OBL, FACW, or FAC: 100.0% (A/B)

Prevalence Index worksheet:

	Total % Cover of:	Multiply by:	
OBL species	0	x 1 =	0
FACW species	0	x 2 =	0
FAC species	65	x 3 =	195
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column Totals:	65 (A)		195 (B)

Prevalence Index = B/A = 3.000

Hydrophytic Vegetation Indicators:

- ☐ **1 - Rapid Test for Hydrophytic Vegetation**
- ☑ **2 - Dominance Test is > 50%**
- ☑ **3 - Prevalence Index is ≤3.0** [1]
- ☐ **Problematic Hydrophytic Vegetation** [1] **(Explain)**

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

Definition of 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.

Sapling/Shrub - Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1m) tall.

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

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

Woody vine - All woody vines, regardless of height.

Hydrophytic Vegetation Present? Yes ◉ No ○

Remarks: (If observed, list morphological adaptations below).

*Indicator suffix = National status or professional decision assigned because Regional status not defined by FWS.

SOIL

Sampling Point: DP-8

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

Depth (inches)	Matrix Color (moist)		%	Redox Features Color (moist)		%	Type [1]	Loc [2]	Texture	Remarks
0-12	10YR	4/1	90	7.5YR	4/6	10	C	M	Loam	
12-18	10YR	5/2	80	7.5YR	4/6	20	C	M	Loam	

[1] Type: C=Concentration. D=Depletion. RM=Reduced Matrix, CS=Covered or Coated Sand Grains [2] Location: PL=Pore Lining. M=Matrix

Hydric Soil Indicators:

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5)
- ☐ Organic Bodies (A6) (LRR P, T, U)
- ☐ 5 cm Mucky Mineral (A7) (LRR P, T, U)
- ☐ Muck Presence (A8) (LRR U)
- ☐ 1 cm Muck (A9) (LRR P, T)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Coast Prairie Redox (A16) (MLRA 150A)
- ☐ Sandy Muck Mineral (S1) (LRR O, S)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Dark Surface (S7) (LRR P, S, T, U)
- ☐ Polyvalue Below Surface (S8) (LRR S, T, U)
- ☐ Thin Dark Surface (S9) (LRR S, T, U)
- ☐ Loamy Mucky Mineral (F1) (LRR O)
- ☐ Loamy Gleyed Matrix (F2)
- ☑ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Marl (F10) (LRR U)
- ☐ Depleted Ochric (F11) (MLRA 151)
- ☐ Iron-Manganese Masses (F12) (LRR O, P, T)
- ☐ Umbric Surface (F13) (LRR P, T, U)
- ☐ Delta Ochric (F17) (MLRA 151)
- ☐ Reduced Vertic (F18) (MLRA 150A, 150B)
- ☐ Piedmont Floodplain Soils (F19) (MLRA 149A)
- ☐ Anomalous Bright Loamy Soils (F20) (MLRA 149A, 153C, 153D)

Indicators for Problematic Hydric Soils [3]:

- ☐ 1 cm Muck (A9) (LRR O)
- ☐ 2 cm Muck (A10) (LRR S)
- ☐ Reduced Vertic (F18) (outside MLRA 150A,B)
- ☐ Piedmont Floodplain Soils (F19) (LRR P, S, T)
- ☐ Anomalous Bright Loamy Soils (F20) (MLRA 153B)
- ☐ Red Parent Material (TF2)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ Other (Explain in Remarks)

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

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ◉ No ○

Remarks:

WETLAND DETERMINATION DATA FORM - Atlantic and Gulf Coastal Plain Region

Project/Site: Six Runs **City/County:** Sampson County **Sampling Date:** 28-Jan-21

Applicant/Owner: Resource Environmental Solutions **State:** NC **Sampling Point:** DP-9

Investigator(s): M. DeAngelo, H. Hidlay **Section, Township, Range:** S T R

Landform (hillslope, terrace, etc.): Toeslope **Local relief (concave, convex, none):** concave **Slope:** 0.0 % / 0.0 °

Subregion (LRR or MLRA): MLRA 133A in LRR P **Lat.:** 35.095432 **Long.:** -78.234584 **Datum:** NAD83

Soil Map Unit Name: Bibb and Johnston soils, frequently flooded **NWI classification:** PFO

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 ◉ No ○	**Is the Sampled Area within a Wetland?** **Yes** ◉ **No** ○
Hydric Soil Present?	Yes ◉ No ○	
Wetland Hydrology Present?	Yes ◉ No ○	

Remarks:
Highly impacted by cattle grazing

HYDROLOGY

Wetland Hydrology Indicators:

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

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☑ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift Deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☑ Water-Stained Leaves (B9)
- ☐ Aquatic Fauna (B13)
- ☐ Marl Deposits (B15) (LRR U)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (minimum of 2 required)

- ☐ Surface Soil Cracks (B6)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Drainage Patterns (B10)
- ☐ Moss Trim Lines (B16)
- ☐ Dry Season Water Table (C2)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☑ FAC-Neutral Test (D5)
- ☐ Sphagnum moss (D8) (LRR T, U)

Field Observations:

Surface Water Present?	Yes ○	No ◉	Depth (inches):
Water Table Present?	Yes ○	No ◉	Depth (inches):
Saturation Present? (includes capillary fringe)	Yes ◉	No ○	Depth (inches): 0

Wetland Hydrology Present? **Yes** ◉ **No** ○

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

Remarks:

VEGETATION (Five/Four Strata) - Use scientific names of plants.

Sampling Point: DP-9

	Absolute % Cover	Dominant Species?	Rel.Strat. Cover	Indicator Status
Tree Stratum (Plot size: 30)				
1. Liquidambar styraciflua	10	☑	50.0%	FAC
2. Quercus michauxii	5	☑	25.0%	FACW
3. Acer rubrum	5	☑	25.0%	FAC
4.	0	☐	0.0%	
5.	0	☐	0.0%	
6.	0	☐	0.0%	
7.	0	☐	0.0%	
8.	0	☐	0.0%	
50% of Total Cover: 10 — 20% of Total Cover: 4	20		= Total Cover	
Sapling or Sapling/Shrub Stratum (Plot size: 30)				
1. Acer rubrum	10	☑	100.0%	FAC
2.	0	☐	0.0%	
3.	0	☐	0.0%	
4.	0	☐	0.0%	
5.	0	☐	0.0%	
6.	0	☐	0.0%	
7.	0	☐	0.0%	
8.	0	☐	0.0%	
50% of Total Cover: 5 — 20% of Total Cover: 2	10		= Total Cover	
Shrub Stratum (Plot size: 30)				
1. Ligustrum sinense	10	☑	100.0%	FAC
2.	0	☐	0.0%	
3.	0	☐	0.0%	
4.	0	☐	0.0%	
5.	0	☐	0.0%	
6.	0	☐	0.0%	
50% of Total Cover: 5 — 20% of Total Cover: 2	10		= Total Cover	
Herb Stratum (Plot size: 30)				
1. Microstegium vimineum	25	☑	71.4%	FAC
2. Doellingeria umbellata	10	☑	28.6%	FACW
3.	0	☐	0.0%	
4.	0	☐	0.0%	
5.	0	☐	0.0%	
6.	0	☐	0.0%	
7.	0	☐	0.0%	
8.	0	☐	0.0%	
9.	0	☐	0.0%	
10.	0	☐	0.0%	
11.	0	☐	0.0%	
12.	0	☐	0.0%	
50% of Total Cover: 17.5 — 20% of Total Cover: 7	35		= Total Cover	
Woody Vine Stratum (Plot size: 30)				
1.	0	☐	0.0%	
2.	0	☐	0.0%	
3.	0	☐	0.0%	
4.	0	☐	0.0%	
5.	0	☐	0.0%	
50% of Total Cover: 0 — 20% of Total Cover: 0	0		= Total Cover	

Dominance Test worksheet:

Number of Dominant Species That are OBL, FACW, or FAC: 7 (A)

Total Number of Dominant Species Across All Strata: 7 (B)

Percent of dominant Species That Are OBL, FACW, or FAC: 100.0% (A/B)

Prevalence Index worksheet:

	Total % Cover of:	Multiply by:	
OBL species	0	x 1 =	0
FACW species	15	x 2 =	30
FAC species	60	x 3 =	180
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column Totals:	75 (A)		210 (B)

Prevalence Index = B/A = 2.800

Hydrophytic Vegetation Indicators:

- ☐ **1 - Rapid Test for Hydrophytic Vegetation**
- ☑ **2 - Dominance Test is > 50%**
- ☑ **3 - Prevalence Index is ≤3.0** [1]
- ☐ **Problematic Hydrophytic Vegetation** [1] **(Explain)**

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

Definition of 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.

Sapling/Shrub - Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1m) tall.

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

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

Woody vine - All woody vines, regardless of height.

Hydrophytic Vegetation Present? Yes ◉ No ○

Remarks: (If observed, list morphological adaptations below).

*Indicator suffix = National status or professional decision assigned because Regional status not defined by FWS.

SOIL

Sampling Point: DP-9

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

Depth (inches)	Matrix Color (moist)		%	Redox Features Color (moist)		%	Type [1]	Loc²	Texture	Remarks
0-10	10YR	4/1	85	7.5YR	4/6	15	C	M	Loam	
10-18	10YR	5/1	90	7.5YR	4/6	10	C	M	Clay Loam	

[1] Type: C=Concentration. D=Depletion. RM=Reduced Matrix, CS=Covered or Coated 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)
- ☐ Organic Bodies (A6) (LRR P, T, U)
- ☐ 5 cm Mucky Mineral (A7) (LRR P, T, U)
- ☐ Muck Presence (A8) (LRR U)
- ☐ 1 cm Muck (A9) (LRR P, T)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Coast Prairie Redox (A16) (MLRA 150A)
- ☐ Sandy Muck Mineral (S1) (LRR O, S)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Dark Surface (S7) (LRR P, S, T, U)
- ☐ Polyvalue Below Surface (S8) (LRR S, T, U)
- ☐ Thin Dark Surface (S9) (LRR S, T, U)
- ☐ Loamy Mucky Mineral (F1) (LRR O)
- ☐ Loamy Gleyed Matrix (F2)
- ☑ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Marl (F10) (LRR U)
- ☐ Depleted Ochric (F11) (MLRA 151)
- ☐ Iron-Manganese Masses (F12) (LRR O, P, T)
- ☐ Umbric Surface (F13) (LRR P, T, U)
- ☐ Delta Ochric (F17) (MLRA 151)
- ☐ Reduced Vertic (F18) (MLRA 150A, 150B)
- ☐ Piedmont Floodplain Soils (F19) (MLRA 149A)
- ☐ Anomalous Bright Loamy Soils (F20) (MLRA 149A, 153C, 153D)

Indicators for Problematic Hydric Soils[3]:

- ☐ 1 cm Muck (A9) (LRR O)
- ☐ 2 cm Muck (A10) (LRR S)
- ☐ Reduced Vertic (F18) (outside MLRA 150A,B)
- ☐ Piedmont Floodplain Soils (F19) (LRR P, S, T)
- ☐ Anomalous Bright Loamy Soils (F20) (MLRA 153B)
- ☐ Red Parent Material (TF2)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ Other (Explain in Remarks)

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

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ◉ No ○

Remarks:

WETLAND DETERMINATION DATA FORM - Atlantic and Gulf Coastal Plain Region

Project/Site: Six Runs **City/County:** Sampson County **Sampling Date:** 28-Jan-21

Applicant/Owner: Resource Environmental Solutions **State:** NC **Sampling Point:** DP-10

Investigator(s): M. DeAngelo, H. Hidlay **Section, Township, Range:** S T R

Landform (hillslope, terrace, etc.): Floodplain **Local relief (concave, convex, none):** convex **Slope:** 0.0 % / 0.0 °

Subregion (LRR or MLRA): MLRA 133A in LRR P **Lat.:** 35.095584 **Long.:** -78.234635 **Datum:** NAD83

Soil Map Unit Name: Bibb and Johnston soils, frequently flooded **NWI classification:** Upland

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 ◉ No ○	**Is the Sampled Area within a Wetland?** Yes ○ No ◉
Hydric Soil Present?	Yes ○ No ◉	
Wetland Hydrology Present?	Yes ○ No ◉	

Remarks:
Highly impacted by cattle grazing

HYDROLOGY

Wetland Hydrology Indicators:

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

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift Deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Aquatic Fauna (B13)
- ☐ Marl Deposits (B15) (LRR U)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (minimum of 2 required)

- ☐ Surface Soil Cracks (B6)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Drainage Patterns (B10)
- ☐ Moss Trim Lines (B16)
- ☐ Dry Season Water Table (C2)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)
- ☐ Sphagnum moss (D8) (LRR T, U)

Field Observations:

Surface Water Present?	Yes ○	No ◉	Depth (inches):
Water Table Present?	Yes ○	No ◉	Depth (inches):
Saturation Present? (includes capillary fringe)	Yes ○	No ◉	Depth (inches):

Wetland Hydrology Present? Yes ○ No ◉

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

Remarks:

VEGETATION (Five/Four Strata) - Use scientific names of plants.

Sampling Point: DP-10

	Absolute % Cover	Dominant Species?	Rel.Strat. Cover	Indicator Status
Tree Stratum (Plot size: 30)				
1. Quercus michauxii	10	☑	40.0%	FACW
2. Carpinus caroliniana	10	☑	40.0%	FAC
3. Quercus alba	5	☑	20.0%	FACU
4.	0	☐	0.0%	
5.	0	☐	0.0%	
6.	0	☐	0.0%	
7.	0	☐	0.0%	
8.	0	☐	0.0%	
50% of Total Cover: 12.5	20% of Total Cover: 5	25	= Total Cover	
Sapling or Sapling/Shrub Stratum (Plot size: 30)				
1.	0	☐	0.0%	
2.	0	☐	0.0%	
3.	0	☐	0.0%	
4.	0	☐	0.0%	
5.	0	☐	0.0%	
6.	0	☐	0.0%	
7.	0	☐	0.0%	
8.	0	☐	0.0%	
50% of Total Cover: 0	20% of Total Cover: 0	0	= Total Cover	
Shrub Stratum (Plot size: 30)				
1. Carpinus caroliniana	5	☑	100.0%	FAC
2.	0	☐	0.0%	
3.	0	☐	0.0%	
4.	0	☐	0.0%	
5.	0	☐	0.0%	
6.	0	☐	0.0%	
50% of Total Cover: 2.5	20% of Total Cover: 1	5	= Total Cover	
Herb Stratum (Plot size: 30)				
1.	0	☐	0.0%	
2.	0	☐	0.0%	
3.	0	☐	0.0%	
4.	0	☐	0.0%	
5.	0	☐	0.0%	
6.	0	☐	0.0%	
7.	0	☐	0.0%	
8.	0	☐	0.0%	
9.	0	☐	0.0%	
10.	0	☐	0.0%	
11.	0	☐	0.0%	
12.	0	☐	0.0%	
50% of Total Cover: 0	20% of Total Cover: 0	0	= Total Cover	
Woody Vine Stratum (Plot size: 30)				
1. Vitis rotundifolia	10	☑	100.0%	FAC
2.	0	☐	0.0%	
3.	0	☐	0.0%	
4.	0	☐	0.0%	
5.	0	☐	0.0%	
50% of Total Cover: 5	20% of Total Cover: 2	10	= Total Cover	

Dominance Test worksheet:

Number of Dominant Species That are OBL, FACW, or FAC: 4 (A)

Total Number of Dominant Species Across All Strata: 5 (B)

Percent of dominant Species That Are OBL, FACW, or FAC: 80.0% (A/B)

Prevalence Index worksheet:

	Total % Cover of:	Multiply by:	
OBL species	0	x 1 =	0
FACW species	10	x 2 =	20
FAC species	25	x 3 =	75
FACU species	5	x 4 =	20
UPL species	0	x 5 =	0
Column Totals:	40 (A)		115 (B)

Prevalence Index = B/A = 2.875

Hydrophytic Vegetation Indicators:

- ☐ **1 - Rapid Test for Hydrophytic Vegetation**
- ☑ **2 - Dominance Test is > 50%**
- ☑ **3 - Prevalence Index is ≤3.0** [1]
- ☐ **Problematic Hydrophytic Vegetation** [1] **(Explain)**

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

Definition of 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.

Sapling/Shrub - Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1m) tall.

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

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

Woody vine - All woody vines, regardless of height.

Hydrophytic Vegetation Present? Yes ◉ No ○

Remarks: (If observed, list morphological adaptations below).

*Indicator suffix = National status or professional decision assigned because Regional status not defined by FWS.

SOIL

Sampling Point: DP-10

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

Depth (inches)	Matrix Color (moist)		%	Redox Features Color (moist)	%	Type [1]	Loc [2]	Texture	Remarks
0-10	7.5YR	4/4	100					Silt Loam	
10-18	7.5YR	4/3	100					Silt Loam	

[1] Type: C=Concentration. D=Depletion. RM=Reduced Matrix, CS=Covered or Coated Sand Grains [2] Location: PL=Pore Lining. M=Matrix

Hydric Soil Indicators:

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5)
- ☐ Organic Bodies (A6) (LRR P, T, U)
- ☐ 5 cm Mucky Mineral (A7) (LRR P, T, U)
- ☐ Muck Presence (A8) (LRR U)
- ☐ 1 cm Muck (A9) (LRR P, T)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Coast Prairie Redox (A16) (MLRA 150A)
- ☐ Sandy Muck Mineral (S1) (LRR O, S)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Dark Surface (S7) (LRR P, S, T, U)
- ☐ Polyvalue Below Surface (S8) (LRR S, T, U)
- ☐ Thin Dark Surface (S9) (LRR S, T, U)
- ☐ Loamy Mucky Mineral (F1) (LRR O)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Marl (F10) (LRR U)
- ☐ Depleted Ochric (F11) (MLRA 151)
- ☐ Iron-Manganese Masses (F12) (LRR O, P, T)
- ☐ Umbric Surface (F13) (LRR P, T, U)
- ☐ Delta Ochric (F17) (MLRA 151)
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Indicators for Problematic Hydric Soils [3]:

- ☐ 1 cm Muck (A9) (LRR O)
- ☐ 2 cm Muck (A10) (LRR S)
- ☐ Reduced Vertic (F18) (outside MLRA 150A,B)
- ☐ Piedmont Floodplain Soils (F19) (LRR P, S, T)
- ☐ Anomalous Bright Loamy Soils (F20) (MLRA 153B)
- ☐ Red Parent Material (TF2)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ Other (Explain in Remarks)

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

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ○ No ◉

Remarks:

Six Runs Mitigation Site
WOUS JD Request
Site Photos

Brad's Branch near WJ and WK

WK Area

WK Area

WF and DE8 Area downstream of pond.

Near WD facing South. Brad's Branch at tree line.

Top of WC facing South

Six Runs Mitigation Site
WOUS JD Request
Site Photos

Southern end of Brad's Branch where stream disappears

WC at end of Brad's Branch where stream disappears

WC below end of Brad's Branch

Downstream end of WC where trees grow up

Between DE4 and WE, facing west

Degraded portion of WE.

Six Runs Mitigation Site
WOUS JD Request
Site Photos

WA above Darden Road

WA above Darden Road

Brad's Branch above Darden Road

M3 (Ephemeral)

M2

Brad's Branch above Darden Road

Six Runs Mitigation Site
WOUS JD Request
Site Photos

Brad's Branch above Darden Road

Brad's Branch above Darden Road

Brad's Branch below Darden Road

DE8

Brad's Branch below Darden Road

Brad's Branch below Darden Road

Six Runs Mitigation Site
WOUS JD Request
Site Photos

Brad' Branch below Darden Road

Brad's Branch below Darden Road

Brad's Branch below Darden Road

DE4

DE4

DE4

Six Runs Mitigation Site
WOUS JD Request
Site Photos

DE4

DE4

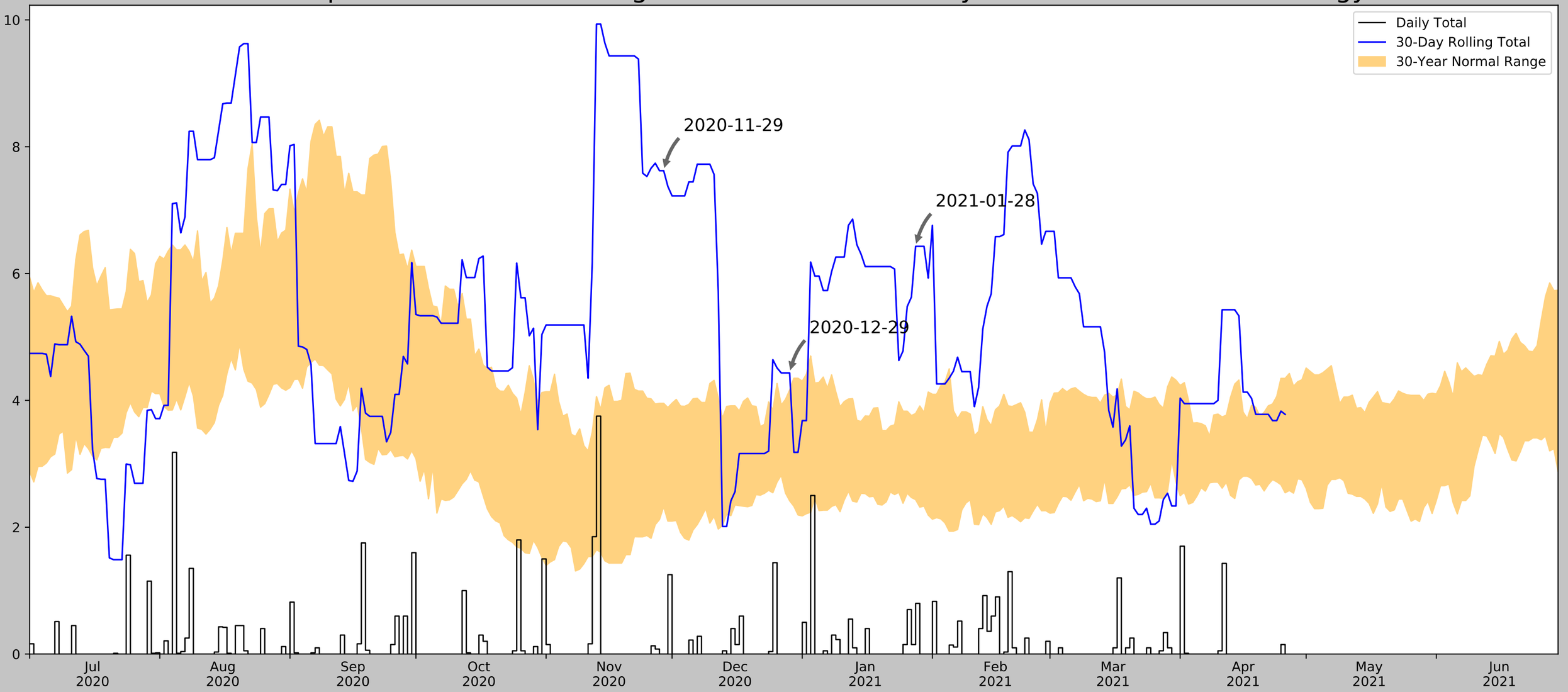
DE8

DE7

DE2

DE3

Antecedent Precipitation vs Normal Range based on NOAA's Daily Global Historical Climatology Network



Coordinates	35.096035, -78.234519
Observation Date	2021-01-28
Elevation (ft)	128.89
Drought Index (PDSI)	Severe wetness
WebWIMP H_2O Balance	Wet Season

30 Days Ending	30th %ile (in)	70th %ile (in)	Observed (in)	Wetness Condition	Condition Value	Month Weight	Product
2021-01-28	2.434646	3.792914	6.429134	Wet	3	3	9
2020-12-29	2.416142	4.162205	4.433071	Wet	3	2	6
2020-11-29	2.324016	3.953937	7.622047	Wet	3	1	3
Result							Wetter than Normal - 18

Figure and tables made by the
Antecedent Precipitation Tool
Version 1.0

Written by Jason Deters
U.S. Army Corps of Engineers

Weather Station Name	Coordinates	Elevation (ft)	Distance (mi)	Elevation Δ	Weighted Δ	Days (Normal)	Days (Antecedent)
CLINTON 2 NE	35.025, -78.2761	158.136	5.442	29.246	2.608	11067	90
CLINTON 1.5 NE	35.0172, -78.3142	154.856	7.07	25.966	3.365	16	0
CLINTON 10.6 N	35.1512, -78.3633	179.134	8.215	50.244	4.11	31	0
MOUNT OLIVE 2.4 SW	35.1763, -78.1018	158.136	9.327	29.246	4.47	55	0
WARSAW 5 E	35.0128, -78.0044	109.908	14.23	18.982	6.673	159	0
GARLAND 4 SW	34.7392, -78.3917	56.102	26.214	72.788	13.704	21	0
SMITHFIELD	35.5172, -78.3442	149.934	29.75	21.044	14.013	4	0

Appendix J

Invasive Species Plan

INVASIVE SPECIES PLAN

Annual monitoring and semi-annual site visits will be conducted to assess the condition of the finished project. These site inspections may identify the presence of invasive vegetation. RES will treat invasive species vegetation within the project area and provide remedial action on a case by- case basis. Common invasive species vegetation, such as Chinese privet (*Ligustrum sinense*), multiflora rose (*Rosa multiflora*), tree-of-heaven (*Ailanthus altissima*), and Japanese honeysuckle (*Lonicera japonica*), will be treated to allow native plants to become established within the conservation easement. Invasive species vegetation will be treated by approved mechanical and/or chemical methods such that the percent composition of exotic/invasive species is less than 5% of the total riparian buffer area. Any control methods requiring herbicide application will be performed in accordance with NC Department of Agriculture (NCDA) rules and regulations. If areas of invasive species exist within the easement, they will be monitored yearly as part of the monitoring protocol and treated if necessary. If required, problem areas will continue to be treated until the project easement shows overall trending towards meeting all monitoring requirements.

Appendix K

Approved FHWA Categorical Exclusion Form

Appendix A

Categorical Exclusion Form for Division of Mitigation Services Projects
Version 2

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

Part 1: General Project Information	
Project Name:	Six Runs Stream and Wetland Mitigation Project
County Name:	Sampson
DMS Number:	100170
Project Sponsor:	Environmental Banc & Exchange, LLC
Project Contact Name:	Katie Webber
Project Contact Address:	3600 Glenwood Avenue, Suite 100, Raleigh, NC 27612
Project Contact E-mail:	kwebber@res.us
DMS Project Manager:	Lindsay Crocker

Project Description

The Six Runs Project encompasses 29.75 acres proposed conservation easement on two parcels in Sampson County, North Carolina. The Project will involve the restoration and enhancement of unnamed tributaries of Six Runs Creek as well as the restoration and enhancement of riparian wetlands. The Project will restore and enhance up to 7,713 linear feet of stream and restore and enhance up to 12 acres of riparian wetlands in the Cape Fear River Basin.

For Official Use Only

Reviewed By:

3-5-2021 — LHCrocker

Date — **DMS Project Manager**

Conditional Approved By:

Date — **For Division Administrator FHWA**

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

Final Approval By:

3-8-21 — Donald W. Brew

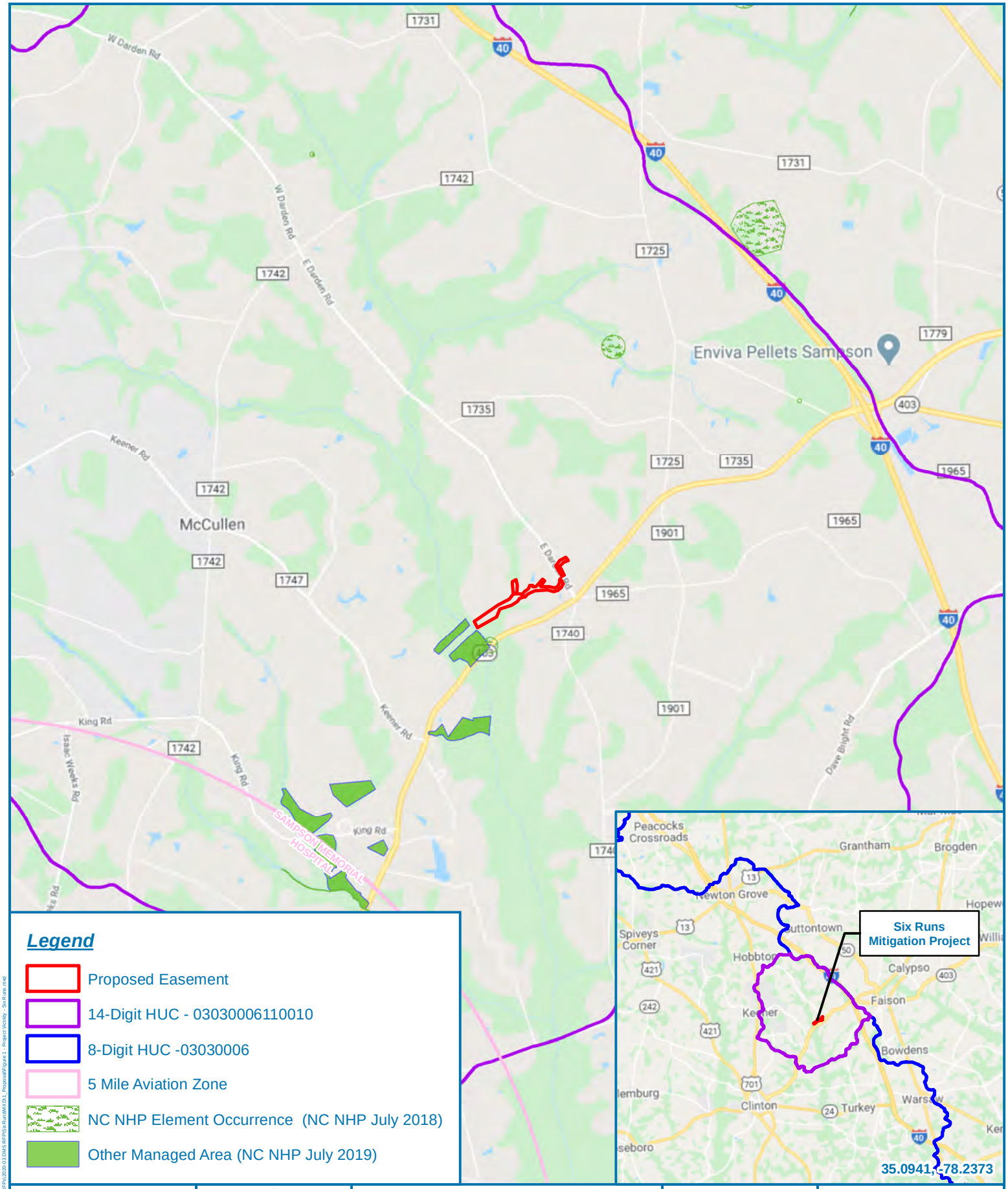
Date — **For Division Administrator FHWA**

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

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

Executive Order 13007 (Indian Sacred Sites)	
1. Is the project located on Federal lands that are within a county claimed as "territory" by the EBCI?	☐ Yes ■ No
2. Has the EBCI indicated that Indian sacred sites may be impacted by the proposed project?	☐ Yes ☐ No ■ N/A
3. Have accommodations been made for access to and ceremonial use of Indian sacred sites?	☐ Yes ☐ No ■ N/A
Farmland Protection Policy Act (FPPA)	
1. Will real estate be acquired?	■ Yes ☐ No
2. Has NRCS determined that the project contains prime, unique, statewide or locally important farmland?	■ Yes ☐ No ☐ N/A
3. Has the completed Form AD-1006 been submitted to NRCS?	■ Yes ☐ No ☐ N/A
Fish and Wildlife Coordination Act (FWCA)	
1. Will the project impound, divert, channel deepen, or otherwise control/modify any water body?	■ Yes ☐ No
2. Have the USFWS and the NCWRC been consulted?	■ Yes ☐ No ☐ N/A
Land and Water Conservation Fund Act (Section 6(f))	
1. Will the project require the conversion of such property to a use other than public, outdoor recreation?	☐ Yes ■ No
2. Has the NPS approved of the conversion?	☐ Yes ☐ No ■ N/A
Magnuson-Stevens Fishery Conservation and Management Act (Essential Fish Habitat)	
1. Is the project located in an estuarine system?	☐ Yes ■ No
2. Is suitable habitat present for EFH-protected species?	☐ Yes ☐ No ■ N/A
3. Is sufficient design information available to make a determination of the effect of the project on EFH?	☐ Yes ☐ No ■ N/A
4. Will the project adversely affect EFH?	☐ Yes ☐ No ■ N/A
5. Has consultation with NOAA-Fisheries occurred?	☐ Yes ☐ No ■ N/A
Migratory Bird Treaty Act (MBTA)	
1. Does the USFWS have any recommendations with the project relative to the MBTA?	☐ Yes ■ No
2. Have the USFWS recommendations been incorporated?	☐ Yes ☐ No ■ N/A
Wilderness Act	
1. Is the project in a Wilderness area?	☐ Yes ■ No
2. Has a special use permit and/or easement been obtained from the maintaining federal agency?	☐ Yes ☐ No ■ N/A

EXHIBITS



Legend

- Proposed Easement
- 14-Digit HUC - 03030006110010
- 8-Digit HUC -03030006
- 5 Mile Aviation Zone
- NC NHP Element Occurrence (NC NHP July 2018)
- Other Managed Area (NC NHP July 2019)

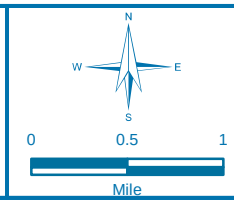


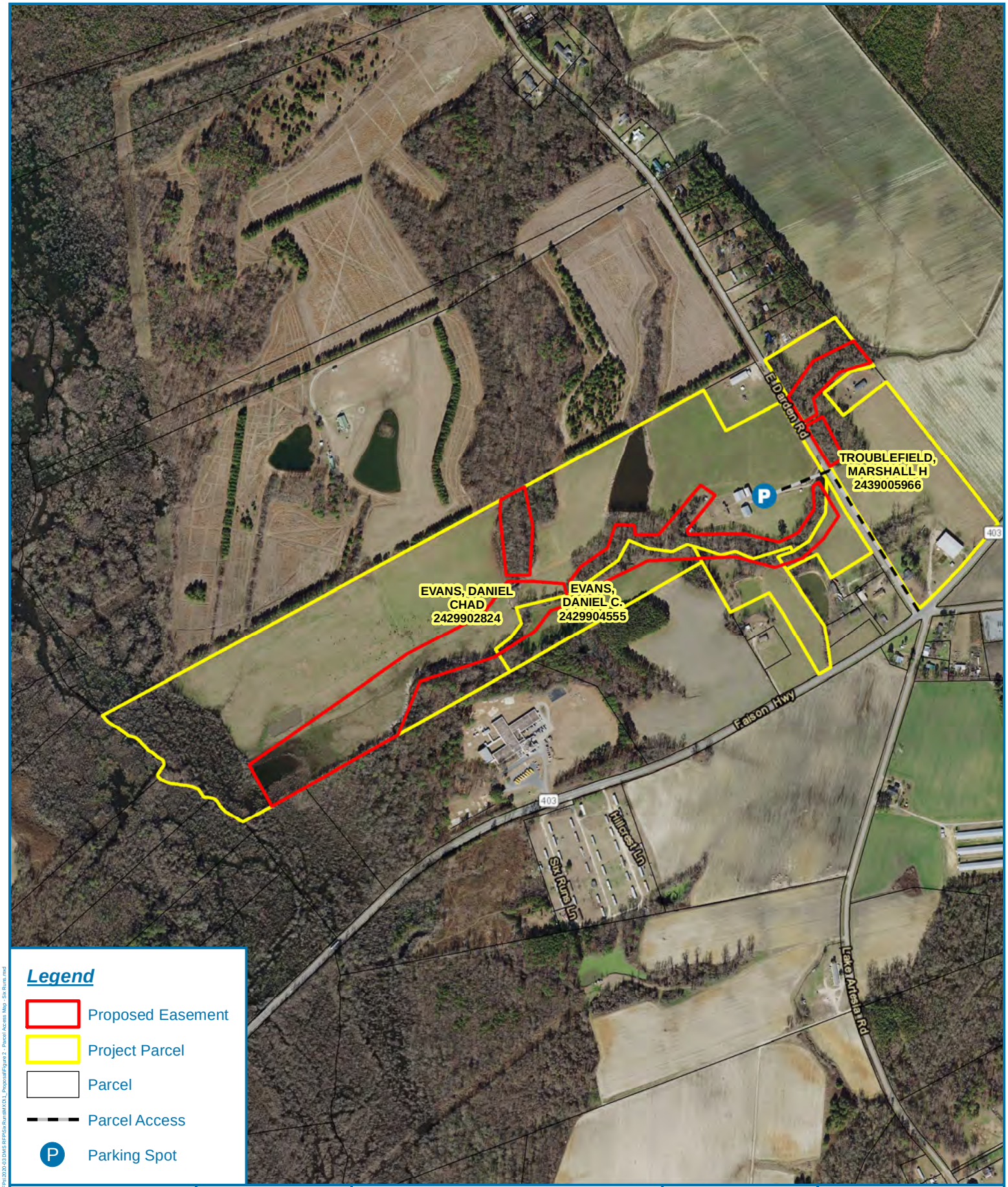
Figure 1 - Project Vicinity

Six Runs Mitigation Project

Sampson County, North Carolina

Date:	3/24/2020
Drawn by:	GDS
Checked by:	MDE
	1 inch = 1 mile

res



Legend

- Proposed Easement
- Project Parcel
- Parcel
- Parcel Access
- Parking Spot

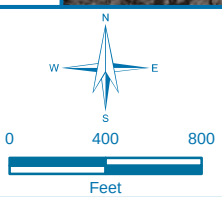


Figure 2 - Parcel Access

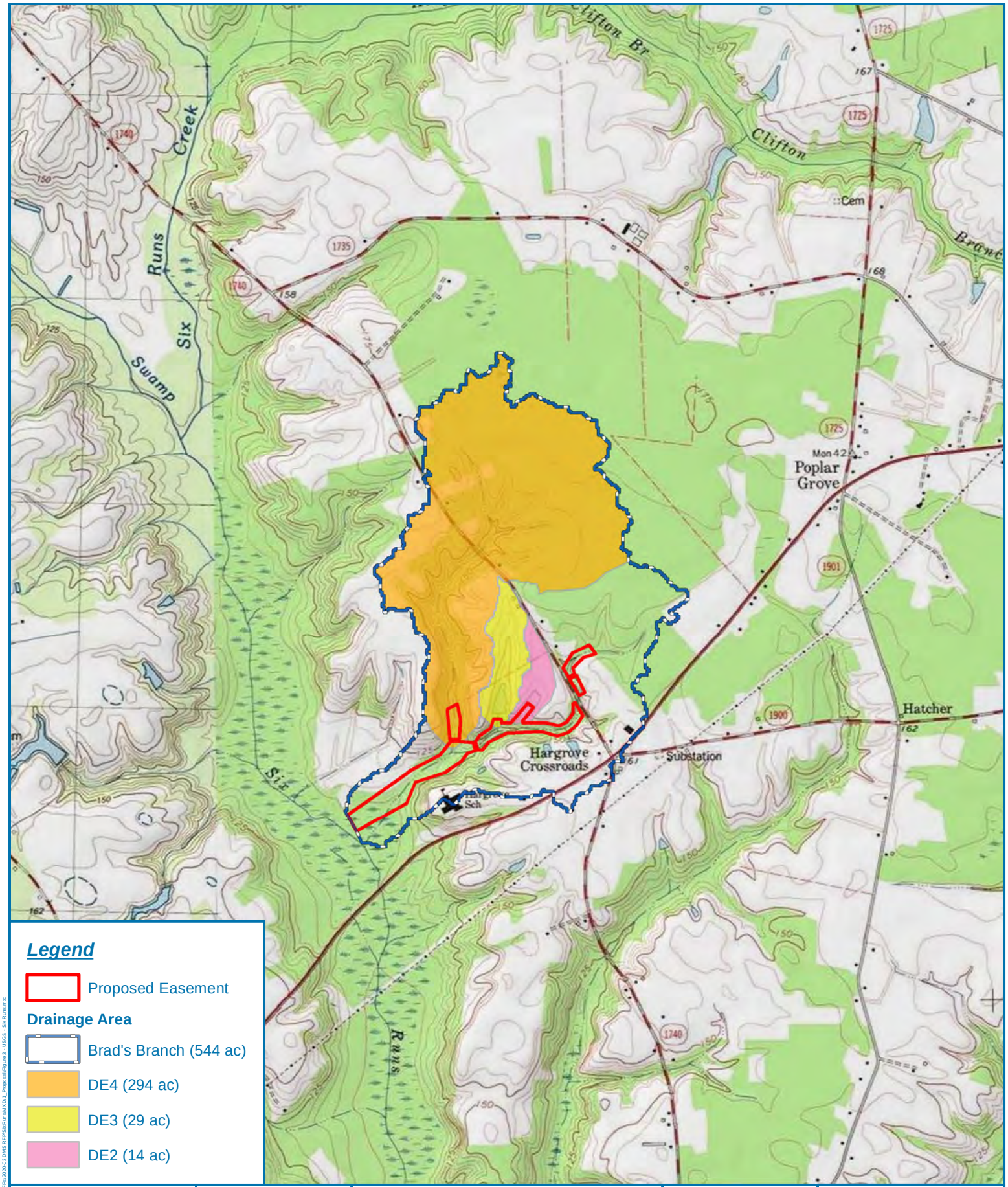
Six Runs Mitigation Project

Sampson County, North Carolina

Date:	3/24/2020
Drawn by:	GDS
Checked by:	MDE
	1 inch = 800 feet

res

Document Path: R:\Projects\Sourdough\projects\NCRFPs\2020\03\SIXRFP\Six Runs\MXD\1_Proposal\Figure 2 - Parcel Access Map - Six Runs.mxd

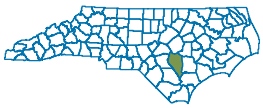


Legend

- Proposed Easement

Drainage Area

- Brad's Branch (544 ac)
- DE4 (294 ac)
- DE3 (29 ac)
- DE2 (14 ac)



N W E S

0 1,000 2,000

Feet

Figure 3 - USGS Faison Quadrangle (1977)

Six Runs Mitigation Project

Sampson County, North Carolina

Date: 3/23/2020

Drawn by: GDS

Checked by: MDE

1 inch = 2,000 feet

res

Document Path: R:\Projects\dot\projects\NCRFP\s\2020.03 DMS RFPS\Six Runs\MXD\1_Proposal\Figure 3 - USGS - Six Runs.mxd

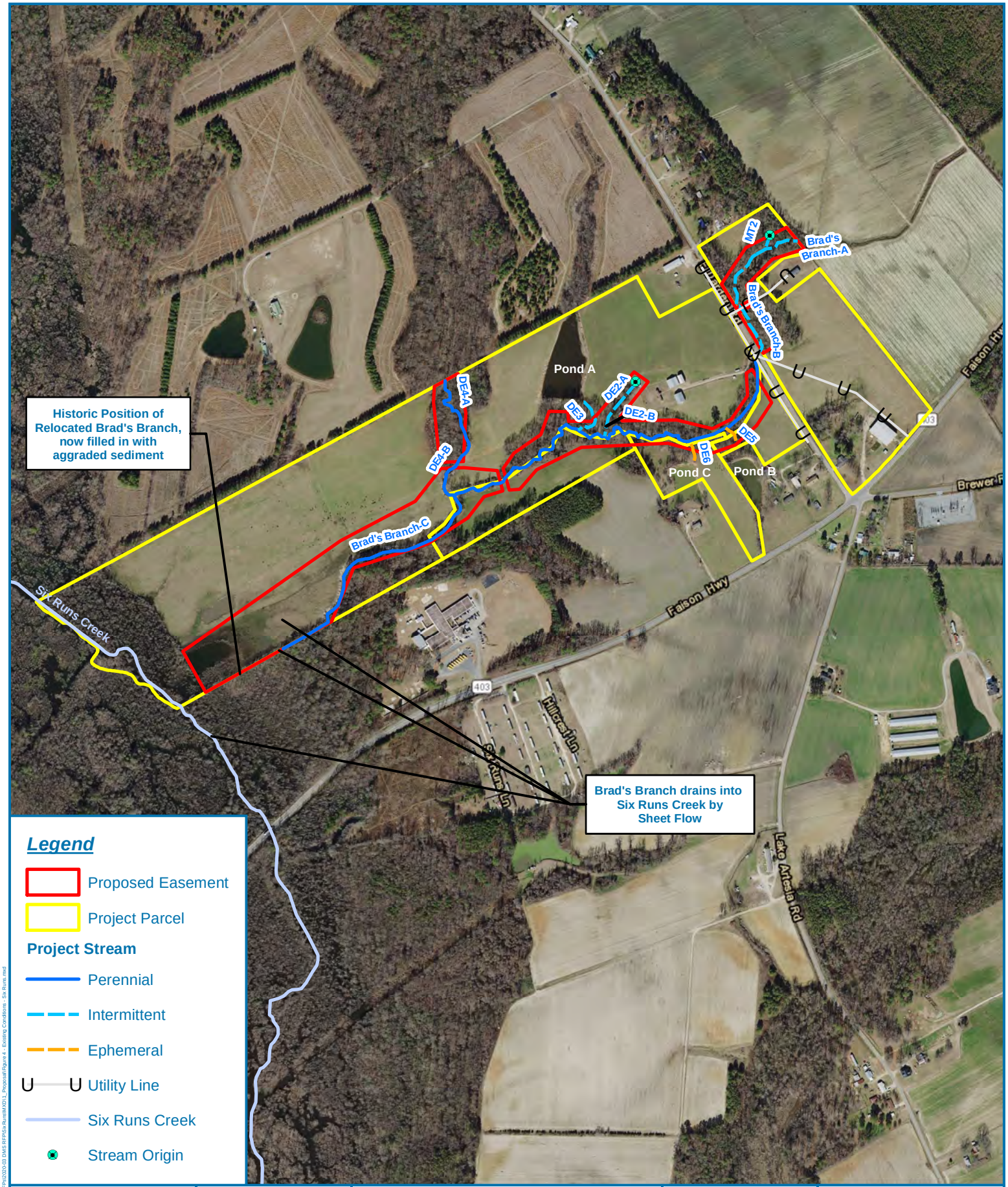


Figure 4 - Existing Conditions

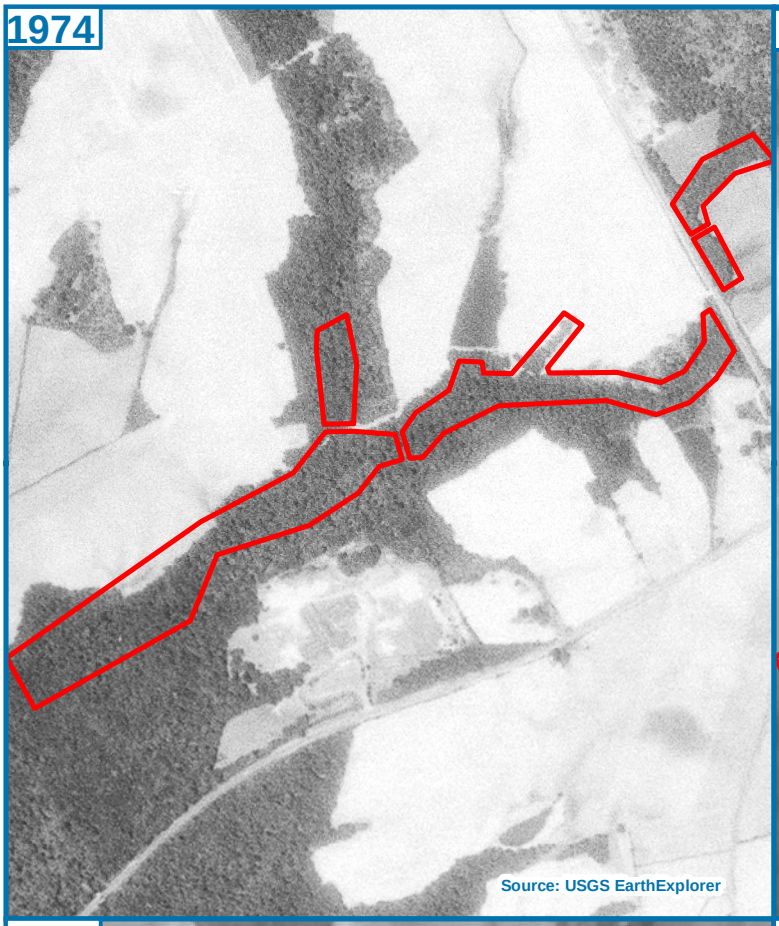
Six Runs Mitigation Project

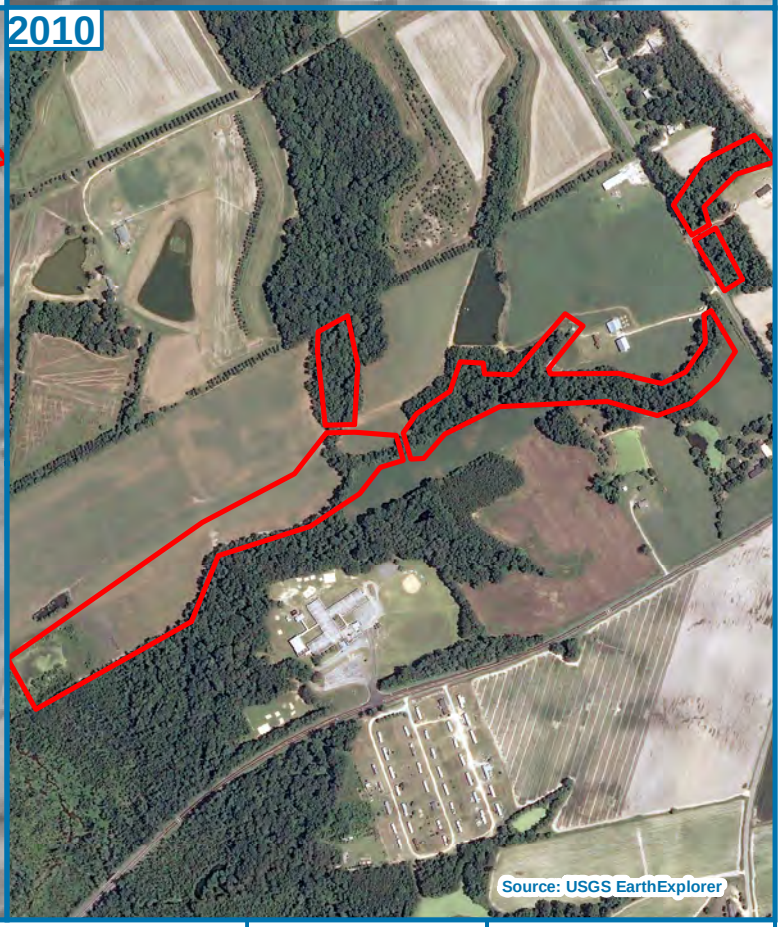
Sampson County, North Carolina

Date:	3/25/2020
Drawn by:	GDS
Checked by:	MDE
	1 inch = 800 feet

res

Document Path: R:\Projects\drawings\projects\NCRFP\sb2020.03 DMS RFP\Six Runs\MXD\1. Proposal\Figure 4 - Existing Conditions - Six Runs.mxd





Legend

Proposed Easement

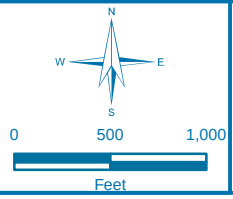


Figure 5 - Historical Aerials

Six Runs Mitigation Project

Sampson County, North Carolina

Date: 3/24/2020

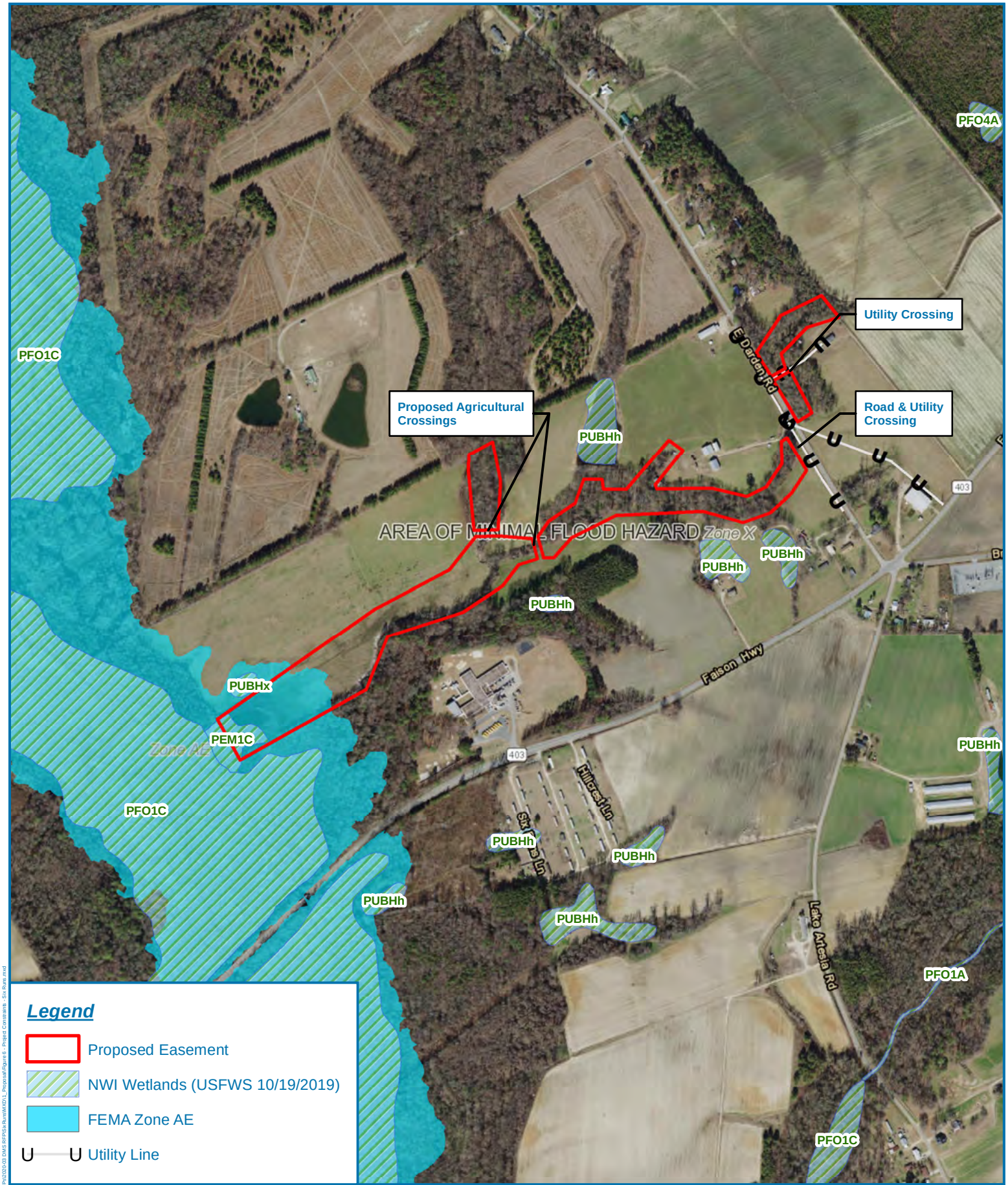
Drawn by: GDS

Checked by: MDE

1 inch = 1,000 feet

res

Document Path: R:\Resp\ddraper\projects\NCRFPs\2020\03\MXD\1 Proposal\Figure 5 - Historical Imagery - Six Runs.mxd



Legend

- Proposed Easement
- NWI Wetlands (USFWS 10/19/2019)
- FEMA Zone AE
- Utility Line

N W E S

0 400 800

Feet

Figure 6 - Project Constraints

Six Runs Mitigation Project

Sampson County, North Carolina

Date: 3/25/2020

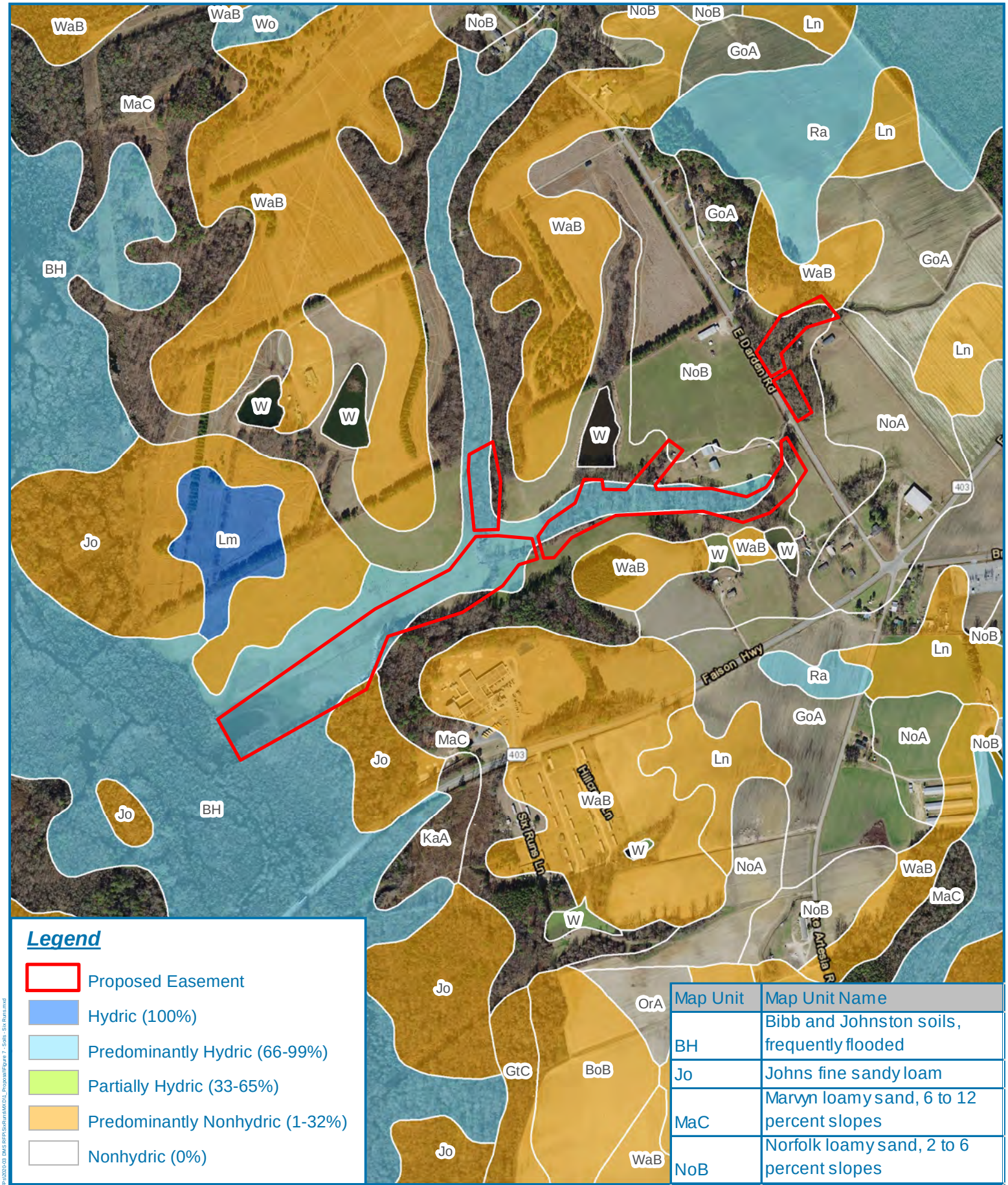
Drawn by: GDS

Checked by: MDE

1 inch = 800 feet

res

Document Path: R:\Projects\drobo\projects\NCRFPs\2020.03 DMS RFPs\Six Runs\MXD\1_Proposal\Figure 6 - Project Constraints - Six Runs.mxd



Legend

- Proposed Easement
- Hydric (100%)
- Predominantly Hydric (66-99%)
- Partially Hydric (33-65%)
- Predominantly Nonhydric (1-32%)
- Nonhydric (0%)

Map Unit	Map Unit Name
BH	Bibb and Johnston soils, frequently flooded
Jo	Johns fine sandy loam
MaC	Marvyn loamy sand, 6 to 12 percent slopes
NoB	Norfolk loamy sand, 2 to 6 percent slopes

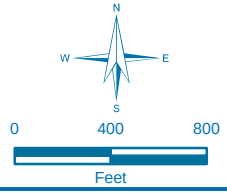


Figure 7 - Mapped Soils

Six Runs Mitigation Project

Sampson County, North Carolina

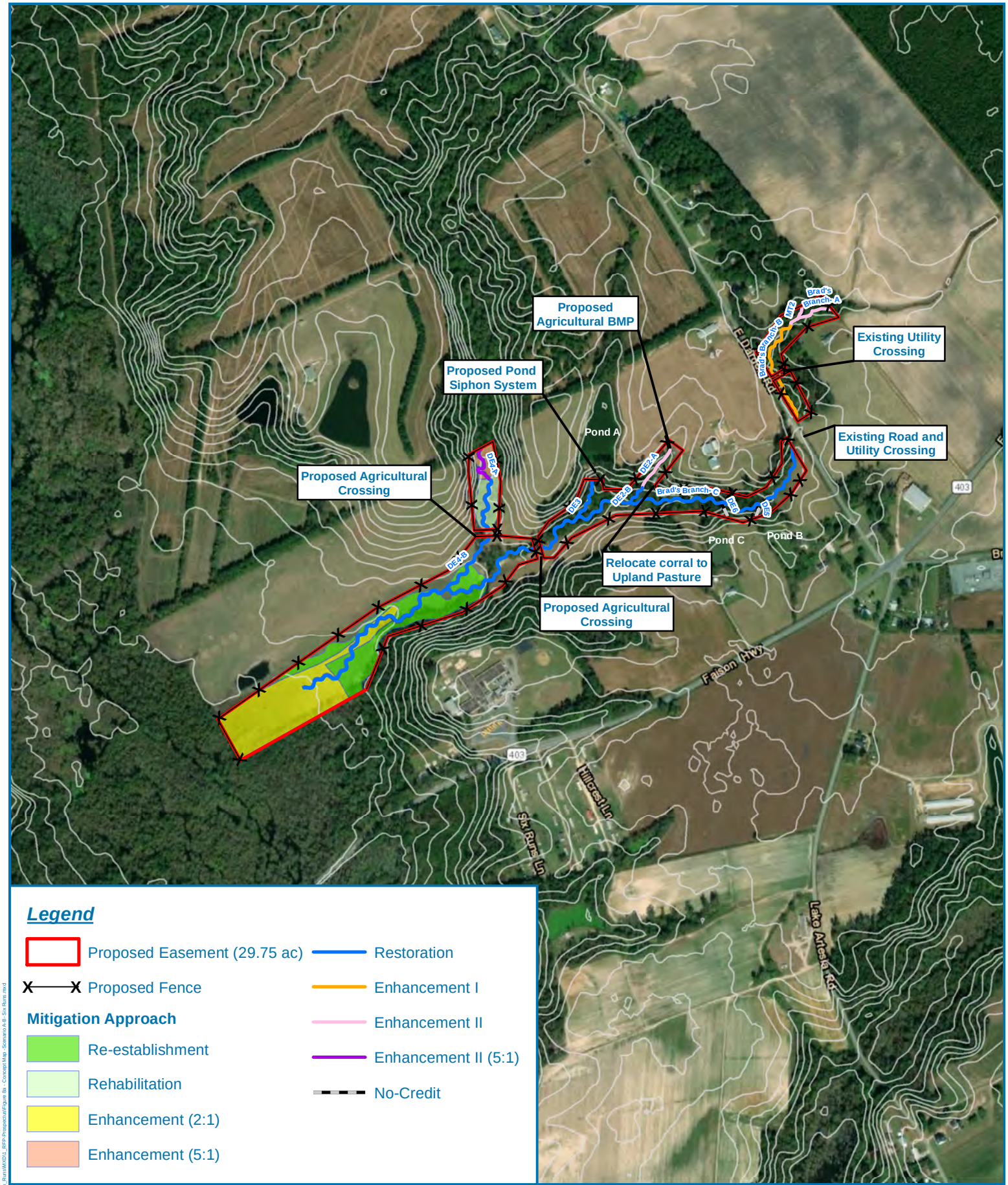
Date: 3/20/2020

Drawn by: GDS

Checked by: MDE

1 inch = 800 feet

res



Legend

- Proposed Easement (29.75 ac)
- Proposed Fence

Mitigation Approach

- Re-establishment
- Rehabilitation
- Enhancement (2:1)
- Enhancement (5:1)
- Restoration
- Enhancement I
- Enhancement II
- Enhancement II (5:1)
- No-Credit

N W E S

0 400 800

Feet

Figure 8 - Concept Plan

Six Runs Mitigation Project

Sampson County, North Carolina

Date: 2/2/2021

Drawn by: MDE

Checked by: KAW

1 inch = 800 feet

res

Document Path: R:\Projects\NC\01_Six Runs\MXD\1_RFP-Prospectus\Figure 8a - Concept Map - Scenario A-B - Six Runs.mxd

Categorical Exclusion CERCLA Summary
Six Runs Mitigation Project

Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA)

The Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), commonly known as Superfund, created a tax on the chemical and petroleum industries to clean up abandoned or uncontrolled hazardous waste sites.

As a part of the environmental screening and CERCLA compliance, an EDR Radius Map Report with Geocheck was ordered for the Six Runs Mitigation Project through Environmental Data Resources, Inc (EDR) on November 17th, 2020. According to the EDR report, there are no reported environmental contamination incidents or hazardous waste sites within one mile of the project property. The summary of the EDR report is enclosed.

There is a daycare facility (Great Beginnings Child Care) near the Six Runs Project that is commercially zoned; however, the parcel is not adjacent to the proposed Six Runs Project easement. According to the landowner, the commercial property has always served as a daycare facility; therefore, no other commercial activity is known to have occurred on the grounds. Furthermore, as mentioned above, the EDR report did not identify any incidents associated with the commercial property.

In addition to the EDR search, during routine site visits conducted by RES staff at the Six Runs Project, visual inspections were conducted to assess the potential for the occurrence of recognized environmental conditions on the property that might not have been revealed in the EDR report. The inspection was conducted to locate and identify any obvious use, storage, or generation of hazardous materials. No hazardous storage containers or substances were observed during the visual inspection.

EDR REPORT

Six Runs
3562 E Darden Rd
Faison, NC 28341

Inquiry Number: 6269759.2s
November 17, 2020

The EDR Radius Map™ Report with GeoCheck®

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

TABLE OF CONTENTS

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

EXECUTIVE SUMMARY

A search of available environmental records was conducted by Environmental Data Resources, Inc (EDR). The report was designed to assist parties seeking to meet the search requirements of EPA's Standards and Practices for All Appropriate Inquiries (40 CFR Part 312), the ASTM Standard Practice for Environmental Site Assessments (E 1527-13), 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

3562 E DARDEN RD
FAISON, NC 28341

COORDINATES

Latitude (North):	35.0947210 - 35° 5' 40.99''
Longitude (West):	78.2379670 - 78° 14' 16.68''
Universal Tranverse Mercator:	Zone 17
UTM X (Meters):	751788.4
UTM Y (Meters):	3886840.2
Elevation:	124 ft. above sea level

USGS TOPOGRAPHIC MAP ASSOCIATED WITH TARGET PROPERTY

Target Property Map:	5948582 FAISON, NC
Version Date:	2013
Southwest Map:	5948576 CLINTON NORTH, NC
Version Date:	2013

AERIAL PHOTOGRAPHY IN THIS REPORT

Portions of Photo from:	20140520, 20140521
Source:	USDA

MAPPED SITES SUMMARY

Target Property Address:
3562 E DARDEN RD
FAISON, NC 28341

Click on Map ID to see full detail.

MAP ID	SITE NAME	ADDRESS	DATABASE ACRONYMS	RELATIVE ELEVATION	DIST (ft. & mi.) DIRECTION
1	GREAT BEGINNINGS CHI	3406 EAST DARDEN ROA	FINDS	Higher	1 ft.
2	HARGROVE ELEMENTARY	7725 FAISON HWY	UST	Lower	775, 0.147, South

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-VSQG ---------- RCRA - Very Small Quantity Generators (Formerly Conditionally Exempt Small Quantity Generators)

Federal institutional controls / engineering controls registries

LUCIS ---------- Land Use Control Information System

US ENG CONTROLS ..... Engineering Controls Sites List
US INST CONTROLS ..... Institutional Controls Sites List

Federal ERNS list

ERNS ..... Emergency Response Notification System

State- and tribal - equivalent NPL

NC HSDS ..... Hazardous Substance Disposal Site

State- and tribal - equivalent CERCLIS

SHWS ..... Inactive Hazardous Sites Inventory

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

SWF/LF ..... List of Solid Waste Facilities
OLI ..... Old Landfill Inventory
DEBRIS ..... Solid Waste Active Disaster Debris Sites Listing
LCID ..... Land-Clearing and Inert Debris (LCID) Landfill Notifications

State and tribal leaking storage tank lists

LUST ..... Regional UST Database
LAST ..... Leaking Aboveground Storage Tanks
INDIAN LUST ..... Leaking Underground Storage Tanks on Indian Land
LUST TRUST ..... State Trust Fund Database

State and tribal registered storage tank lists

FEMA UST ..... Underground Storage Tank Listing
AST ..... AST Database
INDIAN UST ..... Underground Storage Tanks on Indian Land

State and tribal institutional control / engineering control registries

INST CONTROL ..... No Further Action Sites With Land Use Restrictions Monitoring

State and tribal voluntary cleanup sites

INDIAN VCP ..... Voluntary Cleanup Priority Listing
VCP ..... Responsible Party Voluntary Action Sites

State and tribal Brownfields sites

BROWNFIELDS ..... Brownfields Projects Inventory

ADDITIONAL ENVIRONMENTAL RECORDS

Local Brownfield lists

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

Local Lists of Landfill / Solid Waste Disposal Sites

HIST LF ..... Solid Waste Facility Listing

SWRCY	Recycling Center Listing
INDIAN ODI	Report on the Status of Open Dumps on Indian Lands
ODI	Open Dump Inventory
DEBRIS REGION 9	Torres Martinez Reservation Illegal Dump Site Locations
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
UXO ---- Unexploded Ordnance Sites
DOCKET HWC ---- Hazardous Waste Compliance Docket Listing
ECHO ---- Enforcement & Compliance History Information
FUELS PROGRAM ---- EPA Fuels Program Registered Listing
AIRS ---- Air Quality Permit Listing
ASBESTOS ---- ASBESTOS
COAL ASH ---- Coal Ash Disposal Sites
DRYCLEANERS ---- Drycleaning Sites
Financial Assurance ---- Financial Assurance Information Listing
NPDES ---- NPDES Facility Location Listing
UIC ---- Underground Injection Wells Listing
AOP ---- Animal Operation Permits Listing
PCSRP ---- Petroleum-Contaminated Soil Remediation Permits
CCB ---- Coal Ash Structural Fills (CCB) Listing
SEPT HAULERS ---- Permitted Septage Haulers Listing
MINES MRDS ---- Mineral Resources Data System

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.

EXECUTIVE SUMMARY

STANDARD ENVIRONMENTAL RECORDS

State and tribal registered storage tank lists

UST: The Underground Storage Tank database contains registered USTs. USTs are regulated under Subtitle I of the Resource Conservation and Recovery Act (RCRA). The data come from the Department of Environment & Natural Resources' Petroleum Underground Storage Tank Database.

A review of the UST list, as provided by EDR, and dated 07/31/2020 has revealed that there is 1 UST site within approximately 0.25 miles of the target property.

Lower Elevation	Address	Direction / Distance	Map ID	Page
HARGROVE ELEMENTARY Tank Status: Abandoned Facility Id: 00-0-0000029377	7725 FAISON HWY	S 1/8 - 1/4 (0.147 mi.)	2	8

ADDITIONAL ENVIRONMENTAL RECORDS

Other Ascertainable Records

FINDS: The Facility Index System contains both facility information and "pointers" to other sources of information that contain more detail. These include: RCRIS; Permit Compliance System (PCS); Aerometric Information Retrieval System (AIRS); FATES (FIFRA [Federal Insecticide Fungicide Rodenticide Act] and TSCA Enforcement System, FTTS [FIFRA/TSCA Tracking System]; CERCLIS; DOCKET (Enforcement Docket used to manage and track information on civil judicial enforcement cases for all environmental statutes); Federal Underground Injection Control (FURS); Federal Reporting Data System (FRDS); Surface Impoundments (SIA); TSCA Chemicals in Commerce Information System (CICS); PADS; RCRA-J (medical waste transporters/disposers); TRIS; and TSCA. The source of this database is the U.S. EPA/NTIS.

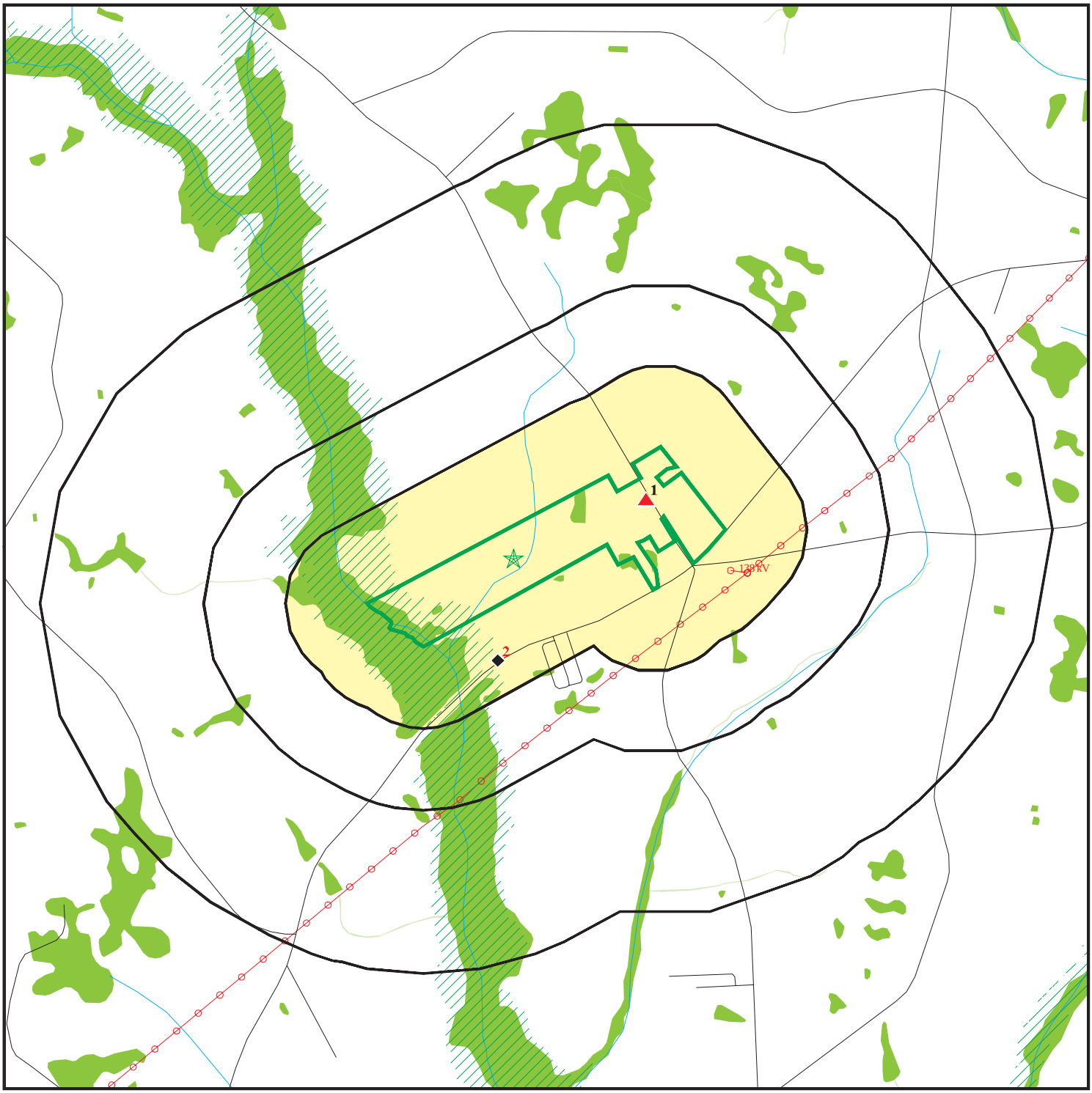
A review of the FINDS list, as provided by EDR, and dated 02/03/2020 has revealed that there is 1 FINDS site within approximately 0.001 miles of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
GREAT BEGINNINGS CHI Registry ID:: 110018736938	3406 EAST DARDEN ROA	0 - 1/8 (0.000 mi.)	1	8

EXECUTIVE SUMMARY

There were no unmapped sites in this report.

OVERVIEW MAP - 6269759.2S



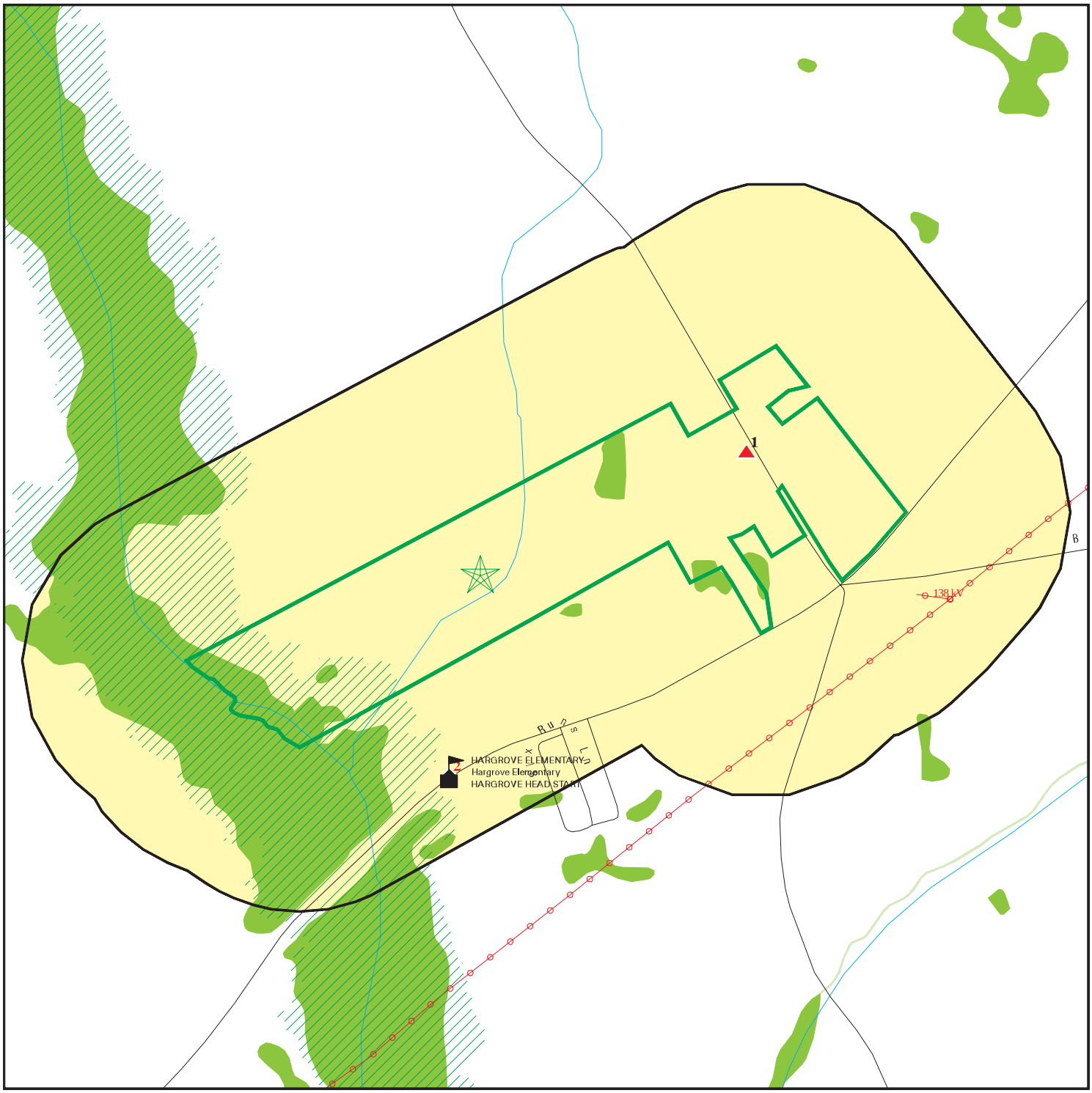
0 1/4 1/2 1 Miles

- Target Property
- Sites at elevations higher than or equal to the target property
- Sites at elevations lower than the target property
- Manufactured Gas Plants
- National Priority List Sites
- Dept. Defense Sites
- Indian Reservations BIA
- Power transmission lines
- Special Flood Hazard Area (1%)
- 0.2% Annual Chance Flood Hazard
- National Wetland Inventory
- State Wetlands
- Hazardous Substance Disposal Sites

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

SITE NAME: Six Runs ADDRESS: 3562 E Darden Rd Faison NC 28341 LAT/LONG: 35.094721 / 78.237967	CLIENT: Resource Environmental Solutions, LLC CONTACT: JEREMY L SCHMID INQUIRY #: 6269759.2s DATE: November 17, 2020 11:30 am

DETAIL MAP - 6269759.2S



- Target Property
- Sites at elevations higher than or equal to the target property
- Sites at elevations lower than the target property
- Manufactured Gas Plants
- Sensitive Receptors
- National Priority List Sites
- Dept. Defense Sites

0 1/8 1/4 1/2 Miles

- Indian Reservations BIA
- Power transmission lines
- Special Flood Hazard Area (1%)
- 0.2% Annual Chance Flood Hazard
- National Wetland Inventory
- State Wetlands
- Hazardous Substance Disposal Sites

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

SITE NAME:	Six Runs	CLIENT:	Resource Environmental Solutions, LLC
ADDRESS:	3562 E Darden Rd Faison NC 28341	CONTACT:	JEREMY L SCHMID
		INQUIRY #:	6269759.2s
LAT/LONG:	35.094721 / 78.237967	DATE:	November 17, 2020 11:30 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								
Federal NPL site list								
NPL	1.000		0	0	0	0	NR	0
Proposed NPL	1.000		0	0	0	0	NR	0
NPL LIENS	1.000		0	0	0	0	NR	0
Federal Delisted NPL site list								
Delisted NPL	1.000		0	0	0	0	NR	0
Federal CERCLIS list								
FEDERAL FACILITY	0.500		0	0	0	NR	NR	0
SEMS	0.500		0	0	0	NR	NR	0
Federal CERCLIS NFRAP site list								
SEMS-ARCHIVE	0.500		0	0	0	NR	NR	0
Federal RCRA CORRACTS facilities list								
CORRACTS	1.000		0	0	0	0	NR	0
Federal RCRA non-CORRACTS TSD facilities list								
RCRA-TSDF	0.500		0	0	0	NR	NR	0
Federal RCRA generators list								
RCRA-LQG	0.250		0	0	NR	NR	NR	0
RCRA-SQG	0.250		0	0	NR	NR	NR	0
RCRA-VSQG	0.250		0	0	NR	NR	NR	0
Federal institutional controls / engineering controls registries								
LUCIS	0.500		0	0	0	NR	NR	0
US ENG CONTROLS	0.500		0	0	0	NR	NR	0
US INST CONTROLS	0.500		0	0	0	NR	NR	0
Federal ERNS list								
ERNS	0.001		0	NR	NR	NR	NR	0
State- and tribal - equivalent NPL								
NC HSDS	1.000		0	0	0	0	NR	0
State- and tribal - equivalent CERCLIS								
SHWS	1.000		0	0	0	0	NR	0
State and tribal landfill and/or solid waste disposal site lists								
SWF/LF	0.500		0	0	0	NR	NR	0
OLI	0.500		0	0	0	NR	NR	0
DEBRIS	0.500		0	0	0	NR	NR	0
LCID	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
State and tribal leaking storage tank lists								
LUST	0.500		0	0	0	NR	NR	0
LAST	0.500		0	0	0	NR	NR	0
INDIAN LUST	0.500		0	0	0	NR	NR	0
LUST TRUST	0.500		0	0	0	NR	NR	0
State and tribal registered storage tank lists								
FEMA UST	0.250		0	0	NR	NR	NR	0
UST	0.250		0	1	NR	NR	NR	1
AST	0.250		0	0	NR	NR	NR	0
INDIAN UST	0.250		0	0	NR	NR	NR	0
State and tribal institutional control / engineering control registries								
INST CONTROL	0.500		0	0	0	NR	NR	0
State and tribal voluntary cleanup sites								
INDIAN VCP	0.500		0	0	0	NR	NR	0
VCP	0.500		0	0	0	NR	NR	0
State and tribal Brownfields sites								
BROWNFIELDS	0.500		0	0	0	NR	NR	0
ADDITIONAL ENVIRONMENTAL RECORDS								
Local Brownfield lists								
US BROWNFIELDS	0.500		0	0	0	NR	NR	0
Local Lists of Landfill / Solid Waste Disposal Sites								
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
ODI	0.500		0	0	0	NR	NR	0
DEBRIS REGION 9	0.500		0	0	0	NR	NR	0
IHS OPEN DUMPS	0.500		0	0	0	NR	NR	0
Local Lists of Hazardous waste / Contaminated Sites								
US HIST CDL	0.001		0	NR	NR	NR	NR	0
US CDL	0.001		0	NR	NR	NR	NR	0
Local Land Records								
LIENS 2	0.001		0	NR	NR	NR	NR	0
Records of Emergency Release Reports								
HMIRS	0.001		0	NR	NR	NR	NR	0
SPILLS	0.001		0	NR	NR	NR	NR	0
IMD	0.500		0	0	0	NR	NR	0

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
SPILLS 90	0.001		0	NR	NR	NR	NR	0
SPILLS 80	0.001		0	NR	NR	NR	NR	0
Other Ascertainable Records								
RCRA NonGen / NLR	0.250		0	0	NR	NR	NR	0
FUDS	1.000		0	0	0	0	NR	0
DOD	1.000		0	0	0	0	NR	0
SCRD DRYCLEANERS	0.500		0	0	0	NR	NR	0
US FIN ASSUR	0.001		0	NR	NR	NR	NR	0
EPA WATCH LIST	0.001		0	NR	NR	NR	NR	0
2020 COR ACTION	0.250		0	0	NR	NR	NR	0
TSCA	0.001		0	NR	NR	NR	NR	0
TRIS	0.001		0	NR	NR	NR	NR	0
SSTS	0.001		0	NR	NR	NR	NR	0
ROD	1.000		0	0	0	0	NR	0
RMP	0.001		0	NR	NR	NR	NR	0
RAATS	0.001		0	NR	NR	NR	NR	0
PRP	0.001		0	NR	NR	NR	NR	0
PADS	0.001		0	NR	NR	NR	NR	0
ICIS	0.001		0	NR	NR	NR	NR	0
FTTS	0.001		0	NR	NR	NR	NR	0
MLTS	0.001		0	NR	NR	NR	NR	0
COAL ASH DOE	0.001		0	NR	NR	NR	NR	0
COAL ASH EPA	0.500		0	0	0	NR	NR	0
PCB TRANSFORMER	0.001		0	NR	NR	NR	NR	0
RADINFO	0.001		0	NR	NR	NR	NR	0
HIST FTTS	0.001		0	NR	NR	NR	NR	0
DOT OPS	0.001		0	NR	NR	NR	NR	0
CONSENT	1.000		0	0	0	0	NR	0
INDIAN RESERV	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	0.001		0	NR	NR	NR	NR	0
US AIRS	0.001		0	NR	NR	NR	NR	0
US MINES	0.250		0	0	NR	NR	NR	0
ABANDONED MINES	0.250		0	0	NR	NR	NR	0
FINDS	0.001		1	NR	NR	NR	NR	1
UXO	1.000		0	0	0	0	NR	0
DOCKET HWC	0.001		0	NR	NR	NR	NR	0
ECHO	0.001		0	NR	NR	NR	NR	0
FUELS PROGRAM	0.250		0	0	NR	NR	NR	0
AIRS	0.001		0	NR	NR	NR	NR	0
ASBESTOS	0.001		0	NR	NR	NR	NR	0
COAL ASH	0.500		0	0	0	NR	NR	0
DRYCLEANERS	0.250		0	0	NR	NR	NR	0
Financial Assurance	0.001		0	NR	NR	NR	NR	0
NPDES	0.001		0	NR	NR	NR	NR	0
UIC	0.001		0	NR	NR	NR	NR	0
AOP	0.001		0	NR	NR	NR	NR	0
PCSRP	0.500		0	0	0	NR	NR	0
CCB	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
SEPT HAULERS	0.001		0	NR	NR	NR	NR	0
MINES MRDS	0.001		0	NR	NR	NR	NR	0
EDR HIGH RISK HISTORICAL RECORDS								
EDR Exclusive Records								
EDR MGP	1.000		0	0	0	0	NR	0
EDR Hist Auto	0.125		0	NR	NR	NR	NR	0
EDR Hist Cleaner	0.125		0	NR	NR	NR	NR	0
EDR RECOVERED GOVERNMENT ARCHIVES								
Exclusive Recovered Govt. Archives								
RGA HWS	0.001		0	NR	NR	NR	NR	0
RGA LF	0.001		0	NR	NR	NR	NR	0
RGA LUST	0.001		0	NR	NR	NR	NR	0
- Totals --		0	1	1	0	0	0	2

NOTES:

TP = Target Property

NR = Not Requested at this Search Distance

Sites may be listed in more than one database

1
< 1/8
1 ft.

GREAT BEGINNINGS CHILD CARE
3406 EAST DARDEN ROAD
FAISON, NC 28341

FINDS **1007717075**
N/A

Relative:
Higher

Actual:
153 ft.

FINDS:
Registry ID: 110018736938

Click Here:

Environmental Interest/Information System:
NC-FITS (North Carolina - Facility Identification Template For States) is North Carolina Department of Environment and Natural Resources' (NCDENR) Facility Identification Template for States that provides a common facility identifier in order to improve accessibility to comprehensive information about environmental regulated entities in the state of North Carolina.

Click this hyperlink while viewing on your computer to access additional FINDS: detail in the EDR Site Report.

2
South
1/8-1/4
0.147 mi.
775 ft.

HARGROVE ELEMENTARY SCHOOL
7725 FAISON HWY
FAISON, NC 28341

UST **U001204706**
N/A

Relative:
Lower

Actual:
116 ft.

UST:

Name:	HARGROVE ELEMENTARY SCHOOL
Address:	7725 FAISON HWY
City,State,Zip:	FAISON, NC 28341
Facility Id:	00-0-0000029377
Contact:	SAMPSON COUNTY BOARD OF EDUCATION
Contact Address1:	439 ROWN RD/PO BOX 439
Contact Address2:	Not reported
Contact City/State/Zip:	CLINTON, NC 28328-0439
FIPS County Desc:	Sampson
Latitude:	35.0916
Longitude:	-78.2348
Tank Id:	1
Tank Status:	Abandoned
Installed Date:	01/01/1970
Perm Close Date:	04/30/2015
Product Name:	Heating Oil/Fuel
Tank Capacity:	10000
Root Tank Id:	Not reported
Main Tank:	No
Compartment Tank:	No
Manifold Tank:	0
Commercial:	Yes
Regulated:	No
Other CP Tank:	Not reported
Overfill Protection Name:	Unknown
Spill Protection Name:	Unknown
Leak Detection Name:	Unknown
Decode for TCONS_KEY:	Single Wall Steel
Decode for PCONS_KEY:	Unknown
Decode for PSYS_KEY:	Unknown

HARGROVE ELEMENTARY SCHOOL (Continued) **U001204706**

Click here to access the North Carolina DEQ records for this facility:

Count: 0 records.

ORPHAN SUMMARY

City	EDR ID	Site Name	Site Address	Zip	Database(s)
		NO SITES FOUND			

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

To maintain currency of the following federal and state databases, EDR contacts the appropriate governmental agency on a monthly or quarterly basis, as required.

Number of Days to Update: Provides confirmation that EDR is reporting records that have been updated within 90 days from the date the government agency made the information available to the public.

STANDARD ENVIRONMENTAL RECORDS

Federal NPL site list

NPL: National Priority List

National Priorities List (Superfund). The NPL is a subset of CERCLIS and identifies over 1,200 sites for priority cleanup under the Superfund Program. NPL sites may encompass relatively large areas. As such, EDR provides polygon coverage for over 1,000 NPL site boundaries produced by EPA's Environmental Photographic Interpretation Center (EPIC) and regional EPA offices.

Date of Government Version: 07/29/2020
Date Data Arrived at EDR: 08/03/2020
Date Made Active in Reports: 08/25/2020
Number of Days to Update: 22

Source: EPA
Telephone: N/A
Last EDR Contact: 11/05/2020
Next Scheduled EDR Contact: 01/11/2021
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: 07/29/2020
Date Data Arrived at EDR: 08/03/2020
Date Made Active in Reports: 08/25/2020
Number of Days to Update: 22

Source: EPA
Telephone: N/A
Last EDR Contact: 11/05/2020
Next Scheduled EDR Contact: 01/11/2021
Data Release Frequency: Quarterly

NPL LIENS: Federal Superfund Liens

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

Date of Government Version: 10/15/1991
Date Data Arrived at EDR: 02/02/1994
Date Made Active in Reports: 03/30/1994
Number of Days to Update: 56

Source: EPA
Telephone: 202-564-4267
Last EDR Contact: 08/15/2011
Next Scheduled EDR Contact: 11/28/2011
Data Release Frequency: No Update Planned

Federal Delisted NPL site list

Delisted NPL: National Priority List Deletions

The National Oil and Hazardous Substances Pollution Contingency Plan (NCP) establishes the criteria that the EPA uses to delete sites from the NPL. In accordance with 40 CFR 300.425.(e), sites may be deleted from the NPL where no further response is appropriate.

Date of Government Version: 07/29/2020
Date Data Arrived at EDR: 08/03/2020
Date Made Active in Reports: 08/25/2020
Number of Days to Update: 22

Source: EPA
Telephone: N/A
Last EDR Contact: 11/05/2020
Next Scheduled EDR Contact: 01/11/2021
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: 04/03/2019
Date Data Arrived at EDR: 04/05/2019
Date Made Active in Reports: 05/14/2019
Number of Days to Update: 39

Source: Environmental Protection Agency
Telephone: 703-603-8704
Last EDR Contact: 10/02/2020
Next Scheduled EDR Contact: 01/11/2021
Data Release Frequency: Varies

SEMS: Superfund Enterprise Management System

SEMS (Superfund Enterprise Management System) tracks hazardous waste sites, potentially hazardous waste sites, and remedial activities performed in support of EPA's Superfund Program across the United States. The list was formerly know as CERCLIS, renamed to SEMS by the EPA in 2015. The list contains data on potentially hazardous waste sites that have been reported to the USEPA by states, municipalities, private companies and private persons, pursuant to Section 103 of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). This dataset also contains sites which are either proposed to or on the National Priorities List (NPL) and the sites which are in the screening and assessment phase for possible inclusion on the NPL.

Date of Government Version: 07/29/2020
Date Data Arrived at EDR: 08/03/2020
Date Made Active in Reports: 08/25/2020
Number of Days to Update: 22

Source: EPA
Telephone: 800-424-9346
Last EDR Contact: 11/05/2020
Next Scheduled EDR Contact: 01/25/2021
Data Release Frequency: Quarterly

Federal CERCLIS NFRAP site list

SEMS-ARCHIVE: Superfund Enterprise Management System Archive

SEMS-ARCHIVE (Superfund Enterprise Management System Archive) tracks sites that have no further interest under the Federal Superfund Program based on available information. The list was formerly known as the CERCLIS-NFRAP, renamed to SEMS ARCHIVE by the EPA in 2015. EPA may perform a minimal level of assessment work at a site while it is archived if site conditions change and/or new information becomes available. Archived sites have been removed and archived from the inventory of SEMS sites. Archived status indicates that, to the best of EPA's knowledge, assessment at a site has been completed and that EPA has determined no further steps will be taken to list the site on the National Priorities List (NPL), unless information indicates this decision was not appropriate or other considerations require a recommendation for listing at a later time. The decision does not necessarily mean that there is no hazard associated with a given site; it only means that. based upon available information, the location is not judged to be potential NPL site.

Date of Government Version: 07/29/2020
Date Data Arrived at EDR: 08/03/2020
Date Made Active in Reports: 08/25/2020
Number of Days to Update: 22

Source: EPA
Telephone: 800-424-9346
Last EDR Contact: 11/05/2020
Next Scheduled EDR Contact: 01/25/2021
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: 06/15/2020
Date Data Arrived at EDR: 06/22/2020
Date Made Active in Reports: 09/17/2020
Number of Days to Update: 87

Source: EPA
Telephone: 800-424-9346
Last EDR Contact: 09/22/2020
Next Scheduled EDR Contact: 01/04/2021
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: 06/15/2020
Date Data Arrived at EDR: 06/22/2020
Date Made Active in Reports: 09/18/2020
Number of Days to Update: 88

Source: Environmental Protection Agency
Telephone: (404) 562-8651
Last EDR Contact: 09/22/2020
Next Scheduled EDR Contact: 01/04/2021
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: 06/15/2020
Date Data Arrived at EDR: 06/22/2020
Date Made Active in Reports: 09/18/2020
Number of Days to Update: 88

Source: Environmental Protection Agency
Telephone: (404) 562-8651
Last EDR Contact: 09/22/2020
Next Scheduled EDR Contact: 01/04/2021
Data Release Frequency: Quarterly

RCRA-SQG: RCRA - Small Quantity Generators

RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Small quantity generators (SQGs) generate between 100 kg and 1,000 kg of hazardous waste per month.

Date of Government Version: 06/15/2020
Date Data Arrived at EDR: 06/22/2020
Date Made Active in Reports: 09/18/2020
Number of Days to Update: 88

Source: Environmental Protection Agency
Telephone: (404) 562-8651
Last EDR Contact: 09/22/2020
Next Scheduled EDR Contact: 01/04/2021
Data Release Frequency: Quarterly

RCRA-VSQG: RCRA - Very Small Quantity Generators (Formerly 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). Very small quantity generators (VSQGs) generate less than 100 kg of hazardous waste, or less than 1 kg of acutely hazardous waste per month.

Date of Government Version: 06/15/2020
Date Data Arrived at EDR: 06/22/2020
Date Made Active in Reports: 09/18/2020
Number of Days to Update: 88

Source: Environmental Protection Agency
Telephone: (404) 562-8651
Last EDR Contact: 09/22/2020
Next Scheduled EDR Contact: 01/04/2021
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: 08/06/2020
Date Data Arrived at EDR: 08/21/2020
Date Made Active in Reports: 11/11/2020
Number of Days to Update: 82

Source: Department of the Navy
Telephone: 843-820-7326
Last EDR Contact: 11/05/2020
Next Scheduled EDR Contact: 02/22/2021
Data Release Frequency: Varies

US ENG CONTROLS: Engineering Controls Sites List

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

Date of Government Version: 02/13/2020
Date Data Arrived at EDR: 02/20/2020
Date Made Active in Reports: 05/15/2020
Number of Days to Update: 85

Source: Environmental Protection Agency
Telephone: 703-603-0695
Last EDR Contact: 11/05/2020
Next Scheduled EDR Contact: 12/07/2020
Data Release Frequency: Varies

US INST CONTROLS: Institutional Controls Sites List

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

Date of Government Version: 02/13/2020
Date Data Arrived at EDR: 02/20/2020
Date Made Active in Reports: 05/15/2020
Number of Days to Update: 85

Source: Environmental Protection Agency
Telephone: 703-603-0695
Last EDR Contact: 11/05/2020
Next Scheduled EDR Contact: 12/07/2020
Data Release Frequency: Varies

Federal ERNS list

ERNS: Emergency Response Notification System

Emergency Response Notification System. ERNS records and stores information on reported releases of oil and hazardous substances.

Date of Government Version: 06/15/2020
Date Data Arrived at EDR: 06/22/2020
Date Made Active in Reports: 09/17/2020
Number of Days to Update: 87

Source: National Response Center, United States Coast Guard
Telephone: 202-267-2180
Last EDR Contact: 09/22/2020
Next Scheduled EDR Contact: 01/04/2021
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: 10/14/2020
Next Scheduled EDR Contact: 02/01/2021
Data Release Frequency: No Update Planned

State- and tribal - equivalent CERCLIS

SHWS: Inactive Hazardous Sites Inventory

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

Date of Government Version: 05/11/2020
Date Data Arrived at EDR: 06/10/2020
Date Made Active in Reports: 08/24/2020
Number of Days to Update: 75

Source: Department of Environment, Health and Natural Resources
Telephone: 919-508-8400
Last EDR Contact: 09/09/2020
Next Scheduled EDR Contact: 12/21/2020
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: 03/06/2020
Date Data Arrived at EDR: 03/24/2020
Date Made Active in Reports: 06/10/2020
Number of Days to Update: 78

Source: Department of Environment and Natural Resources
Telephone: 919-733-0692
Last EDR Contact: 09/23/2020
Next Scheduled EDR Contact: 01/04/2021
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: 08/22/2019
Date Data Arrived at EDR: 10/11/2019
Date Made Active in Reports: 12/19/2019
Number of Days to Update: 69

Source: Department of Environment & Natural Resources
Telephone: 919-733-4996
Last EDR Contact: 10/05/2020
Next Scheduled EDR Contact: 01/18/2021
Data Release Frequency: Varies

DEBRIS: Solid Waste Active Disaster Debris Sites Listing
NCDEQ Division of Waste Management Solid Waste Section Temporary Disaster Debris Staging Site (TDDSS) Locations which are available to be activated in a disaster or emergency.. Disaster Debris Sites can only be used for temporary disaster debris storage if the site's responsible party activates the site for use by notifying the NCDEQ DWM Solid Waste Section staff during an emergency

Date of Government Version: 10/31/2019
Date Data Arrived at EDR: 12/20/2019
Date Made Active in Reports: 02/24/2020
Number of Days to Update: 66
Source: Department of Environmental Quality
Telephone: 919-707-8247
Last EDR Contact: 09/16/2020
Next Scheduled EDR Contact: 12/28/2020
Data Release Frequency: Varies

LCID: Land-Clearing and Inert Debris (LCID) Landfill Notifications
A list all of the Land-Clearing and Inert Debris (LCID) Landfill Notification facilities (under 2 acres in size) in North Carolina.

Date of Government Version: 04/30/2020
Date Data Arrived at EDR: 07/09/2020
Date Made Active in Reports: 09/23/2020
Number of Days to Update: 76
Source: Department of Environmental Quality
Telephone: 919-707-8248
Last EDR Contact: 10/09/2020
Next Scheduled EDR Contact: 01/18/2021
Data Release Frequency: Varies

State and tribal leaking storage tank lists

LUST: Regional UST Database
This database contains information obtained from the Regional Offices. It provides a more detailed explanation of current and historic activity for individual sites, as well as what was previously found in the Incident Management Database. Sites in this database with Incident Numbers are considered LUSTs.

Date of Government Version: 07/31/2020
Date Data Arrived at EDR: 08/04/2020
Date Made Active in Reports: 10/27/2020
Number of Days to Update: 84
Source: Department of Environment and Natural Resources
Telephone: 919-707-8200
Last EDR Contact: 11/03/2020
Next Scheduled EDR Contact: 02/15/2021
Data Release Frequency: Quarterly

LAST: Leaking Aboveground Storage Tanks
A listing of leaking aboveground storage tank site locations.

Date of Government Version: 07/31/2020
Date Data Arrived at EDR: 08/04/2020
Date Made Active in Reports: 10/27/2020
Number of Days to Update: 84
Source: Department of Environment & Natural Resources
Telephone: 877-623-6748
Last EDR Contact: 11/03/2020
Next Scheduled EDR Contact: 02/15/2021
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: 04/14/2020
Date Data Arrived at EDR: 05/20/2020
Date Made Active in Reports: 08/12/2020
Number of Days to Update: 84
Source: EPA Region 10
Telephone: 206-553-2857
Last EDR Contact: 10/23/2020
Next Scheduled EDR Contact: 02/01/2021
Data Release Frequency: Varies

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

Date of Government Version: 04/29/2020
Date Data Arrived at EDR: 05/20/2020
Date Made Active in Reports: 08/12/2020
Number of Days to Update: 84
Source: EPA Region 1
Telephone: 617-918-1313
Last EDR Contact: 10/23/2020
Next Scheduled EDR Contact: 02/01/2021
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: 04/08/2020
Date Data Arrived at EDR: 05/20/2020
Date Made Active in Reports: 08/12/2020
Number of Days to Update: 84

Source: Environmental Protection Agency
Telephone: 415-972-3372
Last EDR Contact: 10/23/2020
Next Scheduled EDR Contact: 02/01/2021
Data Release Frequency: Varies

INDIAN LUST R4: Leaking Underground Storage Tanks on Indian Land
LUSTs on Indian land in Florida, Mississippi and North Carolina.

Date of Government Version: 04/14/2020
Date Data Arrived at EDR: 05/26/2020
Date Made Active in Reports: 08/12/2020
Number of Days to Update: 78

Source: EPA Region 4
Telephone: 404-562-8677
Last EDR Contact: 10/23/2020
Next Scheduled EDR Contact: 02/01/2021
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: 04/14/2020
Date Data Arrived at EDR: 05/20/2020
Date Made Active in Reports: 08/12/2020
Number of Days to Update: 84

Source: EPA, Region 5
Telephone: 312-886-7439
Last EDR Contact: 10/23/2020
Next Scheduled EDR Contact: 02/01/2021
Data Release Frequency: Varies

INDIAN LUST R8: Leaking Underground Storage Tanks on Indian Land
LUSTs on Indian land in Colorado, Montana, North Dakota, South Dakota, Utah and Wyoming.

Date of Government Version: 04/14/2020
Date Data Arrived at EDR: 05/20/2020
Date Made Active in Reports: 08/12/2020
Number of Days to Update: 84

Source: EPA Region 8
Telephone: 303-312-6271
Last EDR Contact: 10/23/2020
Next Scheduled EDR Contact: 02/01/2021
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: 04/15/2020
Date Data Arrived at EDR: 05/20/2020
Date Made Active in Reports: 08/12/2020
Number of Days to Update: 84

Source: EPA Region 7
Telephone: 913-551-7003
Last EDR Contact: 10/23/2020
Next Scheduled EDR Contact: 02/01/2021
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: 04/08/2020
Date Data Arrived at EDR: 05/20/2020
Date Made Active in Reports: 08/12/2020
Number of Days to Update: 84

Source: EPA Region 6
Telephone: 214-665-6597
Last EDR Contact: 10/23/2020
Next Scheduled EDR Contact: 02/01/2021
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: 06/26/2020
Date Data Arrived at EDR: 07/07/2020
Date Made Active in Reports: 09/24/2020
Number of Days to Update: 79

Source: Department of Environment and Natural Resources
Telephone: 919-733-1315
Last EDR Contact: 10/07/2020
Next Scheduled EDR Contact: 01/18/2021
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: 02/01/2020
Date Data Arrived at EDR: 03/19/2020
Date Made Active in Reports: 06/09/2020
Number of Days to Update: 82

Source: FEMA
Telephone: 202-646-5797
Last EDR Contact: 10/01/2020
Next Scheduled EDR Contact: 01/18/2021
Data Release Frequency: Varies

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

Date of Government Version: 07/31/2020
Date Data Arrived at EDR: 08/04/2020
Date Made Active in Reports: 10/22/2020
Number of Days to Update: 79

Source: Department of Environment and Natural Resources
Telephone: 919-733-1308
Last EDR Contact: 11/04/2020
Next Scheduled EDR Contact: 02/15/2021
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: 06/09/2020
Date Data Arrived at EDR: 06/11/2020
Date Made Active in Reports: 08/26/2020
Number of Days to Update: 76

Source: Department of Environment and Natural Resources
Telephone: 919-715-6183
Last EDR Contact: 09/11/2020
Next Scheduled EDR Contact: 12/28/2020
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: 04/29/2020
Date Data Arrived at EDR: 05/20/2020
Date Made Active in Reports: 08/12/2020
Number of Days to Update: 84

Source: EPA, Region 1
Telephone: 617-918-1313
Last EDR Contact: 10/23/2020
Next Scheduled EDR Contact: 02/01/2021
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: 04/14/2020
Date Data Arrived at EDR: 05/26/2020
Date Made Active in Reports: 08/12/2020
Number of Days to Update: 78

Source: EPA Region 4
Telephone: 404-562-9424
Last EDR Contact: 10/23/2020
Next Scheduled EDR Contact: 02/01/2021
Data Release Frequency: Varies

INDIAN UST R7: Underground Storage Tanks on Indian Land
The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 7 (Iowa, Kansas, Missouri, Nebraska, and 9 Tribal Nations).

Date of Government Version: 04/03/2020
Date Data Arrived at EDR: 05/20/2020
Date Made Active in Reports: 08/12/2020
Number of Days to Update: 84

Source: EPA Region 7
Telephone: 913-551-7003
Last EDR Contact: 10/23/2020
Next Scheduled EDR Contact: 02/01/2021
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: 04/08/2020
Date Data Arrived at EDR: 05/20/2020
Date Made Active in Reports: 08/12/2020
Number of Days to Update: 84

Source: EPA Region 9
Telephone: 415-972-3368
Last EDR Contact: 10/23/2020
Next Scheduled EDR Contact: 02/01/2021
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: 04/14/2020
Date Data Arrived at EDR: 05/20/2020
Date Made Active in Reports: 08/12/2020
Number of Days to Update: 84

Source: EPA Region 10
Telephone: 206-553-2857
Last EDR Contact: 10/23/2020
Next Scheduled EDR Contact: 02/01/2021
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: 04/14/2020
Date Data Arrived at EDR: 05/20/2020
Date Made Active in Reports: 08/12/2020
Number of Days to Update: 84

Source: EPA Region 5
Telephone: 312-886-6136
Last EDR Contact: 10/23/2020
Next Scheduled EDR Contact: 02/01/2021
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: 04/08/2020
Date Data Arrived at EDR: 05/20/2020
Date Made Active in Reports: 08/12/2020
Number of Days to Update: 84

Source: EPA Region 6
Telephone: 214-665-7591
Last EDR Contact: 10/23/2020
Next Scheduled EDR Contact: 02/01/2021
Data Release Frequency: Varies

INDIAN UST R8: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 8 (Colorado, Montana, North Dakota, South Dakota, Utah, Wyoming and 27 Tribal Nations).

Date of Government Version: 04/14/2020
Date Data Arrived at EDR: 05/20/2020
Date Made Active in Reports: 08/13/2020
Number of Days to Update: 85

Source: EPA Region 8
Telephone: 303-312-6137
Last EDR Contact: 10/23/2020
Next Scheduled EDR Contact: 02/01/2021
Data Release Frequency: Varies

State and tribal institutional control / engineering control registries

INST CONTROL: No Further Action Sites With Land Use Restrictions Monitoring

A land use restricted site is a property where there are limits or requirements on future use of the property due to varying levels of cleanup possible, practical, or necessary at the site.

Date of Government Version: 05/11/2020
Date Data Arrived at EDR: 06/10/2020
Date Made Active in Reports: 08/24/2020
Number of Days to Update: 75

Source: Department of Environmental Quality
Telephone: 919-508-8400
Last EDR Contact: 09/09/2020
Next Scheduled EDR Contact: 12/21/2020
Data Release Frequency: Quarterly

State and tribal voluntary cleanup sites

INDIAN VCP R7: Voluntary Cleanup Priority Lisitng
A listing of voluntary cleanup priority sites located on Indian Land located in Region 7.

Date of Government Version: 03/20/2008
Date Data Arrived at EDR: 04/22/2008
Date Made Active in Reports: 05/19/2008
Number of Days to Update: 27

Source: EPA, Region 7
Telephone: 913-551-7365
Last EDR Contact: 04/20/2009
Next Scheduled EDR Contact: 07/20/2009
Data Release Frequency: Varies

INDIAN VCP R1: Voluntary Cleanup Priority Listing
A listing of voluntary cleanup priority sites located on Indian Land located in Region 1.

Date of Government Version: 07/27/2015
Date Data Arrived at EDR: 09/29/2015
Date Made Active in Reports: 02/18/2016
Number of Days to Update: 142

Source: EPA, Region 1
Telephone: 617-918-1102
Last EDR Contact: 09/16/2020
Next Scheduled EDR Contact: 01/04/2021
Data Release Frequency: Varies

VCP: Responsible Party Voluntary Action Sites
Responsible Party Voluntary Action site locations.

Date of Government Version: 05/11/2020
Date Data Arrived at EDR: 06/10/2020
Date Made Active in Reports: 08/24/2020
Number of Days to Update: 75

Source: Department of Environment and Natural Resources
Telephone: 919-508-8400
Last EDR Contact: 09/09/2020
Next Scheduled EDR Contact: 12/21/2020
Data Release Frequency: Quarterly

State and tribal Brownfields sites

BROWNFIELDS: Brownfields Projects Inventory
A brownfield site is an abandoned, idled, or underused property where the threat of environmental contamination has hindered its redevelopment. All of the sites in the inventory are working toward a brownfield agreement for cleanup and liabitliy control.

Date of Government Version: 06/24/2020
Date Data Arrived at EDR: 06/25/2020
Date Made Active in Reports: 09/08/2020
Number of Days to Update: 75

Source: Department of Environment and Natural Resources
Telephone: 919-733-4996
Last EDR Contact: 09/29/2020
Next Scheduled EDR Contact: 01/11/2021
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: 06/01/2020
Date Data Arrived at EDR: 06/02/2020
Date Made Active in Reports: 06/09/2020
Number of Days to Update: 7

Source: Environmental Protection Agency
Telephone: 202-566-2777
Last EDR Contact: 09/15/2020
Next Scheduled EDR Contact: 12/28/2020
Data Release Frequency: Semi-Annually

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

Local Lists of Landfill / Solid Waste Disposal Sites

HIST LF: Solid Waste Facility Listing
A listing of solid waste facilities.

Date of Government Version: 11/06/2006
Date Data Arrived at EDR: 02/13/2007
Date Made Active in Reports: 03/02/2007
Number of Days to Update: 17

Source: Department of Environment & Natural Resources
Telephone: 919-733-0692
Last EDR Contact: 01/19/2009
Next Scheduled EDR Contact: N/A
Data Release Frequency: No Update Planned

SWRCY: Recycling Center Listing
A listing of recycling center locations.

Date of Government Version: 04/09/2020
Date Data Arrived at EDR: 04/09/2020
Date Made Active in Reports: 06/25/2020
Number of Days to Update: 77

Source: Department of Environment & Natural Resources
Telephone: 919-707-8137
Last EDR Contact: 10/22/2020
Next Scheduled EDR Contact: 02/08/2021
Data Release Frequency: Varies

INDIAN ODI: Report on the Status of Open Dumps on Indian Lands
Location of open dumps on Indian land.

Date of Government Version: 12/31/1998
Date Data Arrived at EDR: 12/03/2007
Date Made Active in Reports: 01/24/2008
Number of Days to Update: 52

Source: Environmental Protection Agency
Telephone: 703-308-8245
Last EDR Contact: 10/20/2020
Next Scheduled EDR Contact: 02/08/2021
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: 10/13/2020
Next Scheduled EDR Contact: 02/01/2021
Data Release Frequency: No Update Planned

ODI: Open Dump Inventory
An open dump is defined as a disposal facility that does not comply with one or more of the Part 257 or Part 258 Subtitle D Criteria.

Date of Government Version: 06/30/1985
Date Data Arrived at EDR: 08/09/2004
Date Made Active in Reports: 09/17/2004
Number of Days to Update: 39

Source: Environmental Protection Agency
Telephone: 800-424-9346
Last EDR Contact: 06/09/2004
Next Scheduled EDR Contact: N/A
Data Release Frequency: No Update Planned

IHS OPEN DUMPS: Open Dumps on Indian Land
A listing of all open dumps located on Indian Land in the United States.

Date of Government Version: 04/01/2014
Date Data Arrived at EDR: 08/06/2014
Date Made Active in Reports: 01/29/2015
Number of Days to Update: 176

Source: Department of Health & Human Serivces, Indian Health Service
Telephone: 301-443-1452
Last EDR Contact: 10/30/2020
Next Scheduled EDR Contact: 02/08/2021
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: 03/18/2020
Date Data Arrived at EDR: 03/19/2020
Date Made Active in Reports: 06/09/2020
Number of Days to Update: 82

Source: Drug Enforcement Administration
Telephone: 202-307-1000
Last EDR Contact: 11/16/2020
Next Scheduled EDR Contact: 03/08/2021
Data Release Frequency: No Update Planned

US CDL: Clandestine Drug Labs

A listing of clandestine drug lab locations. The U.S. Department of Justice ("the Department") provides this web site as a public service. It contains addresses of some locations where law enforcement agencies reported they found chemicals or other items that indicated the presence of either clandestine drug laboratories or dumpsites. In most cases, the source of the entries is not the Department, and the Department has not verified the entry and does not guarantee its accuracy. Members of the public must verify the accuracy of all entries by, for example, contacting local law enforcement and local health departments.

Date of Government Version: 03/18/2020
Date Data Arrived at EDR: 03/19/2020
Date Made Active in Reports: 06/09/2020
Number of Days to Update: 82

Source: Drug Enforcement Administration
Telephone: 202-307-1000
Last EDR Contact: 11/16/2020
Next Scheduled EDR Contact: 03/08/2021
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: 07/29/2020
Date Data Arrived at EDR: 08/03/2020
Date Made Active in Reports: 08/25/2020
Number of Days to Update: 22

Source: Environmental Protection Agency
Telephone: 202-564-6023
Last EDR Contact: 11/05/2020
Next Scheduled EDR Contact: 01/11/2021
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: 06/22/2020
Date Data Arrived at EDR: 06/23/2020
Date Made Active in Reports: 09/17/2020
Number of Days to Update: 86

Source: U.S. Department of Transportation
Telephone: 202-366-4555
Last EDR Contact: 09/22/2020
Next Scheduled EDR Contact: 01/04/2021
Data Release Frequency: Quarterly

SPILLS: Spills Incident Listing

A listing spills, hazardous material releases, sanitary sewer overflows, wastewater treatment plant bypasses and upsets, citizen complaints, and any other environmental emergency calls reported to the agency.

Date of Government Version: 06/30/2020
Date Data Arrived at EDR: 07/30/2020
Date Made Active in Reports: 10/15/2020
Number of Days to Update: 77

Source: Department of Environment & Natural Resources
Telephone: 919-807-6308
Last EDR Contact: 10/09/2020
Next Scheduled EDR Contact: 12/21/2020
Data Release Frequency: Quarterly

IMD: Incident Management Database

Groundwater and/or soil contamination incidents

Date of Government Version: 07/31/2020
Date Data Arrived at EDR: 08/04/2020
Date Made Active in Reports: 10/22/2020
Number of Days to Update: 79

Source: Department of Environment and Natural Resources
Telephone: 877-623-6748
Last EDR Contact: 11/03/2020
Next Scheduled EDR Contact: 02/15/2021
Data Release Frequency: No Update Planned

SPILLS 90: SPILLS90 data from FirstSearch

Spills 90 includes those spill and release records available exclusively from FirstSearch databases. Typically, they may include chemical, oil and/or hazardous substance spills recorded after 1990. Duplicate records that are already included in EDR incident and release records are not included in Spills 90.

Date of Government Version: 09/27/2012
Date Data Arrived at EDR: 01/03/2013
Date Made Active in Reports: 03/06/2013
Number of Days to Update: 62

Source: FirstSearch
Telephone: N/A
Last EDR Contact: 01/03/2013
Next Scheduled EDR Contact: N/A
Data Release Frequency: No Update Planned

SPILLS 80: SPILLS80 data from FirstSearch

Spills 80 includes those spill and release records available from FirstSearch databases prior to 1990. Typically, they may include chemical, oil and/or hazardous substance spills recorded before 1990. Duplicate records that are already included in EDR incident and release records are not included in Spills 80.

Date of Government Version: 06/14/2001
Date Data Arrived at EDR: 01/03/2013
Date Made Active in Reports: 03/06/2013
Number of Days to Update: 62

Source: FirstSearch
Telephone: N/A
Last EDR Contact: 01/03/2013
Next Scheduled EDR Contact: N/A
Data Release Frequency: No Update Planned

Other Ascertainable Records

RCRA NonGen / NLR: RCRA - Non Generators / No Longer Regulated

RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Non-Generators do not presently generate hazardous waste.

Date of Government Version: 06/15/2020
Date Data Arrived at EDR: 06/22/2020
Date Made Active in Reports: 09/18/2020
Number of Days to Update: 88

Source: Environmental Protection Agency
Telephone: (404) 562-8651
Last EDR Contact: 09/22/2020
Next Scheduled EDR Contact: 01/04/2021
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: 08/05/2020
Date Data Arrived at EDR: 08/13/2020
Date Made Active in Reports: 10/21/2020
Number of Days to Update: 69

Source: U.S. Army Corps of Engineers
Telephone: 202-528-4285
Last EDR Contact: 08/13/2020
Next Scheduled EDR Contact: 11/30/2020
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: 10/13/2020
Next Scheduled EDR Contact: 01/25/2021
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: 04/02/2018
Date Data Arrived at EDR: 04/11/2018
Date Made Active in Reports: 11/06/2019
Number of Days to Update: 574

Source: U.S. Geological Survey
Telephone: 888-275-8747
Last EDR Contact: 10/08/2020
Next Scheduled EDR Contact: 01/18/2021
Data Release Frequency: N/A

SCRD DRYCLEANERS: State Coalition for Remediation of Drycleaners Listing

The State Coalition for Remediation of Drycleaners was established in 1998, with support from the U.S. EPA Office of Superfund Remediation and Technology Innovation. It is comprised of representatives of states with established drycleaner remediation programs. Currently the member states are Alabama, Connecticut, Florida, Illinois, Kansas, Minnesota, Missouri, North Carolina, Oregon, South Carolina, Tennessee, Texas, and Wisconsin.

Date of Government Version: 01/01/2017
Date Data Arrived at EDR: 02/03/2017
Date Made Active in Reports: 04/07/2017
Number of Days to Update: 63

Source: Environmental Protection Agency
Telephone: 615-532-8599
Last EDR Contact: 11/09/2020
Next Scheduled EDR Contact: 02/22/2021
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: 06/15/2020
Date Data Arrived at EDR: 06/22/2020
Date Made Active in Reports: 09/10/2020
Number of Days to Update: 80

Source: Environmental Protection Agency
Telephone: 202-566-1917
Last EDR Contact: 09/22/2020
Next Scheduled EDR Contact: 01/04/2021
Data Release Frequency: Quarterly

EPA WATCH LIST: EPA WATCH LIST

EPA maintains a "Watch List" to facilitate dialogue between EPA, state and local environmental agencies on enforcement matters relating to facilities with alleged violations identified as either significant or high priority. Being on the Watch List does not mean that the facility has actually violated the law only that an investigation by EPA or a state or local environmental agency has led those organizations to allege that an unproven violation has in fact occurred. Being on the Watch List does not represent a higher level of concern regarding the alleged violations that were detected, but instead indicates cases requiring additional dialogue between EPA, state and local agencies - primarily because of the length of time the alleged violation has gone unaddressed or unresolved.

Date of Government Version: 08/30/2013
Date Data Arrived at EDR: 03/21/2014
Date Made Active in Reports: 06/17/2014
Number of Days to Update: 88

Source: Environmental Protection Agency
Telephone: 617-520-3000
Last EDR Contact: 11/02/2020
Next Scheduled EDR Contact: 02/15/2021
Data Release Frequency: Quarterly

2020 COR ACTION: 2020 Corrective Action Program List

The EPA has set ambitious goals for the RCRA Corrective Action program by creating the 2020 Corrective Action Universe. This RCRA cleanup baseline includes facilities expected to need corrective action. The 2020 universe contains a wide variety of sites. Some properties are heavily contaminated while others were contaminated but have since been cleaned up. Still others have not been fully investigated yet, and may require little or no remediation. Inclusion in the 2020 Universe does not necessarily imply failure on the part of a facility to meet its RCRA obligations.

Date of Government Version: 09/30/2017
Date Data Arrived at EDR: 05/08/2018
Date Made Active in Reports: 07/20/2018
Number of Days to Update: 73

Source: Environmental Protection Agency
Telephone: 703-308-4044
Last EDR Contact: 11/06/2020
Next Scheduled EDR Contact: 02/15/2021
Data Release Frequency: Varies

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

TSCA: Toxic Substances Control Act

Toxic Substances Control Act. TSCA identifies manufacturers and importers of chemical substances included on the TSCA Chemical Substance Inventory list. It includes data on the production volume of these substances by plant site.

Date of Government Version: 12/31/2016
Date Data Arrived at EDR: 06/17/2020
Date Made Active in Reports: 09/10/2020
Number of Days to Update: 85

Source: EPA
Telephone: 202-260-5521
Last EDR Contact: 09/18/2020
Next Scheduled EDR Contact: 12/28/2020
Data Release Frequency: Every 4 Years

TRIS: Toxic Chemical Release Inventory System

Toxic Release Inventory System. TRIS identifies facilities which release toxic chemicals to the air, water and land in reportable quantities under SARA Title III Section 313.

Date of Government Version: 12/31/2018
Date Data Arrived at EDR: 08/14/2020
Date Made Active in Reports: 11/04/2020
Number of Days to Update: 82

Source: EPA
Telephone: 202-566-0250
Last EDR Contact: 08/14/2020
Next Scheduled EDR Contact: 11/30/2020
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: 07/20/2020
Date Data Arrived at EDR: 07/21/2020
Date Made Active in Reports: 10/08/2020
Number of Days to Update: 79

Source: EPA
Telephone: 202-564-4203
Last EDR Contact: 10/19/2020
Next Scheduled EDR Contact: 02/01/2021
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: 07/29/2020
Date Data Arrived at EDR: 08/03/2020
Date Made Active in Reports: 08/25/2020
Number of Days to Update: 22

Source: EPA
Telephone: 703-416-0223
Last EDR Contact: 11/05/2020
Next Scheduled EDR Contact: 12/14/2020
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: 07/24/2020
Date Data Arrived at EDR: 08/03/2020
Date Made Active in Reports: 10/21/2020
Number of Days to Update: 79

Source: Environmental Protection Agency
Telephone: 202-564-8600
Last EDR Contact: 10/14/2020
Next Scheduled EDR Contact: 02/01/2021
Data Release Frequency: Varies

RAATS: RCRA Administrative Action Tracking System

RCRA Administration Action Tracking System. RAATS contains records based on enforcement actions issued under RCRA pertaining to major violators and includes administrative and civil actions brought by the EPA. For administration actions after September 30, 1995, data entry in the RAATS database was discontinued. EPA will retain a copy of the database for historical records. It was necessary to terminate RAATS because a decrease in agency resources made it impossible to continue to update the information contained in the database.

Date of Government Version: 04/17/1995
Date Data Arrived at EDR: 07/03/1995
Date Made Active in Reports: 08/07/1995
Number of Days to Update: 35

Source: EPA
Telephone: 202-564-4104
Last EDR Contact: 06/02/2008
Next Scheduled EDR Contact: 09/01/2008
Data Release Frequency: No Update Planned

PRP: Potentially Responsible Parties

A listing of verified Potentially Responsible Parties

Date of Government Version: 04/27/2020
Date Data Arrived at EDR: 05/06/2020
Date Made Active in Reports: 06/09/2020
Number of Days to Update: 34

Source: EPA
Telephone: 202-564-6023
Last EDR Contact: 11/05/2020
Next Scheduled EDR Contact: 02/15/2021
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: 10/09/2019
Date Data Arrived at EDR: 10/11/2019
Date Made Active in Reports: 12/20/2019
Number of Days to Update: 70

Source: EPA
Telephone: 202-566-0500
Last EDR Contact: 10/02/2020
Next Scheduled EDR Contact: 01/18/2021
Data Release Frequency: Annually

ICIS: Integrated Compliance Information System

The Integrated Compliance Information System (ICIS) supports the information needs of the national enforcement and compliance program as well as the unique needs of the National Pollutant Discharge Elimination System (NPDES) program.

Date of Government Version: 11/18/2016
Date Data Arrived at EDR: 11/23/2016
Date Made Active in Reports: 02/10/2017
Number of Days to Update: 79

Source: Environmental Protection Agency
Telephone: 202-564-2501
Last EDR Contact: 10/01/2020
Next Scheduled EDR Contact: 01/18/2021
Data Release Frequency: Quarterly

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

FTTS: FIFRA/ TSCA Tracking System - FIFRA (Federal Insecticide, Fungicide, & Rodenticide Act)/TSCA (Toxic Substances Control Act)
FTTS tracks administrative cases and pesticide enforcement actions and compliance activities related to FIFRA, TSCA and EPCRA (Emergency Planning and Community Right-to-Know Act). To maintain currency, EDR contacts the Agency on a quarterly basis.

Date of Government Version: 04/09/2009
Date Data Arrived at EDR: 04/16/2009
Date Made Active in Reports: 05/11/2009
Number of Days to Update: 25

Source: EPA/Office of Prevention, Pesticides and Toxic Substances
Telephone: 202-566-1667
Last EDR Contact: 08/18/2017
Next Scheduled EDR Contact: 12/04/2017
Data Release Frequency: No Update Planned

FTTS INSP: FIFRA/ TSCA Tracking System - FIFRA (Federal Insecticide, Fungicide, & Rodenticide Act)/TSCA (Toxic Substances Control Act)
A listing of FIFRA/TSCA Tracking System (FTTS) inspections and enforcements.

Date of Government Version: 04/09/2009
Date Data Arrived at EDR: 04/16/2009
Date Made Active in Reports: 05/11/2009
Number of Days to Update: 25

Source: EPA
Telephone: 202-566-1667
Last EDR Contact: 08/18/2017
Next Scheduled EDR Contact: 12/04/2017
Data Release Frequency: No Update Planned

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: 08/05/2020
Date Data Arrived at EDR: 08/10/2020
Date Made Active in Reports: 10/08/2020
Number of Days to Update: 59

Source: Nuclear Regulatory Commission
Telephone: 301-415-7169
Last EDR Contact: 10/13/2020
Next Scheduled EDR Contact: 01/31/2021
Data Release Frequency: Quarterly

COAL ASH DOE: Steam-Electric Plant Operation Data
A listing of power plants that store ash in surface ponds.

Date of Government Version: 12/31/2018
Date Data Arrived at EDR: 12/04/2019
Date Made Active in Reports: 01/15/2020
Number of Days to Update: 42

Source: Department of Energy
Telephone: 202-586-8719
Last EDR Contact: 09/04/2020
Next Scheduled EDR Contact: 12/14/2020
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: 01/12/2017
Date Data Arrived at EDR: 03/05/2019
Date Made Active in Reports: 11/11/2019
Number of Days to Update: 251

Source: Environmental Protection Agency
Telephone: N/A
Last EDR Contact: 08/31/2020
Next Scheduled EDR Contact: 12/14/2020
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: 09/13/2019
Date Data Arrived at EDR: 11/06/2019
Date Made Active in Reports: 02/10/2020
Number of Days to Update: 96

Source: Environmental Protection Agency
Telephone: 202-566-0517
Last EDR Contact: 11/06/2021
Next Scheduled EDR Contact: 02/15/2021
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: 07/01/2019
Date Data Arrived at EDR: 07/01/2019
Date Made Active in Reports: 09/23/2019
Number of Days to Update: 84

Source: Environmental Protection Agency
Telephone: 202-343-9775
Last EDR Contact: 09/24/2020
Next Scheduled EDR Contact: 01/11/2021
Data Release Frequency: Quarterly

HIST FTTS: FIFRA/TSCA Tracking System Administrative Case Listing

A complete administrative case listing from the FIFRA/TSCA Tracking System (FTTS) for all ten EPA regions. The information was obtained from the National Compliance Database (NCDB). NCDB supports the implementation of FIFRA (Federal Insecticide, Fungicide, and Rodenticide Act) and TSCA (Toxic Substances Control Act). Some EPA regions are now closing out records. Because of that, and the fact that some EPA regions are not providing EPA Headquarters with updated records, it was decided to create a HIST FTTS database. It included records that may not be included in the newer FTTS database updates. This database is no longer updated.

Date of Government Version: 10/19/2006
Date Data Arrived at EDR: 03/01/2007
Date Made Active in Reports: 04/10/2007
Number of Days to Update: 40

Source: Environmental Protection Agency
Telephone: 202-564-2501
Last EDR Contact: 12/17/2007
Next Scheduled EDR Contact: 03/17/2008
Data Release Frequency: No Update Planned

HIST FTTS INSP: FIFRA/TSCA Tracking System Inspection & Enforcement Case Listing

A complete inspection and enforcement case listing from the FIFRA/TSCA Tracking System (FTTS) for all ten EPA regions. The information was obtained from the National Compliance Database (NCDB). NCDB supports the implementation of FIFRA (Federal Insecticide, Fungicide, and Rodenticide Act) and TSCA (Toxic Substances Control Act). Some EPA regions are now closing out records. Because of that, and the fact that some EPA regions are not providing EPA Headquarters with updated records, it was decided to create a HIST FTTS database. It included records that may not be included in the newer FTTS database updates. This database is no longer updated.

Date of Government Version: 10/19/2006
Date Data Arrived at EDR: 03/01/2007
Date Made Active in Reports: 04/10/2007
Number of Days to Update: 40

Source: Environmental Protection Agency
Telephone: 202-564-2501
Last EDR Contact: 12/17/2008
Next Scheduled EDR Contact: 03/17/2008
Data Release Frequency: No Update Planned

DOT OPS: Incident and Accident Data

Department of Transporation, Office of Pipeline Safety Incident and Accident data.

Date of Government Version: 01/02/2020
Date Data Arrived at EDR: 01/28/2020
Date Made Active in Reports: 04/17/2020
Number of Days to Update: 80

Source: Department of Transporation, Office of Pipeline Safety
Telephone: 202-366-4595
Last EDR Contact: 10/27/2020
Next Scheduled EDR Contact: 02/08/2021
Data Release Frequency: Quarterly

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: 06/30/2020
Date Data Arrived at EDR: 07/15/2020
Date Made Active in Reports: 07/21/2020
Number of Days to Update: 6

Source: Department of Justice, Consent Decree Library
Telephone: Varies
Last EDR Contact: 10/01/2020
Next Scheduled EDR Contact: 01/18/2021
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: 09/22/2020
Next Scheduled EDR Contact: 01/04/2021
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: 10/06/2020
Next Scheduled EDR Contact: 01/18/2021
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: 08/08/2017
Date Data Arrived at EDR: 09/11/2018
Date Made Active in Reports: 09/14/2018
Number of Days to Update: 3

Source: Department of Energy
Telephone: 202-586-3559
Last EDR Contact: 11/06/2020
Next Scheduled EDR Contact: 02/15/2021
Data Release Frequency: Varies

UMTRA: Uranium Mill Tailings Sites

Uranium ore was mined by private companies for federal government use in national defense programs. When the mills shut down, large piles of the sand-like material (mill tailings) remain after uranium has been extracted from the ore. Levels of human exposure to radioactive materials from the piles are low; however, in some cases tailings were used as construction materials before the potential health hazards of the tailings were recognized.

Date of Government Version: 08/30/2019
Date Data Arrived at EDR: 11/15/2019
Date Made Active in Reports: 01/28/2020
Number of Days to Update: 74

Source: Department of Energy
Telephone: 505-845-0011
Last EDR Contact: 08/21/2020
Next Scheduled EDR Contact: 11/30/2020
Data Release Frequency: Varies

LEAD SMELTER 1: Lead Smelter Sites

A listing of former lead smelter site locations.

Date of Government Version: 07/29/2020
Date Data Arrived at EDR: 08/03/2020
Date Made Active in Reports: 08/25/2020
Number of Days to Update: 22

Source: Environmental Protection Agency
Telephone: 703-603-8787
Last EDR Contact: 11/05/2020
Next Scheduled EDR Contact: 01/11/2021
Data Release Frequency: Varies

LEAD SMELTER 2: Lead Smelter Sites

A list of several hundred sites in the U.S. where secondary lead smelting was done from 1931and 1964. These sites may pose a threat to public health through ingestion or inhalation of contaminated soil or dust

Date of Government Version: 04/05/2001
Date Data Arrived at EDR: 10/27/2010
Date Made Active in Reports: 12/02/2010
Number of Days to Update: 36

Source: American Journal of Public Health
Telephone: 703-305-6451
Last EDR Contact: 12/02/2009
Next Scheduled EDR Contact: N/A
Data Release Frequency: No Update Planned

US AIRS (AFS): Aerometric Information Retrieval System Facility Subsystem (AFS)

The database is a sub-system of Aerometric Information Retrieval System (AIRS). AFS contains compliance data on air pollution point sources regulated by the U.S. EPA and/or state and local air regulatory agencies. This information comes from source reports by various stationary sources of air pollution, such as electric power plants, steel mills, factories, and universities, and provides information about the air pollutants they produce. Action, air program, air program pollutant, and general level plant data. It is used to track emissions and compliance data from industrial plants.

Date of Government Version: 10/12/2016
Date Data Arrived at EDR: 10/26/2016
Date Made Active in Reports: 02/03/2017
Number of Days to Update: 100

Source: EPA
Telephone: 202-564-2496
Last EDR Contact: 09/26/2017
Next Scheduled EDR Contact: 01/08/2018
Data Release Frequency: Annually

US AIRS MINOR: Air Facility System Data

A listing of minor source facilities.

Date of Government Version: 10/12/2016
Date Data Arrived at EDR: 10/26/2016
Date Made Active in Reports: 02/03/2017
Number of Days to Update: 100

Source: EPA
Telephone: 202-564-2496
Last EDR Contact: 09/26/2017
Next Scheduled EDR Contact: 01/08/2018
Data Release Frequency: Annually

US MINES: Mines Master Index File

Contains all mine identification numbers issued for mines active or opened since 1971. The data also includes violation information.

Date of Government Version: 05/01/2020
Date Data Arrived at EDR: 05/21/2020
Date Made Active in Reports: 08/13/2020
Number of Days to Update: 84

Source: Department of Labor, Mine Safety and Health Administration
Telephone: 303-231-5959
Last EDR Contact: 08/25/2020
Next Scheduled EDR Contact: 12/07/2020
Data Release Frequency: Semi-Annually

MINES VIOLATIONS: MSHA Violation Assessment Data

Mines violation and assessment information. Department of Labor, Mine Safety & Health Administration.

Date of Government Version: 05/28/2020
Date Data Arrived at EDR: 05/28/2020
Date Made Active in Reports: 08/13/2020
Number of Days to Update: 77

Source: DOL, Mine Safety & Health Admi
Telephone: 202-693-9424
Last EDR Contact: 09/10/2020
Next Scheduled EDR Contact: 12/14/2020
Data Release Frequency: Quarterly

US MINES 2: Ferrous and Nonferrous Metal Mines Database Listing

This map layer includes ferrous (ferrous metal mines are facilities that extract ferrous metals, such as iron ore or molybdenum) and nonferrous (Nonferrous metal mines are facilities that extract nonferrous metals, such as gold, silver, copper, zinc, and lead) metal mines in the United States.

Date of Government Version: 05/06/2020
Date Data Arrived at EDR: 05/27/2020
Date Made Active in Reports: 08/13/2020
Number of Days to Update: 78

Source: USGS
Telephone: 703-648-7709
Last EDR Contact: 08/28/2020
Next Scheduled EDR Contact: 12/07/2020
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: 08/28/2020
Next Scheduled EDR Contact: 12/07/2020
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: 06/22/2020
Date Data Arrived at EDR: 06/22/2020
Date Made Active in Reports: 09/10/2020
Number of Days to Update: 80

Source: Department of Interior
Telephone: 202-208-2609
Last EDR Contact: 09/16/2020
Next Scheduled EDR Contact: 12/21/2020
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: 02/03/2020
Date Data Arrived at EDR: 03/03/2020
Date Made Active in Reports: 05/28/2020
Number of Days to Update: 86

Source: EPA
Telephone: (404) 562-9900
Last EDR Contact: 09/15/2020
Next Scheduled EDR Contact: 12/14/2020
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: 05/31/2018
Date Data Arrived at EDR: 07/26/2018
Date Made Active in Reports: 10/05/2018
Number of Days to Update: 71

Source: Environmental Protection Agency
Telephone: 202-564-0527
Last EDR Contact: 08/19/2020
Next Scheduled EDR Contact: 12/07/2020
Data Release Frequency: Varies

ECHO: Enforcement & Compliance History Information

ECHO provides integrated compliance and enforcement information for about 800,000 regulated facilities nationwide.

Date of Government Version: 06/27/2020
Date Data Arrived at EDR: 07/02/2020
Date Made Active in Reports: 09/28/2020
Number of Days to Update: 88

Source: Environmental Protection Agency
Telephone: 202-564-2280
Last EDR Contact: 10/06/2020
Next Scheduled EDR Contact: 01/18/2021
Data Release Frequency: Quarterly

UXO: Unexploded Ordnance Sites

A listing of unexploded ordnance site locations

Date of Government Version: 12/31/2018
Date Data Arrived at EDR: 07/02/2020
Date Made Active in Reports: 09/17/2020
Number of Days to Update: 77

Source: Department of Defense
Telephone: 703-704-1564
Last EDR Contact: 10/08/2020
Next Scheduled EDR Contact: 01/25/2021
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: 08/17/2020
Date Data Arrived at EDR: 08/17/2020
Date Made Active in Reports: 10/21/2020
Number of Days to Update: 65

Source: EPA
Telephone: 800-385-6164
Last EDR Contact: 11/13/2020
Next Scheduled EDR Contact: 03/01/2021
Data Release Frequency: Quarterly

AIRS: Air Quality Permit Listing

A listing of facilities with air quality permits.

Date of Government Version: 06/08/2020
Date Data Arrived at EDR: 06/09/2020
Date Made Active in Reports: 08/21/2020
Number of Days to Update: 73

Source: Department of Environmental Quality
Telephone: 919-707-8726
Last EDR Contact: 09/09/2020
Next Scheduled EDR Contact: 12/21/2020
Data Release Frequency: Varies

ASBESTOS: ASBESTOS
Asbestos notification sites

Date of Government Version: 08/04/2020
Date Data Arrived at EDR: 08/07/2020
Date Made Active in Reports: 10/22/2020
Number of Days to Update: 76

Source: Department of Health & Human Services
Telephone: 919-707-5973
Last EDR Contact: 11/12/2020
Next Scheduled EDR Contact: 02/01/2021
Data Release Frequency: Varies

COAL ASH: Coal Ash Disposal Sites
A listing of coal combustion products distribution permits issued by the Division for the treatment, storage, transportation, use and disposal of coal combustion products.

Date of Government Version: 03/06/2020
Date Data Arrived at EDR: 03/24/2020
Date Made Active in Reports: 06/05/2020
Number of Days to Update: 73

Source: Department of Environment & Natural Resources
Telephone: 919-807-6359
Last EDR Contact: 09/23/2020
Next Scheduled EDR Contact: 01/04/2021
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: 05/31/2020
Date Data Arrived at EDR: 06/19/2020
Date Made Active in Reports: 09/09/2020
Number of Days to Update: 82

Source: Department of Environment & Natural Resources
Telephone: 919-508-8400
Last EDR Contact: 09/16/2020
Next Scheduled EDR Contact: 12/28/2020
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: 07/31/2020
Date Data Arrived at EDR: 08/04/2020
Date Made Active in Reports: 10/22/2020
Number of Days to Update: 79

Source: Department of Environment & Natural Resources
Telephone: 919-733-1322
Last EDR Contact: 11/04/2020
Next Scheduled EDR Contact: 02/15/2021
Data Release Frequency: Quarterly

Financial Assurance 2: Financial Assurance Information Listing
Information for solid waste facilities. Financial assurance is intended to ensure that resources are available to pay for the cost of closure, post-closure care, and corrective measures if the owner or operator of a regulated facility is unable or unwilling to pay.

Date of Government Version: 10/02/2012
Date Data Arrived at EDR: 10/03/2012
Date Made Active in Reports: 10/26/2012
Number of Days to Update: 23

Source: Department of Environmental & Natural Resources
Telephone: 919-508-8496
Last EDR Contact: 09/17/2020
Next Scheduled EDR Contact: 01/04/2021
Data Release Frequency: Varies

Financial Assurance 3: Financial Assurance Information
Hazardous waste financial assurance information.

Date of Government Version: 06/04/2020
Date Data Arrived at EDR: 06/05/2020
Date Made Active in Reports: 08/17/2020
Number of Days to Update: 73
Source: Department of Environment & Natural Resources
Telephone: 919-707-8222
Last EDR Contact: 09/02/2020
Next Scheduled EDR Contact: 12/21/2020
Data Release Frequency: Varies

NPDES: NPDES Facility Location Listing
General information regarding NPDES(National Pollutant Discharge Elimination System) permits.

Date of Government Version: 07/01/2020
Date Data Arrived at EDR: 07/27/2020
Date Made Active in Reports: 10/14/2020
Number of Days to Update: 79
Source: Department of Environment & Natural Resources
Telephone: 919-733-7015
Last EDR Contact: 10/27/2020
Next Scheduled EDR Contact: 02/08/2021
Data Release Frequency: Varies

UIC: Underground Injection Wells Listing
A listing of uncerground injection wells locations.

Date of Government Version: 06/03/2020
Date Data Arrived at EDR: 06/04/2020
Date Made Active in Reports: 08/13/2020
Number of Days to Update: 70
Source: Department of Environment & Natural Resources
Telephone: 919-807-6412
Last EDR Contact: 08/26/2020
Next Scheduled EDR Contact: 12/14/2020
Data Release Frequency: Quarterly

AOP: Animal Operation Permits Listing
This listing includes animal operations that are required to be permitted by the state.

Date of Government Version: 04/01/2020
Date Data Arrived at EDR: 05/26/2020
Date Made Active in Reports: 05/27/2020
Number of Days to Update: 1
Source: Department of Environmental Quality
Telephone: 919-707-9129
Last EDR Contact: 09/11/2020
Next Scheduled EDR Contact: 12/21/2020
Data Release Frequency: Varies

PCSRP: Petroleum-Contaminated Soil Remediation Permits
To treat petroleum-contaminated soil in order to protect North Carolinaa??s environment and the health of the citizens of North Carolina.

Date of Government Version: 07/06/2020
Date Data Arrived at EDR: 07/07/2020
Date Made Active in Reports: 09/23/2020
Number of Days to Update: 78
Source: Department of Environmental Quality
Telephone: 919-707-8248
Last EDR Contact: 10/07/2020
Next Scheduled EDR Contact: 01/18/2021
Data Release Frequency: Varies

SEPT HAULERS: Permitted Septage Haulers Listing
This list of all active and permitted Septage Land Application Site (SLAS) and Septage Detention and Treatment Facility (SDTF) sites in North Carolina. The purpose of this map is to provide the public and government entities a visual overview of the businesses that manage septage and septage facilities throughout the state.

Date of Government Version: 05/13/2020
Date Data Arrived at EDR: 07/07/2020
Date Made Active in Reports: 09/23/2020
Number of Days to Update: 78
Source: Department of Environmental Quality
Telephone: 919-707-8248
Last EDR Contact: 10/09/2020
Next Scheduled EDR Contact: 01/18/2021
Data Release Frequency: Varies

MINES MRDS: Mineral Resources Data System
Mineral Resources Data System

Date of Government Version: 04/06/2018
Date Data Arrived at EDR: 10/21/2019
Date Made Active in Reports: 10/24/2019
Number of Days to Update: 3
Source: USGS
Telephone: 703-648-6533
Last EDR Contact: 08/28/2020
Next Scheduled EDR Contact: 12/07/2020
Data Release Frequency: Varies

CCB: Coal Ash Structural Fills (CCB) Listing

These are not permitted Coal Ash landfills A list all of the now closed Coal Ash Structural Fills (CCB) in North Carolina, in point data form. The purpose is to provide the public and other government entities a visual overview of coal ash structural fills throughout the state and increase public awareness of their current locations.

Date of Government Version: 02/27/2020
Date Data Arrived at EDR: 07/07/2020
Date Made Active in Reports: 09/23/2020
Number of Days to Update: 78

Source: Department of Environmental Quality
Telephone: 919-707-8248
Last EDR Contact: 10/09/2020
Next Scheduled EDR Contact: 01/18/2021
Data Release Frequency: Varies

PCS ENF: Enforcement data

No description is available for this data

Date of Government Version: 12/31/2014
Date Data Arrived at EDR: 02/05/2015
Date Made Active in Reports: 03/06/2015
Number of Days to Update: 29

Source: EPA
Telephone: 202-564-2497
Last EDR Contact: 10/02/2020
Next Scheduled EDR Contact: 01/18/2021
Data Release Frequency: Varies

PCS INACTIVE: Listing of Inactive PCS Permits

An inactive permit is a facility that has shut down or is no longer discharging.

Date of Government Version: 11/05/2014
Date Data Arrived at EDR: 01/06/2015
Date Made Active in Reports: 05/06/2015
Number of Days to Update: 120

Source: EPA
Telephone: 202-564-2496
Last EDR Contact: 10/02/2020
Next Scheduled EDR Contact: 01/18/2021
Data Release Frequency: Semi-Annually

PCS: Permit Compliance System

PCS is a computerized management information system that contains data on National Pollutant Discharge Elimination System (NPDES) permit holding facilities. PCS tracks the permit, compliance, and enforcement status of NPDES facilities.

Date of Government Version: 07/14/2011
Date Data Arrived at EDR: 08/05/2011
Date Made Active in Reports: 09/29/2011
Number of Days to Update: 55

Source: EPA, Office of Water
Telephone: 202-564-2496
Last EDR Contact: 10/02/2020
Next Scheduled EDR Contact: 01/18/2021
Data Release Frequency: Semi-Annually

EDR HIGH RISK HISTORICAL RECORDS

EDR Exclusive Records

EDR MGP: EDR Proprietary Manufactured Gas Plants

The EDR Proprietary Manufactured Gas Plant Database includes records of coal gas plants (manufactured gas plants) compiled by EDR's researchers. Manufactured gas sites were used in the United States from the 1800's to 1950's to produce a gas that could be distributed and used as fuel. These plants used whale oil, rosin, coal, or a mixture of coal, oil, and water that also produced a significant amount of waste. Many of the byproducts of the gas production, such as coal tar (oily waste containing volatile and non-volatile chemicals), sludges, oils and other compounds are potentially hazardous to human health and the environment. The byproduct from this process was frequently disposed of directly at the plant site and can remain or spread slowly, serving as a continuous source of soil and groundwater contamination.

Date of Government Version: N/A
Date Data Arrived at EDR: N/A
Date Made Active in Reports: N/A
Number of Days to Update: N/A

Source: EDR, Inc.
Telephone: N/A
Last EDR Contact: N/A
Next Scheduled EDR Contact: N/A
Data Release Frequency: No Update Planned

EDR Hist Auto: EDR Exclusive Historical Auto Stations

EDR has searched selected national collections of business directories and has collected listings of potential gas station/filling station/service station sites that were available to EDR researchers. EDR's review was limited to those categories of sources that might, in EDR's opinion, include gas station/filling station/service station establishments. The categories reviewed included, but were not limited to gas, gas station, gasoline station, filling station, auto, automobile repair, auto service station, service station, etc. This database falls within a category of information EDR classifies as "High Risk Historical Records", or HRHR. EDR's HRHR effort presents unique and sometimes proprietary data about past sites and operations that typically create environmental concerns, but may not show up in current government records searches.

Date of Government Version: N/A
Date Data Arrived at EDR: N/A
Date Made Active in Reports: N/A
Number of Days to Update: N/A

Source: EDR, Inc.
Telephone: N/A
Last EDR Contact: N/A
Next Scheduled EDR Contact: N/A
Data Release Frequency: Varies

EDR Hist Cleaner: EDR Exclusive Historical Cleaners

EDR has searched selected national collections of business directories and has collected listings of potential dry cleaner sites that were available to EDR researchers. EDR's review was limited to those categories of sources that might, in EDR's opinion, include dry cleaning establishments. The categories reviewed included, but were not limited to dry cleaners, cleaners, laundry, laundromat, cleaning/laundry, wash & dry etc. This database falls within a category of information EDR classifies as "High Risk Historical Records", or HRHR. EDR's HRHR effort presents unique and sometimes proprietary data about past sites and operations that typically create environmental concerns, but may not show up in current government records searches.

Date of Government Version: N/A
Date Data Arrived at EDR: N/A
Date Made Active in Reports: N/A
Number of Days to Update: N/A

Source: EDR, Inc.
Telephone: N/A
Last EDR Contact: N/A
Next Scheduled EDR Contact: N/A
Data Release Frequency: Varies

EDR RECOVERED GOVERNMENT ARCHIVES

Exclusive Recovered Govt. Archives

RGA HWS: Recovered Government Archive State Hazardous Waste Facilities List

The EDR Recovered Government Archive State Hazardous Waste database provides a list of SHWS incidents derived from historical databases and includes many records that no longer appear in current government lists. Compiled from Records formerly available from the Department of Environment, Health and Natural Resources in North Carolina.

Date of Government Version: N/A
Date Data Arrived at EDR: 07/01/2013
Date Made Active in Reports: 12/24/2013
Number of Days to Update: 176

Source: Department of Environment, Health and Natural Resources
Telephone: N/A
Last EDR Contact: 06/01/2012
Next Scheduled EDR Contact: N/A
Data Release Frequency: Varies

RGA LF: Recovered Government Archive Solid Waste Facilities List

The EDR Recovered Government Archive Landfill database provides a list of landfills derived from historical databases and includes many records that no longer appear in current government lists. Compiled from Records formerly available from the Department of Environment, Health and Natural Resources in North Carolina.

Date of Government Version: N/A
Date Data Arrived at EDR: 07/01/2013
Date Made Active in Reports: 01/13/2014
Number of Days to Update: 196

Source: Department of Environment, Health and Natural Resources
Telephone: N/A
Last EDR Contact: 06/01/2012
Next Scheduled EDR Contact: N/A
Data Release Frequency: Varies

RGA LUST: Recovered Government Archive Leaking Underground Storage Tank

The EDR Recovered Government Archive Leaking Underground Storage Tank database provides a list of LUST incidents derived from historical databases and includes many records that no longer appear in current government lists. Compiled from Records formerly available from the Department of Environment, Health and Natural Resources in North Carolina.

Date of Government Version: N/A
Date Data Arrived at EDR: 07/01/2013
Date Made Active in Reports: 12/20/2013
Number of Days to Update: 172

Source: Department of Environment, Health and Natural Resources
Telephone: N/A
Last EDR Contact: 06/01/2012
Next Scheduled EDR Contact: N/A
Data Release Frequency: Varies

OTHER DATABASE(S)

Depending on the geographic area covered by this report, the data provided in these specialty databases may or may not be complete. For example, the existence of wetlands information data in a specific report does not mean that all wetlands in the area covered by the report are included. Moreover, the absence of any reported wetlands information does not necessarily mean that wetlands do not exist in the area covered by the report.

CT MANIFEST: Hazardous Waste Manifest Data
Facility and manifest data. Manifest is a document that lists and tracks hazardous waste from the generator through transporters to a tsd facility.

Date of Government Version: 08/10/2020
Date Data Arrived at EDR: 10/20/2020
Date Made Active in Reports: 11/02/2020
Number of Days to Update: 13

Source: Department of Energy & Environmental Protection
Telephone: 860-424-3375
Last EDR Contact: 11/09/2020
Next Scheduled EDR Contact: 02/22/2021
Data Release Frequency: No Update Planned

NJ MANIFEST: Manifest Information
Hazardous waste manifest information.

Date of Government Version: 12/31/2018
Date Data Arrived at EDR: 04/10/2019
Date Made Active in Reports: 05/16/2019
Number of Days to Update: 36

Source: Department of Environmental Protection
Telephone: N/A
Last EDR Contact: 10/09/2020
Next Scheduled EDR Contact: 01/18/2021
Data Release Frequency: Annually

NY MANIFEST: Facility and Manifest Data
Manifest is a document that lists and tracks hazardous waste from the generator through transporters to a TSD facility.

Date of Government Version: 01/01/2019
Date Data Arrived at EDR: 04/29/2020
Date Made Active in Reports: 07/10/2020
Number of Days to Update: 72

Source: Department of Environmental Conservation
Telephone: 518-402-8651
Last EDR Contact: 10/30/2020
Next Scheduled EDR Contact: 02/08/2021
Data Release Frequency: Quarterly

PA MANIFEST: Manifest Information
Hazardous waste manifest information.

Date of Government Version: 06/30/2018
Date Data Arrived at EDR: 07/19/2019
Date Made Active in Reports: 09/10/2019
Number of Days to Update: 53

Source: Department of Environmental Protection
Telephone: 717-783-8990
Last EDR Contact: 10/07/2020
Next Scheduled EDR Contact: 01/25/2021
Data Release Frequency: Annually

RI MANIFEST: Manifest information
Hazardous waste manifest information

Date of Government Version: 12/31/2018
Date Data Arrived at EDR: 10/02/2019
Date Made Active in Reports: 12/10/2019
Number of Days to Update: 69

Source: Department of Environmental Management
Telephone: 401-222-2797
Last EDR Contact: 11/11/2020
Next Scheduled EDR Contact: 03/01/2021
Data Release Frequency: Annually

WI MANIFEST: Manifest Information
Hazardous waste manifest information.

Date of Government Version: 05/31/2018
Date Data Arrived at EDR: 06/19/2019
Date Made Active in Reports: 09/03/2019
Number of Days to Update: 76

Source: Department of Natural Resources
Telephone: N/A
Last EDR Contact: 09/02/2020
Next Scheduled EDR Contact: 12/21/2020
Data Release Frequency: Annually

Oil/Gas Pipelines
Source: Endeavor Business Media
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 Endeavor Business Media. This information is provided on a best effort basis and Endeavor Business Media does not guarantee its accuracy nor warrant its fitness for any particular purpose. Such information has been reprinted with the permission of Endeavor Business Media.

Electric Power Transmission Line Data
Source: Endeavor Business Media
This map includes information copyrighted by Endeavor Business Media. This information is provided on a best effort basis and Endeavor Business Media does not guarantee its accuracy nor warrant its fitness for any particular purpose. Such information has been reprinted with the permission of Endeavor Business Media.

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

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

NWI: National Wetlands Inventory. This data, available in select counties across the country, was obtained by EDR in 2002, 2005 and 2010 from the U.S. Fish and Wildlife Service.

State Wetlands Data: Wetland Inventory
Source: US Fish & Wildlife Service
Telephone: 703-358-2171

Current USGS 7.5 Minute Topographic Map
Source: U.S. Geological Survey

STREET AND ADDRESS INFORMATION

GEOCHECK ®- PHYSICAL SETTING SOURCE ADDENDUM

TARGET PROPERTY ADDRESS

SIX RUNS
3562 E DARDEN RD
FAISON, NC 28341

TARGET PROPERTY COORDINATES

Latitude (North):	35.094721 - 35° 5' 41.00''
Longitude (West):	78.237967 - 78° 14' 16.68''
Universal Tranverse Mercator:	Zone 17
UTM X (Meters):	751788.4
UTM Y (Meters):	3886840.2
Elevation:	124 ft. above sea level

USGS TOPOGRAPHIC MAP

Target Property Map:	5948582 FAISON, NC
Version Date:	2013
Southwest Map:	5948576 CLINTON NORTH, NC
Version Date:	2013

EDR's GeoCheck Physical Setting Source Addendum is provided to assist the environmental professional in forming an opinion about the impact of potential contaminant migration.

Assessment of the impact of contaminant migration generally has two principle investigative components:

1. Groundwater flow direction, and
2. Groundwater flow velocity.

Groundwater flow direction may be impacted by surface topography, hydrology, hydrogeology, characteristics of the soil, and nearby wells. Groundwater flow velocity is generally impacted by the nature of the geologic strata.

GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

GROUNDWATER FLOW DIRECTION INFORMATION

Groundwater flow direction for a particular site is best determined by a qualified environmental professional using site-specific well data. If such data is not reasonably ascertainable, it may be necessary to rely on other sources of information, such as surface topographic information, hydrologic information, hydrogeologic data collected on nearby properties, and regional groundwater flow information (from deep aquifers).

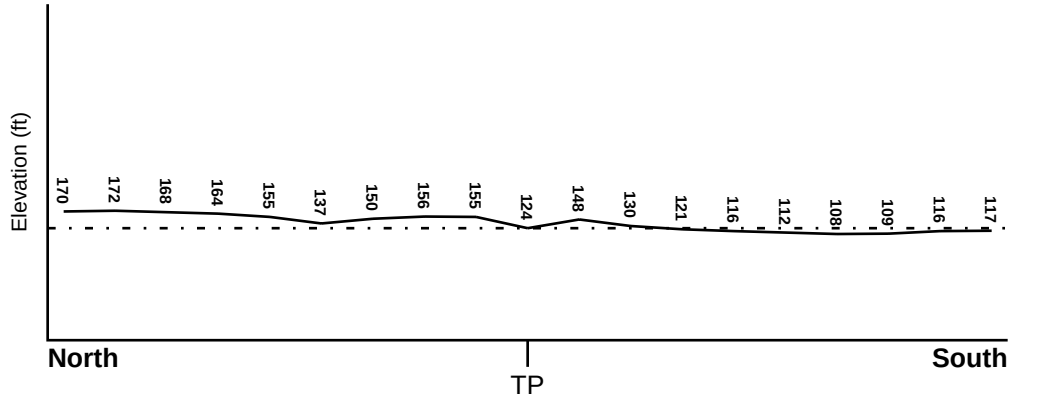
TOPOGRAPHIC INFORMATION

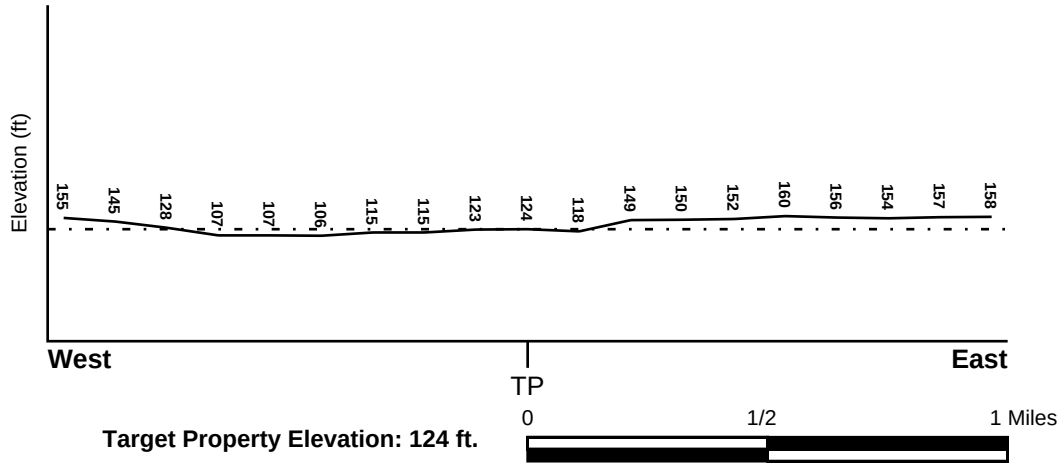
Surface topography may be indicative of the direction of surficial groundwater flow. This information can be used to assist the environmental professional in forming an opinion about the impact of nearby contaminated properties or, should contamination exist on the target property, what downgradient sites might be impacted.

TARGET PROPERTY TOPOGRAPHY

General Topographic Gradient: General SW

SURROUNDING TOPOGRAPHY: ELEVATION PROFILES





0 1/2 1 Miles

Target Property Elevation: 124 ft.

Source: Topography has been determined from the USGS 7.5' 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.

GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

HYDROLOGIC INFORMATION

Surface water can act as a hydrologic barrier to groundwater flow. Such hydrologic information can be used to assist the environmental professional in forming an opinion about the impact of nearby contaminated properties or, should contamination exist on the target property, what downgradient sites might be impacted.

Refer to the Physical Setting Source Map following this summary for hydrologic information (major waterways and bodies of water).

FEMA FLOOD ZONE

Flood Plain Panel at Target Property	FEMA Source Type
3720242800J	FEMA FIRM Flood data

Additional Panels in search area:	FEMA Source Type
Not Reported	

NATIONAL WETLAND INVENTORY

NWI Quad at Target Property	NWI Electronic Data Coverage
FAISON	YES - refer to the Overview Map and Detail Map

HYDROGEOLOGIC INFORMATION

Hydrogeologic information obtained by installation of wells on a specific site can often be an indicator of groundwater flow direction in the immediate area. Such hydrogeologic information can be used to assist the environmental professional in forming an opinion about the impact of nearby contaminated properties or, should contamination exist on the target property, what downgradient sites might be impacted.

AQUIFLOW®

Search Radius: 1.000 Mile.

EDR has developed the AQUIFLOW Information System to provide data on the general direction of groundwater flow at specific points. EDR has reviewed reports submitted by environmental professionals to regulatory authorities at select sites and has extracted the date of the report, groundwater flow direction as determined hydrogeologically, and the depth to water table.

MAP ID	LOCATION FROM TP	GENERAL DIRECTION GROUNDWATER FLOW
Not Reported		

GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

GROUNDWATER FLOW VELOCITY INFORMATION

Groundwater flow velocity information for a particular site is best determined by a qualified environmental professional using site specific geologic and soil strata data. If such data are not reasonably ascertainable, it may be necessary to rely on other sources of information, including geologic age identification, rock stratigraphic unit and soil characteristics data collected on nearby properties and regional soil information. In general, contaminant plumes move more quickly through sandy-gravelly types of soils than silty-clayey types of soils.

GEOLOGIC INFORMATION IN GENERAL AREA OF TARGET PROPERTY

Geologic information can be used by the environmental professional in forming an opinion about the relative speed at which contaminant migration may be occurring.

ROCK STRATIGRAPHIC UNIT

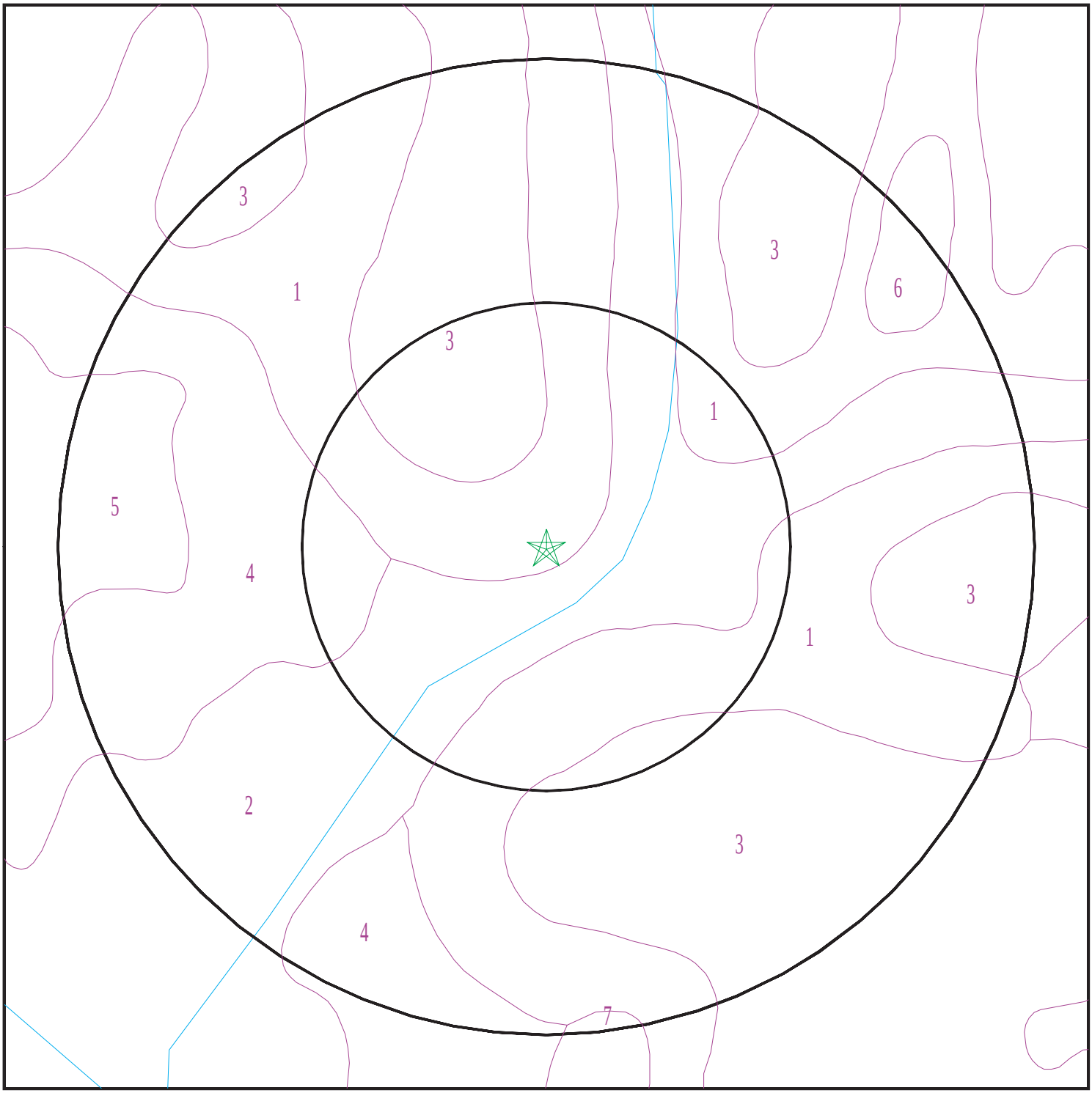
Era:	Mesozoic
System:	Cretaceous
Series:	Washita Group
Code:	lK3 *(decoded above as Era, System & Series)*

GEOLOGIC AGE IDENTIFICATION

Category: Stratified Sequence

Geologic Age and Rock Stratigraphic Unit Source: P.G. Schruben, R.E. Arndt and W.J. Bawiec, Geology of the Conterminous U.S. at 1:2,500,000 Scale - a digital representation of the 1974 P.B. King and H.M. Beikman Map, USGS Digital Data Series DDS - 11 (1994).

SSURGO SOIL MAP - 6269759.2s



Target Property
SSURGO Soil
Water

0 1/16 1/8 1/4 Miles

N

SITE NAME:	Six Runs	CLIENT:	Resource Environmental Solutions, LLC
ADDRESS:	3562 E Darden Rd Faison NC 28341	CONTACT:	JEREMY L SCHMID
LAT/LONG:	35.094721 / 78.237967	INQUIRY #:	6269759.2s
		DATE:	November 17, 2020 11:30 am

GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

DOMINANT SOIL COMPOSITION IN GENERAL AREA OF TARGET PROPERTY

The U.S. Department of Agriculture's (USDA) Soil Conservation Service (SCS) leads the National Cooperative Soil Survey (NCSS) and is responsible for collecting, storing, maintaining and distributing soil survey information for privately owned lands in the United States. A soil map in a soil survey is a representation of soil patterns in a landscape. The following information is based on Soil Conservation Service SSURGO data.

Soil Map ID: 1

Soil Component Name: Marvyn

Soil Surface Texture: loamy fine sand

Hydrologic Group: Class B - Moderate infiltration rates. Deep and moderately deep, moderately well and well drained soils with moderately coarse textures.

Soil Drainage Class: Well drained

Hydric Status: Partially hydric

Corrosion Potential - Uncoated Steel: Moderate

Depth to Bedrock Min: > 0 inches

Depth to Watertable Min: > 0 inches

Soil Layer Information							
	Boundary			Classification		Saturated hydraulic conductivity micro m/sec	Soil Reaction (pH)
Layer	Upper	Lower	Soil Texture Class	AASHTO Group	Unified Soil		
1	3 inches	11 inches	loamy fine sand	Granular materials (35 pct. or less passing No. 200), Silty, or Clayey Gravel and Sand.	COARSE-GRAINED SOILS, Sands, Sands with fines, Clayey sand. COARSE-GRAINED SOILS, Sands, Sands with fines, Silty Sand.	Max: 42 Min: 14	Max: 6 Min: 4.5
2	11 inches	44 inches	sandy clay loam	Granular materials (35 pct. or less passing No. 200), Silty, or Clayey Gravel and Sand.	COARSE-GRAINED SOILS, Sands, Sands with fines, Clayey sand. COARSE-GRAINED SOILS, Sands, Sands with fines, Silty Sand.	Max: 42 Min: 14	Max: 6 Min: 4.5
3	44 inches	75 inches	sandy clay loam	Granular materials (35 pct. or less passing No. 200), Silty, or Clayey Gravel and Sand.	COARSE-GRAINED SOILS, Sands, Sands with fines, Clayey sand. COARSE-GRAINED SOILS, Sands, Sands with fines, Silty Sand.	Max: 42 Min: 14	Max: 6 Min: 4.5

Soil Layer Information							
	Boundary			Classification		Saturated hydraulic conductivity micro m/sec	Soil Reaction (pH)
Layer	Upper	Lower	Soil Texture Class	AASHTO Group	Unified Soil		
4	0 inches	3 inches	loamy sand	Granular materials (35 pct. or less passing No. 200), Silty, or Clayey Gravel and Sand.	COARSE-GRAINED SOILS, Sands, Sands with fines, Clayey sand. COARSE-GRAINED SOILS, Sands, Sands with fines, Silty Sand.	Max: 42 Min: 14	Max: 6 Min: 4.5

Soil Map ID: 2

Soil Component Name: Bibb

Soil Surface Texture: loamy sand

Hydrologic Group: Class D - Very slow infiltration rates. Soils are clayey, have a high water table, or are shallow to an impervious layer.

Soil Drainage Class: Poorly drained

Hydric Status: All hydric

Corrosion Potential - Uncoated Steel: High

Depth to Bedrock Min: > 0 inches

Depth to Watertable Min: > 23 inches

Soil Layer Information							
	Boundary			Classification		Saturated hydraulic conductivity micro m/sec	Soil Reaction (pH)
Layer	Upper	Lower	Soil Texture Class	AASHTO Group	Unified Soil		
1	0 inches	5 inches	loamy sand	Silt-Clay Materials (more than 35 pct. passing No. 200), Silty Soils.	FINE-GRAINED SOILS, Silts and Clays (liquid limit less than 50%), silt.	Max: 42 Min: 14	Max: 5.5 Min: 3.6
2	5 inches	59 inches	sandy loam	Silt-Clay Materials (more than 35 pct. passing No. 200), Silty Soils.	FINE-GRAINED SOILS, Silts and Clays (liquid limit less than 50%), silt.	Max: 42 Min: 14	Max: 5.5 Min: 3.6

Soil Layer Information							
	Boundary			Classification		Saturated hydraulic conductivity micro m/sec	Soil Reaction (pH)
Layer	Upper	Lower	Soil Texture Class	AASHTO Group	Unified Soil		
3	59 inches	79 inches	loamy sand	Silt-Clay Materials (more than 35 pct. passing No. 200), Silty Soils.	FINE-GRAINED SOILS, Silts and Clays (liquid limit less than 50%), silt.	Max: 42 Min: 14	Max: 5.5 Min: 3.6

Soil Map ID: 3

Soil Component Name: Wagram

Soil Surface Texture: loamy fine sand

Hydrologic Group: Class A - High infiltration rates. Soils are deep, well drained to excessively drained sands and gravels.

Soil Drainage Class: Well drained

Hydric Status: Partially hydric

Corrosion Potential - Uncoated Steel: Low

Depth to Bedrock Min: > 0 inches

Depth to Watertable Min: > 0 inches

Soil Layer Information							
	Boundary			Classification		Saturated hydraulic conductivity micro m/sec	Soil Reaction (pH)
Layer	Upper	Lower	Soil Texture Class	AASHTO Group	Unified Soil		
1	7 inches	24 inches	loamy fine sand	Granular materials (35 pct. or less passing No. 200), Silty, or Clayey Gravel and Sand.	COARSE-GRAINED SOILS, Sands, Sands with fines, Clayey sand. COARSE-GRAINED SOILS, Sands, Sands with fines, Silty Sand.	Max: 141 Min: 42	Max: 6 Min: 4.5
2	24 inches	83 inches	sandy clay loam	Granular materials (35 pct. or less passing No. 200), Silty, or Clayey Gravel and Sand.	COARSE-GRAINED SOILS, Sands, Sands with fines, Clayey sand. COARSE-GRAINED SOILS, Sands, Sands with fines, Silty Sand.	Max: 141 Min: 42	Max: 6 Min: 4.5

Soil Layer Information							
	Boundary			Classification		Saturated hydraulic conductivity micro m/sec	Soil Reaction (pH)
Layer	Upper	Lower	Soil Texture Class	AASHTO Group	Unified Soil		
3	0 inches	7 inches	loamy sand	Granular materials (35 pct. or less passing No. 200), Silty, or Clayey Gravel and Sand.	COARSE-GRAINED SOILS, Sands, Sands with fines, Clayey sand. COARSE-GRAINED SOILS, Sands, Sands with fines, Silty Sand.	Max: 141 Min: 42	Max: 6 Min: 4.5

Soil Map ID: 4

Soil Component Name: Johns

Soil Surface Texture: fine sandy loam

Hydrologic Group: Class C - Slow infiltration rates. Soils with layers impeding downward movement of water, or soils with moderately fine or fine textures.

Soil Drainage Class: Moderately well drained

Hydric Status: Partially hydric

Corrosion Potential - Uncoated Steel: Moderate

Depth to Bedrock Min: > 0 inches

Depth to Watertable Min: > 69 inches

Soil Layer Information							
	Boundary			Classification		Saturated hydraulic conductivity micro m/sec	Soil Reaction (pH)
Layer	Upper	Lower	Soil Texture Class	AASHTO Group	Unified Soil		
1	0 inches	7 inches	fine sandy loam	Granular materials (35 pct. or less passing No. 200), Silty, or Clayey Gravel and Sand.	COARSE-GRAINED SOILS, Sands, Clean Sands, Well-graded sand. COARSE-GRAINED SOILS, Sands, Sands with fines, Silty Sand.	Max: 141 Min: 42	Max: 5.5 Min: 4.5

Soil Layer Information							
	Boundary			Classification		Saturated hydraulic conductivity micro m/sec	Soil Reaction (pH)
Layer	Upper	Lower	Soil Texture Class	AASHTO Group	Unified Soil		
2	7 inches	11 inches	fine sandy loam	Granular materials (35 pct. or less passing No. 200), Silty, or Clayey Gravel and Sand.	COARSE-GRAINED SOILS, Sands, Clean Sands, Well-graded sand. COARSE-GRAINED SOILS, Sands, Sands with fines, Silty Sand.	Max: 141 Min: 42	Max: 5.5 Min: 4.5
3	11 inches	31 inches	sandy clay loam	Granular materials (35 pct. or less passing No. 200), Silty, or Clayey Gravel and Sand.	COARSE-GRAINED SOILS, Sands, Clean Sands, Well-graded sand. COARSE-GRAINED SOILS, Sands, Sands with fines, Silty Sand.	Max: 141 Min: 42	Max: 5.5 Min: 4.5
4	31 inches	59 inches	sand	Granular materials (35 pct. or less passing No. 200), Silty, or Clayey Gravel and Sand.	COARSE-GRAINED SOILS, Sands, Clean Sands, Well-graded sand. COARSE-GRAINED SOILS, Sands, Sands with fines, Silty Sand.	Max: 141 Min: 42	Max: 5.5 Min: 4.5

Soil Map ID: 5

Soil Component Name: Lumbee

Soil Surface Texture: sandy loam

Hydrologic Group: Class B/D - Drained/undrained hydrology class of soils that can be drained and are classified.

Soil Drainage Class: Poorly drained

Hydric Status: All hydric

Corrosion Potential - Uncoated Steel: High

Depth to Bedrock Min: > 0 inches

Depth to Watertable Min: > 15 inches

Soil Layer Information							
	Boundary			Classification		Saturated hydraulic conductivity micro m/sec	Soil Reaction (pH)
Layer	Upper	Lower	Soil Texture Class	AASHTO Group	Unified Soil		
1	0 inches	5 inches	sandy loam	Not reported	Not reported	Max: 141 Min: 42	Max: 5.5 Min: 4.5
2	5 inches	14 inches	sandy loam	Not reported	Not reported	Max: 141 Min: 42	Max: 5.5 Min: 4.5
3	14 inches	35 inches	sandy clay loam	Not reported	Not reported	Max: 141 Min: 42	Max: 5.5 Min: 4.5
4	35 inches	59 inches	loamy sand	Not reported	Not reported	Max: 141 Min: 42	Max: 5.5 Min: 4.5

Soil Map ID: 6

Soil Component Name: Water

Soil Surface Texture: sandy loam

Hydrologic Group: Class B/D - Drained/undrained hydrology class of soils that can be drained and are classified.

Soil Drainage Class:
Hydric Status: Not hydric

Corrosion Potential - Uncoated Steel: Not Reported

Depth to Bedrock Min: > 0 inches

Depth to Watertable Min: > 0 inches

No Layer Information available.

Soil Map ID: 7

Soil Component Name: Kalmia

Soil Surface Texture: loamy sand

Hydrologic Group: Class B - Moderate infiltration rates. Deep and moderately deep, moderately well and well drained soils with moderately coarse textures.

Soil Drainage Class: Well drained

GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

Hydric Status: Partially hydric

Corrosion Potential - Uncoated Steel: Moderate

Depth to Bedrock Min: > 0 inches

Depth to Watertable Min: > 0 inches

Soil Layer Information							
	Boundary			Classification		Saturated hydraulic conductivity micro m/sec	Soil Reaction (pH)
Layer	Upper	Lower	Soil Texture Class	AASHTO Group	Unified Soil		
1	0 inches	7 inches	loamy sand	Granular materials (35 pct. or less passing No. 200), Silty, or Clayey Gravel and Sand.	COARSE-GRAINED SOILS, Sands, Sands with fines, Silty Sand.	Max: 141 Min: 42	Max: 5.5 Min: 4.5
2	7 inches	11 inches	loamy sand	Granular materials (35 pct. or less passing No. 200), Silty, or Clayey Gravel and Sand.	COARSE-GRAINED SOILS, Sands, Sands with fines, Silty Sand.	Max: 141 Min: 42	Max: 5.5 Min: 4.5
3	11 inches	31 inches	sandy clay loam	Granular materials (35 pct. or less passing No. 200), Silty, or Clayey Gravel and Sand.	COARSE-GRAINED SOILS, Sands, Sands with fines, Silty Sand.	Max: 141 Min: 42	Max: 5.5 Min: 4.5
4	31 inches	59 inches	loamy sand	Granular materials (35 pct. or less passing No. 200), Silty, or Clayey Gravel and Sand.	COARSE-GRAINED SOILS, Sands, Sands with fines, Silty Sand.	Max: 141 Min: 42	Max: 5.5 Min: 4.5

LOCAL / REGIONAL WATER AGENCY RECORDS

EDR Local/Regional Water Agency records provide water well information to assist the environmental professional in assessing sources that may impact ground water flow direction, and in forming an opinion about the impact of contaminant migration on nearby drinking water wells.

GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

WELL SEARCH DISTANCE INFORMATION

DATABASE	SEARCH DISTANCE (miles)
Federal USGS	1.000
Federal FRDS PWS	Nearest PWS within 1 mile
State Database	1.000

FEDERAL USGS WELL INFORMATION

MAP ID	WELL ID	LOCATION FROM TP
1	USGS40000884533	1/8 - 1/4 Mile South

FEDERAL FRDS PUBLIC WATER SUPPLY SYSTEM INFORMATION

MAP ID	WELL ID	LOCATION FROM TP
2	NC0382483	1/2 - 1 Mile SSW

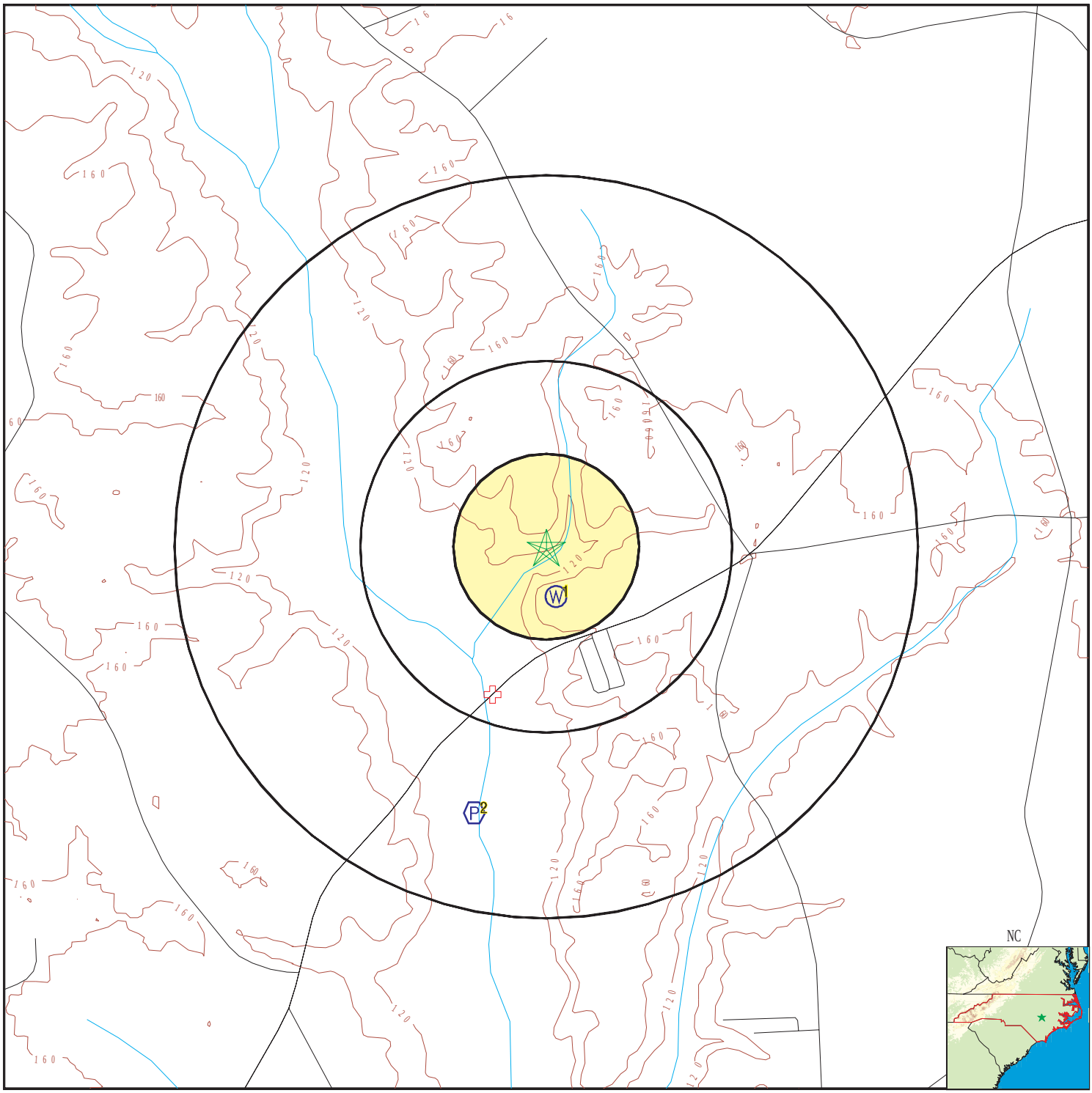
Note: PWS System location is not always the same as well location.

STATE DATABASE WELL INFORMATION

MAP ID	WELL ID	LOCATION FROM TP
No Wells Found		

OTHER STATE DATABASE INFORMATION

PHYSICAL SETTING SOURCE MAP - 6269759.2s



- County Boundary
- Major Roads
- Contour Lines
- Earthquake epicenter, Richter 5 or greater
- Water Wells
- Public Water Supply Wells
- Cluster of Multiple Icons
- Groundwater Flow Direction
- GI Indeterminate Groundwater Flow at Location
- GV Groundwater Flow Varies at Location
- Wildlife Areas
- Natural Areas
- Rare & Endangered Species

SITE NAME:	Six Runs	CLIENT:	Resource Environmental Solutions, LLC
ADDRESS:	3562 E Darden Rd Faison NC 28341	CONTACT:	JEREMY L SCHMID
		INQUIRY #:	6269759.2s
LAT/LONG:	35.094721 / 78.237967	DATE:	November 17, 2020 11:30 am

GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID
Direction
Distance
Elevation | Database | EDR ID Number

1
South | **FED USGS** | **USGS40000884533**
1/8 - 1/4 Mile
Higher

Organization ID:	USGS-NC		
Organization Name:	USGS North Carolina Water Science Center		
Monitor Location:	SA-018	Type:	Well
Description:	Not Reported	HUC:	03030006
Drainage Area:	Not Reported	Drainage Area Units:	Not Reported
Contrib Drainage Area:	Not Reported	Contrib Drainage Area Unts:	Not Reported
Aquifer:	Not Reported	Formation Type:	Not Reported
Aquifer Type:	Not Reported	Construction Date:	Not Reported
Well Depth:	Not Reported	Well Depth Units:	Not Reported
Well Hole Depth:	Not Reported	Well Hole Depth Units:	Not Reported

---

2
SSW | **FRDS PWS** | **NC0382483**
1/2 - 1 Mile
Lower

Epa region:	04	State:	NC
Pwsid:	NC0382483	Pwsname:	HARGROVE ELEM SCHOOL
Cityserved:	Not Reported	Stateserved:	NC
Zipserved:	Not Reported	Fipscounty:	37163
Status:	Closed	Retpopsrvd:	435
Pwssvcconn:	1	Psource longname:	Groundwater
Pwstype:	NTNCWS	Owner:	Private
Contact:	ROBERT CARROLL OR MGR NOW	Contactorgname:	Not Reported
Contactphone:	Not Reported	Contactaddress1:	Not Reported
Contactaddress2:	PO BOX 439	Contactcity:	CLINTON
Contactstate:	NC	Contactzip:	28328
Pwsactivitycode:	I		
Pwsid:	NC0382483	Facid:	3967
Facname:	TANK	Factype:	Treatment_plant
Facactivitycode:	I	Trtobjective:	disinfection
Trtprocess:	hypochlorination, post	Factypecode:	TP
PWS ID:	NC0382483	PWS type:	System Owner/Responsible Party
PWS name:	HAROLD BRADSHAW OR MAINT SUPR		
PWS address:	Not Reported	PWS city:	CLINTON
PWS state:	NC	PWS zip:	28328
PWS ID:	NC0382483	PWS type:	System Owner/Responsible Party
PWS name:	SAMPSON CO BD OF EDUCATION		
PWS address:	Not Reported	PWS city:	CLINTON
PWS state:	NC	PWS zip:	28328
PWS ID:	NC0382483	Activity status:	Active
Date system activated:	7706	Date system deactivated:	Not Reported
Retail population:	00000525	System name:	HARGROVE ELEM SCHOOL
System address:	Not Reported	System city:	CLINTON
System state:	NC	System zip:	28328
County FIPS:	082	City served:	CLINTON
Population served:	501 - 1,000 Persons	Treatment:	Treated
Latitude:	350503	Longitude:	0781430

GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Latitude:	345952	Longitude:	0781924

Violation id:	494	Orig code:	S
State:	NC	Violation Year:	1993
Contamination code:	5000	Contamination Name:	Lead and Copper Rule
Violation code:	51	Violation name:	Initial Tap Sampling for Pb and Cu
Rule code:	350	Rule name:	LCR
Violation measur:	Not Reported	Unit of measure:	Not Reported
State mcl:	Not Reported	Cmp bdt:	07/01/1993
Cmp edt:	Not Reported		

Violation id:	597	Orig code:	S
State:	NC	Violation Year:	1996
Contamination code:	5000	Contamination Name:	Lead and Copper Rule
Violation code:	52	Violation name:	Follow-up Or Routine LCR Tap M/R
Rule code:	350	Rule name:	LCR
Violation measur:	Not Reported	Unit of measure:	Not Reported
State mcl:	Not Reported	Cmp bdt:	01/01/1996
Cmp edt:	Not Reported		

Violation id:	697	Orig code:	S
State:	NC	Violation Year:	1995
Contamination code:	5000	Contamination Name:	Lead and Copper Rule
Violation code:	52	Violation name:	Follow-up Or Routine LCR Tap M/R
Rule code:	350	Rule name:	LCR
Violation measur:	Not Reported	Unit of measure:	Not Reported
State mcl:	Not Reported	Cmp bdt:	01/01/1995
Cmp edt:	Not Reported		

PWS currently has or had major violation(s) or enforcement:Yes

Violation ID:	9413621	Violation source ID:	Not Reported
PWS telephone:	Not Reported	Contaminant:	LEAD & COPPER RULE
Violation type:	Initial Tap Sampling for Pb and Cu		
Violation start date:	070193	Violation end date:	123193
Violation period (months):	006	Violation awareness date:	Not Reported
Major violator:	Not Reported	Maximum contaminant level:	Not Reported
Number of required samples:	Not Reported	Number of samples taken:	Not Reported
Analysis method:	Not Reported	Analysis result:	Not Reported

GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID
Direction
Distance

Database EDR ID Number

NC_NHEO NC50006841

Elclass:	P	Precision1:	S
Eostat:	H	Gisid:	133357
Edr id:	NC50006841		

GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS
RADON

AREA RADON INFORMATION

Federal EPA Radon Zone for SAMPSON County: 3

Note: Zone 1 indoor average level > 4 pCi/L.
: Zone 2 indoor average level >= 2 pCi/L and <= 4 pCi/L.
: Zone 3 indoor average level < 2 pCi/L.

Federal Area Radon Information for SAMPSON COUNTY, NC

Number of sites tested: 5

Area	Average Activity	% <4 pCi/L	% 4-20 pCi/L	% >20 pCi/L
Living Area - 1st Floor	0.640 pCi/L	100%	0%	0%
Living Area - 2nd Floor	Not Reported	Not Reported	Not Reported	Not Reported
Basement	Not Reported	Not Reported	Not Reported	Not Reported

PHYSICAL SETTING SOURCE RECORDS SEARCHED

TOPOGRAPHIC INFORMATION

USGS 7.5' Digital Elevation Model (DEM)
Source: United States Geologic Survey
EDR acquired the USGS 7.5' Digital Elevation Model in 2002 and updated it in 2006. The 7.5 minute DEM corresponds to the USGS 1:24,000- and 1:25,000-scale topographic quadrangle maps. The DEM provides elevation data with consistent elevation units and projection.

Current USGS 7.5 Minute Topographic Map
Source: U.S. Geological Survey

HYDROLOGIC INFORMATION

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

HYDROGEOLOGIC INFORMATION

AQUIFLOW^{R} Information System
Source: EDR proprietary database of groundwater flow information
EDR has developed the AQUIFLOW Information System (AIS) to provide data on the general direction of groundwater flow at specific points. EDR has reviewed reports submitted to regulatory authorities at select sites and has extracted the date of the report, hydrogeologically determined groundwater flow direction and depth to water table information.

GEOLOGIC INFORMATION

Geologic Age and Rock Stratigraphic Unit
Source: P.G. Schruben, R.E. Arndt and W.J. Bawiec, Geology of the Conterminous U.S. at 1:2,500,000 Scale - A digital representation of the 1974 P.B. King and H.M. Beikman Map, USGS Digital Data Series DDS - 11 (1994).

STATSGO: State Soil Geographic Database
Source: Department of Agriculture, Natural Resources Conservation Service (NRCS)
The U.S. Department of Agriculture's (USDA) Natural Resources Conservation Service (NRCS) leads the national Conservation Soil Survey (NCSS) and is responsible for collecting, storing, maintaining and distributing soil survey information for privately owned lands in the United States. A soil map in a soil survey is a representation of soil patterns in a landscape. Soil maps for STATSGO are compiled by generalizing more detailed (SSURGO) soil survey maps.

SSURGO: Soil Survey Geographic Database
Source: Department of Agriculture, Natural Resources Conservation Service (NRCS)
Telephone: 800-672-5559
SSURGO is the most detailed level of mapping done by the Natural Resources Conservation Service, mapping scales generally range from 1:12,000 to 1:63,360. Field mapping methods using national standards are used to construct the soil maps in the Soil Survey Geographic (SSURGO) database. SSURGO digitizing duplicates the original soil survey maps. This level of mapping is designed for use by landowners, townships and county natural resource planning and management.

PHYSICAL SETTING SOURCE RECORDS SEARCHED

LOCAL / REGIONAL WATER AGENCY RECORDS

FEDERAL WATER WELLS

PWS: Public Water Systems
Source: EPA/Office of Drinking Water
Telephone: 202-564-3750
Public Water System data from the Federal Reporting Data System. A PWS is any water system which provides water to at least 25 people for at least 60 days annually. PWSs provide water from wells, rivers and other sources.

PWS ENF: Public Water Systems Violation and Enforcement Data
Source: EPA/Office of Drinking Water
Telephone: 202-564-3750
Violation and Enforcement data for Public Water Systems from the Safe Drinking Water Information System (SDWIS) after August 1995. Prior to August 1995, the data came from the Federal Reporting Data System (FRDS).

USGS Water Wells: USGS National Water Inventory System (NWIS)
This database contains descriptive information on sites where the USGS collects or has collected data on surface water and/or groundwater. The groundwater data includes information on wells, springs, and other sources of groundwater.

STATE RECORDS

North Carolina Public Water Supply Wells
Source: Department of Environmental Health
Telephone: 919-715-3243

OTHER STATE DATABASE INFORMATION

North Carolina Wildlife Resources/Game Lands
Source: Center for Geographic Information and Analysis
Telephone: 919-733-2090
All publicly owned game lands managed by the North Carolina Wildlife Resources Commission and as listed in Hunting and Fishing Maps.

NC Natural Heritage Sites: Natural Heritage Element Occurrence Sites
Source: Natural Heritage Occurrence Sites Center for Geographic Information and Analysis
Telephone: 919-733-2090
A point coverage identifying locations of rare and endangered species, occurrences of exemplary or unique natural ecosystems (terrestrial or aquatic), and special animal habitats (e.g., colonial waterbird nesting sites).

NC Natural Areas: Significant Natural Heritage Areas
Source: Center for Geographic Information and Analysis
Telephone: 919-733-2090
A polygon converage identifying sites (terrestrial or aquatic) that have particular biodiversity significance. A site's significance may be due to the presenceof rare species, rare or high quality natural communities, or other important ecological features.

RADON

State Database: NC Radon
Source: Department of Environment & Natural Resources
Telephone: 919-733-4984
Radon Statistical and Non Statiscal Data

Area Radon Information
Source: USGS
Telephone: 703-356-4020
The National Radon Database has been developed by the U.S. Environmental Protection Agency (USEPA) and is a compilation of the EPA/State Residential Radon Survey and the National Residential Radon Survey. The study covers the years 1986 - 1992. Where necessary data has been supplemented by information collected at private sources such as universities and research institutions.

PHYSICAL SETTING SOURCE RECORDS SEARCHED

EPA Radon Zones
Source: EPA
Telephone: 703-356-4020
Sections 307 & 309 of IRAA directed EPA to list and identify areas of U.S. with the potential for elevated indoor radon levels.

OTHER

Airport Landing Facilities: Private and public use landing facilities
Source: Federal Aviation Administration, 800-457-6656

Epicenters: World earthquake epicenters, Richter 5 or greater
Source: Department of Commerce, National Oceanic and Atmospheric Administration

Earthquake Fault Lines: The fault lines displayed on EDR's Topographic map are digitized quaternary faultlines, prepared in 1975 by the United State Geological Survey

STREET AND ADDRESS INFORMATION

USDA FORM AD-1006

United States Department of Agriculture

Natural Resources
Conservation Service

North Carolina
State Office

4407 Bland Rd.
Suite 117
Raleigh
North Carolina 27609
Voice (704) 680-3541
Fax (844) 325-2156

March 1, 2021

Jeremy Schmid
Senior Ecologist
RES
3600 Glenwood Avenue, Suite 100
Raleigh, NC 27612

Dear Mr. Schmid;

The following information is in response to your request soliciting comments regarding the Proposed Six Runs Mitigation Project in Sampson County, NC.

Projects are subject to Farmland Protection Policy Act (FPPA) requirements if they may irreversibly convert farmland (directly or indirectly) to nonagricultural use and are completed by a Federal agency or with assistance from a Federal agency.

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 forest land, pastureland, cropland, or other land, but not water or urban built-up land. Farmland means prime or unique farmlands as defined in section 1540(c)(1) of the Act or farmland that is determined by the appropriate state or unit of local government agency or agencies with concurrence of the Secretary to be farmland of statewide of local importance.

“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 USGS topographical maps, or as ``urban-built-up'' on the USDA Important Farmland Maps. See over for more information.

The area in question includes land classified as Prime Farmland. In accordance with the Code of Federal Regulations 7CFR 658, Farmland Protection Policy Act, the AD-1006 was initiated. NRCS Completed Parts II, IV, V of the form and returned for completion by the requesting agency.

If you have any questions, please feel free to call me at (704) 680-3541 office or (704) 754-6734 cell.

Sincerely,

Kristin L May

Kristin L May
Acting State Soil Scientist

cc:
Gavin Thompson, supervisory soil conservationist, NRCS, Clinton, NC

U.S. Department of Agriculture

FARMLAND CONVERSION IMPACT RATING

PART I *(To be completed by Federal Agency)*	Date Of Land Evaluation Request 11/16/2020
Name of Project Six Runs	Federal Agency Involved Federal Highway Admin (FHWA)
Proposed Land Use Conservation Easement	County and State Sampson County, NC
PART II *(To be completed by NRCS)*	Date Request Received By NRCS 2/4/2021 / Person Completing Form: Kristin Mav

Does the site contain Prime, Unique, Statewide or Local Important Farmland? *(If no, the FPPA does not apply - do not complete additional parts of this form)*	YES	NO	Acres Irrigated	Average Farm Size
	☑	☐	None	314

Major Crop(s)	Farmable Land In Govt. Jurisdiction	Amount of Farmland As Defined in FPPA
Corn	Acres: 85.87 % 520459 ac.	Acres: 85.87 % 520459 ac.

Name of Land Evaluation System Used	Name of State or Local Site Assessment System	Date Land Evaluation Returned by NRCS
Sampson Co. LESA	NA	3/1/2021

PART III *(To be completed by Federal Agency)*	Alternative Site Rating			
	Site A	Site B	Site C	Site D
A. Total Acres To Be Converted Directly	29.75			
B. Total Acres To Be Converted Indirectly	0			
C. Total Acres In Site	29.75			
PART IV *(To be completed by NRCS)* Land Evaluation Information				
A. Total Acres Prime And Unique Farmland	3.7			
B. Total Acres Statewide Important or Local Important Farmland	5.1			
C. Percentage Of Farmland in County Or Local Govt. Unit To Be Converted	0.0017			
D. Percentage Of Farmland in Govt. Jurisdiction With Same Or Higher Relative Value	85.60			
PART V (To be completed by NRCS) Land Evaluation Criterion Relative Value of Farmland To Be Converted (Scale of 0 to 100 Points)	19			

PART VI *(To be completed by Federal Agency)* Site Assessment Criteria *(Criteria are explained in 7 CFR 658.5 b. For Corridor project use form NRCS-CPA-106)*	**Maximum Points**	Site A	Site B	Site C	Site D
1. Area In Non-urban Use	(15)	15			
2. Perimeter In Non-urban Use	(10)	10			
3. Percent Of Site Being Farmed	(20)	18			
4. Protection Provided By State and Local Government	(20)	0			
5. Distance From Urban Built-up Area	(15)	15			
6. Distance To Urban Support Services	(15)	5			
7. Size Of Present Farm Unit Compared To Average	(10)	4			
8. Creation Of Non-farmable Farmland	(10)	0			
9. Availability Of Farm Support Services	(5)	5			
10. On-Farm Investments	(20)	10			
11. Effects Of Conversion On Farm Support Services	(10)	0			
12. Compatibility With Existing Agricultural Use	(10)	0			
TOTAL SITE ASSESSMENT POINTS	160	82	0	0	0
PART VII ***(To be completed by Federal Agency)***					
Relative Value Of Farmland *(From Part V)*	100	19	0	0	0
Total Site Assessment *(From Part VI above or local site assessment)*	160	82	0	0	0
TOTAL POINTS ***(Total of above 2 lines)***	260	101	0	0	0

Site Selected:	Date Of Selection	Was A Local Site Assessment Used? YES ☐ NO ☐

Reason For Selection:

Name of Federal agency representative completing this form:	Date:

(See Instructions on reverse side) **Form AD-1006 (03-02)**

STEPS IN THE PROCESSING THE FARMLAND AND CONVERSION IMPACT RATING FORM

Step 1 - Federal agencies (or Federally funded projects) involved in proposed projects that may convert farmland, as defined in the Farmland Protection Policy Act (FPPA) to nonagricultural uses, will initially complete Parts I and III of the form. For Corridor type projects, the Federal agency shall use form NRCS-CPA-106 in place of form AD-1006. The Land Evaluation and Site Assessment (LESA) process may also be accessed by visiting the FPPA website, http://fppa.nrcs.usda.gov/lesa/.

Step 2 - Originator (Federal Agency) will send one original copy of the form together with appropriate scaled maps indicating location(s)of project site(s), to the Natural Resources Conservation Service (NRCS) local Field Office or USDA Service Center and retain a copy for their files. (NRCS has offices in most counties in the U.S. The USDA Office Information Locator may be found at http://offices.usda.gov/scripts/ndISAPI.dll/oip_public/USA_map**,** or the offices can usually be found in the Phone Book under U.S. Government, Department of Agriculture. A list of field offices is available from the NRCS State Conservationist and State Office in each State.)

Step 3 - NRCS will, within 10 working days after receipt of the completed form, make a determination as to whether the site(s) of the proposed project contains prime, unique, statewide or local important farmland. (When a site visit or land evaluation system design is needed, NRCS will respond within 30 working days.

Step 4 - For sites where farmland covered by the FPPA will be converted by the proposed project, NRCS will complete Parts II, IV and V of the form.

Step 5 - NRCS will return the original copy of the form to the Federal agency involved in the project, and retain a file copy for NRCS records.

Step 6 - The Federal agency involved in the proposed project will complete Parts VI and VII of the form and return the form with the final selected site to the servicing NRCS office.

Step 7 - The Federal agency providing financial or technical assistance to the proposed project will make a determination as to whether the proposed conversion is consistent with the FPPA.

INSTRUCTIONS FOR COMPLETING THE FARMLAND CONVERSION IMPACT RATING FORM

(For Federal Agency)

Part I: When completing the "County and State" questions, list all the local governments that are responsible for local land use controls where site(s) are to be evaluated.

Part III: When completing item B (Total Acres To Be Converted Indirectly), include the following:

1. Acres not being directly converted but that would no longer be capable of being farmed after the conversion, because the conversion would restrict access to them or other major change in the ability to use the land for agriculture.
2. Acres planned to receive services from an infrastructure project as indicated in the project justification (e.g. highways, utilities planned build out capacity) that will cause a direct conversion.

Part VI: Do not complete Part VI using the standard format if a State or Local site assessment is used. With local and NRCS assistance, use the local Land Evaluation and Site Assessment (LESA).

1. Assign the maximum points for each site assessment criterion as shown in § 658.5(b) of CFR. In cases of corridor-type project such as transportation, power line and flood control, criteria #5 and #6 will not apply and will, be weighted zero, however, criterion #8 will be weighed a maximum of 25 points and criterion #11 a maximum of 25 points.

2. Federal agencies may assign relative weights among the 12 site assessment criteria other than those shown on the FPPA rule after submitting individual agency FPPA policy for review and comment to NRCS. In all cases where other weights are assigned, relative adjustments must be made to maintain the maximum total points at 160. For project sites where the total points equal or exceed 160, consider alternative actions, as appropriate, that could reduce adverse impacts (e.g. Alternative Sites, Modifications or Mitigation).

Part VII: In computing the "Total Site Assessment Points" where a State or local site assessment is used and the total maximum number of points is other than 160, convert the site assessment points to a base of 160.
Example: if the Site Assessment maximum is 200 points, and the alternative Site "A" is rated 180 points:

$$\frac{\text{Total points assigned Site A}}{\text{Maximum points possible}} = \frac{180}{200} \text{ X } 160 = 144 \text{ points for Site A}$$

For assistance in completing this form or FPPA process, contact the local NRCS Field Office or USDA Service Center.

NRCS employees, consult the FPPA Manual and/or policy for additional instructions to complete the AD-1006 form.

Uniform Act Compliance Letters

February 19, 2021

Joan B Troublefield
8261 Faison Hwy,
Faison, NC 28341

Re: Six Runs Mitigation Project

Dear Mrs. Troublefield,

As part of the environmental documentation process in preparation for the stream mitigation project on your property, this letter is to inform you of provisions in the Federal Highway Administration Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, as amended, referred to as the Uniform Act.

The Uniform Act requires that we inform you in writing that this conservation easement transaction is voluntary and that the project is being developed by Environmental Banc & Exchange, LLC for the North Carolina Division of Mitigation Services (NCDMS). Neither EBX nor NCDMS have the authority to acquire the property by eminent domain. In addition, EBX believes that the agreed purchase price for the conservation easement area represents the fair market value.

This letter is for your information, and you do not need to respond. As always, please feel free to call me at 919-302-2324 with any questions.

Sincerely,

Kenton Beal
Land Representative

February 19, 2021

Daniel Evans
3406 E. Darden Rd,
Faison, NC 28341

Re: Six Runs Mitigation Project

Dear Mr. Evans,

As part of the environmental documentation process in preparation for the stream mitigation project on your property, this letter is to inform you of provisions in the Federal Highway Administration Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, as amended, referred to as the Uniform Act.

The Uniform Act requires that we inform you in writing that this conservation easement transaction is voluntary and that the project is being developed by Environmental Banc & Exchange, LLC for the North Carolina Division of Mitigation Services (NCDMS). Neither EBX nor NCDMS have the authority to acquire the property by eminent domain. In addition, EBX believes that the agreed purchase price for the conservation easement area represents the fair market value.

This letter is for your information, and you do not need to respond. As always, please feel free to call me at 919-302-2324 with any questions.

Sincerely,

Kenton Beal
Land Representative

CORRESPONDENCE

United States Department of the Interior

FISH AND WILDLIFE SERVICE

Raleigh Field Office
P.O. Box 33726
Raleigh, NC 27636-3726

Date: 12-21-2020

Self-Certification Letter

Project Name Six Runs

Dear Applicant:

Thank you for using the U.S. Fish and Wildlife Service (Service) Raleigh Ecological Services online project review process. By printing this letter in conjunction with your project review package, you are certifying that you have completed the online project review process for the project named above in accordance with all instructions provided, using the best available information to reach your conclusions. This letter, and the enclosed project review package, completes the review of your project in accordance with the Endangered Species Act of 1973 (16 U.S.C. 1531-1544, 87 Stat. 884), as amended (ESA), and the Bald and Golden Eagle Protection Act (16 U.S.C. 668-668c, 54 Stat. 250), as amended (Eagle Act). This letter also provides information for your project review under the National Environmental Policy Act of 1969 (P.L. 91-190, 42 U.S.C. 4321-4347, 83 Stat. 852), as amended. A copy of this letter and the project review package must be submitted to this office for this certification to be valid. This letter and the project review package will be maintained in our records.

The species conclusions table in the enclosed project review package summarizes your ESA and Eagle Act conclusions. Based on your analysis, mark all the determinations that apply:

- [x] "no effect" determinations for proposed/listed species and/or proposed/designated critical habitat; and/or
- [ ] "may affect, not likely to adversely affect" determinations for proposed/listed species and/or proposed/designated critical habitat; and/or
- [ ] "may affect, likely to adversely affect" determination for the Northern long-eared bat (Myotis septentrionalis) and relying on the findings of the January 5, 2016, Programmatic Biological Opinion for the Final 4(d) Rule on the Northern long-eared bat;
- [x] "no Eagle Act permit required" determinations for eagles.

We certify that use of the online project review process in strict accordance with the instructions provided as documented in the enclosed project review package results in reaching the appropriate determinations. Therefore, we concur with the “no effect” or “not likely to adversely affect” determinations for proposed and listed species and proposed and designated critical habitat; the “may affect” determination for Northern long-eared bat; and/or the “no Eagle Act permit required” determinations for eagles. Additional coordination with this office is not needed. Candidate species are not legally protected pursuant to the ESA. However, the Service encourages consideration of these species by avoiding adverse impacts to them. Please contact this office for additional coordination if your project action area contains candidate species. Should project plans change or if additional information on the distribution of proposed or listed species, proposed or designated critical habitat, or bald eagles becomes available, this determination may be reconsidered. This certification letter is valid for 1 year. Information about the online project review process including instructions, species information, and other information regarding project reviews within North Carolina is available at our website http://www.fws.gov/raleigh/pp.html. If you have any questions, you can write to us at Raleigh@fws.gov or please contact Leigh Mann of this office at 919-856-4520, ext. 10.

Sincerely,

/s/Pete Benjamin

Pete Benjamin
Field Supervisor
Raleigh Ecological Services

Enclosures - project review package

Species Conclusions Table

Project Name: Six Runs

Date: 12-21-2020

Species / Resource Name	Conclusion	ESA Section 7 / Eagle Act Determination	Notes / Documentation
Red-cockaded Woodpecker Picoides borealis	No suitable habitat present	No Effect	There are only a few pine trees present on the property and lacks foraging habitat due to cattle pasture
Wood Stork Mycteria americana	No suitable habitat present	No Effect	None observed on two separate site visits over a period of one hour each visit. No rookery areas observed.
American Alligator Alligator mississippiensis	No suitable habitat present	No Effect	
Pondberry Lindera melissifolia	No suitable habitat present	No Effect	Site stressors include ditching and land use conversion to pasture / heavy livestock pressure throughout pasture and wooded areas.
Critical Habitat	No critical habitat present	No Effect	
Bald eagle	unlikely to disturb nesting bald eagles	No Eagle Act Permit Required	No large water bodies within a mile of the project

Acknowledgement: I agree that the above information about my proposed project is true. I used all of the provided resources to make an informed decision about impacts in the immediate and surrounding areas.

Jeremy Schmid, Senior Ecologist

Signature /Title

12/21/2020

Date

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Raleigh Ecological Services Field Office
Post Office Box 33726
Raleigh, NC 27636-3726
Phone: (919) 856-4520 Fax: (919) 856-4556

In Reply Refer To:
Consultation Code: 04EN2000-2021-SLI-0248
Event Code: 04EN2000-2021-E-00521
Project Name: Six Runs

November 17, 2020

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 species list generated pursuant to the information you provided 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. The species list fulfills the requirements of the U.S. Fish and Wildlife Service (Service) under section 7(c) of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 *et seq.*).

New information based on updated surveys, changes in the abundance and distribution of species, changed habitat conditions, or other factors could change this list. Please feel free to contact us if you need more current information or assistance regarding the potential impacts to federally proposed, listed, and candidate species and federally designated and proposed critical habitat. Please note that under 50 CFR 402.12(e) of the regulations implementing section 7 of the Act, the accuracy of this species list 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 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.

Section 7 of the Act requires that all federal agencies (or their designated non-federal representative), in consultation with the Service, insure that any action federally authorized, funded, or carried out by such agencies is not likely to jeopardize the continued existence of any federally-listed endangered or threatened species. A biological assessment or evaluation may be prepared to fulfill that requirement and in determining whether additional consultation with the Service is necessary. In addition to the federally-protected species list, information on the species' life histories and habitats and information on completing a biological assessment or

evaluation and can be found on our web page at http://www.fws.gov/raleigh. Please check the web site often for updated information or changes

If your project contains suitable habitat for any of the federally-listed species known to be present within the county where your project occurs, the proposed action has the potential to adversely affect those species. As such, we recommend that surveys be conducted to determine the species' presence or absence within the project area. The use of North Carolina Natural Heritage program data should not be substituted for actual field surveys.

If you determine that the proposed action may affect (i.e., likely to adversely affect or not likely to adversely affect) a federally-protected species, you should notify this office with your determination, the results of your surveys, survey methodologies, and an analysis of the effects of the action on listed species, including consideration of direct, indirect, and cumulative effects, before conducting any activities that might affect the species. If you determine that the proposed action will have no effect (i.e., no beneficial or adverse, direct or indirect effect) on federally listed species, then you are not required to contact our office for concurrence (unless an Environmental Impact Statement is prepared). However, you should maintain a complete record of the assessment, including steps leading to your determination of effect, the qualified personnel conducting the assessment, habitat conditions, site photographs, and any other related articles.

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 development of an eagle conservation plan (http://www.fws.gov/windenergy/eagle_guidance.html). Additionally, wind energy projects should follow the wind energy guidelines (http://www.fws.gov/windenergy/) for minimizing impacts to migratory birds 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.

Not all Threatened and Endangered Species that occur in North Carolina are subject to section 7 consultation with the U.S Fish and Wildlife Service. Atlantic and shortnose sturgeon, sea turtles,when in the water, and certain marine mammals are under purview of the National Marine Fisheries Service. If your project occurs in marine, estuarine, or coastal river systems you should also contact the National Marine Fisheries Service, http://www.nmfs.noaa.gov/

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. If you have any questions or comments, please contact John Ellis of this office at john_ellis@fws.gov.

Attachment(s):

- Official Species List

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:

Raleigh Ecological Services Field Office
Post Office Box 33726
Raleigh, NC 27636-3726
(919) 856-4520

Project Summary

Consultation Code: 04EN2000-2021-SLI-0248

Event Code: 04EN2000-2021-E-00521

Project Name: Six Runs

Project Type: STREAM / WATERBODY / CANALS / LEVEES / DIKES

Project Description: Stream and wetland mitigation site contracted by NCDMS

Project Location:

Approximate location of the project can be viewed in Google Maps: https://www.google.com/maps/place/35.09575455494985N78.2326535615814W

Counties: Sampson, NC

Endangered Species Act Species

There is a total of 4 threatened, endangered, or candidate species on this species list.

Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species.

IPaC does not display listed species or critical habitats under the sole jurisdiction of NOAA Fisheries[1], as USFWS does not have the authority to speak on behalf of NOAA and the Department of Commerce.

See the "Critical habitats" section below for those critical habitats that lie wholly or partially within your project area under this office's jurisdiction. Please contact the designated FWS office if you have questions.

---

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.

Birds

NAME	STATUS
Red-cockaded Woodpecker *Picoides borealis* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/7614	Endangered
Wood Stork *Mycteria americana* Population: AL, FL, GA, MS, NC, SC No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/8477	Threatened

Reptiles

NAME	STATUS
American Alligator *Alligator mississippiensis* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/776	Similarity of Appearance (Threatened)

Flowering Plants

NAME	STATUS
Pondberry *Lindera melissifolia*	Endangered

No critical habitat has been designated for this species.

Species profile: https://ecos.fws.gov/ecp/species/1279

Critical habitats

THERE ARE NO CRITICAL HABITATS WITHIN YOUR PROJECT AREA UNDER THIS OFFICE'S JURISDICTION.

NC DEPARTMENT OF
NATURAL AND CULTURAL RESOURCES

Roy Cooper, **Governor**
Susi Hamilton, **Secretary**
Walter Clark, **Director, Land and Water Stewardship**

NCNHDE-11457

February 24, 2020

Matthew DeAngelo
Resource Environmental Solutions, LLC
302 Jefferson Street
Raleigh, NC 27607
RE: Six Runs

Dear Matthew DeAngelo:

The North Carolina Natural Heritage Program (NCNHP) appreciates the opportunity to provide information about natural heritage resources for the project referenced above.

Based on the project area mapped with your request, a query of the NCNHP database indicates that there are no records for rare species, important natural communities, natural areas, and/or conservation/managed areas within the proposed project boundary. Please note that although there may be no documentation of natural heritage elements within the project boundary, it does not imply or confirm their absence; the area may not have been surveyed. The results of this query should not be substituted for field surveys where suitable habitat exists. In the event that rare species are found within the project area, please contact the NCNHP so that we may update our records.

The attached 'Potential Occurrences' table summarizes rare species and natural communities that have been documented within a one-mile radius of the property boundary. The proximity of these records suggests that these natural heritage elements may potentially be present in the project area if suitable habitat exists. Tables of natural areas and conservation/managed areas within a one-mile radius of the project area, if any, are also included in this report.

If a Federally-listed species is found within the project area or is indicated within a one-mile radius of the project area, the NCNHP recommends contacting the US Fish and Wildlife Service (USFWS) for guidance. Contact information for USFWS offices in North Carolina is found here: https://www.fws.gov/offices/Directory/ListOffices.cfm?statecode=37.

Please note that natural heritage element data are maintained for the purposes of conservation planning, project review, and scientific research, and are not intended for use as the primary criteria for regulatory decisions. Information provided by the NCNHP database may not be published without prior written notification to the NCNHP, and the NCNHP must be credited as an information source in these publications. Maps of NCNHP data may not be redistributed without permission.

The NC Natural Heritage Program may follow this letter with additional correspondence if a Dedicated Nature Preserve, Registered Heritage Area, Clean Water Management Trust Fund easement, or Federally-listed species are 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 Within a One-mile Radius of the Project Area
Six Runs
February 24, 2020
NCNHDE-11457

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	24288	Hyla andersonii	Pine Barrens Treefrog	1968-05-26	H	5-Very Low	---	Significantly Rare	G4	S3
Dragonfly or Damselfly	33771	Somatochlora georgiana	Coppery Emerald	2004-Pre	H?	5-Very Low	---	Significantly Rare	G3G4	S2?
Dragonfly or Damselfly	33781	Stylurus ivae	Shining Clubtail	2004-Pre	H?	5-Very Low	---	Significantly Rare	G4	S2S3
Vascular Plant	7039	Sagittaria weatherbiana	Grassleaf Arrowhead	1957-05-05	H	3-Medium	---	Endangered	G5T3T4	S2

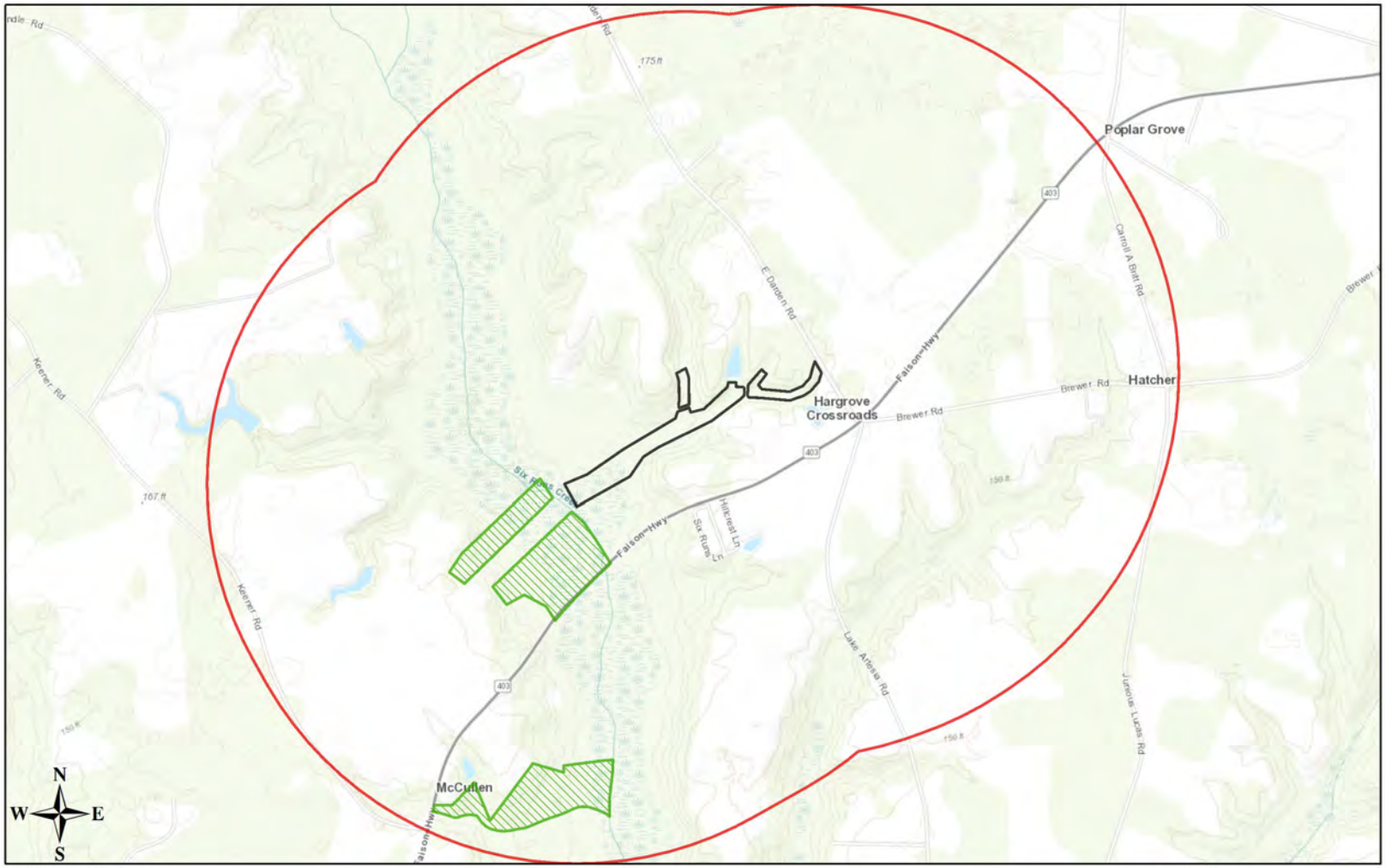
No Natural Areas are Documented Within a One-mile Radius of the Project Area

Managed Areas Documented Within a One-mile Radius of the Project Area

Managed Area Name	Owner	Owner Type
US Fish and Wildlife Service Easement	US Fish and Wildlife Service	Federal
US Fish and Wildlife Service Easement	US Fish and Wildlife Service	Federal
US Fish and Wildlife Service Easement	US Fish and Wildlife Service	Federal

Definitions and an explanation of status designations and codes can be found at https://ncnhde.natureserve.org/content/help. Data query generated on February 24, 2020; source: NCNHP, Q1 Jan 2020. 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-11457: Six Runs



February 24, 2020

- Project Boundary
- Buffered Project Boundary
- Managed Area (MAREA)

1:24,385

0 0.2 0.4 0.8 mi

0 0.325 0.65 1.3 km

Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community

3600 Glenwood Avenue, Suite 100
Raleigh, NC 27612

Corporate Headquarters
6575 West Loop South, Suite 300
Bellaire, TX 77401
Main: 713.520.5400

December 21, 2020

Renee Gledhill-Earley
North Carolina State Historic Preservation Office
4617 Mail Service Center
Raleigh NC 27699-4617

Subject: Project Scoping for Six Runs Mitigation Project in Sampson County

Dear Ms. Gledhill-Earley,

Resource Environmental Solutions, LLC (RES) is contracted by the North Carolina Division of Mitigation Services (NCDMS) to conduct stream and riparian wetland mitigation activities for the Six Runs Project to provide compensatory mitigation for unavoidable stream and riparian wetland impacts. The proposed project presents an opportunity to restore and enhance up to 8,293 linear feet of stream and restore and enhance up to 12 acres of riparian wetland in the Cape Fear River Basin.

RES requests review and comment on any possible issues that might emerge with respect to archaeological or cultural resources associated with a potential stream and riparian wetland mitigation project on the Six Runs Site. Coordinates for the site are as follows: 35.093301 N, -78.238684 W. A USGS site map with approximate limits of conservation easement is attached.

A review of the N.C. State Historic Preservation Office (SHPO) HPOWEB GIS Service database (http://gis.ncdcr.gov/hpoweb/; accessed November 13, 2020) was performed as part of the site due diligence evaluation to reveal any listed or potential eligible historic or archeological resources.The database did not reveal any listed or potentially eligible historic or archeological resources on the proposed properties or within a 0.5-mile radius of the project area. Land use around the project is pasture, residential land, and bottomland hardwood forest.

We ask that you review this site based on the attached information to determine the presence of any historic properties and provide a comment response of your findings. We thank you in advance for your timely response and cooperation. You may return the comment to my attention at the address in the letterhead, or via email at jschmid@res.us. Please feel free to contact me with any questions that you may have concerning the extent of site disturbance associated with this project.

Sincerely,

Jeremy Schmid | Senior Ecologist

Attachments: Vicinity Map (Figure 1), USGS Topographic Map (Figure 2), Aerial Map (Figure 3), Conceptual Plan Map (Figure 4)

North Carolina Department of Natural and Cultural Resources

State Historic Preservation Office

Ramona M. Bartos, Administrator

Governor Roy Cooper | Secretary D. Reid Wilson

January 25, 2021

Jeremy Schmid, PWS
Resource Environmental Solutions, LLC
3600 Glenwood Avenue, Suite 100
Raleigh, NC 27612
jschmid@res.us

Re: Six Runs Mitigation Project, restore 12 acres of riparian wetland, 35.093301, -78.238684, Sampson County, ER 21-0132

Dear Mr. Schmid:

Thank you for your letter of December 21, 2020, regarding the above-referenced undertaking. We have reviewed the submittal and offer the following comments.

We have conducted a review of the project and are aware of no historic resources which would be affected by the project. Therefore, we have no comment on the project as proposed.

The above comments are made pursuant to Section 106 of the National Historic Preservation Act and the Advisory Council on Historic Preservation's Regulations for Compliance with Section 106 codified at 36 CFR Part 800.

Thank you for your cooperation and consideration. If you have questions concerning the above comment, contact Renee Gledhill-Earley, environmental review coordinator, at 919-814-6579 or environmental.review@ncdcr.gov. In all future communication concerning this project, please cite the above referenced tracking number.

Sincerely,

Renee Gledhill-Earley

for Ramona Bartos, Deputy
State Historic Preservation Officer

3600 Glenwood Avenue, Suite 100
Raleigh, NC 27612

Corporate Headquarters
6575 West Loop South, Suite 300
Bellaire, TX 77401
Main: 713.520.5400

December 21, 2020

Gabriela Garrison
Eastern Piedmont Coordinator
North Carolina Wildlife Resources Commission
Sandhills Depot
PO Box 149
Hoffman, NC 28347

Subject: Project Scoping for Six Runs Mitigation Project in Sampson County

Dear Ms. Garrison,

The purpose of this letter is to request your review and comment on any possible issues that might emerge with respect to your office's purview for fish and wildlife associated with a potential stream and riparian wetland restoration project on the attached site (USGS site map with approximate property lines and areas of potential ground disturbance are enclosed). The Six Runs Project has been identified by Resource Environmental Solutions, LLC (RES) to provide compensatory mitigation for unavoidable stream and riparian buffer impacts. The proposed project presents the opportunity to restore/enhance up to 8,293 linear feet of stream and restore and preserve up to 12 acres of riparian wetland in the Cape Fear River Basin. Coordinates for the site are: 35.093301, -78.238684. The Project watershed is primarily a mix of row crops, pastureland, and forest and has historically been so since before the 1940s.

We thank you in advance for your timely response and cooperation. You may return the comment to my attention at the address in the letterhead, or via email to jschmid@res.us. Please feel free to contact me with any questions that you may have concerning the extent of site disturbance associated with this project.

Sincerely,

Jeremy Schmid | Senior Ecologist

Attachments: Vicinity Map (Figure 1), USGS Topographic Map (Figure 2), Aerial Map (Figure 3), Conceptual Plan Map (Figure 4)

NORTH CAROLINA WILDLIFE RESOURCES COMMISSION
Cameron Ingram, Executive Director

January 4, 2021

Mr. Jeremy Schmid
Resource Environmental Solutions, LLC
3600 Glenwood Avenue, Suite 100
Raleigh, NC 27612

Subject: Request for Environmental Information for Six Runs Mitigation Project, Sampson County, North Carolina.

Dear Mr. Schmid,

Biologists with the North Carolina Wildlife Resources Commission (NCWRC) have reviewed the proposed project description. Comments are provided in accordance with certain provisions of the Clean Water Act of 1977 (as amended), Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S.C. 661-667e) and North Carolina General Statutes (G.S. 113-131 et seq.).

Resource Environmental Solutions, LLC has developed the Six Runs Mitigation Project. The project will restore up to 8,293 linear feet of stream and preserve up to 12 acres of riparian wetland. The project watershed has been a mix of row crops, pastureland and forest since the 1940s. The project area is located at the intersection of Faison Highway and East Darden Road, northeast of Clinton.

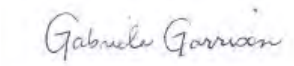
The project area drains to Six Runs Creek in the Cape Fear River basin. Stream restoration projects often improve water quality and aquatic habitat. Establishing native, forested buffers in riparian areas will improve both aquatic and terrestrial habitats and provide a travel corridor for wildlife species.

In addition to stringent best management practices for erosion and sediment control during construction, the NCWRC recommends the use of biodegradable and wildlife-friendly sediment and erosion control devices. Silt fencing, fiber rolls and/or other products should have loose-weave netting that is made of natural fiber materials with movable joints between the vertical and horizontal twines. Silt fencing and similar products that have been reinforced with plastic or metal mesh should be avoided as they impede the movement of terrestrial wildlife species. Excessive silt and sediment loads can have detrimental effects on aquatic resources including destruction of spawning habitat, suffocation of eggs and clogging of gills. Any invasive plant species found onsite should be removed and destroyed.

Thank you for the opportunity to review and comment on this project. If I can be of further assistance, please contact me at (910) 409-7350 or gabriela.garrison@ncwildlife.org.

January 4, 2021
Scoping – Six Runs Mitigation Project

Sincerely,



Gabriela Garrison
Eastern Piedmont Habitat Conservation Coordinator
Habitat Conservation Program

Appendix L

DMS Floodplain Requirements Checklist

EEP Floodplain Requirements Checklist

This form was developed by the National Flood Insurance program, NC Floodplain Mapping program and Ecosystem Enhancement Program to be filled for all EEP projects. The form is intended to summarize the floodplain requirements during the design phase of the projects. The form should be submitted to the Local Floodplain Administrator with three copies submitted to NFIP (attn. State NFIP Engineer), NC Floodplain Mapping Unit (attn. State NFIP Coordinator) and NC Ecosystem Enhancement Program.

Project Location

Name of project:	Six Runs Stream and Wetland Mitigation Project
Name of stream or feature:	Six unnamed tributaries to Six Runs Creek
County:	Sampson
Name of river basin:	Cape Fear
Is project urban or rural?	Rural
Name of Jurisdictional municipality/county:	Sampson County
DFIRM panel number for entire site:	2428 (map number 3720242800J, effective date January 5, 2007)
Consultant name:	Resource Environmental Solutions, LLC
Phone number:	630-605-7595 (Kim Marsh)
Address:	3600 Glenwood Ave Suite 100 Raleigh, NC 27612

Design Information

The Six Runs Stream and Wetland Mitigation Project ("Project") is located within a rural watershed in Sampson County, within the Cape Fear River Basin and USGS 14-digit HUC 03030006110010. The Project proposes to restore 5,813 linear feet of stream, enhance 1,656 linear feet of stream, re-establish 6.221 acres of wetland, rehabilitate 4.913 acres of wetland, enhance 1.008 acres of wetland, preserve 1.656 acres of wetland, and protect a remaining 1.382 acres of wetland. Through these activities, the Project will provide water quality benefit for 570 acres of drainage area. The stream and wetland mitigation components are summarized in the table below. The purpose of the Project is to meet water quality improvements addressed in the River Basin Restoration Priorities and improve overall stream and wetland health.

Reach ID	Length (feet)	Priority
BB-A	*452*	*One (Enhancement)*
BB-B	*562*	*One (Enhancement)*
BB-C	*4,357*	*One (Restoration)*
DE2-A	*231*	*Two (Enhancement)*
DE2-B	*156*	*One (Restoration)*
DE4-A	*301*	*Two (Enhancement)*
DE4-B	*430*	*One (Restoration)*
DE7	*562*	*One (Restoration)*
DE8	*196*	*One (Restoration)*
MT2	*110*	*Two (Enhancement)*

Wetland ID	Area (acres)	Mitigation Type
WA	*0.081*	*Protection*
WB	*0.057*	*Protection*
WC-1	*4.903*	*Rehabilitation*
WC-2	*1.656*	*Preservation*
WD	*0.01*	*Rehabilitation*
WE-1	*0.437*	*Protection*
WE-1	*0.411*	*Enhancement (Low)*
WE-2	*0.597*	*Enhancement (High)*
WE-2	*0.092*	*Protection*
WF	*0.298*	*Protection*
WG	*0.005*	*Protection*
WH	*0.057*	*Protection*
WI	*0.198*	*Protection*
WJ	*0.123*	*Protection*
WK	*0.034*	*Protection*
WL	*5.759*	*Re-establishment*
WM	*0.462*	*Re-establishment*

Floodplain Information

Is project located in a Special Flood Hazard Area (SFHA)?

☑ Yes ☐ No

If project is located in a SFHA, check how it was determined:

☐ Redelineation

☐ Detailed Study

☑ Limited Detail Study

☐ Approximate Study

☐ Don't know

List flood zone designation:

Check if applies:

☑ AE Zone

- ☐ Floodway
- ☐ Non-Encroachment
- ☑ None

☐ A Zone

- ☐ Local Setbacks Required
- ☐ No Local Setbacks Required

If local setbacks are required, list how many feet:

Does proposed channel boundary encroach outside floodway/non-encroachment/setbacks?

☑ Yes ☐ No

Land Acquisition (Check)

☐ State owned (fee simple)

☐ Conservation easment (Design Bid Build)

☑ Conservation Easement (Full Delivery Project)

Note: if the project property is state-owned, then all requirements should be addressed to the Department of Administration, State Construction Office (attn: Herbert Neily, (919) 807-4101)

Is community/county participating in the NFIP program?

(•) Yes ( ) No

Note: if community is not participating, then all requirements should be addressed to NFIP (attn: State NFIP Engineer, (919) 715-8000)

Name of Local Floodplain Administrator: Austin Brinkley
Phone Number: (910) 592-0146

Floodplain Requirements

This section to be filled by designer/applicant following verification with the LFPA

☐ No Action

☑ No Rise

☐ Letter of Map Revision

☐ Conditional Letter of Map Revision

☐ Other Requirements

List other requirements: The consultant will also apply for a General Floodplain Development Permit through Sampson County.

Comments:
The downstream end of the project (approx. 180-LF) is located within the fringe of the 100-year floodplain for Six Runs Creek. While there will be some grading/fill located at this section of the project, it will all be contained at or below existing grade before ultimately tying in to the existing ground. The consultant does not anticipate any impacts on the 100-year floodplain because of this project.

Name: Kim Marsh Signature: 

Title: Engineer II Date: 10/3/2021

FLOOD HAZARD INFORMATION

SEE FIS REPORT FOR ZONE DESCRIPTIONS AND INDEX MAP

THE INFORMATION DEPICTED ON THIS MAP AND SUPPORTING DOCUMENTATION ARE ALSO AVAILABLE IN DIGITAL FORMAT AT HTTP://FRIS.NC.GOV/FRIS

SPECIAL FLOOD HAZARD AREAS
- Without Base Flood Elevation (BFE) *Zone A,V, A99*
- With BFE or Depth *Zone AE, AO, AH, VE, AR*
- Regulatory Floodway

OTHER AREAS OF FLOOD HAZARD
- 0.2% Annual Chance Flood Hazard, Areas of 1% Annual Chance Flood with Average Depth Less Than One Foot or With Drainage Areas of Less Than One Square Mile *Zone X*
- Future Conditions 1% Annual Chance Flood Hazard *Zone X*
- Area with Reduced Flood Risk due to Levee See Notes *Zone X*

OTHER AREAS
- Areas Determined to be Outside the 0.2% Annual Chance Floodplain *Zone X*

GENERAL STRUCTURES
- Channel, Culvert, or Storm Sewer
- Accredited or Provisionally Accredited Levee, Dike, or Floodwall
- Non-accredited Levee, Dike, or Floodwall
- BM5510 North Carolina Geodetic Survey bench mark
- BM5510 National Geodetic Survey bench mark
- BM5510 Contractor Est. NCFMP Survey bench mark
- 012 18.2 Cross Sections with 1% Annual Chance Water Surface Elevation (BFE)
- 8 Coastal Transect
- Coastal Transect Baseline

OTHER FEATURES
- Profile Baseline
- Hydrographic Feature
- Limit of Study
- Jurisdiction Boundary

NOTES TO USERS

For information and questions about this map, available products associated with this FIRM including historic versions of this FIRM, how to order products or the National Flood Insurance Program in general, please call the FEMA Map Information eXchange at 1-877-FEMA-MAP (1-877-336-2627) or visit the FEMA Map Service Center website at http://msc.fema.gov. An accompanying Flood Insurance Study report, Letter of Map Revision (LOMR) or Letter of Map Amendment (LOMA) revising portions of this panel, and digital versions of this FIRM may be available. Visit the North Carolina Floodplain Mapping Program website at http://www.ncfloodmaps.com, or contact the FEMA Map Service Center.

Communities annexing land on adjacent FIRM panels must obtain a current copy of the adjacent panel as well as the current FIRM Index. These may be ordered directly from the Map Service Center at the number listed above.

For community and countywide map dates refer to the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in the community, contact your Insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

Base map information shown on this FIRM was provided in digital format by the North Carolina Floodplain Mapping Program (NCFMP). The source of this information can be determined from the metadata available in the digital FLOOD database and in the Technical Support Data Notebook (TSDN).

ACCREDITED LEVEE NOTES TO USERS: If an accredited levee note appears on this panel check with your local community to obtain more information, such as the estimated level of protection provided (which may exceed the 1-percent-annual-chance level) and Emergency Action Plan, on the levee system(s) shown as providing protection. To mitigate flood risk in residual risk areas, property owners and residents are encouraged to consider flood insurance and floodproofing or other protective measures. For more information on flood insurance, interested parties should visit the FEMA Website at http://www.fema.gov/business/nfip/index.shtm.

PROVISIONALLY ACCREDITED LEVEE NOTES TO USERS: If a Provisionally Accredited Levee (PAL) note appears on this panel, check with your local community to obtain more information, such as the estimated level of protection provided (which may exceed the 1-percent-annual-chance level) and Emergency Action Plan, on the levee system(s) shown as providing protection. To maintain accreditation, the levee owner or community is required to submit the data and documentation necessary to comply with Section 65.10 of the NFIP regulations. If the community or owner does not provide the necessary data and documentation or if the data and documentation provided indicates the levee system does not comply with Section 65.10 requirements, FEMA will revise the flood hazard and risk information for this area to reflect de-accreditation of the levee system. To mitigate flood risk in residual risk areas, property owners and residents are encouraged to consider flood insurance and floodproofing or other protective measures. For more information on flood insurance, interested parties should visit the FEMA Website at http://www.fema.gov/business/nfip/index.shtm.

LIMIT OF MODERATE WAVE ACTION NOTES TO USERS: For some coastal flooding zones the AE Zone category has been divided by a Limit of Moderate Wave Action (LiMWA). The LiMWA represents the approximate landward limit of the 1.5-foot breaking wave. The effects of wave hazards between the VE Zone and the LiMWA (or between the shoreline and the LiMWA for areas where VE Zones are not identified) will be similar to, but less severe than those in the VE Zone.

Limit of Moderate Wave Action (LiMWA)

COASTAL BARRIER RESOURCES SYSTEM (CBRS) NOTE

This map may include approximate boundaries of the CBRS for informational purposes only. Flood insurance is not available within CBRS areas for structures that are newly built or substantially improved on or after the date(s) indicated on the map. For more information see http://www.fws.gov/habitatconservation/coastal_barrier.html, the FIS Report, or call the U.S. Fish and Wildlife Service Customer Service Center at 1-800-344-WILD.

CBRS Area

Otherwise Protected Area

SCALE

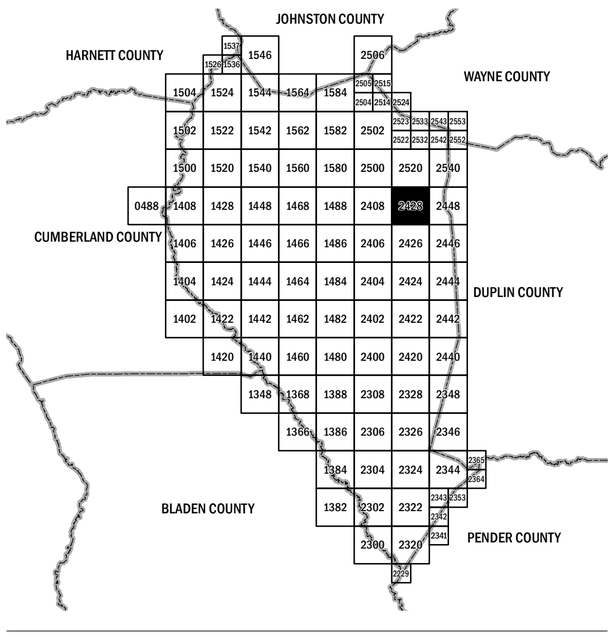
Map Projection:
North Carolina State Plane Projection Feet (Zone 3200)
Datum: NAD 1983 (Horizontal), NAVD 1988 (Vertical)

1 inch = 1,000 feet 1:12,000

0 500 1,000 2,000 Feet

0 150 300 600 Meters

PANEL LOCATOR



This digital Flood Insurance Rate Map (FIRM) was produced through a unique cooperative partnership between the State of North Carolina and the Federal Emergency Management Agency (FEMA). The State of North Carolina has implemented a long term approach to floodplain management to decrease the costs associated with flooding. This is demonstrated by the State's commitment to map flood hazard areas at the local level. As a part of this effort, the State of North Carolina has joined in a Cooperating Technical State agreement with FEMA to produce and maintain this digital FIRM.

NORTH CAROLINA Cooperating Technical State
FEMA'S COOPERATING TECHNICAL PARTNER

FEMA National Flood Insurance Program

NORTH CAROLINA FLOODPLAIN MAPPING PROGRAM
NATIONAL FLOOD INSURANCE PROGRAM
FLOOD INSURANCE RATE MAP

NORTH CAROLINA

PANEL 2428

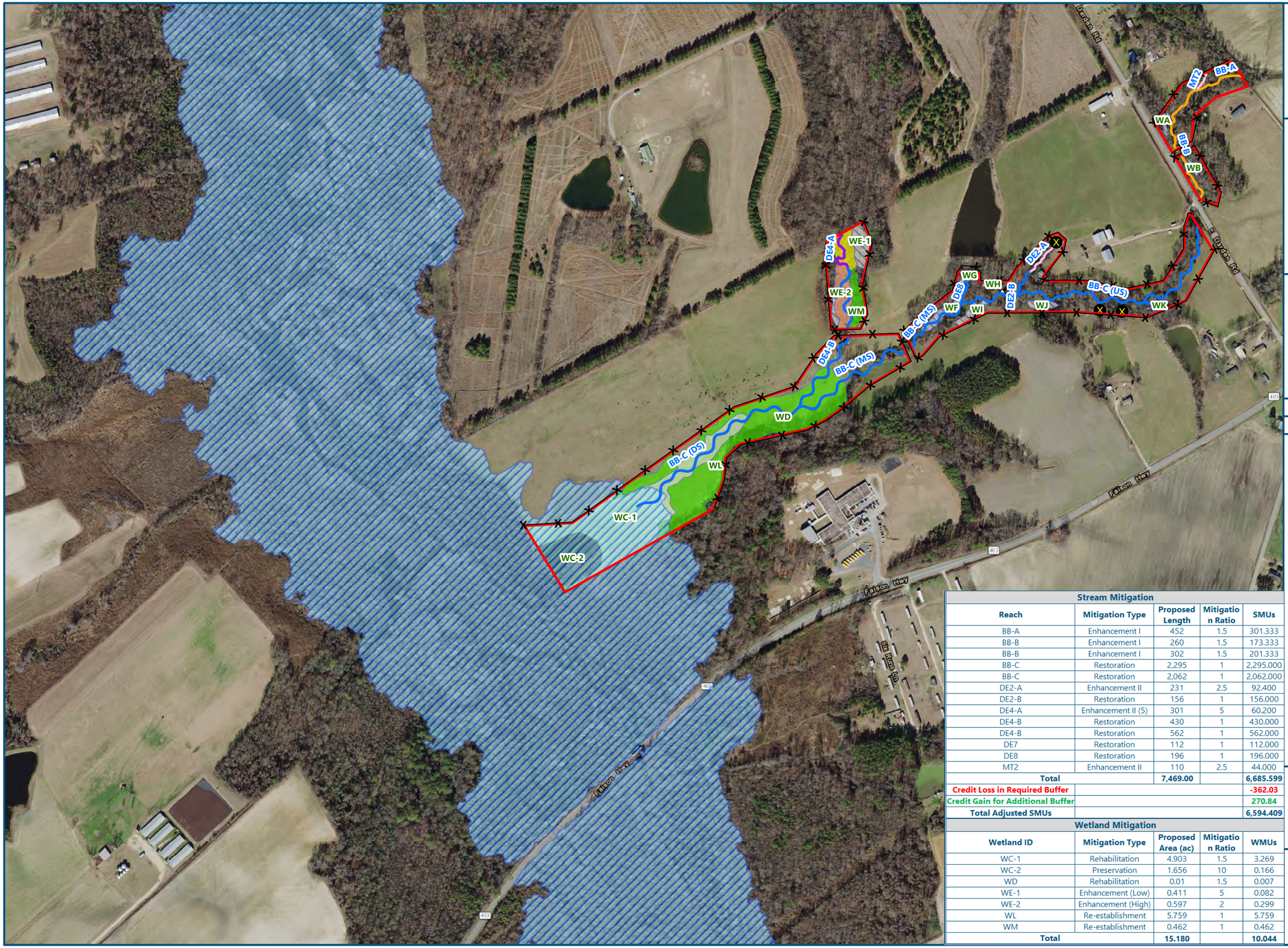
FEMA

Panel Contains:

COMMUNITY	CID	PANEL	SUFFIX
FAISON, TOWN OF	370495	2428	J
SAMPSON COUNTY	370220	2428	J

MAP NUMBER
3720242800J

MAP REVISED
01/05/07



Stream Mitigation				
Reach	**Mitigation Type**	**Proposed Length**	**Mitigation Ratio**	**SMUs**
BB-A	Enhancement I	452	1.5	301.333
BB-B	Enhancement I	260	1.5	173.333
BB-B	Enhancement I	302	1.5	201.333
BB-C	Restoration	2,295	1	2,295.000
BB-C	Restoration	2,062	1	2,062.000
DE2-A	Enhancement II	231	2.5	92.400
DE2-B	Restoration	156	1	156.000
DE4-A	Enhancement II (5)	301	5	60.200
DE4-B	Restoration	430	1	430.000
DE4-B	Restoration	562	1	562.000
DE7	Restoration	112	1	112.000
DE8	Restoration	196	1	196.000
MT2	Enhancement II	110	2.5	44.000
Total		**7,469.00**		**6,685.599**
Credit Loss in Required Buffer				**-362.03**
Credit Gain for Additional Buffer				**270.84**
Total Adjusted SMUs				**6,594.409**

Wetland Mitigation				
Wetland ID	**Mitigation Type**	**Proposed Area (ac)**	**Mitigation Ratio**	**WMUs**
WC-1	Rehabilitation	4.903	1.5	3.269
WC-2	Preservation	1.656	10	0.166
WD	Rehabilitation	0.01	1.5	0.007
WE-1	Enhancement (Low)	0.411	5	0.082
WE-2	Enhancement (High)	0.597	2	0.299
WL	Re-establishment	5.759	1	5.759
WM	Re-establishment	0.462	1	0.462
Total		**15.180**		**10.044**

Restoring a resilient earth for a modern world

N W E S

0 250 500

Feet

1 in = 500 feet

Figure 10 - Conceptual

Six Runs Mitigation Project

Sampson County, North Carolina

Drawn by: KDM	Reviewed by: SJF
Date: 9/20/2021	Revision: n/a

Legend

- Proposed Easement (31.0 ac)

Stream Approach

- Restoration
- Enhancement I
- Enhancement II
- Enhancement II (5:1)
- No Credit
- Proposed Fencing

Wetland Approach

- Re-establishment
- Rehabilitation
- Enhancement (High)
- Enhancement (Low)
- Preservation
- No Credit
- Engineered Sediment Pack

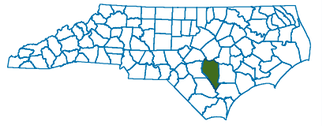
FEMA Flood Hazard Area

- Zone AE

REFERENCE

1) Horizontal Datum is NAD83 UTM Zone 17N

2) Map Projection is NAD_1983_StatePlane_ North_Carolina_FIPS_3200_Feet



Appendix M

Hydric Soil Report

FINAL
Detailed Hydric Soils Study
Six Runs Mitigation Site
Sampson County NC

Prepared for:

Katie Webber
Resource Environmental Solutions
3600 Glenwood Avenue, Suite 100
Raleigh, North Carolina 27612

Prepared by:

George K Lankford Soil Scientist, LSS #1223
George K Lankford, LLC
238 Shady Grove Rd
Pittsboro, NC 27312

February 2021

Soil Scientist Seal

This report describes the results of the soil evaluation performed at the Six Runs Mitigation Site in Sampson County, NC. Any subsequent transfer of the report by the user shall be made by transferring the complete report, including figures, maps, appendices, all attachments and disclaimers.

Study Objectives and Scope

The purpose of the study was to evaluate the site soils and delineate the extent of riparian hydric soils potentially suitable for hydrologic restoration and mitigation. All boundaries shown are based on the detailed field evaluation. The potential for hydrologic restoration of hydric soil is evaluated considering both the historic and existing land use, current conditions, and the sites potential for creating a hydroperiod suitable for its landscape setting and soils. In addition to the anticipated restoration of the stream to reestablish natural overbank flooding frequency, the practical modifications suggested generally take advantage of available natural hydrology and may include, but are not limited to surface drainage modifications such as plugging drainage ditches, removal of fill materials, and microtopographic alteration such as surface roughening or enhancing existing depressions. Recommendation for wetland re-establishment follows the Principles of Wetland Restoration (USEPA 2000) that promote successful development of a functioning wetland community by restoring ecological integrity through reestablishment of natural structure and function. This site evaluation focuses on an evaluation of soils and the use of practical technical solutions to support reestablishment of natural hydrology. Recommendations of removing extensive fill material is typically limited by cost and potential negative environmental impacts. The potential for hydrologic restoration assumes a successful design and ability to construct site modifications necessary to restore adequate hydrology.

This report presents an evaluation of the subject property based upon a detailed field investigation of this site for the purpose of confirming the presence of and delineating the extent of hydric soil. The site is assessed for the suitability of soils for wetland mitigation. The observations and opinions stated in this report reflect conditions apparent on the subject property at the time of the site evaluation. My findings, opinions, conclusions, and recommendations are based on professional experience, soils, drainage patterns, site conditions, and boundaries of the property as evident in the field.

Project Information and Background

The project is located in Sampson County approximately 8 miles northeast of Clinton NC, north of Highway 403 and west of East Darden Road. This project in on the floodplain of several small tributaries to Six Runs Creek and the floodplain of Six Runs Creek (Figure 1). The land use of the contributing watershed community is rural with agricultural farmland and areas of undeveloped forest land (Figure 2). The Six Runs project area is approximately 30 acres. Portions of hydric soils contain jurisdictional wetlands.

NRCS Soil Mapping

A Natural Resource Conservation Service (NRCS) soil mapping unit consists primarily of soils having similarly defined soil properties and physical characteristics with similar management criteria base upon these properties. Mapping units are useful for planning by indicating the types and ranges of soil characteristics that may be found within a landscape. The map units often correlate closely with soils at a location, but have limitations because a site's soils represent the natural conditions and gradients influenced by local geology, slope, and past land management practices. These soil map units provide useful information for interpreting soil within a landscape and inform potential management decisions. General characteristics of mapping units for the Six Runs site are summarized in Table 1. NRCS map units cover large extents and naturally include smaller areas of dissimilar soils not discernable without a detailed site evaluation. Properties of the map units provide the background for interpreting the range of soil properties that may be encountered within the landscape at a site. Although map units are useful for general planning, an on-site evaluation is necessary to determine soil characteristics specific to a site. The characteristics of these map units are a starting point for this soil evaluation (on line NRCS Web Soil Survey 2021).

Table 1. NRCS Hydric Soil Map Units at the Six Runs Site.

Series	Taxonomic Class	Drainage Class	Hydric (Hydric Rating)	Landscape setting (down across)
Bibb and Johnston soils, frequently flooded (BH) (Undifferentiated group) *Not prime farmland – (flood plains/toeslope)* *Parent material - sandy and loamy alluvium* *Depth to water table - 0 to 12 inches* *Flooding – frequent* *Ponding - frequent*				
Bibb (80%)	*Typic Fluvaquents*	poorly	Yes (A/D)	concave-linear
Johnston (10%)	*Cumulic Humaquepts*	very poorly	Yes (A/D)	concave-linear
Johns fine sandy loam (Jo) (Consociation) *Prime farmland if drained – (found on stream terraces)* *Parent material - loamy alluvium over sandy alluvium* *Depth to water table - 18 to 36 inches* *Flooding – rare* *Ponding - none*				
Johns (85%)	*Aquic Hapludults*	moderately well	No (C)	convex- convex
Lumbee (5%)	*Typic Endoaquults*	poorly	Yes (B/D)	concave-linear
Wagram loamy sand, 0 to 6 percent slopes (WaB) (Consociation) *Farmland of statewide importance – (found on marine terraces, ridges/shoulder, ridges / Summits)* *Parent material - loamy marine deposits* *Depth to water table - 60 to 80 inches*				
Wagram (90%)	*Arenic Kandiudults*	well	No (A)	convex - convex
Bibb (3%)	*Typic Fluvaquents*	poorly	Yes (A/D)	concave - linear
Johnston (2%)	*Cumulic Humaquepts*	very poorly	Yes (A/D)	concave - linear
Marvyn loamy sand, 6 to 12 percent slopes (MaC) (Consociation) *Farmland of statewide importance – (ridges on marine terraces)* *Parent material - loamy and clayey marine deposits* *Depth to water table – more than 80 inches*				
Marvyn (80%)	*Typic Kanhapludults*	well	No (B)	convex - convex
Norfolk loamy sand, 2 to 6 percent slopes (NoB) (Consociation) *Prime farmland – (found on marine terraces)* *Parent material - loamy marine sediments* *Depth to water table - 24 to 36 inches*				
Norflolk (83%)	*Typic Kandiudults*	well	No (A)	convex/linear - convex/linear
Wagram (10%)	*Arenic Kandiudults*	well	No (A)	convex - convex
Goldsboro (7%)	*Aquic Paleudults*	moderately well	No (B)	convex - convex

Source-NRCS Web Soil Survey (2021 January)

The NRCS soil survey shows five soil map units within the project limits, two located on floodplains and stream terraces with three upland soil units (Appendix D). The *Bibb and Johnston soils* and the *Johns* map units are found in lower landscape positions in this area where flooding may occur. These alluvial soils formed from deposition of erosional material derived surrounding upland soils. The *Bibb and*

Johnston soils are poorly to very poorly drained and the natural ground water table is expected to be at or near the surface for much of the year. A *Johns* soil is moderately well drained with the water table between 18 and 36 inches much of the year. Both soils have slow runoff and are subject to flooding. The *Bibb and Johnston soils* unit is classified as hydric by the NRCS. The *Johns* soil is not classified as hydric, but contains inclusions of a poorly drained hydric soil. The remaining three map units, *Wagram*, *Marvyn*, and *Norfolk* are upland soils on the side surrounding slopes with slopes from nearly level to 12 percent. They are mostly well drained with limited inclusions of poorly drained soils and are not classified as hydric by the NRCS. General characteristics of these map units are shown in Table 1.

Johnston typically has a thick, very dark gray to black surface layer that is high in organic content (umbric epipedon). The surface texture is usually a mucky loam with redoximorphic features of oxidized iron. It is underlain by a fine sand that is gray to white, often with red, yellow, or brown mottles. A *Bibb* soil has a thin dark surface and typically lacks enough organic matter to be mucky, but contains redoximorphic mottles at a shallow depth. It is typically underlain by a stratified sandy loam having red, yellow, or brown mottles. Both soils have a high saturated hydraulic conductivity (Ks) that make them susceptible to drainage modifications. The *Johns* map unit has a loamy textured surface and may contain small inclusions of poorly drained *Lumbee* soil. The foot slopes adjacent to the floodplain contains the *Wagram, Marvyn,* and *Norfolk* map units. The *Wagram, Marvyn,* and *Norfolk* soils have a sandy surface underlain by a loamy subsoil. These upland soils have a moderately high to high permeability.

Project Approach

The approach to mitigation of hydric soil is to restore a natural hydroperiod and the functions common to natural wetland systems. Restored hydrology should sustain hydroperiods appropriate for this landscape. Portions of the site appear to have retained adequate hydrology to be considered jurisdictional wetlands and have been mapped by RES staff (Figure 2). An official concurrence with the Corps of Engineers is being sought. The wetlands were briefly evaluated and have hydric soils with conditions that appear to meet the criteria for jurisdictional wetlands. The hydric soils suitable for reestablishment appear to lack adequate hydrology and vegetation.

Methodology

A detailed hydric soil investigation for Six Runs Mitigation Site was completed in January of 2021. This evaluation was assisted by soil scientist Katie Webber, a member of the RES staff. Ms. Webber acted as project liaison while studying the approach and evaluation of the soils at this site. A series of approximately 70 soil borings were performed across the site to described and verify the presence and estimate the extent of hydric soil, including soils that appear to exhibit relict or historic hydric indicators (Figure 2). The boring observations are not intended to classify these soils to a series and lack adequate detail classify soil series. Soils were evaluated using morphologic characteristics to determine hydric indicators and evaluate current hydrology and using criteria based on "*Field Indicators of Hydric Soils in the United States*" (USDA, NRCS, 2018, Version 8.2). Hydric soil indicators used are valid for the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Atlantic and Gulf Coastal Plain Region Version 2.0* within Major Land Resource Area (MLRA) 133A (Southern Coastal Plain) - Southern Piedmont and Land Resource Region (LRR) P- South Atlantic and Gulf Slope Cash Crops, Forest, and Livestock Region. A hydroperiod success criteria is proposed based upon Corps mitigation guidelines (US Army Corps of Engineers 2016). Boundary points were located using EOS Arrow 100, a submeter GNSS (Global Navigation Satellite System) by RES staff. Soil boring locations examined during the field evaluation were approximately located using the Terrain Navigator Pro smart phone application by Trimble and figures were produced from the same software.

Hand auger soil borings were used to described current soil characteristics and determine the extent of soil suitable for reestablishment. Hydric indicators typically occur within the upper 18 inches, but some borings extended to greater than 30 inches in depth. The current hydrologic conditions were evaluated

observing the existing drainage modifications (both anthropogenic and natural), the pattern and presentation of soil color and mottles, existing vegetation, and the current water table where observed. In some areas, borings were placed beyond the proposed easement boundaries to evaluate the wider range of floodplain conditions. Representative profiles are described to document the range of characteristics observed (Appendix A). The soil was assessed for current hydrology by evaluating existing drainage modifications (both natural and anthropogenic), interpretation of the location and pattern of the soil color and mottles, existing vegetation, and the current soil water table where observed. The presence of hydric soil indicators does not assume current hydrology. Constraints on stream restoration may limit the extent of potential hydrologic restoration shown. General conditions and patterns representative of this floodplain were noted. Selected photographs of soils and the landscape are shown in Appendix B.

This report describes these findings, conclusions, and recommendation for wetland reestablishment at the Six Runs Mitigation site. The discussion describes relevant soil characteristics, current hydrology, and land management with observed modifications that may affect potential hydrologic restoration. Areas suitable for rehabilitation or enhancement are not reviewed in detail, but have many characteristics in common with the adjacent reestablishment areas.

Results and Discussion

Landscape Setting

This project site is within the Coastal Plain ecoregion of the Middle Atlantic Coastal Plain physiographic region. It is within an ecoregion having moderate relief with rolling, well drained upland landscapes where the streams are relatively low-gradient and sandy-bottomed. Geology within the project and surrounding area is the Black Creek Formation. Parent material of this geologic formation consists of marine deposits of gray to black, lignitic clays containing thin beds and laminae of fine-grained micaceous sand and thick lenses of cross-bedded sand. This formation also contains one of North Carolina's principal aquifer systems.

This site is along the floodplain of a tributary referred to colloquially as Brad's Branch and a number of small, unnamed tributaries to Brad's Branch. The floodplains of these tributaries gently slope toward the larger floodplain of Six Runs Creek located at the downstream end of the project. The upstream portion of the project extends across East Darden Road.

Site Conditions

Current land use of the contributing watershed consists of agricultural activities, including livestock grazing, row crops, and silvicultural land (Figure 2). Land clearing and current livestock management use have removed much of the typical shallow depressions and low hummocks found in adjacent natural areas. The toe slopes exhibit seepage points where discharge is likely from restrictive bedding planes characteristic of the geology. The lower reach of the Brad's Branch has been straightened and moved to the left side of the floodplain. Dredging spoil along the right bank restricts overbank flooding, but appears to allow brief ponding within the pasture.

The current incised stream and adjacent spoil limit frequent overbank flooding, altering the natural hydrologic connection between the stream and its floodplain. Located within this wider floodplain, the few shallow depressions and linear features observed likely indicate the historic locations of the stream channel that was filled. Some of these depressional features contain surface ponding. The wetland boundaries have been delineated by RES staff and Corps concurrence is being sought. For the purposes of this report, the wetlands shown on attached figures do not distinguished between potential mitigation types of rehabilitation or enhancement. Most areas observed appear to be rehabilitation due to impacted hydrology. Due to the extensive hydrologic alterations at this site, the hydroperiod of these depressional features is reduced. Brad's Branch On the floodplain of Six Runs Creek has breached the spoil and is inundating the adjacent floodplain.

The streams and floodplains throughout this project are heavily impacted by livestock. Soil surfaces of the floodplain and adjacent slopes show significant surface churning from livestock with ongoing erosion. Free access of the livestock to the streams is degrading and destabilizing the channel banks. Evidence of reseeding annual or perennial grass throughout the floodplain was evident in January with new seedling growth observed. The floodplains of the upstream reaches are narrower and surrounded by steeper slopes. These smaller channels are more incised and the floodplain generally lacks hydric indicators.

Site Soils

Soils appeared relatively uniform across the floodplain and are within the observed range of characteristics corresponding to the NRCS mapping unit description of *Bibb and Johnston* soils. Representative soil profiles are shown in Appendix A. The soil delineation shows the extent of soils suitable for hydrologic restoration and confirmed the presence of hydric soil indicators within 12 inches (Figure 2). Soils were found to have a black to very dark brown sandy loam surface underlain primarily by a very dark gray to gray sandy loam textured subsoil. Limited areas near toe of slopes were found to be underlain by a slightly more restrictive sandy clay loam. The dark surfaces have a high organic content. Historically prior to conversion, a mucky modifier may have been present although none were observed. Throughout the site, subsoils exhibited redoximorphic concentrations of dark brown to dark yellowish-brown mottles. A few profiles have redoximorphic concentration in the horizon below the potential plow layer. These soils most likely exhibited mottles in the surface horizon prior to conversion and drainage.

The soil disturbing activity include tree clearing, relocation and dredging of the channels, and ongoing activities associated with livestock operations. The disturbances have created a more uniform surface, smoothing the transition from upland to floodplain and removing shallow depressions and hummock typical of the floodplain landscape. Relocation of the stream has obscured the initial channel while dredging has left spoil. Ongoing operations keep the surface churned and enhance site drainage. Upland erosional deposition may be present along the edge of the floodplain. The modifications observed are expected to result in a long-term reduction of surface organic content. Soil homogenization has removed any mucky surface textures historically present. The lowered water table has increased oxidation of minerals and carbon in these porous textured soils.

Hydric Soil Indicators

A soil evaluation found hydric soil indicators throughout large areas of the floodplain. Based on recorded profiles, the most common hydric soil indicators are *A11-Depleted Below Dark Surface*, *F3-Depleted Matrix*, and *F6-Redox Dark Surface*. Other indicators found include *S7- Redox Dark Surface* and *F8-Redox Depressions*. These indicators require a dark to black surface. Often redoximorphic concentrations in one or more of the surface horizon or underlying subsoils are also required. To allow accumulation of high organic matter in the surface horizon long periods of saturation or inundation are required. The F8 indicator is found in shallow depressions and other features where ponding occurs. The disturbance across the site would have destroyed most features of this indicator, but it was likely common across the floodplain.

Current Hydrologic Alterations

Observed hydrologic alterations impacting local groundwater include relocated and incised streams channels with adjacent spoil and smooth-contoured surfaces to facilitate rapid runoff. The loamy textures observed and moderately high permeability of these soils support a rapid lowering of the groundwater at this site. The groundwater may be at or near the surface for limited portions of the growing season in areas adjacent to toe of slope seeps and in shallow depressions. Along the toe of slope, a few areas exhibited seasonal groundwater discharge. Livestock have unrestricted access to the streams and floodplains. Within the fields, livestock have compacted a shallow restrictive layer near the surface that slows infiltration, potentially enhancing the shallow, temporary ponding observed in the depressional

areas. This shallow compacted layer also limits infiltration and increases surface runoff. The spoil berm along the stream bank functionally limits overbank events.

Observations with visible groundwater indicate a water table below 16 inches except in the lowest elevations of the floodplain. The timing of the observations occurred outside of the growing season when ground water is expected to be highest. For observations during the initial investigation in early March 2020, (prior to the growing season), records from the Horticultural Crops Research Station in Clinton show for the three months prior rainfall was above average (Appendix C). The observations in December 2020 (outside of the growing season) followed one month of above average rainfall and the January 2021 observations (outside of the growing season) followed two months of above average rainfall. The observed groundwater during the observation times would be expected to be at or above the ground surface under normal seasonal conditions. The observed depths to a water table supports a significant drainage impact from the drainage modifications. Although the soil water table observations are limited, a deeper water table appears to be representative of large portions of the site.

Potential Hydroperiod for Restored Soils

The soils in the floodplain of this project reflect characteristics of the NRCS map units. Based on mitigation guidance for Coastal Plain soils (US Army Corps of Engineers 2016), both the *Bibb* series (Typic Fluvaquents) and *Johnston* (Cumulic Humaquepts) are expected to have a natural hydroperiod of between 12 and 16 percent during the growing season where the water table is within 12 inches of the surface (Table 2). The Lumbee inclusion of the Johns map unit is considered hydric and is expected to have a natural hydroperiod of between 10 and 12 percent during the growing season. Soil similar to the surrounding soil map units are not anticipated to have hydroperiods exceeding 6 percent and are not included in the Corps guidance.

After restoration, a local hydroperiod slightly higher or lower than this guidance is possible due to natural variation in local topography and internal drainage. Depressional areas may exhibit longer hydroperiods exceeding 16 percent, depending on local topography. Near the downstream end where the channel merges with the floodplain of Six Runs Creek, hydrology will be influenced by Six Runs Creek.

Table 2. Six Runs – Potential Success Criteria for Compensatory Wetland Mitigation

Mapping Unit/Series	Taxonomic Classification	Seasonal High Water Table	Topographic Slope Setting (down/across)	Drainage Classification	*Hydroperiod Range
Bibb	*Typic Fluvaquents*	0 to 12 inches	concave - linear	poorly	12-16%
Johnston	*Cumulic Humaquepts*	0 to 12 inches	concave - linear	very poorly	12-16%
Lumbee**	*Typic Endoaquults*	0 to 12 inches	concave - linear	poorly	10-12%
Johns**	*Aquic Hapludults*	18 to 36 inches	convex - convex	moderately well	6-8%

**Hydroperiod follows US Army Corps of Engineers. 2016. Wilmington District Stream and Wetland Compensatory Mitigation Update. North Carolina Interagency Review Team - October 24, 2016.*

***No direct guidance criteria for*: *Lumbee soils: hydroperiod taken from Tomotley*

For the first year after construction, it may be practical to expect a hydroperiod of less than 12 percent if rainfall patterns are below normal as deep soil becomes saturated and a higher groundwater table becomes established. These suggested hydroperiods are subject to factors related to stream design and frequency of flooding, construction accuracy, local topography, and local drainage after construction.

Functional Uplift from Hydric Soil Reestablishment

The successful construction of this stream and wetland project has the potential to provide numerous benefits to water quality. The watershed is primarily agricultural with the potential of discharging sediments, nutrients, and pollutants into these streams and Six Runs Creek. The stream and wetland reestablishment proposed will raise local groundwater, restoring a more natural hydrologic cycle with the associated functional uplift. The hydric soils present contain high organic materials that are required for many biological processes and chemical transformations.

Successful hydrologic restoration at this site can provide numerous functional uplifts related to soils and water quality. These include, reestablishment of natural oxidation-reduction cycling, improved nutrient and chemical transformations (especially nitrates), and potential immobilization of phosphorus. Potential sources of these pollutants are present in the watershed. After vegetative community establishment, other potential benefits include lowering soil temperatures, increasing organic carbon sequestration, and increasing diversity of beneficial microbial and fungal populations important for soil health. Healthy microbial populations in wetlands are primarily responsible for biochemical transformations of complex organic substances such as ammonia, molecular nitrogen, nitrite and nitrate. Large scale benefits should benefit peak flood control, increase and diversify wildlife habitat, and connect to the natural aquatic communities along Six Runs Creek.

Summary Recommendations and Conclusions

The Six Runs project will restore Brad's Branch and its tributaries, which drain directly to Six Runs Creek. The project site is within a suitable landscape position and soils exhibit numerous hydric indicators on a wide floodplain in an agricultural watershed. Land use of the project site is currently a livestock operation with maintained grass pastures and limited forested areas. Upland areas contributing to this watershed also include row crops. Observed drainage modifications include land clearing, surface smoothing to enhance runoff, and the relocation and dredging of stream channels.

The NRCS soil map units indicate the potential of hydric soils within the floodplain and adjacent tributaries. Soils appeared relatively uniform across the floodplain and are within the observed range of characteristics corresponding to the NRCS mapping unit description of *Bibb and Johnston* soils. Soils were found to have a black to very dark brown sandy loam surface underlain primarily by a very dark gray to gray sandy loam textured subsoil. Throughout the site, subsoils exhibited redoximorphic concentrations of dark brown to dark yellowish-brown mottles. Prior to conversion and drainage, soils most likely exhibited mottles indicating biological activity in the surface horizon.

Common hydric soil indicators observed are *A11-Depleted Below Dark Surface*, *F3-Depleted Matrix*, and *F6-Redox Dark Surface*. Other indicators that were found include *S7- Redox Dark Surface* and *F8-Redox Depressions*. These indicators suggest historic hydrology was wet for long periods of the growing season. Natural hydrology appears to be a high groundwater across the floodplain with discharge along toe slope.

Observed hydrologic alterations impacting local groundwater include incised streams, adjacent spoil, and smooth-contoured surfaces to facilitate rapid runoff. The observed loamy textures and moderately high to high permeability of these soils support a lowering of the groundwater in the floodplain at this site. Observations with visible groundwater indicate the water table is below 16 inches except in the lowest elevations. The timing of the majority of observations occurred outside of the growing season in December and January during the detailed evaluation when water tables are usually the highest. Rainfall prior to the observations has been average to above average rainfall.

Within the pasture, livestock have compacted a shallow restrictive layer that slows infiltration and provides shallow, temporary ponding, especially in the depressional areas. This compacted layer also

limits infiltration and increases surface runoff. The incision of Brad's Branch has lowered the groundwater table of the floodplain with a spoil berm that functionally limits overbank events.

Recommendations

This site has high potential to restore a more natural hydrology to this landscape and provides opportunities for both *Wetland Reestablishment* and *Wetland Rehabilitation*. Practical methods of hydrologic restoration and enhancement would include stream relocation and restoration to raise the stream bed and local ground water table. Additional modifications include removal of the spoil berm, establishment of a more natural, rough surface with small storage depressions, and planting an appropriate vegetative community. No significant areas of fill were identified, but there may be areas at the edge of the floodplain where land clearing and sediment have accumulated that need removal. Based on the soil's similarity to the NRCS mapped units, a general success criterion of 12 to 16% may be expected. All heavy equipment and construction schedules should be limited to dryer conditions and tracked equipment to limit loss of soil structure.

Due to the current drainage modifications and the highly permeable soils, it may take up to a year for the site to become completely saturated and reach the target hydroperiods. For at least the first year after construction, it may be reasonable to expect a hydroperiod between 9 and 12 percent, depending on final construction timing and rainfall.

Conclusions

At the Six Runs mitigation site, the topographic setting and presence of hydric soil is appropriate for a successful hydrologic mitigation project. The hydric soil indicators observed across this floodplain reflect historically wet conditions. Stream restoration should raise the local water table and provide opportunities for multiple overbank flooding events. This project can restore lost and degraded aquatic resources that produce functional uplift, establish natural habitat, and provide connectivity to the larger Six Runs floodplain.

This project provides an opportunity to provide significant reestablishment of aquatic resources and functional benefits of a wetland system. Potential functional benefits include both biogeochemical and physical attributes. The biogeochemical benefits include, reestablishment of natural oxidation-reduction cycling, improved nutrient and chemical transformations, nutrient removal (especially nitrates), and potential immobilization of phosphorus. Potential sources of these pollutants are present in the watershed as well as agricultural chemicals that may be transformed or sequestered. The physical attributes of flood storage and retention, sediment filtration, reestablishment of appropriate community structure, and the establishment of potential high-quality habitat with connectivity to the large floodplain of Six Runs Creek. Because of the present land use in the water shed there is significant value to downstream aquatic communities for potential nutrient capture and sediment trapping. The establishment of a suitable community structure will provide a wide range of habitat and micro habitats.

Practical modifications that include, stream relocation, livestock exclusion, and enhancement/creation of floodplain depressional features, with surface roughening to provide a diverse soil microhabitat. This project will reestablish many natural functions and processes by providing a stable and unique habitat to compliment the restored streams. Upon successful construction, the restored wetland will be able to provide functional benefits of sediment removal, soil chemical and biological transformations of nutrient and chemical pollutants while providing a range of wetland habitats. Other benefits include increased organic carbon accumulation/capture and increases of natural diversity in beneficial microbial and fungal populations important for soil health. Given the observed soil characteristics and presence of hydric soil indicators within a favorable landscape position, this site is suitable for hydrologic wetland reestablishment of degraded aquatic resources.

In general, this appears to be a site with appropriate conditions for *Wetland Re-establishment*, *Wetland Rehabilitation*, and *Wetland Enhancement*. Based upon this detailed study of soils and current conditions observed at this site, the natural hydrology has been significantly altered, resulting in a lowered groundwater table, which could rebound if these modifications are removed.

This report describes the results of the soil evaluation performed at the Six Runs Mitigation Site in Sampson County, NC. Any subsequent transfer of the report by the user shall be made by transferring the complete report, including figures, maps, appendices, all attachments and disclaimers.

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FIGURES

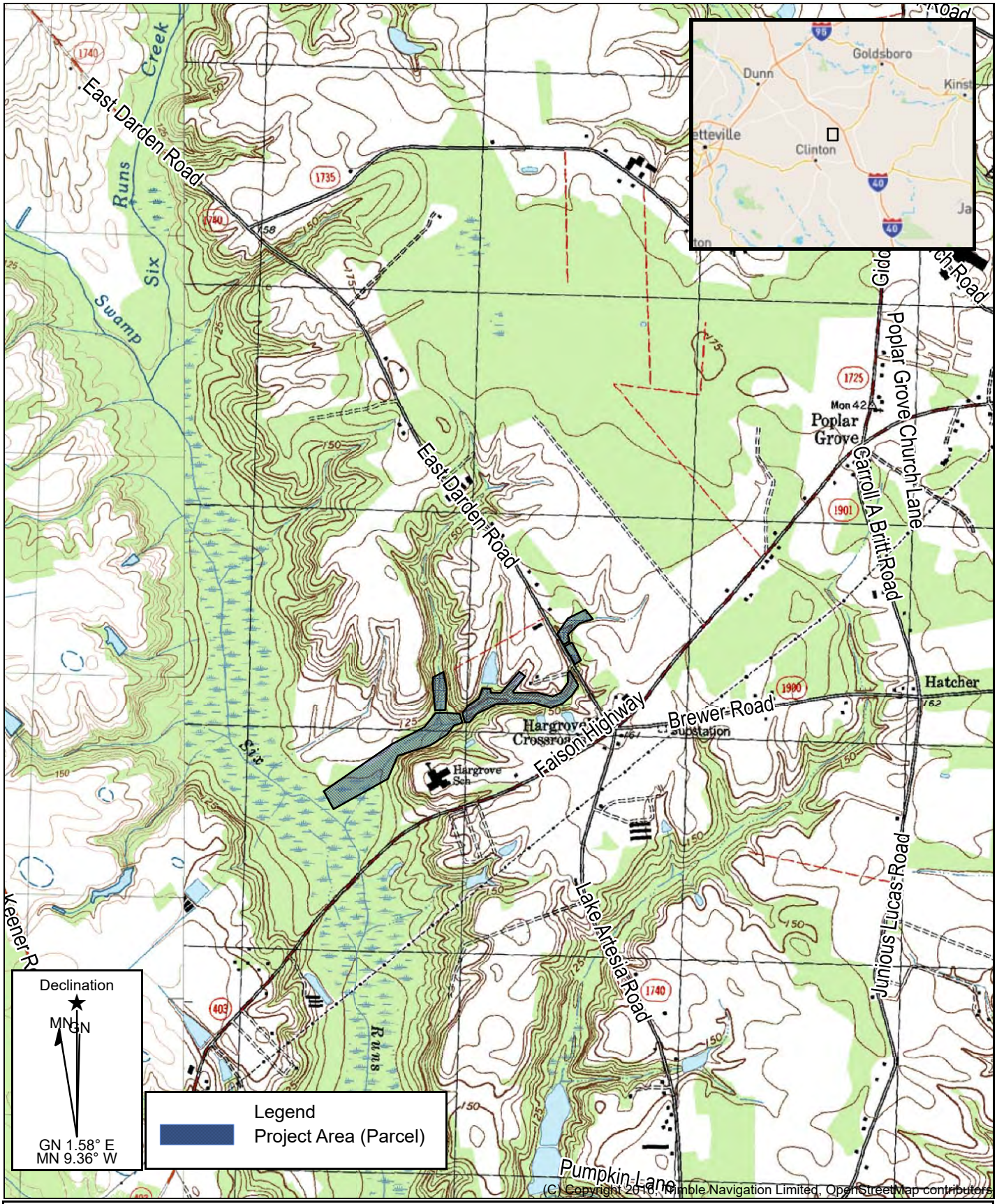
APPENDICES

Appendix A Soil Boring Log

Appendix B Photos

Appendix C Climate Data

Appendix D NRCS Web Soil Survey Report



Map Name: FAISON

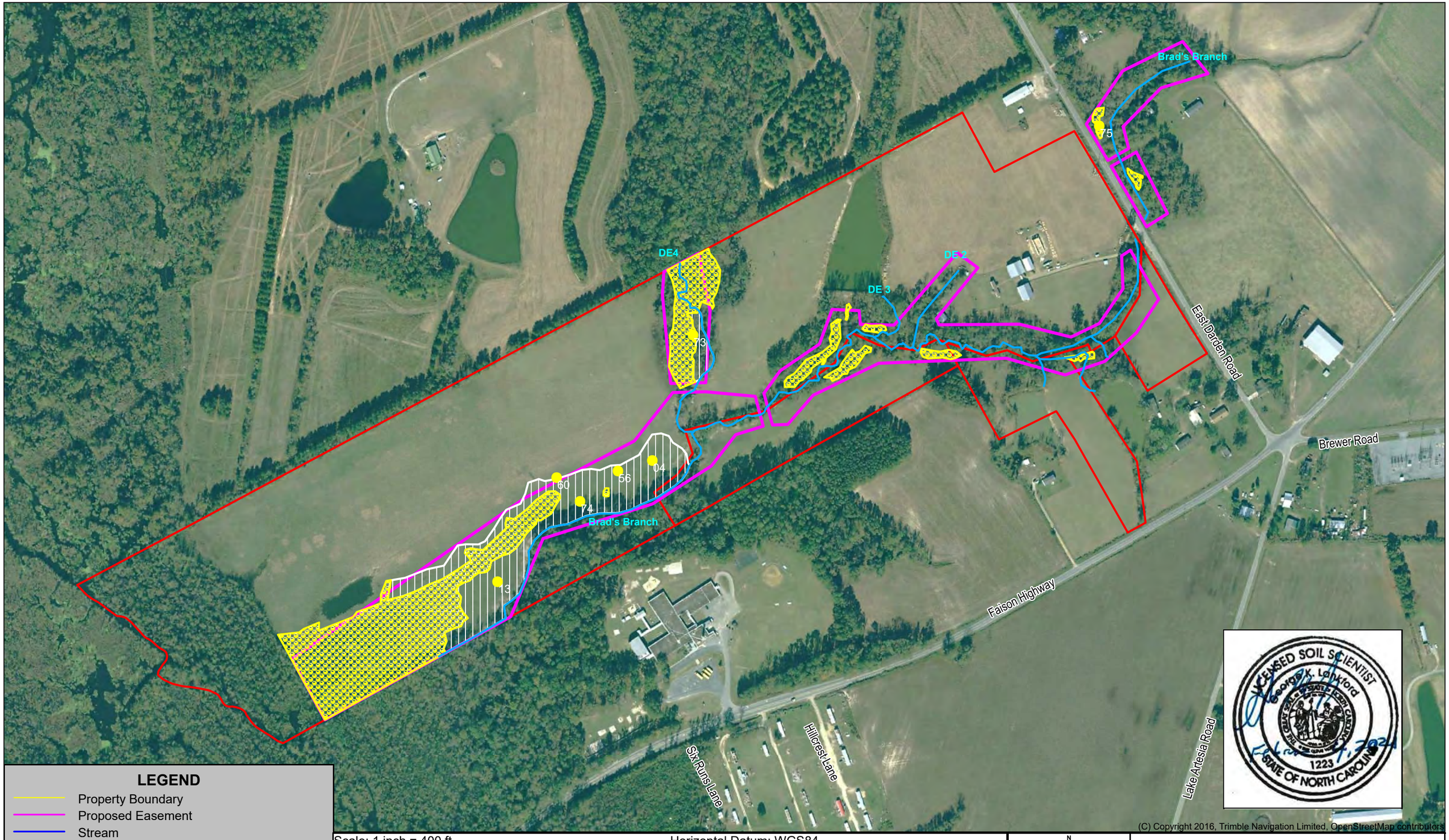
Scale: 1 inch = 2,000 ft.

Figure 1. USGS Vicinity Map
Six Runs Mitigation Site
Sampson County, NC

SCALE 1:24000

0 1000 2000 3000 4000
Feet

0.0 0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9
Miles



LEGEND

- Property Boundary
- Proposed Easement
- Stream
- Hydric Soil-Reestablishment
- Hydric Soil-Rehabilitation
- Hydric Soil-Jurisdictiona
- Soil Profile

Scale: 1 inch = 400 ft.

Horizontal Datum: WGS84

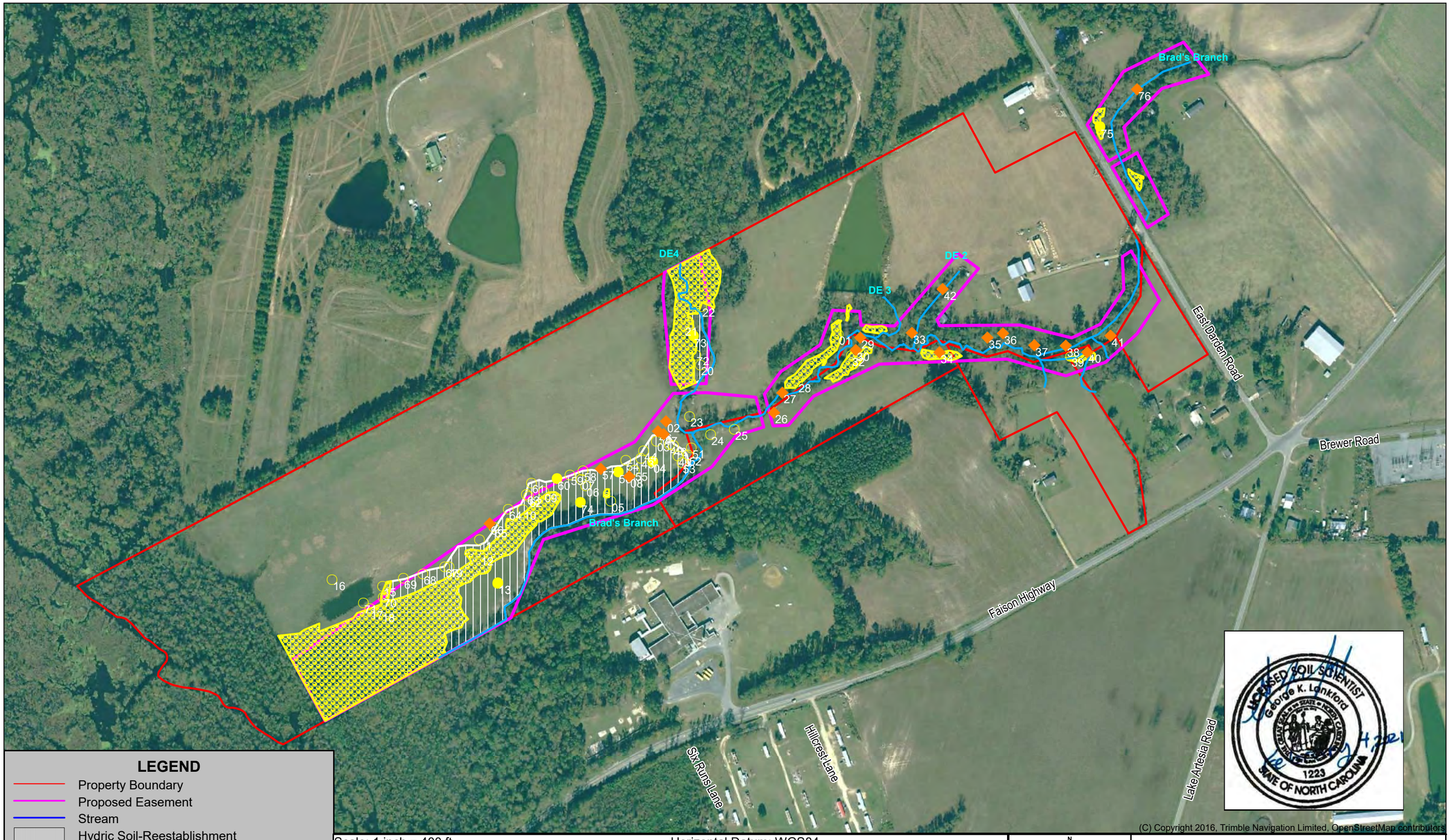
Figure 2. Project Aerial Overview - Hydric Soils
Six Runs Mitigation Site

N, NE, E, SE, S, SW, W, NW

SCALE 1:4800

0 1000 Feet

0.0 0.1 0.2 Miles



LEGEND

- Property Boundary
- Proposed Easement
- Stream
- Hydric Soil-Reestablishment
- Hydric Soil-Rehabilitation
- Hydric Soil-Jurisdictional
- Soil Profile
- Soil Boring -Hydric
- Soil Boring-NonHydric

Scale: 1 inch = 400 ft.

Horizontal Datum: WGS84

Figure 3. Soil Boring Locations
Six Runs Mitigation Site

N, NE, E, SE, S, SW, W, NW

SCALE 1:4800

0 1000 Feet

0.0 0.1 0.2 Miles

Appendix A
Six Runs Mitigation Site, Sampson County NC
Soil Boring Descriptions

Table Representative Soil Profiles at the Six Runs Site

Depth (inches)	Color		Mottle Percentage (Location*)	Texture**	Notes
	Matrix	Mottle			
SB 04 March 2, 2020			Hydric Indicators WT not observed A12 Thick Dark Surface F6-Redox Dark Surface		
0-5	10 YR 3/2			SL	
5-12	10 YR 3/1	10 YR 3/4	12% (PL)	SL	
12-24	10 YR 3/1	10 YR 3/4	20% (PL)	SCL	
24-37	10 YR 4/1	10 YR 4/4	2% (PL)	S	
SB 13 March 2, 2020			Hydric Indicators WT -28" (and rising) A11 Depleted Below Dark Surface S7- Dark Surface F6-Redox Dark Surface		
0-8	10 YR 2/1	10 YR 3/3	8% (PL)	SL	
8-27	10 YR 5/1	10 YR 5/8	25% (PL)	S	
27-33	10 YR 5/2	10 YR 5/6	2% (PL)	S	
SB 56 December 15, 2020			Hydric Indicators WT -25" A11 Depleted Below Dark Surface F3-Depleted Matrix F6-Redox Dark Surface		
0-5	10 YR 2/2			SL	
5-13	10 YR 4/1	7.5 YR 4/6	10% (PL)	SL	
13-27	10 YR 4/1	7.5 YR 4/6	5% (PL)	fLS	
27-30	10 YR 5/1	5 YR 4/6	25% (PL)	SCL	
SB 60 December 15, 2020			Hydric Indicators WT -16" A11 Depleted Below Dark Surface F3-Depleted Matrix F6-Redox Dark Surface		
0-5	10 YR 2/1			SL	
5-10	10 YR 3/1	10 YR 3/6	10% (PL)	SL	
10-14	10 YR 4/1	10 YR 4/6	10% (PL)	SL	
14-24	10 YR 4/1			LS	
24-34	10 YR 4/1	10 YR 3/6 10 YR 4/6	10% (PL) 5% (PL)	LS	

Appendix A
Six Runs Mitigation Site, Sampson County NC
Soil Boring Descriptions

Table Representative Soil Profiles at the Six Runs Site

Depth (inches)	Color		Mottle Percentage (Location*)	Texture**	Notes
	Matrix	Mottle			
SB 73 **January 14, 2021**			Hydric Indicators WT -15" A12 Thick Dark Surface F6-Redox Dark Surface		
0-3	10 YR 2/1			SL	
3-10	10 YR 3/2	5 YR 3/4	2% (PL)	SL	
10-19	10 YR 3/1	7.5 YR 3/3	5% (PL)	SL	
19-31	10 YR 4/1	7.5 YR 4/6 10 YR 6/2	40% (PL) 5% (PL)	SL	
SB 74 **January 14, 2021**			Hydric Indicators WT -10" A11 Depleted Below Dark Surface F3-Depleted Matrix F6-Redox Dark Surface		
0-10	10 YR 3/2	10 YR 3/4	10% (PL)	SL	
10-17	10 YR 4/2	10 YR 4/6	20% (PL)	LS	
17-32	10 YR 4/1	10 YR 3/3	5% (PL)	SL	
SB 75 **January 14, 2021** Jurisdictional wetland northeast of E Darden Rd			Hydric Indicators WT -11" F6-Redox Dark Surface F8-Redox Depressions		
0-15	10 YR 2/2	10 YR 3/4	8% (PL)	SL	
15-21	10 YR 4/3	10 YR 4/6	2% (PL)	SL	

»Indicators valid for NRCS Land Resource Region 133A (Southern Coastal Plain) and Land Resource Region P.
WT = observed apparent water table
*PL =pore lining, M = matrix, UCSG = uncoated sand grains
**Texture (follows USDA textural classification)
S = sand, L = loam, Si = silt, C = clay
f = fine, c = coarse (textural modifiers for sandy soils)

Soil Scientist Seal

Appendix B
Six Runs Mitigation Site – Sampson County, NC
Photo Log

January 2021

1. Hydric profile. Meets the *A11 Depleted Below Dark Surface*, *F3-Depleted Matrix*, and *F6-Redox Dark Surface* indicators. SB#60.

2. Landscape looking down floodplain of Brad's Branch toward Six Runs Creek. SB#60.

Appendix B
Six Runs Mitigation Site – Sampson County, NC
Photo Log

January 2021

3. Hydric profile. Meets the *A11 Depleted Below Dark Surface*, *F3-Depleted Matrix*, and *F6-Redox Dark Surface* indicators. SB#74.

4. Landscape looking up floodplain of Brad's Branch with berm along channel. SB#74.

Appendix B
Six Runs Mitigation Site – Sampson County, NC
Photo Log

January 2021

5. Hydric profile. Meets *A12 Thick Dark Surface*, and *F6-Redox Dark Surface* indicators. SB#73.

6. Landscape looking up levee along tributary DE4. SB#73.

Appendix C
Climate Date

STATE CLIMATE OFFICE OF NORTH CAROLINA
NC STATE UNIVERSITY
CRONOS Database
Station ID: CLIN Station type: ECONET Station name: Horticultural Crops Research Stn
City, State: Clinton, NC County: Sampson County
Latitude: 35.02218 Longitude: -78.28195
Elevation: 166 feet above sea level
Climate division: NC06 - Southern Coastal Plain
Supported by: NC Agricultural Research Service

Date	Number of Records Compiled	monthly Precipitation (in)	Range	WETS Station: CLINTON 2 NE, NC Requested years: 1990 - 2020 Month	Average	30% less than	30% more than
Jan-19	31 (100%)	3.01		Jan	3.50	2.42	4.17
Feb-19	28 (100%)	2.45		Feb	3.08	2.11	3.67
Mar-19	31 (100%)	3.33		Mar	3.71	2.66	4.38
Apr-19	30 (100%)	4.71		Apr	3.23	2.07	3.89
May-19	31 (100%)	2.00		May	4.09	2.74	4.90
Jun-19	30 (100%)	4.27		Jun	4.72	3.23	5.63
Jul-19	31 (100%)	5.52		Jul	5.79	4.09	6.86
Aug-19	31 (100%)	10.60		Aug	6.02	4.13	7.17
Sep-19	30 (100%)	8.69		Sep	6.45	3.12	7.89
Oct-19	31 (100%)	3.11		Oct	3.59	1.97	4.38
Nov-19	30 (100%)	3.00		Nov	3.40	1.96	4.14
Dec-19	31 (100%)	4.22	above	Dec	3.38	2.29	4.03
Jan-20	31 (100%)	4.80	above	Jan	3.50	2.42	4.17
Feb-20	29 (100%)	4.74	above	Feb	3.08	2.11	3.67
Mar-20	31 (100%)	3.21	average	Mar	3.71	2.66	4.38
Apr-20	30 (100%)	4.16		Apr	3.23	2.07	3.89
May-20	31 (100%)	12.22		May	4.09	2.74	4.90
Jun-20	30 (100%)	4.65		Jun	4.72	3.23	5.63
Jul-20	31 (100%)	4.95	average	Jul	5.79	4.09	6.86
Aug-20	31 (100%)	8.64	above	Aug	6.02	4.13	7.17
Sep-20	30 (100%)	5.00	average	Sep	6.45	3.12	7.89
Oct-20	31 (100%)	0.00	below	Oct	3.59	1.97	4.38
Nov-20	30 (100%)	8.33	above	Nov	3.40	1.96	4.14
Dec-20	31 (100%)	5.23	above	Dec	3.38	2.29	4.03
Jan-21	31 (100%)	5.83	above	Jan	3.50	2.42	4.17

annual totals			**Annual:**	**47.08**	**55.30**
year 2019	54.91	average			
year 2020	65.93	above			

= month observed
= 3 months prior to observations

Soil Map—Sampson County, North Carolina
(Six Runs Site)

Map Scale: 1:14,300 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0 200 400 800 1200

Feet: 0 500 1000 2000 3000

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 17N WGS84

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

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: Sampson County, North Carolina
Survey Area Data: Version 20, Jun 3, 2020

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Oct 22, 2018—Oct 25, 2018

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.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
BH	Bibb and Johnston soils, frequently flooded	234.5	24.0%
GoA	Goldsboro loamy sand, 0 to 2 percent slopes, Southern Coastal Plain	91.9	9.4%
GtC	Gritney fine sandy loam, 4 to 8 percent slopes	6.8	0.7%
Jo	Johns fine sandy loam	60.2	6.2%
KaA	Kalmia loamy sand, 0 to 3 percent slopes	6.8	0.7%
Lm	Lumbee sandy loam	11.4	1.2%
Ln	Lynchburg sandy loam, 0 to 2 percent slopes	39.6	4.0%
M-W	Miscellaneous water	0.9	0.1%
MaC	Marvyn loamy sand, 6 to 12 percent slopes	152.1	15.6%
NoA	Norfolk loamy sand, 0 to 2 percent slopes	42.8	4.4%
NoB	Norfolk loamy sand, 2 to 6 percent slopes	80.9	8.3%
Ra	Rains sandy loam, 0 to 2 percent slopes	43.3	4.4%
W	Water	9.5	1.0%
WaB	Wagram loamy sand, 0 to 6 percent slopes	196.3	20.1%
Totals for Area of Interest		**977.1**	**100.0%**

From: Matthew Deangelo
To: Browning, Kimberly D CIV USARMY CESAW (USA)
Subject: RE: Six Runs buffers
Date: Monday, July 18, 2022 10:37:00 AM

Alright got it, and the math works. I have made the revision to the Final, and we will be submitting to DMS soon. Thank you again for digging into this with us. I really appreciate it!

-----Original Message-----
From: Browning, Kimberly D CIV USARMY CESAW (USA) <Kimberly.D.Browning@usace.army.mil>
Sent: Friday, July 15, 2022 10:33 AM
To: Matthew Deangelo <mdeangelo@res.us>
Subject: [EXTERNAL] RE: Six Runs buffers

Thank you. I mean that you should add one additional terminal end for DE2A, which will bring you up to 6004.60 total credits, if my math is correct.

Kim (Browning) Isenhour
Mitigation Project Manager, Regulatory Division I U.S. Army Corps of Engineers l 919.946.5107

-----Original Message-----
From: Matthew Deangelo <mdeangelo@res.us>
Sent: Friday, July 15, 2022 10:05 AM
To: Browning, Kimberly D CIV USARMY CESAW (USA) <Kimberly.D.Browning@usace.army.mil>
Cc: Bradley Breslow <bbreslow@res.us>
Subject: [Non-DoD Source] RE: Six Runs buffers

Thanks for getting back. Attached is the spreadsheet. If we dropped one of the exempt terminal ends and added the other then it would be a wash, correct?

-----Original Message-----
From: Browning, Kimberly D CIV USARMY CESAW (USA) <Kimberly.D.Browning@usace.army.mil>
Sent: Thursday, July 14, 2022 4:58 PM
To: Matthew Deangelo <mdeangelo@res.us>
Cc: Bradley Breslow <bbreslow@res.us>
Subject: [EXTERNAL] RE: Six Runs buffers

Hi Matt,

Thanks for the follow up. I would like to see the updated excel spreadsheet. I think you're still shorting yourself one terminal end; since DE2A originates on the property, you can also include that in the calculation, which may help a little. But I wouldn't include DE8 as exempt terminal end because the pond is upstream, and on the same parcel. I think the wording in the mit plan sounds fine and justifies why that reach was omitted from calculations. I think you left out "SMU" from . (6,320 LF and 5,940.600).

Kim (Browning) Isenhour
Mitigation Project Manager, Regulatory Division I U.S. Army Corps of Engineers l 919.946.5107

-----Original Message-----
From: Matthew Deangelo <mdeangelo@res.us>
Sent: Thursday, July 14, 2022 8:40 AM
To: Browning, Kimberly D CIV USARMY CESAW (USA) <Kimberly.D.Browning@usace.army.mil>
Cc: Bradley Breslow <bbreslow@res.us>
Subject: [Non-DoD Source] RE: [EXTERNAL]

Kim,

Thank you for passing this along and especially for taking the time to talk on the phone through questions regarding some of the Six Runs comments.

I wanted to follow up to ensure that we are on the same page about re-running the NSBW calcs for the Six Runs project. We came to the conclusion that because the portion of Brad's Branch (reaches BB-A and BB-B) that did not have the minimum required buffer (50 ft) is paralleled by an NCDOT road (E Darden Road) and that the stream channel is already within its natural valley, that it is essentially impossible to relocate the channel to attain the required buffer. And that because this situation is out of RES' possible control, that the use of the NSBW could be altered from what was originally proposed in order to prevent such a significant loss of SMU. The scenario we discussed was that we could completely omit the segment of easement upstream of the road from the NSBW calculation and only run it for the remaining easement segments.

I have re-run the buffer tool under this scenario and wanted to present an updated figure and excerpt from the working Final Mitigation Plan so that you can ensure that it was executed and justified appropriately. As we suspected, the SMU adjustment was favorable and total SMU increased. Attached is the NSBW figure, concept figure, and a revised page from the applicable section in the mitigation plan.

I apologize if we are exhausting the topic, but I just want to be concrete before we submit this as Final. Please let us know your thoughts at your convenience. Looking forward to putting this cool site in the ground!

Thank you,

From: Browning, Kimberly D CIV USARMY CESAW (USA) <Kimberly.D.Browning@usace.army.mil>
Sent: Friday, July 8, 2022 9:28 AM
To: Matthew Deangelo <mdeangelo@res.us>
Subject: [EXTERNAL]

The number of stream terminal ends (i.e., stream origins or other points where project streams begin or end, including where streams flow in to and out of internal and external crossings or property boundaries) is factored into the credit adjustments. In general, credit deductions will not be made for the portion of the Ideal Buffer located within the arc of the terminal end where project streams enter or exit the property controlled by the sponsor, such as culverts flowing under a public roads. Deductions will apply to all internal crossings, including farm crossings, reserved access corridors, utility corridors, trails, driveways, and other crossings located on parcels that are subject to sponsor control. The number of exempt terminal ends must be approved by the District, in consultation with the NCIRT. Credit deductions for terminal ends that are not exempt are in addition to deductions applied to internal crossings.

The key here is determining if the sponsor has control of the stream outside the easement. For example, if the conservation easement is contiguous with the parcel boundary, and the stream exits/enters the property at that parcel

boundary, the terminal end would be exempt from a credit deduction. But if the CE is within the parcel boundary and the project could have been continued further on that parcel, that terminal end would not be exempt. It will be important to provide a map of the ideal buffers and one of the actual buffers with the conservation easement AND the parcel boundary shown.

The way the terminal end calculations works is that every exempt terminal end reduces the size of the ideal buffer by 50% of the area in the that zone within the arc around the end of the stream. As an example, the area within the 0-15 foot zone of a standard terminal end is approximately 353.35 ft2 (basically, ½ the area of a circle with a radius of 15 feet – which represents the curved half-circle at the end of the buffer). If you look at the Drop List Info tab, you can see the areas associated with each buffer zone. So for the calculations, 50% of this amount (176.625 ftt) is deducted from the ideal buffer area for the 0 – 15 foot zone for each terminal end entered. This same process is applied to each buffer zone to reduce the size of the ideal buffer in that zone at a rate of 50%. As a result, the percent of Ideal Buffer increases slightly with each terminal end, resulting in a smaller credit deduction. The 50% multiplier was decided on by the IRT as a compromise, so that credit loss for each terminal end is only reduced by 50% rather than 100%.

Kim (Browning) Isenhour

Mitigation Project Manager, Regulatory Division I U.S. Army Corps of Engineers l 919.946.5107